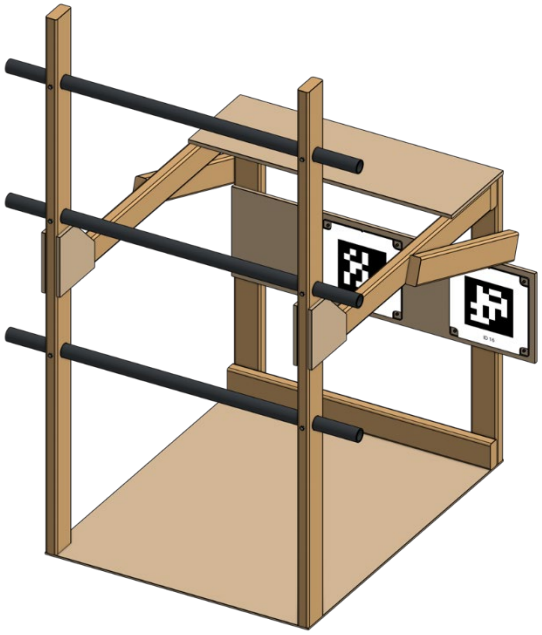
TE-26500 Tower



Description

This is a Tower, designed so that teams can practice hanging from the structure. Each field element has multiple versions designed for teams. Before constructing this assembly, be sure to check the Playing FIELD webpage to confirm the design is the best fit for your team. In this document, you will find assembly instructions and drawings for this design.

CAD Files

CAD files are provided in two formats. Links to both versions can be found on the Playing FIELD webpage.

The Onshape version of the CAD files can be accessed. This design was created in Onshape, a *FIRST*® Modeling Solutions Sponsor.

onshape® by ptc

STEP files of this assembly are included for the convenience of non-Onshape users.

Drawings

All drawing files have been exported to PDF Format. Drawings show the dimensions and details required to cut out individual parts. Assembly instructions can be found below in this document.

Shopping List (if building multiple team element designs, plywood and lumber can be consolidated):

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

- 2” x 4” x 8’ Lumber – 5 Pieces
- 4’ x 4’ x 1/2” Thick Plywood – 1 Sheet
- 4’ x 4’ x 1/4” Thick Plywood – 1 Sheet

Hardware/Other:

- #8 Wood Screws x 2.5” long – Approximately 48 Pieces
- #8 Wood Screws x 1.5” long – Approximately 36 Pieces
- 1-1/4in Schedule 40 Pipe – Aluminum, Iron, or Steel – 3 x 48”
- 1/4-20 x 4” Long Bolt Hex Bolt – 6 pieces
- 1/4-20 Lock Nut – 6 pieces
- 17/64 Drill Bit

Notes about Hardware

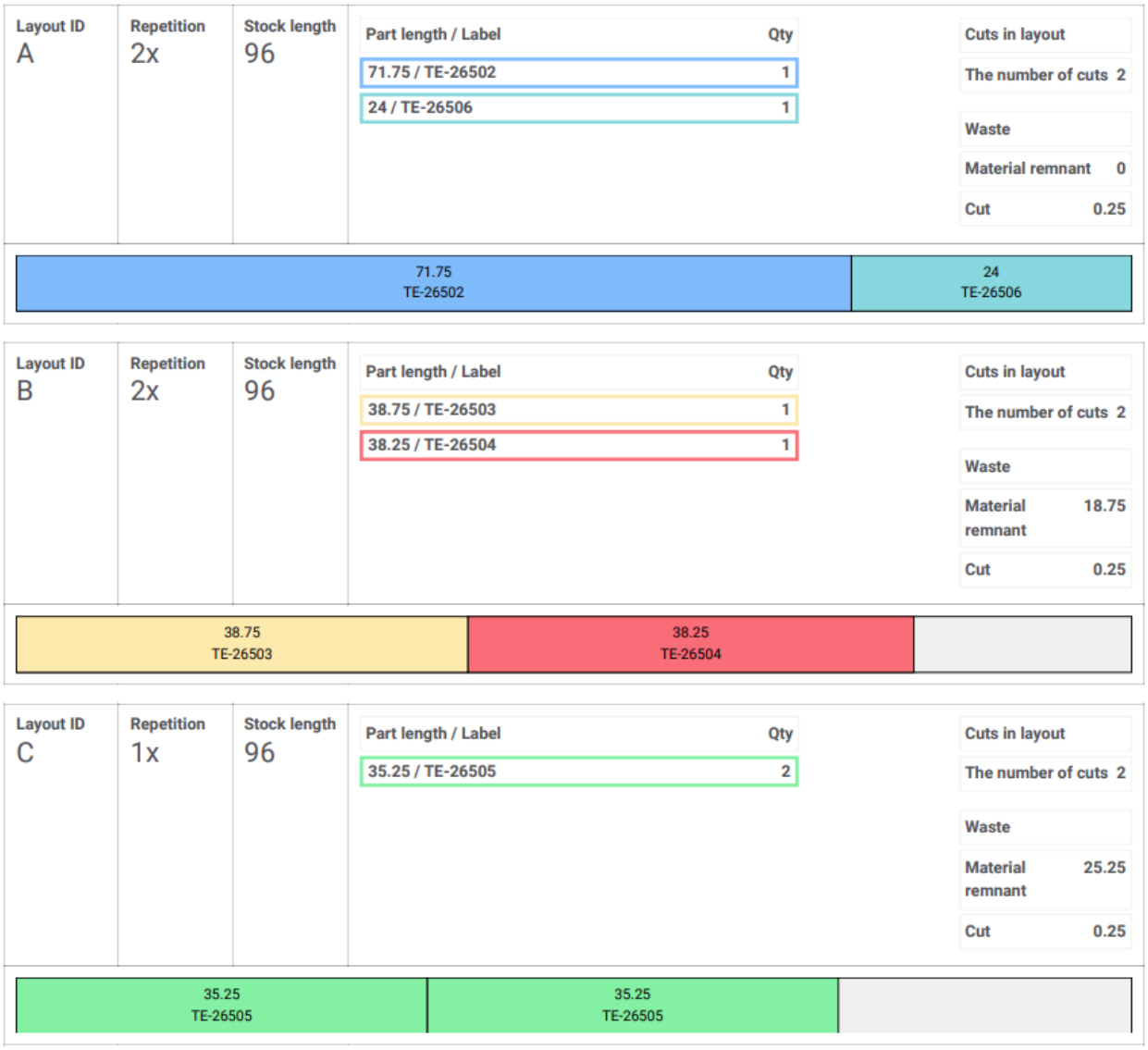
All wood screws can be replaced with nuts and bolts of your choosing to make the design easier to disassemble and store. If this is not a concern for your team, wood screws will make for a sturdier assembly.

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, ½” 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 1-1/2in x 3-1/2in.

Example Cut List (All units are Inches)

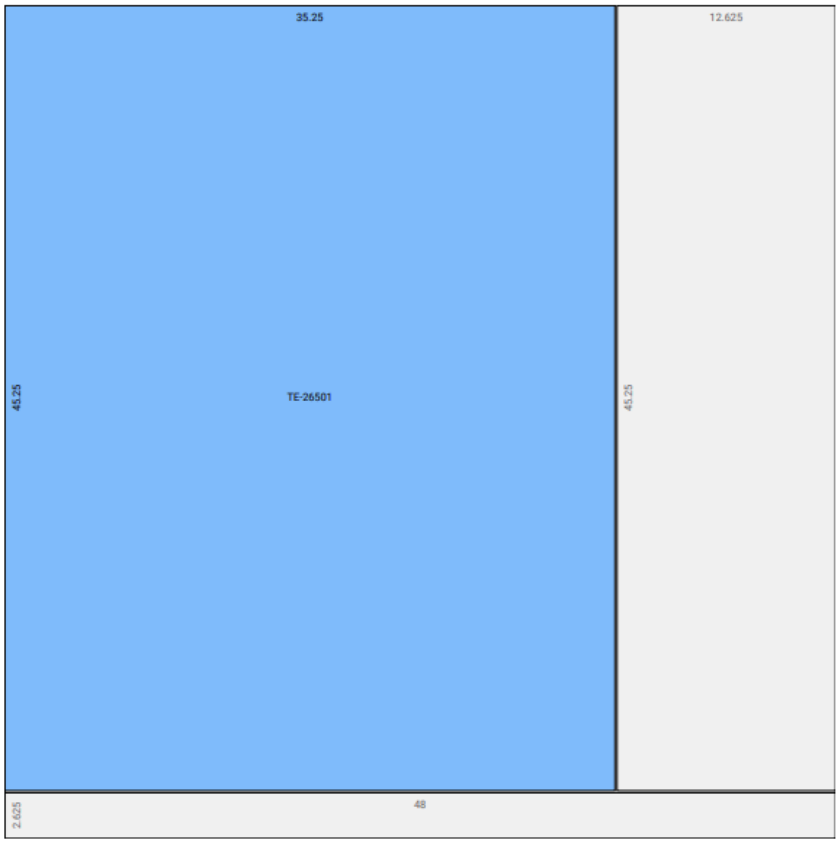
2x4 Lumber (can be combined with all other Team Elements to reduce number of purchased pieces. Be sure to note required repetitions – how many times each Layout ID needs to be cut):



1/2” Plywood (can be combined with all other Team Elements to reduce number of purchased panels):

1/4” Plywood:

