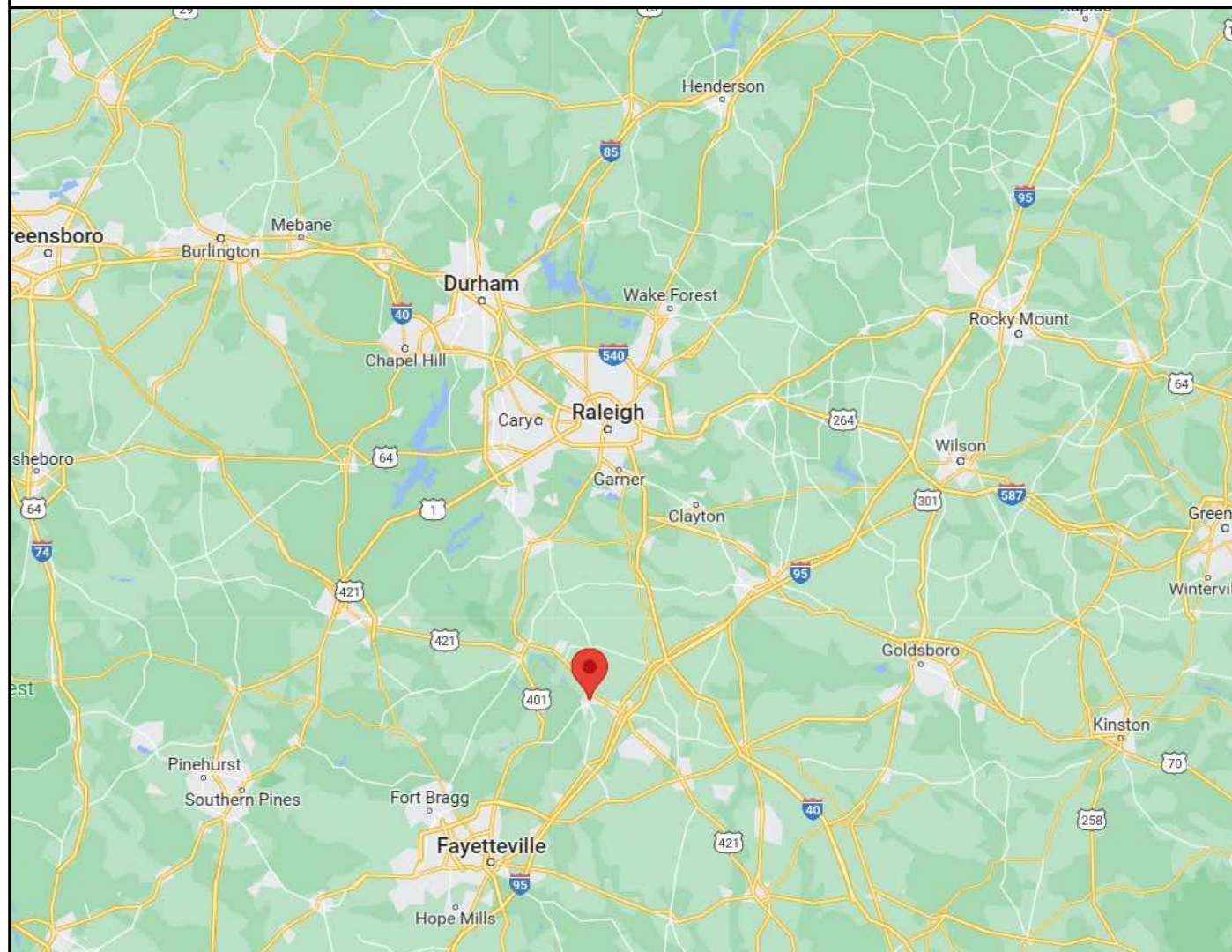
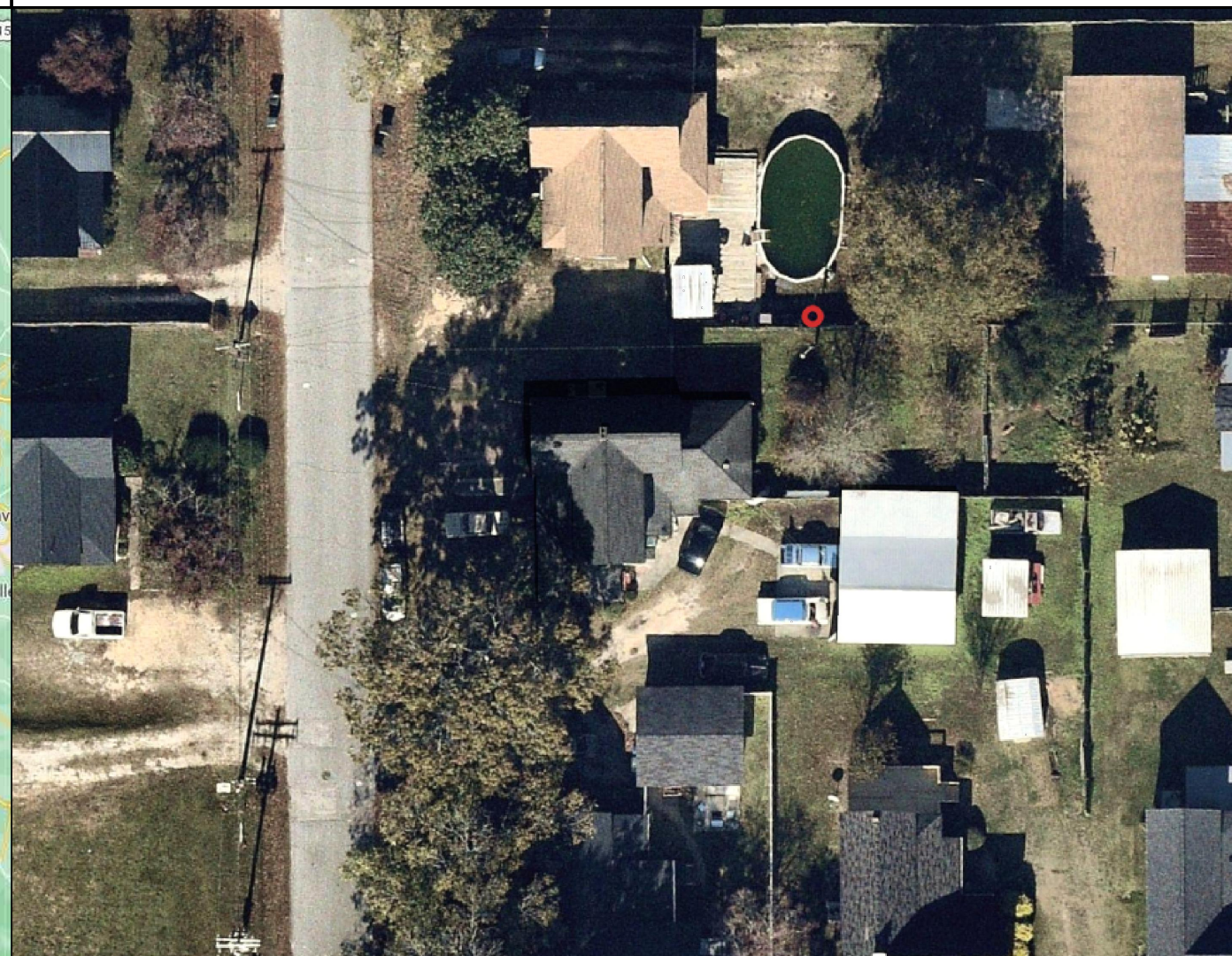


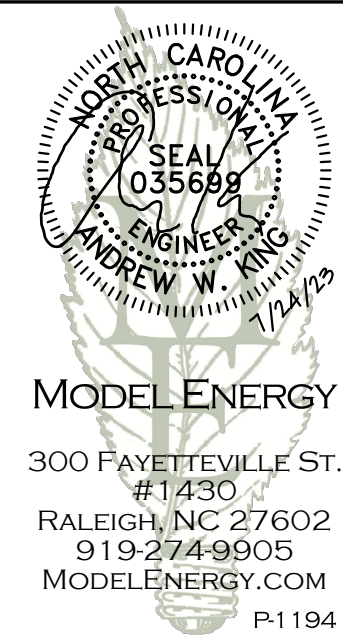
VICINITY MAP



PROPERTY MAP



ENGINEER:



MODEL ENERGY
 300 FAYETTEVILLE ST.
 #1430
 RALEIGH, NC 27602
 919-274-9905
 MODELENERGY.COM
 P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM

16.400 kW DC INPUT
 12.600 kW AC EXPORT

Richard Stump
 101 N 12th St, Erwin,
 NC 28339

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CLIENT:



ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

PROJECT INFORMATION

PV1.1

SCOPE OF WORK

(41) HANWHA Q.CELLS Q.PEAK DUO BLK ML-G10+ 400
 (1) SOLAREEDGE SE7600H-US & SOLAREEDGE SE5000H-US
 (41) SOLAREEDGE S440
 ROOF MOUNT: UNIRAC FLASHKIT PRO
 S-5! PROTEA BRACKET
 MOUNTING RAILS: UNIRAC SM LIGHT RAIL

SITE CONDITION

ASCE 7-10 WIND SPEED - 119 MPH
 EXPOSURE CATEGORY - B
 RISK CATEGORY - II
 SNOW LOAD - 15 LBS/SQFT

SHEET INDEX

PV1.1 - 1.2 PROJECT INFORMATION
 PV2.1 SITE INFORMATION
 PV3.1 - 3.5 STRUCTURAL INFORMATION
 PV4.1 - 4.2 ELECTRICAL INFORMATION
 PV5.1 - 5.6 LABELS, DETAILS & SPECS

INTERCONNECTIONS TYPE

SUPPLY SIDE TAP

CODE REFERENCES

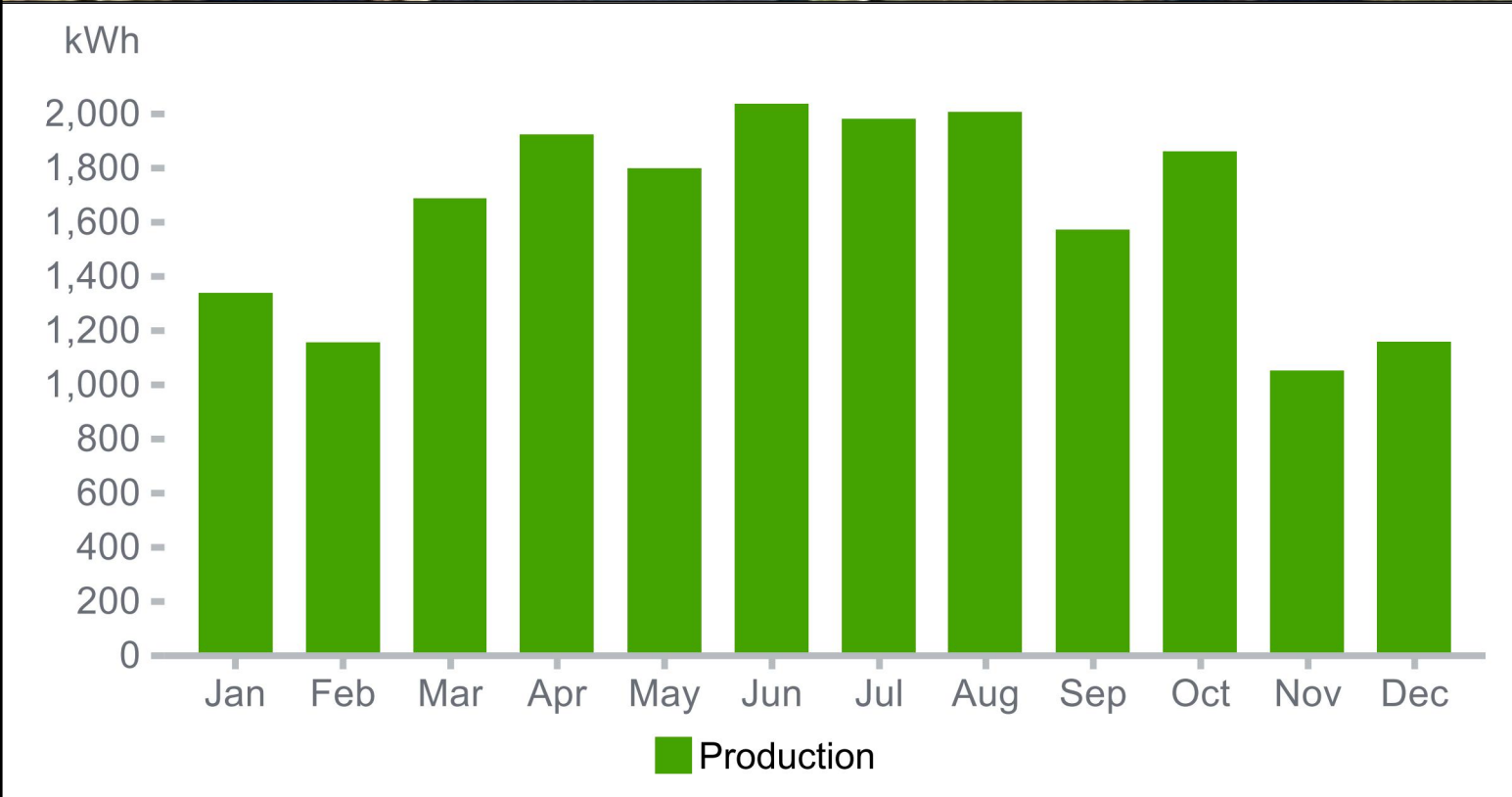
2017 NATIONAL ELECTRIC CODE
 2018 NORTH CAROLINA FIRE CODE
 2018 NORTH CAROLINA BUILDING CODE
 2018 NORTH CAROLINA RESIDENTIAL CODE

UTILITY COMPANY

DUKE ENERGY PROGRESS

LEGEND

- DISCONNECT SWITCH
- FUSE
- CIRCUIT BREAKER
- EQUIP. GROUND



AURORA SOLAR SHADE ANALYSIS

RICHARD STUMP
 101 N 12TH ST, ERWIN,
 NC 28339
 16.400 KW DC STC
 12.600 KW AC

MODULES:

(41) HANWHA Q.CELLS Q.PEAK DUO BLK ML-G10+ 400

INVERTERS:

(1) SOLAREEDGE SE7600H-US
 (1) SOLAREEDGE SE5000H-US

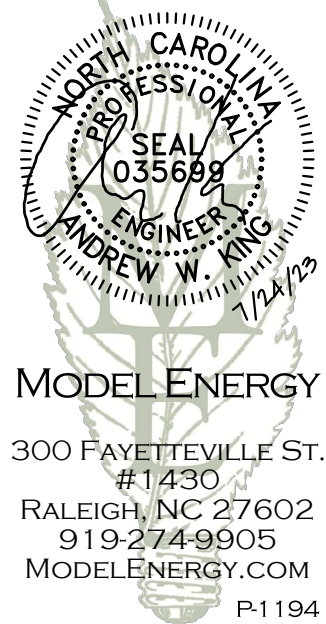
POWER OPTIMIZERS:

(41) SOLAREEDGE S440

THE SYSTEM HAS A FIRST YEAR ANNUAL ENERGY PRODUCTION OF: 19,584 KWH/YEAR

THIS PRODUCTION IS AN ESTIMATE PREPARED USING AURORA SOLAR SHADE ANALYSIS SOFTWARE. ALL SOLAR SYSTEMS EXPERIENCE PERFORMANCE DEGRADATION OVER THEIR LIFETIME. THIS IS USUALLY APPROXIMATELY 1% PER YEAR, BUT VARIES BASED ON EQUIPMENT USED AND ENVIRONMENTAL CONDITIONS.

