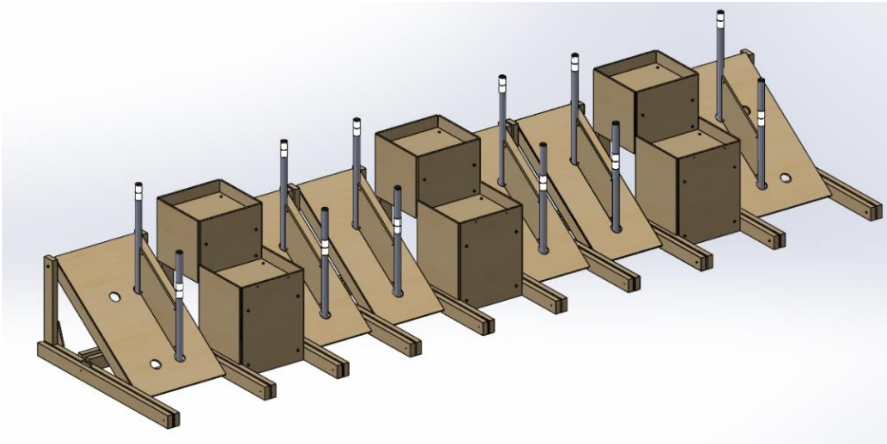


TE-23000 3 GRID ASSEMBLY



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

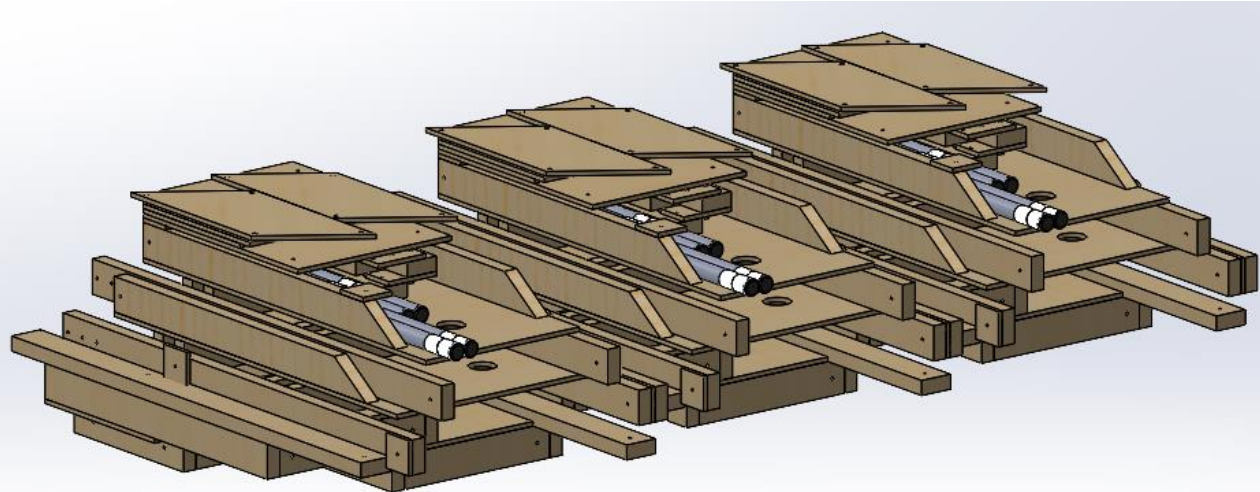
Plywood and Lumber (Example Cut List is at end of Readme):

- 4' x 8' x 1/2" Thick Plywood – Slightly more than 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

