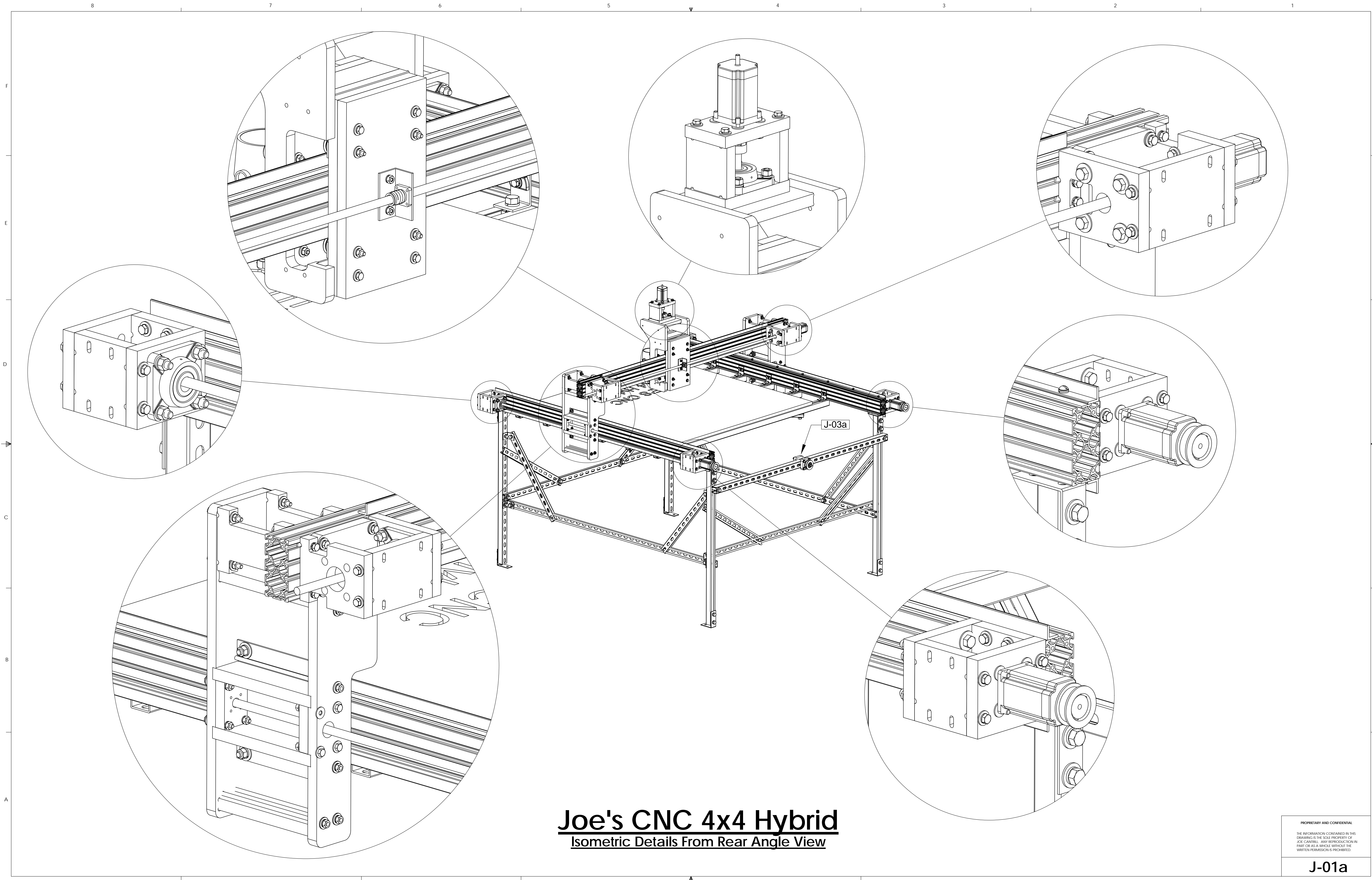


General Table		
PART NO.	DESCRIPTION	QUANTITY
J-01	JOE'S CNC 4X4 Hybrid TOP ASSEMBLY	
J-01a	TIMING BELT PULLEY ASSEMBLY	
J-02	BED ASSEMBLY	1
J-03	BASE STAND	1
J-04	Y-AXIS SIDE SUPPORTS W/ V-BEARING RAIL ASSEMBLY	2
J-05	Y-AXIS CARRIAGE	2
J-06	Y-AXIS MOTOR AND FLANGE BEARING MOUNT	4
J-07	X-AXIS V-BEARING RAIL ASSEMBLY	1
J-08	X-AXIS V-BEARING SLIDE	1
J-09	X-AXIS MOTOR AND FLANGE BEARING MOUNT	2
J-09a	X-AXIS 80/20 FRONT SUPPORT	4
J-10	Z-AXIS CARRIAGE	1
J-11	Z-AXIS MOTOR AND FLANGE BEARING MOUNT	1
J-12	Z-AXIS SLIDE	1
	ROUTER MOUNT, Obtained from K2CNC	1

# Joe's CNC 4x4 Hybrid



**Joe's CNC 4x4 Hybrid**  
Isometric Details From Rear Angle View

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**J-01a**

J-01a Joe's CNC 4x4 Hybrid Cover Sheet

# JOE'S CNC 4X4 HYBRID

Parts Description	Supplier	Quantity
8020 T Slot Aluminum Extrusion 25 S 25-5010 x 72	http://8020inc.com	3
8020 T Slot Hardware T Nuts 10 S 3382 (25pcs) N	http://8020inc.com	6
1018 Carbon Steel Acme Threaded Rod 1/2"-10 5-Start (2tpi) #99030A704	http://www.mcmaster.com	3
1018 Carbon Steel Acme Threaded Rod 1/2"-8 2-Start (4tpi) #99030A316	http://www.mcmaster.com	1
ACME Anti-Backlash Leadnuts - 1/2"-10 ACME 5 Start (2 turns per inch)	www.dumpstercnc.com	3
ACME Anti-Backlash Leadnuts - 1/2"-8 ACME 2 Start (4 turns per inch)	www.dumpstercnc.com	1
Add a 1-3/16" machined square flange	www.dumpstercnc.com	4
1/4 Bore no kw LoveJoy L050 Jaw Coupling Hub Model #990-4044	http://use-enco.com	4
1/2 Bore no kw LoveJoy L050 Jaw Coupling Hub / Model #990-4046	http://use-enco.com	4
LoveJoy Spider	http://use-enco.com	4
1/2" Bore 4 Bolt Flange Bearing Seller: TheBigBearingStore	www.ebay.com	7
GW2X Size 2 Guide Wheel Sealed V Bearing	http://www.superiorbearing.com	16
Concentric bushing for V-groove wheel #2	http://www.cadcamcadcam.com	4
Eccentric bushing for V-groove wheel #2	http://www.cadcamcadcam.com	4
Skate Bearing 5/16" bore		2
3/4" x 3/4" x 1/8" angle iron 72"	Home Depot	6
1/8"x1"x36" Flat Aluminum	Home Depot	3
Superstrut (Unistrut) 1-5/8" x 1-5/8" x 10' 12Ga. Standard Length	Home Depot	5
Superstrut (Unistrut) 1-5/8" x 15/16" x 10' 14Ga. Standard Length	Home Depot	6
90 Degree Angle Superstrut (Unistrut) 1/2" two hole brackets	Home Depot	20
90 Degree Angle Superstrut (Unistrut) 1/2" four hole brackets	Home Depot	8
1/2" Spring Nut Bags (5 pieces)	Home Depot	14
1/4" Spring Nut Bags (5 pieces)	Home Depot	6
1/4" x 1/2" machine screws	Boltdepot.com	58
1/4" x 3/4" Bolts	Boltdepot.com	36
1/4" x 1-1/4" Bolts	Boltdepot.com	26
1/4" x 1-1/2" Bolts	Boltdepot.com	48
1/4" x 2" Bolts	Boltdepot.com	14
1/4" x 3" Bolts	Boltdepot.com	8

Parts Description	Supplier	Quantity
1/4" - 20 nuts	Boltdepot.com	68
1/4" - Flat Washers	Boltdepot.com	175
1/4" - Lock Washers	Boltdepot.com	303
3/8" x 2" Bolts	Boltdepot.com	24
3/8" x 2.5" Bolts	Boltdepot.com	8
3/8" - Flat Washers	Boltdepot.com	44
3/8" - Lock Washers	Boltdepot.com	64
3/8" - Nuts	Boltdepot.com	40
5/16" x 5" Bolts	Boltdepot.com	1
5/16" washers	Boltdepot.com	2
5/16" Lock Washers	Boltdepot.com	1
5/16" Nuts	Boltdepot.com	1
1/2" x 1" Bolts	Boltdepot.com	44
1/2" x 1-1/2" Bolts	Boltdepot.com	25
1/2" x 2" Bolts	Boltdepot.com	4
1/2" x 2-1/2" Bolts	Boltdepot.com	2
1/2" Washers	Boltdepot.com	44
1/2" Lock Washers	Boltdepot.com	70
Hitachi Router 2.25 hp	www.Lowes.com	1
Hitachi Router Mount	www.k2cnc.com	1
Timing Belt L 3/8" Pitch Belt 141" - QB-L14175-050	www.econobelt.com	1
Timing Belt Pulley L 1/4" bore QPELN50015F08	www.econobelt.com	2
Timing Belt Pulley L 1/4" bore QPELN50015F10	www.econobelt.com	1

NOTE:  
1. As always it is better to get more than you need of hardware so you do not run short.  
2. You may also want to purchase hardware in Bulk to save money.  
3. Due to some Manufacturers the Bolt lengths may vary slightly, so it is Suggested to purchase a few 1/4"-20 x 1" bolts

## Joe's CNC 4x4 Hybrid

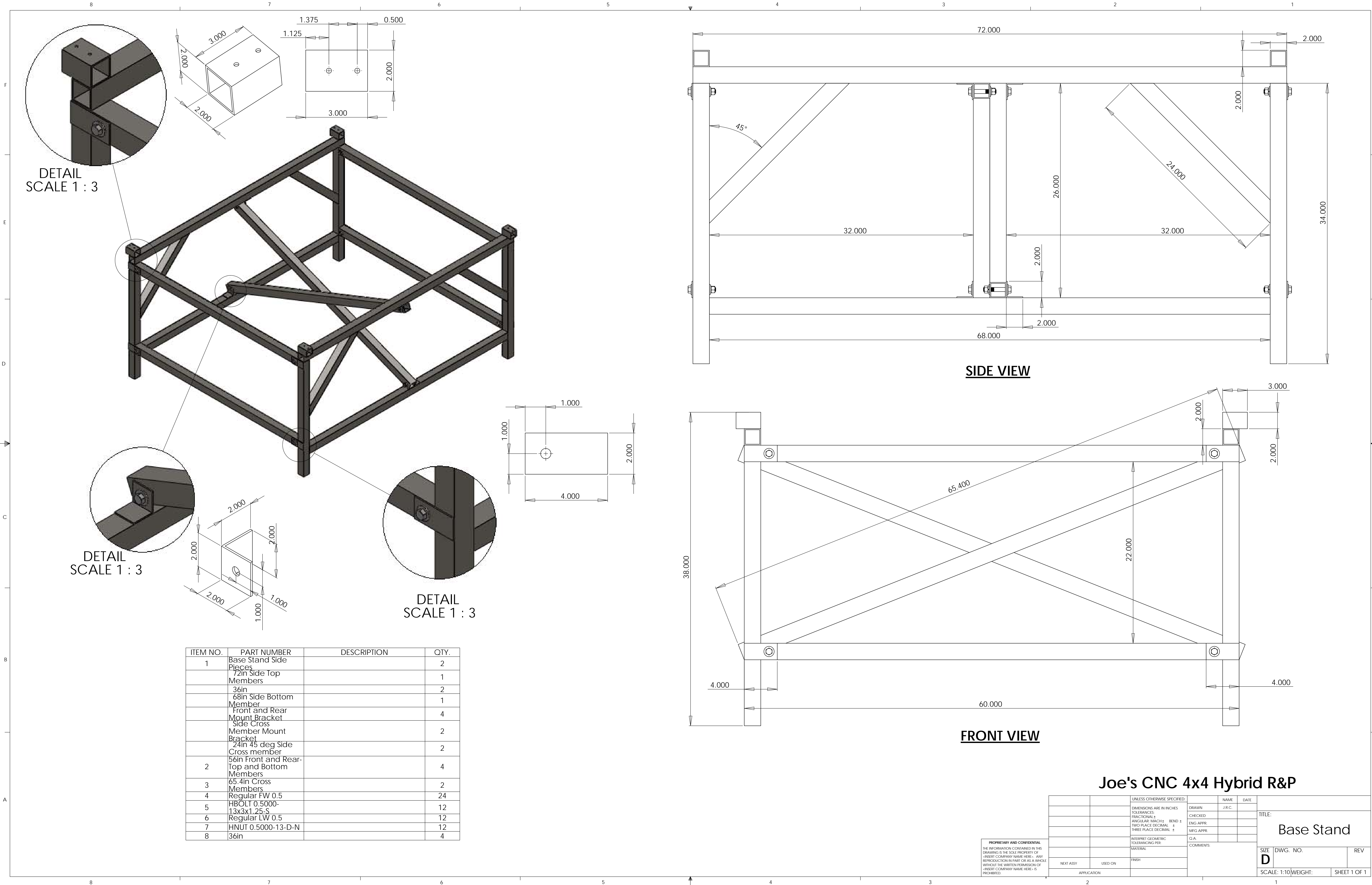
### Bill of Materials

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J-01b

J-01b Joe's CNC 4x4 Hybrid Overall BOM



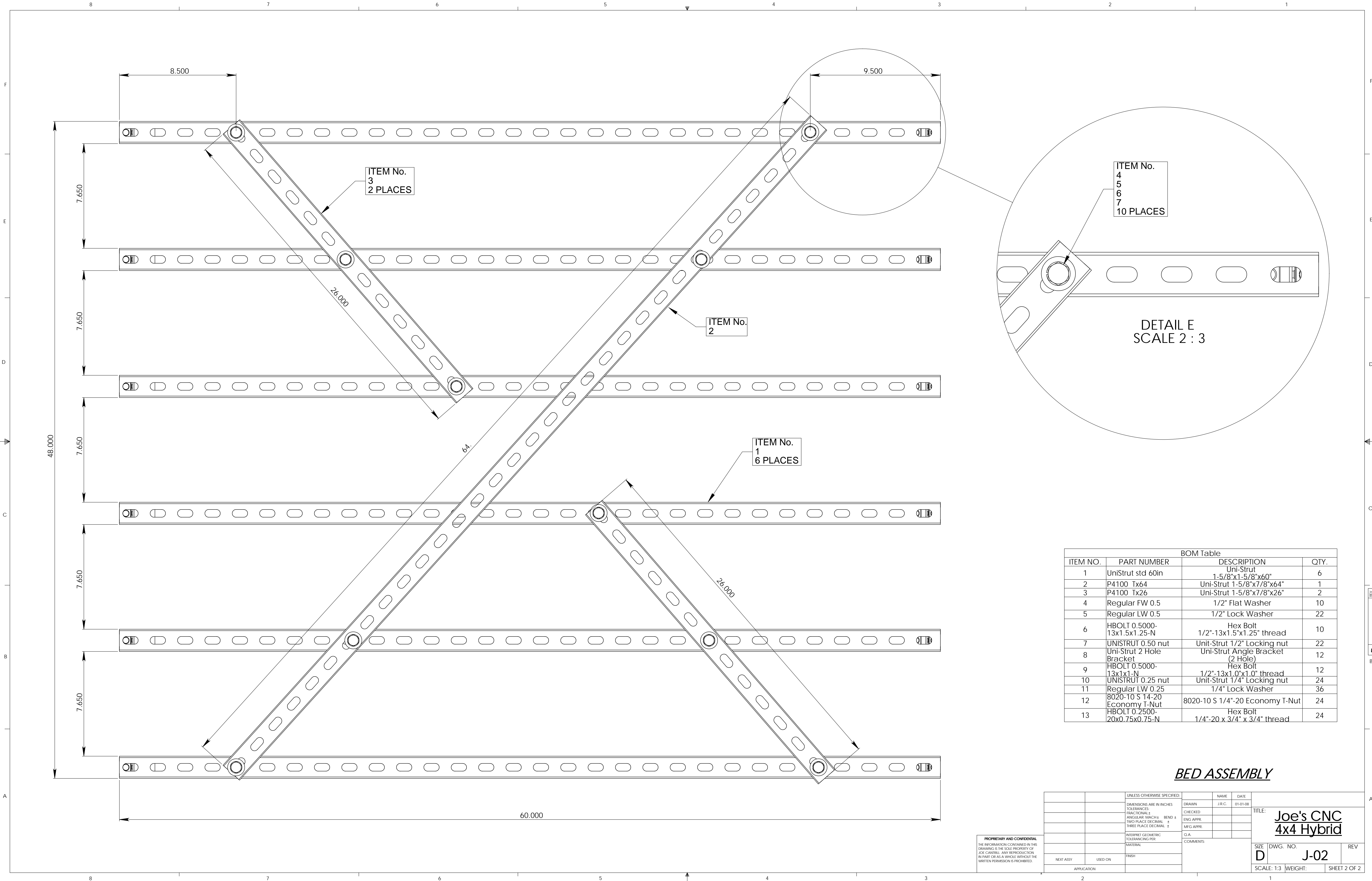


Joe's CNC 4x4 Hybrid R&P

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		ANGULAR MATCH ±		MFG APPR	
		BEND ±		Q.A.	
		TWO PLACE DECIMAL ±		COMMENTS	
		THREE PLACE DECIMAL ±			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL:			
		FINISH:			
		APPLICATION:			
		NEXT ASSY:			
		USED ON:			

TITLE:		SIZE	DWG. NO.	REV
Base Stand		D		
SCALE: 1:10 WEIGHT:		SHEET 1 OF 1		





BOM Table			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	UniStrut std 60in	Uni-Strut 1-5/8"x1-5/8"x60"	6
2	P4100 Tx64	Uni-Strut 1-5/8"x7/8"x64"	1
3	P4100 Tx26	Uni-Strut 1-5/8"x7/8"x26"	2
4	Regular FW 0.5	1/2" Flat Washer	10
5	Regular LW 0.5	1/2" Lock Washer	22
6	HBOLT 0.5000-13x1.5x1.25-N	Hex Bolt 1/2"-13x1.5"x1.25" thread	10
7	UNISTRUT 0.50 nut	Unit-Strut 1/2" Locking nut	22
8	Uni-Strut 2 Hole Bracket	Uni-Strut Angle Bracket (2 Hole)	12
9	HBOLT 0.5000-13x1x1-N	Hex Bolt 1/2"-13x1.0"x1.0" thread	12
10	UNISTRUT 0.25 nut	Unit-Strut 1/4" Locking nut	24
11	Regular LW 0.25	1/4" Lock Washer	36
12	8020-10 S 14-20 Economy T-Nut	8020-10 S 1/4"-20 Economy T-Nut	24
13	HBOLT 0.2500-20x0.75x0.75-N	Hex Bolt 1/4"-20 x 3/4" x 3/4" thread	24

**BED ASSEMBLY**

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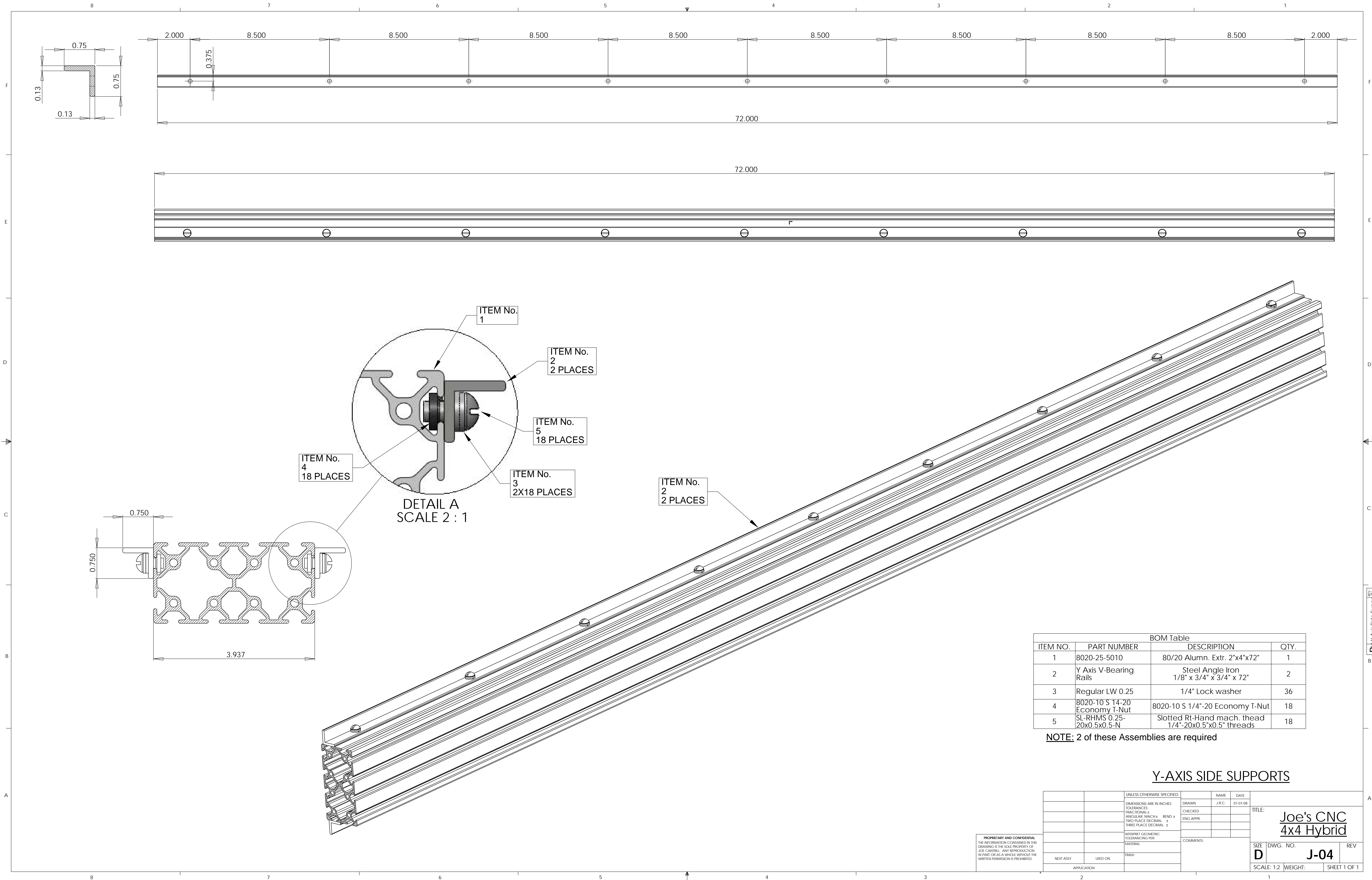
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ANGULAR MATCH ±	BEND ±	ENG APPR.	
TWO PLACE DECIMAL ±	THREE PLACE DECIMAL ±	MFG APPR.	
INTERPRET GEOMETRIC TOLERANCING PER: DIN 15000		Q.A.	
FINISH		COMMENTS	
NEXT ASSY	USED ON		
APPLICATION			

