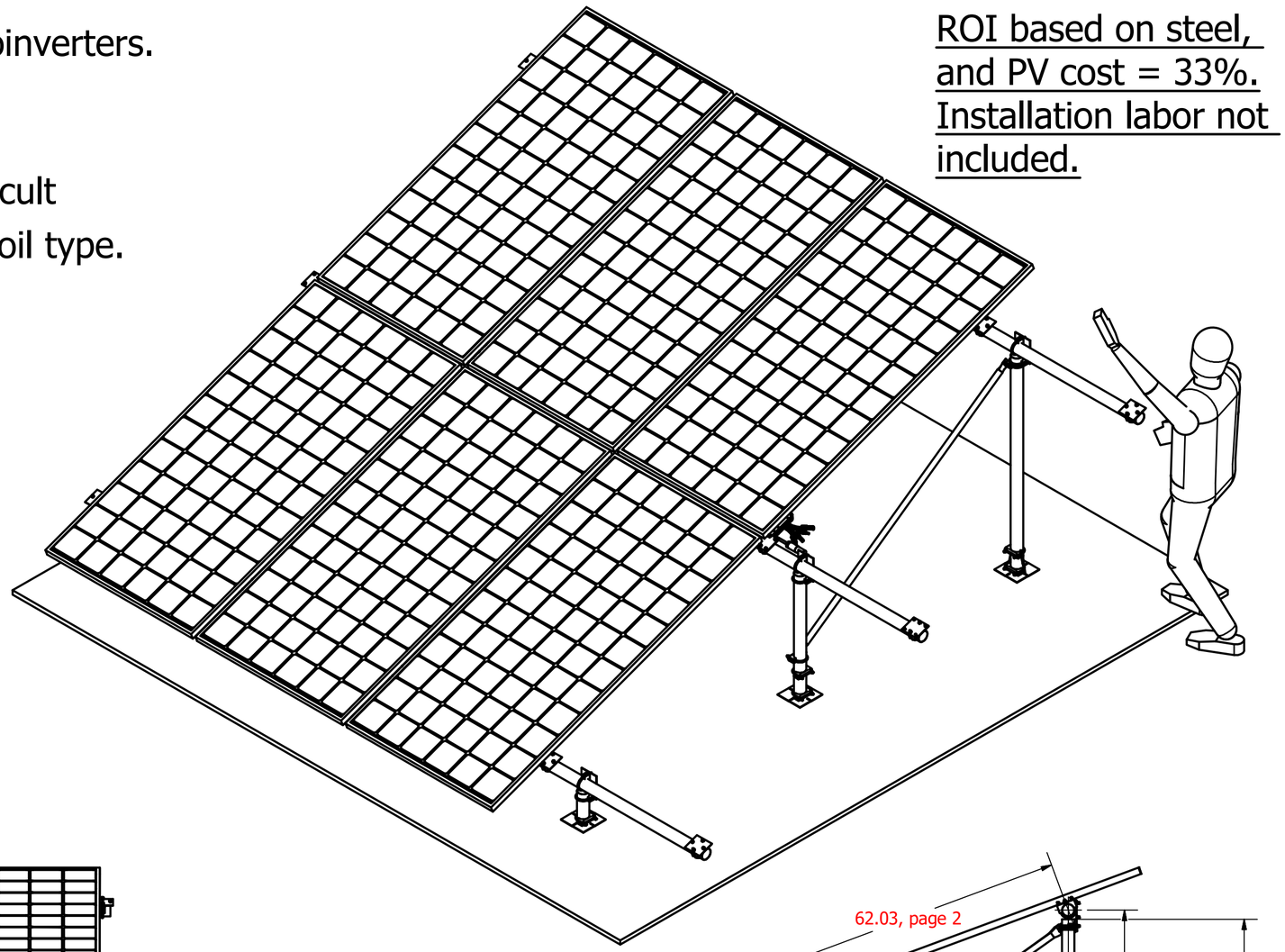
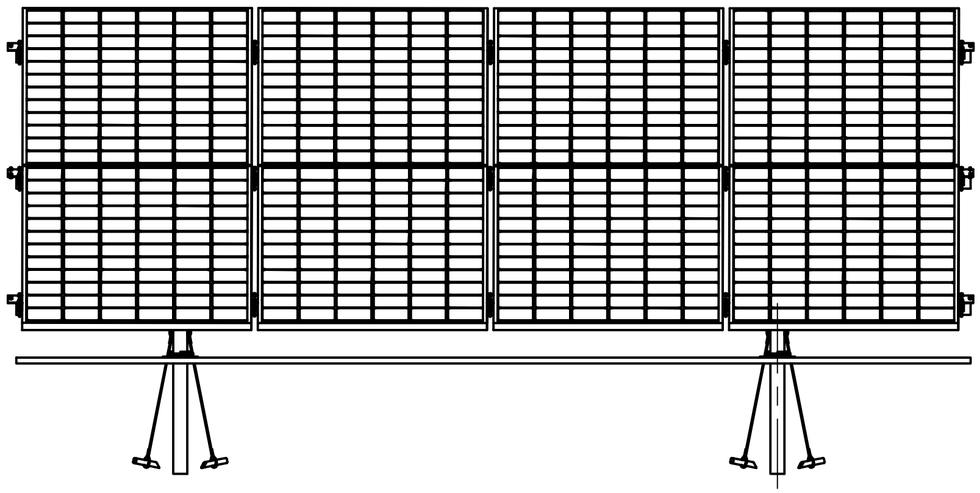
This is a ground mount solar system utilizing microinverters.
In lieu of concrete, the array is held dpwn with
Chizel Anchors. They are driven in with a hammer,

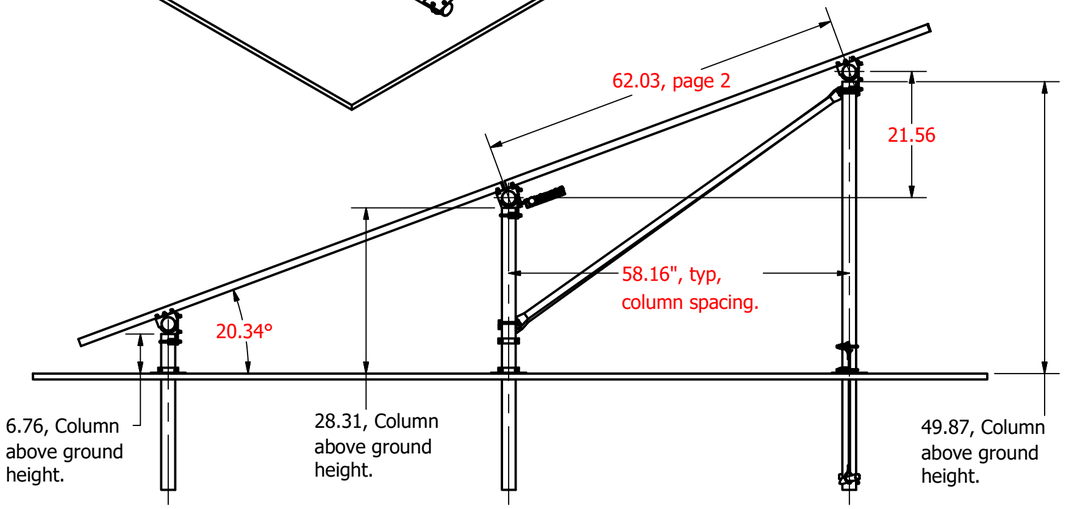
and pulled back so they rotate 90˚, thus being difficult

to pull out. The resistive force depends upon the soil type.

