

Sinclair Designs & Engineering

*Integrated Project Development
& System Manufacturing*

SKY-RACK 2.0 Ground Mount System

INSTALLATION GUIDE



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PRODUCT SPEC SHEET

Fixed Tilt System - Module Clamp Kits or Direct to Frame Season Adjust - Manual



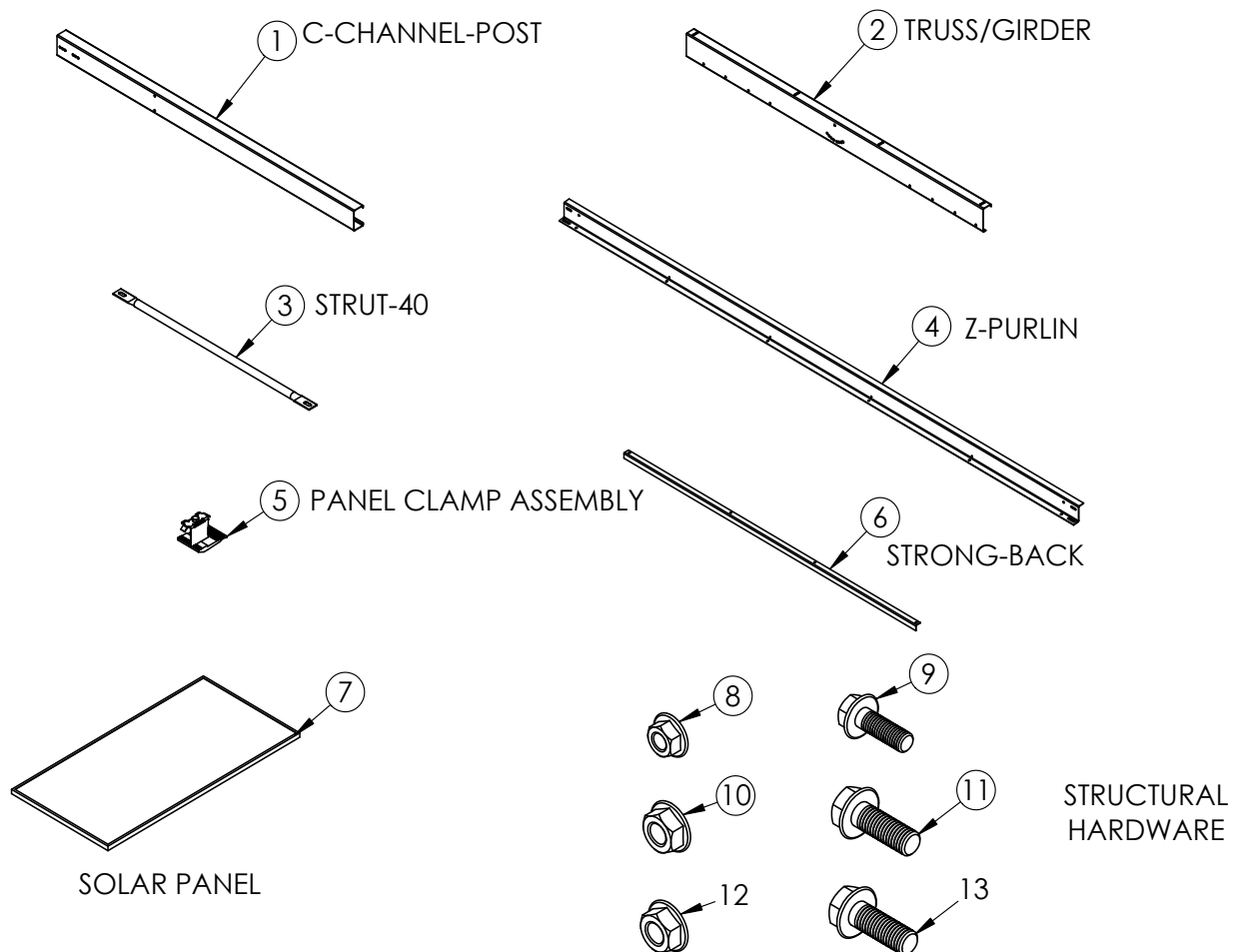
TILT ANGLE	5 - 40 DEGREES	TERRAIN	+/- 5 DEG E/W
MODULE ORIENTATION	2 HIGH PORTRAIT	WIRE MANAGEMENT	ZIP TIE HOLES AVAILABLE
WIND LOAD	125 MPH	WARRANTY	20 - 25 YEAR OPTIONS
SNOW LOAD	60 PSF	MATERIAL	GRADE 50 - 60 HSLA STEEL
GROUND CLEARANCE	24 - 36 IN	COATING	GALVANIZED
MODULE CLAMPS OR DIRECT TO FRAME	OPTIONAL	MANUFACTURING	USA - MICHIGAN MADE

***Note: Higher wind load/snow load options are available.
Formal site specific structural calculations available upon request.***

4X MAIN COMPONENTS	ADDITIONAL COMPONENTS	MINIMAL HARDWARE
1. C-CHANNEL-POST	HIGH WIND/SNOW	2 X 5/8-11 X 1 3/4 BOLTS
2. STRUT-40	STRONG-BACKS	2 X 5/8-11 SERRATED NUTS
3. TRUSS/GIRDER	CANTILEVERS	14 X 1/2-13 X 1 3/4 BOLTS
4. Z-PURLIN (2-5 PANEL LENGTHS)	STRUT-50	14 X 1/2-13 SERRATED NUTS



CLAMP DESIGN: Included Parts List



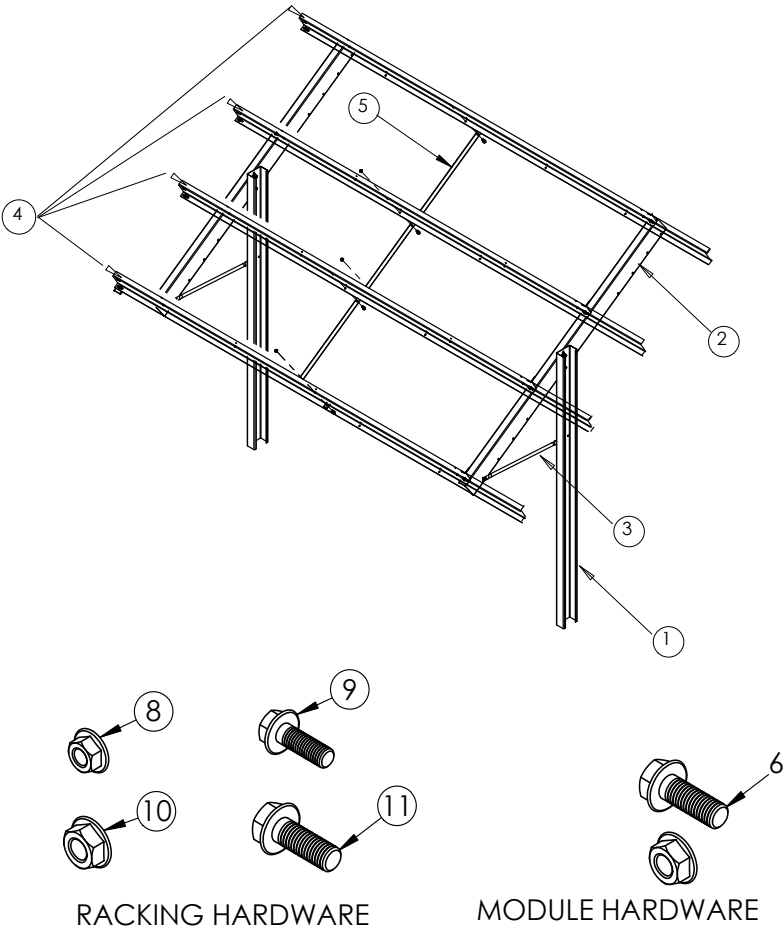
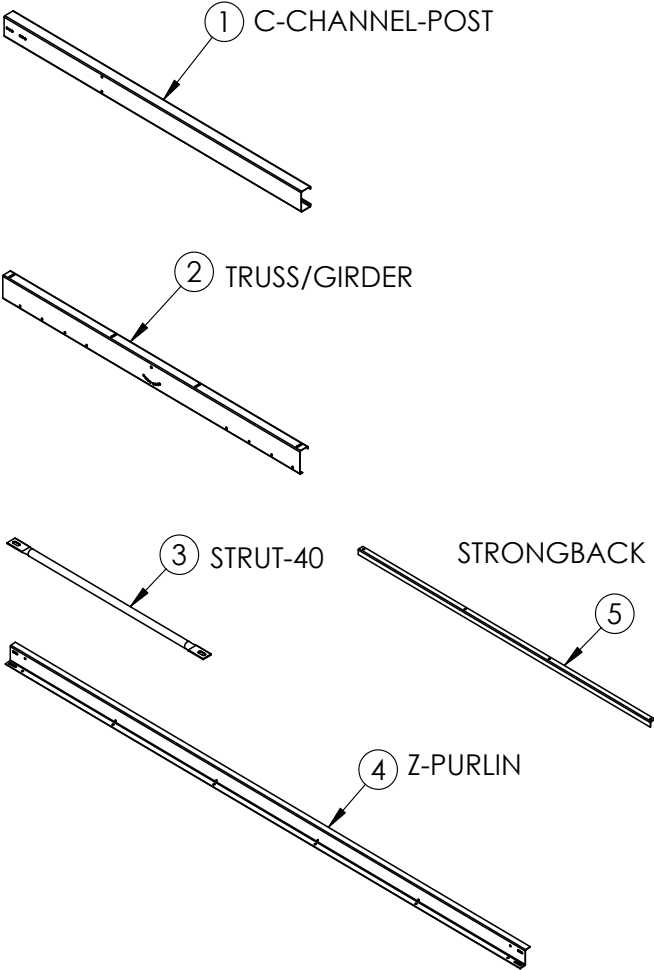
ITEM NO.		QTY
1	C-CHANNEL-POST	2
2	TRUSS/GIRDER	2
3	STRUT-40	21
4	Z-PURLIN	4
5	PANEL CLAMP ASSEMBLY	20
6	STRONG-BACK	1
7	PV MODULE	10
8	1/2-13 FLANGE HEAD NUT	14
9	1/2-13 X 1.5 FLANGE HEAD BOLT	14
10	5/8-11 FLANGE HEAD NUT	4
11	5/8-11 X 1.75 FLANGE HEAD BOLT	4

