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Note:

- If you are planning to disassemble frequently, you may want to consider using bolted connections instead of screws. It is helpful to consider ceiling height and ability to move assembly through doors before fastening sub-assemblies together.
- Bolts spec'd as partially threaded can be replaced with fully threaded bolt of the same length.
- TE-22190 can be replaced with TE-22190-AMActive (if pairing with AndyMark's Motorized Agitator AM-4674) or TE-22190-AMPassive (if pairing with AndyMark's Passive Agitator AM-4673).

Hardware Needed:
 #8 x 2" Long Screw - Qty 48
 #8 x 2.5" Long Screw - Qty 64
 Optional, but recommended: Safety Edging such as pool noodles or baby proofing

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22110	HUB - Complex Build - Base Assembly	1
2	TE-22120	HUB - Complex Build - Lower Exit Assembly	4
3	TE-22130	HUB - Complex Build - Fender Face Assembly	4
4	TE-22140	HUB - Complex Build - Connection Box Assembly	1
5	TE-22150	HUB - Complex Build - Lower Hub Ring Assembly	4
6	TE-22160	HUB - Complex Build - Upper Exit Assembly	4
7	TE-22170	HUB - Complex Build - Leg Assembly	4
8	TE-22180	HUB - Complex Build - Lower Hub Ring to Leg Assembly	4
9	TE-22190	Hub - Complex Build - Upper Hub Assembly	1
10	TE-22200	Hub - Complex Build - Upper Hub Vision Assembly	4
11	washer_flat_.25	Flat Washer for 1/4" Screw	52
12	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	32
13	hex_.25_20_2	Steel Hex Head Bolt 1/4"-20 x 2" long, fully threaded	4
14	hex_.25_20_3.5_partial	Steel Hex Head Bolt, 1/4"-20 x 3.5", partially threaded	8
15	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 1" long, fully threaded	12
16	hex.25_20_5.5	Steel Hex Head Bolt 1/4"-20 x 5.5", partially threaded	8

UNLESS OTHERWISE SPECIFIED:

TEAM _____

NAME _____

DATE _____

DRAWN _____

KAMC

1/4/2022

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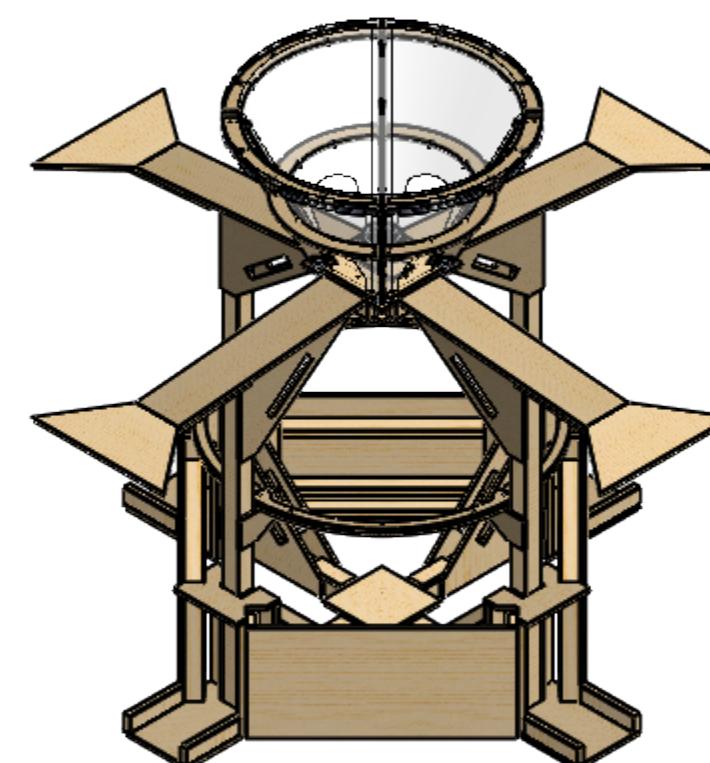
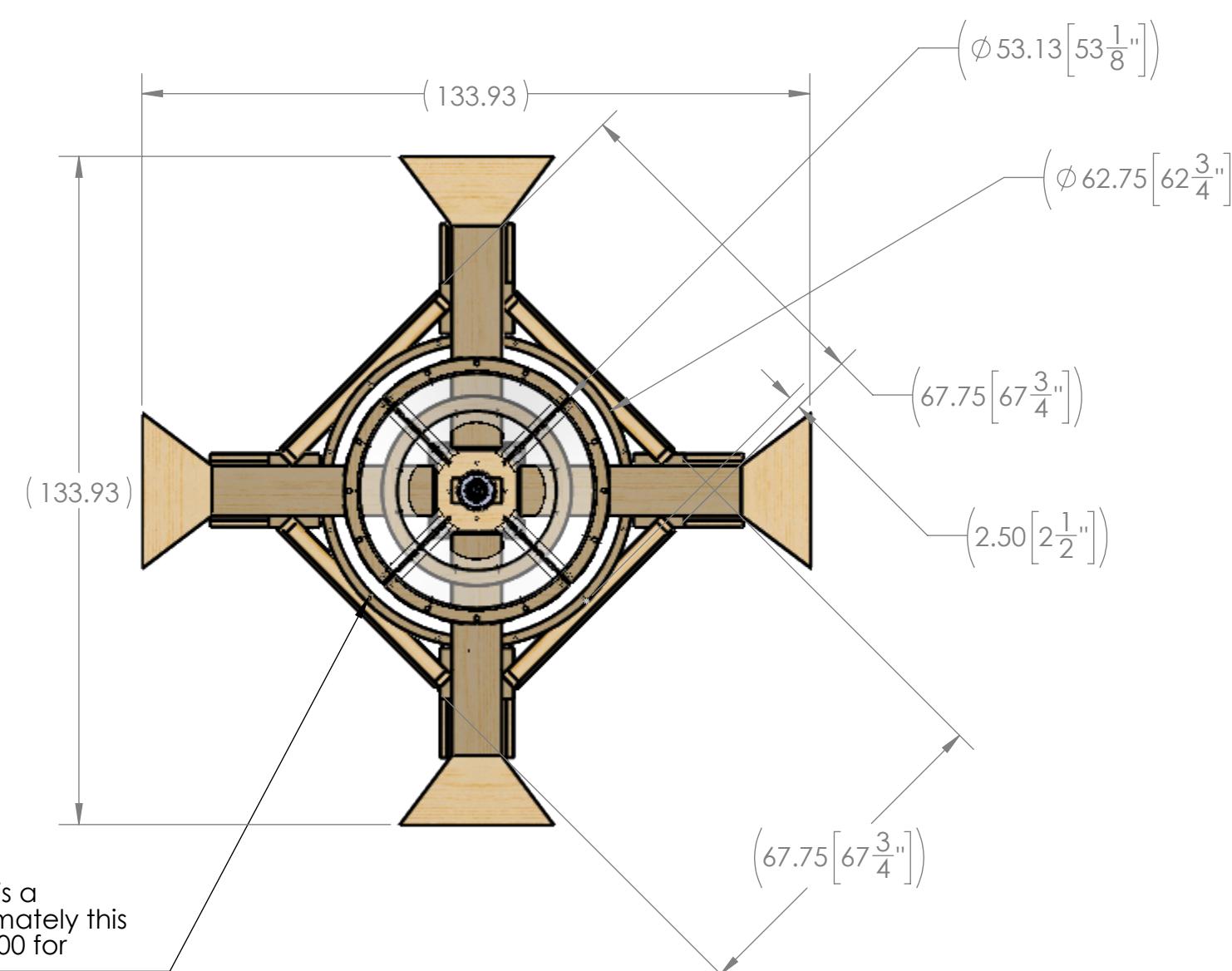
DO NOT SCALE DRAWING

**FIRST
ROBOTICS
COMPETITION**
TITLE:
HUB - Complex Build - Full Hub Assembly
SIZE DWG. NO. REV

C **TE-22100**
SCALE: 1:12 SHEET 1 OF 7

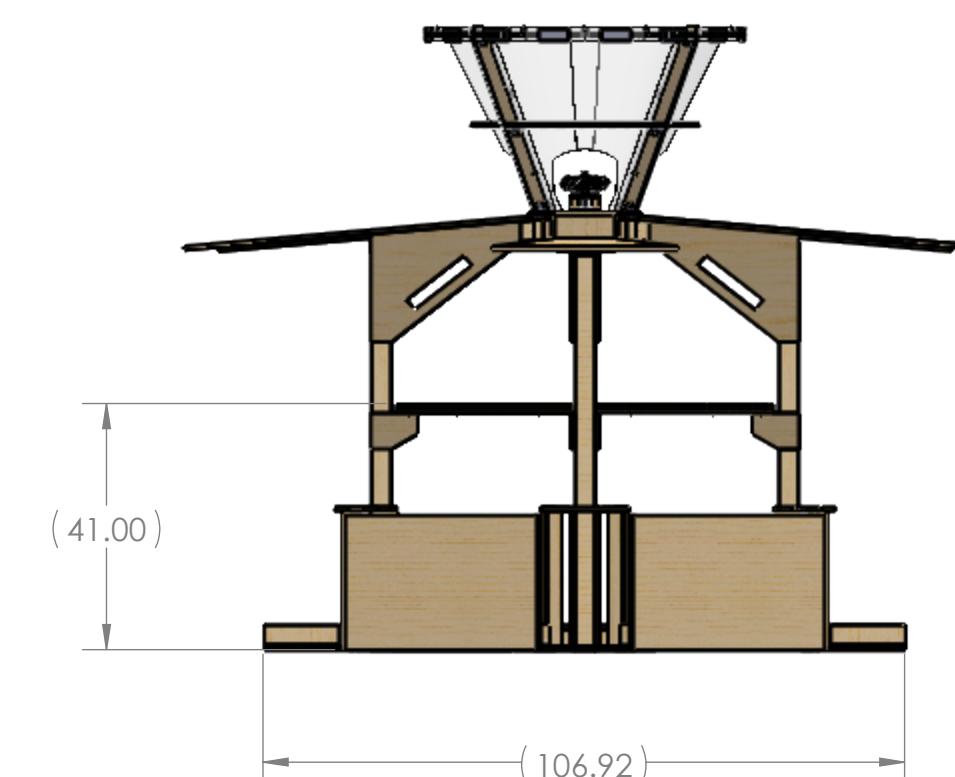
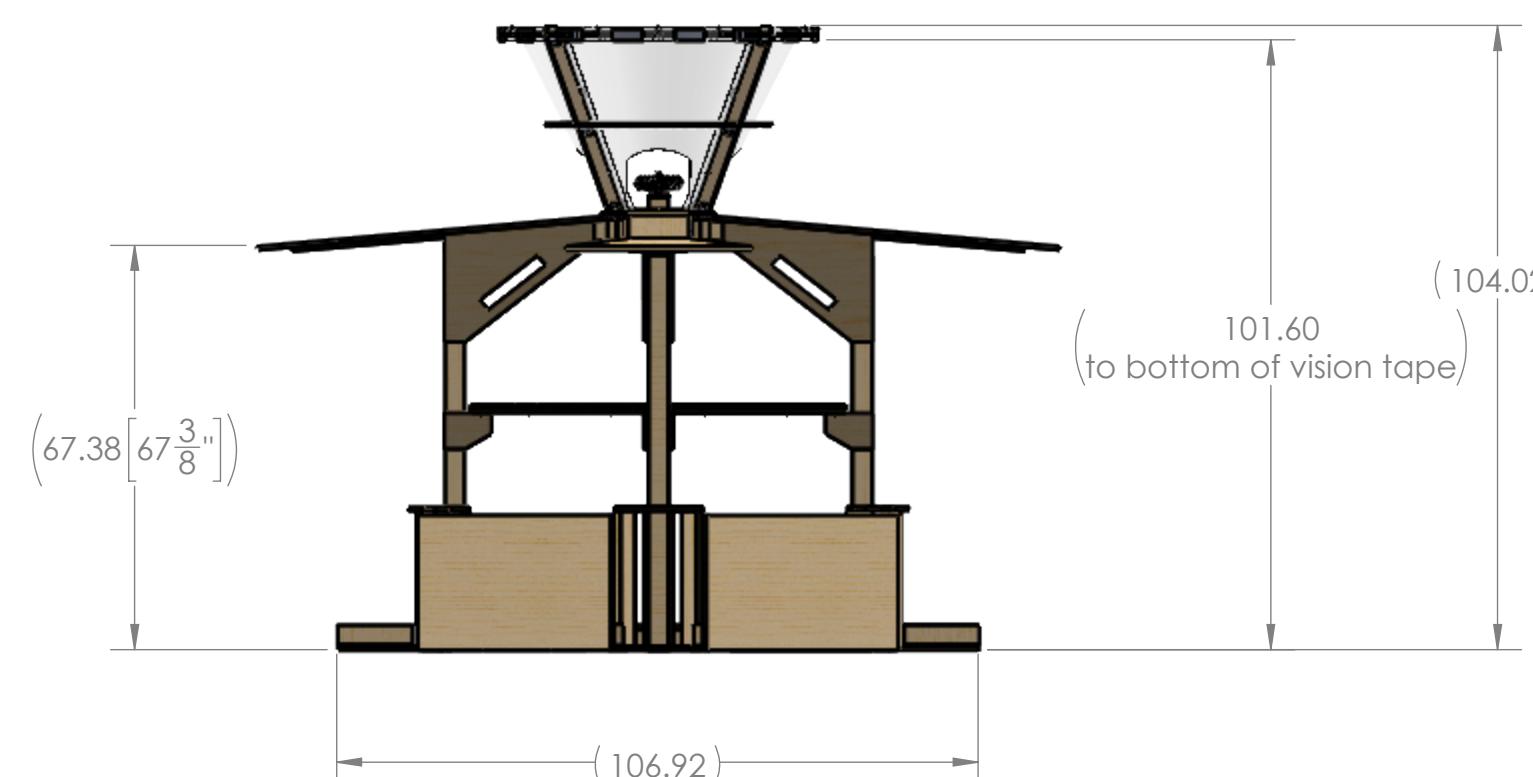
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DRAWN	KAMC	1/4/2022	
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
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 **FIRST
ROBOTICS
COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

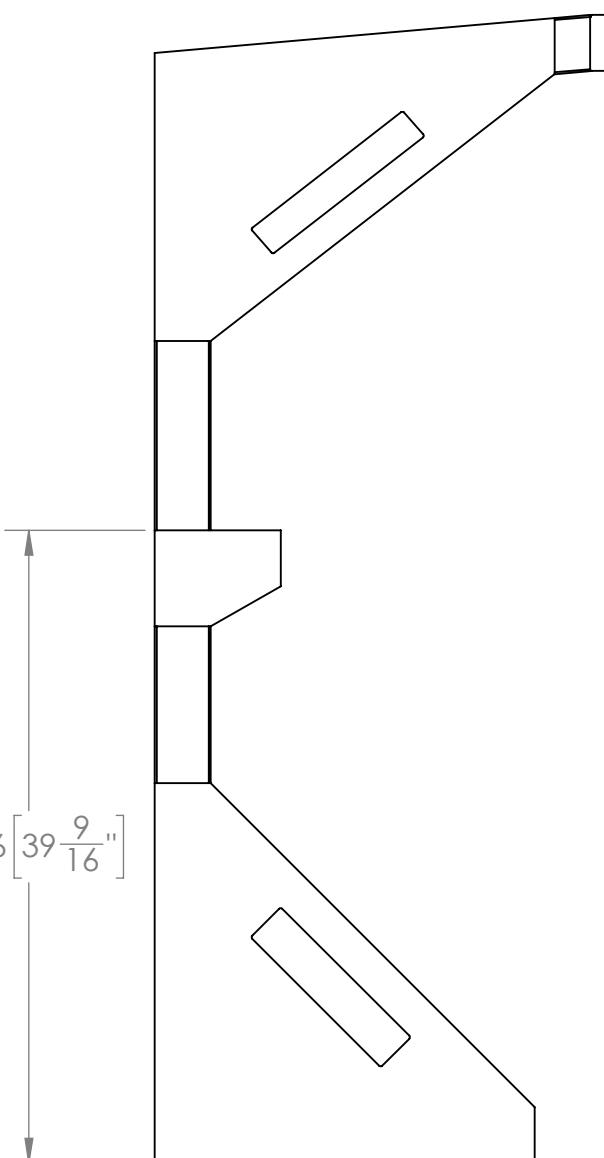
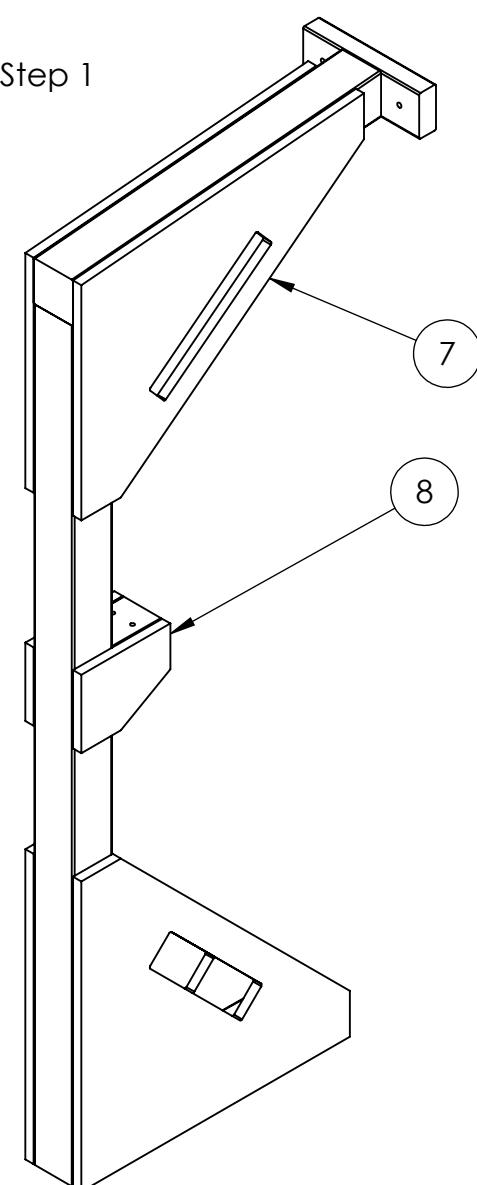
TITLE:
**HUB - Complex Build -
Full Hub Assembly**

SIZE DWG. NO. REV

C TE-22100

SCALE: 1:32 SHEET 2 OF 7

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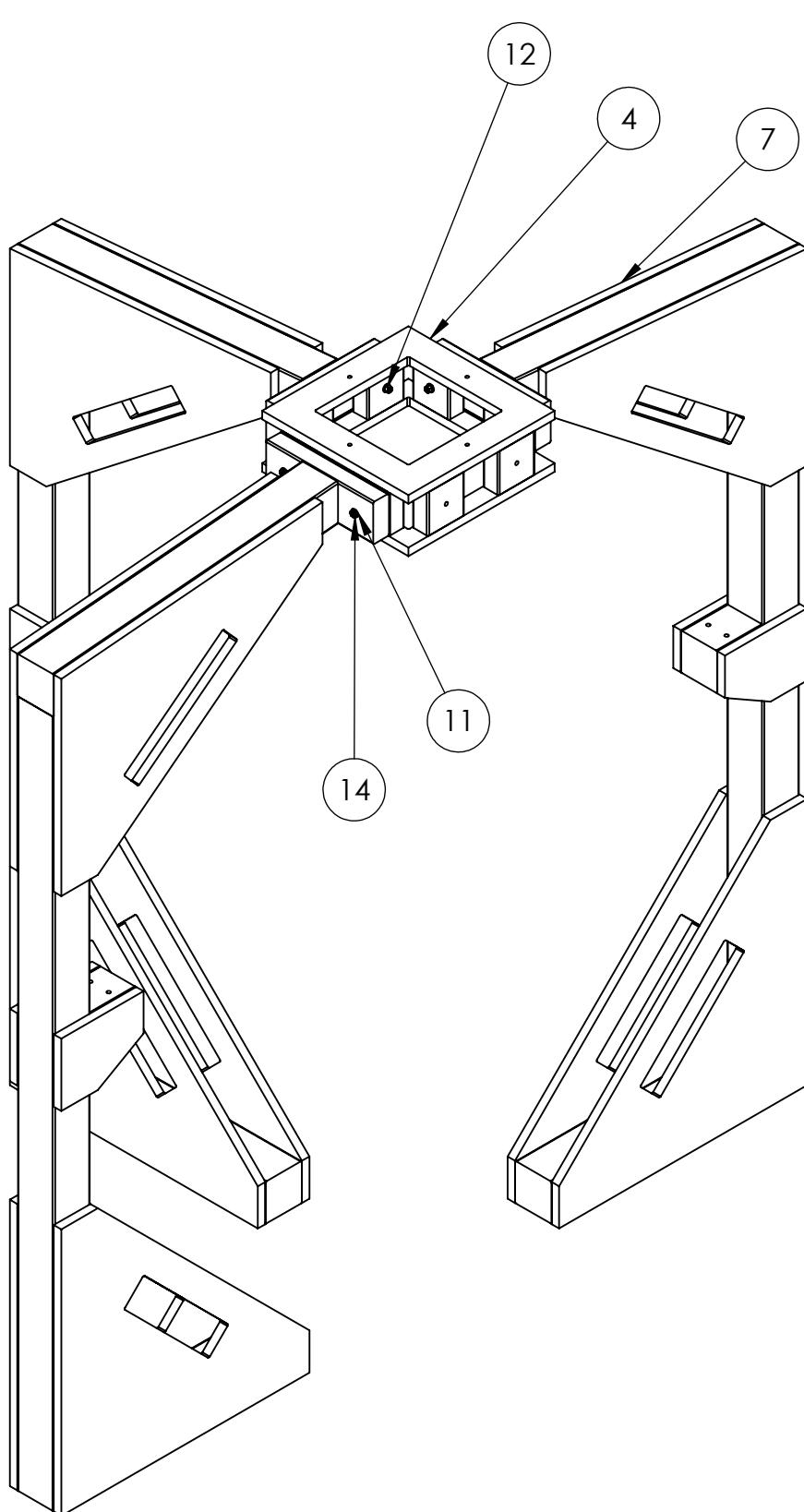
1. Align (8) to (7), as shown.
2. Connect using 2.5" long screws. It is recommended to use 8x screws, 4x into each side.
3. Repeat 3x, for a total of 4x sub-assemblies.

Step 1

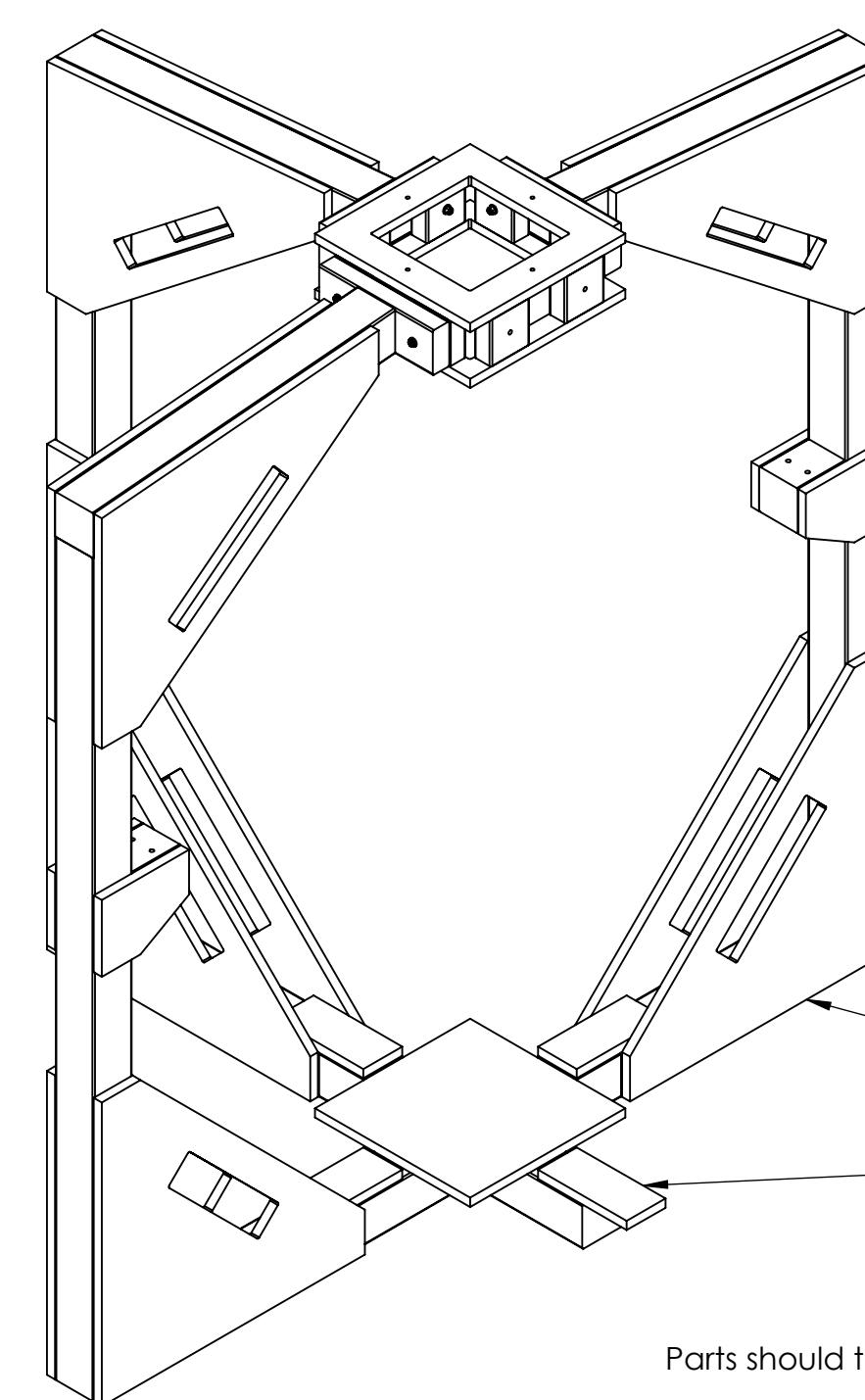
Step 2

Step 3

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1. Align 3x assemblies from Step 1 to (4), as shown.
2. Loosely connect using 2x (14), 4x (11), and 2x (12) per (7). Hardware will be tightened in a later step.



1. Align (1) to Step 2, as shown. Attachment will happen in a later step.

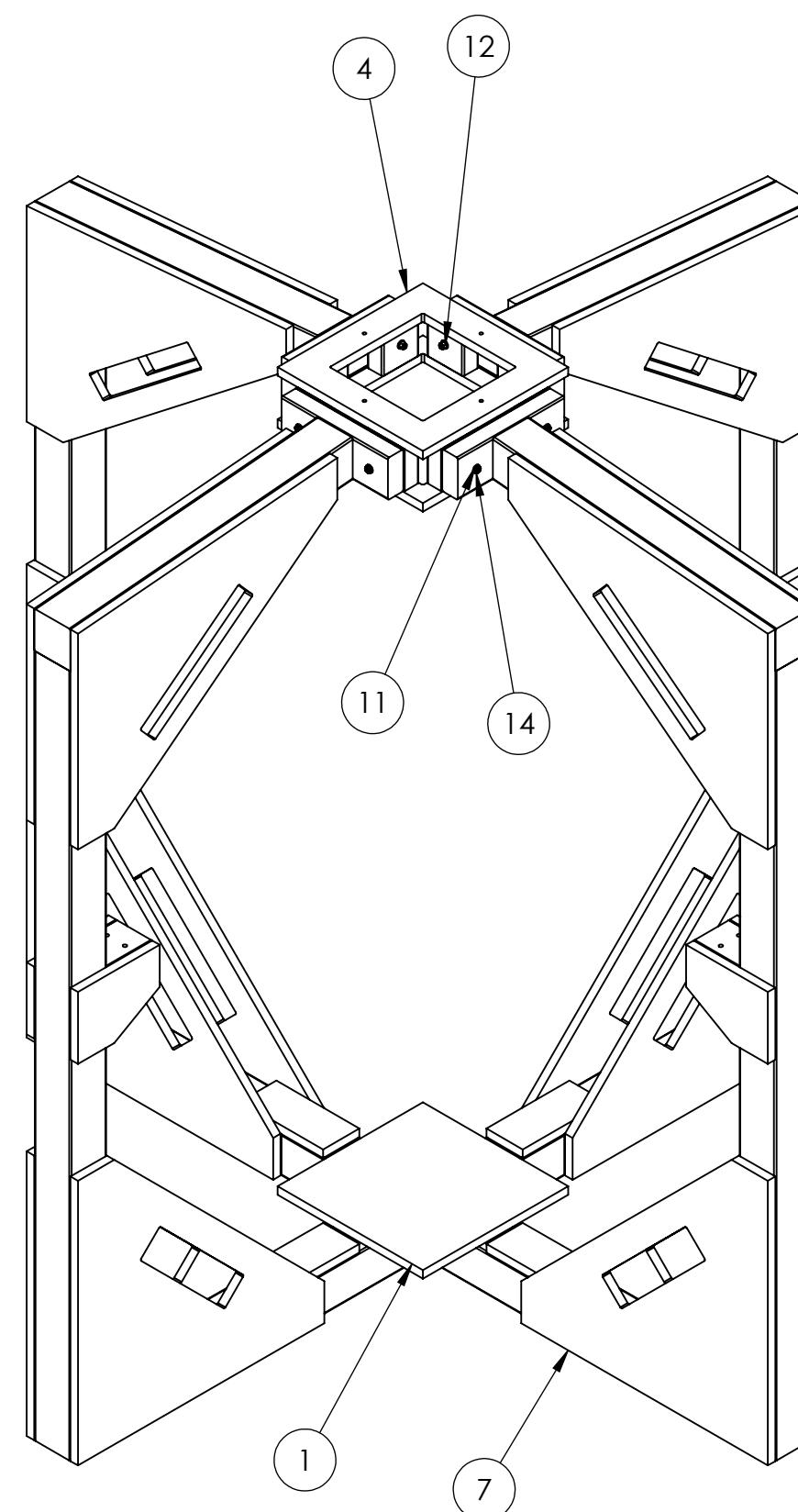
UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	KAMC	1/4/2022	
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
	C	TE-22100	
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING	SCALE: 1:12	SHEET 3 OF 7	

FIRST
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COMPETITION

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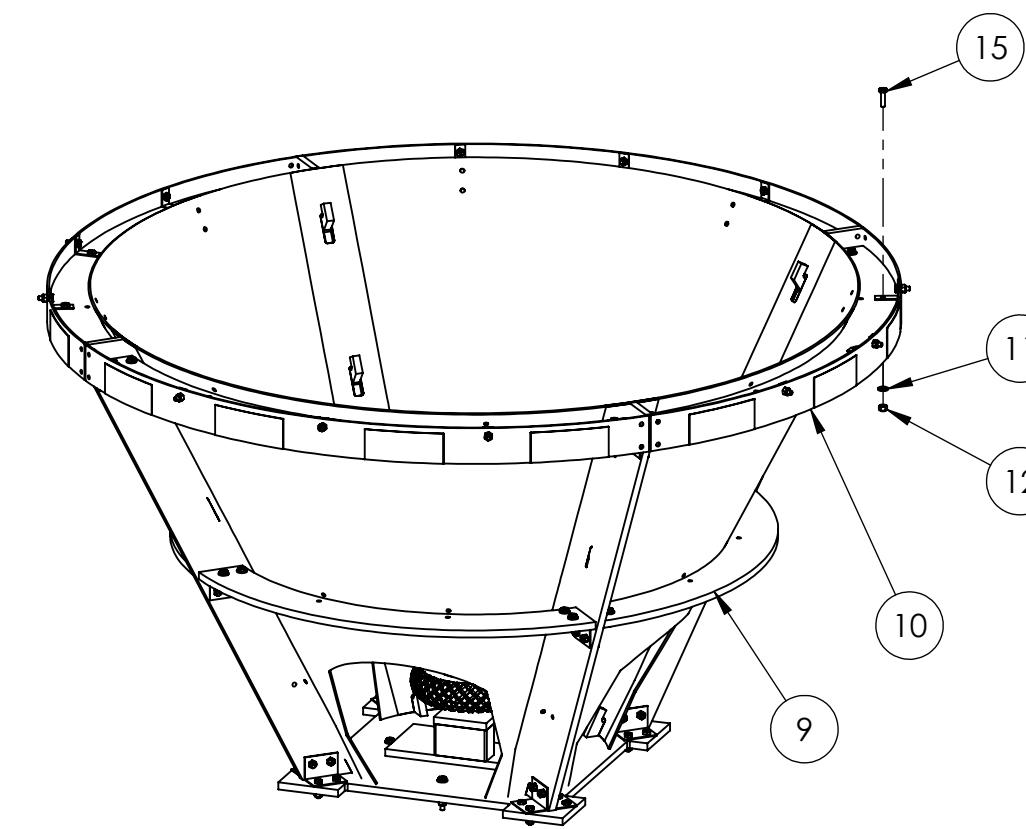
TITLE:
HUB - Complex Build -
Full Hub Assembly

Step 4



- Add remaining Step 1 assembly to Step 3, as shown. Ensure the plywood from (1) sits on top of the 4"x4" lumber of (7).
Note: Attachment between (7) and (1) will occur in a later step.
- Connect (7) to (4) using 2x (14), 4x (11), and 2x (12). Ensure connection is tight.
- Tighten hardware installed in Step 2.

Step 5



- Align 4x (10) to (9), as shown.
Note: If you opted to match drill some/all holes on TE-22194, they should be drilled out now.
- Connect using 3x (15), 3x (11), and 3x (12) per (10).
- If needed, tighten hardware on (10).

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	C	TE-22100	
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING	SCALE: 1:12	SHEET 4 OF 7	

 **FIRST
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COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

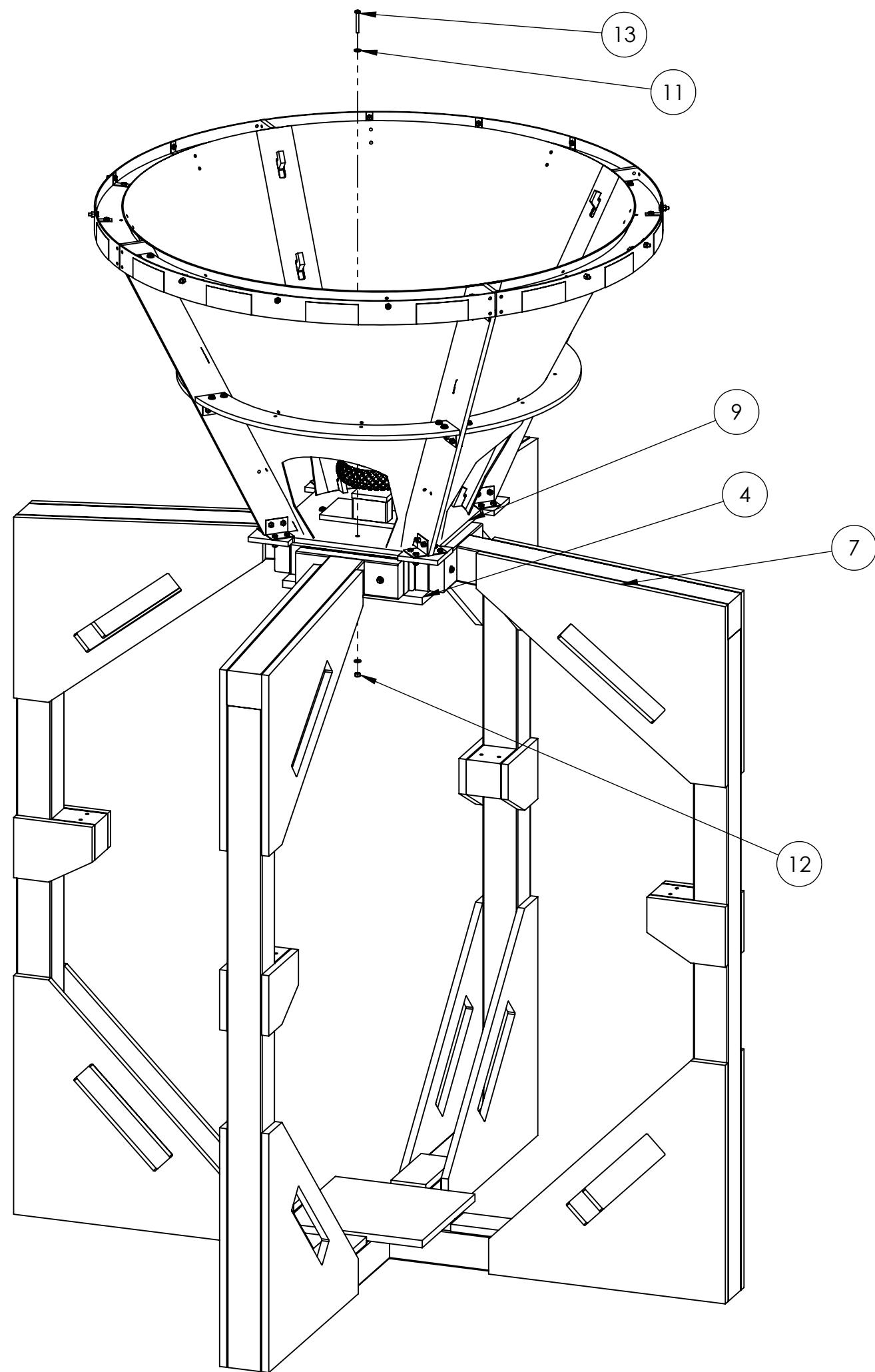
TITLE:
**HUB - Complex Build -
Full Hub Assembly**

SIZE DWG. NO. REV

C TE-22100

SCALE: 1:12 SHEET 4 OF 7

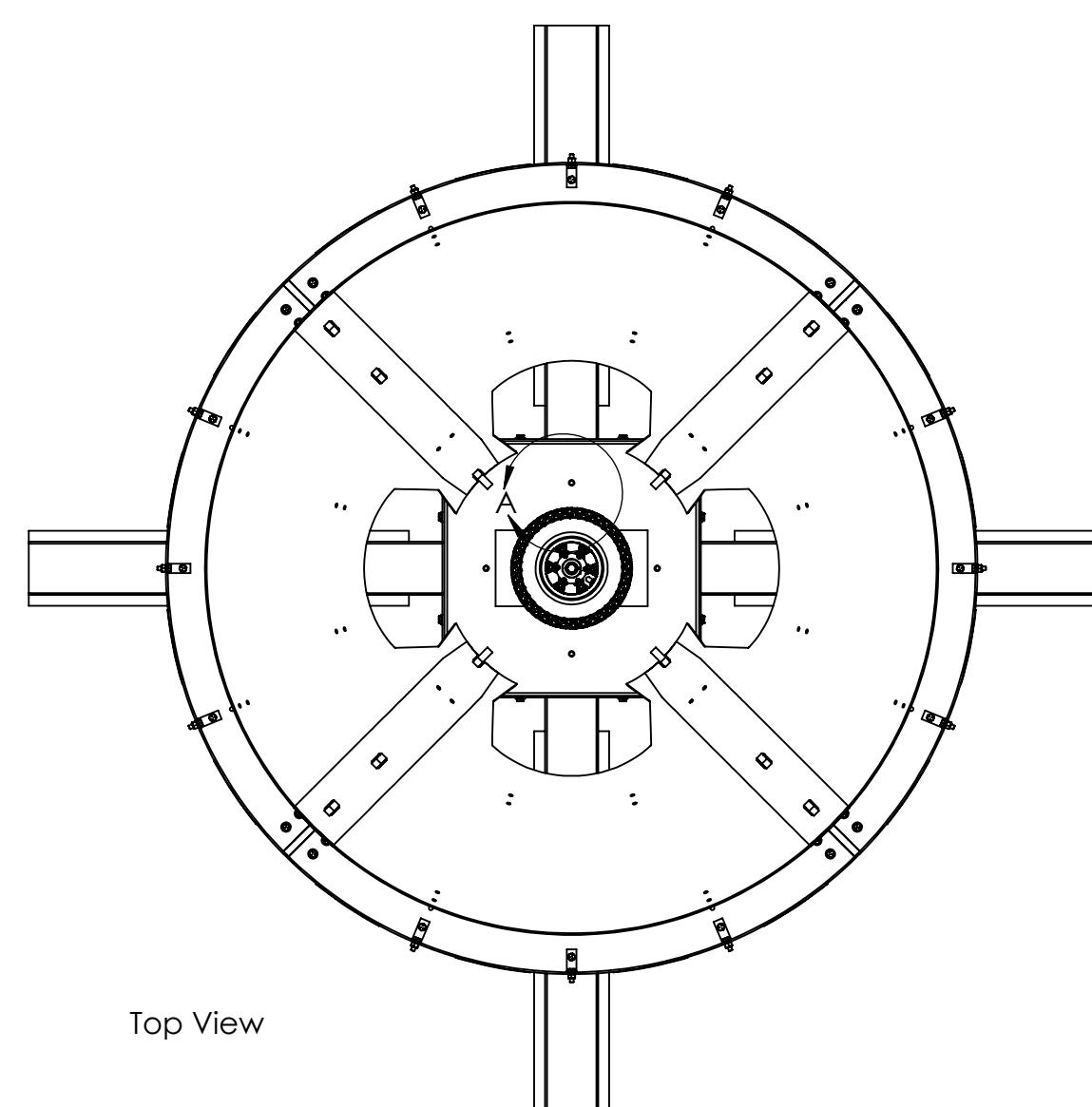
Step 6



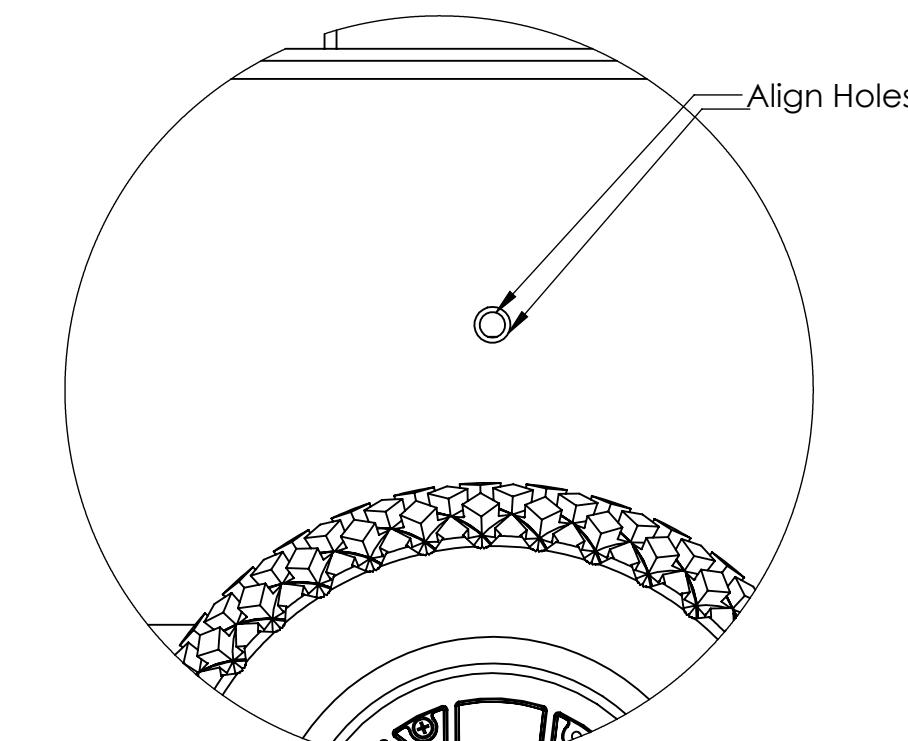
1. Align Step 5 atop Step 4, as shown.

Note: Ensure there are multiple people to lift Step 5 into place. Consider resting Step 5 atop 7, if needed. If using TE-22190-AMActive, be mindful of the motor protruding from the bottom of the assembly.

2. Connect 9 to 4 using 4x 13, 8x 11, and 4x 12.



Top View

DETAIL A
SCALE 1:2

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

TEAM NAME DATE

DRAWN

KAMC

1/4/2022

FIRST
ROBOTICS
COMPETITION
SOLIDWORKS
 Modeling Solutions Partner

 TITLE:
**HUB - Complex Build -
 Full Hub Assembly**

SIZE DWG. NO. REV

C TE-22100

SCALE: 1:12 SHEET 5 OF 7

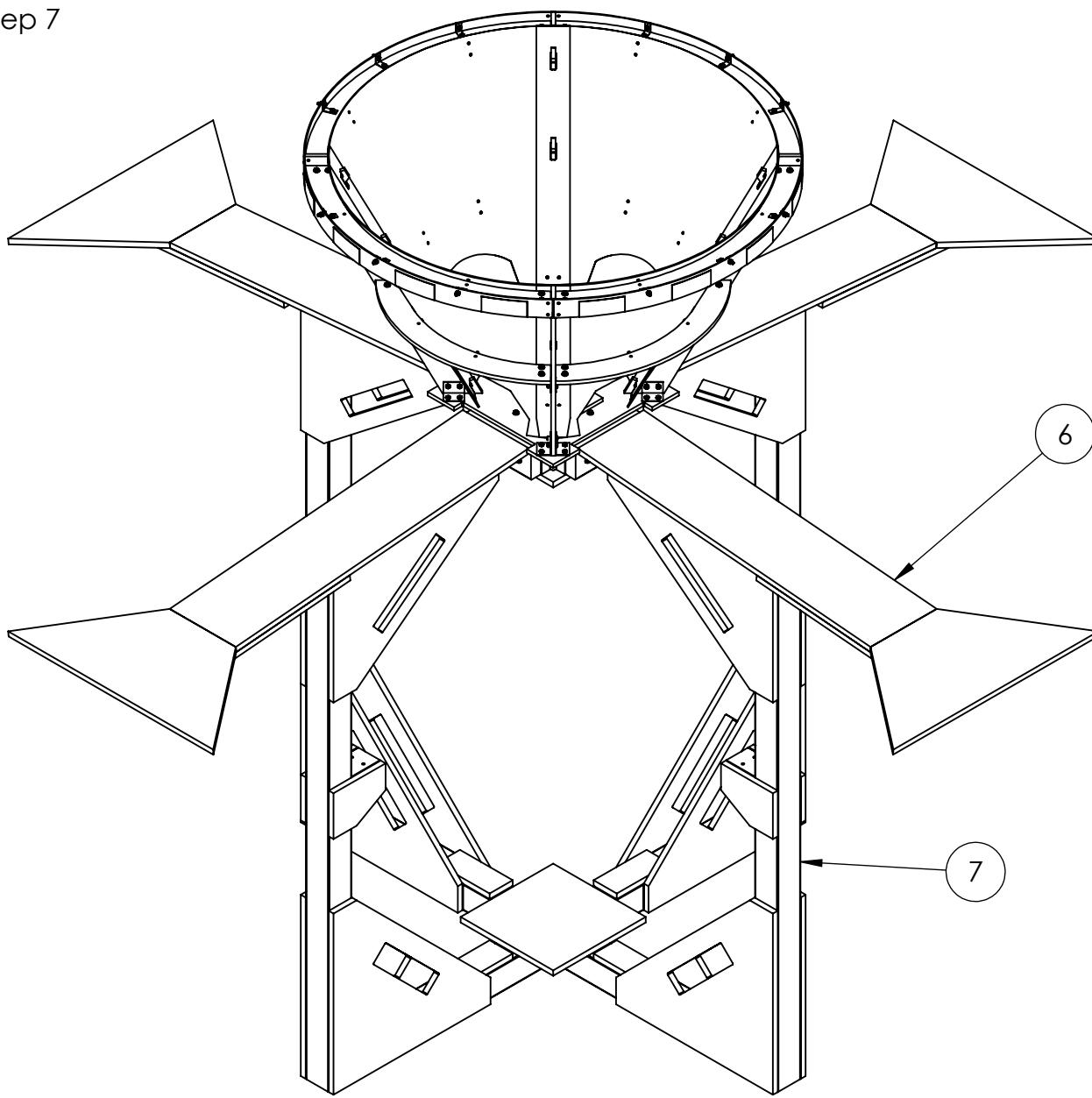
DO NOT SCALE DRAWING

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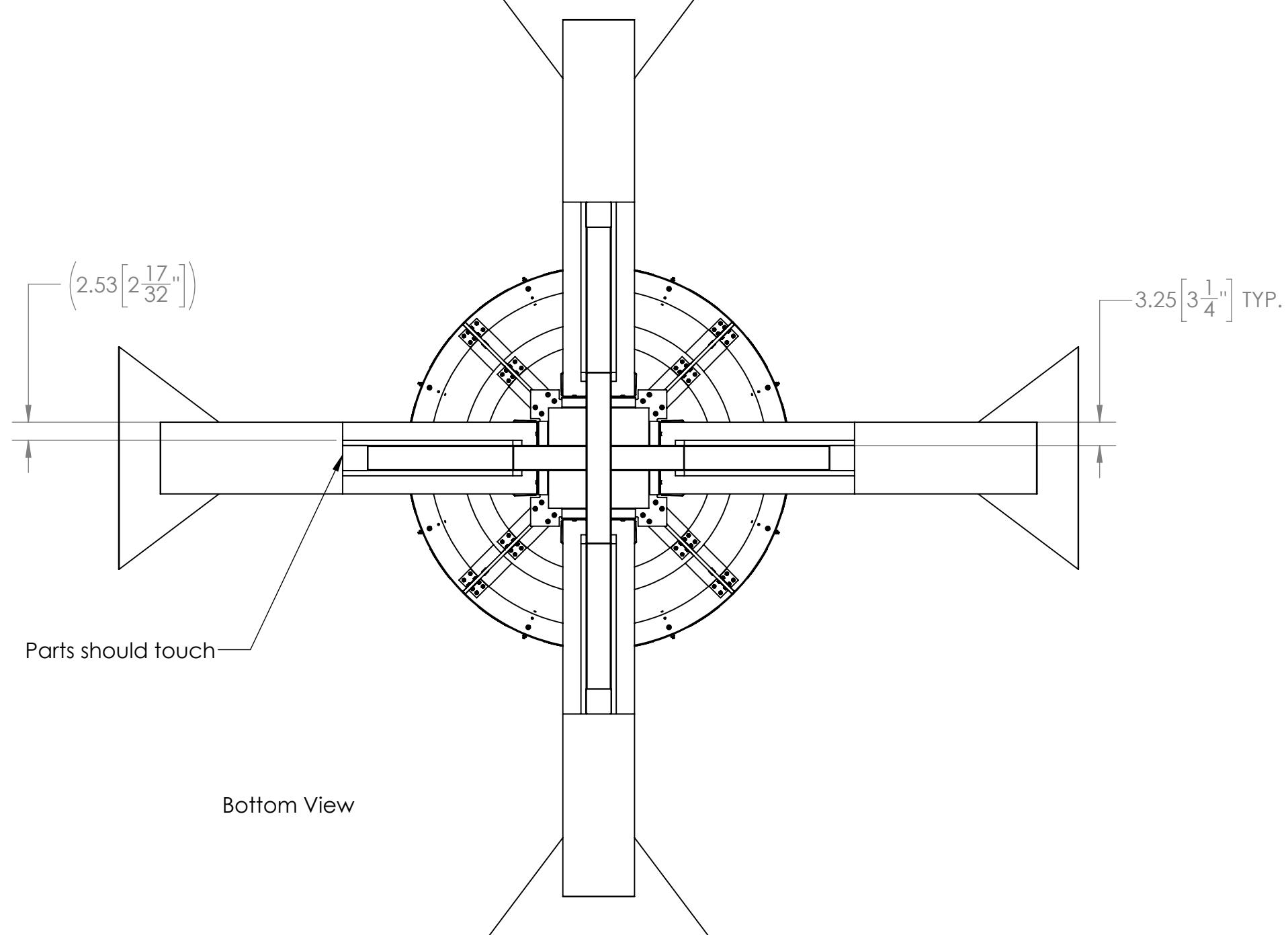
2

Step 7



1. Align 4x **6** to Step 6, as shown.
 2. Connect using 2" long screws. It is recommended to use 8x screws per **6**.
 3. Optional: It is recommended to install safety edging on **6** at this time. Safety edging could be pool noodles, baby proofing material, etc.

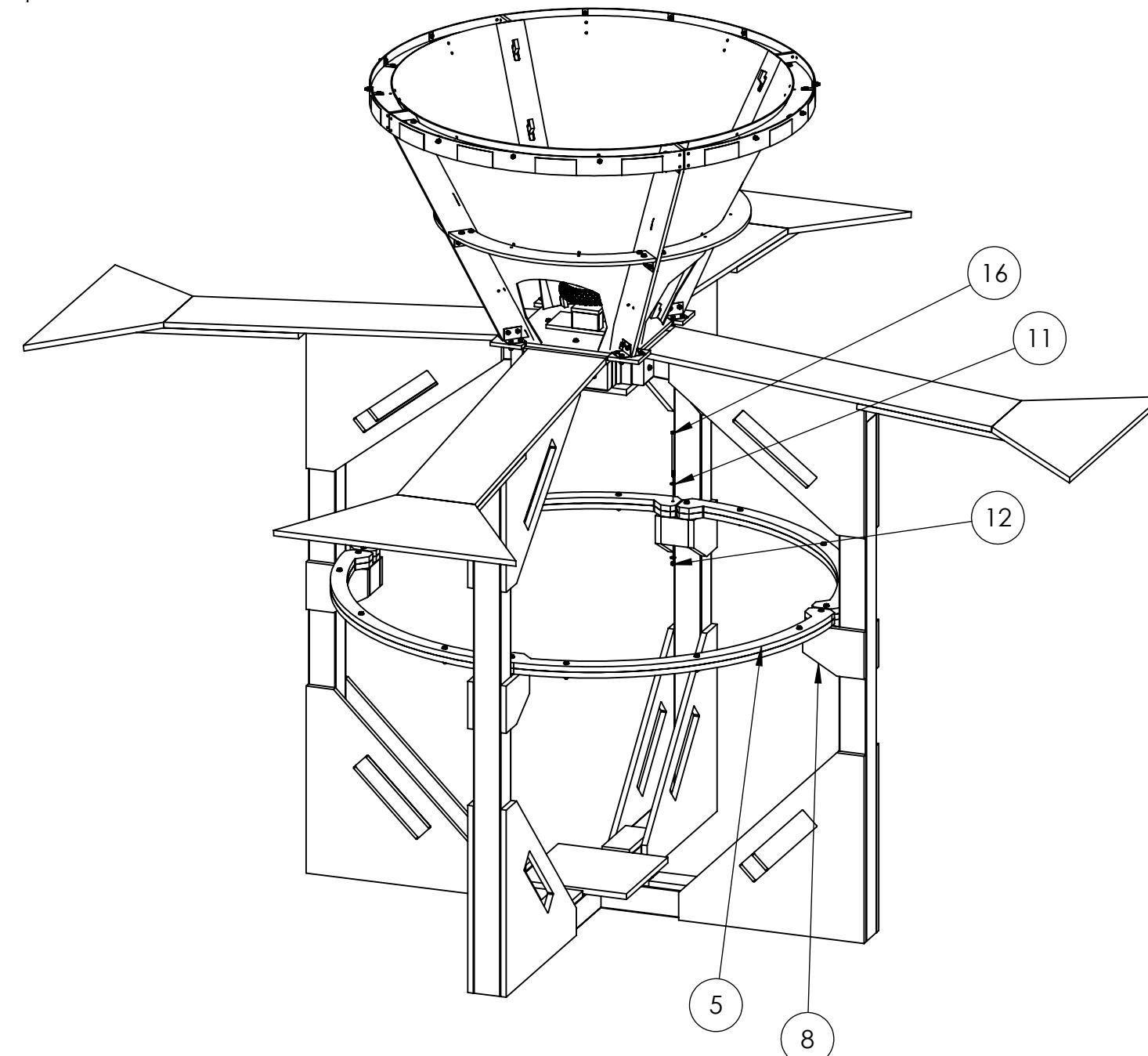
 It is recommended to install safety edging on 6



Parts should touch _____

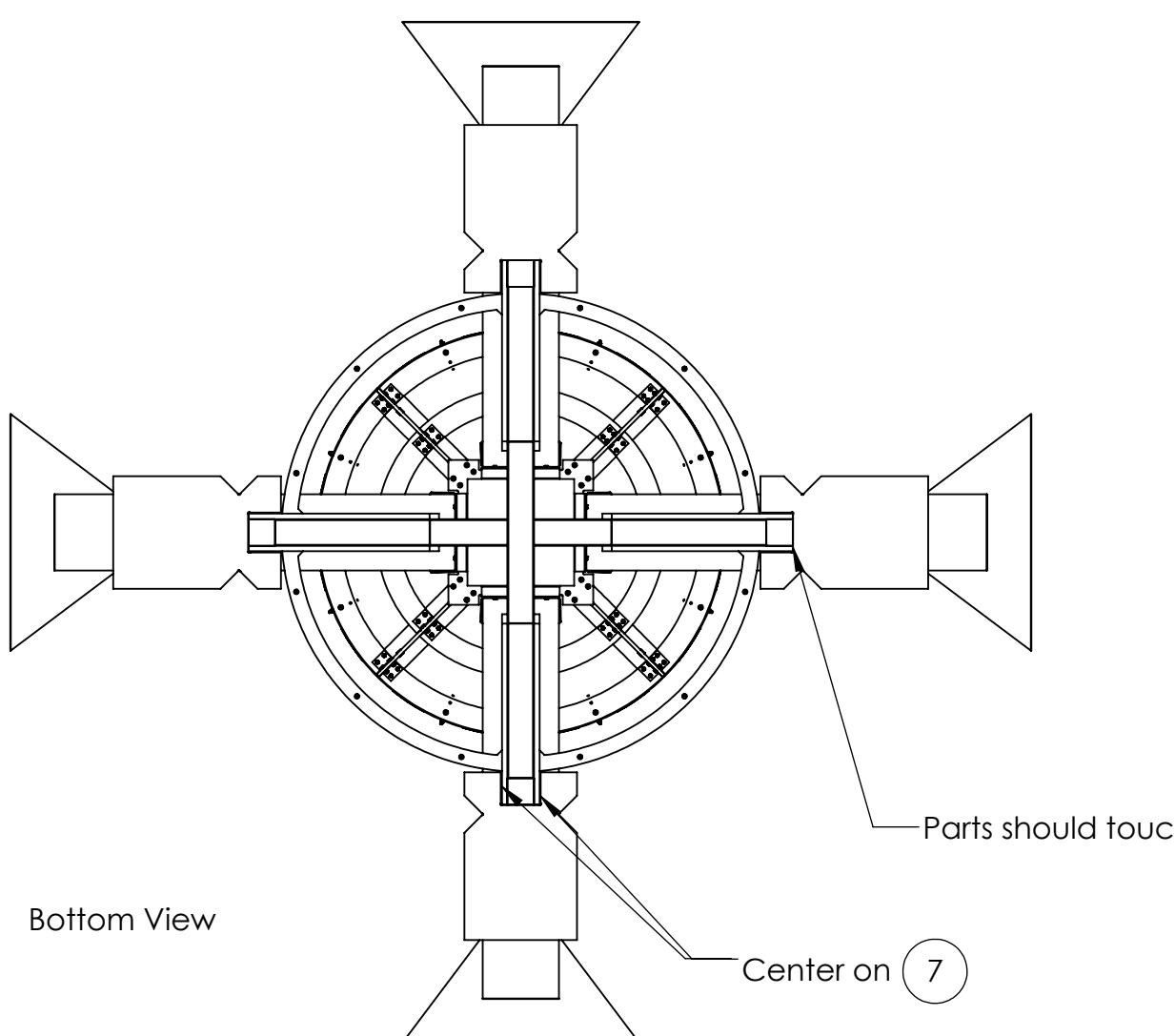
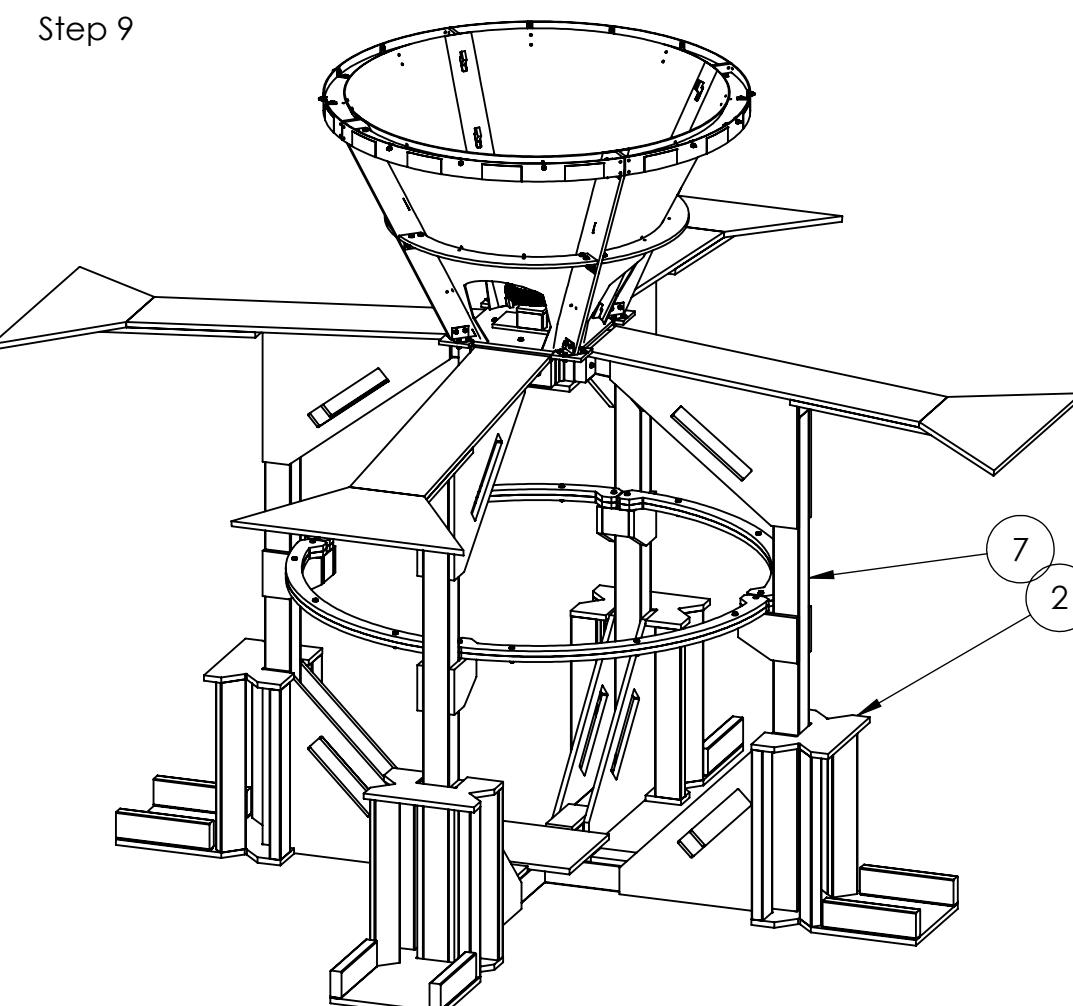
Bottom View

Step 8

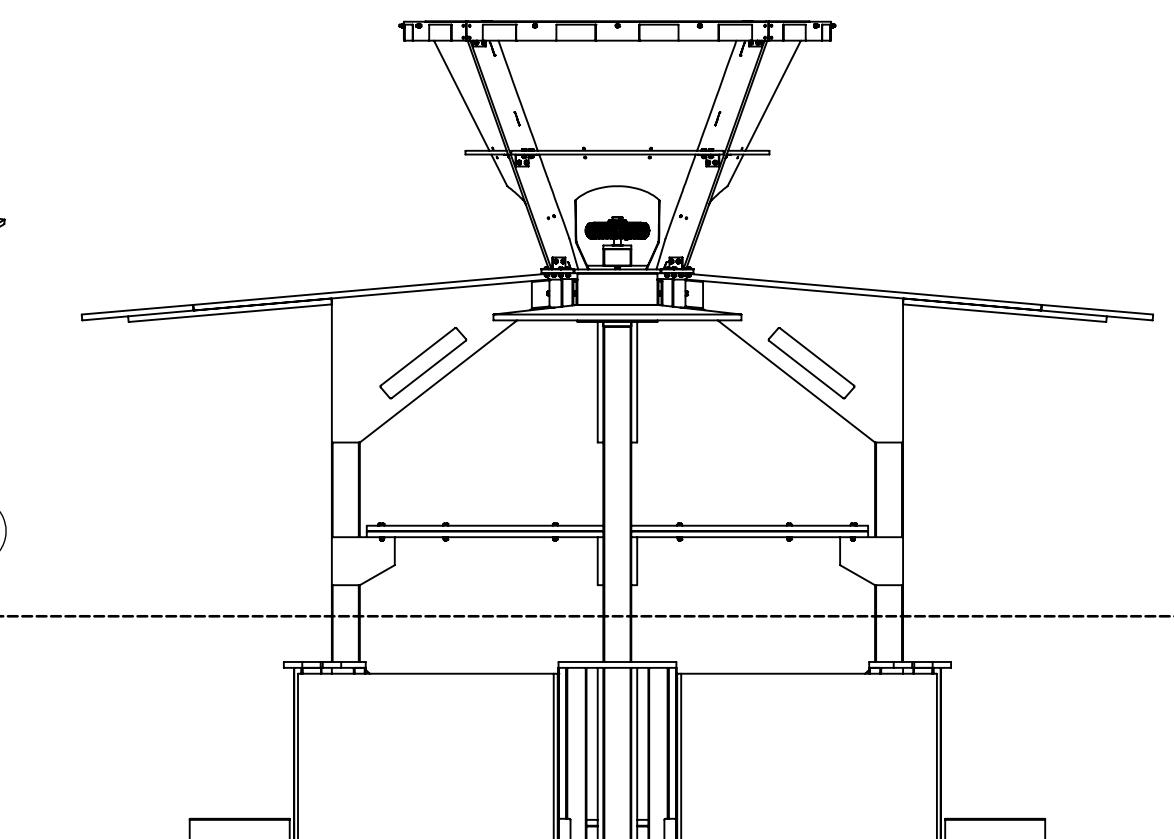
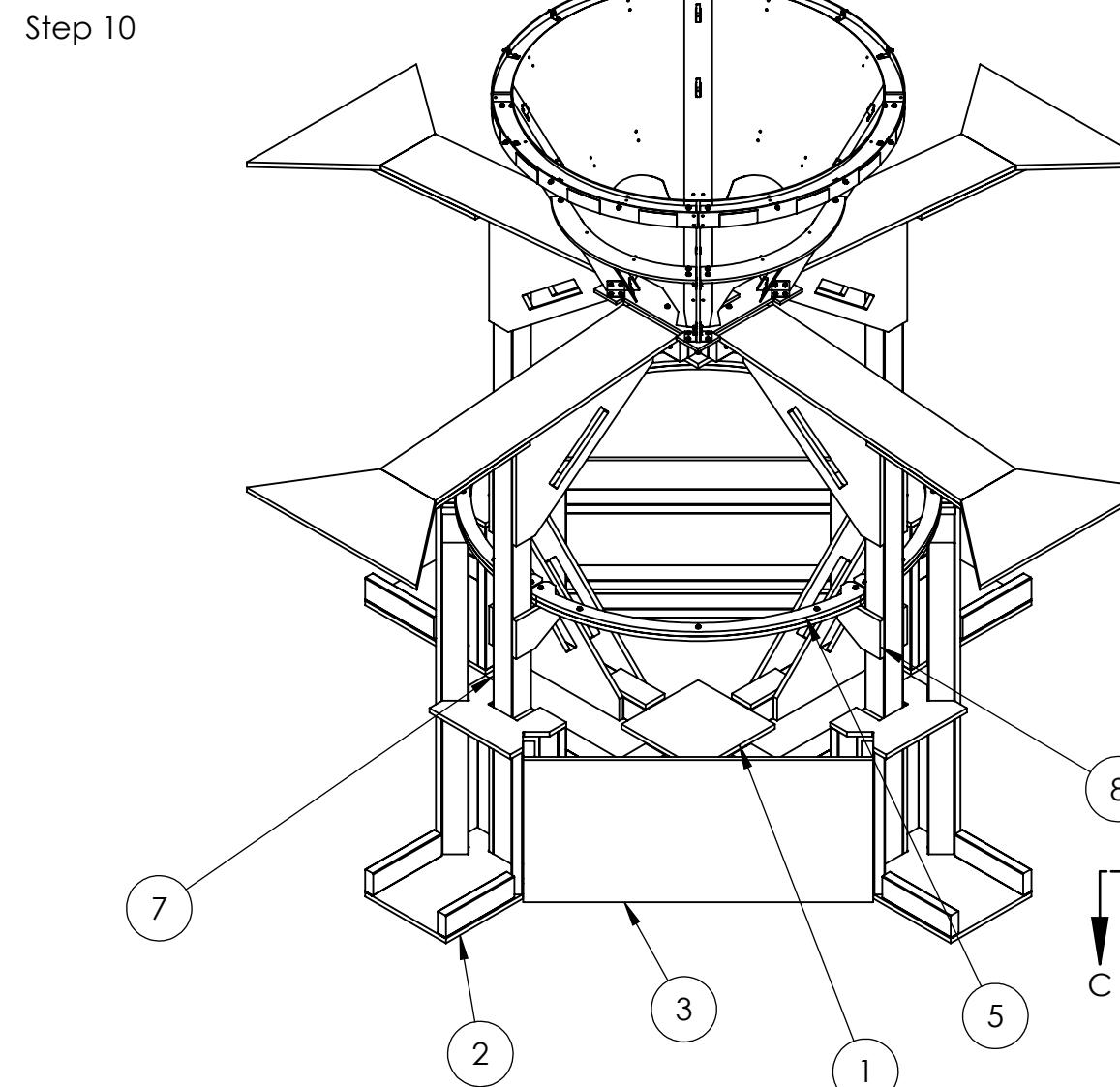


1. Align 4x (5) atop (8) (installed in Step 1 assemblies), as shown.
 2. Loosely connect (5) to (8) using 2x (16), 4x (11), and 2x (12) per (8).

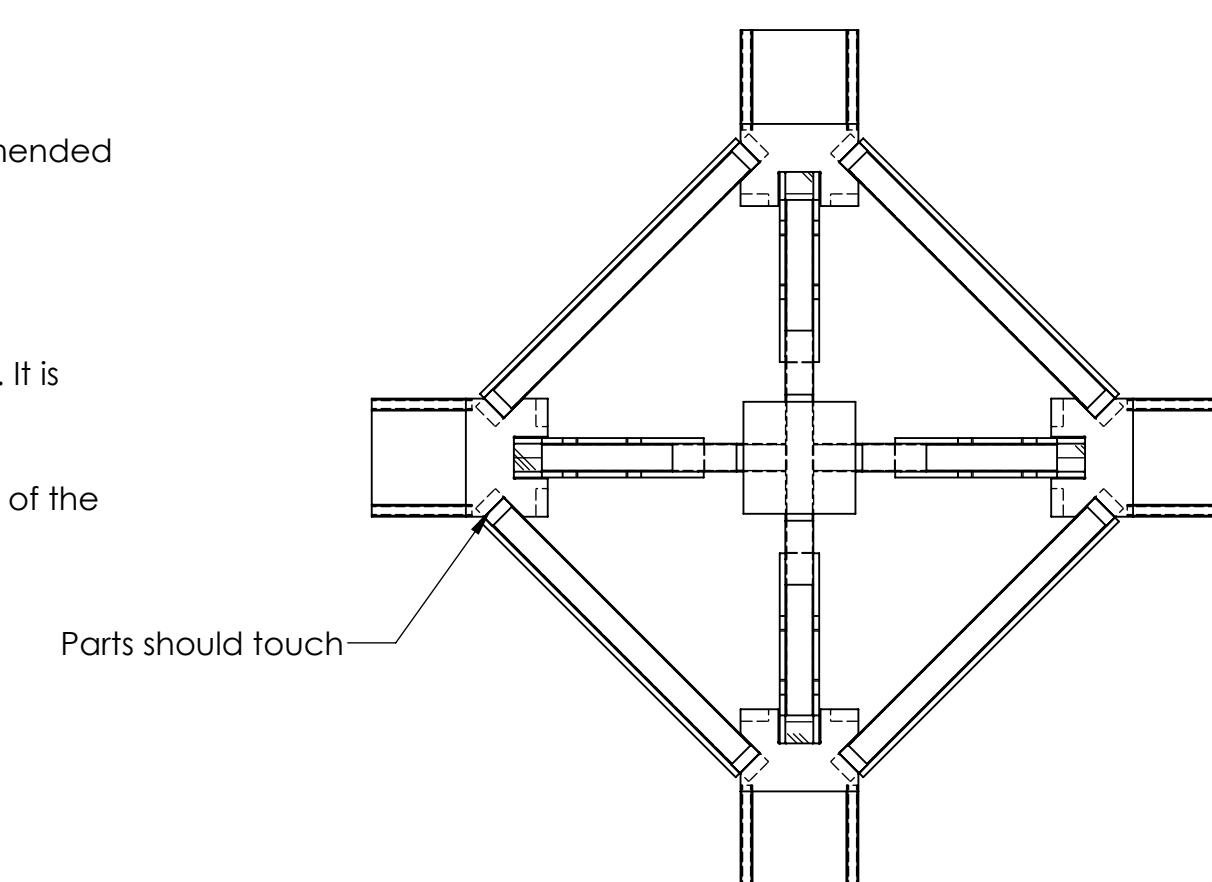
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		DRAWN	KAMC	1/4/2022
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$		PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FIRST® . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FIRST® IS PROHIBITED.		
MATERIAL/FINISH:		COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING		SIZE	DWG. NO.	REV
		C	TE-22100	
		SCALE: 1:18	SHEET 6 OF 7	



1. Align 4x (2) to Step 8, as shown.
Connection will happen in a later step.



1. Add 4x (3) to Step 9, as shown.
 2. Connect (3) to (2) using 2.5" long screws. It is recommended to use 8x screws per (3), 4x per side.
 3. Tighten hardware between 4x (5) and 4x (8).
 4. Optional: Add 2" long screws to connect (1) to 4x (7). It is recommended to 4x screws per (7).
- Note: It is a best practice to avoid placing screws within 1" of the cut edge of 4"x4" lumber.



UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	KAMC	1/4/2022
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$					
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$					
MATERIAL/FINISH:	PROPRIETARY AND CONFIDENTIAL				
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COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING					

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Full Hub Assembly

SIZE DWG. NO. REV

C TE-22100

SCALE: 1:24 SHEET 7 OF 7

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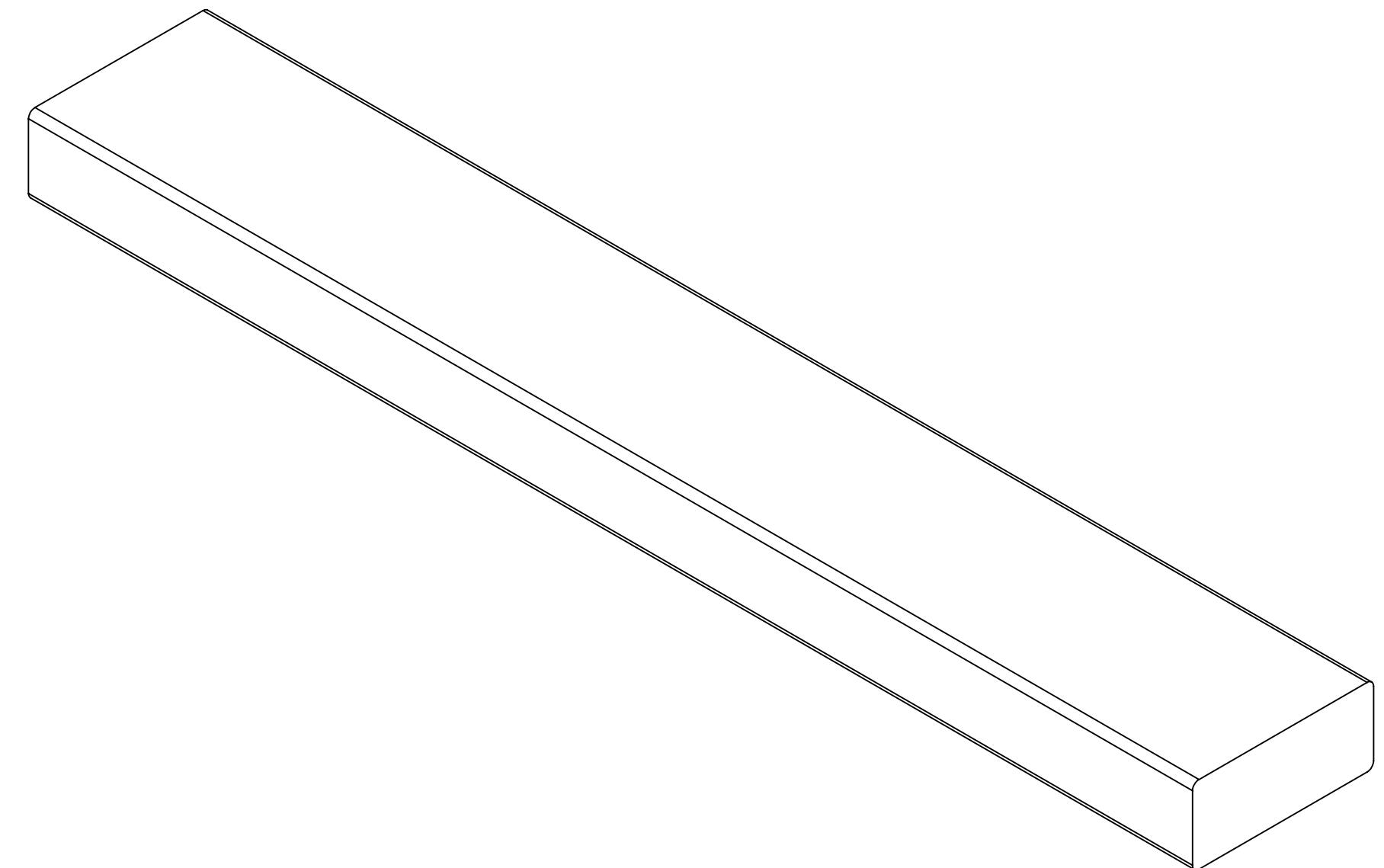
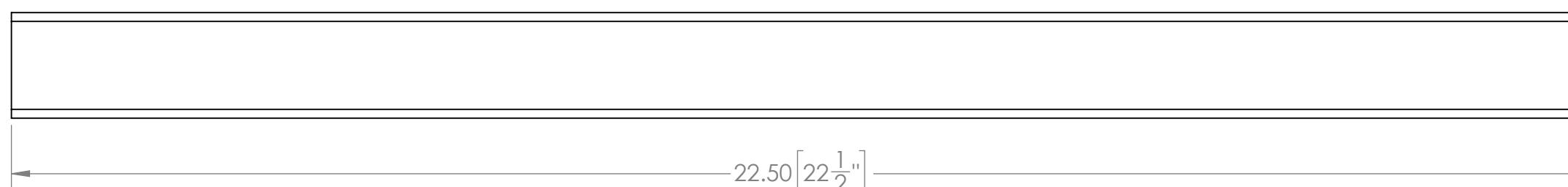
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	KAMC	12/16/2021
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MATERIAL/FINISH: 2" x 4" Lumber	SIZE	DWG. NO.	REV
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.	C	TE-22101	
DO NOT SCALE DRAWING	SCALE: 1:2	SHEET 1 OF 1	

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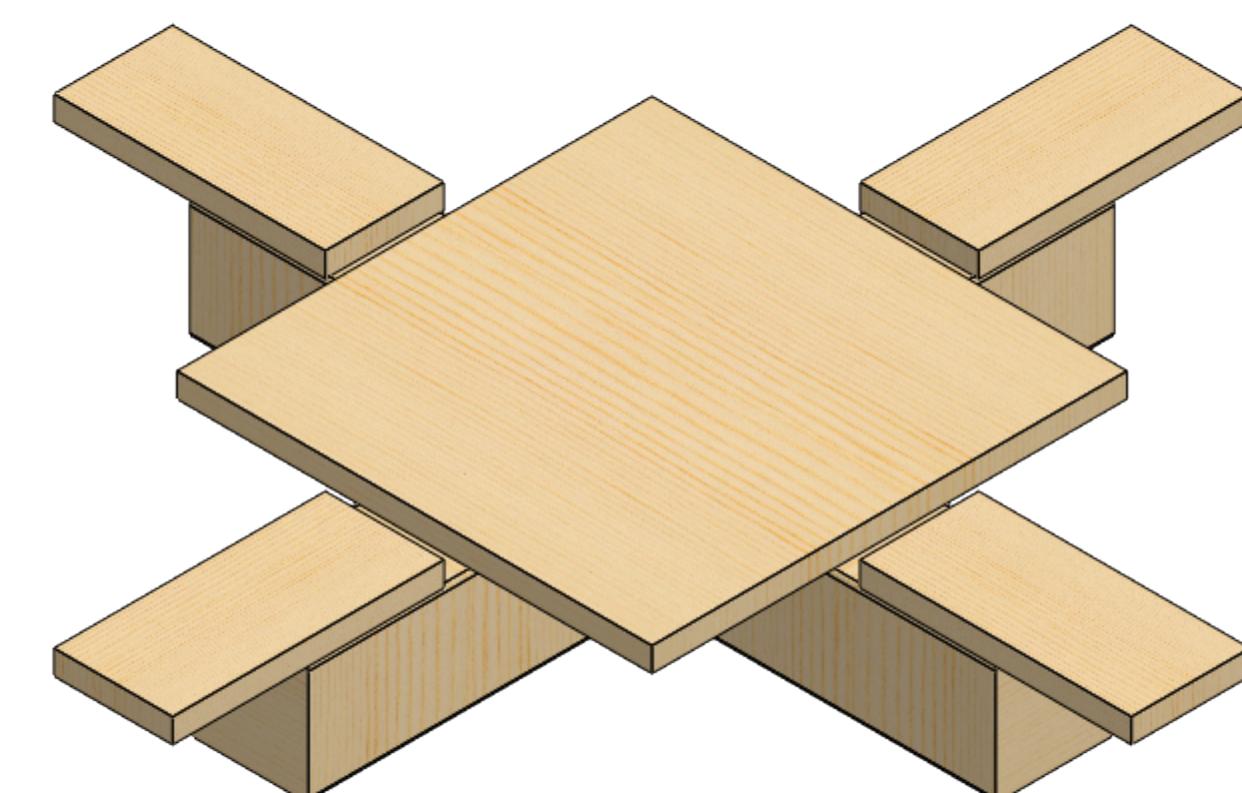
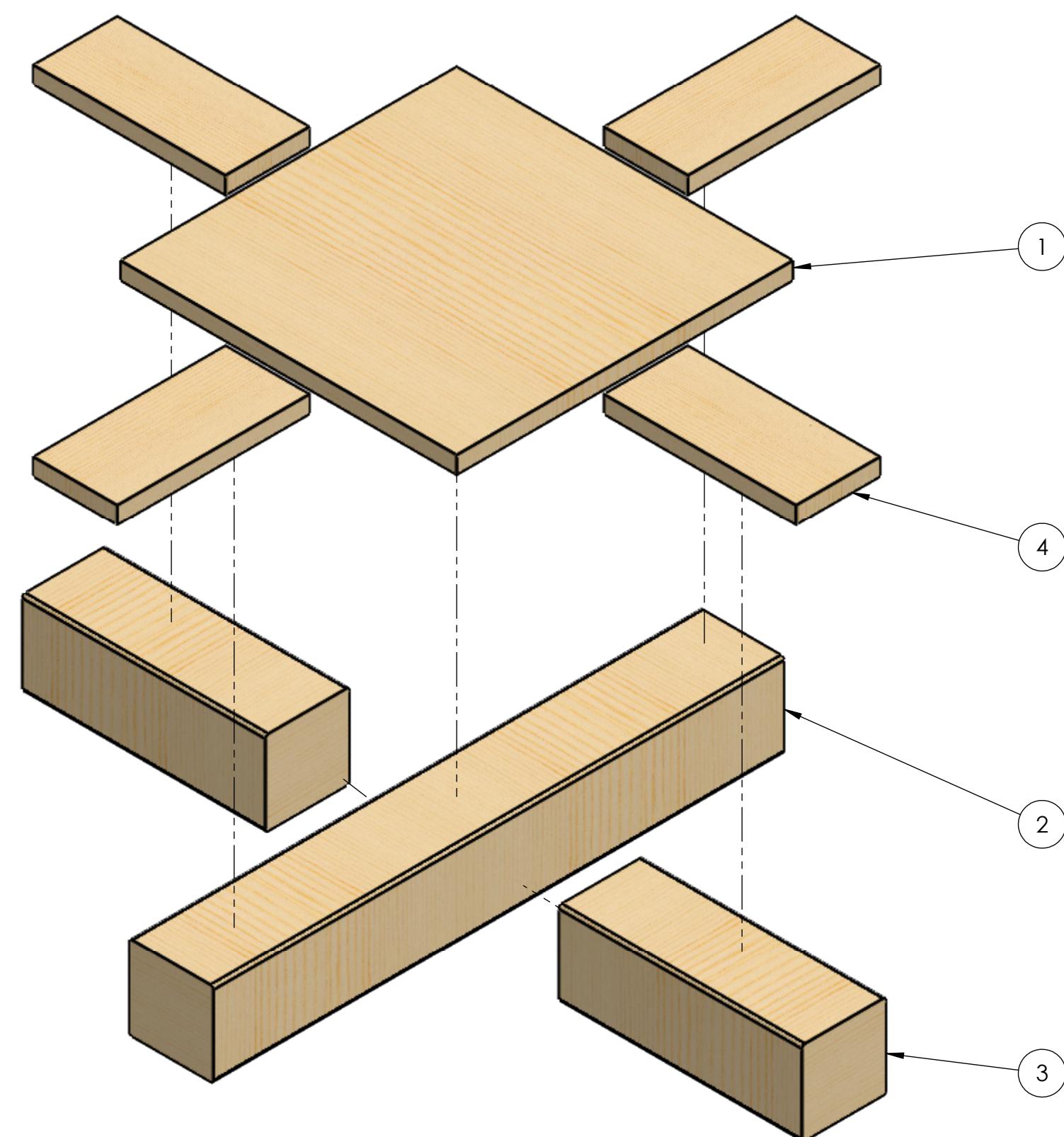
4

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Hardware Needed:
#8 x 2.5" Long Screw - Qty 32

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22111	Hub - Complex Build - Center Base Plate	1
2	TE-22112	HUB - Complex Build - Base Long 4x4	1
3	TE-22113	HUB - Complex Build - Base Short 4x4	2
4	TE-22114	HUB - Complex Build - Base to Leg Connection Plate	4

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

TEAM	NAME	DATE	 FIRST ROBOTICS COMPETITION
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
SIZE	DWG. NO.	REV	C TE-22110
SCALE: 1:4		SHEET 1 OF 3	

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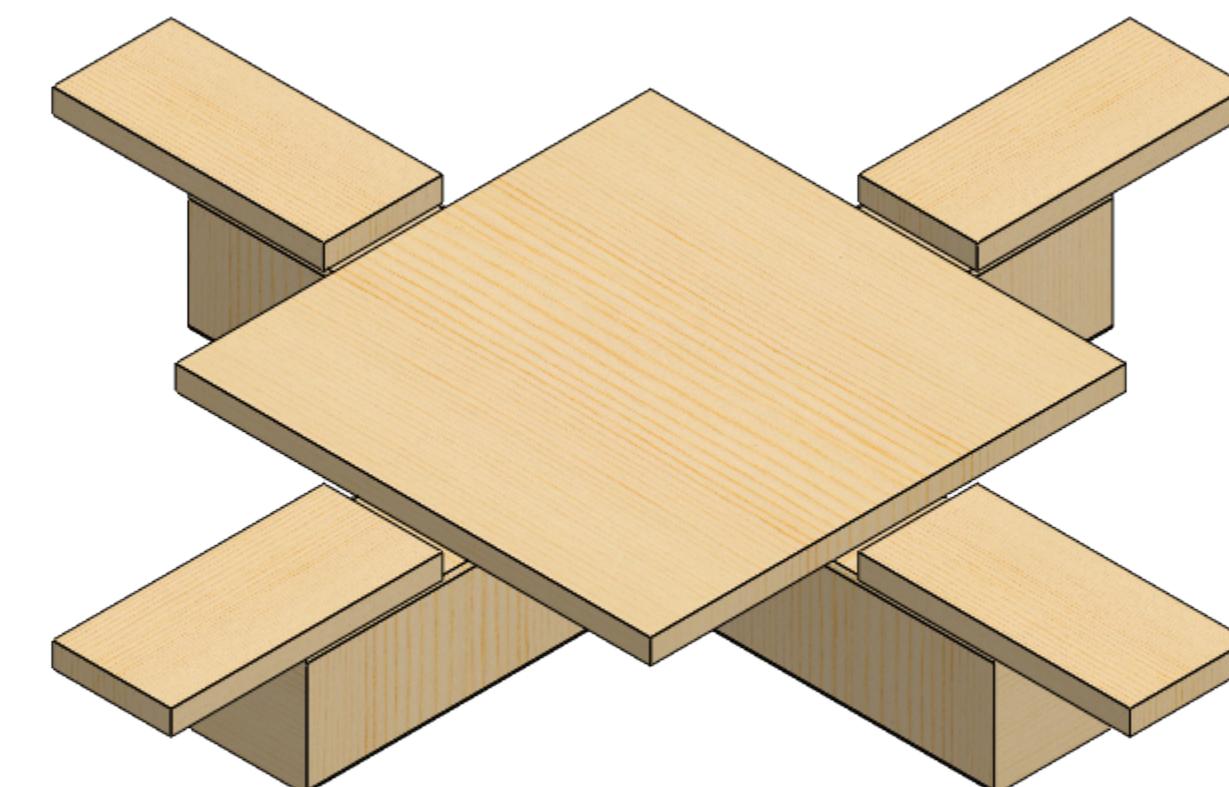
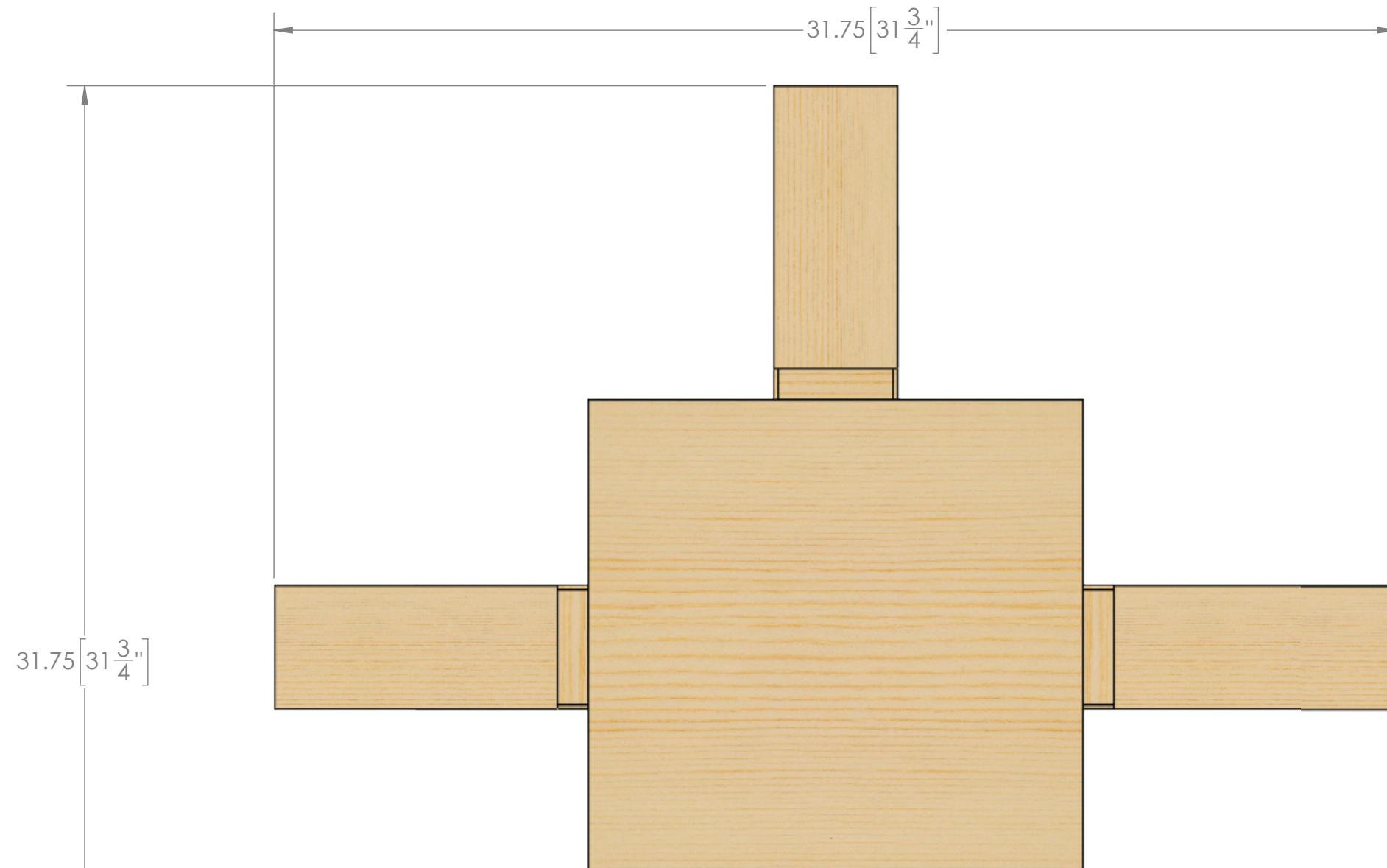
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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Base Assembly

SIZE DWG. NO. REV

C TE-22110

SCALE: 1:4 SHEET 2 OF 3

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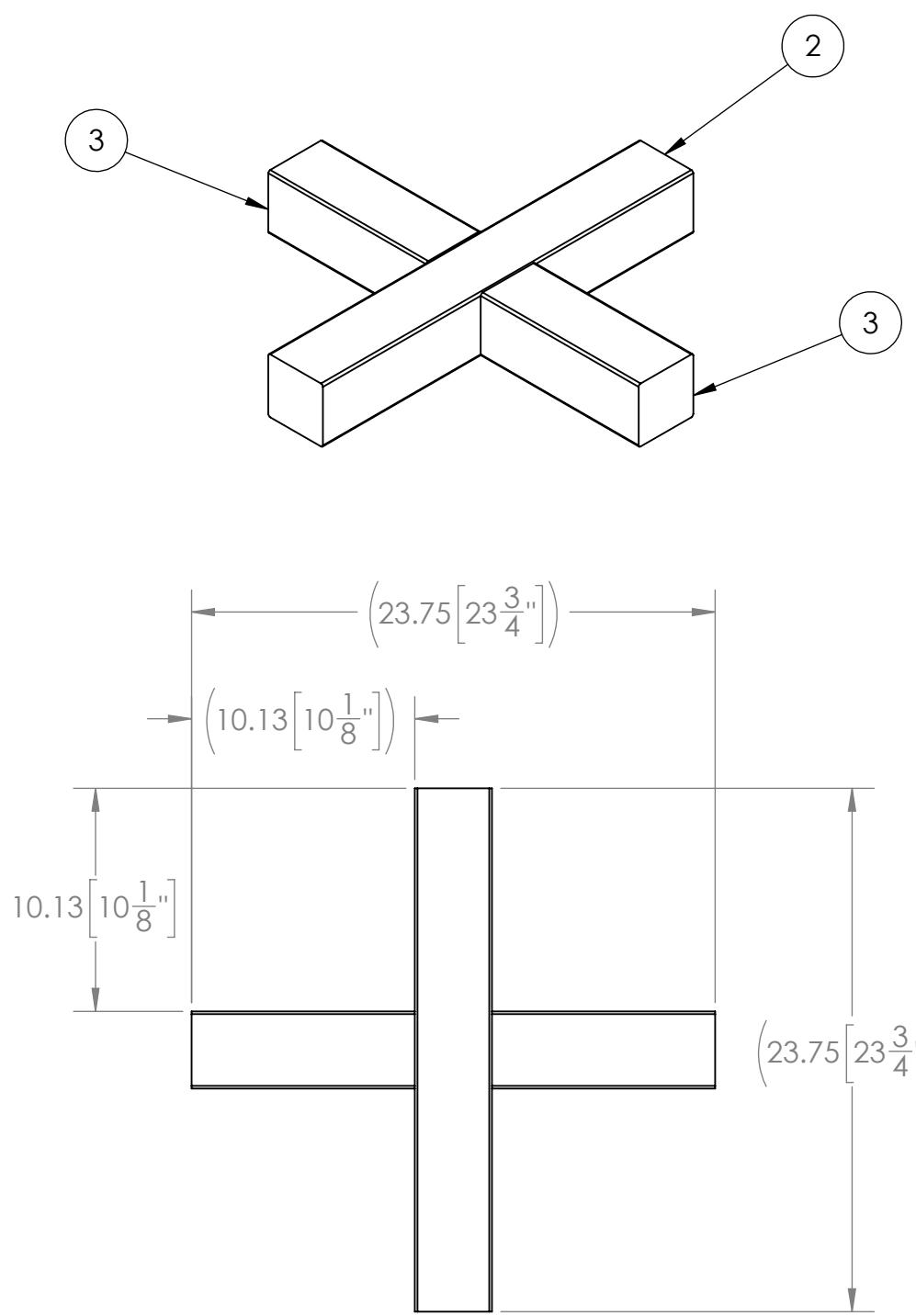
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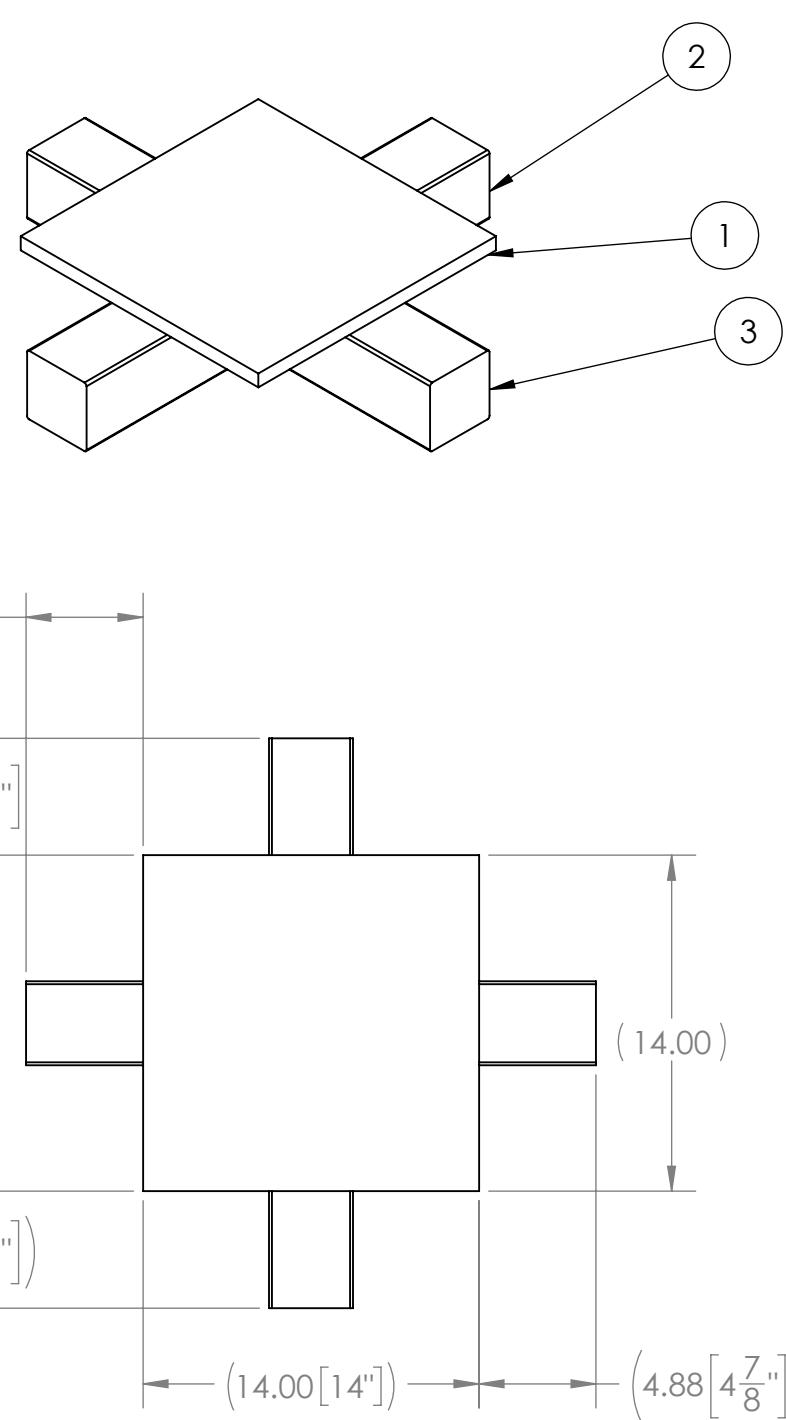
1

Step 1



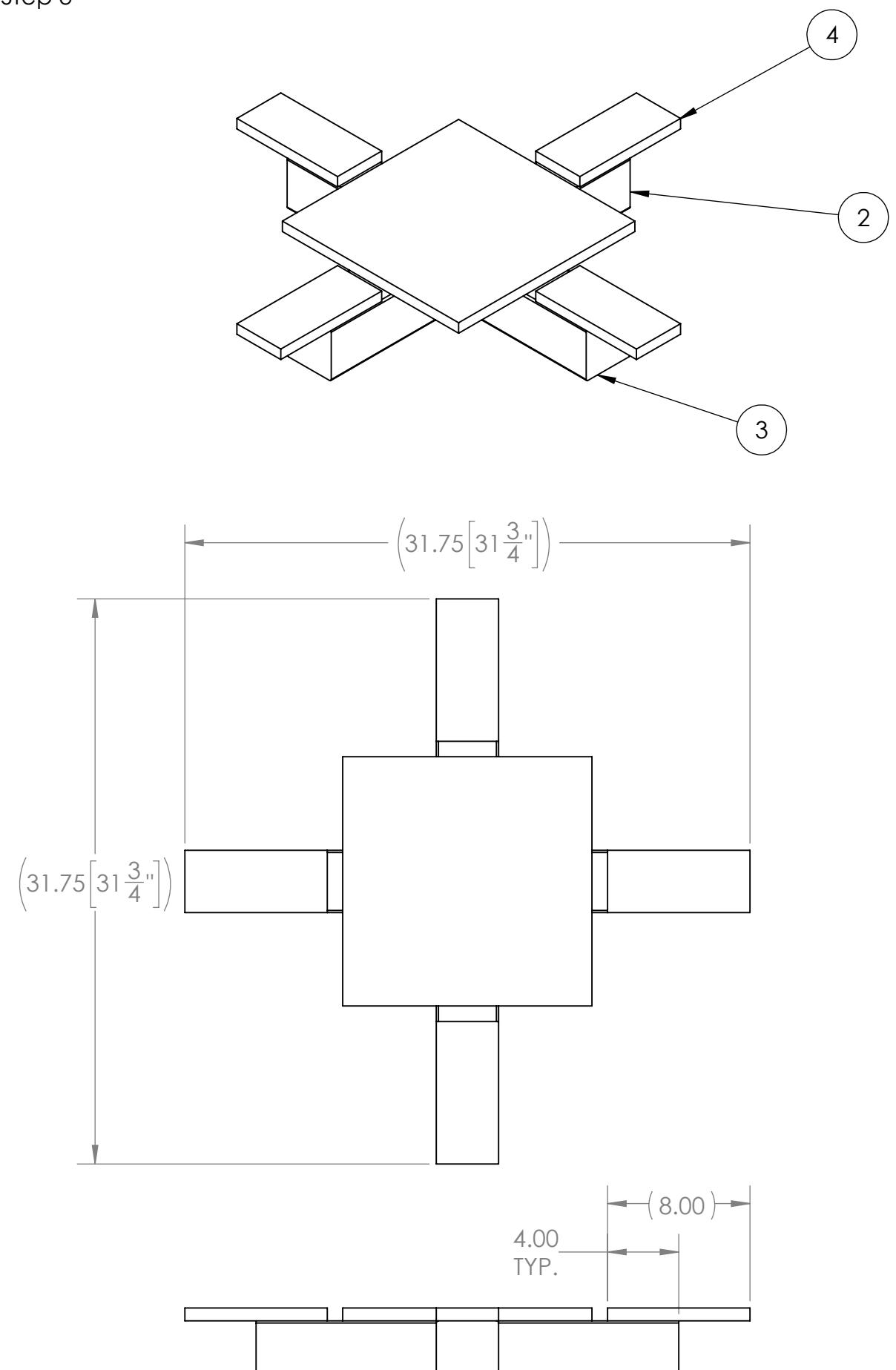
1. Align 2x (3) to (2) as shown. Attachment will happen in next step.