ROI based on steel, and PV cost = 33%. Installation labor not included.



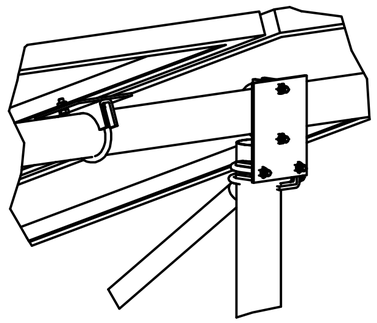




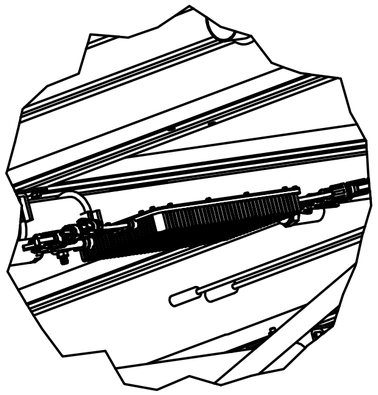
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	8	AstroEnergy_CHSM6612P_305	250 Watt
2	2	NEF_MI_1200	4 in 1 Microinverter,Hoymiles.com
3	21	3042T910_CLAMPING U-BOLT	$2.14 Each
4	2	ShortColumn_2x10_V1	Support Column
5	2	MiddleColumn_2x10_V1	Support Column
6	2	RearColumn_2x10_V1	Support Column
7	3	FencePost for 8 Panel array	Thin wall 2" Galvanized tubinf. 2-3/8" OD
8	40	ANSI/ASME B18.2.1 - 1/4-20 UNC - 0.625	Hex Bolt - UNC (Regular Thread - Inch)
9	40	ANSI B18.2.2 - 1/4 - 20	Hex Nuts (Inch Series) Hex Nut
10	5	PanelMountingPlate_EMT_Middle	Mount, Panel to Horizontal Pipe
11	10	PanelMountingPlate_EMT	Mount, Panel to Horizontal Pipe
12	2	Brace	Wind load brace.

DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: Overall View
QA		
MFG		
APPROVED		
		SIZE C · DWG NO 2x4_GroundMountV1 · REV
		SCALE · SHEET 1 OF 10

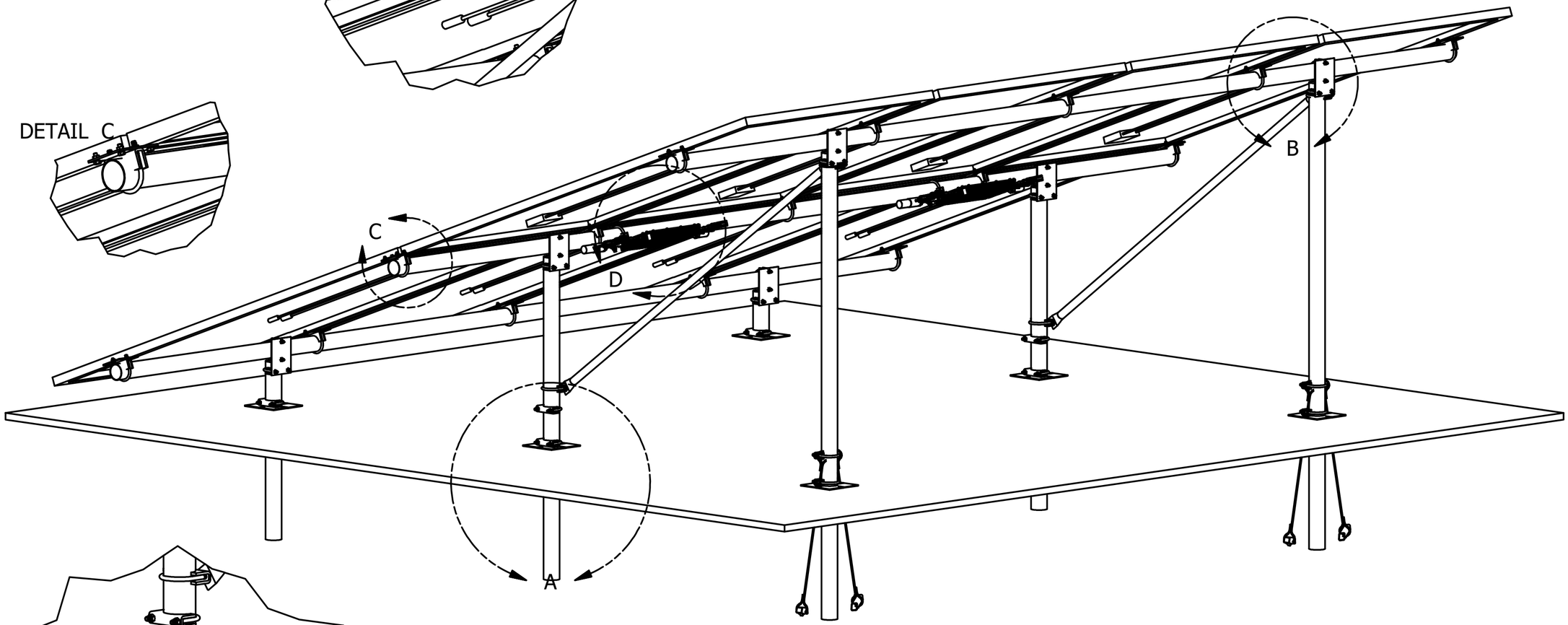
DETAIL B

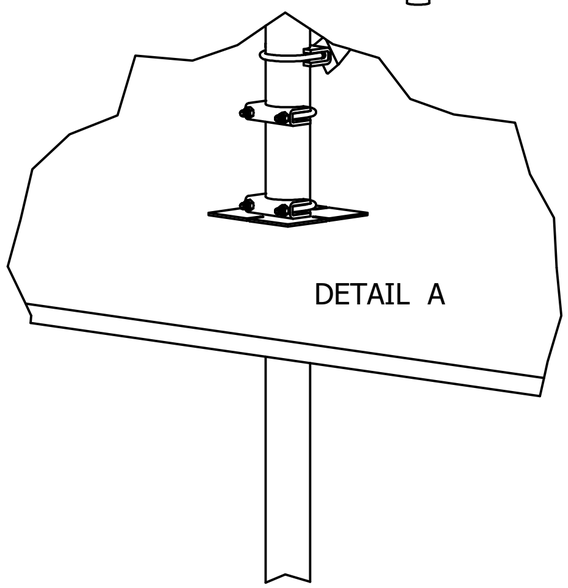


DETAIL D



DETAIL C





DETAIL A

DRAWN BillS	4/29/2020	Watt-Tracker,LLC		
CHECKED		TITLE Backside View		
QA				
MFG				
APPROVED		SIZE C	DWG NO 2x4_GroundMountV1	REV
		SCALE	SHEET 2 OF 10	