ENGINEER:



JOB TITLE:

NEW SOLAR PV SYSTEM
 16.400 KW DC INPUT
 12.600 KW AC EXPORT
 Richard Stump
 101 N 12th St, Erwin,
 NC 28339

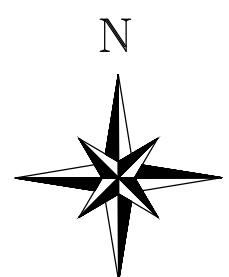
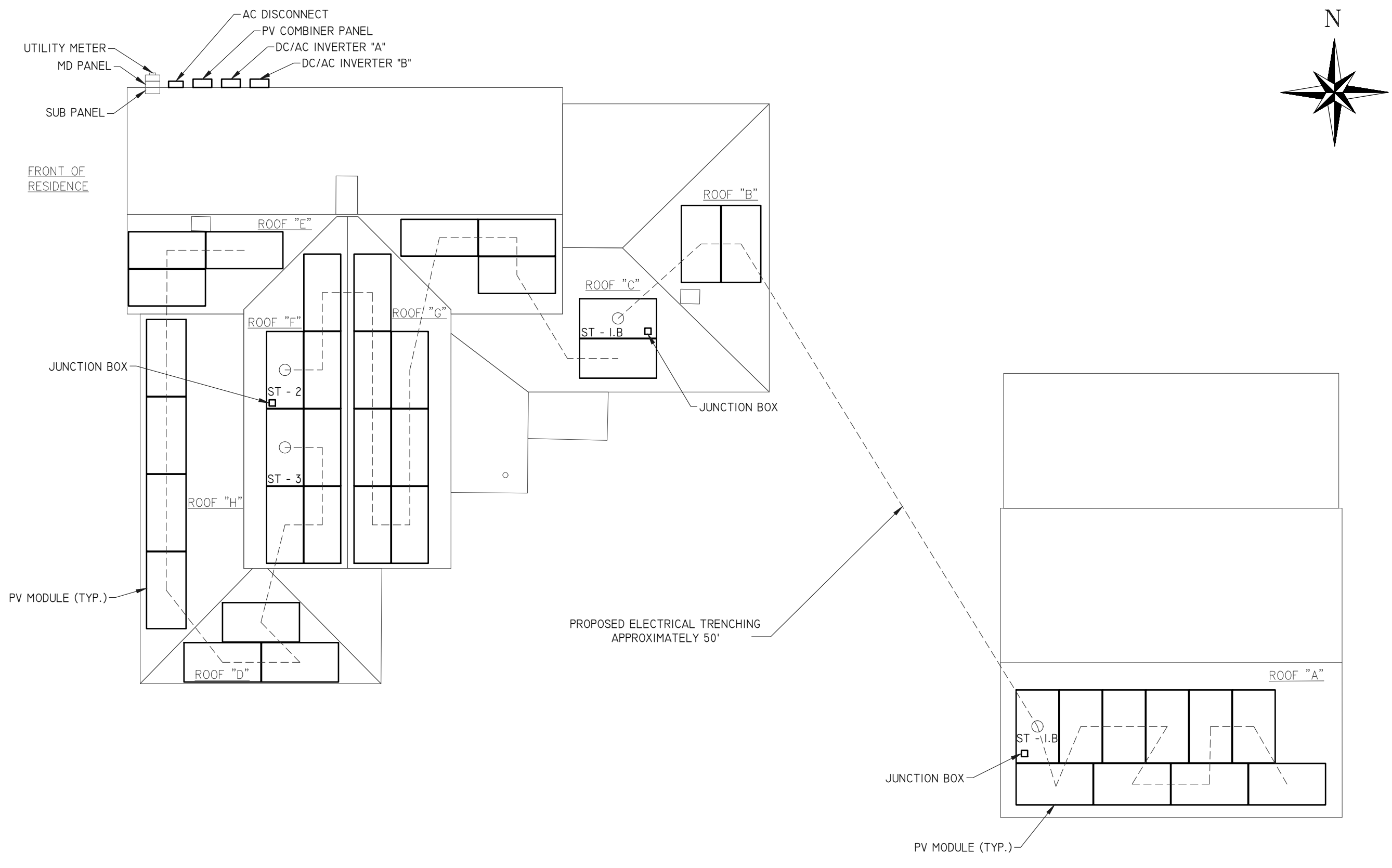
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CLIENT:



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PROJECT INFORMATION
PV1.2



ENGINEER:



MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM

16.400 kW DC INPUT
12.600 kW AC EXPORT

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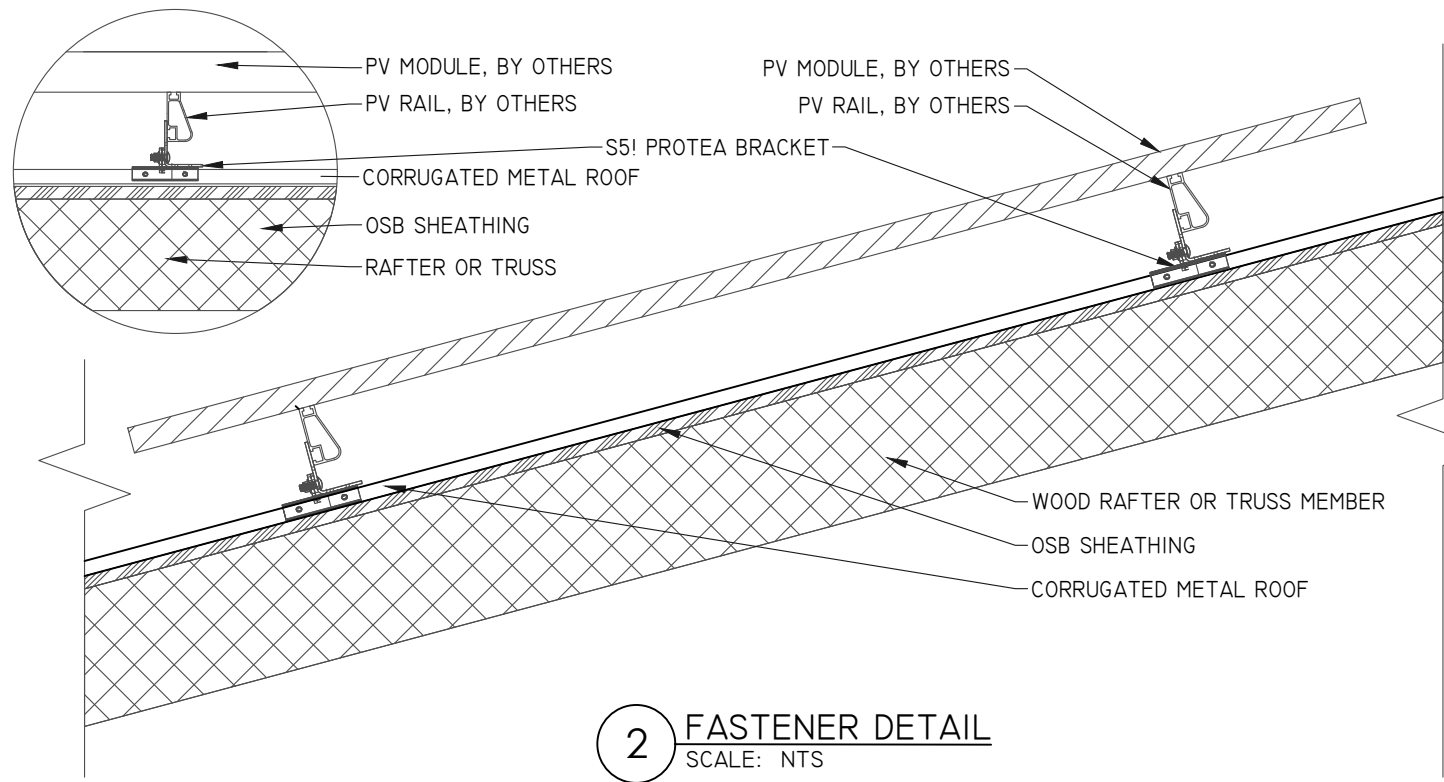
ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

SITE INFORMATION

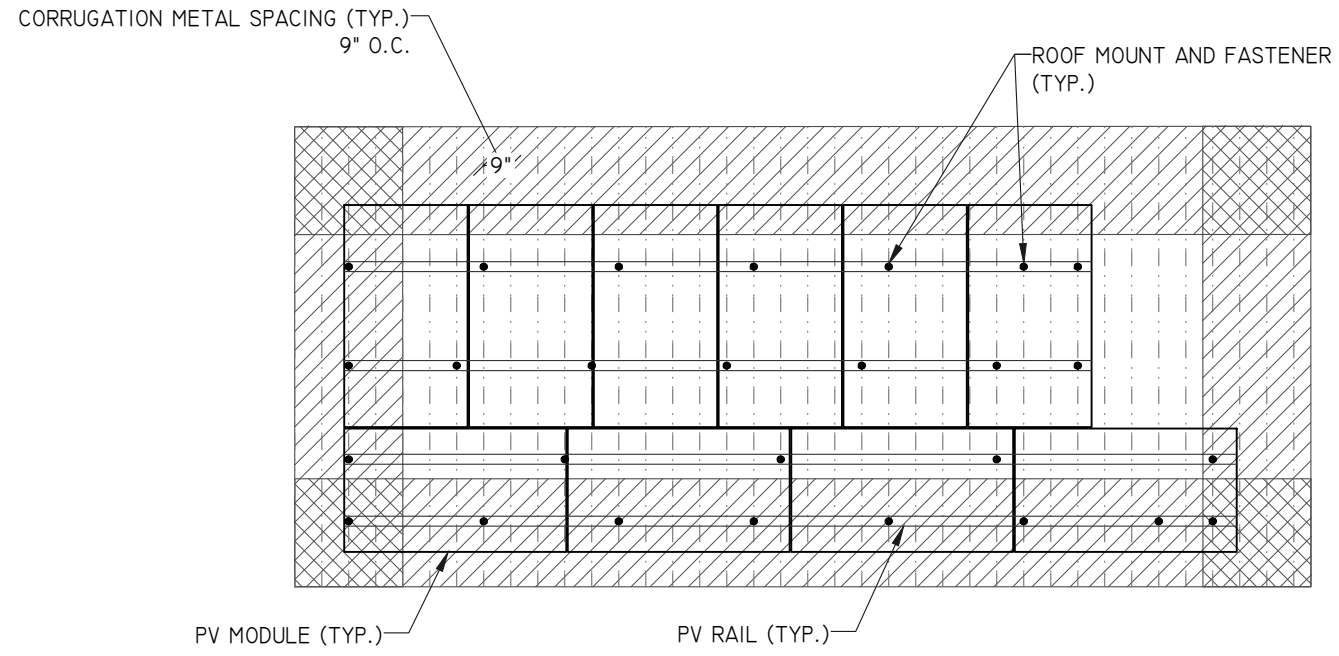
PV2.1

NOTE: PROVIDE ADDITIONAL JUNCTION BOXES AS REQUIRED TO COMBINE MODULES ON DIFFERENT ARRAYS INTO A SINGLE STRING

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



2 FASTENER DETAIL
SCALE: NTS



1 ROOF "A" PLANAR VIEW
SCALE: 3/16" = 1' -0"

ARRAY "A" SUMMARY	
# MODULES	10
# ROOF MOUNTS	27
RAIL LENGTH	131 FT.
ARRAY AREA	211 SQFT.
ARRAY WEIGHT	54.9 LBS.
AZIMUTH @ SN	180°
TILT ANGLE	14°

MOUNTING RAILS	
MAKE	UNIRAC
MODEL	SM LIGHT RAIL
MATERIAL	ALUMINUM
WEIGHT	0.49 LBS/SQFT
SPACING	34"

