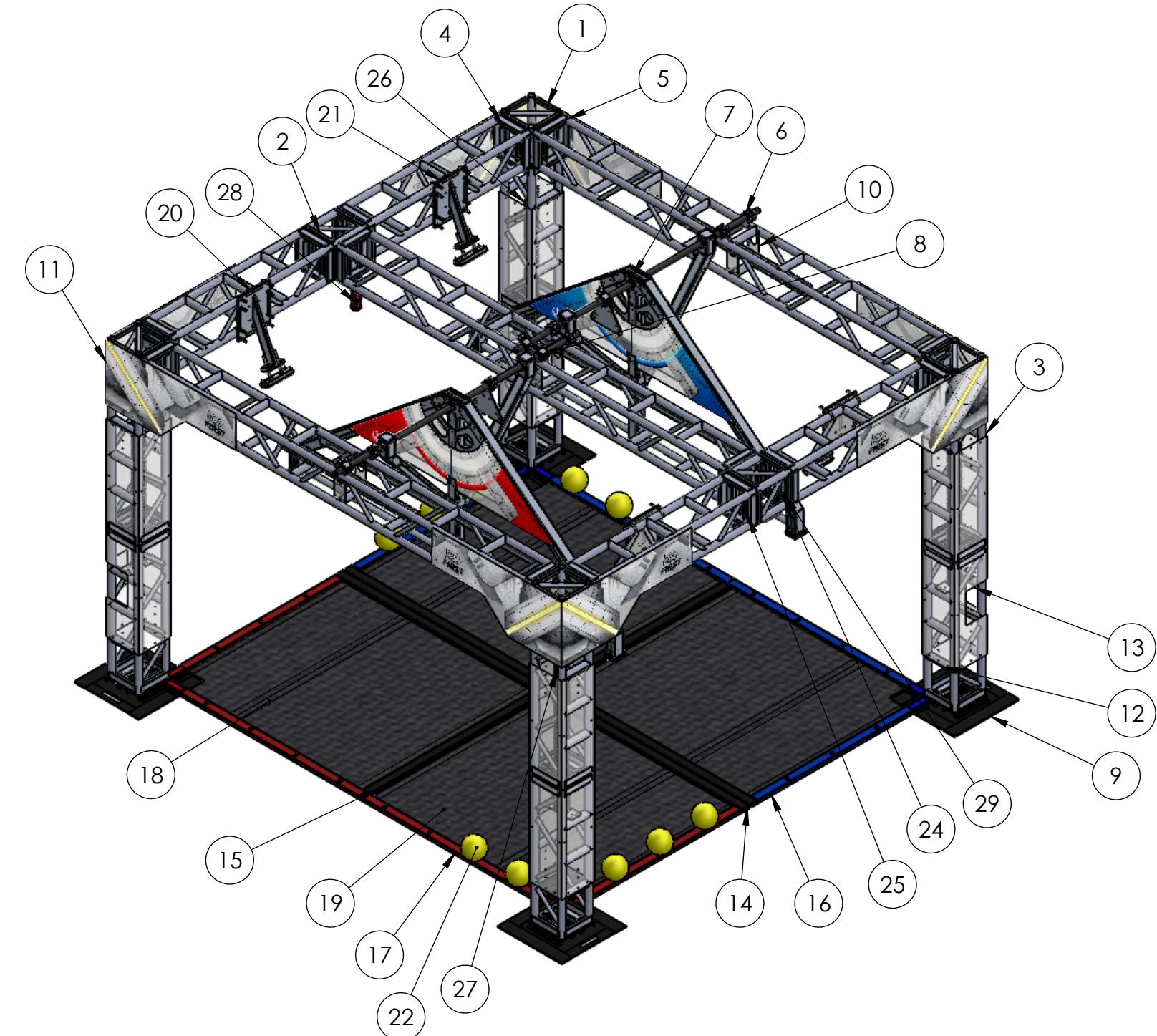


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20001	TS 1212LD-C3P, 3 Way Corner Block Light Duty Truss, Total Structures	4
2	GE-20002	TS 1212LD-C4P, 4 Way Corner Block Light Duty Truss, Total Structures	2
3	GE-20003	TS 1212LD-48P, 48" x 12" x 12" Light Duty Truss, Total Structures	8
4	GE-20004	TS 1212LD-60P, 60" x 12" x 12" Light Duty Truss, Total Structures	4
5	GE-20005	TS 1212LD-144P, 144" x 12" x 12" Light Duty Truss, Total Structures	3
6	GE-20006	Cheeseborough for Truss _ Stacked	8
7	GE-20020	Generator Switch Assembly	2
8	GE-20022	Pivot Pole to Generator Switch Shaft Collar	2
9	GE-20031	Truss Base with Nut Chassis	4
10	GE-20035	Jig for Cheeseboroughs	6
11	GE-20041	Truss Vinyl Plastic	8
12	GE-20043	Shield Generator Truss Leg Plastic	12
13	GE-20044	Shield Generator Truss Leg Plastic_Trench	4
14	GE-20046	Boundary 75.38" w/ hook	4
15	GE-20047	Boundary 63.5" w/ hook	2
16	GE-20048	Boundary 57.5" w/ hook	4
17	GE-20049	Boundary 66.25" w/ hook	4
18	GE-20057	Floor Protector Assembly, Left	2
19	GE-20058	Floor Protector Notched Carpeted Assembly, Right	2
20	GE-20067	Hard Stop, Large	2
21	GE-20068	Hard Stop, Small	2
22	GE-20500	Power Cell	10
24	hex_.625_11_2.00	Hex Head Bolt, 5/8"-11 Thread, 2" length	104
25	hexnut_.625_11	5/8"-11 hex nut	88
26	Light Assembly for Shield Generator_Blue	Light Assembly for Shield Generator_Red	3
27	Light Assembly for Shield Generator_Red	Light Assembly for Shield Generator_Red	3
28	StackLight_Assembly	Stack Light Assembly	2
29	washer_flat_.625	Flat washer for 5/8" screw	192



		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
		DIMENSIONS ARE IN INCHES	DRAWN			
		TOLERANCES:	CHECKED			
		FRACTIONAL $\pm 1/16$	ENG APPR.			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.			
		TWO PLACE DECIMAL $\pm .01$				
		THREE PLACE DECIMAL $\pm .001$				
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
		Q.A.				
		COMMENTS:				
	NEXT ASSY	USED ON	FINISH			
	APPLICATION		DO NOT SCALE DRAWING			
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.					
SCALE: 1:36	WEIGHT:	SHEET 1 OF 4				

FIRST ROBOTICS COMPETITION  SOLIDWORKS
Modeling Solutions Partner

Title:
Shield Generator

Size DWG. NO. **B** GE-20000 **Rev**

4

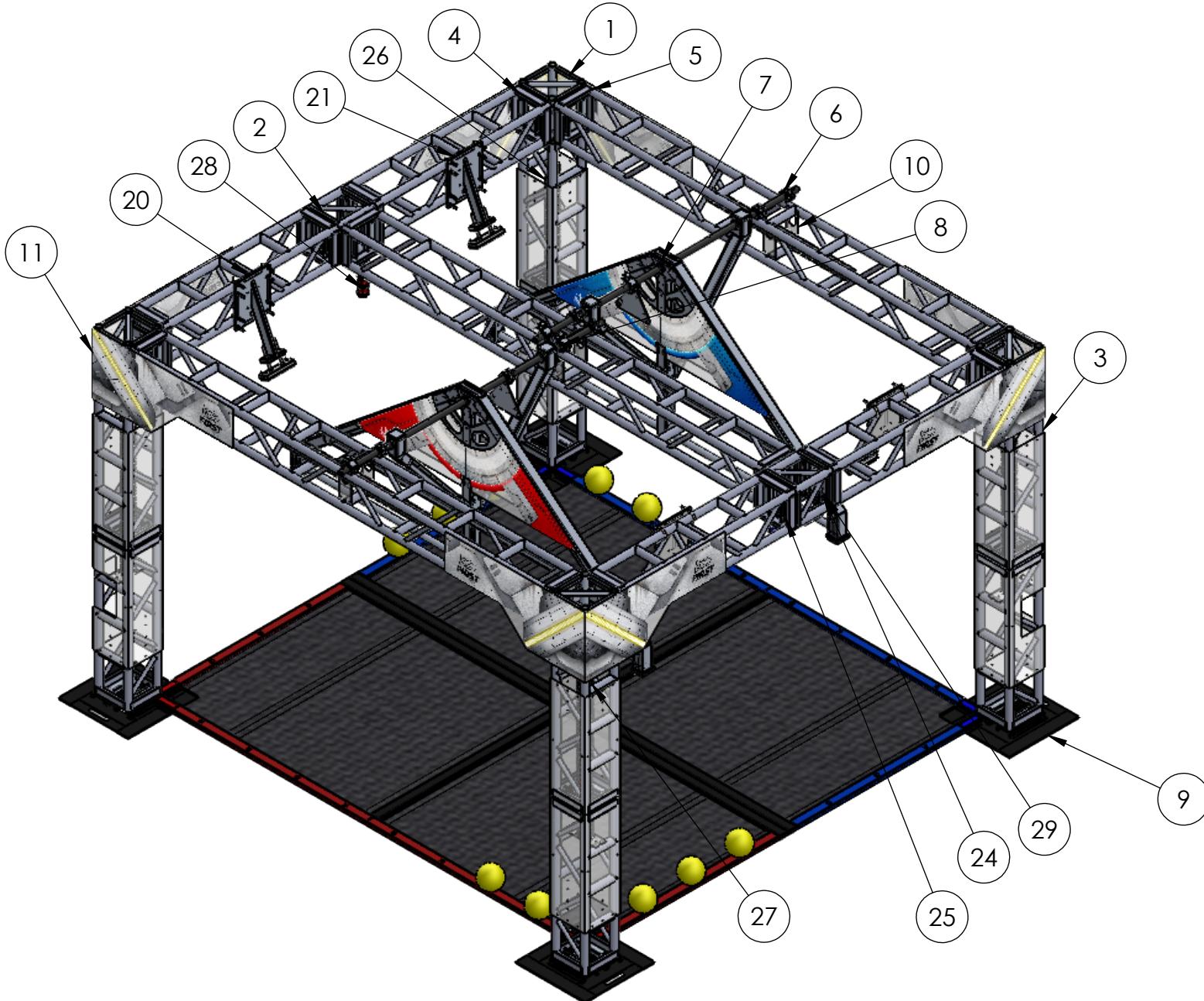
3

2

1

B

B



Notes:

1. (1), (2), (3), (4), (5) are attached via (24), (25), (29), and secured to the field carpet via (9). These parts have volunteer requirements for assembly.
2. (7) is attached to (5) via (6) and aligned using (10). Lifting and securing (7) has volunteer requirements.
3. Attach (8) flush to (6) on both (7) assemblies.
4. Attach (20) and (21) using appropriate hardware.
5. Secure (27) and (26) to Truss using 50-lb cable ties.
6. Secure (11) to Truss using 50-lb cable ties.
7. Secure (28) to Truss using 50-lb cable ties.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:36	WEIGHT:			SHEET 2 OF 4

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Shield Generator

B GE-20000

4

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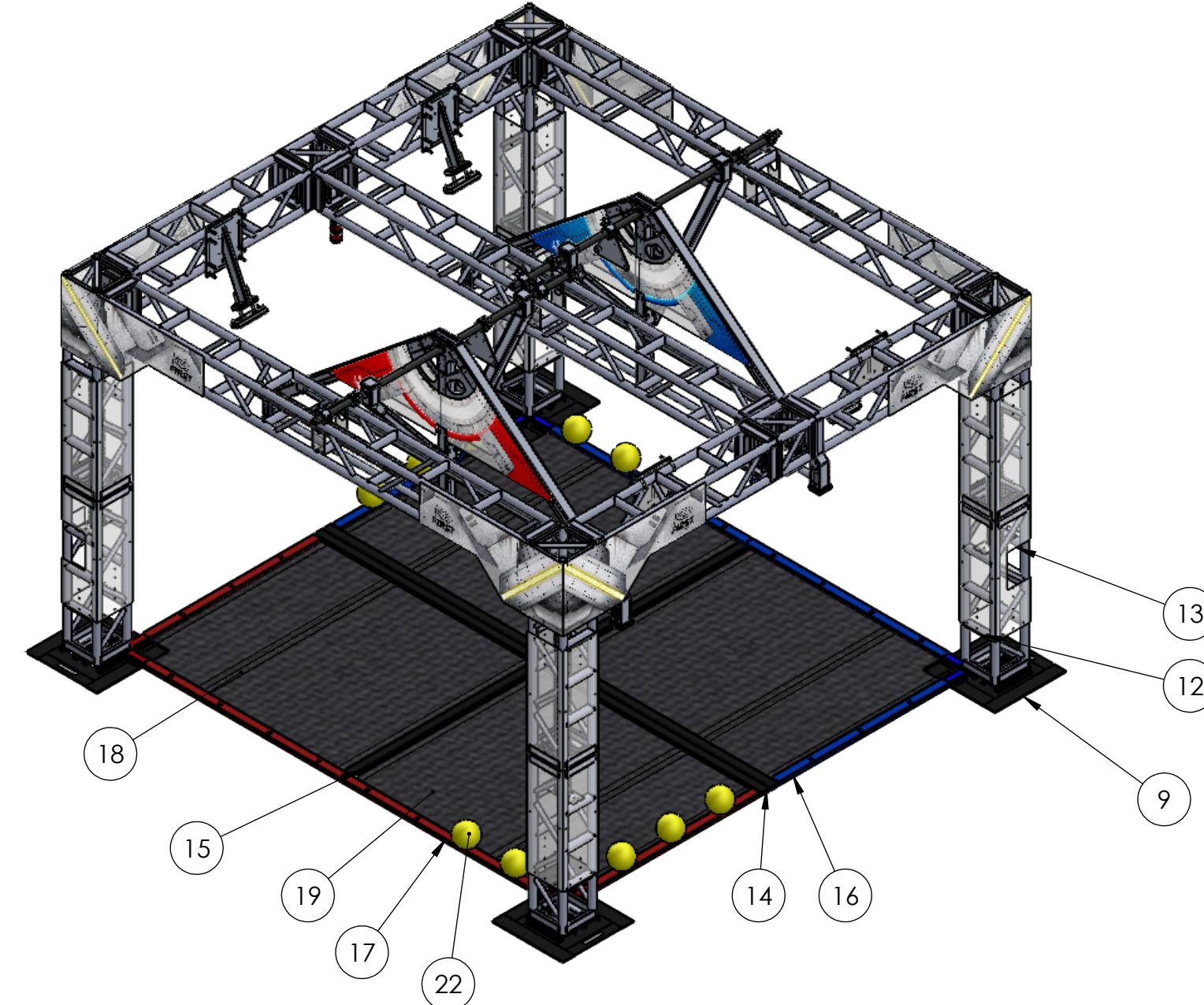
3

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Notes:

1. Align (17) and (16) with boundaries on (9). Apply colored Gaffers Tape to boundaries on (9).
2. Align 2X (14) between 2X (16).
3. Align center of (15) between 2X (17) and 2X (14).
4. Place (18) and (19) between Boundaries.
5. Attach (12) and (13) with 120-lb cable ties. Be sure (13) align with Trenches.
6. Place (22) on Boundaries as needed.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:36	WEIGHT:			SHEET 3 OF 4

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
 Modeling Solutions Partner

TITLE:
Shield Generator

SIZE DWG. NO. **B** GE-20000 **REV**

4

3

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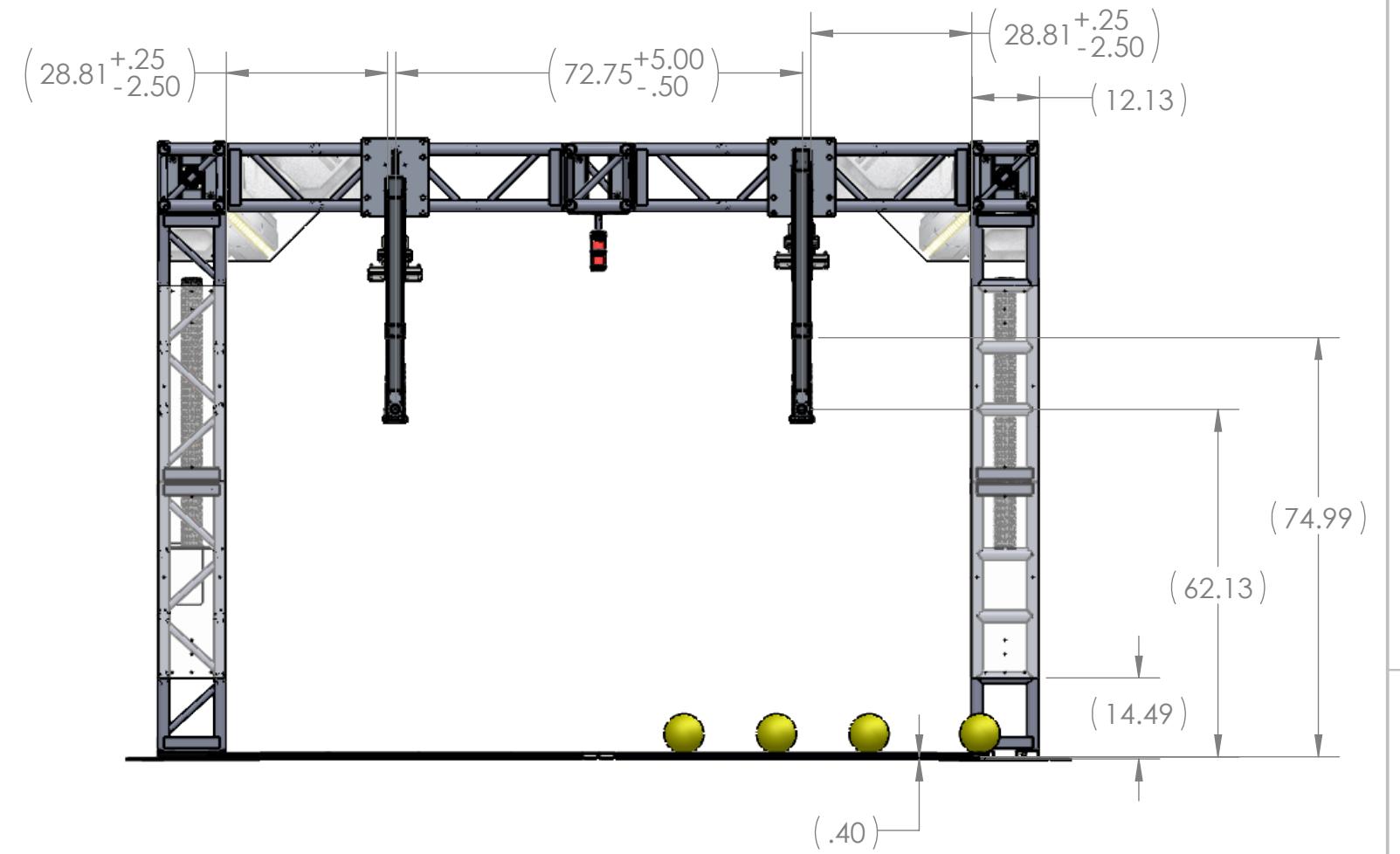
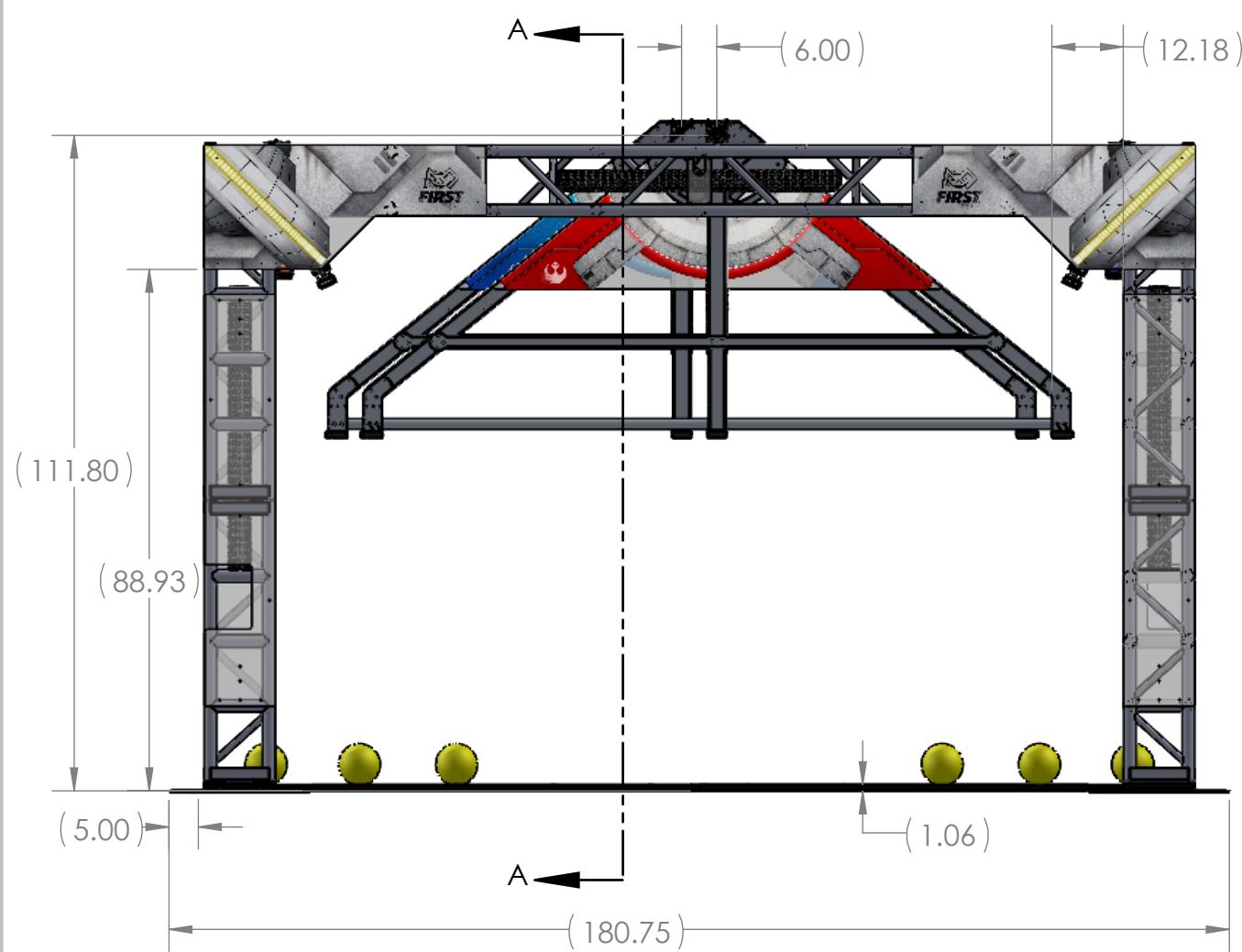
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SECTION A-A

A

A

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DIMENSIONS ARE IN INCHES		TOLERANCES:			
FRACTIONAL: ±1/16		ANGULAR: MACH ±1° BEND ±1°			
TWO PLACE DECIMAL: ±.01		THREE PLACE DECIMAL: ±.001			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: **Shield Generator**

SIZE DWG. NO. **B** **GE-20000** **REV**

SCALE: 1:30 WEIGHT: SHEET 4 OF 4

4

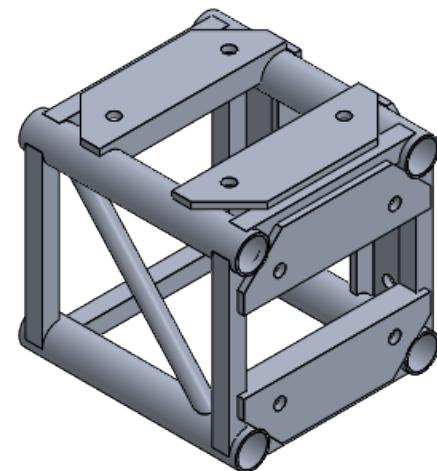
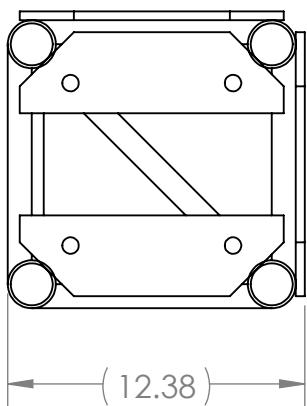
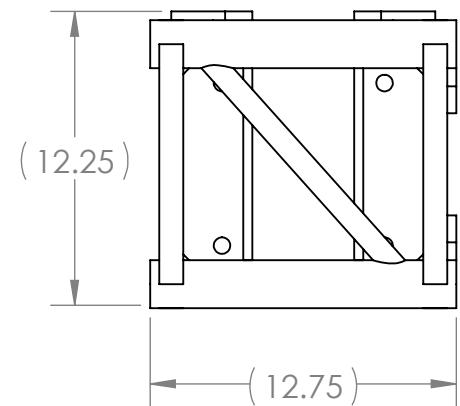
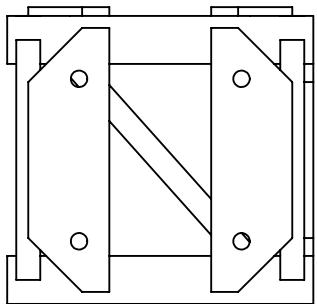
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added Note	10/28/2019	KAMC



DESCRIPTION: 6061-T6 ALUMINUM - LIGHT DUTY TRUSS,
3-SIDED CORNER BLOCK

VENDOR: TOTAL STRUCTURES

PART NUMBER: TS 1212LD-C3P

NOTE: SUBSTITUTIONS NOT ALLOWED

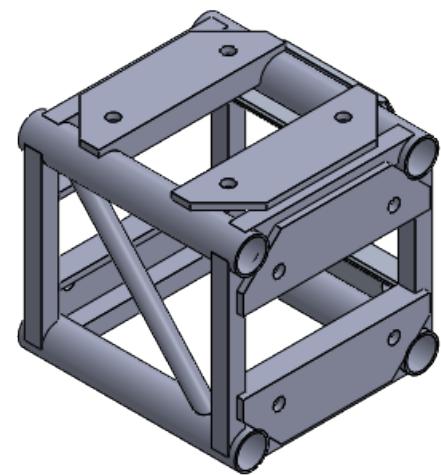
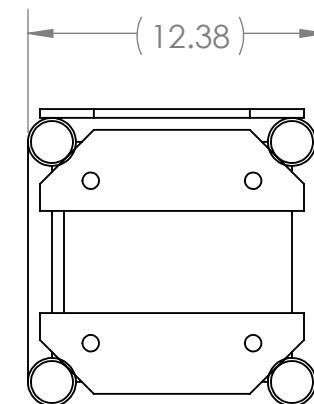
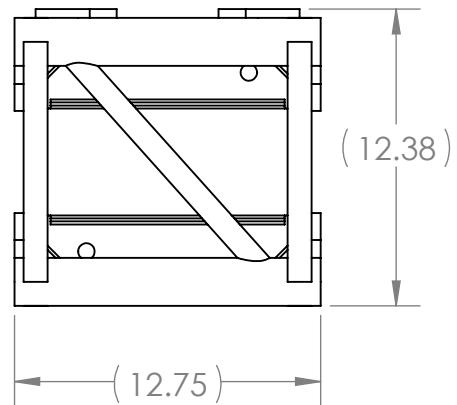
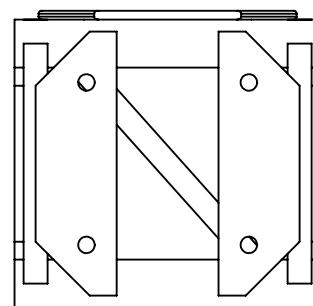
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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: TS 1212LD-C3P, 3 Way Corner Block Light Duty Truss, Total Structures

SIZE DWG. NO. **B** GE-20001 **REV** **A**
SCALE: 1:8 WEIGHT: SHEET 1 OF 1



DESCRIPTION: 6061-T6 ALUMINUM - LIGHT DUTY TRUSS,
4-SIDED CORNER BLOCK

VENDOR: TOTAL STRUCTURES

PART NUMBER: TS 1212LD-C4P

NOTE: SUBSTITUTIONS NOT ALLOWED

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added Note	10/28/2019	KAMC

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC DATE 9/23/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED
		MATERIAL	ENG APPR. MFG APPR.
		FINISH	Q.A.
NEXT ASSY	USED ON	COMMENTS:	
APPLICATION	DO NOT SCALE DRAWING		

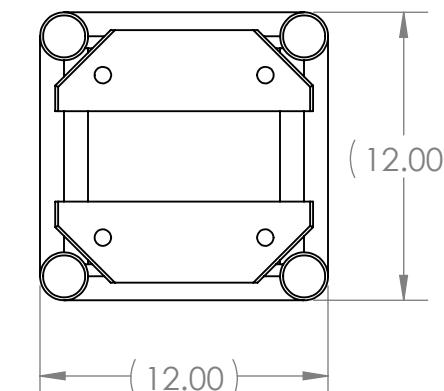
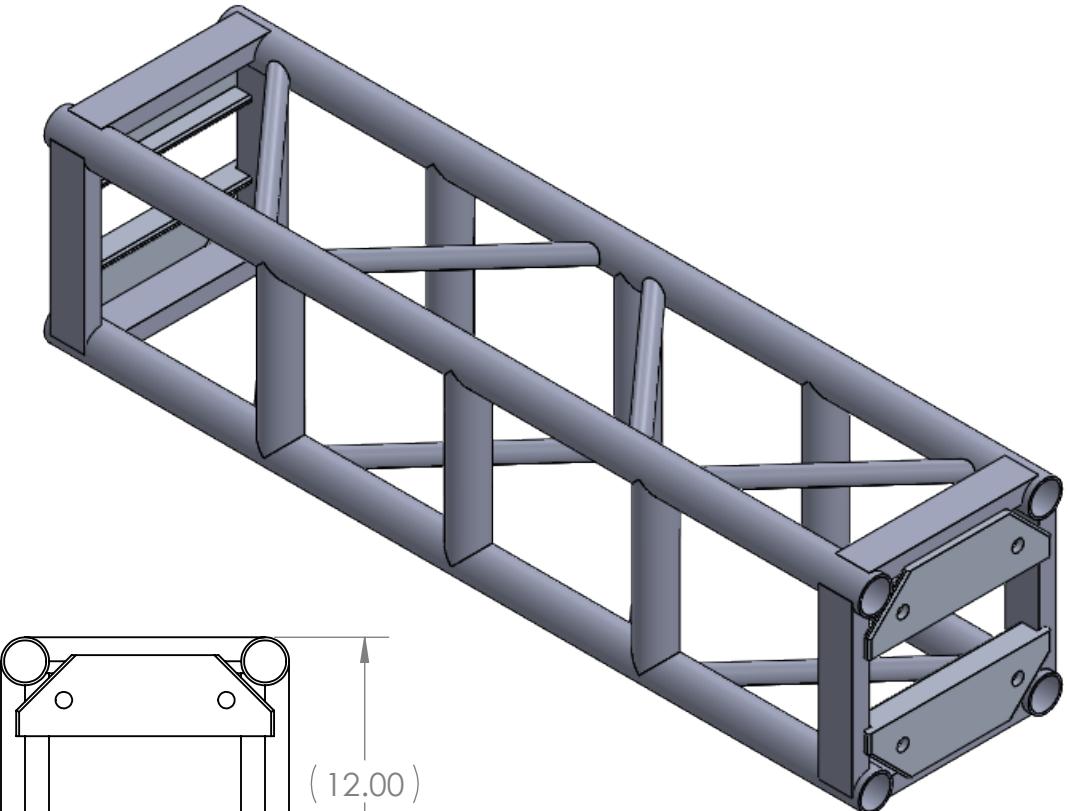
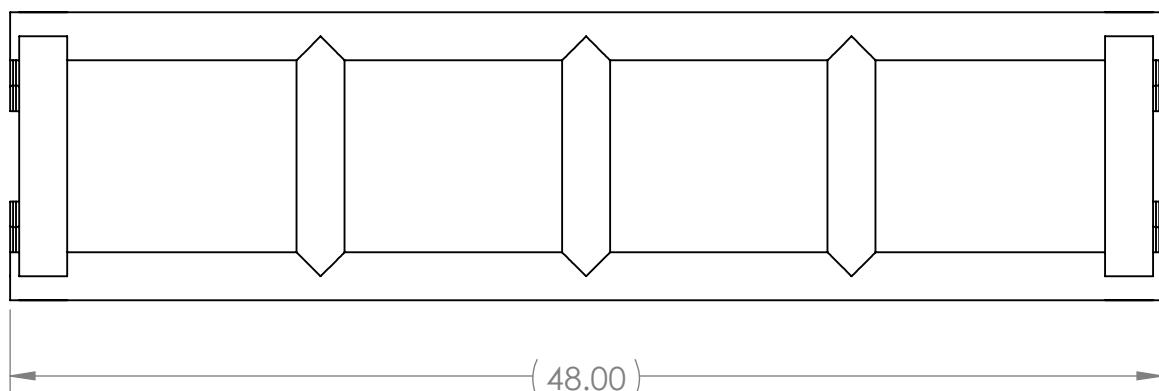
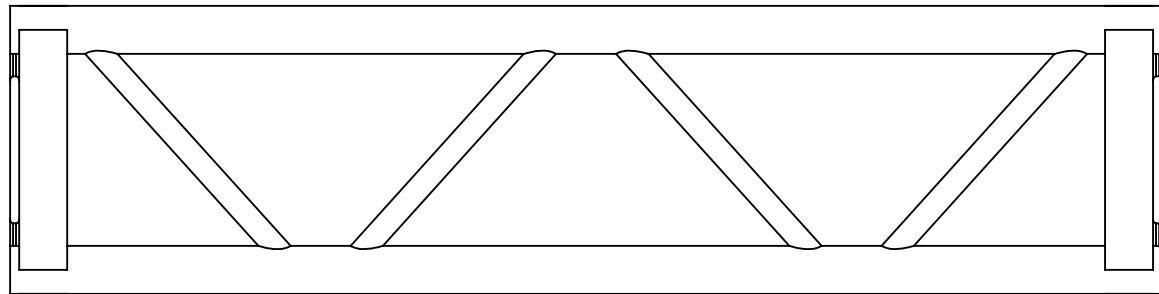
FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: TS 1212LD-C4P, 4 Way Corner Block Light Duty Truss, Total Structures

SIZE DWG. NO. **B** GE-20002 **REV** **A**
SCALE: 1:8 WEIGHT: SHEET 1 OF 1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added Note	10/28/2019	KAMC



DESCRIPTION: 6061-T6 ALUMINUM - LIGHT DUTY TRUSS,
48" X 12" X 12"

VENDOR: TOTAL STRUCTURES

PART NUMBER: TS 1212LD-048P

NOTE: SUBSTITUTIONS NOT ALLOWED



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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

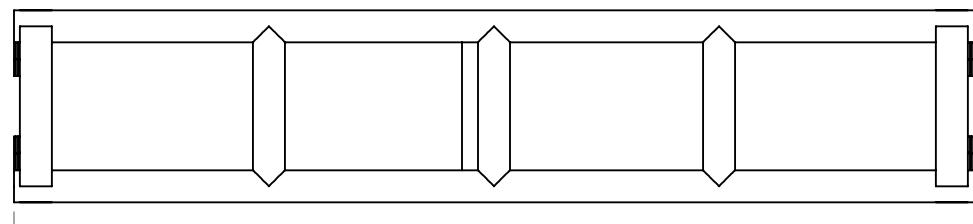
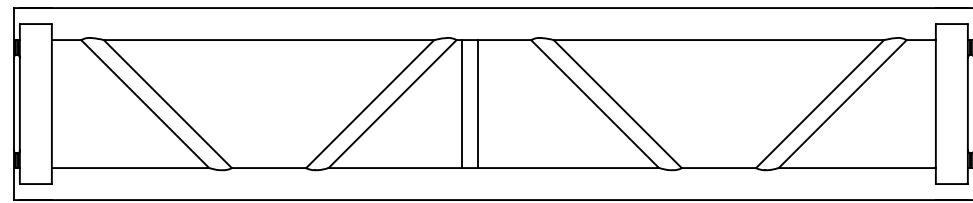
TITLE: TS 1212LD-48P, 48" x 12" x 12" Light Duty Truss, Total Structures

SIZE DWG. NO. **B** GE-20003 **REV**

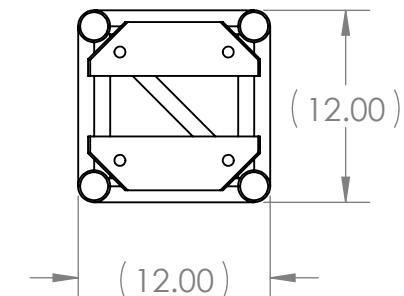
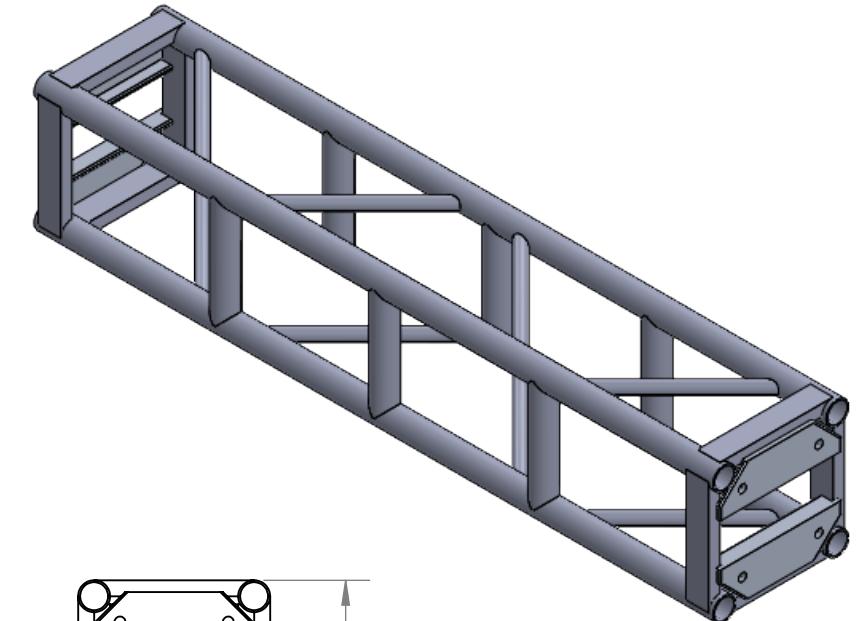
SCALE: 1:8 WEIGHT: SHEET 1 OF 1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added Note	10/28/2019	KAMC



(60.00)



DESCRIPTION: 6061-T6 ALUMINUM - LIGHT DUTY TRUSS,
60" X 12" X 12"

VENDOR: TOTAL STRUCTURES

PART NUMBER: TS 1212LD-060P

NOTE: SUBSTITUTIONS NOT ALLOWED

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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION SOLIDWORKS
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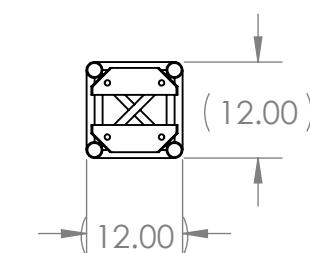
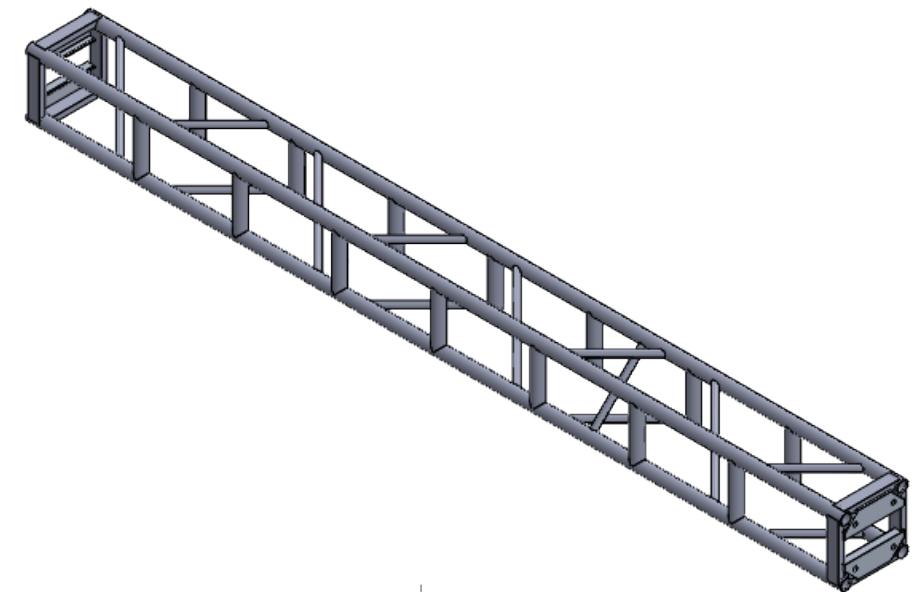
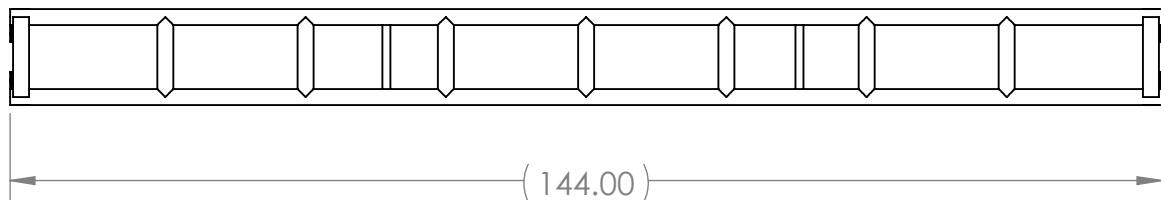
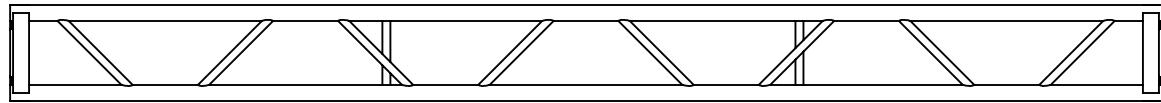
TITLE: TS 1212LD-60P, 60" x 12" x 12" Light Duty Truss, Total Structures

SIZE DWG. NO. **B** GE-20004 **REV**

SCALE: 1:12 WEIGHT: SHEET 1 OF 1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added Note	10/28/2019	KAMC



DESCRIPTION: 6061-T6 ALUMINUM - LIGHT DUTY TRUSS,
144" X 12" X 12"

VENDOR: TOTAL STRUCTURES

PART NUMBER: TS 1212LD-144P

NOTE: SUBSTITUTIONS NOT ALLOWED

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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION SOLIDWORKS
Modeling Solutions Partner

TITLE: TS 1212LD-144P, 144" x 12"
x 12" Light Duty Truss,
Total Structures

SIZE DWG. NO. **REV**
B GE-20005 **A**

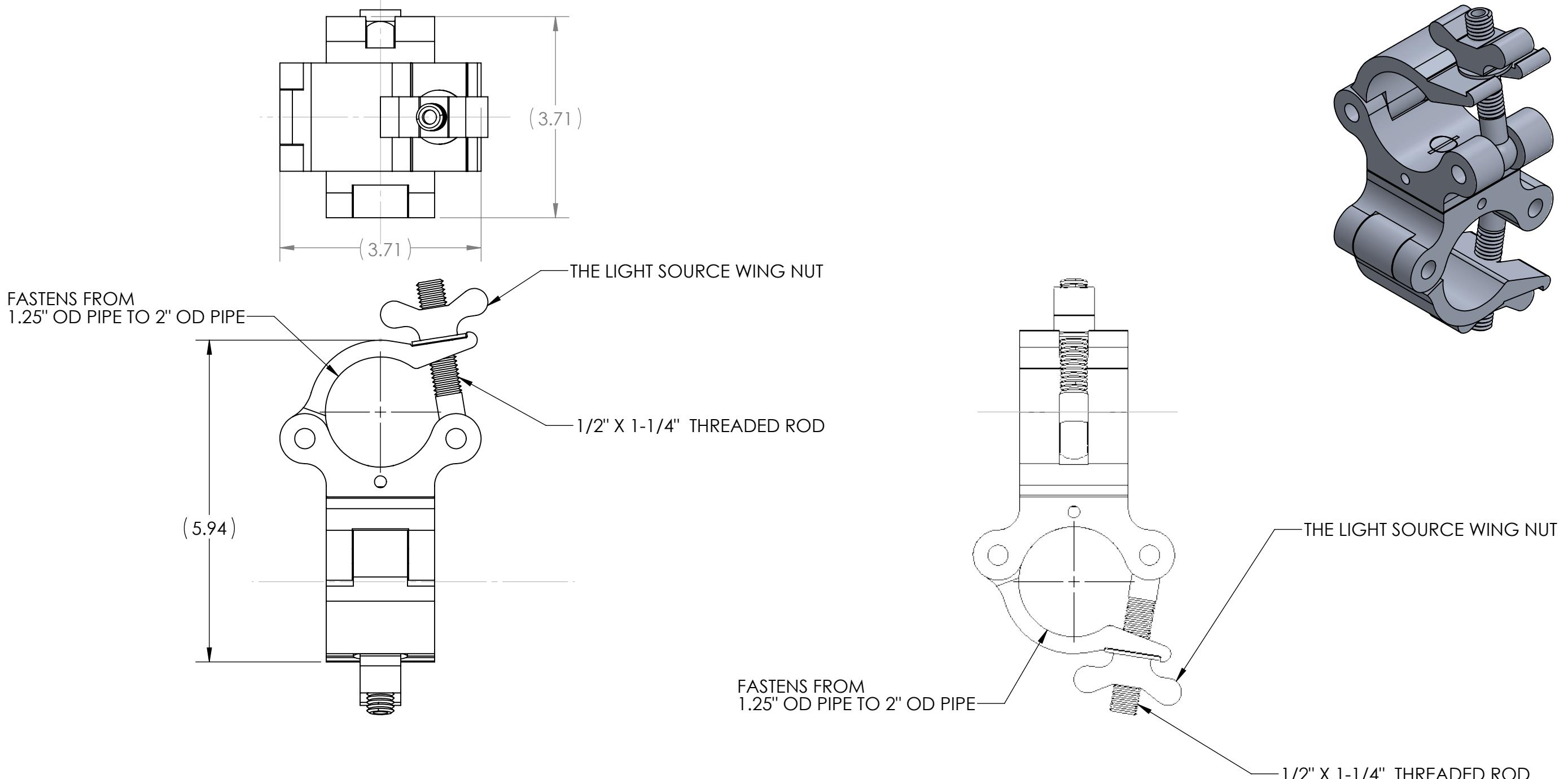
SCALE: 1:24 WEIGHT: SHEET 1 OF 1

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1



DESCRIPTION: STACKED, 90 DEG OFF SET, CHEESE BOROUGH
FOR TRUSS - MEGA-SWIVEL COUPLER, SILVER

VENDOR: TOTAL STRUCTURES VIA THE LIGHT SOURCE

PART NUMBER: MLSM MEGA COUPLER

NOTE: SUBSTITUTIONS NOT ALLOWED

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		DRAWN	CHECKED	ENG APPR.
				MFG APPR.
		Q.A.	COMMENTS:	
		MATERIAL	CHEESEBOROUGH NAME BRAND: MEGA COUPLER	
NEXT ASSY	USED ON	FINISH SILVER		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Cheeseborough for Truss _ Stacked

SIZE DWG. NO. **B** GE-20006 **REV** **0**

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4

3

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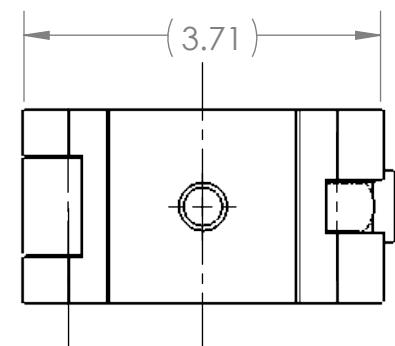
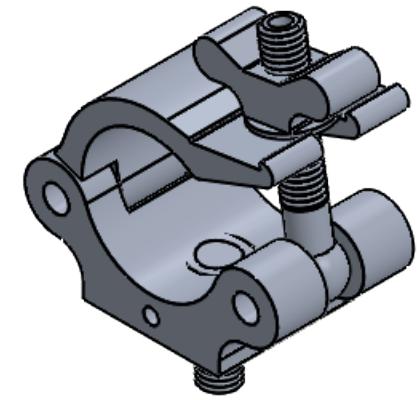
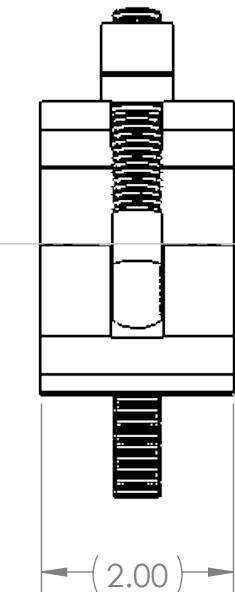
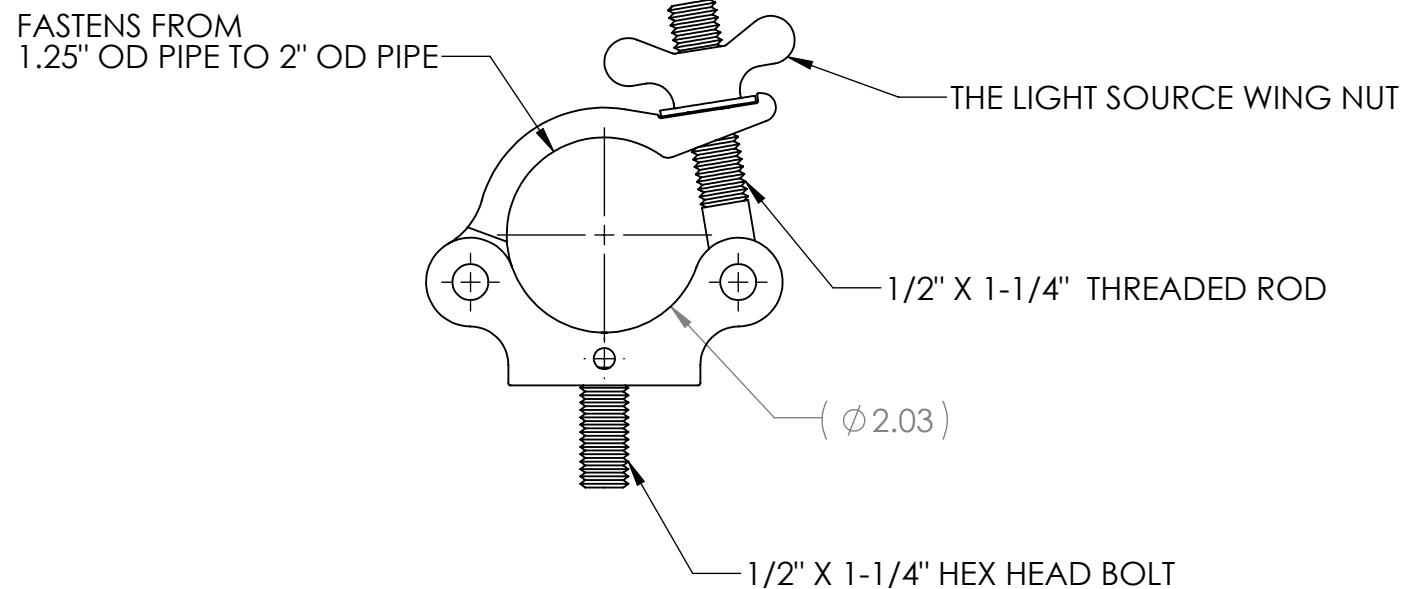
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DESCRIPTION: CHEESE BOROUGH FOR TRUSS - MLM MEGA COUPLER, SILVER

VENDOR: TOTAL STRUCTURES VIA THE LIGHT SOURCE

PART NUMBER: MLM MEGA COUPLER

NOTE: SUBSTITUTIONS NOT ALLOWED

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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	
NEXT ASSY	USED ON	FINISH SILVER	COMMENTS: CHEESEBOROUGH NAME BRAND: MEGA COUPELR	
	APPLICATION	DO NOT SCALE DRAWING	SIZE B	DWG. NO. GE-20007
			REV 0	SCALE: 1:2
			WEIGHT:	SHEET 1 OF 1

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Cheeseborough
for Truss _ Single**

SIZE **B** DWG. NO. **GE-20007** REV **0**

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4

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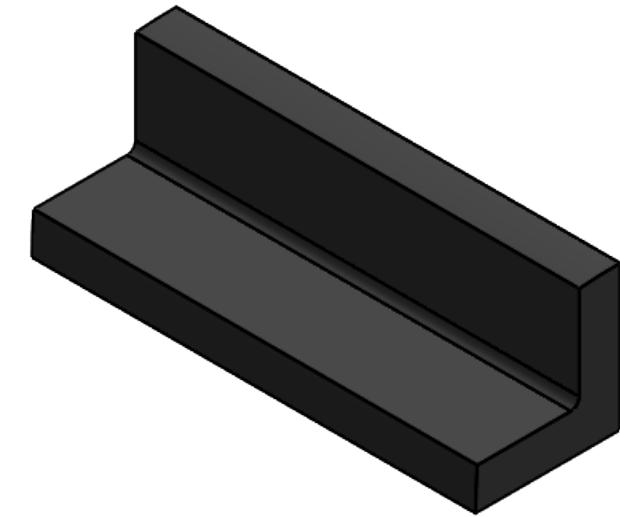
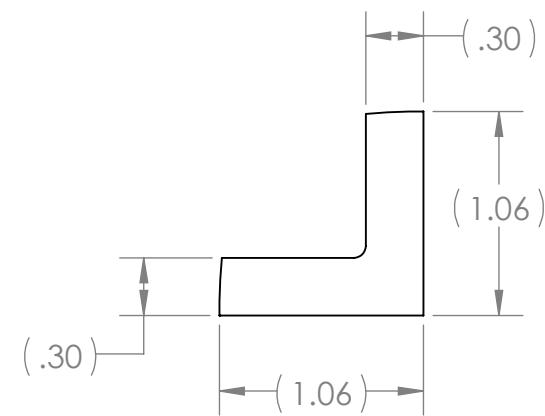
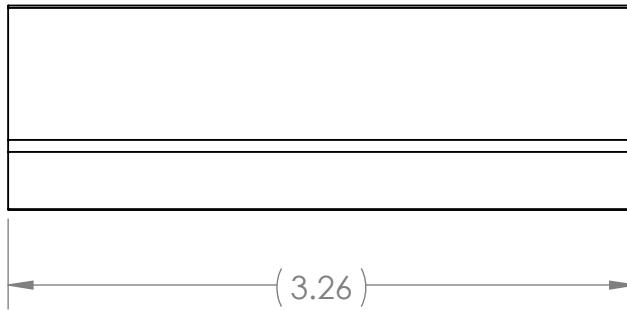
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B

B



A

A

DESCRIPTION: SAFETY EDGE & CORNER GAURD, NBR FOAM, ONYX

VENDOR: ROVING COVE

PART NUMBER: 1305

PACKAGE QUANTITY: 18FEET

NOTE: CUT TO LENGTH

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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	
	NEXT ASSY	USED ON	COMMENTS: FINISH	
			APPLICATION	DO NOT SCALE DRAWING
B		GE-20008		REV
SCALE: 1:1		WEIGHT:	SHEET 1 OF 2	

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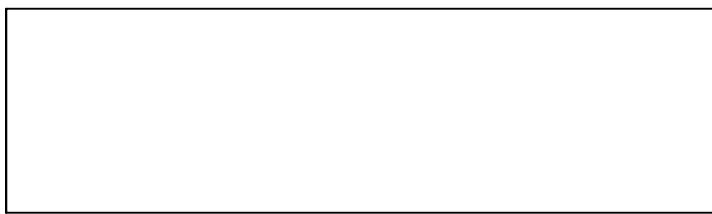
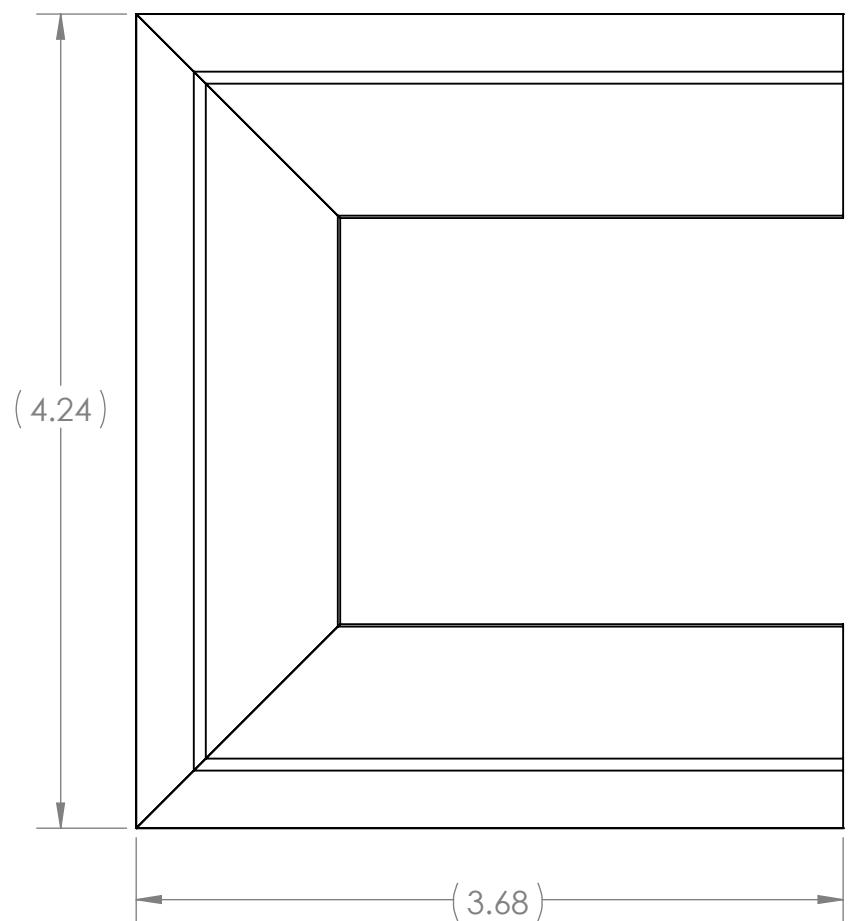
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DESCRIPTION: SAFETY EDGE & CORNER GAURD, NBR FOAM, ONYX

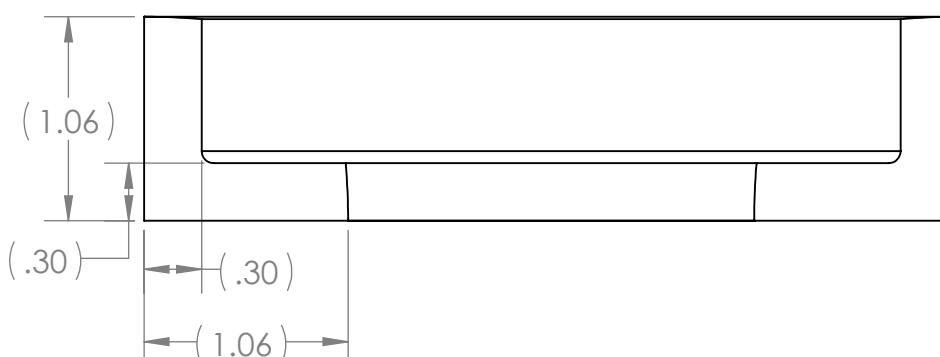
VENDOR: ROVING COVE

PART NUMBER: 1305

PACKAGE QUANTITY: 18FEET

NOTE: CUT TO LENGTH

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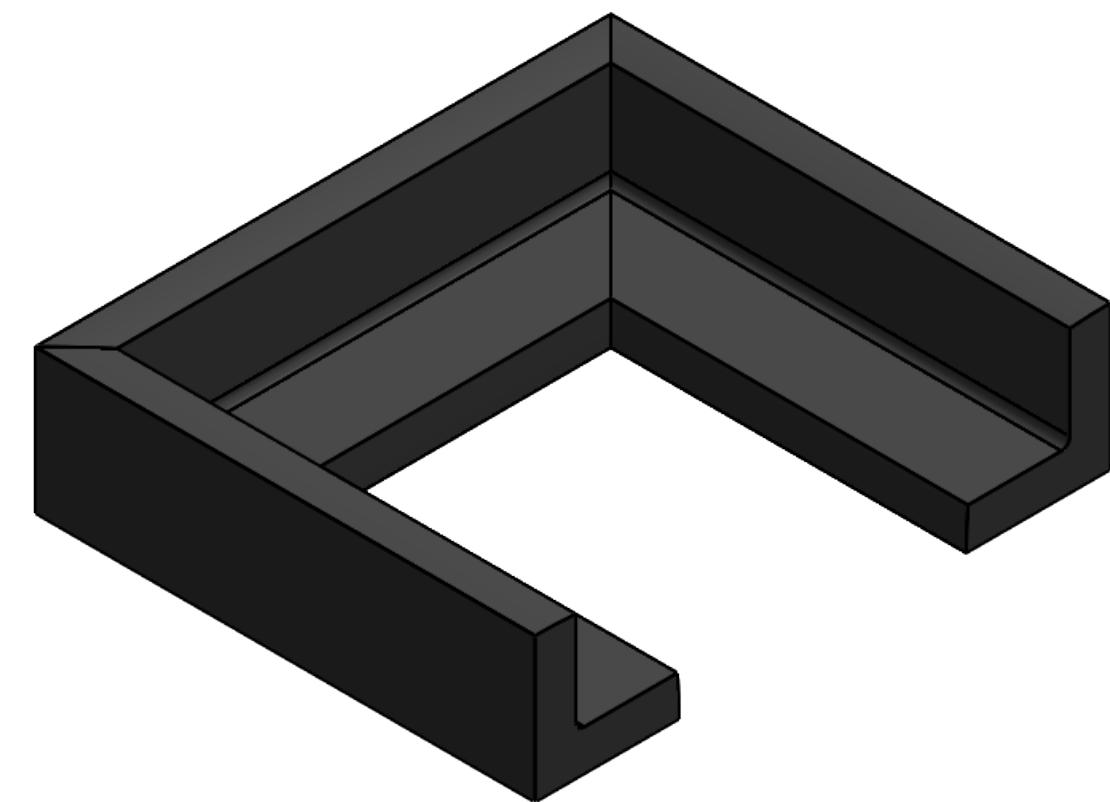


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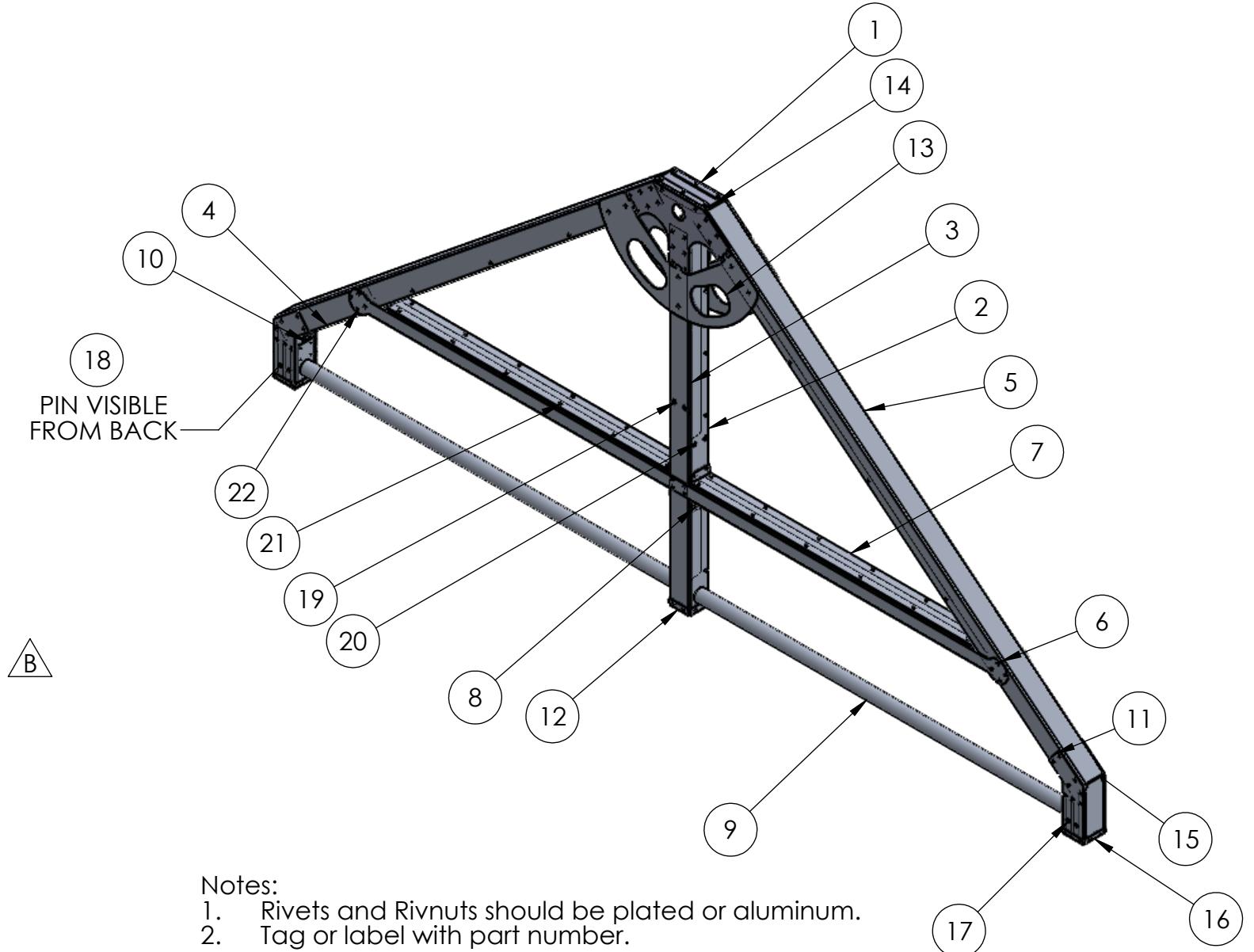
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001		NAME KAMC	DATE 12/15/19
		INTERPRET GEOMETRIC TOLERANCING PER:		ENG APPR. MFG APPR.	
		MATERIAL		Q.A.	
	NEXT ASSY	USED ON	FINISH		COMMENTS:
	APPLICATION		DO NOT SCALE DRAWING		

FIRST[®] ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**Foam Cushion for
Generator Switch**
SIZE DWG. NO. REV
B GE-20008
SCALE: 1:1 WEIGHT: SHEET 2 OF 2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20010 - 01	Hanger - Top	2
2	GE-20010 - 02	Hanger - Center Leg	1
3	GE-20010 - 03	Hanger - Center Leg, Face	1
4	GE-20010 - 04	Hanger - Side Leg	2
5	GE-20010 - 05	Hanger - Side Leg, Face	2
6	GE-20010 - 06	Hanger - Cross Bar	2
7	GE-20010 - 07	Hanger - Cross Bar, Top	2
8	GE-20010 - 08	Hanger - Cross Bar, Bottom	2
9	GE-20010 - 09	Hanger - Hanging Pole	1
10	GE-20010 - 10	Hanger - Hanging Pole Holder	4
11	GE-20010 - 11	Hanger - Hanging Pole Holder, Face	4
12	GE-20010 - 12	Hanger - Center Leg, End Cap	1
13	GE-20010 - 13	Hanger - Sensor Feature	2
14	GE-20010 - 14	Hanger - Top, Face	1
15	GE-20010 - 15	Hanger - Hanging Pole Holder, End	2
16	GE-20010 - 16	Hanger - Hanging Pole Holder, End Cap	2
17	pin_clevis_.25_3.5	Clevis Pin, 1/4" diameter, 3.5" length	4
18	pin_hairpincotter_0.078_1.5	Cotter Pin_ 0.078in x 1.5in	4
19	rivnut_.25_20_.027-.165	Rivnut, 1/4"-20 bolt, material thickness: .027" - .165"	4
20	rivnut_.25_20_.165-.260	Rivnut, 1/4"-20 bolt, material thickness: .165"-.260"	4
21	rivet_.1875_.251-375	3/16" Aluminum Rivet, .251-.375 Grip Range	130
22	rivet_.1875_.376-5	3/16" Aluminum Rivet, .376-.5 Grip Range	92

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MULTIPLE PARTS UPDATED, WEIGHT UPDATED, OVERALL ASSEMBLY OTHERWISE UNCHANGED	9/10/2019	KAMC
A3, 8-B2	B	POST PRODUCTION - CHANGED PIN TO COTTER PIN STYLE	11/18/2019	KAMC



Notes:

1. Rivets and Rivnuts should be plated or aluminum.
2. Tag or label with part number.

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC DATE 9/10/19	
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	CHECKED ENG APPR. MFG APPR.	TITLE: Hanger
	GE-20015		Q.A. COMMENTS: WEIGHT: 67.14 LBS	
NEXT ASSY	USED ON	FINISH BARE		SIZE DWG. NO. B GE-20010 REV B
APPLICATION		DO NOT SCALE DRAWING	SCALE: 1:16	WEIGHT: SHEET 1 OF 8

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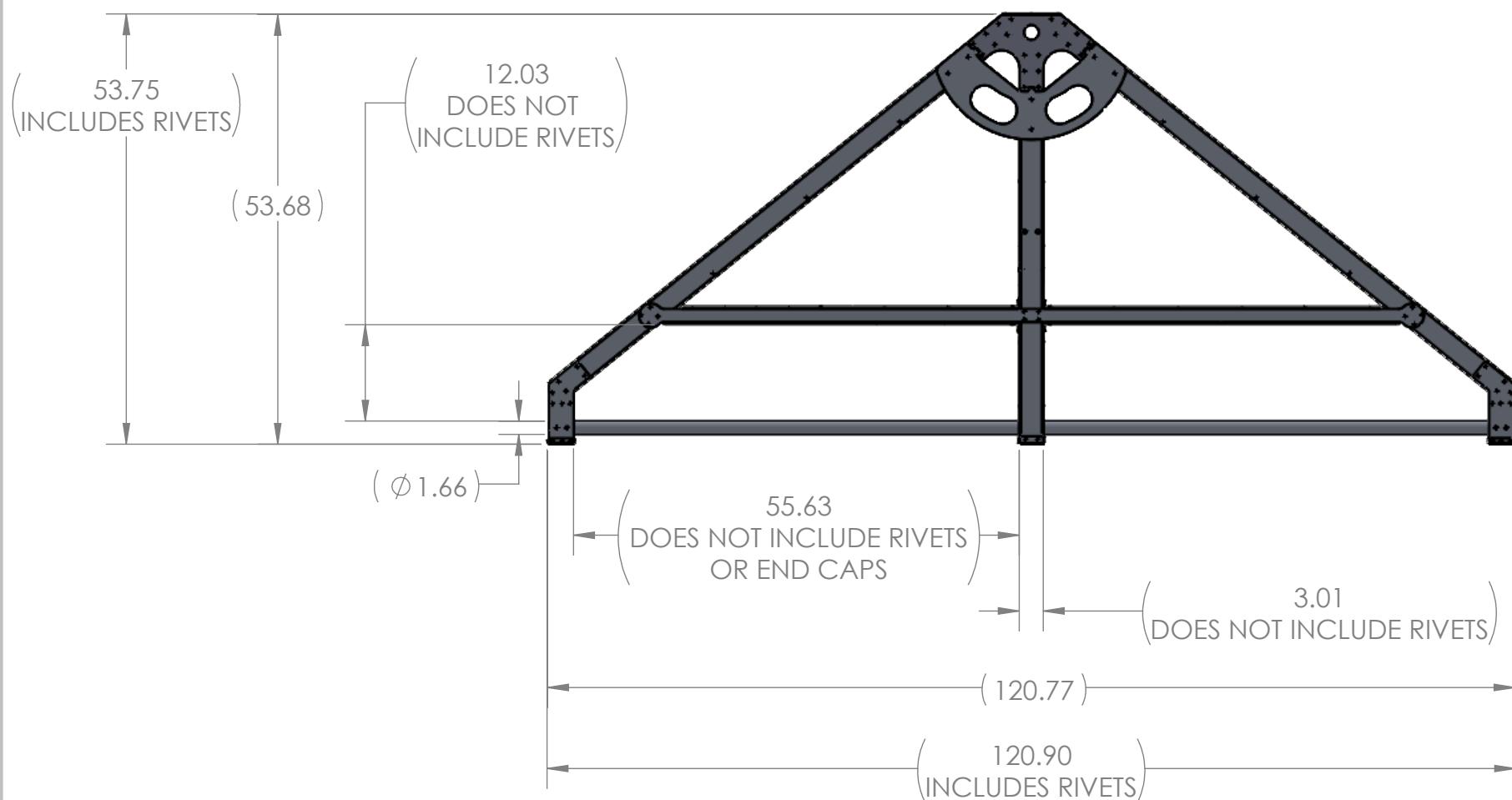
REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

B

B

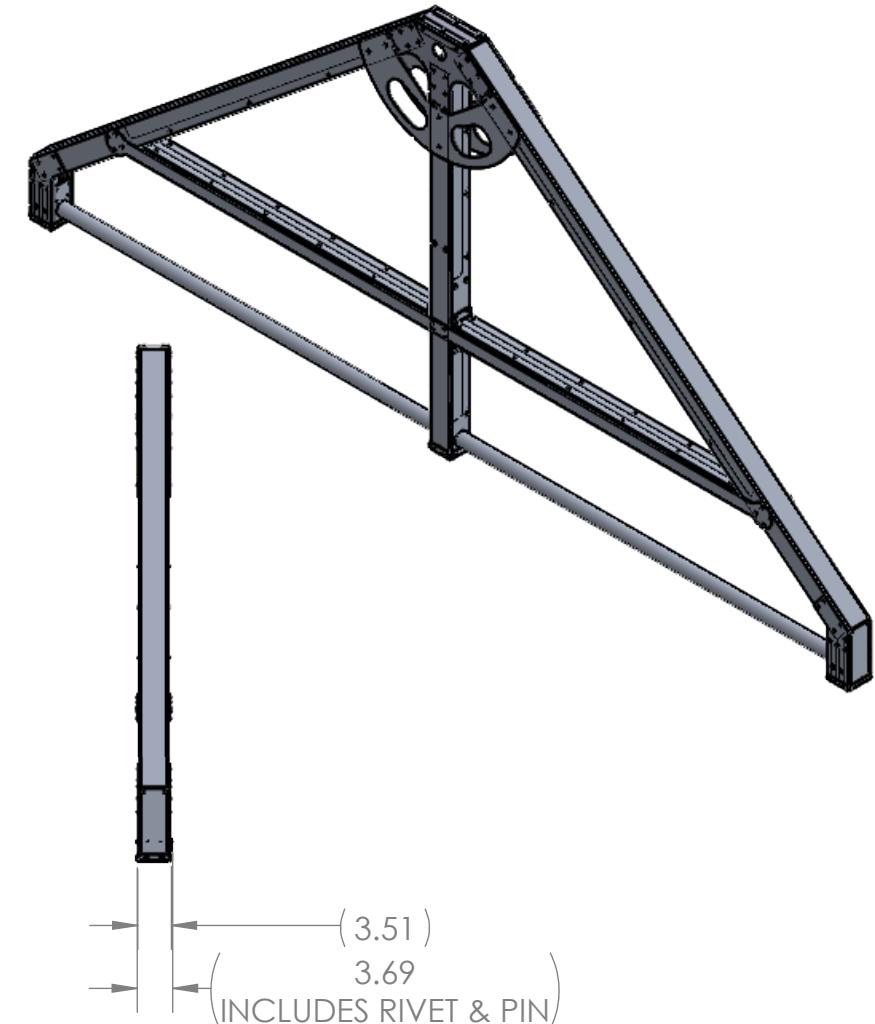
Note: Assembly is symmetric - Left/Right



DIMENSIONS SHOWN FOR REF.

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		INTERPRET GEOMETRIC TOLERANCING PER:		CHECKED ENG APPR. MFG APPR.
	GE-20015	MATERIAL		Q.A. COMMENTS:
	NEXT ASSY	USED ON	FINISH BARE	WEIGHT SHOWN ON SHEET 1
		APPLICATION	DO NOT SCALE DRAWING	SIZE DWG. NO. B GE-20010 REV B
				SCALE: 1:20 WEIGHT: SHEET 2 OF 8



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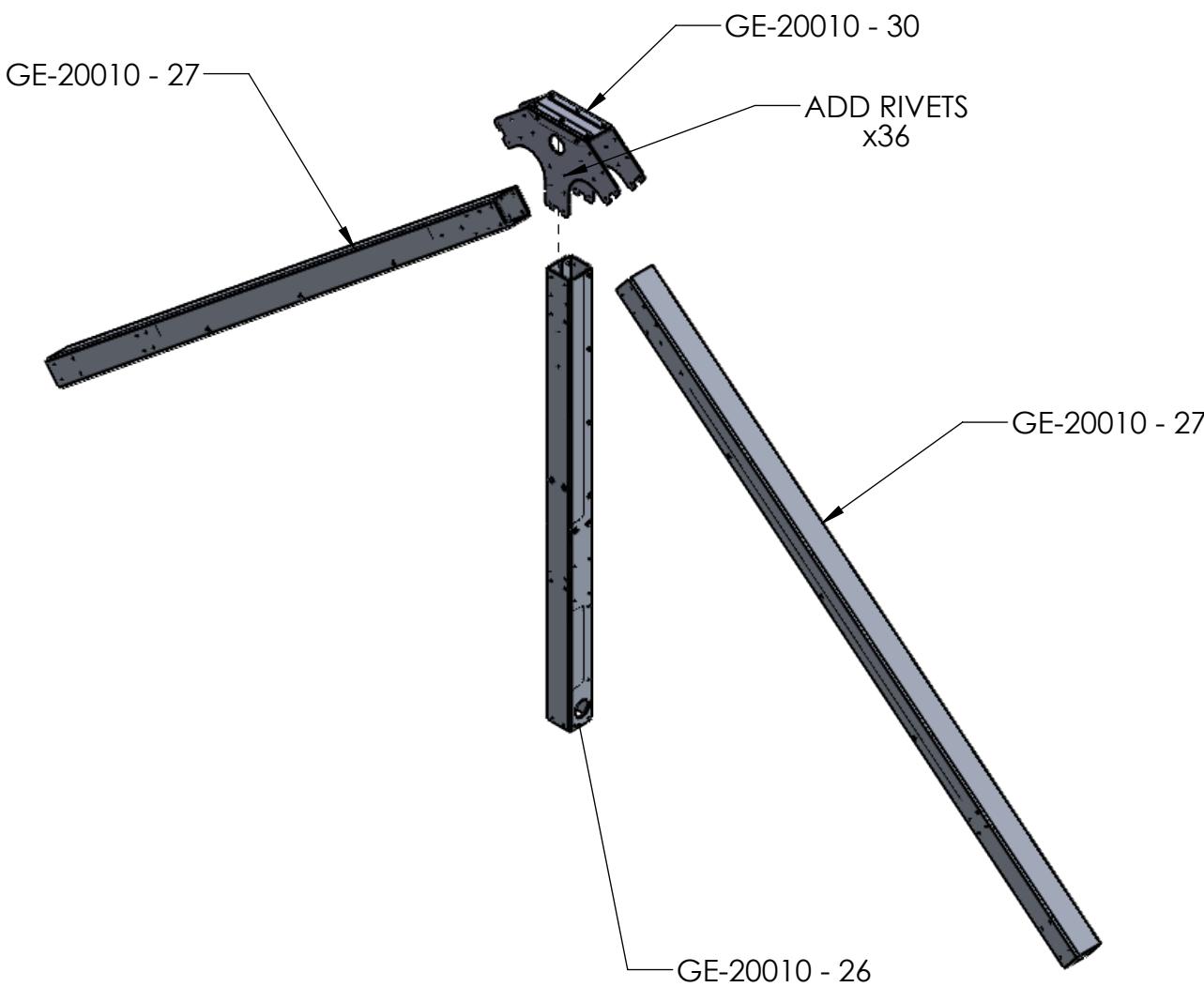
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



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		CHECKED ENG APPR. MFG APPR.	TITLE: Hanger
		Q.A. COMMENTS:	
INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	NEXT ASSY USED ON FINISH APPLICATION	REV B	
MATERIAL	FINISH BARE	DWG. NO. GE-20010	
APPLICATION	DO NOT SCALE DRAWING	SIZE B	
		SCALE: 1:16	
		WEIGHT:	
		SHEET 3 OF 8	

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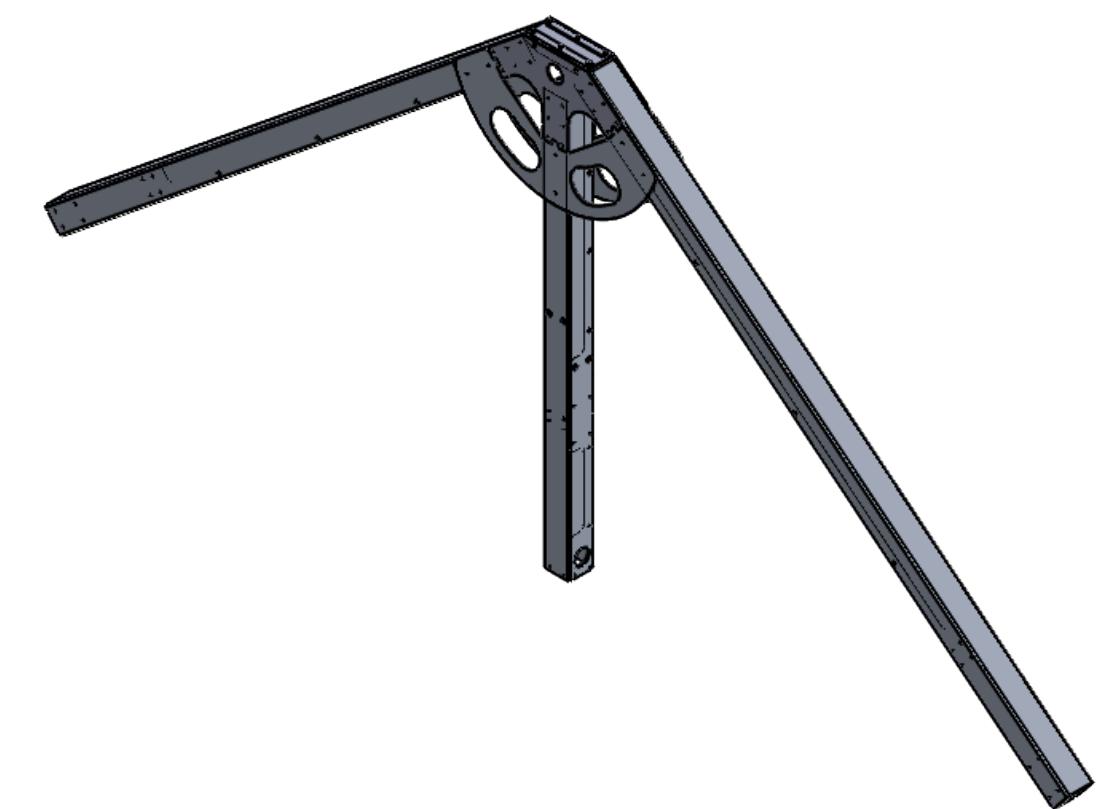
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		INTERPRET GEOMETRIC TOLERANCING PER:		CHECKED	
		MATERIAL		ENG APPR.	
		FINISH		MFG APPR.	
NEXT ASSY	USED ON		Q.A.	COMMENTS:	
APPLICATION	DO NOT SCALE DRAWING				

SIZE	DWG. NO.	REV
B	GE-20010	B
SCALE: 1:16	WEIGHT:	SHEET 4 OF 8

FIRST ROBOTICS COMPETITION	SOLIDWORKS Modeling Solutions Partner
TITLE: Hanger	

4

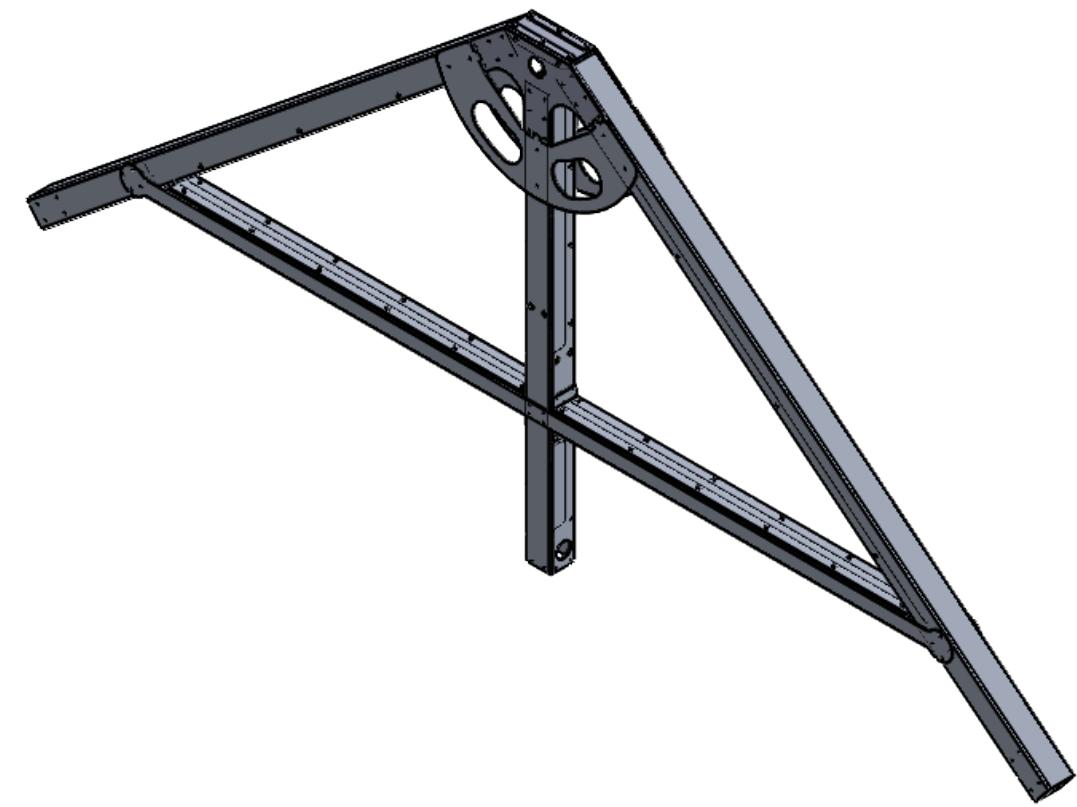
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



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		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger

B GE-20010 **B**

SIZE DWG. NO. REV.
SCALE: 1:16 WEIGHT: SHEET 5 OF 8

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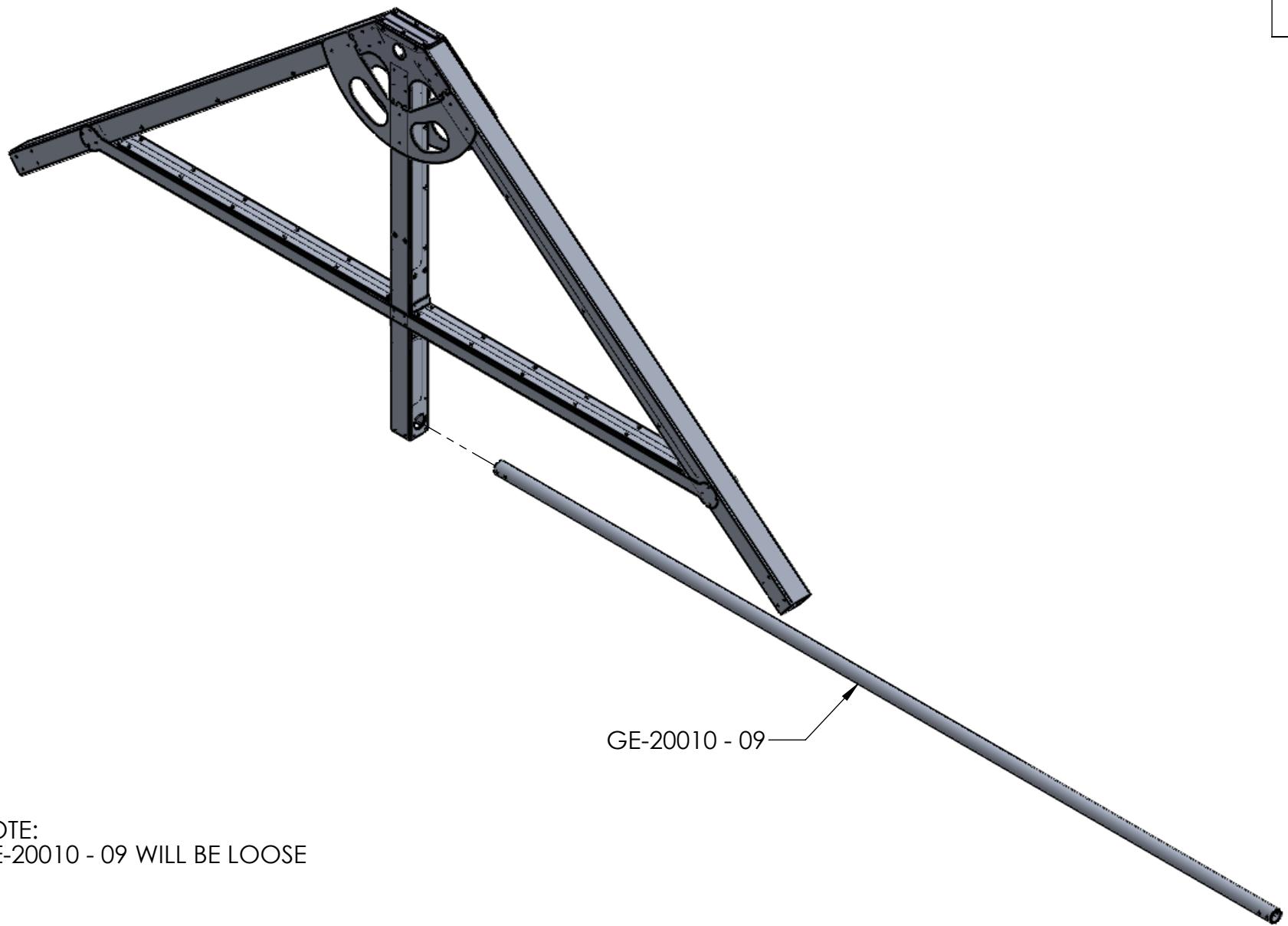
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NOTE:
GE-20010 - 09 WILL BE LOOSE

A

A

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	9/10/19	
		TOLERANCES:			
		FRACTIONAL $\pm 1/16$			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
		TWO PLACE DECIMAL $\pm .01$			
		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC			
		TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger

B **GE-20010** **B**

SIZE DWG. NO. REV
SCALE: 1:16 WEIGHT: SHEET 6 OF 8

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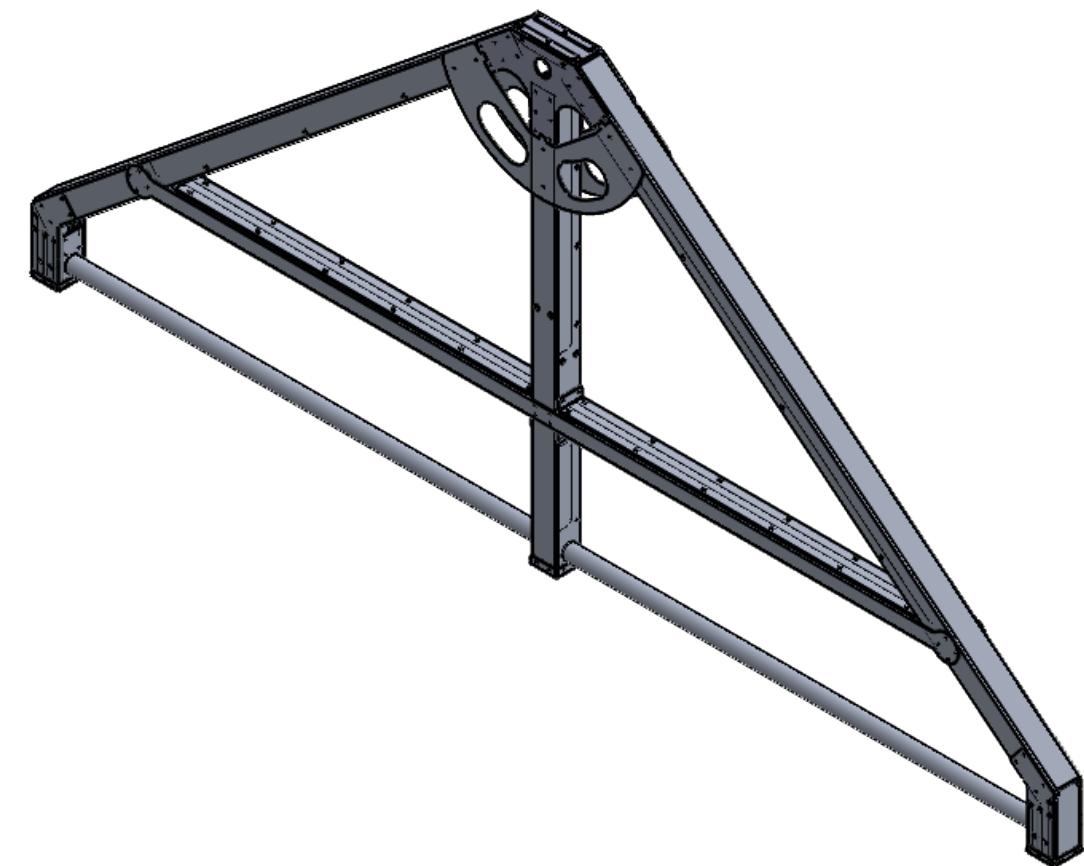
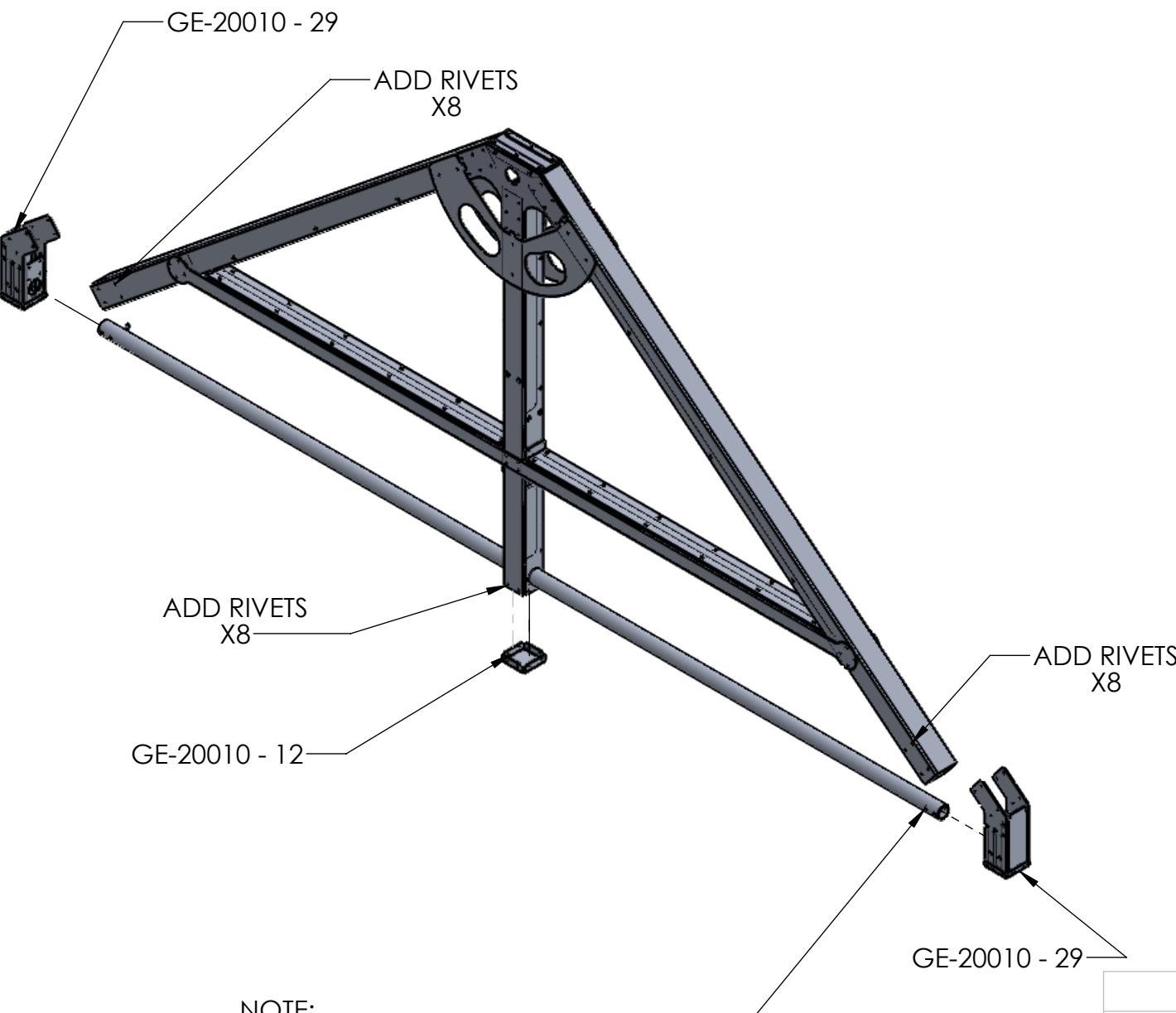
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



NOTE:
ALIGN HOLES IN GE-20010 - 09 WITH
THE SLOTS ON GE-20010 - 30,
SPECIFICALLY GE-20010 - 11
USE PINS TO LOCK POLE IN PLACE

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DRAWN	KAMC	9/10/19		
CHECKED				
ENG APPR.				
MFG APPR.				
Q.A.				
COMMENTS:				
SIZE	DWG. NO.		REV	
B	GE-20010		B	
SCALE: 1:16	WEIGHT:			SHEET 7 OF 8

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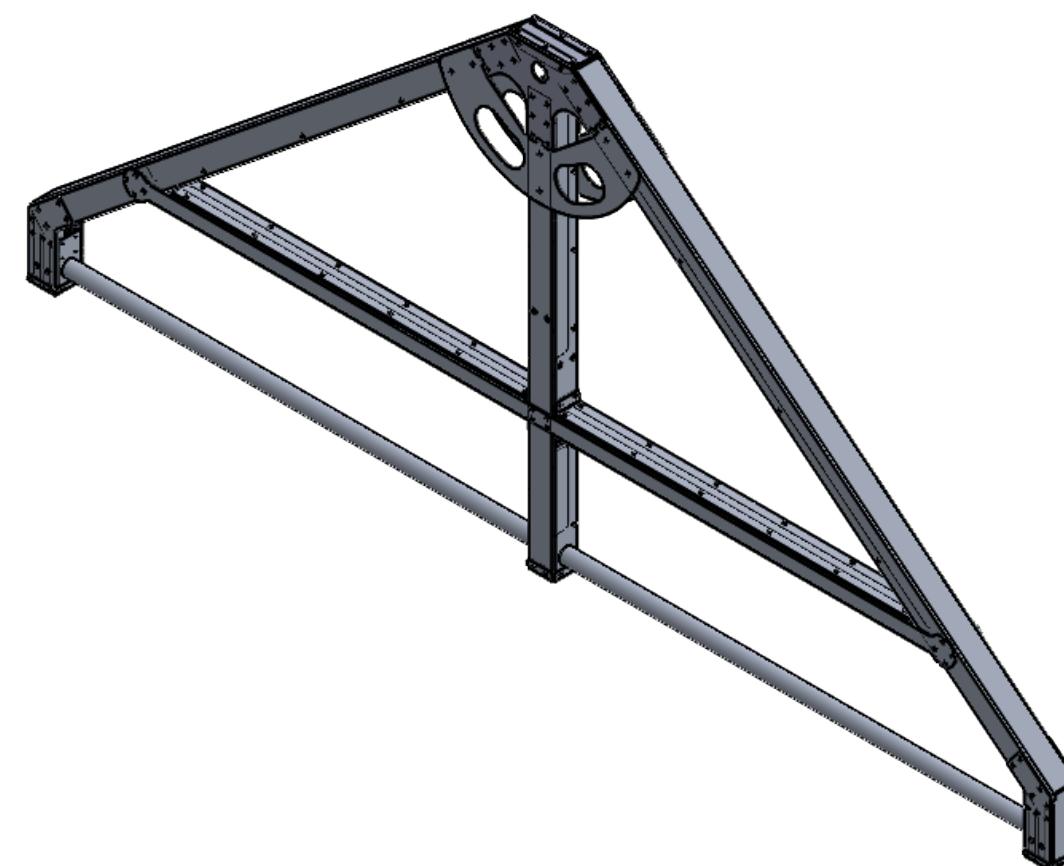
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	pin_clevis_.25_3.5	Clevis Pin, 1/4" diameter, 3.5" length	4
2	pin_hairpincotter_0.078_1.5	Cotter Pin_ 0.078in x 1.5in	4
3	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	28
4	GE-20010 - 30	Hanger - Top Sub Assembly	1
4.1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	10
4.2	GE-20010 - 01	Hanger - Top	2
4.3	GE-20010 - 14	Hanger - Top, Face	1
5	GE-20010 - 26	Hanger - Center Bar Sub Assembly	1
5.1	rivnut_.25_20_.027-.165	Rivnut, 1/4"-20 bolt, material thickness: .027" - .165"	4
5.2	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	8
5.3	GE-20010 - 02	Hanger - Center Leg	1
5.4	rivnut_.25_20_.165-.260	Rivnut, 1/4"-20 bolt, material thickness: .165"-.260"	4
5.5	GE-20010 - 03	Hanger - Center Leg, Face	1
6	GE-20010 - 27	Hanger - Side Leg Assembly	2
6.1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	6
6.2	GE-20010 - 04	Hanger - Side Leg	1
6.3	GE-20010 - 05	Hanger - Side Leg, Face	1
7	GE-20010 - 28	Hanger - Center Bar Sub Assembly	1
7.1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	48
7.2	GE-20010 - 06	Hanger - Cross Bar	2
7.3	GE-20010 - 07	Hanger - Cross Bar, Top	2
7.4	GE-20010 - 08	Hanger - Cross Bar, Bottom	2
8	GE-20010 - 09	Hanger - Hanging Pole	1
9	GE-20010 - 29	Hanger - Hanging Pole Holder Sub Assembly	2
9.1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	12
9.2	GE-20010 - 10	Hanger - Hanging Pole Holder	2
9.3	GE-20010 - 11	Hanger - Hanging Pole Holder, Face	2
9.4	rivet_.1875_.376-.5	3/16" Aluminum Rivet, .376-.5 Grip Range	6
9.5	GE-20010 - 15	Hanger - Hanging Pole Holder, End	1
9.6	GE-20010 - 16	Hanger - Hanging Pole Holder, End Cap	1
10	GE-20010 - 12	Hanger - Center Leg, End Cap	1
11	GE-20010 - 13	Hanger - Sensor Feature	2
12	rivet_.1875_.376-.5	3/16" Aluminum Rivet, .376-.5 Grip Range	80

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B

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



DETAILED BOM SHOWN FOR REF.

Notes:

1. Rivets and Rivnuts should be plated or aluminum.
2. Tag or label with part number.

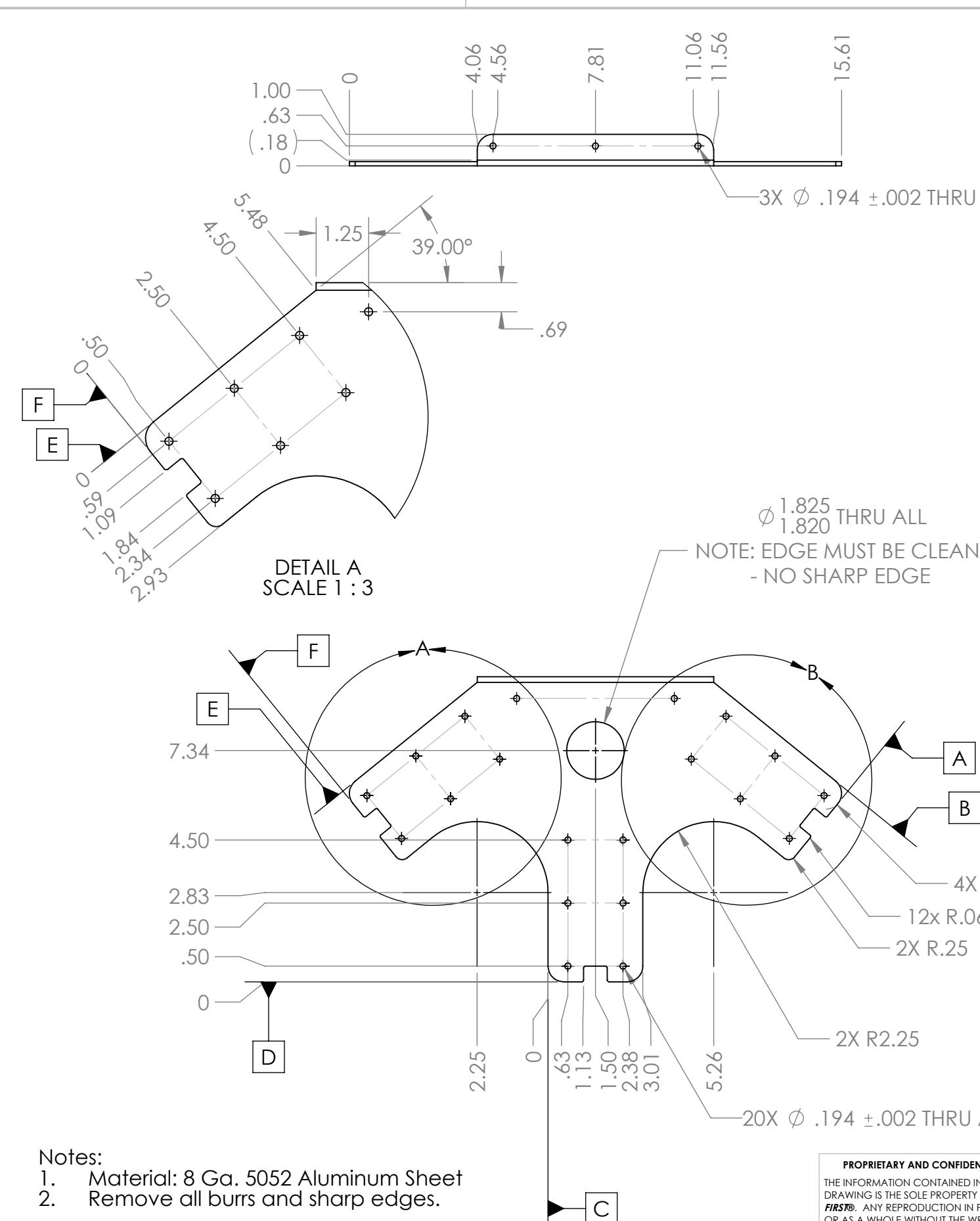
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC 9/10/19	DATE	TITLE:		
					CHECKED	ENG APPR.	
		INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.	COMMENTS:		
	GE-20020	MATERIAL			WEIGHT SHOWN ON SHEET 1		
		NEXT ASSY	USED ON	FINISH	BARE		
			APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV					
B	GE-20010	B					
SCALE: 1:16	WEIGHT:	SHEET 8 OF 8					

4

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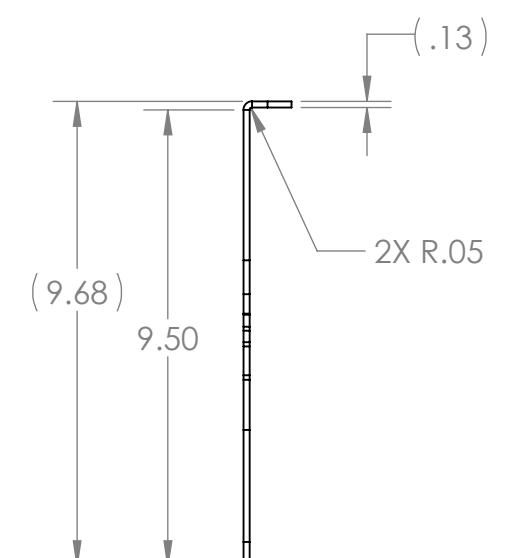
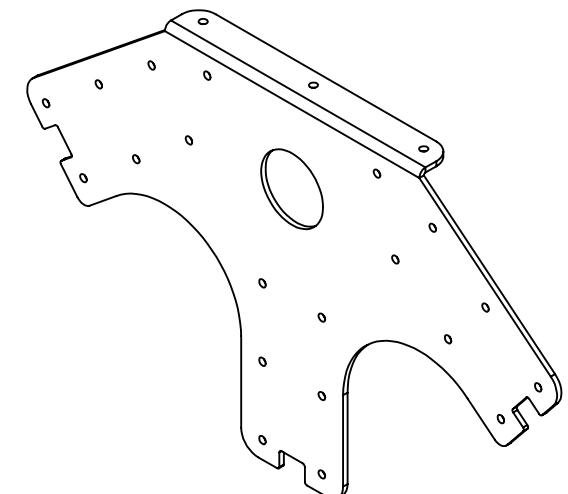


Notes:

1. Material: 8 Ga. 5052 Aluminum Sheet
2. Remove all burrs and sharp edges.

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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE	9/16/19	KAMC



Hanger - Top

FIRST
ROBOTICS
COMPETITION

 SOLIDWORKS
Modeling Solutions Partner

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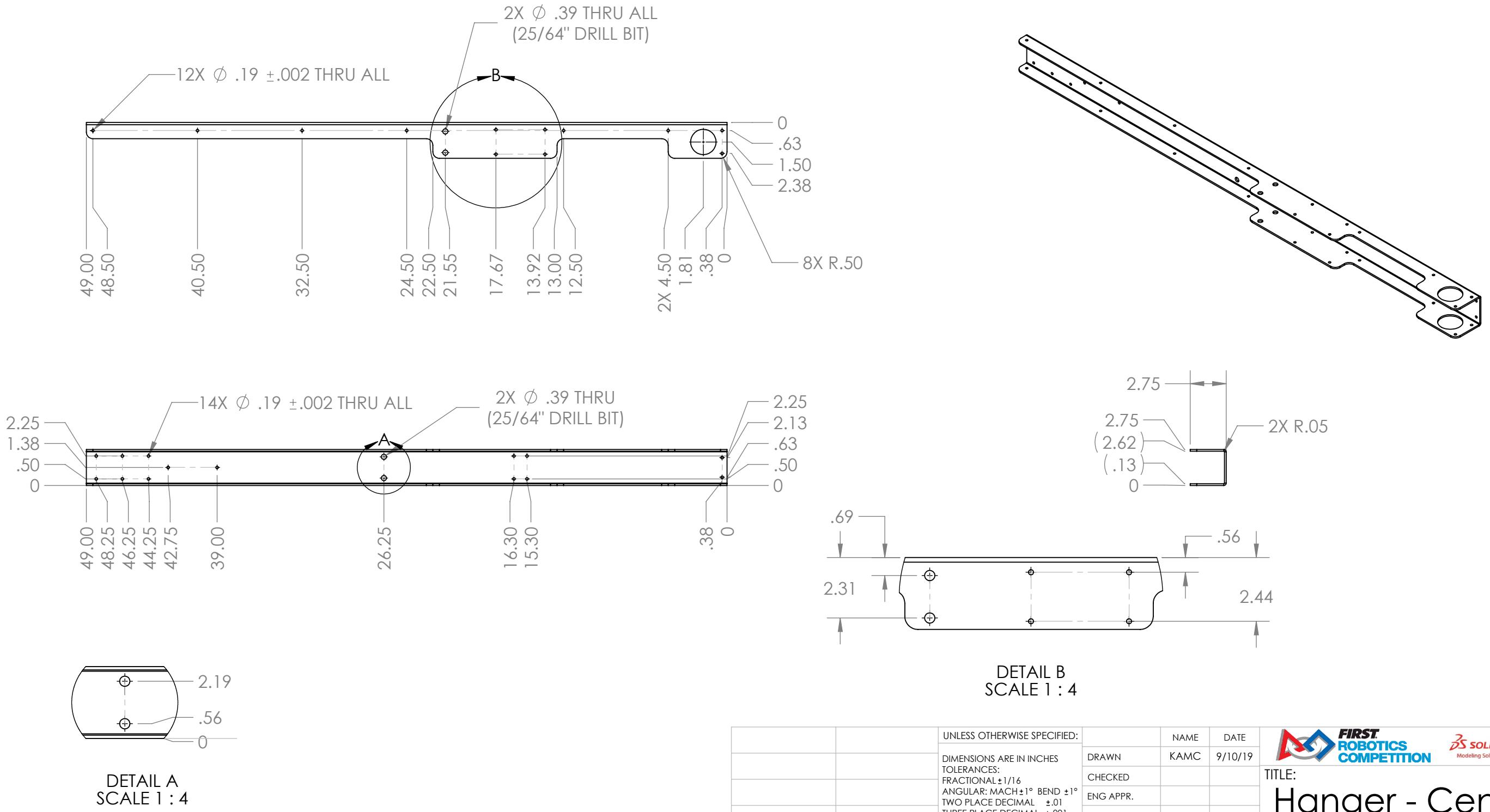
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REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGES	9/17/19	KAMC



- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges

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DRAWN	KAMC	9/10/19		
CHECKED				
ENG APPR.				
MFG APPR.				
Q.A.				
COMMENTS:				
GE-20010 - 26	GE-20010	MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20010 - 02	A		
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hanger - Center
Leg

4

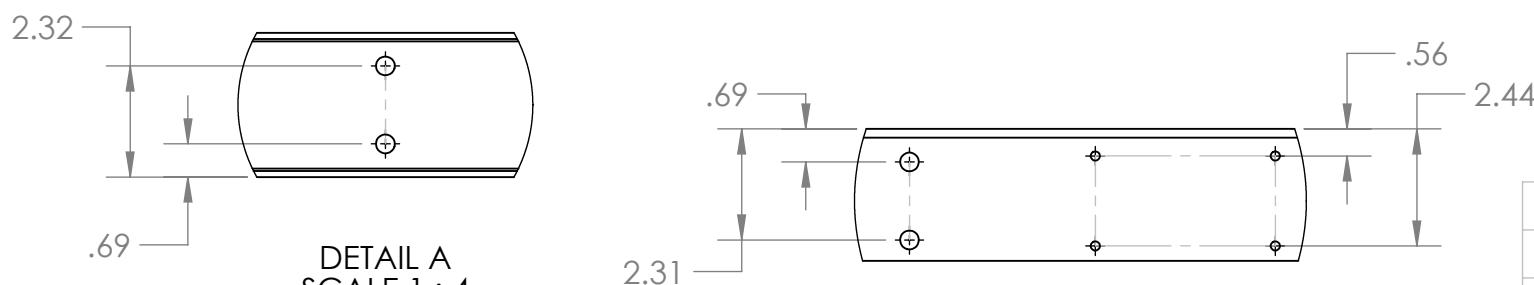
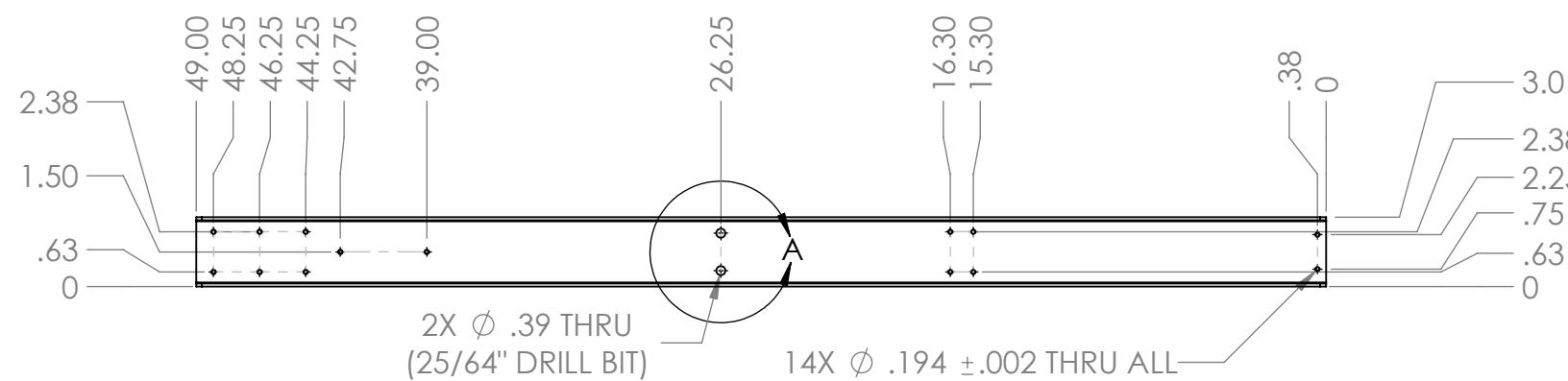
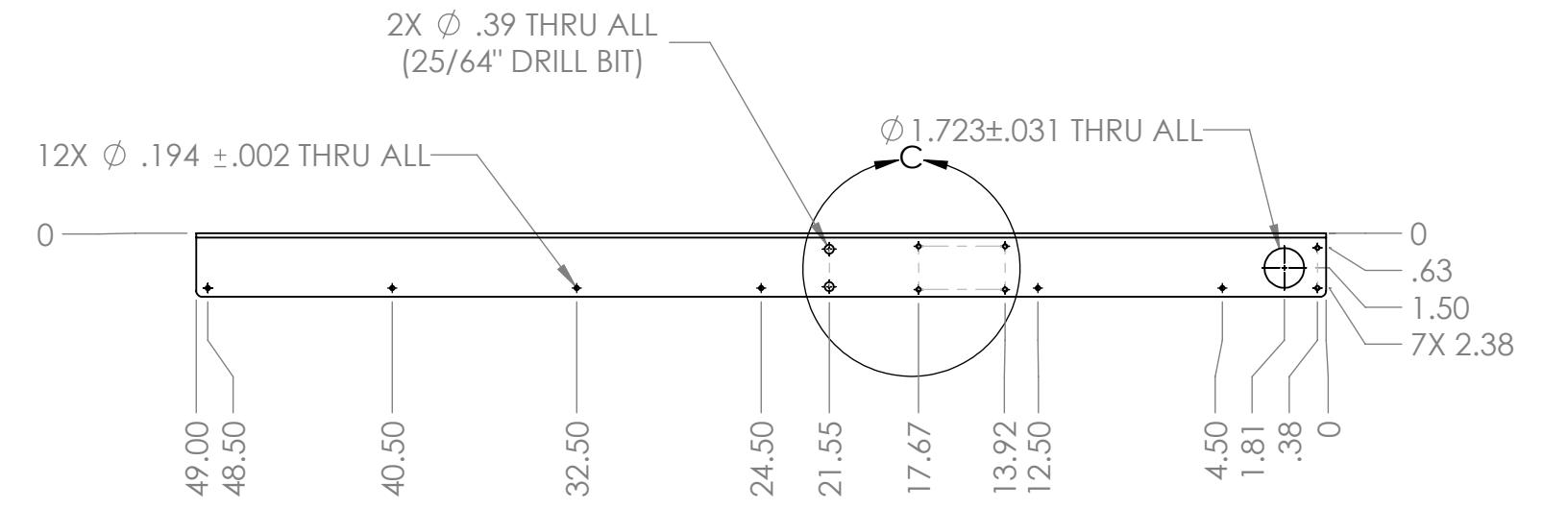
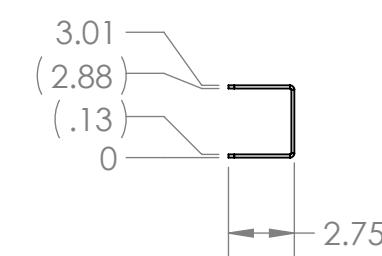
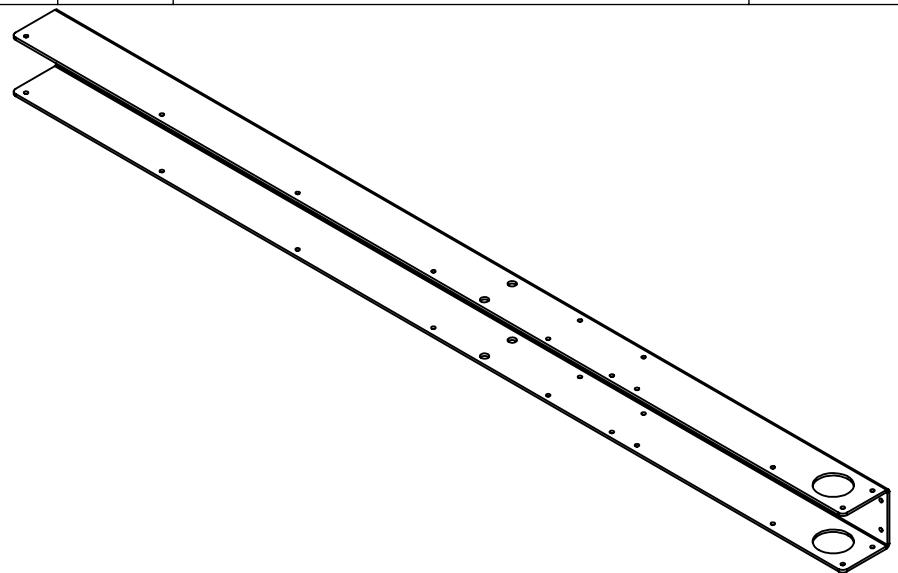
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REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGES	9/16/19	KAMC



- Notes:
- Material: 8 Ga. Aluminum Sheet
 - Remove all burrs and sharp edges.

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DRAWN	KAMC	9/10/19		
CHECKED				
ENG APPR.				
MFG APPR.				
Q.A.				
COMMENTS:				
GE-20010 - 26	GE-20010	MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hanger - Center Leg, Face

SIZE DWG. NO.
B GE-20010 - 03 **A**

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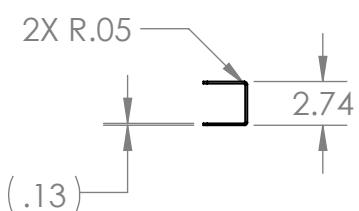
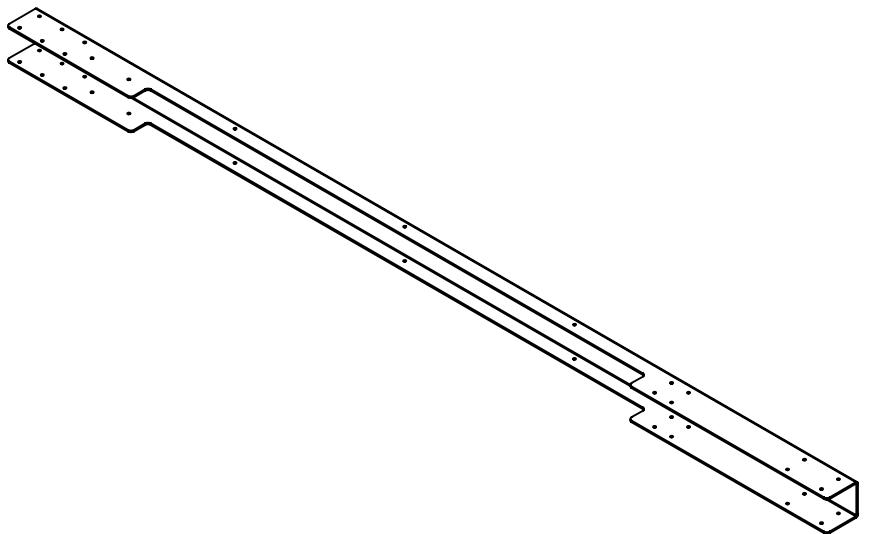
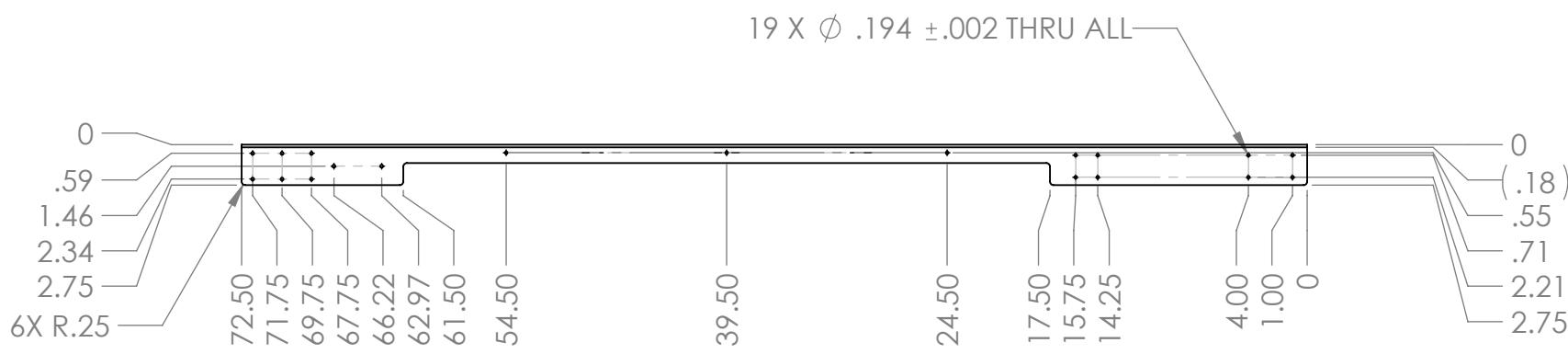
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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE	9/16/19	KAMC

B

B



Notes:

1. Material: 8 Ga. 5052 Aluminum
2. Remove all burrs and sharp edges.

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FIRST®. ANY REPRODUCTION IN PART
OR AS A WHOLE WITHOUT THE WRITTEN
PERMISSION OF **FIRST®** IS PROHIBITED.

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: <h1>Hanger - Side Leg</h1>
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN	KAMC	9/10/19		
			CHECKED				
			ENG APPR.				
			MFG APPR.				
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.				
GE-20010-27	GE-20010	MATERIAL ALUMINUM SHEET	COMMENTS:			SIZE B	DWG. NO. GE-20010 - 04
NEXT ASSY	USED ON	FINISH BARE					
APPLICATION		DO NOT SCALE DRAWING	SCALE: 1:12	WEIGHT:		SHEET 1 OF 1	

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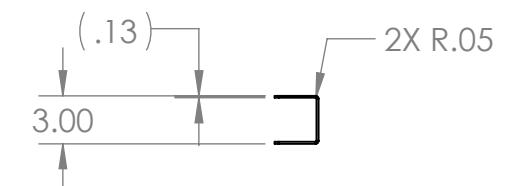
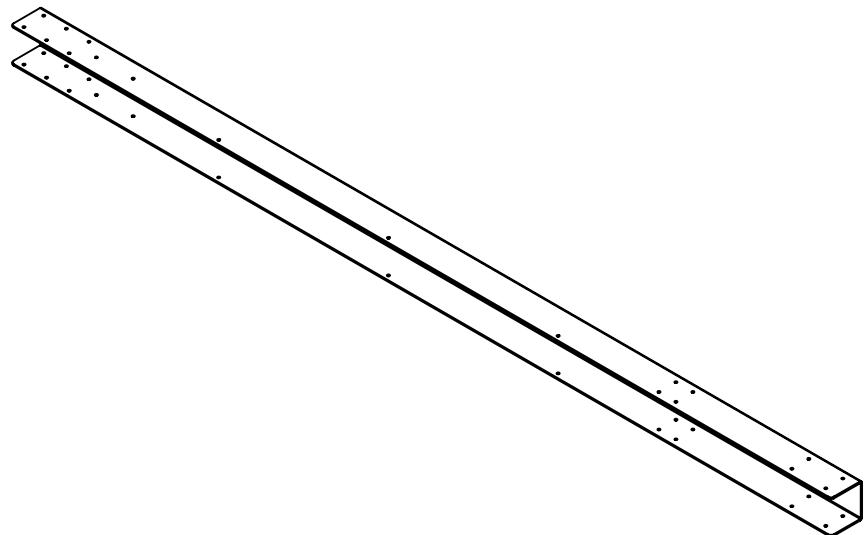
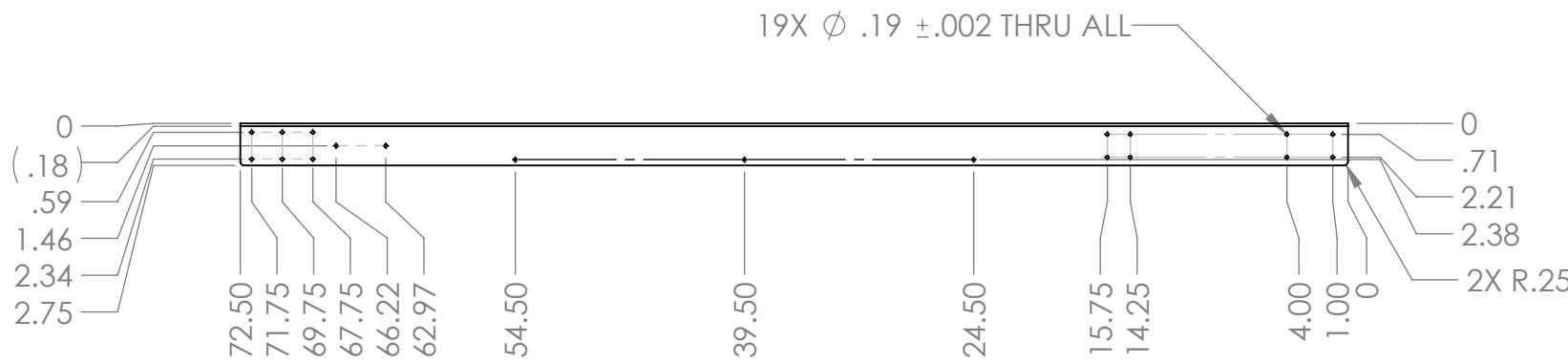
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REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGES	9/16/19	KAMC

B

B



- Notes:
1. Material: 8 Ga. 5052 Aluminum
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN KAMC CHECKED ENG APPR. MFG APPR.	DATE 9/10/19
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
GE-20010-27	GE-20010	MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger - Side Leg, Face

SIZE	DWG. NO.	REV
B	GE-20010 - 05	A
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

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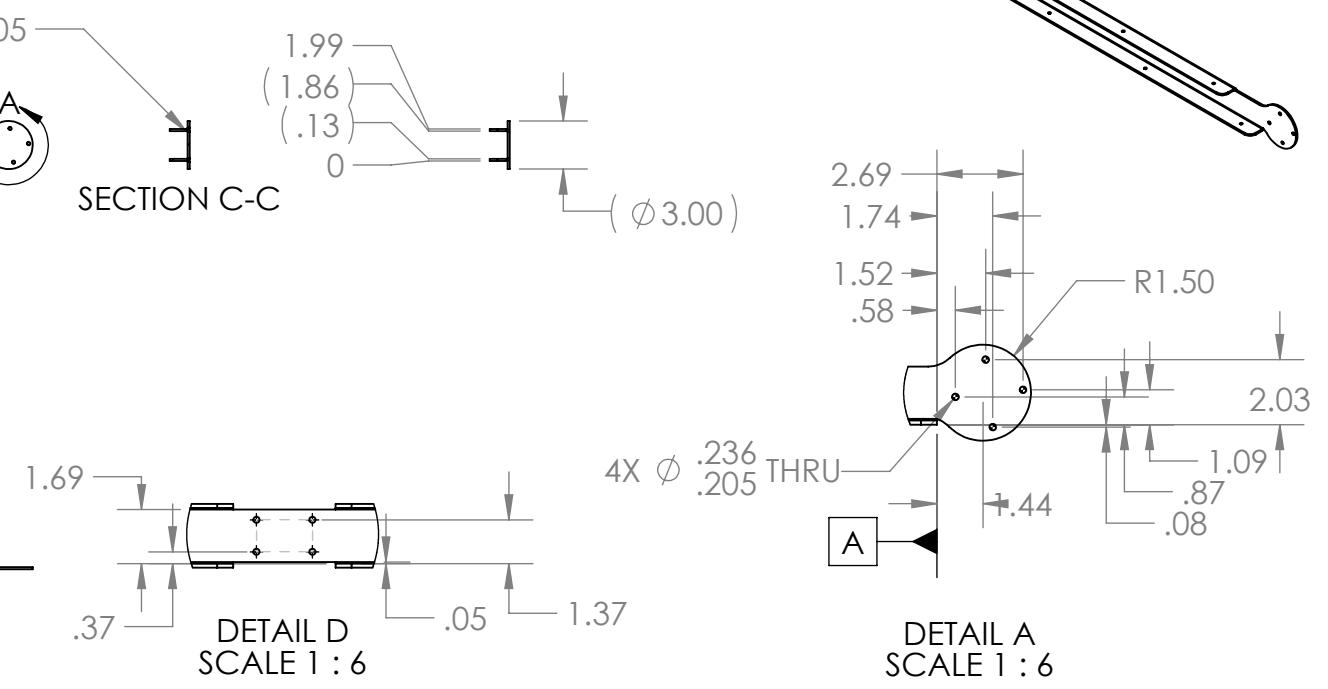
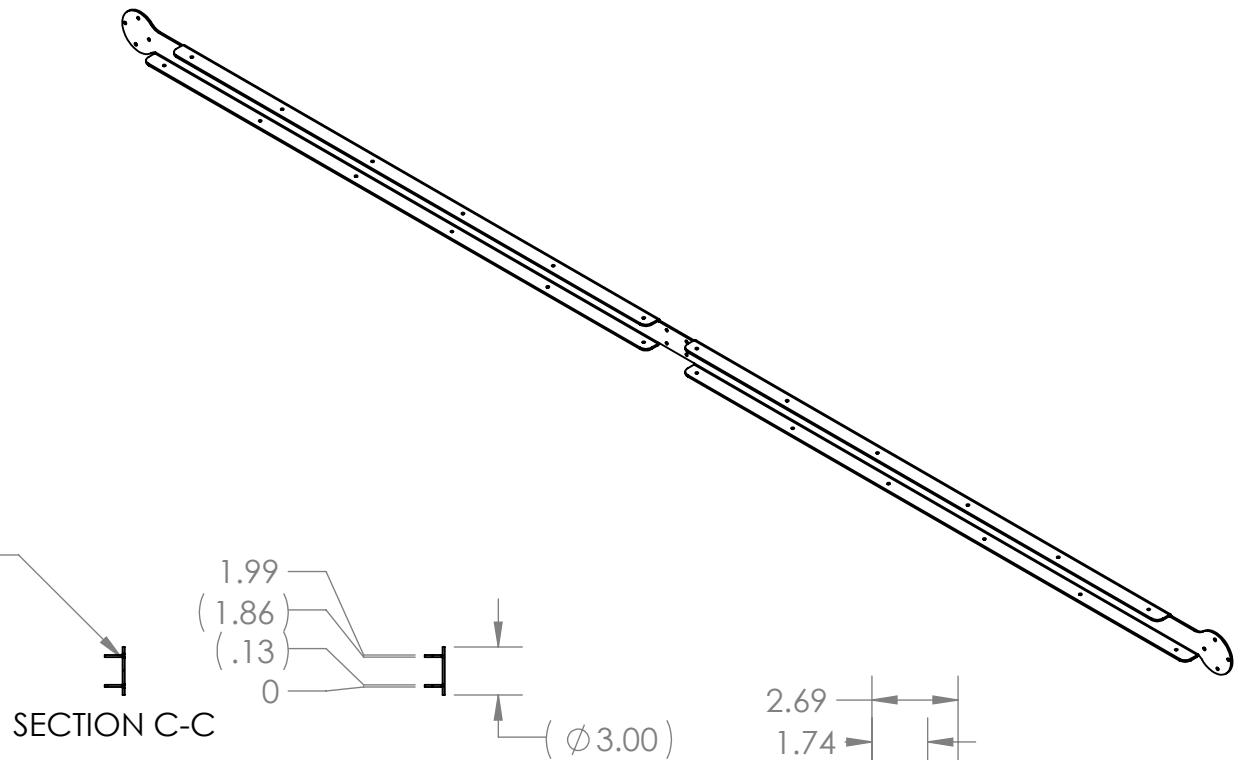
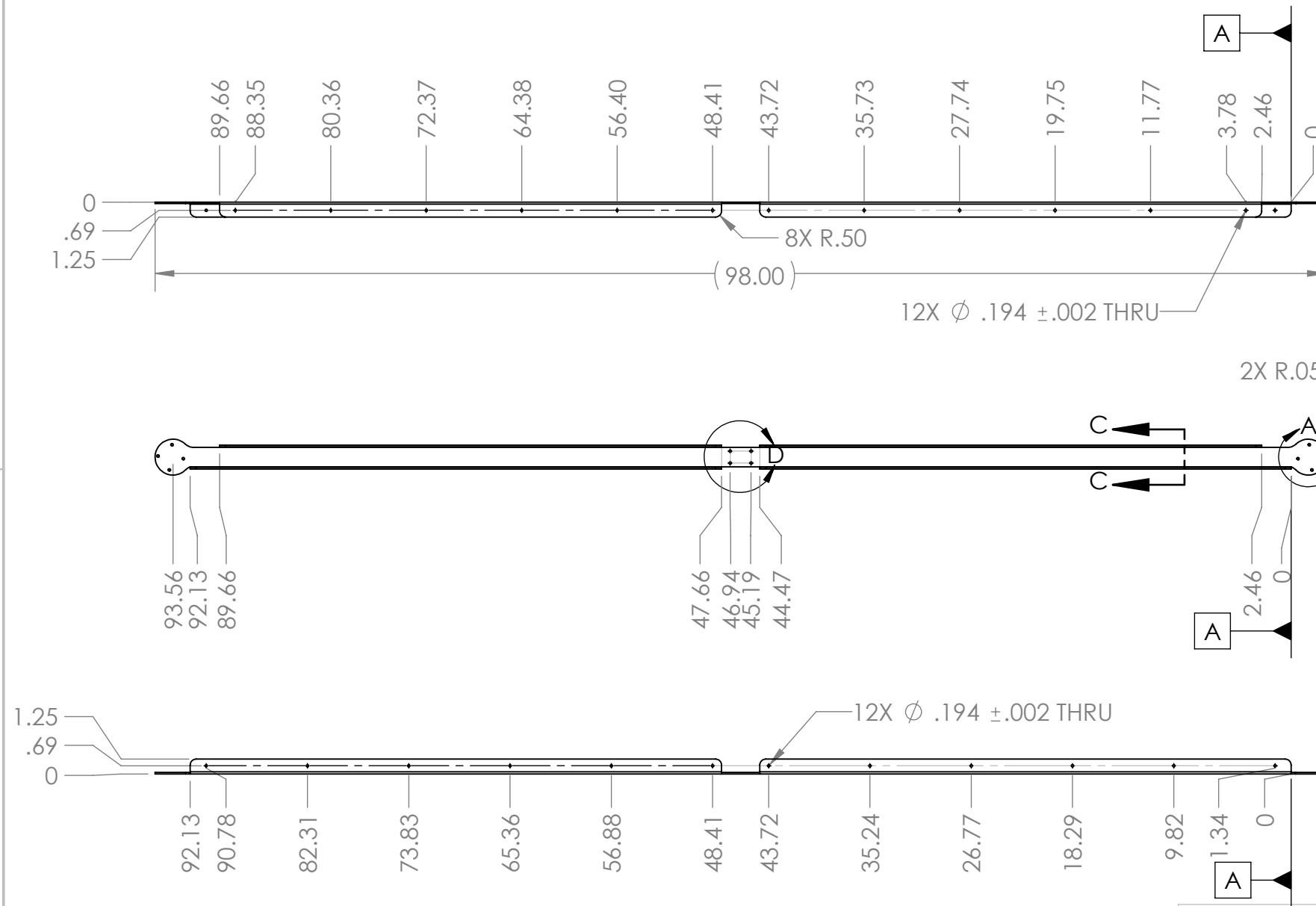
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	UPDATED HOLE PATTERN AND PART LENGTH	9/16/19	KAMC

B

B



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN KAMC 9/10/19	DATE
CHECKED	ENG APPR.	
ENG APPR.	MFG APPR.	
MFG APPR.	Q.A.	
Q.A.	COMMENTS:	
INTERPRET GEOMETRIC TOLERANCING PER:		
MATERIAL ALUMINUM SHEET		
GE-20010-28	GE-20010	
NEXT ASSY	USED ON	
APPLICATION	FINISH	
	BARE	
	DO NOT SCALE DRAWING	
SIZE	DWG. NO.	REV
B	GE-20010 - 06	A
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

Notes:

- Material: 8 Ga. 5052 Aluminum
- Remove all burrs and sharp edges.

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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Hanger - Cross
Bar**

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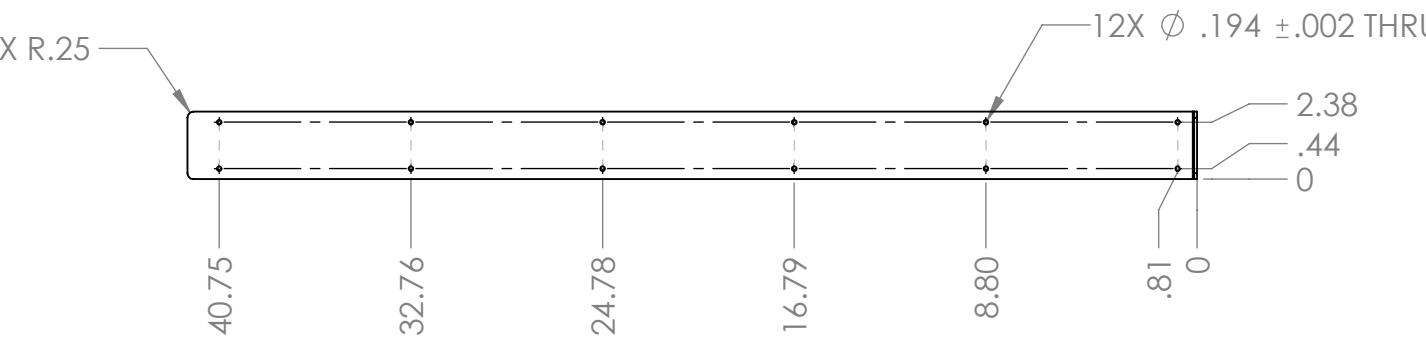
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	PART LENGTH INCREASED	9/16/2019	KAMC

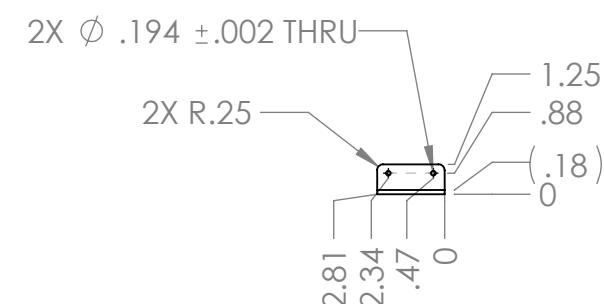
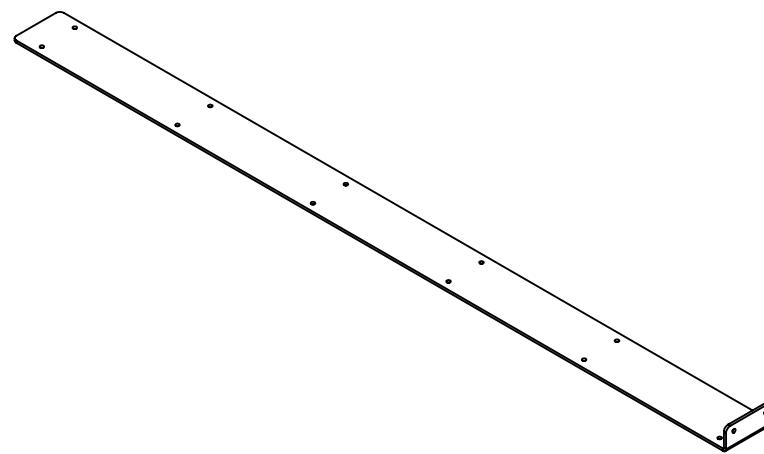
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- Notes:
1. Material: 8 Ga. 5052 Aluminum
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN CHECKED ENG APPR. MFG APPR.	DATE 8/29/19
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
GE-20010 - 28	GE-20010	MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE: Hanger - Cross Bar, Top

SIZE DWG. NO. REV
B GE-20010 - 07 **A**

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

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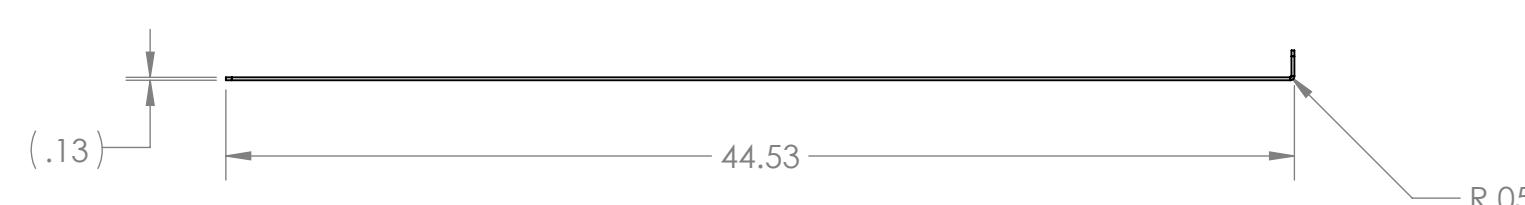
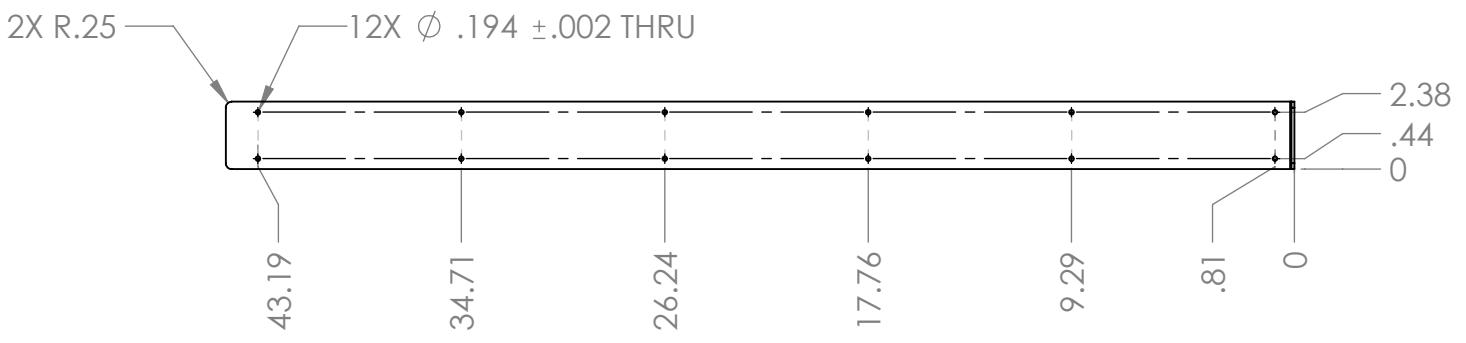
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	PART LENGTH INCREASED	9/16/2019	KAMC

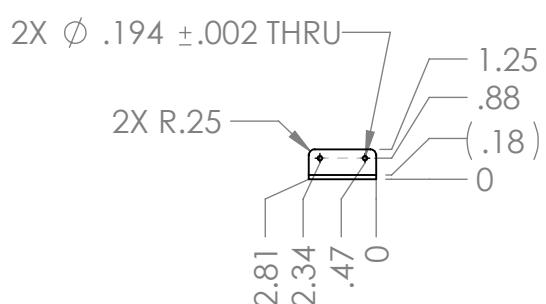
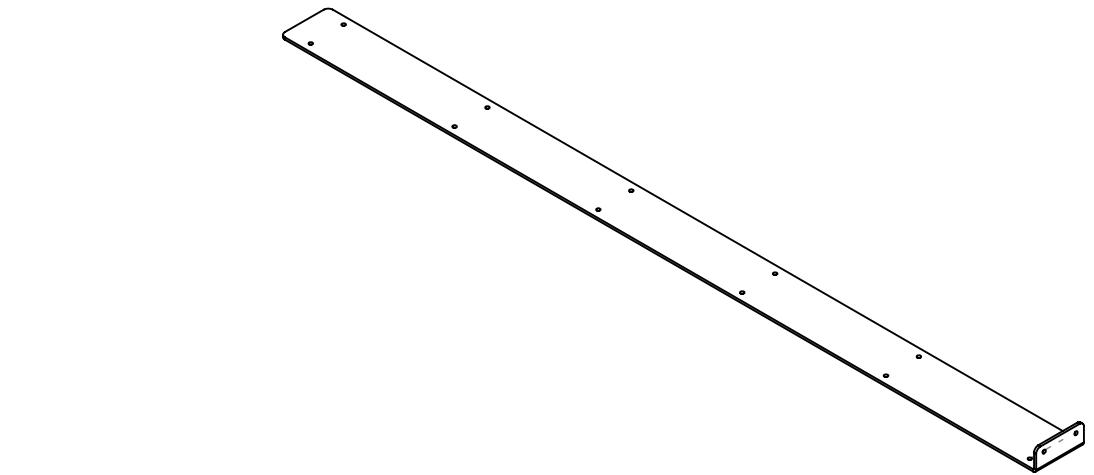
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- Notes:
1. Material: 8 Ga. 5052 Aluminum
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN KAMC 8/29/19	DATE
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED	
		MATERIAL	ENG APPR.	
		ALUMINUM SHEET	MFG APPR.	
		Q.A.	Q.A.	
		COMMENTS:		
GE-20010-28	GE-20010			
NEXT ASSY	USED ON	FINISH		
		BARE		
APPLICATION	DO NOT SCALE DRAWING			
SIZE B	DWG. NO. GE-20010 - 08	REV A		
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

 FIRST ROBOTICS COMPETITION  SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hanger - Cross Bar, Bottom

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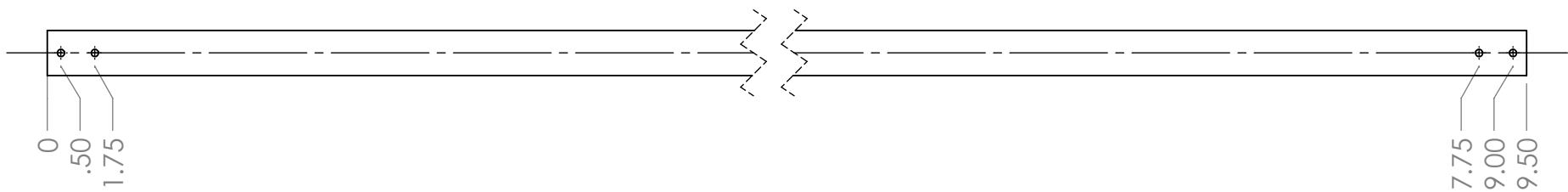
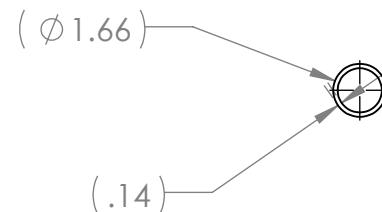
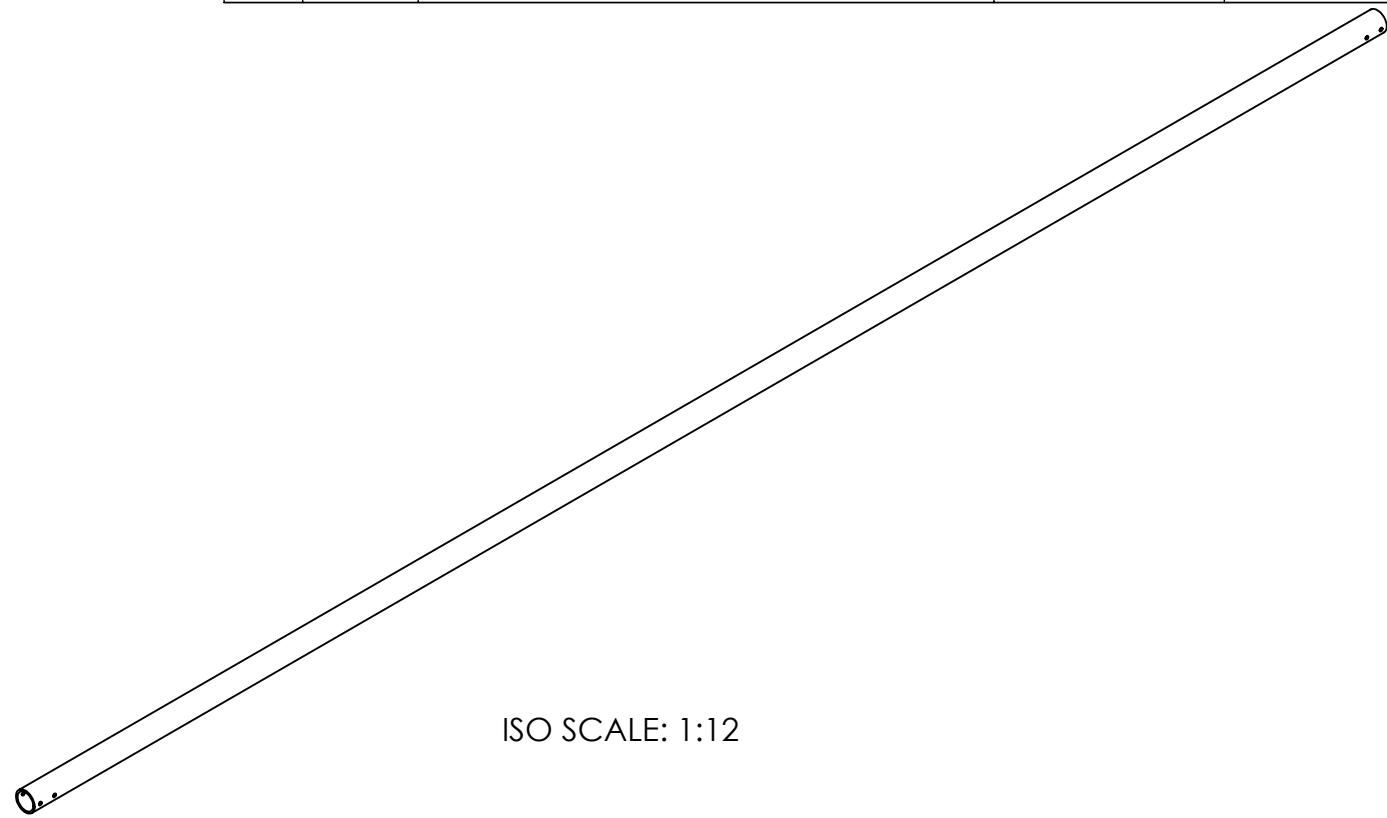
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	PART LENGTH AND HOLE PATTERN MODIFIED	9/17/2019	KAMC

B

B



Notes:

- Material: 1.66" OD x 0.14" WALL x 1.38" ID Aluminum Pipe 6061-T6-Extruded Schedule 40
- Remove all burrs and sharp edges.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC DATE 9/2/19
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL ROUND TUBE	CHECKED ENG APPR. MFG APPR.
GE-20010		Q.A. COMMENTS:	Q.A. COMMENTS:
NEXT ASSY	USED ON	MATERIAL ROUND TUBE	
		FINISH BARE	
APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger - Hanging Pole

SIZE DWG. NO. REV
B GE-20010 - 09 A

SCALE: 1:6 WEIGHT: SHEET 1 OF 1

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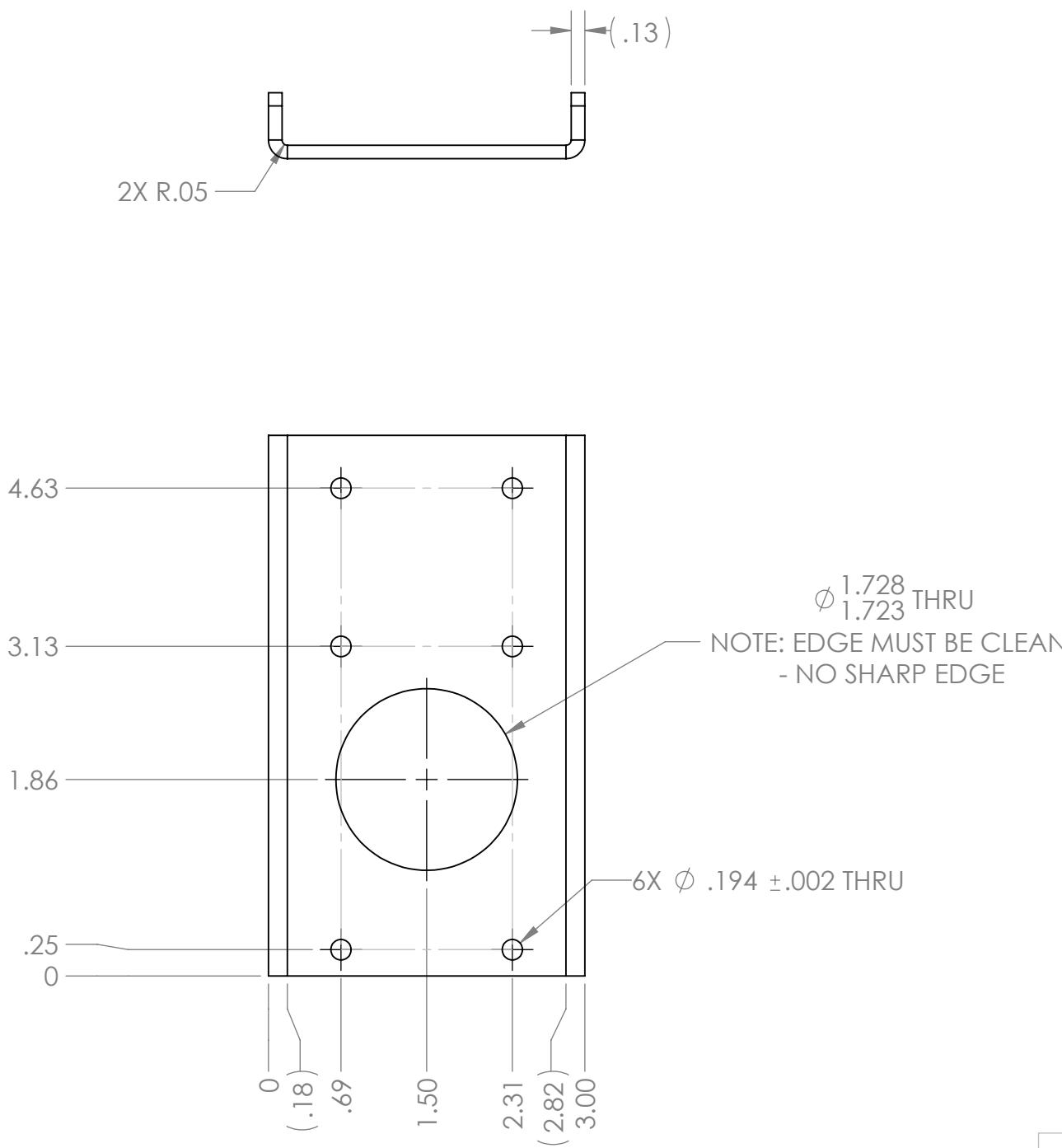
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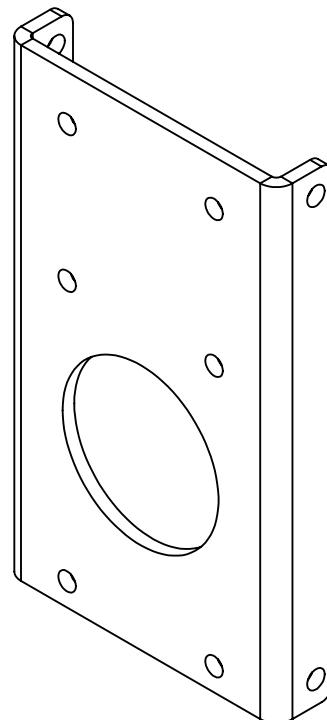
Notes:

1. Material: 8 Ga. 5052 Aluminum Sheet
2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION  SOLIDWORKS <small>Modeling Solutions Partner</small>
		DIMENSIONS ARE IN INCHES	DRAWN	KAMC	9/16/19	
		TOLERANCES: FRACTIONAL $\pm 1/16$	CHECKED			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	ENG APPR.			
		TWO PLACE DECIMAL $\pm .01$	MFG APPR.			
		THREE PLACE DECIMAL $\pm .001$	Q.A.			
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:			
GE-20011 - 16	GE-20011	MATERIAL ALUMINUM SHEET				SIZE DWG. NO. B GE-20010 - 10 REV A
NEXT ASSY	USED ON	FINISH BARE				
APPLICATION		DO NOT SCALE DRAWING		SCALE: 2:3	WEIGHT:	SHEET 1 OF 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE	9/16/2019	KAMC



Hanger - Hanging Pole Holder

4

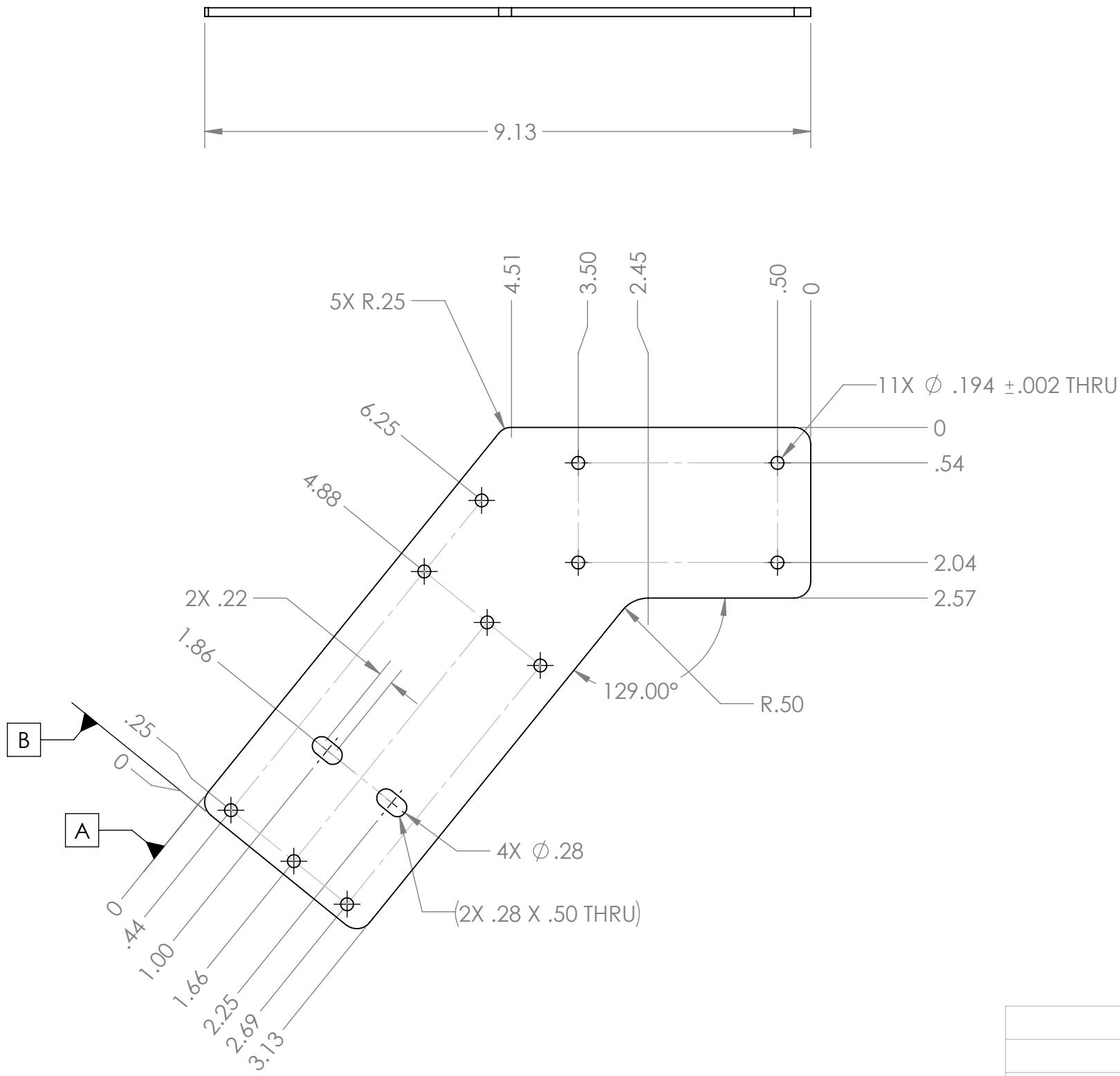
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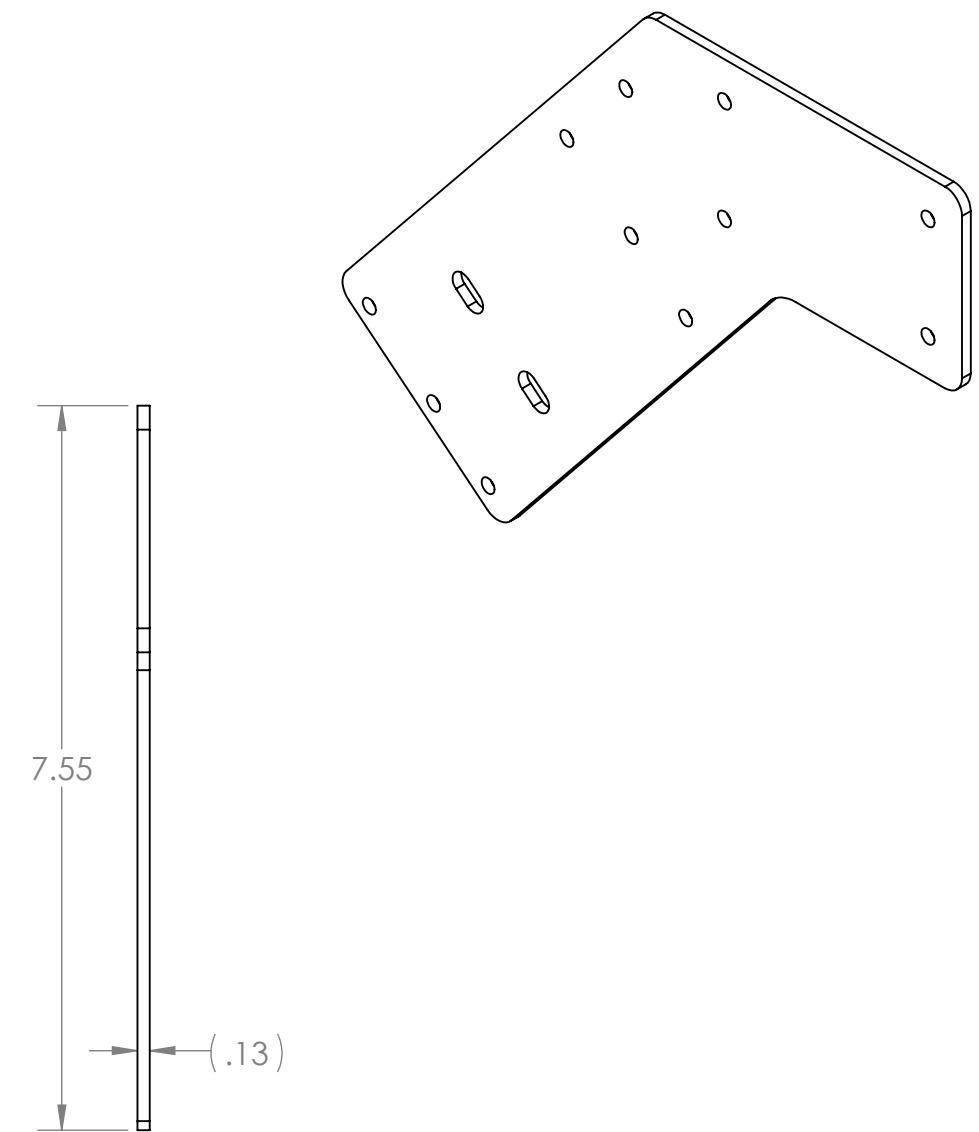
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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	HOLE PATTERN AND GENERAL GEOMETRY MODIFIED	9/16/2019	KAMC



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN CHECKED ENG APPR. MFG APPR.	DATE 9/16/19
GE-20010 - 29	GE-20010	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	
		MATERIAL ALUMINUM SHEET	COMMENTS:	
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

TITLE: Hanger - Hanging Pole Holder, Face

SIZE DWG. NO. REV
B GE-20010 - 11 **A**

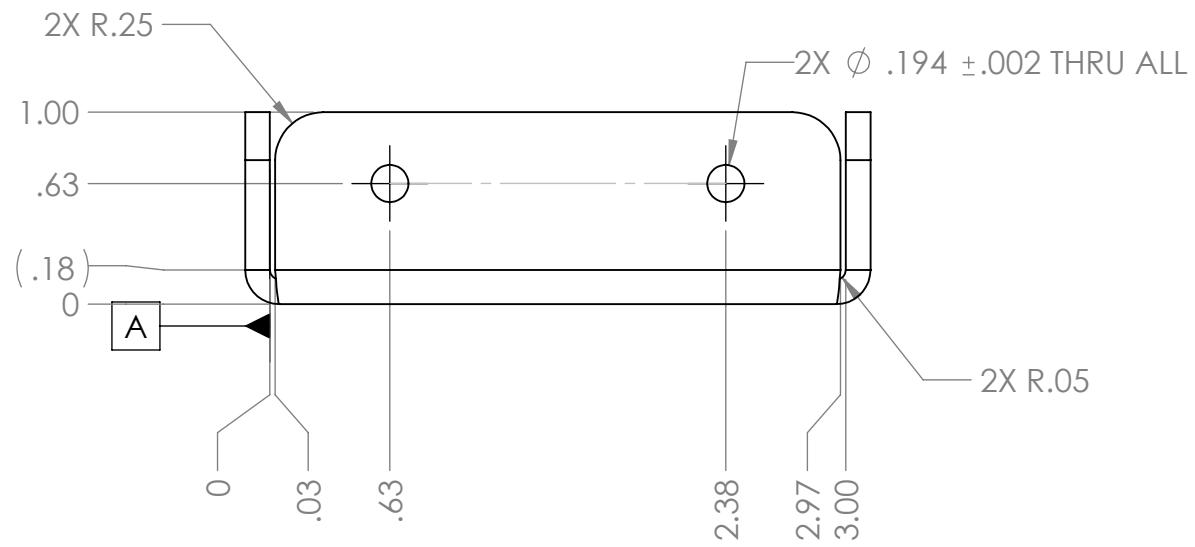
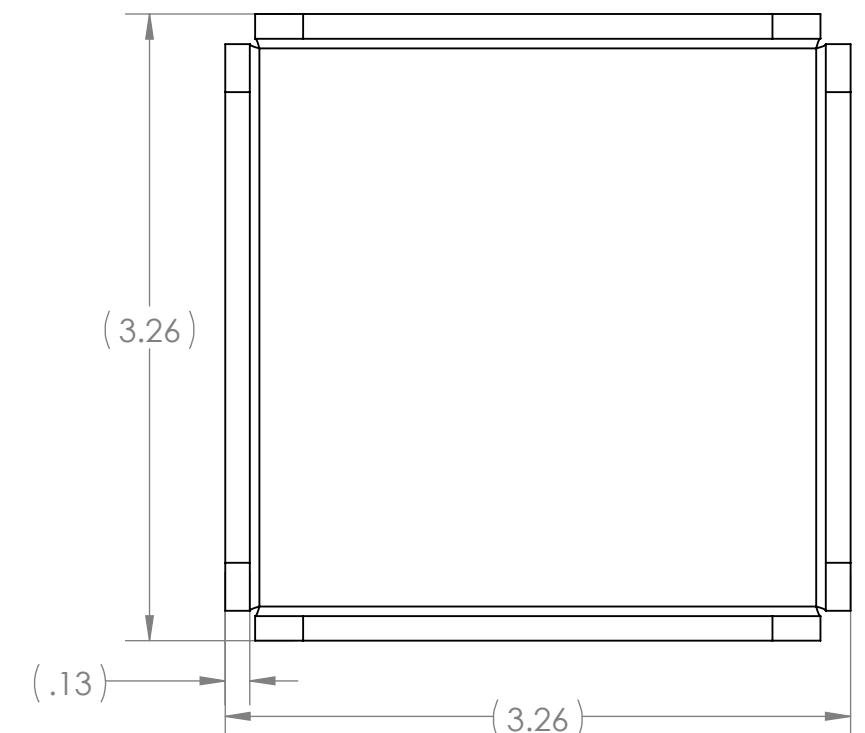
SCALE: 1:2 WEIGHT: SHEET 1 OF 1

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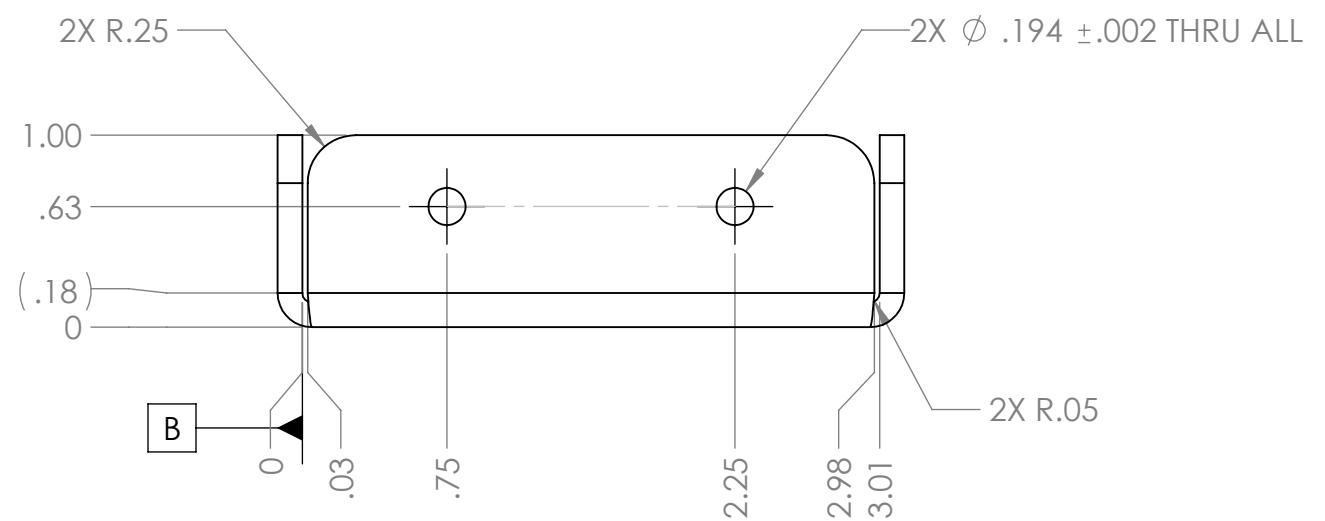
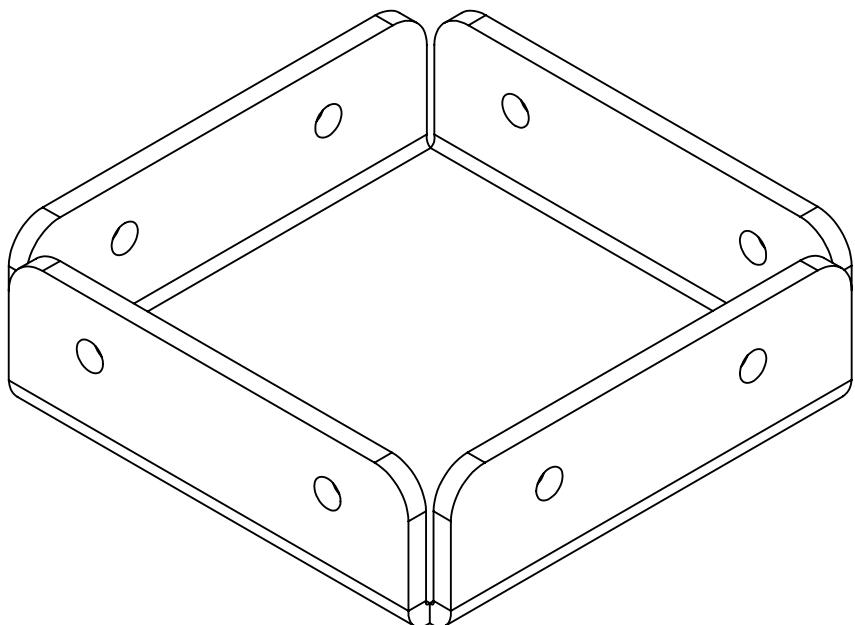
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- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MINOR GEOMETRY CHANGES	9/16/2019	KAMC



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL: $\pm .01$ THREE PLACE DECIMAL: $\pm .001$	NAME DRAWN CHECKED ENG APPR. MFG APPR.	DATE 9/16/19
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
GE-20010		MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

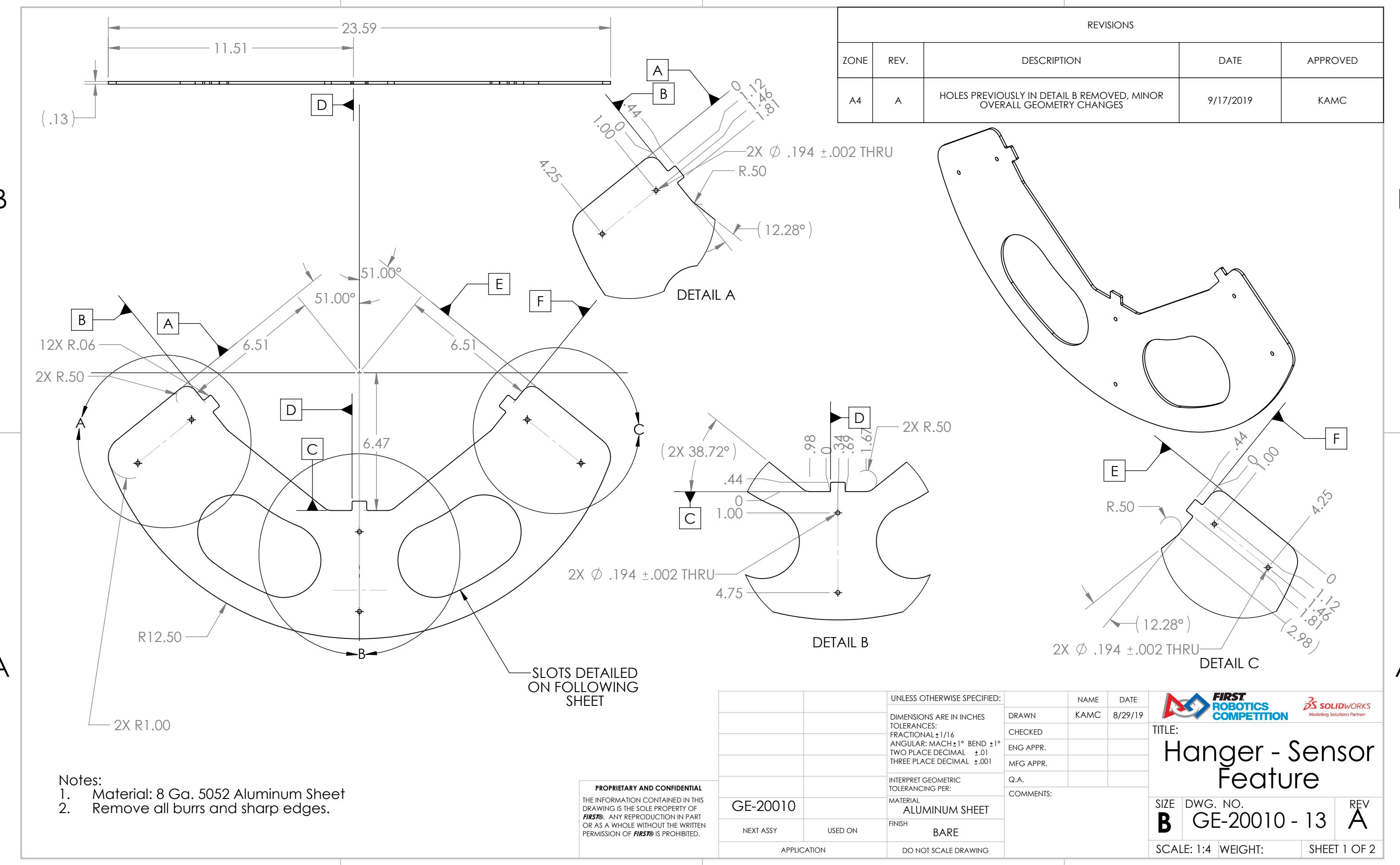
TITLE: Hanger - Center Leg, End Cap
SIZE DWG. NO. B GE-20010 - 12 REV A
SCALE: 1:1 WEIGHT: SHEET 1 OF 1

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UNLESS OTHERWISE SPECIFIED:	NAME	DATE		
DIMENSIONS ARE IN INCHES	KAMC	8/29/19		
TOLERANCES:				
FRACTIONAL: ±1/16				
ANGULAR: MACH ±1° BEND ±1°				
TWO PLACE DECIMAL: ±.01				
THREE PLACE DECIMAL: ±.001				
INTERPRET GEOMETRIC TOLERANCING PER:				
ENG APPR.				
MFG APPR.				
Q.A.				
COMMENTS:				
GE-20010				
NEXT ASSY	USED ON	FINISH		
		BARE		
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:4	WEIGHT:	SHEET 1 OF 2		

