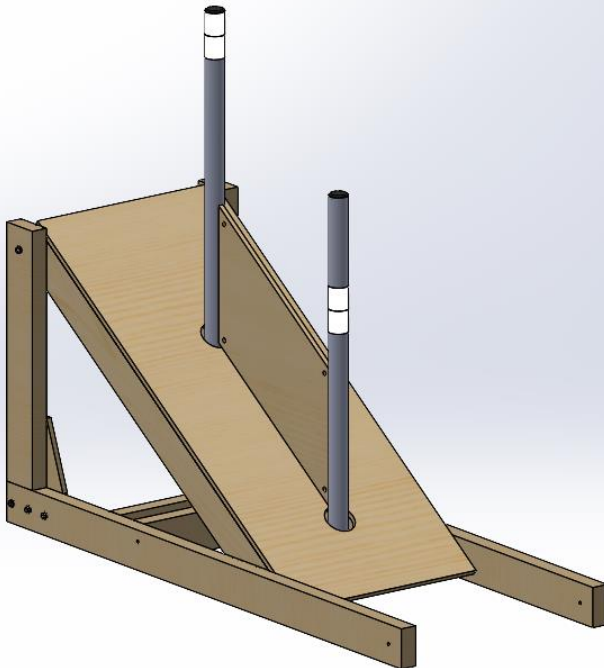


## TE-23003 MIDDLE CONE RAMP ASSEMBLY



**Description:** This is a Middle Cone Ramp, designed so that teams can practice without the need for a full GRID.

### 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

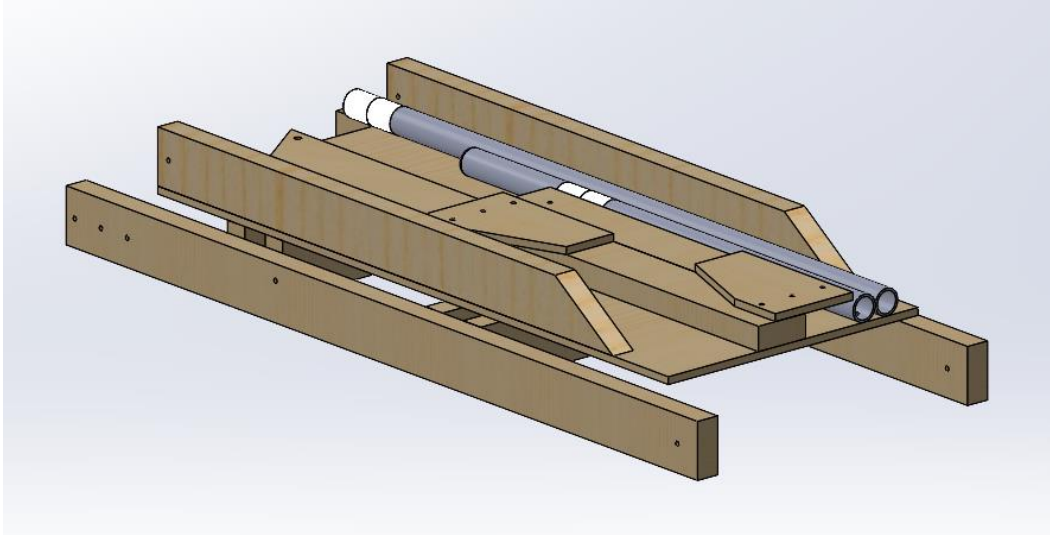
Plywood and Lumber (Example Cut List is at end of Readme):

- 4' x 8' x 1/2" Thick Plywood – Under 1/2 of a sheet
- 2" x 4" x 8' Lumber – 4 Pieces

Hardware:

- 1/4-20 x 2.5" Long – 6 Pieces
- 1/4-20 x 3.5" Long – 2 Pieces
- 1/4-20 x 5" Long – 4 Pieces
- 1/4-20 Wing Nuts – 12 Pieces
- Cable Ties – 4 Pieces
- #8 Wood Screws x 1.5" long – Approximately 16 Pieces
- #8 Wood Screws x 3" Long – Approximately 16 Pieces

**NOTE ON HARDWARE:** All nuts and bolts, except for the 5" long bolts and 4 of the wing nuts (holding the poles), can be replaced with approximately 4x #8 x 1.5" wood screws and 8x #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 an image showing how much space you can save using nuts and bolts instead of wood screws.



*A Cone Ramp can be broken down to be 8.25" tall instead of 26.5" tall (wood frame) or 46" tall (with pole)*

Other:

- 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**.
- 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.
- 2x 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, 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.
- 4x 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
		18.5 x 43.875 / TE-23015	<b>1</b>
		9.5 x 5.75 / TE-23012	<b>2</b>
		9.5 x 25.52 / TE-23007	<b>1</b>
		18.5 x 4	

Repetition <b>1x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste
		54.25 / TE-23008	<b>1</b>	Material remnant 0.375
		18.5 / TE-23010	<b>1</b>	Cut 0.375
		22.5 / TE-23011	<b>1</b>	
		54.25 / TE-23008	18.5 / TE-23010	22.5 / TE-23011

Repetition <b>1x</b>	Stock length <b>96</b>	Part length / Label	Qty	Waste	
		18.5 / TE-23010	<b>3</b>	Material remnant 0.875	
		39.125 / TE-23013	<b>1</b>	Cut 0.5	
		18.5 / TE-23010	18.5 / TE-23010	18.5 / TE-23010	39.125 / TE-23013

Repetition <b>1x</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
		22.5 / TE-23011	<b>1</b>	Material remnant 73.375
				Cut 0.125
		22.5 / TE-23011		