ROOF ZONES "LANDSCAPE":			
ALL ZONES	MAX. RAIL OVERHANG =		8"
□ ZONE 1	MAX. FASTENER SPAN ZONE 1 =		72"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =		45"
▩ ZONE 3	MAX. FASTENER SPAN ZONE 3 =		18"

ROOF ZONES "PORTRAIT":			
ALL ZONES	MAX. RAIL OVERHANG =		8"
□ ZONE 1	MAX. FASTENER SPAN ZONE 1 =		45"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =		18"
▩ ZONE 3	MAX. FASTENER SPAN ZONE 3 =		9"

PV MODULES	
MAKE	HANWHA Q-CELL
MODEL	Q.PEAK DUO BLK ML-G10+ 400
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.3"
WEIGHT	49 LBS

ROOF LOADING "PORTRAIT"	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.5 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-23.0 LBS/SQFT
UPLIFT ZONE 2	-38.0 LBS/SQFT
UPLIFT ZONE 3	-57.1 LBS/SQFT
DOWNWARD	13.6 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-266 LBS
UPLIFT ZONE 2	-176 LBS
UPLIFT ZONE 3	-132 LBS
DOWNWARD	157 LBS

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED:

NAME: ANDREW W. KING, PE

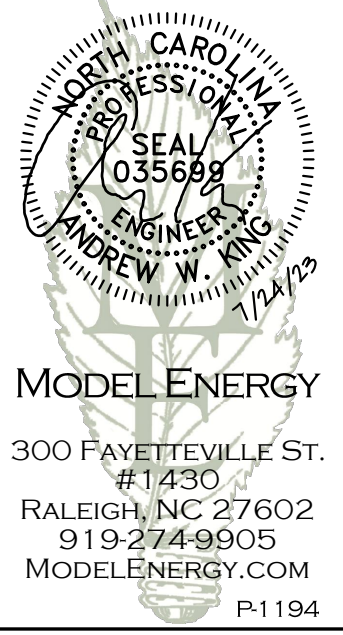
TITLE: PROFESSIONAL ENGINEER

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	S-5!
MODEL	PROTEA BRACKET
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	BI-METAL
MATERIAL	304 SS
SIZE	6MM X 25MM
GENERAL	
WEIGHT	3 LBS
FASTENERS PER MOUNT	4 PER MOUNT
MAX. PULL-OUT FORCE	546 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	273 LBS.

ROOF LOADING "LANDSCAPE"	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.5 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-23.0 LBS/SQFT
UPLIFT ZONE 2	-38.0 LBS/SQFT
UPLIFT ZONE 3	-57.1 LBS/SQFT
DOWNWARD	13.6 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-236 LBS
UPLIFT ZONE 2	-244 LBS
UPLIFT ZONE 3	-147 LBS
DOWNWARD	140 LBS

ROOF "A" SUMMARY	
STRUCTURE:	
TYPE	RAFTER
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 6"
SPACING	24"
EFF. SPAN	12'-5"
PITCH	3/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	CORRUGATED METAL
MATERIAL	STEEL
WEIGHT	1.5 LBS./SQFT.

ENGINEER:



MODEL ENERGY

300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

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16.400 kW DC INPUT
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Richard Stump
101 N 12th St, Erwin,
NC 28339

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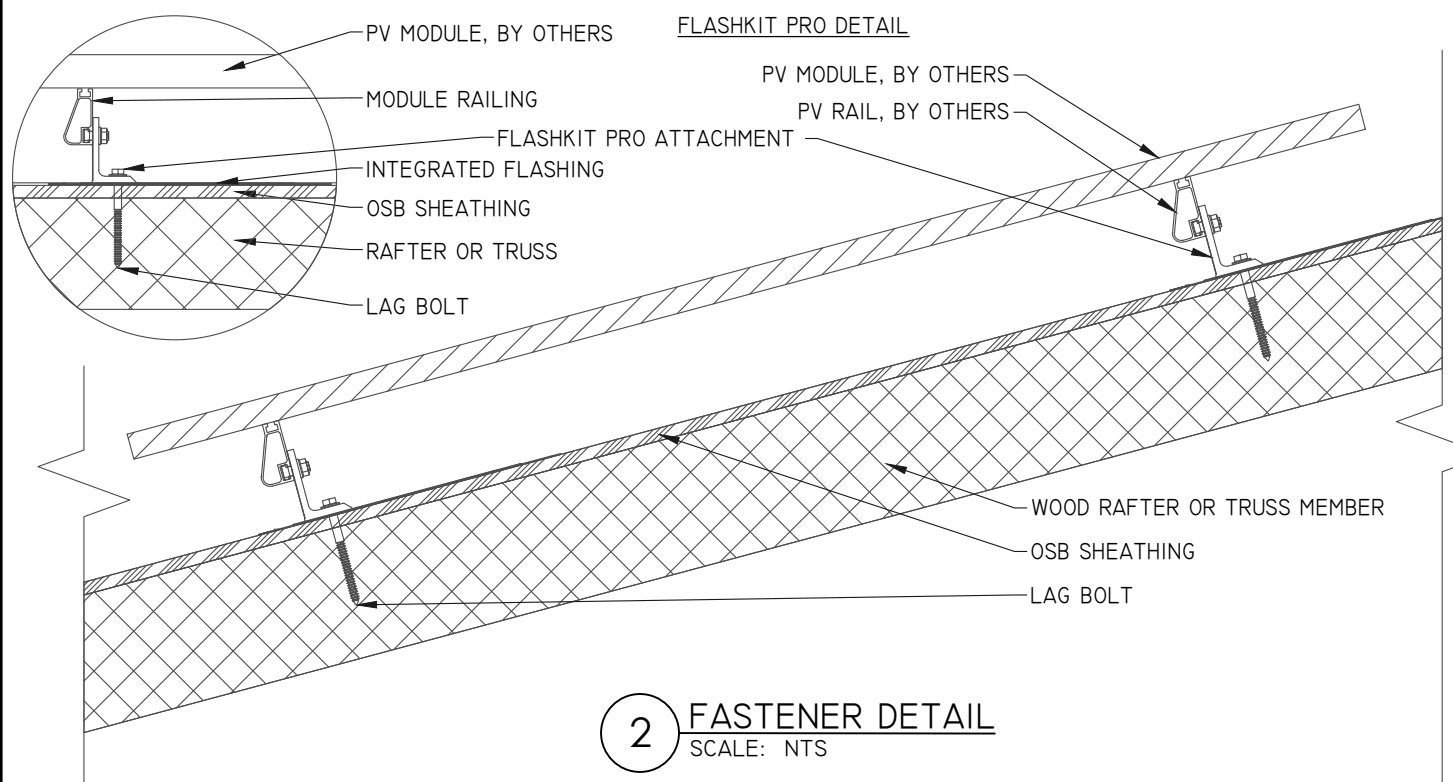
CLIENT:



ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

STRUCTURAL INFORMATION

PV3.1



2 FASTENER DETAIL
SCALE: NTS

ARRAY "B" SUMMARY

# MODULES	2
# ROOF MOUNTS	9
RAIL LENGTH	33 FT.
ARRAY AREA	42 SQFT.
ARRAY WEIGHT	113 LBS.
AZIMUTH @ SN	89°
TILT ANGLE	27°

MOUNTING RAILS

MAKE	UNIRAC
MODEL	SM LIGHT RAIL
MATERIAL	ALUMINUM
WEIGHT	0.49 LBS/SQFT
SPACING	34"

PV MODULES


MAKE	HANWHA Q-CELL
MODEL	Q.PEAK DUO BLK ML-G10+ 400
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.3"
WEIGHT	49 LBS

ROOF "B" ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16"
□ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
▩ ZONE 3	MAX. FASTENER SPAN ZONE 3 =	24"

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED: 

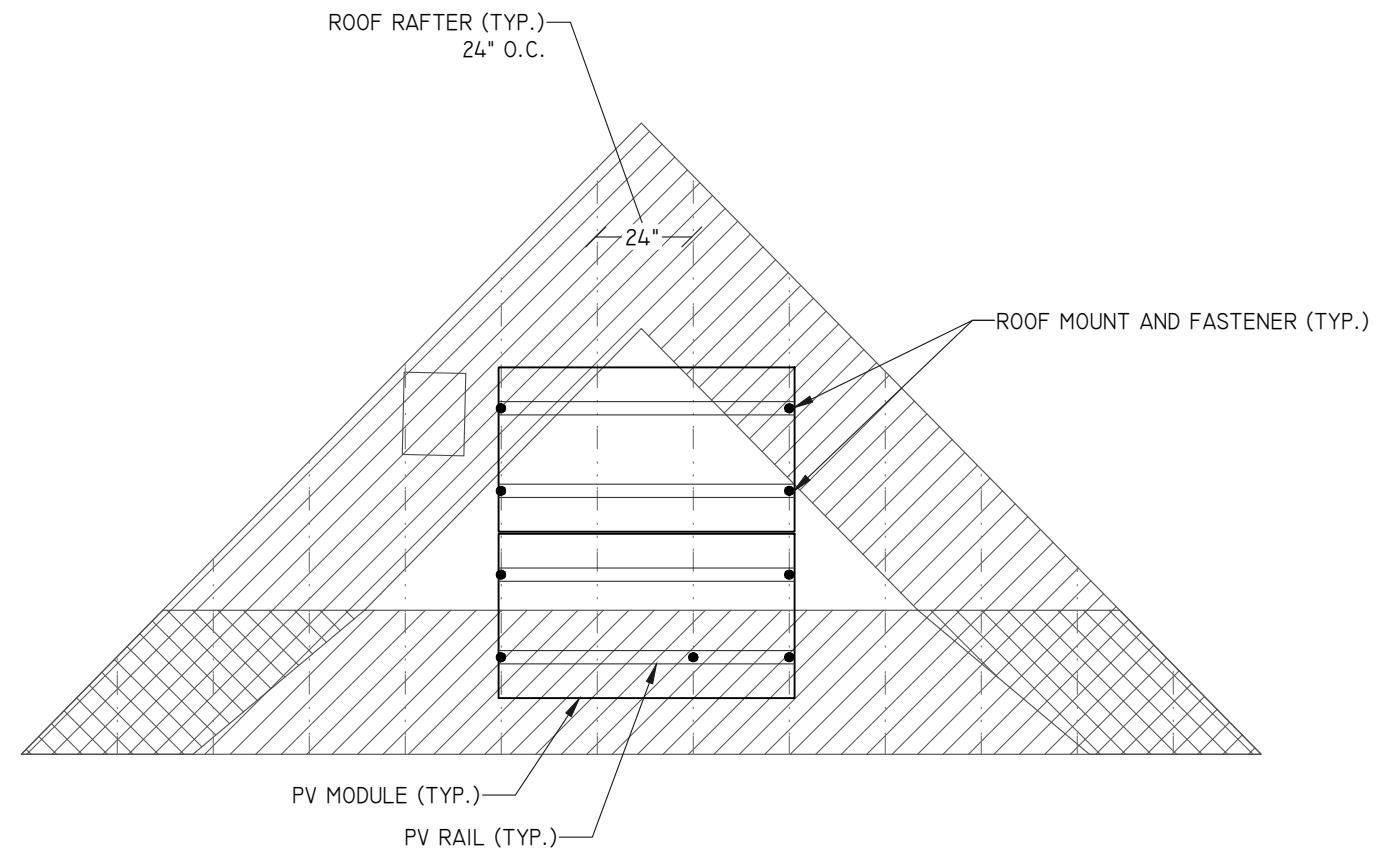
NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF MOUNT & FASTENER

ROOF MOUNT:	
MAKE	UNIRAC
MODEL	FLASHKIT PRO
MATERIAL	ALUMINUM
FASTENER:	
MAKE	GENERIC
MODEL	LAG BOLT
MATERIAL	SS LAG W/EPDM WASHER
SIZE	5/16" x 4"
GENERAL:	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1 PER MOUNT
MAX. PULL-OUT FORCE	800 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	400 LBS.