ITEM NO.	Recommended Installation Tools:	QTY
	1/4 or 1/2 1500 in/lb MIN Impact Driver 1/2 - 3/4 - 15/16 in Impact Sockets (Always take extra batteries)	
5	TORQUE SPEC = 12 ft/lbs	20
9	TORQUE SPEC = 57 ft/lbs	14
11	TORQUE SPEC = 112 ft/lbs	2

Note: Z-PURLIN 49.5 East & West Cantilevers are available - See Design Requirements & Bill of Materials

DIRECT TO FRAME DESIGN:

Included Parts List



ITEM NO.	DESCRIPTION	QTY
1	C-CHANNEL-POST	2
2	TRUSS/GIRDER	2
3	SUPPORT STRUT	2
4	Z-PURLIN	4
5	STRONG-BACK	1
6	1/4-20 SERRATED FLANGED BOLT/NUT	40
7	PV MODULE	10
8	1/2-13 FLANGE HEAD NUT	14
9	1/2-13 X 1.5 FLANGE HEAD BOLT	14
10	5/8-11 FLANGE HEAD NUT	4
11	5/8-11 X 1.75 FLANGE HEAD BOLT	4

TORQUE	Recommended Installation Tools:	
	1/4 or 1/2 1500 in/lb MIN Impact Driver 1/2 - 3/4 - 15/16 in Impact Sockets (Always take extra batteries)	
6	TORQUE SPEC =6 ft/lbs	40
9	TORQUE SPEC =57 ft/lbs	14
11	TORQUE SPEC = 112 ft/lbs	4

Note: Z-PURLIN 49.5 East & West Cantilevers are available - See Design Requirements & Bill of Materials



Safety Information



IMPORTANT

It is highly recommended that system installation and any subsequent modifications, disassembly, or reassembly be conducted by a factory authorized representative. Contact SDE for additional information.



CAUTION: WATCH FOR WIRES!

Extreme caution should be taken when installing near power lines. For your own personal protection, the following safety steps should be taken:

- Perform as many functions as possible on the ground.
- Watch out for overhead power lines. Check the distance to the power lines before starting installation.
- Recommended minimum distance of 6 meters (20 feet) from all power lines.
- Do not use metal ladders.
- Do not install assembly on a windy day.
- If assembly slips, move away from it and let it fall.
- If any part of the assembly comes in contact with a power line, call your local power company. DO NOT TRY TO REMOVE IT YOURSELF! They will remove it safely.
- Make sure that the assembly is properly grounded.



WARNING

Assembling on windy days can be dangerous. Additional precautions should be taken when assembling in high wind areas. The modules surface, even in slight winds, create strong forces. Be prepared to safely handle these forces at unexpected moments. Do not attempt to assemble, move or mount assembly on windy days or serious, even fatal accidents may occur.

SDE is not responsible or liable for damage or injury resulting from antenna installations.



WARNING

Units improperly installed or installed to an inadequate structure can be susceptible to wind damage. This damage can be very serious and even life threatening. The owner and installer assumes full responsibility that the installation is structurally sound to support all loads (weight, wind and ice) and properly sealed against leaks. SDE will not accept liability for any damage caused due to the many unknown variable applications.

1.0 System Set-up Procedure

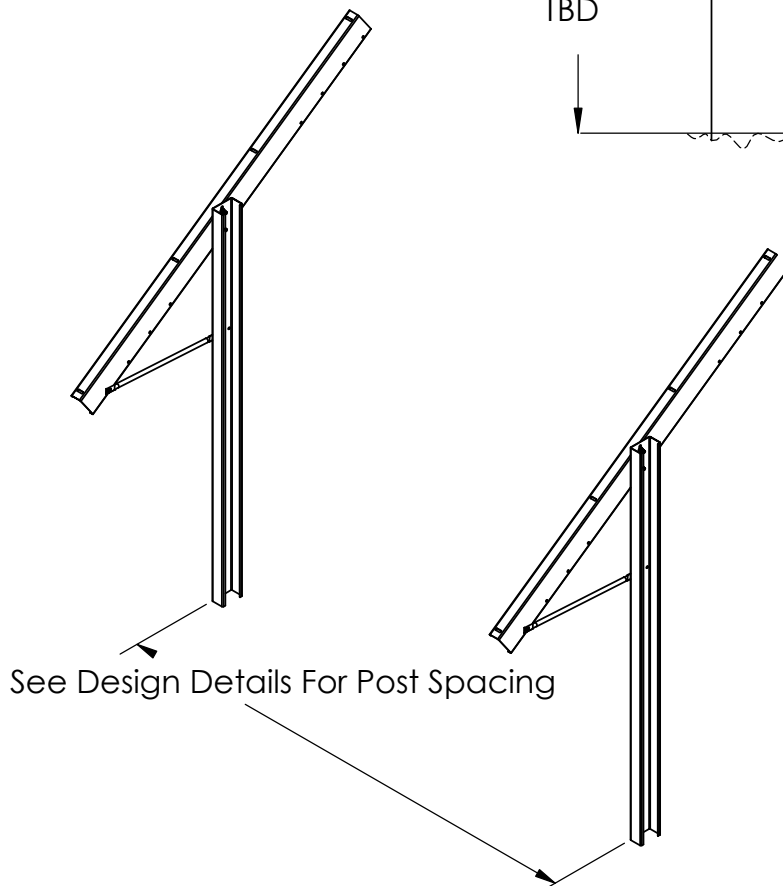
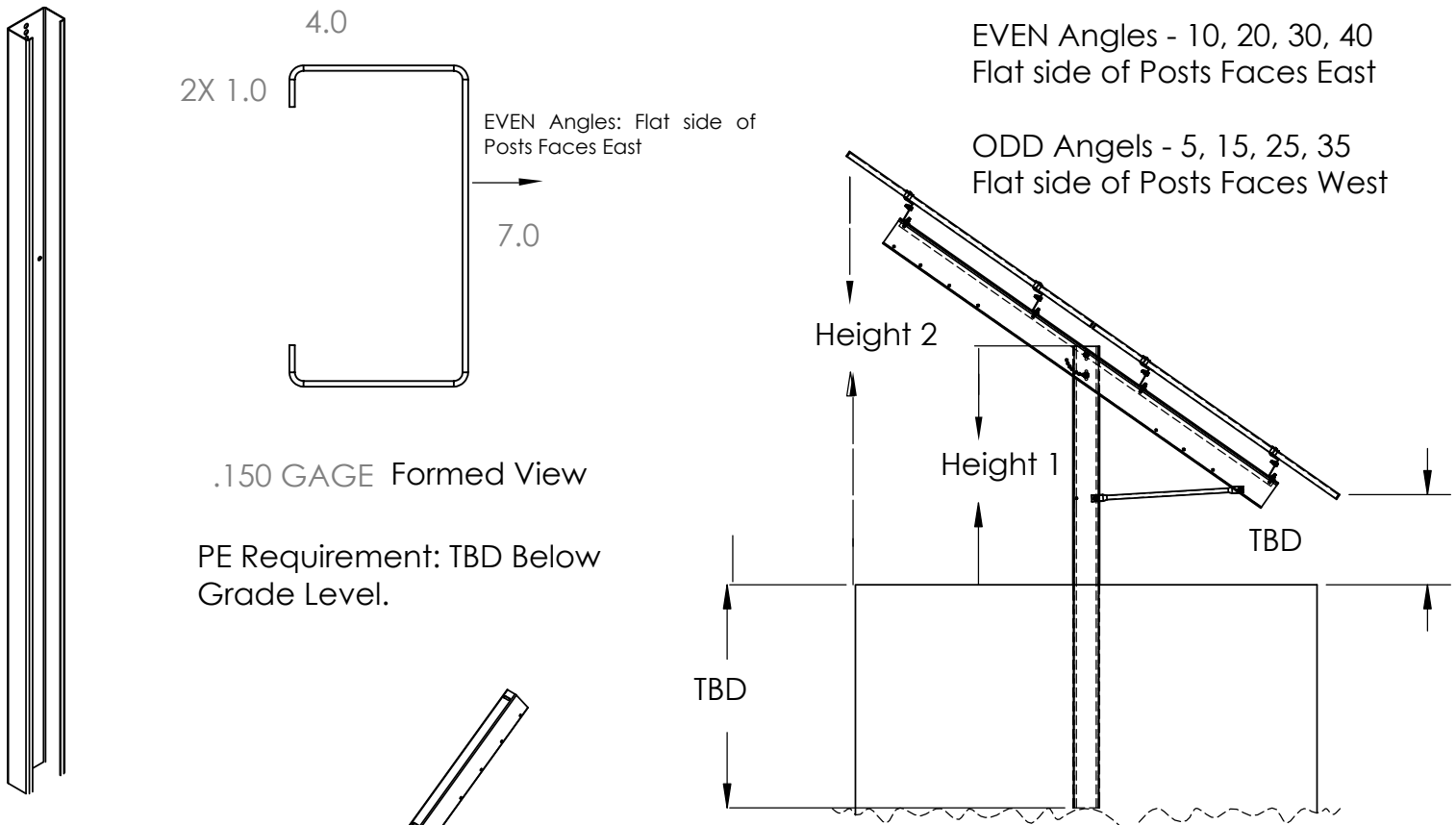


