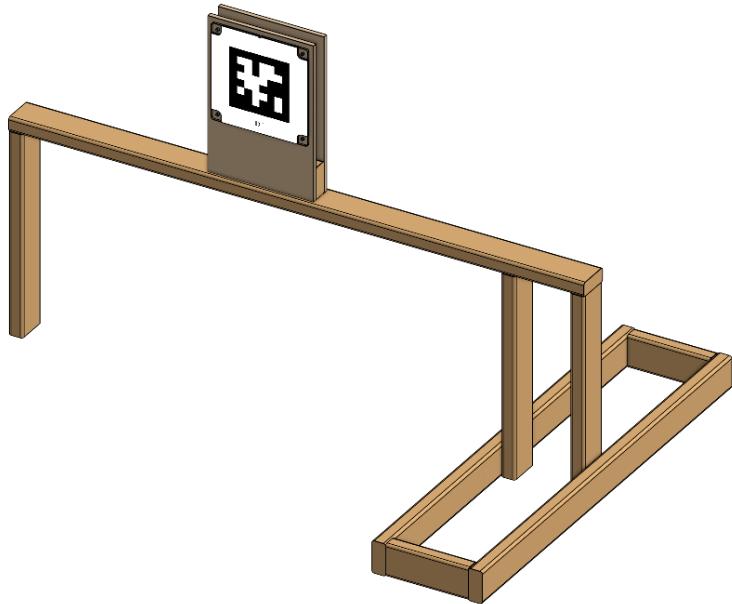


TE-26200 TRENCH



Description

This is a Trench, designed so that teams can practice driving and auto routines. 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 available 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.



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 – 3 Pieces
- 4' x 4' x 1/2" Thick Plywood – 1 Sheet

Hardware/Other:

- #8 Wood Screws x 2.5" long – Approximately 30 Pieces
- #8 Wood Screws x 1.5" long – Approximately 8 Pieces

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, $\frac{1}{2}$ ” 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 $1\frac{1}{2}$ ” x $3\frac{1}{2}$ ”.

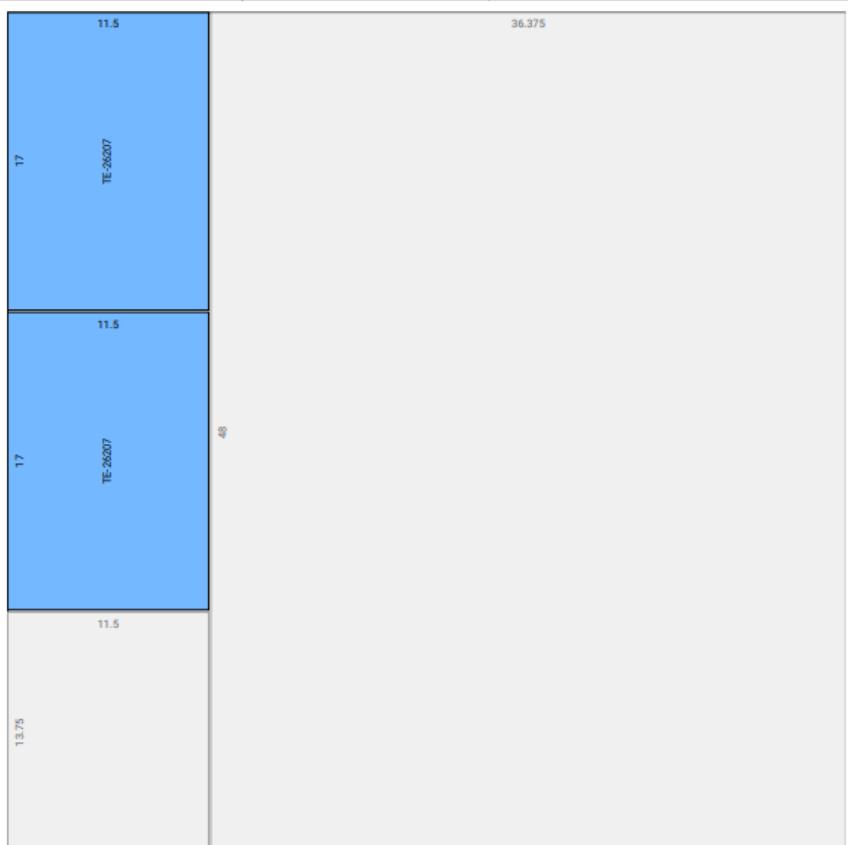
Example Cut List (All units are Inches):

2x4 Lumber (can be combined with all other Team Elements to reduce number of purchased pieces):

| Layout ID A | Repetition 1x | Stock length 96 | <table border="1"> <thead> <tr> <th>Part length / Label</th><th>Qty</th></tr> </thead> <tbody> <tr> <td>47 / TE-26202</td><td>2</td></tr> </tbody> </table> | Part length / Label | Qty | 47 / TE-26202 | 2 | <table border="1"> <tr> <td colspan="2">Cuts in layout</td></tr> <tr> <td colspan="2">The number of cuts 2</td></tr> <tr> <td colspan="2">Waste</td></tr> <tr> <td colspan="2">Material remnant 1.75</td></tr> <tr> <td>Cut</td><td>0.25</td></tr> </table> | Cuts in layout | | The number of cuts 2 | | Waste | | Material remnant 1.75 | | Cut | 0.25 | | | | |
|------------------------|------------------|--------------------|--|---------------------|-----|-------------------|---|---|----------------|--------------|----------------------|---|----------------|--|-----------------------|--|-------|------|------------------------|--|-----|-------|
| Part length / Label | Qty | | | | | | | | | | | | | | | | | | | | | |
| 47 / TE-26202 | 2 | | | | | | | | | | | | | | | | | | | | | |
| Cuts in layout | | | | | | | | | | | | | | | | | | | | | | |
| The number of cuts 2 | | | | | | | | | | | | | | | | | | | | | | |
| Waste | | | | | | | | | | | | | | | | | | | | | | |
| Material remnant 1.75 | | | | | | | | | | | | | | | | | | | | | | |
| Cut | 0.25 | | | | | | | | | | | | | | | | | | | | | |
| 47 TE-26202 | | | 47 TE-26202 | | | | | | | | | | | | | | | | | | | |
| Layout ID B | Repetition 1x | Stock length 96 | <table border="1"> <thead> <tr> <th>Part length / Label</th><th>Qty</th></tr> </thead> <tbody> <tr> <td>62.594 / TE-26205</td><td>1</td></tr> <tr> <td>22.125 / TE-26204</td><td>1</td></tr> <tr> <td>9 / TE-26203</td><td>1</td></tr> </tbody> </table> | Part length / Label | Qty | 62.594 / TE-26205 | 1 | 22.125 / TE-26204 | 1 | 9 / TE-26203 | 1 | <table border="1"> <tr> <td colspan="2">Cuts in layout</td></tr> <tr> <td colspan="2">The number of cuts 3</td></tr> <tr> <td colspan="2">Waste</td></tr> <tr> <td colspan="2">Material remnant 1.906</td></tr> <tr> <td>Cut</td><td>0.375</td></tr> </table> | Cuts in layout | | The number of cuts 3 | | Waste | | Material remnant 1.906 | | Cut | 0.375 |
| Part length / Label | Qty | | | | | | | | | | | | | | | | | | | | | |
| 62.594 / TE-26205 | 1 | | | | | | | | | | | | | | | | | | | | | |
| 22.125 / TE-26204 | 1 | | | | | | | | | | | | | | | | | | | | | |
| 9 / TE-26203 | 1 | | | | | | | | | | | | | | | | | | | | | |
| Cuts in layout | | | | | | | | | | | | | | | | | | | | | | |
| The number of cuts 3 | | | | | | | | | | | | | | | | | | | | | | |
| Waste | | | | | | | | | | | | | | | | | | | | | | |
| Material remnant 1.906 | | | | | | | | | | | | | | | | | | | | | | |
| Cut | 0.375 | | | | | | | | | | | | | | | | | | | | | |
| 62.594 TE-26205 | | | 22.125 TE-26204 | 9 TE-26203 | | | | | | | | | | | | | | | | | | |
| Layout ID C | Repetition 1x | Stock length 96 | <table border="1"> <thead> <tr> <th>Part length / Label</th><th>Qty</th></tr> </thead> <tbody> <tr> <td>22.125 / TE-26204</td><td>2</td></tr> <tr> <td>11.5 / TE-26206</td><td>1</td></tr> <tr> <td>9 / TE-26203</td><td>1</td></tr> </tbody> </table> | Part length / Label | Qty | 22.125 / TE-26204 | 2 | 11.5 / TE-26206 | 1 | 9 / TE-26203 | 1 | <table border="1"> <tr> <td colspan="2">Cuts in layout</td></tr> <tr> <td colspan="2">The number of cuts 4</td></tr> <tr> <td colspan="2">Waste</td></tr> <tr> <td colspan="2">Material remnant 30.75</td></tr> <tr> <td>Cut</td><td>0.5</td></tr> </table> | Cuts in layout | | The number of cuts 4 | | Waste | | Material remnant 30.75 | | Cut | 0.5 |
| Part length / Label | Qty | | | | | | | | | | | | | | | | | | | | | |
| 22.125 / TE-26204 | 2 | | | | | | | | | | | | | | | | | | | | | |
| 11.5 / TE-26206 | 1 | | | | | | | | | | | | | | | | | | | | | |
| 9 / TE-26203 | 1 | | | | | | | | | | | | | | | | | | | | | |
| Cuts in layout | | | | | | | | | | | | | | | | | | | | | | |
| The number of cuts 4 | | | | | | | | | | | | | | | | | | | | | | |
| Waste | | | | | | | | | | | | | | | | | | | | | | |
| Material remnant 30.75 | | | | | | | | | | | | | | | | | | | | | | |
| Cut | 0.5 | | | | | | | | | | | | | | | | | | | | | |
| 22.125 TE-26204 | | 22.125 TE-26204 | 11.5 TE-26206 | 9 TE-26203 | | | | | | | | | | | | | | | | | | |