FIRST ROBOTICS COMPETITION
SolidWorks
Modeling Solutions Partner

Hanger - Sensor Feature

SIZE DWG. NO. REV
B GE-20010 - 13 A

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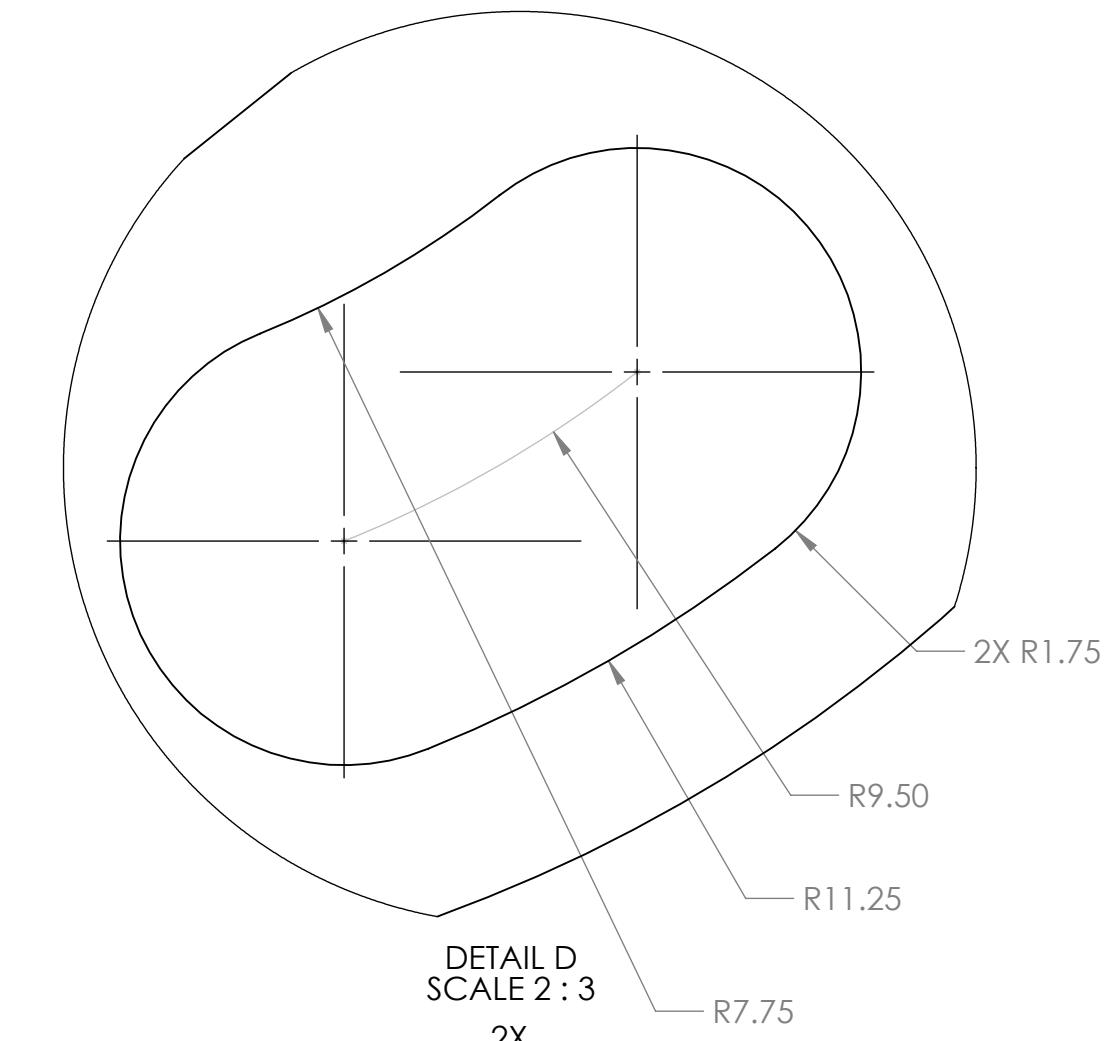
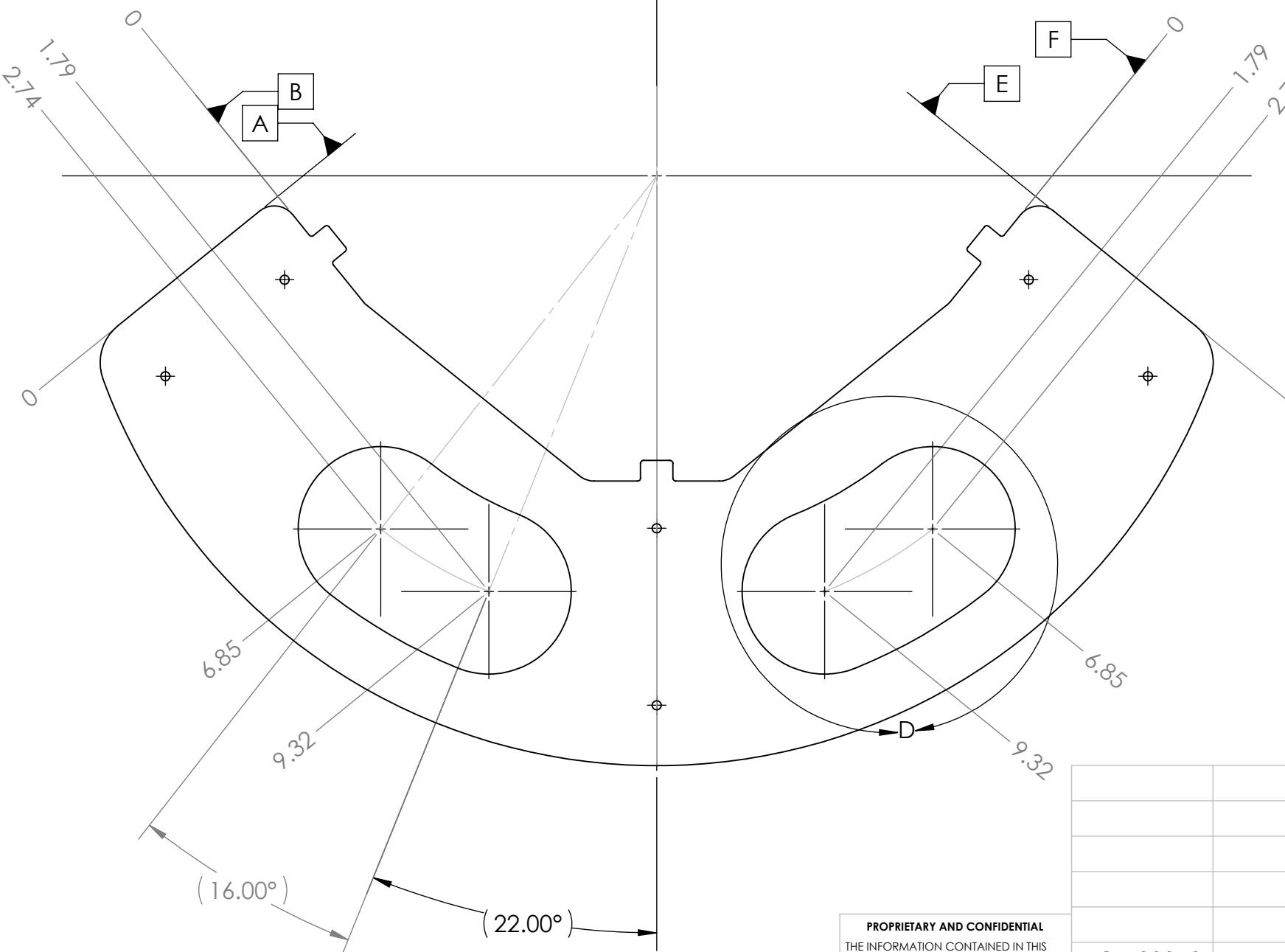
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	8/29/19
		TOLERANCES:		
		FRACTIONAL $\pm 1/16$		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
		TWO PLACE DECIMAL $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC		
		TOLERANCING PER:		
		MATERIAL		
		ALUMINUM SHEET		
		Q.A.		
		COMMENTS:		
GE-20010				
NEXT ASSY	USED ON	FINISH	BARE	
		APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger - Sensor Feature

SIZE DWG. NO. REV
B GE-20010 - 13 A

SCALE: 1:3 WEIGHT: SHEET 2 OF 2

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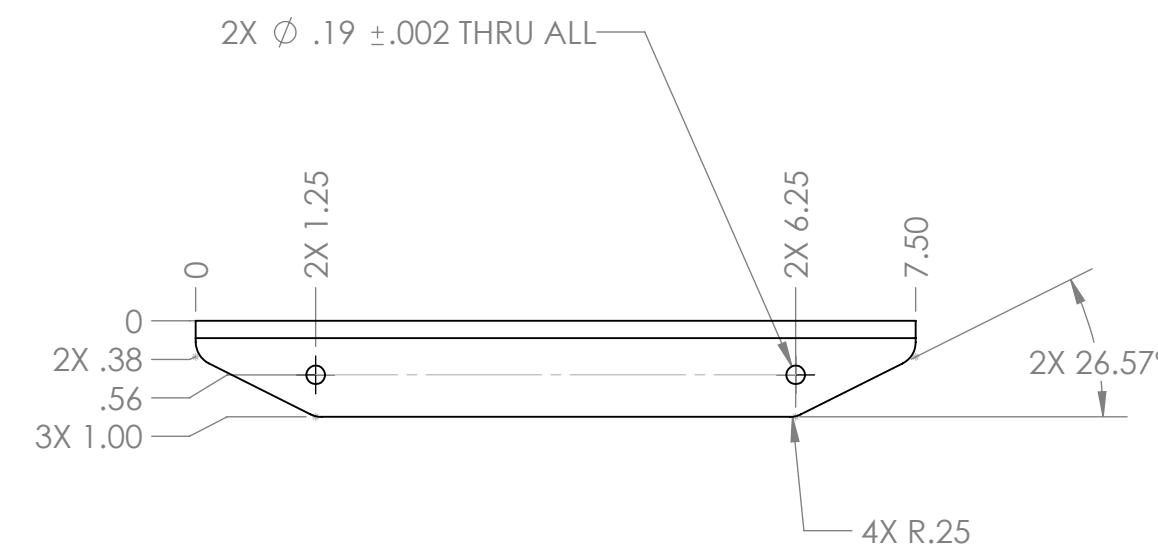
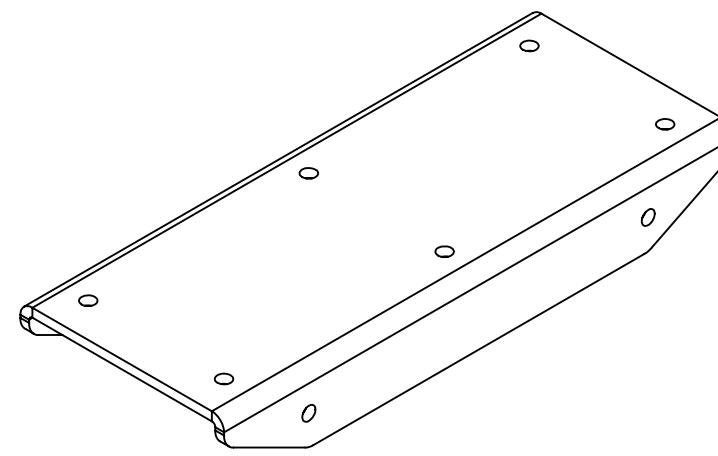
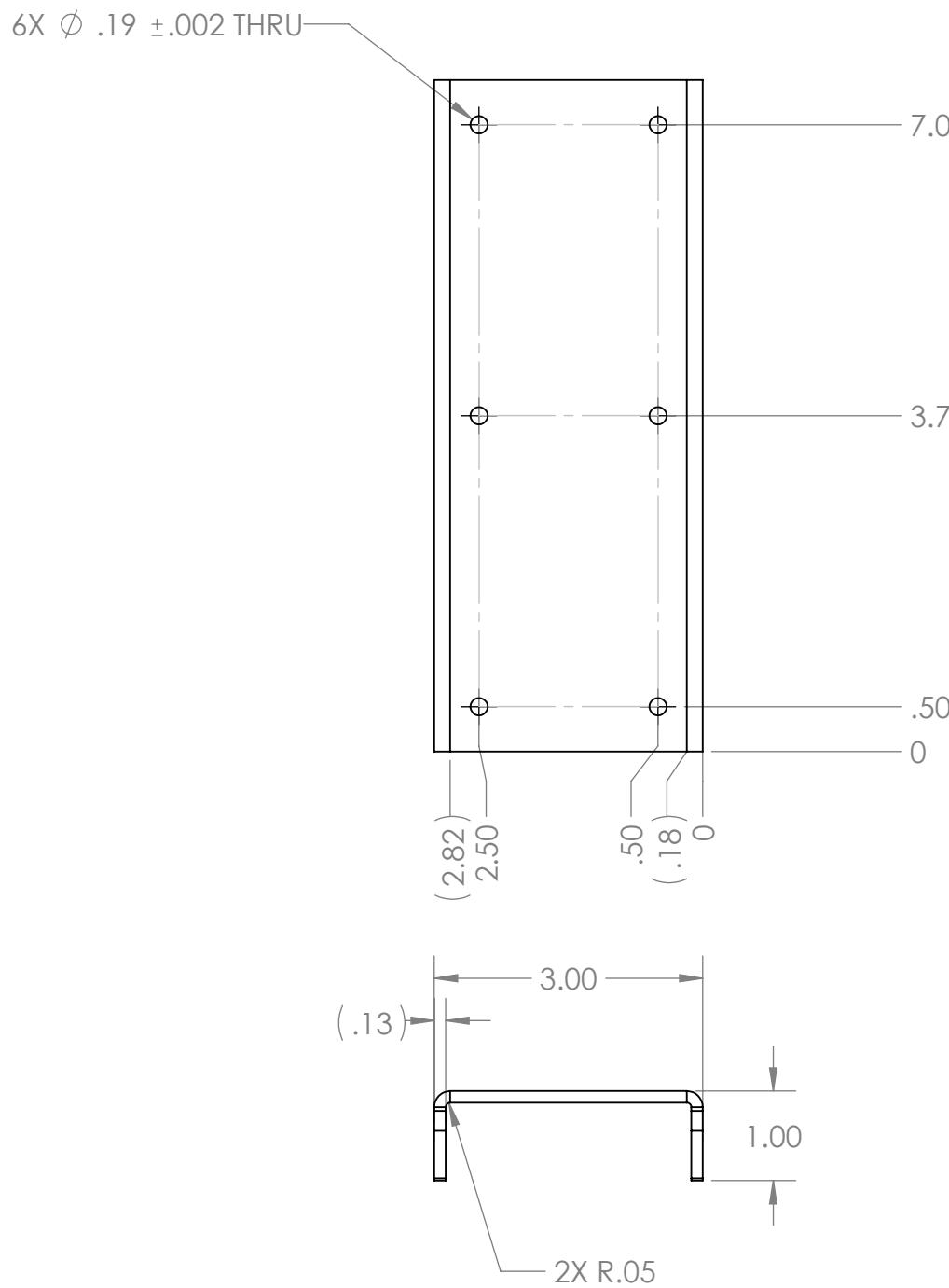
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B

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A

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC DATE 9/16/19	FIRST ROBOTICS COMPETITION
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	SOLIDWORKS Modeling Solutions Partner
		MATERIAL ALUMINUM SHEET	Q.A. COMMENTS:	TITLE: Hanger - Top, Face
GE-20010 - 30	GE-20010	NEXT ASSY USED ON APPLICATION	REV 0	SIZE DWG. NO. B GE-20010 - 14
		FINISH BARE	SCALE: 1:2	WEIGHT: SHEET 1 OF 1
		DO NOT SCALE DRAWING		

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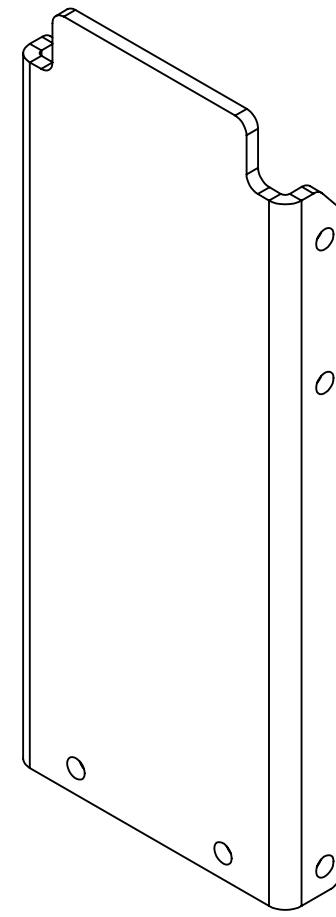
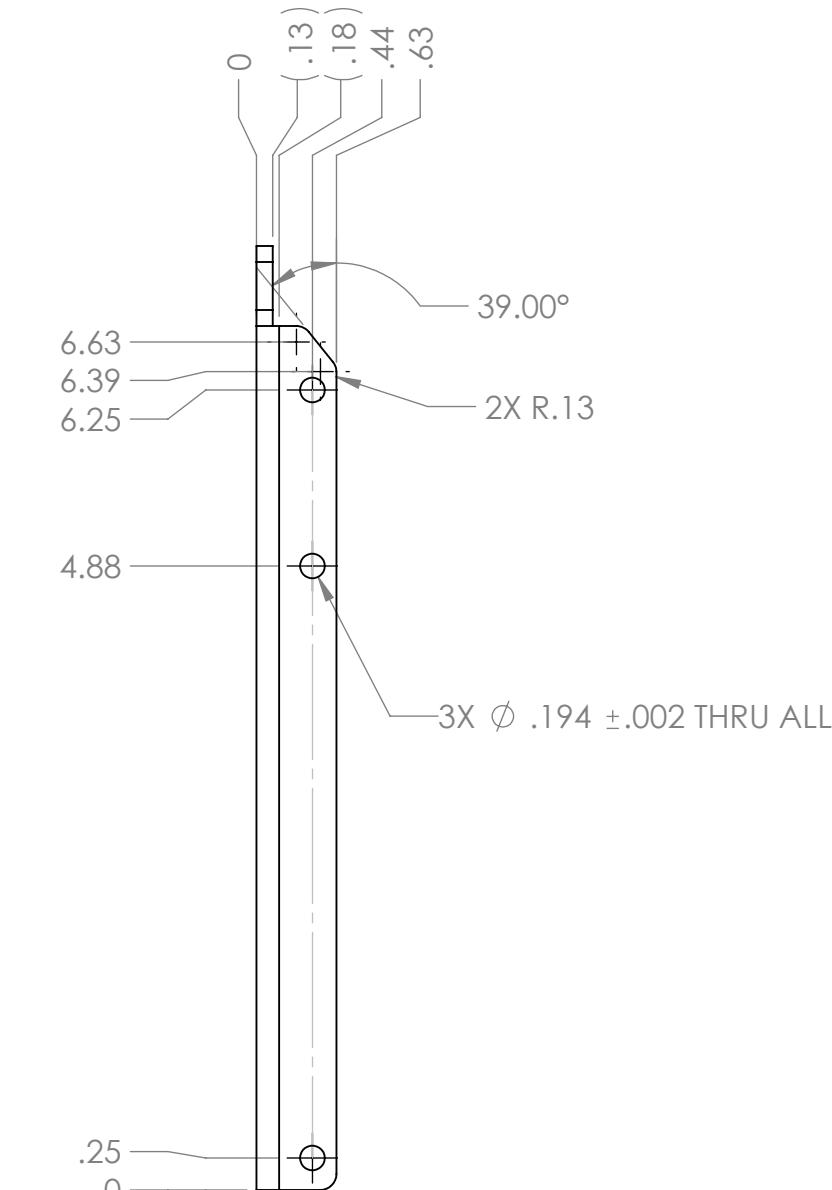
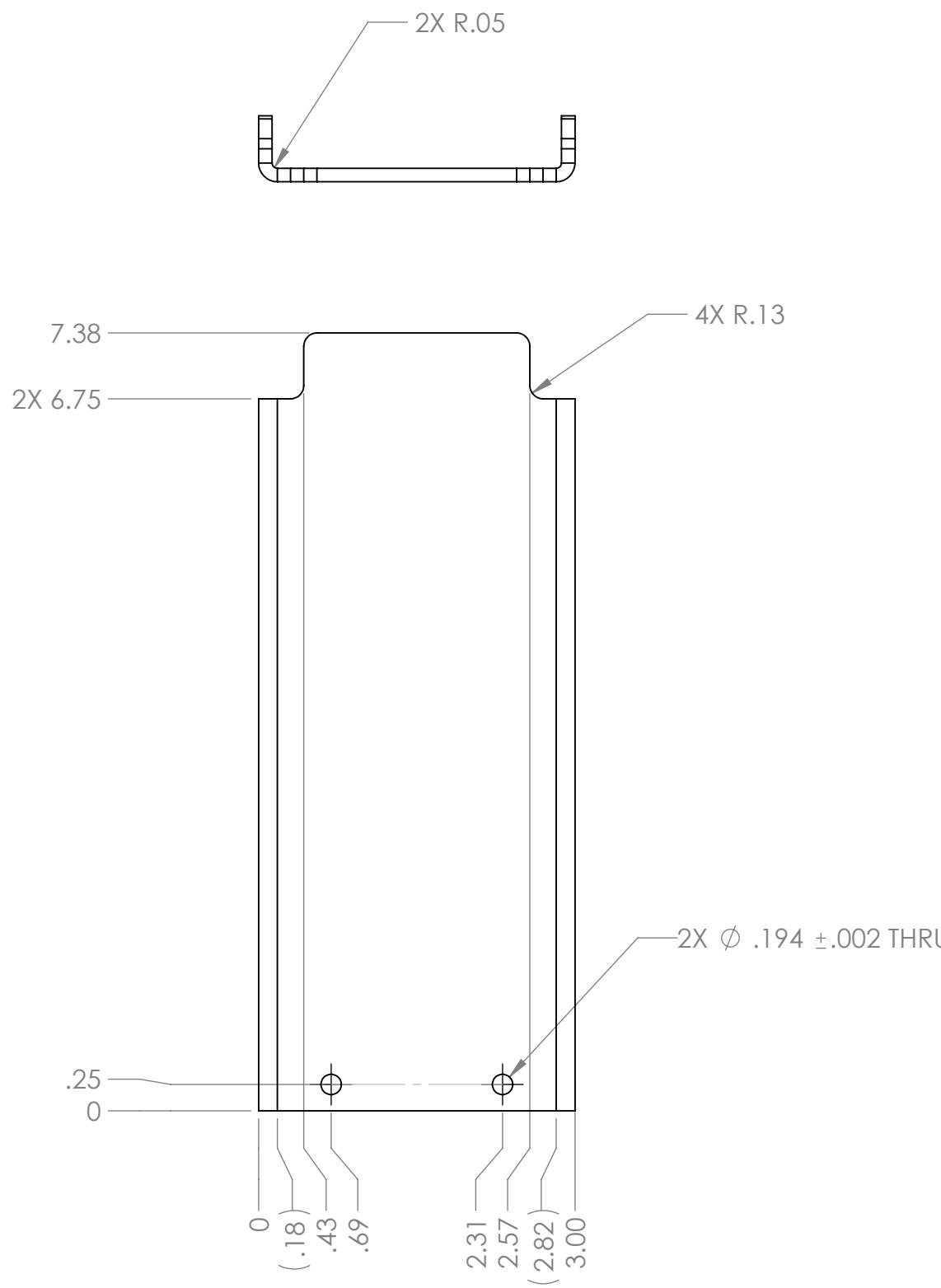
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B

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Note:

1. Material: 8 Ga. 5052 Aluminum Sheet
2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME	DATE
		DRAWN	KAMC	9/16/19
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20010 - 29	GE-20010	INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
		APPLICATION	DO NOT SCALE DRAWING	
SCALE: 2:3		WEIGHT:	SHEET 1 OF 1	
SIZE B DWG. NO. GE-20010 - 15		REV 0		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Hanger - Hanging
Pole Holder, End**

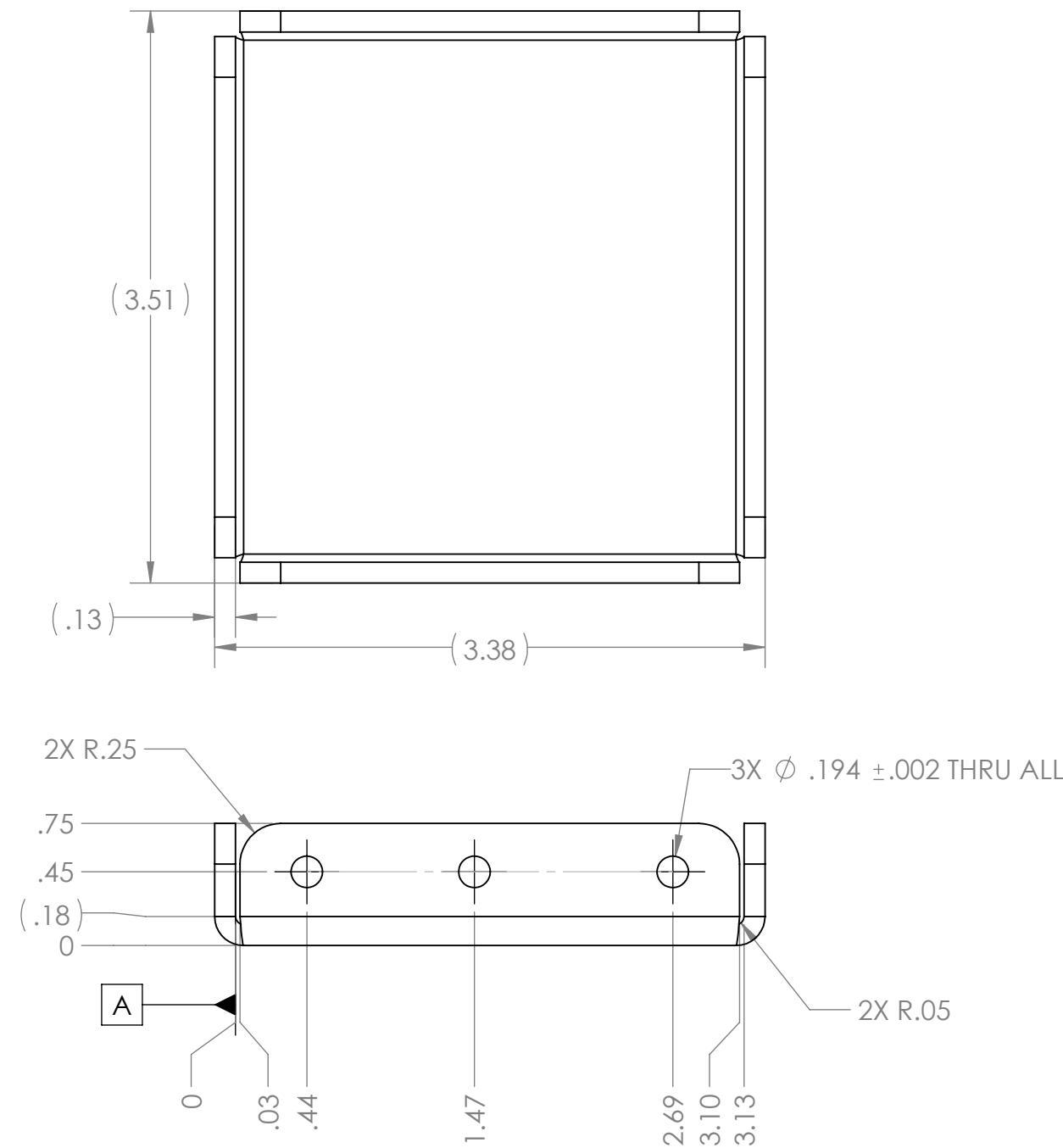
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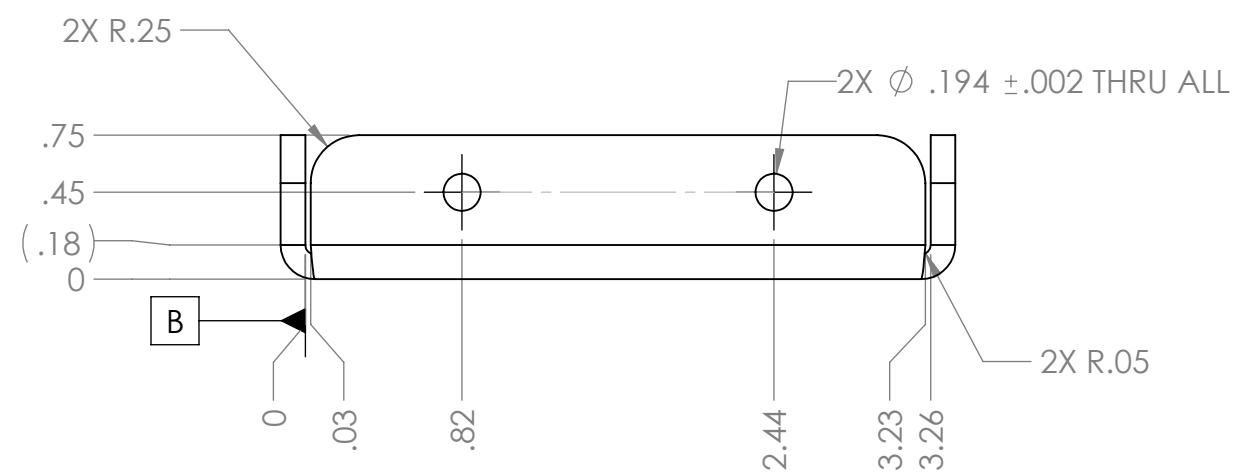
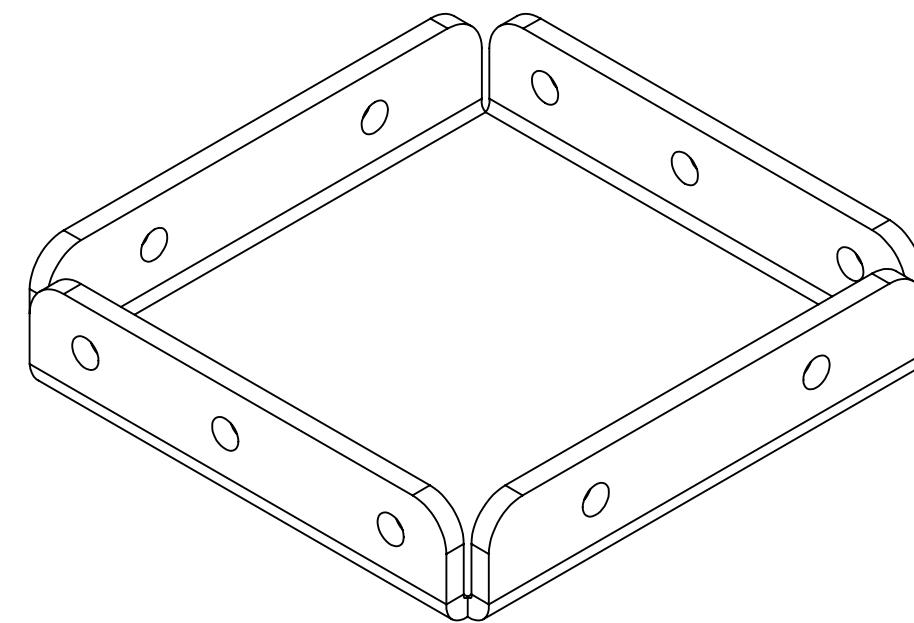
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B



- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN CHECKED ENG APPR. MFG APPR.	DATE KAMC 9/16/19
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
GE-20010 - 29	GE-20010	MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION	DO NOT SCALE DRAWING			
TITLE: Hanger - Hanging Pole Holder, End Cap				
SIZE B	DWG. NO. GE-20010 - 16	REV 0		
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1		

4

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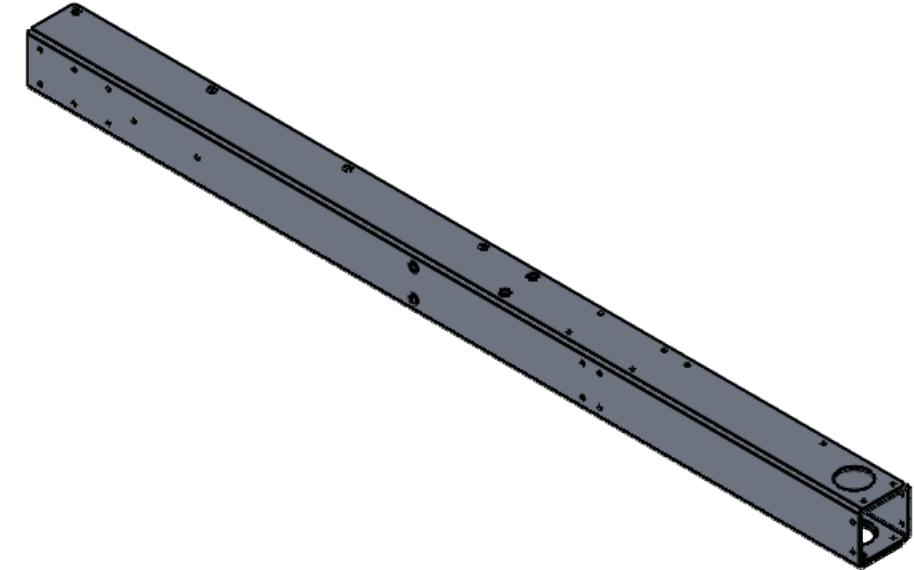
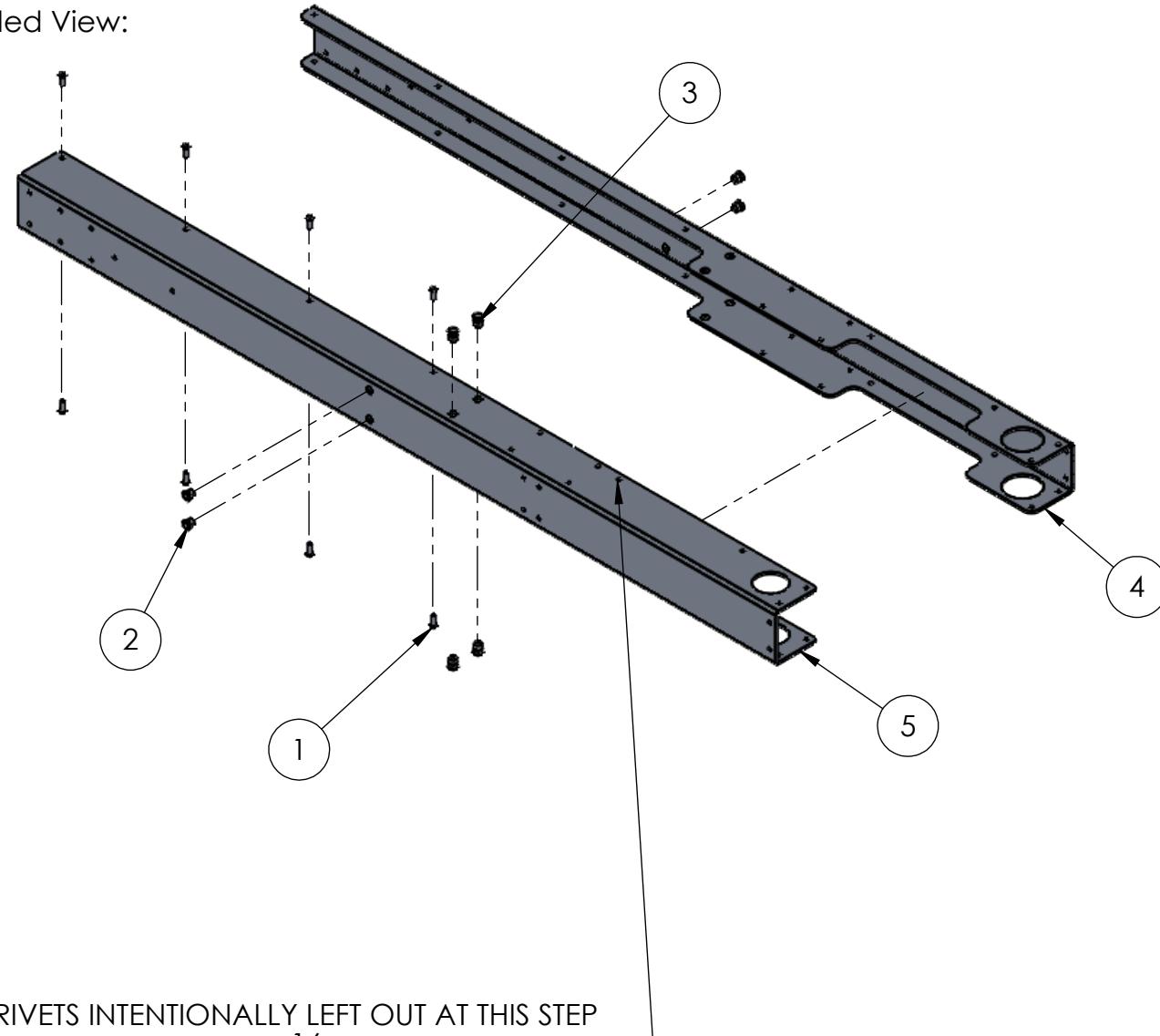
2

1

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	GE-20010-02 & GE-20010-03 UPDATED, BOM UPDATED (REMOVED ONE STYLE OF RIVNUT), WEIGHT COMMENT UPDATED	9/10/2019	KAMC

Exploded View:



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	8
2	rivnut_.25_20_.027-.165	Rivnut, 1/4"-20 bolt, material thickness: .027" - .165"	4
3	rivnut_.25_20_.165-.260	Rivnut, 1/4"-20 bolt, material thickness: .165"-.260"	4
4	GE-20010 - 02	Hanger - Center Leg	1
5	GE-20010 - 03	Hanger - Center Leg, Face	1

		UNLESS OTHERWISE SPECIFIED:	NAME DRAWN KAMC	DATE 9/10/19
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001		
	GE-20010	INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	Q.A. COMMENTS: WEIGHT: 8.39 LBS
		MATERIAL		
	NEXT ASSY	USED ON	FINISH BARE	SIZE B
		APPLICATION	DO NOT SCALE DRAWING	
				DWG. NO. GE-20010 - 26
				REV A
			SCALE: 1:8	WEIGHT: SHEET 1 OF 2

Notes:

- Rivets and Rivnuts should be plated or aluminum.

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ROBOTICS
COMPETITION 
SolidWorks
Modeling Solutions Partner

TITLE:
**Hanger - Center Bar
Sub Assembly**

SIZE **B** DWG. NO. **GE-20010 - 26** REV **A**
SCALE: 1:8 WEIGHT: SHEET 1 OF 2

4

3

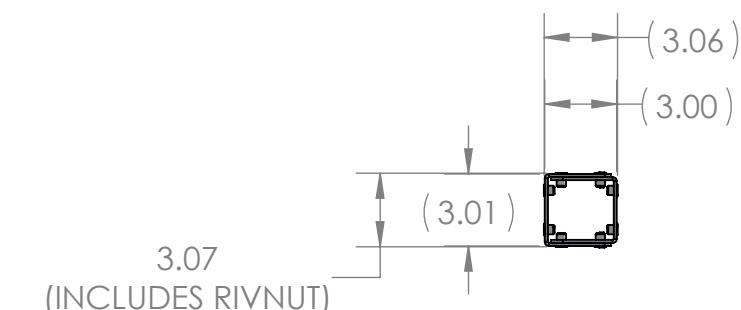
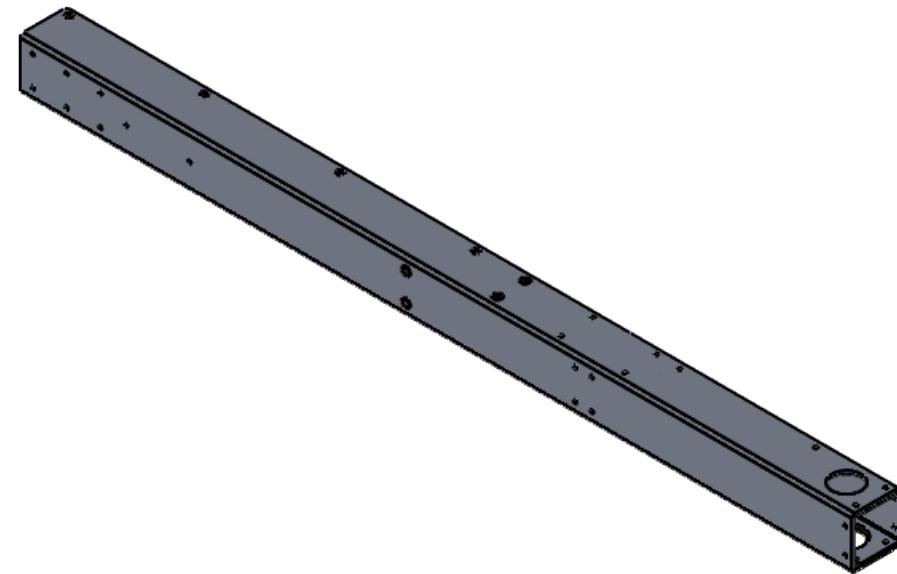
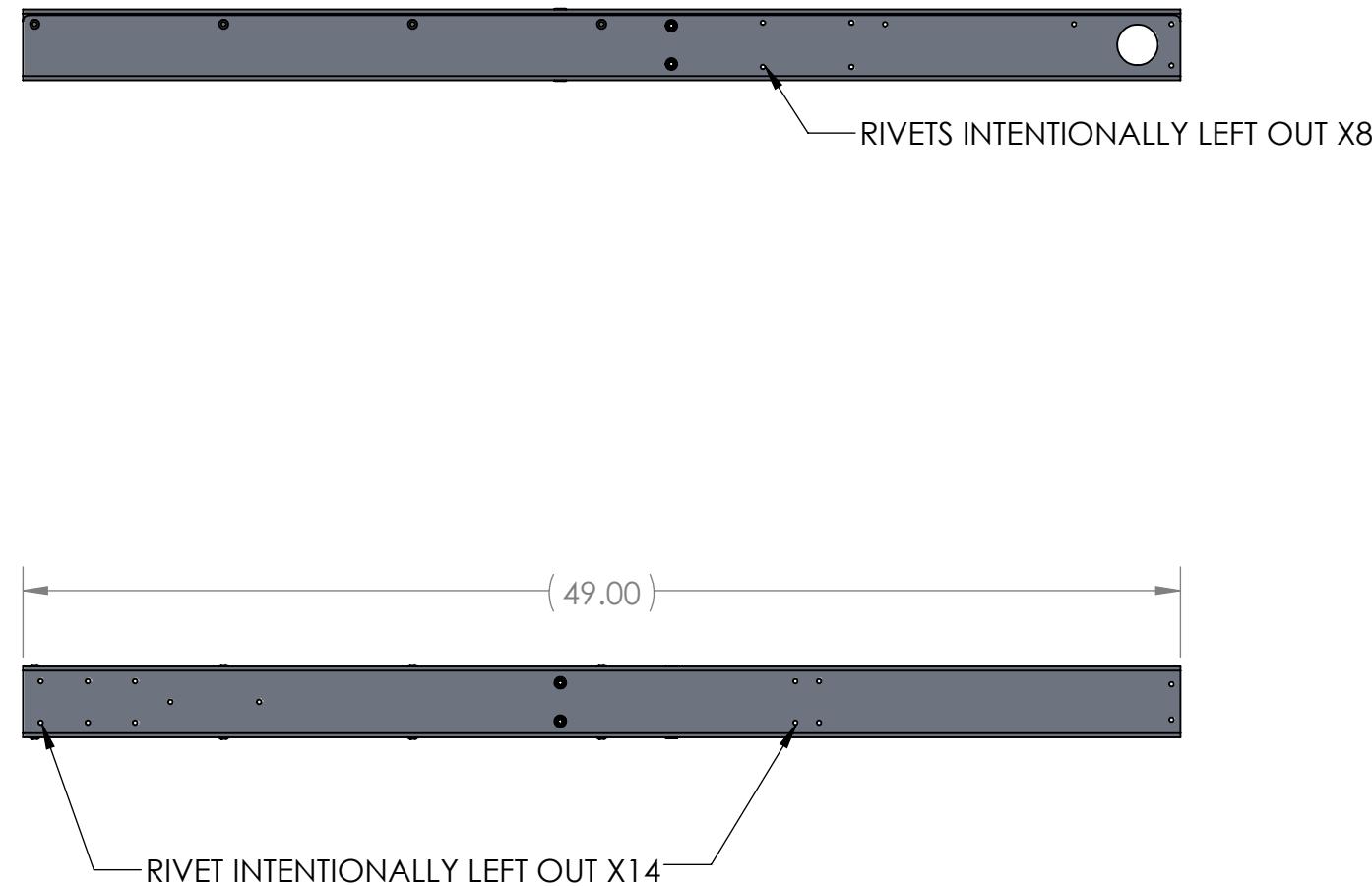
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

B



DIMENSIONS SHOWN FOR REFERENCE

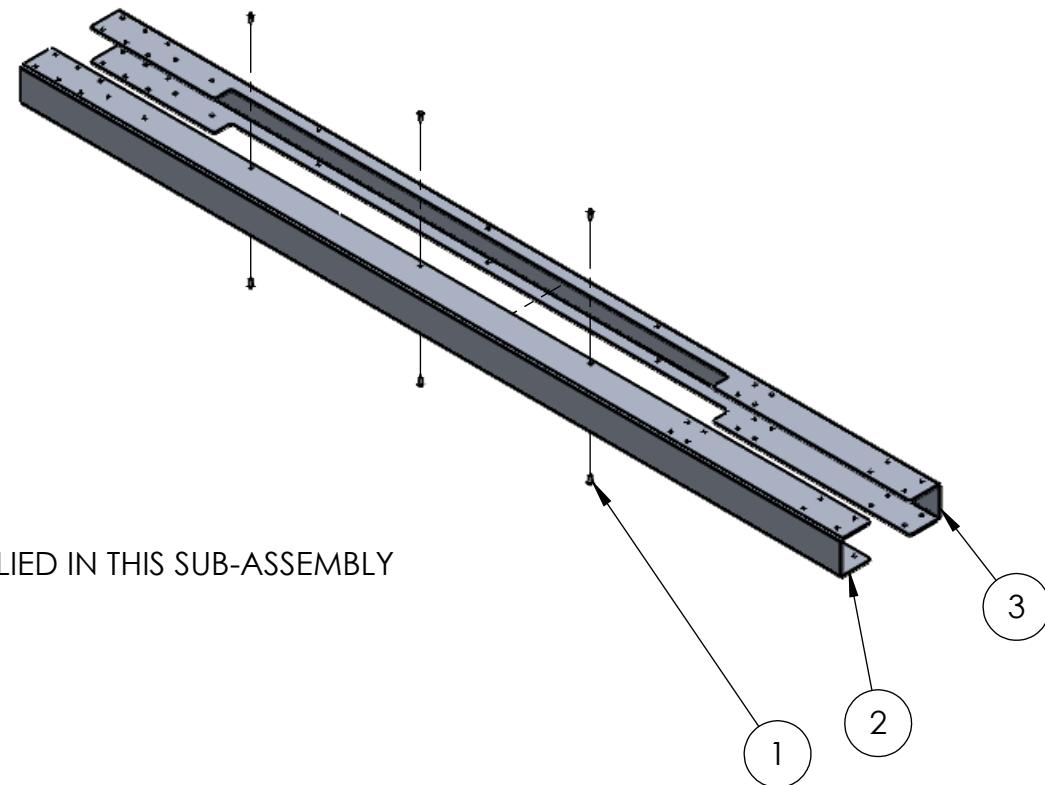
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC 9/10/19	DATE
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		WEIGHT SHOWN ON SHEET 1		
GE-20010		MATERIAL		
NEXT ASSY	USED ON	FINISH	BARE	
	APPLICATION	DO NOT SCALE DRAWING		
B	DWG. NO. GE-20010 - 26	REV A		
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2		

REVISIONS

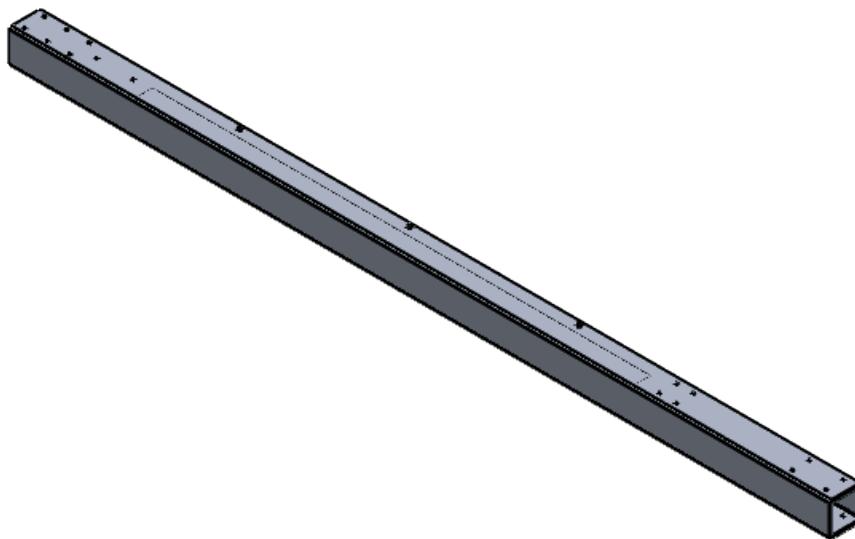
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE TO PARTS	9/16/19	KAMC

Exploded View:



- Notes:
1. Rivets should be plated or aluminum.

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	6
2	GE-20010 - 05	Hanger - Side Leg, Face	1
3	GE-20010 - 04	Hanger - Side Leg	1

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC DATE 9/10/19
	CHECKED	
	ENG APPR.	
	MFG APPR.	
	Q.A.	
	COMMENTS:	
GE-20010	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	WEIGHT: 12.80 LBS
NEXT ASSY	USED ON	FINISH BARE
	APPLICATION	DO NOT SCALE DRAWING
SIZE B	DWG. NO. GE-20010 - 27	REV A
SCALE: 1:12	WEIGHT:	SHEET 1 OF 2

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:

**Hanger - Side
Leg Assembly**

4

3

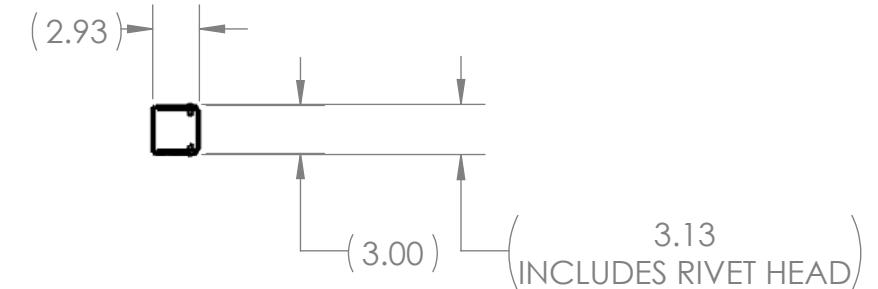
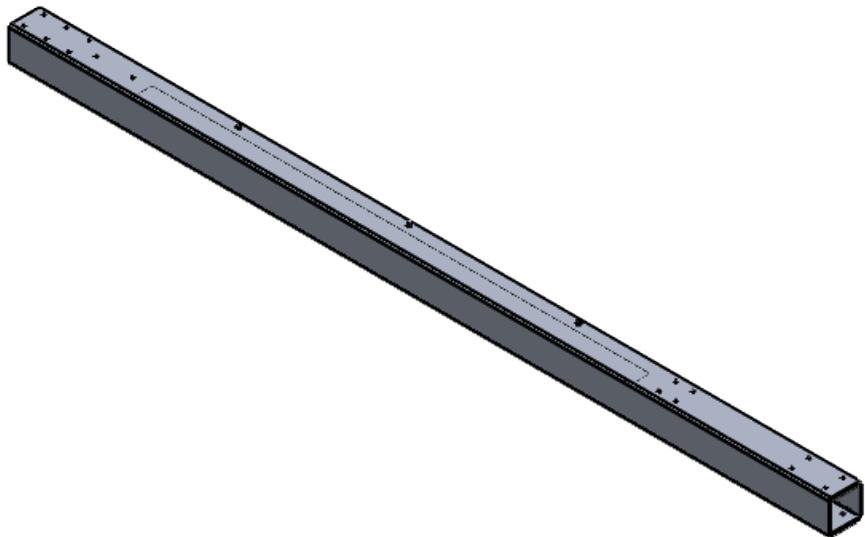
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1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

B



DIMENSIONS SHOWN FOR REFERENCE

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME KAMC	DATE 9/10/19
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		WEIGHT SHOWN ON SHEET 1			
GE-20010		MATERIAL			
NEXT ASSY	USED ON	FINISH	BARE		
		APPLICATION	DO NOT SCALE DRAWING		
SIZE B	DWG. NO. GE-20010 - 27	REV A			
SCALE: 1:12	WEIGHT:	SHEET 2 OF 2			

4

3

2

1

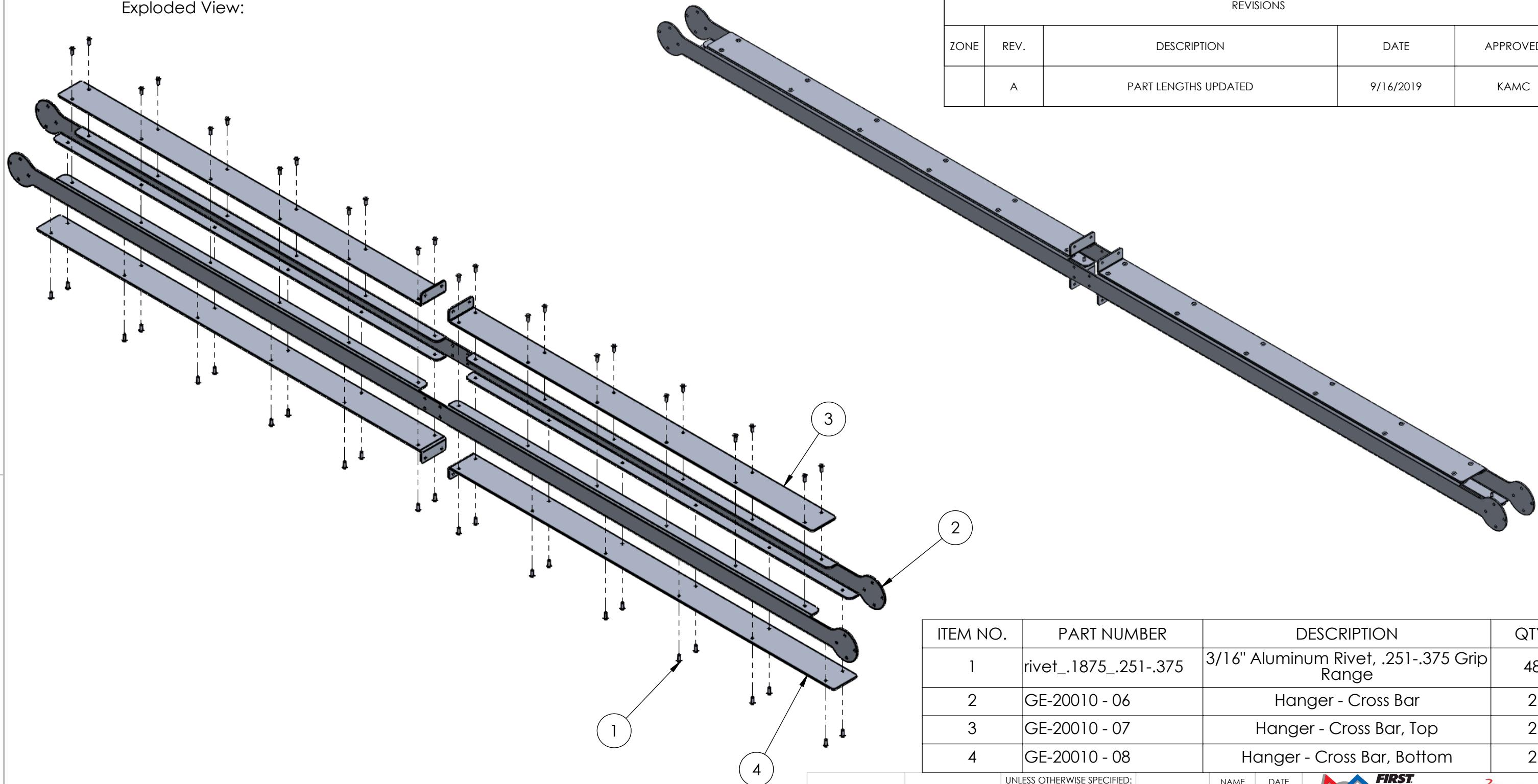
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Exploded View:



- Notes:
- Rivets should be plated or aluminum.

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	PART LENGTHS UPDATED	9/16/2019	KAMC

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	48
2	GE-20010 - 06	Hanger - Cross Bar	2
3	GE-20010 - 07	Hanger - Cross Bar, Top	2
4	GE-20010 - 08	Hanger - Cross Bar, Bottom	2

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN CHECKED ENG APPR. MFG APPR.	DATE KAMC 9/10/19
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
GE-20010	MATERIAL		
NEXT ASSY	USED ON	FINISH BARE	WEIGHT: 15.74 LBS
	APPLICATION	DO NOT SCALE DRAWING	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Hanger - Center Bar
Sub Assembly**

SIZE DWG. NO. REV
B **GE-20010 - 28** **A**

SCALE: 1:8 WEIGHT: SHEET 1 OF 2

4

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2

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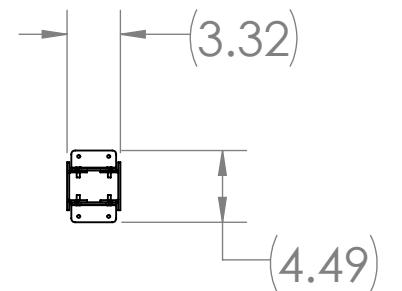
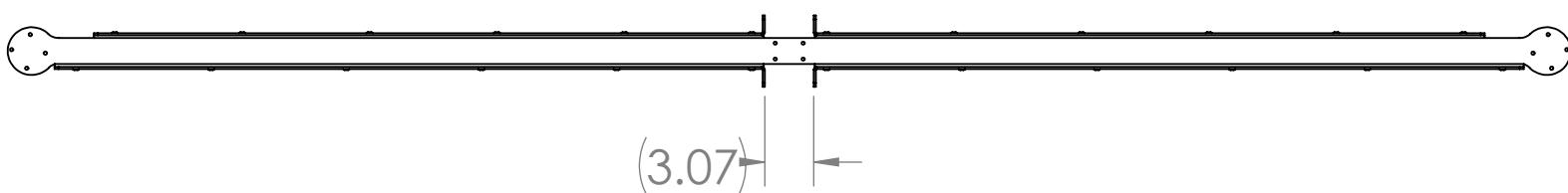
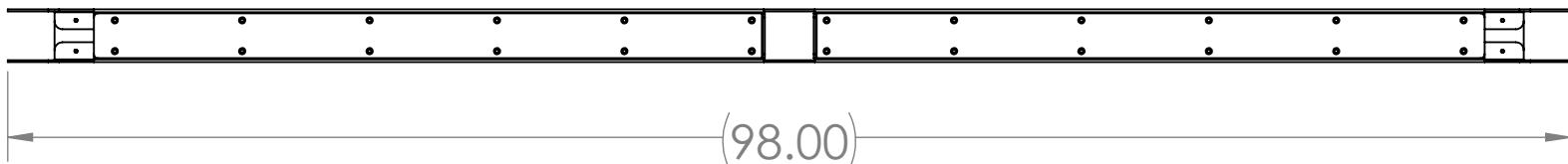
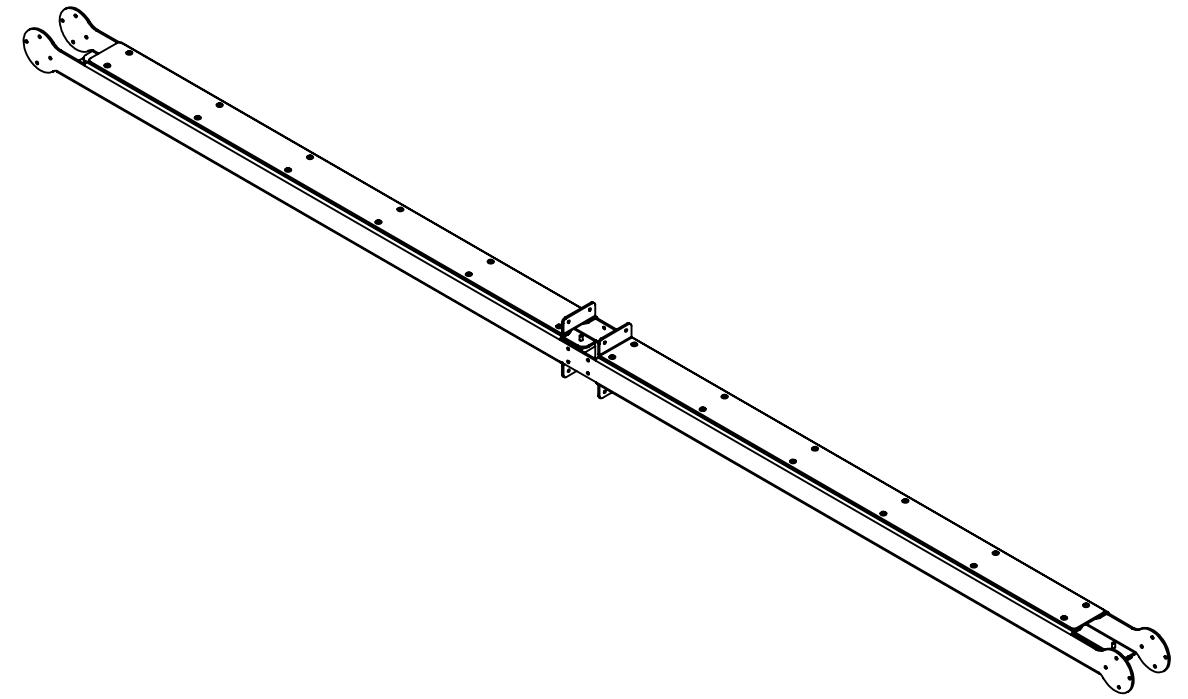
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2

1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



DIMENSIONS SHOWN FOR REFERENCE

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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: $\pm .01$ THREE PLACE DECIMAL: $\pm .001$		NAME KAMC	DATE 9/10/19
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		FINISH	BARE		
		APPLICATION	DO NOT SCALE DRAWING		
		WEIGHT SHOWN ON SHEET 1			
SIZE B	DWG. NO. GE-20010 - 28	REV A			
SCALE: 1:12	WEIGHT:	SHEET 2 OF 2			

4

3

2

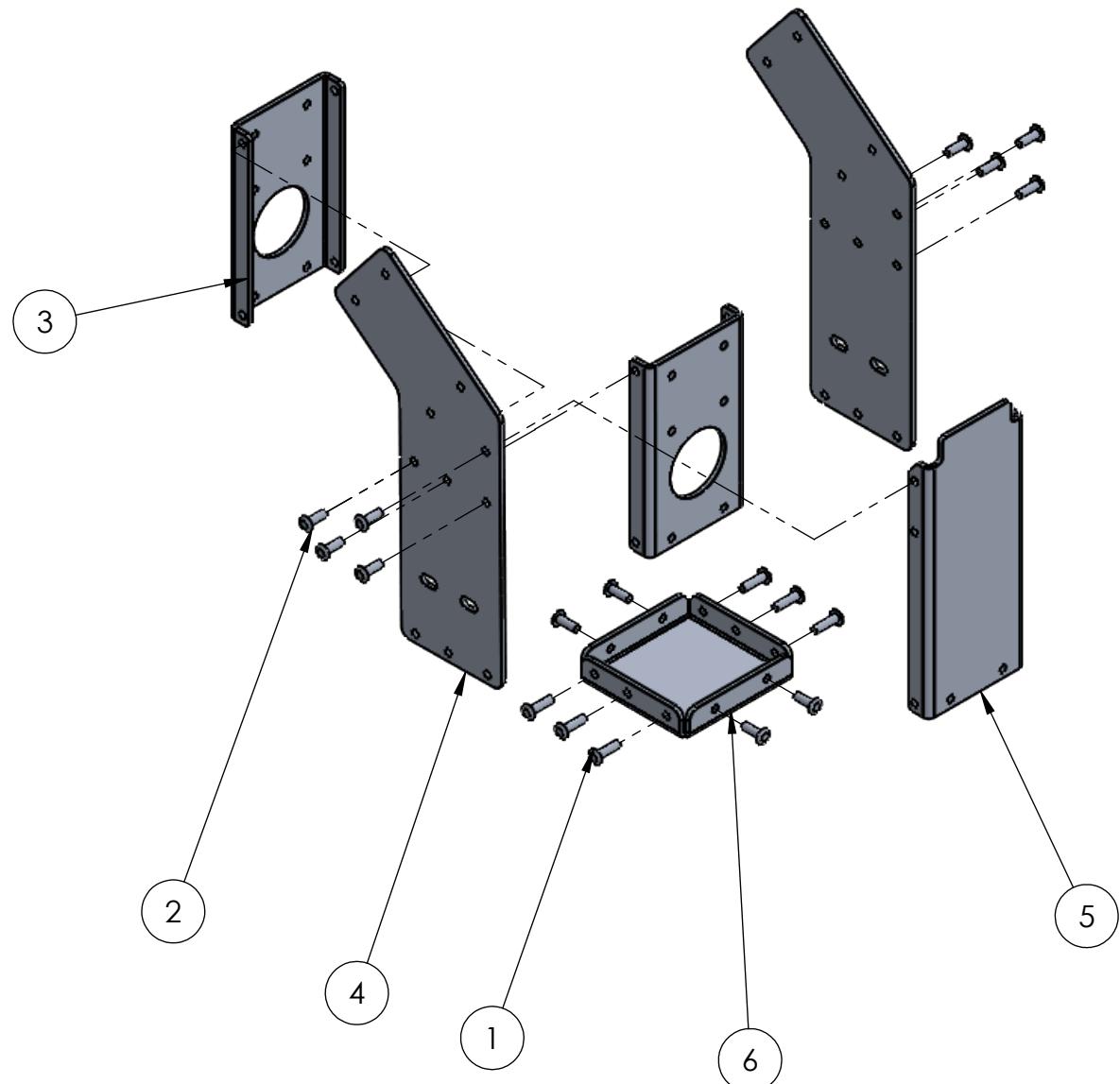
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGES TO PARTS AND OVERALL ASSEMBLY	9/16/2019	KAMC

B

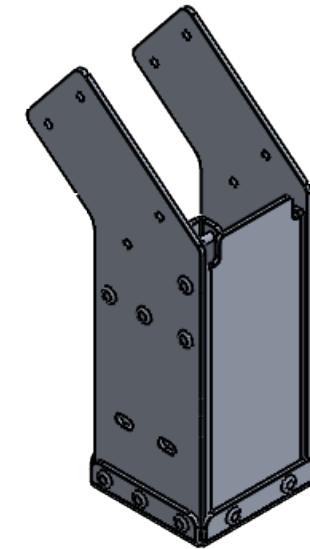
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- Notes:
- Rivets should be plated or aluminum.

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	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001		NAME	DATE
	DRAWN	KAMC	8/25/19	
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:	
GE-20010	MATERIAL		WEIGHT: 1.80 LBS	
NEXT ASSY	USED ON	FINISH	BARE	
	APPLICATION	DO NOT SCALE DRAWING		
		SCALE: 1:4	WEIGHT:	SHEET 1 OF 2



4

3

2

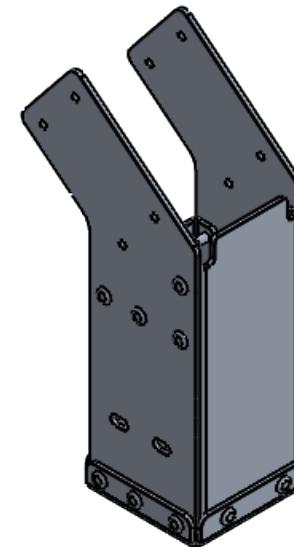
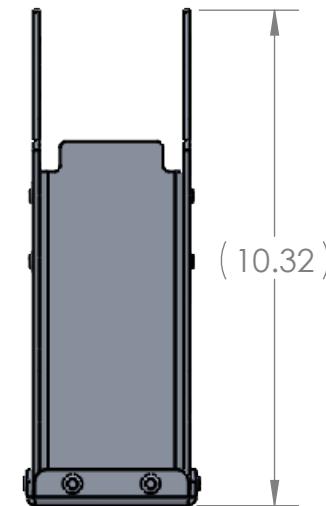
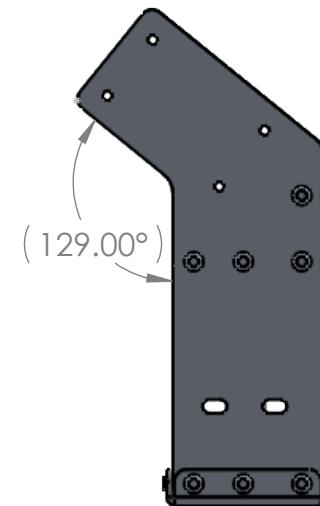
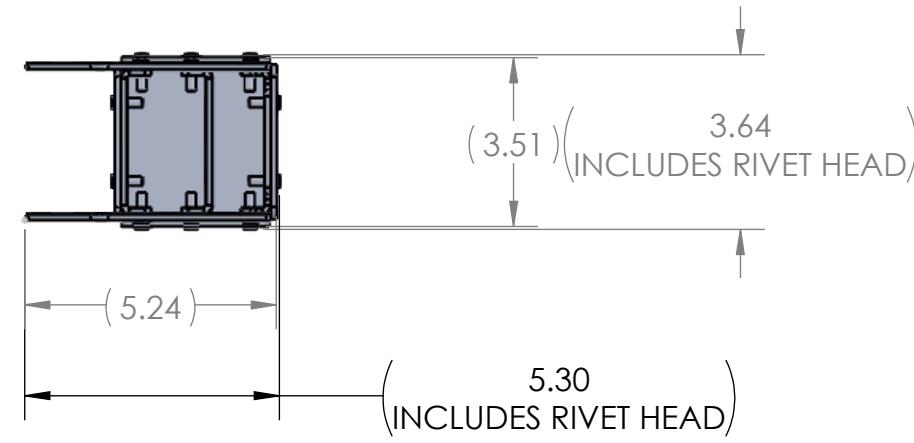
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

B

B



DIMENSIONS SHOWN FOR REFERENCE

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001		NAME DRAWN KAMC 8/26/19	DATE
		INTERPRET GEOMETRIC TOLERANCING PER:		CHECKED	
				ENG APPR.	
				MFG APPR.	
				Q.A.	
				COMMENTS: WEIGHT SHOWN ON SHEET 1	
GE-20010		MATERIAL			
NEXT ASSY	USED ON	FINISH	BARE		
	APPLICATION	DO NOT SCALE DRAWING			
SIZE B	DWG. NO. GE-20010 - 29	REV A			
SCALE: 1:4	WEIGHT:	SHEET 2 OF 2			

4

3

2

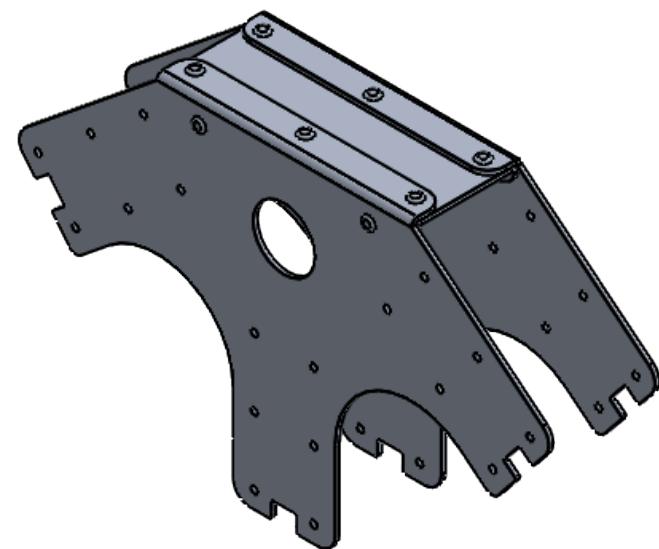
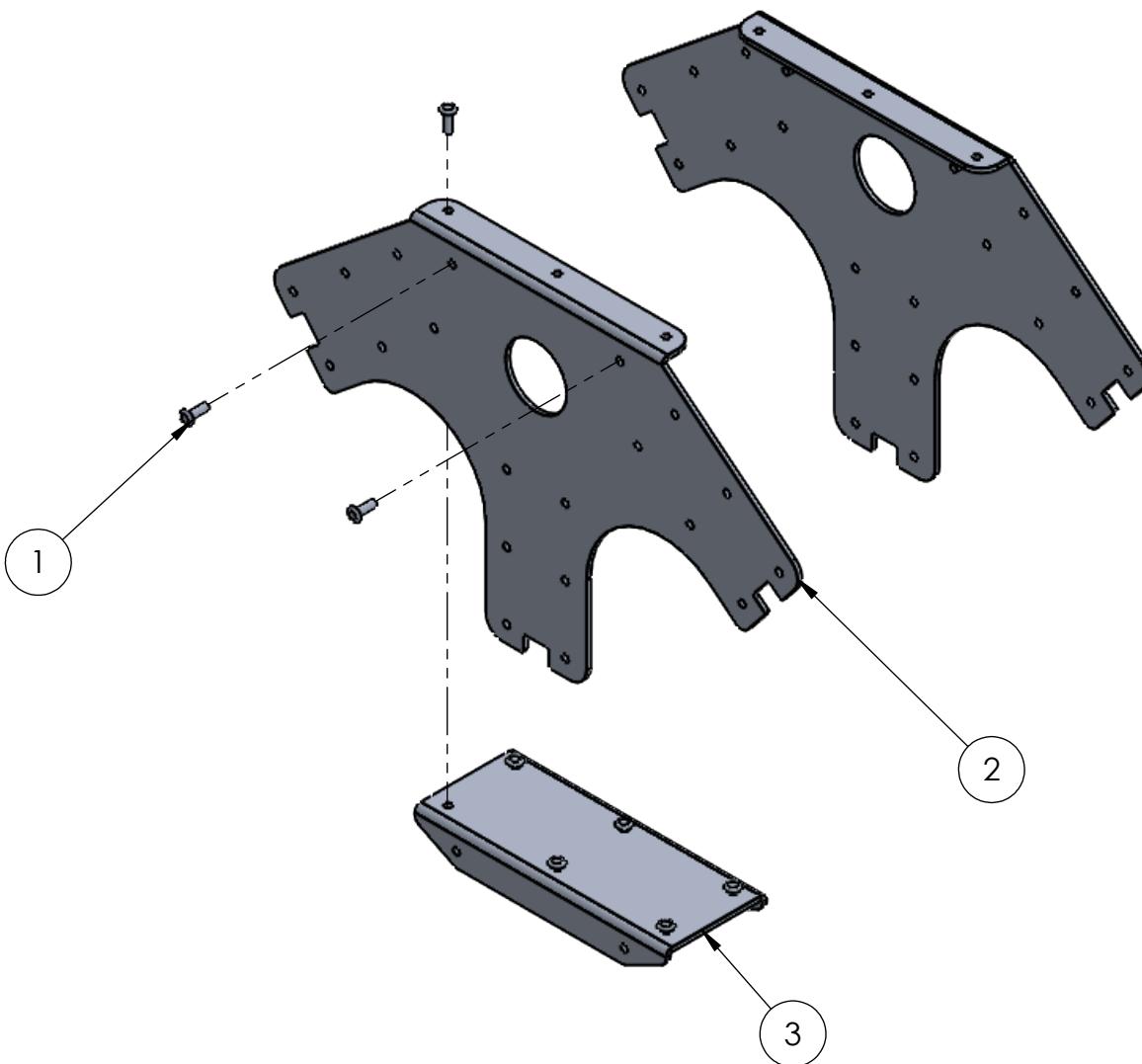
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Notes:
1. Rivets should be plated or aluminum.

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	10
2	GE-20010 - 01	Hanger - Top	2
3	GE-20010 - 14	Hanger - Top, Face	1

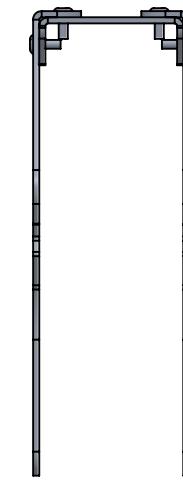
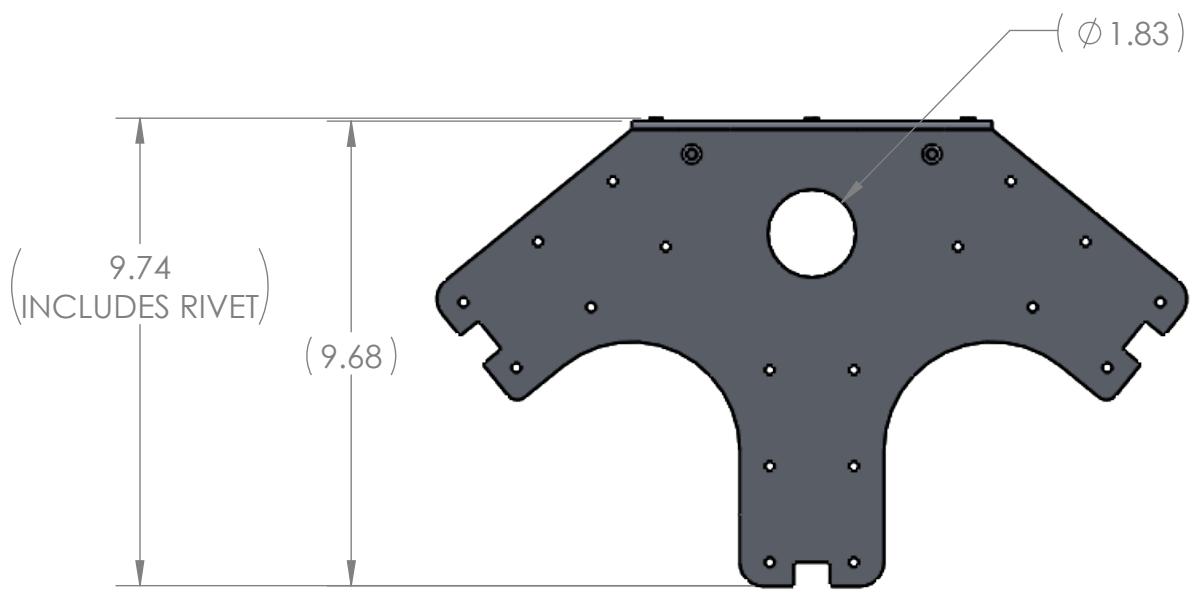
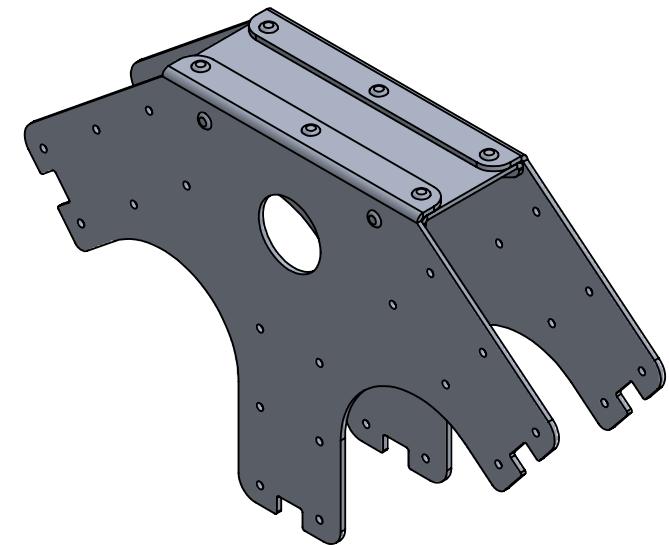
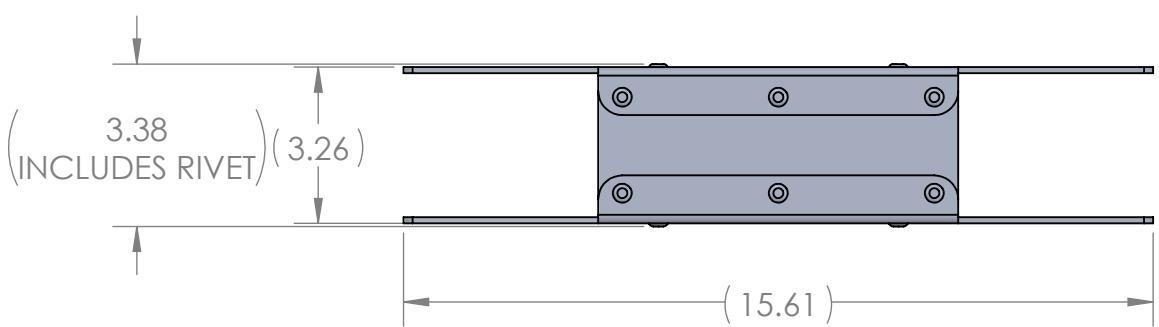
		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	9/16/19
		TOLERANCES:		
		FRACTIONAL: ±1/16		
		ANGULAR: MACH ±1° BEND ±1°		
		TWO PLACE DECIMAL ±.01		
		THREE PLACE DECIMAL ±.001		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
GE-20010		FINISH	BARE	
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING	WEIGHT: 2.40 LBS
TITLE: Hanger - Top Sub Assembly				
SIZE B	DWG. NO. GE-20010 - 30	REV 0		
SCALE: 1:4	WEIGHT:	SHEET 1 OF 2		

4

3

2

1



DIMENSIONS FOR REF.

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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: $\pm .01$ THREE PLACE DECIMAL: $\pm .001$	NAME	DATE
		DRAWN	KAMC	9/16/19
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		WEIGHT SHOWN ON SHEET 1		
GE-20010		MATERIAL		
NEXT ASSY	USED ON	FINISH	BARE	
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:4		WEIGHT:	SHEET 2 OF 2	
SIZE DWG. NO.		REV		
B GE-20010 - 30			0	

FIRST[®] ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hanger - Top Sub Assembly

4

3

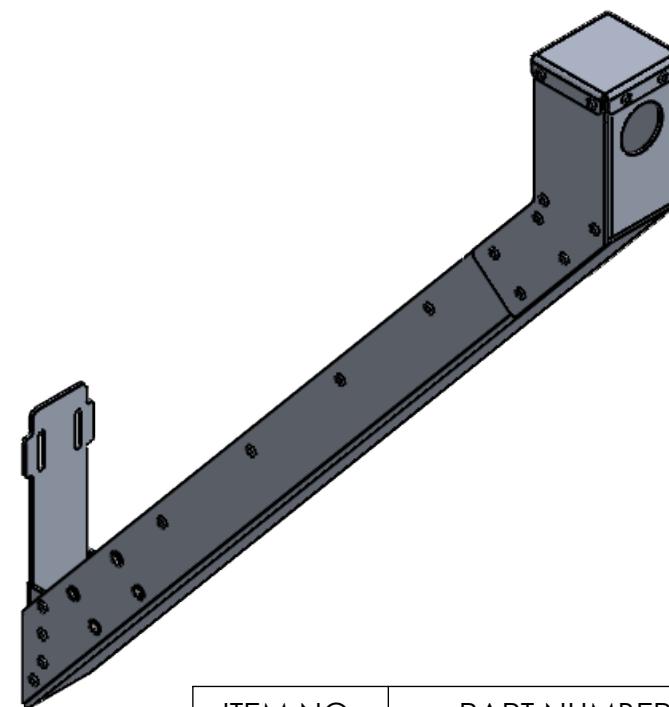
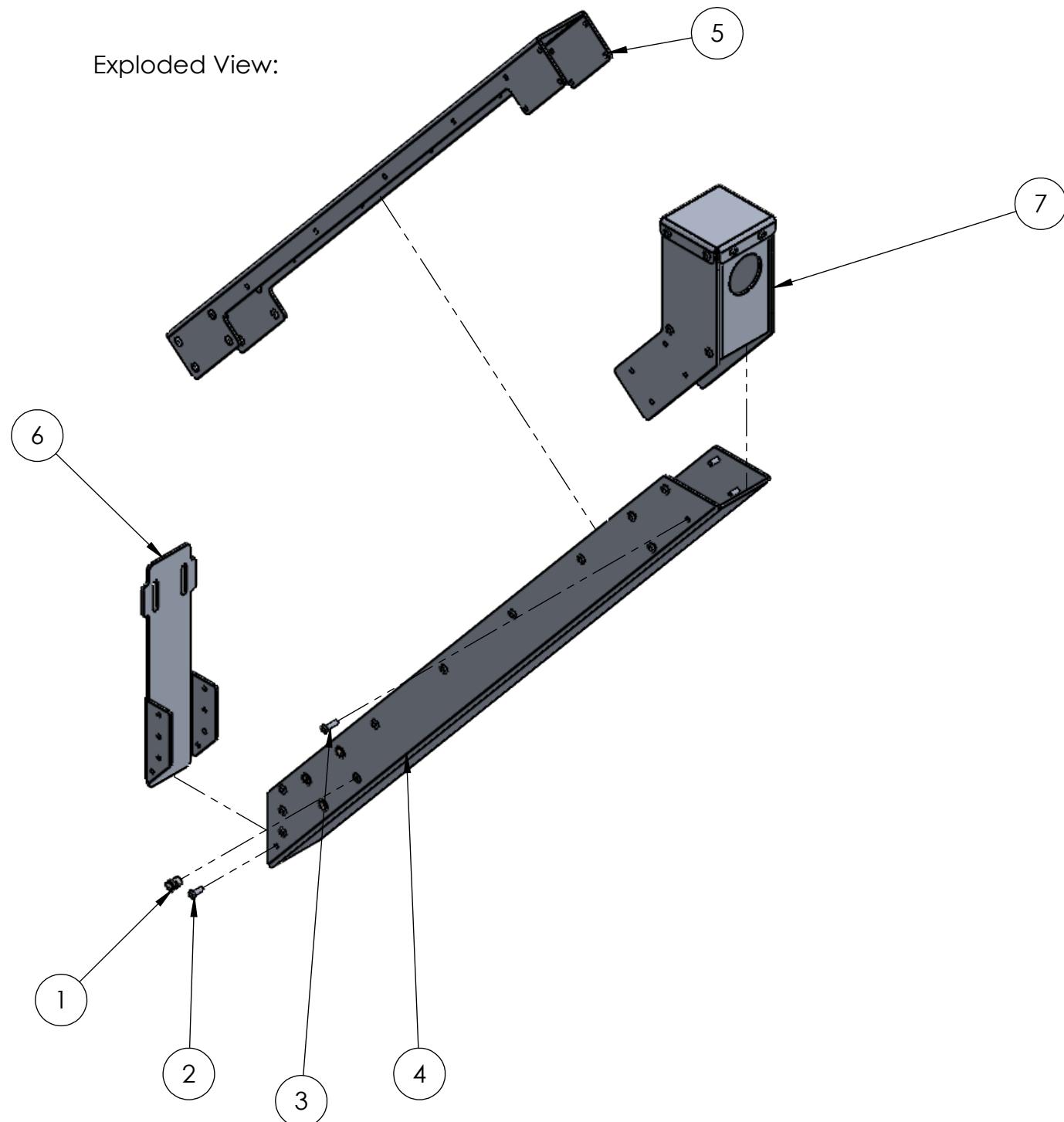
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1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE TO PARTS, PARTS AND SUB ASSEMBLY ADDED	9/16/2019	KAMC

Exploded View:



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivnut_.25_20_.165-.260	Rivnut, 1/4"-20 bolt, material thickness: .165"-.260"	8
2	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	16
3	rivet_.1875_.376-.5	3/16" Aluminum Rivet, .376-.5 Grip Range	8
4	GE-20011 - 01	Hanger Brace - Channel	1
5	GE-20011 - 02	Hanger Brace - Face	1
6	GE-20011 - 06	Hanger Brace - Connection to Hanger	1
7	GE-20011 - 16	Hanger Brace - Pivot Pole Holder Sub Assembly	1

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN KAMC CHECKED ENG APPR. MFG APPR.	DATE 9/16/19
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	TITLE: Hanger Brace
GE-20020	MATERIAL	COMMENTS: WEIGHT: 7.63 LBS	SIZE DWG. NO. B GE-20011 REV A
NEXT ASSY	USED ON	APPLICATION	SCALE: 1:6 WEIGHT: SHEET 1 OF 2
	FINISH	DO NOT SCALE DRAWING	
	BARE		

Notes:

1. Rivets and Rivnuts should be plated or aluminum.
2. Tag or label with part number.

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4

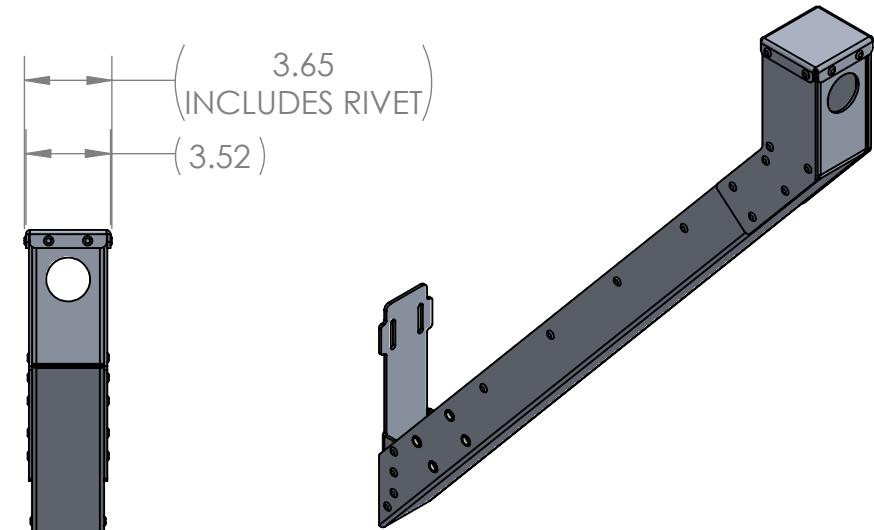
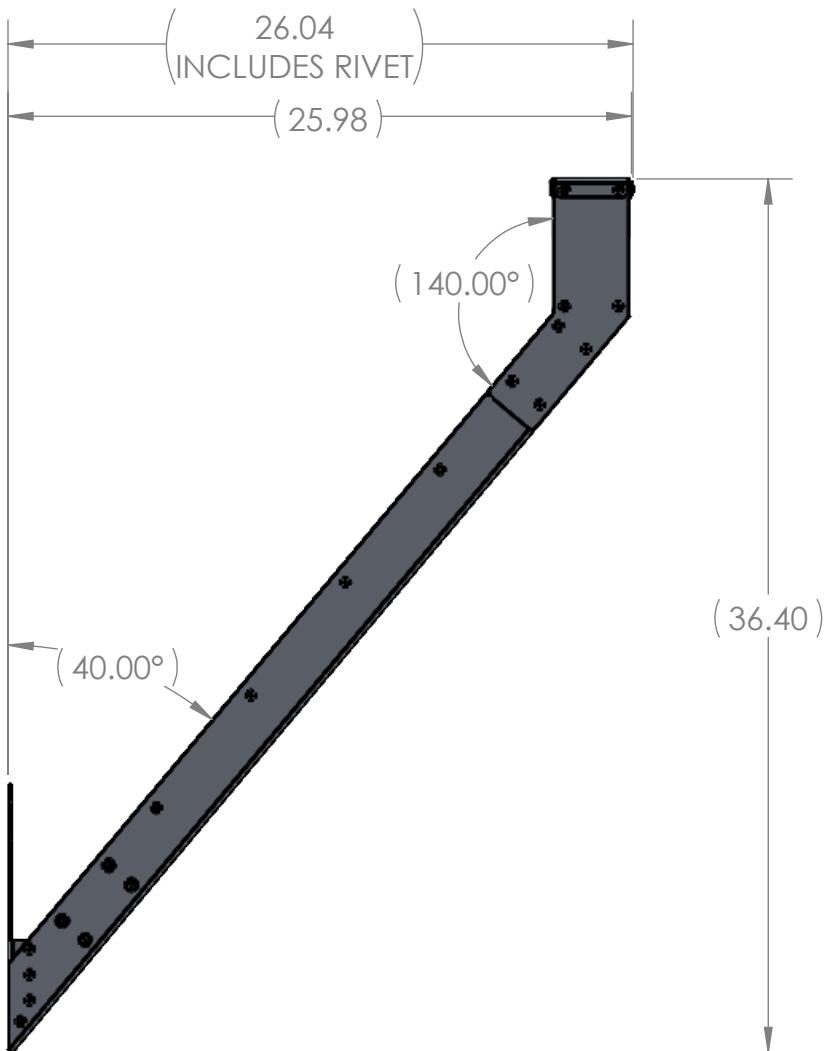
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1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



DIMENSIONS SHOWN FOR REF.

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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: $\pm .01$ THREE PLACE DECIMAL: $\pm .001$		NAME DRAWN KAMC DATE 9/10/19
		INTERPRET GEOMETRIC TOLERANCING PER:		CHECKED
		MATERIAL		ENG APPR. MFG APPR.
		FINISH		Q.A.
		BARE		COMMENTS: WEIGHT SHOWN ON SHEET 1
GE-20020	NEXT ASSY	USED ON	APPLICATION	SIZE DWG. NO. B GE-20011 REV A
			DO NOT SCALE DRAWING	SCALE: 1:8 WEIGHT: SHEET 2 OF 2

FIRST
ROBOTICS
COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger Brace

4

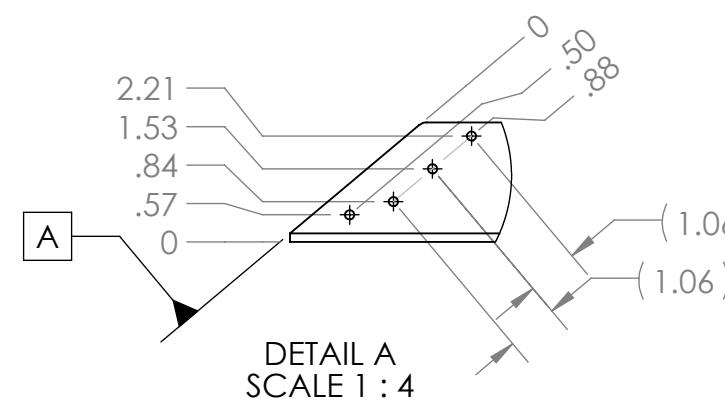
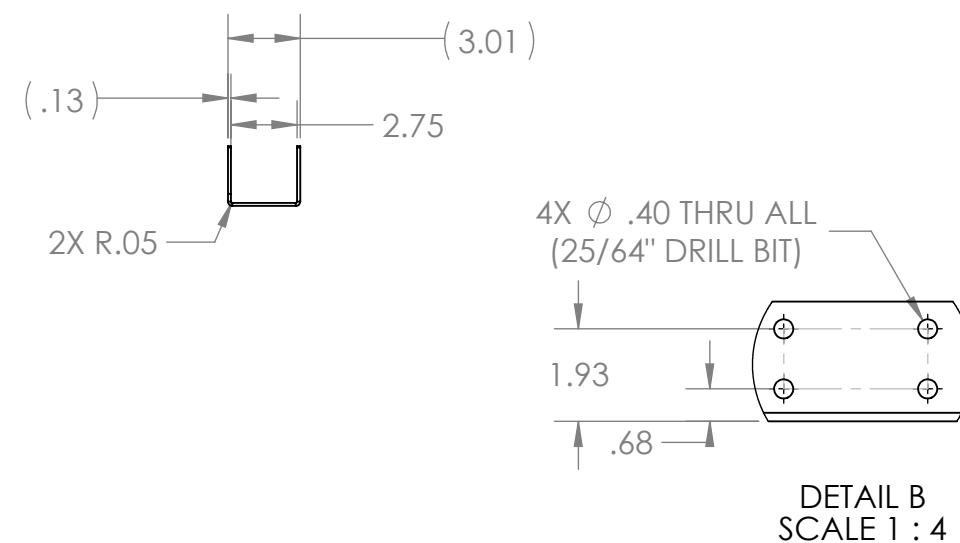
3

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B

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- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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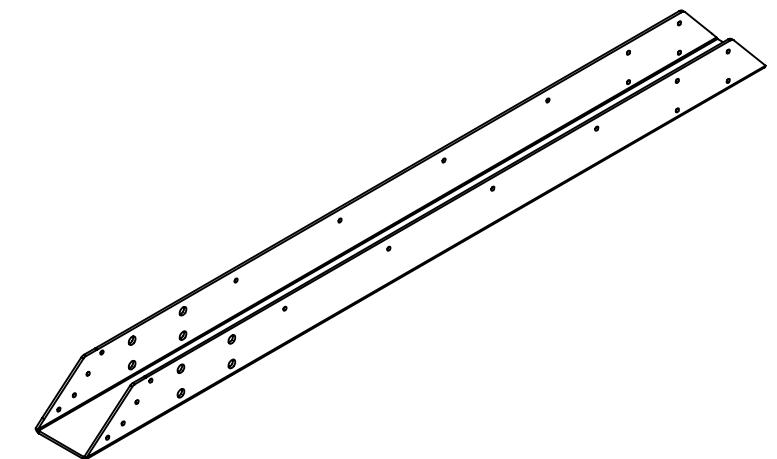
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		DRAWN	KAMC	9/16/19
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20011		MATERIAL	ALUMINUM SHEET	
NEXT ASSY	USED ON	FINISH	BARE	
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:8		WEIGHT:	SHEET 1 OF 1	

SIZE DWG. NO. REV
B GE-20011 - 01 **A**

1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE , INNER BEND REMOVED	9/16/2019	KAMC



FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
Hanger Brace - Channel

2

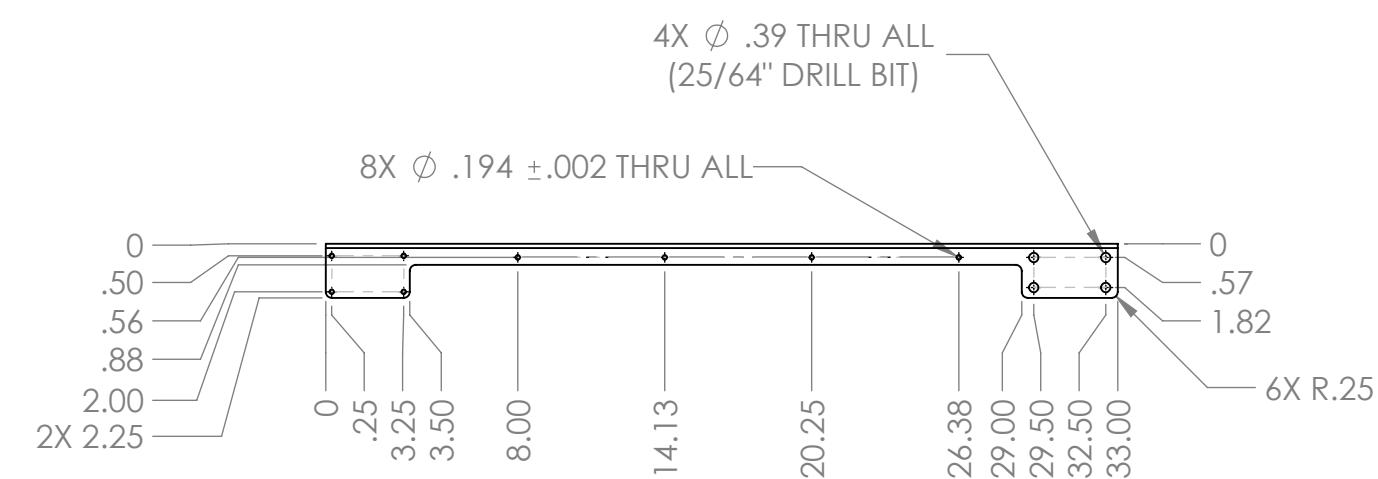
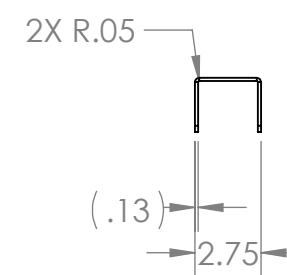
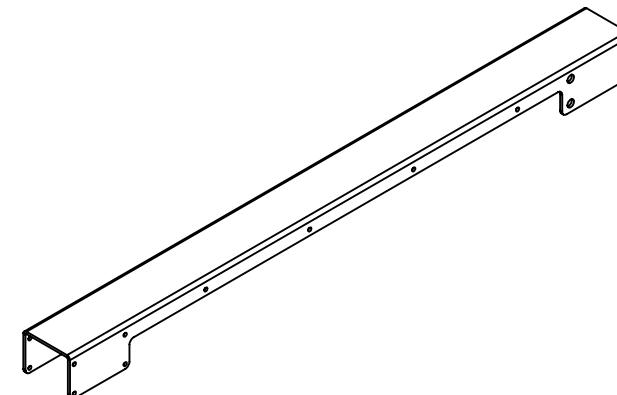
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE	9/16/2019	KAMC



- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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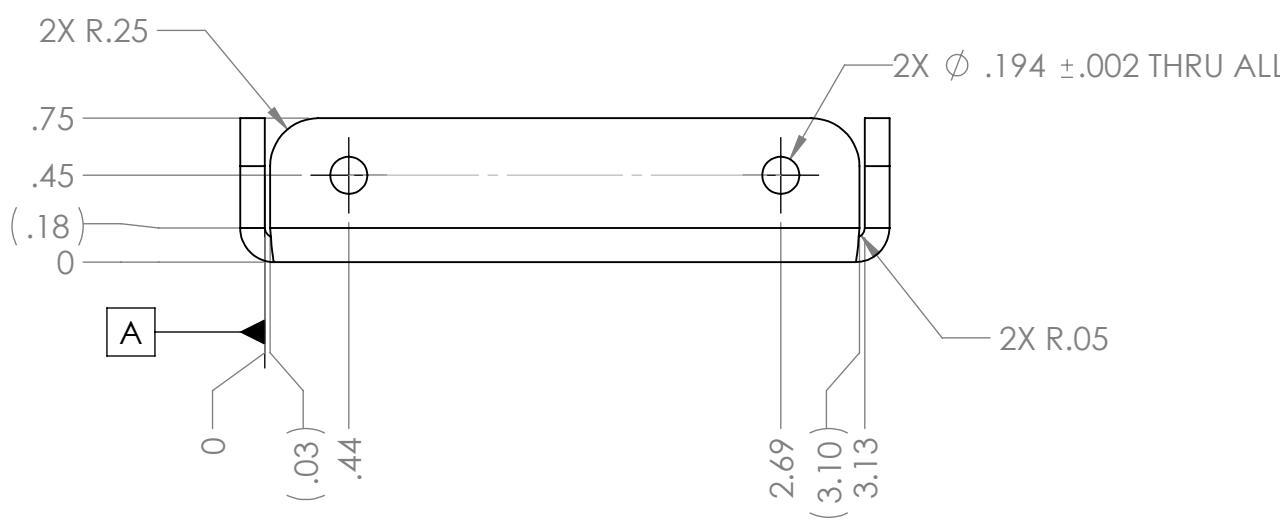
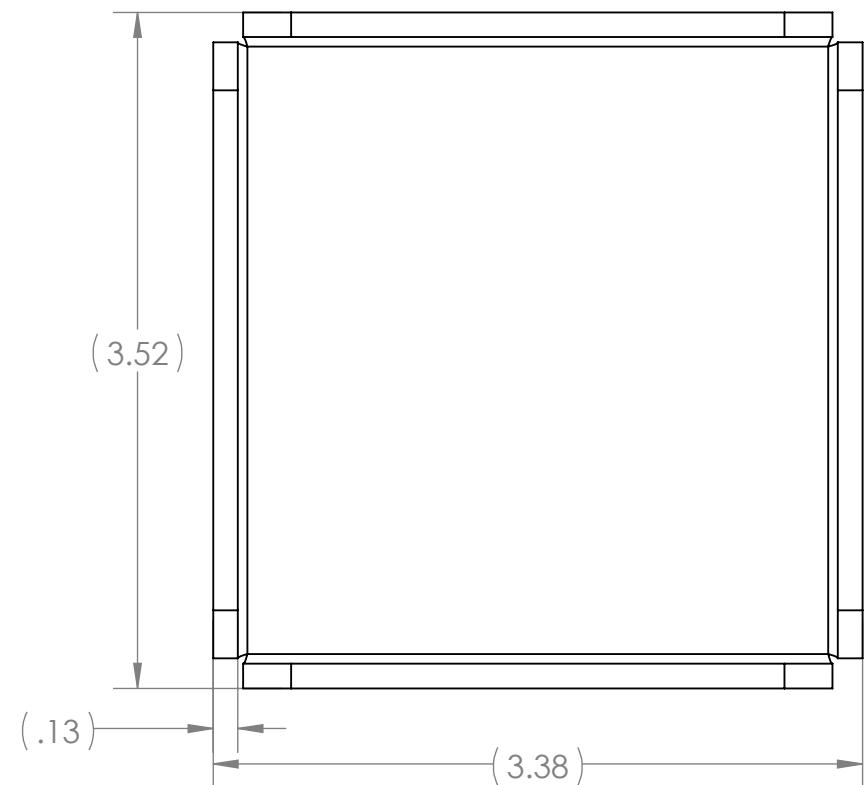
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	DRAWN KAMC 9/16/19	NAME DATE
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		
GE-20011	MATERIAL ALUMINUM SHEET	TITLE: Hanger Brace - Face
NEXT ASSY	USED ON	SIZE DWG. NO. B GE-20011 - 02
APPLICATION	FINISH BARE	REV A
	DO NOT SCALE DRAWING	SCALE: 1:8 WEIGHT: SHEET 1 OF 1

4

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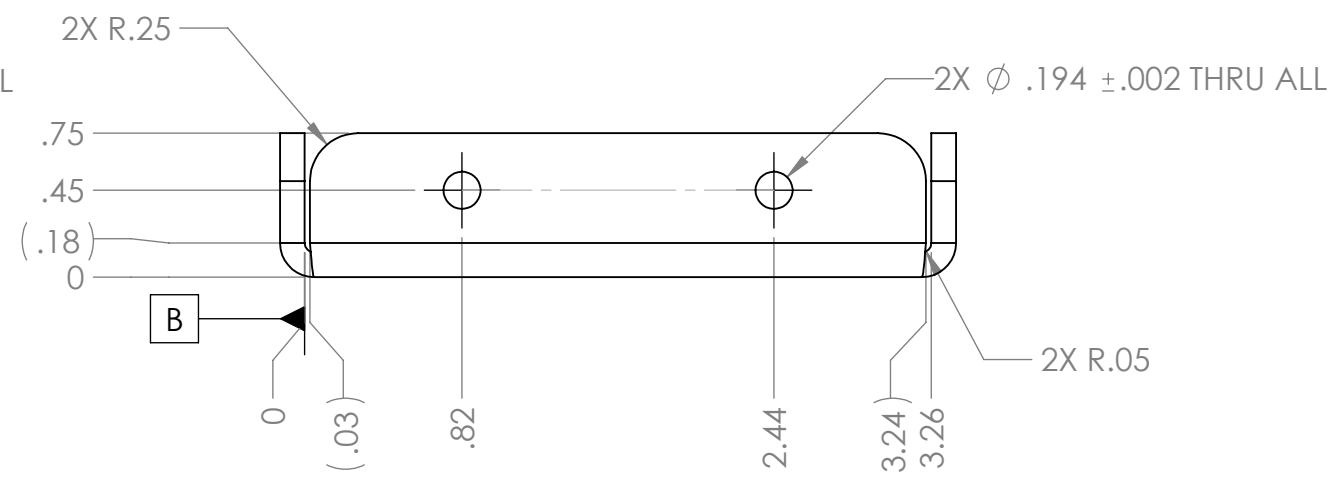
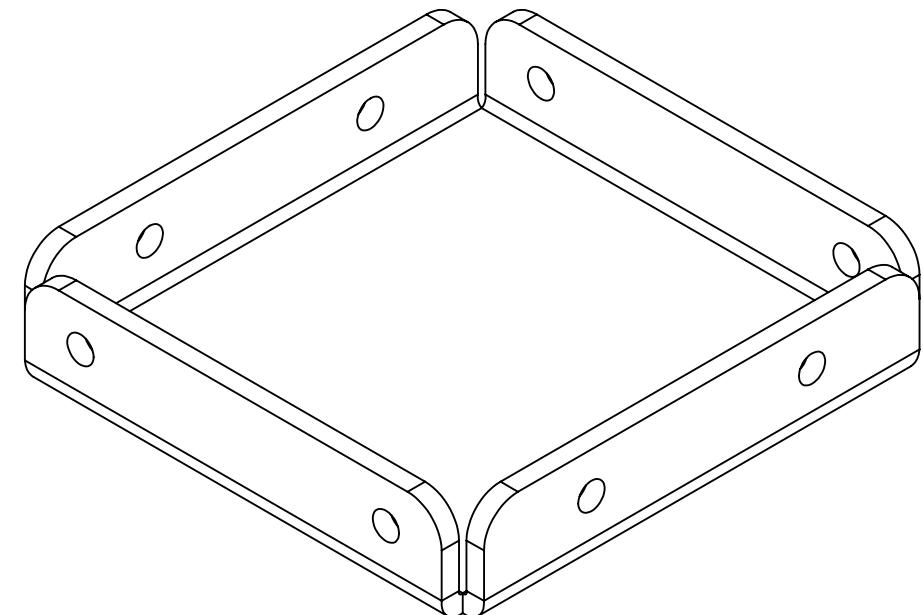
1



- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MAJOR GEOMETRY CHANGE TO ALLOW FOR MANUFACTURING. NAME MODIFICATION MADE.	9/16/2019	KAMC



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN CHECKED ENG APPR. MFG APPR.	DATE KAMC 9/16/19
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
GE-20011 - 16	GE-20011	MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE:

Hanger Brace -
Pivot Pole Top Cap

SIZE DWG. NO. REV
B GE-20011 - 03 **A**

SCALE: 1:1 WEIGHT: SHEET 1 OF 1

4

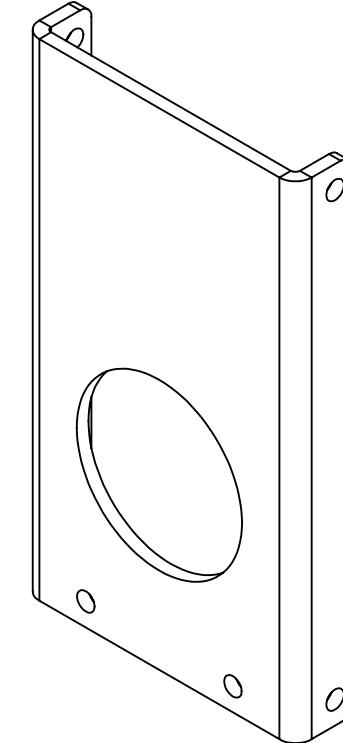
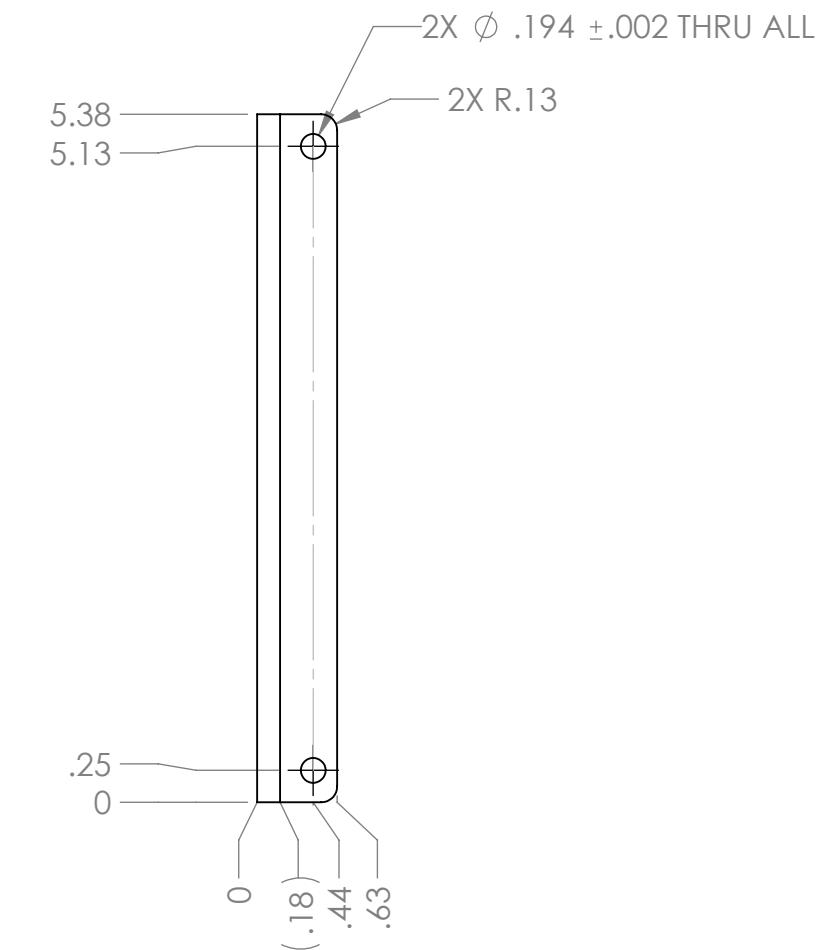
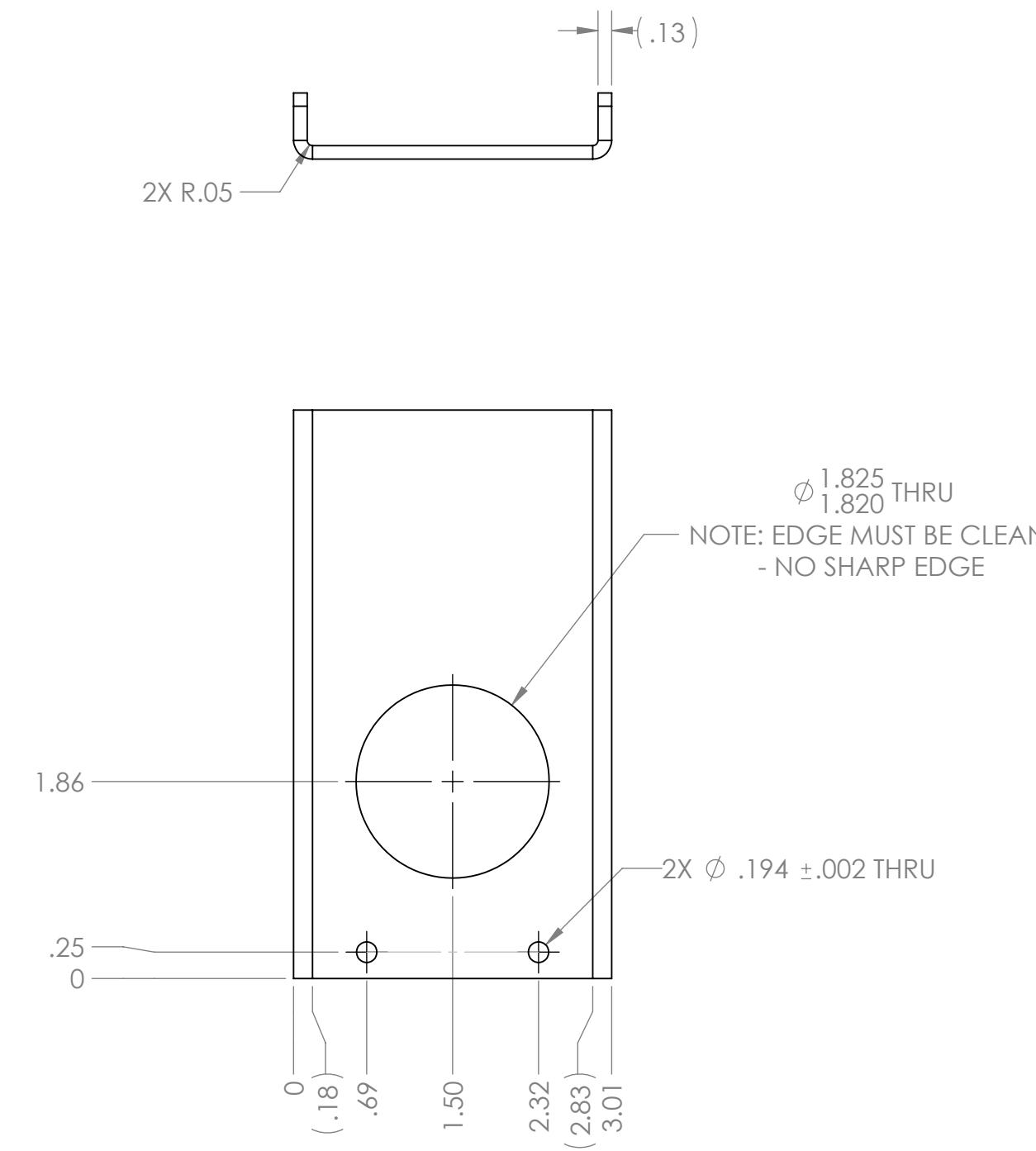
3

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- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC 9/16/19	DATE
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20011 - 16		INTERPRET GEOMETRIC TOLERANCING PER:		
GE-20011		MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 2:3		WEIGHT:	SHEET 1 OF 1	
SIZE DWG. NO. B GE-20011 - 04		REV 0		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Hanger Brace -
Pivot Pole Holder**

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Notes:

1. Material: 8 Ga. 5052 Aluminum Sheet.
2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION 
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN	KAMC	9/16/19	
			CHECKED			
			ENG APPR.			
			MFG APPR.			
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
GE-20011 - 16	GE-20011	MATERIAL ALUMINUM SHEET	COMMENTS:			
NEXT ASSY	USED ON	FINISH BARE				
APPLICATION		DO NOT SCALE DRAWING				
SIZE DWG. NO. REV B GE-20011 - 05 0 SCALE: 1:2 WEIGHT: SHEET 1 OF 1						

4

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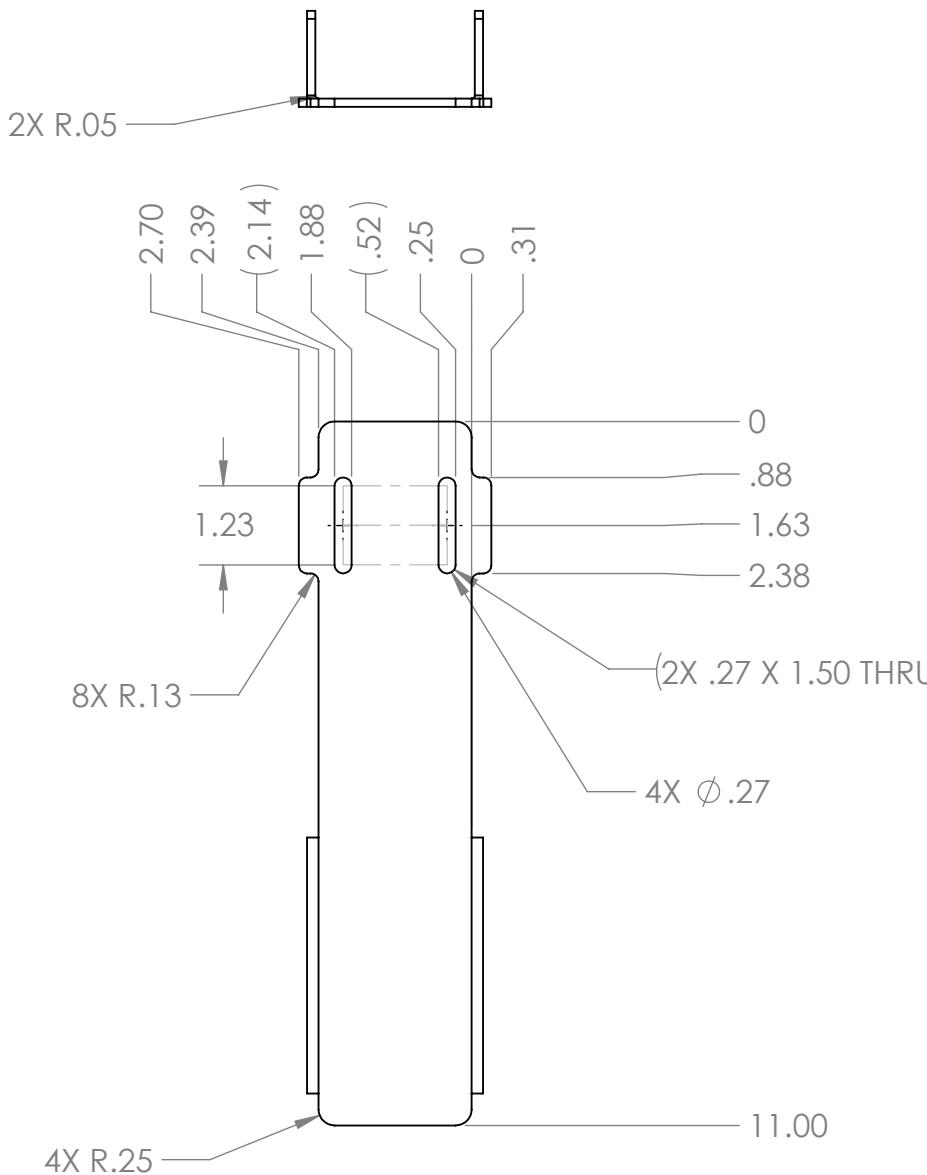
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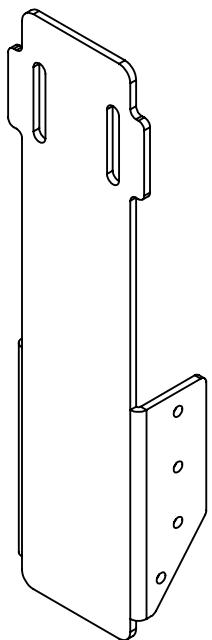
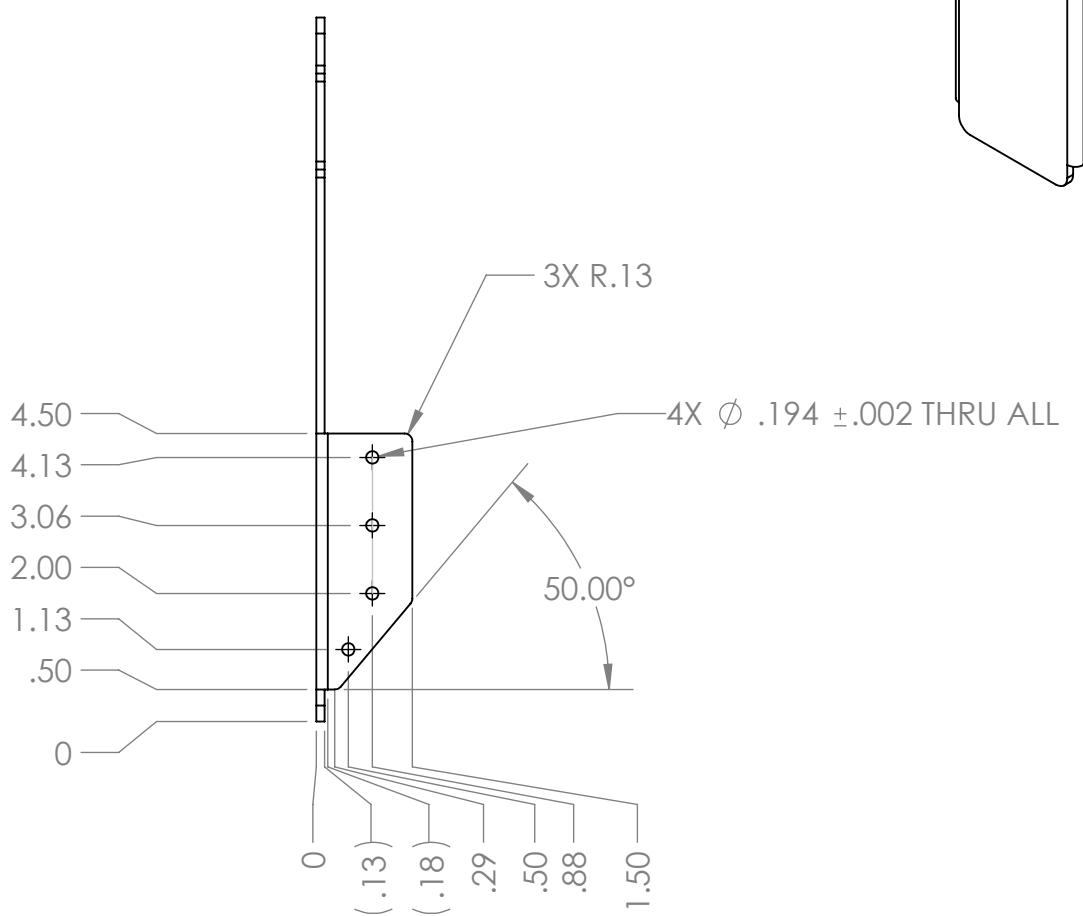
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- Notes:
1. Material: 8 Ga. 5052 Aluminum Sheet
 2. Remove all burrs and sharp edges.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20011		MATERIAL ALUMINUM SHEET		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:3		WEIGHT:	SHEET 1 OF 1	
SIZE DWG. NO. B GE-20011 - 06		REV 0		



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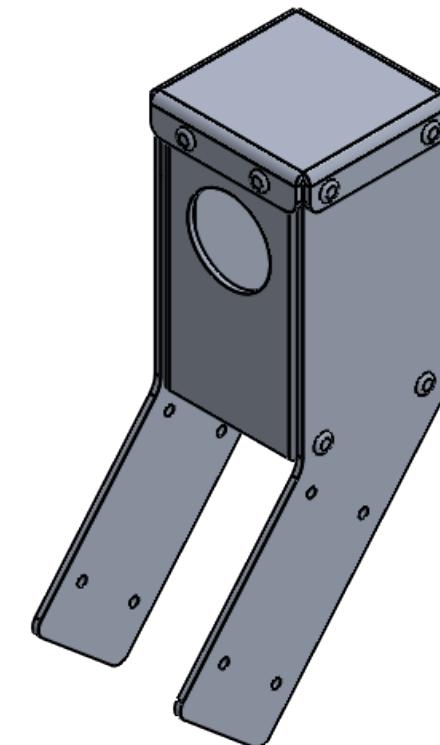
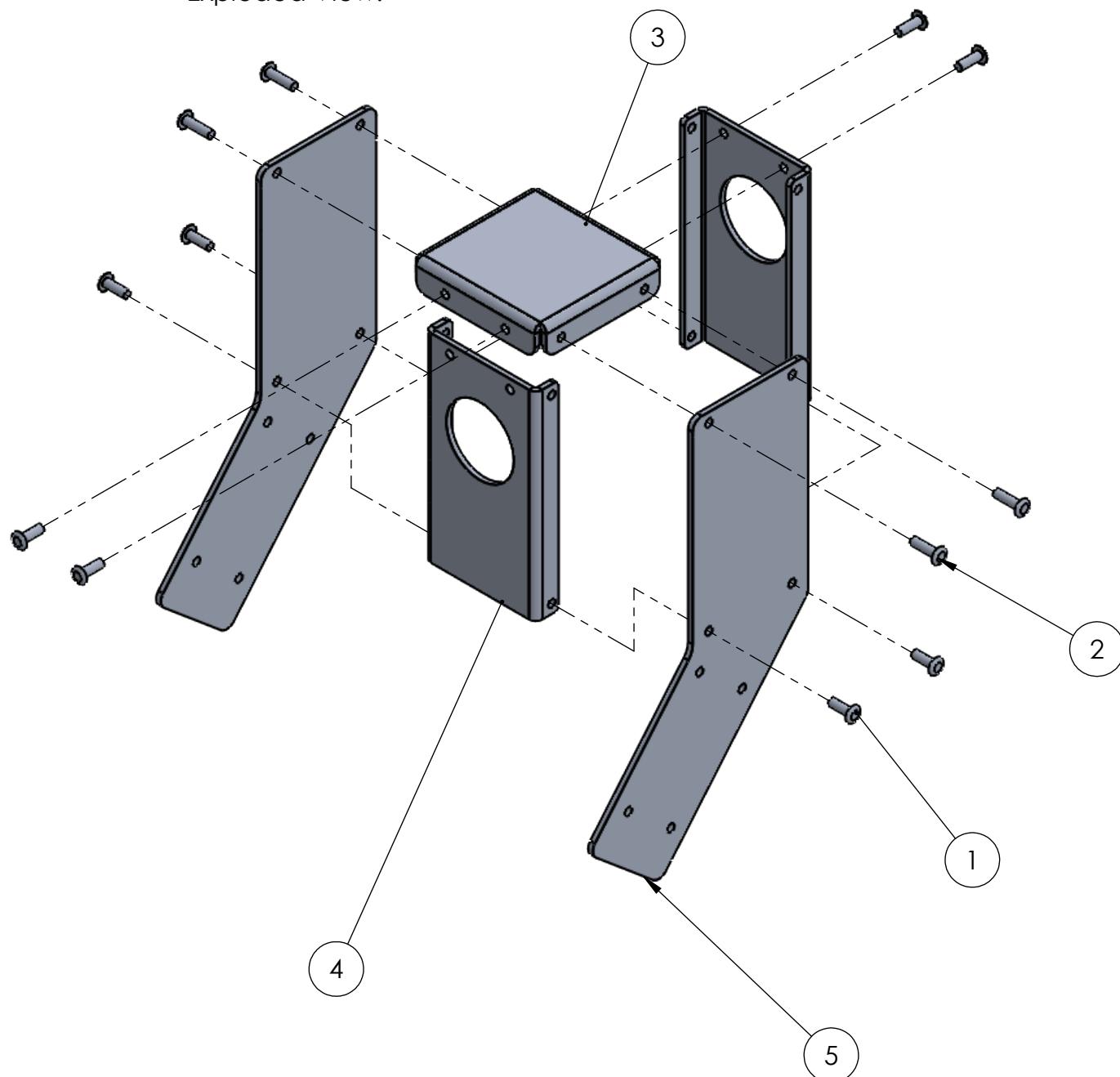
4

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Exploded View:



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivet_.1875_.251-375	3/16" Aluminum Rivet, .251-.375 Grip Range	8
2	rivet_.1875_.376-5	3/16" Aluminum Rivet, .376-.5 Grip Range	4
3	GE-20011 - 03	Hanger Brace - Pivot Pole Top Cap	1
4	GE-20011 - 04	Hanger Brace - Pivot Pole Holder	2
5	GE-20011 - 05	Hanger Brace - Pivot Pole Holder, Face	2

- Notes:
1. Rivets should be plated or aluminum.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN KAMC DATE 9/16/19
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	CHECKED ENG APPR. MFG APPR.
GE-20011	NEXT ASSY USED ON	FINISH BARE	Q.A. COMMENTS: WEIGHT: 1.46 LBS
	APPLICATION	DO NOT SCALE DRAWING	SIZE DWG. NO. B GE-20011 - 16 REV 0
			SCALE: 1:3 WEIGHT: SHEET 1 OF 2

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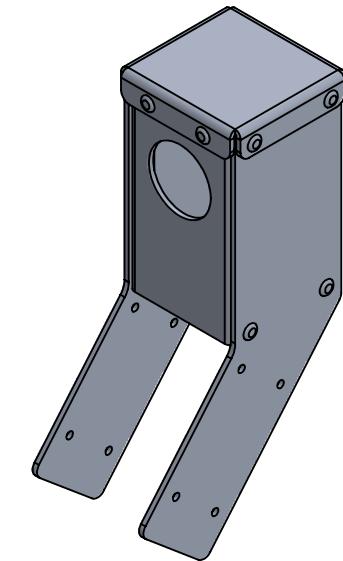
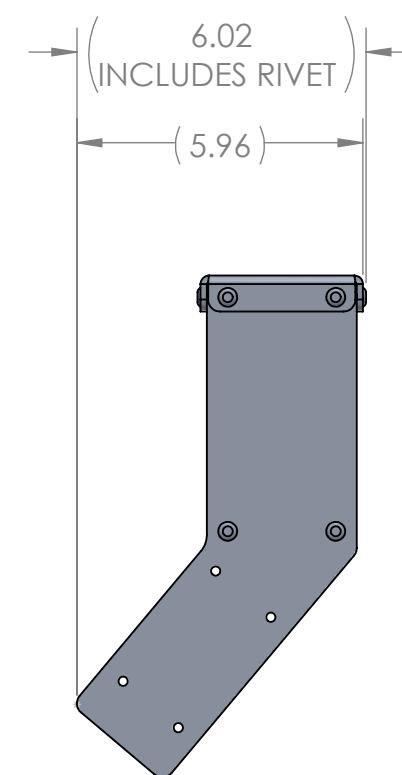
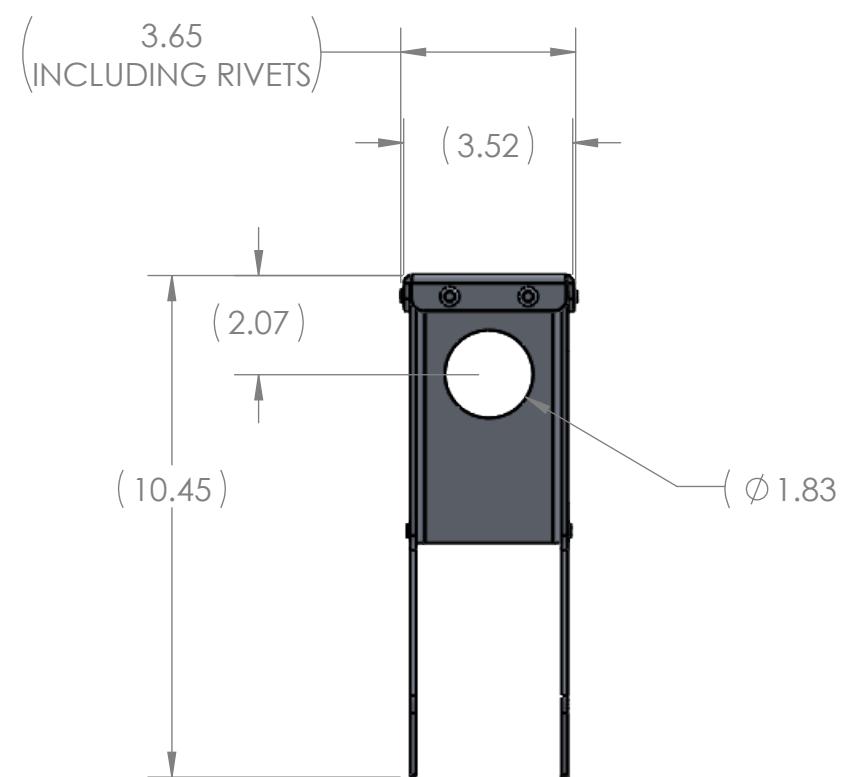
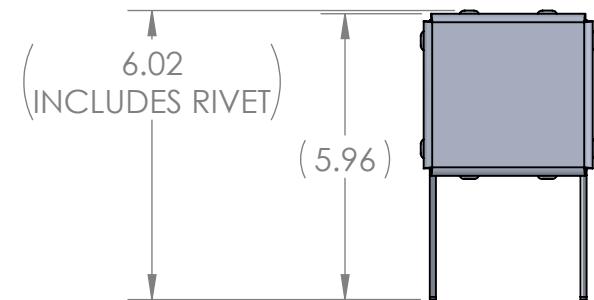
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		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		WEIGHT SHOWN ON SHEET 1			
GE-20011		MATERIAL			
NEXT ASSY	USED ON	FINISH	BARE		
	APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:4	WEIGHT:	SHEET 2 OF 2			
B	GE-20011 - 16	0			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Hanger Brace - Pivot
Pole Holder Sub
Assembly**

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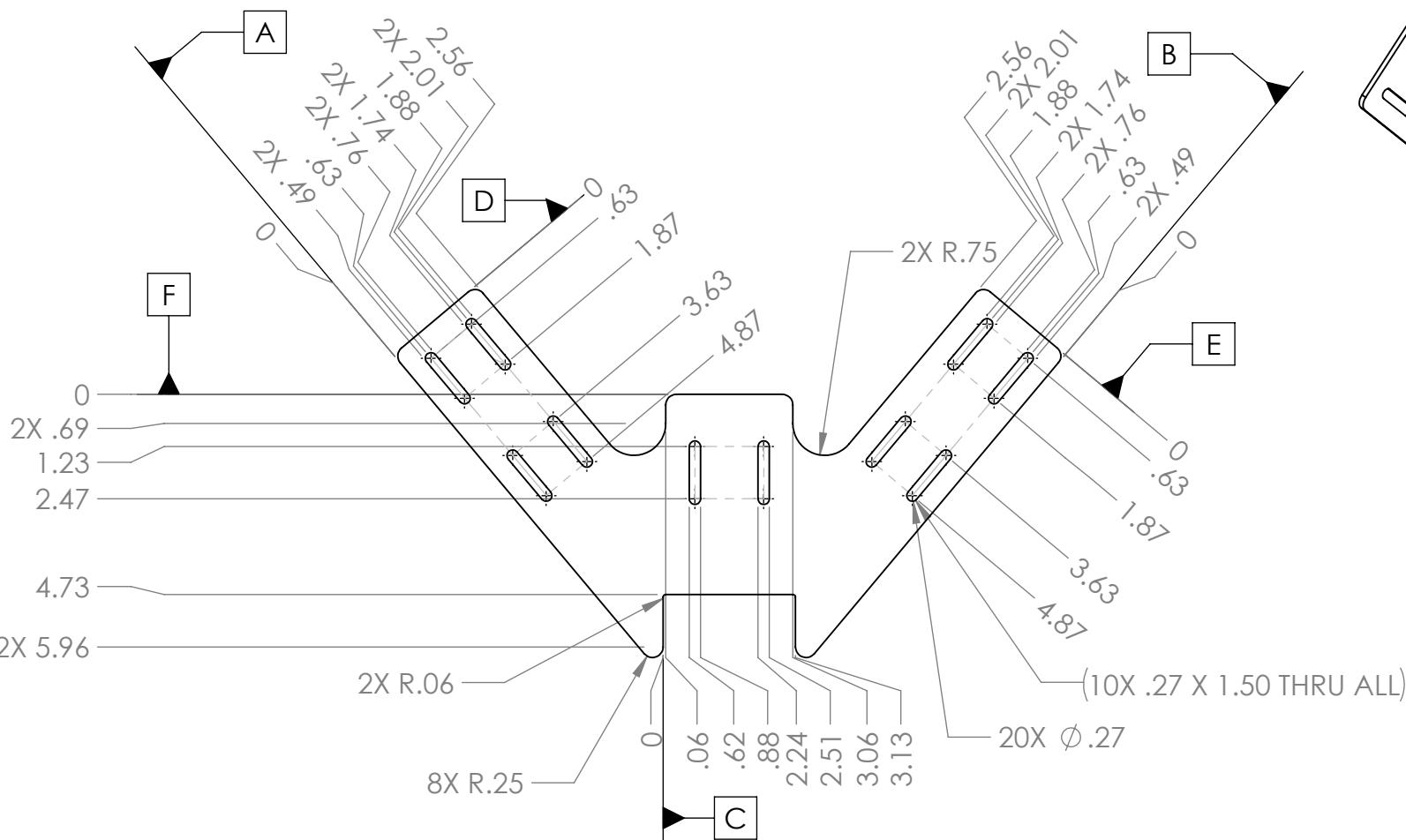
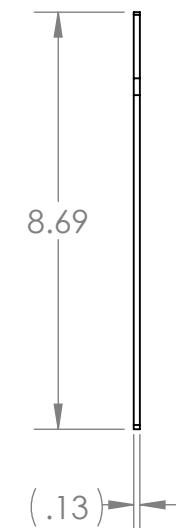
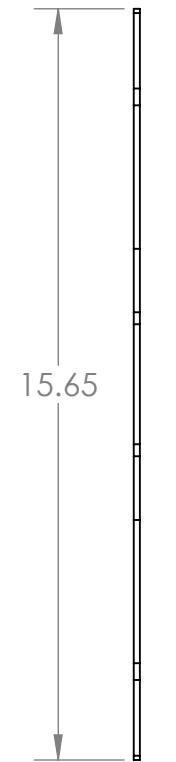
3

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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	MINOR GEOMETRY CHANGES	9/17/2019	KAMC



- Notes:
1. Material: 8 Ga. Aluminum Sheet
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		
FIRST ROBOTICS COMPETITION	SOLIDWORKS Modeling Solutions Partner	TITLE: Hanger Brace - Mounting Plate
SIZE B	DWG. NO. GE-20012	REV A
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

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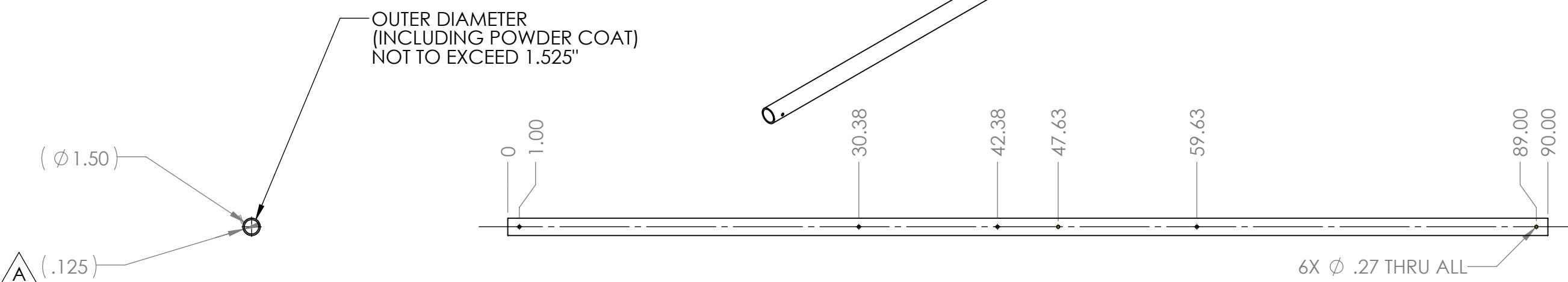
1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A4	A	UPDATED WALL THICKNESS TO 0.125"	10/7/2019	KAMC

B

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Notes:

- Material: 1.50" diameter x 0.125" wall, 1020 DOM A513 Round Tube
- Remove all burrs and sharp edges.
- Powder Coated Black.

 \triangle

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		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL ROUND TUBE	CHECKED ENG APPR. MFG APPR.
GE-20020		Q.A. COMMENTS:	
NEXT ASSY	USED ON	MATERIAL ROUND TUBE	
		FINISH POWDER COAT BLACK	
APPLICATION		DO NOT SCALE DRAWING	
SIZE B	DWG. NO. GE-20013	REV A	
SCALE: 1:10		WEIGHT:	SHEET 1 OF 1

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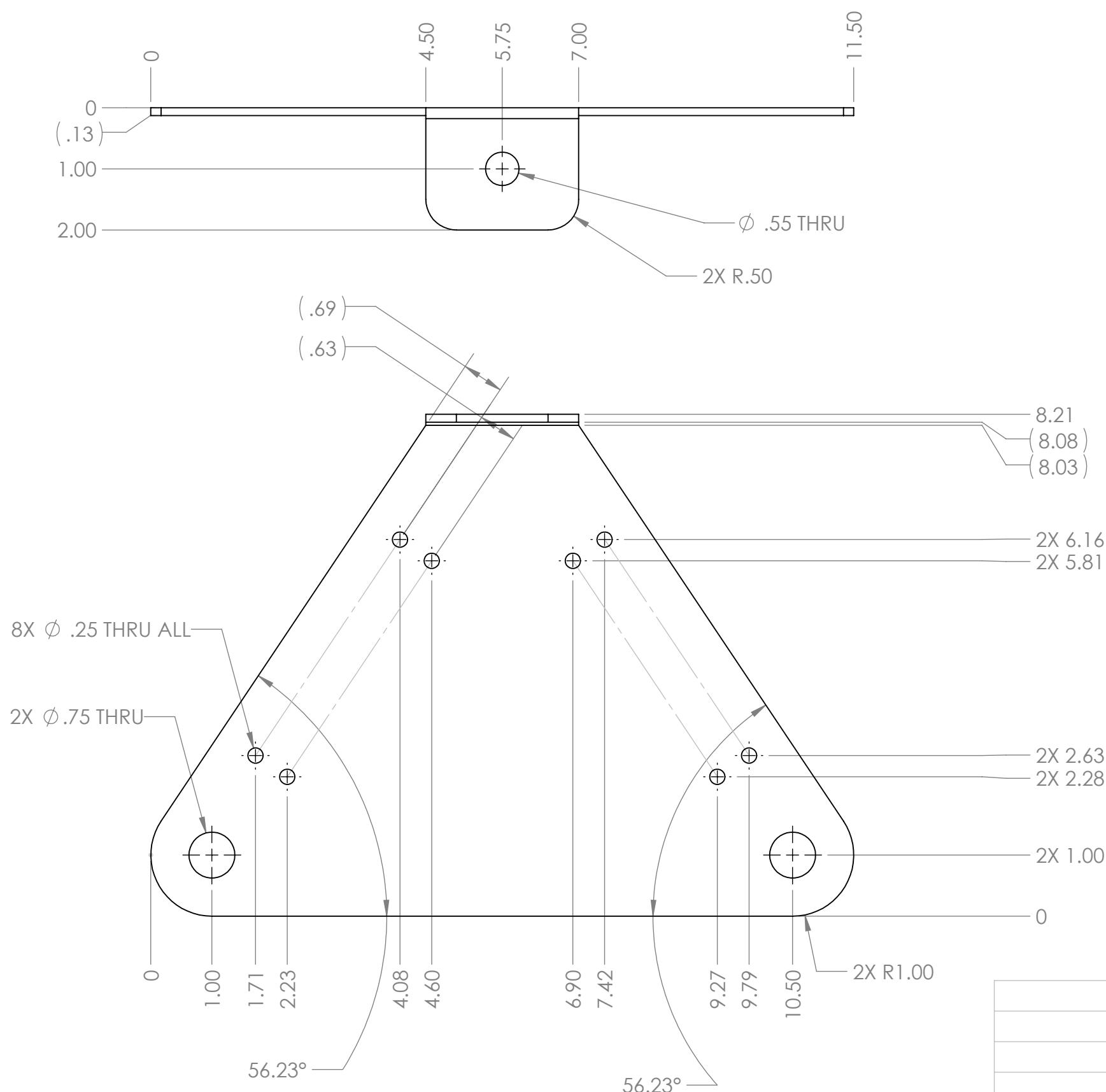
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		UNLESS OTHERWISE SPECIFIED:		NAME KAMC	DATE 9/5/19	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$				
		INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
		MATERIAL ALUMINUM SHEET				
NEXT ASSY	USED ON	FINISH BARE	APPLICATION	DO NOT SCALE DRAWING		

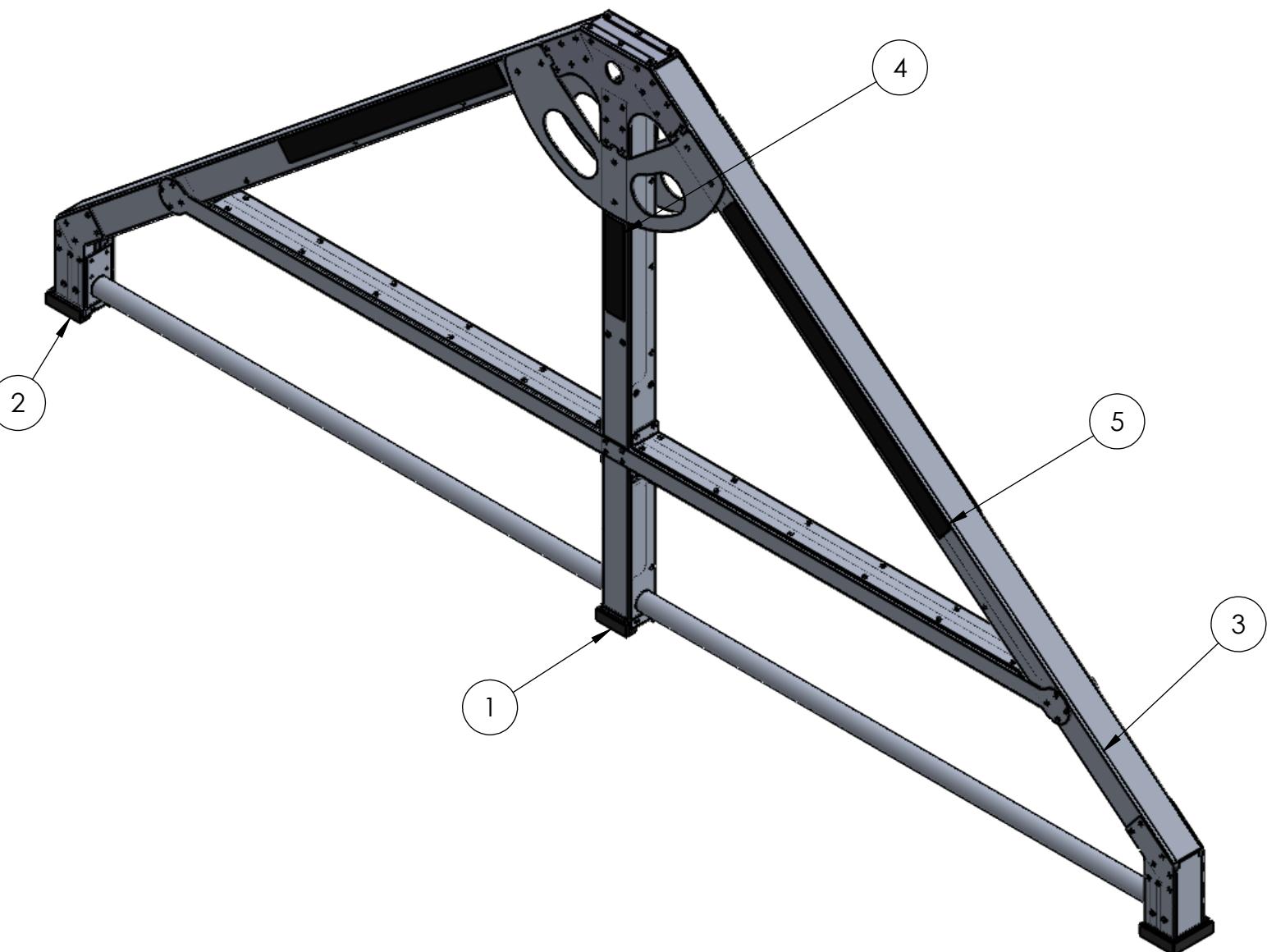
FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hanger - Sensor Mount

B GE-20014

SIZE DWG. NO. REV
SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4 3 2 1



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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20008	Foam Cushion for Generator Switch	1
2	GE-20008	Foam Cushion for Generator Switch	2
3	GE-20010	Hanger	1
4	Hook_2_9	Hook 2" x 9", Adhesive Backed	2
5	Hook_2_30	Hook 2" x 30", Adhesive Backed	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 12/17/19
		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
	GE-20020	MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING	SIZE DWG. NO. REV B GE-2015	
			SCALE: 1:12	WEIGHT: SHEET 1 OF 2

FIRST[®] ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**Generator Switch with
Hook and Corners**

SIZE DWG. NO. REV
B GE-2015

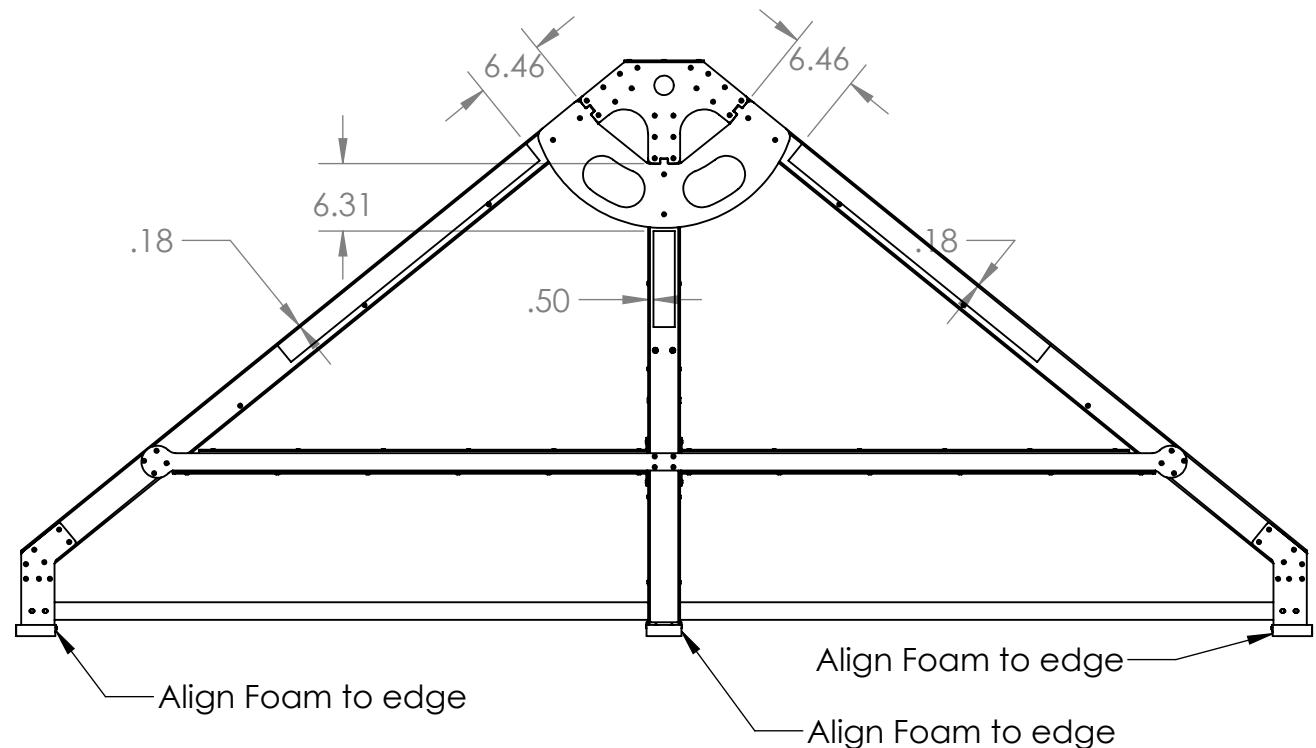
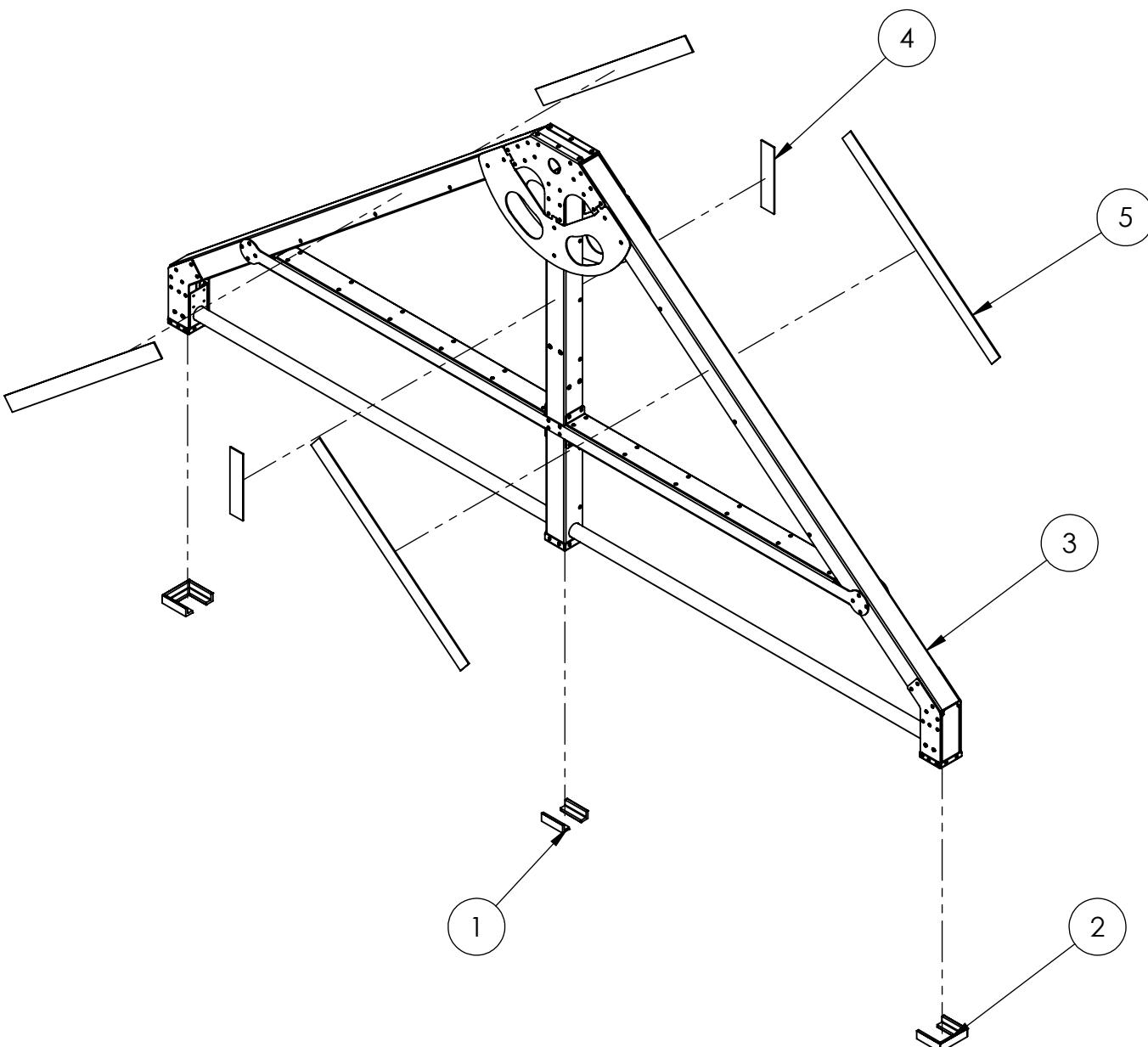
SCALE: 1:12 WEIGHT: SHEET 1 OF 2

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- Notes:**
1. Make sure surface of GE-20010 is clean prior to hook and foam application.
 2. Press firmly on hook and foam to ensure adhesion.

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		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20020		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		
SIZE B	DWG. NO. GE-20015	REV		
SCALE: 1:18	WEIGHT:	SHEET 2 OF 2		

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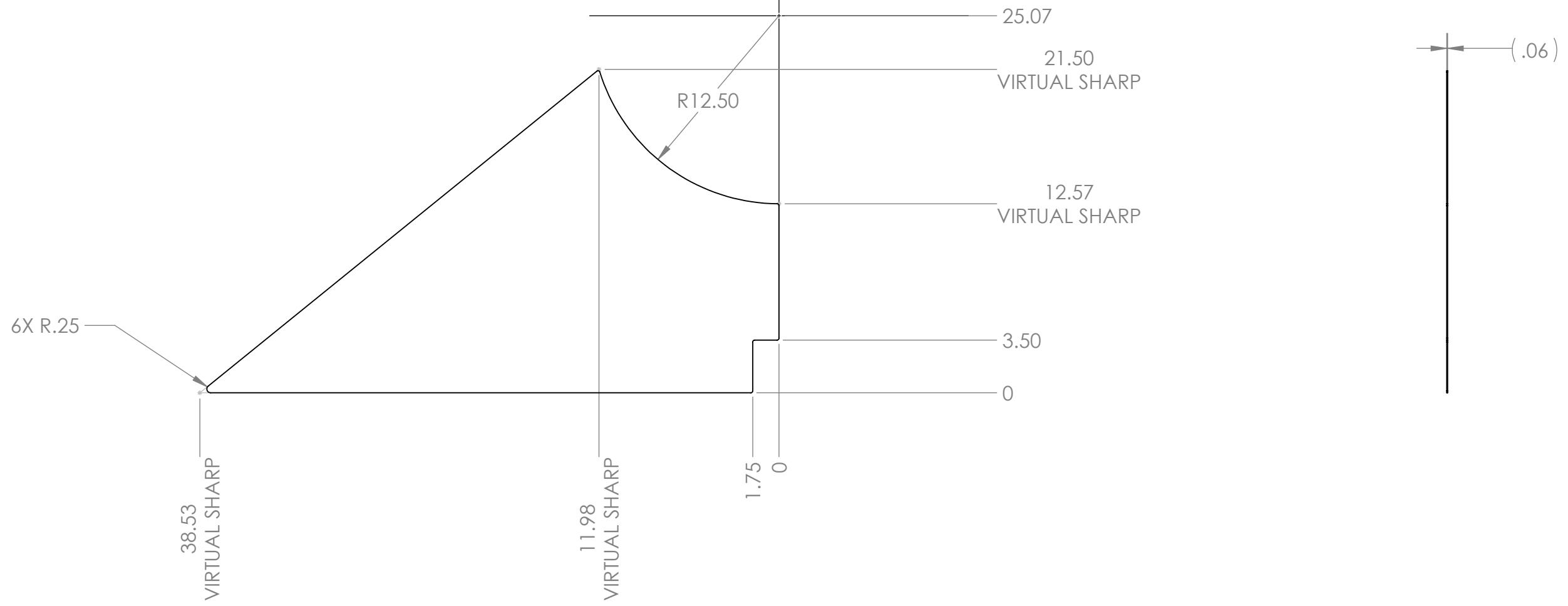
3

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A

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Notes:

1. Material: 1/16" Polycarbonate, Clear
2. Remove all burrs and sharp edges
3. Tag or label with part number
4. Finish: Bare - Vinyl will be applied to face, either side

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 10/9/19
		CHECKED ENG APPR. MFG APPR.	Q.A. COMMENTS:	
GE-20018		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL POLYCARB	TITLE: FIRST ROBOTICS COMPETITION DWG. NO. GE-20016	
GE-20017		MATERIAL POLYCARB		
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING	REV 0	
SCALE: 1:8		WEIGHT:	SHEET 1 OF 1	

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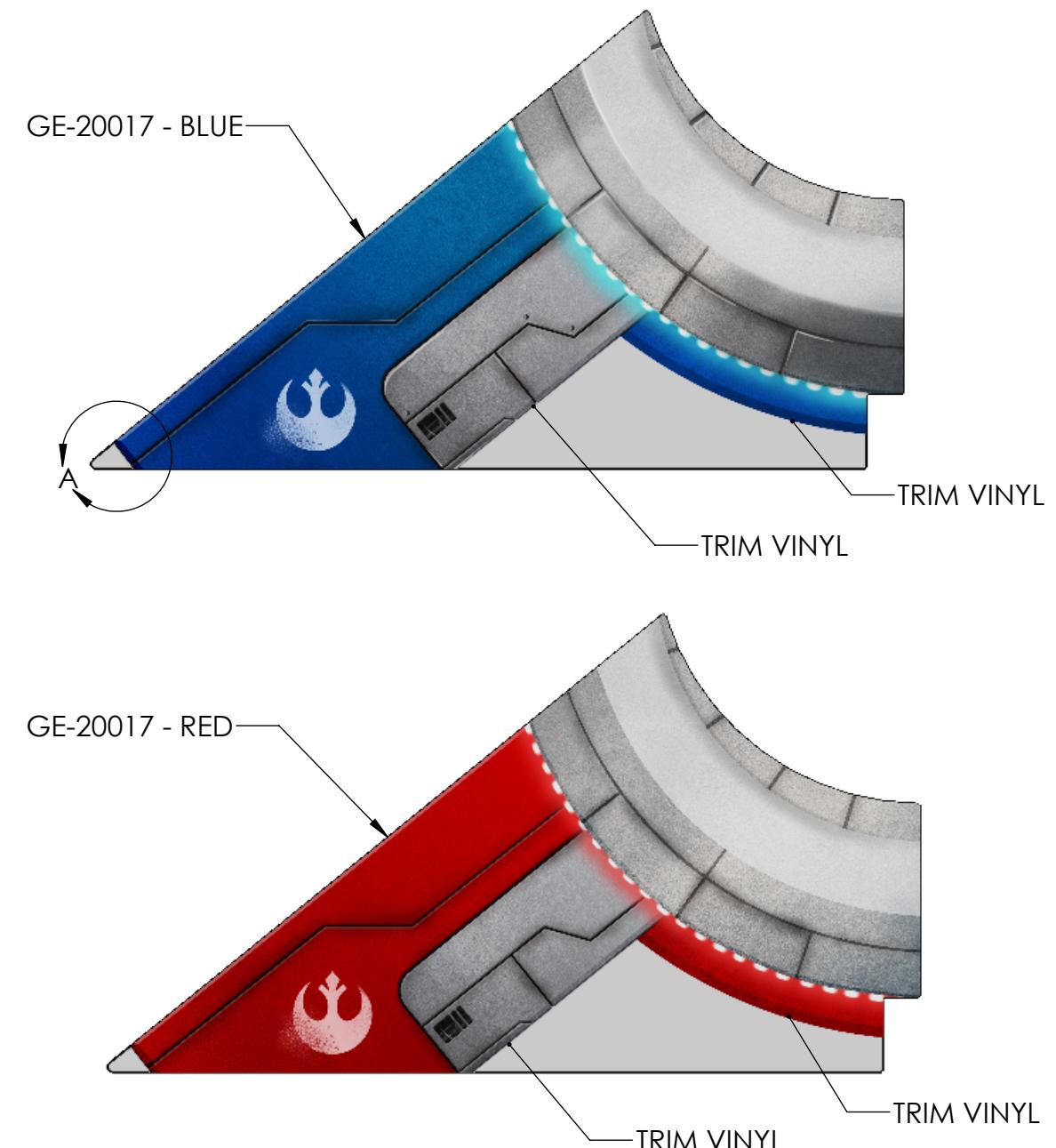
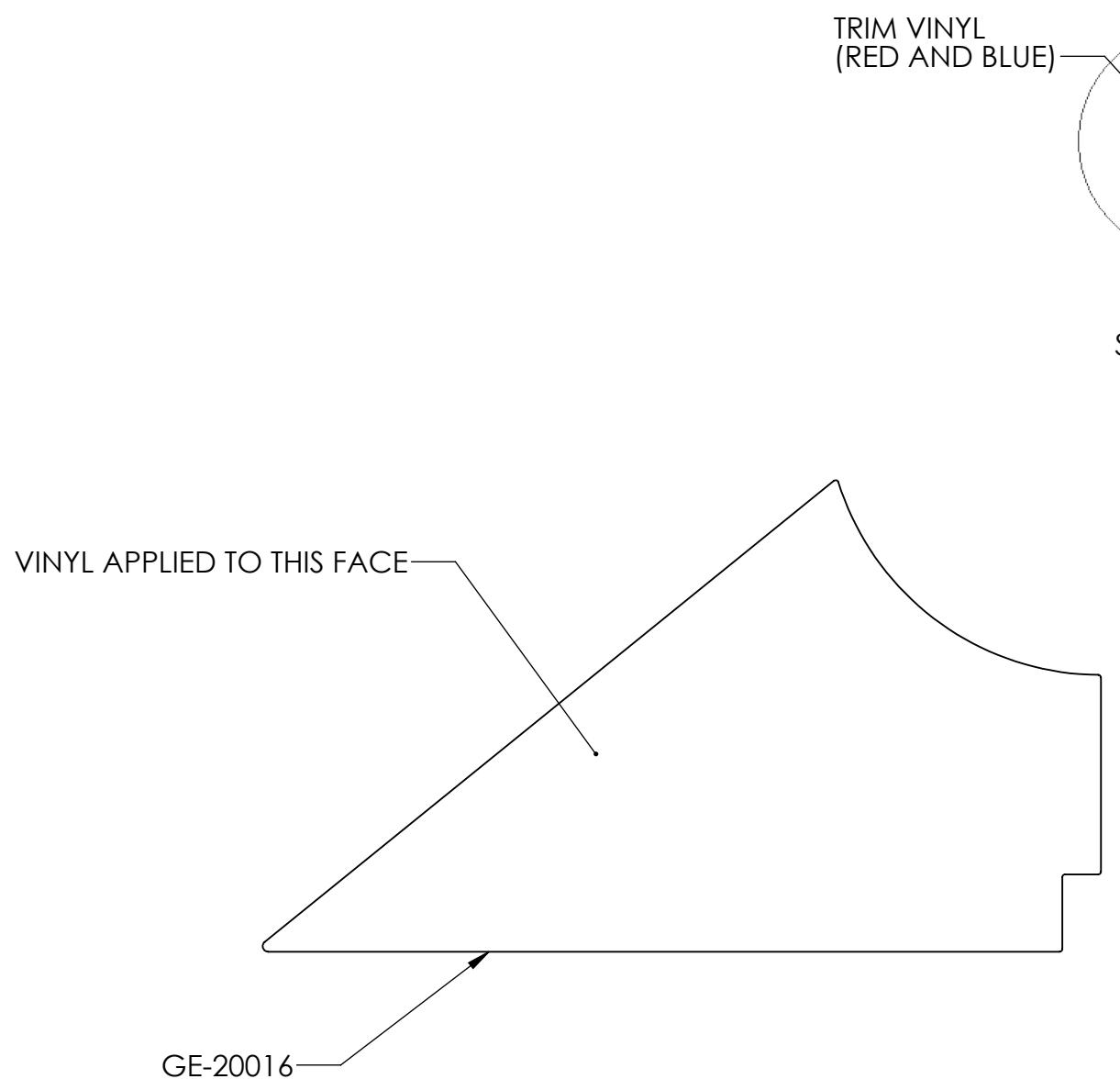
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- Notes:
1. Tag or label with part number

Color Variations		
Part Number	Vinyl Image	Qty per Field
GE-20017 - Blue	GE-20017 - Blue - Vinyl	2
GE-20017 - Red	GE-20017 - Red - Vinyl	2

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		CHECKED ENG APPR. MFG APPR.	
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	Q.A. COMMENTS:
GE-20023			
NEXT ASSY	USED ON	FINISH VINYL	
		APPLICATION	DO NOT SCALE DRAWING
SIZE B	DWG. NO. GE-20017	REV 0	
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1	

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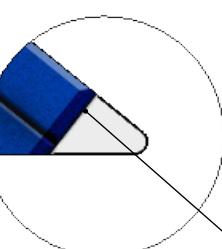
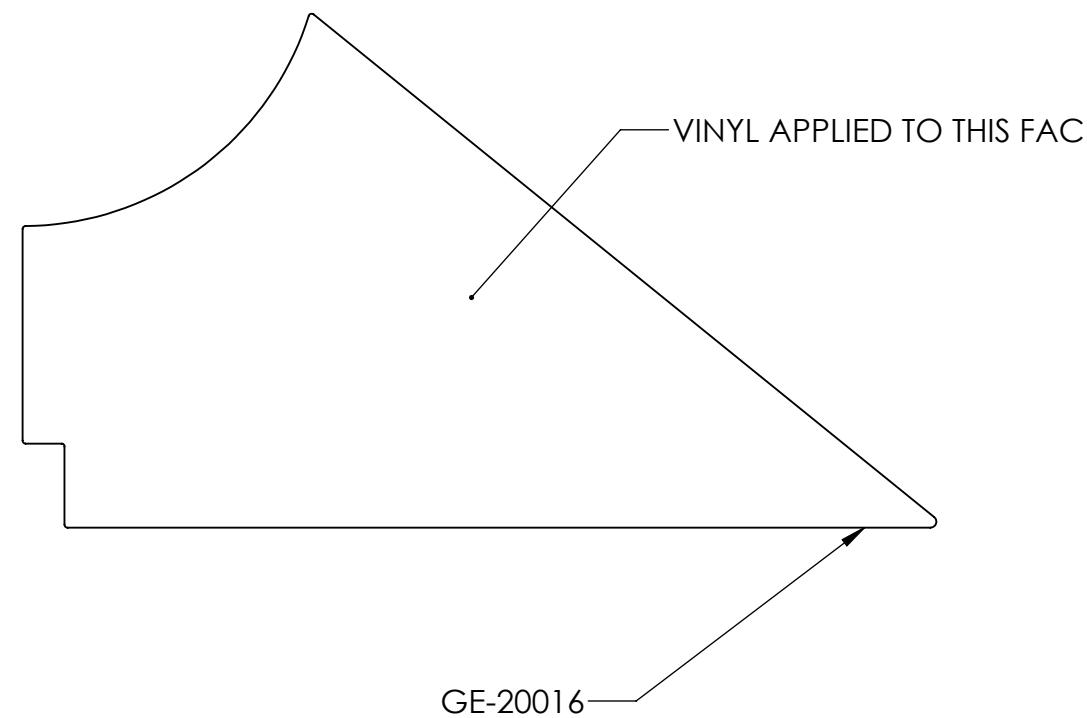
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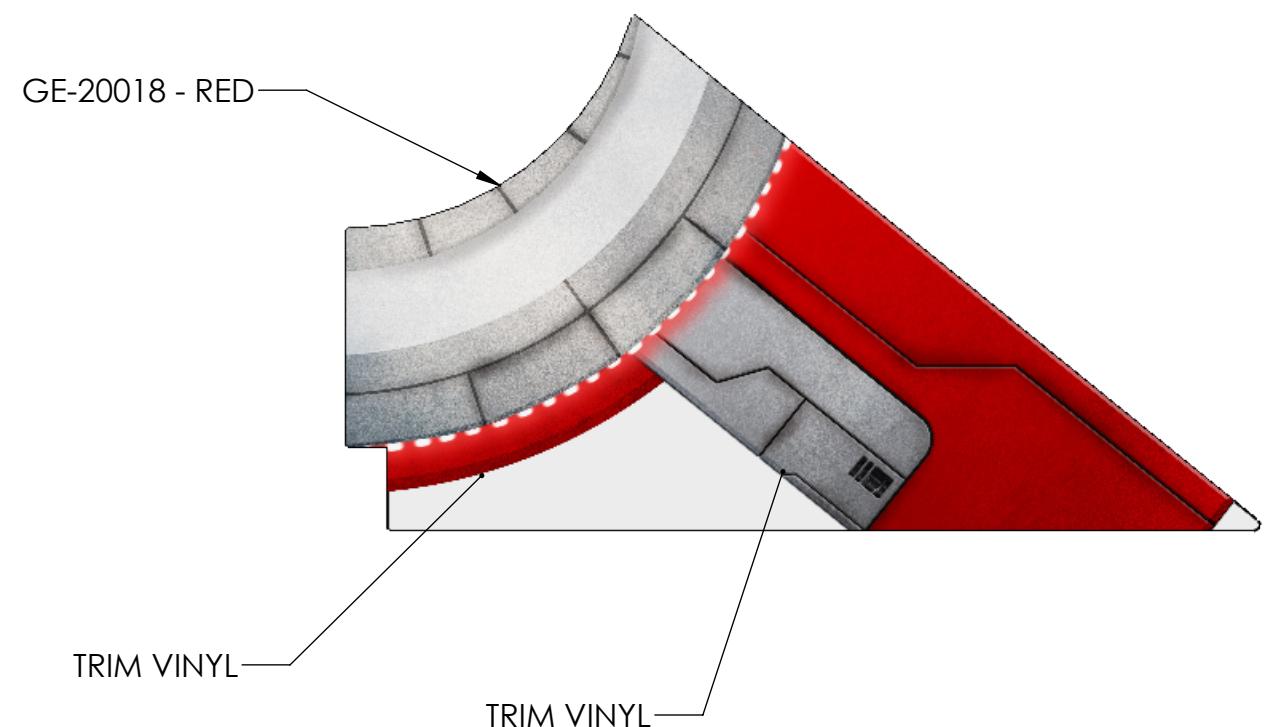
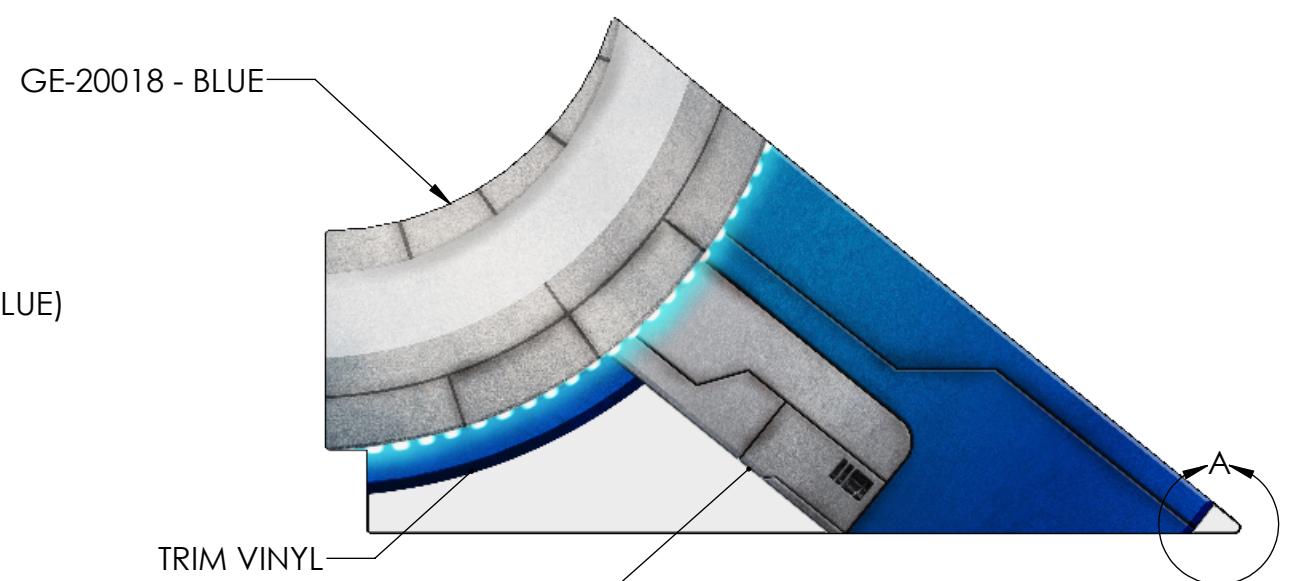
1

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DETAIL A
SCALE 1 : 4



- Notes:
1. Tag or label with part number

Color Variations		
Part Number	Vinyl Image	Qty per Field
GE-20018 - Blue	GE-20018 - Blue - Vinyl	2
GE-20018 - Red	GE-20018 - Red - Vinyl	2

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN	KAMC	10/25/19
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
GE-20024		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH	VINYL		
		APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Generator Switch Vinyl Plastic_Right - with vinyl

B GE-20018 0

SIZE DWG. NO. REV
SCALE: 1:8 WEIGHT: SHEET 1 OF 1

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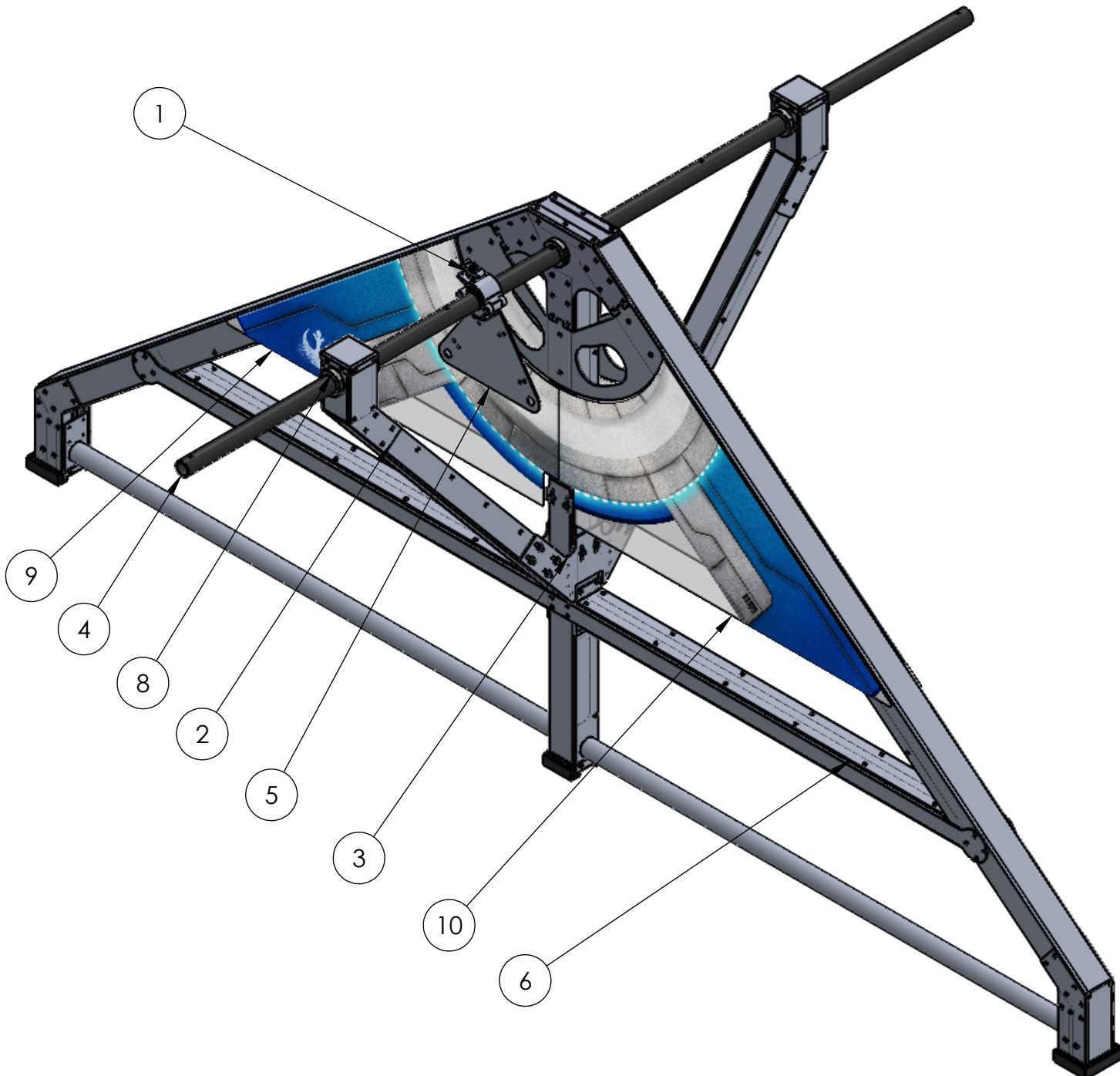
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Note:
1. Vinyl may be red or blue.