Step 2



1. Align (1) to Step 1, as shown.
 2. Connect using 2.5" long screws. It is recommended to use 4x screws into each (3) and 8x (2).
- Note: A best practice when screwing into a 4"x4" is to avoid placing a screw within 1" from the cut edge.

Step 3



1. Align a total of 4x (4) such that x2 are on (2) and x1 is on each (3), as shown.
2. Connect using 2.5" long screws. It is recommended to use 4x screws per (4).

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DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:
DO NOT SCALE DRAWING

TEAM NAME DATE
DRAWN KAMC 12/16/2021

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:

HUB - Complex Build -
Base Assembly

SIZE DWG. NO. REV

C TE-22110

SCALE: 1:8 SHEET 3 OF 3

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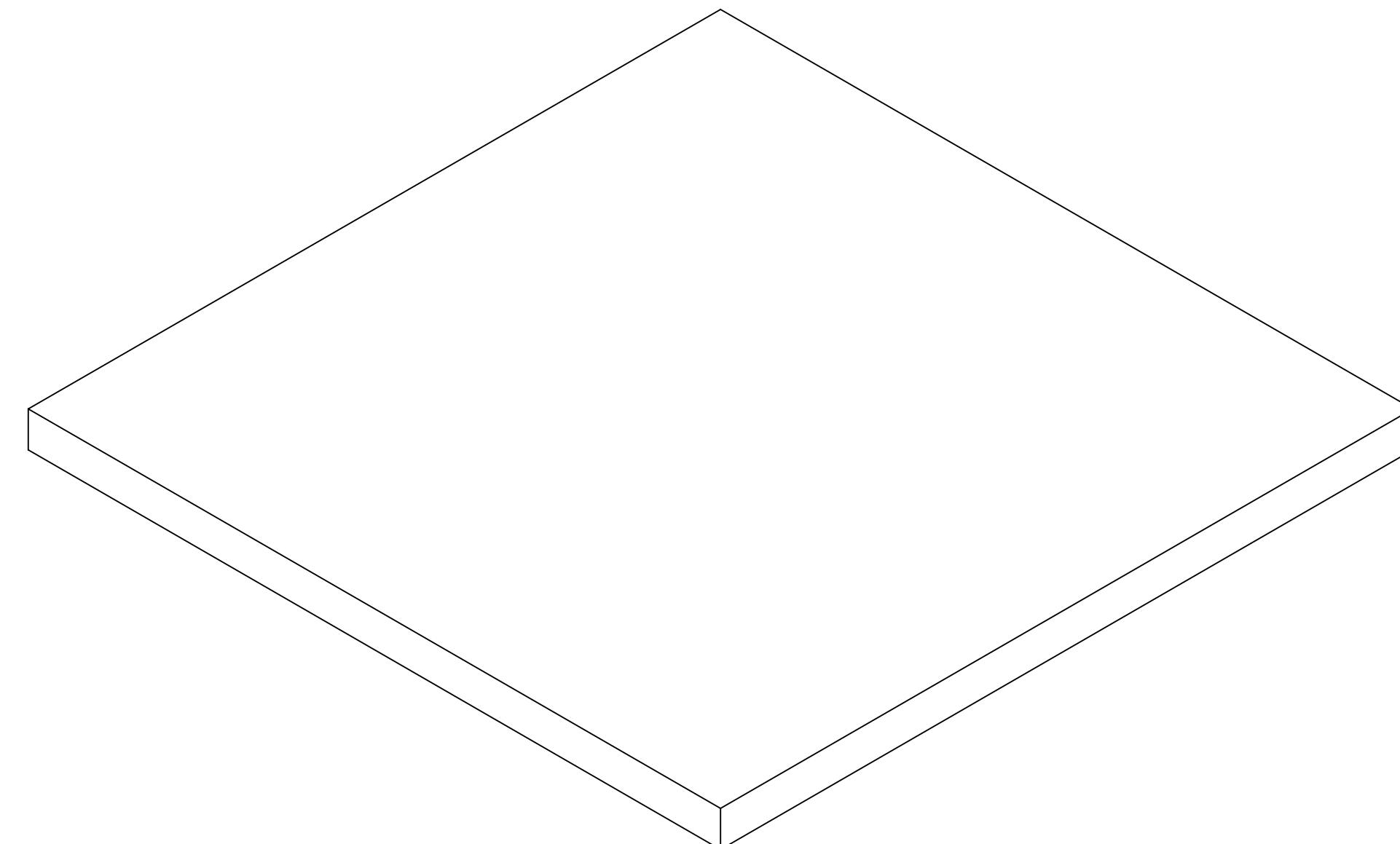
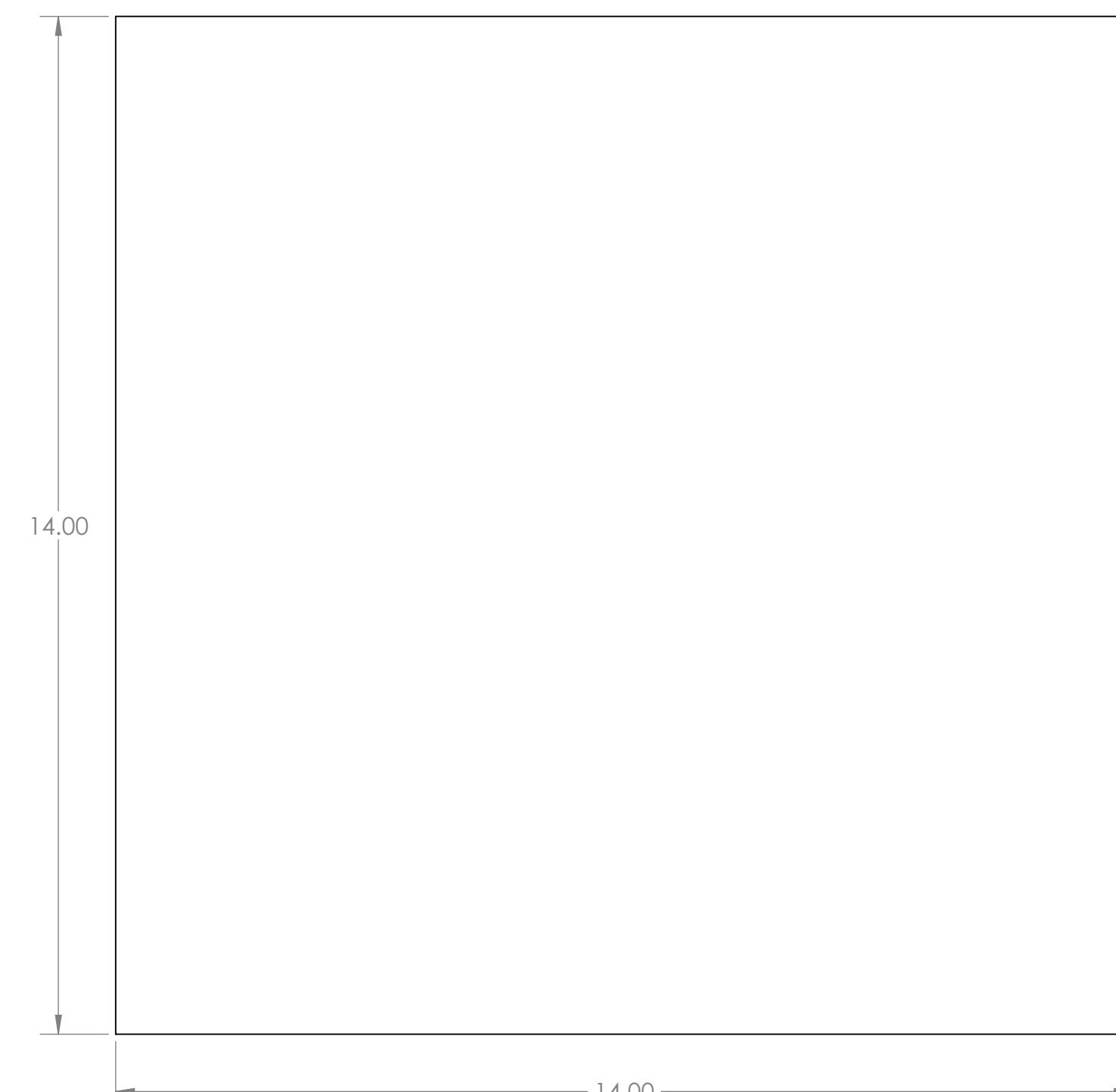
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DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

3/4" Plywood

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/16/2021

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 FIRST
ROBOTICS
COMPETITION

 SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build - Center Base Plate

SIZE DWG. NO. REV

C TE-22111

SCALE: 1:2 SHEET 1 OF 1

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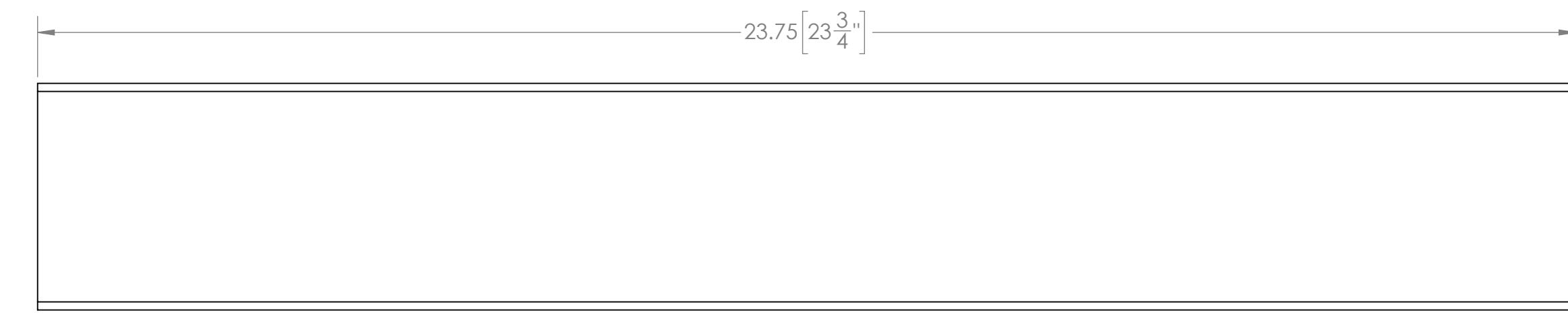
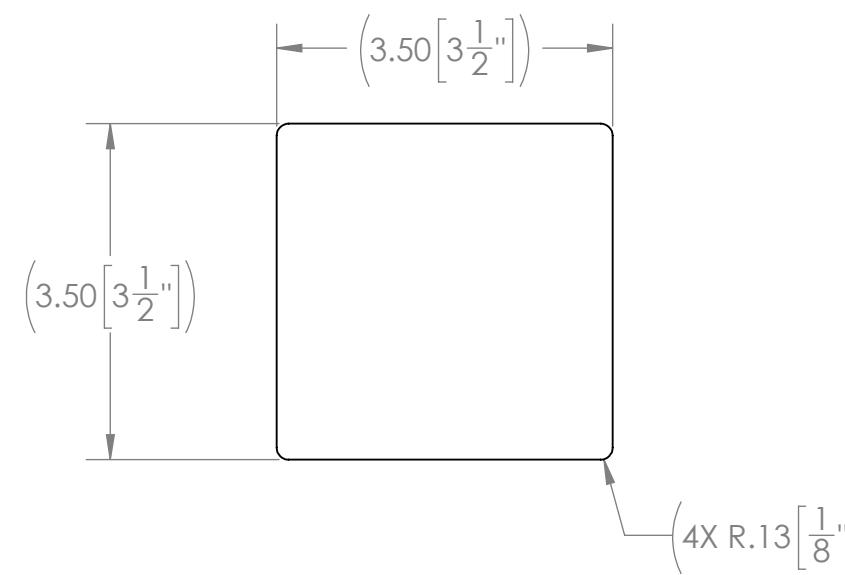
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
4" x 4" Lumber	C	TE-22112	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:2	SHEET 1 OF 1	

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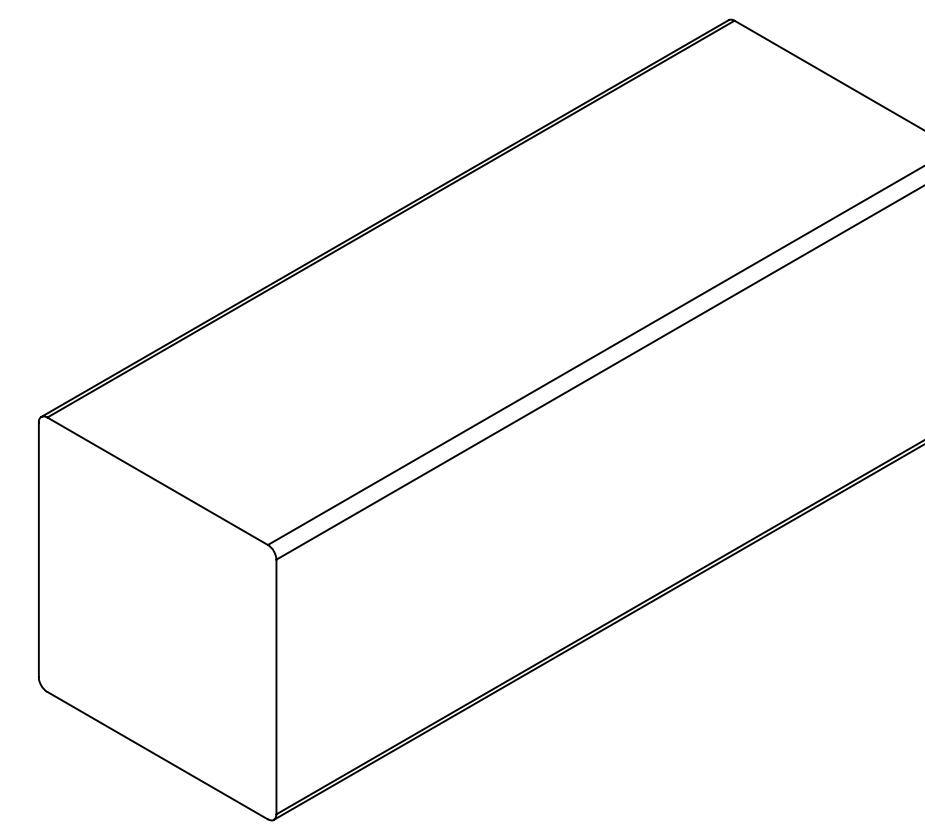
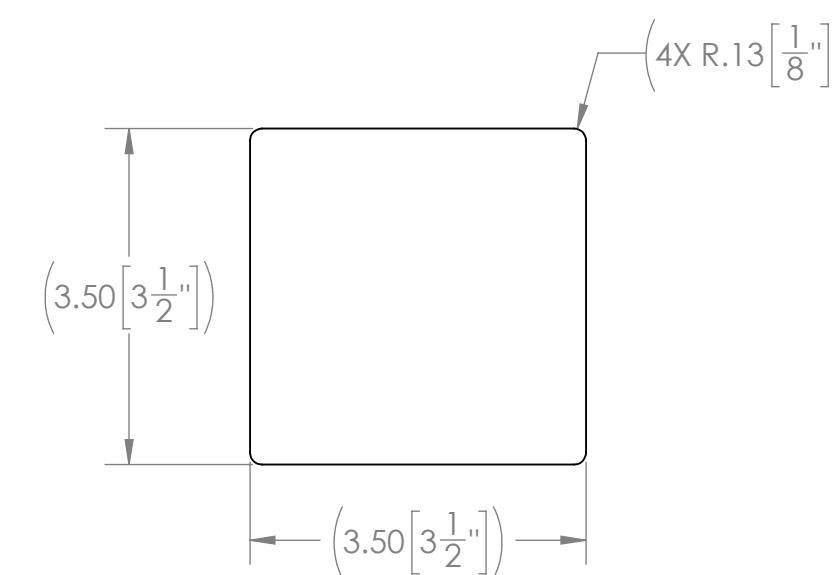
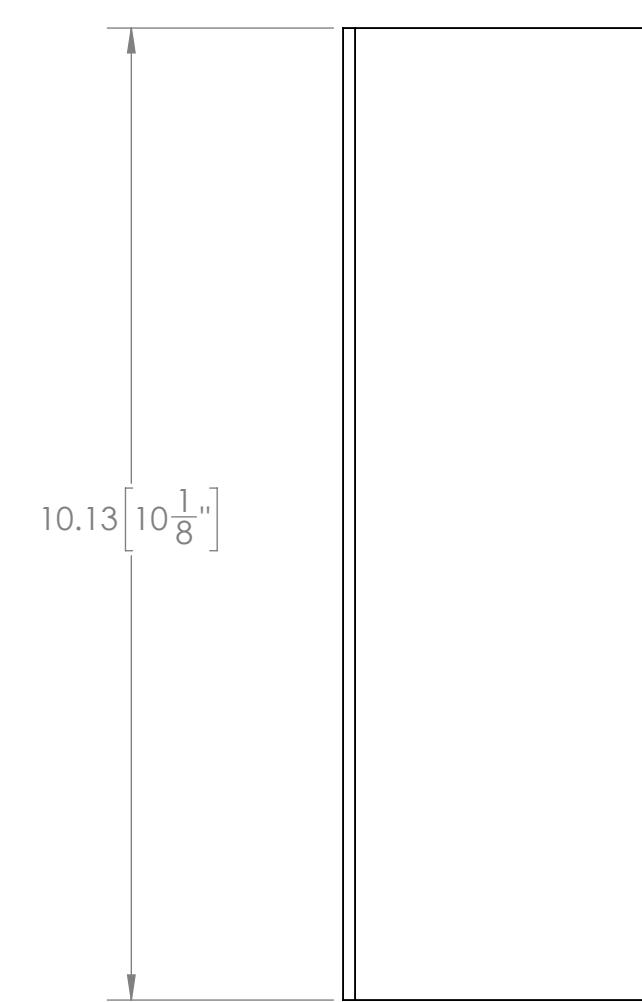
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DRAWN	KAMC	12/16/2021	
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
4" x 4" Lumber	C	TE-22113	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:2	SHEET 1 OF 1	

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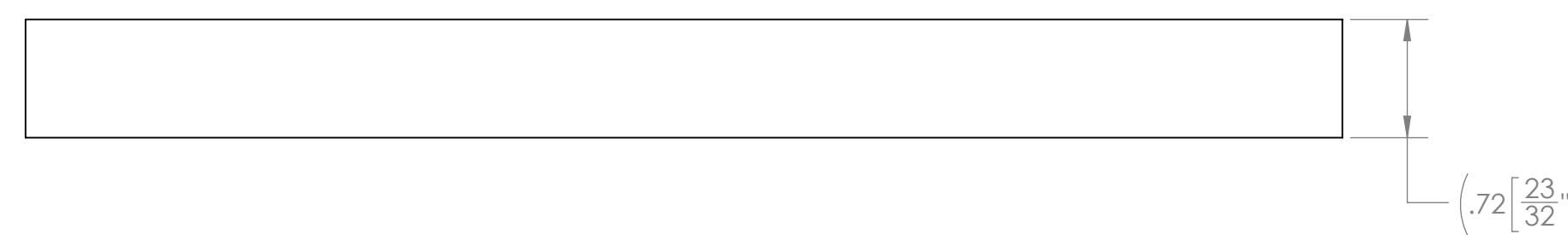
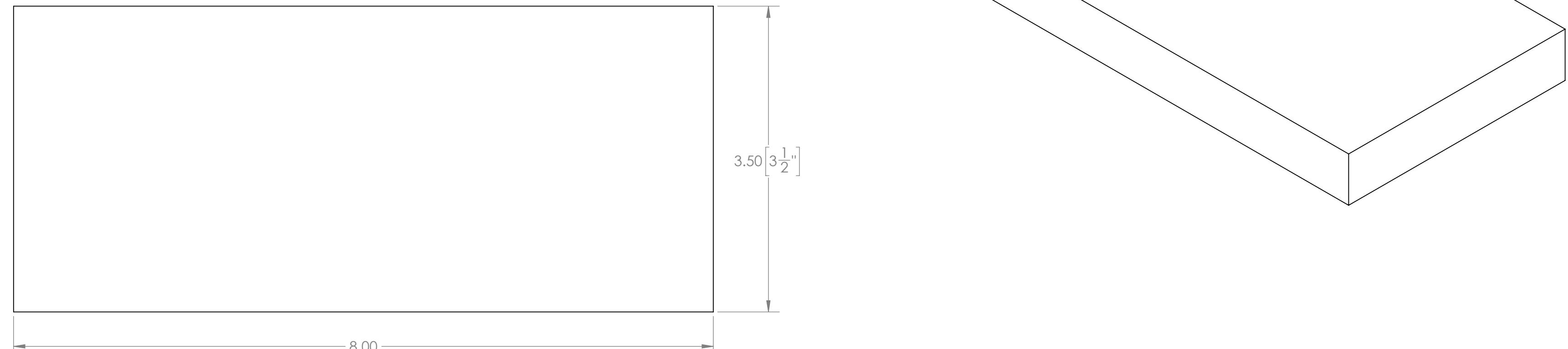
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	KAMC	12/16/2021
PROPRIETARY AND CONFIDENTIAL			
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/FINISH: 3/4" Plywood	SIZE	DWG. NO.	REV
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.	C	TE-22114	
DO NOT SCALE DRAWING	SCALE: 1:1	SHEET 1 OF 1	

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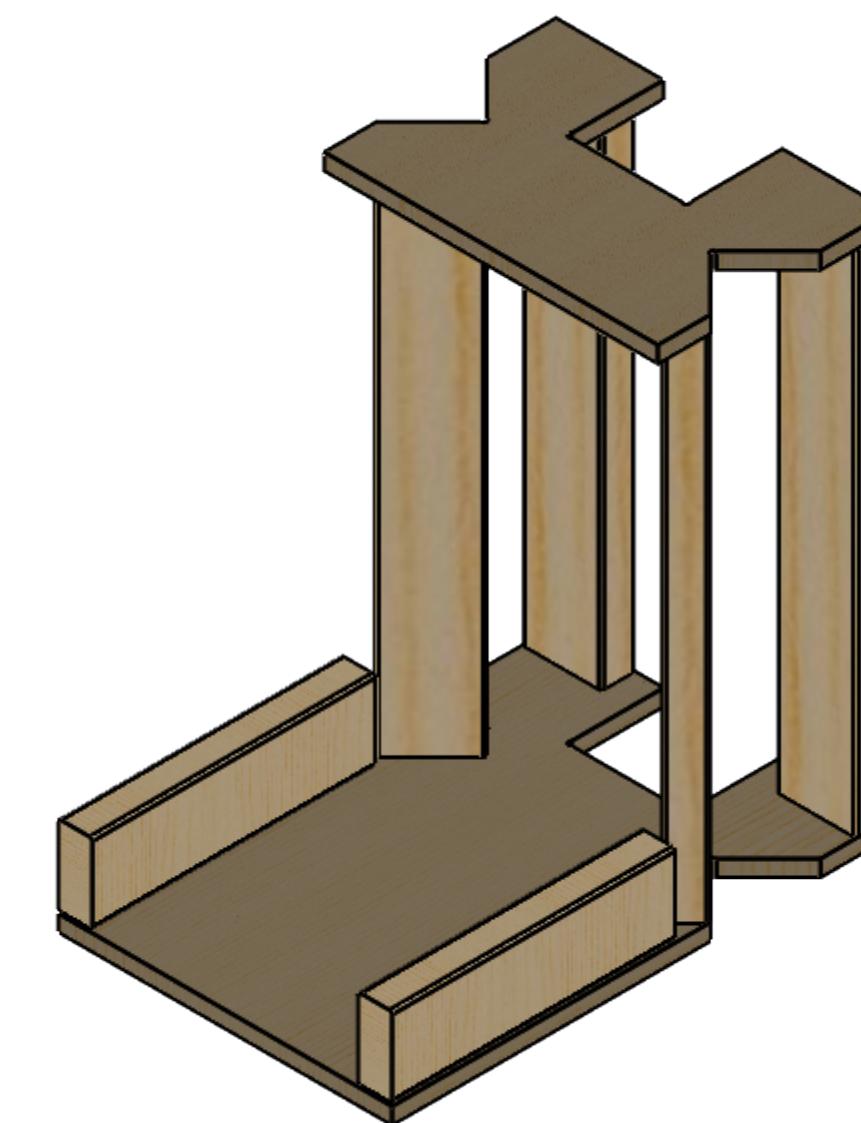
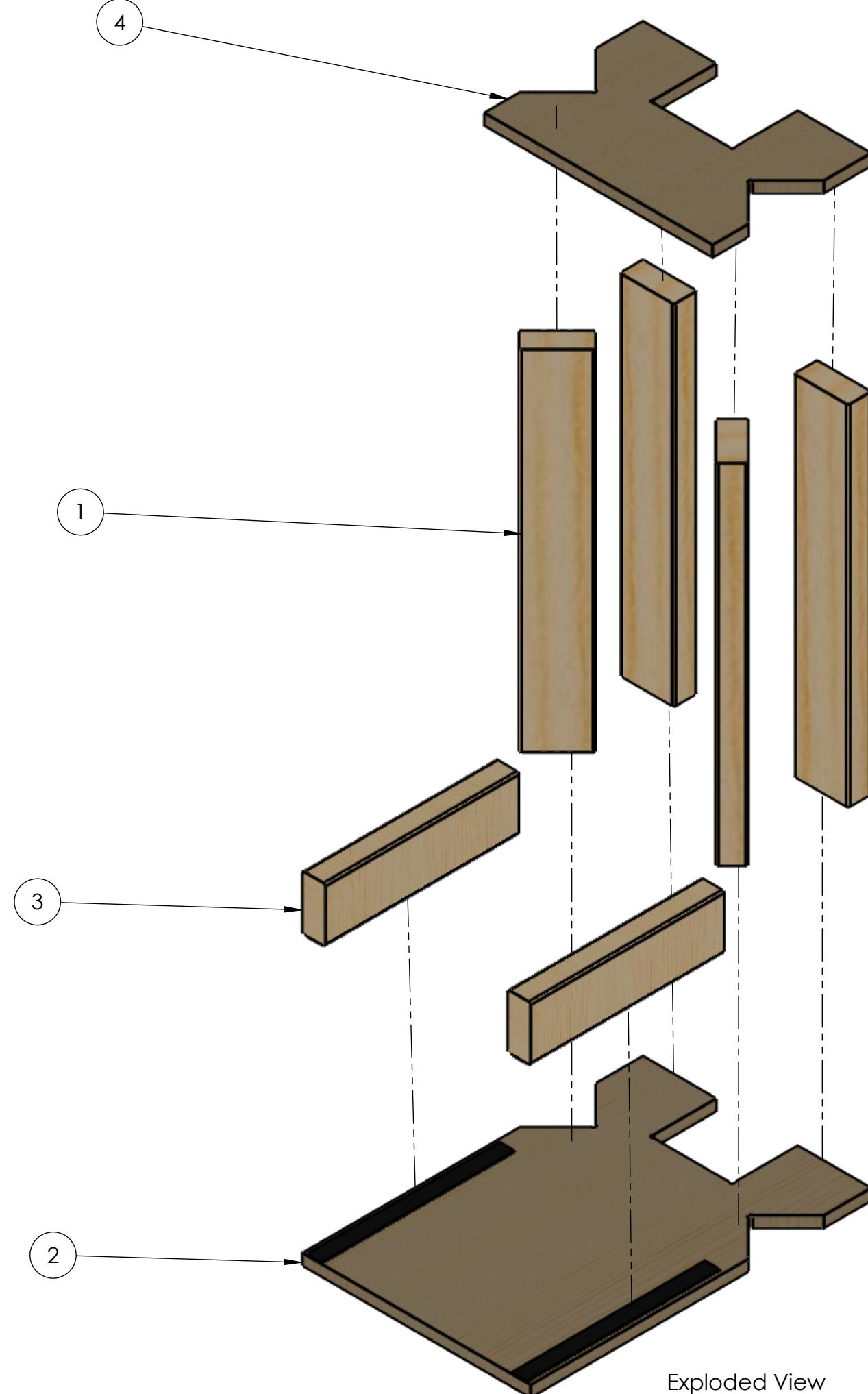
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Hardware Needed:
#8 x 2" Long Screw - Qty 16

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22101	HUB - Complex Build - Fender and Lower Exit Vertical 2x4	4
2	TE-22122	HUB - Complex Build - Lower Exit Bottom with Loop Assembly	1
3	TE-22124	HUB - Complex Build - Lower Exit Removable Edge with Hook Assembly	2
4	TE-22125	HUB - Complex Build - Lower Exit Top	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/20/2021

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COMMENTS:
REMOVE ALL BURRS AND SHARP EDGES.



TITLE: HUB - Complex Build - Lower Exit Assembly

SIZE DWG. NO. REV

C TE-22120

SCALE: 1:6 SHEET 1 OF 3

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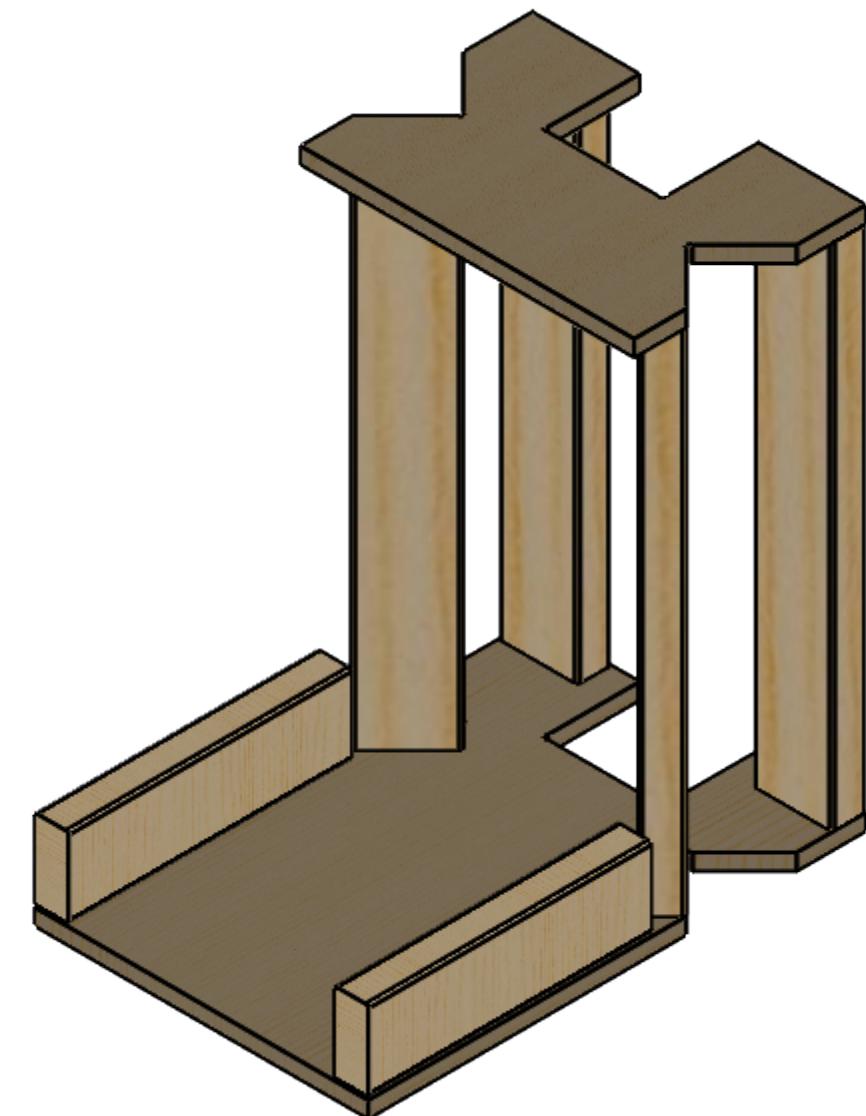
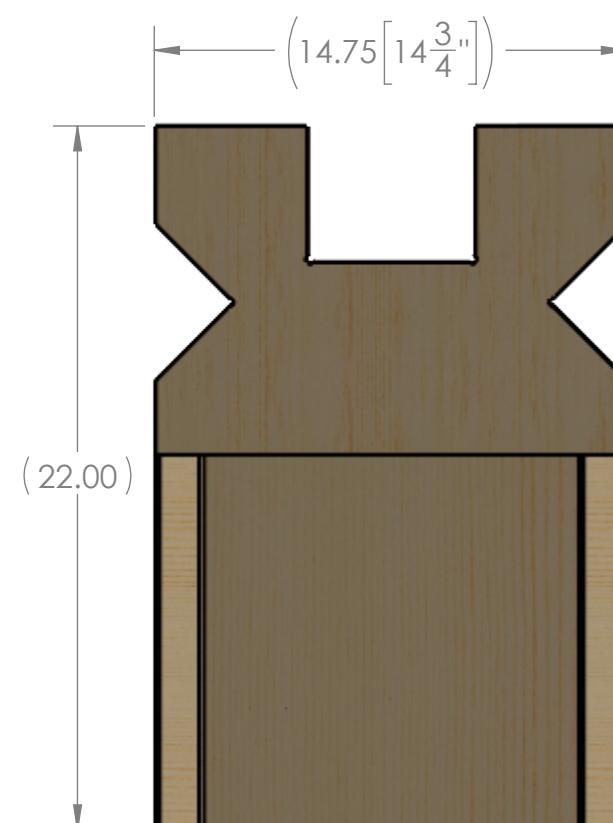
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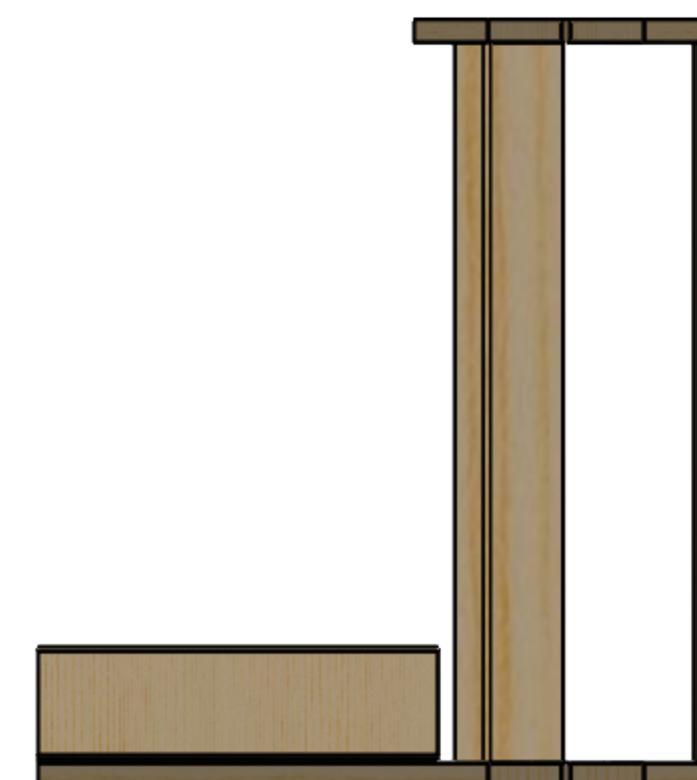
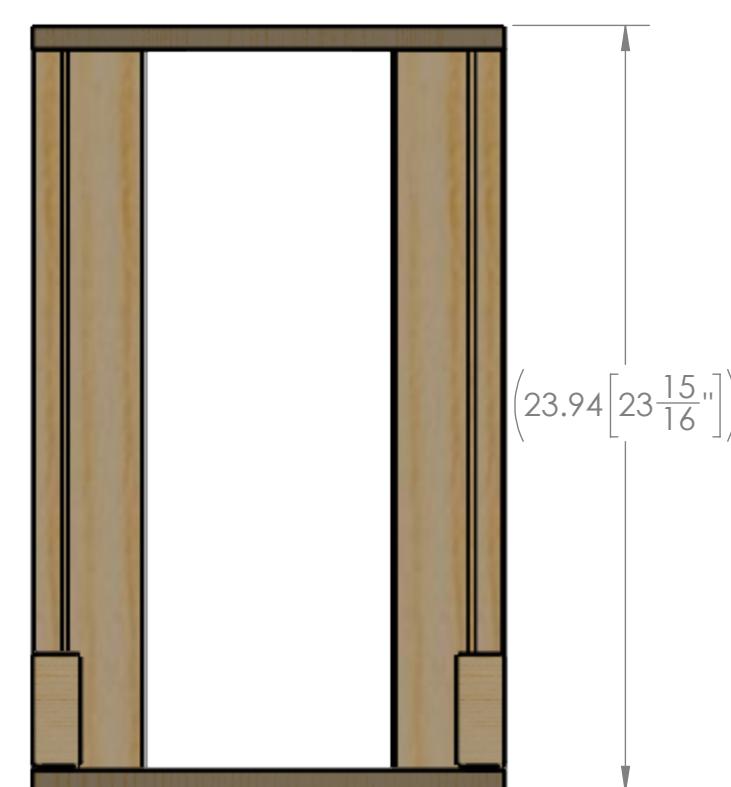
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	KAMC	12/20/2021	
PROPRIETARY AND CONFIDENTIAL			
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

 **FIRST
ROBOTICS
COMPETITION** 

TITLE:
HUB - Complex Build - Lower Exit Assembly

SIZE DWG. NO. REV

C TE-22120

SCALE: 1:6 SHEET 2 OF 3

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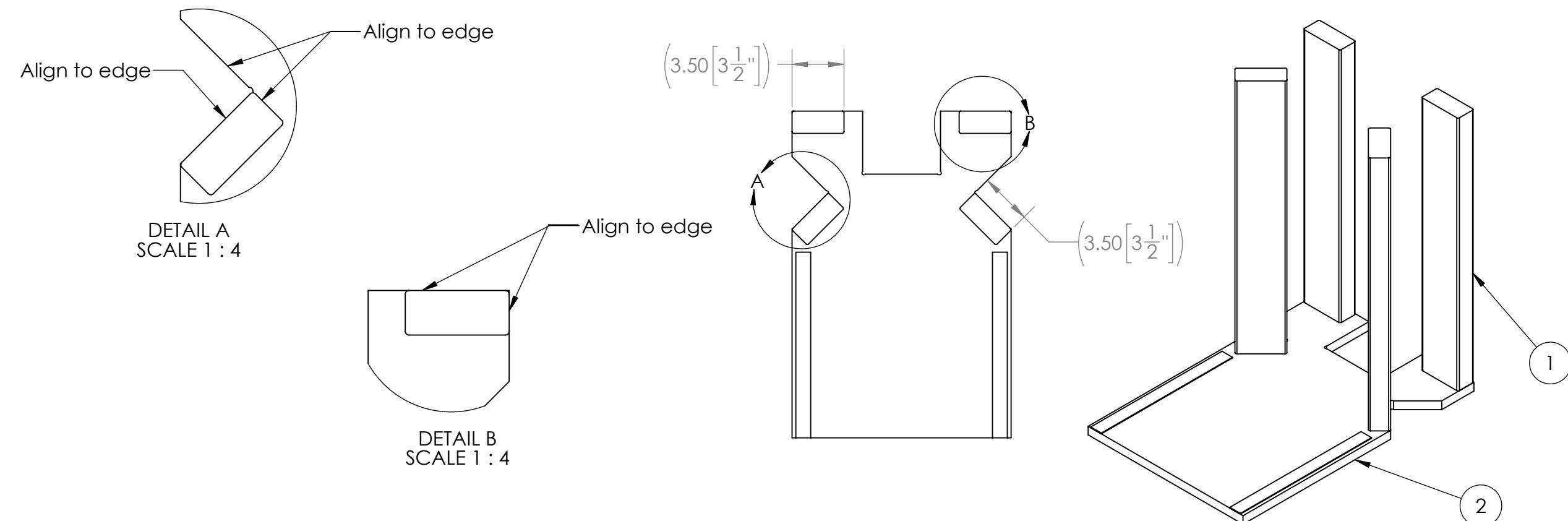
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Step 1

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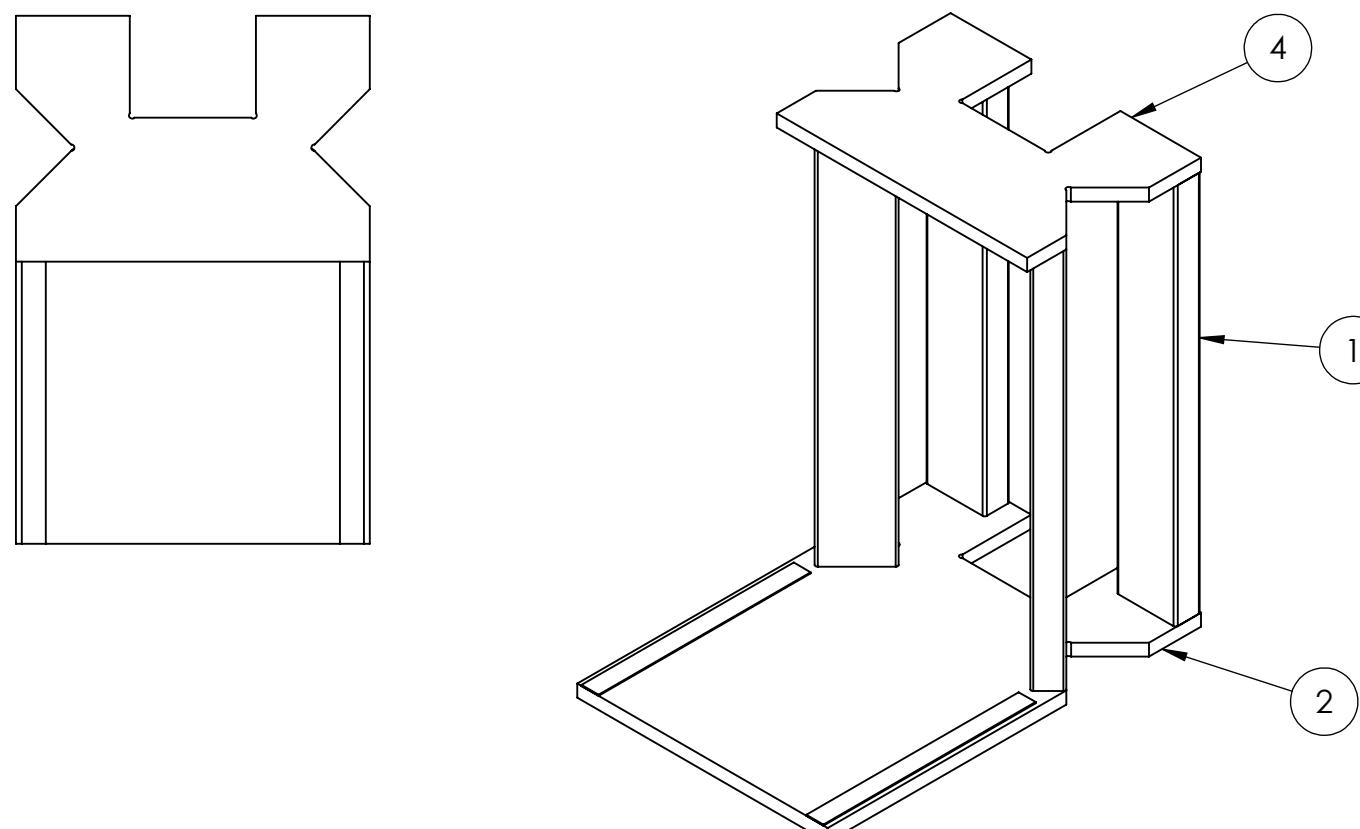
1. Align 4x (1) onto (2) as shown.
2. Secure (1) to (2) by using 2" long screws through the bottom of (1) into (2). It is recommended to use 2x screws into each (1).



Step 2

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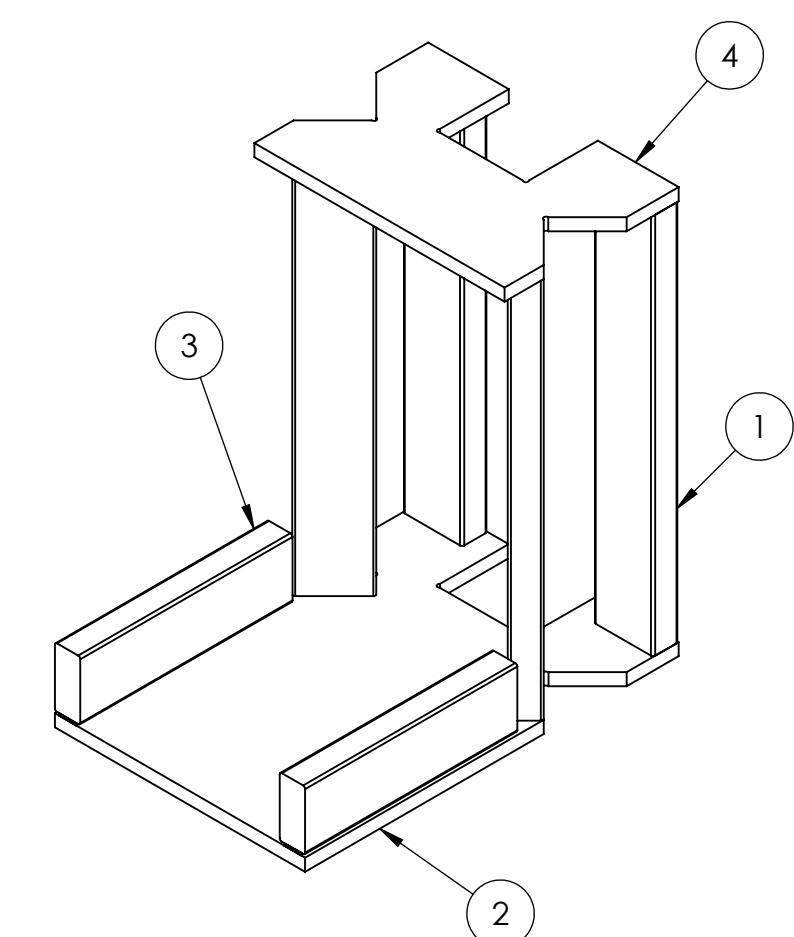
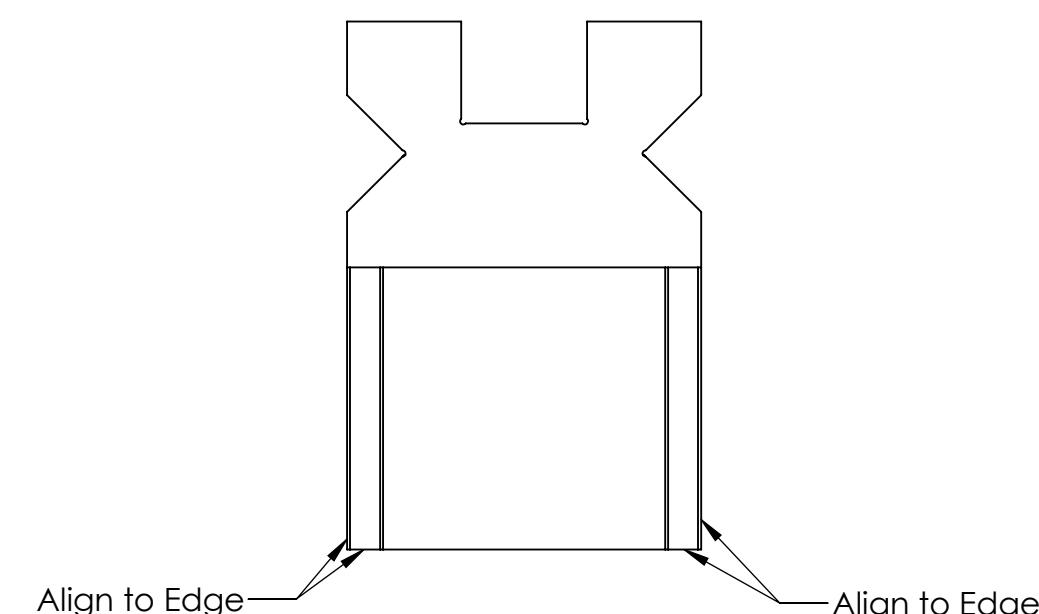
1. Add (4) to Step 1 by aligning (1) to (4) in the same manner as aligning (1) to (2) from Step 1.
2. Secure (4) to (1) by using 2" long screws through the top of (4) into (1). It is recommended to use x2 screws into each (1).



Step 3

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1. Attach 2x (3) to (2) using the pre-installed Hook and Loop, as shown.



UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	KAMC	12/20/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$				
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$				
MATERIAL/FINISH:	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.				
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING				
SIZE		DWG. NO.	REV	
C		TE-22120		
SCALE: 1:8		SHEET 3 OF 3		

FIRST
ROBOTICS
COMPETITION

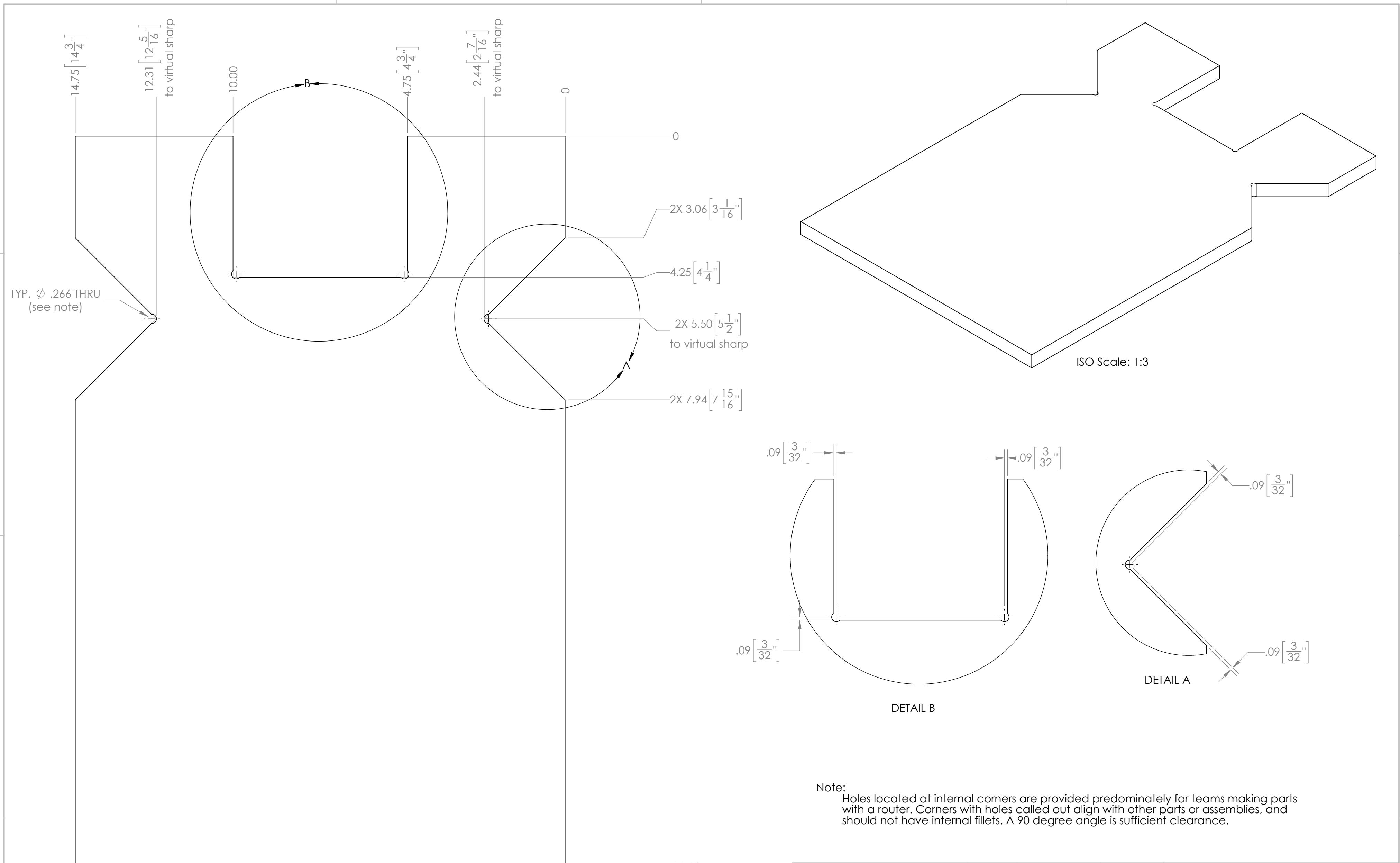
SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Lower Exit Assembly

SIZE DWG. NO. REV

C TE-22120

SCALE: 1:8 SHEET 3 OF 3



UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	KAMC	12/17/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$					
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$					
MATERIAL/FINISH:	3/4" Plywood				
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING					

FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

HUB - Complex Build - Lower Exit Bottom

C **TE-22121**

SCALE: 1:2 **SHEET 1 OF 1**

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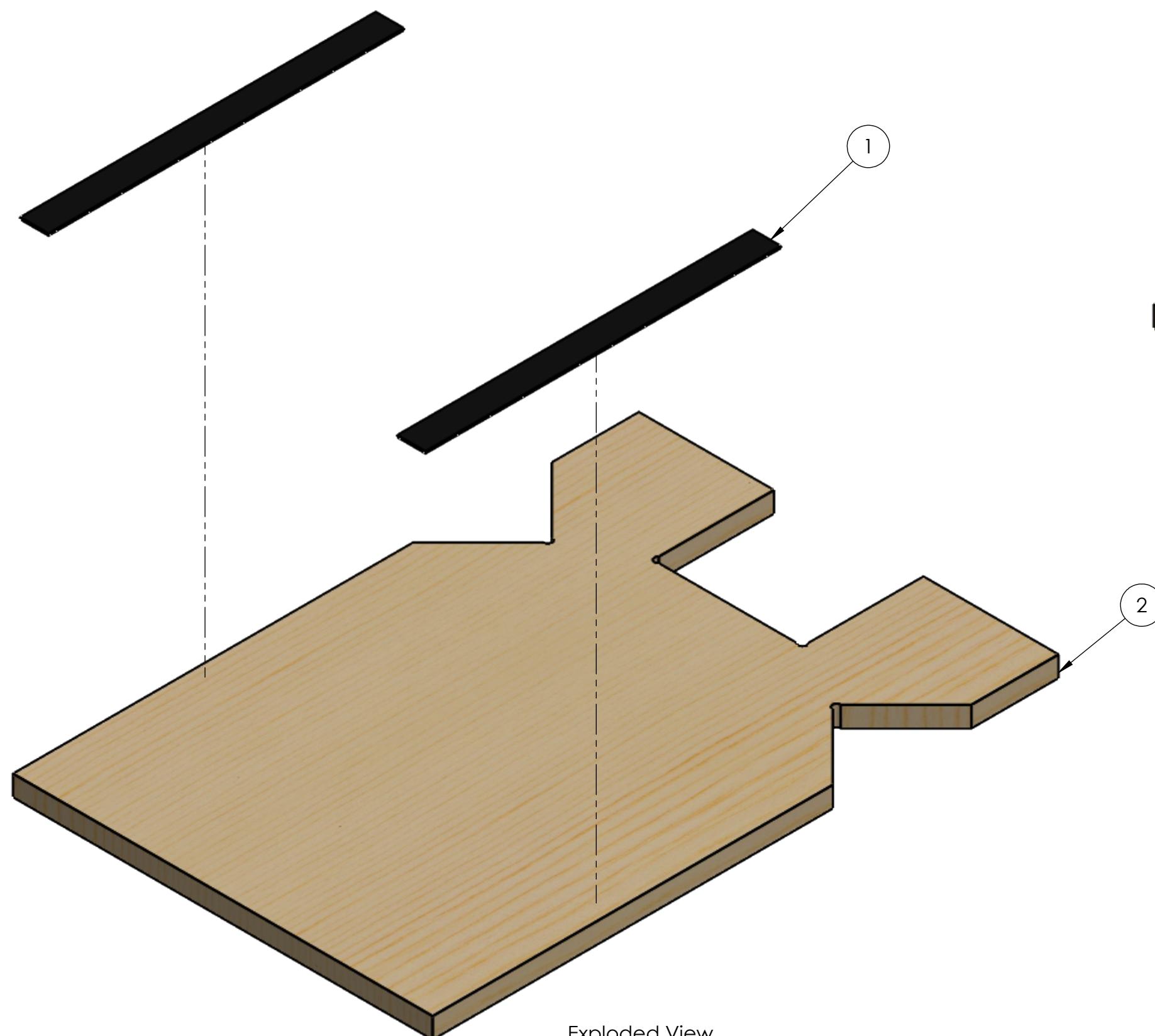
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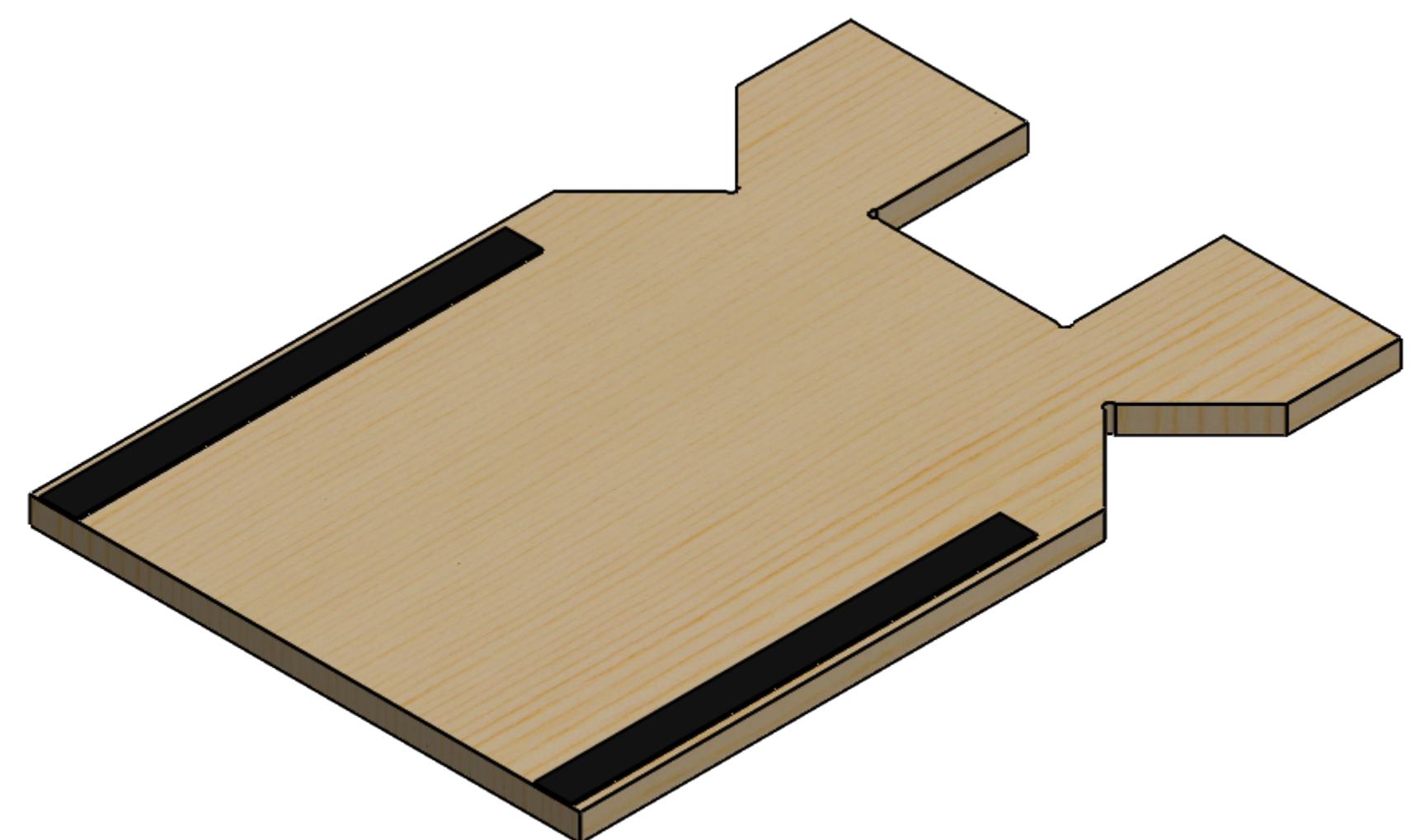
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Exploded View



Step 1

1. Attach (1) to (2) using adhesive backing. Align as shown on Sheet 2.
2. Optional: Use wood staples to connect (1) to (2).

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

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COMMENTS:
REMOVE ALL BURRS AND SHARP
EDGES.

DO NOT SCALE DRAWING

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Loop_1_12.5	1" x 12.5" Loop, Adhesive Backed	2
2	TE-22121	HUB - Complex Build - Lower Exit Bottom	1

Hardware Needed:
Optional: Wood Staples

TEAM NAME DATE
DRAWN KAMC 12/20/2021

FIRST ROBOTICS COMPETITION DS SOLIDWORKS
Modeling Solutions Partner

TITLE: HUB - Complex Build -
Lower Exit Bottom with
Loop Assembly

SIZE DWG. NO. REV
C TE-22122

SCALE: 1:3 SHEET 1 OF 2

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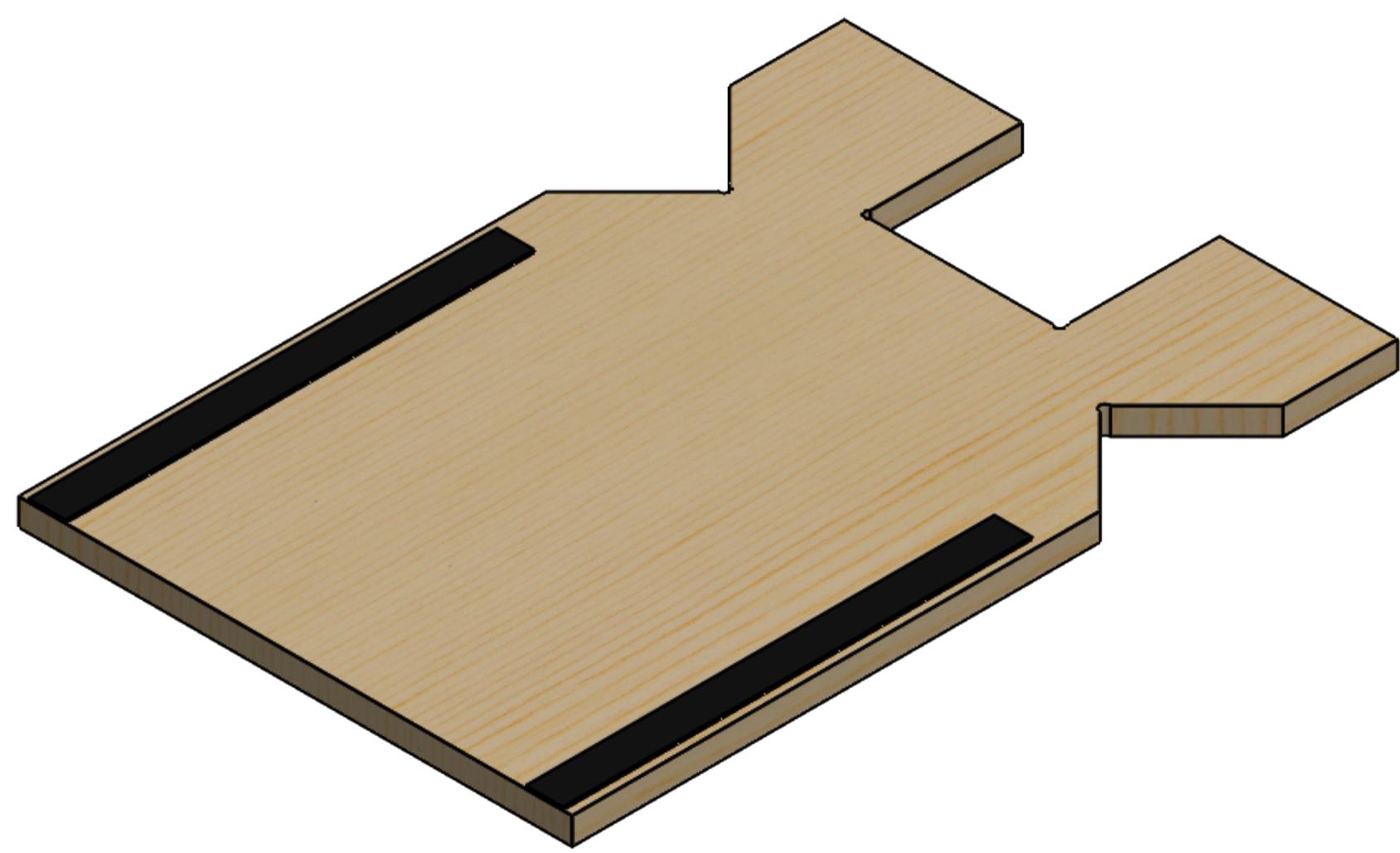
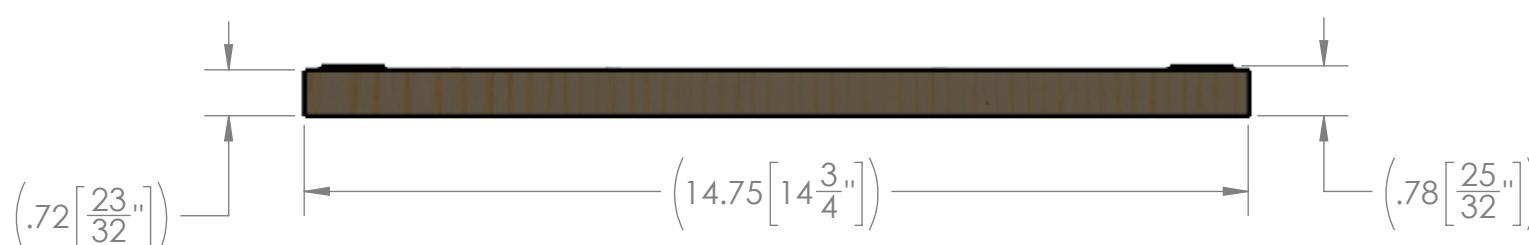
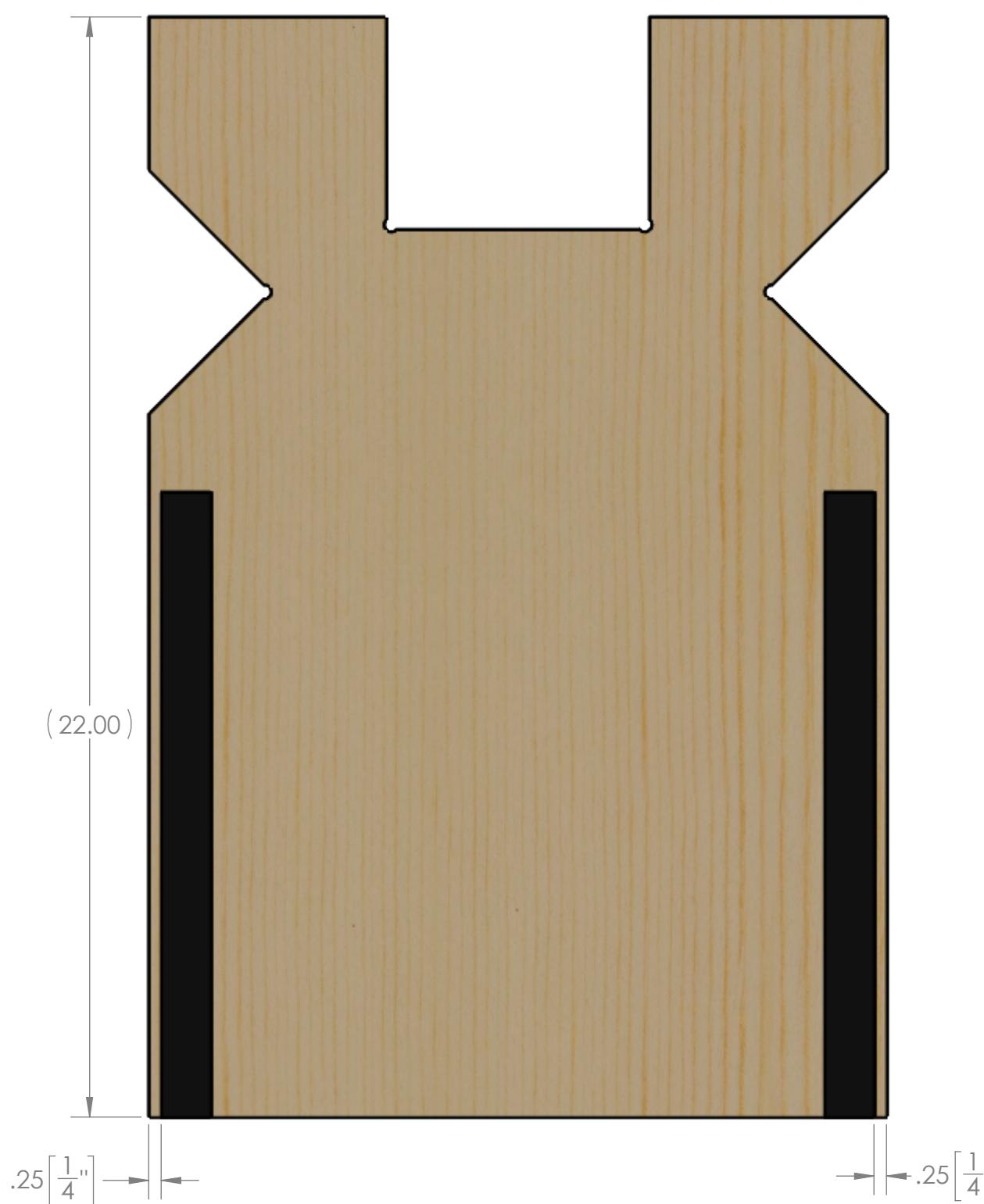
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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/20/2021



TITLE: HUB - Complex Build - Lower Exit Bottom with Loop Assembly

SIZE DWG. NO. REV

C TE-22122

SCALE: 1:3 SHEET 2 OF 2

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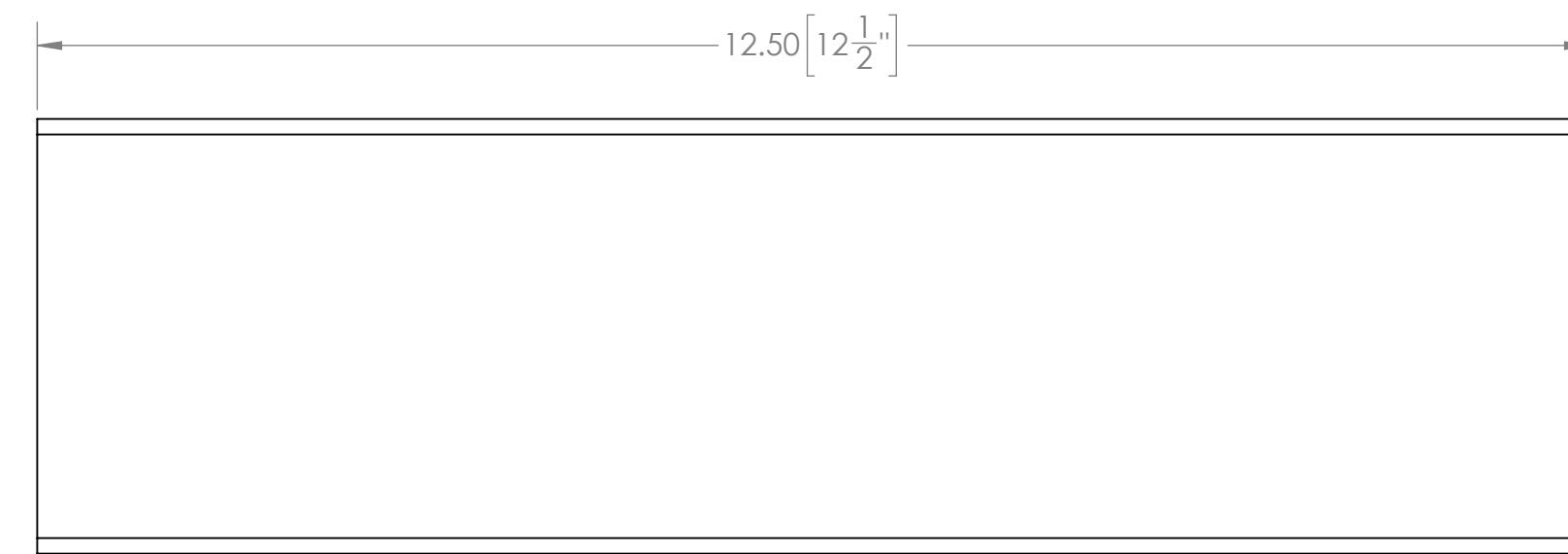
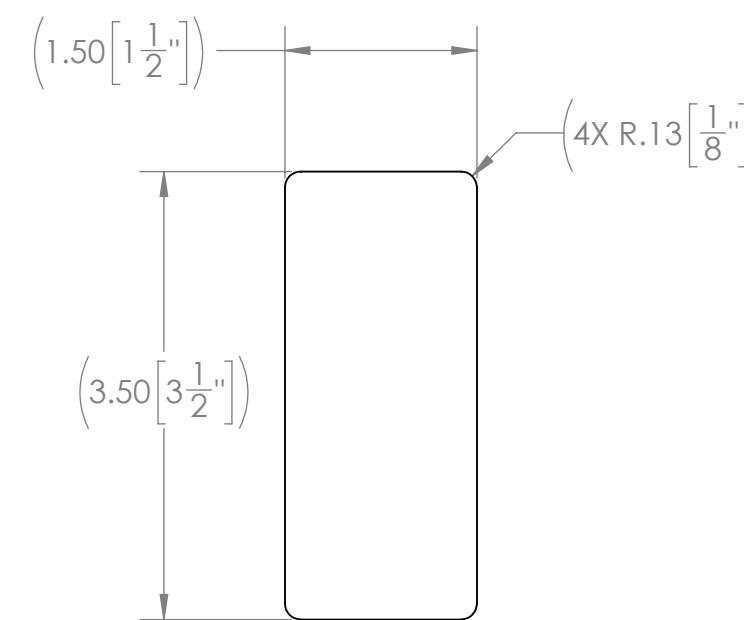
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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:
2" x 4" Lumber

DO NOT SCALE DRAWING

TEAM NAME DATE
DRAWN KAMC 12/17/2021

FIRST ROBOTICS COMPETITION
SOLIDWORKS Modeling Solutions Partner

TITLE: HUB - Complex Build -
Lower Exit Removable
Edge 2x4
SIZE DWG. NO. REV
C TE-22123

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PERMISSION OF FIRST IS
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COMMENTS:
REMOVE ALL BURRS AND SHARP
EDGES.

SCALE: 2:3 SHEET 1 OF 1

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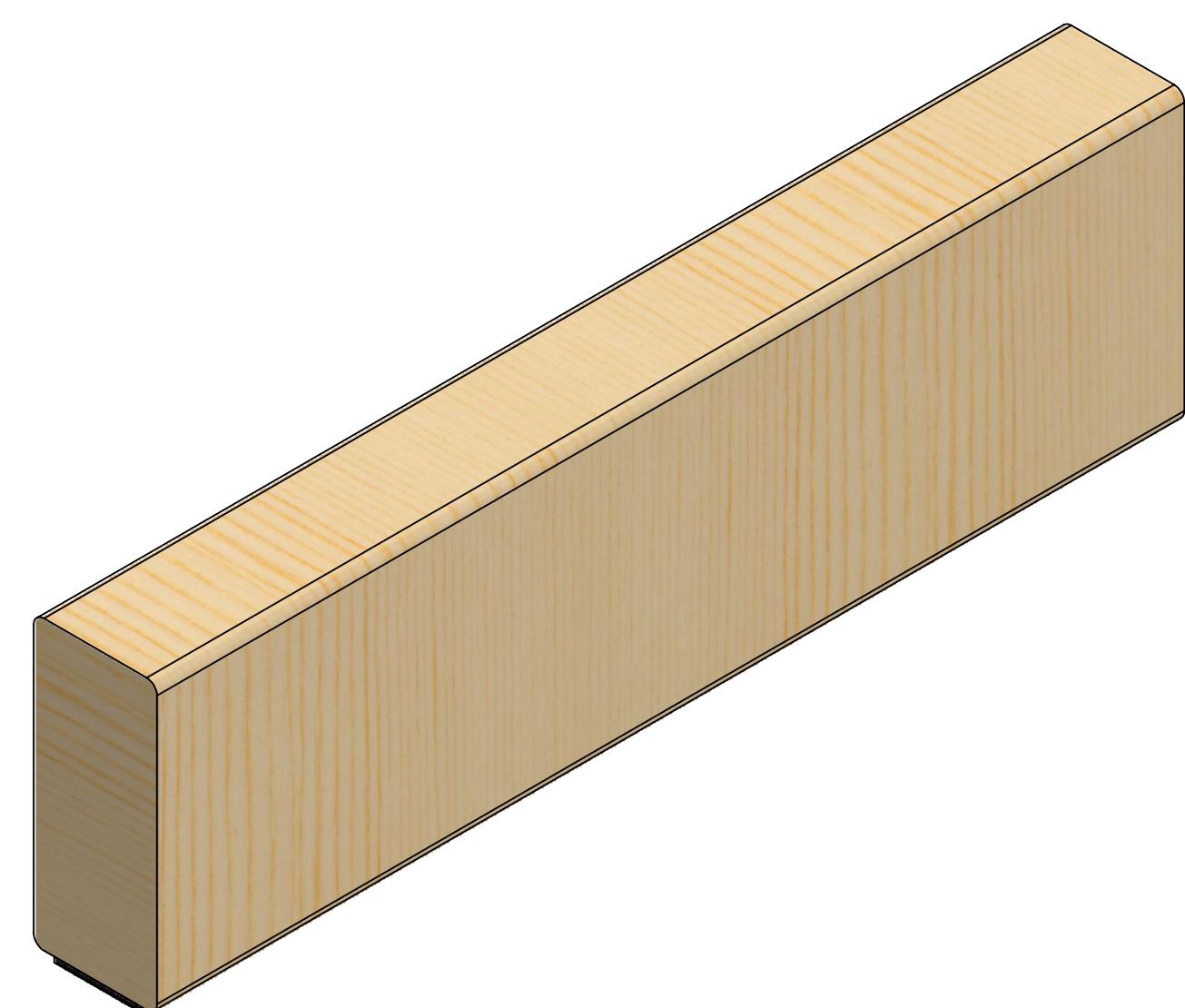
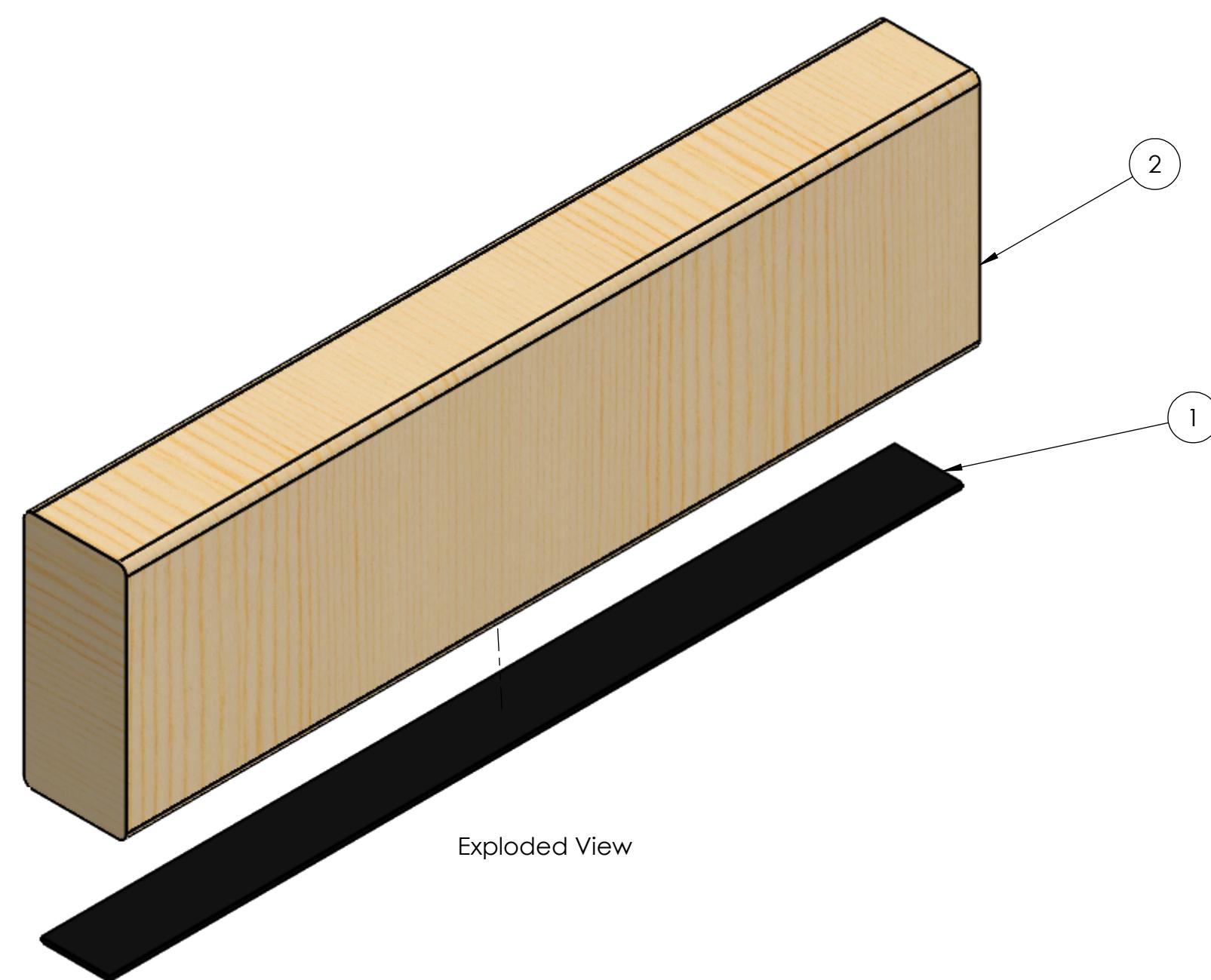
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Hardware Needed:
Optional: Wood Staples

Step 1

1. Attach (1) to (2) as shown using adhesive backing.
2. Optional: Use wood staples to connect (1) to (2).

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Hook_1_12.5	1" x 12.5" Hook, Adhesive Backed	1
2	TE-22123	HUB - Complex Build - Lower Exit Removable Edge 2x4	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

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COMMENTS:
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DO NOT SCALE DRAWING

TEAM NAME DATE
DRAWN KAMC 12/17/2021

FIRST ROBOTICS COMPETITION DS SOLIDWORKS
Modeling Solutions Partner

TITLE: HUB - Complex Build - Lower Exit Removable Edge with Hook Assembly

SIZE DWG. NO. REV
C TE-22124

SCALE: 2:3 SHEET 1 OF 2

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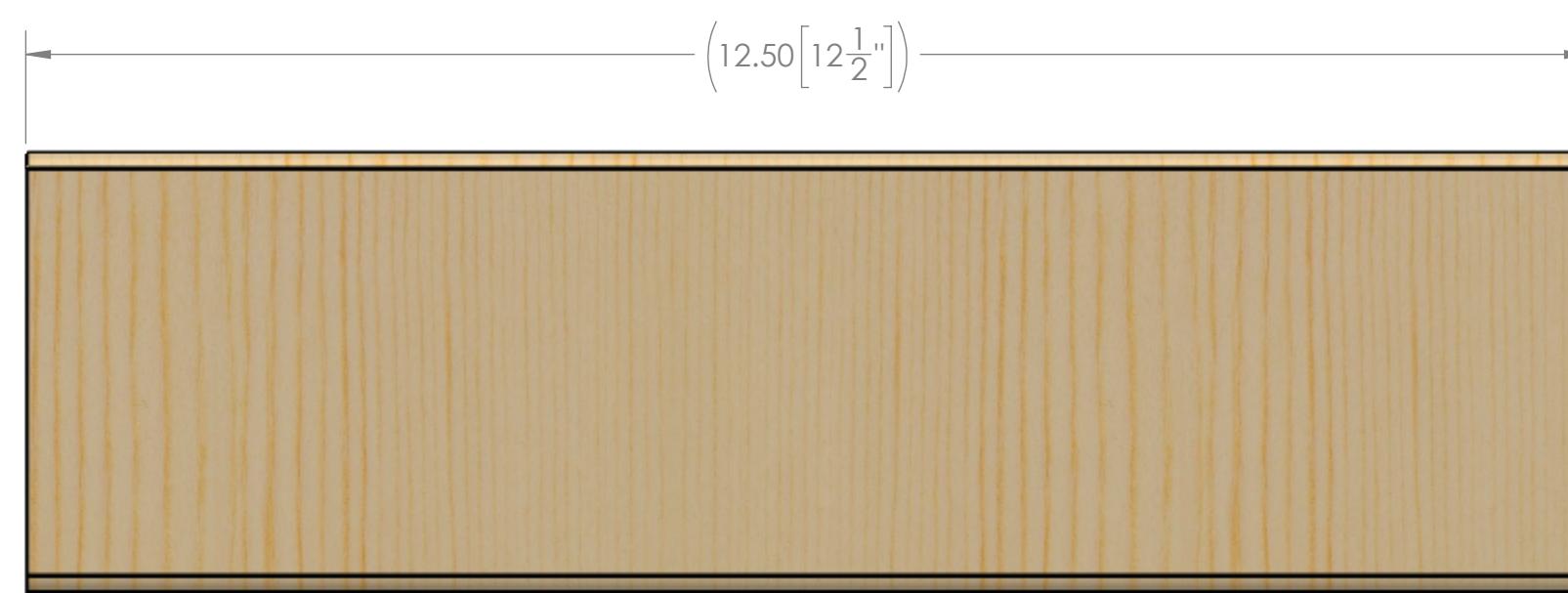
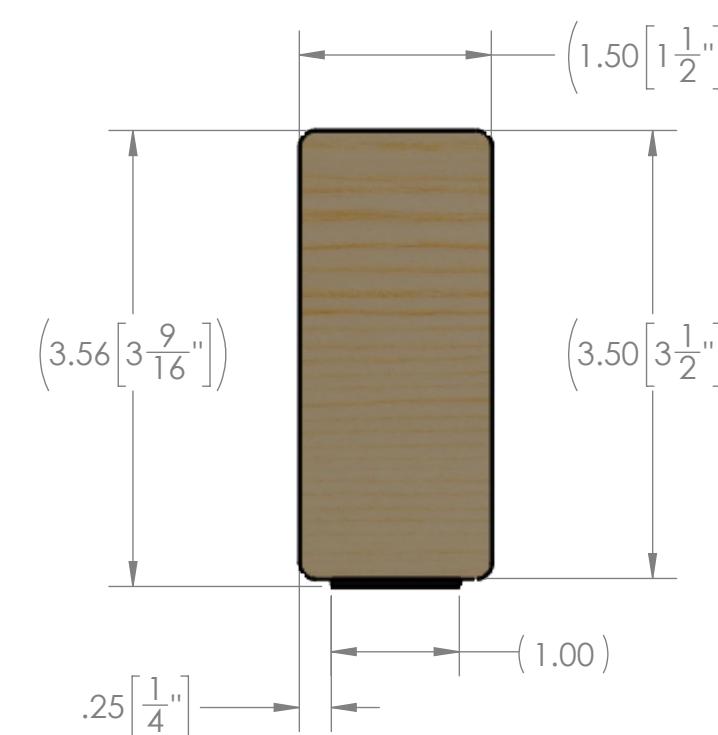
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DRAWN	KAMC	12/17/2021	
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
	C	TE-22124	
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING	SCALE: 2:3	SHEET 2 OF 2	

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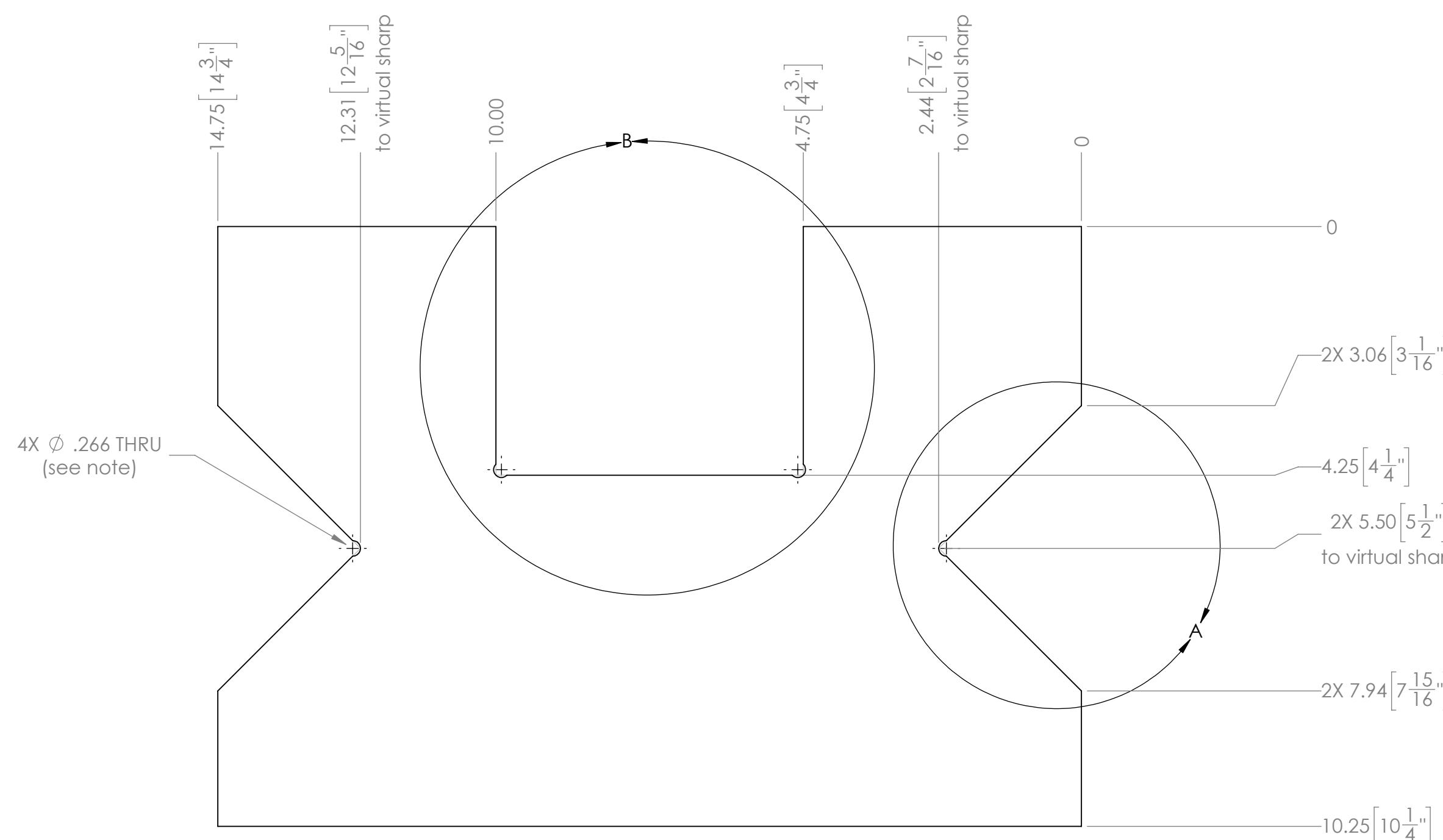
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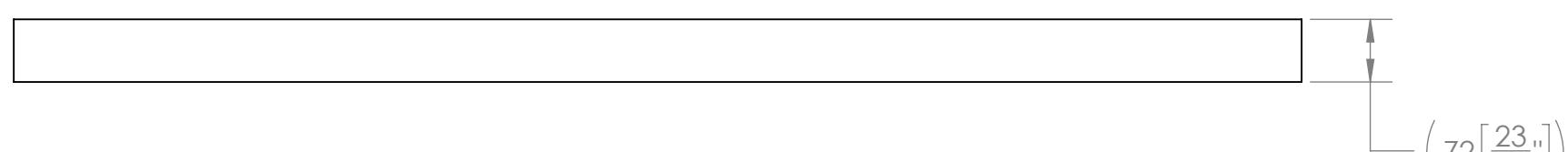
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Note:
Holes located at internal corners are provided predominately for teams
making parts with a router. Corners with holes called out align with other
parts or assemblies, and should not have internal fillets. A 90 degree angle is
sufficient clearance.



UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	KAMC	12/17/2021
TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125				
MATERIAL/FINISH: 3/4" Plywood				
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

TITLE: HUB - Complex Build - Lower Exit Top

SIZE DWG. NO. REV

C TE-22125

SCALE: 1:2 SHEET 1 OF 1

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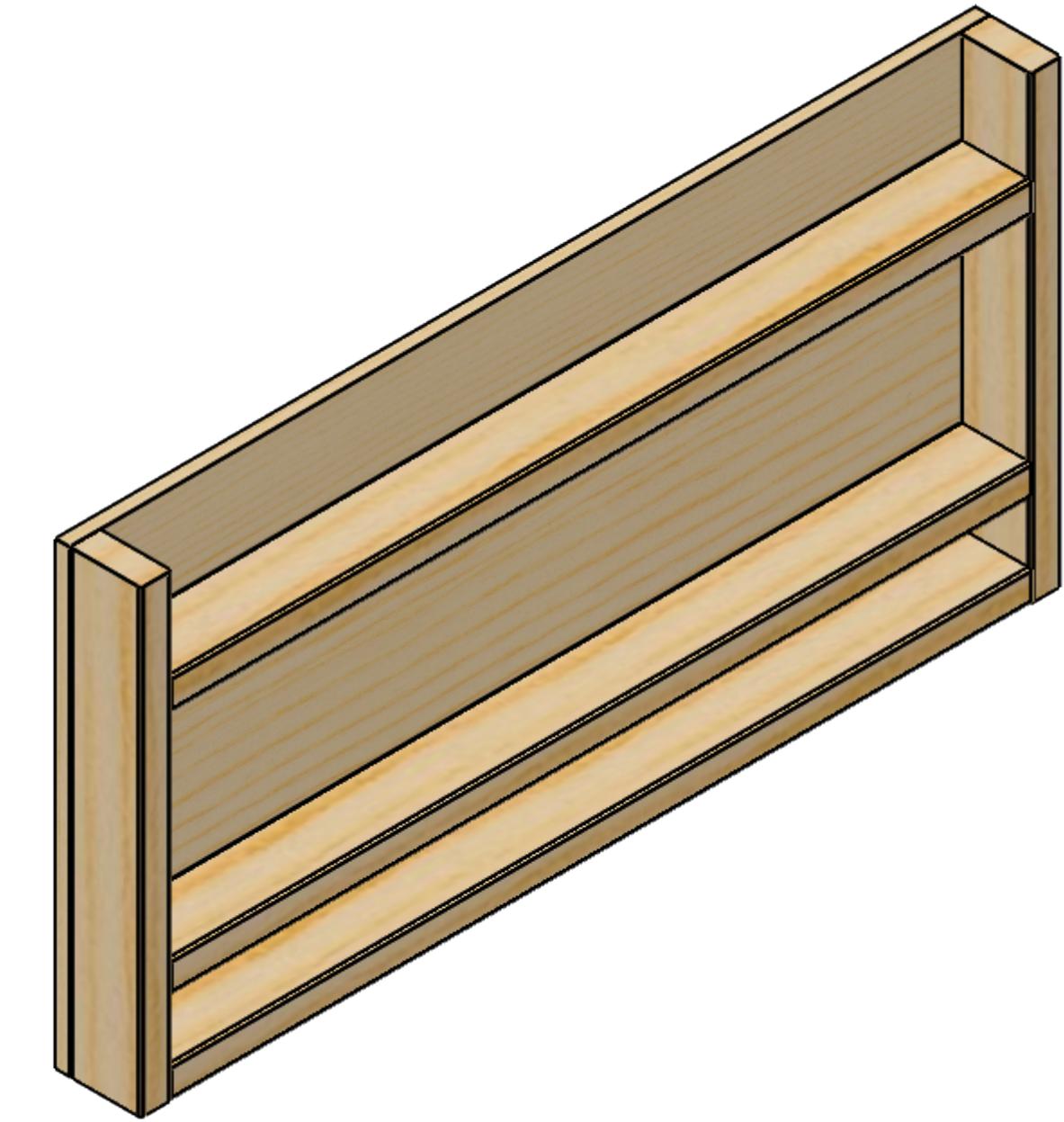
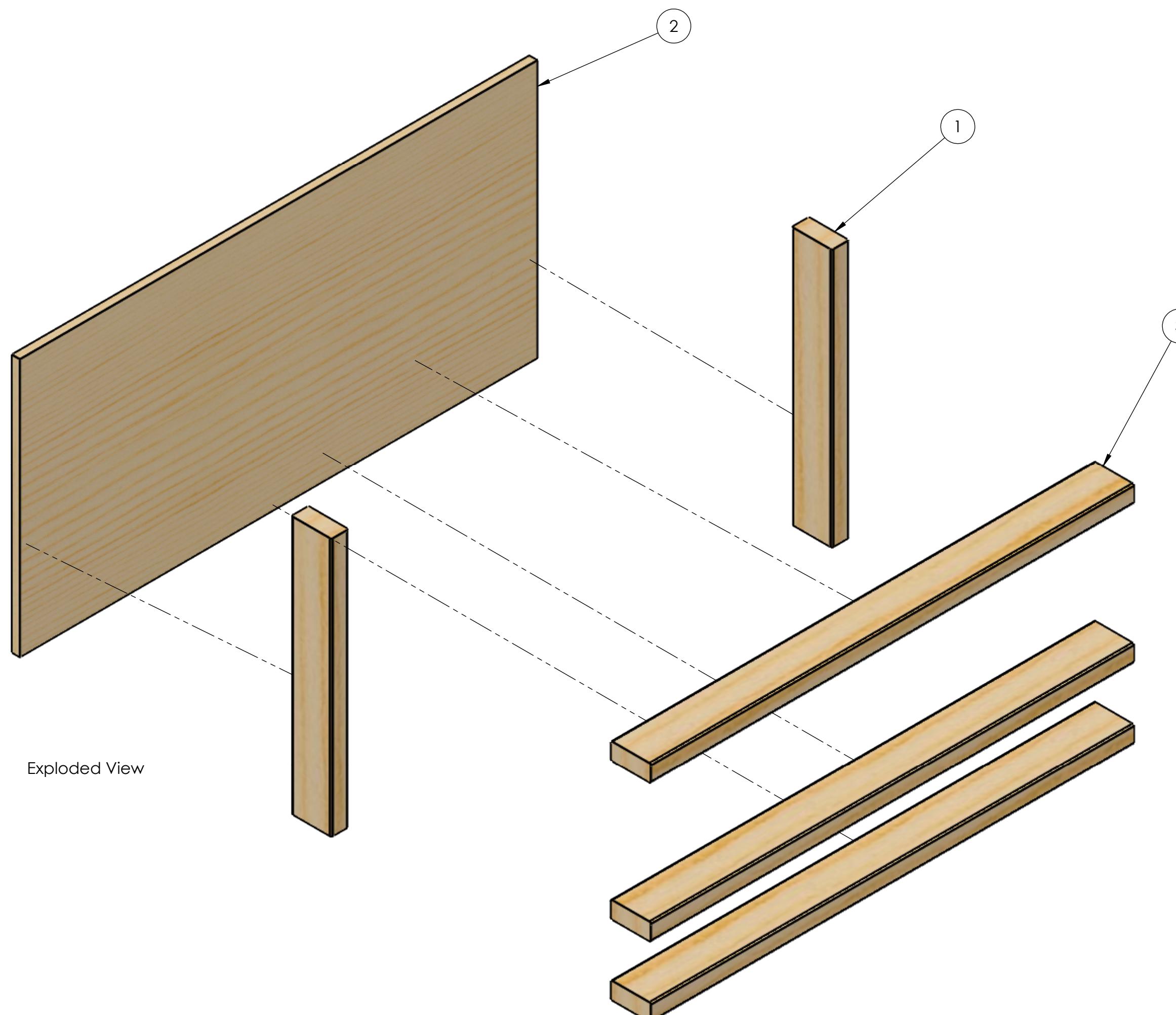
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Hardware Needed:
 #8 x 2" Long Screw - Qty 23
 #8 x 2.5" Long Screw - Qty 12

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22101	HUB - Complex Build - Fender and Lower Exit Vertical 2x4	2
2	TE-22131	HUB - Complex Build - Fender Front Face	1
3	TE-22132	HUB - Complex Build - Fender Horizontal 2x4	3

UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	KAMC	12/20/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$					
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$					
MATERIAL/FINISH:			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.		
COMMENTS:			REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING			SIZE	DWG. NO.	REV
			C	TE-22130	
			SCALE: 1:6	SHEET 1 OF 3	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Fender Face Assembly

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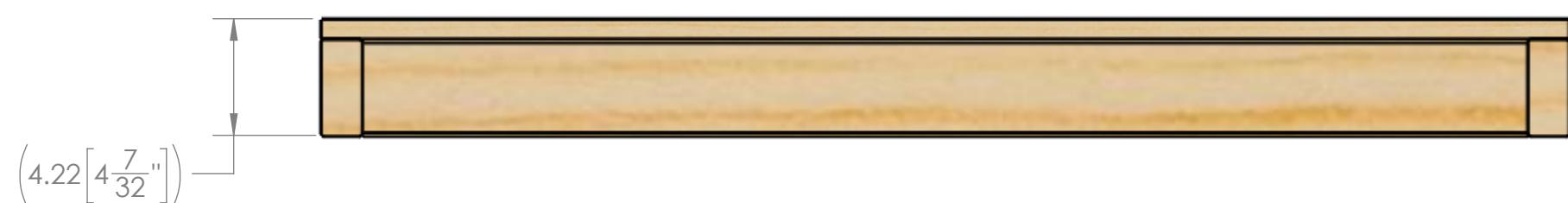
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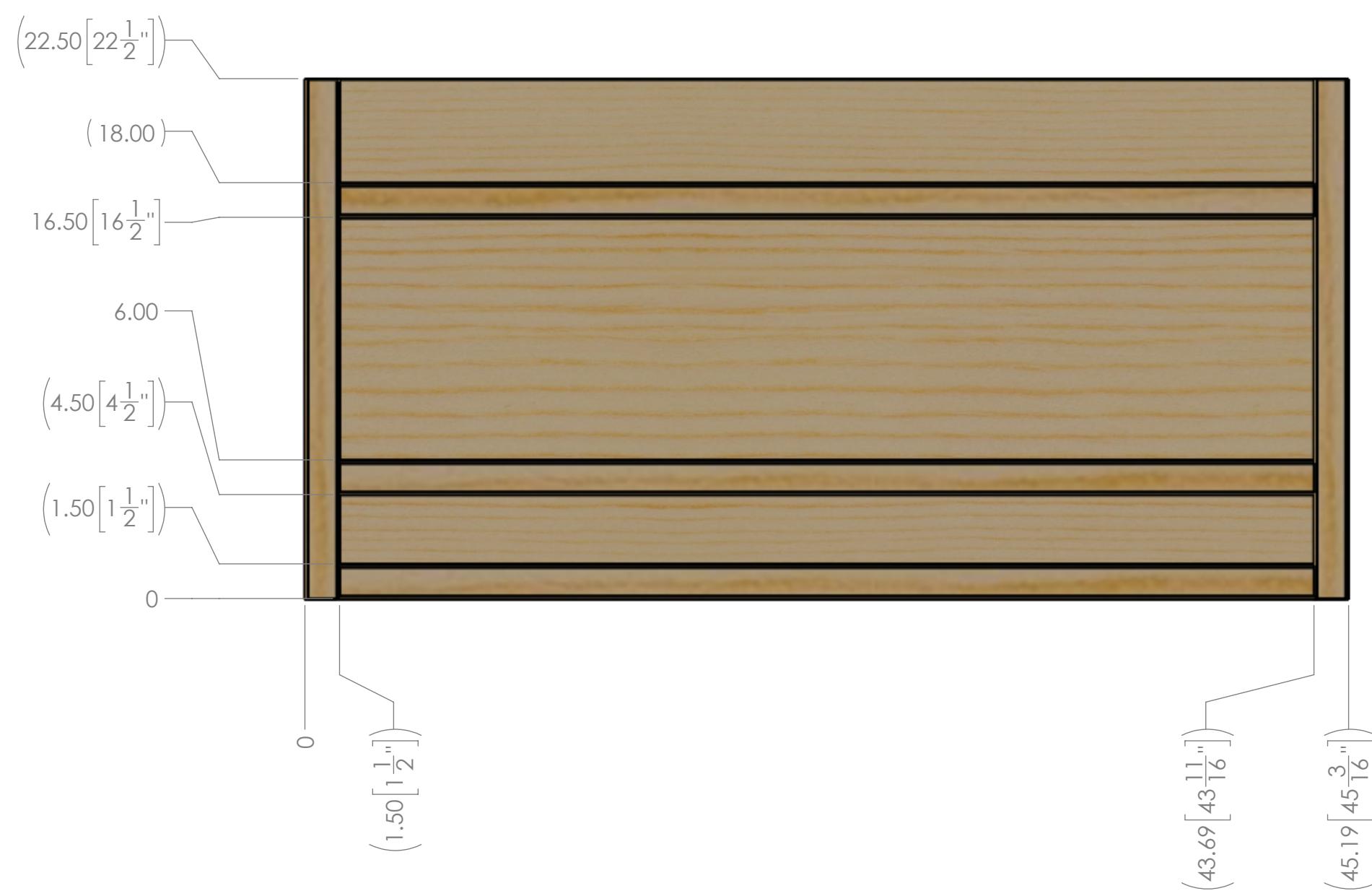
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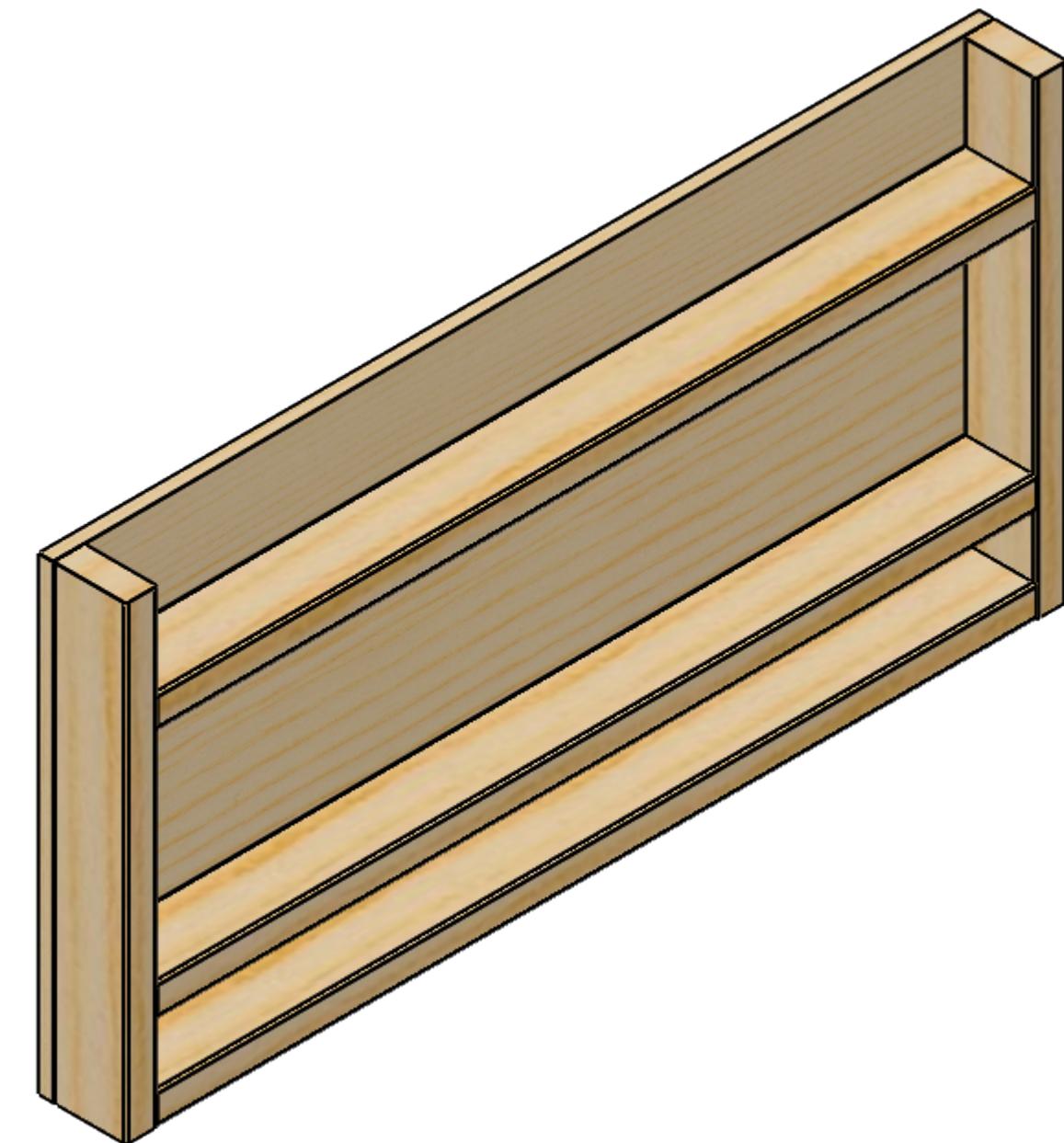


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DRAWN	KAMC	12/20/2021	
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MATERIAL/FINISH:			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
 FIRST ROBOTICS COMPETITION  TITLE: HUB - Complex Build - Fender Face Assembly SIZE DWG. NO. REV C TE-22130			
SCALE: 1:6 SHEET 2 OF 3			

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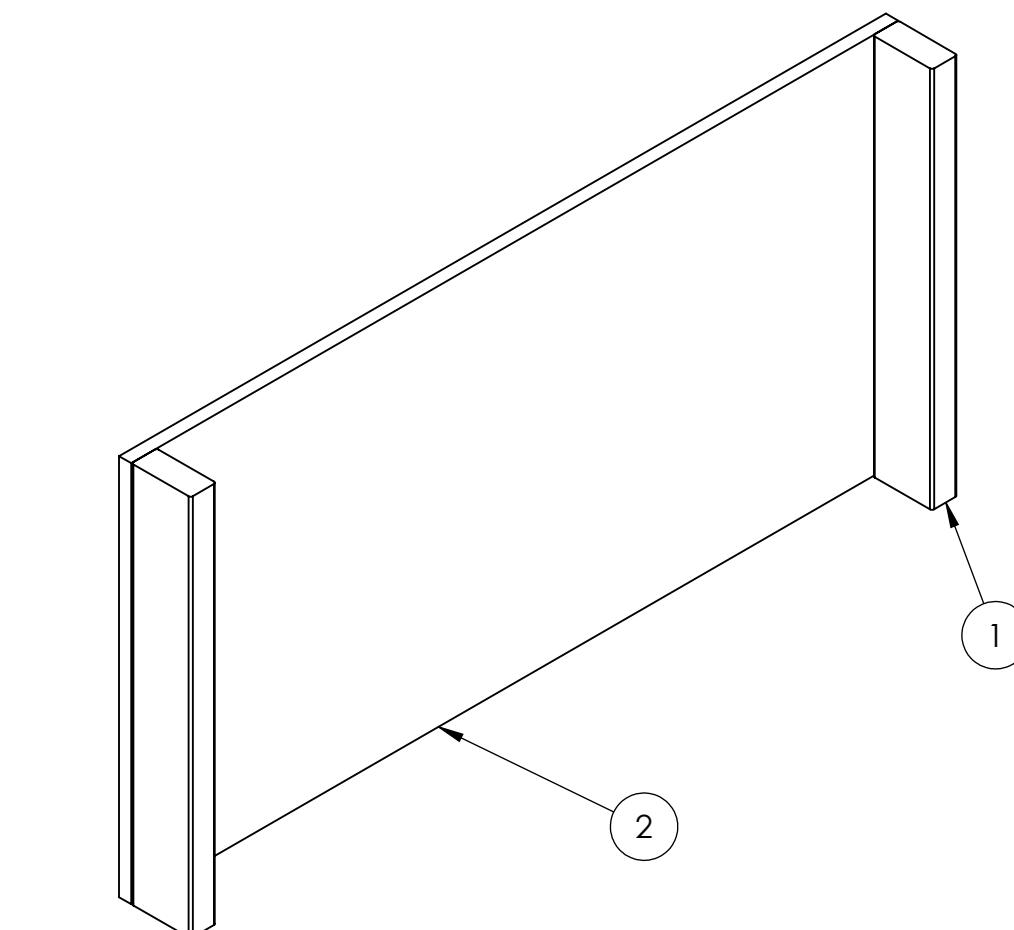
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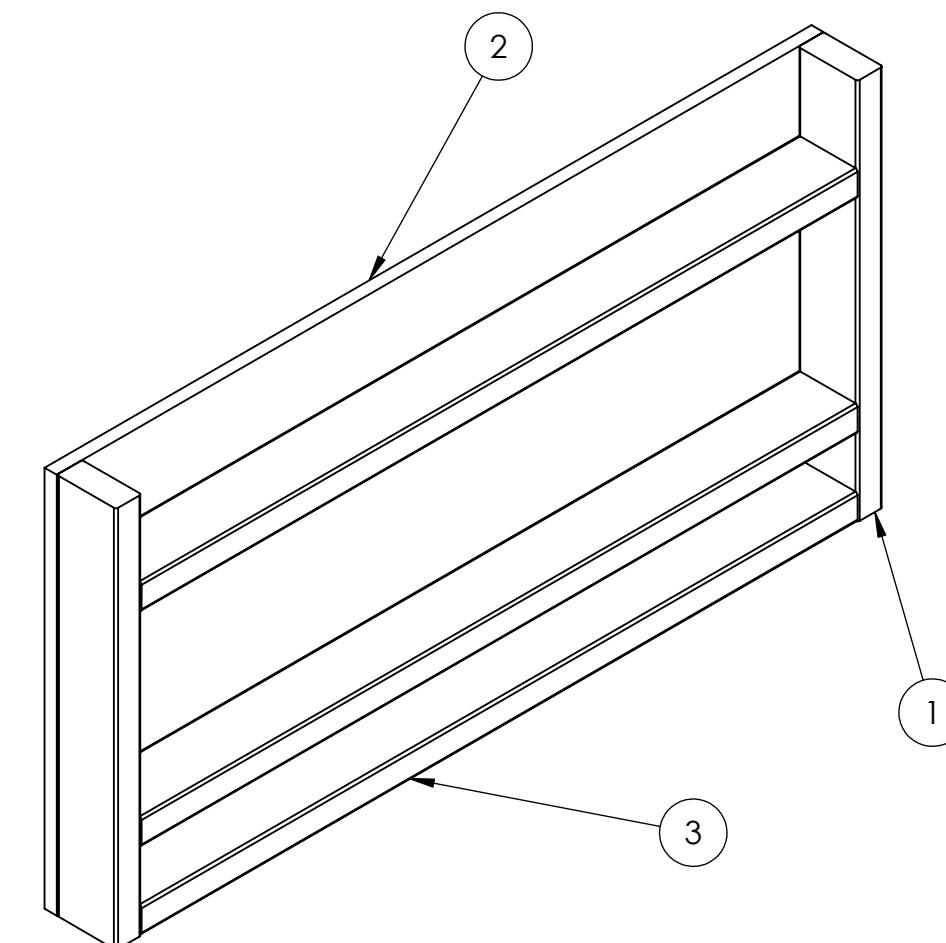
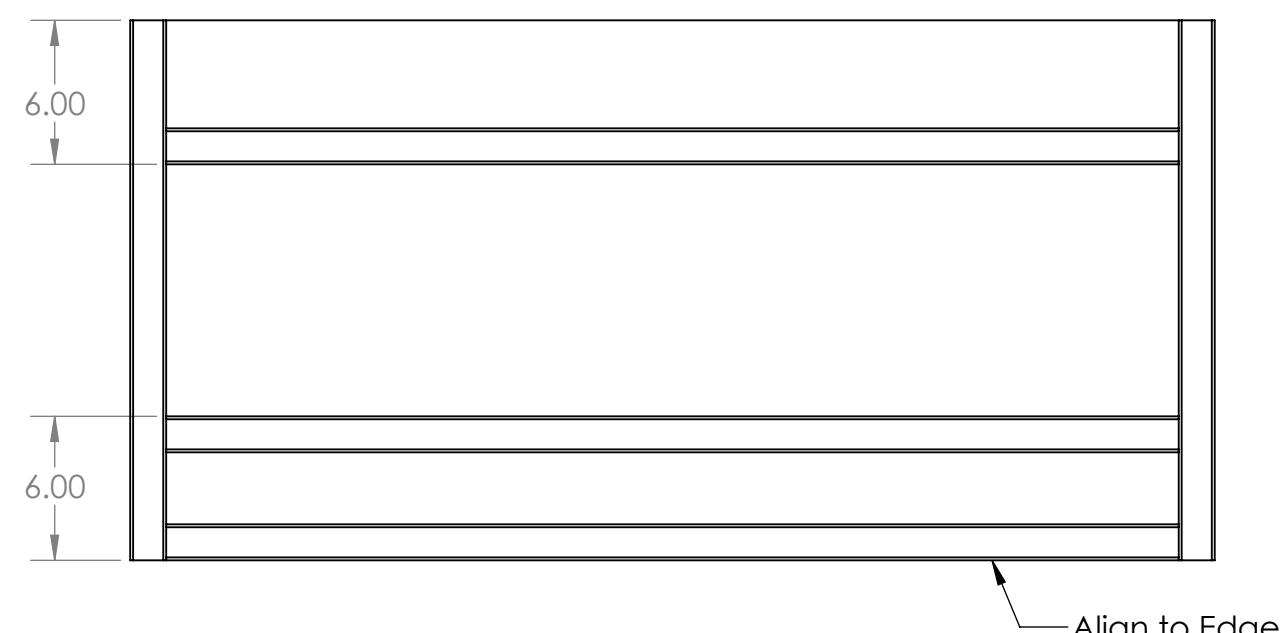
Step 1

1. Align 2x (1) to the edges of (2), as shown.
2. Connect using 2" long screws. It is recommended to use 4x screws into each (1).



Step 2

1. Align 3x (3) between both (1), and position on (2) as shown. If needed, trim (3) to ensure fit.
2. Secure each (3) to (1) using 2.5" long screws. It is recommended to use 2x screws into each end of (3).
3. Secure (3) to (2) using 2" long screws. It is recommended to use 5x screws into each (3).



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	KAMC	12/20/2021	
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
	C	TE-22130	
COMMENTS:		SCALE: 1:8	
REMOVE ALL BURRS AND SHARP EDGES.		SHEET 3 OF 3	
DO NOT SCALE DRAWING			

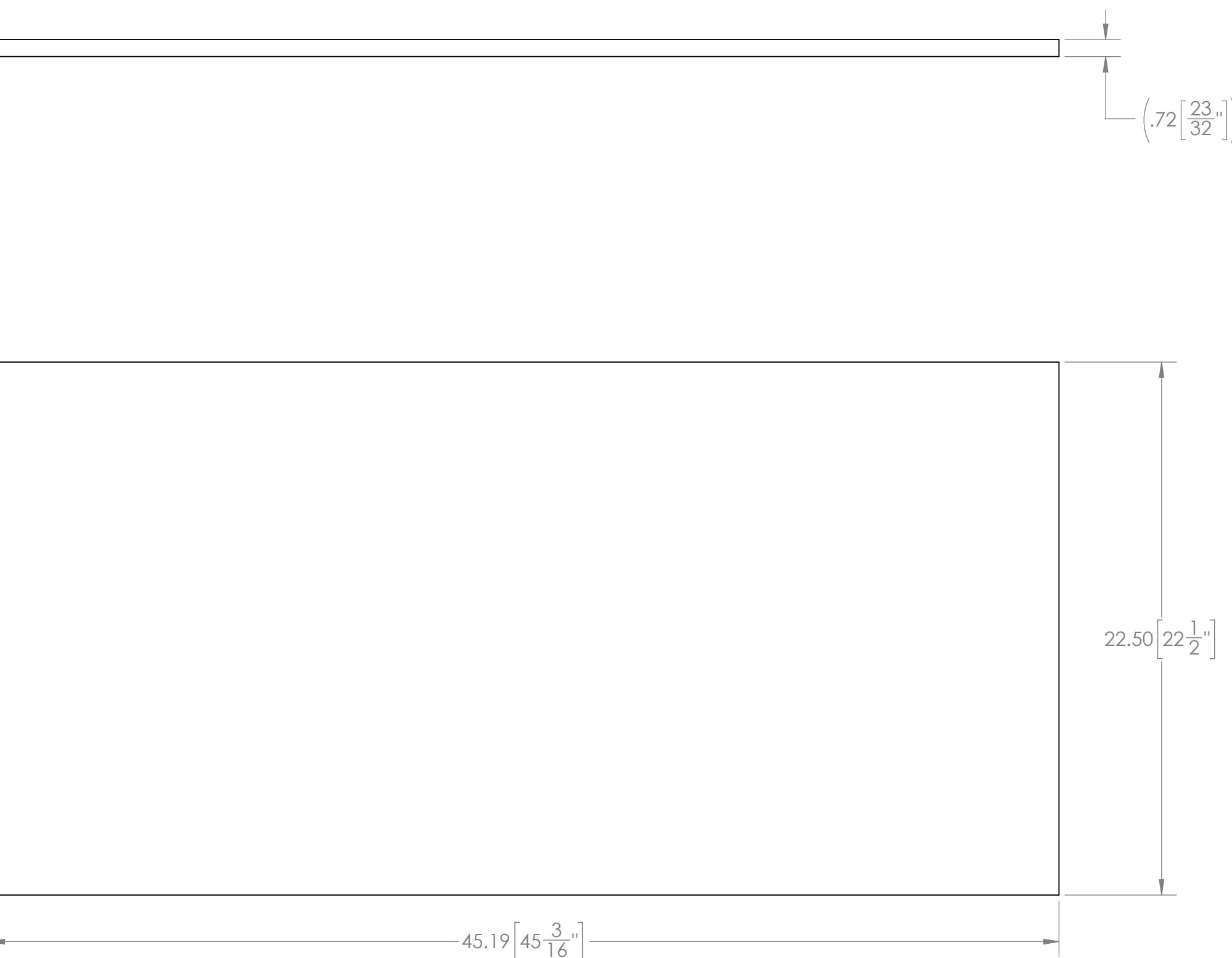
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	KAMC	12/20/2021
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
3/4" Plywood	C	TE-22131	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:5	SHEET 1 OF 1	

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$42.19^{+.00}_{-.06} [42\frac{3}{16}^{+0}_{-1/16}]$

(3.50 [$3\frac{1}{2}$ '])

($4 \times R.13 [\frac{1}{8}]$)

(1.50 [$1\frac{1}{2}$ '])

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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

2" x 4" Lumber

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/20/2021



TITLE: HUB - Complex Build -

Fender Horizontal 2x4

SIZE DWG. NO. REV

C TE-22132

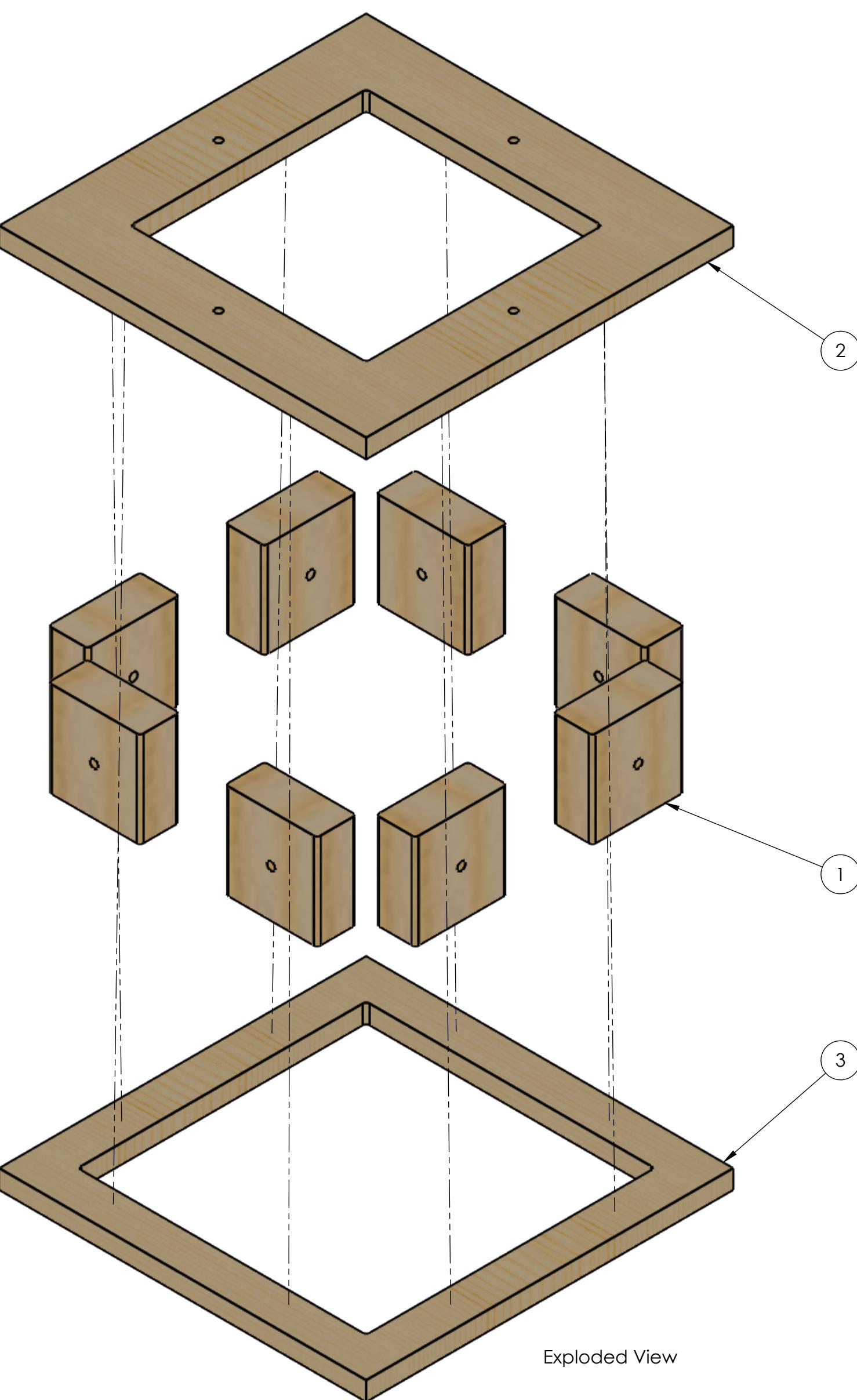
SCALE: 1:4 SHEET 1 OF 1

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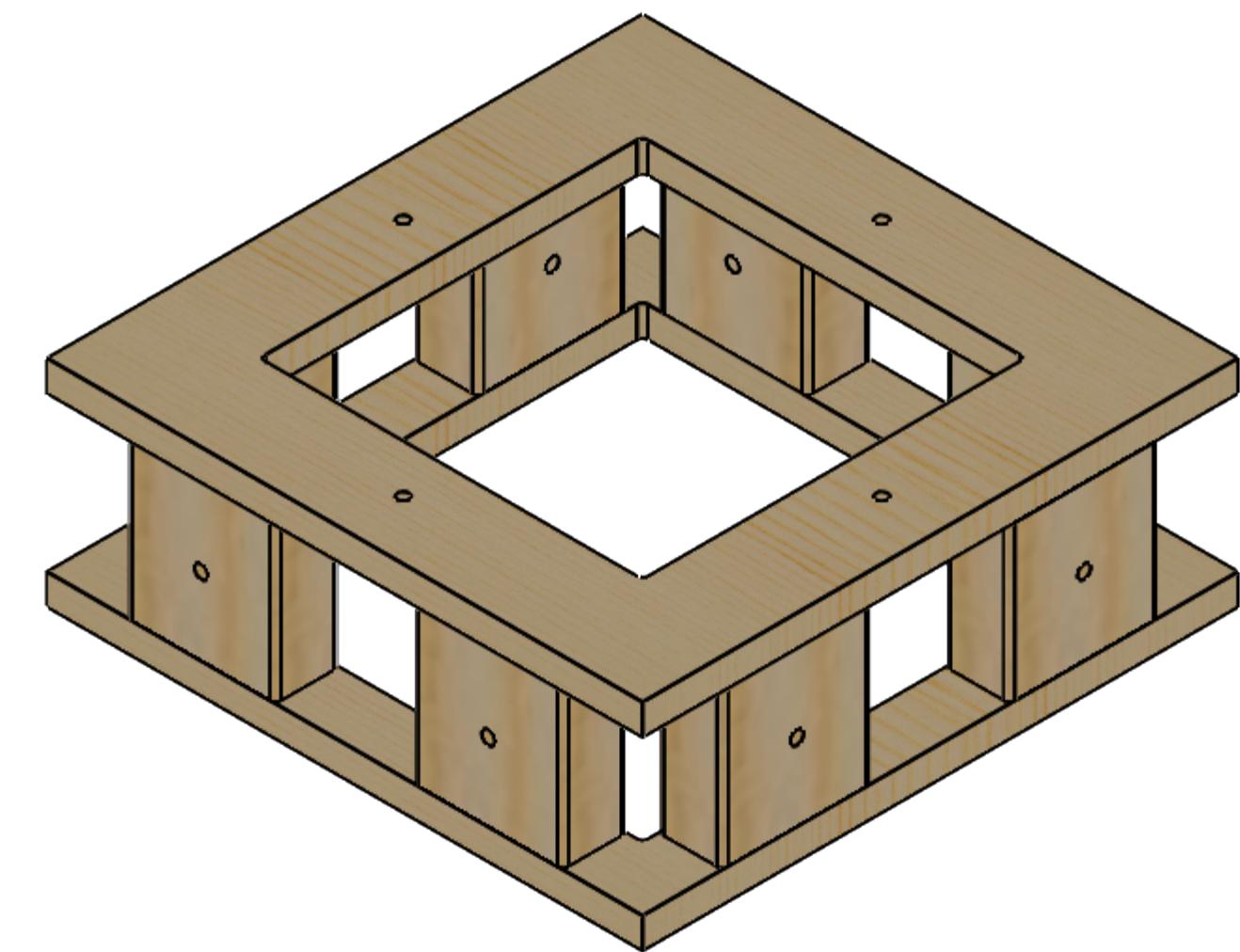
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Exploded View



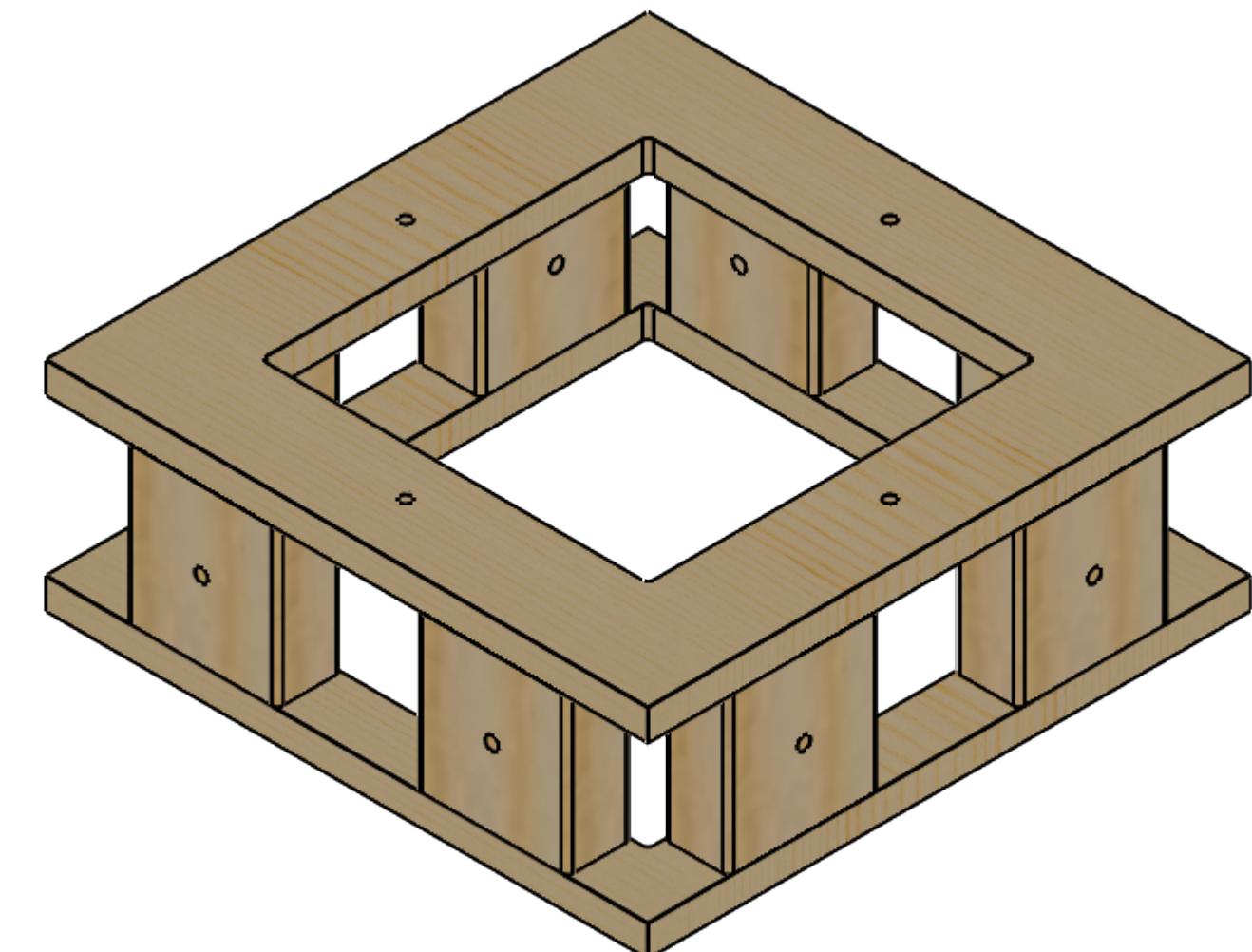
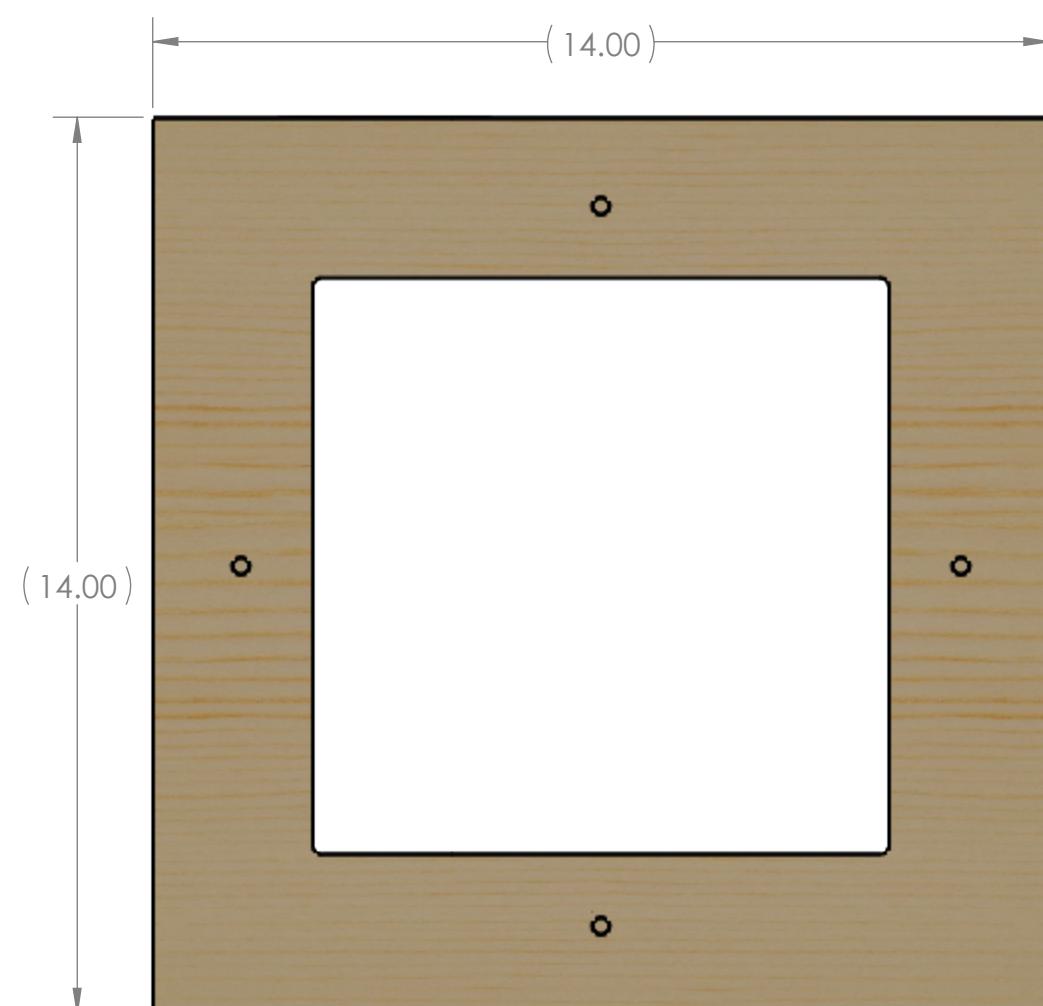
Note:
Use TE-22140-AM if pairing with AndyMark Upper Hub (AM-4671)

Hardware Needed:
#8 x 2" Long Screw - Qty 32

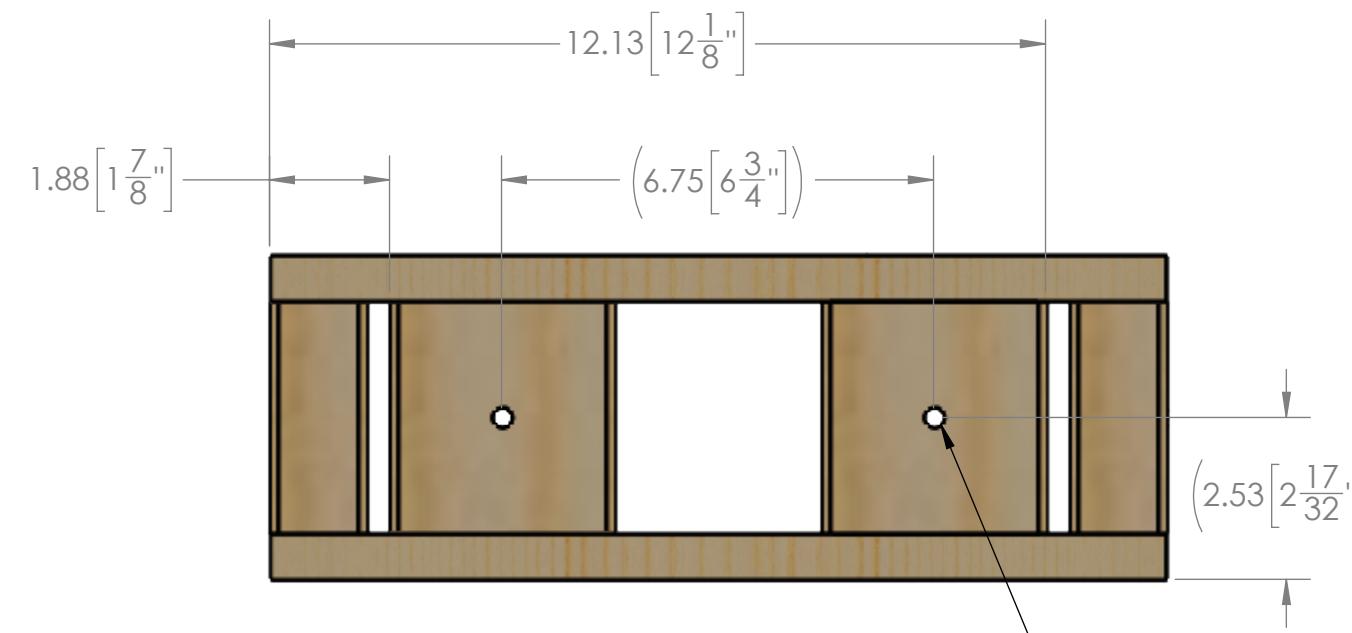
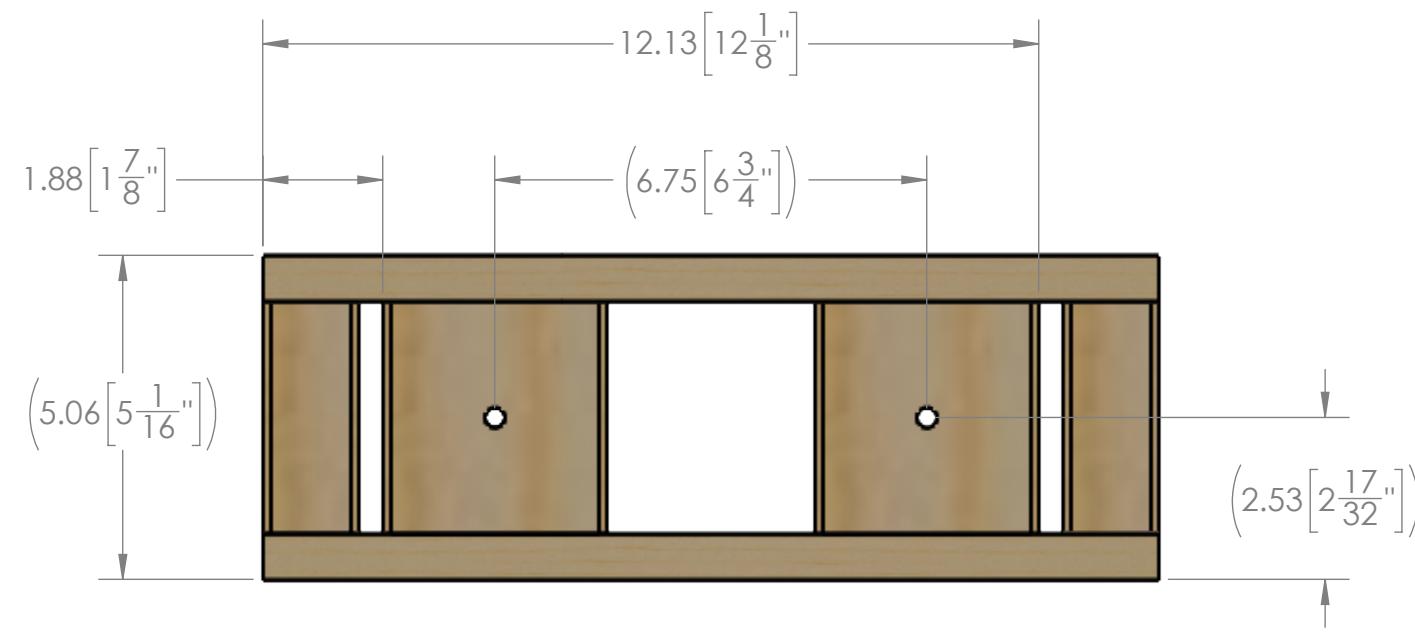
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22141	HUB - Complex Build - Connection Box 2x4	8
2	TE-22142	HUB - Complex Build - Connection Box Top	1
3	TE-22143	HUB - Complex Build - Connection Box Bottom	1

UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
			DRAWN	KAMC	12/20/2021
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.					
COMMENTS:					
REMOVE ALL BURRS AND SHARP EDGES.					
DO NOT SCALE DRAWING					
			TITLE:	HUB - Complex Build - Connection Box Assembly	
			SIZE	DWG. NO.	REV
			C	TE-22140	
			SCALE: 1:3	SHEET 1 OF 3	

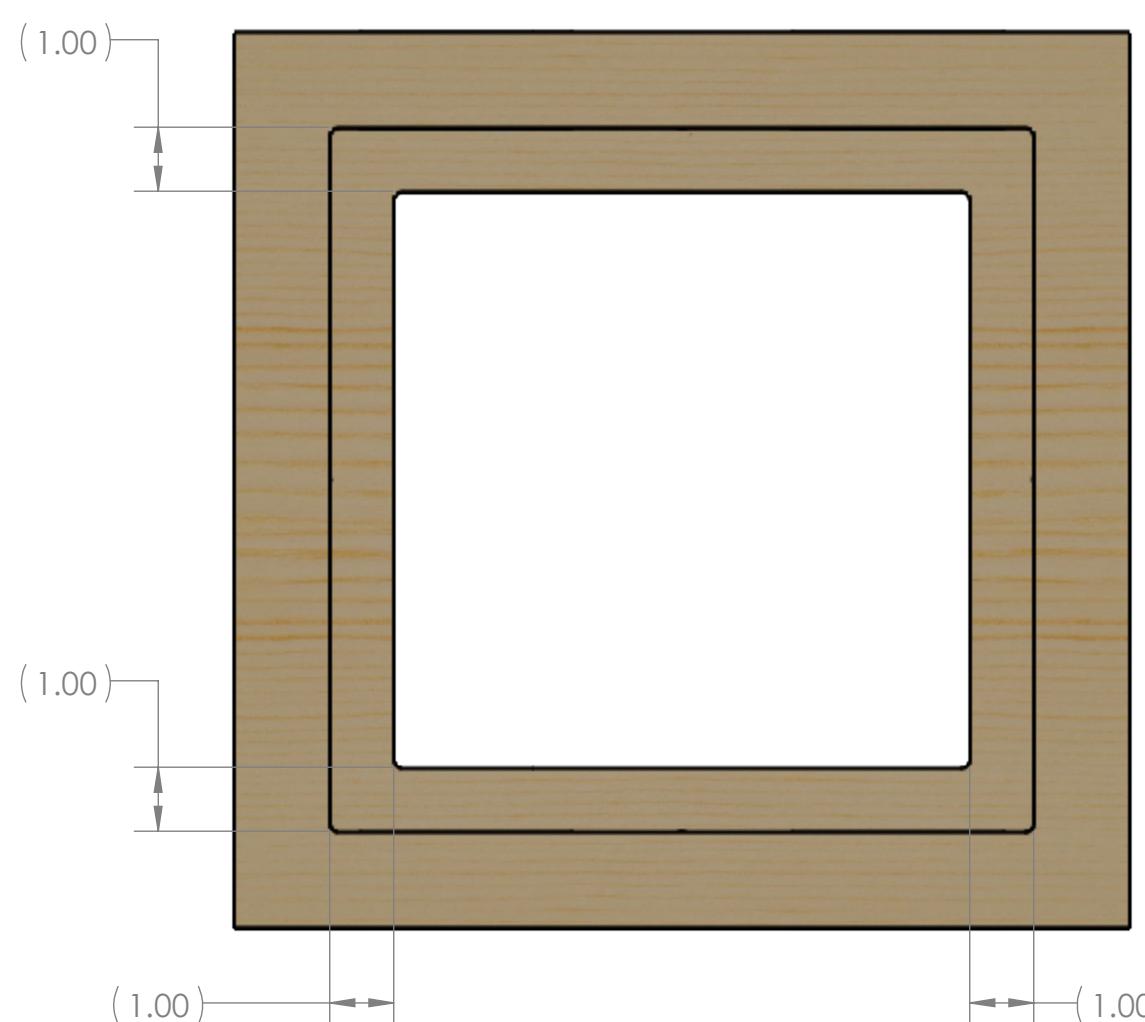
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UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	KAMC	12/20/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$					
PROPRIETARY AND CONFIDENTIAL					
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MATERIAL/FINISH:					
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.					
DO NOT SCALE DRAWING					

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: HUB - Complex Build - Connection Box Assembly

SIZE DWG. NO. REV

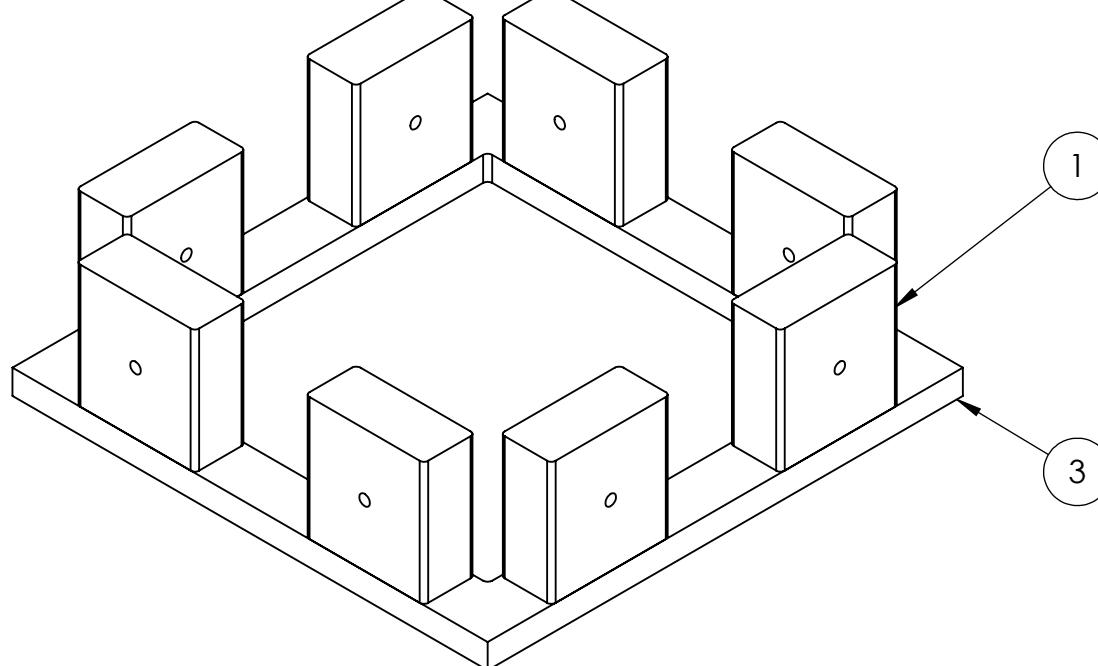
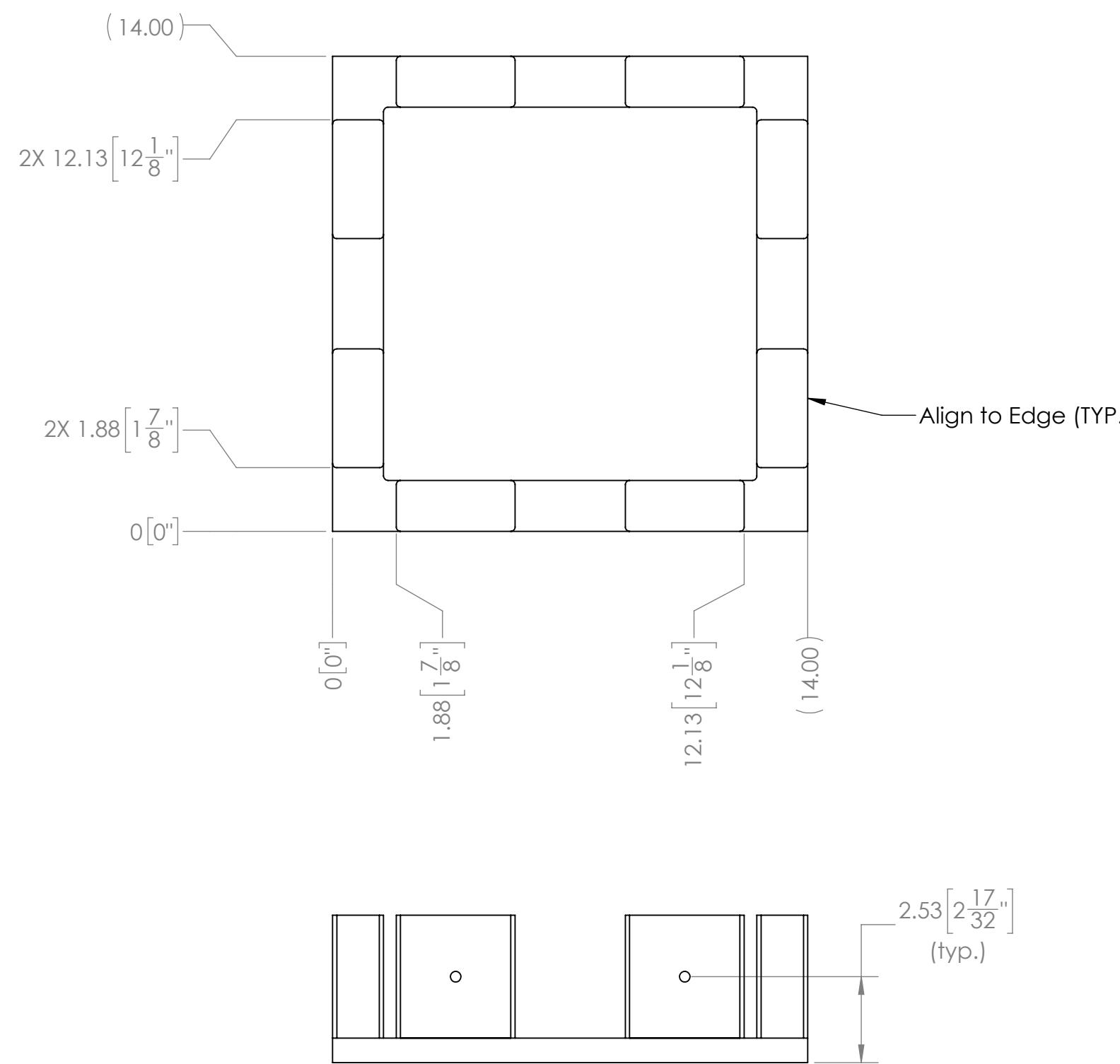
C TE-22140

SCALE: 1:3 SHEET 2 OF 3

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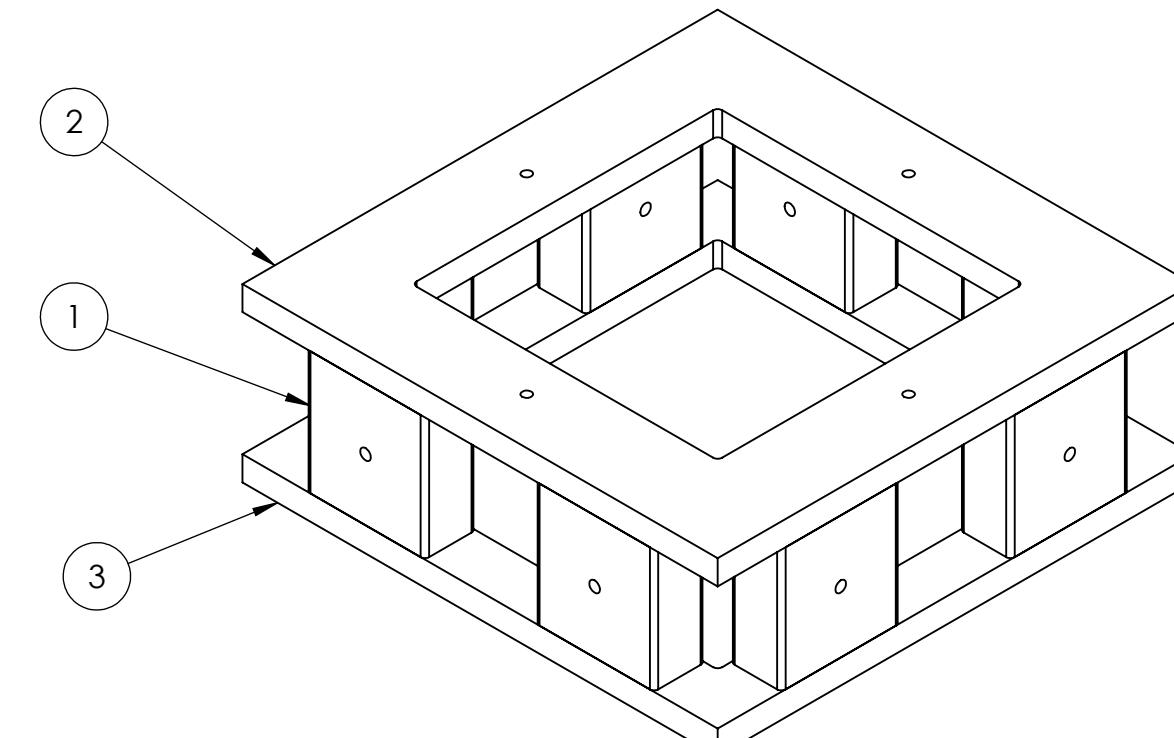
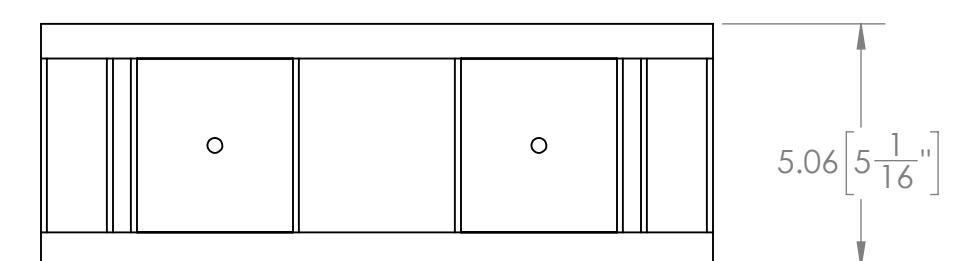
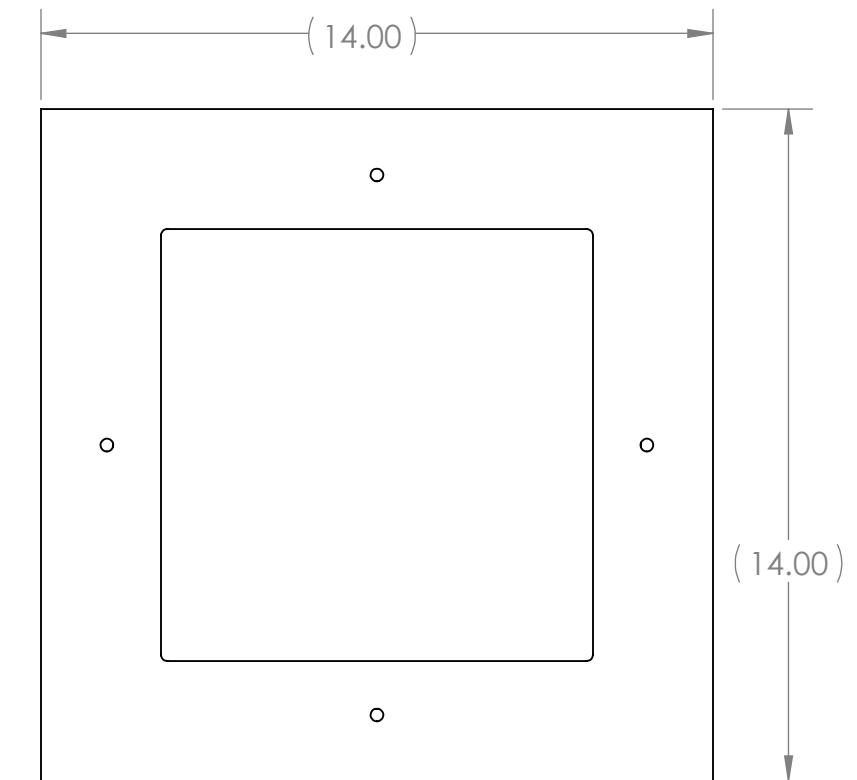
Step 1

1. Align 8x (1) on (3), as shown.
2. Connect using 2" long screws. It is recommended to use 2x screws into each (1).



Step 2

1. Align (2) to Step 1 as shown.
2. Connect using 2" long screws. It is recommended to use 2x screws into each (1).



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	KAMC	12/20/2021	
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION	SOLIDWORKS Modeling Solutions Partner
TITLE: HUB - Complex Build - Connection Box Assembly	
SIZE	DWG. NO.
C	TE-22140
REV	
SCALE: 1:4	SHEET 3 OF 3

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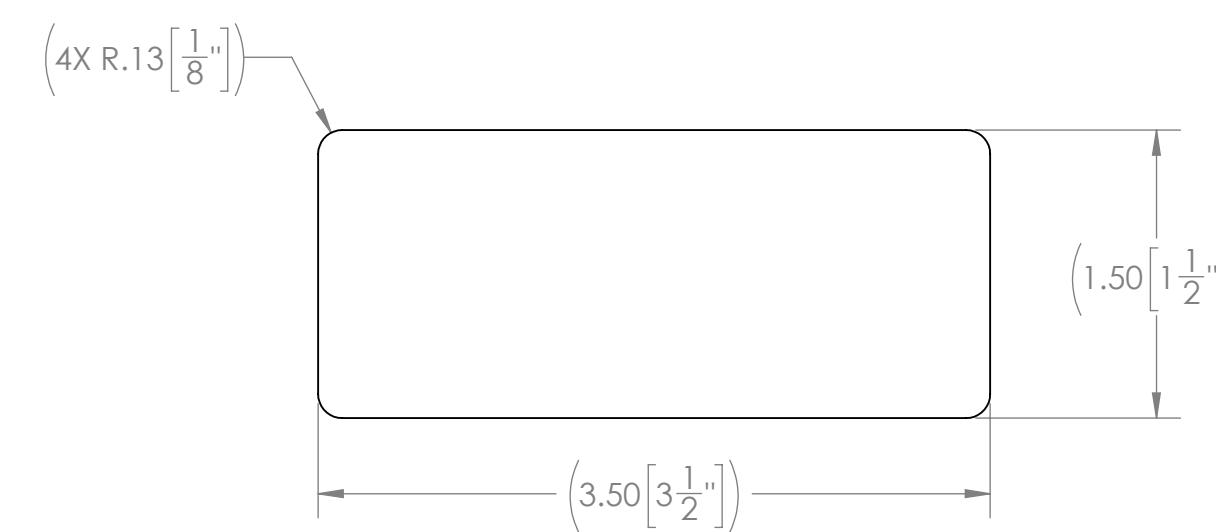
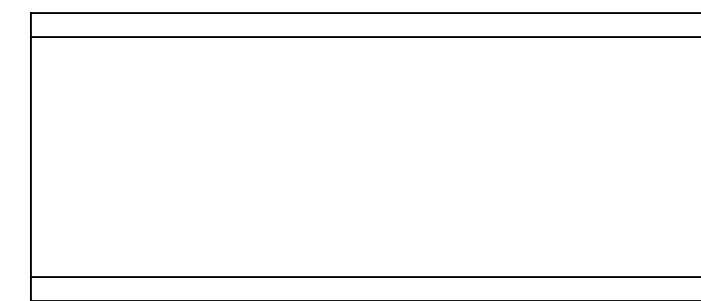
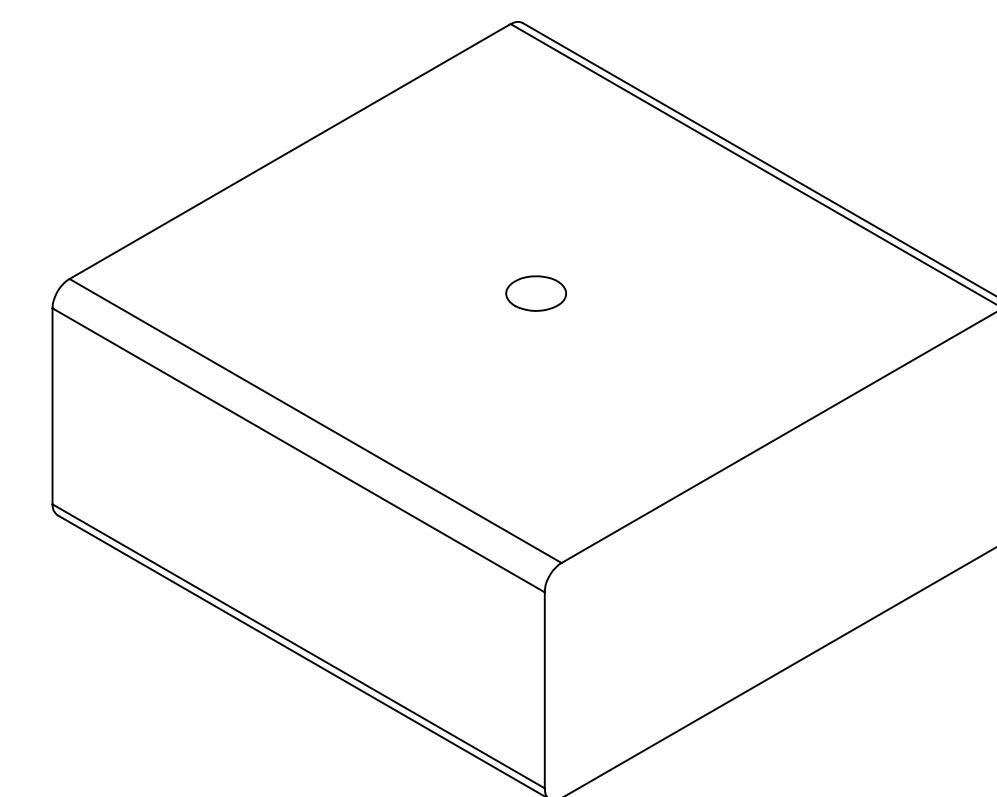
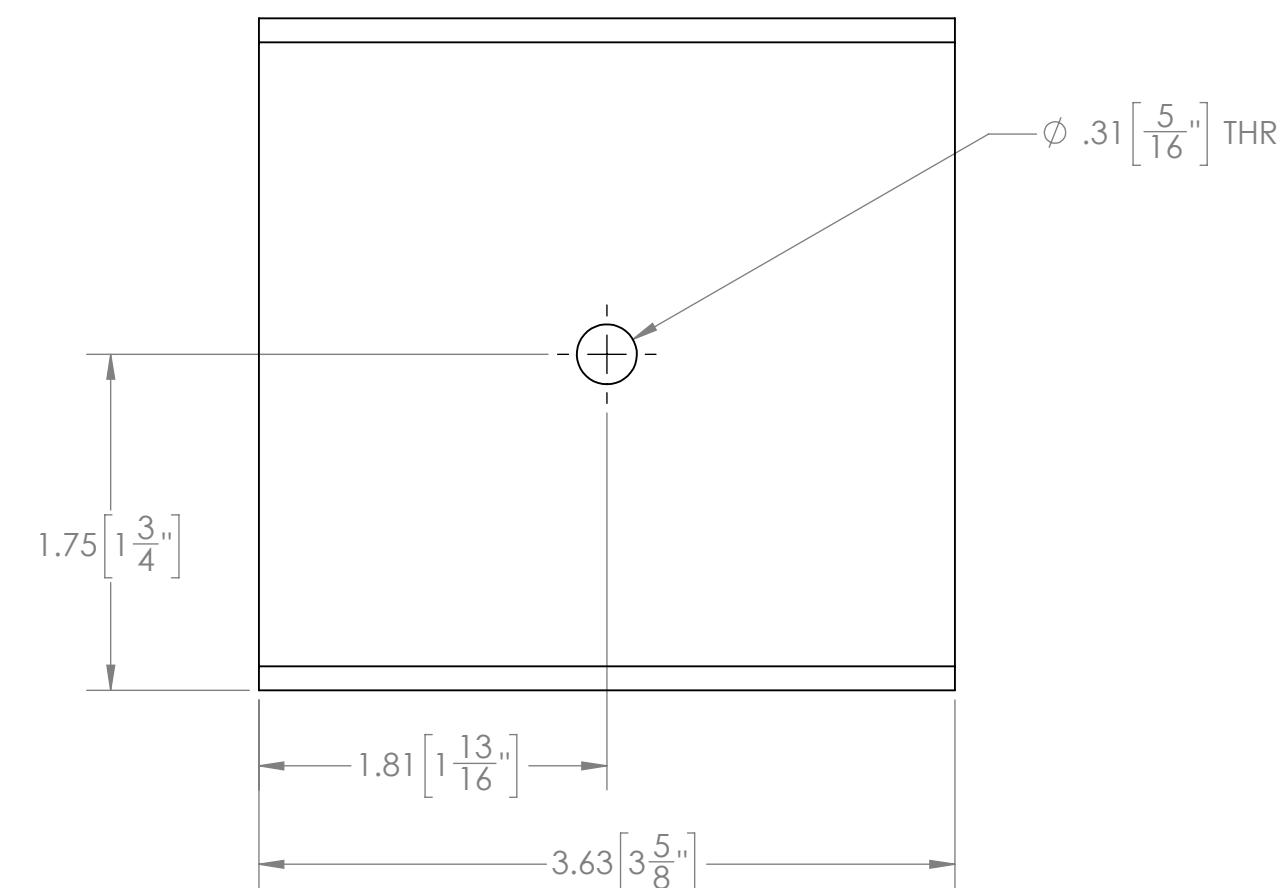
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Note:
Use TE-22141-AM if pairing with AndyMark Upper Hub (AM-4671)

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	KAMC	12/20/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$			
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/FINISH: 2" x 4" Lumber			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
TITLE: HUB - Complex Build - Connection Box 2x4			
SIZE DWG. NO. REV			
C TE-22141			
SCALE: 1:1 SHEET 1 OF 1			

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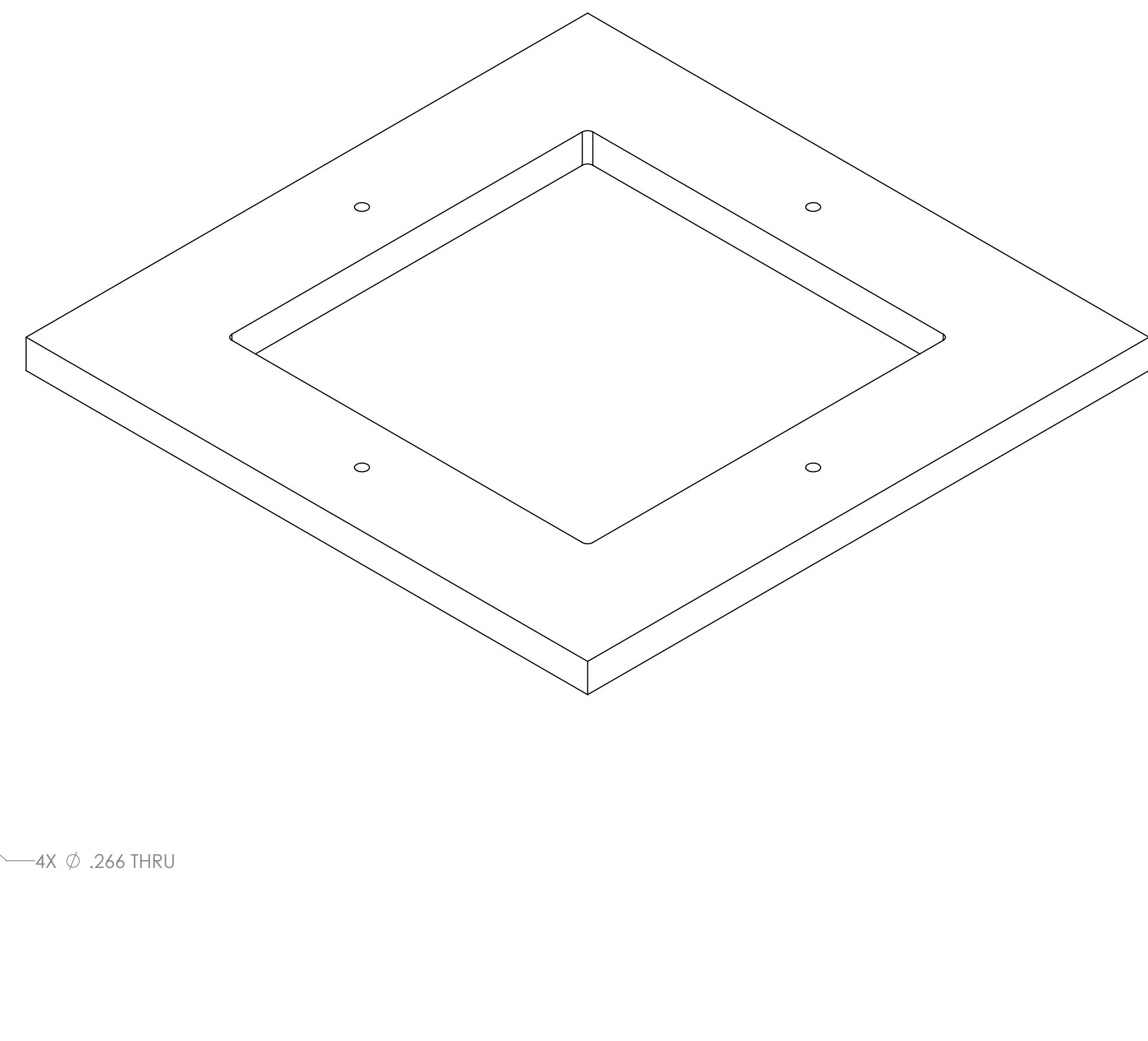
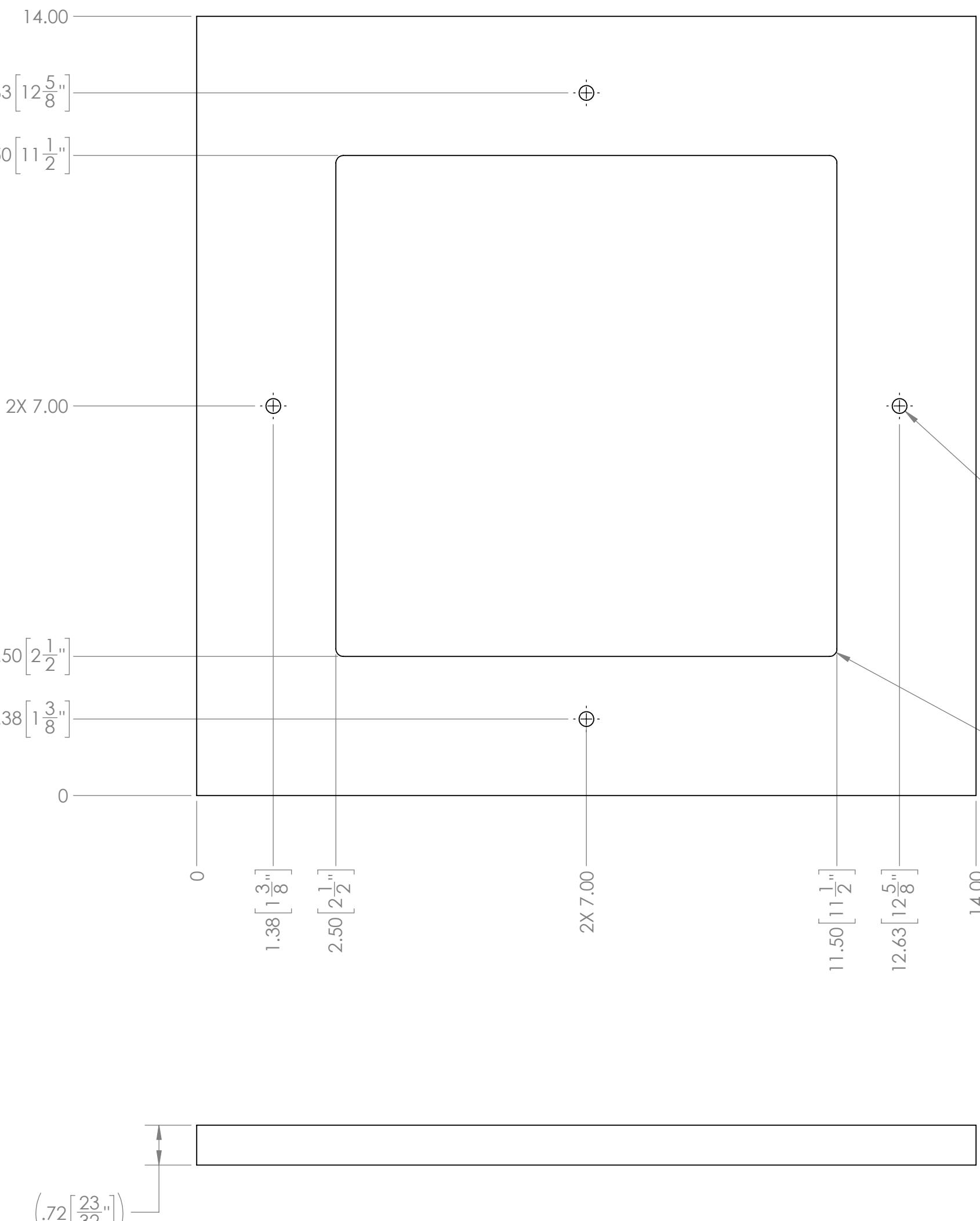
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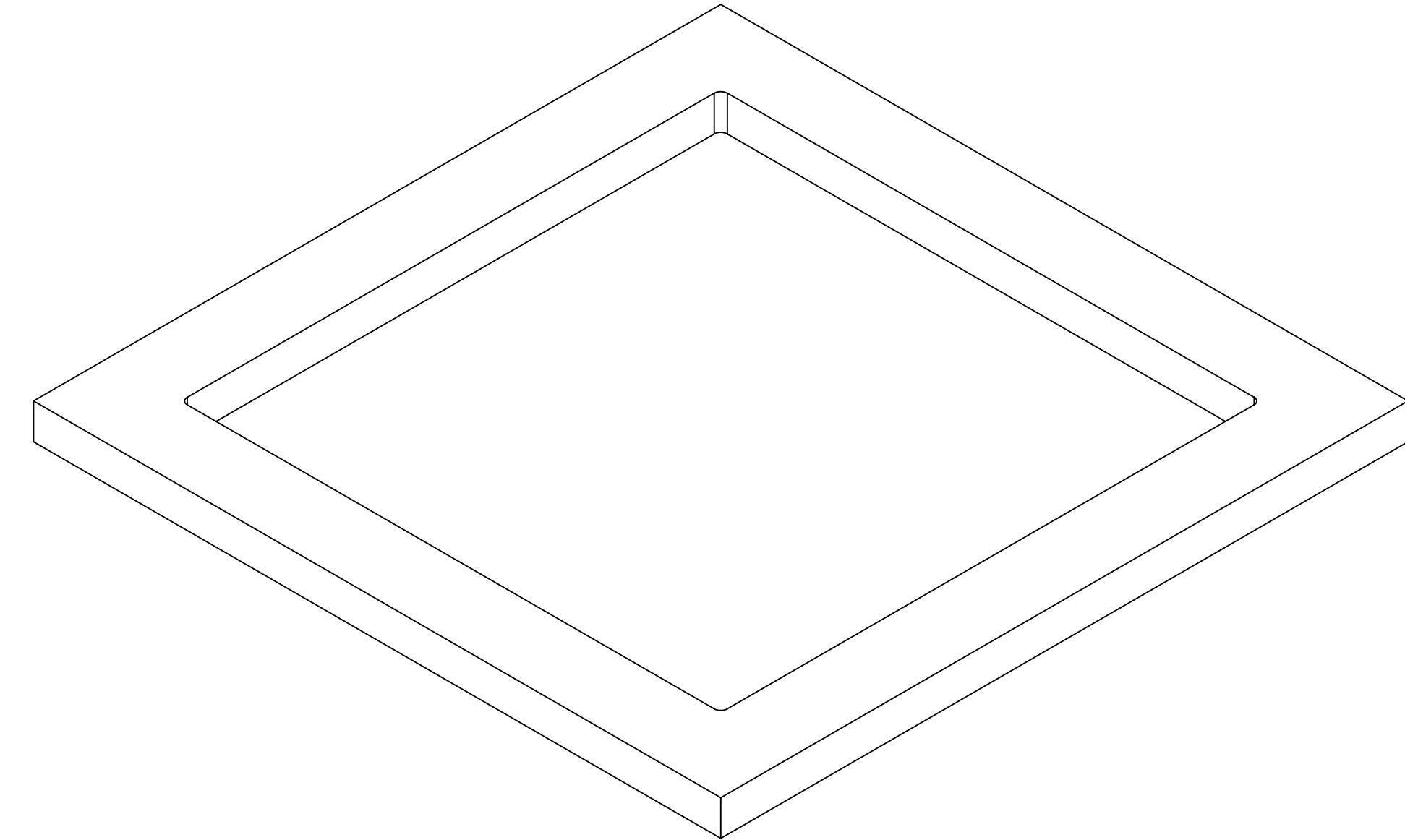
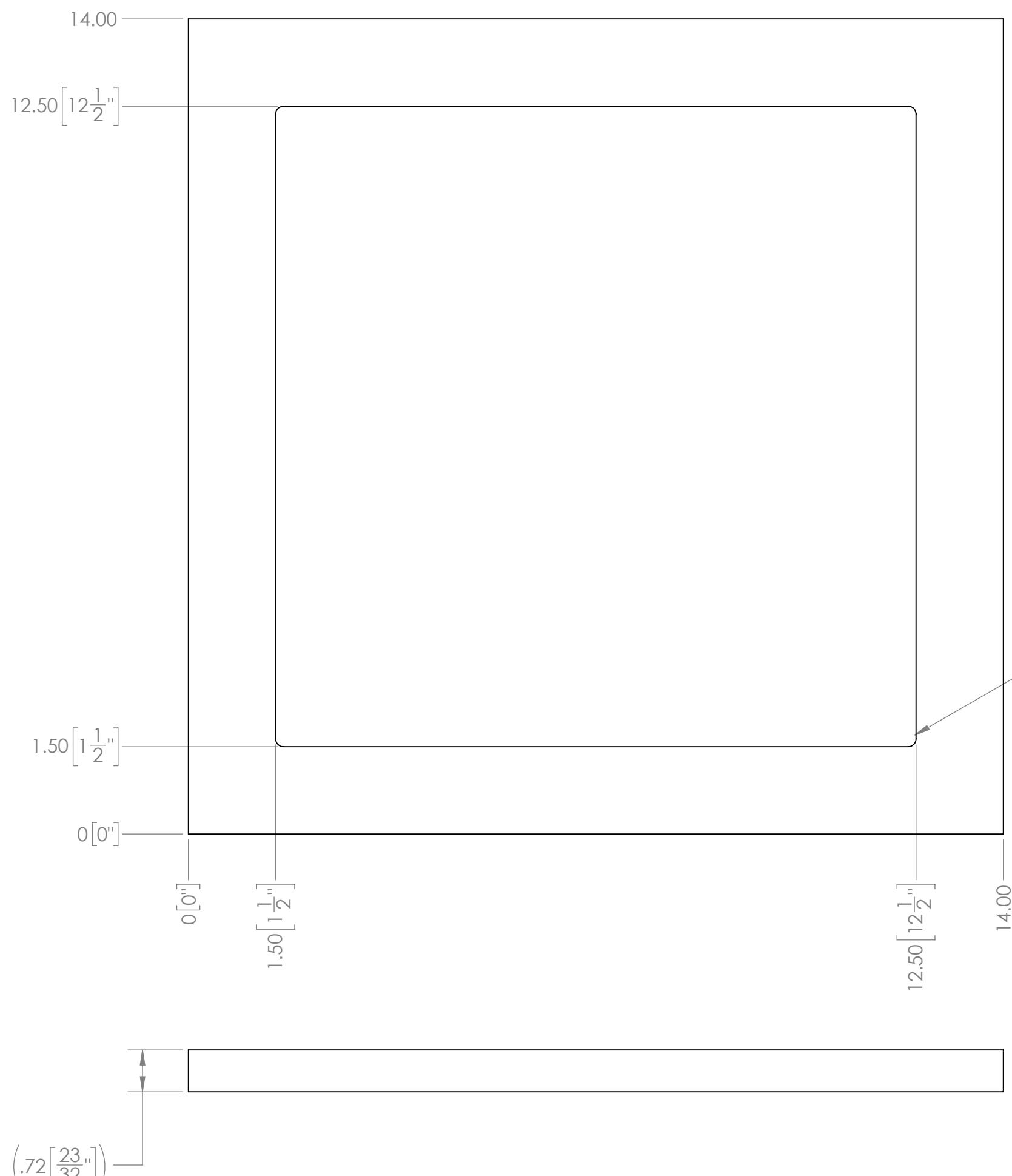
Note:
Radii located at internal corners are provided predominately for teams
making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	KAMC	12/20/2021
PROPRIETARY AND CONFIDENTIAL					
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MATERIAL/FINISH:	3/4" Plywood				
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING					

FIRST	ROBOTICS	COMPETITION
SOLIDWORKS	Modeling Solutions Partner	
TITLE: HUB - Complex Build - Connection Box Top		
SIZE	DWG. NO.	REV
C	TE-22142	
SCALE: 1:2	SHEET 1 OF 1	

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Note:
Radii located at internal corners are provided predominately for teams
making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	KAMC	12/20/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$			
MATERIAL/FINISH:	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.		
COMMENTS:	3/4" Plywood REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Connection Box
Bottom

SIZE DWG. NO. REV

C TE-22143

SCALE: 1:2 SHEET 1 OF 1

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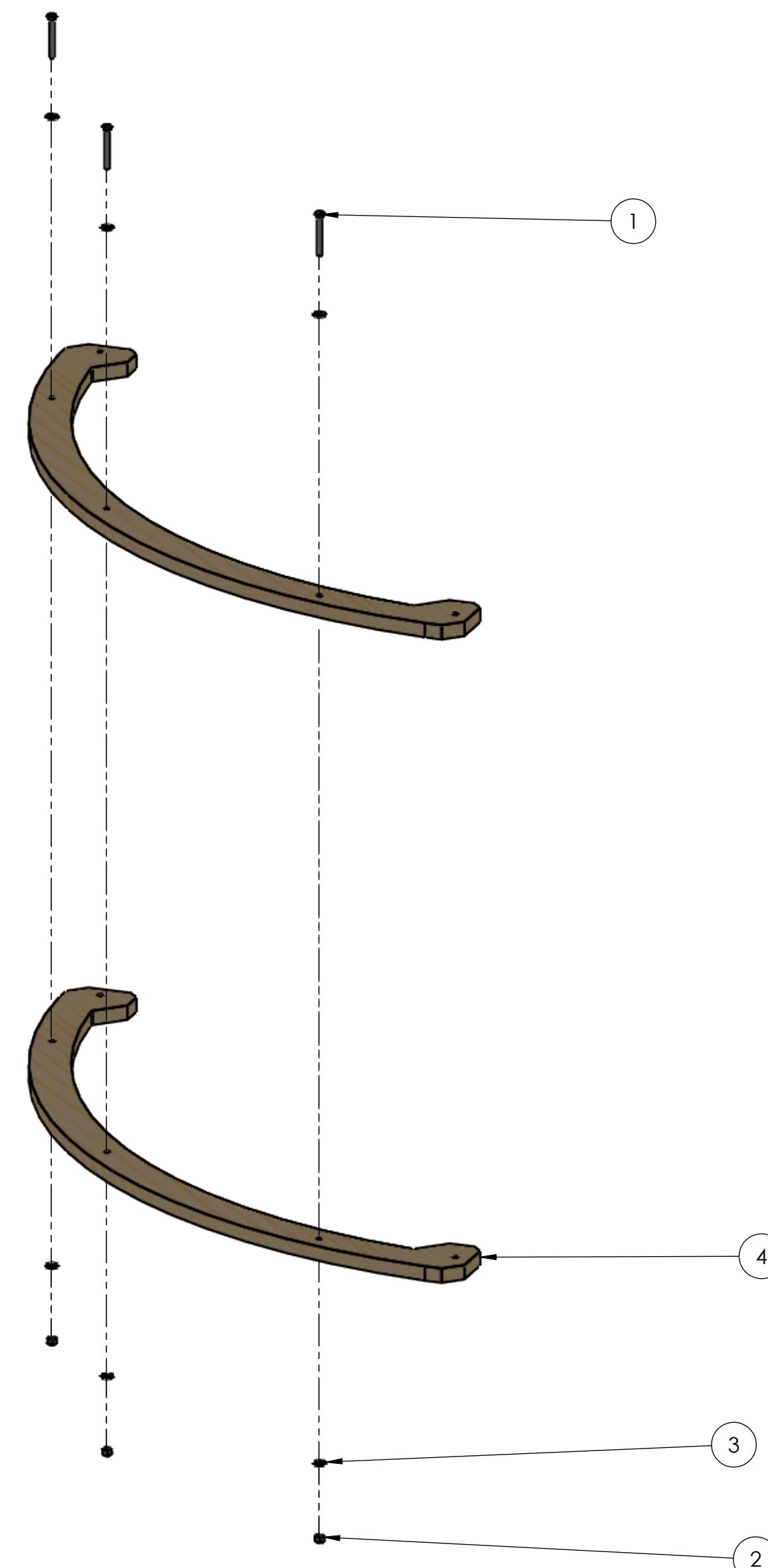
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Step 1

- Align 2x (4) to each other.

Step 2:

- Connect Step 1 using the center 3 holes in (4). Use 1x (1), 2x (4), and 1x (2) per hole.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	hex_.25_20_2	Steel Hex Head Screw, 1/4"-20 x 2" long, fully threaded	3
2	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	3
3	washer_flat_.25	Flat Washer for 1/4" Screw	6
4	TE-22151	HUB - Complex Build - Lower Hub Ring	2

TEAM	NAME	DATE
DRAWN	KAMC	12/20/2021

FIRST ROBOTICS COMPETITION

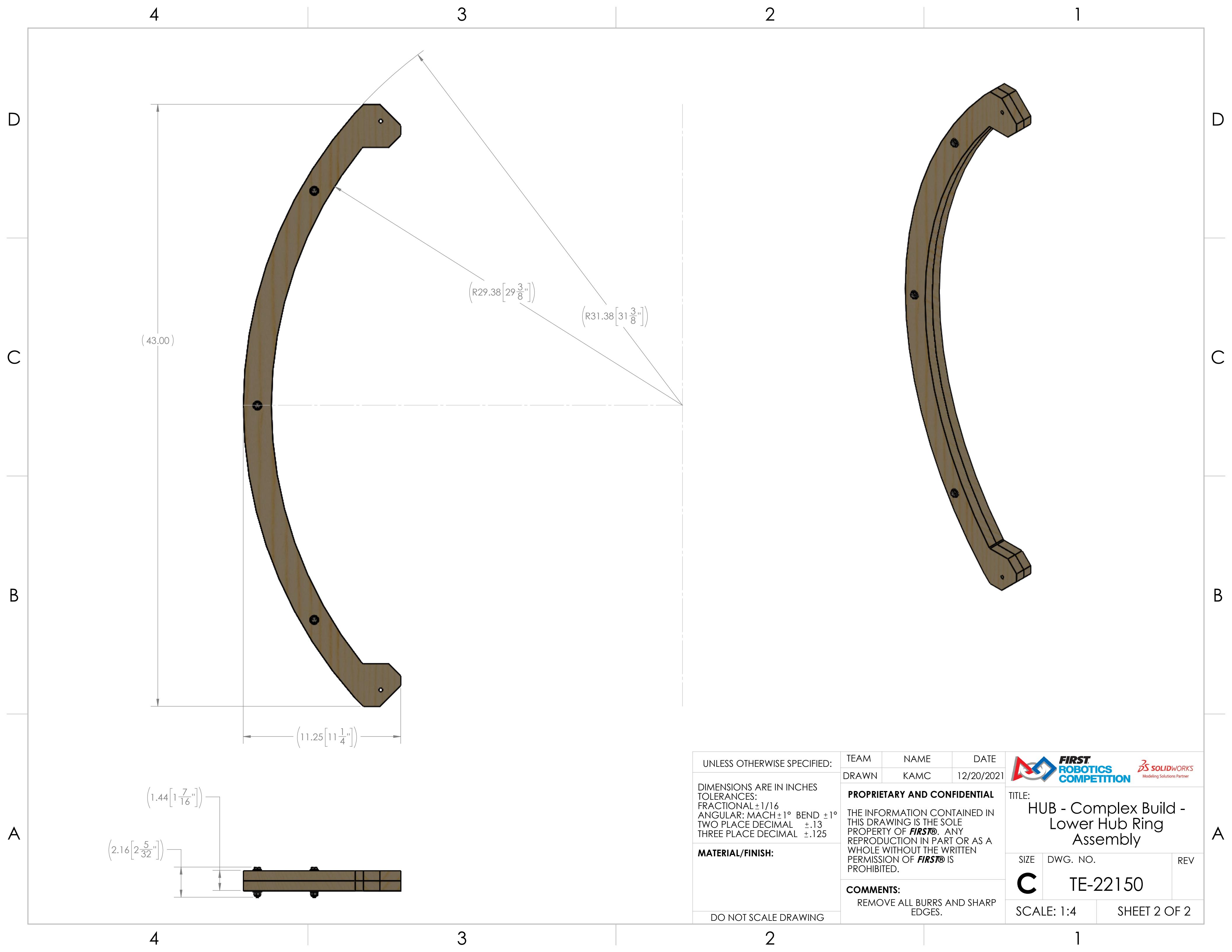
SOLIDWORKS

TITLE:
HUB - Complex Build - Lower Hub Ring Assembly

SIZE DWG. NO. REV

C TE-22150

SCALE: 1:6 SHEET 1 OF 2



4

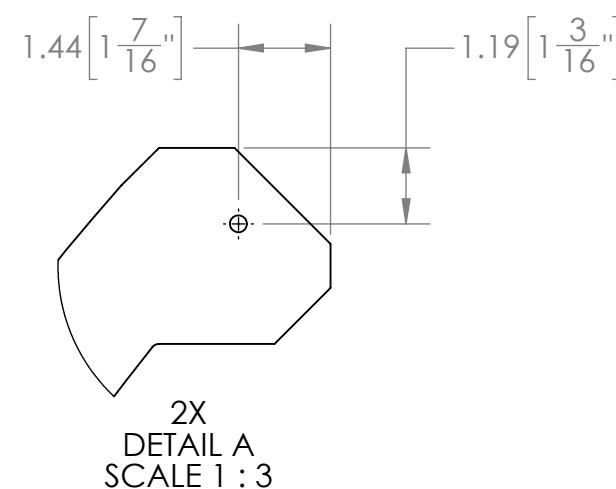
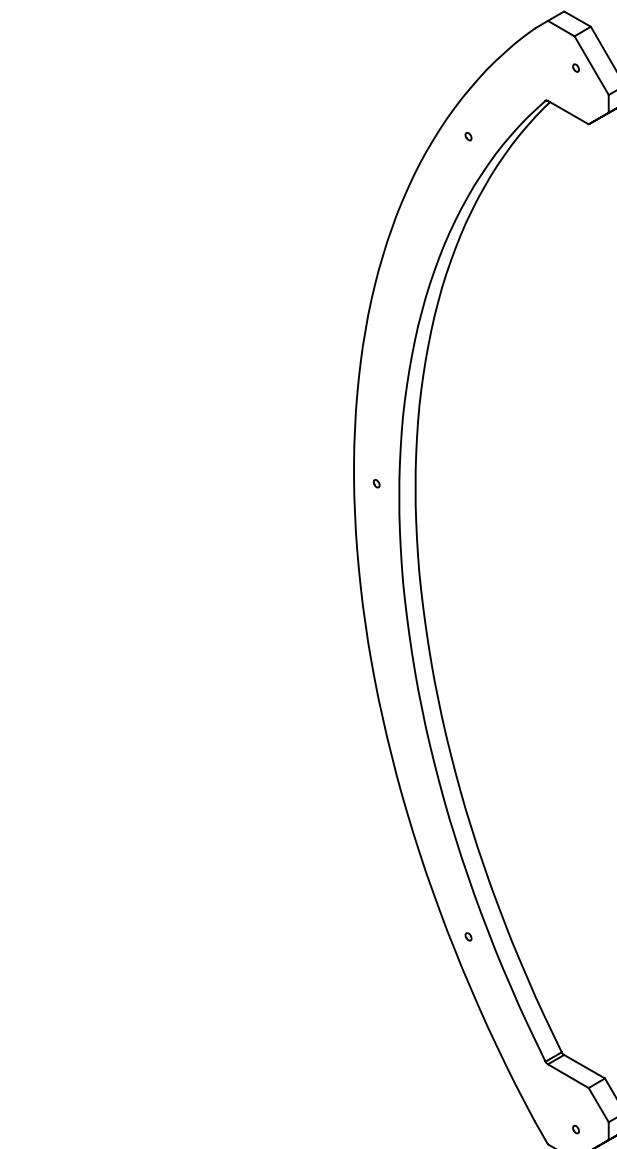
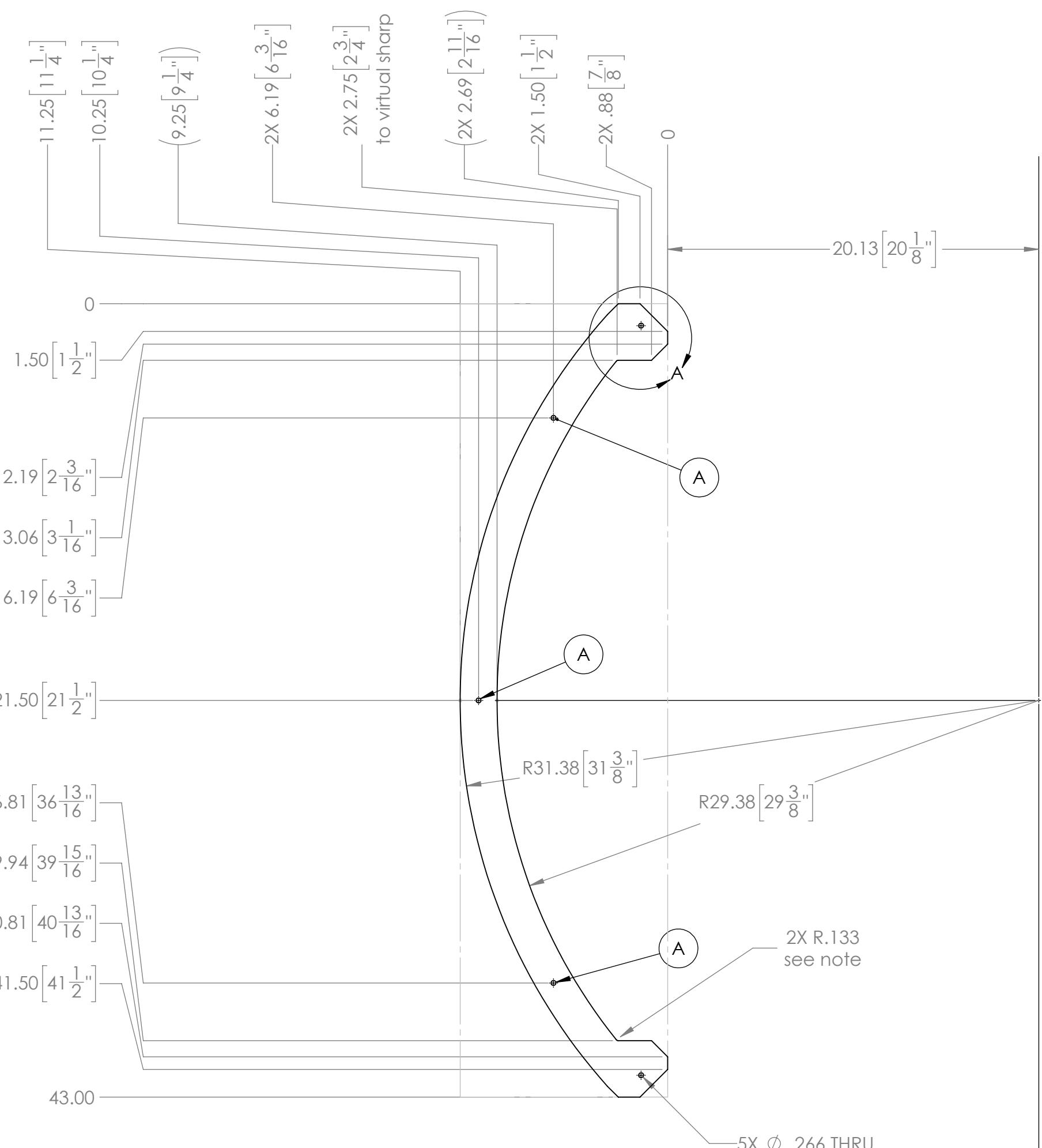
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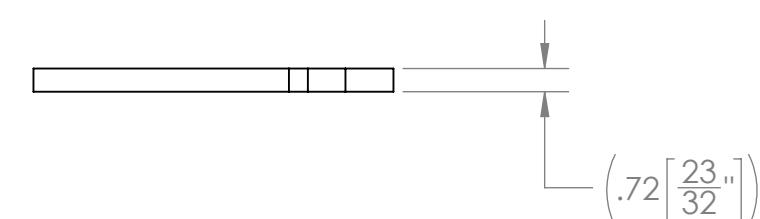
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Note:
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

Holes marked with are used to bolt together TE-22151 to TE-22151 in Assembly TE-22152. Match drilling at assembly level is acceptable.



UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	KAMC	12/20/2021
PROPRIETARY AND CONFIDENTIAL				
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MATERIAL/FINISH:	3/4" Plywood	SIZE	DWG. NO.	REV
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING				

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Lower Hub Ring

SIZE DWG. NO. REV

C TE-22151

SCALE: 1:6 SHEET 1 OF 1

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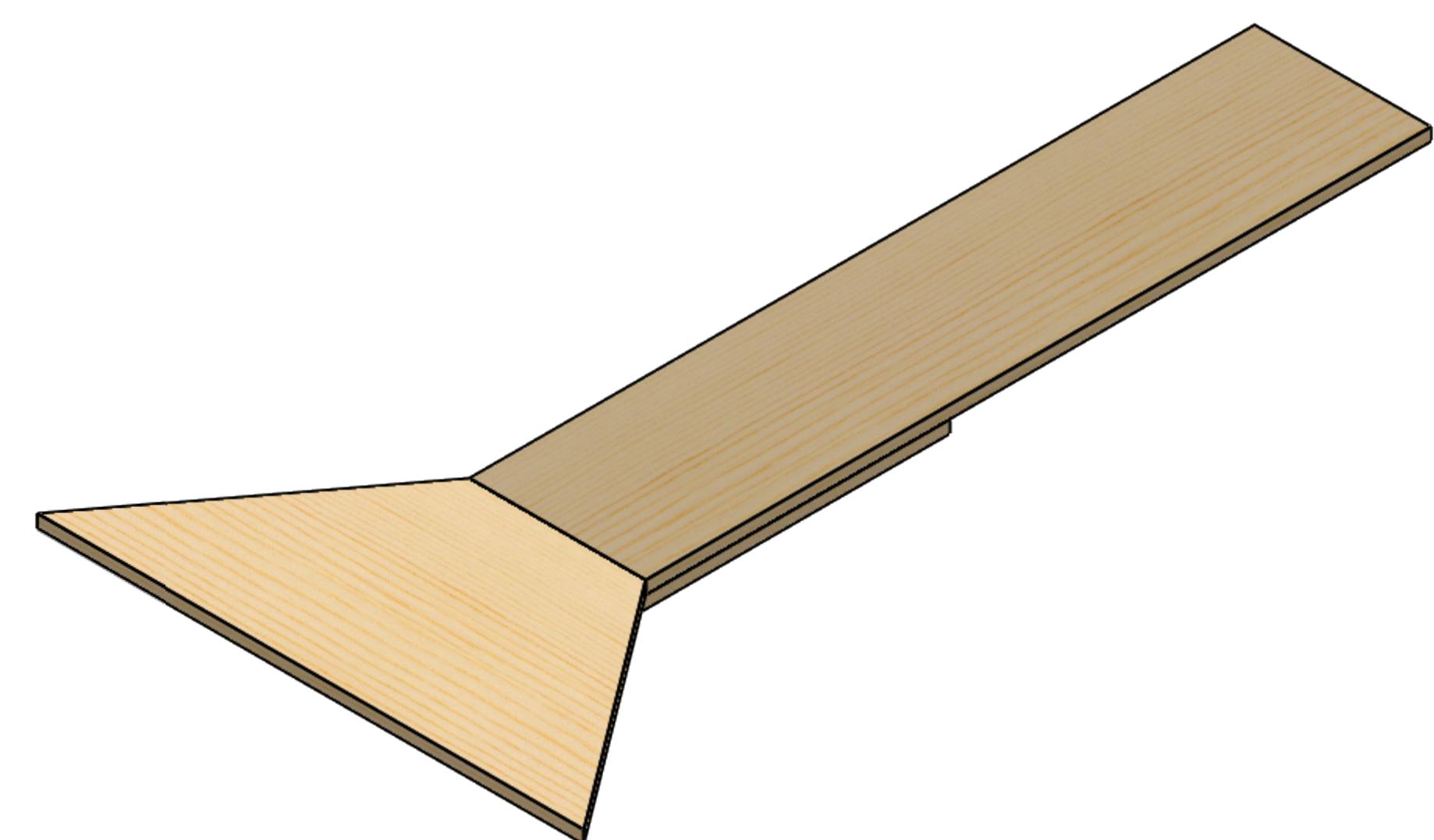
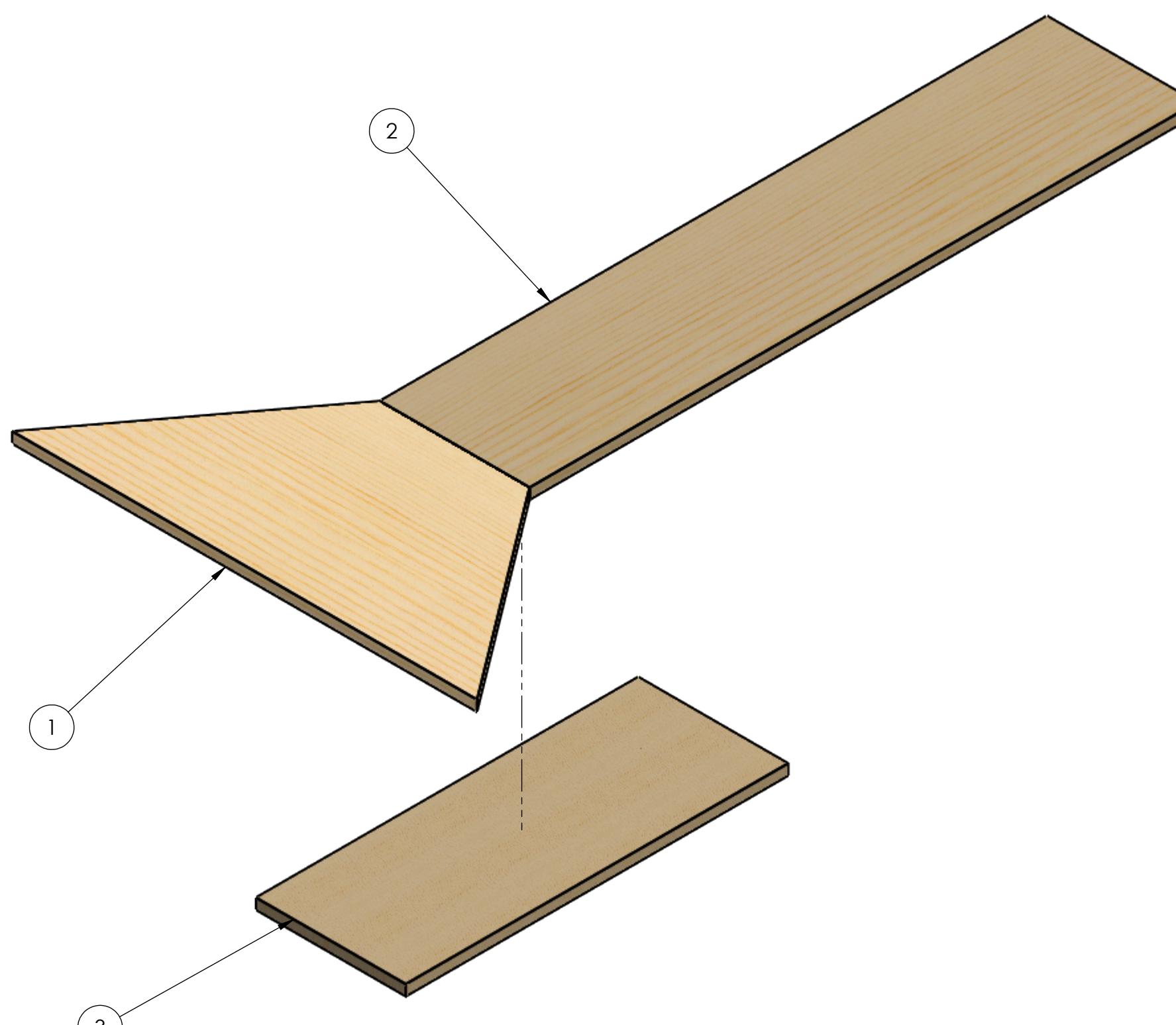
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Hardware:
#8 x 1.25" Long Screw - Qty 12

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22161	HUB - Complex Build - Upper Exit End	1
2	TE-22162	HUB - Complex Build - Upper Exit Base	1
3	TE-22163	HUB - Complex Build - Upper Exit Connection Plate	1

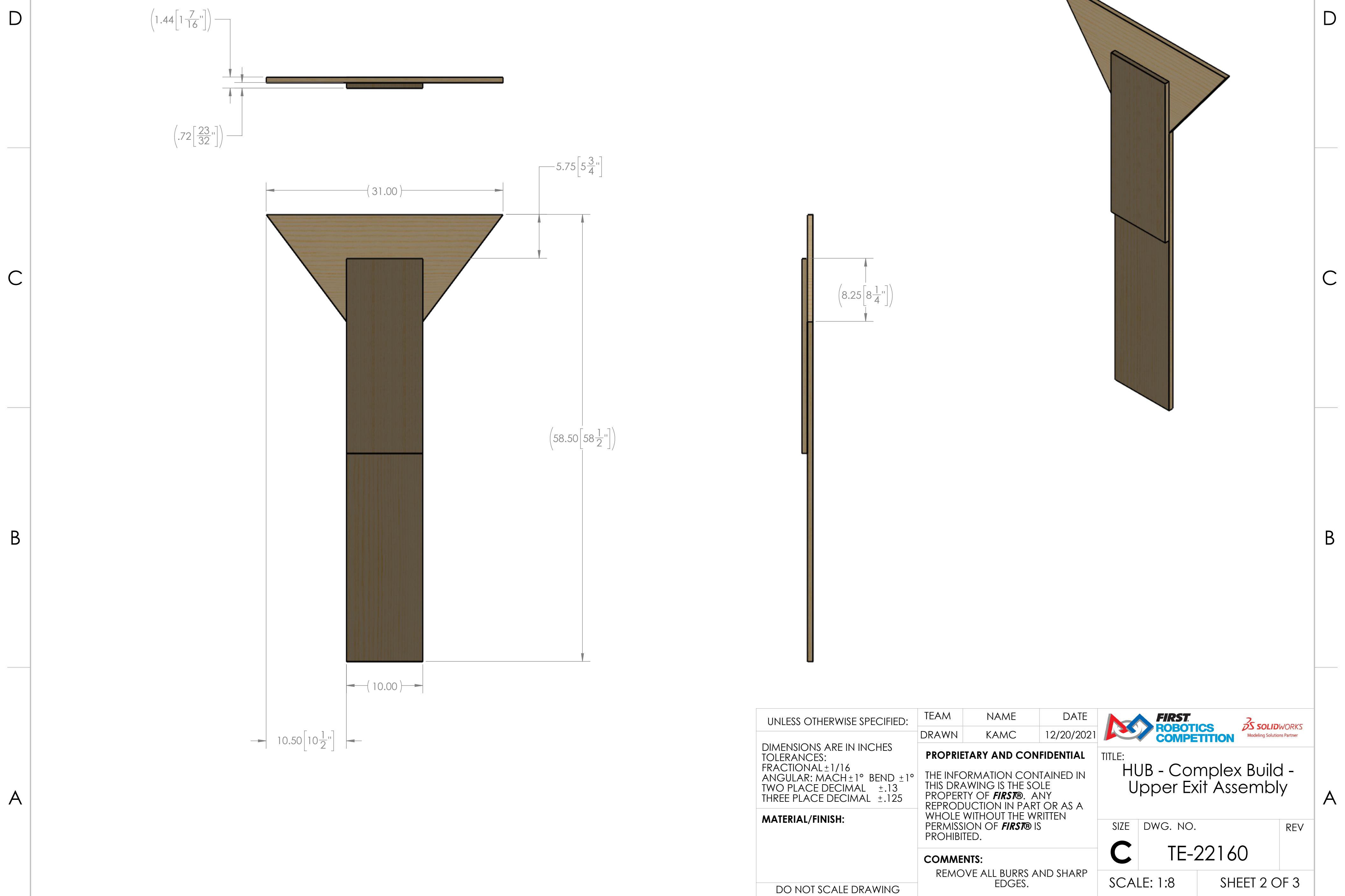
UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE	 FIRST ROBOTICS COMPETITION  SOLIDWORKS Modeling Solutions Partner		
DRAWN	KAMC	12/20/2021						
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$						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/FINISH:						TITLE: HUB - Complex Build - Upper Exit Assembly		
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.						SIZE	DWG. NO.	REV
						C	TE-22160	
DO NOT SCALE DRAWING						SCALE: 1:6	SHEET 1 OF 3	

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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/20/2021



TITLE: HUB - Complex Build -
Upper Exit Assembly

SIZE DWG. NO. REV

C TE-22160

SCALE: 1:8 SHEET 2 OF 3

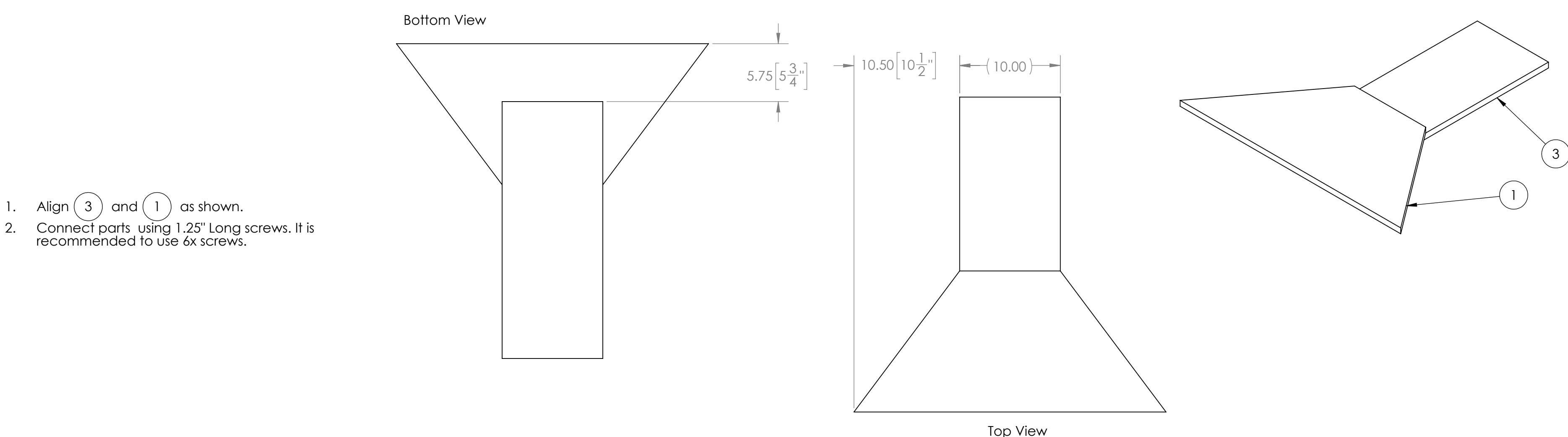
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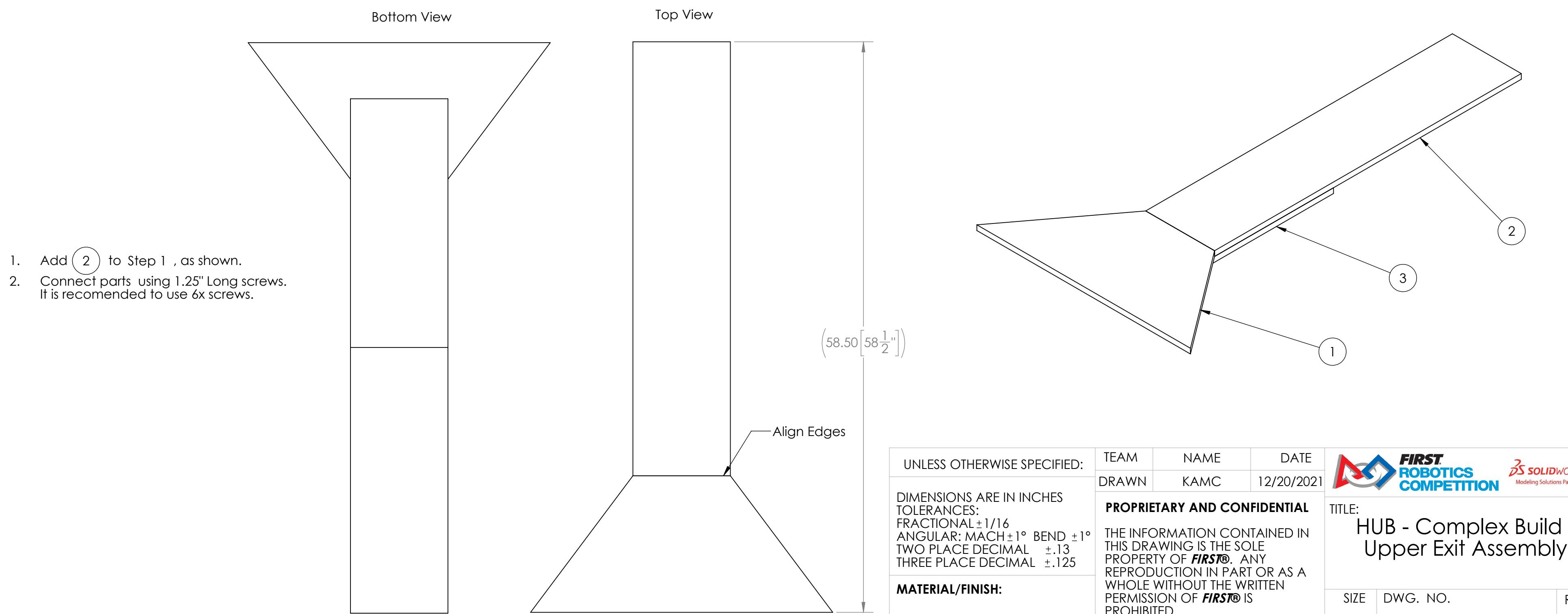
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Step 1



Step 2



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$

TEAM _____ NAME _____ DATE _____

DRAWN KAMC 12/20/2021



TITLE: HUB - Complex Build - Upper Exit Assembly

SIZE DWG. NO. REV

C TE-22160

SCALE: 1:8 SHEET 3 OF 3

MATERIAL/FINISH:

COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.

DO NOT SCALE DRAWING

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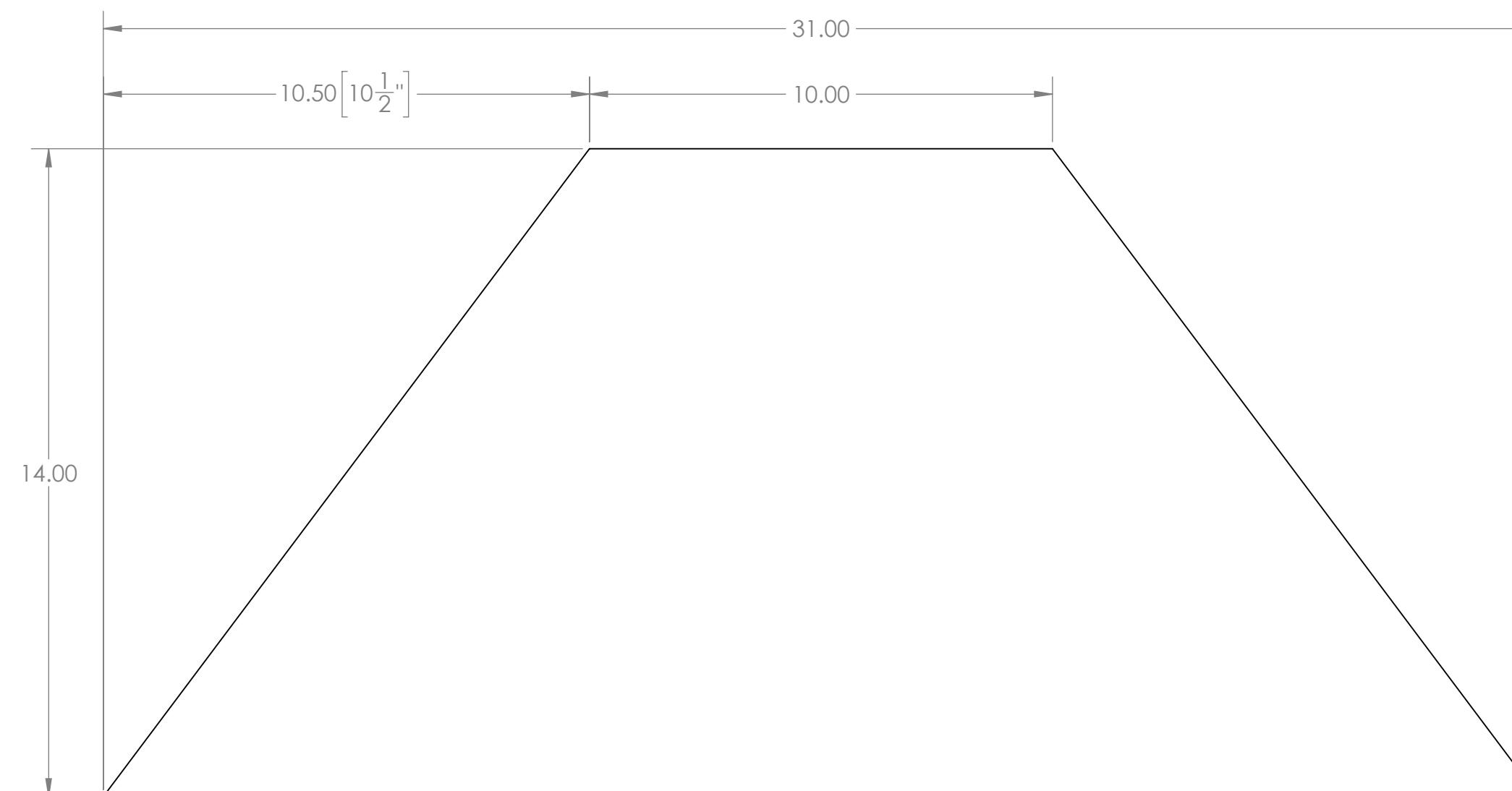
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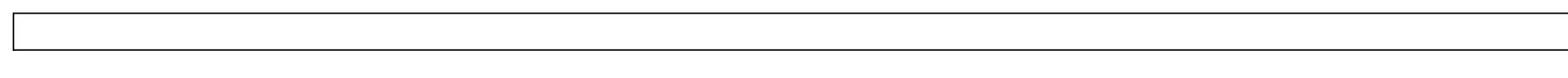
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(.72 [$\frac{23}{32}$ '])

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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm\frac{1}{16}$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	KAMC	12/20/2021
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH: 3/4" Plywood	SIZE	DWG. NO.	REV
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.	C	TE-22161	
DO NOT SCALE DRAWING	SCALE: 1:3	SHEET 1 OF 1	

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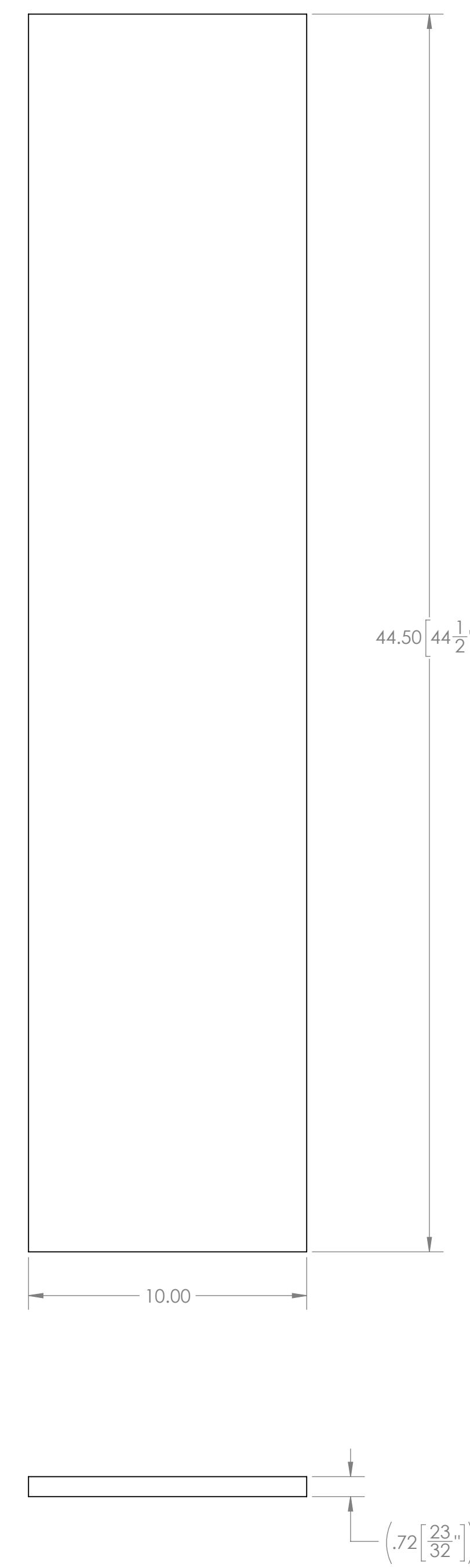
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	KAMC	12/20/2021
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
3/4" Plywood	C	TE-22162	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:4	SHEET 1 OF 1	

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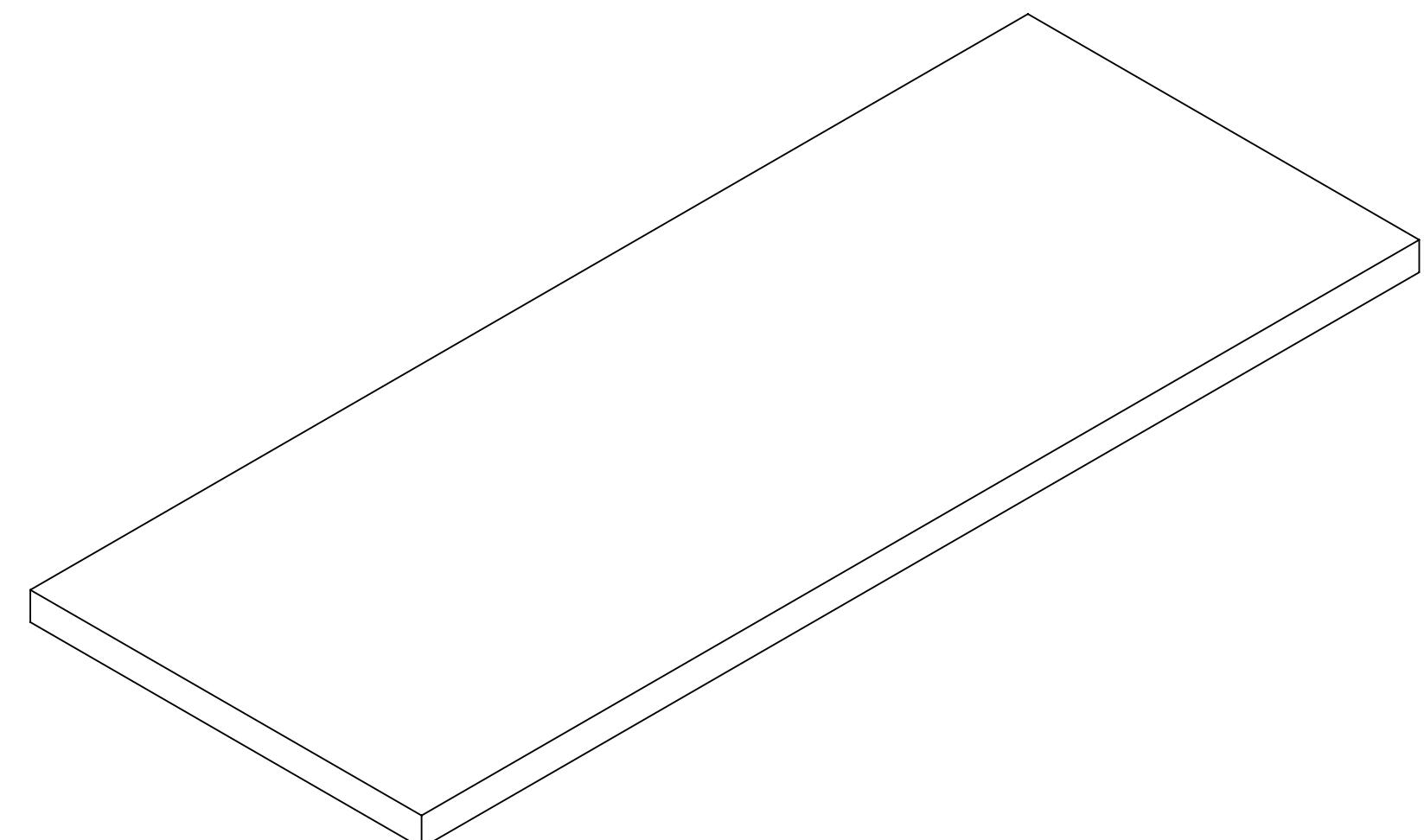
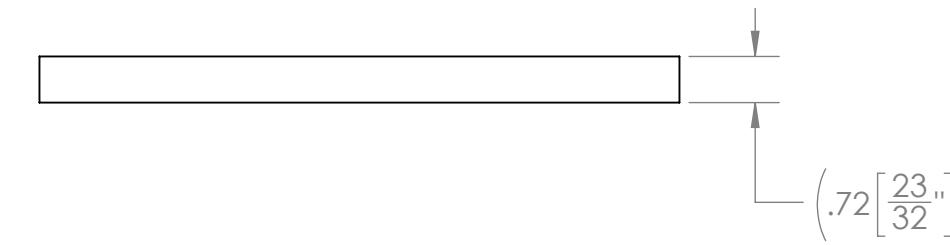
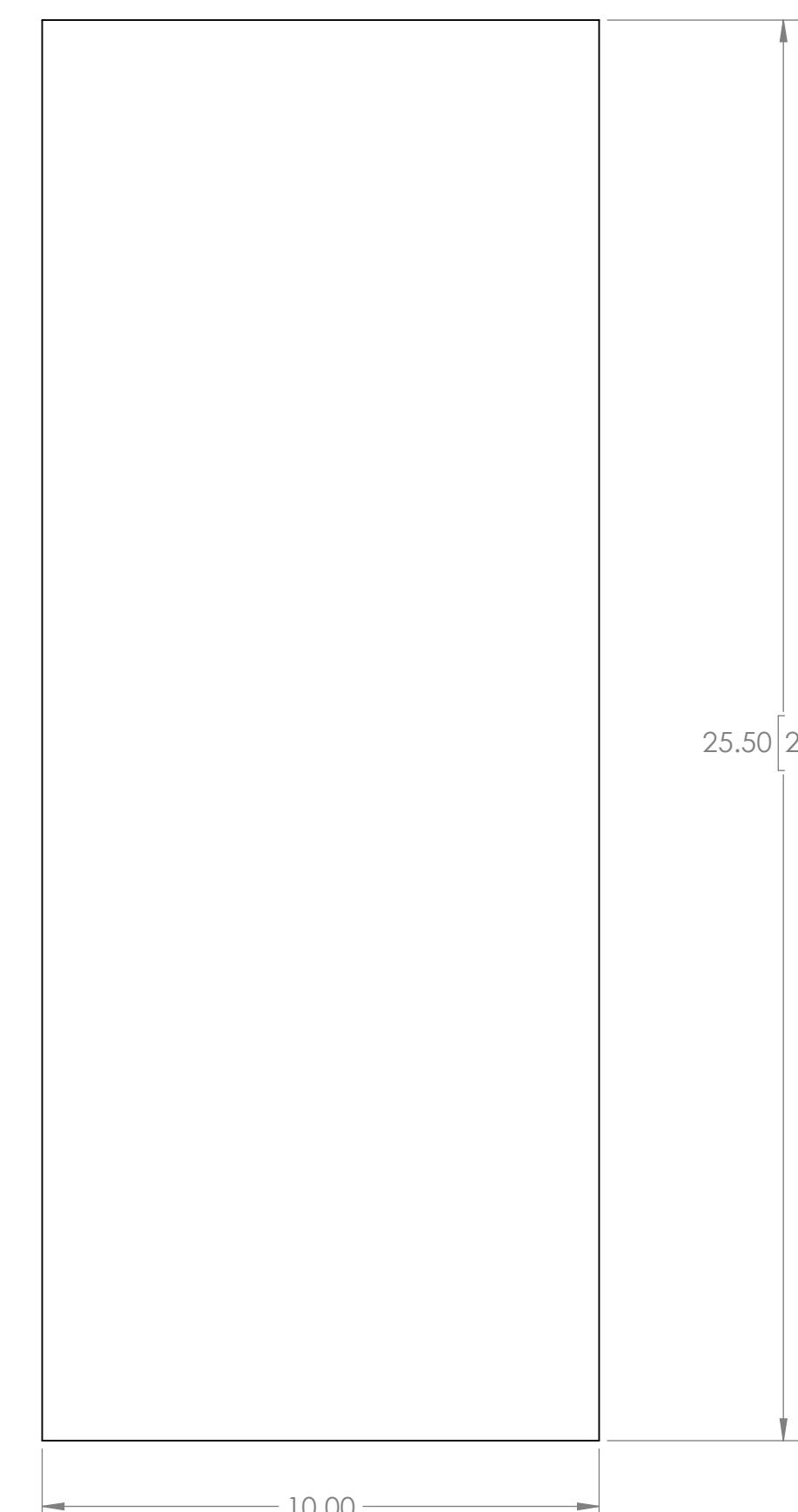
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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

3/4" Plywood

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/20/2021

PROPRIETARY AND CONFIDENTIAL

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COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.



TITLE: HUB - Complex Build -

Upper Exit Connection Plate

SIZE DWG. NO. REV

C TE-22163

SCALE: 1:3 SHEET 1 OF 1

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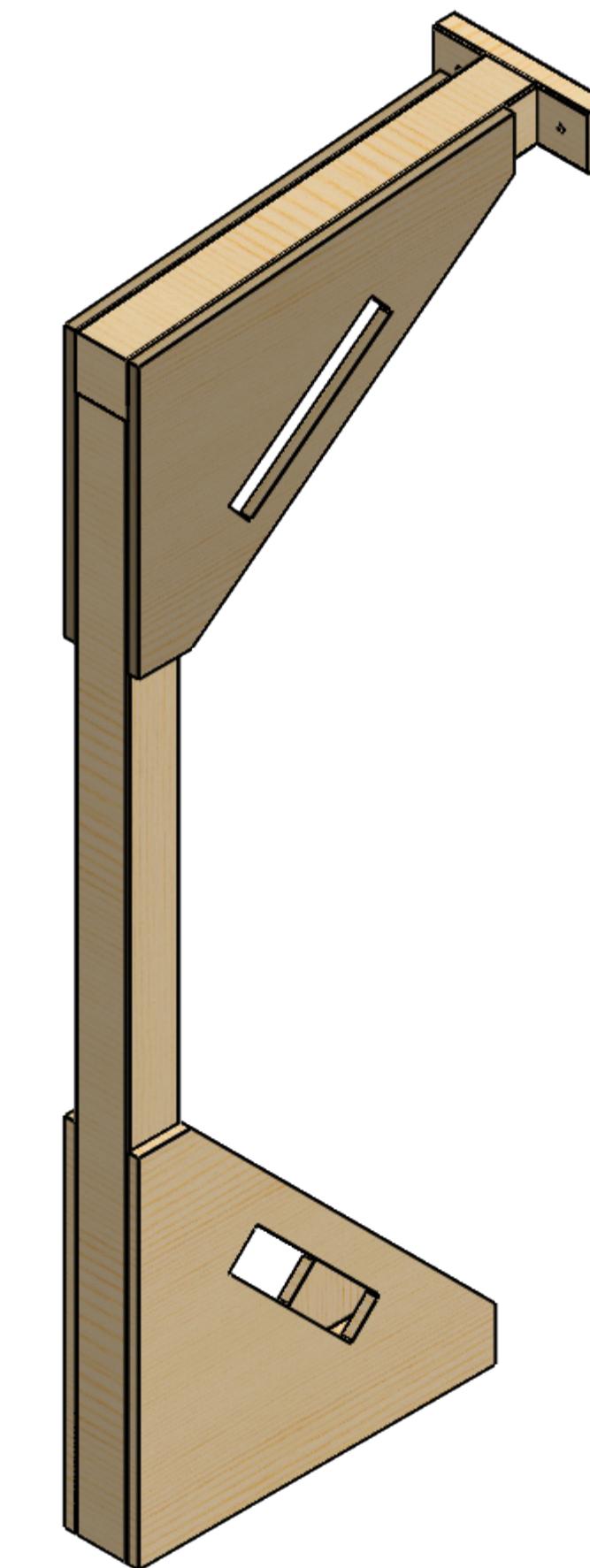
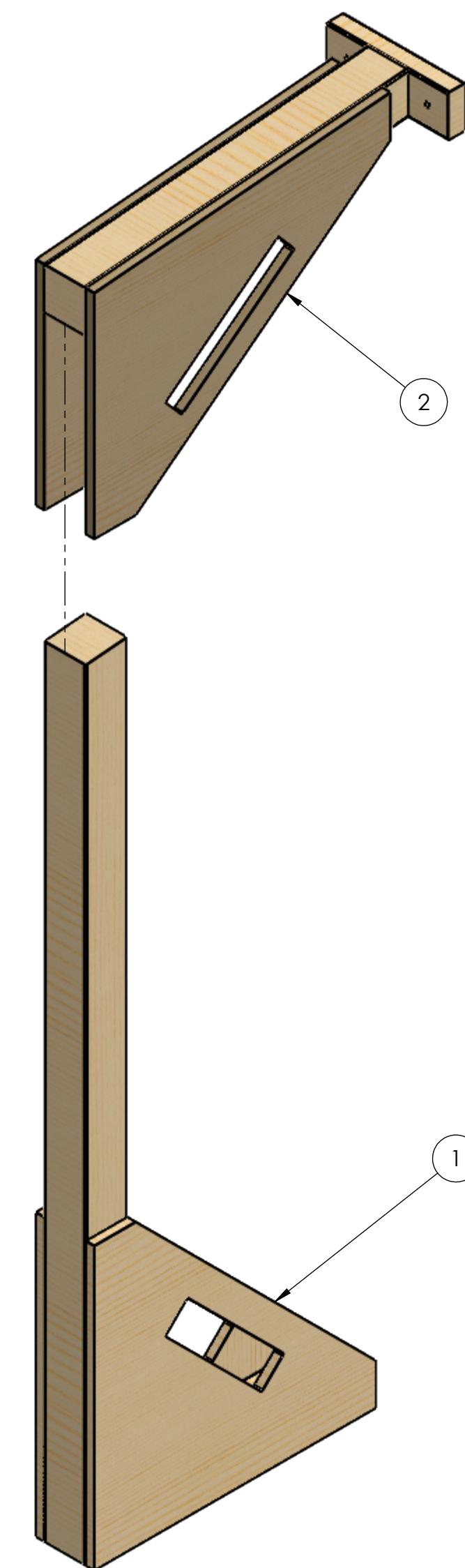
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Step 1:

1. Align (2) and (1), as shown.

Step 2:

1. Connect Step 1 using 2" long screws. It is recommended to use 5x screws on each side.

Hardware Needed:
#8 x 2" Long Screw - Qty 10

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22177	HUB - Complex Build - Lower Leg Assembly	1
2	TE-22178	HUB - Complex Build - Upper Leg Assembly	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

PROPRIETARY AND CONFIDENTIAL
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COMMENTS:
REMOVE ALL BURRS AND SHARP EDGES.

DO NOT SCALE DRAWING

TEAM: KAMC DATE: 12/21/2021
DRAWN: KAMC FIRST ROBOTICS COMPETITION DS SOLIDWORKS Modeling Solutions Partner

TITLE: HUB - Complex Build - Leg Assembly

SIZE DWG. NO. REV

C TE-22170

SCALE: 1:8 SHEET 1 OF 2

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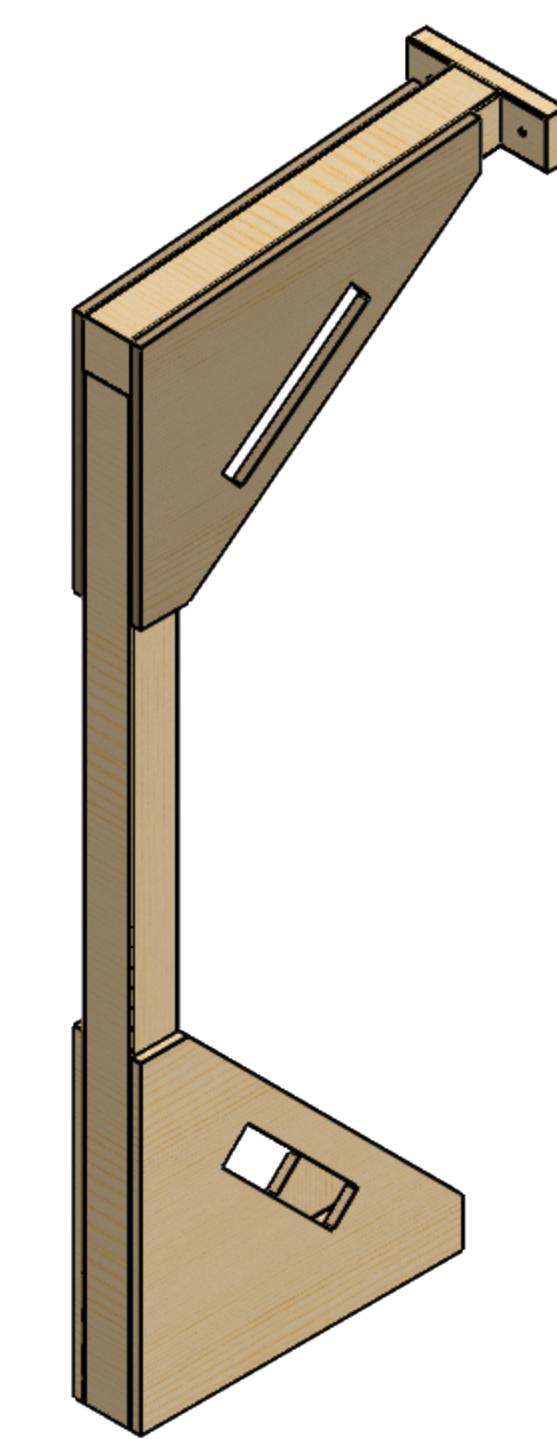
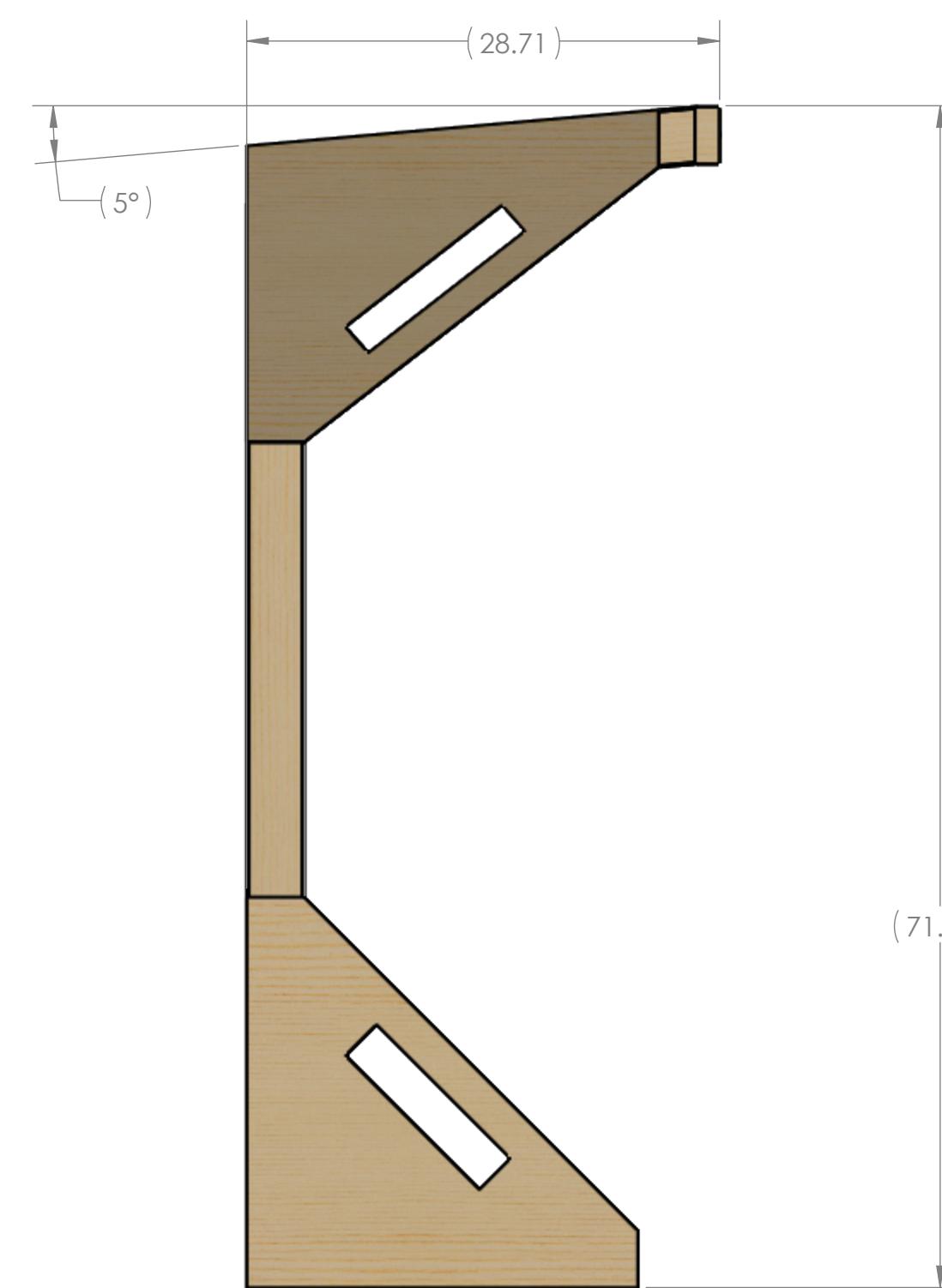
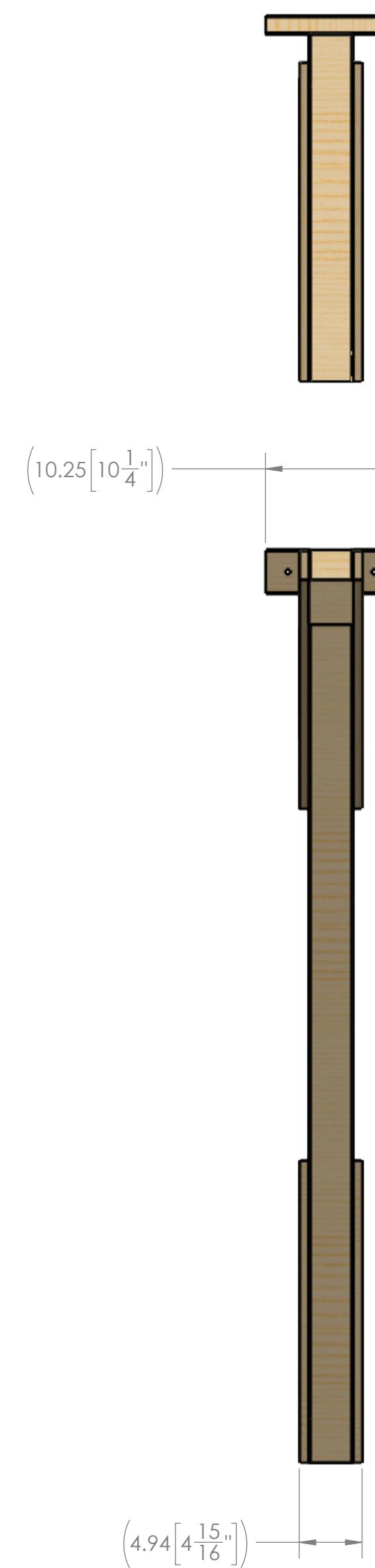
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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$

TEAM _____ NAME _____ DATE _____

DRAWN KAMC 12/21/2021



TITLE: HUB - Complex Build - Leg Assembly

SIZE DWG. NO. REV

C TE-22170

SCALE: 1:10 SHEET 2 OF 2

MATERIAL/FINISH:

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COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.

DO NOT SCALE DRAWING

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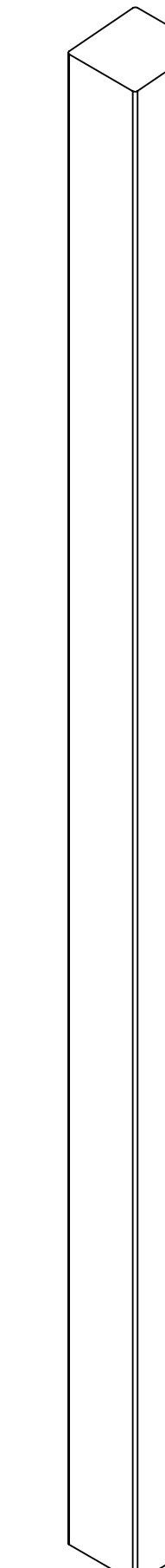
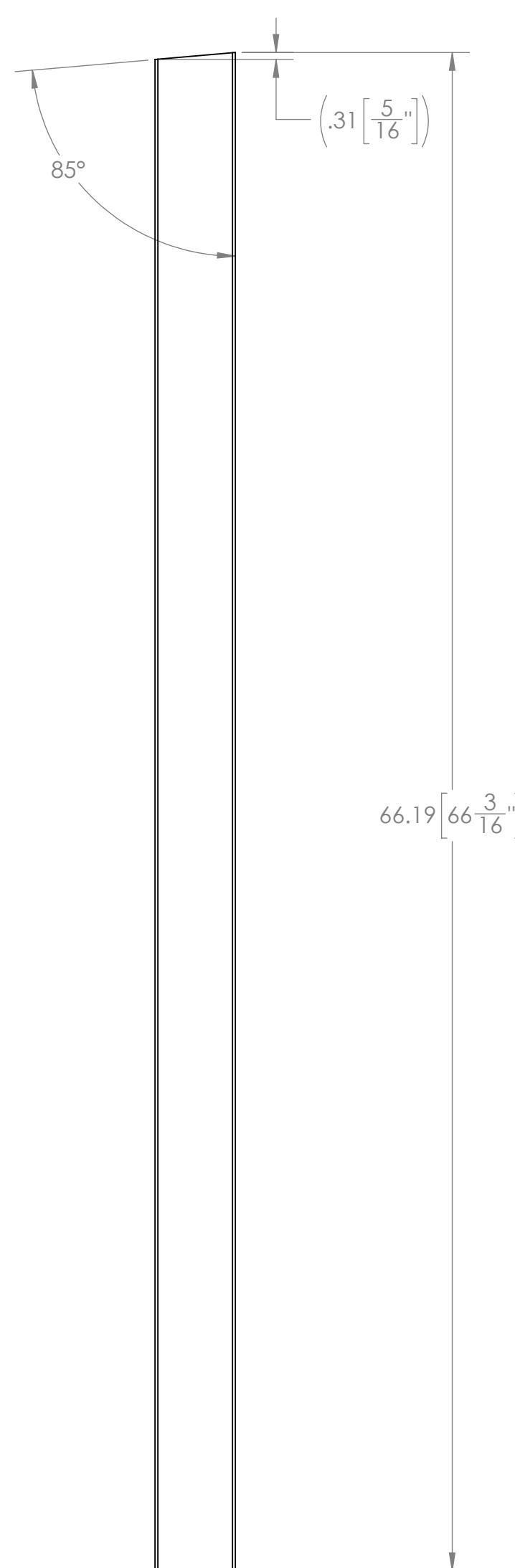
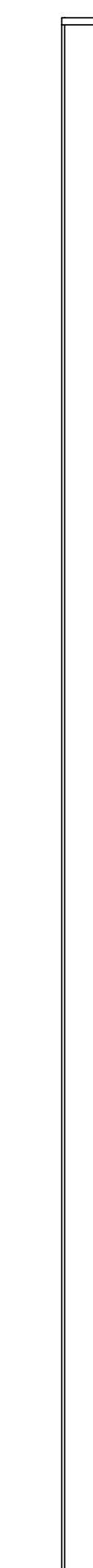
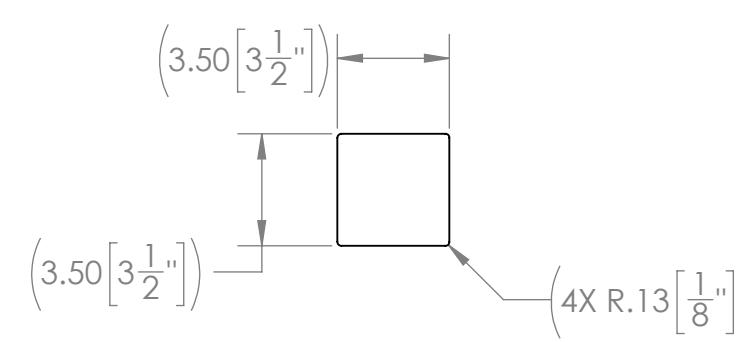
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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$

TWO PLACE DECIMAL $\pm .13$

THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

4" x 4" Lumber

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/21/2021

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COMMENTS:

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TITLE: HUB - Complex Build - Lower Leg Vertical 4x4

SIZE DWG. NO. REV

C TE-22171

SCALE: 1:6 SHEET 1 OF 1

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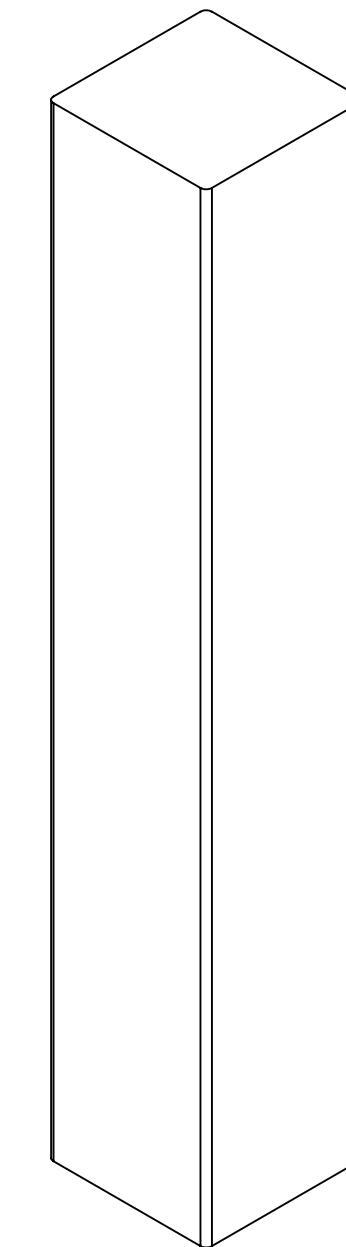
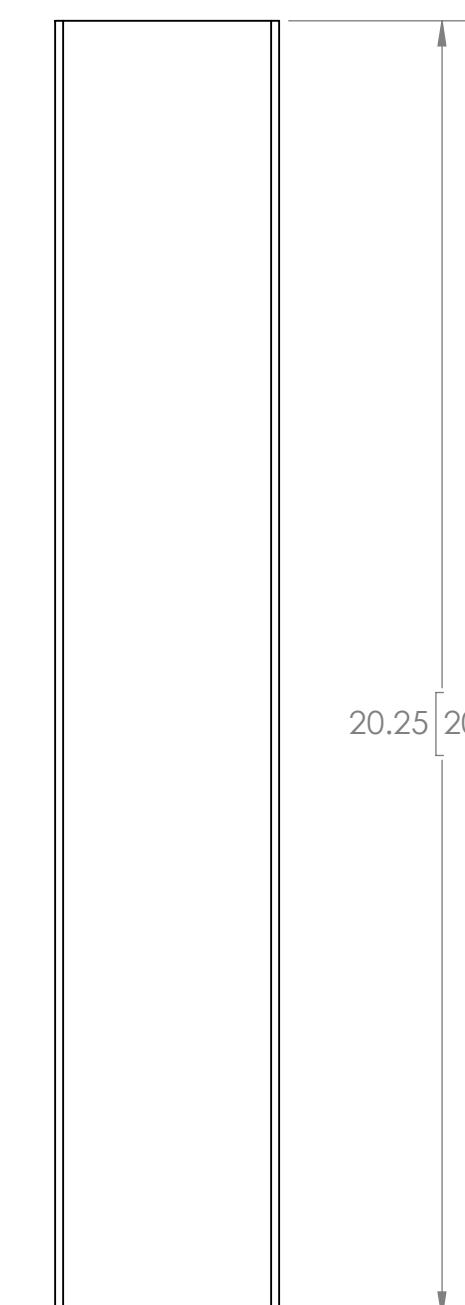
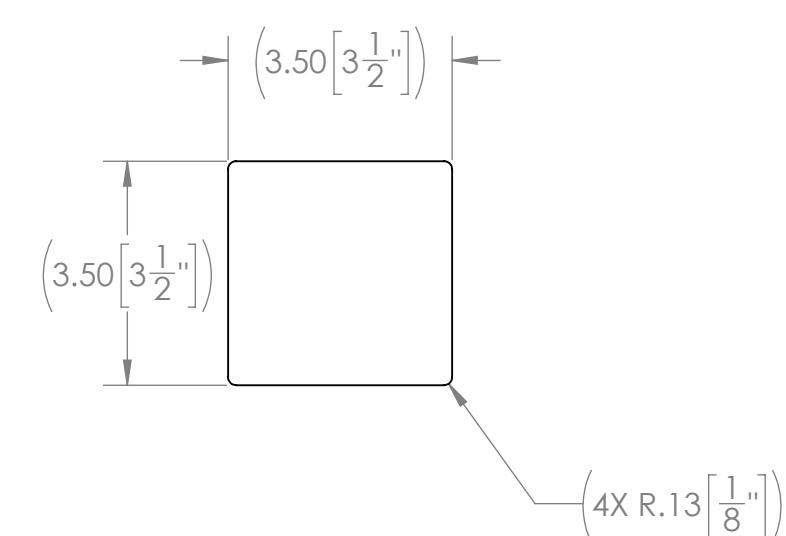
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	KAMC	12/21/2021	
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
4" x 4" Lumber	C	TE-22172	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:3	SHEET 1 OF 1	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Lower Leg Base 4x4

SIZE DWG. NO. REV
C TE-22172

SCALE: 1:3 SHEET 1 OF 1

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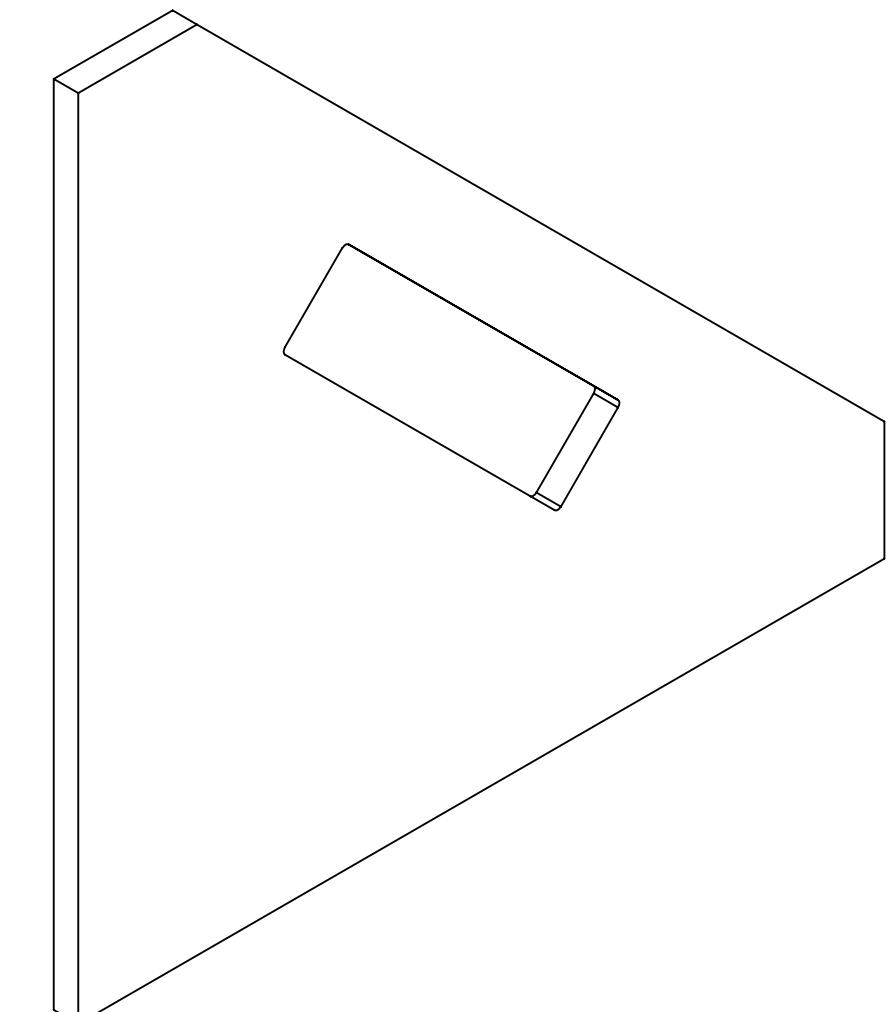
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 $(.72[23\frac{3}{32}'])$ $23.75[23\frac{3}{4}"]$ 4x R.133
see note16.00
to virtual sharp14.13[14 $\frac{1}{8}$ "]
to virtual sharp7.88[7 $\frac{7}{8}$ "]
to virtual sharp6.00
to virtual sharp3.50[3 $\frac{1}{2}$ "]

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3.50[3 $\frac{1}{2}$ "]6.00
to virtual sharp7.88[7 $\frac{7}{8}$ "]
to virtual sharp14.13[14 $\frac{1}{8}$ "]
to virtual sharp16.00
to virtual sharp23.75[23 $\frac{3}{4}$ "]

Cut out is strongly recommended for ease of assembly



Note:
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

3/4" Plywood

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/21/2021

SOLIDWORKS
Modeling Solutions Partner

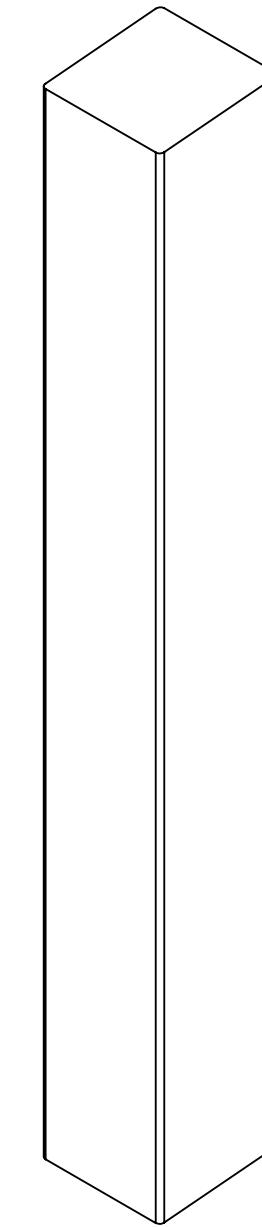
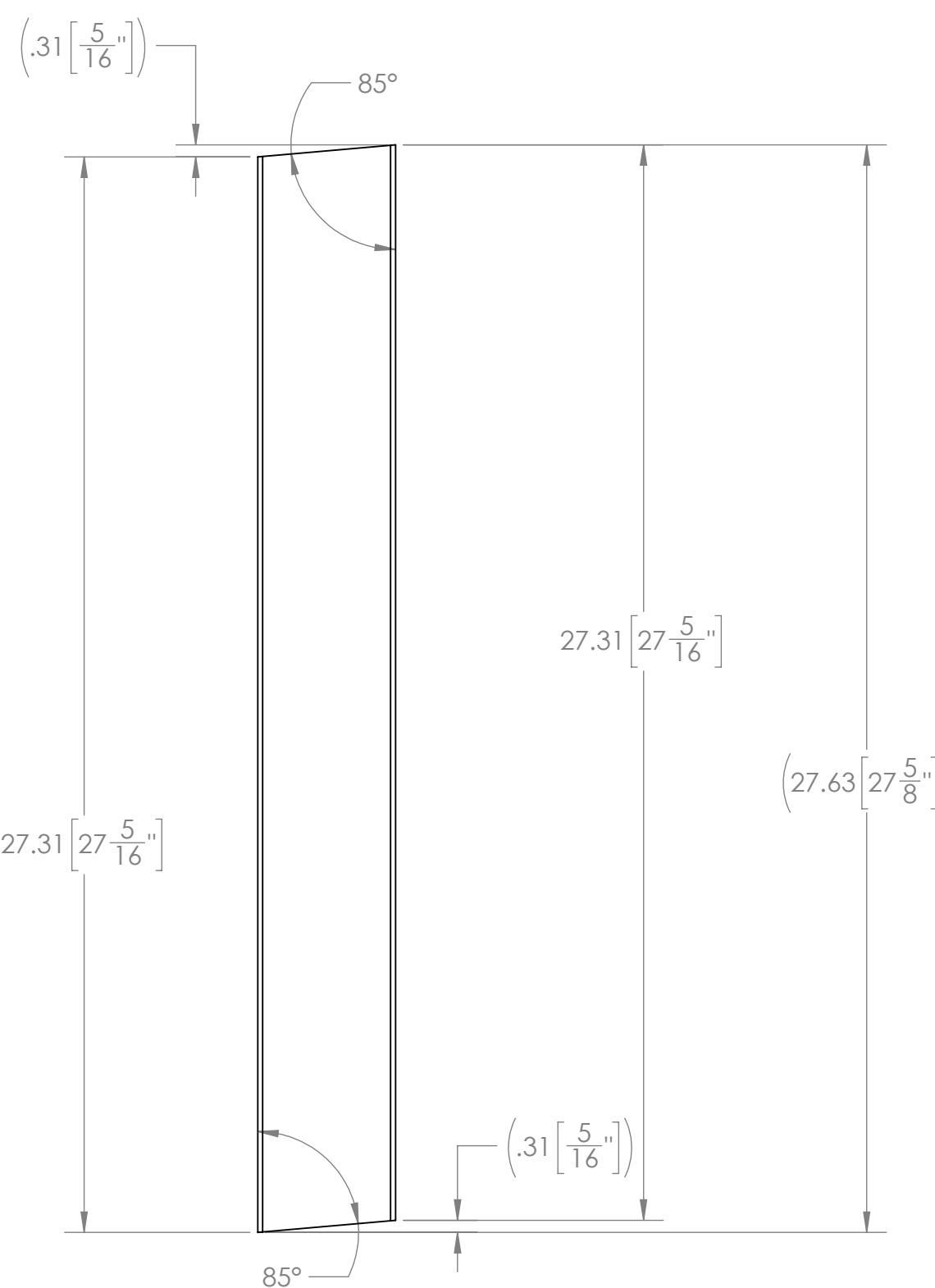
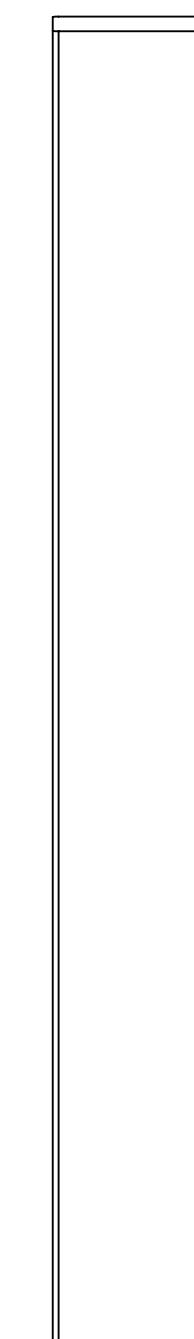
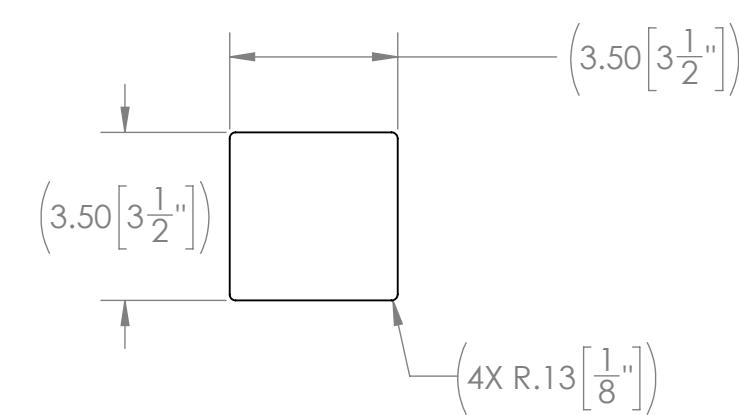
TITLE: HUB - Complex Build - Lower Leg Base Side

SIZE DWG. NO. REV

C TE-22173

SCALE: 1:4 SHEET 1 OF 1

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

DO NOT SCALE DRAWING

TEAM NAME DATE
DRAWN KAMC 12/21/2021

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:

HUB - Complex Build -
Upper Leg 4x4

SIZE DWG. NO. REV

C TE-22174

SCALE: 1:4 SHEET 1 OF 1

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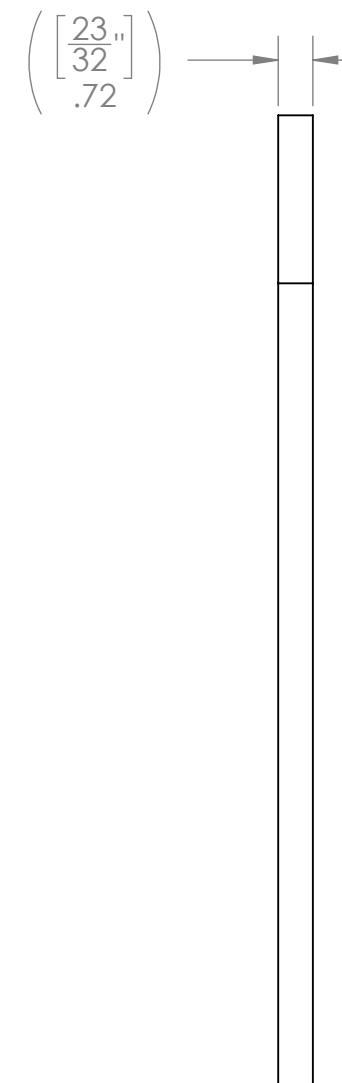
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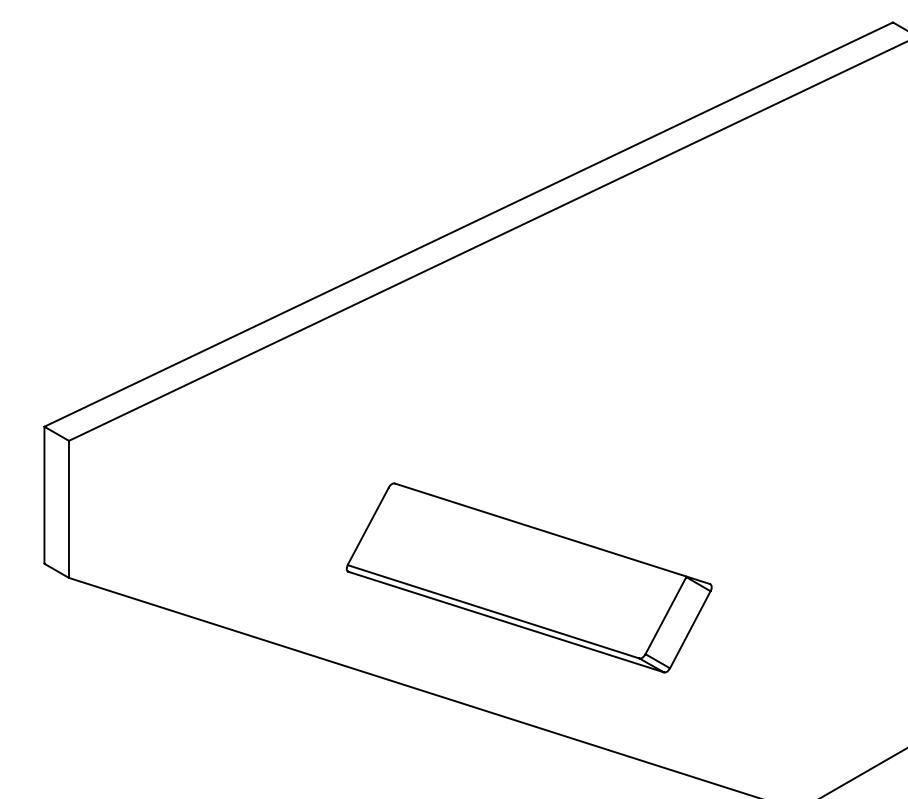
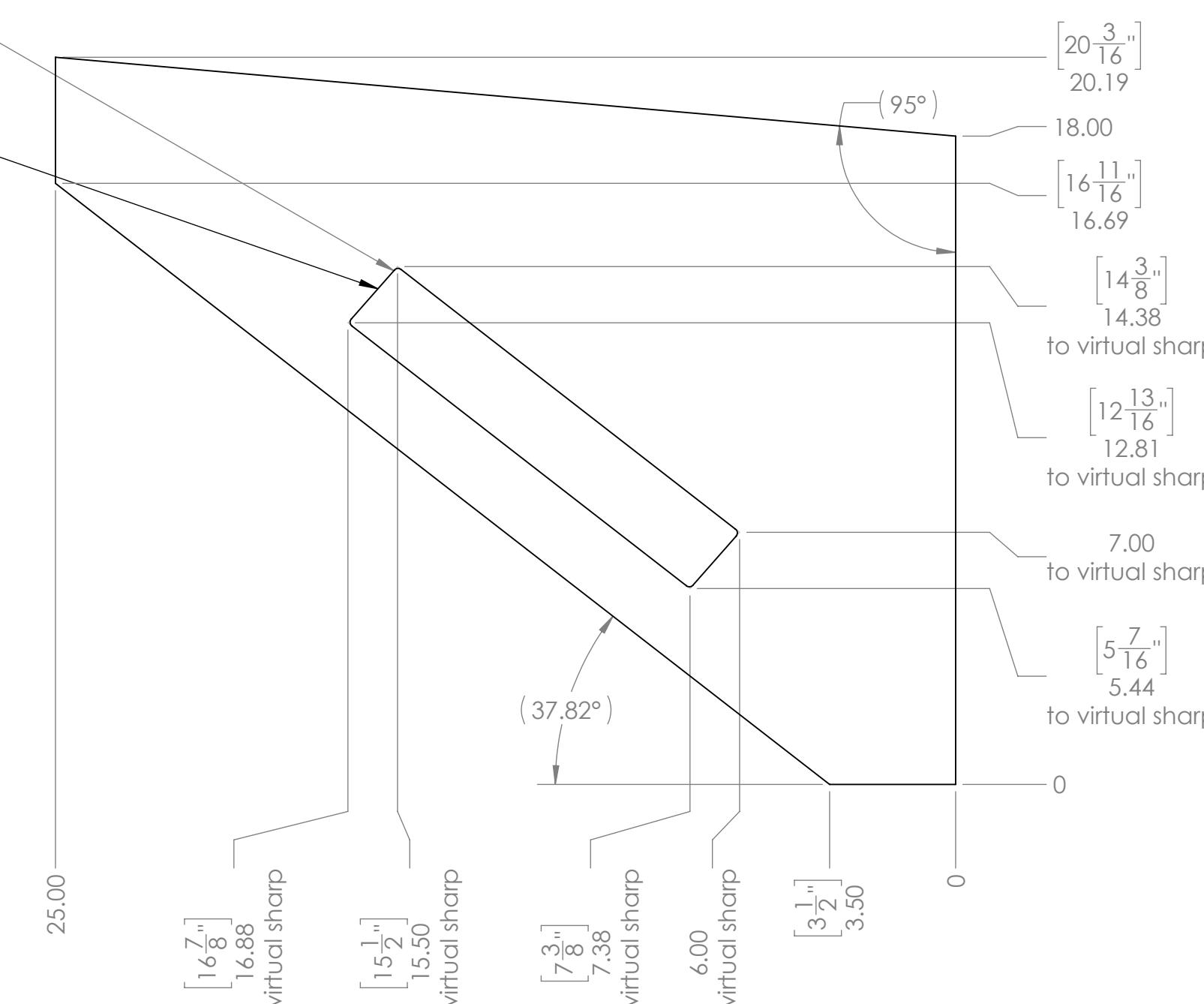
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Cut out is strongly recommended for ease of assembly



Note:
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
3/4" Plywood	C	TE-22175	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:4	SHEET 1 OF 1	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
HUB - Complex Build - Upper Leg Side

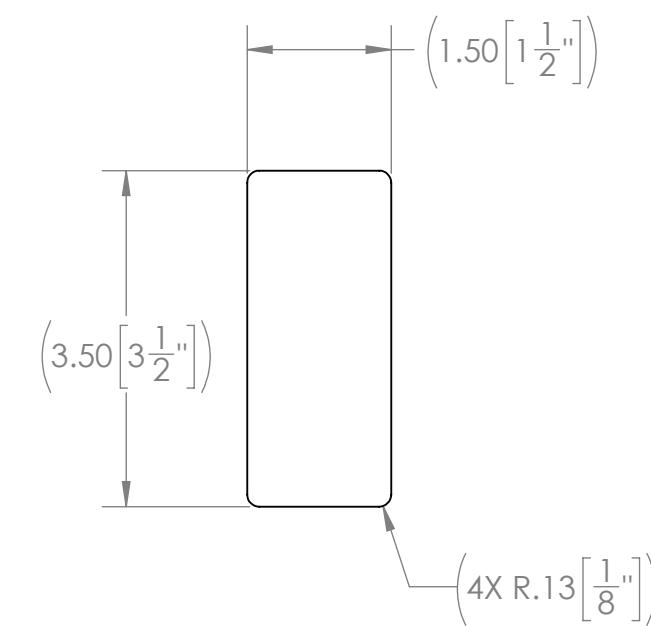
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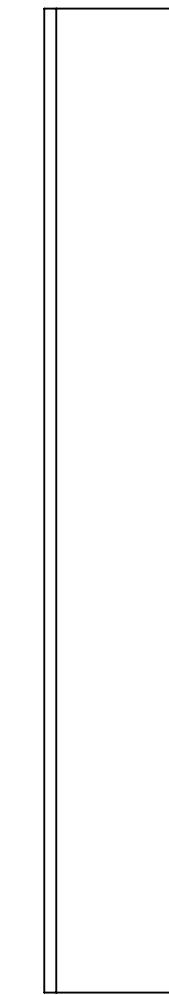
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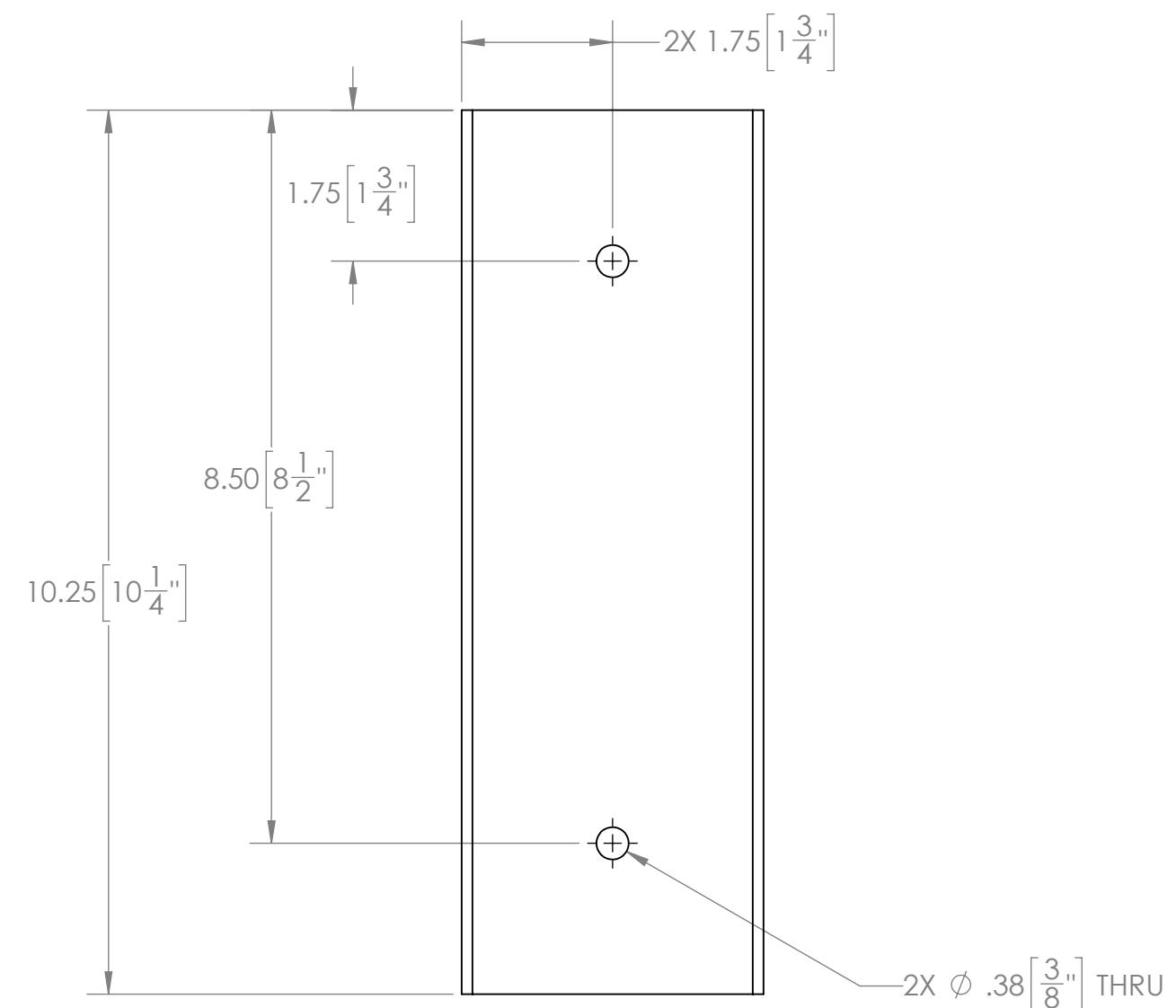
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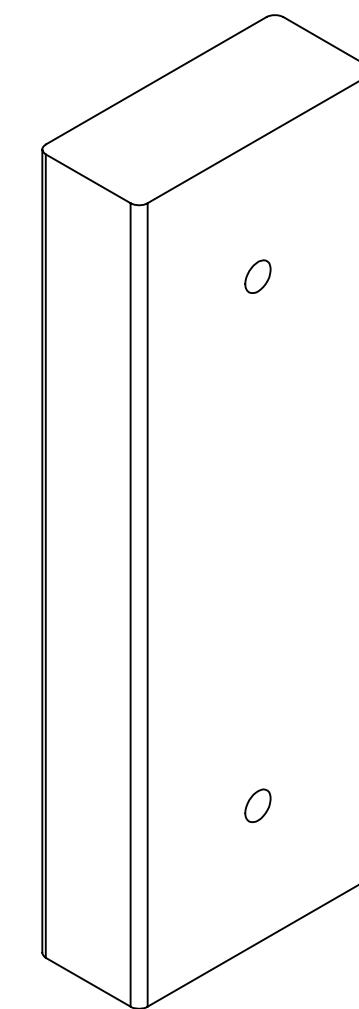
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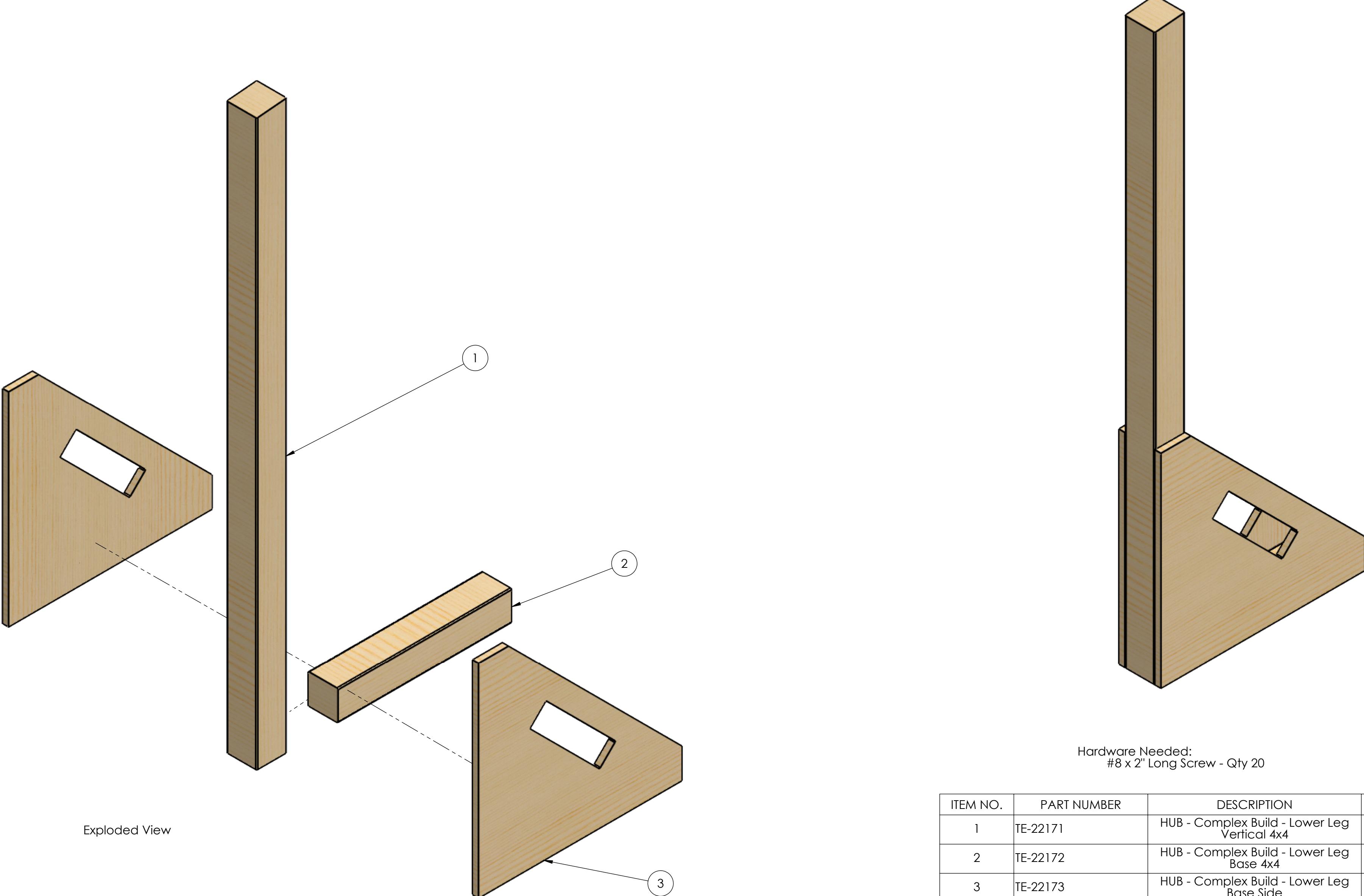


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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
2" x 4" Lumber	C	TE-22176	
COMMENTS:		SCALE: 1:2	
REMOVE ALL BURRS AND SHARP EDGES.		SHEET 1 OF 1	
DO NOT SCALE DRAWING			

 **FIRST
ROBOTICS
COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**HUB - Complex Build -
Upper Leg to
Connection Box 2x4**

SIZE DWG. NO. REV
C TE-22176
SCALE: 1:2 SHEET 1 OF 1



Hardware Needed:
#8 x 2" Long Screw - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22171	HUB - Complex Build - Lower Leg Vertical 4x4	1
2	TE-22172	HUB - Complex Build - Lower Leg Base 4x4	1
3	TE-22173	HUB - Complex Build - Lower Leg Base Side	2

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			DRAWN	KAMC	12/21/2021
PROPRIETARY AND CONFIDENTIAL					
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.					
DO NOT SCALE DRAWING					

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: HUB - Complex Build - Lower Leg Assembly

SIZE DWG. NO. REV

C TE-22177

SCALE: 1:6 SHEET 1 OF 3

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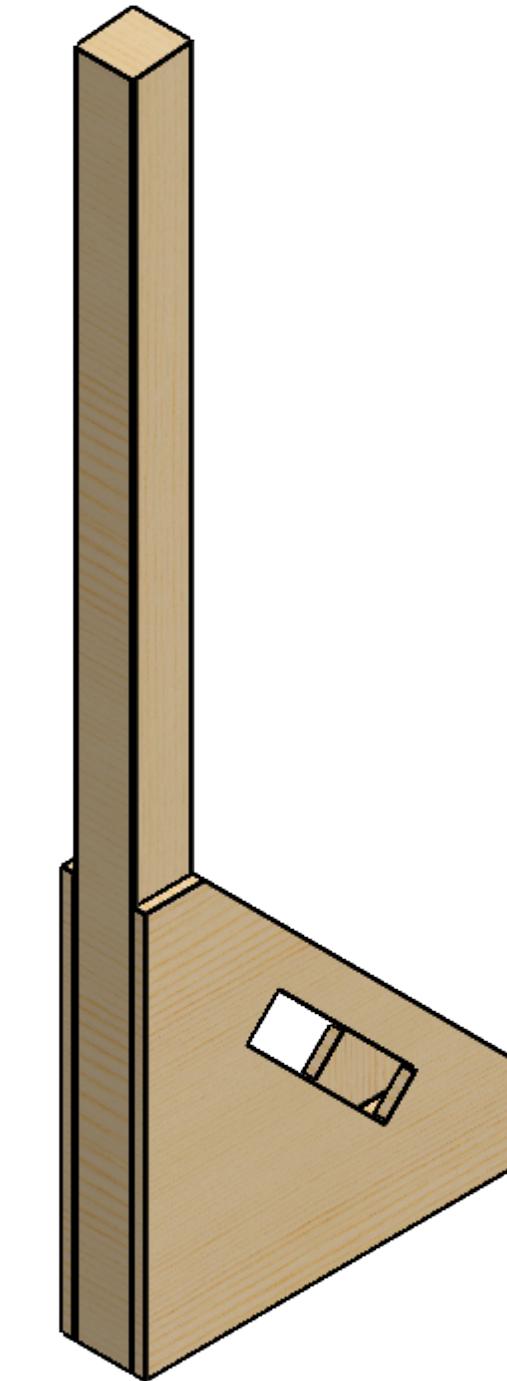
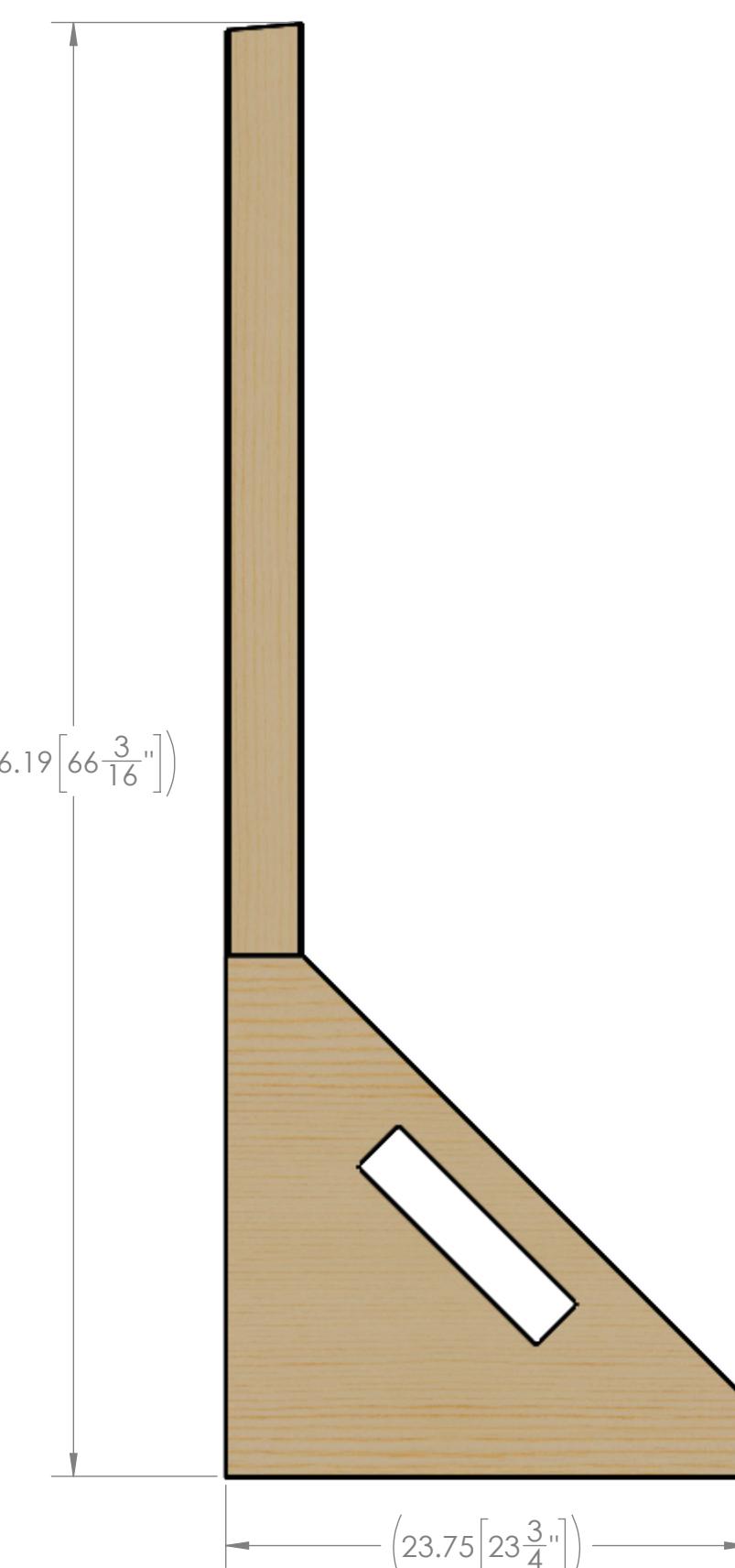
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
C TE-22177			
COMMENTS:	SCALE: 1:8		
REMOVE ALL BURRS AND SHARP EDGES.			SHEET 2 OF 3
DO NOT SCALE DRAWING			

 **FIRST
ROBOTICS
COMPETITION**  SOLIDWORKS
Modeling Solutions Partner

TITLE:
**HUB - Complex Build -
Lower Leg Assembly**

SIZE DWG. NO. REV
C TE-22177

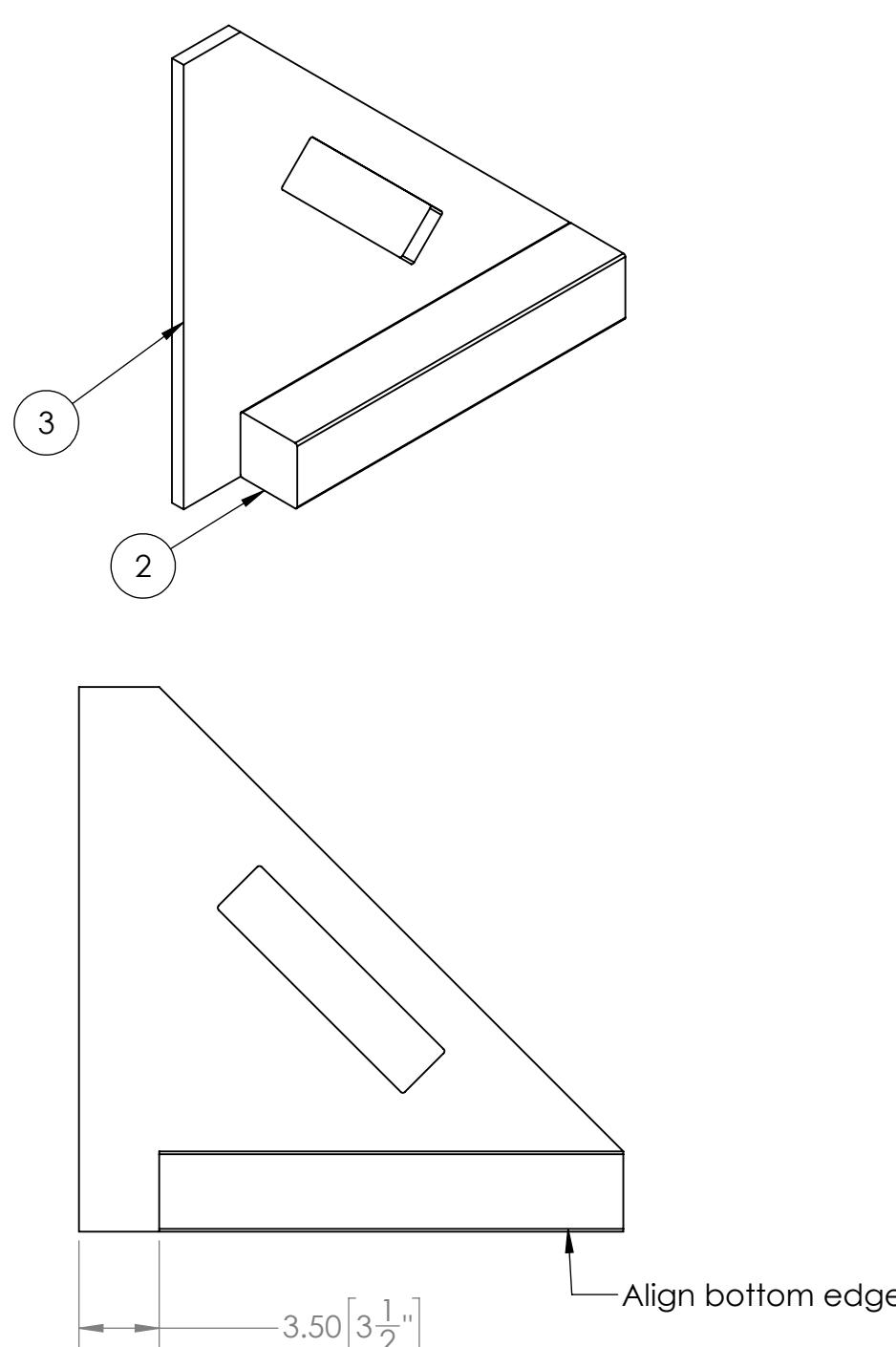
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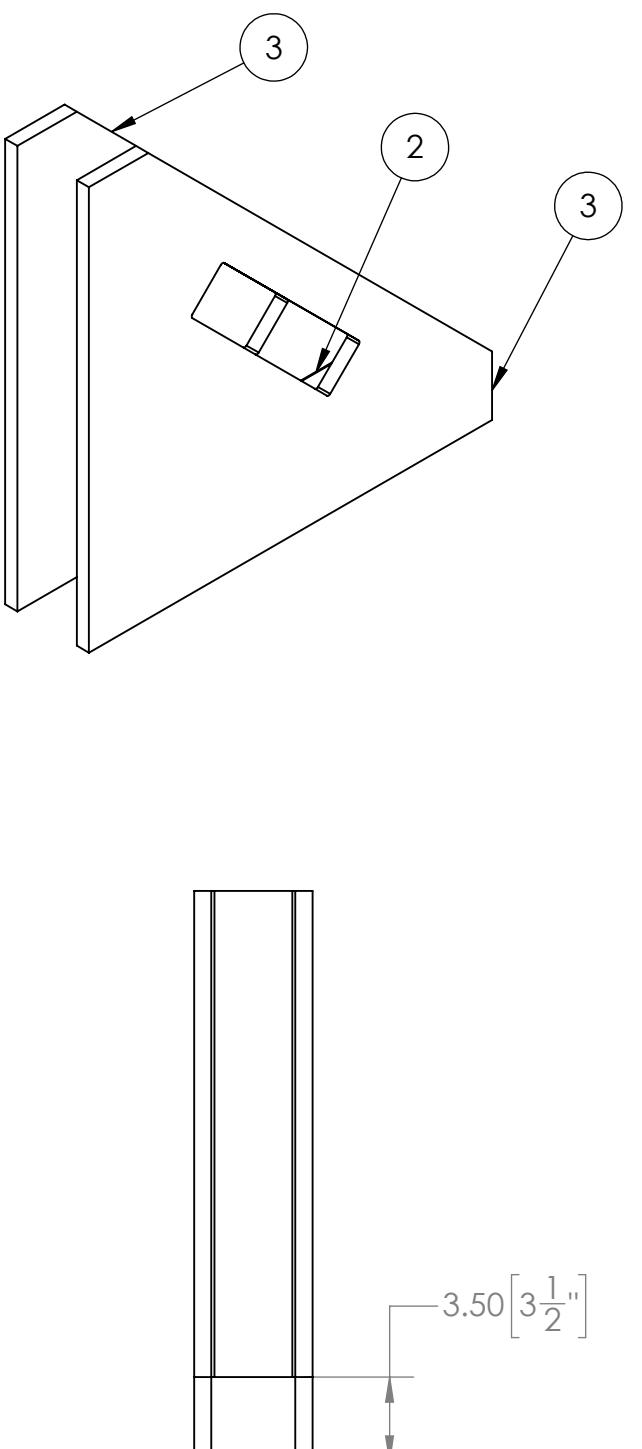
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Step 1



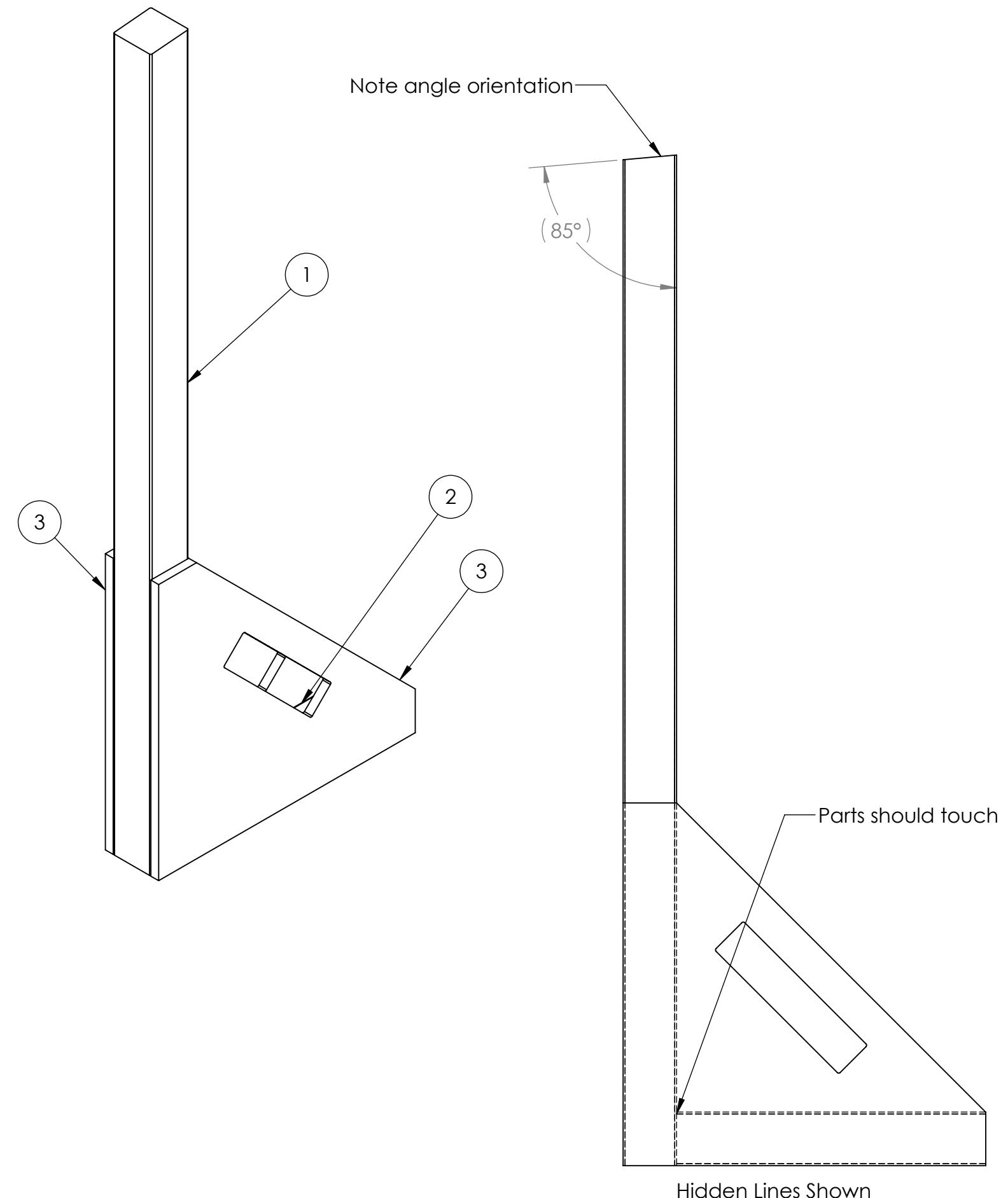
1. Align (2) and (3), as shown.
2. Connect using 2" long screws. It is recommended to use x5 screws.