- LAG BOLT EMBEDDED WITH 2.5" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER



1 ROOF "B" PLANAR VIEW
SCALE: 1/4" = 1' -0"

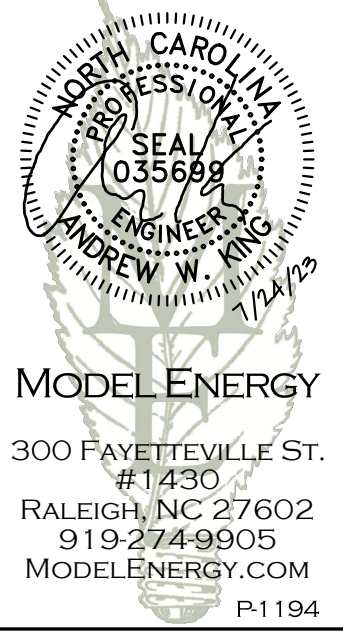
ROOF "B" LOADING

GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS/SQFT
UPLIFT ZONE 2	-29.0 LBS/SQFT
UPLIFT ZONE 3	-29.0 LBS/SQFT
DOWNWARD	23.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-253 LBS
UPLIFT ZONE 2	-199 LBS
UPLIFT ZONE 3	-99 LBS
DOWNWARD	236 LBS

ROOF "B" SUMMARY

STRUCTURE:	
TYPE	RAFTER
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 6"
SPACING	24"
EFF. SPAN	11'-10"
PITCH	6/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

ENGINEER:



MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM

16.400 kW DC INPUT
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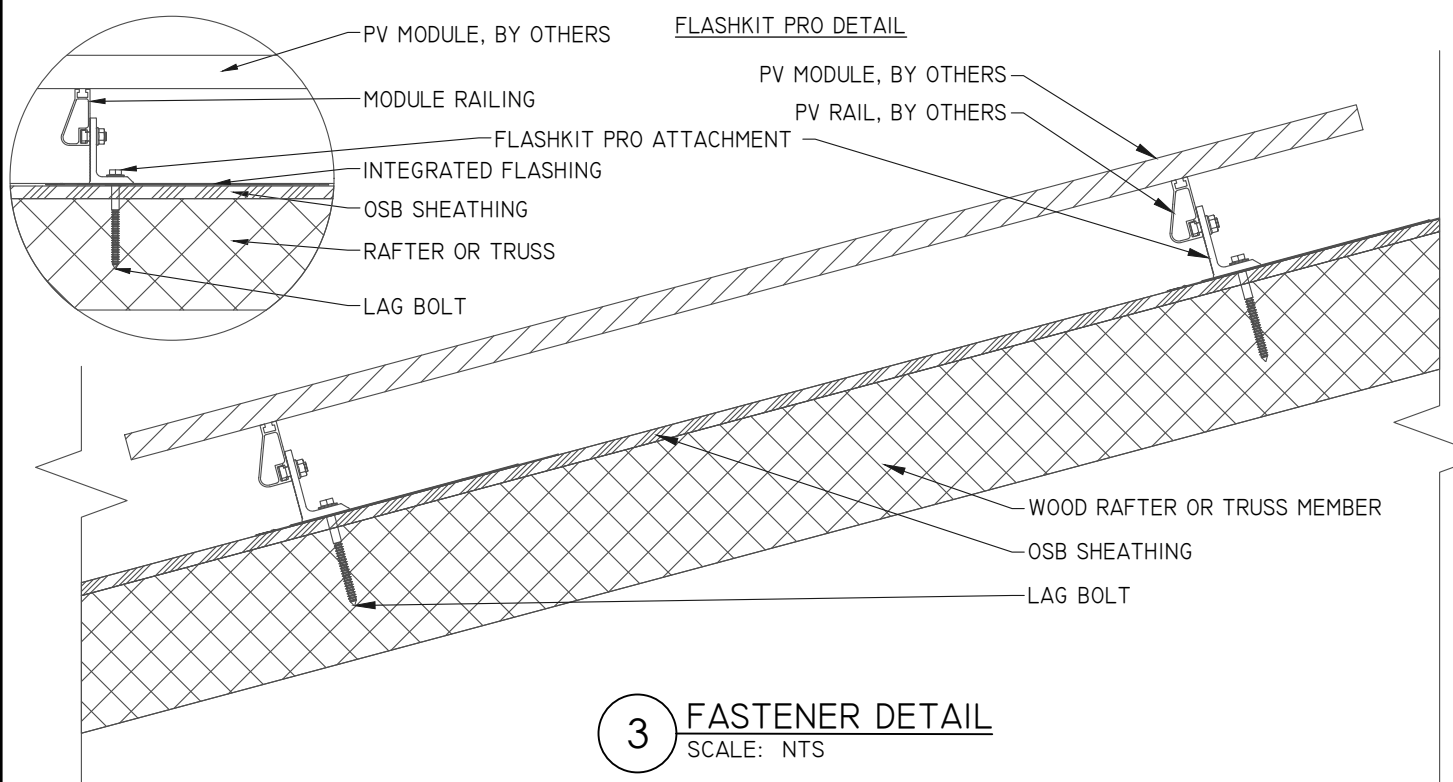
CLIENT:



ISSUED FOR: DATE:
CONSTRUCTION V1-07/12/23
V2-07/20/23

STRUCTURAL INFORMATION

PV3.2



3 FASTENER DETAIL
SCALE: NTS

ARRAY "D" SUMMARY

# MODULES	3
# ROOF MOUNTS	13
RAIL LENGTH	45 FT.
ARRAY AREA	63 SQFT.
ARRAY WEIGHT	168 LBS.
AZIMUTH @ SN	179°
TILT ANGLE	27°

ARRAY "C" SUMMARY


# MODULES	2
# ROOF MOUNTS	9
RAIL LENGTH	33 FT.
ARRAY AREA	42 SQFT.
ARRAY WEIGHT	113 LBS.
AZIMUTH @ SN	179°
TILT ANGLE	27°

MOUNTING RAILS

MAKE	UNIRAC
MODEL	SM LIGHT RAIL
MATERIAL	ALUMINUM
WEIGHT	0.49 LBS/SQFT
SPACING	34"

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED: 

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF SUMMARY

STRUCTURE:	
TYPE	RAFTER
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 6"
SPACING	24"
EFF. SPAN	
ROOF "C"	11'-7"
ROOF "D"	9'-2"
PITCH	
ROOF "C"	6/12
ROOF "D"	6/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

ROOF MOUNT & FASTENER

ROOF MOUNT:	
MAKE	UNIRAC
MODEL	FLASHKIT PRO
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	LAG BOLT
MATERIAL	SS LAG W/EPDM WASHER
SIZE	5/16" x 4"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1 PER MOUNT
MAX. PULL-OUT FORCE	800 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	400 LBS.

PV MODULES

MAKE	HANWHA Q-CELL
MODEL	Q.PEAK DUO BLK ML-G10+ 400
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.3"
WEIGHT	49 LBS

ROOF "D" ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16"
□ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
▩ ZONE 3	MAX. FASTENER SPAN ZONE 3 =	24"

ROOF "C" ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16"
□ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
▩ ZONE 3	MAX. FASTENER SPAN ZONE 3 =	24"

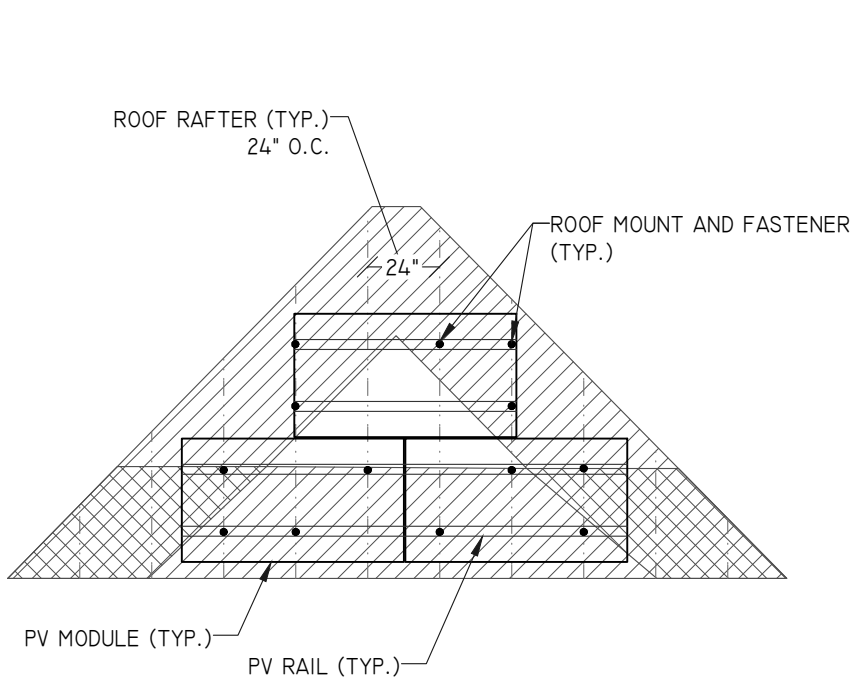
- LAG BOLT EMBEDDED WITH 2.5" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ROOF "D" LOADING

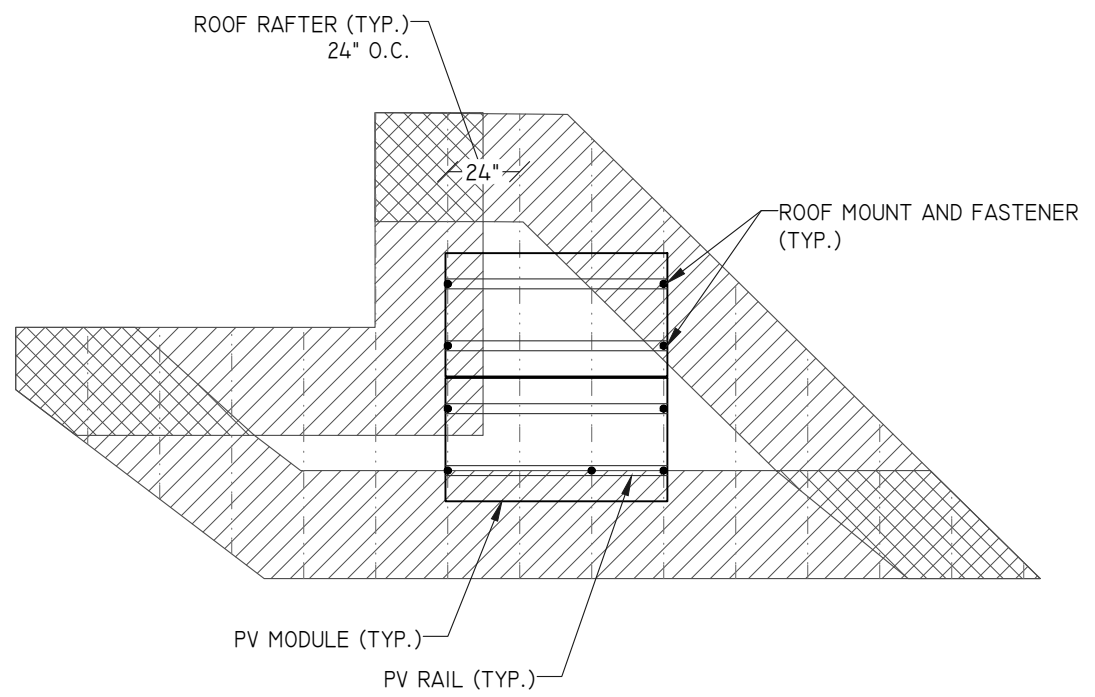
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS/SQFT
UPLIFT ZONE 2	-29.0 LBS/SQFT
UPLIFT ZONE 3	-29.0 LBS/SQFT
DOWNWARD	23.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-253 LBS
UPLIFT ZONE 2	-199 LBS
UPLIFT ZONE 3	-99 LBS
DOWNWARD	236 LBS

ROOF "C" LOADING

GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS/SQFT
UPLIFT ZONE 2	-29.0 LBS/SQFT
UPLIFT ZONE 3	-29.0 LBS/SQFT
DOWNWARD	23.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-253 LBS
UPLIFT ZONE 2	-199 LBS
UPLIFT ZONE 3	-99 LBS
DOWNWARD	236 LBS




2 ROOF "D" PLANAR VIEW
SCALE: 3/16" = 1' -0"



1 ROOF "C" PLANAR VIEW
SCALE: 3/16" = 1' -0"

ENGINEER:



MODEL ENERGY

300 FAYETTEVILLE ST.
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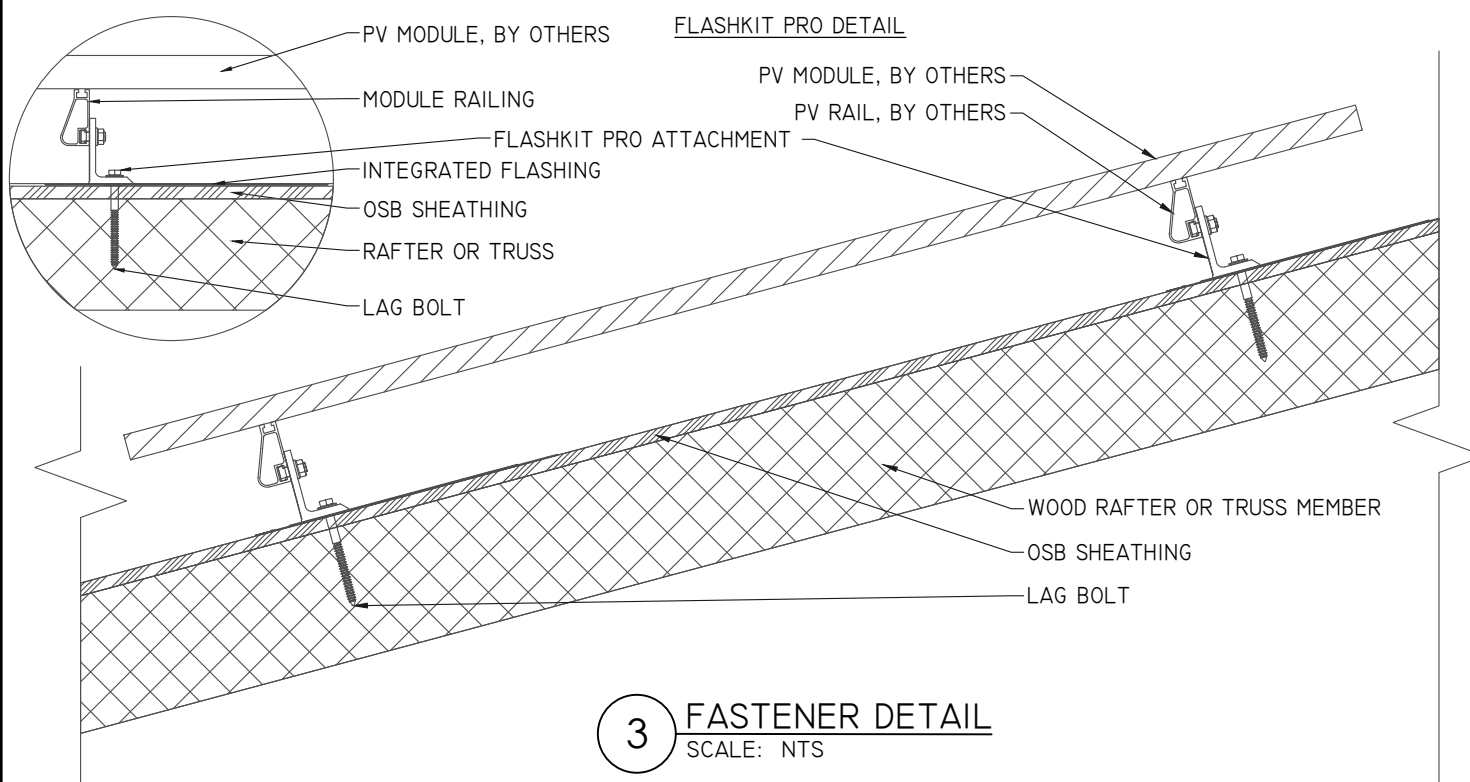
CLIENT:



ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

STRUCTURAL INFORMATION

PV3.3



3 FASTENER DETAIL
SCALE: NTS

ARRAY "F" SUMMARY

# MODULES	7
# ROOF MOUNTS	27
RAIL LENGTH	56 FT.
ARRAY AREA	148 SQFT.
ARRAY WEIGHT	367 LBS.
AZIMUTH @ SN	268°
TILT ANGLE	37°

ARRAY "E" SUMMARY


# MODULES	6
# ROOF MOUNTS	25
RAIL LENGTH	82 FT.
ARRAY AREA	127 SQFT.
ARRAY WEIGHT	331 LBS.
AZIMUTH @ SN	178°
TILT ANGLE	37°

MOUNTING RAILS

MAKE	UNIRAC
MODEL	SM LIGHT RAIL
MATERIAL	ALUMINUM
WEIGHT	0.49 LBS/SQFT
SPACING	34"

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED: 

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF SUMMARY

STRUCTURE:	
TYPE	RAFTER
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 6"
SPACING	24"
EFF. SPAN	
ROOF "E"	8'-0"
ROOF "F"	8'-4"
PITCH	
ROOF "E"	9/12
ROOF "F"	9/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

ROOF MOUNT & FASTENER

ROOF MOUNT:	
MAKE	UNIRAC
MODEL	FLASHKIT PRO
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	LAG BOLT
MATERIAL	SS LAG W/EPDM WASHER
SIZE	5/16" x 4"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1 PER MOUNT
MAX. PULL-OUT FORCE	800 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	400 LBS.

- LAG BOLT EMBEDDED WITH 2.5" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ROOF "F" LOADING

GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS/SQFT
UPLIFT ZONE 2	-29.0 LBS/SQFT
UPLIFT ZONE 3	-29.0 LBS/SQFT
DOWNWARD	23.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-303 LBS
UPLIFT ZONE 2	-358 LBS
UPLIFT ZONE 3	-179 LBS
DOWNWARD	284 LBS

ROOF "E" LOADING

GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-23.0 LBS/SQFT
UPLIFT ZONE 2	-38.0 LBS/SQFT
UPLIFT ZONE 3	-57.1 LBS/SQFT
DOWNWARD	13.6 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-236 LBS
UPLIFT ZONE 2	-260 LBS
UPLIFT ZONE 3	-196 LBS
DOWNWARD	140 LBS

PV MODULES

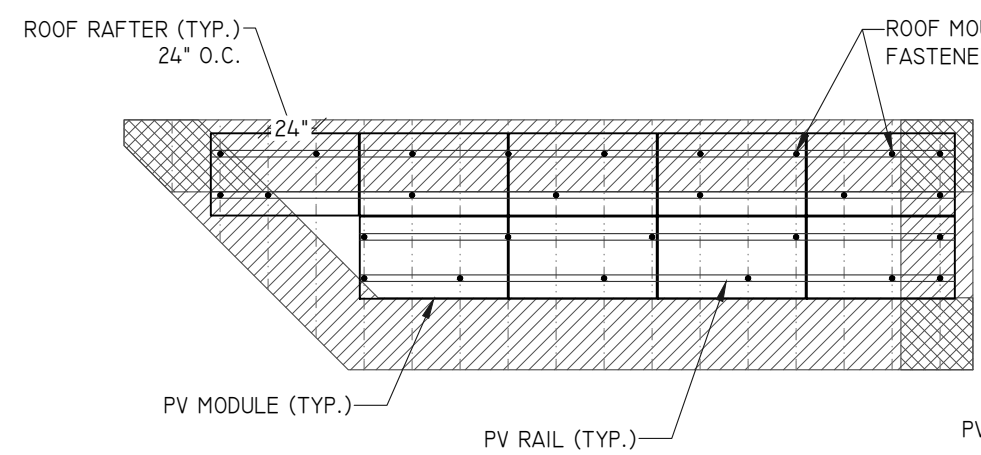
MAKE	HANWHA Q-CELL
MODEL	Q.PEAK DUO BLK ML-G10+ 400
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.3"
WEIGHT	49 LBS

ROOF "F" ZONES:

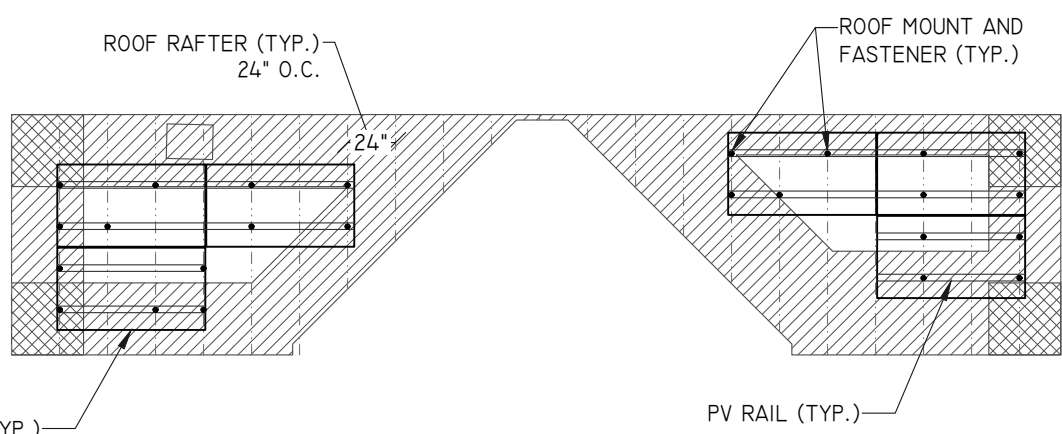
ALL ZONES	MAX. RAIL OVERHANG =	16"
<input type="checkbox"/> ZONE 1	MAX. FASTENER SPAN ZONE 1 =	48"
<input checked="" type="checkbox"/> ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
<input checked="" type="checkbox"/> ZONE 3	DO NOT INSTALL MODULES IN ZONE 3	24"

ROOF "E" ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16"
<input type="checkbox"/> ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72"
<input checked="" type="checkbox"/> ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
<input checked="" type="checkbox"/> ZONE 3	DO NOT INSTALL MODULES IN ZONE 3	24"




2 ROOF "F" PLANAR VIEW
SCALE: 1/8" = 1' -0"



1 ROOF "E" PLANAR VIEW
SCALE: 1/8" = 1' -0"

ENGINEER:



MODEL ENERGY

300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:


NEW SOLAR PV SYSTEM

16.400 kW DC INPUT
12.600 kW AC EXPORT

Richard Stump
101 N 12th St, Erwin,
NC 28339

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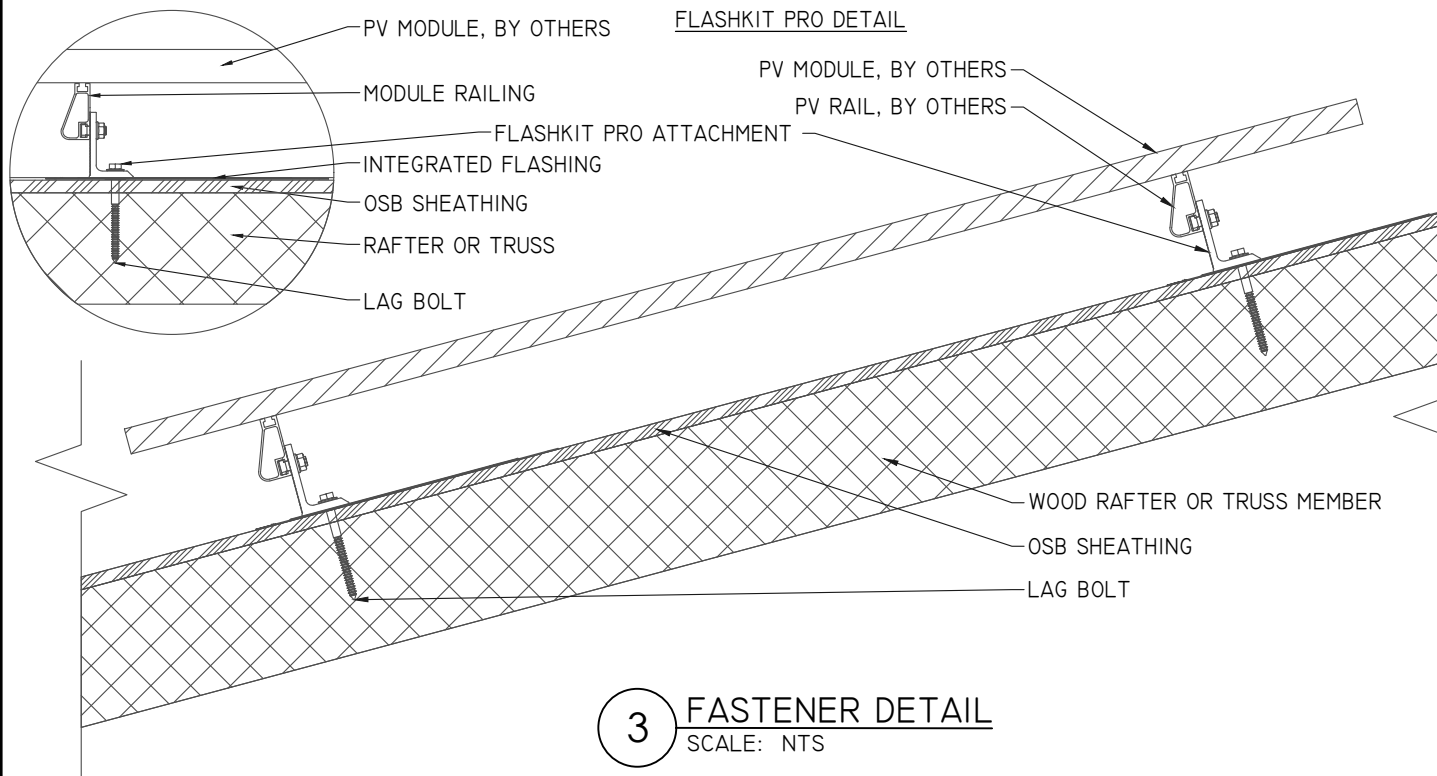
CLIENT:



ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

STRUCTURAL INFORMATION

PV3.4



3 FASTENER DETAIL
SCALE: NTS

ARRAY "H" SUMMARY

# MODULES	4
# ROOF MOUNTS	12
RAIL LENGTH	57 FT.
ARRAY AREA	84 SQFT.
ARRAY WEIGHT	222 LBS.
AZIMUTH @ SN	268°
TILT ANGLE	27°

ARRAY "G" SUMMARY


# MODULES	7
# ROOF MOUNTS	27
RAIL LENGTH	94 FT.
ARRAY AREA	148 SQFT.
ARRAY WEIGHT	386 LBS.
AZIMUTH @ SN	88°
TILT ANGLE	37°

MOUNTING RAILS

MAKE	UNIRAC
MODEL	SM LIGHT RAIL
MATERIAL	ALUMINUM
WEIGHT	0.49 LBS/SQFT
SPACING	34"

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED: 

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF SUMMARY

STRUCTURE:	
TYPE	RAFTER
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 8"
SPACING	24"
EFF. SPAN	
ROOF "G"	8'-4"
ROOF "H"	9'-0"
PITCH	
ROOF "G"	9/12
ROOF "H"	6/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

ROOF MOUNT & FASTENER

ROOF MOUNT:	
MAKE	UNIRAC
MODEL	FLASHKIT PRO
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	LAG BOLT
MATERIAL	SS LAG W/EPDM WASHER
SIZE	5/16" x 4"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1 PER MOUNT
MAX. PULL-OUT FORCE	800 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	400 LBS.