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20007	Cheeseborough for Truss _ Single	1
2	GE-20011	Hanger Brace	2
3	GE-20012	Hanger Brace - Mounting Plate	2
4	GE-20013	Hanger - Pivot Pole	1
5	GE-20014	Hanger - Sensor Mount	1
6	GE-20015	Generator Switch with Hook and Corners	1
7	GE-20021	Pivot Pole to Generator Switch Bearing	6
8	GE-20022	Pivot Pole to Generator Switch Shaft Collar	6
9	GE-20023	Generator Switch Vinyl Left _ With Loop	2
10	GE-20024	Generator Switch Vinyl Right _ With Loop	2
11	hex_.25_20_1.25	Hex Head Bolt, 1/4-20 x 1.25", Steel	24
12	nylock_.5_13	steel nylon-insert locknut, 1/2" - 13	1
13	washer_flat_.25	Flat Washer for 1/4" Screw	24
14	washer_flat_.5	Flat Washer for 1/2" Screw	1

		UNLESS OTHERWISE SPECIFIED:	NAME	DATE	 
		DIMENSIONS ARE IN INCHES	DRAWN	KAMC	
		TOLERANCES:	CHECKED		
		FRACTIONAL: ±1/16	ENG APPR.		
		ANGULAR: MACH ±1° BEND ±1°	MFG APPR.		
		TWO PLACE DECIMAL: ±.01	Q.A.		
		THREE PLACE DECIMAL: ±.001	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION	DO NOT SCALE DRAWING				
WEIGHT: 111.81 LBS					
SIZE	DWG. NO.	REV			
B	GE-20020				
SCALE: 1:12	WEIGHT:	SHEET 1 OF 4			

4

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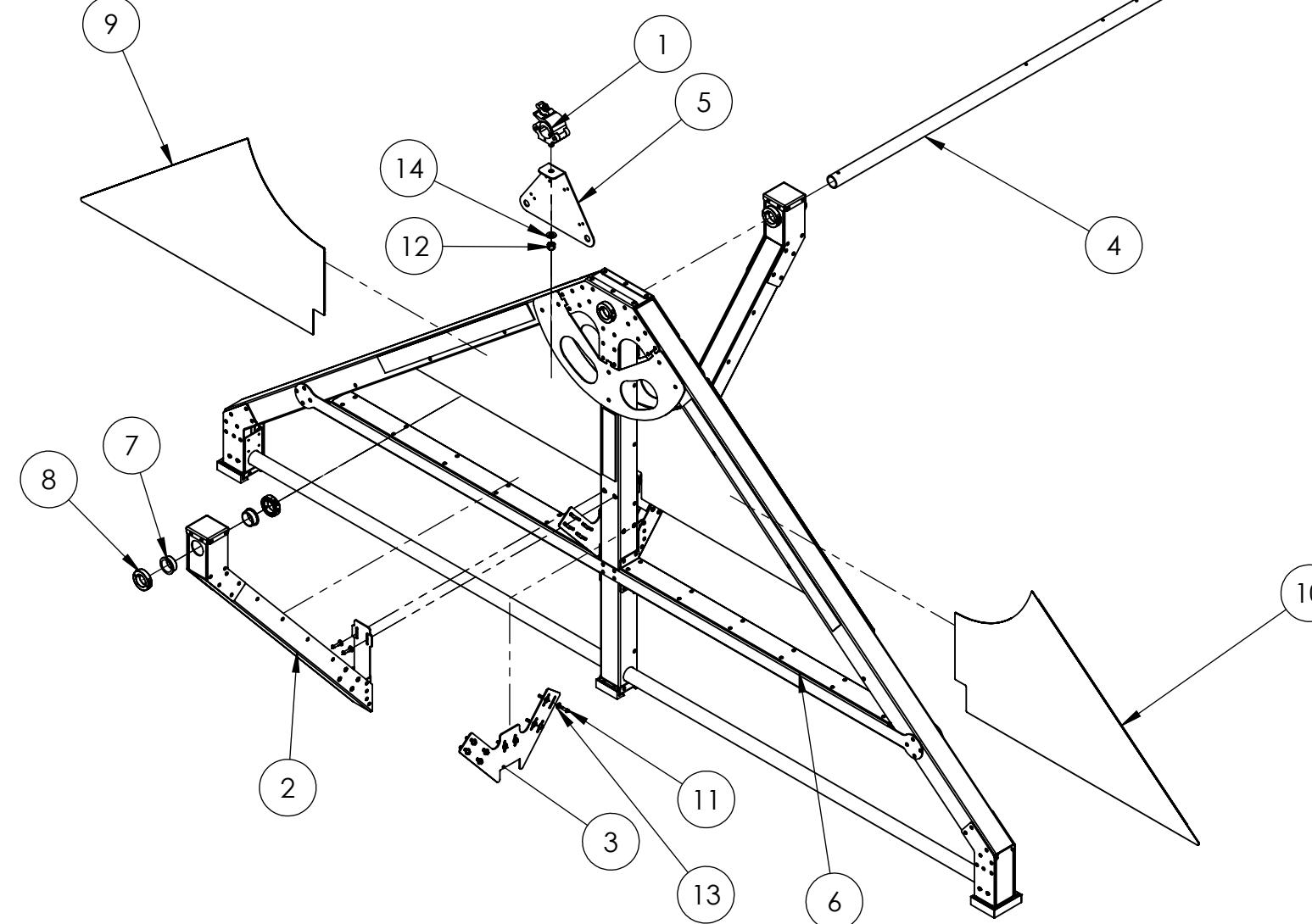
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		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

**Generator
Switch Assembly**

SIZE DWG. NO. REV
B GE-20020

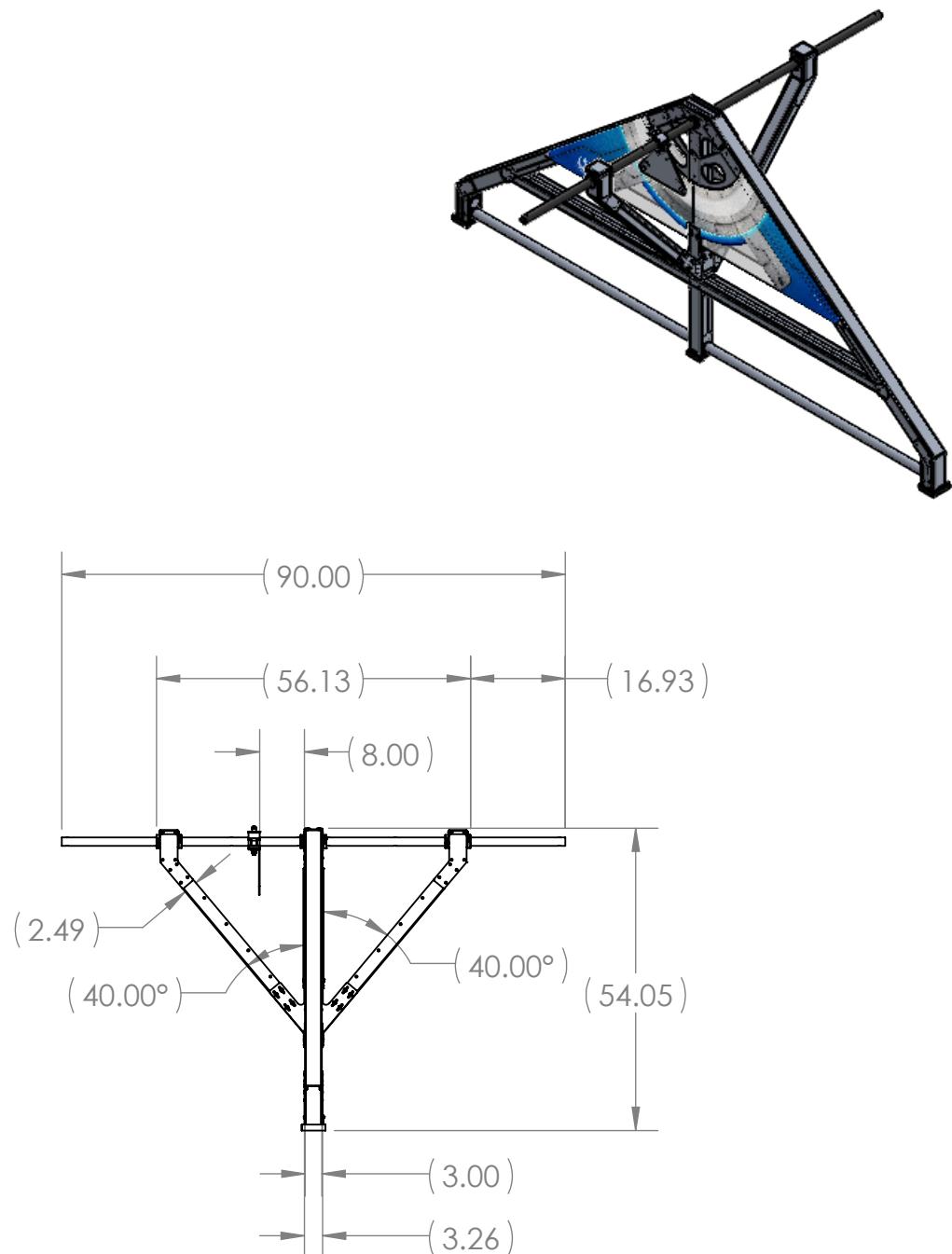
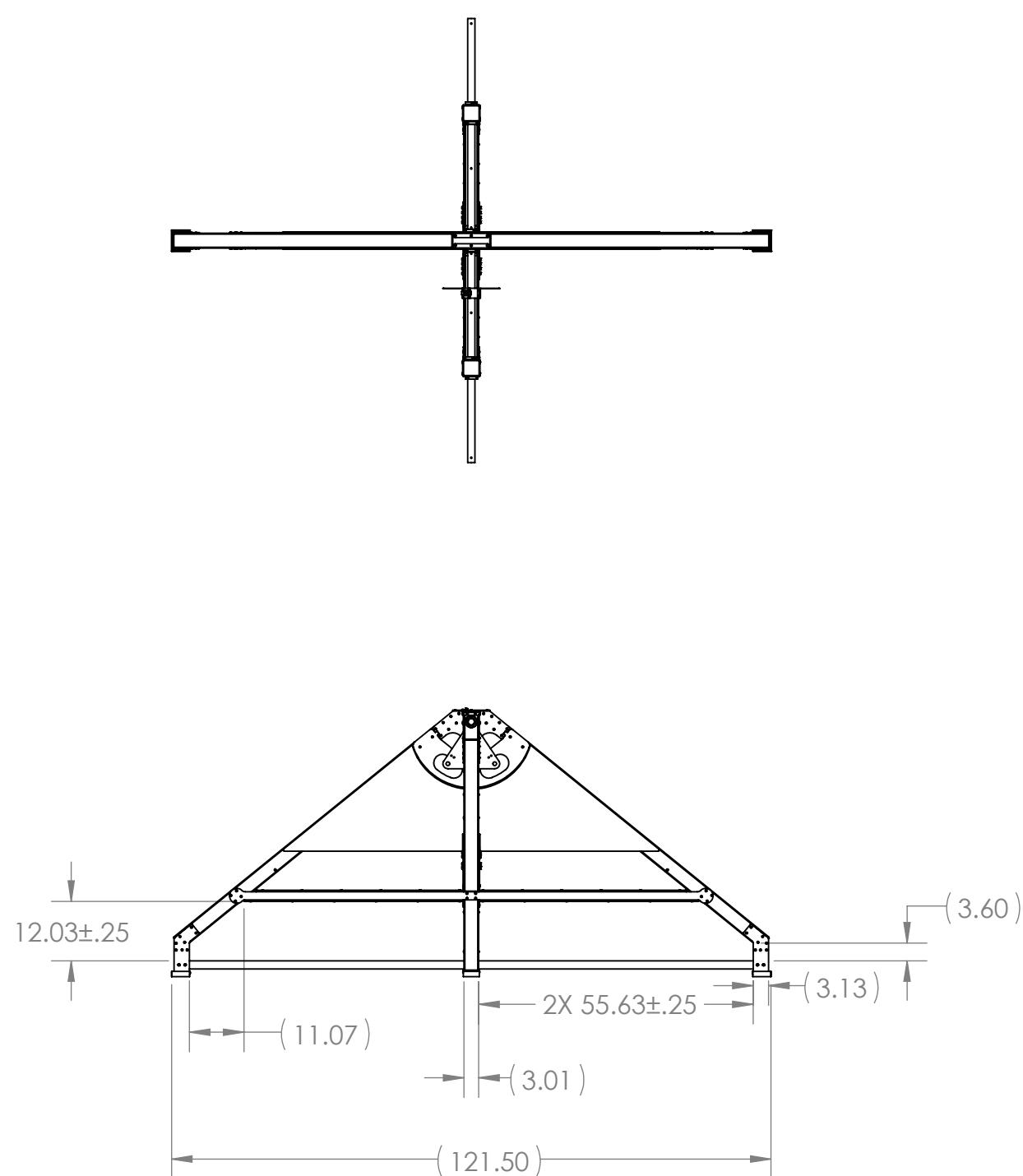
SCALE: 1:18 WEIGHT: SHEET 2 OF 4

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: <h1>Generator Switch Assembly</h1>
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN				
			CHECKED				
			ENG APPR.				
			MFG APPR.				
			Q.A.				
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:				
		MATERIAL		SIZE	DWG. NO.	REV	
NEXT ASSY	USED ON	FINISH		B	GE-20020		
APPLICATION		DO NOT SCALE DRAWING	SCALE: 1:32	WEIGHT:	SHEET 3 OF 4		

4

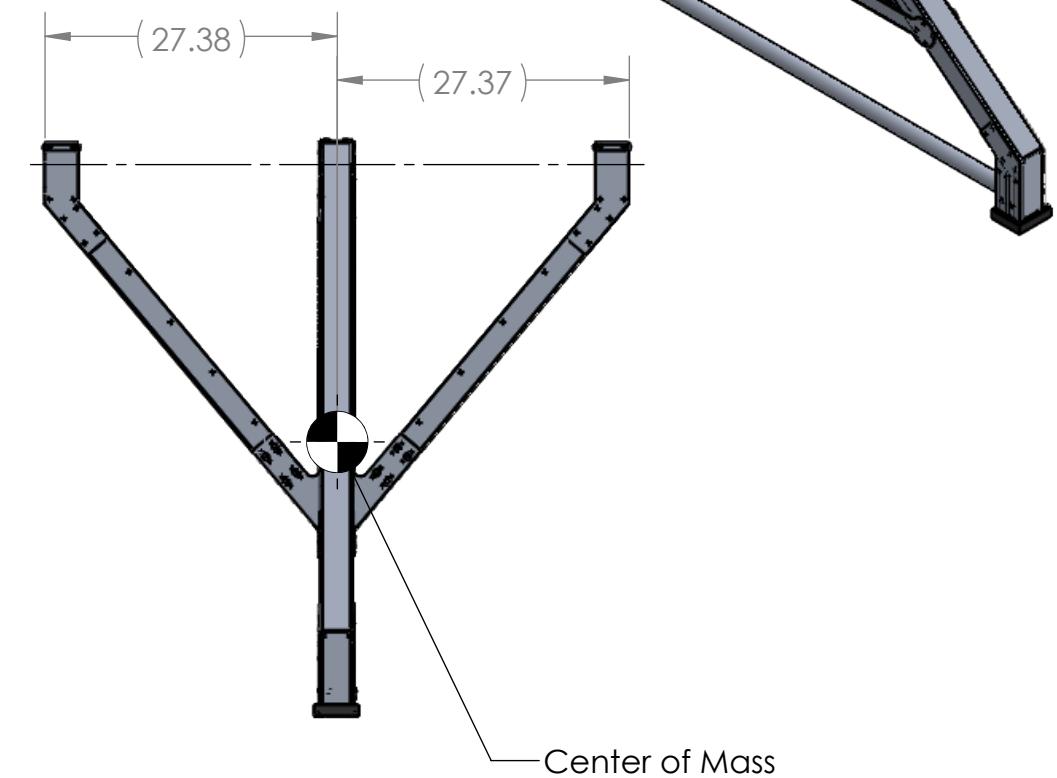
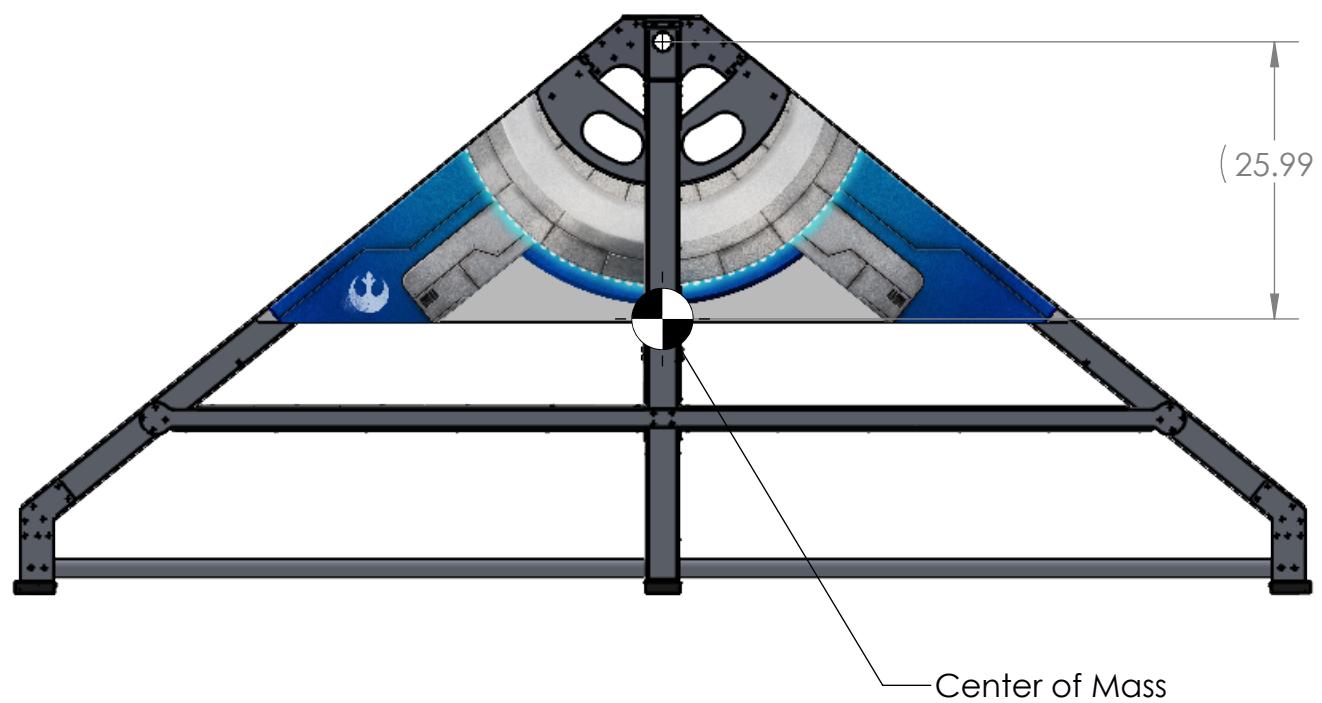
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- NOTE:**
- Only pieces that pivot are shown here. Approximate mass of pivoting system is 93 lbs.

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		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	Q.A. COMMENTS:	
NEXT ASSY	USED ON	FINISH	FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner	
APPLICATION	DO NOT SCALE DRAWING			

TITLE:
**Generator
Switch Assembly**

SIZE	DWG. NO.	REV
B	GE-20020	
SCALE: 1:18	WEIGHT:	SHEET 4 OF 4

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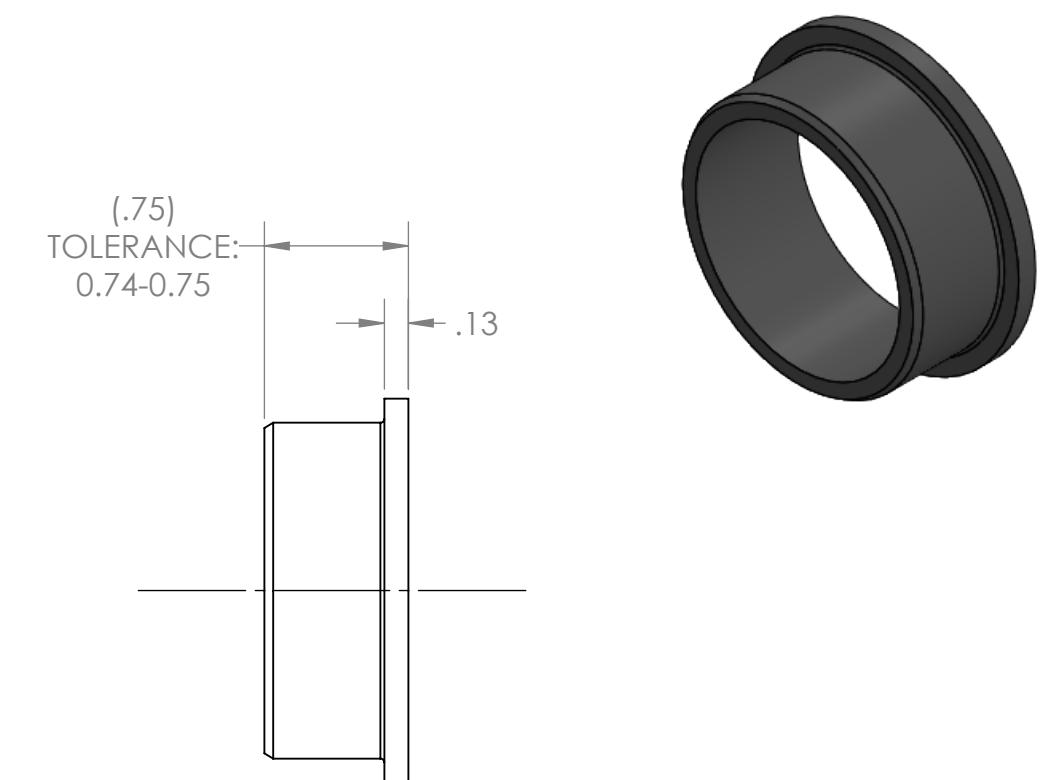
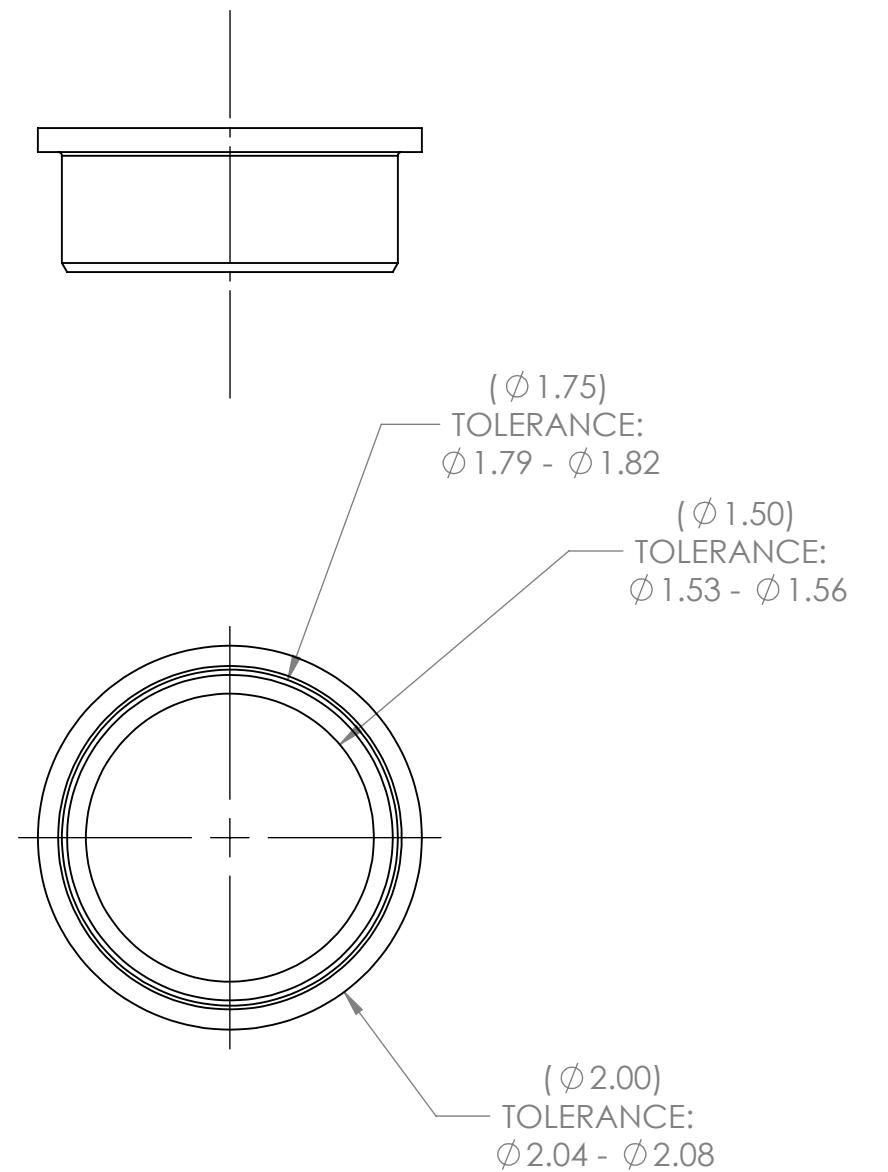
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Updated Notes	10/29/2019	KAMC

B

B



DESCRIPTION: IGLIDE M250 FLANGE BEARING - INCH

VENDOR: IGUS

PART NUMBER: MFI-2428-12

NOTE: SUBSTITUTIONS NOT ALLOWED

A

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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	
	NEXT ASSY	USED ON	FINISH	COMMENTS:
	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Pivot Pole to Generator Switch Bearing

SIZE DWG. NO. REV
B **GE-20021** **A**

SCALE: 1:1 WEIGHT: SHEET 1 OF 1

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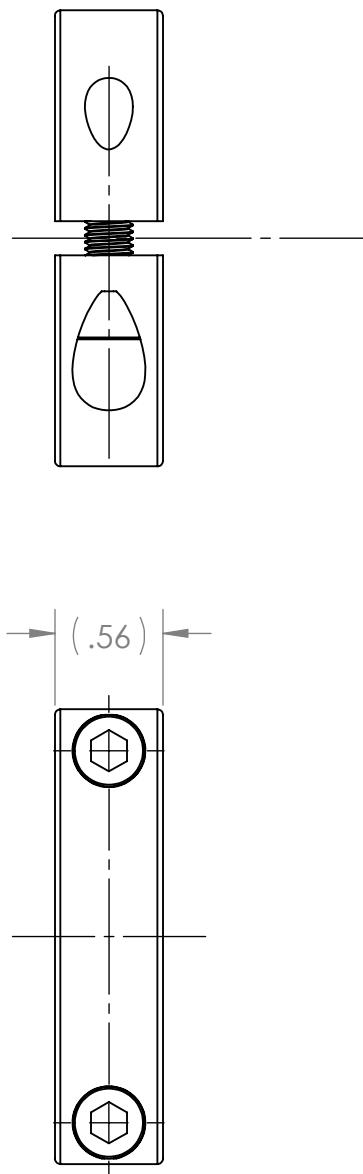
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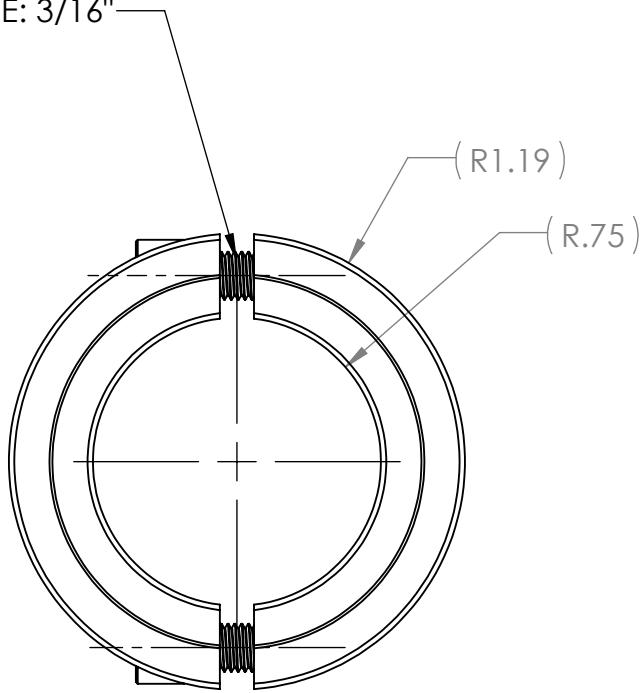
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Updated Notes.	10/29/2019	KAMC



2X FORGED CLAMP SCREWS
1/4-28
HEX WRENCH SIZE: 3/16"



DESCRIPTION: TWO-PIECE SHAFT COLLAR, BLACK OXIDE STEEL, CLAMP STYLE

VENDOR: RULAND

PART NUMBER: SP-24-F

NOTE: EQUIVALENT SUBSTITUTIONS ALLOWED

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME DRAWN KAMC	DATE 10/25/19
		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner

TITLE: Pivot Pole to Generator Switch Shaft Collar

SIZE DWG. NO. REV
B GE-20022 **A**

SCALE: 1:1 WEIGHT: SHEET 1 OF 1

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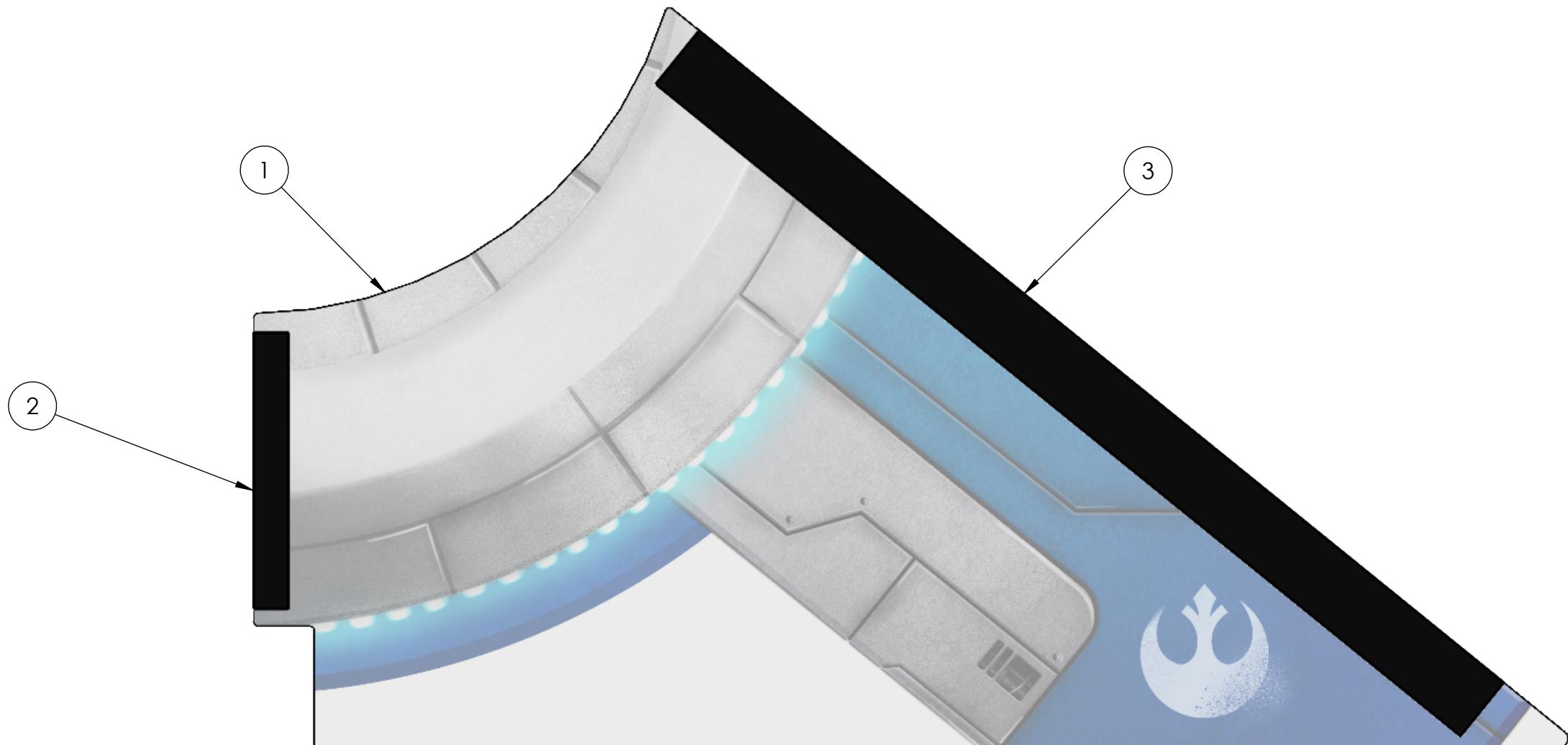
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20017-Blue	Generator Switch Vinyl Plastic_ Left - with vinyl	1
2	Loop_1_8	1" x 8" Loop, Adhesive Backed	1
3	Loop_2_30	2" x 30" Loop, Adhesive Backed	1

		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	12/18/19
		TOLERANCES:		
		FRACTIONAL: ±1/16		
		ANGULAR: MACH ±1° BEND ±1°		
		TWO PLACE DECIMAL ±.01		
		THREE PLACE DECIMAL ±.001		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Generator Switch
Vinyl Left _ With Loop**

SIZE DWG. NO. **REV**
B **GE-20023**

SCALE: 1:4 WEIGHT: SHEET 1 OF 2

4

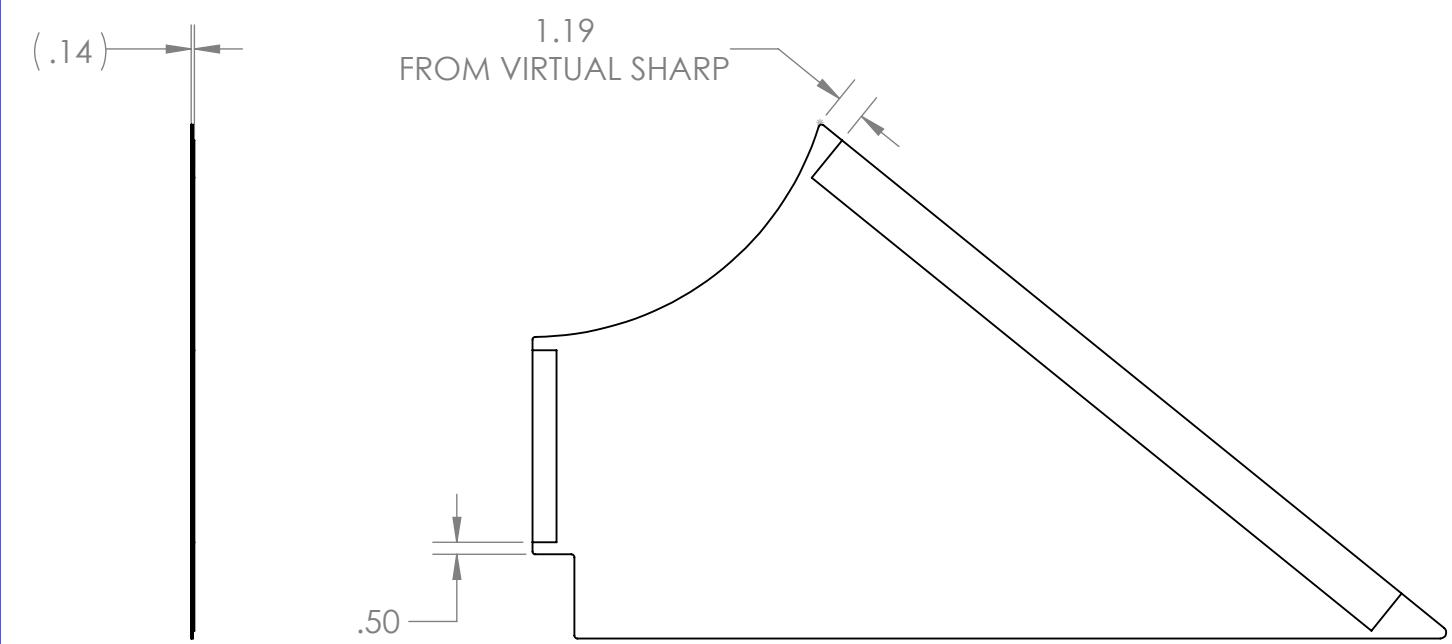
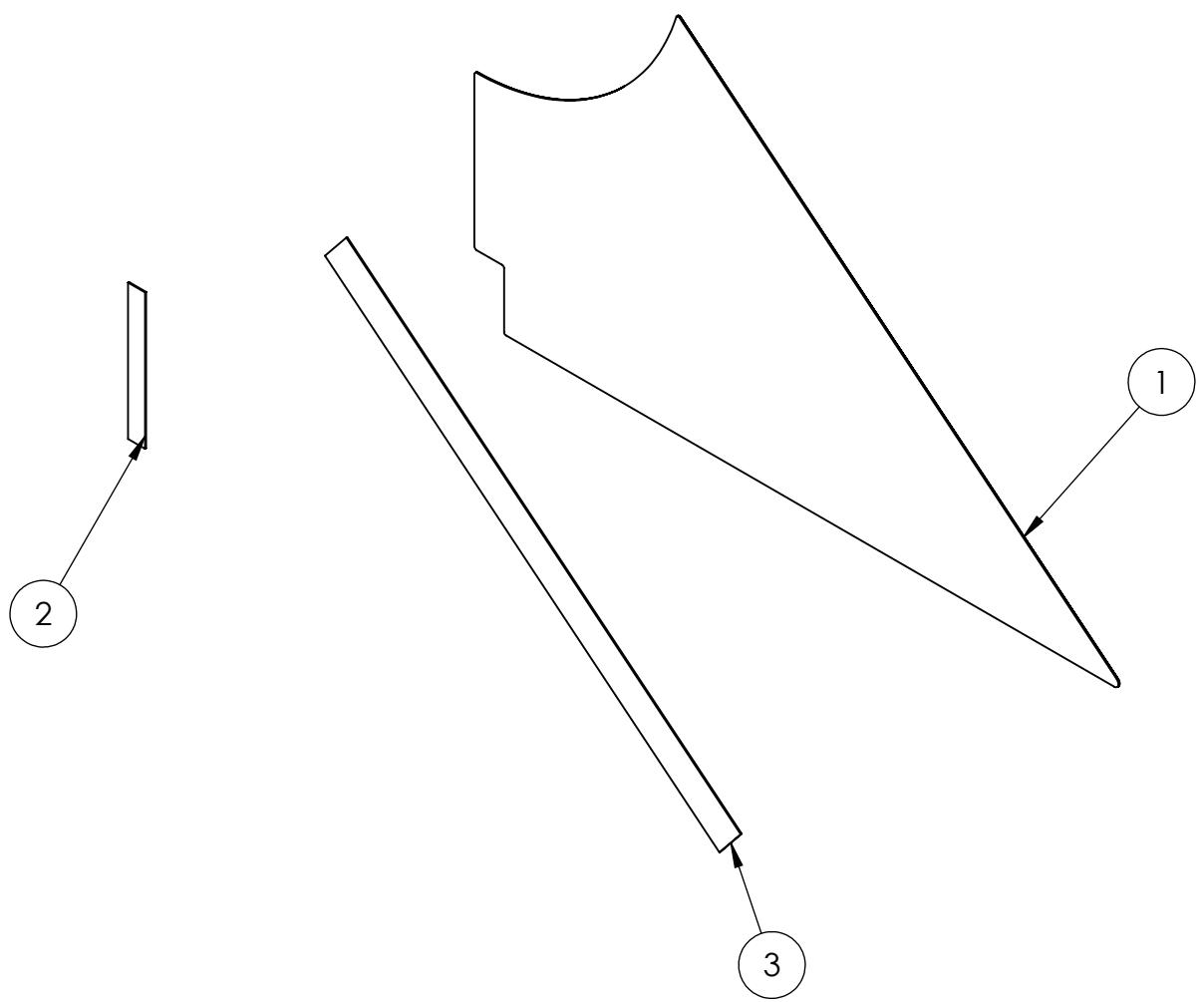
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- Notes:**
1. Make sure non-vinyl surface of GE-20017 is clean prior to loop application.
 2. Press firmly on loop to ensure adhesion.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 12/18/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	
NEXT ASSY	USED ON	FINISH	COMMENTS:	
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

**Generator Switch
Vinyl Left _ With Loop**

SIZE	DWG. NO.	REV
B	GE-20023	
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2

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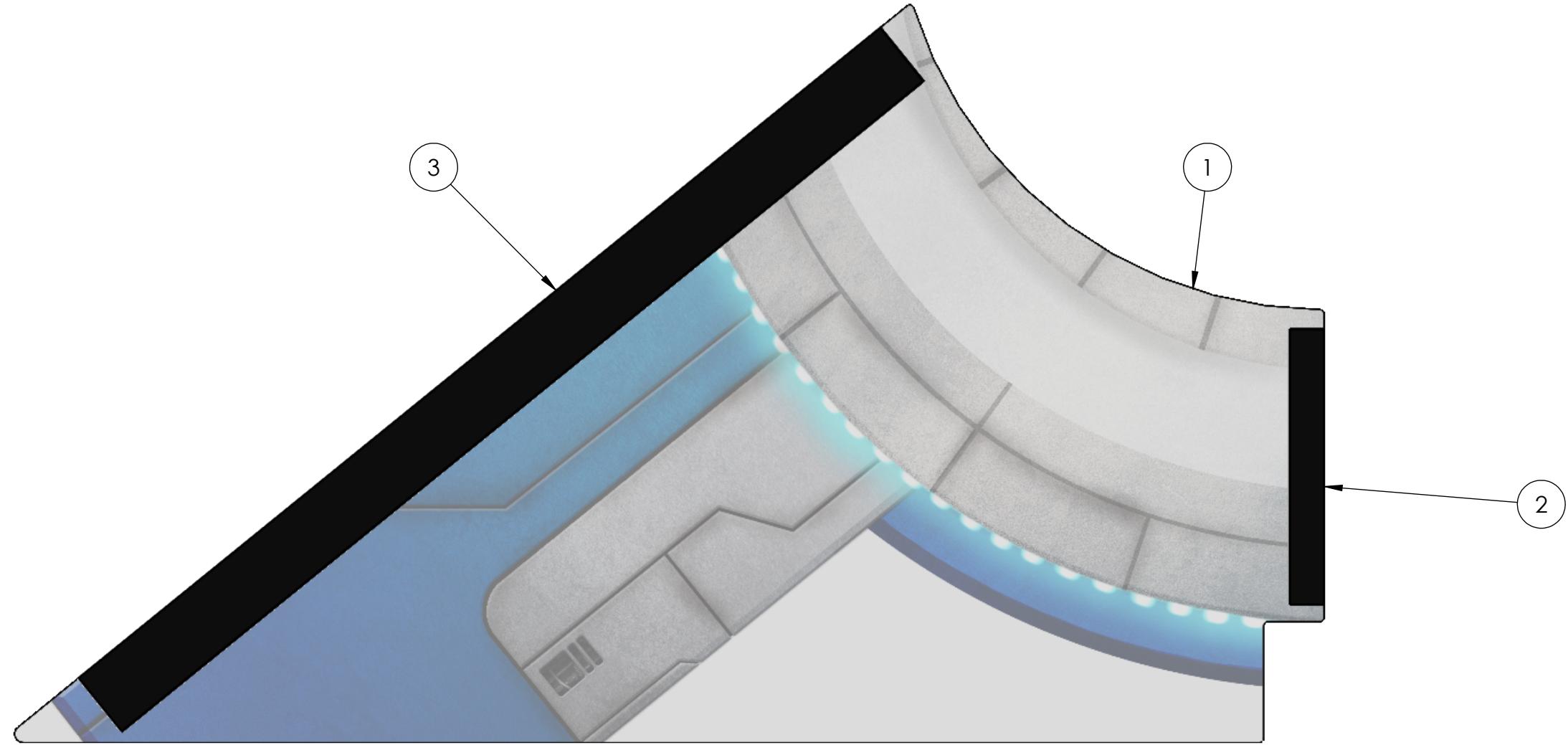
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20018-Blue	Generator Switch Vinyl Plastic_Right - with vinyl	1
2	Loop_1_8	1" x 8" Loop, Adhesive Backed	1
3	Loop_2_30	2" x 30" Loop, Adhesive Backed	1

		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	12/18/19
		TOLERANCES:		
		FRACTIONAL: $\pm\frac{1}{16}$		
		ANGULAR: MACH $\pm 1^\circ$		
		BEND $\pm 1^\circ$		
		TWO PLACE DECIMAL $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

Comments: *(Large empty area for notes)*

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
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Generator Switch Vinyl Right _ With Loop

SIZE DWG. NO. REV
B GE-20024

SCALE: 1:4 WEIGHT: SHEET 1 OF 2

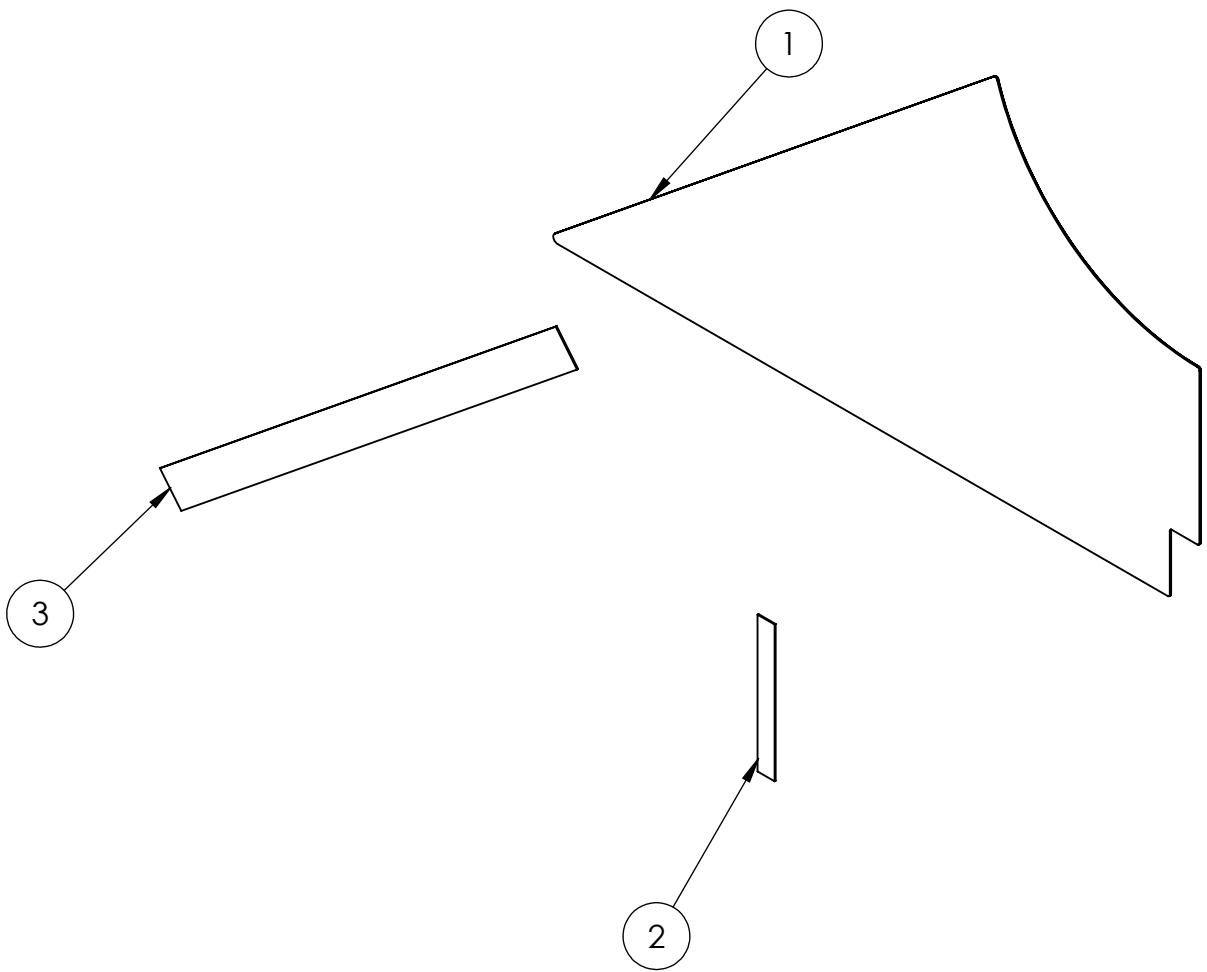
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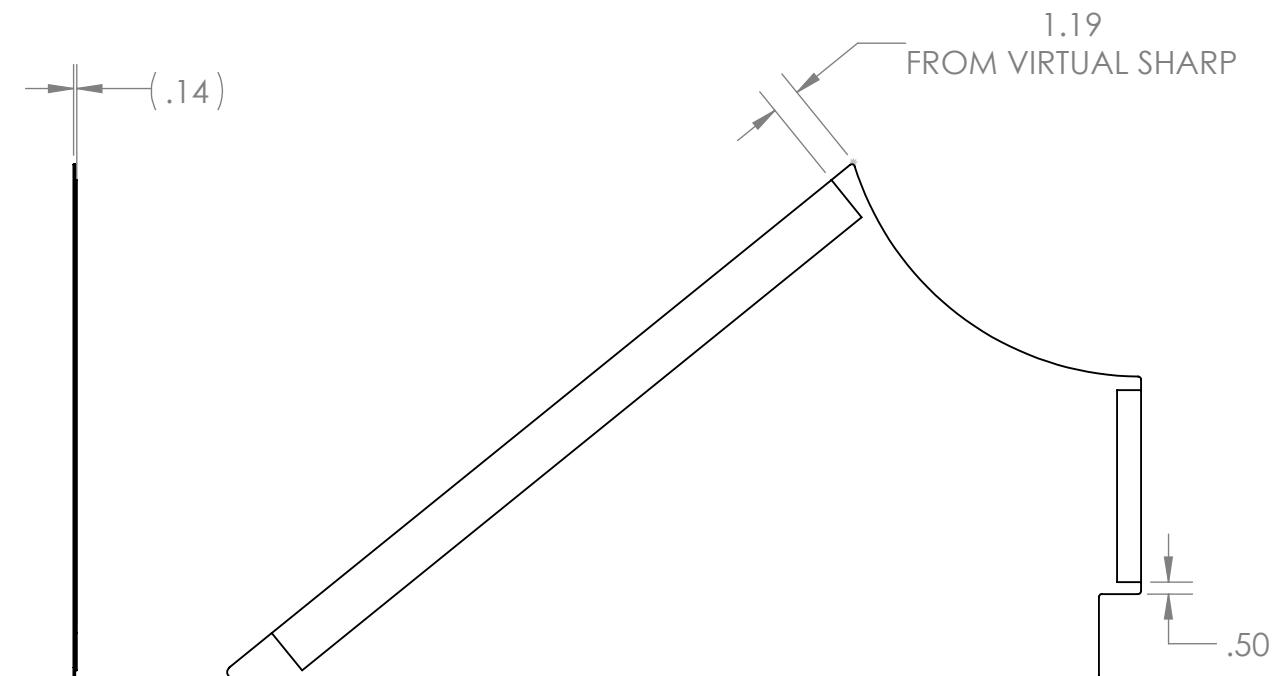
2

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**Notes:**

1. Make sure non-vinyl surface of GE-20018 is clean prior to loop application.
2. Press firmly on loop to ensure adhesion.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC DATE 12/18/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED
		MATERIAL	ENG APPR. MFG APPR.
	NEXT ASSY	USED ON FINISH	Q.A.
	APPLICATION	DO NOT SCALE DRAWING	COMMENTS:

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Generator Switch
Vinyl Right _ With Loop

SIZE	DWG. NO.	REV
B	GE-20024	
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2

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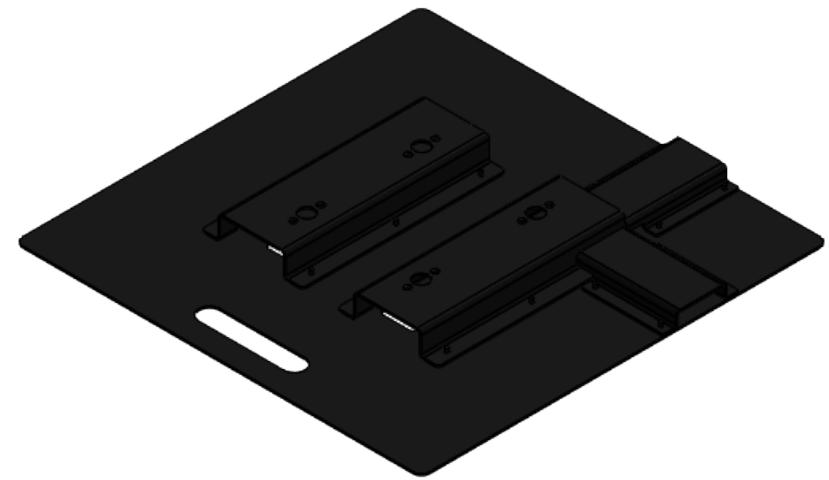
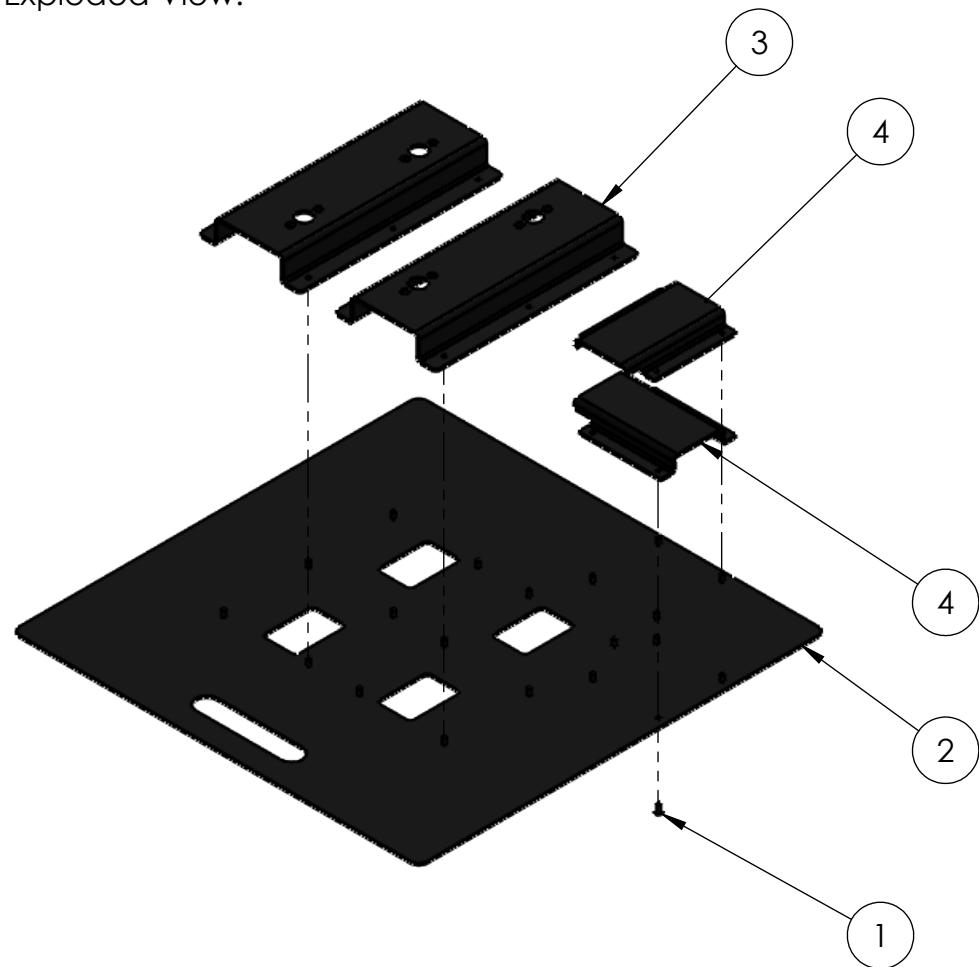
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Exploded View:



- Notes:
1. Rivets should be plated or stainless steel
 2. Tag or label with part number.
 3. Powder Coated Black (Full Assembly).

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	rivet_.1875_.126-.25	3/16" Rivet, .126-.25 Grip Range	20
2	GE-20030 - 01	Truss Base - Sheet Metal Assembly, Base Plate	1
3	GE-20030 - 02	Truss Base - Sheet Metal Assembly, Truss Feet	2
4	GE-20030 - 03	Truss Base - Sheet Metal Assembly, Berm - Red	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC DATE 9/9/19	
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	
		MATERIAL	Q.A. COMMENTS:	
NEXT ASSY	USED ON	FINISH POWDER COAT BLACK		WEIGHT: 24.93 LBS
	APPLICATION	DO NOT SCALE DRAWING		SIZE DWG. NO. REV B GE-20030 0
			SCALE: 1:8 WEIGHT:	SHEET 1 OF 2

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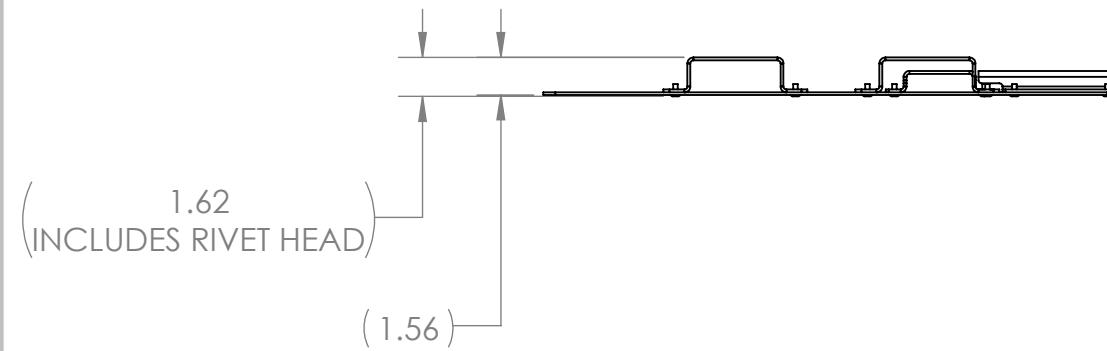
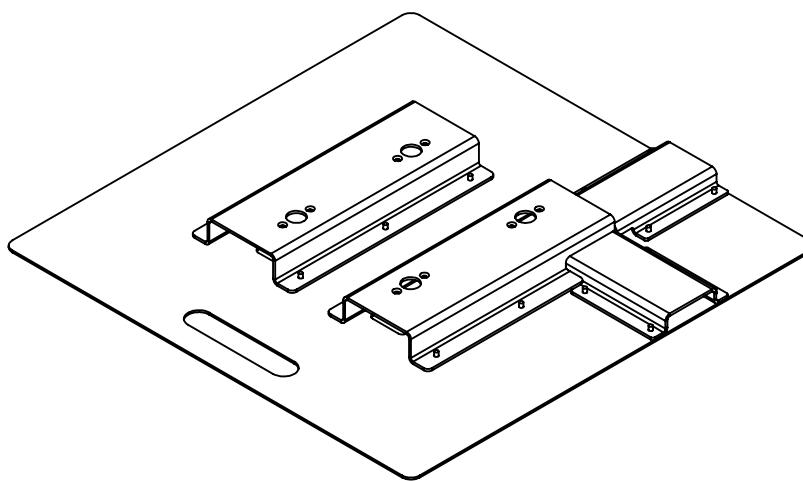
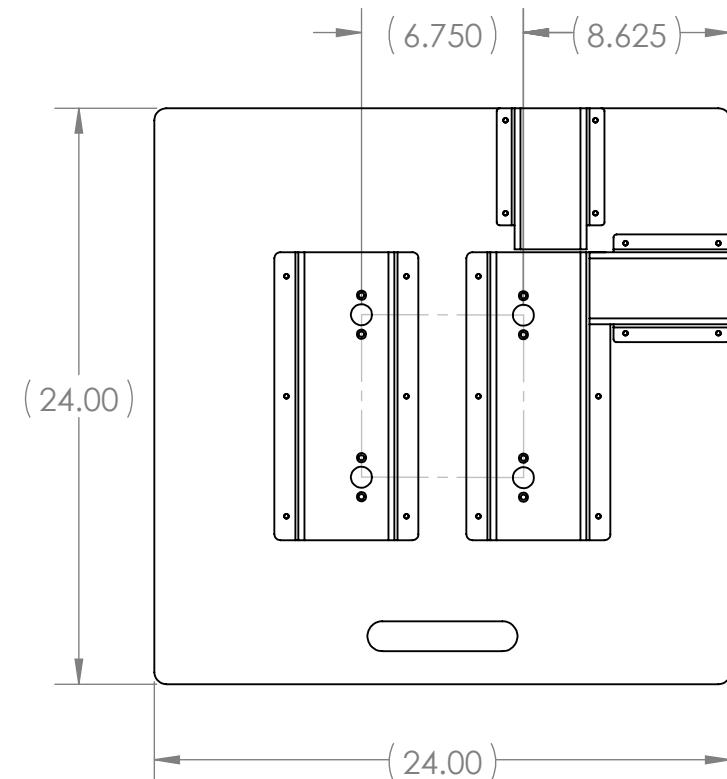
A

4

3

2

1



DIMENSIONS SHOWN FOR REFERENCE

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OR AS A WHOLE WITHOUT THE WRITTEN
PERMISSION OF **FIRST[®]** IS PROHIBITED.

		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	9/2/19
		TOLERANCES:		
		FRACTIONAL: ±1/16		
		ANGULAR: MACH ±1° BEND ±1°		
		TWO PLACE DECIMAL ±.01		
		THREE PLACE DECIMAL ±.001		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
		NEXT ASSY	USED ON	FINISH
				POWDER COAT BLACK
		APPLICATION		DO NOT SCALE DRAWING
TITLE: Truss Base - Sheet Metal Assembly				
SIZE B		DWG. NO. GE-20030	REV 0	
WEIGHT: 24.93 LBS				
SCALE: 1:8 WEIGHT: SHEET 2 OF 2				

4

3

2

1

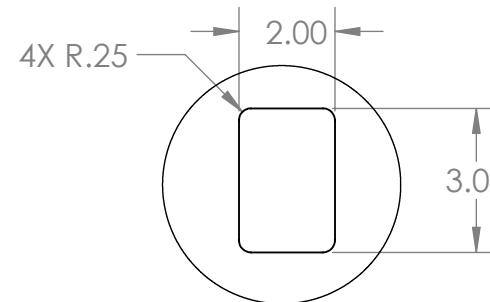
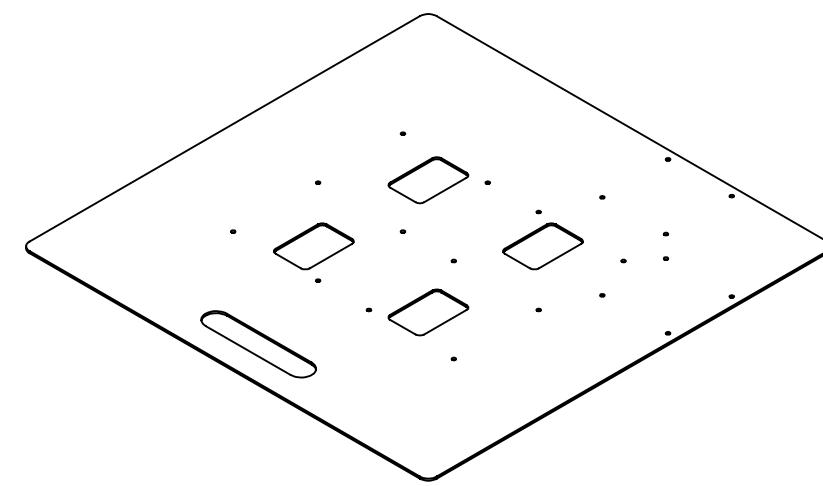
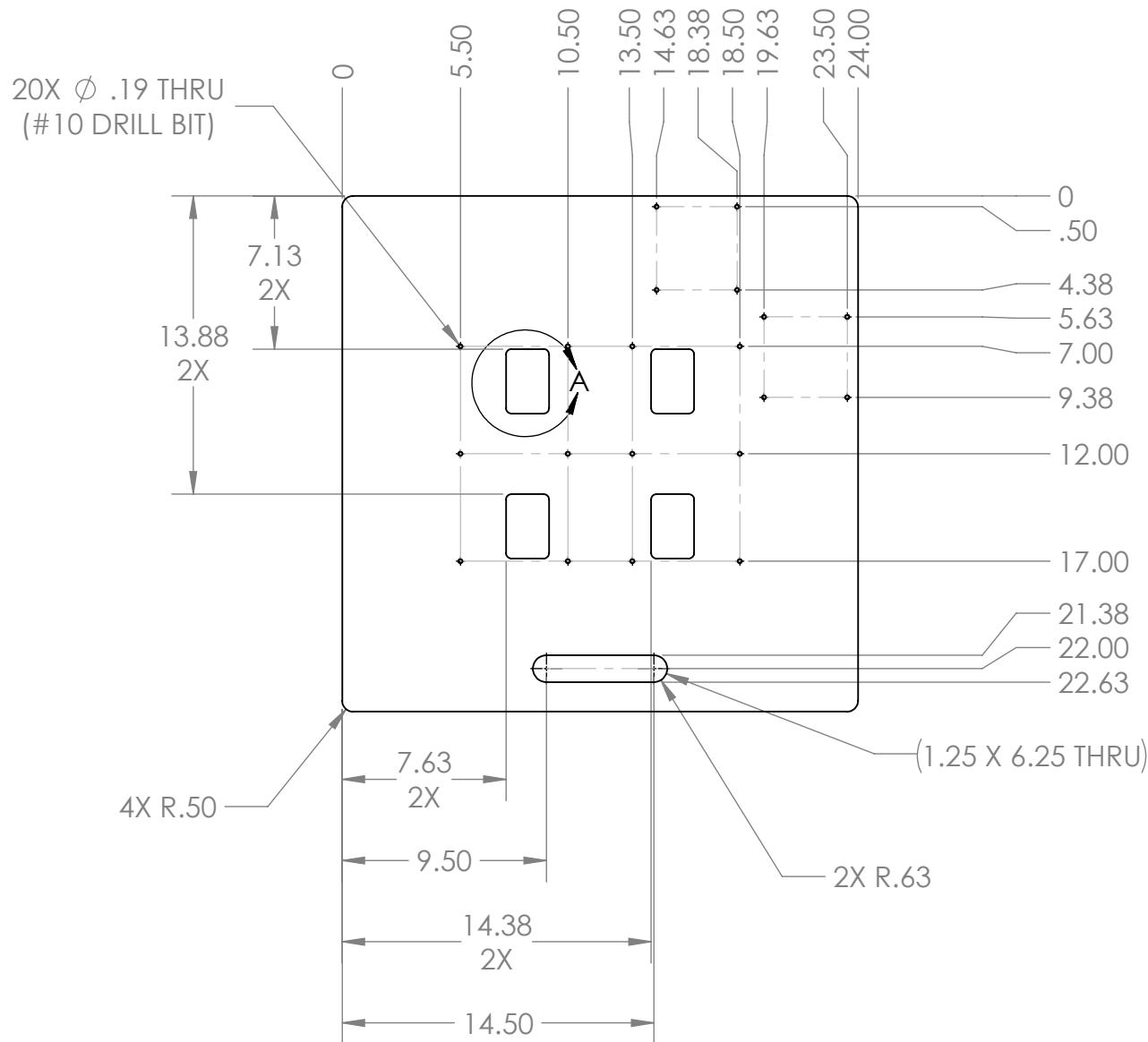
4

3

2

1

B



DETAIL A
SCALE 1 : 4
4X

A



- Notes:
- Material: 12 Ga. (0.105") Mild Steel Sheet A366/1008 Cold Roll
 - Remove all burrs and sharp edges.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC 9/2/19	DATE
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED	
		MATERIAL	ENG APPR.	
		STEEL SHEET	MFG APPR.	
	GE-20030	Q.A.		
NEXT ASSY	USED ON	COMMENTS:		
APPLICATION	FINISH			
	BARE			
	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION

SOLIDWORKS

Title: Truss Base - Sheet Metal Assembly, Base Plate

Size: DWG. NO. B GE-20030 - 01 Rev 0

Scale: 1:8 Weight: Sheet 1 of 1

4

3

2

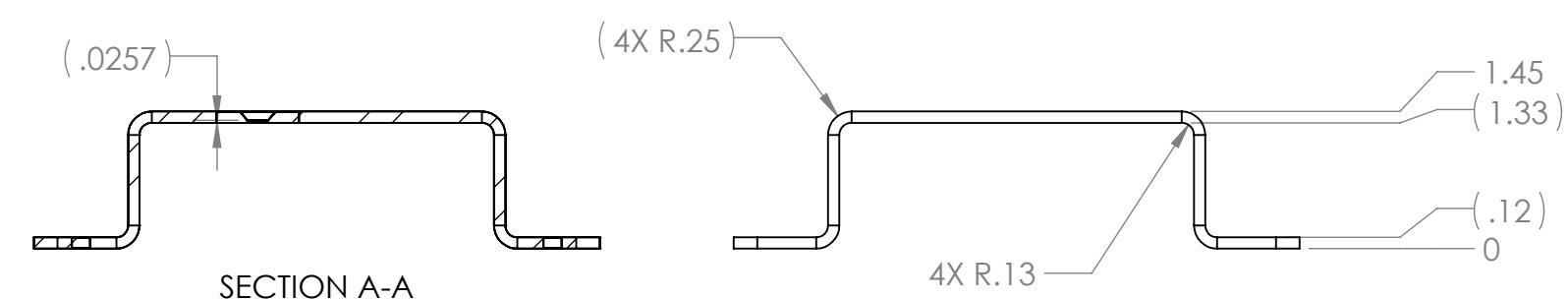
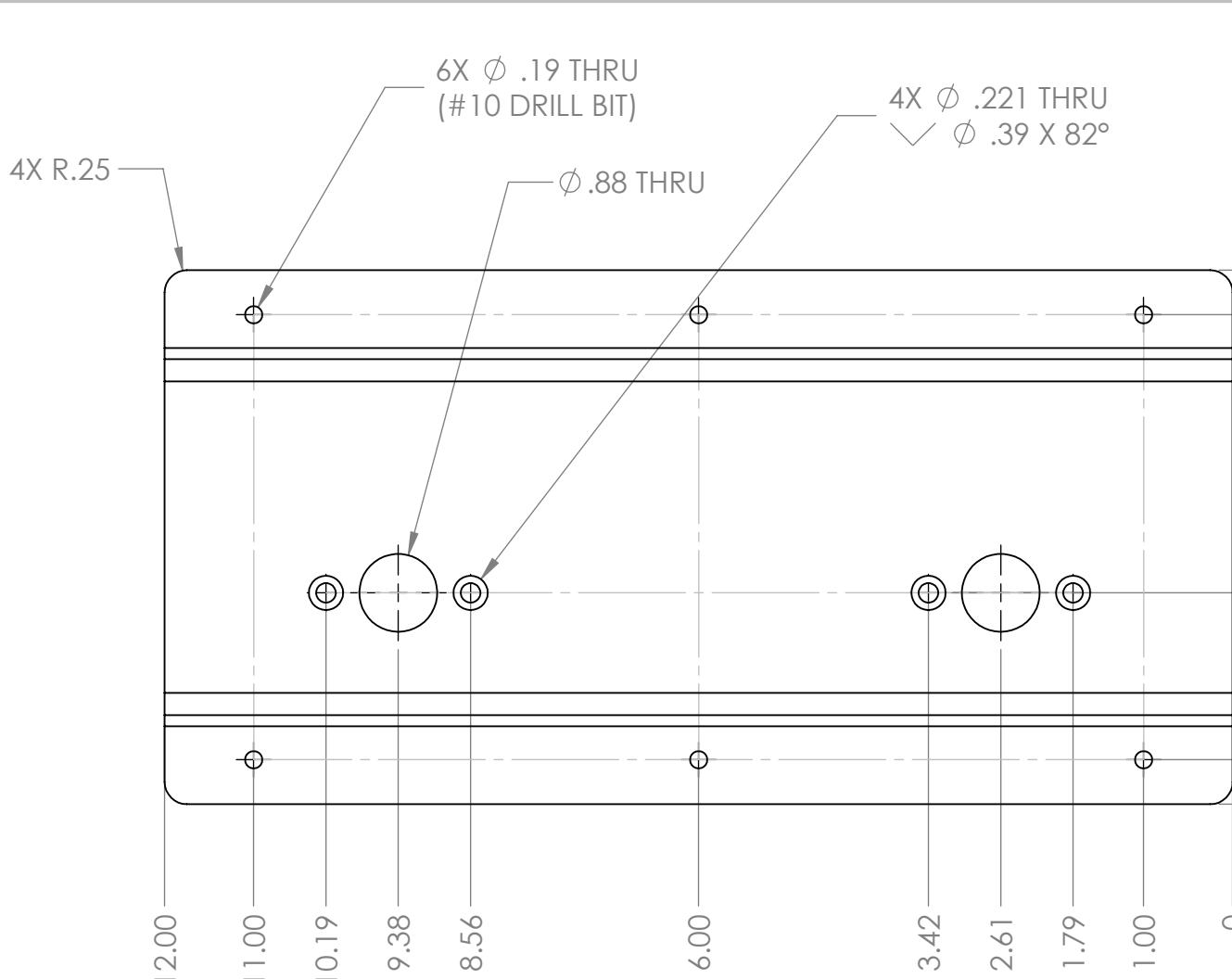
1

4

3

2

1



- Notes:
1. Material: 0.125" Mild Steel Sheet A366/1008 Cold Roll
 2. Remove all burrs and sharp edges.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC DATE 9/2/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED
		MATERIAL	ENG APPR.
		STEEL SHEET	MFG APPR.
	GE-20030	Q.A.	Q.A.
NEXT ASSY	USED ON	COMMENTS:	
APPLICATION	FINISH		
	BARE		
	DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV	
B	GE-20030 - 02	0	
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1	

2

4

3

B

2

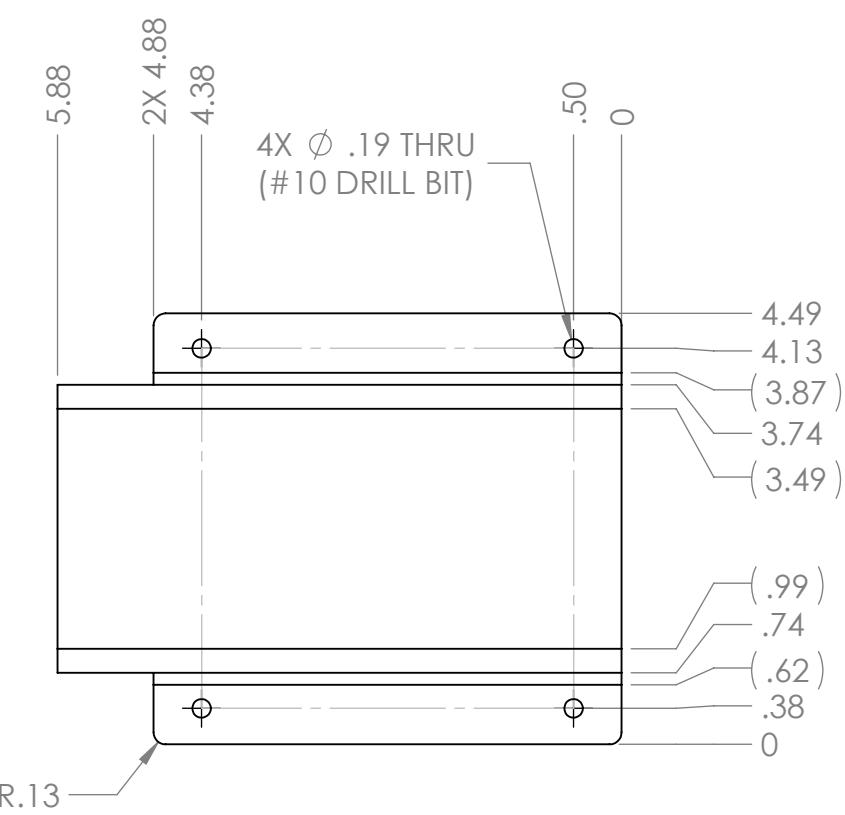
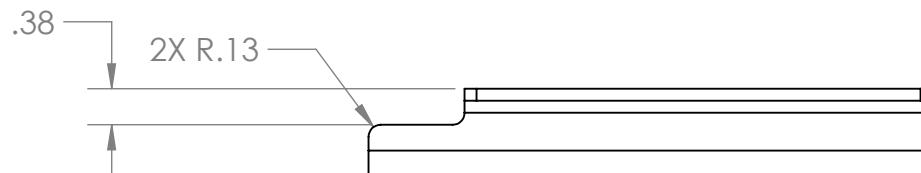
1

4

3

2

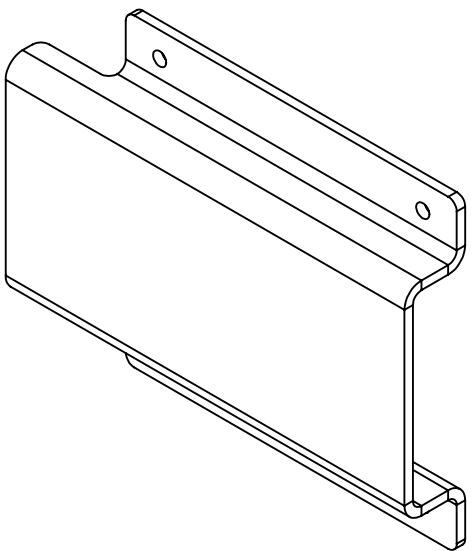
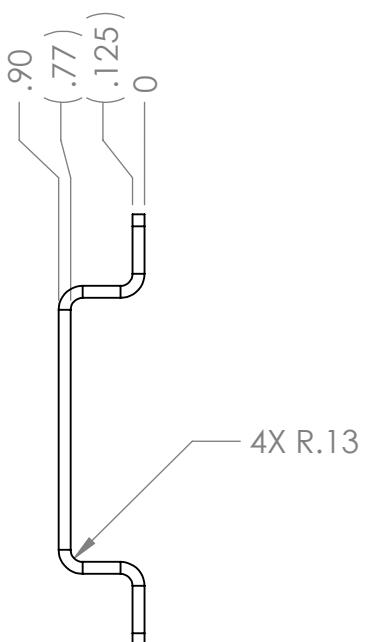
1



- Notes:
1. Material: 0.125" Mild Steel Sheet A366/1008 Cold Roll
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC	DATE 9/2/19
		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL SHEET STEEL	Q.A. COMMENTS:	
GE-20030		FINISH BARE		
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING	
SCALE: 1:2		WEIGHT:	SHEET 1 OF 1	
SIZE B		DWG. NO. GE-20030 - 03	REV 0	



B

A

4

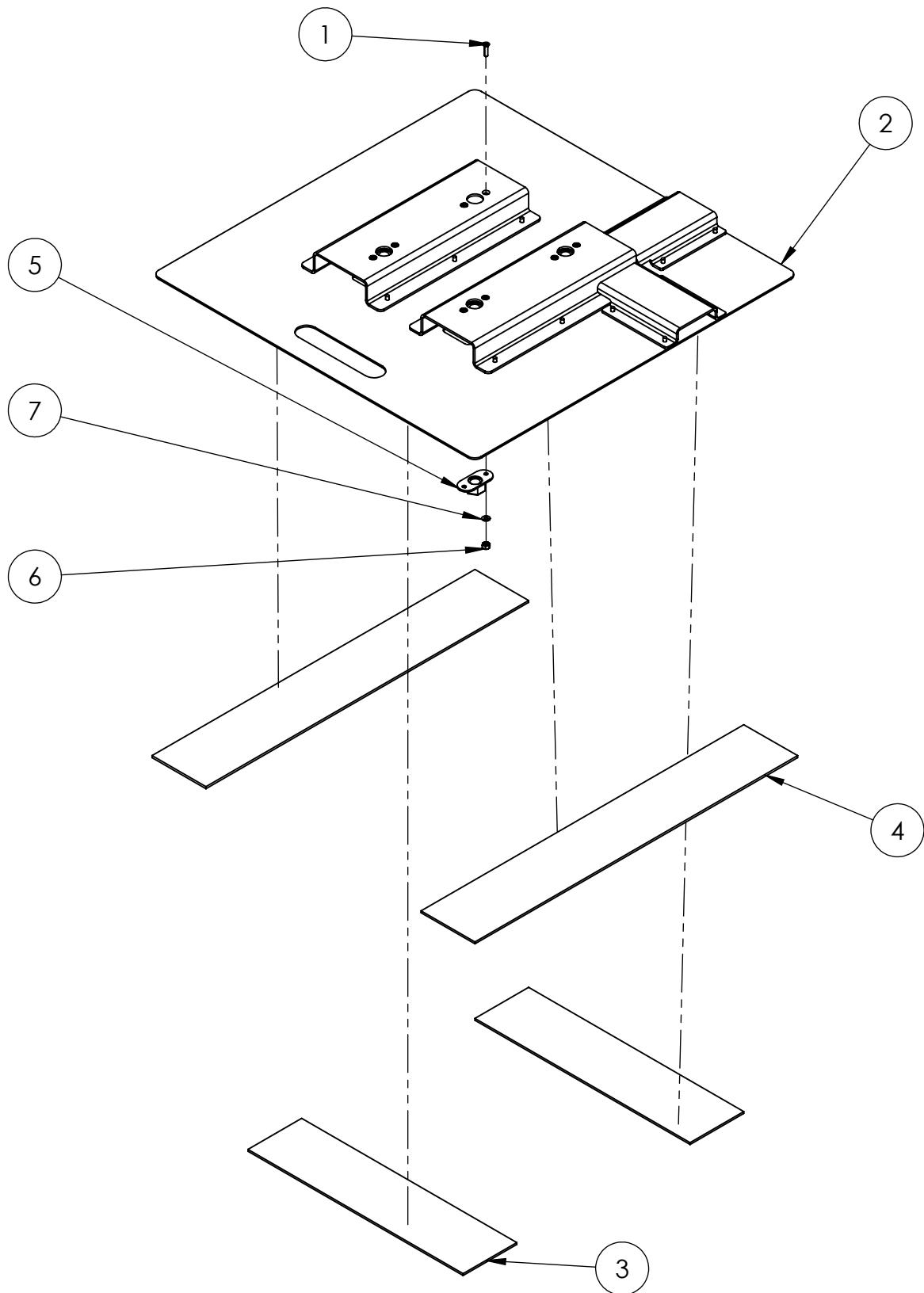
3

2

1

B

B



Note:

1. Make sure surface of GE-20030 is clean prior to hook application.
2. Press firmly on hook to ensure adhesion.
3. Item ⑥ should be loose to allow item ⑤ to float.

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	flat_phillips_10 24_.75	Flat Head, Phillips, .75in Length, 10 24	8
2	GE-20030	Truss Base - Sheet Metal Assembly	1
3	Hook_4_16	4" x 16" Hook Fastener, Adhesive Backed	2
4	Hook_4_24	4" x 24" Hook Fastener, Adhesive Backed	2
5	nut_chassis_.625_11	Nut, Chassis, 5/8-11	4
6	nylock_10_24	Nylock #10-24	8
7	washer_flat_10	Flat Washer for #10 Screw	8

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC DATE 8/29/19
	CHECKED ENG APPR. MFG APPR.	
	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	Q.A. COMMENTS: WEIGHT: 24.4 LBS
NEXT ASSY	USED ON FINISH	
APPLICATION	DO NOT SCALE DRAWING	SIZE DWG. NO. REV B GE-20031
		SCALE: 1:8 WEIGHT: SHEET 1 OF 2

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Truss Base with Nut Chassis

4

3

2

1

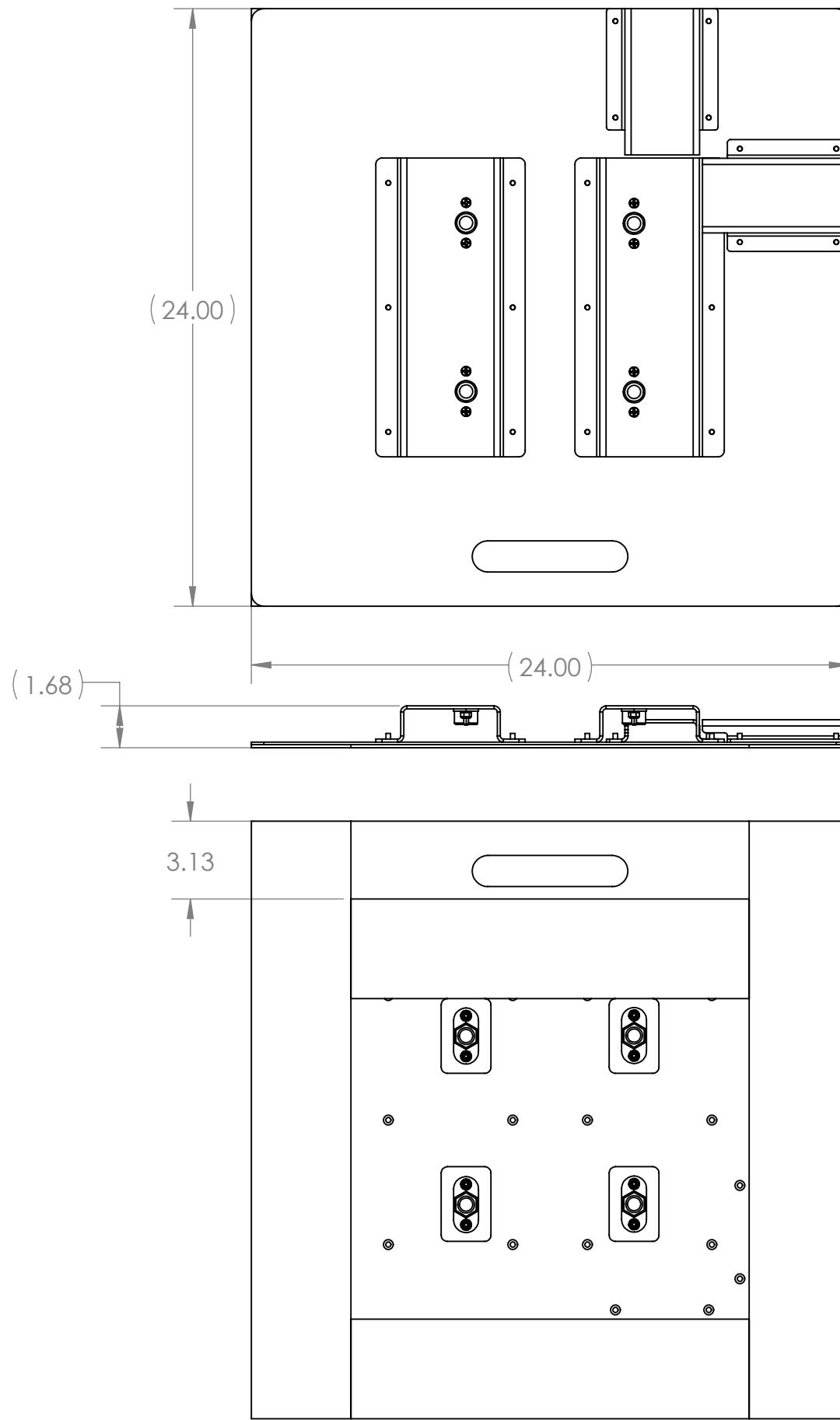
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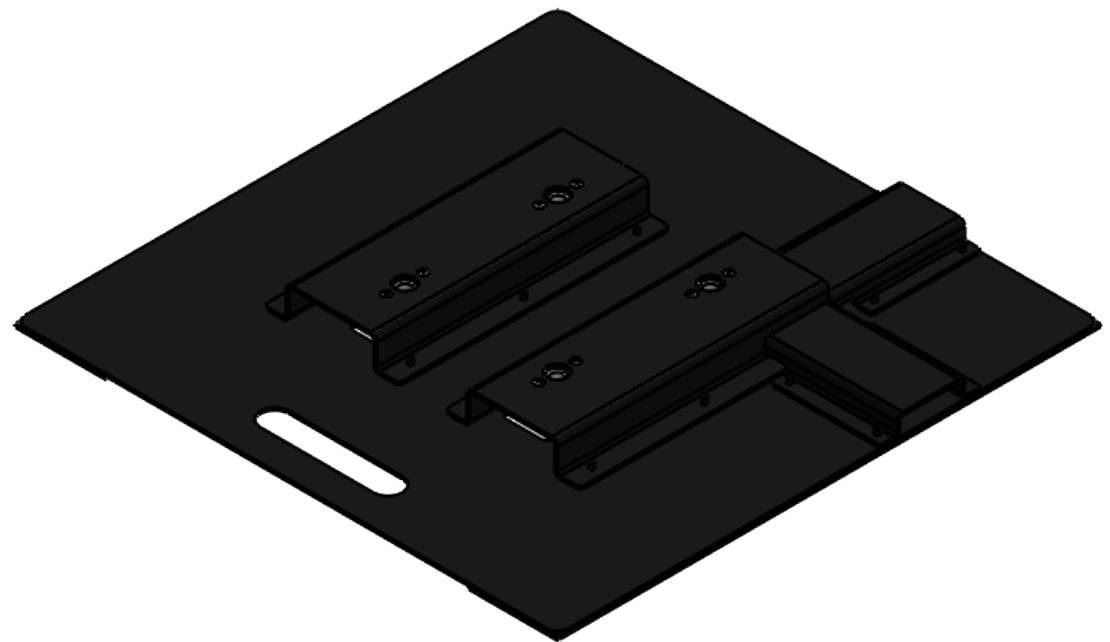
2

1

B



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$, BEND $\pm 1^\circ$ TWO PLACE DECIMAL: $\pm .01$ THREE PLACE DECIMAL: $\pm .001$	NAME DRAWN KAMC DATE 8/29/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED
		MATERIAL	ENG APPR. MFG APPR.
		FINISH	Q.A.
NEXT ASSY	USED ON	COMMENTS:	
APPLICATION	DO NOT SCALE DRAWING		



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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Truss Base with
Nut Chassis**

SIZE DWG. NO. **B GE-20031** REV

SCALE: 1:6 WEIGHT: SHEET 2 OF 2

4

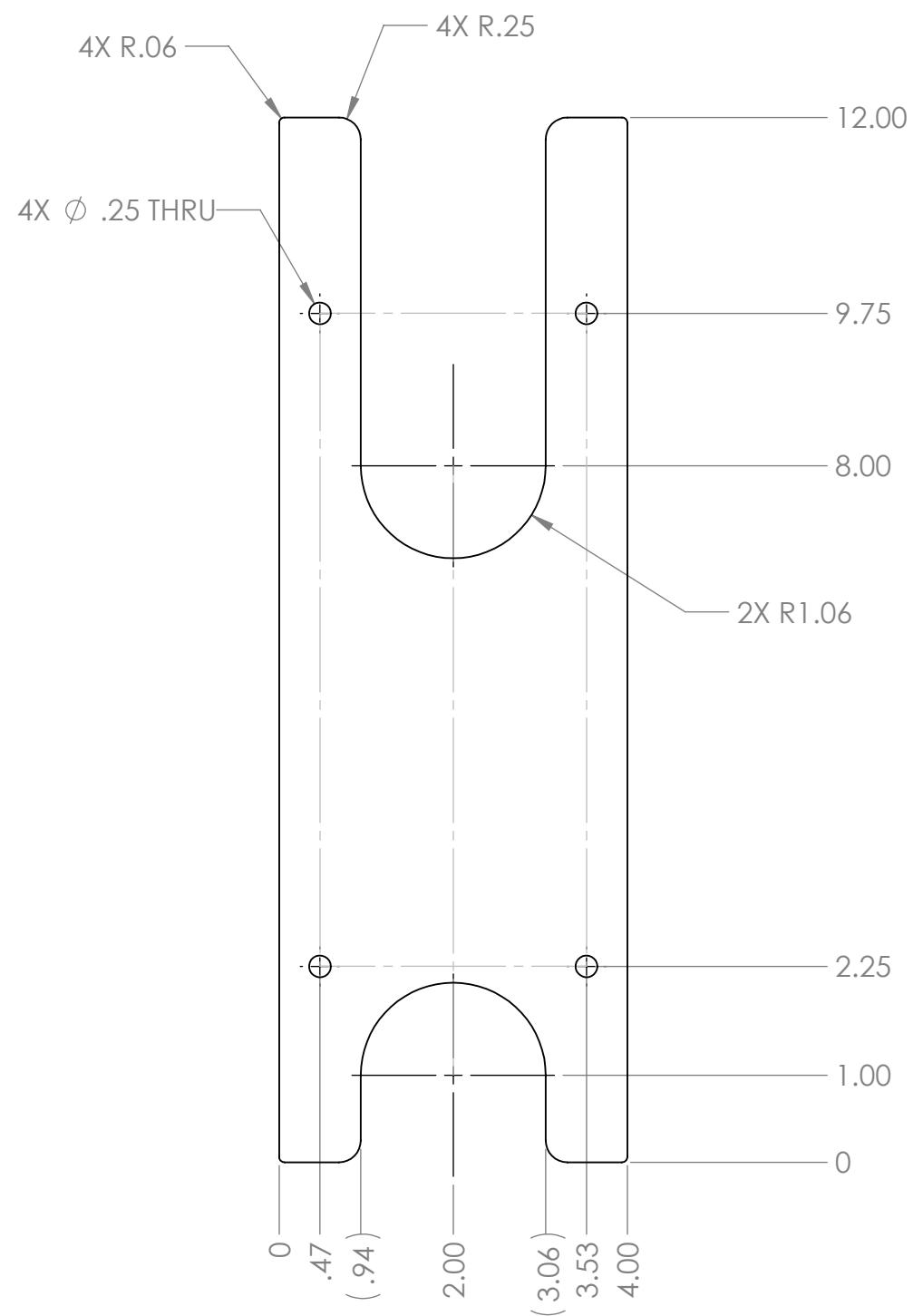
3

2

1

B

B

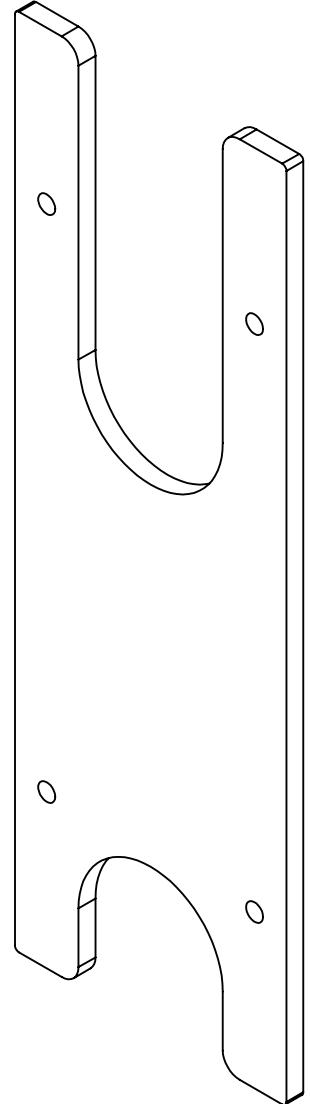
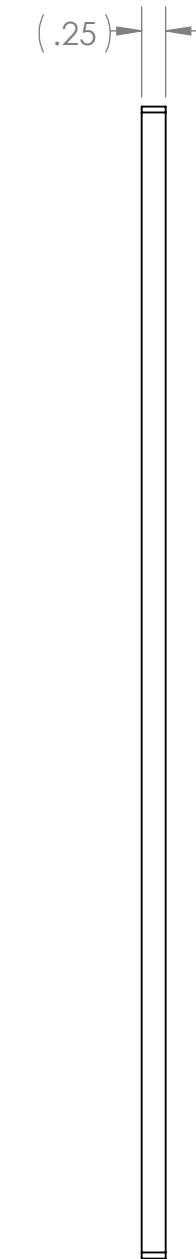


A

A

- Notes:
1. Material: 1/4" Polycarbonate, Clear
 2. Remove all burrs and sharp edges
 3. Tag or label with part number

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		UNLESS OTHERWISE SPECIFIED:			TITLE: Jig for Cheeseboroughs	
		DIMENSIONS ARE IN INCHES				
		TOLERANCES:				
		FRACTIONAL: ±1/16				
		ANGULAR: MACH ±1° BEND ±1°				
		TWO PLACE DECIMAL: ±.01				
		THREE PLACE DECIMAL: ±.001				
		INTERPRET GEOMETRIC TOLERANCING PER:				
		ENG APPR.				
		MFG APPR.				
		Q.A.				
		COMMENTS:				
NEXT ASSY		MATERIAL				
		POLYCARB				
USED ON		FINISH				
		BARE				
APPLICATION		DO NOT SCALE DRAWING				
SIZE	DWG. NO.	REV				
B	GE-20035					
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1				



SOLIDWORKS
Modeling Solutions Partner

4

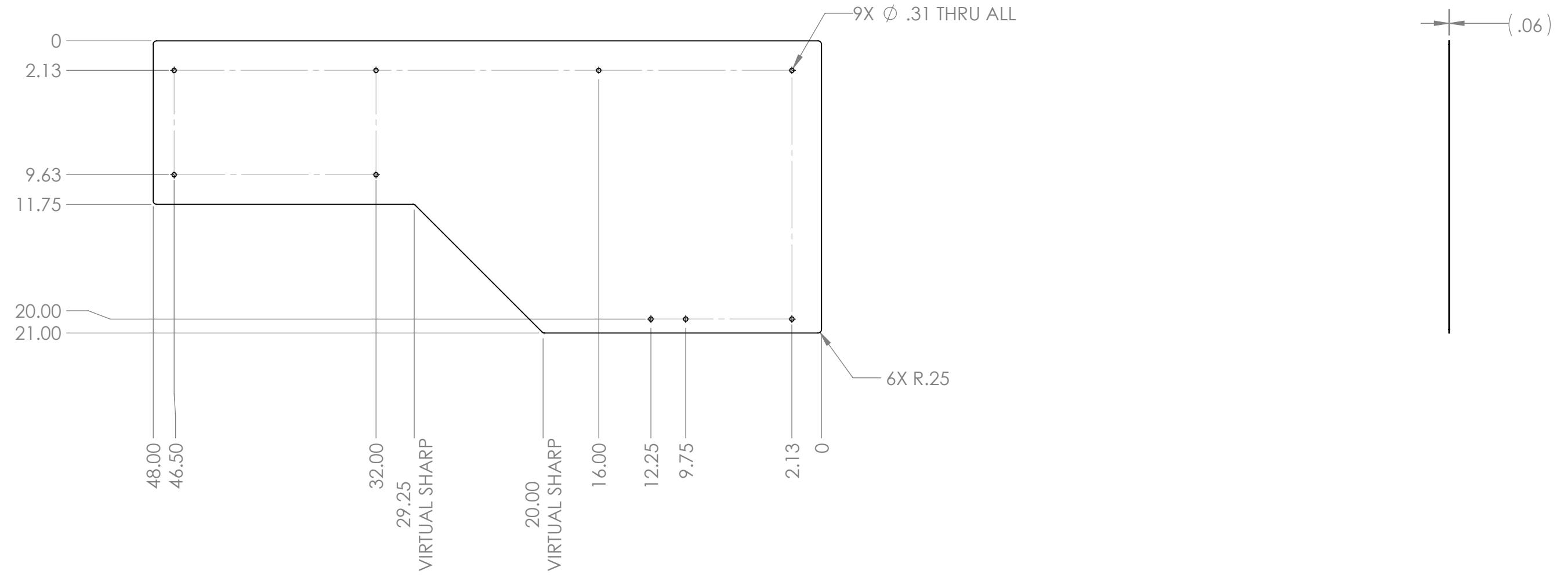
3

2

1

B

B



- Notes:
1. Material: 1/16" Polycarbonate, Clear
 2. Remove all burrs and sharp edges
 3. Tag or label with part number
 4. Finish: Bare - Vinyl will be applied to face, either side

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		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. CHECKED	
		MATERIAL	MFG APPR. Q.A.	
GE-20041		POLYCARB	COMMENTS:	
NEXT ASSY	USED ON	FINISH BARE		
	APPLICATION	DO NOT SCALE DRAWING		
TITLE: Shield Generator Corner Plastic				
SIZE B	DWG. NO. GE-20040	REV 0		
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

4

3

2

1

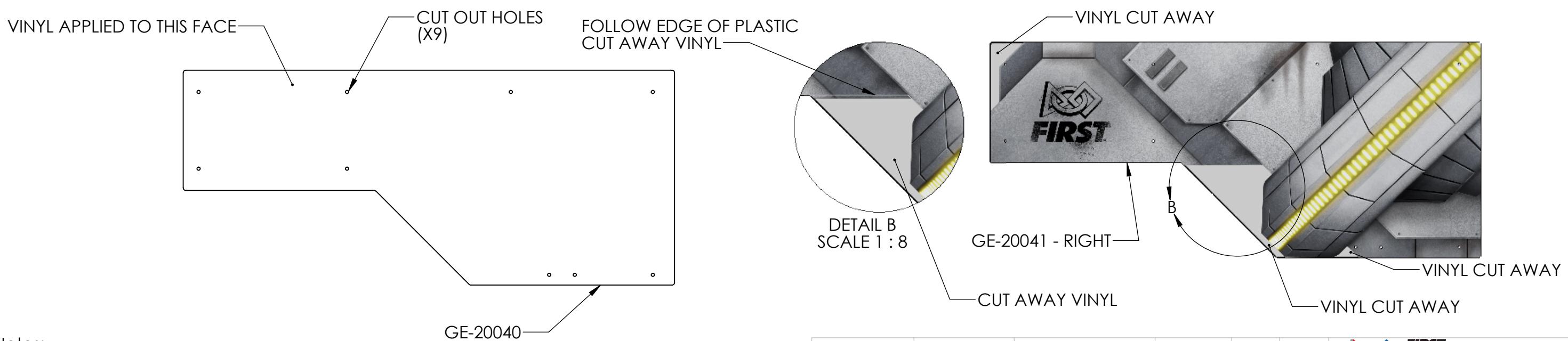
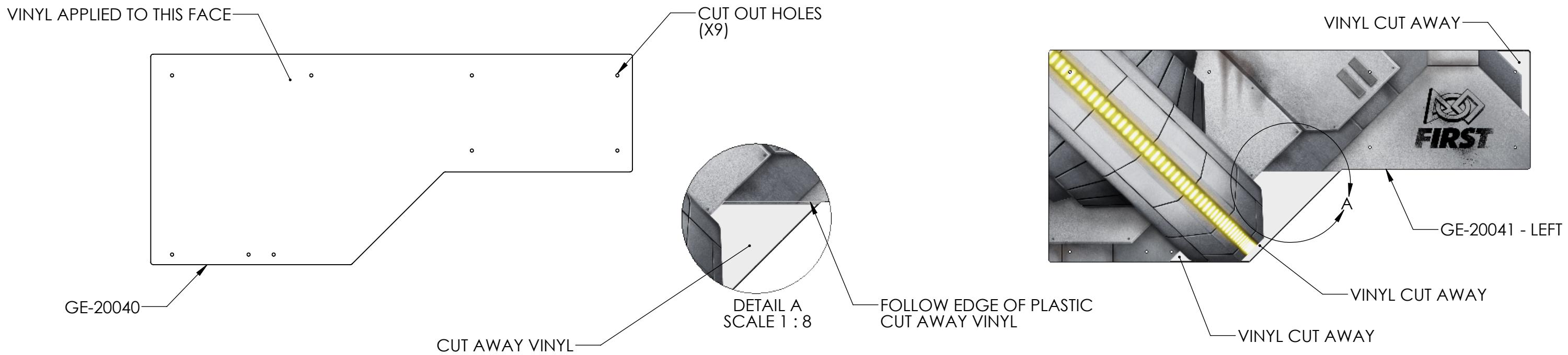
A

4

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2

1



Notes:
1. Tag or label with part number

Left/Right Variations		
Part Number	Vinyl Image	Qty per Field
GE-20041 - Left	GE-20041 - Left - Vinyl	4
GE-20041 - Right	GE-20041 - Right - Vinyl	4

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION  SOLIDWORKS <small>Modeling Solutions Partner</small>
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN	KAMC	10/28/19	
			CHECKED			
			ENG APPR.			
			MFG APPR.			
			Q.A.			
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:			
		MATERIAL				
NEXT ASSY	USED ON	FINISH	VINYL			
APPLICATION		DO NOT SCALE DRAWING		SCALE: 1:10	WEIGHT:	SHEET 1 OF 1

4

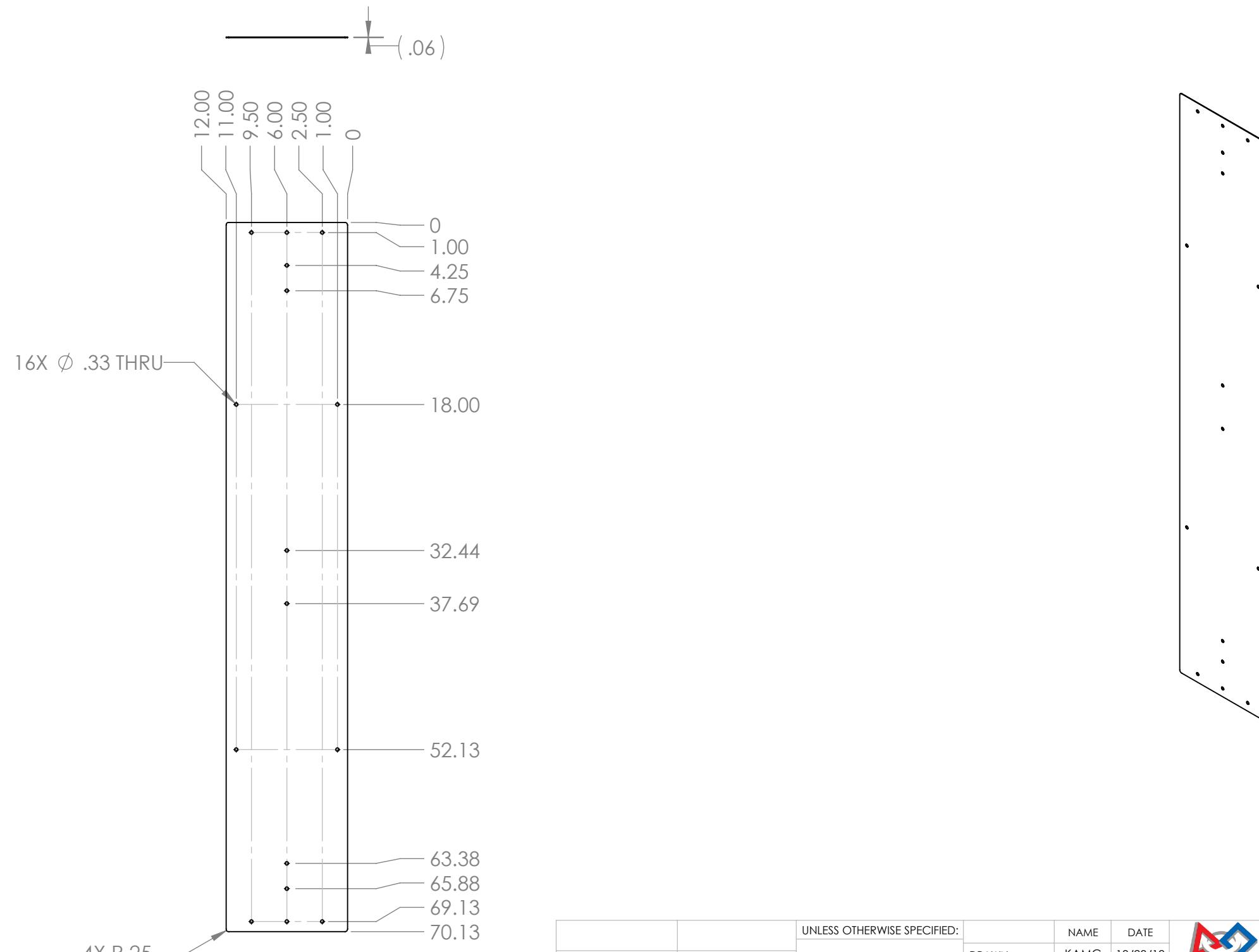
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2

1

B

B



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 10/23/19
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL POLYCARB	ENG APPR. MFG APPR.	
NEXT ASSY		USED ON FINISH BARE	Q.A. COMMENTS:	
		APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Shield Generator Truss Leg Plastic

SIZE	DWG. NO.	REV
B	GE-20043	0
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

4

3

2

1

4

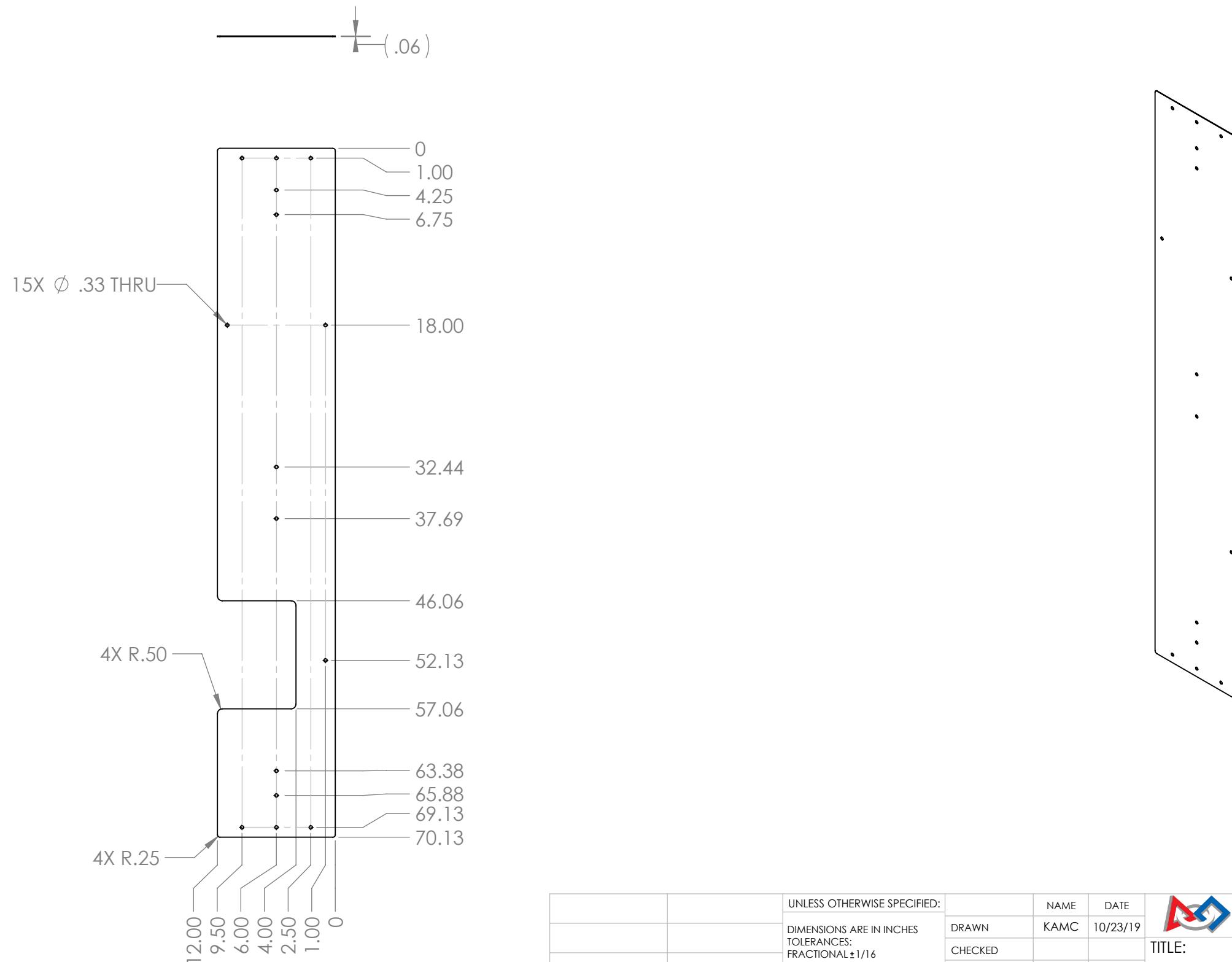
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B

B



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 10/23/19
		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
		POLYCARB		
NEXT ASSY	USED ON	FINISH	BARE	
	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE:
Shield Generator Truss
Leg Plastic_Trench

SIZE DWG. NO. REV
B GE-20044 0

SCALE: 1:12 WEIGHT: SHEET 1 OF 1

4

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1

4

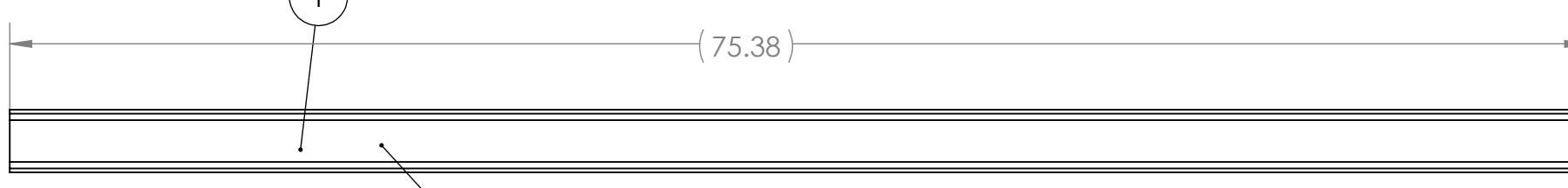
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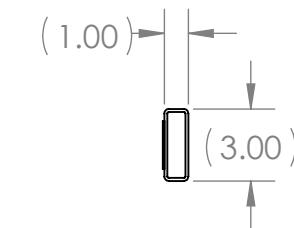
1

B

B



Note:
Hook should be placed centered on the width of the part.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20051	Boundary, Black 75.38"	1
2	Hook_2_75.-375	2" x 75.375" Hook, Adhesive Backed	1

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
			APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Boundary 75.38"
w/ hook

SIZE	DWG. NO.	REV
B	GE-20046	

SCALE: 1:12 WEIGHT: SHEET 1 OF 1

4

3

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4

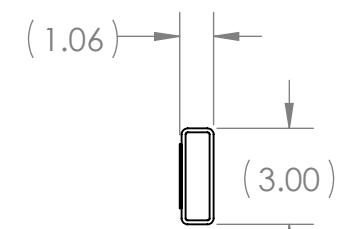
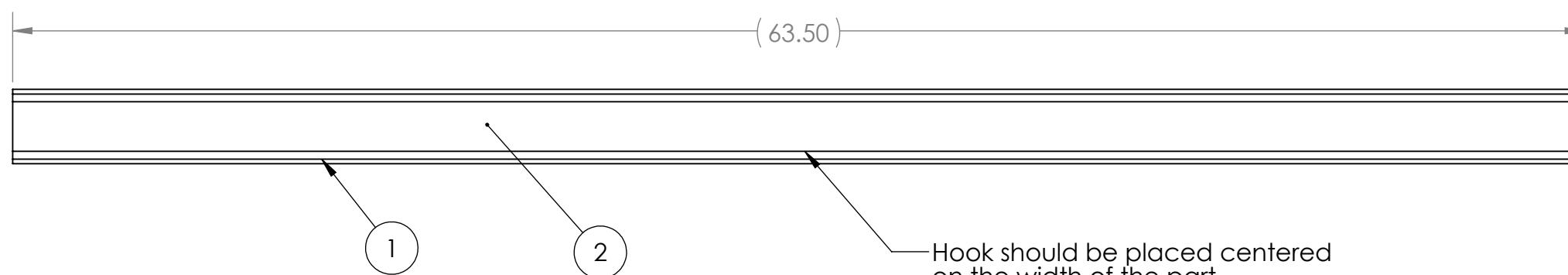
3

2

1

B

B



A

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20052	Boundary, Black 63.5"	1
2	Hook_2_63-50	2" x 63.5" Hook, Adhesive Backed	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Boundary 63.5" w/ hook

SIZE **DWG. NO.** **REV**
B **GE-20047**

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

4

3

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1

4

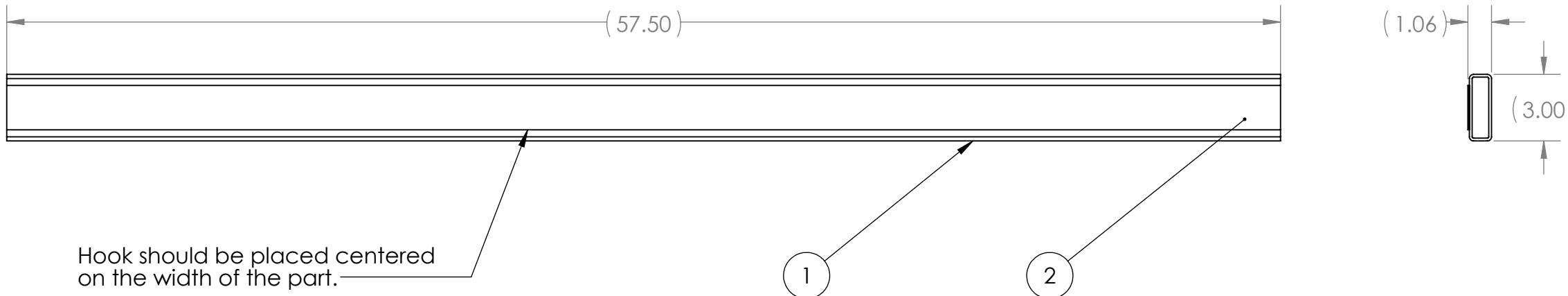
3

2

1

B

B



Note: Item 1 can be red or blue. See part drawing for more details.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20053	Boundary, Red/Blue 57.5"	1
2	Hook_2_57-50	2" x 57.5" Hook, Adhesive Backed	1

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Boundary 57.5" w/ hook

SIZE **DWG. NO.** **REV**
B **GE-20048**

SCALE: 1:6 **WEIGHT:** **Sheet 1 of 1**

4

3

2

1

4

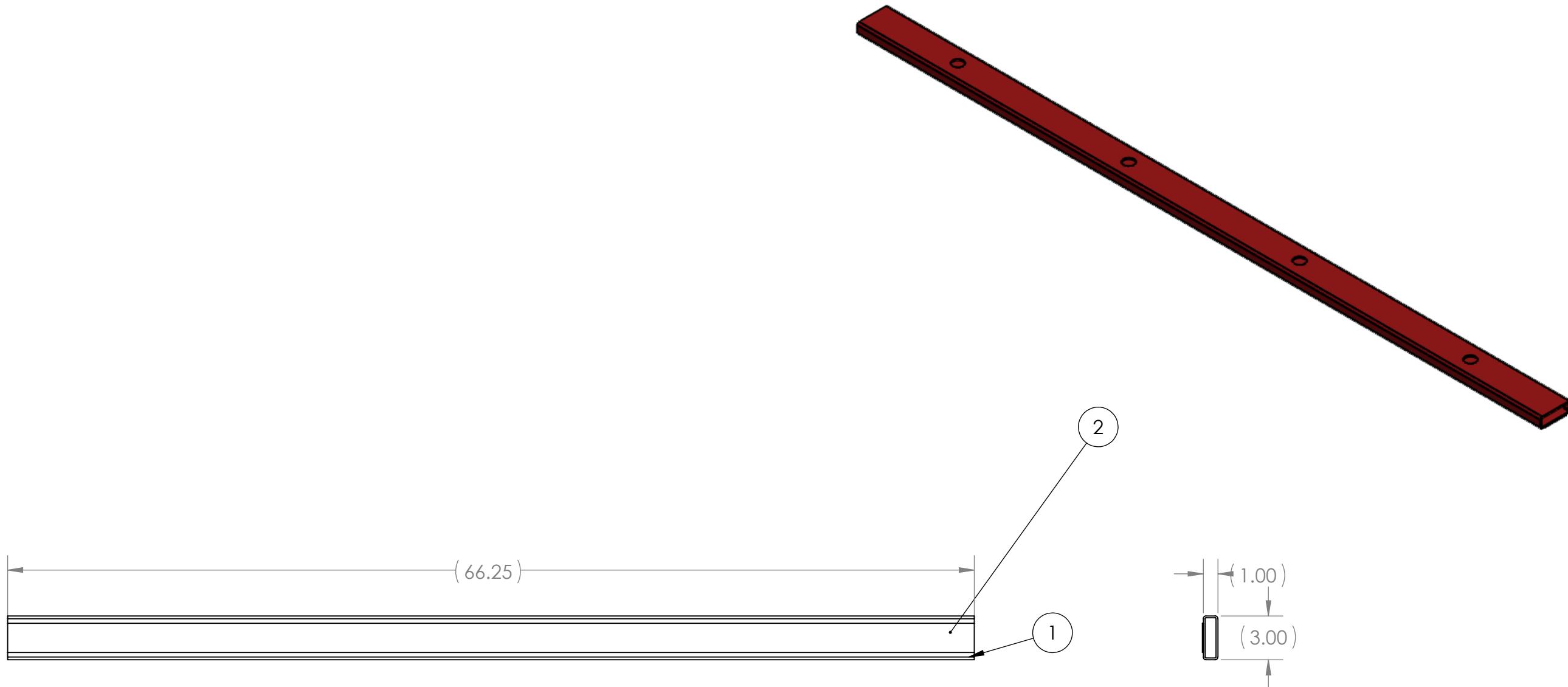
3

2

1

B

B



Note:
Hook should be placed centered on the width of the part.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	PROPRIETARY AND CONFIDENTIAL
1	GE-20054-red	Boundary, Red 66.25"	1	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.
2	Hook_2_66-25	hook 2" adhesive back	1	

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Boundary 66.25" w/ hook
SIZE: DWG. NO. **B** GE-20049 **REV:**

SCALE: 1:8 **WEIGHT:** **SHEET 1 OF 1**

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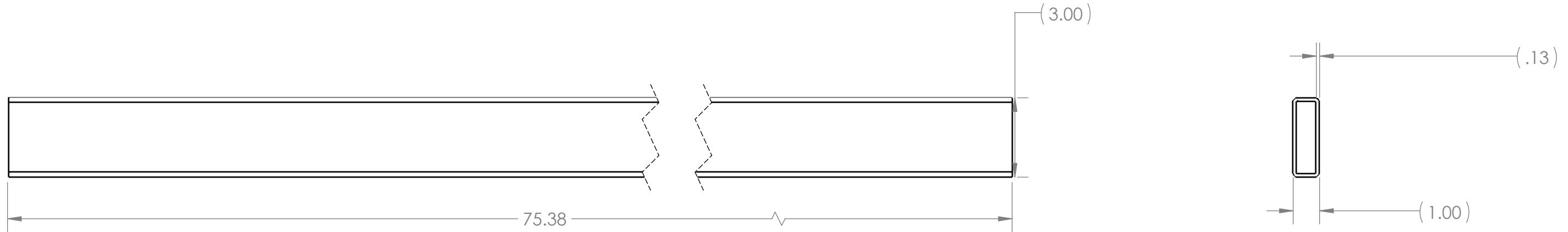
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Notes:

1. Material: 1" x 3" x .125" A513 Rectangular Tube
2. Finish: Tiger Drylac Powder Coating, Or Equivalent
3. Remove All Sharp Edges and Burrs
4. Label or Tag with part number

Part Number	Color
GE-20051	Bengal Black 49/88888

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20051			
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1		

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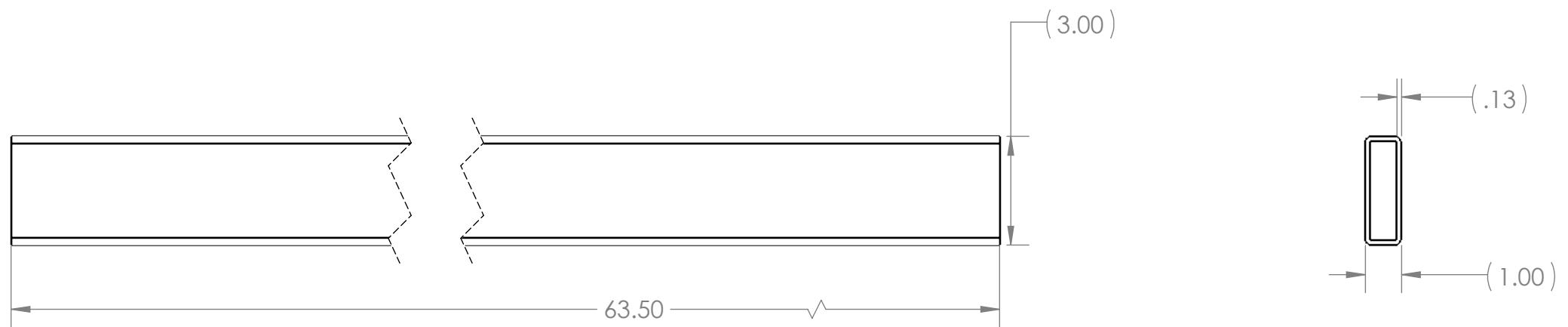
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Notes:

1. Material: 1" x 3" x .125" A513 Rectangular Tube
 2. Finish: Tiger Drylac Powder Coating, Or Equivalent
 3. Remove All Sharp Edges and Burrs
 4. Label or Tag with part number

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Part Number	Color
GE-20052	Bengal Black 49/88888
	UNLESS OTHERWISE SPECIFIED:
	DIMENSIONS ARE IN INCHES
	TOLERANCES:
	FRACTIONAL $\pm 1/16$
	ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$
	TWO PLACE DECIMAL $\pm .01$
	THREE PLACE DECIMAL $\pm .001$
	INTERPRET GEOMETRIC TOLERANCING PER:
	MATERIAL
NEXT ASSY	FINISH
USED ON	
APPLICATION	DO NOT SCALE DRAWING

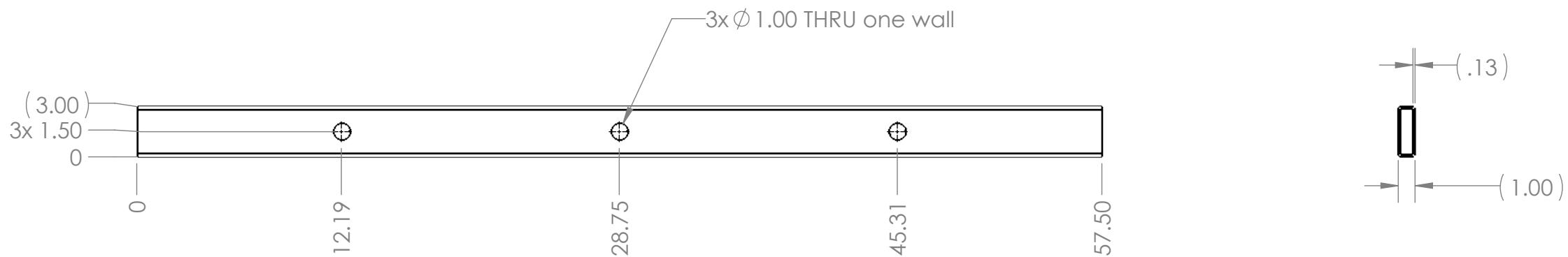
FIRST ROBOTICS COMPETITION		SOLIDWORKS Modeling Solutions Partner
TITLE: Boundary, Black 63.5"		
SIZE B	DWG. NO. GE-20052	REV
SCALE: 1:8		WEIGHT:
		SHEET 1 OF 1

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- Notes:
1. Material: 1" x 3" x .125" A513 Rectangular Tube
 2. Finish: Tiger Drylac Powder Coating, Or Equivalent
 3. Remove All Sharp Edges and Burrs
 4. Label or Tag with part number

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Part Number	Color
GE-20053-RED	Bengal Red 49/33333
GE-20053-BLU	Mercury Blue 59/40653

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	
TOLERANCES:		CHECKED	
FRACTIONAL $\pm 1/16$		ENG APPR.	
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.	
TWO PLACE DECIMAL $\pm .01$		Q.A.	
THREE PLACE DECIMAL $\pm .001$		COMMENTS:	
INTERPRET GEOMETRIC TOLERANCING PER:			
MATERIAL			
NEXT ASSY	USED ON	FINISH	
APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Boundary, Red/Blue 57.5"

SIZE DWG. NO. REV
B GE-20053

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

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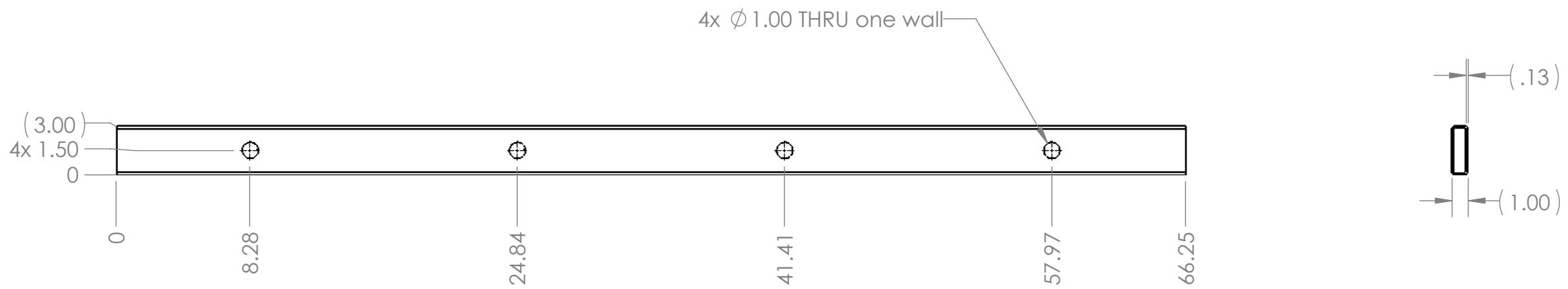
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Notes:

1. Material: 1" x 3" x .125" A513 Rectangular Tube
2. Finish: Tiger Drylac Powder Coating, Or Equivalent
3. Remove All Sharp Edges and Burrs
4. Label or Tag with part number

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Part Number	Color
GE-20054-RED	Bengal Red 49/33333
GE-20054-BLU	Mercury Blue 59/40653

		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN	
		TOLERANCES:	CHECKED	
		FRACTIONAL $\pm 1/16$	ENG APPR.	
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.	
		TWO PLACE DECIMAL $\pm .01$	Q.A.	
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		
SIZE	DWG. NO.		REV	
B	GE-20054			
SCALE: 1:8	WEIGHT:		SHEET 1 OF 1	

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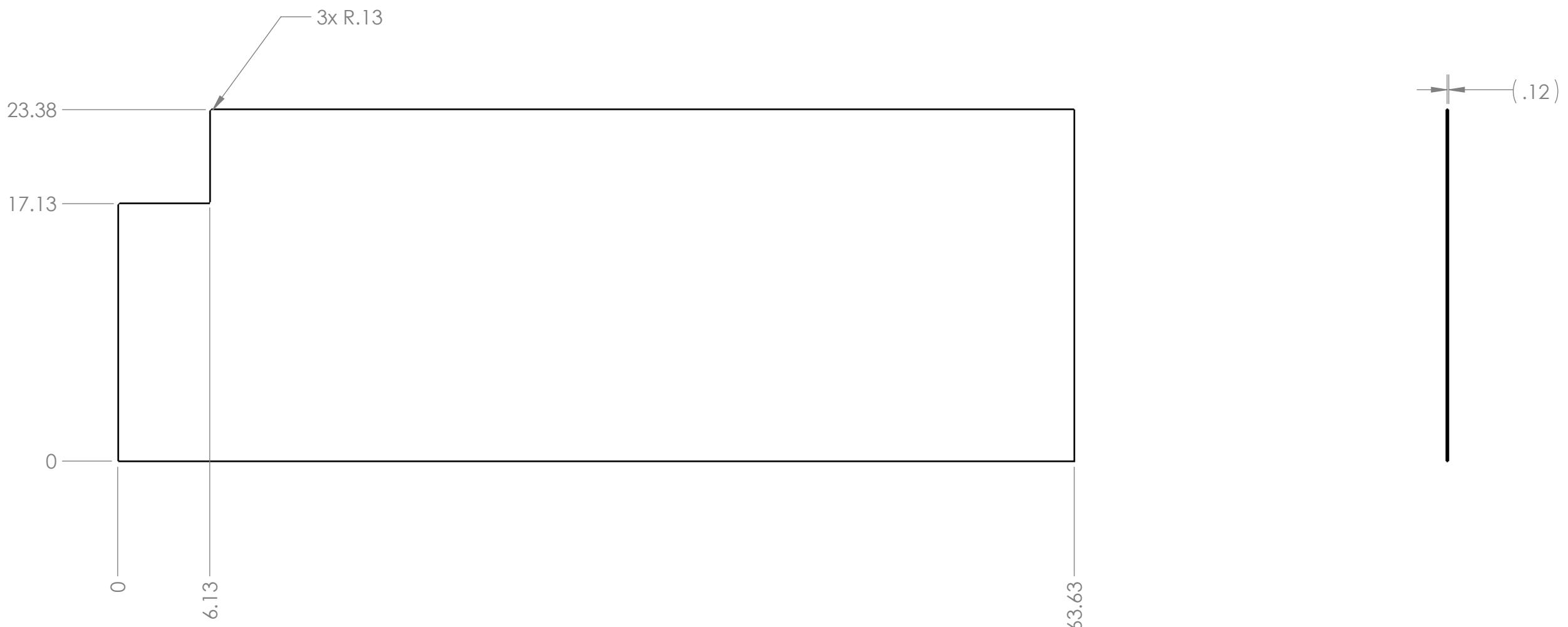
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**Notes:**

1. Material: 1/8" Hardboard
2. Remove all burrs and sharp edges.
3. Tag or Label with part number

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Notched Flooring Protection

SIZE	DWG. NO.	REV
B	GE-20055	
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

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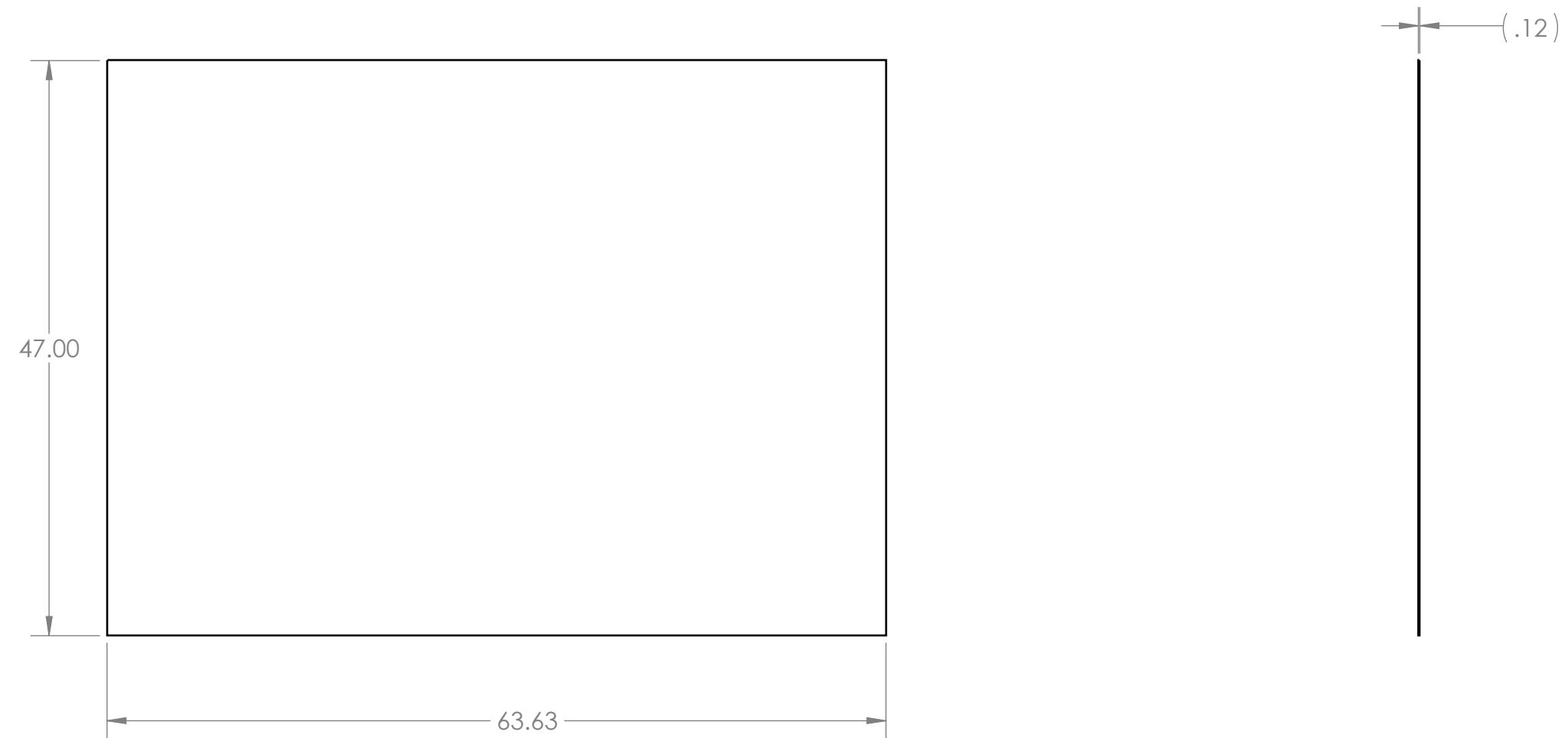
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**Notes:**

1. Material: 1/8" Hardboard
2. Remove all burrs and sharp edges.
3. Tag or Label with part number

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Floor protection full

SIZE	DWG. NO.	REV
B	GE-20056	
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

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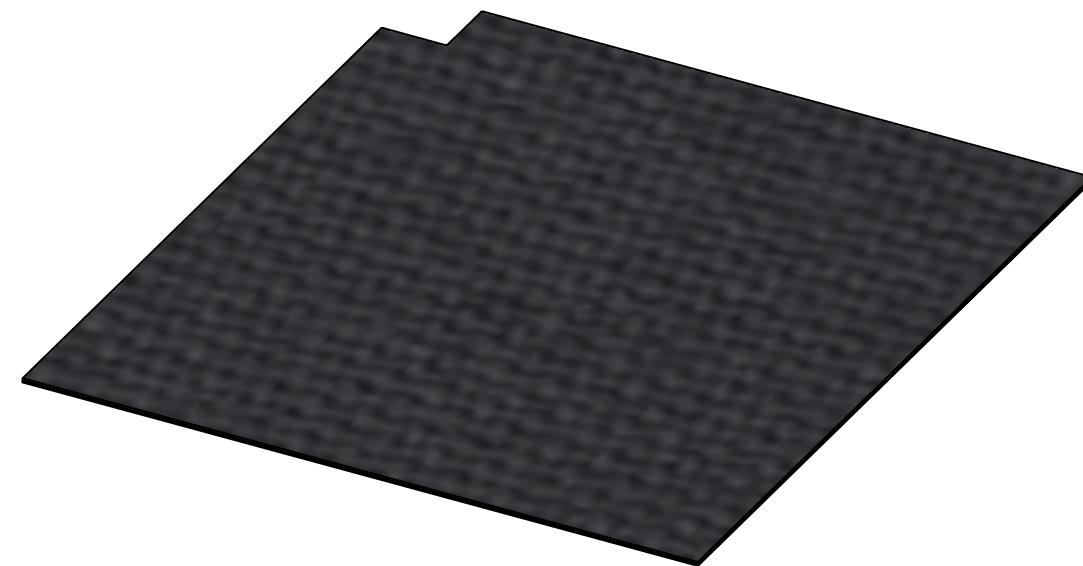
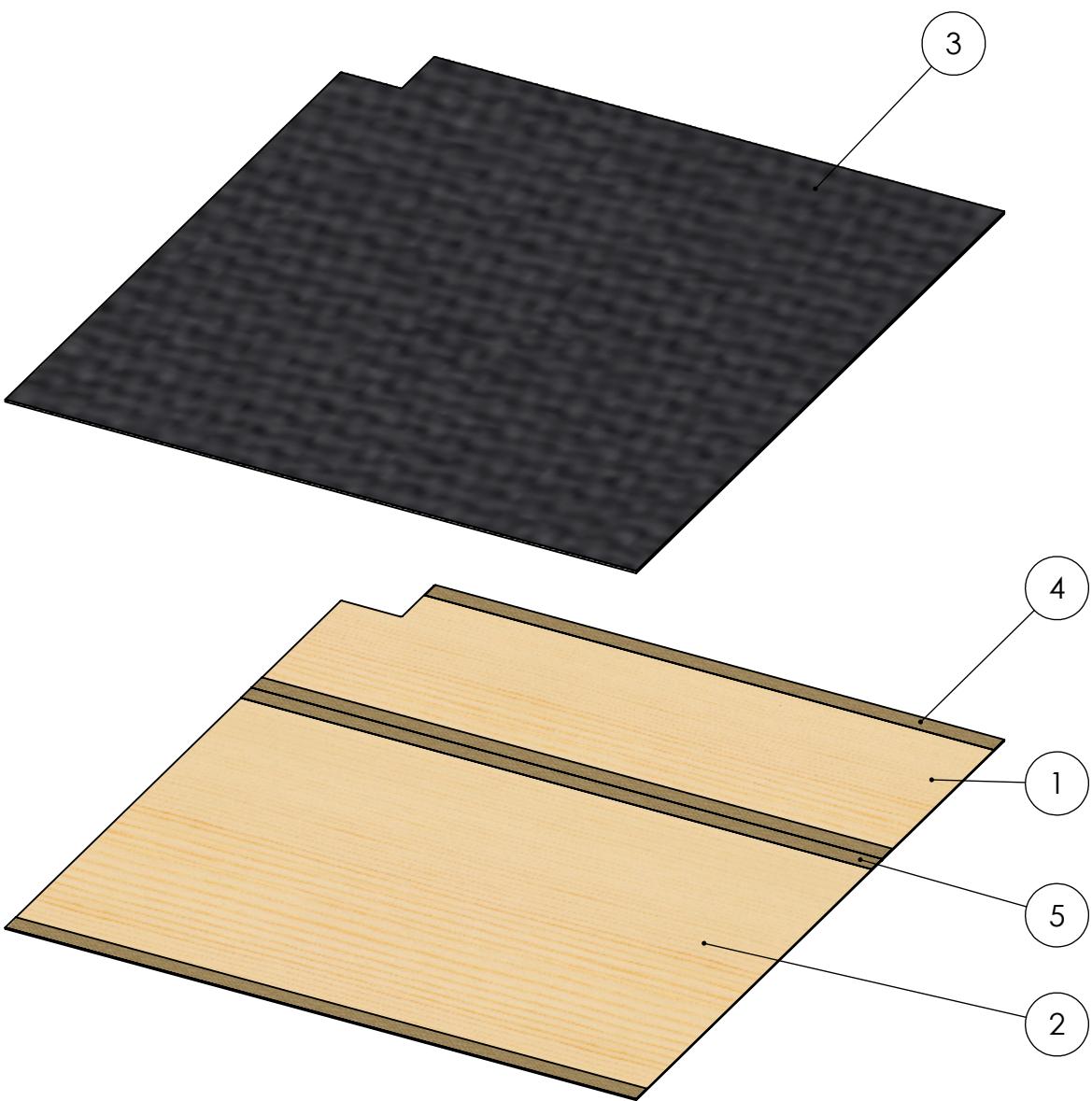
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20055	Notched Flooring Protection	1
2	GE-20056	Floor protection full	1
3	GE-20057 - 01	Carpet	1
4	Carpet Tape _ 57.375	Carpet Tape - Adhesive	1
5	Carpet Tape _ 63.625	Carpet Tape - Adhesive	3

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME	DATE
	DRAWN		
	CHECKED		
	ENG APPR.		
	MFG APPR.		
	Q.A.		
	COMMENTS:		
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER:	
		MATERIAL	
APPLICATION	FINISH	NEXT ASSY	
	DO NOT SCALE DRAWING	USED ON	
SCALE: 1:16		WEIGHT:	SHEET 1 OF 2

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Floor Protector Assembly, Left

GE-20057

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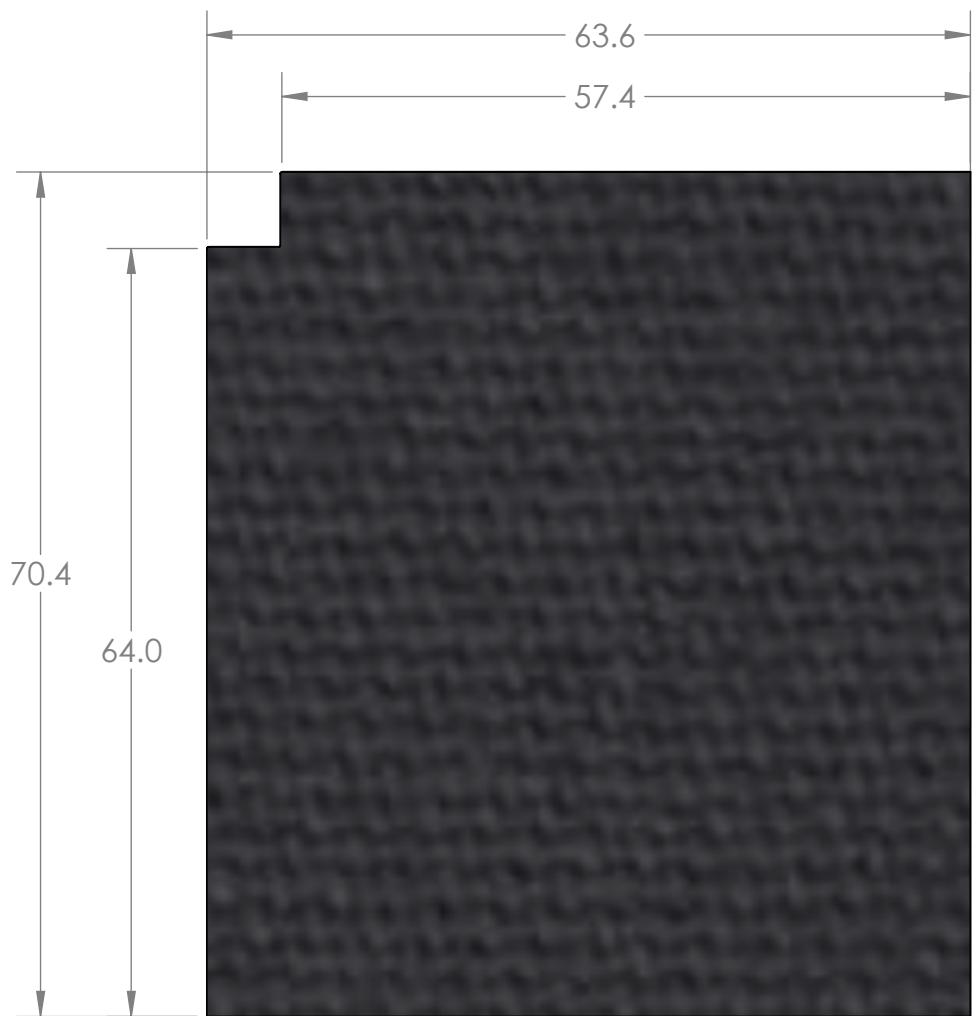
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Carpet Dims

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
	APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Floor Protector Assembly, Left
SIZE **DWG. NO.** **REV**
B **GE-20057**

SCALE: 1:16 WEIGHT: SHEET 2 OF 2

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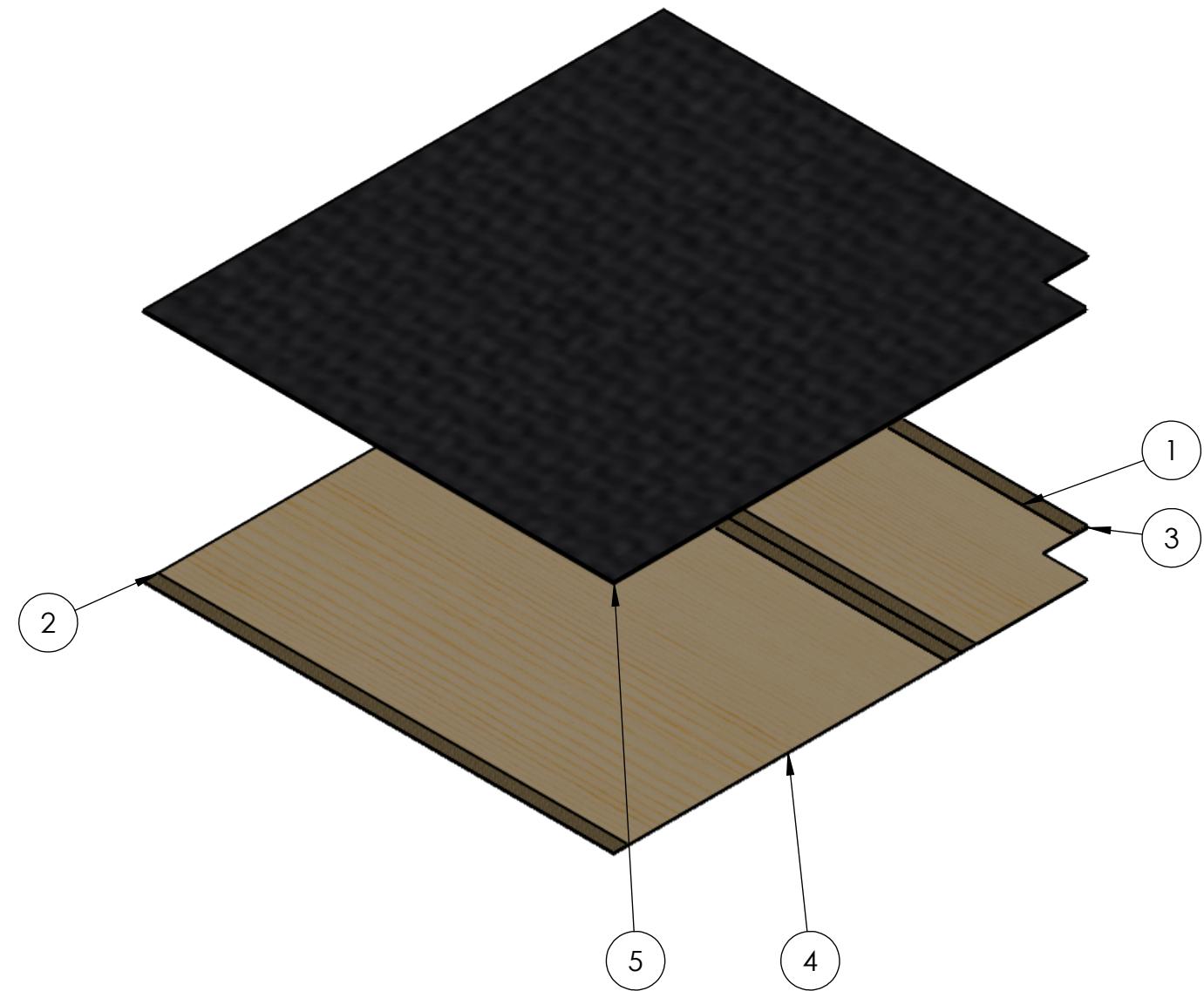
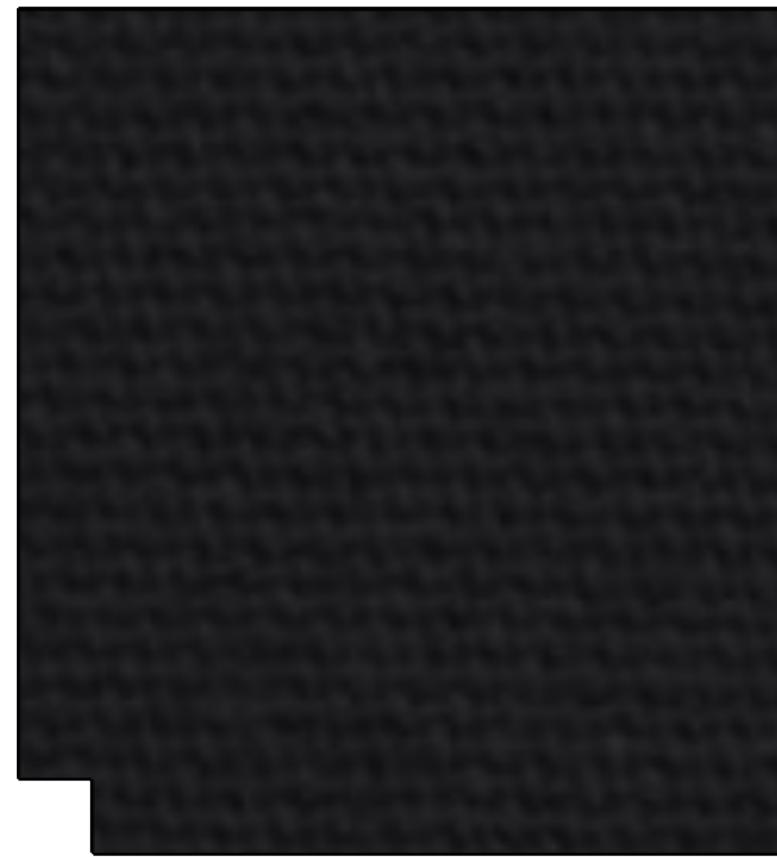
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Carpet Tape _ 57.375	Carpet Tape - Adhesive	1
2	Carpet Tape _ 63.625	Carpet Tape - Adhesive	3
3	GE-20055	Notched Flooring Protection	1
4	GE-20056	Floor protection full	1
5	GE-20058 - 01	Floor Protector Notched - Carpet, Right	1

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
			MATERIAL		
			FINISH		
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRAWING			
			SIZE	DWG. NO.	REV
B			GE-20058		
			SCALE: 1:16	WEIGHT:	SHEET 1 OF 1

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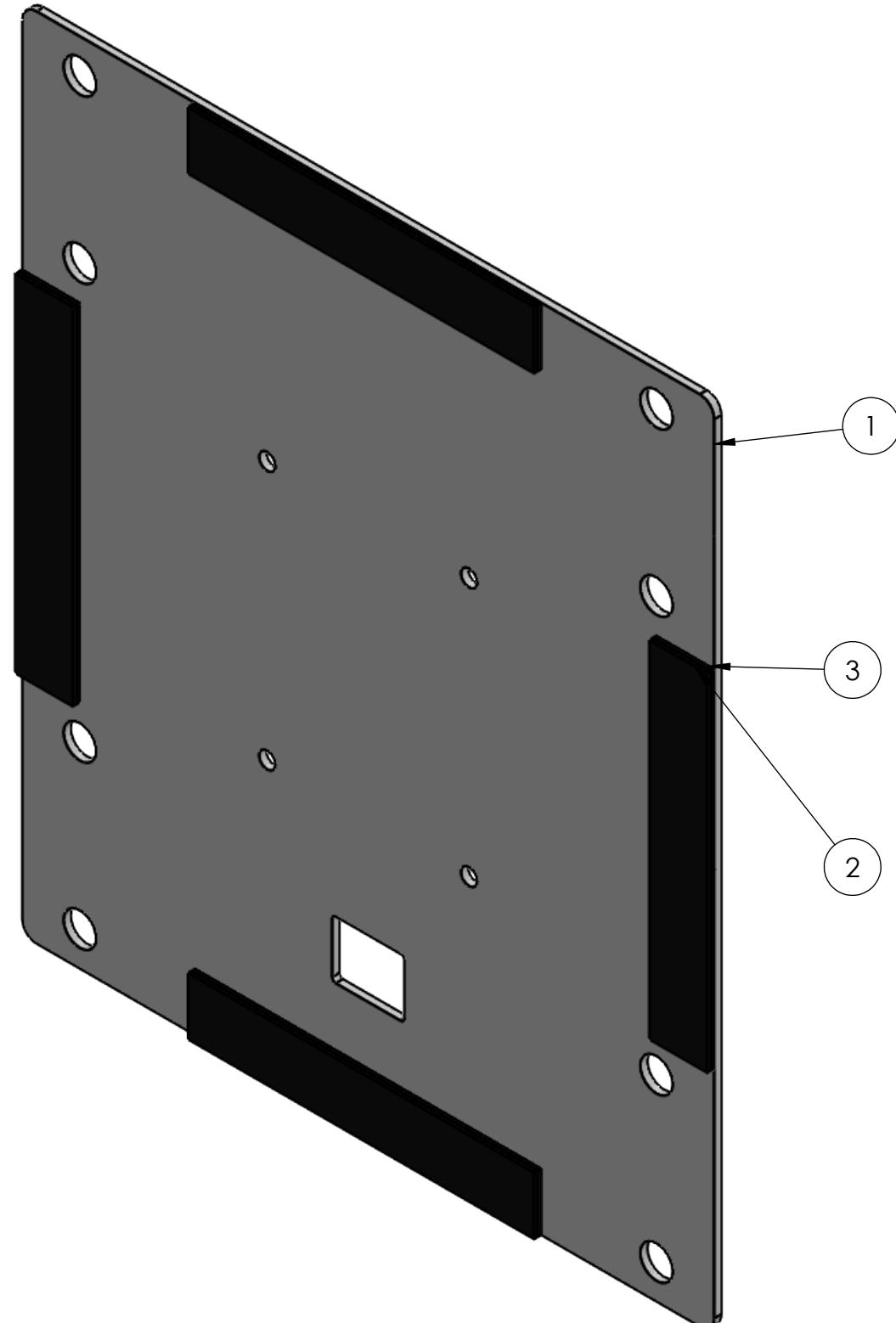
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20087	Hard Stop, Truss Protection	1
2	Hook_1_6	1" x 6" Hook, Adhesive Backed	4
3	Loop_1_6	1" x 6" Loop, Adhesive Backed	4

		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	KAMC	12/16/19
		TOLERANCES:		
		FRACTIONAL $\pm 1/16$		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
		TWO PLACE DECIMAL $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**Hard Stop, Truss
Protection , with Hook
and Loop**

SIZE DWG. NO. **B** **GE-20066** **REV**

SCALE: 1:2 WEIGHT: SHEET 1 OF 3

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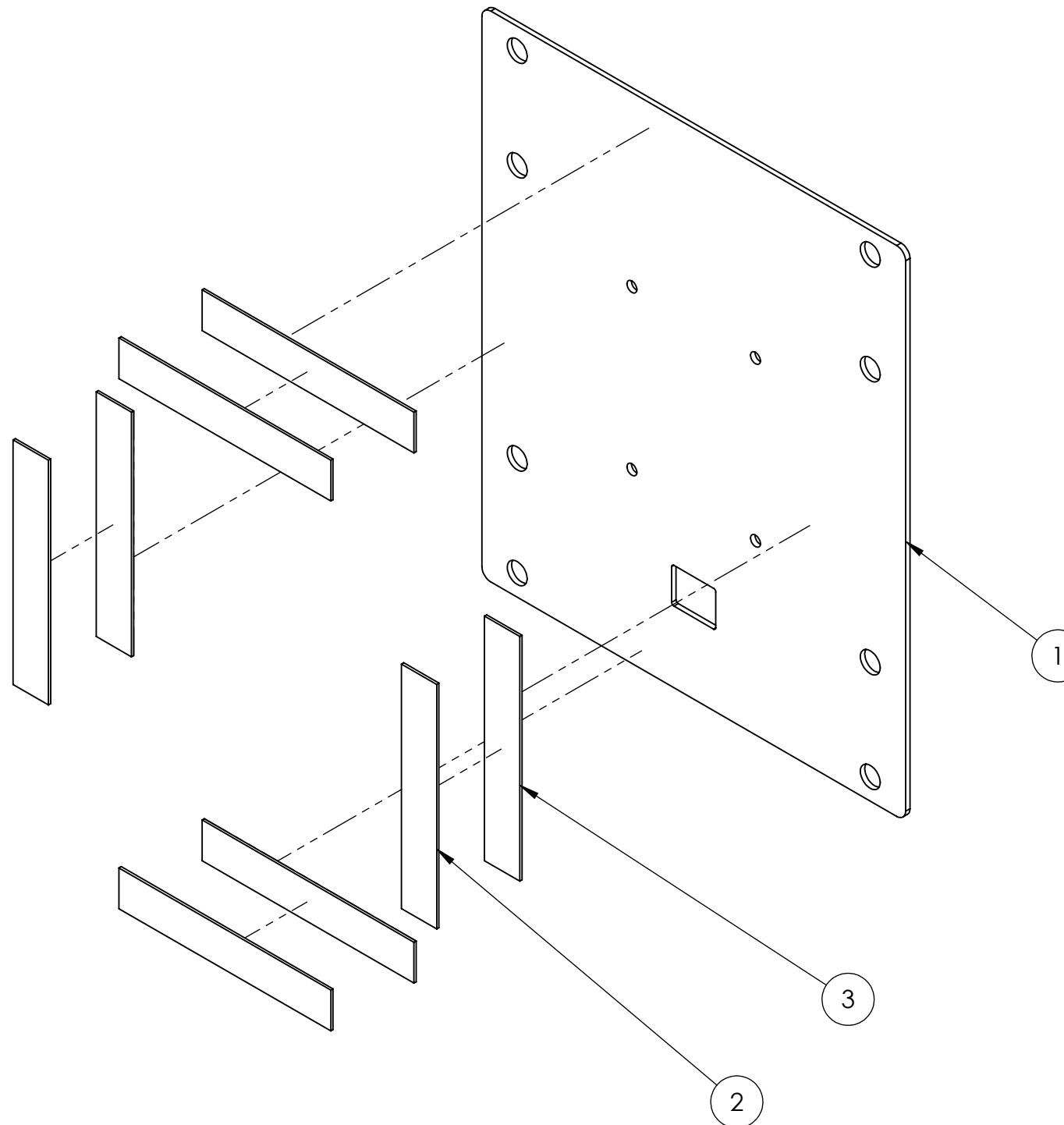
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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	KAMC	12/16/19
TOLERANCES:		CHECKED		
FRACTIONAL $\pm 1/16$		ENG APPR.		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.		
TWO PLACE DECIMAL $\pm .01$		Q.A.		
THREE PLACE DECIMAL $\pm .001$		COMMENTS:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Truss Protection , with Hook and Loop

SIZE	DWG. NO.	REV
B	GE-20066	

SCALE: 1:3 **WEIGHT:**

SHEET 2 OF 3

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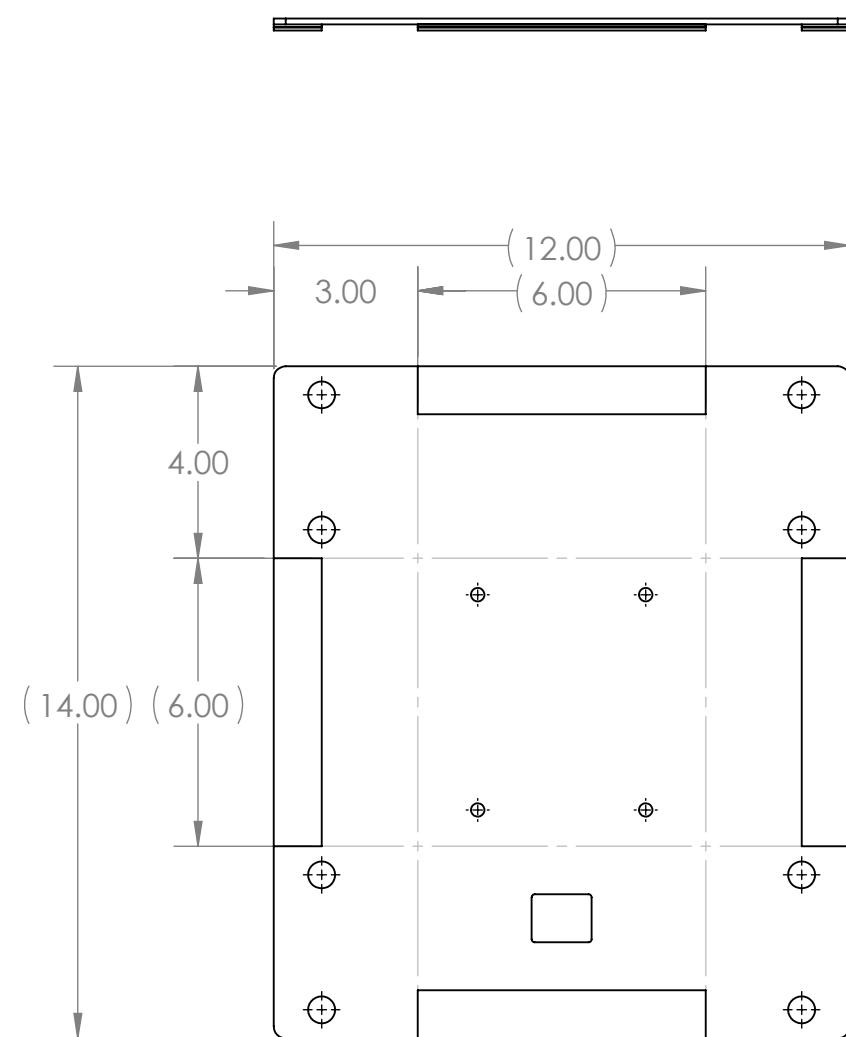
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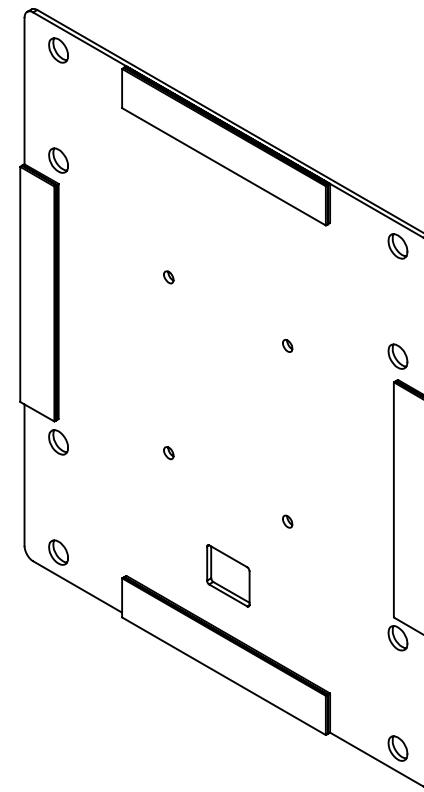
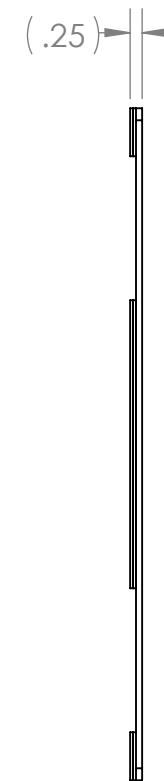
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 12/16/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED	
			ENG APPR.	
			MFG APPR.	
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
	APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Truss Protection , with Hook and Loop

SIZE	DWG. NO.	REV
B	GE-20066	
SCALE: 1:4	WEIGHT:	SHEET 3 OF 3

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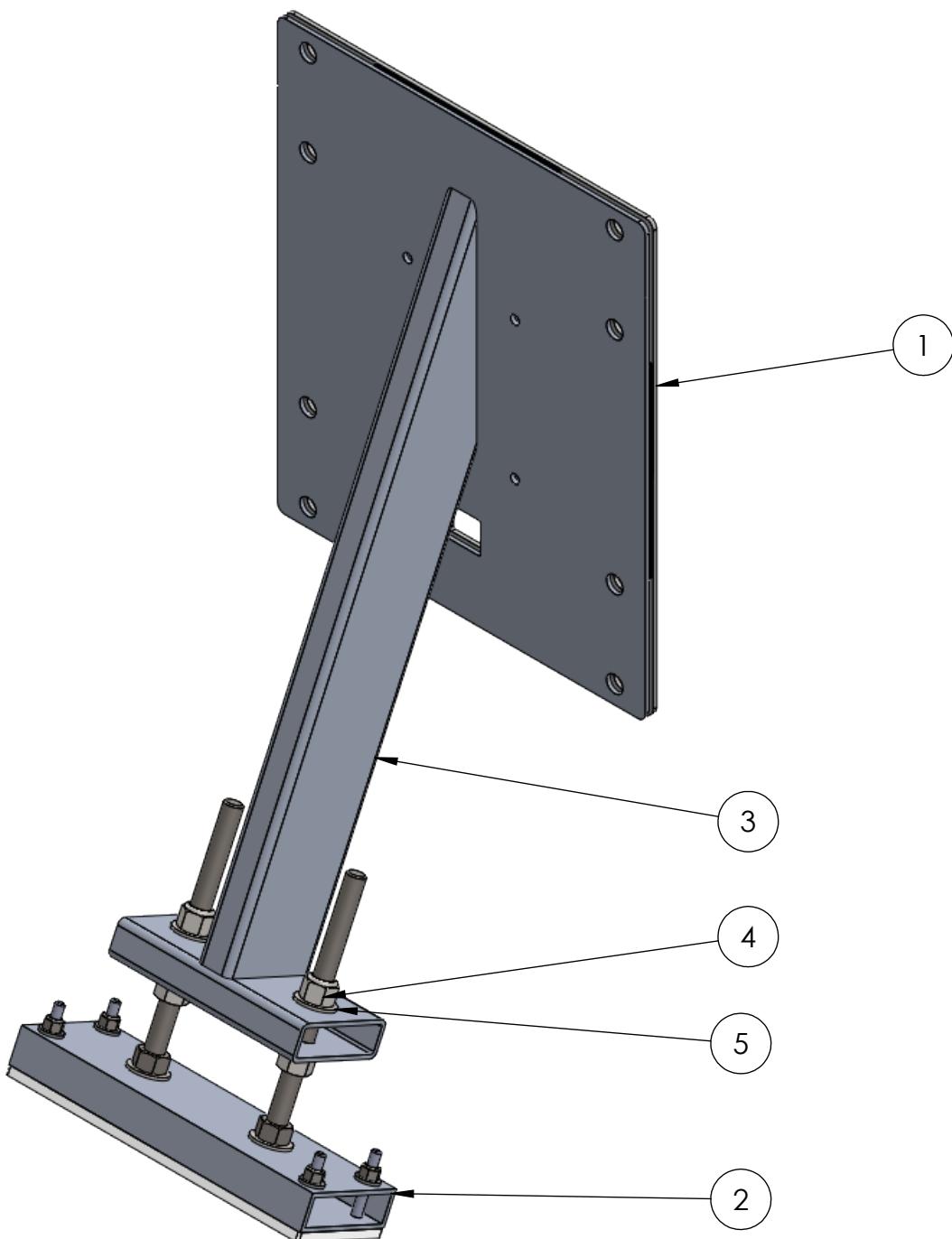
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20066	Hard Stop, Truss Protection , with Hook and Loop	1
2	GE-20072	Hard Stop, Hitting Assembly	1
3	GE-20088	Hard Stop, Weldment, Large	1
4	nylock_.5_13	steel nylon-insert locknut, 1/2" - 13	4
5	washer_flat_.5	Flat Washer for 1/2" Screw	4

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL $\pm 1/16$		ENG APPR.	
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.	
		TWO PLACE DECIMAL $\pm .01$		Q.A.	
		THREE PLACE DECIMAL $\pm .001$		COMMENTS:	
		INTERPRET GEOMETRIC			
		TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
Hard Stop, Large

SIZE DWG. NO. **B** **GE-20067** **REV**

SCALE: 1:4 WEIGHT: SHEET 1 OF 3

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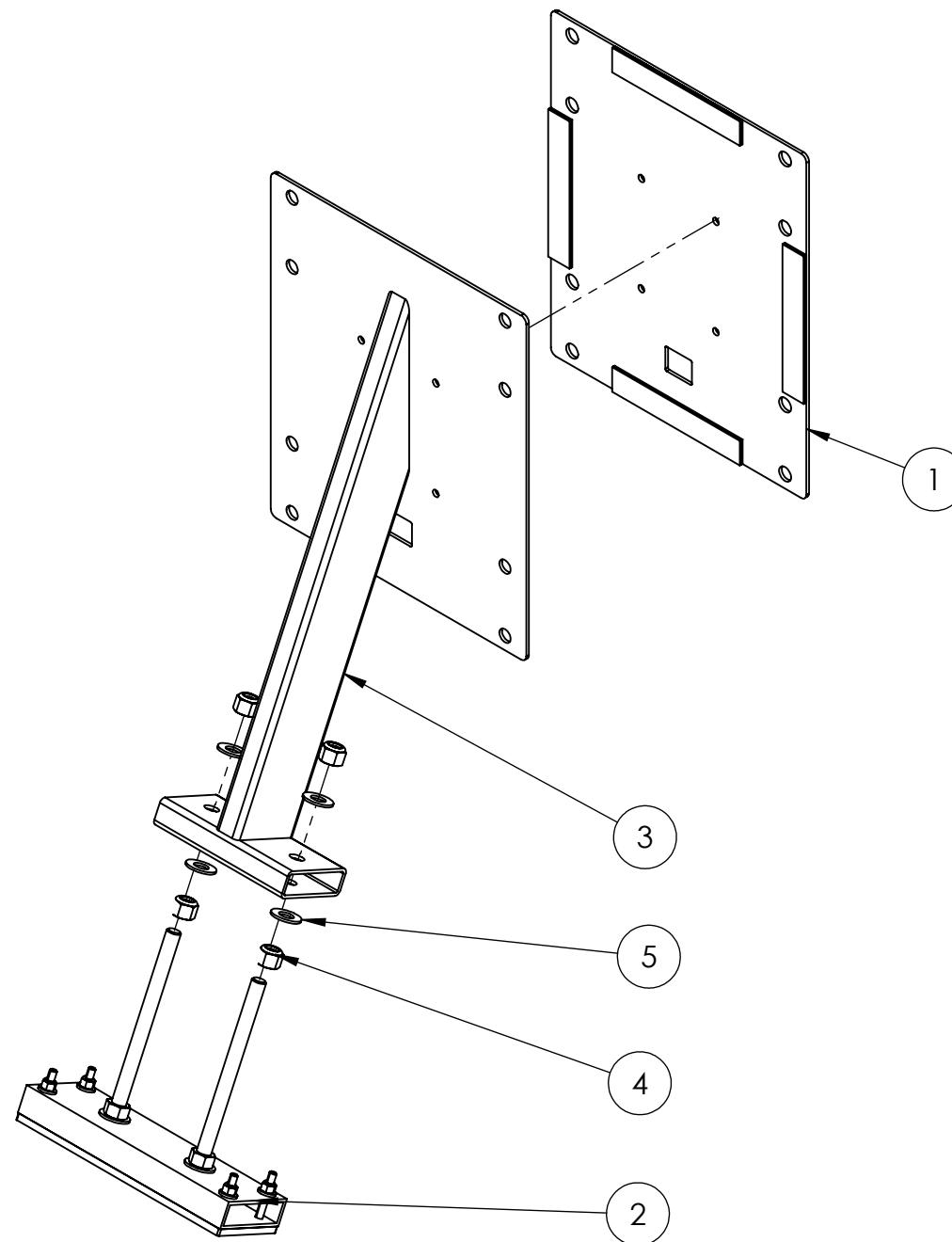
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 12/16/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
Hard Stop, Large

SIZE B	DWG. NO. GE-20067	REV
SCALE: 1:6	WEIGHT:	SHEET 2 OF 3

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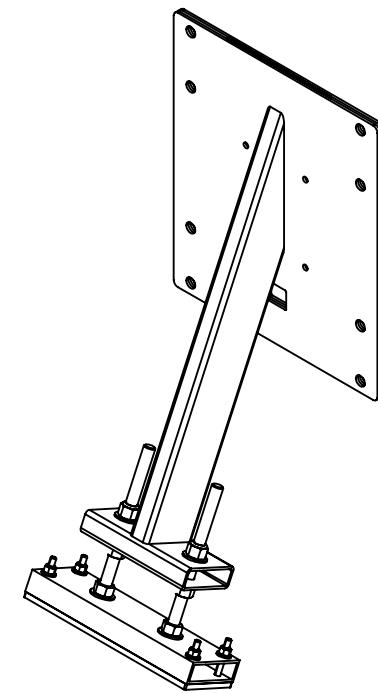
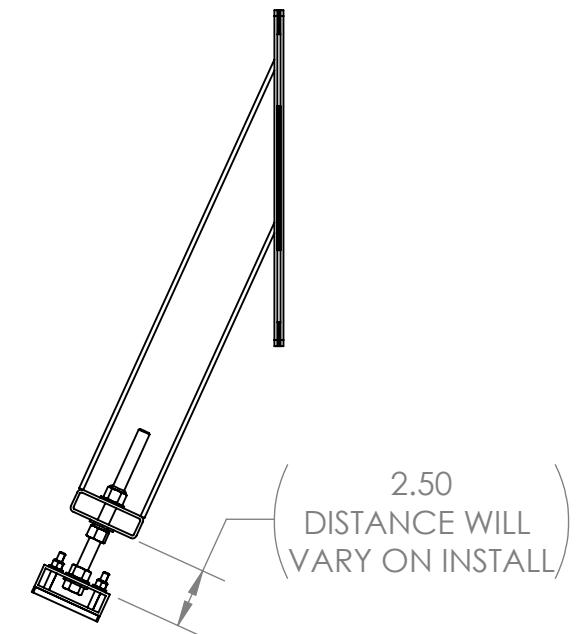
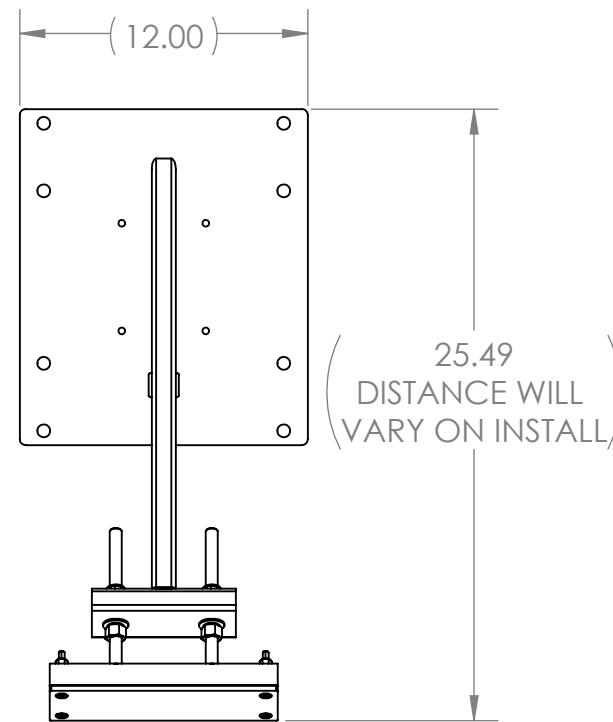
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		INTERPRET GEOMETRIC TOLERANCING PER:		DRAWN CHECKED ENG APPR. MFG APPR.	
		MATERIAL		Q.A.	
	NEXT ASSY	USED ON	FINISH	COMMENTS:	
	APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
Hard Stop, Large

SIZE DWG. NO. **B** **GE-20067** **REV**

SCALE: 1:8 WEIGHT: SHEET 3 OF 3

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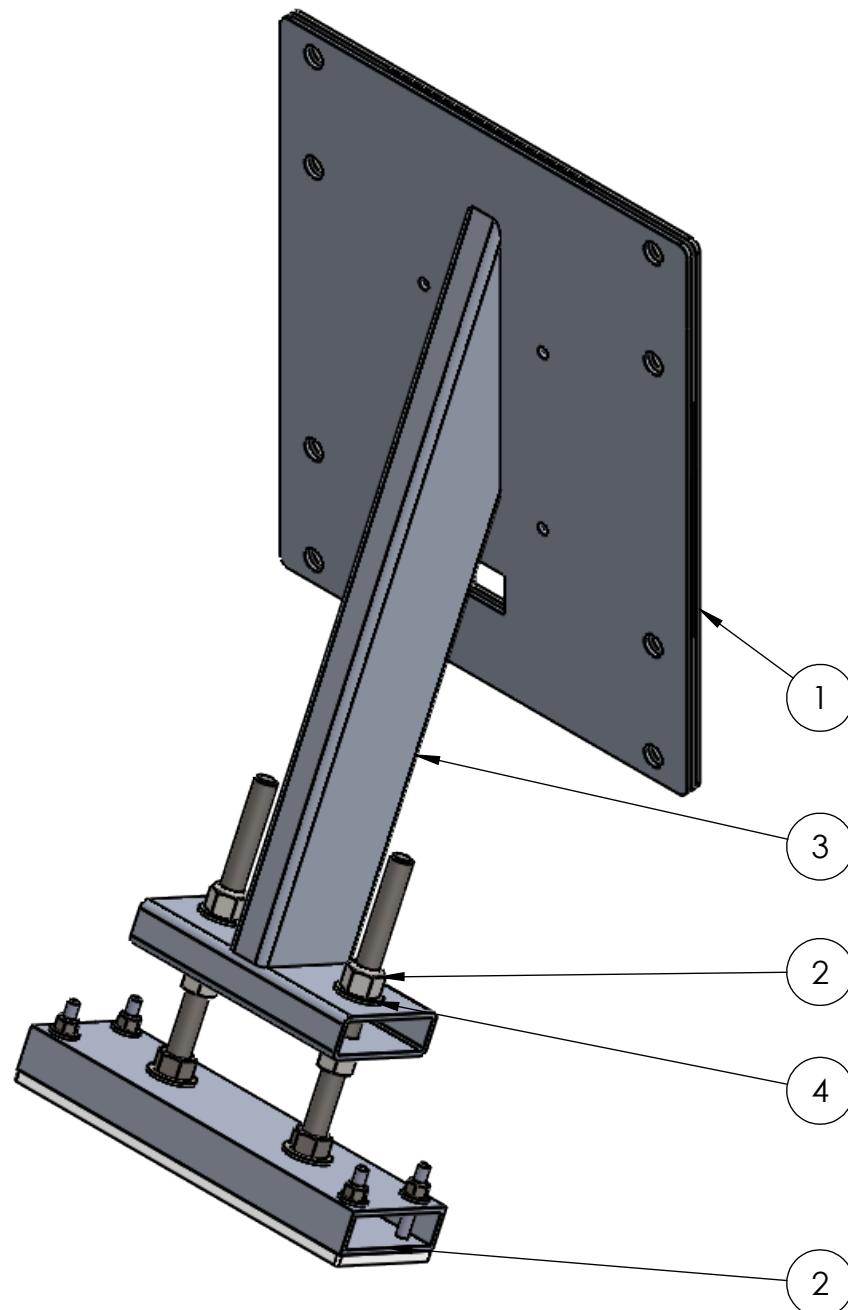
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ITEM NO.	PART NUMBER	DESCRIPTION	
1	GE-20066	Hard Stop, Truss Protection , with Hook and Loop	1
2	GE-20072	Hard Stop, Hitting Assembly	1
3	GE-20089	Hard Stop, Weldment, Small	1
4	washer_flat_.5	Flat Washer for 1/2" Screw	4
5	nylock_.5_13	steel nylon-insert locknut, 1/2" - 13	4

