GENERAL NOTES - COMMERCIAL SOLAR PV SYSTEM

2.1.1 SITE NOTES:

2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE PER MANUFACTURER SPECIFICATIONS.
2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER NEC 110.26.
2.1.6 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH APPLICABLE BUILDING CODE AND APPROVED MANUFACTURER'S INSTRUCTIONS.
2.1.7 PV ARRAY INSTALLATION SHALL COMPLY WITH IFC 2015 SECTION 605.11 FOR FIRE DEPARTMENT ACCESS AND ROOFTOP PATHWAYS.

2.2.1 EQUIPMENT LOCATIONS:
2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AND WORKING CLEARANCES AS REQUIRED BY NEC 110.26.
2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT OR WET LOCATIONS MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AND ENVIRONMENTAL CONDITIONS AS SPECIFIED BY NEC 690.31.
2.2.4 JUNCTION AND PULL BOXES PERMITTED TO BE INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
2.2.5 ADDITIONAL DISCONNECT(S) SHALL BE PROVIDED WHERE INVERTER(S) ARE NOT WITHIN SIGHT OF THE SERVICE DISCONNECT OR AS REQUIRED BY AHJ.
2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO APPLICABLE NEC REQUIREMENTS.
2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 STRUCTURAL NOTES:

2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL AND STRUCTURAL CALCULATIONS APPROVED BY A LICENSED PROFESSIONAL ENGINEER.
2.3.3 ROOF ATTACHMENTS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ATTACHMENT SPACING SHALL NOT EXCEED MAXIMUM SPAN DISTANCE SPECIFIED BY RACKING MANUFACTURER.
2.3.4 ALL ROOF PENETRATIONS FOR RACKING ATTACHMENTS, CONDUIT, OR JUNCTION BOXES SHALL BE PROPERLY FLASHED AND SEALED WITH APPROVED MATERIALS PER MANUFACTURER'S INSTRUCTIONS.
2.3.5 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS TO DISTRIBUTE STRUCTURAL LOADS.

2.4.1 WIRING & CONDUIT NOTES:
2.4.2 ALL CONDUIT, WIRE, AND RACEWAYS WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.
2.4.3 CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.8 (CIRCUIT SIZING AND CURRENT), NEC 690.7 (MAXIMUM VOLTAGE), AND NEC 310.15 (AMPACITY).
2.4.4 VOLTAGE DROP SHALL BE LIMITED TO 2% FOR FEEDER CIRCUITS AND 3% COMBINED FOR FEEDER AND BRANCH CIRCUITS, OR AS SPECIFIED BY DESIGN.
2.4.5 DC CIRCUIT WIRING SHALL BE CONTAINED WITHIN METALLIC CONDUIT, METAL ENCLOSURE, OR SUITABLE RACEWAY AS REQUIRED BY NEC 690.31.
2.4.6 AC CONDUCTORS SHALL BE COLORED OR PERMANENTLY MARKED AS FOLLOWS PER NEC 200.6 AND 210.5:
PHASE A (L1) - BLACK
PHASE B (L2) - RED
PHASE C (L3) - BLUE
NEUTRAL - WHITE OR GRAY
GROUND - GREEN OR GREEN WITH YELLOW STRIPE
IN 4-WIRE DELTA SYSTEMS, THE HIGH LEG SHALL BE IDENTIFIED WITH ORANGE COLOR [NEC 110.15(B)].

2.5.1 GROUNDING & BONDING NOTES:

2.5.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE. GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR WET LOCATIONS.
2.5.3 PV SYSTEM EQUIPMENT GROUNDING SHALL BE INSTALLED IN ACCORDANCE WITH NEC 690.43 AND NEC 690.45.
2.5.4 EQUIPMENT GROUNDING CONDUCTORS (EGC) SHALL BE SIZED PER NEC 250.122 BASED ON THE RATING OF THE OVERCURRENT PROTECTIVE DEVICE.
2.5.5 METAL ENCLOSURES, RACEWAYS, JUNCTION BOXES, INVERTER ENCLOSURES, AND COMBINER BOXES SHALL BE BONDED AND GROUNDED PER NEC 250.86 AND 250.134.
2.5.6 MODULE FRAMES AND MOUNTING STRUCTURE SHALL BE BONDED AND GROUNDED USING LISTED EQUIPMENT GROUNDING CONDUCTORS OR LISTED GROUNDING DEVICES PER MANUFACTURER'S INSTRUCTIONS AND NEC 690.43.
2.5.7 GROUNDING ELECTRODE SYSTEM SHALL COMPLY WITH NEC 690.47(C) AND NEC 250.50. IF EXISTING GROUNDING ELECTRODE SYSTEM IS INACCESSIBLE OR INADEQUATE, ADDITIONAL ELECTRODES SHALL BE INSTALLED PER NEC 250.52 AND 250.53.
2.5.8 EQUIPMENT GROUNDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED WITH GREEN TAPE. CONDUCTORS LARGER THAN #6 AWG MAY BE IDENTIFIED AT TERMINATIONS [NEC 250.119].
2.5.9 GROUND-FAULT PROTECTION SHALL BE PROVIDED AS REQUIRED BY NEC 690.5 TO REDUCE FIRE HAZARDS.

2.6.1 DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:

2.6.2 DISCONNECTING MEANS SHALL BE PROVIDED FOR ALL UNGROUNDED CONDUCTORS IN ACCORDANCE WITH NEC 690.13 AND NEC 690.15.
2.6.3 DISCONNECTS SHALL BE WIRED SUCH THAT WHEN OPENED, THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE" OR "SOURCE" (TYPICALLY UPPER TERMINALS).
2.6.4 DISCONNECTS SHALL BE READILY ACCESSIBLE, EXTERNALLY OPERABLE, AND INDICATE WHETHER IN OPEN OR CLOSED POSITION [NEC 690.17].
2.6.5 PV SYSTEM DISCONNECTING MEANS SHALL BE LOCKABLE IN THE OPEN POSITION AND PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM DISCONNECT [NEC 690.17].
2.6.6 RAPID SHUTDOWN SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH NEC 690.12 TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS. CONTROLLED CONDUCTORS SHALL BE LIMITED TO 80 VOLTS OR LESS WITHIN 10 SECONDS OF RAPID SHUTDOWN INITIATION.
2.6.7 OVERCURRENT PROTECTION DEVICES (OCPD) SHALL BE RATED AND SIZED IN ACCORDANCE WITH NEC 690.8(B), 690.9, AND NEC ARTICLE 240.
2.6.8 INVERTER OUTPUT CIRCUIT CONDUCTORS SHALL BE PROTECTED BY OVERCURRENT DEVICES RATED PER NEC 690.8(B)(1) AND INVERTER MANUFACTURER'S SPECIFICATIONS.

2.7.1 INTERCONNECTION NOTES:

2.7.2 INTERCONNECTION OF ELECTRIC POWER PRODUCTION SOURCES SHALL BE IN ACCORDANCE WITH NEC ARTICLE 705.
2.7.3 UTILITY-INTERACTIVE INVERTER(S) SHALL BE LISTED TO UL 1741 AND SHALL COMPLY WITH IEEE 1547 STANDARD FOR INTERCONNECTING DISTRIBUTED RESOURCES.
2.7.4 POWER PRODUCTION SOURCES SHALL NOT BE CONNECTED TO PREMISES WIRING UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE LOCAL UTILITY COMPANY.

--- LOAD-SIDE INTERCONNECTION ---
2.7.5 LOAD-SIDE CONNECTIONS SHALL COMPLY WITH NEC 705.12(D)(2): SUM OF 125% OF INVERTER(S) OUTPUT CIRCUIT CURRENT AND RATING OF MAIN OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUS OR CONDUCTOR.
2.7.6 WHERE TWO SOURCES SUPPLY A BUSBAR, THE SUM OF 125% OF INVERTER OUTPUT CURRENT PLUS THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120% OF THE BUSBAR AMPACITY [NEC 705.12(D)(2)]. THE INVERTER OUTPUT CIRCUIT BREAKER SHALL BE POSITIONED AT THE OPPOSITE END FROM THE INPUT FEEDER LOCATION.
2.7.7 BACKFED CIRCUIT BREAKERS SHALL BE SECURED IN PLACE BY AN ADDITIONAL FASTENER OR BE IDENTIFIED AS SUITABLE FOR BACKFEED OPERATION [NEC 705.12(D)(5)].

--- SUPPLY-SIDE INTERCONNECTION ---
2.7.8 SUPPLY-SIDE CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC 705.11.
2.7.9 SUPPLY-SIDE INTERCONNECTION CONDUCTORS SHALL BE SIZED PER NEC 705.28 AND SHALL NOT BE SMALLER THAN SERVICE ENTRANCE CONDUCTORS WHERE THEY SERVE THE SAME FUNCTION.
2.7.10 OVERCURRENT PROTECTION FOR SUPPLY-SIDE CONNECTIONS SHALL BE PROVIDED IN ACCORDANCE WITH NEC 705.30.

2.8.1 LABELING AND MARKING REQUIREMENTS:

2.8.2 PV SYSTEM DC DISCONNECT SHALL BE PERMANENTLY MARKED "PHOTOVOLTAIC SYSTEM DISCONNECT" [NEC 690.17].
2.8.3 RAPID SHUTDOWN INITIATION DEVICE OR MAIN SERVICE DISCONNECT SHALL BE MARKED WITH LOCATION AND INSTRUCTIONS FOR INITIATING RAPID SHUTDOWN [NEC 690.12(B)(2)].
2.8.4 MAIN SERVICE PANEL SHALL BE MARKED WITH A PERMANENT LABEL INDICATING PRESENCE OF MULTIPLE POWER SOURCES PER NEC 705.12.
2.8.5 POINT OF INTERCONNECTION SHALL BE FIELD-MARKED WITH RATED OUTPUT CURRENT AND VOLTAGE OF INVERTER(S).
2.8.6 ALL LABELS SHALL BE REFLECTIVE, WEATHER-RESISTANT, AND PERMANENTLY AFFIXED.

SYMBOL LEGEND

E	MAIN ENTRANCE DOOR	CBR	COMBINER BOX	M	(E) UTILITY METER
MEP	MAIN ELECTRICAL PANEL	TB	TAP BOX	V	PV REVENUE METER
JB	JUNCTION BOX	SUB	SUB (AC) PANEL	U	UTILITY POLE
S	AC DISCONNECT	MM	METER/MAIN	A	MODULE STRINGING
INV	OC/AC INVERTER	RSD	RAPID SHUTDOWN	B	MODULE STRINGING
DCSW	DC DISCONNECT	CBR	(DC) COMBINER BOX	C	MODULE STRINGING
PNL	AC PANELBOARD			D	MODULE STRINGING

FENCE
PROPERTY LINE
SETBACK
ROOF RAFTERS
MODULE STRINGING
EQUIPMENT GROUND
CONDUIT
FIRE CLEARANCE

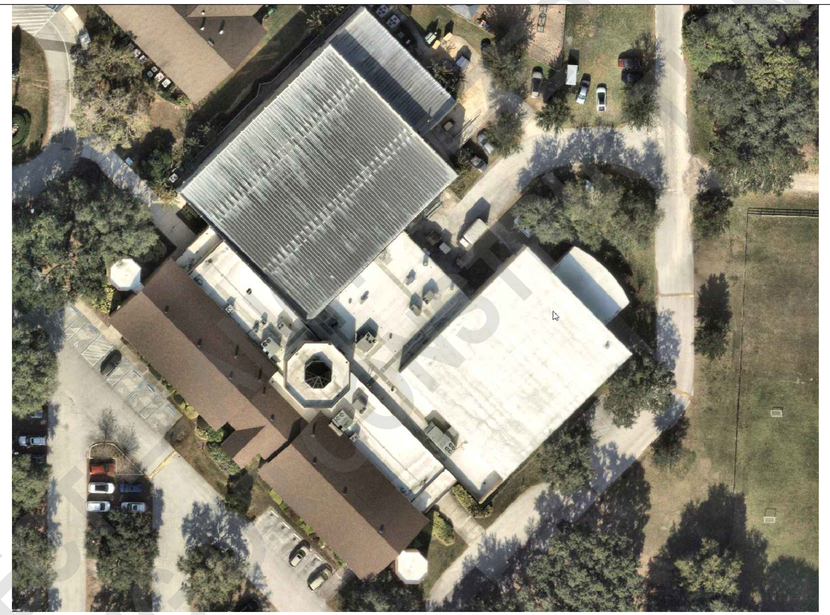
SOLAR (PV) MODULE
SHEET KEYNOTE INDICATOR
NORTH INDICATOR

DISCLAIMER: PLEASE NOTE THAT THE ABBREVIATIONS, ANNOTATIONS, AND SYMBOLS LISTED ARE INTENDED TO ILLUSTRATE THOSE THAT ARE COMMONLY USED; NOT ALL ARE NECESSARILY UTILIZED WITHIN THIS SET OF DRAWINGS.

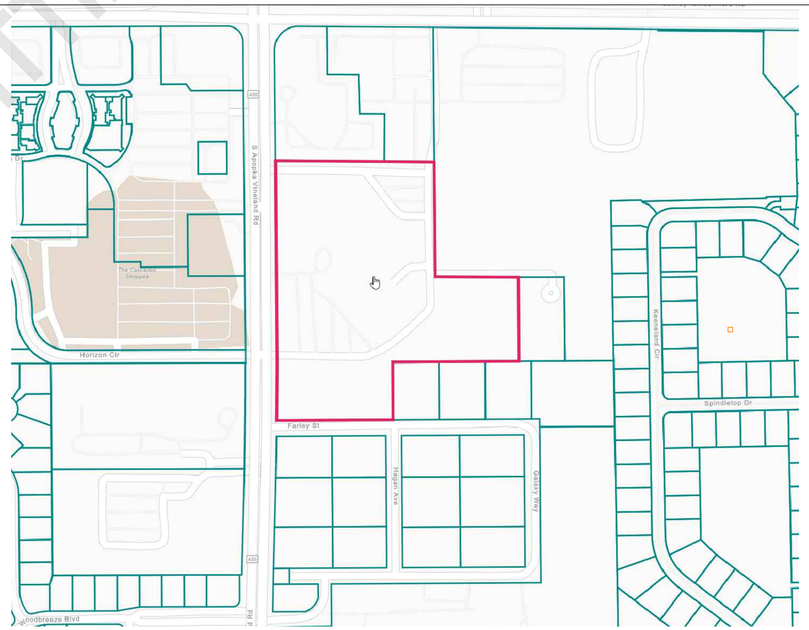
NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX,
XXXXXX, XX XXXXX
ASSESSOR'S #: XXXXXXXXX



01 G-1 AERIAL PHOTO



02 G-1 VICINITY MAP

SHEET LIST TABLE

SHEET NUMBER	SHEET TITLE
G-1	COVER SHEET
A-1	SITE PLAN
A-2	PV ROOF PLAN
A-3	SOLAR ATTACHMENT PLAN
E-1	SINGLE LINE DIAGRAM
E-2	ELECTRICAL TABLES & LABELS
S-1	MOUNTING DETAILS
S-2	MOUNTING DETAILS
D-1	DATASHEET
D-2	DATASHEET
D-3	DATASHEET
D-4	DATASHEET
D-5	DATASHEET

PROJECT INFORMATION

OWNER
NAME: XXXXXXXX

PROJECT MANAGER
NAME: XXXXXXXX
PHONE: XXXXXXXX

CONTRACTOR
NAME: XXXXX
PHONE: XXXXXXXX

AUTHORITIES HAVING JURISDICTION
BUILDING: XXXXXXXX
ZONING: XXXXXXXX
UTILITY: XXXXXXXX

DESIGN SPECIFICATIONS
OCCUPANCY: GROUP A-3
CONSTRUCTION: TYPE III-B
ZONE DISTRICT: COMMERCIAL
GROUND SNOW LOAD: 0 PSF
WIND EXPOSURE: B
WIND SPEED: 137 MPH
FIRE SPRINKLERS: YES
BUILDING HEIGHT: ~35'

APPLICABLE CODES & STANDARDS
BUILDING: FBC 2023/ASCE 7-22
ELECTRICAL: NEC 2020
FIRE: FFPC, 8TH ED. (2023)/NFPA 1 2021 ED

SQUARE FOOTAGE OF ROOF: 59291.08 SQ. FT.
SQUARE FOOTAGE OF ARRAY: 14931.71 SQ. FT.
PERCENTAGE OF ROOF SPACE USED BY SOLAR PV ARRAYS 25.18%

SCOPE OF WORK
SYSTEM SIZE: STC: 180 x 440W = 79.2kW [INV-1],
110 x 550W = 60.5kW [INV-1],
291 x 550W = 160.05kW [INV-2]
PTC: 180 X 417.5W = 75.15KW [INV-1],
110 X 512.6W = 56.386KW [INV-1],
291 X 512.6W = 149.167KW [INV-2]
(180) HYUNDAI ENERGY SOLUTIONS HiN-T440NF(BK) [INV-1],
(110) LONGI SOLAR LR5-72HIH-550M [INV-1]
(291) LONGI SOLAR LR5-72HIH-550M [INV-2]
(2) SOLAR EDGE SE120KUS (277/480V)

