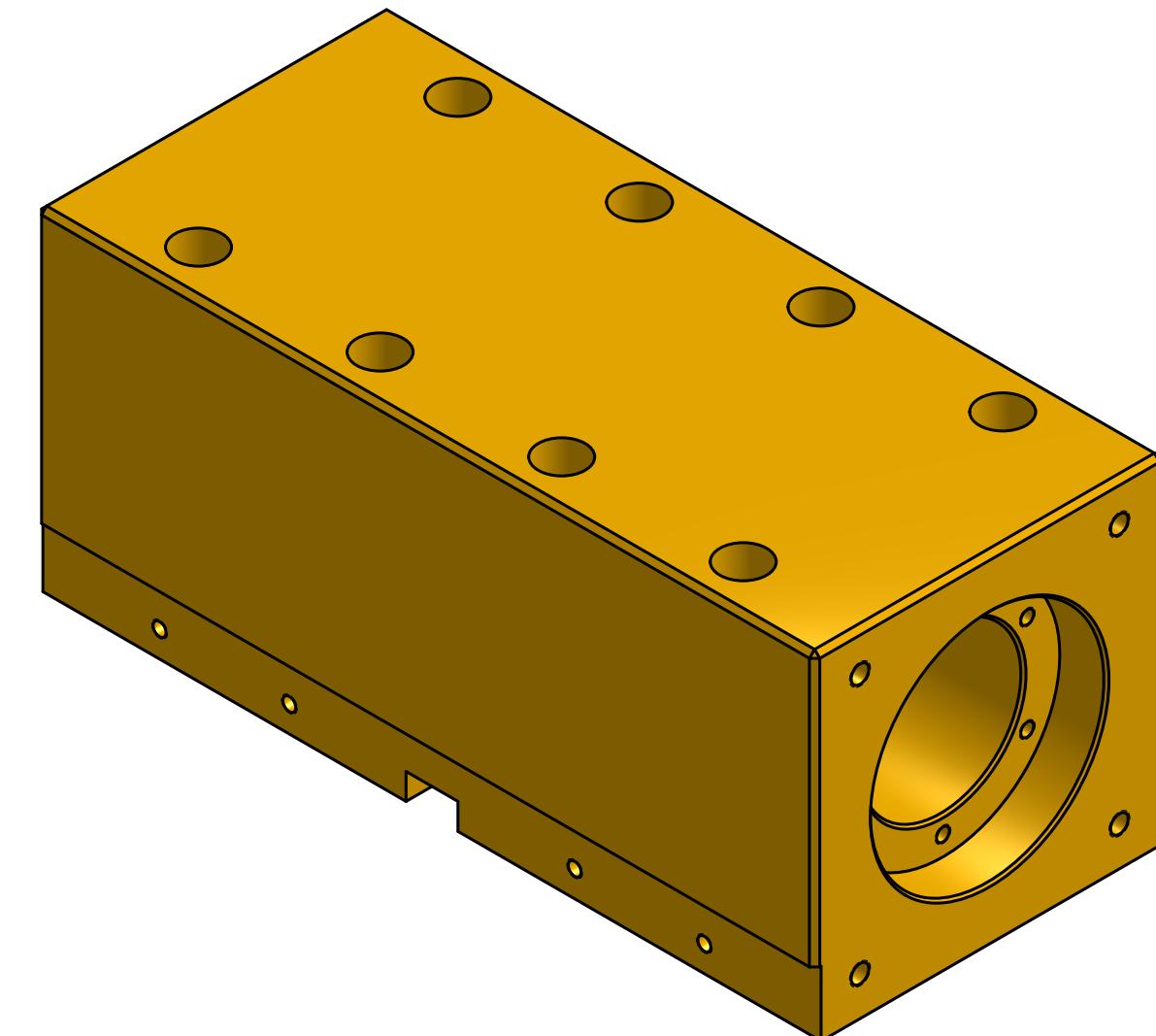
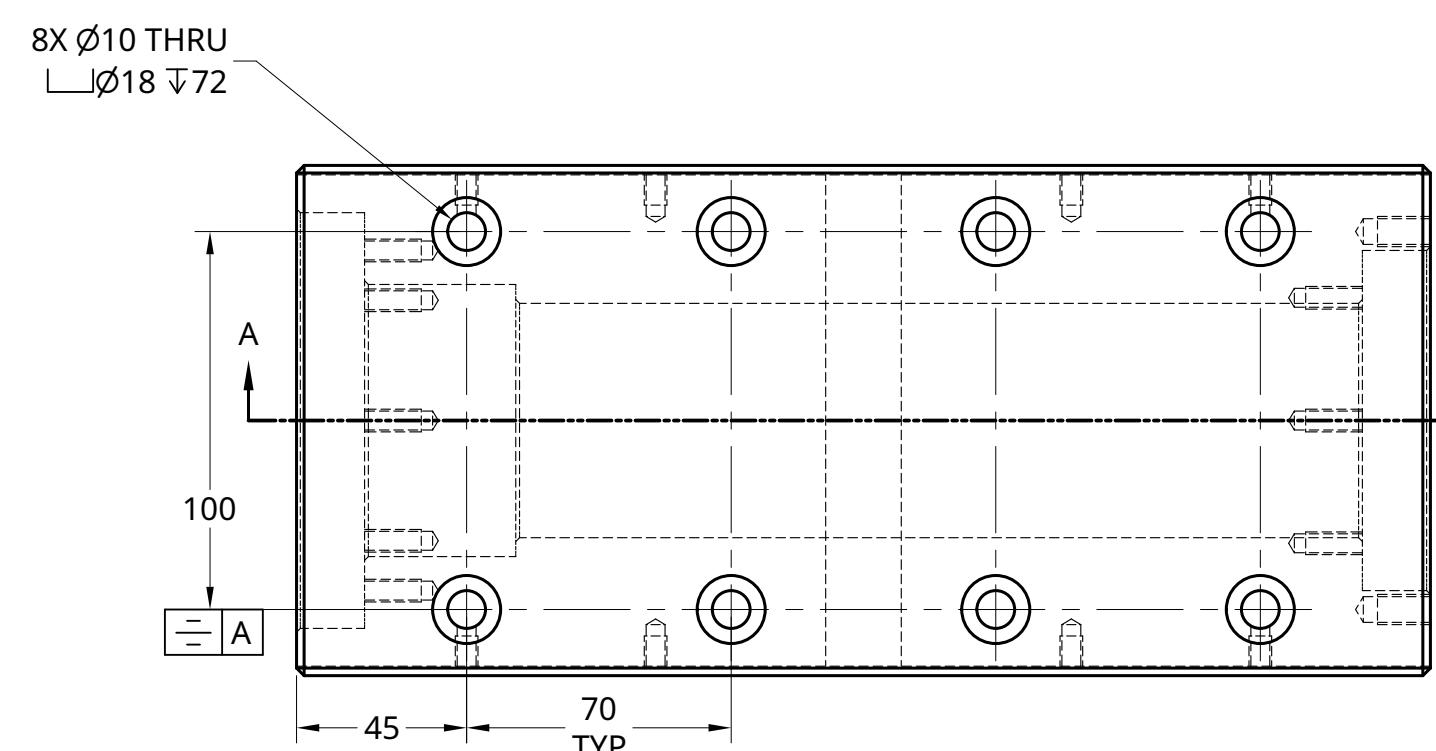
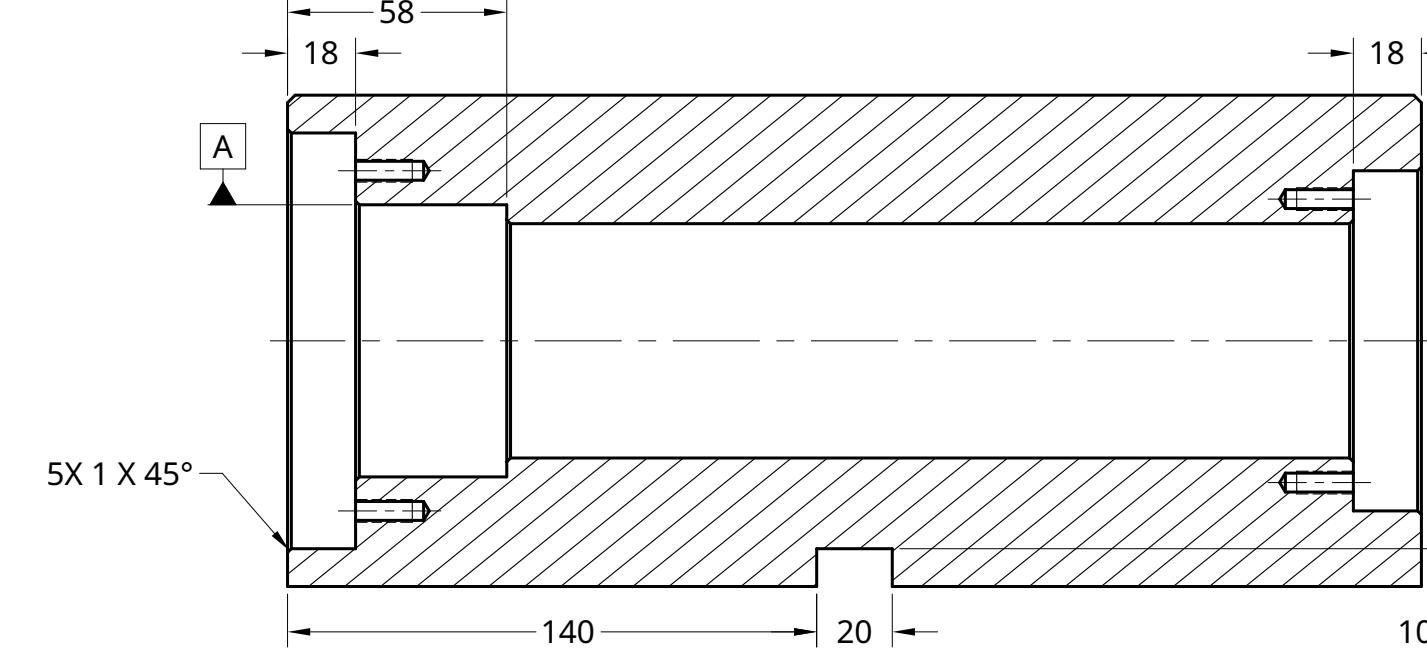
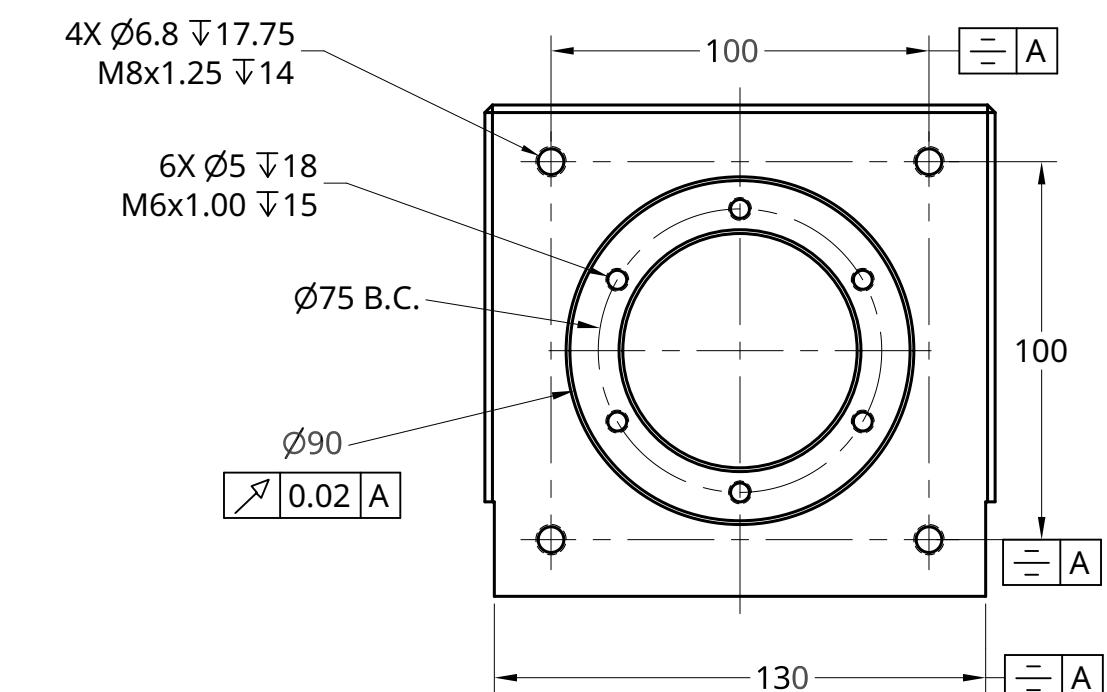
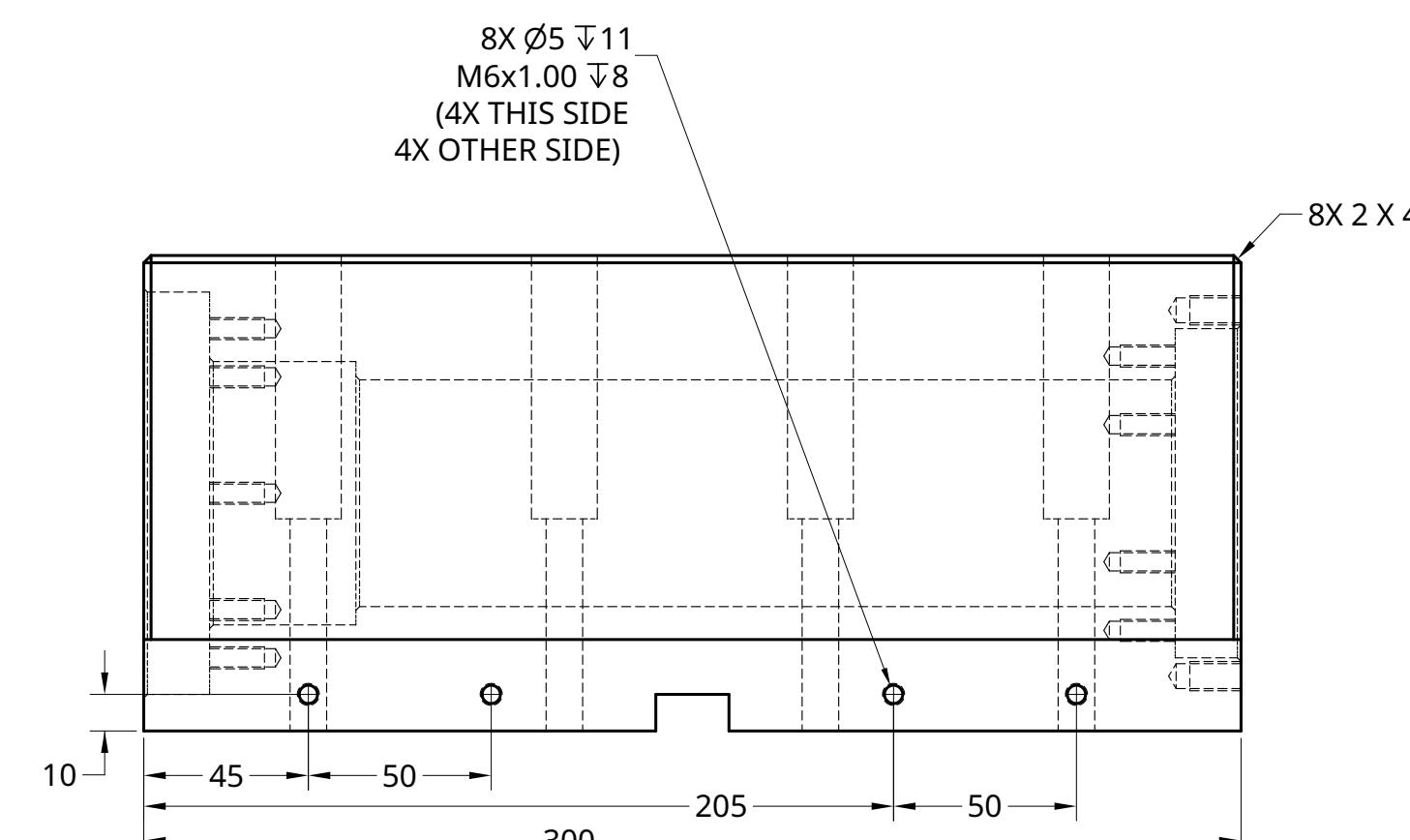
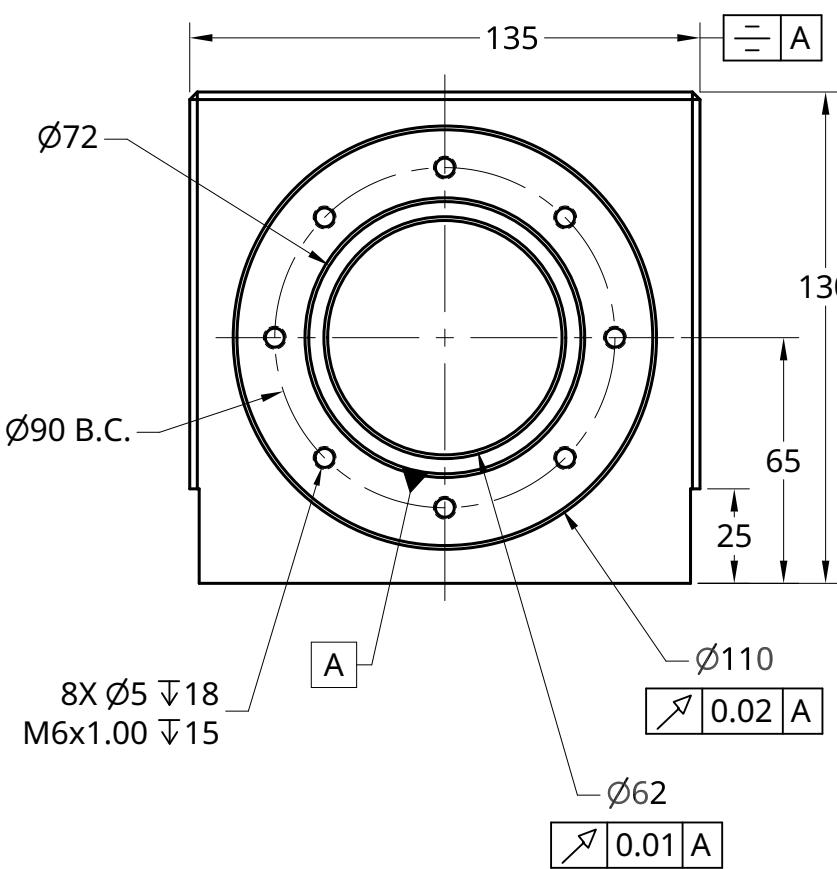


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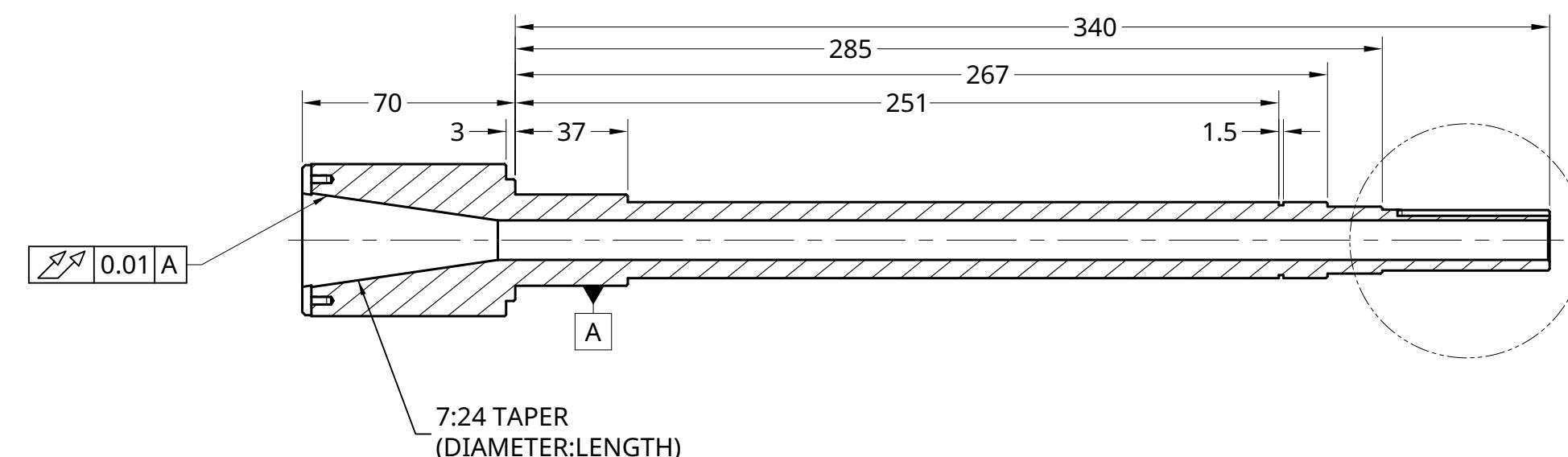
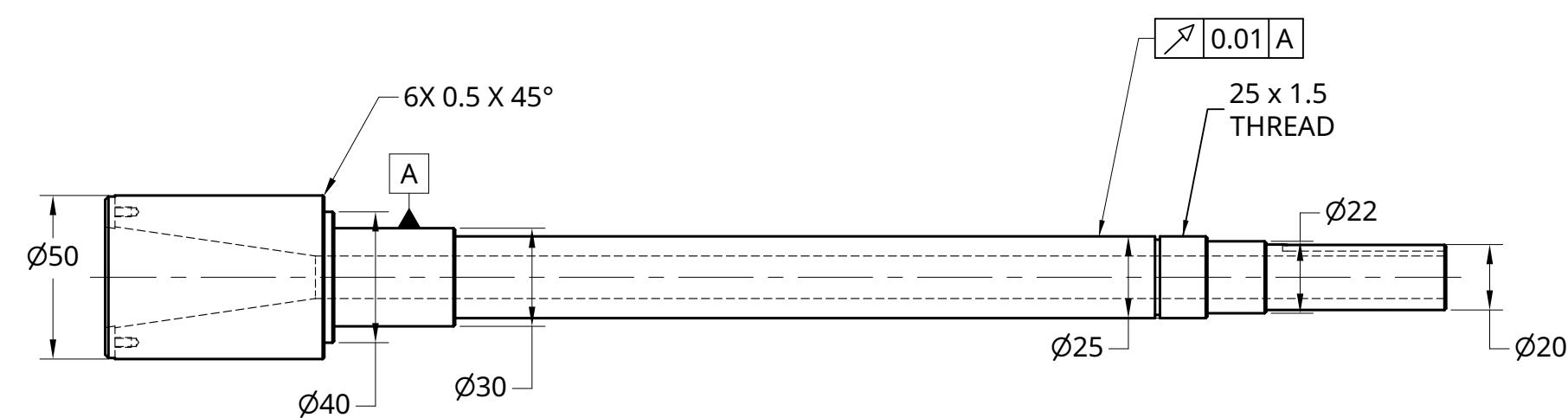
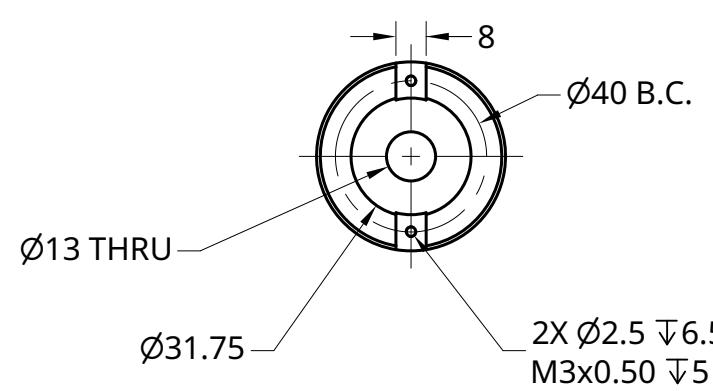
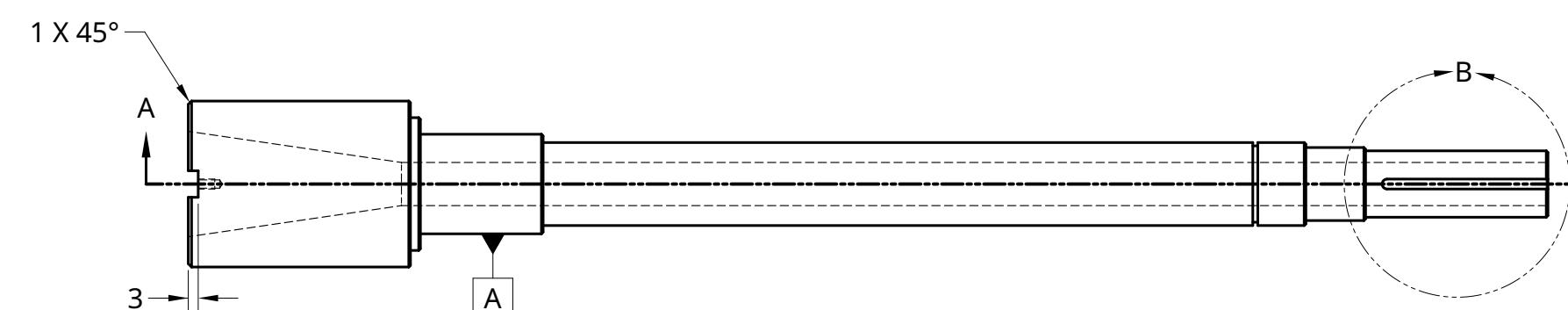
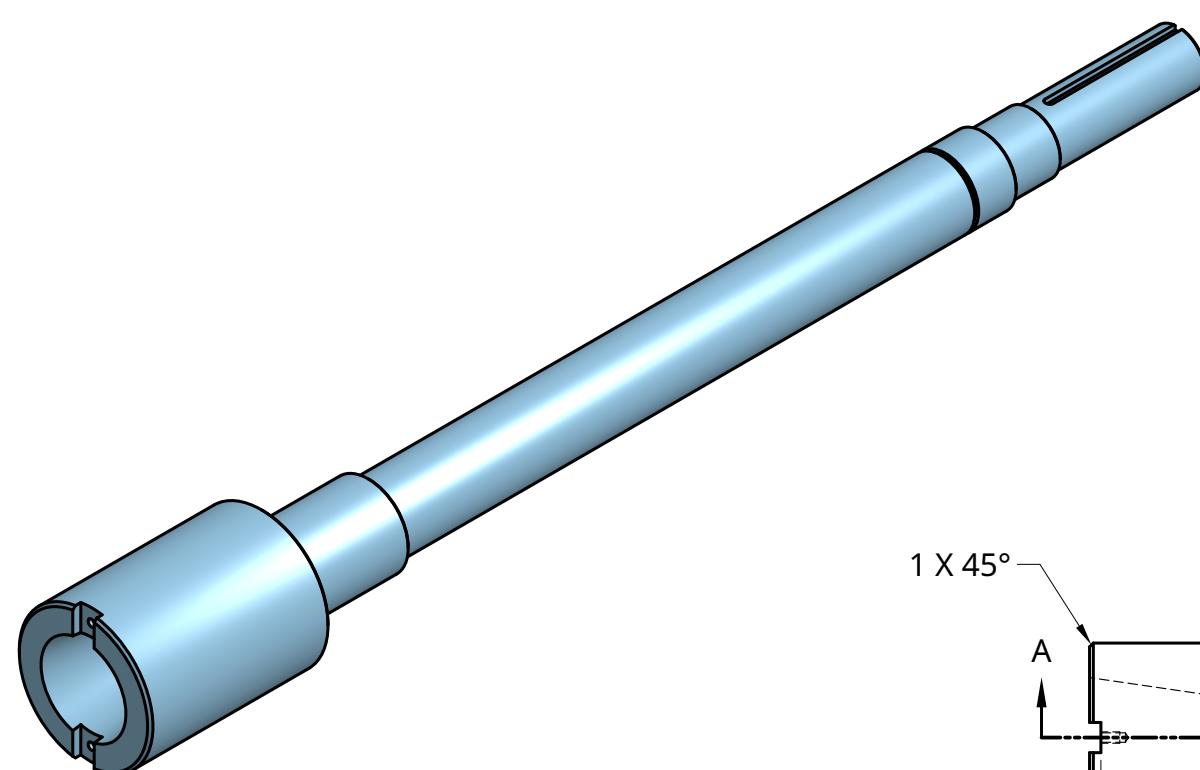