Post spacing, front to back, depends upon the panel used. Specifically the spacing of the panel mounting holes. They are inboard of the panel ends by 12" or so.
For this 2 up array, the panel holes at the middle column have to be drilled. Do so, one inch in from both edges. And drill the holes on the same end as the panel wires.
The choice of panel also influences the post spacing, because you want to utilize the additional panel mounting holes. On Page 1, there is a triangle with the dimensions shown in red.
The hypoteneuse number is shown below. It is the distance from one mounting hole to the end of the panel, plus half of the panel gaps.

The basic trigonometry is that the cosine of the panel angle - Cosine(20.34˚) - is equal to the post spacing divided by the hypoteneuse. Or, to transpose, the panel spacing

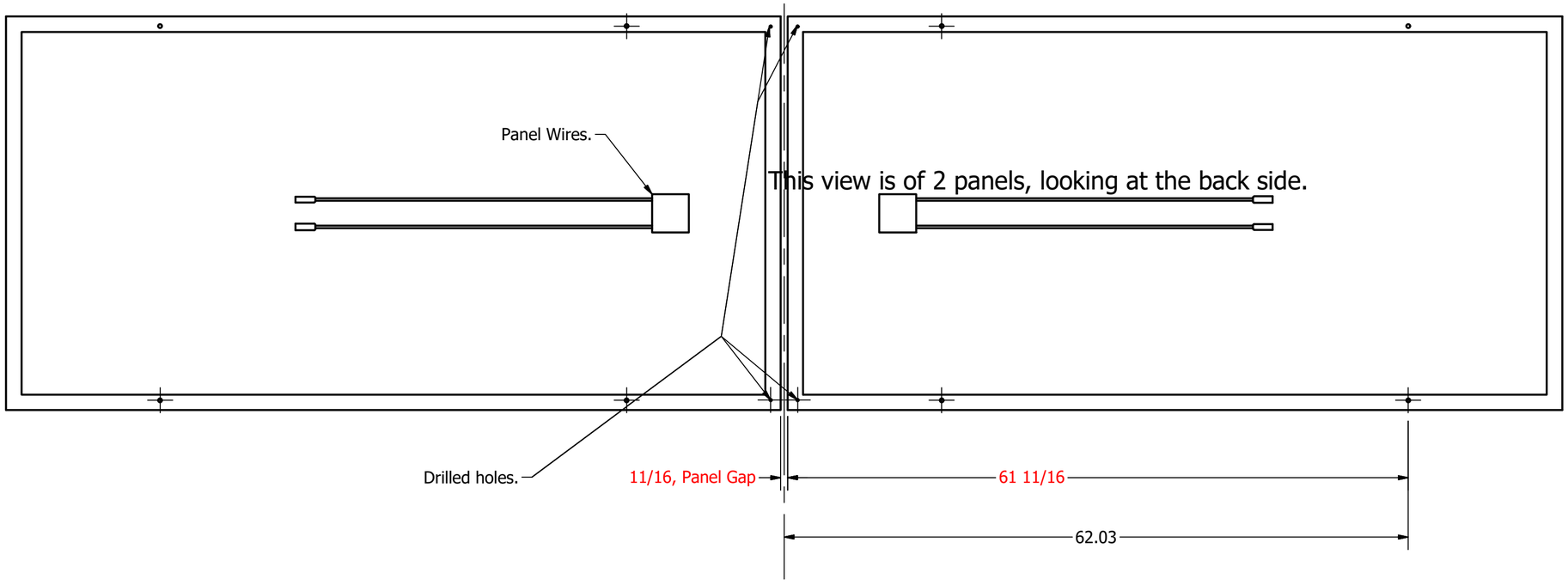
is equal to the hypoteneuse times Cos(20.34˚). Spacing = 62.03" x Cos(20.34) = 58.16" See the number on page 1. This math needs to be done for the panel you use.

Once the pole spacing has been calculated, mark the post locations in the soil for the poles. Then drive the posts in with a sledge hammer
and a short 2" x 4", to prevent bending of the column tops.

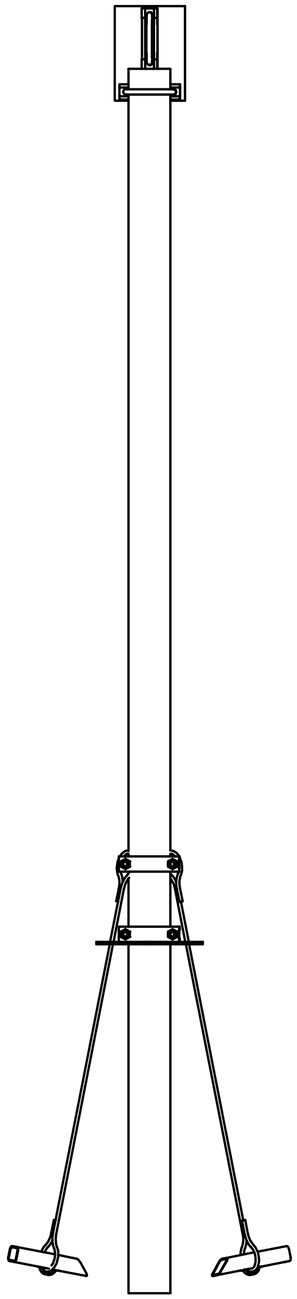
Sight the 3 poles so they are in a visual line, front to back. Assemble the array, with the solar panel wires located near the center posts.