Step 2



1. Add an additional (3) to Step 1, as shown.
2. Connect using 2" long screws. It is recommended to use x5 screws.

Step 3



1. Add (1) to Step 2 by sliding between both (3). Align as shown, such that (1) and (2) touch, and noting the orientation of the angle on (1).
2. Connect (1) to both (3) using 2" long screws. It is recommended to use x5 screws per (3).

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM NAME DATE
DRAWN KAMC 12/21/2021

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

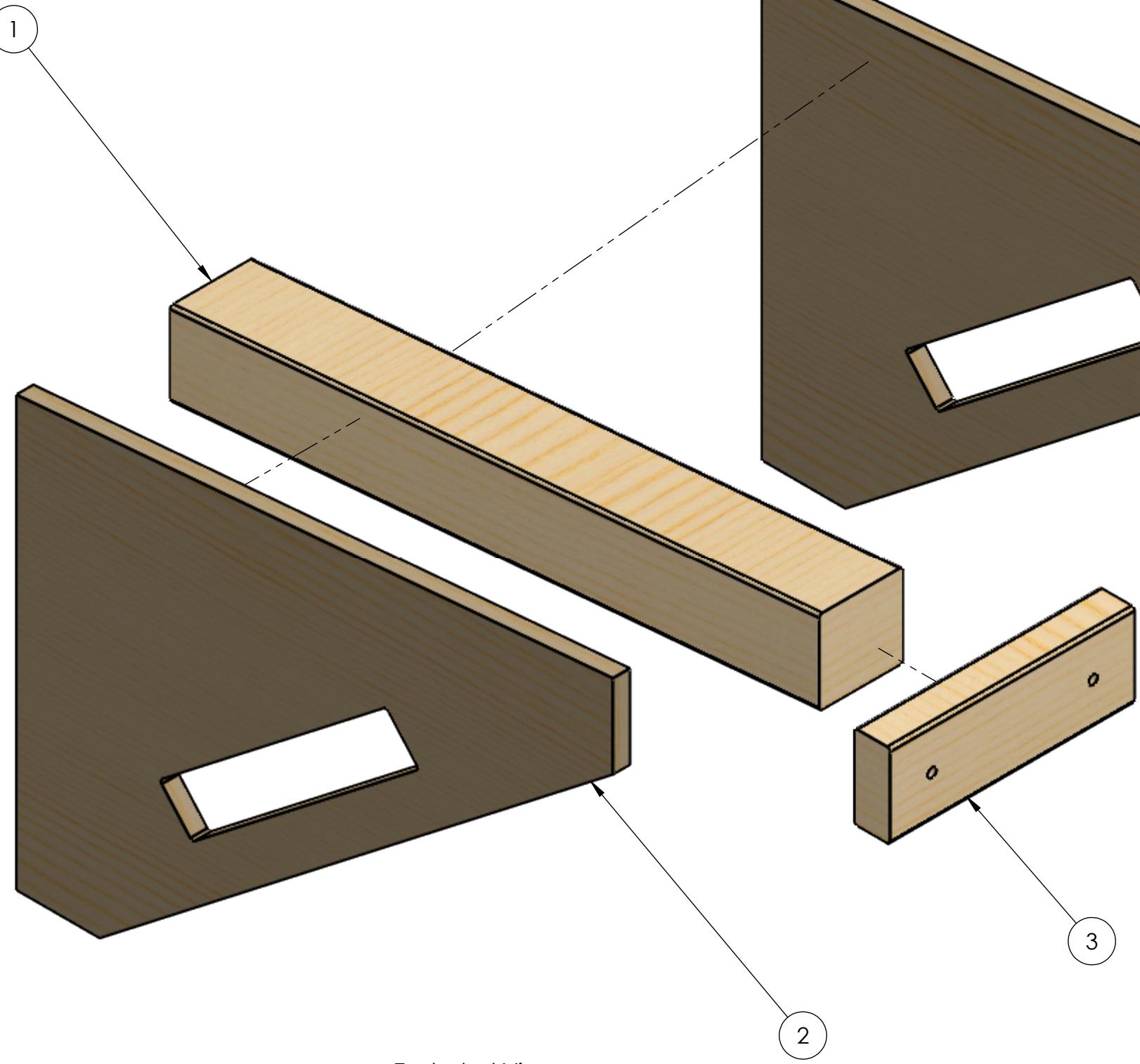
TITLE:

HUB - Complex Build -
Lower Leg Assembly

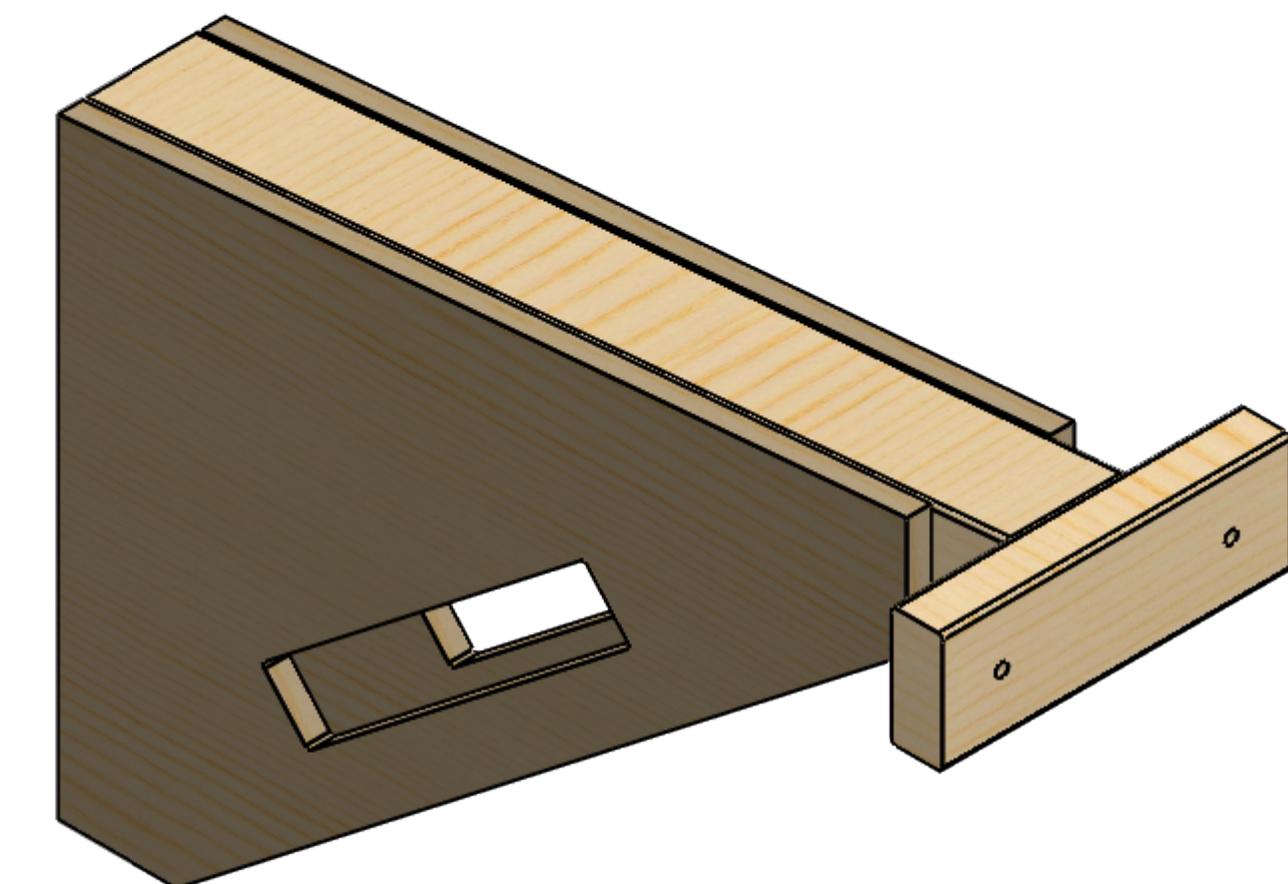
SIZE DWG. NO. REV

C TE-22177

SCALE: 1:8 SHEET 3 OF 3



Exploded View



Hardware Needed:
 #8 x 2" Long Screw - Qty 10
 #8 x 2.5" Long Screw - Qty 5

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22174	HUB - Complex Build - Upper Leg 4x4	1
2	TE-22175	HUB - Complex Build - Upper Leg Side	2
3	TE-22176	HUB - Complex Build - Upper Leg to Connection Box 2x4	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
 TOLERANCES:
 FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 12/21/2021



SOLIDWORKS
 Modeling Solutions Partner

TITLE: HUB - Complex Build - Upper Leg Assembly

SIZE DWG. NO. REV

C TE-22178

SCALE: 1:4 SHEET 1 OF 3

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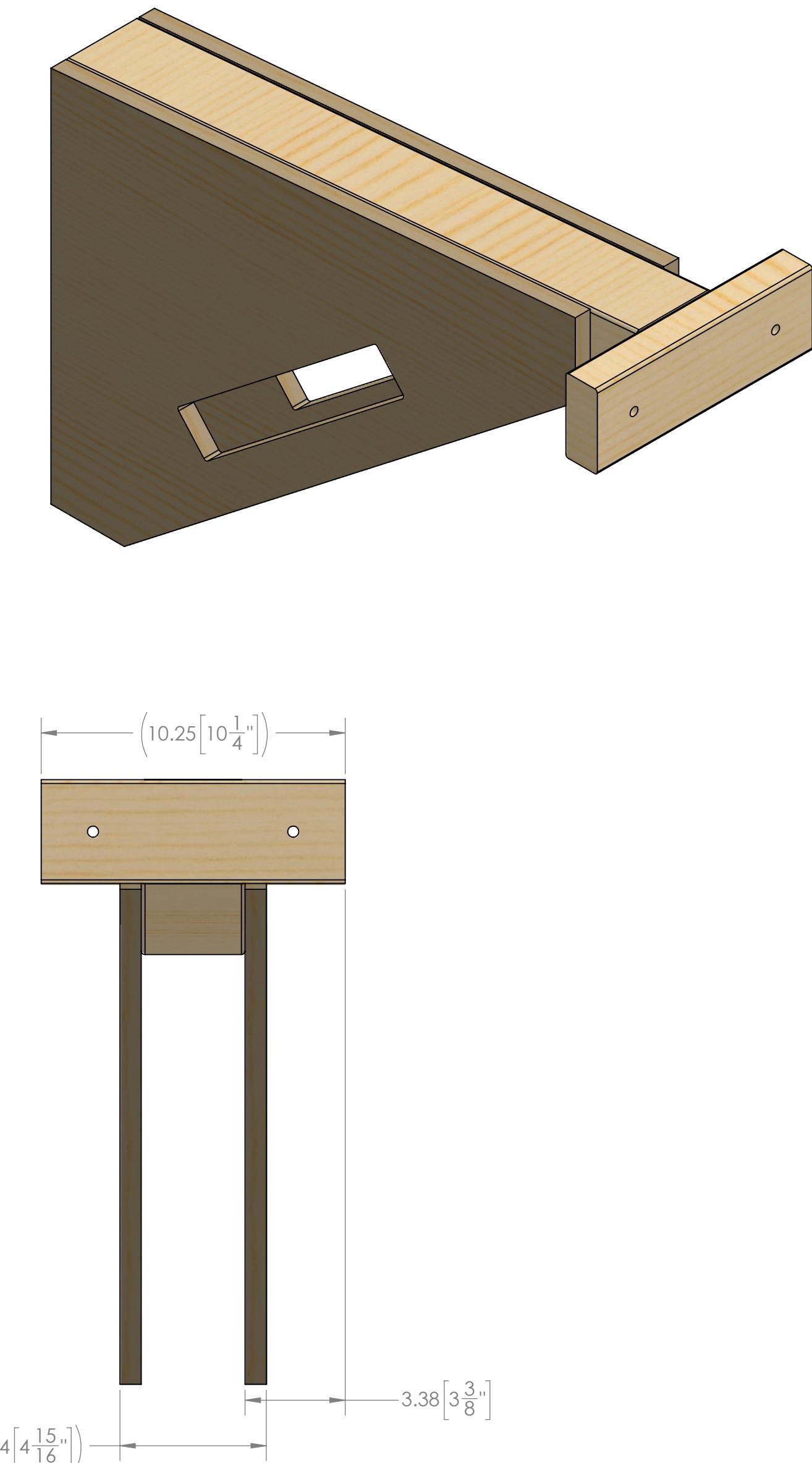
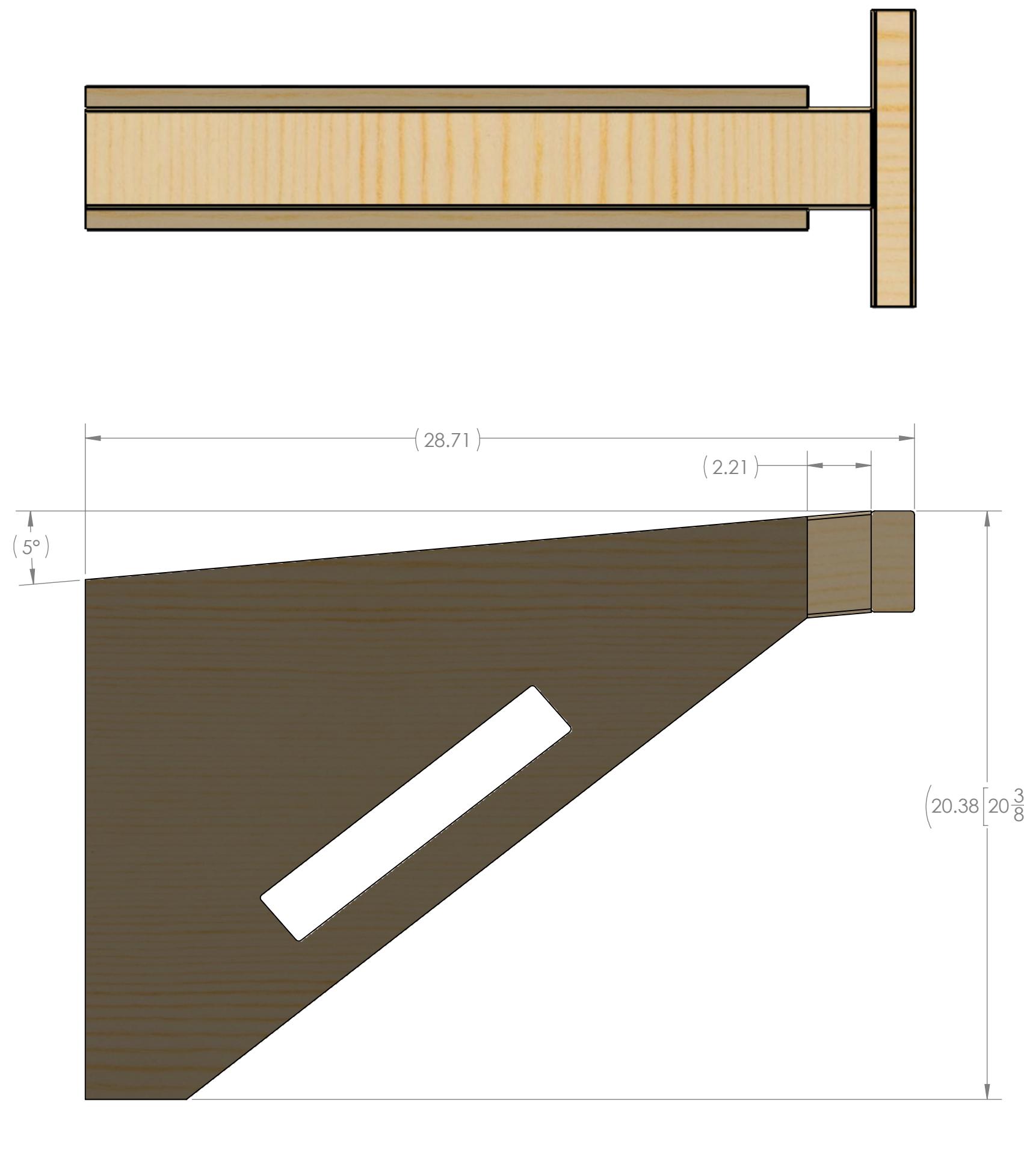
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DIMENSIONS ARE IN INCHES	DRAWN	KAMC	12/21/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$			
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MATERIAL/FINISH: COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Upper Leg Assembly

SIZE DWG. NO. REV

C TE-22178

SCALE: 1:4 SHEET 2 OF 3

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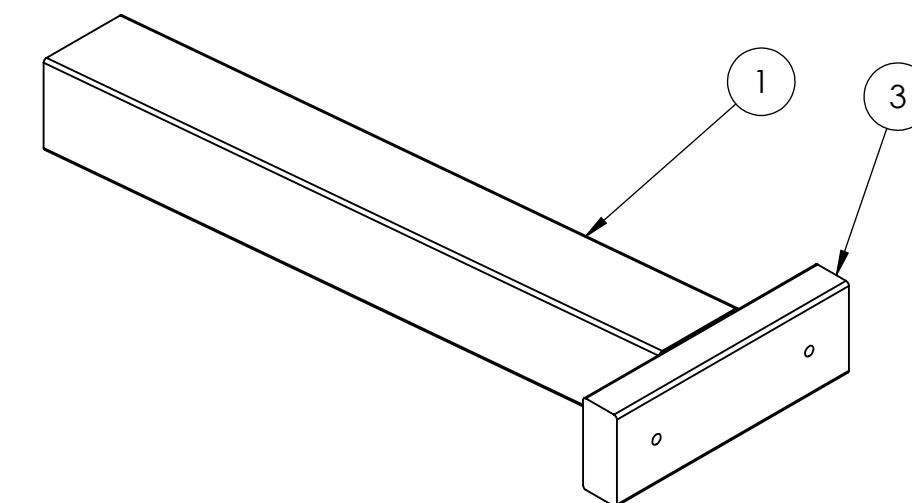
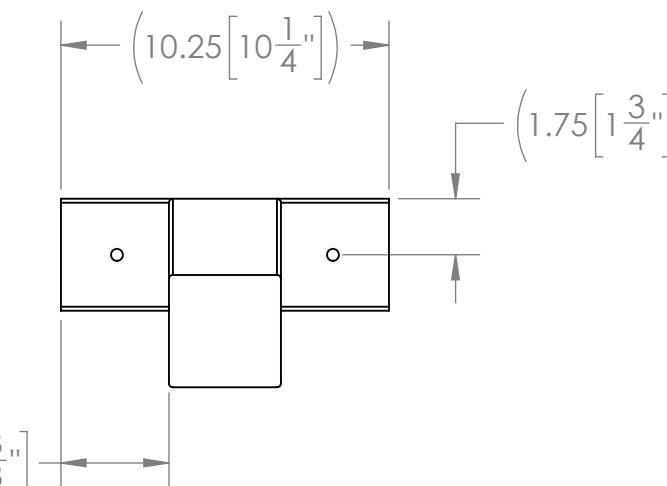
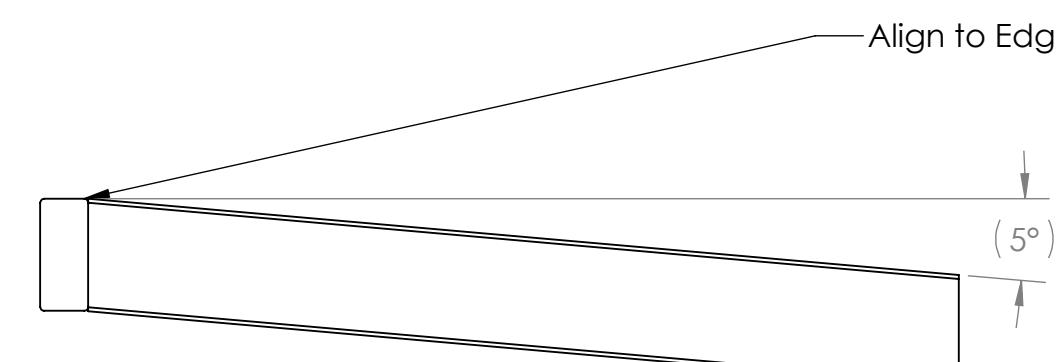
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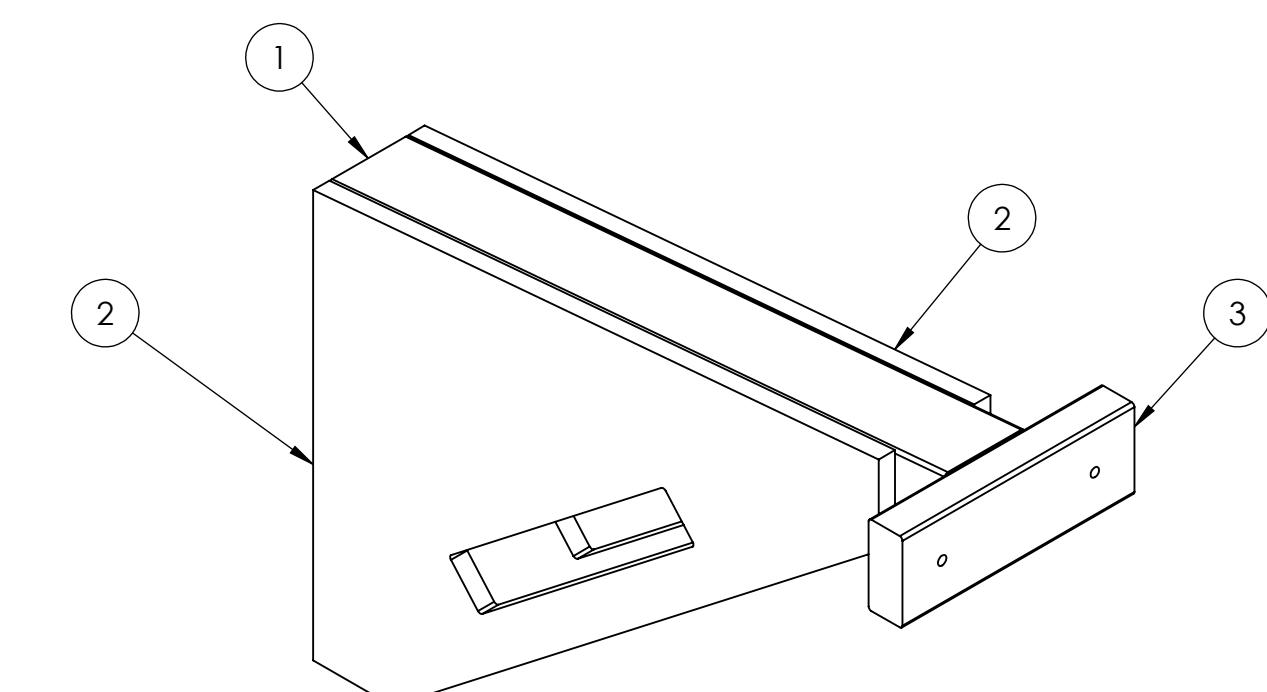
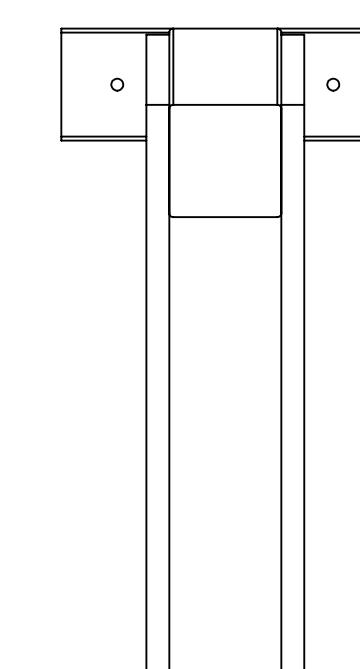
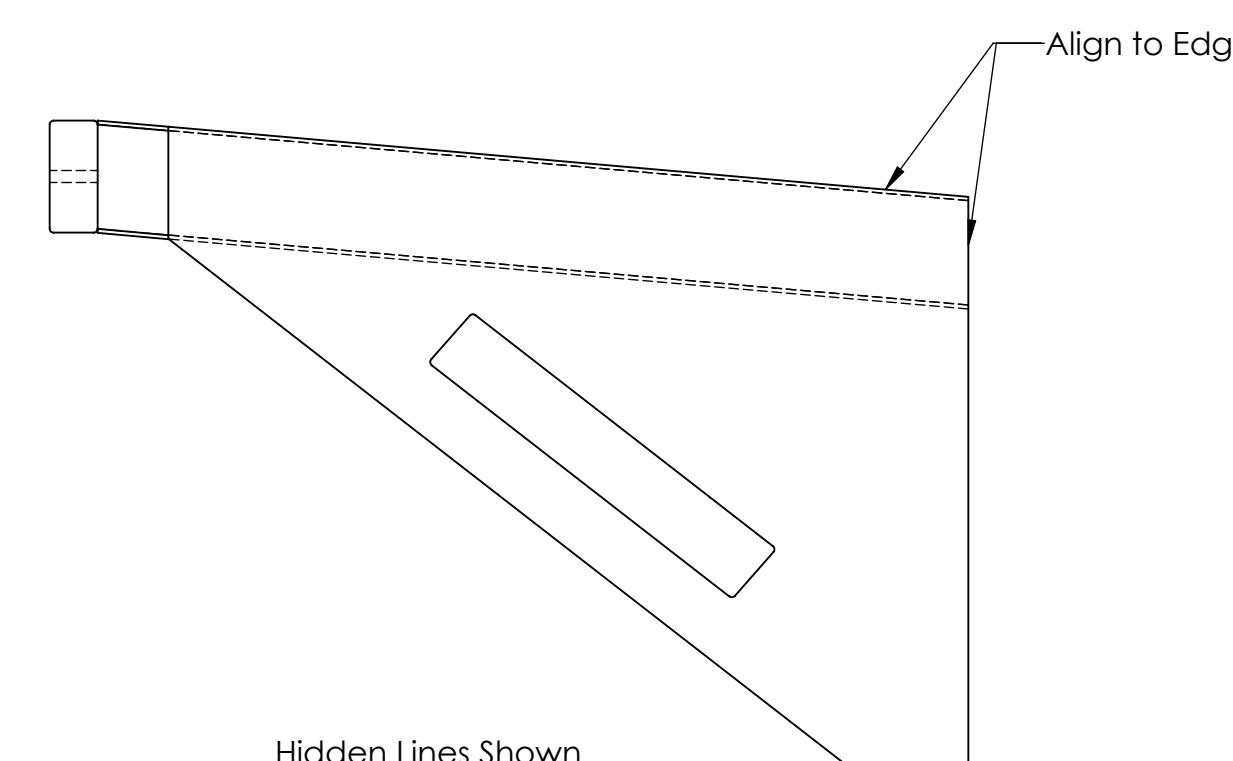
Step 1

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1. Align (3) on (1), as shown.
 2. Connect using 2.5" long screws. It is recommended to use 5x screws.



Step 2

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1. Add x1 (2) to each side of (1), as shown.
 2. Connect using 2" long screws. It is recommended to use 5x screws per (2).



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$

TEAM

NAME

DATE

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12/21/2021



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TITLE:
HUB - Complex Build -
Upper Leg Assembly

SIZE DWG. NO. REV

C TE-22178

SCALE: 1:6 SHEET 3 OF 3

DO NOT SCALE DRAWING

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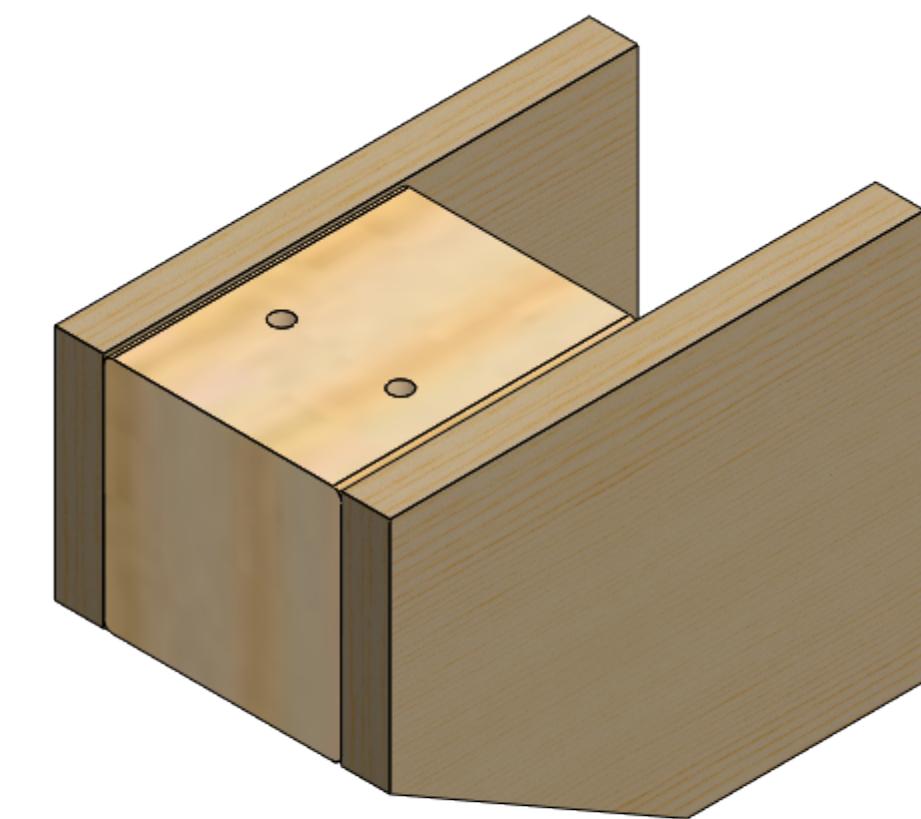
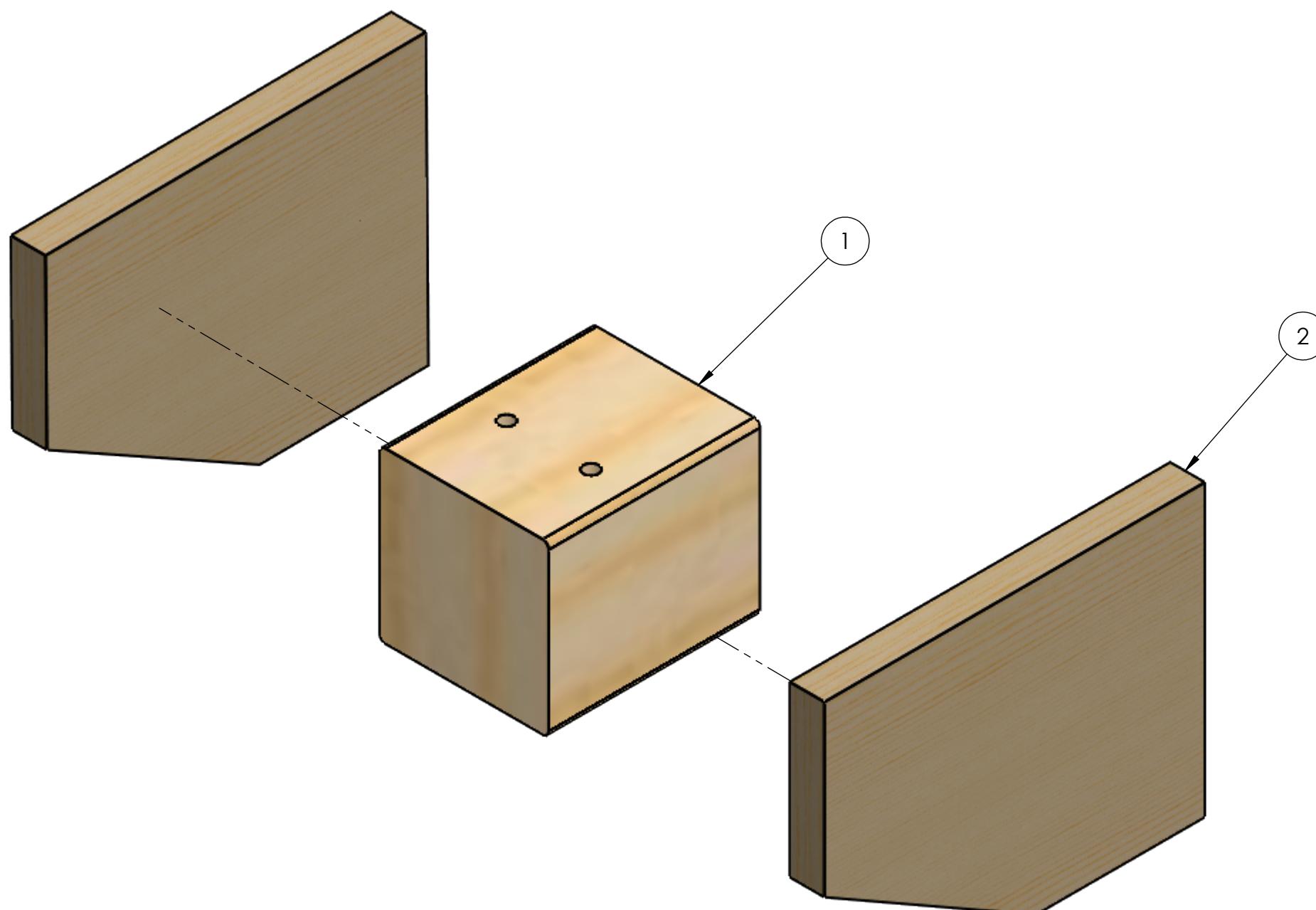
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Hardware Needed:
#8 x 2" Long Screw - Qty 8

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22181	HUB - Complex Build - Lower Hub Ring to Leg 4x4	1
2	TE-22182	HUB - Complex Build - Lower Hub Ring to Leg Side	2

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MATERIAL/FINISH:			COMMENTS:			
			REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			SIZE	DWG. NO.	REV	
			C	TE-22180		
			SCALE: 1:2		SHEET 1 OF 3	

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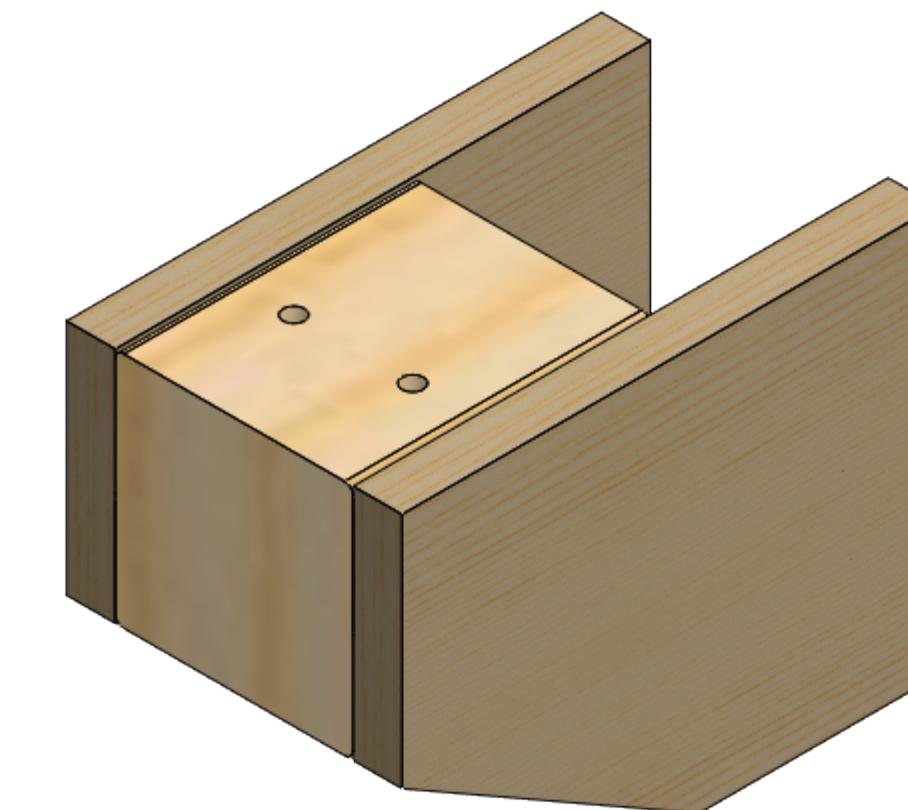
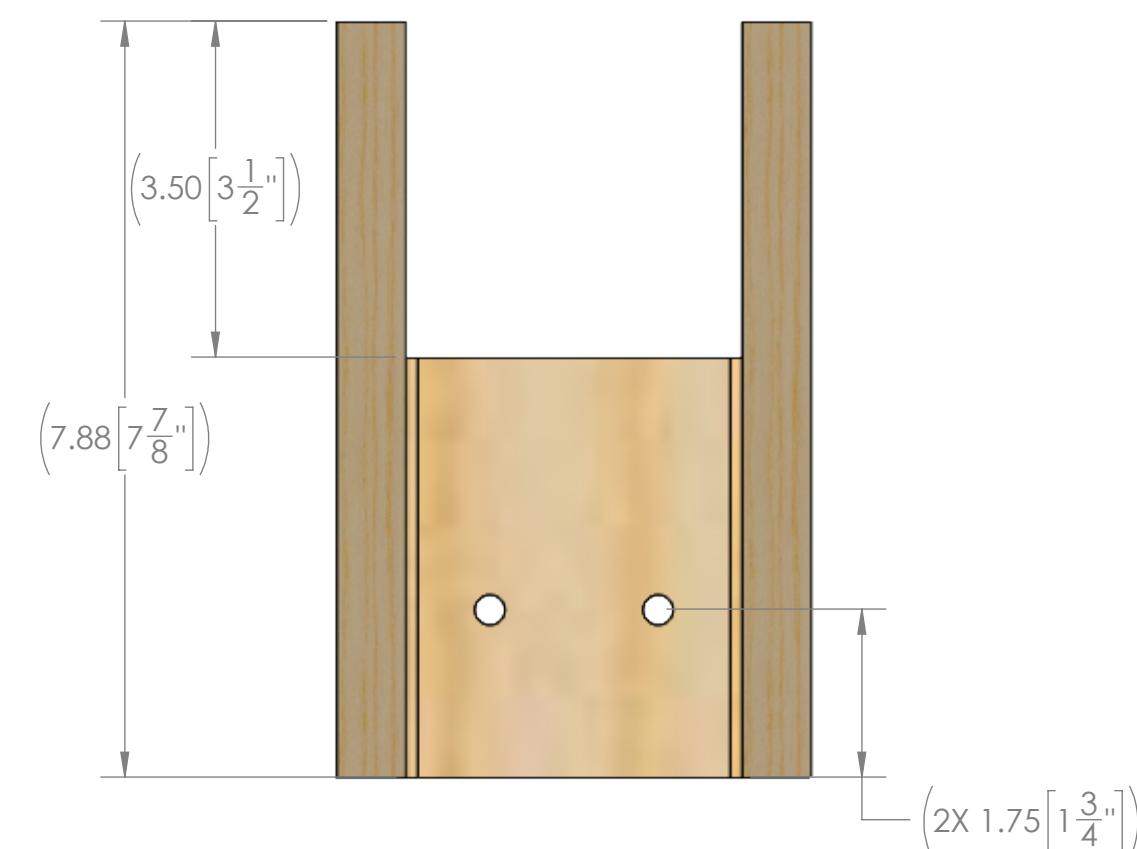
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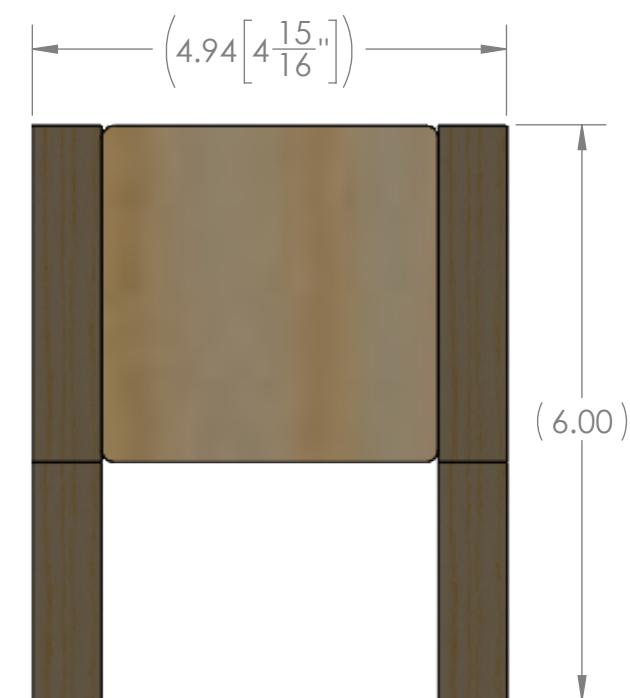
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MATERIAL/FINISH:			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
HUB - Complex Build -
Lower Hub Ring to Leg
Assembly

SIZE DWG. NO. REV
C TE-22180

SCALE: 1:2 SHEET 2 OF 3

4

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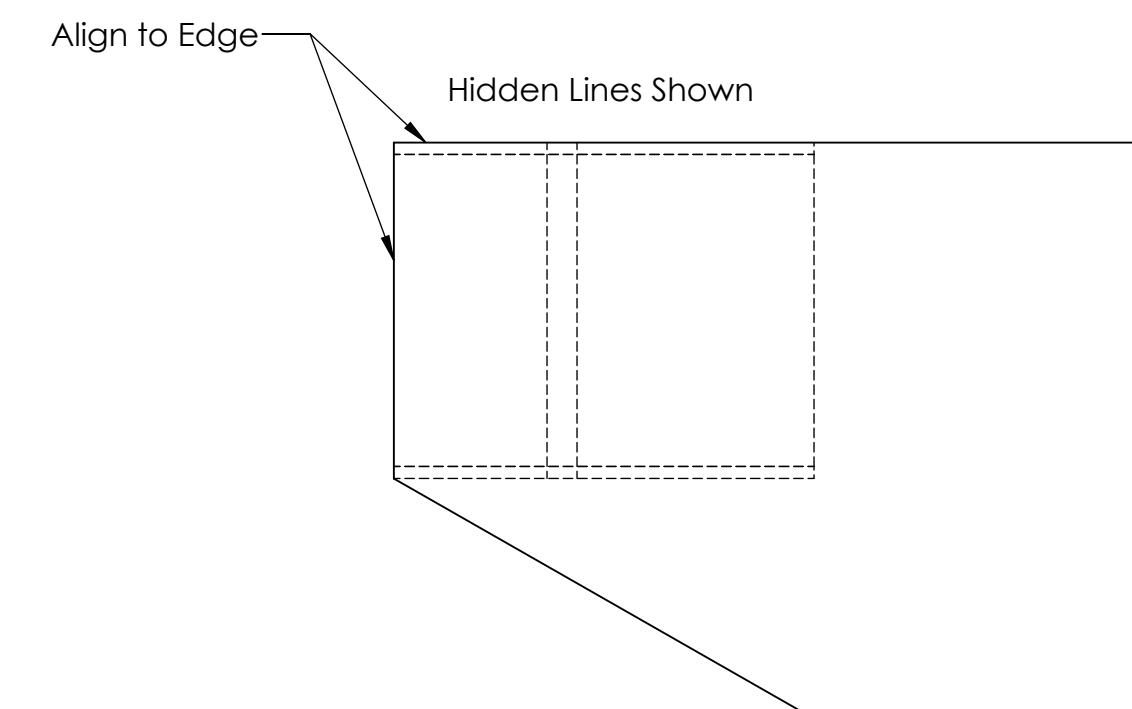
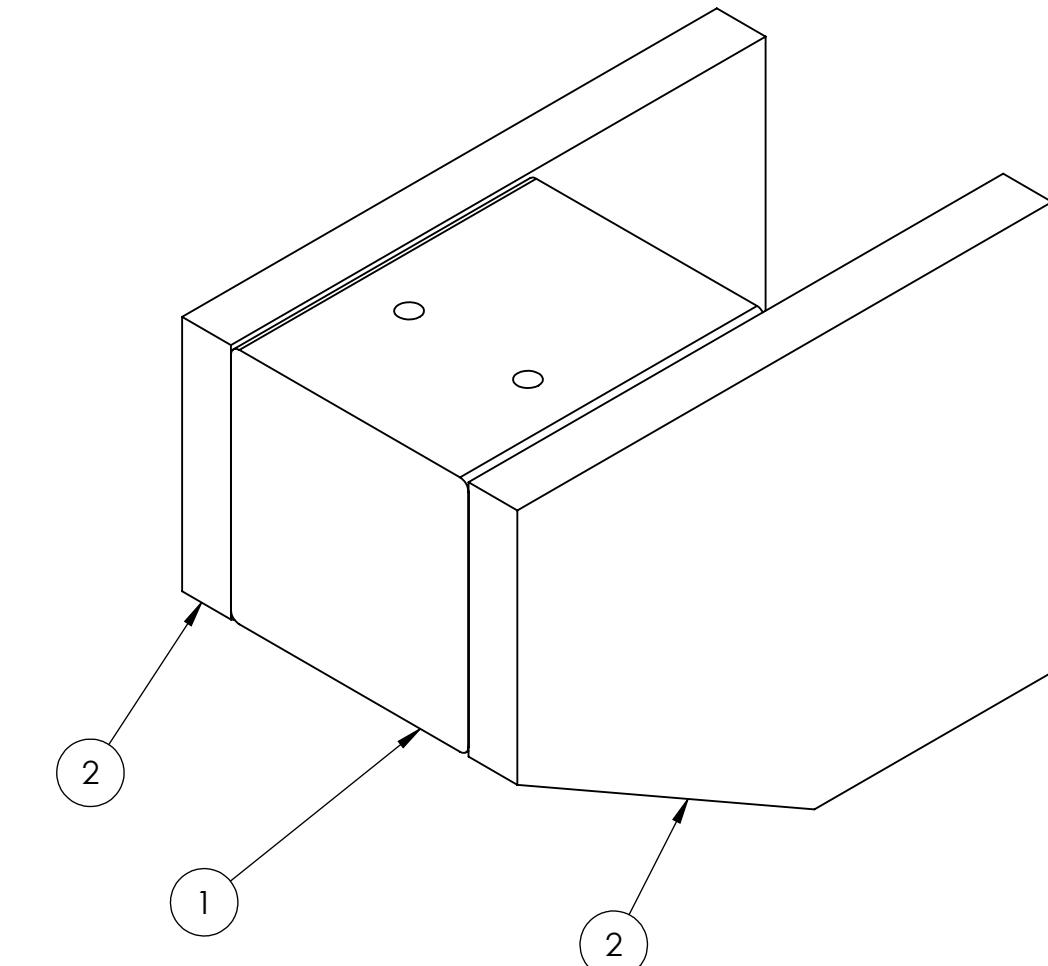
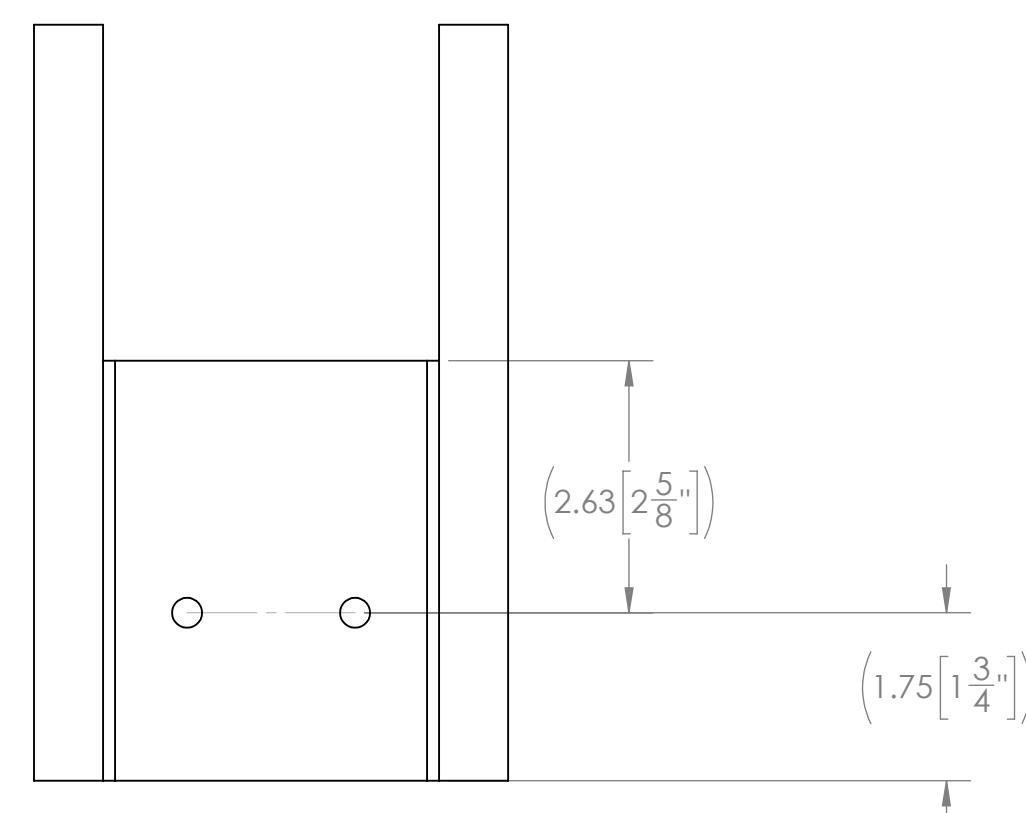
3

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Step 1

1. Align 2x (2) to (1), as shown.
2. Connect using 2" long screws. It is recommended to use 4x screws per (2).



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TITLE: FIRST ROBOTICS COMPETITION <small>SOLIDWORKS Modeling Solutions Partner</small>			
SIZE DWG. NO. REV			
C	TE-22180		
SCALE: 1:2		SHEET 3 OF 3	

4

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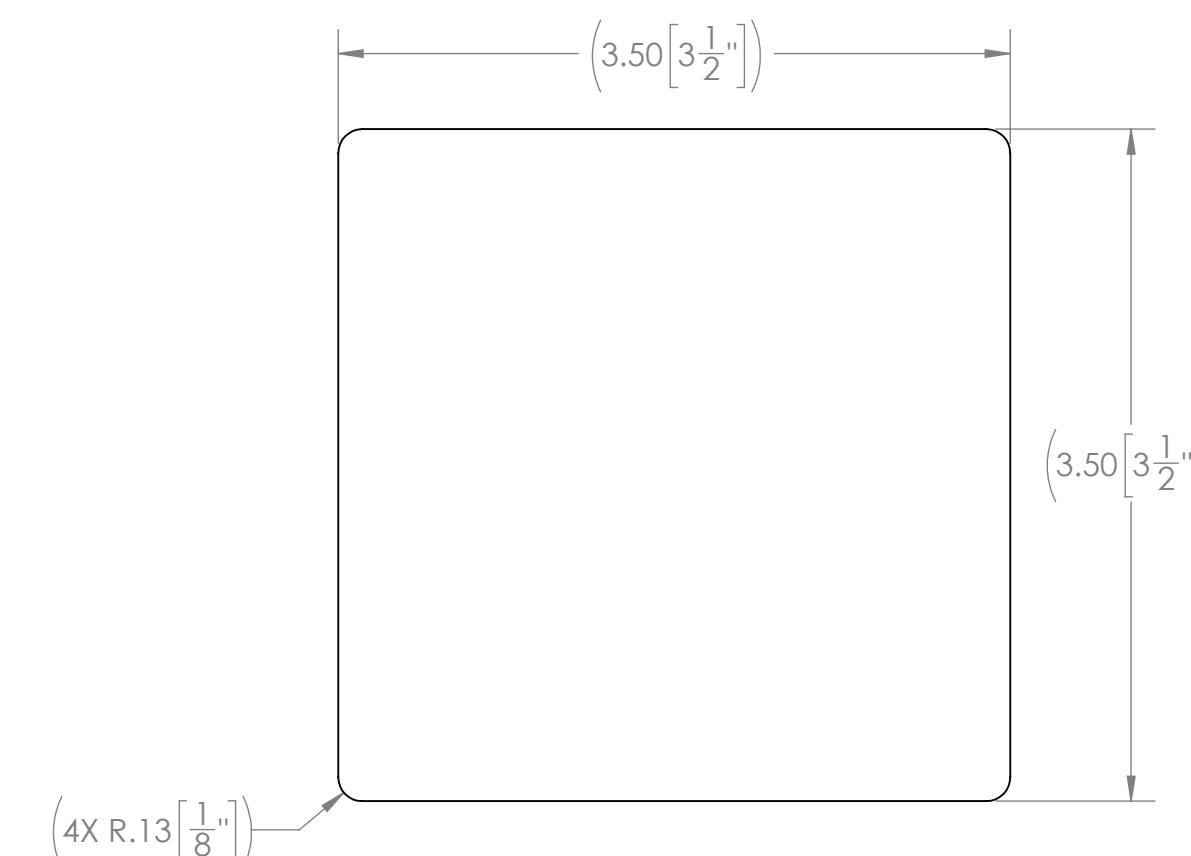
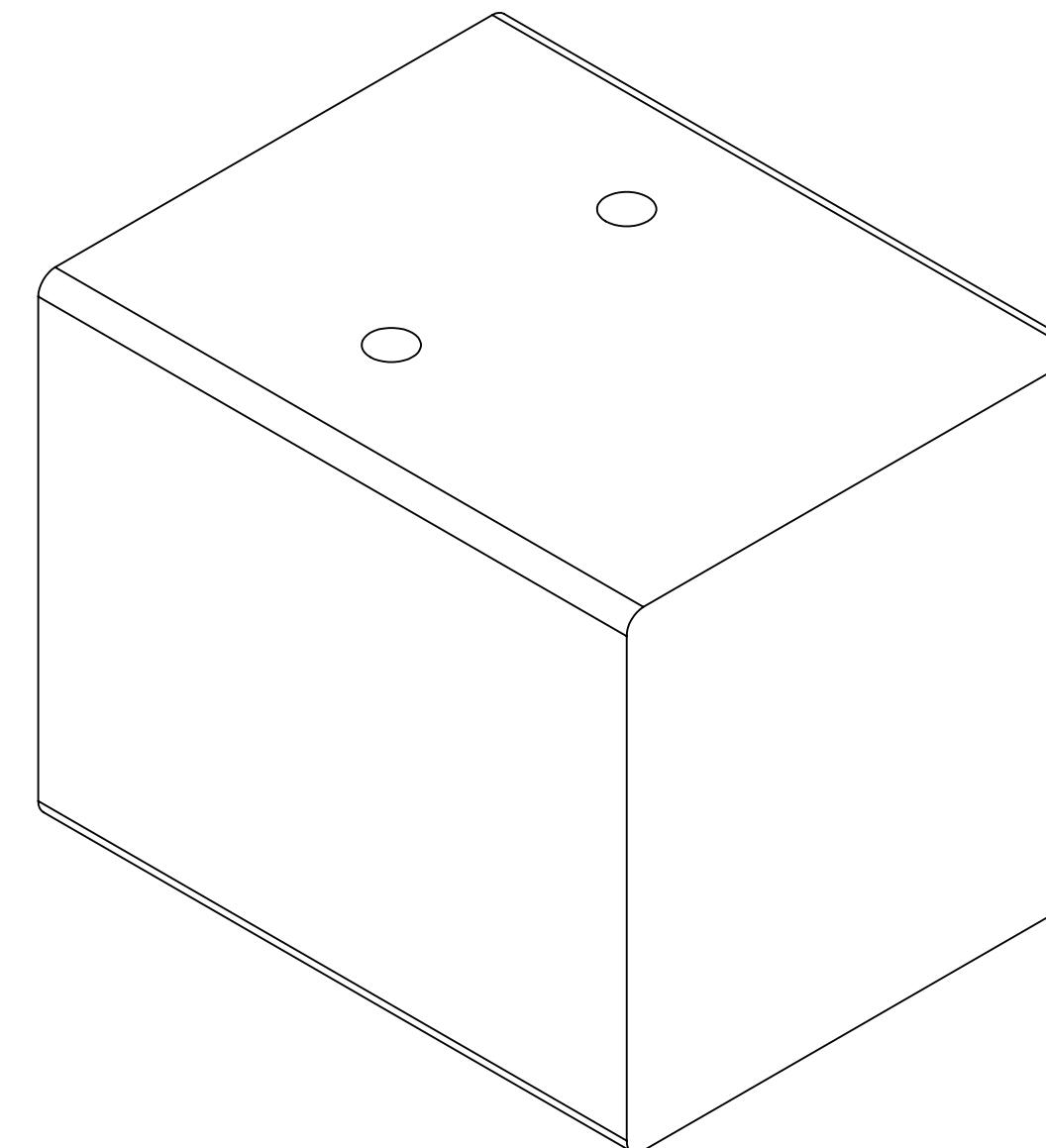
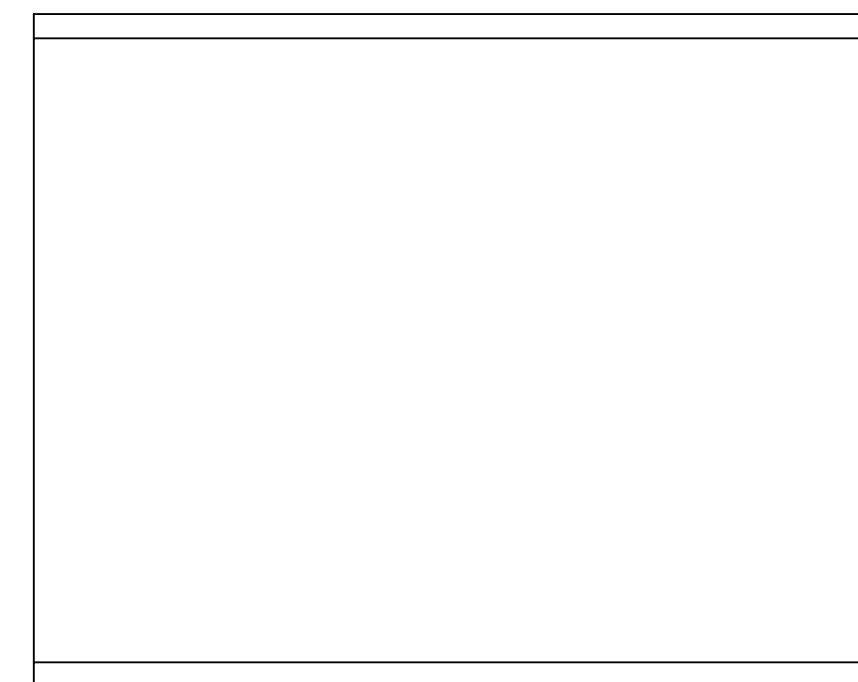
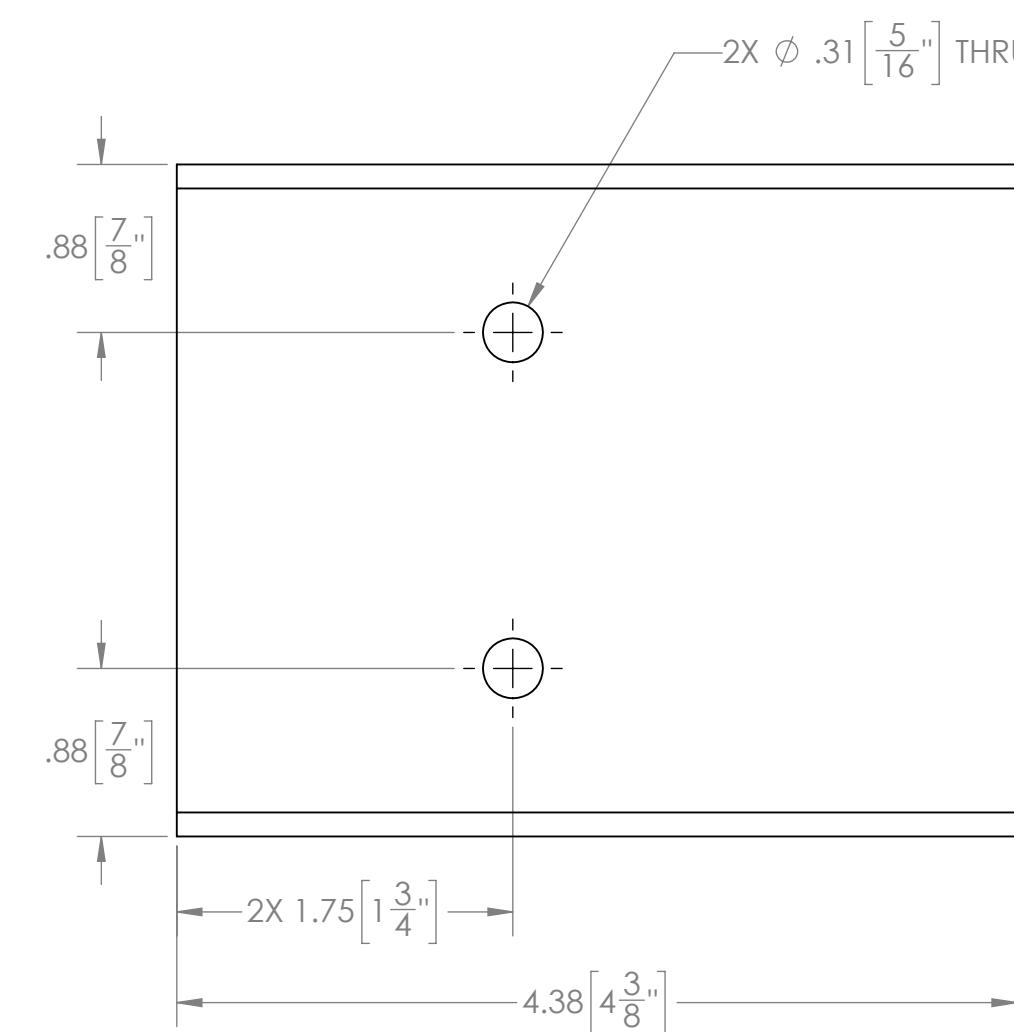
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MATERIAL/FINISH: 4" x 4" Lumber			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
 FIRST ROBOTICS COMPETITION  SOLIDWORKS Modeling Solutions Partner			
TITLE: HUB - Complex Build - Lower Hub Ring to Leg 4x4			
SIZE DWG. NO. REV			
C	TE-22181		
SCALE: 1:1 SHEET 1 OF 1			

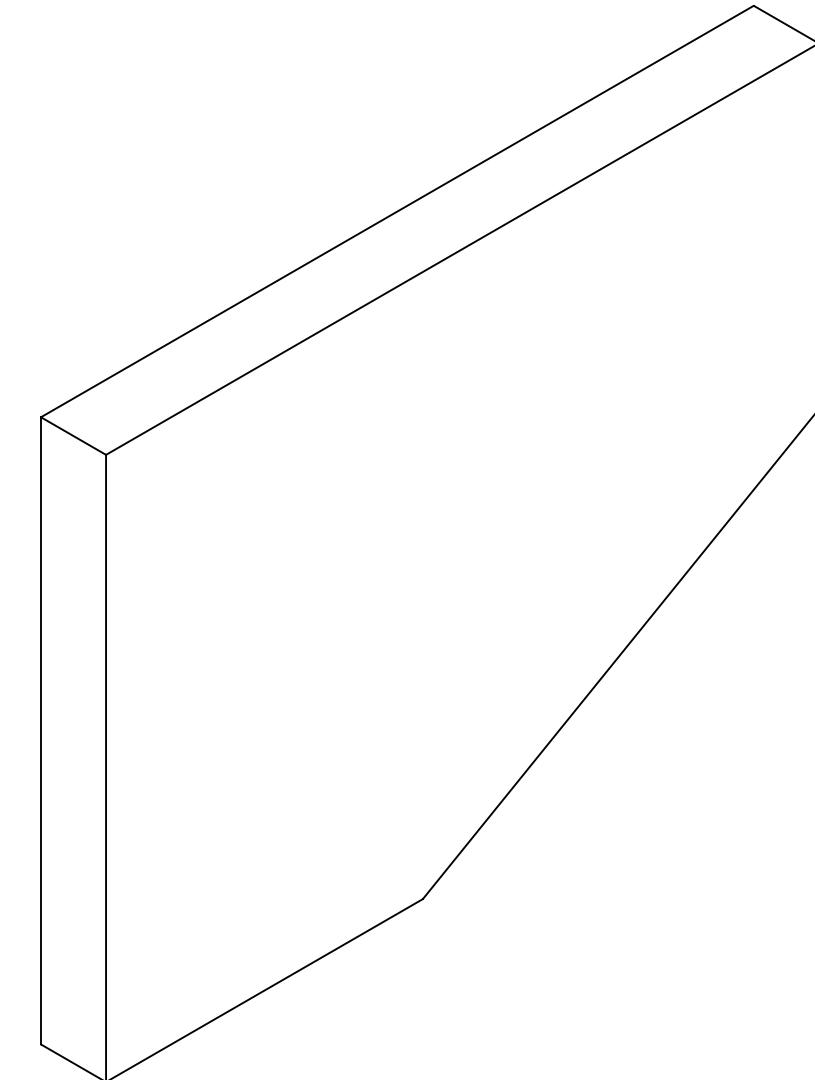
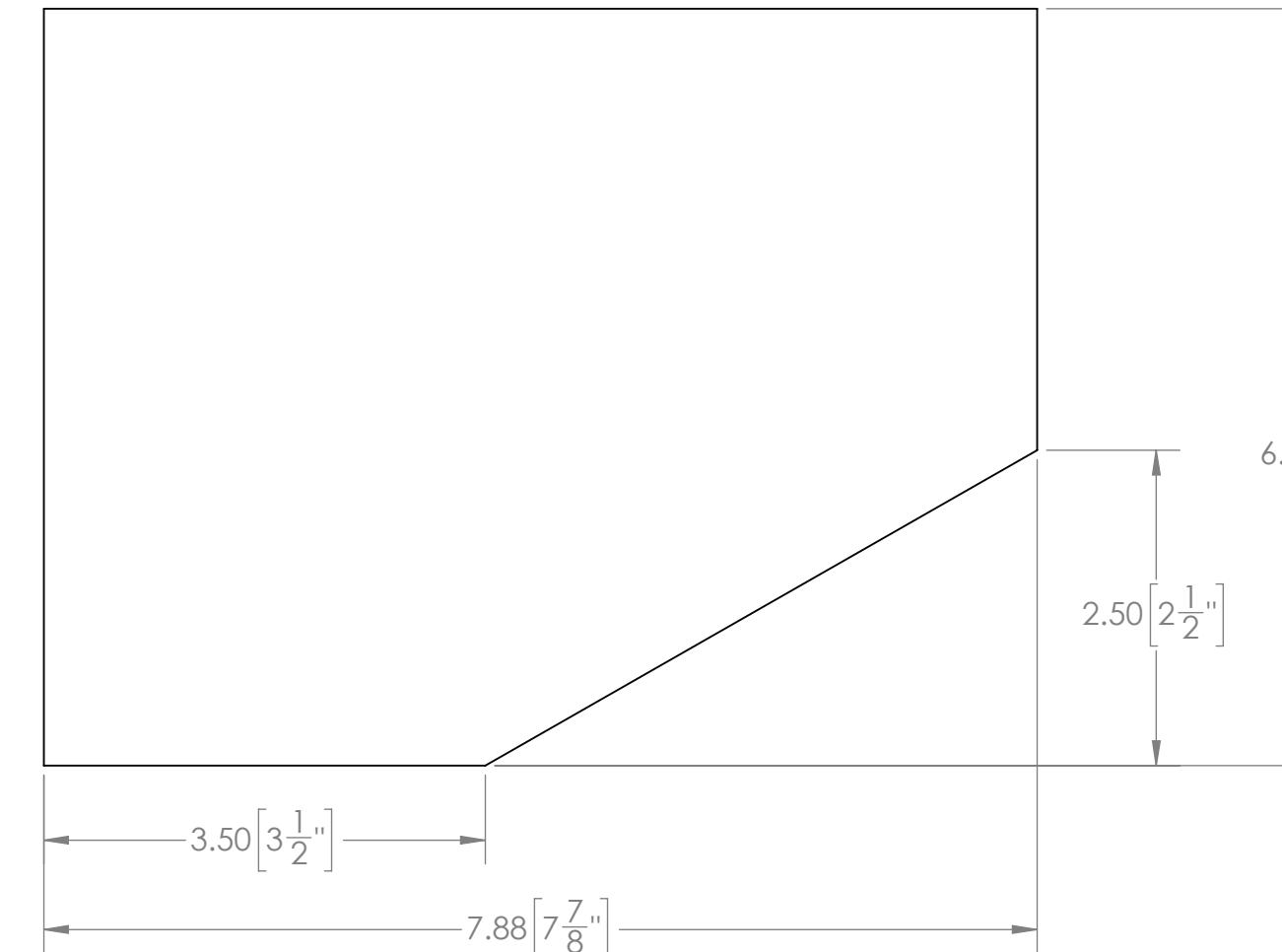
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	KAMC	12/21/2021
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MATERIAL/FINISH: 3/4" Plywood	SIZE	DWG. NO.	REV
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.	C	TE-22182	
DO NOT SCALE DRAWING	SCALE: 2:3	SHEET 1 OF 1	

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FIRST ROBOTICS COMPETITION
 

 TITLE: HUB - Complex Build - Lower Hub Ring to Leg Side
 SIZE DWG. NO. REV
 C TE-22182

SCALE: 2:3 SHEET 1 OF 1

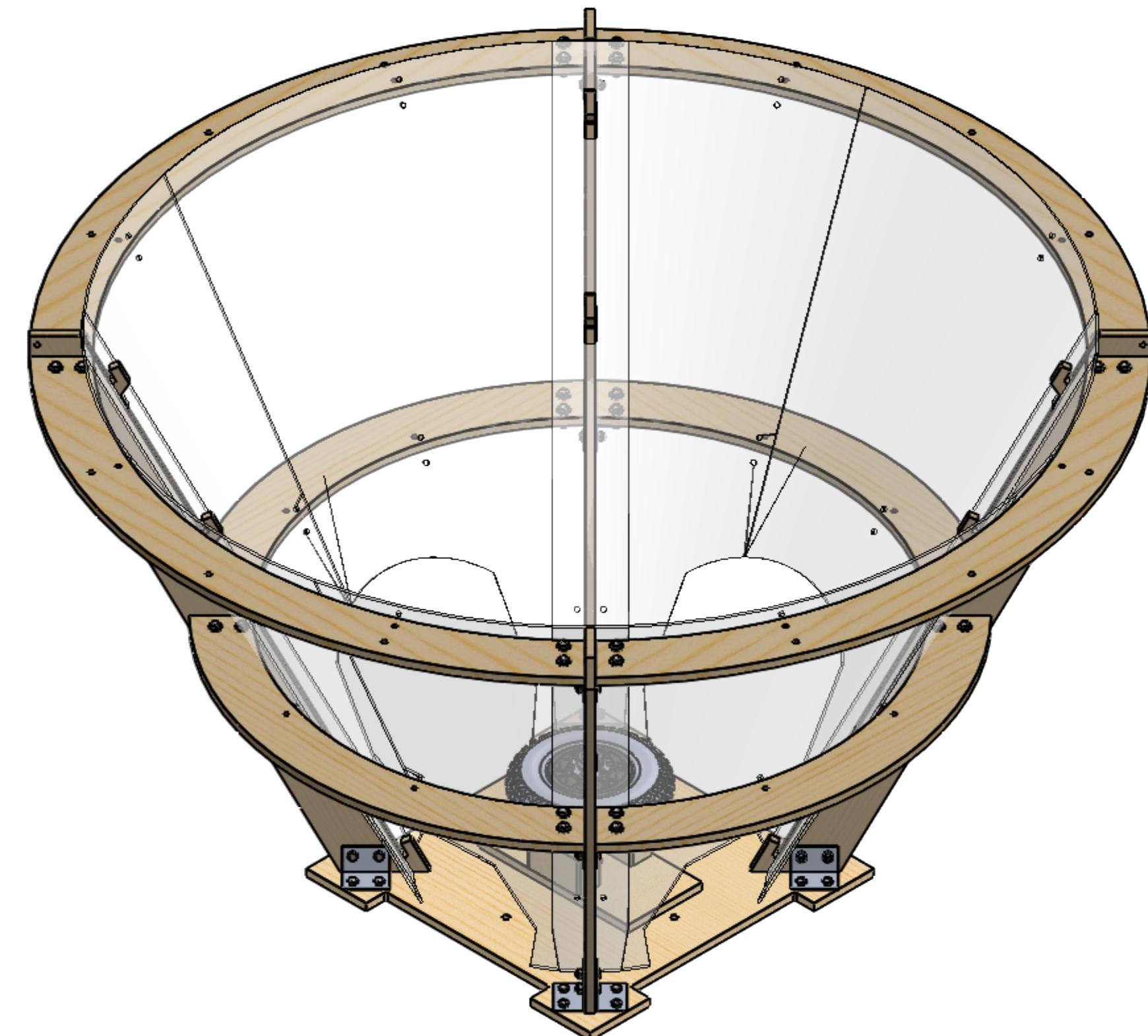
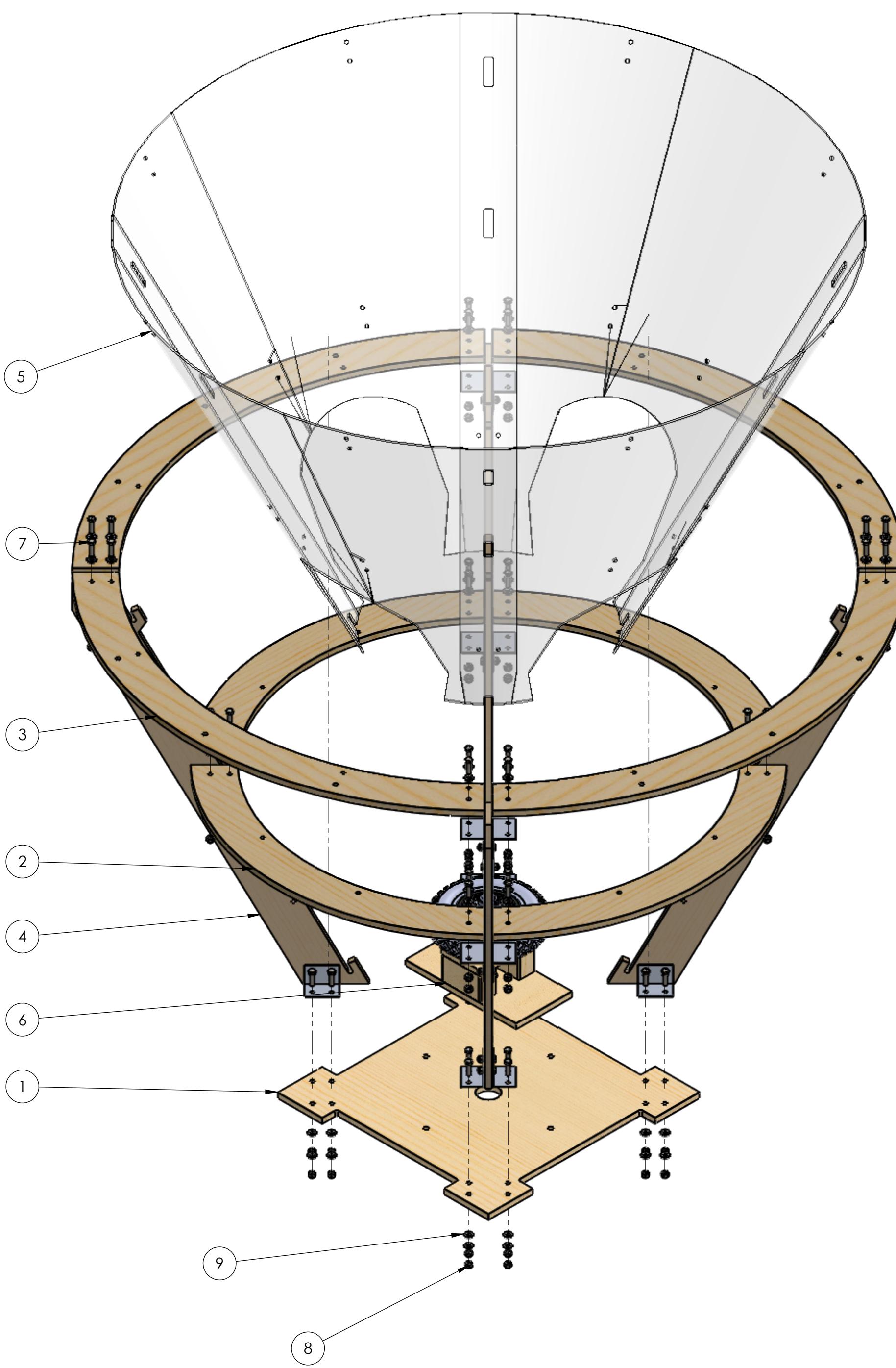
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Hardware Needed:
 #8 x 1" Long Screw - Qty 4
 50 lb. cable ties - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22191	Hub - Complex Build - Upper Hub Base	1
2	TE-22193	Hub - Complex Build - Upper Hub Lower Ring	4
3	TE-22194	Hub - Complex Build - Upper Hub Upper Ring	4
4	TE-22196	Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly	4
5	TE-22197	Hub - Complex Build - Upper Hub Plastic	4
6	TE-22210	Hub - Complex Build - Passive Agitator	1
7	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	48
8	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	48
9	washer_flat_.25	Flat Washer for 1/4" Screw	48

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		DRAWN	CO	1/3/2022
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$				
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MATERIAL/FINISH:				
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FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hub - Complex Build - Upper Hub Assembly

C **TE-22190**

SIZE **DWG. NO.** **REV**

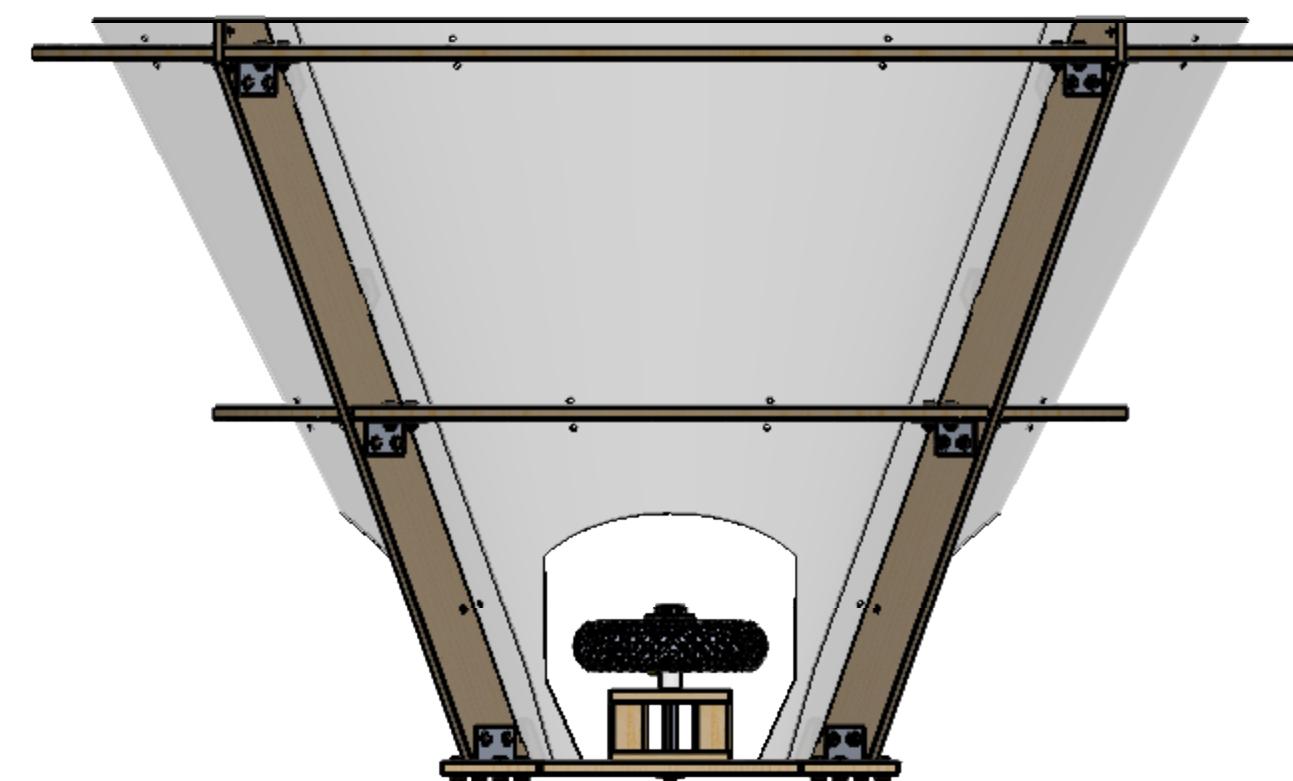
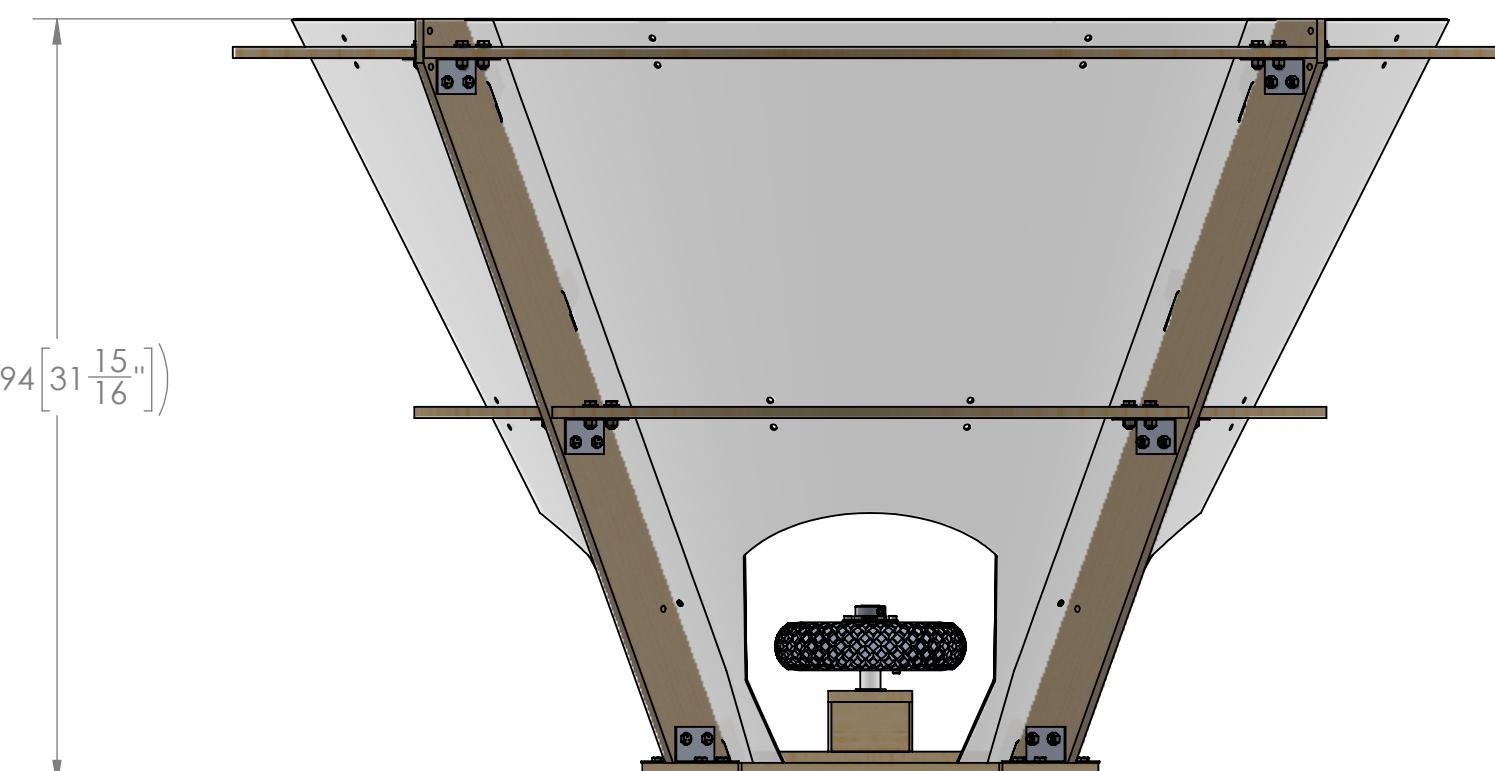
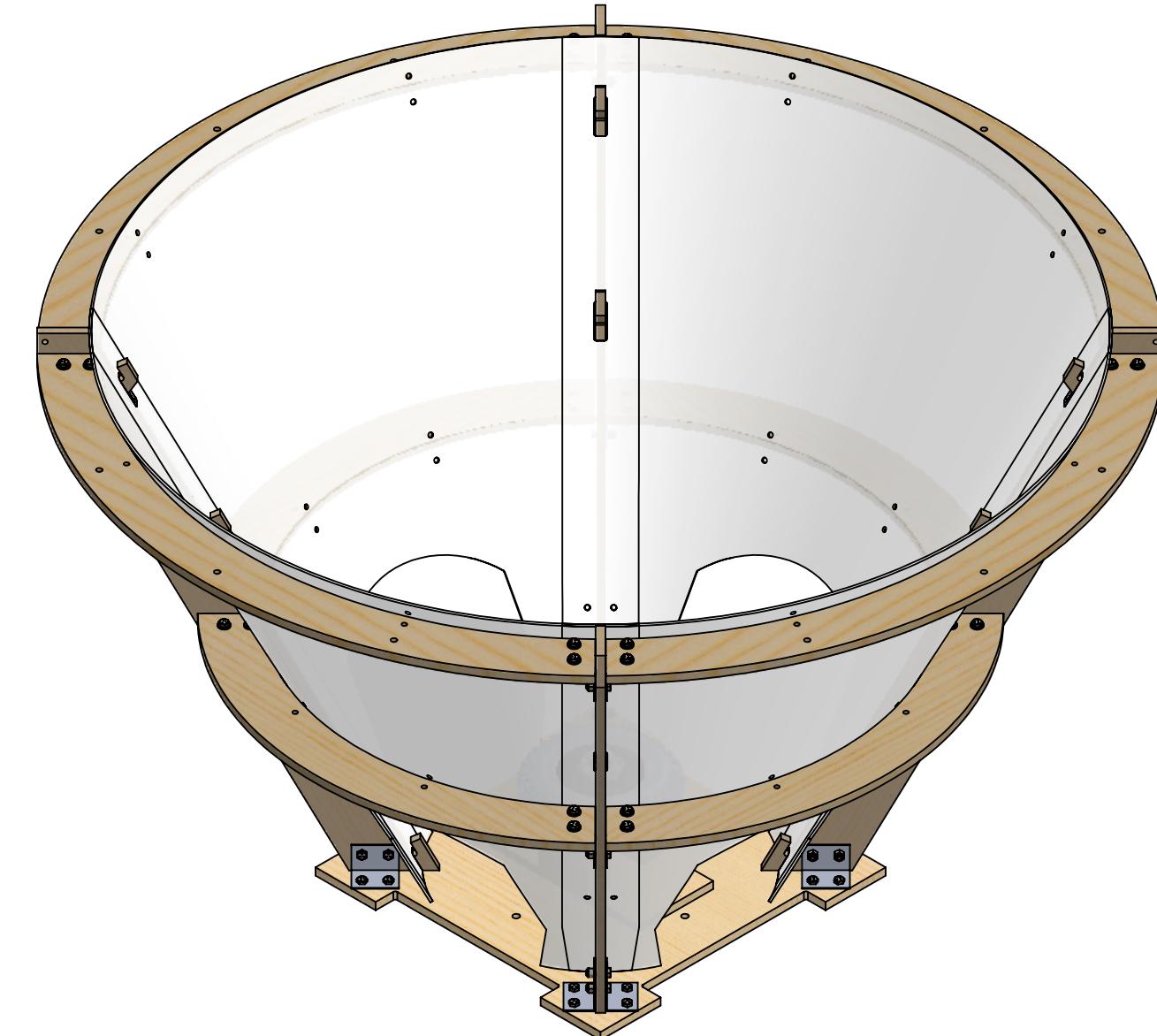
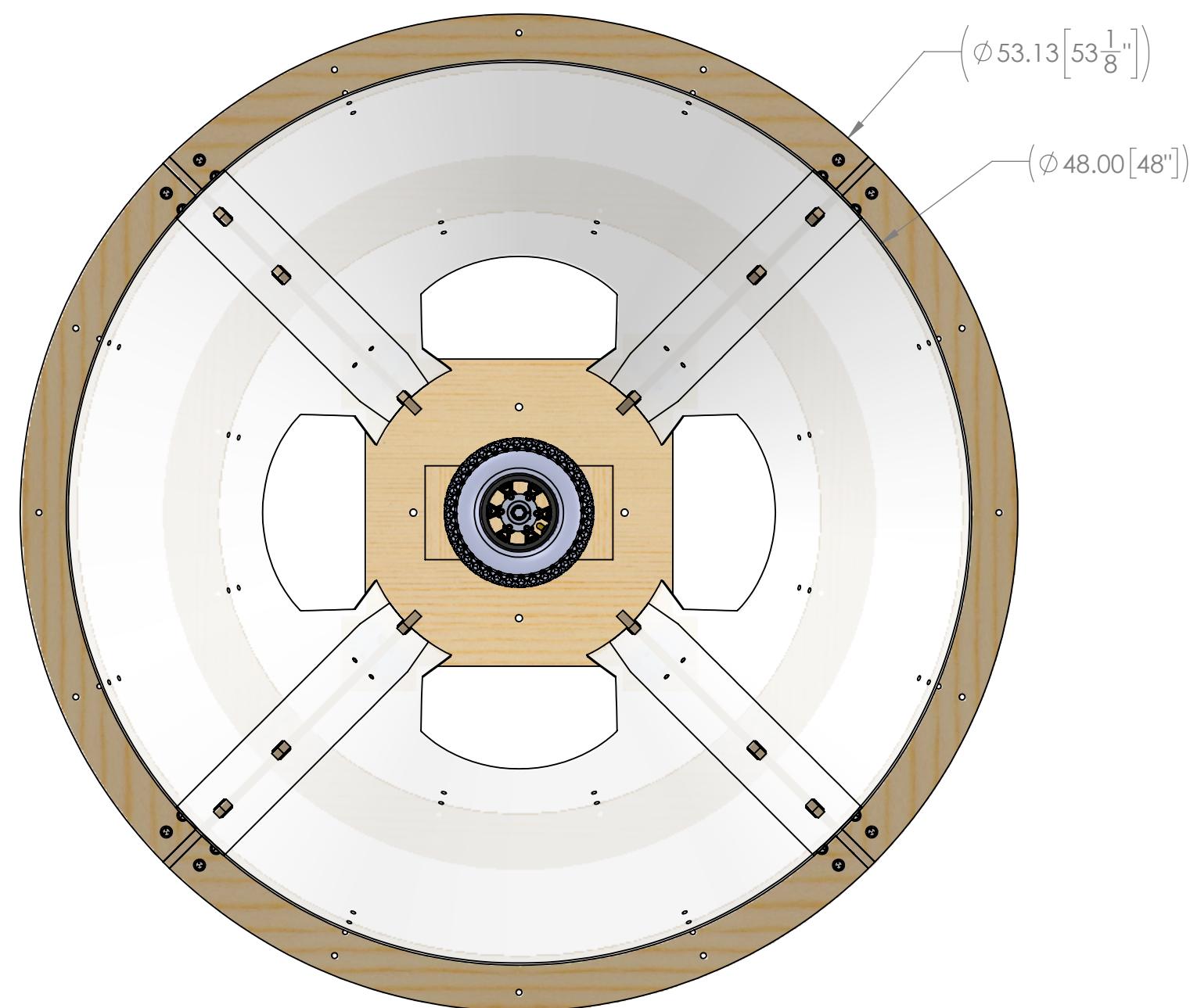
SCALE: 1:6 **SHEET 1 OF 5**

4

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 **FIRST
ROBOTICS
COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

TITLE: **Hub - Complex Build - Upper Hub Assembly**

SIZE DWG. NO. REV
C TE-22190

SCALE: 1:8 SHEET 2 OF 5

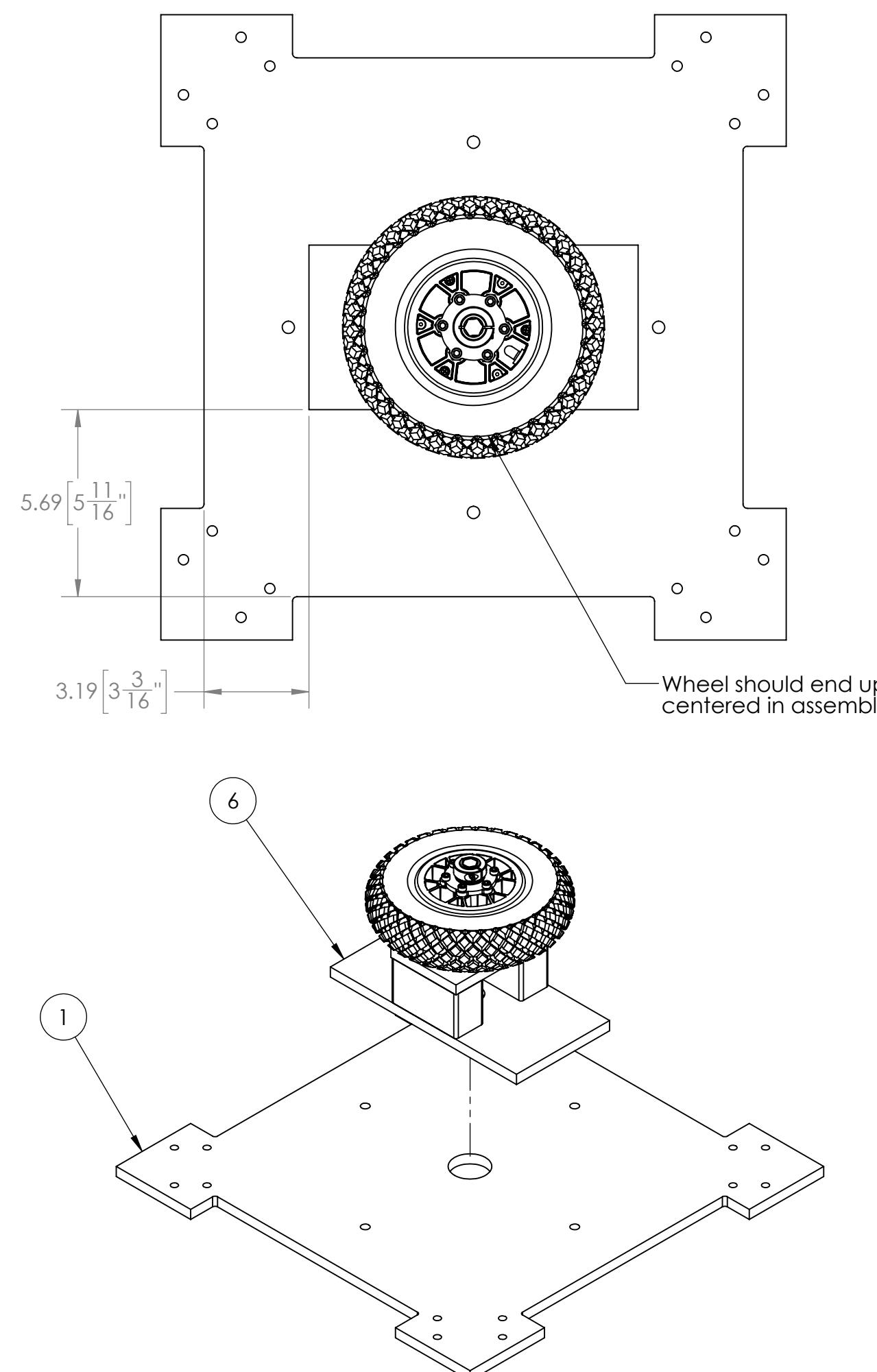
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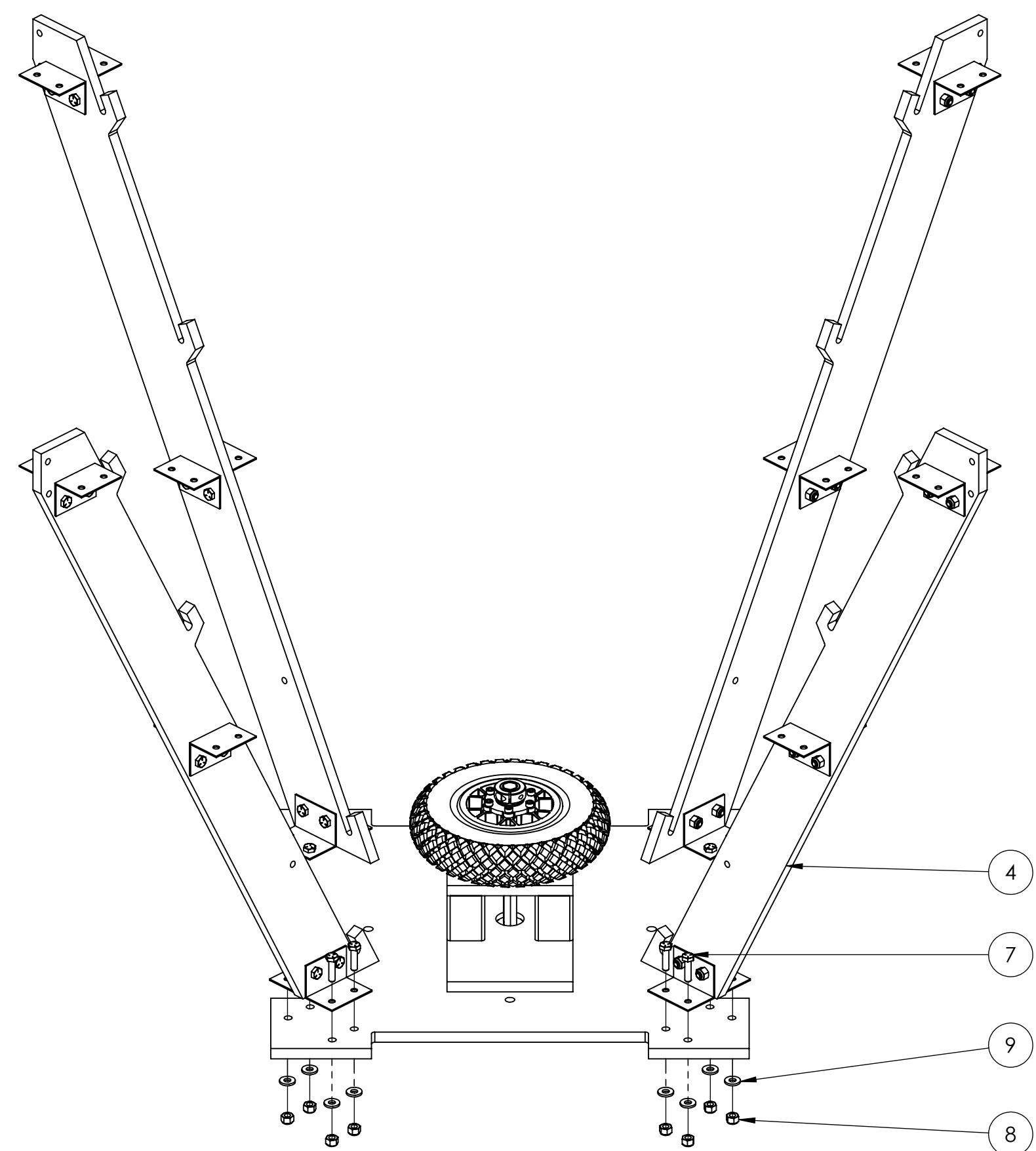
1

Step 1



1. Align (6) to (1) as shown. Wheel should be able to freely rotate. If not, hole in (1) may need to be enlarged.
2. Connect using 1" long screws. It is recommended to use 4x screws.