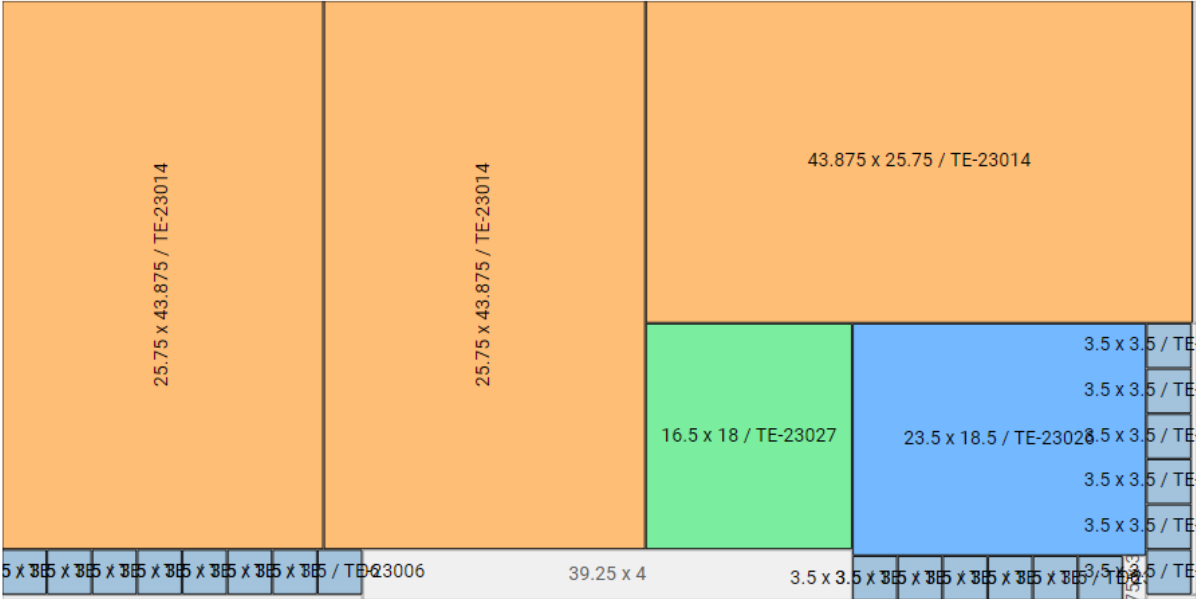
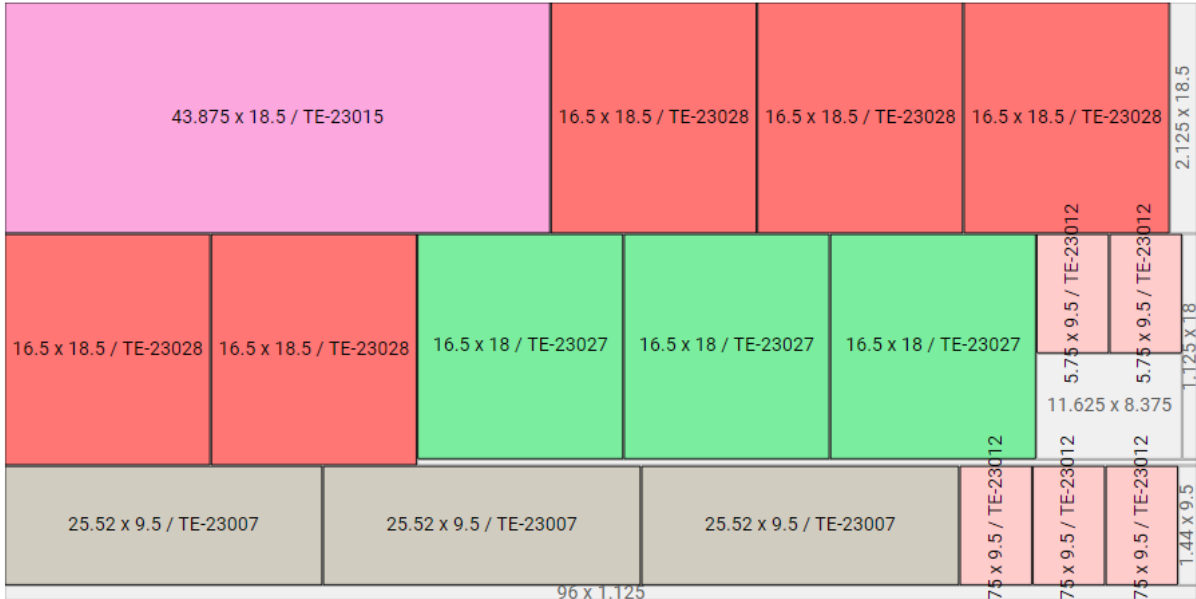
Other:

- 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):