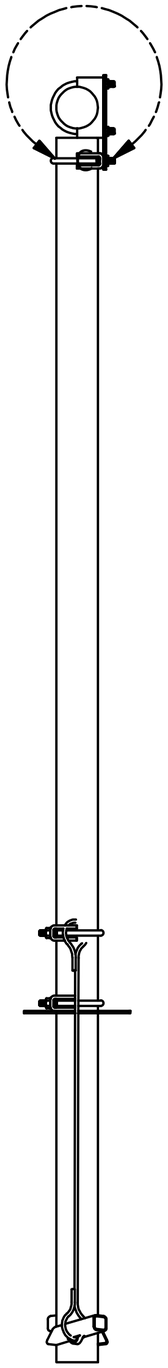
Chizel anchors are most effective on the long columns, on the high side of the array, because of higher wind load uplift.
Additionally, to limit wind uplift, chain link fence can be installed on the rear columns with slats. There is also a product - solar scrim - to cover the wires,
if the permit authority requires this for safety.

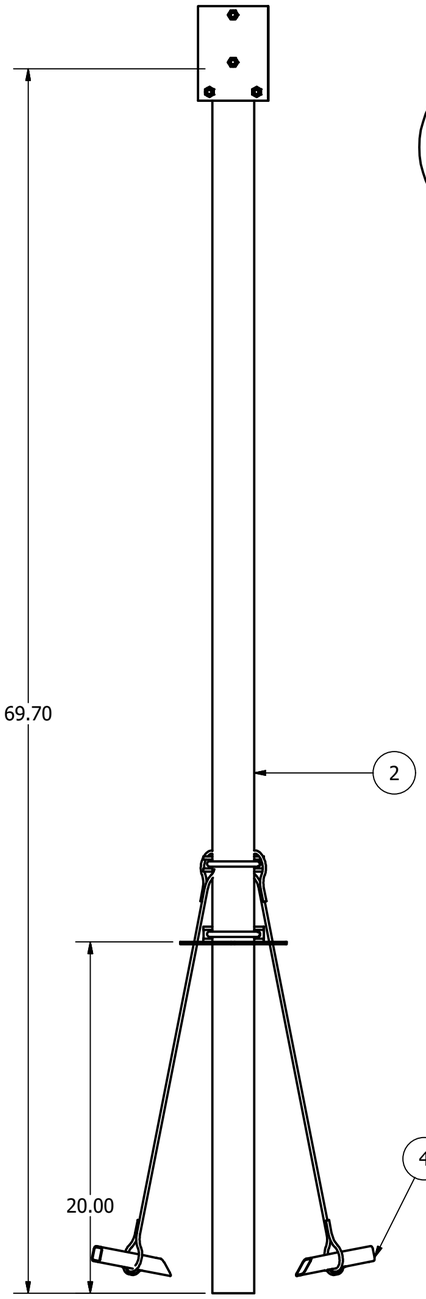
Next, assemble the microinverters to a 220 Volt AC line thru a 15 amp breaker. You are up and running when the breaker is turned on. You can measure the
AC amps with a clamp on meter VOM. It should be about 8 amps, 1 amp per panel. (275 watts / 240 Vac is near 1 amp)

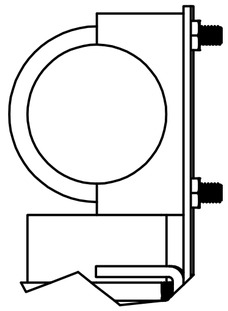


DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: 2 Panels & Hole spacing
QA		
MFG		
APPROVED		
		SIZE C | DWG NO 2x4_GroundMountV1 | REV
		SCALE | SHEET 3 OF 10