Warning: Extreme care must be taken for this setup procedure to avoid bodily injury and/or equipment damage.

1.1 Post Install

Choose a site that is as level as possible. Install depth will be determined by many factors, such as region and local building code & national ASCE requirements.

4x7 C-Channel (.150 GAGE) GRADE 50 - G90 Coating with Chem-Guard



<u>Angle</u>	<u>Height 1</u>	<u>Height 2</u>
45	73.5	134
40	68	124
35	62.5	113
30	57	102
25	51	90
20	44	77
15	38	64
10	31	51
5	25	38

1.0 System Set-up Procedure - POST DRIVEN SYSTEM



Warning: Extreme care must be taken for this setup procedure to avoid bodily injury and/or equipment damage.

STEP 1: IF USING CLAMPS, VERIFY YOUR PANEL PROGRESSION CALCULATION
(Module Width + .4in Clamp Width) Multiplied by # of Modules. This will determine the minimum amount of racking needed.

STEP 2: POST SPACING DIMENSIONS FOR STANDARD 72 CELL MODULES

202in Center to Center spacing (10x Panel Section)

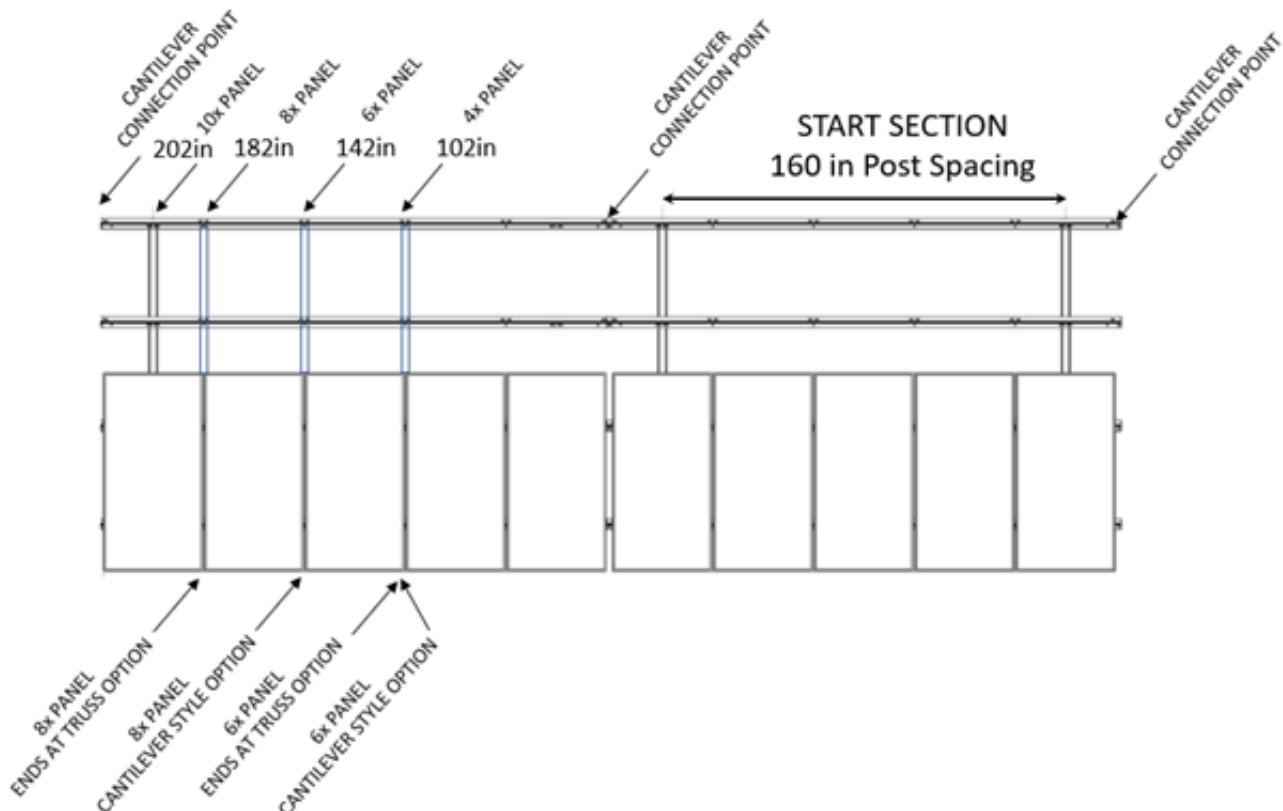
182 or *142in Center to Center spacing (8x Panel Section Options)

142 or *102in Center to Center spacing (6x Panel Section Options)

2x or 4x Panels can be added with Cantilever Extensions on the end of the arrays (Z-PURLIN-49.5)

We recommend building the system from East to West, as it is more efficient to overlap the z-purlins progressively on top.

DESIGN OVERVIEW



*** Recommended for Cantilever Design**

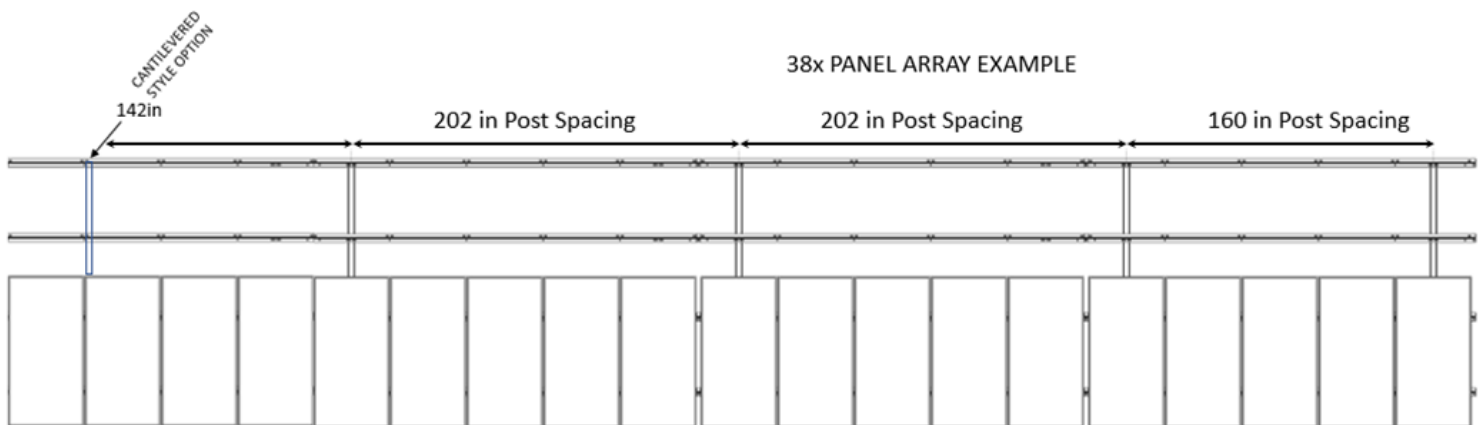
1.0 System Set-up Procedure - POST TEMPLATE



