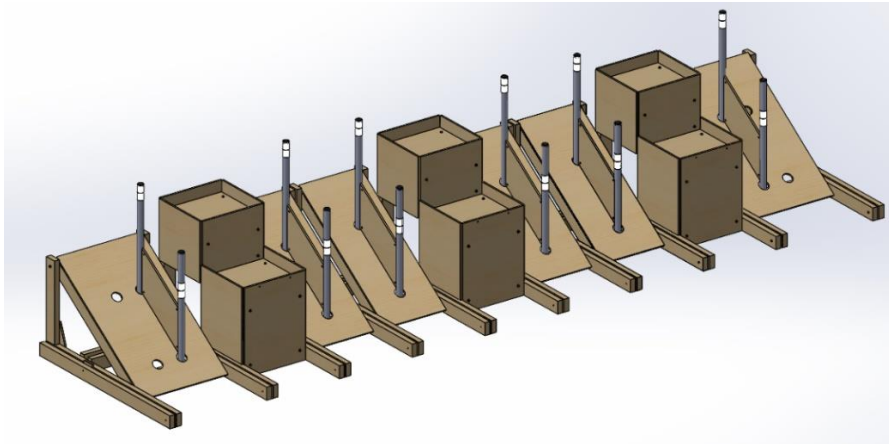


## TE-23000 3 GRID ASSEMBLY



**Description:** This is a full set of GRIDs, designed so that teams can practice with as close to a real set of GRIDs as possible. For details on using AprilTags with this assembly, see the AprilTag Images and User Guide document on the Playing Field page.

### FILES INCLUDED

In this compressed folder, you will find all of the drawings, CAD Files and STEP Files for this design.

**Drawings:** For your convenience, all drawing files have been exported to PDF Format. Each major field assembly will have both assembly drawings and component drawings.

**CAD Files:** All SOLIDWORKS files required to build or modify the assembly.

**STEP files:** STEP files of the assembly are included for the convenience of non-SOLIDWORKS users.

### SHOPPING LIST

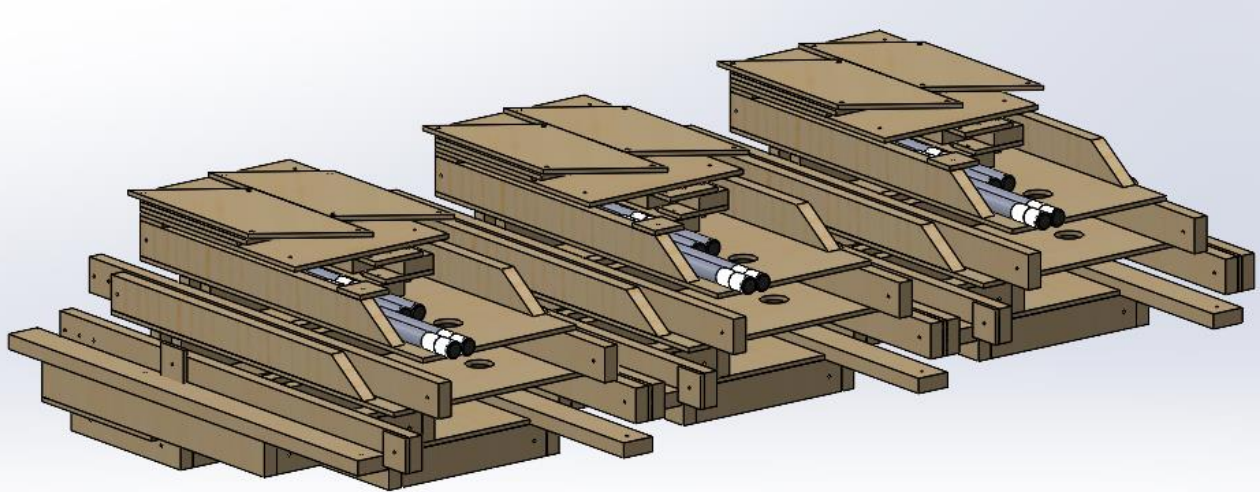
Plywood and Lumber (Example Cut List is at end of Readme):

- 4' x 8' x 1/2" Thick Plywood – 4 sheets
- 2" x 4" x 8' Lumber – 34 Pieces

Hardware:

- 1/4-20 x 2" Long – 60 Pieces
- 1/4-20 x 2.5" Long – 36 Pieces
- 1/4-20 x 3.5" Long – 12 Pieces
- 1/4-20 x 4" Long – 20 Pieces
- 1/4-20 x 5" Long – 24 Pieces
- 1/4-20 Wing Nuts – 92 Pieces
- 1/4-20 T-Nuts – 60 Pieces
- #8 Wood Screws x 1.5" long – Approximately 144 Pieces
- #8 Wood Screws x 3" Long – Approximately 200 Pieces

**NOTE ON HARDWARE:** All nuts, bolts and t-nuts except for the 5" long bolts and 24 of the wing nuts (holding the poles) can be replaced with approximately 40x #8 x 1.5" wood screws and 100x #8 x 3" wood screws. The design uses these nuts and bolts to allow itself to be broken down into a much smaller footprint for packing. If this is not a concern for your team, wood screws will make for a sturdier assembly. Below is a drawing showing how much space you can save using nuts and bolts instead of wood screws.



*A set of GRIDs can be condensed to almost 1/4 of its usual size when assembled with nuts and bolts*

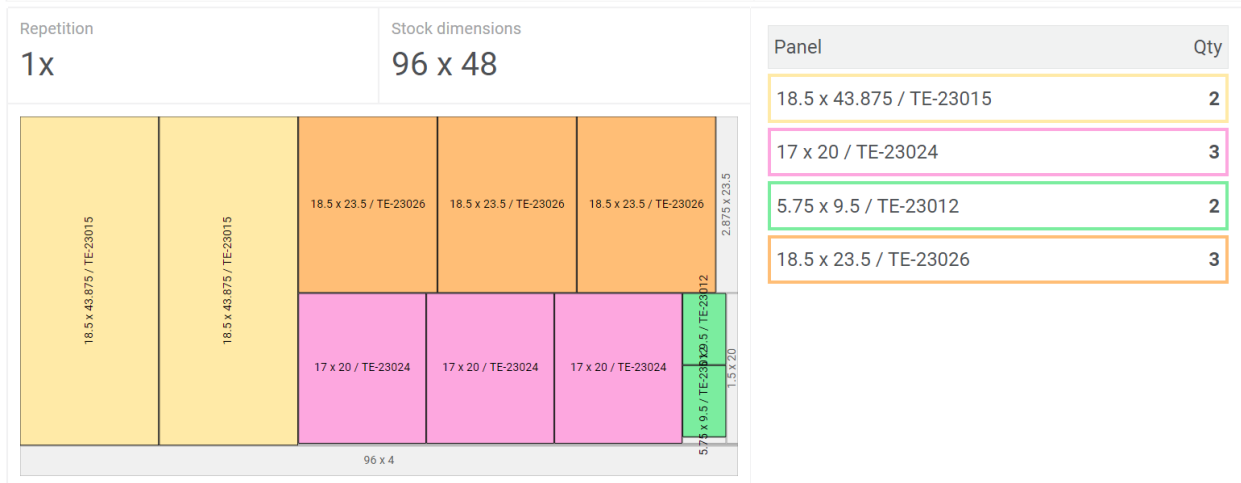
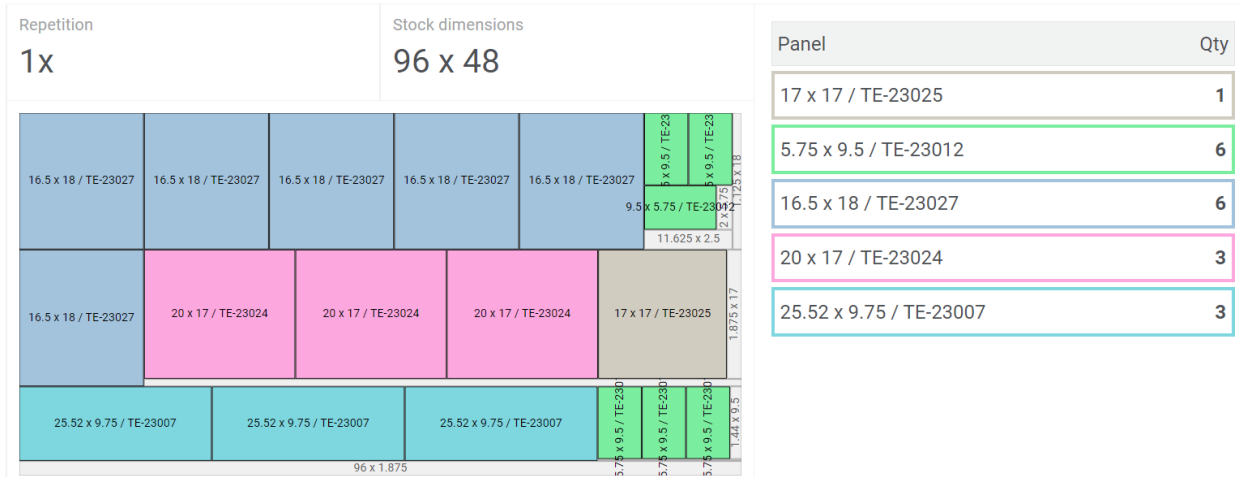
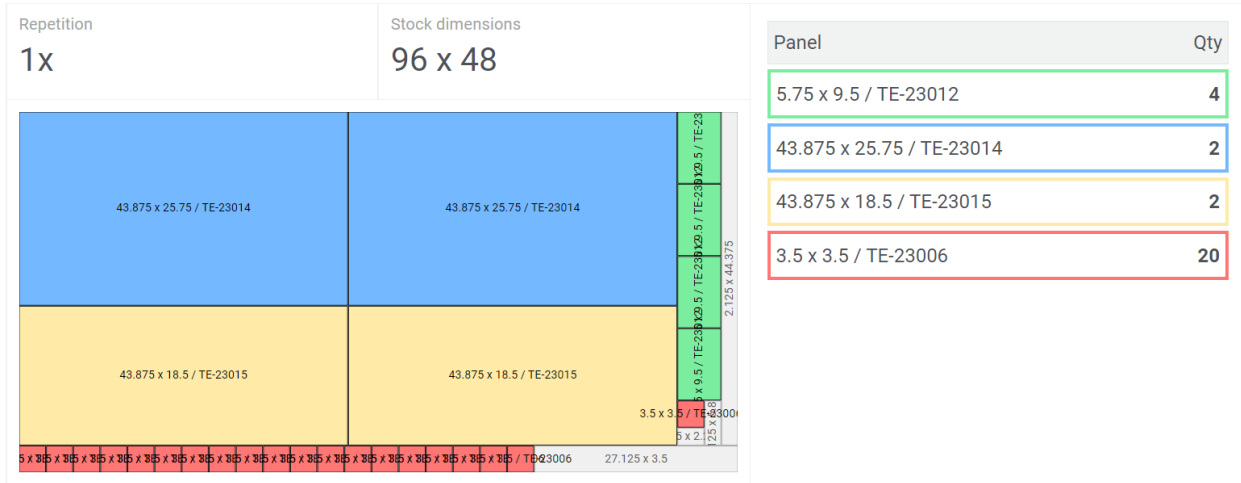
Other:

- 6x 1-1/4" Schedule 40 Aluminum Pipe x 45 11/16" Long – This pipe could be made from Black Iron Pipe from the 2022 Team Element Hangar, or out of PVC if you don't have the resources to cut and drill metal pipes. AndyMark also sells this pipe (without the drilled holes) with a cap installed, part number **am-4942\_back**.
- 6x 1-1/4" Schedule 40 Aluminum Pipe x 33 11/16" Long – This pipe could be made from Black Iron Pipe from the 2022 Team Element Hangar, or also out of PVC if you don't have the resources to cut and drill metal pipes. AndyMark also sells this pipe (without the drilled holes) with a cap installed, part number **am-4942\_front**.
- AndyMark also sells these as a pair of poles, part number **am-4942\_pair**, and a half field's worth of poles, part number **am-4942\_half**. All AndyMark poles do not have the drilled holes in the sides of the poles.
- 12x Pole Caps. The official Pole Caps are **CCF-RT-13-1** from caplugs.com. These caps are also available at AndyMark individually, part number **am-1686**. There is also a CAD file of a similar but not exact model of the caps available, part number TE-23029, to be 3D printed or otherwise manufactured. If making this cap is a challenge, lengthening your pole by 3/16" and not having a cap is a relatively close alternative to the pole with the cap installed.
- 24x 5.25" long pieces of vision tape, supplied in the Kit of Parts.
- 2-3/4" Spade Bit, Forstner Bit or Hole Saw

**Notes about materials:**

- Plywood and Hardboard Sheets – quality of plywood is up to the user. Plywood of lower qualities may contain voids and may warp more than high quality plywood. All dimensions listed are "nominal". For example, 1/2" plywood is typically 15/32".
- Lumber - quality of lumber is up to the user. Please keep in mind that lumber of lower qualities may warp more than high quality lumber. All dimensions below are the "mill cut" dimensions. For example, 2" x 4" lumber is really 1 1/2" x 3 1/2".