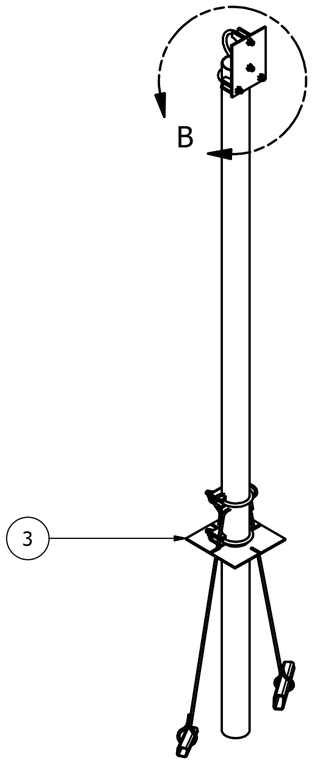


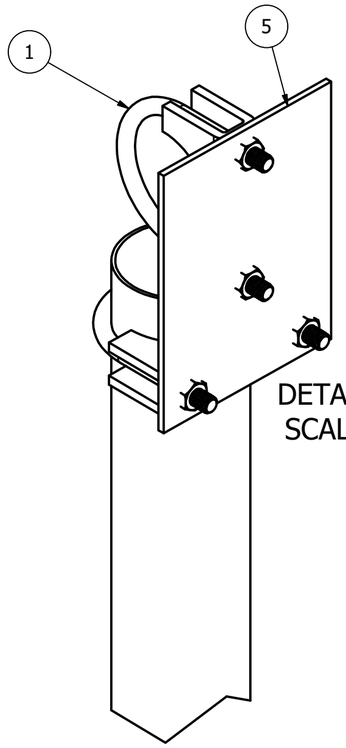






DETAIL C
SCALE .5

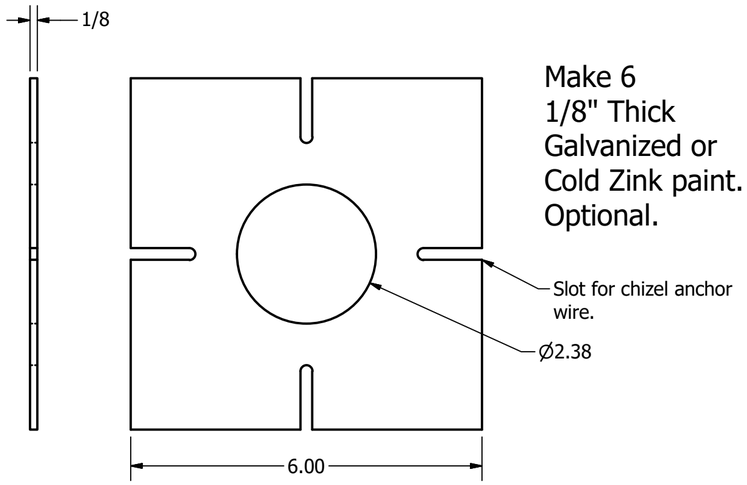




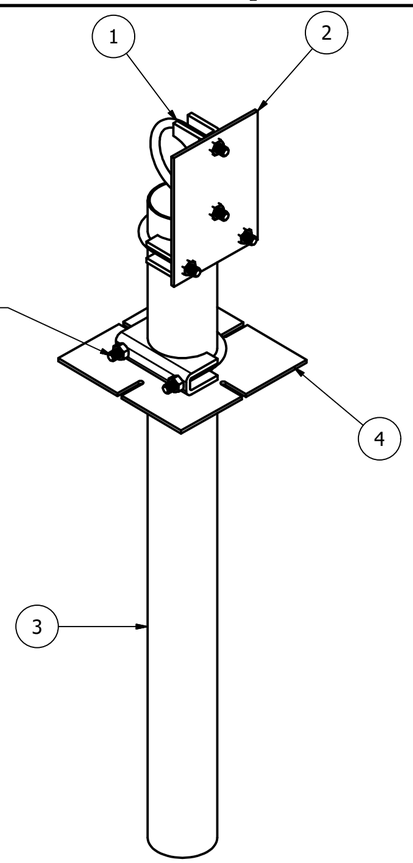
DETAIL B
SCALE .5

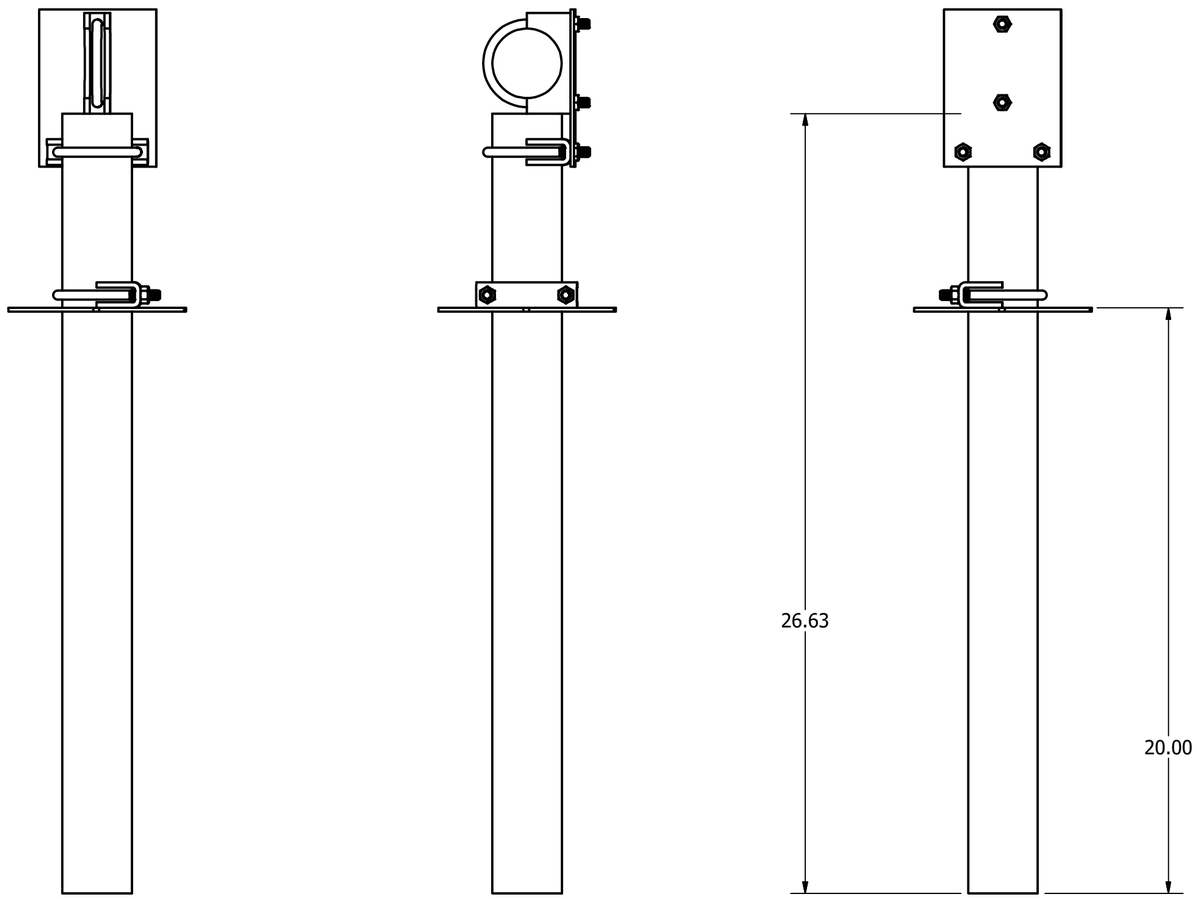
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	3042T910_CLAMPING U-BOLT	McMaster Carr
2	1	RearColumn_2inch_fence post_V1	
3	1	EarthPlate	
4	2	Chisel Anchor	See https://anchorsmart.com or Duckbill Earth Anchors by Foresight Products.
5	1	PostMountingPlate_EMTV1	Mount, Column to Horizontal Pipe

DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: Rear Support Column
QA		
MFG		
APPROVED		
		SIZE C / DWG NO 2x4_GroundMountV1 / REV
		SCALE / SHEET 4 OF 10



An alternative to using a pipe clamp
to restrain the earth plate from moving up
is a 3/8" bolt and nut.

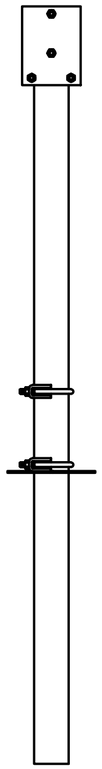


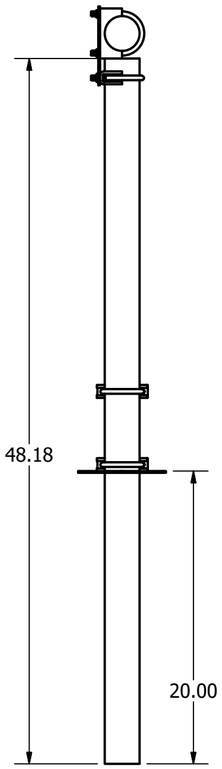


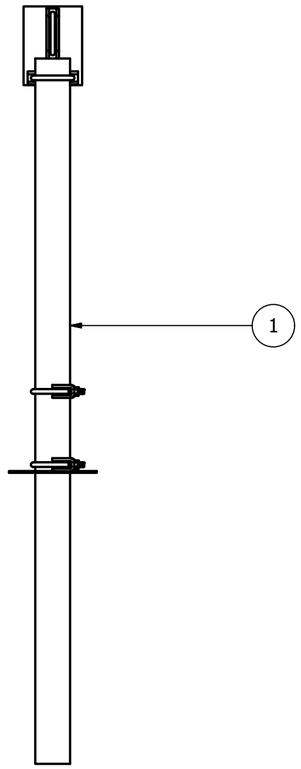
Explanation: Earth plate and chizel anchors.
The plate restrains the column from sinking.
The anchor restrains the column from uplift.
An alternative to both is to set the post in concrete.
Pour the concrete only after the array has
been assenbled.