ATTACHMENT TYPE: S-5! S-5-U CLAMP, ULTRAFOOT RAFTER
MSP UPGRADE: NO

LOGO

CONTRACTOR
XXXXX
ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX
PHONE: XXXXXXXX
LIC. NO.: XXXXXXXX

PROJECT
NEW PV SYSTEM: 299.750 kWp
XXXXXXXX
1111 XXXXXXXX, XXXXXX, XX XXXXX
APN: XXXXXXXXX

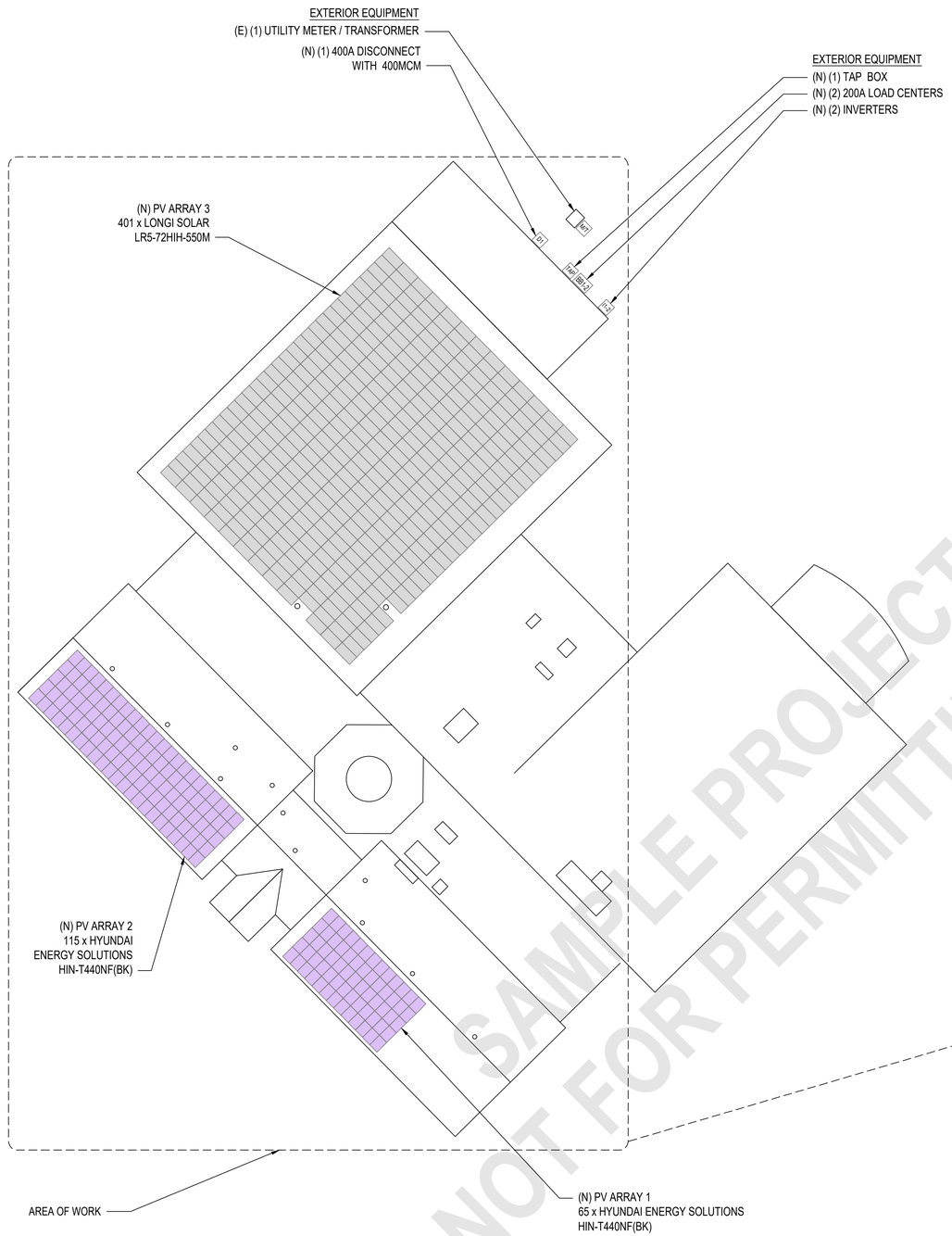
ENGINEER OF RECORD

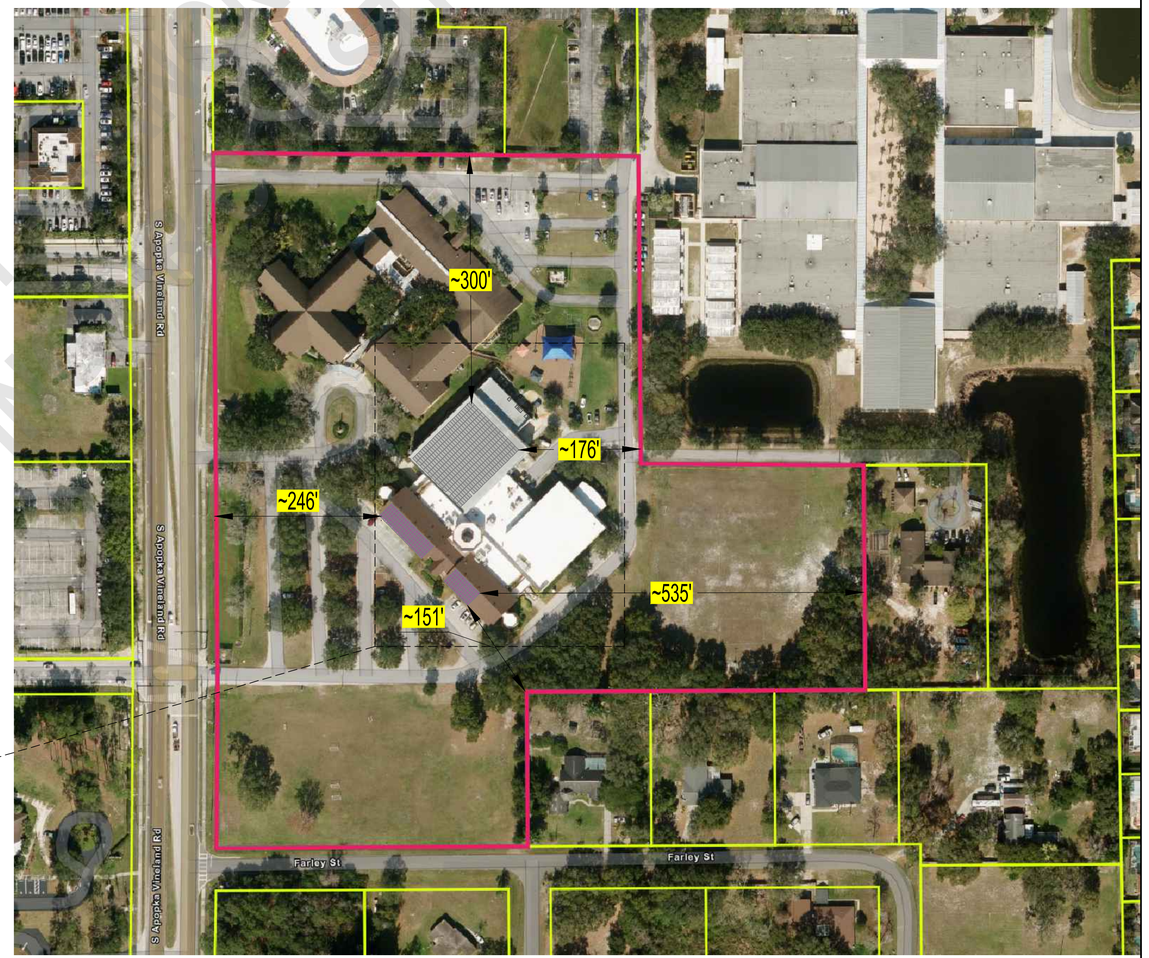
REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: COVER SHEET
DATE: 06.19.2026
DESIGN BY: V.G.
SHEET NUMBER: G-1





GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. SEE SHEET T-001 FOR LEGEND OF SYMBOLS
3. FIELD VERIFY EQUIPMENT LOCATIONS

01 A-1 SITE PLAN
1/24" = 1'-0"
0 12' 24'

N W E S

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: SITE PLAN

DATE: 06.19.2026

DESIGN BY: V.G.

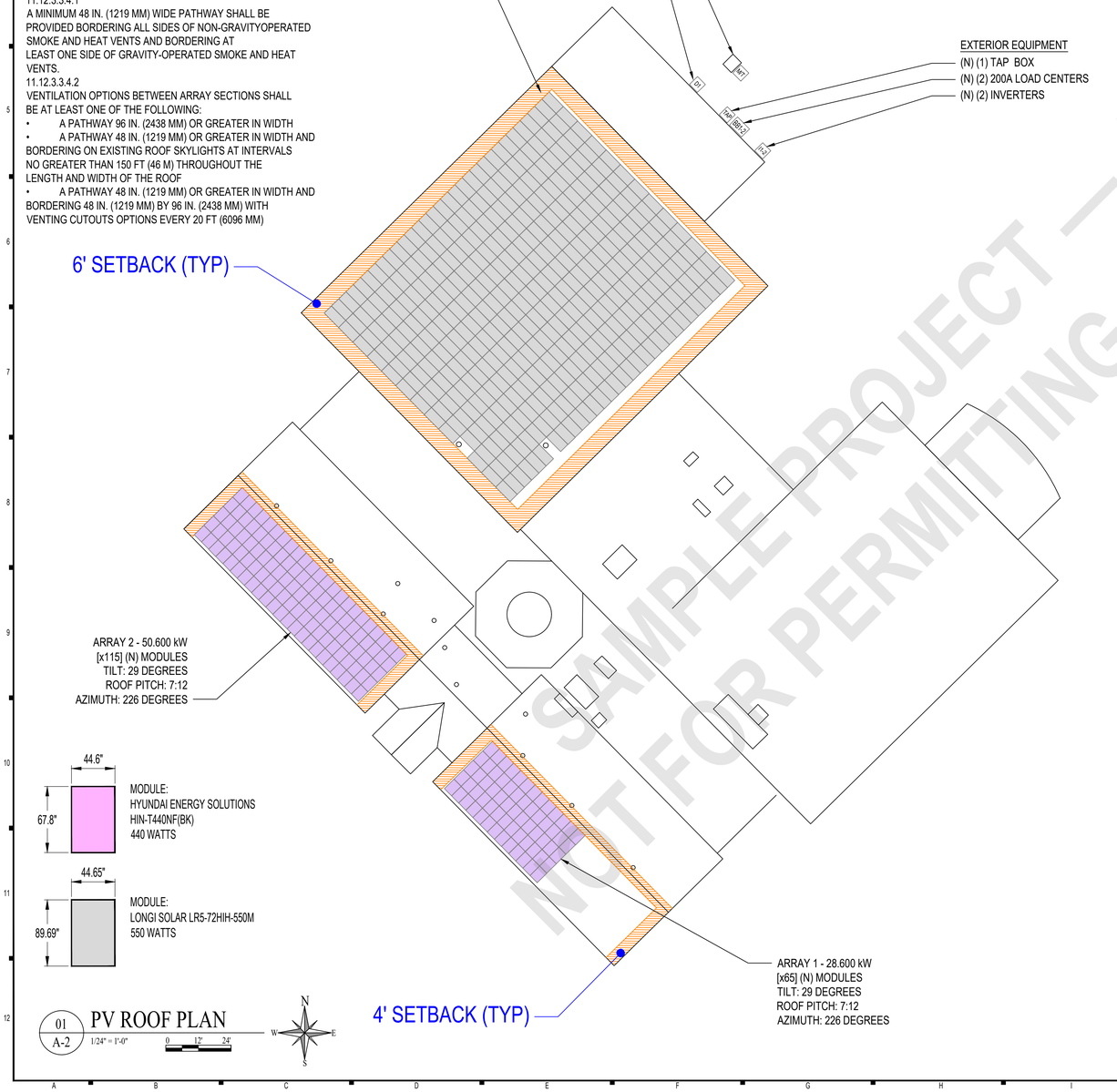
SHEET NUMBER: A-1

PATHWAY NOTES (COMMERCIAL)
NFPA 1 11.12.3.3 COMMERCIAL BUILDINGS
11.12.3.3.2 PERIMETER PATHWAYS
11.12.3.3.2.1
A MINIMUM 48 IN. (1219 MM) WIDE PERIMETER PATHWAY SHALL BE PROVIDED AROUND THE EDGES OF THE ROOF FOR BUILDINGS WITH A LENGTH OR WIDTH OF 250 FT (76.2 M) OR LESS ALONG EITHER AXIS.
11.12.3.3.2.2
A MINIMUM 6 FT (1829 MM) WIDE PERIMETER PATHWAY SHALL BE PROVIDED AROUND THE EDGES OF THE ROOF FOR BUILDINGS HAVING LENGTH OR WIDTH GREATER THAN 250 FT (76.2 M) ALONG EITHER AXIS.
11.12.3.3.3 OTHER PATHWAYS
PATHWAYS SHALL BE OVER AREAS CAPABLE OF SUPPORTING FIREFIGHTERS ACCESSING THE ROOF AND SHALL BE PROVIDED BETWEEN ARRAY SECTIONS AS FOLLOWS:

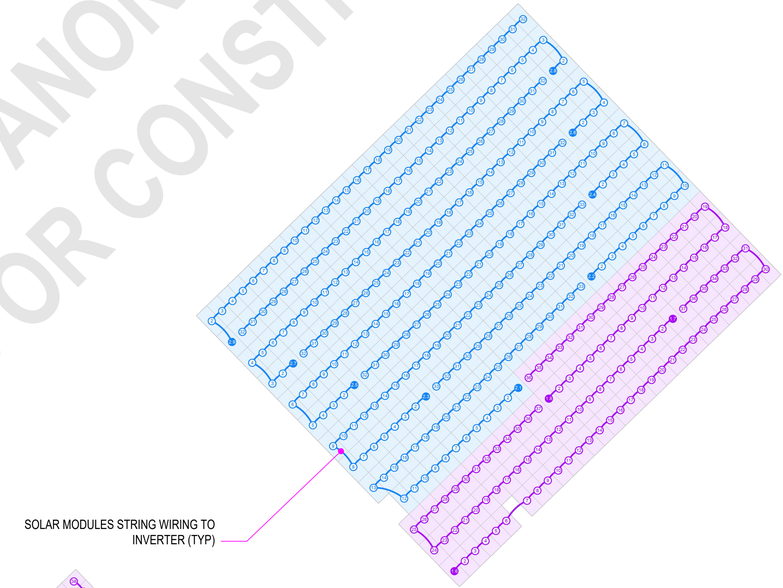
- PATHWAYS SHALL BE PROVIDED IN A STRAIGHT LINE 48 IN. (1219 MM) OR GREATER IN WIDTH TO ALL VENTILATION HATCHES AND ROOF STANDPIPES.
- PATHWAYS SHALL BE PROVIDED 48 IN. (1219 MM) OR GREATER IN WIDTH AROUND ROOF ACCESS HATCHES WITH AT LEAST ONE 48 IN. (1219 MM) OR GREATER IN WIDTH PATHWAY TO THE PARAPET OR ROOF EDGE.
- PATHWAYS SHALL BE PROVIDED AT INTERVALS NO GREATER THAN 150 FT (46 M) THROUGHOUT THE LENGTH AND WIDTH OF THE ROOF.

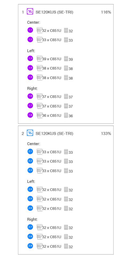
11.12.3.3.4 SMOKE VENTILATION
11.12.3.3.4.1
A MINIMUM 48 IN. (1219 MM) WIDE PATHWAY SHALL BE PROVIDED BORDERING ALL SIDES OF NON-GRAVITYOPERATED SMOKE AND HEAT VENTS AND BORDERING AT LEAST ONE SIDE OF GRAVITY-OPERATED SMOKE AND HEAT VENTS.
11.12.3.3.4.2
VENTILATION OPTIONS BETWEEN ARRAY SECTIONS SHALL BE AT LEAST ONE OF THE FOLLOWING:

- A PATHWAY 96 IN. (2438 MM) OR GREATER IN WIDTH
- A PATHWAY 48 IN. (1219 MM) OR GREATER IN WIDTH AND BORDERING ON EXISTING ROOF SKYLIGHTS AT INTERVALS NO GREATER THAN 150 FT (46 M) THROUGHOUT THE LENGTH AND WIDTH OF THE ROOF
- A PATHWAY 48 IN. (1219 MM) OR GREATER IN WIDTH AND BORDERING 48 IN. (1219 MM) BY 96 IN. (2438 MM) WITH VENTING CUTOUTS OPTIONS EVERY 20 FT (6096 MM)



01 A-2 PV ROOF PLAN
1/24" = 1'-0"
0 12" 24"





GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. SEE SHEET T-001 FOR LEGEND OF SYMBOLS
3. FIELD VERIFY EQUIPMENT LOCATIONS

LOGO

CONTRACTOR
XXXXX
ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX
PHONE: XXXXXXXXX
LIC. NO.: XXXXXXXX

PROJECT
NEW PV SYSTEM: 299.750 kWp
XXXXXXXX
1111 XXXXXXXX, XXXXXX, XX XXXXX
APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: PV ROOF PLAN

DATE: 06.19.2026
DESIGN BY: V.G.