POST TEMPLATE OVERVIEW BY MODULE QUANTITY

# OF MODULES	START SECTION	ADD SECTION 1	ADD SECTION 2	ADD SECTION 3	ADD SECTION 4	ADD SECTION 5
8	142 in					
10	160 in (10x PANEL SECTION)					
12	160 in (10x PANEL SECTION)	(ADD 4x CANTILEVERS)				
14	160 in (10x PANEL SECTION)	(ADD 8x CANTILEVERS)				
16	160 in (10x PANEL SECTION)	102 in (6x PANEL SECTION)				
18	160 in (10x PANEL SECTION)	142 in (8x PANEL SECTION)				
20	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)				
22	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 4x CANTILEVERS)			
24	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 8x CANTILEVERS)			
26	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	102 in (6x PANEL SECTION)			
28	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	142 in (8x PANEL SECTION)			
30	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)			
32	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 4x CANTILEVERS)		
34	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 8x CANTILEVERS)		
36	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	102 in (6x PANEL SECTION)		
38	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	142 in (8x PANEL SECTION)		
40	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)		
42	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 4x CANTILEVERS)	
44	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 8x CANTILEVERS)	
46	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	102 in (6x PANEL SECTION)	
48	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	142 in (8x PANEL SECTION)	
50	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	
52	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 4x CANTILEVERS)
54	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	(ADD 8x CANTILEVERS)
56	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	102 in (6x PANEL SECTION)
58	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	142 in (8x PANEL SECTION)
60	160 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)	202 in (10x PANEL SECTION)

38x PANEL ARRAY EXAMPLE



1.0 System Set-up Procedure - POST DRIVEN SYSTEM



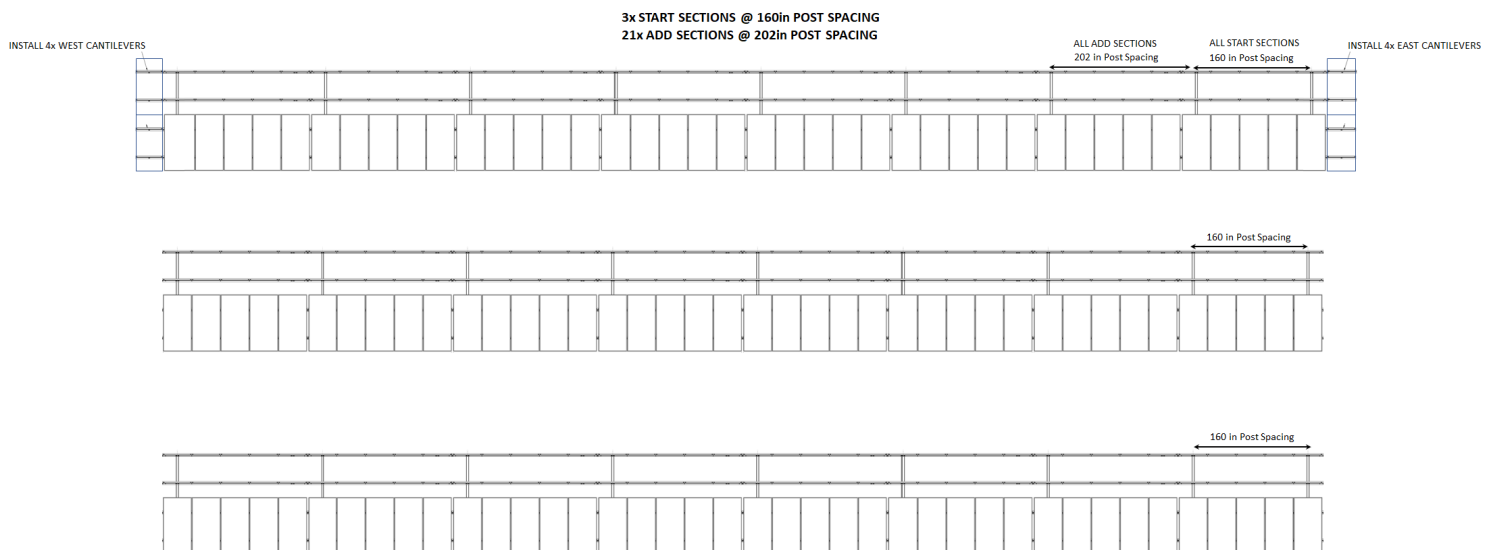
POWER HOME SOLAR - APTOS 415W MODULE - COMMERCIAL PROJECTS

STEP 1: IF USING CLAMPS, VERIFY YOUR PANEL PROGRESSION CALCULATION
(Module Width + .4in Clamp Width) Multiplied by # of Modules. This will determine the minimum amount of racking needed.

STEP 2: POST SPACING DIMENSIONS FOR STANDARD 72 CELL MODULES
202in Center to Center spacing (10x Panel Section)
182 or *142in Center to Center spacing (8x Panel Section Options)
142 or *102in Center to Center spacing (6x Panel Section Options)

2x or 4x Panels can be added with Cantilever Extensions on the end of the arrays (Z-PURLIN-49.5)

We recommend building the system from East to West, as it is more efficient to overlap the z-purlins progressively on top.



*** Recommended for Cantilever Design**

1.0 System Set-up Procedure



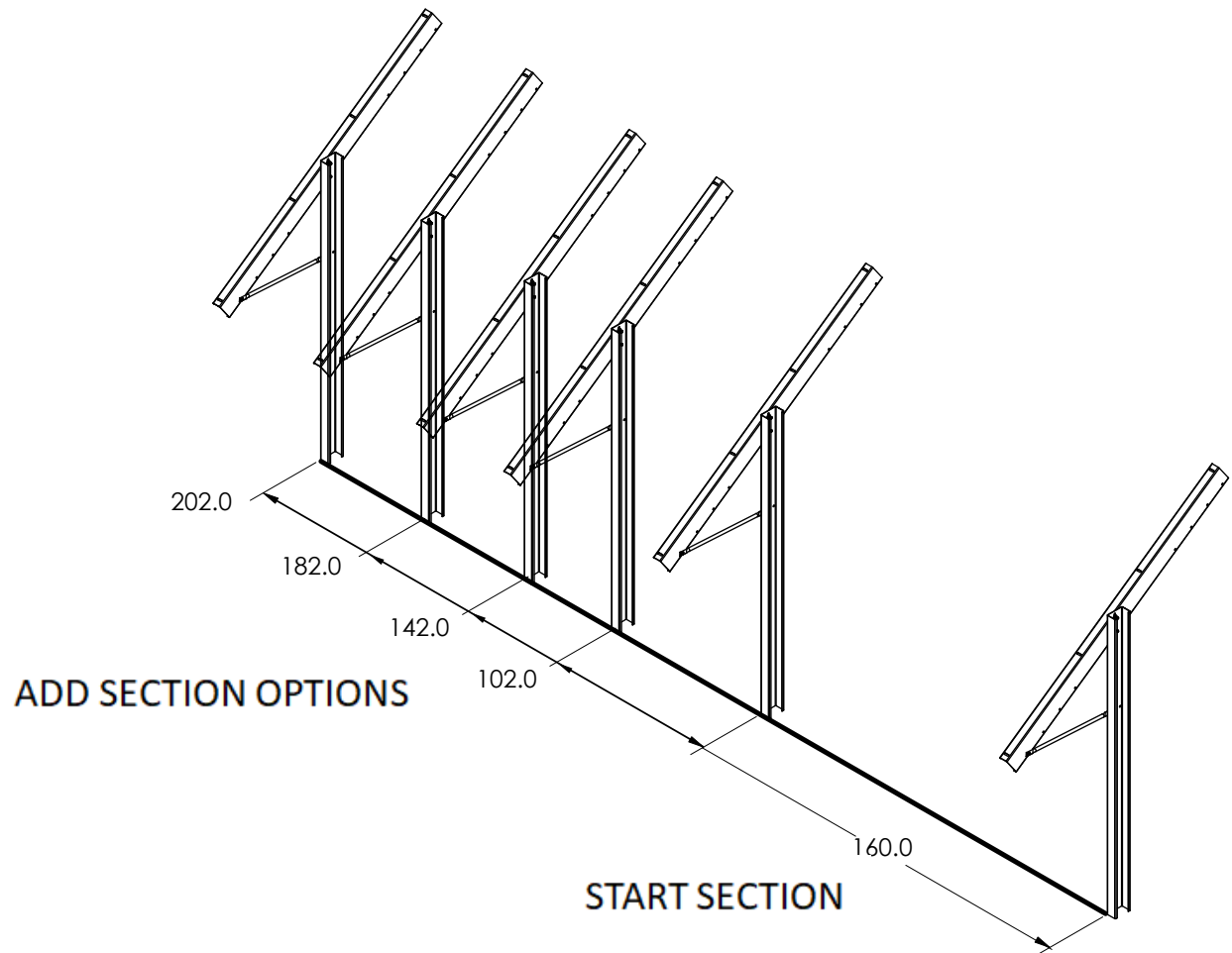
1.3 POST SPACING TEMPLATE

10x Panel "START" section requires 160in Post Spacing. 10x Panel "ADD" sections require 202in Post Spacing.