Layout ID	Repetition	Stock dimensions
A	1x	48 x 48

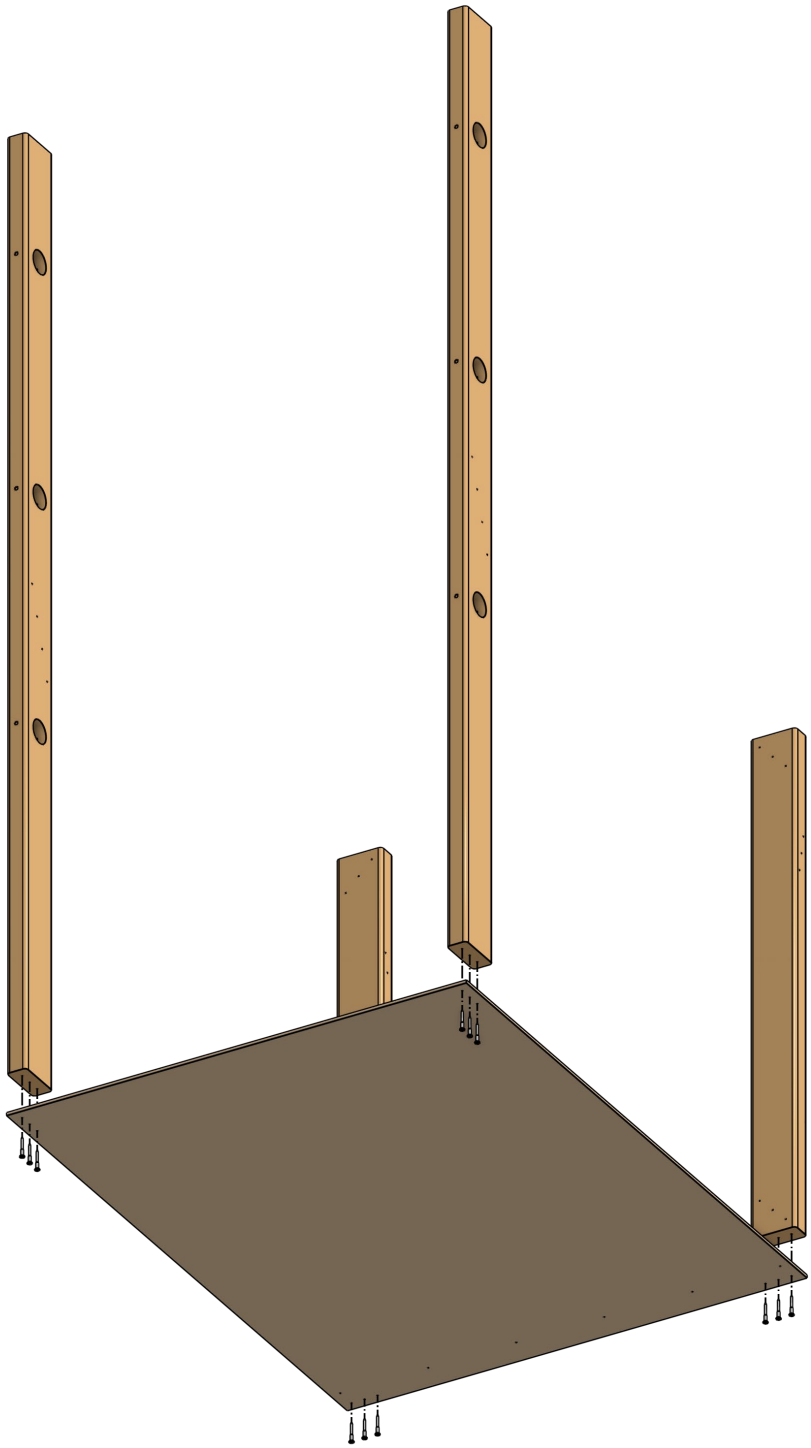


Panel	Qty
35.25 x 45.25 / TE-26501	1

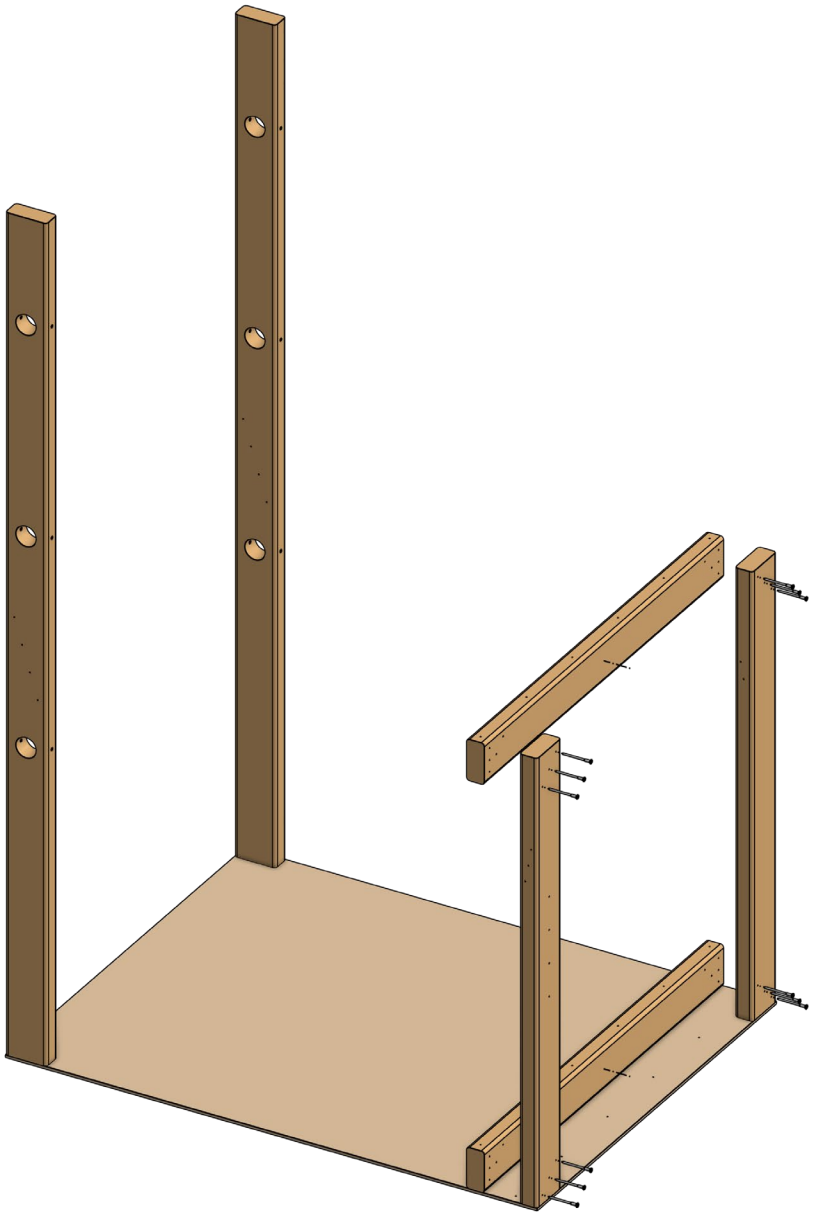
Cuts in layout	
The length of cuts	93.25
The number of cuts	2

Assembly Instructions

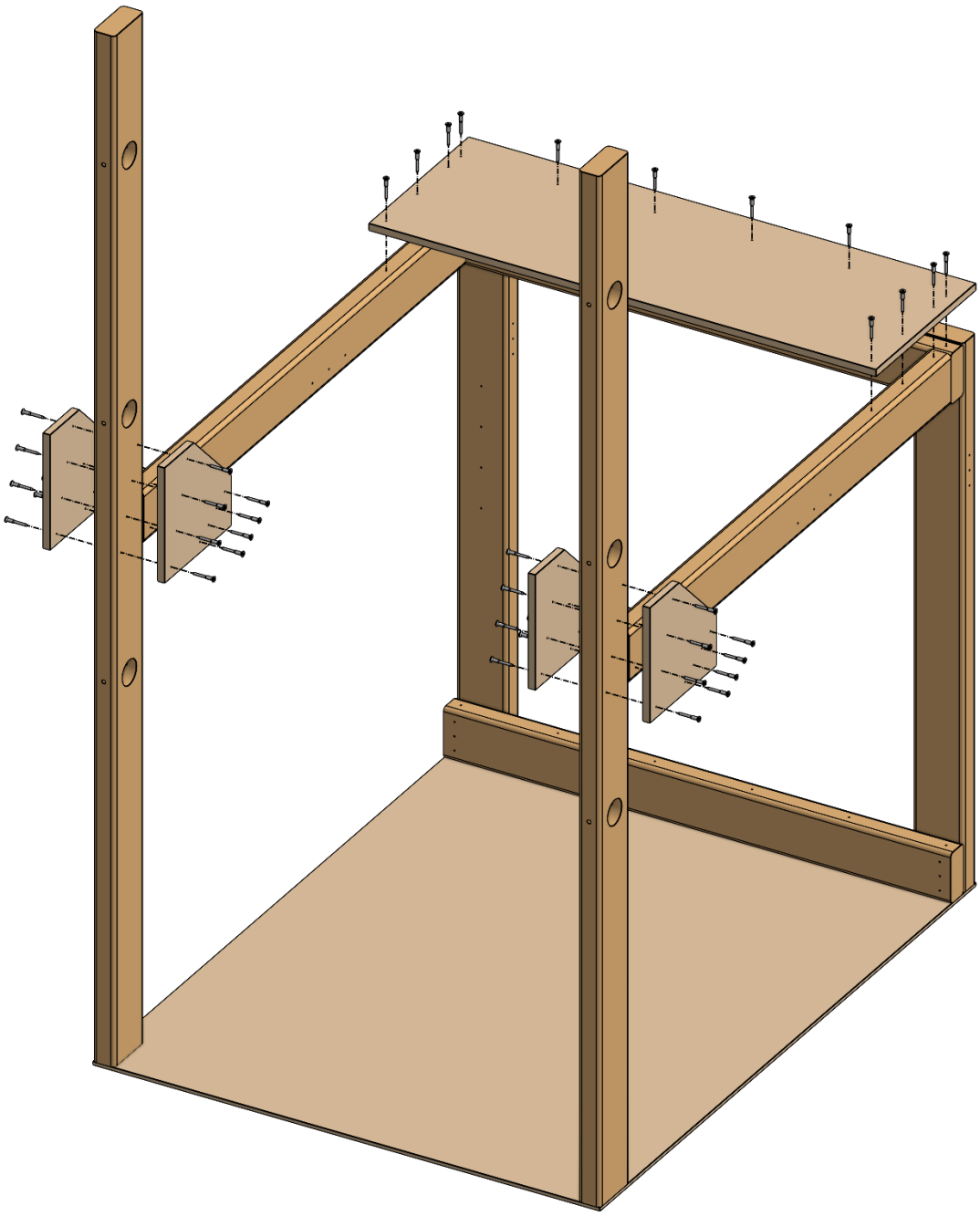
1. Fasten both TE-26502 (Tower Upright Beam) with the holes biased upwards and two TE-26504 (Tower Vertical Support Beam) on top of TE-26501 (Tower Bottom Base Plate) using 1-1/2in screws.



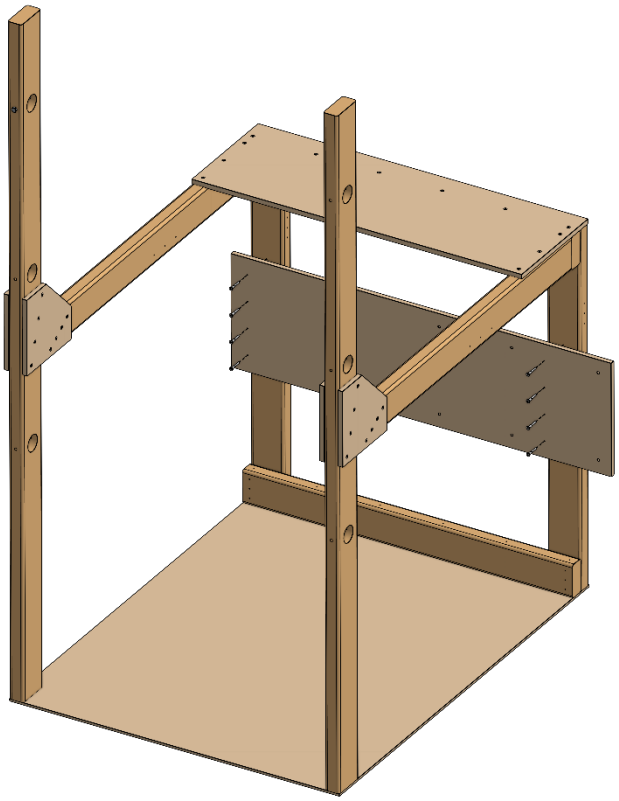
2. Attach both TE-26505 (Tower Horizontal Support Beam) to the top and bottom of the TE-26504s (Tower Vertical Support Beam) using 2-1/2in screws and to the top of the TE-26501 (Tower Bottom Base Plate) using 1-1/2in screws.