SHEET NUMBER: A-2

STRUCTURAL WIND LOAD SUMMARY — ASCE 7-22 (ASD Load Combination: 0.6D + 0.6W)							
STRUCT	ARRAYS	PRESET	ZONES TESTED	GOV	CLAMP D/A (lbs)	ANCHOR D/A (lbs)	STATUS
1	Array 1, Array 2 (180 mod)	ULTRAFOOT RAFTER	Interior, Edge, Corner	Corner	208 / 898	445 / 1325	PASS
2	Array 3 (401 mod)	S-5! S-5-U Clamp	Interior, Edge, Corner	Corner	188 / 300	402 / 300	FAIL

STRUCTURE 1 — governing zone: Corner

Arrays: Array 1, Array 2 | Modules: 180 | Preset: ULTRAFOOT RAFTER

Structure 1 — Per-zone Comparison

ZONE	GCp	PRESSURE (psf)	CLAMP D/A (lbs)	ANCHOR D/A (lbs)	STATUS
Interior	-0.9	9.96	69 / 898	148 / 1325	PASS
Edge	-1.3	21.58	150 / 898	321 / 1325	PASS
Corner (GOV)	-1.8	29.88	208 / 898	445 / 1325	PASS

Technical Parameters	
Solar Panel Size	89.69 x 44.65 in
Panel Weight	60.63 lbs
Panel Area	27.81 sq ft
Basic Wind Speed (V)	137.0 mph
Panel Height (h2)	5.0 in
Mean Roof Height	35.0 ft
Dominant Roof Slope	0 - 29.0 deg

Velocity Pressure	
qh Formula	0.00256 Kz Kzt Ka V2
Kz	0.73
Kzt	1.0
Ke	0.9641
V	137.0 mph
qh	34.87 psf

IBC 2024/IRC 2024/ASCE 7-22 Pressure Calculations

(G Cp)	-1.8	External pressure coef.
Kd	0.85	
Ya	1.5	Array edge factor
Ya	0.6223	Equalization factor
Strength Wind Pressure	qh x Kd x GCp x Ye x Ya = 49.8 psf	Eq. 29.4-7
ASD Wind Pressure	0.6 x p = 29.88 psf	used for attachment check
Uplift Force (F)	29.88 psf x 27.81 sq ft = 830.97 lbs	Total per panel

Uplift - Clamp

Clamps per Panel	4
Uplift per Clamp	830.97 lbs / 4 = 207.74 lbs demand
Clamp Allowable	898.0 lbs (PASS)

Dead Loads

Distributed Load	2.18 psf
Point Load	15.16 lbs

Load Combinations (ASD per ASCE 7-22 Sec 2.4)

COMBINATION	VALUE (psf)	STATUS
W = strength-level wind pressure; 0.6 factor applied per ASD load combinations		
LC1: D	2.18	downward
LC2: D + S	2.18	downward
LC3: D + 0.6W	-27.70	net uplift
LC4: D + 0.75 0.6W + 0.75S	-20.23	net uplift
LC5: 0.6D + 0.6W	-28.57	net uplift <-- governing
Net uplift per anchor (LC5): 28.57 psf x 14.88 sq ft = 425.12 lbs		
Anchors must resist 425.12 lbs uplift (see Anchor check)		

Uplift - Anchor (Worst Case)

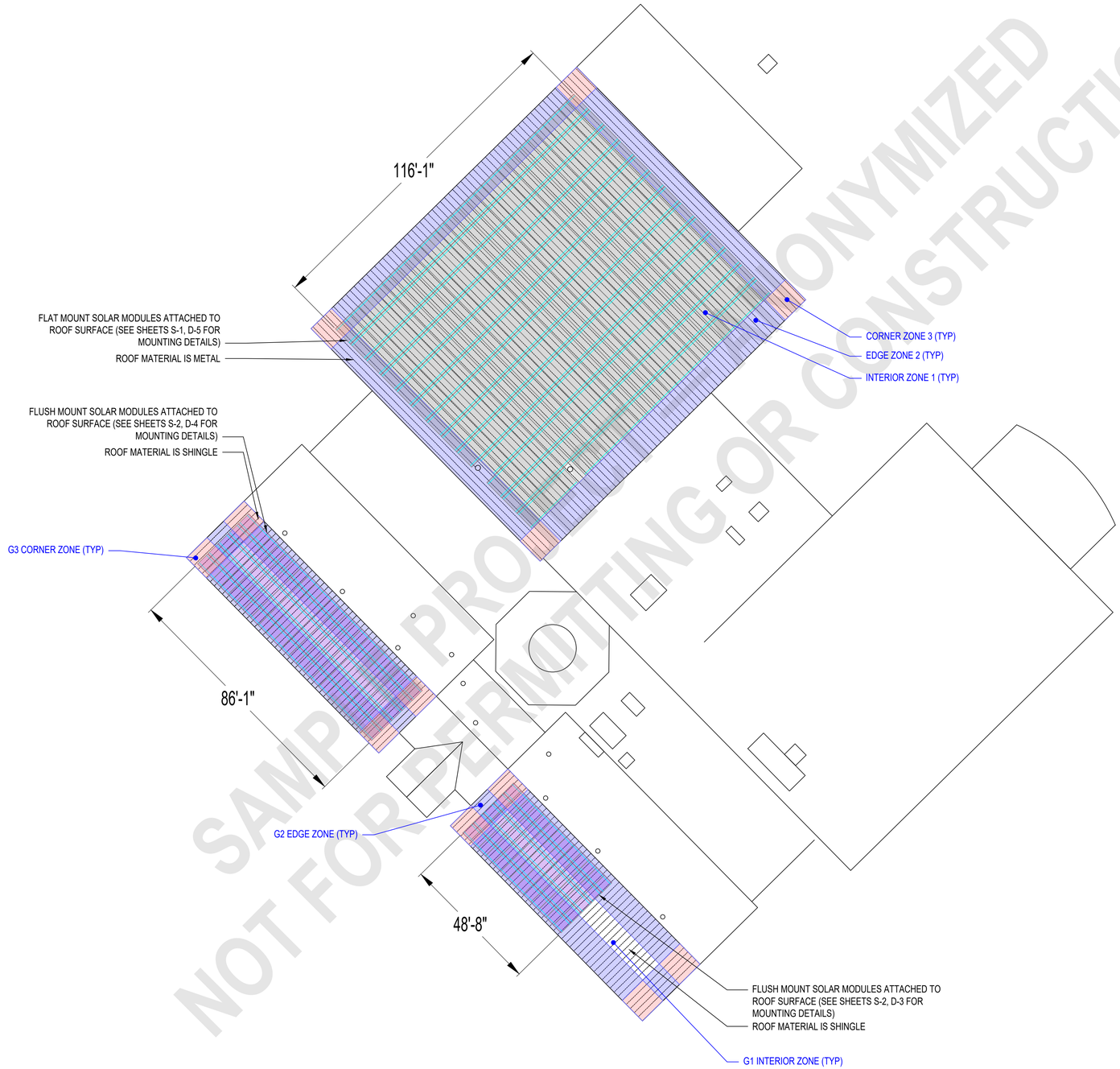
Nom Span	48.0 in
Tributary Area	14.88 sq ft
Uplift per Anchor	29.88 psf x 14.88 sq ft = 444.61 lbs demand (ASD)
Anchor Allowable	1325.0 lbs

System Summary

CHECK	DEMAND vs ALLOWABLE	STATUS
Clamp Uplift	207.74 lbs vs 898.0 lbs	PASS
Anchor Uplift	444.61 lbs vs 1325.0 lbs	PASS SF: 2.98
RESULT	PASS - System adequate per ASCE 7-22	

Zone Dimensions (Gable/Hip roof) -- ASCE 26.2

a formula	a = max(min(0.10W, 0.4h), max(0.04W, 3 ft))
Upper bound	min(0.10W=21.3 ft, 0.4h=14.0 ft) = 14.0 ft
Floor minimum	max(0.04W=8.52 ft, 3 ft) = 8.52 ft
Zone dimension a	14.0 ft (168.0 in) -- governed by upper bound
G2 Edge width	14.0 ft (168.0 in) from array/roof edge
G3 Corner size	14.0 ft x 14.0 ft (168.0 x 168.0 in)
G1 Interior	Remaining array area



01 A-3 SOLAR ATTACHMENT PLAN

1/20" = 1'-0" 0 10' 20'

N W E S

STRUCTURE 2 — governing zone: Corner

Arrays: Array 3 | Modules: 401 | Preset: S-5! S-5-U Clamp

Structure 2 — Per-zone Comparison

ZONE	GCp	PRESSURE (psf)	CLAMP D/A (lbs)	ANCHOR D/A (lbs)	STATUS
Interior	-0.9	9.01	63 / 300	134 / 300	PASS
Edge	-1.3	19.51	136 / 300	290 / 300	PASS
Corner (GOV)	-1.8	27.02	188 / 300	402 / 300	FAIL

Technical Parameters	
Solar Panel Size	89.69 x 44.65 in
Panel Weight	60.63 lbs
Panel Area	27.81 sq ft
Basic Wind Speed (V)	137.0 mph
Panel Height (h2)	5.0 in
Mean Roof Height	25.0 ft
Dominant Roof Slope	0 - 1.0 deg

Velocity Pressure	
qh Formula	0.00256 Kz Kzt Ka V2
Kz	0.66
Kzt	1.0
Ke	0.9941
V	137.0 mph
qh	31.53 psf

IBC 2024/IRC 2024/ASCE 7-22 Pressure Calculations

(G Cp)	-1.8	External pressure coef.
Kd	0.85	
Ya	1.5	Array edge factor
Ya	0.6223	Equalization factor
Strength Wind Pressure	qh x Kd x GCp x Ye x Ya = 45.03 psf	Eq. 29.4-7
ASD Wind Pressure	0.6 x p = 27.02 psf	used for attachment check
Uplift Force (F)	27.02 psf x 27.81 sq ft = 751.43 lbs	Total per panel

Uplift - Clamp

Clamps per Panel	4
Uplift per Clamp	751.43 lbs / 4 = 187.86 lbs demand
Clamp Allowable	300.0 lbs (PASS)

Dead Loads

Distributed Load	2.18 psf
Point Load	15.16 lbs

Load Combinations (ASD per ASCE 7-22 Sec 2.4)

COMBINATION	VALUE (psf)	STATUS
W = strength-level wind pressure; 0.6 factor applied per ASD load combinations		
LC1: D	2.18	downward
LC2: D + S	2.18	downward
LC3: D + 0.6W	-24.84	net uplift
LC4: D + 0.75 0.6W + 0.75S	-18.08	net uplift
LC5: 0.6D + 0.6W	-25.71	net uplift <-- governing
Net uplift per anchor (LC5): 25.71 psf x 14.88 sq ft = 382.56 lbs		
Anchors must resist 382.56 lbs uplift (see Anchor check)		

Uplift - Anchor (Worst Case)

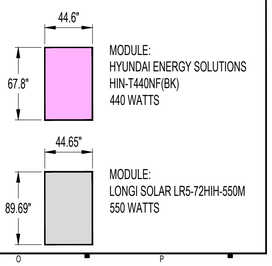
Nom Span	48.0 in
Tributary Area	14.88 sq ft
Uplift per Anchor	27.02 psf x 14.88 sq ft = 402.06 lbs demand (ASD)
Anchor Allowable	300.0 lbs

System Summary

CHECK	DEMAND vs ALLOWABLE	STATUS
Clamp Uplift	187.86 lbs vs 300.0 lbs	PASS
Anchor Uplift	402.06 lbs vs 300.0 lbs	FAIL
RESULT	FAIL - See checks above	

Zone Dimensions (Flat/Low-slope roof) -- ASCE 26.2

a formula	a = max(min(0.10W, 0.4h), max(0.04W, 3 ft))
Upper bound	min(0.10W=21.3 ft, 0.4h=10.0 ft) = 10.0 ft
Floor minimum	max(0.04W=8.52 ft, 3 ft) = 8.52 ft
Zone dimension a	10.0 ft (120.0 in) -- governed by upper bound
Zone 2 Edge width	10.0 ft (120.0 in) from array/roof edge
Zone 3 Corner size	10.0 ft x 10.0 ft (120.0 x 120.0 in)
Zone 1 Interior	Remaining array area



LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX
XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: SOLAR ATTACHMENT PLAN

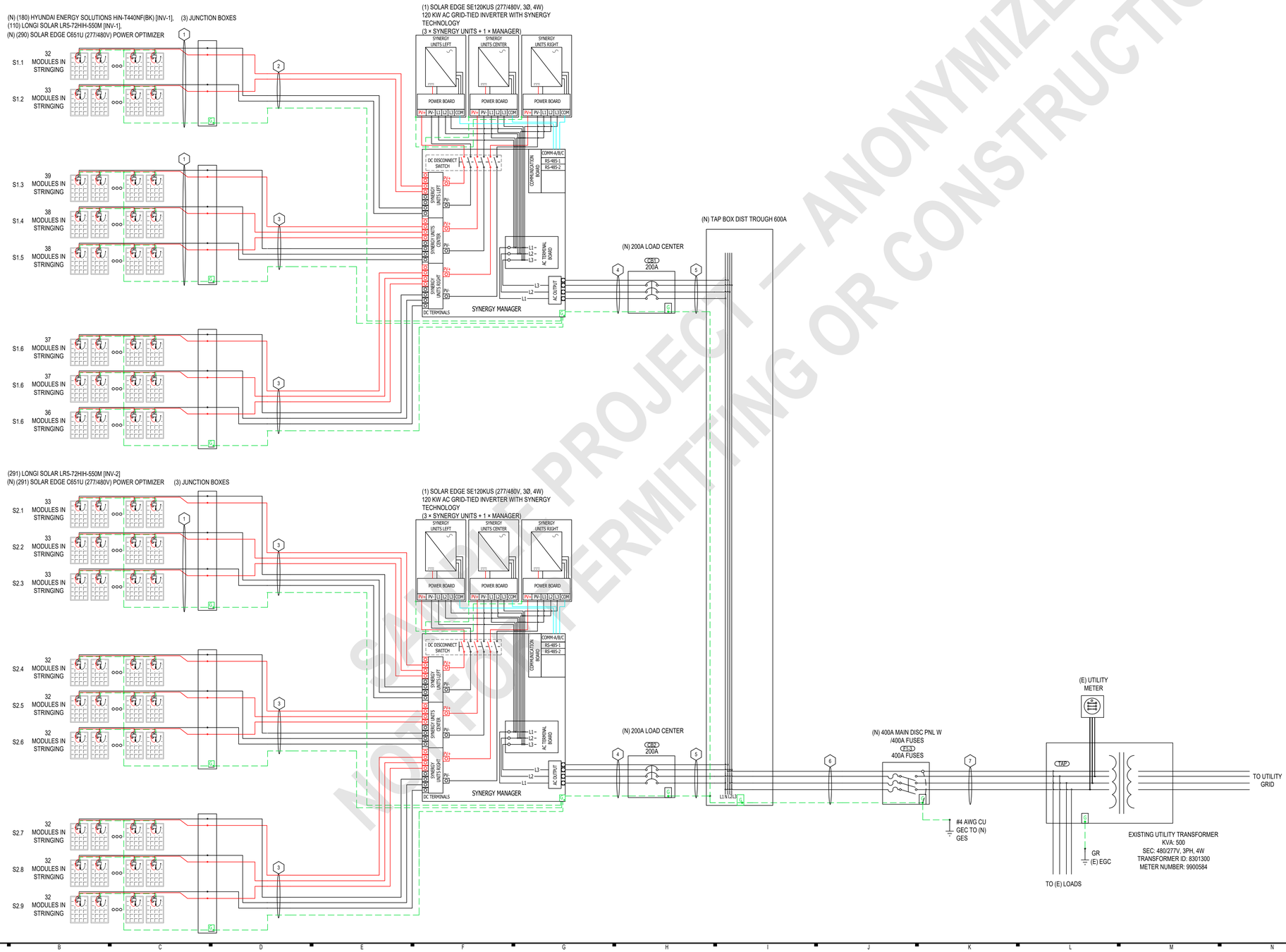
DATE: 06.19.2026

DESIGN BY: V.G.