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES		DRAWN	KAMC 12/16/19
		TOLERANCES:		CHECKED	
		FRACTIONAL: ±1/16		ENG APPR.	
		ANGULAR: MACH ±1° BEND ±1°		MFG APPR.	
		TWO PLACE DECIMAL ±.01		Q.A.	
		THREE PLACE DECIMAL ±.001		COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hard Stop, Small

SIZE DWG. NO. REV
B GE-20068

SCALE: 1:4 WEIGHT: SHEET 1 OF 3

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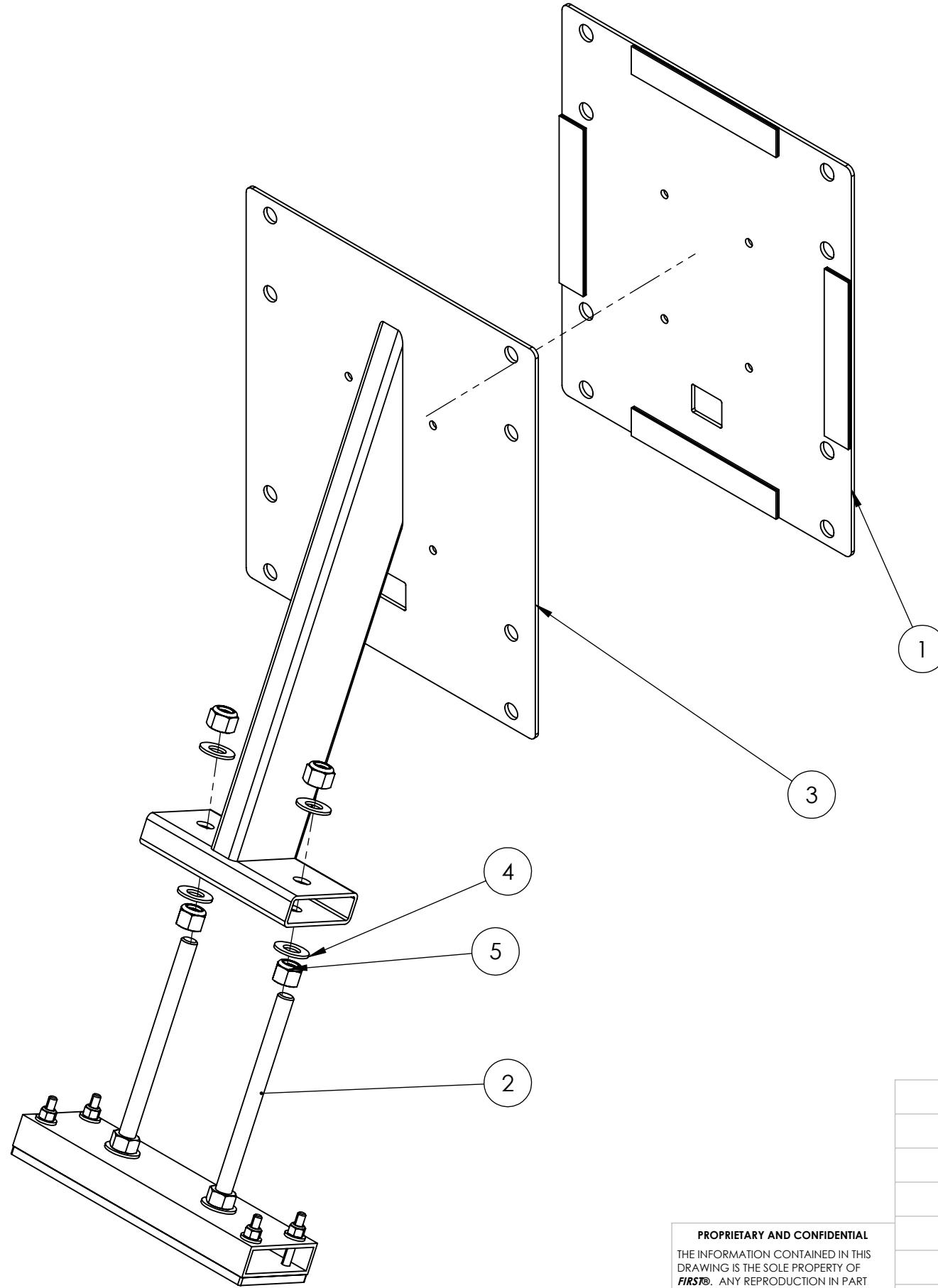
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hard Stop, Small

SIZE DWG. NO. **B** GE-20068 **REV**

SCALE: 1:4 WEIGHT: SHEET 2 OF 3

4

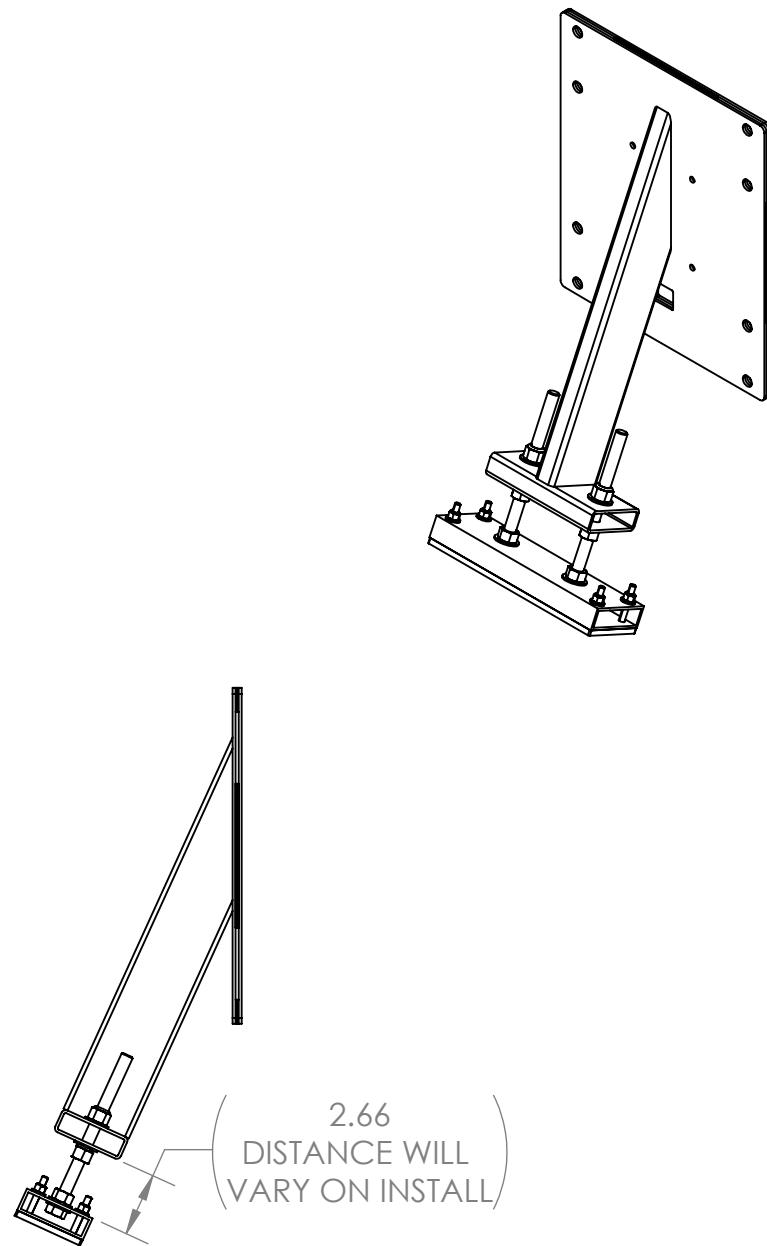
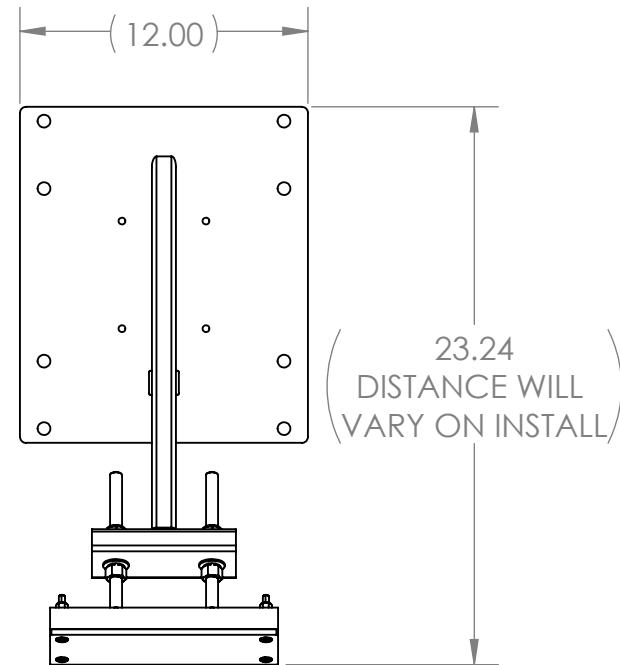
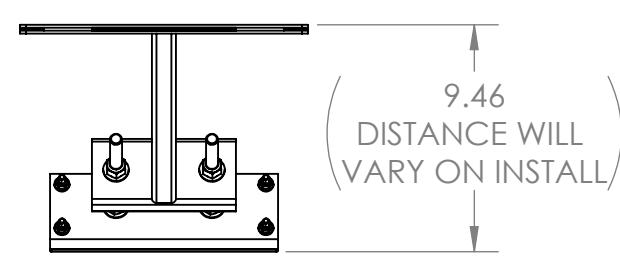
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME KAMC	DATE 12/16/19
		INTERPRET GEOMETRIC TOLERANCING PER:		DRAWN CHECKED ENG APPR. MFG APPR.	
		MATERIAL		Q.A.	
	NEXT ASSY	USED ON	FINISH	COMMENTS:	
	APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
Hard Stop, Small

SIZE DWG. NO. **B** **GE-20068** **REV**

SCALE: 1:8 WEIGHT: SHEET 3 OF 3

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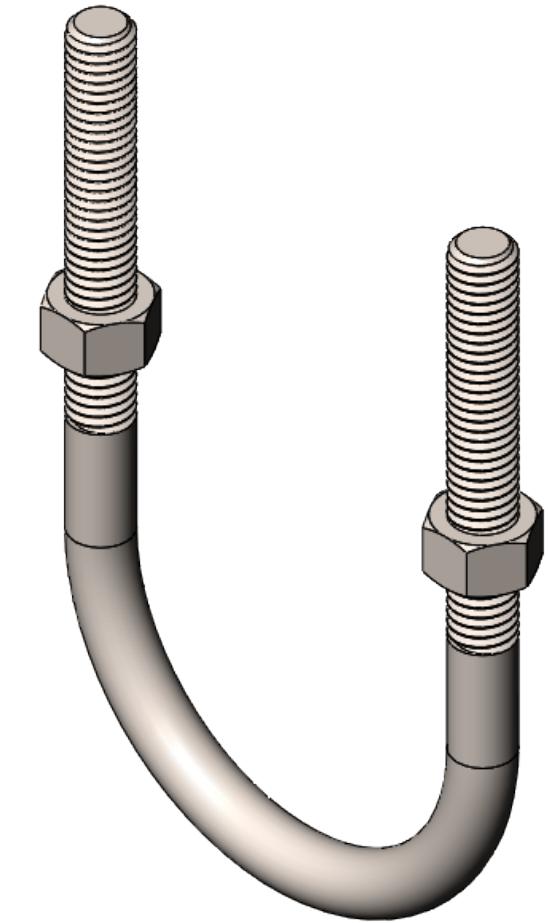
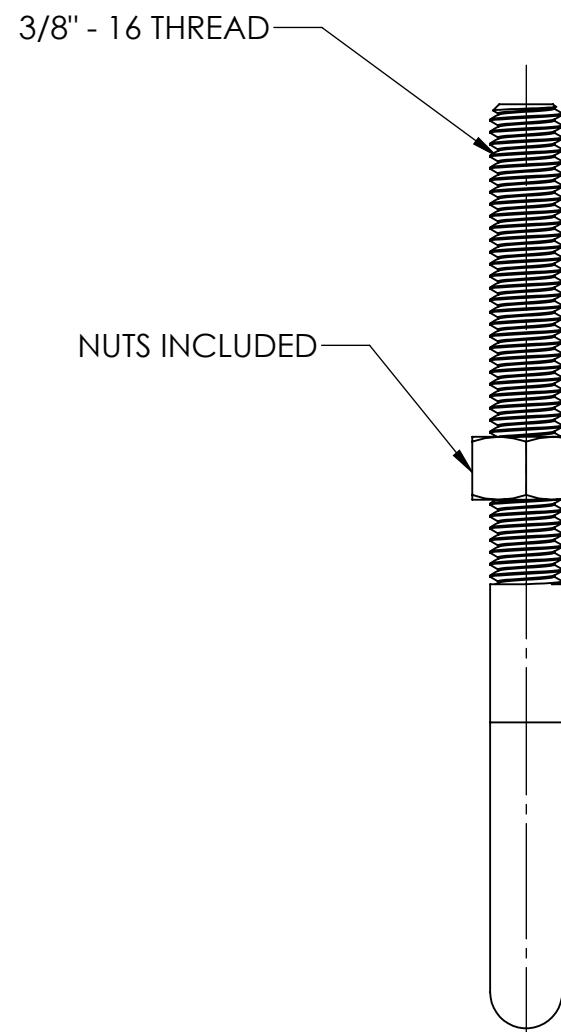
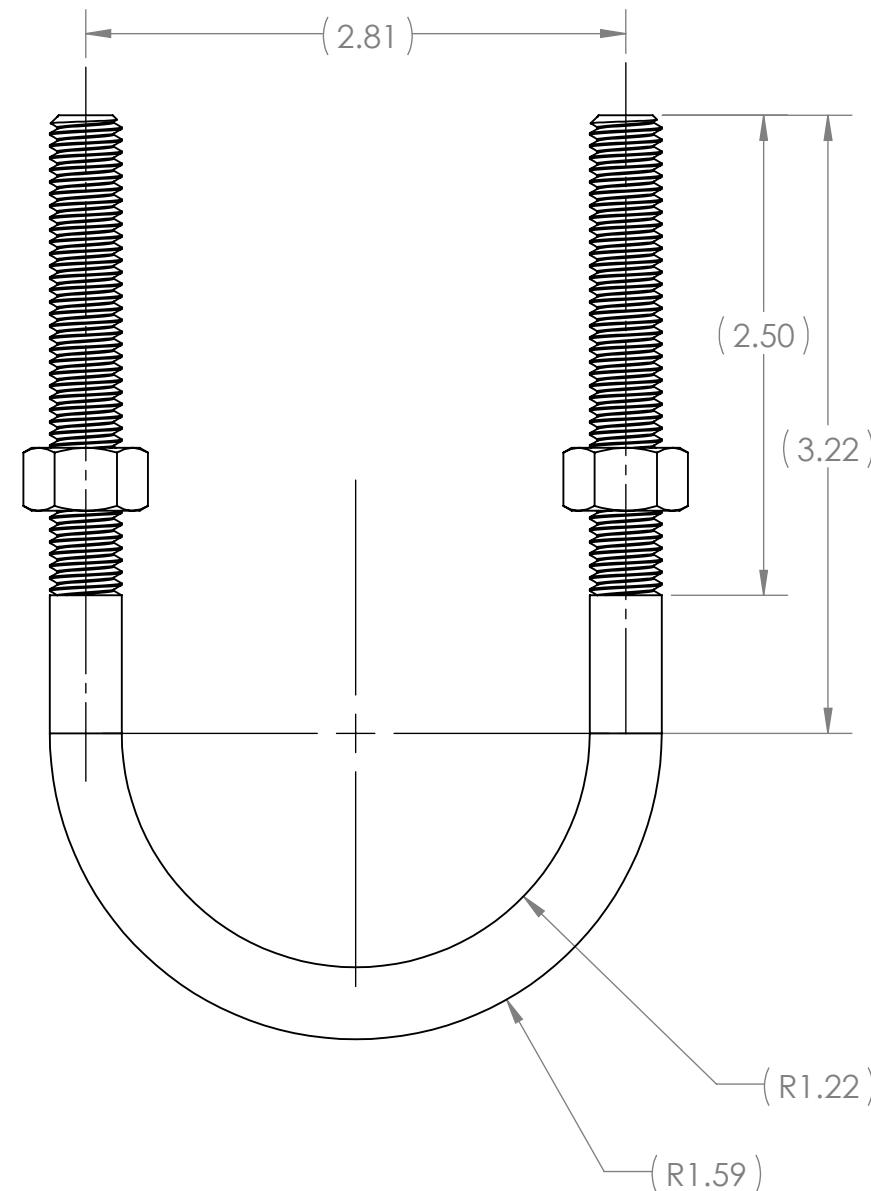
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A

DESCRIPTION: STEEL U-BOLT, 3/8"-16, 2-7/16" ID**VENDOR:** MCMASTER CARR**VENDOR PART NUMBER:** 8880T959

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			

TITLE: U-Bolt, Truss to Hard Stop

SIZE	DWG. NO.	REV
B	GE-20069	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1

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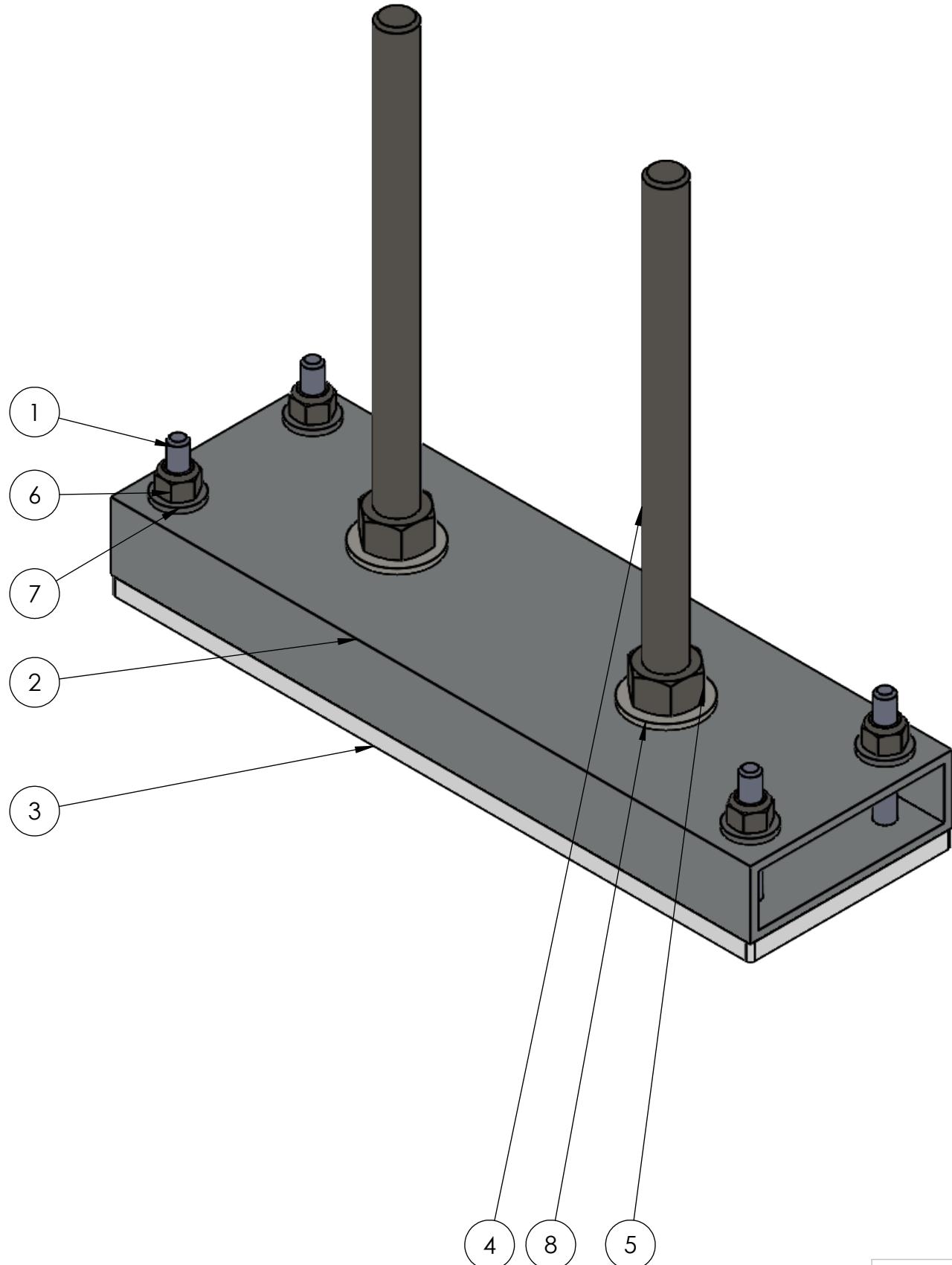
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	flat_phil_.25_20_2	.25"-20 x 2" Flat Head Phillips	4
2	GE-20084	Hard Stop, Hitting Tube	1
3	GE-20085	Hard Stop, Hitting Plate	1
4	hex_.5_13_7	Steel Hex Head Screw, 1/2"-13 x 7" long, fully threaded	2
5	hexnut_.5_13	Steel Hex Nut, 1/2"-13	2
6	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	4
7	washer_flat_.25	Flat Washer for 1/4" Screw	4
8	washer_flat_.5	Flat Washer for 1/2" Screw	4

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC	DATE 12/16/19
	CHECKED		
	ENG APPR.		
	MFG APPR.		
	Q.A.		
	COMMENTS:		
	MATERIAL		
NEXT ASSY	USED ON	FINISH	
APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Hitting Assembly

SIZE DWG. NO. **REV**
B GE-20072

SCALE: 2:3 WEIGHT: SHEET 1 OF 3

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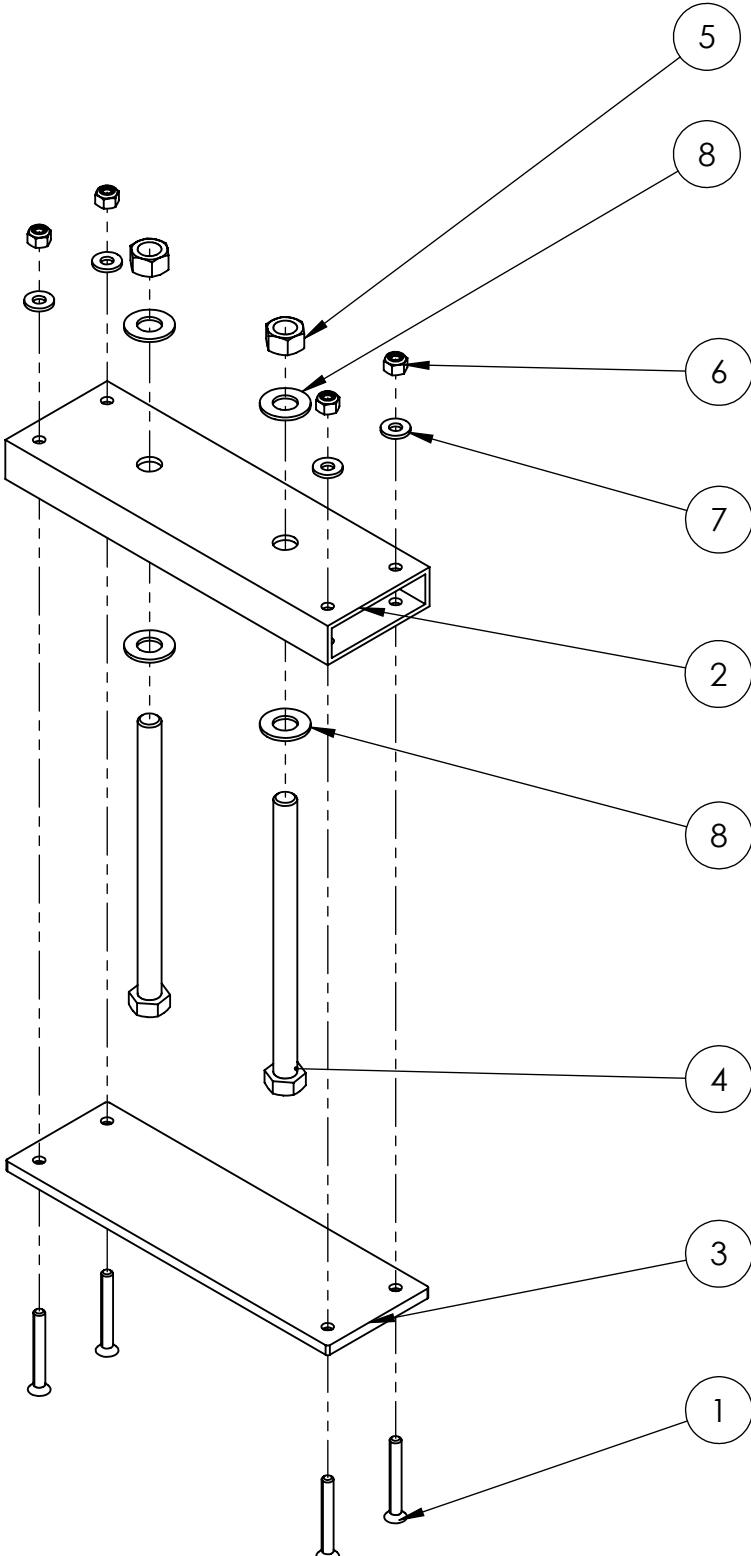
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		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	COMMENTS:
	NEXT ASSY	USED ON	FINISH	
	APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop,
Hitting Assembly

SIZE	DWG. NO.	REV
B	GE-20072	
SCALE: 1:4	WEIGHT:	SHEET 2 OF 3

4

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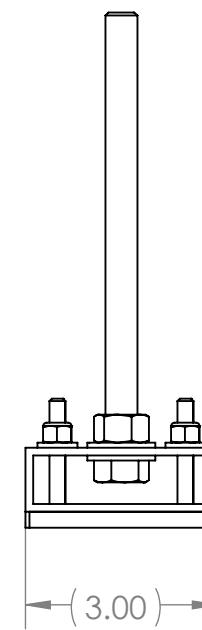
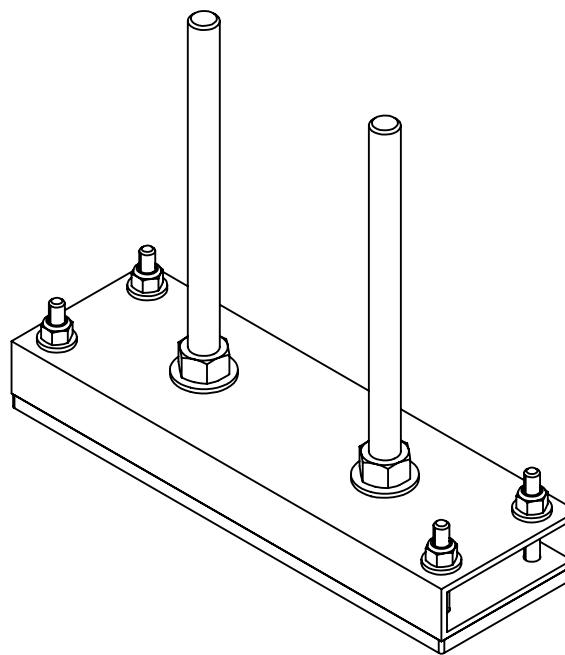
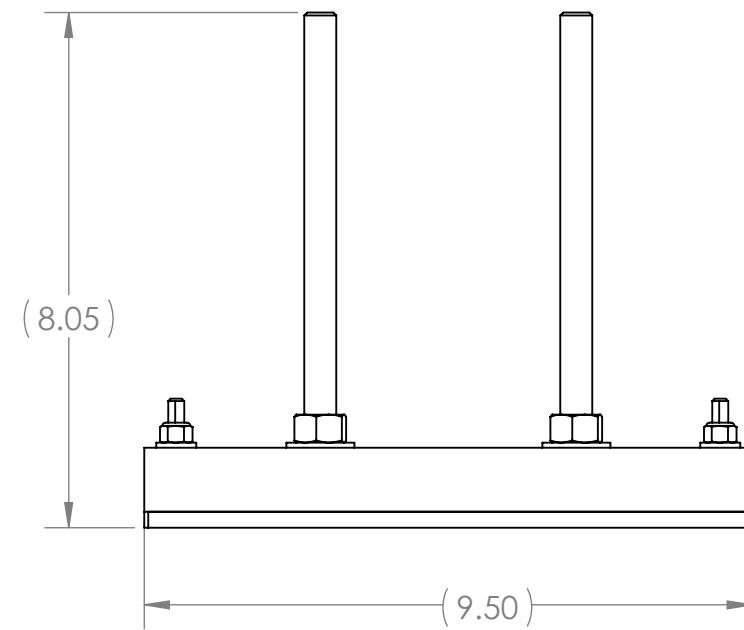
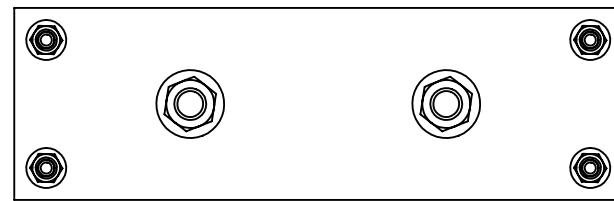
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
	NEXT ASSY	USED ON	FINISH		
	APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

**Hard Stop,
Hitting Assembly**

SIZE DWG. NO. **REV**
B **GE-20072**

SCALE: 1:3 WEIGHT: SHEET 3 OF 3

4

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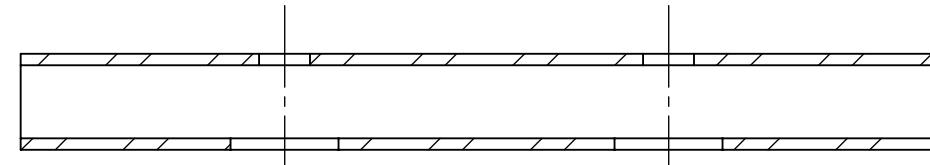
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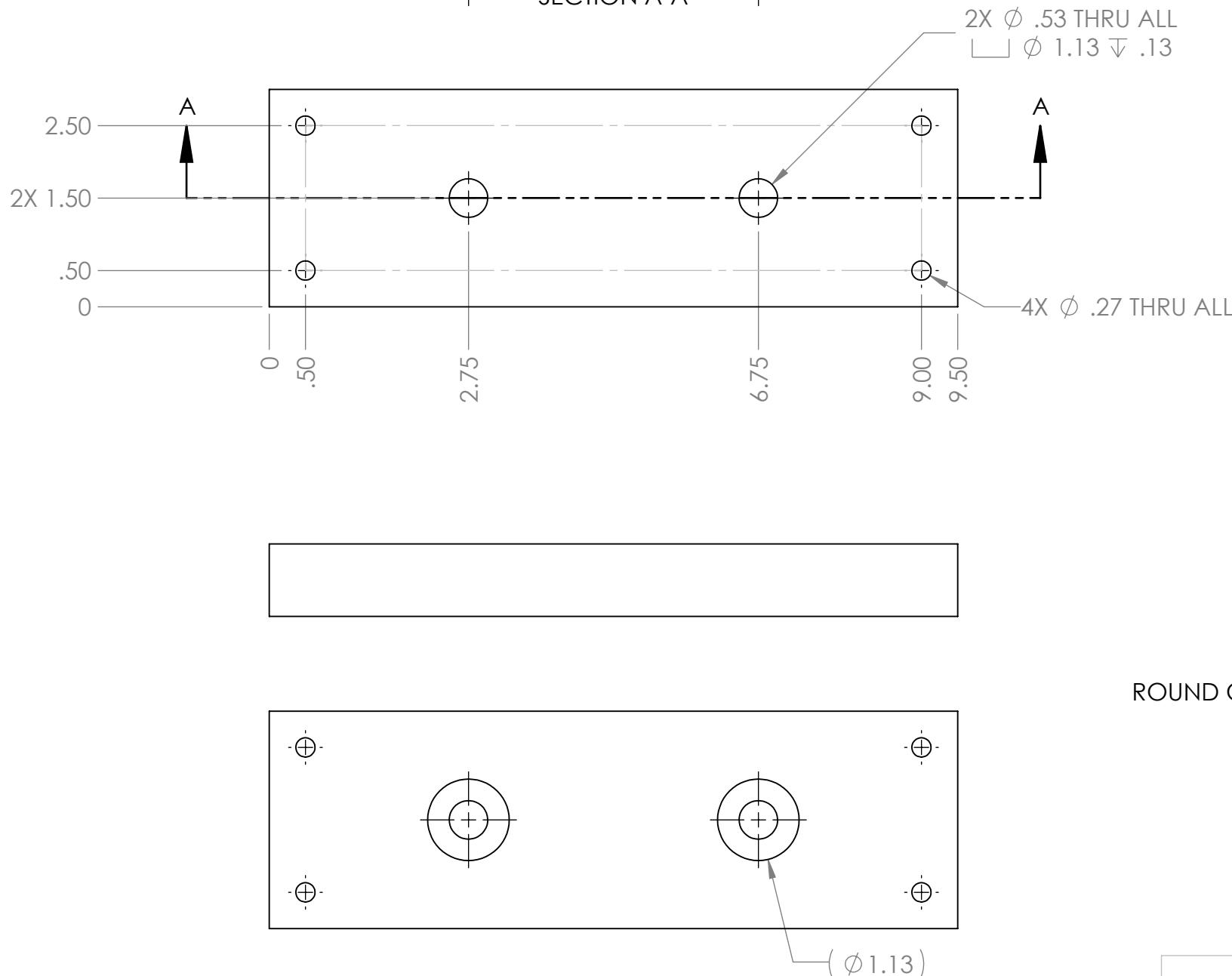
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SECTION A-A

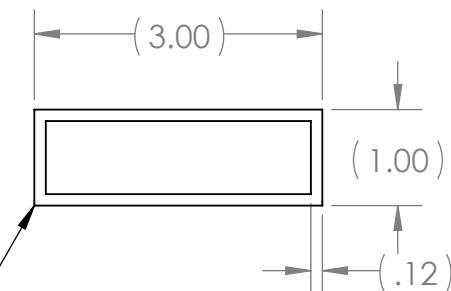
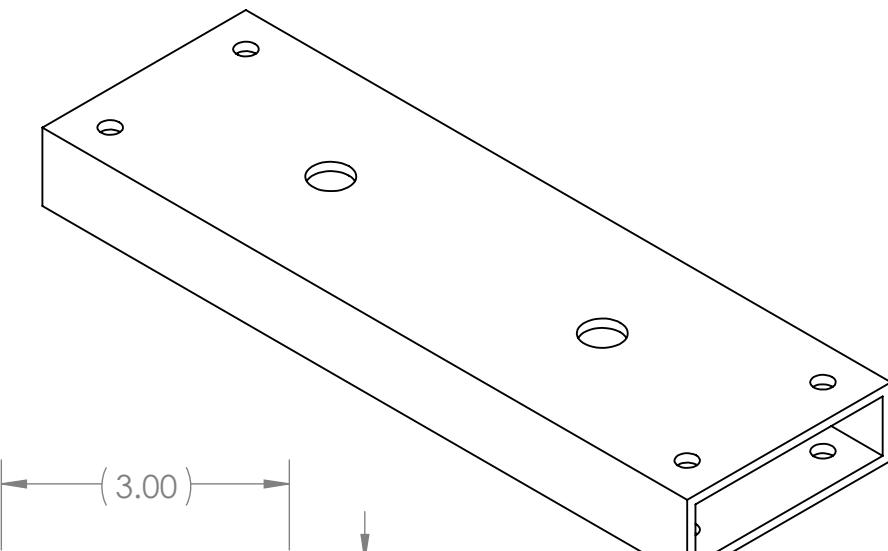


- Notes:
1. Material: 1" x 3" x 0.12" Mild Steel Rectangle Tube A500/A513 Hot Rolled
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.
 4. Finish: Gray/Silver - Painted



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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2, A4	A	UPDATED FINISH & APPLICATION TABLE	10/21/2019	KAMC



ROUND CORNERS PERMITTED



		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES		
		TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN	KAMC 10/3/19
			CHECKED	
			ENG APPR.	
			MFG APPR.	
			Q.A.	
			COMMENTS:	
	GE-20074	MATERIAL STEEL TUBE		
		FINISH PAINT		
		APPLICATION	DO NOT SCALE DRAWING	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
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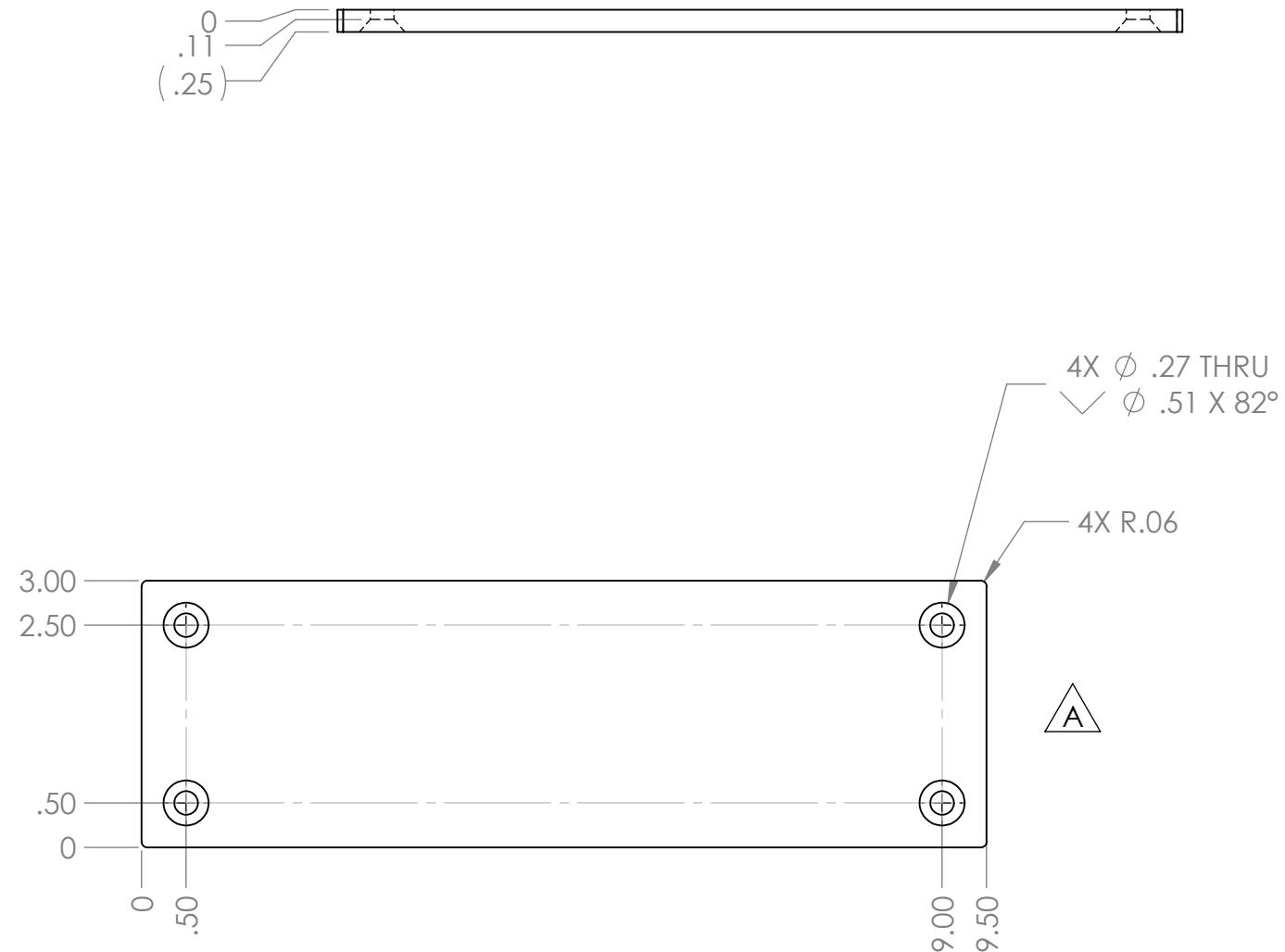
TITLE:
**Hard Stop,
Hitting Tube**

SIZE DWG. NO. REV
B GE-20084 A
SCALE: 1:2 WEIGHT: SHEET 1 OF 1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2, A3	A	PART SIZE, NUMBER OF HOLES, AND APPLICATION TABLE MODIFIED	10/22/2019	KAMC

HIDDEN LINES SHOWN - FOR HOLE REF.



- Notes:
1. Material: 0.25" HDPE, Texture: Natural/Smooth, Color: White
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 10/3/19
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED	
			ENG APPR.	
			MFG APPR.	
			Q.A.	
		COMMENTS:		
GE-20072		MATERIAL HDPE		
NEXT ASSY	USED ON	FINISH BARE		
	APPLICATION	DO NOT SCALE DRAWING		
SIZE B	DWG. NO. GE-20085	REV A		
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1		



**Hard Stop,
Hitting Plate**

SOLIDWORKS

Modeling Solutions Partner

4

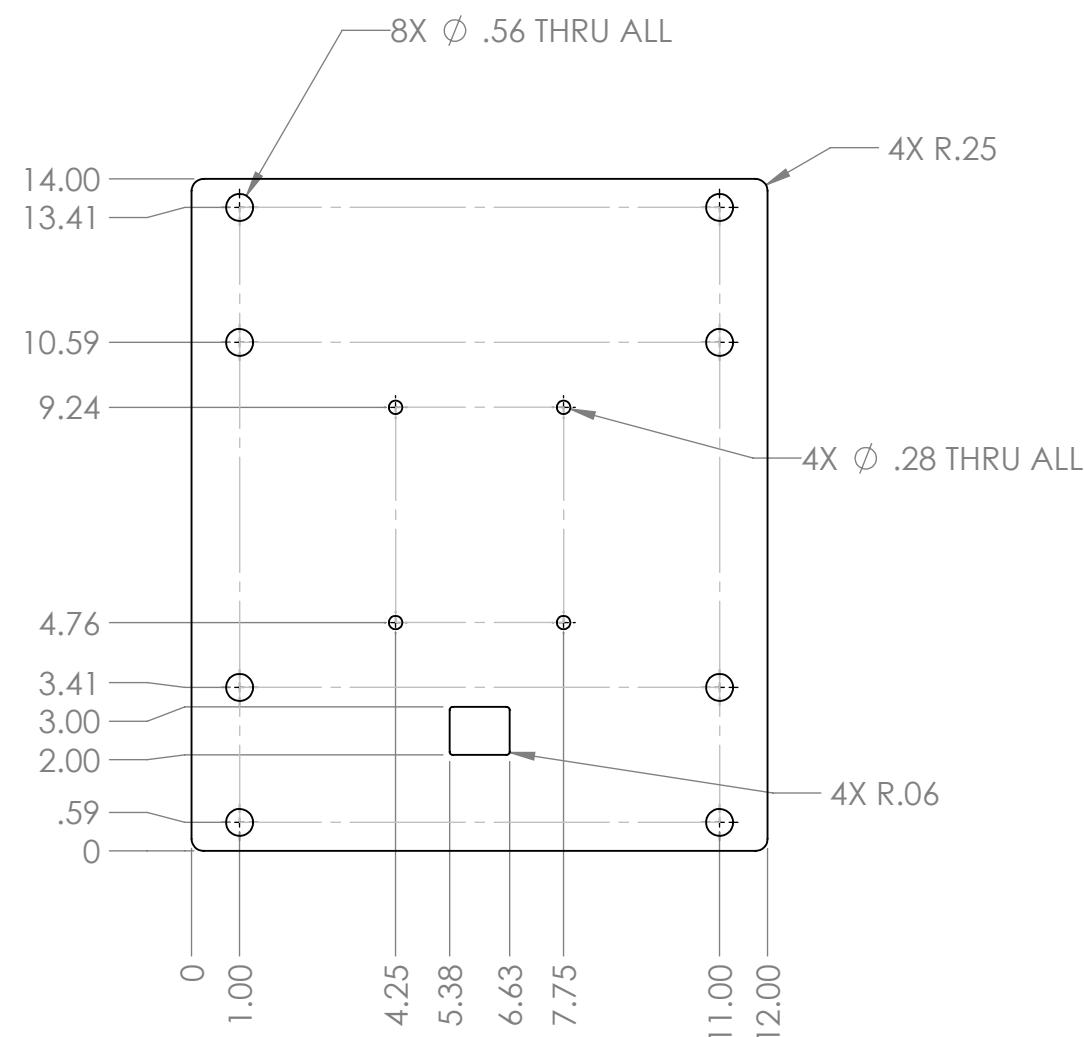
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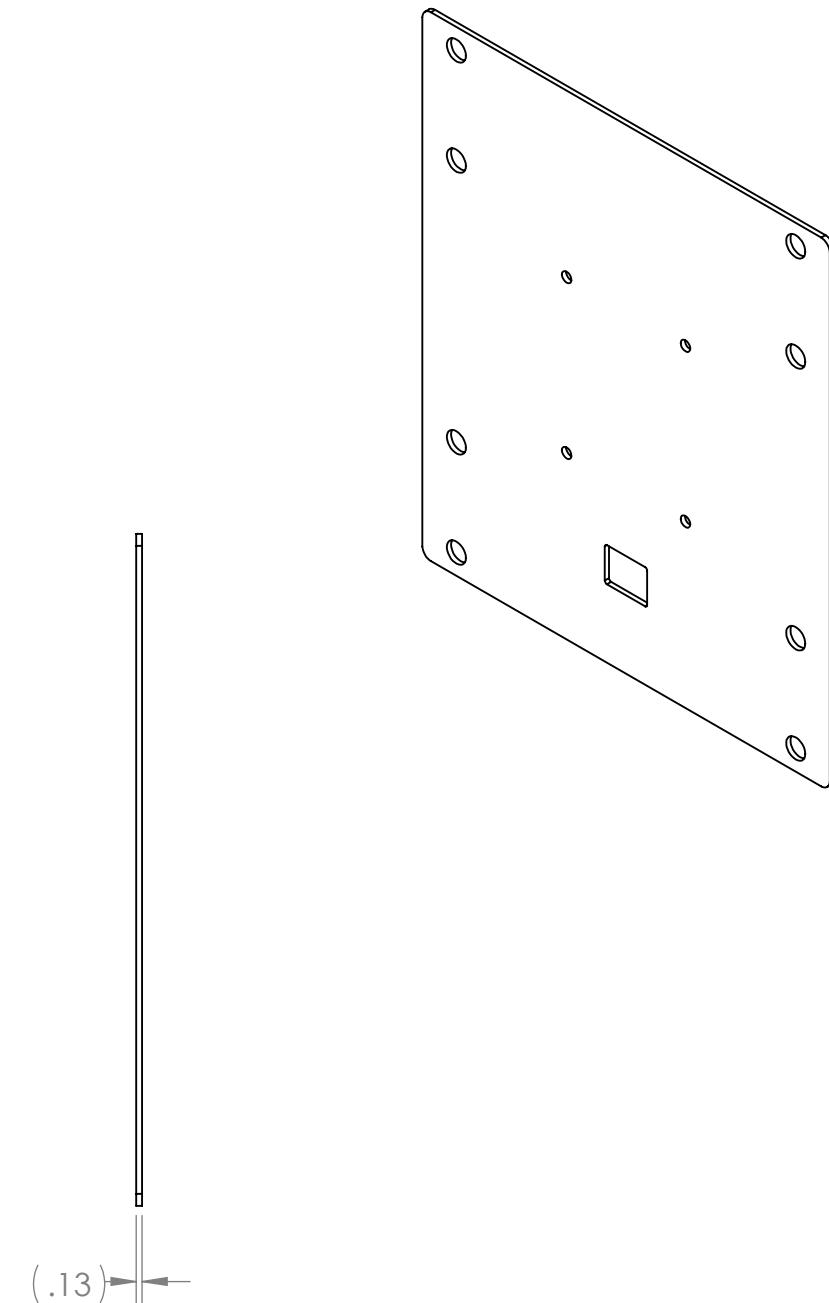
B

B



- Notes:
1. Material: 0.125" HDPE, Texture: Natural/Smooth, Color: White
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME DRAWN KAMC	DATE 10/21/19
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL HDPE	ENG APPR. MFG APPR. Q.A.	
NEXT ASSY	USED ON	FINISH BARE	COMMENTS:	
	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Truss Protection

SIZE **DWG. NO.** **REV**
B **GE-20087**

SCALE: 1:4 **WEIGHT:** **SHEET 1 OF 1**

4

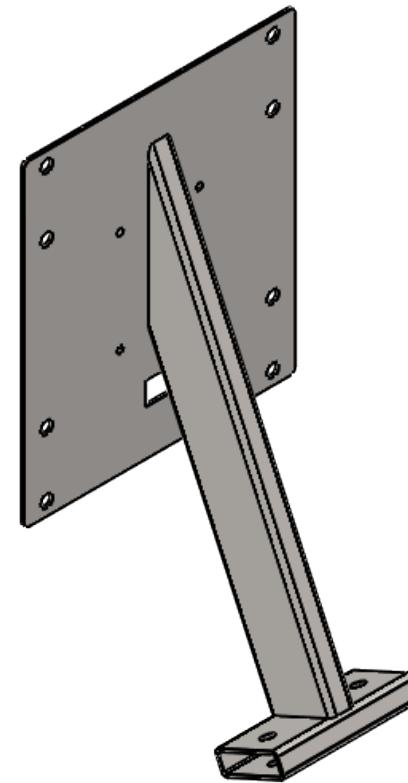
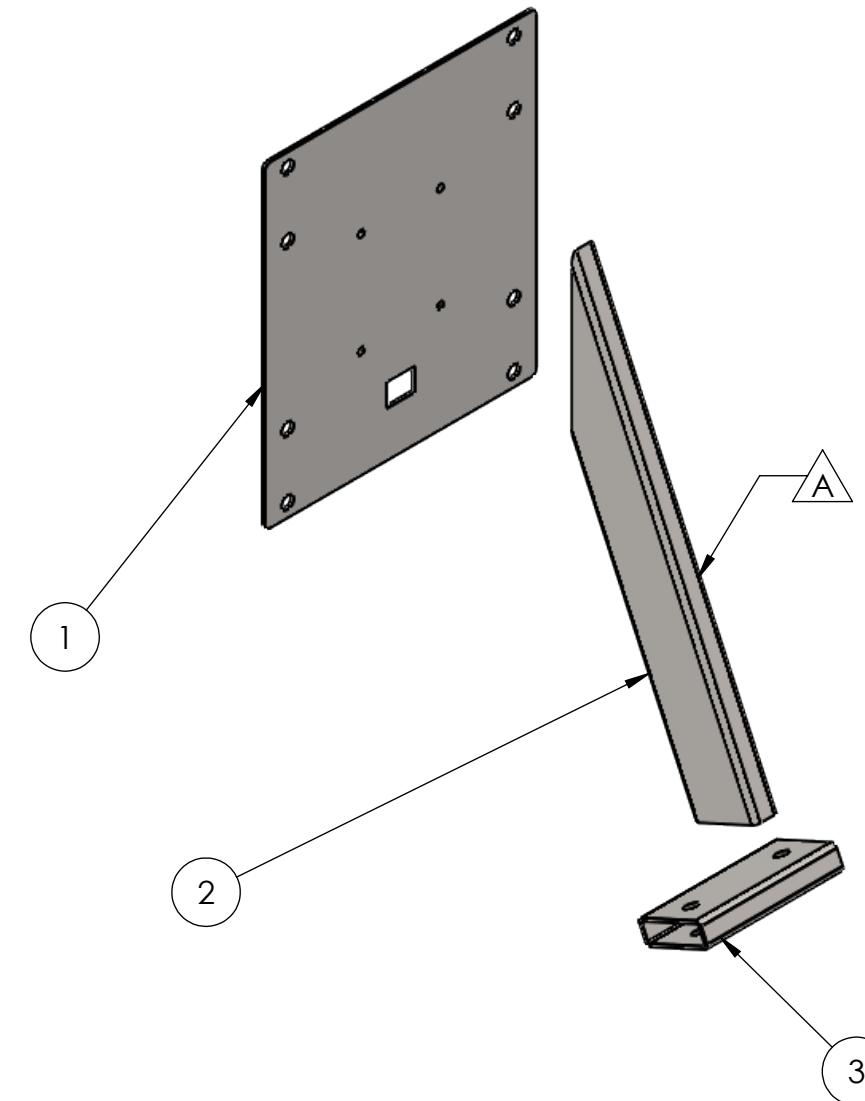
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2, B3, 2-A2, 2- A4	A	GE-20082 Part Length Modified	10/30/2019	KAMC



- Notes:
1. Finish: Silver/Gray - Paint
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20081	Hard Stop, Weldment, Truss Mount Plate	1
2	GE-20082	Hard Stop, Weldment, Tube, Long	1
3	GE-20086	Hard Stop, Weldment, Tube, Hitting Assembly Mount	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
	DRAWN	KAMC	10/22/19	
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
		COMMENTS:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
		PAINT		
APPLICATION		DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV		
B	GE-20088	A		
SCALE: 1:6	WEIGHT:	SHEET 1 OF 2		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:

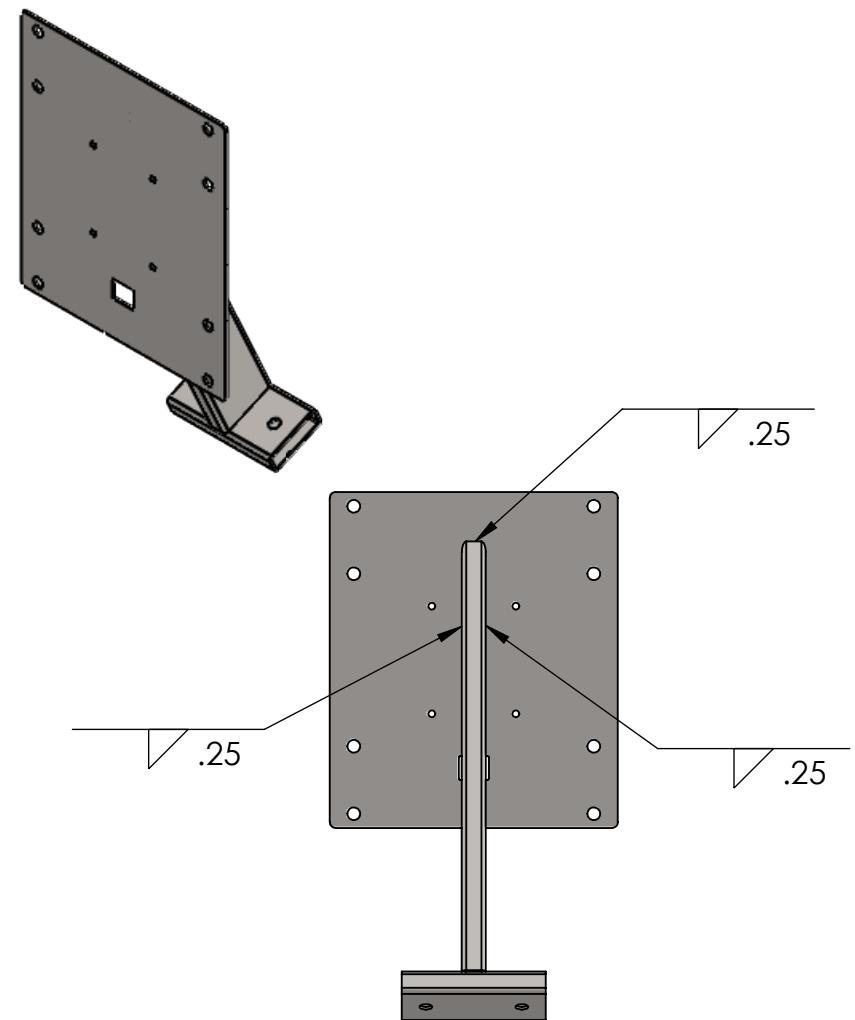
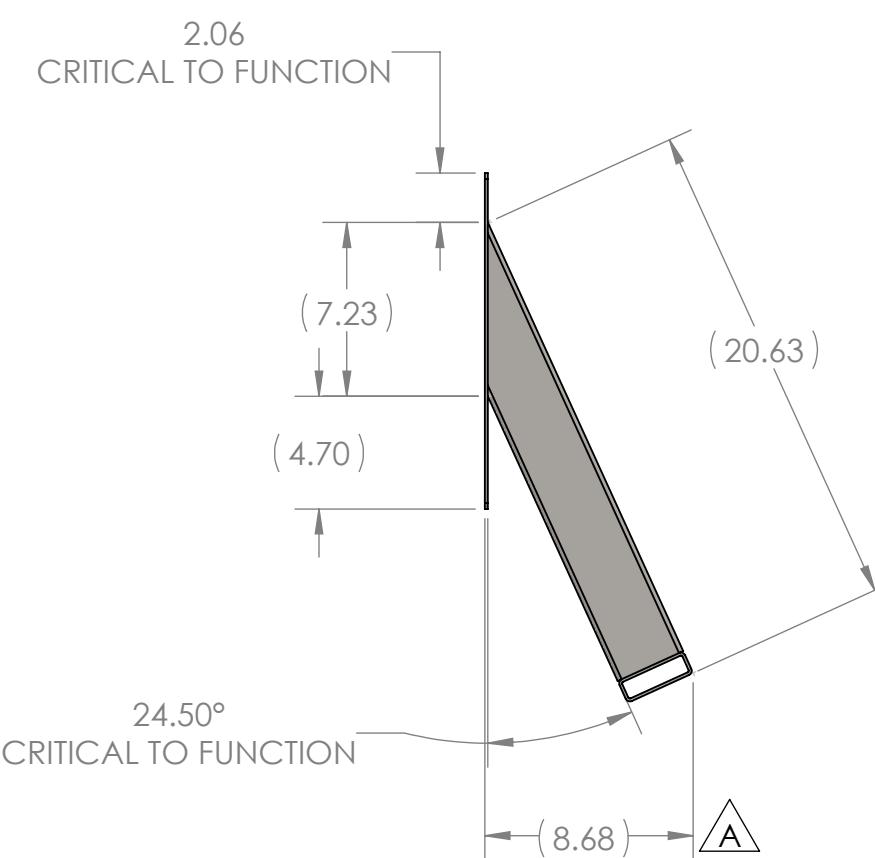
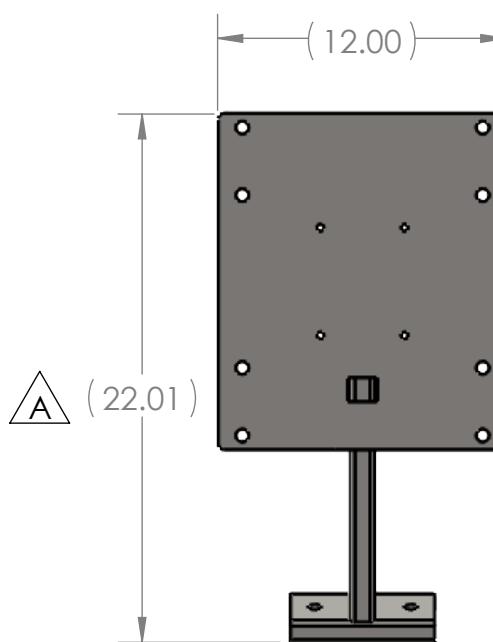
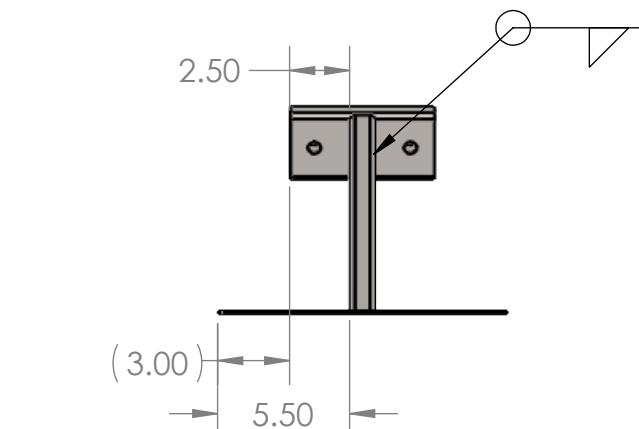
Hard Stop,
Weldment, Large

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

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		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
		MATERIAL		
NEXT ASSY	USED ON	FINISH PAINT		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Weldment, Large

SIZE	DWG. NO.	REV
B	GE-20088	A
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2

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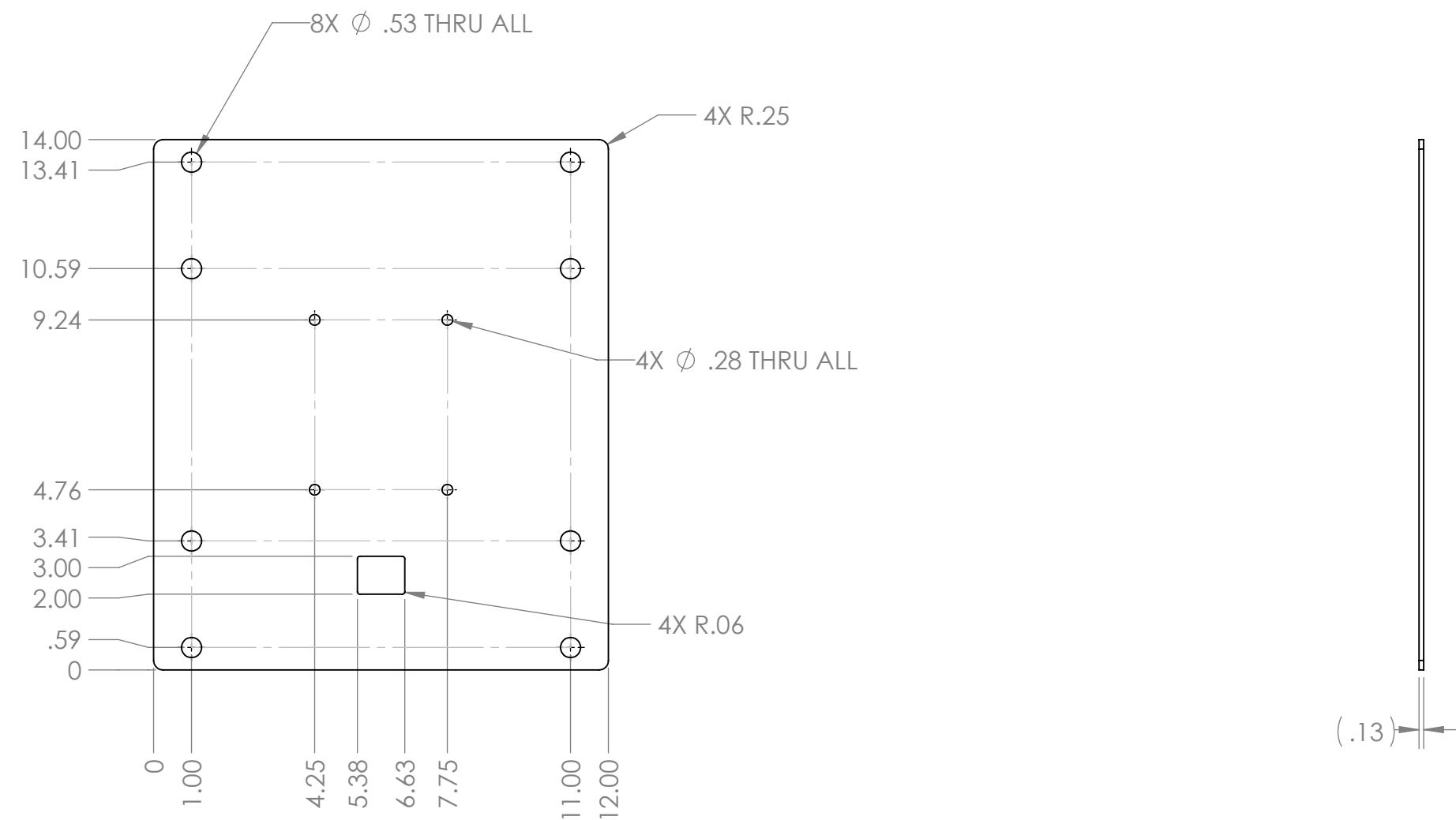
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Notes:

1. Material: 0.125" Mild Steel A366/1008 Cold Roll
2. Remove all burrs and sharp edges.

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		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20089	INTERPRET GEOMETRIC TOLERANCING PER:			
GE-20088	MATERIAL STEEL PLATE			
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:4		WEIGHT:	SHEET 1 OF 1	
SIZE DWG. NO. B GE-20081		REV 0		



SOLIDWORKS

Modeling Solutions Partner

TITLE:
**Hard Stop, Weldment,
Truss Mount Plate**

4

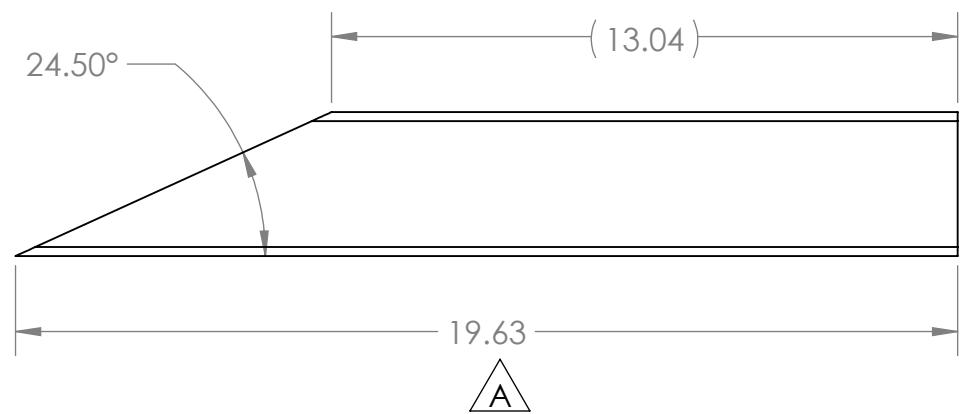
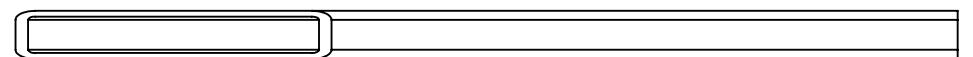
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REVISIONS

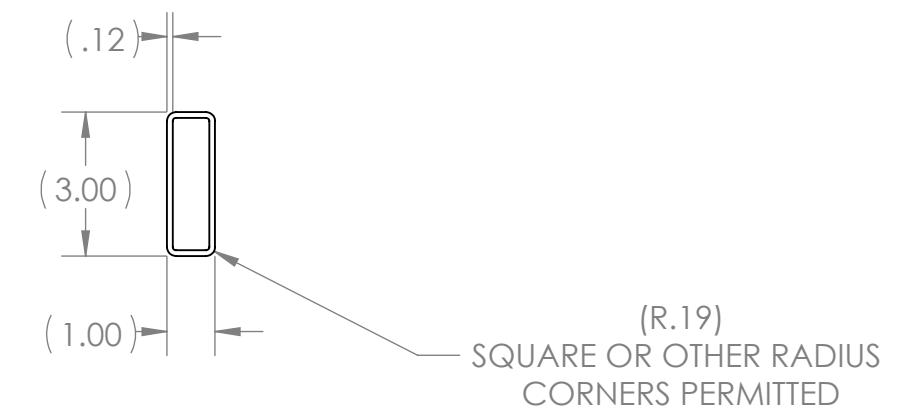
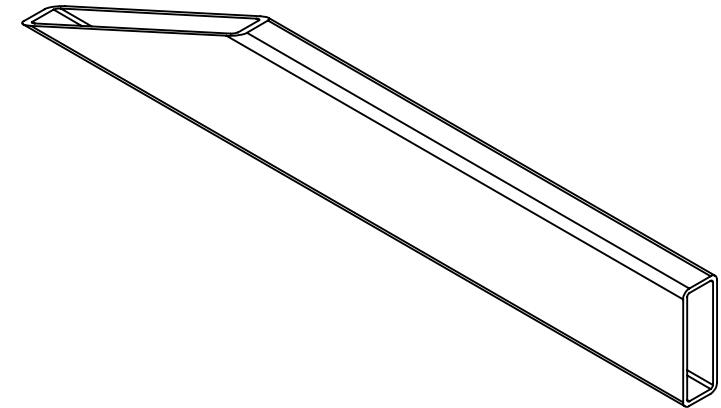
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2, A3	A	Updated Part Length & Application Table	10/30/2019	KAMC



Notes:

- Material: 1" x 3" x 0.12" Mild Steel Rectangle Tube A500/A513 Hot Rolled
- Remove all burrs and sharp edges.

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	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME DRAWN KAMC DATE 10/22/19
	INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED
	MATERIAL	ENG APPR.
GE-20088	STEEL TUBE	MFG APPR.
NEXT ASSY	USED ON	Q.A.
	FINISH	COMMENTS:
	BARE	
APPLICATION	DO NOT SCALE DRAWING	
SIZE DWG. NO. B GE-20082		REV A
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Hard Stop, Weldment,
Tube, Long

4

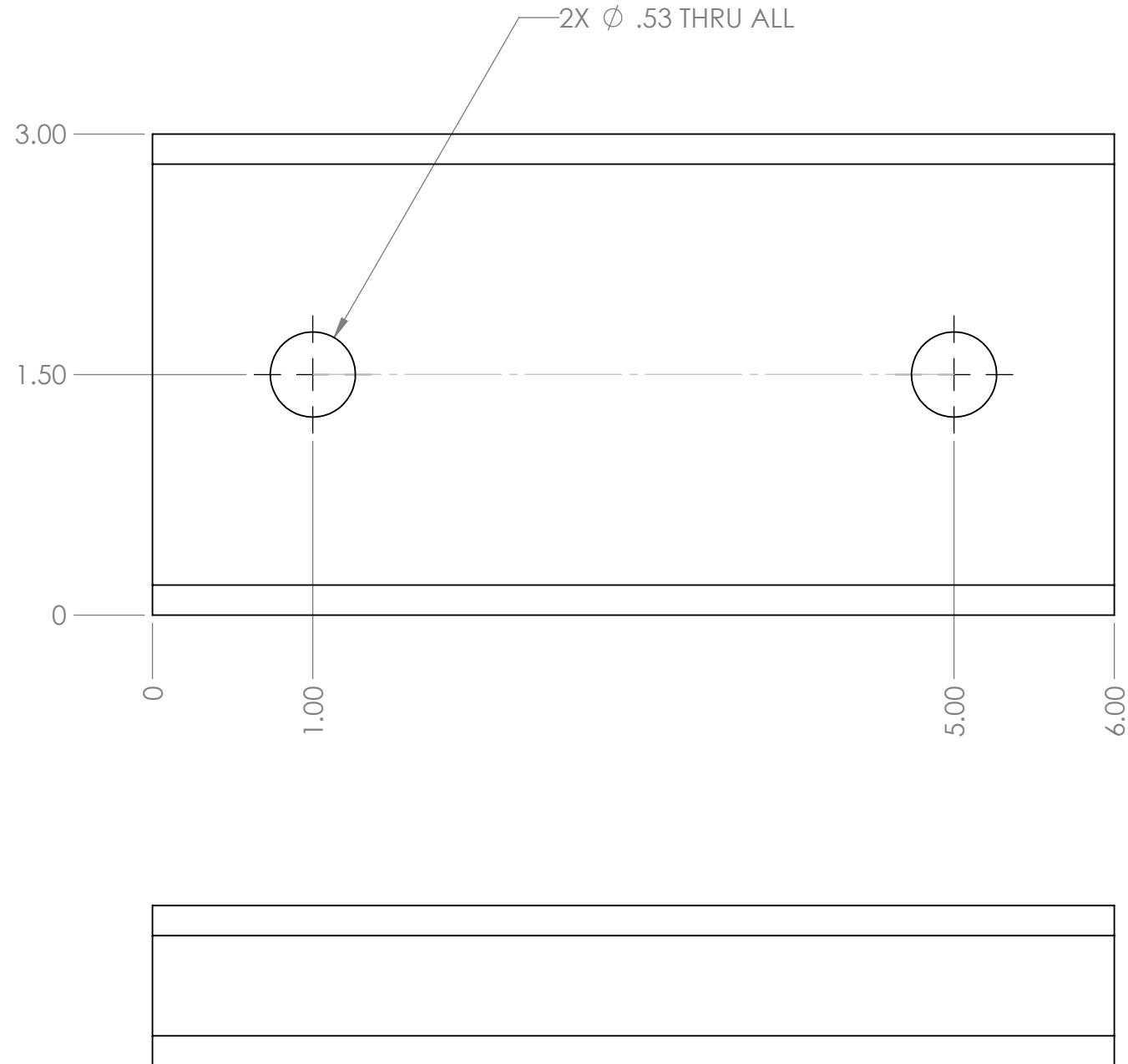
3

2

1

B

B



- Notes:
- Material: 1" x 3" x 0.12" Mild Steel Rectangle Tube A500/A513 Hot Rolled
 - Remove all burrs and sharp edges.

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GE-20088		DRAWN	CHECKED	
GE-20089		ENG APPR.	MFG APPR.	
NEXT ASSY	USED ON	Q.A.	COMMENTS:	
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Weldment,
Tube, Hitting Assembly
Mount

SIZE	DWG. NO.	REV
B	GE-20086	0
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1

4

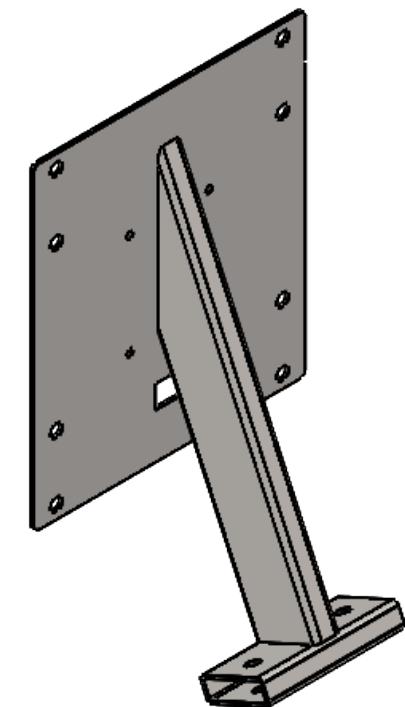
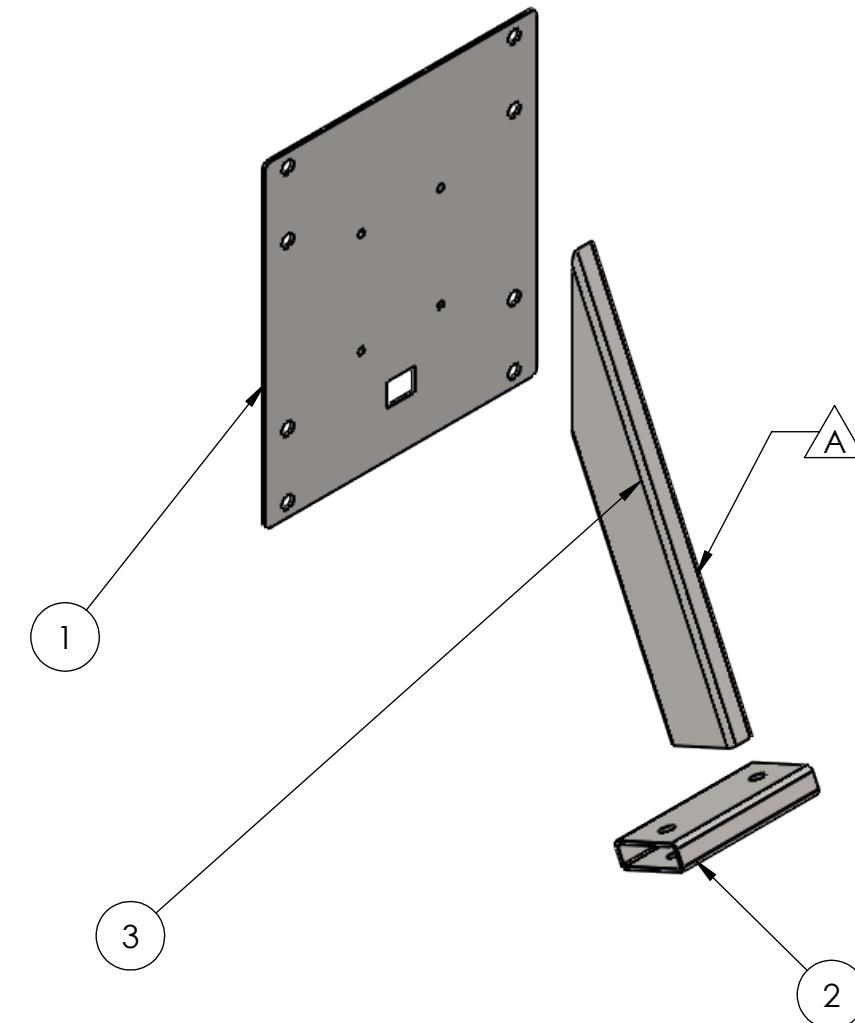
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2

1

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2, B3, 2-A2, 2- A4, 2- B3	A	Updated Length of Part GE-20083 & Changed Mounting Location to GE-20081	10/30/2019	KAMC



- Notes:
1. Finish: Silver/Gray - Paint
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED ENG APPR. MFG APPR.	
		MATERIAL	Q.A.	
NEXT ASSY	USED ON	FINISH PAINT	COMMENTS:	
APPLICATION		DO NOT SCALE DRAWING		

SIZE	DWG. NO.	REV	B	GE-20089	A
			SCALE: 1:6	WEIGHT:	SHEET 1 OF 2

FIRST
ROBOTICS
COMPETITION  **SOLIDWORKS**
Modeling Solutions Partner

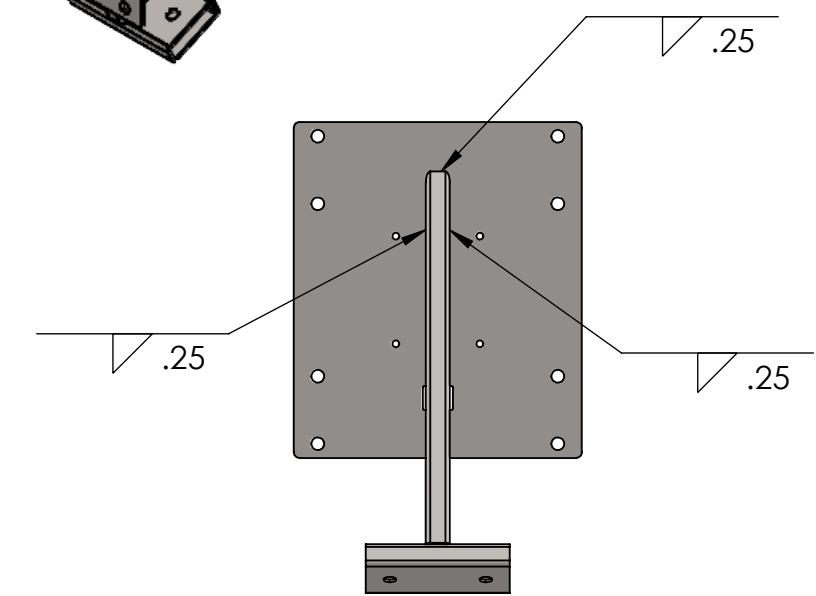
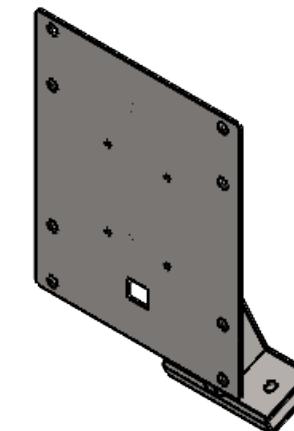
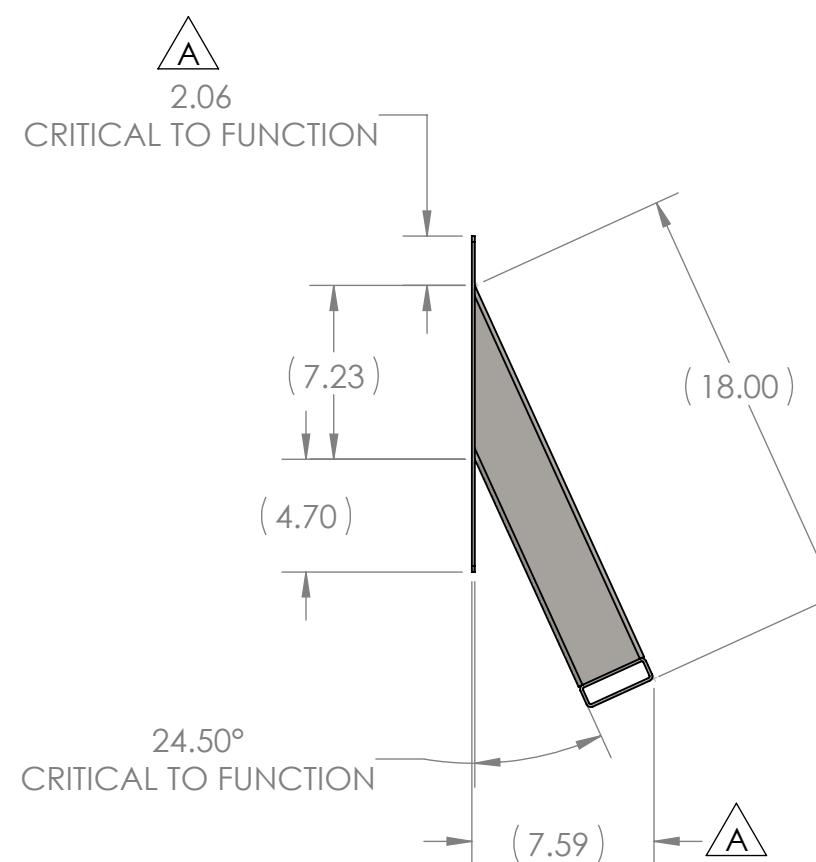
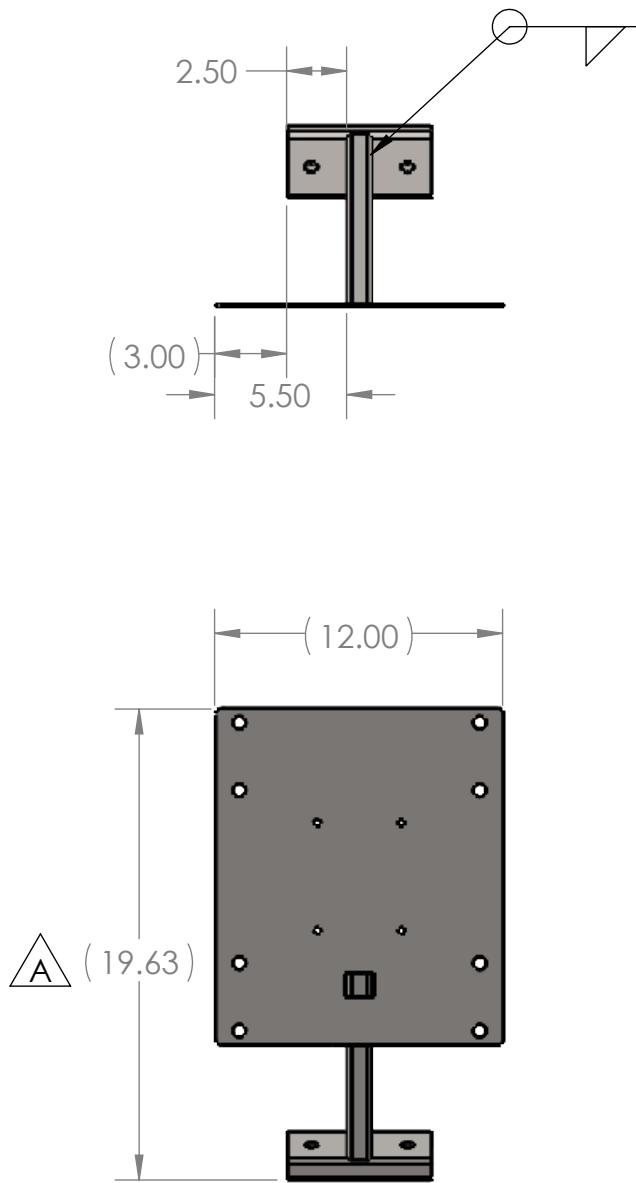
TITLE:
**Hard Stop,
Weldment, Small**

4

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2

1



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

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		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:
		MATERIAL		
NEXT ASSY	USED ON	FINISH PAINT		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE: Hard Stop, Weldment, Small

SIZE	DWG. NO.	REV
B	GE-20089	A
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2

4

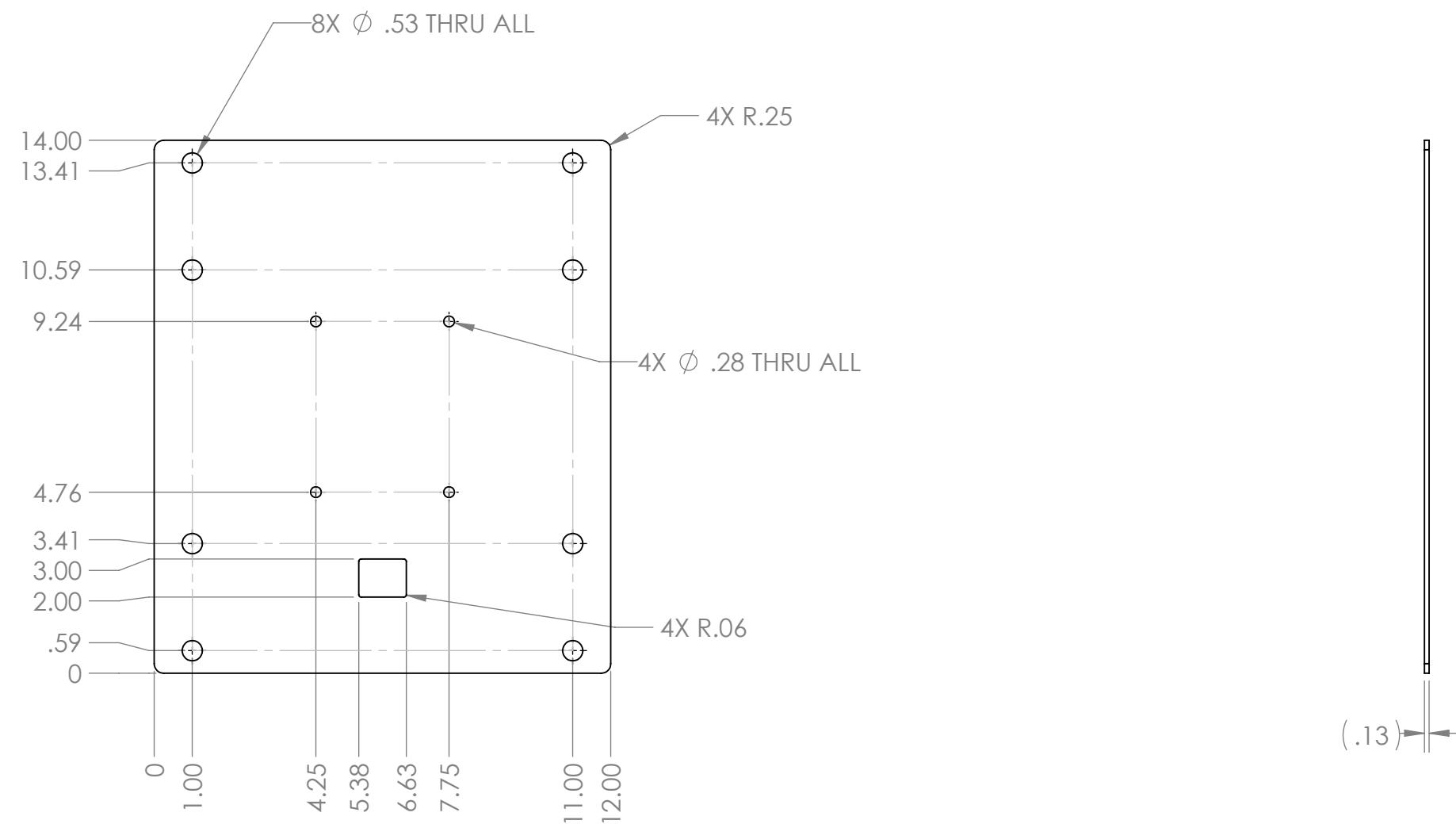
3

2

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B

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Notes:

1. Material: 0.125" Mild Steel A366/1008 Cold Roll
2. Remove all burrs and sharp edges.

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		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
GE-20089	INTERPRET GEOMETRIC TOLERANCING PER:			
GE-20088	MATERIAL STEEL PLATE			
NEXT ASSY	USED ON	FINISH BARE		
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:4		WEIGHT:	SHEET 1 OF 1	
SIZE DWG. NO. B GE-20081		REV 0		



SOLIDWORKS
Modeling Solutions Partner

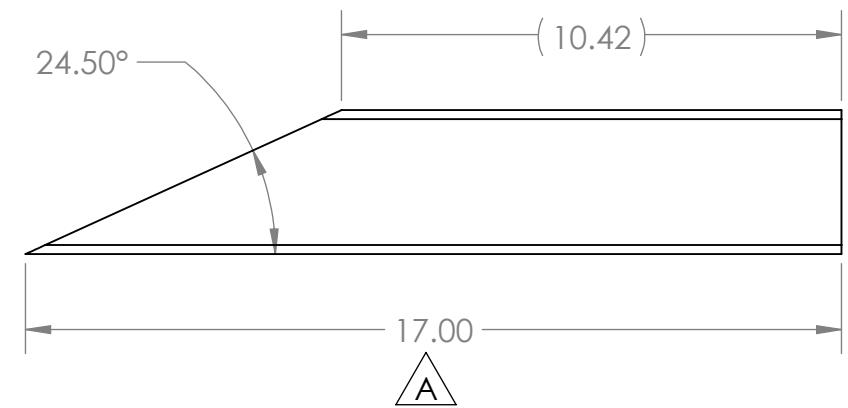
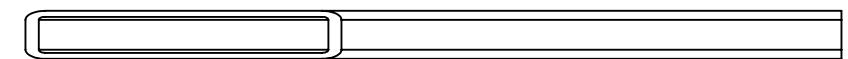
TITLE:
**Hard Stop, Weldment,
Truss Mount Plate**

4

3

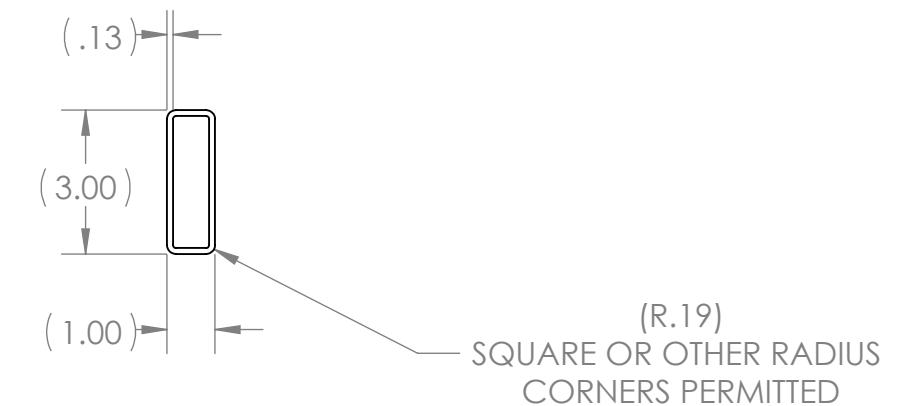
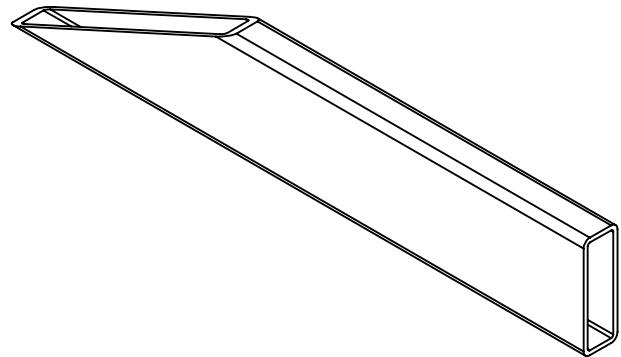
2

1



Notes:
1. Material: 1" x 3" x 0.12" Mild Steel Rectangle Tube A500/A513 Hot Rolled
2. Remove all burrs and sharp edges.

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REVISIONS					
ZONE	REV.	DESCRIPTION	DATE	APPROVED	
A2, A3	A	Updated Part Length & Application Table	10/30/2019	KAMC	

A	GE-20089	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN KAMC 10/22/19	NAME DATE
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED	
		MATERIAL	ENG APPR.	
		STEEL TUBE	MFG APPR.	
		FINISH	Q.A.	
		BARE	COMMENTS:	
		APPLICATION	DO NOT SCALE DRAWING	

B	GE-20083	SIZE	DWG. NO.	REV
				A
SCALE: 1:4	WEIGHT:		SHEET 1 OF 1	

4

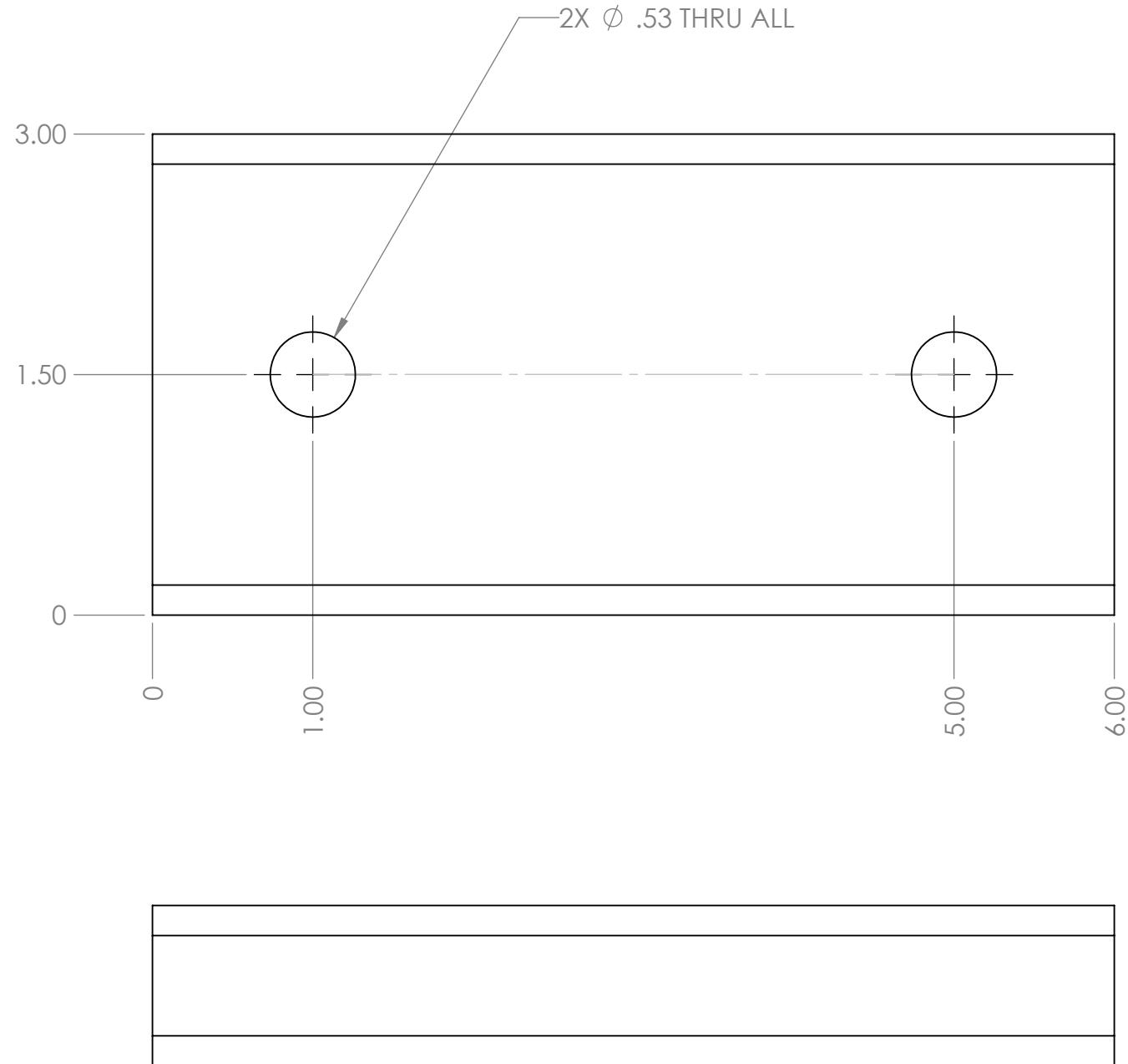
3

2

1

B

B



- Notes:
- Material: 1" x 3" x 0.12" Mild Steel Rectangle Tube A500/A513 Hot Rolled
 - Remove all burrs and sharp edges.

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GE-20088		DRAWN	CHECKED	
GE-20089		ENG APPR.	MFG APPR.	
NEXT ASSY		Q.A.	COMMENTS:	
USED ON				
FINISH				
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hard Stop, Weldment,
Tube, Hitting Assembly
Mount

SIZE DWG. NO. **B** GE-20086 **REV** **0**

SCALE: 1:1 WEIGHT: SHEET 1 OF 1

4

3

2

1

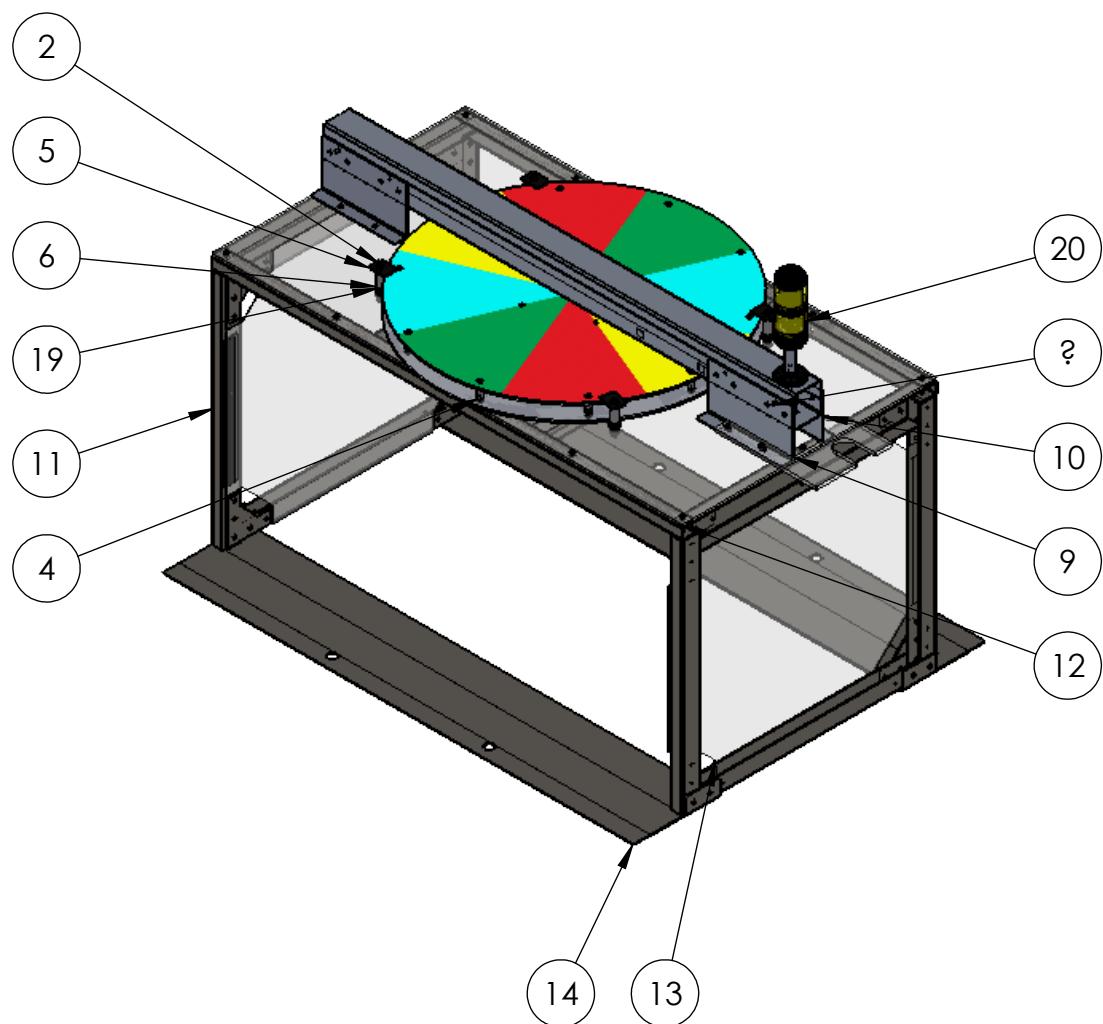
4

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1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	46CLR	46CLR	1
2	Button_hex_.375_16_2.5	Button hex drive 3/8-16 x 2.5"	4
3	Flat_phil_.25_20_2.25	Flat Head Phil .25-20 x 2.25"	4
4	GE-20104	Control Panel	1
5	GE-20121	Flange for control panel	4
6	GE-20122	0.375" id bearing shielded	8
7	GE-20141	Mounting Bracket (46CLR ColorSight)	2
8	GE-20142	Sensor Tray Lid	1
9	GE-20143	Trench to Truss Gusset	1
10	GE-20160	Sensor Housing Assembly	1
11	GE-20161	GE-20101 with hook	2
12	GE-20162	GE-20102 with GE-20114	1
13	GE-20163	GE-20115 with loop	2
14	GE-20164	GE-20123 with 4" hook	2
15	Pan_phil_10-32_1	Pan Head 10-32 1"	4
16	Pan_phil_10-32_.625	Pan head Phil 10-32 x 5/8	24
17	Pan_phil_M3_35	Pan Head M3 x 35mm	2
18	Pin_quick_ring_.25_0.6875	Quick Release Pin with ring 11/16" usable	4
19	Spacer_.375_.75_2	3/4" OD 2" spacer for 3/8" screw	4
20	StackLight_Assembly	Stack Light Assembly	1
21	flat_phil_.25_20_.75	Steel Phillips Flat Head Screw, 1-4"-20 x 3/4" long, fully threaded	2
22	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	7
23	nylock_.375_16	Steel Nylon-Insert Locknut, 3/8"-16	5
24	nylock_10_32	Low-Strength Steel Nylon-Insert Locknut, Zinc-Plated, 10-32 Thread Size	16
25	nylock_M3	nylock M3	2



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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	
		DIMENSIONS ARE IN INCHES	DRAWN				TITLE: <h1>Trench with Control Panel</h1>
		TOLERANCES: FRACTIONAL $\pm 1/16$	CHECKED				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	ENG APPR.				
		TWO PLACE DECIMAL $\pm .01$	MFG APPR.				
		THREE PLACE DECIMAL $\pm .001$	Q.A.				
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:				
		MATERIAL				SIZE DWG. NO. REV B GE-20100	
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					
			SCALE: 1:16	WEIGHT:	SHEET 1 OF 6		

4

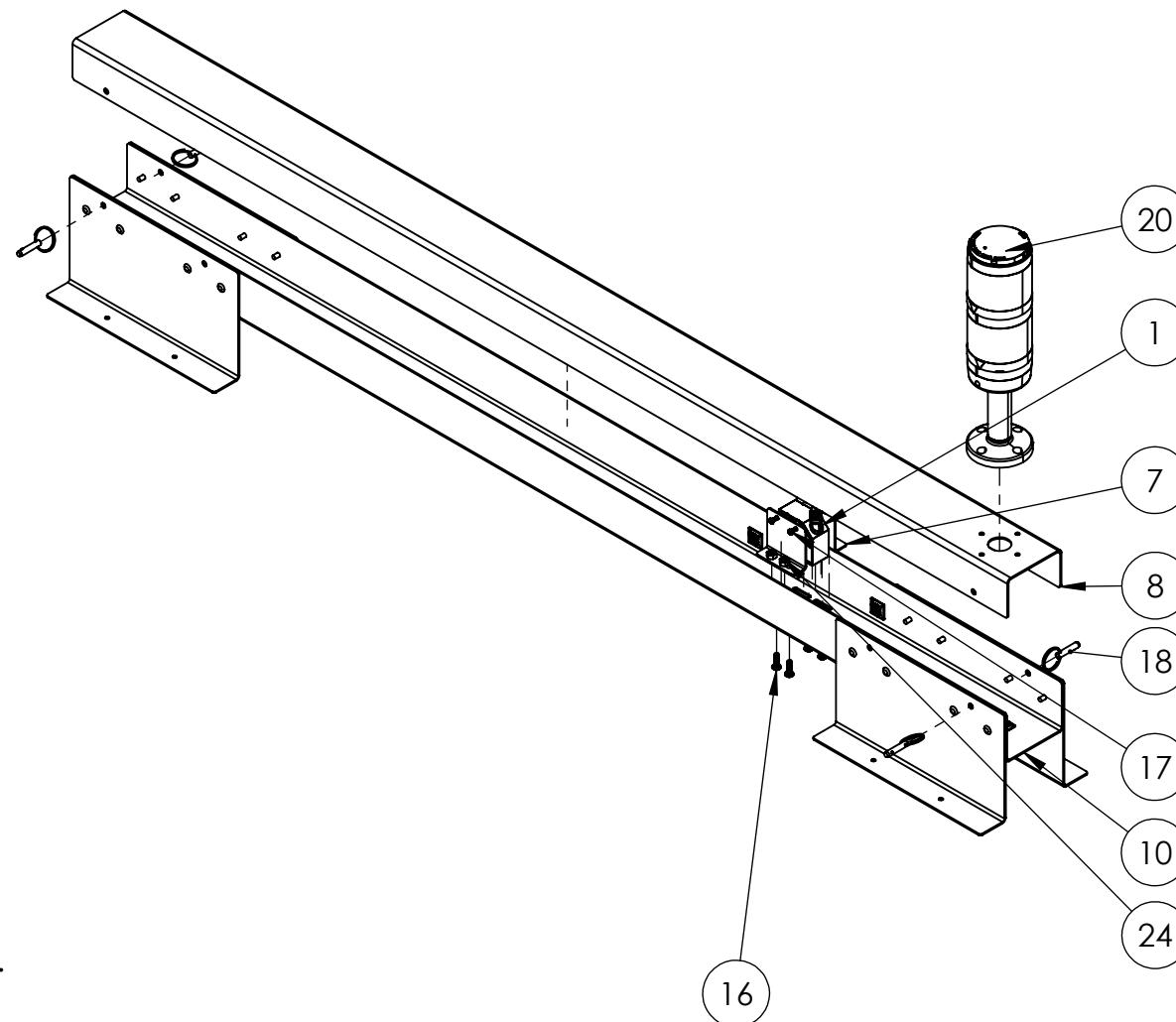
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2

1

B

B



Notes:

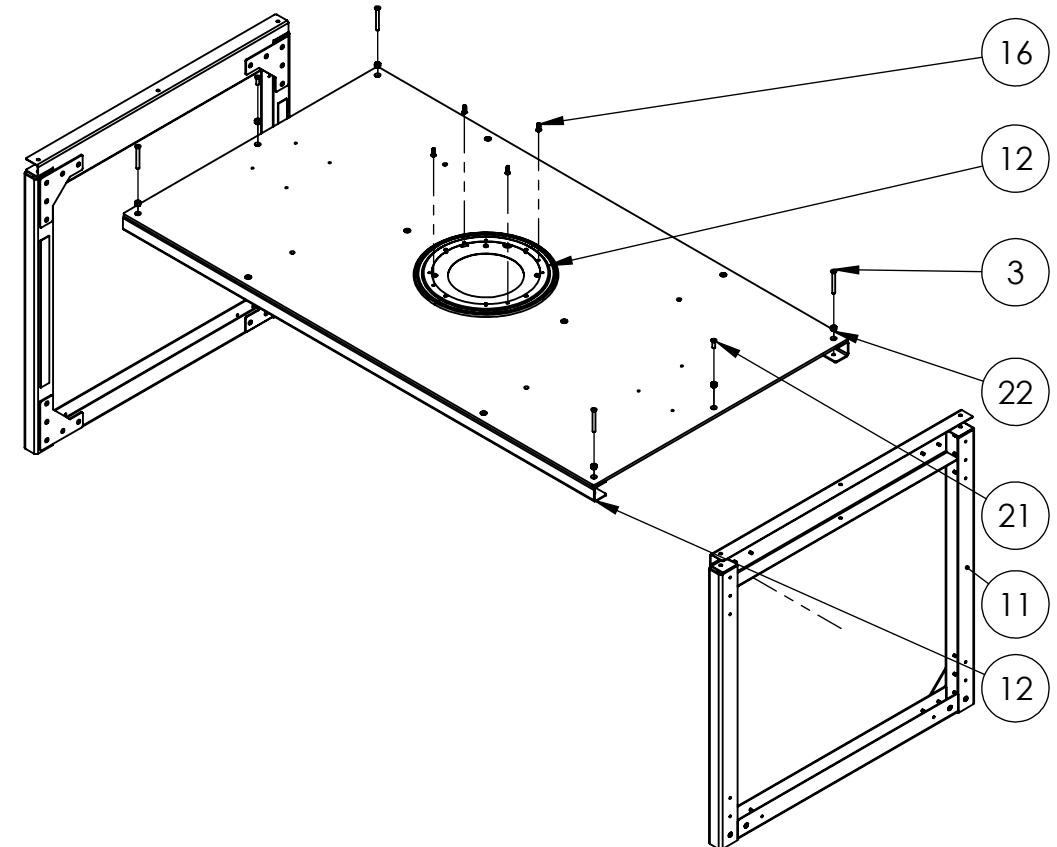
1. Attach (20) to (8) using cable 50lb cable ties.
2. Attach (7) to (1) with (17).
3. Attach step 2 to (10) with (16)
4. Attach (8) to (10) with (18) in 4 spots

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
TITLE: Trench with Control Panel					
SIZE B DWG. NO. GE-20100 REV 1					
SCALE: 1:16 WEIGHT: 1 SHEET 2 OF 6					

B

B



Notes:

1. Slide (11) into (12)
2. Attach (12) to (11) using (3), (21) and (22) in three spots per side

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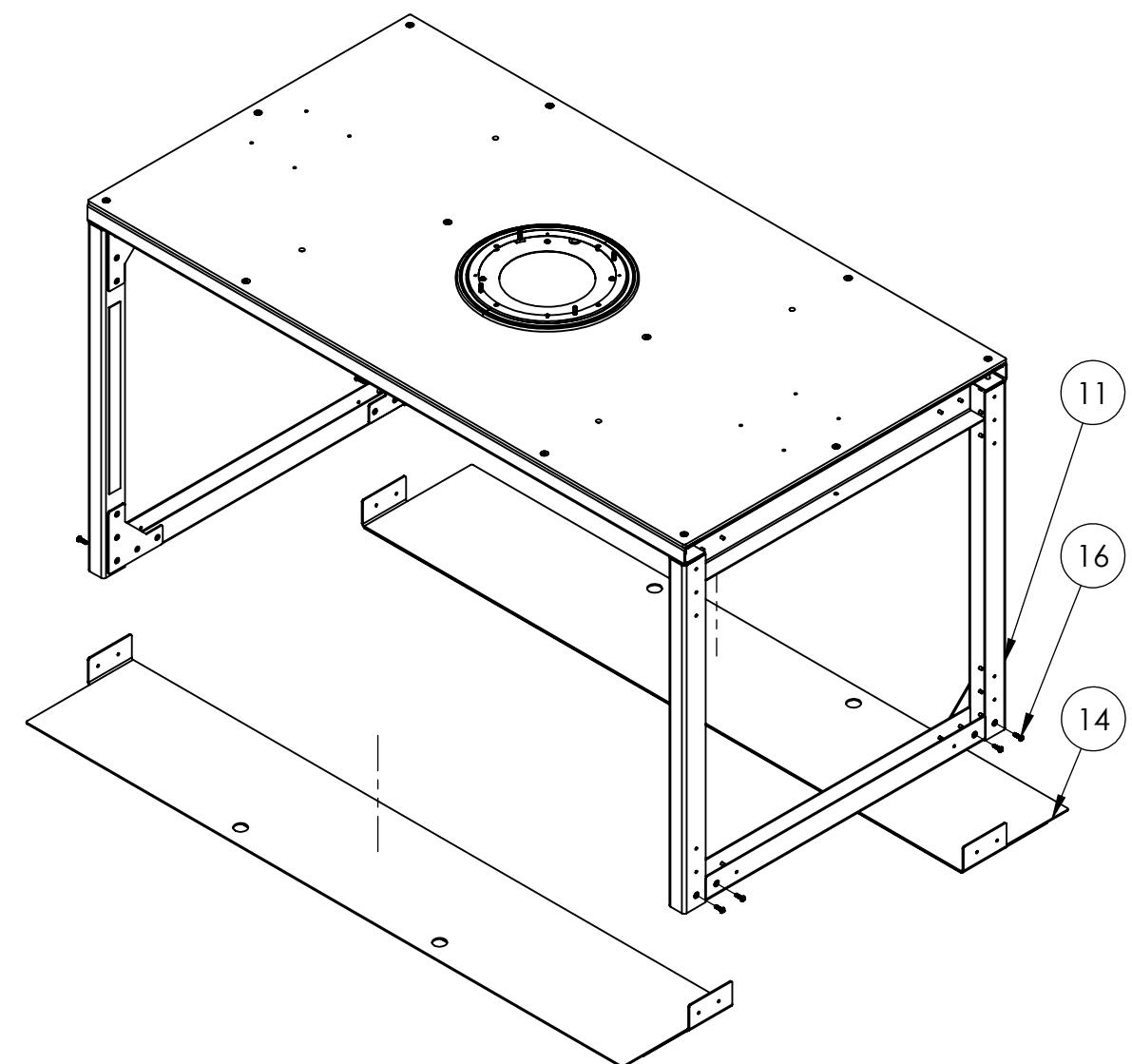
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		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001							
		INTERPRET GEOMETRIC TOLERANCING PER:							
		MATERIAL							
NEXT ASSY	USED ON	FINISH		COMMENTS:					
		APPLICATION							
		DO NOT SCALE DRAWING							

B

B

Notes:

1. Attach (14) to (11) on the outside
2. Use (16) to assemble. Rivet nut is in (11)



A

A

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
FIRST ROBOTICS COMPETITION					
TITLE: Trench with Control Panel					
SIZE	DWG. NO.		REV		
B	GE-20100				
SCALE: 1:16	WEIGHT:		SHEET 4 OF 6		

4

3

2

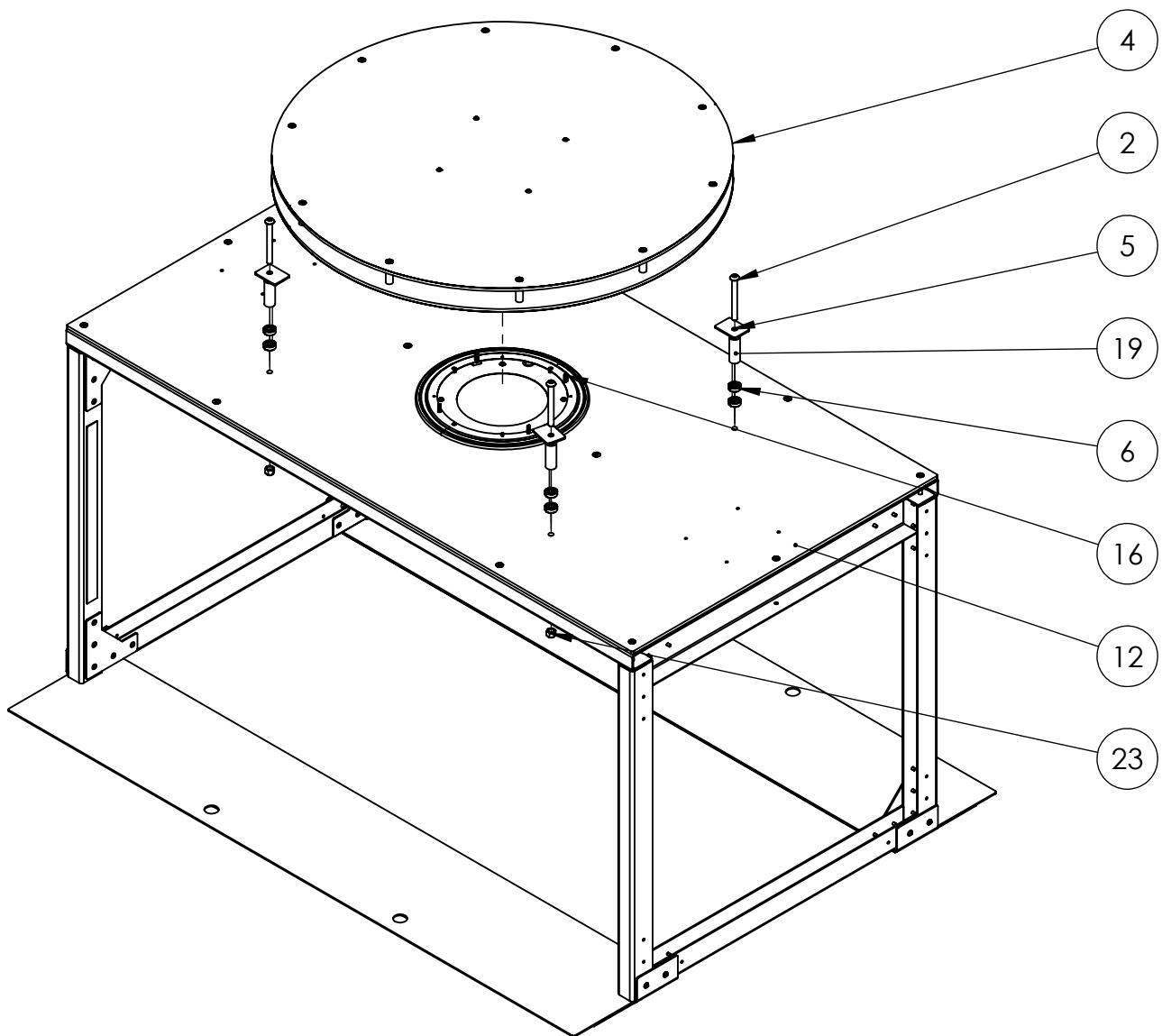
1

B

B

Notes:

1. Attach (4) to (12) on the Susan with (16).
 2. Assemble from top to bottom the following. (2) (5) (19) (6)
 3. Insert Step 2 into (12) and secure with (23)



4

3

2

1

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		DIMENSIONS ARE IN INCHES	DRAWN			
		TOLERANCES:	CHECKED			
		FRACTIONAL $\pm 1/16$	ENG APPR.			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.			
		TWO PLACE DECIMAL $\pm .01$	Q.A.			
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
SCALE: 1:16		WEIGHT:	SHEET 5 OF 6			

4

3

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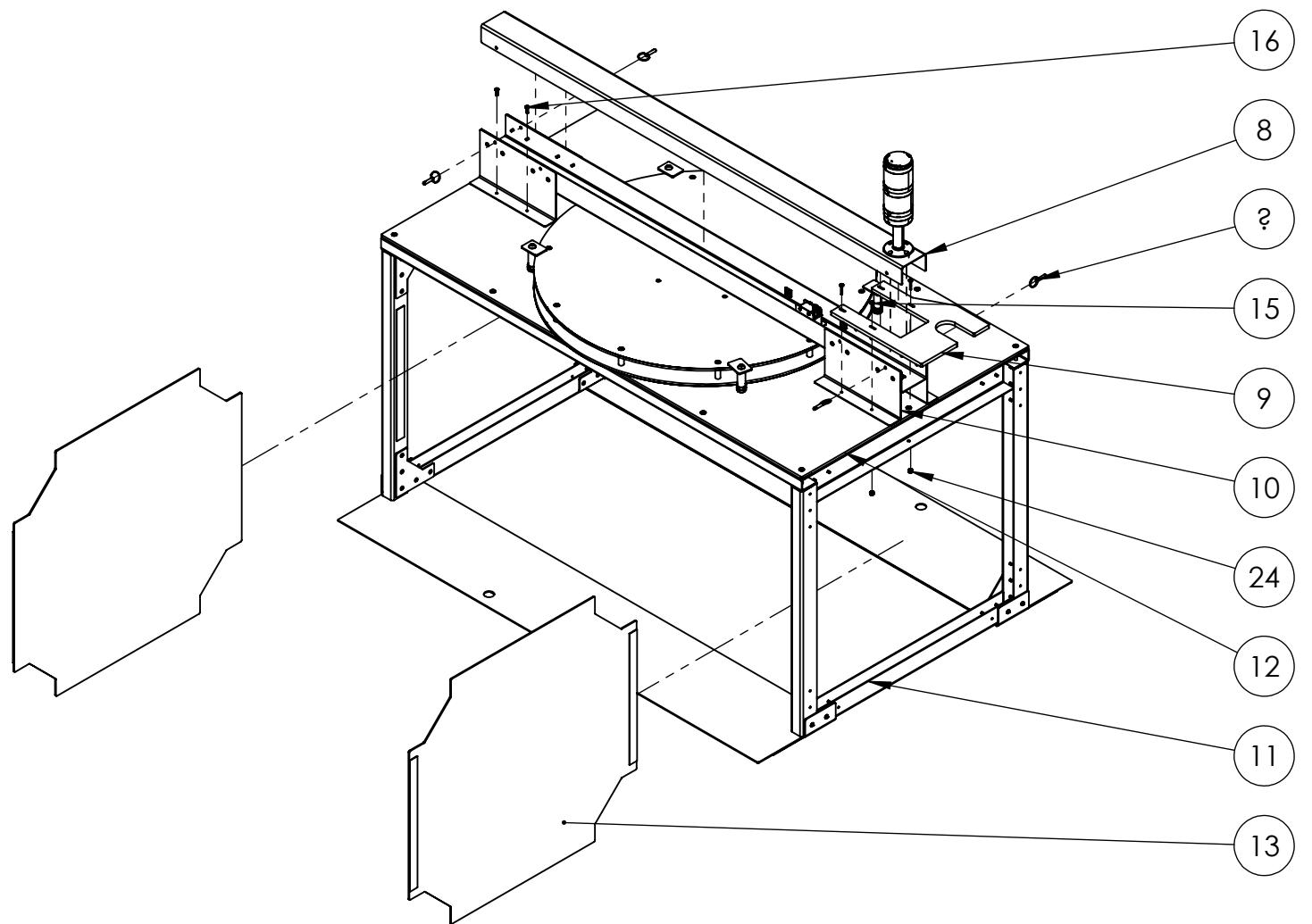
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B

B

- Notes:

 1. Attach (13) to (11) with hook and loop
 2. Attach (10) to (12) using (16) just on one side
 3. After placement on the field attach (9) to (10) and (12) with (15)
 4. After wiring and pass through of cable attach (8) to (10) using (?)



A

A

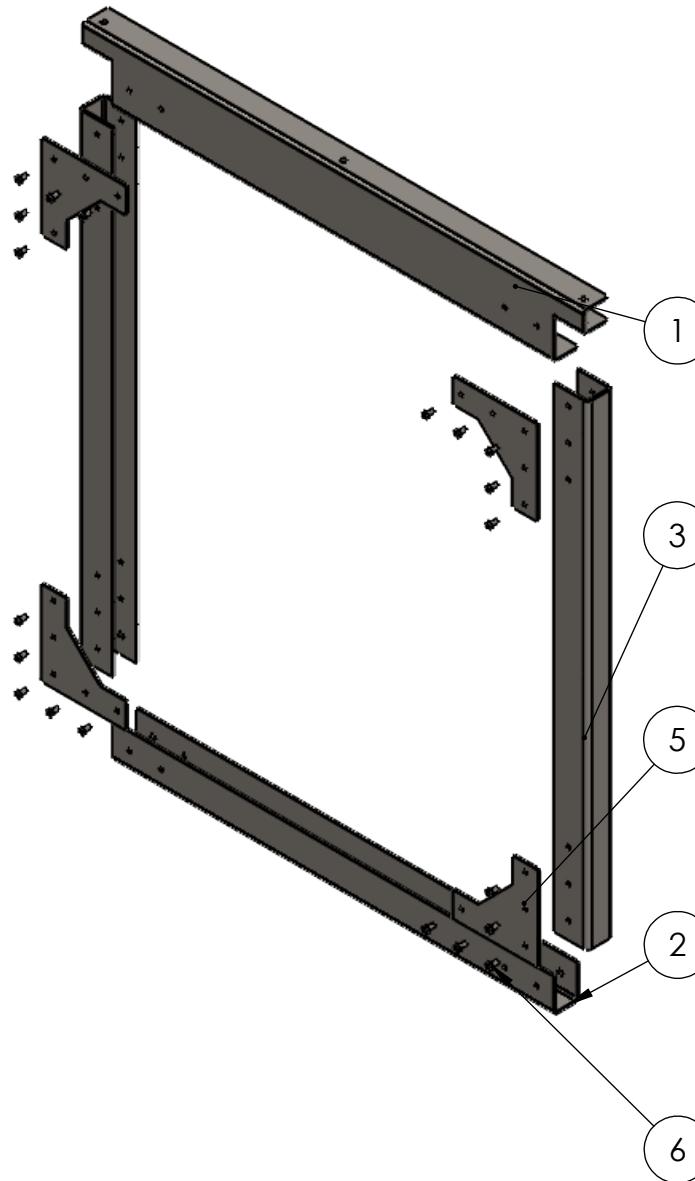
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		DIMENSIONS ARE IN INCHES	DRAWN				
		TOLERANCES:	CHECKED				
		FRACTIONAL $\pm 1/16$	ENG APPR.				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.				
		TWO PLACE DECIMAL $\pm .01$	Q.A.				
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:				
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					
			SCALE: 1:16	WEIGHT:		SHEET 6 OF 6	

4

3

2

1



Notes:

- ## 1. Label or Tag with Part Number

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20101-01	14 Gauge Pre-plated steel	1
2	GE-20101-02	12 Gauge Pre-plated Steel	1
3	GE-20101-03	12 Gauge Pre-plated steel	1
5	GE-20101-04	12 Gauge Pre-plated steel	4
6	rivet_.1875_.126-.25	3/16" Rivet, .126-.25 Grip Range	20

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION  SOLIDWORKS Modeling Solutions Partner	TITLE: <h1>Trench Leg</h1>
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	DRAWN				
		TWO PLACE DECIMAL $\pm .01$	CHECKED				
		THREE PLACE DECIMAL $\pm .001$	ENG APPR.				
		INTERPRET GEOMETRIC TOLERANCING PER:	MFG APPR.				
		MATERIAL	Q.A.				
		FINISH	COMMENTS:				
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING	SCALE: 1:8	WEIGHT:	SHEET 1 OF 5	
				SIZE B	DWG. NO. GE-20101	REV A	

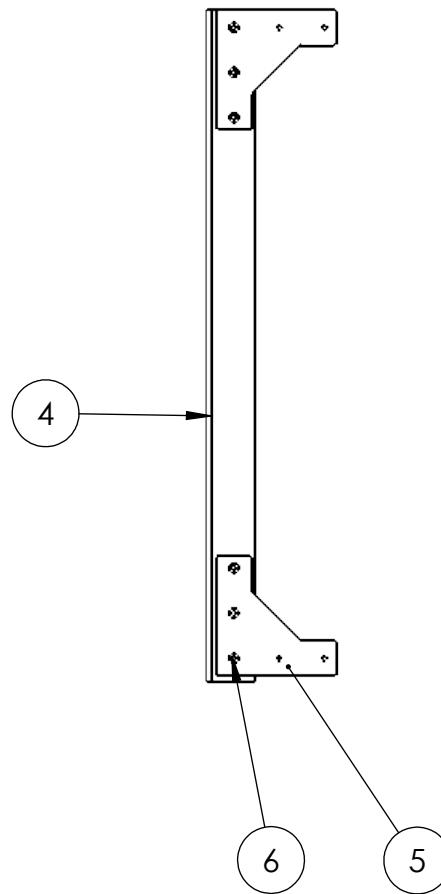
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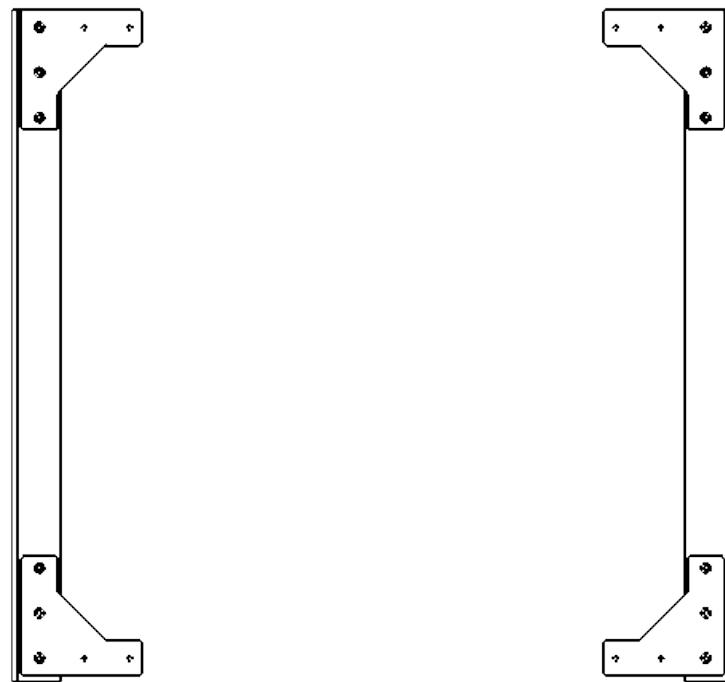
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Step 1:

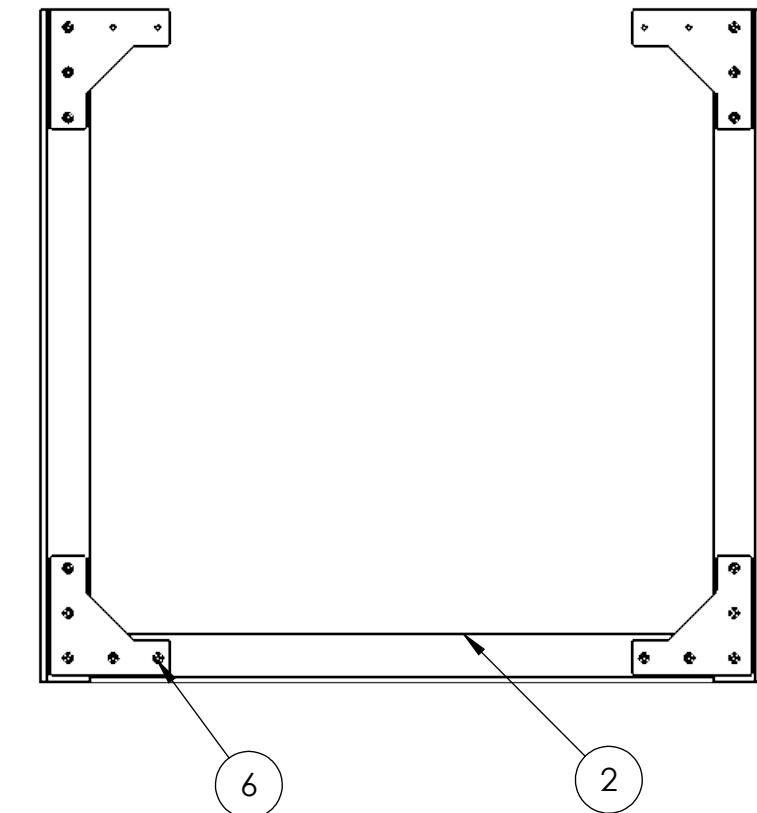


Assembly **5** to **4** with **6** QTY (6)
Note: Zinc Plated Steel Rivets

Step 2:



Step 3:



Attach **2** to Step 2: with channel facing up with **6** QTY(4)
Note: Zinc Plated Steel Rivets

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
B	GE-20101	A			
SCALE: 1:8	WEIGHT:	SHEET 2 OF 5			

FIRST
ROBOTICS
COMPETITION
SOLIDWORKS
Modeling Solutions Partner

Trench Leg

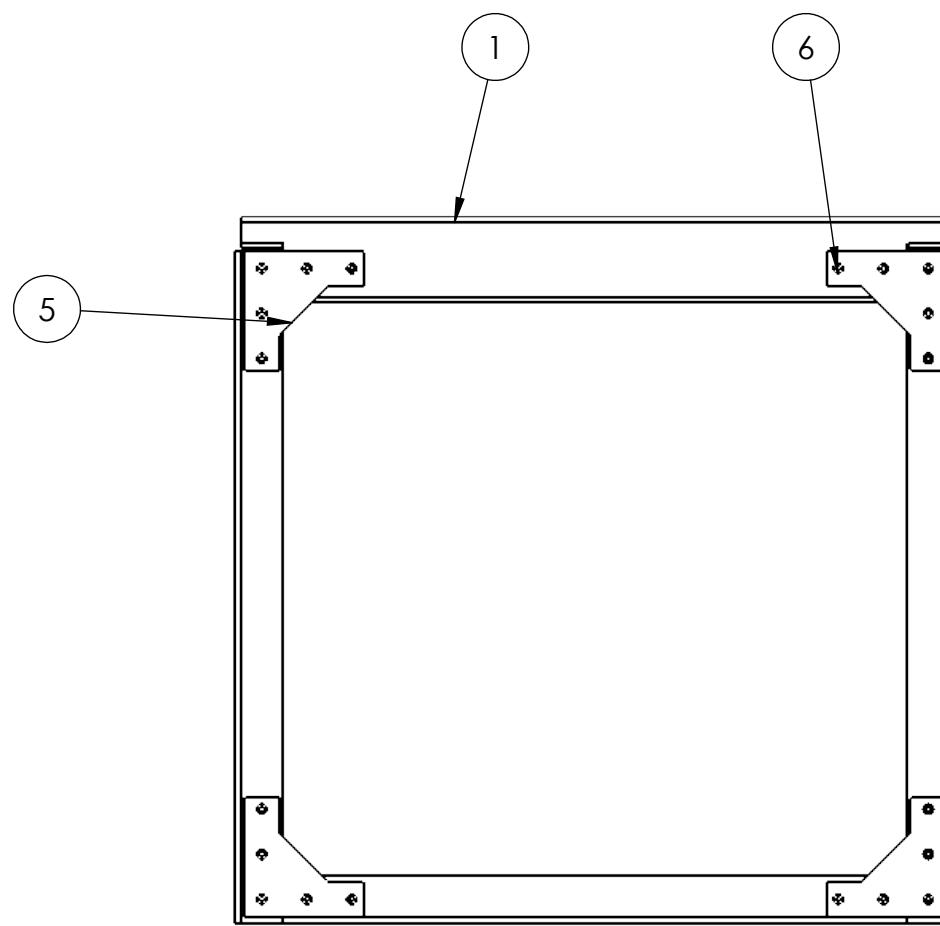
4

3

2

1

Step 4:



Attach (1) to Step 3: with (6) QTY(4). Flanges away from (5)

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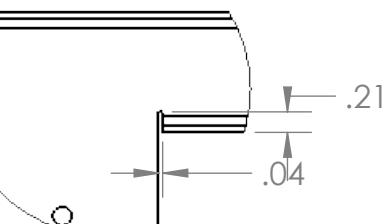
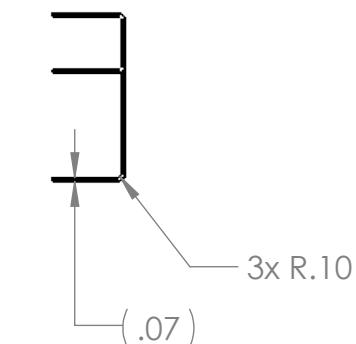
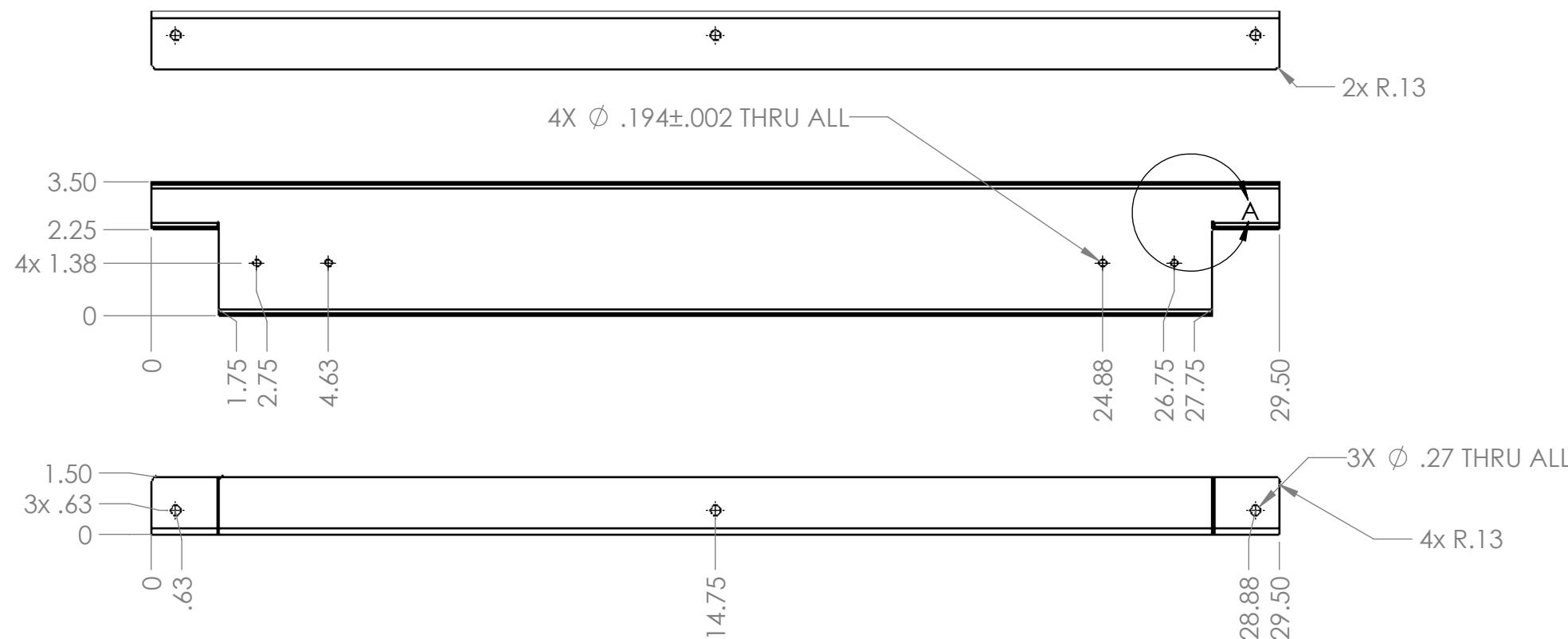
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
B	GE-20101	A			
SCALE: 1:8	WEIGHT:	SHEET 3 OF 5			

4

3

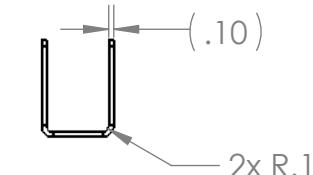
2

1

GE-20101-01
QTY (1)DETAIL A
SCALE 1 : 2

Notes:

1. Material: 14 Ga. Pre-plated steel
2. Remove all burrs and sharp edges.

GE-20101-02
QTY (1)

Notes:

1. Material: 12 Ga. Pre-plated steel
2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES		
		TOLERANCES:		
		FRACTIONAL: ±1/16		
		ANGULAR: MACH ±1° BEND ±1°		
		TWO PLACE DECIMAL ±.01		
		THREE PLACE DECIMAL ±.001		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION

SOLIDWORKS

Modeling Solutions Partner

TITLE: Trench Leg

SIZE DWG. NO. REV

B GE-20101 A

SCALE: 1:8 WEIGHT: SHEET 4 OF 5

4

3

2

1

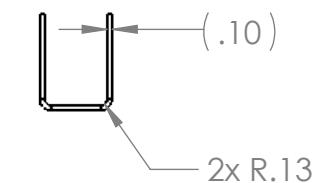
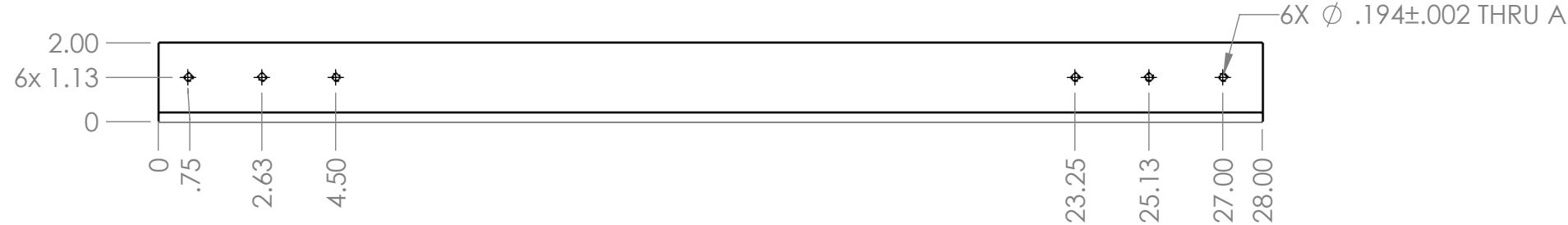
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3

2

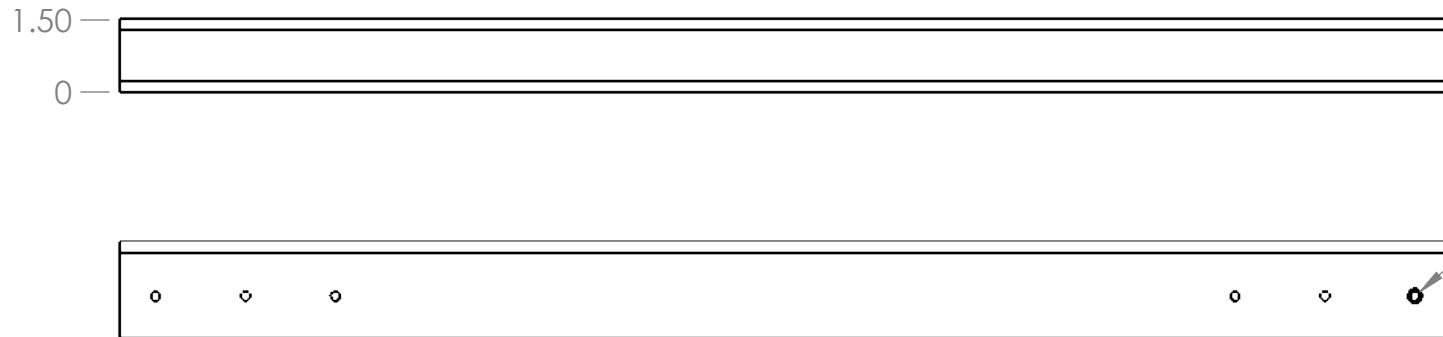
1

GE-20101-03
QTY(2)



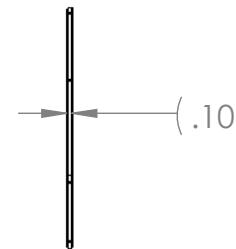
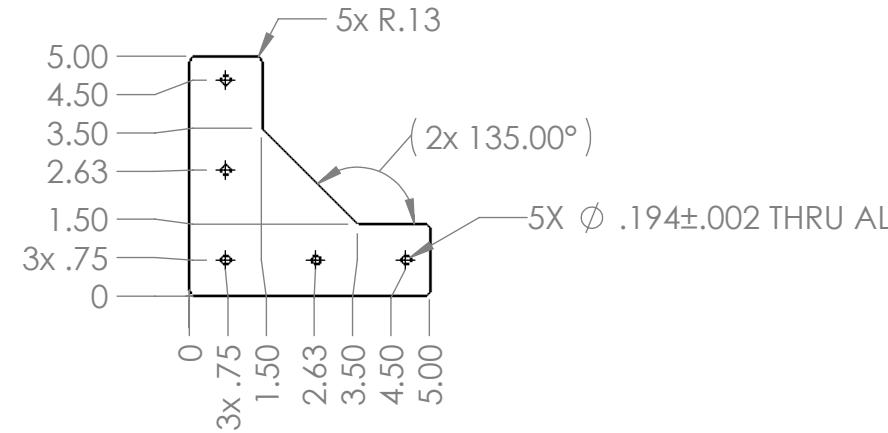
B

B



- Notes:
1. Material: 12 Ga. Pre-plated steel
 2. Remove all burrs and sharp edges.

GE-20101-04
QTY(4)



- Notes:
1. Material: 12 Ga. Pre-plated steel
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
	APPLICATION	DO NOT SCALE DRAWING		
SIZE	DWG. NO.		REV	
B	GE-20101		A	
SCALE: 1:8	WEIGHT:		SHEET	5 OF 5

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Trench Leg

4

3

2

1

4

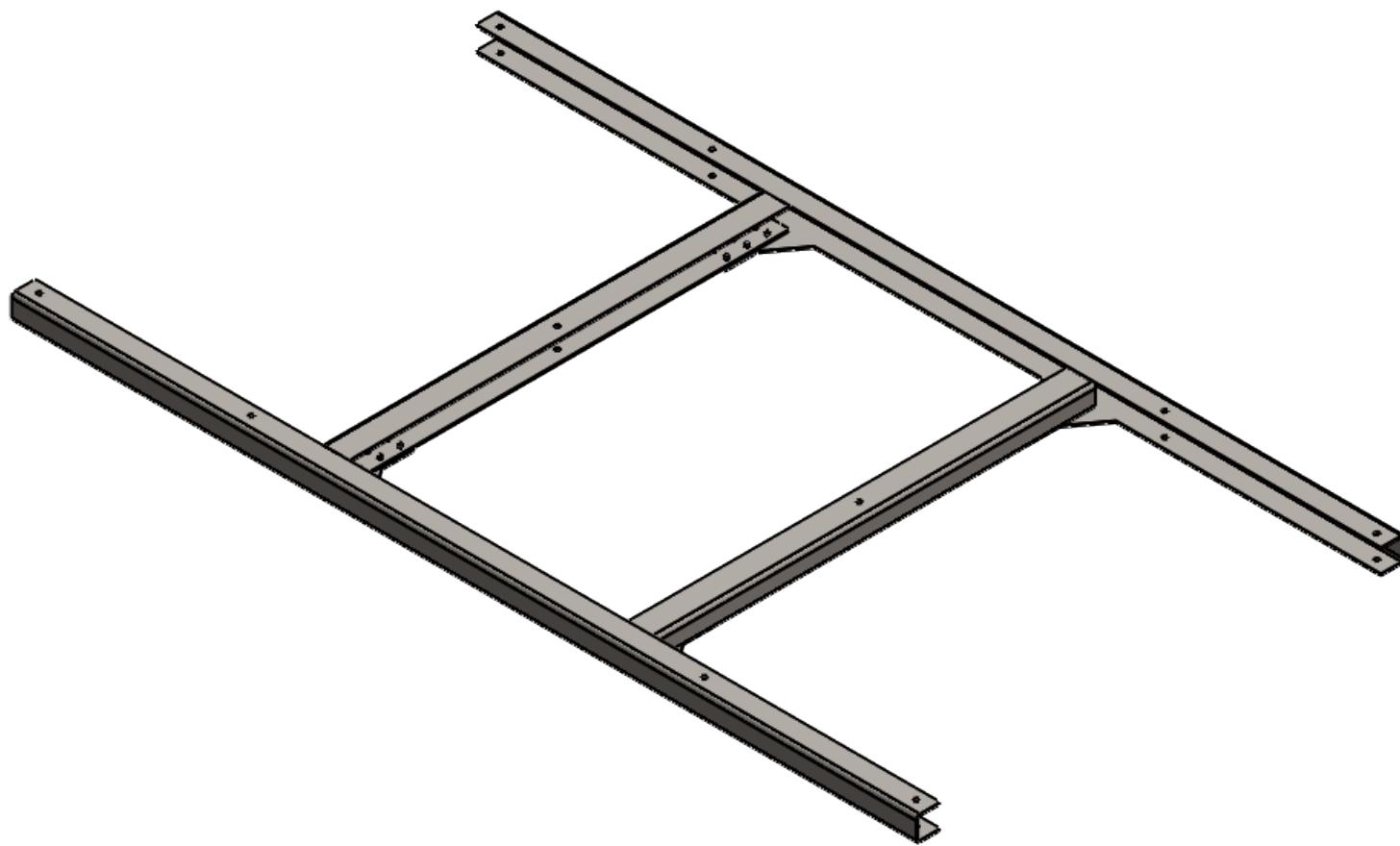
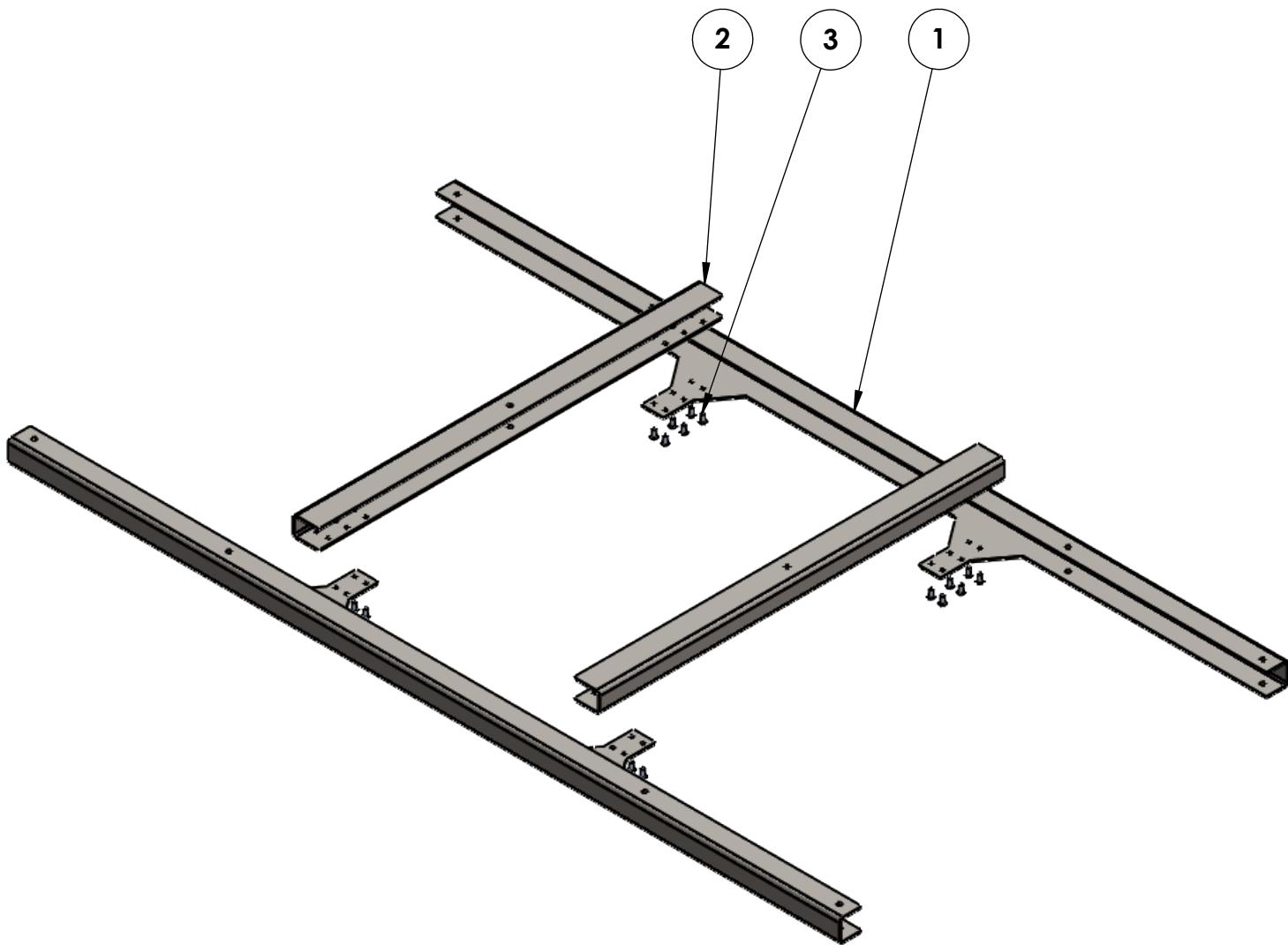
3

2

1

B

B



- Note:**
1. Tag or Label with Part Number
 2. Zinc Plated Steel Rivets (3)

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20102-01	12 Gauge Pre-plated Steel	2
2	GE-20102-02	12 Gauge Pre-plated Steel	2
3	rivet_.1875_.126-.25	3/16" Rivet, .126-.25 Grip Range	24
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001			
DRAWN CHECKED ENG APPR. MFG APPR.			
INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL			
NEXT ASSY APPLICATION			
USED ON FINISH			
COMMENTS:			
TITLE: Trench Top Frame			
SIZE DWG. NO. REV B GE-2012			
SCALE: 1:12 WEIGHT: SHEET 1 OF 3			

4

3

2

1

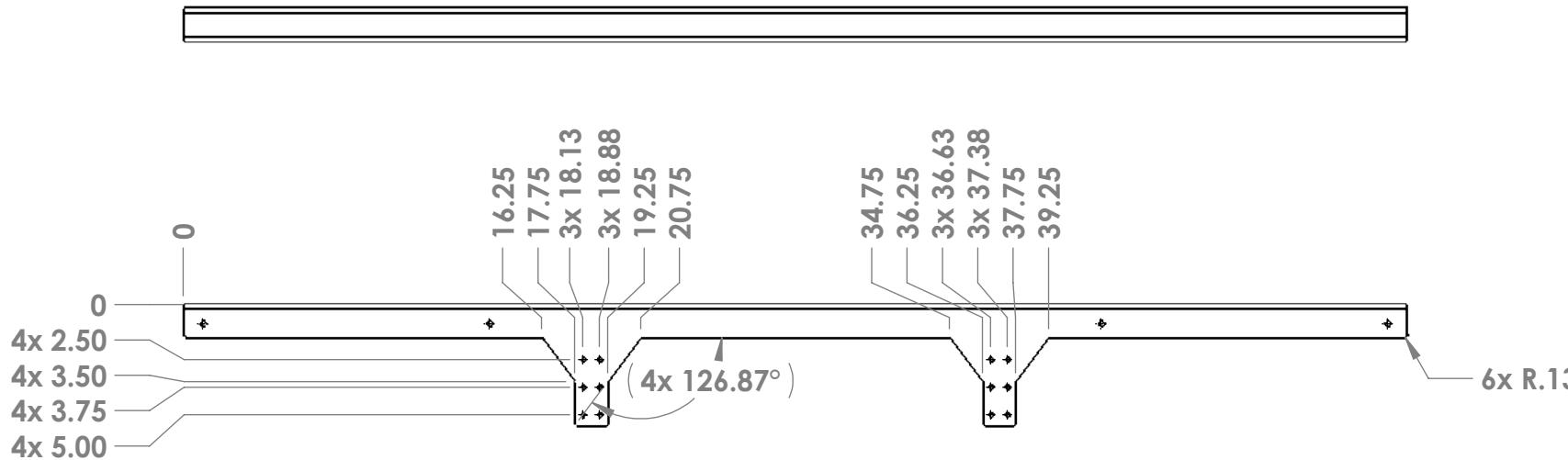
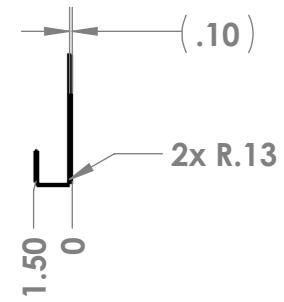
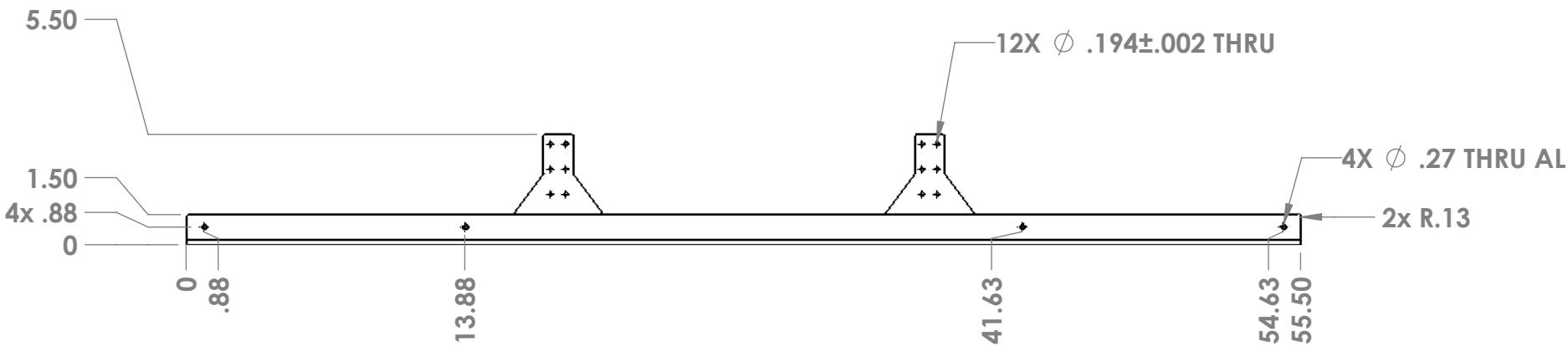
4

3

2

1

GE-20102-01
QTY (2)



A

- Notes:
1. Material: 12 Ga. Pre-plated steel
 2. Remove all burrs and sharp edges

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		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001				
		INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
FIRST ROBOTICS COMPETITION	SOLIDWORKS	Modeling Solutions Partner				
TITLE: Trench Top Frame						
SIZE B	DWG. NO. GE-20102	REV				
SCALE: 1:12	WEIGHT:	SHEET 2 OF 3				

4

3

2

1

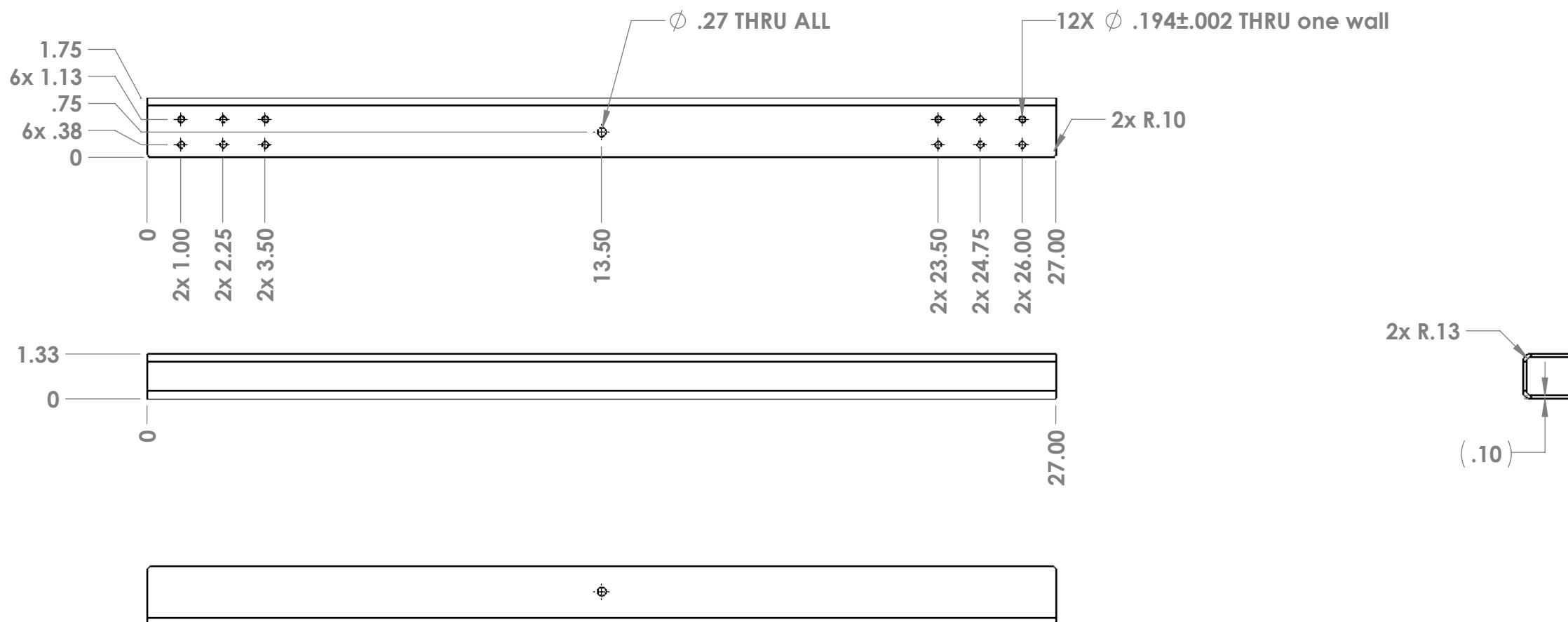
4

3

2

1

GE-20102-02
QTY (2)

**Notes:**

1. Material: 12 Ga. Pre-plated steel
2. Remove all burrs and sharp edges.

4

3

2

1

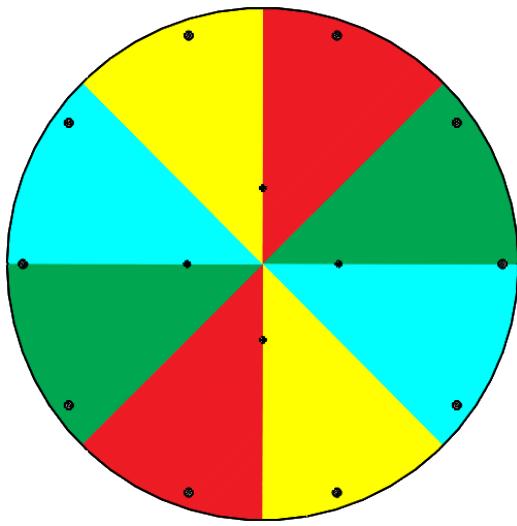
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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001				
		INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
FIRST ROBOTICS COMPETITION	SOLIDWORKS	TITLE: Trench Top Frame				
B	GE-20102	SIZE	DWG. NO.	REV		
SCALE: 1:12	WEIGHT:	SHEET 3 OF 3				

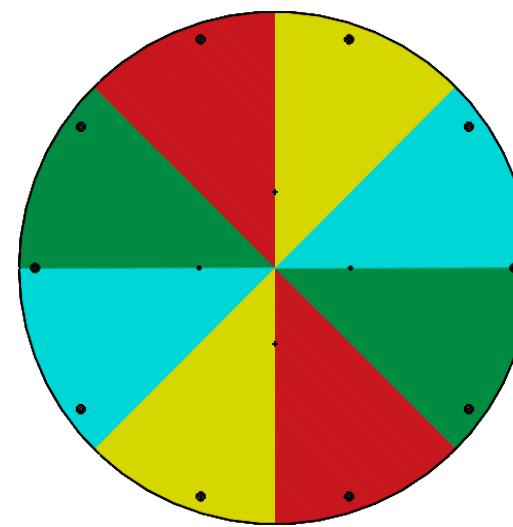
2

1

Top



Bottom



B

B

A

A

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN		
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED		
		MATERIAL	ENG APPR.		
			MFG APPR.		
			Q.A.		
		COMMENTS:			
	NEXT ASSY	USED ON			
	APPLICATION	FINISH			
		DO NOT SCALE DRAWING			
SIZE		DWG. NO.	REV		
A		GE-20104			
SCALE: 1:12			WEIGHT:	SHEET 1 OF 5	

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SOLIDWORKS
Modeling Solutions Partner

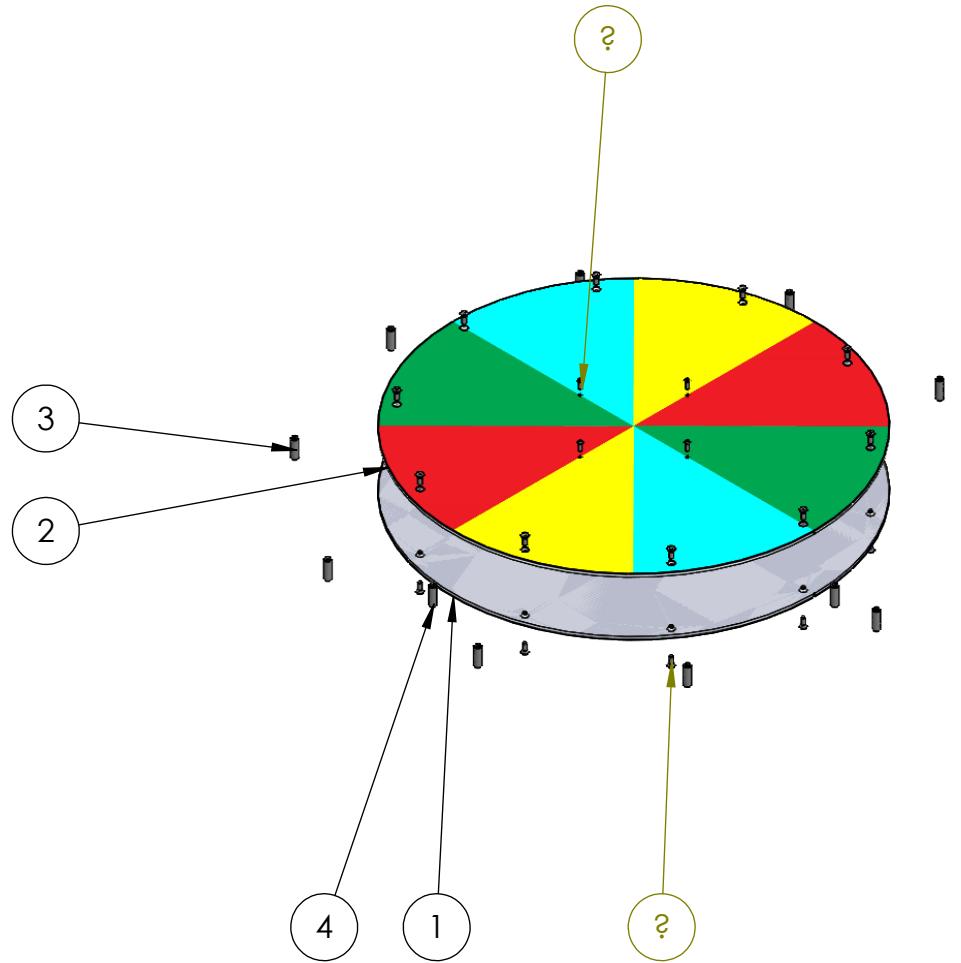
TITLE:

Control Panel

2

1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20105	Bottom Control Panel	1
2	GE-20106	Top Control Panel	1
3	93330A662	Threaded_standoff_.25_1.5	10
4	91125A421	Threaded standoff 10-32 x 1.5"	4
5	Flat Hex .25_20_.75	Flat Hex .25_20_.75	20
6	round_hex_10_32_.625_full	Round Hex Head, #10-32 x 5/8" long, fully threaded	4



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		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND \pm TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$
		INTERPRET GEOMETRIC TOLERANCING PER:
		MATERIAL
NEXT ASSY	USED ON	FINISH
	APPLICATION	DO NOT SCALE DRAWING

D:		NAME	DATE
	DRAWN		
	CHECKED		
1°	ENG APPR.		
	MFG APPR.		
	Q.A.		