8x Panel "ADD" sections require 142in Post Spacing.

6x Panel "ADD" sections require 102in Post Spacing.

2x & 4x Panel "ADD" sections require Z-PURLIN-49.5 Cantilevers



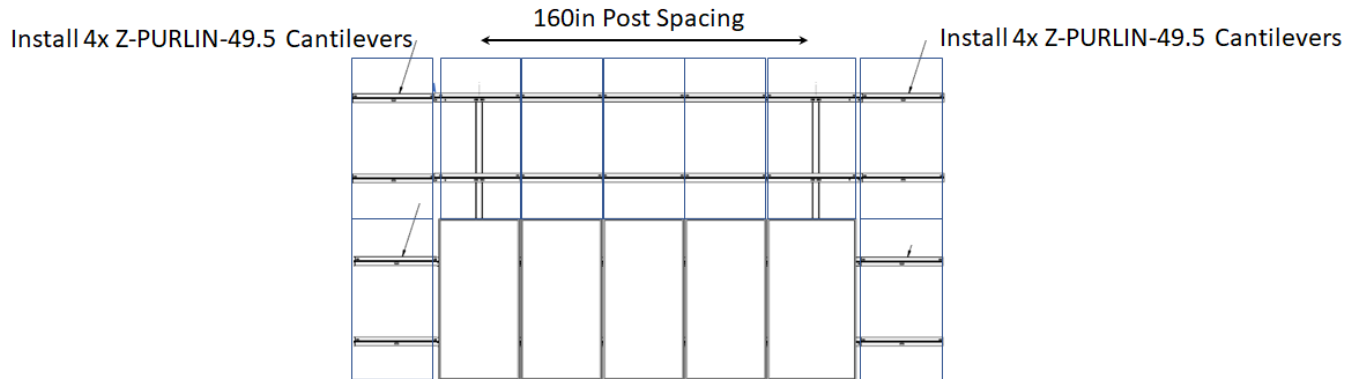
1.0 System Set-up Procedure



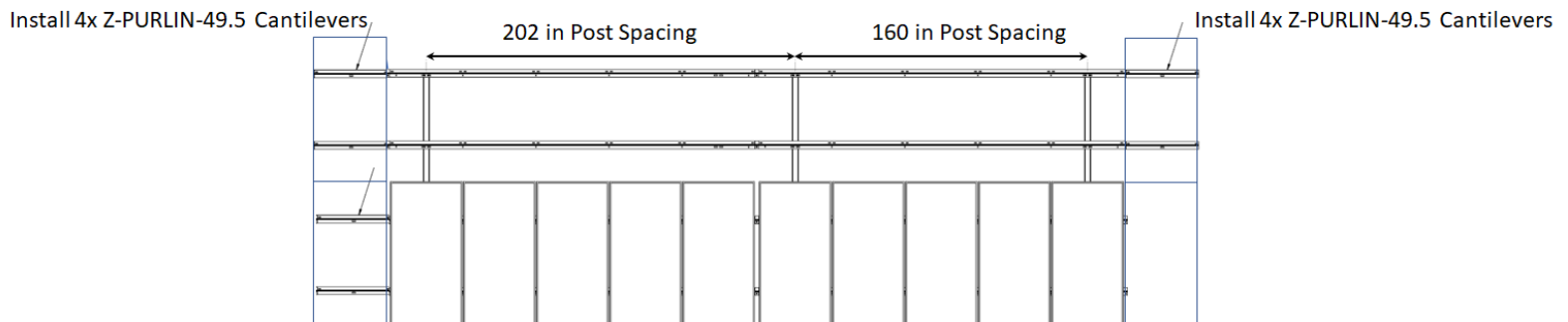
1.4 POST SPACING TEMPLATE CONTINUED

SEE BELOW CANTILEVER DESIGN OPTIONS

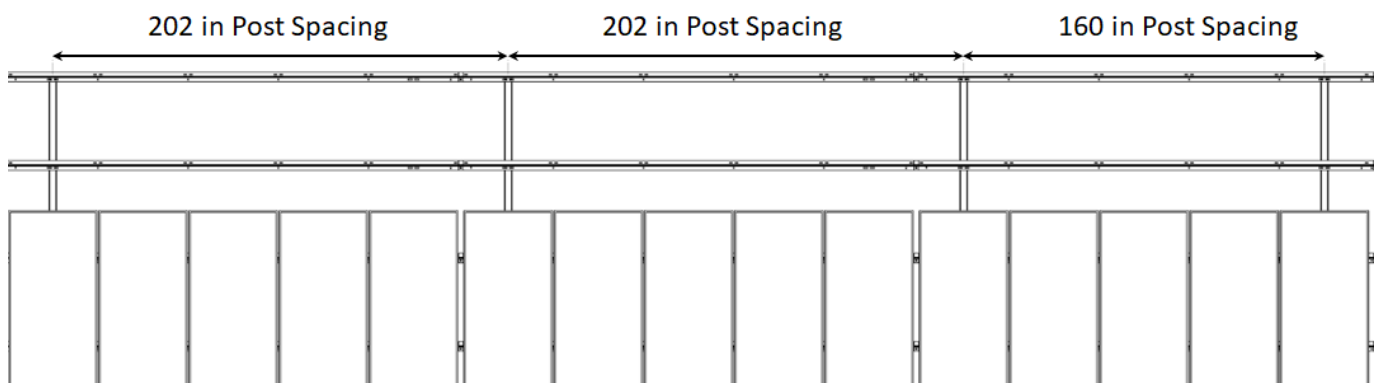
12x or 14x Panel Array Example with Cantilever Options