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

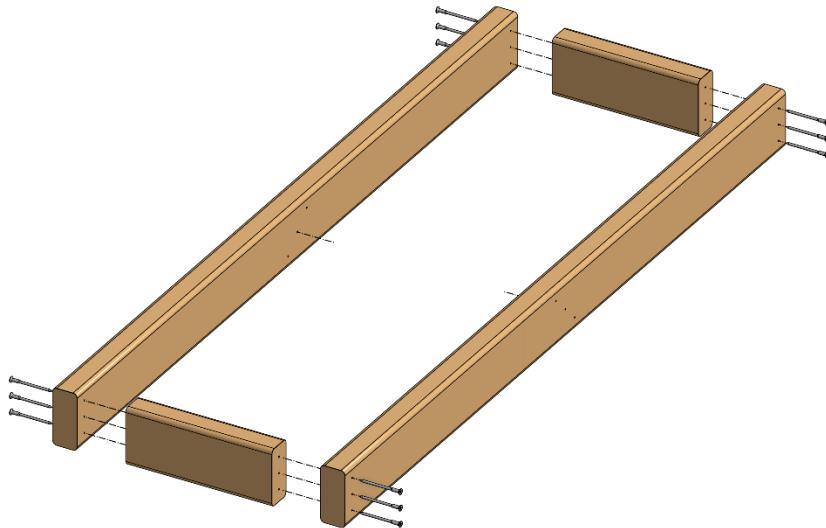
| Layout ID | Repetition | Stock dimensions | Panel | Qty |
|-----------|------------|------------------|----------------------|-----|
| A | 1x | 48 x 48 | 11.5 x 17 / TE-26207 | 2 |
| | | | Cuts in layout | |
| | | | The length of cuts | 71 |
| | | | The number of cuts | 3 |



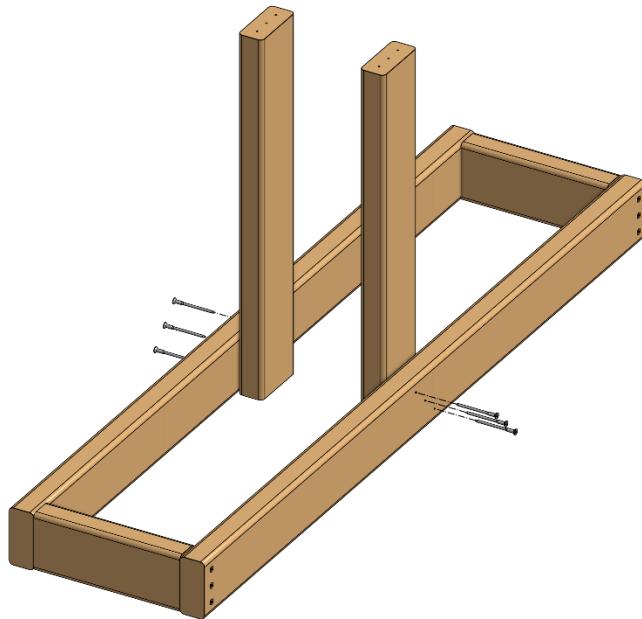
The diagram shows a 48x48 stock panel with three 11.5x17 panels stacked vertically. The top panel is labeled 'TE-26207' and the middle panel is labeled 'TE-26207'. The bottom panel is labeled '11.5' and '13.75'. The stock dimensions are 48 x 48, and the panel dimensions are 11.5 x 17.

Assembly Instructions

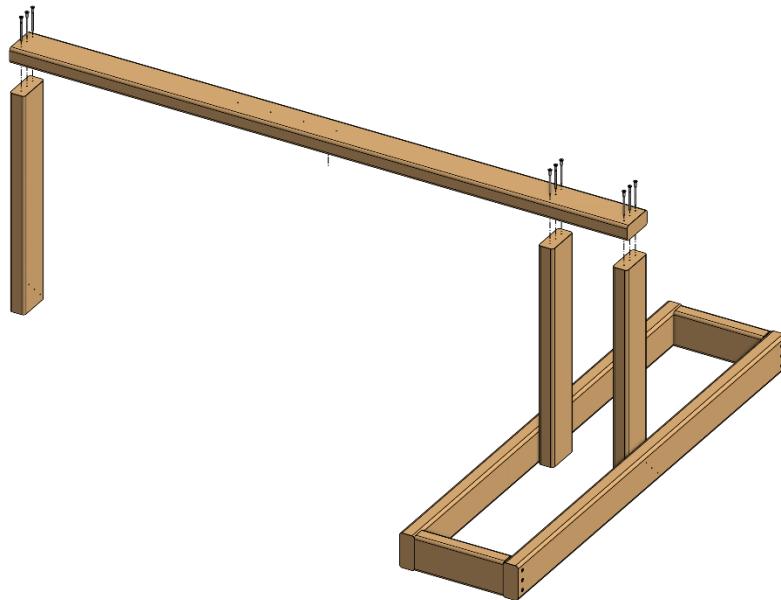
1. Fasten the base together with two TE-26202 (Trench Base Depth Beam) and two TE-26203 (Trench Base Width Beam). Attach all together using 2-1/2in screws.



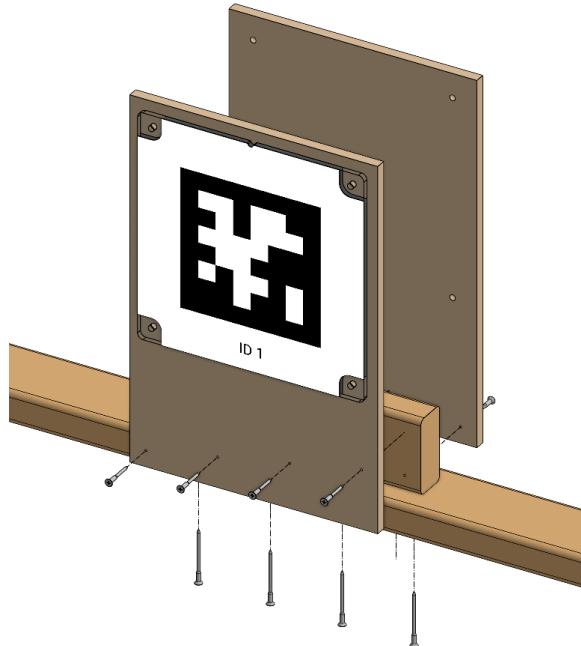
2. Attached two TE-26204 (Trench Height Beam) centered along the inside face of the beams using 2-1/2in screws.

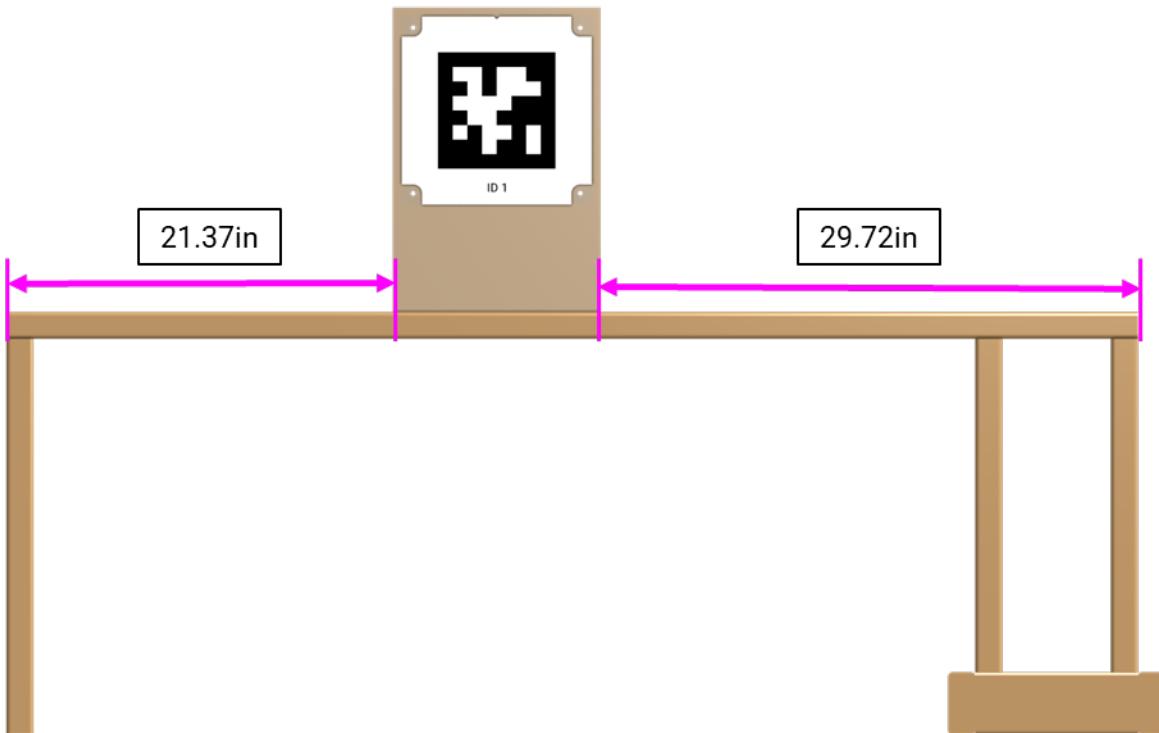


3. Attach TE-26205 (Trench Arm Beam) on top of the height beams along with the 3rd TE-26204 (Trench Height Beam) at the end of the arm using 2-1/2in screws



4. Attach the TE-26206 (Trench April Tag Mount Beam) onto TE-26205 (Trench Arm Beam) as dimensioned below and attach both TE-26207 (Trench April Tag Panel) to each of TE-26206 using 1-1/2in screws.