TITLE:

Control Panel

SIZE	DWG. NO.	REV
A	GE-20104	
SCALE: 1:12 WEIGHT:		SHEET 2 OF 5

2

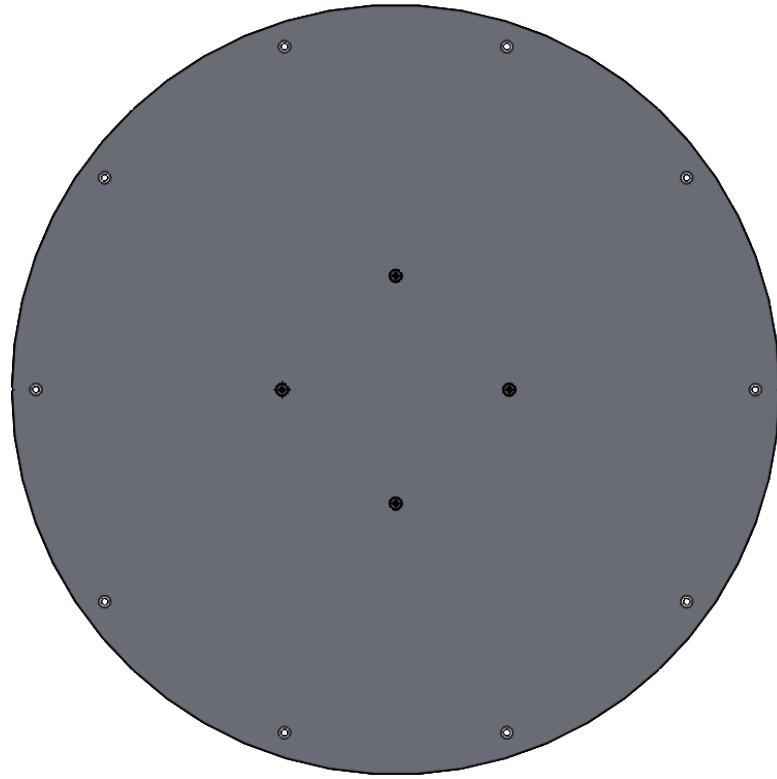
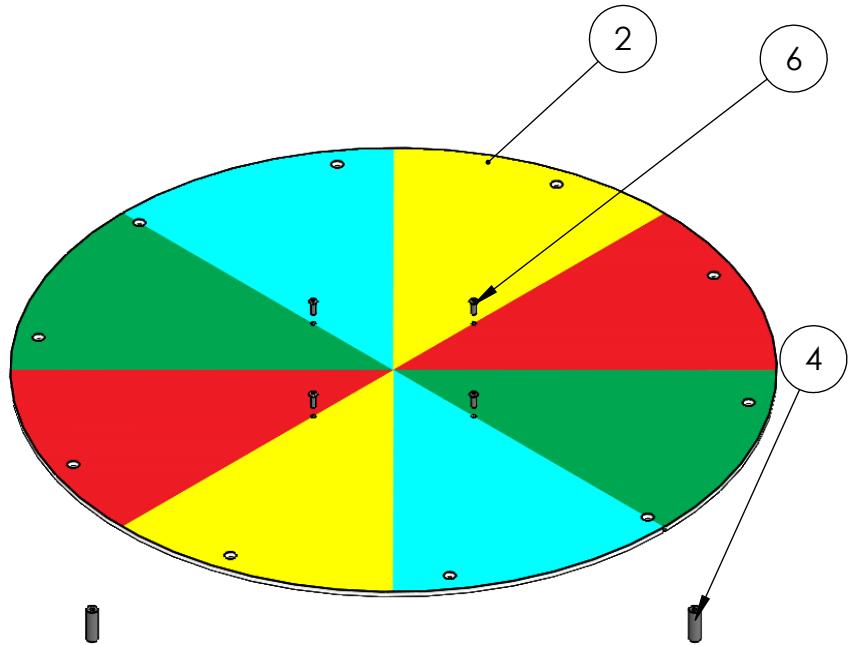
1

2

1

B

B



Notes:

1. Remove Protective backing
2. Attach (4) to (2) using (6) 4 spots.

Bottom

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		UNLESS OTHERWISE SPECIFIED:		DRAWN	NAME	DATE			
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$							
INTERPRET GEOMETRIC TOLERANCING PER:									
		MATERIAL		Q.A.					
NEXT ASSY	USED ON	FINISH		COMMENTS:					
APPLICATION		DO NOT SCALE DRAWING							



SOLIDWORKS
Modeling Solutions Partner

TITLE:

Control Panel

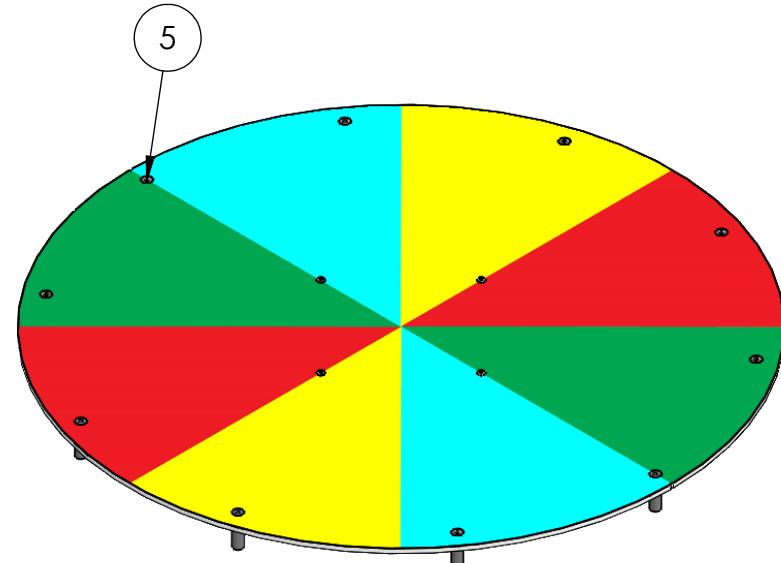
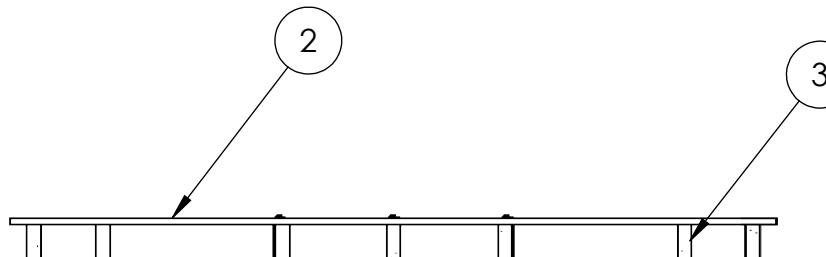
SIZE	DWG. NO.	REV
A	GE-20104	
SCALE: 1:12	WEIGHT:	SHEET 3 OF 5

2

1

2

1



B

B

Notes:

1. Attach (3) to (2) using (5).

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

SIZE	DWG. NO.	REV
A	GE-20104	
SCALE: 1:12	WEIGHT:	SHEET 4 OF 5

 **FIRST
ROBOTICS
COMPETITION** 
Modeling Solutions Partner

TITLE:

Control Panel

2

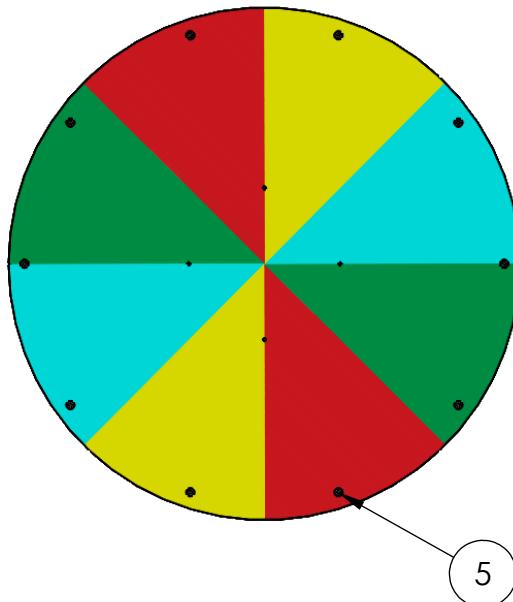
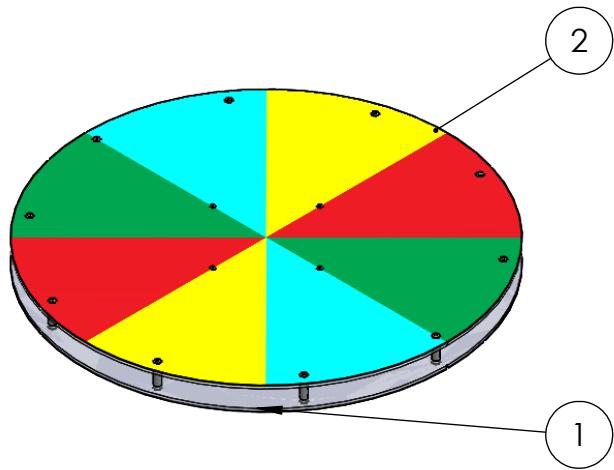
1

2

1

B

B



Notes:

1. Remove the protective backing from 1.
2. Align colors to match
3. Attach 1 to 2 using 5

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		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

 **FIRST
ROBOTICS
COMPETITION** 
Modeling Solutions Partner

TITLE:

Control Panel

SIZE	DWG. NO.	REV
A	GE-20104	
SCALE: 1:12	WEIGHT:	SHEET 5 OF 5

2

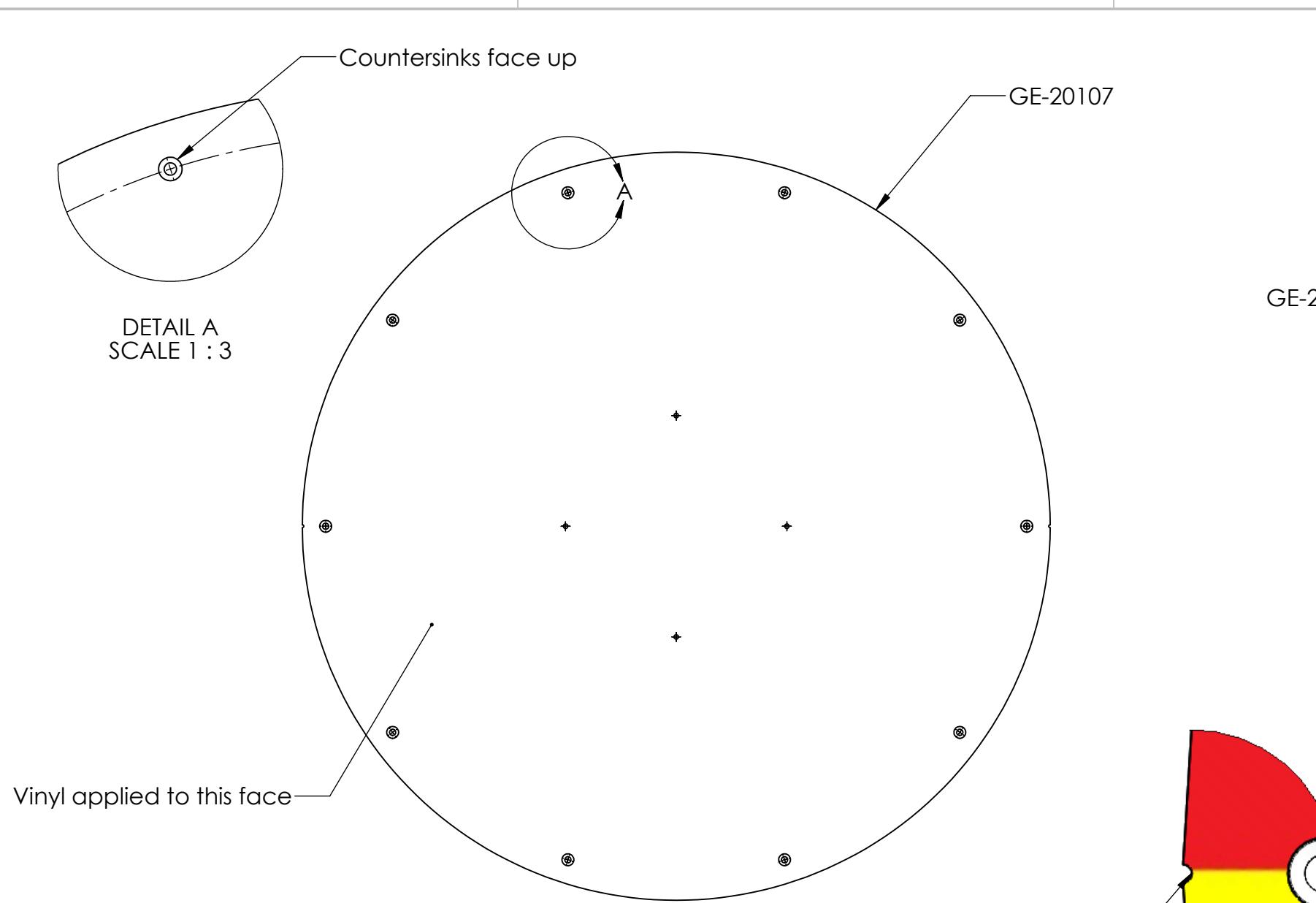
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4

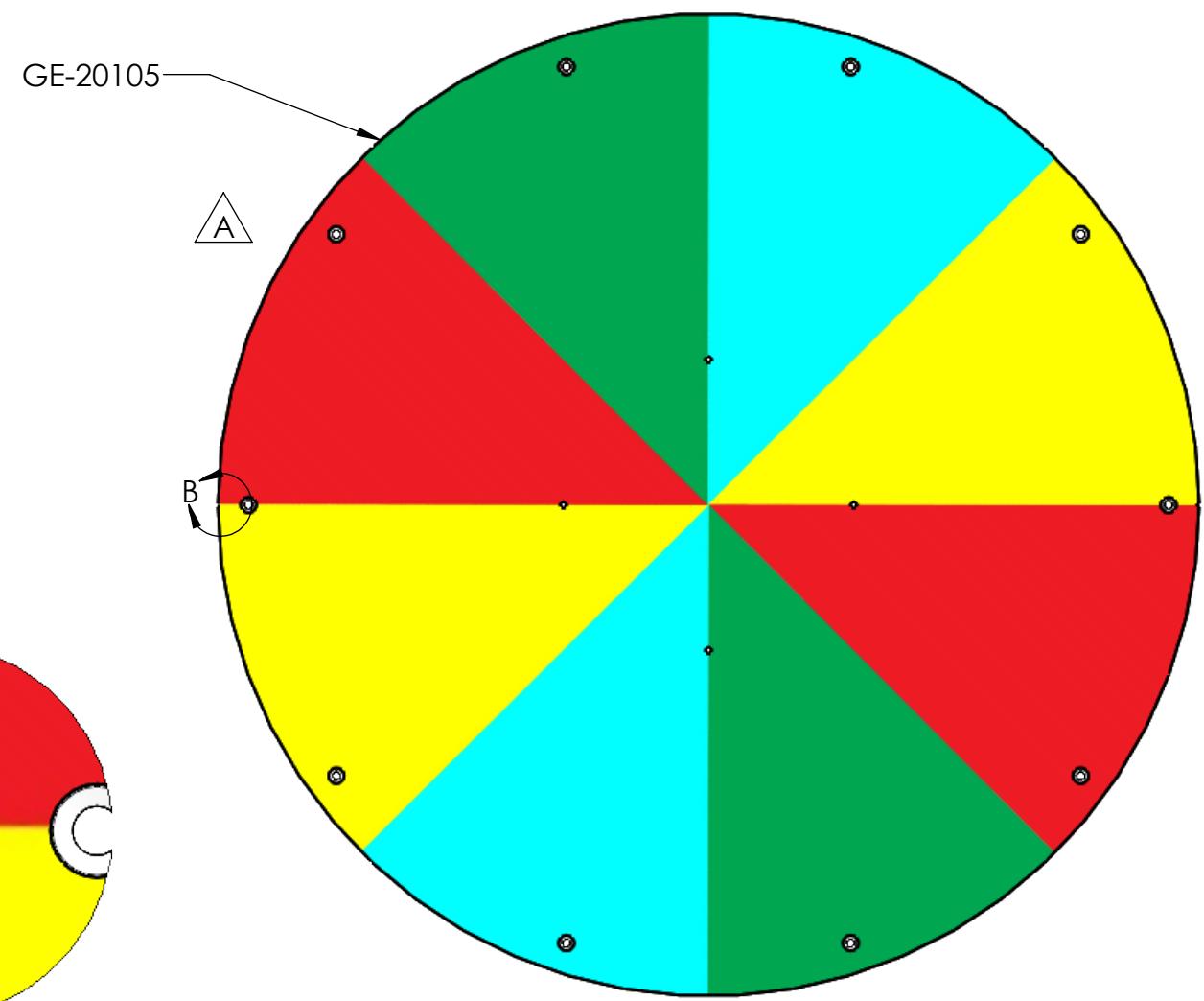
3

2

1



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B2	A	Image updated, color pattern reversed.	12/7/2019	CPO



DETAIL B
SCALE 1 : 1

Part Number	Vinyl Image	QTY per field
GE-20105	GE-20105-Vinyl	3

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		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION	DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV			
B	GE-20105	A			
SCALE: 1:6	WEIGHT:	SHEET 1 OF 1			

 FIRST
ROBOTICS
COMPETITION  SOLIDWORKS
Modeling Solutions Partner

TITLE:
Bottom Control Panel

SIZE DWG. NO. REV
B GE-20105 A
SCALE: 1:6 WEIGHT: SHEET 1 OF 1

4

3

2

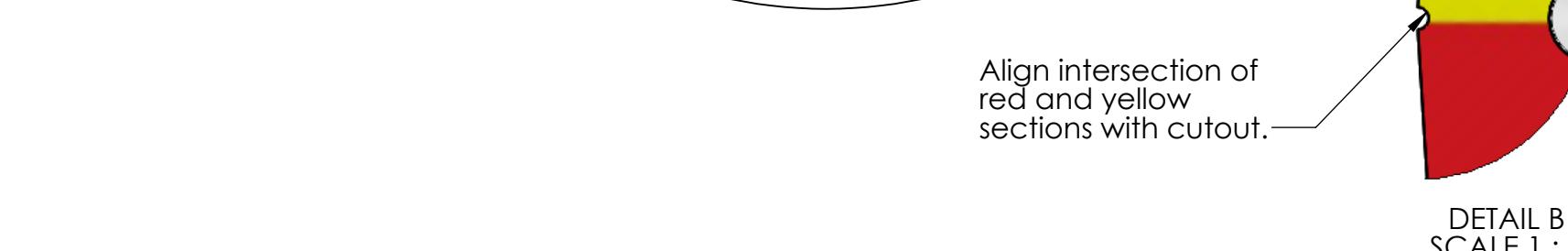
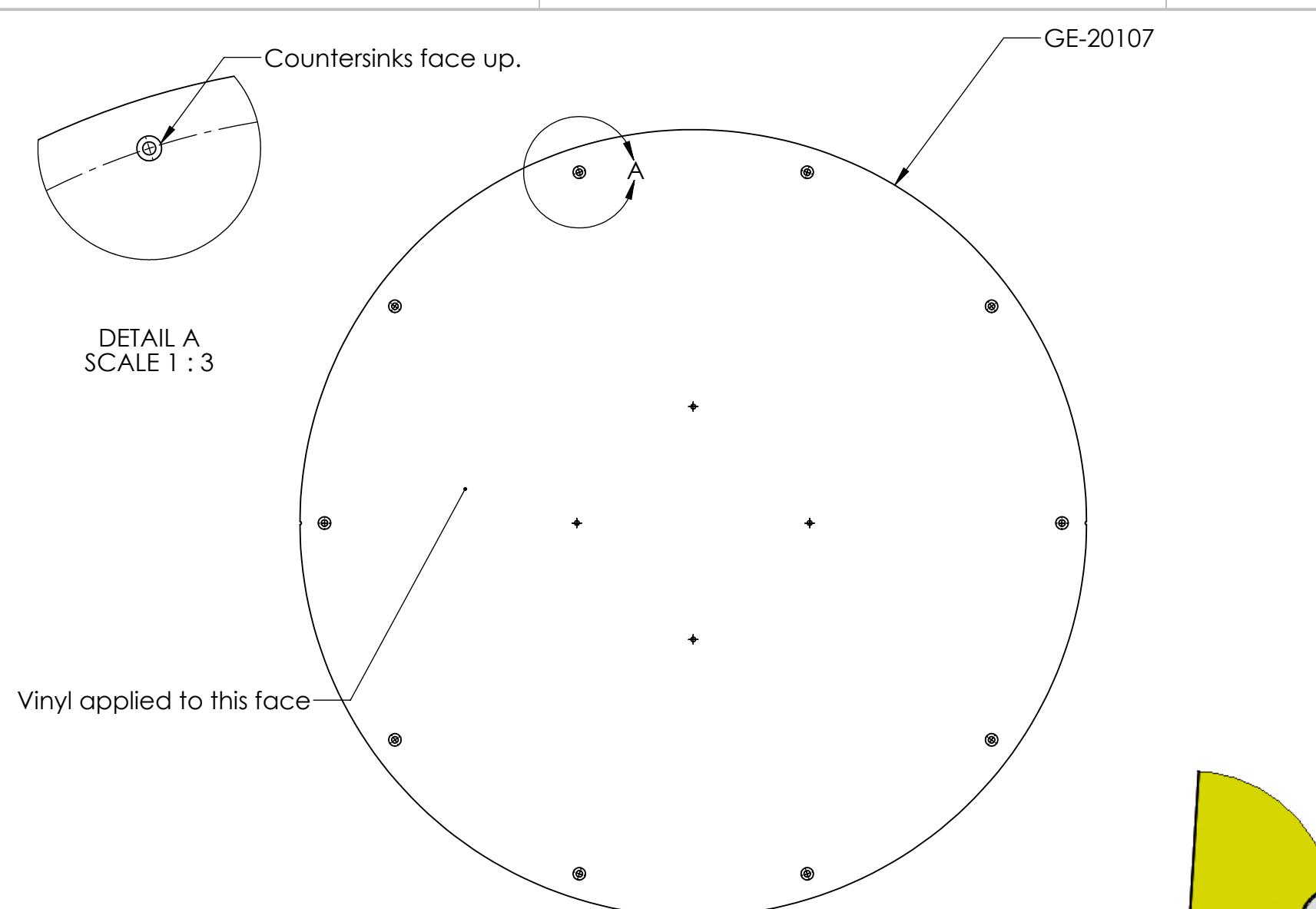
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4

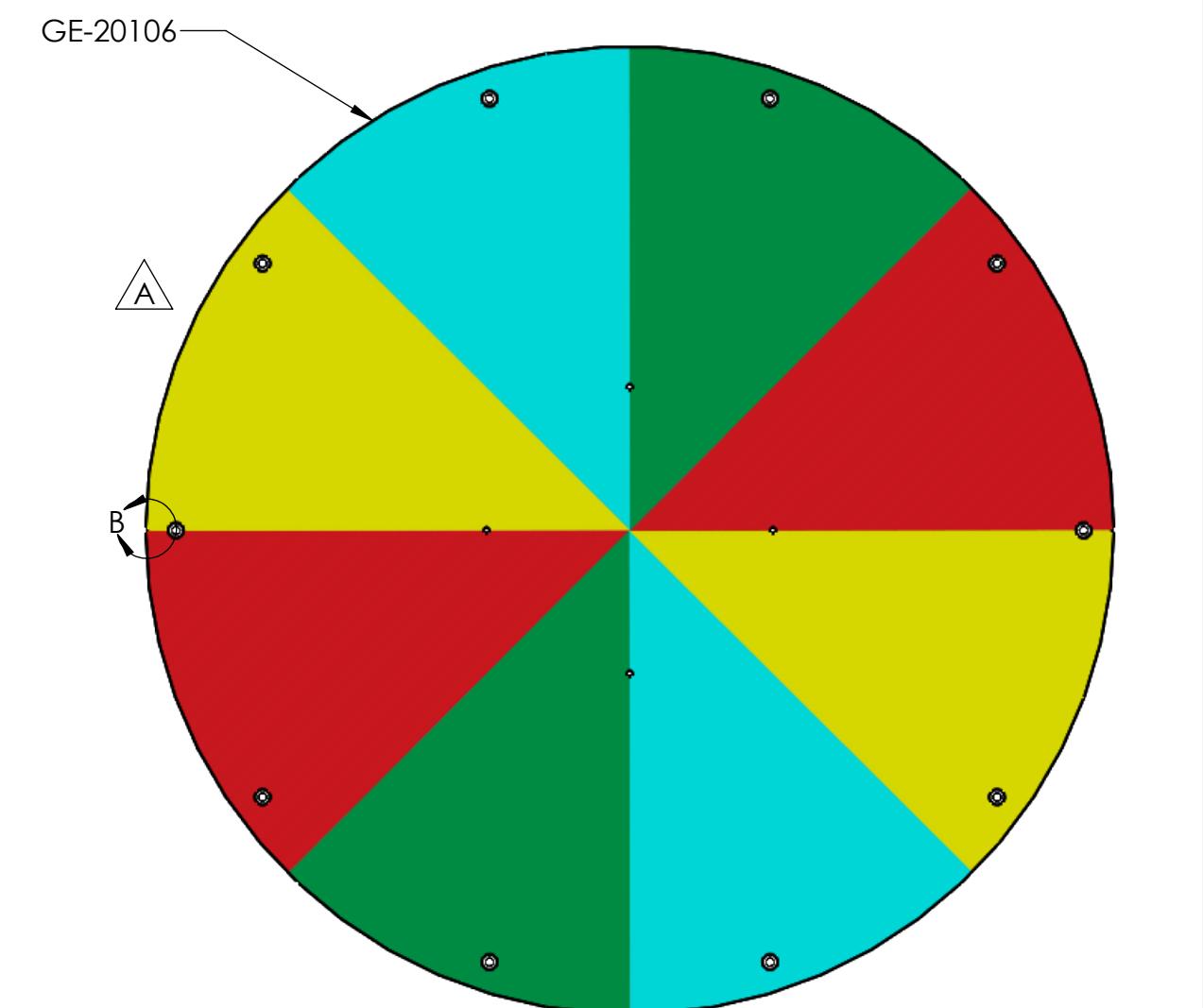
3

2

1



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B2	A	Image updated, color pattern reversed	12/7/2019	CPO



Part Number	Vinyl Image	QTY per field
GE-20106	GE-20106-Vinyl	3

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION

SOLIDWORKS

TITLE: Top Control Panel

SIZE DWG. NO. REV
B GE-20106 A

SCALE: 1:6 WEIGHT: SHEET 1 OF 1

4

3

2

1

4

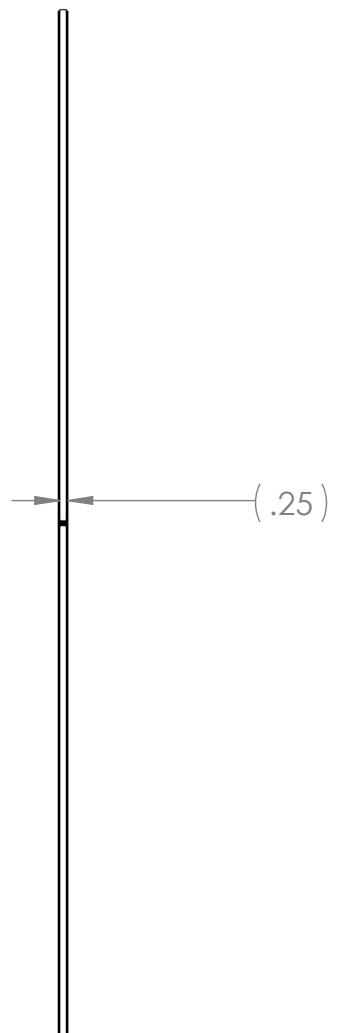
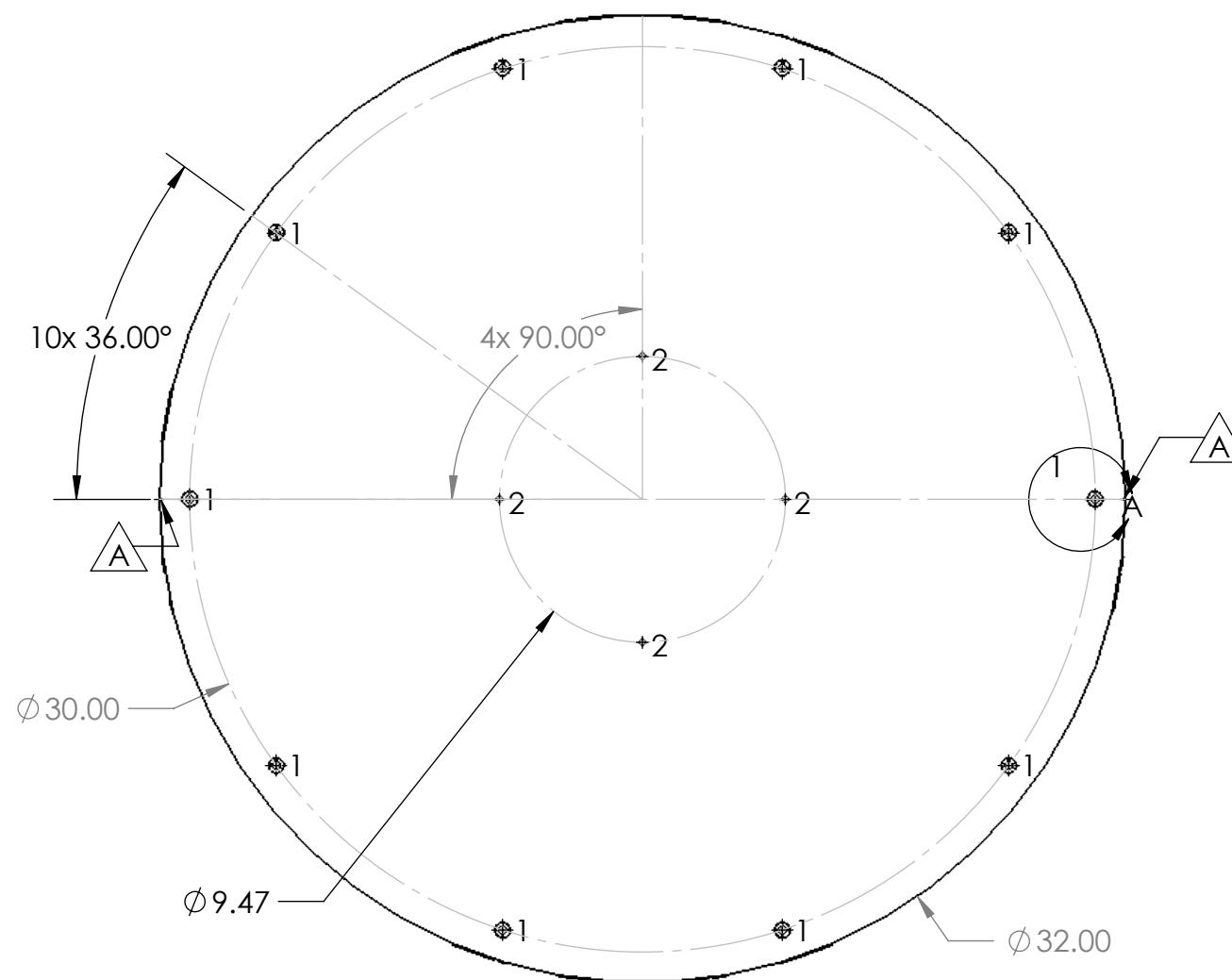
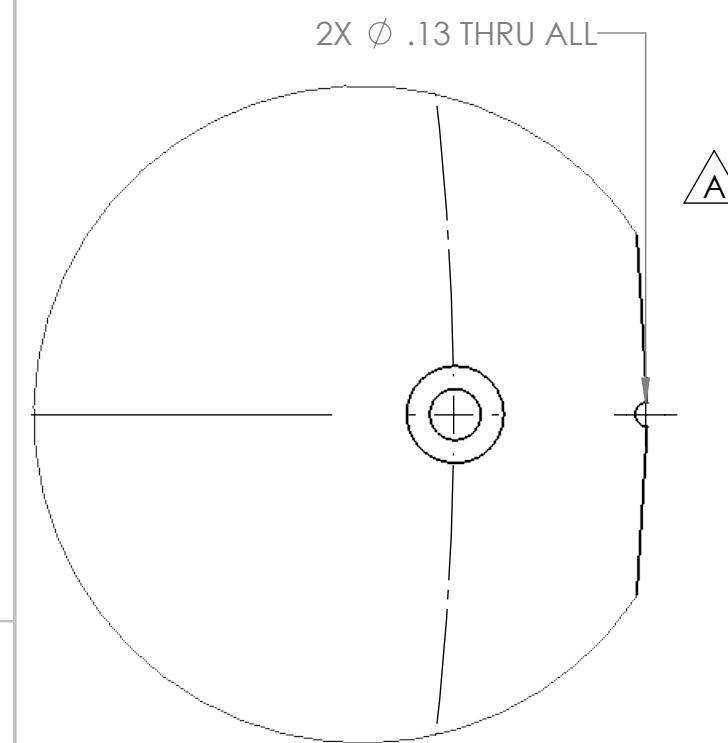
3

2

1

TAG	SIZE	QUANTITY
1	∅ .27 THRU ALL ✓ ∅ .51 X 82°	10
2	∅ .19 THRU ALL	4

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B2, B3, B4	A	0.125" Alignment holes for vinyl	10/21/2019	NTW



Notes:

- NOTES:

 1. Material: 0.25" Clear Polycarbonate
 2. Remove all burrs and sharp edges.
 3. Label or Tag with Part Number

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION  SOLIDWORKS <small>Modeling Solutions Partner</small>
		DIMENSIONS ARE IN INCHES	DRAWN			
		TOLERANCES:	CHECKED			
		FRACTIONAL $\pm 1/16$	ENG APPR.			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.			
		TWO PLACE DECIMAL $\pm .01$	Q.A.			
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:			
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
SIZE B DWG. NO. GE-20107 REV A SCALE: 1:8 WEIGHT: SHEET 1 OF 1						

Control Panel Plastic

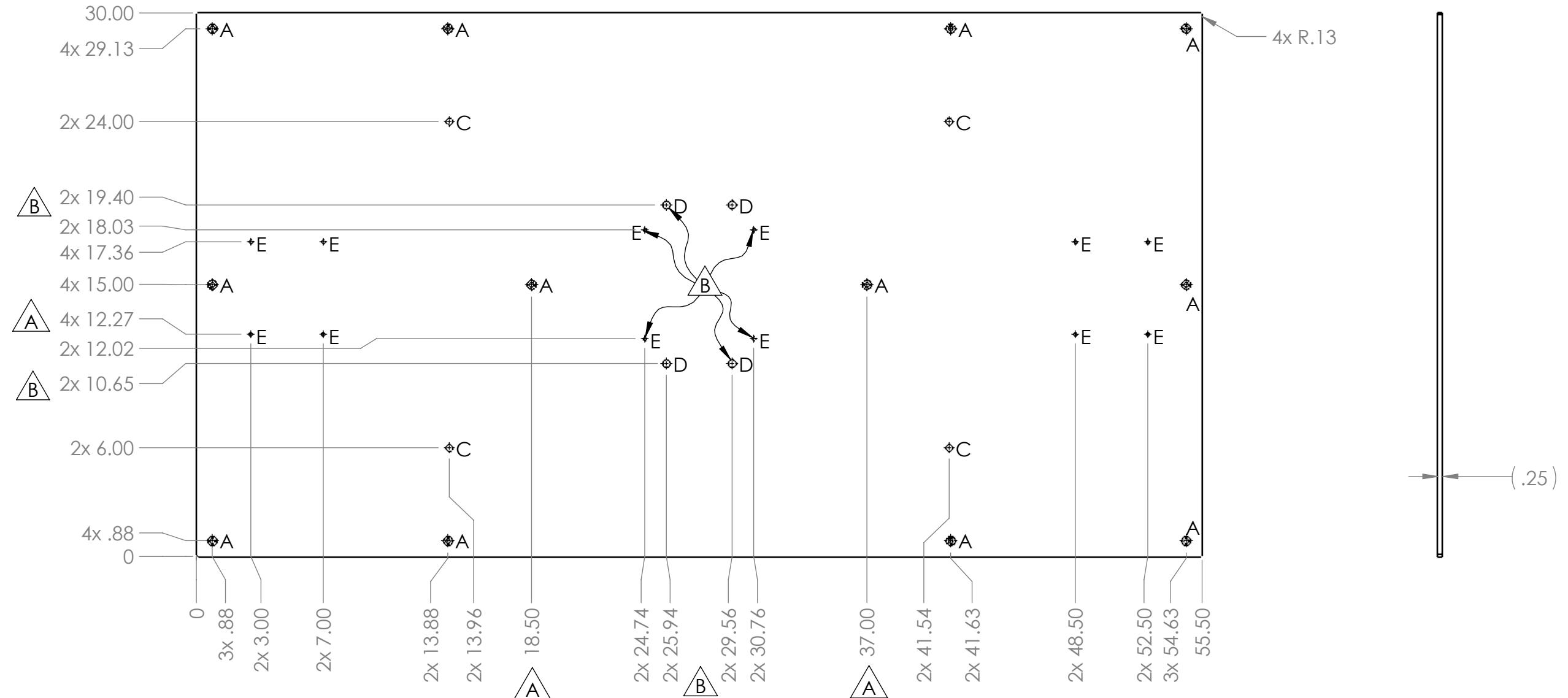
E DWG. NO. GE 20107 REV A

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

TAG	SIZE	QUANTITY
A	$\phi .27$ THRU ALL $\checkmark \phi .51 \times 82^\circ$	12
C	$\phi .38$ THRU ALL	4
D	$\phi .44$ THRU ALL	4
E	$\phi .20$ THRU ALL	12

B
B

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2, A3, B4	A	Moved holes to align with part	9/19/2019	NTW
A3, A4, B2, B3, B4	B	Added Second set of D size holes. Change holes to match #10 size to match remaining E size	9/24/2019	NTW



- Notes:
1. Material: 0.25" Clear Polycarbonate
 2. Remove all burrs and sharp edges.
 3. Label or Tag with Part Number

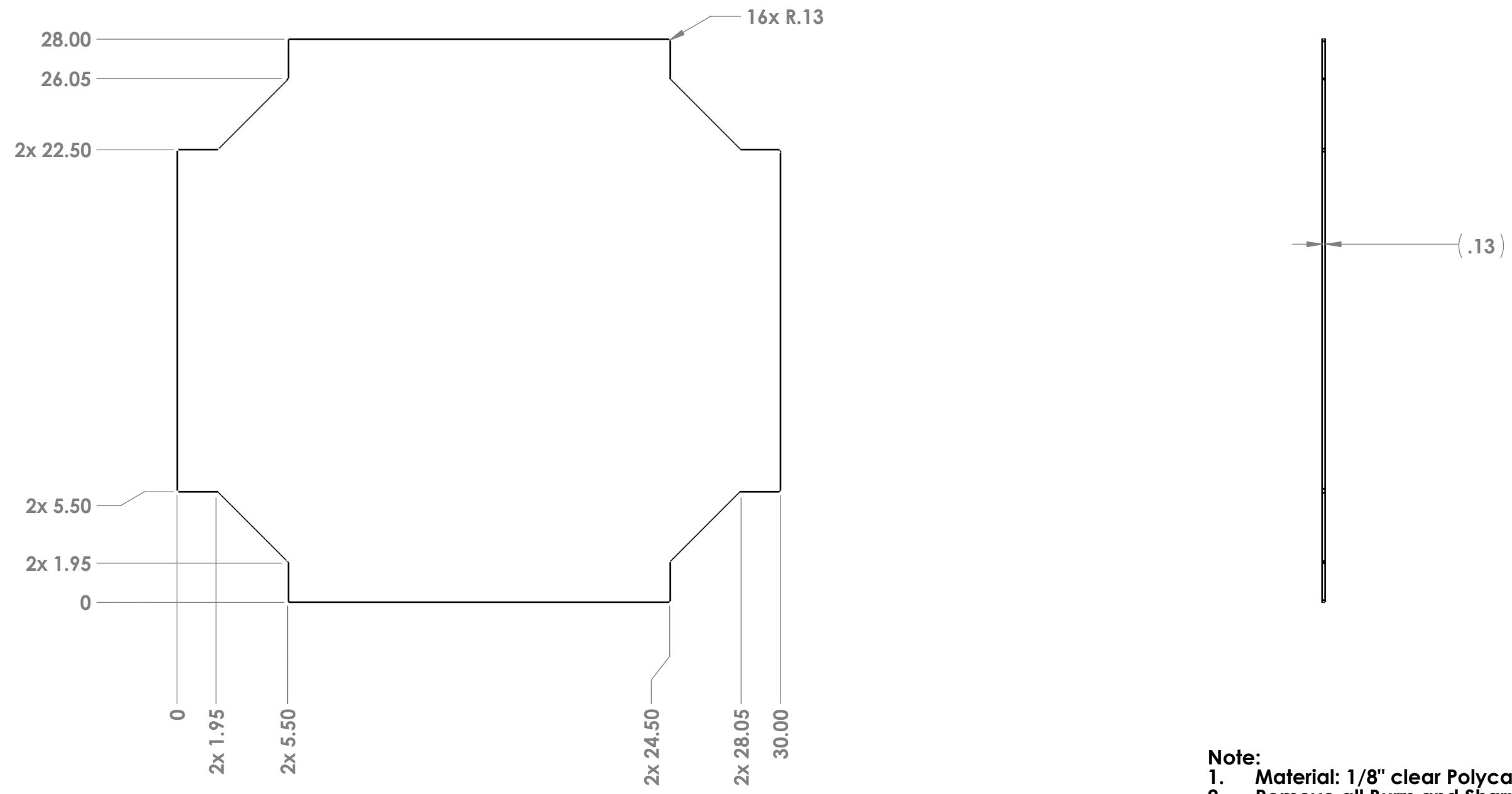
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN	NTW	8/29/19
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		
SIZE	DWG. NO.		REV	
B	GE-20114		B	
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Trench Top Plastic



Note:

1. Material: 1/8" clear Polycarbonate
 2. Remove all Burrs and Sharp edges
 3. Label or Tag with Part Number

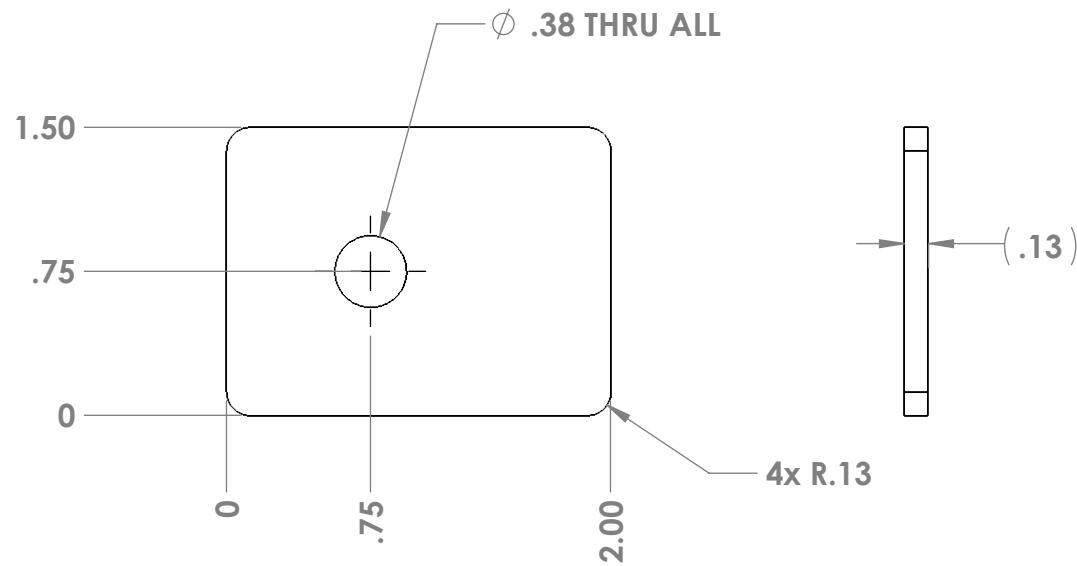
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION 
		DIMENSIONS ARE IN INCHES	DRAWN			
		TOLERANCES:	CHECKED			
		FRACTIONAL $\pm 1/16$	ENG APPR.			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.			
		TWO PLACE DECIMAL $\pm .01$	Q.A.			
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				

2

1

B

B

**Notes:**

1. Material: 0.125" Black HDPE Smooth Finish
2. Remove all burrs and sharp edges.
3. Bag and Label with part number

A

A

		UNLESS OTHERWISE SPECIFIED:		DRAWN	NAME	DATE		
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$						
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		CHECKED	ENG APPR.	MFG APPR.		
NEXT ASSY	USED ON	FINISH						
APPLICATION		DO NOT SCALE DRAWING		COMMENTS:				
FIRST	SOLIDWORKS	Modeling Solutions Partner						
TITLE: Flange for control panel								
SIZE	DWG. NO.			REV				
A	GE-20121							
SCALE: 1:1 WEIGHT: SHEET 1 OF 1								

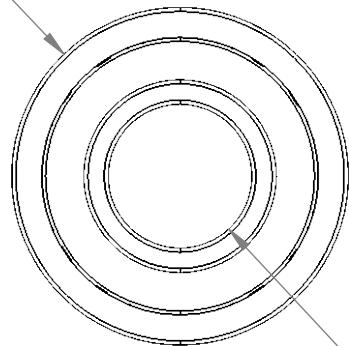
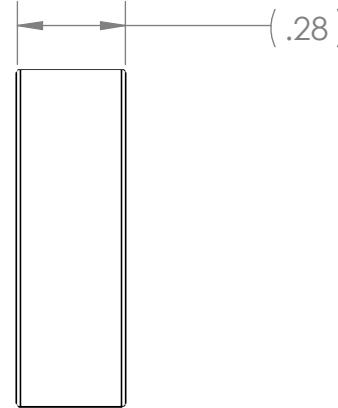
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2

1

B

B

 $(\phi .88)$  $\phi .38$ 

Notes:

1. 0.375" id shielded bearing (R6ZZ)

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		UNLESS OTHERWISE SPECIFIED:				NAME	DATE
		DIMENSIONS ARE IN INCHES			DRAWN		
		TOLERANCES:			CHECKED		
		FRACTIONAL $\pm 1/16$			ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$			Q.A.		
		THREE PLACE DECIMAL $\pm .001$			COMMENTS:		
		INTERPRET GEOMETRIC					
		TOLERANCING PER:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					



SOLIDWORKS
Modeling Solutions Partner

TITLE:

0.375" id bearing
shielded

SIZE	DWG. NO.	REV
A	GE-20122	
SCALE: 2:1	WEIGHT:	SHEET 1 OF 1

4

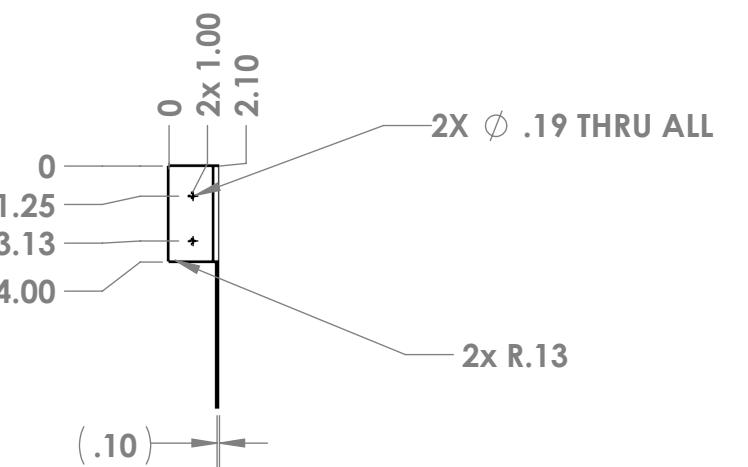
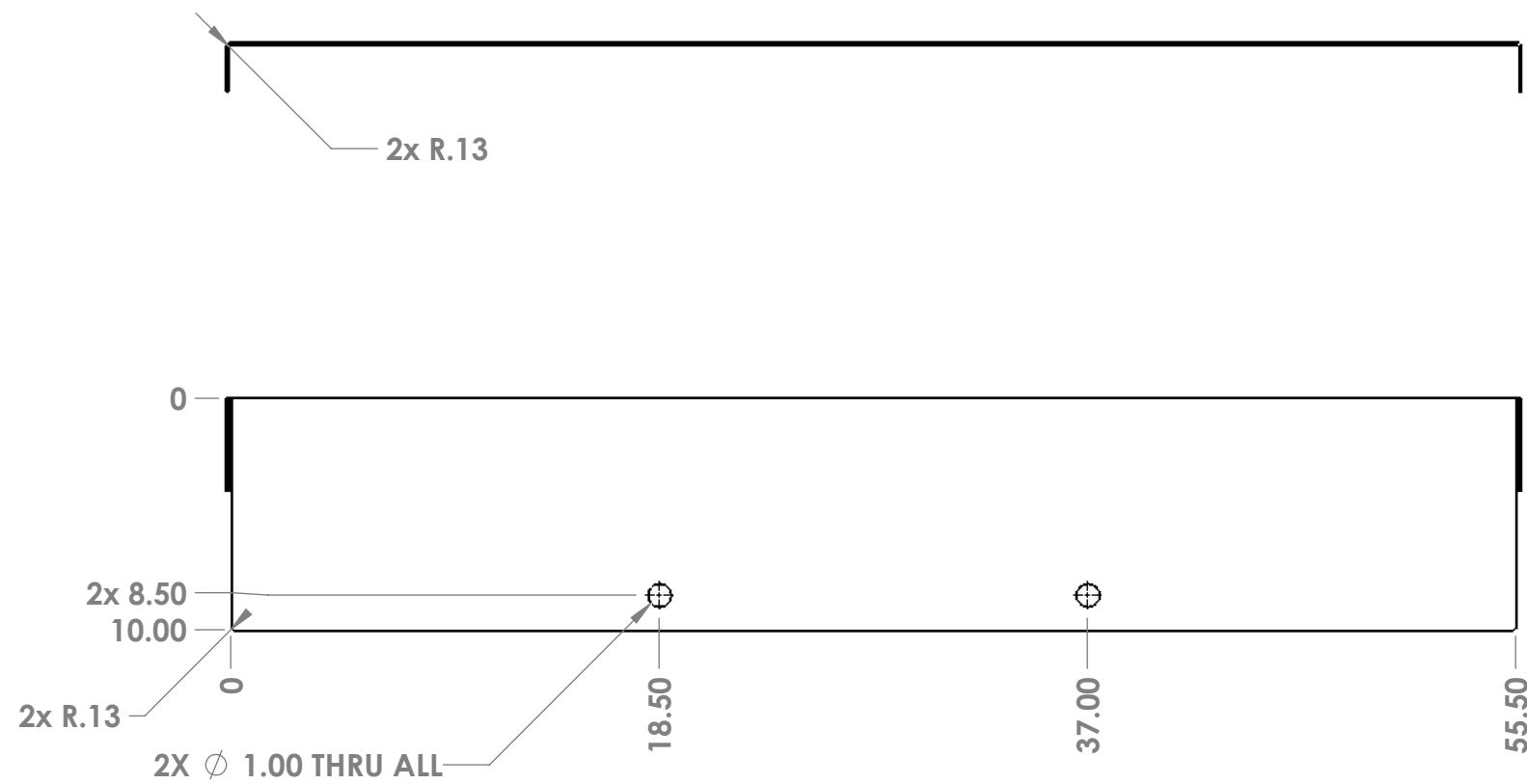
3

2

1

B

B

**Notes:**

1. Material: 12 Ga. Pre Plated Steel
2. Remove all burrs and sharp edges.
3. Label or Tag with part number

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$				
		INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Trench Base

SIZE	DWG. NO.	REV
B	GE-20123	
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1

4

3

2

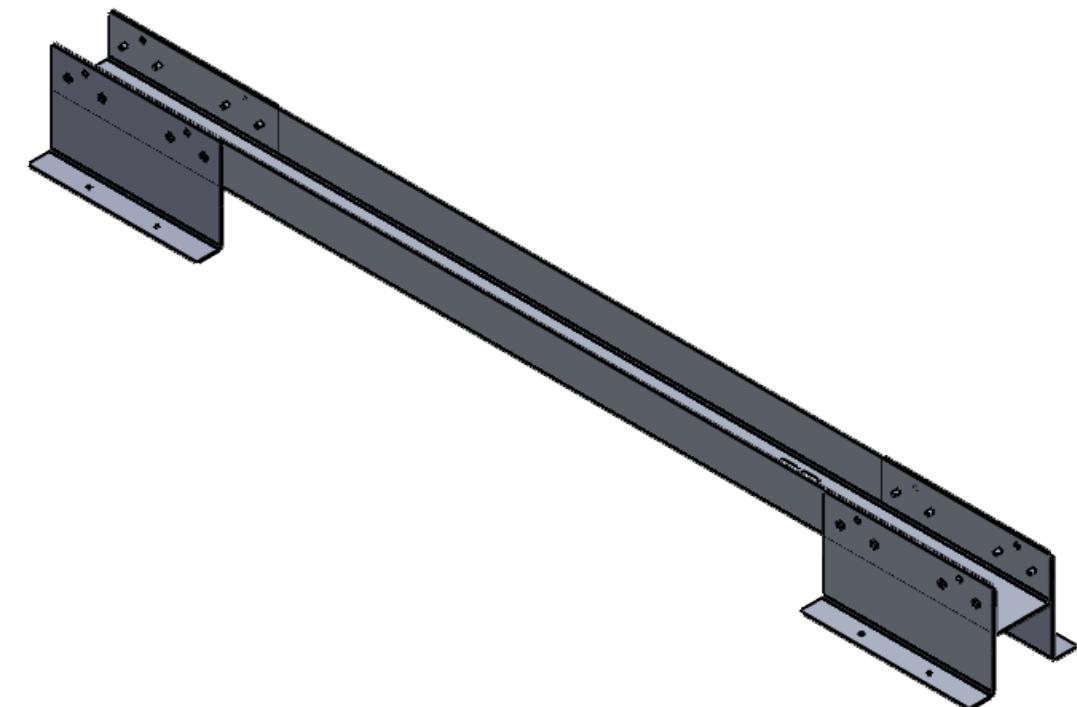
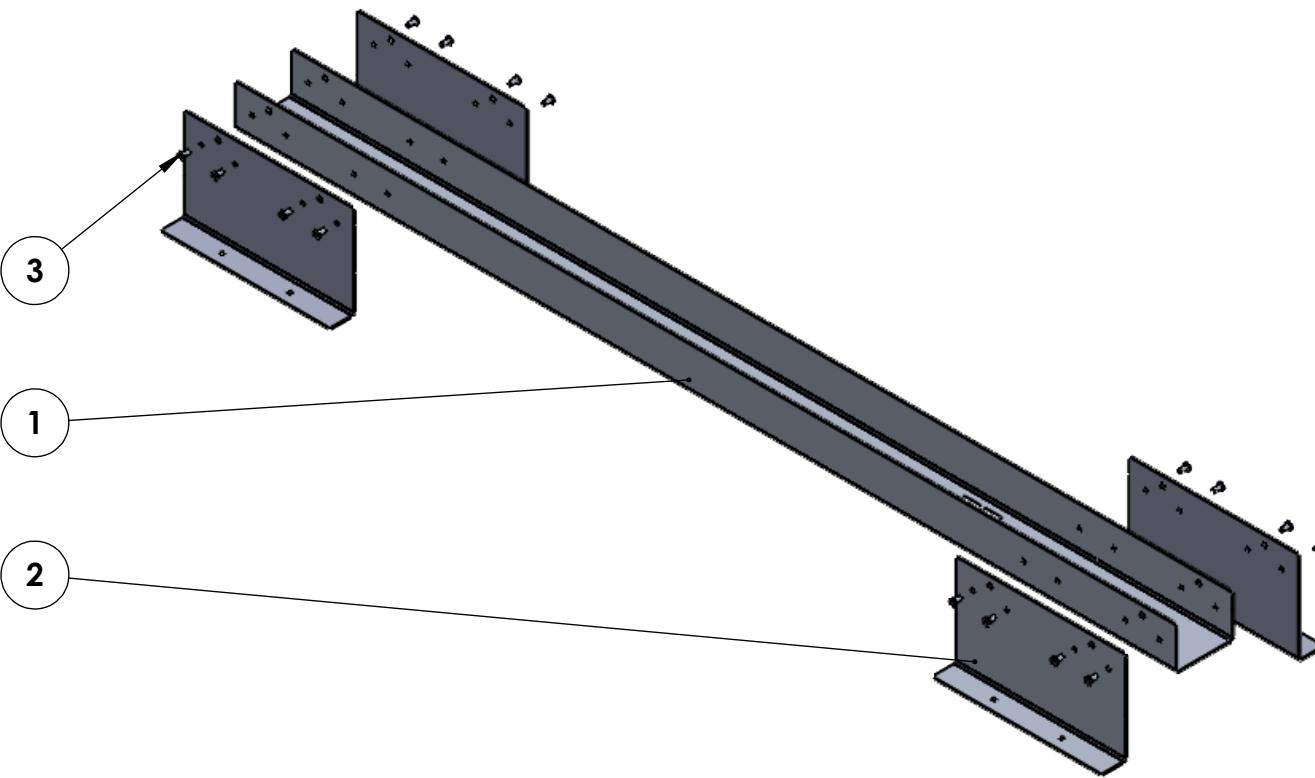
1

4

3

2

1



Note:
Tag or Label with part number

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20140-01	12 Gauge Aluminum	1
2	GE-20140-03	12 Gauge Aluminum	4
3	rivet_.1875_.126-.25	3/16" Rivet, .126-.25 Grip Range	16
FIRST ROBOTICS COMPETITION			
Sensor Housing Assembly			
SIZE	DWG. NO.	REV	
B	GE-20140		
SCALE: 1:8 WEIGHT: SHEET 1 OF 3			
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001 INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL NEXT ASSY USED ON FINISH APPLICATION DO NOT SCALE DRAWING			
DRAWN NAME DATE CHECKED ENG APPR. MFG APPR. Q.A. COMMENTS:			

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4

3

2

1

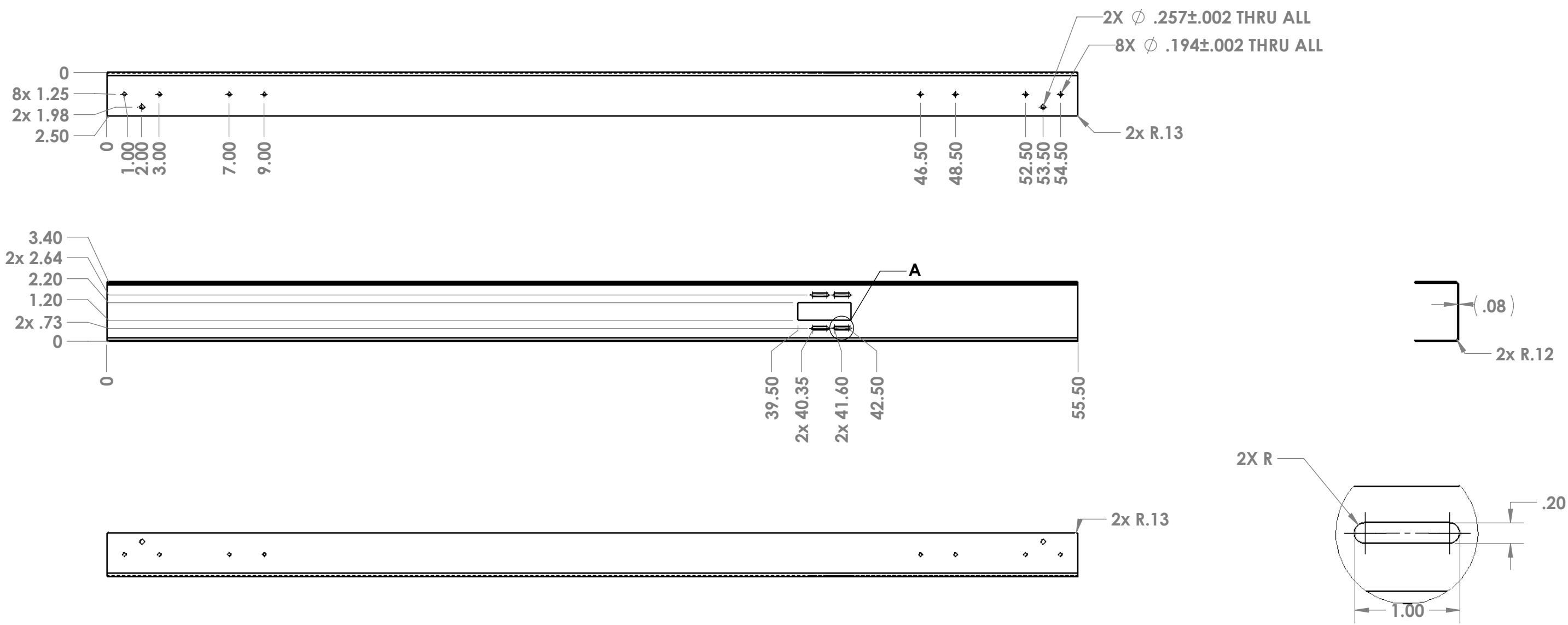
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3

2

1

GE-20140-01
QTY(1)



Notes:
 1. Material: 12 Ga. Aluminum 5052
 2. Remove all burrs and sharp edges.

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DIMENSIONS ARE IN INCHES		TOLERANCES:		DRAWN	
FRACTIONAL $\pm 1/16$		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		CHECKED	
TWO PLACE DECIMAL $\pm .01$		THREE PLACE DECIMAL $\pm .001$		ENG APPR.	
				MFG APPR.	
		INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.	
		MATERIAL		COMMENTS:	
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

Sensor Housing Assembly

SIZE	DWG. NO.	REV
B	GE-20140	
SCALE: 1:8	WEIGHT:	SHEET 2 OF 3

4

3

2

1

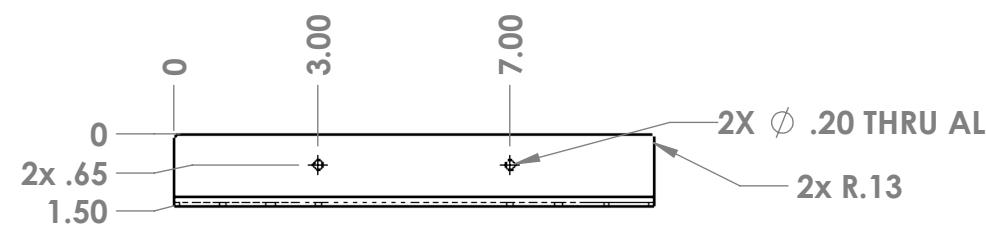
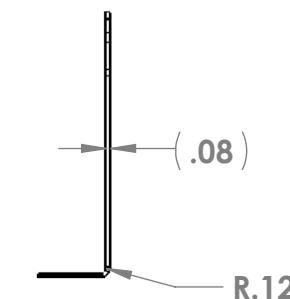
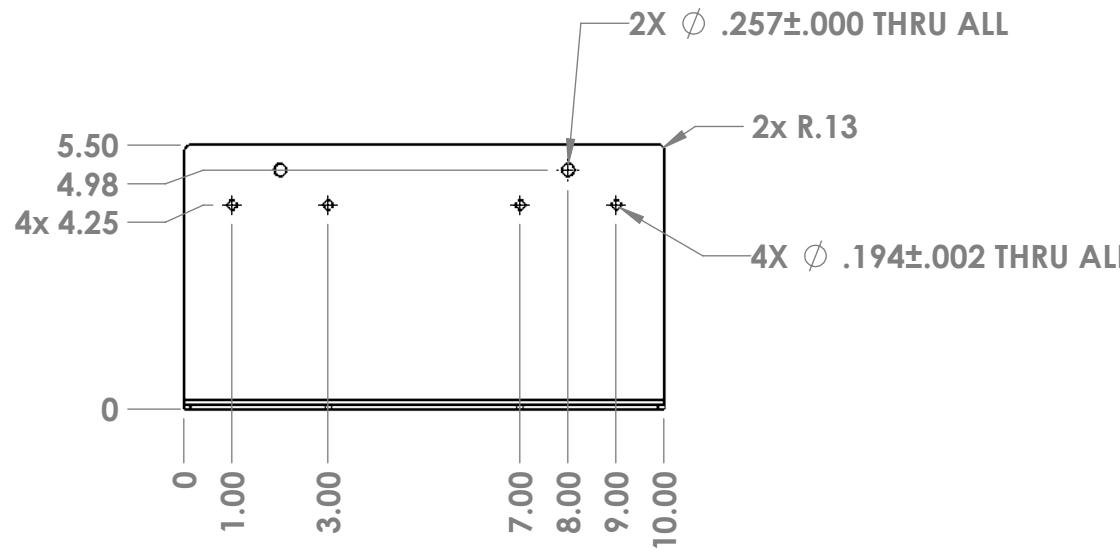
4

3

2

1

GE-20140-03
QTY(4)



- Notes:**
1. Material: 12 Ga. Aluminum 5052
 2. Remove all burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN		
TOLERANCES:		CHECKED		
FRACTIONAL: ±1/16		ENG APPR.		
ANGULAR: MACH ±1° BEND ±1°		MFG APPR.		
TWO PLACE DECIMAL ±.01		Q.A.		
THREE PLACE DECIMAL ±.001		COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Sensor Housing Assembly

SIZE	DWG. NO.	REV
B	GE-20140	
SCALE: 1:8	WEIGHT:	SHEET 3 OF 3

4

3

2

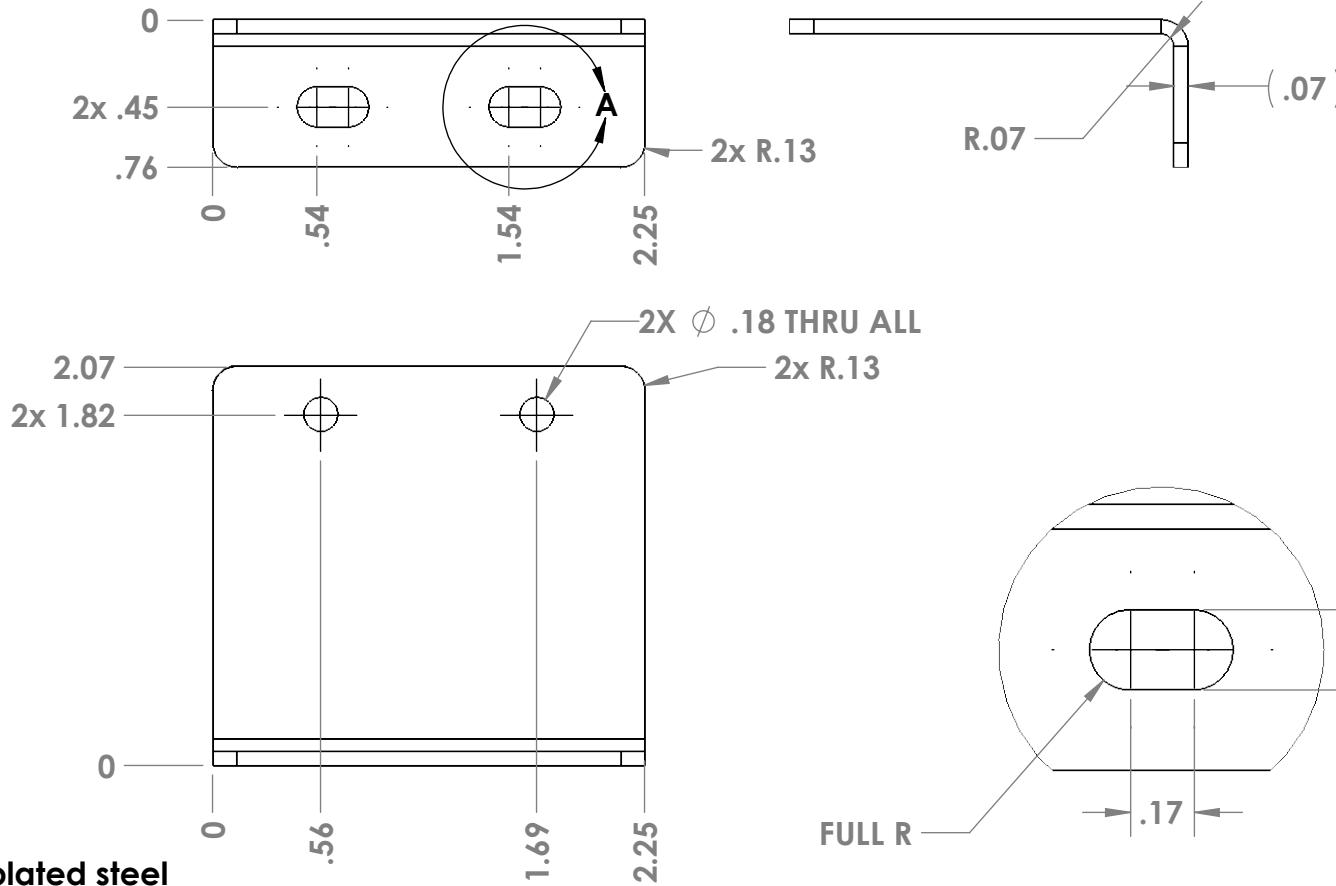
1

2

1

B

B



DETAIL A
SCALE 2 : 1

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			



TITLE:

Mounting Bracket (46CLR ColorSight)

SIZE	DWG. NO.	REV
A	GE-20141	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1

2

1

A

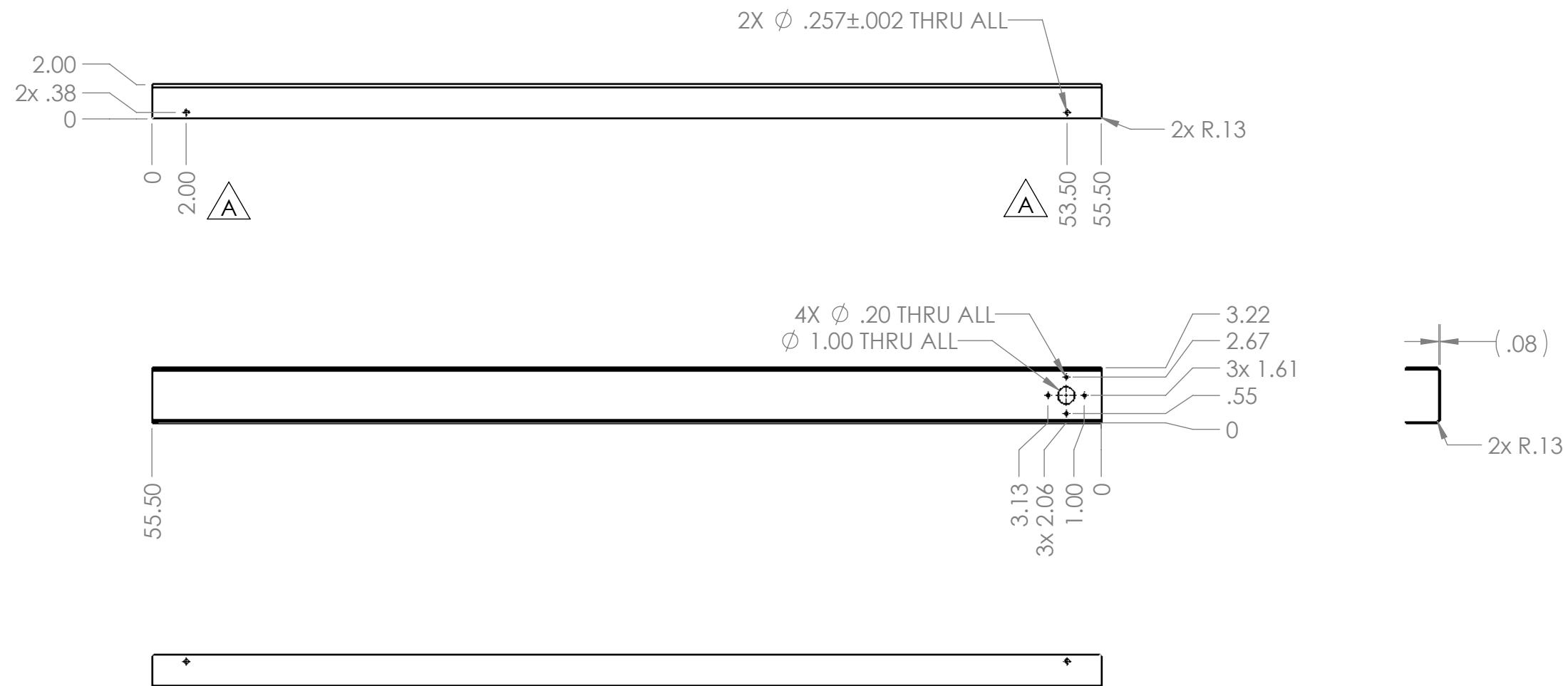
4

3

2

1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B2, B4	A	Moved holes for pins	9/20/2019	NTW



Notes:

- NOTES:

 1. Material: 12 Ga. Aluminum 5052
 2. Remove all burrs and sharp edges.
 3. Tag or Label with part number

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		DIMENSIONS ARE IN INCHES	DRAWN				
		TOLERANCES:	CHECKED				
		FRACTIONAL $\pm 1/16$	ENG APPR.				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.				
		TWO PLACE DECIMAL $\pm .01$	Q.A.				
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:				
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					
			SIZE	DWG. NO.		REV	
			B	GE-20142		A	
			SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

4

3

2

1

4

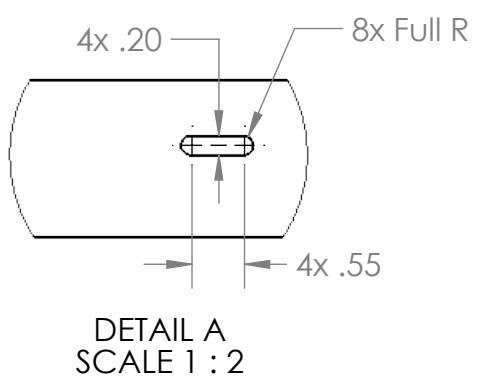
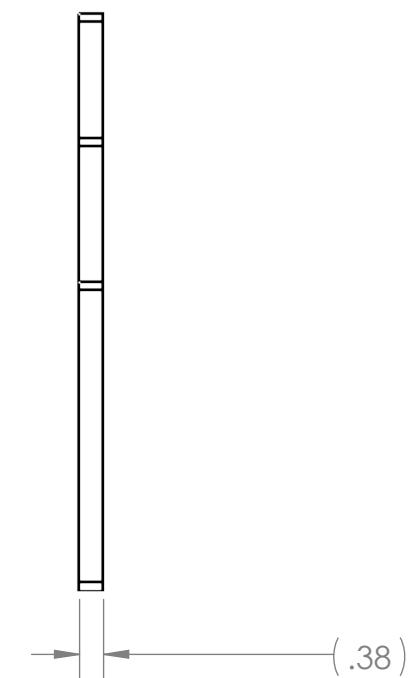
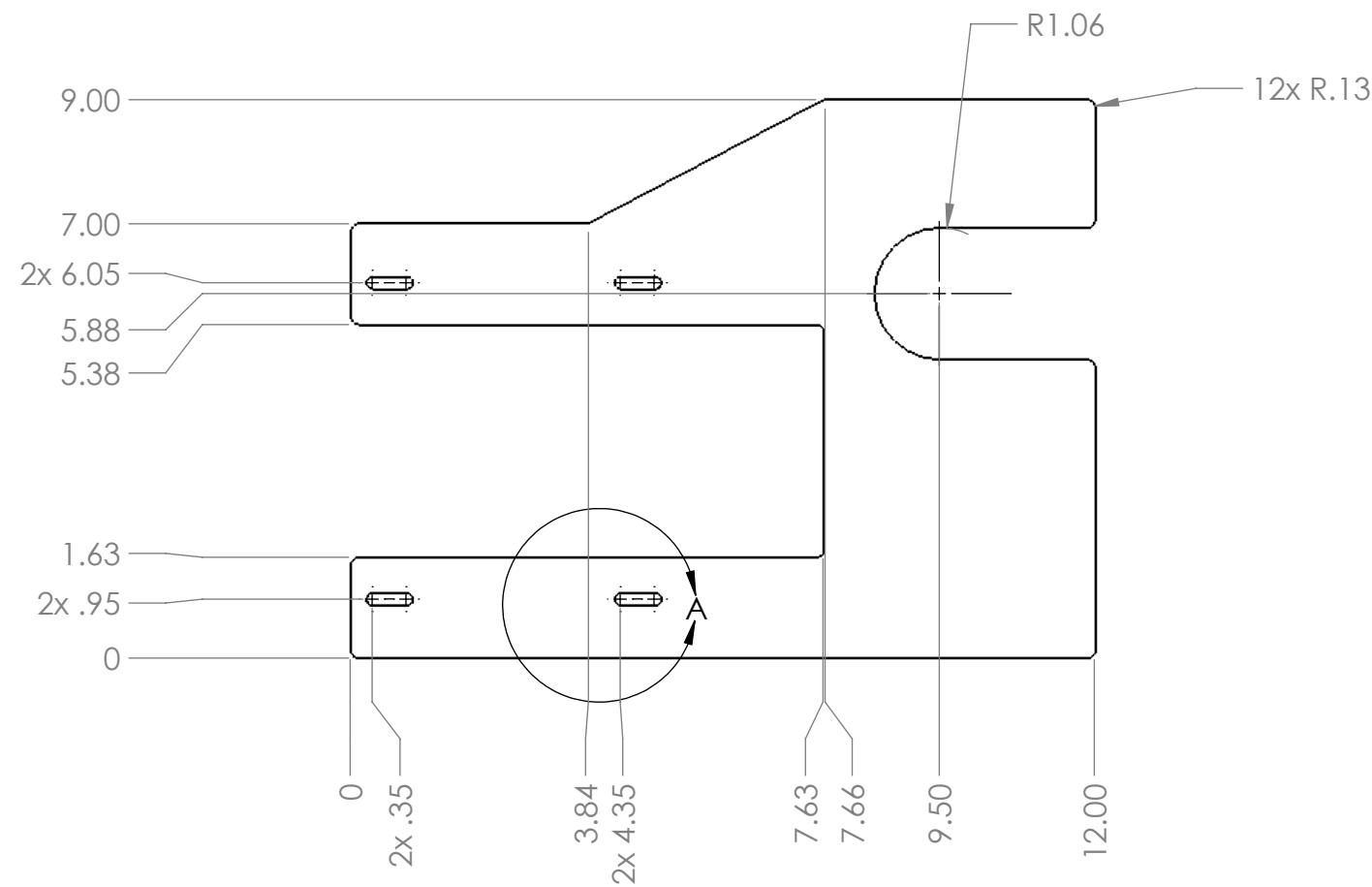
3

2

1

B

B



Note:

1. Material 0.375" Polycarbonate, Clear
2. Remove all burrs and sharp edges
3. Tag or Label with part number

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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 $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
		NEXT ASSY	USED ON	FINISH
		APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Trench to Truss Gusset

SIZE	DWG. NO.	REV
B	GE-20143	
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

4

3

2

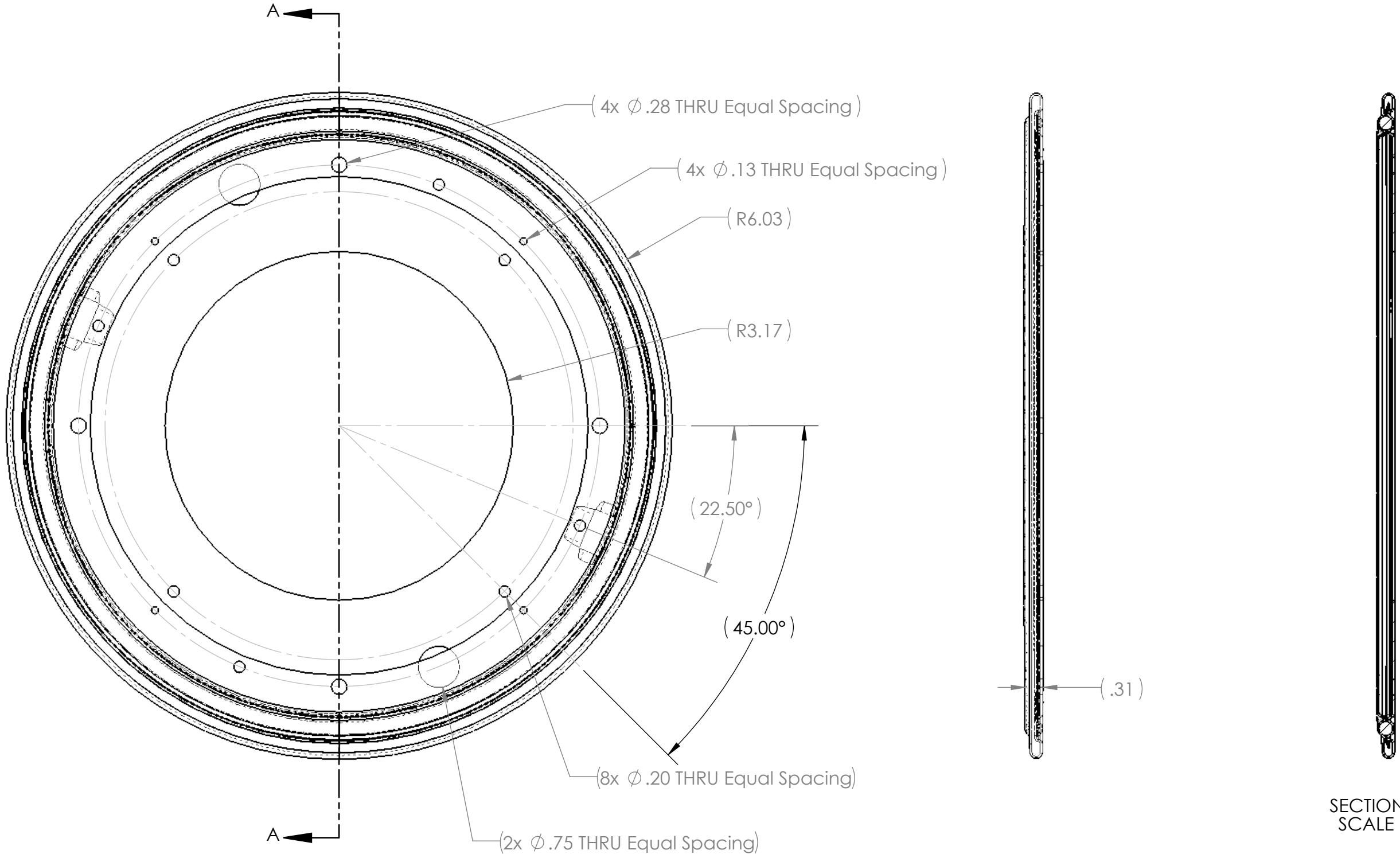
1

4

3

2

1



SECTION A-A
SCALE 1 : 2

Note:
Triangle Manufacturing
Steel Round Lazy Susan Turntable Bearing 22gau-12" with 4 detents
Part number: 12d6234

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	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		
		FINISH		
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.		REV	
B	GE-20150			
SCALE: 1:4	WEIGHT:			SHEET 1 OF 1

4

3

2

1

4

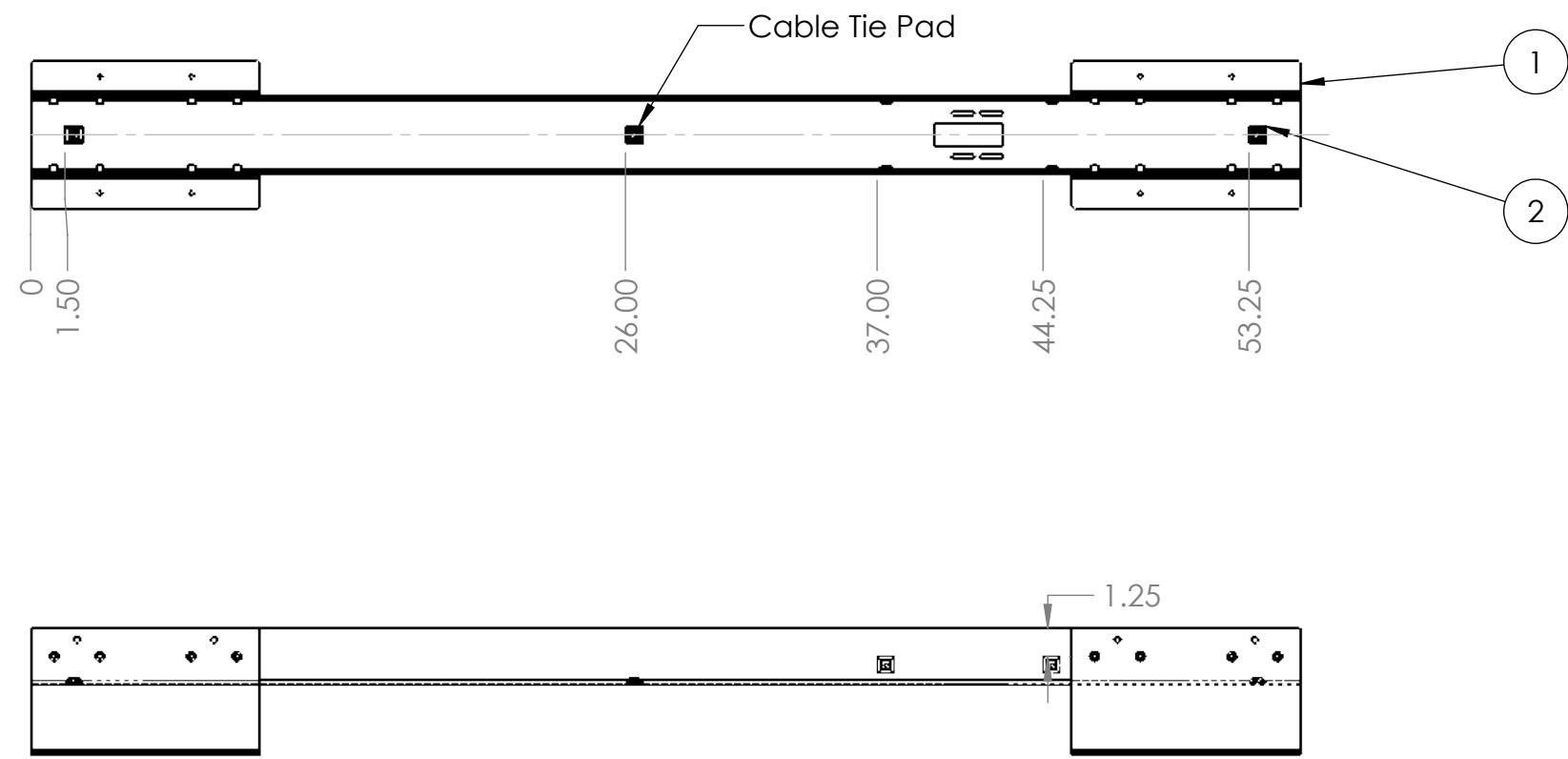
3

2

1

B

B



Cable Tie placement

A

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20140	Sensor Housing Assembly	1
2	CABLE TIE MOUNT	CABLE TIE MOUNT	7

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TOLERANCES:		CHECKED		
FRACTIONAL: $\pm 1/16$		ENG APPR.		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.		
TWO PLACE DECIMAL $\pm .01$		Q.A.		
THREE PLACE DECIMAL $\pm .001$		COMMENTS:		
INTERPRET GEOMETRIC TOLERANCING PER:		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
**Sensor Housing Assembly
with cable tie mounts**

SIZE	DWG. NO.	REV
B	GE-20160	
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

4

3

2

1

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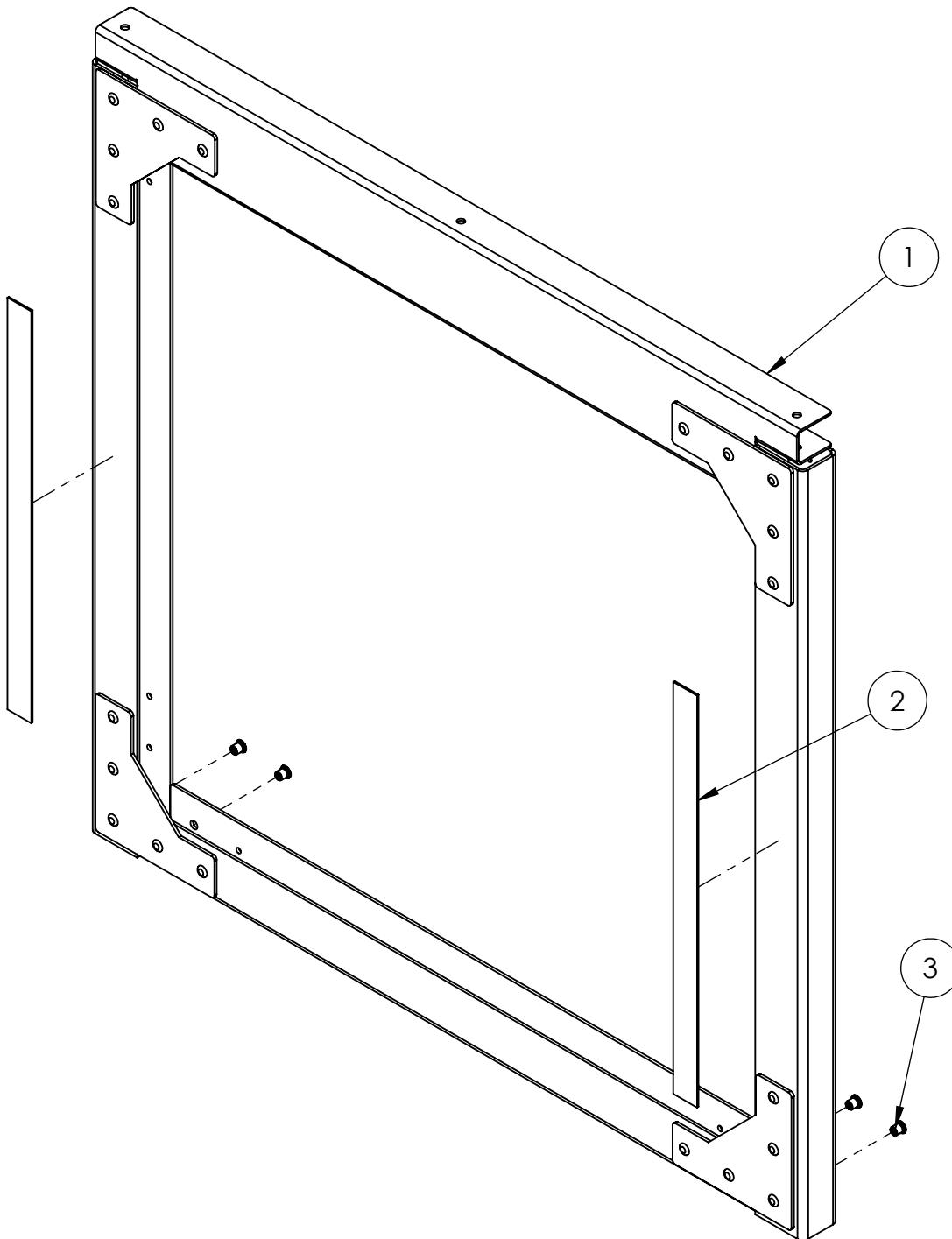
3

2

1

B

B



A

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20101	Trench Leg	1
2	Hook_1_15	1" x 15" Hook, Adhesive Backed	2
3	rivnut_10-32_.130	rivnut 10-32 grip range .020 to .130	4

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: GE-20101 with hook
SIZE: B **DWG. NO.:** GE-20161 **REV:**

SCALE: 1:8 WEIGHT: SHEET 1 OF 2

4

3

2

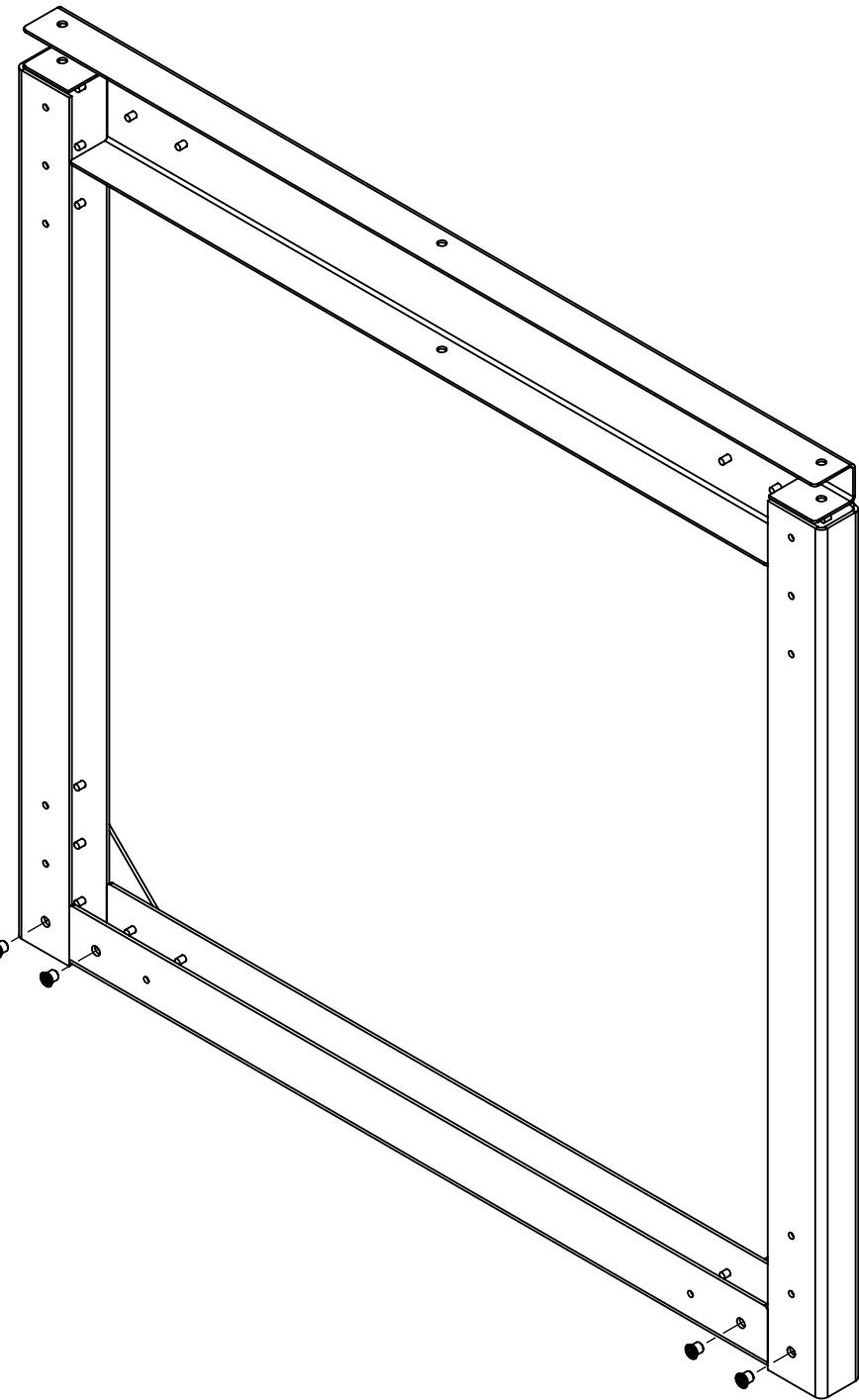
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4

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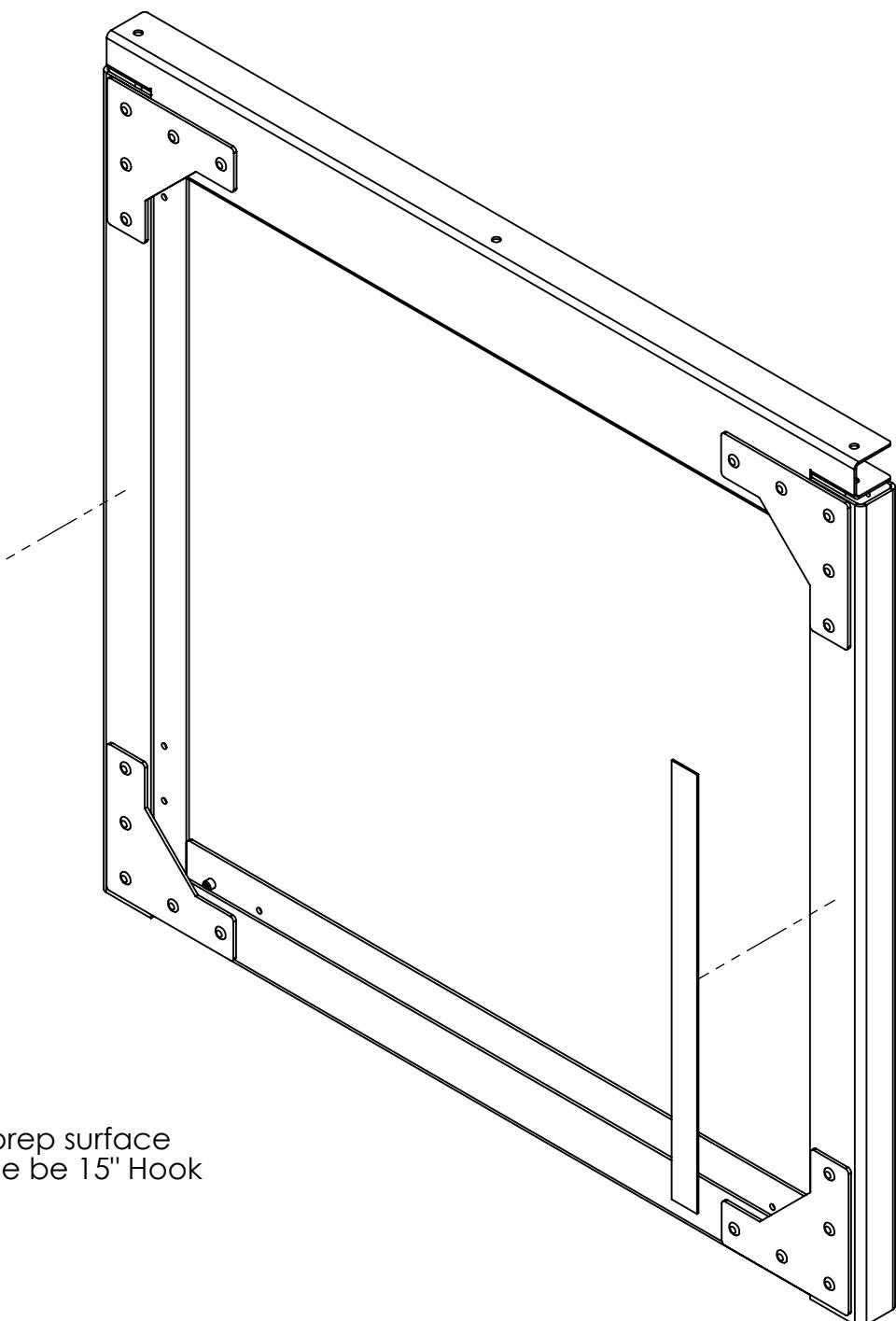
2

1



Notes:

1. Install #10-32 rivet nuts to GE-20101 as shown



Notes:

1. Clean and prep surface
2. Apply 1" wide bevel 15" Hook

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	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		
APPLICATION	FINISH			
	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: GE-20101 with hook

SIZE	DWG. NO.	REV
B	GE-20161	
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2

4

3

2

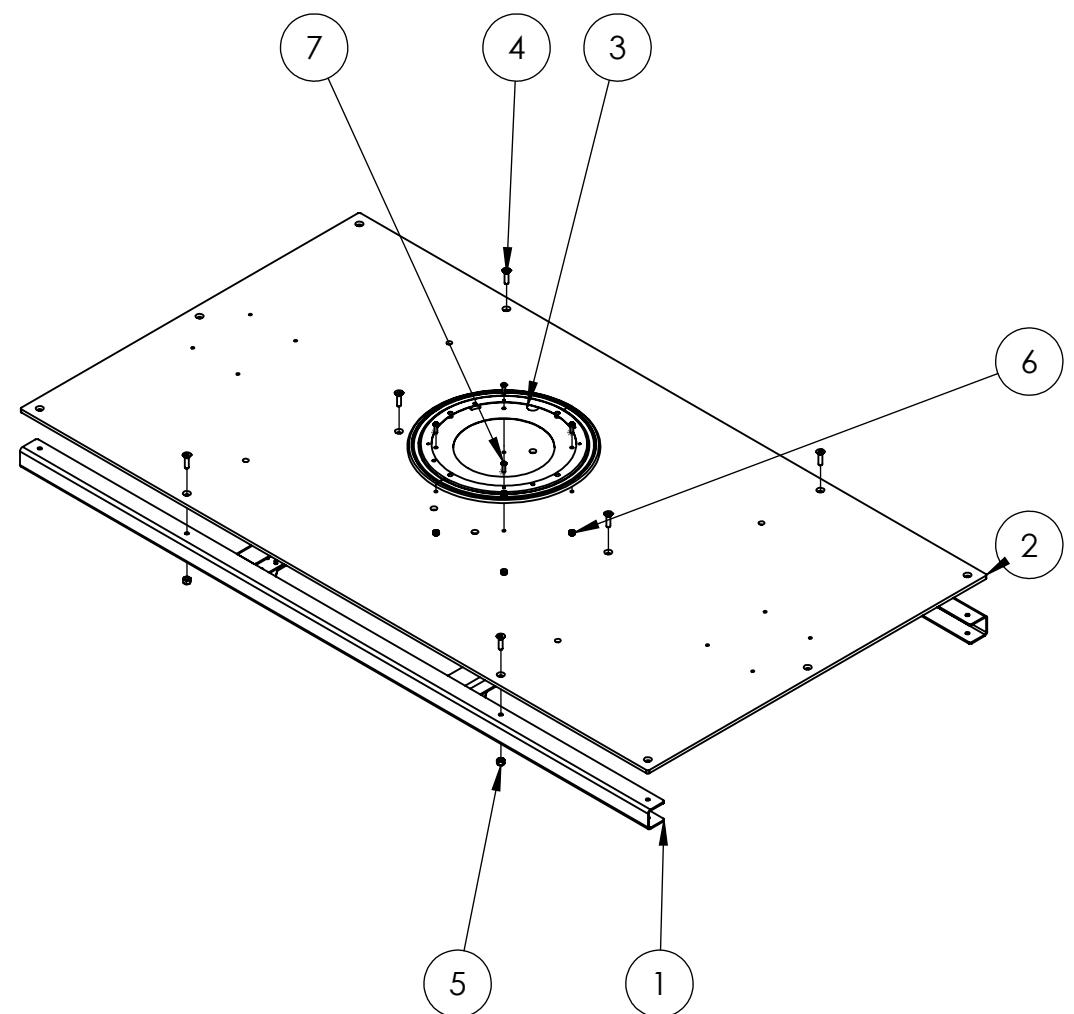
1

B

B

Notes:

1. Attach (2) to (1) with (4) and (5) in 6 spots.
2. Attach (3) to (2) with (7) and (6) in 4 spots. Making sure to align access holes in (3) to matching cut out in (2)



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20102	Trench Top Frame	1
2	GE-20114	Trench Top Plastic	1
3	GE-20150	12d6234 Triangle Manufacturing	1
4	flat_hex_.25_20_1	Steel Hex Flat Head Screw, 1/4"-20 x 1" long, fully threaded	6
5	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	6
6	nylock_10_32	Low-Strength Steel Nylon-Insert Locknut, Zinc-Plated, 10-32 Thread Size	4
7	round_hex_10_32_.625_full	Round Hex Head, #10-32 x 5/8" long, fully threaded	4

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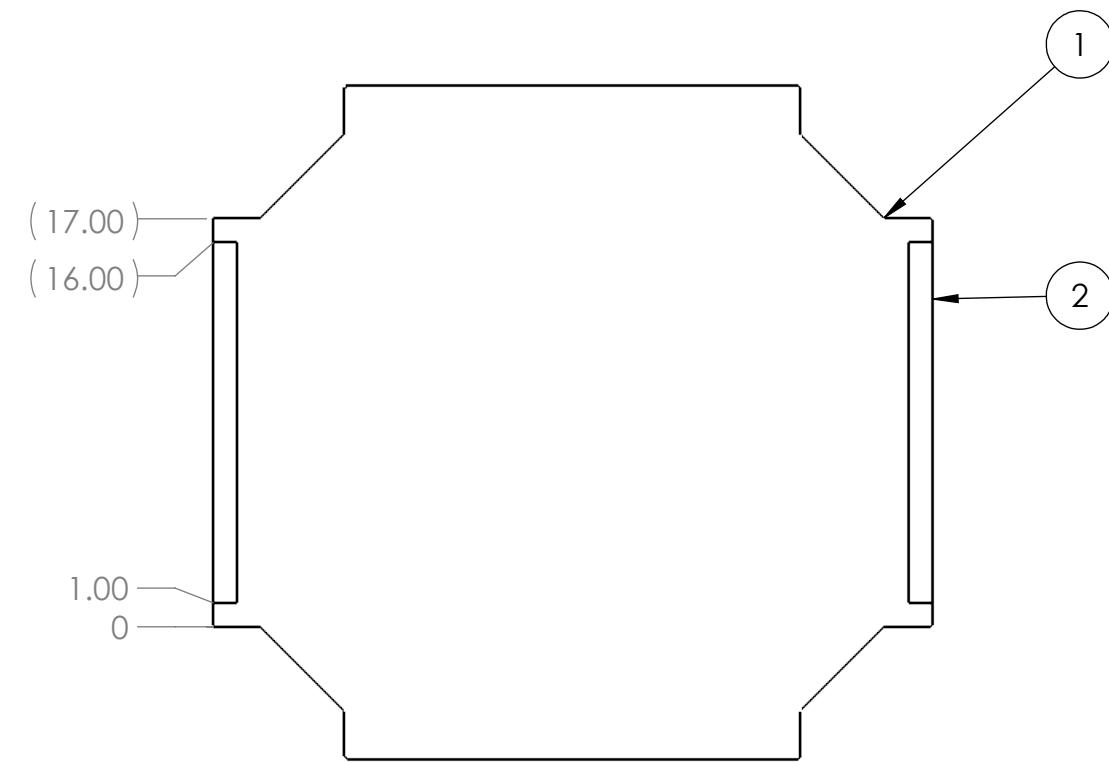
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.			REV
B	GE-20162			
SCALE: 1:12	WEIGHT:			SHEET 1 OF 1

B

B

Notes:

1. Remove protective Plasic.
2. Attach (2) to (1) as shown on back side only.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20115	Trench Side Plastic	1
2	Loop_1_15	1" x 15" Loop, Adhesive Backed	2

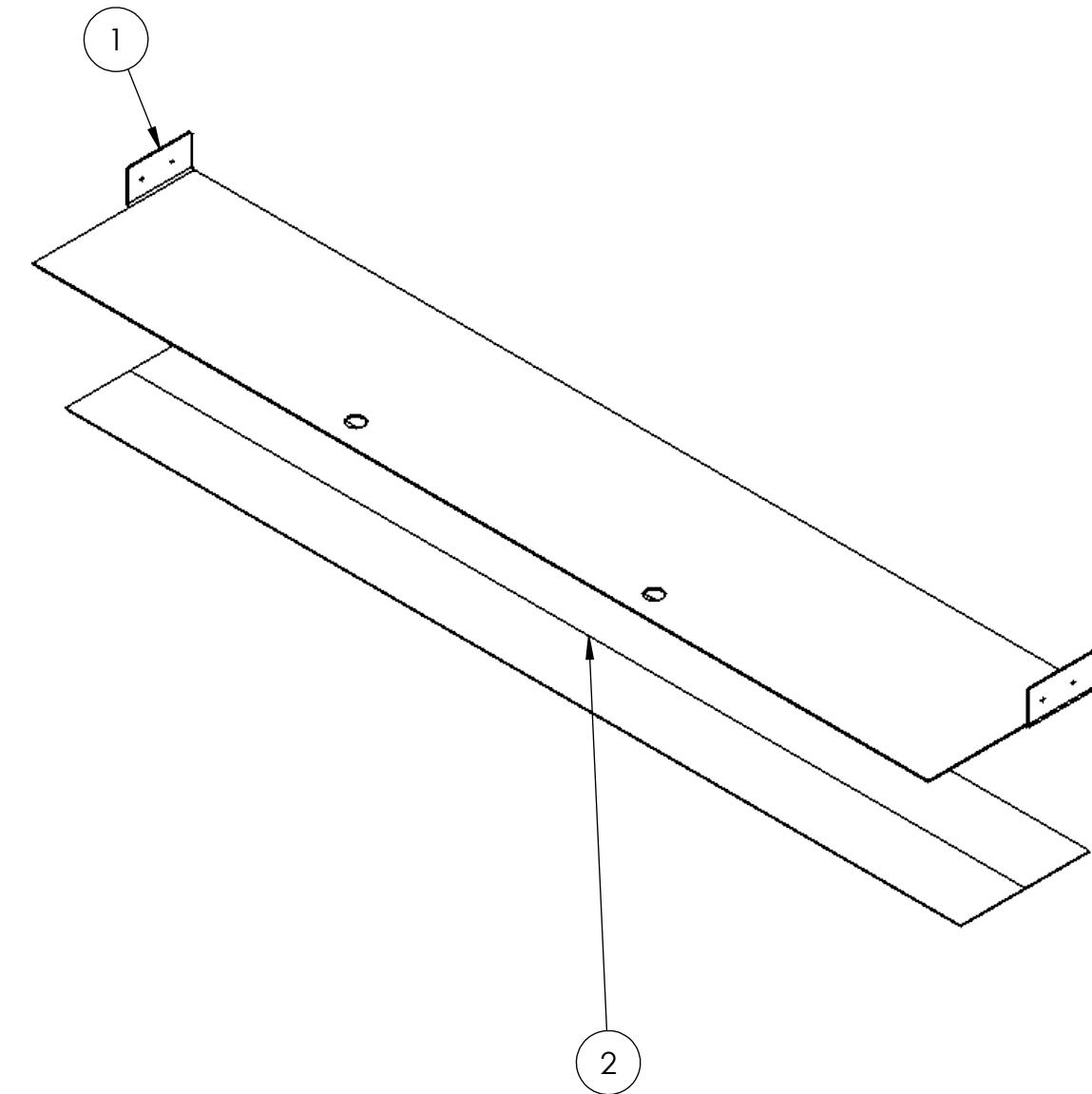
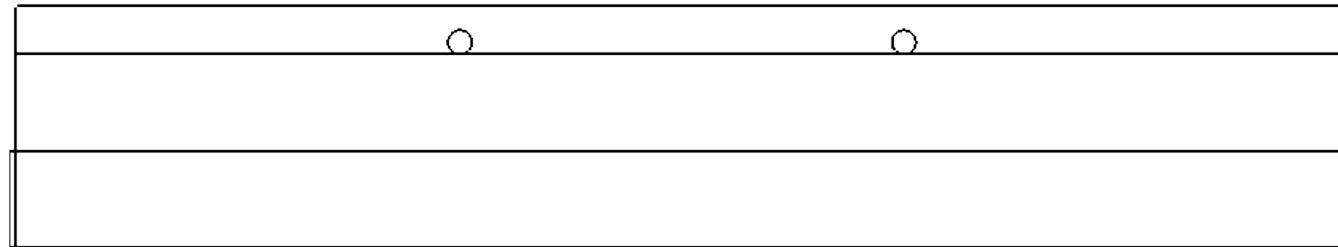
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20163			
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

GE-20115 with loop



Notes:

1. Clean and prep bottom surface
2. Attach **(2)** to **(1)** as shown above.
3. No Hook permissible in the circular cut outs.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20123	Trench Base	1
2	Hook_4_55	4" x 55" Hook, Adhesive Backed	2

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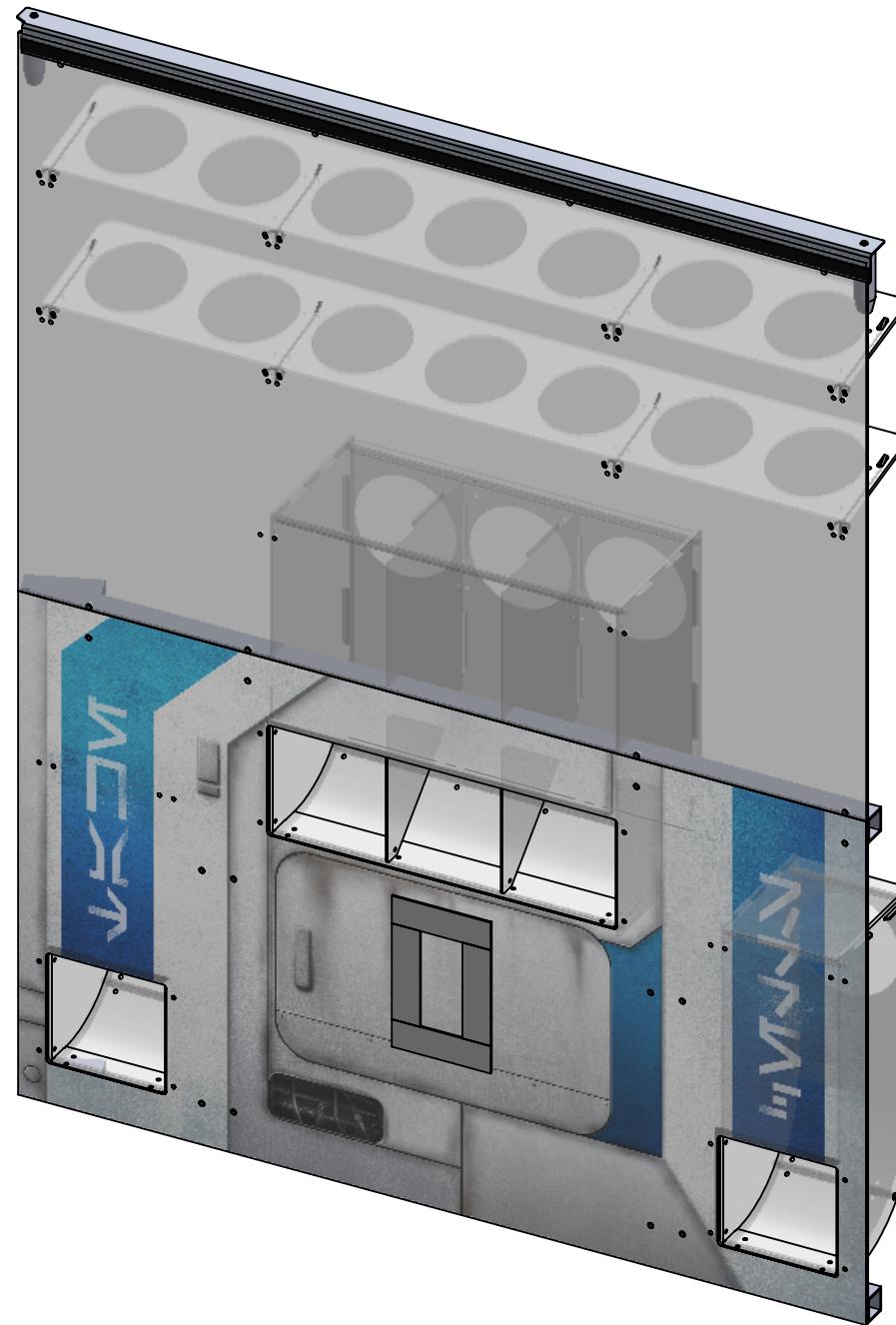
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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20164			
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1		

4

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20201	Frame, Bay	1
2	GE-20203	Ball Rack, Bay	2
3	GE-20204	Hook, Pegboard, 6.75"	8
4	GE-20205	Chute Assembly, Lower	2
5	GE-20210	Chute Assembly, Upper	1
6	GE-20216	Top Rail, Standard	1
7	GE-20221	Front Face, with Target	1
8	GE-20313	Anchor with hook	1
9	Hook_1_60	1" x 60" Hook, Adhesive Backed	1
10	Loop_1_60	1" x 60" Loop, Adhesive Backed	1

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL: ±1/16		ENG APPR.	
		ANGULAR: MACH ±1° BEND ±1°		MFG APPR.	
		TWO PLACE DECIMAL ±.01		Q.A.	
		THREE PLACE DECIMAL ±.001		COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST
ROBOTICS
COMPETITION
SOLIDWORKS
Modeling Solutions Partner

TITLE: Loading Bay

SIZE DWG. NO. **B** GE-20200 **REV**

SCALE: 1:12 WEIGHT: SHEET 1 OF 2

4

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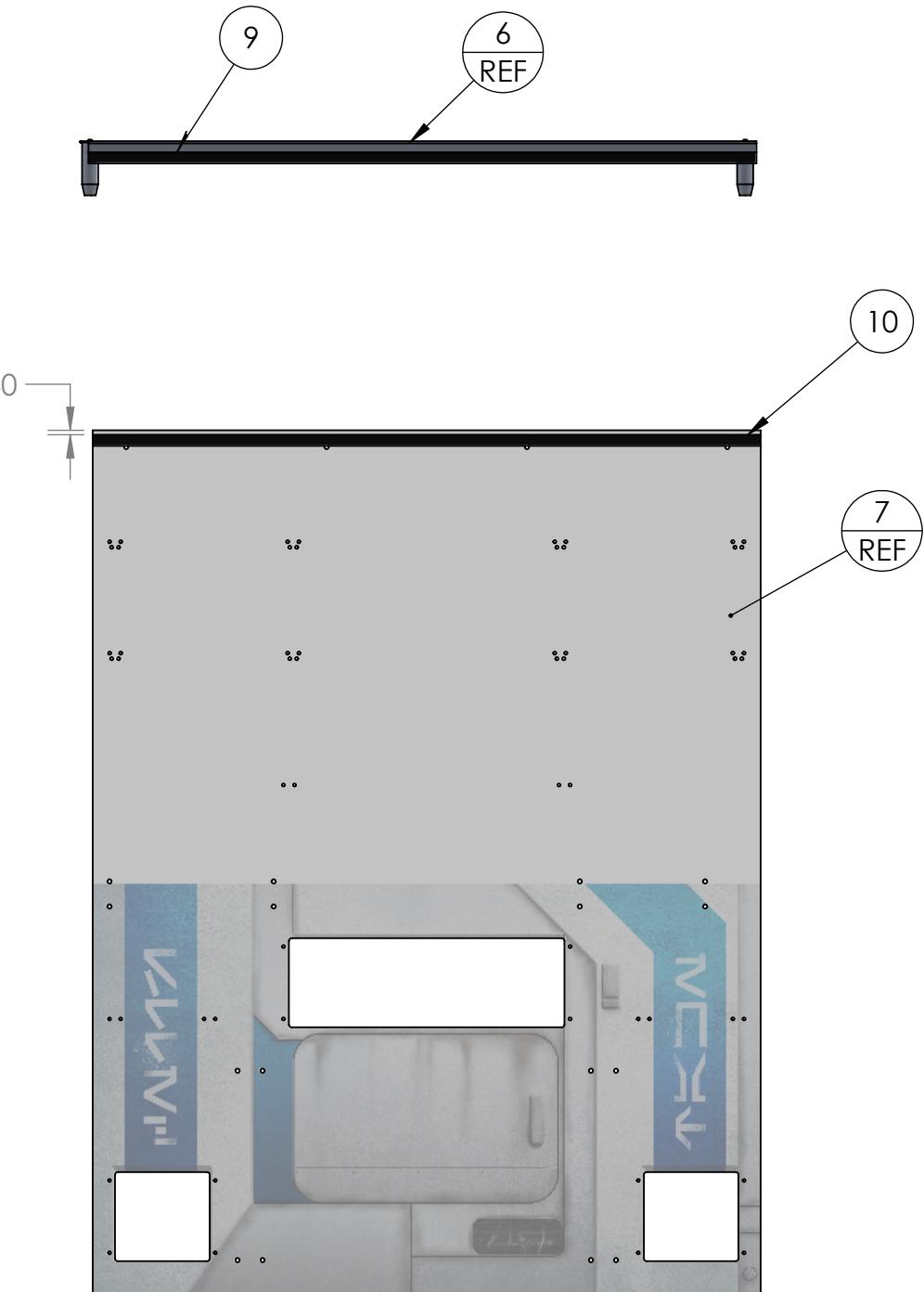
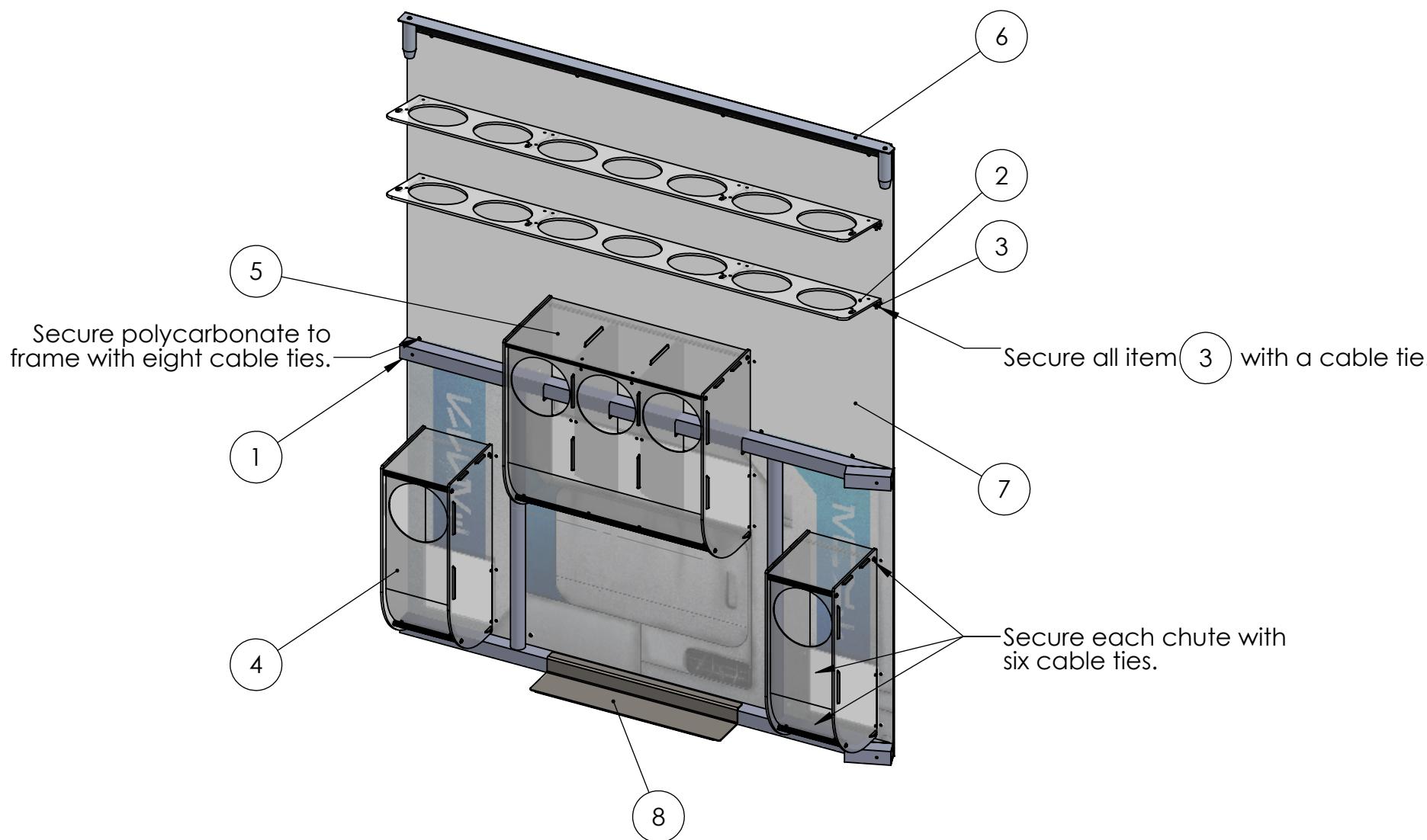
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B



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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
NEXT ASSY	USED ON	MATERIAL			
		FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Loading Bay

SIZE DWG. NO. REV
B GE-20200

SCALE: 1:16 WEIGHT: SHEET 2 OF 2

4

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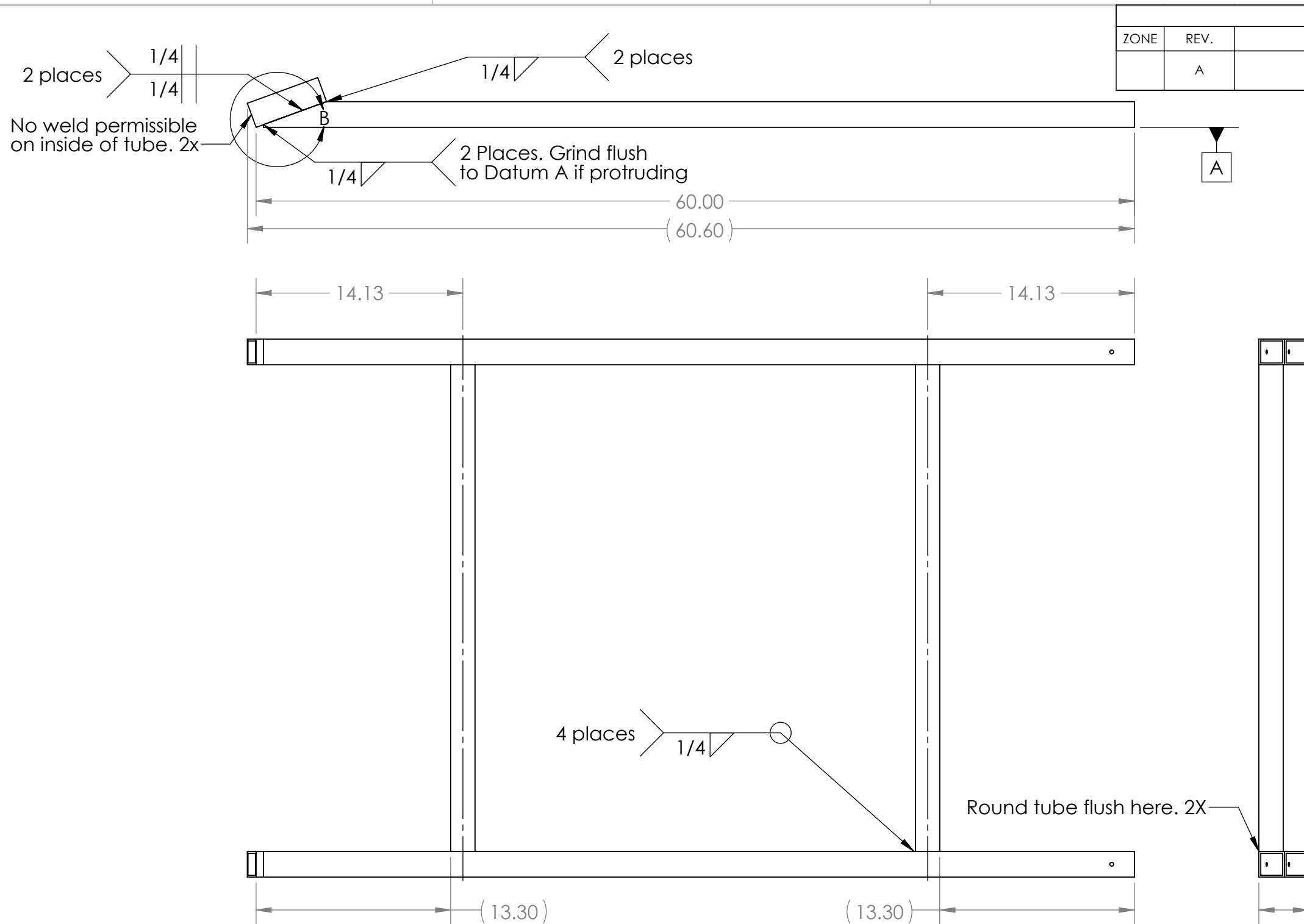
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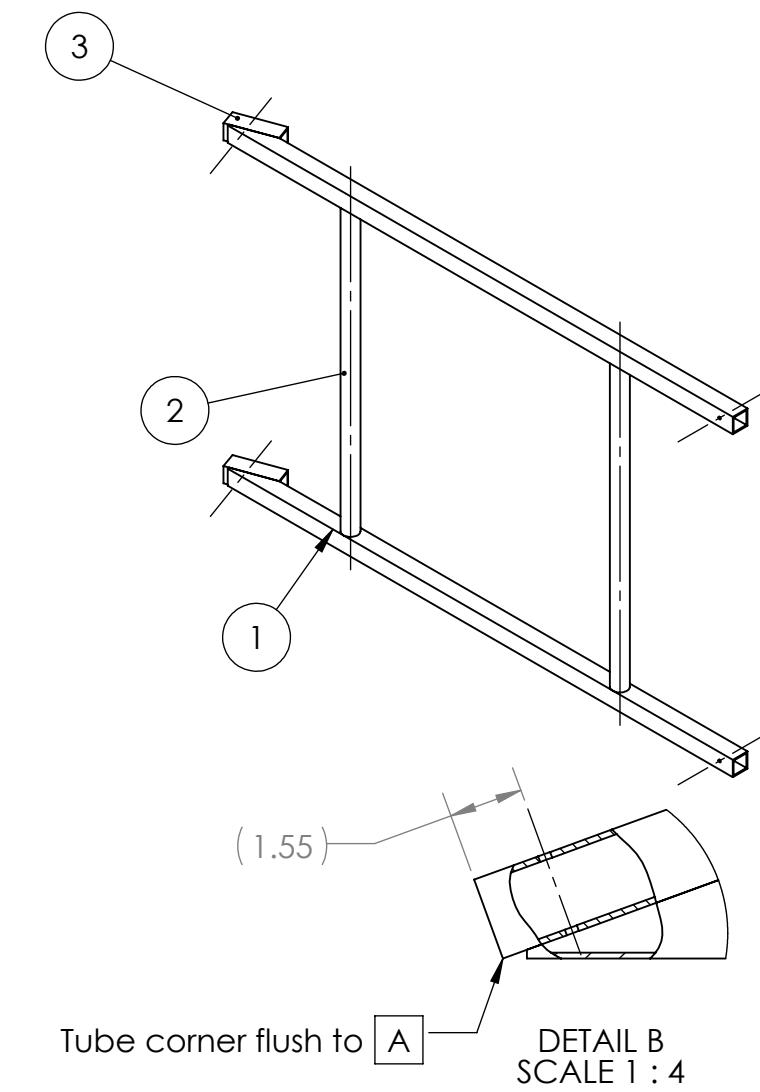
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2

1



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	Changed Title	9/11/2019	DAF



Notes:

1. Tag or label with part number
2. Remove all burrs and sharp edges

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20201-01	1.75" x .125" thk. Square Tubing, 6063 Aluminum	2
2	GE-20201-02	1-1/4" Schedule 40 Pipe, 6061 Aluminum	2
3	GE-20201-03	1.75" x .125" thk. Square Tubing, 6063 Aluminum	2

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
NEXT ASSY	USED ON	MATERIAL		
APPLICATION	FINISH			
	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION

SOLIDWORKS

Modeling Solutions Partner

TITLE: Frame, Bay

SIZE DWG. NO. REV.
B GE-20201 **A**

SCALE: 1:8 WEIGHT: SHEET 1 OF 2

4

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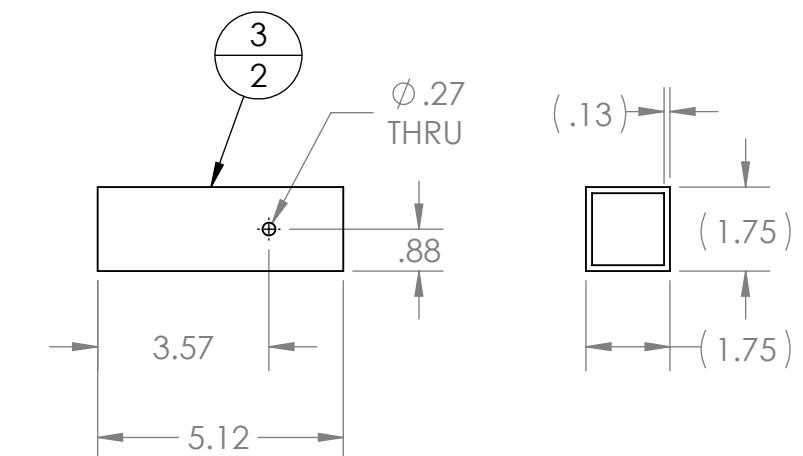
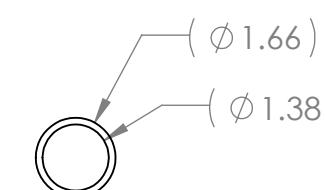
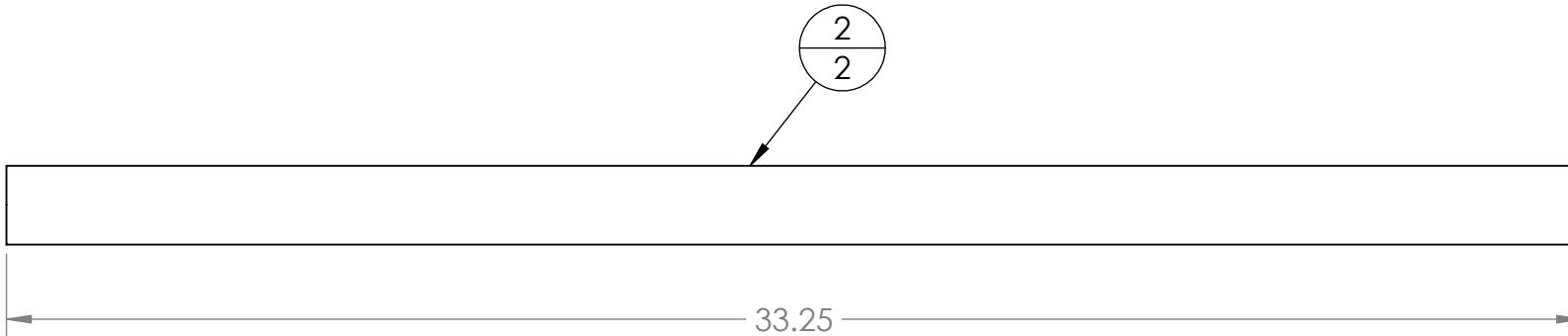
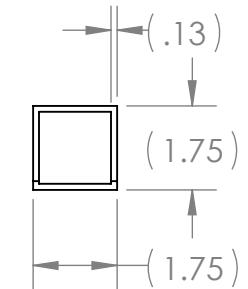
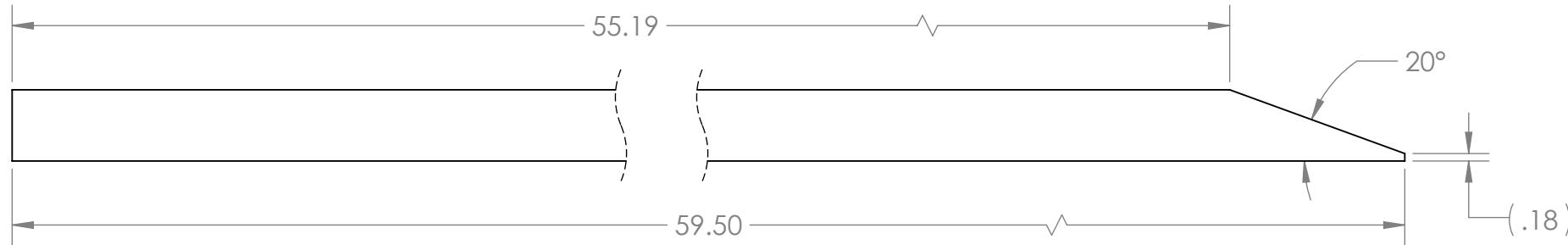
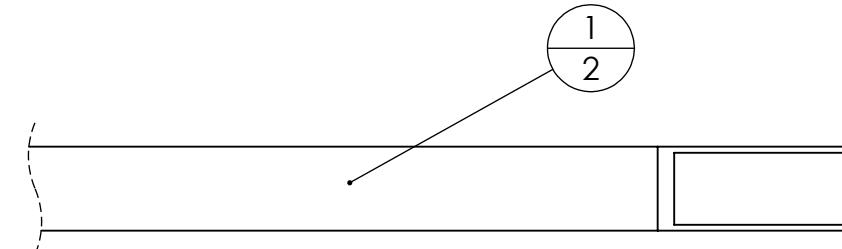
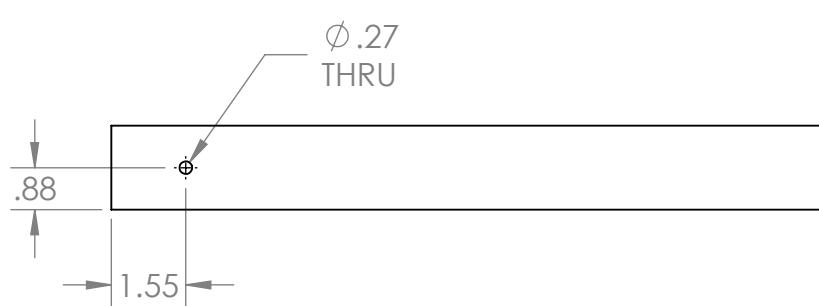
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DIMENSIONS ARE IN INCHES		TOLERANCES:			
FRACTIONAL $\pm 1/16$		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .01$		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING	COMMENTS:		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:

Frame, Bay

SIZE DWG. NO. REV
B GE-20201 **A**

SCALE: 1:4 WEIGHT: SHEET 2 OF 2

4

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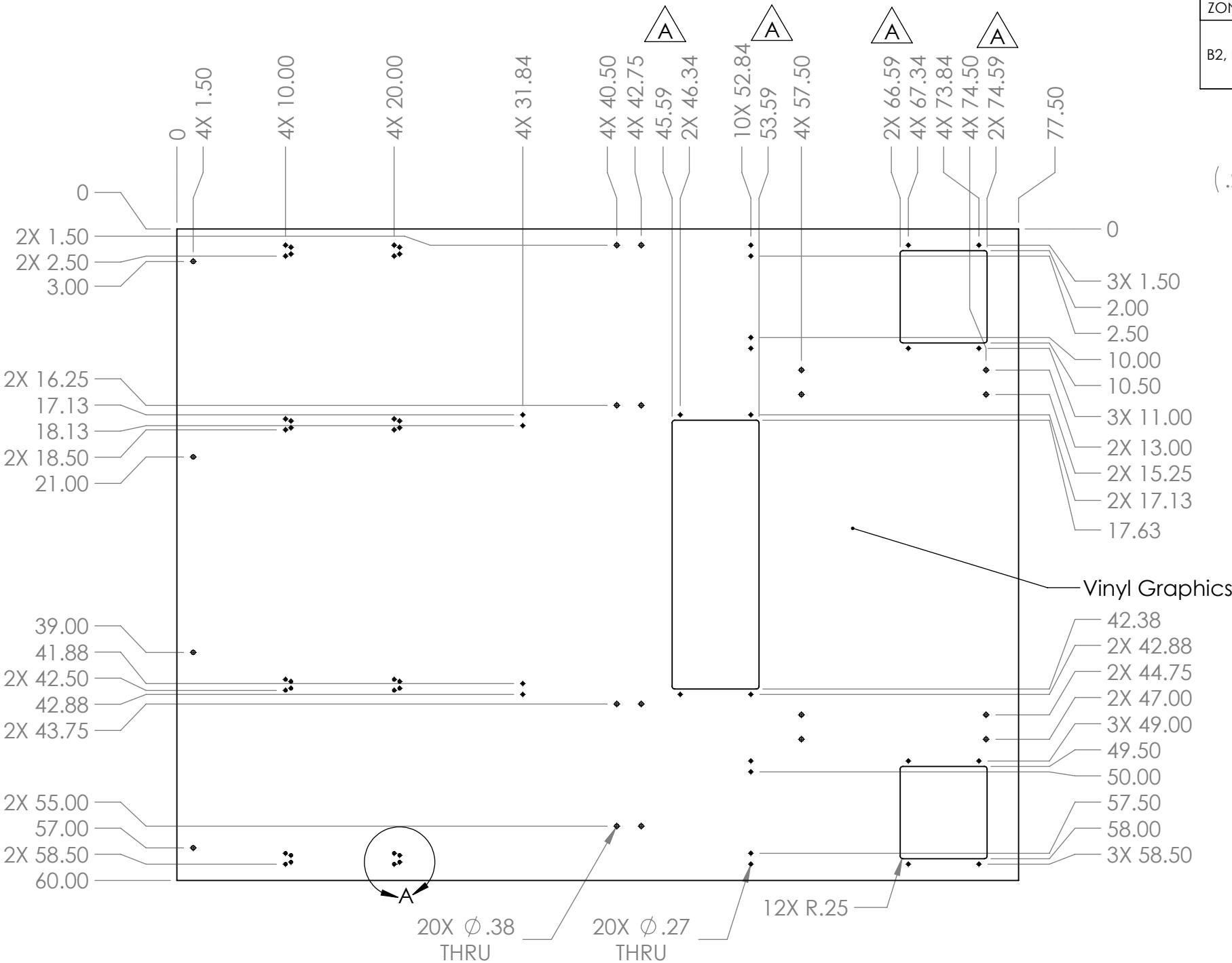
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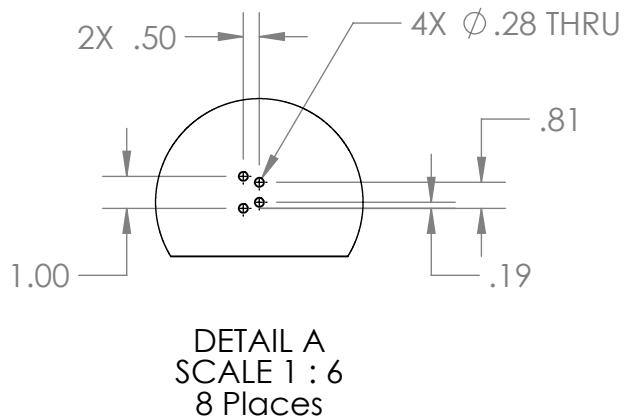
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B



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B2, B3	A	45.59 was 45.50, 66.59 was 66.5, 74.59 was 74.5. Added 53.59	9/16/2019	DAF



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Front Face, Bay

SIZE DWG. NO. REV
B GE-20202 A

SCALE: 1:12 WEIGHT: SHEET 1 OF 1

4

3

2

1

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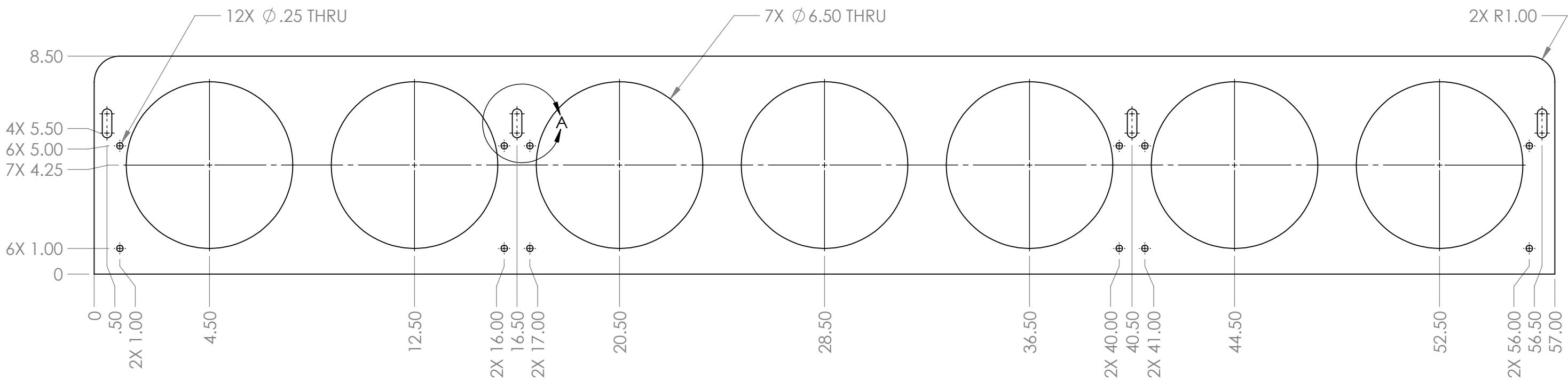
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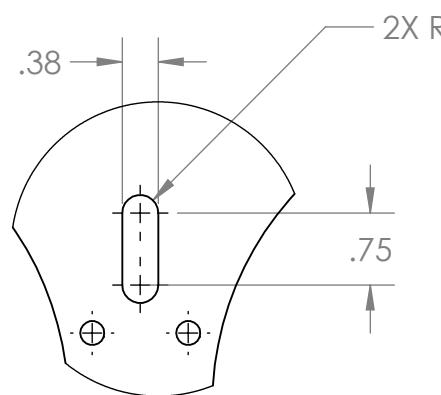
1

B

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(.25)



DETAIL A
SCALE 1 : 2
4 Places

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Notes:

1. Material: 1/4" thick, clear, polycarbonate.
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	MATERIAL		
		FINISH		
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Ball Rack, Bay

SIZE DWG. NO. REV
B GE-20203

SCALE: 1:4 WEIGHT: SHEET 1 OF 1

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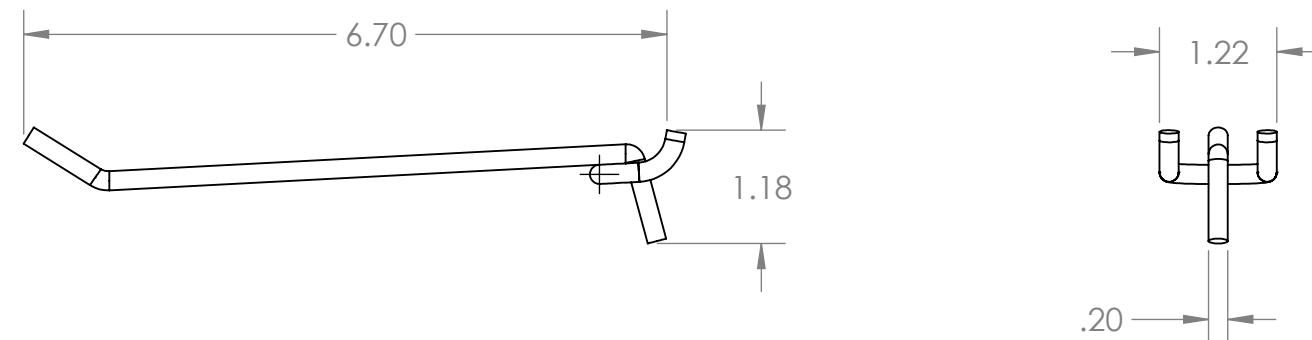
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B

B



DESCRIPTION: ZINC-PLATED STEEL
PEGBOARD HOOK FOR 3/16" AND 9/32"
DIAMETER PEG HOLE, 6-3/4" PROJECTION

VENDOR: MC MASTER-CARR

PART NUMBER: 18535A63

PACKAGE QUANTITY: 10

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Hook,
Pegboard, 6.75"

SIZE DWG. NO. **REV**
B GE-20204

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

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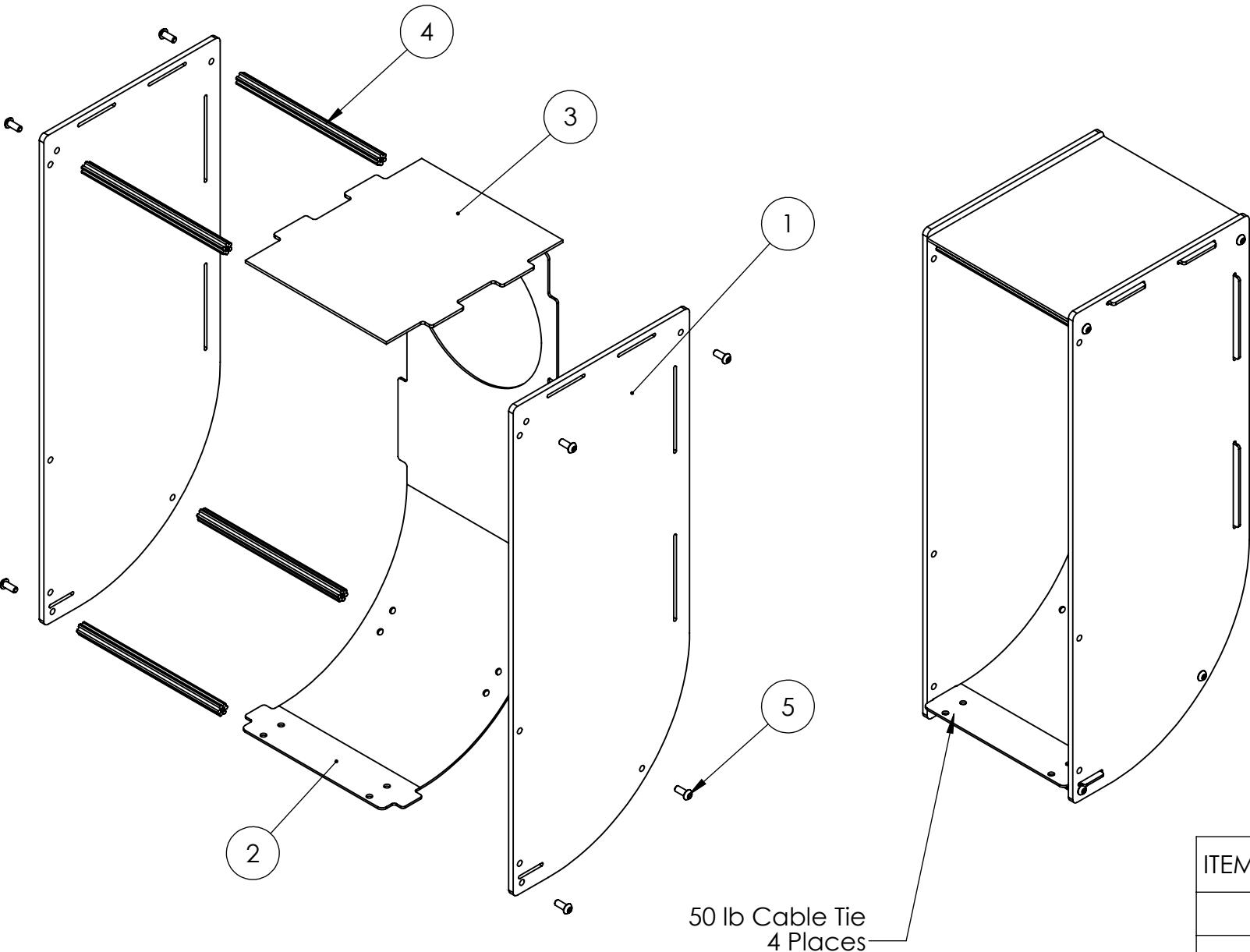
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20206	Side Plate, Lower Chute	2
2	GE-20207	Slide, Lower Chute	1
3	GE-20208	Top, Lower Chute	1
4	GE-20209	Churro, Lower Chute	4
5	round_hex_.25_20_.625_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	8

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	
TOLERANCES: FRACTIONAL $\pm 1/16$	CHECKED	
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	ENG APPR.	
TWO PLACE DECIMAL $\pm .01$	MFG APPR.	
THREE PLACE DECIMAL $\pm .001$	Q.A.	
INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:	
MATERIAL		
NEXT ASSY	USED ON	FINISH
APPLICATION		DO NOT SCALE DRAWING

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Chute Assembly, Lower

SIZE DWG. NO. **B** GE-20205 **REV**

SCALE: 1:6 WEIGHT: SHEET 1 OF 1

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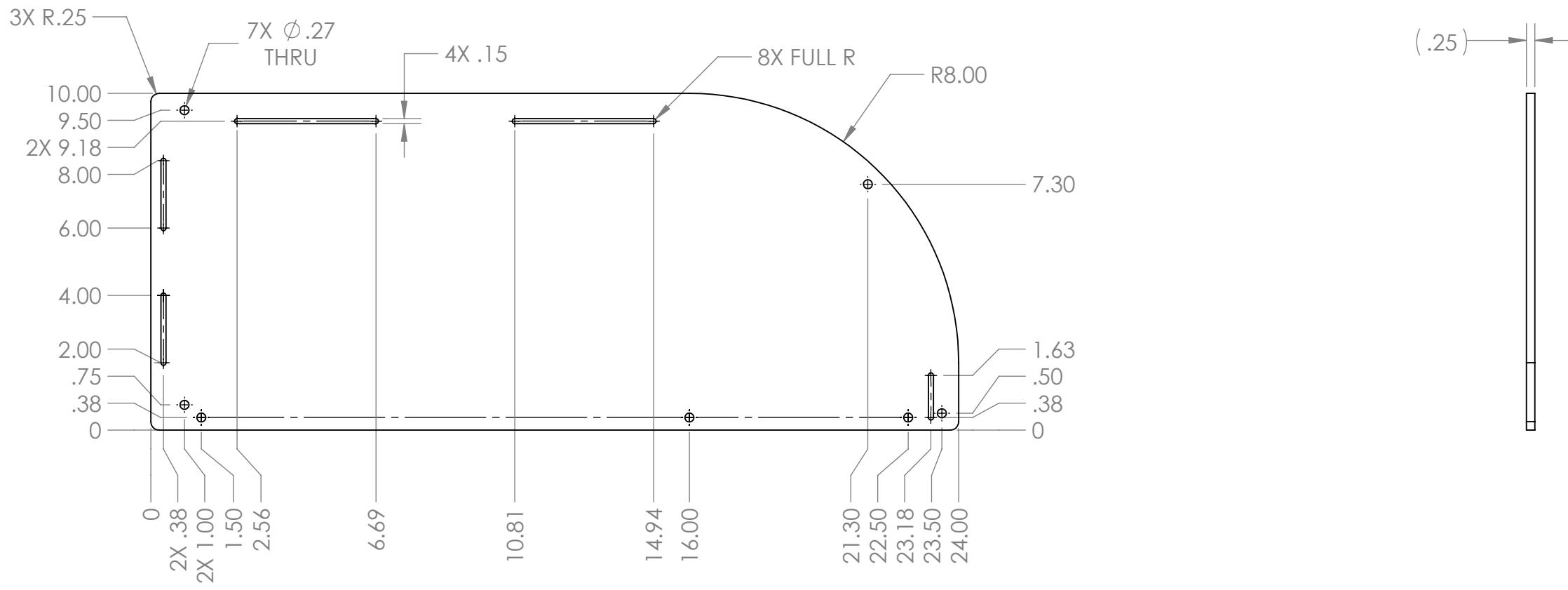
3

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**Notes:**

1. Material: 1/4" Polycarbonate, Clear
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN		
TOLERANCES:		CHECKED		
FRACTIONAL $\pm 1/16$		ENG APPR.		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.		
TWO PLACE DECIMAL $\pm .01$		Q.A.		
THREE PLACE DECIMAL $\pm .001$		COMMENTS:		
INTERPRET GEOMETRIC TOLERANCING PER:		MATERIAL		
NEXT ASSY		FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Title: Side Plate, Lower Chute
Size: B **Dwg. No.:** GE-20206 **Rev:**

Scale: 1:4 **Weight:**

Sheet 1 of 1

4

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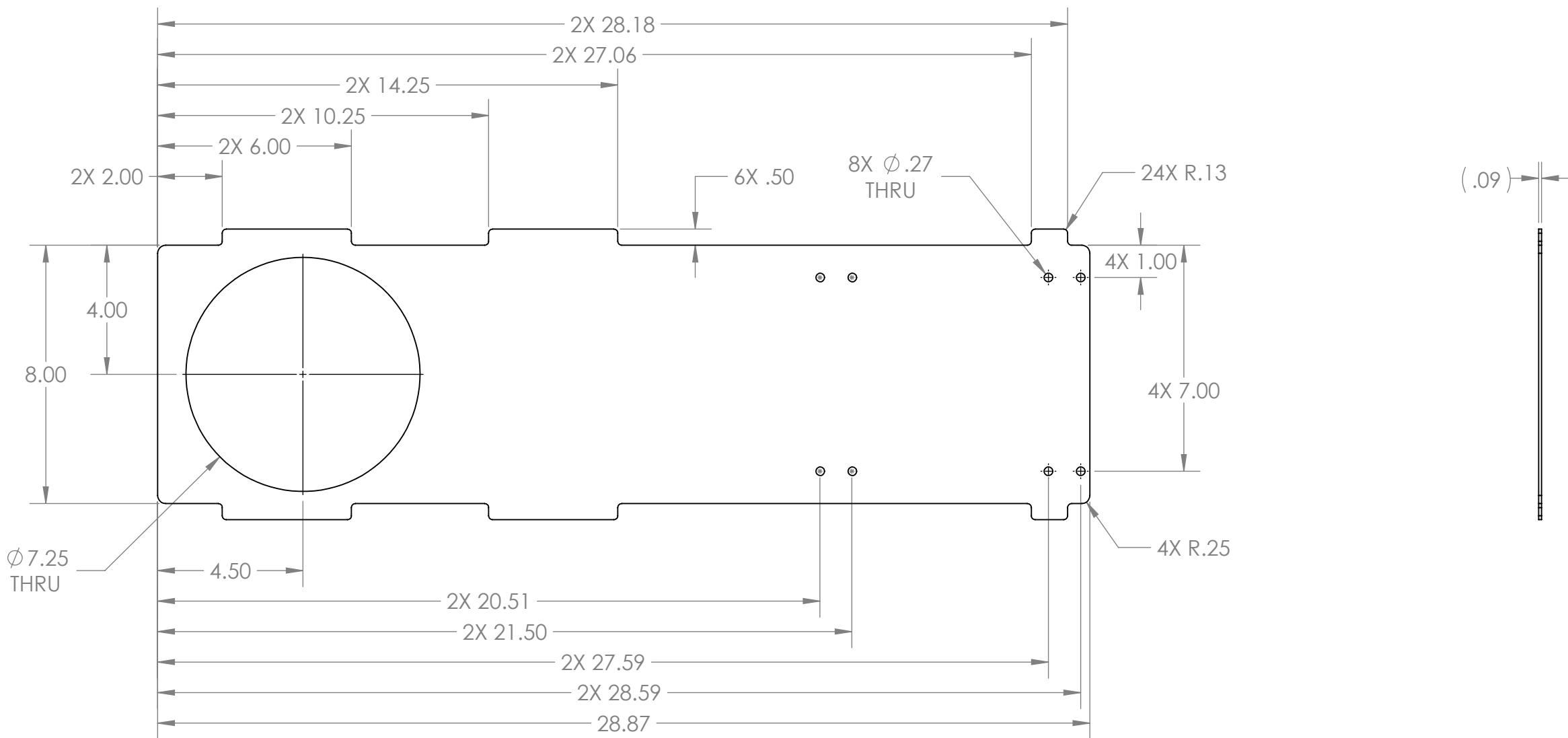
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**Notes:**

1. Material: 0.093" thick polycarbonate, clear
2. Remove all burrs and sharp edges
3. Tag or label with part number

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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 $\pm .01$				
THREE PLACE DECIMAL $\pm .001$				
INTERPRET GEOMETRIC TOLERANCING PER:				
MATERIAL				
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:4		WEIGHT:	SHEET 1 OF 1	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Slide, Lower Chute

SIZE DWG. NO. REV
B GE-20207

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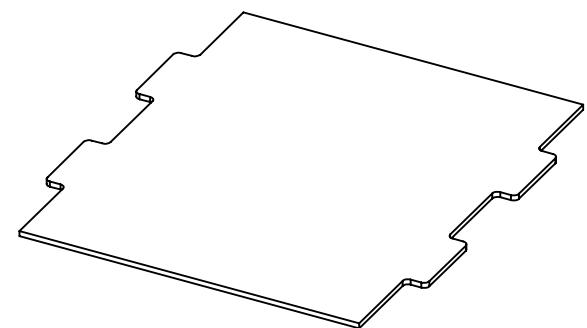
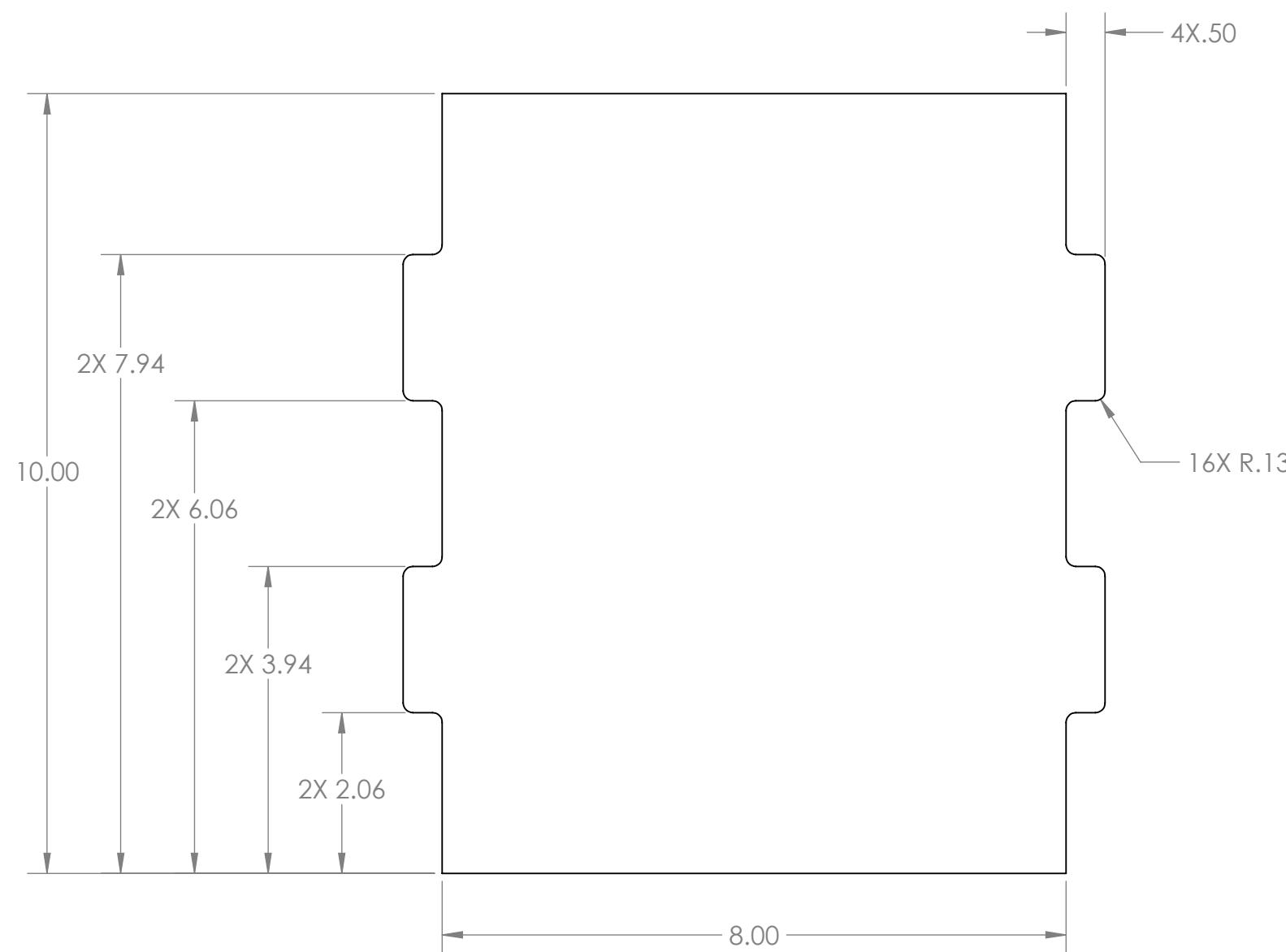
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- Notes:
1. Material: 1/8" thick, polycarbonate, clear.
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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		UNLESS OTHERWISE SPECIFIED:		NAME DATE DRAWN CHECKED ENG APPR. MFG APPR.	TITLE: FIRST ROBOTICS COMPETITION SOLIDWORKS Modeling Solutions Partner		
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001					
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					
SIZE	DWG. NO.	REV		B GE-20208			
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1					

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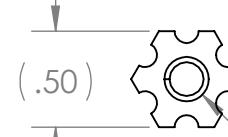
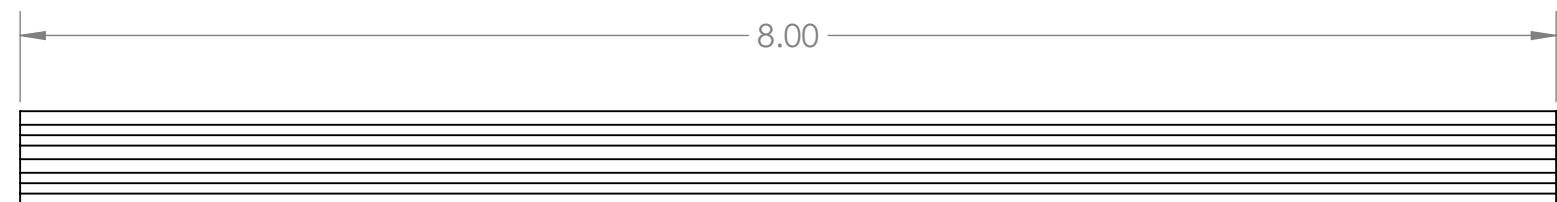
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2X 1/4 - 20 UNC-2B $\nabla .5$ 

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Notes:

1. Material: Aluminum
2. Description: AndyMark Churro
3. Make from AndyMark PN: am-3101-6, or equivalent.
4. Bag or tag with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
B	GE-20209				
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

**Churro, Lower
Chute**

4

3

2

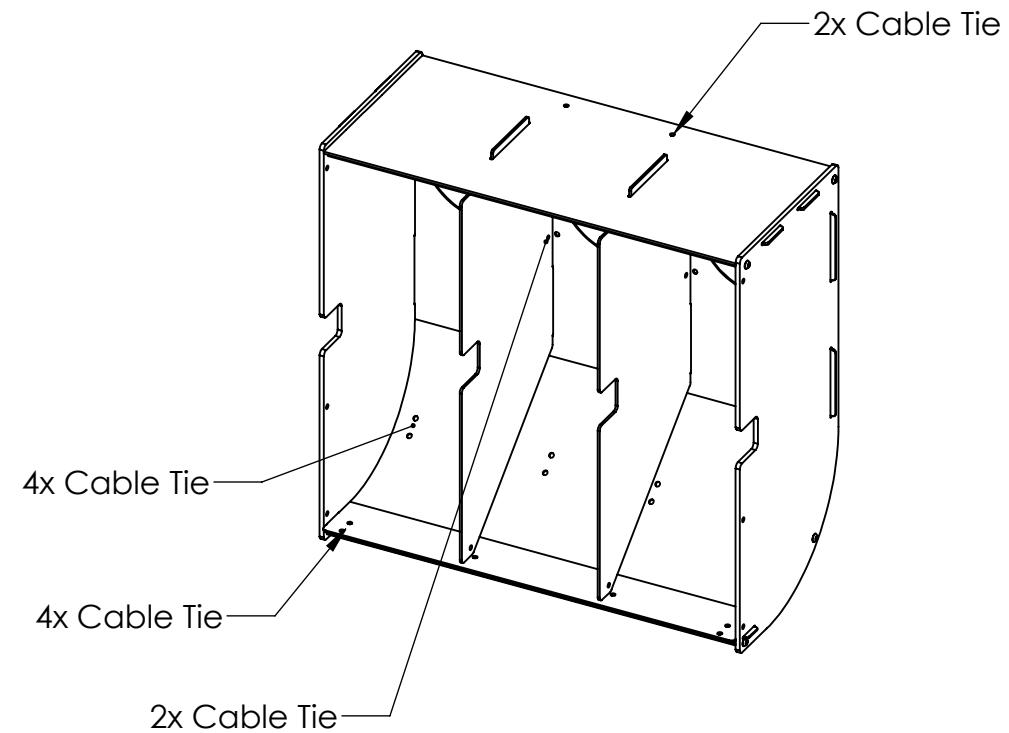
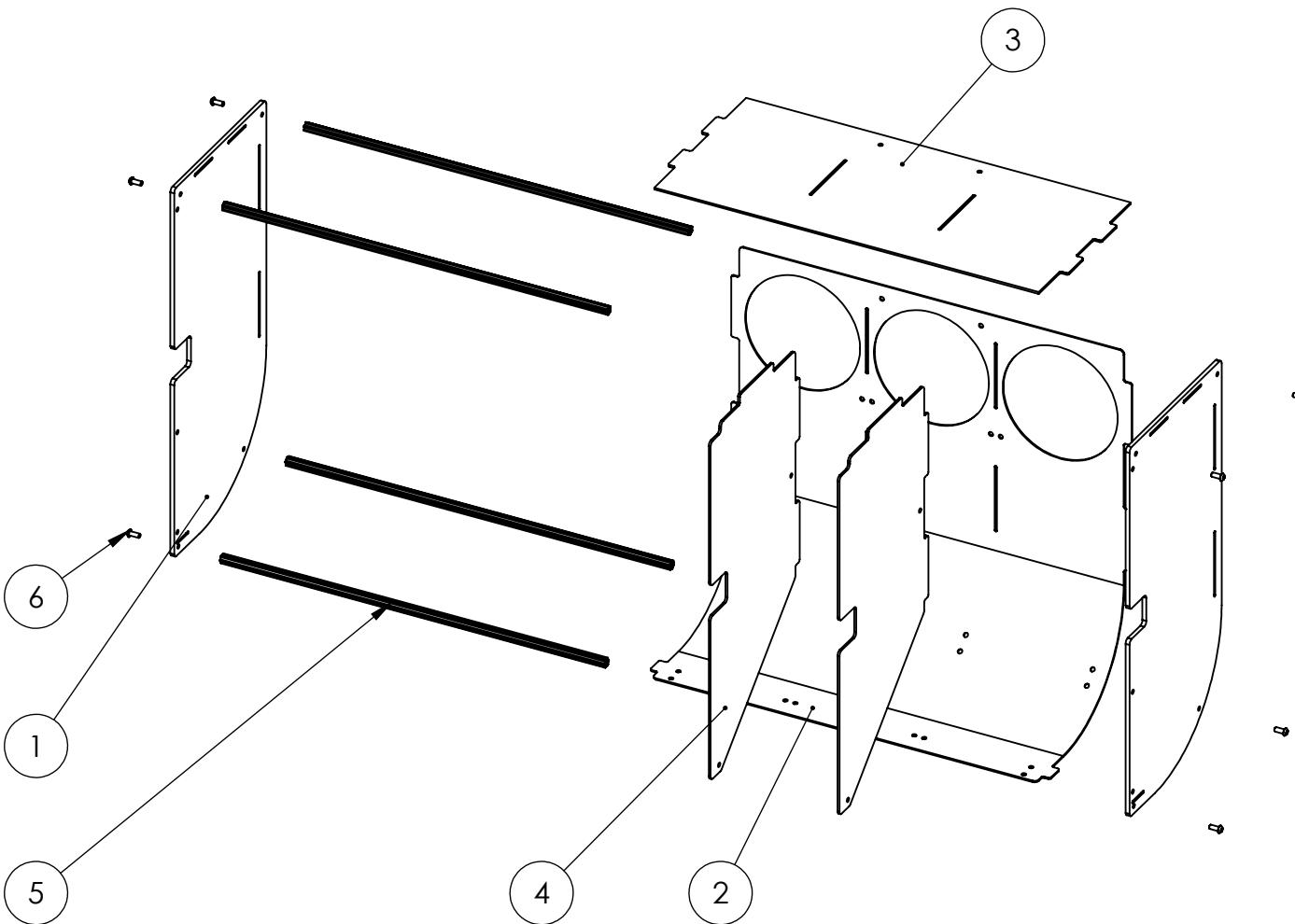
1

4

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2

1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20211	Side Plate, Upper Chute	2
2	GE-20212	Slide, Upper Chute	1
3	GE-20213	Top, Upper Chute	1
4	GE-20214	Divider, Upper Chute	2
5	GE-20215	Churro, Upper Chute	4
6	round_hex_.25_20_.625_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	8

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN	
		TOLERANCES: FRACTIONAL $\pm 1/16$	CHECKED	
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	ENG APPR.	
		TWO PLACE DECIMAL $\pm .01$	MFG APPR.	
		THREE PLACE DECIMAL $\pm .001$	Q.A.	
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:	
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:10	WEIGHT:	SHEET 1 OF 1	SIZE	DWG. NO.
B		GE-20210	REV	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Chute Assembly,
Upper**

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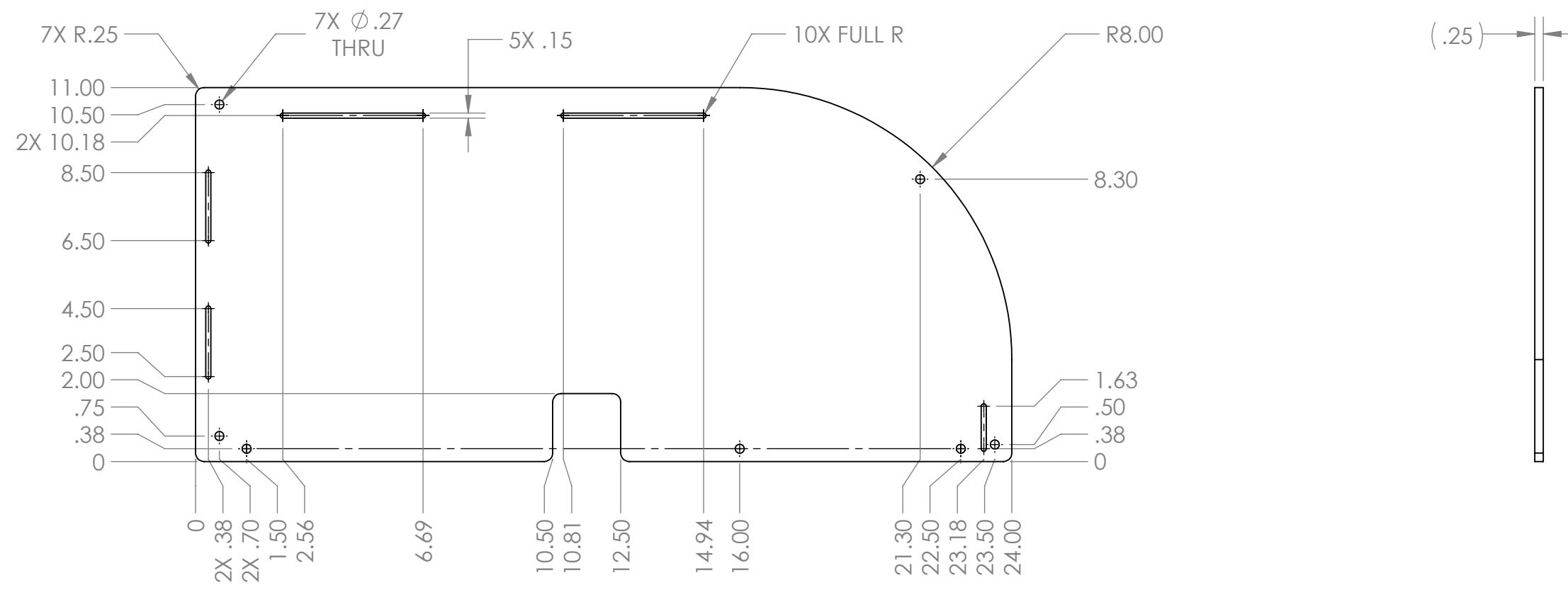
4

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Notes:

1. Material: 1/4" Polycarbonate, Clear
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
		APPLICATION	DO NOT SCALE DRAWING	
SIZE	DWG. NO.		REV	
B	GE-20211			
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1		



SOLIDWORKS

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Side Plate, Upper Chute

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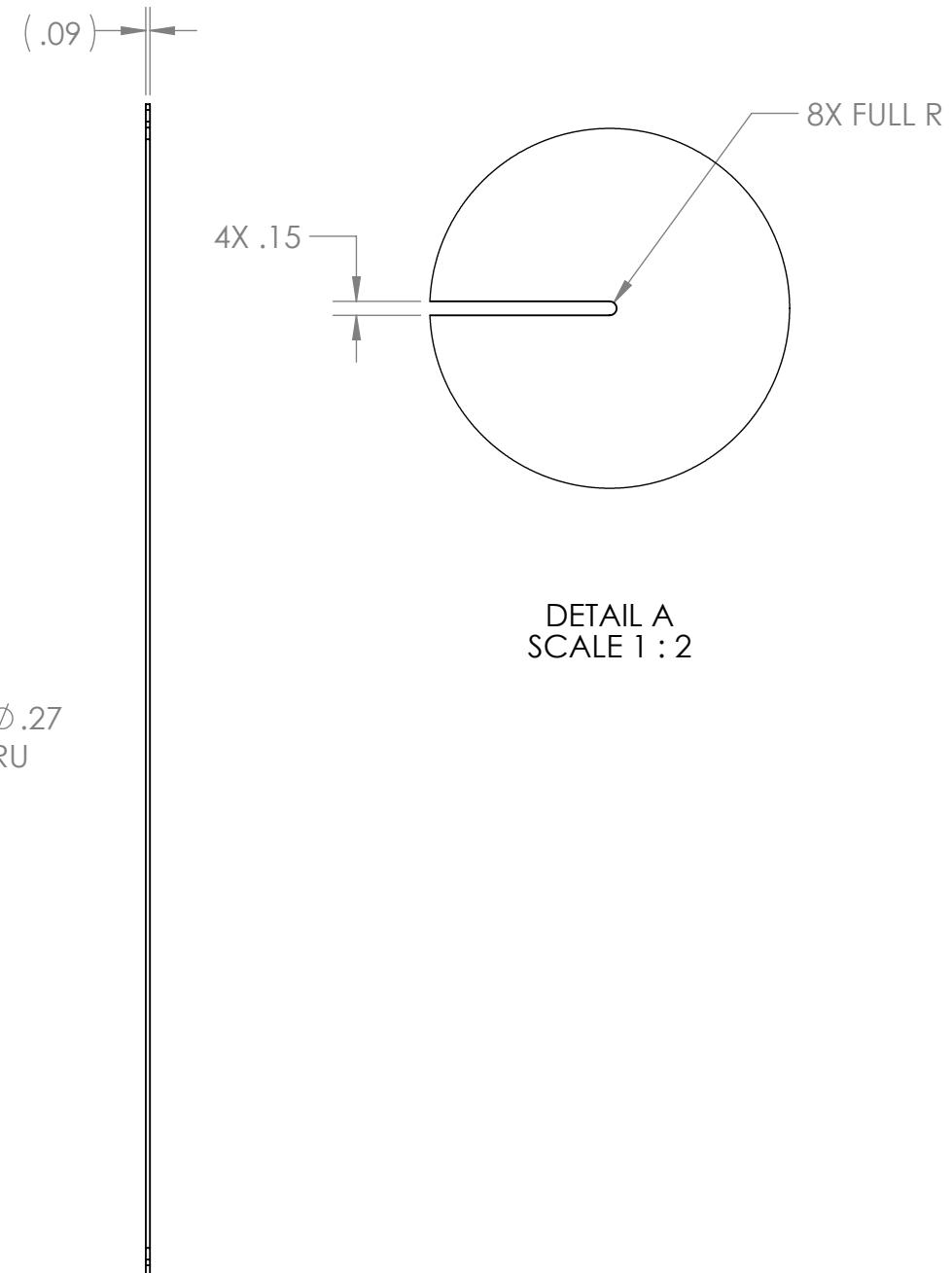
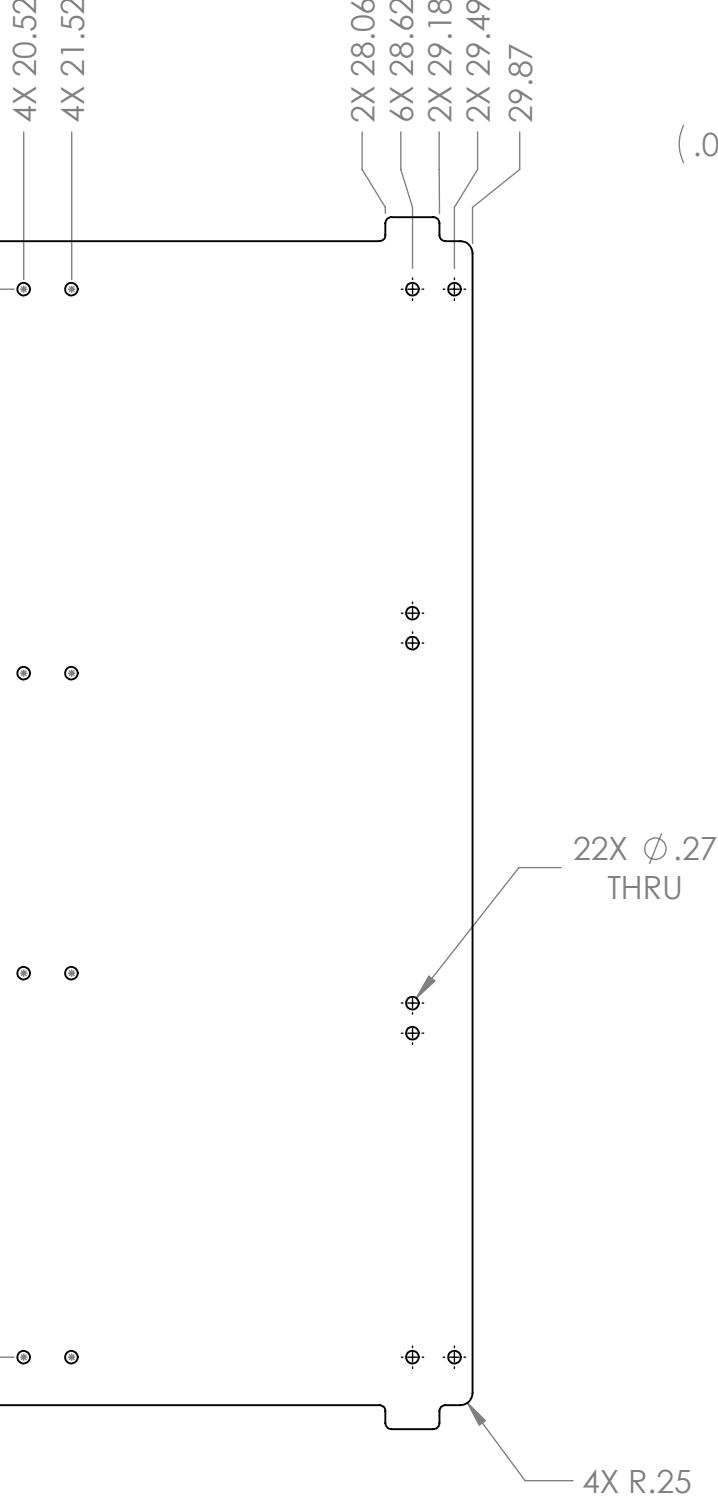
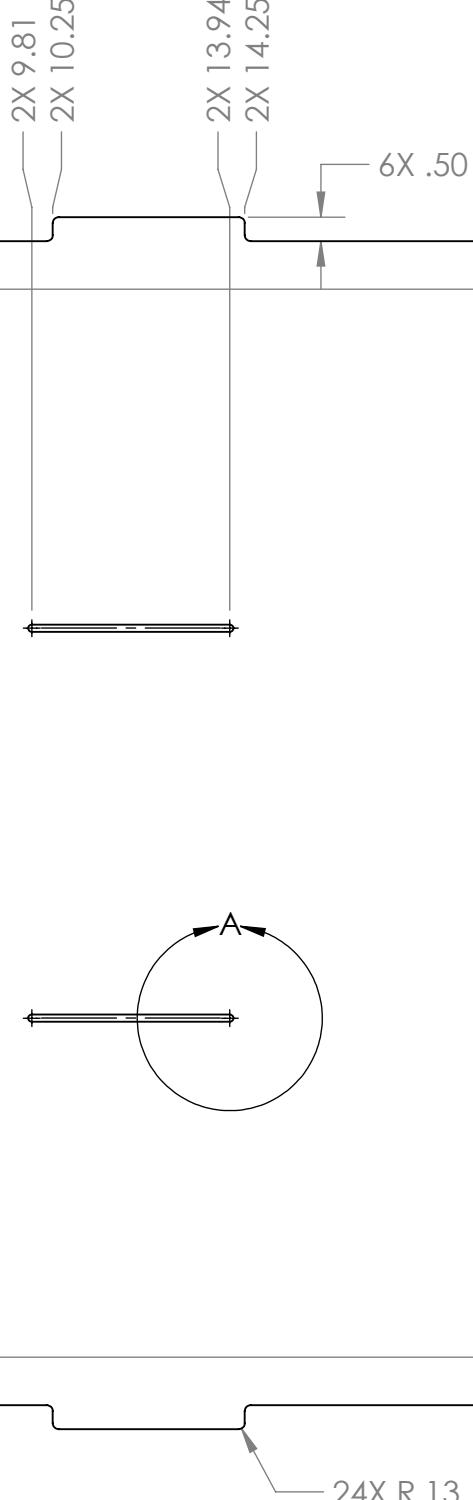
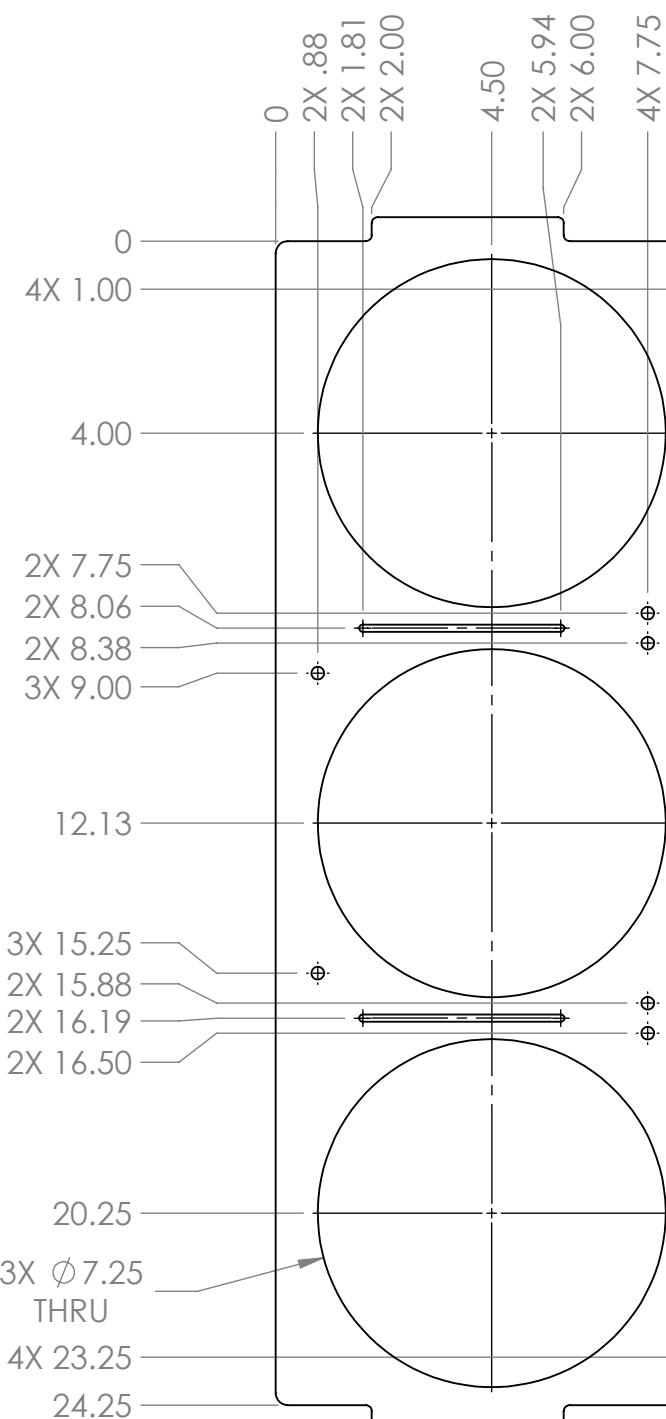
3

2

1

B

B



DETAIL A
SCALE 1 : 2

- Notes:
1. Material: .093" polycarbonate, clear
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$			DRAWN	NAME	DATE		
		INTERPRET GEOMETRIC TOLERANCING PER:			CHECKED				
		MATERIAL			ENG APPR.				
		FINISH			MFG APPR.				
NEXT ASSY		APPLICATION			Q.A.	COMMENTS:			
		DO NOT SCALE DRAWING							
B		GE-20212							
SCALE: 1:4		WEIGHT:			SHEET 1 OF 1				

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
Slide, Upper
Chute

4

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1

A

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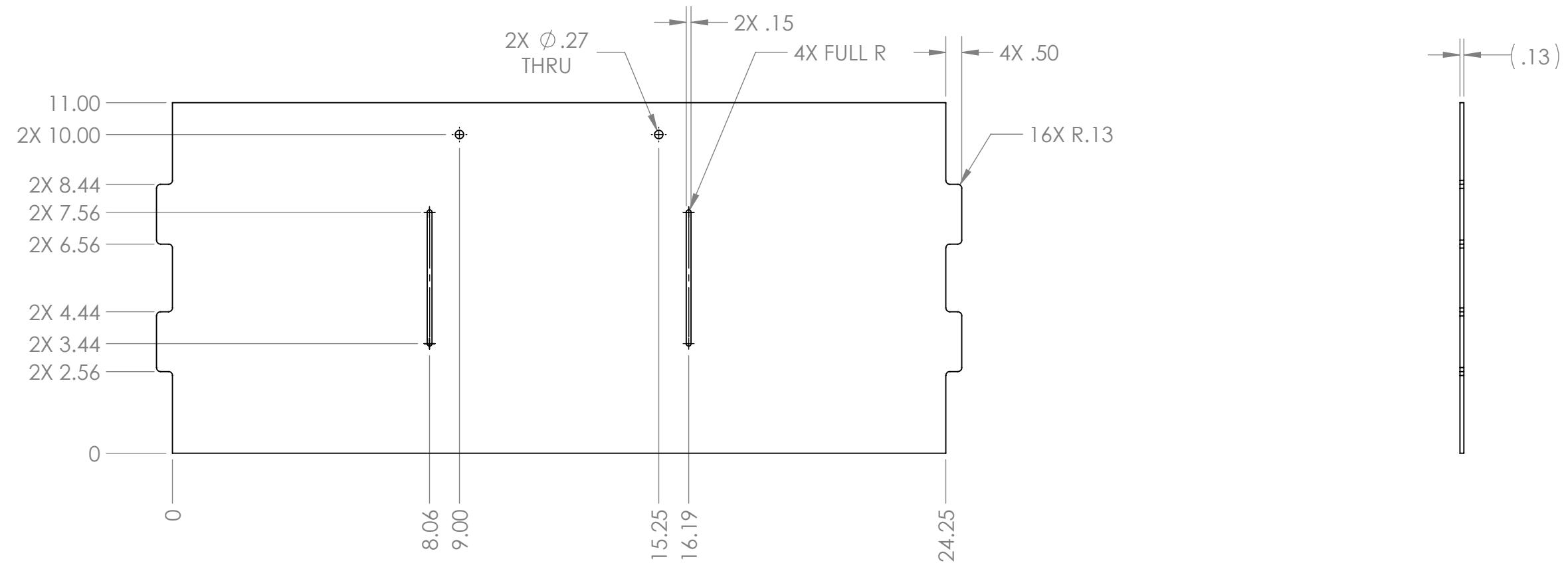
3

2

1

B

B



A

Notes:

1. Material: 1/8" polycarbonate, clear
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Top, Upper Chute

B	GE-20213	REV
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

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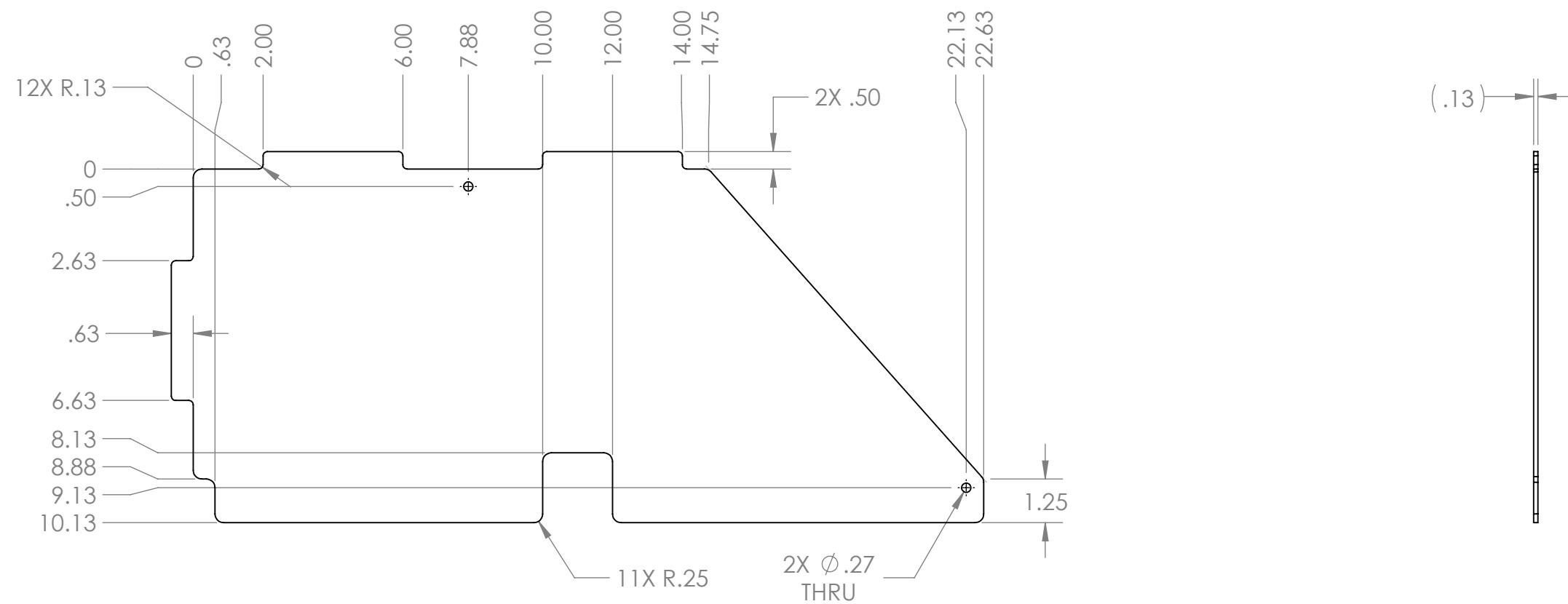
3

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Notes:

1. Material: 1/8" thick polycarbonate, clear
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
SIZE	DWG. NO.		REV		
B	GE-20214				
SCALE: 1:4	WEIGHT:		SHEET 1 OF 1		



SOLIDWORKS
Modeling Solutions Partner

TITLE:

Divider, Upper Chute

SIZE DWG. NO. REV

B GE-20214

SCALE: 1:4 WEIGHT: SHEET 1 OF 1

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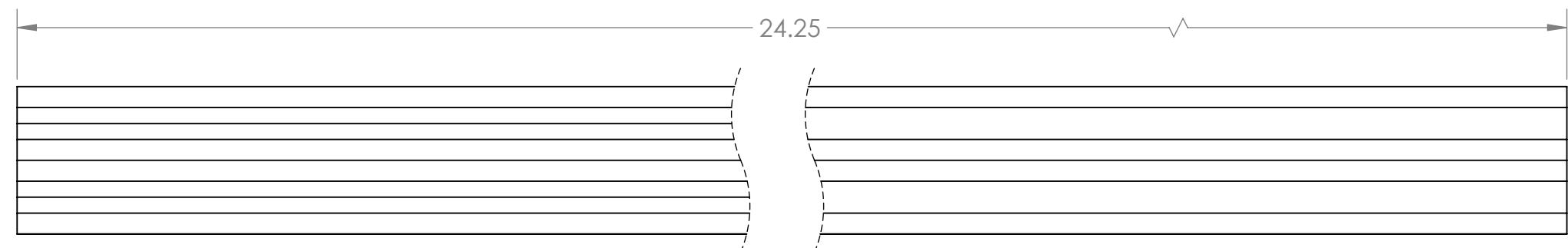
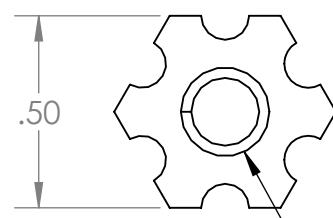
3

2

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B



2X 1/4-20 UNC-2B ∇ .50

Notes:

1. Material: Aluminum
2. Description: AndyMark Churro
3. Make from AndyMark PN: am-3101-6 or equivalent.
4. Bag or tag with part number.