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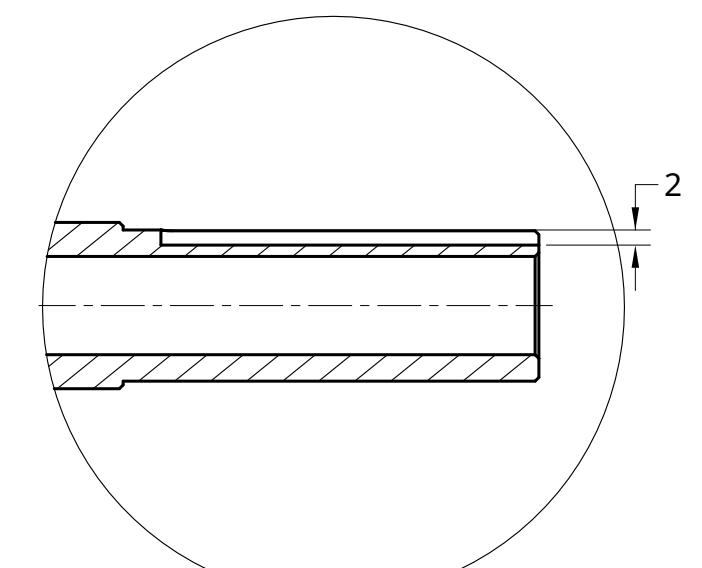
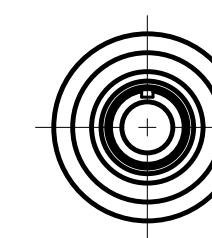
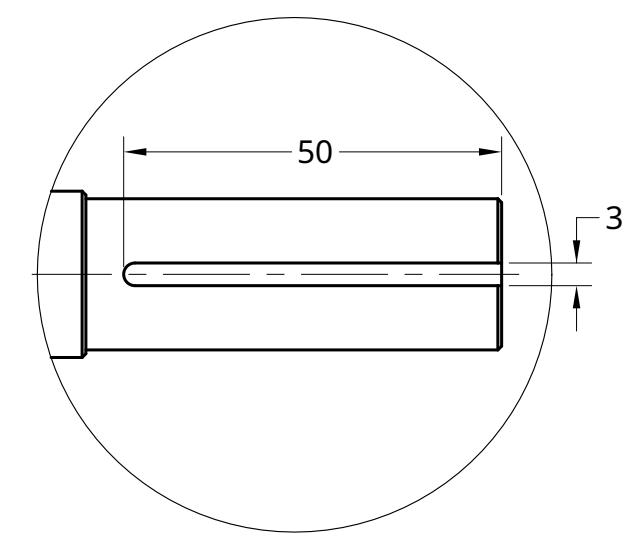


| Ferris State University | | |
|---|--------------------|--------------------|
| DRILL UNIT SPINDLE ASSEMBLY DETAILS SPINDLE HOUSING | | |
| SIZE | DWG NO. | REV. |
| C | BR-549-A-001 | |
| SCALE 1:4 | WEIGHT 27.071 kg | HEET 1 of 8 |
| UNLESS OTHERWISE SPECIFIED, .XX + .0-. .XXX + .00-. .XXXX + .0000- ANGULAR = ± ° FRACTIONAL = ± # | NAME | DATE |
| SURFACE FINISH ✓ | BRIAN BRADY | 10/16/2019 |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | CHECKED | |
| THIRD ANGLE PROJECTION | APPROVED | |
| | | |
| | MATERIAL CAST IRON | VOLUME 3881130 mm³ |

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SECTION A - A



| UNLESS OTHERWISE SPECIFIED, .XX ± .XX .XXX ± .XXX .XXXX ± .XXXX | | NAME | DATE |
|--|--------------|------------------------|--------------|
| DRAWN | BRIAN BRADY | | 10/16/2019 |
| CHECKED | | | |
| APPROVED | | | |
| DO NOT SCALE DRAWING | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | |
| | STEEL 8620 | 224786 mm ³ | |
| | SCALE 1:2 | WEIGHT 1.765 kg | SHEET 2 of 8 |
| | DWG NO. | REV. | |
| | BR-549-A-002 | | |

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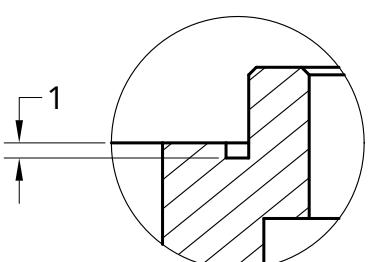
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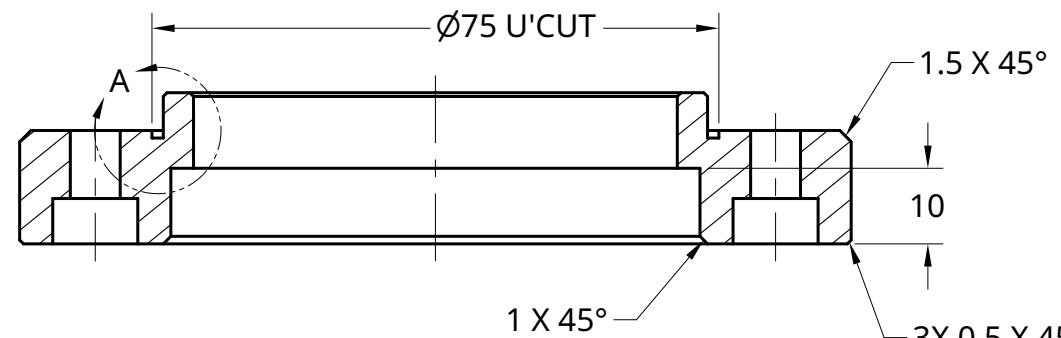
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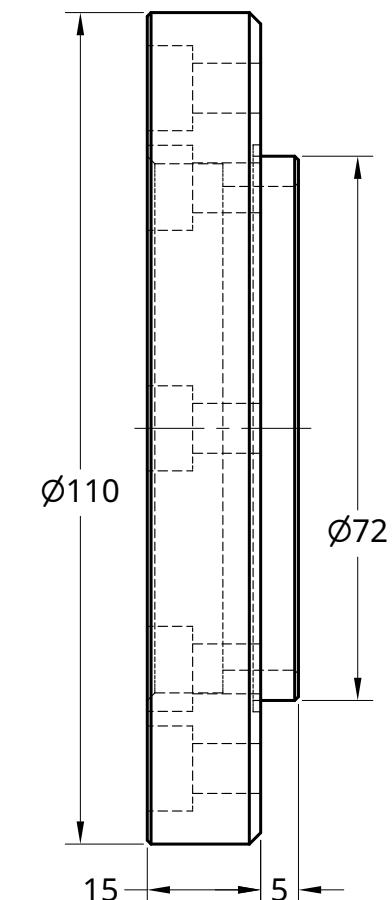
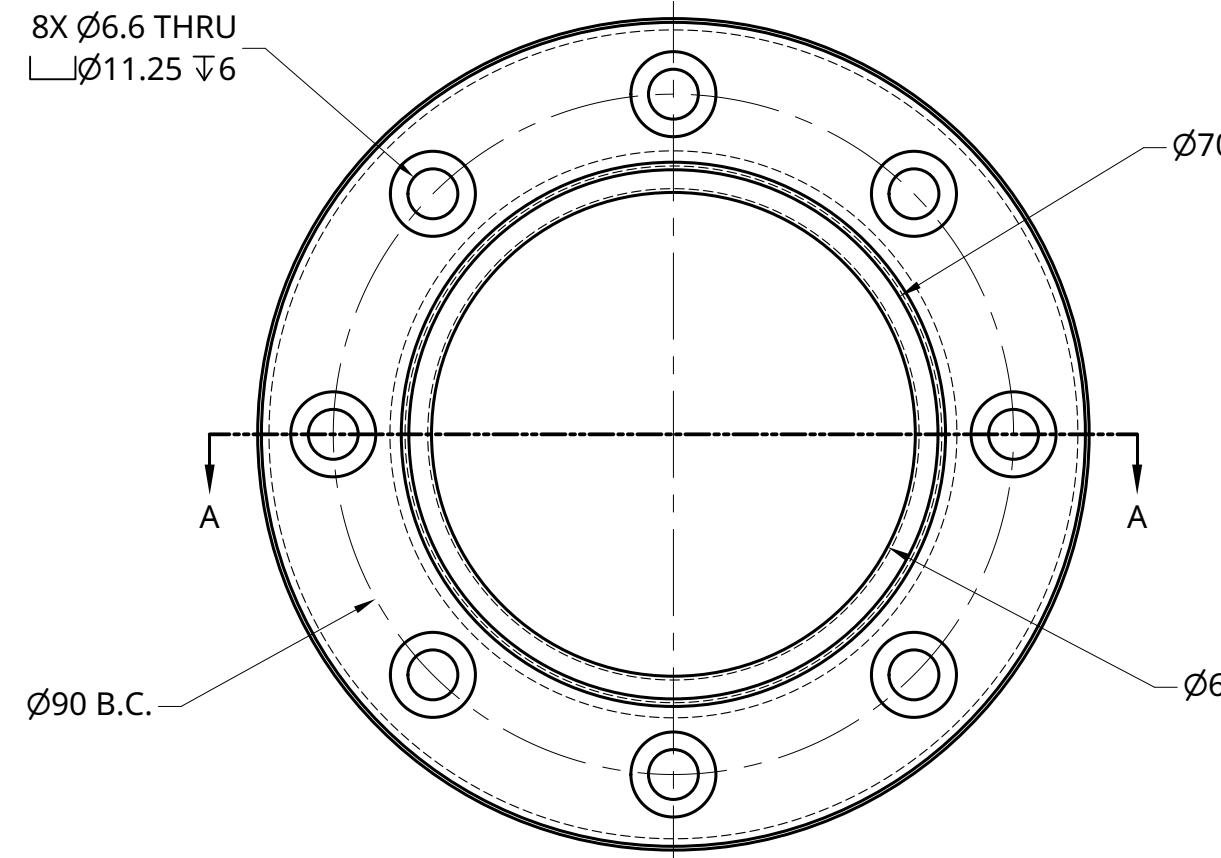
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DETAIL A
SCALE 2:1



SECTION A - A



UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00-
.XXXX = ±.000- ANGULAR = ± °
FRACTIONAL = ±

SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND
REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN BRIAN BRADY DATE 10/16/2019
CHECKED _____
APPROVED _____

TITLE DRILL UNIT
SPINDLE ASSEMBLY DETAILS
FRONT BEARING CAP

SIZE B DWG NO. BR-549-A-003 REV.

MATERIAL STEEL 4130 VOLUME 84079 mm³

SCALE 1:1 WEIGHT 0.660 kg SHEET 3 of 8

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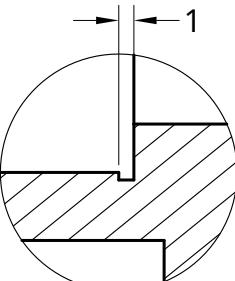
Ferris State University

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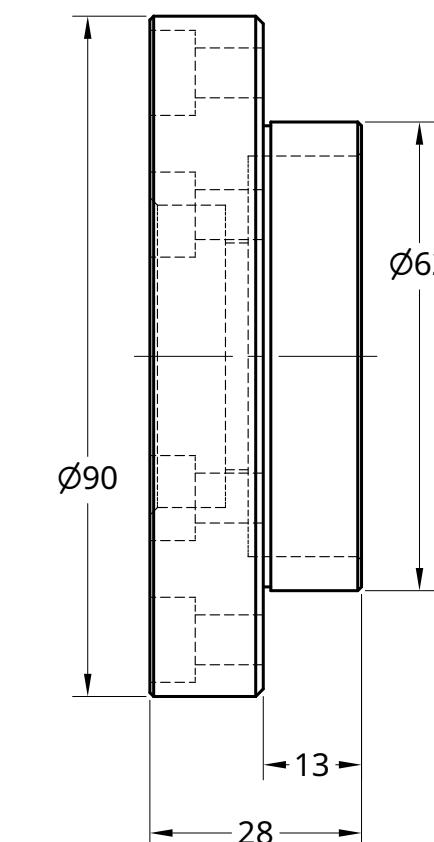
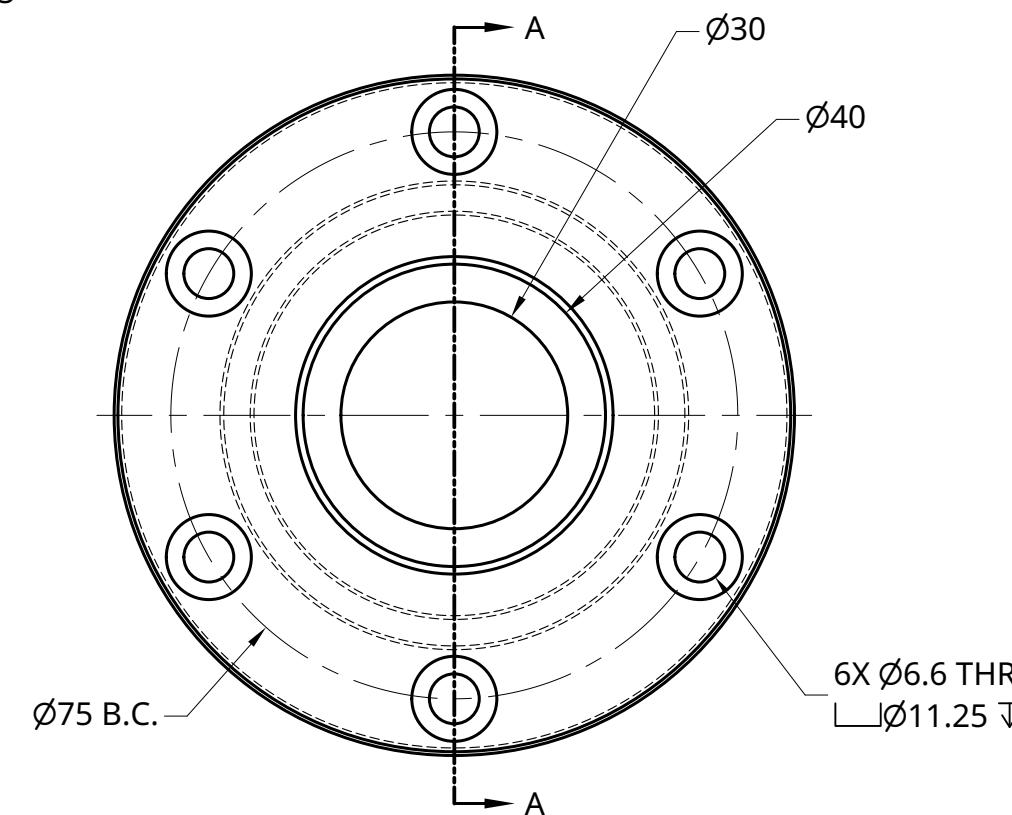
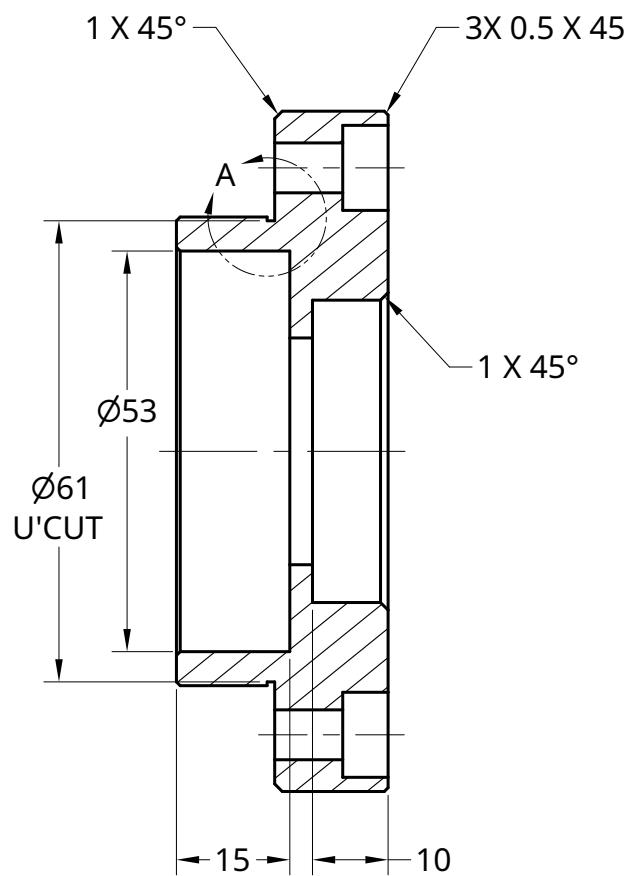
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DETAIL A
SCALE 2:1



SECTION A - A

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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- .XXX = ±.00- .XXXX = ±.000- ANGULAR = ± ° FRACTIONAL = ± | | NAME | DATE |
| DRAWN | BRIAN BRADY | 10/16/2019 | |
| CHECKED | | | TITLE |
| APPROVED | | | DRILL UNIT |
| DO NOT SCALE DRAWING | | | SPINDLE ASSEMBLY DETAILS |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | REAR BEARING SLEEVE |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | SIZE |
| | STEEL 4130 | 81087 mm ³ | B DWG NO. |
| | | | BR-549-A-004 REV. |
| SCALE | 1:1 | WEIGHT | 0.637 kg |
| | | SHEET | 4 of 8 |

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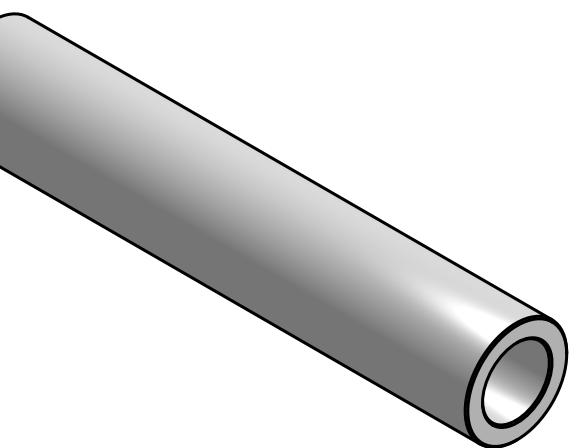
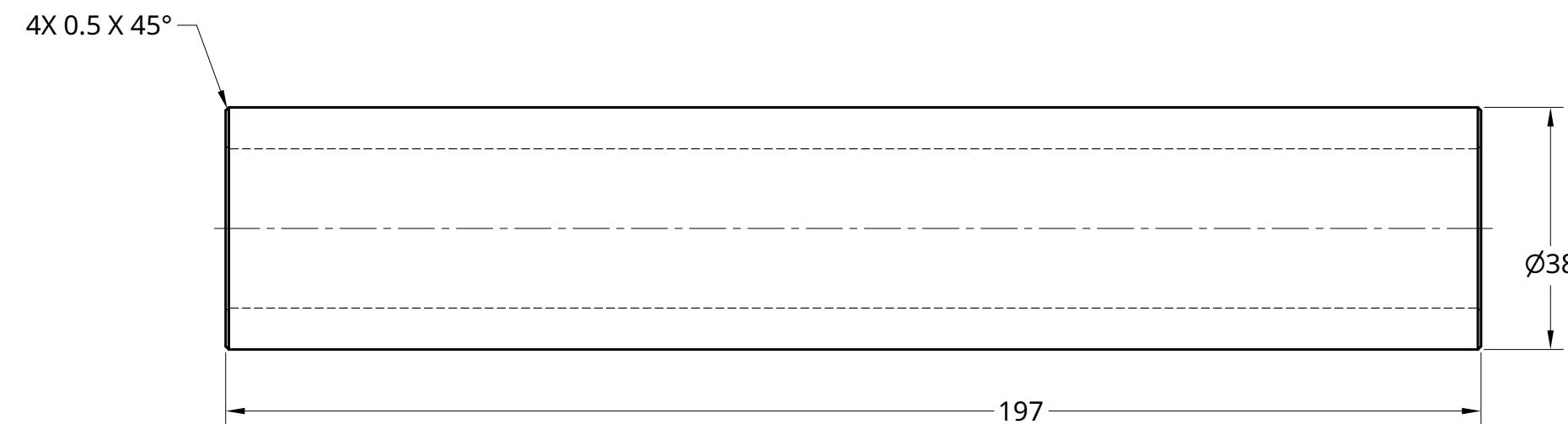
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- .XXX = ±.00- .XXXX = ±.000- | | NAME BRIAN BRADY | DATE 10/16/2019 |
| SURFACE FINISH ✓ | | ANGULAR = ± ° FRACTIONAL = ± | TITLE |
| DO NOT SCALE DRAWING | | APPROVED | DRILL UNIT |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | THIRD ANGLE PROJECTION | SPINDLE ASSEMBLY DETAILS |
| MATERIAL STEEL 1020 | | VOLUME 126669 mm³ | INNER BEARING SPACER |
| SCALE 1:1 | | WEIGHT 0.997 kg | REV. |
| DWG NO. BR-549-A-005 | | | SHEET 5 of 8 |

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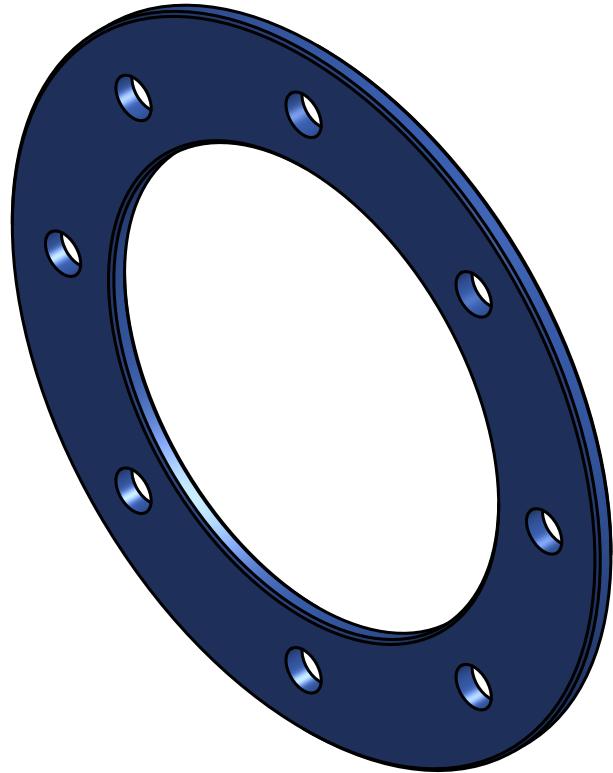
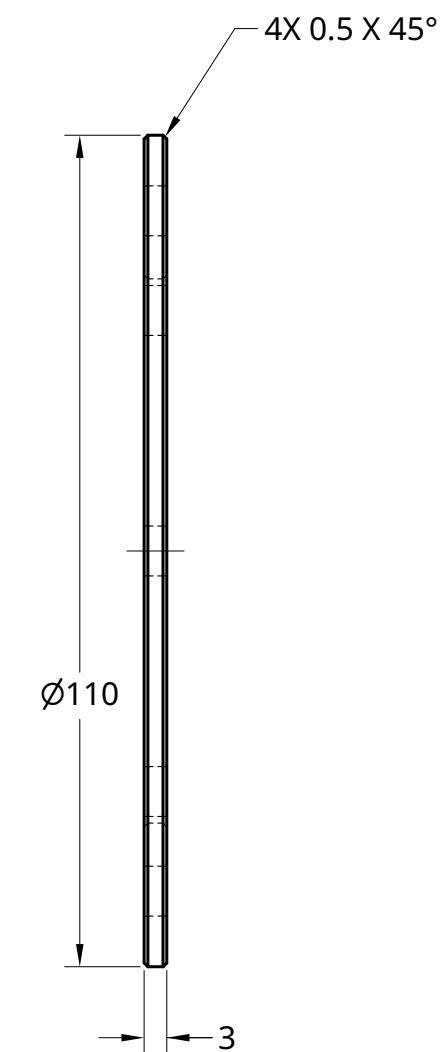
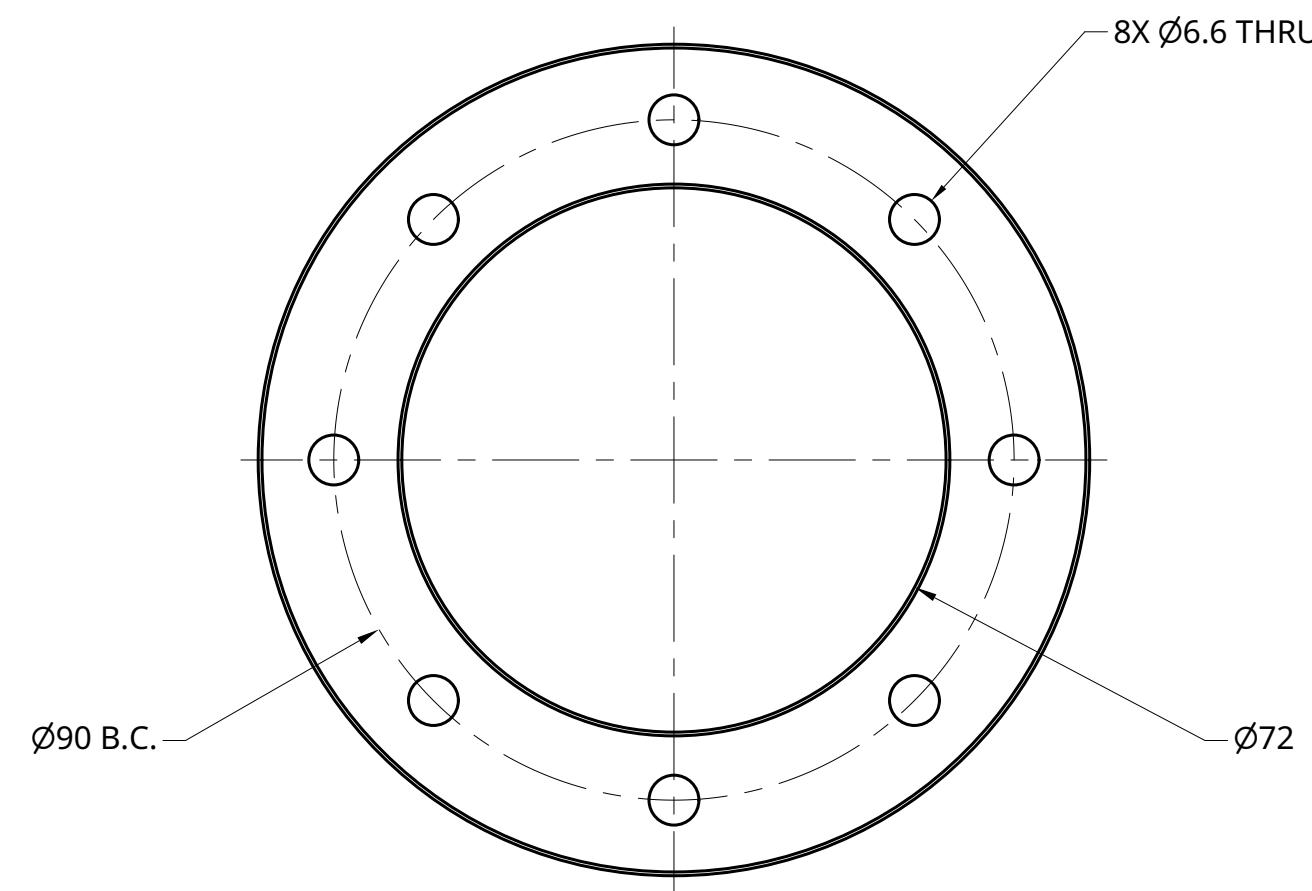
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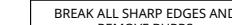
UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-.
.XXX = ±.00-. ANGULAR = ± °
.XXXX = ±.000-. FRACTIONAL = ±

SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN BY BRIAN BRADY DATE 10/16/2019
CHECKED BY _____
APPROVED BY _____

TITLE DRILL UNIT
SPINDLE ASSEMBLY DETAILS
FRONT FITTING SPACER

SIZE B DWG NO. BR-549-A-006 REV.