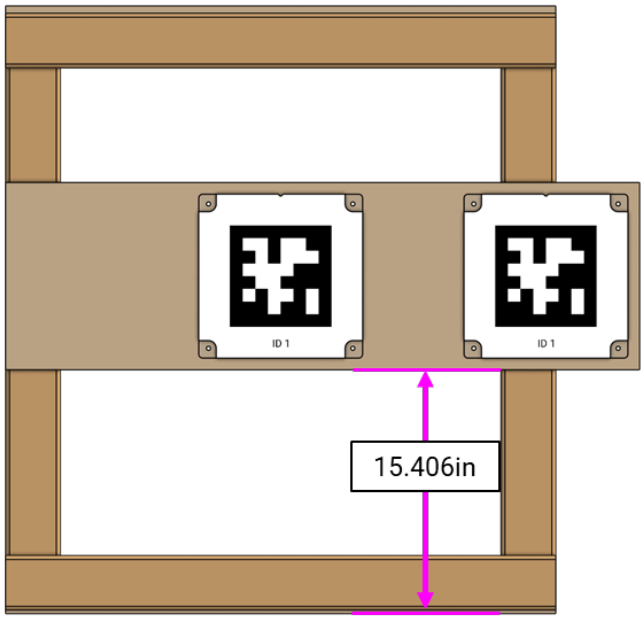


3. Attach both TE-26503 (Tower Upright Support Beam) using 4 TE-26508 (Tower Upright Support Plate) on both sides of the TE-26502 (Tower Upright Beam) and the TE-26507 (Tower Top Support Plate) on top of the TE-26505 (Tower Horizontal Support Beam). The bottom of TE-26503 should be 34-3/4in from the bottom of TE-26502. Fasten all using 1-1/2in screws.

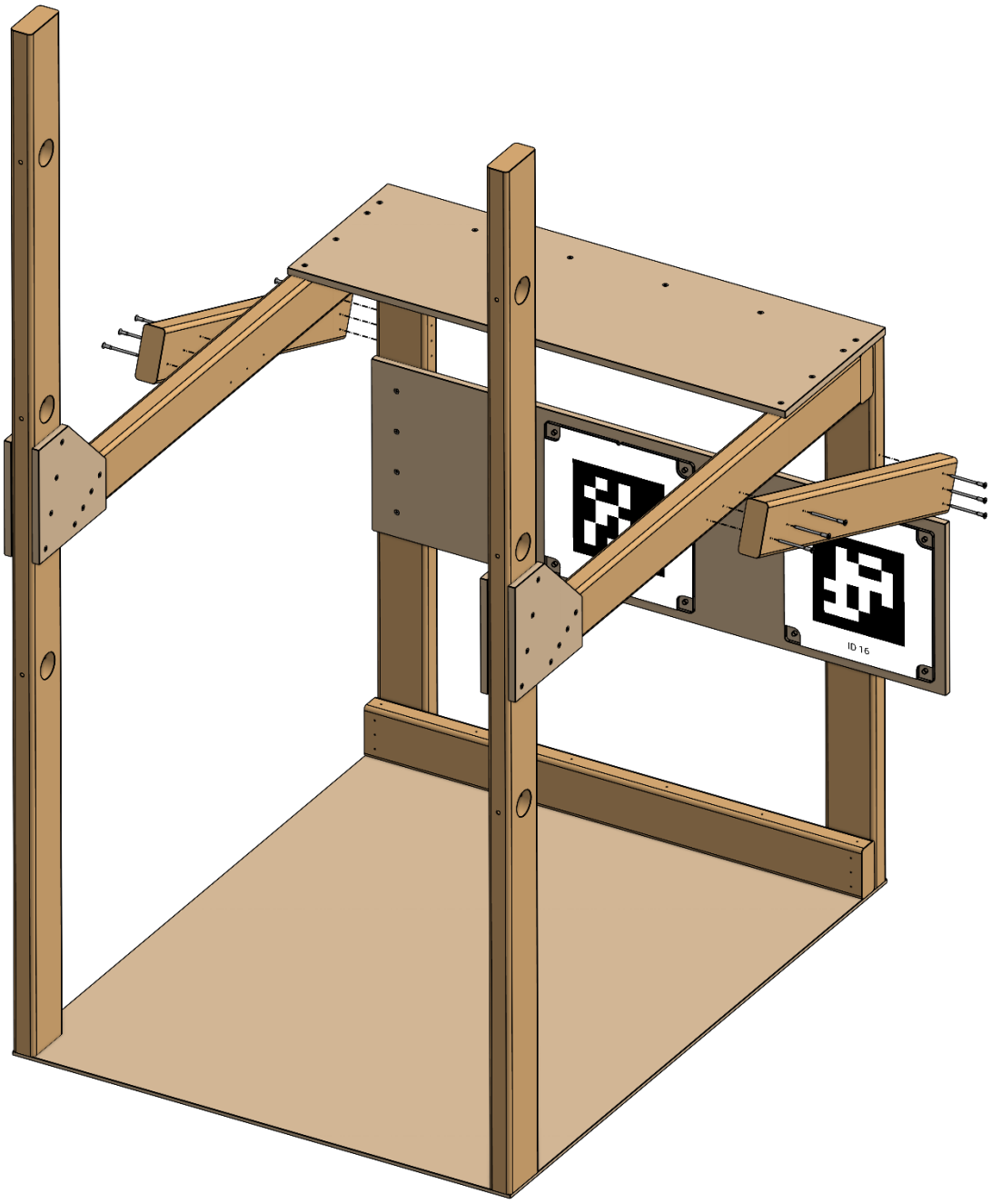


4. Attach the TE-26510 (Tower April Tag Plate) to the inside of both TE-26504s (Tower Vertical Support Beam) and keep it flush with the left Vertical Support and mount it 15-13/32in above the TE-26501 (Tower Bottom Base Plate). All using 1-1/2in screws.

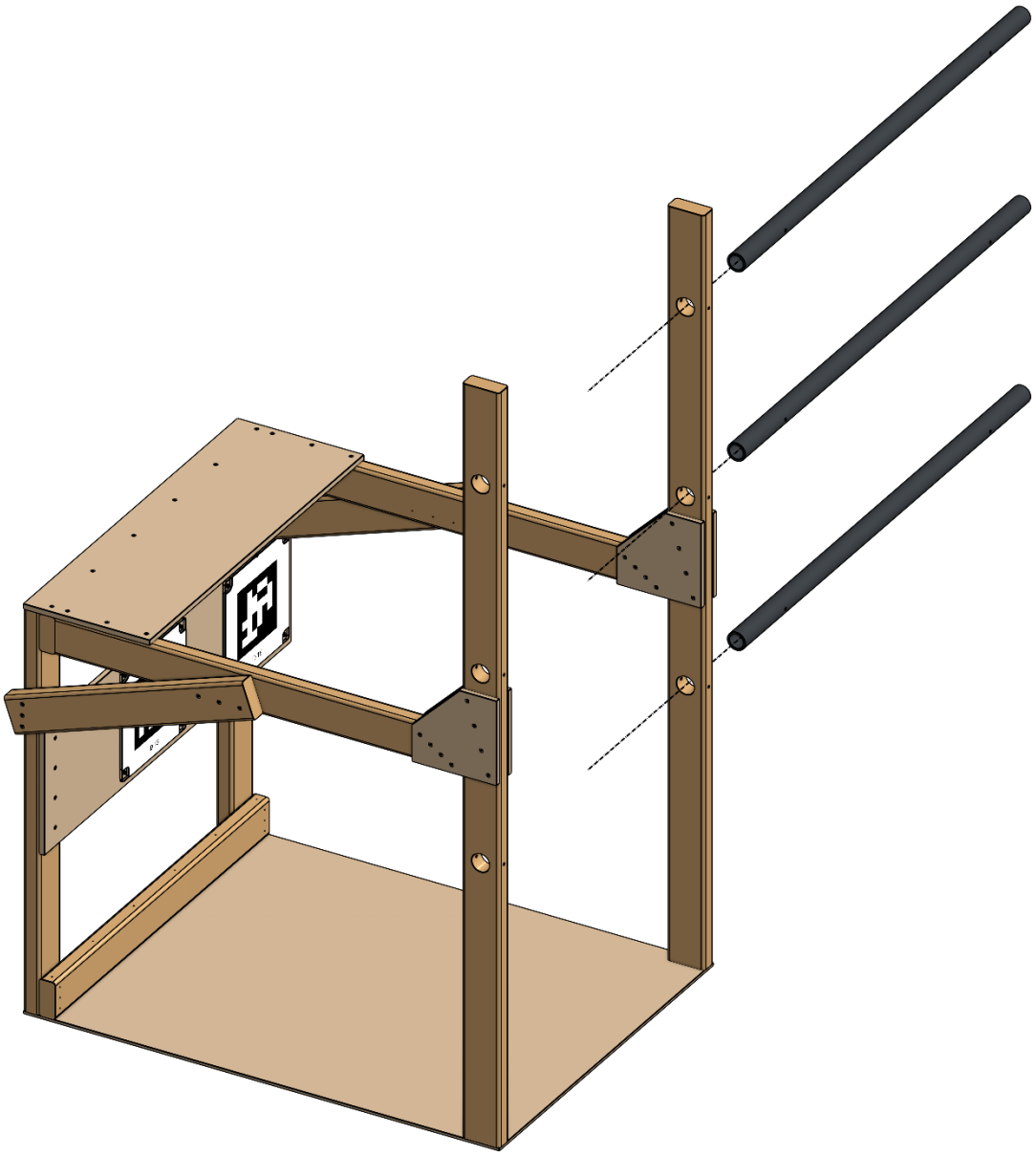




5. Attach two TE-26506s (Tower Angle Support Beam) approximately halfway down the outside of each TE-26503 (Tower Upright Support Beam) at a downwards angle touching the top of TE-26510 (Tower April Tag Plate). Attach using 2-1/2in screws.