TITLE: **Joe's CNC  
4x4 Hybrid**

SIZE DWG. NO. REV

SCALE: 1:3 WEIGHT: SHEET 2 OF 2





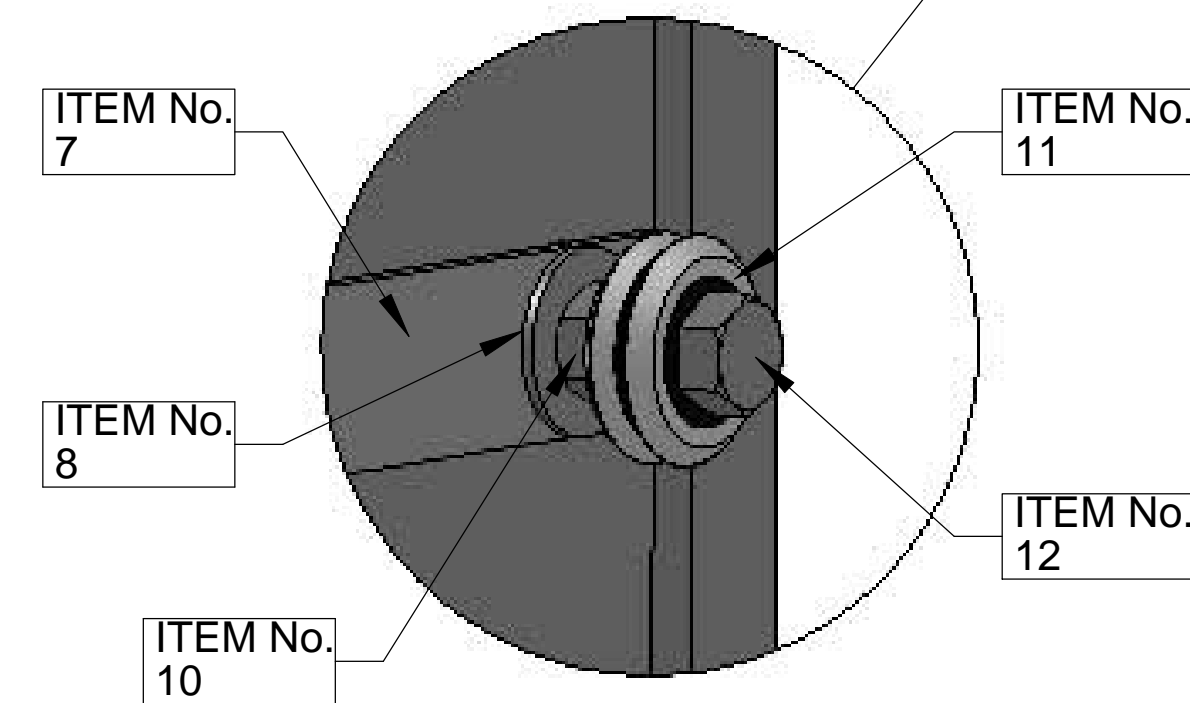
BOM Table			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	8020-25-5010	80/20 Alumn. Extr. 2"x4"x72"	1
2	Y Axis V-Bearing Rails	Steel Angle Iron 1/8" x 3/4" x 3/4" x 72"	2
3	Regular LW 0.25	1/4" Lock washer	36
4	8020-10 S 14-20 Economy T-Nut	8020-10 S 1/4"-20 Economy T-Nut	18
5	SL-RHMS 0.25-20x0.5x0.5-N	Slotted Rt-Hand mach. thead 1/4"-20x0.5"x0.5" threads	18

NOTE: 2 of these Assemblies are required

Y-AXIS SIDE SUPPORTS

		UNLESS OTHERWISE SPECIFIED:		NAME		DATE		TITLE: <div>Joe's CNC 4x4 Hybrid</div>	
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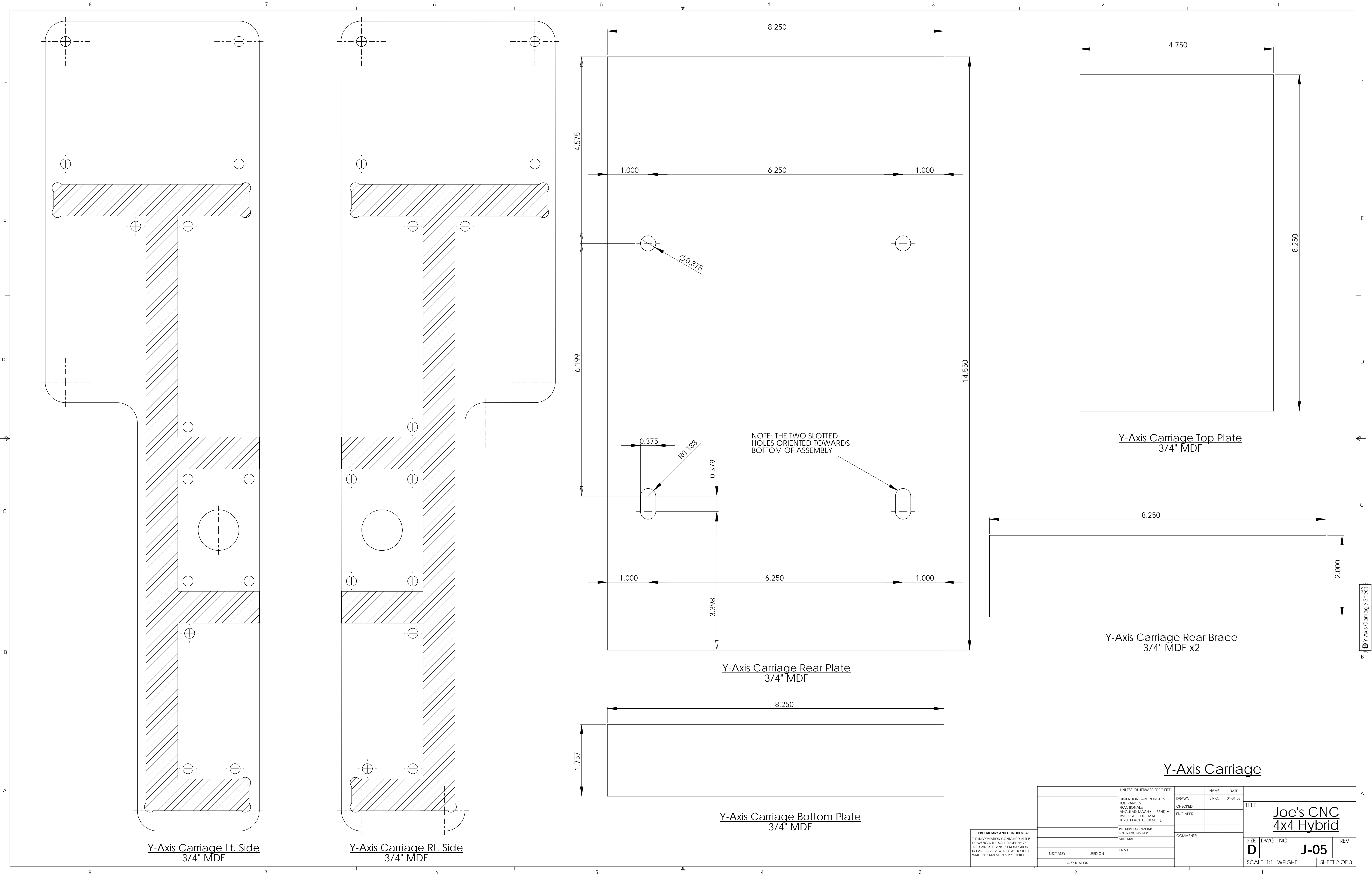
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100





Y-Axis Carriage Top Plate  
3/4" MDF

Y-Axis Carriage Rear Brace  
3/4" MDF x2

Y-Axis Carriage Rear Plate  
3/4" MDF

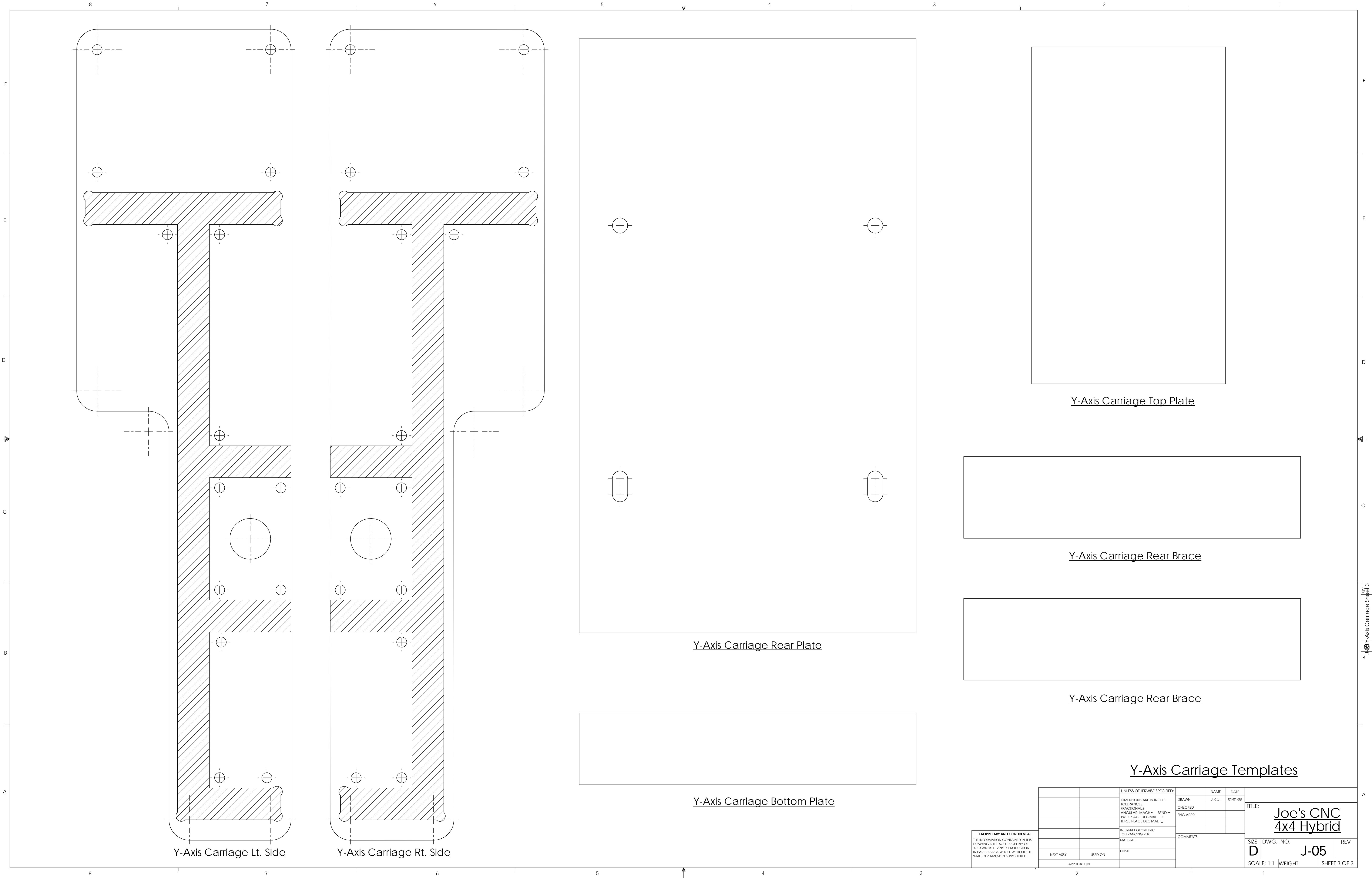
Y-Axis Carriage Bottom Plate  
3/4" MDF

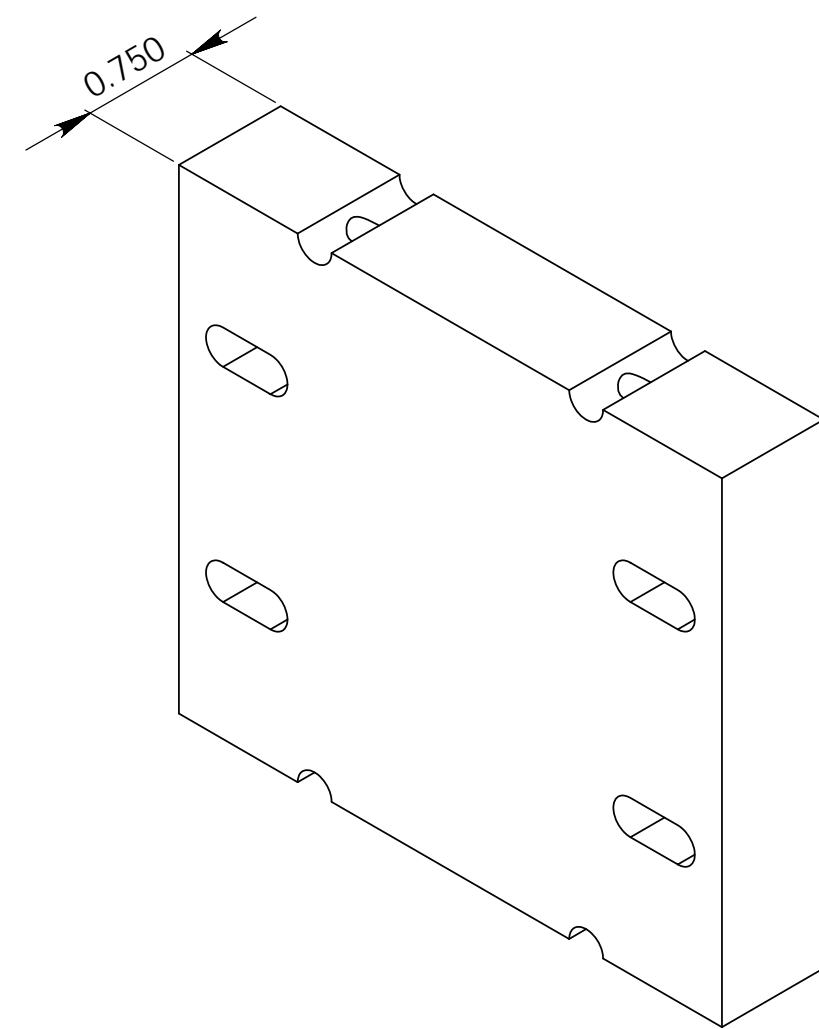
Y-Axis Carriage Lt. Side  
3/4" MDF

Y-Axis Carriage Rt. Side  
3/4" MDF

Y-Axis Carriage

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NEXT ASSY		USED ON		INTERPRET GEOMETRIC TOLERANCING PER:		<p>SIZE DWG. NO.</p> <p>D J-05</p> <p>SCALE: 1:1 WEIGHT: SHEET 2 OF 3</p>	
APPLICATION		FINISH		COMMENTS:			
				MATERIAL			





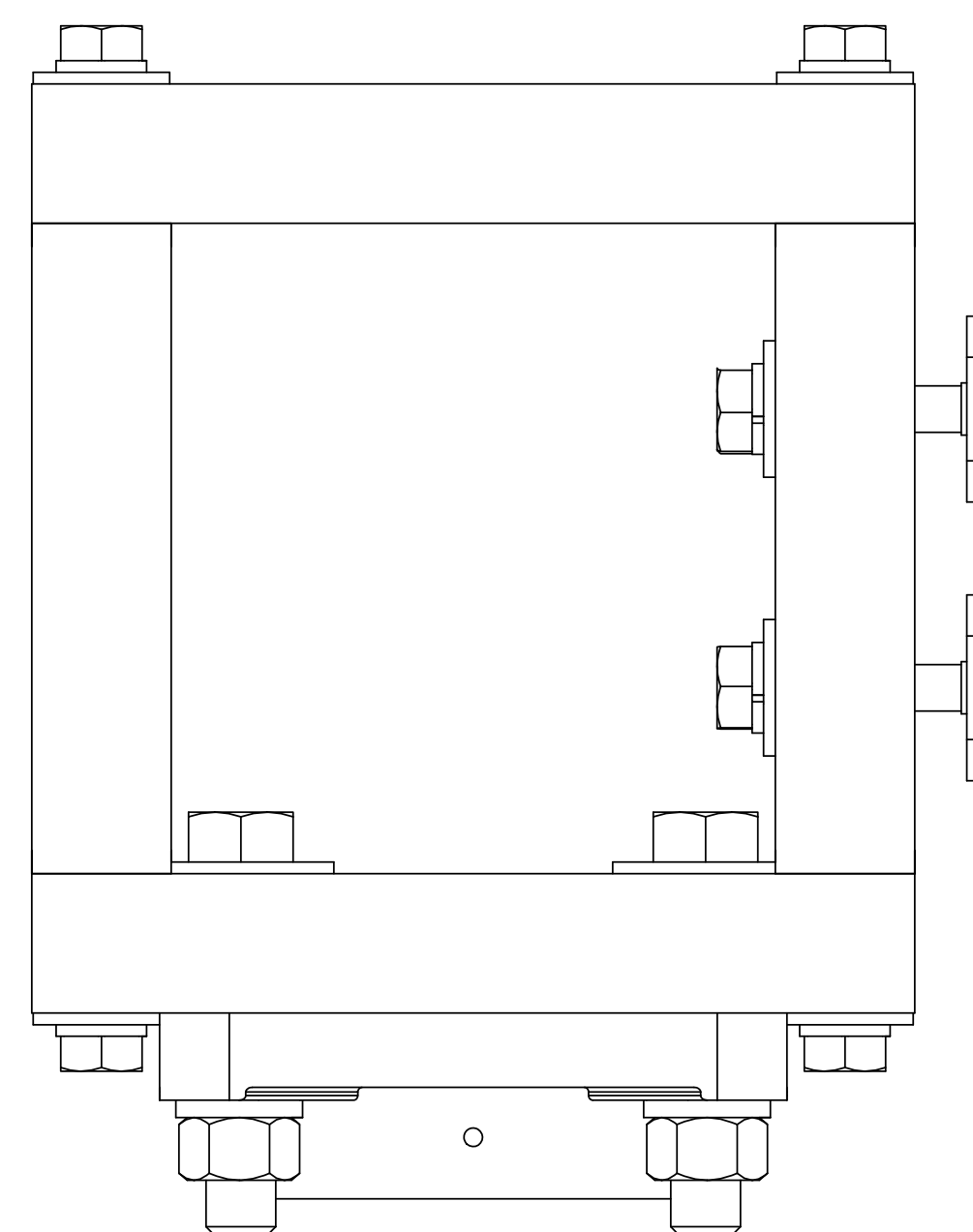
Exploded view diagram of a 1000W 24VDC Motor. The diagram shows the motor assembly with various components labeled with item numbers and their quantities:

- ITEM No. 1: 1 (Motor housing)
- ITEM No. 2: 1 (Top plate)
- ITEM No. 3: 1 (Bottom plate)
- ITEM No. 4: 4 (Screws)
- ITEM No. 5: 5 (Screws)
- ITEM No. 6: 8 PLACES (Screws)
- ITEM No. 7: 1 (Motor shaft)
- ITEM No. 8: 8 (Screws)
- ITEM No. 9: 9 (Screws)
- ITEM No. 10: 10 (Screws)
- ITEM No. 11: 11 (Screws)
- ITEM No. 13: 4 PLACES (Screws)

Technical drawing of a rectangular plate with the following dimensions and features:

- Overall width: 4.750
- Overall height: 4.000
- Top edge dimensions (from left): 1.125, 2.500, 1.125
- Left edge dimensions (from top): 1.000, 2.000, 1.000
- Right edge dimension (from top): 2.000
- Bottom edge dimension (from left): 2.375
- Central circular feature: Diameter  $\varnothing 0.250$
- Four smaller circular features: Diameter  $\varnothing 0.300$
- Internal dimensions: 0.750 (vertical), 0.375 (horizontal)

Isometric view of a rectangular block with a central rectangular hole and eight circular holes. A dimension line indicates a width of 0.750.



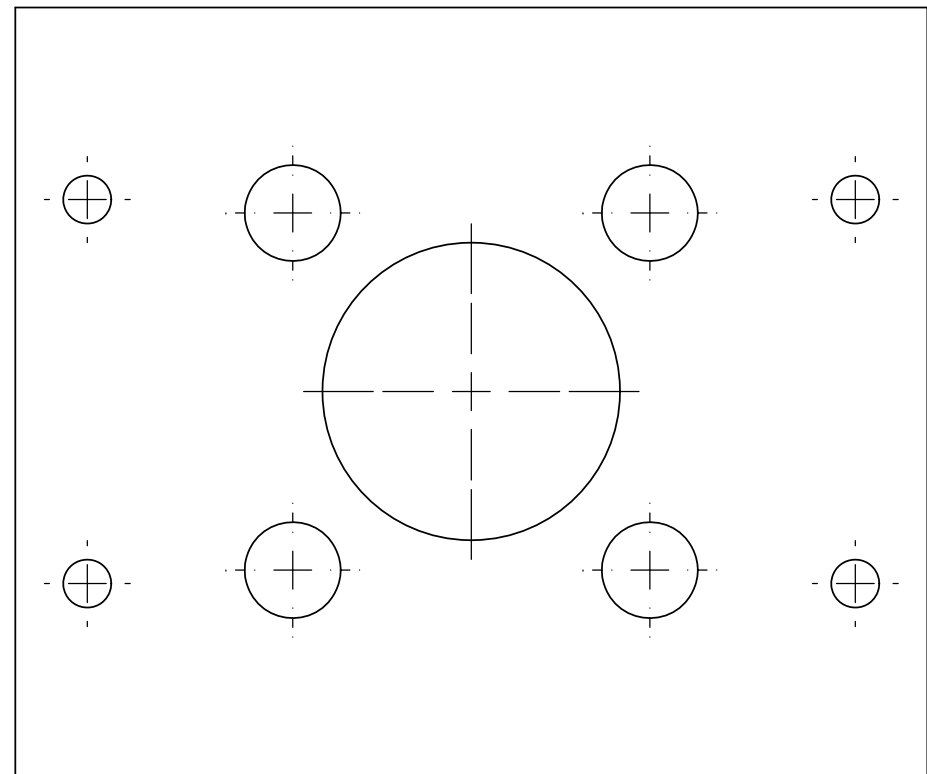
Technical drawing of a rectangular plate with dimensions and hole locations. The overall dimensions are 4.750 (width) and 4.000 (height). The plate features a central circular hole with a diameter of 2.000. There are six smaller circular holes, each with a diameter of 0.500, arranged in two rows of three. The horizontal spacing between the centers of the holes is 1.445, and the vertical spacing is 2.000. The center of the large hole is located 2.375 from the left edge and 2.000 from the bottom edge. The top edge of the plate is 1.000 from the top of the drawing, and the bottom edge is 1.000 from the bottom of the drawing.