MATERIAL STEEL 1020 VOLUME 15331 mm³

SCALE 1:1 WEIGHT 0.121 kg SHEET 6 of 8

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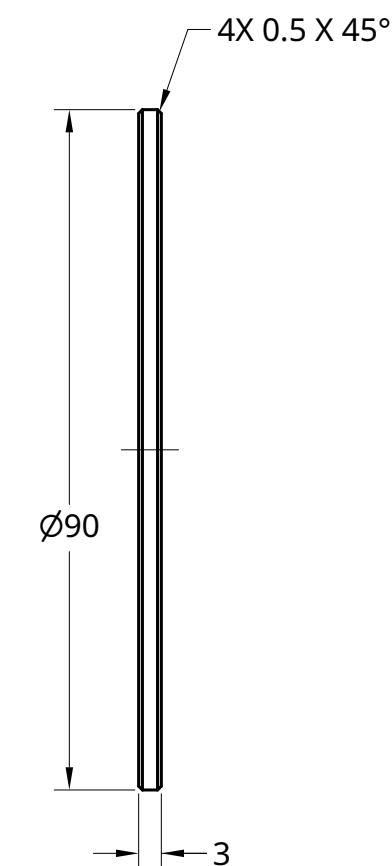
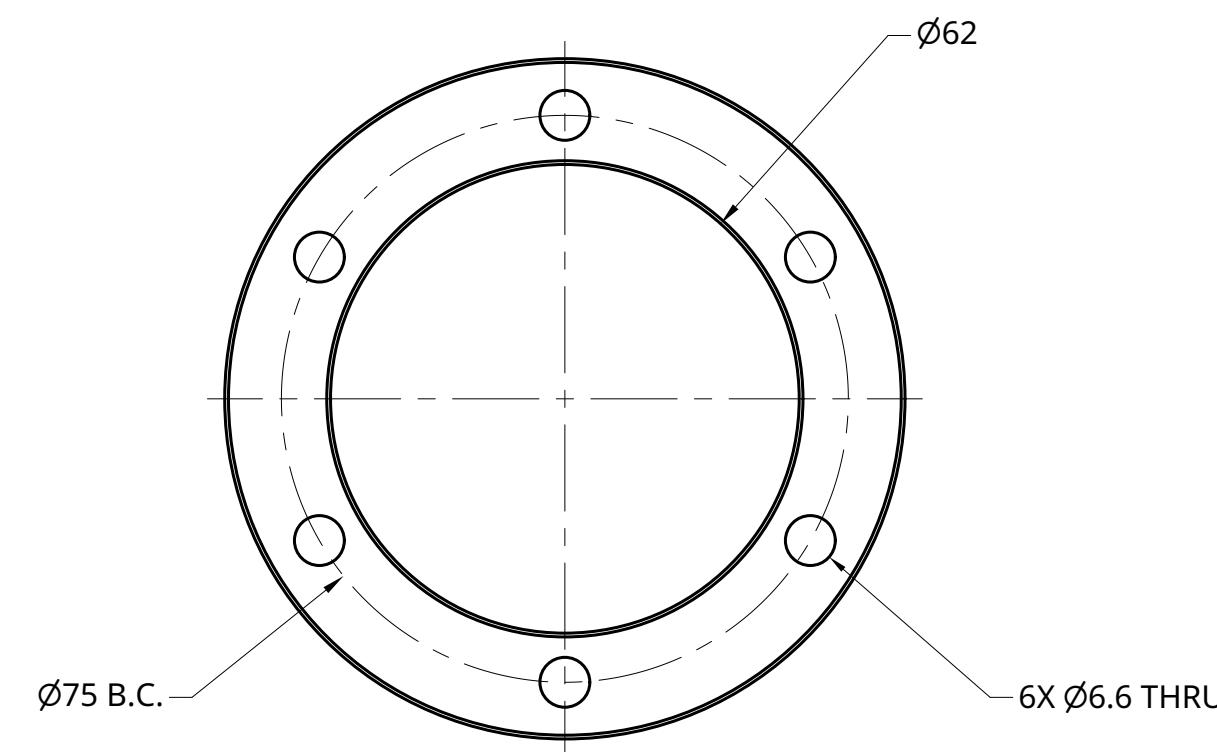
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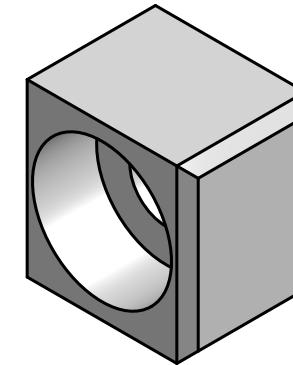
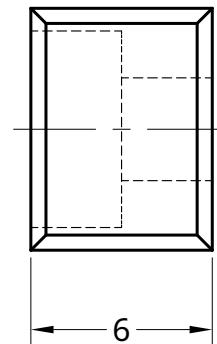
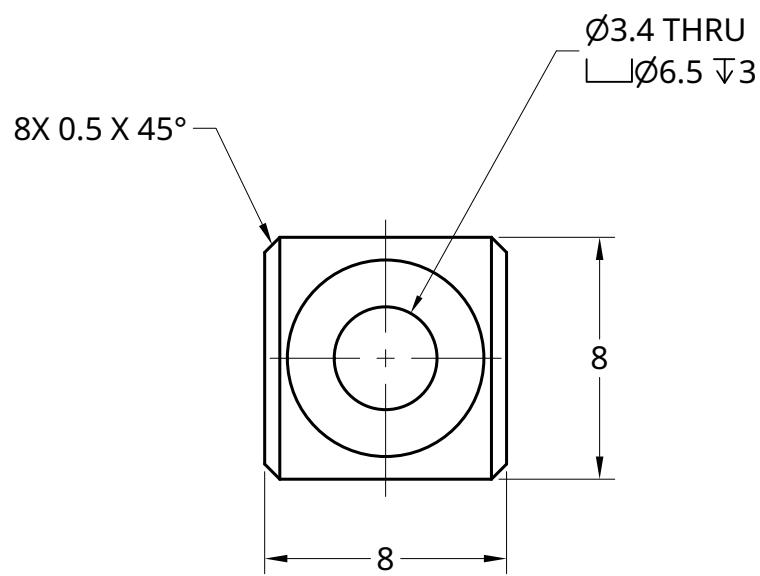
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0-. .XXX = ±.00-. ANGULAR = ± ° .XXXX = ±.000-. FRACTIONAL = ± | | | DRAWN | NAME | DATE |
| | | | checked | BRIAN BRADY | 10/16/2019 |
| | | | APPROVED | | |
| | | | DO NOT SCALE DRAWING | | |
| | | | BREAK ALL SHARP EDGES AND REMOVE BURRS | | |
| THIRD ANGLE PROJECTION | | | MATERIAL | VOLUME | |
| | | | STEEL 1020 | 9293 mm³ | |
| | | | SCALE | 1:1 | REV. |
| | | | | WEIGHT | 0.073 kg |
| | | | | SHEET | 7 of 8 |

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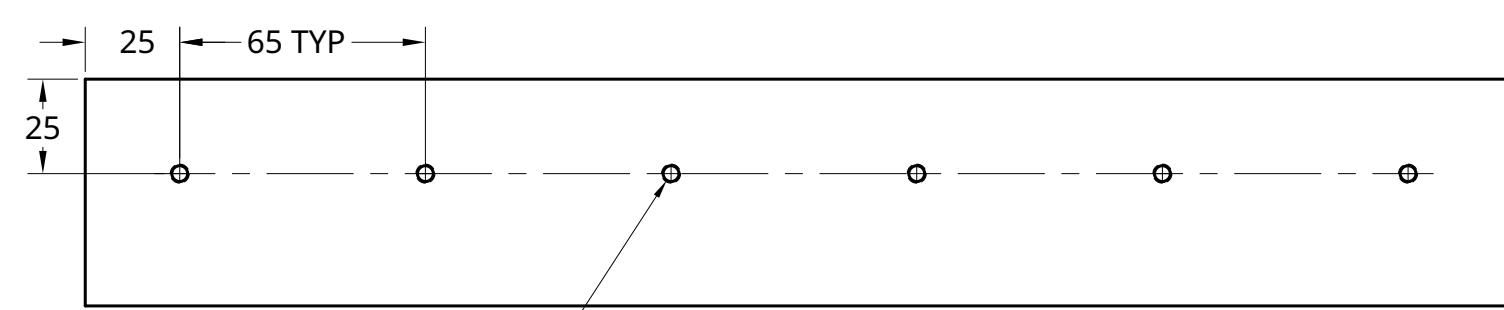
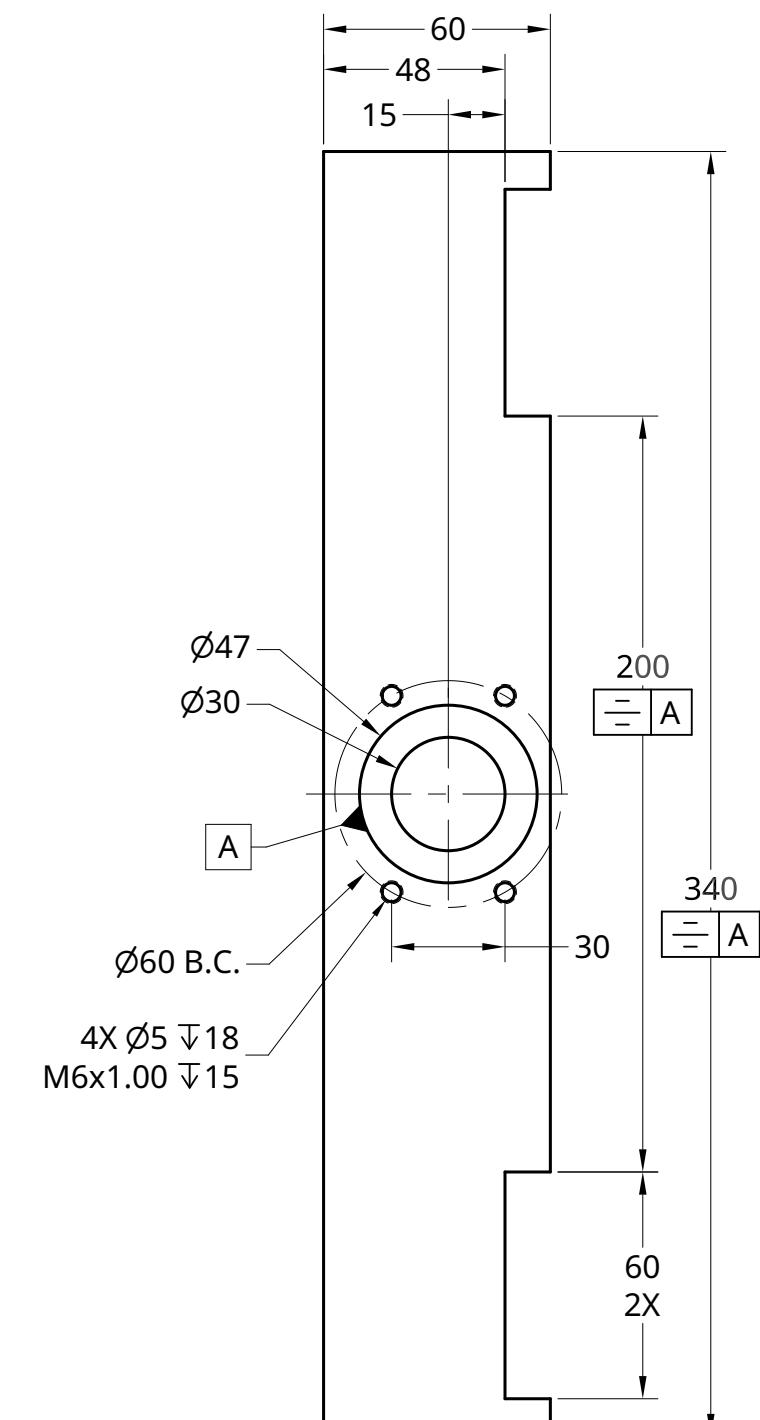
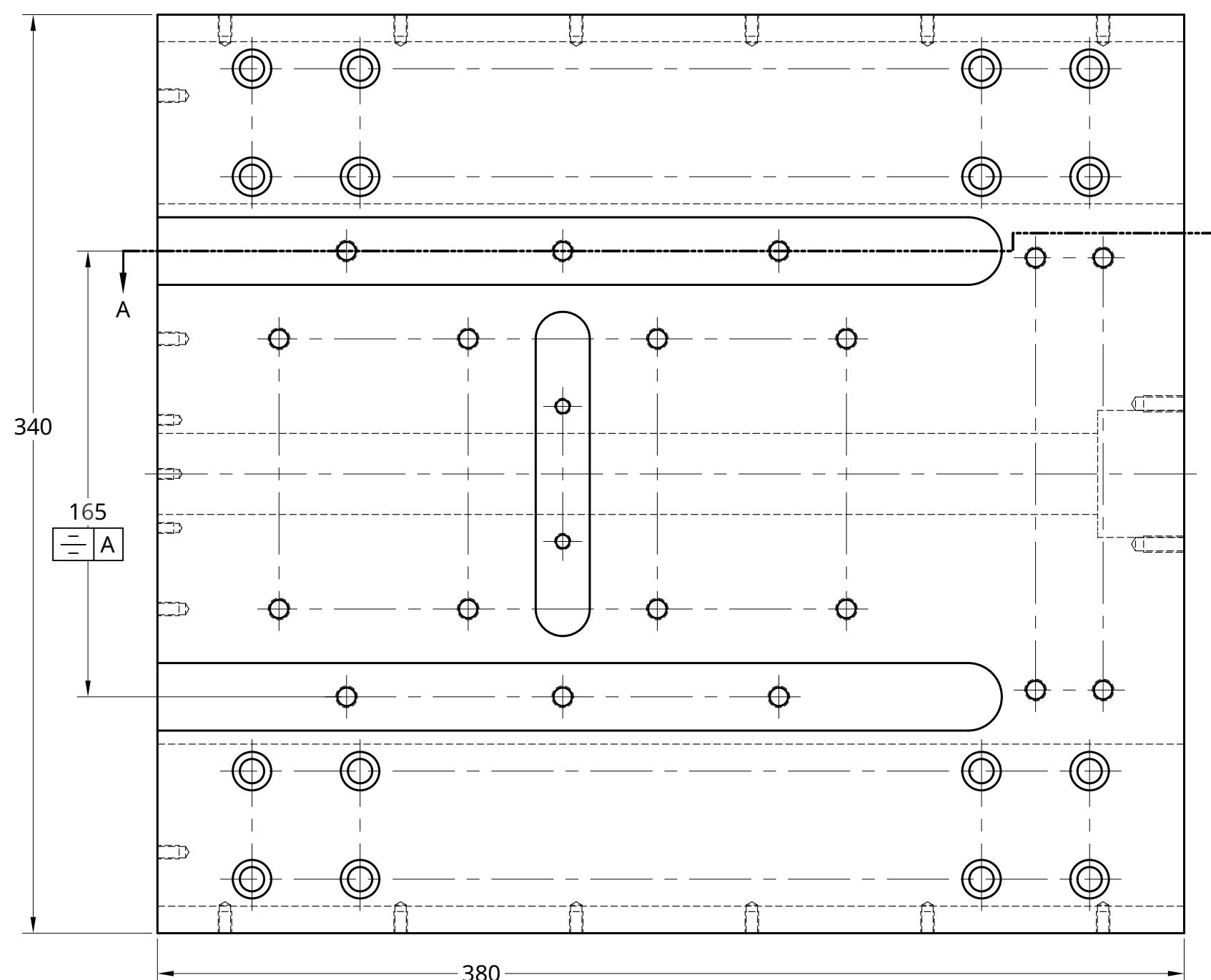
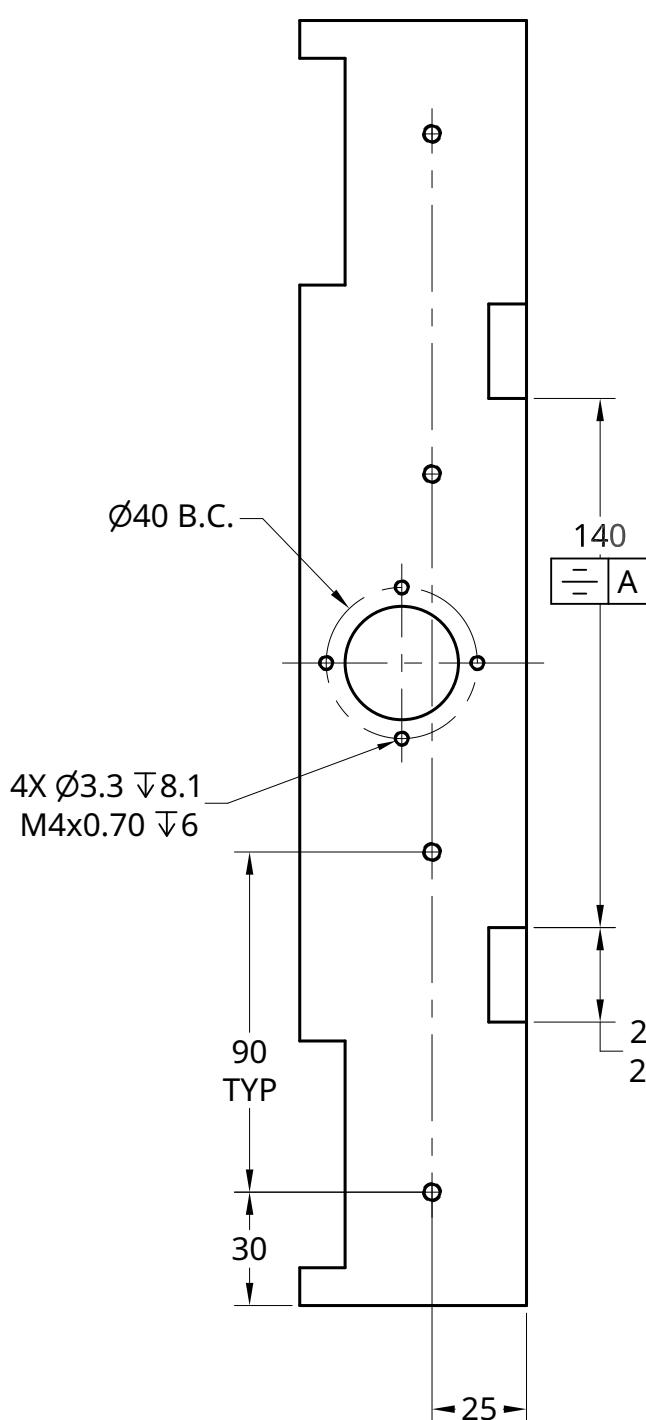
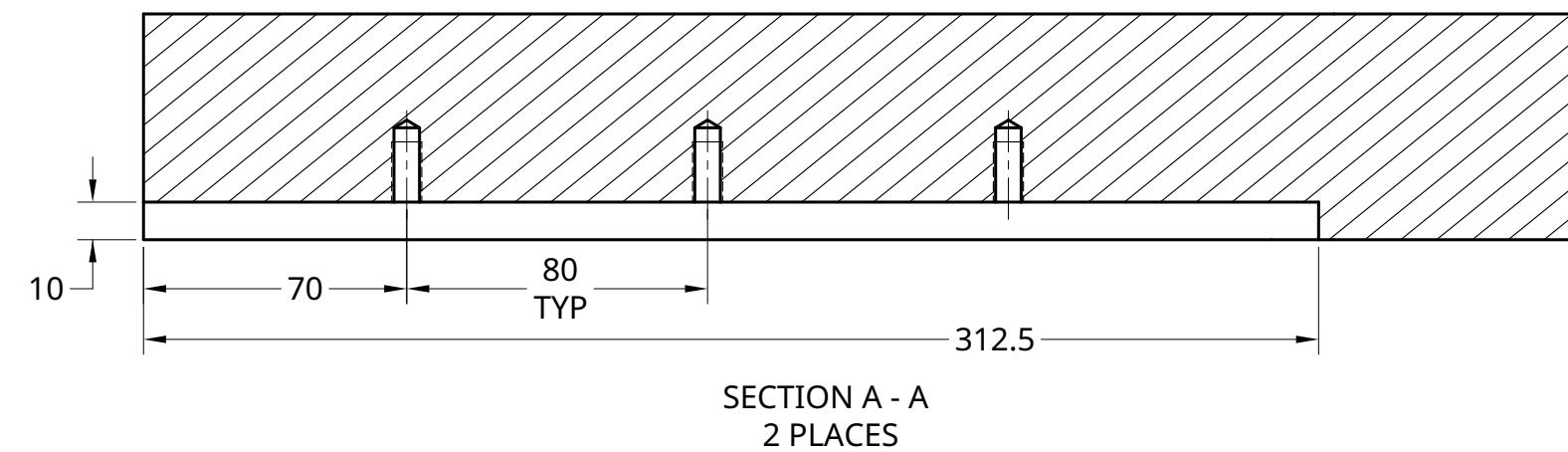
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|---|--|------------|---------------------|------------|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES $.XX = \pm .0$ $XXX = \pm .00$ $XXXX = \pm .000$ SURFACE FINISH ✓ | | DRAWN | BRIAN BRADY | DATE |
| | | CHECKED | | 10/16/2019 |
| | | APPROVED | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| THIRD ANGLE PROJECTION | | MATERIAL | VOLUME | |
| | | STEEL 4130 | 251 mm ³ | |
| | | SCALE | 4:1 | REV. |
| | | DWG NO. | BR-549-A-008 | SHEET |
| | | | | 8 of 8 |

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12X $\phi 4.2 \downarrow 10.4$
M5x0.80 $\downarrow 8$
6X THIS SIDE,
6X OTHER SIDE

| UNLESS OTHERWISE SPECIFIED, .XX = ±.0-. .XXX = ±.00-. .XXXX = ±.000-. SURFACE FINISH | | NAME | DATE |
|--|-------------|-------------------------|---------|
| DRAWN | BRIAN BRADY | 10/16/2019 | |
| CHECKED | | | |
| APPROVED | | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | |
| | STEEL 8620 | 6655558 mm ³ | |
| SCALE 1:2 | WEIGHT | 52.246 kg | REV. |
| | | | 1 of 16 |

Ferris State University

DRILL UNIT
SLIDE PLATE ASSEMBLY DETAILS
SLIDE PLATE

SIZE C DWG NO. BR-549-B-001 REV.