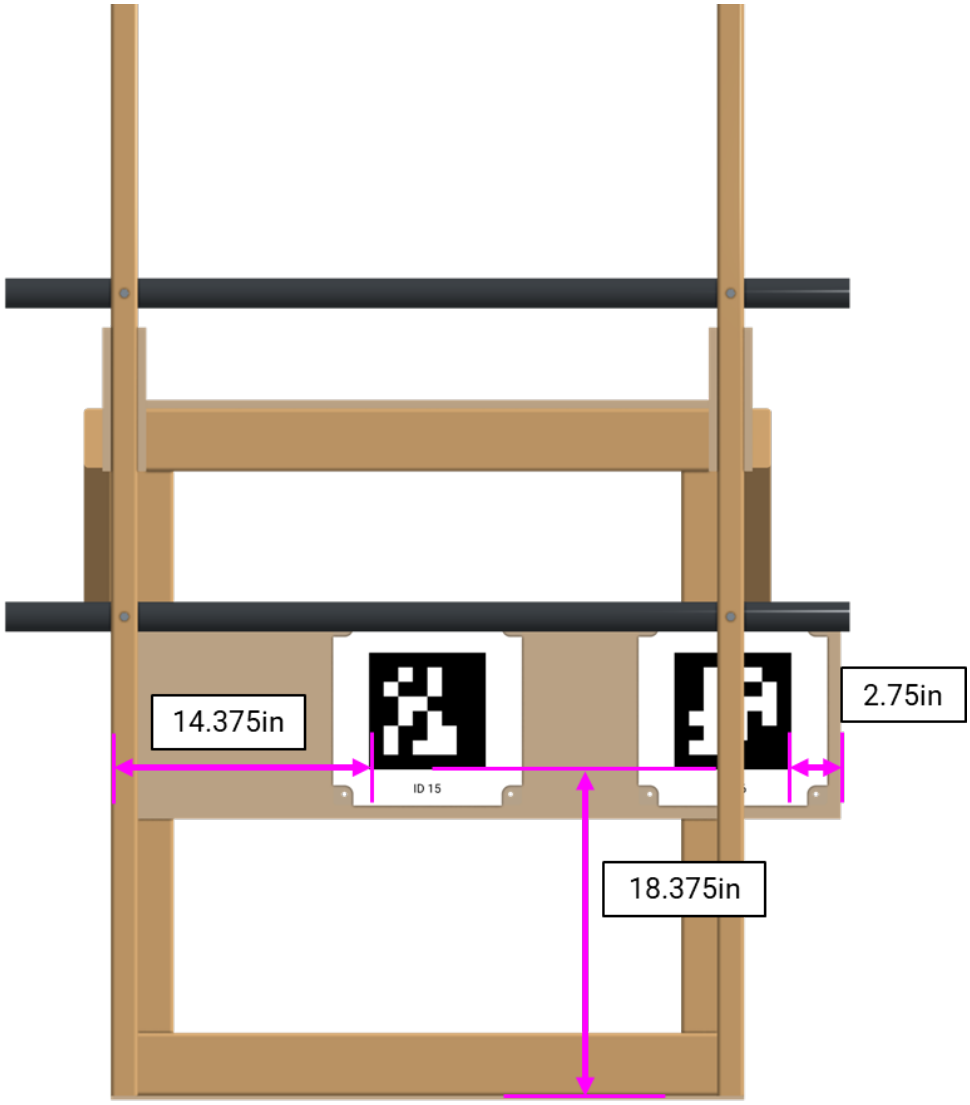
6. Slide in all three TE-26509s (Tower Rung) into the TE-26502 (Tower Upright Beam) and fix them in place by using the 1/4-20 x 4” Long Bolt Hex Bolt with Lock Nuts through the Rung. The ends of the rungs should extend 5-7/8in beyond the outside edges of the TE-26502 (Tower Upright Beams).



AprilTag Placement

The image below illustrates where the tag should be located on the team version of the Tower. The dimension provided is the height from the carpet to the bottom edge of the black square on the tag, and the left and right edge of the Tower AprilTag Plate to the edges of the black square on the tag.

The tag shown may not match the tag required for this field element. This tag may be IDs 15, 16, 31, or 32 depending on the desired position on the field. For further details on AprilTag field layout and printing AprilTags, see the AprilTag Images and User Guide document on the Playing FIELD webpage.

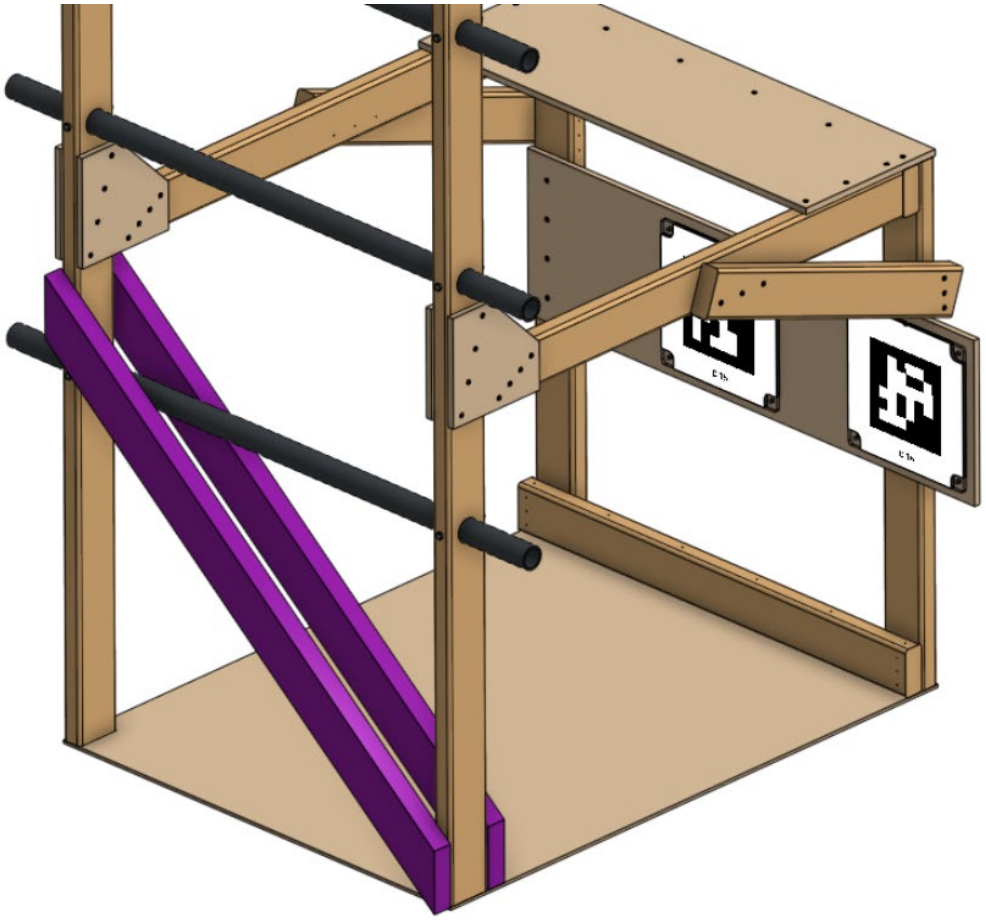


Support and Optional Add-Ons

There are numerous ways that teams may attempt to interact with the Tower. While this structure on its own will be sufficient for some of these interactions, it may be necessary to consider additional weight or bracing to ensure the structure works as intended.

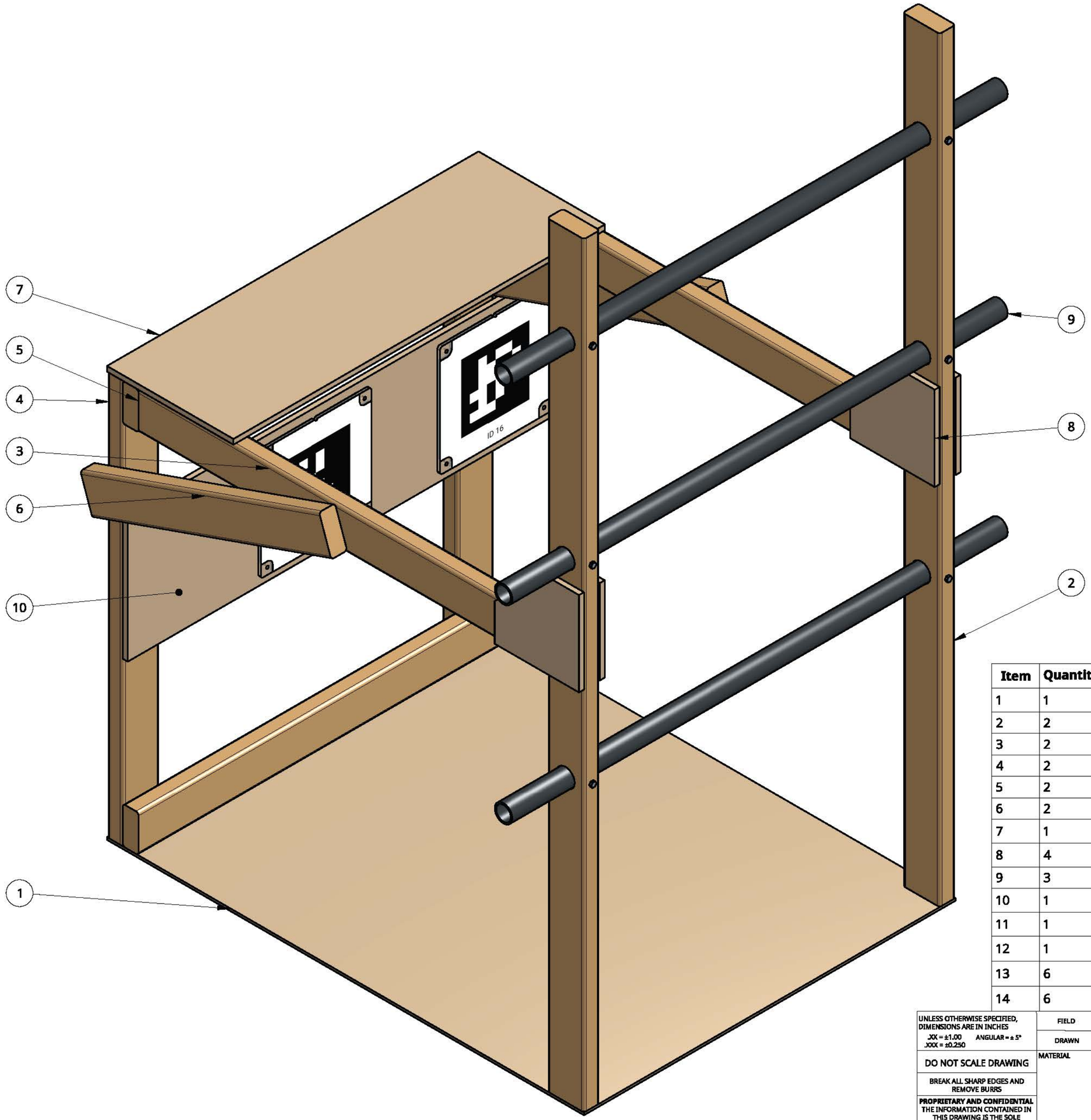
As one example, a team that is planning to have their weight far outside of the front of the Tower will need to consider solutions such as adding weight or anchoring down the back of the Tower.

As another example, it may be necessary to add some extra support beams in locations where the robot isn't interacting with the structure if designing around specific climb geometries. For example, if a robot is interacting with only the sides of the Tower, some extra lumber attached as shown below in purple will add some extra support. Teams should take the time to decide if it is necessary to add more pieces to the Tower based on robot designs being tested on it.