### Y-Axis Motor and Flange Bearing Assembly

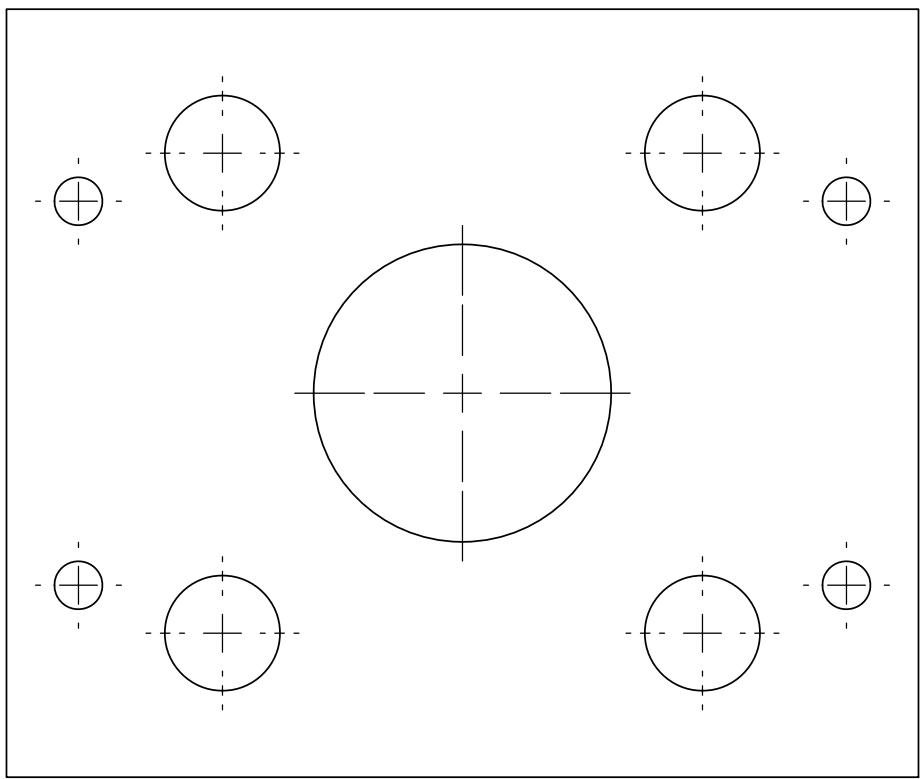
Note: 4 of these assemblies are needed

J-06 Y-Axis Mold And Flange Bearing Assembly Sheet 1

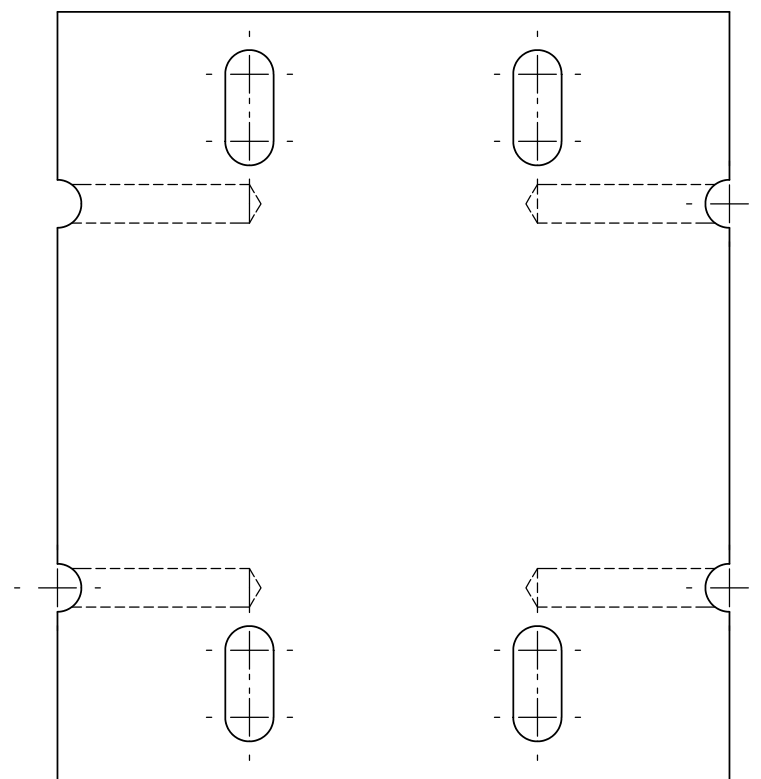




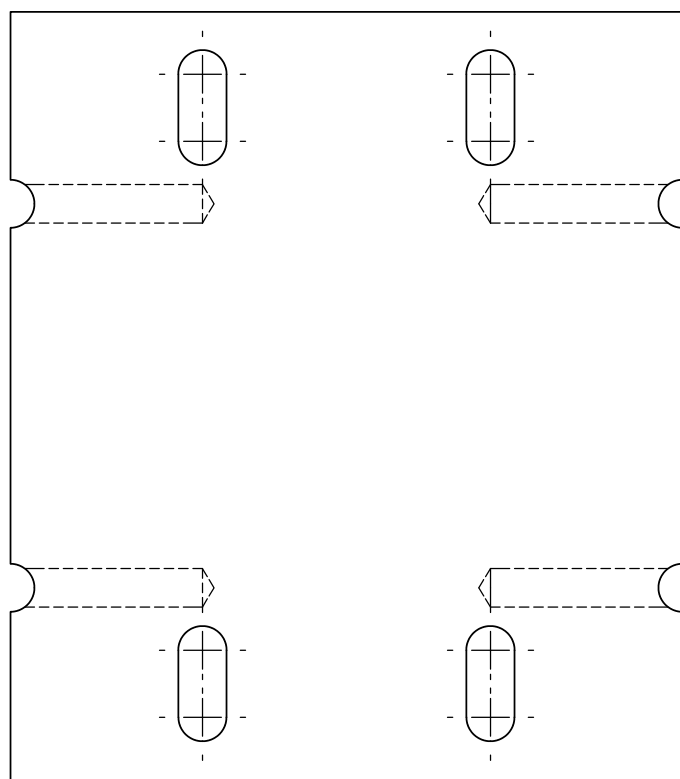
Y-Axis Motor Mount  
H.D.P.E.



Y-Axis Flange Bearing Mount  
H.D.P.E.



Y-Axis Motor and Flange Bearing Side Plate  
H.D.P.E.



Y-Axis Motor and Flange Bearing Side Plate  
H.D.P.E.

Y-Axis Motor and Flange Bearing Assembly  
Templates

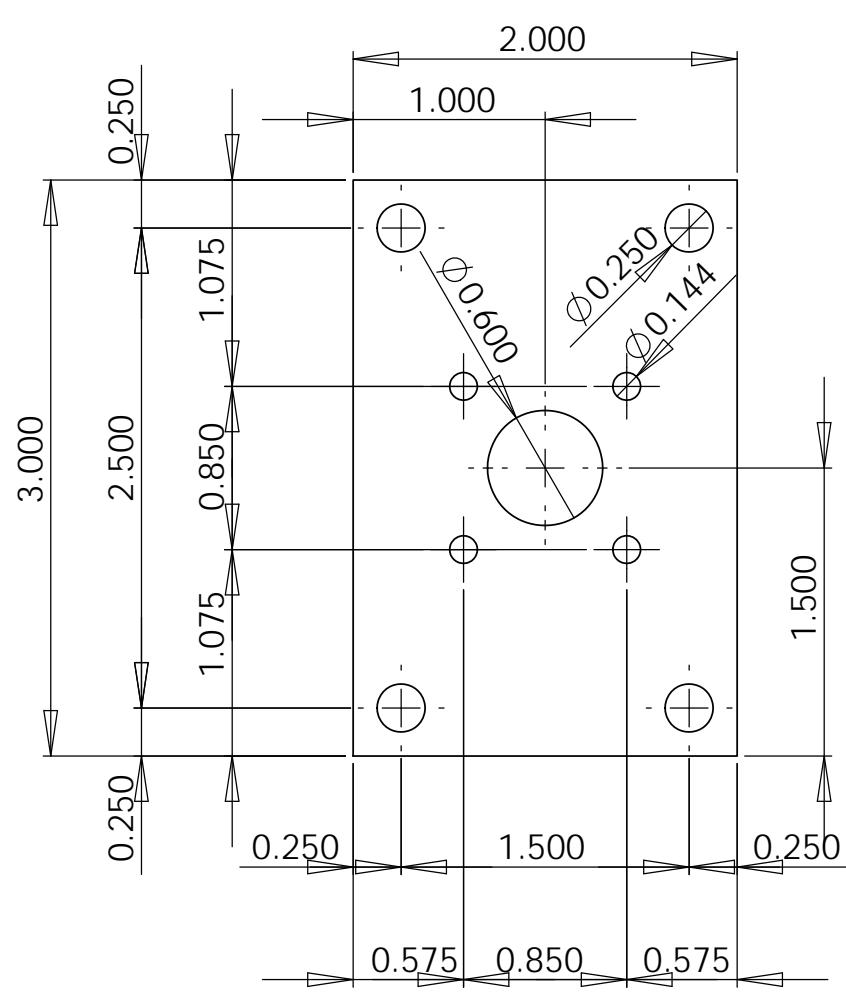
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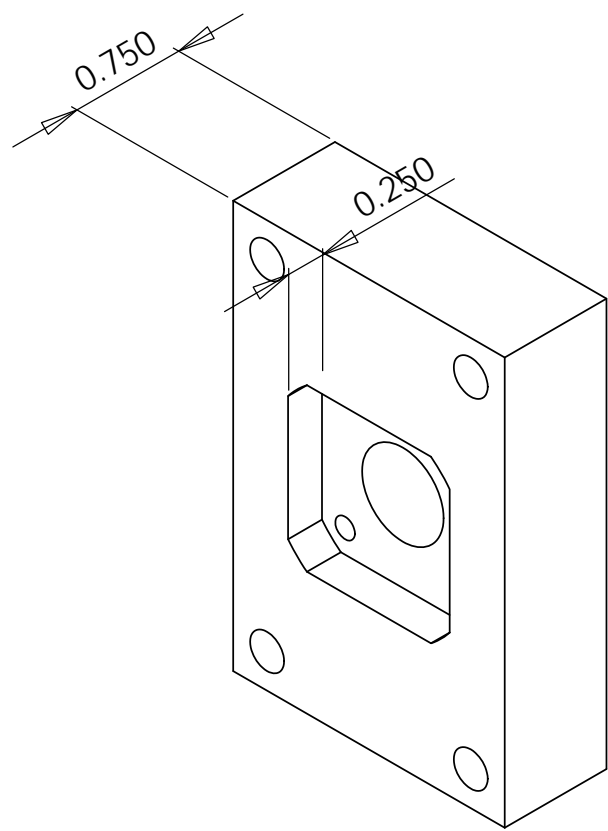
TITLE:  
**Joe's CNC**  
**4x4 Hybrid**

SIZE DWG. NO. REV  
**D J-06**

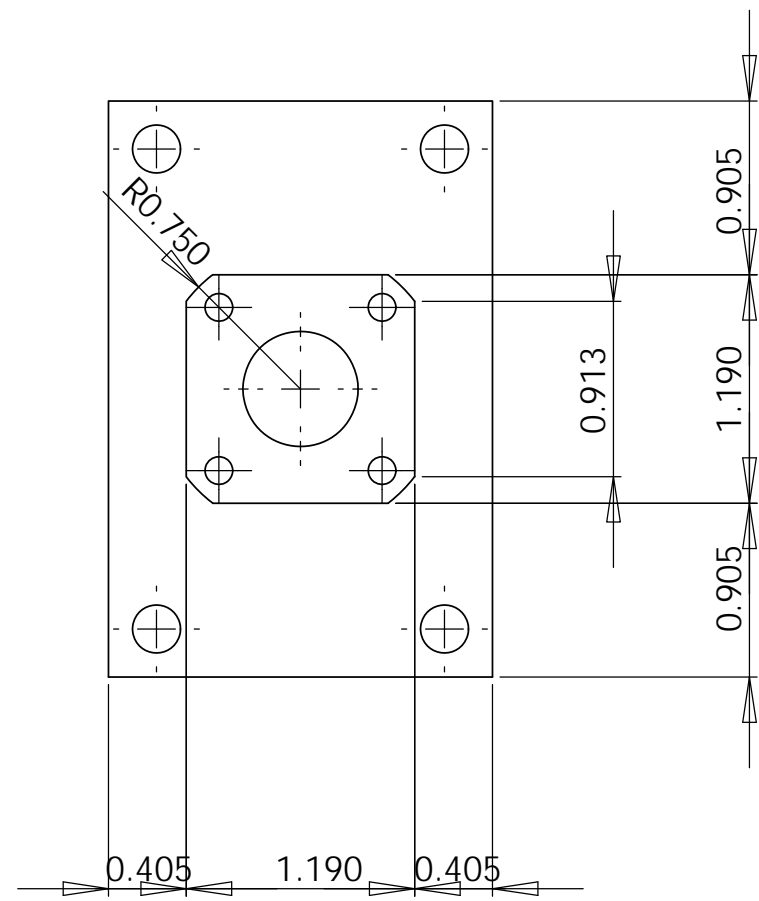
SCALE: 1:1 WEIGHT: SHEET 2 OF 2



Rear View



Isometric View



Front View  
Template

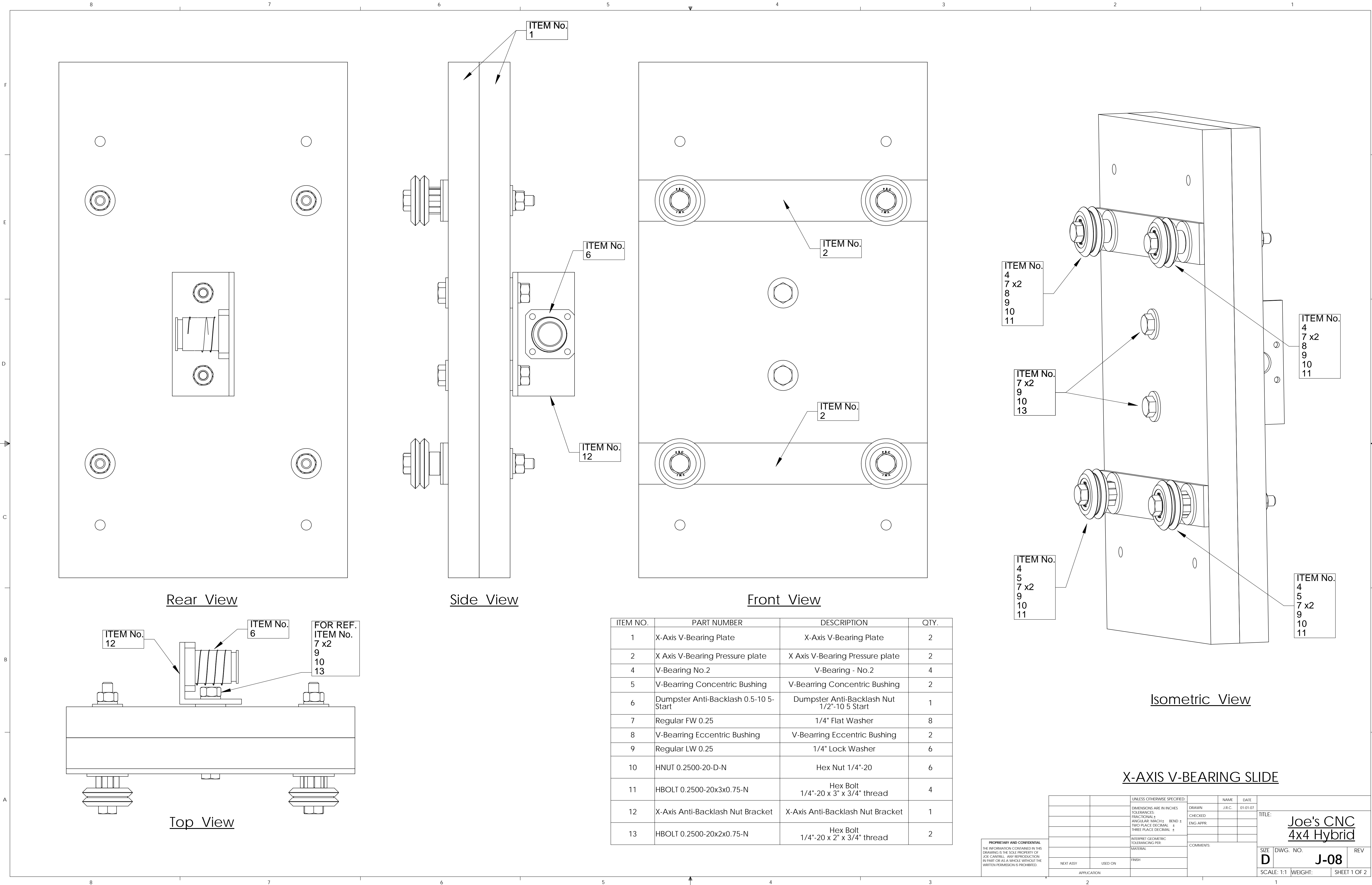
Y-Axis Anti-Backlash Nut Housing

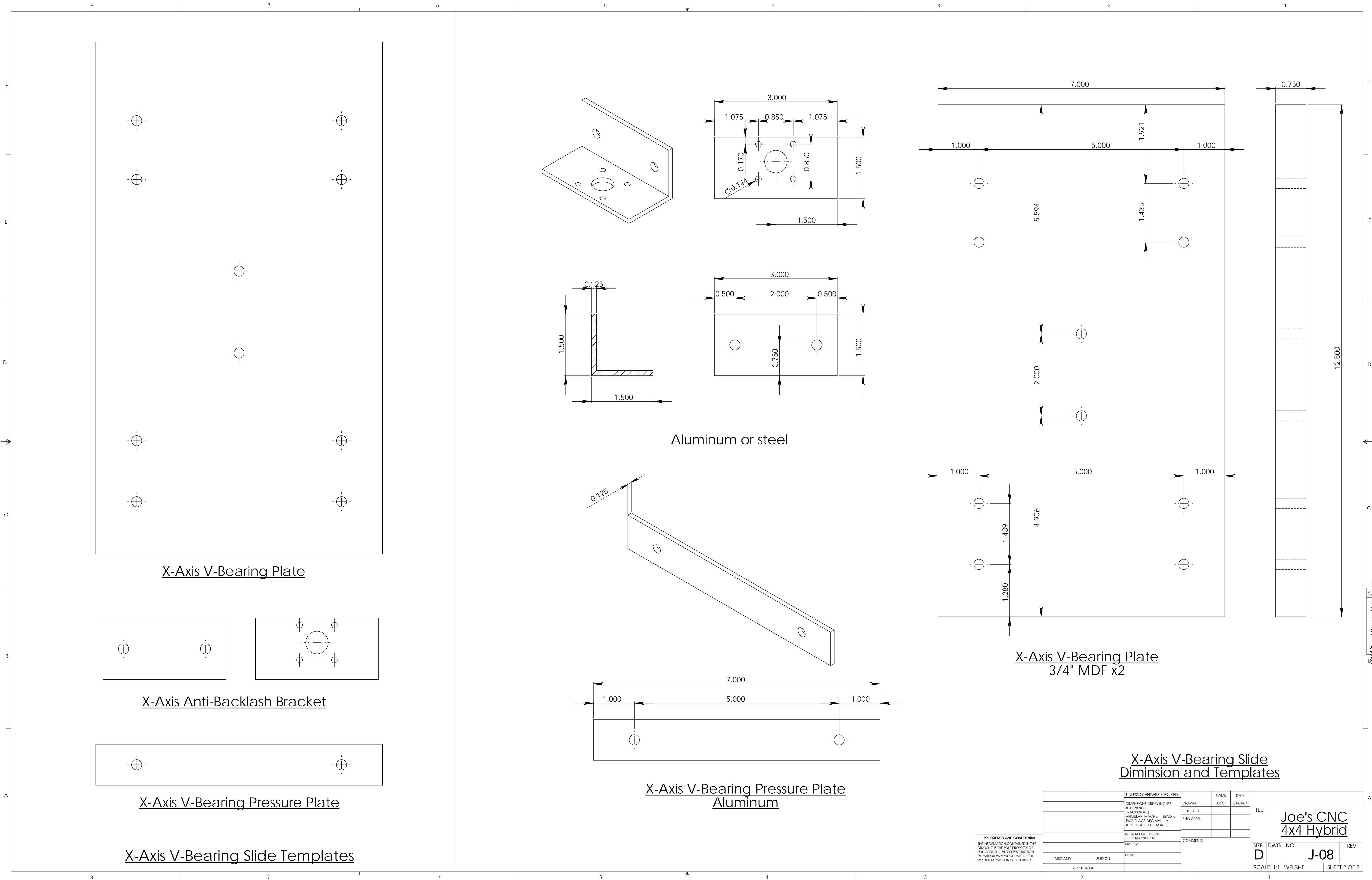
Note: 2 parts needed

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		THREE PLACE DECIMAL ±									
		INTERPRET GEOMETRIC TOLERANCING PER:									
		MATERIAL:									
		FINISH:									
NEXT ASSY		USED ON				SIZE		DWG. NO.		REV	
APPLICATION						D		J-06a			
								SCALE: 2:1		SHEET 1 OF 1	