SHEET NUMBER: A-3

CONDUCTOR AMPACITY & CONDUIT SCHEDULE

ID	TYPICAL	CONDUCTOR	EGC	NEUTRAL	CONDUIT	# C.C. COND.	CONDUIT FILL, %	TEMP. CORR. FACTOR	FILL FACTOR	OCPD	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP. (90°C)	DERATED AMP. (FROM 90°C)	AMP. @ TERMINAL (75°C)	LENGTH	VOLTAGE DROP @ 75°C (NEC T8)
1	17	10 AWG PV WIRE, COPPER	6 AWG BARE, COPPER	—	FREE AIR	2	—	0.96 (34.1 °C)	1	N/A	24A	30A	55A	52.8A	35A	180 FT	1.26%
2	1	10 AWG PV WIRE, COPPER	10 AWG THWN-2, COPPER	—	1" LFMC	4	22.44%	0.96 (34.1 °C)	0.8	N/A	24A	30A	40A	30.72A	35A	10 FT	0.07%
3	5	10 AWG PV WIRE, COPPER	10 AWG THWN-2, COPPER	—	1" LFMC	6	32.45%	0.96 (34.1 °C)	0.8	N/A	24A	30A	40A	30.72A	35A	10 FT	0.07%
4	2	3/0 AWG THWN-2, COPPER	6 AWG THWN-2, COPPER	3/0 AWG THWN-2, COPPER	2" LFMC	3	34.57%	0.96 (34.1 °C)	1	200A	144.3A	180.38A	225A	216A	200A	20 FT	0.08%
5	2	3/0 AWG THWN-2, COPPER	6 AWG THWN-2, COPPER	3/0 AWG THWN-2, COPPER	2" LFMC	3	33.44%	0.96 (34.1 °C)	1	N/A	144.3A	180.38A	225A	216A	200A	10 FT	0.04%
6	1	2×3/0 AWG THWN-2, COPPER	2×3 AWG THWN-2, COPPER	2×3/0 AWG THWN-2, COPPER	2×2" PVC	3	35.52%	0.96 (34.1 °C)	1	400A	288.6A	360.75A	225A ×2 (450A)	216A ×2 (432A)	200A ×2 (400A)	20 FT	0.08%
7	1	2×3/0 AWG THWN-2, COPPER	—	2×3/0 AWG THWN-2, COPPER	2×2" PVC	3	29.4%	0.96 (34.1 °C)	1	400A	288.6A	360.75A	225A ×2 (450A)	216A ×2 (432A)	200A ×2 (400A)	40 FT	0.16%



LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: SINGLE LINE DIAGRAM

DATE: 06.19.2026

DESIGN BY: V.G.

SHEET NUMBER: E-1

DC OPTIMIZER — SYSTEM SUMMARY

	SYSTEM SUMMARY																
	INVERTER #1								INVERTER #2								
DC INPUT (STRING)	S1.1	S1.2	S1.3	S1.4	S1.5	S1.6	S1.7	S1.8	S2.1	S2.2	S2.3	S2.4	S2.5	S2.6	S2.7	S2.8	S2.9
DC OPTIMIZER OUTPUT CURRENT	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A	24A
OPTIMIZERS PER STRING	32	33	39	38	38	37	37	36	33	33	33	32	32	32	32	32	32
STRING OPERATING VOLTAGE	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V	850V
STRING MPP CURRENT	16.56A	17.08A	20.19A	19.67A	19.67A	23.94A	23.94A	23.29A	21.35A	21.35A	21.35A	20.71A	20.71A	20.71A	20.71A	20.71A	20.71A
MODULE	HYUNDAI ENERGY SOLUTIONS HIN-T440NF(BK)					LONGI SOLAR LR5-72HIH-550M			LONGI SOLAR LR5-72HIH-550M								
INV STC POWER (DC)	139,700W								160,050W								
INV PTC POWER (DC)	131,536W								149,167W								
INVERTER MAX AC OUTPUT CURRENT	144.3A								144.3A								
INVERTER MAX AC OUTPUT POWER	120,000W								120,000W								
TOTAL STC POWER (DC)	299,750W																
TOTAL PTC POWER (DC)	280,703W																
TOTAL MAX AC CURRENT	288.6A																
TOTAL MAX AC POWER	240,000W																

MODULES

REF.	QTY.	MAKE AND MODEL	P_dc	P_ptc	Isc (A)	Imp (A)	Voc (V)	Vmp (V)	V_oc Temp Coeff. / B_Voc	FUSE RATING
PM1-178	178	HYUNDAI ENERGY SOLUTIONS HIN-T440NF(BK)	440W	417.5W	14.39A	13.63A	38.8V	32.3V	-0.097V/°C (-0.25%/°C)	30A
PM179-581	403	LONGI SOLAR LR5-72HIH-550M	550W	512.6W	13.98A	13.12A	49.8V	41.95V	-0.132V/°C (-0.27%/°C)	25A

POWER OPTIMIZERS

REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-581	581	SOLAR EDGE C651U (277/480V)	650W	24A	25A	80V	98.8%

AC DISCONNECTS

REF.	QTY.	MAKE AND MODEL	TYPE	CURRENT	VOLTAGE	AC/DC	PHASES	ENCLOSURE
D1	1	EATON DH365FRK	FUSED	400A	600V	AC	3PH	NEMA 3R

INVERTERS

REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-2	2	SOLAR EDGE SE120KUS (277/480V)	480V	FLOATING	200A	120000W	144.3A	3x48.5A	1000V	98.5%

OCPDs

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1-2	2	200A	480VAC
F1-3	3	400A	480VAC

DESIGN TEMPERATURES

PARAMETER	VALUE	SOURCE
ASHRAE EXTREME LOW	-2.4°C (27.7°F)	EXECUTIVE, (28.50°; -81.37°)
ASHRAE 2% HIGH	34.1°C (93.4°F)	EXECUTIVE, (28.50°; -81.37°)

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT
LOCATED ON THE NE SIDE OF THE BUILDING

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION (5 3/4" X 1 1/8").
[NEC 690.56(B)]

WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS.
PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS
[NEC 690.4(D),(E)]

LABELING NOTES
1.1 LABELING REQUIREMENTS BASED ON THE 2014 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]
1.6 ALL SIGNAGE MUST BE PERMANENTLY ATTACHED AND BE WEATHER RESISTANT/SUNLIGHT RESISTANT AND CANNOT BE HAND-WRITTEN PER NEC 110.21(B)

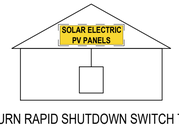
⚠ WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL 1
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (2" X 4").
[NEC 690.13].

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

LABEL 2
AT POINT OF INTERCONNECTION OVERCURRENT DEVICE (2" X 4").
[NEC 705.12(B)(2)(3)(B)].

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 ARRAY

LABEL 3
AT RAPID SHUTDOWN SYSTEM (3 3/4" X 5 1/4"). [NEC 690.56(C)(1)(A)].

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 4
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS (5 3/4" X 1 1/8").
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 5
AT RAPID SHUTDOWN DISCONNECT SWITCH (5 1/4" X 2").

⚠ CAUTION
SOLAR ELECTRIC SYSTEM CONNECTED

LABEL 6
AT UTILITY METER (5 3/4" X 1 1/8")
[NEC 690.56(B)]

⚠ WARNING
DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL 7
AT POINT OF INTERCONNECTION (2 3/4" X 1 5/8").
[NEC 705.12(B)(3)]

⚠ WARNING
SOLAR ELECTRIC CIRCUIT BREAKER IS BACKFED

LABEL 8
AT POINT OF INTERCONNECTION (2" X 1").
[NEC 705.12(B)(3)]

PHOTOVOLTAIC SOLAR DC DISCONNECT

LABEL 10
AT EACH DC DISCONNECTING MEANS (4" X 1").
[NEC 690.13(B)].

PHOTOVOLTAIC SOLAR AC DISCONNECT

LABEL 9
AT EACH AC DISCONNECTING MEANS (4" X 1").
[NEC 690.13(B)].

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT 288.6 A
NOMINAL OPERATING AC VOLTAGE 480 V

LABEL 11
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS (4" X 2").
[NEC 690.54]

PHOTOVOLTAIC SYSTEM DC DISCONNECT

OPERATING VOLTAGE	850	VDC
OPERATING CURRENT	150.11	ADC
MAX SYSTEM VOLTAGE	1000	VDC
SHORT CIRCUIT CURRENT	192	ADC

⚠ WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL 12.1 (INVERTER #1)
AT EACH DC DISCONNECTING MEANS (4" X 5"). [NEC 690.14 (C)(2), 690.17 (4), 690.53]

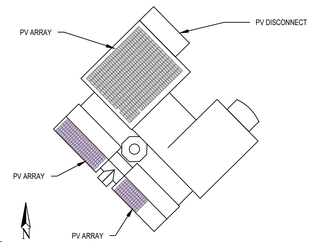
PHOTOVOLTAIC SYSTEM DC DISCONNECT

OPERATING VOLTAGE	850	VDC
OPERATING CURRENT	188.31	ADC
MAX SYSTEM VOLTAGE	1000	VDC
SHORT CIRCUIT CURRENT	216	ADC

⚠ WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL 12 (INVERTER #2)
AT EACH DC DISCONNECTING MEANS (4" X 5"). [NEC 690.14 (C)(2), 690.17 (4), 690.53]

!CAUTION!
MULTIPLE SOURCES OF POWER SAFETY DISCONNECTS AS SHOWN:



LOGO

CONTRACTOR
XXXXX
ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX
PHONE: XXXXXXXXX
LIC. NO.: XXXXXXXX

PROJECT
NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

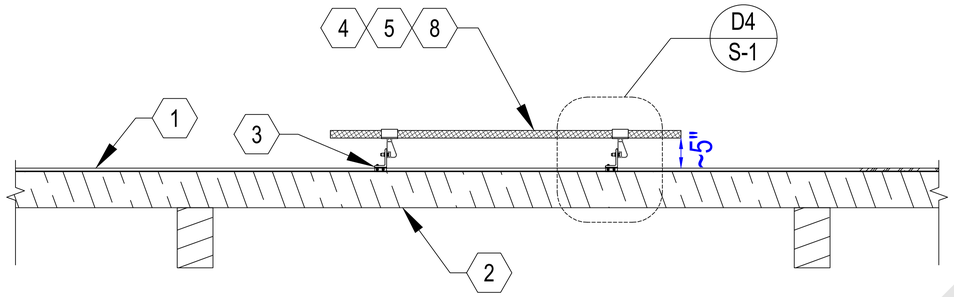
NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

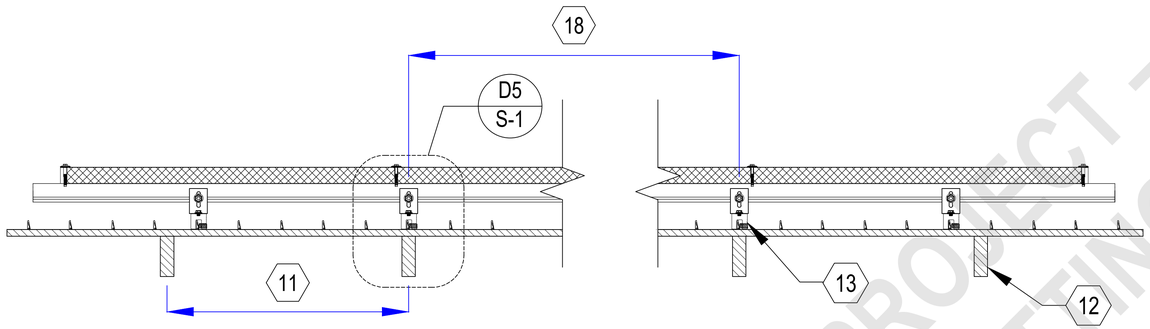
SHEET TITLE: ELECTRICAL TABLES & LABELS

DATE: 06.19.2026
DESIGN BY: V.G.

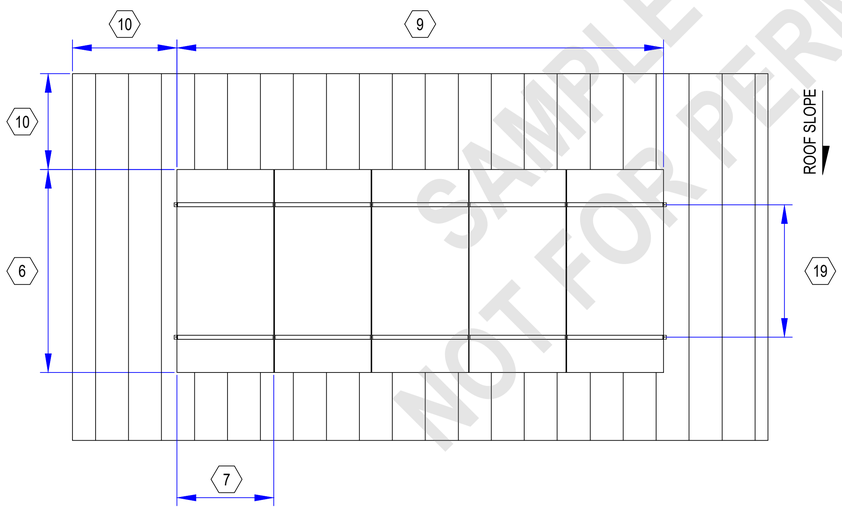
SHEET NUMBER: E-2



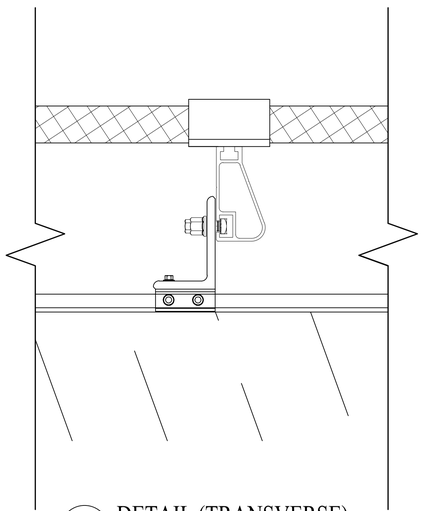
01 S-1 RACKING DETAIL (TRANSVERSE)



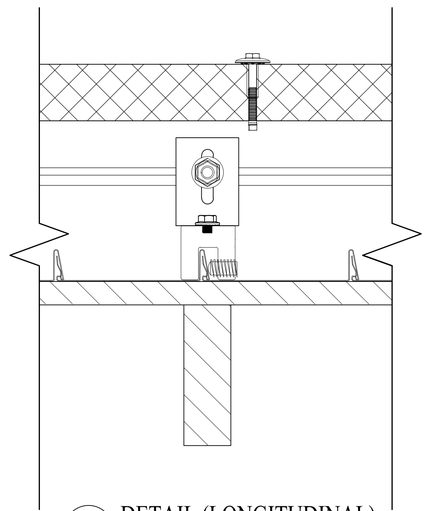
02 S-1 RACKING DETAIL (LONGITUDINAL)



03 S-1 RACKING DETAIL (TOP)



04 S-1 DETAIL (TRANSVERSE)



05 S-1 DETAIL (LONGITUDINAL)

SHEET KEYNOTES

1. ROOF MATERIAL: METAL
2. ROOF STRUCTURE: SINGLE SPAN RAFTER
3. ATTACHMENT TYPE: S-5! S-5-U CLAMP
4. MODULE MANUFACTURER: LONGI SOLAR
5. MODULE MODEL: LR5-72HIH-550M
6. MODULE LENGTH: 89.69"
7. MODULE WIDTH: 44.65"
8. MODULE WEIGHT: 60.63 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: 6' FROM EDGE
11. RAFTER SPACING: 24" O.C.
12. RAFTER SIZE: 2X6 NOMINAL
13. SETSCREWS ON SAME SIDE OF CLAMP
14. TOTAL # OF ATTACHMENTS: 544.
15. TOTAL AREA: 11032.55 SQ. FT.
16. TOTAL WEIGHT: 29600.45 LBS.
17. DISTRIBUTED LOAD: 2.68 PSF
18. MAX. HORIZONTAL STANDOFF: 48".
19. MAX. VERTICAL STANDOFF: IN ACCORDANCE WITH MODULE MANUFACTURER'S INSTRUCTIONS.
20. STANDOFF STAGGERING: NO
21. RAIL MANUFACTURER (OR EQUIV.): SNAPNRACK SERIES 100
22. RAIL MODEL (OR EQUIVALENT): UR-45