Version History

Version	Description of Changes	Date
1	• Initial Draft	01/10/2026
2	• Updated header image of document to display correct orientation of TE-26508. • Added reference dimension measurements to assembly instruction step 3 and step 6.	01/12/2026



Item	Quantity	Part number	Description
1	1	TE-26501	Tower Bottom Base Plate
2	2	TE-26502	Tower Upright Beam
3	2	TE-26503	Tower Upright Support Beam
4	2	TE-26504	Tower Vertical Support Beam
5	2	TE-26505	Tower Horizontal Support Beam
6	2	TE-26506	Tower Angle Support Beam
7	1	TE-26507	Tower Top Support Plate
8	4	TE-26508	Tower Upright Support Plate
9	3	TE-26509	Tower Rung
10	1	TE-26510	Tower April Tag Plate
11	1	FE-00083-ID15	AprilTag, ID 15
12	1	FE-00083-ID16	AprilTag, ID 16
13	6		Hex bolt 1/4-20 x 4 Steel Zinc Plated
14	6		Hex lock nut with nylon insert 1/4-20 Steel Zinc Plated

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES
.XX = ±1.00 ANGULAR = ± 5°
.XXX = ±0.250

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND REMOVE BURRS

FIELD	NAME	DATE
DRAWN	AV	10/20/2025

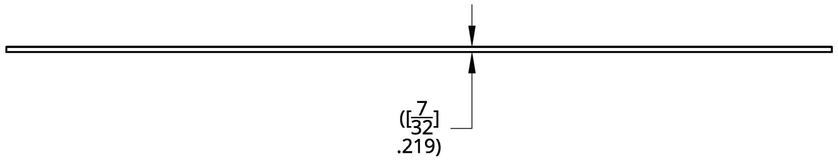
MATERIAL

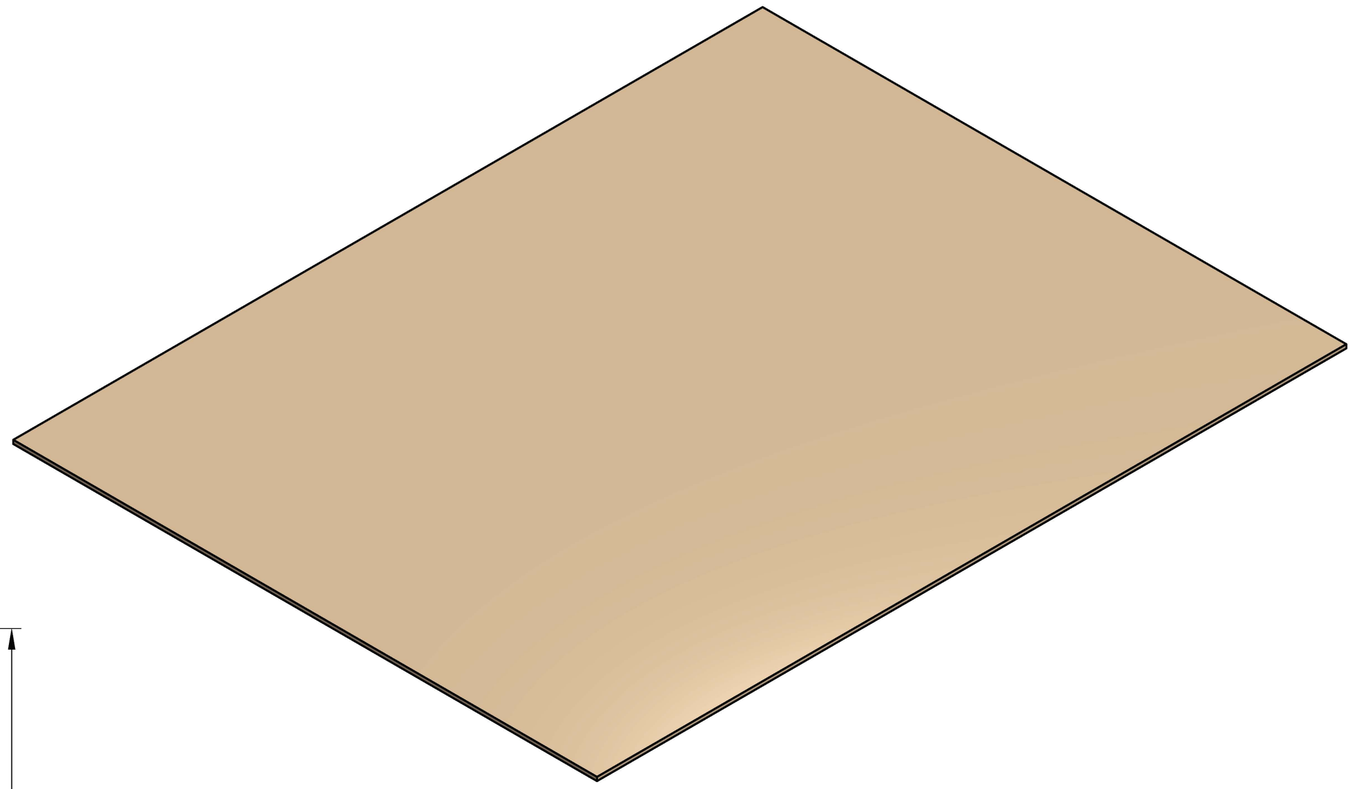
FIRST ROBOTICS COMPETITION

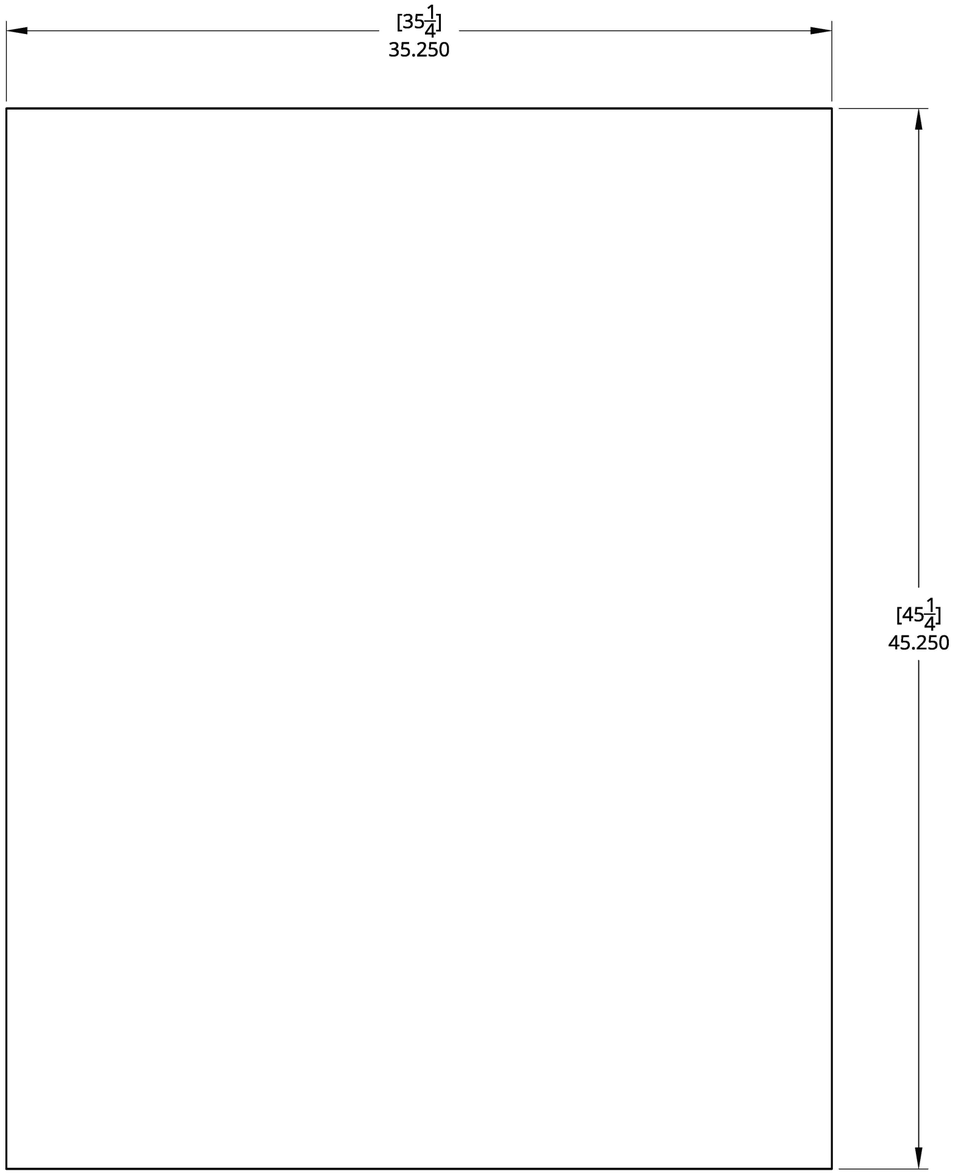
TITLE: TE TOWER

SIZE	DWG NO.	REV.
C	TE-26500	

SCALE: 1:5 SHEET: 1 of 1







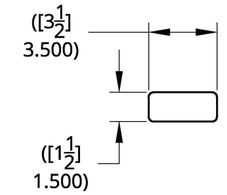
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR = ± 5° .XXX = ±0.250	FIELD	NAME	DATE
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	1/4" PLYWOOD		