X-Axis V-Bearing Plate

X-Axis Anti-Backlash Bracket

X-Axis V-Bearing Pressure Plate

X-Axis V-Bearing Slide Templates

Aluminum or steel

X-Axis V-Bearing Pressure Plate  
Aluminum

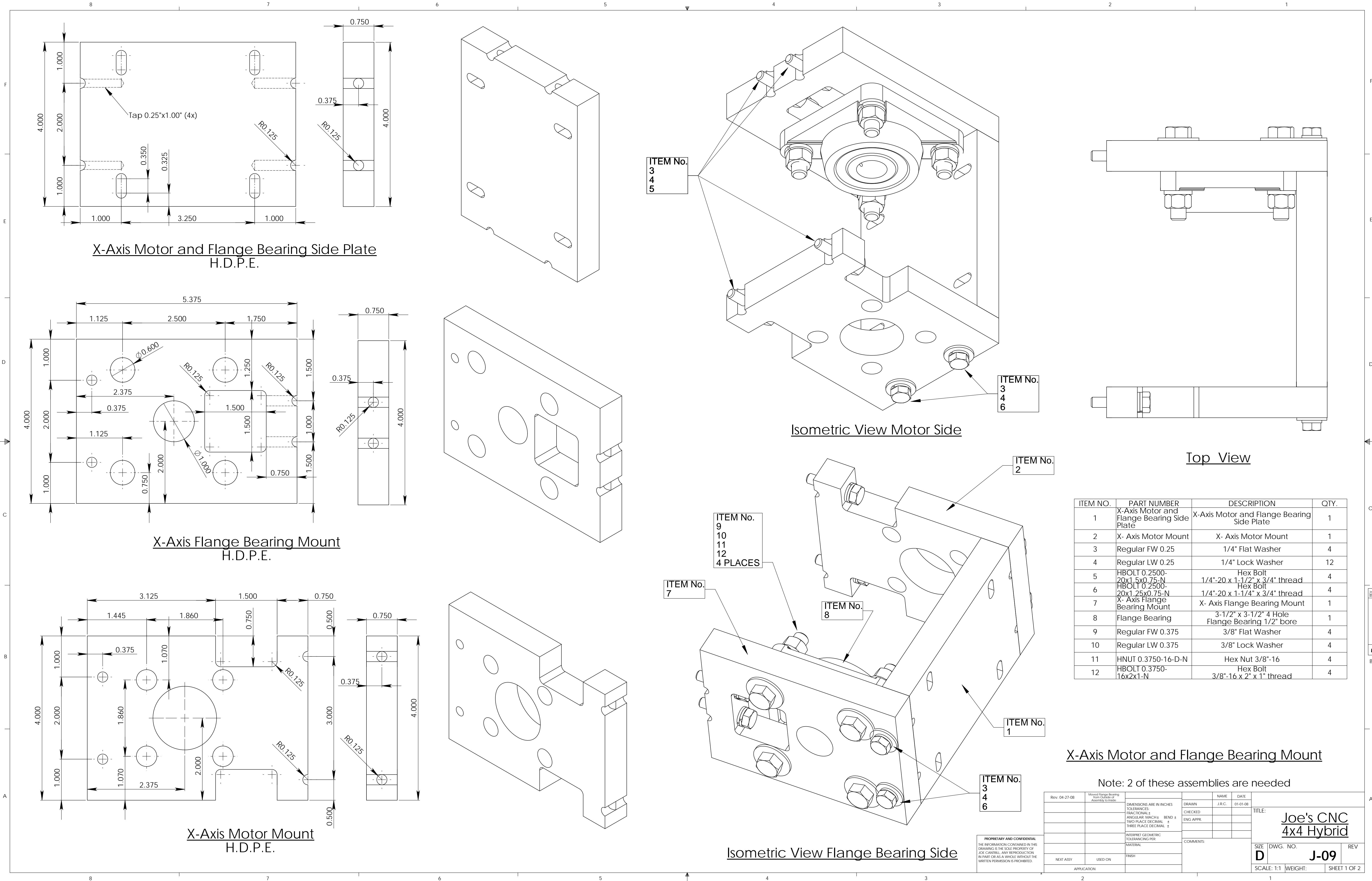
X-Axis V-Bearing Plate  
3/4" MDF x2

X-Axis V-Bearing Slide  
Diminon and Templates

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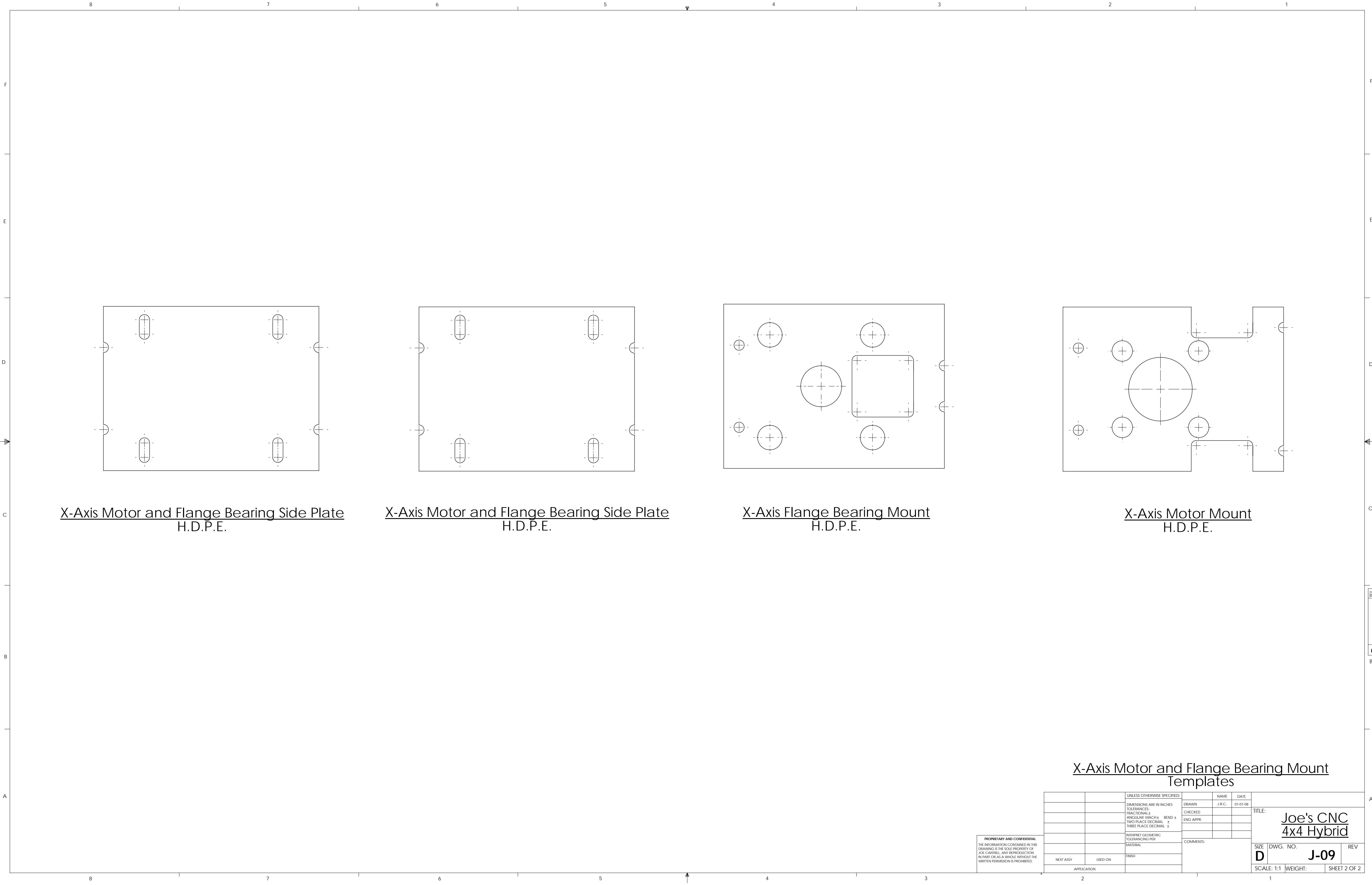
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BEND ±			
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THREE PLACE DECIMAL ±			
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MATERIAL:			
FINISH:			
APPLICATION:			
NEXT ASSY:			
USED ON:			

TITLE:		
Joe's CNC 4x4 Hybrid		
SIZE	DWG. NO.	REV
D	J-08	
SCALE: 1:1		WEIGHT:
		SHEET 2 OF 2



J-09 X-Axis Motor and Flange Bearing Mount Sheet 1





X-Axis Motor and Flange Bearing Side Plate  
H.D.P.E.

X-Axis Motor and Flange Bearing Side Plate  
H.D.P.E.

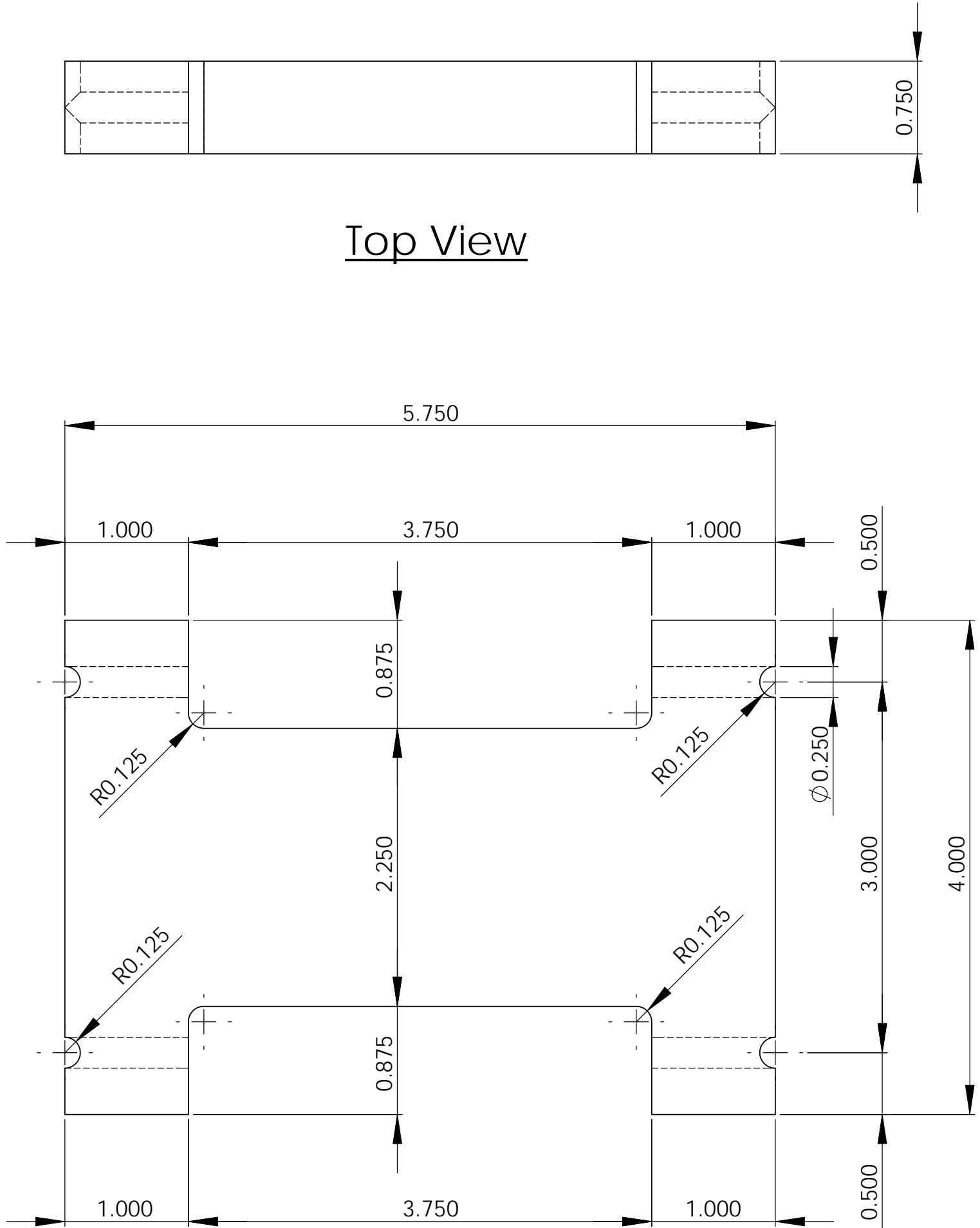
X-Axis Flange Bearing Mount  
H.D.P.E.

X-Axis Motor Mount  
H.D.P.E.

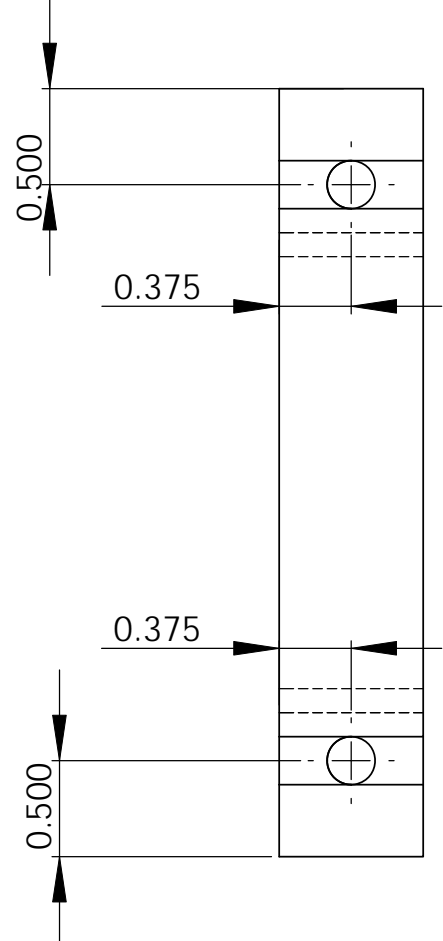
X-Axis Motor and Flange Bearing Mount  
Templates

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NEXT ASSY	USED ON	FINISH				
APPLICATION						

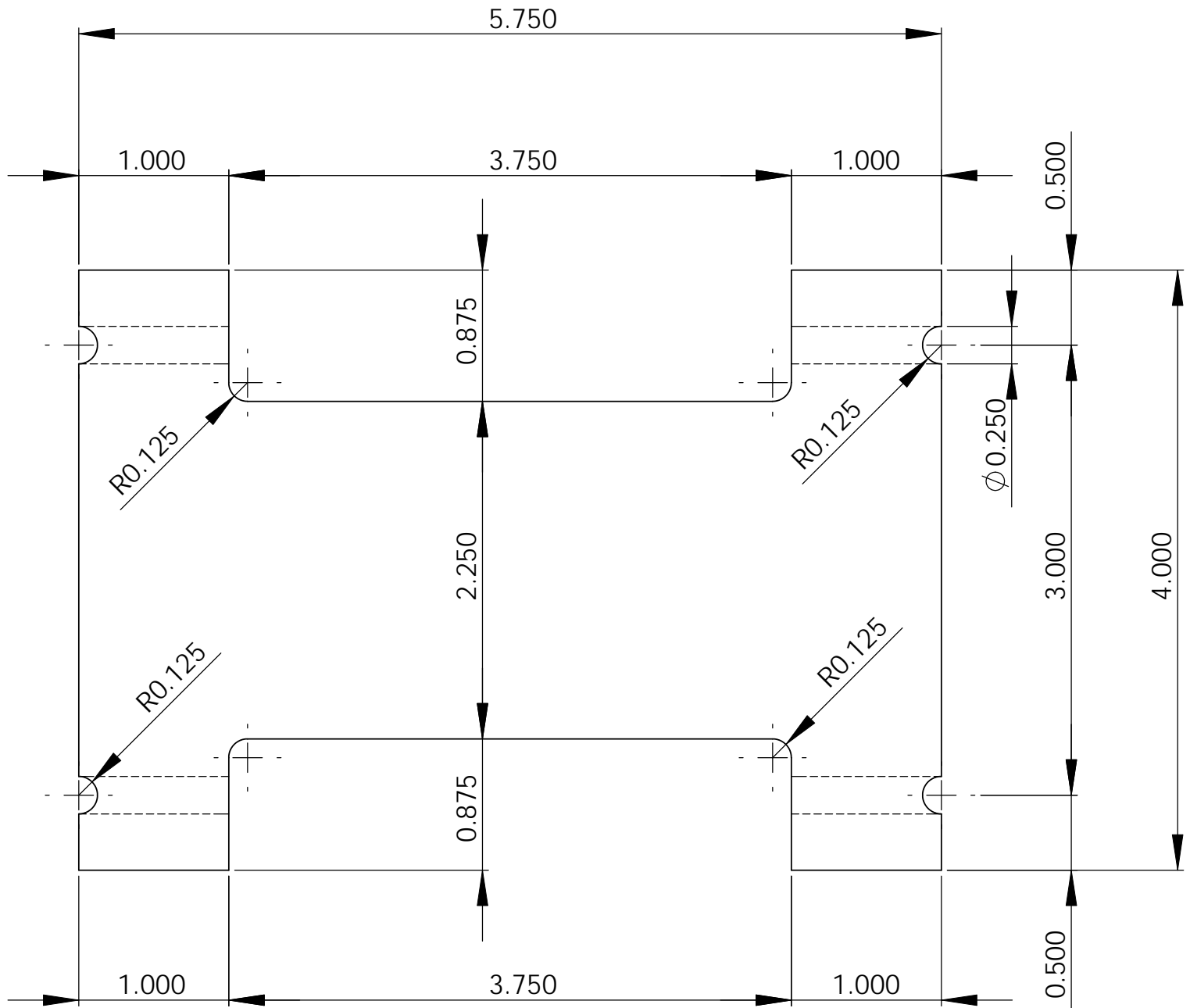
Top View



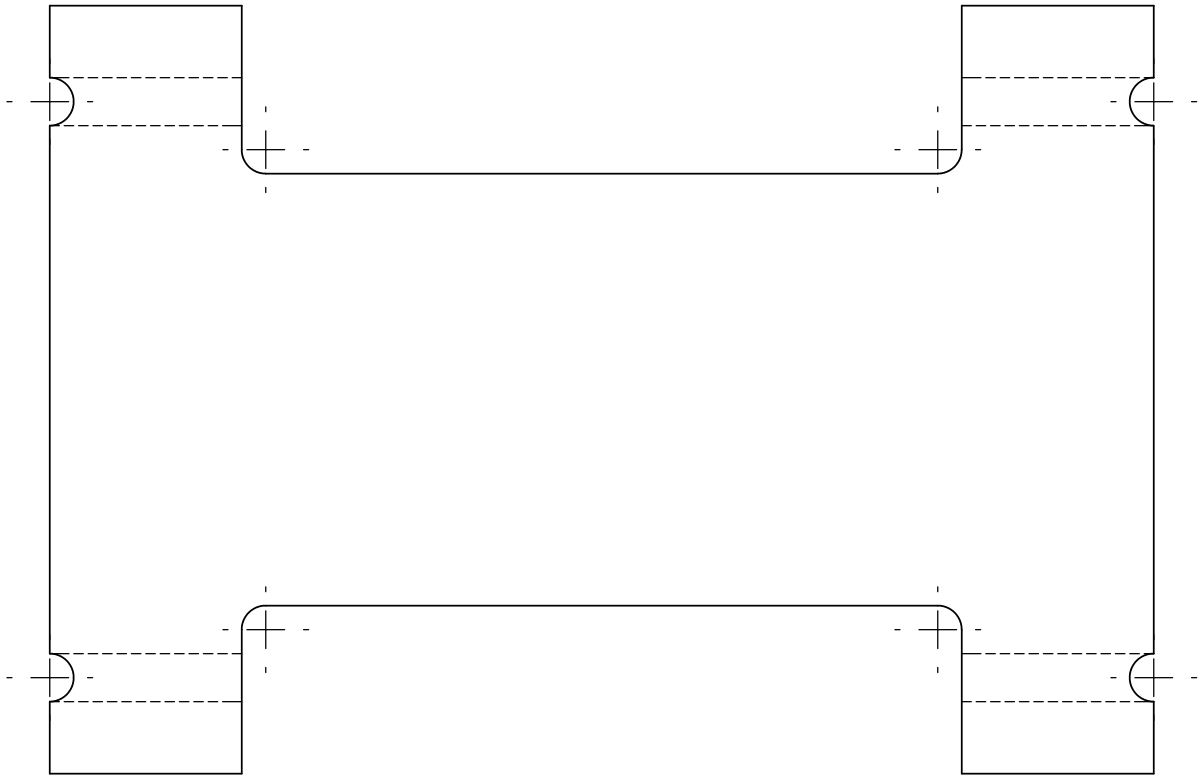
Side View



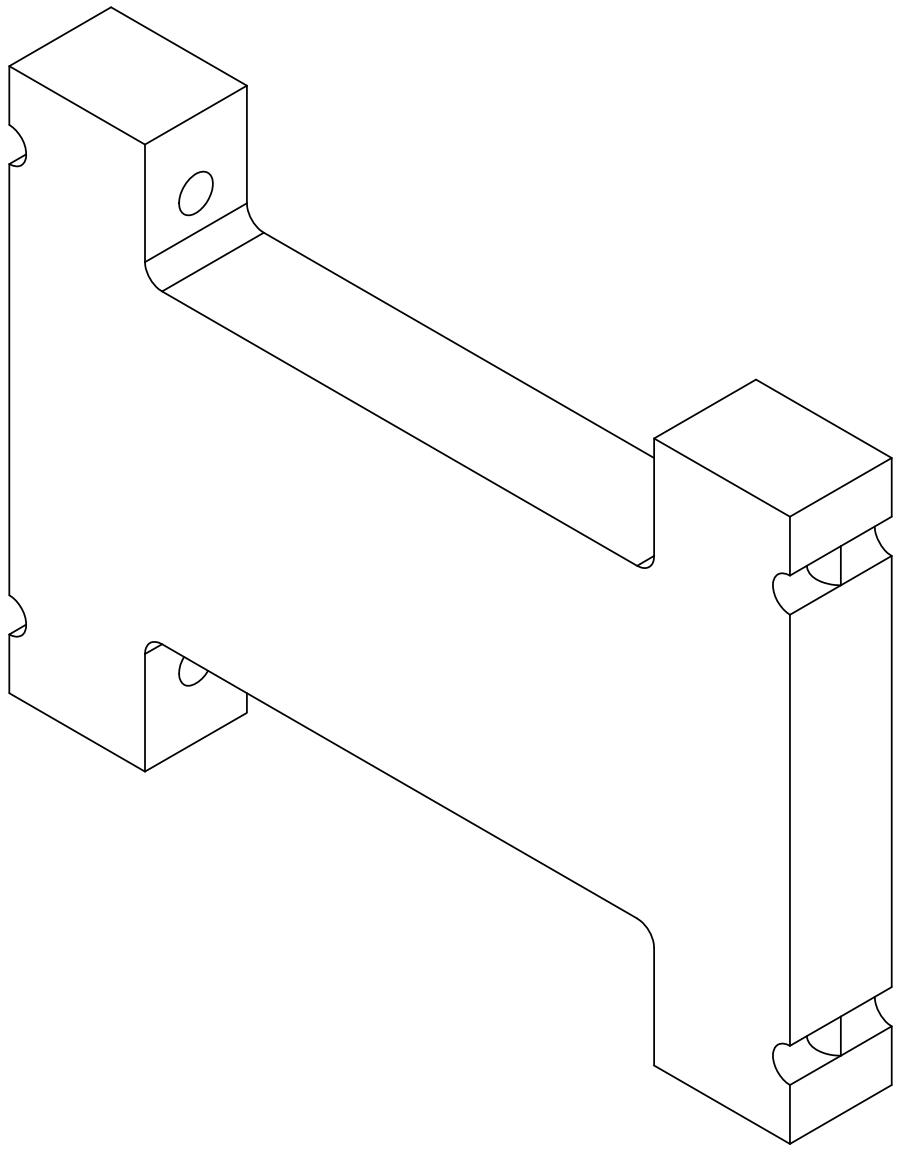
Front View



X-Axis 80/20 Front Support Template

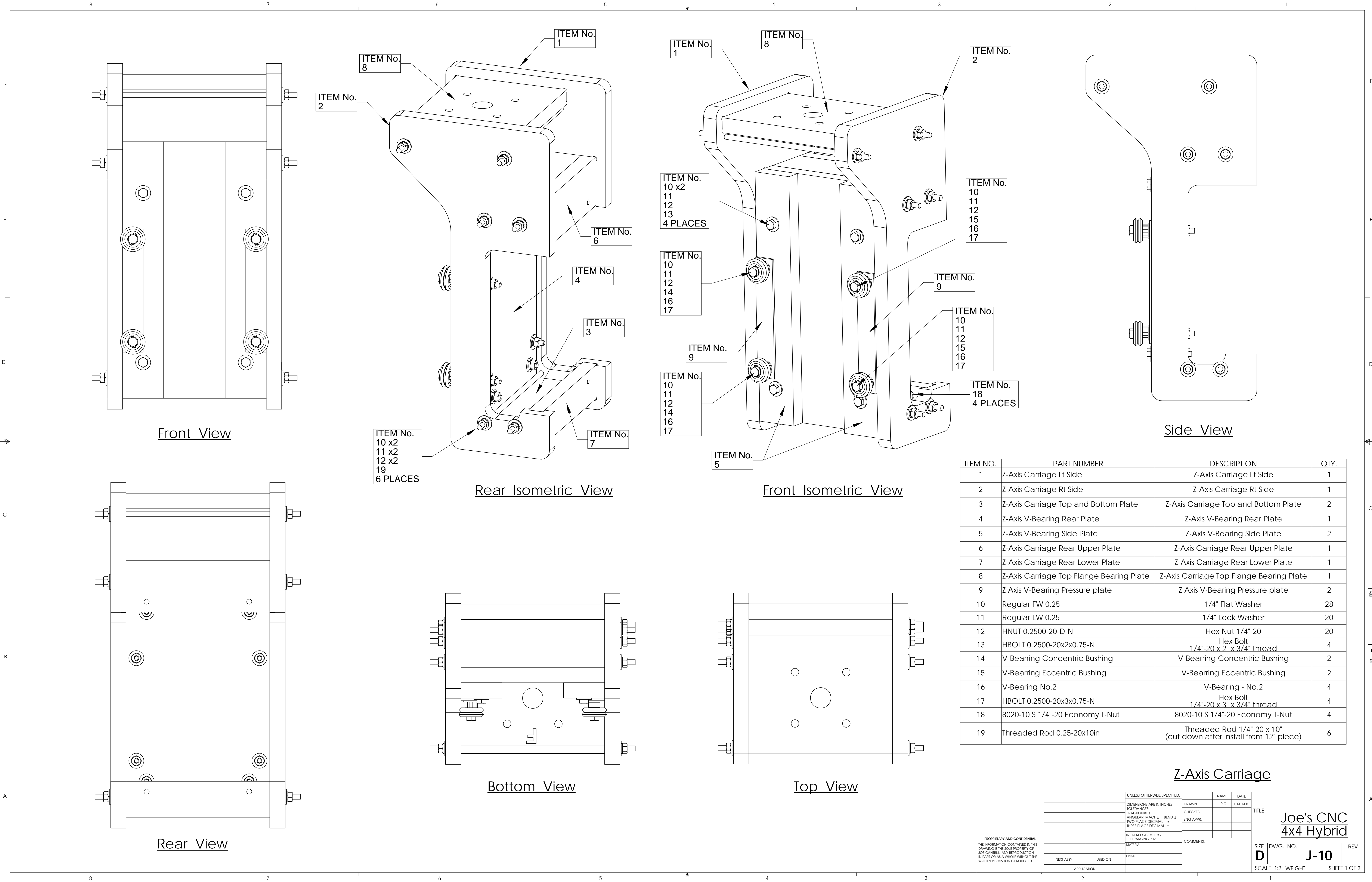


Isometric View (HDPE)