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

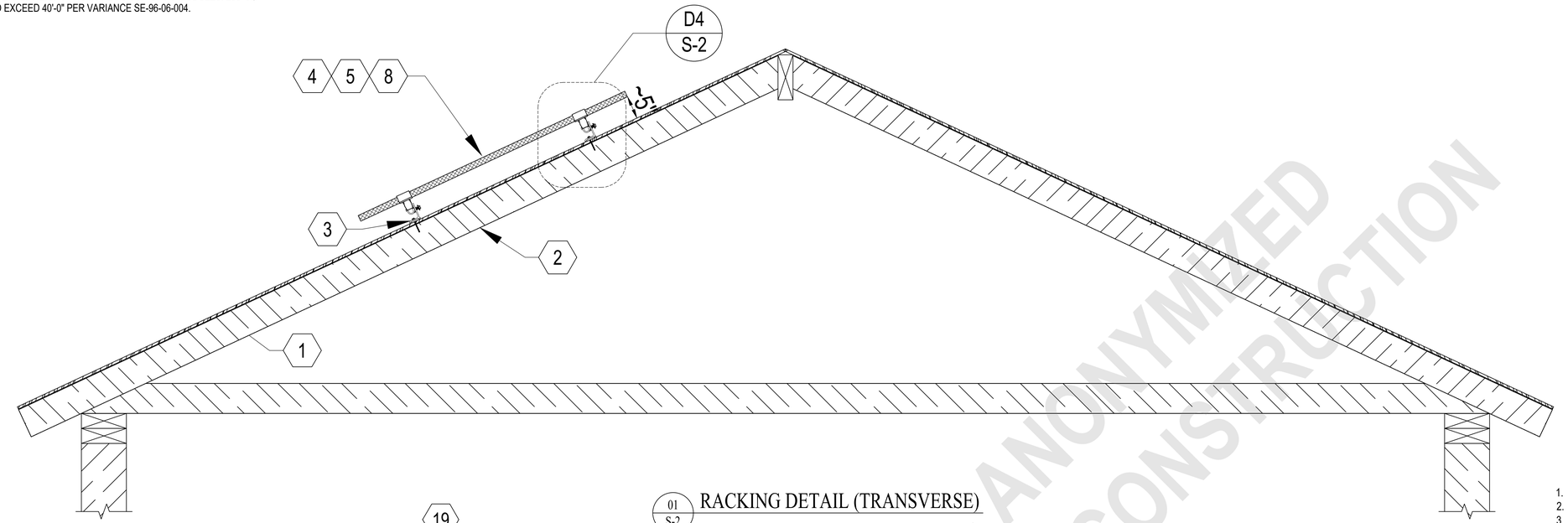
SHEET TITLE: MOUNTING DETAILS

DATE: 06.19.2026

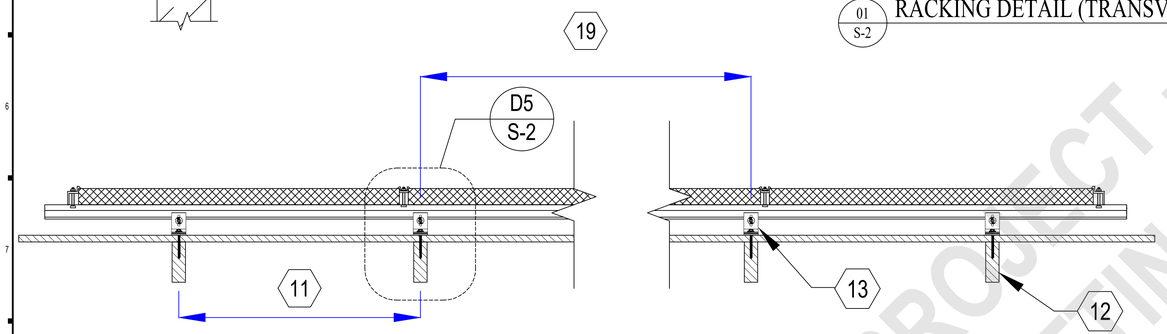
DESIGN BY: V.G.

SHEET NUMBER: S-1

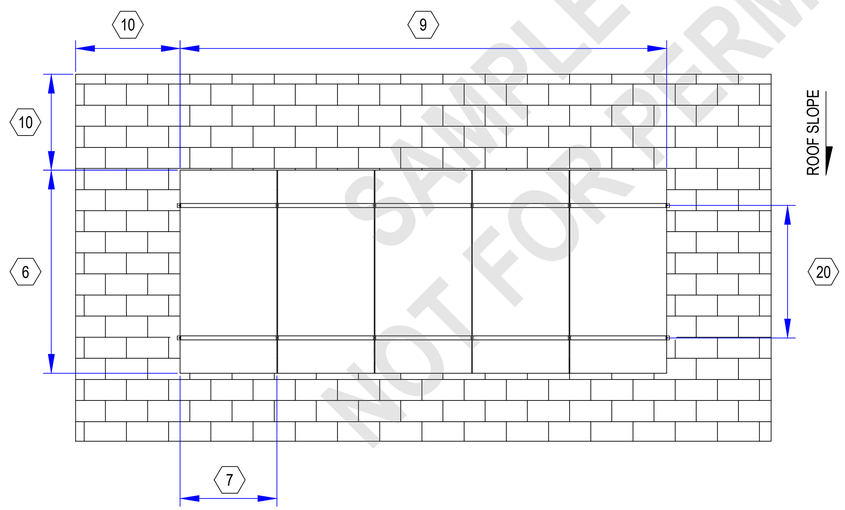
MAX OVERALL HEIGHT FROM FFE TO TOP OF PV MODULES: ±35'-0",
NOT TO EXCEED 40'-0" PER VARIANCE SE-96-06-004.



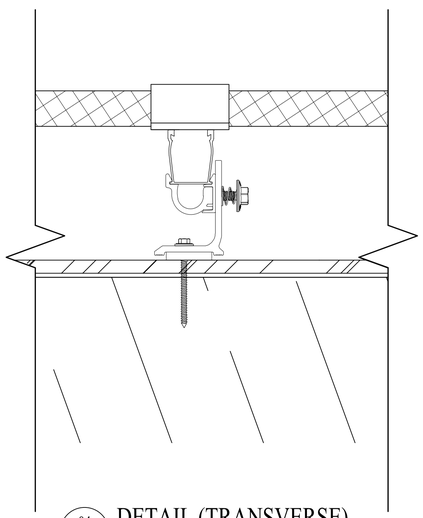
01 S-2 RACKING DETAIL (TRANSVERSE)



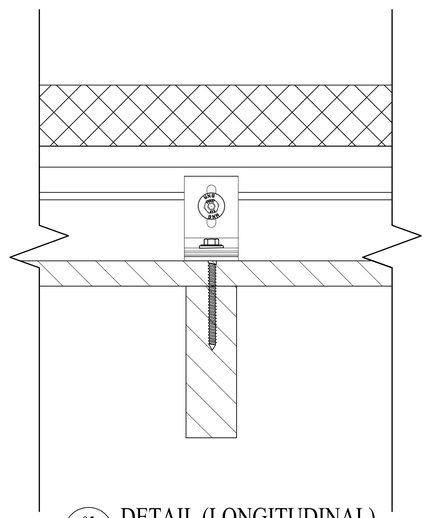
02 S-2 RACKING DETAIL (LONGITUDINAL)



03 S-2 RACKING DETAIL (TOP)



04 S-2 DETAIL (TRANSVERSE)



05 S-2 DETAIL (LONGITUDINAL)

SHEET KEYNOTES

1. ROOF MATERIAL: SHINGLE
2. ROOF STRUCTURE: SINGLE SPAN RAFTER
3. ATTACHMENT TYPE: ULTRAFOOT RAFTER
4. MODULE MANUFACTURER: HYUNDAI ENERGY SOLUTIONS
5. MODULE MODEL: HIN-T440NF(BK)
6. MODULE LENGTH: 67.8"
7. MODULE WIDTH: 44.6"
8. MODULE WEIGHT: 50.01 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: 4' FROM EDGE
11. RAFTER SPACING: 24" O.C.
12. RAFTER SIZE: 2X6 NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 2 1/2 IN.
15. TOTAL # OF ATTACHMENTS: 240.
16. TOTAL AREA: 3779.85 SQ. FT.
17. TOTAL WEIGHT: 9952.02 LBS.
18. DISTRIBUTED LOAD: 2.63 PSF
19. MAX. HORIZONTAL STANDOFF: 48".
20. MAX. VERTICAL STANDOFF: IN ACCORDANCE WITH MODULE MANUFACTURER'S INSTRUCTIONS.
21. STANDOFF STAGGERING: NO
22. RAIL MANUFACTURER (OR EQUIV.): SNAPNRACK SERIES 100
23. RAIL MODEL (OR EQUIVALENT): UR-45

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX
XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: MOUNTING DETAILS

DATE: 06.19.2026

DESIGN BY: V.G.

SHEET NUMBER: S-2

HD HYUNDAI ENERGY SOLUTIONS

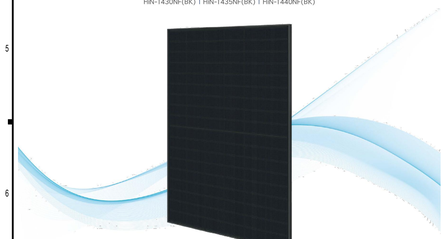
eng.hd-hyundaies.co.kr

HD HYUNDAI SOLAR MODULE

NF(BK) Series

Premium N-Type TOPCon Module

HIN-T430NF(BK) I HIN-T435NF(BK) I HIN-T440NF(BK)



22.53% High Efficiency · High-End TOPCon Technology · Higher Bifaciality · Long-Term Reliability · Compatible with Carport Applications · For Residential (Full Black Design)

HD Hyundai's Warranty Provisions

- 25 - 25-Year Product Warranty — Materials and workmanship
- 30 - 30-Year Performance Warranty — First year degradation: 1% · Linear warranty after initial year: with D_R0 annual degradation, 87.4% is guaranteed up to 30years

*Refer to IEC61215 standard warranty for details.

Certification

ISO 9001 : Quality management systems
ISO 14001 : Environmental management systems
ISO 45001 : Occupational health and safety management systems
IEC 61215 / IEC 61730 : Photovoltaic module qualification (CEL)
IEC 61701: Salt mist corrosion testing
IEC 62716 : Ammonia corrosion testing
IEC 62804 : Potential Induced Degradation (PID) testing
IEC 60068-2-68: Sand and dust testing for environmental durability

Electrical Characteristics

HIN-TxxxNF(BK)		HIN-T430NF(BK)		HIN-T435NF(BK)		HIN-T440NF(BK)	
Item	Unit		BNPI		BNPI		BNPI
Nominal output (Pmax)	W	430	470	435	482	440	488
Open circuit voltage (Voc)	V	38.4	38.4	38.6	38.6	38.8	38.8
Short circuit current (Isc)	A	14.25	15.79	14.32	15.87	14.39	15.94
Voltage at Pmax (Vmpp)	V	31.9	31.9	32.1	32.1	32.3	32.3
Current at Pmax (Impp)	A	13.48	14.94	13.56	15.02	13.63	15.10
Module efficiency	%	22.02		22.28		22.53	
Power Class Sorting	W	0 ~ +5					
Temperature coefficient of Pmax	%/K	-0.30					
Temperature coefficient of Voc	%/K	-0.25					
Temperature coefficient of Isc	%/K	0.046					
Bifaciality	%	80%±10%					

*STC : irradiance 1,000 W/m², cell temperature 25°C, AM=1.5 / Test uncertainty for Pmax ±3%, Voc ±3%, Isc ±3%

**The electrical properties of BNPI are measured under the irradiance corresponding to 1000 W/m² on the module front and 135 W/m² on the module rear.

Additional Power Gain from rear side					
Pmpp gain	Pmpp(W)	Vmpp(V)	Impp(A)	Voc(V)	Isc(A)
5%	458	32.30	14.18	38.80	14.97
15%	493	32.30	15.27	38.80	16.12
25%	528	32.40	16.36	38.90	17.27

*Electrical characteristics with different rear power gain (reference to 440W)

Mechanical Characteristics

Dimensions	1,722mm (L) x 1,134mm (W) x 30mm (H) (67.80in x 44.65in x 1.2in)
Weight	24.5 kg (50.0 lbs)
Solar Cells	N-Type TOPCon, 108 (6x18) monocrystalline 166B half-cut bifacial cells
Output Cables	Cable : (+)1,200mm(47.2in), (-)1,200mm(47.2in) / Customized length available Connector : 35sub4 MC4 genuine Connector / Compatible, IP68
Junction Box	3-part, 3 bypass diodes, IP68 rated
Construction	Front : 2.0mm(0.08in) semi-tempered solar glass with high transmittance and anti-reflective coating Rear : 2.0mm(0.08in) semi-tempered solar glass
Frame	Anodized aluminum alloy

Installation Safety Guide

- Only qualified personnel should install or perform maintenance.
- Be aware of dangerous high DC voltage.
- Do not handle or install modules when they are wet.

Nominal Module Operation Temperature	44°C ± 2°C
Operating Temperature	-40°C~+85°C
Maximum System Voltage	DC 1,500 V
Maximum Reverse Current	30A
Maximum Test Load *See Installation Manual	Front 5,400Pa *Rear 5,400Pa
Fire Performance	Type 29

Shipping Configurations

Packing Direction	Vertical	Packing pallet weight (kg)	912
Container Size (HC)	40'	Modules Per Pallet (pcs)	36
Pallets Per Container	26	Modules Per Container (pcs)	936

Module Diagram (unit : mm)

I-V Curves (HIN-T440NF(BK))

Sales & Marketing hes.sales@hd.com

HD Hyundai Energy Solutions reserves the right to update or modify the specifications and features listed in this datasheet without prior notice. Always check the latest version of the datasheet for accurate information. Before using the product, please refer to the installation and operation manual and warranty. We retain the right of final interpretation.

HD HYUNDAI ENERGY SOLUTIONS

Hi-MO 5m

(G2)

LR5-72HIH
535~555M

- Gebaseerd op M10-182mm wafel, beste keus voor ultra-grote stroomcentrales
- Met behulp van geavanceerde module technologieën om superieure module-efficiëntie te leveren
- Uitstekende prestaties bij energieopwekking
- Langdurige betrouwbaarheid verzekerd door hoge module kwaliteit

12 12 jaar garantie op materialen en verwerking

25 25 jaar garantie voor extra lineair uitgangsvermogen

Volledige systeem -en productcertificeringen

IEC 61215, IEC 61730, UL 61730

ISO9001:2015 ISO Kwaliteitsmanagementsysteem

ISO14001:2015 ISO Milieubeheersysteem

ISO45001:2018 Veiligheid en Gezondheid op het werk

TS62941: Richtlijn voor module-ontwerp en typegoedkeuring

LONGi

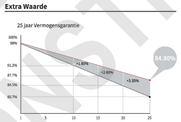
Hi-MO 5m

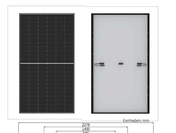
LR5-72HIH 535~555M

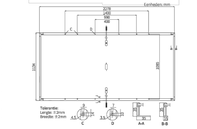
21.5%	0~3%	<2%	0.55%	HALF-CELL
MAXIMALE MODULE-EFFICIËNTIE	VERMOGENSTOLERANTIE	EERSTE JAAR VERMOGENSDEGRADATIE	JAARLIJKSE VERMOGENSDEGRADATIE	Lagere bedrijfstemperatuur

Extra Waarde

25 jaar Vermogensgarantie







Mechanische eigenschappen

Celconfiguratie	144 (6×24)
Junctiebox	IP68, drie diodes
Uitgangskabel	4mm² ; ±1200mm
Connector	MC4 EVO2
Glas	3.2mm gecoat gehard glas
Frame	Geanodiseerd aluminium frame
Gewicht	27.1kg
Afmetingen	2278×1134×35mm
Verpakking	31 stuks per pallet / 155 stuks per 20' GP / 620 stuks per 40' HC

Elektrische eigenschappen STC : AM1.5 1000W/m² 25°C NOCT : AM1.5 800W/m² 20°C ±3% Testonzekerheid voor Pmax: ±3%

Modelnummer	LR5-72HIH-535M		LR5-72HIH-540M		LR5-72HIH-545M		LR5-72HIH-550M		LR5-72HIH-555M	
Testconditie	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximaal vermogen (Pmax/W)	535	399.9	540	403.6	545	407.4	550	411.1	555	414.8
Nullastspanning (Voc/V)	49.35	46.40	49.50	46.54	49.65	46.68	49.80	46.82	49.95	46.97
Kortsluitstroom (Isc/A)	13.78	11.14	13.85	11.20	13.92	11.25	13.98	11.31	14.04	11.35
MPP Spanning (Vmp/V)	41.50	38.55	41.65	38.69	41.80	38.83	41.95	38.97	42.10	39.11
MPP Stroom (Imp/A)	12.90	10.38	12.97	10.43	13.04	10.49	13.12	10.56	13.19	10.61
Module-efficiëntie(%)	20.7		20.9		21.1		21.3		21.5	

Bedrijfsparameters

Bedrijfstemperatuur	-40°C ~ +85°C
Vermogenstolerantie	0 ~ 3%
Voc- en Isc-tolerantie	±3%
Maximale systeemspanning	DC1500V (IEC/UL)
Maximale stroom-stringzekering	25A
Nominale bedrijfstemperatuur van cellen	45±2°C
Klasse	Klasse II
Brandclassificaties	UL-type 1 of 2 IEC-Klasse C

Mechanische belasting

Maximale statische belasting-voorkant	5400Pa
Maximale statische belasting achterkant	2400Pa
Hagelstenentest	25mm Hagelstenen op snelh. van 23m/s