4

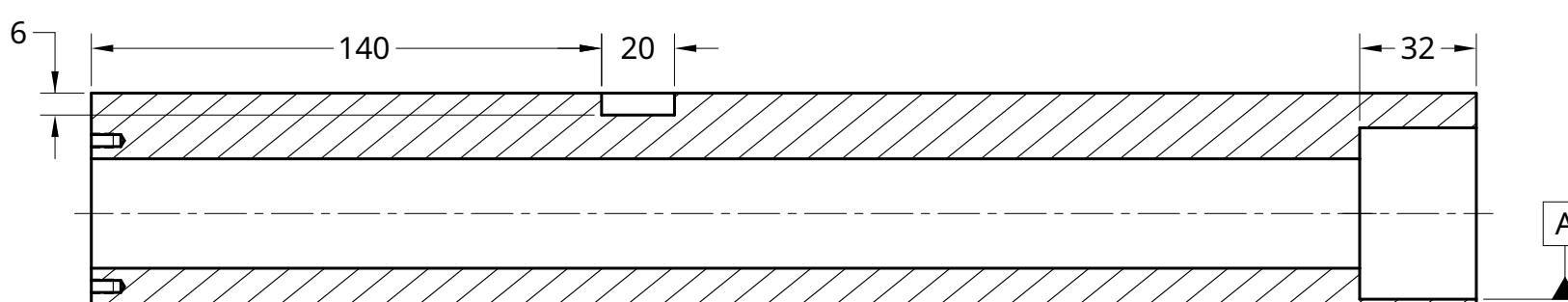
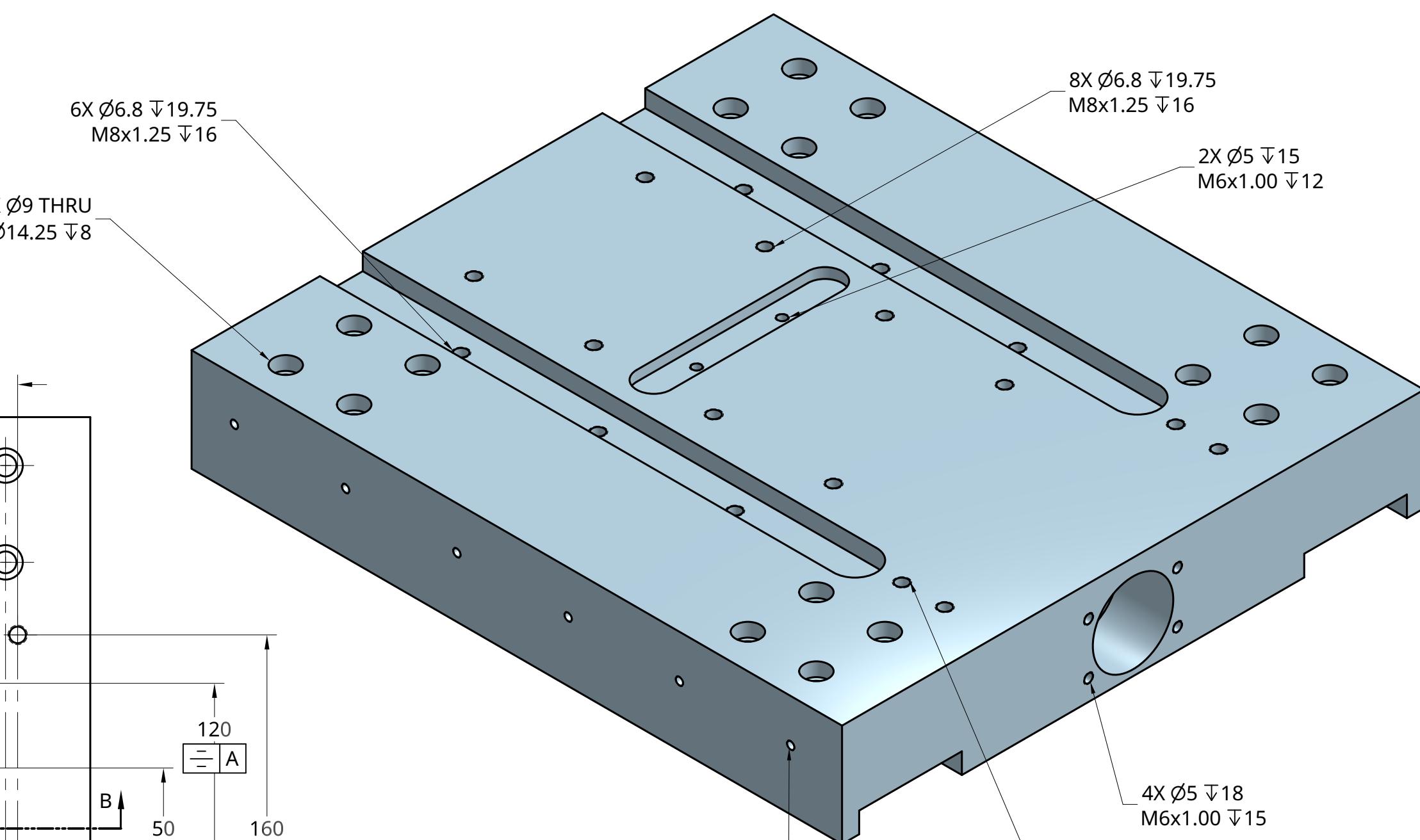
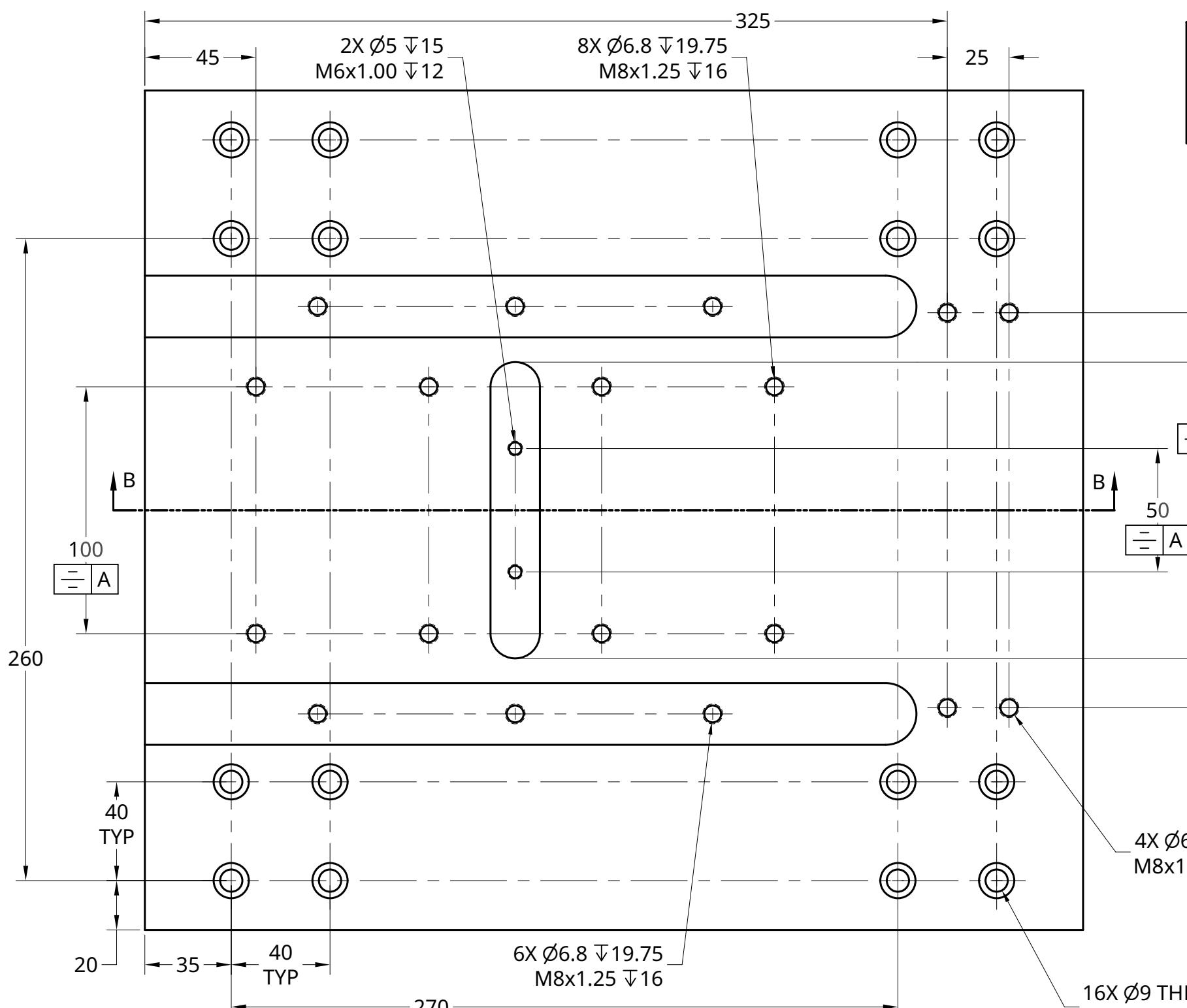
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SECTION B - B

| UNLESS OTHERWISE SPECIFIED, .XX + .0-. .XXX + .00-. .XXXX + .0000- | | NAME | DATE |
|---|--------------|------------------------|-----------|
| DRAWN | BRIAN BRADY | 10/16/2019 | |
| CHECKED | | | |
| APPROVED | | | |
| DO NOT SCALE DRAWING | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | |
| (Cone icon) | STEEL 8620 | 665558 mm ³ | |
| SCALE | 1:2 | WEIGHT | 52.246 kg |
| DWG. NO. | BR-549-B-001 | | REV. |

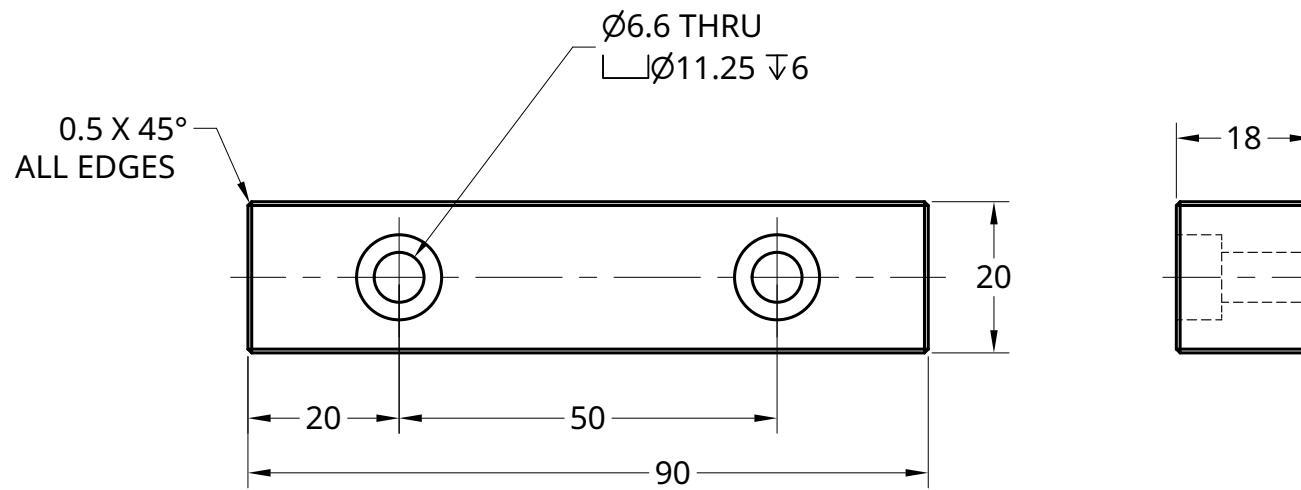
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES | | NAME | DATE | Ferris State University | | |
| .XX = ±.0- | ANGULAR = ± ° | DRAWN | BRIAN BRADY | 10/16/2019 | | |
| XXX = ±.00- | FRACTIONAL = ± | CHECKED | | | TITLE | |
| XXXX = ±.000- | | APPROVED | | | DRILL UNIT | |
| SURFACE FINISH ✓ | | | | | SLIDE PLATE ASSEMBLY DETAILS | |
| DO NOT SCALE DRAWING | | | | | 20 X 18 X 90 KEY | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | | SIZE | DWG NO. |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | | A | BR-549-B-002 | REV. |
| | STEEL 4130 | 30323 mm ³ | | SCALE | 1:1 | WEIGHT |
| | | | | | 0.238 kg | SHEET |
| | | | | | | 3 of 16 |

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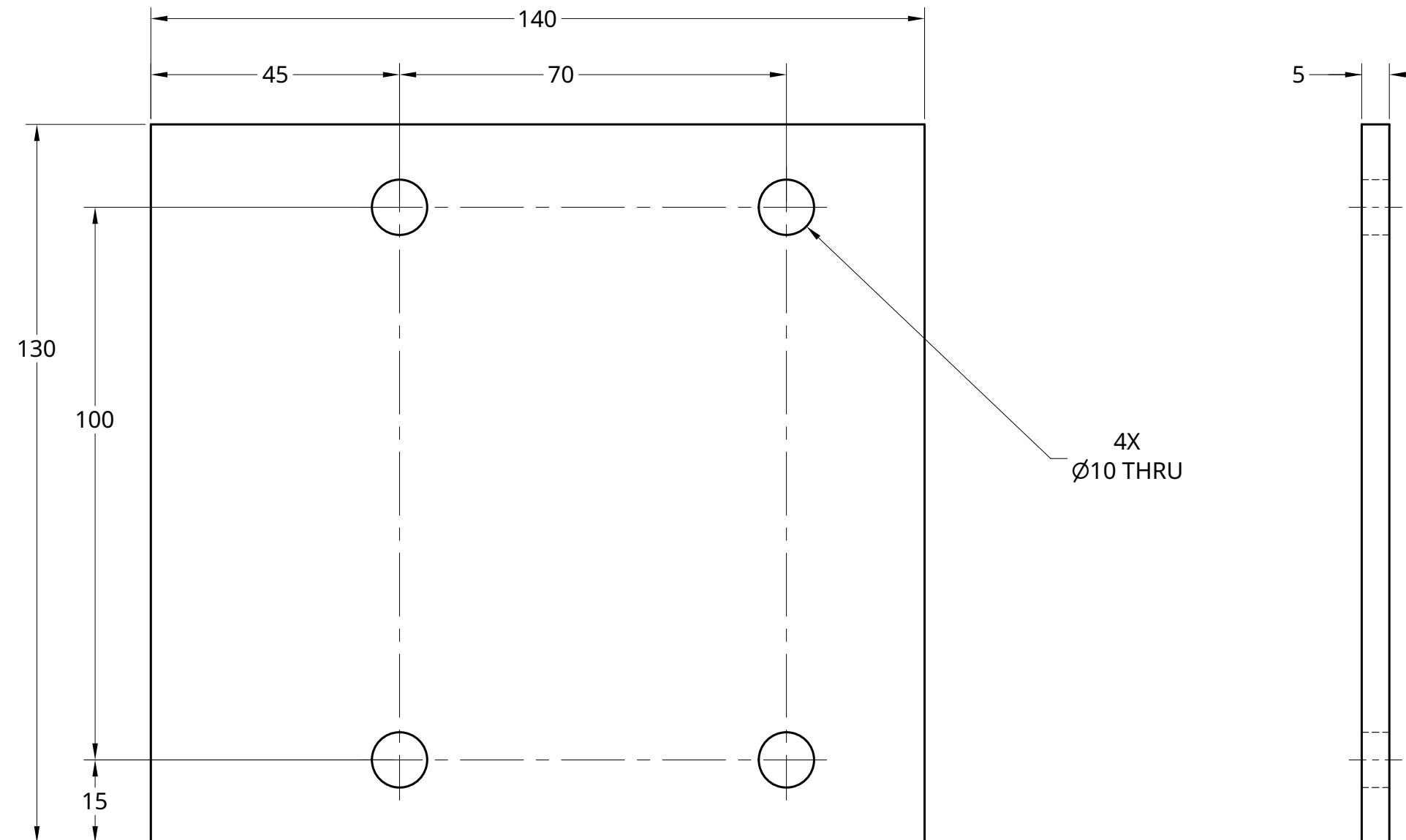
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- ANGULAR = ± ° .XXX = ±.00- FRACTIONAL = ± .XXXX = ±.000- | | DRAWN | BRIAN BRADY | DATE |
| SURFACE FINISH | ✓ | CHECKED | | 10/16/2019 |
| DO NOT SCALE DRAWING | | APPROVED | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| THIRD ANGLE PROJECTION | | MATERIAL | VOLUME | |
| | | STEEL 1020 | 89249 mm ³ | REV. |
| | | SCALE | 1:1 | WEIGHT |
| | | | | 0.704 kg |
| | | | | 4 of 16 |
| Ferris State University | | | | |
| DRILL UNIT | | | | |
| SLIDE PLATE ASSEMBLY DETAILS | | | | |
| HOUSING FITTING SPACER | | | | |
| BR-549-B-003 | | | | |

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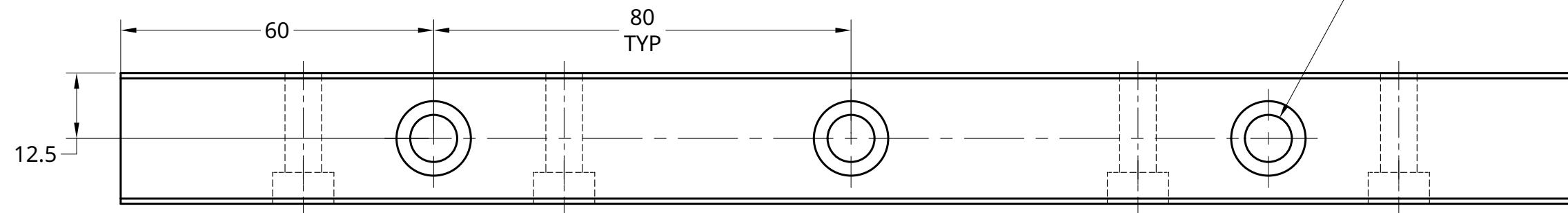
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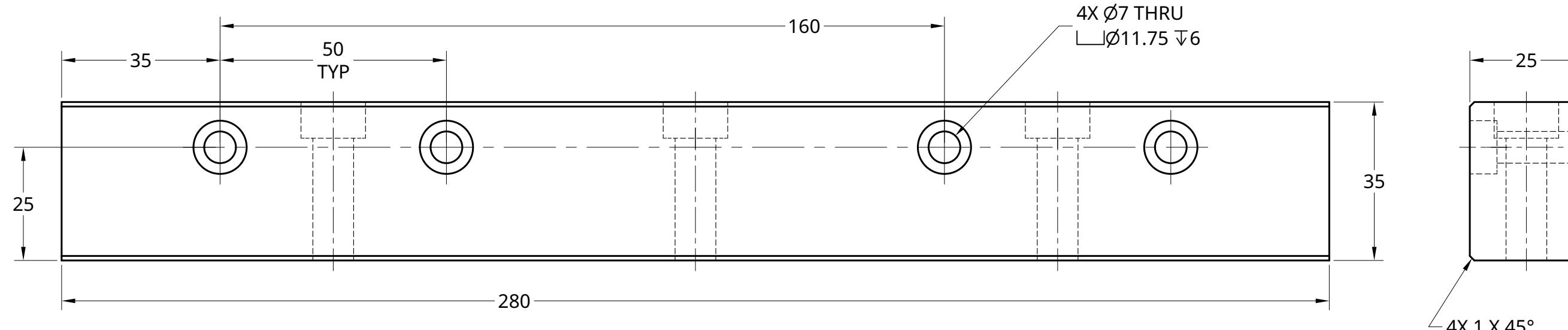
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|---|--|---------------------------------|------------------------------|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- .XXX = ±.00- .XXXX = ±.000- | | NAME BRIAN BRADY | DATE 10/16/2019 |
| SURFACE FINISH ✓ | | ANGULAR = ± ° FRACTIONAL = ± | TITLE |
| DO NOT SCALE DRAWING | | APPROVED | DRILL UNIT |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | THIRD ANGLE PROJECTION | SLIDE PLATE ASSEMBLY DETAILS |
| REV. | | MATERIAL STEEL 1020 | PUSH-PULL BLOCK |
| SIZE B | | VOLUME 229932 mm³ | DWG NO. BR-549-B-004 |
| SCALE 1:1 | | WEIGHT 1.810 kg | SHEET 5 of 16 |

4

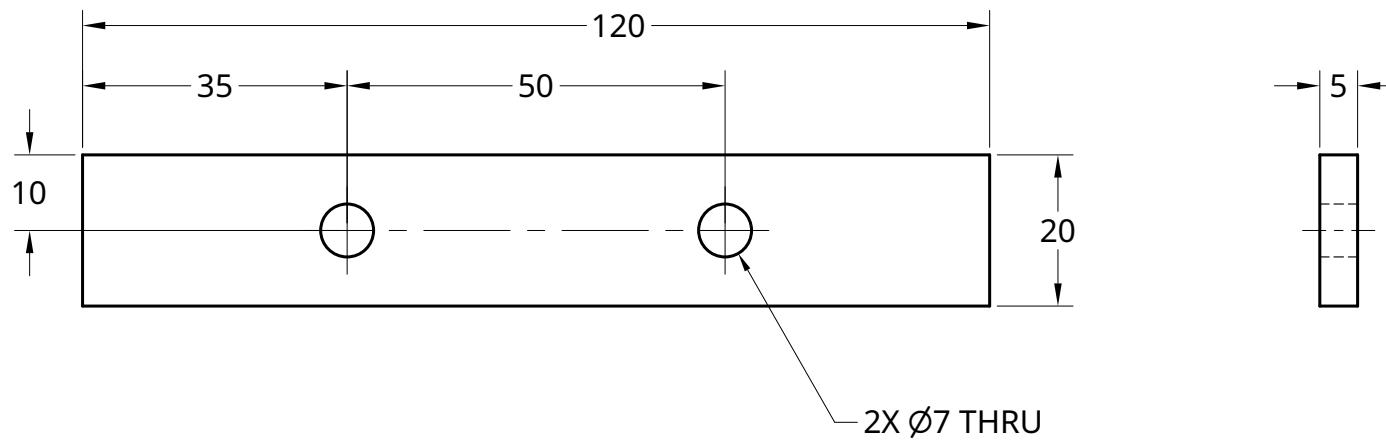
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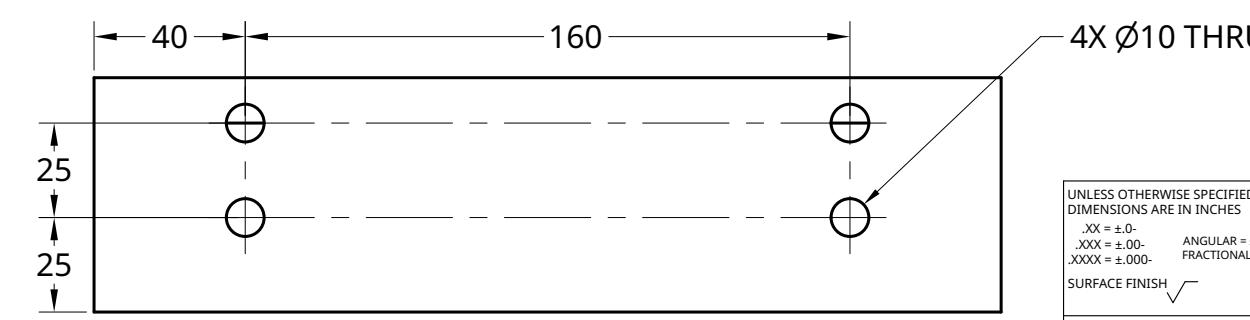
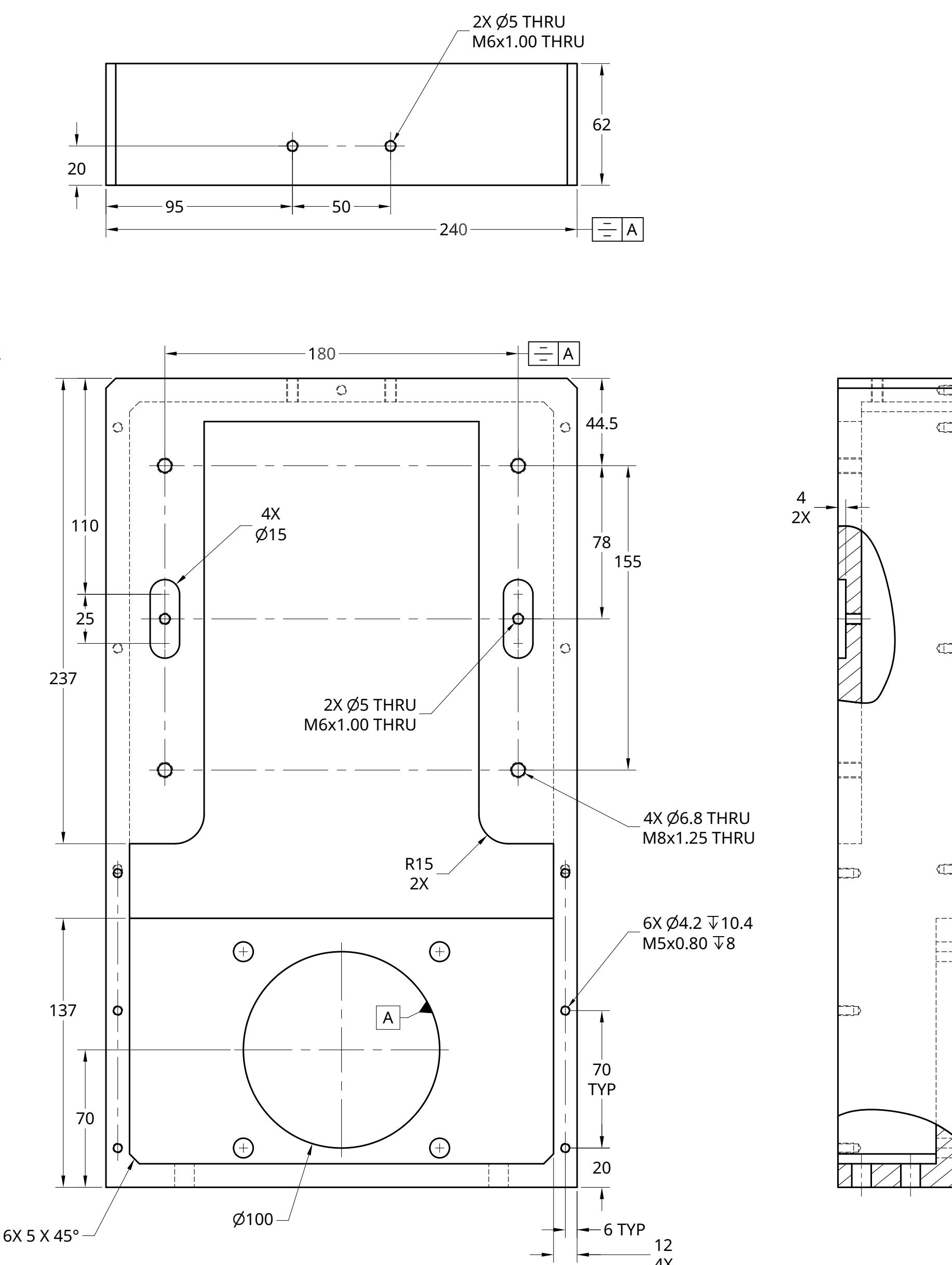
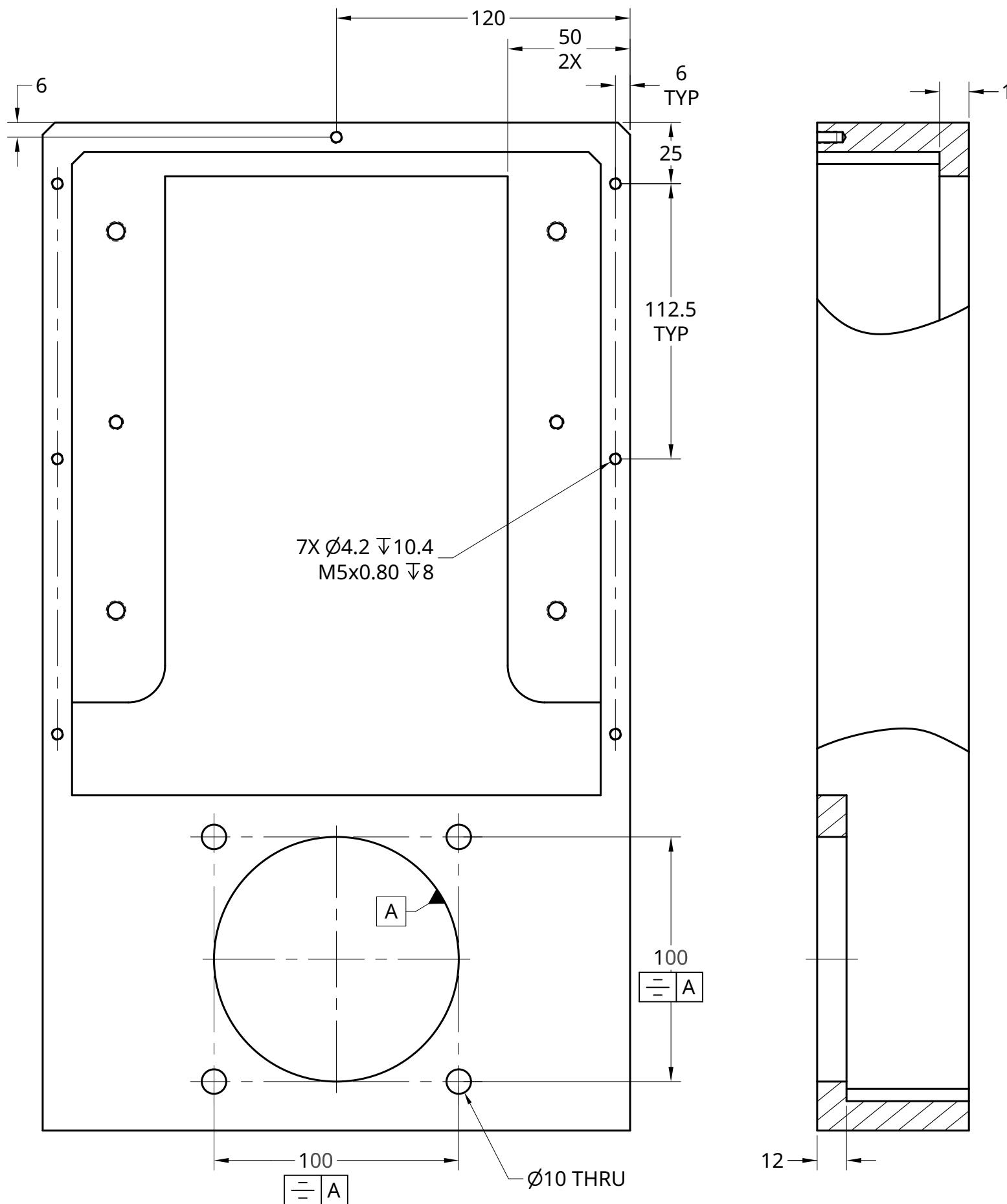