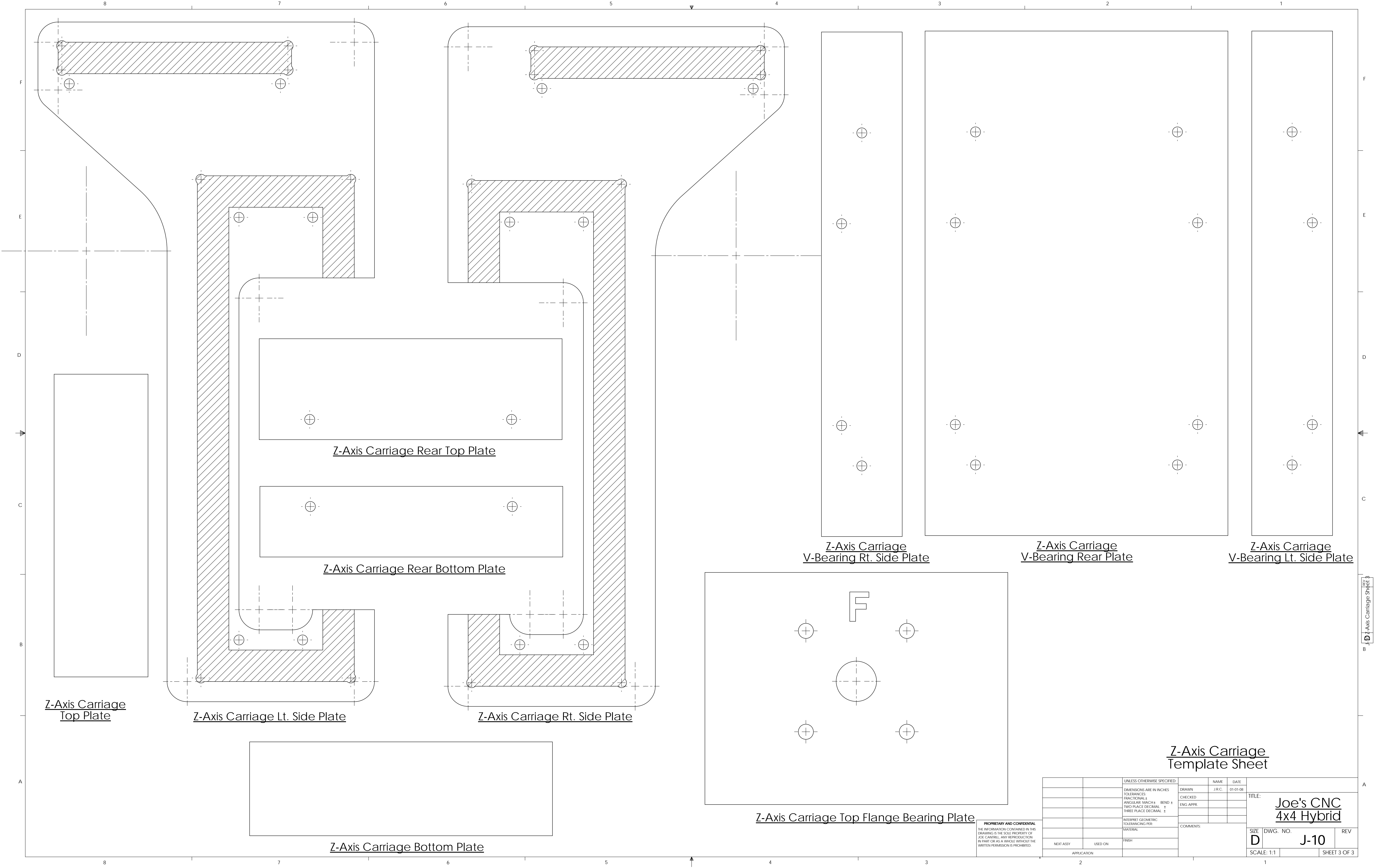
X-AXIS 80/20 FRONT SUPPORT

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR MATCH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±		DRAWN	NAME	DATE	TITLE: <b>Joe's CNC 4x4 Hybrid</b>
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		ENG APPR.			
		MFG APPR.			
INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		Q.A.	COMMENTS:		SIZE <b>D</b>
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APPLICATION		FINISH			DWG. NO. <b>J-09a</b>
					SCALE: 1:1 WEIGHT: SHEET 1 OF 1



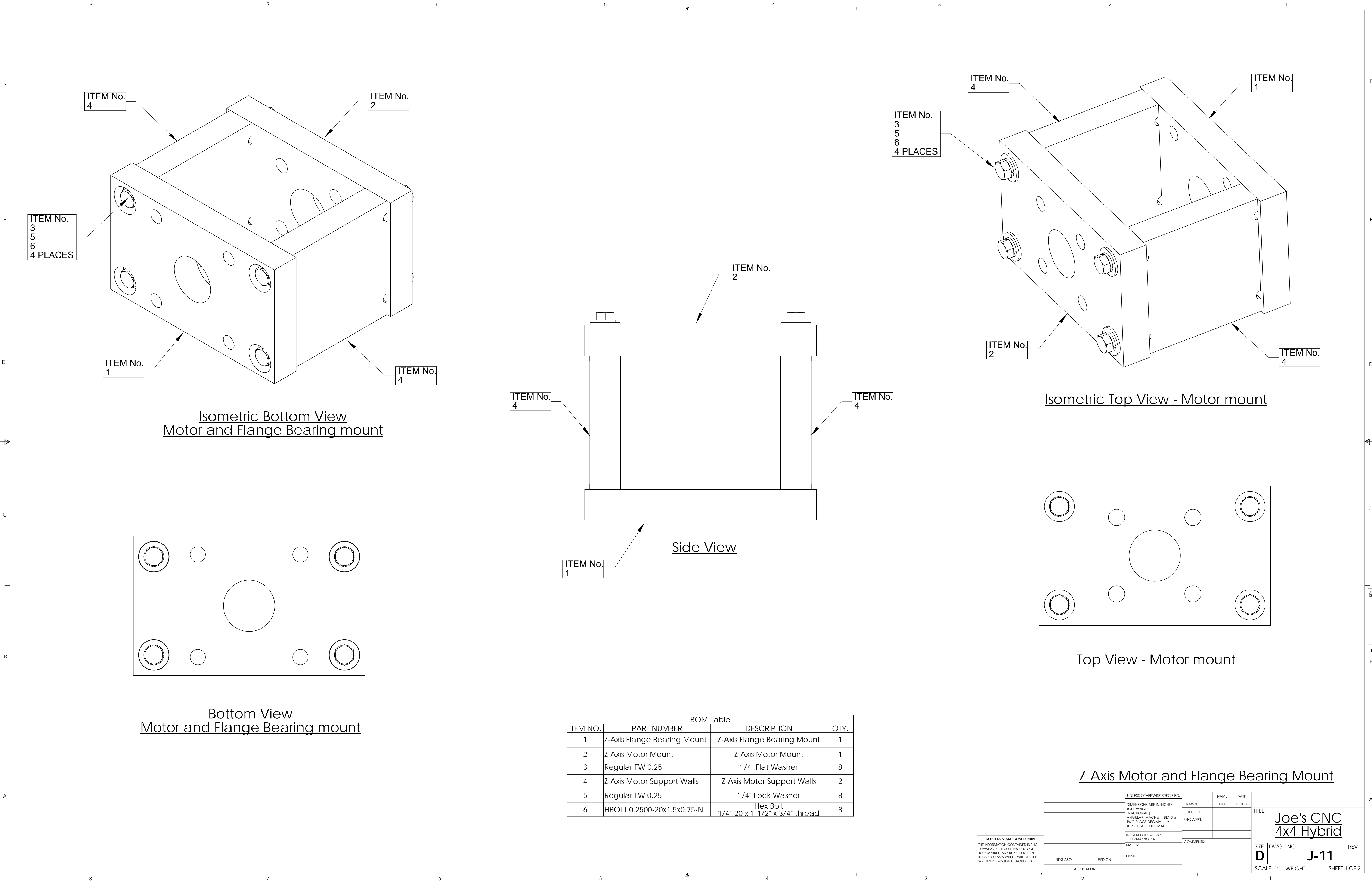


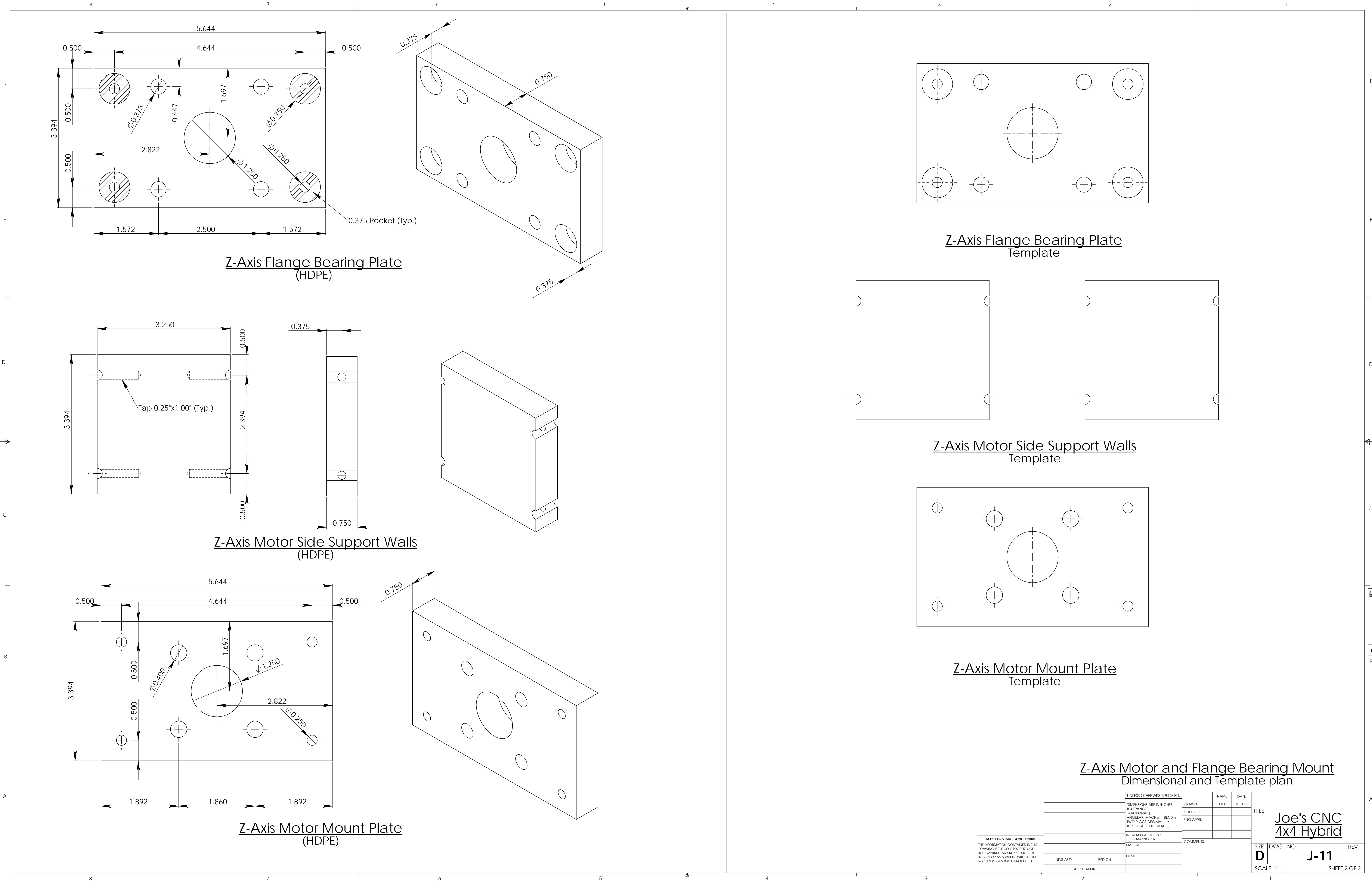




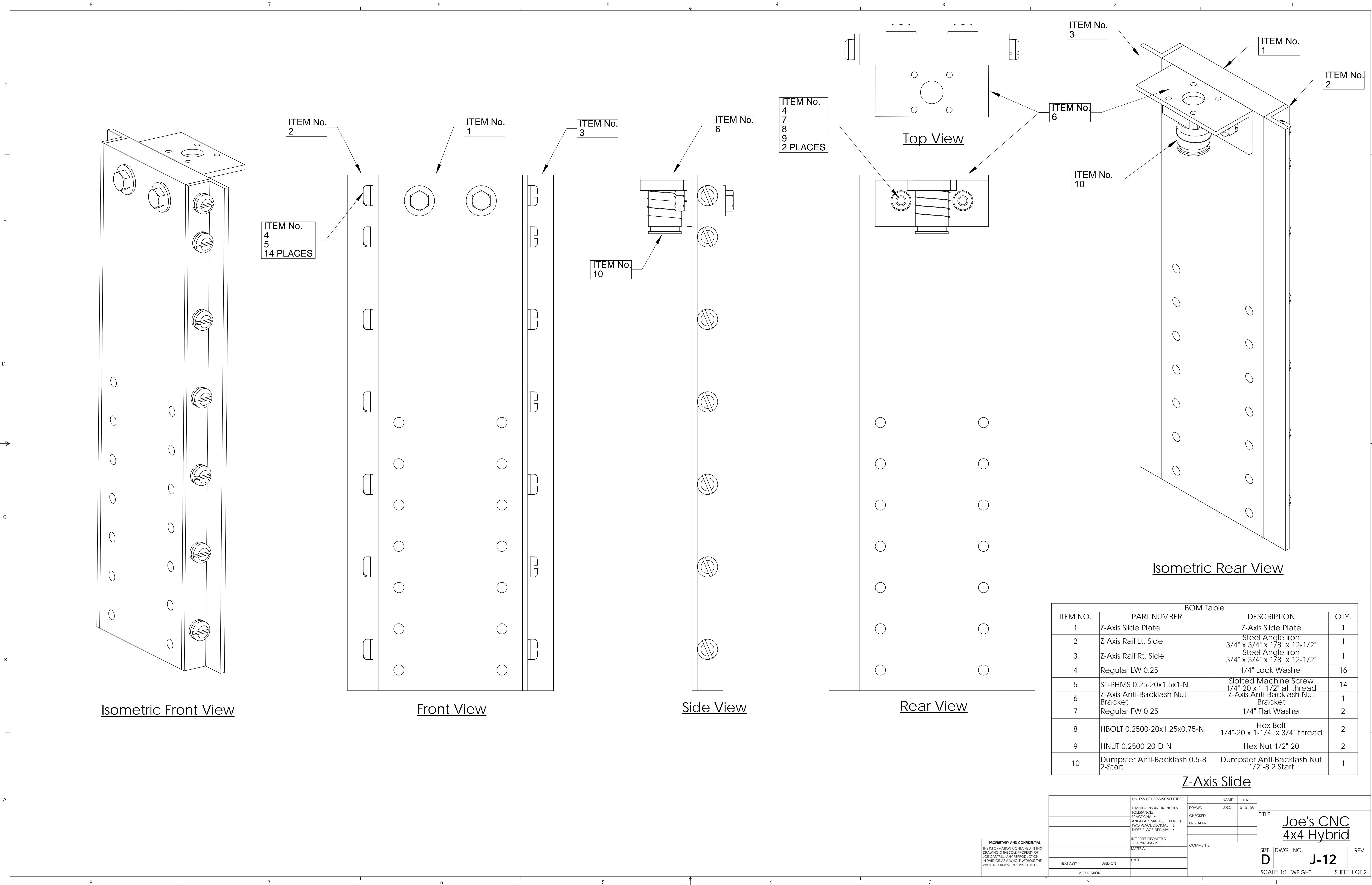
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ANGULAR MACH ±			
BEND ±			
TWO PLACE DECIMAL ±			
THREE PLACE DECIMAL ±			
INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:	
FINISH			
NEXT ASSY	USED ON		
APPLICATION			

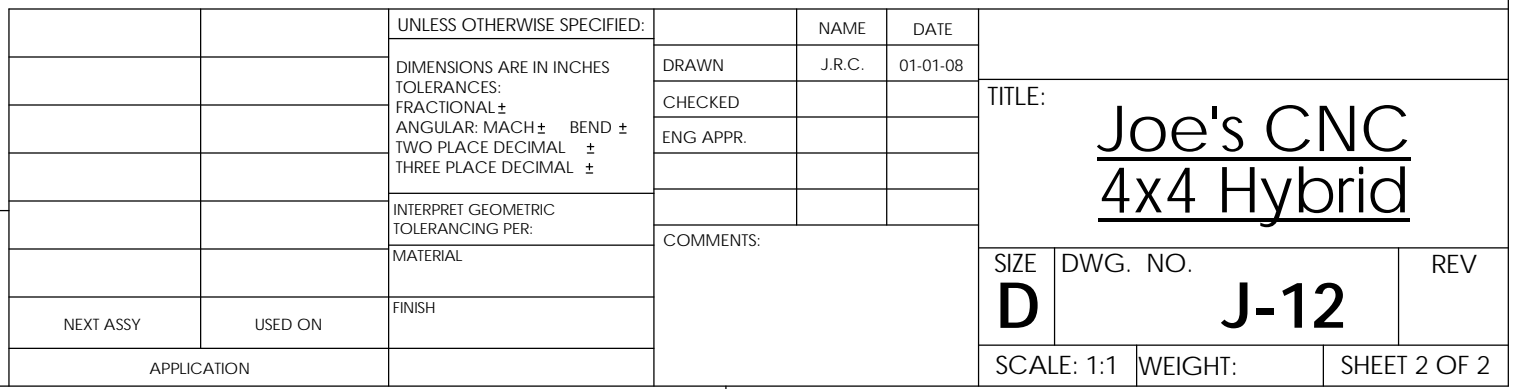
TITLE:		Joe's CNC 4x4 Hybrid	
SIZE	DWG. NO.	REV	
D	J-10		
SCALE: 1:1		SHEET 3 OF 3	