Temperatuurwaarden (STC)

Temperatuur Coëfficiënt van Isc	+0.050%/°C
Temperatuur Coëfficiënt van Voc	-0.260%/°C
Temperatuur Coëfficiënt van Pmax	-0.340%/°C

LONGi

Floor 19, Lujiazui Financial Plaza, Century Avenue (DS), Pudong Shanghai, China
Tel: +86-21-80162606
Web: www.longi.com

Specificaties in deze datasheet kunnen zonder voorafgaande kennisgeving worden gewijzigd. LONGi behoudt zich het recht van definitieve interpretatie voor. QGDZDM20Rdl/Version/yh02.02

Three Phase Inverter with Synergy Technology

USA Domestic Content Eligible

For North America

SE50KUS / SE80KUS / SE100KUS / SE110KUS / SE120KUS

INVERTER

12-20 YEAR WARRANTY

Made in the USA

SOLAREDGE'S USA-MANUFACTURED OFFERING FOR C&I ROOFTOPS AND CARPORTS

- Eligible for domestic content*: SolarEdge USA manufactured inverters, when paired with certain SolarEdge USA-manufactured power optimizers, are intended to be eligible for the enhanced federal income tax credit for domestic content
- Pre-commissioning feature for automated validation of system components and wiring during the site installation process and prior to grid connection
- Easy two person installation with lightweight, modular design (each inverter consists of two or three Synergy units and one Synergy Manager)
- Independent operation of each Synergy unit enables higher uptime and easy serviceability
- Built in thermal sensors detect faulty wiring, ensuring enhanced protection and safety
- Built in arc fault protection and rapid shutdown
- Built in PID mitigation for maximized system performance
- Monitored** and field-replaceable surge protection devices, to better withstand surges caused by lightning or other events
- Built in module level monitoring with Ethernet or cellular communication for full system visibility

* For more details, see Eligibility for Domestic Content on the last page.
** Applicable only for DC and AC SPDs

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Three Phase Inverter with Synergy Technology

USA Domestic Content Eligible for North America

SE50KUS / SE80KUS / SE100KUS / SE110KUS / SE120KUS

Applicable to inverters with part numbers	SE-DBL-US xxxIBNxx	SE-TRI-US xxxIBNxx				
Model Number	SE80KUS	SE50KUS	SE100KUS	SE110KUS	SE120KUS	UNITS
INSTALLATION SPECIFICATIONS						
Number of Synergy Units per Inverter	2	3				
AC Maximum Conduit Size	2 ½"	4/0 AWG / 1/0 AWG				in
AC Maximum Conductor Size Line / PE	1 x 3" / 2 x 2"					in
Inverter Unit / Synergy Manager	Multi-input (fuse-less)[3]: DE-xxx-USxxxxGU	6 / 3 pairs; 6 – 12 AWG	9 / 3 pairs; 6 – 12 AWG			
	Combined input (fuse-less): DE-xxx-USxxxxNU	N/A	3 pairs / 1 pair, 2 – 4 AWG; copper or aluminum			
Dimensions (H x W x D)	Synergy Unit: 27 x 12.9 x 10.75 / 518 x 328 x 273 Synergy Manager: 14.17 x 17.8 x 7.8 / 360 x 450 x 200					in / mm
Weight	Synergy Unit: 70.4 / 32 Synergy Manager: 28.6 / 13					lb / kg
Operating Temperature Range	-40 to +140 / -40 to +60[4]					°F / °C
Cooling	Fan (user-replaceable)					
Noise	< 67					dBA
Protection Rating	NEMA 3R					
Mounting	Brackets provided					

(3) Fusing is not included with the multi-input version of the Synergy Manager.
(4) For power derating information, see the Temperature Derating technical note for North America.

***Eligibility for Domestic Content**

As it relates to the domestic content rules, the U.S. Department of Treasury and the IRS have not yet issued proposed or final regulations. Rather, the IRS has issued three notices - Notice 2023-38, Notice 2024-41 and Notice 2025-08. These notices provide guidance regarding the domestic content rules. SolarEdge products referenced herein are manufactured with the intent to be eligible for inclusion under the elective safe harbor table in calculating the Domestic Cost Percentage under the **"Rooftop (MLPE)"** category (under IRS **Notices 2024-41 and 2025-08, depending on the PV cost+ chart below**). Eligibility is subject to the installation of qualified USA-Manufactured inverters and Power Optimizers (C635U) in the same project. SolarEdge does not provide tax and/or legal advice. You should consult with your own legal and/or tax advisor(s) regarding the eligibility of your project for the ITC or PTC, including the 10% Domestic Content bonus, to determine how the applicable rules apply to your project. The forward-looking statements in this document are accurate as of the date herein and are subject to change. For more information, please contact your local SolarEdge sales representative.

PN	Domestically produced MPCs per notice 2024-41*	Domestically produced MPCs per notice 2025-08*
USE-SK-US000NNB4, when paired with C635U	Printed Circuit Board Assemblies, Electrical Parts, Enclosure (35.6%)	Printed Circuit Board Assemblies (DC-DC) and (AC-AC), Enclosure, Production (24.8%)
USE5K-US000NNB4, when paired with C635U	Printed Circuit Board Assemblies, Electrical Parts, Enclosure (35.6%)	Printed Circuit Board Assemblies (DC-DC) and (AC-AC), Enclosure, Production (24.8%)
USE7K-US000NNB4, when paired with C635U	Printed Circuit Board Assemblies, Electrical Parts, Enclosure (37.6%)	Printed Circuit Board Assemblies (DC-DC) and (AC-AC), Enclosure, Production (24.8%)
USE10K-US000NNB4, when paired with C635U	Printed Circuit Board Assemblies, Electrical Parts, Enclosure (37.6%)	Printed Circuit Board Assemblies (DC-DC) and (AC-AC), Enclosure, Production (24.8%)

Commercial Power Optimizer

USA Domestic Content Eligible

C651U

POWER OPTIMIZER

Made in the USA

SolarEdge's USA-manufactured offering for C&I projects, for power optimization at the module level

- **Eligible for Domestic Content***
  - SolarEdge USA manufactured power optimizers, when paired with certain SolarEdge USA-manufactured inverters, are intended to be eligible for the enhanced federal income tax credit for domestic content.
- **Higher Energy Yields**
  - Generates maximum power from each PV module
  - High efficiency (99.5%)
  - Supports high power and bifacial PV modules, including G12 modules
- **Enhanced Monitoring and Visibility**
  - Maximum system visibility up to the individual module level
  - Pinpointed fault detection and remote troubleshooting
- **Maximum Protection with Built-in Safety**
  - Designed to automatically reduce high DC voltage to touch safe levels, upon grid/inverter shutdown, with SafeDC™
  - Includes SolarEdge Sense Connect, designed to prevent arcs by monitoring Power Optimizer connectors for overheating
  - Certified to Photovoltaic Rapid Shutdown, according to NEC 2014 – 2023

* For more information, refer to the last page of this document

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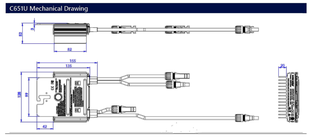
Power Optimizer

USA Domestic Content Eligible for North America

C651U

Power Optimizer Model	C651U	
INPUT		
Rated Input DC Power[1]	650	W
Absolute Maximum Input Voltage (Voc)	80	Vdc
MPPT Operating Range	12.5 – 80	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module[2]	20	Adc
Maximum Adjusted Short Circuit Current (with Safety Factor)[3]	25	Adc
Maximum Efficiency	99.5	%
Weighted Efficiency	98.8	%
Overvoltage Category	II	
OUTPUT DURING OPERATION		
Maximum Output Power	650	Wdc
Maximum Output Current	24	Adc
Maximum Output Voltage	60	Vdc
SAFETY FEATURES		
SafeDC™	Yes	
Safety Output Voltage per Power Optimizer	0.5 ± 0.075	Vdc
Sense Connect	Yes	
Photovoltaic Rapid Shutdown System	Yes, NEC 2014 – 2023	
STANDARD COMPLIANCE		
EMC	FCC Part 15, IEC 61000-6-2, IEC 61000-6-3	
Safety	IEC62109-1 (class II safety), UL 1741 UL 1741 CSA C22.2#107.1	
Material	UL94 V-0, UV Resistant	
RoHS	Yes	
Fire Safety	VDE-AR-E 2100-712:2013-05	
INSTALLATION SPECIFICATIONS		
Compatible SolarEdge Inverters[4]	Commercial Three Phase Inverters with one of the following part number structures: xSE-SPK-USxxxxNxx SE-DBL-USxxxxNxx SE-TRI-USxxxxNxx	
Maximum Allowed System Voltage	1000	Vdc
Dimensions (W x L x H)	128 x 155 x 52 / 5.03 x 6.10 x 2.05	mm / in
Weight	1080 / 2.38	gr / lb
Input Connector	MC4[5]	
Input Wire Length	(+) 1.4, (-) 1.4 / (+) 4.59, (-) 4.59[6]	m / ft
Output Connector	MC4	
Output Wire Length	(+) 3.0 (-) 0.10 / (+) 9.84, (-) 0.32	m / ft
Operating Temperature Range[7]	-40 to +85 / -40 to +185	°C / °F
Protection Rating	IP68 / NEMA6P	
Relative Humidity	0 – 100	%

(1) Modules with a front side maximum power of up to 715W at STC are allowed. Up to +5% power tolerance is allowed.
(2) When using bifacial modules, consider only the front side Isc at STC (5% back side gain). For details, see here.
(3) Adjusted for ambient temperature, irradiance, bifacial gain, safety factor, and so on, in accordance with NEC and CSA.
(4) For detailed inverter compatibility information, see here.
(5) For other connector types please contact SolarEdge.
(6) The Sense Connect feature is only enabled on the output wire connectors. For details, see here.
(7) For ambient temperatures above +85°C / +185°F, power derating is applied. For details, see here.



Eligibility for Domestic Content

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USE10K-US000NNB4, when paired with C635U	Printed Circuit Board Assemblies, Electrical Parts, Enclosure (37.6%)	Printed Circuit Board Assemblies (DC-DC) and (AC-AC), Enclosure, Production (24.8%)

Power Optimizer

USA Domestic Content Eligible for North America

C651U

PV System Design Using a SolarEdge Inverter[8]		208V Grid SE30K	208V Grid SE77.3K*	277/480V Grid SE30K, SE33.3K*	277/480V Grid SE40K*	
Compatible Power Optimizers		C651U				
Minimum String Length	Power Optimizers	13	13	18	18	
	PV Modules	13	13	18	18	
Maximum String Length	Power Optimizers	57	57	57	57	
	PV Modules	57	57	57	57	
Maximum Continuous Power per String		10,000	9600	20,400	20,400	W
Maximum Allowed Connected Power per String[9]		1 string or more – 15,000	1 string – 15,400 2 strings or more – 15,600	1 string – 22,650 2 strings or more – 15,400	1 string – 22,650 2 strings or more – 20,400	W
Parallel Strings of Different Lengths or Orientations		Yes				
Maximum Difference in Number of Power Optimizers Allowed Between the Shortest and Longest String Connected to the Same Inverter Unit		5 Power Optimizers				

*The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter
(8) C651U cannot be mixed with any other Power Optimizer models in the same string.
(9) To connect more STC power per string, design your project using SolarEdge Designer.

Eligibility for Domestic Content

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Three Phase Inverter with Synergy Technology

USA Domestic Content Eligible for North America

SE50KUS / SE80KUS / SE100KUS / SE110KUS / SE120KUS

Applicable to inverters with part numbers	SE-DBL-US xxxIBNxx	SE-TRI-US xxxIBNxx				
Model Number	SE80KUS	SE50KUS	SE100KUS	SE110KUS	SE120KUS	UNITS
OUTPUT						
Total Rated AC Output Capacity	80,000	100,000				W
Rated AC Active Output Power	80,000	50,000	100,000	110,000	120,000	W
Maximum AC Apparent Output Power	80,000	50,000	100,000	120,000	120,000	VA
AC Output Line Connections	3W + PE, 4W + PE					
Supported Grids	WYE: 1N-C, 1N-S, 1N-C-S, 1T, 1T, Delta 1T					
AC Output Voltage Minimum-Nominal-Maximum[1]: (L-N)	244 – 277 – 305	105 – 120 – 132.5	244 – 277 – 305			Vac
AC Output Voltage Minimum-Nominal-Maximum[1]: (L-L)	422.5 – 480 – 529	183 – 208 – 229	422.5 – 480 – 529			Vac
AC Frequency Minimum-Nominal-Maximum[1]	59.5 – 60 – 60.5					Hz
Maximum Continuous Output Current (per phase), PF=1	96.5	139.5	120	144.3		Aac
GFDI Threshold	1					A
Utility Monitoring, Islanding Protection, Configurable Power Factor, Country Configurable Thresholds	Yes					
Total Harmonic Distortion	< 3					%
Power Factor Range	±0.85 to 1					
INPUT[2]						
Maximum DC Power (Module STC) Inverter / Synergy Unit	140,000 / 70,000	87,500 / 29,165	175,000 / 58,300	210,000 / 70,000		W
Transformer-less, Ungrounded	Yes					
Maximum Input Voltage DC + to DC-	1000	600	1000			Vdc
Operating Voltage Range	850 – 1000	370 – 600	850 – 1000			Vdc
Maximum Input Current	2 x 48.25	3 x 46.5	3 x 40	3 x 48.25		Adc
Reverse-Polarity Protection	Yes					
Ground-Fault Isolation Detection	600kΩ sensitivity per Synergy Unit[3]					
CEC Weighted Efficiency	98.5	97	98.5			%
Nighttime Power Consumption	< 8	< 12				W
ADDITIONAL FEATURES						
Supported Communication Interfaces[4]	2 x RS485, Ethernet, Wi-Fi (optional), Cellular (optional)					
Smart Energy Management	Export Limitation					
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection					
Arc Fault Protection	Built-in, user configurable (according to UL 1699B)					
Photovoltaic Rapid Shutdown System	NEC 2014 – 2023, built-in, if paired with C651U					
PID Rectifier	Nighttime, built-in					
RS485 Surge Protection (ports 1+2)	Type 1, field replaceable, integrated					
AC, DC Surge Protection	Type 1, field replaceable, integrated					
DC SAFETY SWITCH						
DC Disconnect	Built-in					
STANDARD COMPLIANCE						
Safety	UL 1699B, UL 1741 SA, UL 1741 SB, UL 1741 SB AE, UL 1998, CSA C22.2#107.1 Canadian AVC according to T.I.L. M-07,					
Grid Connection Standards	IEEE 1547-2018, Rule 21, Rule 14 (H)					
Emissions	FCC Part 15 Class A					

(1) For other regional settings please contact SolarEdge support.
(2) For compatibility of inverters and power optimizers, see the technical note.
(3) Where permitted by local regulations.
(4) For specifications of the optional communication options, visit the Communication product page or the Knowledge Center to download the relevant product datasheet.

RoHS

Intertek

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: DATASHEET

DATE: 06.19.2026

DESIGN BY: V.G.