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
SIZE DWG. NO.		REV			
B	GE-20215				
SCALE: 2:1	WEIGHT:	SHEET 1 OF 1			

FIRST
ROBOTICS
COMPETITION

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TITLE:

**Churro, Upper
Chute**

SIZE DWG. NO.

B GE-20215

REV

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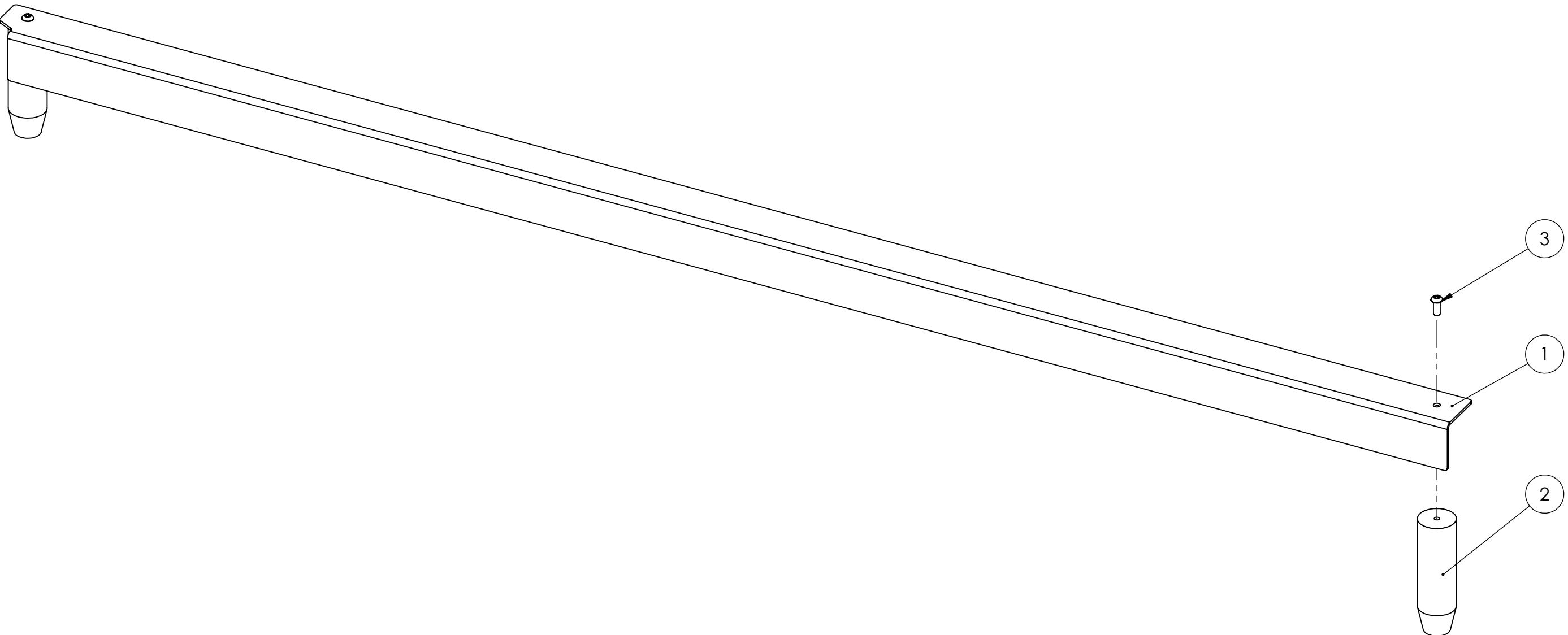
1

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20217	Top Rail, Angle	1
2	GE-20218	Top Rail, Post	2
3	round_hex_.25_20_.625_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	2

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL $\pm 1/16$		ENG APPR.	
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.	
		TWO PLACE DECIMAL $\pm .01$		Q.A.	
		THREE PLACE DECIMAL $\pm .001$		COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Top Rail, Standard

SIZE	DWG. NO.	REV
B	GE-20216	
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

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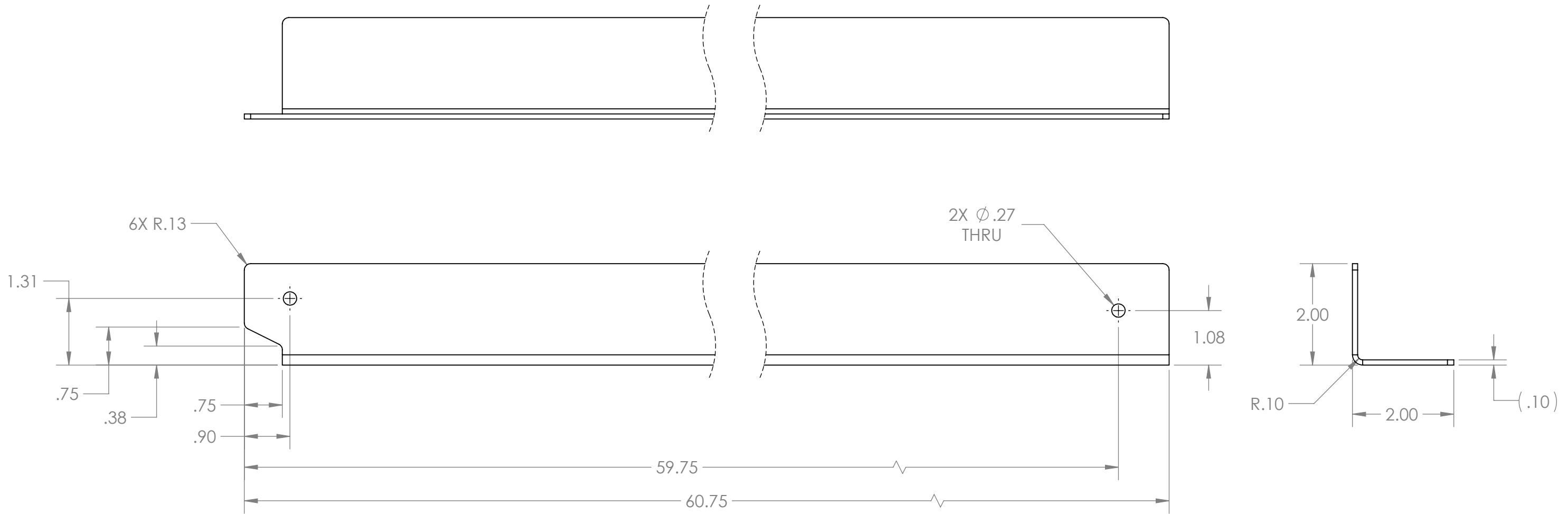
3

2

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B

B



Notes:

1. Material: 5052 Aluminum Sheet, 10 GA.
2. Remove all burrs and sharp edges.
3. Tag or Label with part number.

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN		
TOLERANCES:			CHECKED		
FRACTIONAL $\pm 1/16$			ENG APPR.		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			MFG APPR.		
TWO PLACE DECIMAL $\pm .01$			Q.A.		
THREE PLACE DECIMAL $\pm .001$			COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
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Top Rail, Angle

SIZE	DWG. NO.	REV
B	GE-20217	
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1

4

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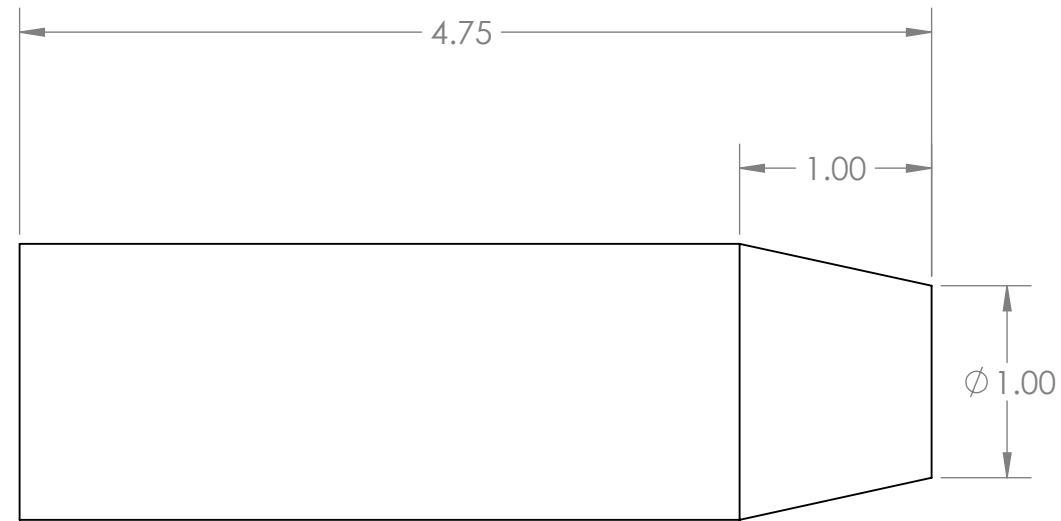
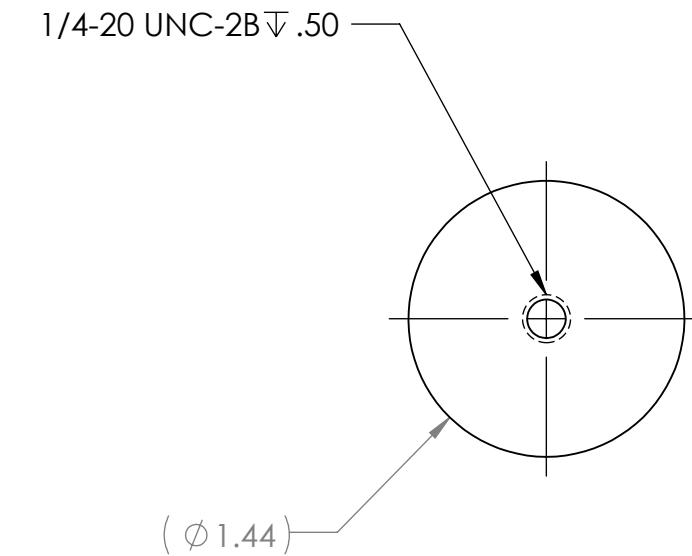
4

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Notes:

1. Material: 1-7/16 diameter, 6061 Aluminum.
2. Remove all burrs and sharp edges.
3. Bag or tag with part number.

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			CHECKED		
			ENG APPR.		
			MFG APPR.		
			Q.A.		
			COMMENTS:		
		MATERIAL			
	NEXT ASSY	USED ON	FINISH		
		APPLICATION	DO NOT SCALE DRAWING		
B	GE-20218			REV	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1			

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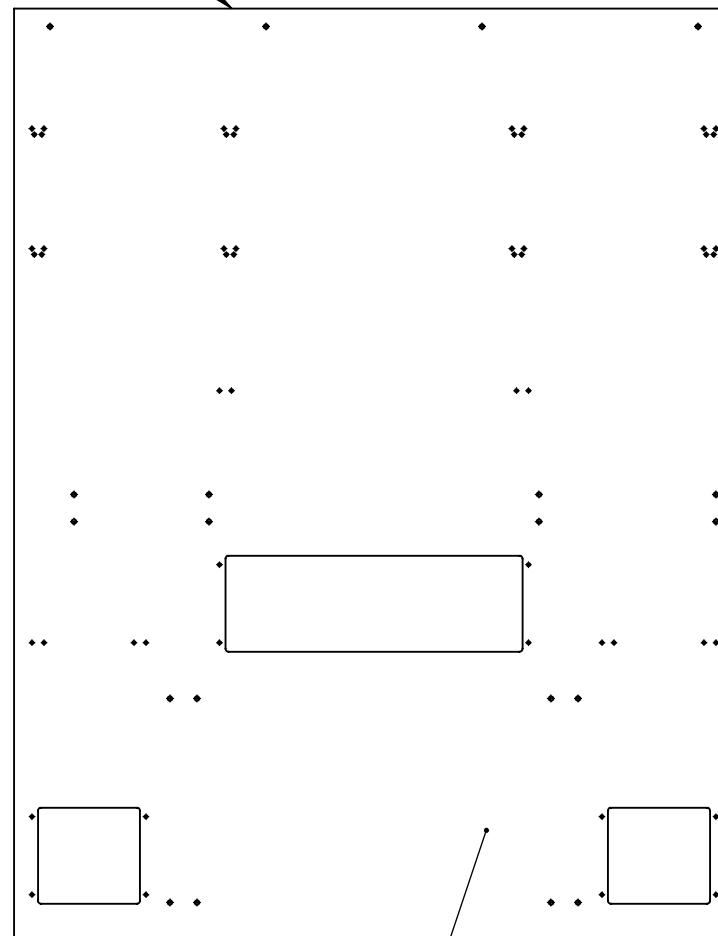
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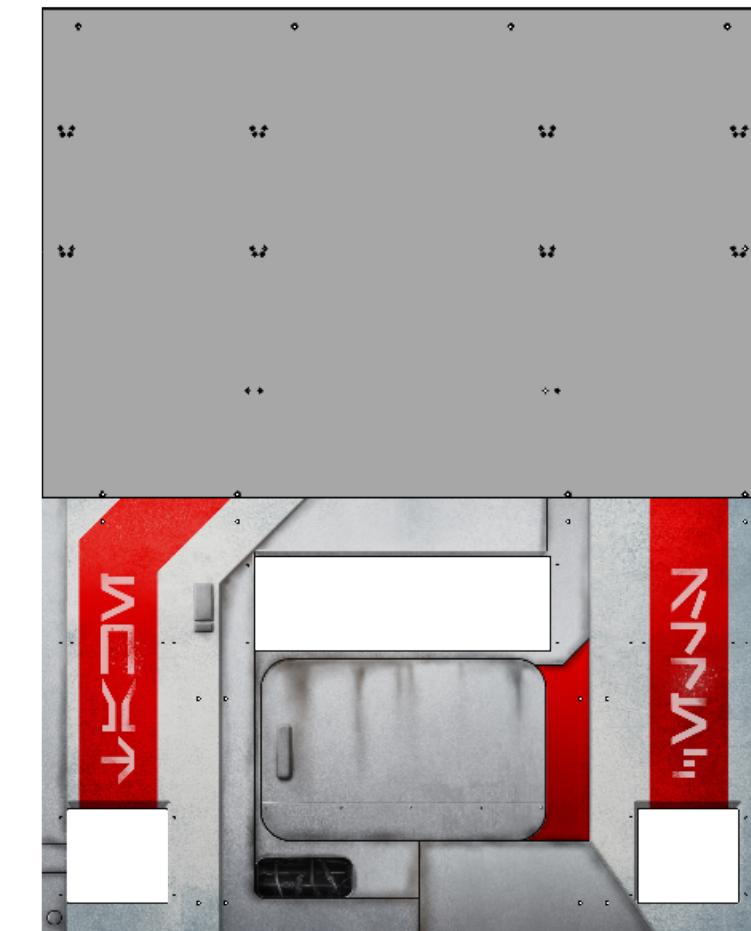
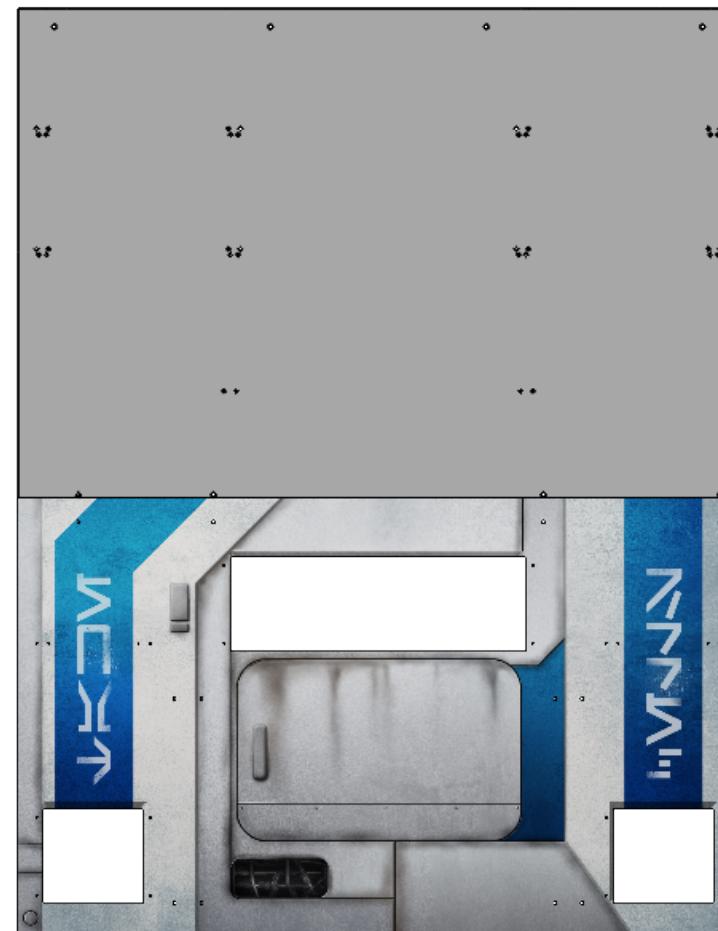
2

1

GE-20202



Vinyl applied to one face. Front and back of part are identical.



Notes:
1. Tag or label with part number

Color Variations		
Part Number	Vinyl Image	QTY per field
GE-20220-Blue	GE-20220-Blue-Vinyl	1
GE-20220-Red	GE-20220-Red-Vinyl	1

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
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		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
			MATERIAL		
			FINISH		
	NEXT ASSY	USED ON			
			APPLICATION	DO NOT SCALE DRAWING	
SIZE	DWG. NO.	REV			
B	GE-20220				
SCALE: 1:16	WEIGHT:	SHEET 1 OF 1			

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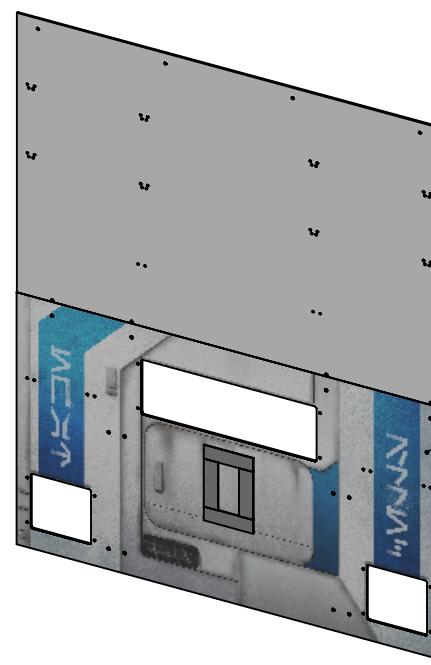
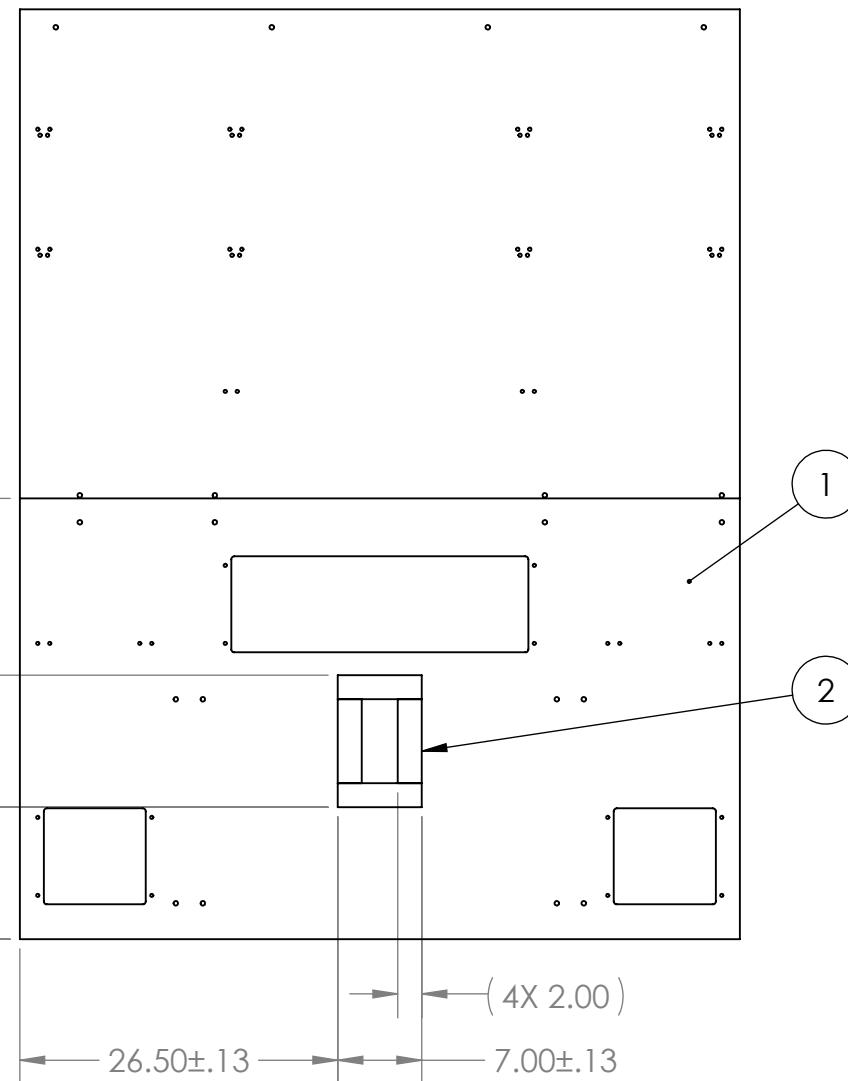
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GE-20220-Blue Shown

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20220	Front Face with Vinyl	1
2	Vision_LoadingBay	2" Wide, 3M 8830 Scotchlite Reflective Material	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
	DRAWN		
	CHECKED		
	ENG APPR.		
	MFG APPR.		
	Q.A.		
	COMMENTS:		
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER:	
		MATERIAL	
APPLICATION	FINISH		
	DO NOT SCALE DRAWING		

TITLE:
Front Face, with Target

SIZE	DWG. NO.	REV
B	GE-20221	
SCALE: 1:16	WEIGHT:	SHEET 1 OF 1

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COMPETITION

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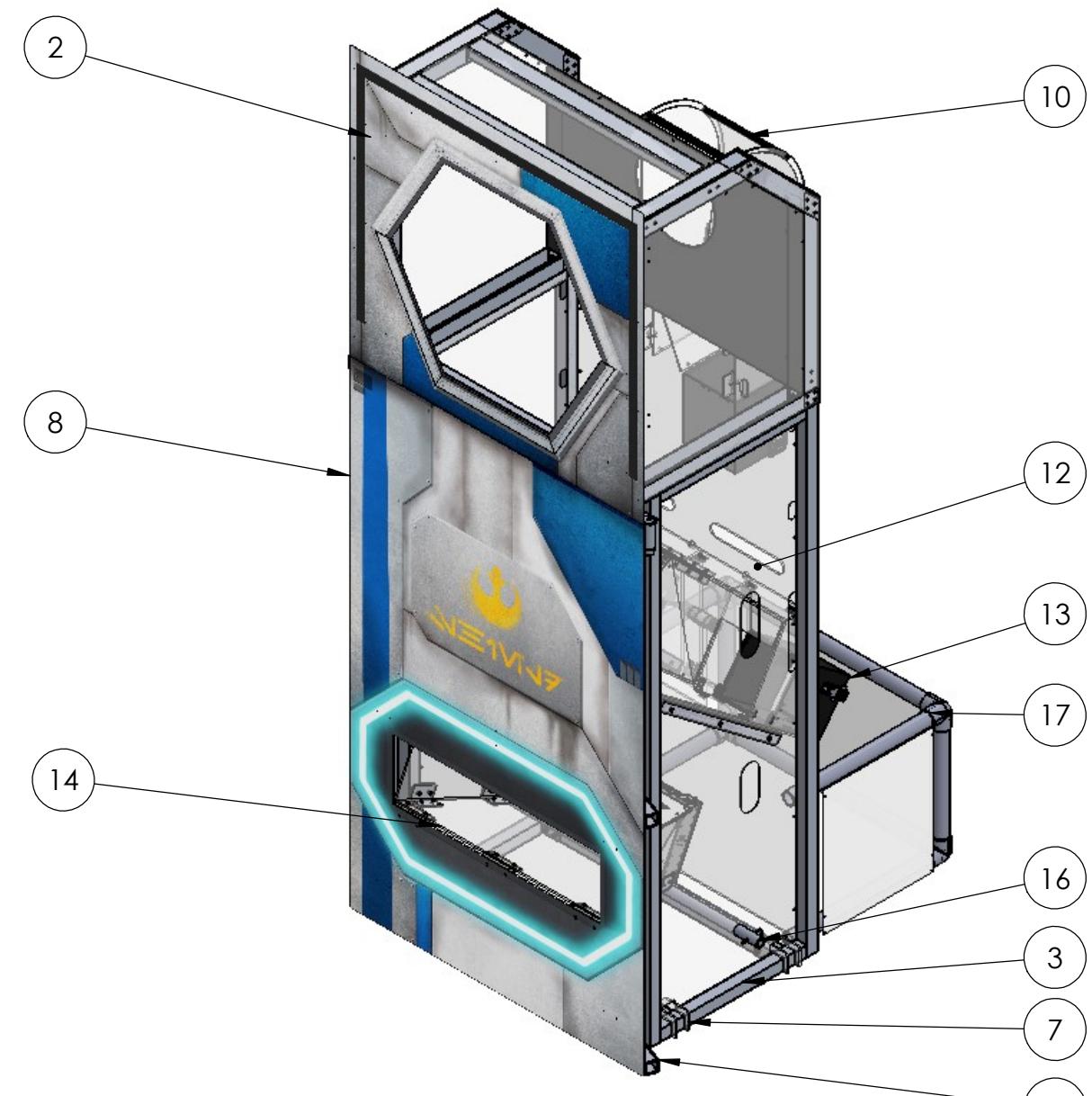
B

Notes:
1. This assembly exists in red and blue configurations. Only blue is shown here.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	flat_phil_.25_20_.75	Steel Phillips Flat Head Screw, 1-4"-20 x 3/4" long, fully threaded	6
2	GE-20301	Power Port Top Assembly	1
3	GE-20309	Goal Base Upright	2
4	GE-20310	Low Power Port Frame	1
5	GE-20313	Anchor with hook	1
6	GE-20316	Power Port Base Back Top	1
7	GE-20319	Power Port Base Brace Assembly	2
8	GE-20321	Low Power Port with Vinyl	1
9	GE-20323	Top Rail, Standard	1
10	GE-20337	Inner Port Chute Assembly	1
11	GE-20338	Side Polycarbonate Assembly, Right	1
12	GE-20339	Side Polycarbonate Assembly, Left	1
13	GE-20340	Outer Port Serializer	1
14	GE-20350	Plastic Serializer Assembly	1
15	GE-20370	Counter Assembly	1
16	GE-20387	support bar	1
17	GE-20390	Corral Assembly	1
18	GE-20398	Power Port Base Back Bottom	1
19	hex_.25_20_2.25_partial	Steel Hex Head Screw, 1/4"-20 x 2-1/4" long, partially threaded	4
20	hex_.25_20_.625	Steel Hex Head Screw, 1/4"-20 x 5/8" long, fully threaded	2
21	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	12
22	pin_quick_ring_.25_1.8125	Ring-Grip Quick-Release Pin, 1/4" diameter, 1-13/16" long	2

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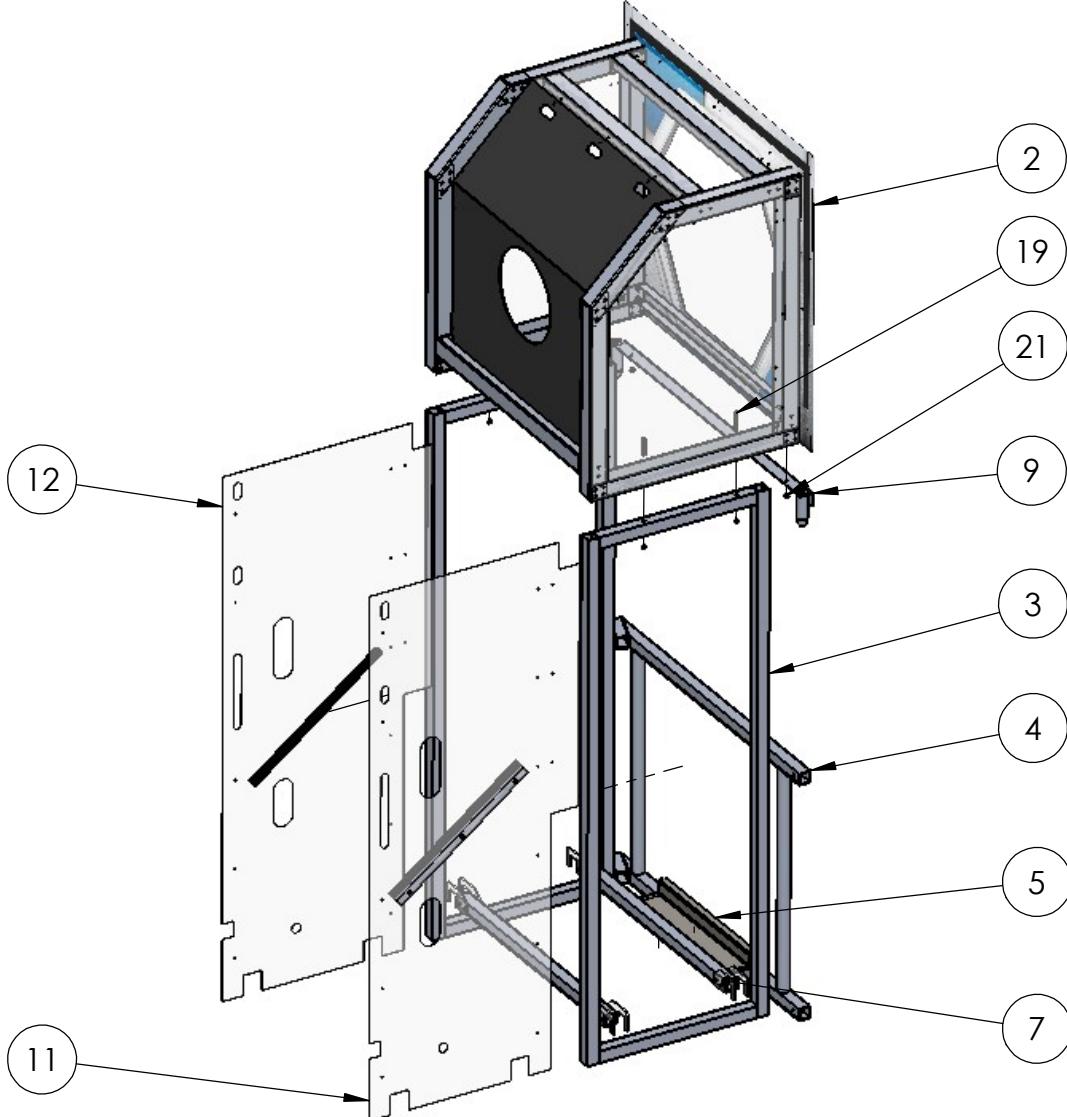
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		TOLERANCES:	CHECKED		
		FRACTIONAL: ±1/16	ENG APPR.		
		ANGULAR: MACH ±1° BEND ±1°	MFG APPR.		
		TWO PLACE DECIMAL ±.01	Q.A.		
		THREE PLACE DECIMAL ±.001	COMMENTS:		
		INTERPRET GEOMETRIC			
		TOLERANCING PER:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
		APPLICATION	DO NOT SCALE DRAWING		
SIZE	DWG. NO.			REV	
B	GE-20300				
SCALE: 1:20	WEIGHT:			SHEET 1 OF 4	

**FIRST
ROBOTICS
COMPETITION**

SOLIDWORKS
Modeling Solutions Partner

Power Port

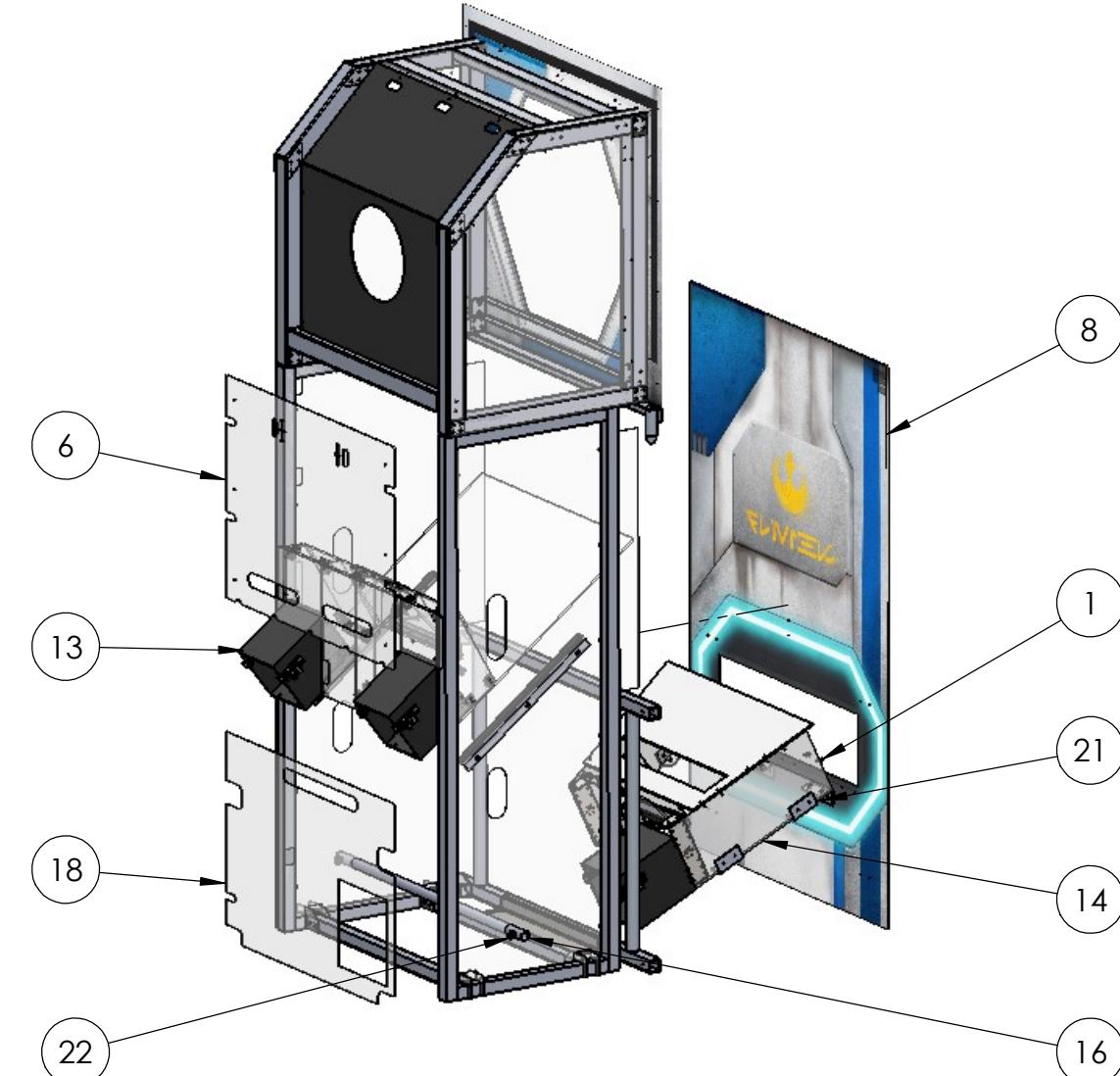
B



Notes:

1. Items 9 and 4 should be installed during creation of Alliance Wall.
2. Attach 2 to 3 and 9 using 19, 20, and 21.
3. Place item 5 in place and affix to carpet.
4. Attach the item 7 pieces to 3 using the plastic hooks.
5. Slide 11 and 12 into place and secure using 50 lb. cable ties.

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Notes:

1. Insert 16 into the assembly, secure in place using 22.
2. Attach 14 to 8 using 1 and 21.
3. Slide this subassembly into place and secure using 120 lb. cable ties.
4. Attach 13 to the assembly using the hook and loop fastener.
5. Attach 6 and 18 using 50 lb. cable ties.

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME	DATE
	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		
		FINISH		
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:25	WEIGHT:			SHEET 2 OF 4
B	GE-20300			REV

B

A

FIRST
ROBOTICS
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Modeling Solutions Partner

4

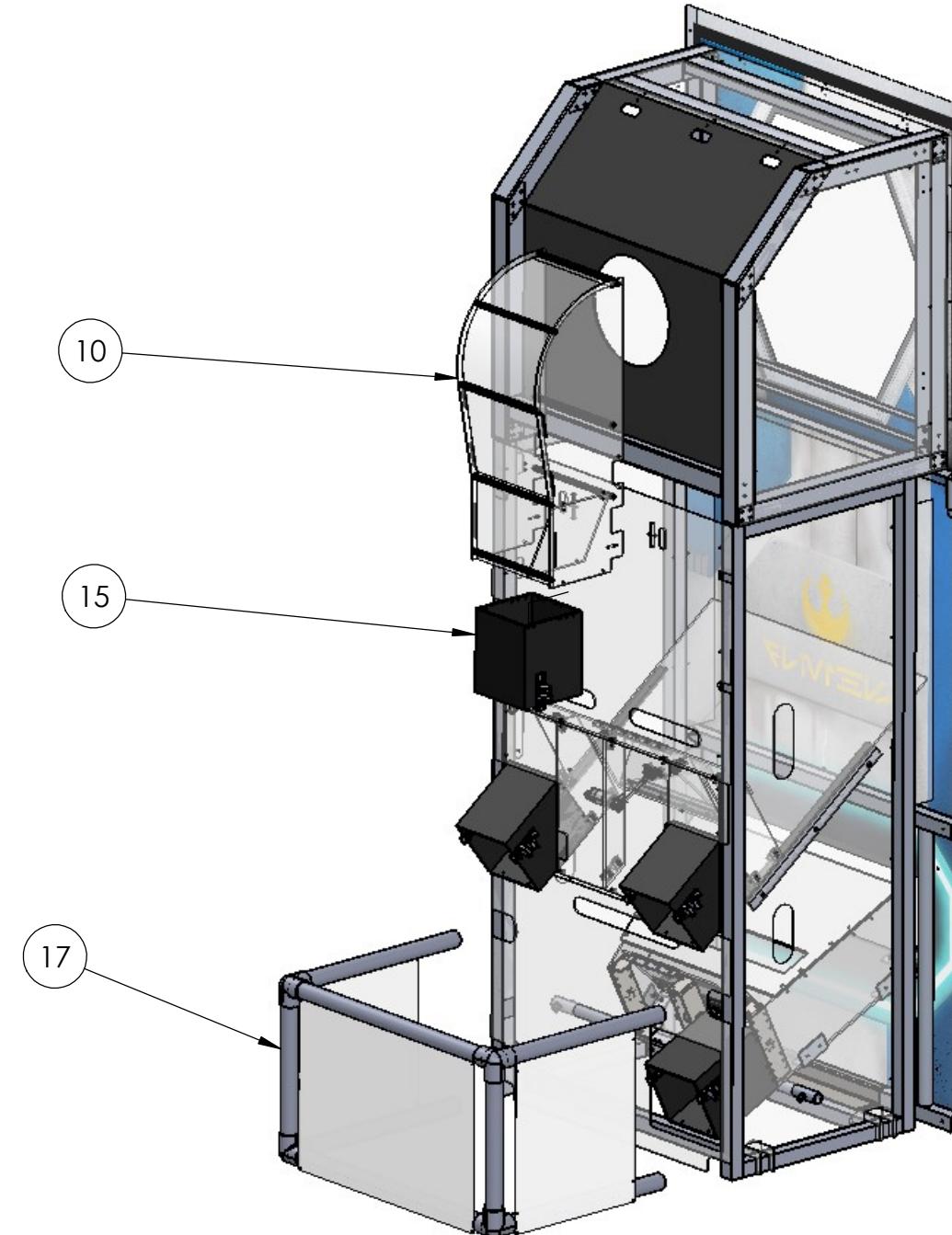
3

2

1

B

B



Notes:

1. Attach 15 to 10 using 50 lb. cable ties.
2. Attach this subassembly to the rest of the assembly using 50 lb. cable ties.
3. Slide 17 into place.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
SIZE	DWG. NO.		REV		
B	GE-20300				
SCALE: 1:20	WEIGHT:		SHEET 3 OF 4		

4

3

2

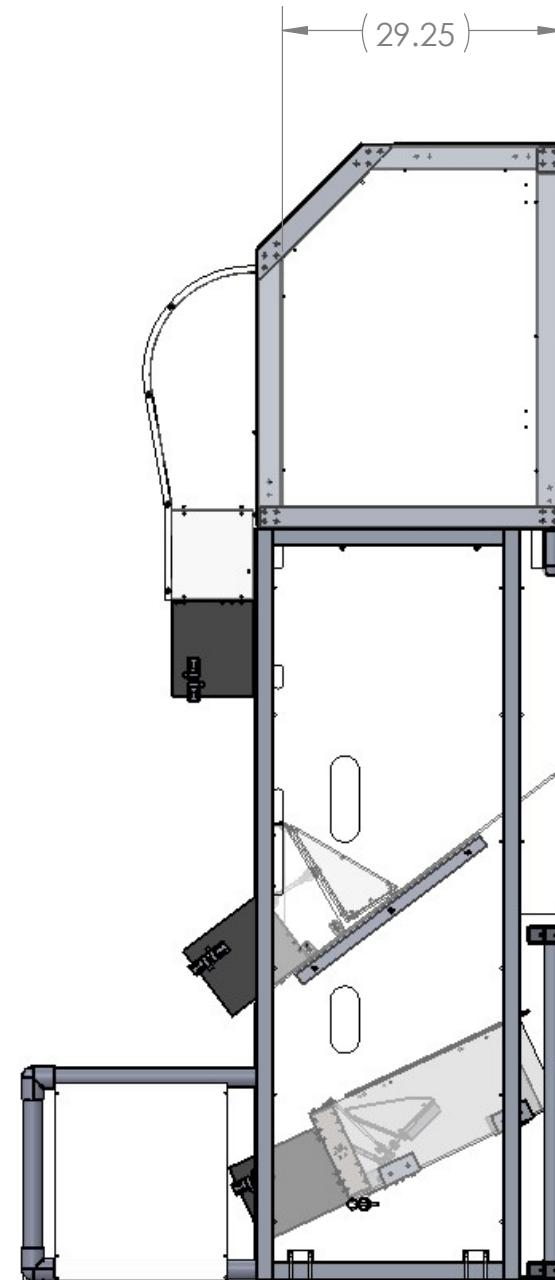
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1



(113.19)

(83.19)

(18.00)

(98.19)

(81.19)

B

B

A

A

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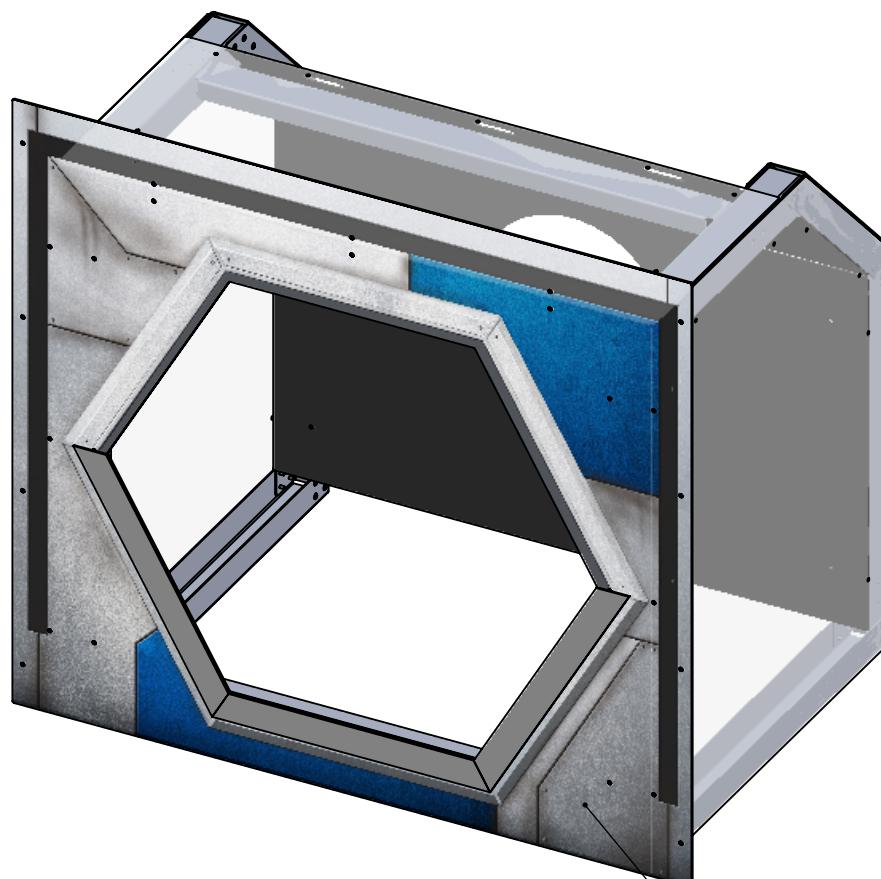
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: <h1>Power Port</h1>
		DIMENSIONS ARE IN INCHES	DRAWN				
		TOLERANCES:	CHECKED				
		FRACTIONAL $\pm 1/16$	ENG APPR.				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.				
		TWO PLACE DECIMAL $\pm .01$	QA.				
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:				
		INTERPRET GEOMETRIC TOLERANCING PER:				SIZE DWG. NO. B GE-20300 REV SCALE: 1:20 WEIGHT: SHEET 4 OF 4	
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					

4

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2

1



Blue version shown,
also exists in red.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20302	Power Port Top Frame	2
2	GE-20303	Power Port Top Brace	4
3	GE-20304	Power Port Top Side Polycarbonate	2
4	GE-20305	Power Port Top Back Polycarbonate	1
5	GE-20307	Power Port Top Roof Polycarbonate	1
6	GE-20308	Power Port Top Deflector Polycarbonate	1
7	GE-20322	Power Port Top Front	1
8	hex_.25_20_.625	Steel Hex Head Screw, 1/4"-20 x 5/8" long, fully threaded	16

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL: ±1/16		ENG APPR.	
		ANGULAR: MACH ±1° BEND ±1°		MFG APPR.	
		TWO PLACE DECIMAL ±.01			
		THREE PLACE DECIMAL ±.001			
		INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.	
		MATERIAL		COMMENTS:	
	NEXT ASSY	USED ON	FINISH		
	APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV			
B	GE-20301				
SCALE: 1:12	WEIGHT:	SHEET 1 OF 2			

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 FIRST
ROBOTICS
COMPETITION

 SOLIDWORKS
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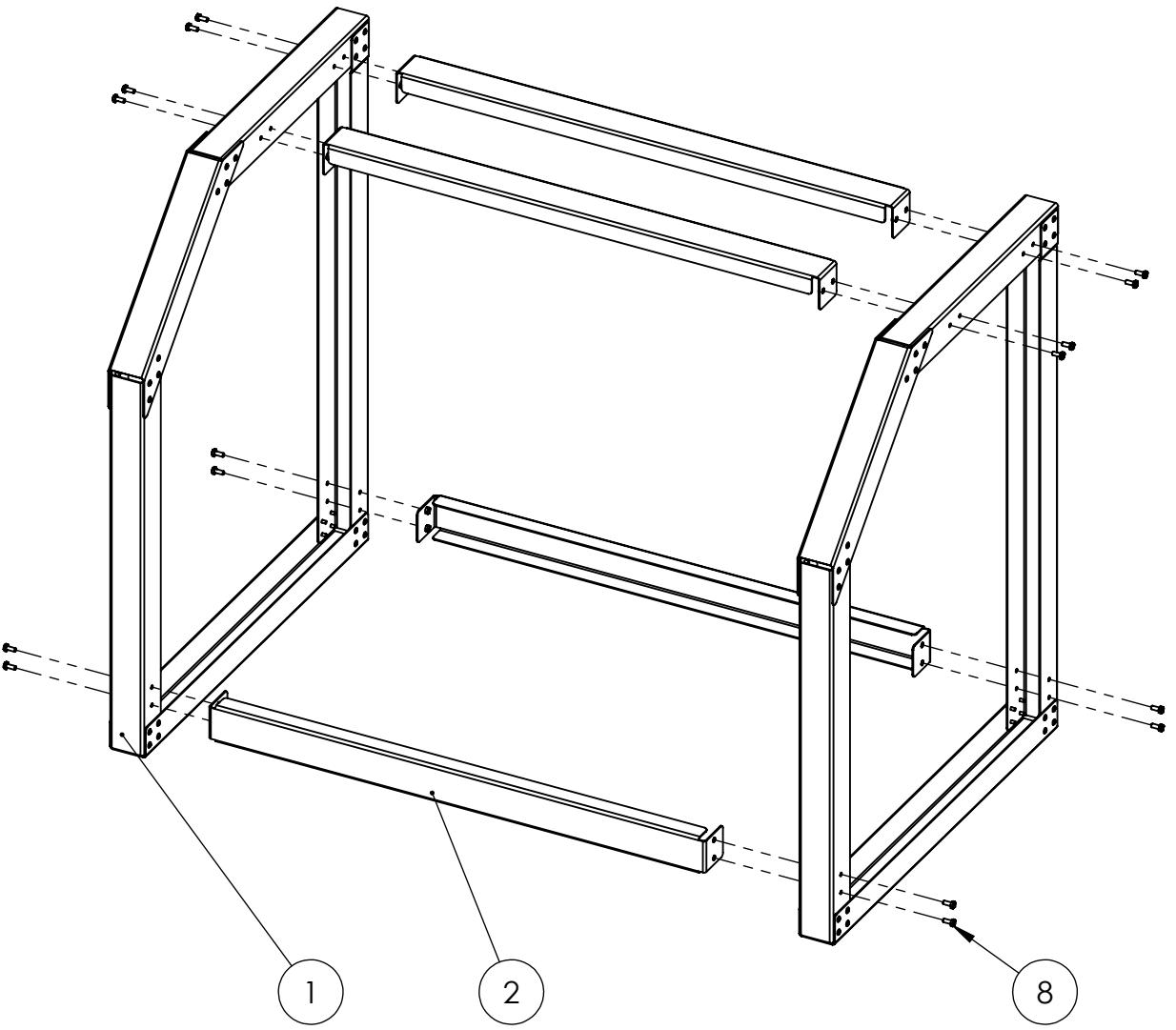
Power Port Top Assembly

4

3

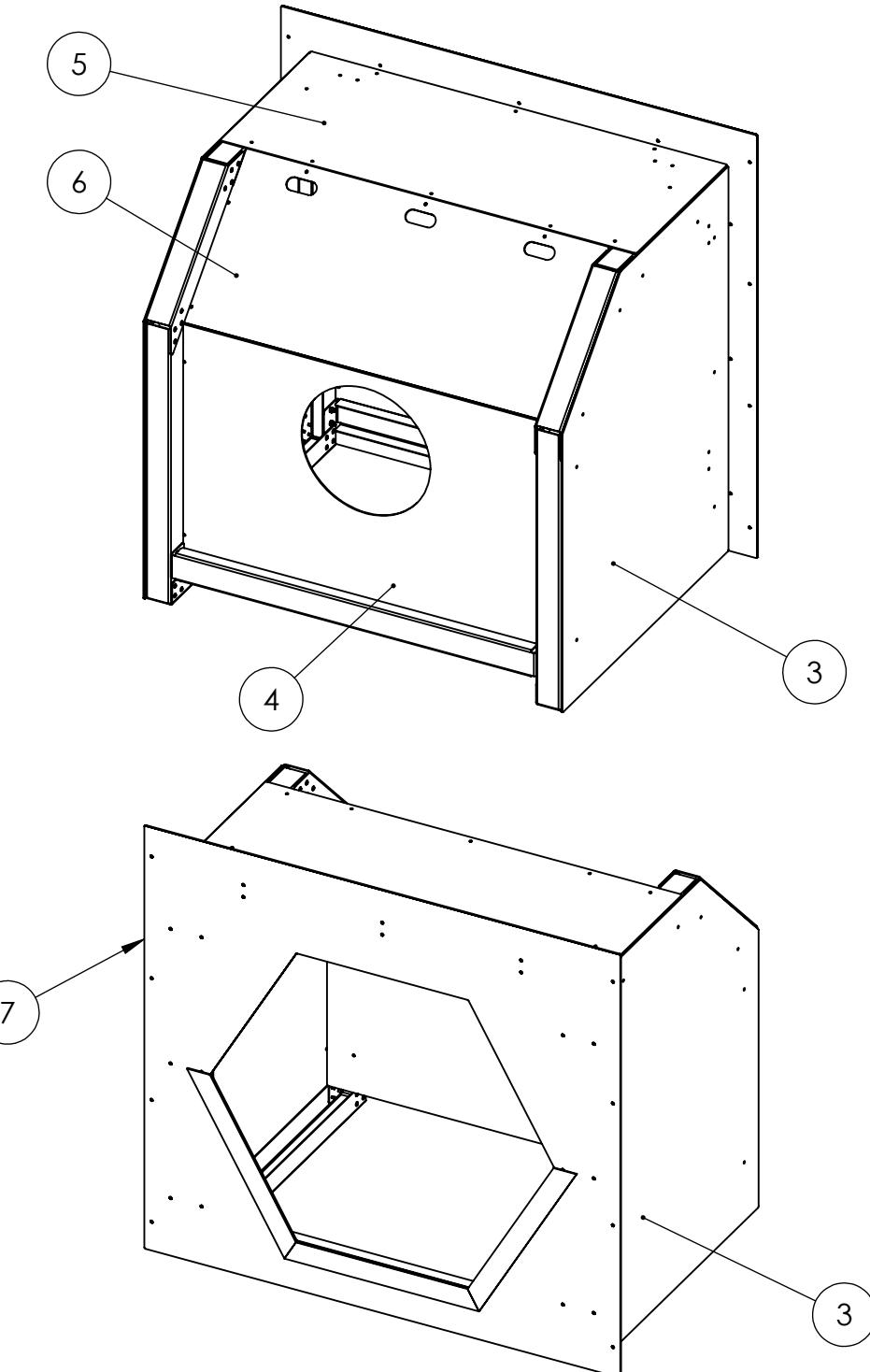
2

1



Notes:
1. Cable tie plastic at available locations.

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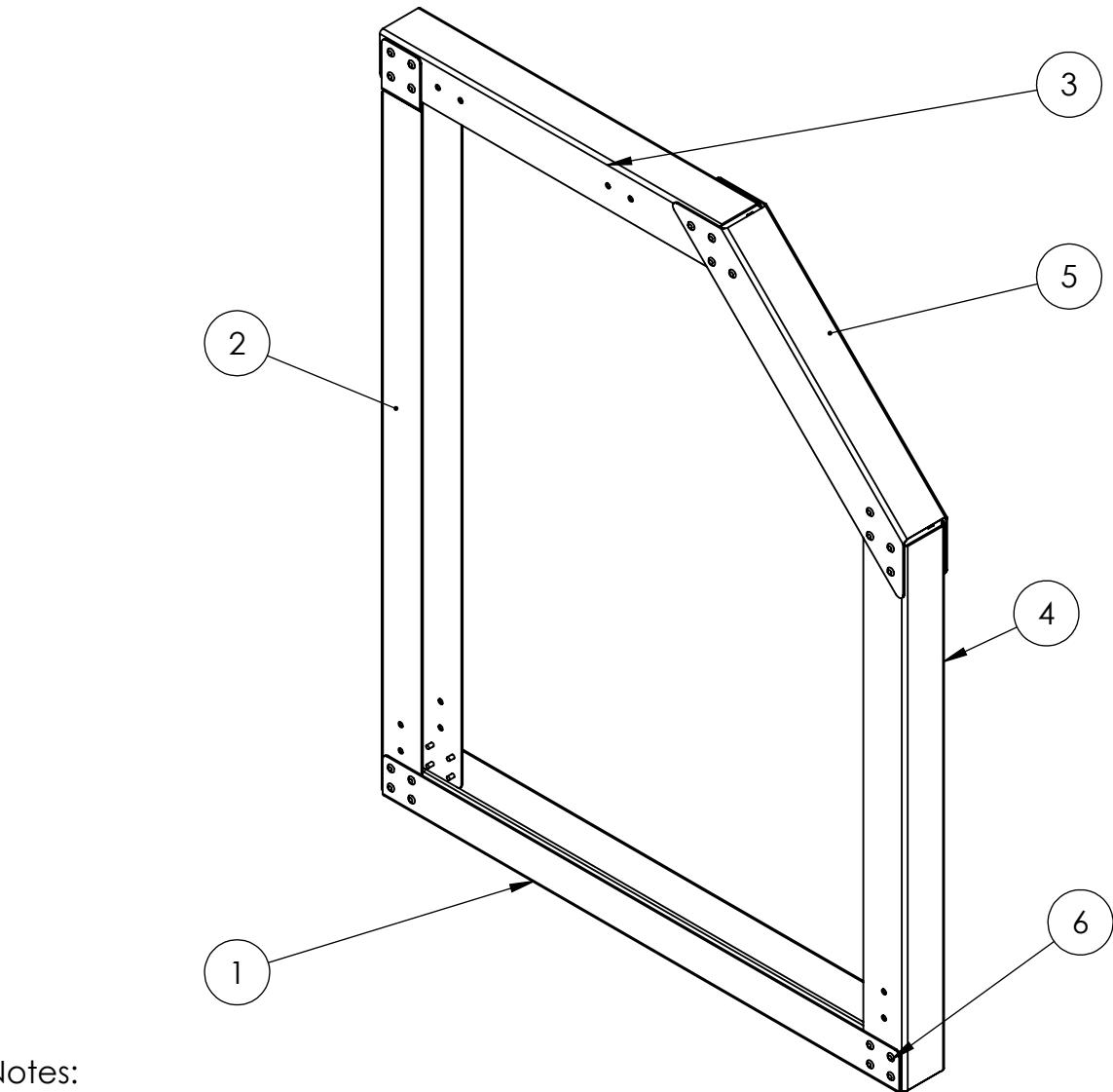
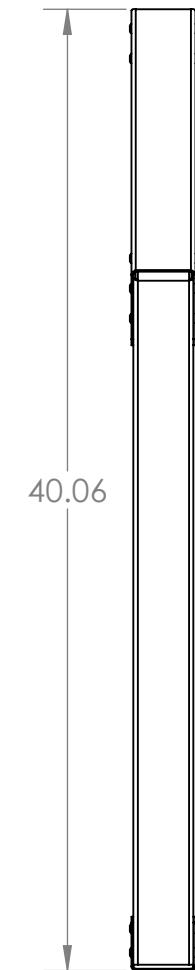
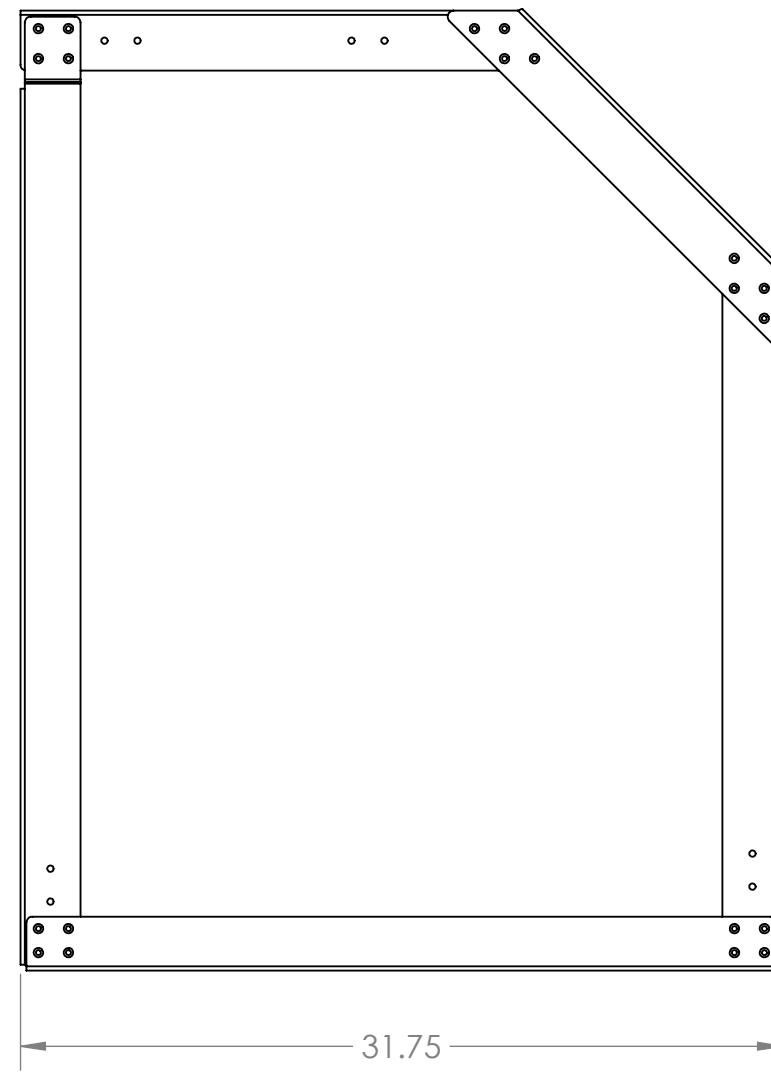
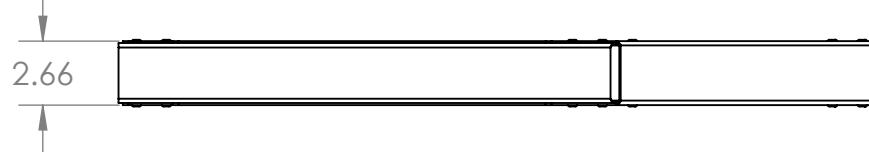


		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES			
		TOLERANCES:			
		FRACTIONAL: $\pm 1/16$			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
		TWO PLACE DECIMAL $\pm .01$			
		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC			
		TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Top Assembly

SIZE	DWG. NO.	REV
B	GE-20301	
SCALE: 1:12	WEIGHT:	SHEET 2 OF 2



Notes:

- A**
1. Rivets to be aluminum.
 2. Tag or label with part number.
 3. Remove all burrs and sharp edges.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20302-01	12 GA, 5052 Aluminum	1
2	GE-20302-02	12 GA, 5052 Aluminum	1
3	GE-20302-03	12 GA, 5052 Aluminum	1
4	GE-20302-04	12 GA, 5052 Aluminum	1
5	GE-20302-05	12 GA, 5052 Aluminum	1
6	rivet_.1875_.126-.25	3/16" Rivet, .126-.25 Grip Range	40

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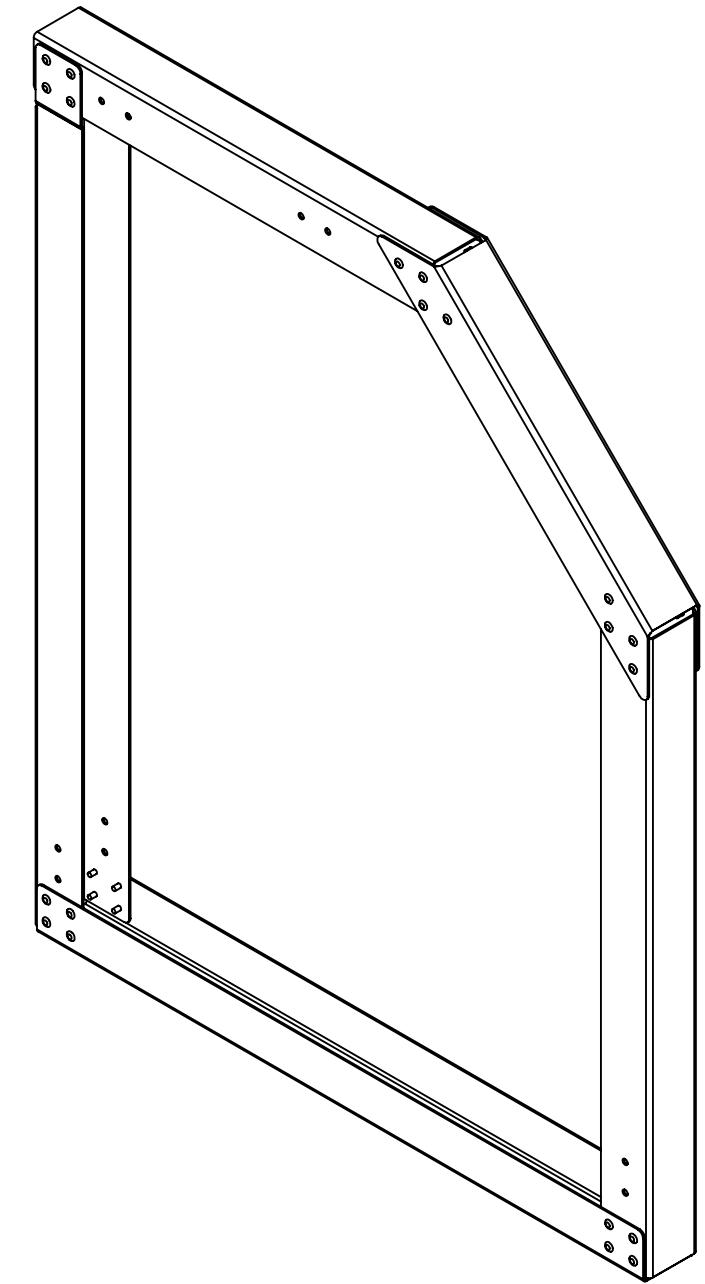
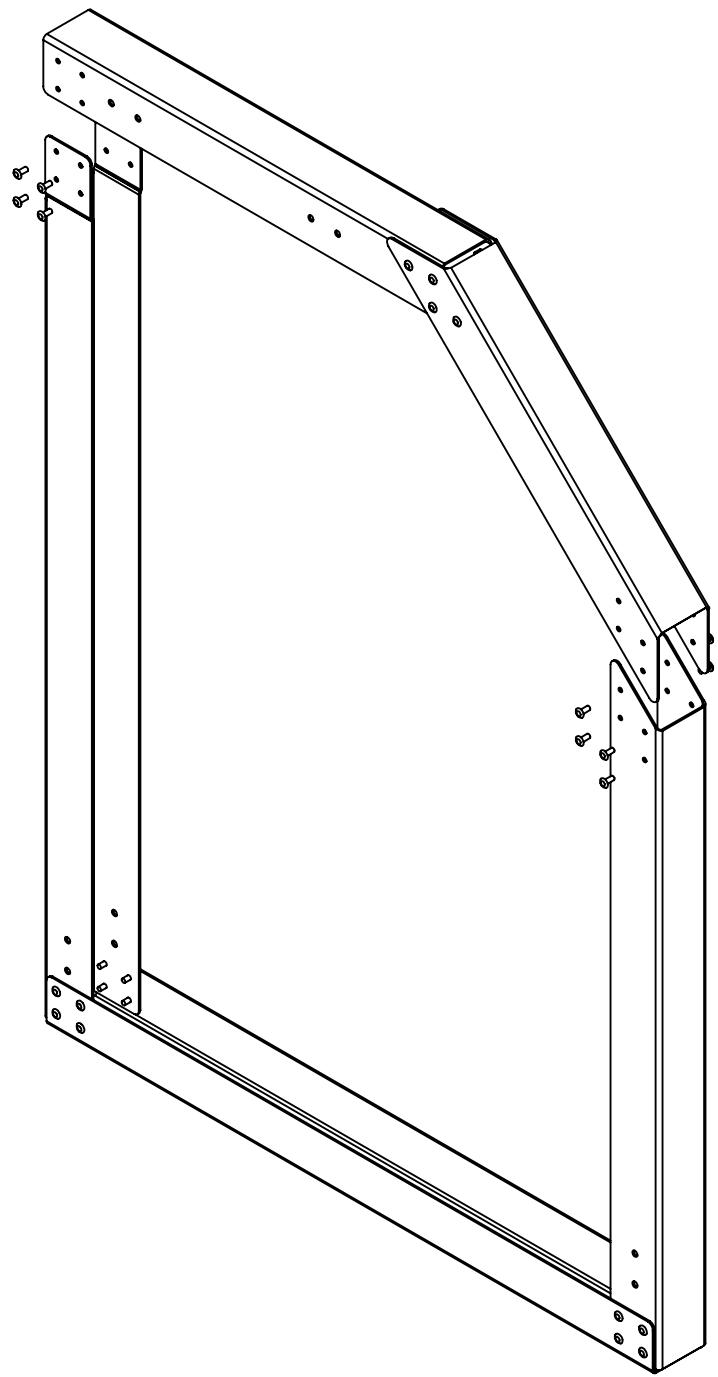
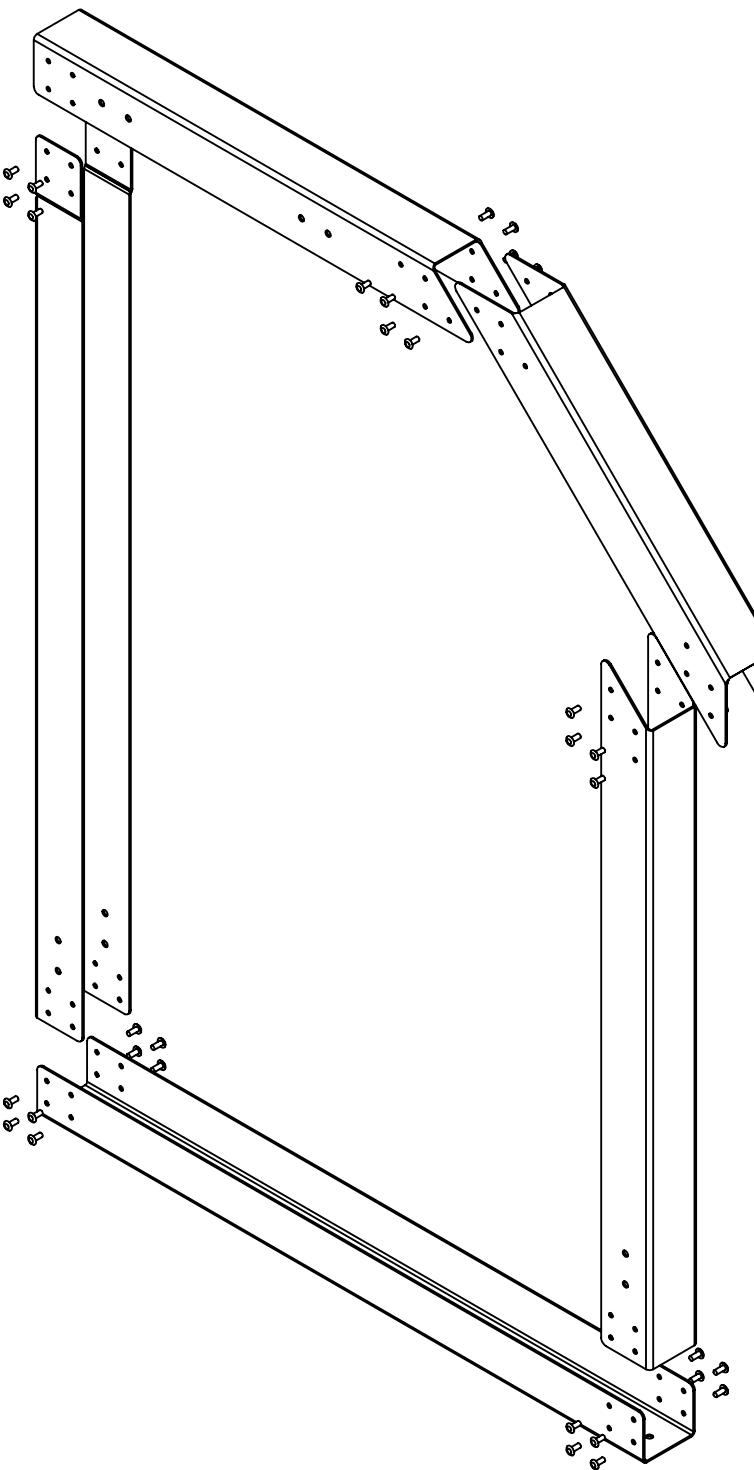
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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
NEXT ASSY	USED ON	MATERIAL		
		FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Power Port Top Frame

SIZE DWG. NO. **REV**
B **GE-20302** **A**

SCALE: 1:8 WEIGHT: SHEET 1 OF 4



4

3

2

1

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	
		DIMENSIONS ARE IN INCHES	DRAWN				TITLE: <h1>Power Port Top Frame</h1>
		TOLERANCES: FRACTIONAL $\pm 1/16$	CHECKED				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	ENG APPR.				
		TWO PLACE DECIMAL $\pm .01$	MFG APPR.				
		THREE PLACE DECIMAL $\pm .001$	Q.A.				
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:				
		MATERIAL				SIZE DWG. NO. B GE-20302	
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING	SCALE: 1:7	WEIGHT:	SHEET 2 OF 4		

4

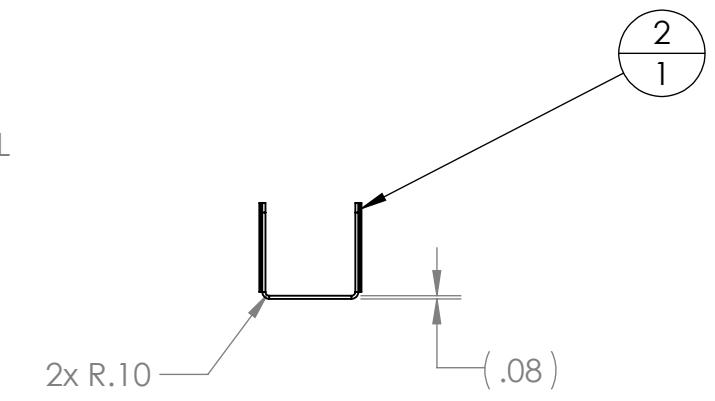
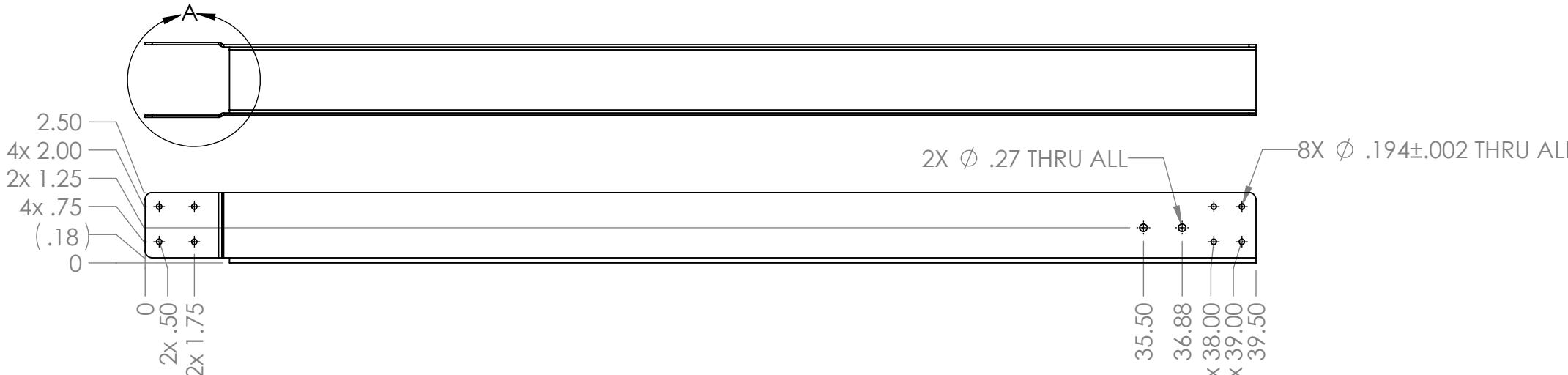
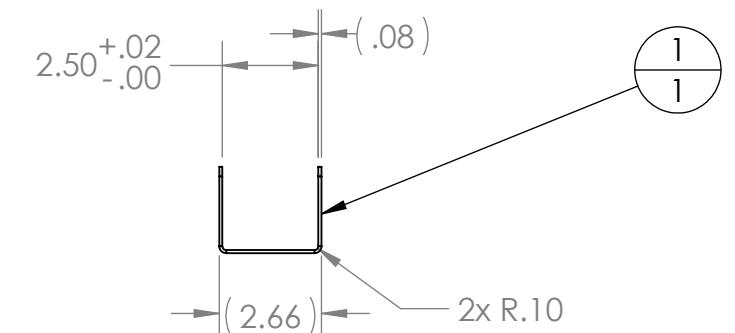
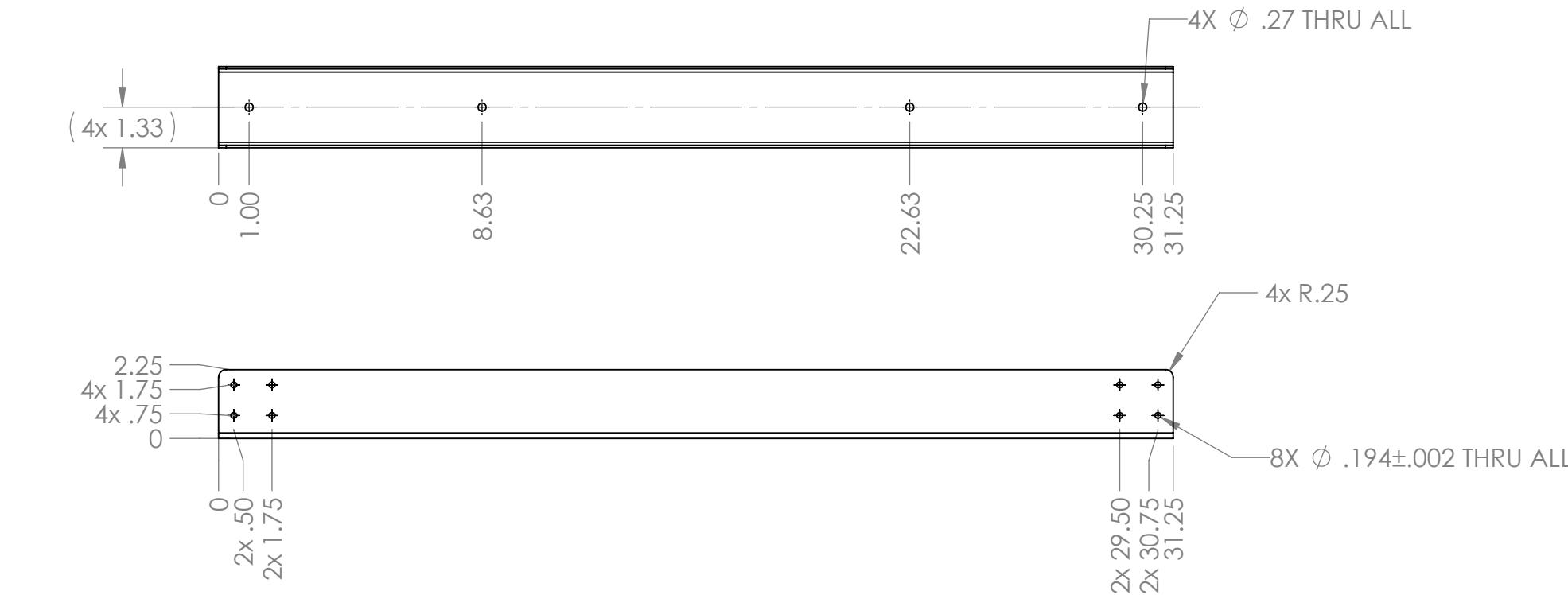
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DETAIL A
SCALE 1 : 2

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	
TOLERANCES:			CHECKED	
FRACTIONAL: ±1/16			ENG APPR.	
ANGULAR: MACH ±1° BEND ±1°			MFG APPR.	
TWO PLACE DECIMAL: ±.01			Q.A.	
THREE PLACE DECIMAL: ±.001			COMMENTS:	
INTERPRET GEOMETRIC TOLERANCING PER:		MATERIAL		
NEXT ASSY		FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Top Frame

SIZE	DWG. NO.	REV
B	GE-20302	A
SCALE: 1:5	WEIGHT:	SHEET 3 OF 4

4

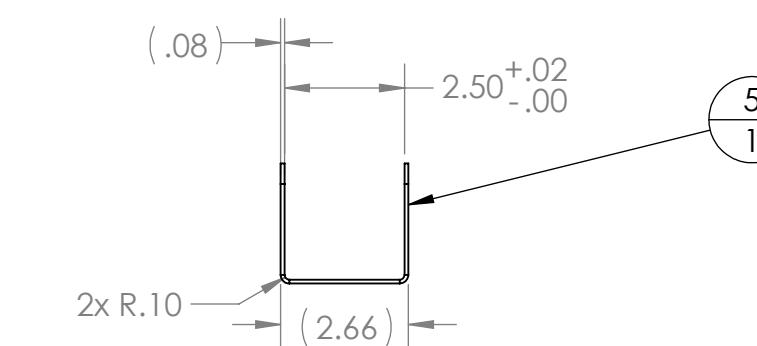
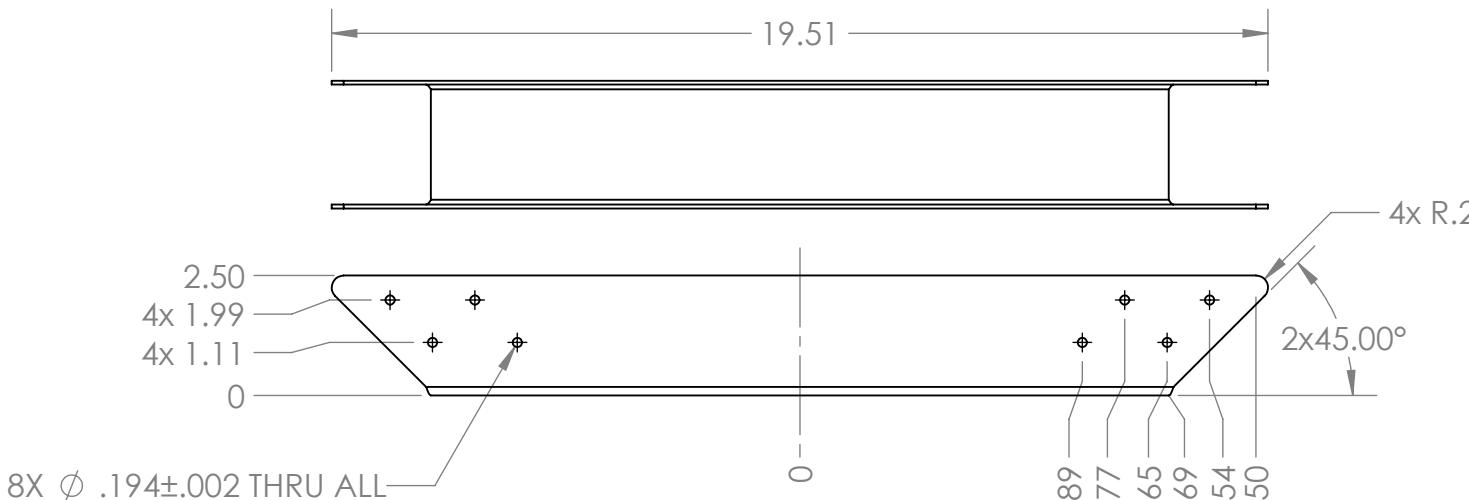
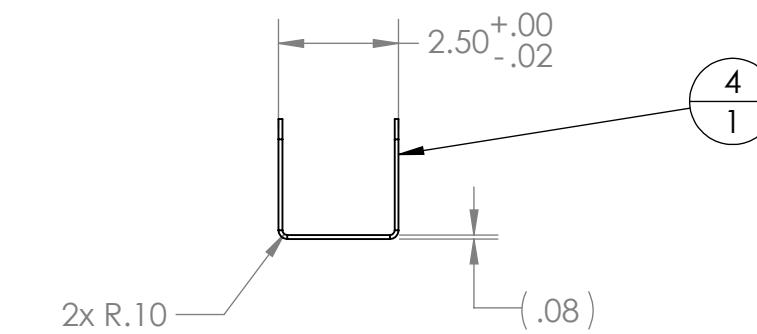
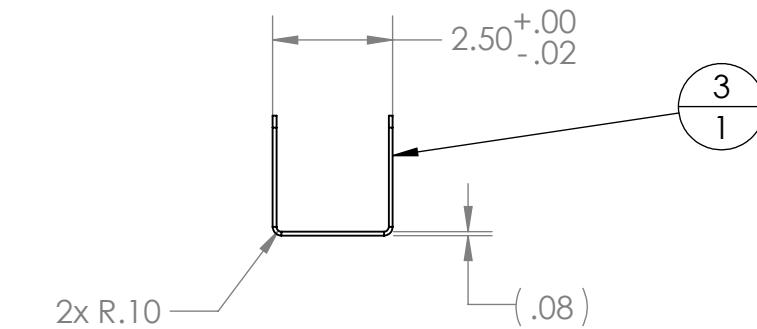
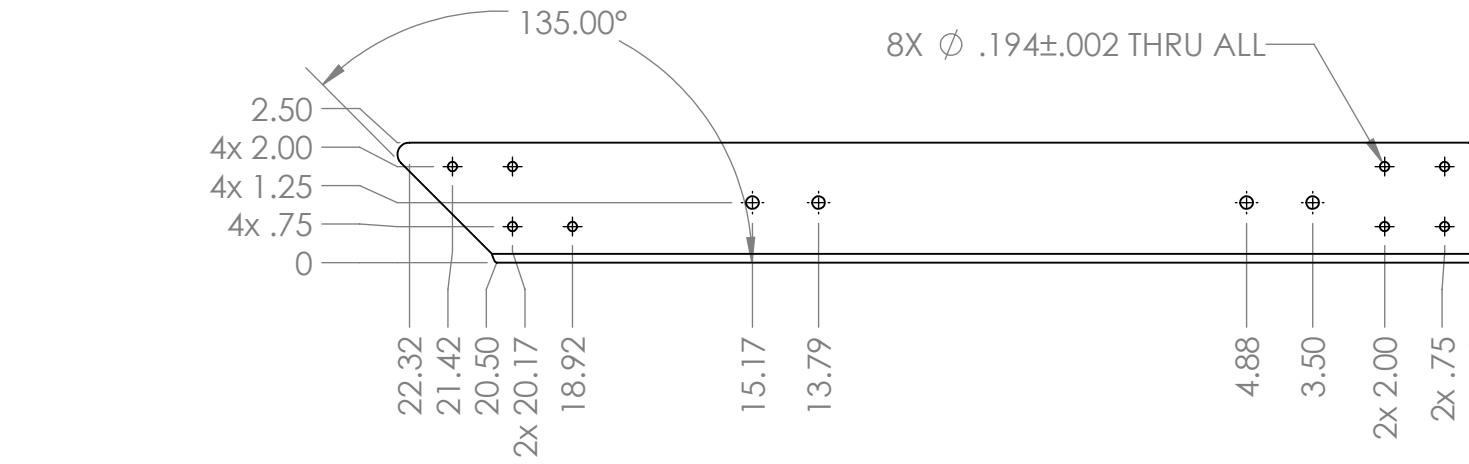
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	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		
		FINISH		
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Top Frame

SIZE	DWG. NO.	REV
B	GE-20302	A
SCALE: 1:4	WEIGHT:	SHEET 4 OF 4

4

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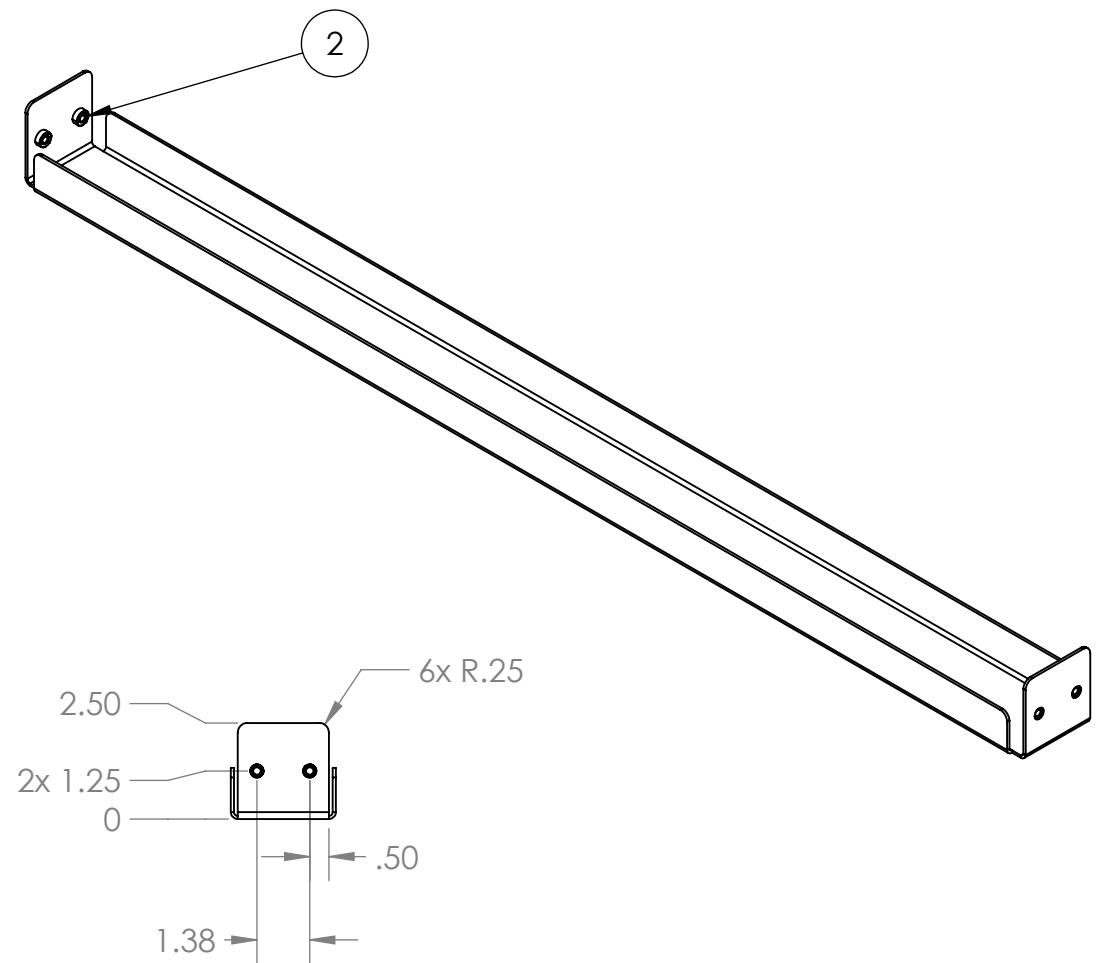
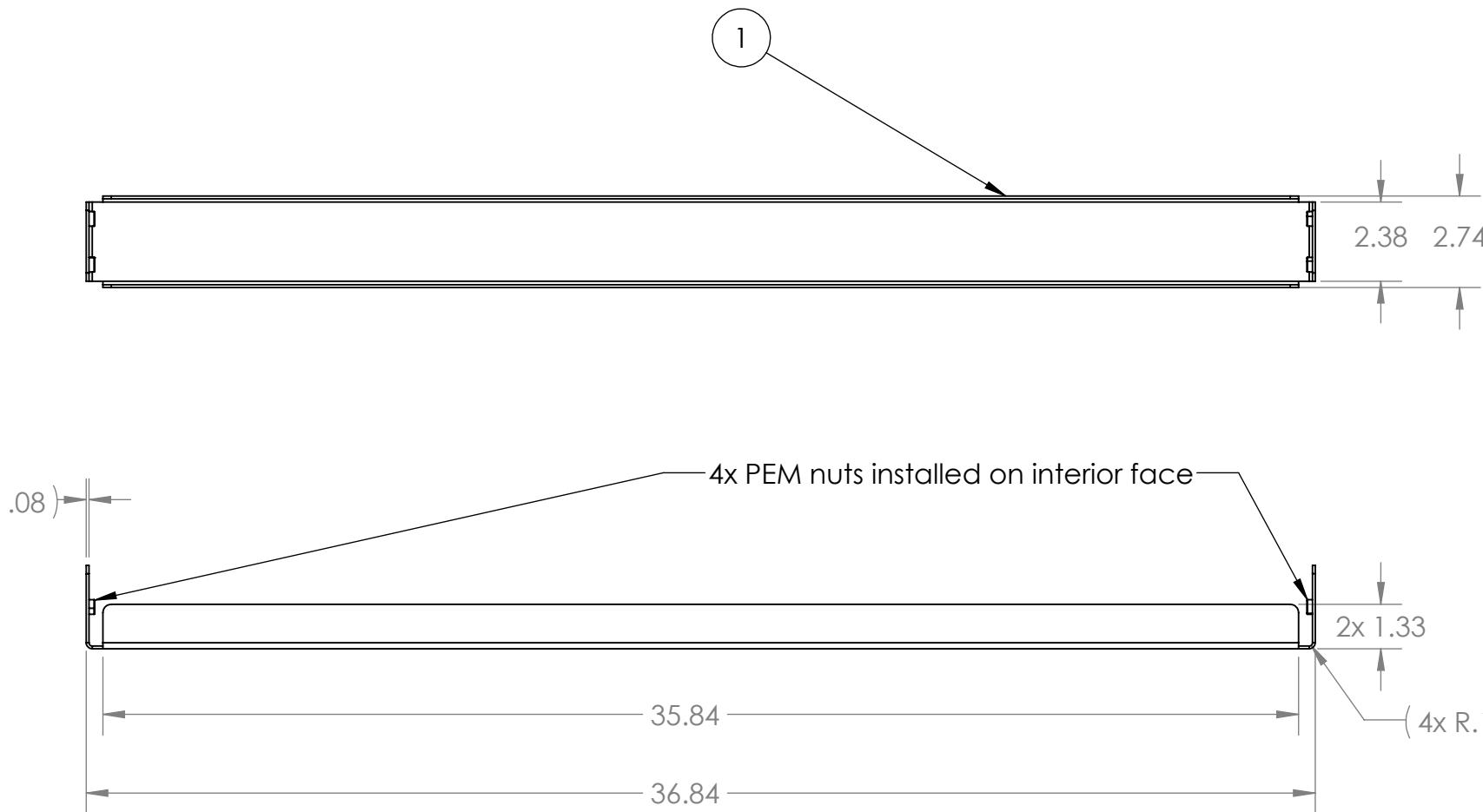
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Part material changed to aluminum.	9/30/2019	CPO

B

B



Notes:

1. Tag or label with Part Number
2. Remove all burrs and sharp edges

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	PROPRIETARY AND CONFIDENTIAL
1	GE-20303-01	12 GA, 5052 Aluminum	1	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.
2	S-0420-1ZI-PennEngineering	1/4-20 self-clinching nut, .054 shank	4	

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
		APPLICATION	DO NOT SCALE DRAWING	
SIZE	DWG. NO.	REV		
B	GE-20303	A		
SCALE: 1:5	WEIGHT:	SHEET 1 OF 1		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Top Brace

4

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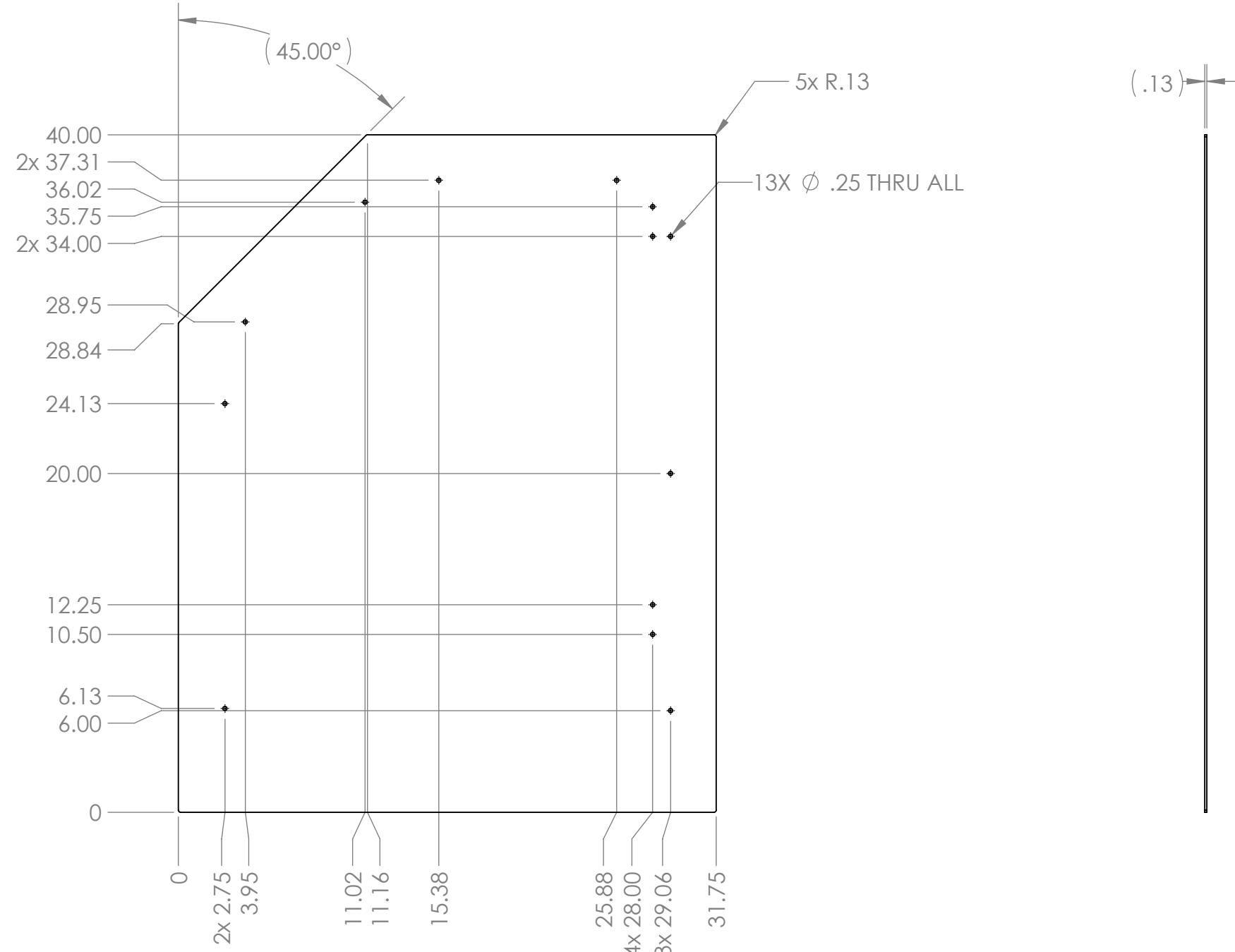
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B

B

**Notes:**

- Material: 1/8" thick, clear polycarbonate
- Remove all burrs and sharp edges
- Tag or label with part number

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
		APPLICATION	DO NOT SCALE DRAWING	
SIZE	DWG. NO.		REV	
B	GE-20304			
SCALE: 1:8	WEIGHT:		SHEET 1 OF 1	

SOLIDWORKS
Modeling Solutions Partner

Power Port Top Side Polycarbonate

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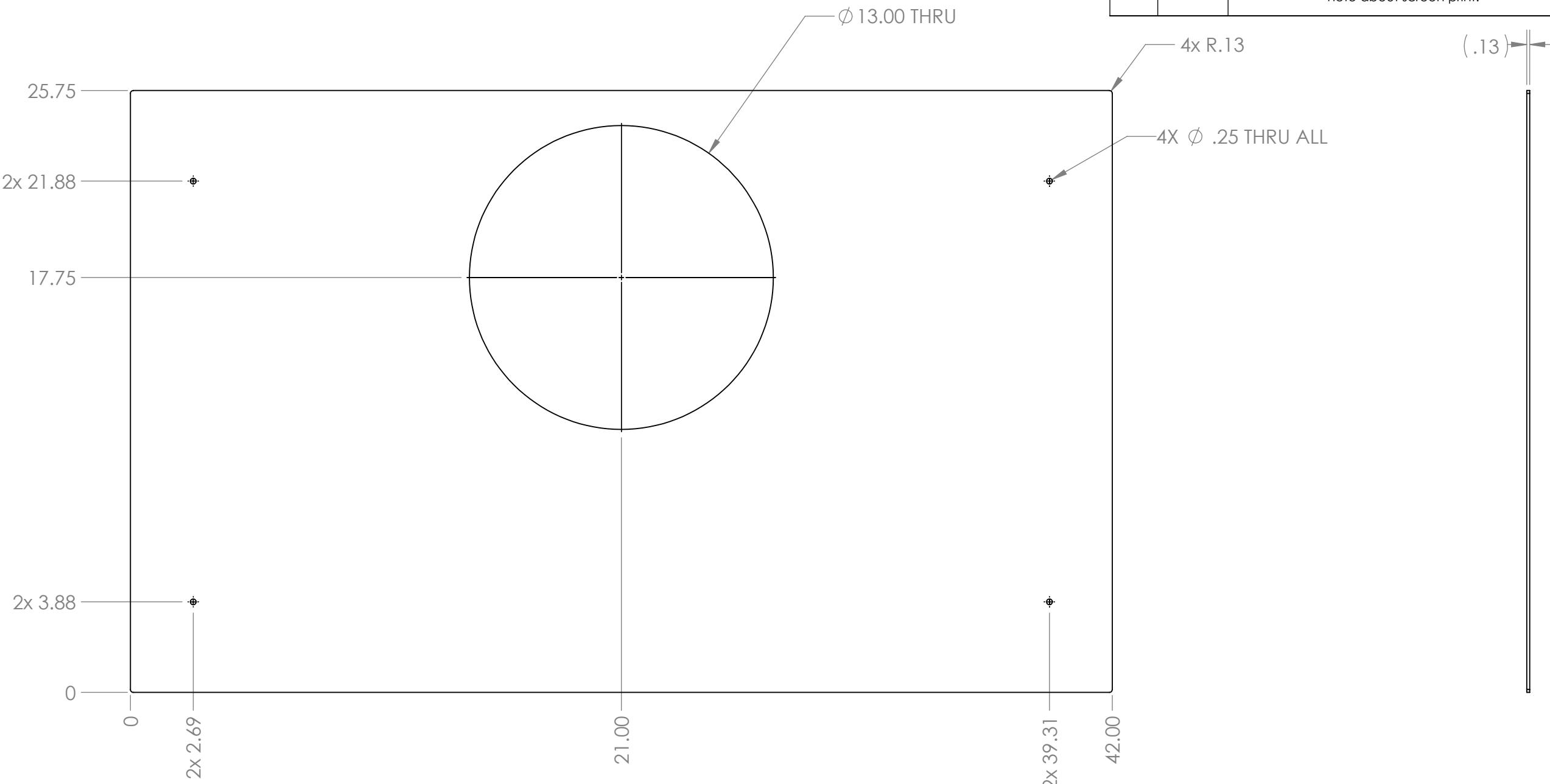
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B

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Notes:

1. Material: 1/8" thick polycarbonate - black
2. Remove all burrs and sharp edges
3. Tag or label with part number

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A4	A	Updated material to black polycarbonate, eliminated note about screen print.	10/28/2019	CPO

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$, BEND $\pm 1^\circ$ TWO PLACE DECIMAL: $\pm .01$ THREE PLACE DECIMAL: $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20305	A		
SCALE: 1:5	WEIGHT:	SHEET 1 OF 1		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE: Power Port Top
Back
Polycarbonate

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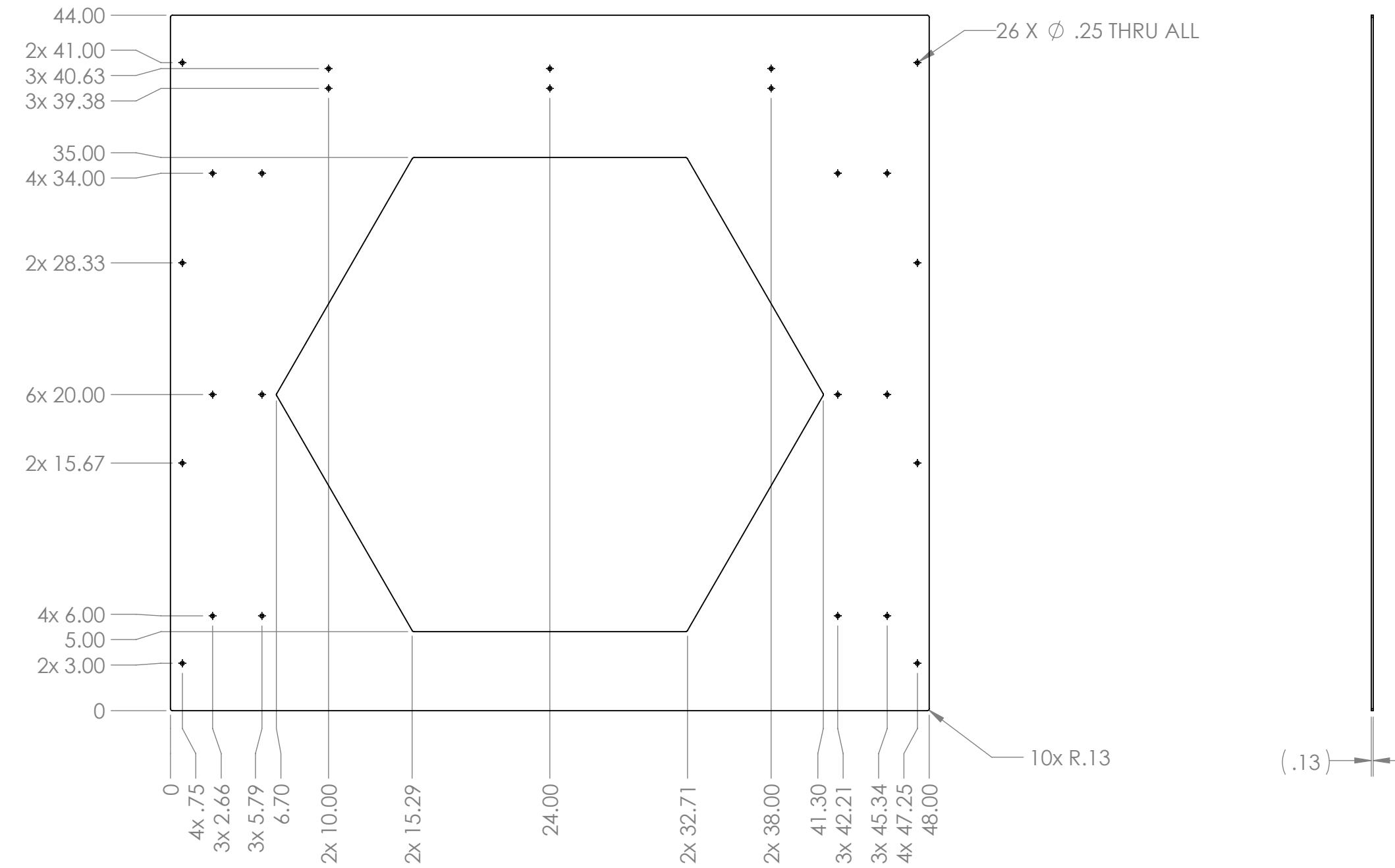
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B

B



Notes:

1. Material: 1/8" Thick Polycarbonate, Clear
2. Vinyl to be applied to face.
3. Tag or label with part number.
4. Remove burrs and sharp edges.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
	APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Power Port Top Front Polycarbonate

SIZE **DWG. NO.** **REV**
B **GE-20306**

SCALE: 1:8 **WEIGHT:** **SHEET 1 OF 1**

4

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4

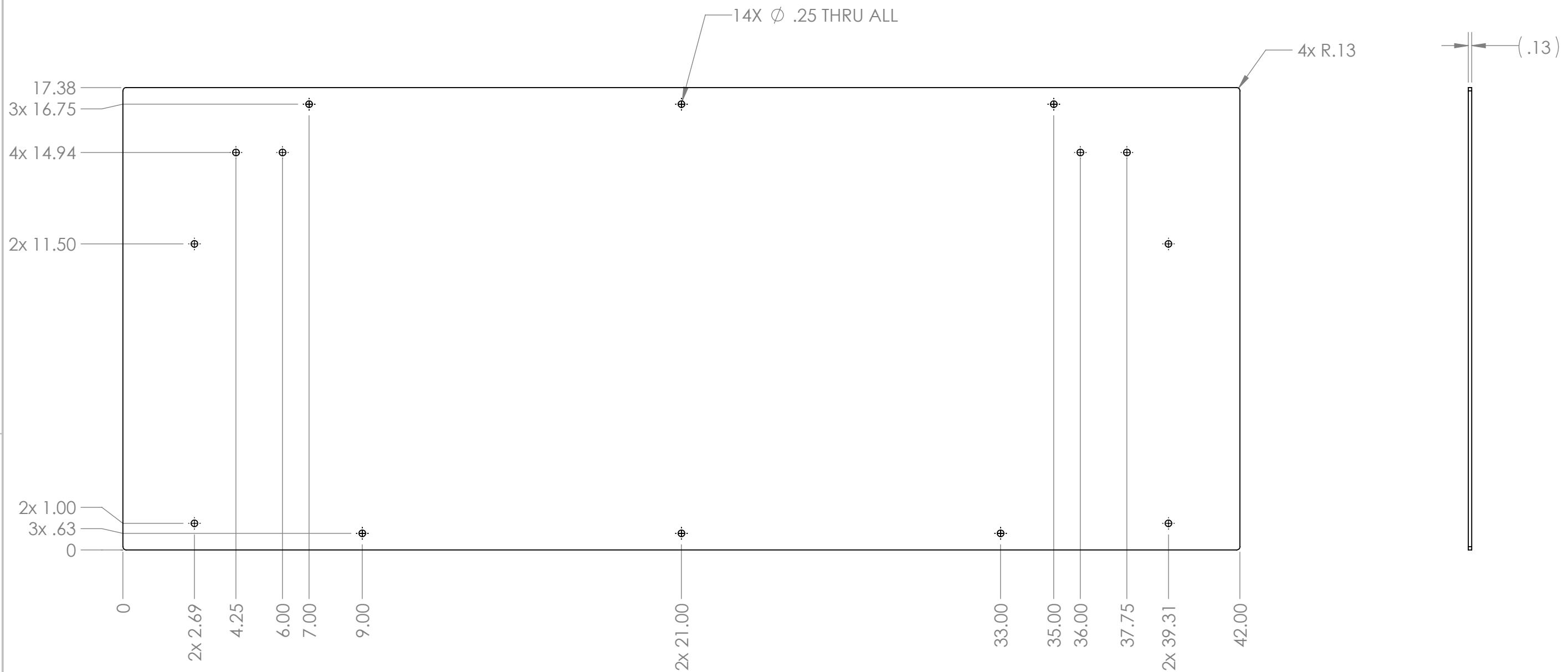
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B

B

**Notes:**

1. Material: 1/8" thick, clear polycarbonate
2. Remove all burrs and sharp edges
3. Tag or label with part number

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001				
		INTERPRET GEOMETRIC TOLERANCING PER:		ENG APPR.	MFG APPR.	
		MATERIAL				
NEXT ASSY	USED ON	FINISH		Q.A. COMMENTS:		
APPLICATION		DO NOT SCALE DRAWING				
A	A	FIRST ROBOTICS COMPETITION	SOLIDWORKS Modeling Solutions Partner	TITLE:		
Power Port Top Roof Polycarbonate		SIZE B DWG. NO. GE-20307		REV		
SCALE: 1:4		WEIGHT:		SHEET 1 OF 1		

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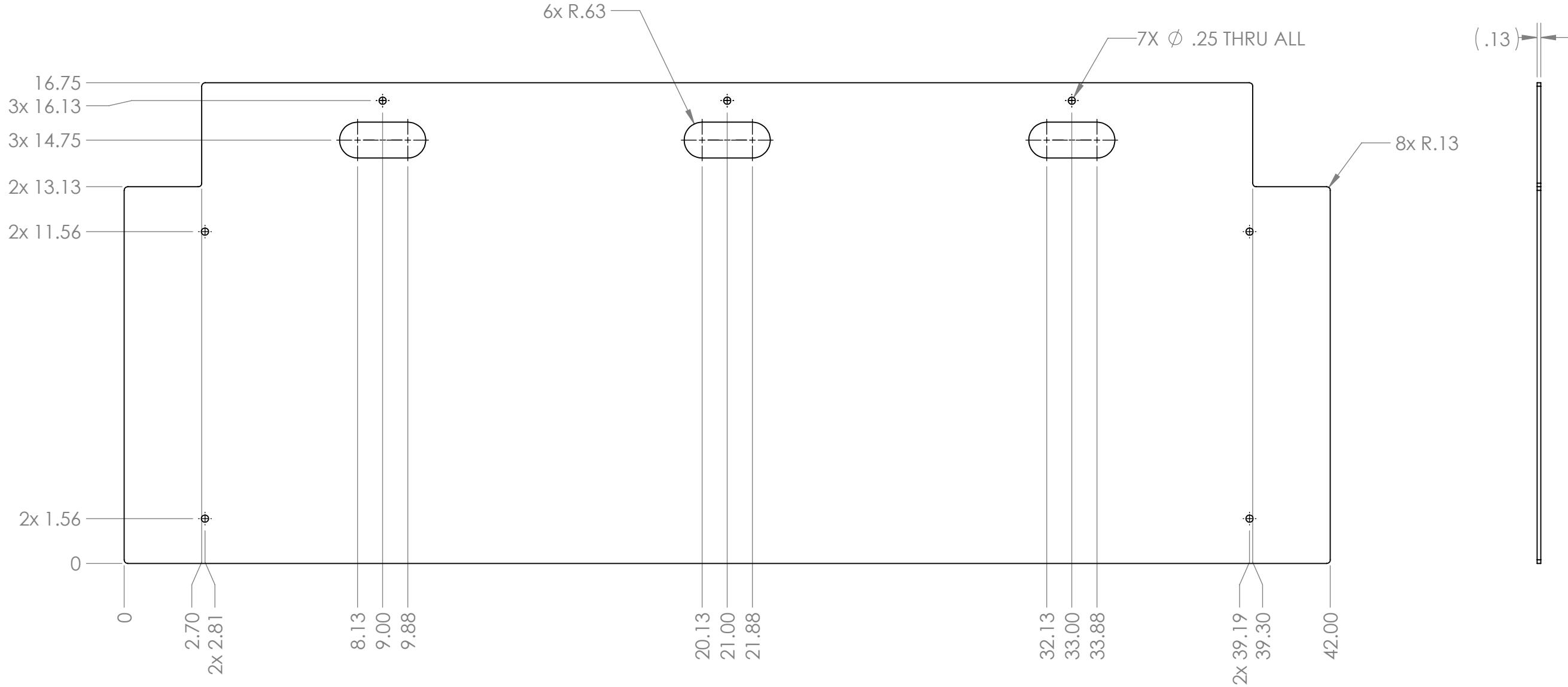
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Finish changed from vinyl to screen print.	10/9/2019	CPO
A4	B	Updated material to black polycarbonate, eliminated note about screen print.	10/28/2019	CPO

B

B



Notes:

1. Material: 1/8" thick polycarbonate - black
2. Remove all burrs and sharp edges
3. Tag or label with part number



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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN	
TOLERANCES:			CHECKED	
FRACTIONAL: ±1/16			ENG APPR.	
ANGULAR: MACH ±1° BEND ±1°			MFG APPR.	
TWO PLACE DECIMAL: ±.01			Q.A.	
THREE PLACE DECIMAL: ±.001			COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Power Port Top Deflector Polycarbonate

SIZE	DWG. NO.	REV
B	GE-20308	B
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

4

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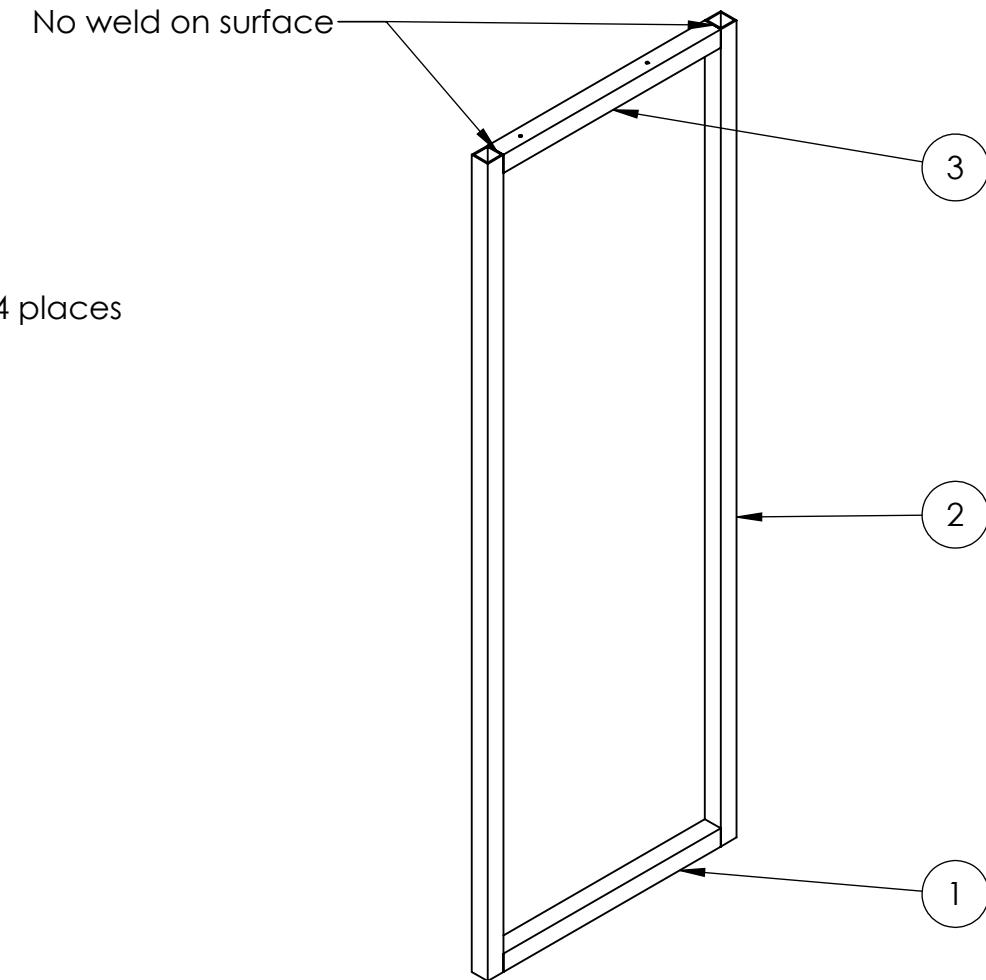
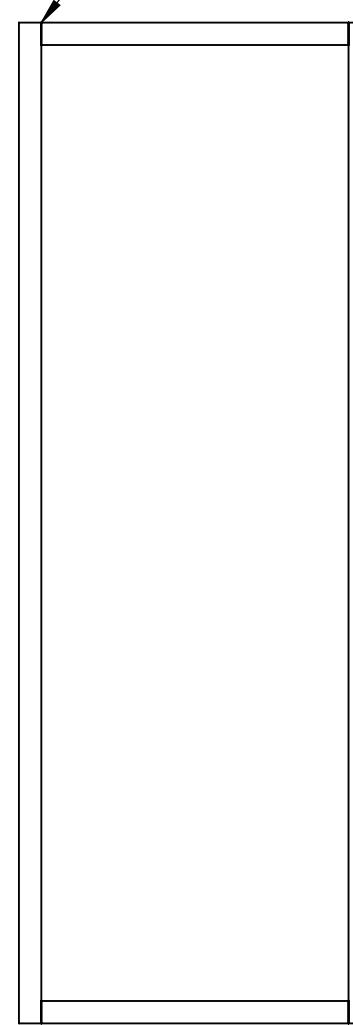
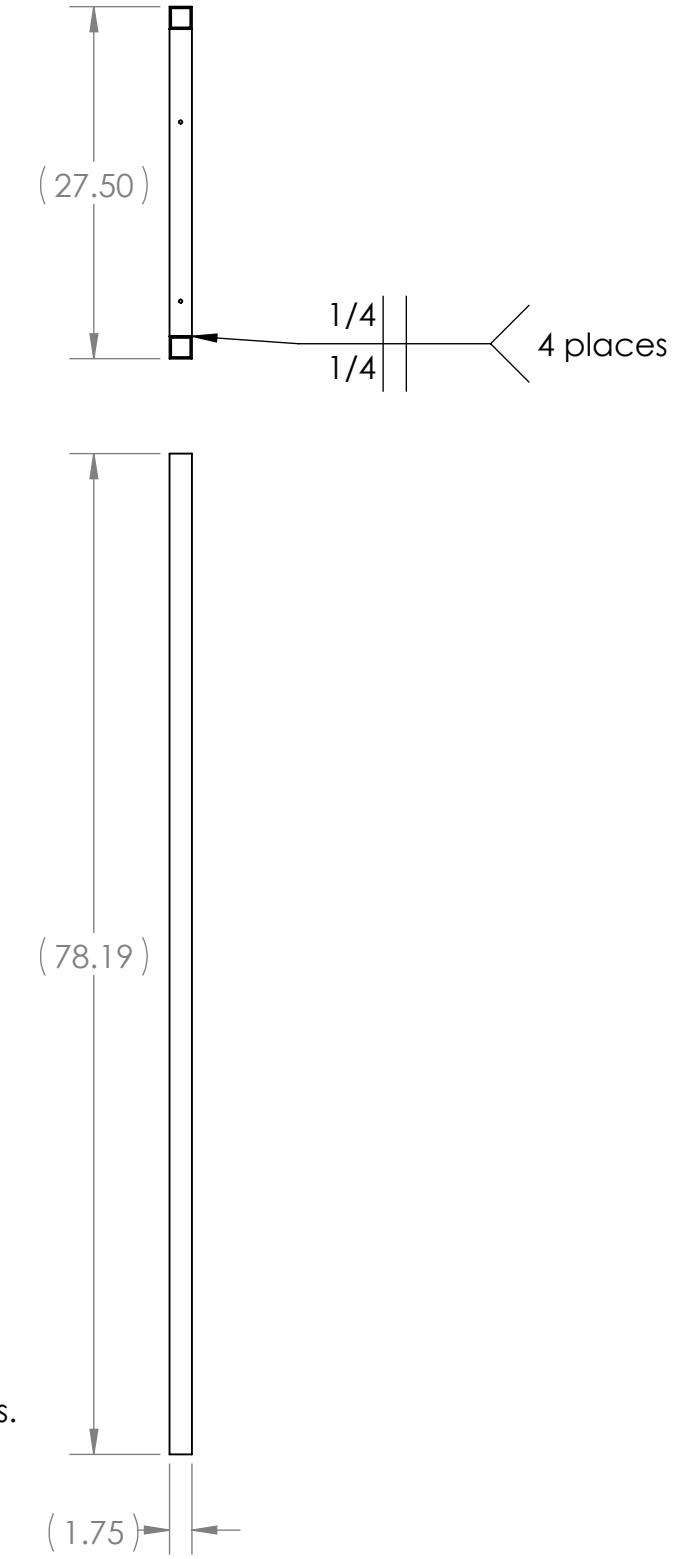
1

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Notes:

1. Tag or label with part number.
2. Remove burrs and sharp edges.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20309-01	1.75" x .125" thk. Square Tube, 6061 Aluminum	1
2	GE-20309-02	1.75" x .125" thk. Square Tube, 6061 Aluminum	2
3	GE-20309-03	1.75" x .125" thk. Square Tube, 6061 Aluminum	1

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES		TOLERANCES:			
FRACTIONAL $\pm \frac{1}{16}$		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
TWO PLACE DECIMAL $\pm .01$		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING	COMMENTS:		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Goal Base Upright

SIZE DWG. NO. REV
B GE-20309

SCALE: 1:15 WEIGHT: SHEET 1 OF 2

4

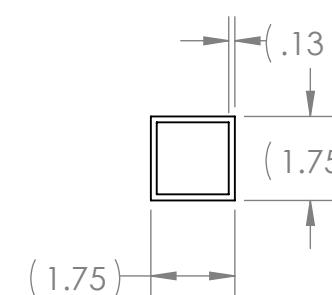
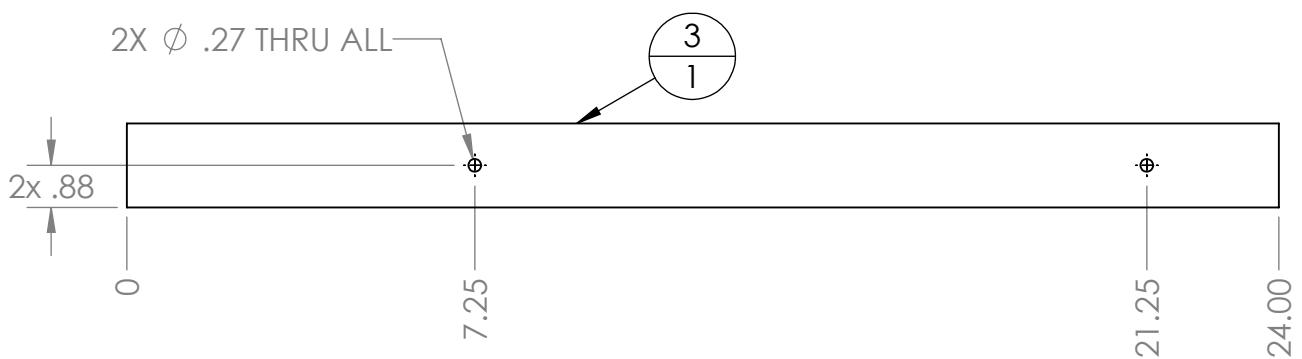
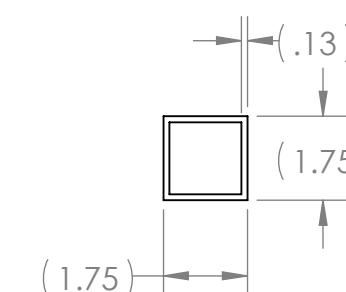
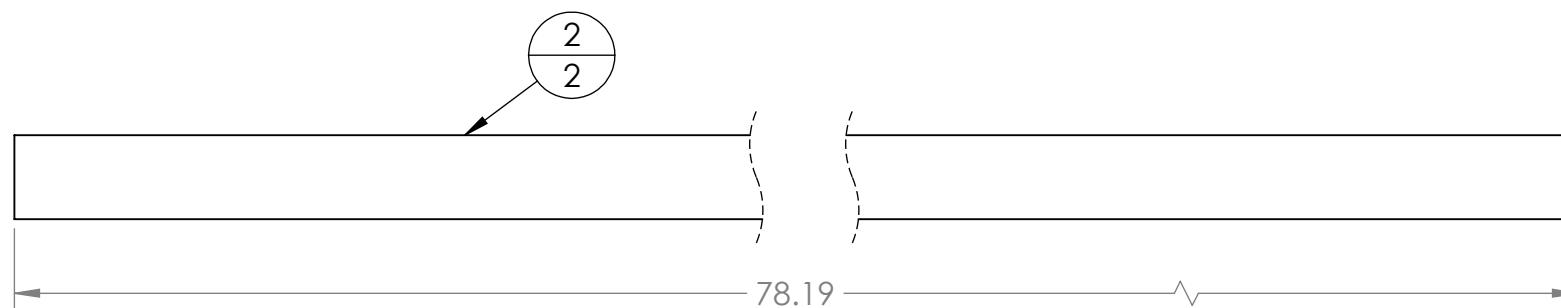
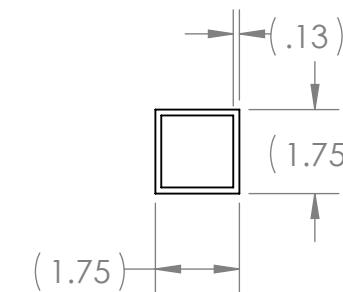
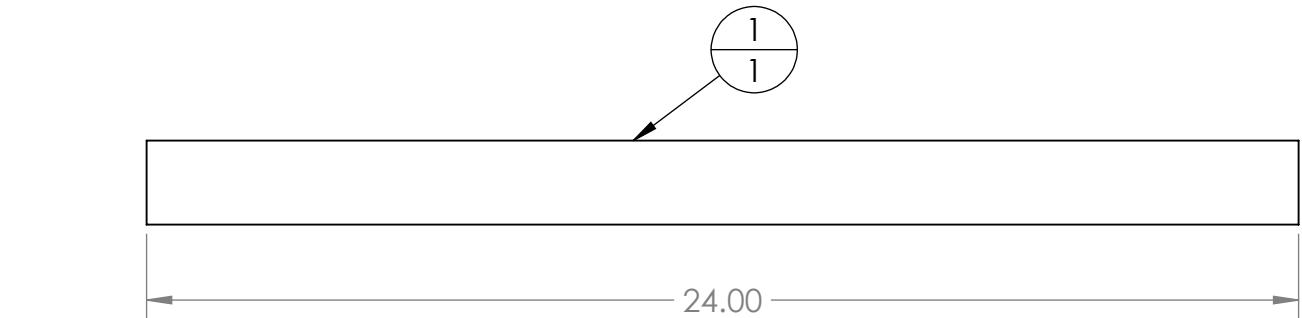
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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:4	WEIGHT:			SHEET 2 OF 2

FIRST
ROBOTICS
COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Goal Base Upright

SIZE DWG. NO. REV
B GE-20309

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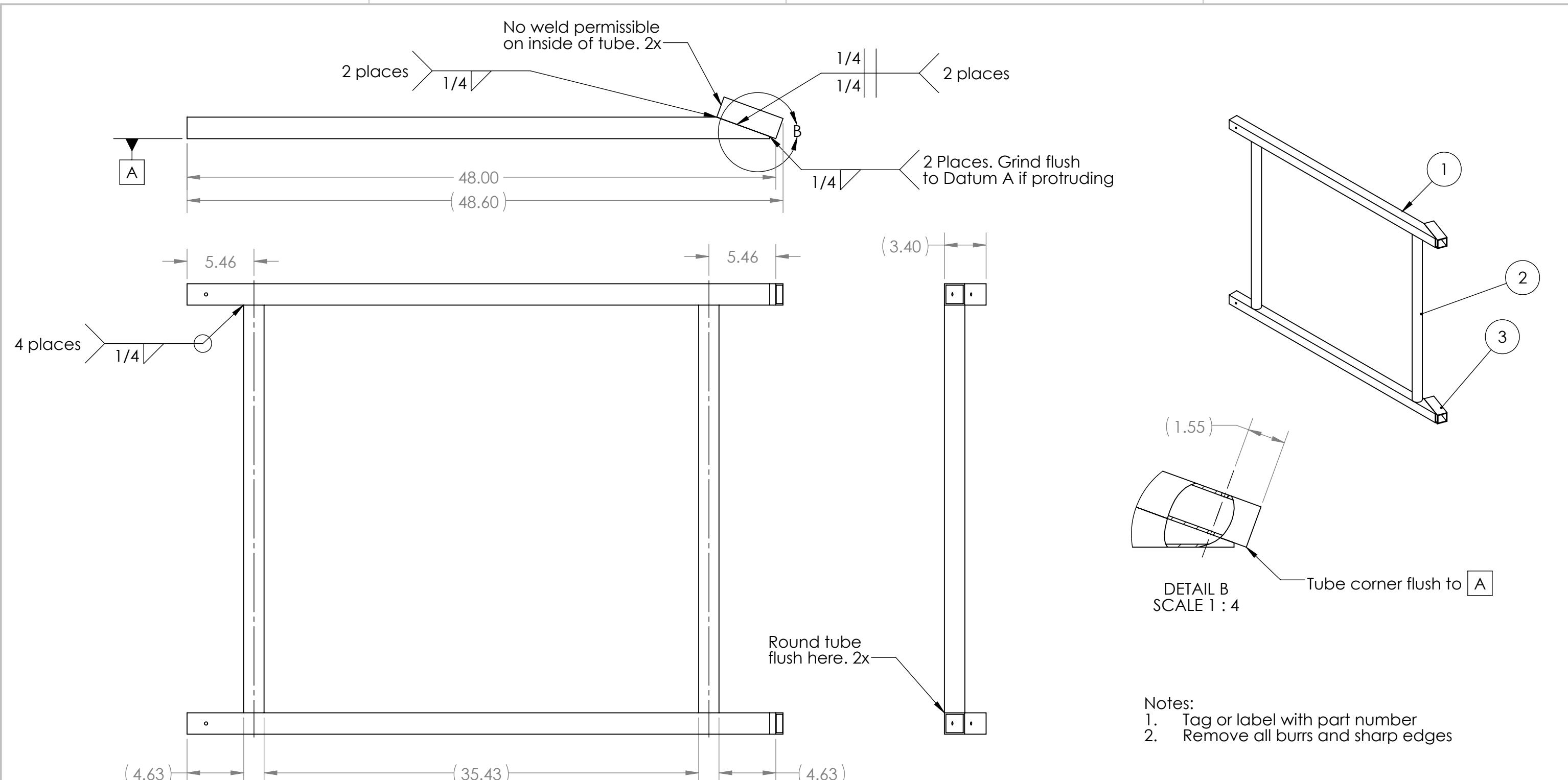
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20310-01	1.75" x .125" thk. Square Tubing, 6063 Aluminum	2
2	GE-20310-02	1-1/4" Schedule 40 Pipe, 6061 Aluminum	2
3	GE-20310-03	1.75" x .125" thk. Square Tubing, 6063 Aluminum	2

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
SIZE	DWG. NO.		REV		
B	GE-20310				
SCALE: 1:8	WEIGHT:		SHEET 1 OF 2		

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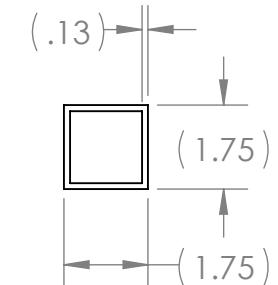
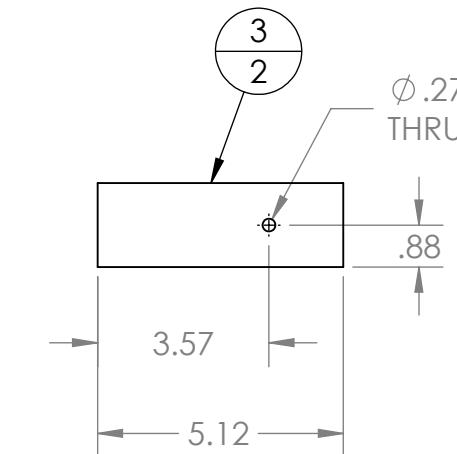
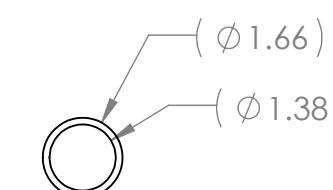
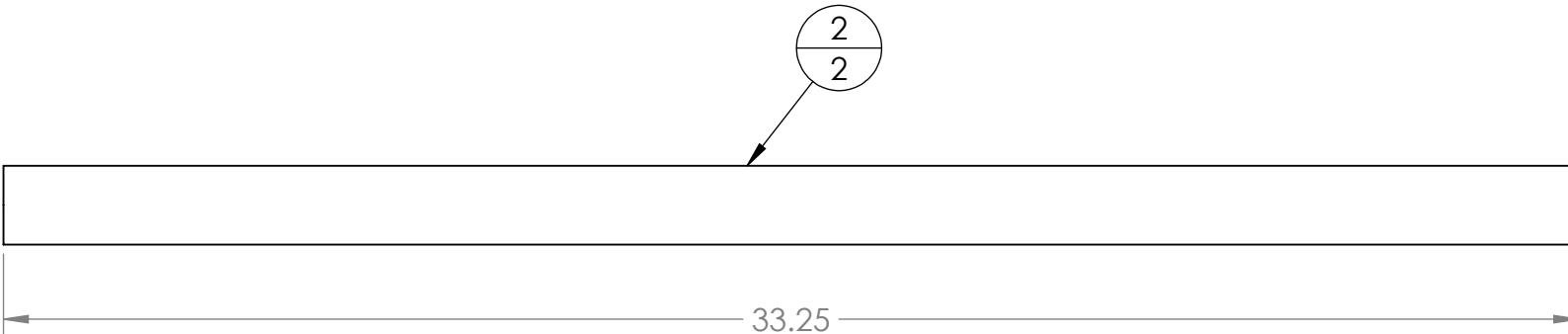
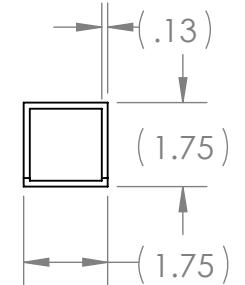
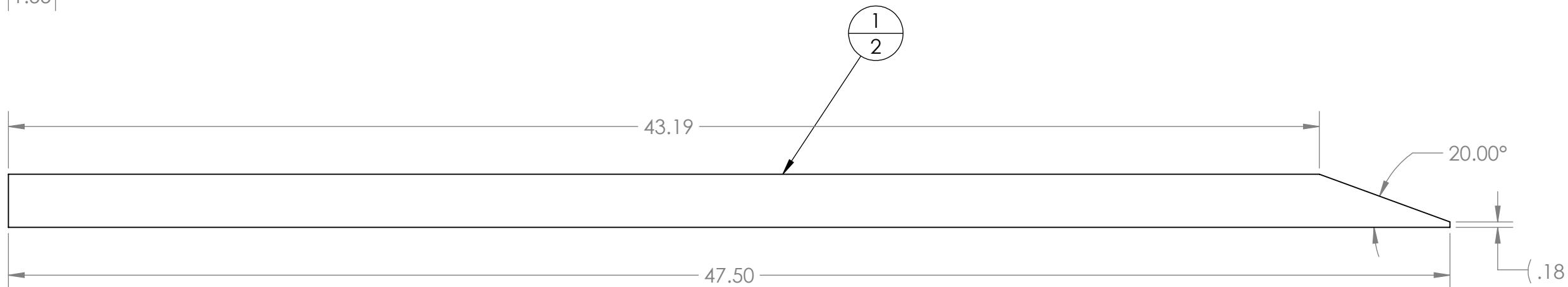
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		UNLESS OTHERWISE SPECIFIED:				NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN					
TOLERANCES:		CHECKED					
FRACTIONAL: ±1/16		ENG APPR.					
ANGULAR: MACH ±1° BEND ±1°		MFG APPR.					
TWO PLACE DECIMAL ±.01		Q.A.					
THREE PLACE DECIMAL ±.001		COMMENTS:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Low Power Port Frame

SIZE	DWG. NO.	REV
B	GE-20310	

SCALE: 1:4 WEIGHT: SHEET 2 OF 2

4

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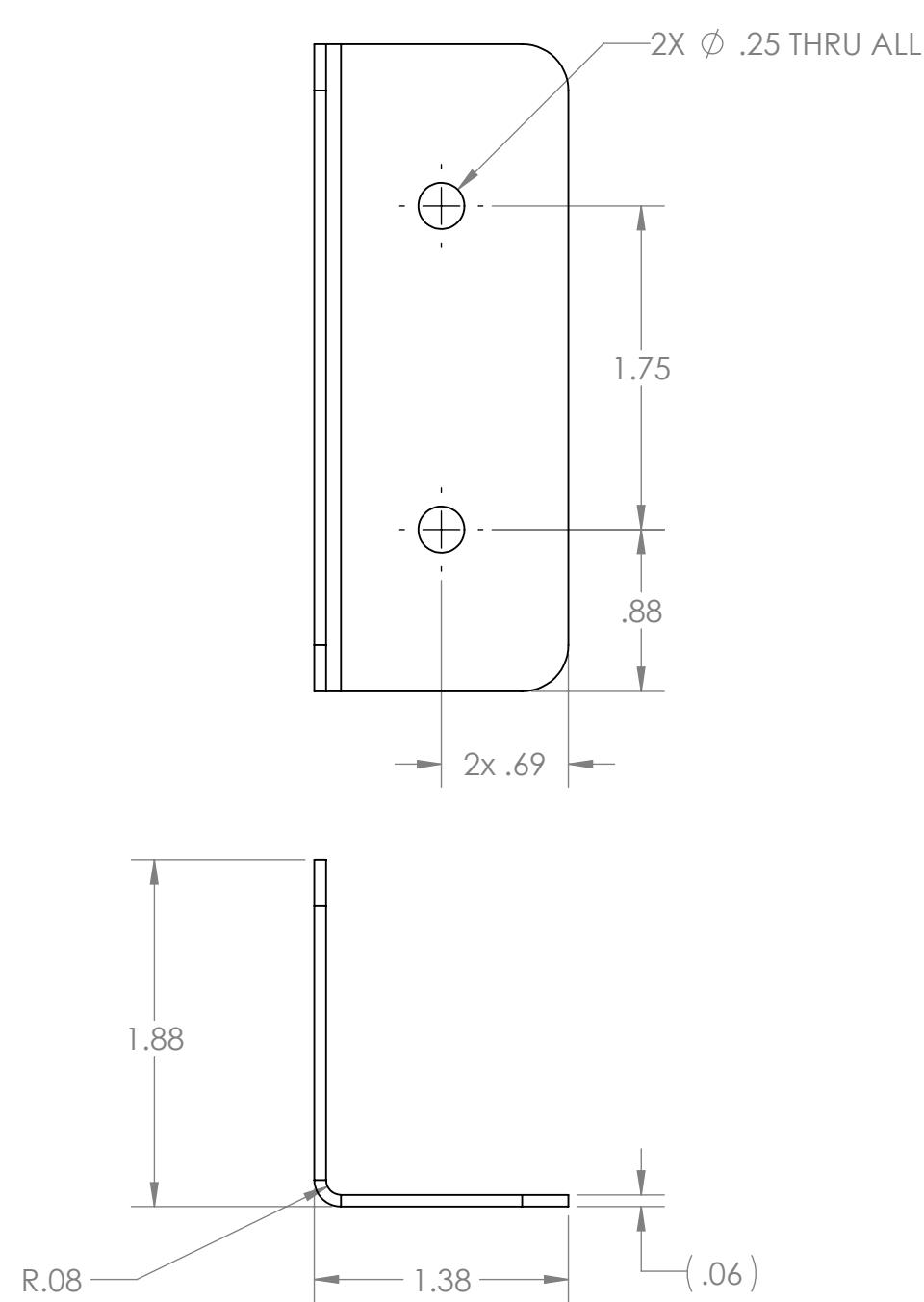
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- Notes:
1. Material: 16 GA. Preplated Steel
 2. Remove all burrs and sharp edge
 3. Tag or label with part number

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	MATERIAL		
APPLICATION		FINISH		
		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Light Bracket

SIZE	DWG. NO.	REV
B	GE-20311	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1

4

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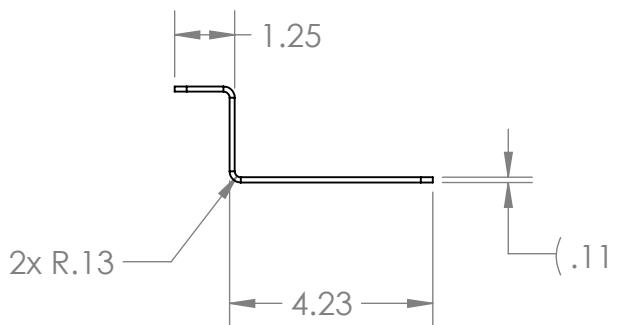
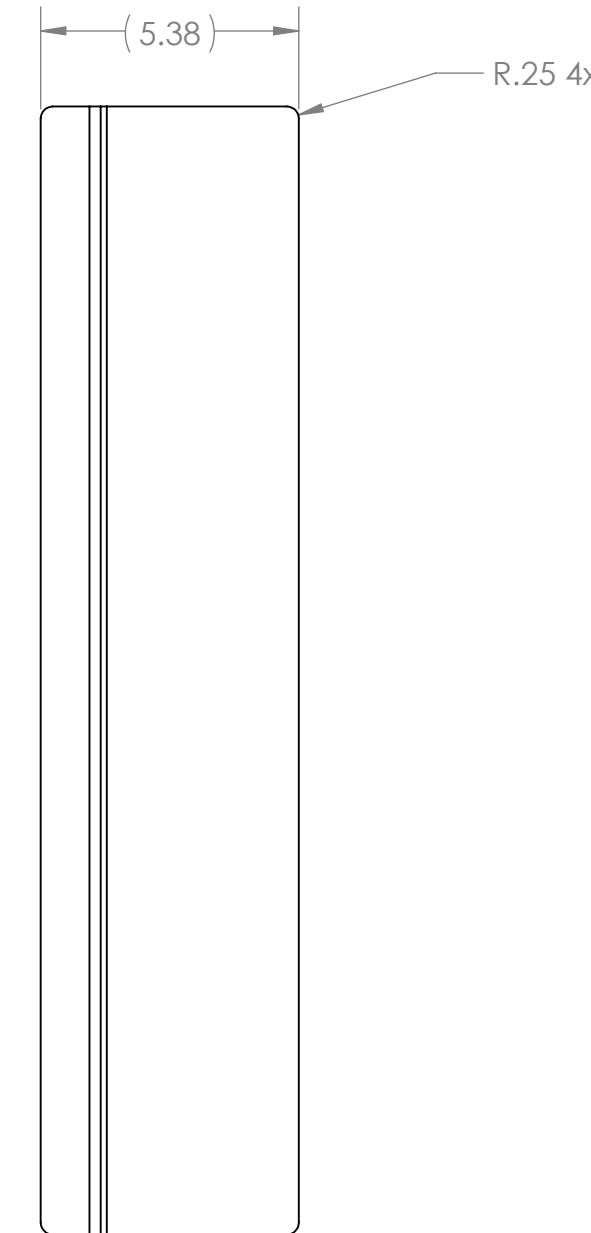
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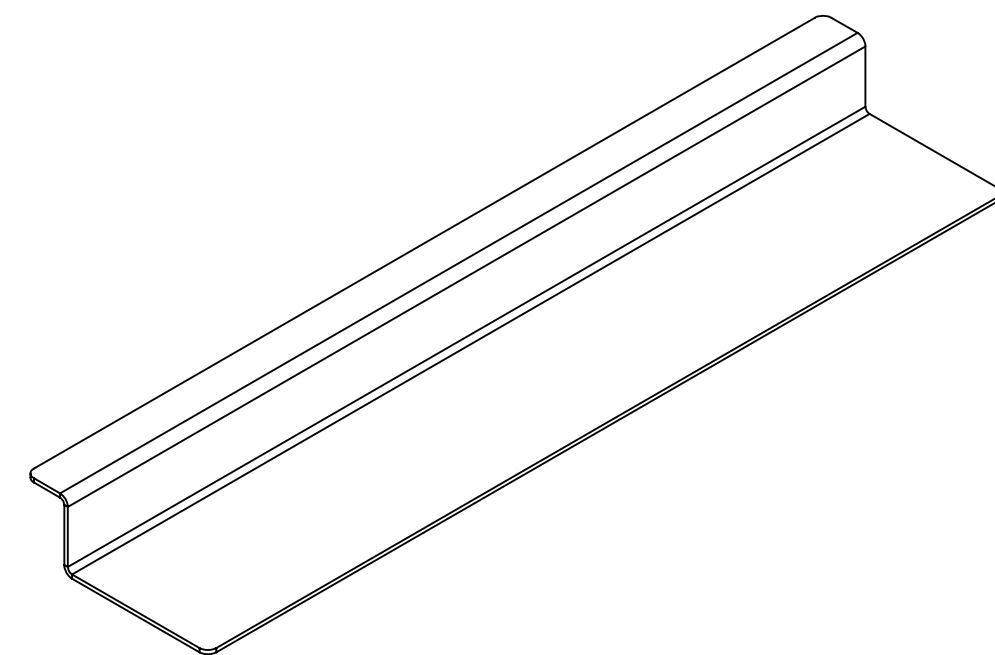
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- Notes:
1. Material: 12 Gauge Preplated Steel
 2. Remove all burrs and sharp edges
 3. Tag or label with part number

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	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	MATERIAL		
APPLICATION	FINISH			
	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20312			
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1		



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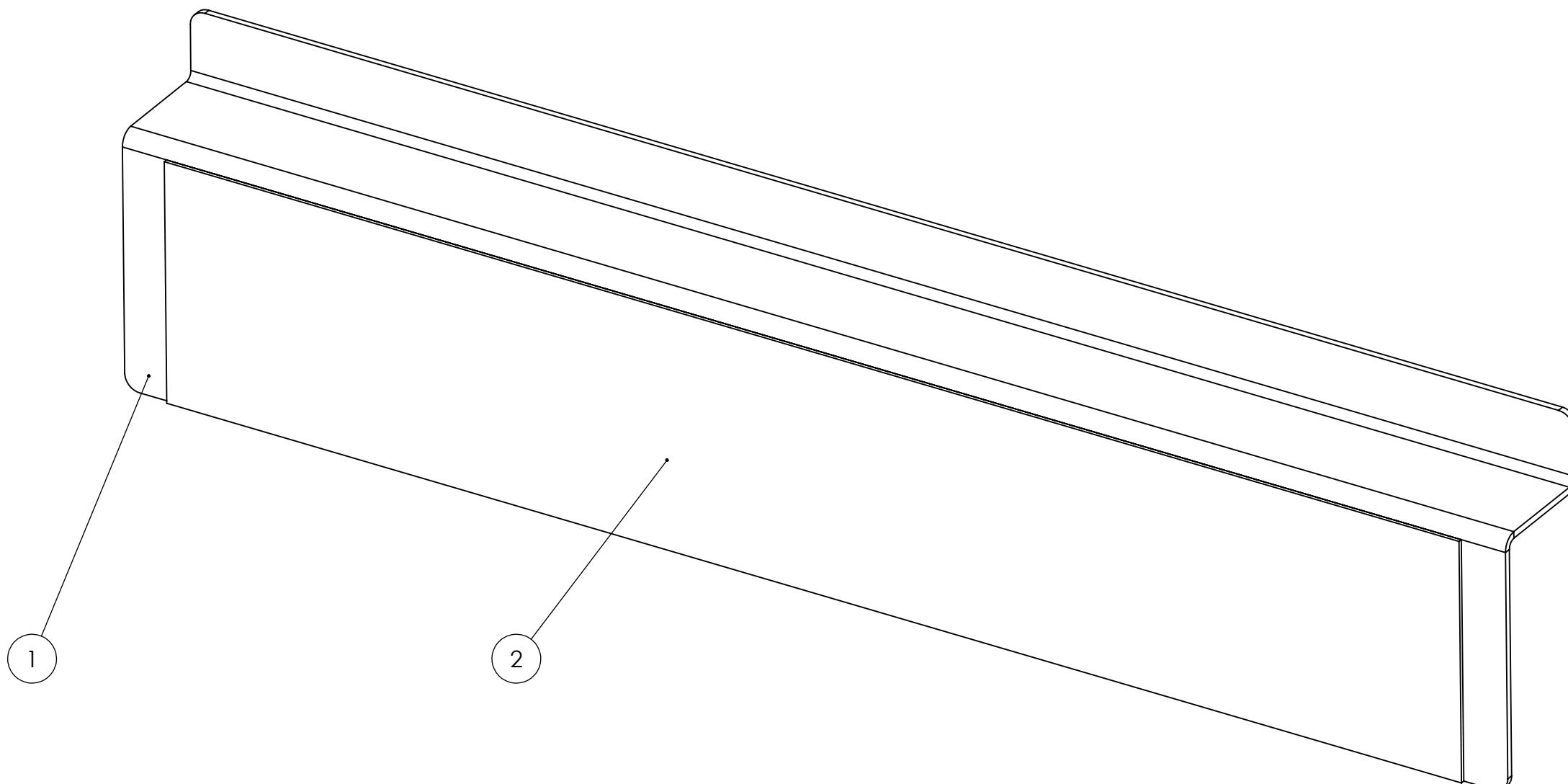
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Notes:

1. Make sure surface of GE-20312 is clean prior to hook application
 2. Press firmly on hook to ensure adhesion.

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ITEM NO.	PART NUMBER	DESCRIPTION			QTY.
1	GE-20312	Anchor			1
2	Hook_4_22	4" x 22" Hook Fastener, Adhesive Backed			1
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN		
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED		
		MATERIAL	ENG APPR.		
		FINISH	MFG APPR.		
NEXT ASSY	USED ON		Q.A.		
APPLICATION		DO NOT SCALE DRAWING			
SCALE: 1:2			WEIGHT:		SHEET 1 OF 1

4

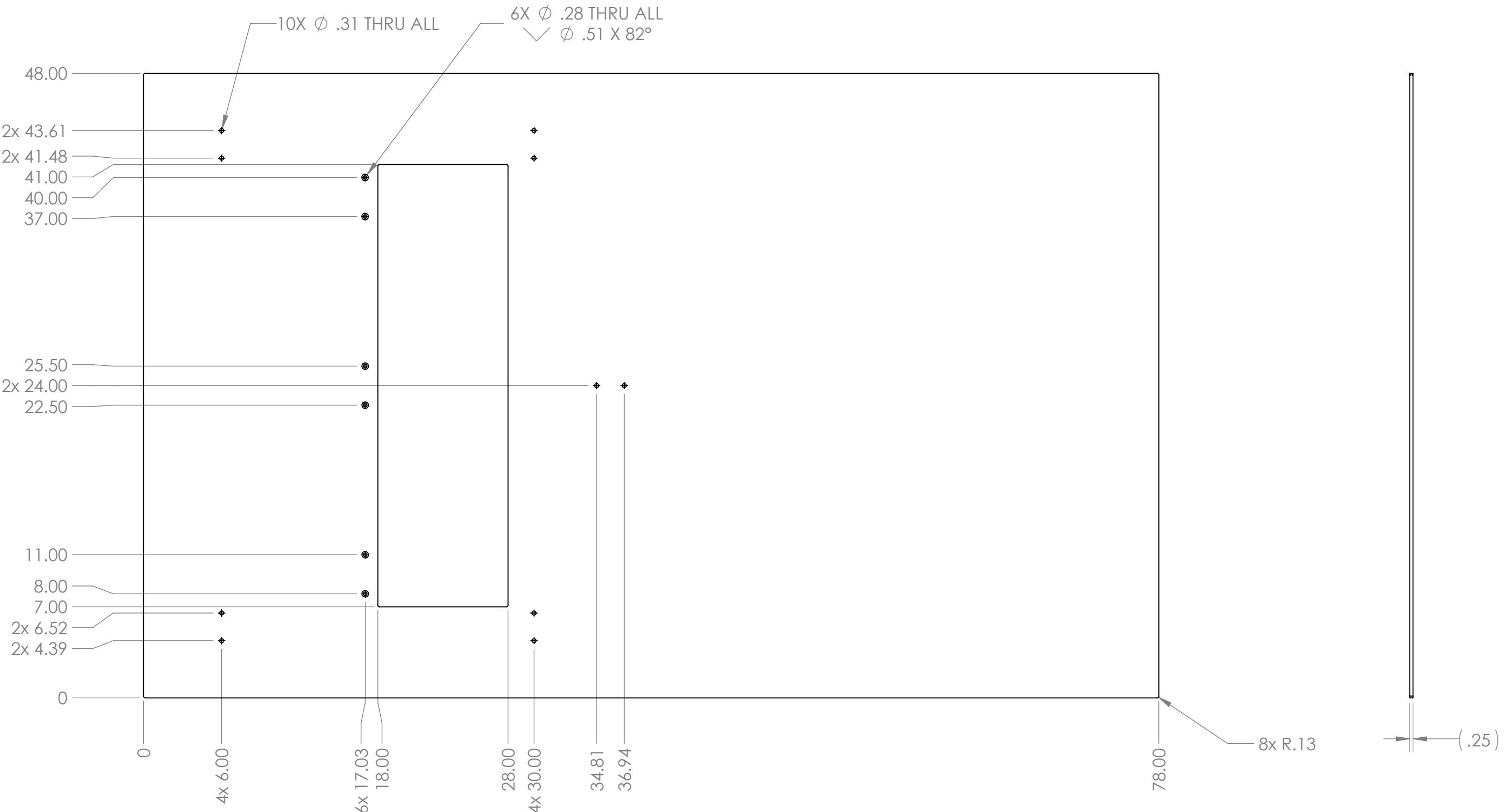
3

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Notes:

1. Material: 1/4" thk. Polycarbonate, Clear.
2. Tag or label with part number.
3. Remove all burrs and sharp edges.
4. Finish: Vinyl to be applied to face.