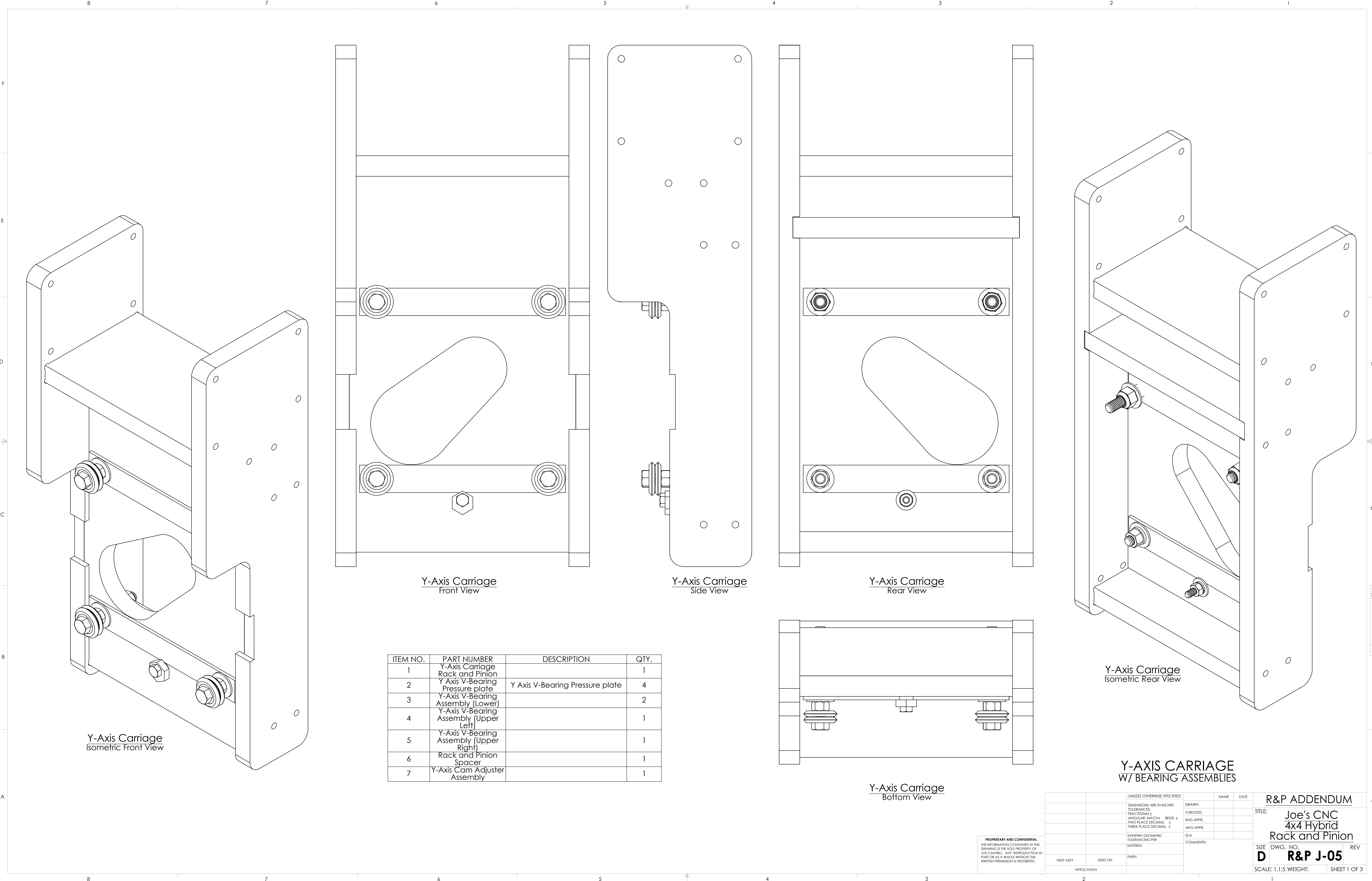


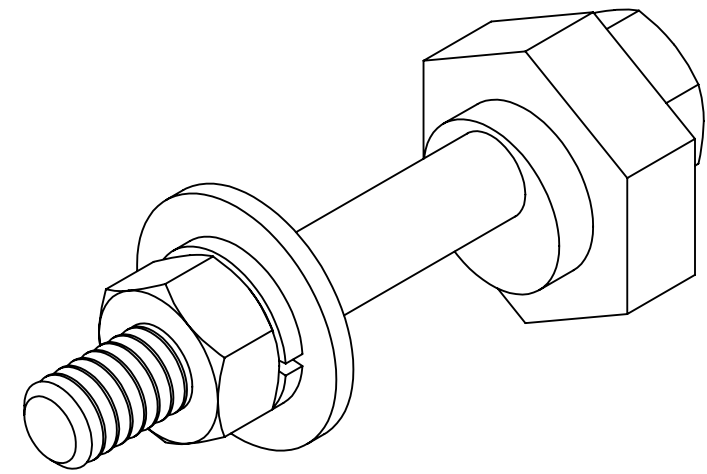




# **RACK & PINION**

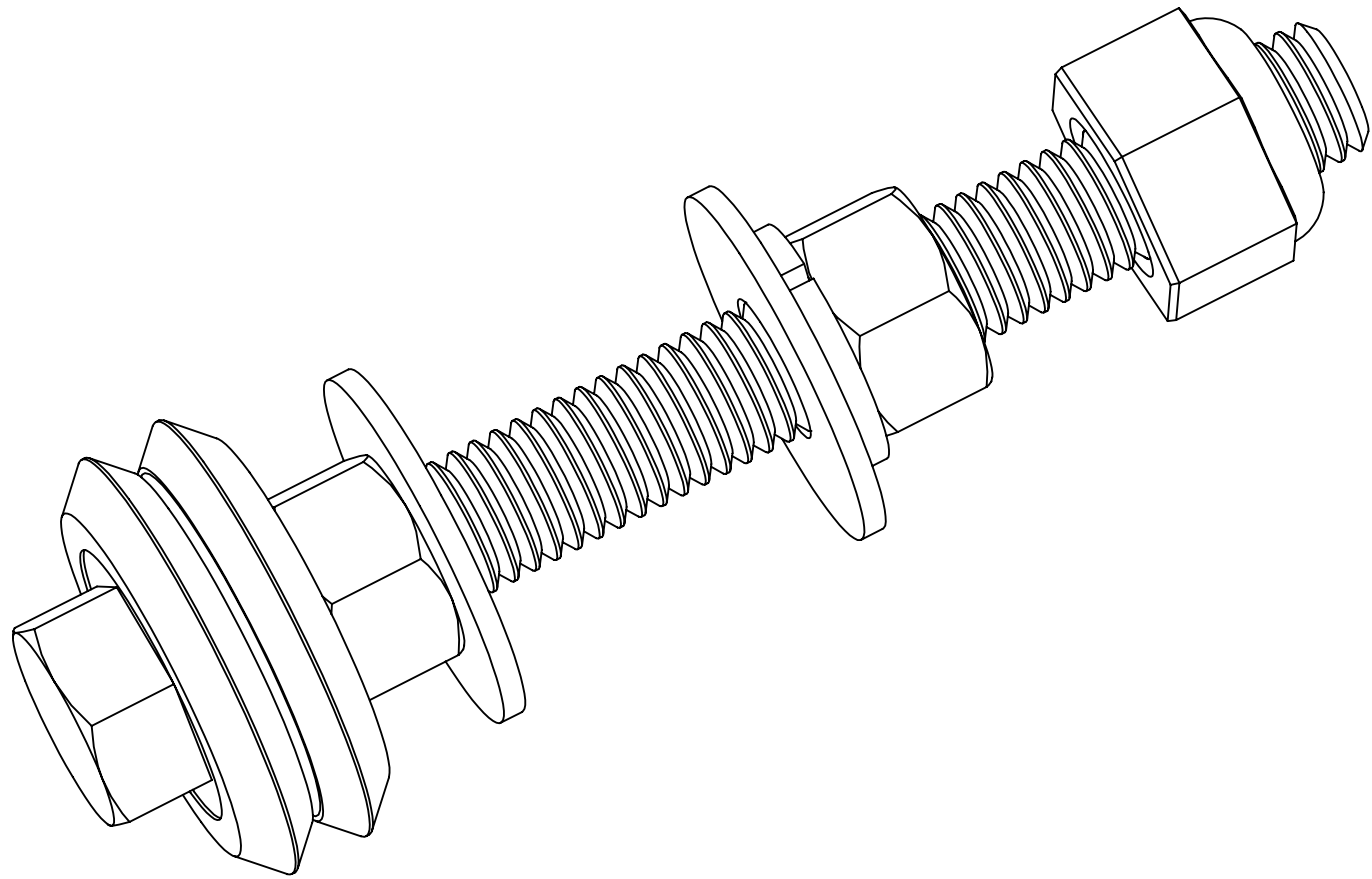
## **ADDENDUM SHEETS**





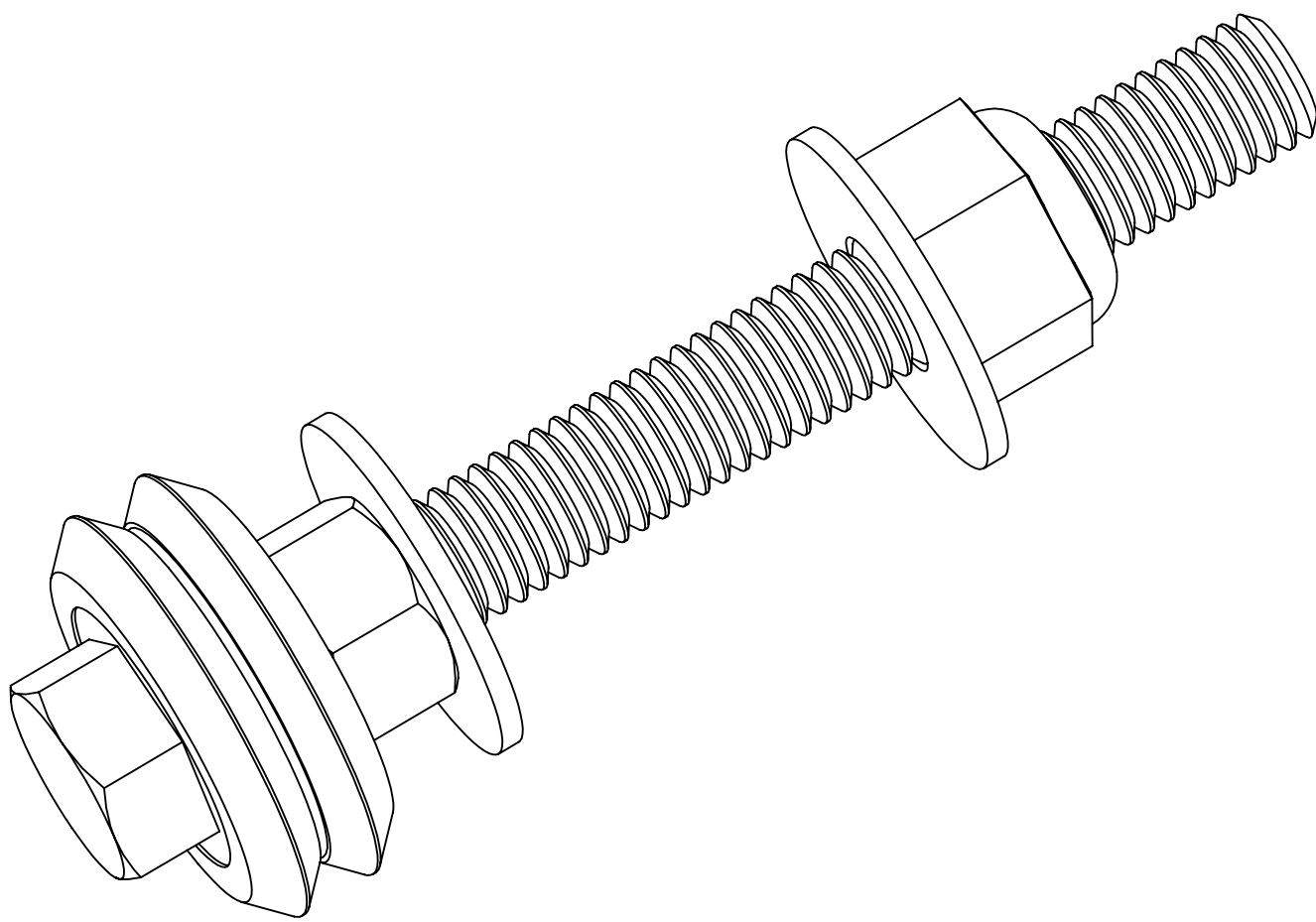
Y-Axis Cam Adjuster Assembly (x2)  
Isometric View

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0.50in Cam Adjuster		1
2	HBOLT 0.2500-20x2x0.75-S		1
3	Regular FW 0.25		1
4	Regular LW 0.25		1
5	HNUT 0.2500-20-D-N		1



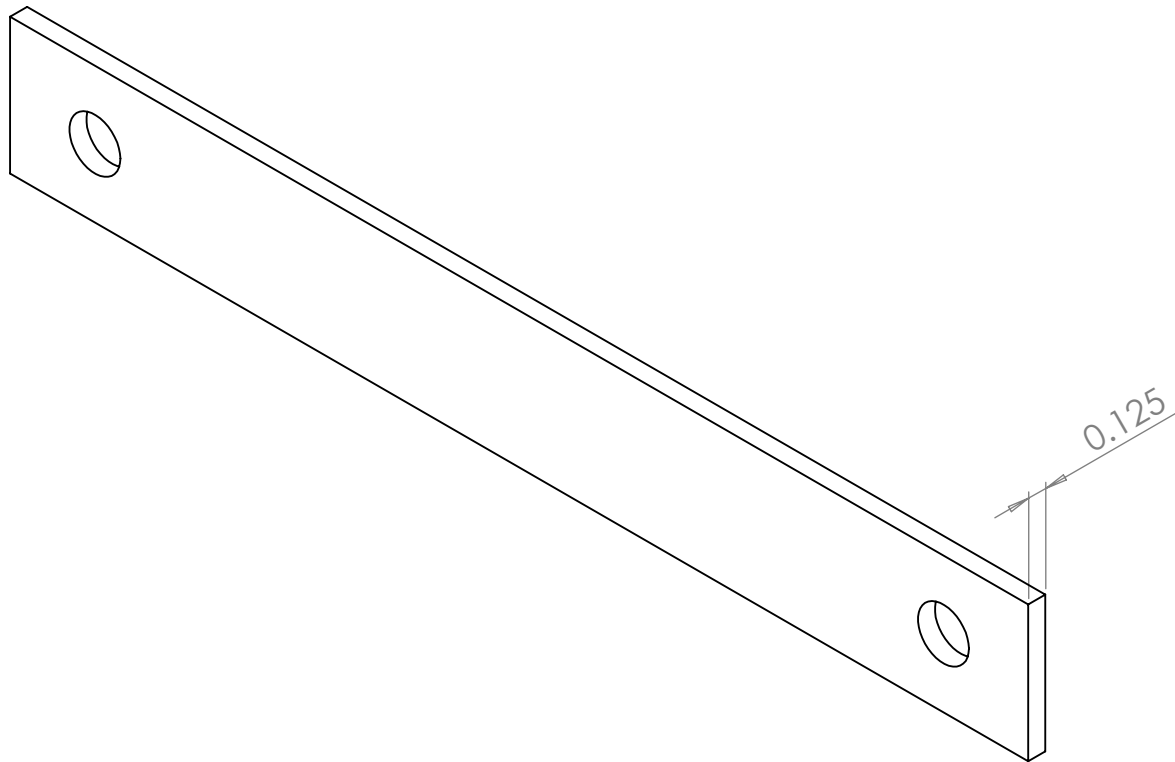
Upper Left  
Y-Axis Bearing Assembly  
Isometric View

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	HBOLT 0.3750-16x3.5x3.5-S		1
2	Regular FW 0.375		2
3	V-Bearing No.2	V-Bearing - No.2	1
4	HNUT 0.3750-16-D-N		2
5	Regular LW 0.375		1
6	0.375 locknut	1/4 inch locknut	1

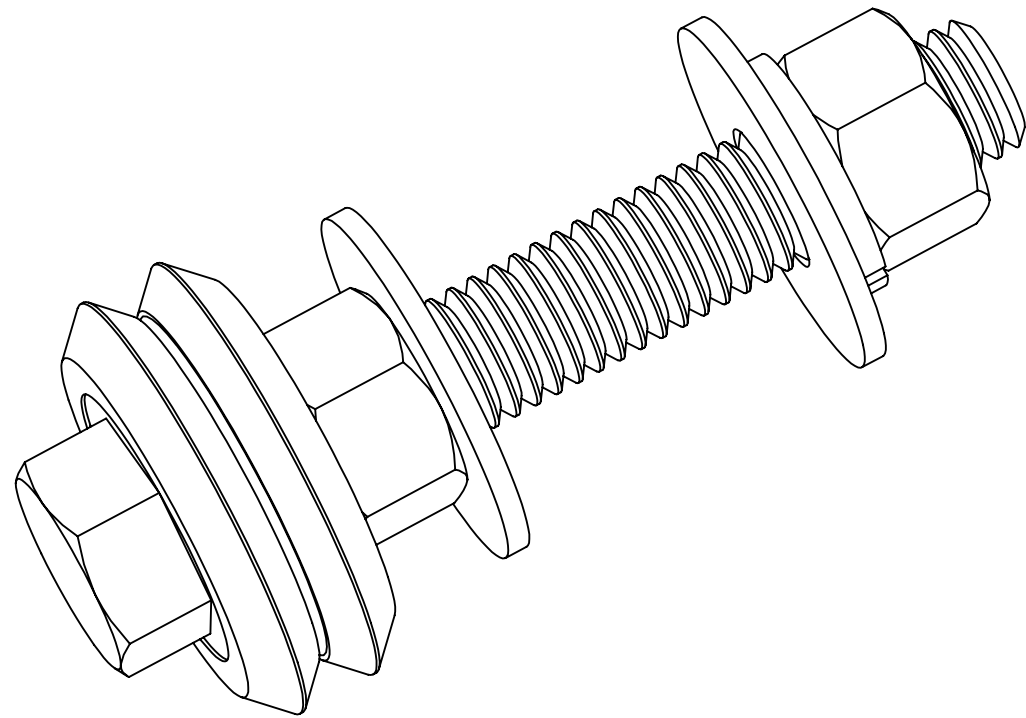
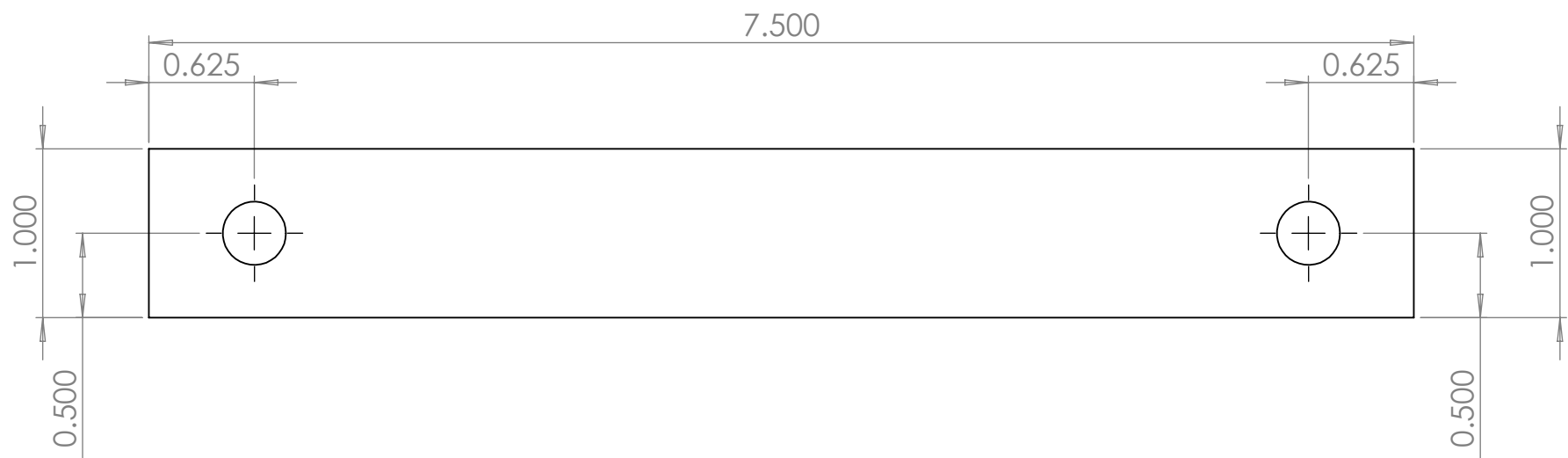


Upper Right  
Y-Axis Bearing Assembly  
Isometric View

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	HBOLT 0.3750-16x3.5x3.5-S		1
2	Regular FW 0.375		2
3	V-Bearing No.2	V-Bearing - No.2	1
4	HNUT 0.3750-16-D-N		1
5	0.375 locknut	1/4 inch locknut	1



Y-Axis V-Bearing Pressure Plate (x4)  
Scale 1:1



Lower Y-Axis Bearing Assembly (x2)  
Isometric View

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	HBOLT 0.3750-16x2.5x2.5-S		1
2	Regular FW 0.375		2
3	V-Bearing No.2	V-Bearing - No.2	1
4	HNUT 0.3750-16-D-N		2
5	Regular LW 0.375		1