- LAG BOLT EMBEDDED WITH 2.5" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ROOF "H" LOADING

GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS/SQFT
UPLIFT ZONE 2	-29.0 LBS/SQFT
UPLIFT ZONE 3	-29.0 LBS/SQFT
DOWNWARD	23.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-253 LBS
UPLIFT ZONE 2	-199 LBS
UPLIFT ZONE 3	-99 LBS
DOWNWARD	236 LBS

ROOF "G" LOADING

GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS/SQFT
UPLIFT ZONE 2	-29.0 LBS/SQFT
UPLIFT ZONE 3	-29.0 LBS/SQFT
DOWNWARD	23.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-253 LBS
UPLIFT ZONE 2	-199 LBS
UPLIFT ZONE 3	-99 LBS
DOWNWARD	236 LBS

PV MODULES

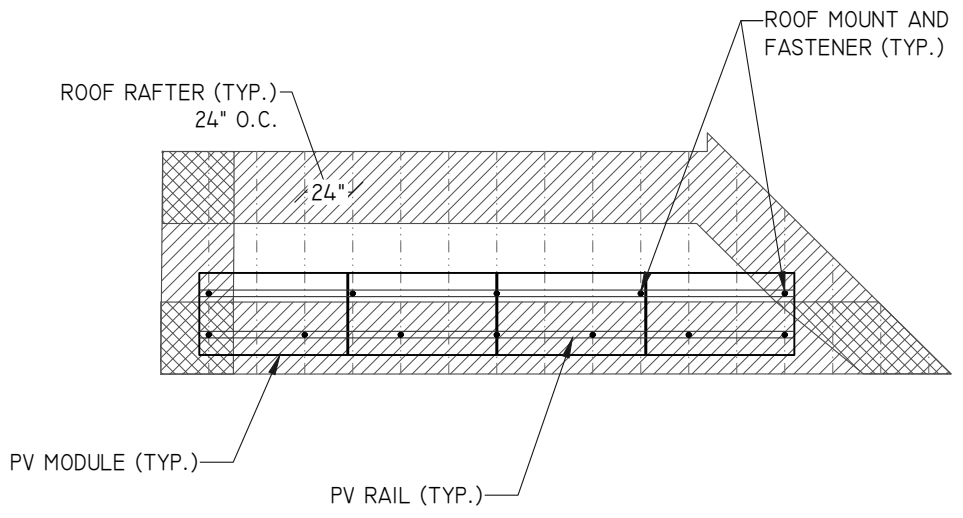
MAKE	HANWHA Q-CELL
MODEL	Q.PEAK DUO BLK ML-G10+ 400
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.3"
WEIGHT	49 LBS

ROOF "H" ZONES:

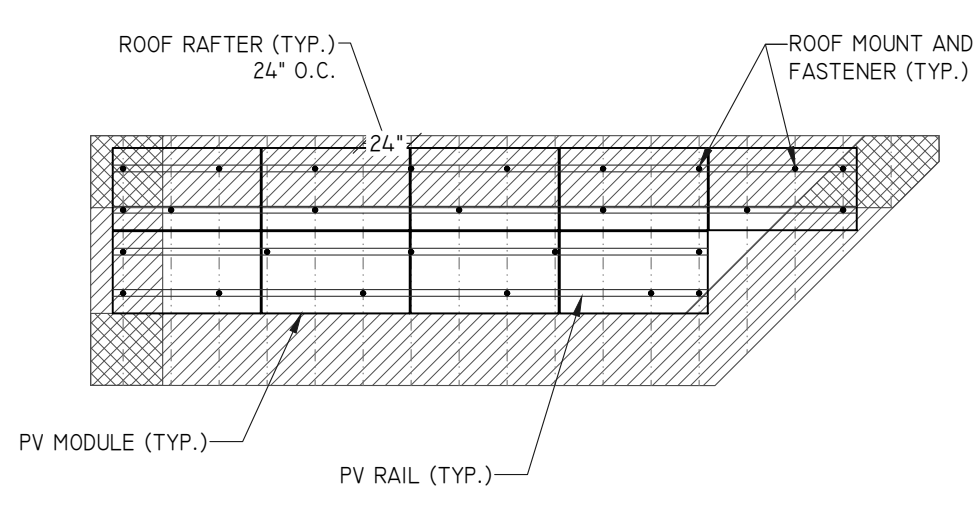
ALL ZONES	MAX. RAIL OVERHANG =	16"
☐ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
▩ ZONE 3	DO NOT INSTALL MODULES IN ZONE 3	24"

ROOF "G" ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16"
☐ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48"
▩ ZONE 3	DO NOT INSTALL MODULES IN ZONE 3	24"




2 ROOF "H" PLANAR VIEW
SCALE: 1/8" = 1' - 0"



1 ROOF "G" PLANAR VIEW
SCALE: 1/8" = 1' - 0"

ENGINEER:



MODEL ENERGY

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16.400 kW DC INPUT
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CLIENT:



ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

STRUCTURAL INFORMATION

PV3.5

DC/AC INVERTER "B"	
MAKE	SOLAREEDGE
MODEL	SE7600H-US
TECHNOLOGY	TRANS-LESS
DC INPUT:	
MAX. POWER	11800 WATTS
MAX. VOLT	480 VOLTS
NOM. VOLT.	400 VOLTS
MAX. CURRENT	20 AMPS
MAX. SCC	45 AMPS
STRINGS INPUTS	2 STRINGS
AC OUTPUT:	
RATED POWER	7600 WATTS
MAX. POWER	7600 WATTS
NOM. VOLT.	240 VOLTS
MAX. CURR.	32 AMPS
GFP (Y/N)	YES
RPP (Y/N)	YES
GFCI (Y/N)	YES
AFCI (Y/N)	YES
DC DISC. (Y/N)	YES
RAPID SHUTDOWN	AUTOMATIC
FUSE RATING	15 AMPS
PROTECT. RATING	NEMA 4X

MODULE OPTIMIZER	
MAKE	SOLAREEDGE
MODEL	S440
DC INPUT:	
RATED POWER	440 WATTS
VOLT. RANGE	8-60
MAX. SCC	14.5 AMPS
DC OUTPUT:	
MAX. CURRENT	15 AMPS
MAX. VOLT.	60 VOLTS
MAX. SYSTEM VOLT.	1000 VOLTS
MIN. STRING	8 OPTIMIZERS
MAX. STRING	25 OPTIMIZERS
MAX. POWER	5700 WATTS

PV MODULES	
MAKE	HANWHA Q-CELL
MODEL	Q.PEAK DUO BLK ML-G10+ 400
TECHNOLOGY	MONO-CRYST.
NOM. POWER (Pnom)	
400 WATTS	
NOM. VOLT. (Vmp)	
37.13 VOLTS	
O.C. VOLT. (Voc)	
45.30 VOLTS	
MAX. SYS. VOLT.	
1000 V (UL)	
TEMP. COEF. (Vtc)	
-0.27 %/°C	
NOM. CURR. (Imp)	
10.77 AMPS	
S.C. CURR. (Isc)	
11.14 AMPS	
MAX. SERIES FUSE	
20 AMPS	

DC/AC INVERTER "A"	
MAKE	SOLAREEDGE
MODEL	SE5000H-US
TECHNOLOGY	TRANS-LESS
DC INPUT:	
MAX. POWER	7750 WATTS
MAX. VOLT	480 VOLTS
NOM. VOLT.	380 VOLTS
MAX. CURRENT	13.5 AMPS
MAX. SCC	45 AMPS
STRINGS INPUTS	2 STRINGS
AC OUTPUT:	
RATED POWER	5000 WATTS
MAX. POWER	5000 WATTS
NOM. VOLT.	240 VOLTS
MAX. CURR.	21 AMPS
GFP (Y/N)	YES
RPP (Y/N)	YES
GFCI (Y/N)	YES
AFCI (Y/N)	YES
DC DISC. (Y/N)	YES
RAPID SHUTDOWN	AUTOMATIC
FUSE RATING	15 AMPS
PROTECT. RATING	NEMA 4X

CONDUCTOR SCHEDULE													
TAG	CURRENT CARRYING CONDUCTORS				GROUNDING CONDUCTORS				CONDUIT/RACEWAY			NOTES	
	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL		LOCATION
C1	2	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	PV WIRE	-	-	-	FREE AIR	1
C2.1	2	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	1/2"	PVC40	BURIED	2,4,7,8
C2.2	2	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	1/2"	FMC/EMT/MC	EXT/INT	2,4
C2.3	4	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	3/4"	FMC/EMT/MC	EXT/INT	2,4
C3	3	10 AWG	COPPER	THWN	1	10 AWG	COPPER	THWN	1	1/2"	NOTE 5	INT/EXT	2,4,5
C4	3	8 AWG	COPPER	THWN	1	10 AWG	COPPER	THWN	1	3/4"	NOTE 5	EXTERIOR	2,4,5
C5	3	4 AWG	COPPER	THWN	1	8 AWG	COPPER	THWN	1	1"	NOTE 5	EXTERIOR	2,4,5
C6	3	4 AWG	COPPER	THWN	1	8 AWG	COPPER	THWN	1	1 1/4"	NOTE 5	EXTERIOR	2,4,5,6
XC	-	-	-	-	-	-	-	-	-	-	-	-	3

- NOTES:
- MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS
 - CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED
 - EXISTING CONDUCTORS, FIELD VERIFY
 - EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR
 - PVC, EMT, ROMEX, LFNMC & FMC ARE ACCEPTABLE WHEN USED IN ACCORDANCE WITH ARTICLES 330, 334, 348, 350, 352, 356, & 358 OF THE 2017 NEC
 - SERVICE CONDUCTORS SHALL NOT TRAVEL MORE THAN 5' INSIDE OF THE BUILDING AND MORE THAN 10' IN TOTAL.
 - SCH 40 PVC IN TRENCHING AT 18" MINIMUM DEPTH, EMT INSIDE OF BUILDING.
 - EMT ABOVE GROUND BURIED PVC ALONG TRENCH PATH

JUNCTION BOX	
MAKE	SOLADECK
MODEL	0783-3R
PRO. RATING	NEMA 3R
VOLT. RATING	600 VOLTS
AMP RATING	120 AMPS
UL LISTING	UL 50

- NOTES:
- PROVIDE ADDITIONAL JUNCTION BOXED AS REQUIRED TO COMBINE MODULES ON DIFFERENT ARRAYS INTO A SINGLE STRING

PV COMBINER PANEL (NEW)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	125 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	NO
BREAKER RATING	N/A

- NOTES:
- BACK-FEED SOLAR OUTPUT VIA (1) 30A & (1) 40A BREAKERS AT THE OPPOSITE END OF THE BUS BAR FROM FEEDER LUGS.
 - PROVIDE WITH PERMANENT LABEL THAT READS, "PV COMBINER PANEL. DO NOT ADD ADDITIONAL LOADS."

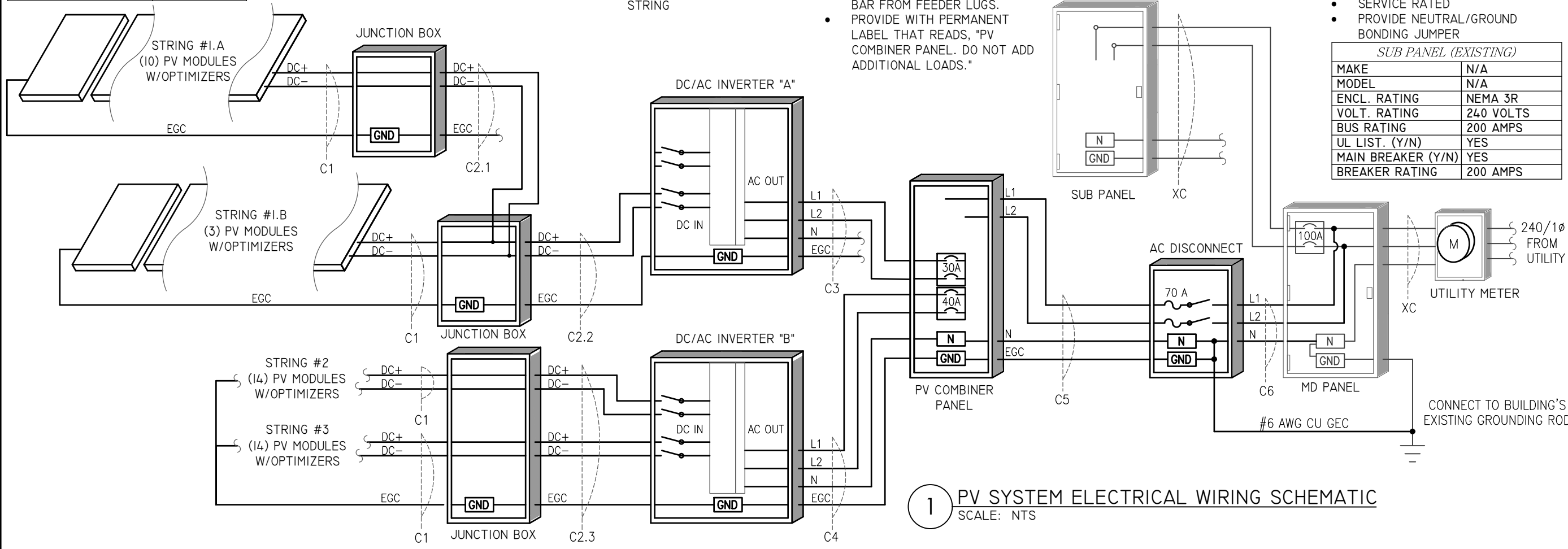
MD PANEL (EXISTING)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	NO
BREAKER RATING	N/A

- NOTES:
- BACK-FEED SOLAR OUTPUT VIA SUPPLY SIDE TAP INSIDE OF MD PANEL

AC DISCONNECT	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
AMP RATING	100 AMPS
UL LIST. (Y/N)	YES
FUSED (Y/N)	YES
FUSE RATING	70 AMPS

- NOTES:
- LOAD-BREAK RATED
 - VISIBLE OPEN
 - LOCKABLE IN OPEN POSITION
 - INSTALL ADJACENT TO METER
 - DISCONNECT TO BE READILY ACCESSIBLE TO UTILITY COMPANY PERSONNEL AT ALL TIMES
 - SERVICE RATED
 - PROVIDE NEUTRAL/GROUND BONDING JUMPER

SUB PANEL (EXISTING)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS



1 PV SYSTEM ELECTRICAL WIRING SCHEMATIC
SCALE: NTS

ENGINEER:

MODEL ENERGY
300 FAYETTEVILLE ST. #1430
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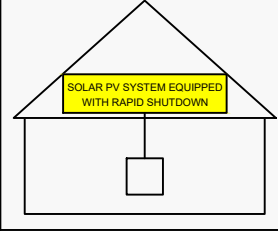
ELECTRICAL INFORMATION

PV4.1

EQUIPMENT LABELS

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY



NEC 690.56 (C)(1)(a)
PLACE WITHIN 3FT OF SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATIONS OF RAPID SHUTDOWN SWITCHES

PV SYSTEM DISCONNECT

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

WARNING DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

NEC 705.12 (B)(3)
PLACE ON ALL EQUIPMENT THAT IS SUPPLIED BY BOTH POWER SOURCES

WARNING ELECTRIC SHOCK HAZARD

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

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

WARNING POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12 (B)(2)(3)(b)
PLACE ADJACENT TO BACK-FED BREAKER

WARNING: PHOTOVOLTAIC POWER SOURCE

NEC 690.31 (G)(3)&(4)
PLACE ON ALL JUNCTION BOXES, EXPOSED RACEWAYS, AND OTHER WIRING METHODS EVERY 10' AND ON EVERY SECTION SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEC 690.56 (C)(3)
PLACE ON RAPID SHUTDOWN SWITCH OR EQUIPMENT WITH INTEGRATED RAPID SHUTDOWN *REFLECTIVE*

WARNING FED BY MULTIPLE POWER SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING UTILITY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR

NEC 705.12 (B)(2)(3)(c)
PLACE ADJACENT TO BACK-FED BREAKER

EQUIPMENT LABEL NOTES
1. LABELS SHOWN ARE 1/2 THEIR ACTUAL REQUIRED SIZE.
2. LABEL MATERIAL SHALL BE SUITABLE FOR THE EQUIPMENT ENVIRONMENT.
3. CONDUIT SHALL BE MARKED WITH REQUIRED LABEL EVERY 10 FEET.