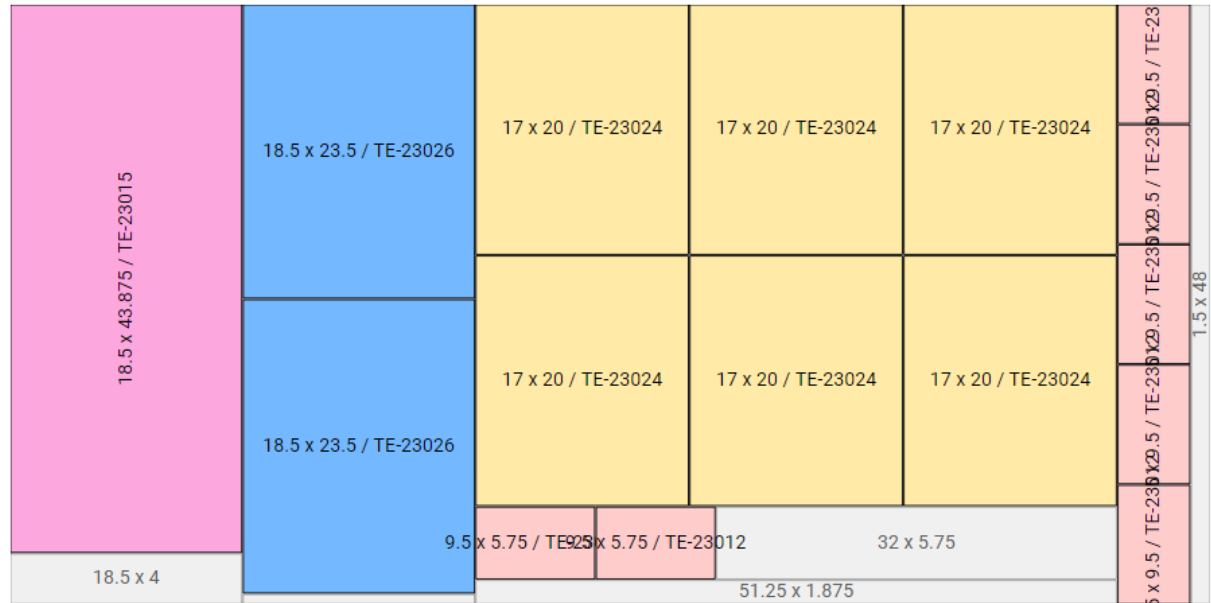
Repetition 1x	Stock dimensions 96 x 48
 <p>25.75 x 43.875 / TE-23014</p> <p>25.75 x 43.875 / TE-23014</p> <p>43.875 x 25.75 / TE-23014</p> <p>16.5 x 18 / TE-23027</p> <p>23.5 x 18.5 / TE-23028</p> <p>3.5 x 3.5 / TE-23006</p> <p>39.25 x 4</p> <p>3.5 x 3.5</p>	
Repetition 1x	Stock dimensions 96 x 48
 <p>43.875 x 18.5 / TE-23015</p> <p>16.5 x 18.5 / TE-23028</p> <p>16.5 x 18.5 / TE-23028</p> <p>16.5 x 18.5 / TE-23028</p> <p>16.5 x 18.5 / TE-23028</p> <p>16.5 x 18 / TE-23027</p> <p>16.5 x 18 / TE-23027</p> <p>16.5 x 18 / TE-23027</p> <p>25.52 x 9.5 / TE-23007</p> <p>25.52 x 9.5 / TE-23007</p> <p>25.52 x 9.5 / TE-23007</p> <p>7.5 x 9.5 / TE-23012</p> <p>7.5 x 9.5 / TE-23012</p> <p>7.5 x 9.5 / TE-23012</p> <p>2.125 x 18.5</p> <p>1.125 x 18</p> <p>1.44 x 9.5</p>	