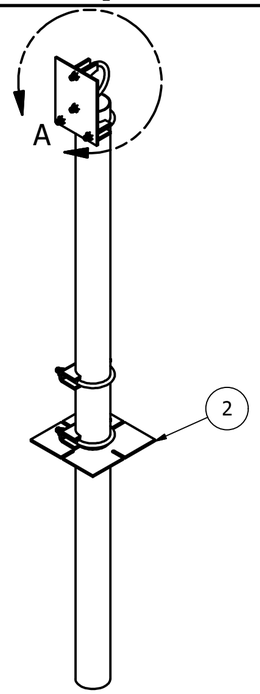
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	3042T910_CLAMPING U-BOLT	McMaster Carr
2	1	PostMountingPlate_EMTV1	Mount, Column to Horizontal Pipe
3	1	ShortFenceColumn_V1	
4	1	EarthPlate	

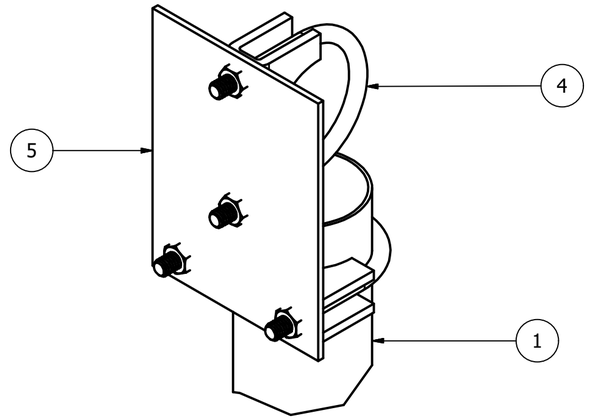
DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: Front Support Column
QA		
MFG		
APPROVED		
SIZE C	DWG NO 2x4_GroundMountV1	REV
SCALE	SHEET 5 OF 10	







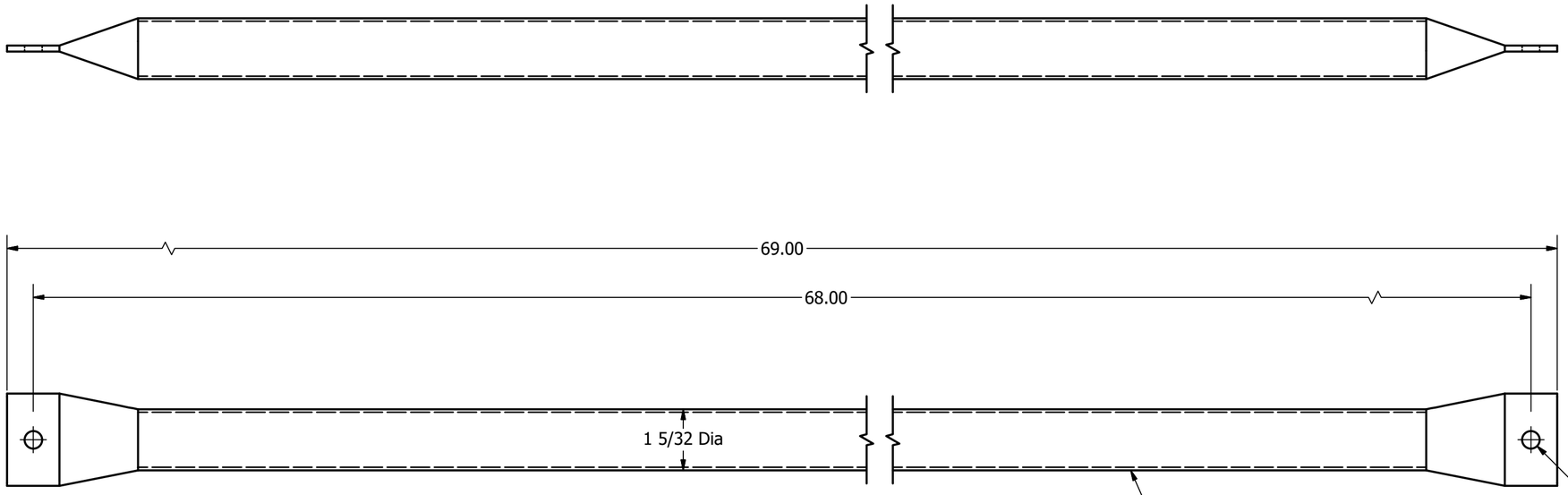




DETAIL A
SCALE .5

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	MiddleColumn_2x10_V1	
2	1	EarthPlate	
4	4	3042T910_CLAMPING U-BOLT	McMaster Carr
5	1	PostMountingPlate_EMTV1	Mount, Column to Horizontal Pipe

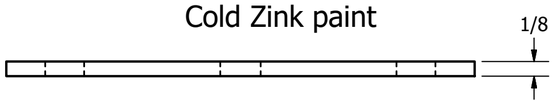
DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: Middle Support Column
QA		
MFG		
APPROVED		
		SIZE C / DWG NO 2x4_GroundMountV1 / REV
		SCALE / SHEET 6 OF 10

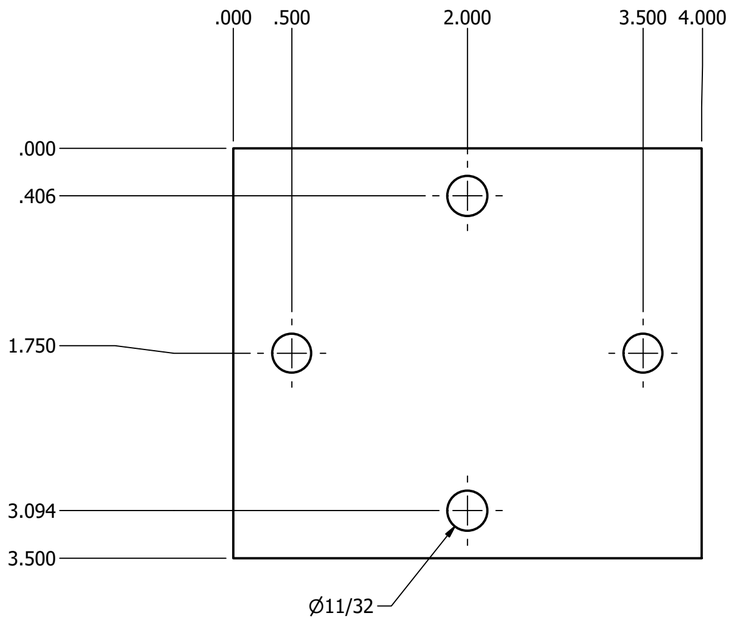


It does not matter how you squash the ends,
but maintain hole spacing.

DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: Brace
QA		
MFG		
APPROVED		
		SIZE C / DWG NO 2x4_GroundMountV1 / REV
		SCALE / SHEET 7 OF 10

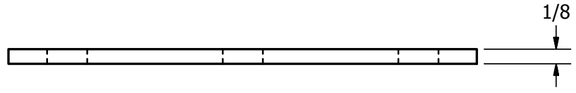
Make 10
1/8" Thick
Galvanized or
Cold Zink paint

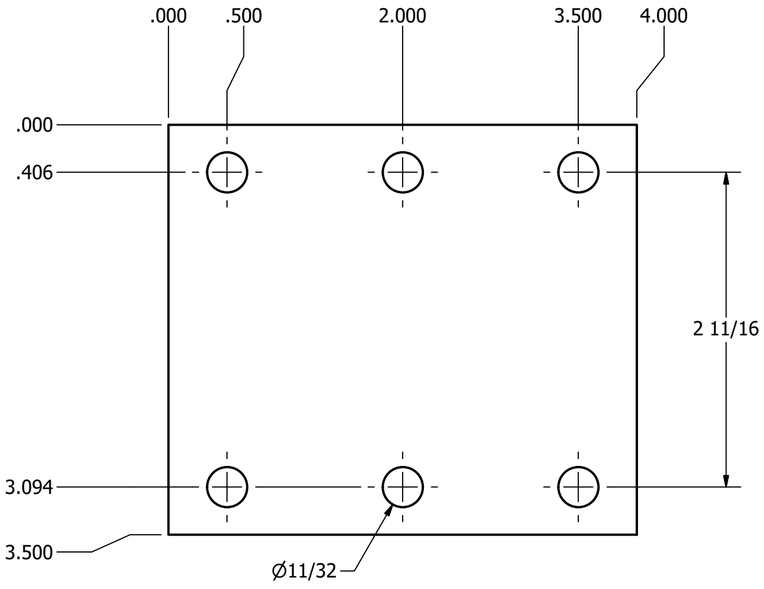




Material cost - $0.32
$3.20 for 10 pieces

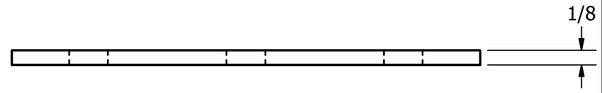
Make 5
1/8" Thick
Galvanized or
Cold Zink paint

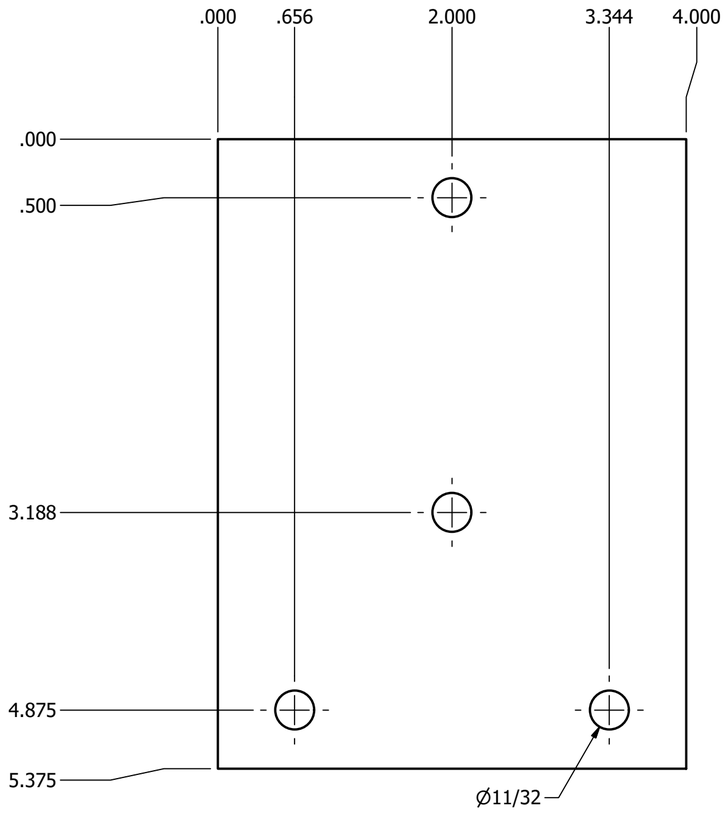




Material cost - $0.32
$2 for 5 pieces

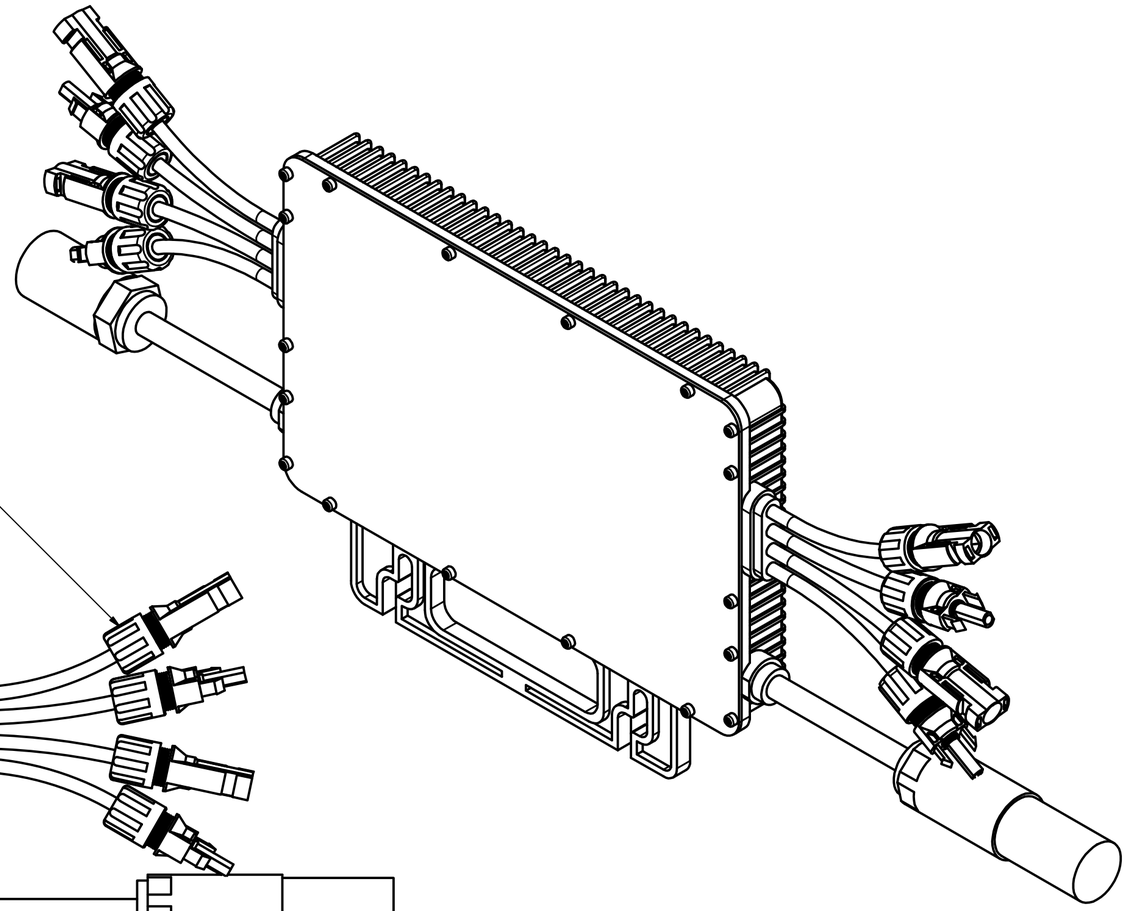
Make 6
1/8" Thick
Galvanized or
Cold Zink paint