**Example Cut List (All Units are Inches):**



Repetition <b>1x</b>		Stock dimensions <b>96 x 48</b>		Panel Qty							
		<table border="1"> <tr><td>17 x 17 / TE-23025</td><td>5</td></tr> <tr><td>18.5 x 15 / TE-23028</td><td>6</td></tr> <tr><td>25.52 x 9.75 / TE-23007</td><td>3</td></tr> </table>		17 x 17 / TE-23025	5	18.5 x 15 / TE-23028	6	25.52 x 9.75 / TE-23007	3		
17 x 17 / TE-23025	5										
18.5 x 15 / TE-23028	6										
25.52 x 9.75 / TE-23007	3										
Repetition <b>8x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste							
		54.25 / TE-23005	1	Material remnant	0.375						
		18.5 / TE-23010	1	Cut	0.375						
		22.5 / TE-23011	1								
		54.25 / TE-23005	18.5 / TE-23010	22.5 / TE-23011							
Repetition <b>4x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste							
		39.125 / TE-23013	2	Material remnant	0.375						
		17 / TE-23023	1	Cut	0.375						
		39.125 / TE-23013	39.125 / TE-23013	17 / TE-23023							
Repetition <b>4x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste							
		54.25 / TE-23008	1	Material remnant	0.375						
		18.5 / TE-23010	1	Cut	0.375						
		22.5 / TE-23011	1								
		54.25 / TE-23008	18.5 / TE-23010	22.5 / TE-23011							
Repetition <b>2x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste							
		25.75 / TE-23009	1	Material remnant	0.125						
		18.5 / TE-23010	1	Cut	0.625						
		17 / TE-23019	2								
		17 / TE-23023	1								
		25.75 / TE-23009	18.5 / TE-23010	17 / TE-23019	17 / TE-23019						
				17 / TE-23023							

Repetition <b>2x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste	
		29 / TE-23020	1	Material remnant	0.625
		33 / TE-23021	2	Cut	0.375
		29 / TE-23020	33 / TE-23021	33 / TE-23021	

Repetition <b>1x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste	
		18.5 / TE-23010	1	Material remnant	0.5
		33 / TE-23021	2	Cut	0.5
		10.5 / TE-23022	1		
		18.5 / TE-23010	33 / TE-23021	33 / TE-23021	10.5 / TE-23022

Repetition <b>3x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste	
		25.75 / TE-23009	1	Material remnant	0.875
		34.5 / TE-23018	2	Cut	0.375
		25.75 / TE-23009	34.5 / TE-23018	34.5 / TE-23018	

Repetition <b>1x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste	
		25.75 / TE-23009	3	Material remnant	1.25
		17 / TE-23019	1	Cut	0.5
		25.75 / TE-23009	25.75 / TE-23009	25.75 / TE-23009	17 / TE-23019

Repetition <b>4x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste	
		54.25 / TE-23008	1	Material remnant	1.875
		29 / TE-23020	1	Cut	0.375
		10.5 / TE-23022	1		
		54.25 / TE-23008	29 / TE-23020	10.5 / TE-23022	

Repetition <b>4x</b>	Stock length <b>96</b>	Part length / Label		Qty	Waste	
		54.25 / TE-23008		<b>1</b>	Material remnant	2.375
		39.125 / TE-23013		<b>1</b>	Cut	0.25
		54.25 / TE-23008		39.125 / TE-23013		

Repetition <b>1x</b>	Stock length <b>96</b>	Part length / Label		Qty	Waste	
		18.5 / TE-23010		<b>1</b>	Material remnant	49.625
		17 / TE-23019		<b>1</b>	Cut	0.375
		18.5 / TE-23010		17 / TE-23019		10.5 / TE-23022