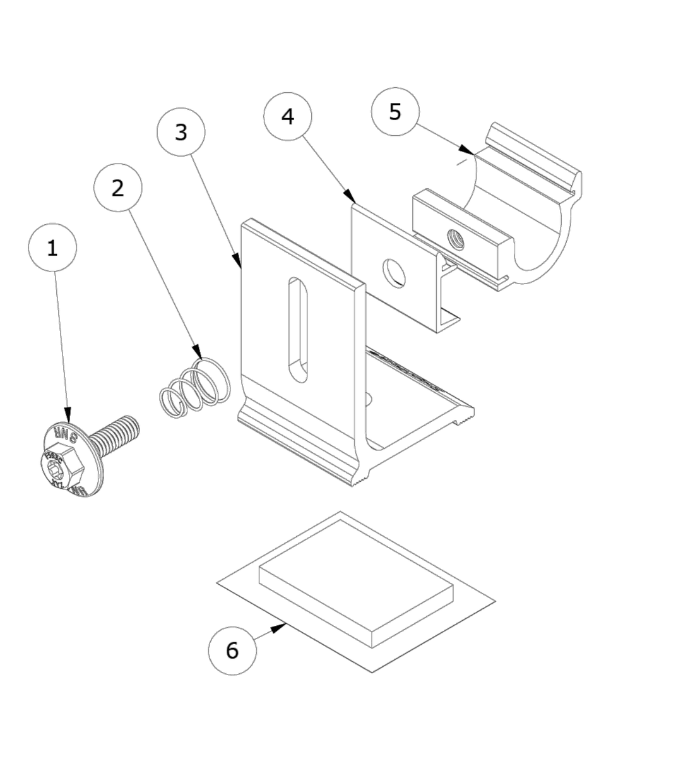
SHEET NUMBER: D-1

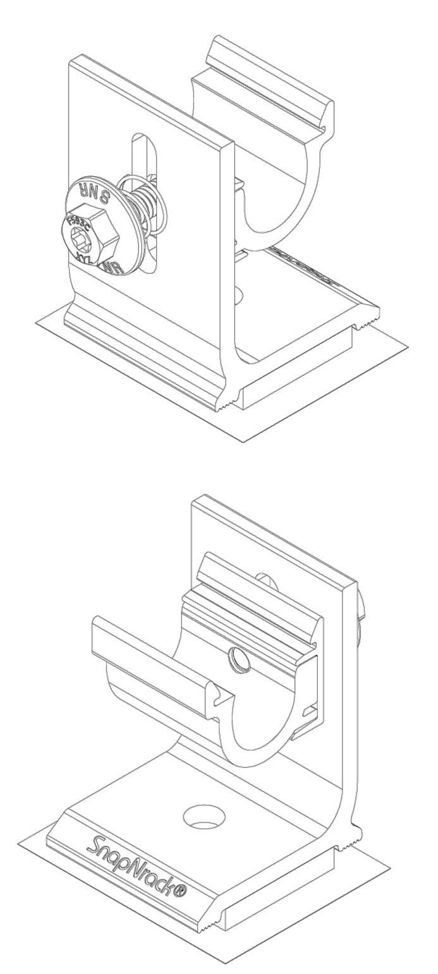
SNAPNRACK, TDS, ULTRAFOOT RAFTER

DESCRIPTION:	DOC NUMBER:	
SNAPNRACK, TDS, ULTRAFOOT RAFTER	SNR-DC-01436	SnapNrack®
PART NUMBER(S): 242-10056	DRAWN BY: M.AFFENTRANGER	SNR SOLAR LLC 775 FIERO LANE, SUITE 200 SAN LUIS OBISPO, CA 93401 USA EMAIL: CONTACT@SNAPNRACK.COM
UNITS: IN, LB, DEG [MM, KG, DEG] — SHEET: 1:2	REV: B — DATE: 2/6/2025	THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SNR SOLAR LLC.

DESIGN REACTIONS, ALLOWABLE

FASTENER	SUBSTRATE	EMBEDMENT	UPLIFT (LB)	DOWNFORCE (LB)	SIDE (LB)	LATERAL (LB)
(1) 5/16" LAG SCREW	WOOD FRAMING	2-1/2"	1325	2500	444	735





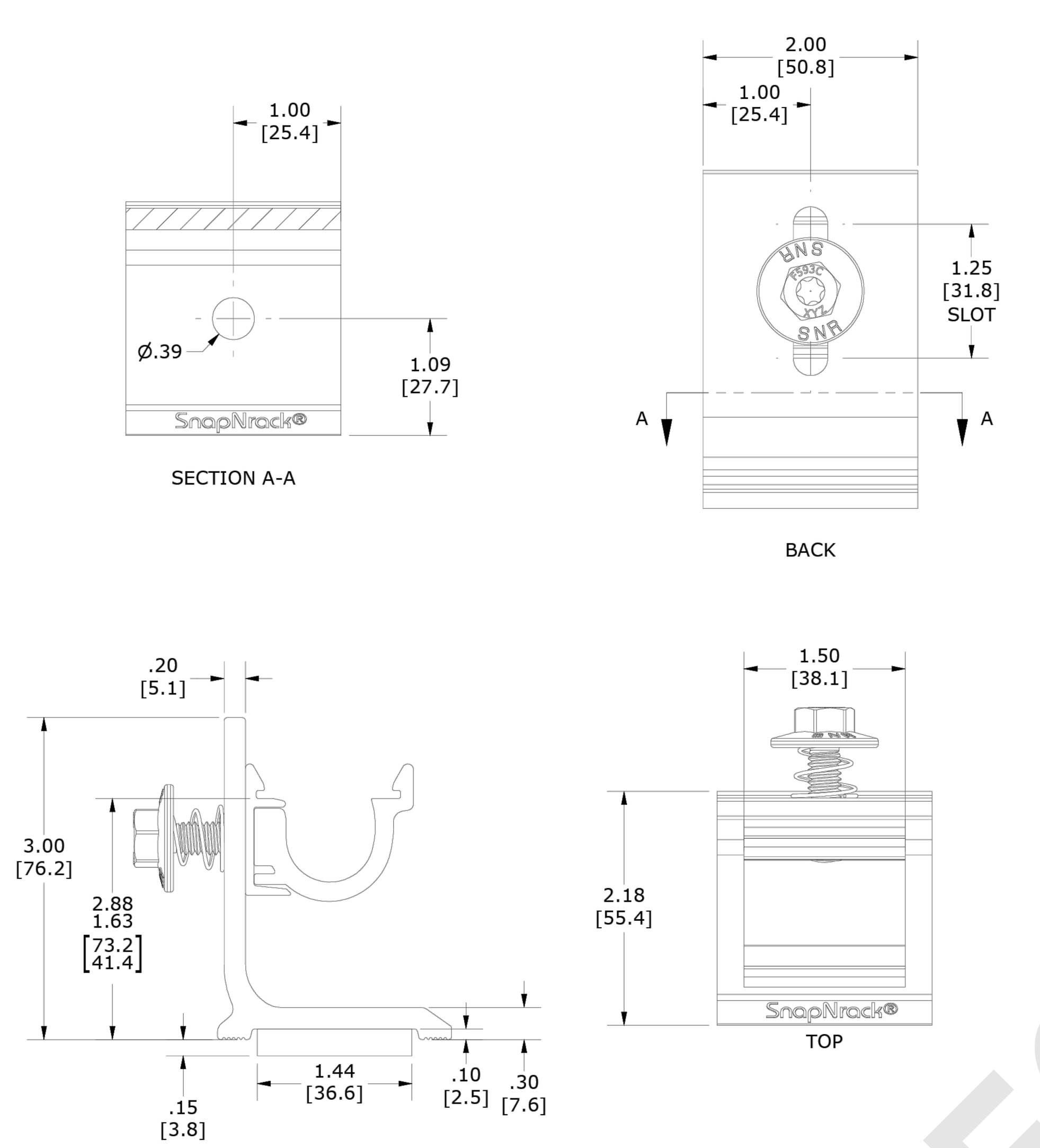
PARTS LIST

ITEM	QTY	DESCRIPTION
1	1	BOLT, WIDE FLANGE, RECESSED, 5-16IN-18 X 1IN, SS
2	1	SNAPNRACK, ULTRA RAIL MOUNT SPRING, SS
3	1	SNAPNRACK, ULTRAFOOT BASE, RAFTER, BLACK
4	1	SNAPNRACK, UR FLIP CLAMP, THRU, SILVER
5	1	SNAPNRACK, UR FLIP CLAMP, TAP, BLACK
6	1	SNAPNRACK, BUTYL PAD, 2.00IN X 1.44IN X .25IN

MATERIALS:	6000 SERIES ALUMINUM & 300 SERIES STAINLESS STEEL
TORQUE SPECIFICATION:	16 FT-LBS FT-LBS
CERTIFICATION:	UL 2703, FILE E359313
WEIGHT (LBS):	.365

SNAPNRACK, TDS, ULTRAFOOT RAFTER

DESCRIPTION:	DOC NUMBER:	
SNAPNRACK, TDS, ULTRAFOOT RAFTER	SNR-DC-01436	SnapNrack®
PART NUMBER(S): 242-10056	DRAWN BY: M.AFFENTRANGER	SNR SOLAR LLC
UNITS: IN, LB, DEG [MM, KG, DEG] — SHEET: 2:2	REV: B — DATE: 2/6/2025	

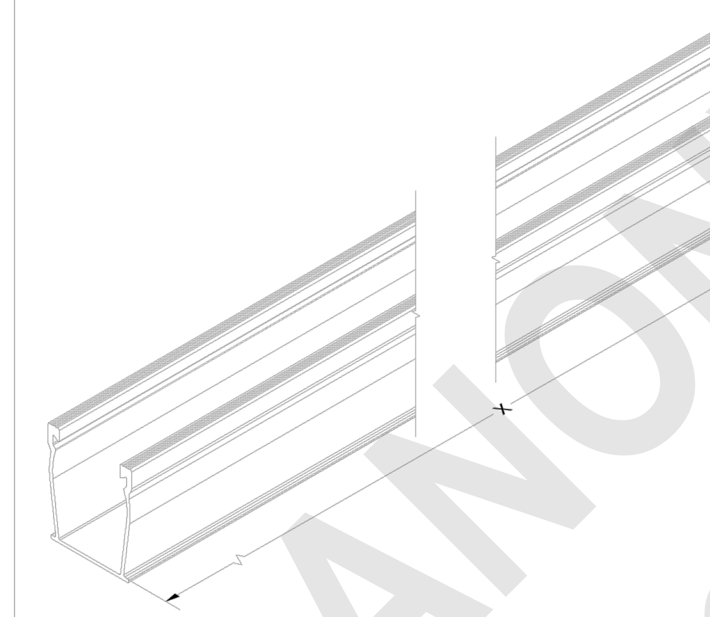


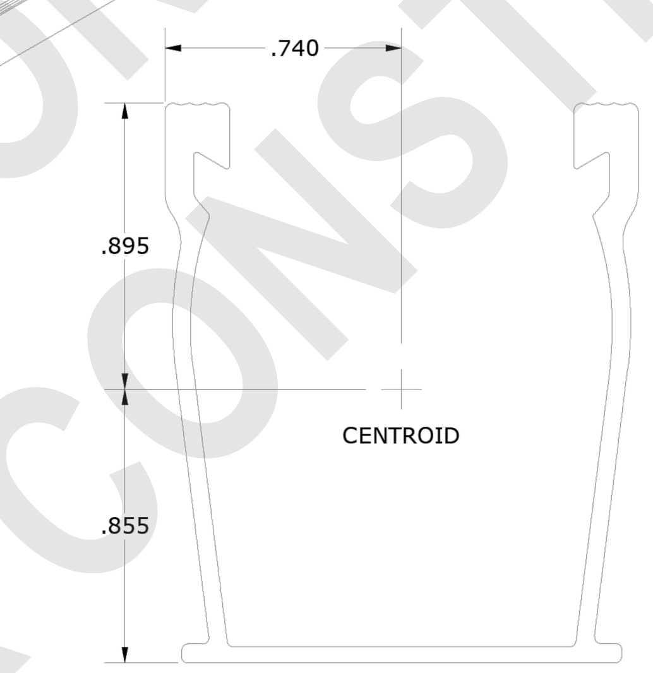
SNAPNRACK, TDS, UR-45 RAIL (USA)

DESCRIPTION:	DOC NUMBER:	
SNAPNRACK, TDS, UR-45 RAIL (USA)	SNR-DC-01451	SnapNrack®
PART NUMBER(S): 232-10095-USA, 232-10096-USA, 232-10097-USA, 232-10130-USA	DRAWN BY: H.WULFEKOETTER	SNR SOLAR LLC 775 FIERO LANE, SUITE 200 SAN LUIS OBISPO, CA 93401 USA EMAIL: CONTACT@SNAPNRACK.COM
UNITS: IN, LB, DEG [MM, KG, DEG] — SHEET: 1:1	REV: C — DATE: 4/1/2025	THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SNR SOLAR LLC.

UR-45 RAIL PROPERTIES

SKU	FINISH	RAIL LENGTH (X)	WEIGHT (lb)
232-10095-USA	MILL	172 in	5.55
232-10096-USA	BLACK	172 in	5.55
232-10097-USA	MILL	94 in	3.03
232-10130-USA	MILL	186 in	6.00





SECTION PROPERTIES

A	0.319 in^2
Ixx	0.134 in^4
Iyy	0.121 in^4
Sx (TOP)	0.152 in^3
Sx (BOT)	0.156 in^3
Sy (LEFT)	0.164 in^3
Sy (RIGHT)	0.164 in^3

MATERIALS:	6005-T5 ALUMINUM
DESIGN LOAD (LBS):	N/A
ULTIMATE LOAD (LBS):	N/A
TORQUE SPECIFICATION:	N/A FT-LBS
CERTIFICATION:	UL 2703, FILE E359313
WEIGHT (LBS):	VARIES, SEE PROPERTIES TABLE

S-5!® The Right Way!®

S-5-U and S-5-U Mini

The right way to attach almost anything to metal roofs!

S-5-U Clamp

The S-5-U clamp is by far our most popular and most versatile clamp. It fits about 85% of the standing seam profiles manufactured in North America—including most structural and architectural profiles. It can be used on vertically oriented seams and, by rotating the clamp 90 degrees, it can also be used on most horizontal 2" seam profiles.

Its simple design, generous dimensioning, and multiple hole orientations are what make the S-5-U clamp so versatile for use with the S-5!® snow retention products, such as ColorGard®, as well as with other heavy-duty applications.

Installation is as simple as setting the specially patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-U Mini Clamp

The S-5-U Mini is a bit shorter than the S-5-U and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.

The S-5-U clamp is our most popular and versatile clamp, fitting about 85% of the standing seam profiles in North America.

888-825-3432 | www.S-5.com | MADE IN THE USA

SnapNrack

snapnrack.com

Ultra Rail Roof Mount System

The Ultimate Value in Rooftop Solar

- Industry leading Wire Management Solutions
- Mounts available for all roof types
- Single Tool Installation
- All SnapNrack Module Clamps & Accessories are compatible with both rail profiles

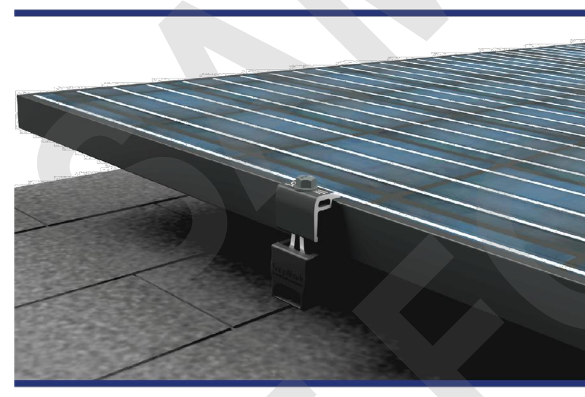
Start Installing Ultra Rail Today

SnapNrack Ultra Rail System

A sleek, straightforward rail solution for mounting solar modules on all roof types. Ultra Rail now features *one* rail profile, UR-45, a lightweight rail profile that's suited for all geographic regions, with varying span capabilities. UR-45 Rail maintains all the great features of SnapNrack rail like snap-in module clamps and an open rail channel for integrated wire management. The Ultra Rail portfolio features multiple roof attachment sealing technologies for all install preferences.

NEW! UltraFoot Roof Attachments (Coming Soon)

- Features SpeedSeal™+ Technology, a pre-installed butyl pad for easy peel & stick installation
- The ***only*** single lag roof attachment with butyl sealing available
- UltraFoot available in (3) configurations to accomodate rafter & deck mounting based on DeckAnchor™ or wood screw install preferences
- All UltraFoot designs feature ***new*** Flip Clamp Mount that centers load over fastener & creates an easier snap-in experience with UR-45 Rail

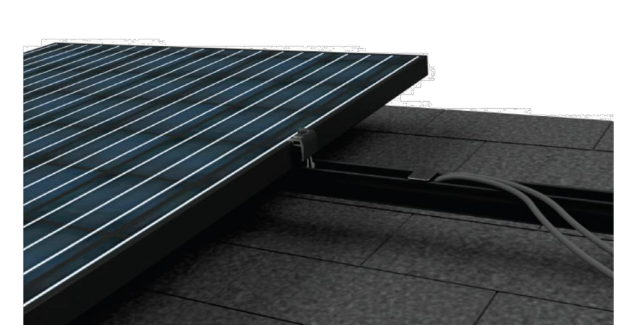


The Entire System is a Snap to Install

- Ultra Rail Mounts include snap-in brackets for attaching rail
- Ultra Rail Mid Clamps & End Clamps are one-size-fits-all universal clamping height
- Universal End Clamps & snap-in End Caps provide a clean look to the array edge

Unparalleled Wire Management

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Module clamps eliminate bolt interference in the rail channel creating more space for wire management
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits & Conduit Clamps
- System is fully bonded & listed to UL 2703 Standard



Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

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

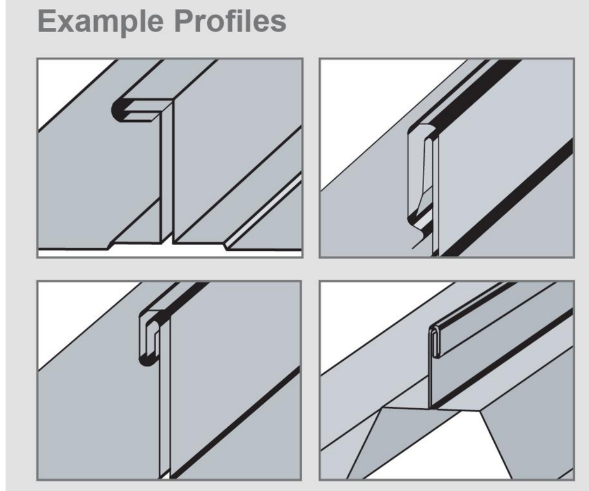
S-5!® The Right Way!®

The strength of the S-5-U clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

The **S-5-U and S-5-U Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-U is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit **www.S-5.com** for more information including CAD details, metallurgical compatibilities and specifications.