DIRECT CURRENT PHOTOVOLTAIC POWER SOURCE

MAXIMUM VOLTAGE 600 VDC
MAX CIR. CURRENT 15 AMPS

NEC 690.53
PLACE ON ALL DC DISCONNECTING MEANS

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLT. 240 VAC
MAXIMUM OPERATING AC OUTPUT CURRENT 53 AMPS

NEC 690.54
PLACE ON INTERCONNECTION DISCONNECTING MEANS

DIRECT CURRENT PHOTOVOLTAIC POWER SOURCE

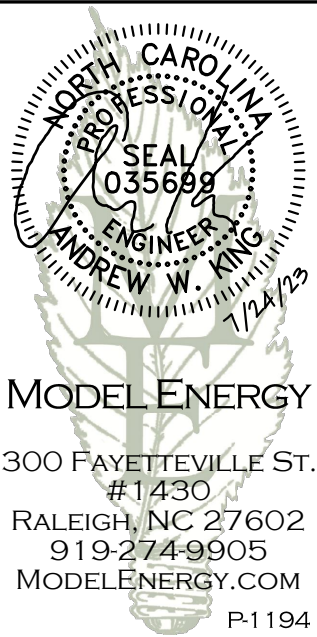
MAXIMUM VOLTAGE 600 VDC
MAX CIR. CURRENT 30 AMPS

NEC 690.53
PLACE ON ALL DC DISCONNECTING MEANS

CONSTRUCTION NOTES

- ALL WORK AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL, STATE, AND LOCAL CODES AND ORDINANCES
- FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS, BEST PRACTICES, AND SPECIFICATIONS
- WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS
- THE PHOTOVOLTAIC SYSTEM SHALL NOT EXCEED 600 VOLTS OR 800 AMPS
- EACH ELECTRICAL APPLIANCE SHALL BE PROVIDED WITH A NAMEPLATE GIVING THE IDENTIFYING NAME AND THE RATING IN VOLTS AND AMPERES, OR VOLTS AND WATTS. IF THE APPLIANCE IS TO BE USED ON A SPECIFIC FREQUENCY OR FREQUENCIES, IT SHALL BE SO MARKED. WHERE MOTOR OVERLOAD PROTECTION EXTERNAL TO THE APPLIANCES IS REQUIRED, THE APPLIANCE SHALL BE SO MARKED
- WHERE APPLICABLE, GROUNDING ELECTRODE CONDUCTOR TO BE CONTINUOUS. GROUNDING CRIMPS TO BE IRREVERSIBLE
- IN ONE- AND TWO-FAMILY DWELLINGS, LIVE PARTS IN PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OVER 150 VOLTS TO GROUND, SHALL ONLY BE ACCESSIBLE TO QUALIFIED PERSONS WHILE ENERGIZED.
- PHOTOVOLTAIC SYSTEMS SHALL BE PERMANENTLY MARKED AT VARIOUS EQUIPMENT LOCATIONS TO IDENTIFY THAT A PHOTOVOLTAIC SYSTEM IS INSTALLED AND THAT VARIOUS DANGERS ARE PRESENT.
- EACH PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM DISCONNECT
- WHERE ALL TERMINALS OF A DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A WARNING SIGN SHALL BE MOUNTED ON OR ADJACENT TO THE DISCONNECT
- A PERMANENT LABEL FOR THE DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE SHALL BE PROVIDED BY THE INSTALLED AT THE DC DISCONNECT MEANS
- A PERMANENT PLAQUE OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES SERVING THE PREMISES, SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL POWER PRODUCTION SOURCES.
- A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED DENOTING THE LOCATIONS OF THE SERVICE DISCONNECT MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECT MEANS IF THEY ARE NOT LOCATED AT THE SAME LOCATION.
- ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC SECTION 690.4 (C)

ENGINEER:



MODEL ENERGY

300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM

JOB TITLE:

NEW SOLAR PV SYSTEM

16.400 kW DC INPUT
12.600 kW AC EXPORT

Richard Stump

101 N 12th St, Erwin,
NC 28339

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CLIENT:



ISSUED FOR: DATE:

CONSTRUCTION V1-07/12/23

V2-07/20/23

ELECTRICAL INFORMATION

PV4.2

Q.PEAK DUO BLK ML-G10+ SERIES



385-405 Wp | 132 Cells
20.6% Maximum Module Efficiency

MODEL Q.PEAK DUO BLK ML-G10+



6 busbar cell technology

12 busbar cell technology



Breaking the 20% efficiency barrier

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.6%.



A reliable investment

Inclusive 25-year product warranty and 25-year linear performance warranty¹.



Enduring high performance

Long-term yield security with Anti LeTID Technology, Anti PID Technology² and Hot-Spot Protect.



Extreme weather rating

High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).



Innovative all-weather technology

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.



The most thorough testing programme in the industry

Qcells is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

¹ See data sheet on rear for further information.
² APT test conditions according to IEC/TS 62804-1:2015, method A (-1500 V, 96 h)

The ideal solution for:

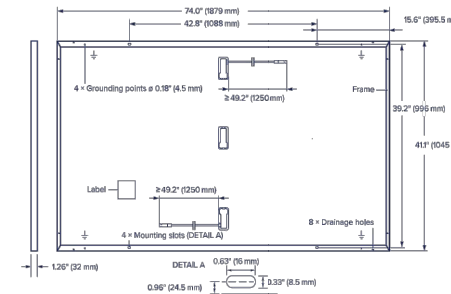
Rooftop arrays on residential buildings



Q.PEAK DUO BLK ML-G10+ SERIES

Mechanical Specification

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm ² Solar cable; (+) ≥49.2 in (1250 mm), (-) ≥49.2 in (1250 mm)
Connector	Stäubli MC4; IP68



Electrical Characteristics

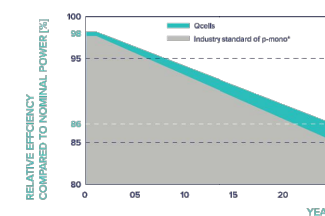
POWER CLASS		385	390	395	400	405	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5 W/-0 W)							
Minimum	Power at MPP ¹	P _{MPP} [W]	385	390	395	400	405
	Short Circuit Current ¹	I _{SC} [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage ¹	V _{OC} [V]	45.19	45.23	45.27	45.3	45.34
	Current at MPP	I _{MPP} [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V _{MPP} [V]	36.36	36.62	36.88	37.13	37.39
	Efficiency ¹	η [%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT²

Minimum	Power at MPP	P _{MPP} [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I _{SC} [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V _{OC} [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I _{MPP} [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V _{MPP} [V]	34.59	34.81	35.03	35.25	35.46

¹Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25 ±2°C, AM 1.5 according to IEC 60904-3 • ²800 W/m², NMOT, spectrum AM 1.5

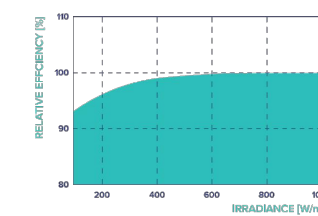
Qcells PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Qcells sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000 W/m²).

¹Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α [%/K]	+0.04	Temperature Coefficient of V _{OC}	β [%/K]	-0.27
Temperature Coefficient of P _{MPP}	γ [%/K]	-0.34	Nominal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3°C)

Properties for System Design

Maximum System Voltage	V _{SYS} [V]	1000 (IEC)/1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI/UL 61730	TYPE 2
Max. Design Load, Push/Pull ¹	[lbs/ft ²]	75 (3600 Pa)/55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	-40°F up to +185°F (-40°C up to +85°C)
Max. Test Load, Push/Pull ²	[lbs/ft ²]	113 (5400 Pa)/84 (4000 Pa)		

³ See Installation Manual

Qualifications and Certificates

UL 61730, CE-compliant, Quality Controlled PV - TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells),



Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL: +1 949 748 59 96 | EMAIL: hq-inquiry@qcells.com | WEB: www.qcells.com



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	V2-07/20/23

LABELS,
DETAILS & SPECS

PV5.1

Specifications subject to technical changes © Qcells Q.PEAK DUO BLK ML-G10+ series_385-405_2022-07_Rev02_BA

Power Optimizer For Residential Installations

S440, S500



POWER OPTIMIZER

Enabling PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Detects abnormal PV connector behavior, preventing potential safety issues*
- Faster installations with simplified cable management and easy assembly using a single bolt
- Module-level voltage shutdown for installer and firefighter safety
- Flexible system design for maximum space utilization
- Superior efficiency (99.5%)
- Compatible with bifacial PV modules

* Functionality subject to inverter model and firmware version

solaredge.com



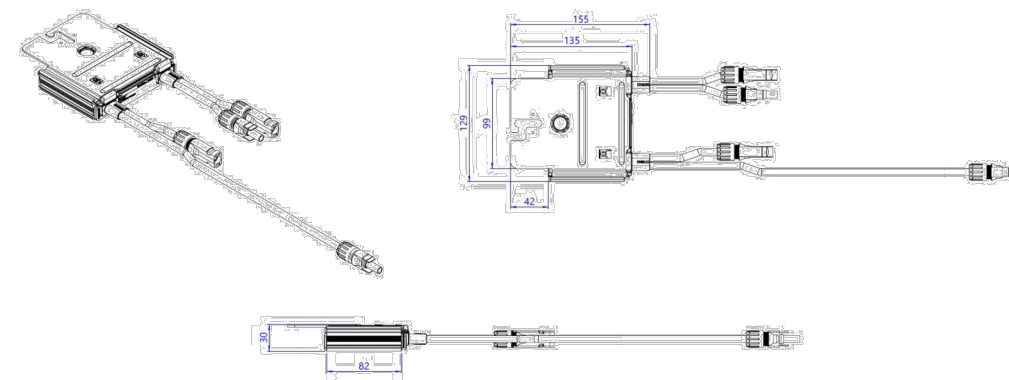
Power Optimizer For Residential Installations S440, S500

	S440	S500	UNIT
Rated Input DC Power ⁽¹⁾	440	500	W
Absolute Maximum Input Voltage (Voc)		60	Vdc
MPPT Operating Range		8 - 60	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency		99.5	%
Weighted Efficiency		98.6	%
Overtoltage Category		II	
OUTPUT DURING OPERATION			
Maximum Output Current		15	Adc
Maximum Output Voltage		60	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)			
Safety Output Voltage per Power Optimizer		1	Vdc
STANDARD COMPLIANCE			
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011		
Safety	IEC62109-1 (class II safety), UL1741		
Material	UL94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
INSTALLATION SPECIFICATIONS			
Maximum Allowed System Voltage		1000	Vdc
Dimensions (W x L x H)		129 x 155 x 30	mm
Weight (including cables)		655 / 1.5	gr / lb
Input Connector		MC4 ⁽²⁾	
Input Wire Length		0.1	m
Output Connector		MC4	
Output Wire Length		(+) 2.3, (-) 0.10	m
Operating Temperature Range ⁽³⁾		-40 to +85	°C
Protection Rating		IP68 / NEMA6P	
Relative Humidity		0 - 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed
 (2) For other connector types please contact SolarEdge
 (3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter		Single Phase HD-Wave	Three Phase	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500	8	16	18	
Maximum String Length (Power Optimizers)		25	50	50	
Maximum Nominal Power per String ⁽⁴⁾		5700	11250 ⁽⁵⁾	12750 ⁽⁶⁾	W
Parallel Strings of Different Lengths or Orientations			Yes		

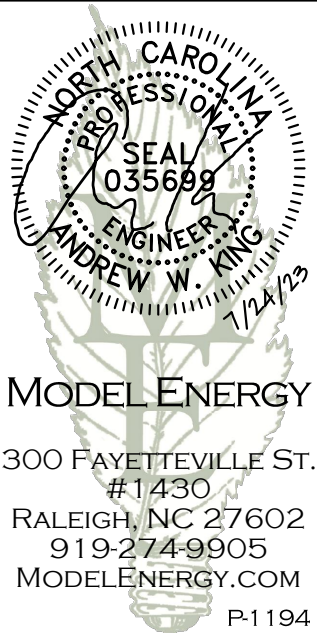
(4) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>
 (5) For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W
 (6) For the 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W
 (7) It is not allowed to mix S-series and P-series Power Optimizers in new installations



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CE RoHS

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 V2-07/20/23

EQUIPMENT
 SPEC SHEETS

PV5.2

Single Phase Inverter with HD-Wave Technology

for North America

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



12-25
YEAR
WARRANTY

INVERTERS

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)

solaredge.com



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 ⁽¹⁾							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 ⁽²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V ⁽²⁾	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600k Ω Sensitivity								
Maximum Inverter Efficiency	99	99.2				99 @ 240V 98.5 @ 208V		%	
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 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 ⁽³⁾								
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect								
STANDARD COMPLIANCE									
Safety	UL1741, UL1741 SA, UL1599B, CSA C22.2, Canadian AFCEI 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	1" Maximum / 14-6 AWG				1" Maximum / 14-4 AWG				
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG				1" Maximum / 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	-13 to +140 / -25 to +60 ⁽⁴⁾ (-40°F / -40°C option) ⁽⁵⁾							°F / °C	
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

⁽¹⁾ For other regional settings please contact SolarEdge support
⁽²⁾ A higher current source may be used; the inverter will limit its input current to the values stated
⁽³⁾ Revenue grade inverter P/N: SExxxxH-US000NNC2
⁽⁴⁾ For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>
⁽⁵⁾ -40 version P/N: SExxxxH-US000NNU4

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EQUIPMENT
SPEC SHEETS

PV5.3

FLASHKIT PRO



FLASHKIT PRO is the complete attachment solution for composition shingle roofs. Featuring Unirac's patented **SHED & SEAL** technology, a weather proof system which provides the ultimate protection against roof leaks. Kitted in 10 packs for maximum convenience, flashings and hardware are available in Mill or Dark finishes. With **FLASHKIT pro**, you have everything you need for a quick, professional installation.