Repetition

1x

Stock dimensions

96 x 48

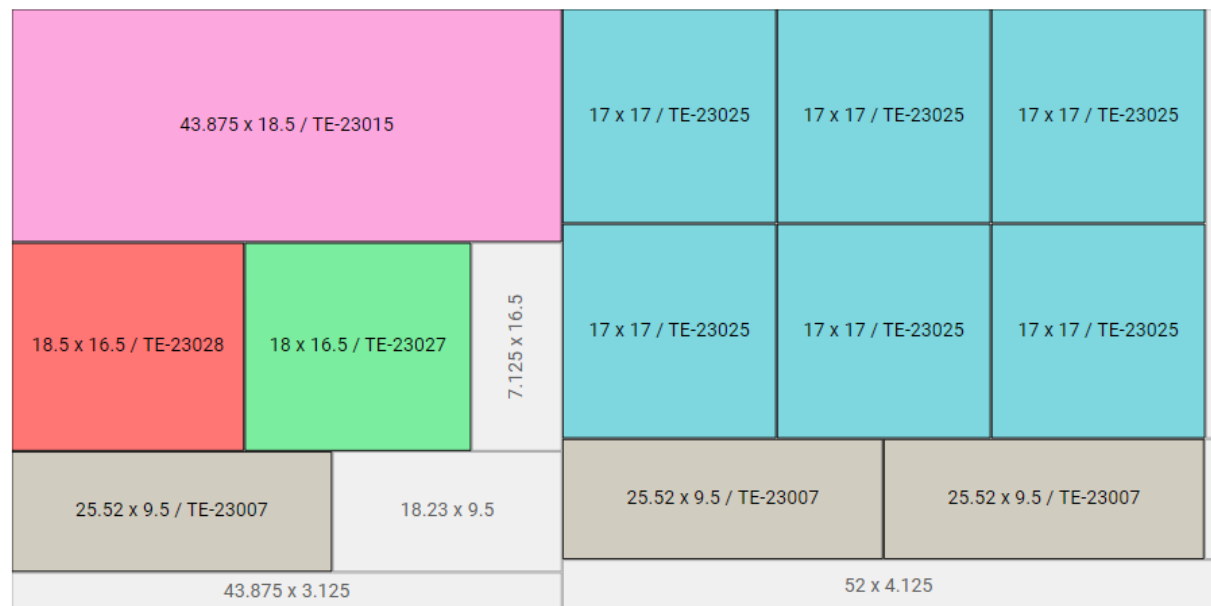


Repetition

1x

Stock dimensions

96 x 48



Repetition		Stock dimensions				
1x		96 x 48				
<div><div>16.5 x 18 / TE-23027</div><div>16.5 x 29.875</div><div>79.375 x 48</div></div>						
Repetition	Stock length	Part length / Label		Qty	Waste	
		54.25 / TE-23005		1	Material remnant 0.375	
		22.5 / TE-23011		1	Cut 0.375	
		18.5 / TE-23010		1		
		54.25 / TE-23005		22.5 / TE-23011	18.5 / TE-23010	
Repetition	Stock length	Part length / Label		Qty	Waste	
		17 / TE-23017		1	Material remnant 0.375	
		39.125 / TE-23013		2	Cut 0.375	
		17 / TE-23017		39.125 / TE-23013	39.125 / TE-23013	
Repetition	Stock length	Part length / Label		Qty	Waste	
		17 / TE-23019		2	Material remnant 0.125	
		17 / TE-23017		1	Cut 0.625	
		18.5 / TE-23010		1		
		25.75 / TE-23009		1		
		17 / TE-23019		17 / TE-23019	17 / TE-23017	
		18.5 / TE-23010		25.75 / TE-23009		

Repetition 3x	Stock length 96	Part length / Label	Qty	Waste	
		33 / TE-23021	2	Material remnant	0.625
		29 / TE-23020	1	Cut	0.375
<div>33 / TE-23021 33 / TE-23021 29 / TE-23020</div>					

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

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

Repetition 3x	Stock length 96	Part length / Label	Qty	Waste	
		10.5 / TE-23022	1	Material remnant	1.875
		29 / TE-23020	1	Cut	0.375
		54.25 / TE-23005	1		
<div>10.5 / TE-23022 29 / TE-23020 54.25 / TE-23005</div>					

Repetition 1x	Stock length 96	Part length / Label	Qty	Waste	
		10.5 / TE-23022	2	Material remnant	1.75
		54.25 / TE-23005	1	Cut	0.5
		18.5 / TE-23010	1		
<div>10.5 / TE-23022 10.5 / TE-23022 54.25 / TE-23005 18.5 / TE-23010</div>					

Repetition	Stock length	Part length / Label	Qty	Waste
4x	96			
		39.125 / TE-23013	1	Material remnant 2.375
		54.25 / TE-23005	1	Cut 0.25
		39.125 / TE-23013	54.25 / TE-23005	

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