22x or 24x Panel Array Example with Cantilever Options



30x PANEL ARRAY EXAMPLE

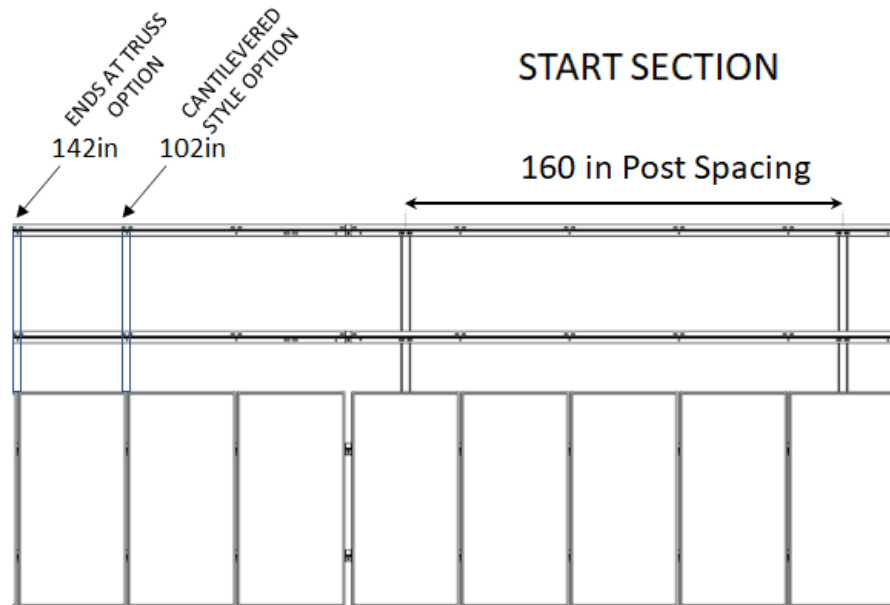


1.0 System Set-up Procedure

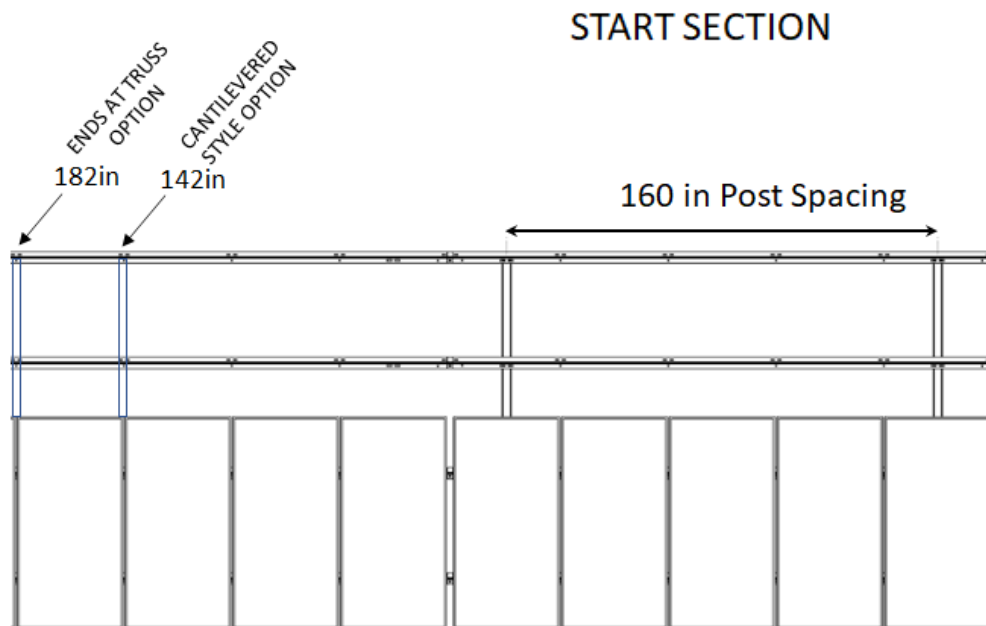


1.4 POST SPACING TEMPLATE CONTINUED

SEE BELOW CANTILEVER DESIGN OPTIONS



EXAMPLE: 6x PANEL ADD SECTION DESIGN OPTIONS



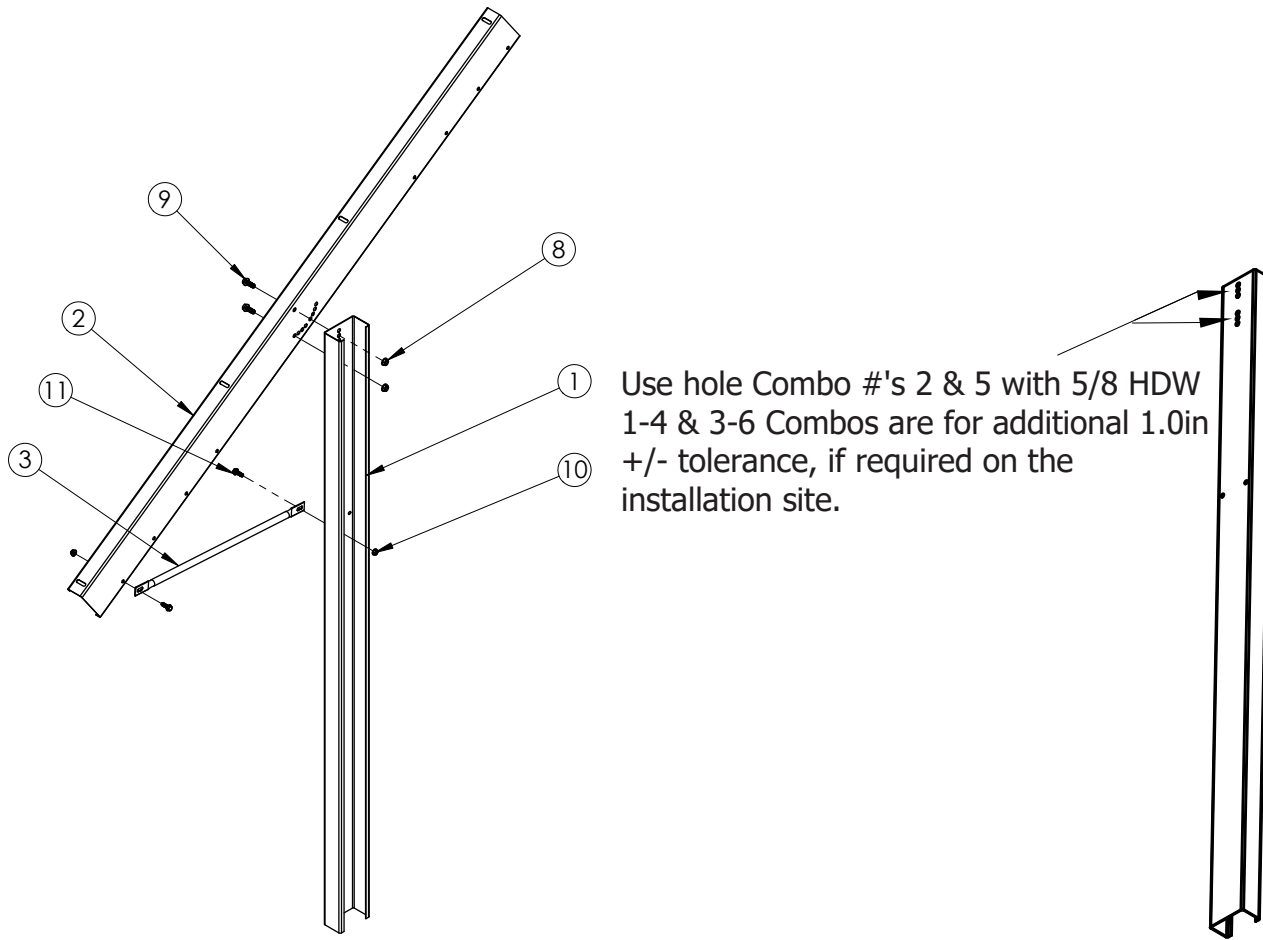
EXAMPLE: 8x PANEL ADD SECTION DESIGN OPTIONS

1.0 System Set-up Procedure



1.2 TRUSS-120 ASSEMBLY TO POST

Fasten angled mount on driven post with provided hardware. Then add support strut with hardware shown. Note: the C-Channel has a 6x hole pattern for +/- 1.0 in tolerance.



STEP 1: Install TRUSS to the C-Channel Post with 2x 5/8-11 x 1 1/2in Bolts/Nuts.

STEP 2: Install STRUT-40 to the C-Channel Post & Truss with 2x 1/2-13 x 1 1/2in Bolts/Nuts

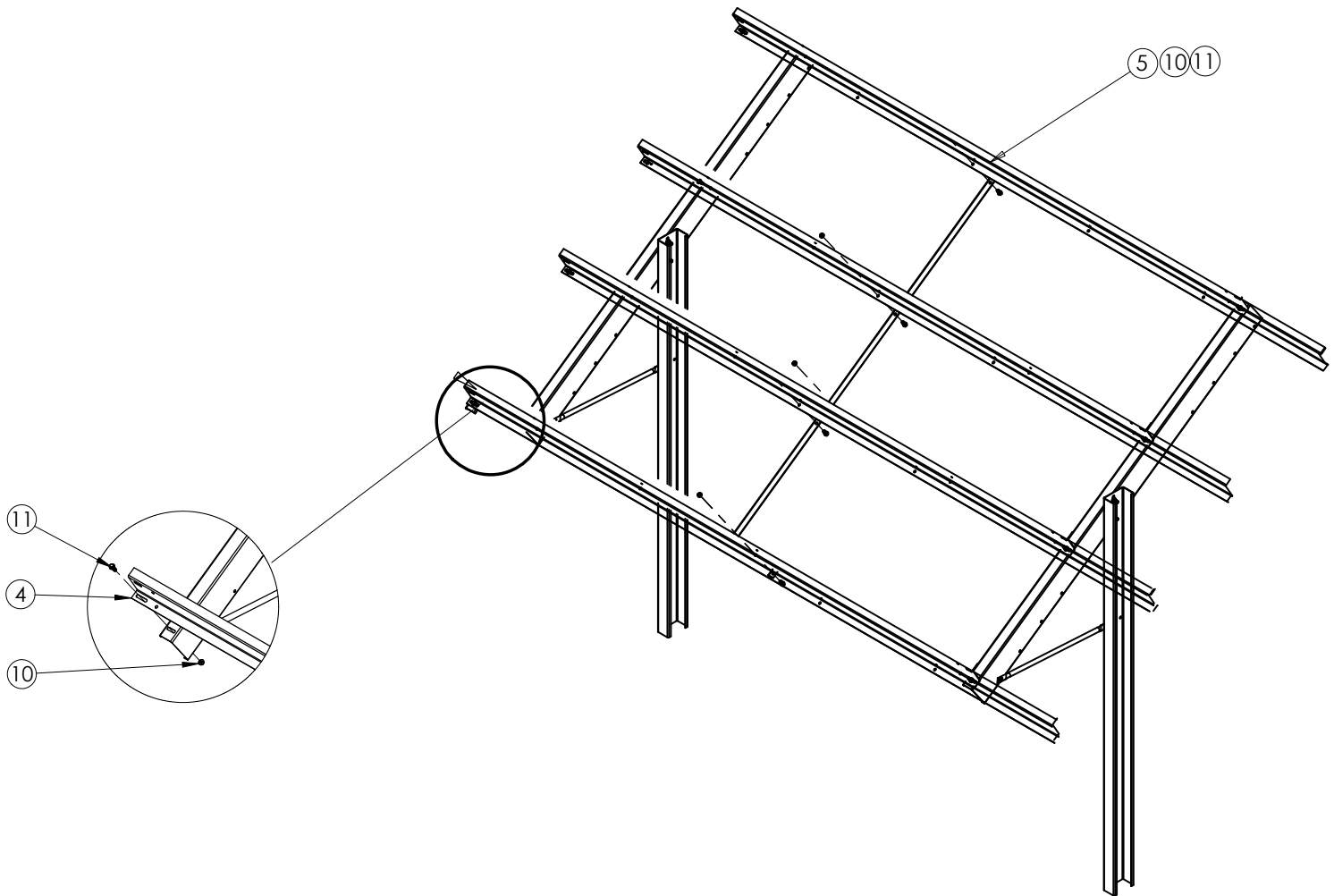
1.0 System Set-up Procedure



1.4 Z-PURLIN to TRUSS ASSEMBLY

Attach 4x Z-Purlins to the SLR-TRUSS with 1/2-13 x 1 1/2 Hardware.