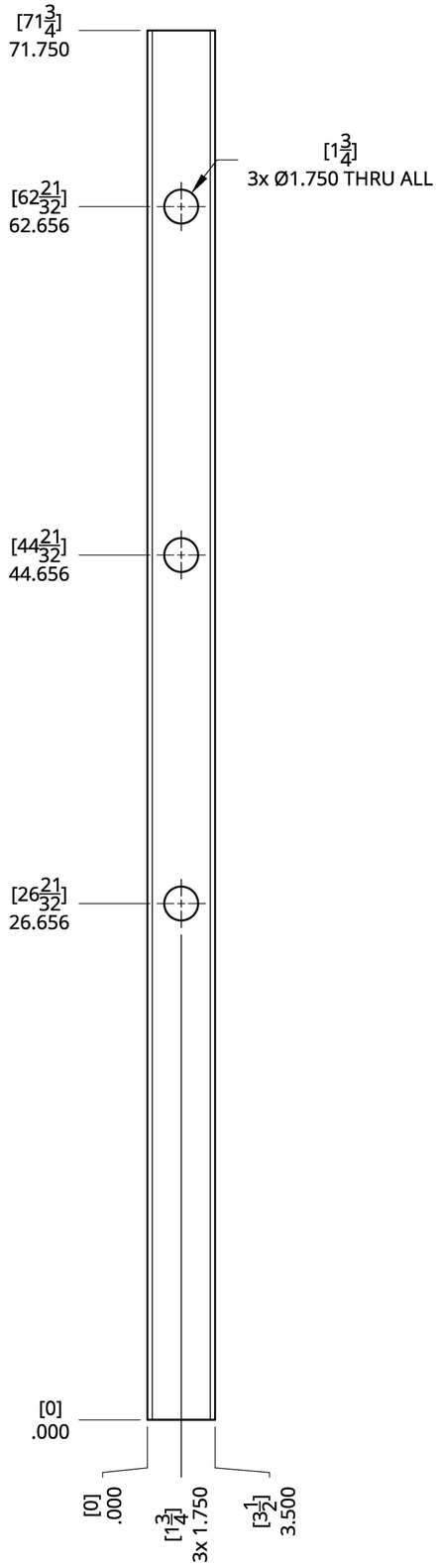
FIRST ROBOTICS COMPETITION

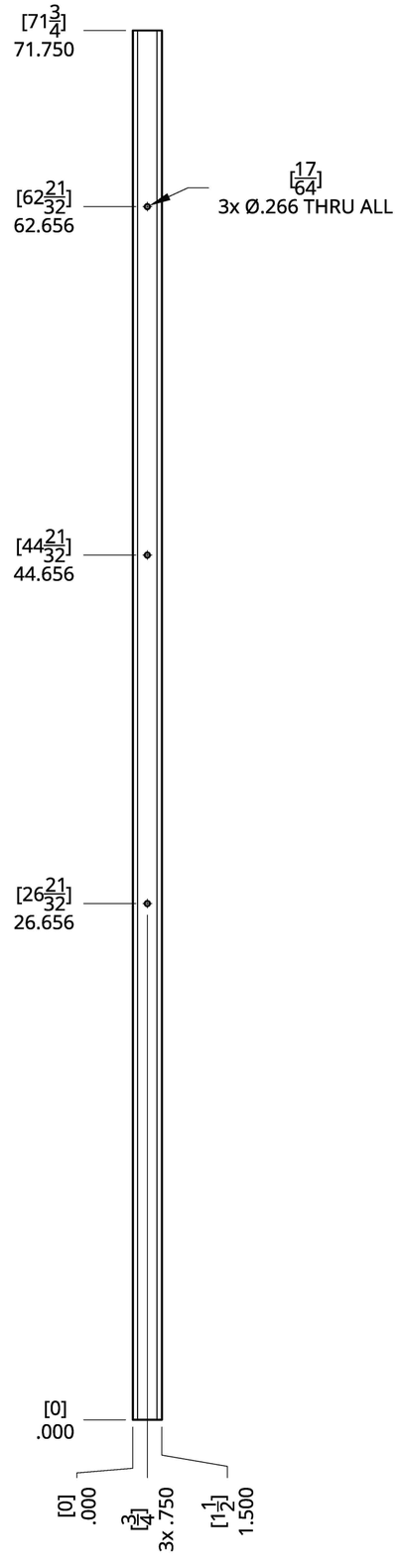
TITLE

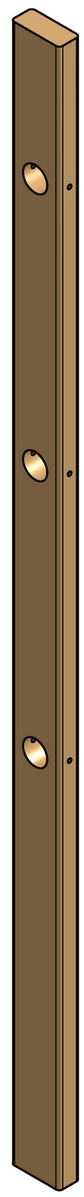
TOWER BOTTOM BASE PLATE

SIZE	DWG NO.	REV.
C	TE-26501	
SCALE 1:5	SHEET 1 of 1	







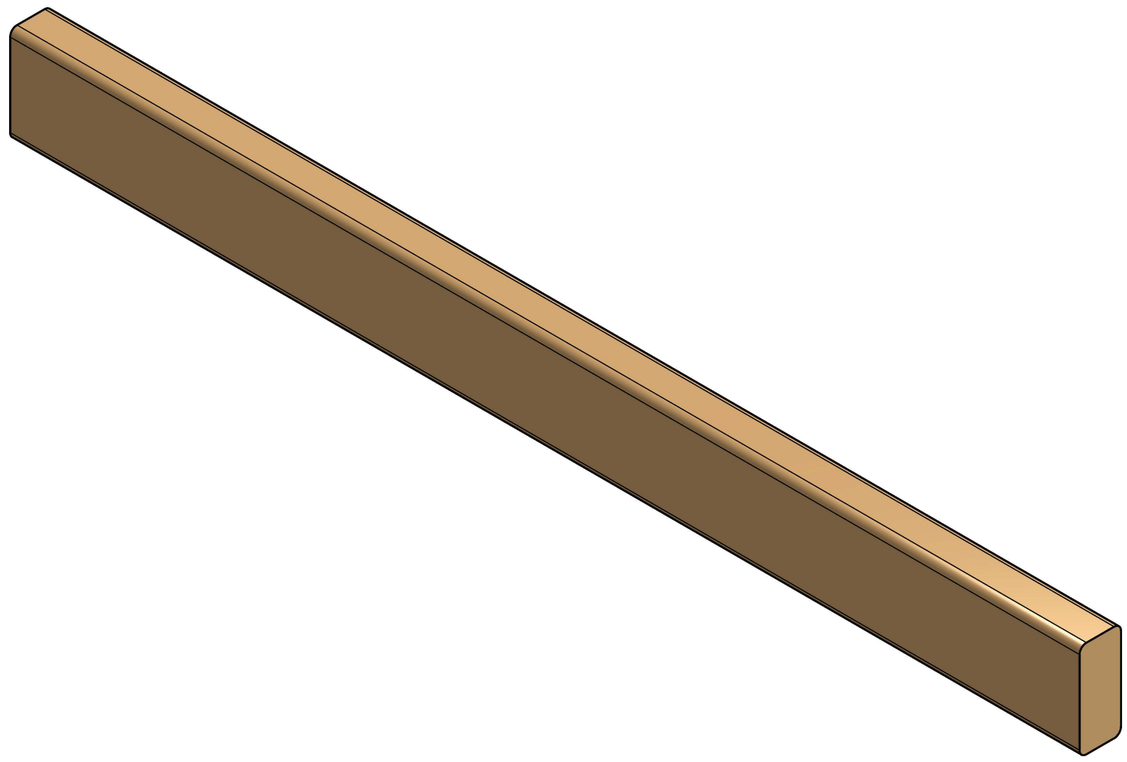


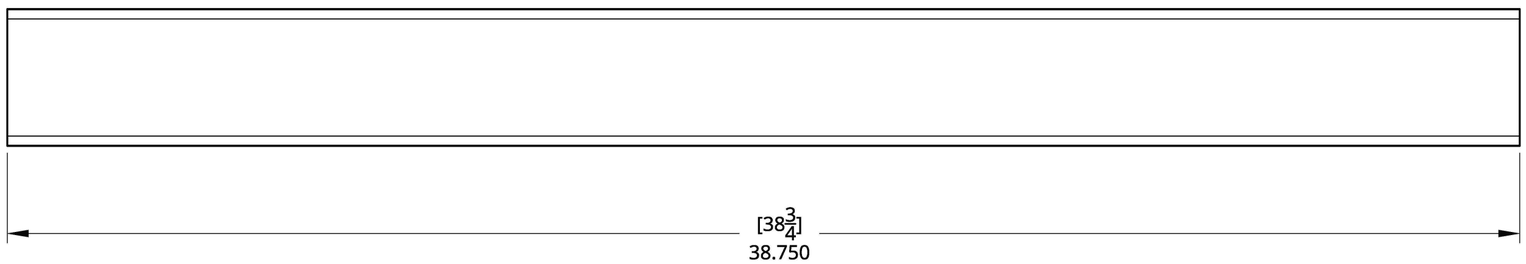
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR = ± 5° .XXX = ±0.250	FIELD	NAME	DATE
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	2X4 LUMBER		

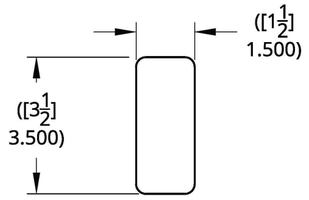
FIRST ROBOTICS COMPETITION

TITLE: TOWER UPRIGHT BEAM

SIZE	DWG NO.	REV.
C	TE-26502	
SCALE: 1:6	SHEET: 1 of 1	







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	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	2X4 LUMBER		
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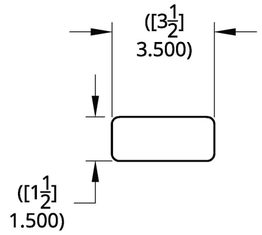
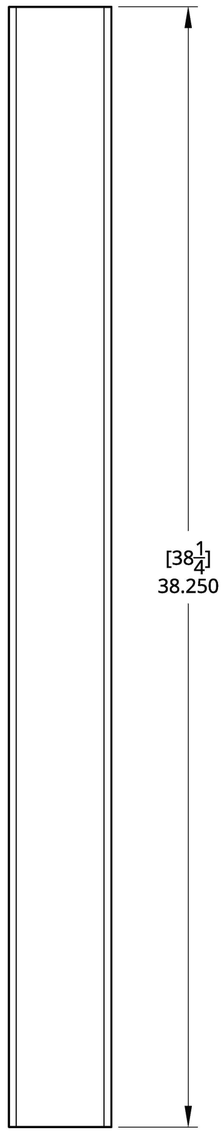
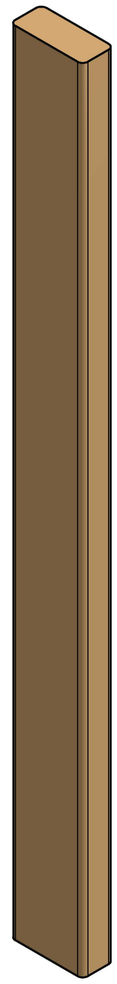
FIRST ROBOTICS COMPETITION

TITLE: TOWER UPRIGHT SUPPORT BEAM

SIZE	DWG NO.	REV.
C	TE-26503	
SCALE: 1:3	SHEET: 1 of 1	







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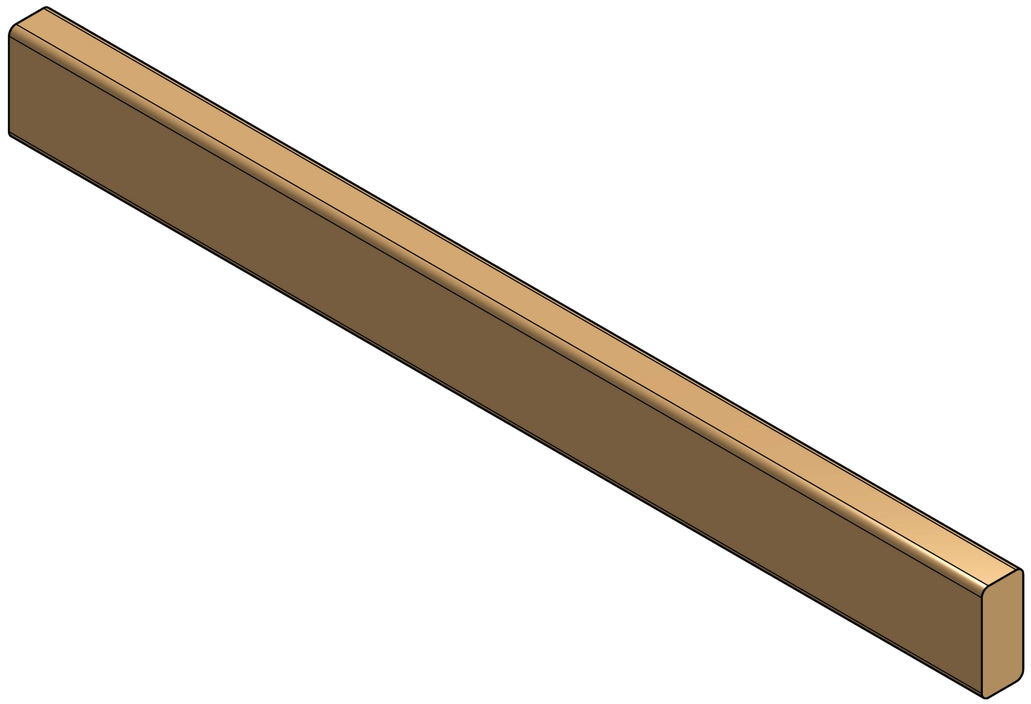
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	2X4 LUMBER		