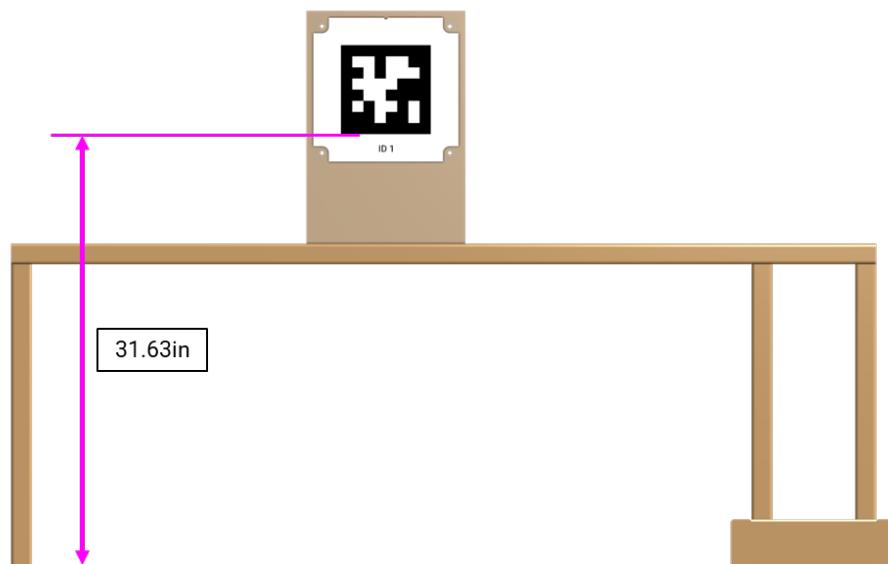
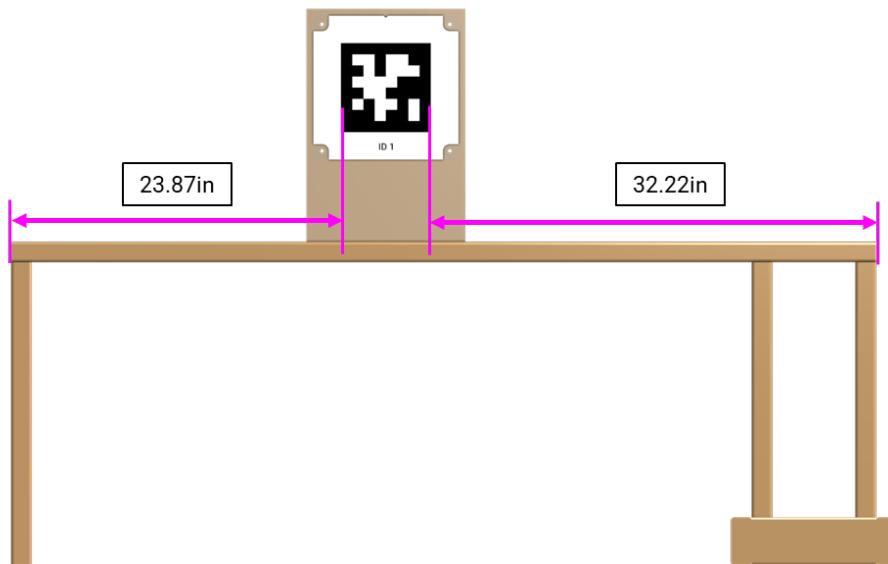




AprilTag Placement

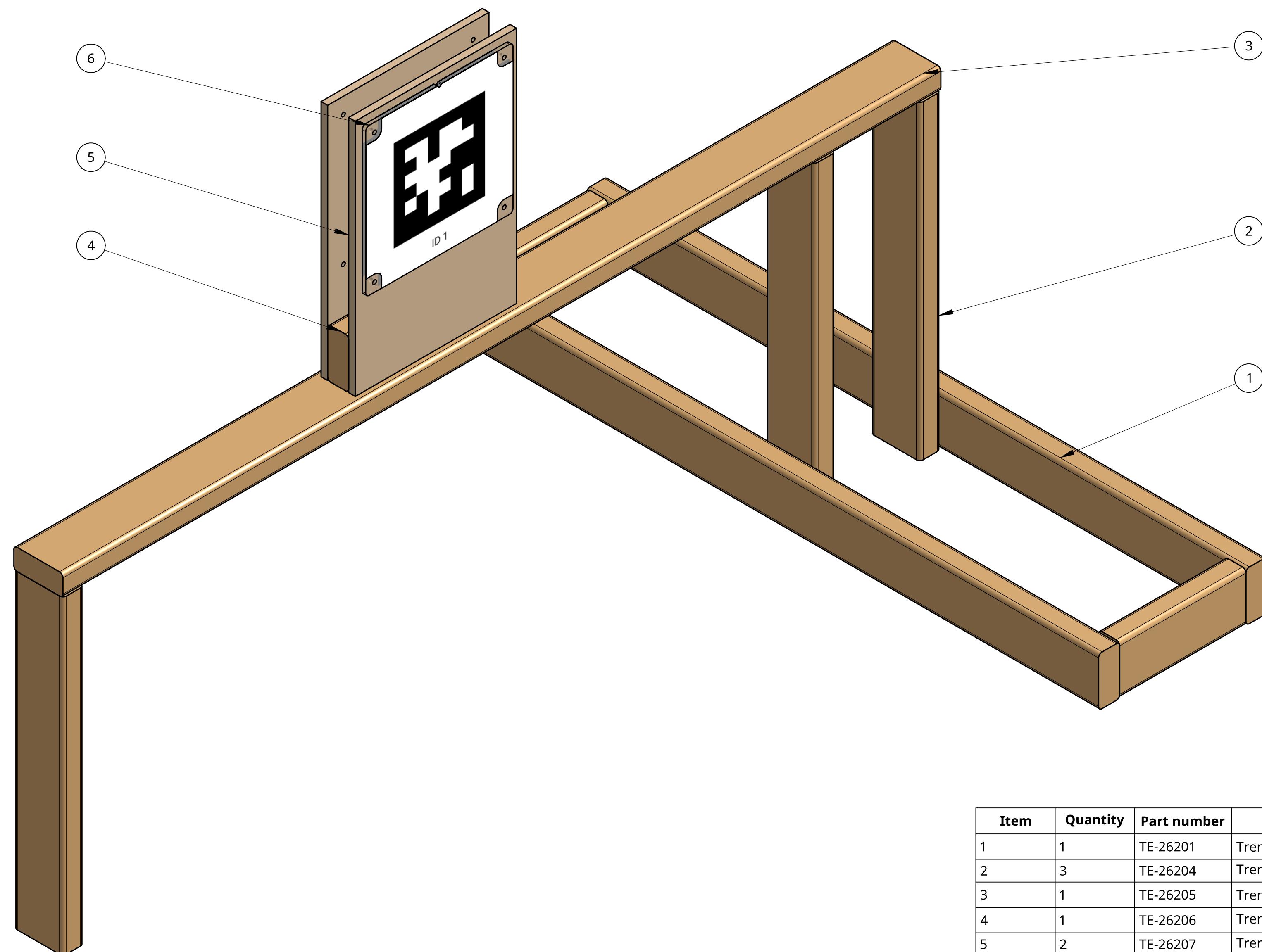
The image below illustrates where the tag should be located on the team version of the Trench. The dimension provided is the height from the carpet to the bottom edge of the black square on the tag, and ends of the arm to the left and right edges of the black square on the tag.

The tag shown may not match the tag required for this field element. The tags needed may be IDs 1, 6, 7, 12, 17, 22, 23 or 28 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](#).