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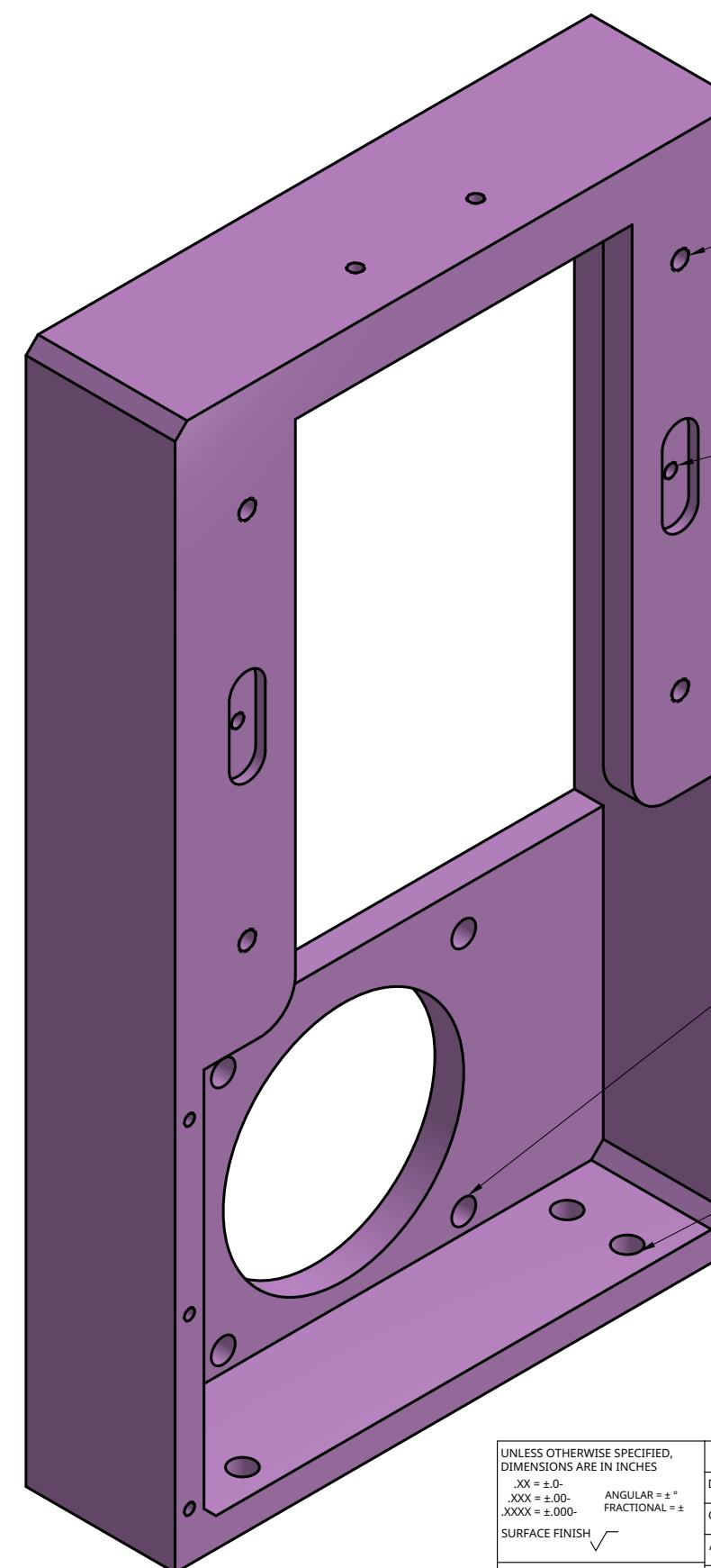
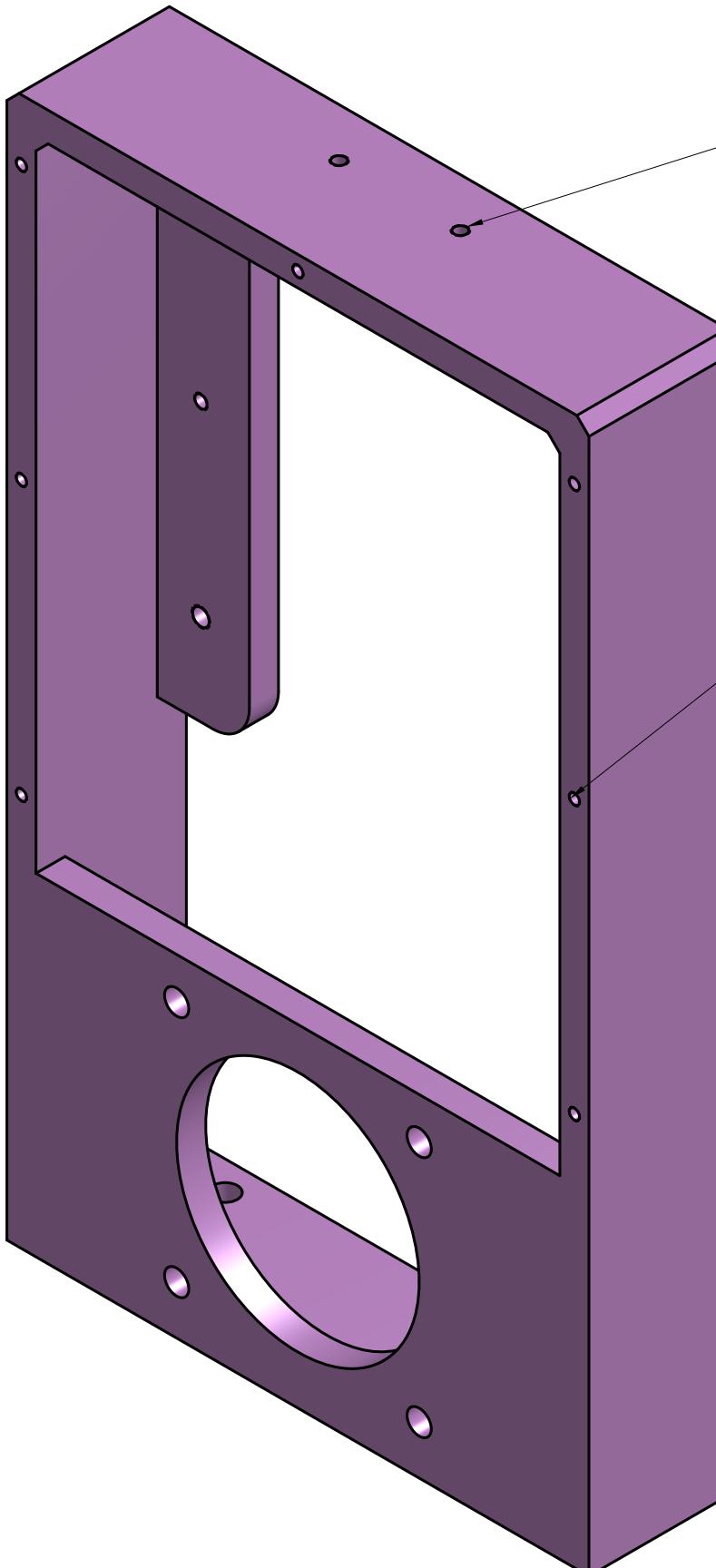
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|--|--|------------------------------|---------------------------------|--------------------|------------------------------|--|--|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES XX = $\pm .0$ - XXX = $\pm .00$ - XXXX = $\pm .000$ - SURFACE FINISH ✓ | | DRAWN CHECKED APPROVED | NAME BRIAN BRADY | DATE 10/16/2019 | Ferris State University | | |
| DO NOT SCALE DRAWING | | | | | TITLE | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | | DRILL UNIT | | |
| THIRD ANGLE PROJECTION | | MATERIAL STEEL 1020 | VOLUME 11615 mm ³ | | SLIDE PLATE ASSEMBLY DETAILS | | |
| | | | | | PUSH-PULL FITTING SPACER | | |
| | | SCALE 1:1 | WEIGHT 0.091 kg | | DWG NO. BR-549-B-005 | | |
| | | | | | REV. | | |
| | | | | | SHEET 6 of 16 | | |

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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES XX = ±0. XXX = ±0.00 XXXX = ±0.000 ANGULAR = ± ° FRACTIONAL = ± " | | | | NAME | DATE |
|--|-----|------------|-------------------------|-------------|------------|
| SURFACE FINISH | | CHECKED | | BRIAN BRADY | 10/16/2019 |
| DO NOT SCALE DRAWING | | APPROVED | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | | |
| THIRD ANGLE PROJECTION | | MATERIAL | VOLUME | | |
| | | STEEL 1020 | 1370293 mm ³ | | |
| | | REV. | | | |
| | | DWG NO. | | | |
| | | SIZE | | | |
| | | C | BR-549-B-006 | | |
| SCALE | 1:2 | WEIGHT | 10.784 kg | HEET | 7 of 16 |



UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00-
.XXXX = ±.000-
ANGULAR = ± °
FRACTIONAL = ±
SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND
REMOVE BURRS

THIRD ANGLE PROJECTION

NAME

BRIAN BRADY

DATE

10/16/2019

TITLE

Ferris State University

DRILL UNIT

SLIDE PLATE ASSEMBLY DETAILS

SPINDLE MOTOR MOUNTING FRAME

SIZE

B

DWG NO.

BR-549-B-006

REV.

SCALE

1:2

WEIGHT

10.784 kg

SHEET

8 of 16

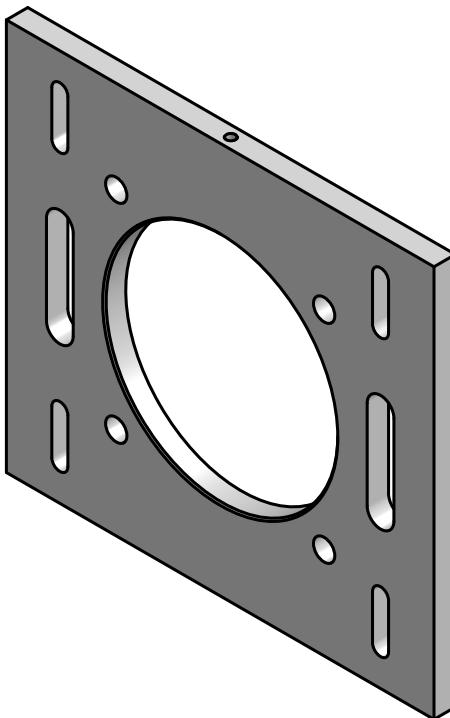
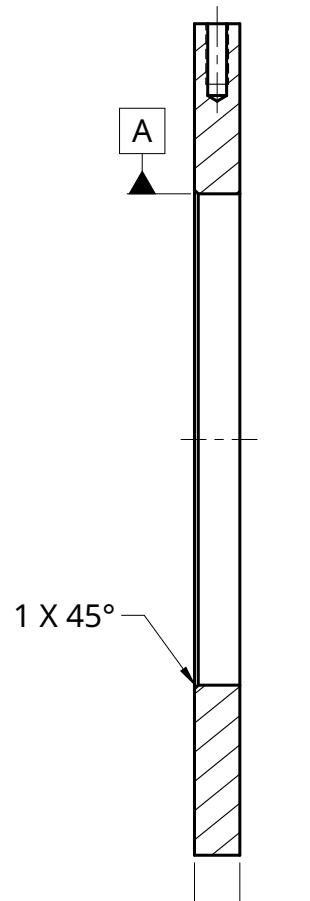
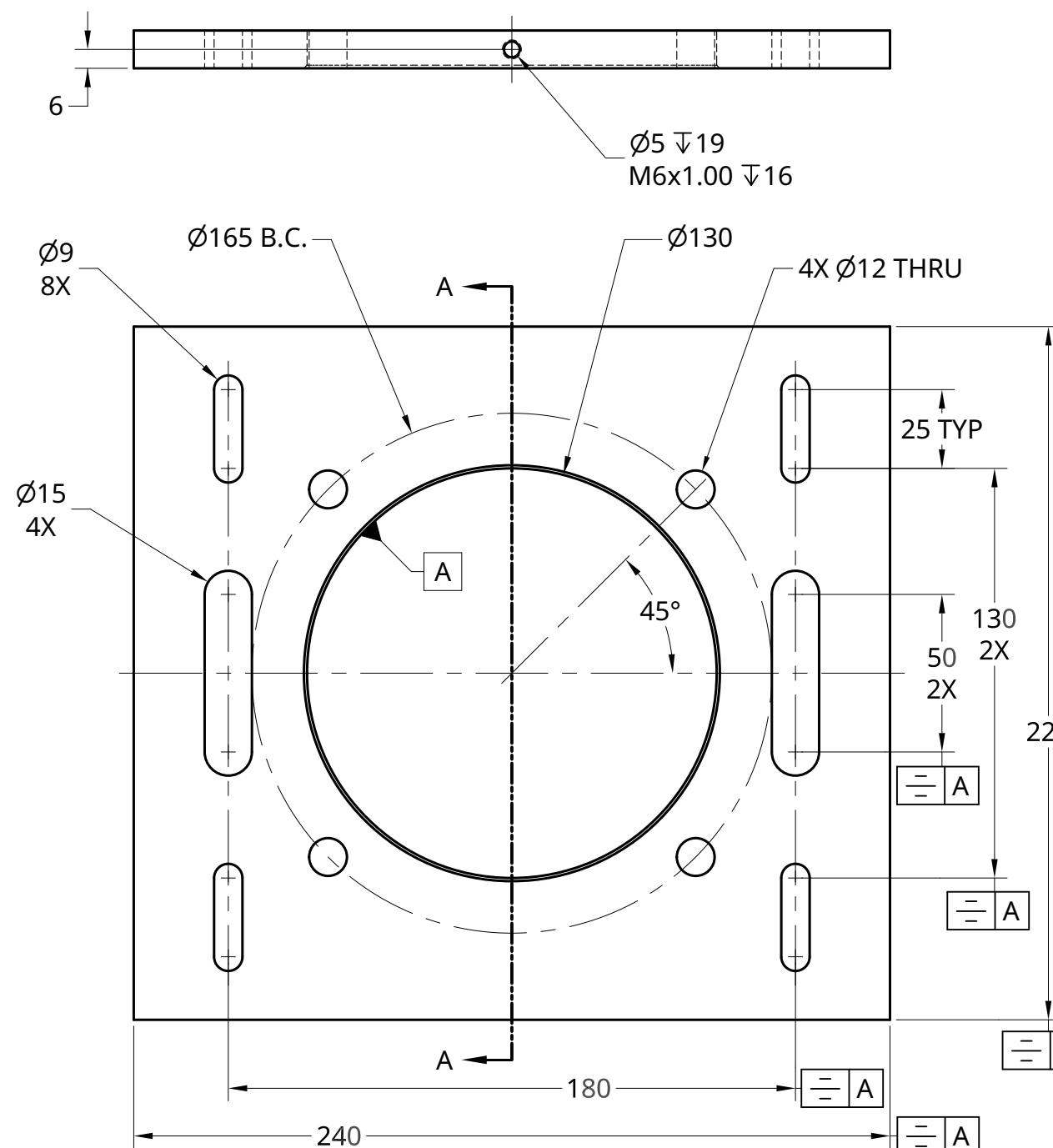
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0-. .XXX = ±.00-. .XXXX = ±.000- | | NAME BRIAN BRADY | DATE 10/16/2019 |
| ANGULAR = ± ° FRACTIONAL = ± | | | TITLE |
| SURFACE FINISH ✓ | | | DRILL UNIT |
| DO NOT SCALE DRAWING | | | SLIDE PLATE ASSEMBLY DETAILS |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | MOTOR MOUNTING PLATE |
| THIRD ANGLE PROJECTION | | MATERIAL STEEL 8620 | VOLUME 432210 mm³ |
| | | SIZE B | DWG NO. BR-549-B-007 |
| SCALE 1:2 | | WEIGHT 3.393 kg | SHEET 9 of 16 |

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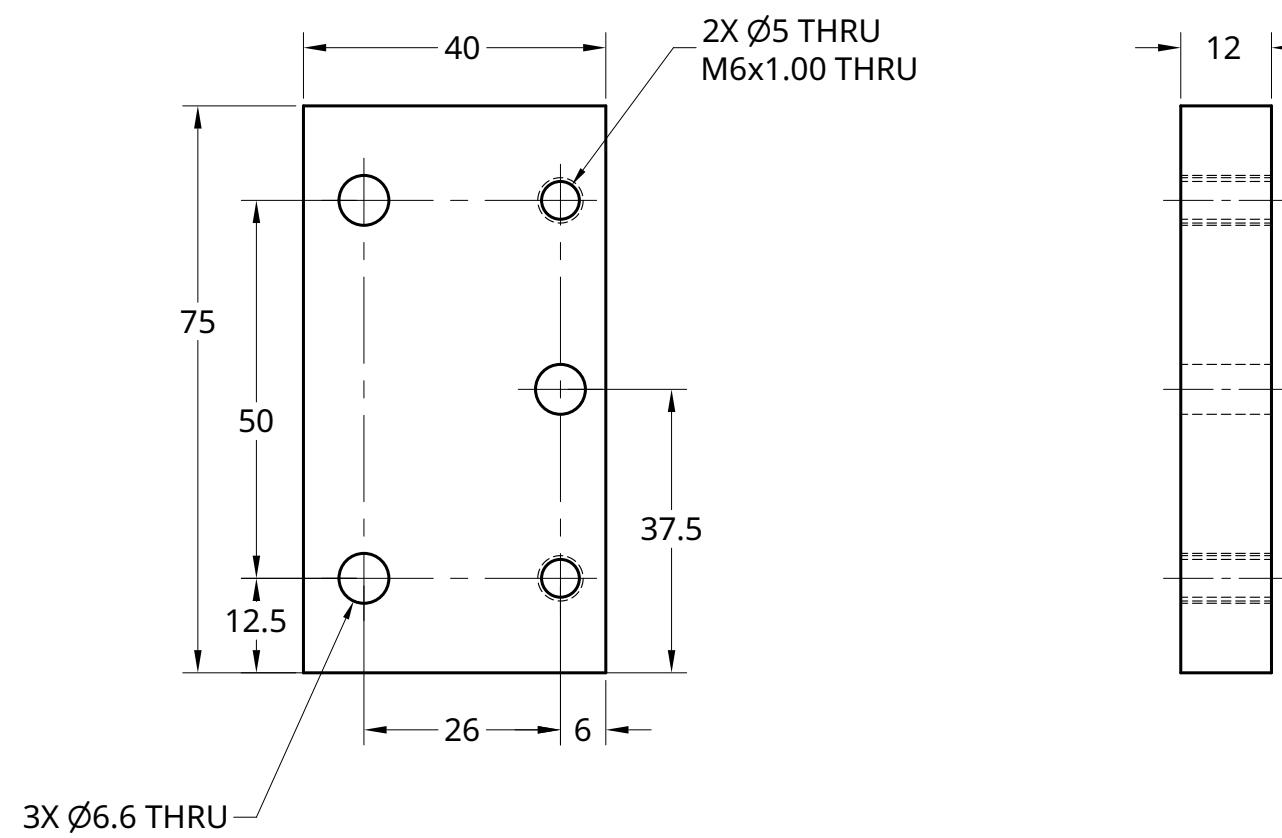
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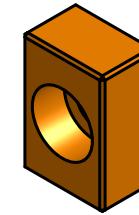
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| SURFACE FINISH ✓ | DRAWN | NAME | DATE |
| DO NOT SCALE DRAWING | CHECKED | BRIAN BRADY | 10/16/2019 |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | APPROVED | | |
| THIRD ANGLE PROJECTION | | | |
| | MATERIAL | VOLUME | |
| | STEEL 1020 | 34297 mm ³ | |
| Ferris State University | | | |
| DRILL UNIT SLIDE PLATE ASSEMBLY DETAILS MOTOR ADJUSTER BLOCK | | | |
| SIZE B DWG NO. BR-549-B-008 REV. | | | |
| SCALE 1:1 | WEIGHT 0.270 kg | SHEET 10 of 16 | |

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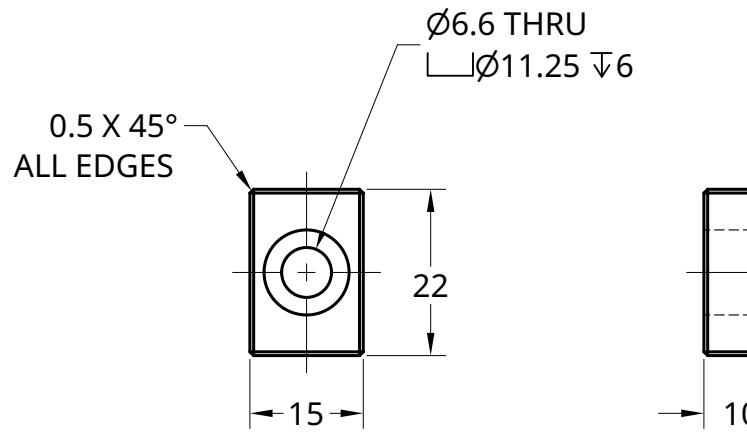
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES XX = ±.0- XXX = ±.00- XXXX = ±.000- SURFACE FINISH ✓ DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS THIRD ANGLE PROJECTION | DRAWN | BRIAN BRADY | DATE |
| | CHECKED | | |
| | APPROVED | | |
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| | | | |
| TITLE | | Ferris State University | |
| DRILL UNIT | | SLIDE PLATE ASSEMBLY DETAILS | |
| MEDIUM SLIDE KEY | | REV. | |
| SIZE A DWG NO. | | BR-549-B-009 | |
| SCALE 1:1 | | WEIGHT 0.020 kg | |
| SHEET 11 of 16 | | | |
| | | | |
| MATERIAL | | VOLUME | |
| STEEL 4130 | | 2544 mm³ | |

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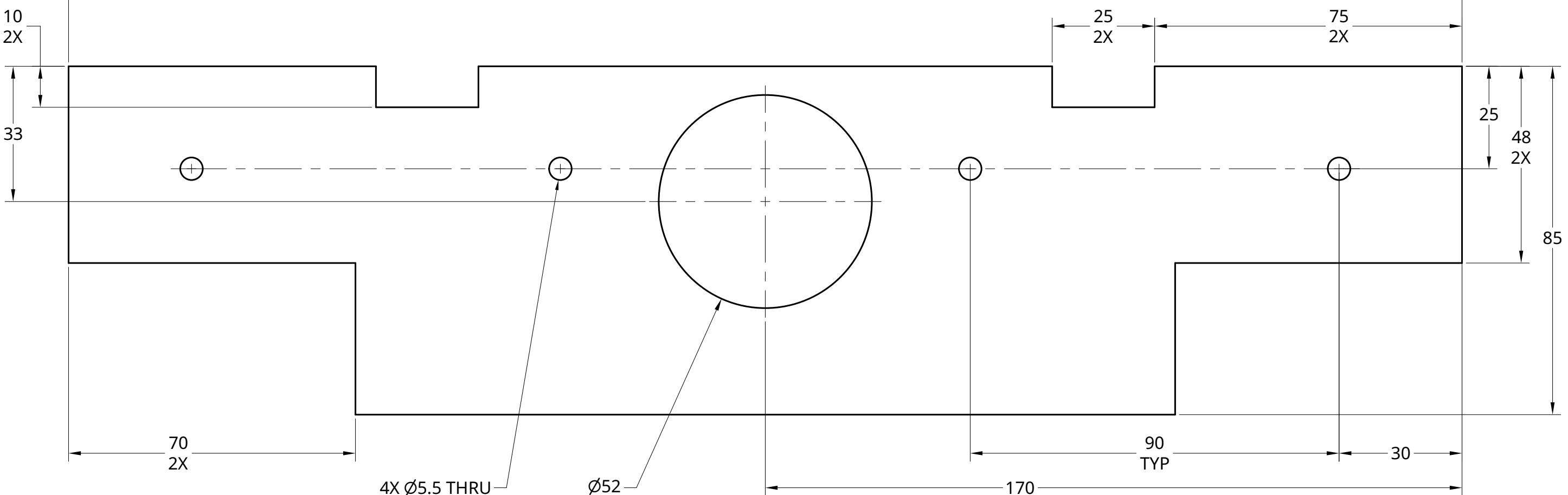
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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00- ANGULAR = ± °
.XXXX = ±.000- FRACTIONAL = ±
SURFACE FINISH ✓

DO NOT SCALE DRAWING
BREAK ALL SHARP EDGES AND REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN
BRIAN BRADY
10/16/2019

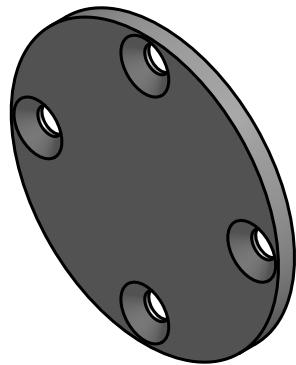
CHECKED

APPROVED

Ferris State University
DRILL UNIT
SLIDE PLATE ASSEMBLY DETAILS
FRONT CHIP COVER

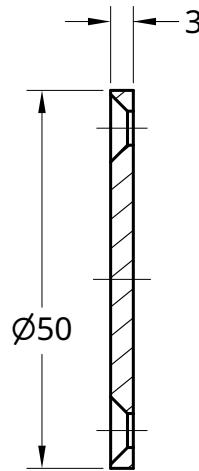
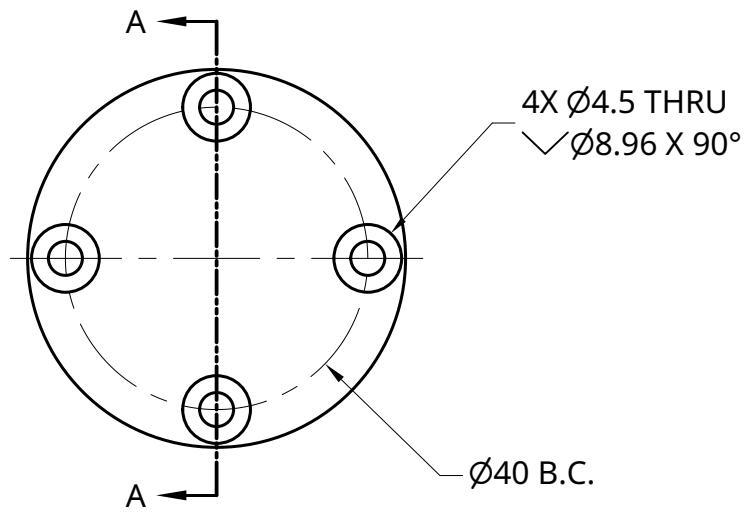
SIZE B DWG NO. BR-549-B-010 REV.