TRUSTED WATER SEAL FLASHINGS
FEATURING SHED & SEAL TECHNOLOGY



YOUR COMPLETE SOLUTION
Flashings, lags, continuous slot L-Feet and hardware



CONVENIENT 10 PACKS
Packaged for speed and ease of handling

THE COMPLETE ROOF ATTACHMENT SOLUTION

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

FLASHKIT PRO

INSTALLATION GUIDE



FLASHKIT PRO IS THE COMPLETE FLASHING AND ATTACHMENT SOLUTION FOR COMPOSITION ROOFS.



INSTALL **FLASHKIT PRO** FLASHING



INSTALL L-FOOT



ATTACH L-FOOT TO RAIL

PRE-INSTALL

- Locate roof rafters and snap chalk lines to mark the installation point for each roof attachment.
- Drill a 7/32" pilot hole at each roof attachment. Fill each pilot hole with sealant.

STEP 1 INSTALL FLASHKIT PRO FLASHING

- Add a U-shaped bead of roof sealant to the underside of the flashing with the open side of the U pointing down the roof slope. Slide the aluminum flashing underneath the row of shingles directly up slope from the pilot hole as shown. Align the indicator marks on the lower end of the flashing with the chalk lines on the roof to center the raised hole in the flashing over the pilot hole in the roof. When installed correctly, the flashing will extend under the two courses of shingles above the pilot hole.

STEP 2 INSTALL L-FOOT

- Fasten L-foot and Flashing into place by passing the included lag bolt and pre-installed stainless steel-backed EPDM washer through the L-foot EPDM grommet, and the raised hole in the flashing, into the pilot hole in the roof rafter.

- Drive the lag bolt down until the L-foot is held firmly in place. It is normal for the EPDM on the underside of the stainless steel backed EPDM washer to compress and expand beyond the outside edge of the steel washer when the proper torque is applied.

TIP:

- Use caution to avoid over-torquing the lag bolt if using an impact driver.
- Repeat Steps 1 and 2 at each roof attachment point.

STEP 3 ATTACH L-FOOT TO RAIL

- Insert the included 3/8"-16 T-bolts into the lower slot on the Rail (sold separately), spacing the bolts to match the spacing between the roof attachments.
- Position the Rail against the L-Foot and insert the threaded end of the T-Bolt through the continuous slot in the L-Foot. Apply anti-seize to bolt threads to prevent galling of the T-bolt and included 3/8" serrated flange nut. Place the 3/8" flange nut on the T-bolt and finger tighten. Repeat STEP 3 until all L-Feet are secured to the Rail with a T-bolt. Adjust the level and height of the Rail and torque each bolt to 30ft-lbs.

FASTER INSTALLATION. 25-YEAR WARRANTY.

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EQUIPMENT SPEC SHEETS

PV5.4

The right way to attach solar PV to trapezoidal roof profiles!

S-5![®]

The Right Way![™]

NEW

**NOW AVAILABLE
IN ALUMINUM**

ProteaBracket[™]

ProteaBracket[™]

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket[™] is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket* can be used for rail mounting or "direct-attach" with S-5! PVKIT[™]

Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot[™]
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*



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



*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

*See www.S-5.com for details.

S-5![®]

The Right Way![™]

ProteaBracket[™] is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

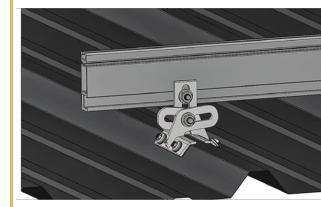
ProteaBracket[™] is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

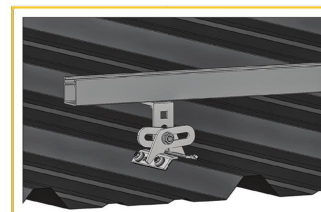
For design assistance, ask your distributor, or visit www.S-5.com for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5![®] holding strength is unmatched in the industry.

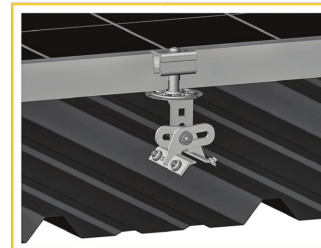
Multiple Attachment Options:



Side Mount Rail



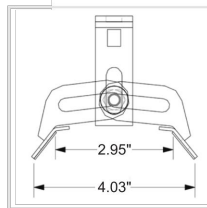
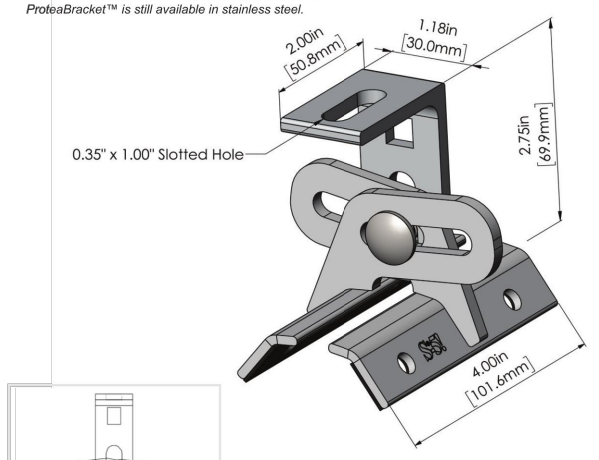
Bottom Mount Rail



w/S-5!
PVKIT[™]
(rail-less)

ProteaBracket[™]

ProteaBracket[™] is still available in stainless steel.



ProteaBracket fits profiles up to 3 inches

INSTALLATION:

- No surface preparation needed.** (1) Wipe away excess oil and debris. (2) Peel off adhesive release paper. (3) Align and mount bracket directly onto crown of panel. (4) Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket[™] and the S-5! PVKIT[™] 2.0 mounted on a trapezoidal roof profile

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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ENGINEER:



MODEL ENERGY

300 FAYETTEVILLE ST.
#1430

RALEIGH, NC 27602
919-274-9905

MODELENERGY.COM

P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM

16.400 kW DC INPUT

12.600 kW AC EXPORT

Richard Stump

101 N 12th St, Erwin,
NC 28339

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CLIENT:



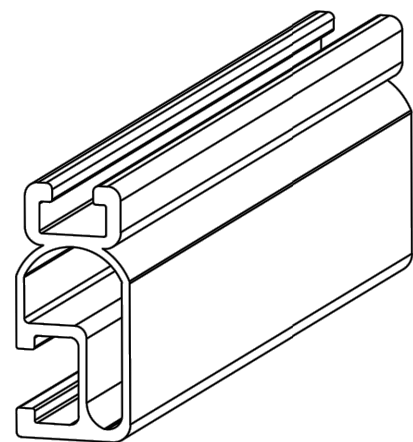
ISSUED FOR: DATE:

CONSTRUCTION V1-07/12/23

V2-07/20/23

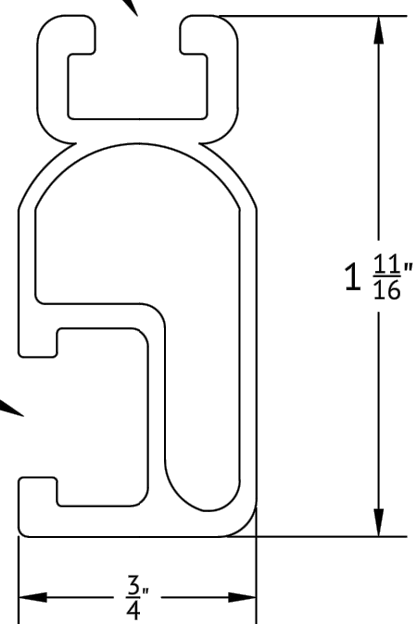
EQUIPMENT
SPEC SHEETS

PV5.5



1/4" BOLT LOCATION

3/8" BOLT LOCATION



UNIRAC
 1411 BROADWAY BLVD NE
 ALBUQUERQUE, NM 87102 USA
 WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	LIGHT RAIL
REVISION DATE:	APRIL 2016

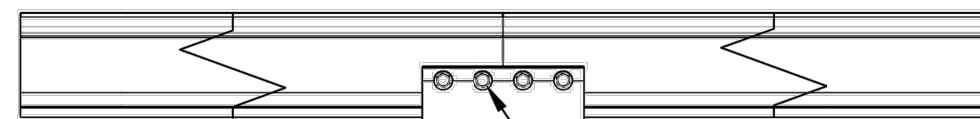
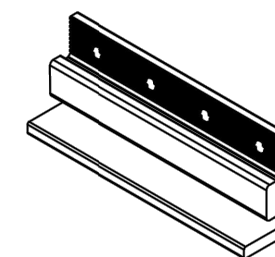
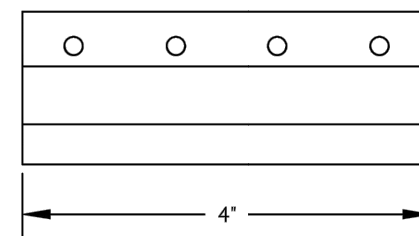
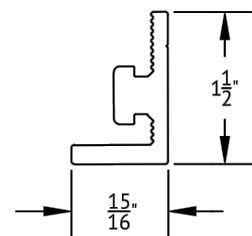
DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE
 OR MORE US PATENTS

LEGAL NOTICE

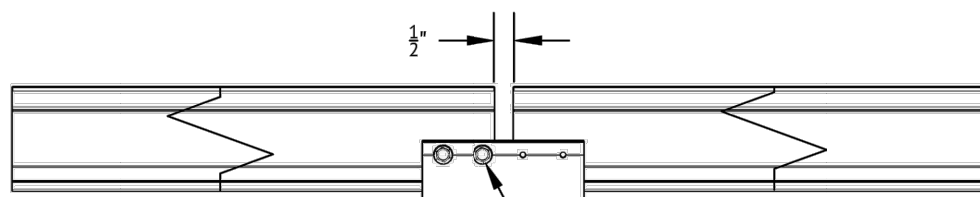
SM-P02
 SHEET

BONDING SPLICE BAR



#12 X 3/4" SELF DRILLING SS SCREWS INCLUDED

TYPICAL SPLICE BAR DETAIL



NOTE THAT ONLY 2 SCREWS ARE
 USED AT AN EXPANSION JOINT.
 THE SPLICE BAR DOES NOT BOND
 ACROSS AN EXPANSION JOINT.

TYPICAL EXPANSION JOINT DETAIL

UNIRAC
 1411 BROADWAY BLVD NE
 ALBUQUERQUE, NM 87102 USA
 WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	BONDING SPLICE BAR
REVISION DATE:	APRIL 2016

DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE
 US PATENTS

LEGAL NOTICE

SM-A01
 SHEET

ENGINEER:

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 RALEIGH, NC 27602
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 NC 28339

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CLIENT:

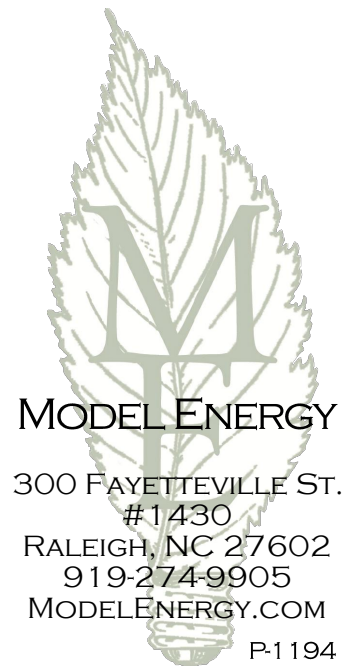


ISSUED FOR:	DATE:
CONSTRUCTION	V1-07/12/23
	V2-07/20/23

EQUIPMENT
 SPEC SHEETS

PV5.6

Customer: Richard Stump
Installer: SmartSun
Subject: PV System Structural Compliance
Date: 07/12/23



To whom it may concern:

Model Energy, PLLC has reviewed the installation details of the proposed PV system that is to be installed by SmartSun at 101 N 12th St, Erwin, NC 28339. The conditions of the existing structure have been reviewed and validated by Model Energy, PLLC. The existing roof structure has been designed to support the additional loads of the proposed PV system. In addition, the racking and fastening system shall be capable of securing the system to the structure under design conditions when installed properly and in accordance with the racking and fastening arrangement detailed within the accompanying permit set. The installation design is compliant with current 2018 North Carolina state and national building codes.

Thank you,

Andrew King, PE