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| Item | Quantity | Part number | Description |
|------|----------|---------------|-----------------------------|
| 1 | 1 | TE-26201 | Trench Base |
| 2 | 3 | TE-26204 | Trench Height Beam |
| 3 | 1 | TE-26205 | Trench Arm Beam |
| 4 | 1 | TE-26206 | Trench April Tag Mount Beam |
| 5 | 2 | TE-26207 | Trench April Tag Panel |
| 6 | 1 | FE-00083-ID1 | AprilTag, ID 1 |
| 7 | 1 | FE-00083-ID12 | AprilTag, ID 12 |

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|---|---------|------------|-------|---|--------|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES ANGULAR = $\pm 1^\circ$ FRACTIONAL = $\pm 1/16$ | TEAM | NAME | DATE |  | |
| DRAWN | AV | 10/20/2025 | TITLE | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | MATERIAL | |
| 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 | DWG NO. | TE-26200 | | | REV. |
| SCALE | 1:4 | | | | SHEET |
| | | | | | 1 of 1 |

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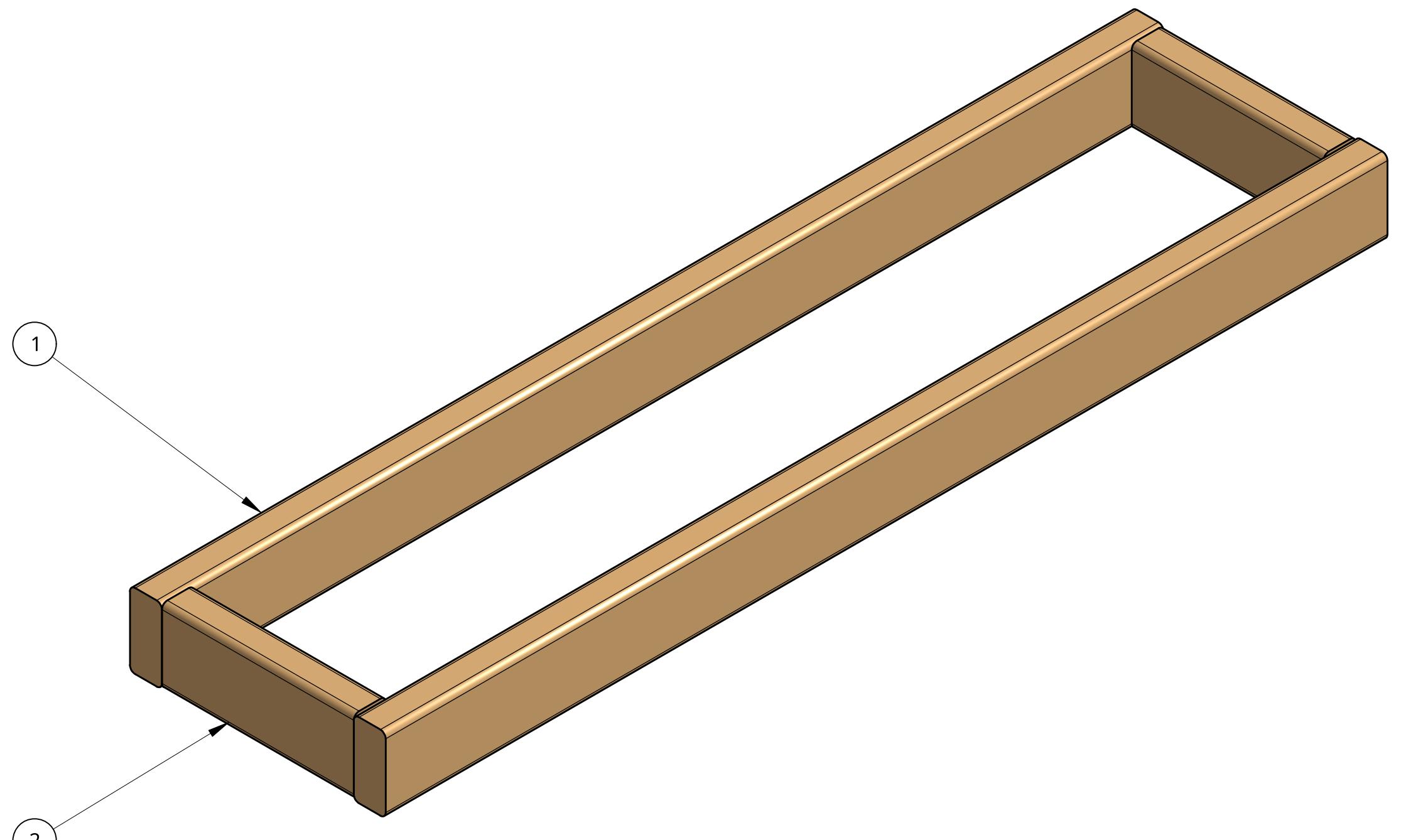
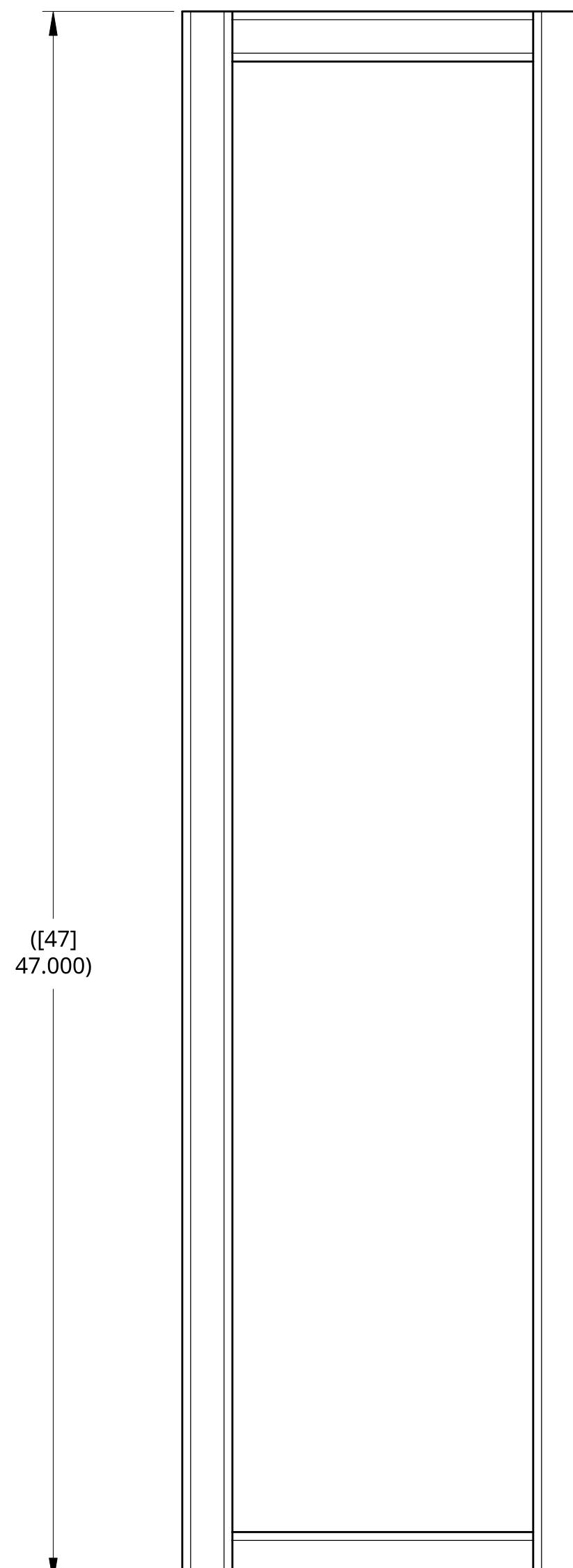
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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
ANGULAR = $\pm 1^\circ$
FRACTIONAL = $\pm 1/16$
DO NOT SCALE DRAWING
BREAK ALL SHARP EDGES AND
REMOVE BURRS
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN
THIS DRAWING IS THE SOLE
PROPERTY OF FIRST®. ANY
REPRODUCTION IN PART OR AS A
WHOLE WITHOUT THE WRITTEN
PERMISSION OF FIRST® IS
PROHIBITED.

| TEAM | NAME | DATE | FIRST ROBOTICS COMPETITION |
|----------|---------|------------|----------------------------------|
| DRAWN | AV | 10/20/2025 | |
| MATERIAL | | | TITLE TRENCH BASE |
| SIZE | DWG NO. | REV. | |
| C | | | TE-26201 |
| SCALE | 1:4 | | SHEET 1 of 1 |