Face Top Z-Purlin Flanges North



1.5 STRONG-BACK Install

Install STRONG-BACK to Z-purlins with 4x 1/2-13 hardware as detailed above.

1.0 System Set-up Procedure

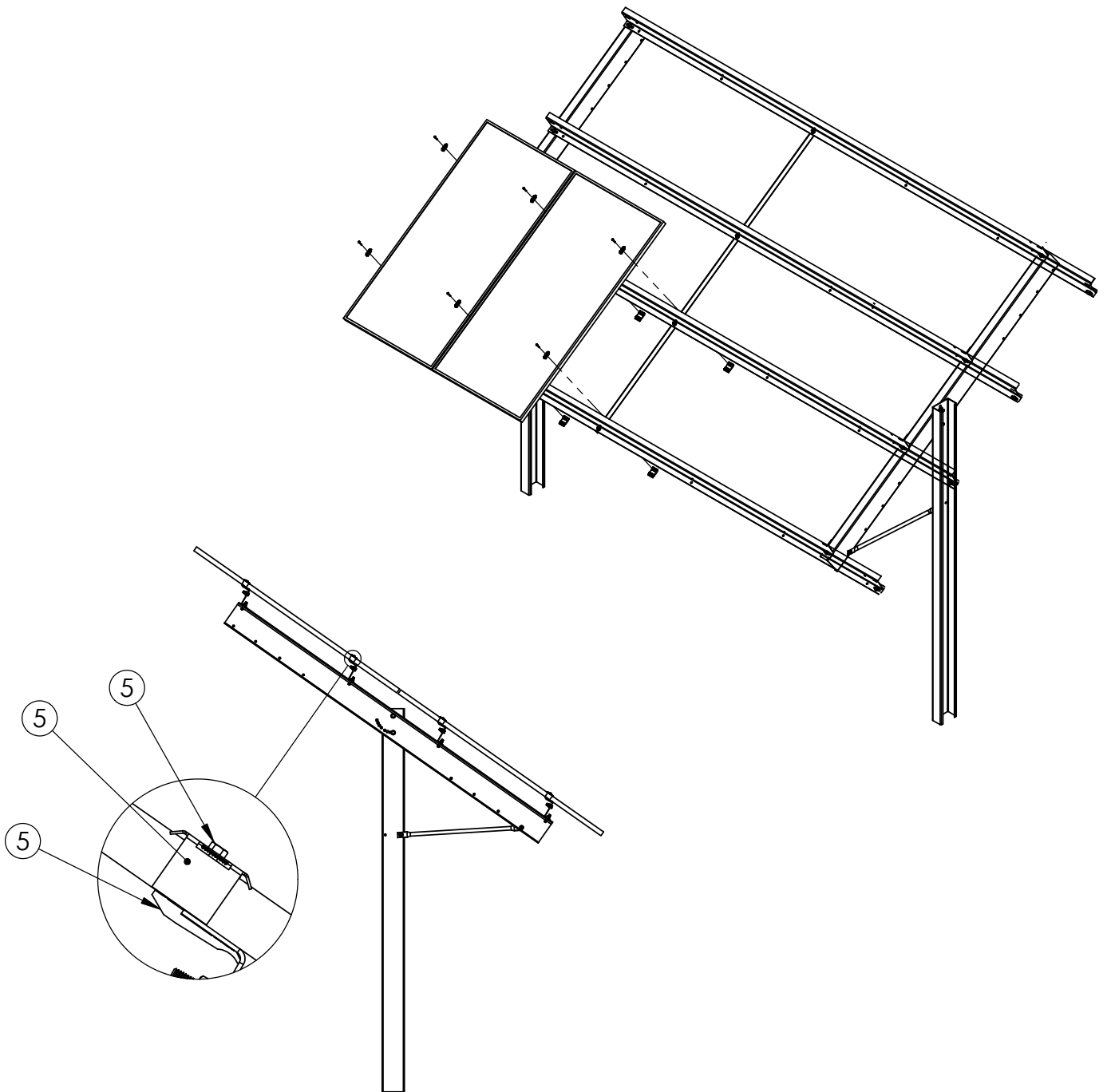


1.6 Panel Installation with Clamps

If Panels are to be installed with provided clamp assemblies. This clamp consists of three parts:
1x 5/16 x 2 1/2 Serrated Flanged Bolt - 1x UL Stainless Mid Clamp - 1x Tapped Aluminum Extrusion

1.6.1 Panel Installation without Clamps

If Panels are to be installed direct to frame, line up the module frame holes with the Z-Purlin slots and install 1/4-20 x 5/8 stainless serrated flanged bolts & nuts.

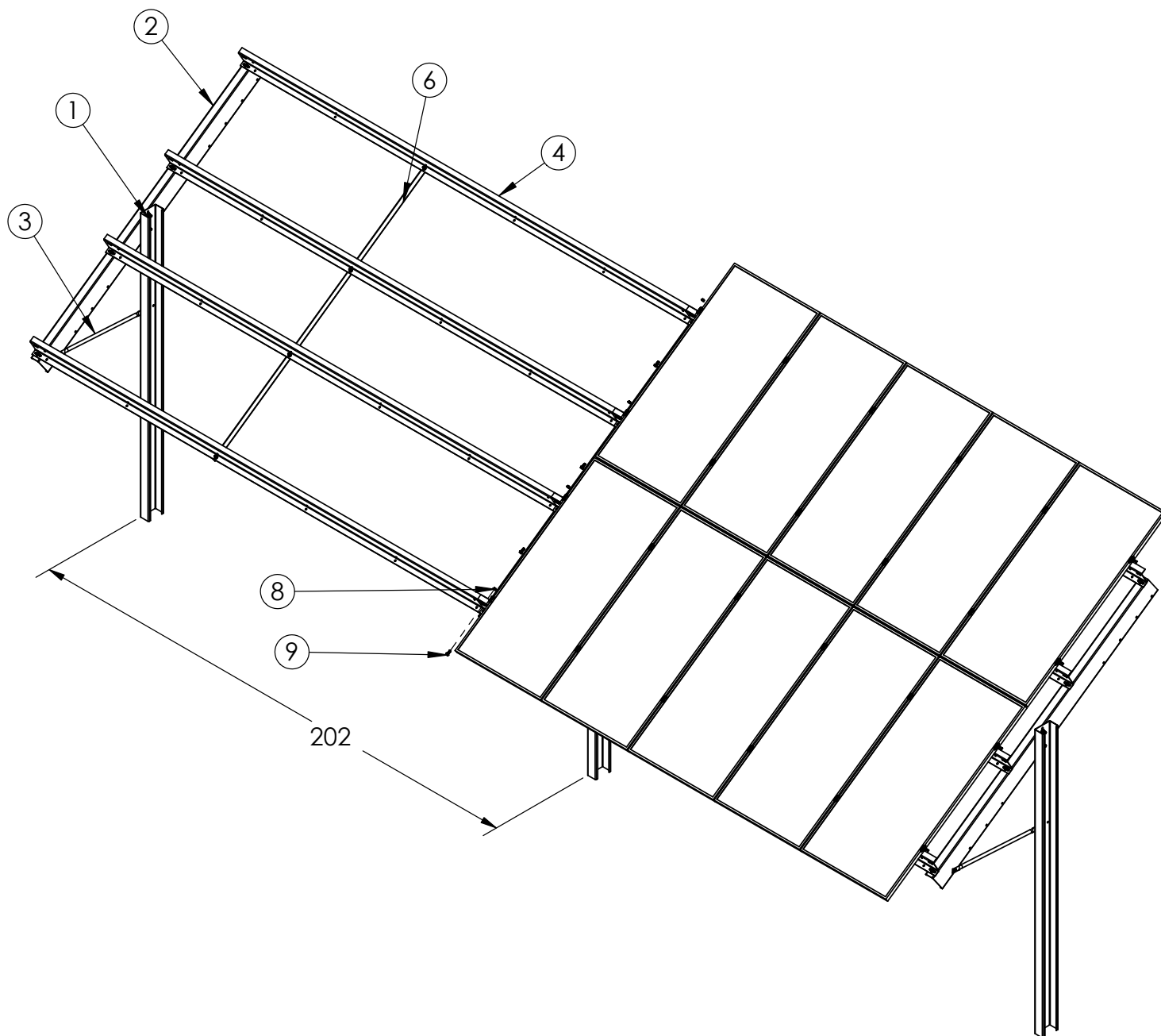


1.0 System Set-up Procedure



1.7.1 Additional Panel Install

Additional panels can be added on to any system at the time of purchase or at a later date. For anything over 2 additional panels, the full extra structure will be required with additional purlins.