Step 2

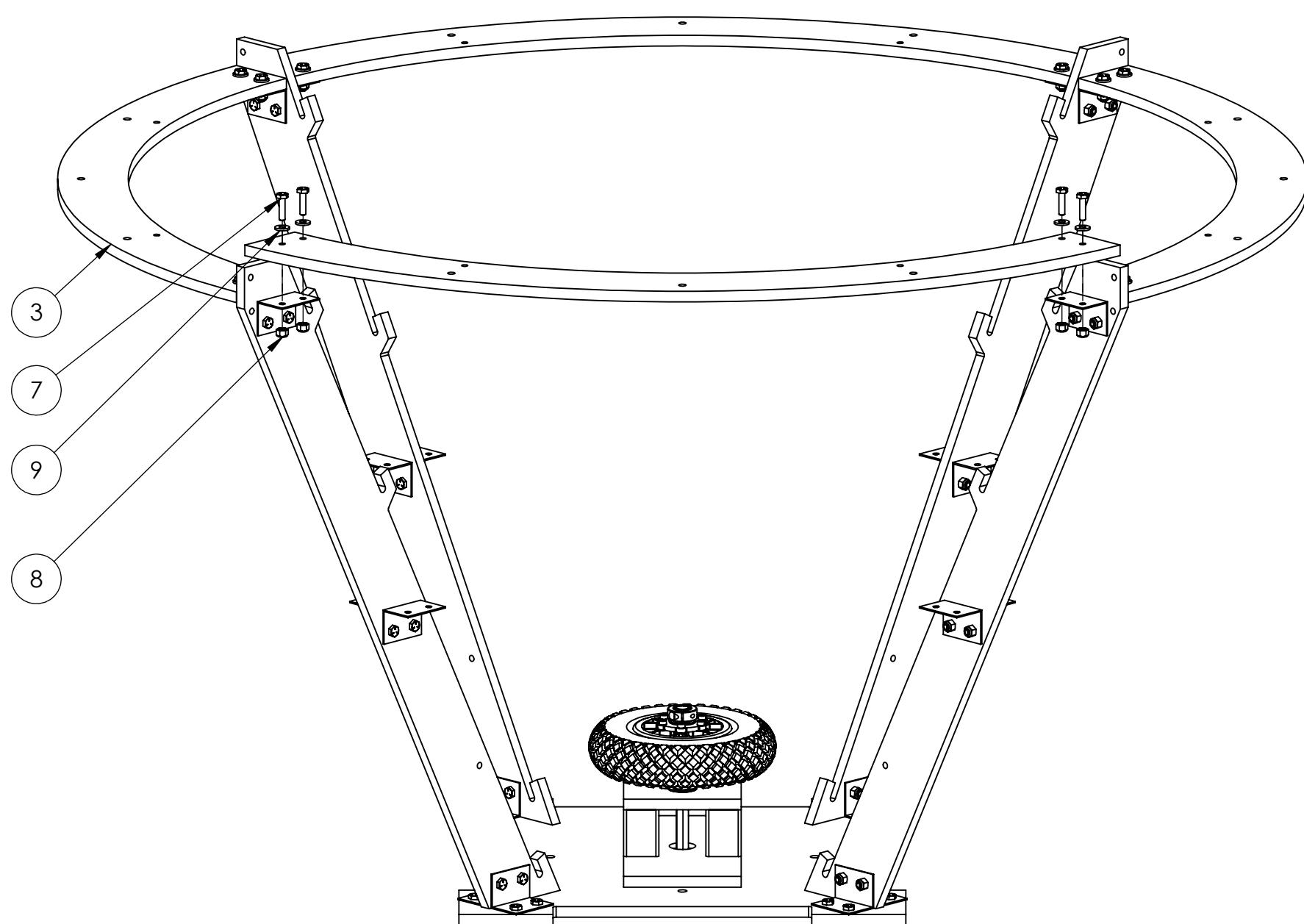


1. Align 4x (4) to Step 1, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (4).

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TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$				
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$				
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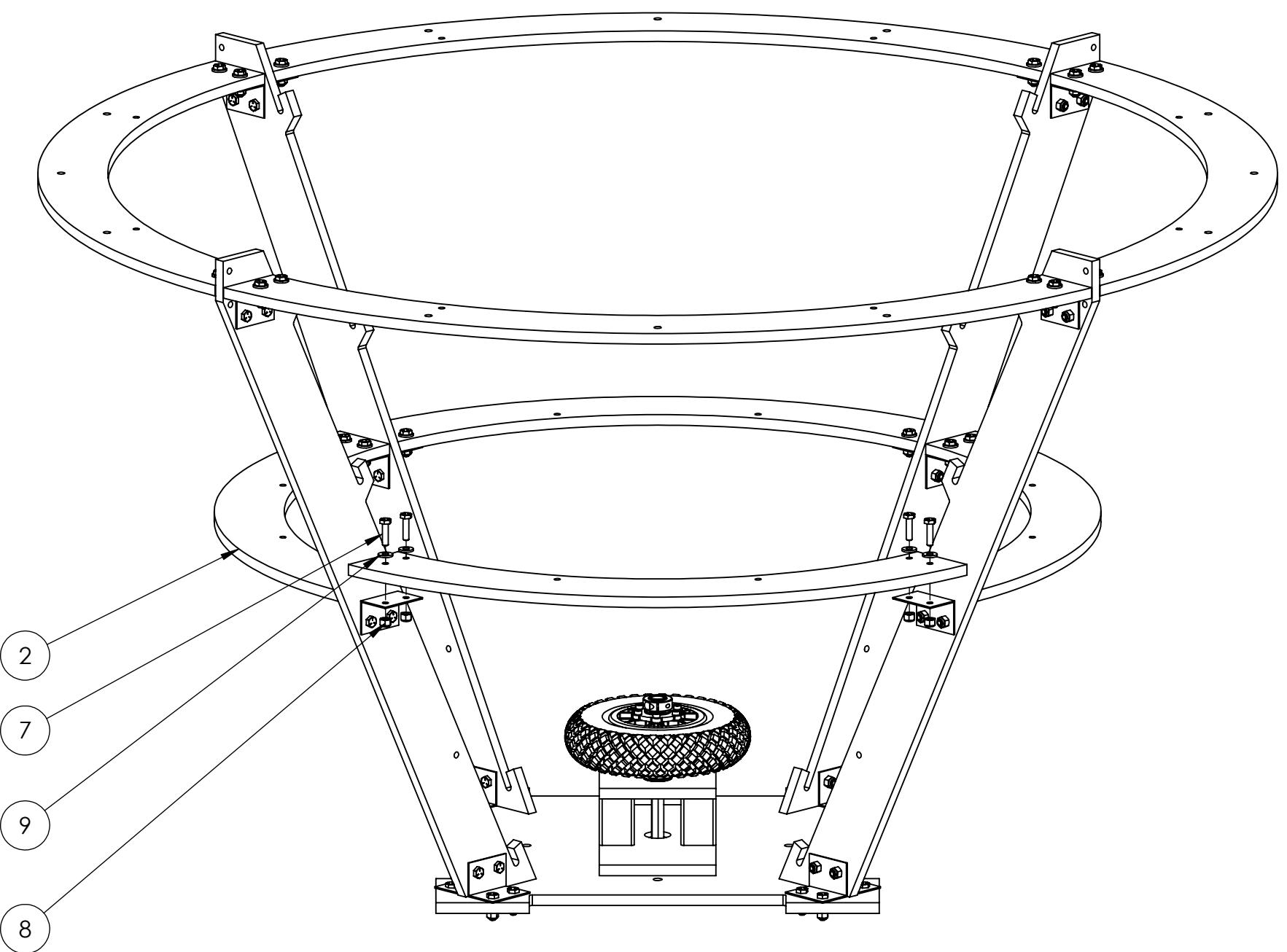
		TITLE: Hub - Complex Build - Upper Hub Assembly	
		SIZE	DWG. NO.
C	TE-22190	REV	
SCALE: 1:5	SHEET 3 OF 5		

Step 3



1. Align 4x (3) to Step 2, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (3).

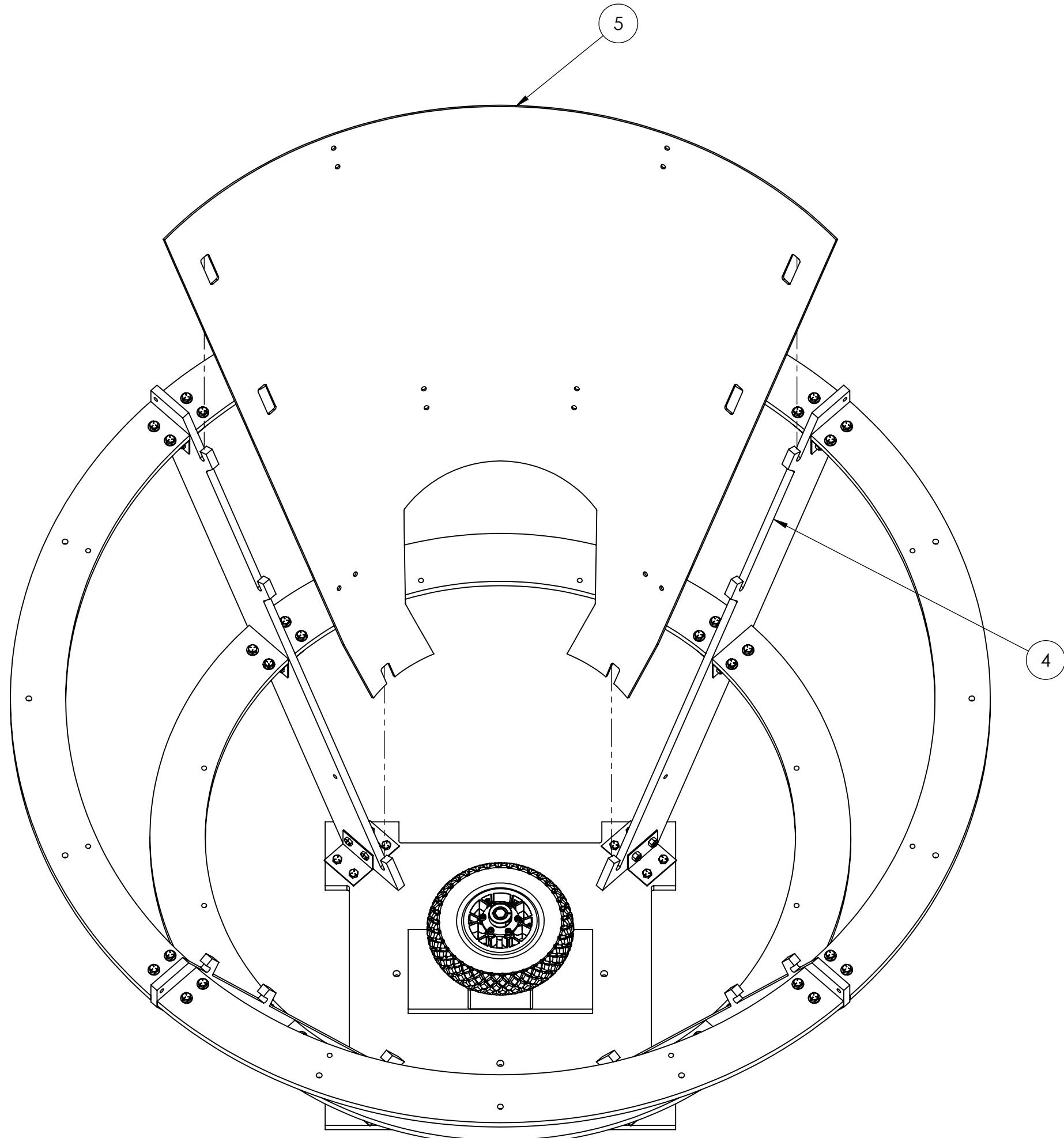
Step 4



1. Align 4x (2) to Step 3, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (2).

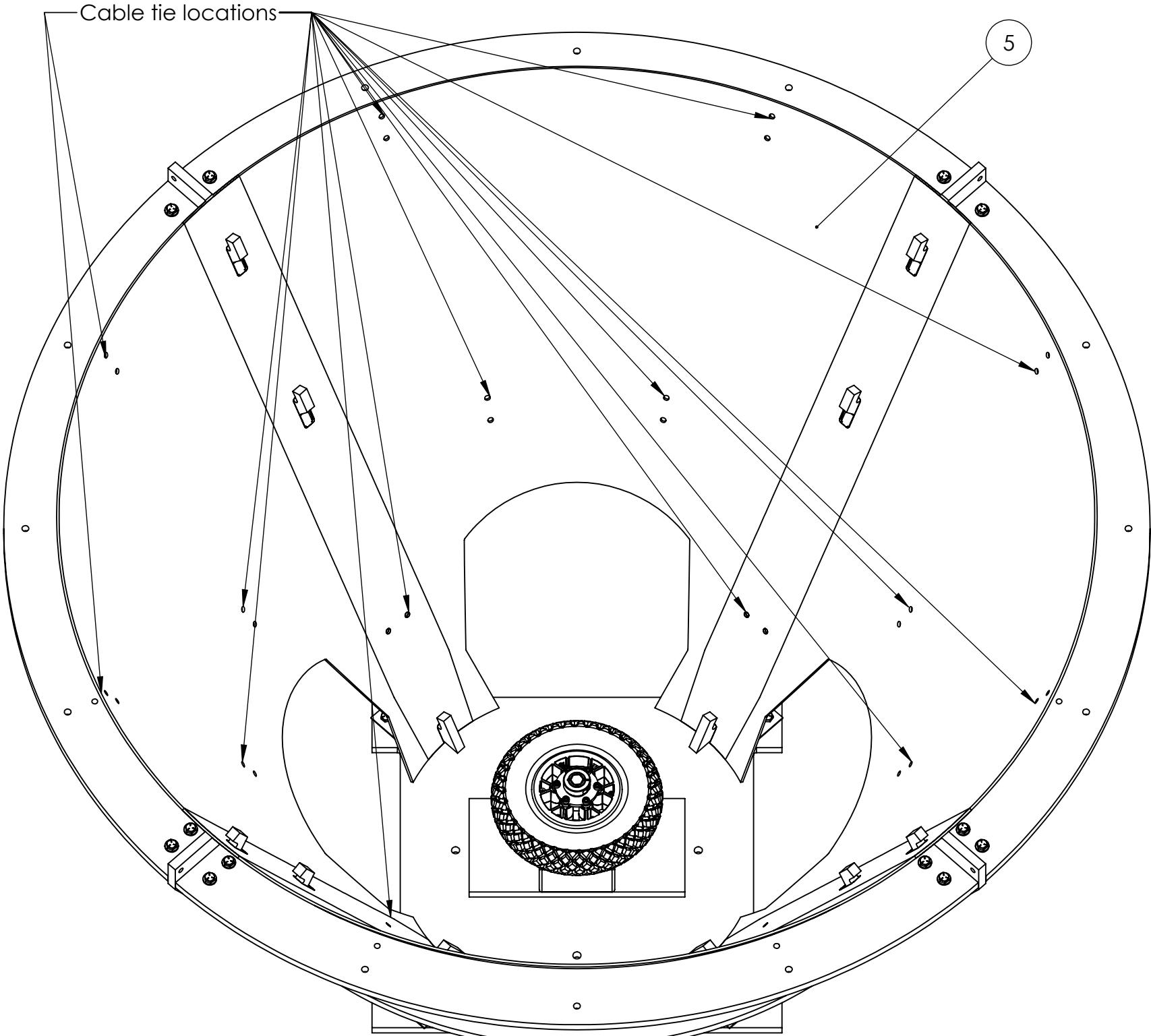
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COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING			SIZE	DWG. NO.	REV
			C	TE-22190	
			SCALE: 1:6	SHEET 4 OF 5	

Step 5



1. Attach (5) to assembly. Do this by bending (5) while lowering into position. All rectangular cutouts (6x) in (5) need to align with hooks on (4). Note: It will be helpful to have multiple people to help with alignment.
2. Press (5) down firmly to ensure it is fully seated.

Step 6



1. Continue the process described in Step 4 by working around in a circular pattern until there is a total of 4x (5) installed. The orientation of overlaps should not matter (i.e. there is no need to worry about installing in a clockwise or counterclockwise manner). Note: It will be more difficult to seat (5) in overlapped locations - the final piece will be the most difficult.
2. Secure (5) to assembly using 20x 50 lb cable ties.

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TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$					
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SIZE	DWG. NO.	REV	C	TE-22190	
SCALE: 1:6	SHEET 5 OF 5				

 **FIRST
ROBOTICS
COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

TITLE: **Hub - Complex Build - Upper Hub Assembly**

SIZE DWG. NO. REV

C TE-22190

SCALE: 1:6 SHEET 5 OF 5

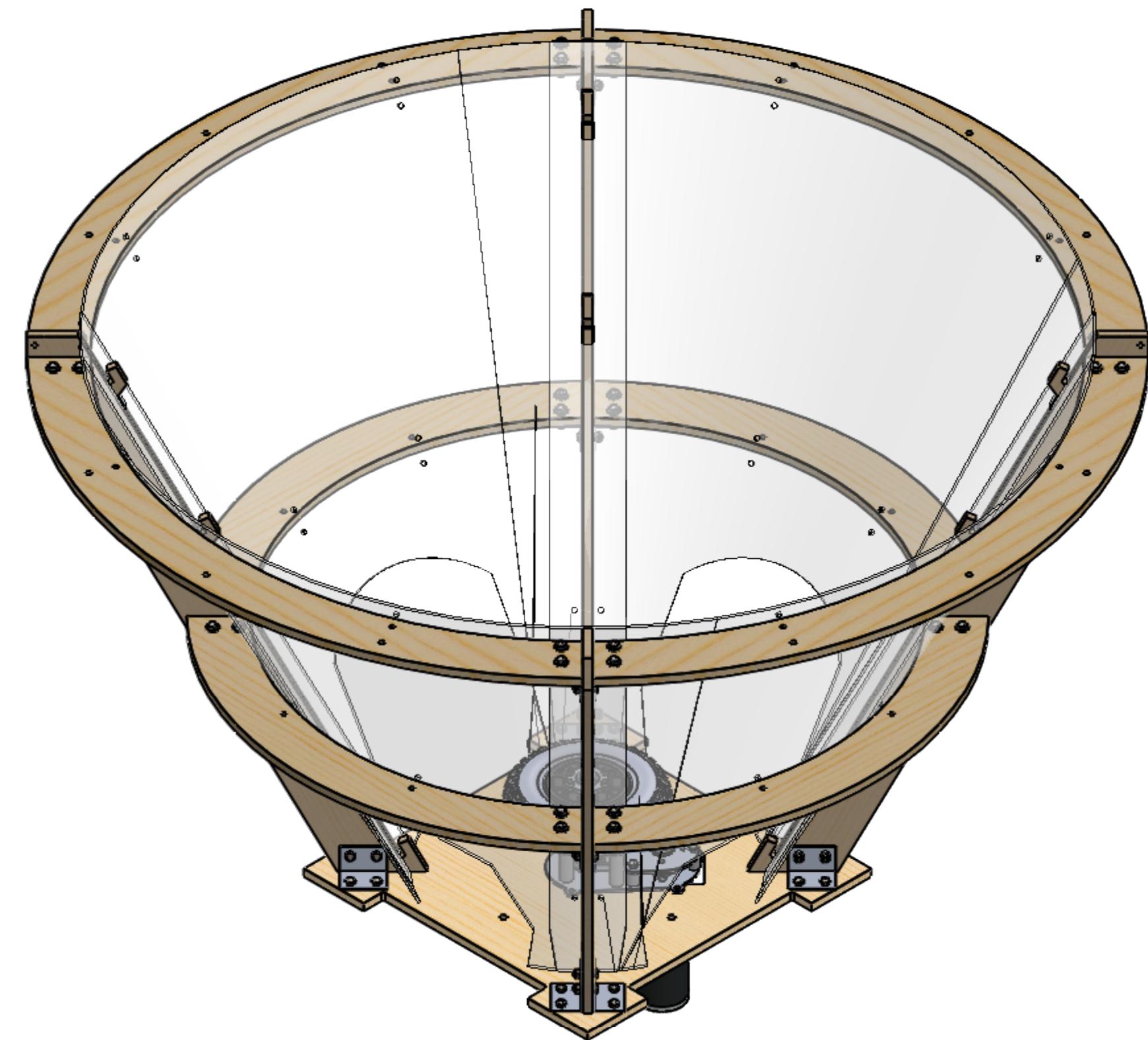
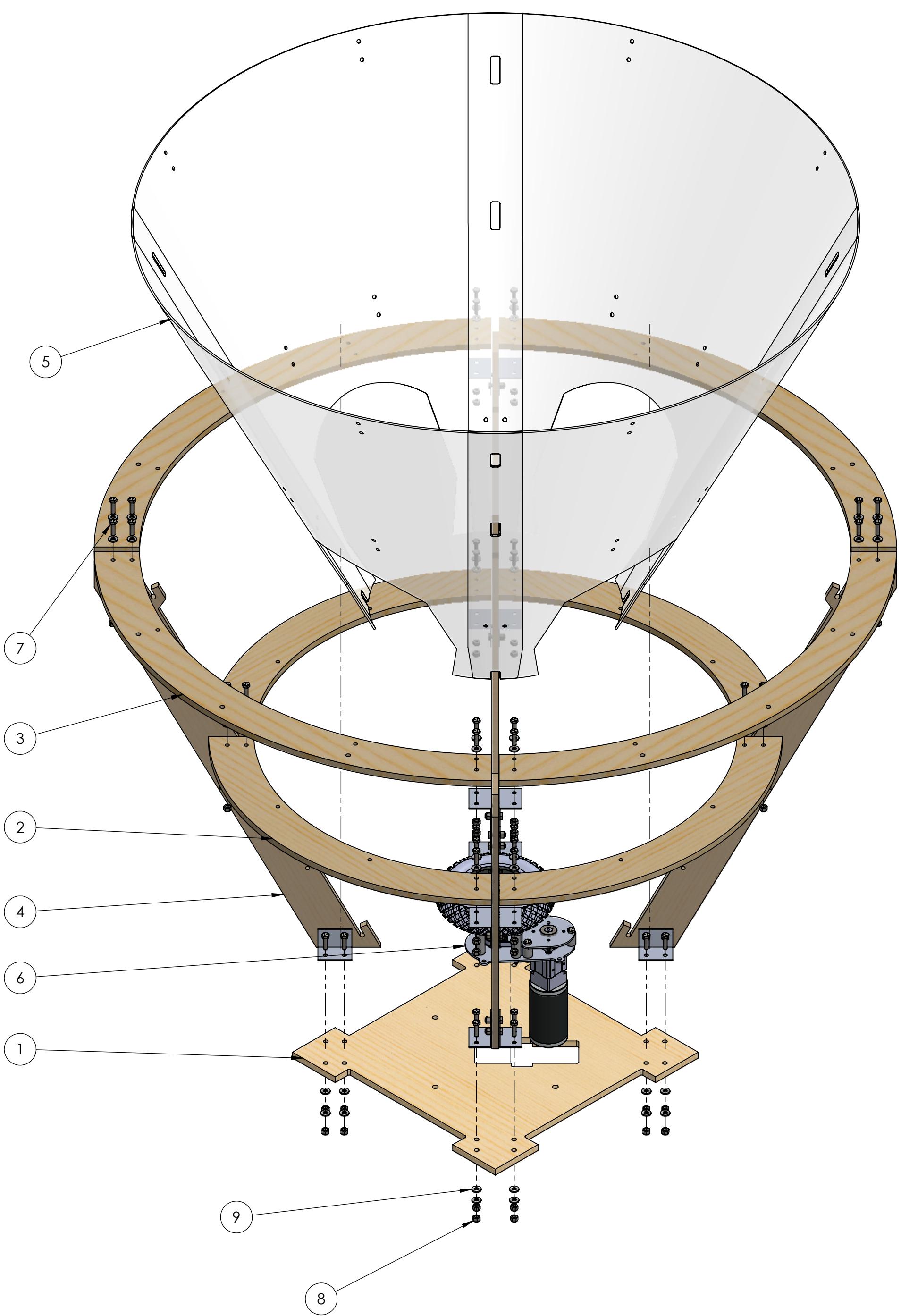
4

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Hardware Needed:
 #8 x 0.5" Long Screw - Qty 4
 1/4" Flat Washer - Qty 4
 50 lb. cable ties - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22191_AM-4674	Hub - Complex Build - Upper Hub Base for AM Agitator AM-4674	1
2	TE-22193	Hub - Complex Build - Upper Hub Lower Ring	4
3	TE-22194	Hub - Complex Build - Upper Hub Upper Ring	4
4	TE-22196	Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly	4
5	TE-22197	Hub - Complex Build - Upper Hub Plastic	4
6	AM-4674	AM Active Assembly	1
7	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	48
8	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	48
9	washer_flat_.25	Flat Washer for 1/4" Screw	48

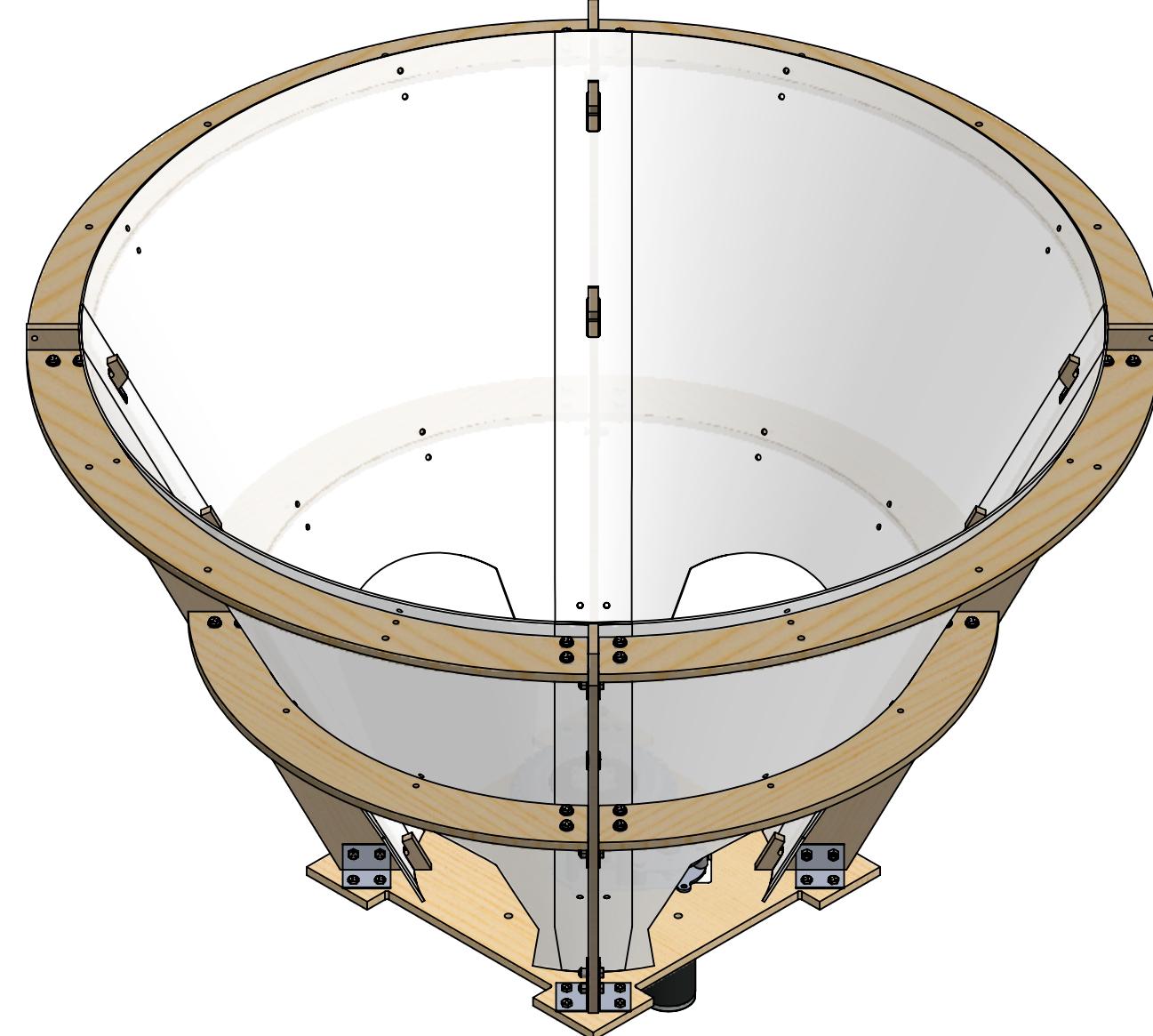
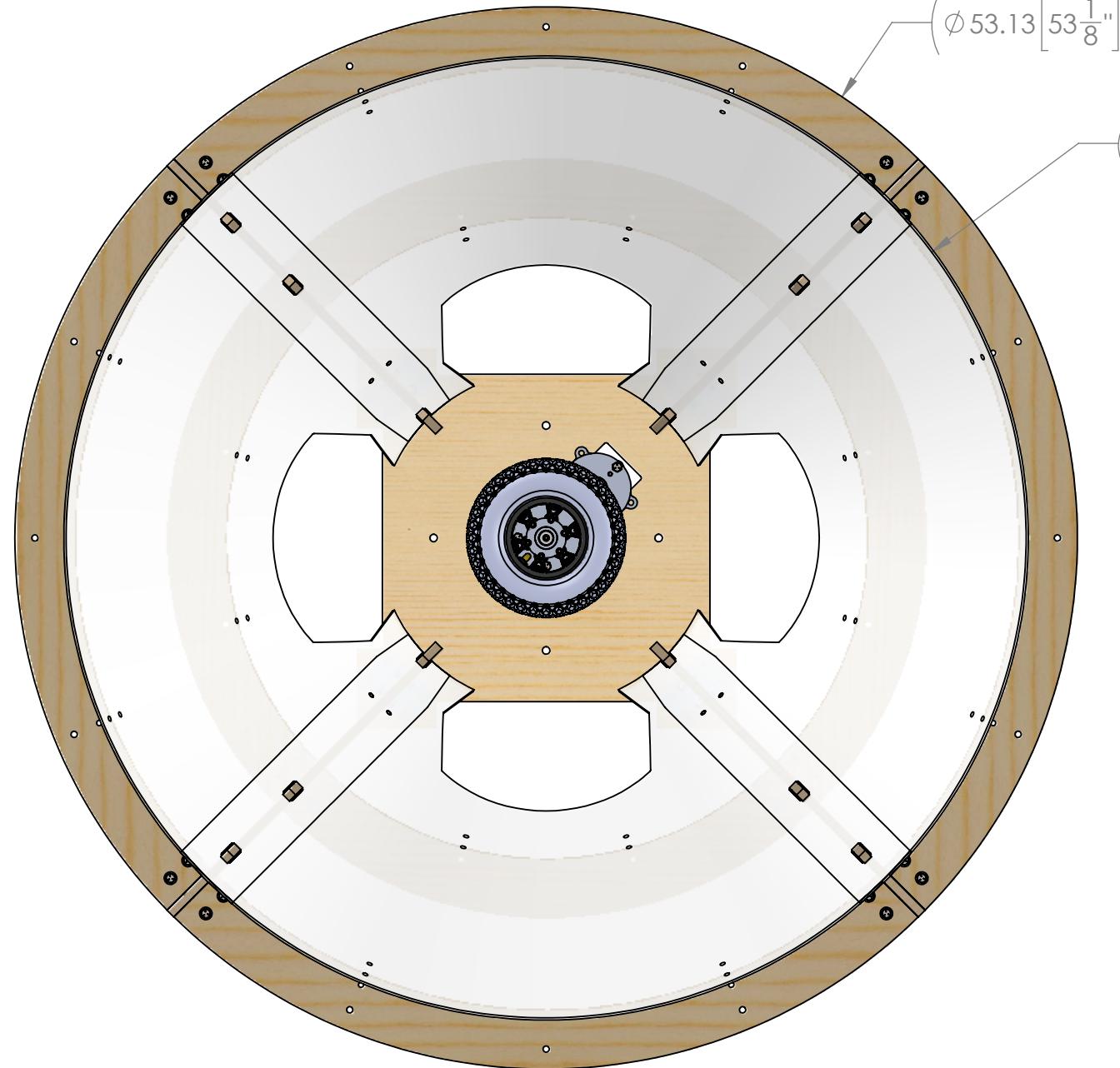
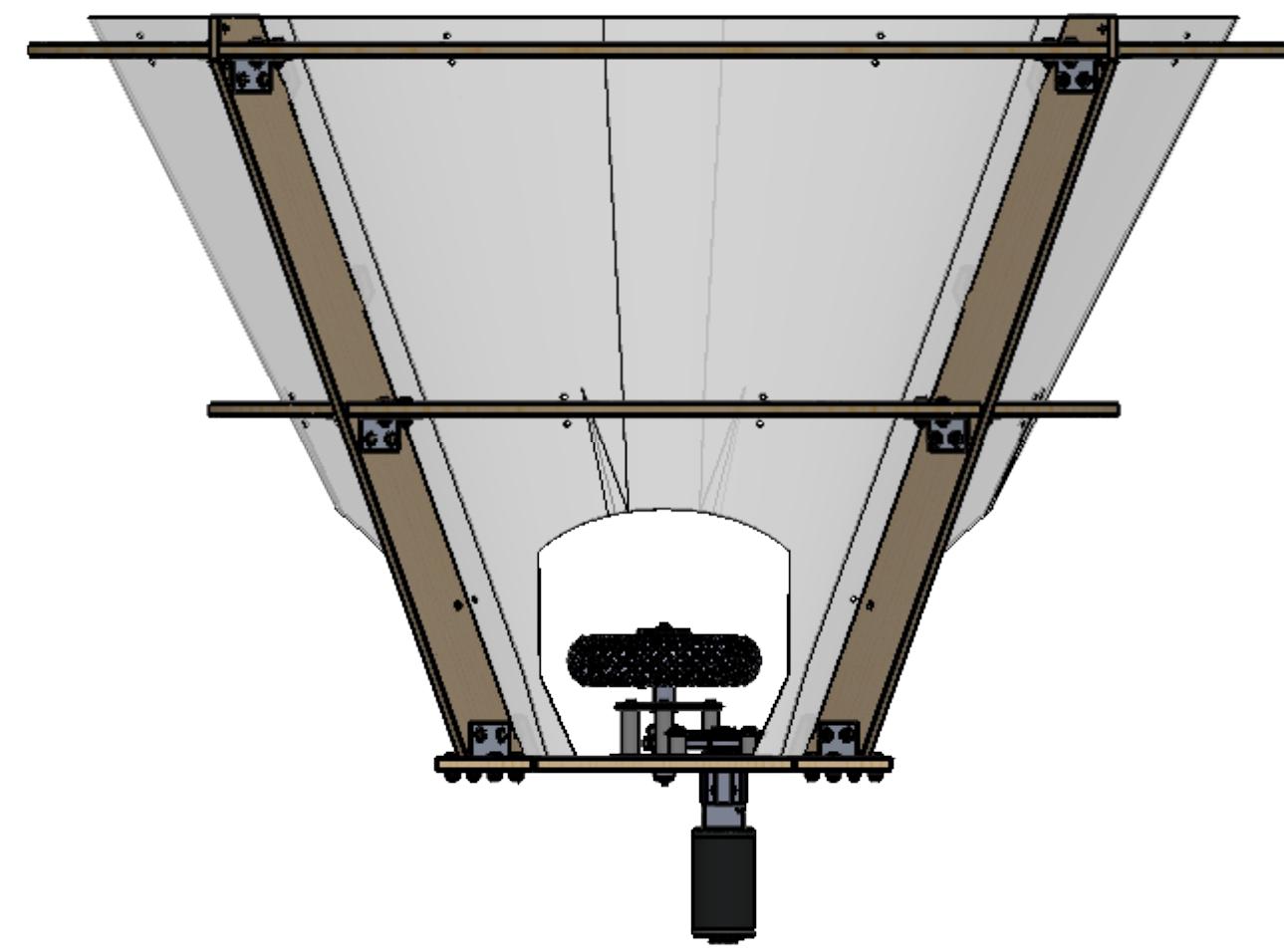
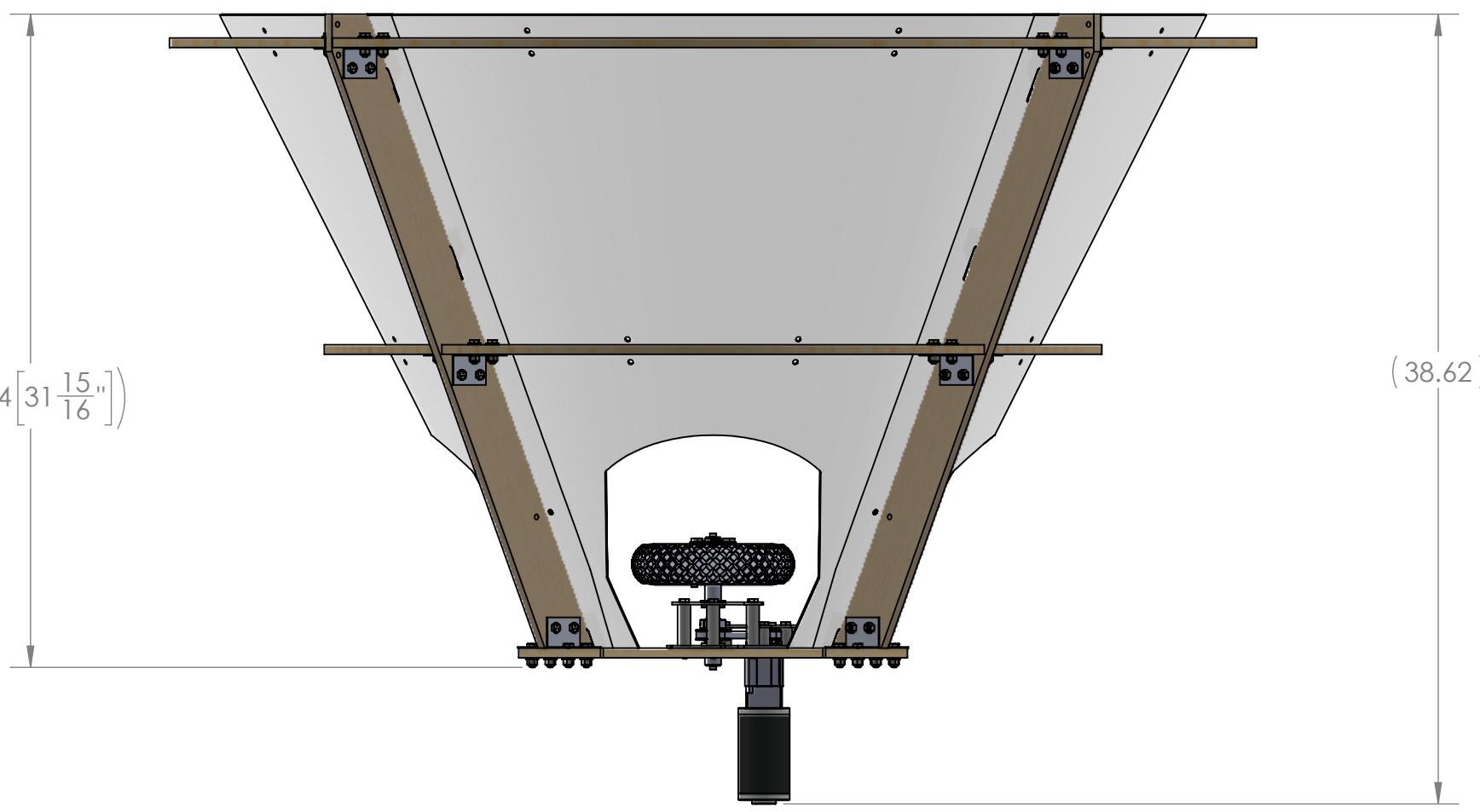
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FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674

SIZE DWG. NO. REV
C TE-22190-AMActive

SCALE: 1:6 **SHEET** 1 OF 6



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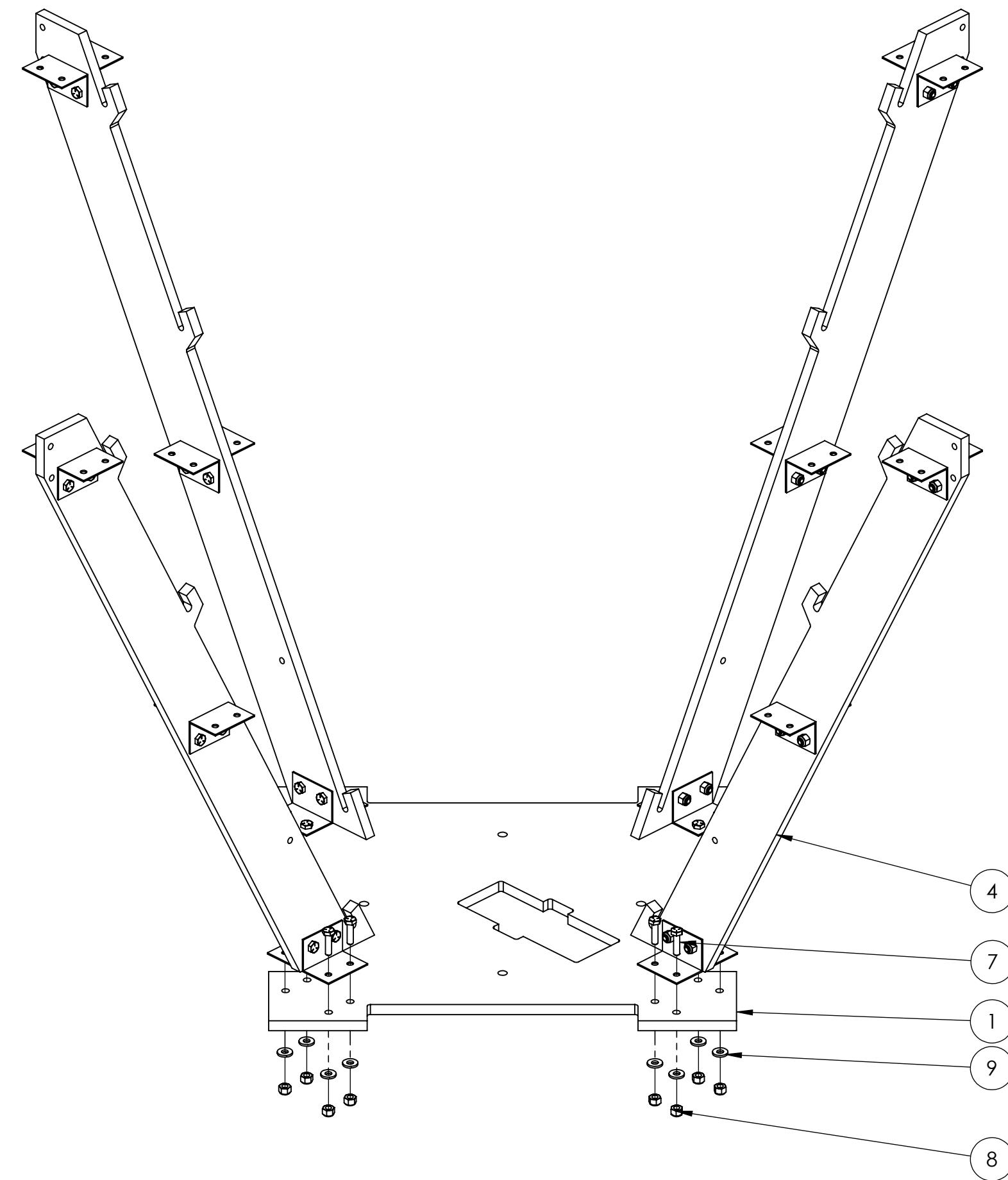
TITLE: Hub - Complex Build -
Upper Hub Assembly
for AM Agitator AM-
4674

SIZE DWG. NO. REV
C TE-22190-AMActive

SCALE: 1:8 SHEET 2 OF 6

D

Step 1



1. Align 4x (4) to (1), as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (4).

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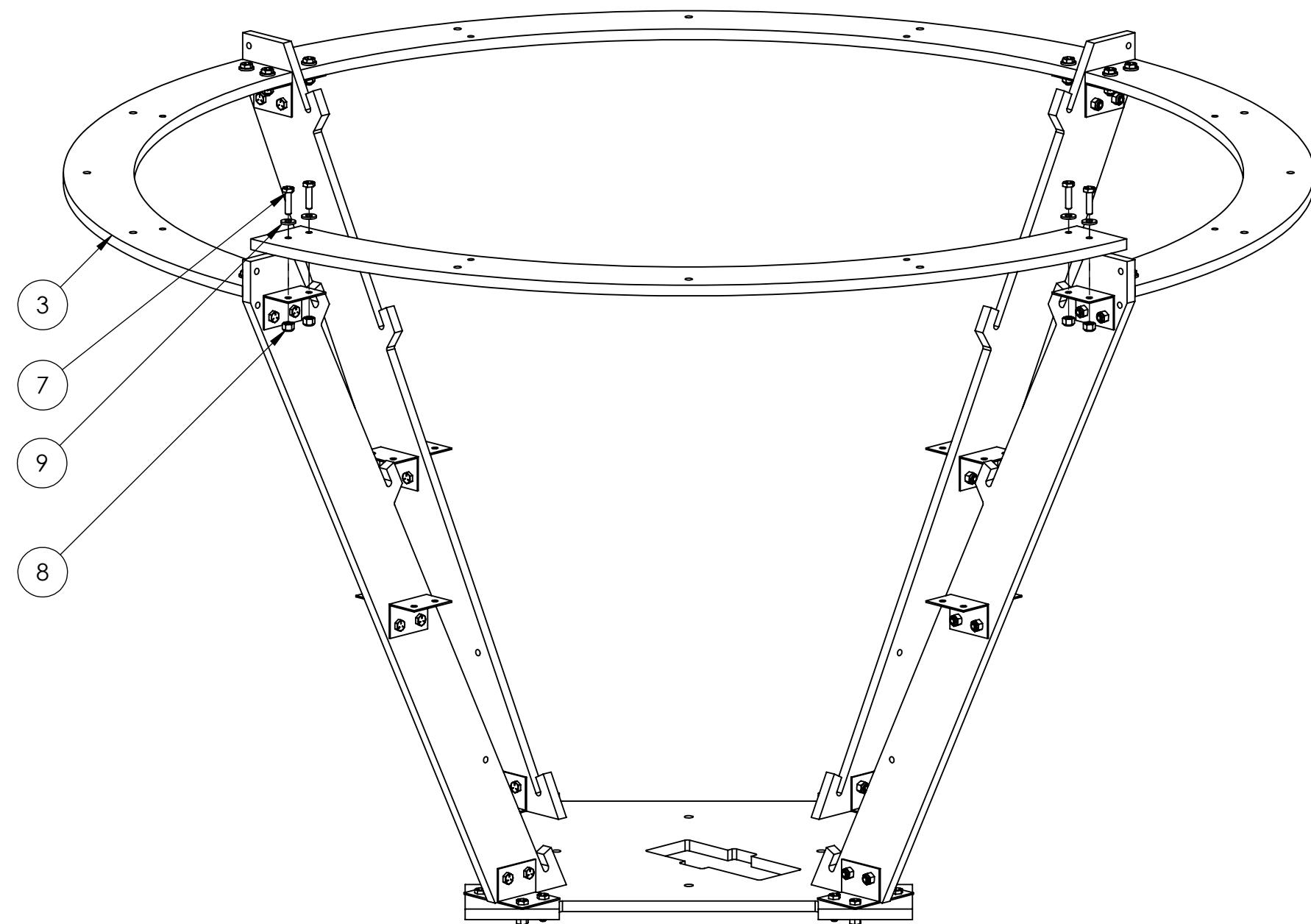
 **FIRST
ROBOTICS
COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Assembly
for AM Agitator AM-
4674

SIZE DWG. NO. REV
C TE-22190-AMActive

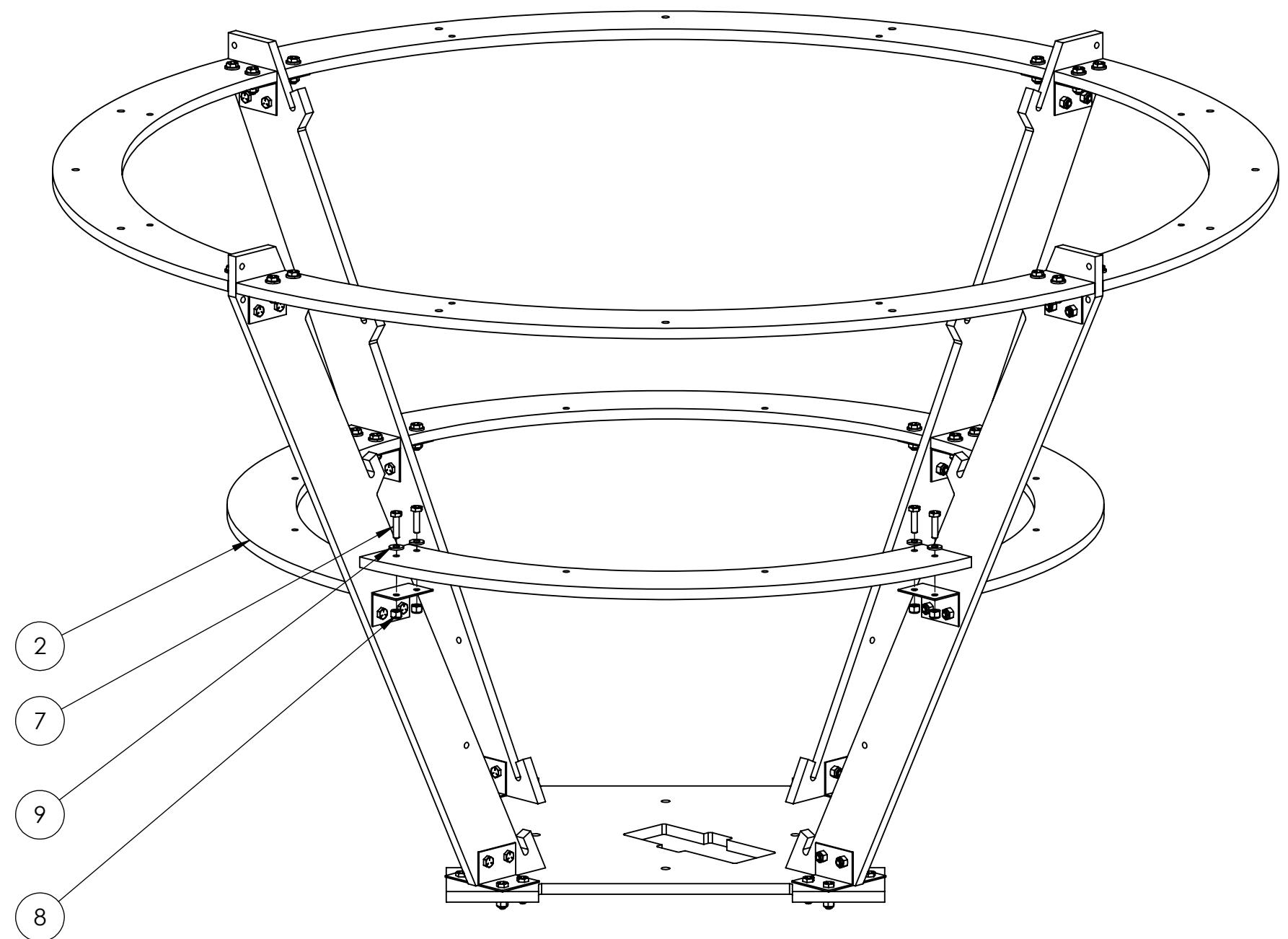
SCALE: 1:5 SHEET 3 OF 6

Step 2



1. Align 4x (3) to Step 1, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (3).

Step 3



1. Align 4x (2) to Step 2, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (2).

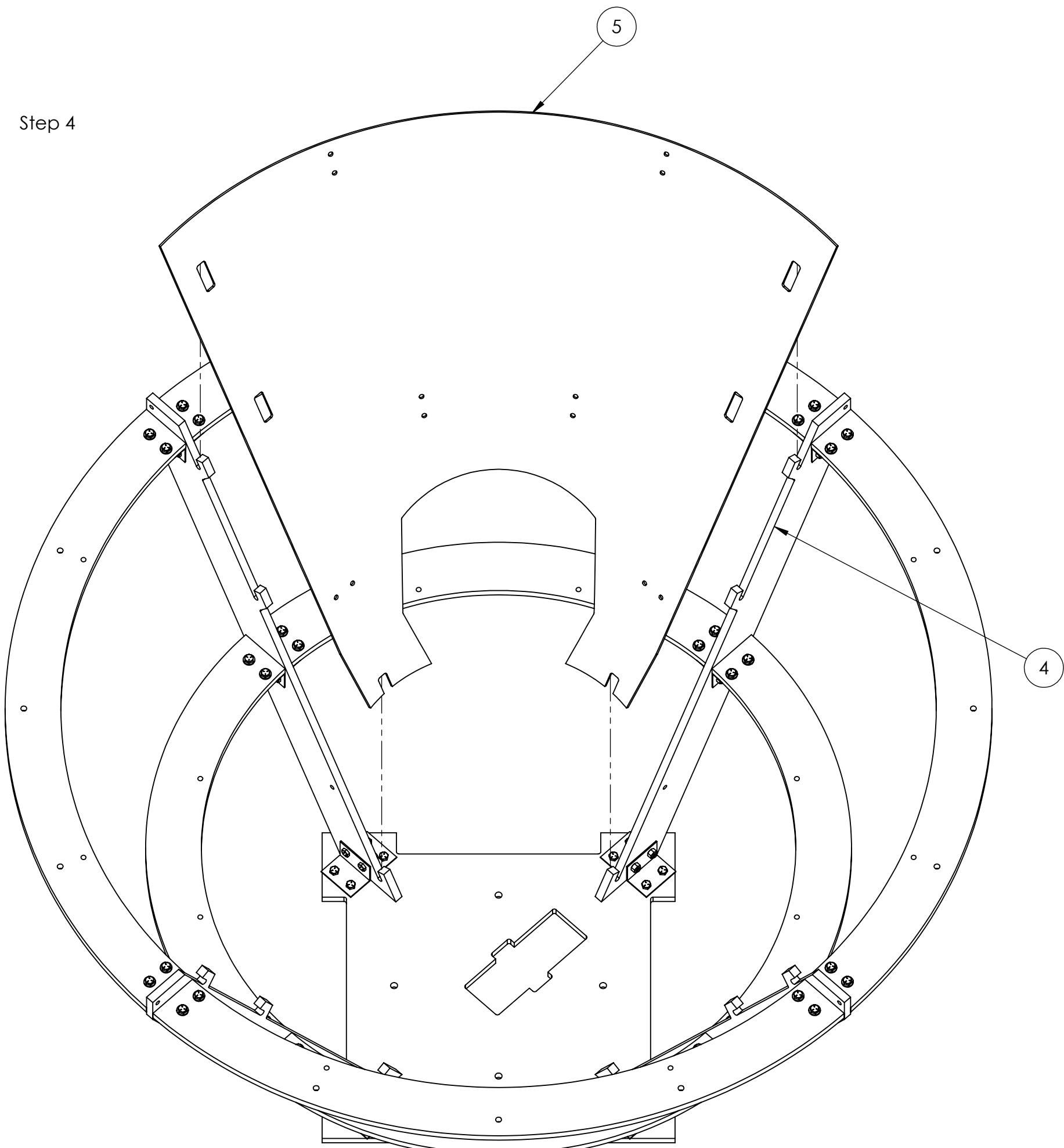
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DIMENSIONS ARE IN INCHES		DRAWN	CO	1/3/2022
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$				
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$				
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FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

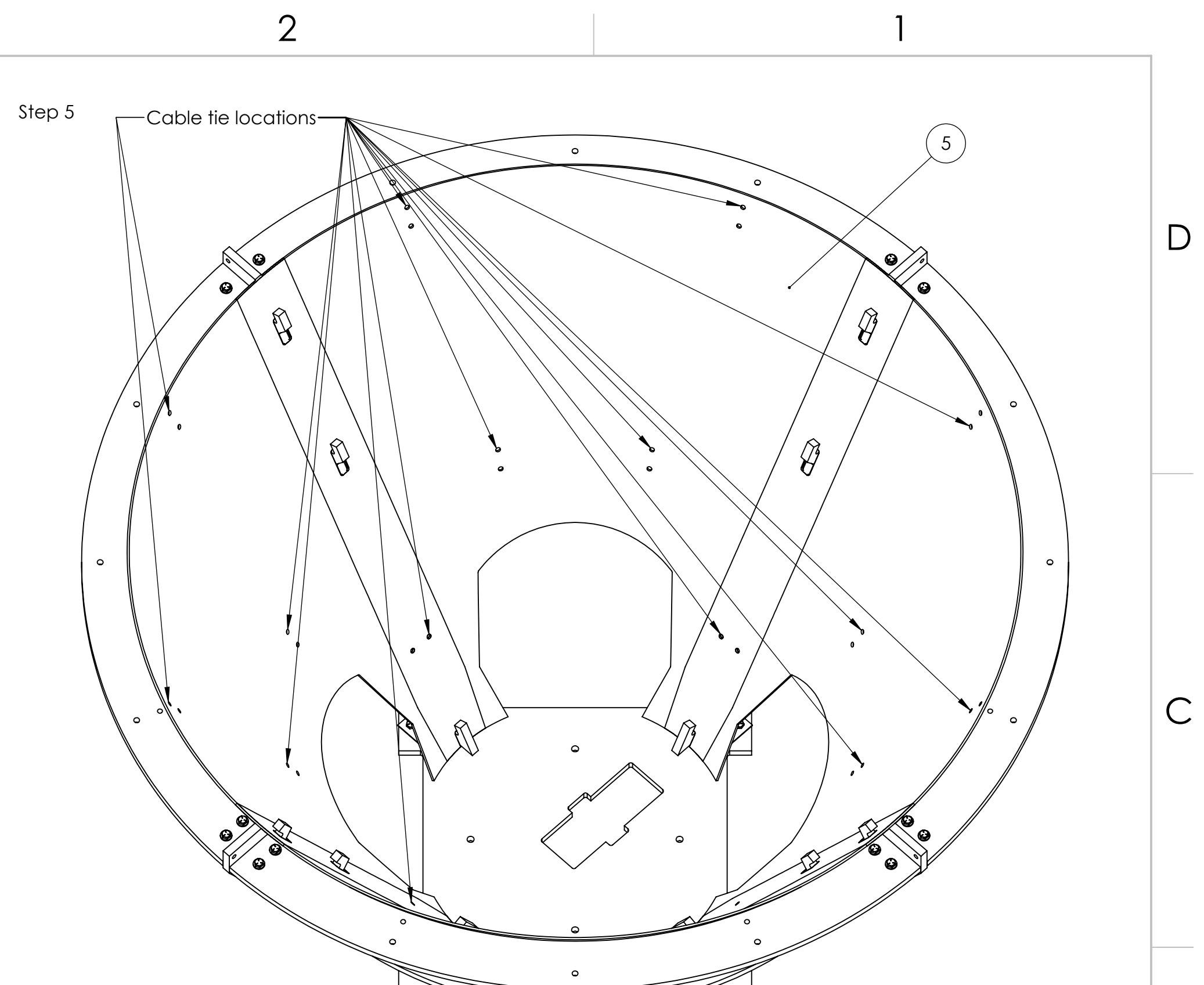
TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674

SIZE DWG. NO. REV
C TE-22190-AMActive

SCALE: 1:6 **SHEET 4 OF 6**



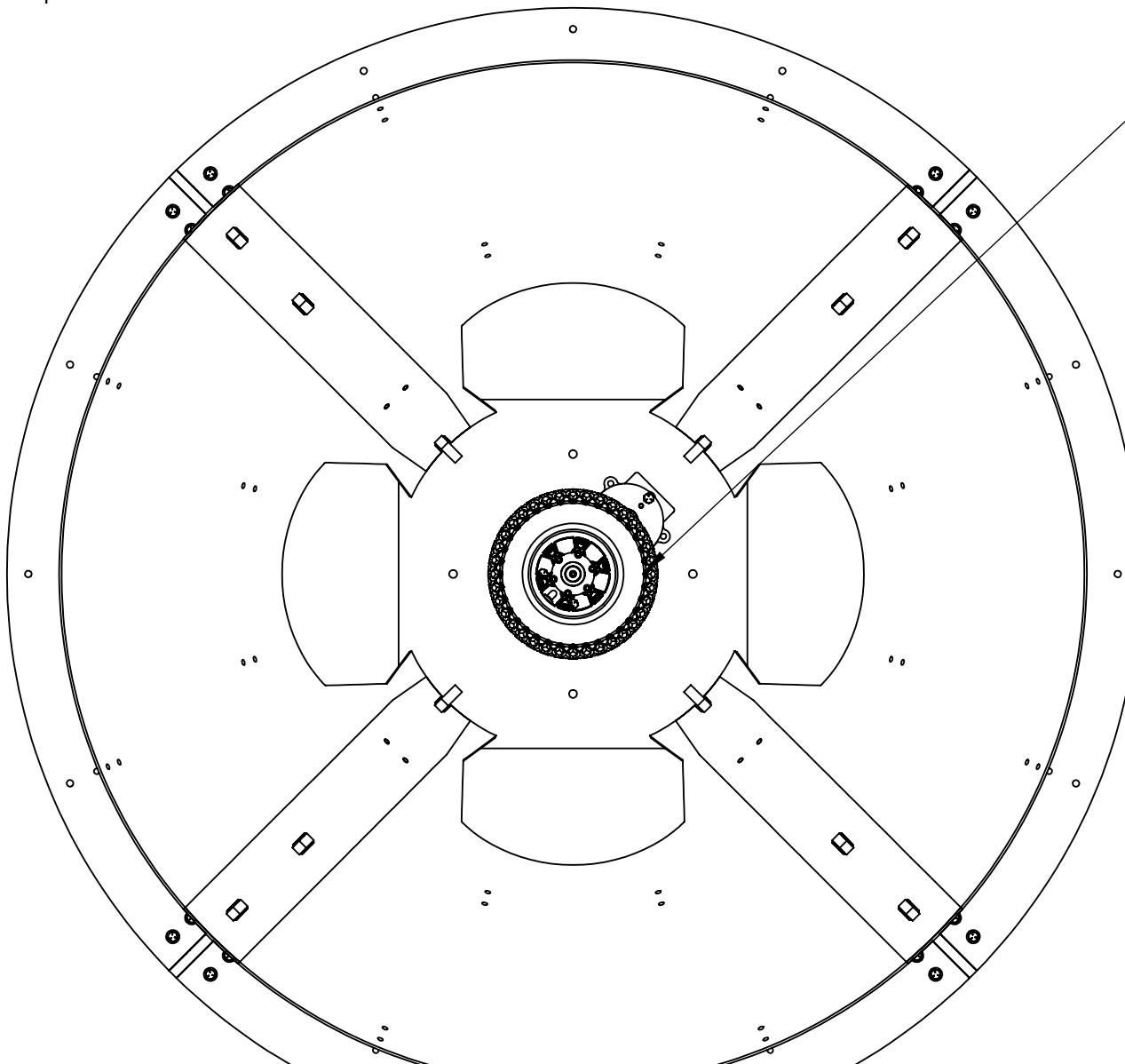
1. Align 1x (5) to Step 3. Do this by bending (5) while lowering into position. The cutouts (6x) in (5) need to align with hooks on (4). Note: It will be helpful to have multiple people to aid with alignment.
2. Press (5) down firmly to ensure it is fully seated.



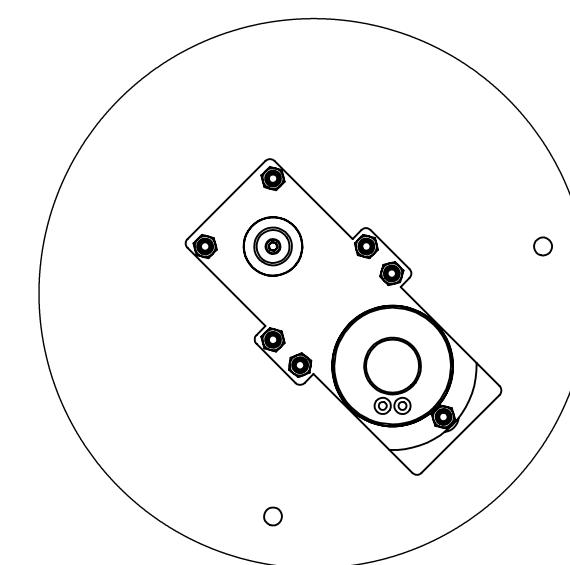
1. Continue the process described in Step 4 by working around in a circular pattern until there is a total of 4x (5) installed. The orientation of overlaps should not matter (i.e. there is no need to worry about installing in a clockwise or counterclockwise manner). Note: It will be more difficult to seat (5) in overlapped locations - the final piece will be the most difficult.
2. Secure (5) to assembly using 50 lb cable ties, as shown.

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 FIRST ROBOTICS COMPETITION  SOLIDWORKS Modeling Solutions Partner			
TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674			
SIZE DWG. NO. REV			
C TE-22190-AMActive			
SCALE: 1:6 SHEET 5 OF 6			

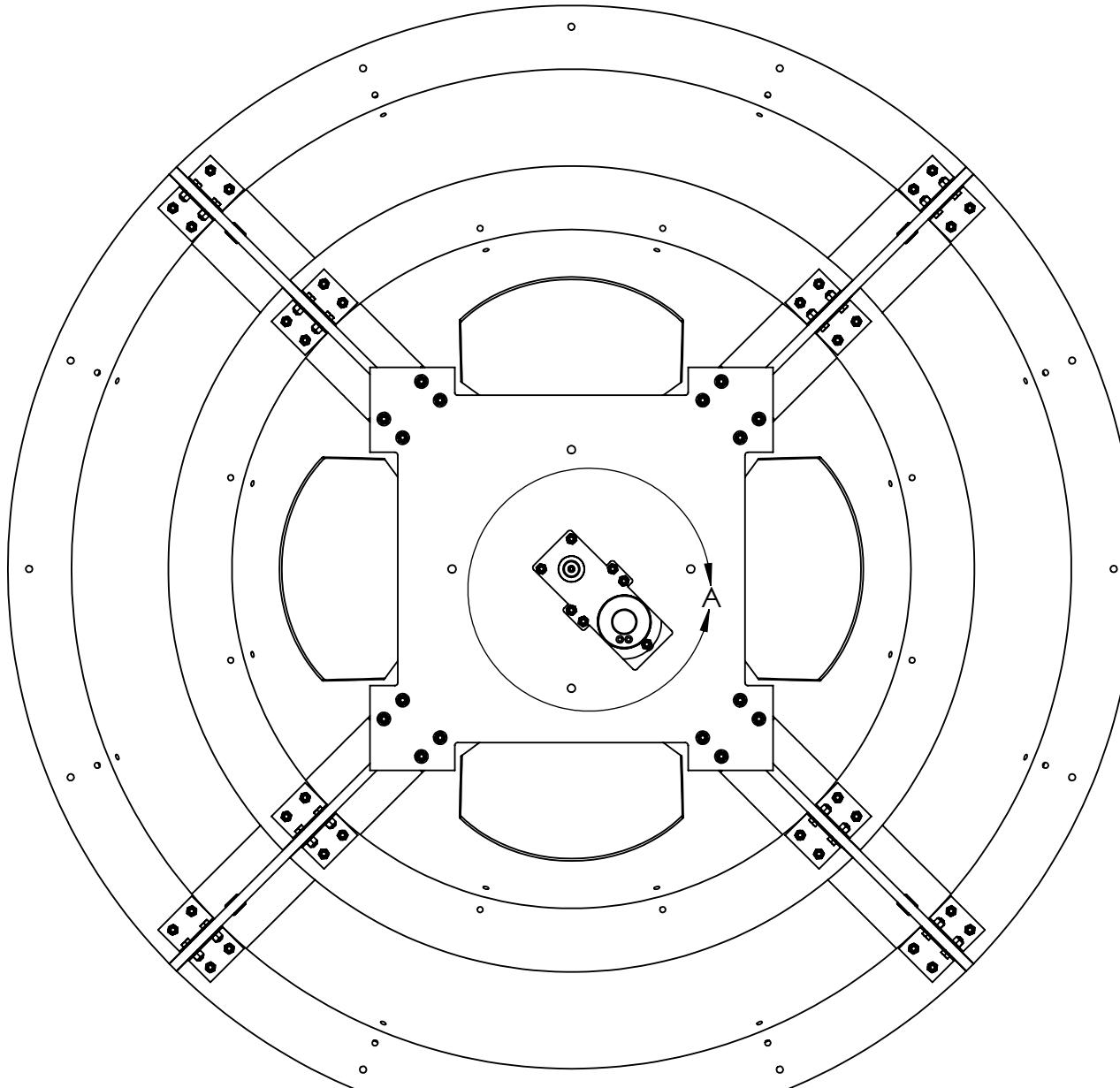
Step 6



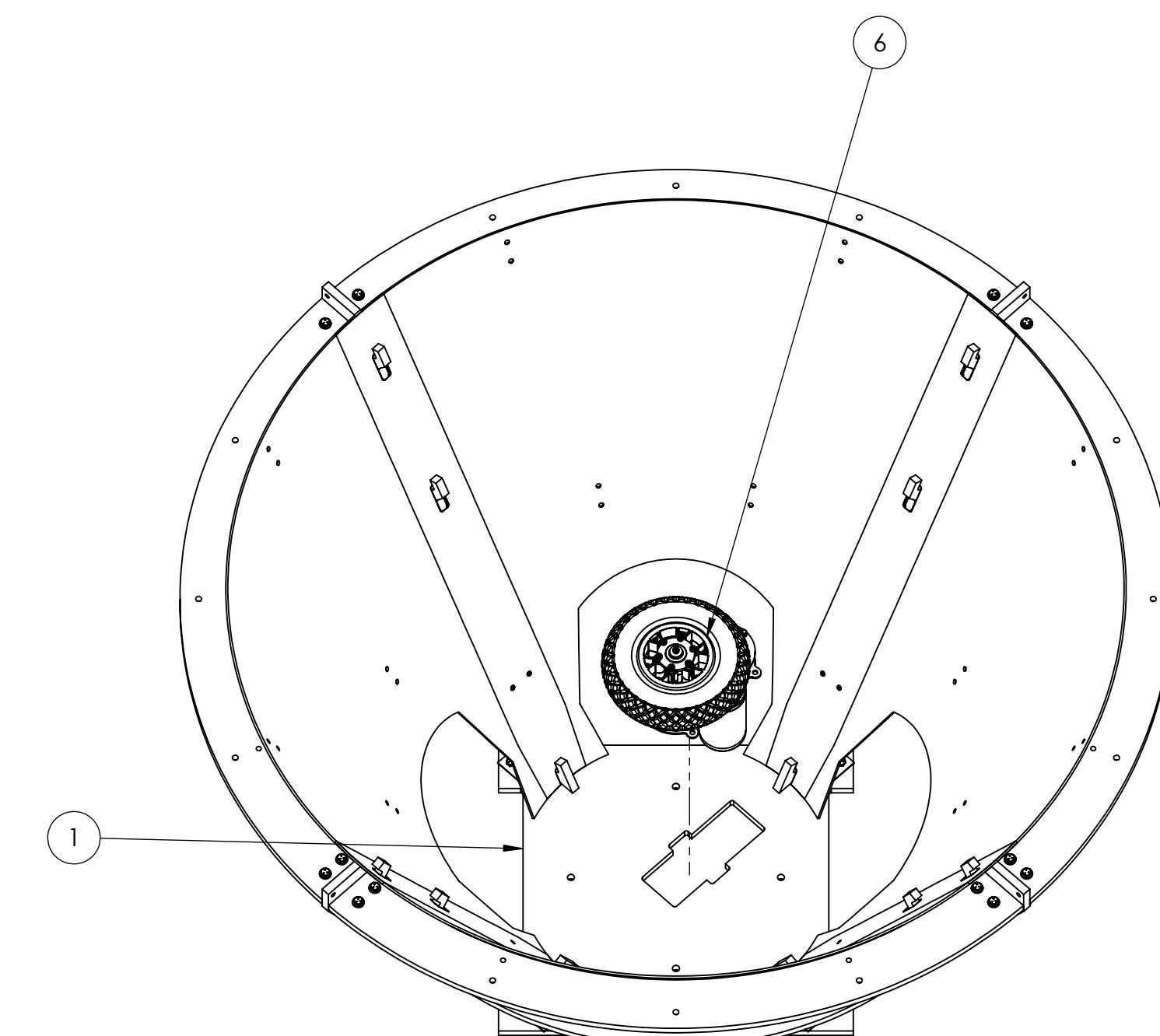
Top View



Bottom View

DETAIL A
SCALE 1 : 4

Wheel may need to be temporarily removed from 6 to fasten assembly down.
Wheel should end up centered in assembly.



Note - completion of this step will make installation of TE-22190-AMActive into TE-22100 more difficult. However, this step will be more difficult to complete when installed at the TE-22100 level. Consider your resources and proceed accordingly.

1. Align 6 to 1, as shown. Bolts in 6 should align with cutout in 1, as shown in Detail A.
 2. Connect using 4x 0.5" long screws paired with and inserted through 4x 1/4" flat washers.
- Alternatively - drill holes in 1 and use 4x bolts with nuts (Nylock recommended) to fasten.

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TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$				
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$				
MATERIAL/FINISH:	PROPRIETARY AND CONFIDENTIAL			
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FIRST ROBOTICS COMPETITION	SOLIDWORKS Modeling Solutions Partner
TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674	
SIZE	DWG. NO.
C	TE-22190-AMActive
REV	
SCALE: 1:8	SHEET 6 OF 6

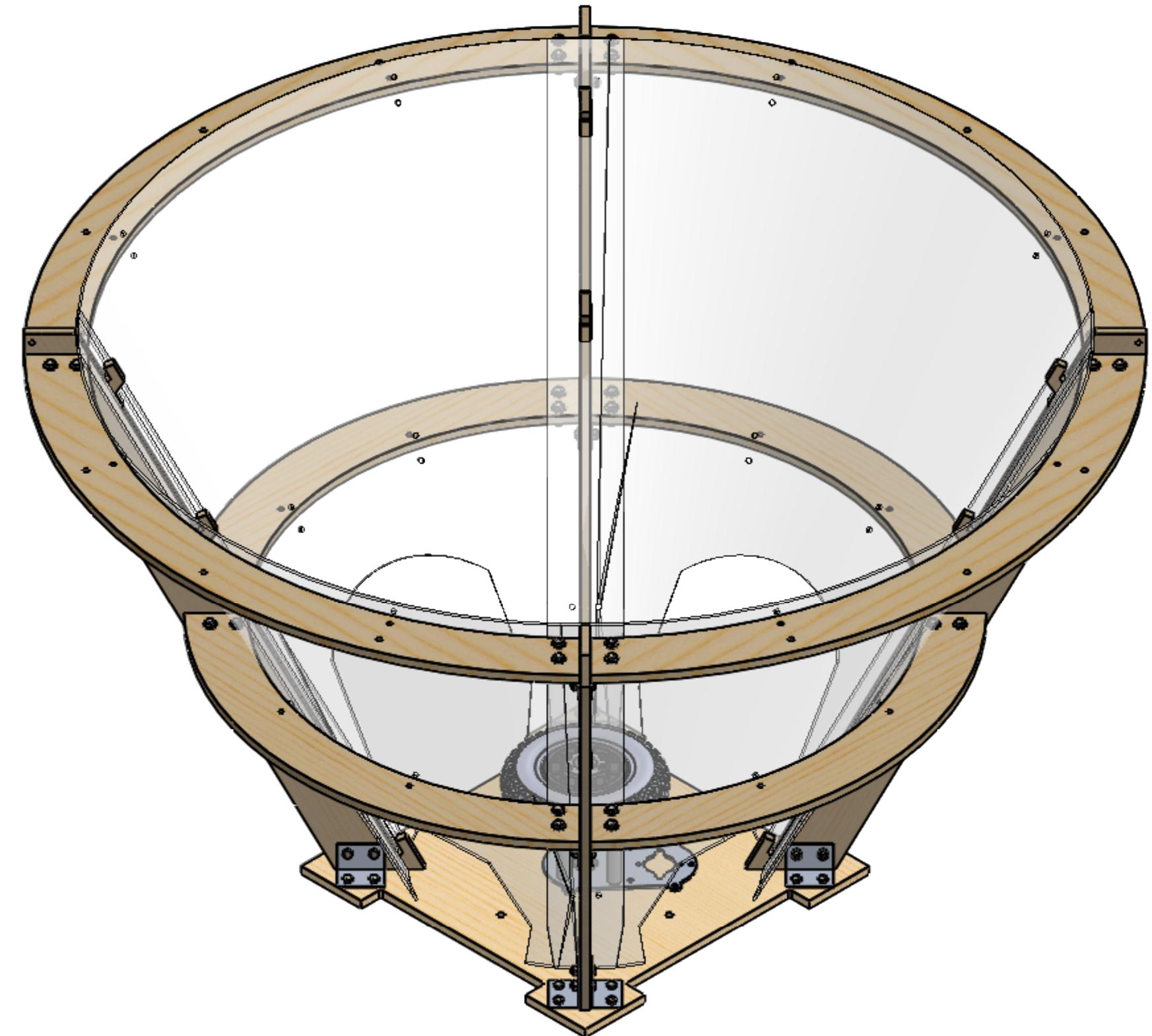
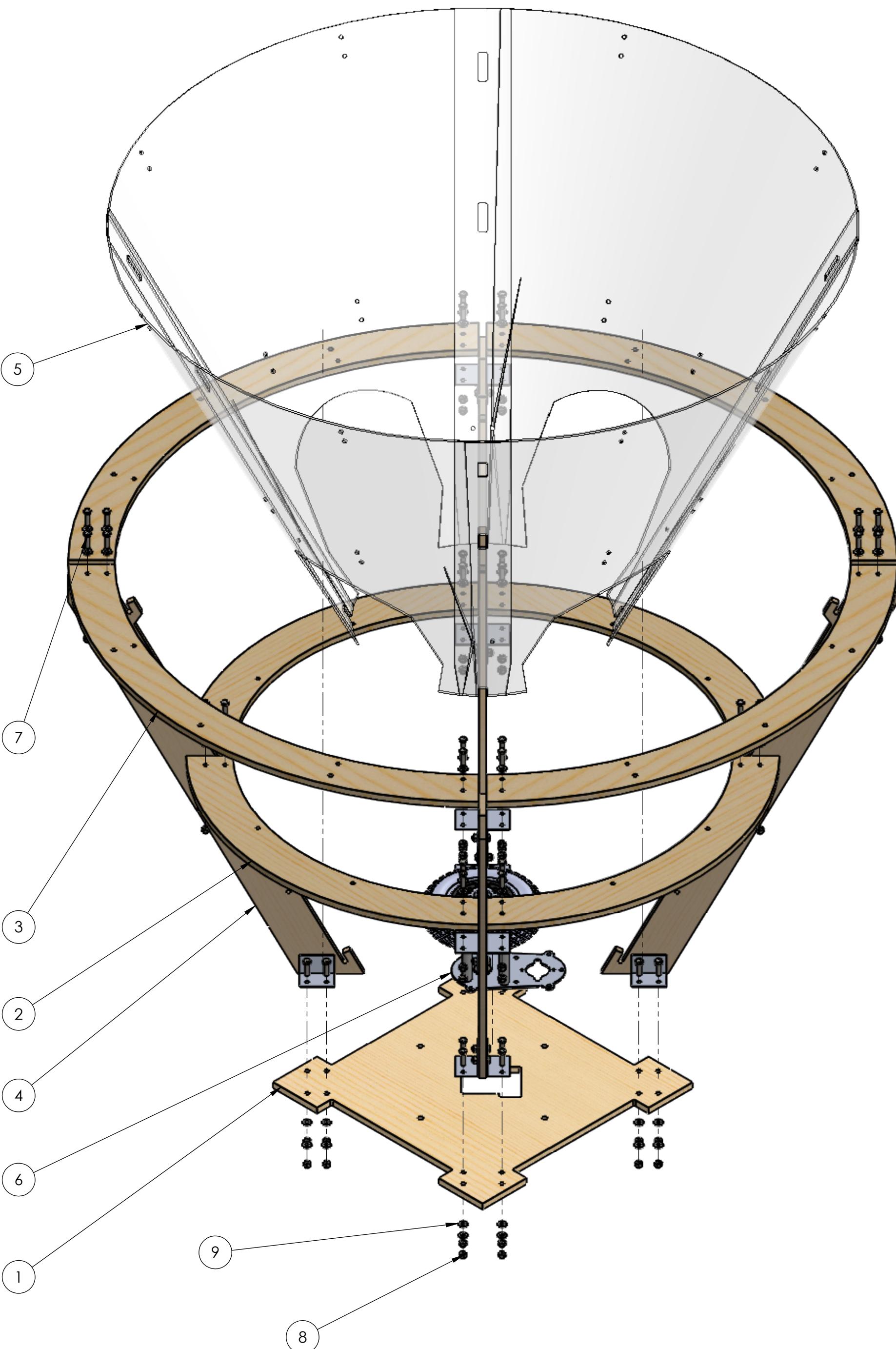
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Hardware Needed:
 #8 x 0.5" Long Screw - Qty 4
 1/4" Flat Washer - Qty 4
 50 lb. cable ties - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22191_AM-4673	Hub - Complex Build - Upper Hub Base for AM Agitator AM-4673	1
2	TE-22193	Hub - Complex Build - Upper Hub Lower Ring	4
3	TE-22194	Hub - Complex Build - Upper Hub Upper Ring	4
4	TE-22196	Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly	4
5	TE-22197	Hub - Complex Build - Upper Hub Plastic	4
6	AM-4673	Passive High Agitator	1
7	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	48
8	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	48
9	washer_flat_.25	Flat Washer for 1/4" Screw	48

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE
DRAWN	CO	1/3/2022		

DIMENSIONS ARE IN INCHES
 TOLERANCES:
 FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

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COMMENTS:
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DO NOT SCALE DRAWING

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Assembly
AM Agitator AM-4673

SIZE DWG. NO. REV
C TE-22190-AMPassive

SCALE: 1:6 SHEET 1 OF 5

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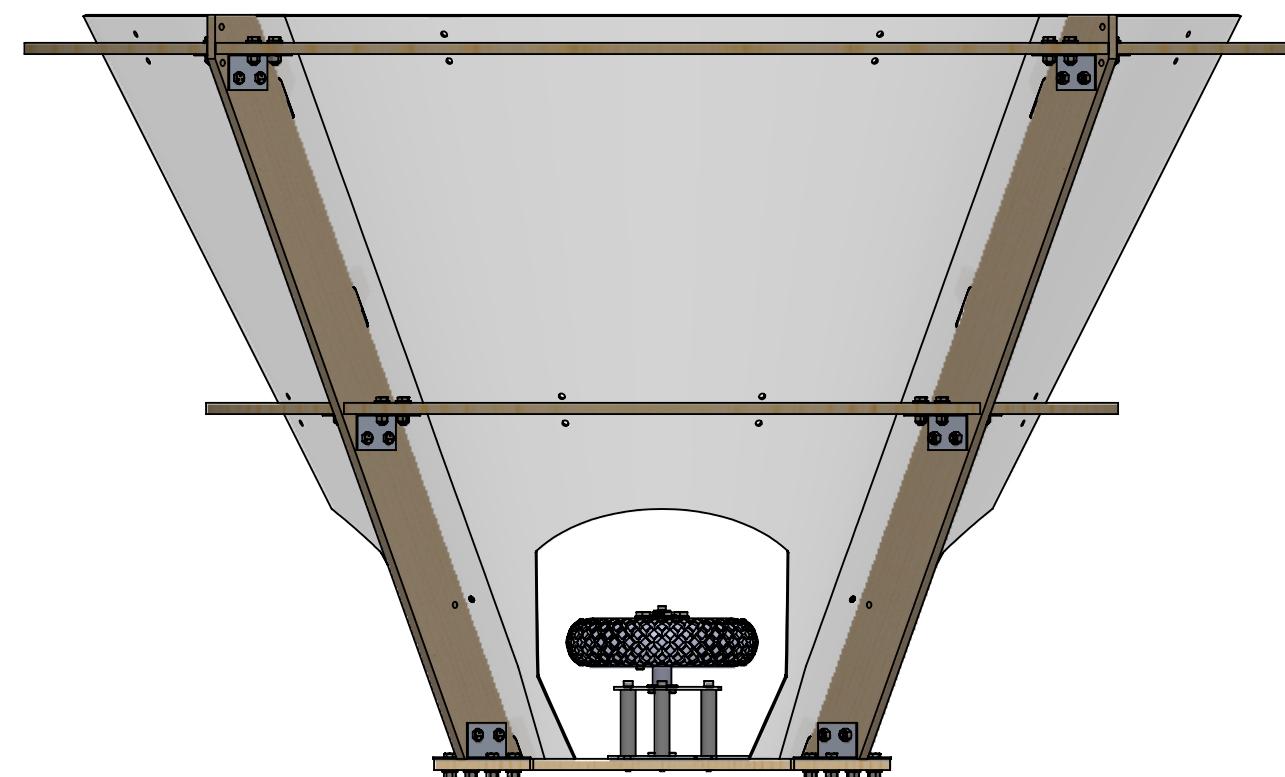
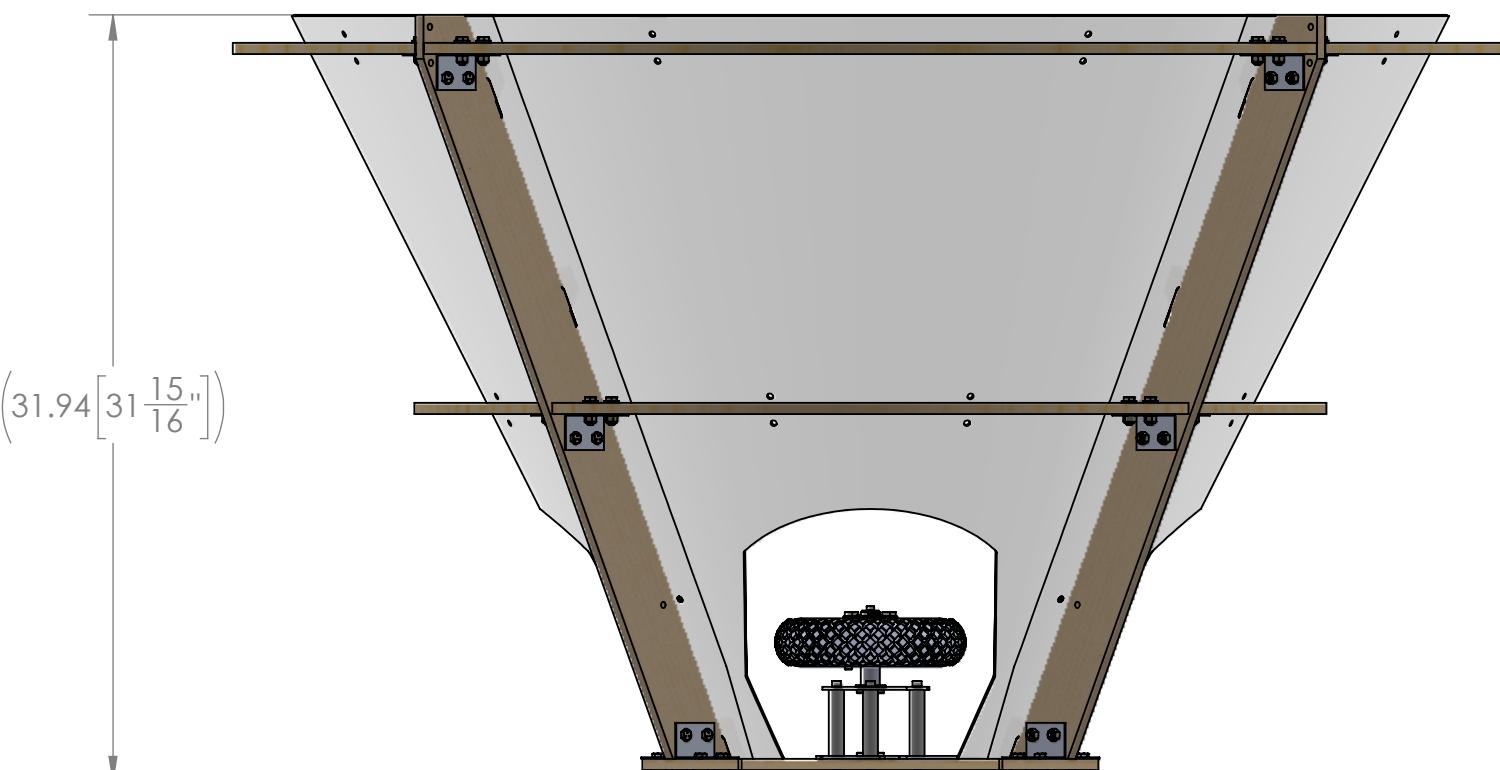
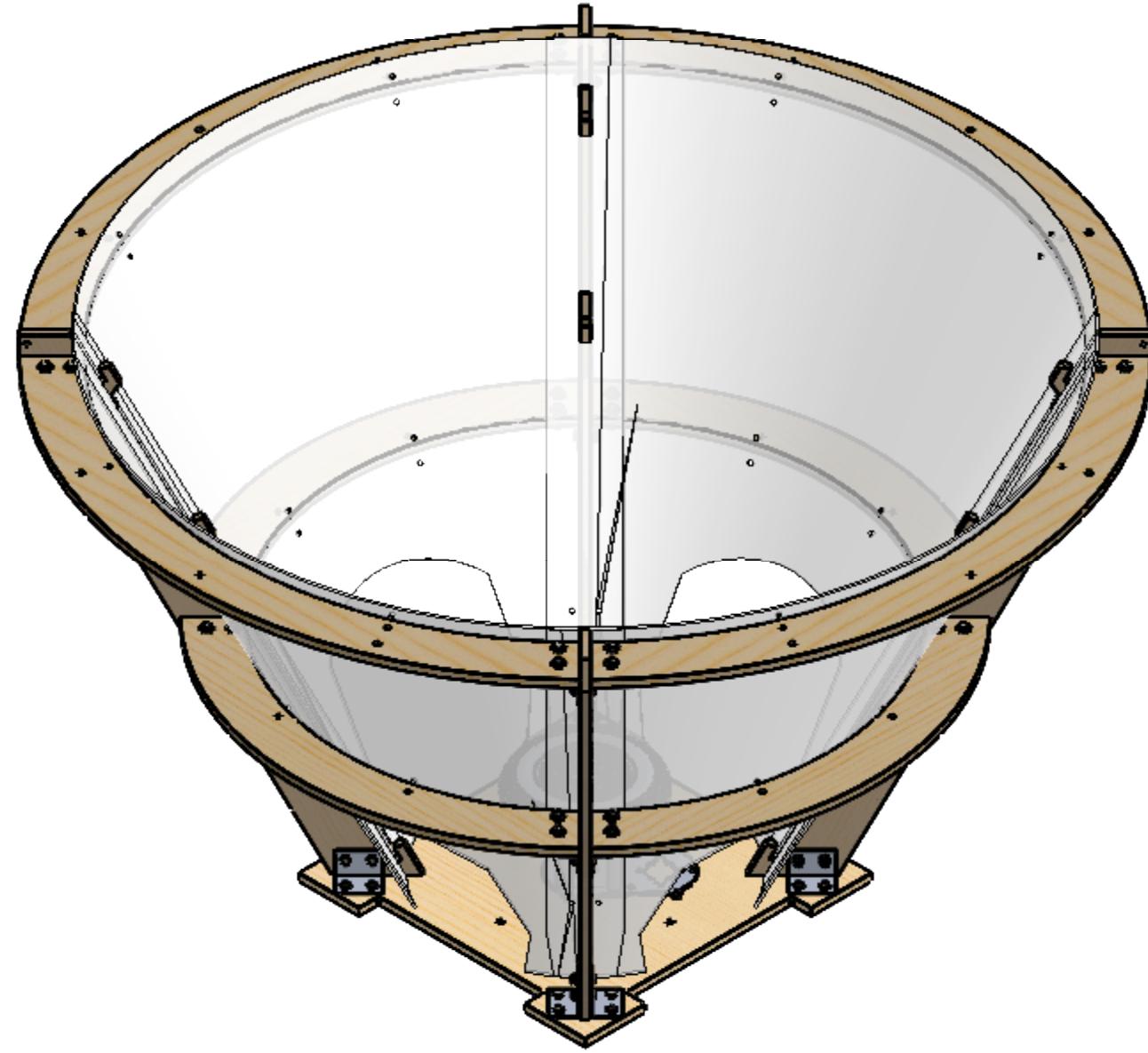
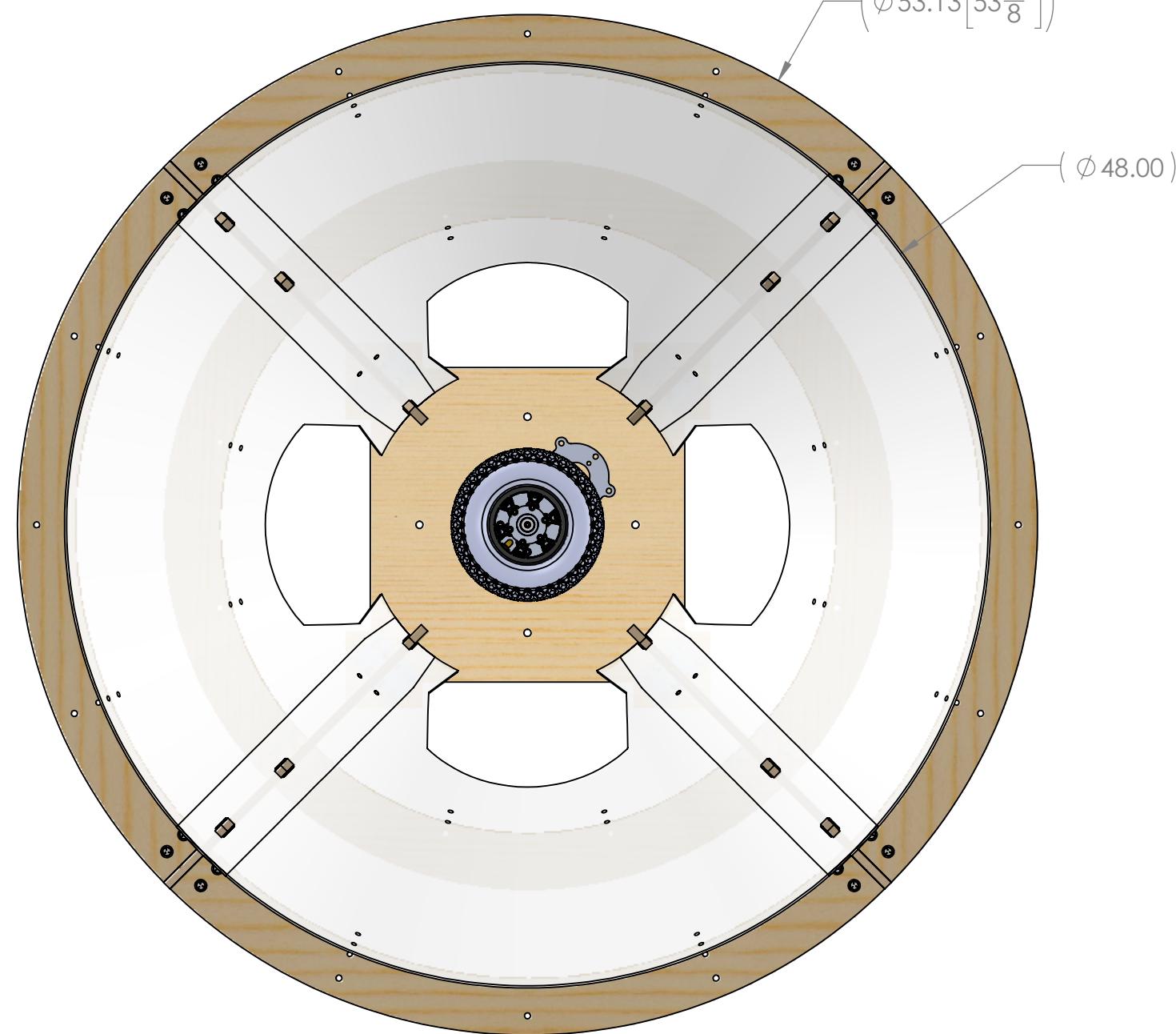
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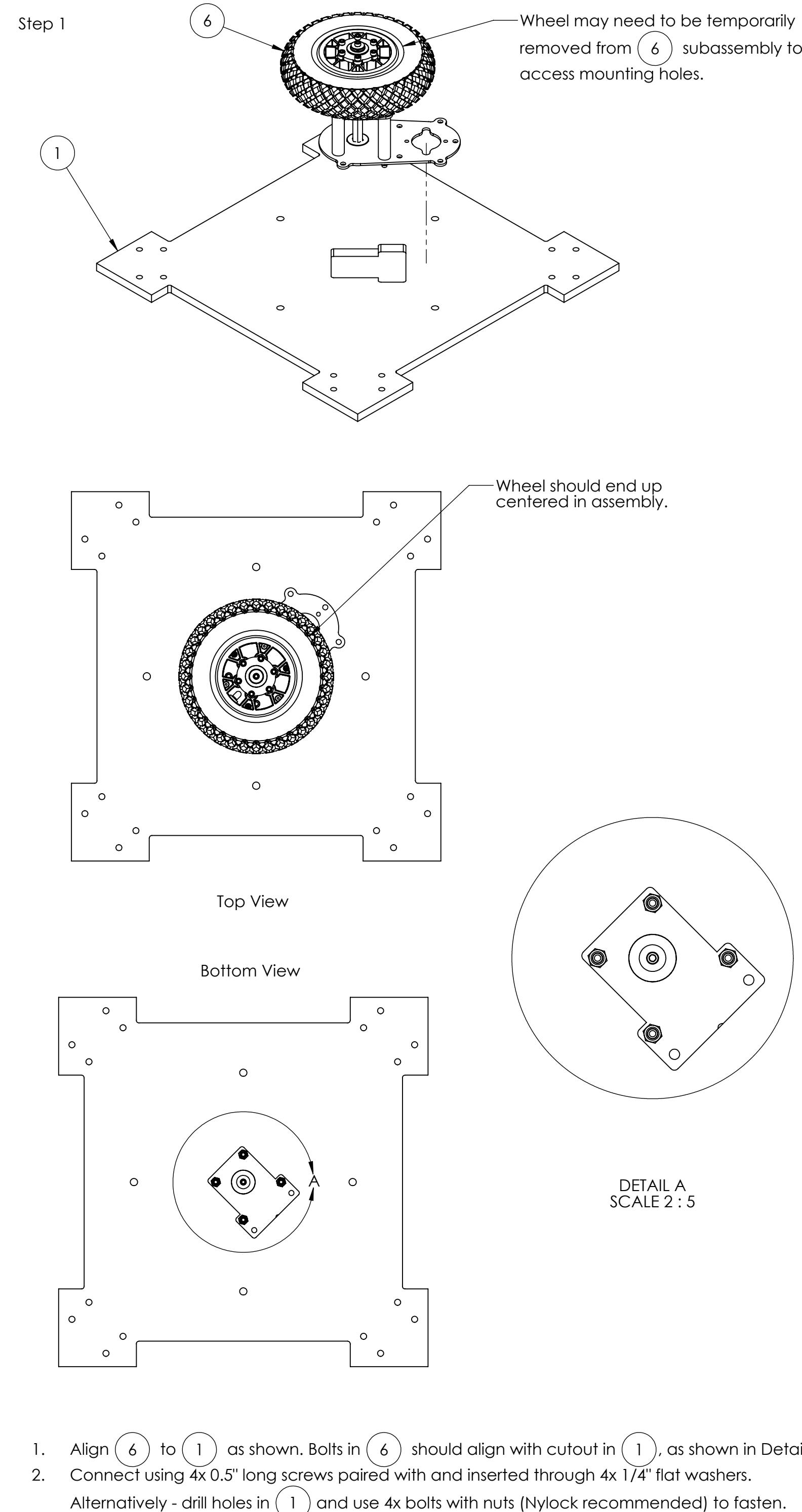
UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	CO	1/3/2022	
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