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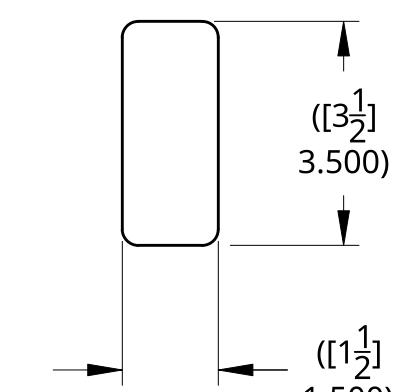
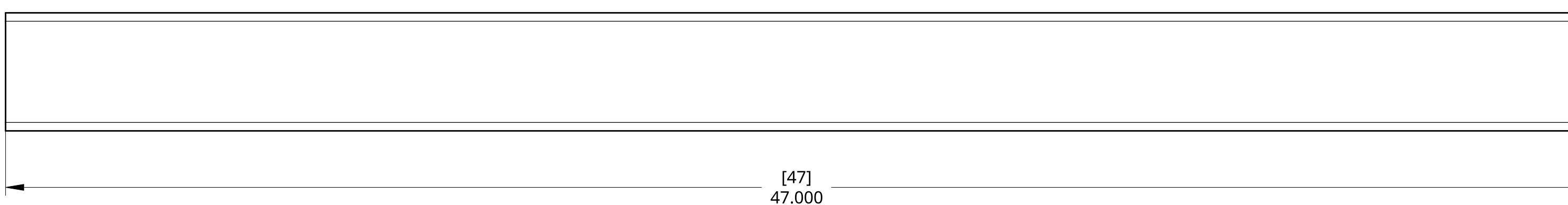
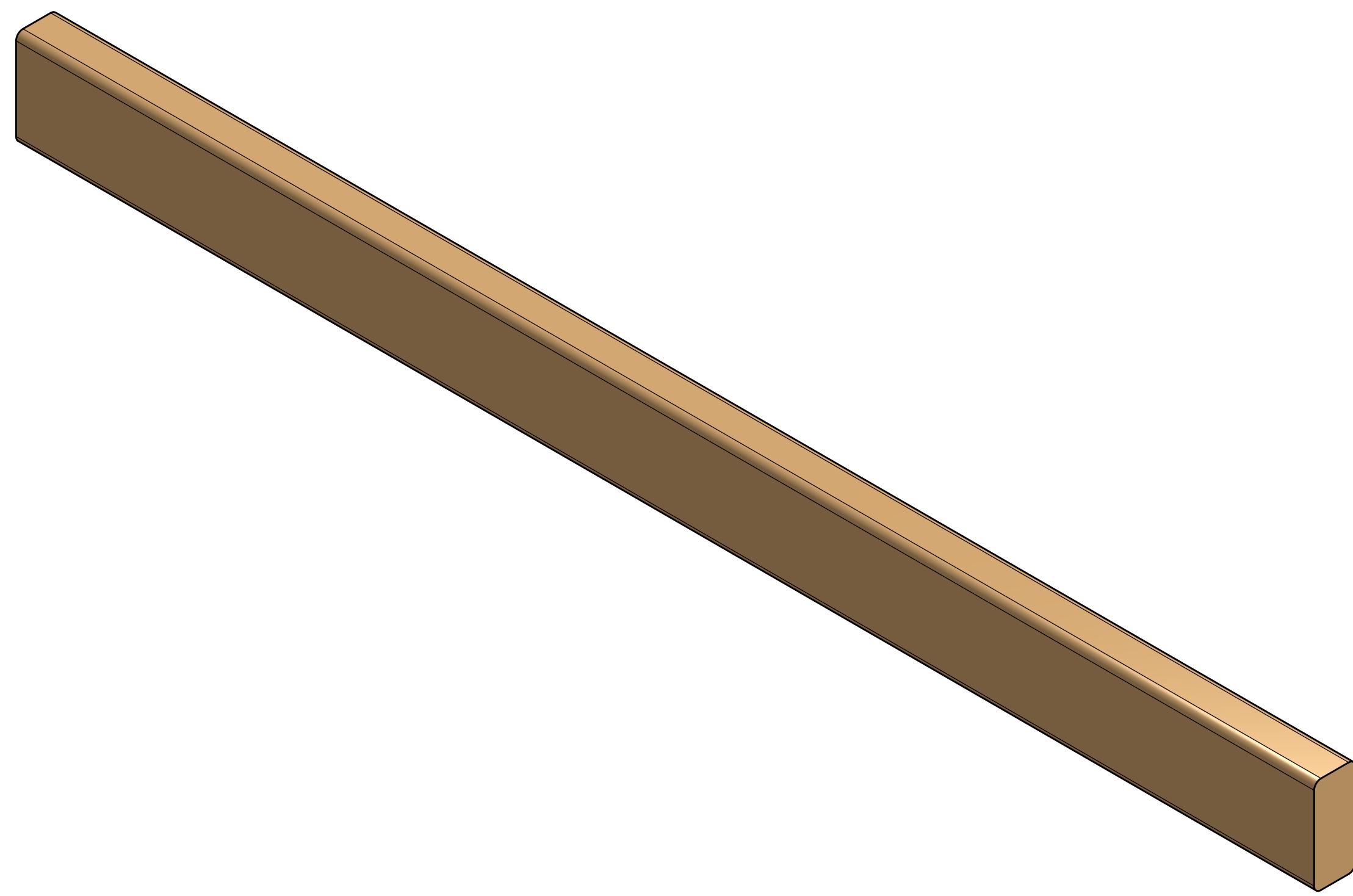
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES ANGULAR = $\pm 1^\circ$ FRACTIONAL = $\pm 1/16$ | TEAM | NAME | DATE |  FIRST ROBOTICS COMPETITION |
| | DRAWN | AV | 10/21/2025 | |
| DO NOT SCALE DRAWING | MATERIAL 2X4 LUMBER | TITLE TRENCH BASE DEPTH BEAM | SIZE C DWG NO. TE-26202 REV. | SCALE 1:3 SHEET 1 of 1 |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
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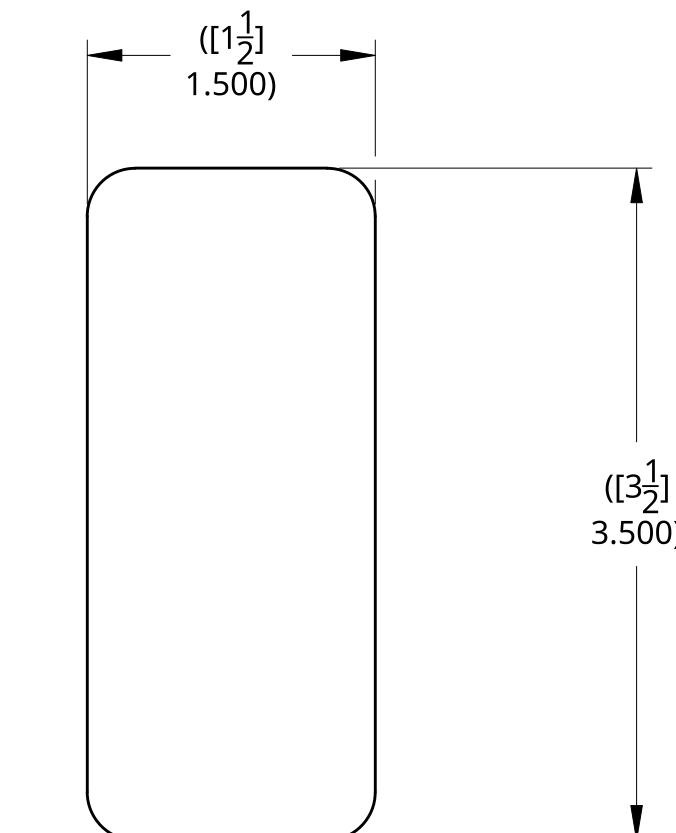
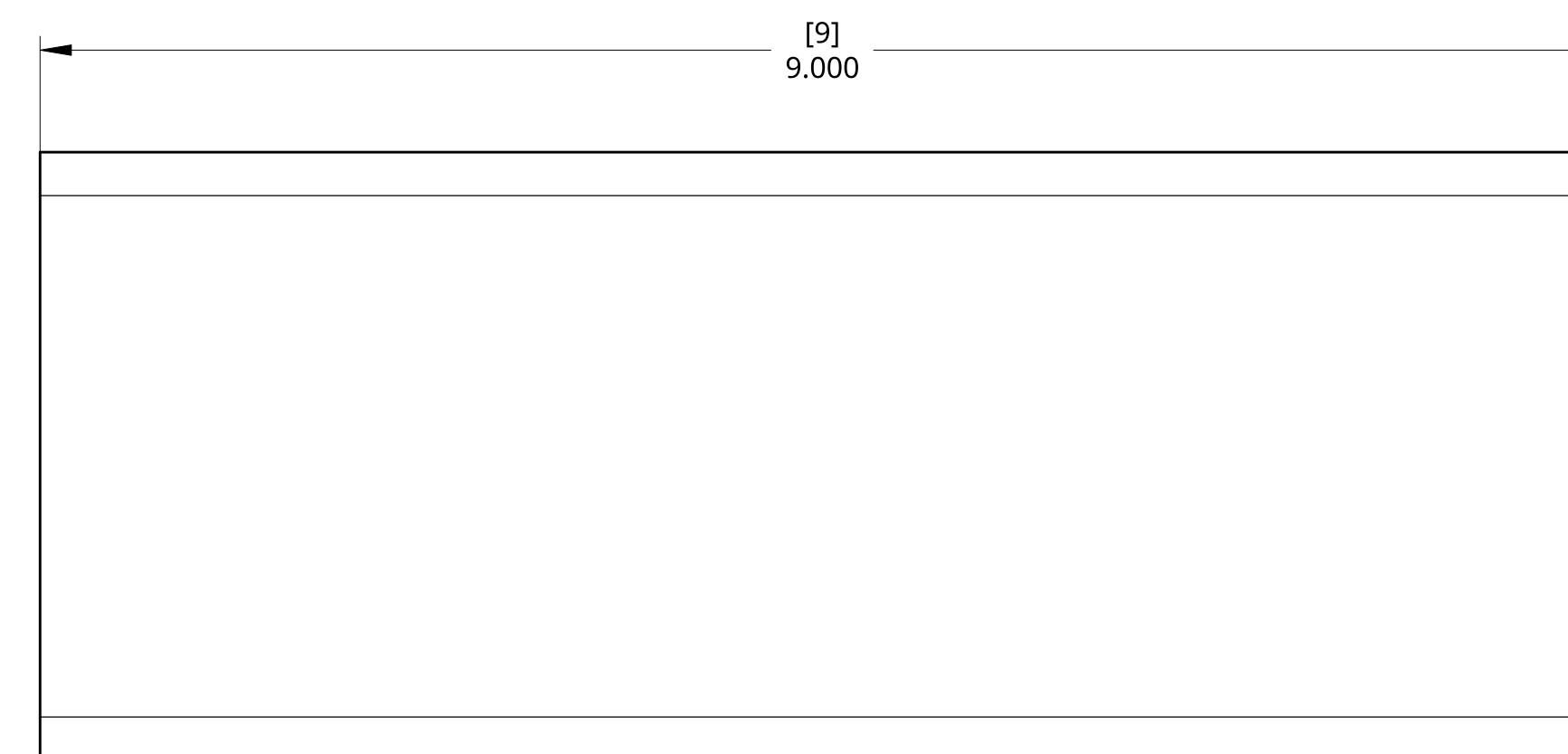
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES ANGULAR = $\pm 1^\circ$ FRACTIONAL = $\pm 1/16$ | TEAM | NAME | DATE |  FIRST ROBOTICS COMPETITION |
| | DRAWN | AV | 10/21/2025 | |
| DO NOT SCALE DRAWING | MATERIAL 2X4 LUMBER | TITLE TRENCH BASE WIDTH BEAM | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| 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-26203 | REV. | |
| SCALE 1:1 | SHEET | 1 of 1 | | |