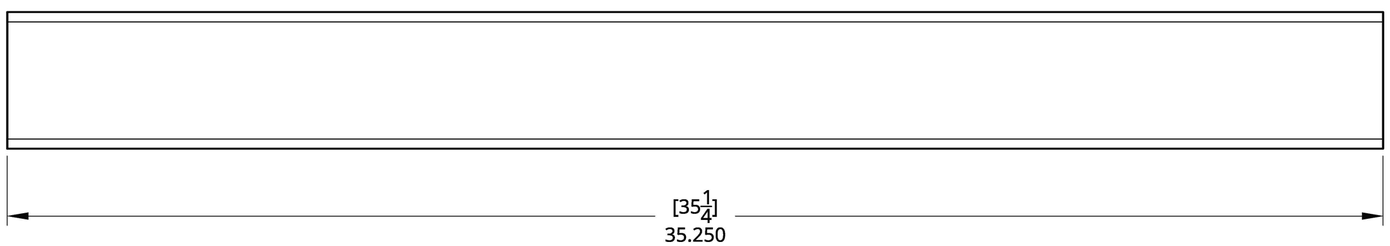
FIRST ROBOTICS COMPETITION

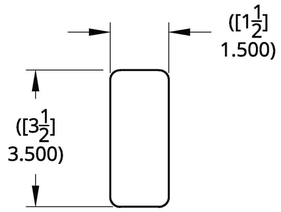
TITLE

TOWER VERTICAL SUPPORT BEAM

SIZE	DWG NO.	REV.
C	TE-26504	
SCALE 1:4		SHEET 1 of 1





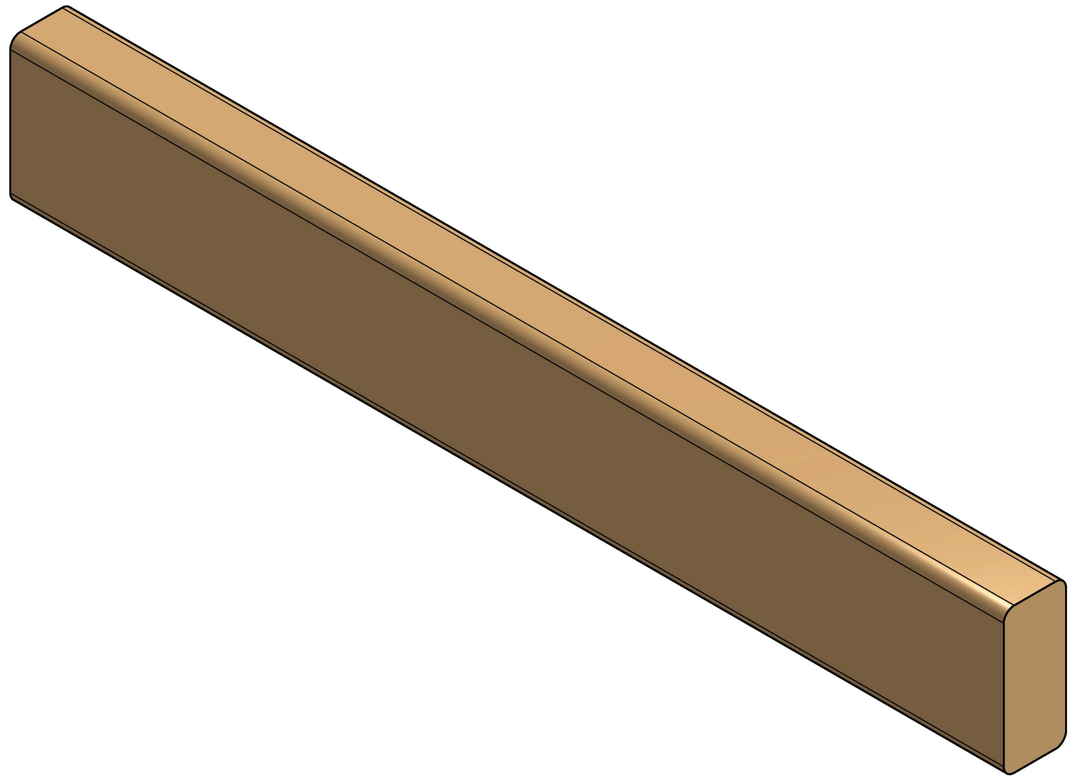


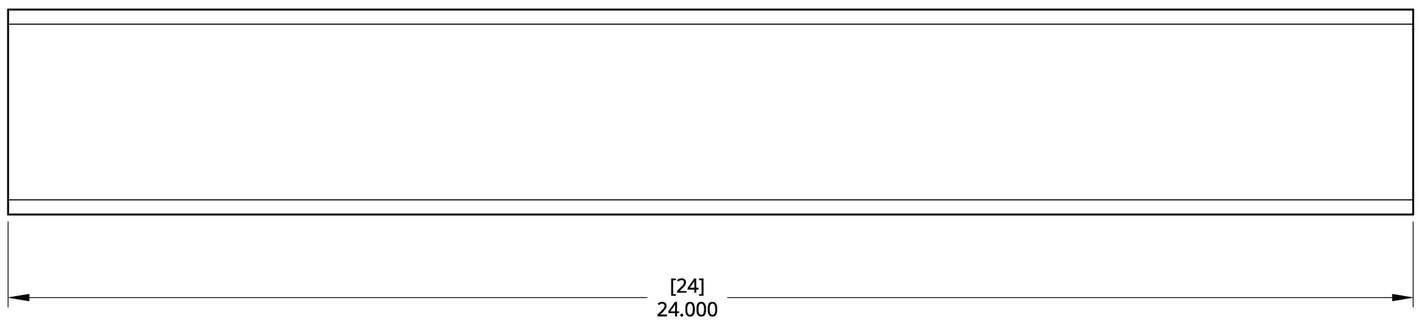
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR = ± 5° .XXX = ±0.250	FIELD	NAME	DATE
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	2X4 LUMBER		

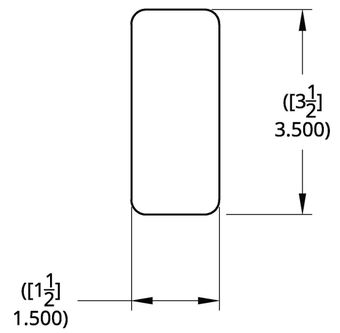
FIRST ROBOTICS COMPETITION

TITLE
TOWER HORIZONTAL SUPPORT BEAM

SIZE	DWG NO.	REV.
C	TE-26505	
SCALE 1:3	SHEET 1 of 1	







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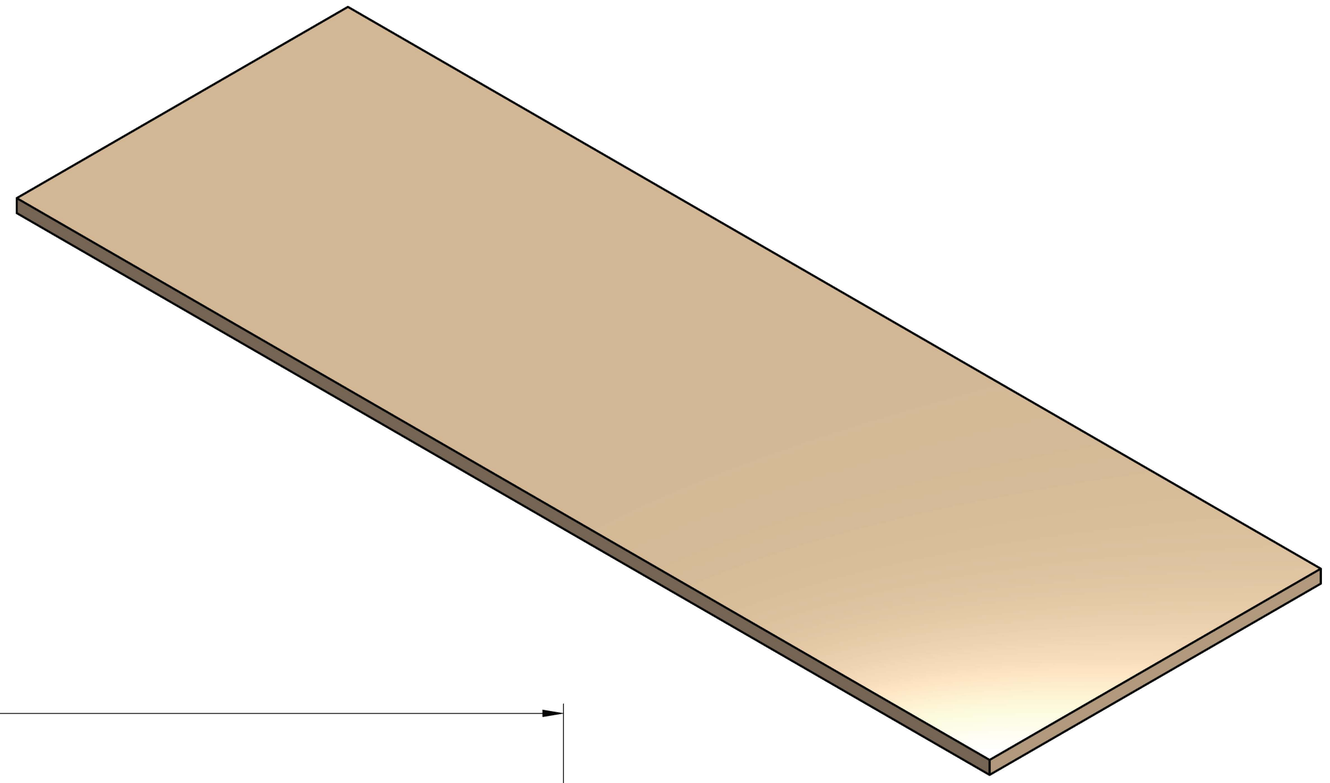
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	2X4 LUMBER		