SCALE 1:1 WEIGHT 0.496 kg SHEET 12 of 16



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SECTION A - A

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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES | | | NAME | DATE | Ferris State University | | |
| .XX = ±.0- | ANGULAR = ± ° | DRAWN | BRIAN BRADY | 10/16/2019 | | | |
| XXX = ±.00- | FRACTIONAL = ± | CHECKED | | | | | |
| XXXX = ±.000- | | APPROVED | | | | | |
| SURFACE FINISH ✓ | | TITLE | | | DRILL UNIT SLIDE PLATE ASSEMBLY DETAILS BALL SCREW HOLE COVER | | |
| DO NOT SCALE DRAWING | | SIZE | A | DWG NO. | BR-549-B-011 | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | VOLUME | 5513 mm³ | REV. | | | |
| THIRD ANGLE PROJECTION | MATERIAL | STEEL 1010 | | SCALE | 1:1 | WEIGHT | 0.043 kg |
| | | | | | | SHEET | 13 of 16 |

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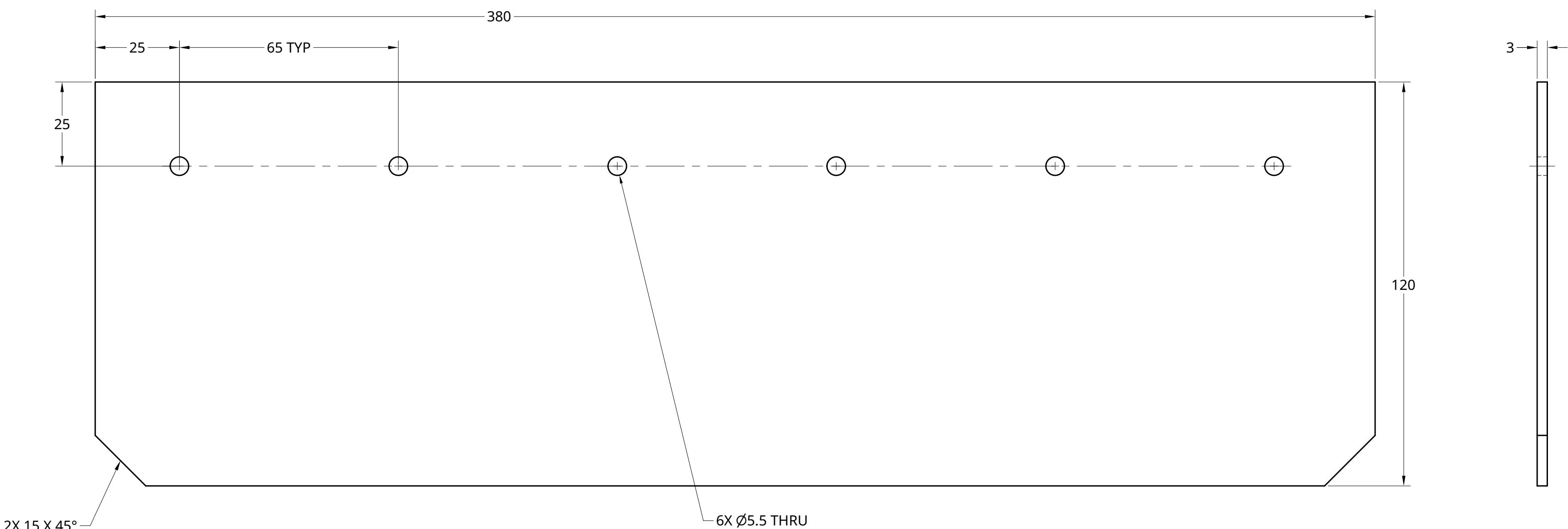
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| UNLESS OTHERWISE SPECIFIED, .XX ± .0-. .XXX ± .00-. .XXXX ± .000- | | NAME DRAWN BRIAN BRADY | DATE 10/16/2019 |
| ANGULAR ± ° FRCTIONAL ± # | | CHECKED | |
| SURFACE FINISH ✓ | | APPROVED | |
| DO NOT SCALE DRAWING | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | | MATERIAL STEEL 1010 | VOLUME 135697 mm ³ |
|  | | REV. | |
| SIZE C DWG NO. BR-549-B-012 | | SCALE 1:1 | WEIGHT 1.068 kg |
| | | | SHEET 14 of 16 |

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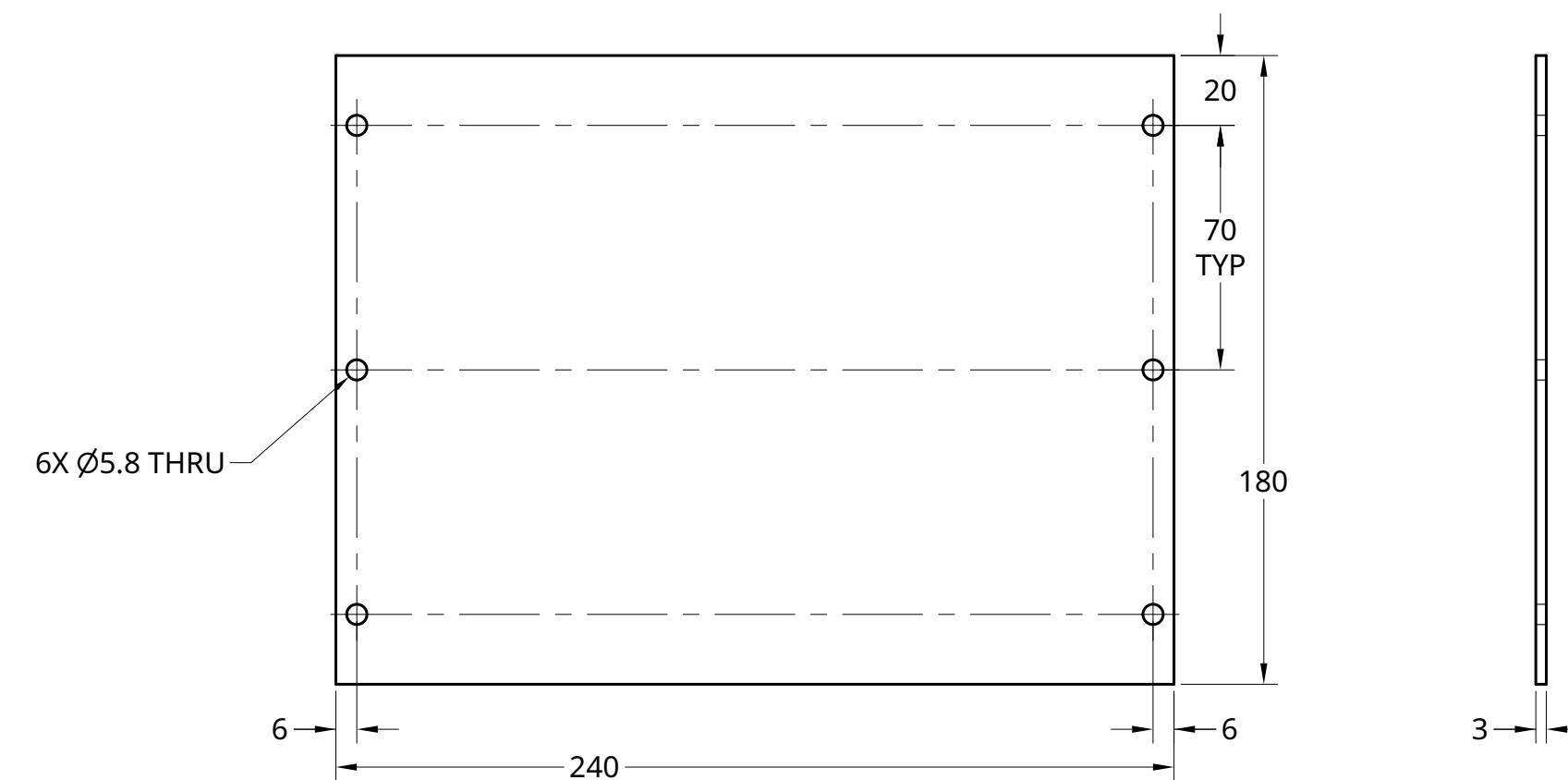
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0-. .XXX = ±.00-. .XXXX = ±.000- | | NAME BRIAN BRADY | DATE 10/16/2019 |
| SURFACE FINISH ✓ | | CHECKED | |
| DO NOT SCALE DRAWING | | APPROVED | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | | MATERIAL POLYCARBONATE | VOLUME 129124 mm ³ |
| | | | REV. |
| | | SIZE B | DWG NO. BR-549-B-013 |
| | | SCALE 1:2 | WEIGHT 0.154 kg |
| | | | SHEET 15 of 16 |

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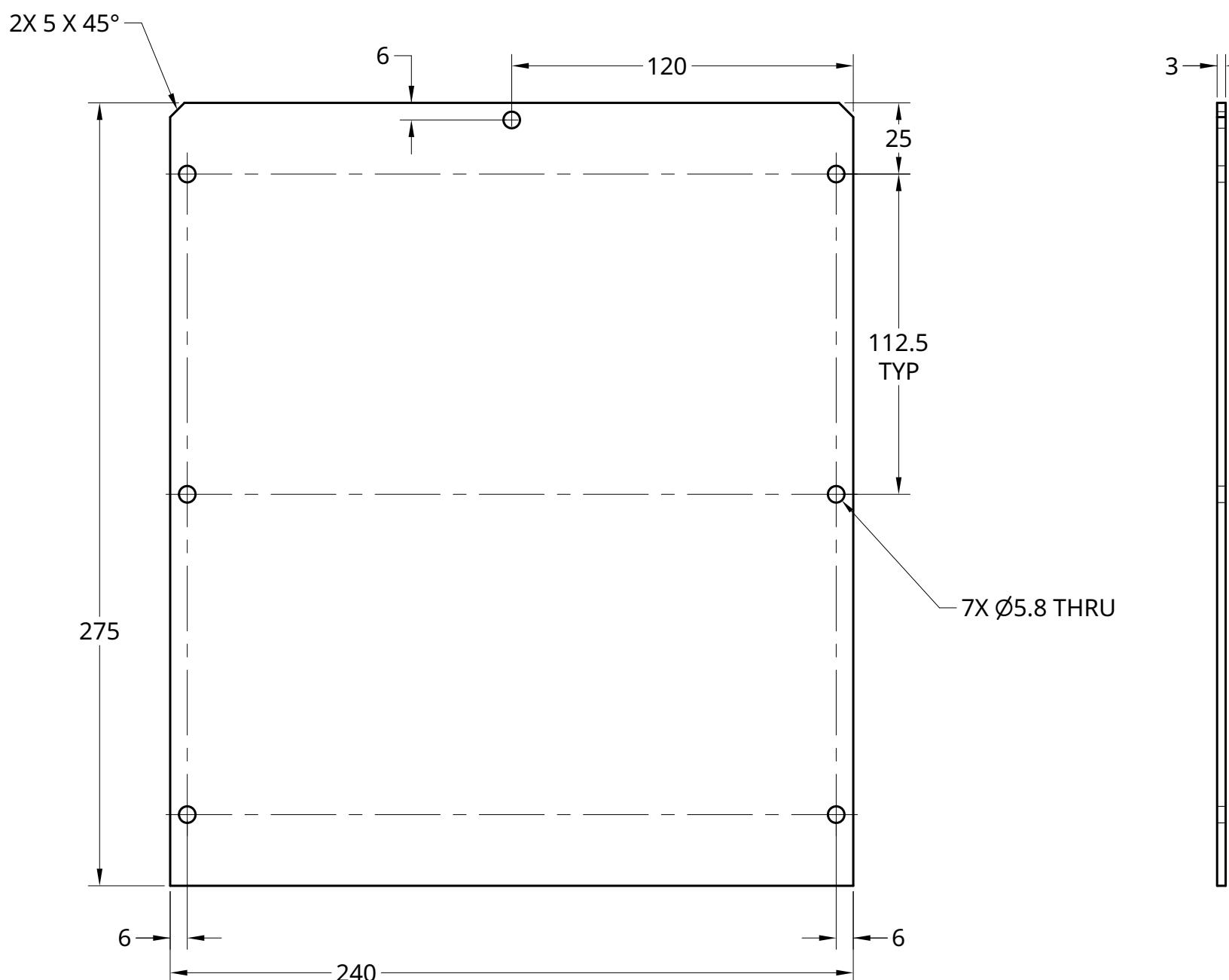
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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00-
.XXXX = ±.000- ANGULAR = ± °
FRACTIONAL = ±

SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND
REMOVE BURRS

THIRD ANGLE PROJECTION

DRAWN BRIAN BRADY DATE 10/16/2019
CHECKED _____
APPROVED _____

TITLE

DRILL UNIT
SLIDE PLATE ASSEMBLY DETAILS
UPPER COVER PLATE - MOTOR

SIZE

B

DWG NO.

BR-549-B-014

REV.

MATERIAL POLYCARBONATE VOLUME 197370 mm³

SCALE

1:2

WEIGHT

0.235 kg

SHEET 16 of 16

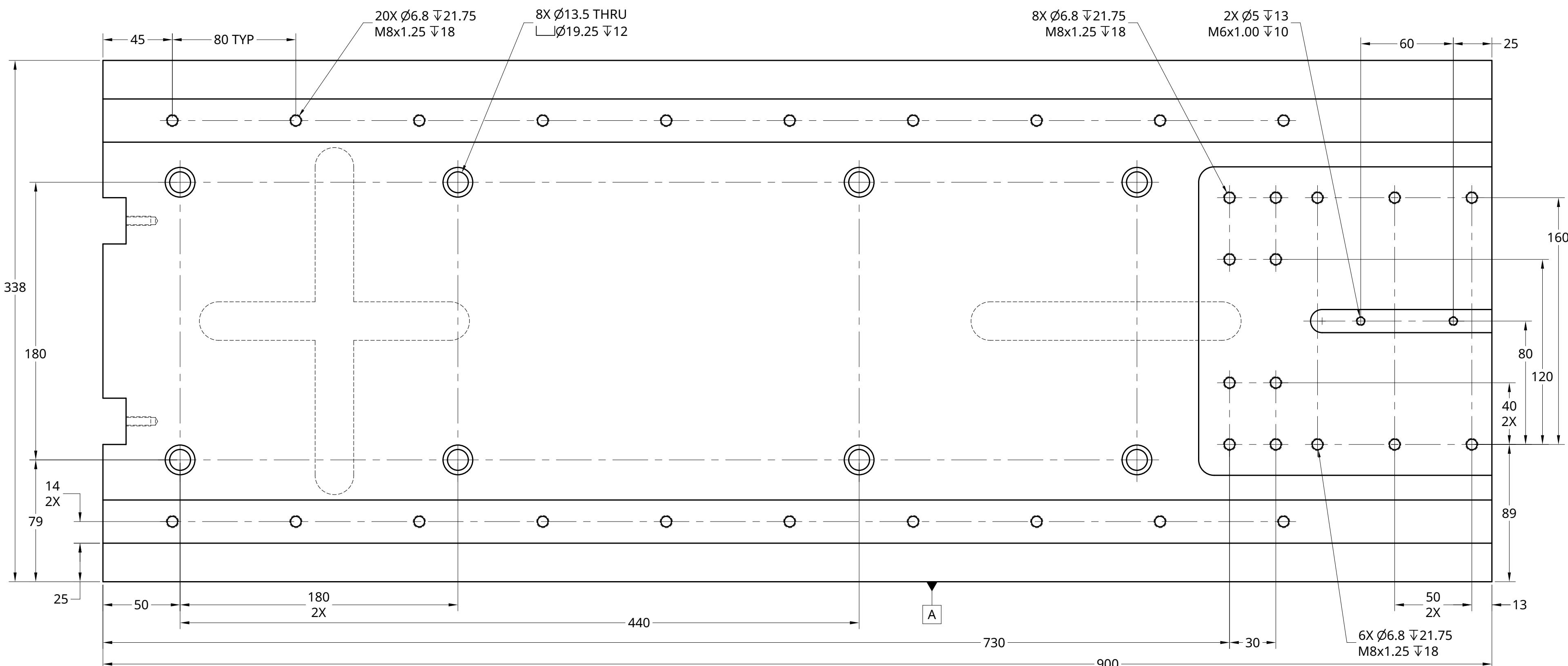
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| Ferris State University | | | |
|--|--|---------------------|---------------------------------|
| DRILL UNIT MAIN ASSEMBLY DETAILS BASE PLATE | | | |
| SIZE | DWG NO. | REV. | |
| C | BR-549-C-001 | | |
| SCALE 1:2 | WEIGHT 114,347 kg | SHEET 1 of 20 | |
| UNLESS OTHERWISE SPECIFIED, .XX ± .D. .XXX ± .D0. .XXXX ± .D000. DIMENSIONS ARE IN INCHES ANGULAR ± ° FRACTIONAL ± # SURFACE FINISH ✓ | NAME DRAWN BRIAN BRADY CHECKED APPROVED | DATE 10/16/2019 | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | THIRD ANGLE PROJECTION | MATERIAL STEEL 8620 | VOLUME 14566452 mm ³ |

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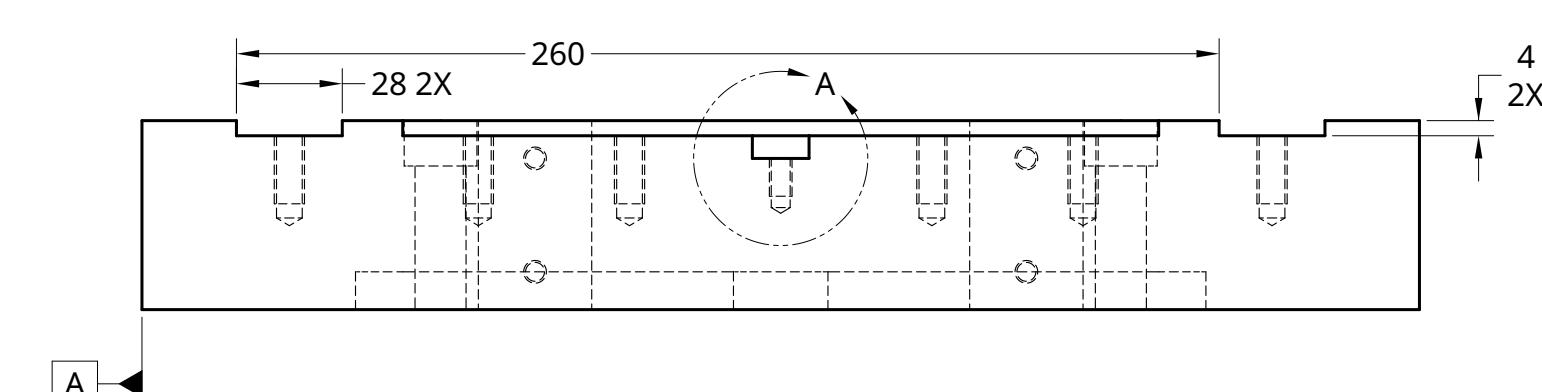
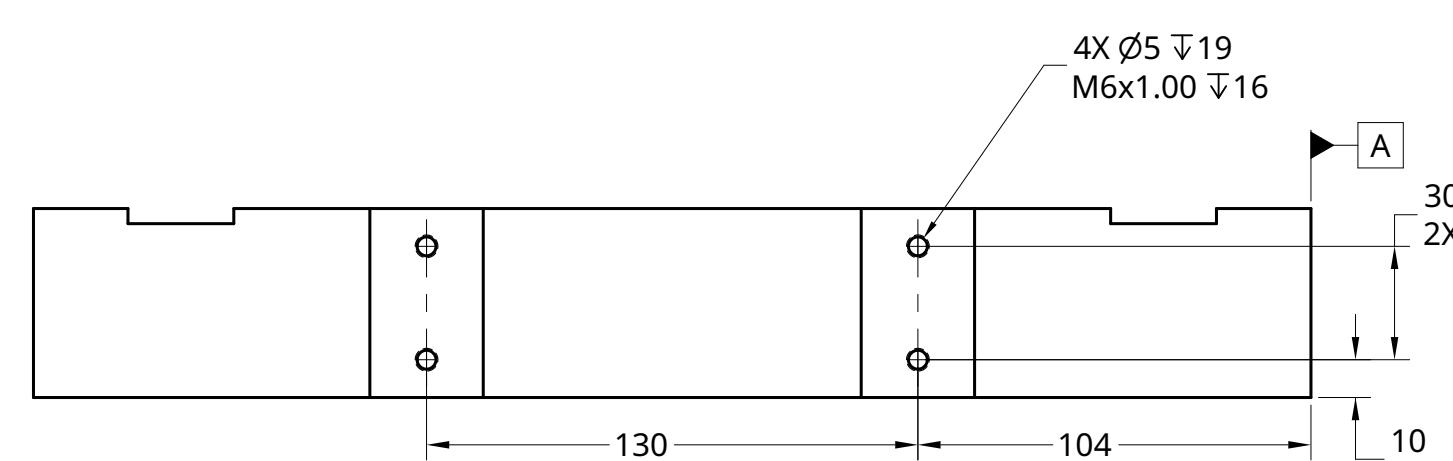
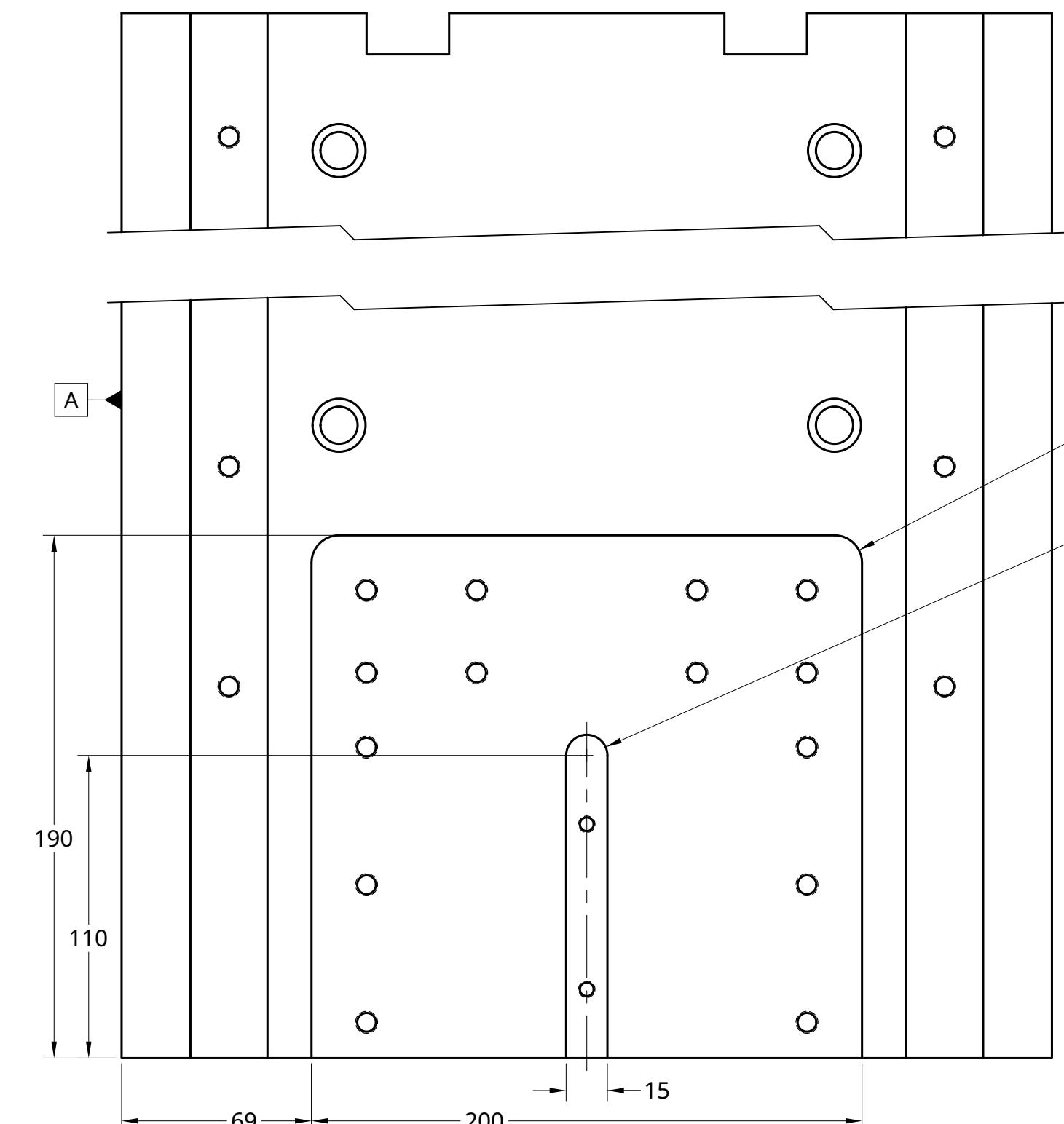
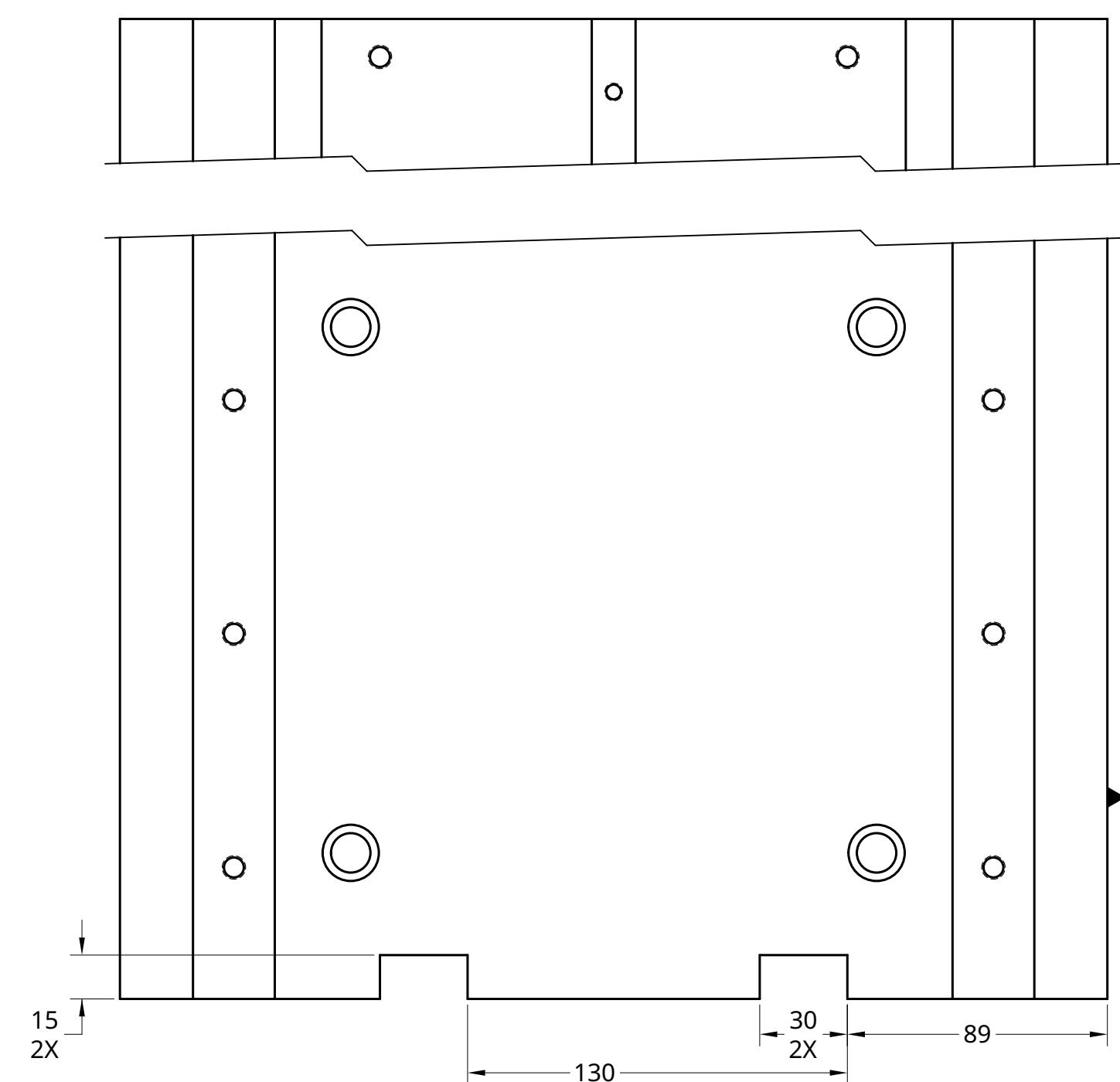
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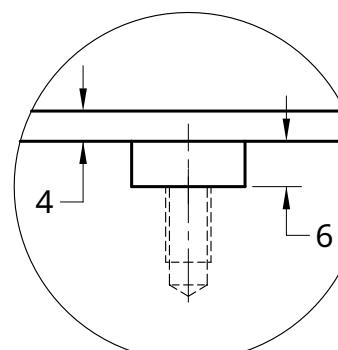
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LEFT VIEW