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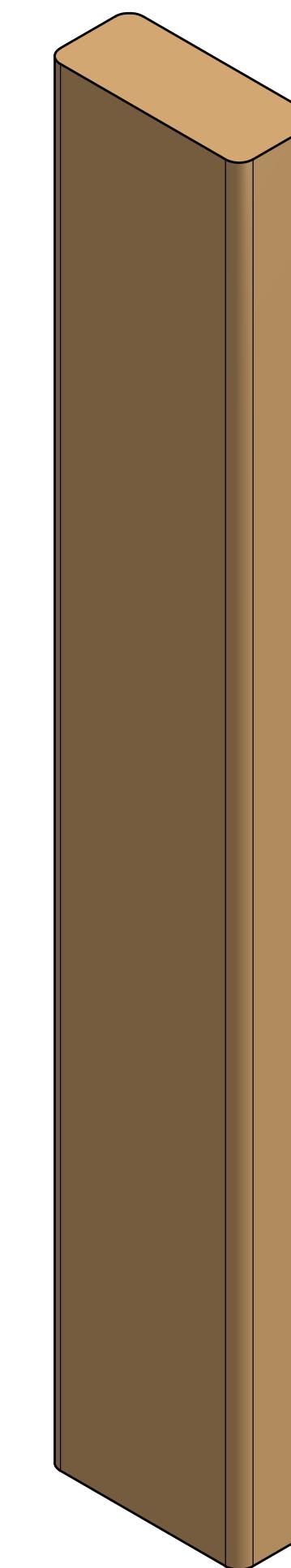
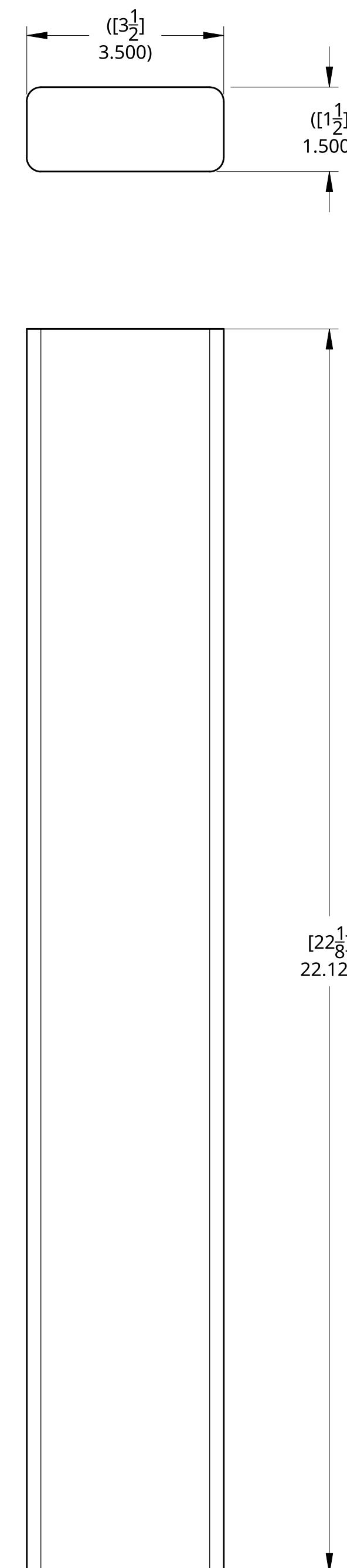
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES ANGULAR = $\pm 1^\circ$ FRACTIONAL = $\pm 1/16$ | TEAM | NAME | DATE |  FIRST ROBOTICS COMPETITION |
| | DRAWN | AV | 10/20/2025 | |
| DO NOT SCALE DRAWING | | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| 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. | MATERIAL | | | |
| | 2X4 LUMBER | | | |
| | | TITLE | | |
| | | TRENCH HEIGHT BEAM | | |
| | | | | |
| | SIZE | DWG NO. | | |
| | C | | TE-26204 | REV. |
| | SCALE | | 1:2 | SHEET |
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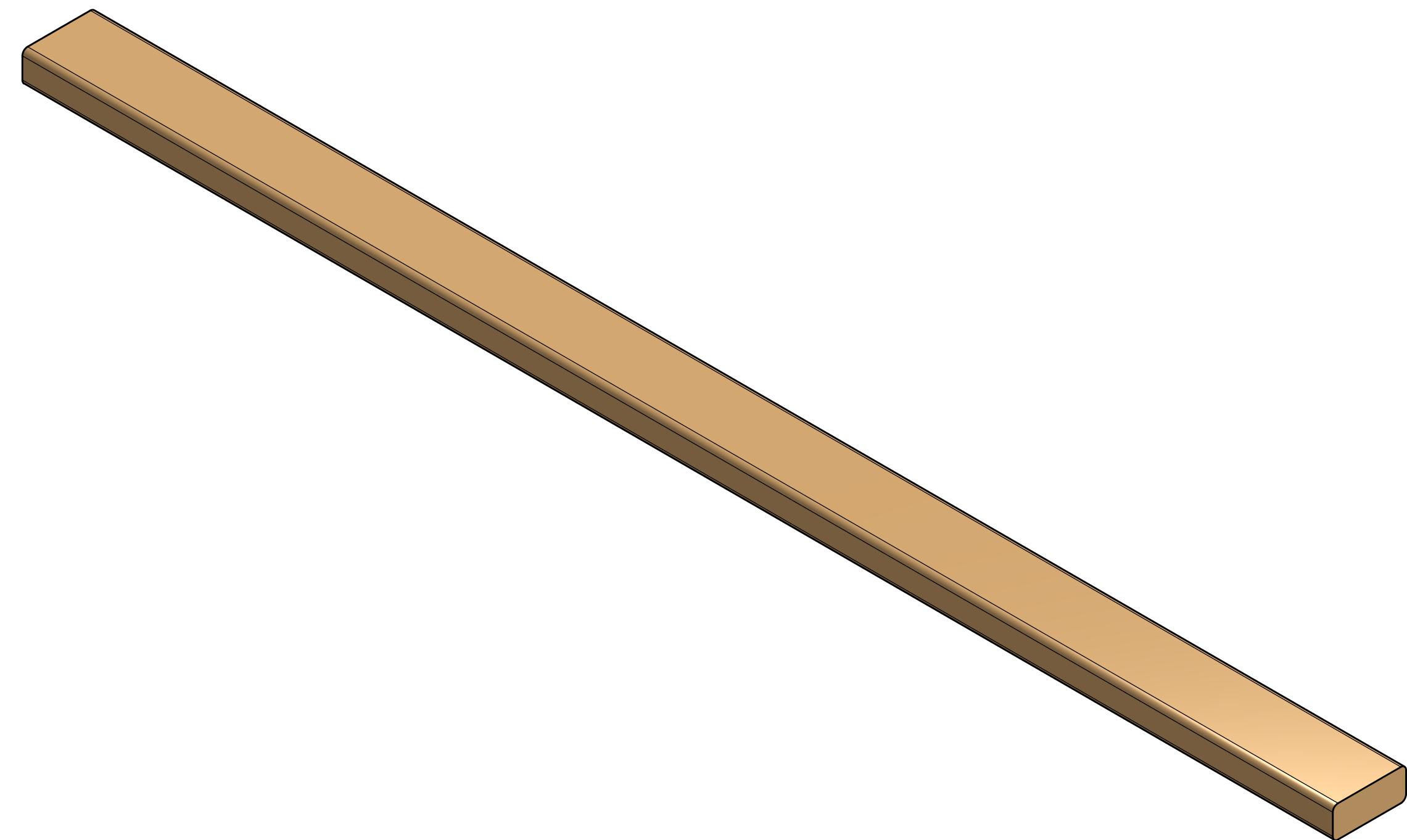
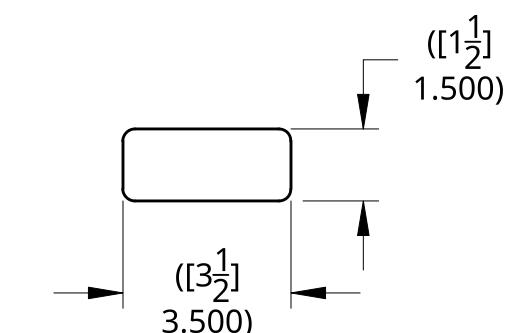
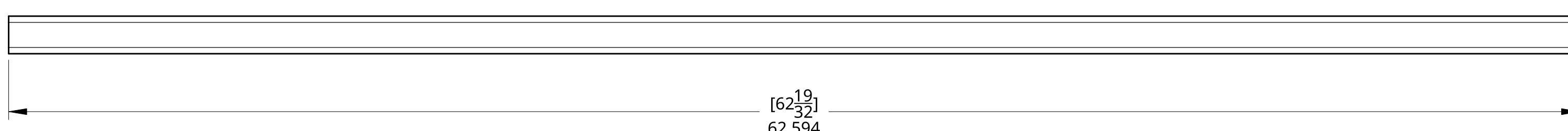
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES ANGULAR = $\pm 1^\circ$ FRACTIONAL = $\pm 1/16$ | TEAM | NAME | DATE |  FIRST ROBOTICS COMPETITION |
| | DRAWN | AV | 10/20/2025 | |
| DO NOT SCALE DRAWING | MATERIAL | TITLE | 2X4 LUMBER | TRENCH ARM BEAM |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| 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 | DWG NO. | REV. | TE-26205 |
| SCALE | 1:4 | SHEET | 1 of 1 | |