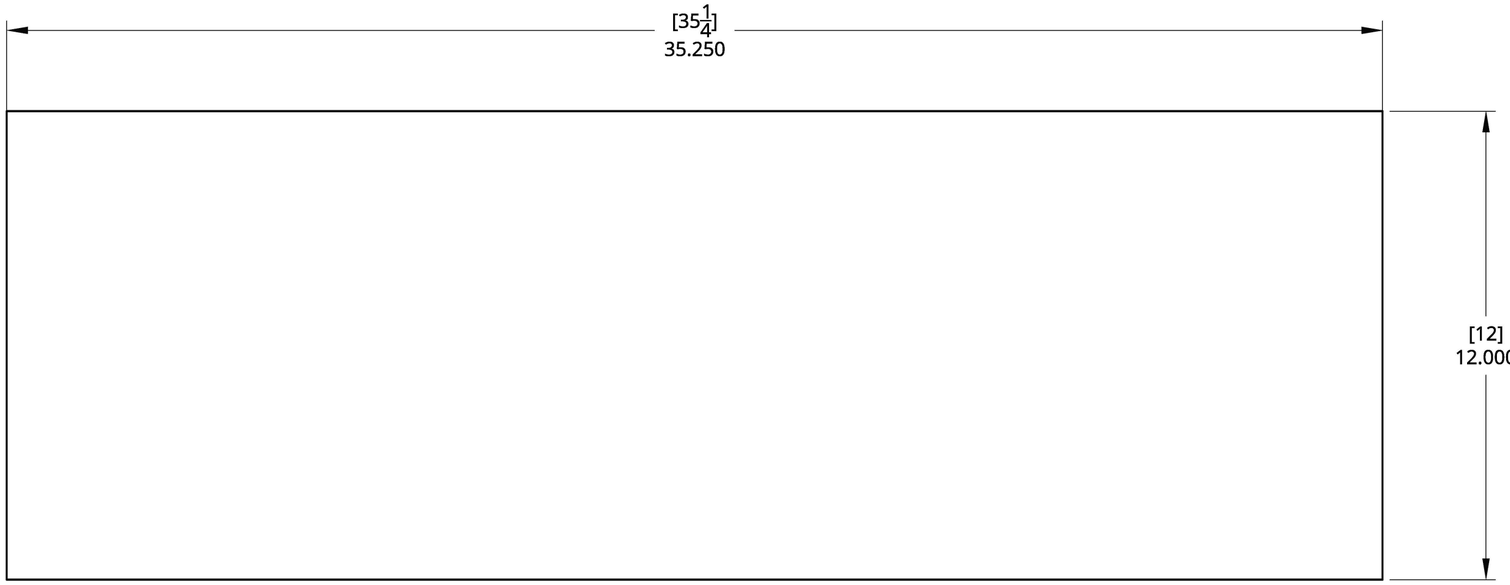
FIRST ROBOTICS COMPETITION

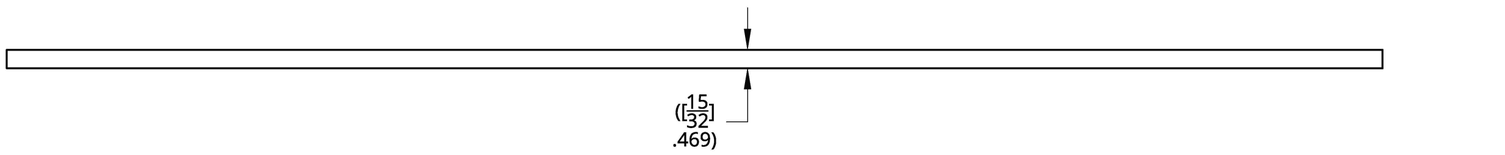
TITLE

TOWER ANGLE SUPPORT BEAM

SIZE	DWG NO.	REV.
C	TE-26506	
SCALE 1:2	SHEET 1 of 1	







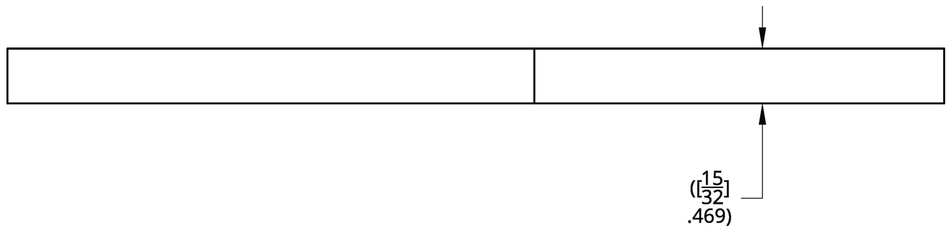
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR = ± 5° .XXX = ±0.250	FIELD	NAME	DATE
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		
BREAK ALL SHARP EDGES AND REMOVE BURRS	1/2" PLYWOOD		

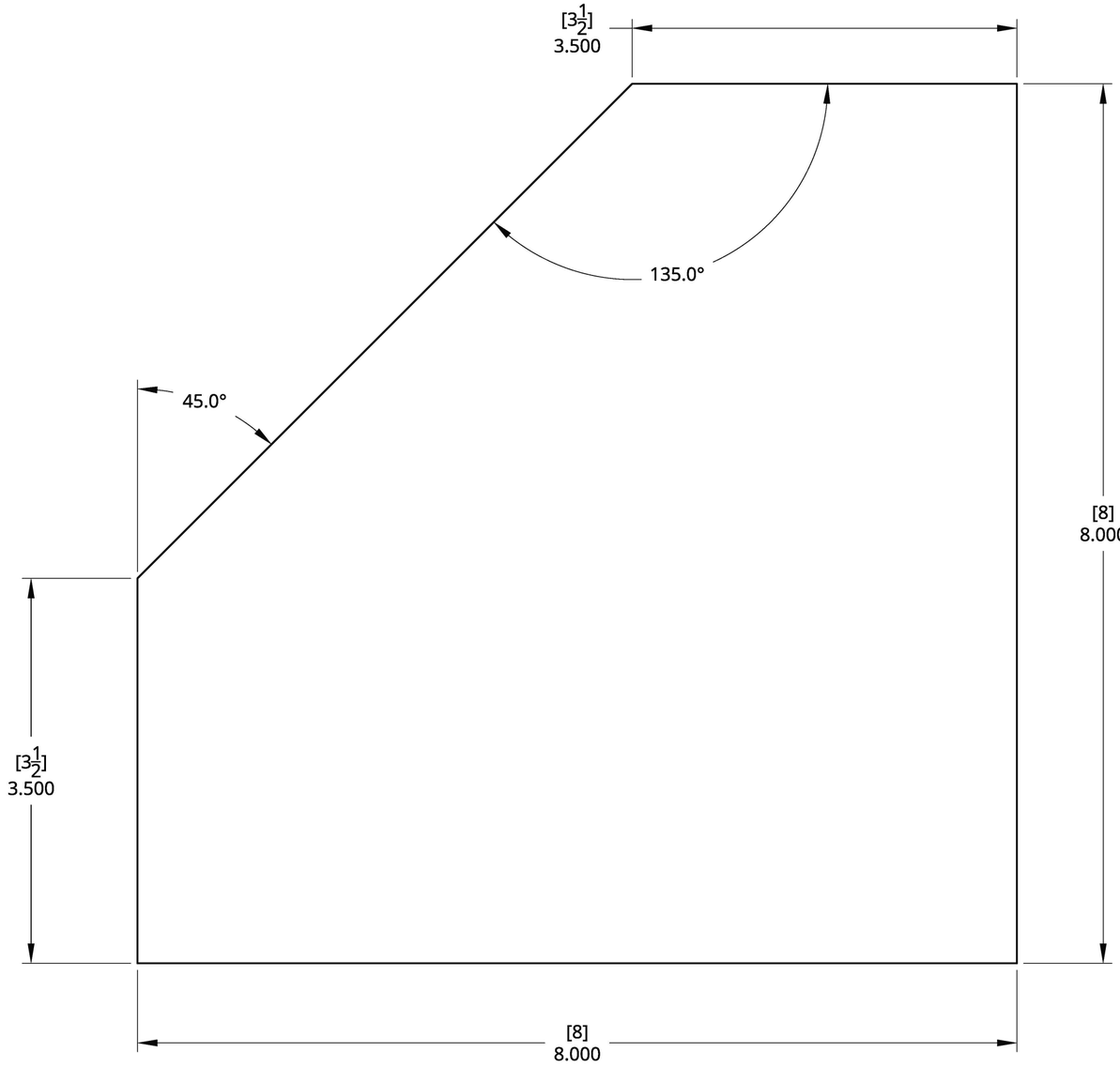
FIRST ROBOTICS COMPETITION

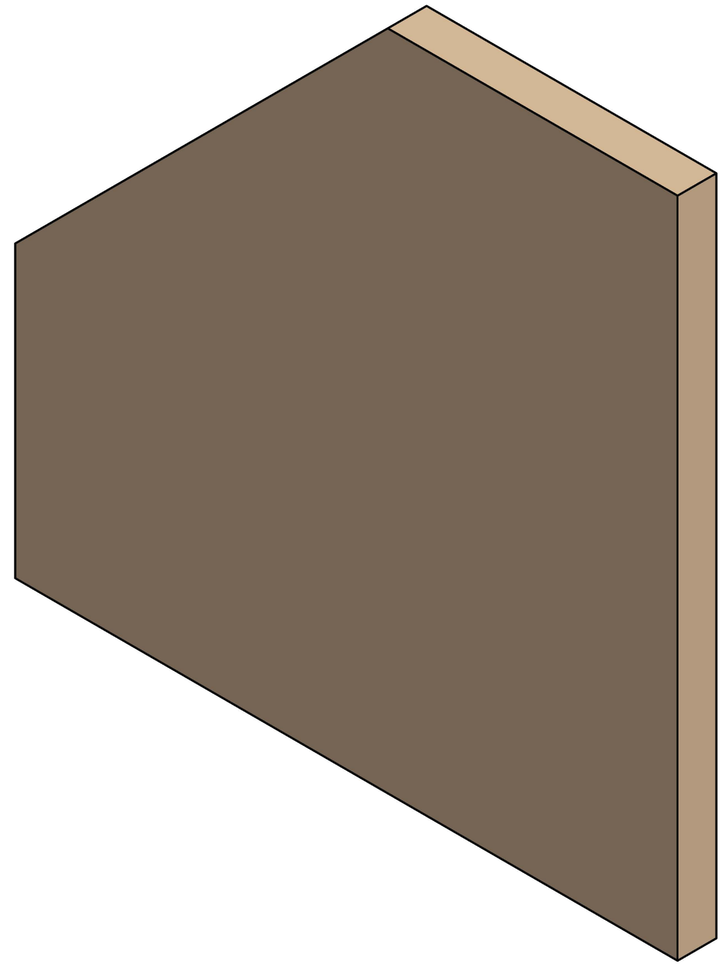
TITLE

TOWER TOP SUPPORT PLATE

SIZE	DWG NO.	REV.
C	TE-26507	
SCALE 1:3	SHEET 1 of 1	

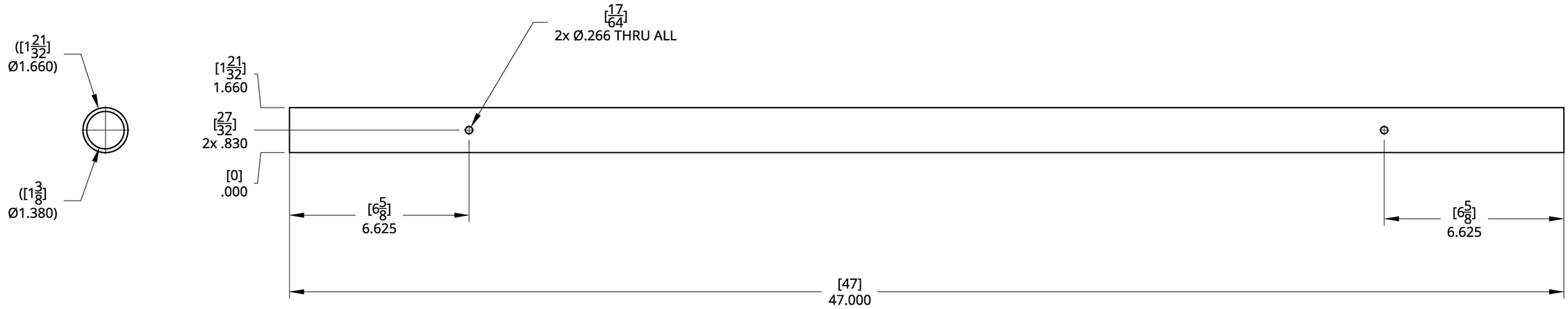






UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR = ± 5° .XXX = ±0.250	FIELD	NAME	DATE
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL		TITLE
BREAK ALL SHARP EDGES AND REMOVE BURRS	1/2" PLYWOOD		TOWER UPRIGHT SUPPORT PLATE
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ***FIRST***®. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ***FIRST***® IS PROHIBITED.	SIZE C	DWG NO. TE-26508	REV.
	SCALE 1:1	SHEET 1 of 1	

FIRST ROBOTICS COMPETITION



UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR = ± 5° .XXX = ±0.250	FIELD	NAME	DATE
	DRAWN	AV	10/20/2025
DO NOT SCALE DRAWING	MATERIAL: 1-1/4" SCHEDULE 40 PIPE - ALUMINUM, STEEL, OR IRON		
BREAK ALL SHARP EDGES AND REMOVE BURRS			

FIRST ROBOTICS COMPETITION

TITLE: TOWER RUNG

SIZE	DWG NO.	REV.
C	TE-26509	

SCALE	SHEET
1:3	1 of 1