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ROBOTICS
COMPETITION**  **SOLIDWORKS**
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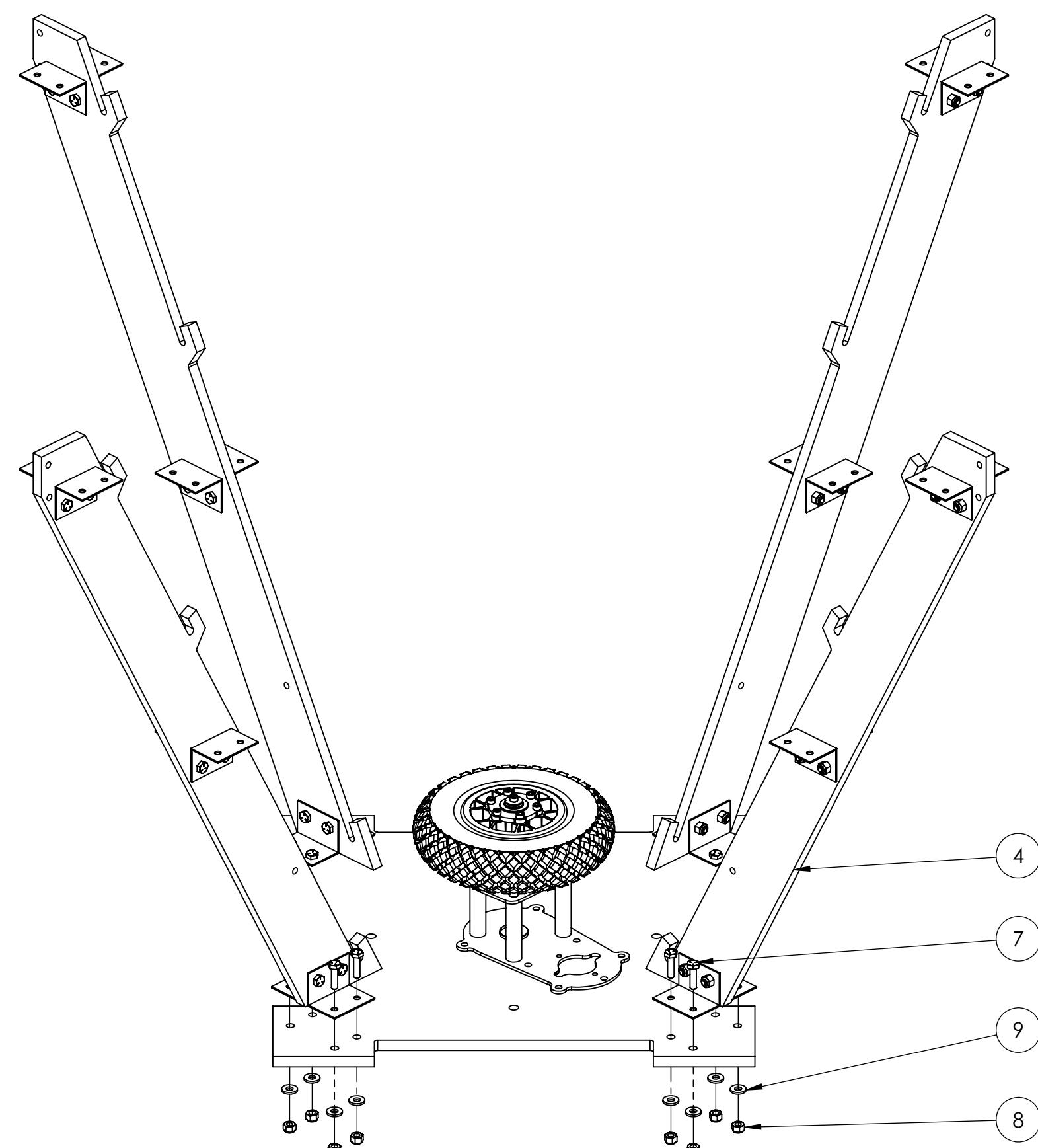
TITLE: Hub - Complex Build -
Upper Hub Assembly
AM Agitator AM-4673

SIZE DWG. NO. REV
C TE-22190-AMPassive

SCALE: 1:8 SHEET 2 OF 5



Step 2



1. Align 4x 4 to Step 1, as shown.
2. Connect using 4x 7, 4x 9, and 4x 8 per 4 .

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DIMENSIONS ARE IN INCHES		DRAWN	CO	1/3/2022
PROPRIETARY AND CONFIDENTIAL				
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV	
	C	TE-22190-AMPassive		
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING		SCALE: 1:5	SHEET 3 OF 5	

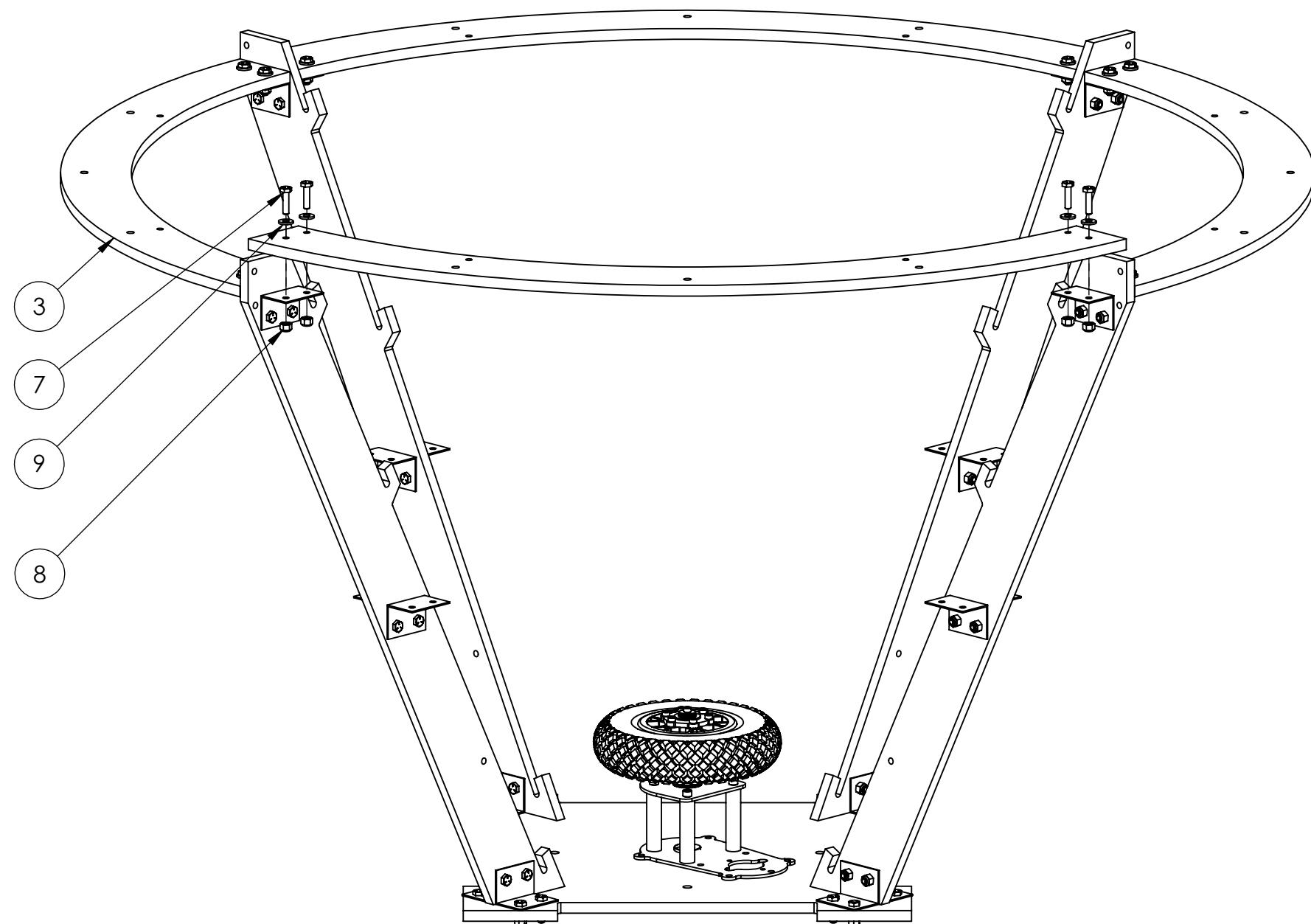
FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Assembly
AM Agitator AM-4673

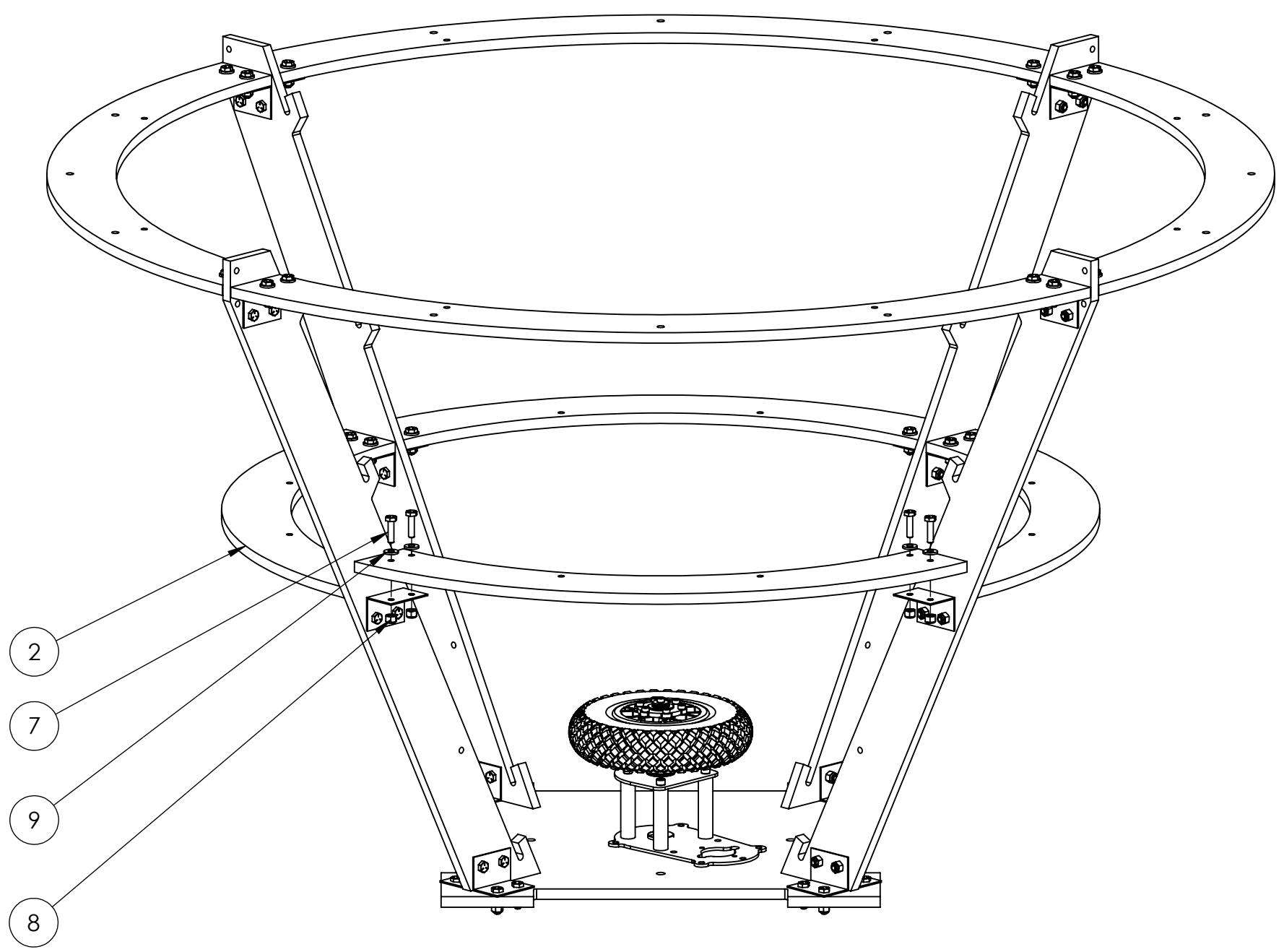
SIZE DWG. NO. REV
C TE-22190-AMPassive

Step 3



1. Align 4x (3) to Step 2, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (3).

Step 4



1. Align 4x (2) to Step 3, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (2).

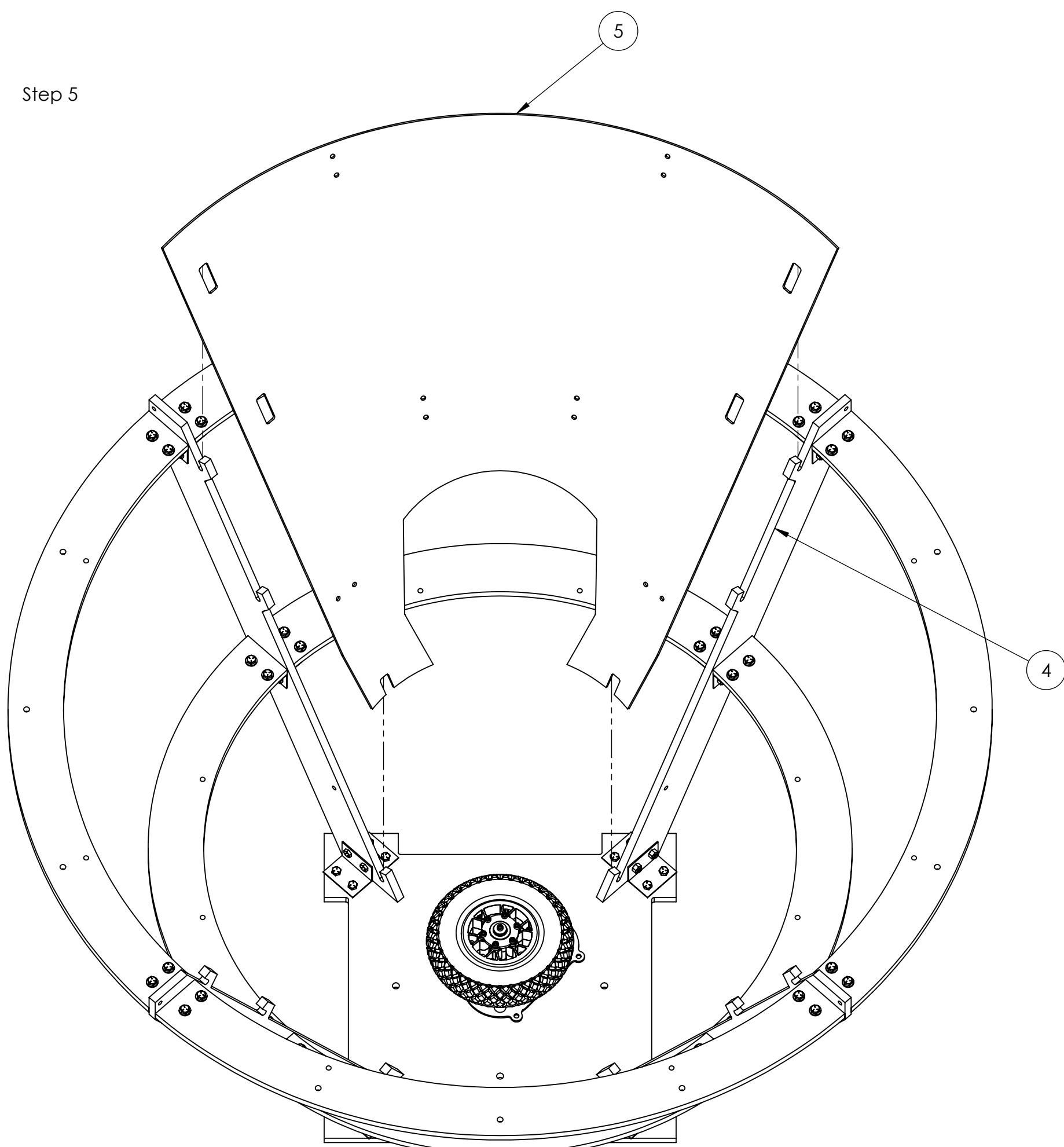
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	TEAM	NAME	DATE
	DRAWN	CO	1/3/2022
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

TITLE: Hub - Complex Build - Upper Hub Assembly AM Agitator AM-4673

SIZE DWG. NO. REV
C TE-22190-AMPassive

SCALE: 1:6 **SHEET** 4 OF 5

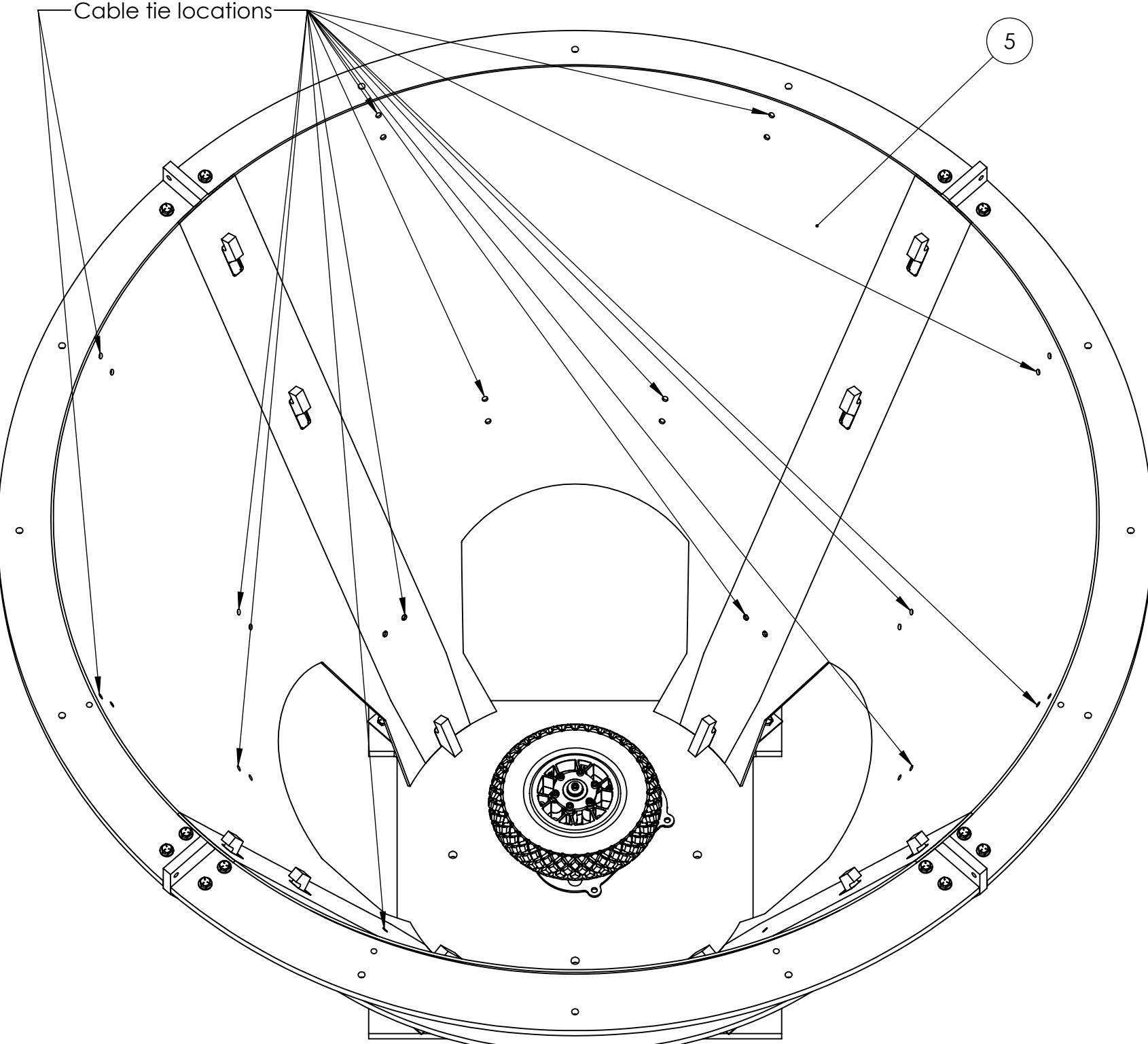


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1. Continue the process described in Step 4 by working around in a circular pattern until there is a total of 4x 5 installed. The orientation of overlaps should not matter (i.e. there is no need to worry about installing in a clockwise or counterclockwise manner). Note: It will be more difficult to seat 5 in overlapped locations - the final piece will be the most difficult.
2. Secure 5 to assembly using 20x 50 lb cable ties, as shown.

1. Align 1x 5 to Step 3. Do this by bending 5 while lowering into position. The rectangular cutouts (6x) in 5 need to align with hooks on 4. Note: It will be helpful to have multiple people to help with alignment.
2. Press 5 down firmly to ensure it is fully seated.

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DRAWN	CO	1/3/2022	
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
 FIRST ROBOTICS COMPETITION  SOLIDWORKS Modeling Solutions Partner			
TITLE: Hub - Complex Build - Upper Hub Assembly AM Agitator AM-4673			
SIZE DWG. NO. REV			
C TE-22190-AMPassive			
SCALE: 1:6 SHEET 5 OF 5			

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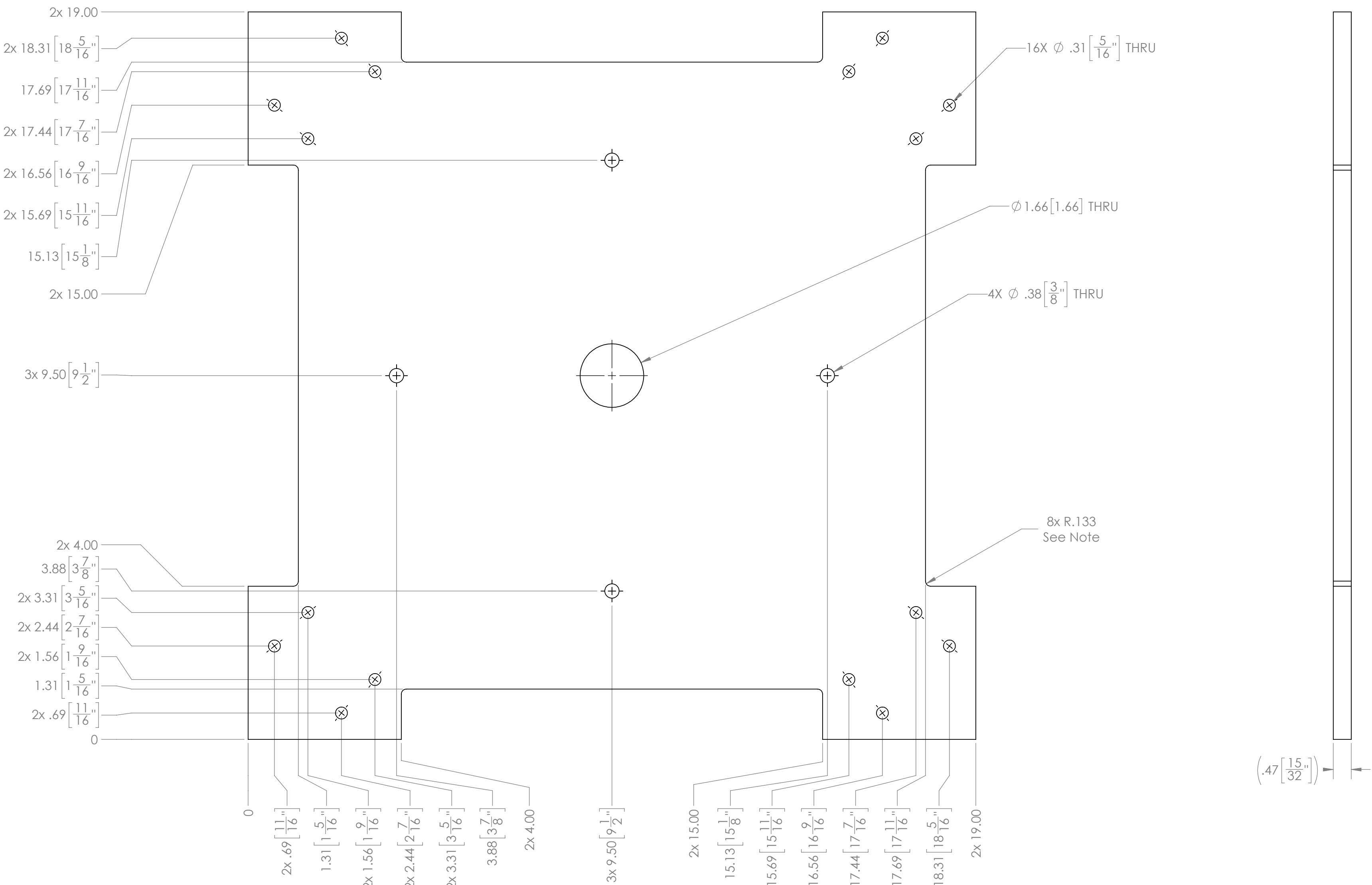
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DRAWN	CO	12/31/2021	
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH: 1/2" Plywood			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hub - Complex Build -
Upper Hub Base

SIZE DWG. NO. REV

C TE-22191

SCALE: 1:2 SHEET 1 OF 1

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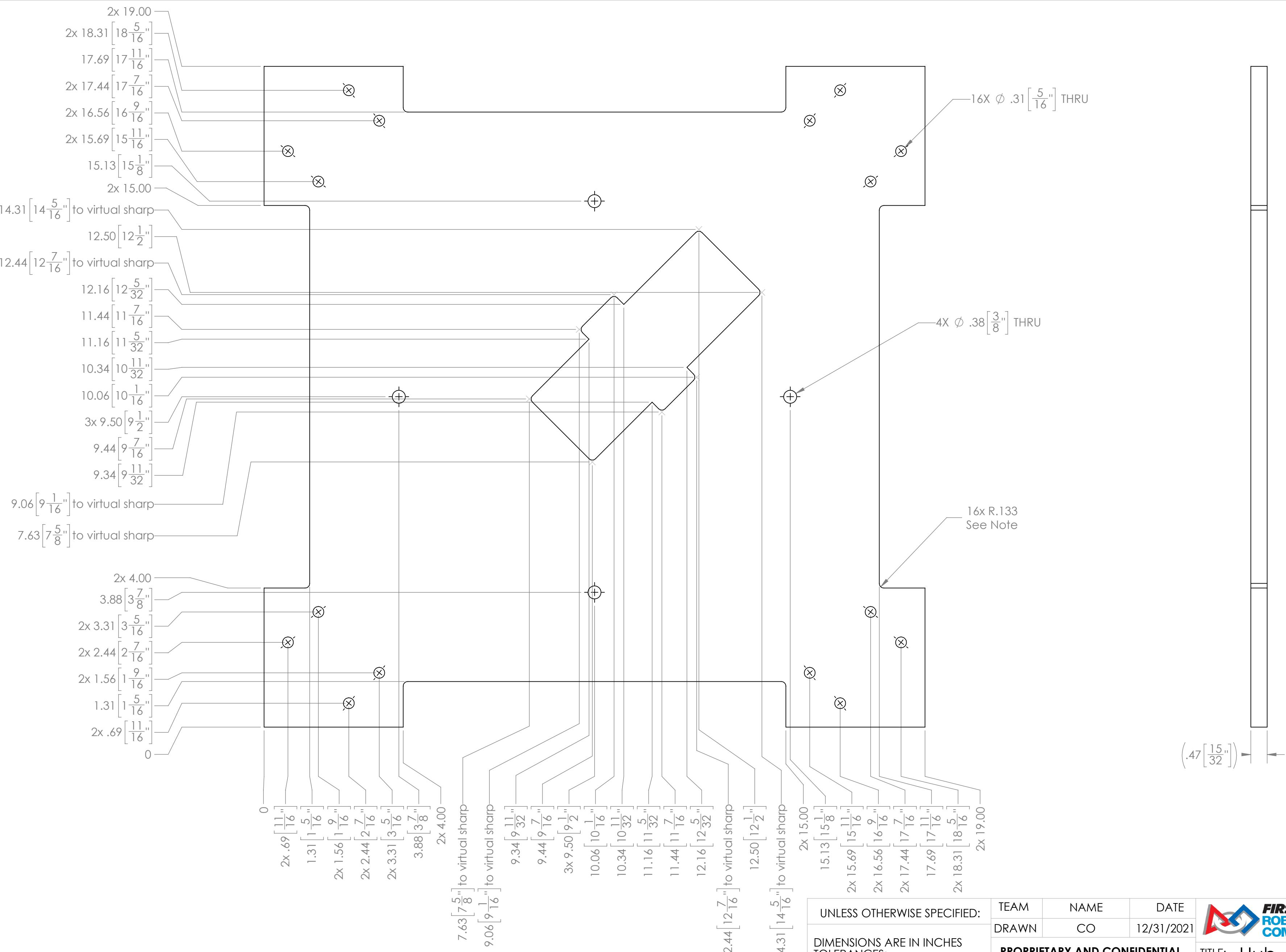
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MATERIAL/FINISH: 1/2" Plywood			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
SIZE		DWG. NO.	REV
C		TE-22191-AMActive	
SCALE: 1:2		SHEET 1 OF 1	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Base for
AM Agitator AM-4674

SIZE DWG. NO. REV
C TE-22191-AMActive

SCALE: 1:2 SHEET 1 OF 1

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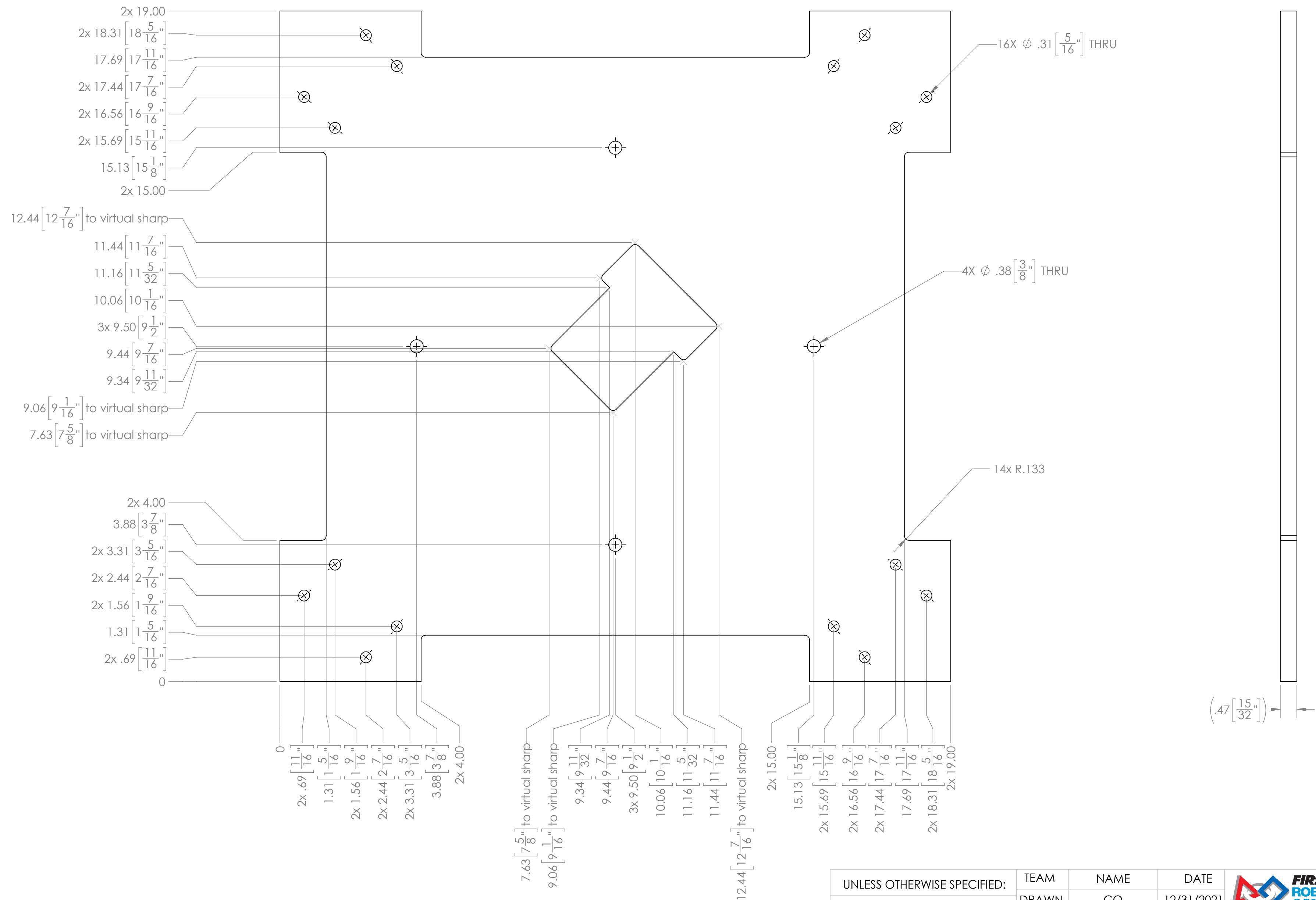
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DRAWN	CO	12/31/2021	
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MATERIAL/FINISH: 1/2" Plywood			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
SIZE DWG. NO.		REV	
C TE-22191-AMPassive			
SCALE: 1:2		SHEET 1 OF 1	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Base for
AM Agitator AM-4673

SIZE DWG. NO.

C TE-22191-AMPassive

SCALE: 1:2 SHEET 1 OF 1

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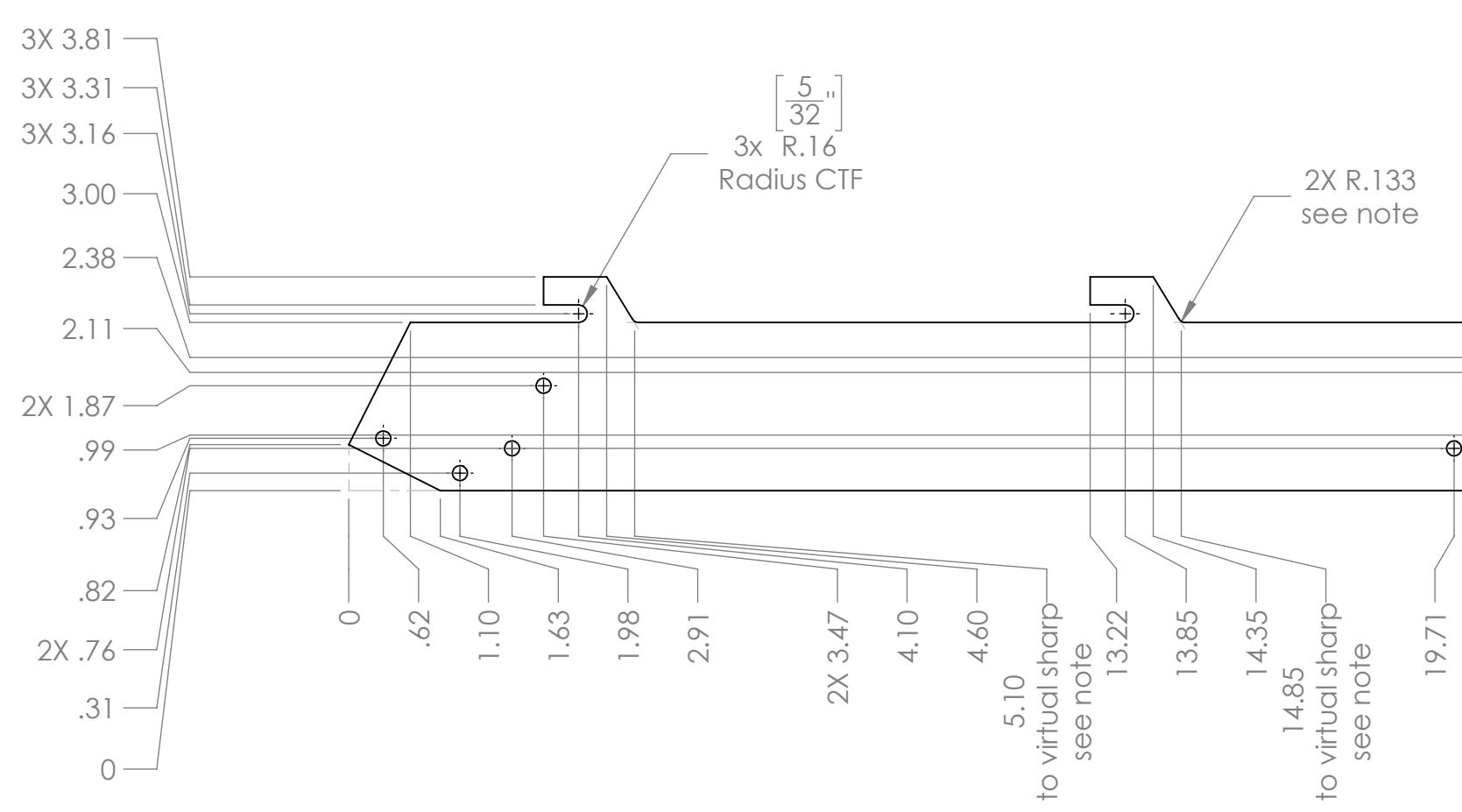
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Notes:
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DRAWN	KAMC	12/21/2021	
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MATERIAL/FINISH:	1/2" Plywood		
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
FIRST ROBOTICS COMPETITION	SOLIDWORKS Modeling Solutions Partner		
TITLE: Hub - Complex Build - Upper Hub Vertical Support			
SIZE	DWG. NO.	REV	
C	TE-22192		
SCALE: 1:3		SHEET 1 OF 1	

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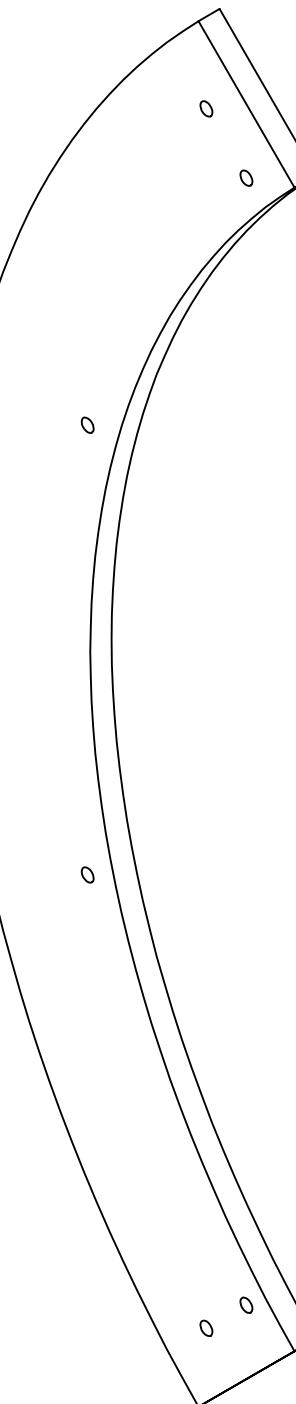
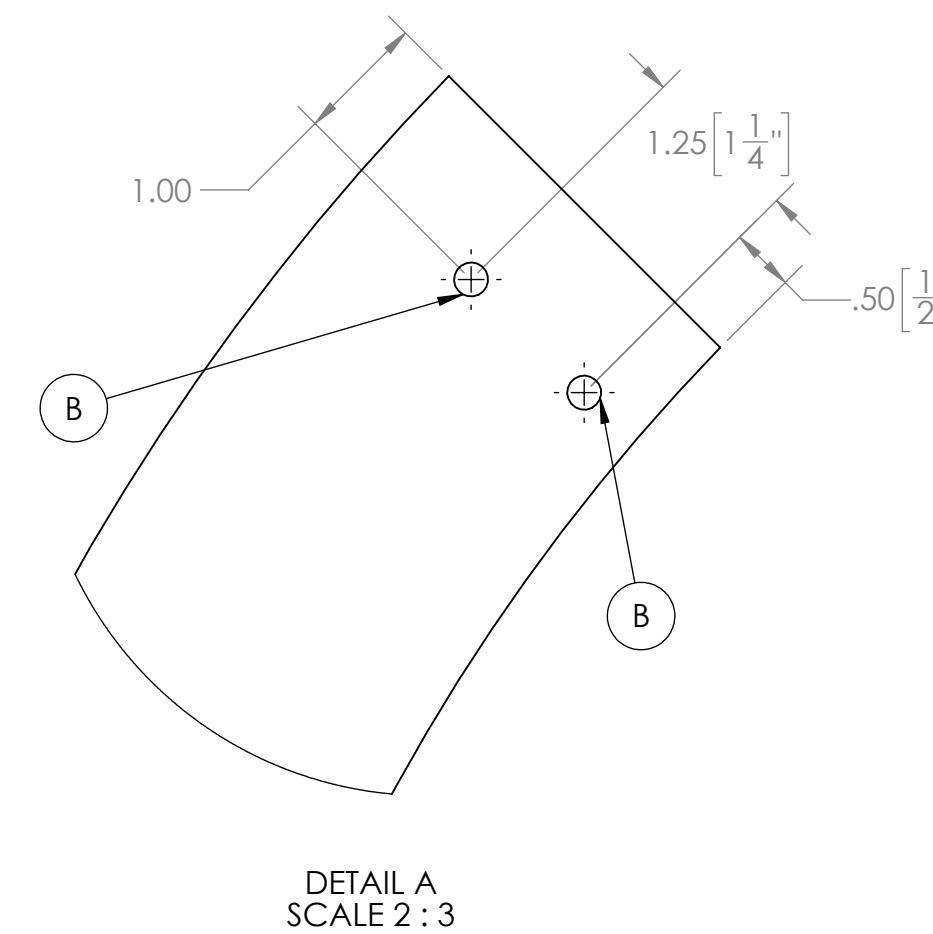
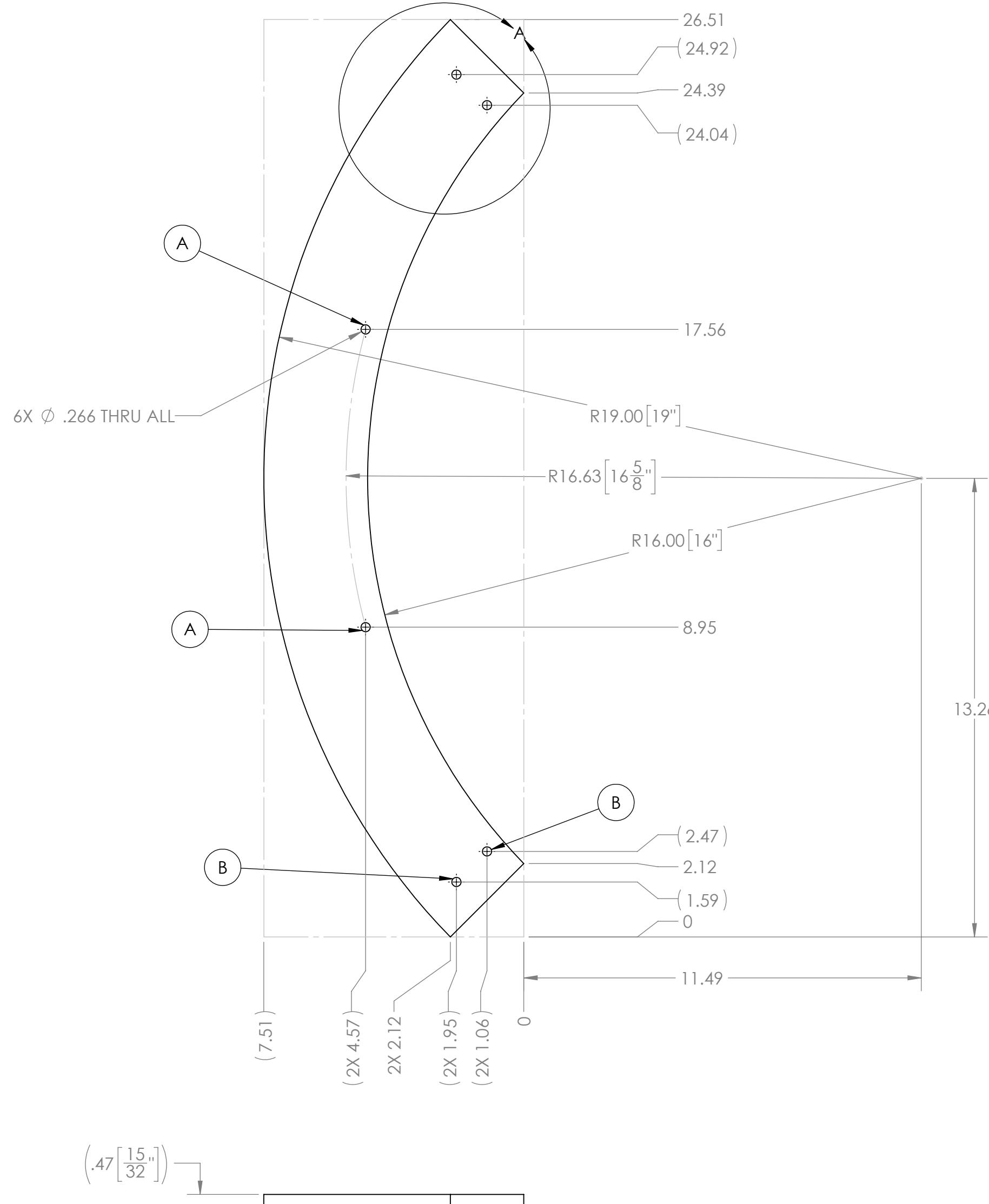
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Notes:

- Holes noted with (A) are used for cable ties that attach TE-22197. Consider match drilling, locations do not need to be precise.
- Holes noted with (B) are for connection to TE-22196.

UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	KAMC	12/21/2021
PROPRIETARY AND CONFIDENTIAL					
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MATERIAL/FINISH:	1/2" Plywood				
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING					

FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

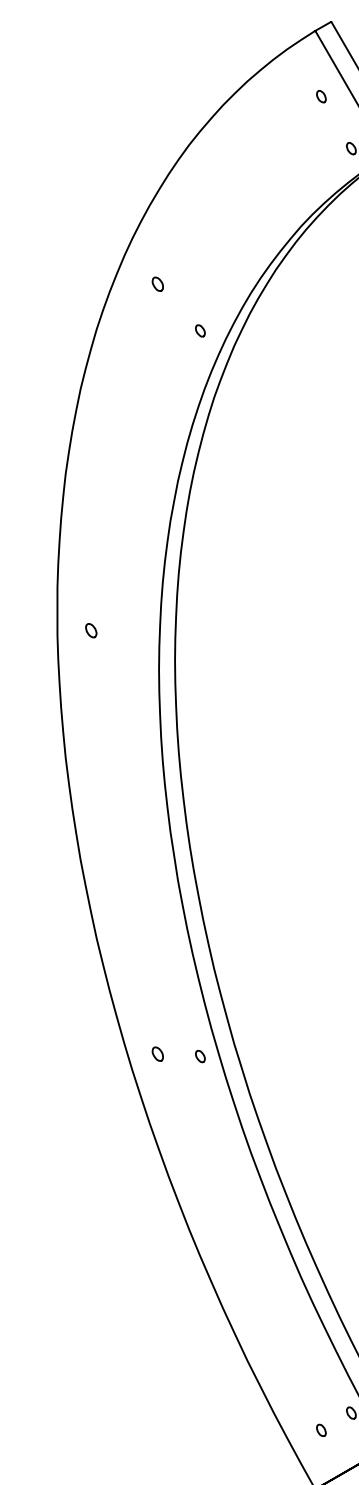
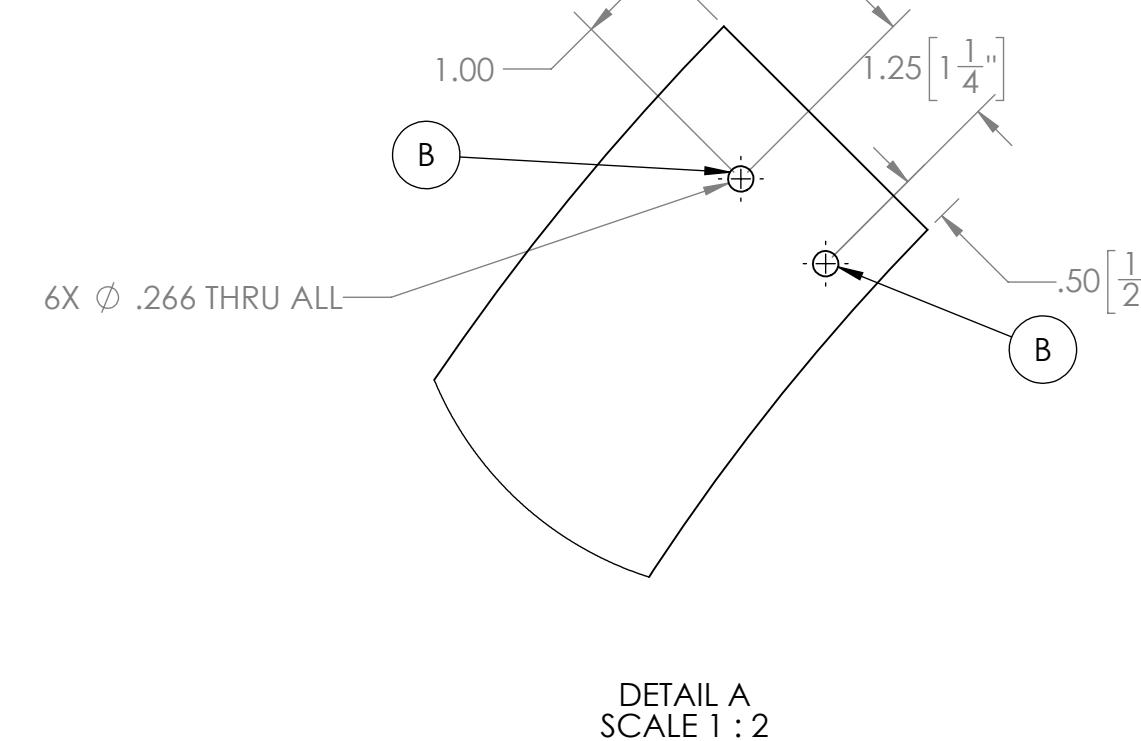
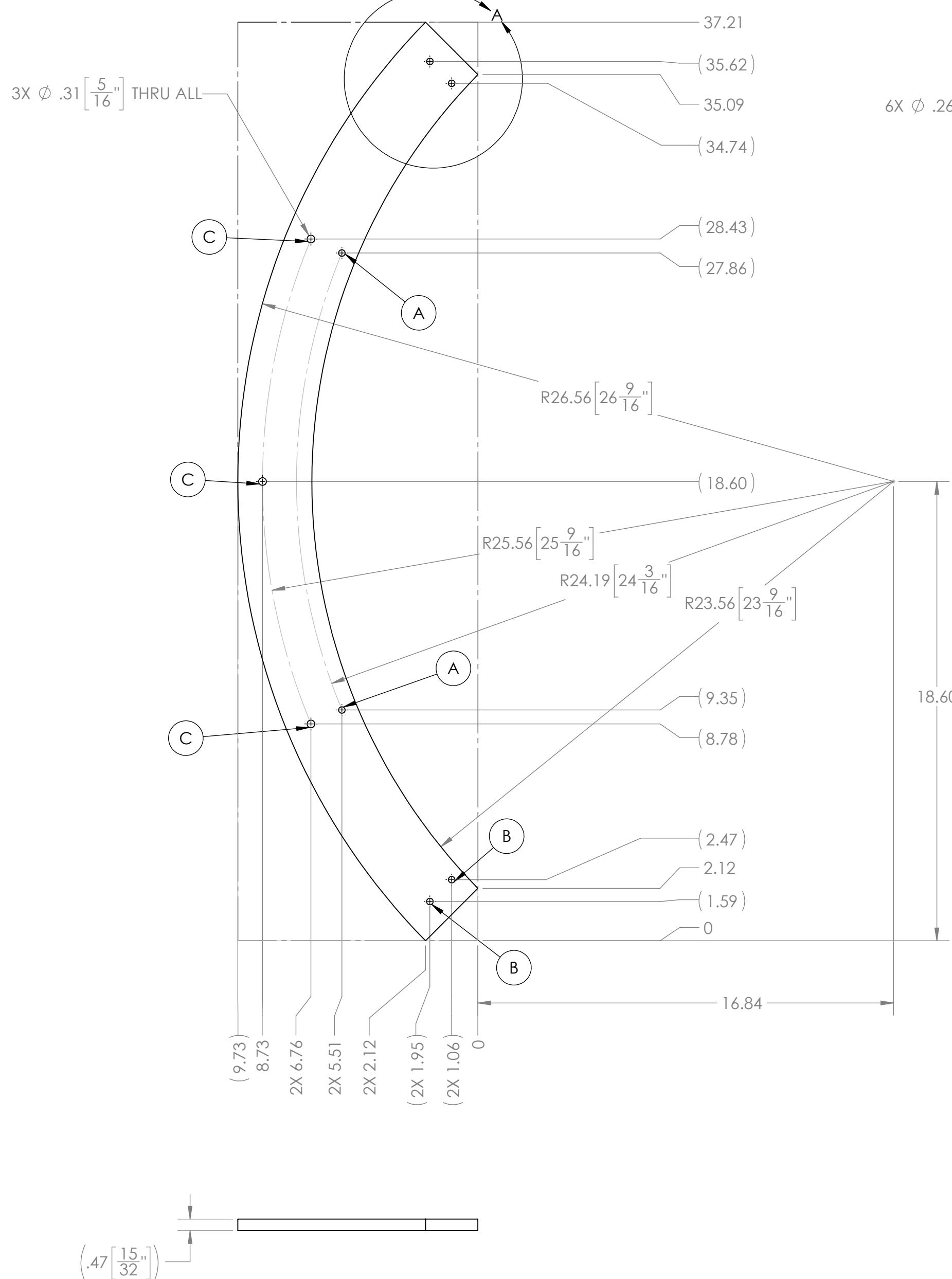
TITLE: Hub - Complex Build - Upper Hub Lower Ring

SIZE DWG. NO. REV

C TE-22193

SCALE: 1:3 **SHEET** 1 OF 1

D



Notes:

- Holes noted with (A) are used for cable ties that attach TE-22197. Consider match drilling, locations do not need to be precise.
- Holes noted with (B) are for connection to TE-22196.
- Holes noted with (C) are used to connect TE-22200. Consider locating one hole, and match drilling remaining.

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	KAMC	12/21/2021
TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$				
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/FINISH:	1/2" Plywood			
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING				

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hub - Complex Build -
Upper Hub Upper Ring

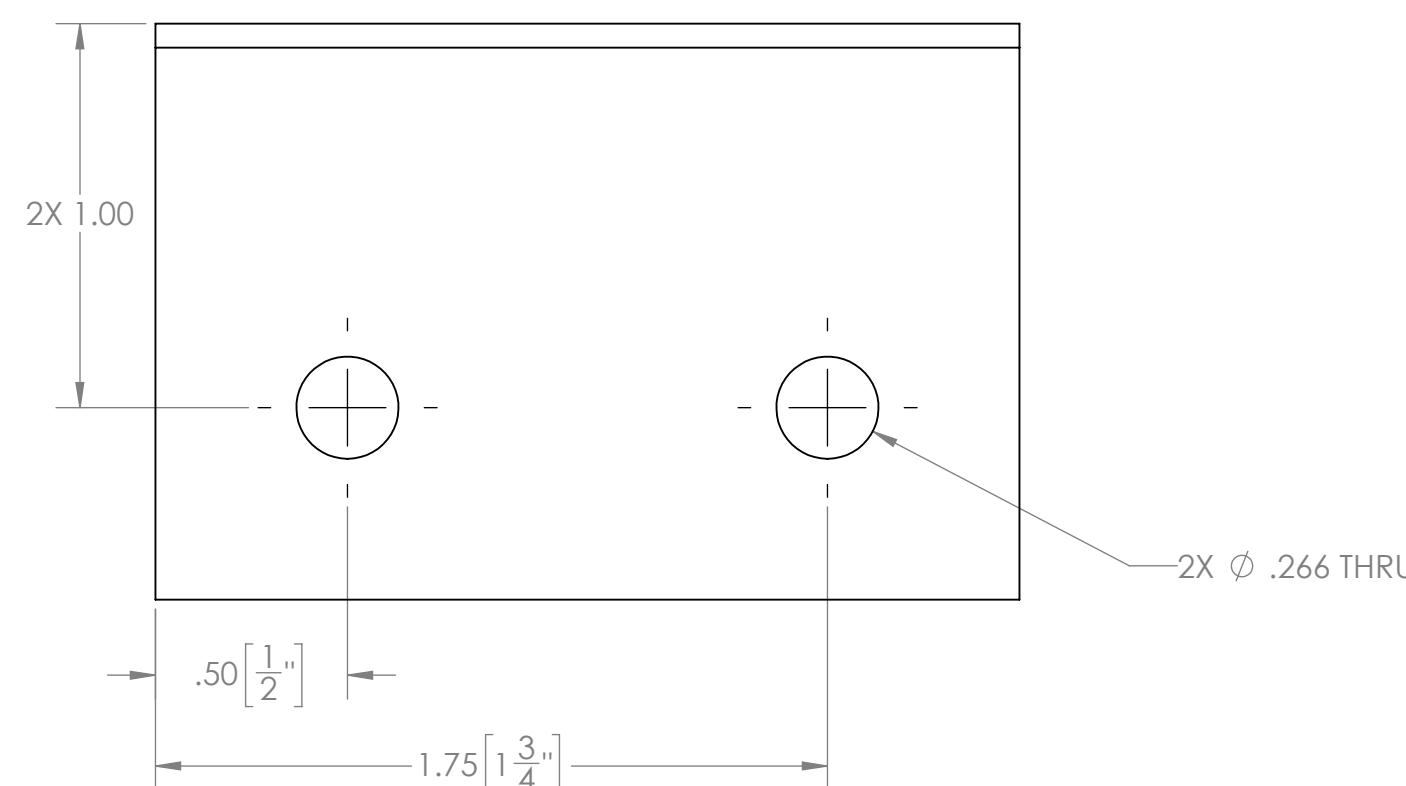
SIZE DWG. NO. REV

C TE-22194

SCALE: 1:4 SHEET 1 OF 1

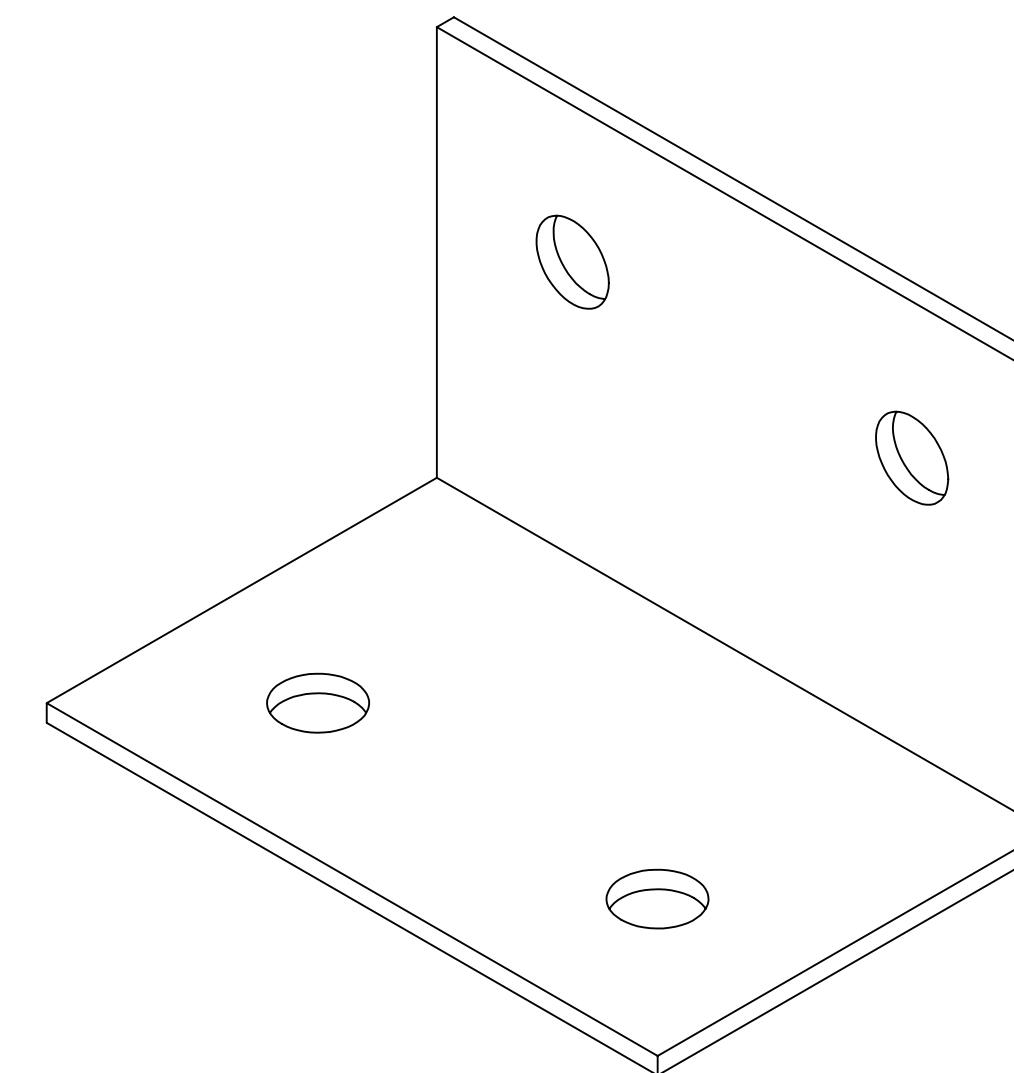
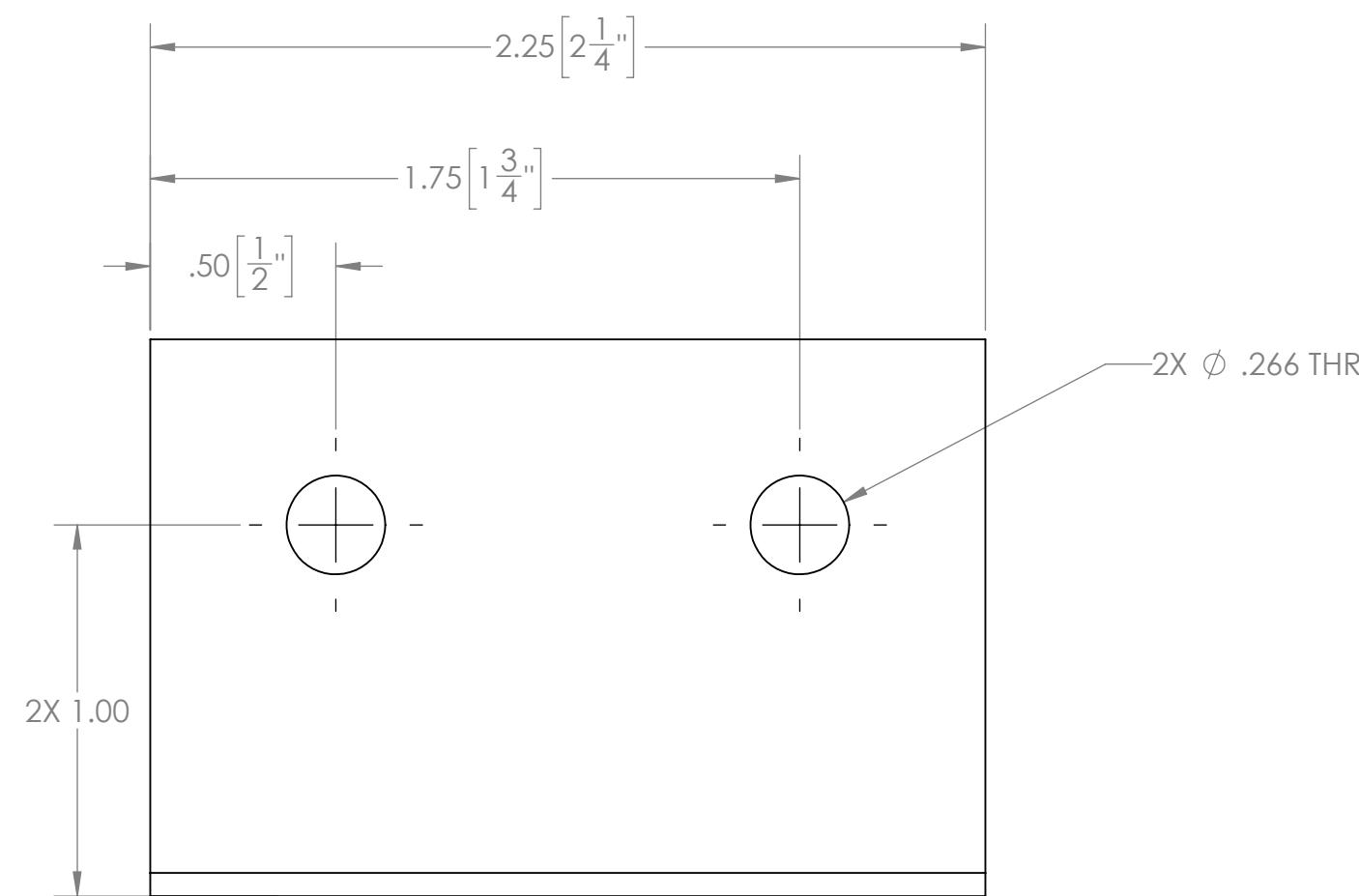
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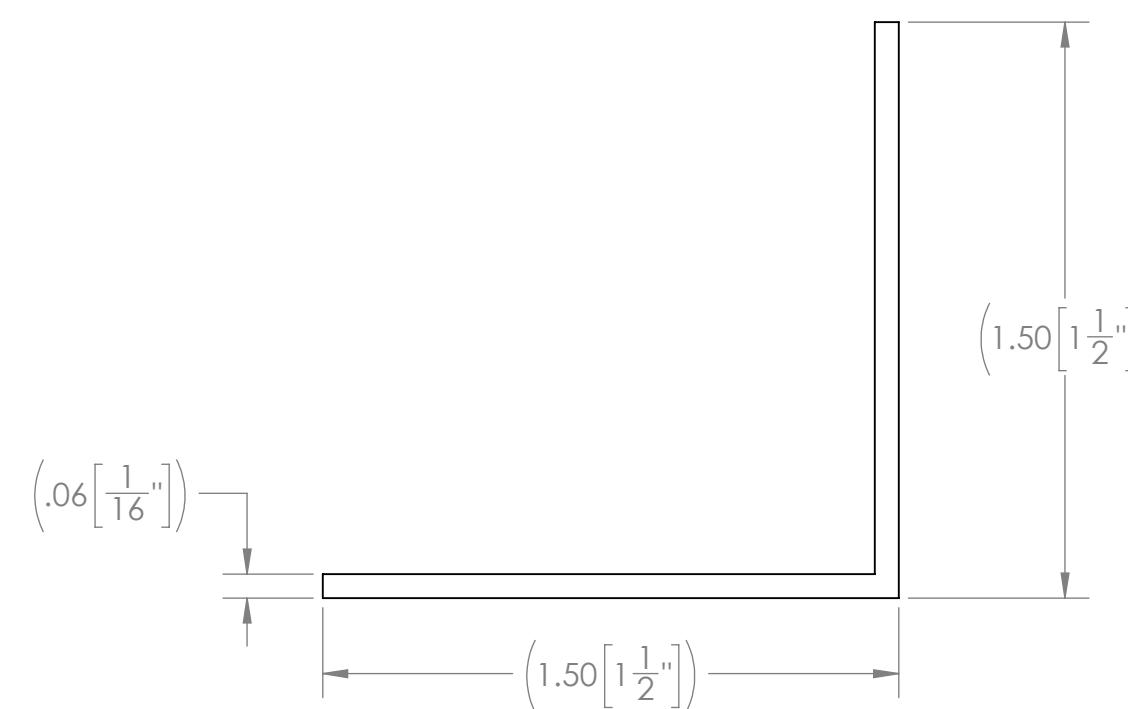
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UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	KAMC	12/21/2021
PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH: 1 1/2" x 1 1/2" x 1/16" Aluminum Angle			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST[®] ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Vertical
Support Bracket

SIZE DWG. NO. REV
C TE-22195

SCALE: 2:1 SHEET 1 OF 1

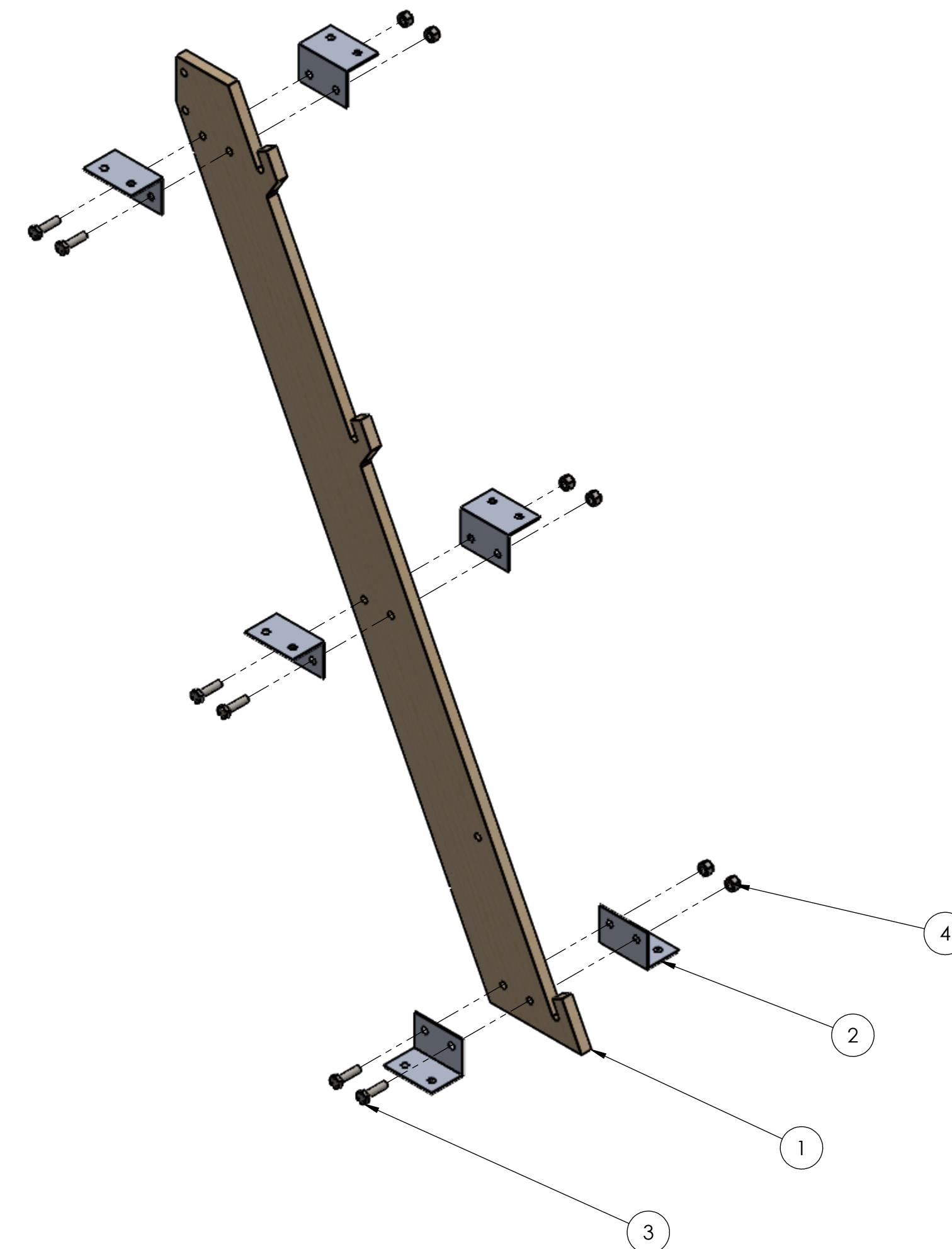
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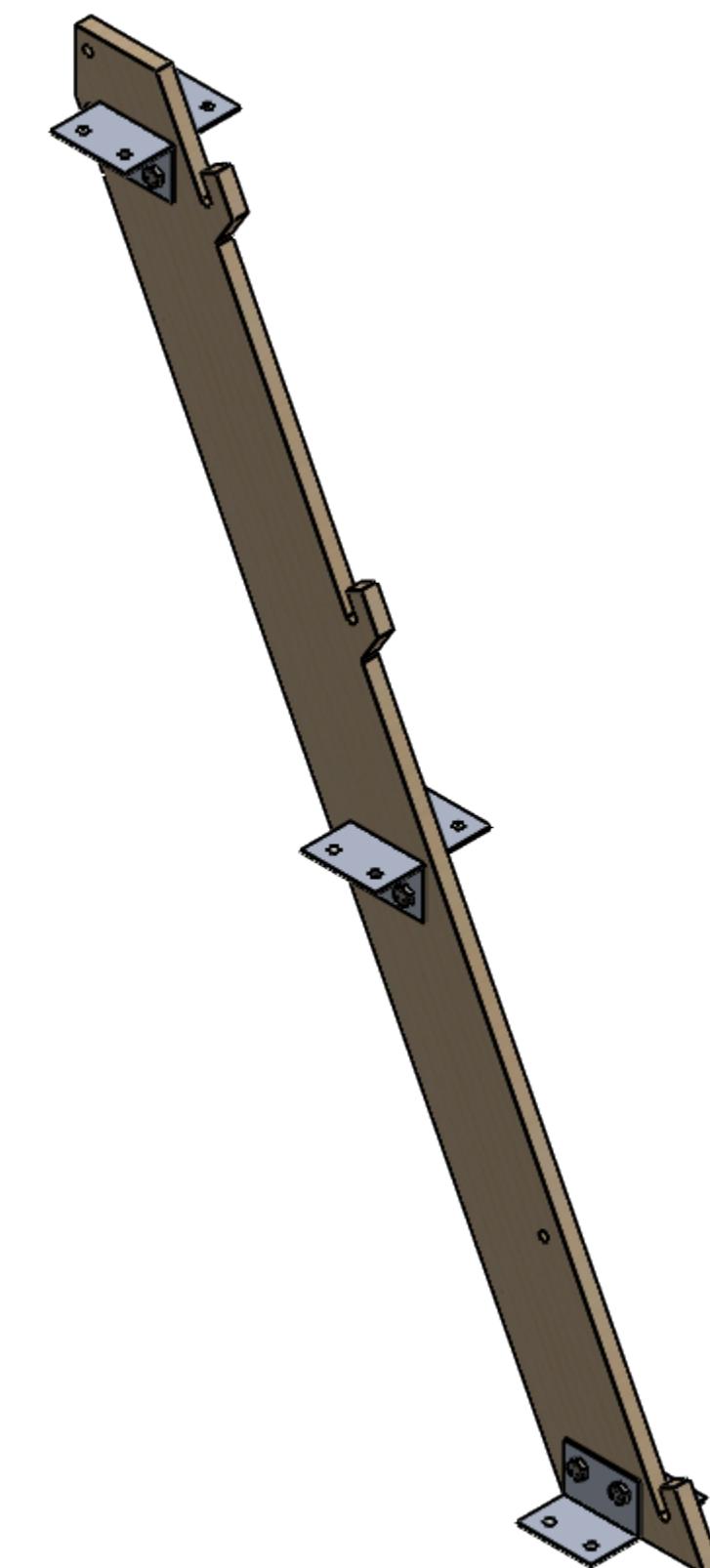
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Step 1:

1. Attach 6x (2) to (1) using 6x (3) and 6x (4). as shown. Note orientation of (2).



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
 ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
 TWO PLACE DECIMAL $\pm .13$
 THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22192	Hub - Complex Build - Upper Hub Vertical Support	1
2	TE-22195	Hub - Complex Build - Upper Hub Vertical Support Bracket	6
3	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	6
4	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	6

TEAM	NAME	DATE
DRAWN	KAMC	12/22/2021

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COMMENTS:
REMOVE ALL BURRS AND SHARP EDGES.

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ROBOTICS
COMPETITION** DS SOLIDWORKS
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TITLE: Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly

SIZE DWG. NO. REV

C TE-22196

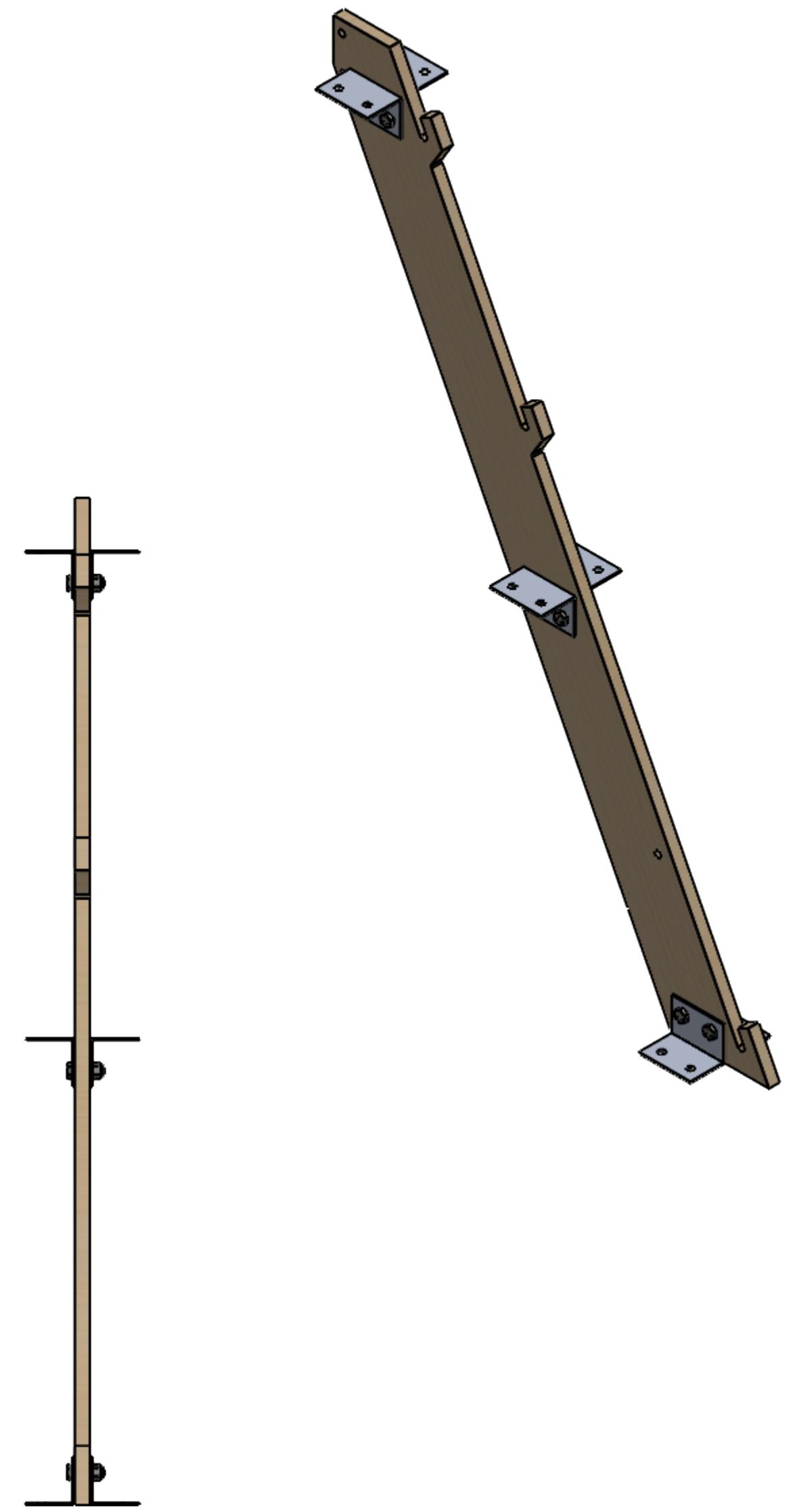
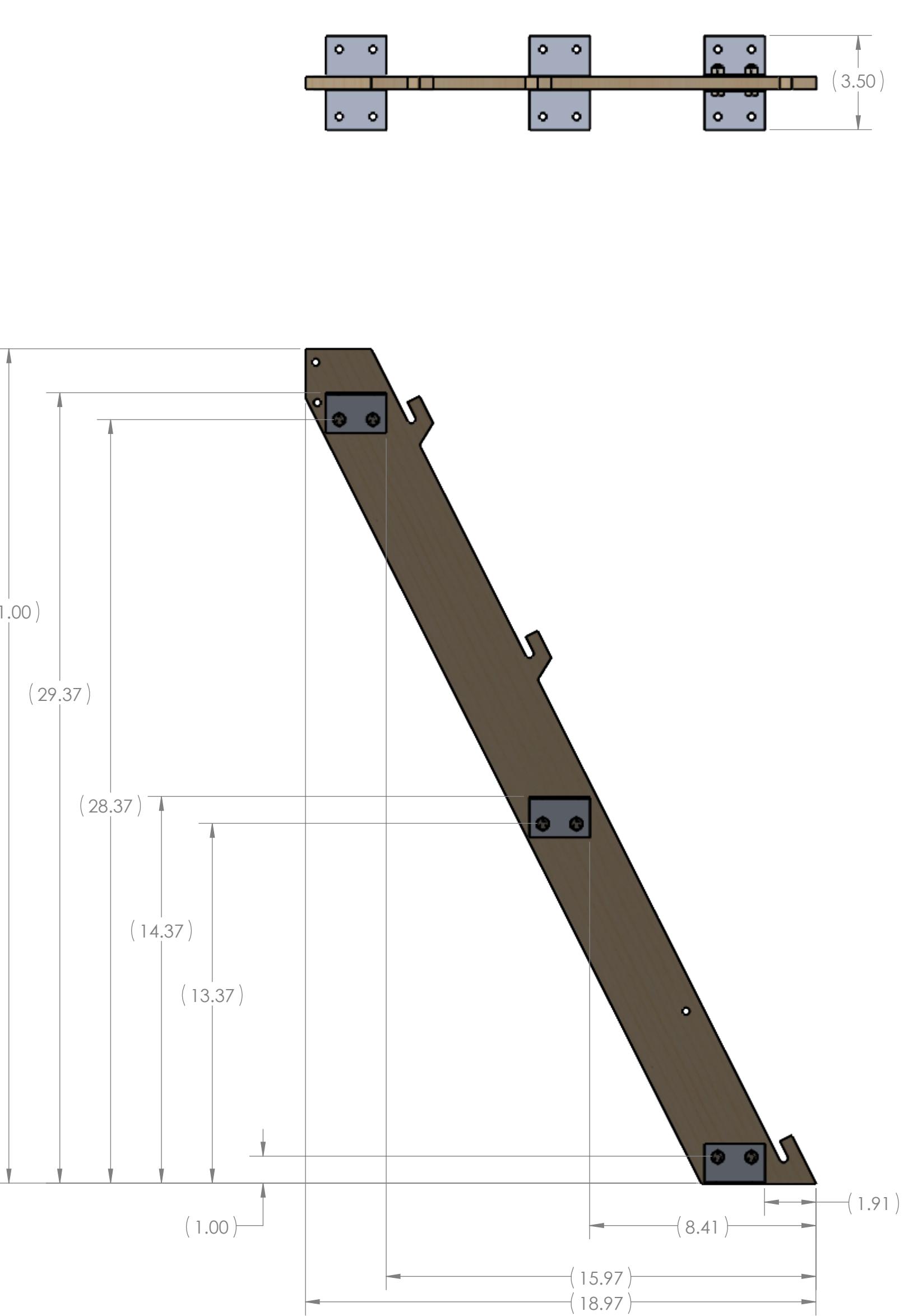
SCALE: 1:4 SHEET 1 OF 2

4

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DRAWN	KAMC	12/22/2021	
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build -
Upper Hub Vertical
Support and Bracket
Assembly

SIZE DWG. NO. REV

C TE-22196

SCALE: 1:4 SHEET 2 OF 2

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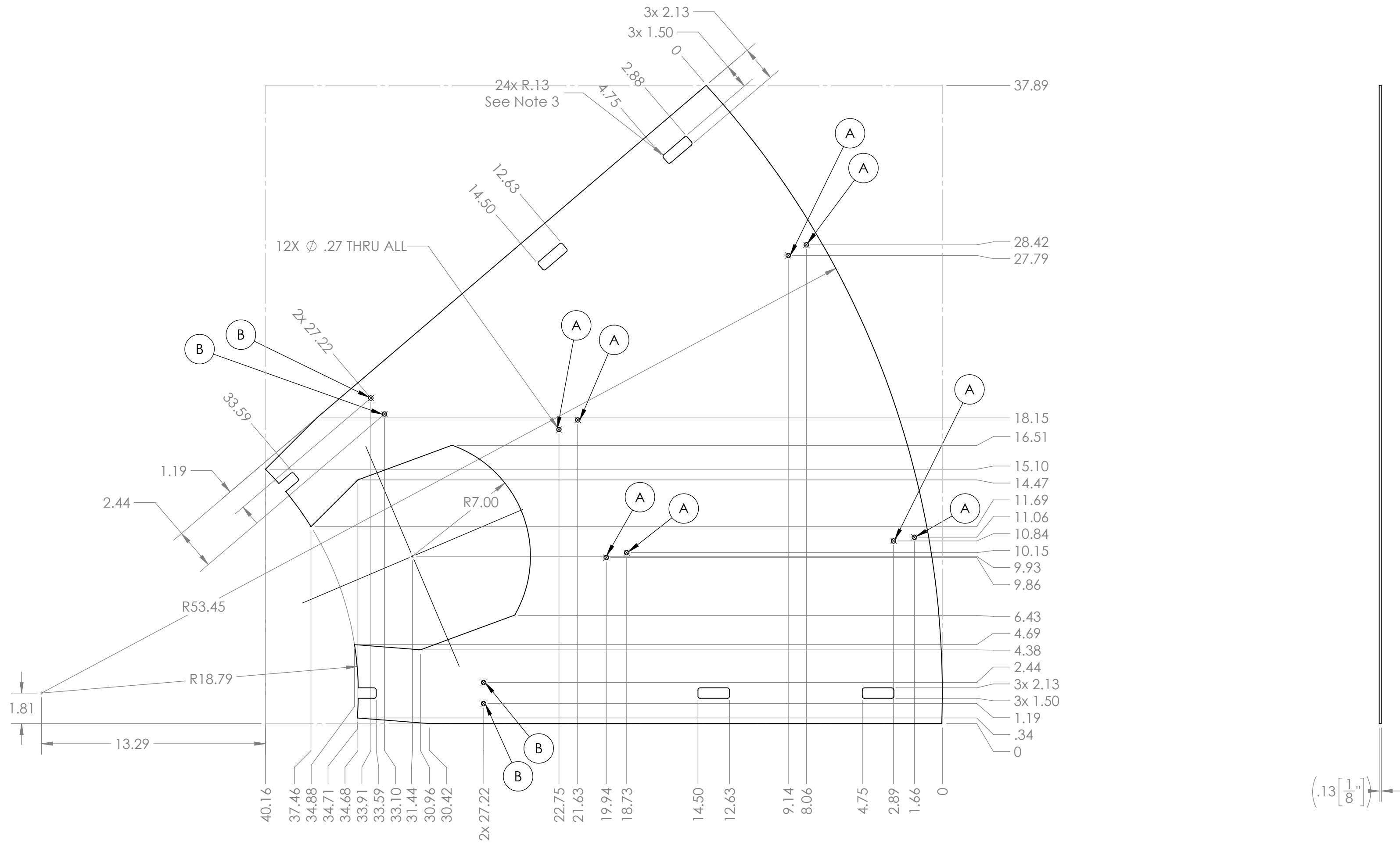
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Notes:

1. Holes labeled (A) are used for cable ties to attach this piece to TE-22193 and TE-22194. Consider match drilling, locations do not need to be precise.
2. Holes labeled (B) are for cable ties that tie adjacent pieces of TE-22197 to each other and to TE-22196.
3. Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:	VEND	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	CO	6/28/2021
TOLERANCES:			
FRACTIONAL $\pm 1/16$			
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .01$			
THREE PLACE DECIMAL $\pm .005$			
MATERIAL/FINISH:			
1/8" thk. Polycarbonate, Clear			
COMMENTS:			
REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

 FIRST
ROBOTICS
COMPETITION

 SOLIDWORKS
Modeling Solutions Partner

TITLE: Hub - Complex Build - Upper Hub Plastic
SIZE DWG. NO. REV
C TE-22197

SCALE: 1:5 SHEET 1 OF 1

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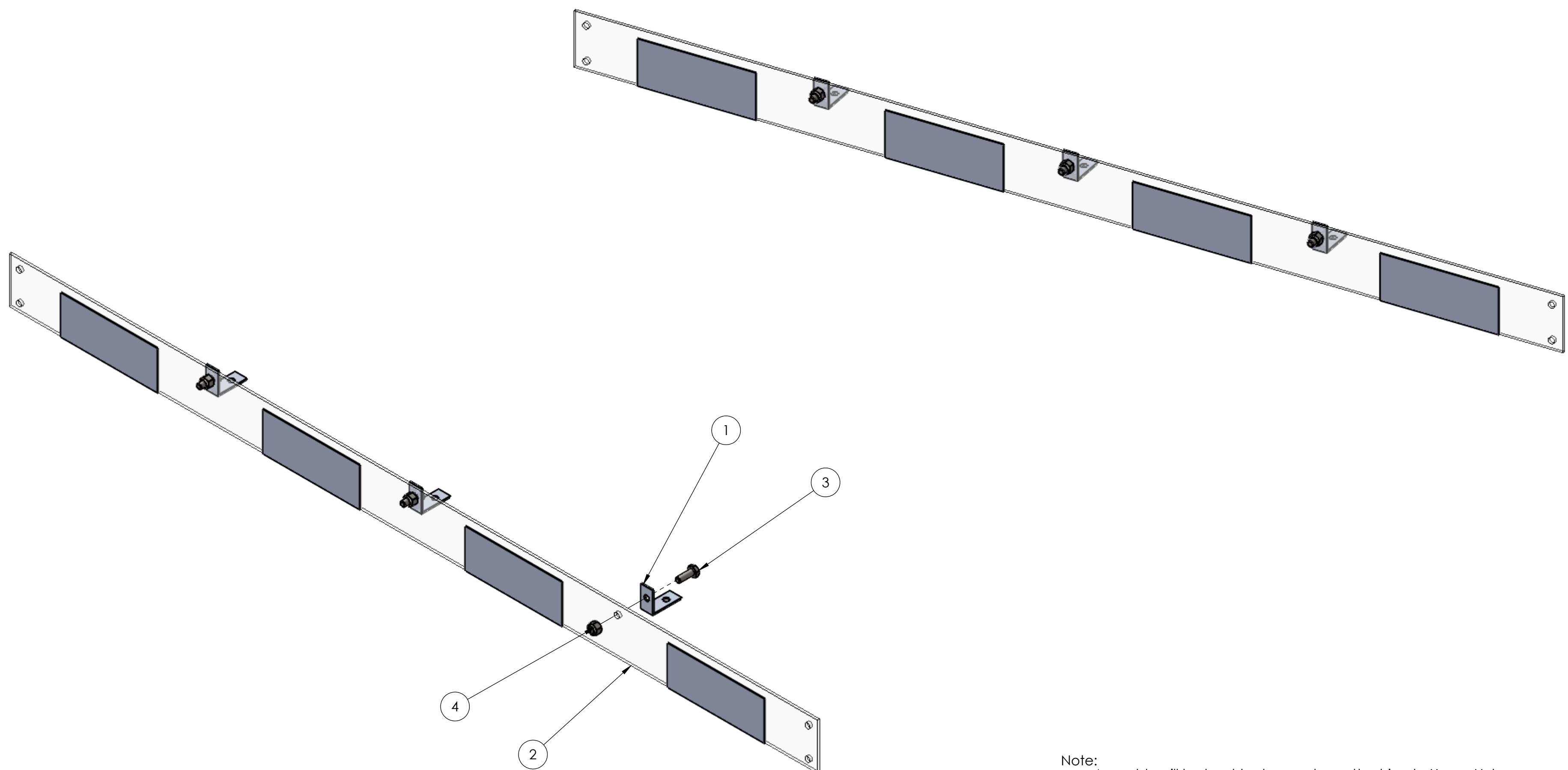
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Note:
Assembly will be bent to shape when attaching to Upper Hub.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22202	Hub - Complex Build - Upper Hub Vision Ring Bracket	3
2	TE-22203	Hub - Complex Build - Vision Ring with Target Assembly	1
3	hex_.25_20_0.75	Steel Hex Head Screw, 1/4"-20 x 0.75" long, fully threaded	3
4	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	3

Step 1:

1. Attach (1) to (2) using (3) and (4), as shown. Ensure the connection is slightly loose to allow for ease of assembly in future step.

Note that (1) should be on face opposite of vision tape.