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		DIMENSIONS ARE IN INCHES					
		TOLERANCES:					
		FRACTIONAL: ±1/16					
		ANGULAR: MACH ±1° BEND ±1°					
		TWO PLACE DECIMAL ±.01					
		THREE PLACE DECIMAL ±.001					
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL					
NEXT ASSY		FINISH					
APPLICATION		DO NOT SCALE DRAWING					

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Low Power Port Polycarbonate

SIZE	DWG. NO.	REV
B	GE-20314	

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

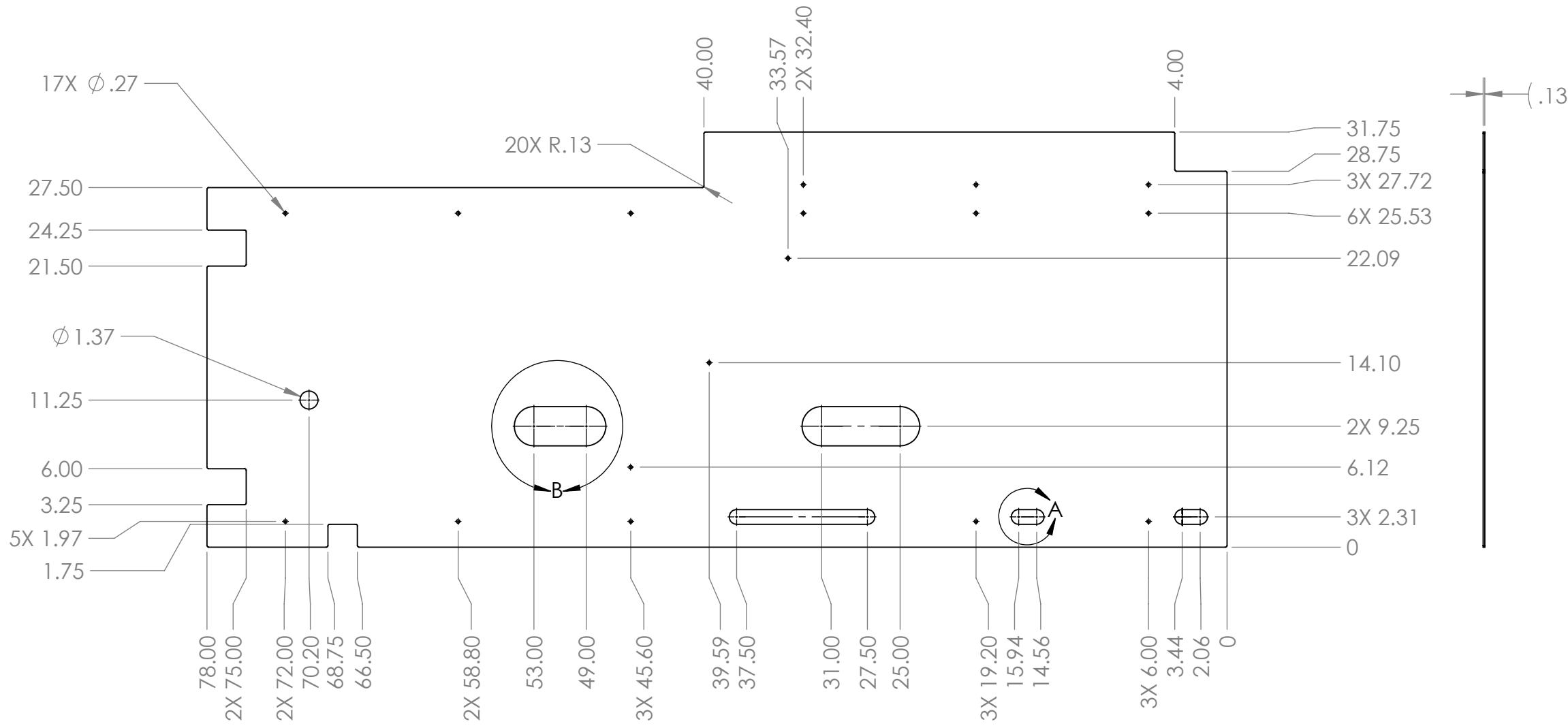
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- Notes:
1. Material: 1/8" Clear Polycarbonate.
 2. Remove burrs and sharp edges.
 3. Tag or label with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION

SOLIDWORKS Modeling Solutions Partner

TITLE:
Power Port Base Side Polycarbonate

SIZE DWG. NO. REV
B GE-20315

SCALE: 1:10 WEIGHT: SHEET 1 OF 1

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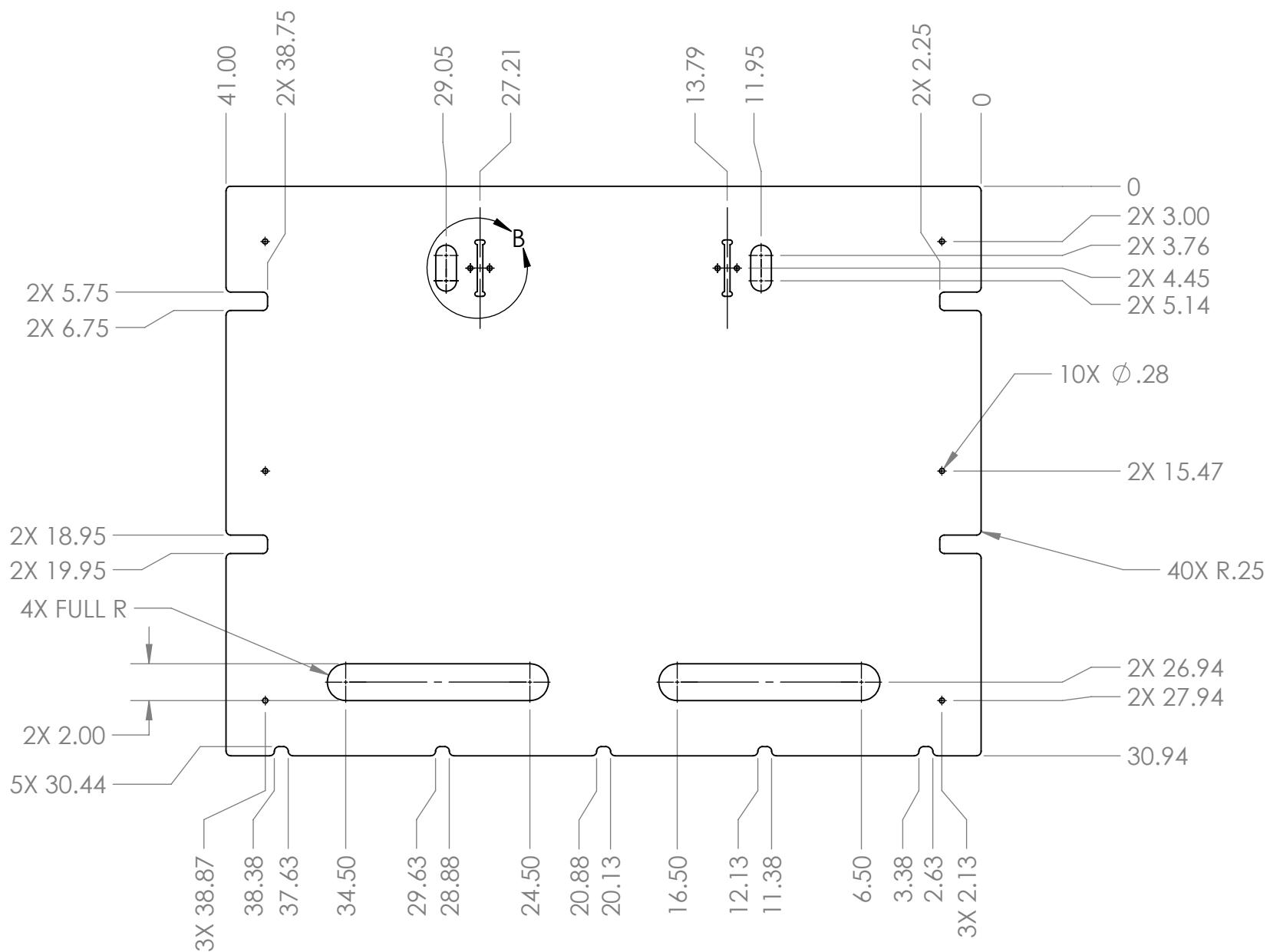
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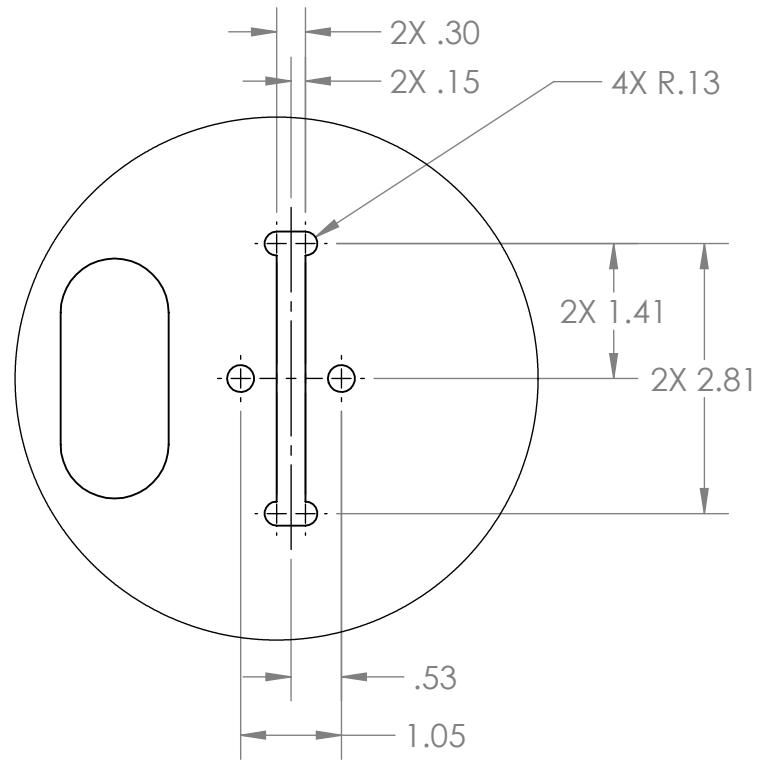
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- Notes:
1. Material: 1/4" Clear Polycarbonate.
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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		DRAWN CHECKED ENG APPR. MFG APPR.	Q.A.	COMMENTS:
		INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL	MATERIAL	
NEXT ASSY	USED ON	FINISH		
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Base Back Top

SIZE	DWG. NO.	REV
B	GE-20316	
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1

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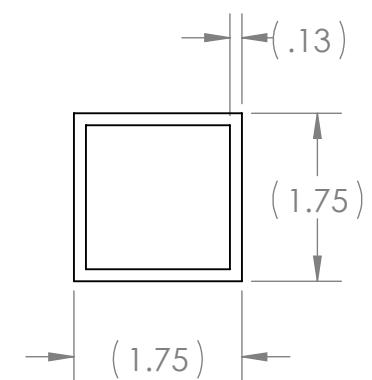
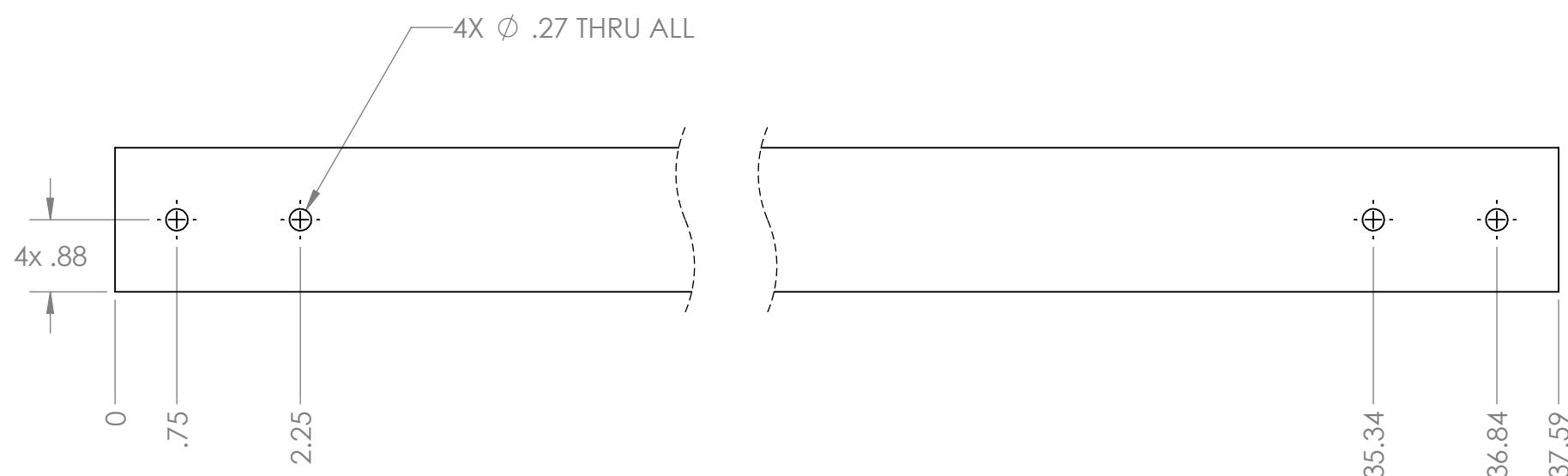
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Notes:

1. Material: 1.75" x .125" thk. Square Tube, 6063 Aluminum
 2. Remove all burrs and sharp edges
 3. Tag or label with part numbers

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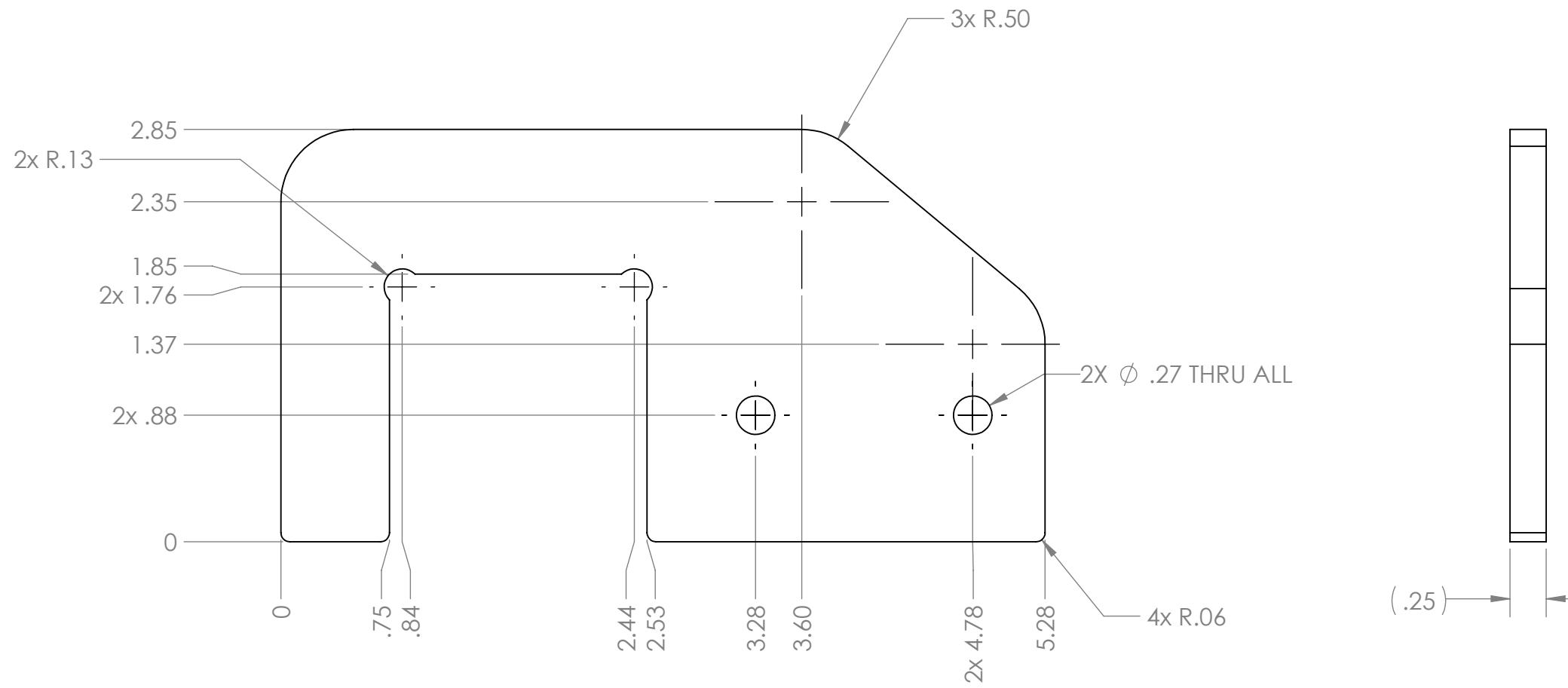
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Notes:

1. Material: 1/4" thk. Polycarbonate, Clear
2. Tag or label with part number
3. Remove all burrs and sharp edges

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

**Power Port Base
Brace Hook**

SIZE	DWG. NO.	REV
B	GE-20318	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1

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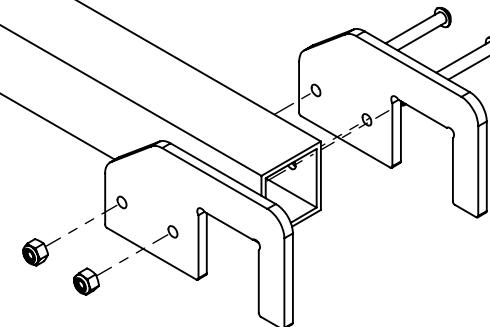
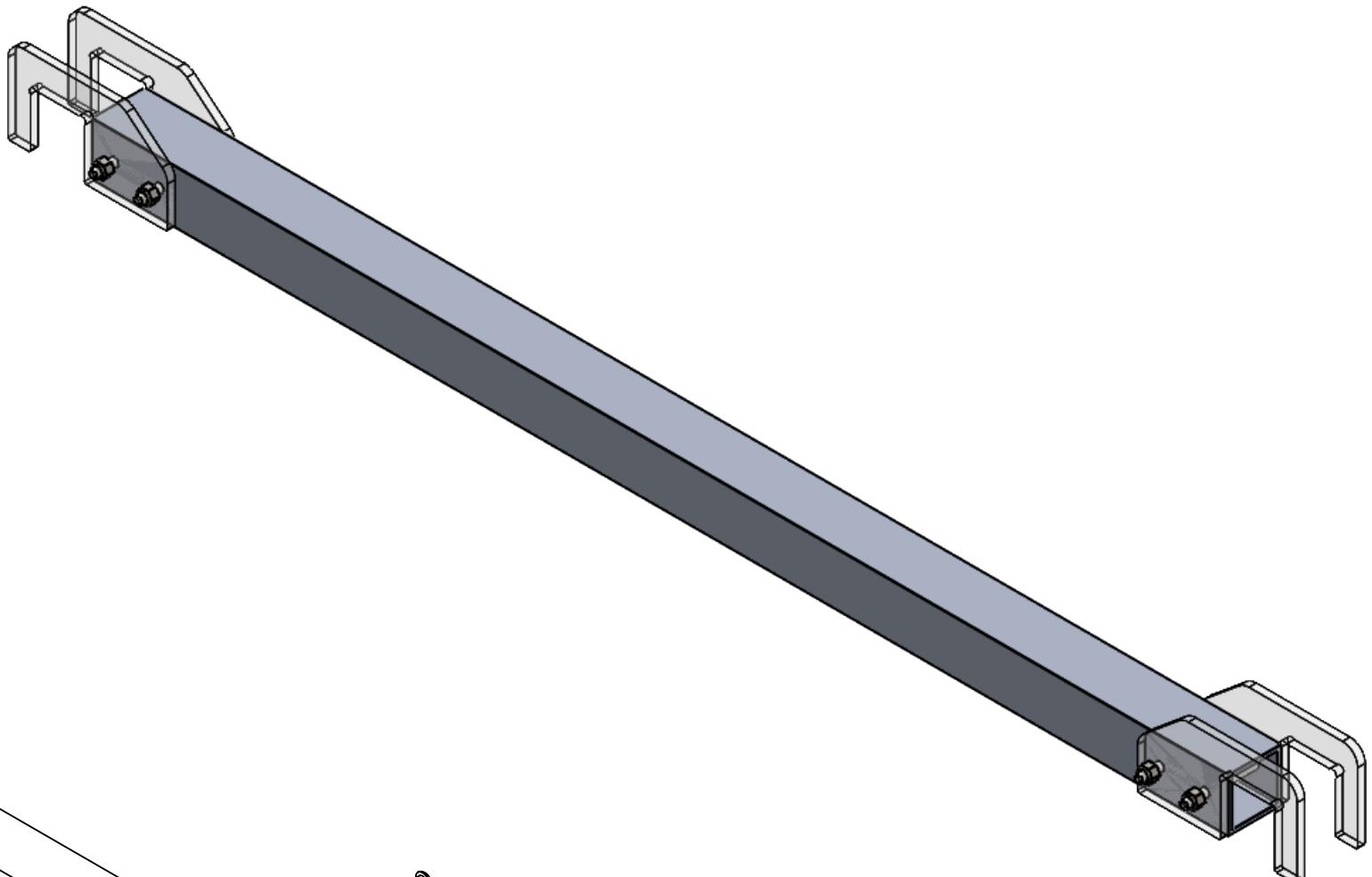
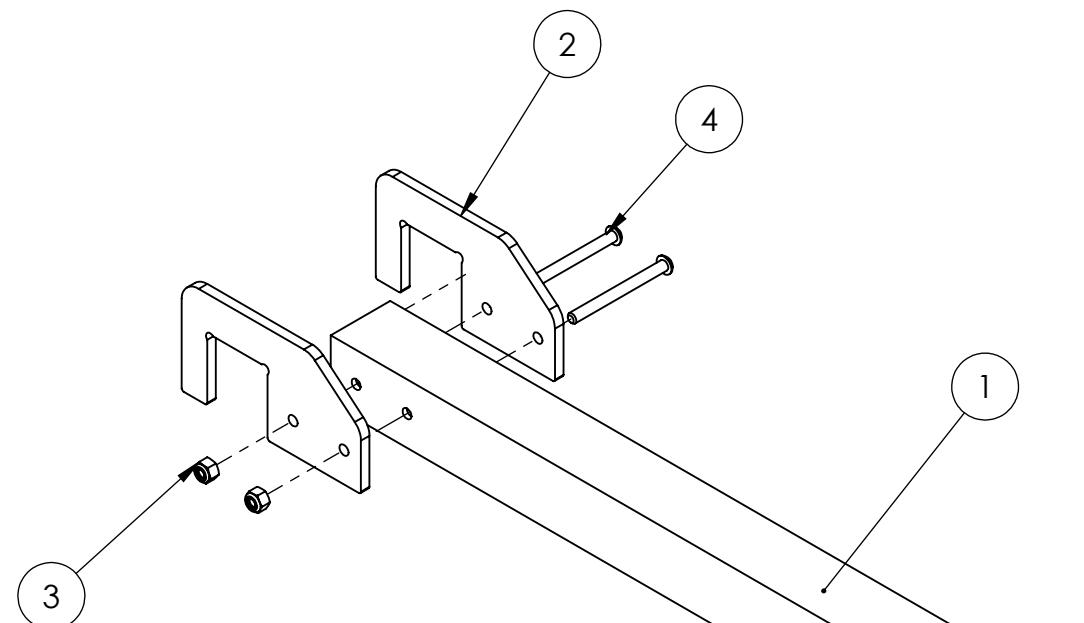
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20317	Power Port Base Brace Bar	1
2	GE-20318	Power Port Base Brace Hook	4
3	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	4
4	round_hex_.25_20_2.7 5_partial	Steel Button Head Hex Drive Screw, 1/4"-20 x 2.75" long, partially threaded	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR.	MFG APPR.
		MATERIAL	Q.A.	COMMENTS:
	NEXT ASSY	USED ON	FINISH	
	APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

**Power Port Base
Brace Assembly**

B GE-20319

SIZE DWG. NO. REV
SCALE: 1:8 WEIGHT: SHEET 1 OF 1

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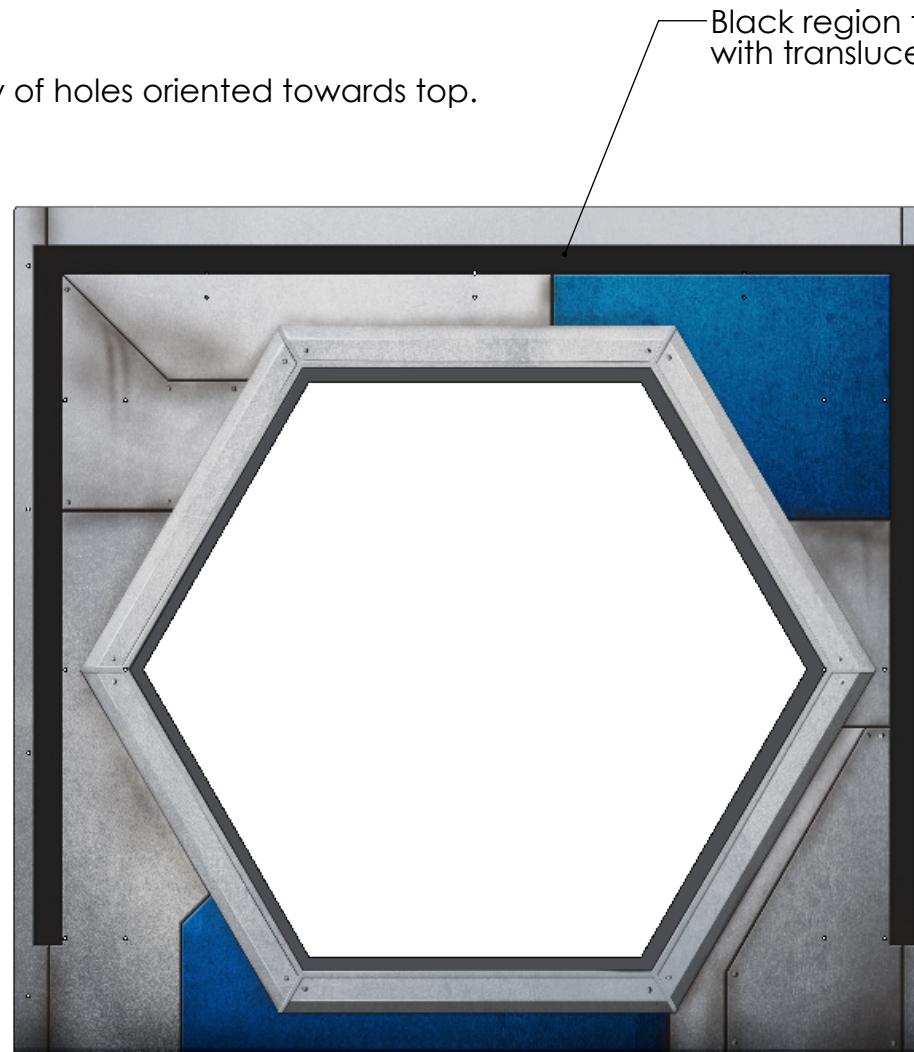
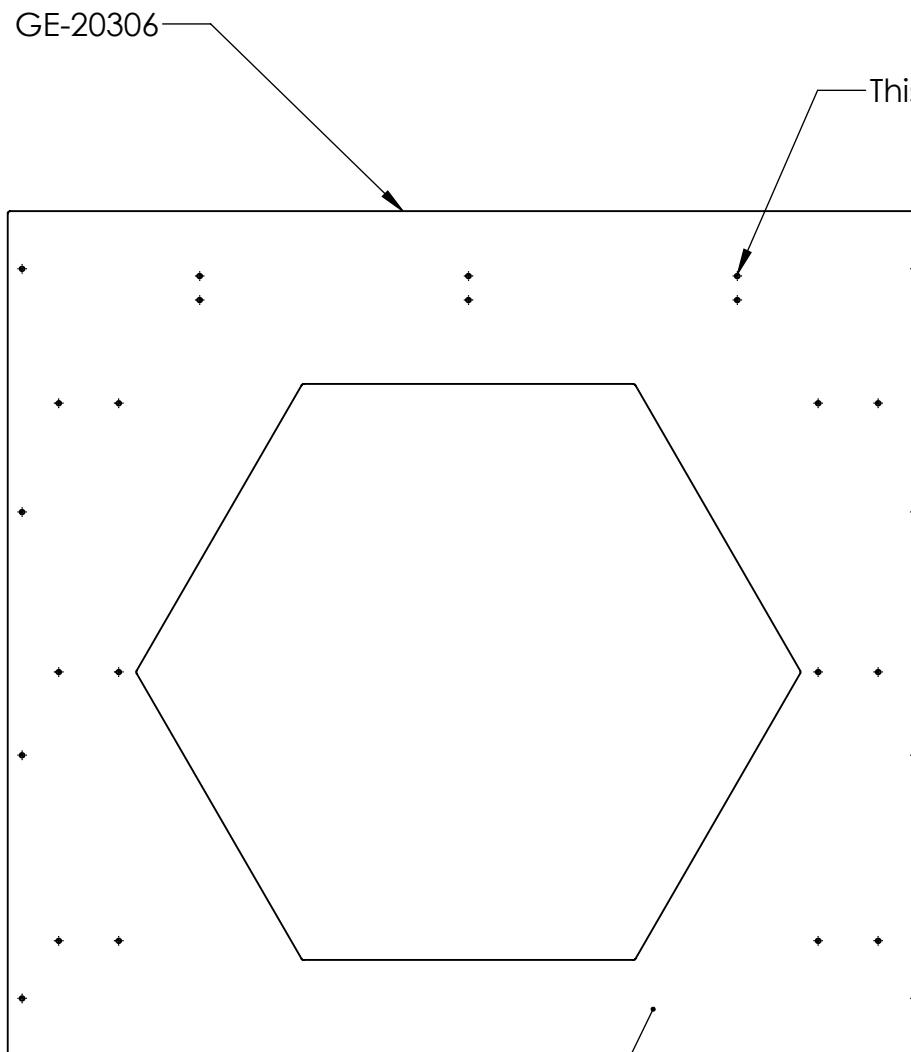
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- Notes:**
1. Tag or label with part number

Color Variations		
Part Number	Vinyl Image	QTY per field
GE-20320-Blue	GE-20320-Blue-Vinyl	1
GE-20320-Red	GE-20320-Red-Vinyl	1

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
SIZE	DWG. NO.	REV			
B	GE-20320				
SCALE: 1:10	WEIGHT:	SHEET 1 OF 1			

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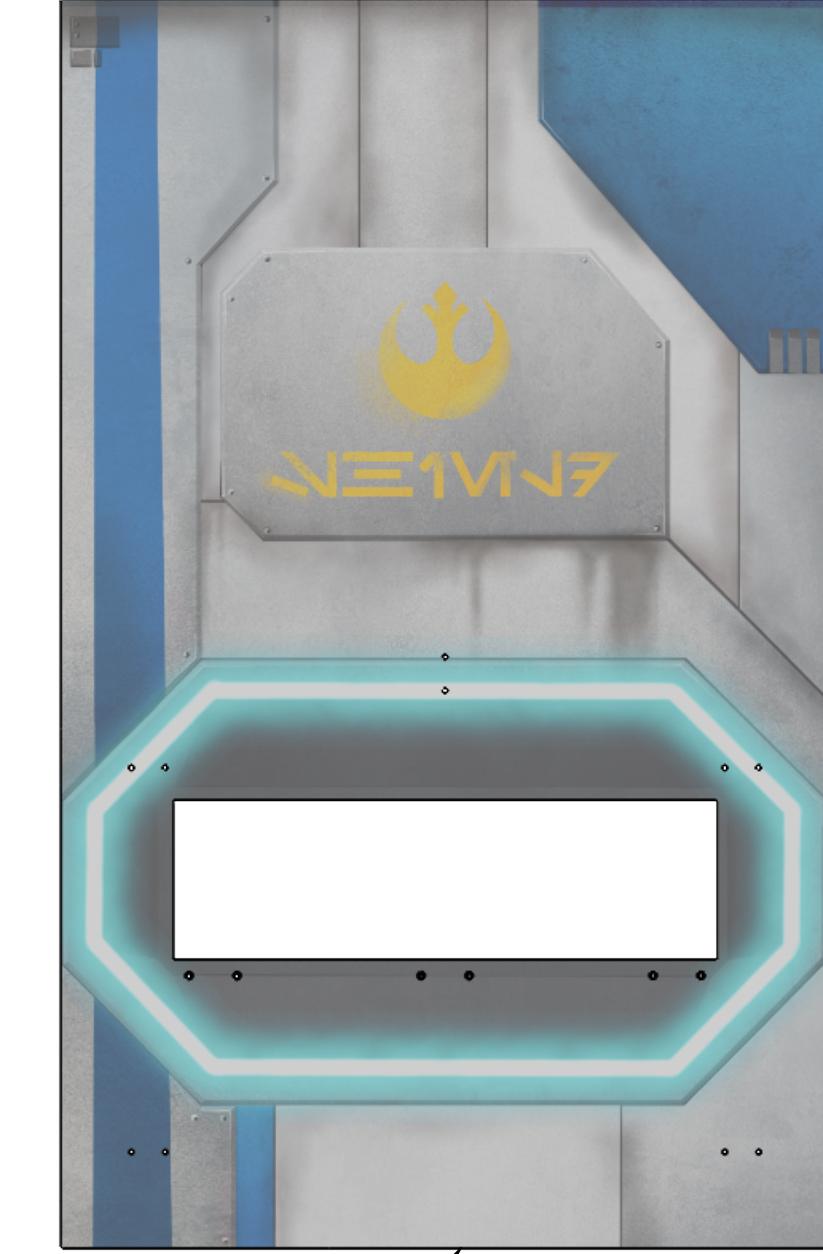
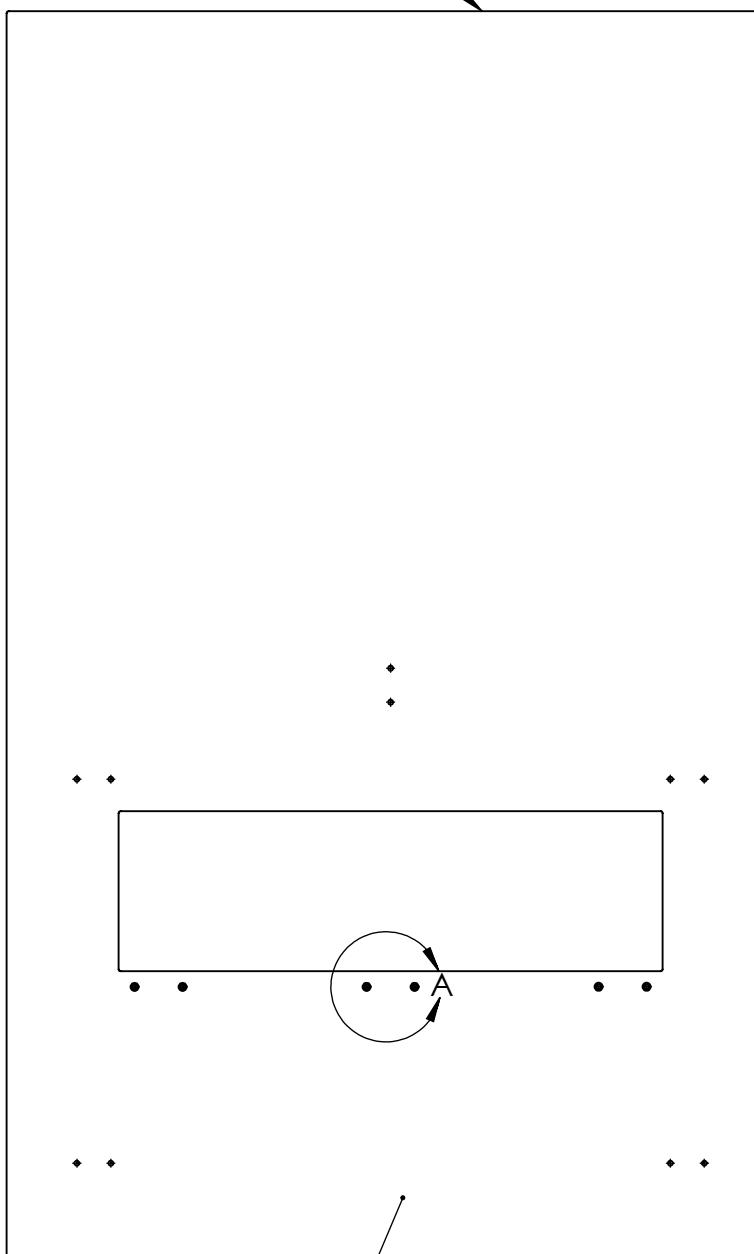
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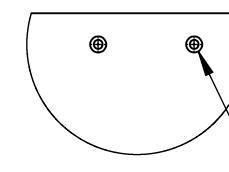
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GE-20314



Vinyl applied to this face

DETAIL A
SCALE 1 : 6

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Color Variations		
Part Number	Vinyl Image	QTY per field
GE-20321-Blue	GE-20321-Blue-Vinyl	1
GE-20321-Red	GE-20321-Red-Vinyl	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Low Power Port with Vinyl

SIZE DWG. NO. REV
B GE-20321

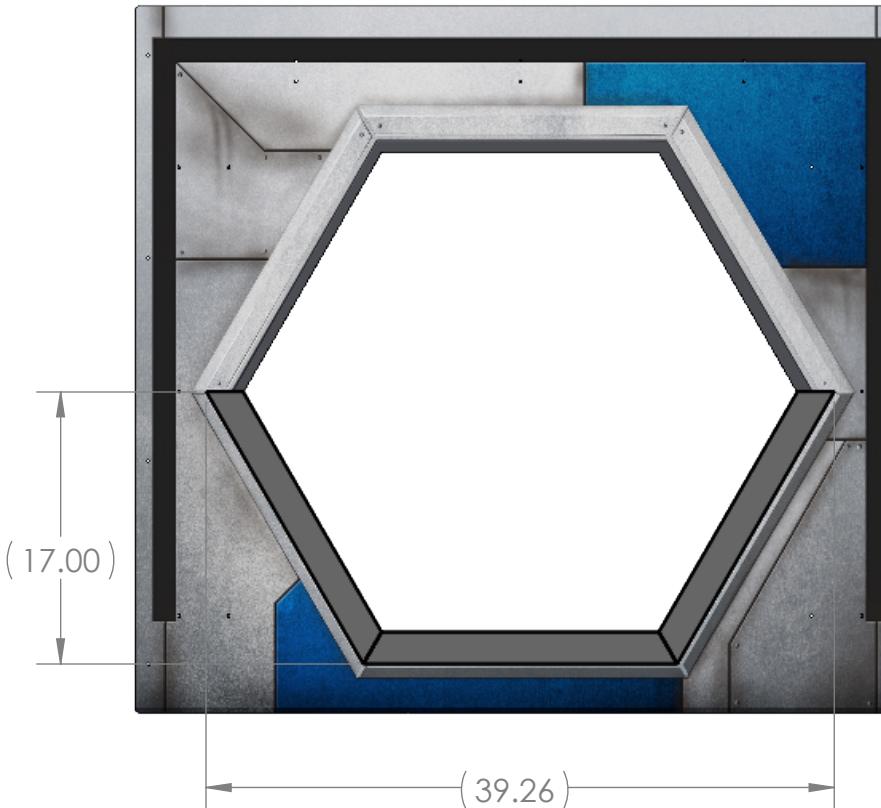
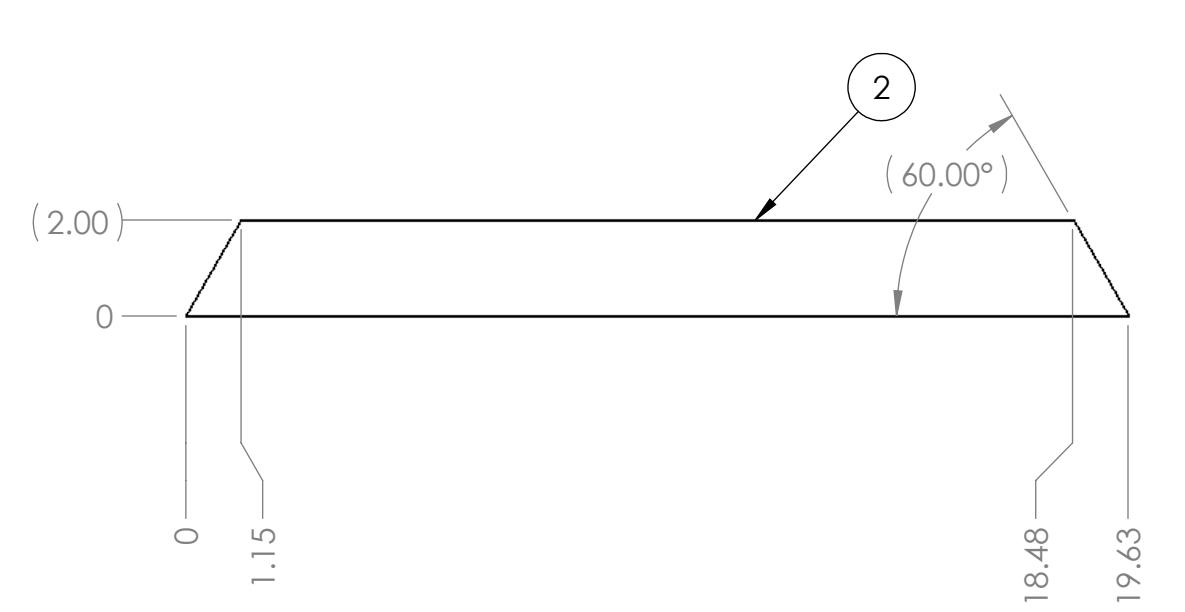
SCALE: 1:12 WEIGHT: SHEET 1 OF 1

4

3

2

1



Notes:

1. Attach 2 3X to 1.
2. Align to lower portion of the opening on the face of the vinyl
3. Repeat for GE-20320-Red.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20320-Blue	Power Port Top Front with Vinyl	1
2	Vision_PowerPort		3

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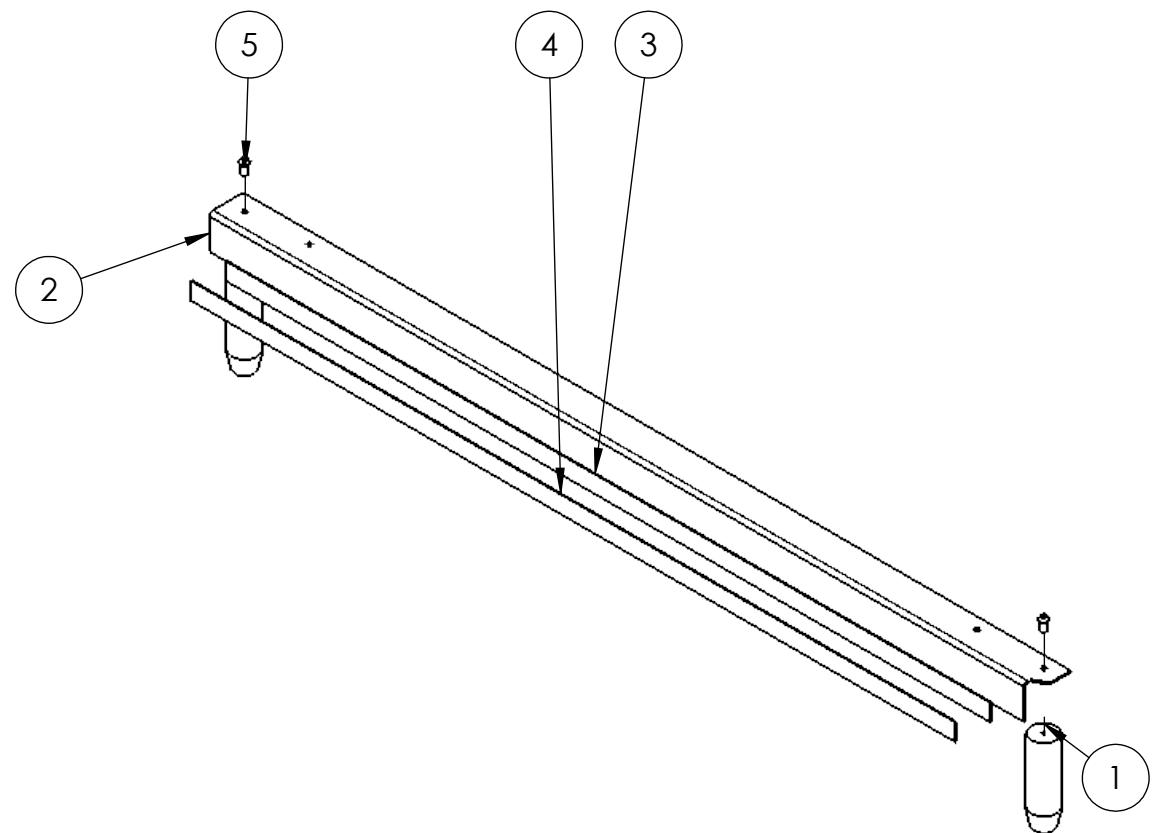
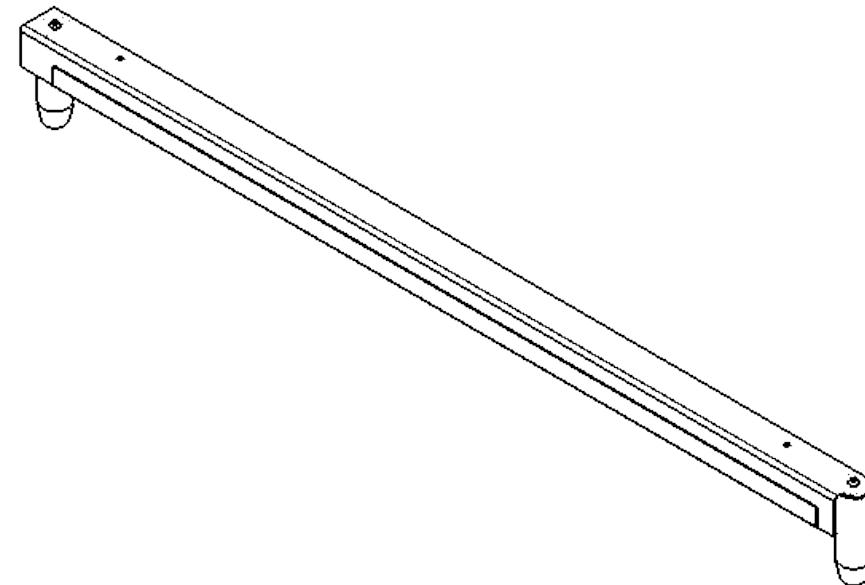
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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING	
				REV
B		GE-20322		
SCALE: 1:12		WEIGHT:		SHEET 1 OF 1

4

3

2

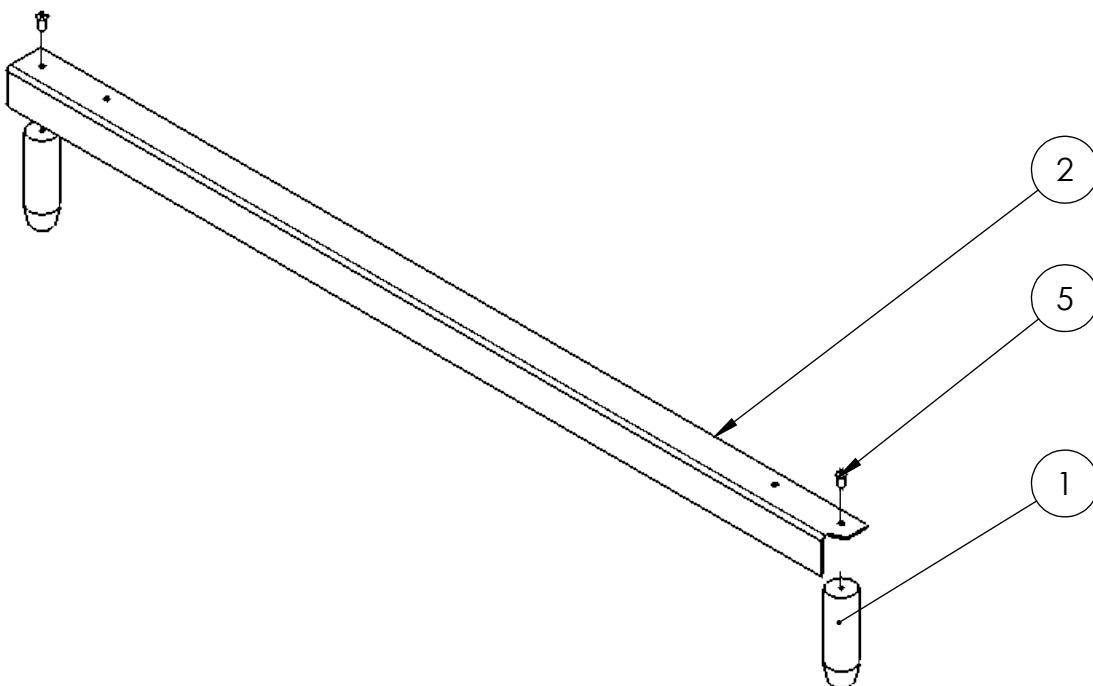
1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20218	Top Rail, Post	2
2	GE-20324	Top Rail, Power Port Angle	1
3	Hook_1_45	1" X 45" Hook, Adhesive Backed	1
4	Loop_1_45	1" x 45" Loop, Adhesive Backed	1
5	round_hex_.25_20_.62 5_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	2

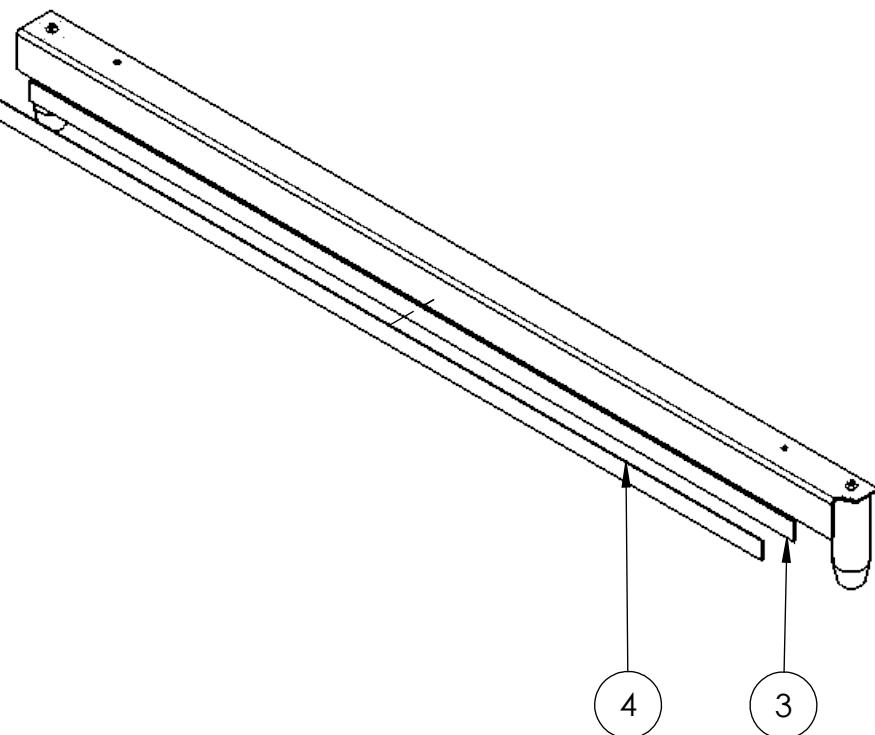
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
SIZE		DWG. NO.	REV		
B		ge-20323			
SCALE: 1:8		WEIGHT:	SHEET 1 OF 2		



Notes:

1. Attach (1) to the underside of (2)
2. Fasten in place with (5)



Note:

1. Clean and Prep (2).
2. Attach (3) to the front of (2).
3. Attach (4) to (3) and leave the protective backing on.

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	DRAWN			
	CHECKED			
	ENG APPR.			
	MFG APPR.			
	Q.A.			
	COMMENTS:			
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		
		FINISH		
APPLICATION	DO NOT SCALE DRAWING			
SCALE: 1:8		SIZE	DWG. NO.	REV
B		ge-20323		
SCALE: 1:8		WEIGHT:	SHEET 2 OF 2	

FIRST
ROBOTICS
COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

**Top Rail,
Standard**

4

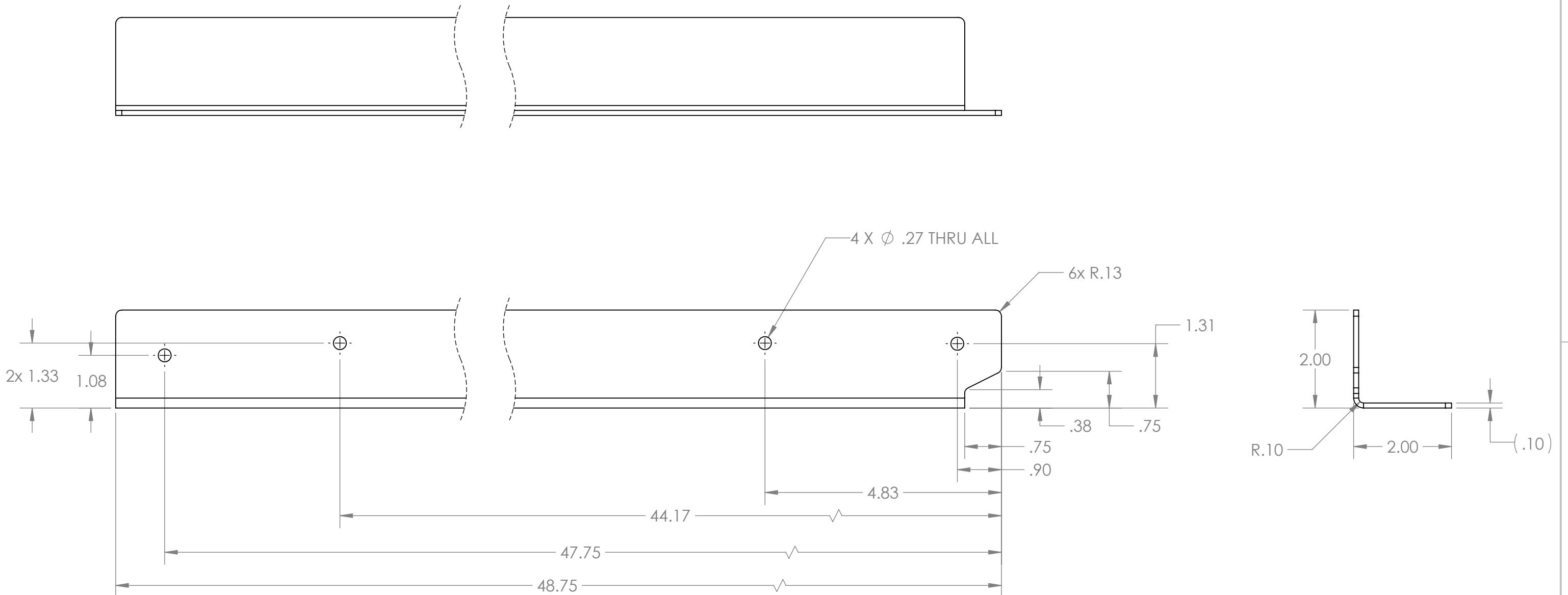
3

2

1

B

B



Notes:

1. Material: 5052 Aluminum Sheet, 10 GA.
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
SIZE	DWG. NO.			REV	
B	GE-20324				
SCALE: 1:2	WEIGHT:				
					SHEET 1 OF 1

4

3

2

1

4

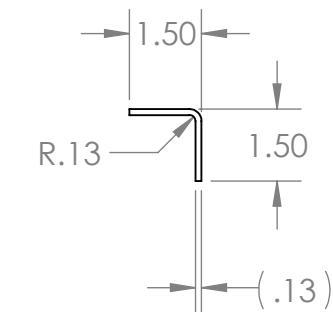
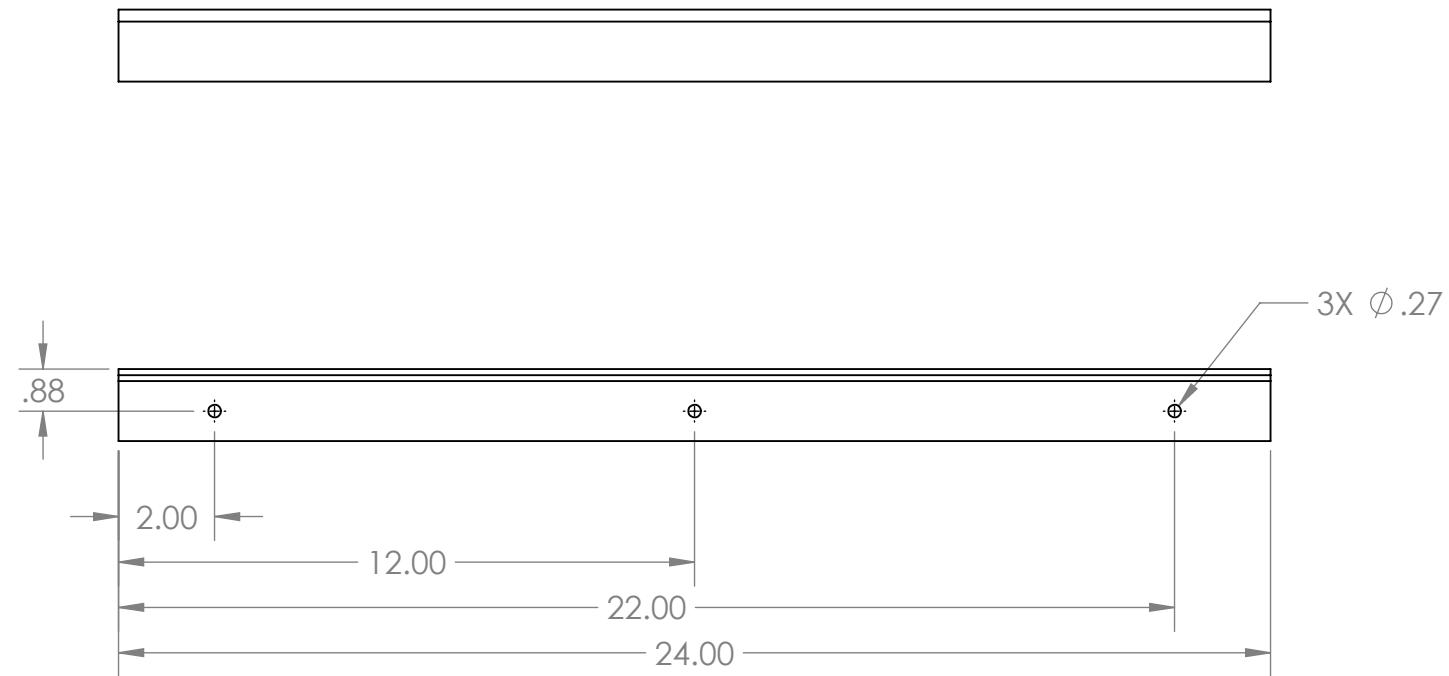
3

2

1

B

B

**Notes:**

1. Material: 1/8" thick, 5052 Aluminum, or similar.
2. Remove all burrs and sharp edges.
3. Bag or tag with part number.

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		UNLESS OTHERWISE SPECIFIED:		NAME _____ DATE _____	
		DIMENSIONS ARE IN INCHES			
		TOLERANCES:			
		FRACTIONAL: $\pm 1/16$			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
		TWO PLACE DECIMAL $\pm .01$			
		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:		TITLE: Angle, Side Polycarbonate	
		MATERIAL			
		NEXT ASSY			
		USED ON		SIZE B DWG. NO. GE-20325 REV	
		FINISH			
		APPLICATION			
		DO NOT SCALE DRAWING		SCALE: 1:4 WEIGHT: SHEET 1 OF 1	

4

3

2

1

4

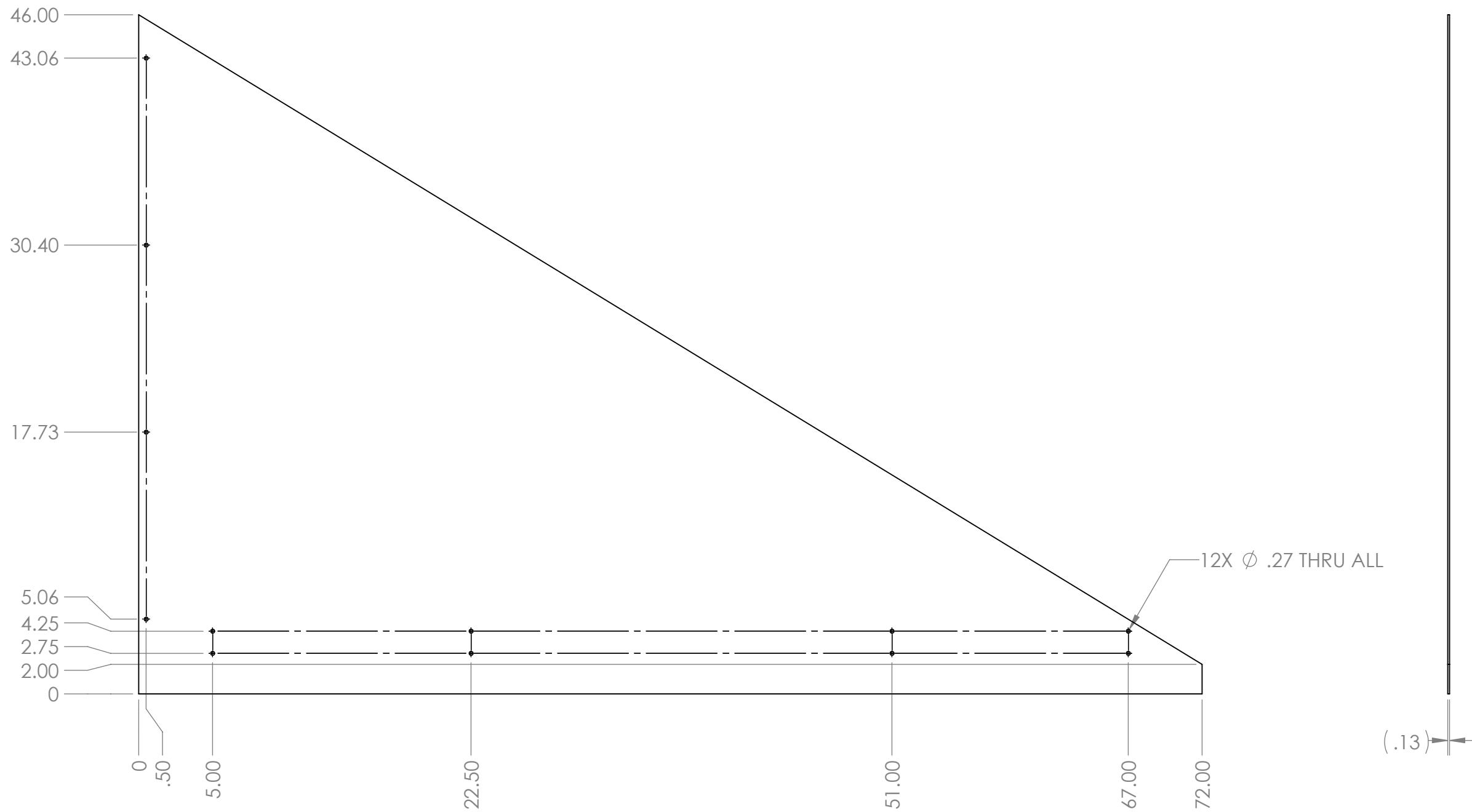
3

2

1

B

B



- Notes:
- Material: 1/8" Thick Polycarbonate, Clear
 - Vinyl to be applied to face.
 - Tag or label with part number
 - Remove burrs and sharp edges

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Power Port Backboard

B	GE-20327	REV
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1

4

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2

1

4

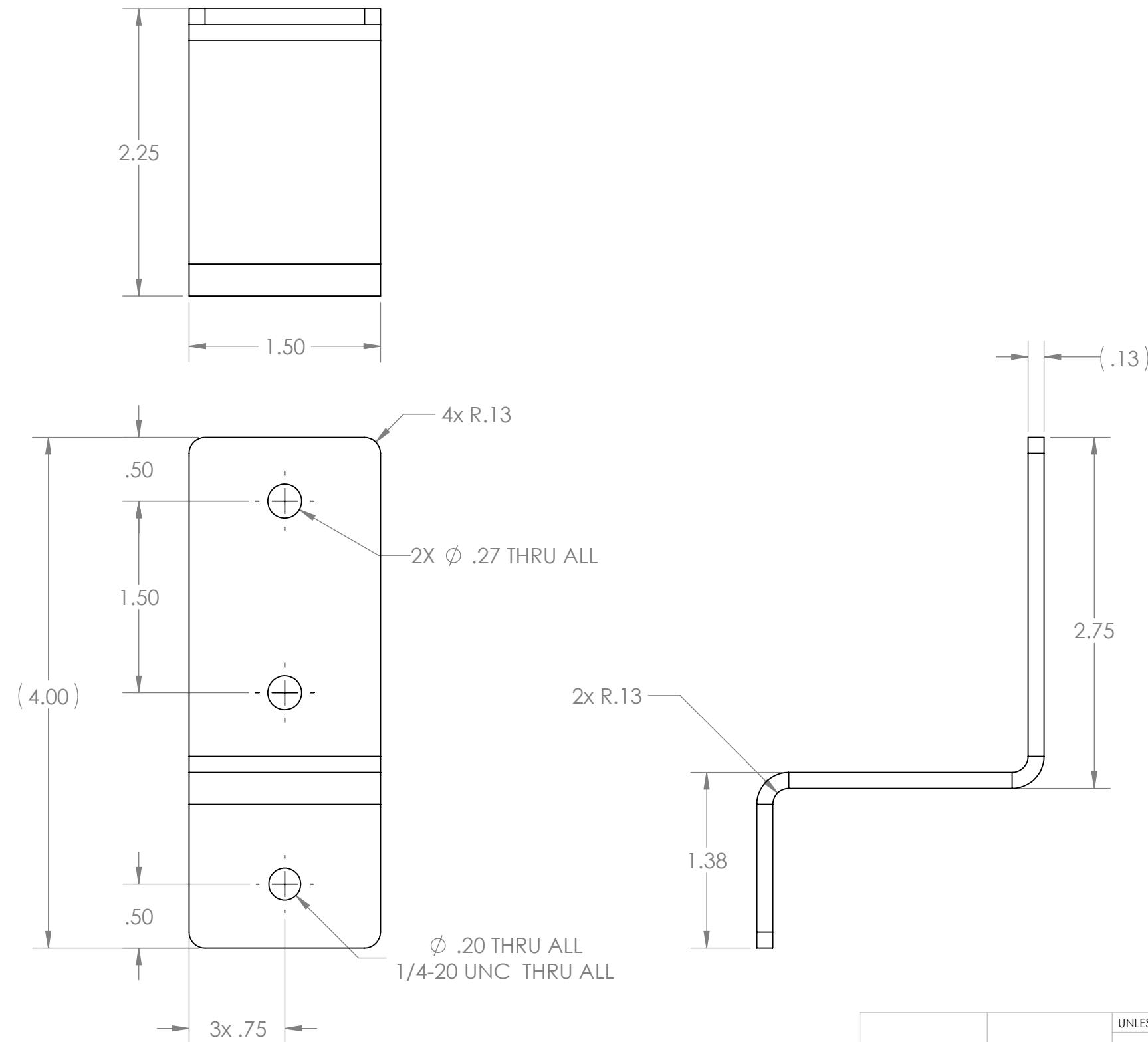
3

2

1

B

B



- Notes:
1. Remove all burrs and sharp edges
 2. Bag or label with part number
 3. Material: 11 Ga. Preplated Steel

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DRAWN		DIMENSIONS ARE IN INCHES		
CHECKED		TOLERANCES: FRACTIONAL: ±1/16		
ENG APPR.		ANGULAR: MACH ±1° BEND ±1°		
MFG APPR.		TWO PLACE DECIMAL: ±.01		
Q.A.		THREE PLACE DECIMAL: ±.001		
INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
MATERIAL				
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Title: Backboard Bracket

SIZE	DWG. NO.	REV
B	GE-20328	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1

4

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1

4

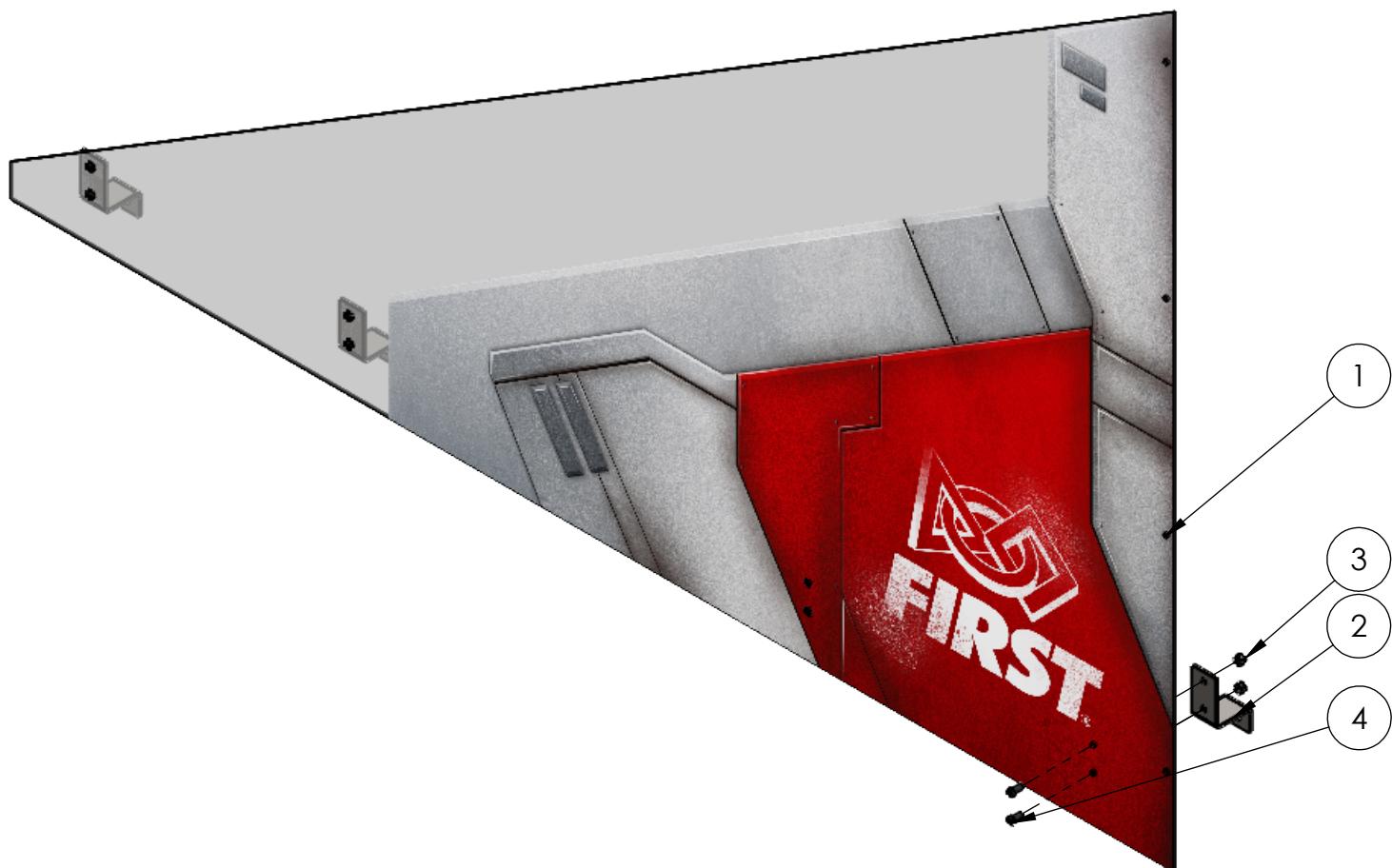
3

2

1

B

B



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20331-Red	Power Port Backboard Left with Vinyl	1
2	GE-20328	Backboard Bracket	4
3	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	8
4	round_hex_.25_20_.62_5_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	8

Note:

NOTE:
1. Plastic with vinyl same for both RED and BLUE

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN			
			CHECKED			
			ENG APPR.			
			MFG APPR.			
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
		MATERIAL	COMMENTS:			
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
			SCALE: 1:12	WEIGHT:	REV	
					B	GE-20329
					SHEET 1 OF 1	

4

3

2

1

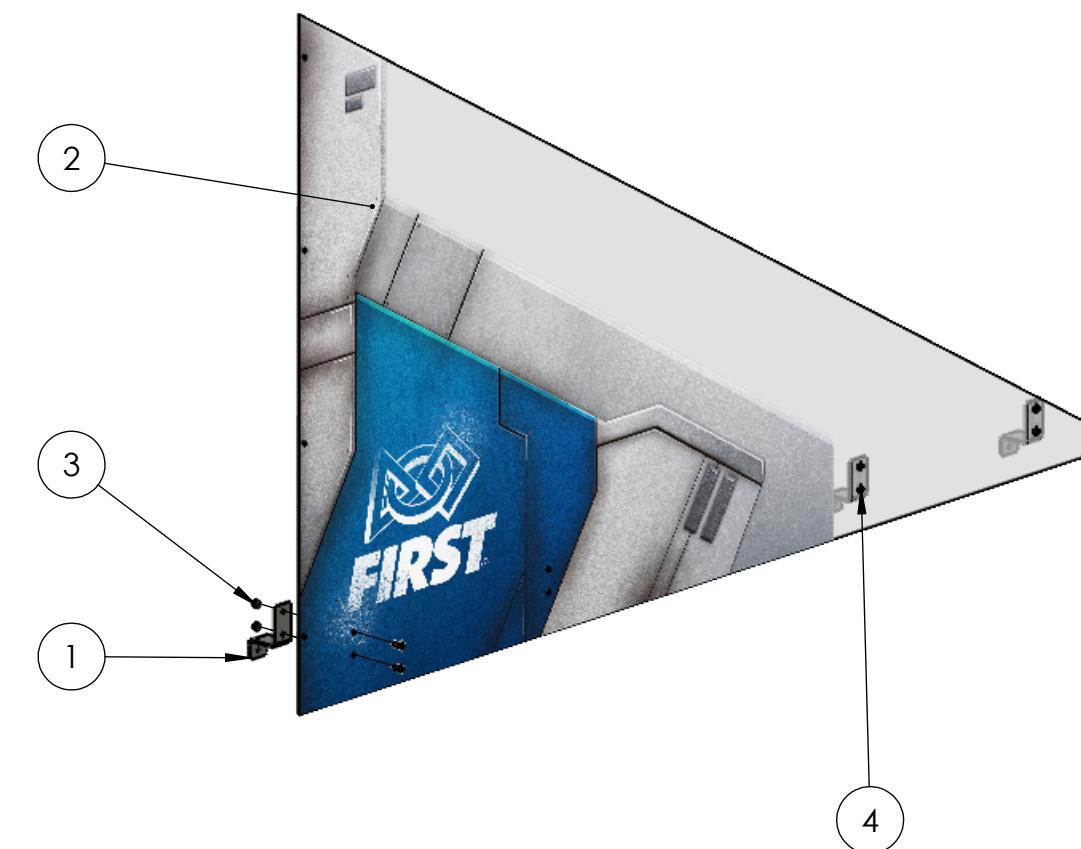
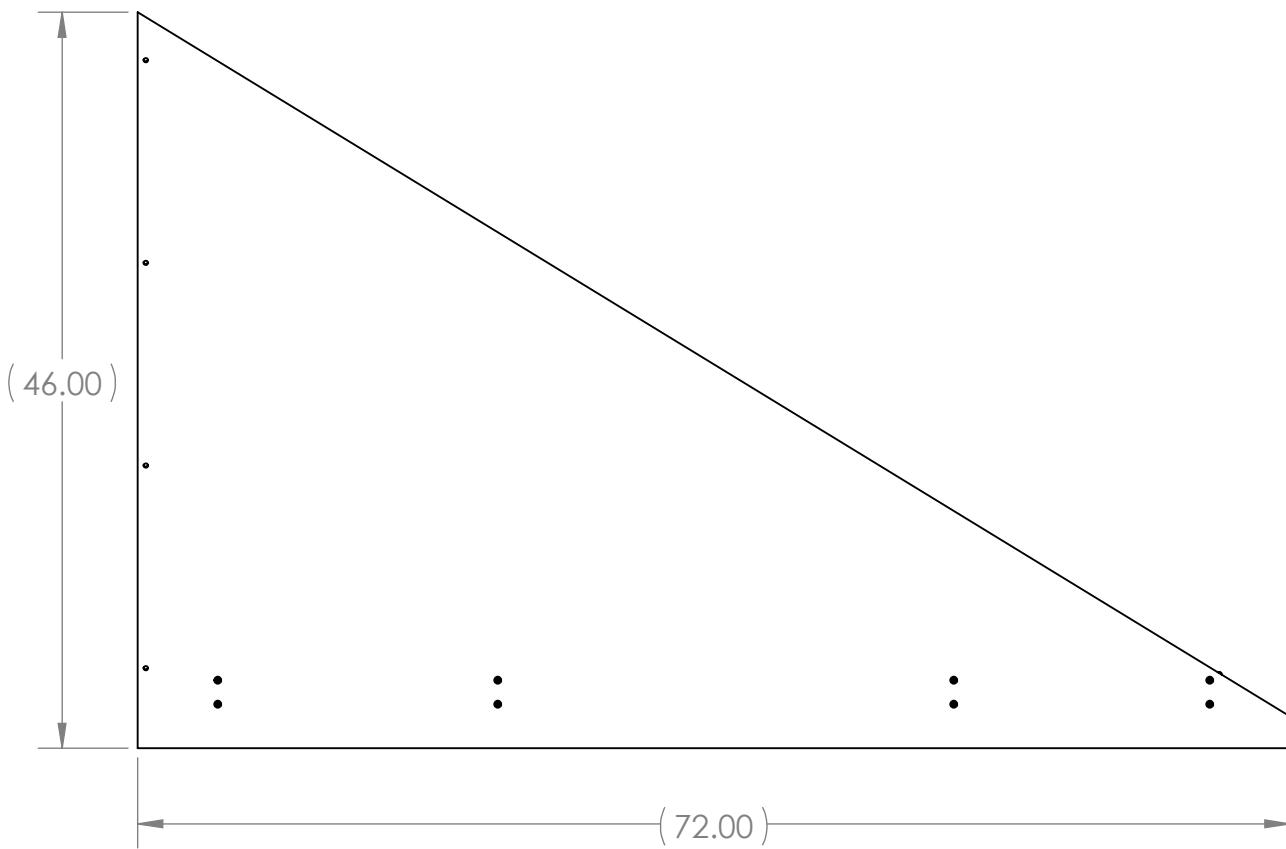
4

3

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1

B



Note: Item ② can be red or blue. See drawing for more details.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20328	Backboard Bracket	4
2	GE-20332	Power Port Backboard Right with Vinyl	1
3	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	8
4	round_hex_.25_20_.62 5_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	8

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		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$			
		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.	COMMENTS:	
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Power Port
Backboard Right
Assembly

SIZE DWG. NO. **B** **GE-20330** **REV**

SCALE: 1:12 WEIGHT: SHEET 1 OF 1

4

3

2

1

B

A

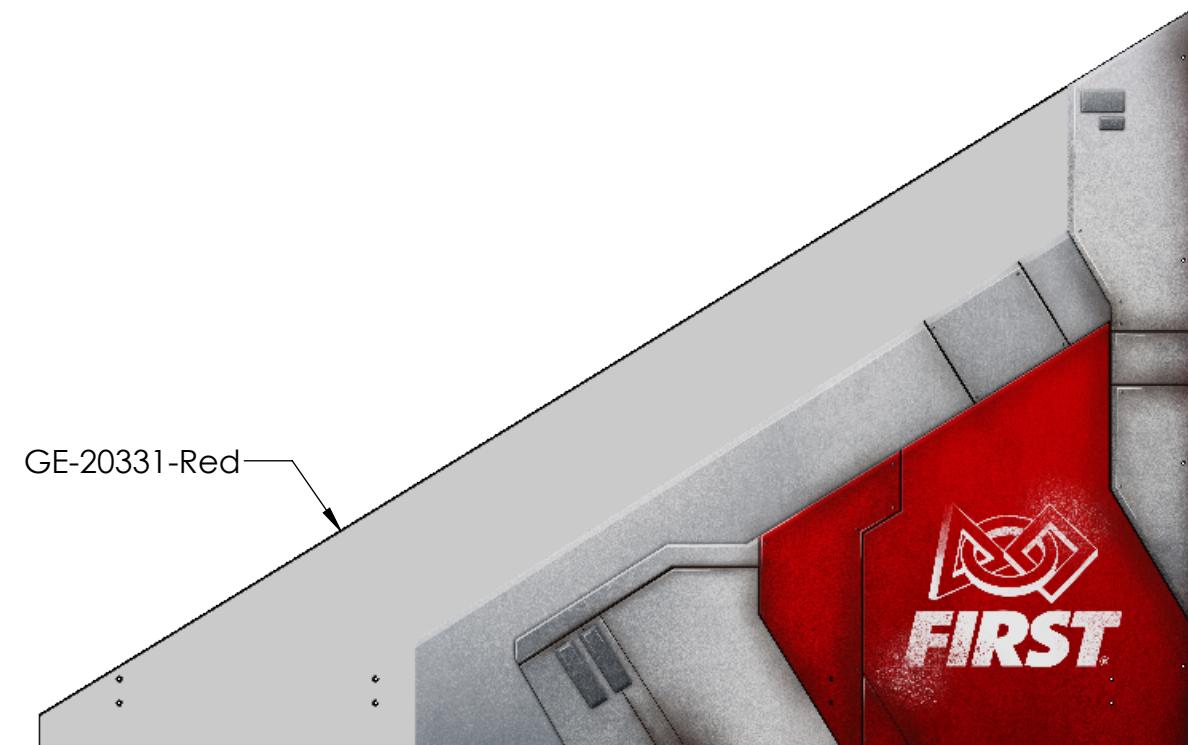
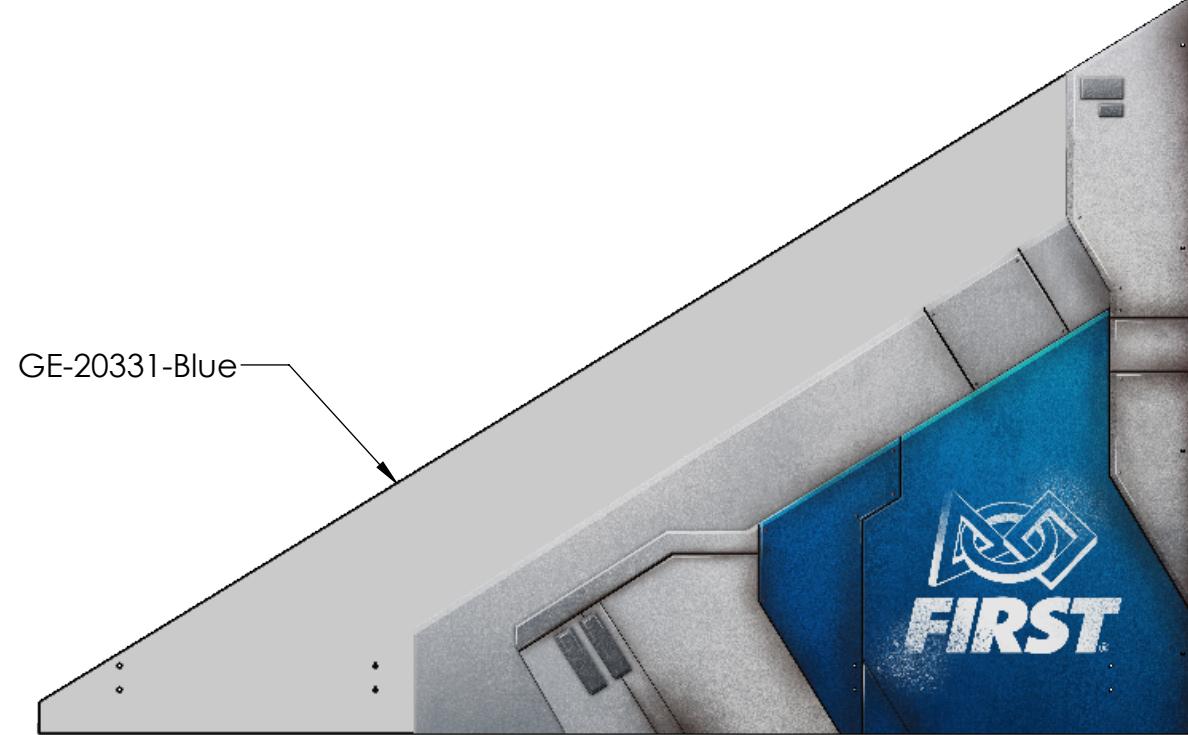
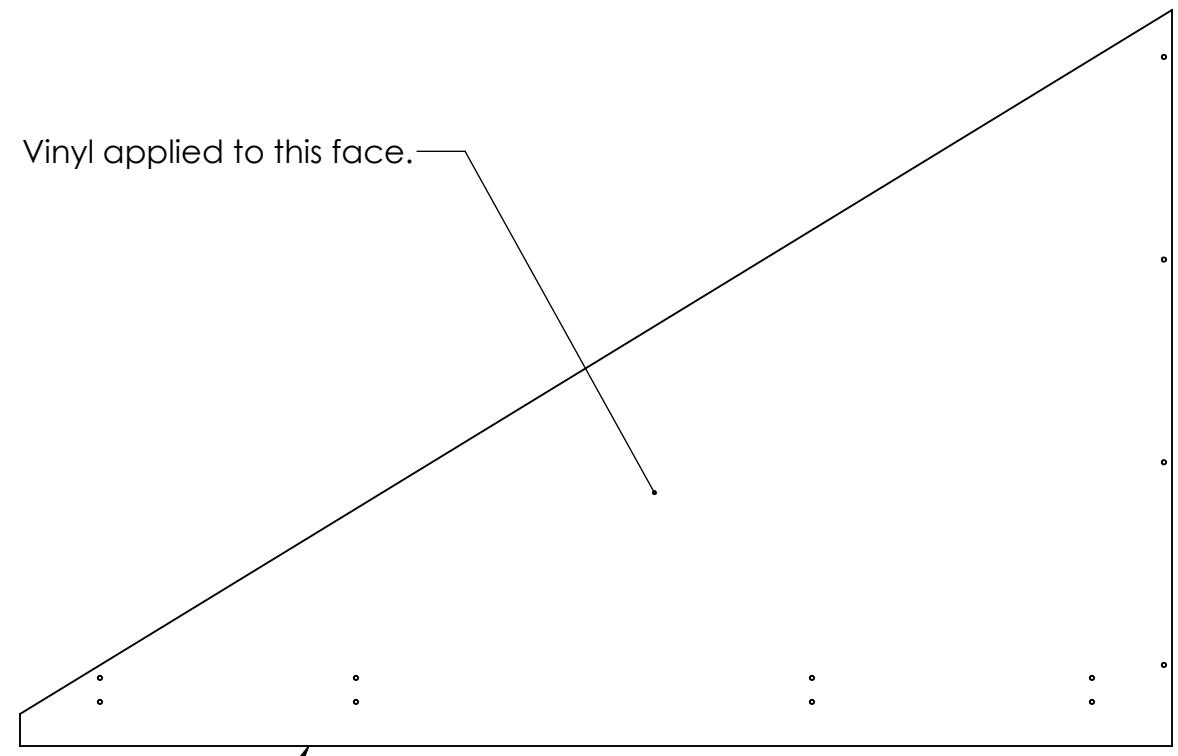
4

3

2

1

B



A

Notes: Tag or label with part number

Color Variations		
Part Number	Vinyl Image	QTY per field
GE-20331-Blue	GE-20331-Blue-Vinyl	1
GE-20331-Red	GE-20331-Red-Vinyl	1

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
	NEXT ASSY	USED ON	FINISH	
		APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
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TITLE: Power Port Backboard Left with Vinyl

SIZE DWG. NO. **B** **GE-20331** **REV**

SCALE: 1:12 WEIGHT: SHEET 1 OF 1

4

3

2

1

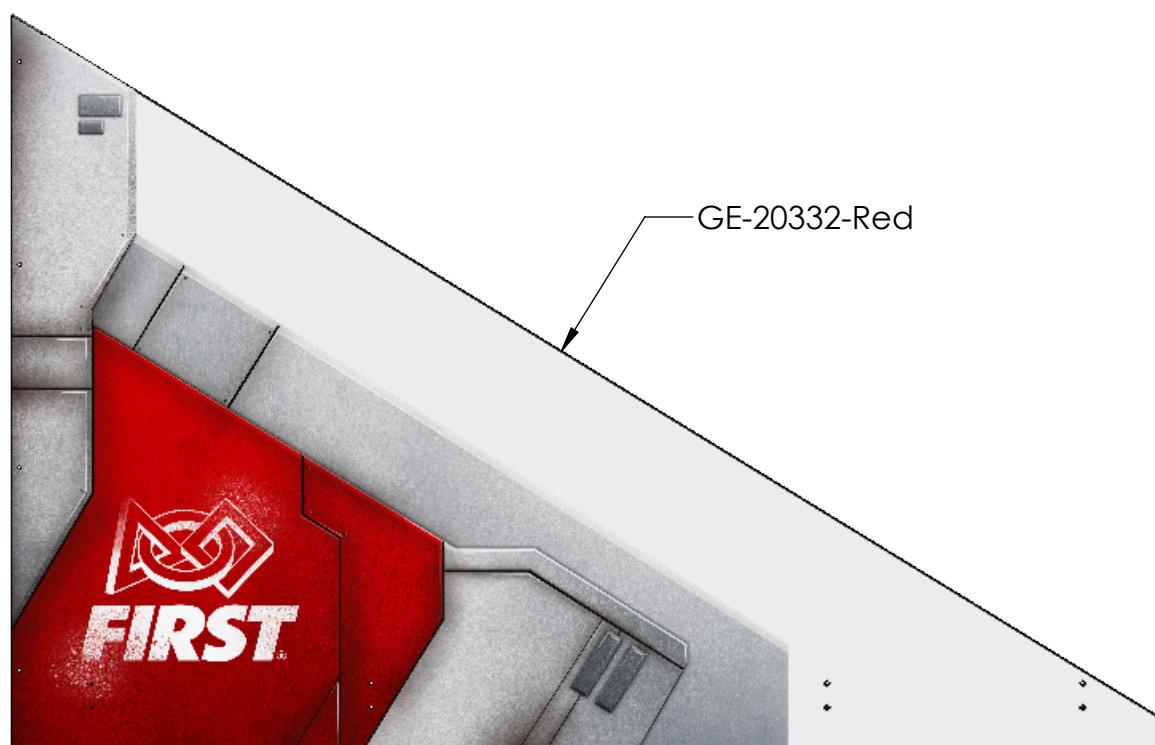
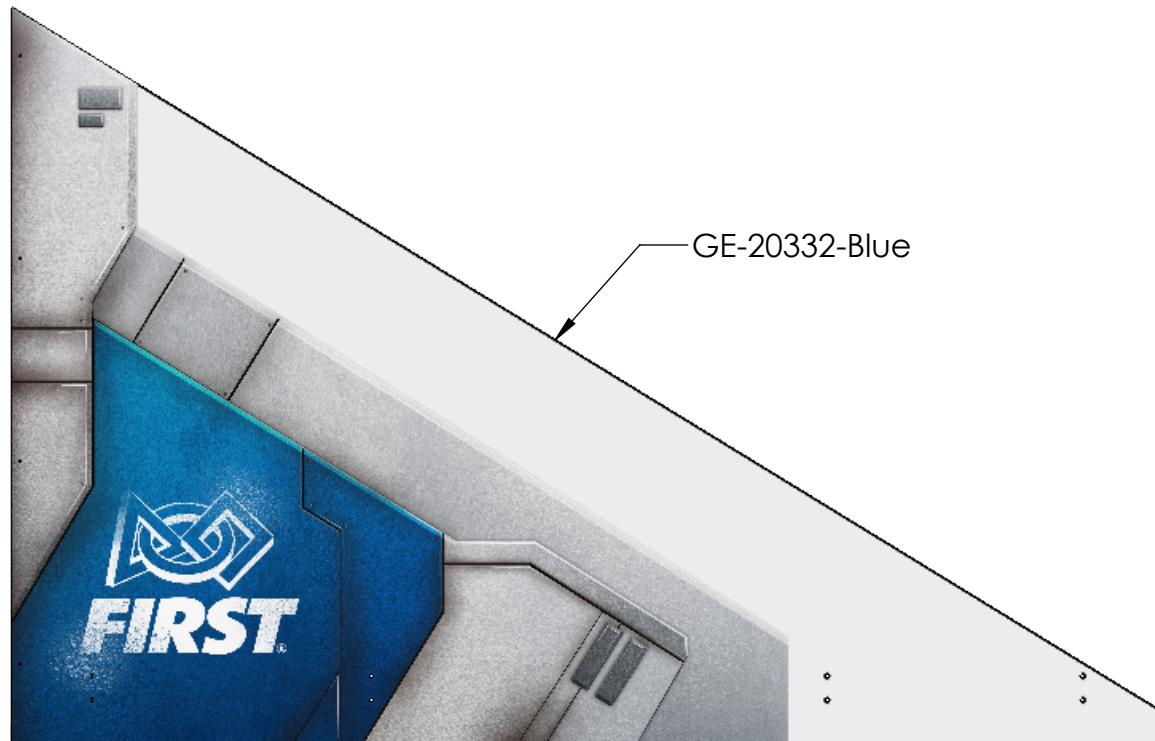
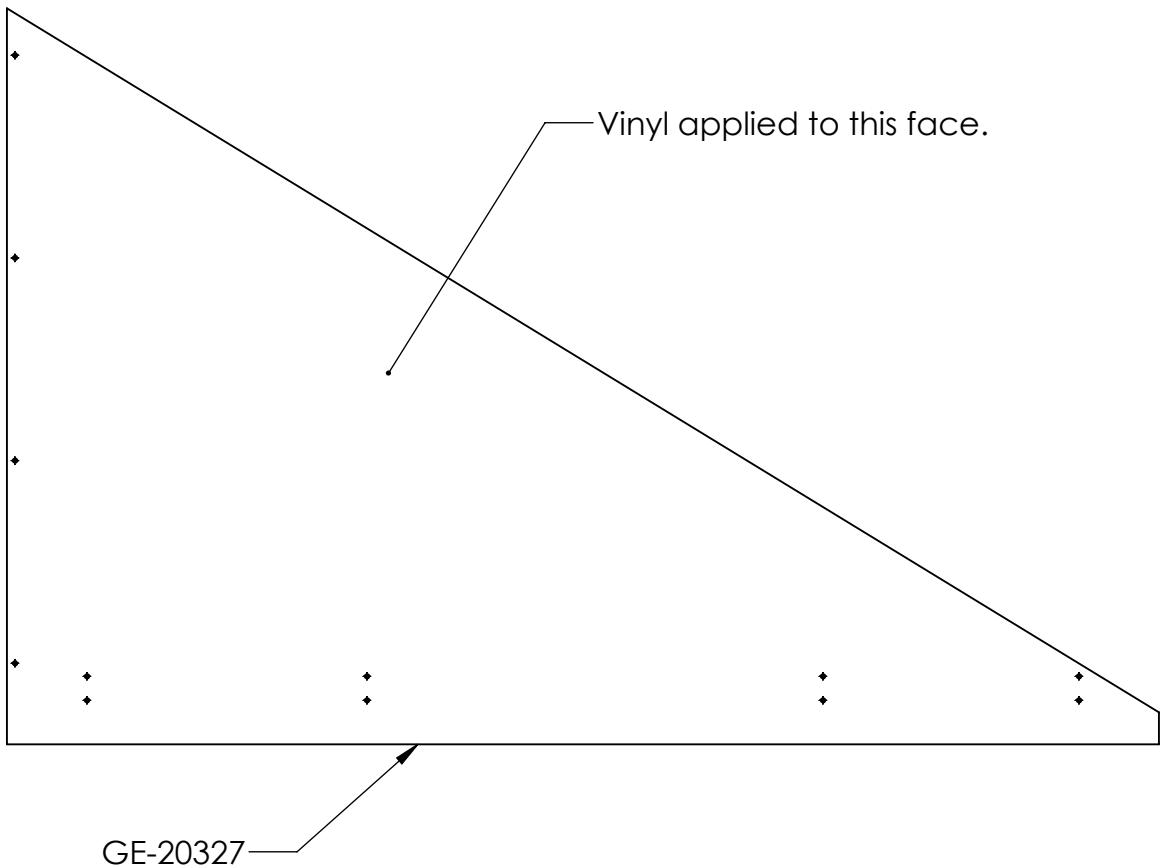
4

3

2

1

B



Color Variations		
Part Number	Vinyl Image	QTY per field
GE-20332-Red	GE-20332-Red-Vinyl	1
GE-20332-Blue	GE-20332-Blue-Vinyl	1

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		DIMENSIONS ARE IN INCHES	DRAWN		
		TOLERANCES:	CHECKED		
		FRACTIONAL $\pm 1/16$	ENG APPR.		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.		
		TWO PLACE DECIMAL $\pm .01$	Q.A.		
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION	DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV			
B	GE-20332				
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1			

4

3

2

1

B

A

4

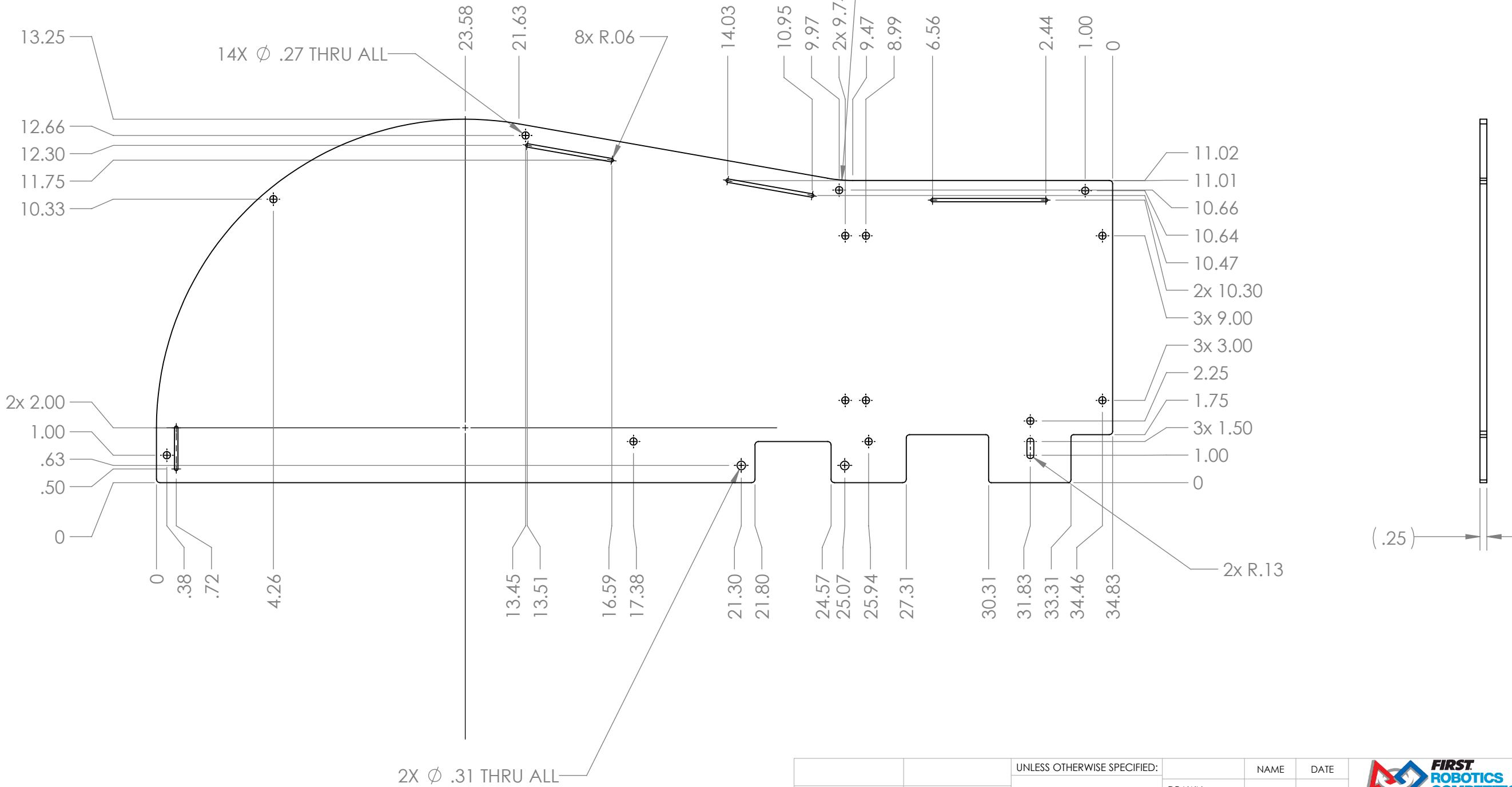
3

2

1

B

B



- Notes:
1. Material: 1/4" thick, clear polycarbonate.
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

2X Ø .31 THRU ALL

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:		DRAWN	CHECKED
		MATERIAL			
NEXT ASSY	USED ON	FINISH		ENG APPR.	MFG APPR.
APPLICATION		DO NOT SCALE DRAWING		Q.A.	COMMENTS:

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
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TITLE: Inner Port Chute Wall

SIZE	DWG. NO.	REV
B	GE-20333	

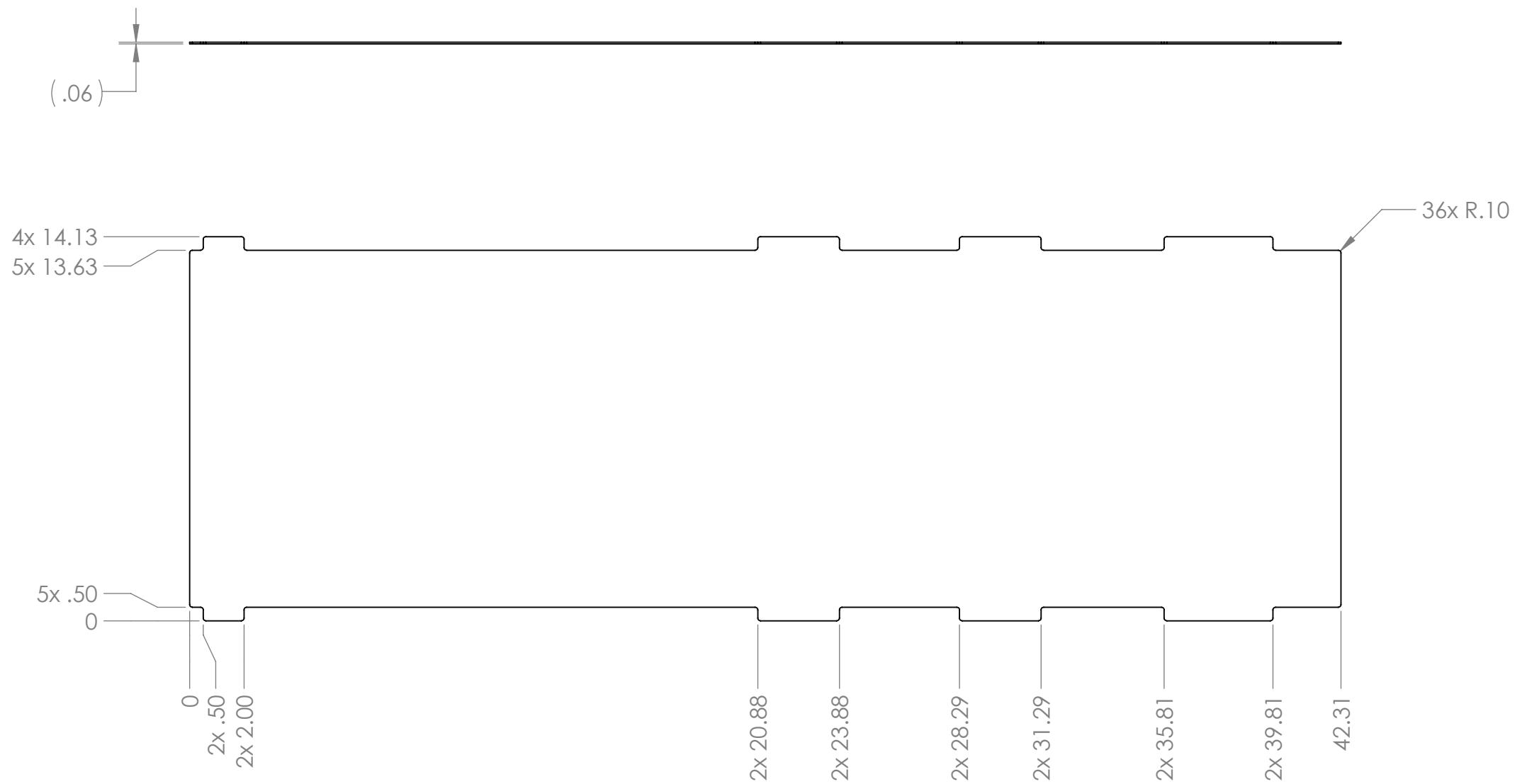
SCALE: 1:4 WEIGHT: SHEET 1 OF 1

4

3

2

1



Notes:

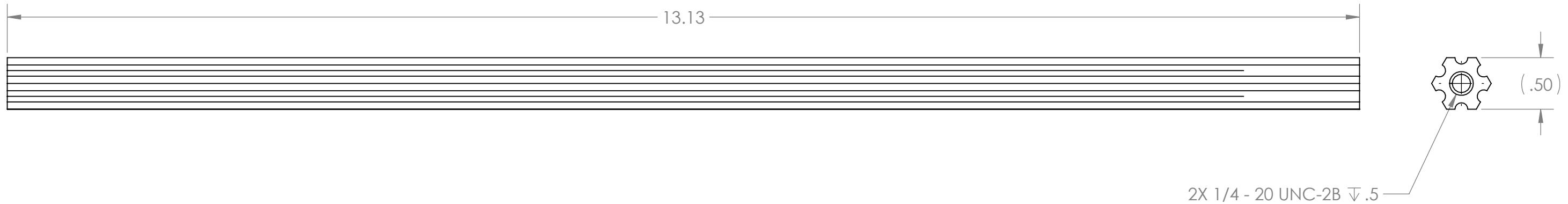
1. Material: 1/16" thick, clear polycarbonate
 2. Remove all burrs and sharp edges
 3. Tag or label with part number

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN			
			CHECKED			
			ENG APPR.			
			MFG APPR.			
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
		MATERIAL	COMMENTS:			
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
SIZE DWG. NO. REV B GE-20334						
SCALE: 1:5 WEIGHT: SHEET 1 OF 1						

B

B



Notes:

1. Material: Aluminum
2. Description: AndyMark Churro
3. Make from AndyMark PN: am-3101-6, or equivalent.
4. Bag or tag with part number.

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
	APPLICATION	DO NOT SCALE DRAWING			

TITLE:		SIZE		DWG. NO.	REV
Inner Port Chute Churro		B		GE-20335	
SCALE: 1:1		WEIGHT:		SHEET 1 OF 1	

4

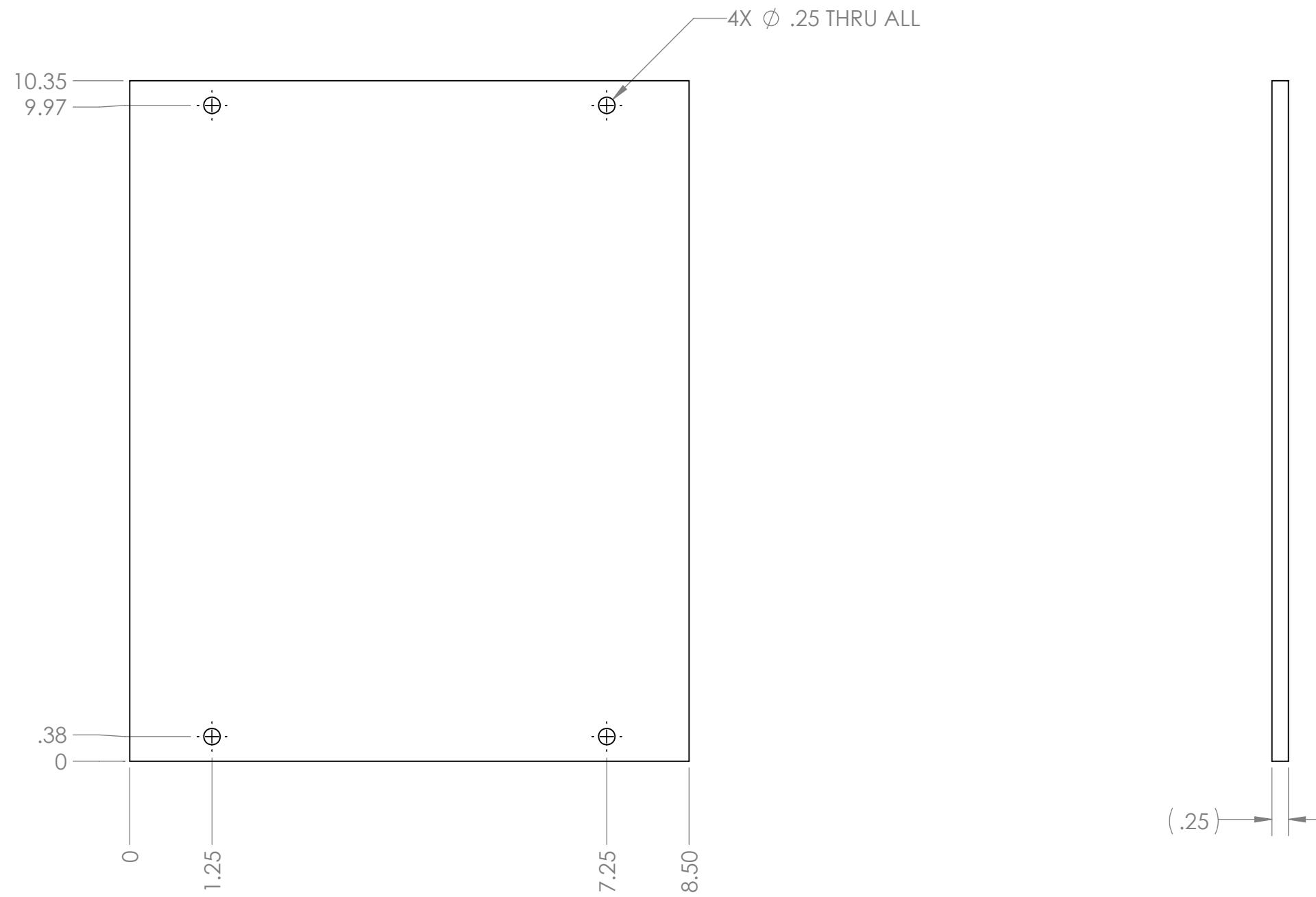
3

2

1

B

B

**Notes:**

1. Material: 1/4" thk. Polycarbonate, Clear.
2. Remove burrs and sharp edges.
3. Tag or label with part number.

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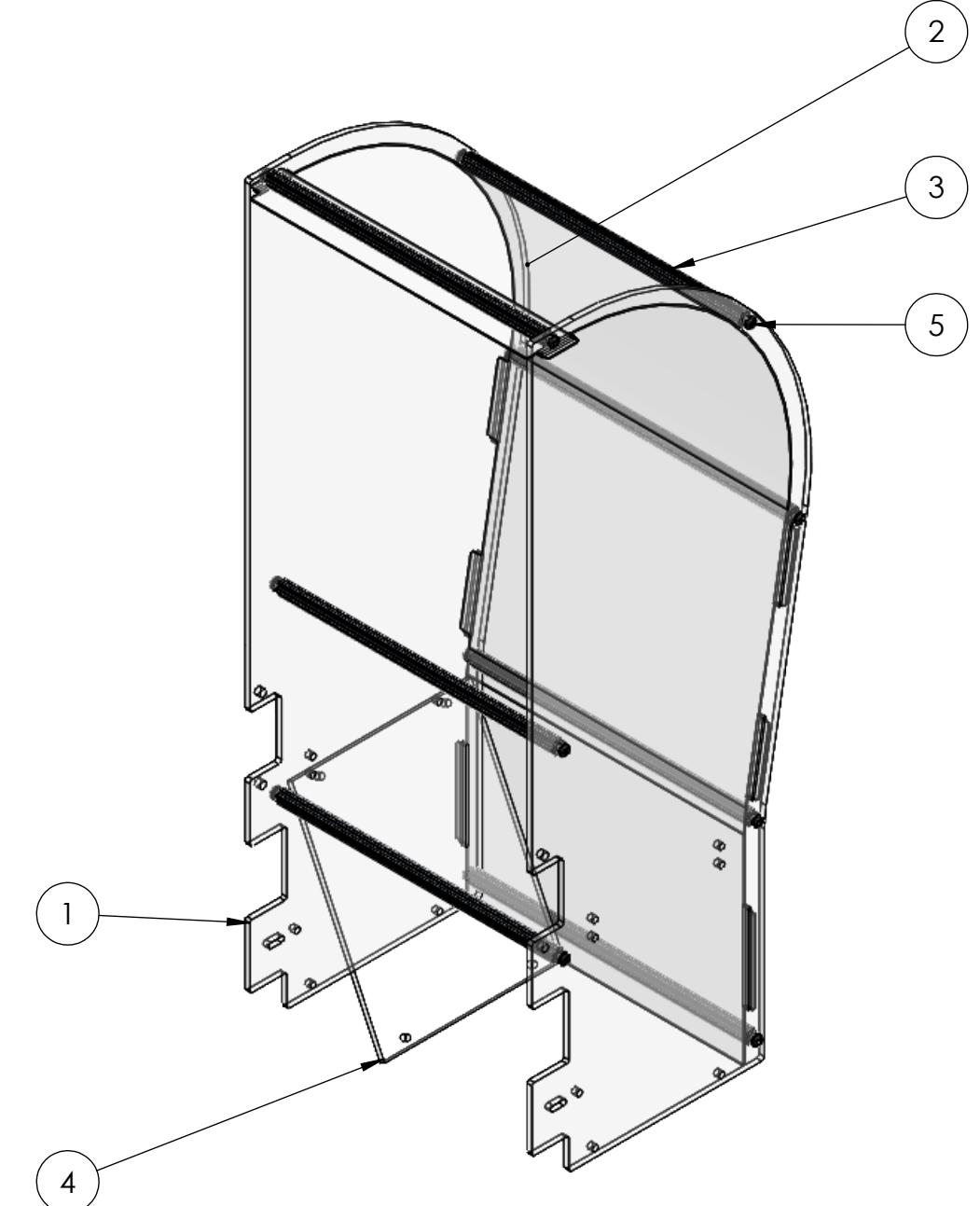
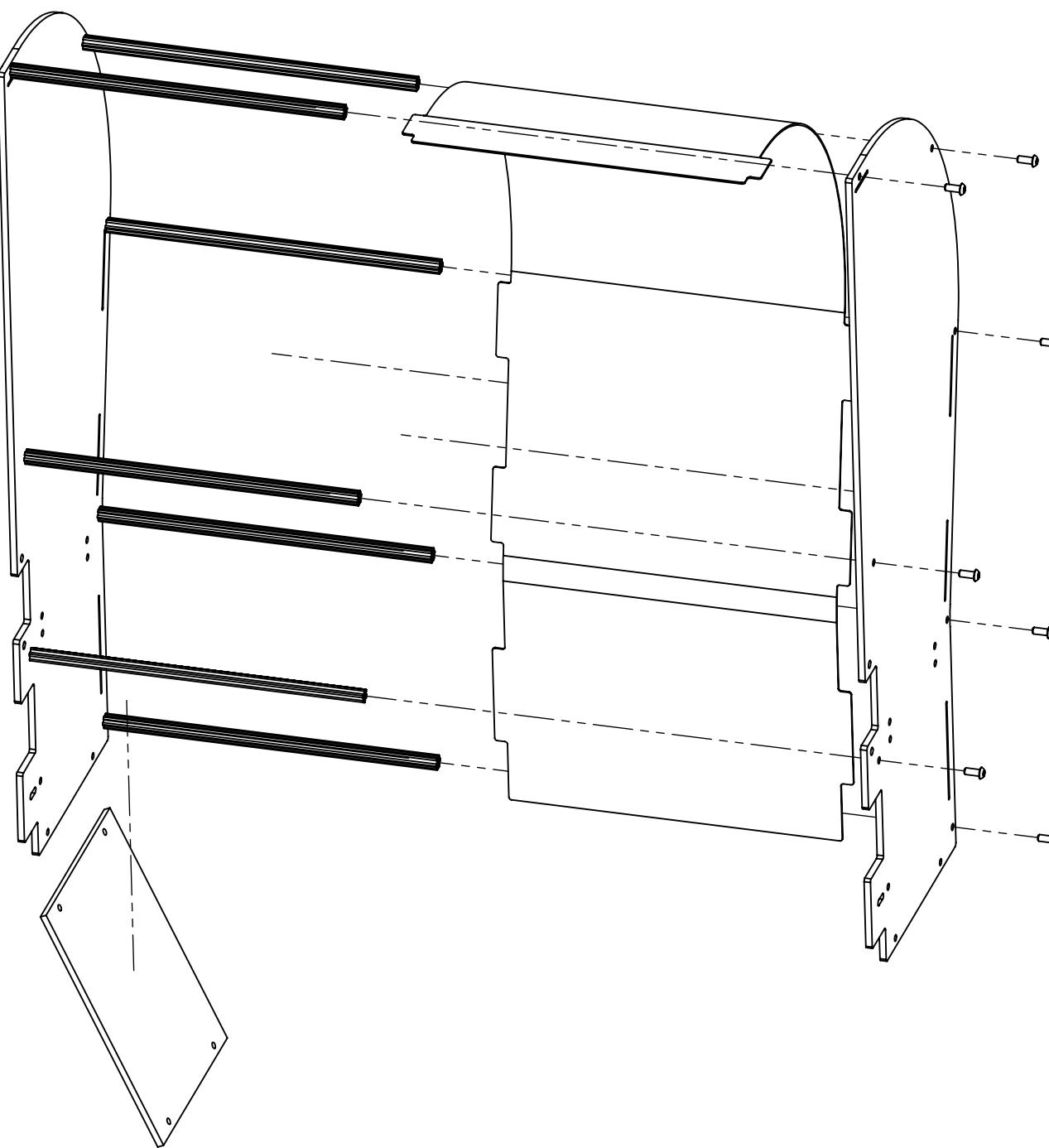
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
B	GE-20336				
SCALE: 1:2	WEIGHT:				
		SHEET 1 OF 1			

4

3

2

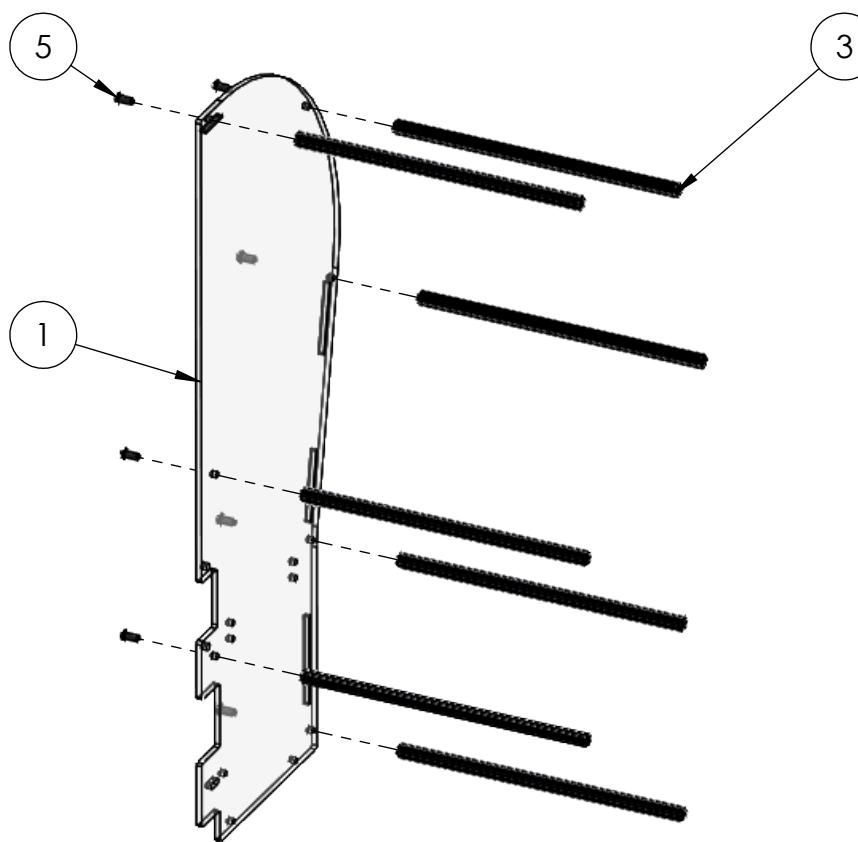
1



ITEM NO.	PART NUMBER	DESCRIPTION	
1	GE-20333	Inner Port Chute Wall	2
2	GE-20334	Inner Port Chute Slide	1
3	GE-20335	Inner Port Chute Churro	7
4	GE-20336	Inner Port Chute Ramp	1
5	round_hex_25_20_.62 5_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	14

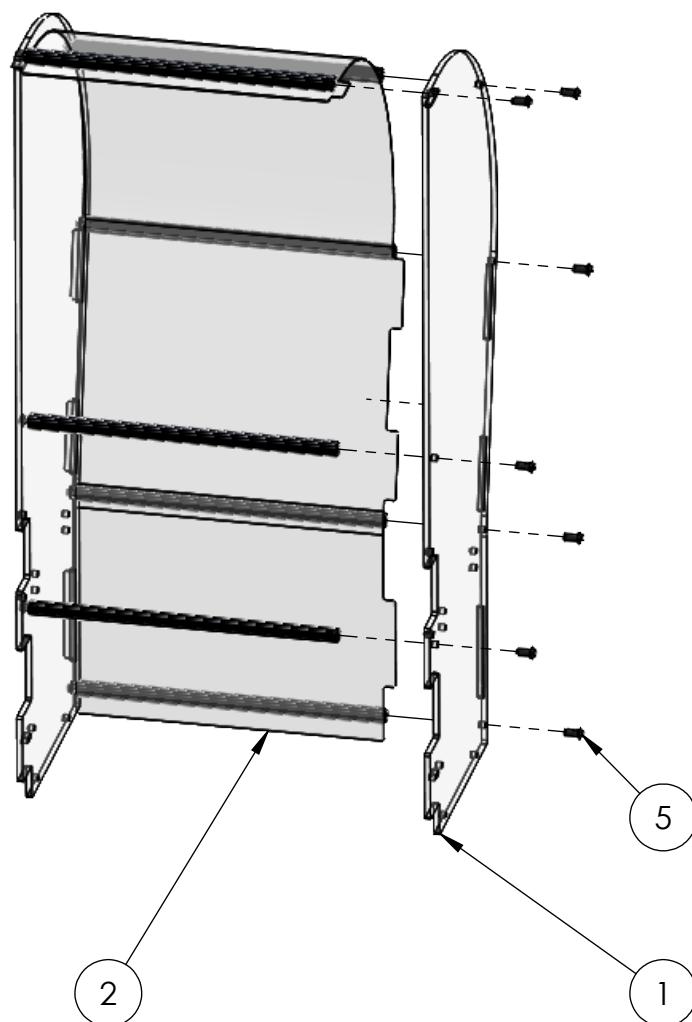
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		FINISH			
		NEXT ASSY	USED ON		
		APPLICATION	DO NOT SCALE DRAWING		
		SIZE	DWG. NO.	REV	
B	GE-20337				
SCALE: 1:6	WEIGHT:	SHEET 1 OF 2			



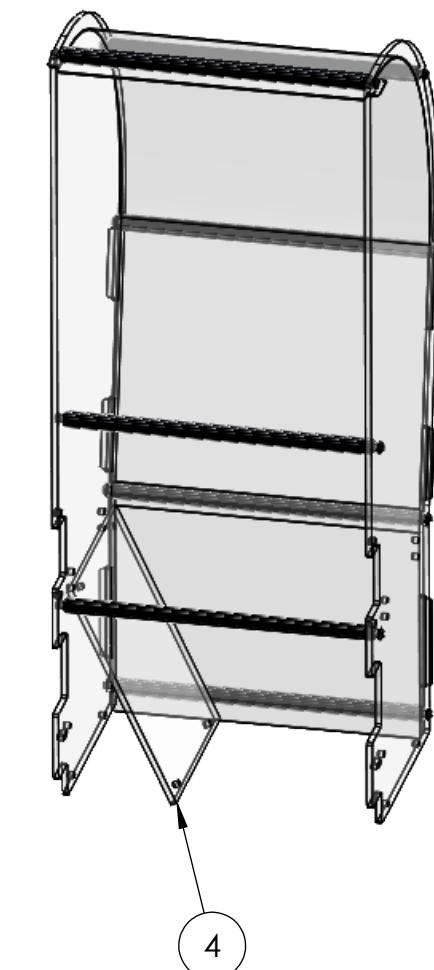
Notes:

1. Attach **(3)** (qty. 7) to **(1)** using **(5)** (qty. 7)



Notes:

1. Attach (2) to the assembly by bending and aligning the plastic tabs
 2. Attach (1) to the assembly, aligning with the tabs of (2). Bolt using (5) (qty. 7)



Notes:

1. Attach (4) to the assembly using 50 lb. cable ties.

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION  SOLIDWORKS <small>Modeling Solutions Partner</small>
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN			
			CHECKED			
			ENG APPR.			
			MFG APPR.			
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
		MATERIAL	COMMENTS:			
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING	SCALE: 1:8	WEIGHT:	SHEET 2 OF 2	

4

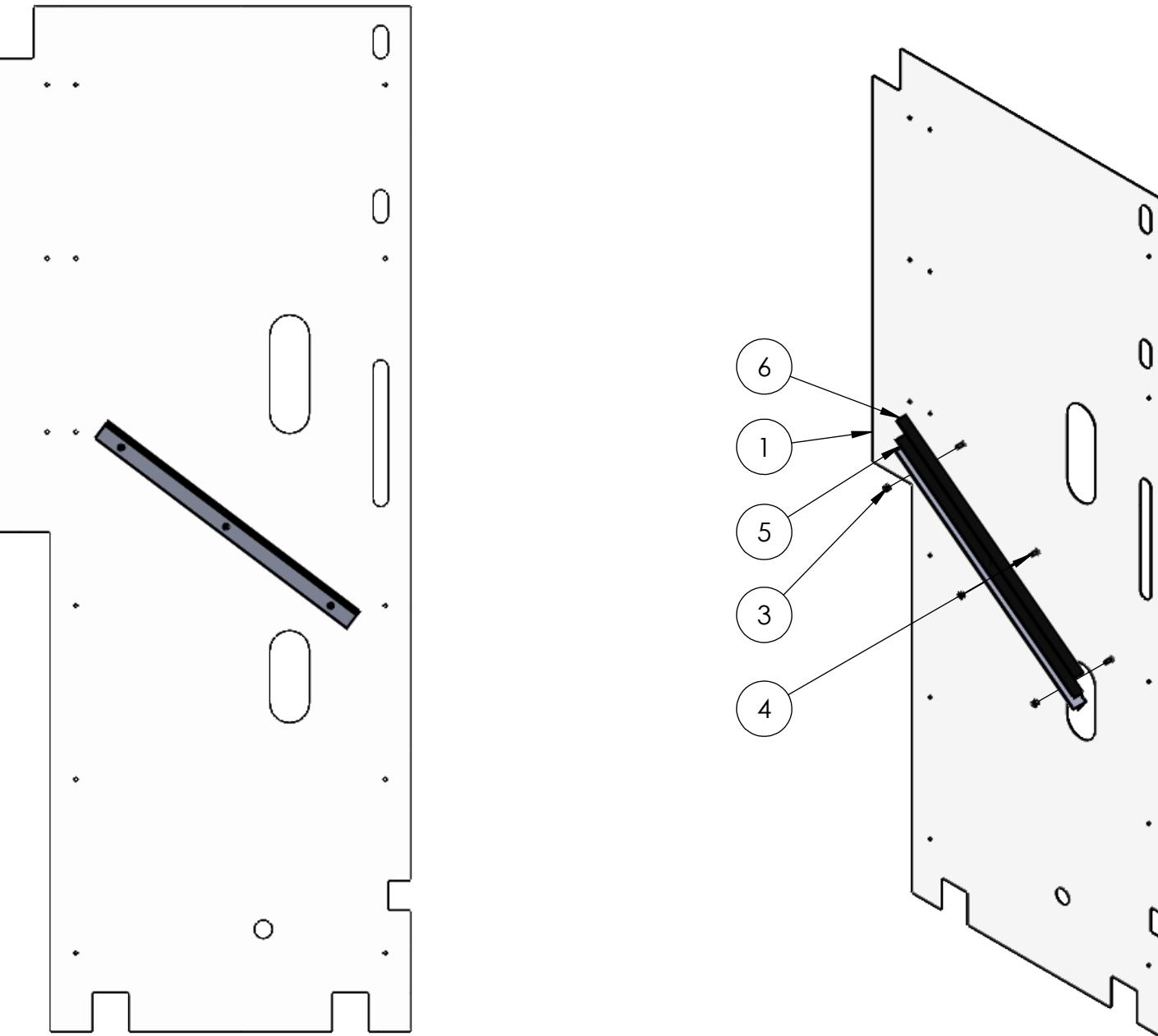
3

2

1

B

B



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20315	Power Port Base Side Polycarbonate	1
2	GE-20325	Angle, Side Polycarbonate	1
3	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	3
4	round_hex_.25_20_.62 5_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	3
5	Hook_1_24	1"x 24" Hook, Adhesive backed	1
6	Loop_1_24	1" x 24" Loop, Adhesive backed	1

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV		
B	GE-20338			
SCALE: 1:24	WEIGHT:	SHEET 1 OF 2		

4

3

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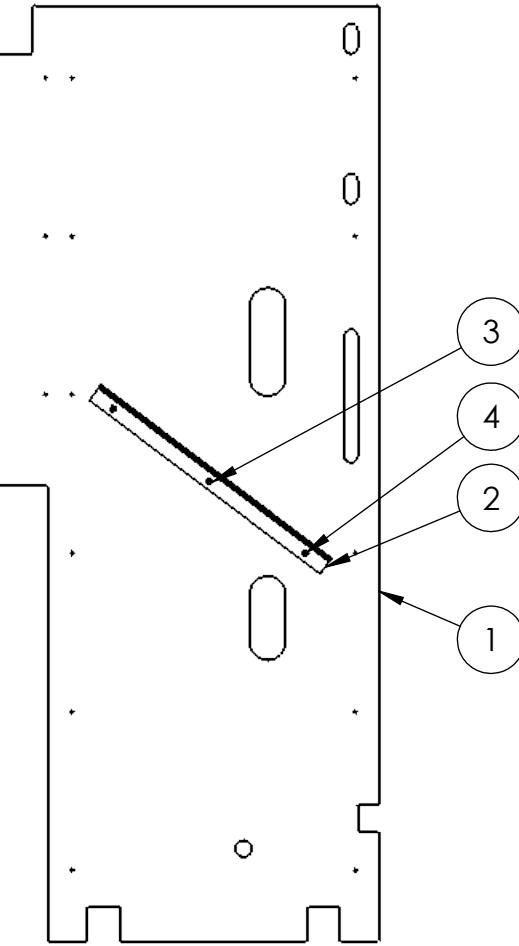
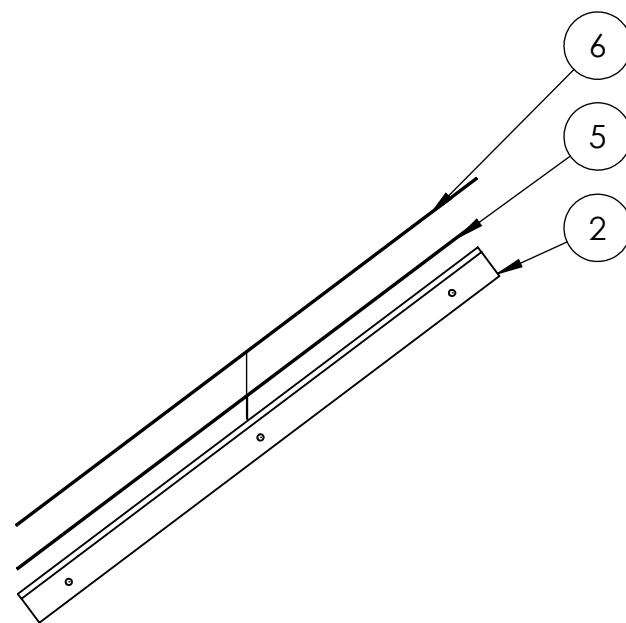
1

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1



Notes:

1. Clean and prep (2)
2. Attach (5) to (2) to the back without drilled holes.
3. Attach (6) to (5) leaving protective backing on.

Notes:

1. Remove protective plastic from (1).
2. Attach (2) to one in the orientation shown above.
3. Fasten with (3) and (4) in three locations.

4

3

2

1

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE:
Side Polycarbonate Assembly,
Right

SIZE DWG. NO. REV

B GE-20338

SCALE: 1:24 WEIGHT: SHEET 2 OF 2

4

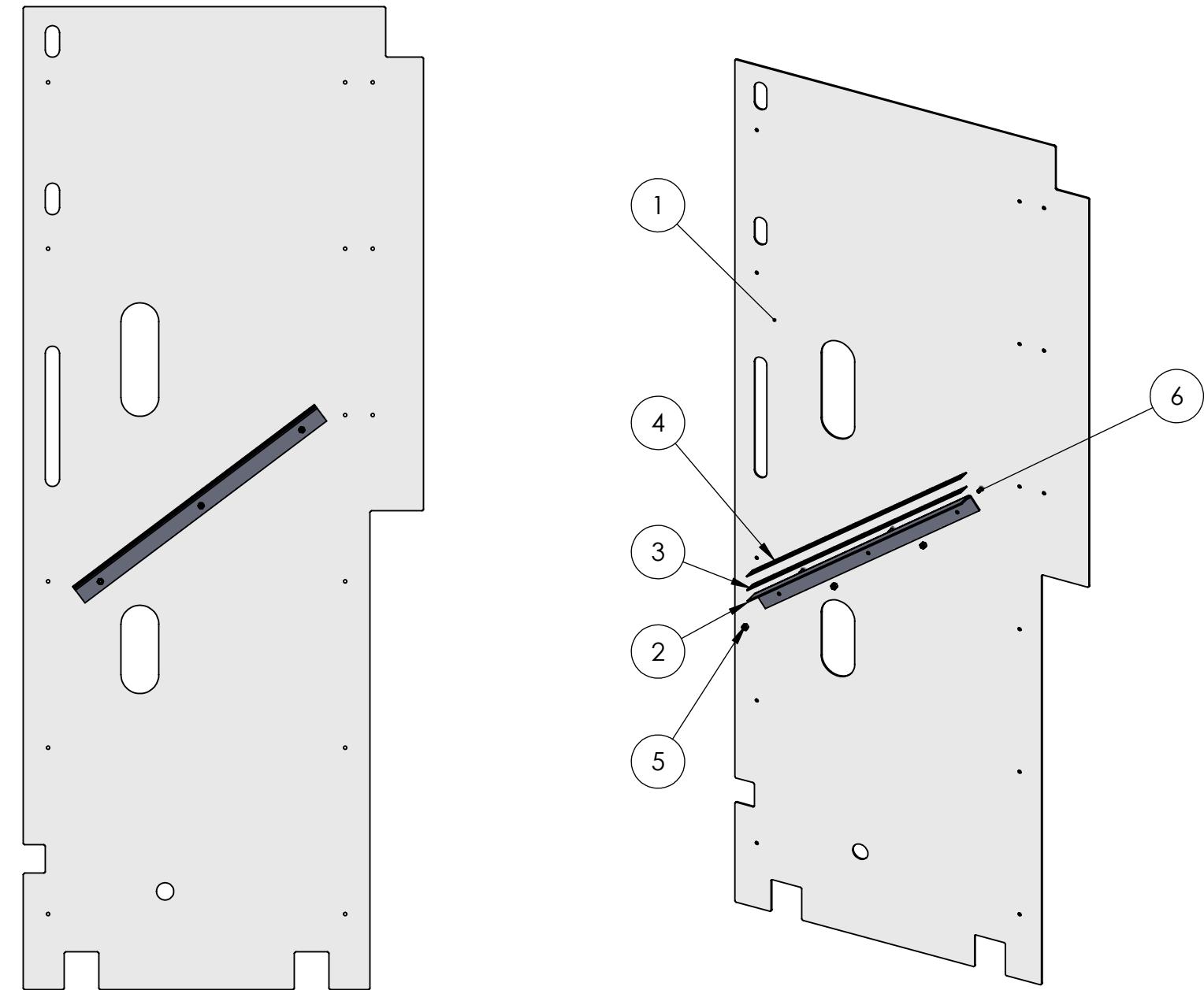
3

2

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B

B



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20315	Power Port Base Side Polycarbonate	1
2	GE-20325	Angle, Side Polycarbonate	1
3	Hook_1_24	1"x 24" Hook, Adhesive backed	1
4	Loop_1_24	1" x 24" Loop, Adhesive backed	1
5	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	3
6	round_hex_.25_20_.62	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	3

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV		
B	GE-20339			
SCALE: 1:12	WEIGHT:	SHEET 1 OF 2		

4

3

2

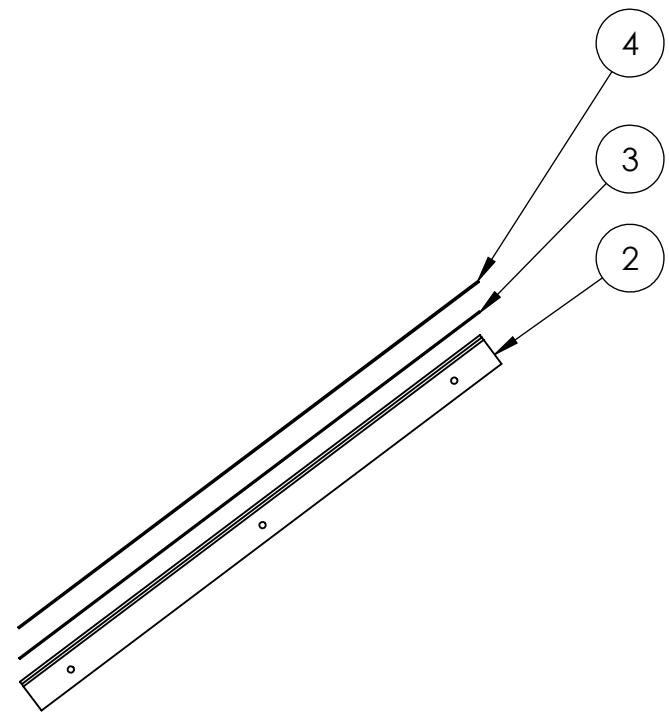
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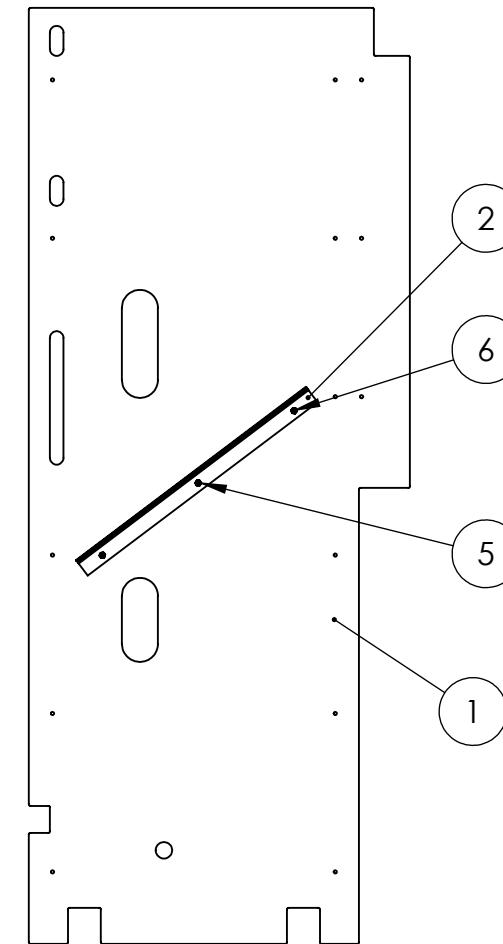
2

1



Notes:

1. Clean and prep **(2)**.
2. Attach **(3)** to **(2)** to the face without holes.
3. Attach **(4)** to **(3)**, but leave the protective backing on.



Notes:

1. Remove protective plastic from **(1)**.
2. Attach **(2)** to the plastic in the orientation shown.
3. Fasten with **(6)** and **(5)** in three locations.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
MATERIAL				
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Side Polycarbonate Assembly, Left

B	GE-20339	REV
SCALE: 1:24	WEIGHT:	SHEET 2 OF 2

4

3

2

1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20341	Floor, Outer Port Serializer	1
2	GE-20342	Side Plate, Outer Port Serializer	4
3	GE-20343	Top Plate, Outer Port Serializer	1
4	GE-20344	Hinge, Outer Port Serializer	1
5	GE-20345	Paddle, Outer Port Serializer	1
6	GE-20346	Angle, Outer Port Serializer	1
7	GE-20347	Foot, Outer Port Serializer	1
8	GE-20348	Ramp, Outer Port Serializer	2
9	GE-20349	Motor Mount, Outer Port Serializer	1
10	GE-20364	Igus Bearing	2
11	GE-20370	Counter Assembly	2
12	GE-20381	NeverRest 60	1
13	GE-20382	Hub	1
14	GE-20384	L Bracket	2
15	GE-20385	Spacer	3
16	GE-20399	Cover, Outer Port Serializer	1
17	Clamp_4hole	4 Hole Clamp, TCH: 504-1700800	15
18	CUP POINT SET SCREW 10-24_.50	Cup Point Set Screw 10-24	1
19	hex_.25_20_1.25	Hex Head Bolt, 1/4-20 x 1.25", Steel	2
20	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	4
21	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	80
22	round_hex_.25_20_.625_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	2
23	socket_hex_3mm_14mm	Socket Head Screw, 3mm x .5mm x 14mm	6
24	threaded_rod_.25_20_4	Threaded Rod, 1/4-20 x 4"	1

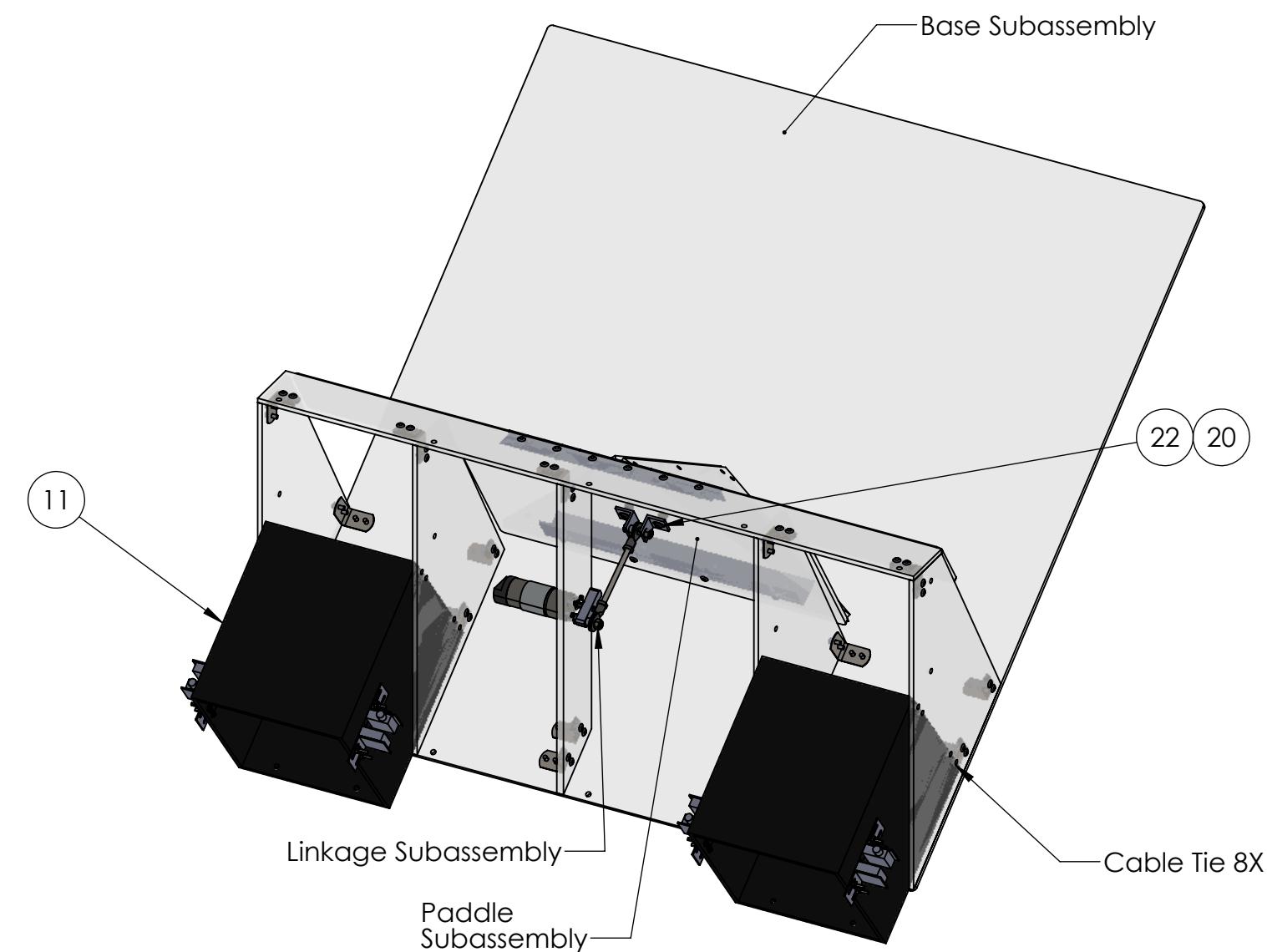
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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:8		WEIGHT:	SHEET 1 OF 2	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Outer Port Serializer

B **GE-20340**

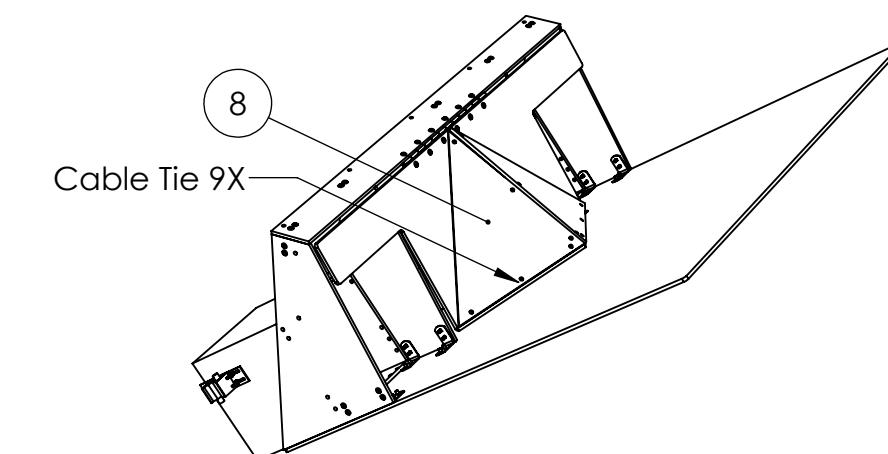
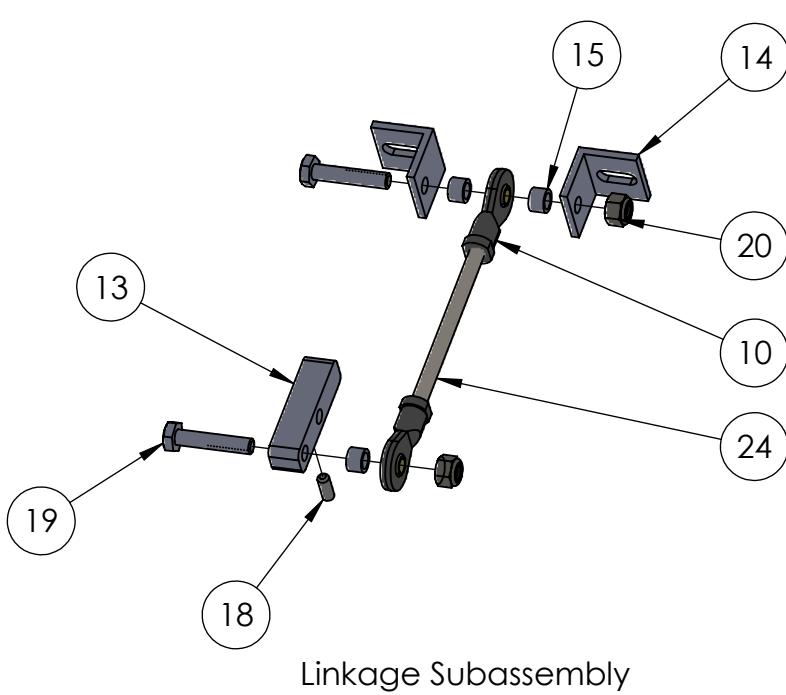
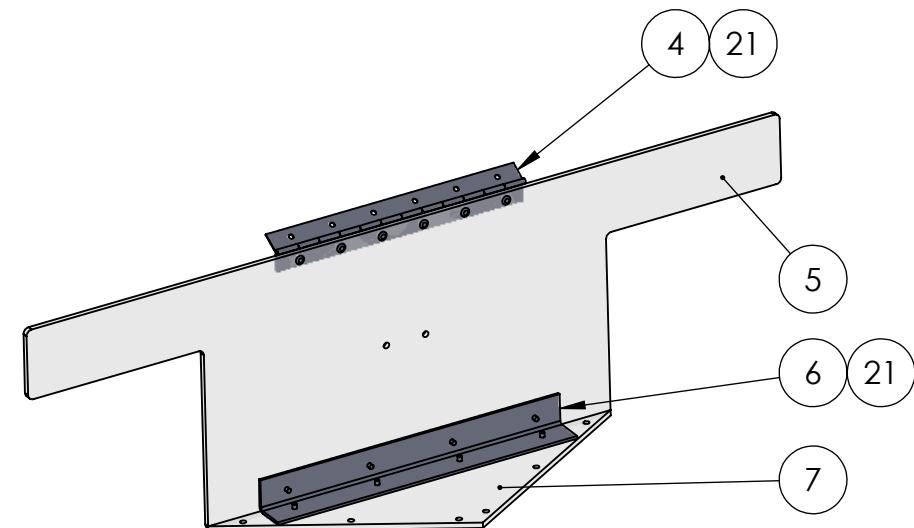
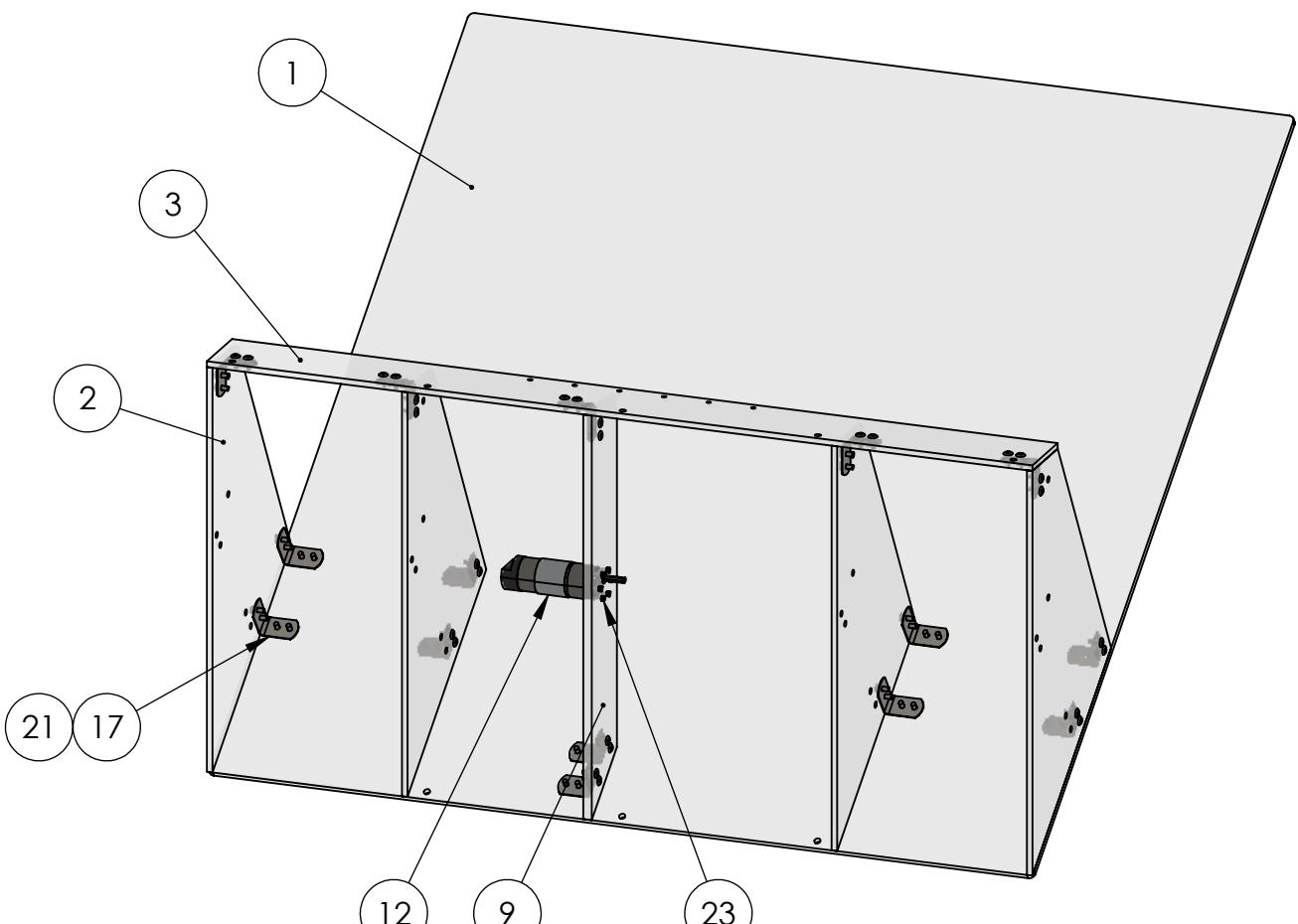


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	DRAWN		
	CHECKED		
	ENG APPR.		
	MFG APPR.		
	Q.A.		
	COMMENTS:		
NEXT ASSY	MATERIAL		
USED ON	FINISH		
APPLICATION	DO NOT SCALE DRAWING		
SCALE: 1:12			WEIGHT:
SHEET 2 OF 2			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Outer Port Serializer

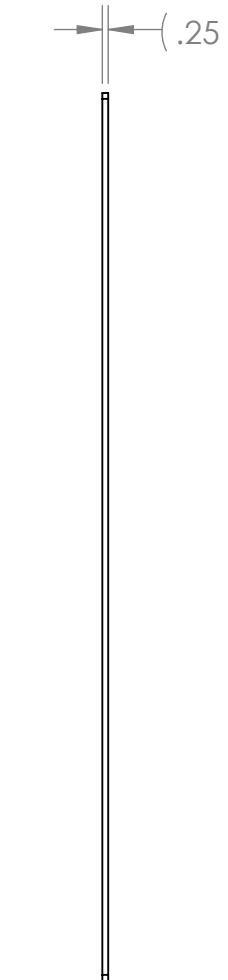
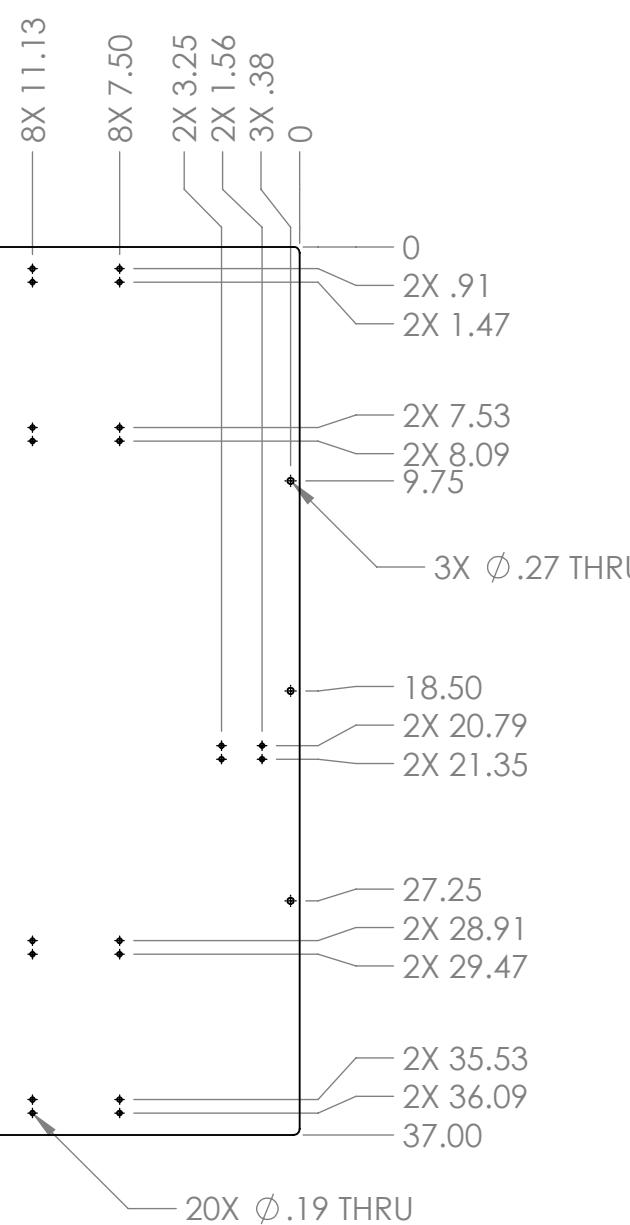
SIZE DWG. NO. REV
B GE-20340

4

39.00

B

4X R.25



- Notes:
1. Material: 1/4" clear polycarbonate.
 2. Remove all burrs and sharp edges.
 3. Label or tag with part number.

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		TOLERANCES:		
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		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
		TWO PLACE DECIMAL $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY		FINISH		
APPLICATION		DO NOT SCALE DRAWING		
TITLE:		FIRST ROBOTICS COMPETITION		
B		SOLIDWORKS Modeling Solutions Partner		
SIZE		DWG. NO.		
GE-20341		REV		
SCALE: 1:8		WEIGHT:		
SHEET 1 OF 1				

4

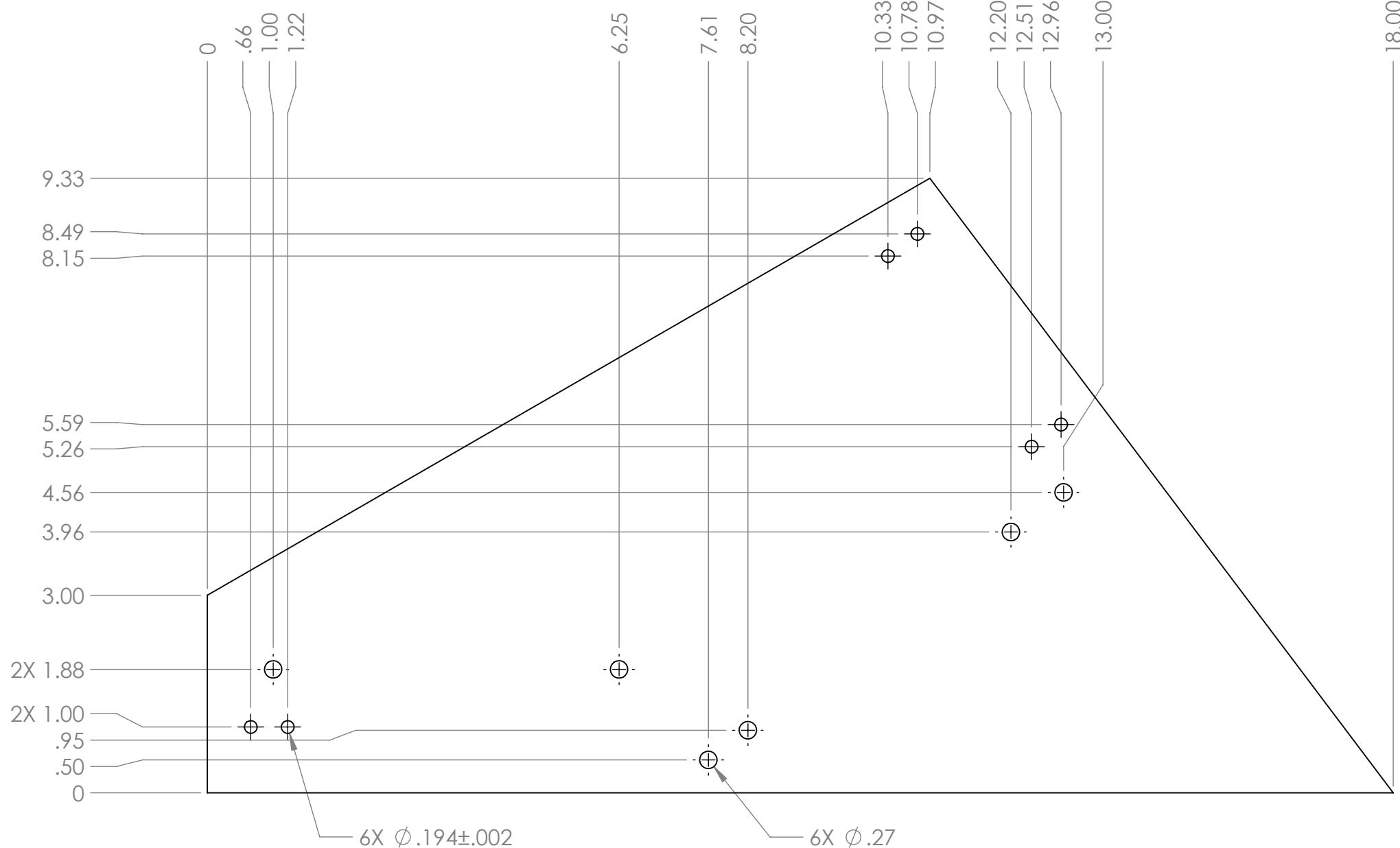
3

2

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B

B



- Notes:
1. Material: 1/4" Clear Polycarbonate.
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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		INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.	COMMENTS:		
NEXT ASSY	USED ON	MATERIAL					
APPLICATION	FINISH						
	DO NOT SCALE DRAWING						
FIRST ROBOTICS COMPETITION	SOLIDWORKS						
TITLE: Side Plate, Outer Port Serializer							
SIZE	DWG. NO.						
B	GE-20342						
SCALE: 1:2	WEIGHT:						
SHEET 1 OF 1							

4

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4

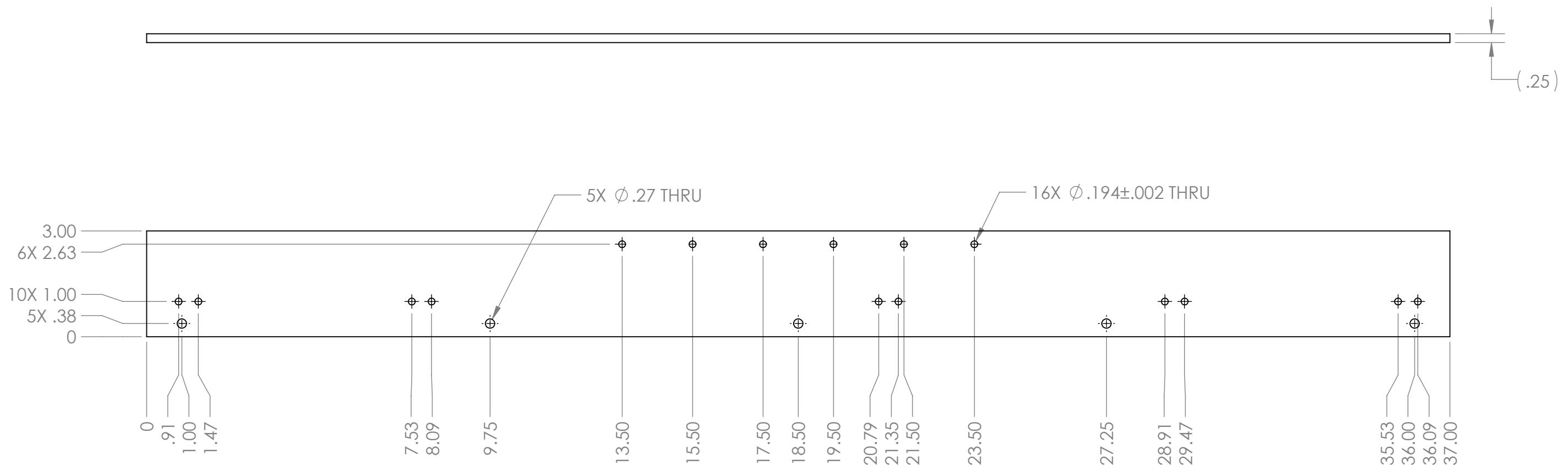
3

2

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B

B



NOTES:

1. Material: 1/4" Clear Polycarbonate.
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		CHECKED		
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		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.		REV	
B	GE-20343			
SCALE: 1:3	WEIGHT:		SHEET 1 OF 1	

4

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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

**Top Plate, Outer
Port Serializer**

4

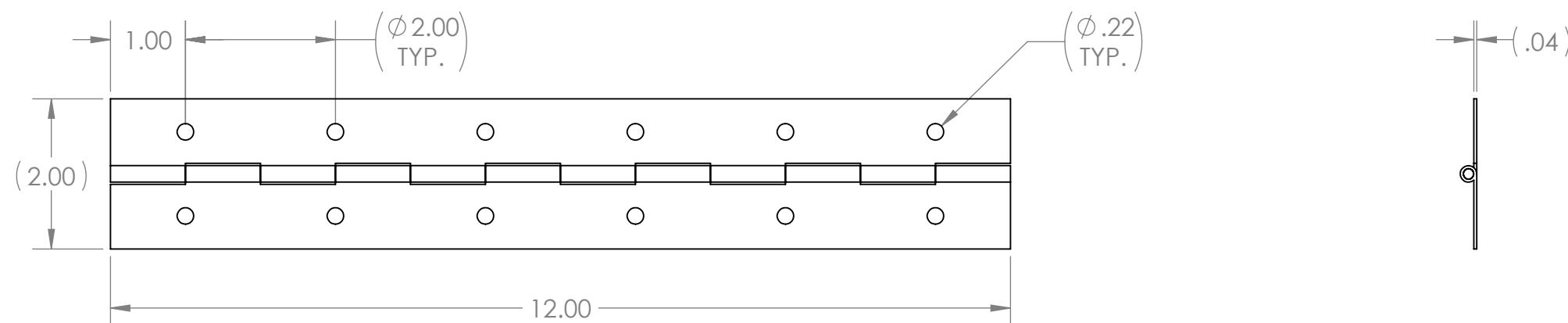
3

2

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B

B



Notes:

1. Make from commercial part:
Vendor: TCH
Website: TCHWEB.com
SKU #: 505-1965801
Description: STEEL CONTINUOUS HINGE - 0.04" X 2.0" X 72"
WITH NICKEL PLATE & MOUNTING HOLES
2. Bar or tag with part number.
3. Remove burrs and sharp edges.

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN		
TOLERANCES:			CHECKED		
FRACTIONAL: ±1/16			ENG APPR.		
ANGULAR: MACH ±1° BEND ±1°			MFG APPR.		
TWO PLACE DECIMAL ±.01			Q.A.		
THREE PLACE DECIMAL ±.001			COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Hinge, Outer Port Serializer

SIZE	DWG. NO.	REV
B	GE-20344	
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1

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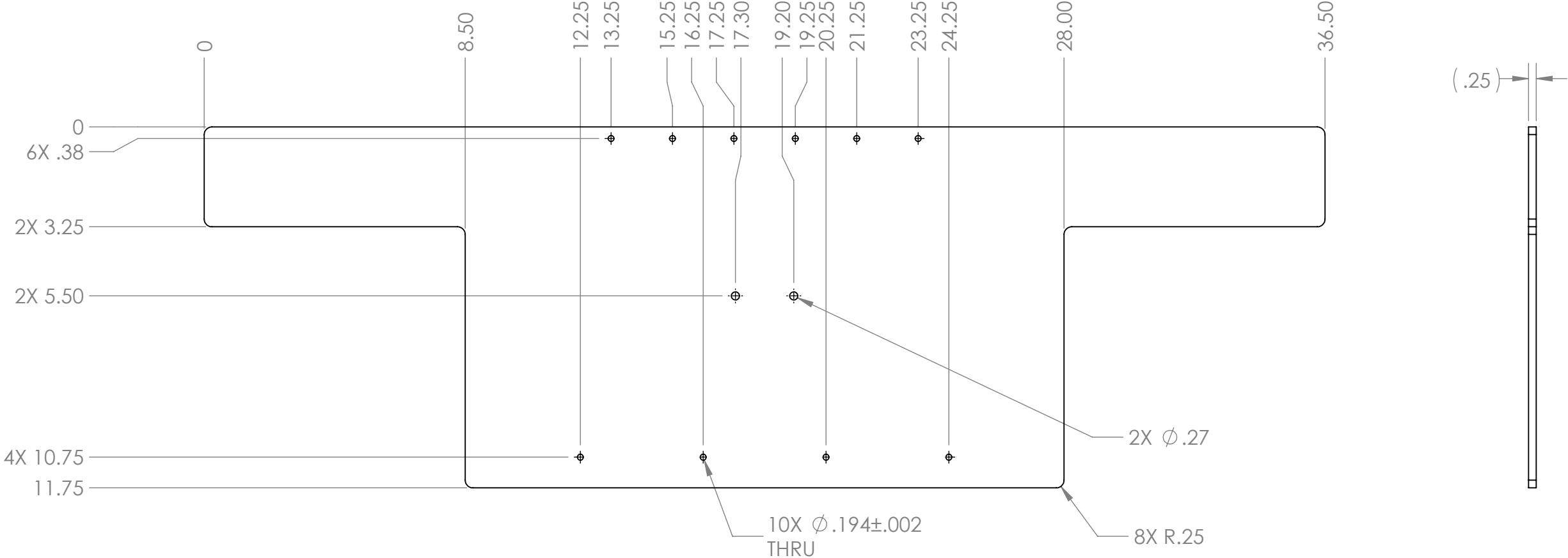
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2

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B

B



A

A

Notes:

1. Material: 1/4" Clear Polycarbonate.
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.		REV	
B	GE-20345			
SCALE: 1:4	WEIGHT:		SHEET 1 OF 1	

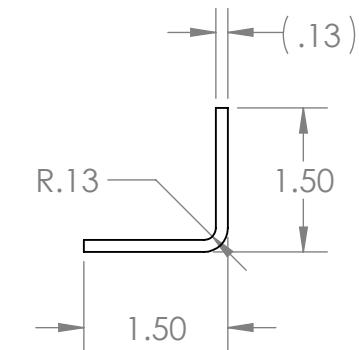
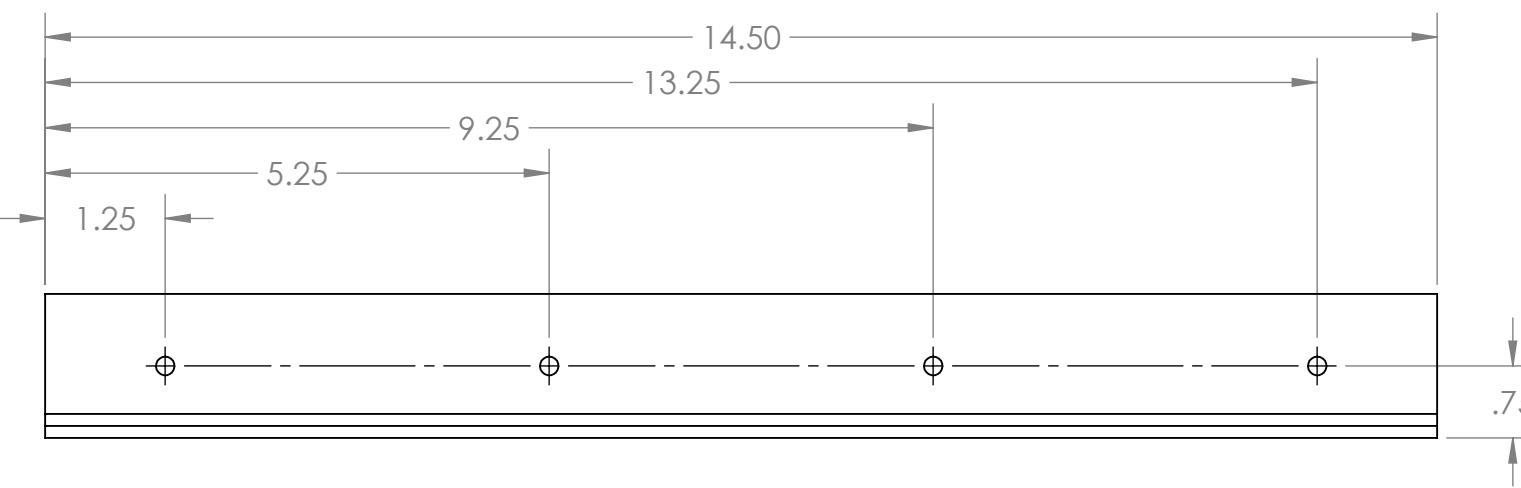
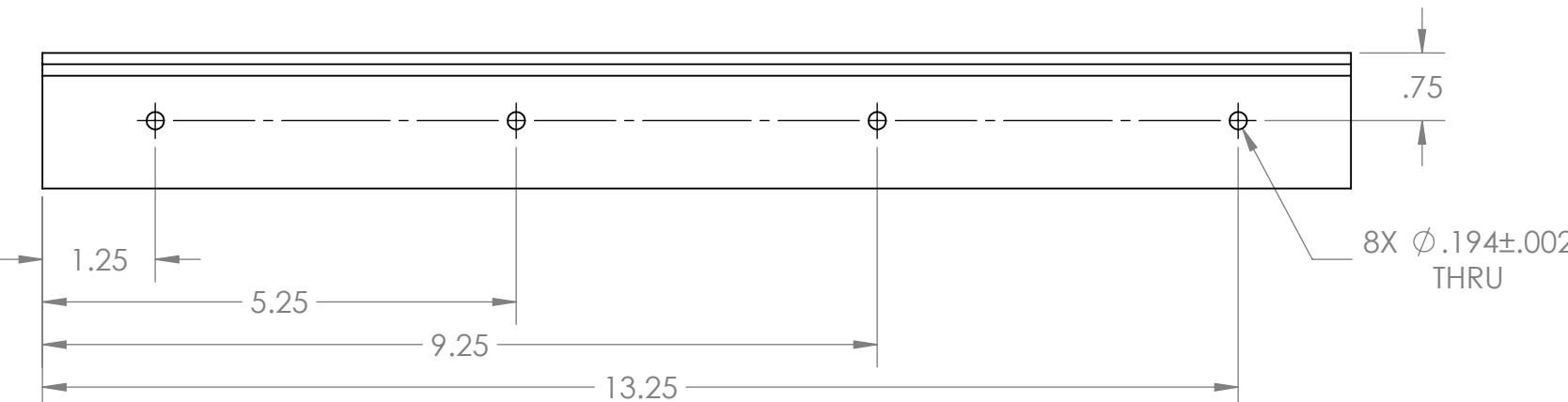
4

3

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B



A

Notes:

1. Material: 1/8" 5052 Aluminum sheet or similar.
2. Remove all burrs and sharp edges.
3. Bag or tag with part number.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		
SCALE: 1:2		WEIGHT:	SHEET 1 OF 1	
SIZE DWG. NO. B GE-20346		REV		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Title:
Angle, Outer Port Serializer

4

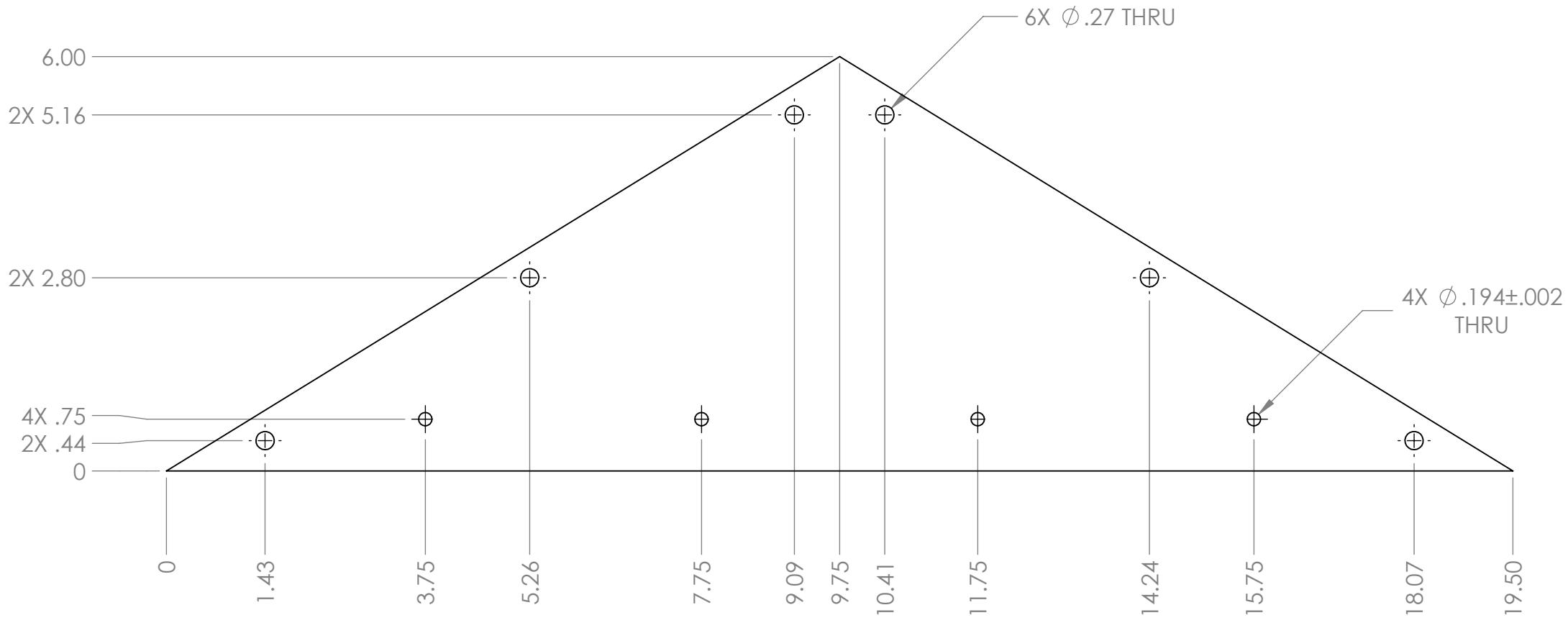
3

2

1

B

B



A

A

Notes:

1. Material: 1/4" Clear Polycarbonate
2. Remove all burrs and sharp edges.
3. Tag or label with part number,

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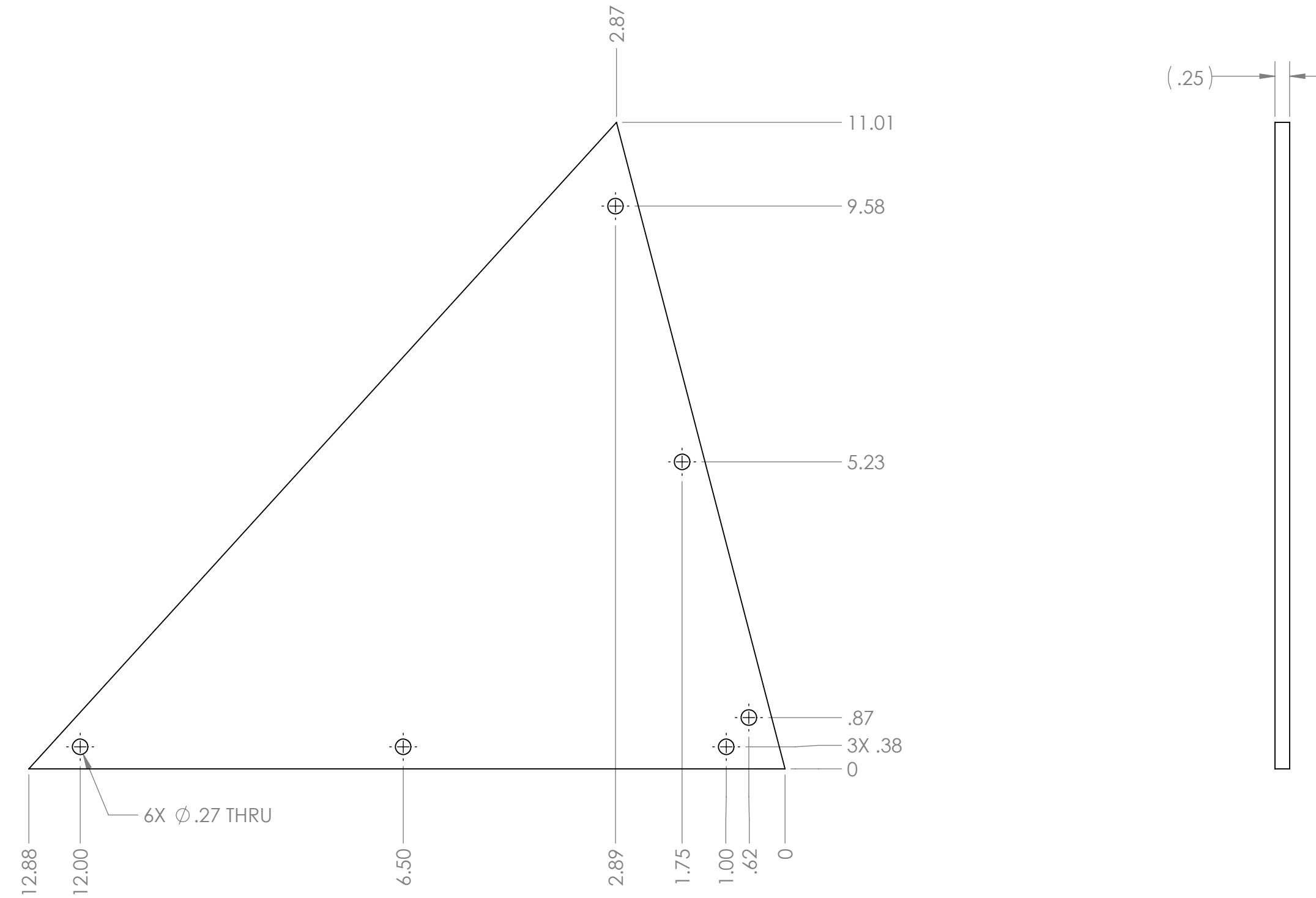
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20347			
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1		

4

3

2

1



NOTES:

1. Material: 1/4" Clear Polycarbonate
2. Remove all burrs and sharp edges.
3. Label or tag with part number.

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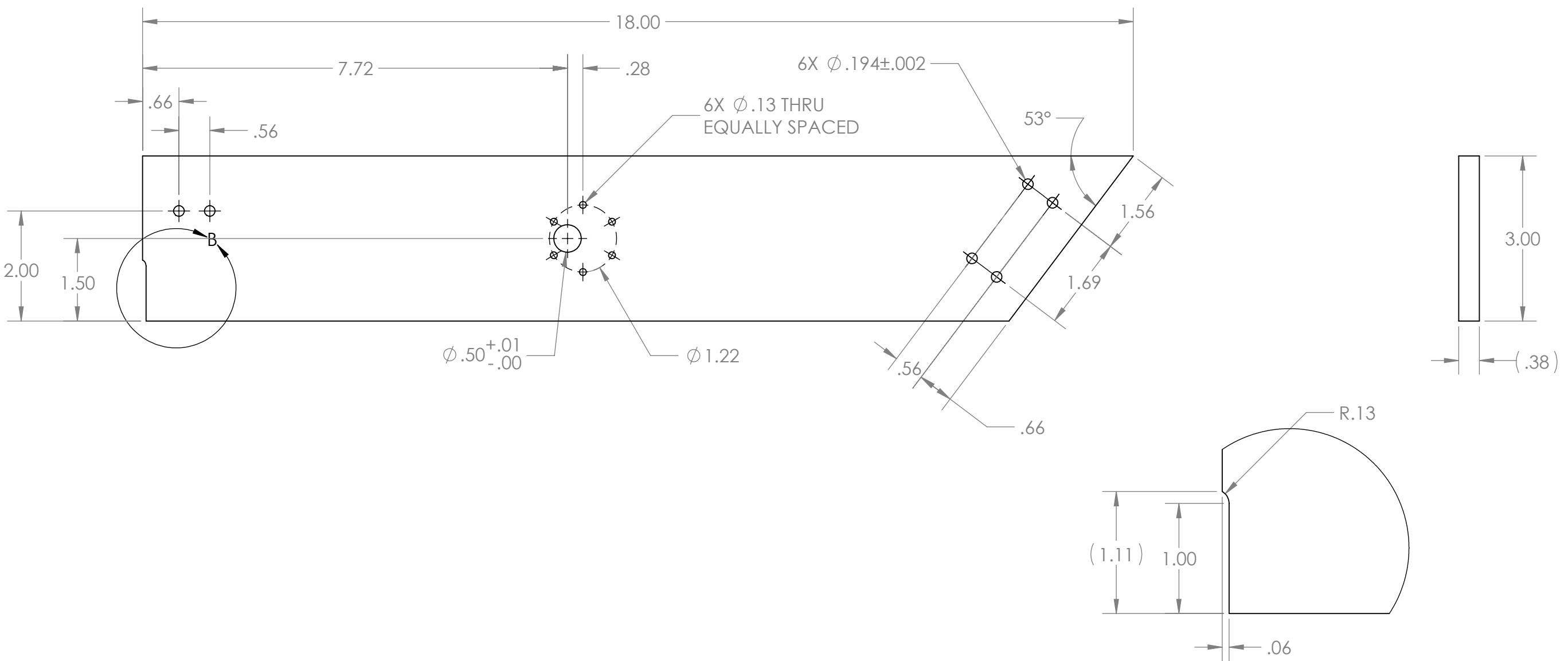
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: <h1>Ramp, Outer Port Serializer</h1>
		DIMENSIONS ARE IN INCHES	DRAWN				
		TOLERANCES:	CHECKED				
		FRACTIONAL $\pm 1/16$	ENG APPR.				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.				
		TWO PLACE DECIMAL $\pm .01$	Q.A.				
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:				
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					
				SCALE: 1:2	WEIGHT:	SHEET 1 OF 1	

4

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Notes:

1. Material: 3/8" Clear Polycarbonate
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001	DRAWN	NAME	DATE
			CHECKED		
			ENG APPR.		
			MFG APPR.		
			Q.A.		
			COMMENTS:		
			MATERIAL		
			FINISH		
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION

SOLIDWORKS

TITLE: Motor Mount, Outer Port Serializer

SIZE DWG. NO. REV
B GE-20349

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4

3

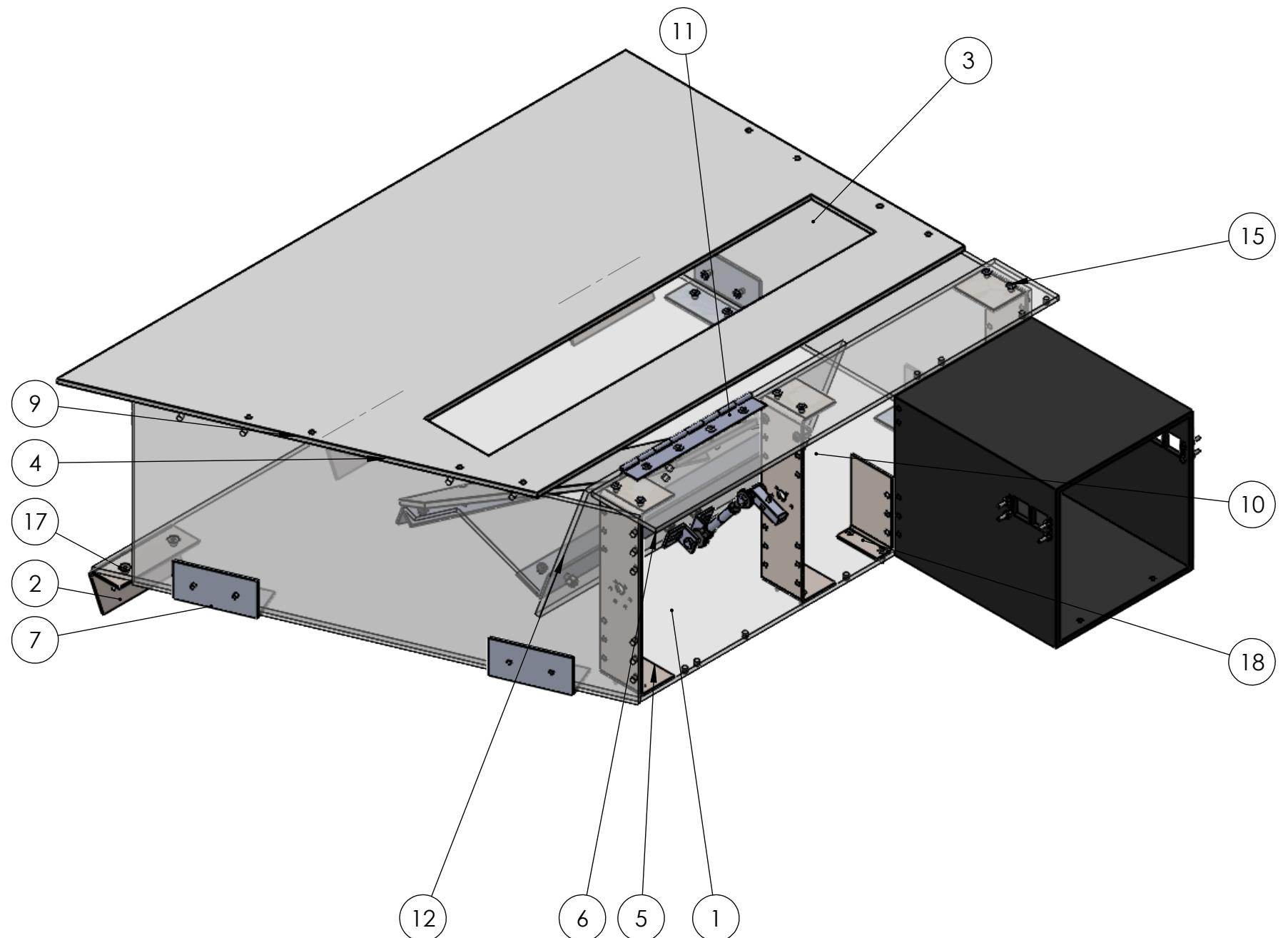
2

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B

B

ITEM NO.	PART NUMBER	DESCRIPTION	
1	GE-20351	1/4" Thick Polycarbonate Sheet	1
2	GE-20352	Sheet Metal Angle	3
3	GE-20356	Serializer Side Wall	1
4	GE-20357	Serializer Side Wall Angled	1
5	GE-20354	Serializer Bracket Support	2
6	GE-20355	Top Bracket	1
7	GE-20353	2 x 2 Aluminum Angle 6063	4
8	GE-20370	Counter Assembly	1
9	GE-20365	1/4" Thick Polycarbonate Sheet	1
10	GE-20380	NeverRest Assembly	1
11	GE-20358	Steel Continuous Hinge, Nickel (6' lengths) TCH 505-1965801	1
12	GE-20360	Pusher Assembly	1
13	round_hex_.25_20_.75_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 3/4" long, fully threaded	2
14	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	10
15	rivet_.1875_.251-.375	3/16" Aluminum Rivet, .251-.375 Grip Range	38
16	round_hex_.25_20_.62_5_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 5/8" long, fully threaded	2
17	Flat Hex .25_20_.75	Flat Hex .25_20_.75	6
18	GE-20373	Counter Box Side Bracket	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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
DRAWN				
CHECKED				
ENG APPR.				
MFG APPR.				
Q.A.				
COMMENTS:				
NEXT ASSY	USED ON	INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		
APPLICATION	FINISH			
DO NOT SCALE DRAWING				
SIZE	DWG. NO.		REV	
B	GE-20350			
SCALE: 1:6	WEIGHT:	SHEET 1 OF 4		

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

TITLE:
**Plastic Serializer
Assembly**

4

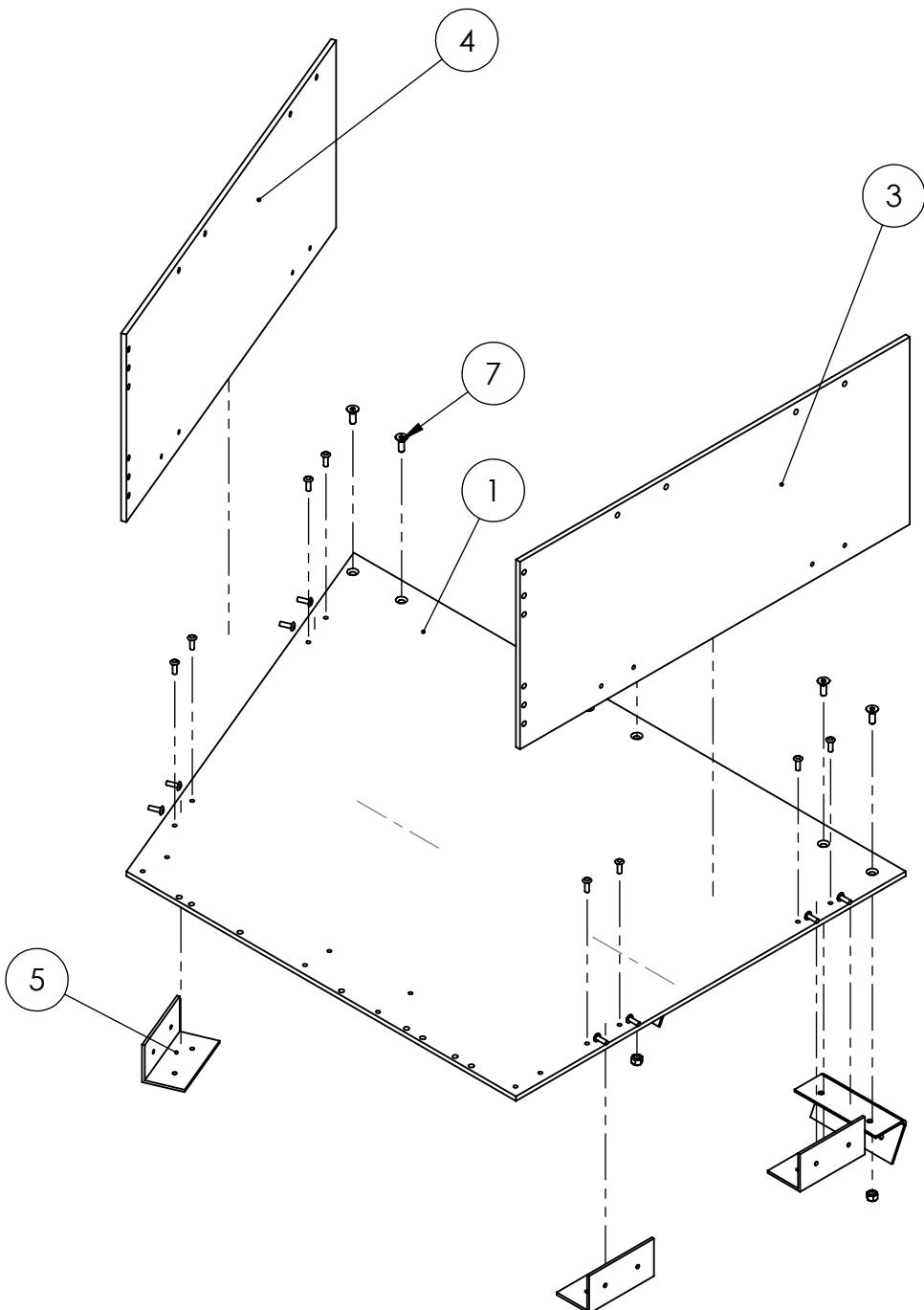
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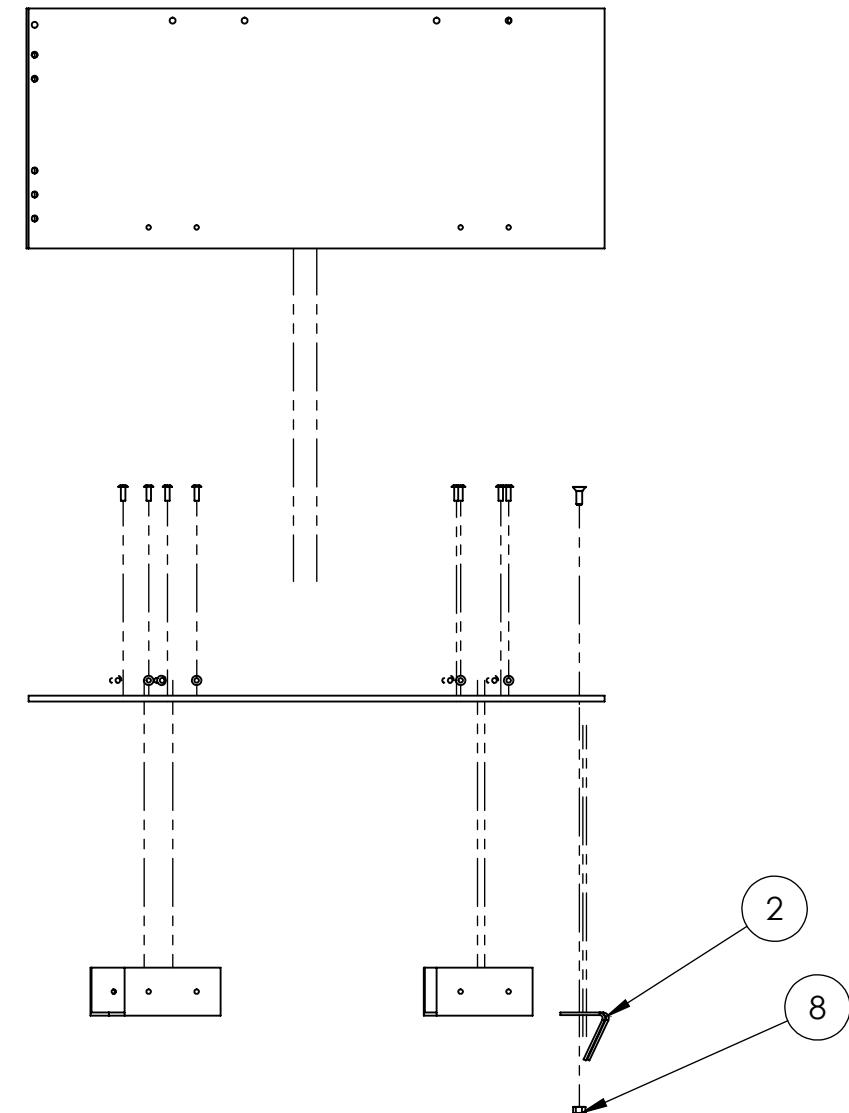
B

B



Note: Place Item 2 (QTY:4) in four places
Place Item 5 (QTY:4) in four places

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Notes:
Attach Item 2 6 places

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL: ±1/16		ENG APPR.	
		ANGULAR: MACH ±1° BEND ±1°		MFG APPR.	
		TWO PLACE DECIMAL ±.01		Q.A.	
		THREE PLACE DECIMAL ±.001		COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
	NEXT ASSY	USED ON	FINISH		
	APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Plastic Serializer Assembly

SIZE	DWG. NO.	REV
B	GE-20350	
SCALE: 1:8	WEIGHT:	SHEET 2 OF 4

4

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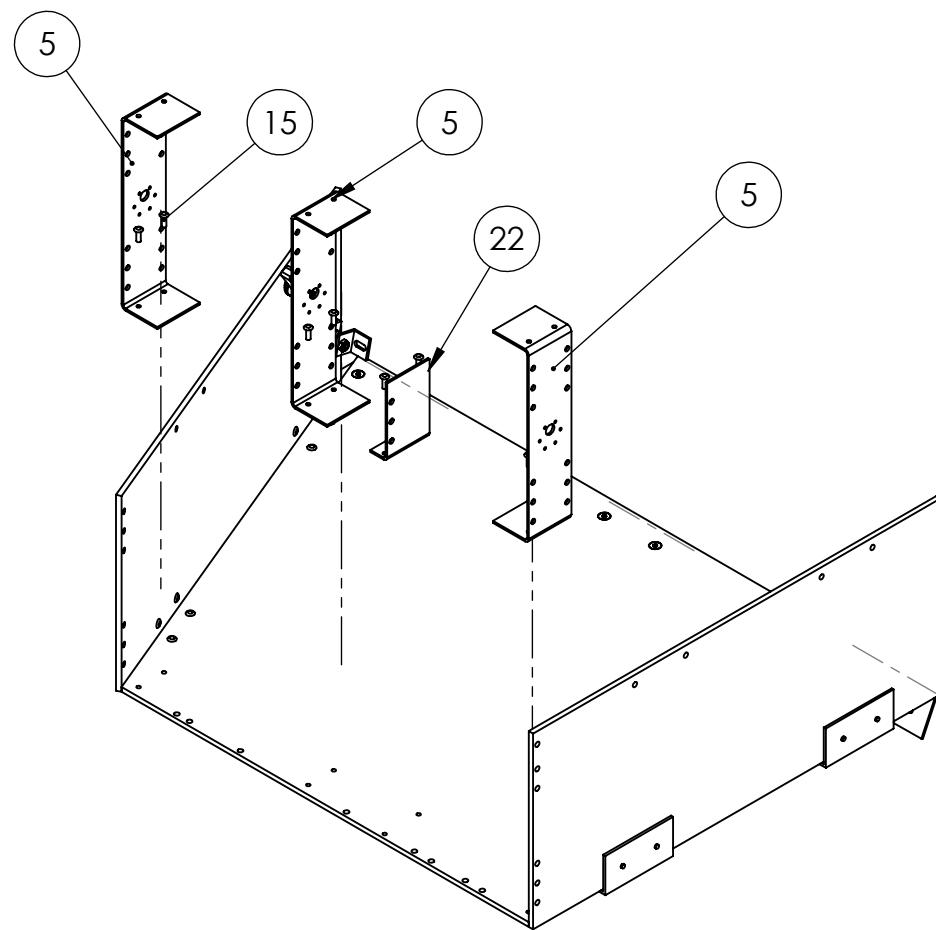
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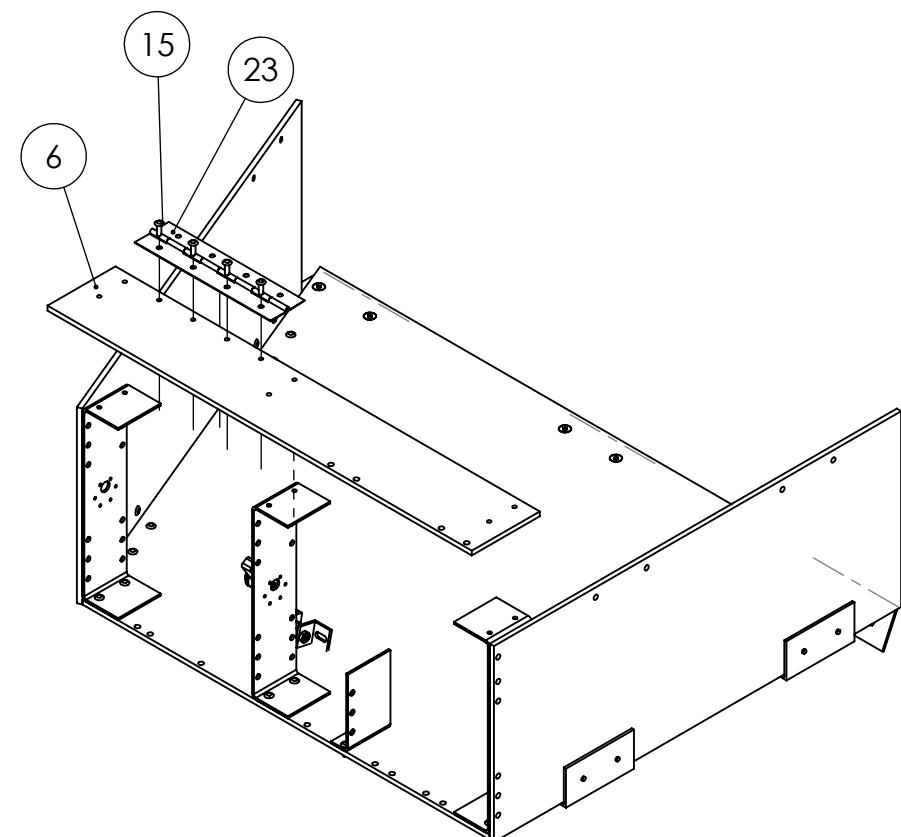
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Notes:
Attach Item 5 and 21 with Item 15



Notes:
Attach Item 6 and 22 with Item 15

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner
TITLE: Plastic Serializer Assembly
SIZE **B** DWG. NO. **GE-20350** REV
SCALE: 1:8 WEIGHT: SHEET 3 OF 4