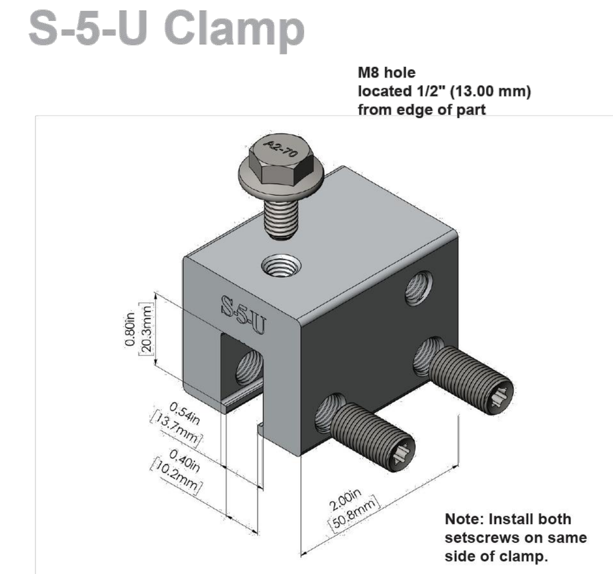
The S-5-U clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

Example Profiles

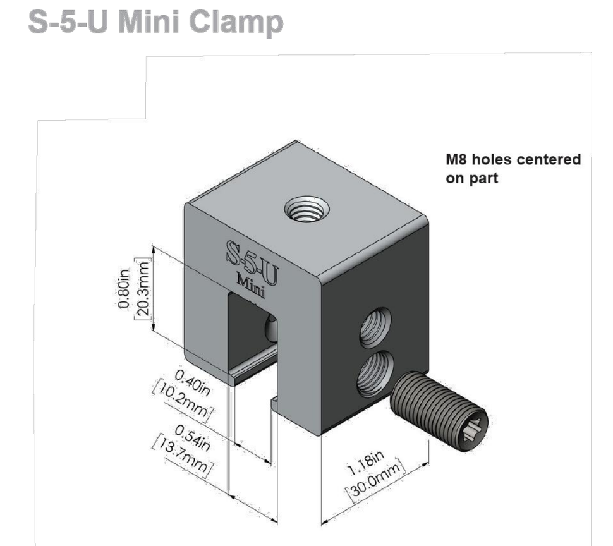


For horizontal seams under 0.65", do not use this clamp. Visit www.S-5.com for more detailed information and proper clamp usage.

S-5-U Clamp



S-5-U Mini Clamp



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

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

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be verified using a calibrated torque wrench between 160 and 180 inch pounds when used on 22ga steel, and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength.

Distributed by

LOGO

CONTRACTOR	
	XXXXX
ADDRESS:	XXX XXXXXXXX, XXXXXX, XX XXXXX
PHONE:	XXXXXXXXX
LIC. NO.:	XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: DATASHEET

DATE: 06.19.2026

DESIGN BY: V.G.

SHEET NUMBER: D-2

Ultra Rail Bill of Materials

SnapNrack

Installation Address:

Company Name: Public

Project Number:

Create Date: Sat Mar 28 2026

BOM Number: 32687

PV Attributes

Manufacturer: Hyundai Solar
Model: HiN-T440NF(BK)
Rated Power: 440 W
Depth: 1.18 in
Length: 67.8 in
Frame color: Black
Width: 44.6 in

Site Conditions

Wind Speed: 137 mph
Snow Load: 0 psf
Building Code: 2021 IBC

Installation Attributes

Racking System: Ultra Rail
Number of Modules: 230
Total System Size: 101.2 KW
Number of Sub-Arrays: 2

Project Dimensions and Weights

SnapNrack System Weight: 994.15 lbs
Array Square Footage: 4,829.81 sq. ft.
Total Module Weight: 11,502.3 lbs
Distributed Load: 2.59 lbs/sq. ft.
Total System Weight: 12,496.45 lbs

Ultra Rail Bill of Materials

SnapNrack

SKU	Description	Quantity
232-10095--USA	UR-45 Rail, 172", Mill (USA)	130
242-01213	UR-40 & UR-45 Splice, Silver	120
232-10101	UR-45 End Cap	40
242-02070	Ultra Rail Mid Clamp, Silver	440
242-02072	Ultra Rail End Clamp, Silver	40
242-10056	UltraFoot, Rafter, Black	300
242-02168	Sealing Washer Lag, 4-1/2", SS	300
242-10034	OmniLug	10

SHEET: Array 1

Installation Attributes

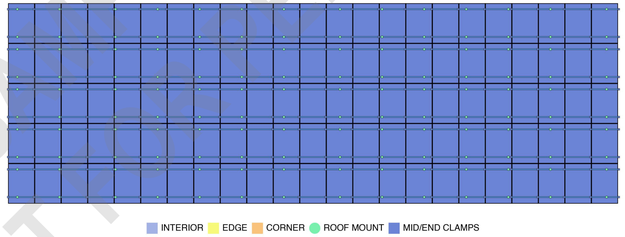
SYSTEM SIZE:	50.6 KW
MODULES:	115
DIMENSIONS:	342.00" x 1042.30"
HARDWARE WEIGHT:	497.075 lbs
MODULE WEIGHT:	5,751.15 lbs
ARRAY WEIGHT:	6,248.225 lbs
ROOF PITCH:	29°
ROOF HEIGHT:	25 ft
TOTAL SQ FT:	2,414.9 sq. ft.
LOAD:	2.59 lbs/sq. ft.

Structural Engineering Report

Portrait - Installed/Maximum Rail Span	
ZONE 1:	72 in. / 85 in.
ZONE 2:	72 in. / 75 in.
ZONE 3:	72 in. / 78 in.
Portrait - Installed/Maximum Cantilever	
ZONE 1:	24 in. / 28 in.
ZONE 2:	24 in. / 25 in.
ZONE 3:	24 in. / 26 in.
Landscape - Installed/Maximum Rail Span	
ZONE 1:	96 in. / 98 in.
ZONE 2:	72 in. / 87 in.
ZONE 3:	72 in. / 90 in.
Landscape - Installed/Maximum Cantilever	
ZONE 1:	32 in. / 32 in.
ZONE 2:	24 in. / 29 in.
ZONE 3:	24 in. / 30 in.

Components

UR-45 RAIL, 172", MILL (USA):	65
UR-40 & UR-45 SPLICE:	60
UR-45 END CAP:	20
ULTRA RAIL MID CLAMP:	220
ULTRA RAIL END CLAMP:	20
ULTRAFOOT, RAFTER, BLACK:	150
SEALING WASHER LAG, 4-1/2", SS:	150
OMNILUG USA:	5



SnapNrack

INSTALLER SHALL CONFIRM THAT THE DESIGN DETAILS REPRESENTED COMPLY WITH THE SNAPNRACK ULTRA RAIL INSTALLATION MANUAL AND ALL REQUIRED CODES AND STANDARDS PRIOR TO INSTALLATION.

COMPANY NAME: Public

PROJECT NAME:

SHEET: Array 1

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: DATASHEET

DATE: 06.19.2026

DESIGN BY: V.G.

SHEET NUMBER: D-3

Ultra Rail Bill of Materials

SnapNrack

Installation Address:

Company Name: Public

Project Number:

Create Date: Thu May 21 2026

BOM Number: 35942

PV Attributes

Manufacturer: Hyundai Solar
Model: HiN-T440NF(BK)
Rated Power: 440 W
Depth: 1.18 in
Length: 67.8 in
Frame color: Black
Width: 44.6 in

Site Conditions

Wind Speed: 137 mph
Snow Load: 0 psf
Building Code: 2021 IBC

Installation Attributes

Racking System: Ultra Rail
Number of Modules: 65
Total System Size: 28.6 KW
Number of Sub-Arrays: 1

Project Dimensions and Weights

SnapNrack System Weight: 272.93 lbs
Array Square Footage: 1,364.95 sq. ft.
Total Module Weight: 3,250.65 lbs
Distributed Load: 2.58 lbs/sq. ft.
Total System Weight: 3,523.58 lbs

Ultra Rail Bill of Materials

SnapNrack

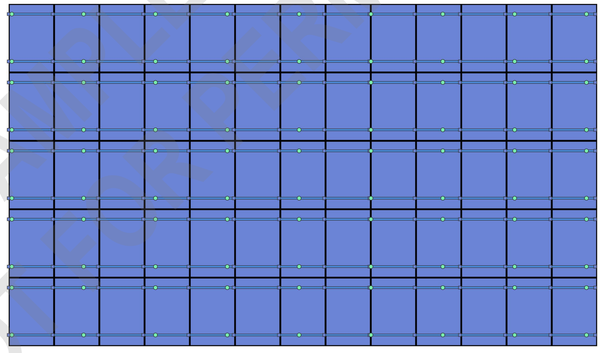
SKU	Description	Quantity
232-10095--USA	UR-45 Rail, 172", Mill (USA)	35
242-01213	UR-40 & UR-45 Splice, Silver	30
232-10101	UR-45 End Cap	20
242-02070	Ultra Rail Mid Clamp, Silver	120
242-02072	Ultra Rail End Clamp, Silver	20
242-10056	UltraFoot, Rafter, Black	90
242-02168	Sealing Washer Lag, 4-1/2", SS	90
242-10034--USA	OmniLug	5

SHEET: Array 1

Installation Attributes	
SYSTEM SIZE:	28.6 KW
MODULES:	65
DIMENSIONS:	W (left-right): 588.80" x H (top-bottom): 342.00"
HARDWARE WEIGHT:	272.925 lbs
MODULE WEIGHT:	3,250.65 lbs
ARRAY WEIGHT:	3,523.575 lbs
ROOF PITCH:	0.00°
ROOF HEIGHT:	14.00 ft
TOTAL SQ FT:	1,364.95 sq. ft.
LOAD:	2.58 lbs/sq. ft.

Structural Engineering Report	
Portrait - Installed/Maximum Rail Span	
ZONE 1:	72 in. / 83 in.
ZONE 2:	72 in. / 74 in.
ZONE 3:	48 in. / 64 in.
Portrait - Installed/Maximum Cantilever	
ZONE 1:	24 in. / 27 in.
ZONE 2:	24 in. / 24 in.
ZONE 3:	16 in. / 21 in.
Landscape - Installed/Maximum Rail Span	
ZONE 1:	72 in. / 95 in.
ZONE 2:	72 in. / 85 in.
ZONE 3:	72 in. / 76 in.
Landscape - Installed/Maximum Cantilever	
ZONE 1:	24 in. / 31 in.
ZONE 2:	24 in. / 28 in.
ZONE 3:	24 in. / 25 in.

Components	
OMNILUG USA:	5
SEALING WASHER LAG, 4-1/2", SS:	90
ULTRA RAIL END CLAMP:	20
ULTRA RAIL MID CLAMP:	120
ULTRAFOOT, RAFTER, BLACK:	90
UR-40 & UR-45 SPLICE:	30
UR-45 END CAP:	20
UR-45 RAIL, 172", MILL (USA):	35



INTERIOR EDGE CORNER ROOF MOUNT MID/END CLAMPS

SnapNrack

INSTALLER SHALL CONFIRM THAT THE DESIGN DETAILS REPRESENTED COMPLY WITH THE SNAPNRACK ULTRA RAIL INSTALLATION MANUAL AND ALL REQUIRED CODES AND STANDARDS PRIOR TO INSTALLATION.

COMPANY NAME: Public

PROJECT NAME:

SHEET: Array 1

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: DATASHEET

DATE: 06.19.2026

DESIGN BY: V.G.

SHEET NUMBER: D-4

Ultra Rail Bill of Materials

SnapNrack

Installation Address:

Company Name: Public

Project Number:

Create Date: Sat Mar 28 2026

BOM Number: 32688

PV Attributes

Manufacturer: Longi Solar
Model: LR5-72HBD-550M
Rated Power: 550 W
Length: 88.81 in
Width: 44.61 in
Depth: 1.38 in
Frame color: Silver

Site Conditions

Wind Speed: 137 mph
Snow Load: 0 psf
Building Code: 2021 IBC

Installation Attributes

Racking System: Ultra Rail
Total System Size: 220.55 KW
Number of Sub-Arrays: 1
Number of Modules: 401

Project Dimensions and Weights

SnapNrack System Weight: 1,811.15 lbs
Total Module Weight: 27,789.3 lbs
Total System Weight: 29,600.45 lbs
Array Square Footage: 11,032.55 sq. ft.
Distributed Load: 2.68 lbs/sq. ft.

Ultra Rail Bill of Materials

SnapNrack

SKU	Description	Quantity
232-10095--USA	UR-45 Rail, 172", Mill (USA)	221
242-01213	UR-40 & UR-45 Splice, Silver	206
232-10101	UR-45 End Cap	56
242-02070	Ultra Rail Mid Clamp, Silver	774
242-02072	Ultra Rail End Clamp, Silver	56
242-10043--USA	All Purpose L Foot feat. S-5! S-5-U	544
242-10034	OmniLug	14

SHEET: Array 1

Installation Attributes

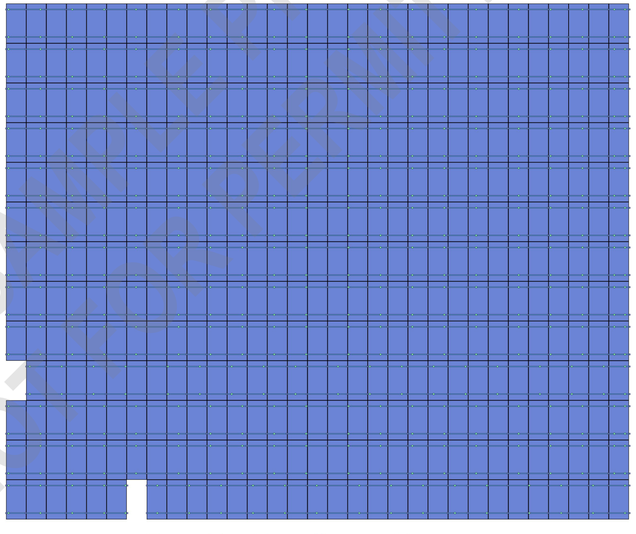
SYSTEM SIZE:	220.55 KW
MODULES:	401
DIMENSIONS:	1163.53" x 1405.41"
HARDWARE WEIGHT:	1,811.152 lbs
MODULE WEIGHT:	27,789.3 lbs
ARRAY WEIGHT:	29,600.452 lbs
ROOF PITCH:	0°
ROOF HEIGHT:	14 ft
TOTAL SQ FT:	11,032.55 sq. ft.
LOAD:	2.68 lbs/sq. ft.

Structural Engineering Report

Portrait - Installed/Maximum Rail Span	
ZONE 1:	72 in. / 76 in.
ZONE 2:	48 in. / 66 in.
ZONE 3:	48 in. / 56 in.
Portrait - Installed/Maximum Cantilever	
ZONE 1:	24 in. / 25 in.
ZONE 2:	16 in. / 22 in.
ZONE 3:	16 in. / 18 in.
Landscape - Installed/Maximum Rail Span	
ZONE 1:	72 in. / 95 in.
ZONE 2:	72 in. / 85 in.
ZONE 3:	72 in. / 77 in.
Landscape - Installed/Maximum Cantilever	
ZONE 1:	24 in. / 31 in.
ZONE 2:	24 in. / 28 in.
ZONE 3:	24 in. / 25 in.

Components

UR-45 RAIL, 172", MILL (USA):	221
UR-40 & UR-45 SPLICE:	206
UR-45 END CAP:	56
ULTRA RAIL MID CLAMP:	774
ULTRA RAIL END CLAMP:	56
ALL PURPOSE L FOOT FEAT. S-5! S-5-N MINI:	544
OMNILUG USA:	14



INTERIOR EDGE CORNER ROOF MOUNT MID/END CLAMPS

SnapNrack

INSTALLER SHALL CONFIRM THAT THE DESIGN DETAILS REPRESENTED COMPLY WITH THE SNAPNRACK ULTRA RAIL INSTALLATION MANUAL AND ALL REQUIRED CODES AND STANDARDS PRIOR TO INSTALLATION.

COMPANY NAME: Public

PROJECT NAME:

SHEET: Array 1

LOGO

CONTRACTOR

XXXXX

ADDRESS: XXX XXXXXXXX, XXXXXX, XX XXXXX

PHONE: XXXXXXXXX

LIC. NO.: XXXXXXXX

PROJECT

NEW PV SYSTEM: 299.750 kWp

XXXXXXXX

1111 XXXXXXXX, XXXXXX, XX XXXXX

APN: XXXXXXXXX

ENGINEER OF RECORD

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: DATASHEET

DATE: 06.19.2026

DESIGN BY: V.G.

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