UNLESS OTHERWISE SPECIFIED:			TEAM	NAME	DATE
			DRAWN	CO	12/31/2021
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$					
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MATERIAL/FINISH:					
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.					
DO NOT SCALE DRAWING					

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hub - Complex Build -
Upper Hub Vision
Assembly

SIZE DWG. NO. REV
C TE-22200

SCALE: 1:3 SHEET 1 OF 2

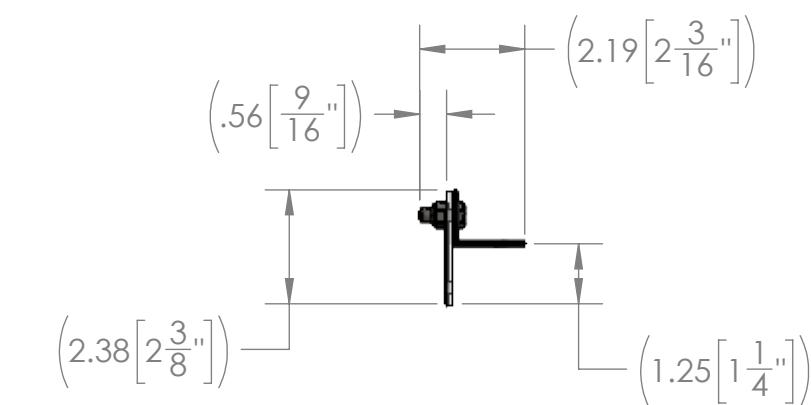
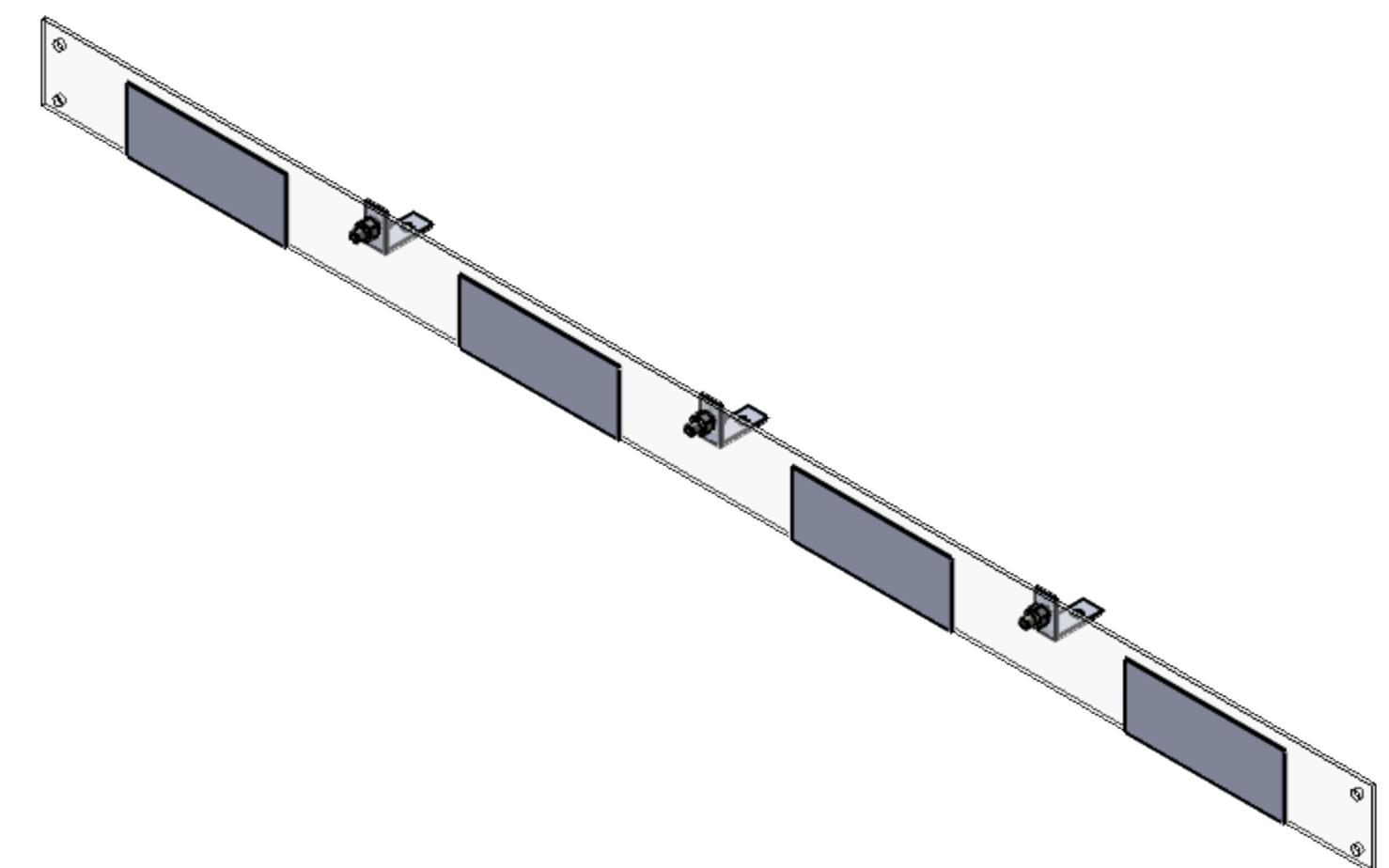
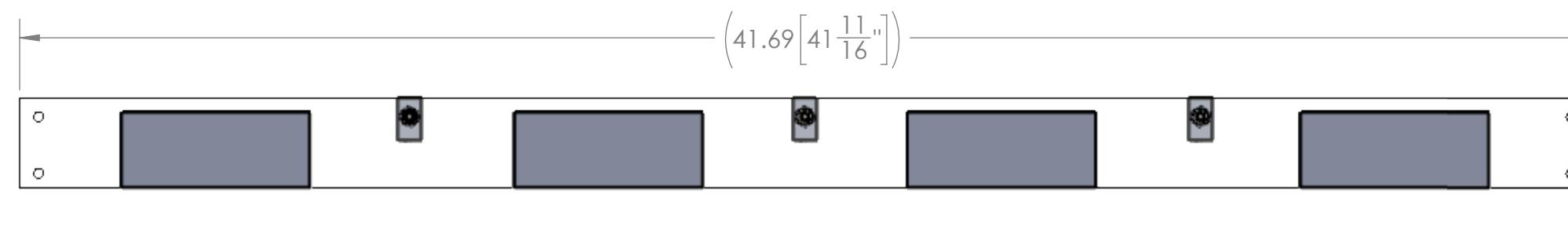
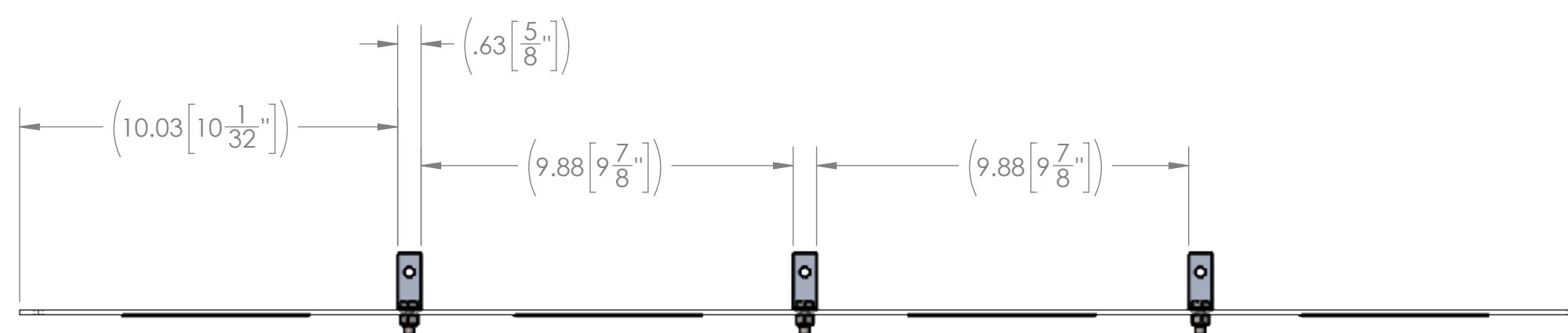
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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

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DRAWN CO 12/31/2021

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EDGES.**FIRST[®] ROBOTICS COMPETITION** DS SOLIDWORKS
Modeling Solutions PartnerTITLE: Hub - Complex Build -
Upper Hub Vision
Assembly

SIZE DWG. NO. REV

C TE-22200

SCALE: 1:4 SHEET 2 OF 2

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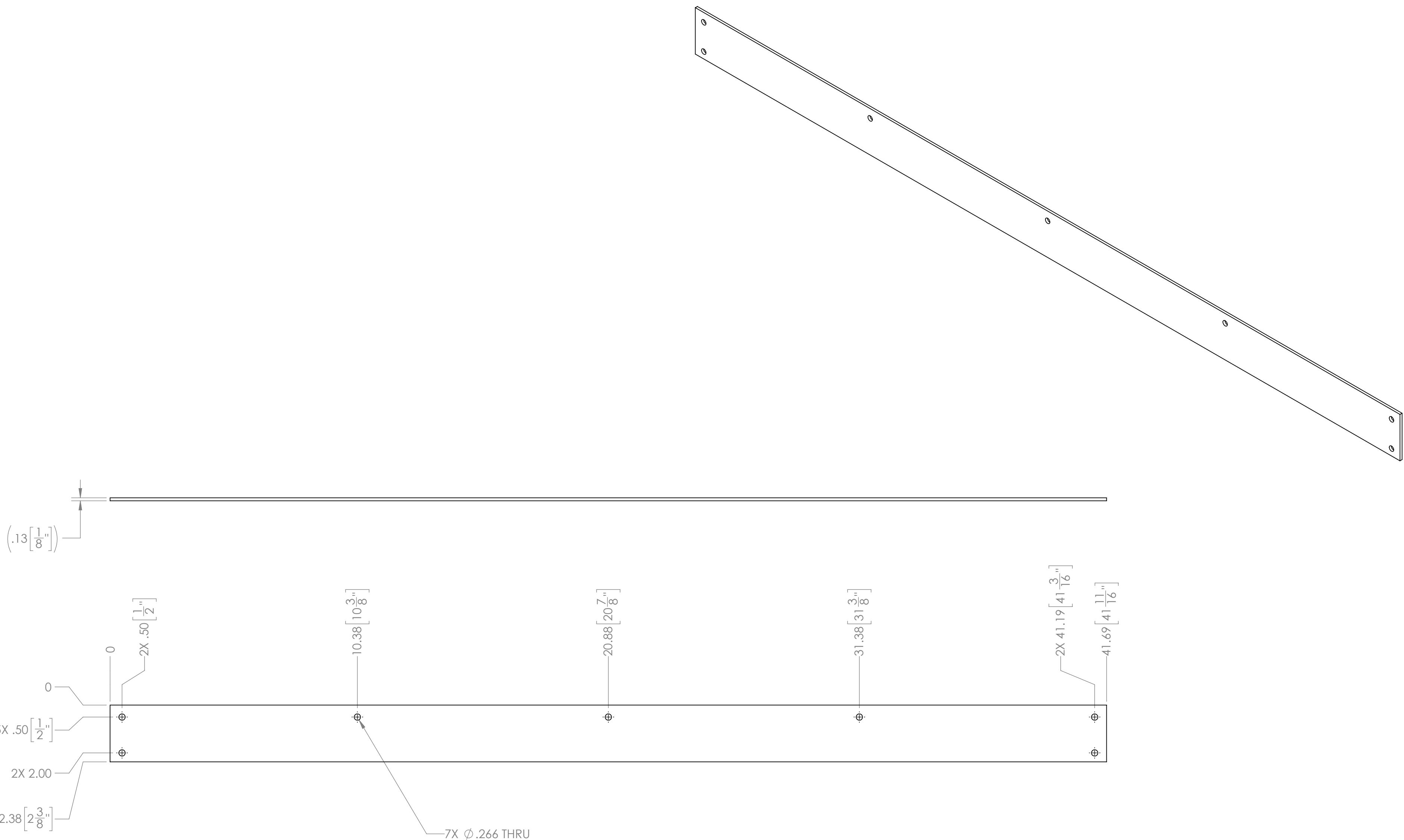
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PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:			
1/8" thk. Polycarbonate, Clear			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hub - Complex Build -
Upper Hub Vision Ring
Plastic

SIZE DWG. NO. REV
C TE-22201

SCALE: 1:3 SHEET 1 OF 1

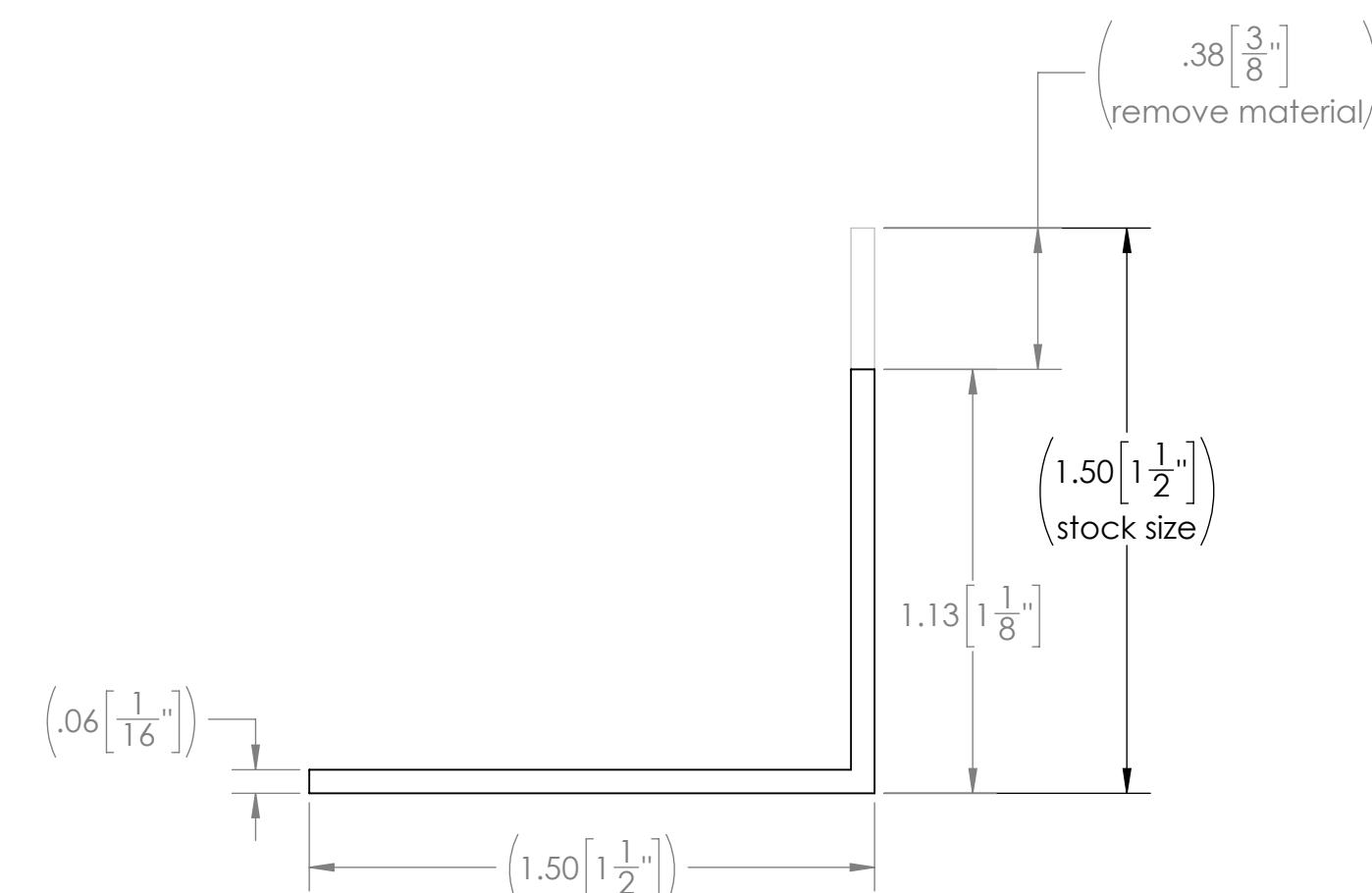
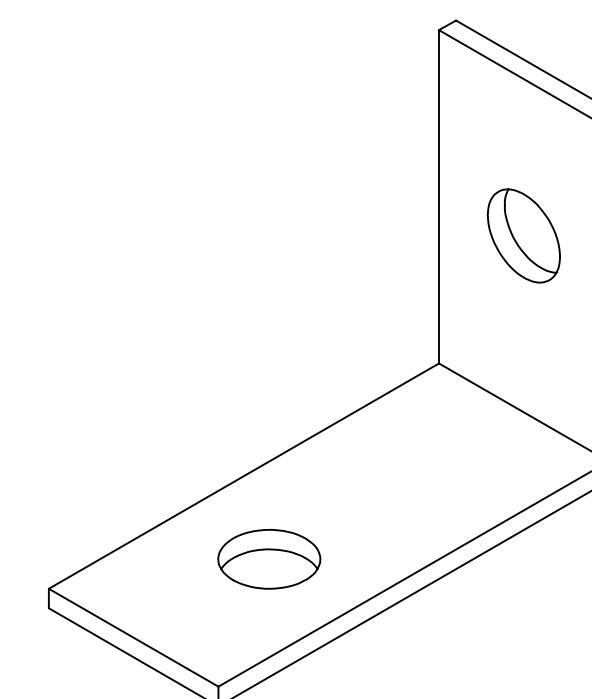
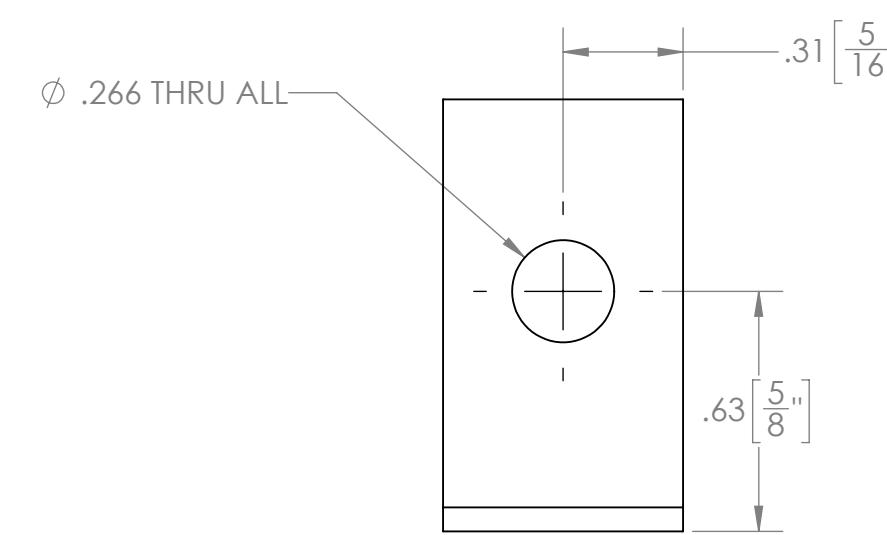
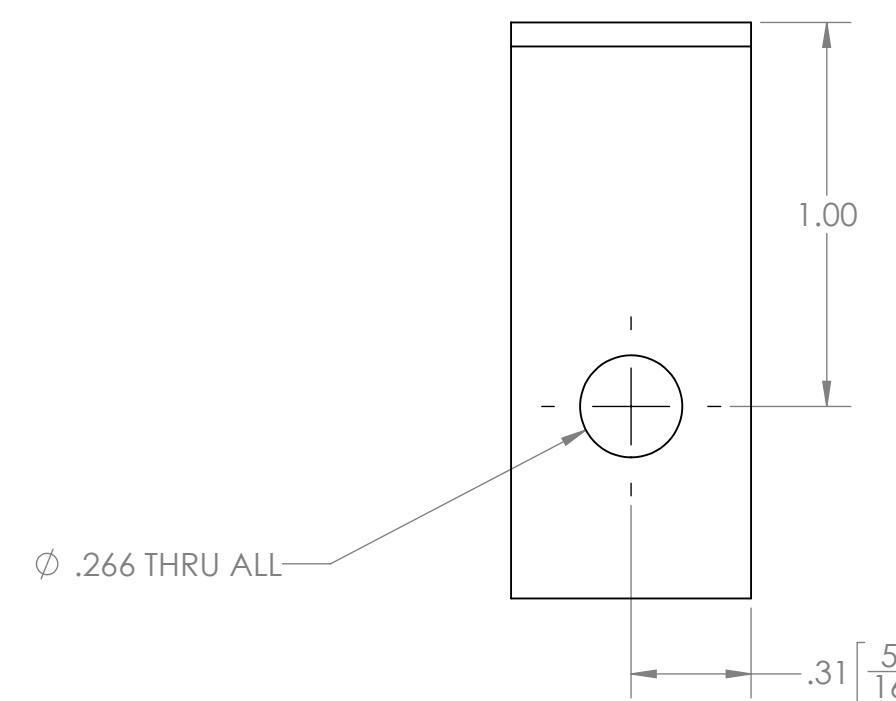
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DRAWN	KAMC	12/22/2021	
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MATERIAL/FINISH: 1.5" x 1.5" x .0625" Aluminum Angle, Cut to Size			
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
TITLE: Hub - Complex Build - Upper Hub Vision Ring Bracket			
SIZE	DWG. NO.	REV	
C	TE-22202		
SCALE: 2:1	SHEET 1 OF 1		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

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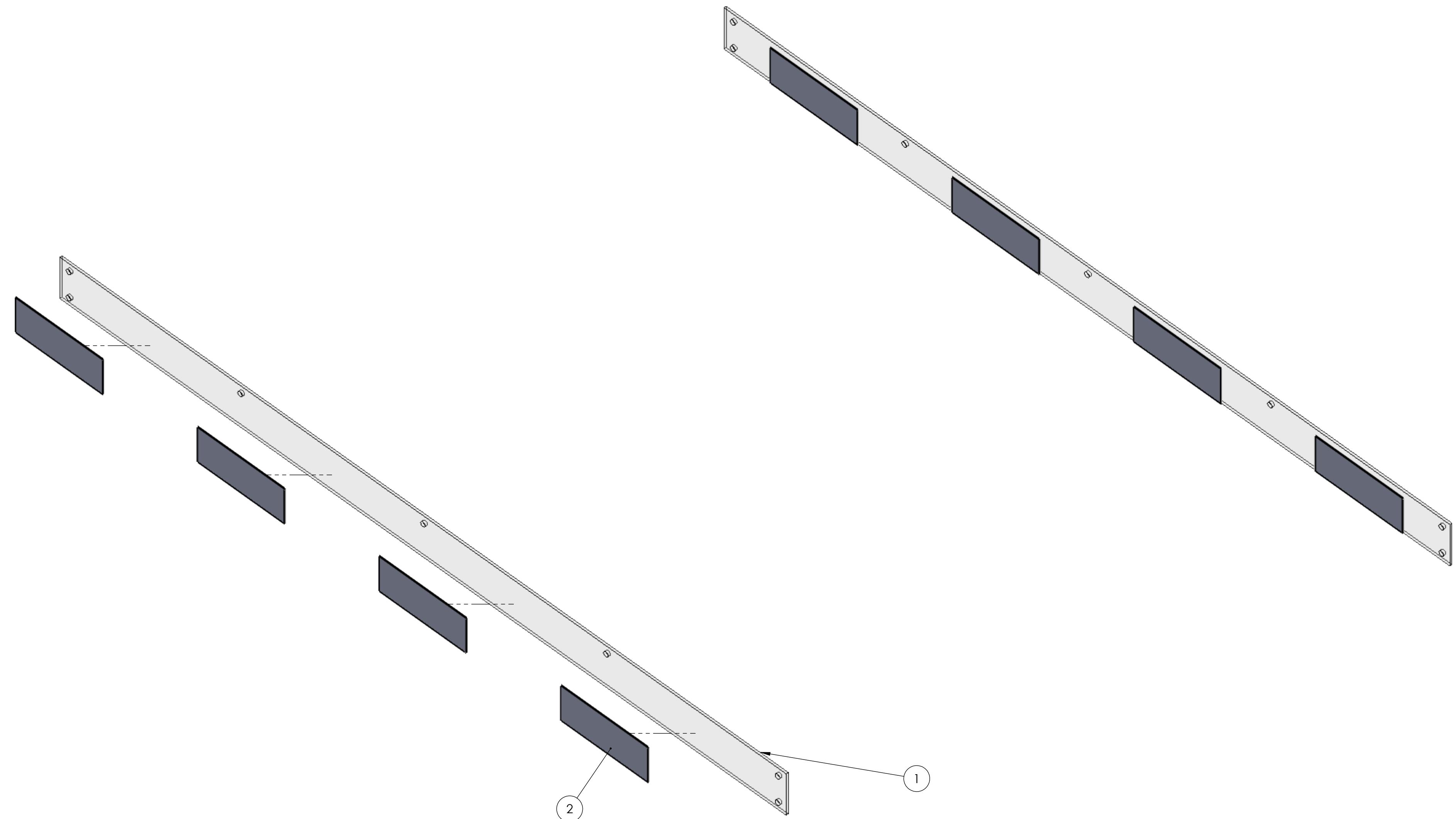
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Note:
Assembly will be bent to shape when attaching to Upper Hub.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22201	Hub - Complex Build - Upper Hub Vision Ring Plastic	1
2	Reflective Tape_VISIONTARGET	2" Wide, 5" Long Vision Target Tape	4

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FIRST ROBOTICS COMPETITION Modeling Solutions Partner
 TITLE: Hub - Complex Build - Vision Ring with Target Assembly
 SIZE DWG. NO. REV
C TE-22203
 SCALE: 1:3 SHEET 1 OF 2

Step 1:

1. Align 4x (2) to (1), as shown on Sheet 2. Note hole orientation on (1).
2. Connect (2) to (1) using the adhesive backing on (2).

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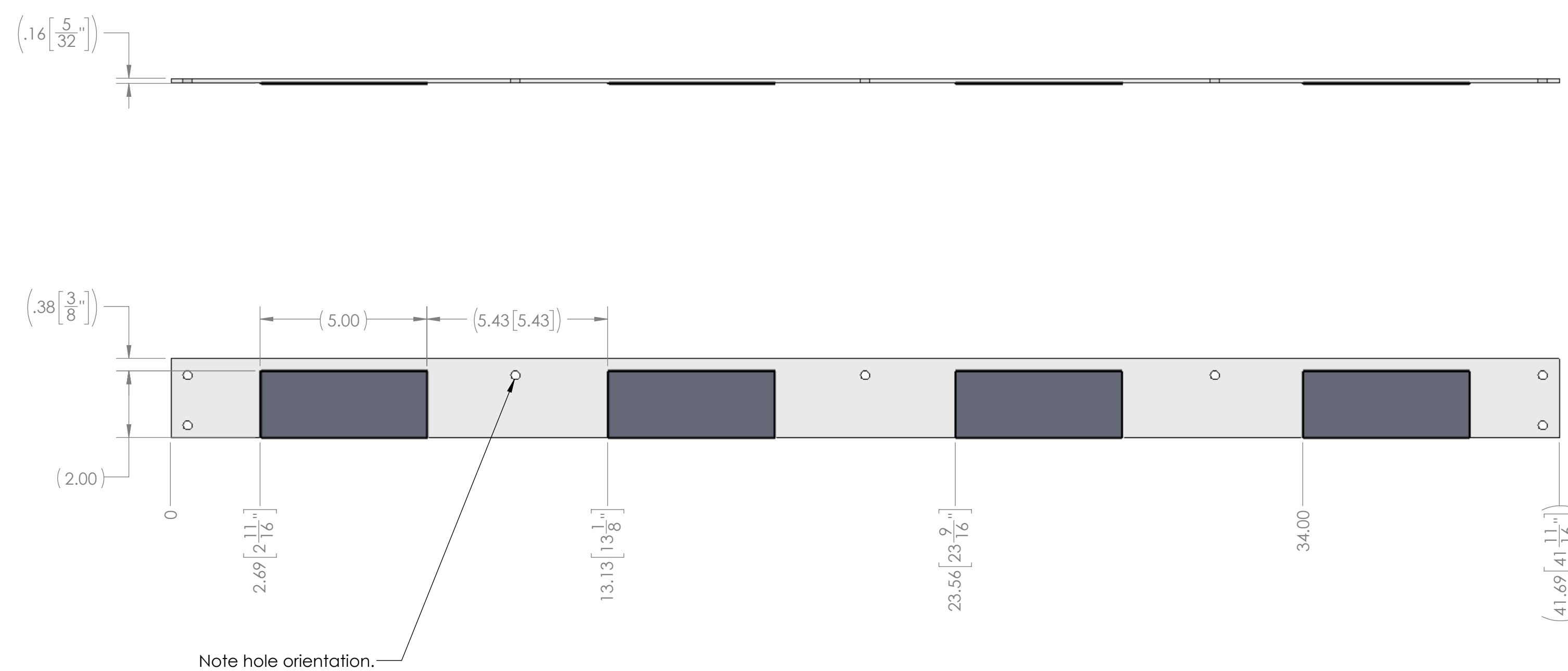
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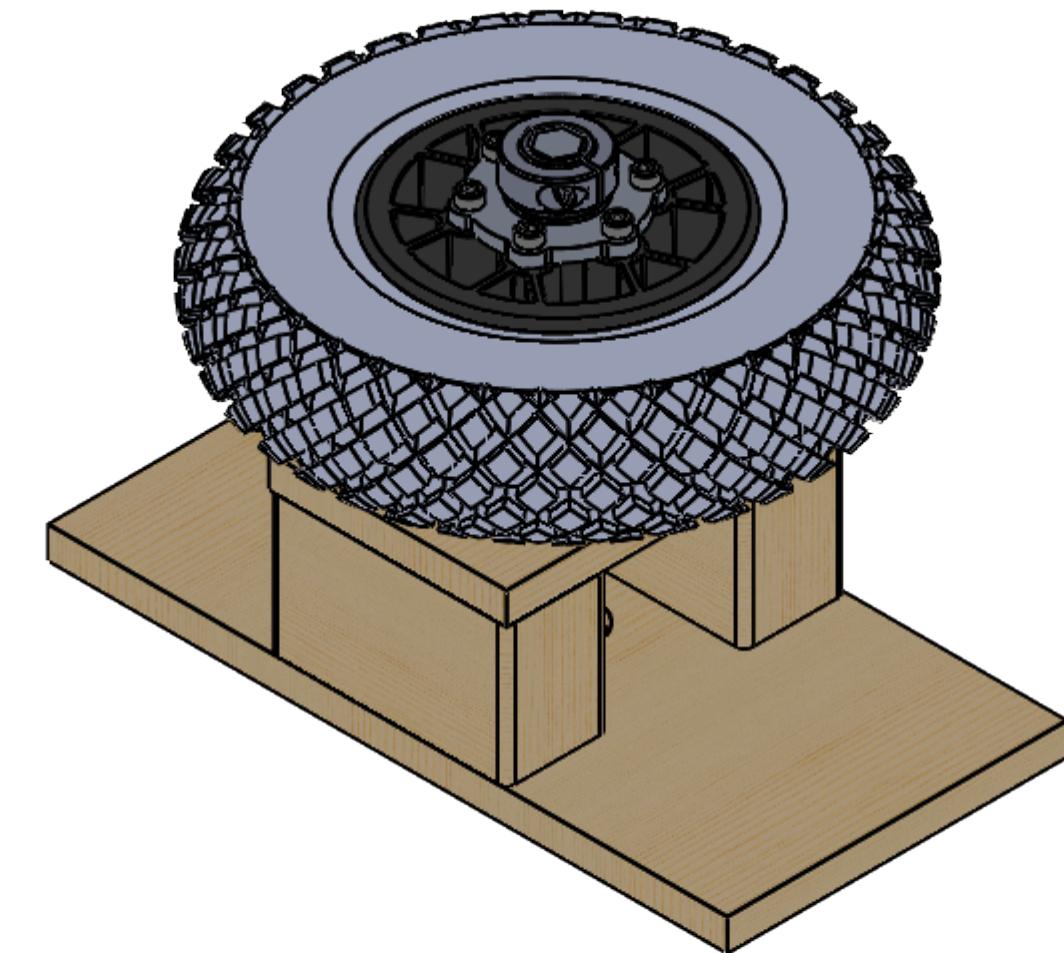
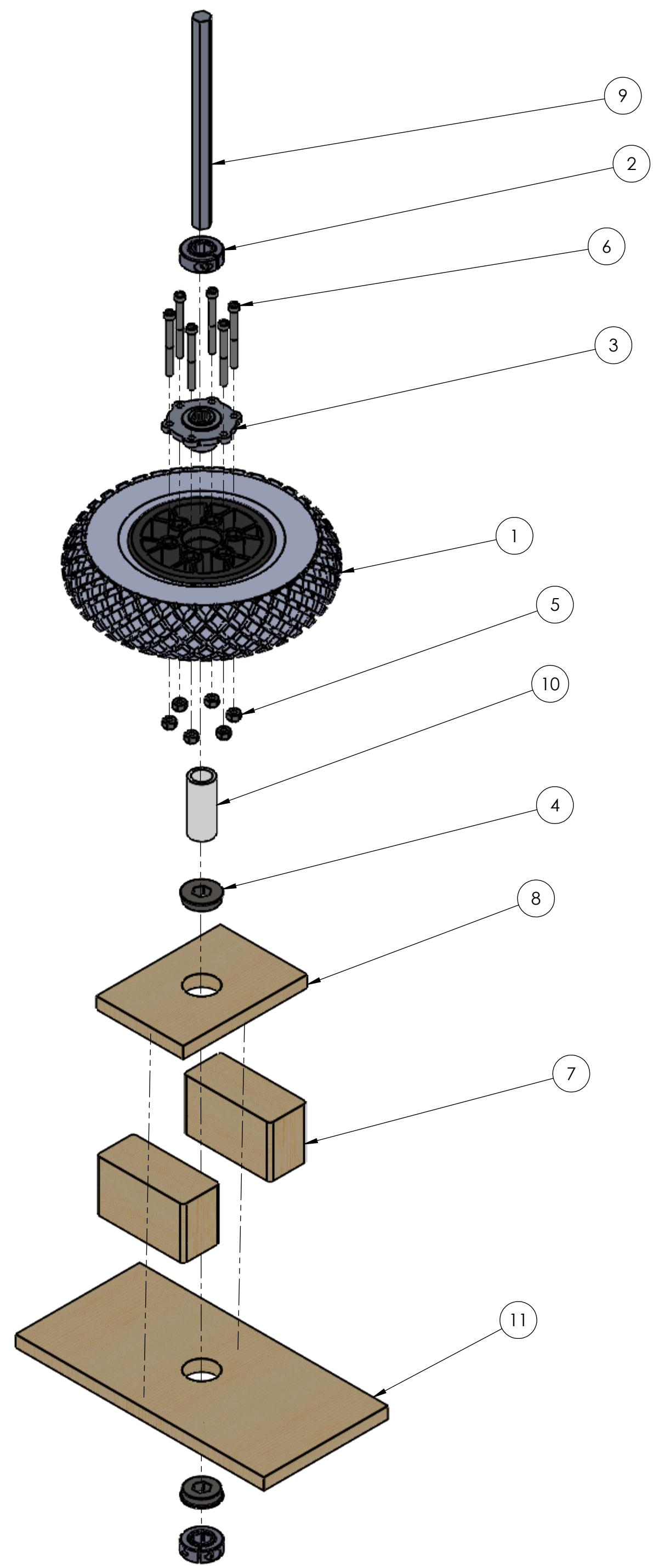
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING			
FIRST ROBOTICS COMPETITION			
SOLIDWORKS Modeling Solutions Partner			
TITLE: Hub - Complex Build - Vision Ring with Target Assembly			
SIZE DWG. NO. REV			
C TE-22203			
SCALE: 1:3 SHEET 2 OF 2			



ISO Scale: 1:2

Hardware Needed:
#8 x 1.25" Long Screw - Qty 4

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	am-0970	8 in. Pneumatic Wheel	1
2	am-1526_500Hex HD Collar Clamp	1/2" hex shaft collar	2
3	am-4124	AndyMark 1/2 in. Hex Hub	1
4	bearing_0.5in_flanged_hex	0.5 in. flanged hex bearing	2
5	nylock_10_32	Low-Strength Steel Nylon-Insert Locknut, Zinc-Plated, 10-32 Thread Size	6
6	socket_hex_10_32_2_p	Socket Head Screw, 10-32 x 2" long, partially threaded	6
7	TE-22211	Hub - Complex Build - Passive Agitator 2x4	2
8	TE-22212	Hub - Complex Build - Passive Agitator Top	1
9	TE-22213	Hub - Complex Build - Passive Agitator - Shaft	1
10	TE-22214	Hub - Complex Build - Passive Agitator - Spacer	1
11	TE-22215	Hub - Complex Build - Passive Agitator Bottom	1

Notes:

- Item ② may be replaced with other equivalent parts. Excess hex shaft resulting from differences of shaft collar widths should protrude out bottom of assembly.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.

DO NOT SCALE DRAWING

TEAM NAME DATE
DRAWN CO 12/22/2021

FIRST ROBOTICS COMPETITION  DS SOLIDWORKS Modeling Solutions Partner

TITLE: Hub - Complex Build - Passive Agitator

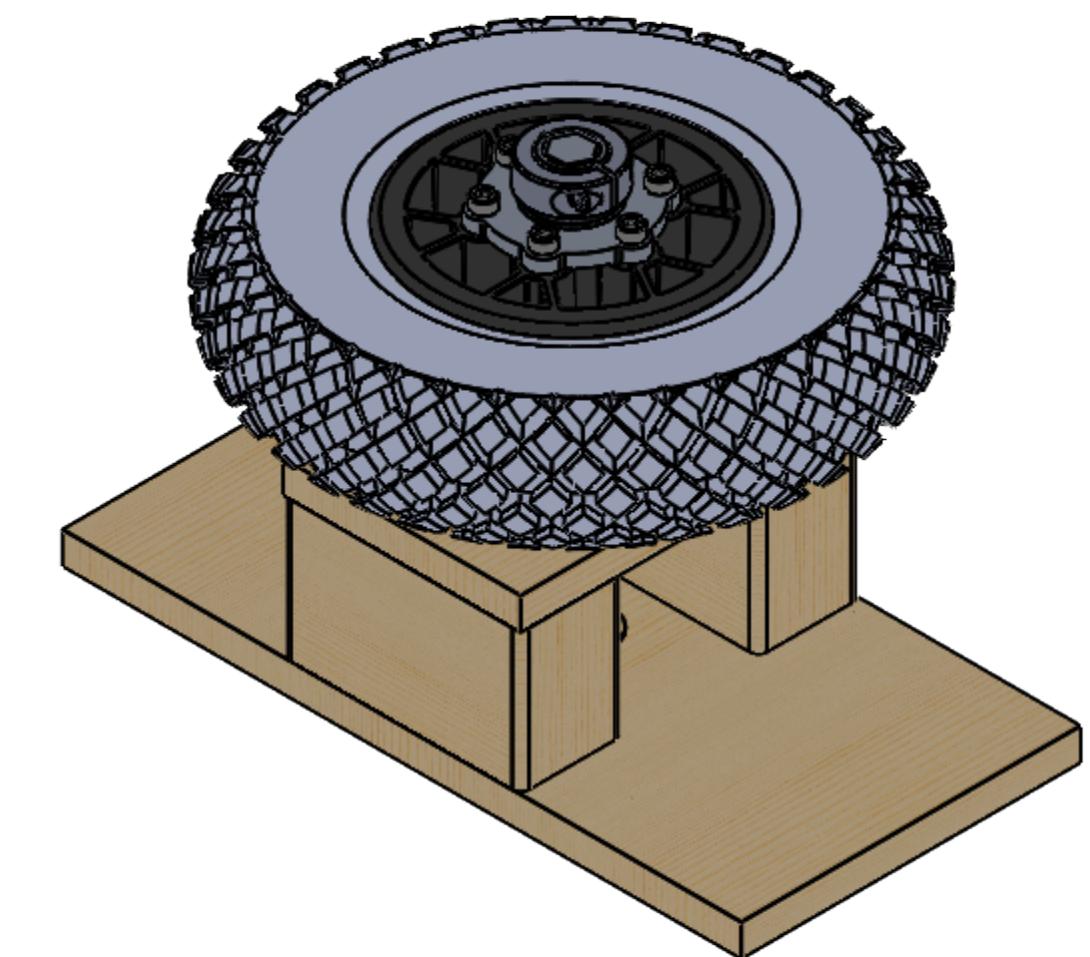
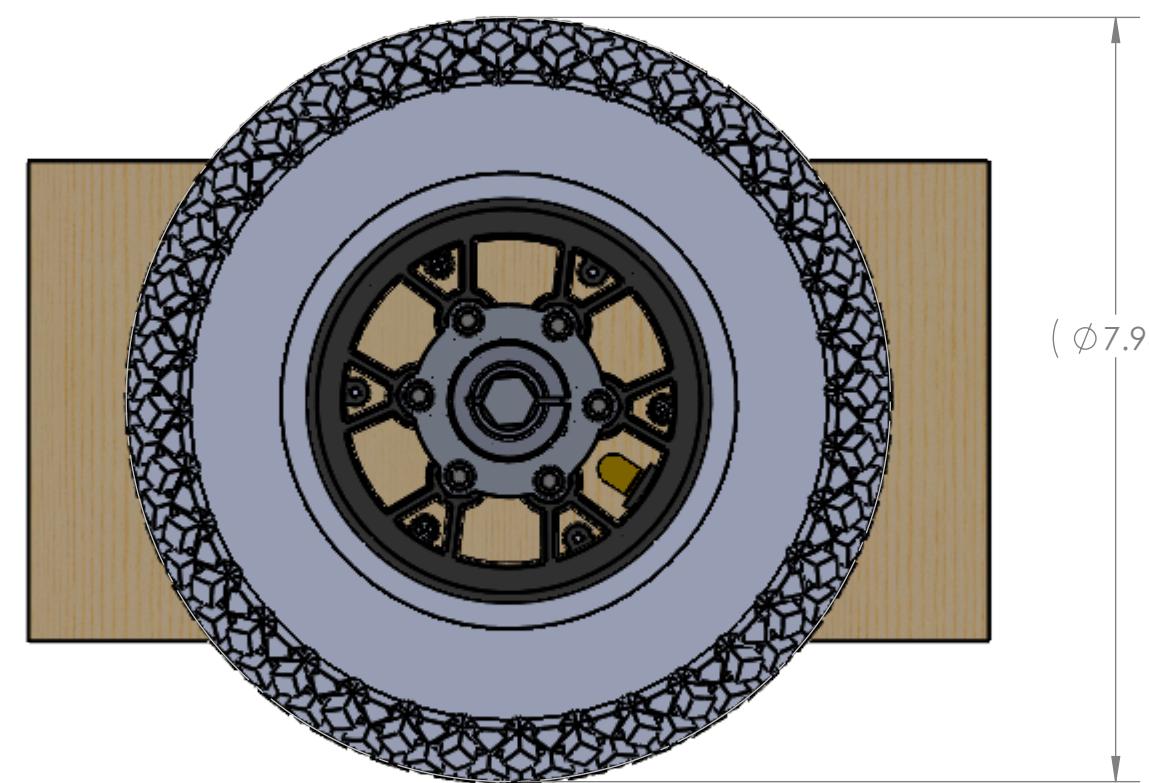
SIZE DWG. NO. REV

C TE-22210

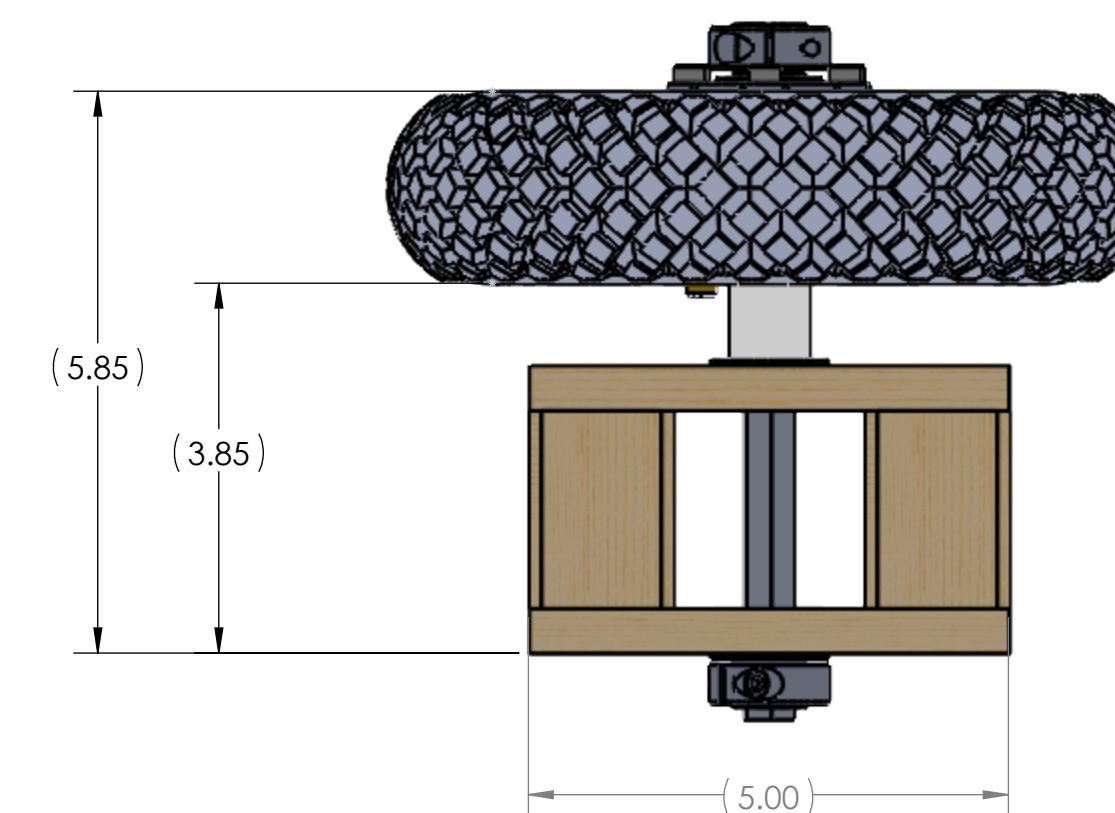
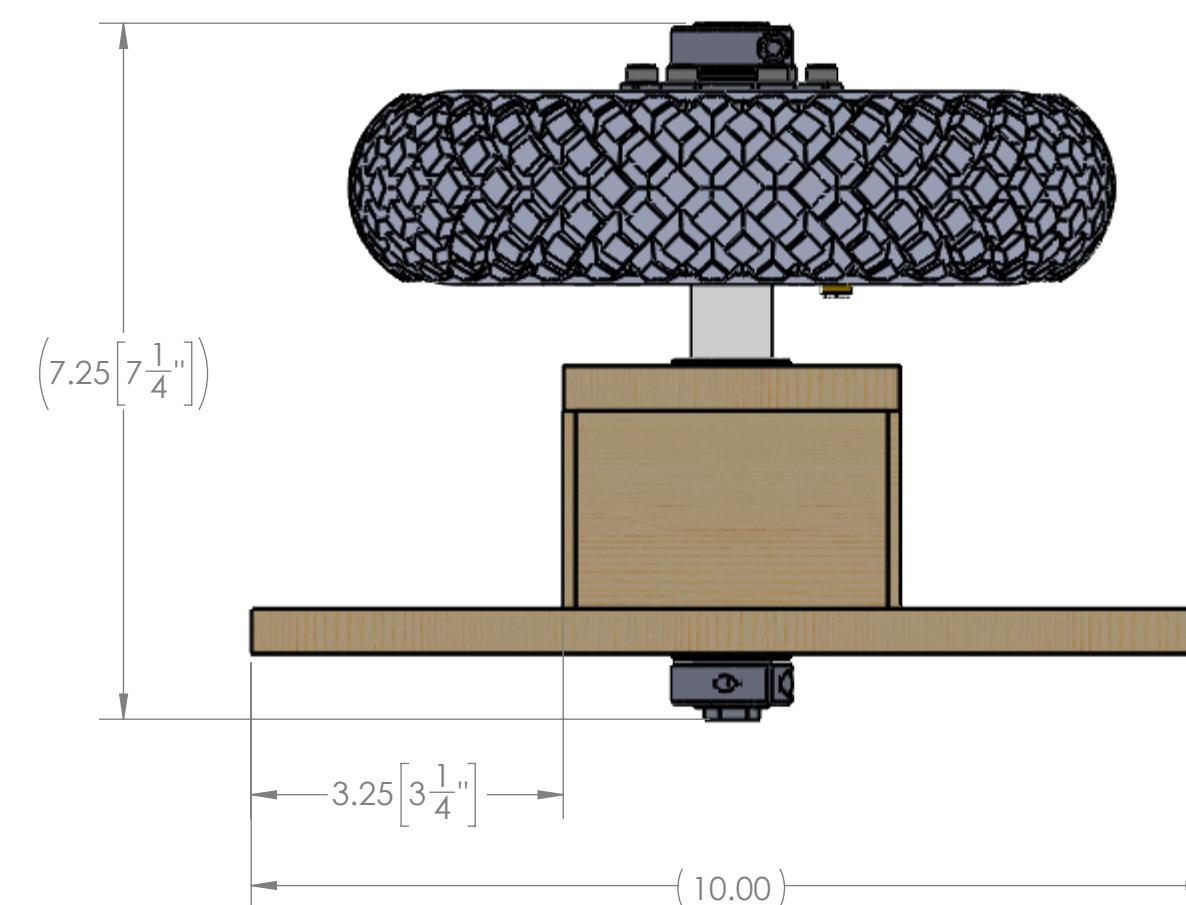
SCALE: 1:3 SHEET 1 OF 4

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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$

TEAM _____ NAME _____ DATE _____

DRAWN CO 12/22/2021



SOLIDWORKS

Modeling Solutions Partner

TITLE: Hub - Complex Build - Passive Agitator

SIZE DWG. NO. REV

C TE-22210

SCALE: 1:2 SHEET 2 OF 4

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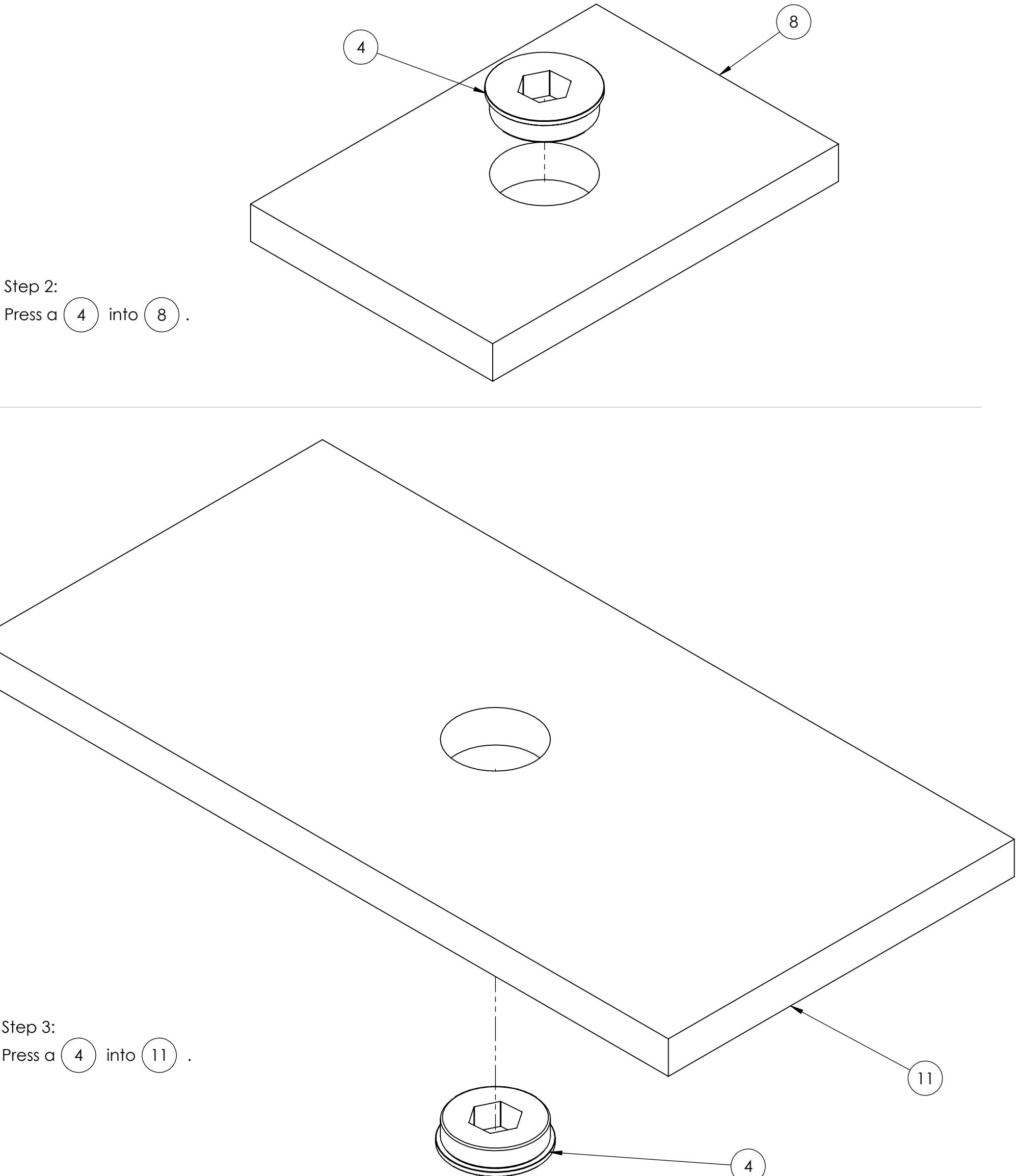
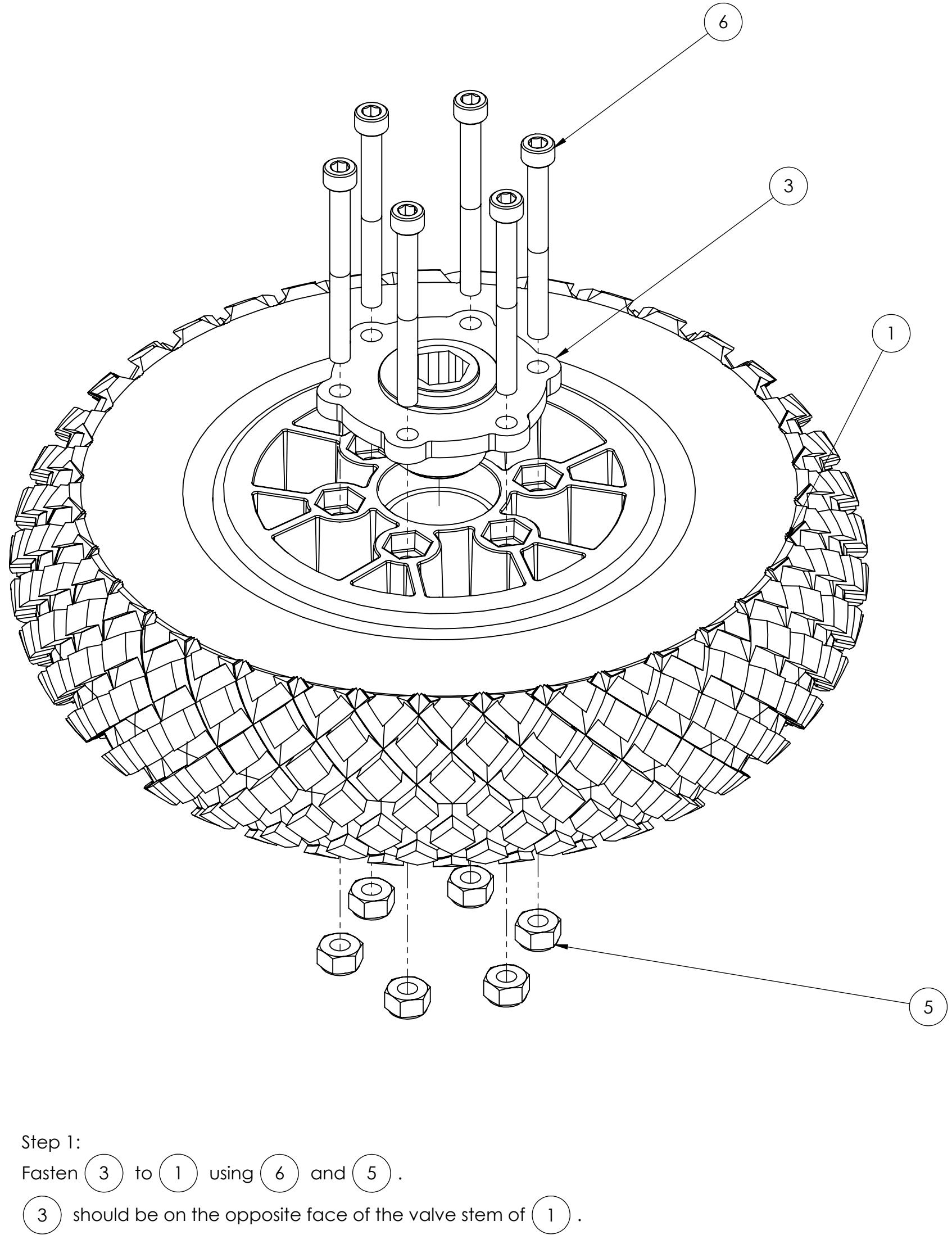
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MATERIAL/FINISH:

COMMENTS:
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DO NOT SCALE DRAWING

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MATERIAL/FINISH:	SIZE	DWG. NO.	REV		
	C	TE-22210			
COMMENTS:	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING			SCALE: 1:1	SHEET 3 OF 4	

 **FIRST
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COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**Hub - Complex Build -
Passive Agitator**

SIZE DWG. NO. REV

C TE-22210

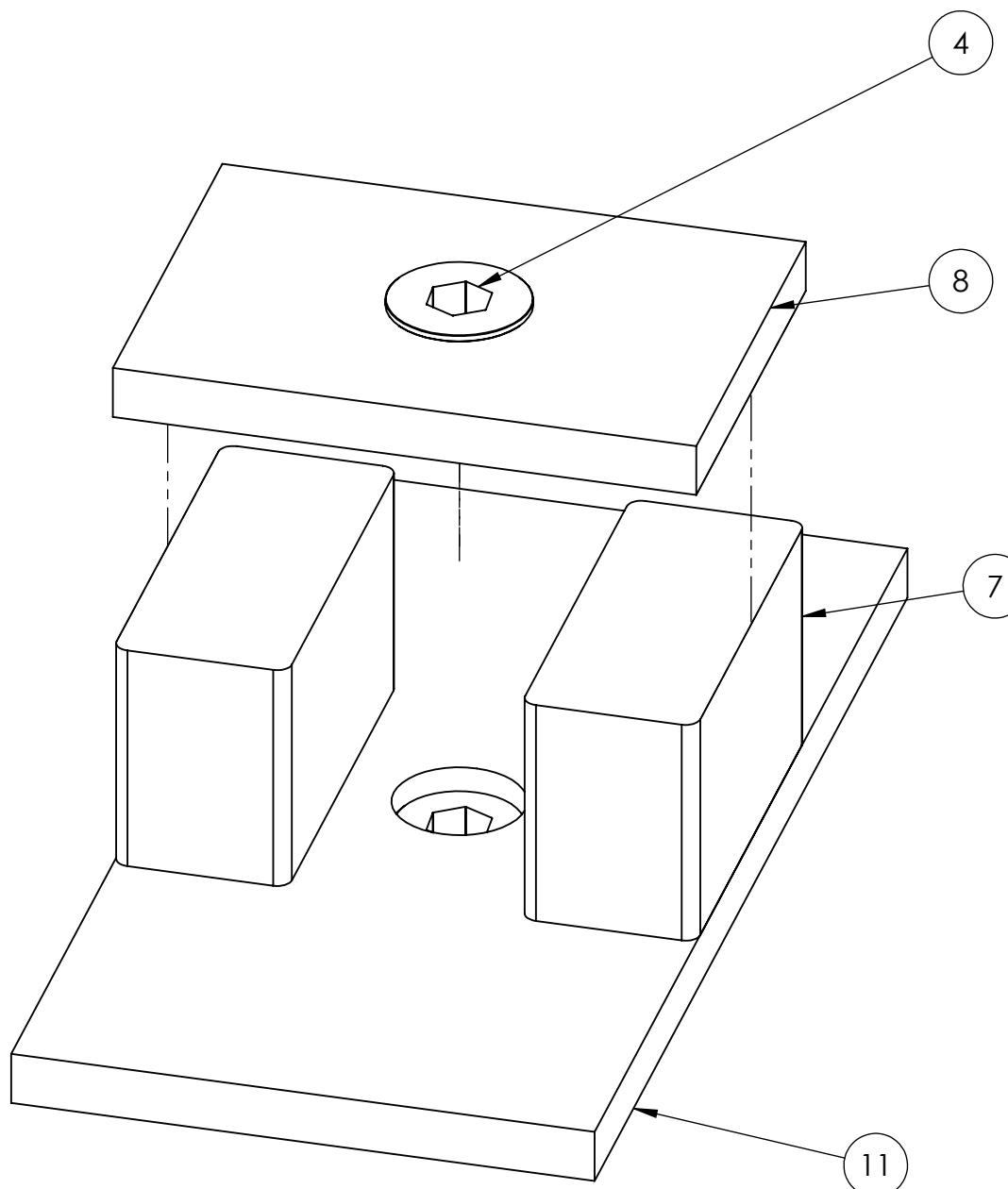
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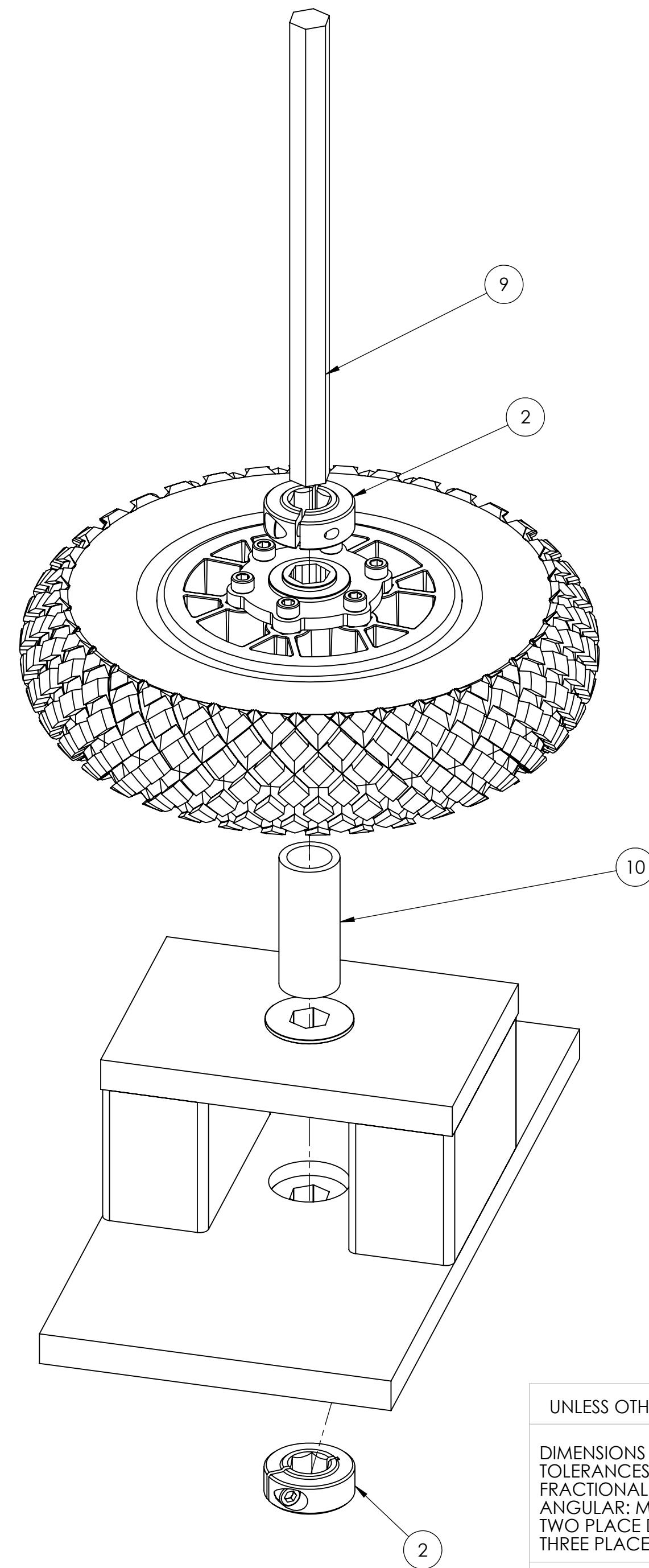
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Step 4:
 Attach (11) and (8) to (7) using 1.25" long wood screws. It is recommended to use 4x screws per (7), 2x into each end.
 Note flange orientation of (4) and (11). Flanges should be facing externally.



Step 5:
 Slide components onto (9) as shown and tighten each (2). Shaft collars should be tightened such that everything is flush and snug. Excess shaft length should be adjusted to below assembly.

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DIMENSIONS ARE IN INCHES	DRAWN	CO	12/22/2021
TOLERANCES: FRACTIONAL $\pm 1/16$			
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .13$			
THREE PLACE DECIMAL $\pm .125$			
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COMMENTS:			
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TITLE: Hub - Complex Build - Passive Agitator		
SIZE	DWG. NO.	REV
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SCALE: 2:3		SHEET 4 OF 4

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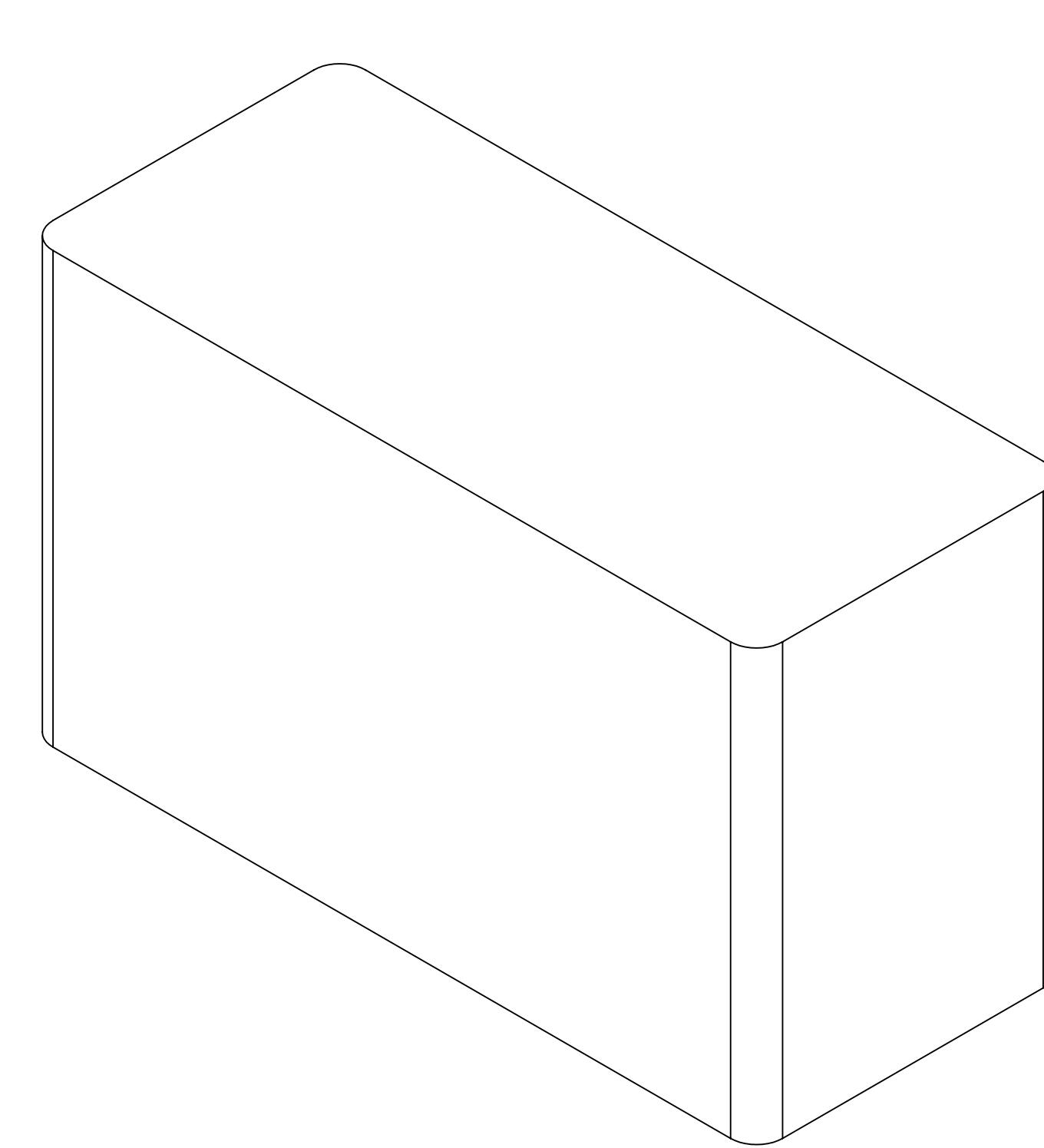
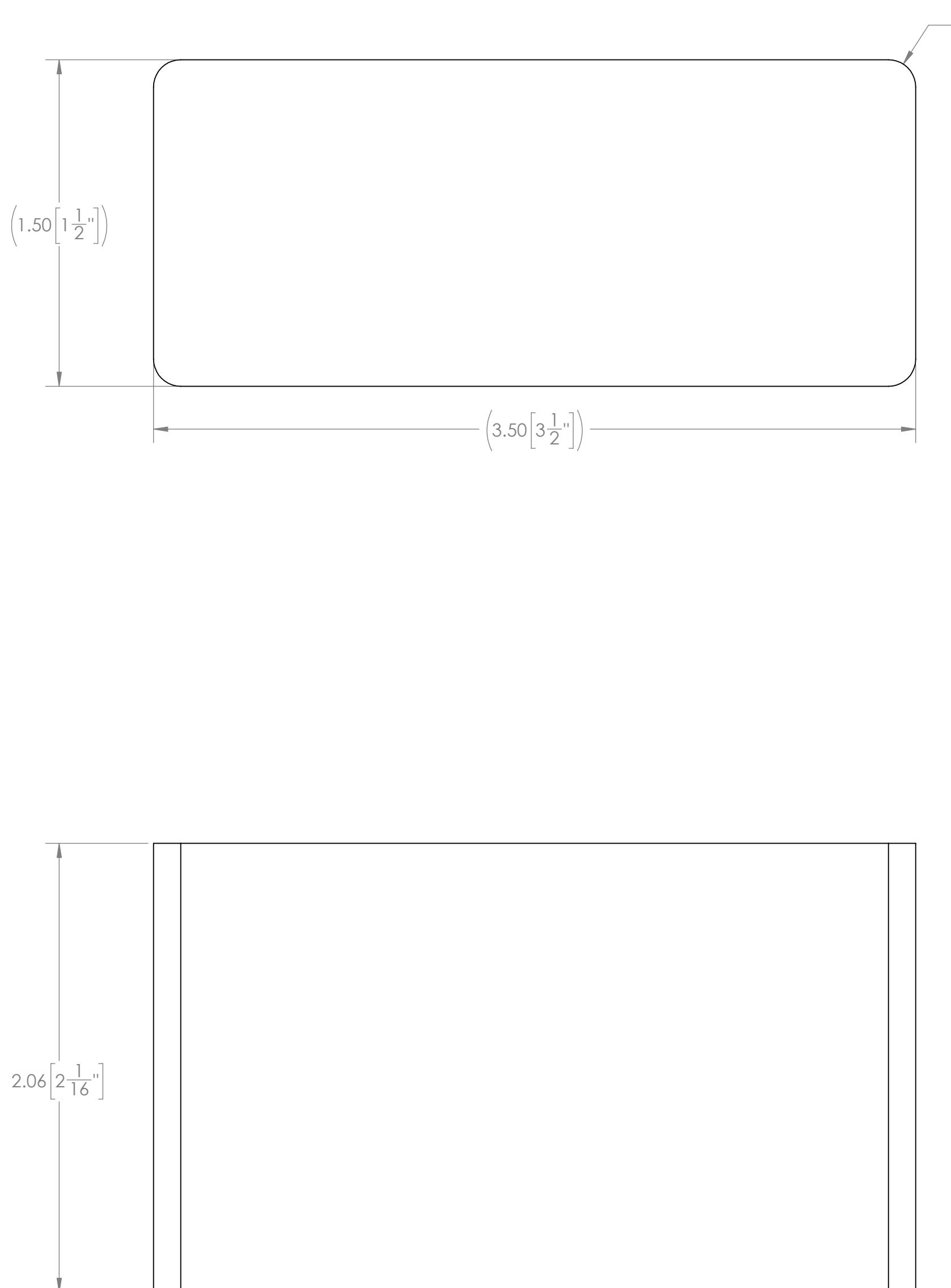
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MATERIAL/FINISH:	SIZE	DWG. NO.	REV
2" x 4" Lumber	C	TE-22211	
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 2:1	SHEET 1 OF 1	

 **FIRST
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COMPETITION**  **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**Hub - Complex Build -
Passive Agitator 2x4**

SIZE DWG. NO. REV
C TE-22211

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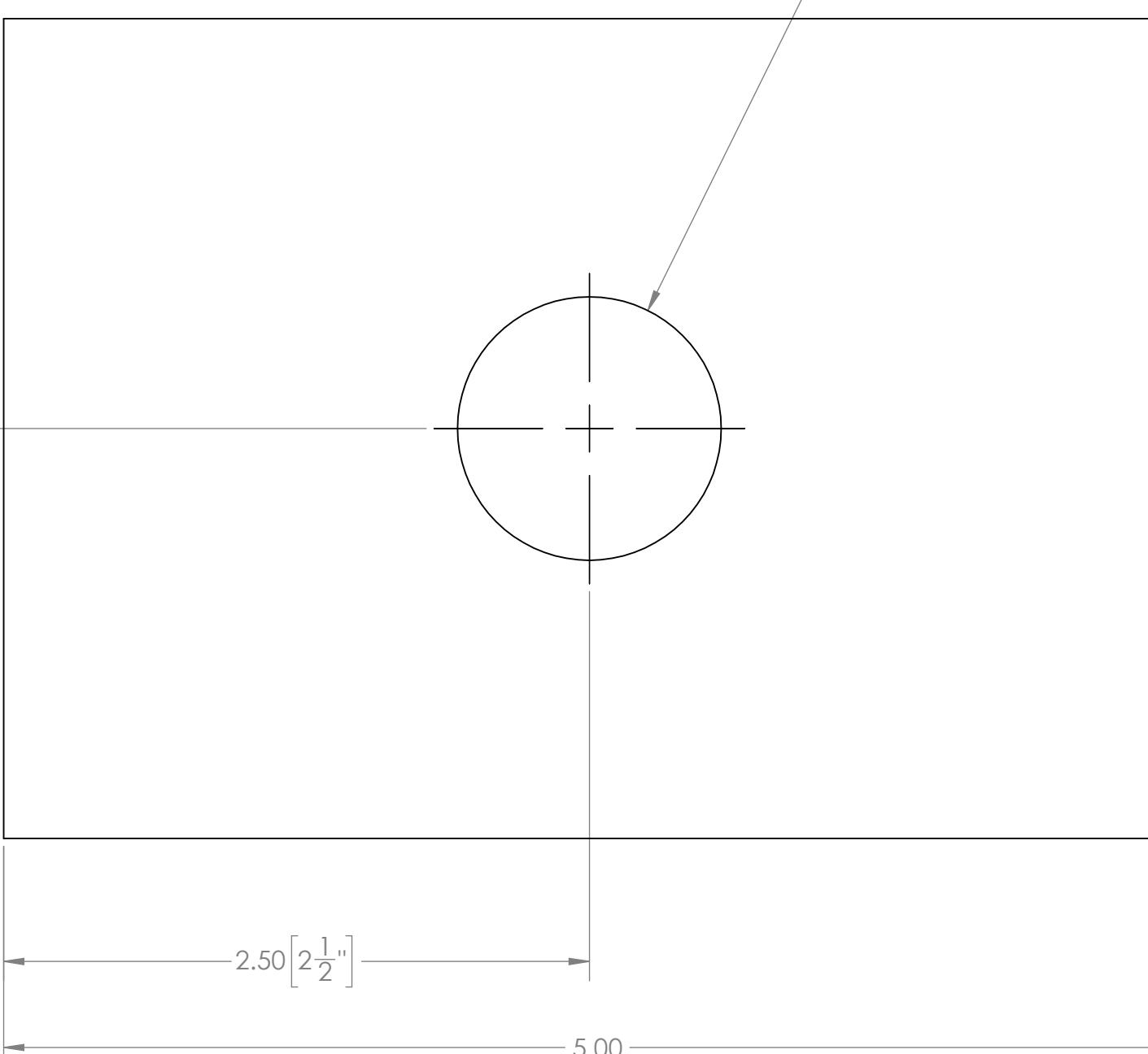
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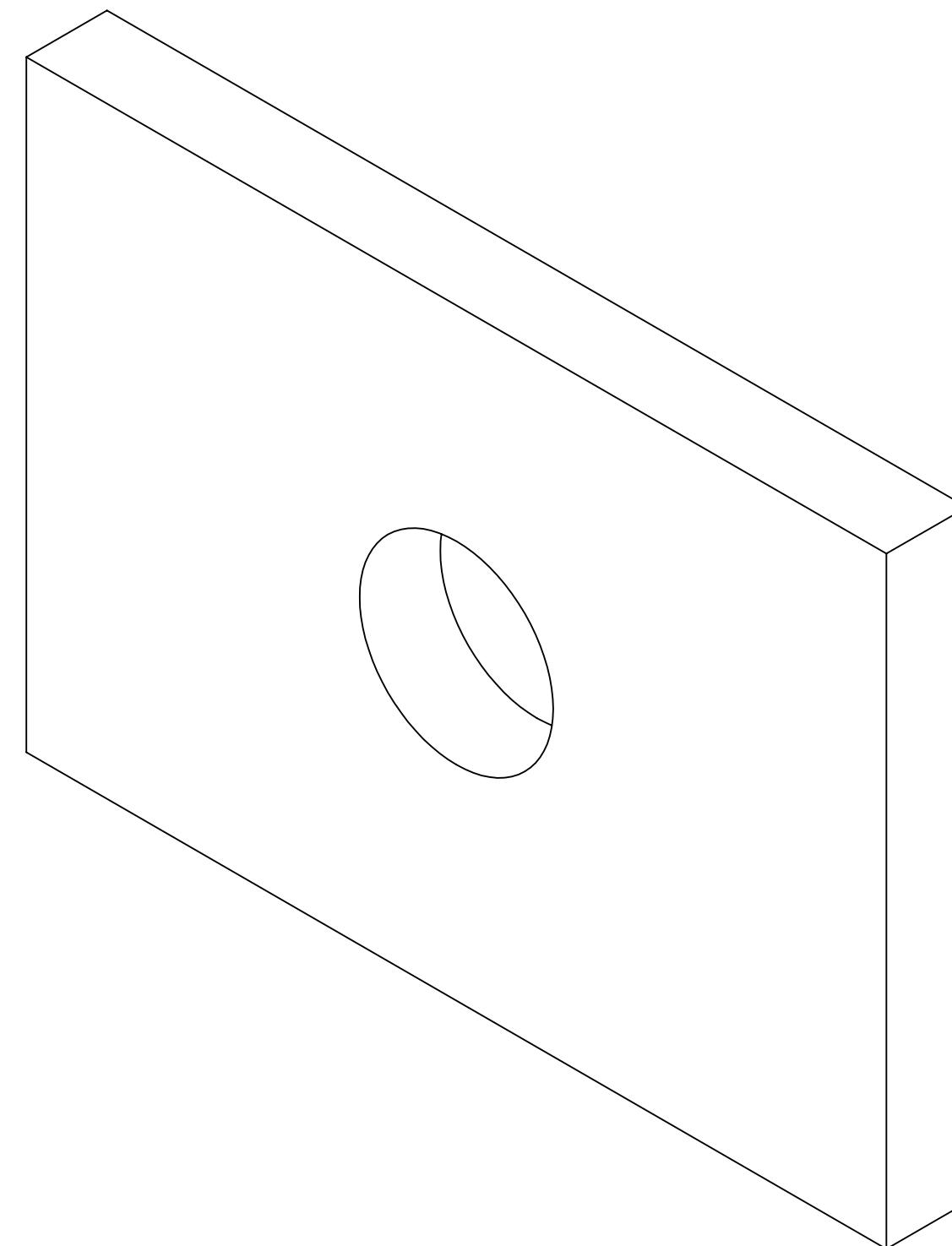
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 $(.47\left[\frac{15}{32}\right])$

3.50 $\left[3\frac{1}{2}\right]$
1.75 $\left[1\frac{3}{4}\right]$



$\phi 1.125\left[1\frac{1}{8}\right]$ THRU
Hole for .5" hex bearing



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TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$			
MATERIAL/FINISH:			
1/2" Plywood			
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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hub - Complex Build -
Passive Agitator Top

SIZE DWG. NO. REV

C TE-22212

SCALE: 3:2 SHEET 1 OF 1

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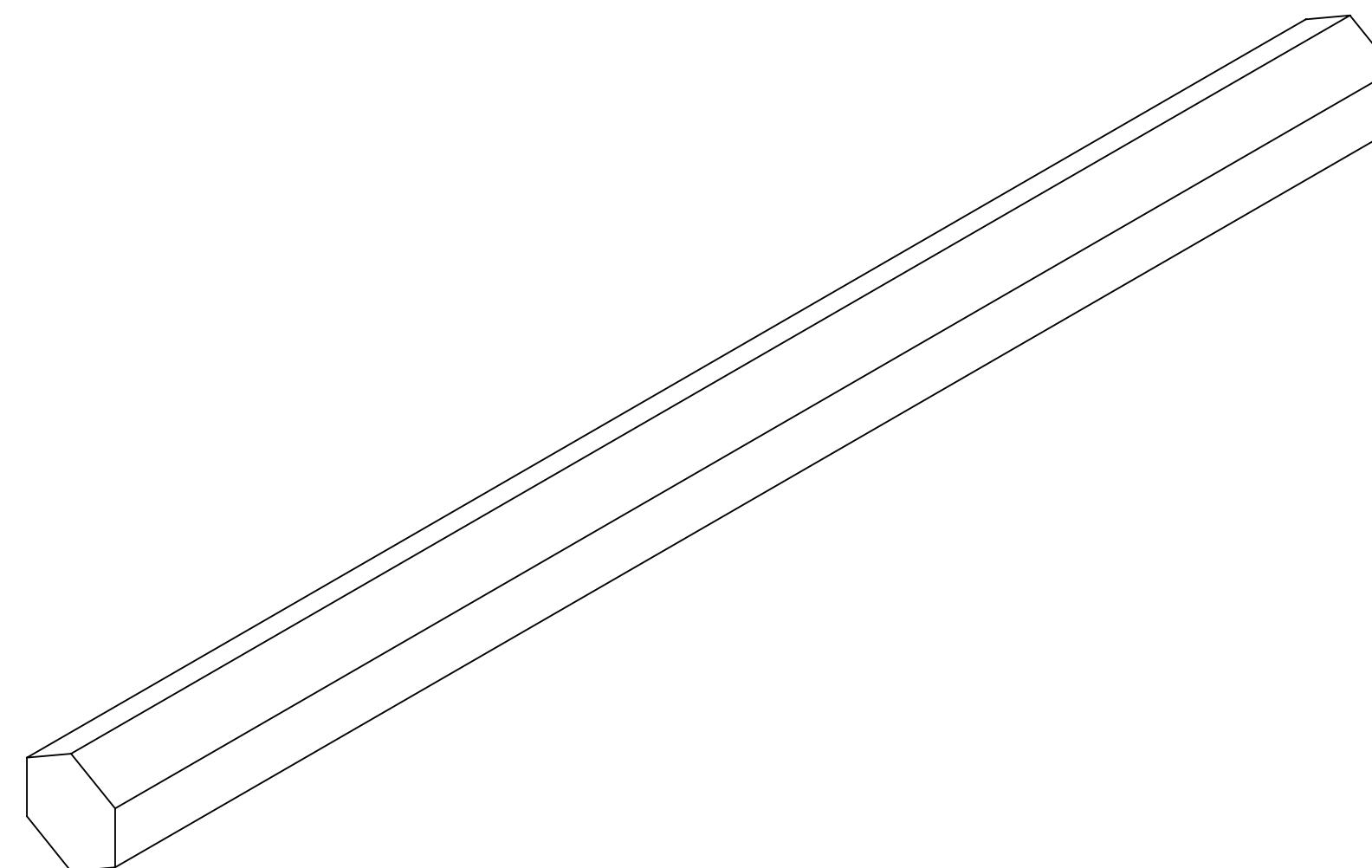
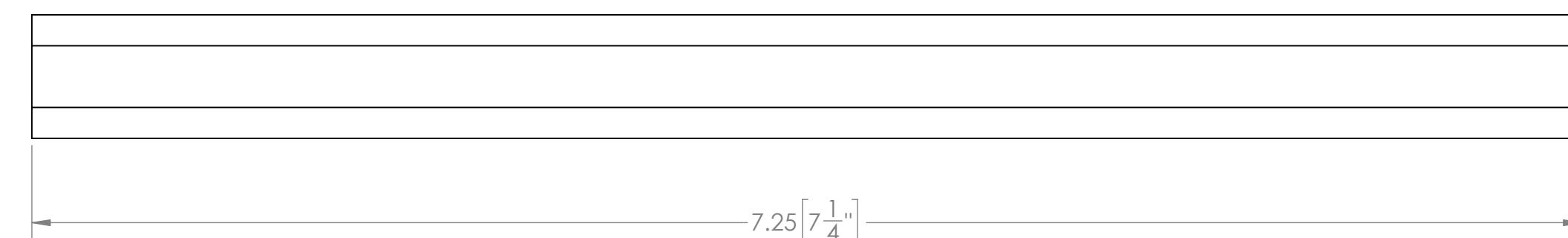
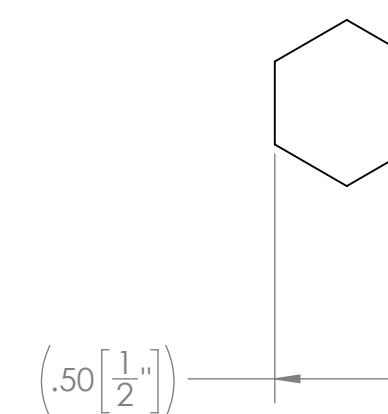
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DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	DRAWN	CO	12/22/2021
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MATERIAL/FINISH: 1/2" Hex Shaft	SIZE	DWG. NO.	REV
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.	C	TE-22213	
DO NOT SCALE DRAWING	SCALE: 3:2	SHEET 1 OF 1	

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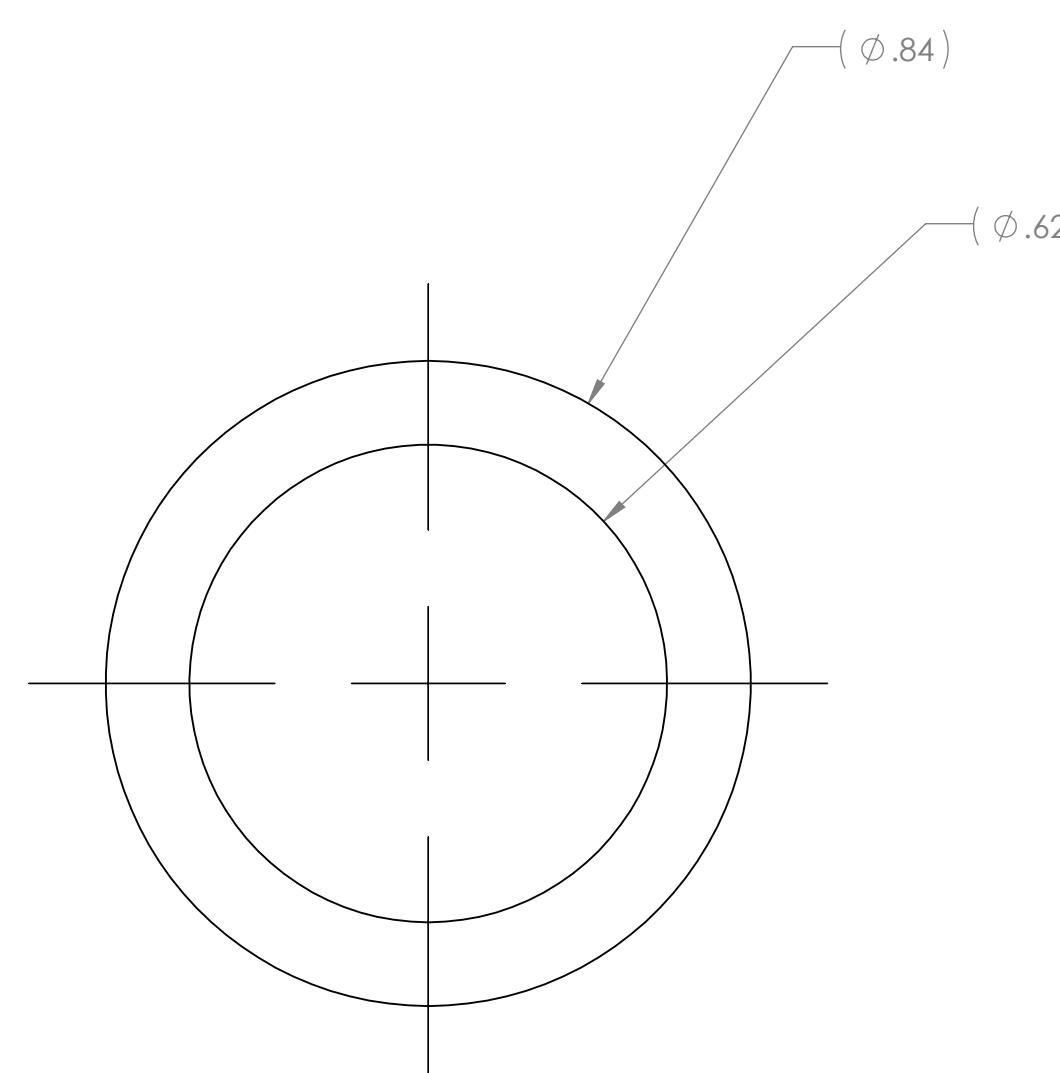
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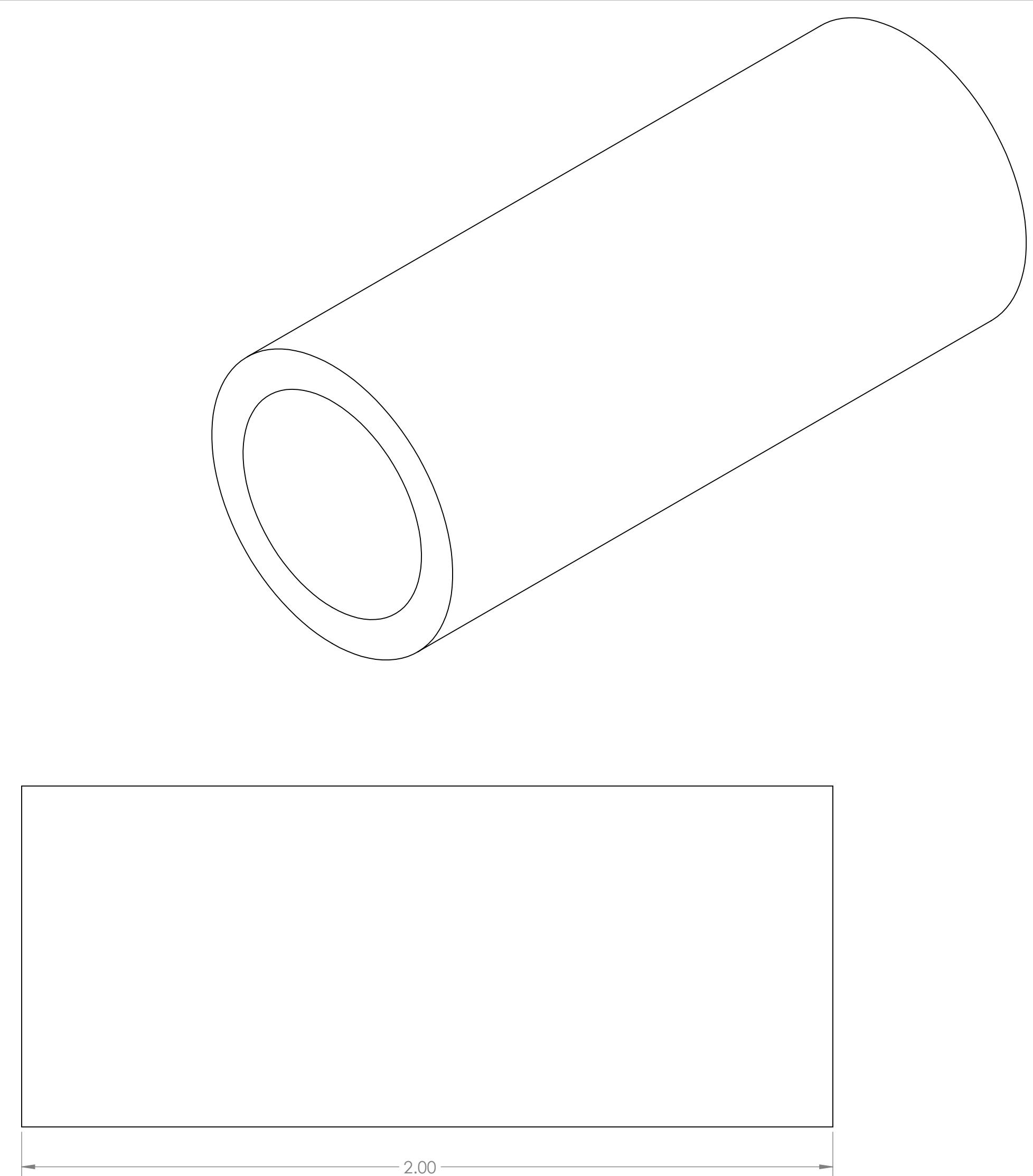
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Notes:
1. PVC may be replaced with equivalent length of hex spacer stock, or use of shaft collars.



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TEAM NAME DATE

DRAWN CO 12/22/2021

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

1/2" Schedule 40 PVC Pipe

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TITLE:

Hub - Complex Build -
Passive Agitator -
Spacer

SIZE DWG. NO. REV

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SCALE: 4:1 SHEET 1 OF 1

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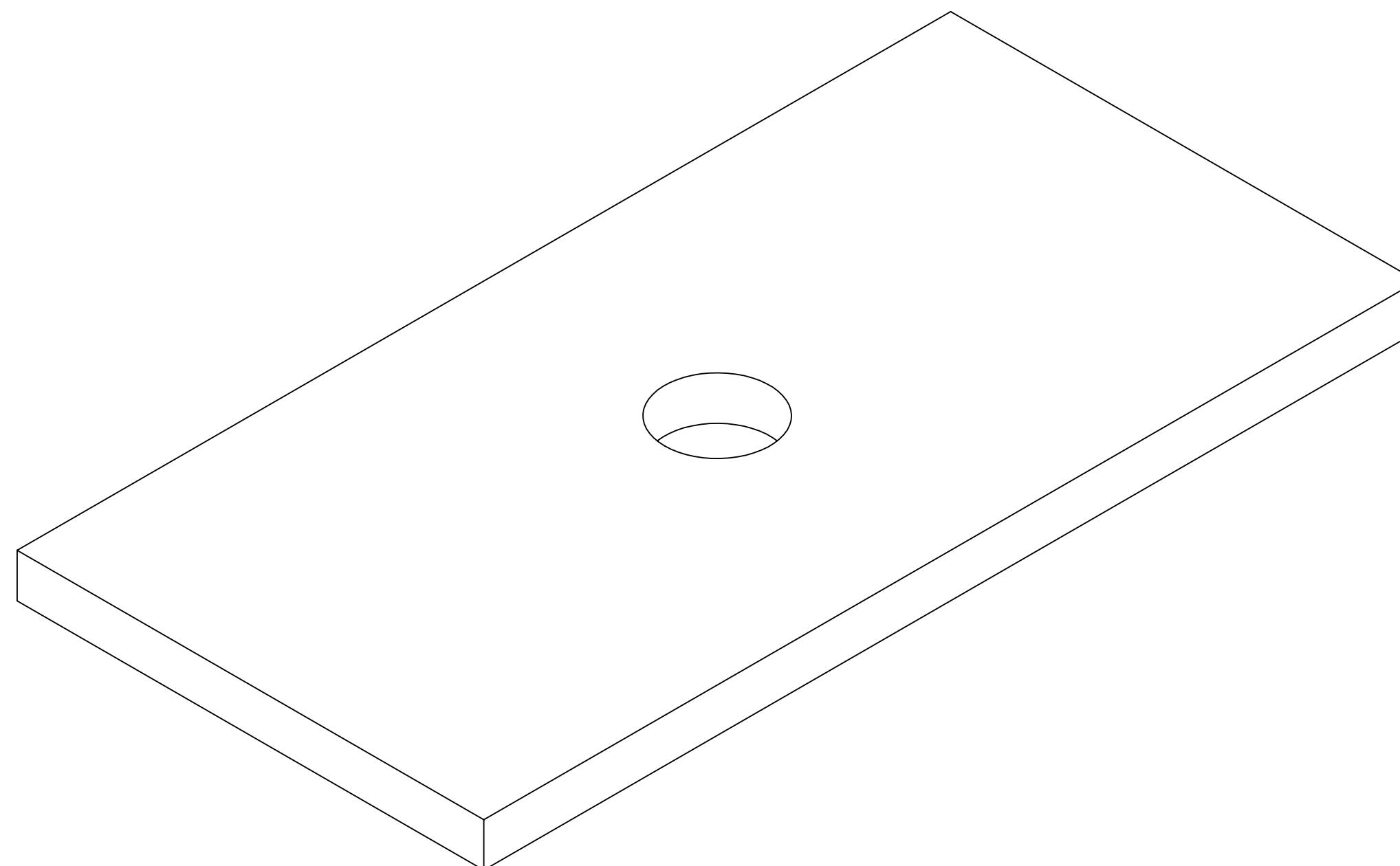
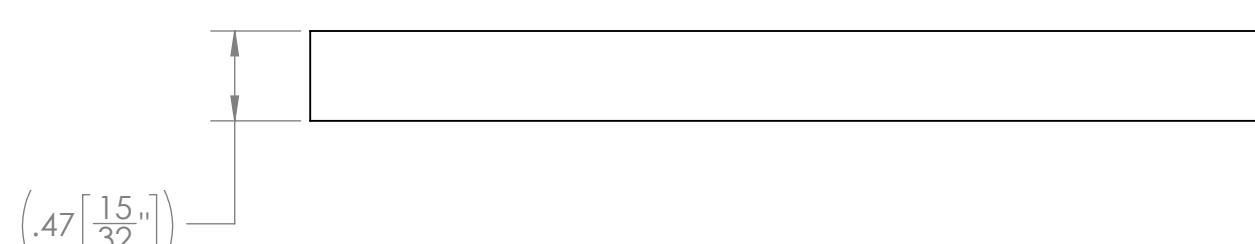
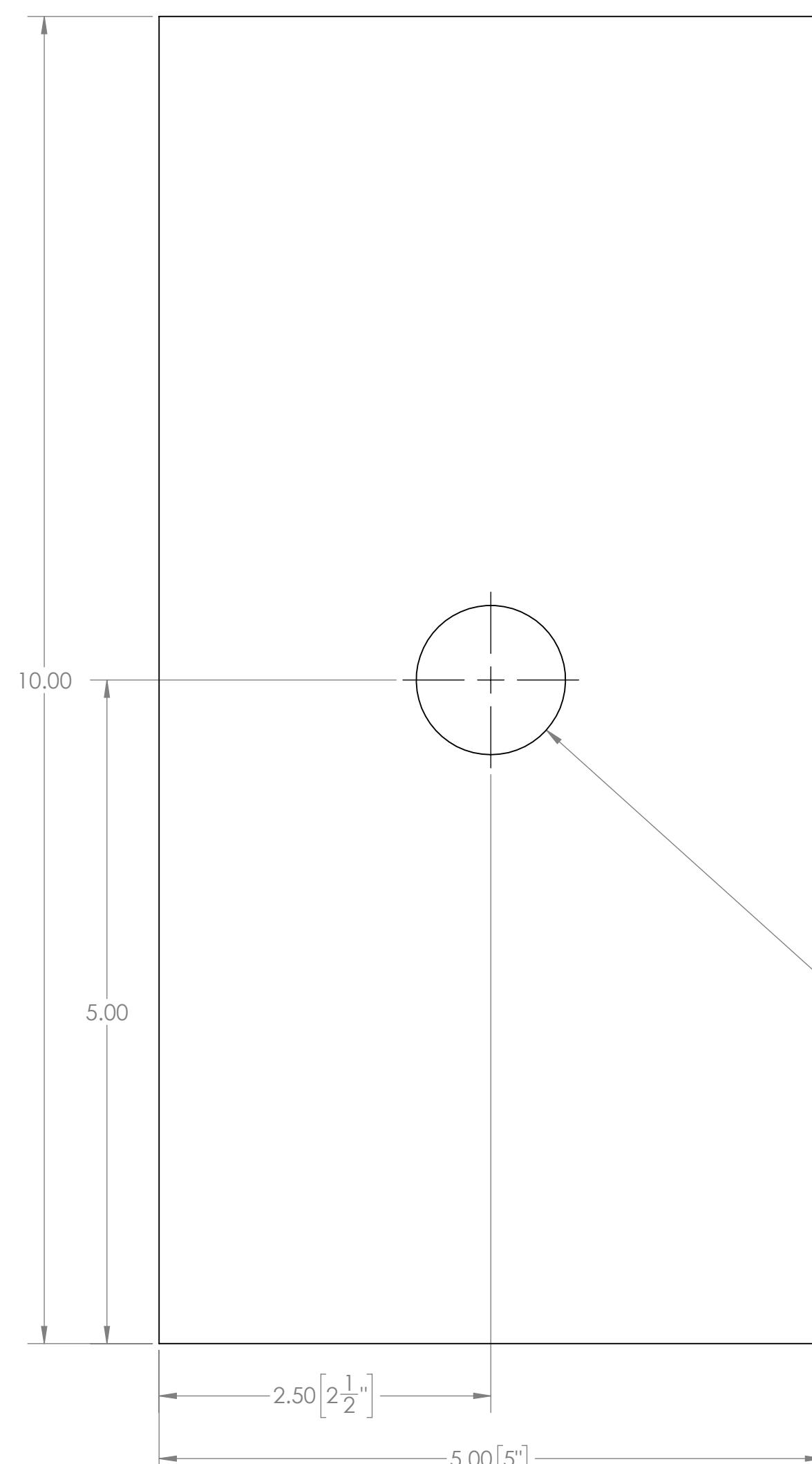
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DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL $\pm 1/16$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
TWO PLACE DECIMAL $\pm .13$
THREE PLACE DECIMAL $\pm .125$

MATERIAL/FINISH:

1/2" Plywood

DO NOT SCALE DRAWING

TEAM NAME DATE

DRAWN KAMC 1/3/2022

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COMMENTS:

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FIRST[®] ROBOTICS COMPETITION

SOLIDWORKS

Modeling Solutions Partner

TITLE: Hub - Complex Build -

Passive Agitator
Bottom

SIZE DWG. NO. REV

C TE-22215

SCALE: 1:1 SHEET 1 OF 1

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