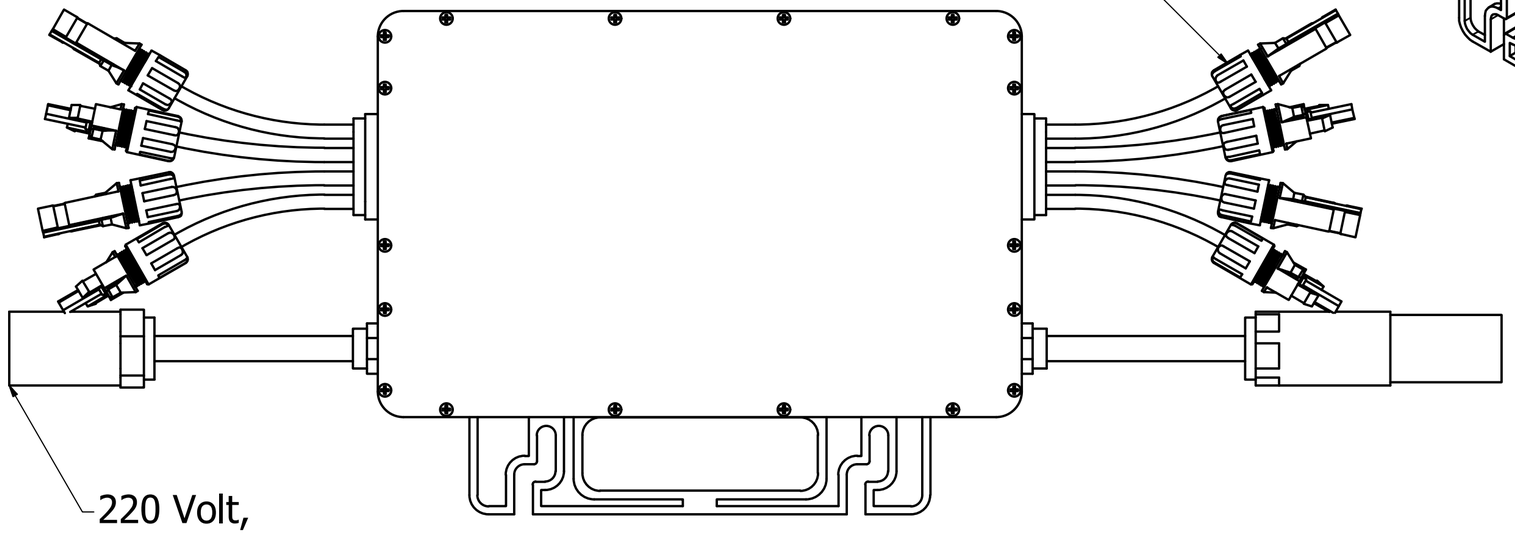


Material cost - $0.45
$2.70 for 6 pieces

DRAWN BillS	4/29/2020	Watt-Tracker,LLC		
CHECKED		TITLE Mounting Plates		
QA				
MFG				
APPROVED		SIZE C	DWG NO 2x4_GroundMountV1	REV
		SCALE	SHEET 8 OF 10	



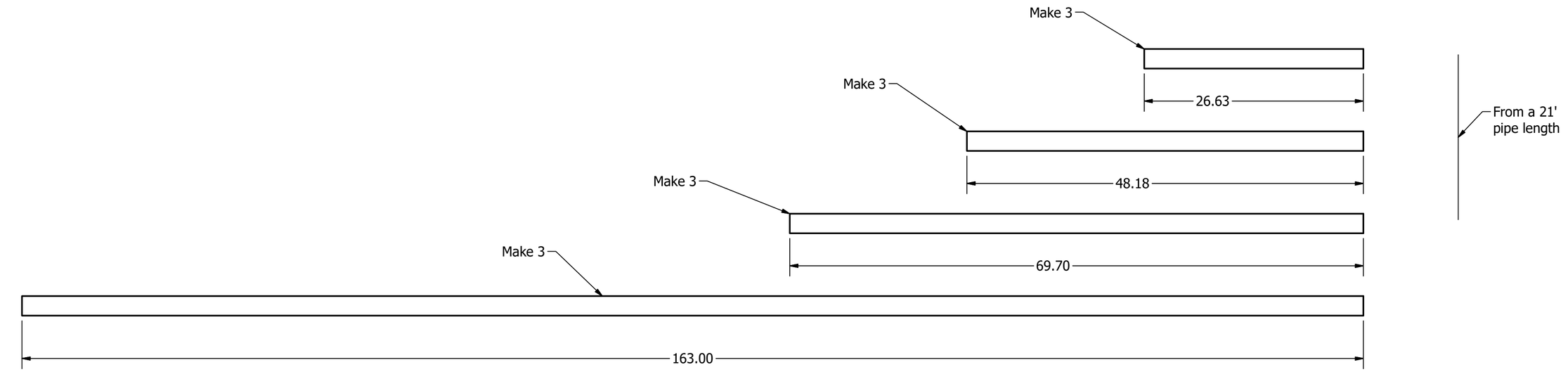
Panel Connections
with MC 4 Connectors



220 Volt,
Single phase

See NEFPOWER.com

DRAWN BillS	4/29/2020	Watt-Tracker,LLC		
CHECKED		TITLE 4 in 1 Microinverter		
QA				
MFG				
APPROVED		SIZE C	DWG NO 2x4_GroundMountV1	REV
		SCALE	SHEET 9 OF 10	



Pipe requirements = 2.375 OD x .0553 wall thickness x 76'-10.5".
Pipe cost = $120

DRAWN BillS	4/29/2020	Watt-Tracker,LLC
CHECKED		TITLE: Cut List
QA		
MFG		
APPROVED		
		SIZE C / DWG NO 2x4_GroundMountV1 / REV
		SCALE / SHEET 10 OF 10