RIGHT VIEW

DETAIL A
SCALE 1:1

| UNLESS OTHERWISE SPECIFIED, .XX ± .0-. .XXX ± .00-. .XXXX ± .000- | | NAME | DATE |
|--|-------------|--------------------------|------------|
| DRAWN | BRIAN BRADY | 10/16/2019 | |
| CHECKED | | | |
| APPROVED | | | |
| DO NOT SCALE DRAWING | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | |
| (Cone icon) | STEEL 8620 | 14566452 mm ³ | |
| SCALE | 1:2 | WEIGHT | 114.347 kg |
| REV. | | SHEET | 2 of 20 |

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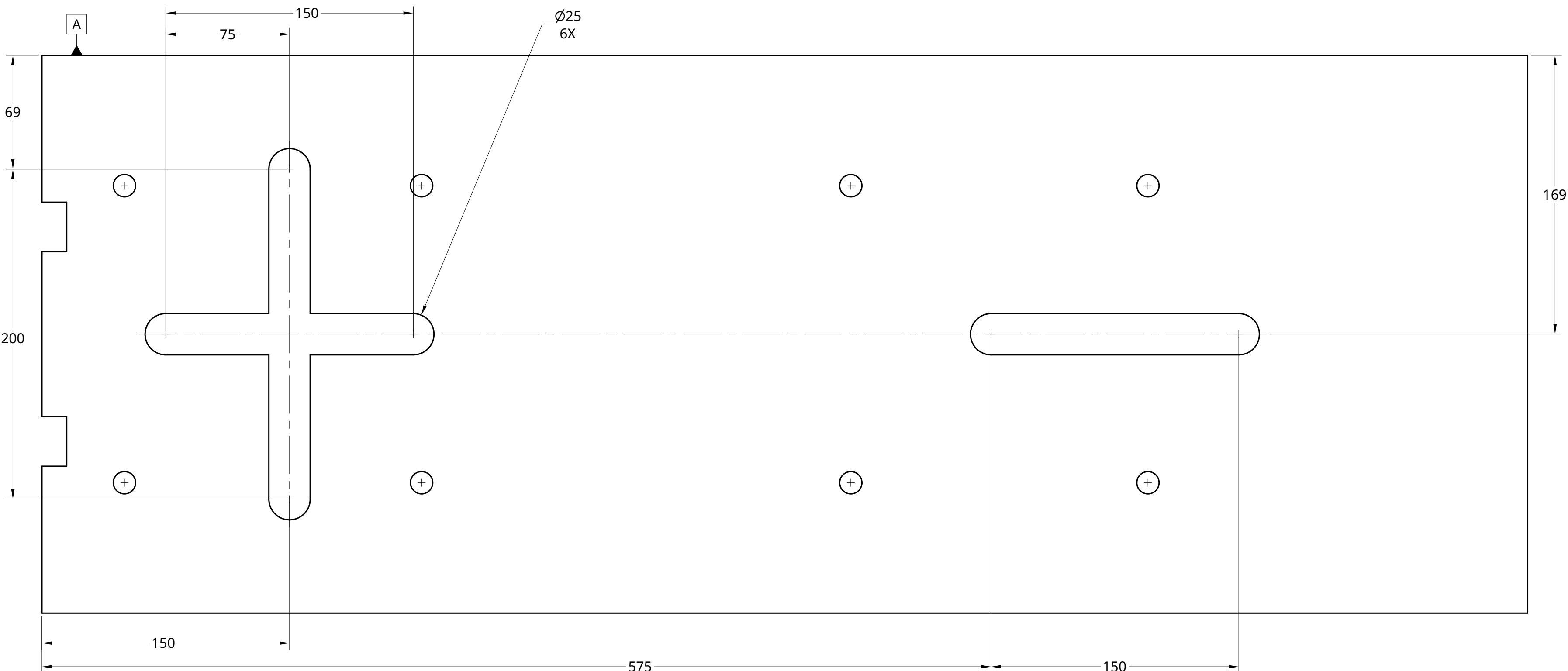
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| UNLESS OTHERWISE SPECIFIED, .XX + .0-. .XXX + .00-. ANGULAR = ± * XXXX + .000-. FRACTIONAL = ± * | | NAME DRAWN BRIAN BRADY | DATE 10/16/2019 |
| SURFACE FINISH ✓ | | CHECKED | |
| APPROVED | | | |
| DO NOT SCALE DRAWING | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | | MATERIAL STEEL 8620 | VOLUME 14566452 mm ³ |
|  | | | |
| SIZE C DWG NO. BR-549-C-001 REV. | | | |
| SCALE 1:2 WEIGHT 114.347 kg SHEET 3 of 20 | | | |

Ferris State University

DRILL UNIT
MAIN ASSEMBLY DETAILS
BASE PLATE

BR-549-C-001

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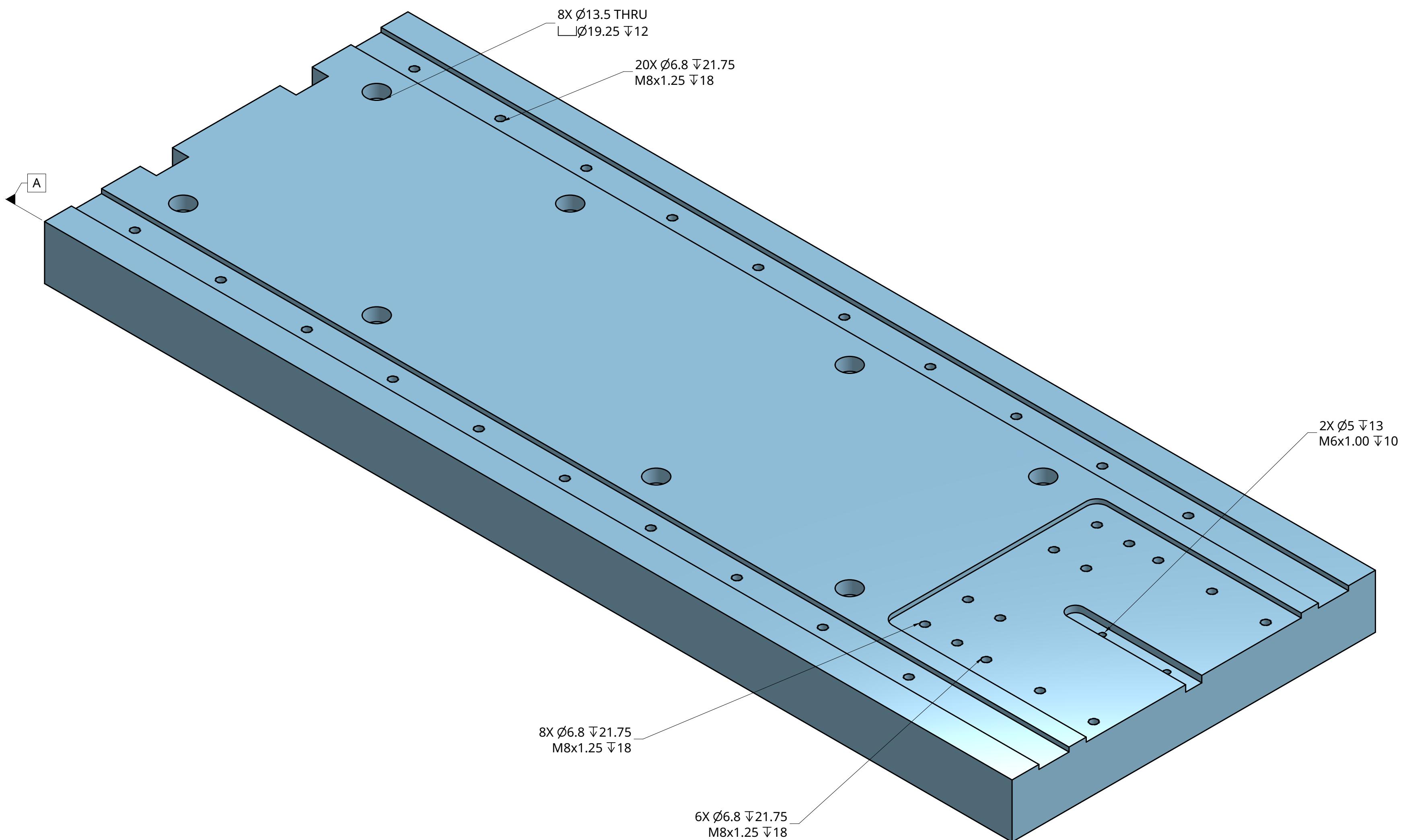
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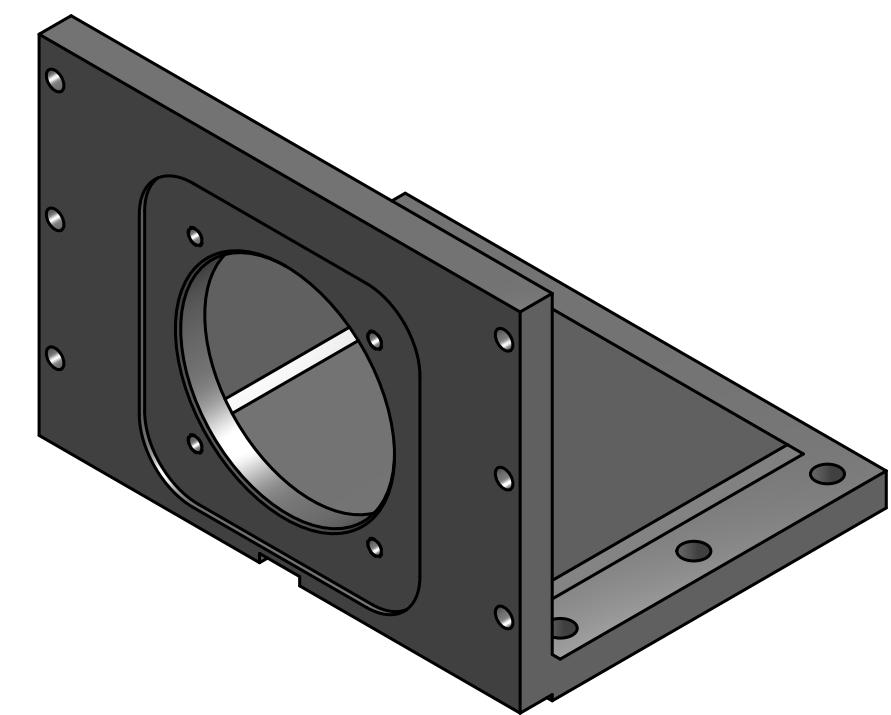
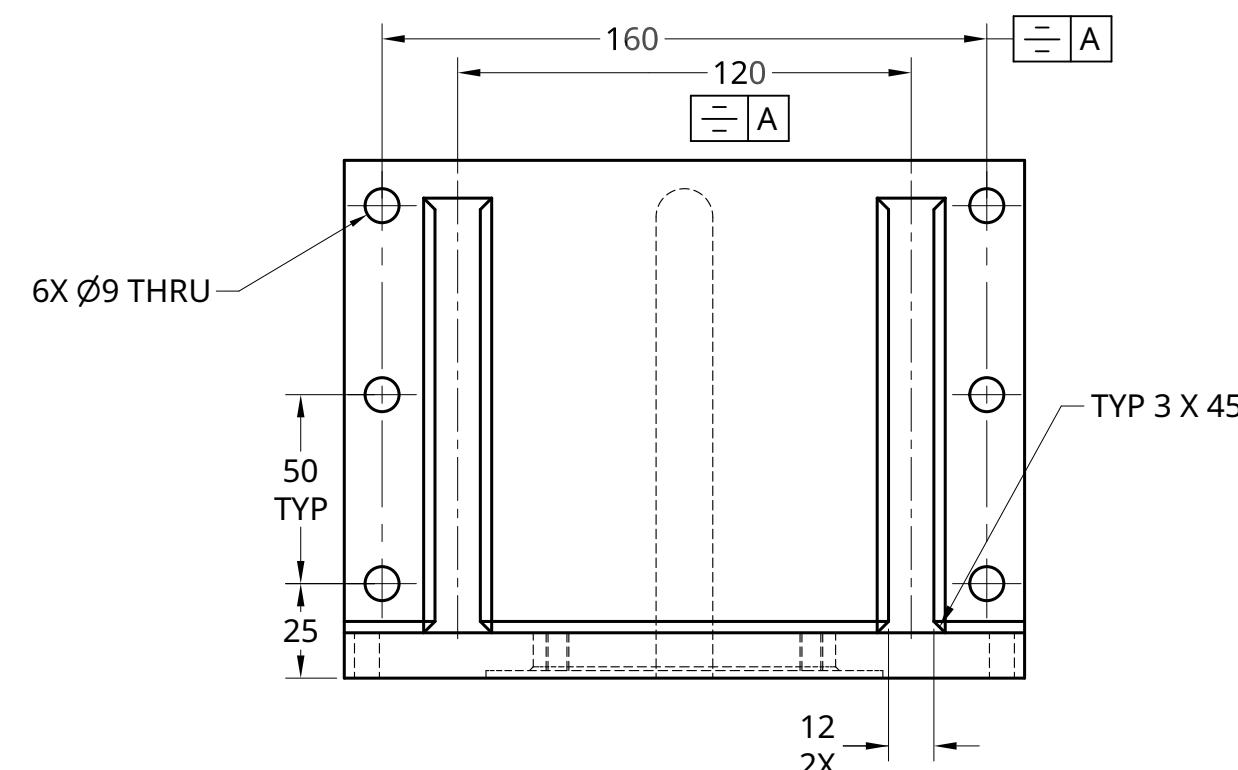
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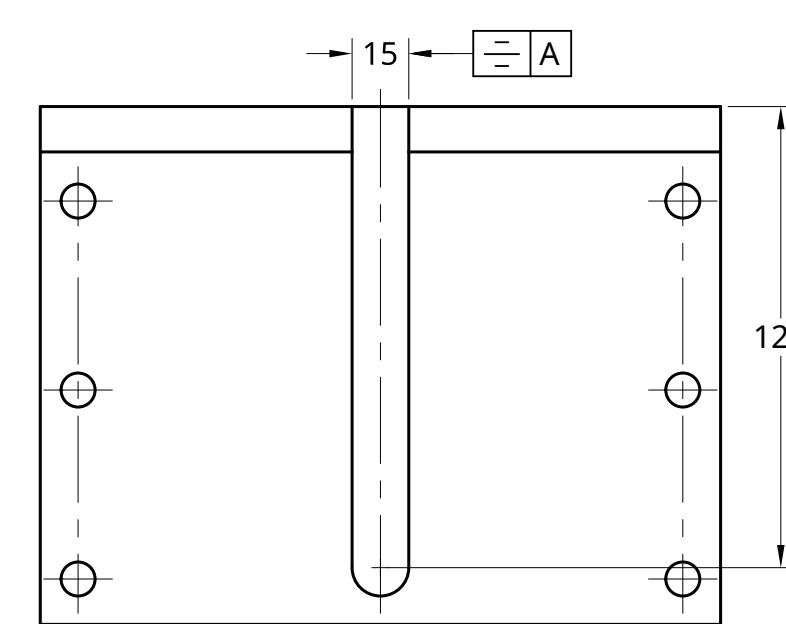
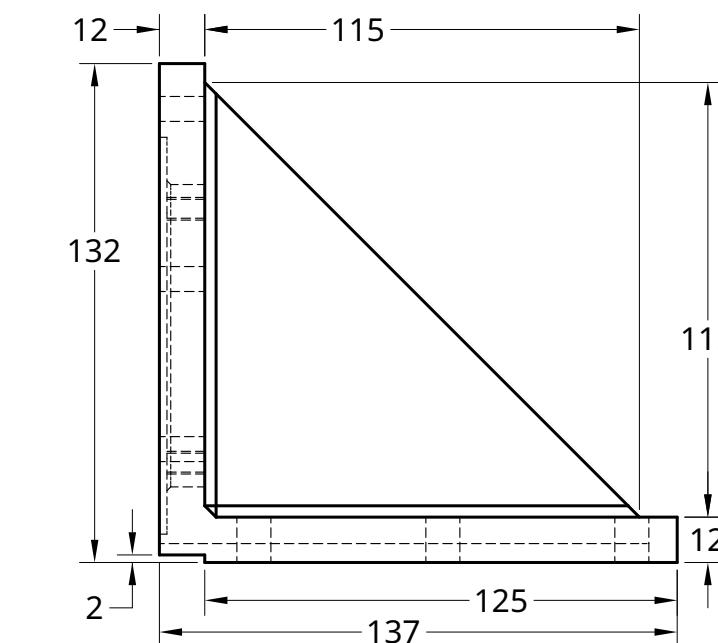
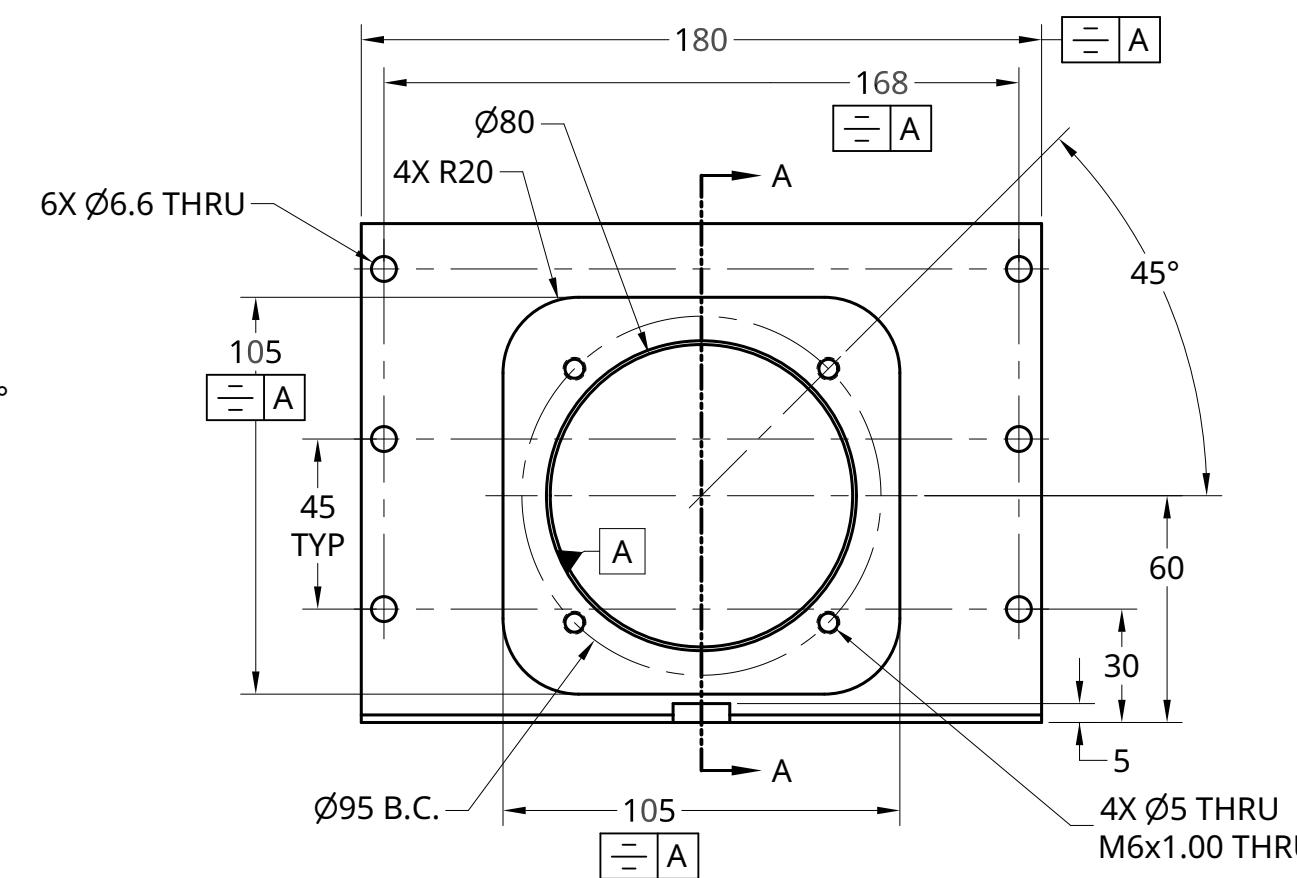
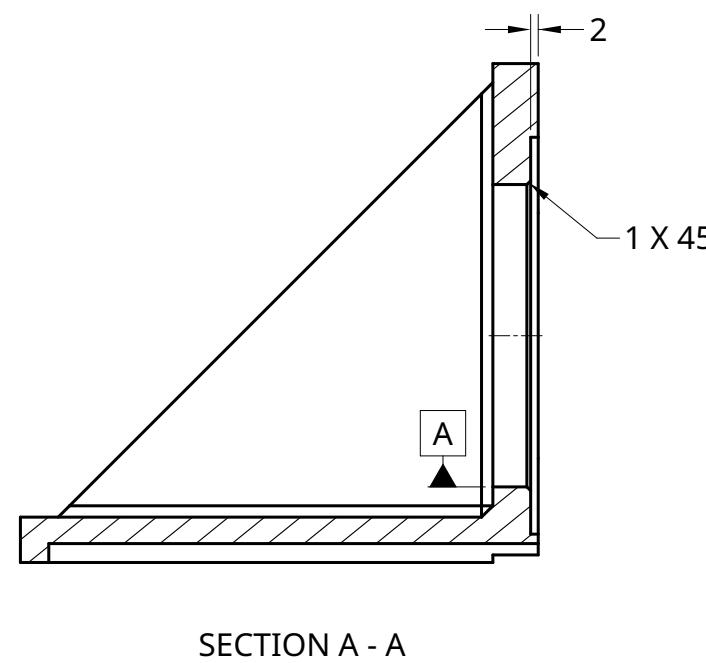


| Ferris State University | | | |
|---|--------------------------------------|-----------------------|---------|
| DRILL UNIT MAIN ASSEMBLY DETAILS BASE PLATE | | | |
| SIZE | DWG NO. | REV. | |
| C | BR-549-C-001 | | |
| SCALE 1:2 | WEIGHT 114.347 kg | SHEET | 4 of 20 |
| UNLESS OTHERWISE SPECIFIED, .XX ±.0. .XXX ±.00. .XXXX ±.000. SURFACE FINISH ✓ | NAME DRAWN CHECKED APPROVED | DATE 10/16/2019 | |
| DIMENSIONS ARE IN INCHES ANGULAR ± ° FRACTIONAL ± 1/8 | | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | MATERIAL STEEL 8620 | VOLUME 1456652 mm³ | |