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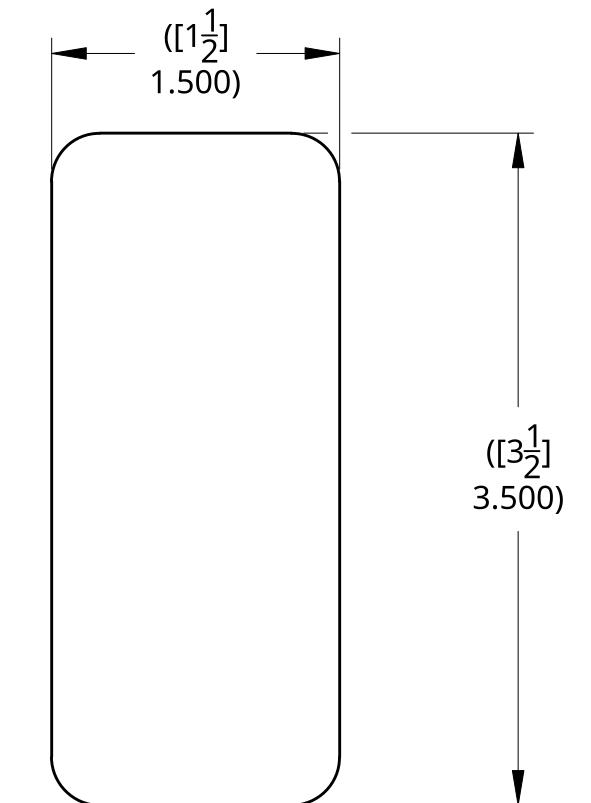
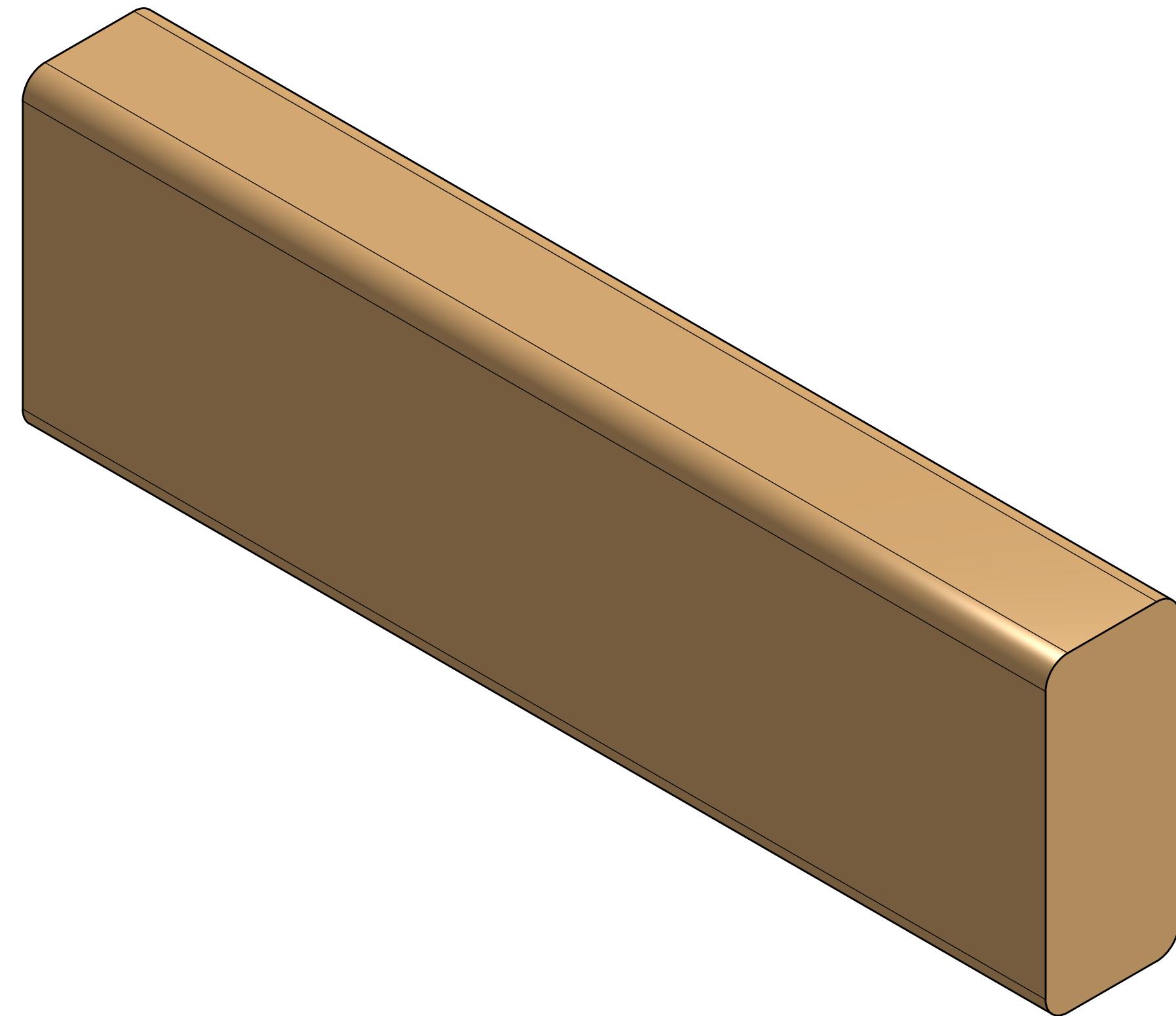
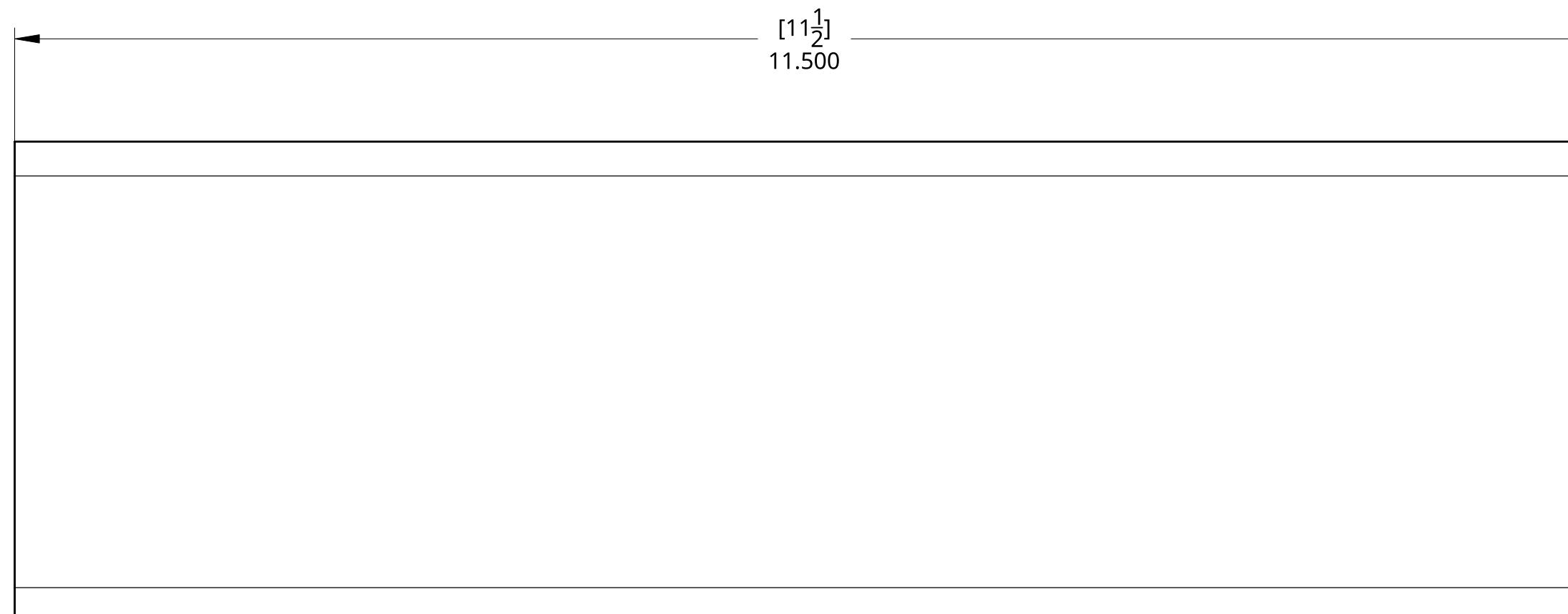
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±1.00 ANGULAR ± 5° .XXX = ±0.250 | FIELD | NAME | DATE |  FIRST ROBOTICS COMPETITION |
| | DRAWN | AV | 10/20/2025 | |
| DO NOT SCALE DRAWING | MATERIAL 2X4 LUMBER | TITLE TRENCH APRIL TAG MOUNT BEAM | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| 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-26206 | REV. | |
| SCALE 1:1 | SHEET | 1 of 1 | | |