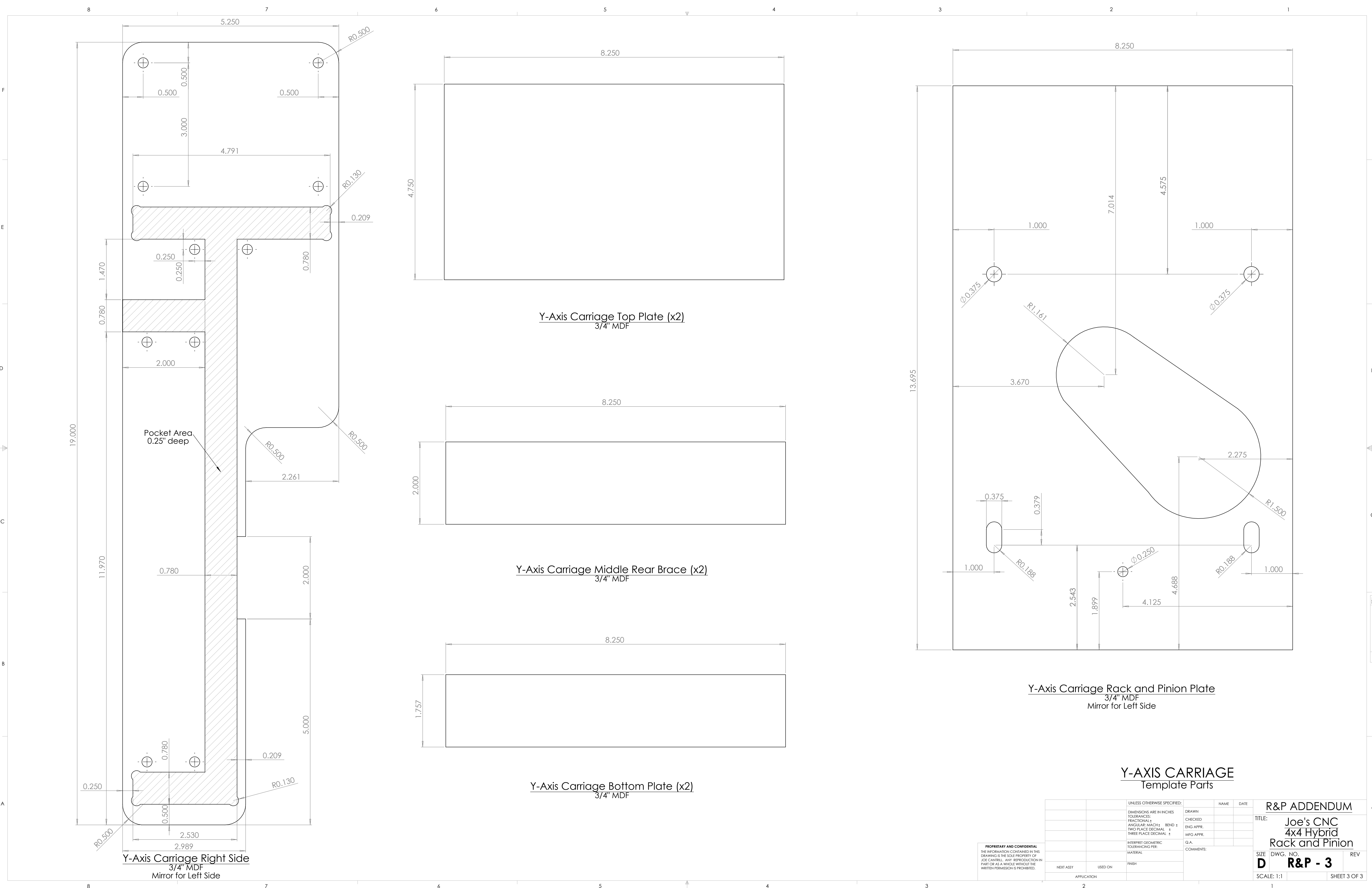
Y-AXIS CARRIAGE  
Assembly Parts

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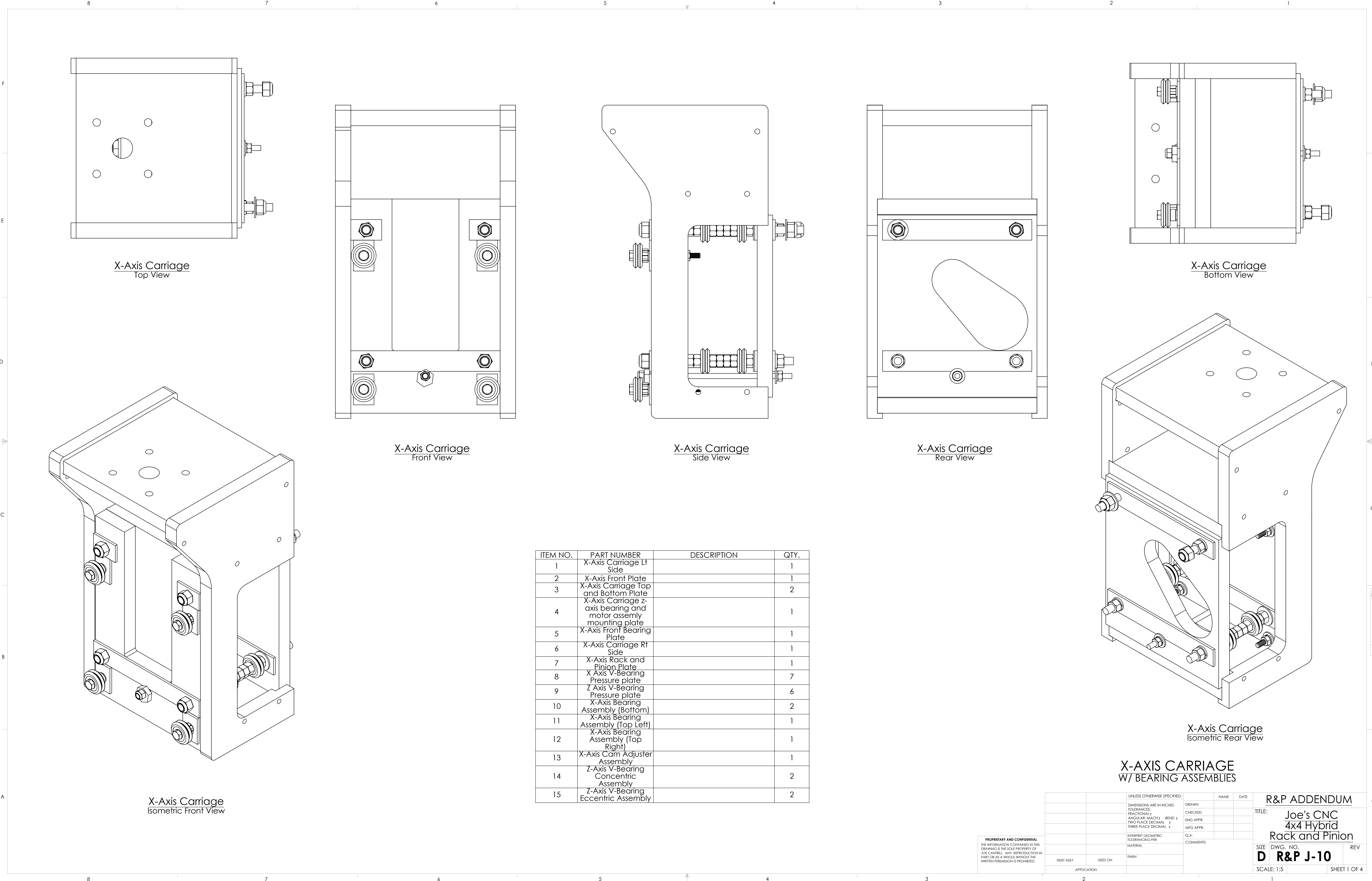
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		ANGULAR: MATCH ±	MFG APPR:		
		BEND: ±	G.A.		
		TWO PLACE DECIMAL: ±	COMMENTS:		
		THREE PLACE DECIMAL: ±			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL:			
		FINISH:			
NEXT ASSY	USED ON				
APPLICATION					

R&P ADDENDUM		
TITLE: Joe's CNC 4x4 Hybrid Rack and Pinion		
SIZE: D	DWG. NO. R&P J-10	REV
SCALE: 2:1	SHEET 2 OF 3	









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		DIMENSIONS ARE IN INCHES	DRAWN		
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		BEND ±			
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		MATERIAL:	COMMENTS:		
		FINISH			
NEXT ASSY	USED ON				
APPLICATION					

R&P ADDENDUM		
TITLE: Joe's CNC 4x4 Hybrid Rack and Pinion		
SIZE	DWG. NO.	REV
D	R&P J-10	
SCALE: 1:5	SHEET 1 OF 4	



### Z-Axis V-Bearing Concentric Assembly

### Z-Axis V-Bearing Eccentric Assembly

### X-Axis V-Bearing Top Left Assembly

### X-Axis Cam Adjuster Assembly Isometric View

X&Z-Axis V-Bearing Pressure Plate (x6)  
Isometric View



X-Axis V-Bearing Pressure Plate (x7)  
Isometric View

R&P ADDENDUM

TITLE: Joe's CNC  
4x4 Hybrid  
Rack and Pinion

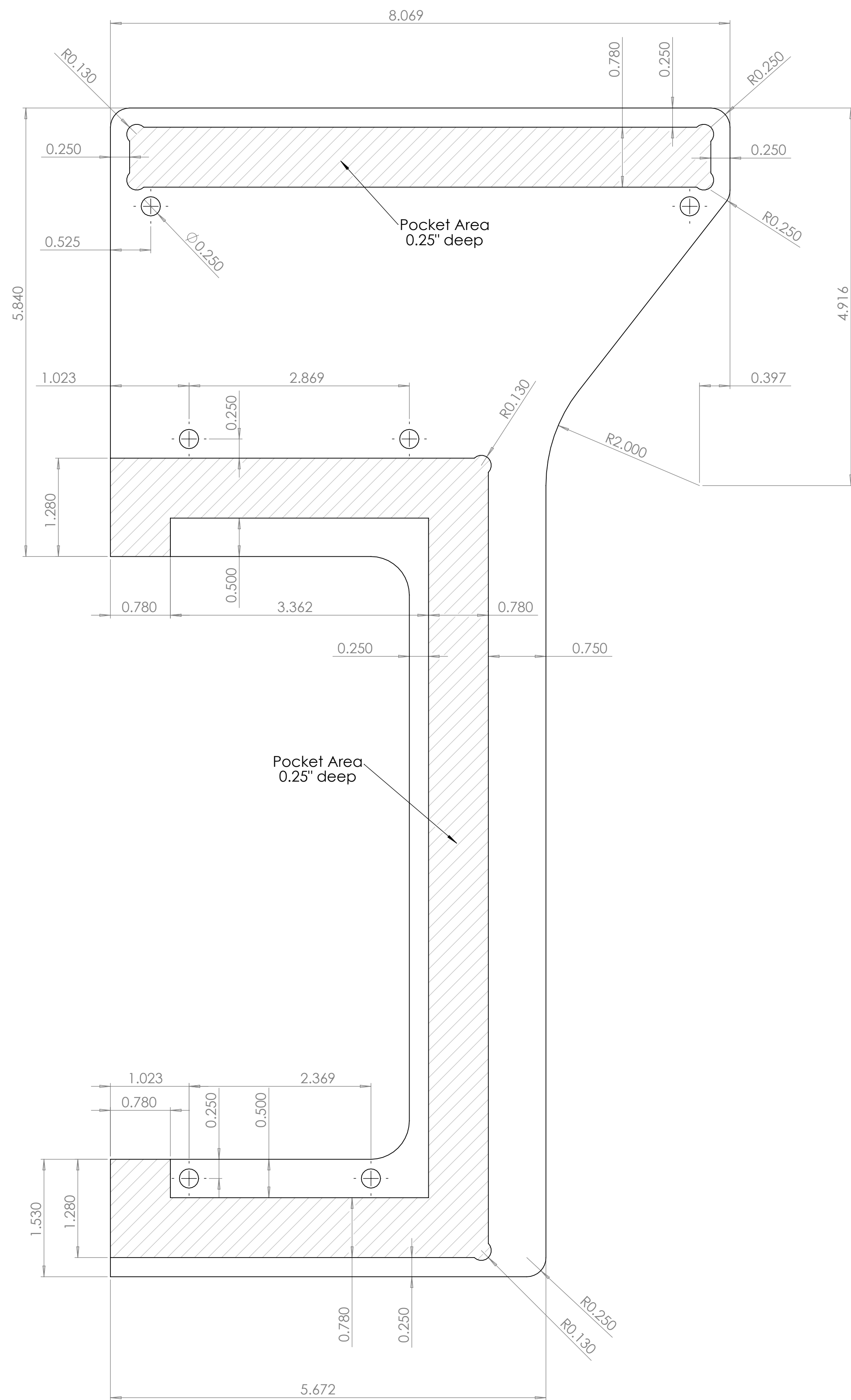
SIZE	DWG. NO.	R
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D R&amp;P J-10

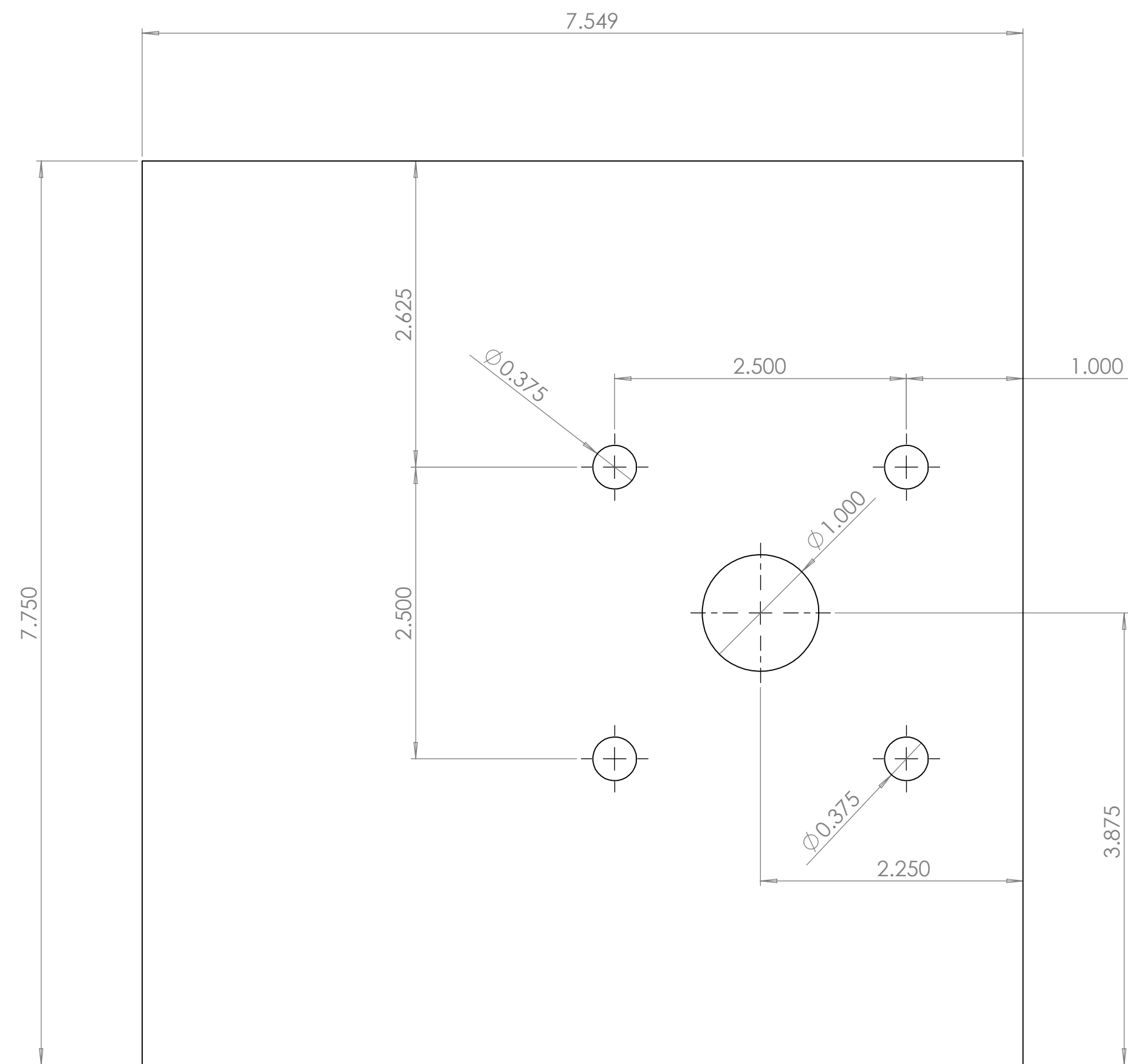
SCALE: 1:1		SHEET 2 OF 2
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NEXT ASSY

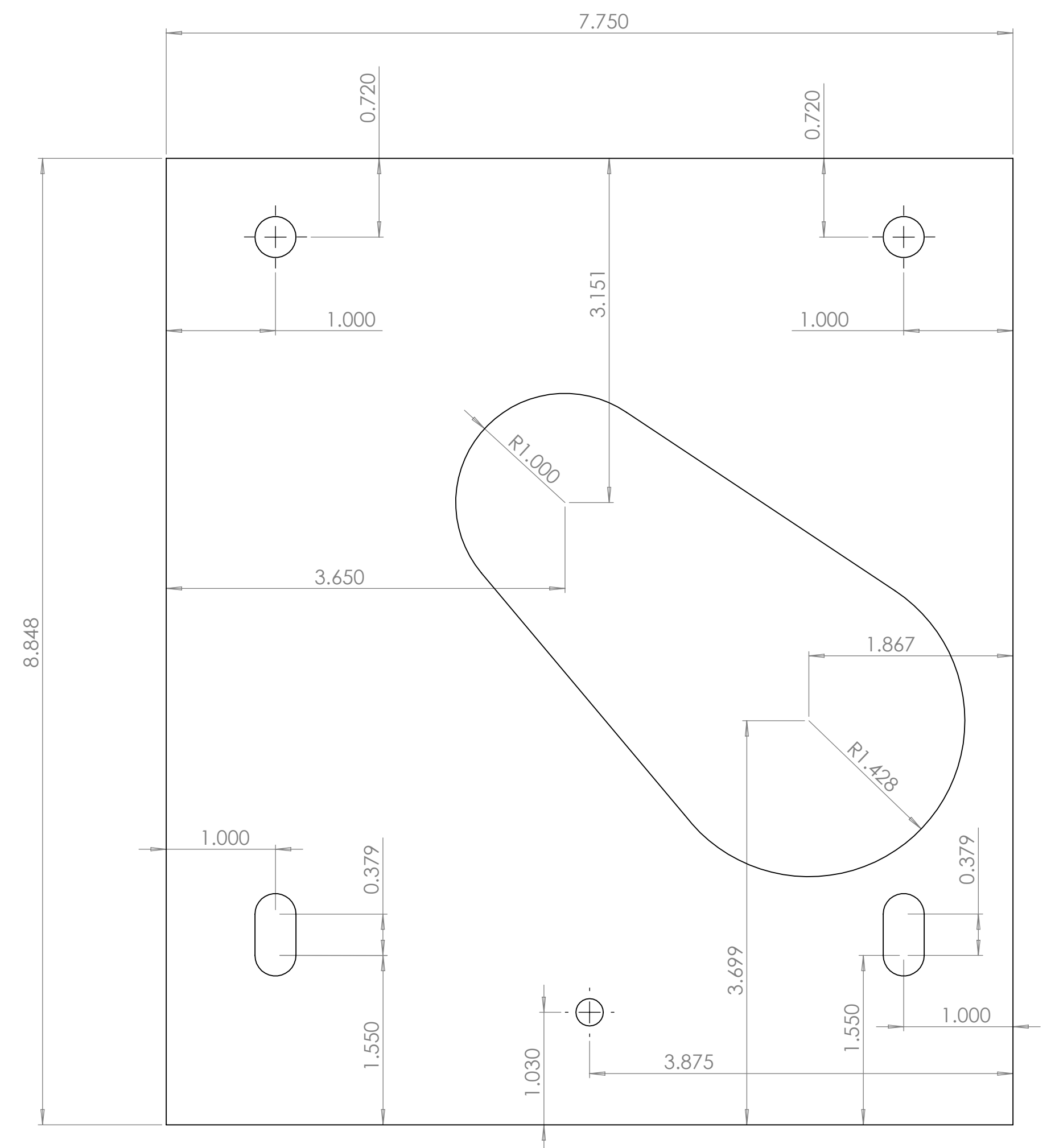


X-Axis Carriage Right Side  
3/4" MDF  
Mirror for Left Side



X-Axis Carriage Top Plate  
for Z-Axis Motor Mount  
3/4" MDF

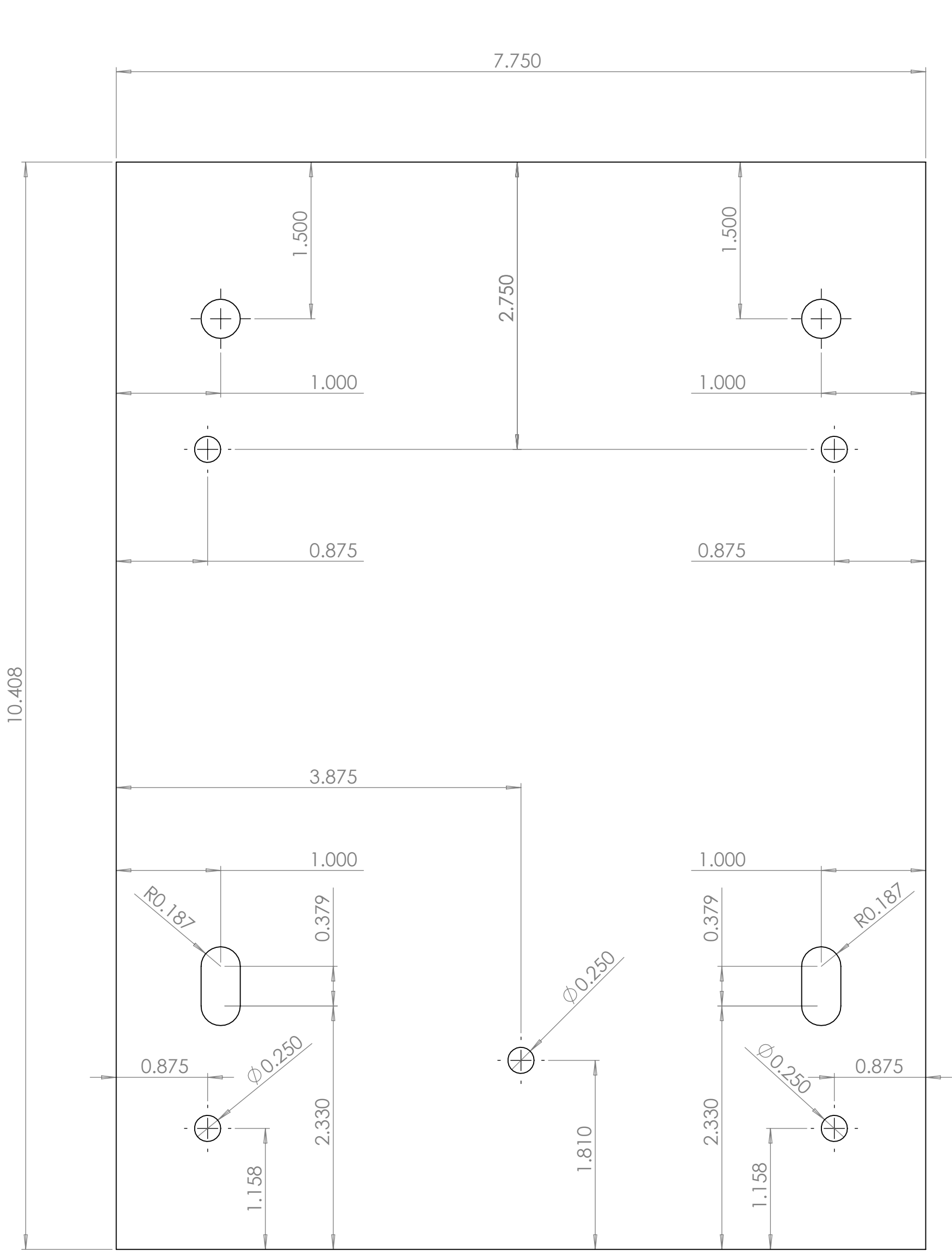
X-Axis Carriage Top and Bottom Plate  
3/4" MDF