4

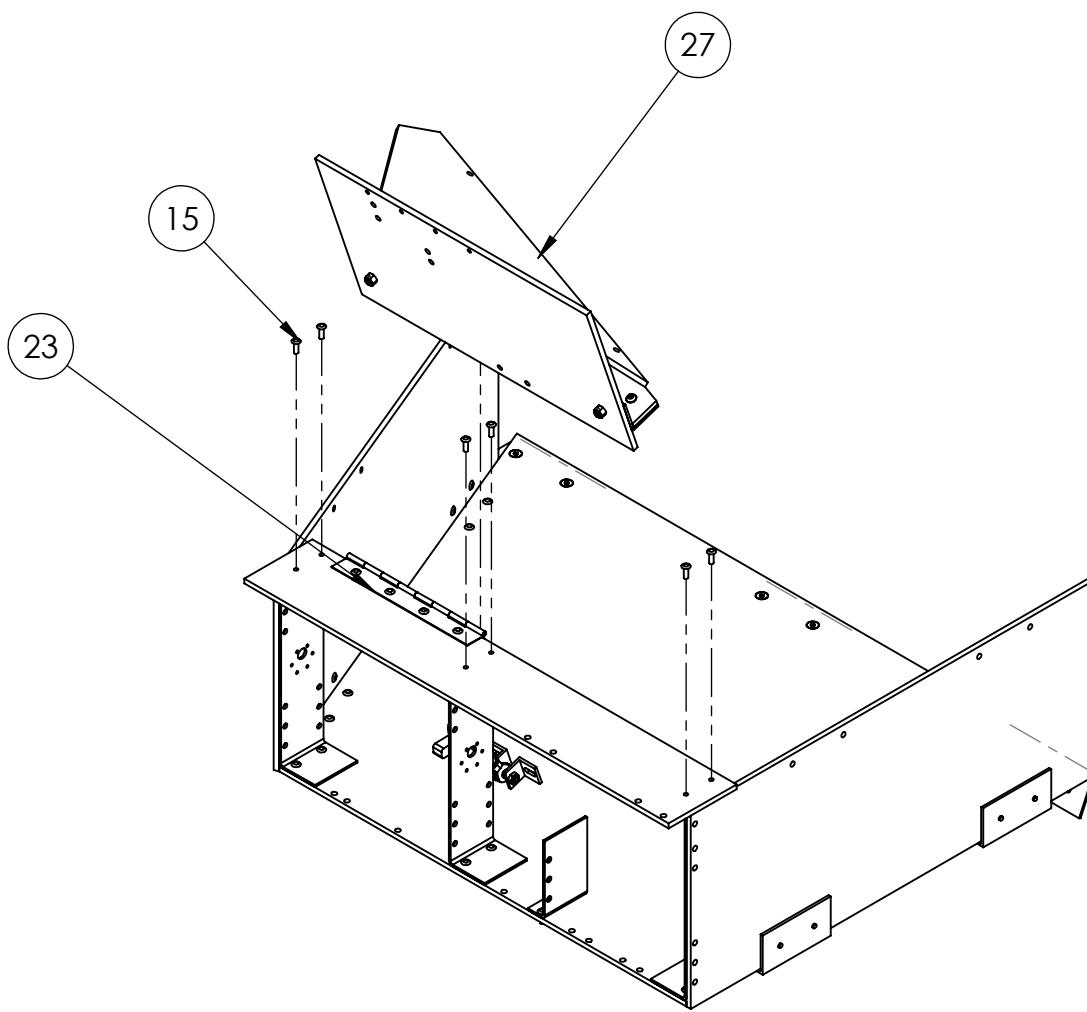
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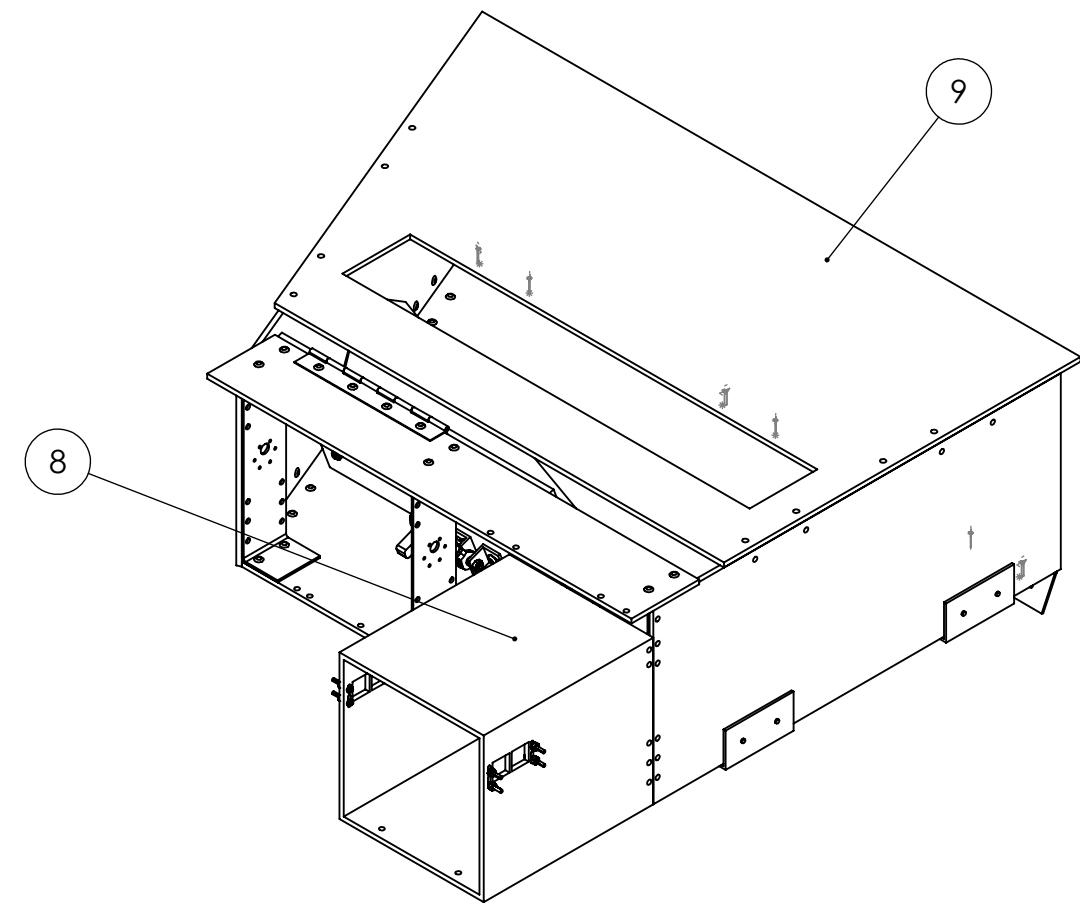
1

B

B



Note:
Attach item 27 and 23 using item 15



Note:
Attach item 9 and 8 using cable ties

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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST
ROBOTICS
COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Plastic Serializer
Assembly

B **GE-20350**

SIZE DWG. NO. REV
SCALE: 1:8 WEIGHT: SHEET 4 OF 4

4

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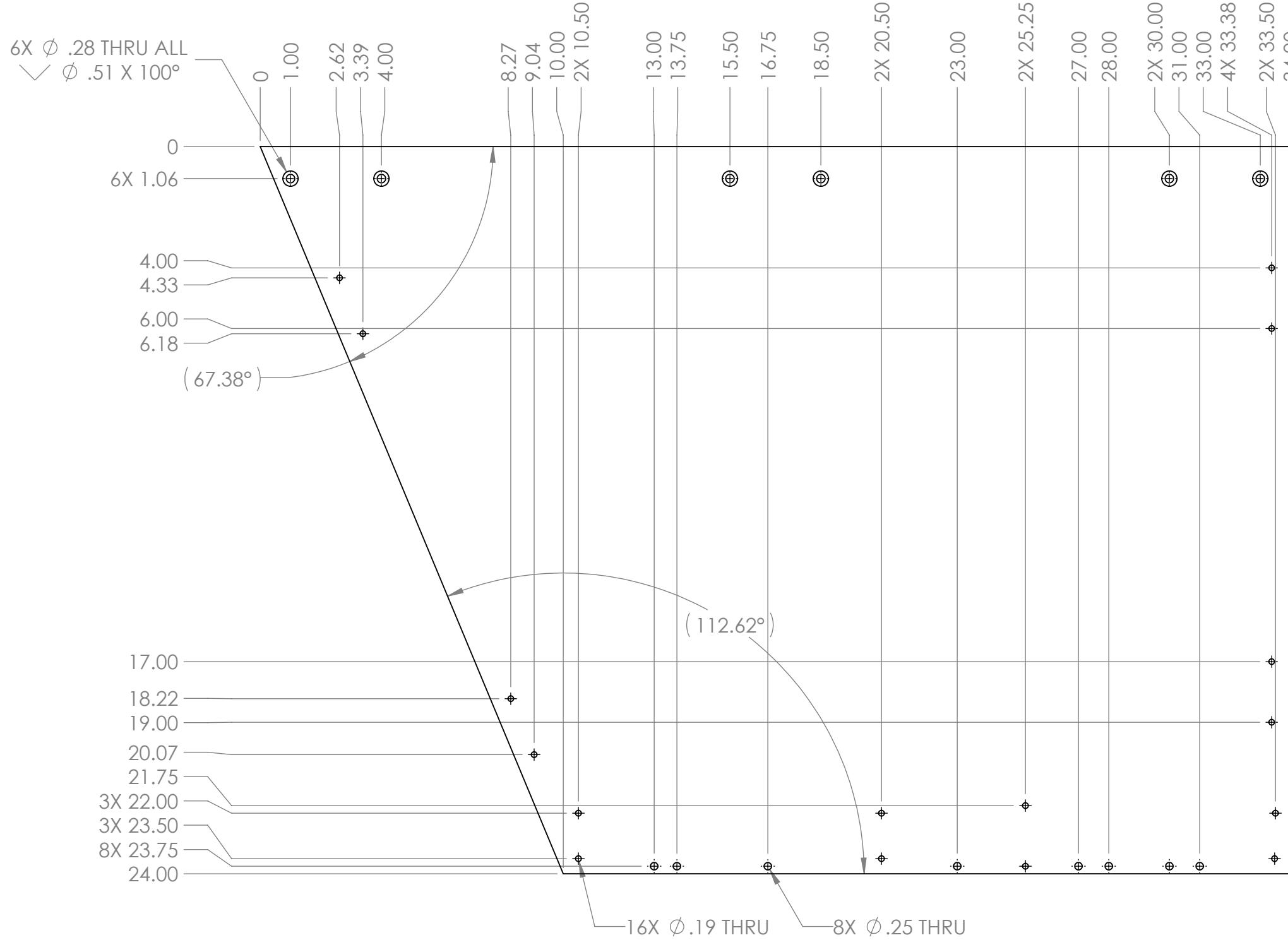
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A



Notes:
 1. Material 1/4" Thick Polycarbonate Sheet, Clear
 2. Remove Sharp Edges and Burrs
 3. Tag or Label with Part Number

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		UNLESS OTHERWISE SPECIFIED:			NAME	DATE	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.01 THREE PLACE DECIMAL ±.001					
		INTERPRET GEOMETRIC TOLERANCING PER:			Q.A.	COMMENTS:	
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
		APPLICATION	DO NOT SCALE DRAWING				
FIRST ROBOTICS COMPETITION	SOLIDWORKS	Modeling Solutions Partner					
TITLE: 1/4" Thick Polycarbonate Sheet							
SIZE	DWG. NO.	REV					
B	GE-20351						
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1					

4

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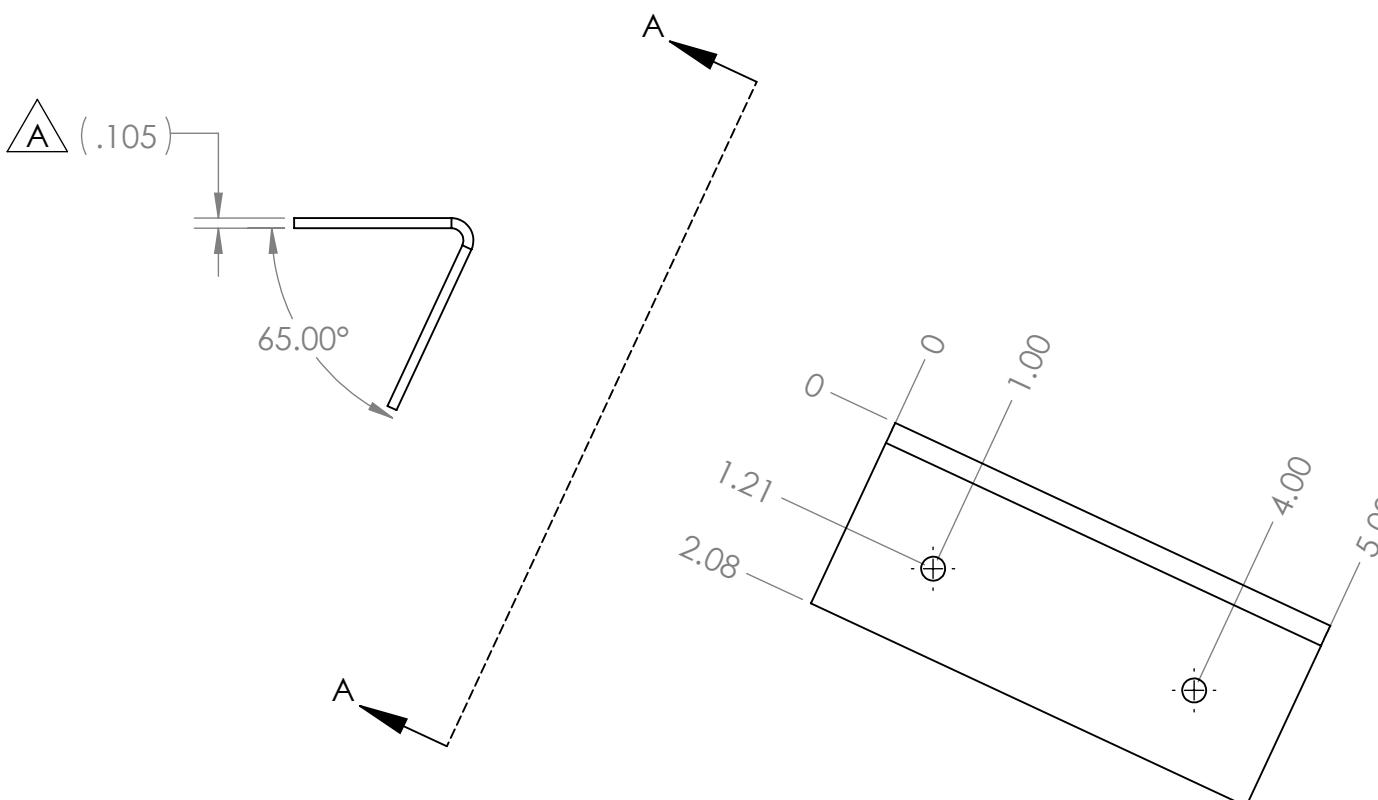
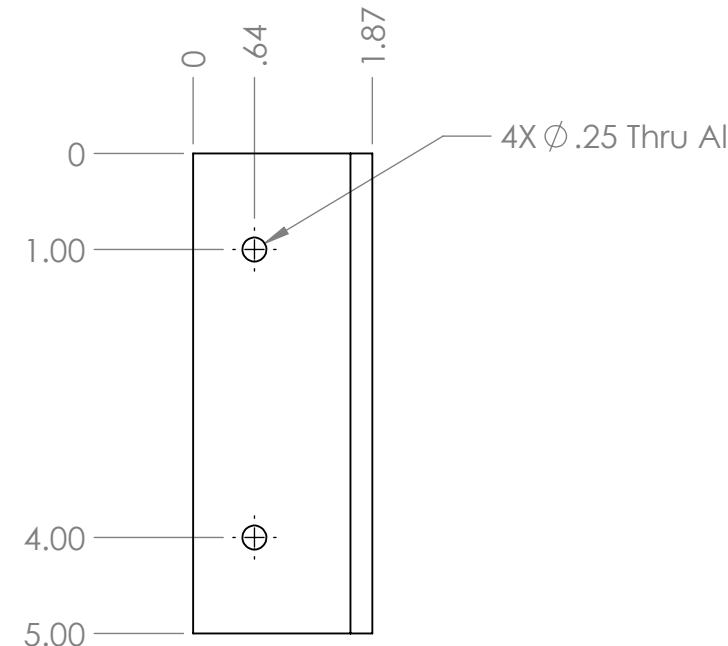
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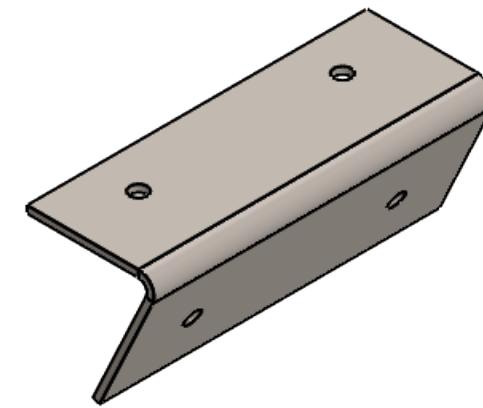


- Note:
1. Material: 12 GA Plated Sheet
 2. Remove Sharp edges and burrs
 3. Label and Tag with part number

VIEW A-A

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B4	A	12 Gage Steel Thickness updated	11/1/2019	MXS



		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Sheet Metal Angle

SIZE DWG. NO. REV
B GE-20352 A

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4

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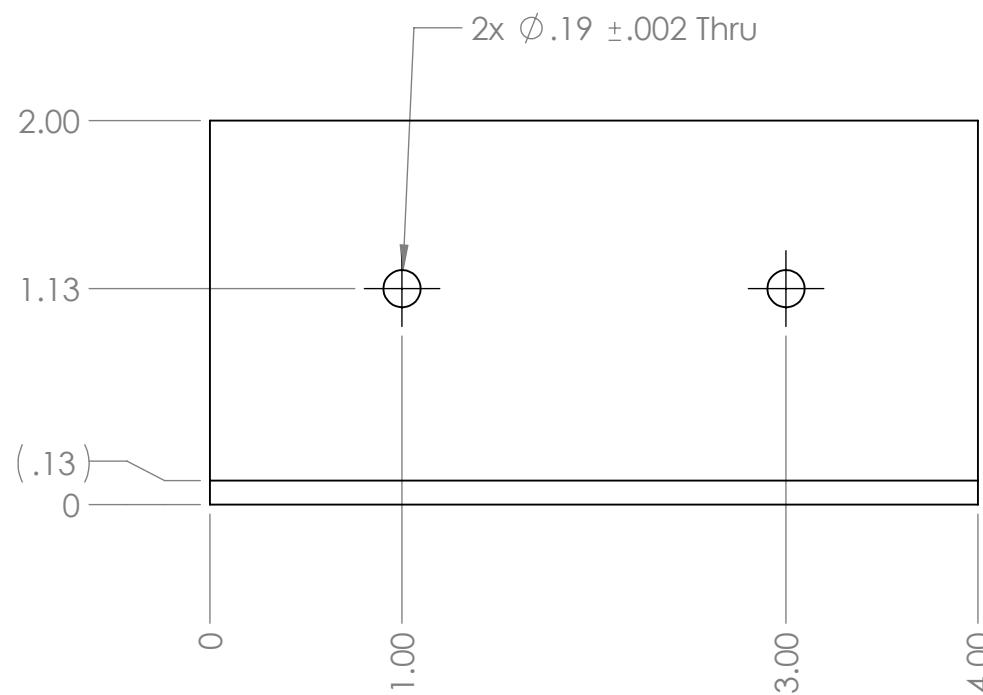
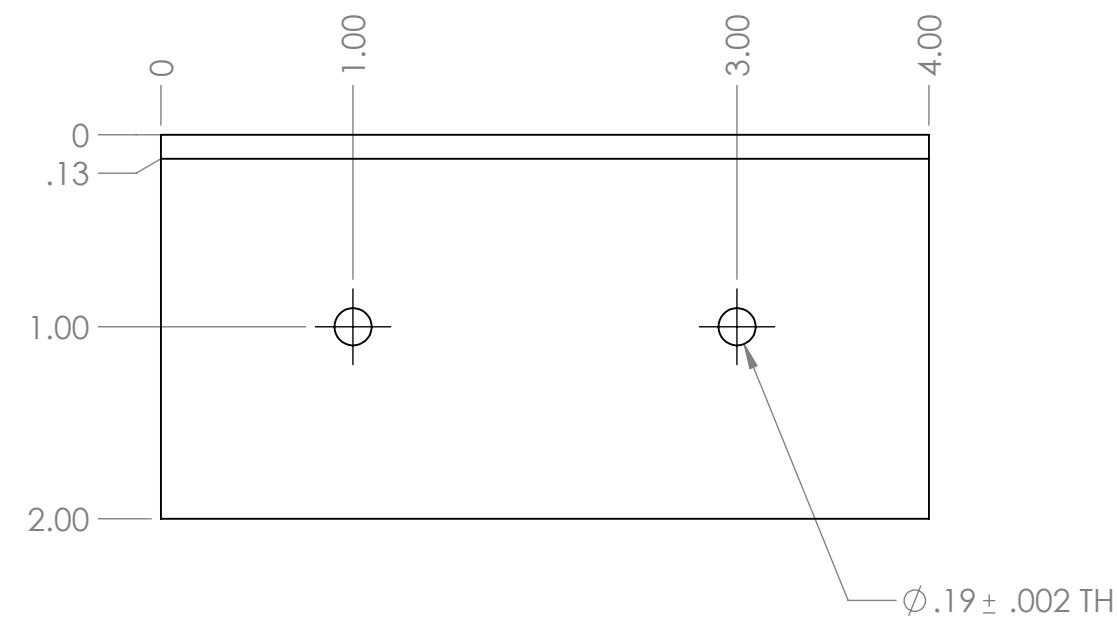
3

2

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B

B

**Notes**

1. Material: 2" x 2" x .125" Aluminum Angle 6063
2. Remove Sharp Edges and Burrs
3. Tag and Label with Part Number

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES				
TOLERANCES:				
FRACTIONAL: $\pm 1/16$				
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$				
TWO PLACE DECIMAL $\pm .01$				
THREE PLACE DECIMAL $\pm .001$				
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: 2 x 2 Aluminum Angle 6063
SIZE DWG. NO. **B** GE-20353 **REV**

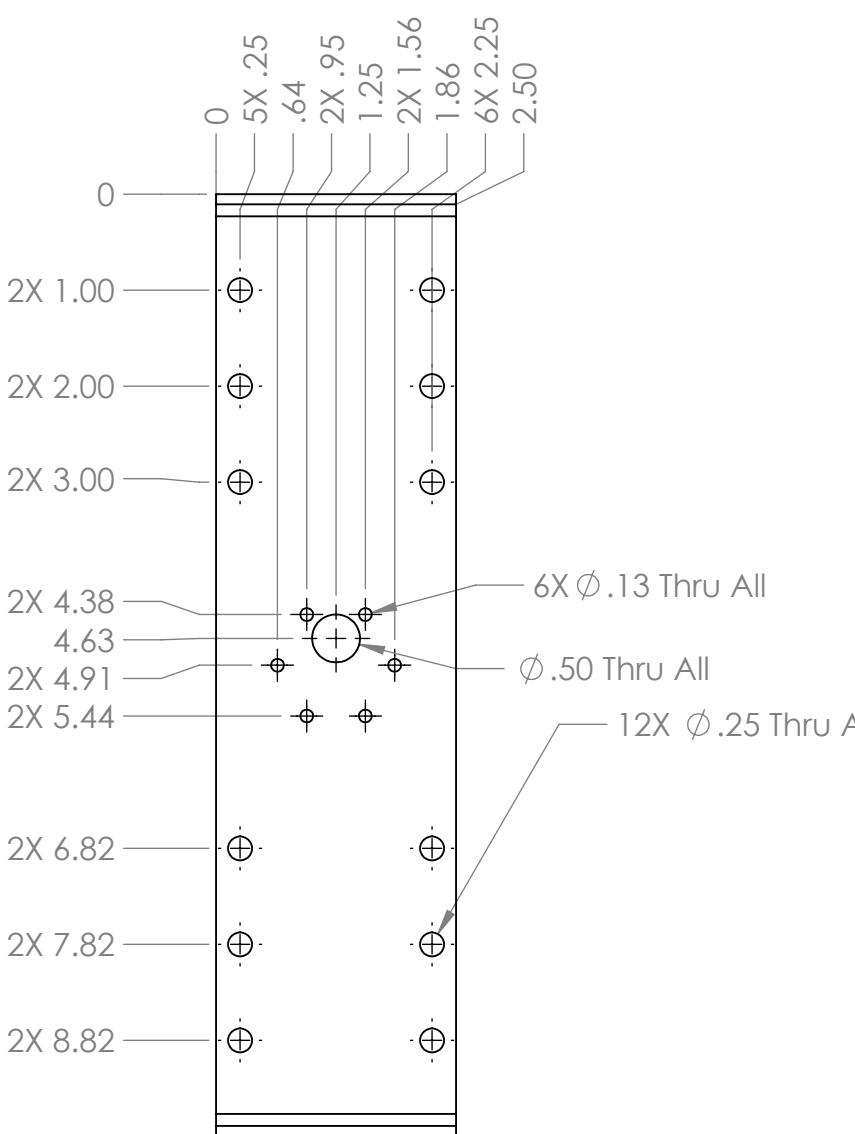
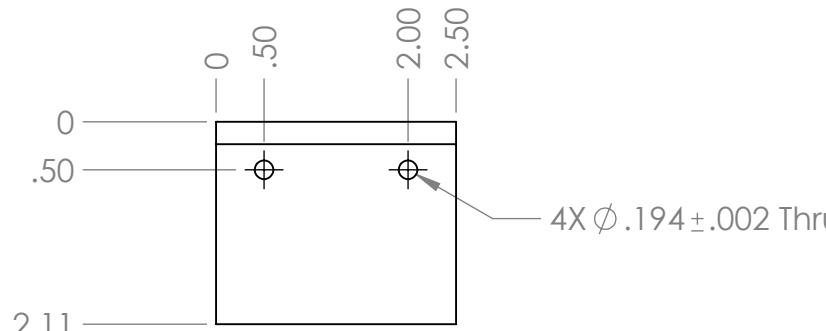
SCALE: 1:1 **WEIGHT:** **SHEET 1 OF 1**

4

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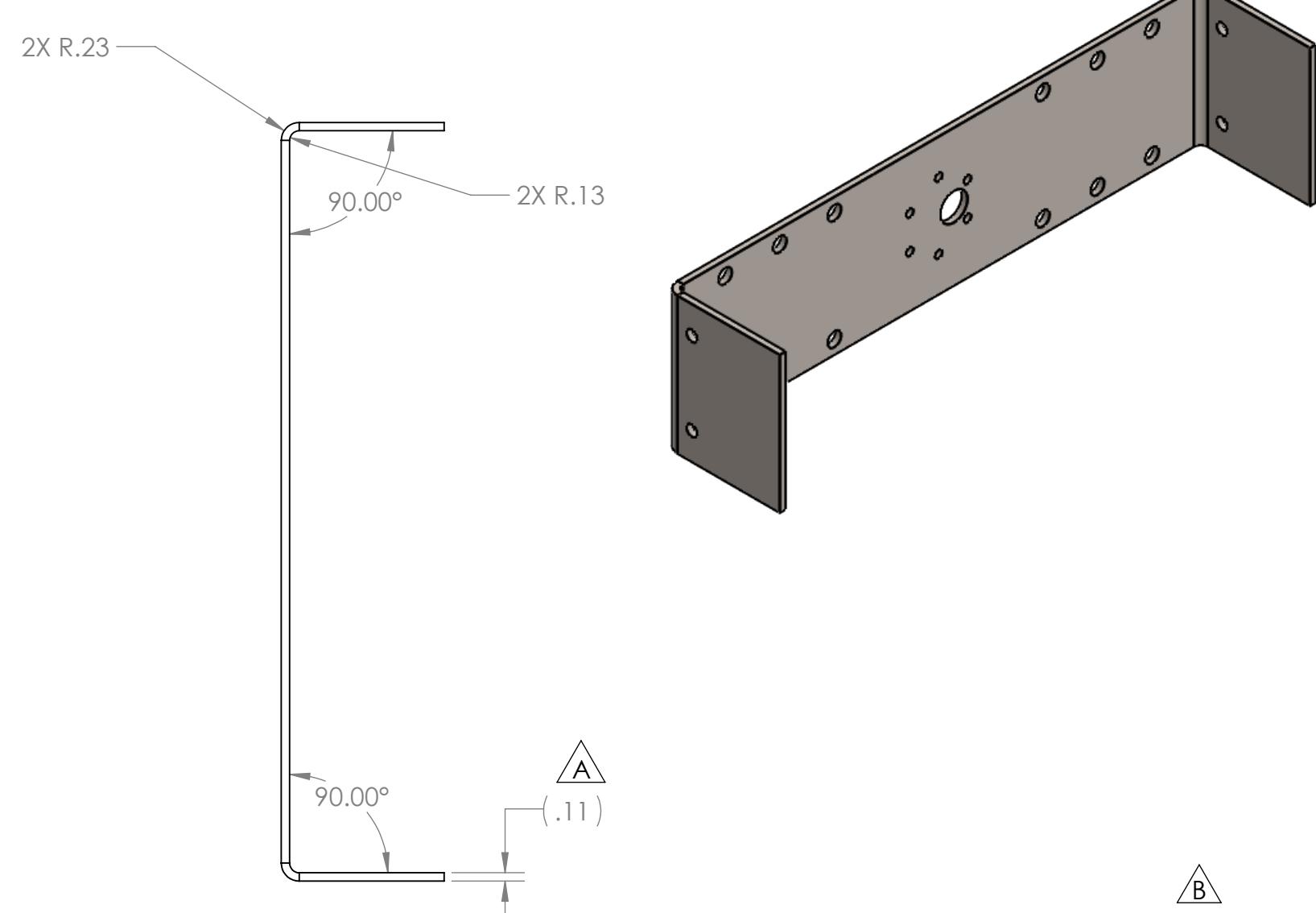
1



Notes:
1. Material: 12 Ga. Pre Plated Steel
2. Remove all burrs and sharp edges
3. Tag and Label With Part Number

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A2	A	Changed to 12 Gage Preplated Steel	10/24/2019	MXS
A1	B	Changed Part description	10/30/2019	MXS



		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES		
		TOLERANCES:		
		FRACTIONAL: $\pm 1/16$		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
		TWO PLACE DECIMAL $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
		NEXT ASSY	USED ON	FINISH
		APPLICATION	DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Serializer Bracket Support

SIZE DWG. NO. **B** GE-20354 **REV** **B**

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4

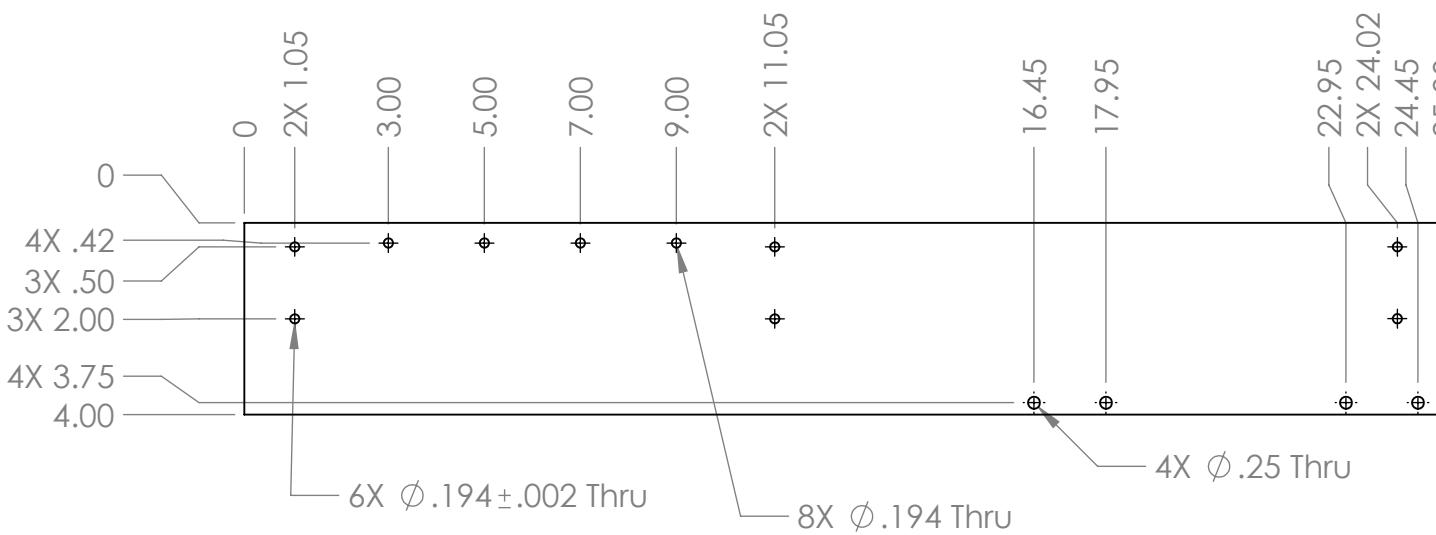
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**Notes:**

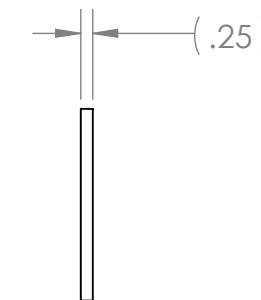
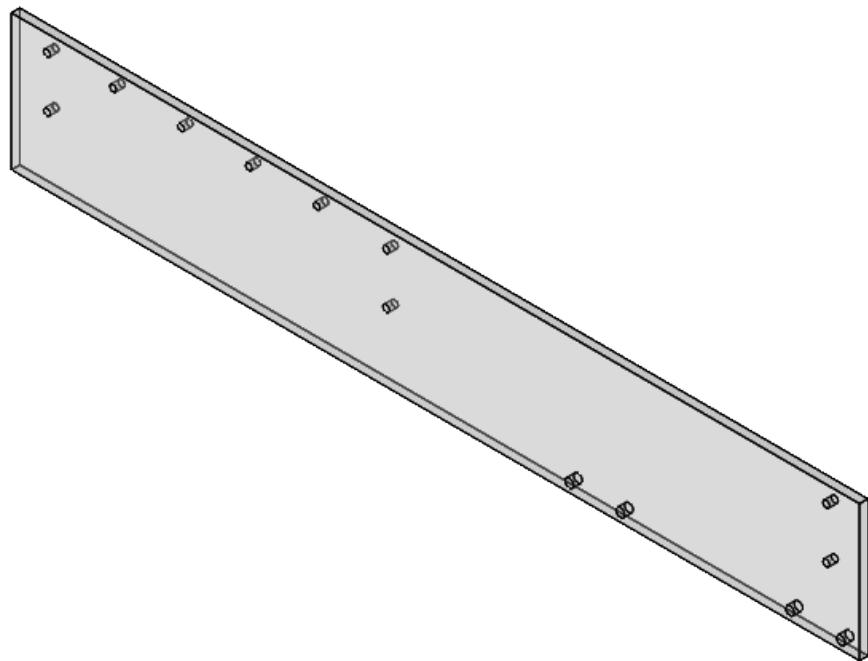
1. Material 1/4" Thick Polycarbonate Sheet
2. Remove Sharp Edges and Burrs
3. Label and Tag with Part Number

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES		
		TOLERANCES:		
		FRACTIONAL \pm 1/16		
		ANGULAR: MACH \pm 1° BEND \pm 1°		
		TWO PLACE DECIMAL \pm .01		
		THREE PLACE DECIMAL \pm .001		
		INTERPRET GEOMETRIC		
		TOLERANCING PER:		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		NEXT ASSY	USED ON	FINISH
		APPLICATION	DO NOT SCALE DRAWING	

SIZE	DWG. NO.	REV
B	GE-20355	
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

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SIZE	DWG. NO.	REV
B	GE-20355	
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

4

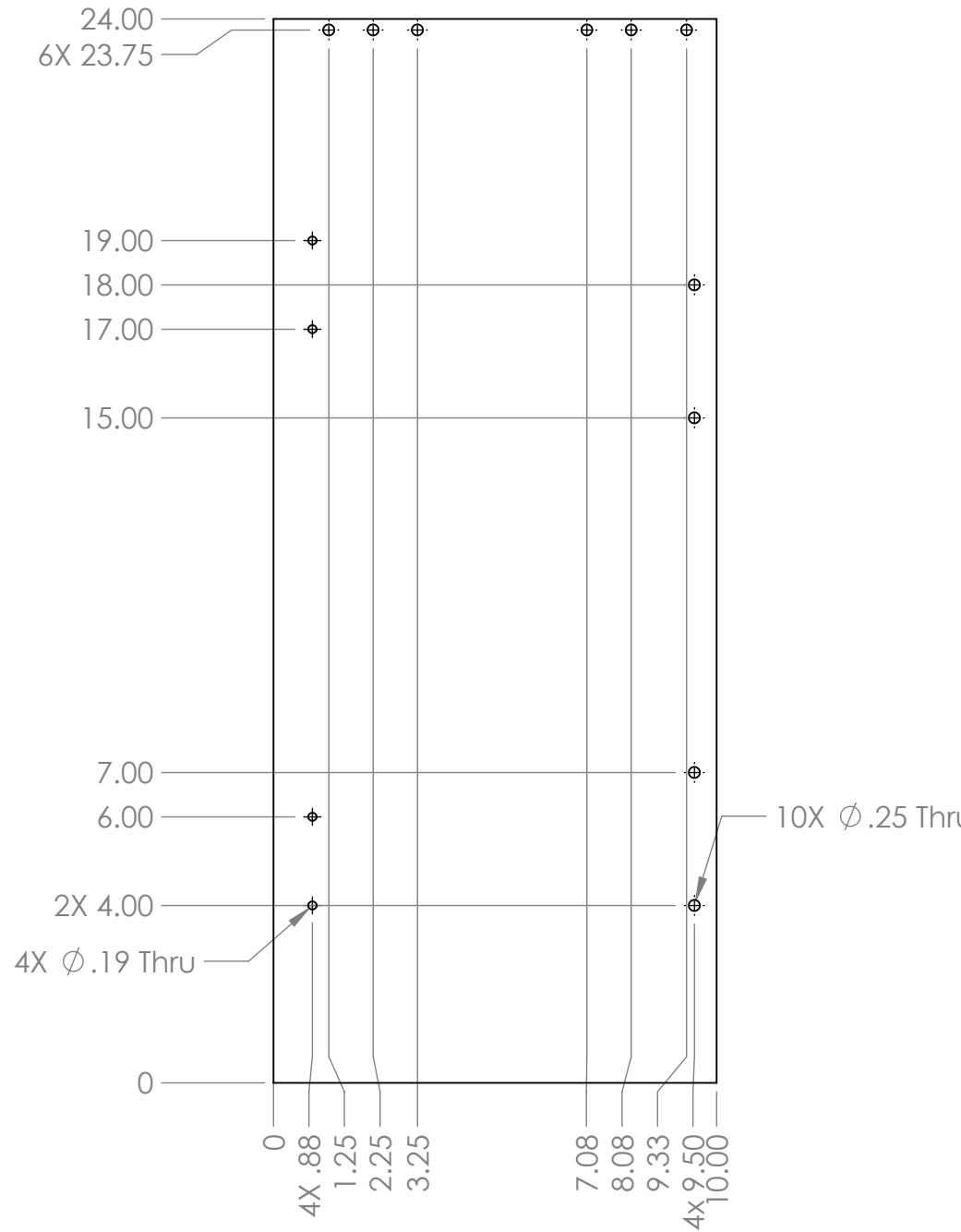
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		DRAWN		
		CHECKED		
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		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.	REV		
B	GE-20356			
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1		

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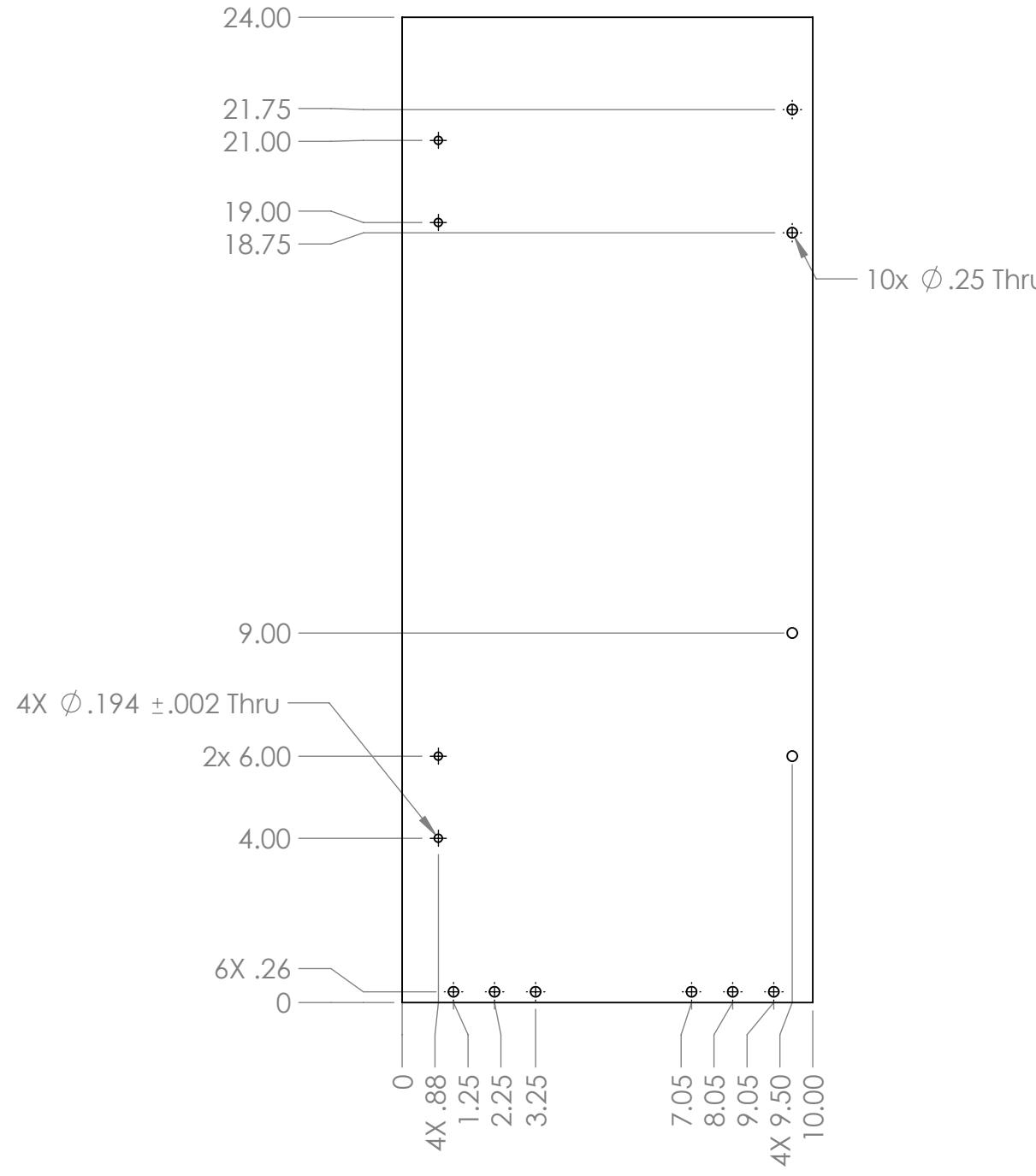
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Notes:

1. Material: 1/4" Thick Polycarbonate Sheet
2. Remove Sharp Edges And Burrs
3. Tag and Label with Part Numbers

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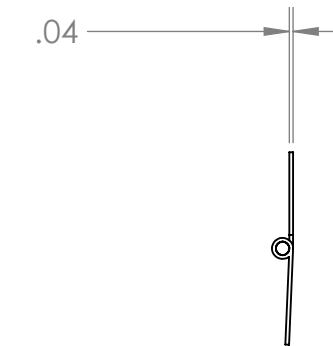
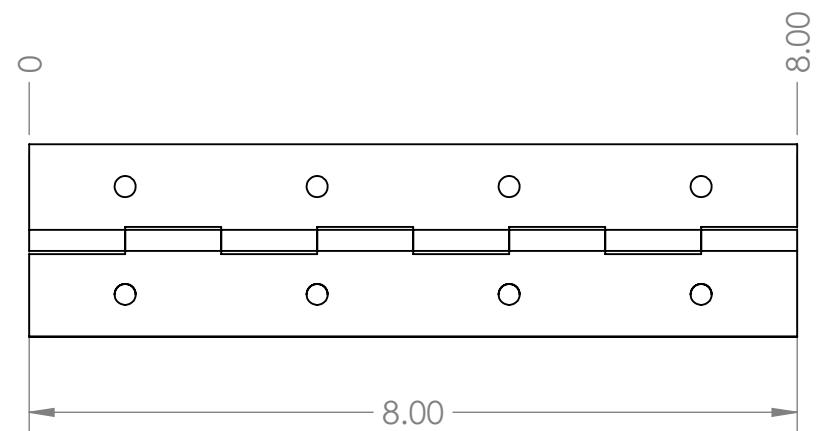
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B

B



Description: STEEL CONTINUOUS HINGE - 0.04" X 2.0" X 72" WITH NICKEL PLATE & MOUNTING HOLES

Vendor TCH

Part Number: 505-1965801

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES			
		TOLERANCES:			
		FRACTIONAL $\pm 1/16$			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
		TWO PLACE DECIMAL $\pm .01$			
		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC			
		TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING	COMMENTS: Steel Continuous Hinge, Nickel (6' lengths) TCH 505- 1965801		
SIZE	DWG. NO.		B GE-20358		
REV					
SCALE: 1:2	WEIGHT:		SHEET 1 OF 1		



SOLIDWORKS
Modeling Solutions Partner

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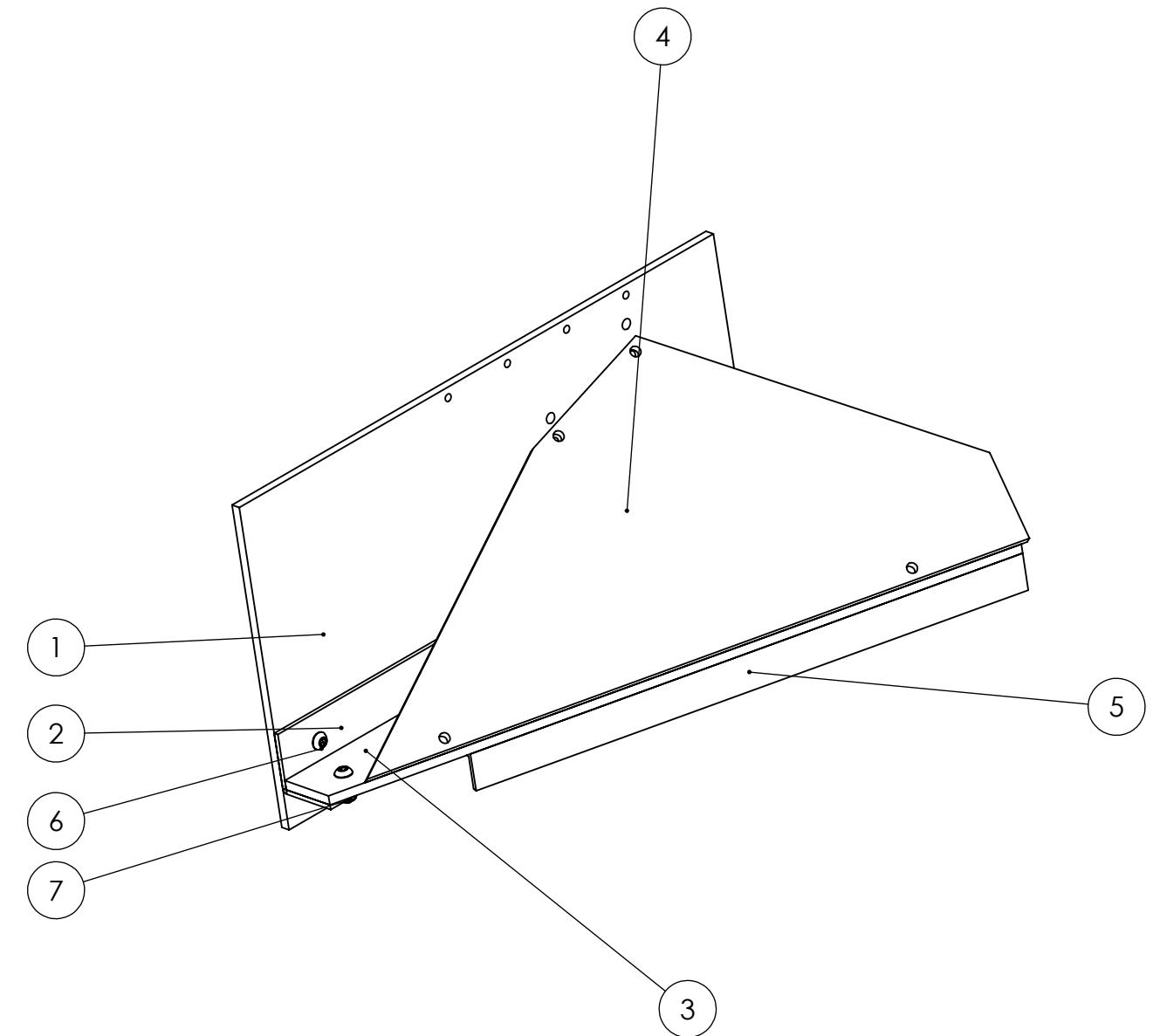
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B

B



A

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20361	Polycarbonate Face	1
2	GE-20362	Angle Bracket	1
3	GE-20363	Angle Pusher	1
4	GE-20374	Serializer Top Angle	1
5	GE-20367	Serializer Lower Angle Bracket	1
6	round_hex_.25_20_.75_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 3/4" long, fully threaded	6
7	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	6

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: <h1>Pusher Assembly</h1>	
		DIMENSIONS ARE IN INCHES	DRAWN					
		TOLERANCES:	CHECKED					
		FRACTIONAL $\pm 1/16$	ENG APPR.					
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.					
		TWO PLACE DECIMAL $\pm .01$	Q.A.					
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:					
		MATERIAL				SIZE DWG. NO. B GE-20360	REV	
NEXT ASSY	USED ON	FINISH						
APPLICATION		DO NOT SCALE DRAWING				SCALE: 1:4	WEIGHT:	SHEET 1 OF 2

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This technical diagram illustrates the exploded view of a shelving unit. The assembly consists of several components: a vertical panel (1) with mounting holes, a horizontal cross brace (2), a top horizontal beam (3) supported by vertical legs (4), a bottom horizontal beam (5), and a base plate (6). A callout line labeled "Note Cable Tie 4 places" points to the junction where the top beam (3) meets the vertical panel (1). Numbered callouts (1 through 7) point to specific parts: 1 points to the top edge of the vertical panel; 2 points to the cross brace; 3 points to the top horizontal beam; 4 points to the vertical support leg; 5 points to the bottom horizontal beam; 6 points to the base plate; and 7 points to a fastener on the vertical panel.

A

A

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN		
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			
 FIRST ROBOTICS COMPETITION  SOLIDWORKS Modeling Solutions Partner					
TITLE: <h1>Pusher Assembly</h1>					
SIZE	DWG. NO.			REV	
	B	GE-20360			
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2			

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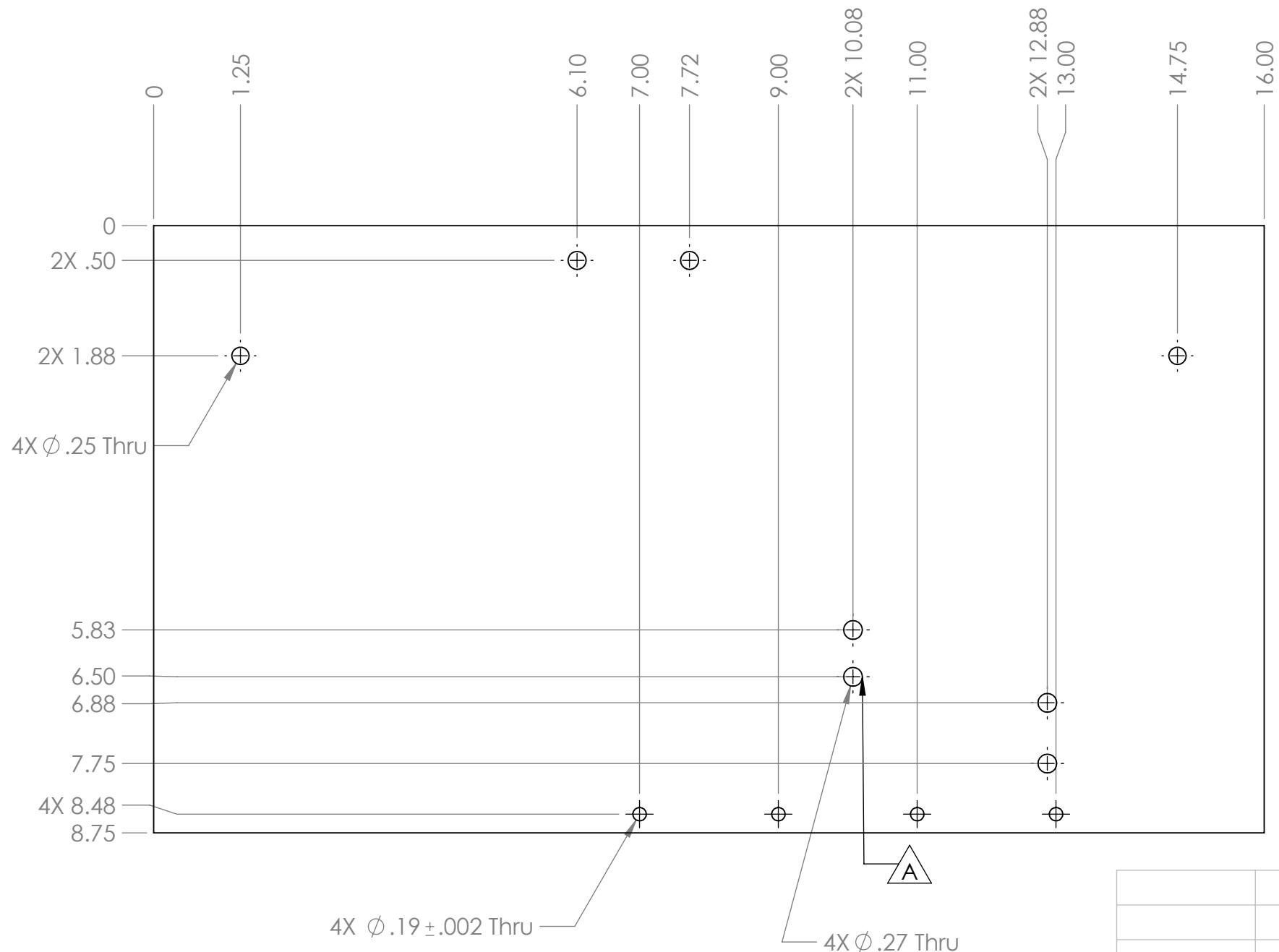
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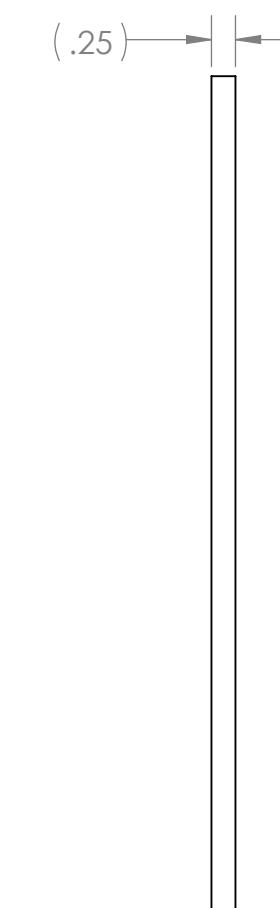
B



Note:
 1. Material: 1/4" Thick Polycarbonate Sheet
 2. Remove Sharp Edges and Burrs
 3. Tag and Label with Part Number

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added Four holes	11/22/2019	MXS
A1	B	Description/Title Change	12/19/2019	MXS



B

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES			
		TOLERANCES:			
		FRACTIONAL: ±1/16			
		ANGULAR: MACH ±1° BEND ±1°			
		TWO PLACE DECIMAL ±.01			
		THREE PLACE DECIMAL ±.001			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			
TITLE: Polycarbonate Face		SIZE: B DWG. NO. GE-20361		REV: B	
SCALE: 1:2		WEIGHT:	SHEET 1 OF 1		

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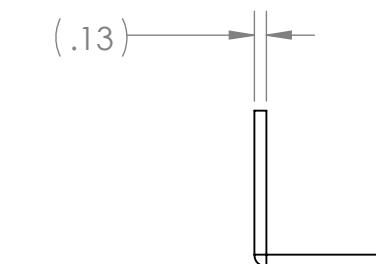
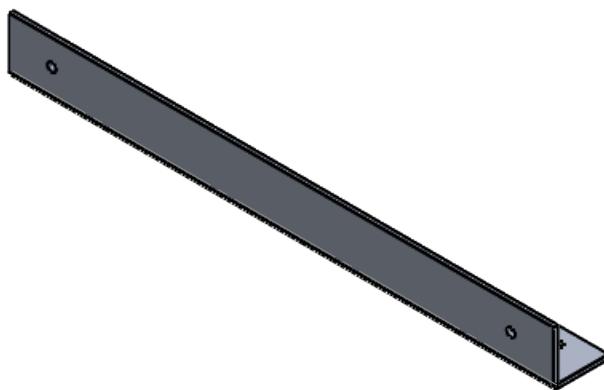
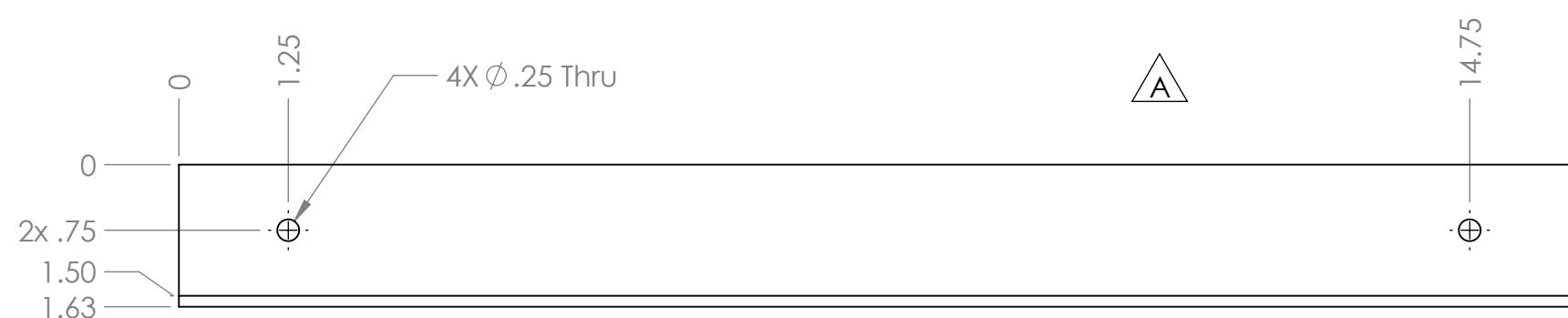
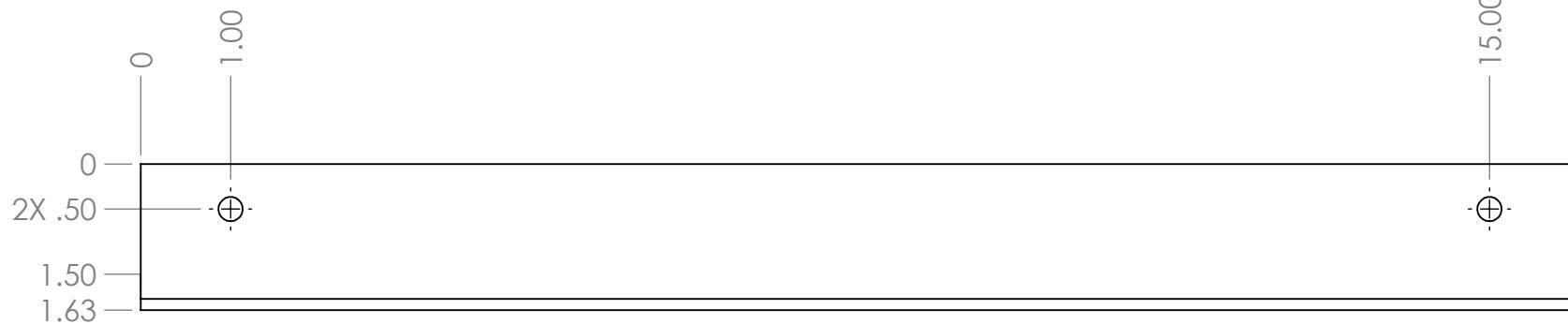
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Hole Change	12/19/2019	MXS
A1	B	Description/title change	12/19/2019	MXS



B

Notes:
 1. Material: 1.5" X 1.5" X .125" Aluminum Angle 6063
 2. Remove Sharp Edges and Burrs
 3. Tag and Label with Part Number 2x .75

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		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL $\pm 1/16$		ENG APPR.	
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.	
		TWO PLACE DECIMAL $\pm .01$		Q.A.	
		THREE PLACE DECIMAL $\pm .001$		COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
	NEXT ASSY	USED ON	FINISH		
	APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
 Modeling Solutions Partner

ANGLE BRACKET

SIZE	DWG. NO.	REV
B	GE-20362	C
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1

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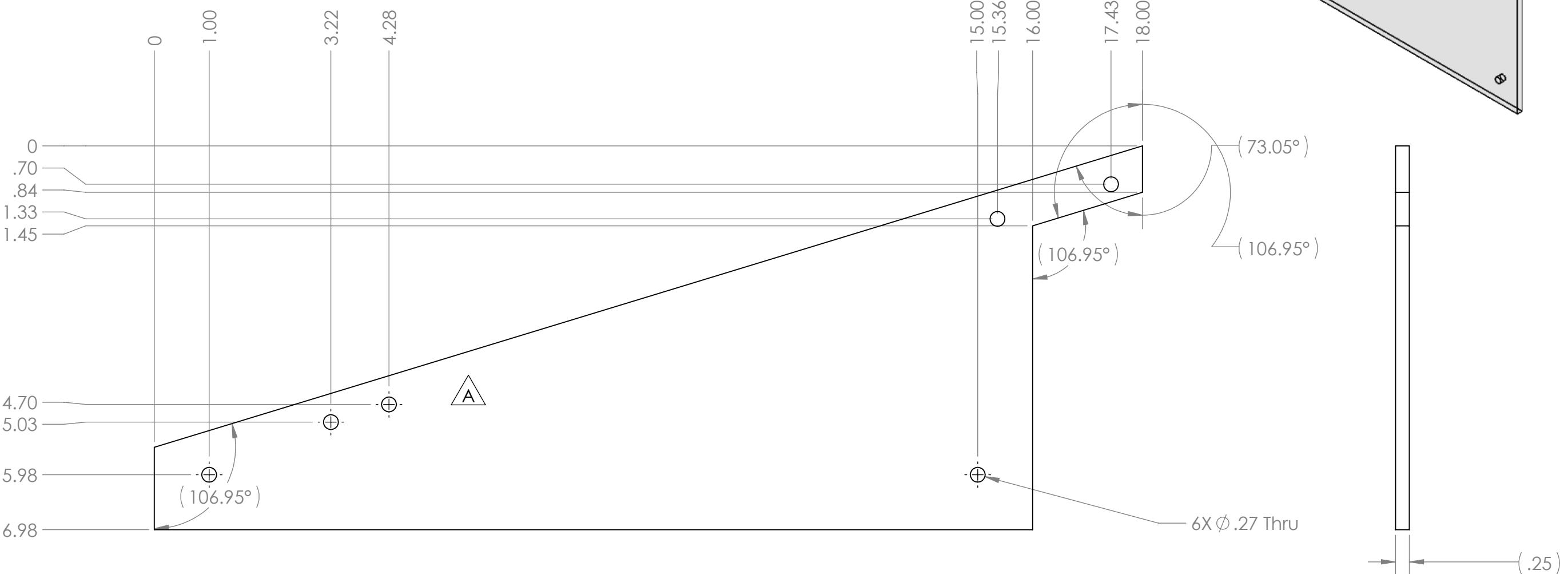
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REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Added four holes	11/27/2019	MXS



Notes:

1. Material: 1/4" Thick Polycarbonate Sheet, Clear
2. Remove Sharp Edges and Burrs
3. Tag and Label with Part Number

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
SIZE	DWG. NO.				REV
B	GE-20363				A
SCALE: 1:2	WEIGHT:				SHEET 1 OF 1

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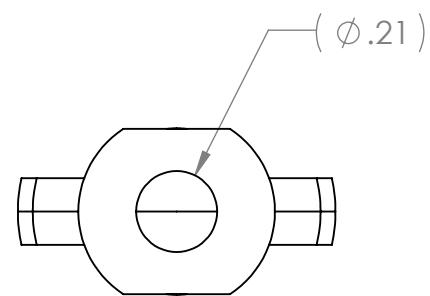
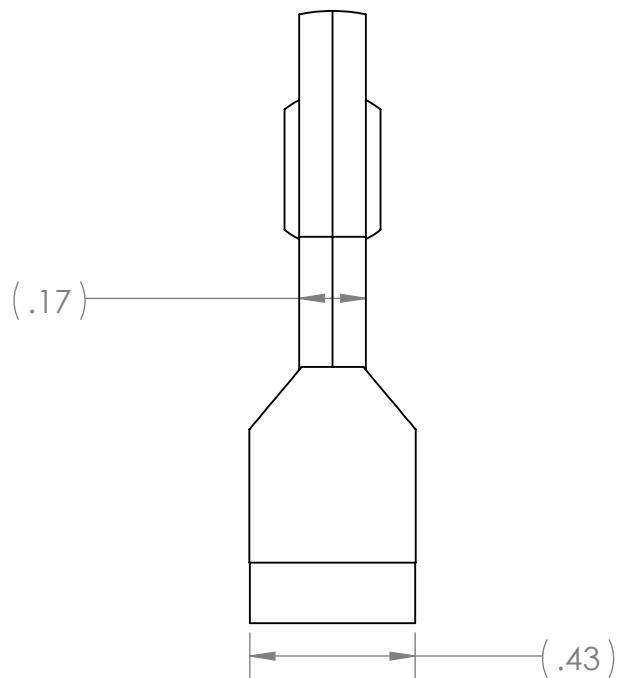
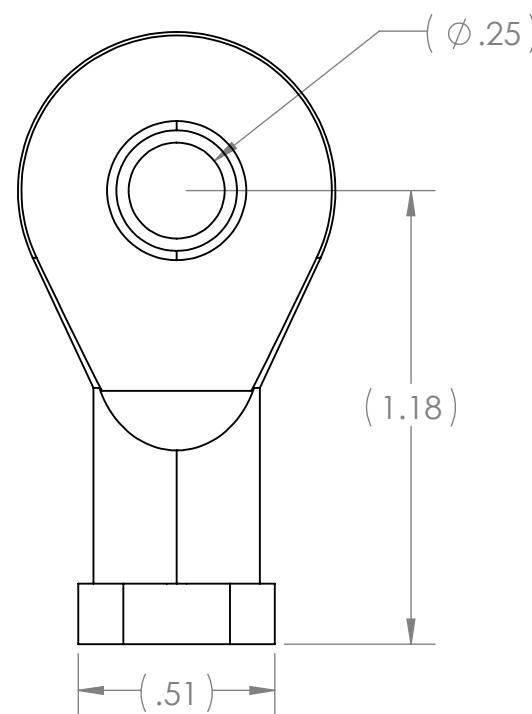
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Description: Rod end with female thread, EBRI igubal®, spherical ball iglide® L280, inch

Vendor: Igus

Part Number: EBRI-04

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN		
TOLERANCES:		CHECKED		
FRACTIONAL $\pm 1/16$		ENG APPR.		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.		
TWO PLACE DECIMAL $\pm .01$		Q.A.		
THREE PLACE DECIMAL $\pm .001$		COMMENTS:		
		MATERIAL		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: igus bearing

SIZE	DWG. NO.	REV
B	GE-20364	
SCALE: 2:1	WEIGHT:	SHEET 1 OF 1

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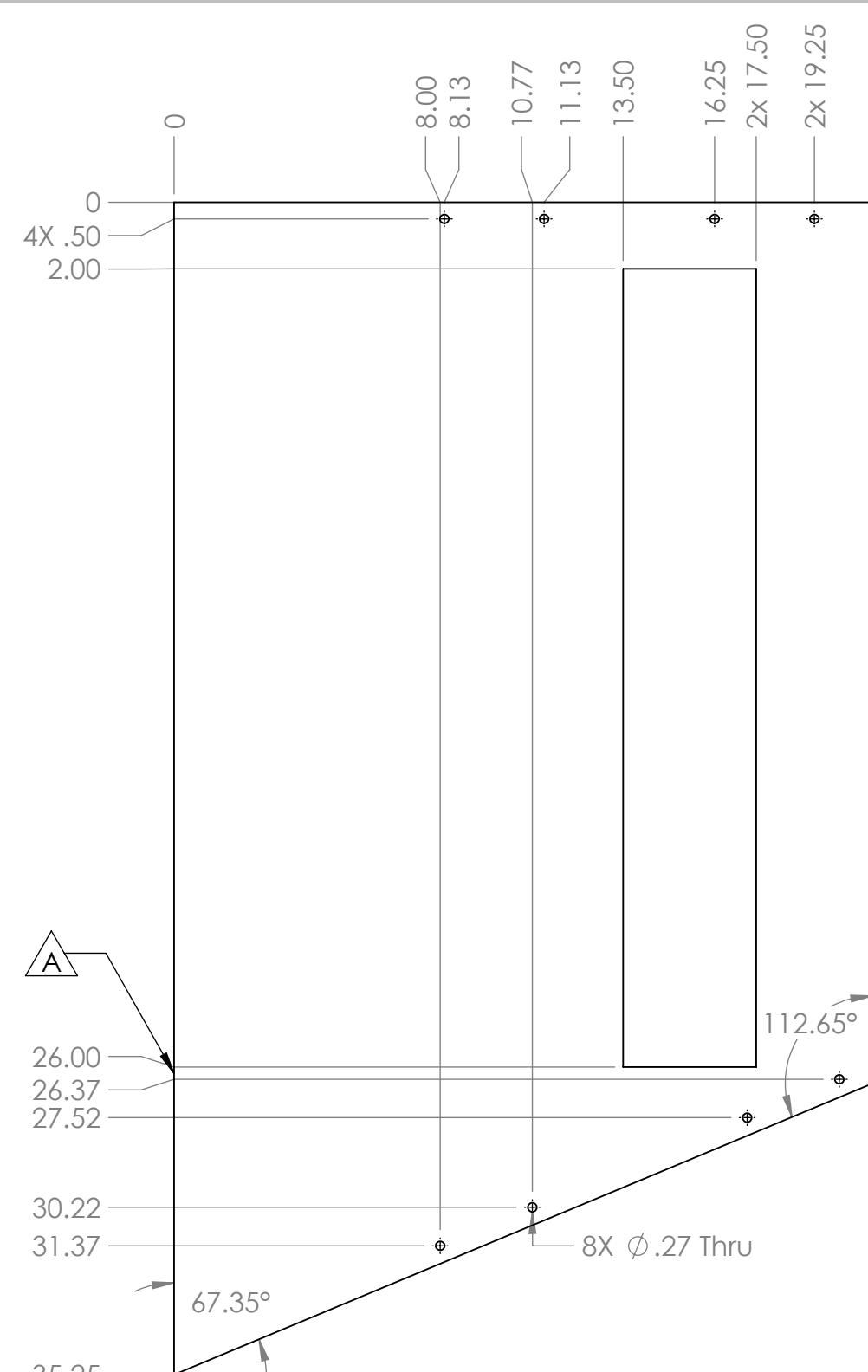
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Notes:

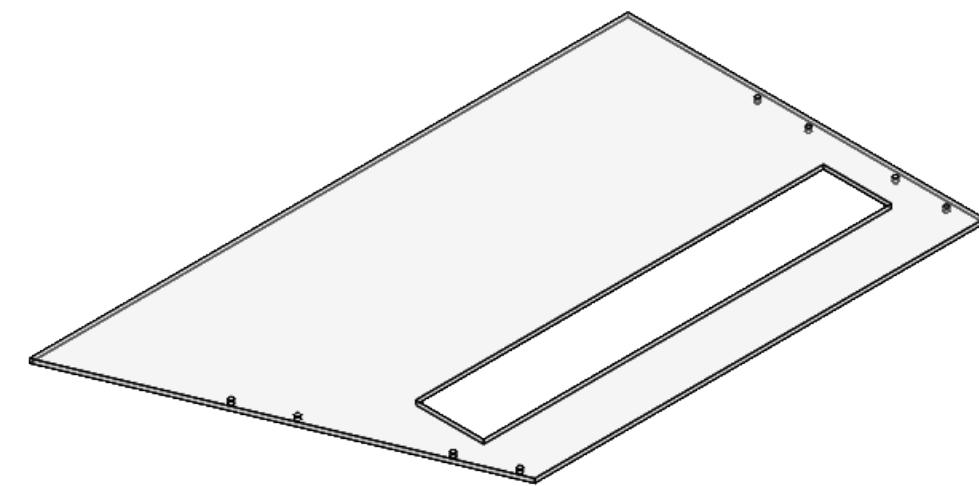
- Notes:

 1. Material 1/4" Thick Polycarbonate Sheet
 2. Remove Sharp Edges and Burrs
 3. Tag and Label with Part Number

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REVISIONS				
ONE	REV.	DESCRIPTION	DATE	APPROVED
A4	A	Changed overall dimensions to make smaller	10/24/2019	MXS



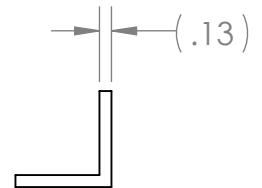
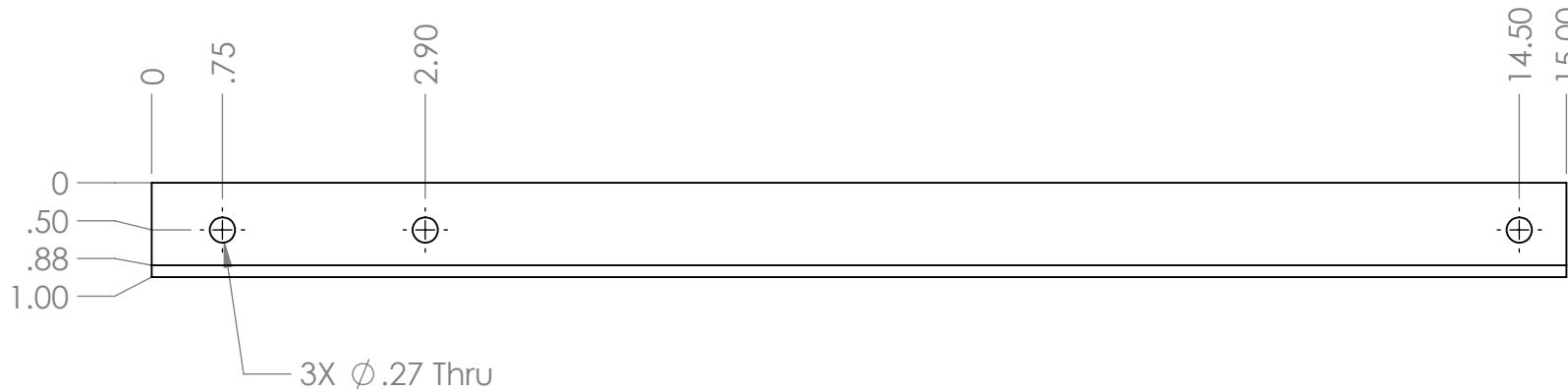
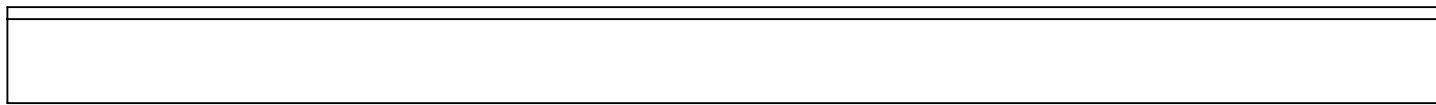
 FIRST ROBOTICS COMPETITION			 SOLIDWORKS <small>Modeling Solutions Partner</small>
TITLE: 1/4" Thick Polycarbonate Sheet			
SIZE	DWG. NO.	REV	
B	GE-20365	A	
SCALE: 1:5		WEIGHT:	SHEET 1 OF 1

4

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Notes:

- Material: 1 X 1x .125 aluminumn Angle 6063
- Remove Sharp Edges and Burrs
- Tag and Label Wtih Part number

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Serializer Lower Angle Bracket

B	GE-20367	REV
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1

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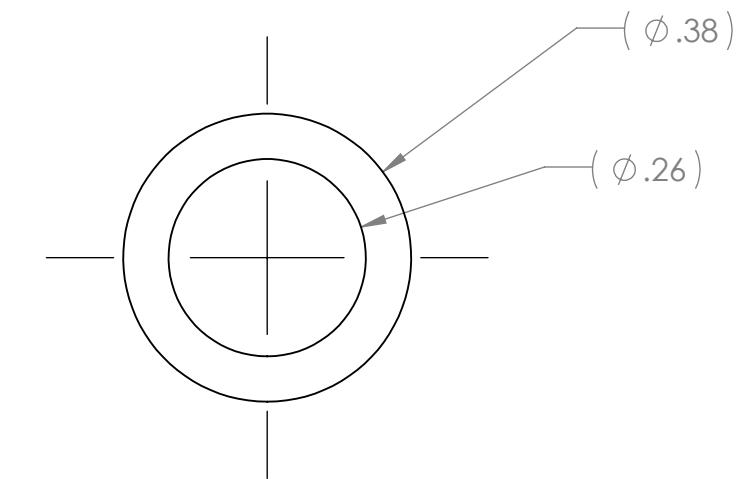
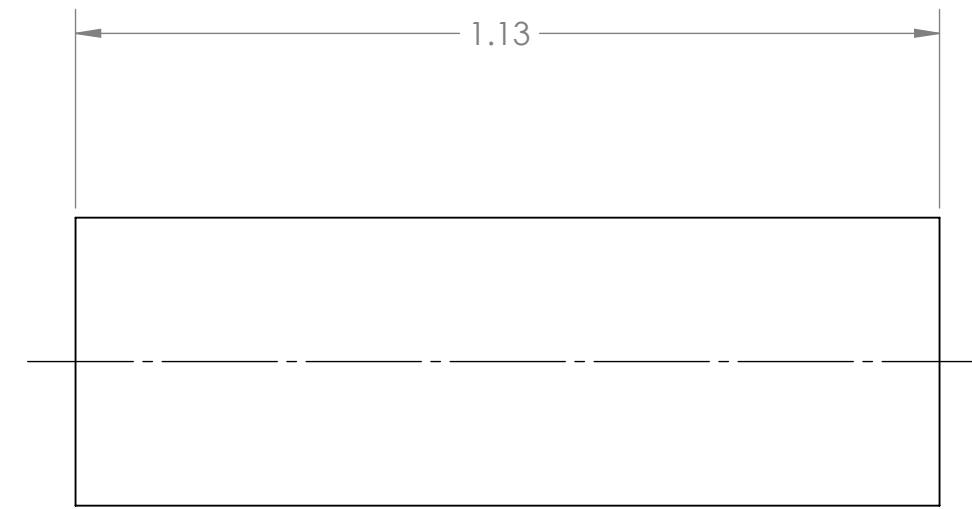
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B

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Description: Aluminum Spacer 3/8 OD x .257 ID x 1-1/8 Long

Vendor: Aluminum Spacers

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		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
	APPLICATION	DO NOT SCALE DRAWING			
B	GE-20368				
SCALE: 4:1	WEIGHT:	SHEET 1 OF 1			

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Title:
Serializer 1/4 x 20
Rod Spacer

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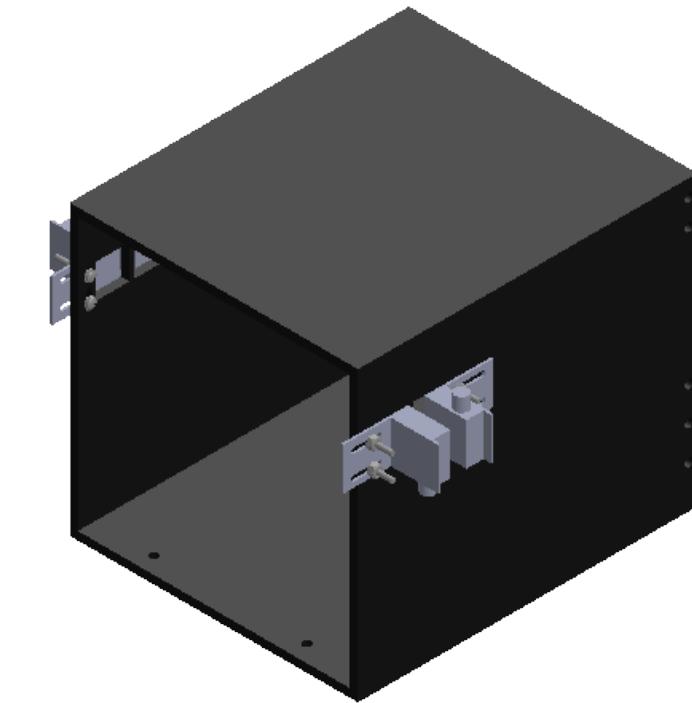
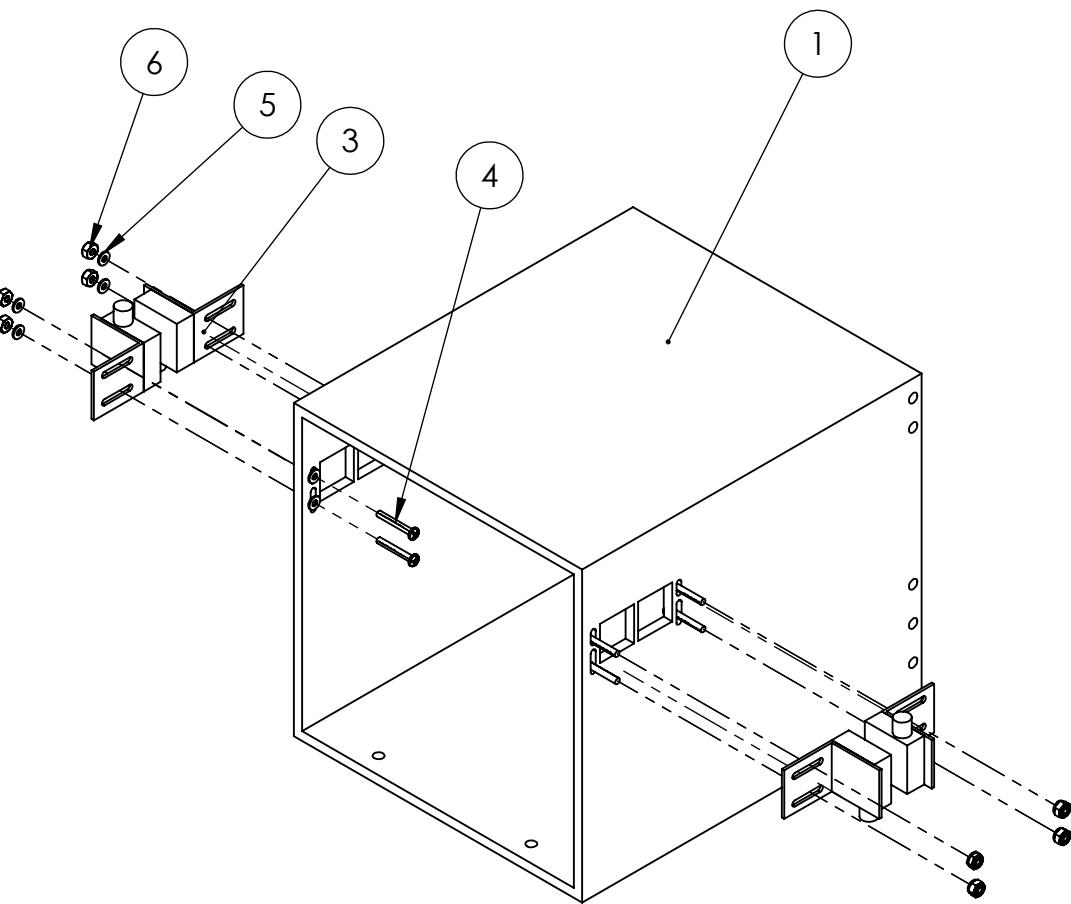
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B

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A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20372	Counter Box	1
2	VisiSight_with_bracket	VisiSight Break Beam with Bracket	-
4	6-32_Pan_Phil_1	6-32 Steel Pan Head Phillips Screw	8
5	No.5 Washer	No 5 Screw washer	16
6	Nylock_6_32	6-32 Nylock Nut	8

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
		APPLICATION	DO NOT SCALE DRAWING	
SIZE	DWG. NO.		REV	
B	GE-20370			
SCALE: 1:2	WEIGHT:		SHEET 1 OF 3	

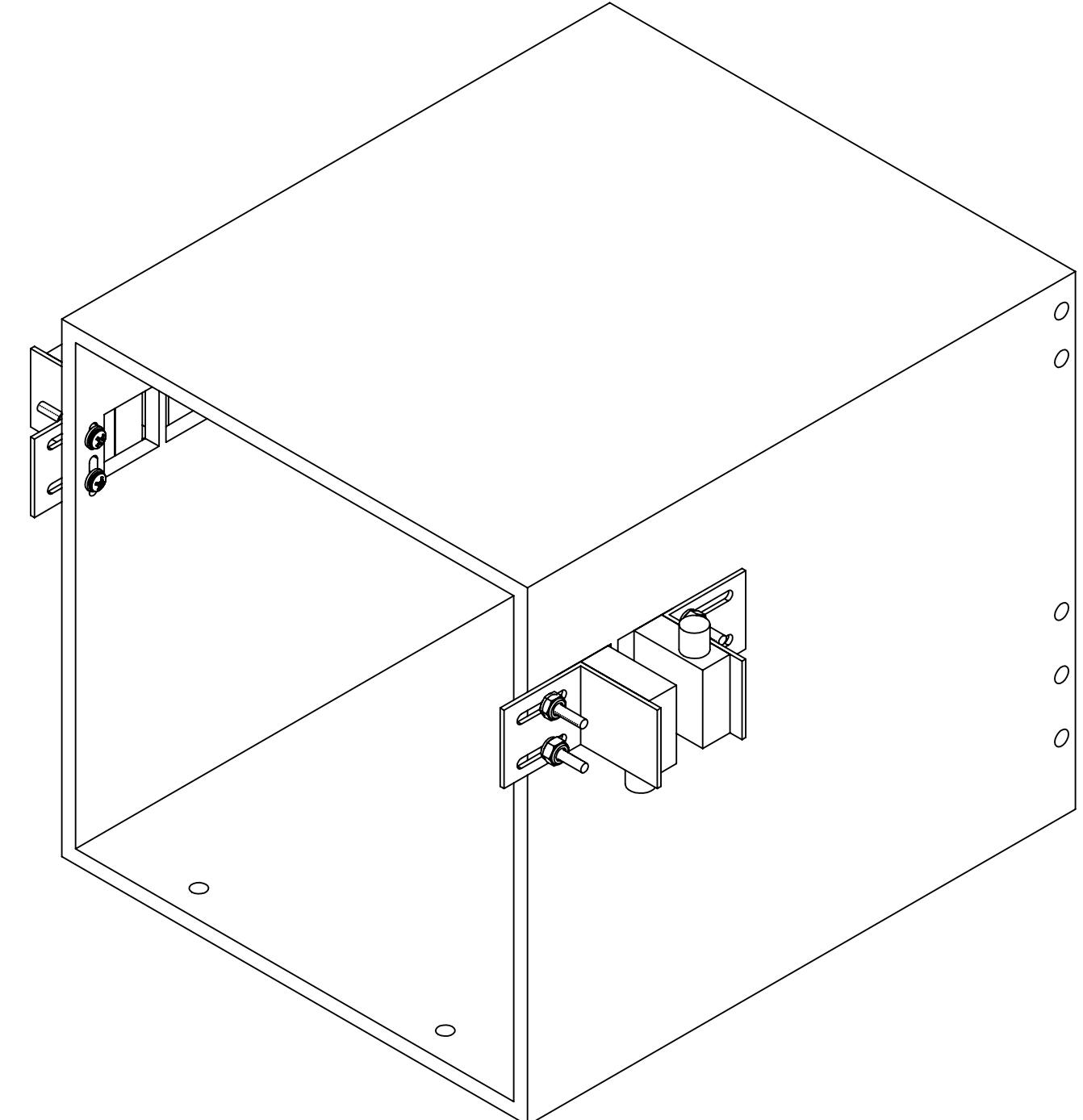
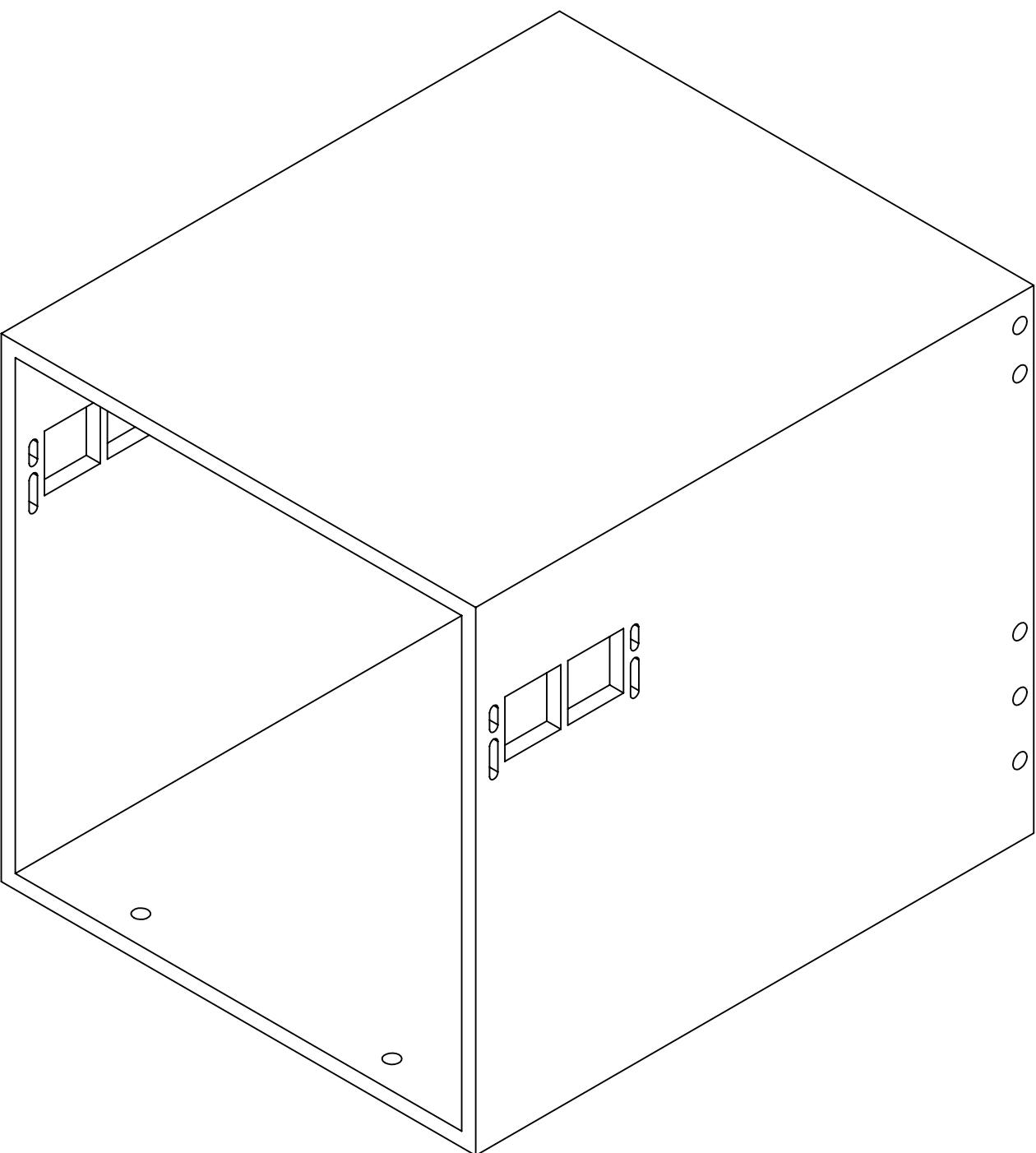
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

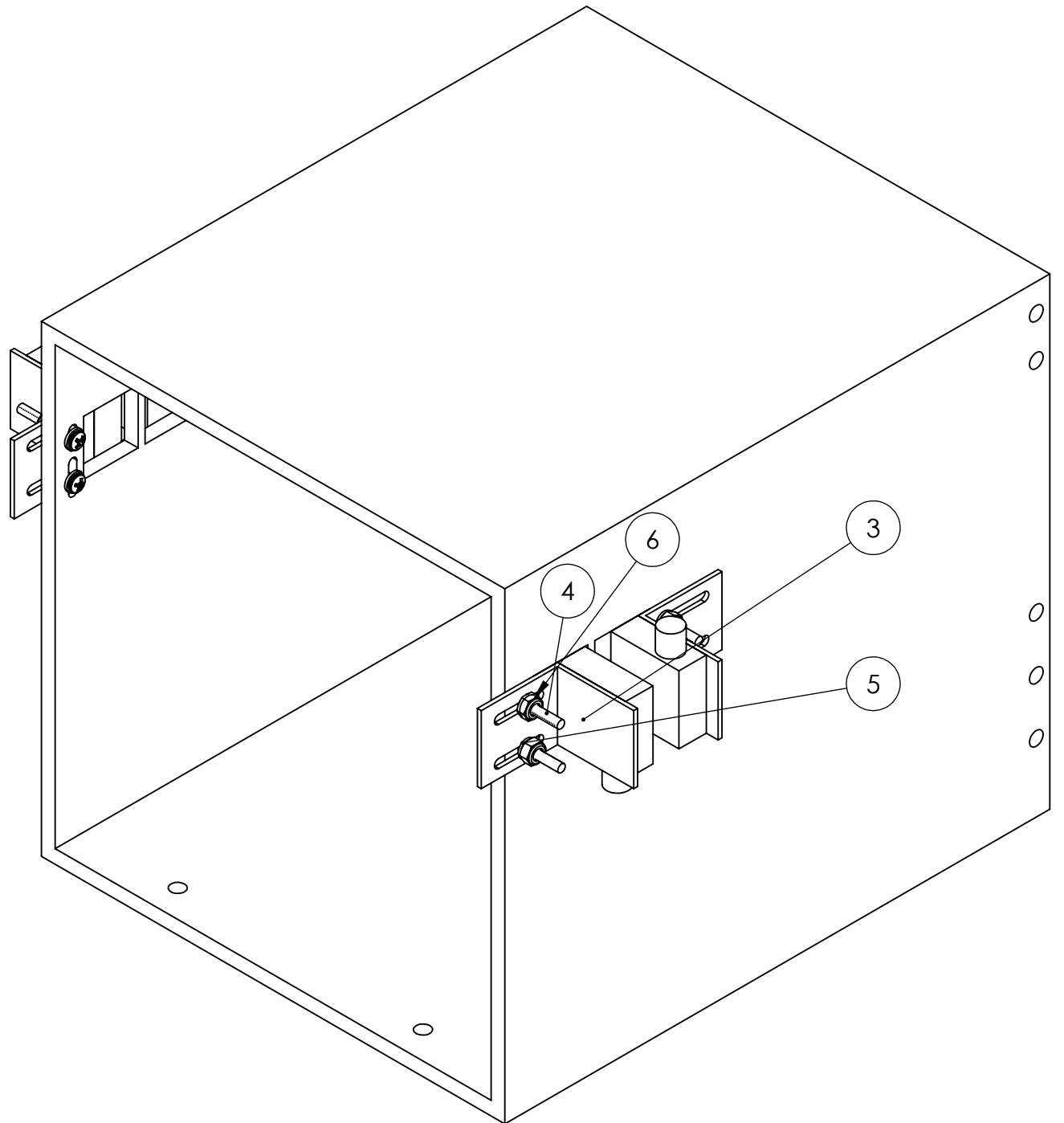
FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner
TITLE: Counter Assembly
SIZE **B** DWG. NO. **GE-20370** REV
SCALE: 1:4 WEIGHT: SHEET 2 OF 3

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Note:
Using item 1 attach item 3 using hardware from items 4,5,6 in four places

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		DIMENSIONS ARE IN INCHES			
		TOLERANCES:			
		FRACTIONAL: $\pm\frac{1}{16}$			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			
		TWO PLACE DECIMAL $\pm .01$			
		THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC			
		TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

COUNTER ASSEMBLY

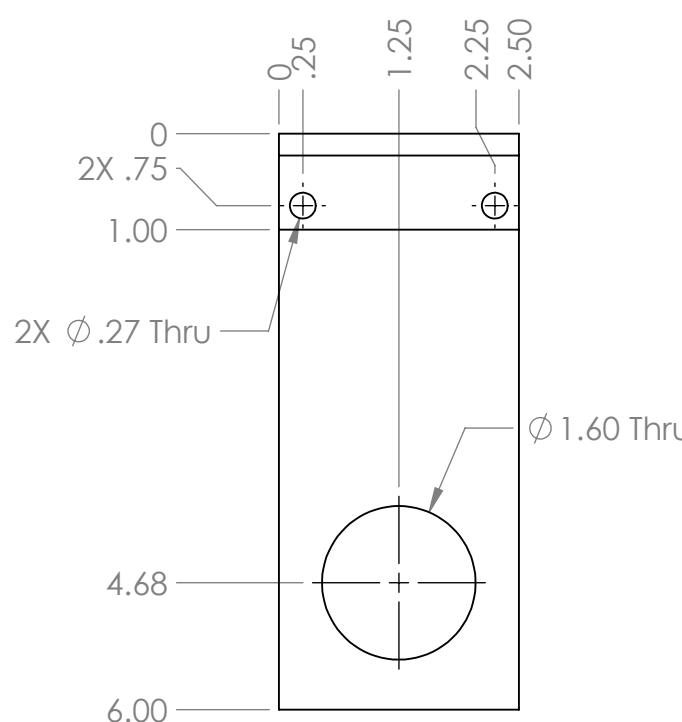
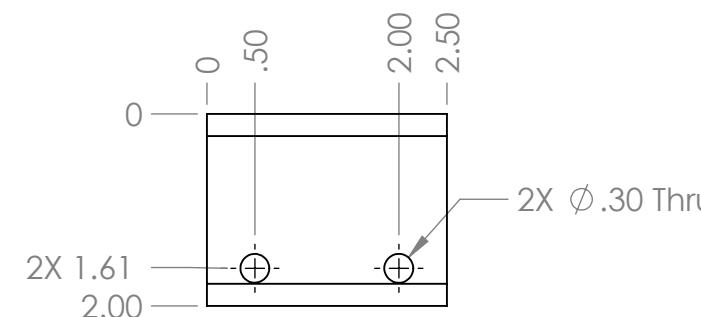
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B	GE-20370	
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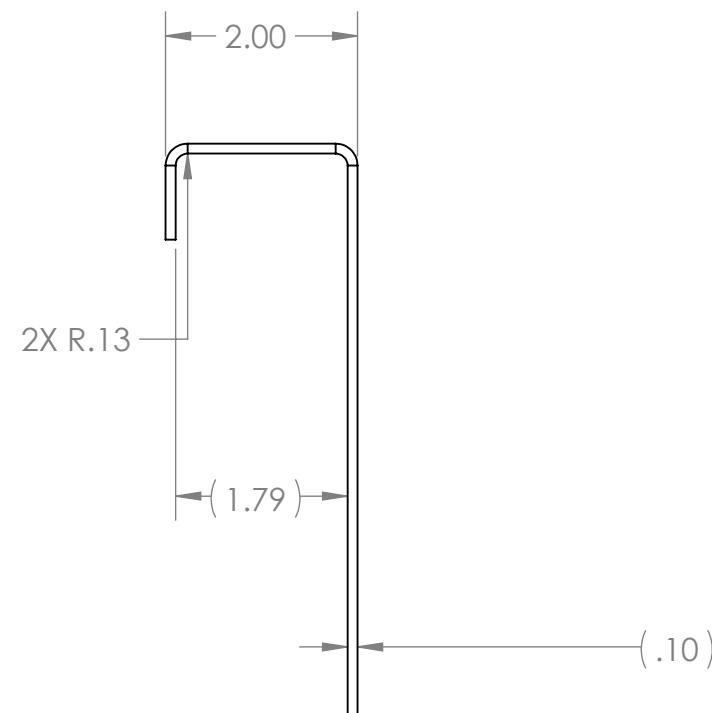
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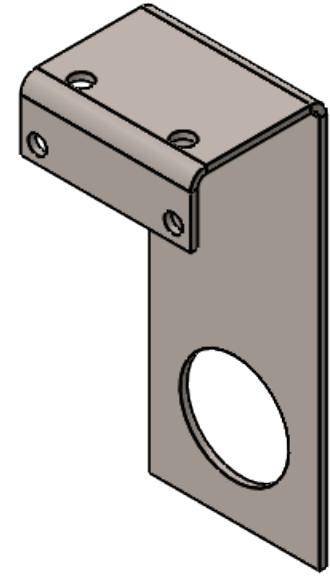


Notes:
1. Material: 12 GA Pre Plated Steel
2. Remove Sharp Edges and Burrs
3. Tag and Label with Part Number



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		DIMENSIONS ARE IN INCHES			
		TOLERANCES:			
		FRACTIONAL: ±1/16			
		ANGULAR: MACH ±1° BEND ±1°			
		TWO PLACE DECIMAL ±.01			
		THREE PLACE DECIMAL ±.001			
		INTERPRET GEOMETRIC		Q.A.	
		TOLERANCING PER:		COMMENTS:	
		MATERIAL			
	NEXT ASSY	USED ON	FINISH		
		APPLICATION	DO NOT SCALE DRAWING		
SIZE	DWG. NO.			REV	
B	GE-20371				
SCALE: 1:2	WEIGHT:			SHEET 1 OF 1	



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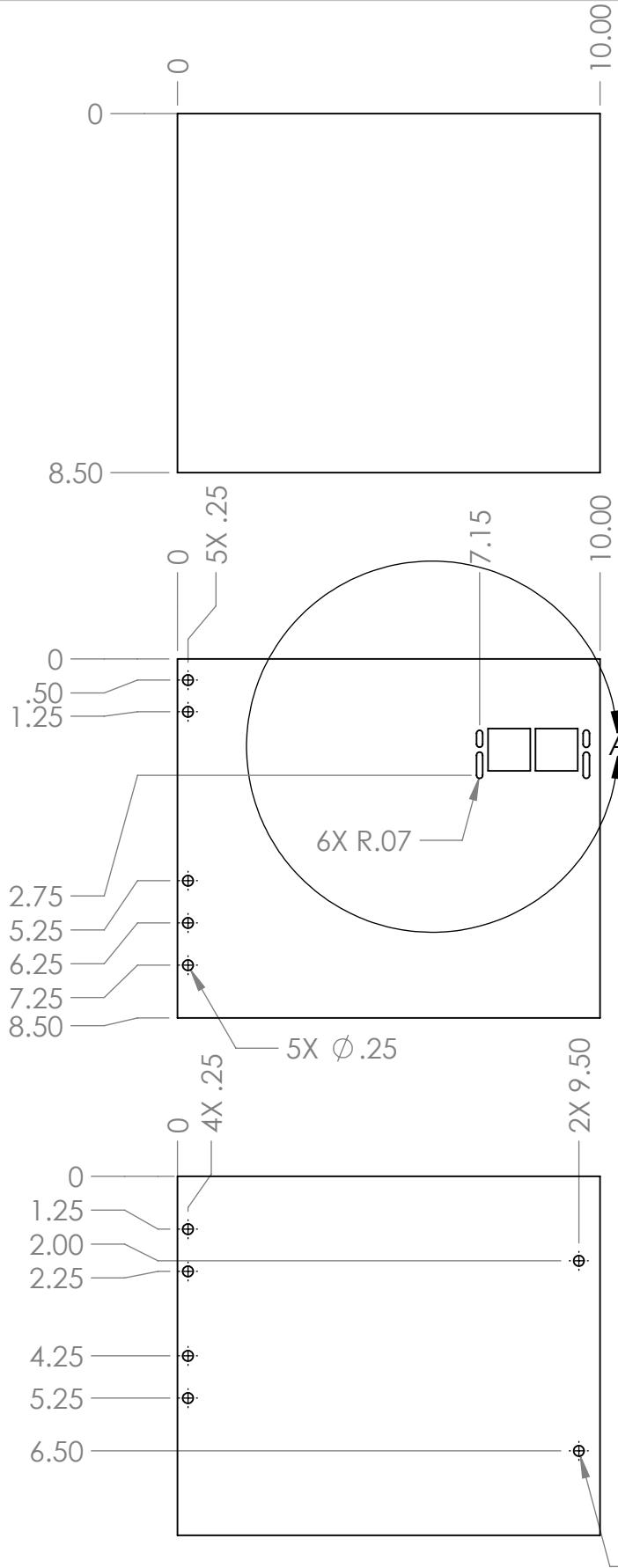
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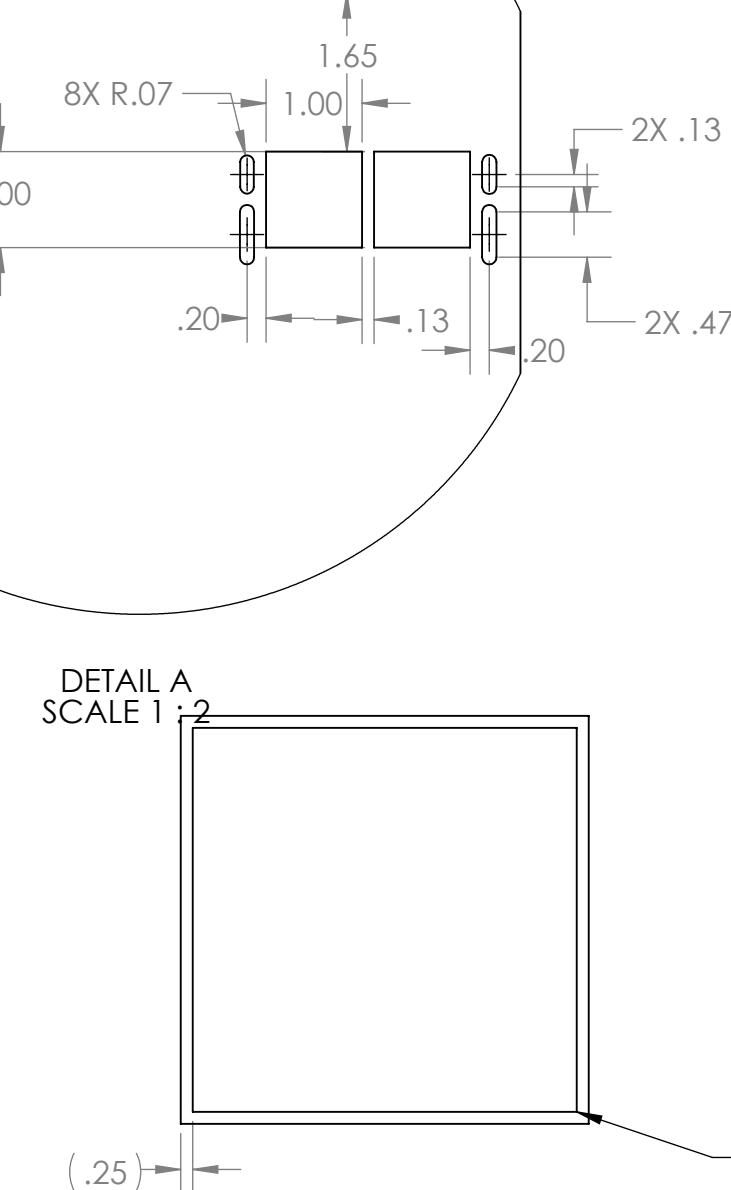
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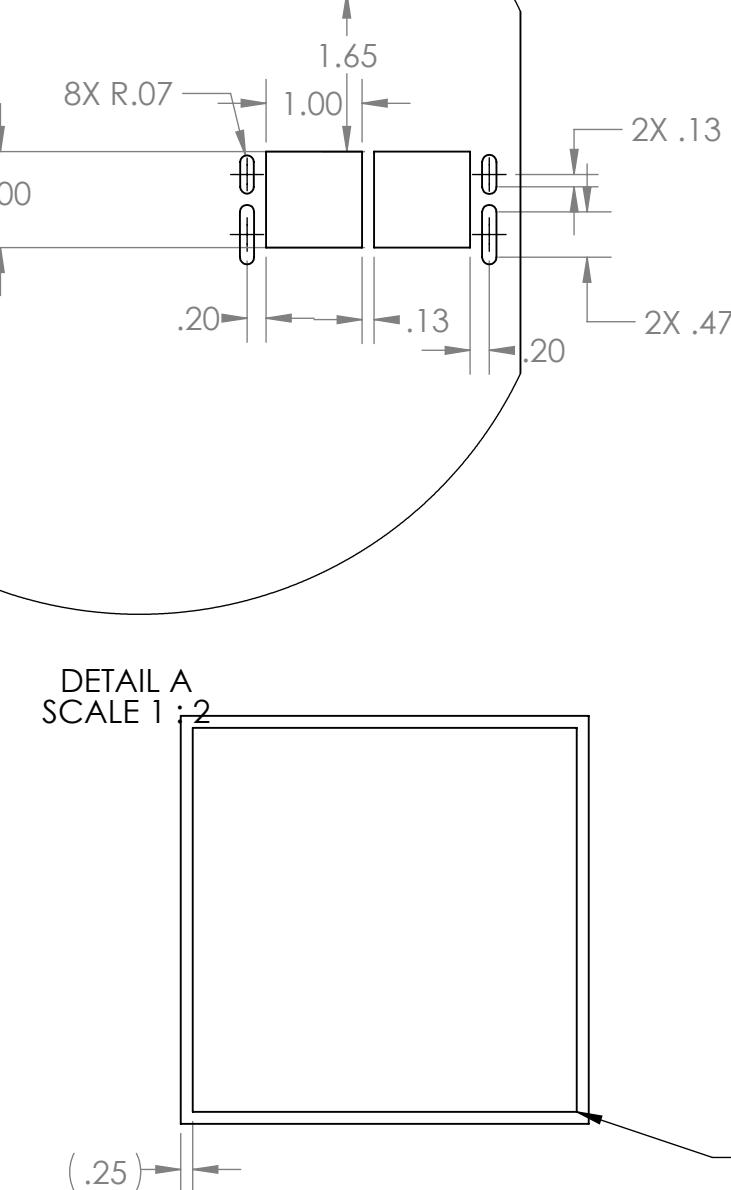
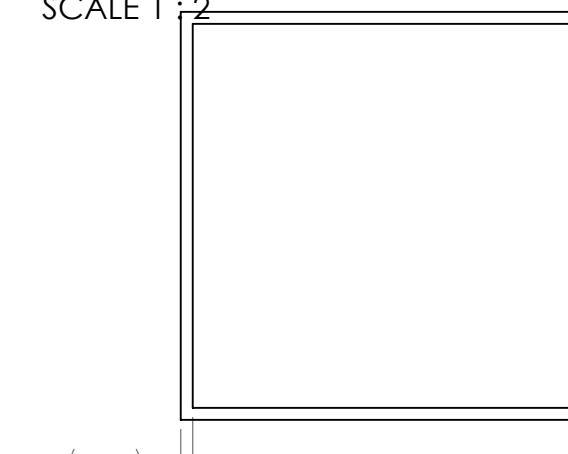
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Note:
 1. Material: 1/4" Thick HDPE Sheet, Black
 2. Finish: Orange Peel
 3. Remove Sharp Edges and Burrs
 4. Tag and Label With Part Number



DETAIL A
SCALE 1:2



UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES			
TOLERANCES:			
FRACTIONAL: ±1/16			
ANGULAR: MACH ±1° BEND ±1°			
TWO PLACE DECIMAL ±.01			
THREE PLACE DECIMAL ±.001			
INTERPRET GEOMETRIC		Q.A.	COMMENTS:
TOLERANCING PER:			
MATERIAL			
NEXT ASSY		FINISH	
USED ON			
APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Counter Box

SIZE DWG. NO. REV
B GE-20372

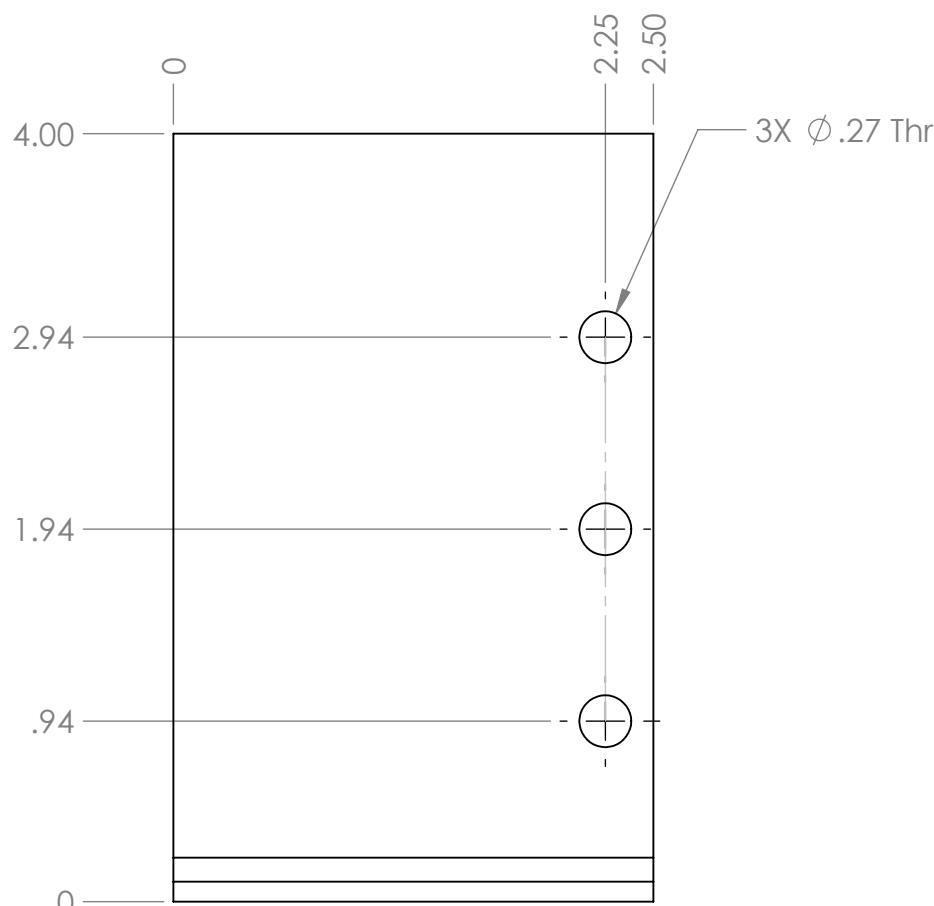
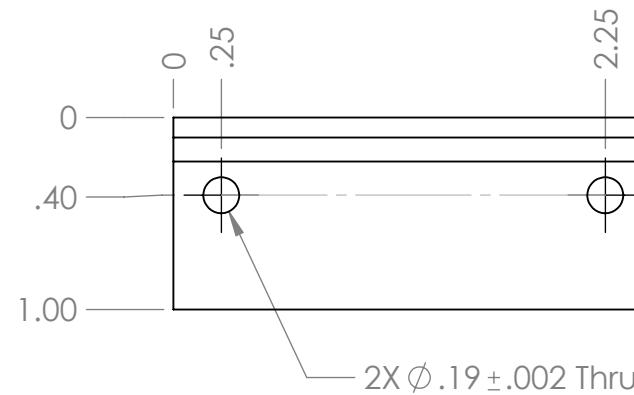
SCALE: 1:4 WEIGHT: SHEET 1 OF 1

4

3

2

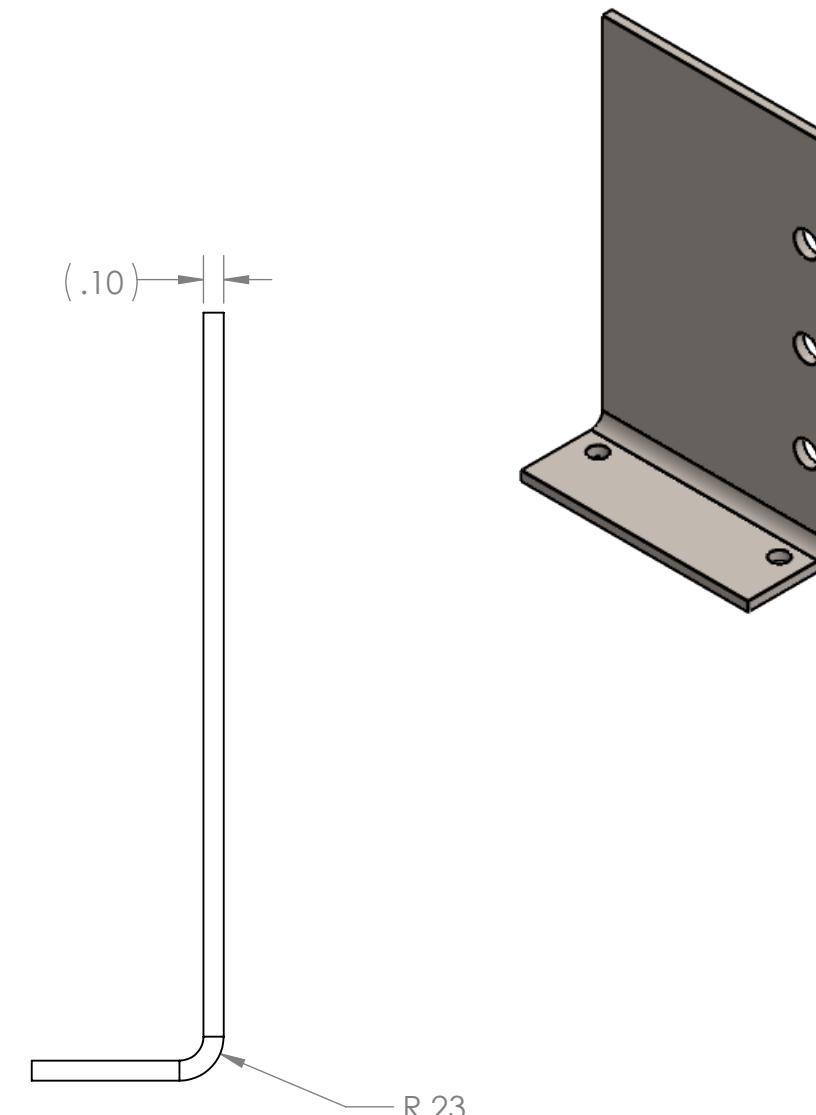
1



Note:
1. Material: 12 Gage Preplated Steel Sheet
2. Remove Sharp Edges and Burrs
3. Tag and Label With Part Number

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A1	A	Changed Part Name	11/22/2019	MXS

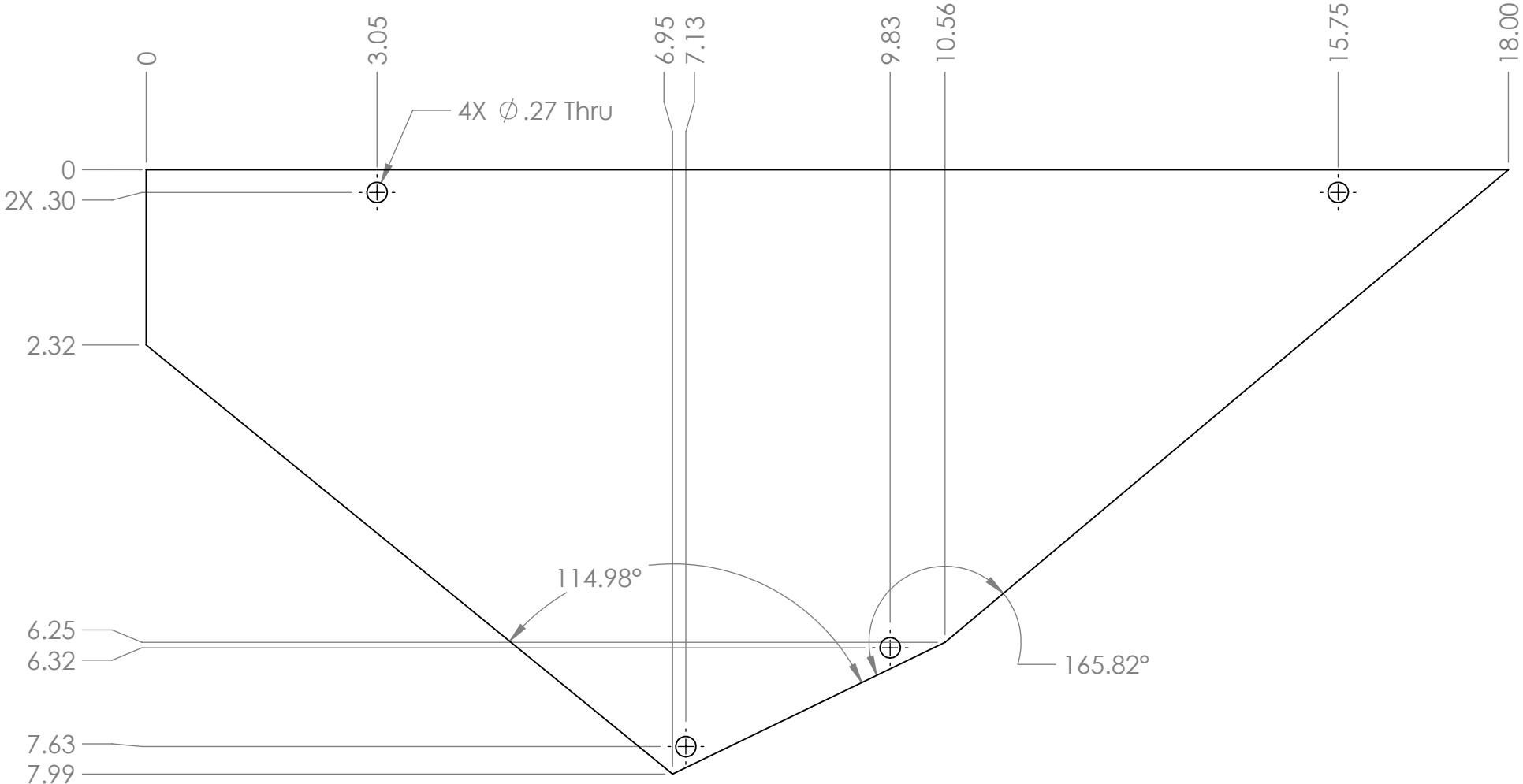


		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DRAWN		DIMENSIONS ARE IN INCHES		
CHECKED		TOLERANCES: FRACTIONAL $\pm 1/16$		
ENG APPR.		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
MFG APPR.		TWO PLACE DECIMAL $\pm .01$		
Q.A.		THREE PLACE DECIMAL $\pm .001$		
INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
MATERIAL				
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Counter Box Side Bracket

SIZE	DWG. NO.	REV
B	GE-20373	A
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1



Notes:

1. Material : 1/4" Thick Polycarbonate Sheet, Clear
2. Remove Sharp Edges and Burrs
3. Tag and Label with Part Numbers

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		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DRAWN		DIMENSIONS ARE IN INCHES		
CHECKED		TOLERANCES: FRACTIONAL $\pm 1/16$		
ENG APPR.		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
MFG APPR.		TWO PLACE DECIMAL $\pm .01$		
Q.A.		THREE PLACE DECIMAL $\pm .001$		
INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:		
MATERIAL				
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Serializer Top Angle

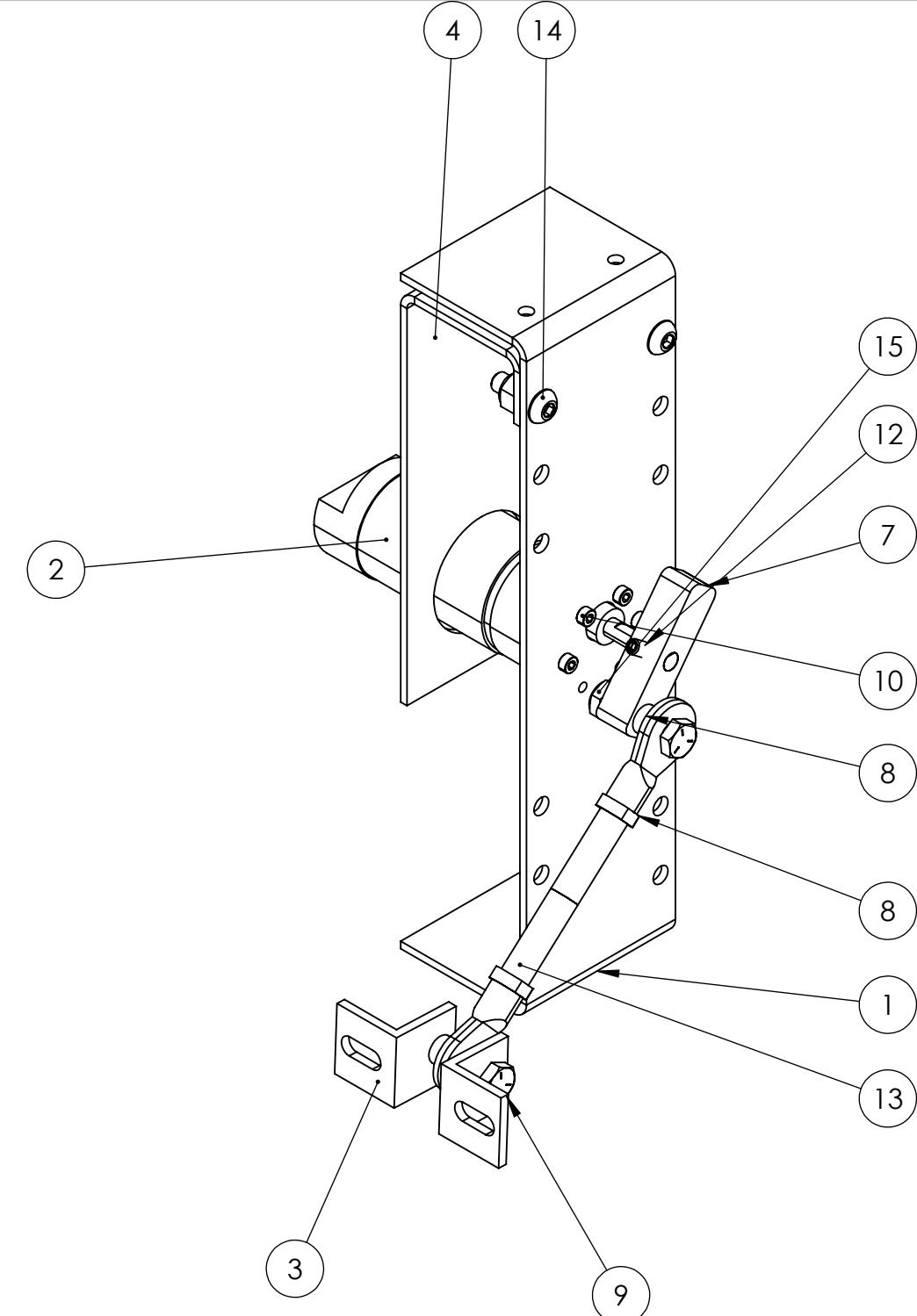
SIZE	DWG. NO.	REV
B	GE-20374	
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

B

B

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20354	Serializer Bracket Support	1
2	GE-20381	NeverRest 60	1
3	GE-20384	L Bracket	2
4	GE-20371	Motor Bracket	1
5	GE-20386	1/4x20 Threaded Shaft	1
6	GE-20385	Spacer	3
7	GE-20382	Hub	1
8	GE-20364	igus bearing	2
9	hex_.25_20_1.25	Hex Head Bolt, 1/4-20 x 1.25", Steel	2
10	M3 SOCKET HEAD CAP SCREW	M3 Socket Head Cap Screw 5mm	4
11	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	2
12	CUP POINT SET SCREW 10-24_.50	Cup Point Set Screw 10-24	1
13	GE-20368	Serializer 1/4 x 20 Rod Spacer	2
14	round_hex_.25_20_.75_full	Steel Button Head Hex Drive Screw, 1/4"-20 x 3/4" long, fully threaded	2
15	Nylock_Shallow_.25_20	Nylock Shallow 1/4 x 20	2

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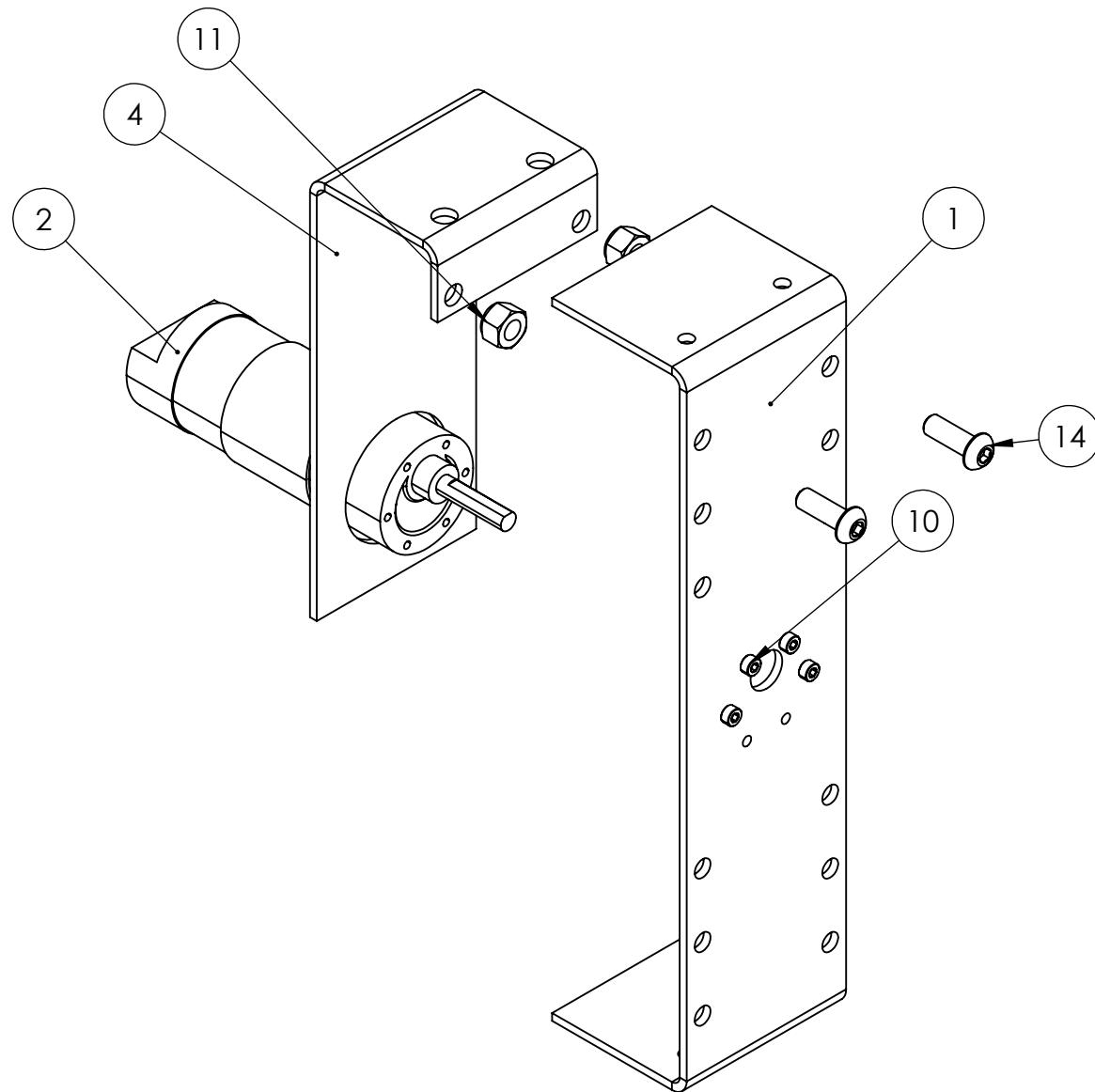


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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
		APPLICATION	DO NOT SCALE DRAWING		
SIZE	DWG. NO.	REV			
B	GE-20380				
SCALE: 1:2	WEIGHT:	SHEET 1 OF 2			

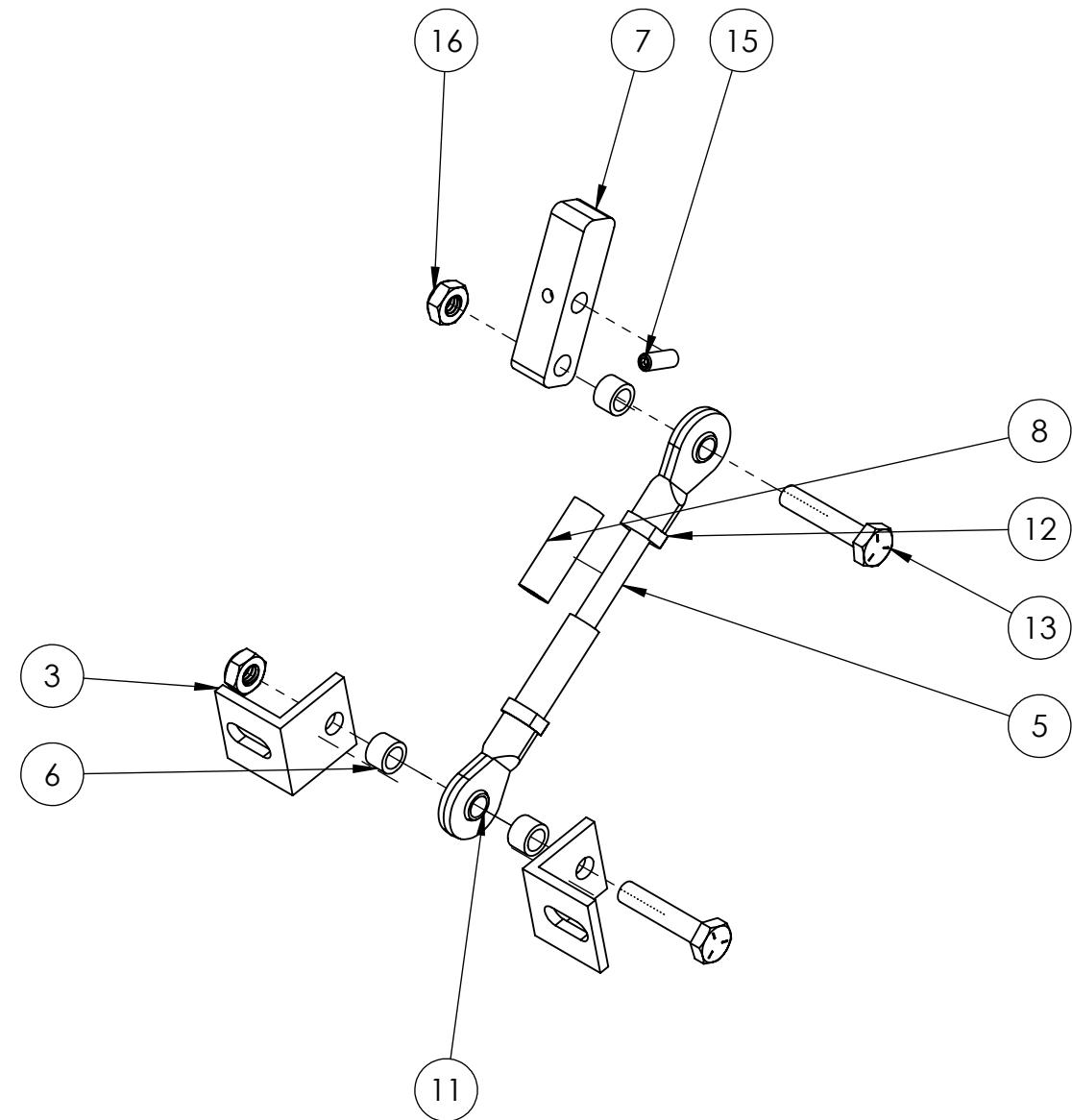
FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

NeverRest
Assembly



Base Assembly Exploded View



Linkage Exploded View

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

NeverRest Assembly

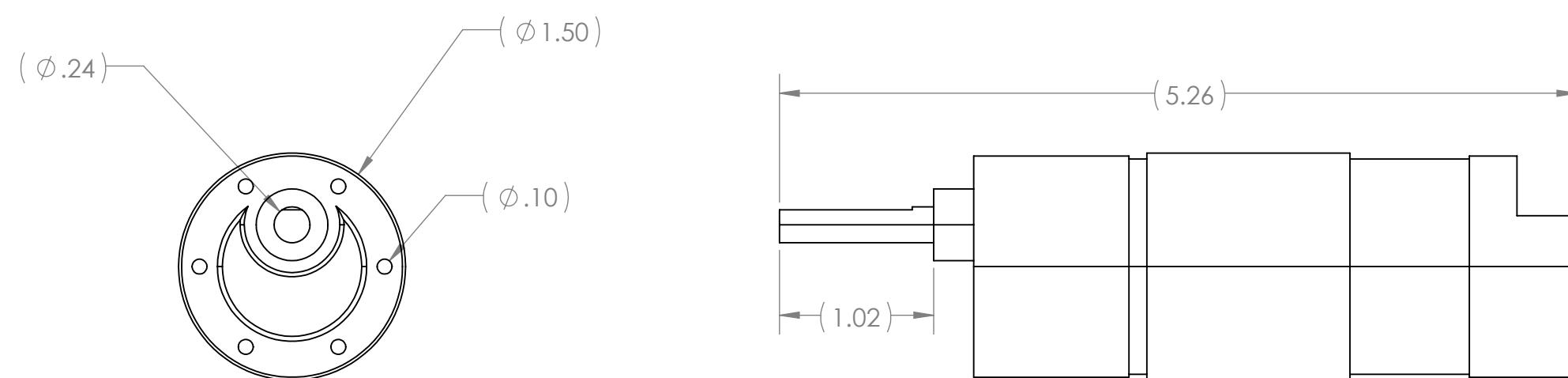
SIZE	DWG. NO.	REV
B	GE-20380	
SCALE: 1:8	WEIGHT:	SHEET 2 OF 2

4

3

2

1



Description: NeverRest 60 Motor

Vendor: Andymark

Part Number: am-3103

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: NeverRest 60

SIZE DWG. NO. **B** GE-20381 **REV**

SCALE: 1:2 WEIGHT: SHEET 1 OF 1

4

3

2

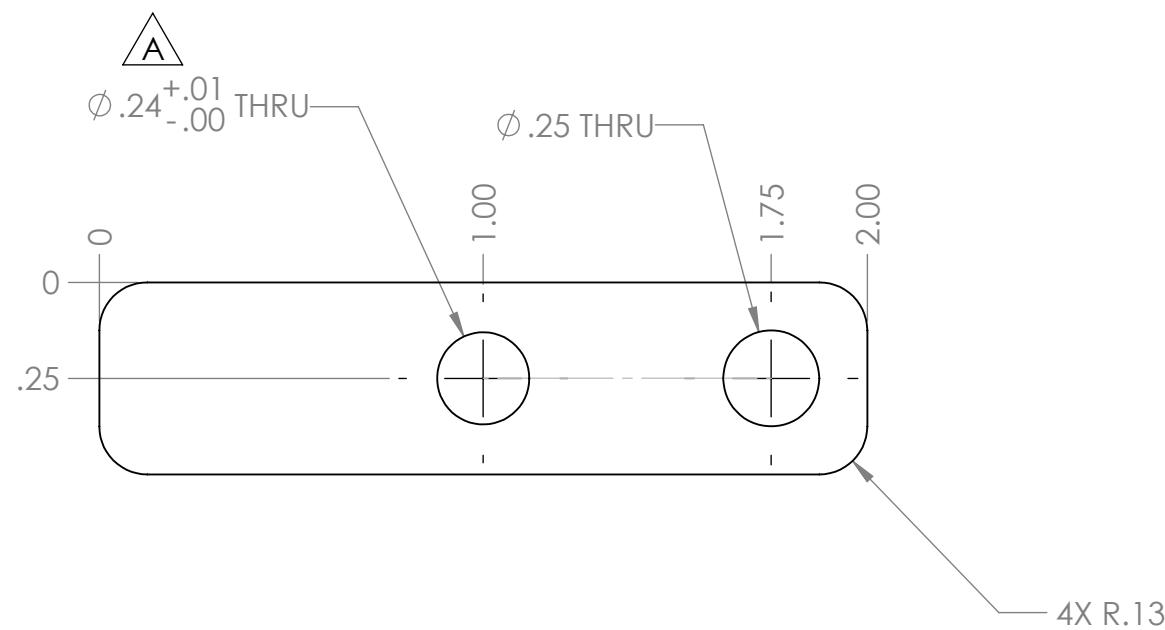
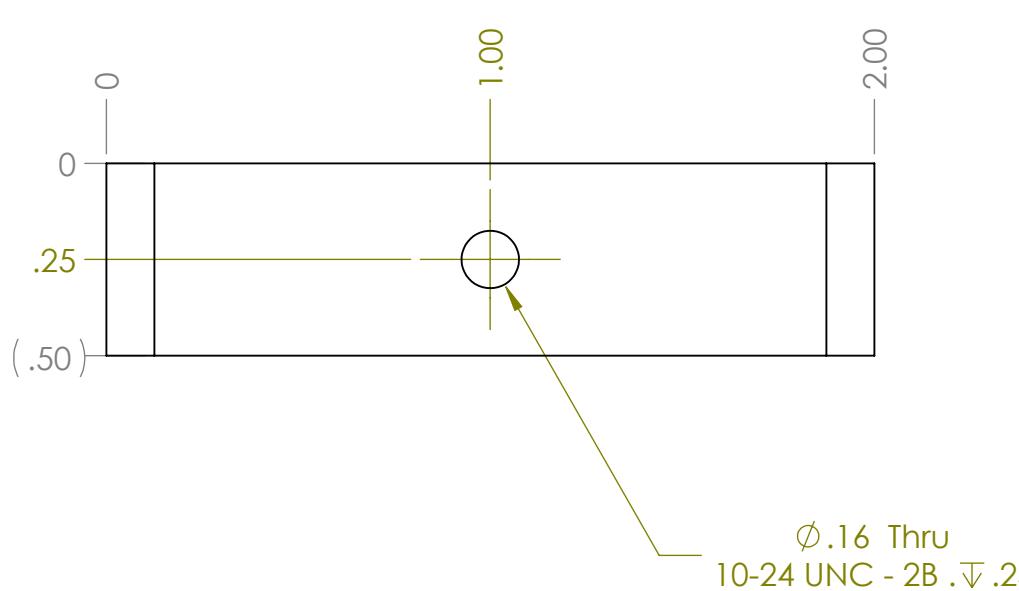
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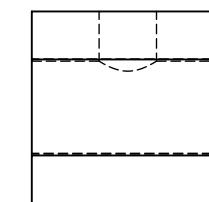
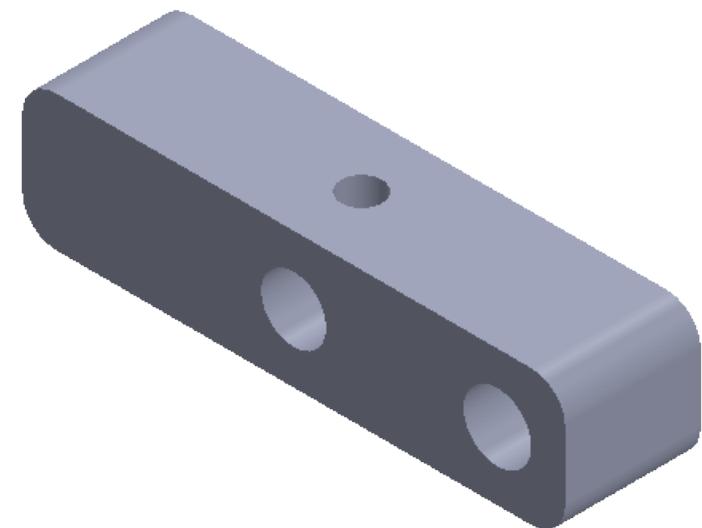
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Note:
1. Material: 1/2" Square Bar, 6061 Aluminum
2. Remove Sharp Edges and Burrs
3. Tag and Label With Part Number

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REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B4	A	Changed Hole size and tolanced	10/23/2019	MXS



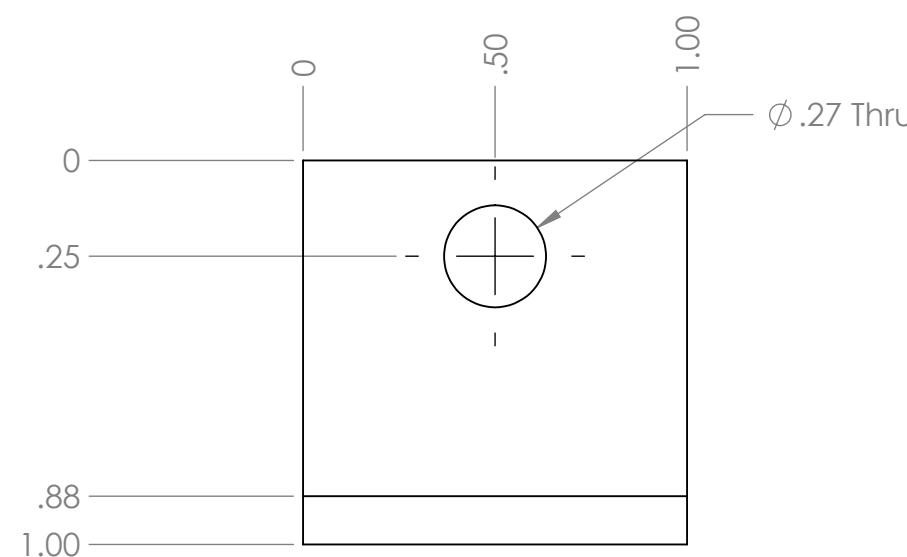
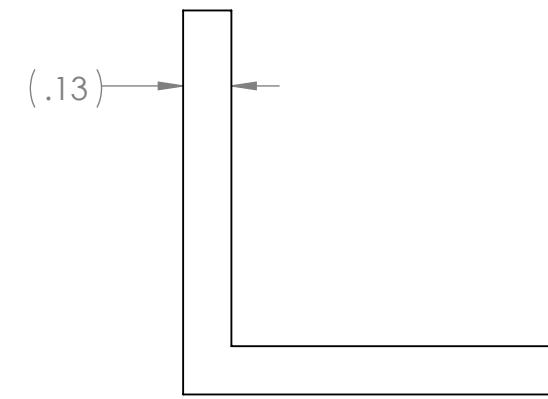
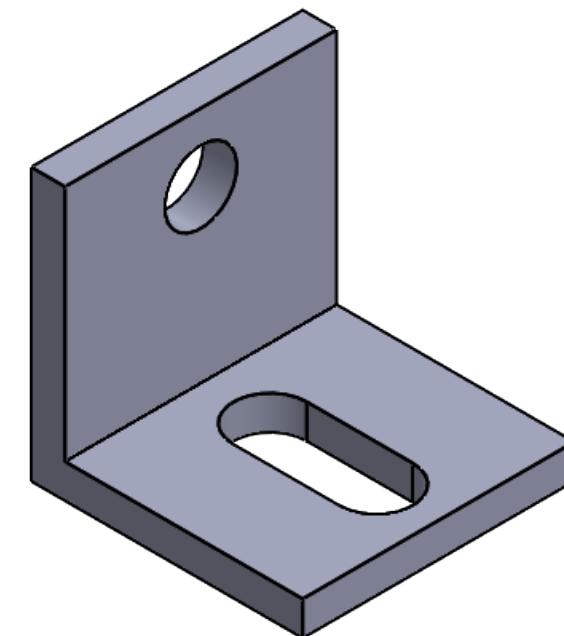
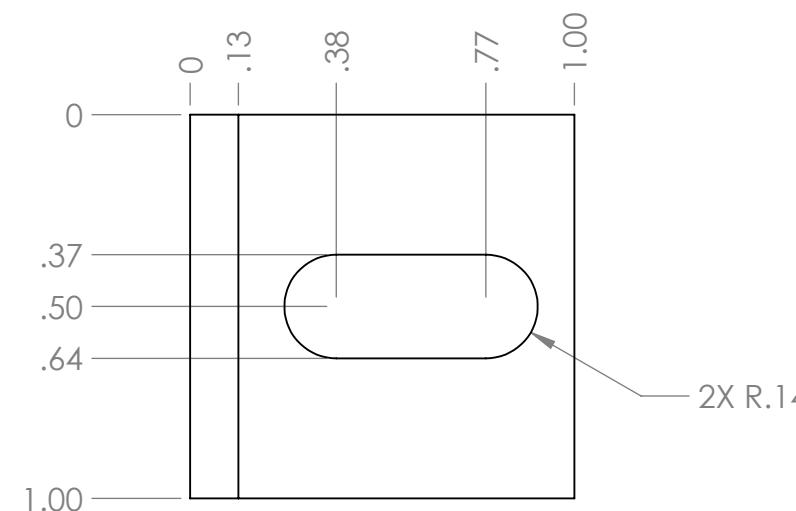
		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES		
		TOLERANCES:		
		FRACTIONAL $\pm 1/16$		
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		
		TWO PLACE DECIMAL $\pm .01$		
		THREE PLACE DECIMAL $\pm .001$		
		INTERPRET GEOMETRIC TOLERANCING PER:		
		MATERIAL		
		Q.A.		
		COMMENTS:		
NEXT ASSY	USED ON	FINISH		
APPLICATION		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

HUB

SIZE	DWG. NO.	REV
B	GE-20382	B
SCALE: 2:1	WEIGHT:	SHEET 1 OF 1

4 3 2 1



- Notes:
1. Material: 1x1x.125 Aluminum Angle 6063
 2. Remove Sharp Edges and Burrs
 3. Tag and Label with Part Numbers

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

L Bracket

SIZE	DWG. NO.	REV
B	GE-20384	
SCALE: 2:1	WEIGHT:	SHEET 1 OF 1

4 3 2 1

4

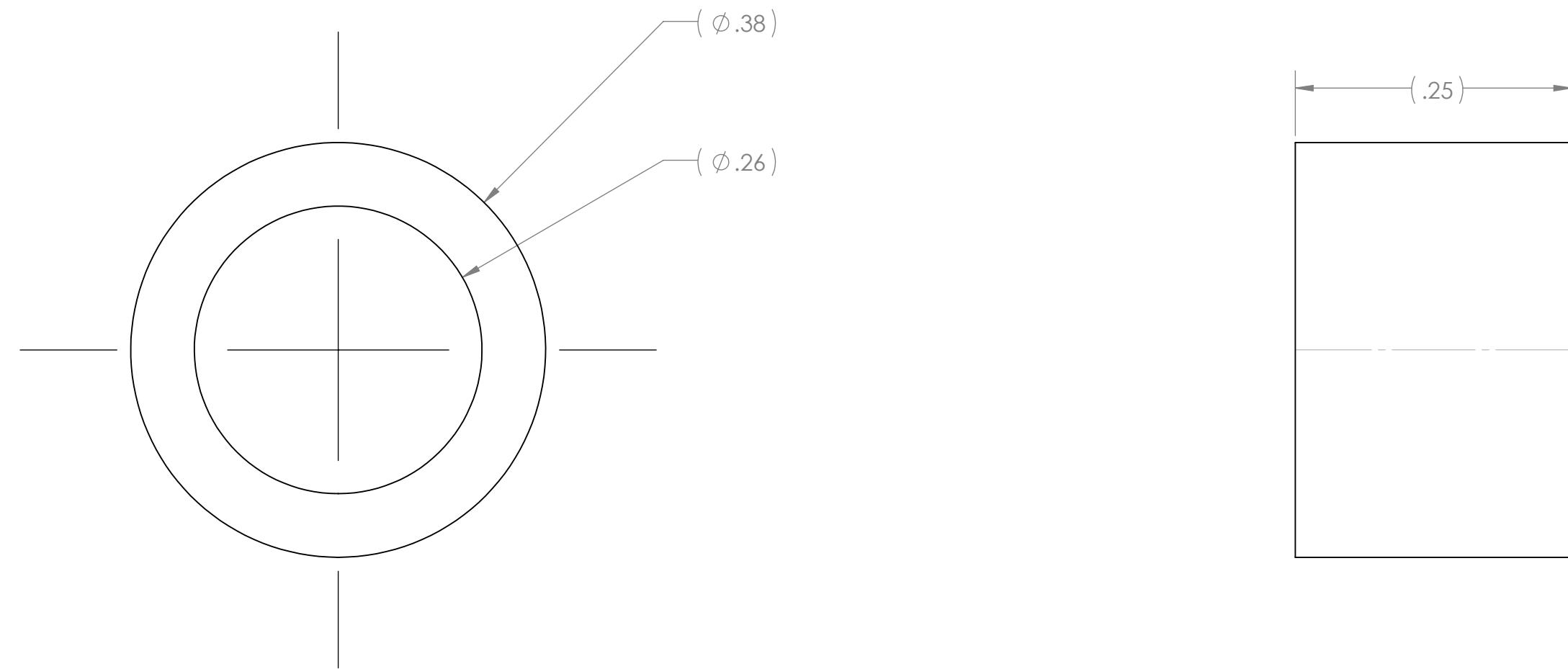
3

2

1

B

B



Notes

Vendor: McMasterCarr

Partnumber: 94639A569

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		DIMENSIONS ARE IN INCHES		DRAWN	
		TOLERANCES:		CHECKED	
		FRACTIONAL $\pm 1/16$		ENG APPR.	
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$		MFG APPR.	
		TWO PLACE DECIMAL $\pm .01$		Q.A.	
		THREE PLACE DECIMAL $\pm .001$		COMMENTS:	
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
 Modeling Solutions Partner

Title: Spacer

Size: DWG. NO. **B** GE-20385 **Rev:**

Scale: 8:1 **Weight:**

Sheet 1 of 1

4

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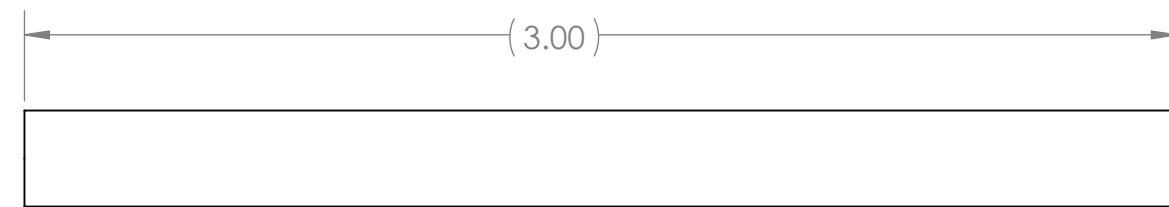
2

1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A3	A	Changed Part and part length	10/24/2019	MXS

B

B



A

Notes

- NOTES:
1. Material: Low-Strength Steel Threaded Rod
1/4"-20 Thread Size, 3" Long

Mcmaster-Carr: 91565A554

A

A

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: 1/4x20 Threaded Shaft
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$	DRAWN				
			CHECKED				
			ENG APPR.				
			MFG APPR.				
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.				
		MATERIAL	COMMENTS:				
NEXT ASSY	USED ON	FINISH				SIZE DWG. NO. B GE-20386	REV A
APPLICATION		DO NOT SCALE DRAWING					
			SCALE: 2:1	WEIGHT:	SHEET 1 OF 1		

4

3

2

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4

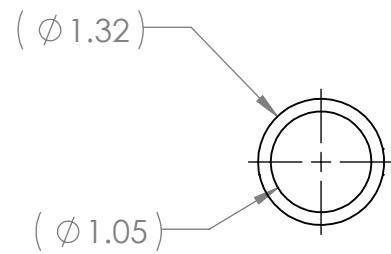
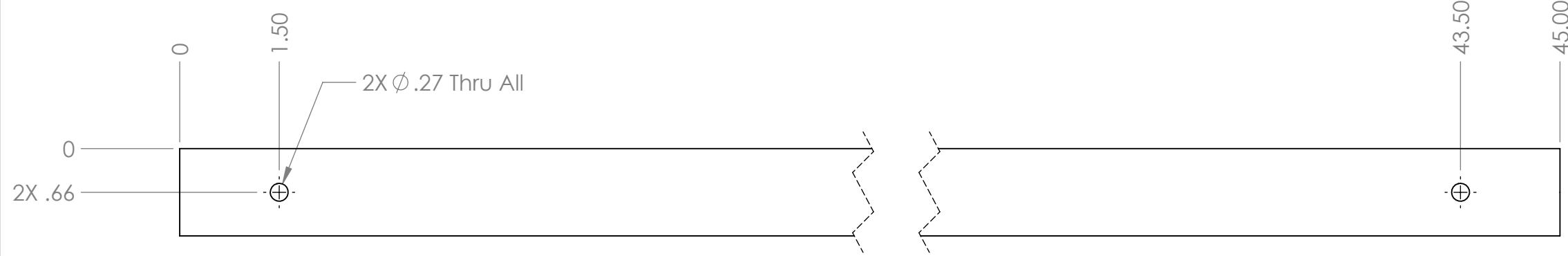
3

2

1

B

B



Notes:
 1. Material: 1" Schedule 40 Pipe, 6061 Aluminum
 2. Remove Sharp Edges and Burrs
 3. Tag and Label With Part Number

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		UNLESS OTHERWISE SPECIFIED:		NAME _____ DATE _____ DRAWN _____ CHECKED _____ ENG APPR. _____ MFG APPR. _____ Q.A. _____	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			
SIZE		DWG. NO.		REV	
B		GE-20387			
SCALE: 1:2		WEIGHT:		SHEET 1 OF 1	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
 Modeling Solutions Partner

TITLE: support bar

4

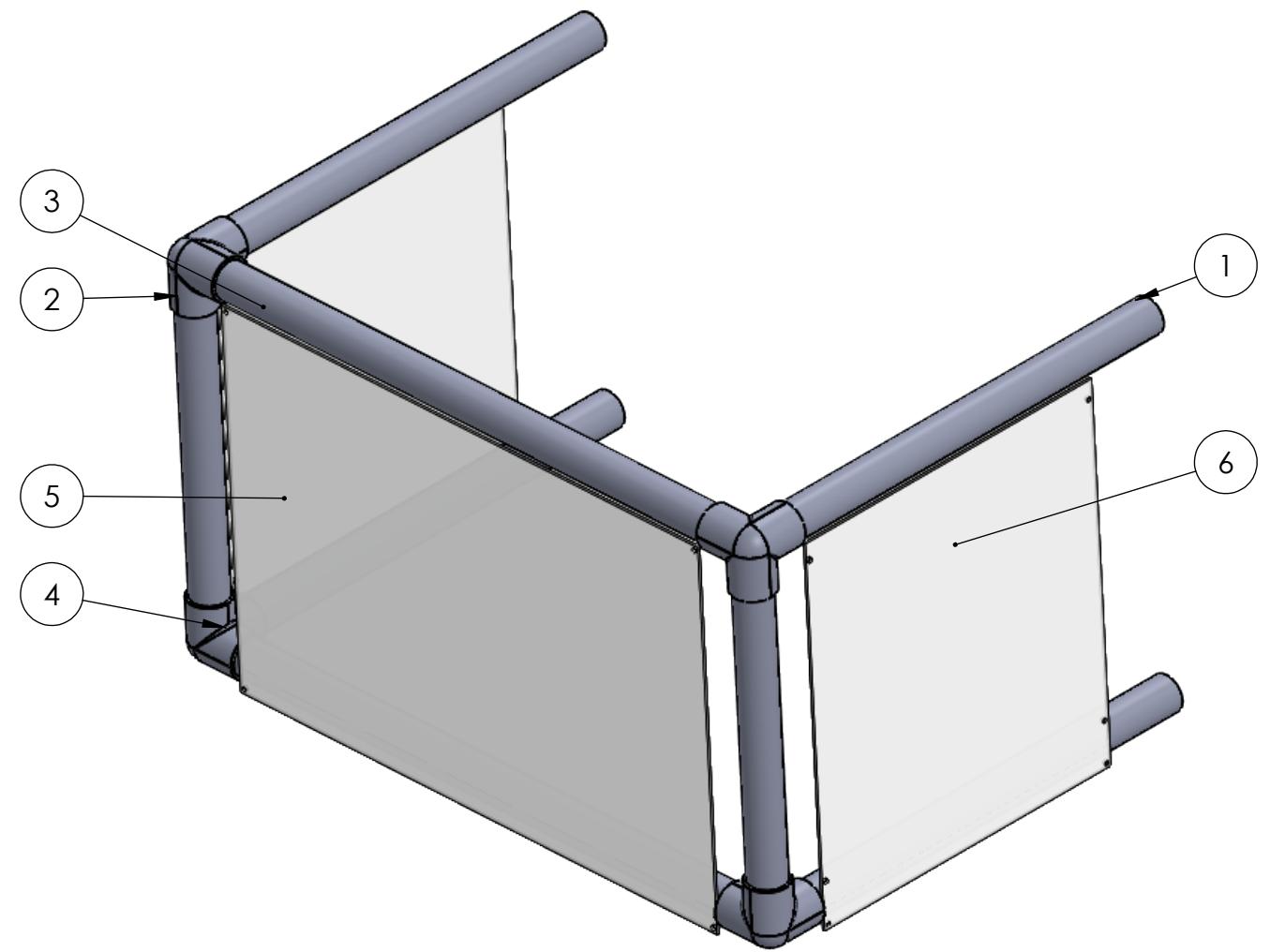
3

2

1

B

B



Note: Use cable ties to attach plastic pieces.

A

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GE-20393	Corral Leg Side	4
2	GE-20396	Corral Elbow	4
3	GE-20395	Corral Leg Middle	2
4	GE-20394	Corral Leg Vertical	2
5	GE-20391	Corral Backboard	1
6	GE-20392	Corral Side Plastic	2

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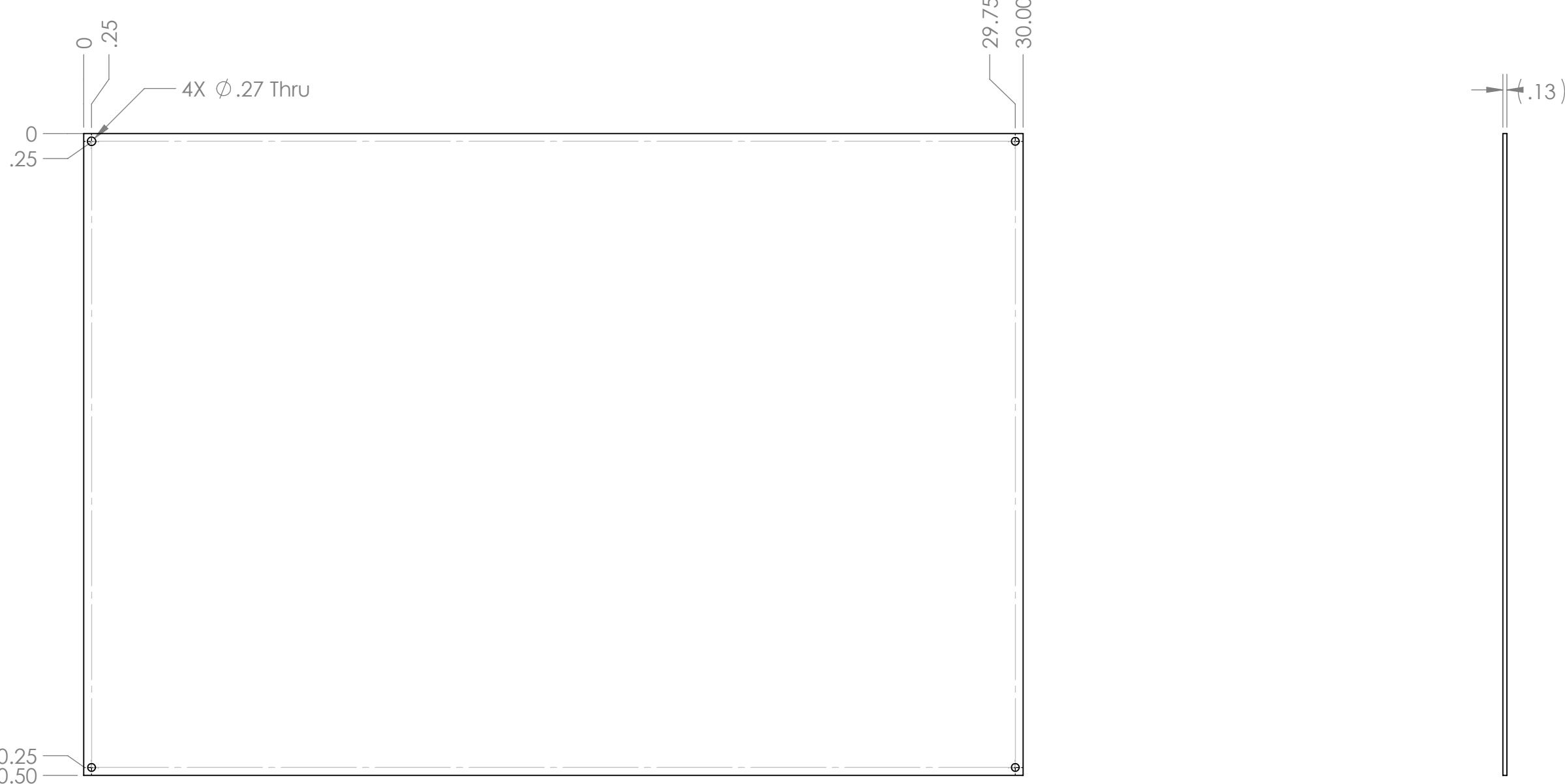
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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
	APPLICATION	DO NOT SCALE DRAWING			
SIZE	DWG. NO.			REV	
B	GE-20390				
SCALE: 1:8	WEIGHT:			SHEET 1 OF 1	

4

3

2

1



B

B

A

A

Notes:

1. Material: 1/8" Polycarbonate Sheet clear
2. Remove Sharp Edges and Burrs
3. Tag and Label with Part Numbers

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		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

Coral Backboard

SIZE	DWG. NO.	REV
B	GE-20391	
SCALE: 1:4	WEIGHT:	SHEET 1 OF 1

4

3

2

1

4

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2

1



- Notes:
1. Material: 1/8" Thick Polycarbonate Clear
 2. Remove Sharp Edges and Burrs
 3. Tag and label with part number

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		UNLESS OTHERWISE SPECIFIED:		NAME _____ DATE _____ DRAWN _____ CHECKED _____ ENG APPR. _____ MFG APPR. _____ Q.A. _____ COMMENTS: _____	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .01$ THREE PLACE DECIMAL $\pm .001$			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			
B	GE-20392	SIZE DWG. NO. REV			
SCALE: 1:4		WEIGHT:	SHEET 1 OF 1		

4

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FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Coral Side Plastic

4

3

2

1

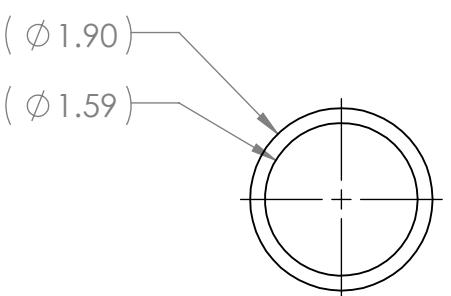
B

B

0



24.00



Notes:

1. Materials: 1 1/2" Schedule 40 PVC Pipe, White
2. Remove Sharp edges and burrs
3. Remove markings and lettering
4. Tag and Label with Part Numbers

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON	APPLICATION		
		DO NOT SCALE DRAWING		

FIRST ROBOTICS COMPETITION **SOLIDWORKS**
Modeling Solutions Partner

TITLE: Corral Leg Side

B	GE-20393	REV
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1

4

3

2

1

4

3

2

1

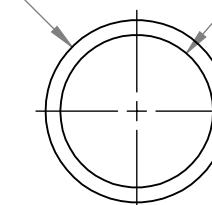
B

B



18.00

(Ø 1.90)



(Ø 1.59)

Notes:

1. Material: 1-1/2" Schedule 40 PVC Pipe, White
2. Remove Lettering and Markings
3. Remove Sharp Edges and Burrs
4. Tag and Label with Part Number

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PERMISSION OF **FIRST®** IS PROHIBITED.

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES			DRAWN		
TOLERANCES:			CHECKED		
FRACTIONAL $\pm 1/16$			ENG APPR.		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$			MFG APPR.		
TWO PLACE DECIMAL $\pm .01$			Q.A.		
THREE PLACE DECIMAL $\pm .001$			COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
SIZE		DWG. NO.		REV	
B		GE-20394			
SCALE: 1:2		WEIGHT:		SHEET 1 OF 1	



SOLIDWORKS

Modeling Solutions Partner

Corral Leg Vertical

4

3

2

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4

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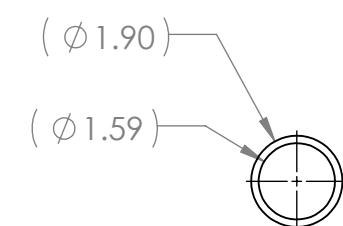
B

A

B

C

33.13



Notes

1. Material: 1-1/2" Schedule 40 PVC, White
 2. Remove Labeling and Lettering
 3. Remove Sharp Edges and Burrs
 4. Tag and Label with Part Number

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 FIRST ROBOTICS COMPETITION	TITLE: <h1>Corral Leg Middle</h1>
		DIMENSIONS ARE IN INCHES	DRAWN				
		TOLERANCES:	CHECKED				
		FRACTIONAL $\pm 1/16$	ENG APPR.				
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.				
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		THREE PLACE DECIMAL $\pm .001$	COMMENTS:				
		INTERPRET GEOMETRIC				SIZE DWG. NO. B GE-20395 REV	
		TOLERANCING PER:					
		MATERIAL					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					

4

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2

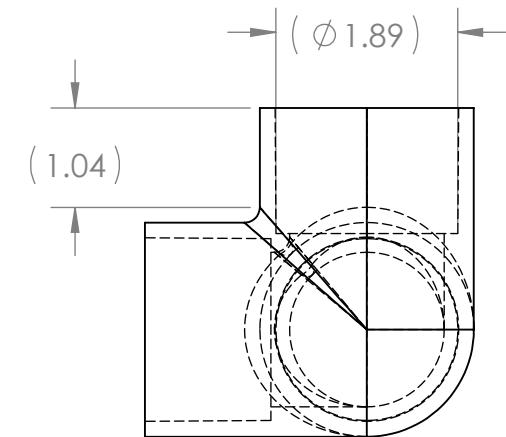
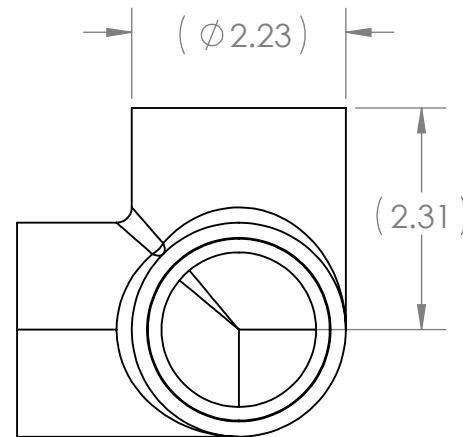
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1



Description: Standard-Wall PVC Pipe Fitting for Water Side-Outlet Elbow Connector, 1-1/2 Socket-Connect Female

Vendor: McMaster-Carr

Part Number: 4880K634

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL: ±.01 THREE PLACE DECIMAL: ±.001		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
SIZE	DWG. NO.			REV	
B	GE-20396				
SCALE: 1:2	WEIGHT:			SHEET 1 OF 1	

FIRST
ROBOTICS
COMPETITION

SOLIDWORKS
Modeling Solutions Partner

Corral Elbow

4

3

2

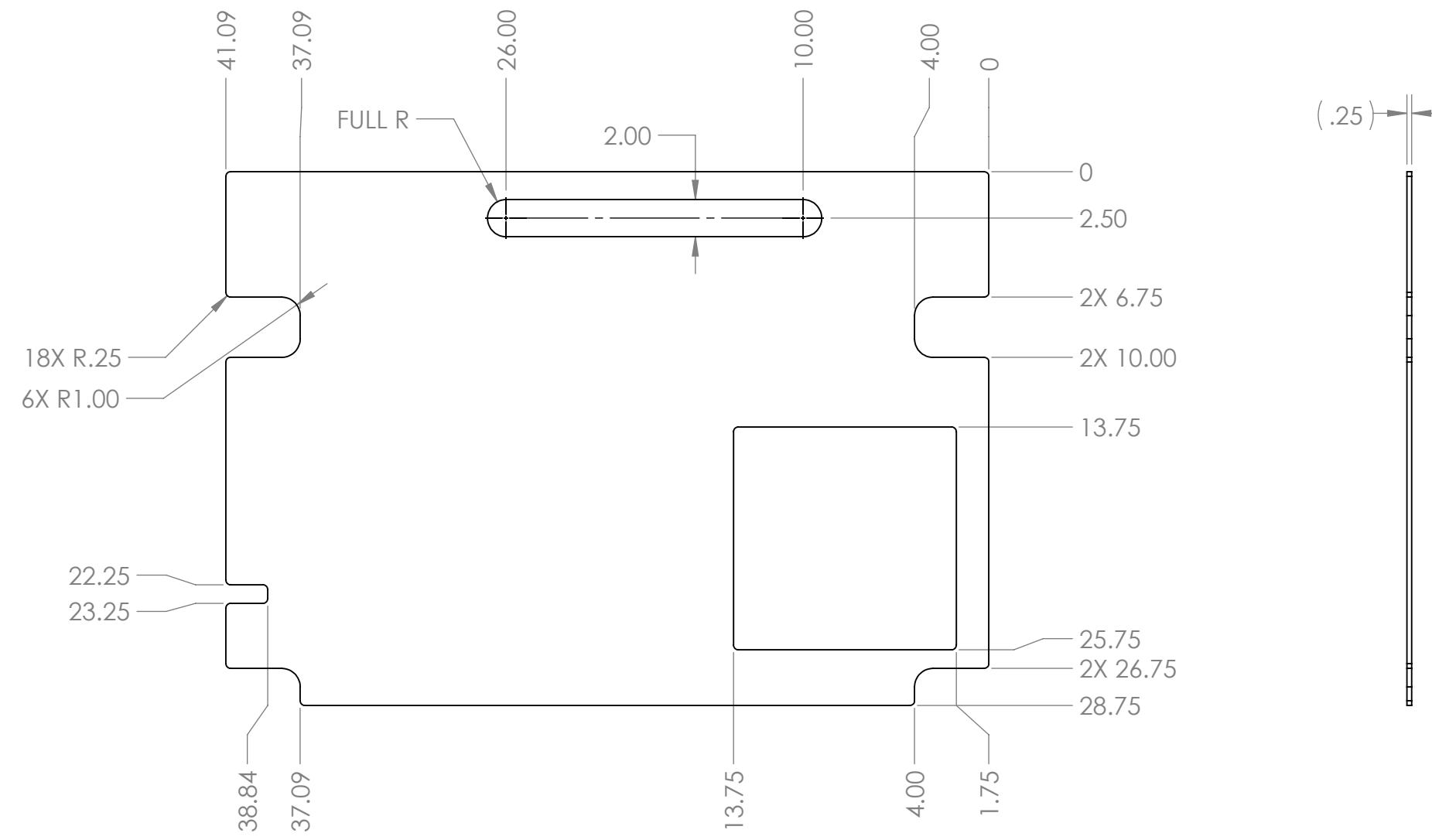
1

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**Notes:**

1. Material: 1/4" Clear Polycarbonate.
2. Remove all burrs and sharp edges.
3. Tag or label with part number.

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		MATERIAL		
		FINISH		
NEXT ASSY	USED ON			
APPLICATION	DO NOT SCALE DRAWING			
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B	GE-20398			
SCALE: 1:8	WEIGHT:		SHEET 1 OF 1	

4

3

2

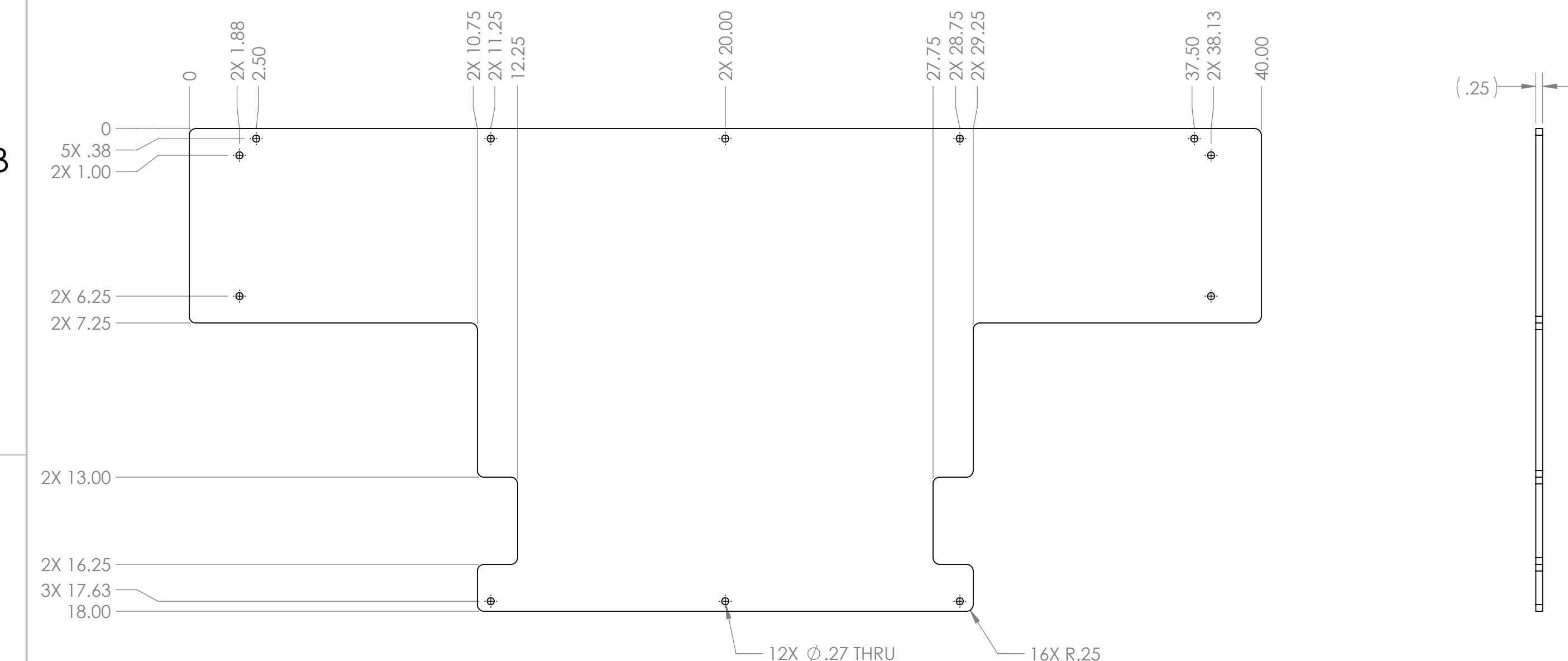
1

4

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1



Notes:

- Notes:

 1. Material: 1/4" Clear Polycarbonate
 2. Remove all burrs and sharp edges.
 3. Tag or label with part number.

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		DIMENSIONS ARE IN INCHES	DRAWN			
		TOLERANCES:	CHECKED			
		FRACTIONAL $\pm 1/16$	ENG APPR.			
		ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$	MFG APPR.			
		TWO PLACE DECIMAL $\pm .01$	Q.A.			
		THREE PLACE DECIMAL $\pm .001$	COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
SIZE DWG. NO. REV B GE-20399 						
SCALE: 1:4 WEIGHT: SHEET 1 OF 1						

4

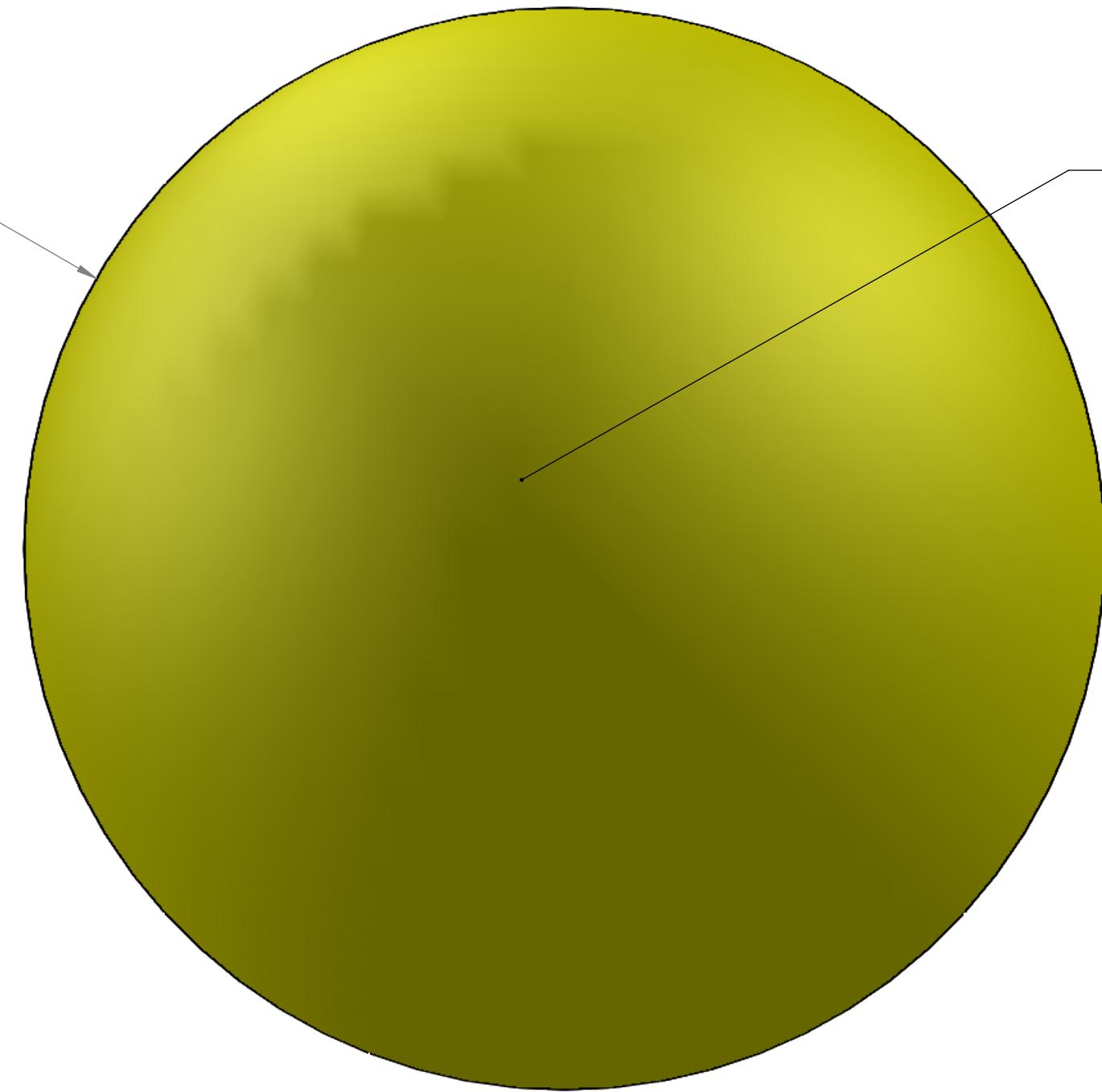
3

2

1

B

B

 $\phi 7.00$ 

FIRST logo applied to face in black.

A

A

Notes:

1. Description: Medium Bounce Dino-Skin Foam Ball, 7 inches
2. Source: Flaghouse
3. Item #: 1892 YEL
4. Available to teams as am-4200 from AndyMark

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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 $\pm .01$ THREE PLACE DECIMAL $\pm .001$		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
		MATERIAL			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		NEXT ASSY	USED ON	FINISH	
		APPLICATION		DO NOT SCALE DRAWING	
B	GE-20500				
SCALE: 1:1	WEIGHT:			SHEET 1 OF 1	

 **FIRST
ROBOTICS
COMPETITION** 
Modeling Solutions Partner

Power Cell

4

3

2

1