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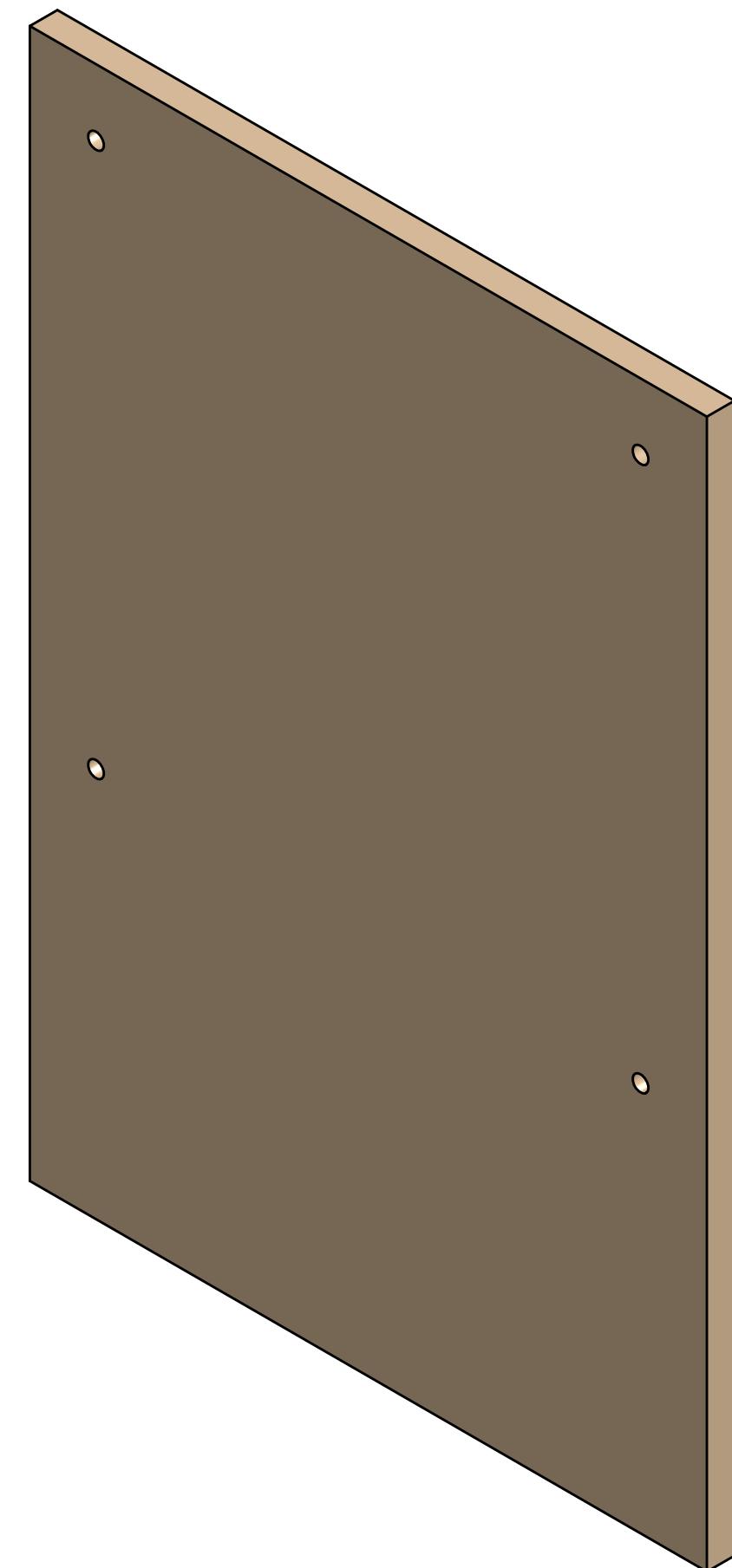
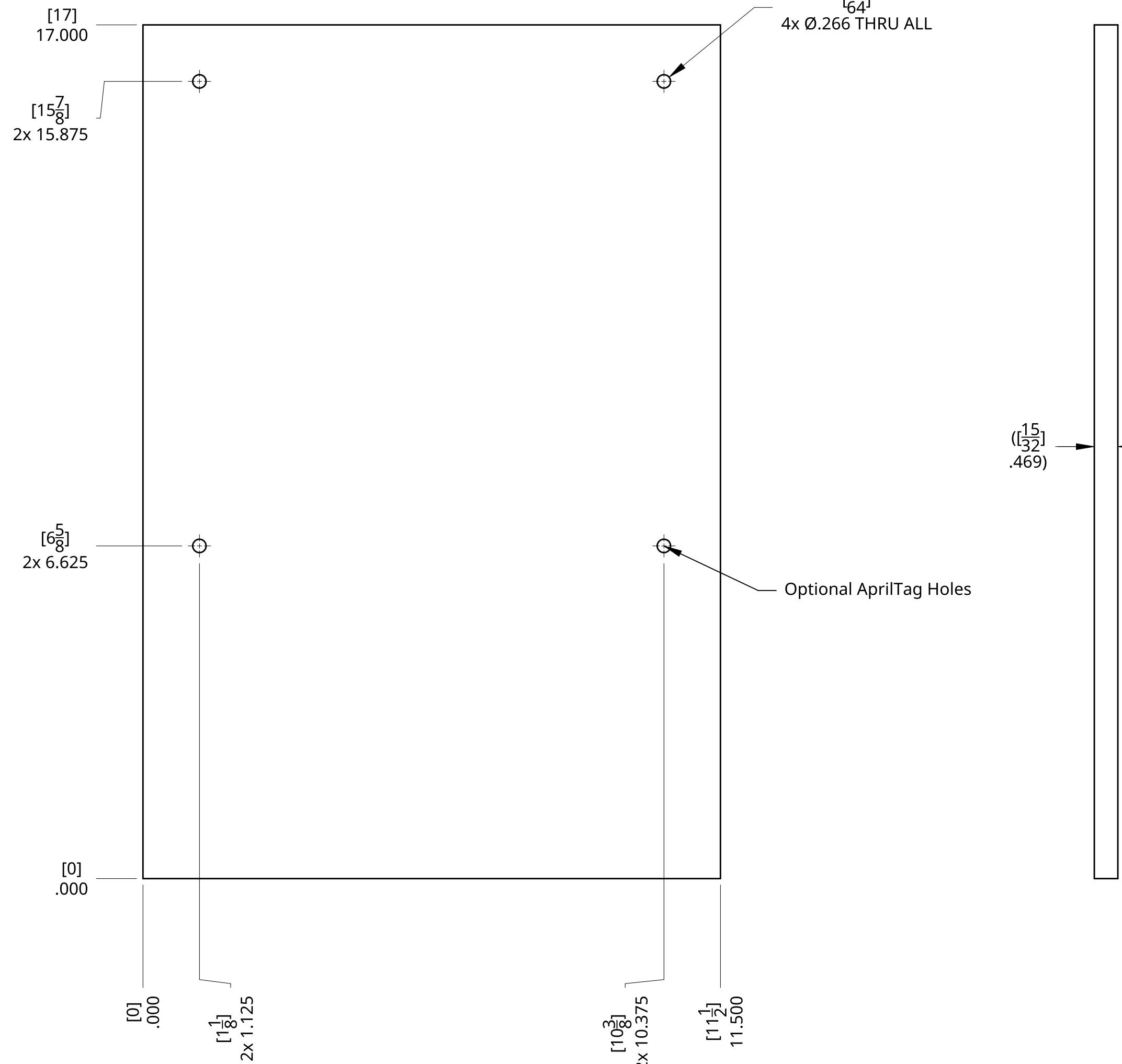
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES ANGULAR = $\pm 1^\circ$ FRACTIONAL = $\pm 1/16$ | | TEAM | NAME | DATE | FIRST ROBOTICS COMPETITION | |
| DRAWN | AV | 10/20/2025 | | | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | | | TITLE |
| 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. | | | | | | 1/2" PLYWOOD |
| SIZE | DWG NO. | REV. | C | TE-26207 | | |
| SCALE | 1:2 | SHEET | 1 of 1 | | | |