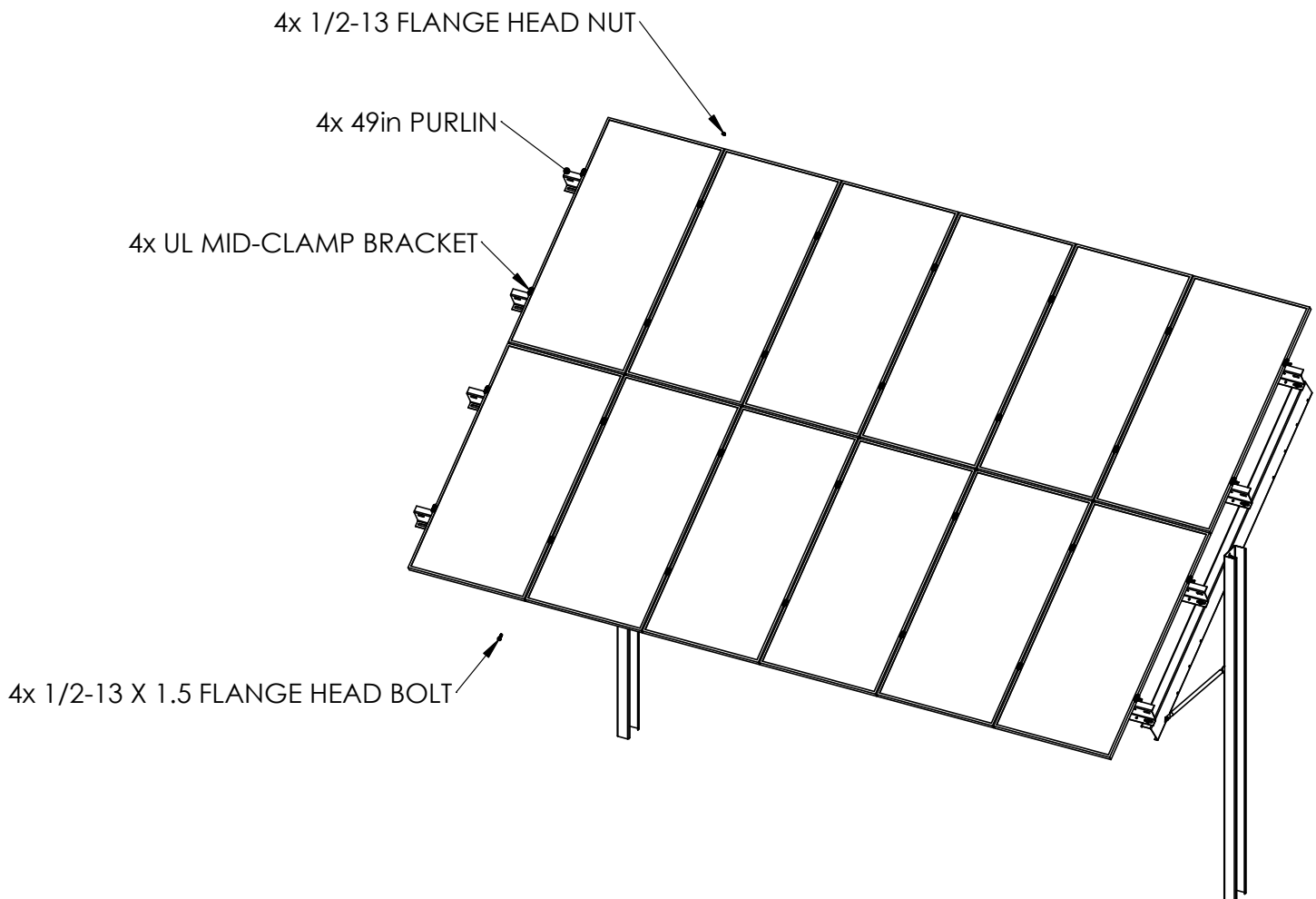


1.0 System Set-up Procedure



1.7.2 Additional Panel Install - 2 panels

Adding 2 panels requires (4) 49 in purlins, (2) additional clamp brackets, (4) bolts, and (4) nuts to attach the short purlins. This can be added on either side to provide shade for the controller.

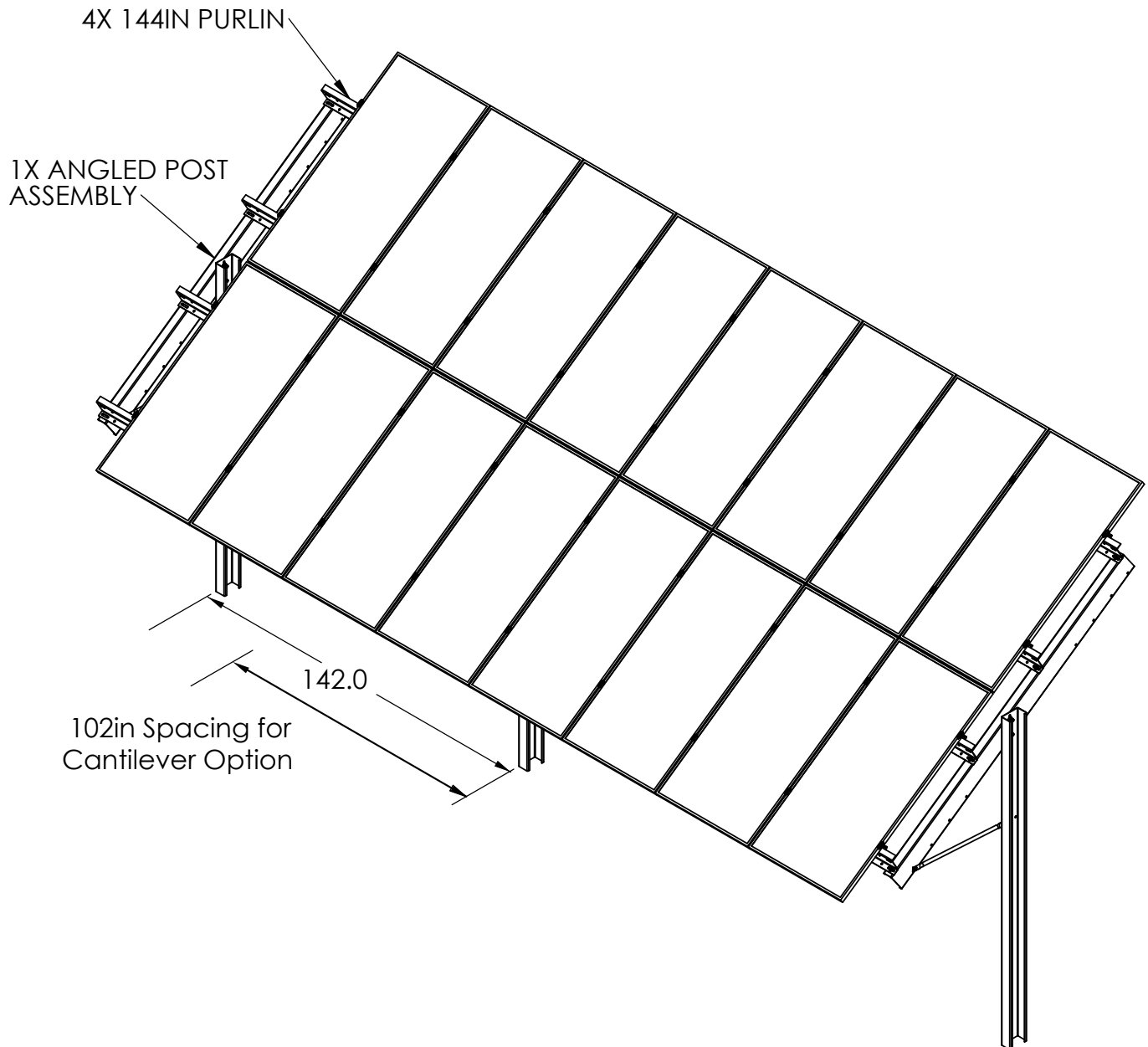


1.0 System Set-up Procedure



1.7.4 Additional Panel Install - 6 panels

Adding 6 panels requires (4) 144 in Z-purlins, (6) additional clamp brackets, (4) bolts, and (4) nuts to attach the short purlins to the long purlins. This also requires the addition of another angled post assembly. You can also set the post spacing to 102in, if you prefer a cantilevered style option.



1.0 System Set-up Procedure



1.7.5 Additional Panel Install -8 panels

Adding 8 panels requires (4) 184 in purlins, (8) additional clamp brackets, (4) bolts, and (4) nuts to attach the short purlins to the long purlins. This also requires the addition of another angled post assembly.