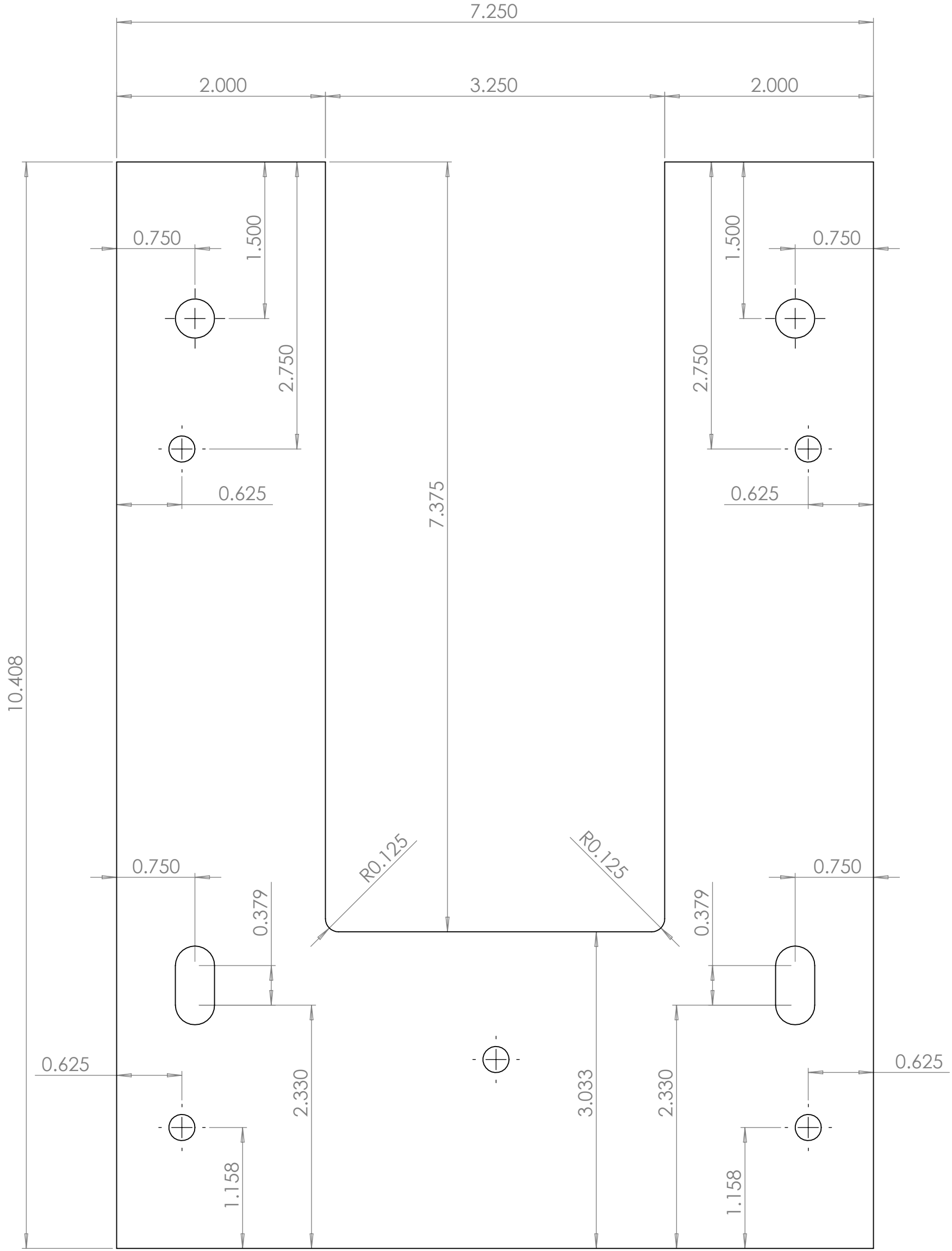
X-Axis Carriage Rack and Pinion Plate  
3/4" MDF

<





X-Axis Carriage Front Plate  
3/4" MDF



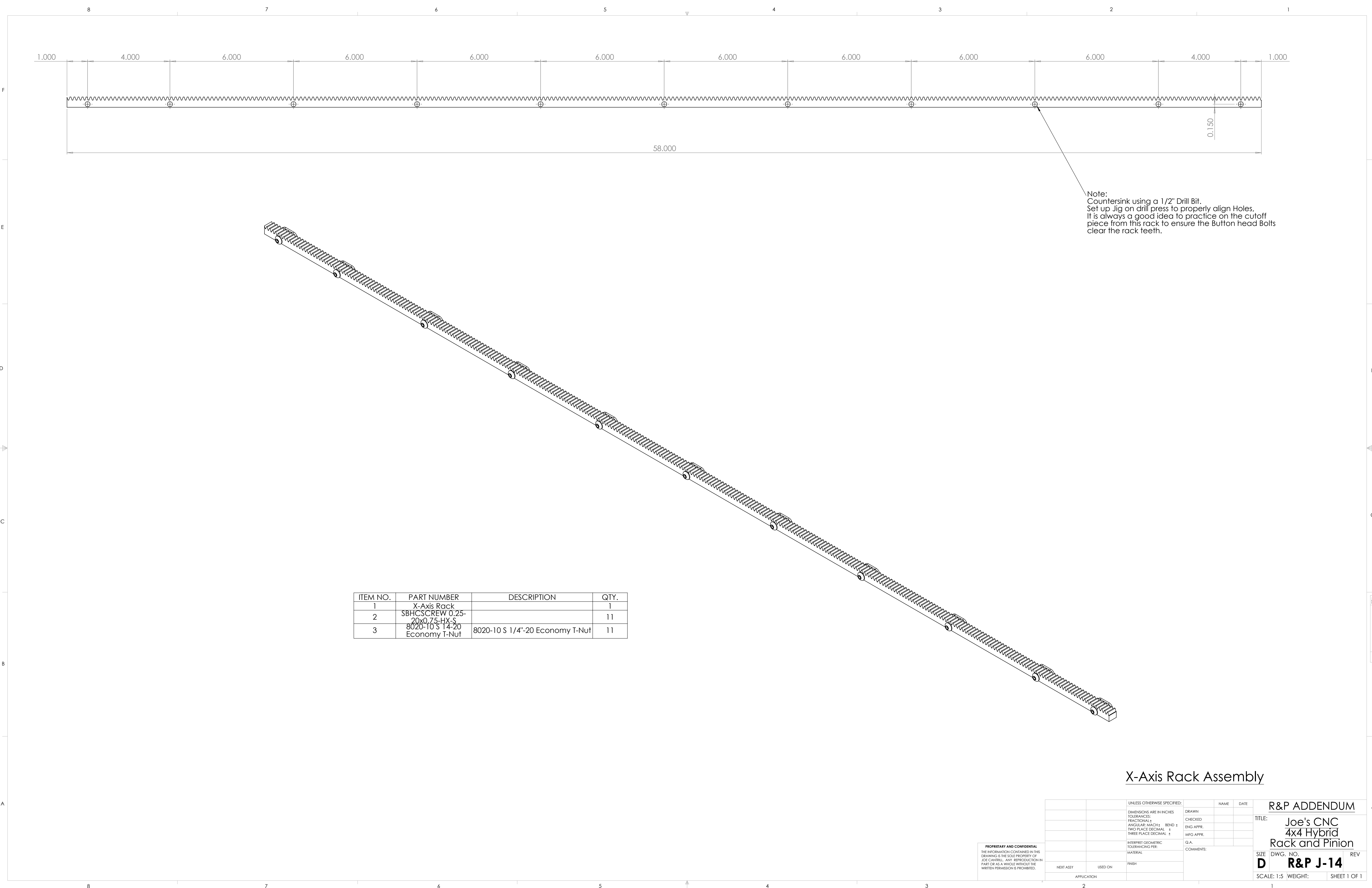
X-Axis Carriage Front Plate  
3/4" MDF

X-AXIS CARRIAGE  
Template PARTS

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		TOLERANCING PER:			
		MATERIAL			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION					

R&P ADDENDUM		
TITLE: Joe's CNC		
4x4 Hybrid		
Rack and Pinion		
SIZE	DWG. NO.	REV
D	R&P J-10	
SCALE: 1:1		SHEET 4 OF 4



Note:  
Countersink using a 1/2" Drill Bit.  
Set up Jig on drill press to properly align Holes.  
It is always a good idea to practice on the cutoff  
piece from this rack to ensure the Button head Bolts  
clear the rack teeth.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	X-Axis Rack		1
2	SBHCSCREW 0.25-20x0.75-HX-S		11
3	8020-10 S 14-20 Economy T-Nut	8020-10 S 1/4"-20 Economy T-Nut	11

X-Axis Rack Assembly

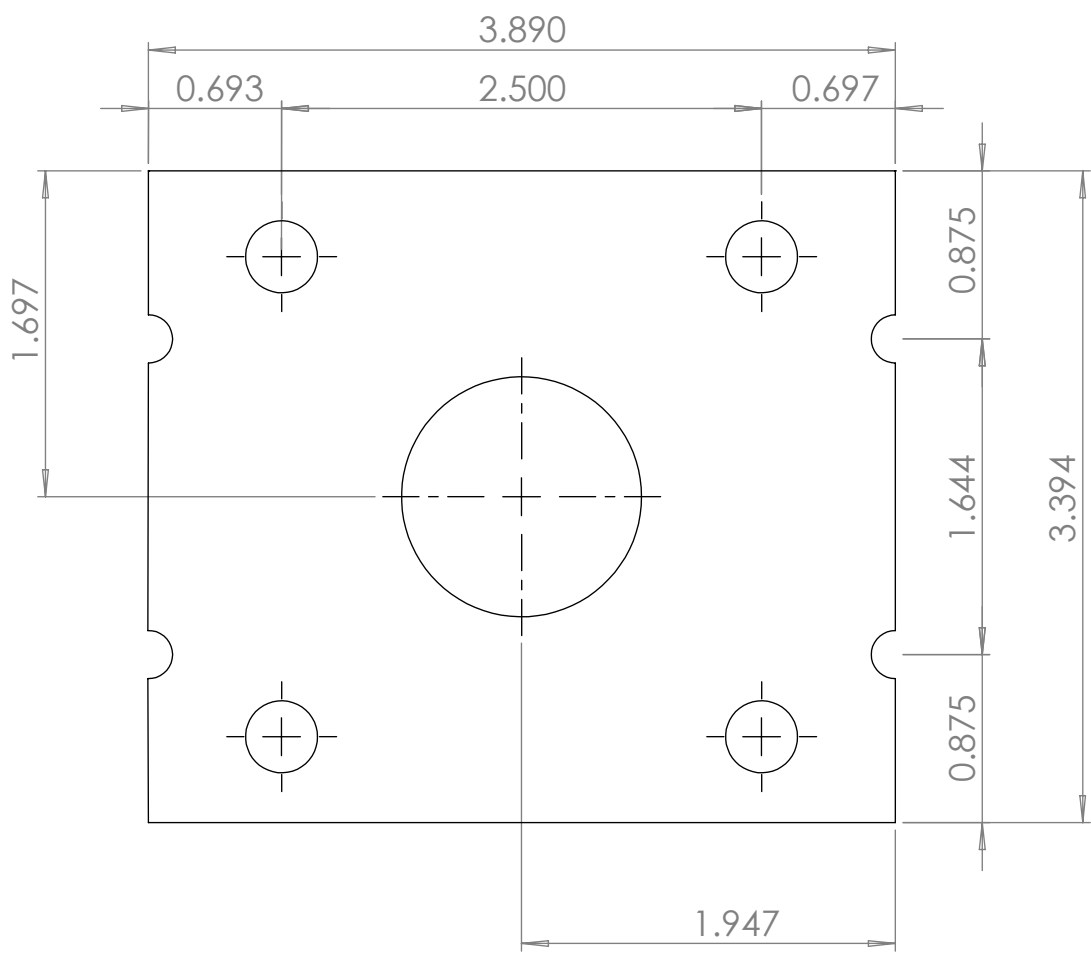
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APPLICATION					

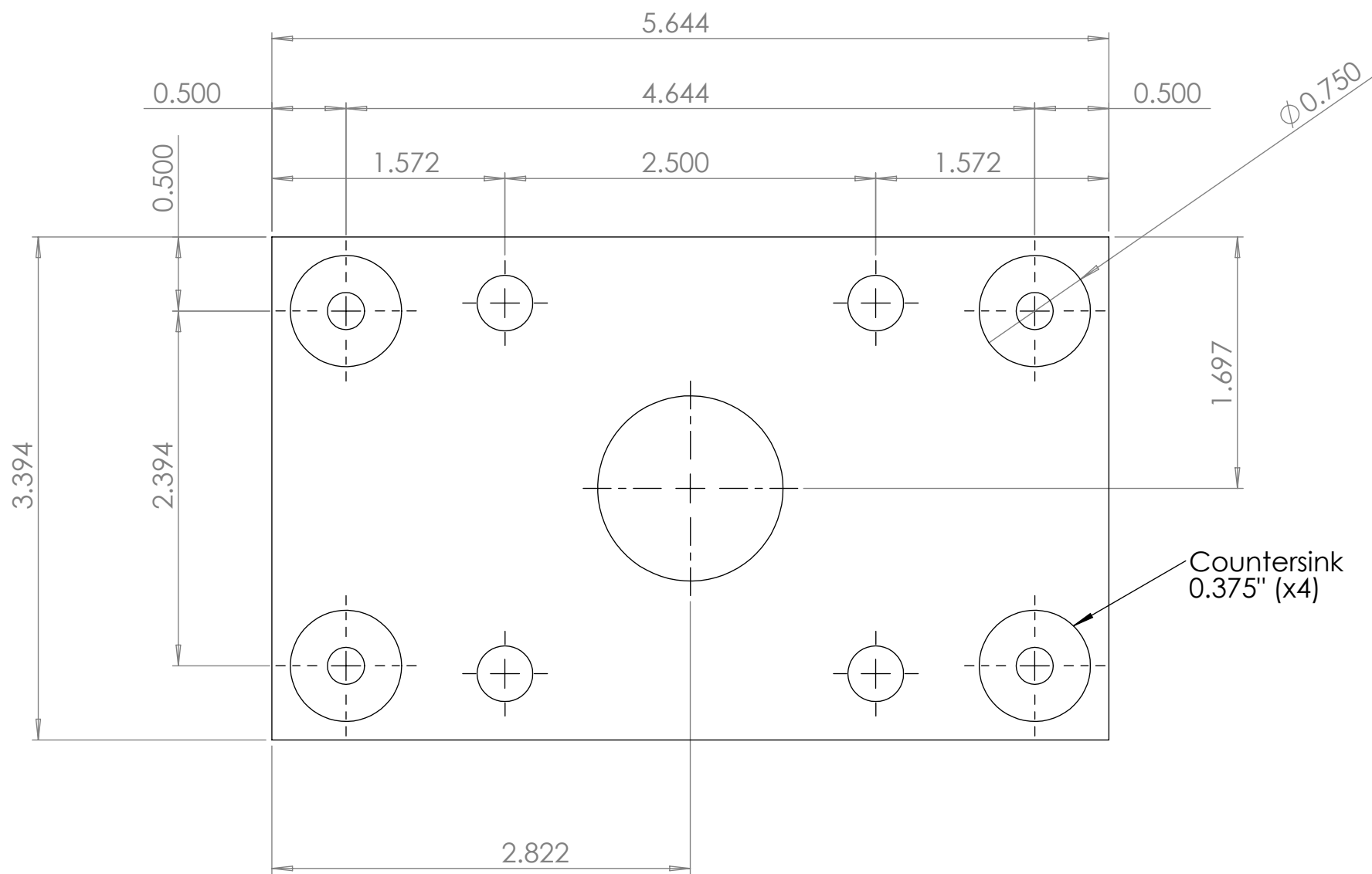
R&P ADDENDUM			
TITLE: Joe's CNC 4x4 Hybrid Rack and Pinion			
SIZE	DWG. NO.	REV	
D	R&P J-14		
SCALE: 1:5		WEIGHT:	SHEET 1 OF 1



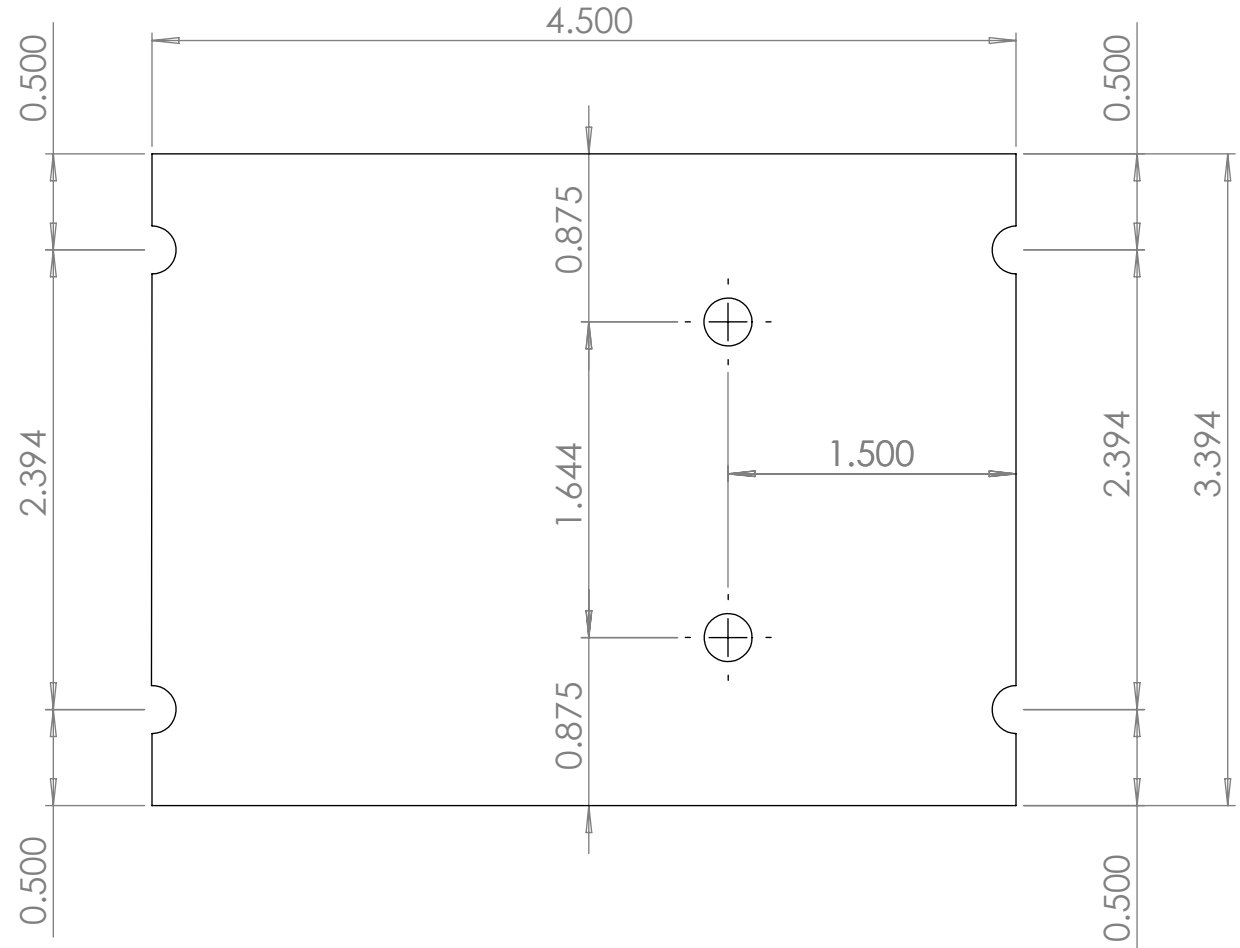
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Z-Axis Motor Mount	Z-Axis Motor Mount	1
2	Regular FW 0.25	1/4" Flat Washer	4
3	Regular LW 0.25	1/4" Lock Washer	4
4	HBOLT 0.2500-20x1.5x0.75-N	Hex Bolt 1/4"-20 x 1-1/2" x 3/4" thread	4
5	Nema23 Motor with Lovejoy Couplers		1
6	Regular LW 0.375		12
7	Regular LW 0.25		4
8	Z-Axis Motor Support Walls	Z-Axis Motor Support Walls	1
9	Z-Axis Motor Support Walls	Z-Axis Motor Support Walls	2
10	Flange Bearing	3-1/2" x 3-1/2" 4 Hole Flange Bearing 1/2" bore	2
11	Z-Axis Flange Bearing Mount	Z-Axis Flange Bearing Mount	1
12	HBOLT 0.2500-20x1.5x0.75-S		8
13	HBOLT 0.3125-18x2x0.875-N		4
14	HBOLT 0.3750-16x2.5x1-N		4
15	Regular FW 0.375		8
16	HNUT 0.3750-16-D-N		8



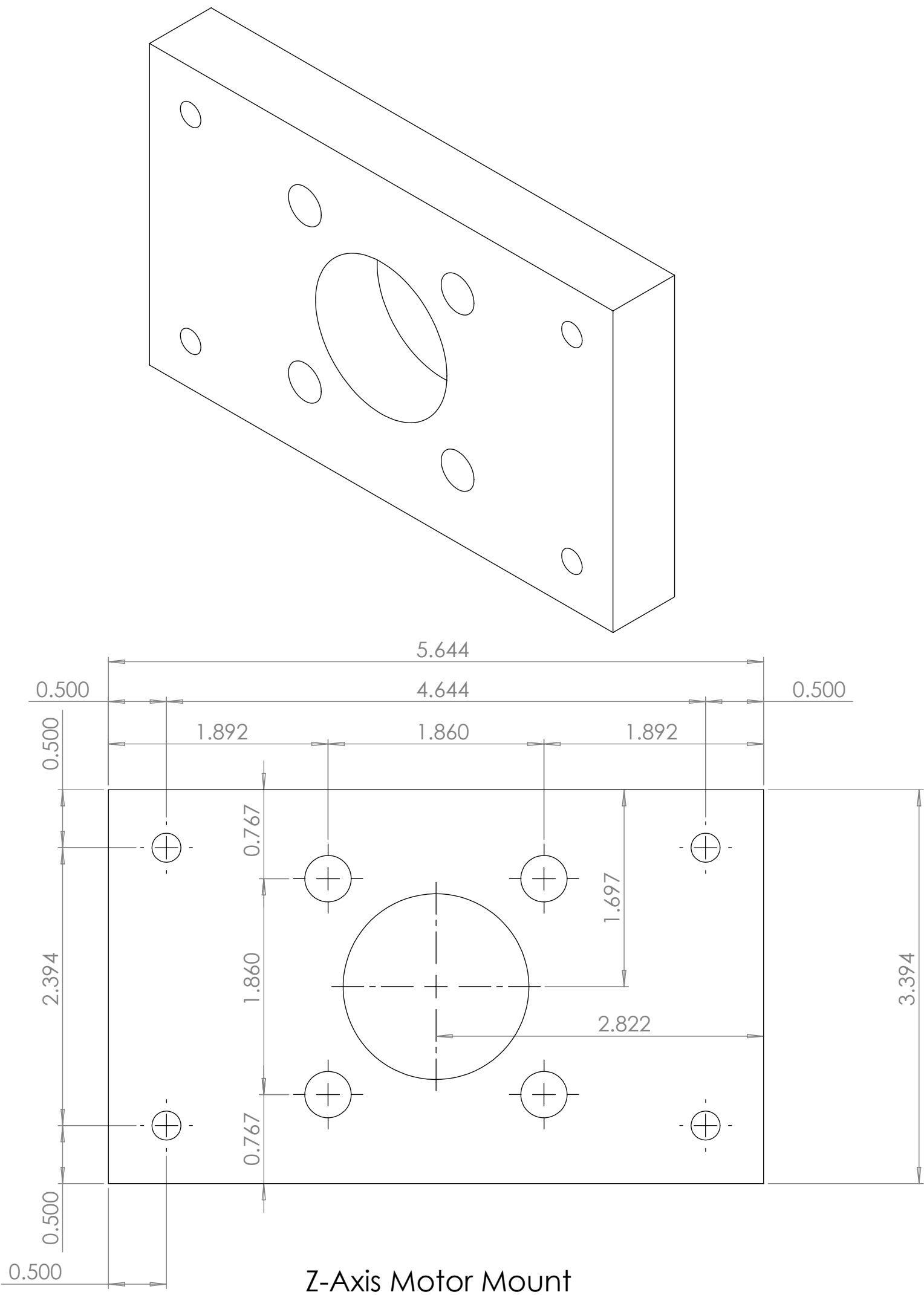
### Z-Axis Middle Flange Bearing Support



### Z-Axis Flange Bearing Mount



### Z-Axis Motor Support walls



## Z-Axis Motor Mount

## Z-Axis Motor and Flange Bearing Assembly

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	NEXT ASSY	USED ON	FINISH			
	APPLICATION					