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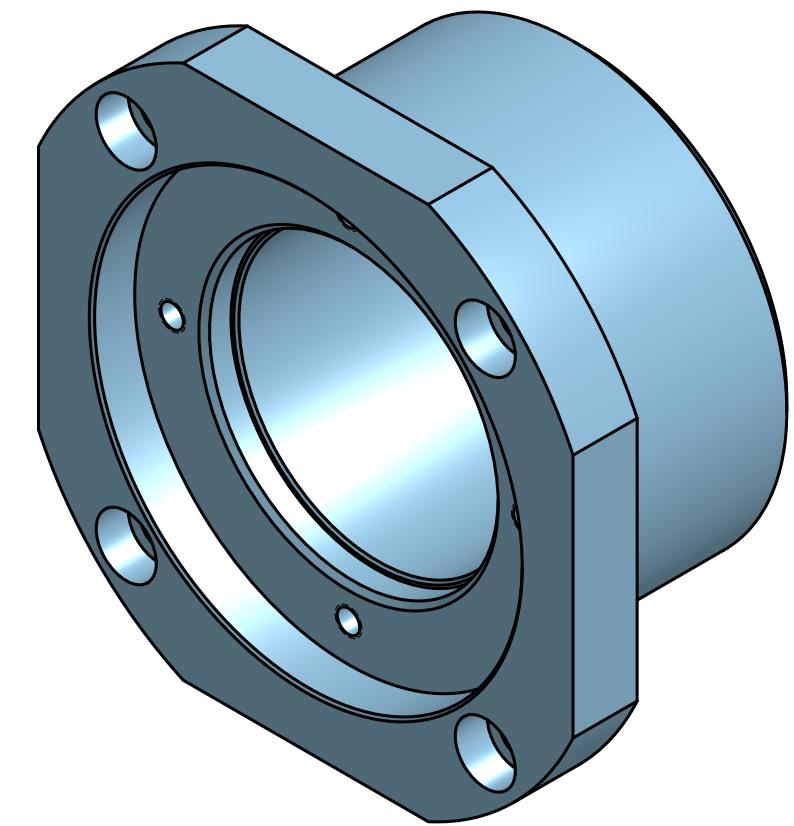
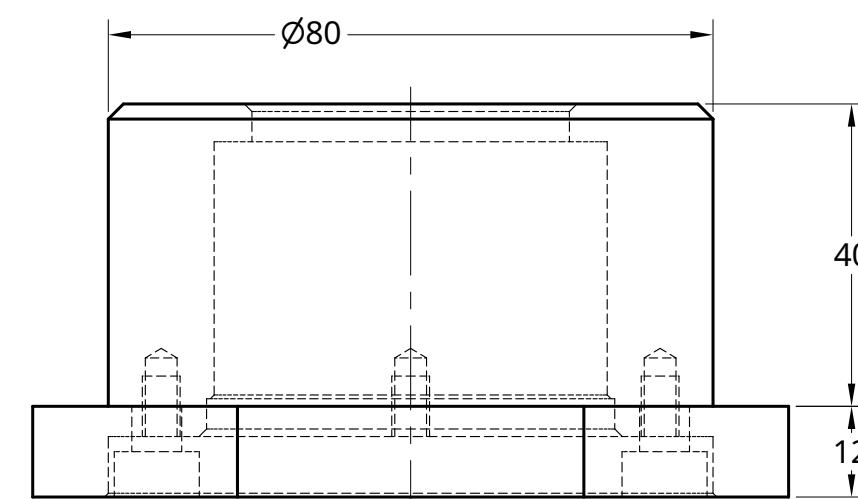


| UNLESS OTHERWISE SPECIFIED, .XX = ±.0-. .XXX = ±.00-. .XXXX = ±.000-. SURFACE FINISH | | NAME DRAWN CHECKED APPROVED | DATE 10/16/2019 |
|--|--|--------------------------------------|----------------------------------|
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | | MATERIAL STEEL 1020 | VOLUME 278550 mm ³ |
| | | SCALE 1:2 | WEIGHT 2.187 kg |
| REV. | | SHEET 5 of 20 | |

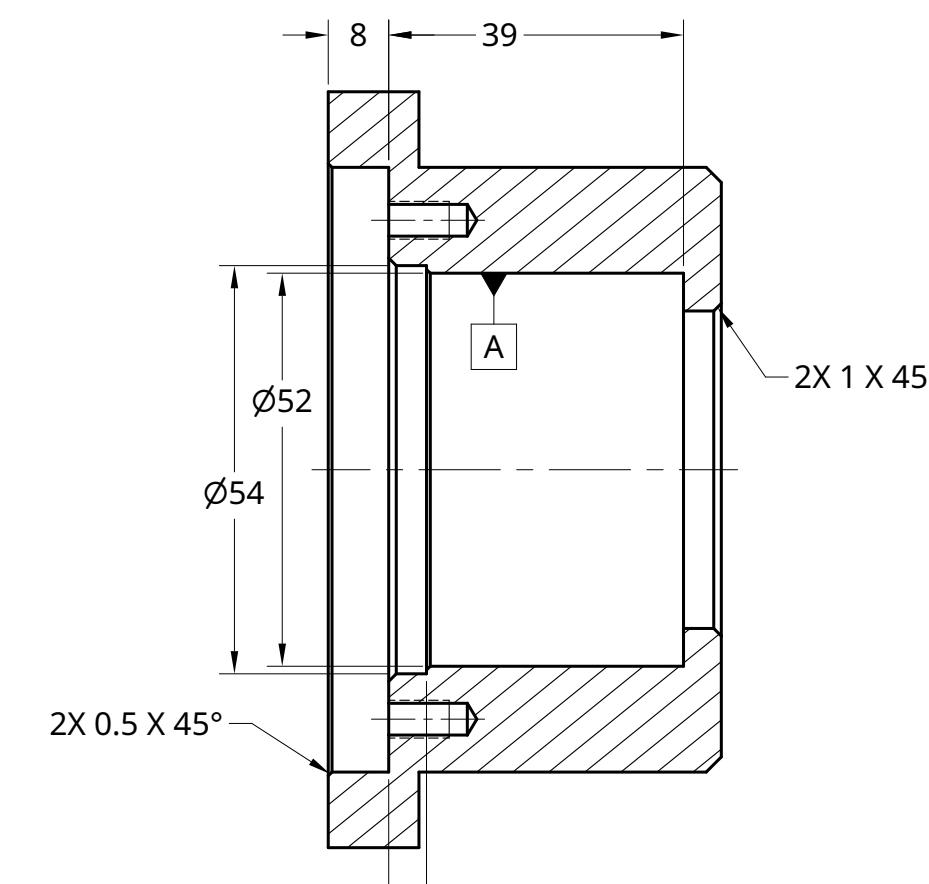
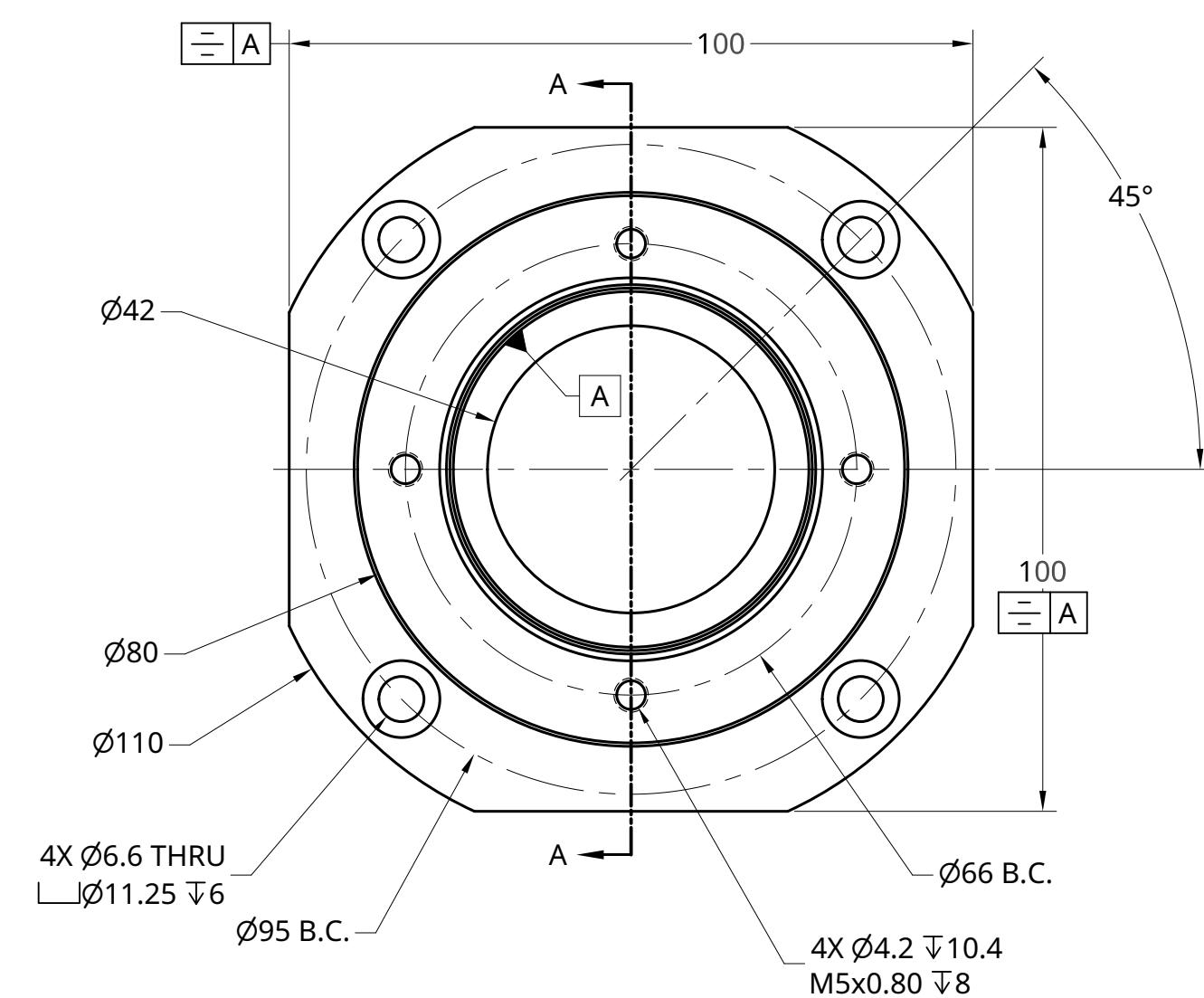
Ferris State University
DRILL UNIT
MAIN ASSEMBLY DETAILS
BALL SCREW SUPPORT BRACKET

SIZE C DWG NO. BR-549-C-002

D



C



SECTION A - A

A

| UNLESS OTHERWISE SPECIFIED, .XX = ±.0-. .XXX = ±.00-. XXXX = ±.0000- SURFACE FINISH | | NAME DRAWN CHECKED APPROVED | DATE 10/16/2019 | |
|---|--|--------------------------------------|------------------------|----------------------------------|
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | THIRD ANGLE PROJECTION | MATERIAL STEEL 4130 | VOLUME 172398 mm ³ |
| | | | REV. C | DWG NO. BR-549-C-003 |
| | | SCALE 1:1 | WEIGHT 1.353 kg | Sheet 6 of 20 |

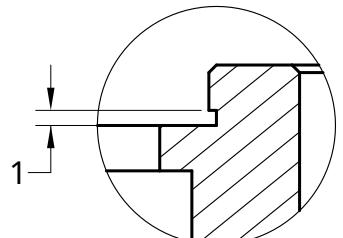
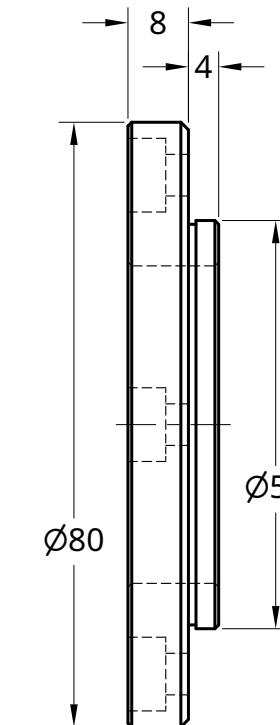
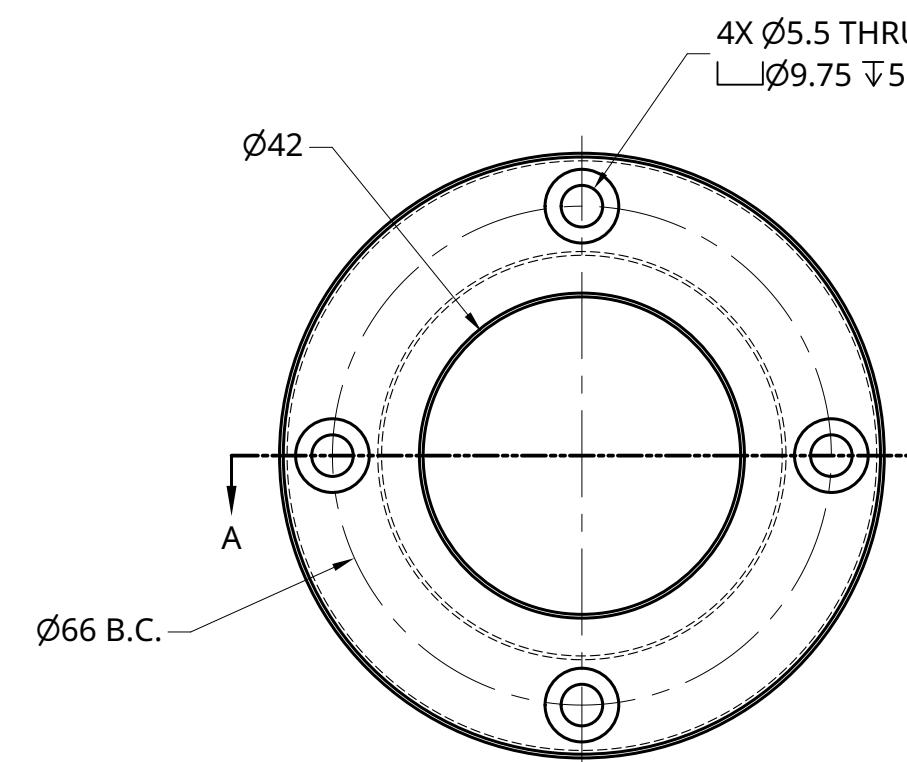
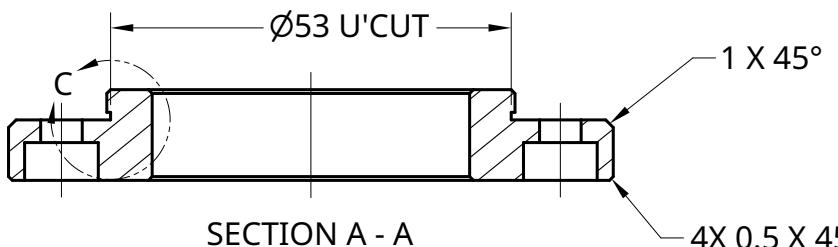
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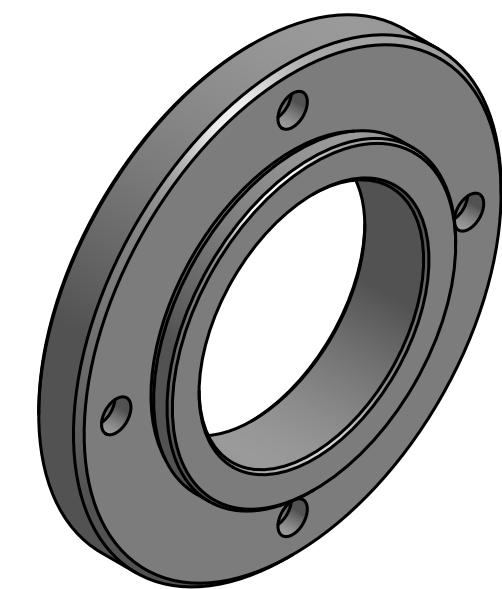
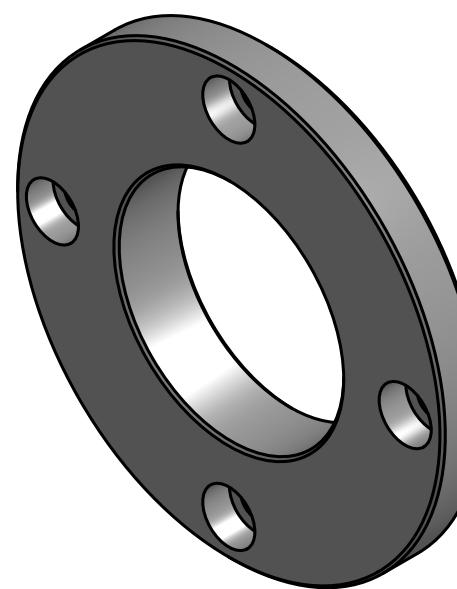
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DETAIL C
SCALE 2:1

| | | | |
|---|-------------|-----------------------|------------------------|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- .XXX = ±.00- .XXXX = ±.000- | | NAME | DATE |
| DRAWN | BRIAN BRADY | 10/16/2019 | |
| CHECKED | | | TITLE |
| APPROVED | | | DRILL UNIT |
| DO NOT SCALE DRAWING | | | MAIN ASSEMBLY DETAILS |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | BALL SCREW BEARING CAP |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | SIZE |
| | STEEL 4130 | 30675 mm ³ | B DWG NO. |
| | | | BR-549-C-004 REV. |
| SCALE | 1:1 | WEIGHT | 0.241 kg |
| | | SHEET | 7 of 20 |



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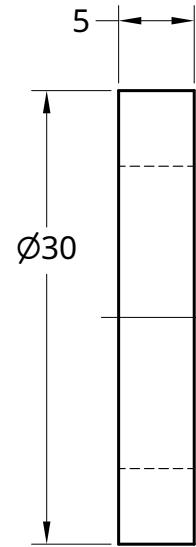
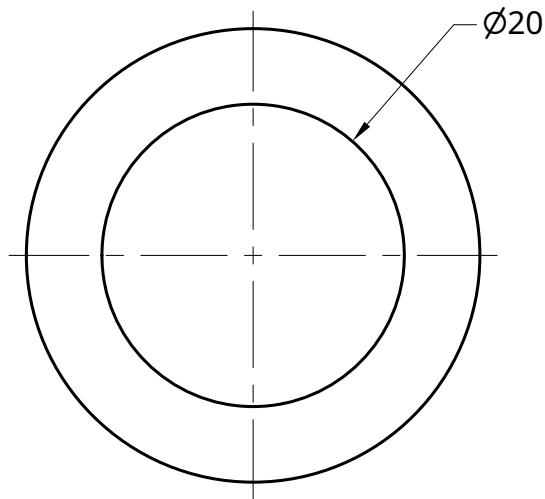
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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES

.XX = ±.0-
.XXX = ±.00-
.XXXX = ±.000-

ANGULAR = ± °
FRACTIONAL = ±

SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND
REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN

CHECKED

APPROVED

NAME

BRIAN BRADY

DATE

10/16/2019

TITLE

Ferris State University
DRILL UNIT
MAIN ASSEMBLY DETAILS
BALL SCREW BEARING SPACER

SIZE

A

DWG NO.

BR-549-C-005

REV.

SCALE

2:1

WEIGHT

0.015 kg

SHEET

8 of 20

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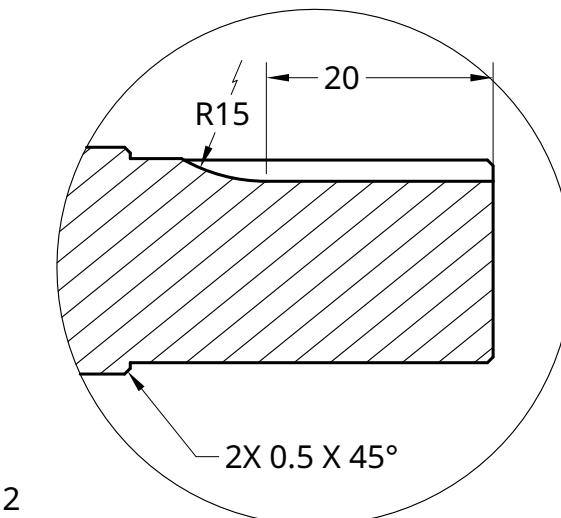
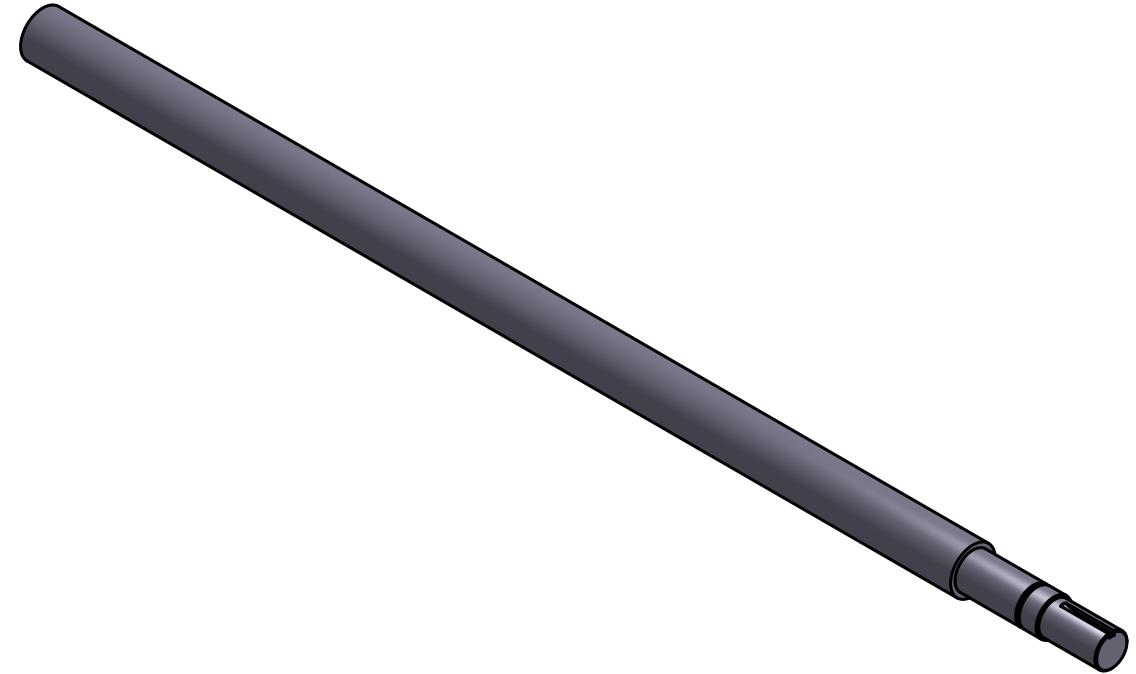
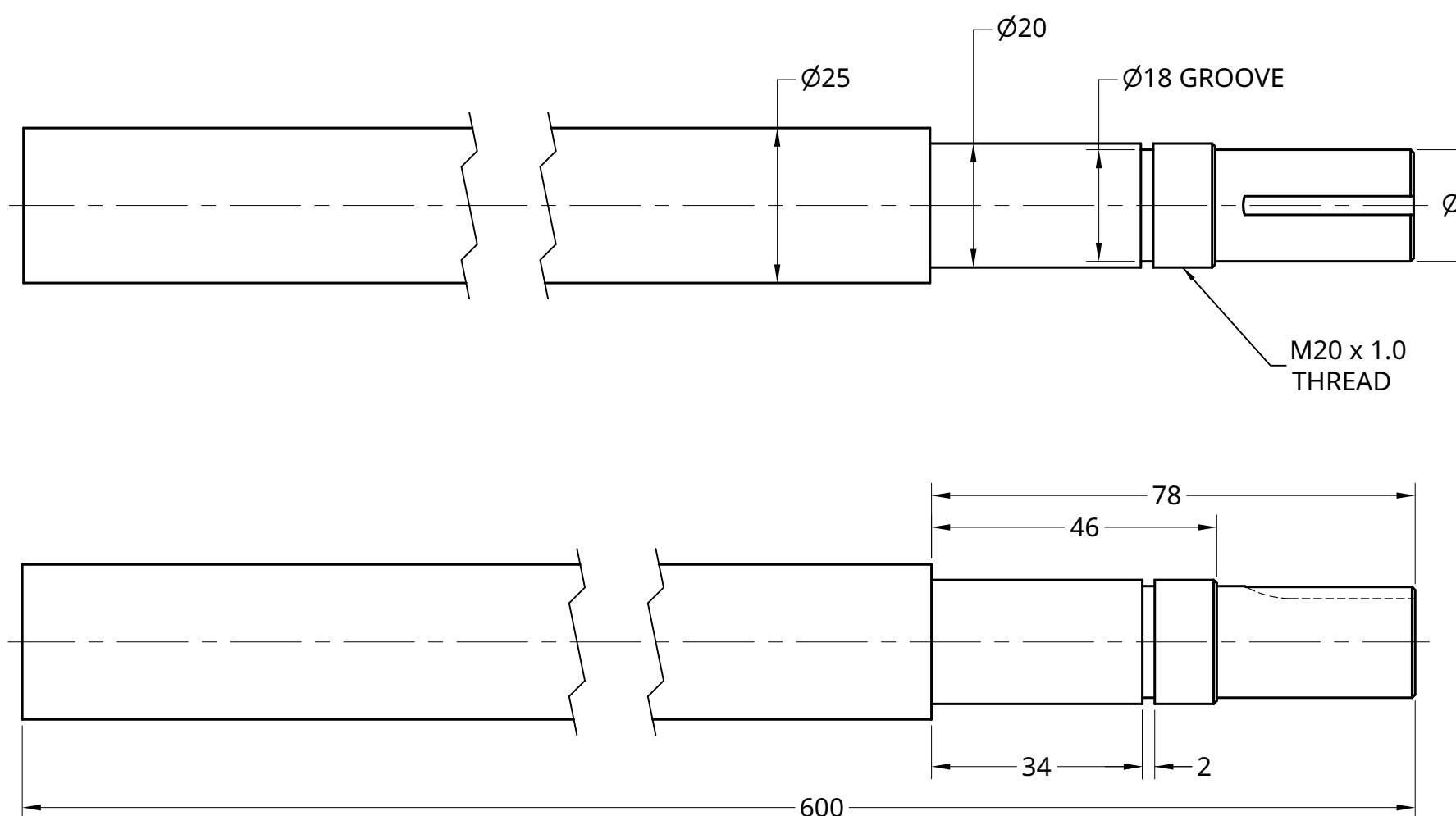
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|---|-------------------------|------------------------------|----------------------------------|------------------|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0-. .XXX = ±.00-. .XXXX = ±.000- | | NAME DRAWN BRIAN BRADY | DATE 10/16/2019 | FRACTIONAL = ± |
| SURFACE FINISH ✓ | | CHECKED | | |
| APPROVED | | | | |
| DO NOT SCALE DRAWING | | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| THIRD ANGLE PROJECTION | | MATERIAL STEEL 8620 | VOLUME 278550 mm ³ | REV. |
| | | | | |
| SIZE B | DWG NO. BR-549-C-006 | | | |
| SCALE 1:1 | WEIGHT 2.187 kg | | | SHEET 9 of 20 |

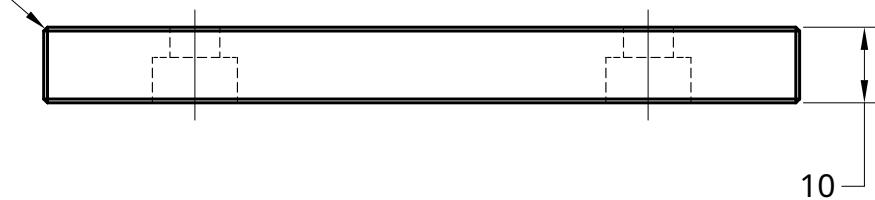
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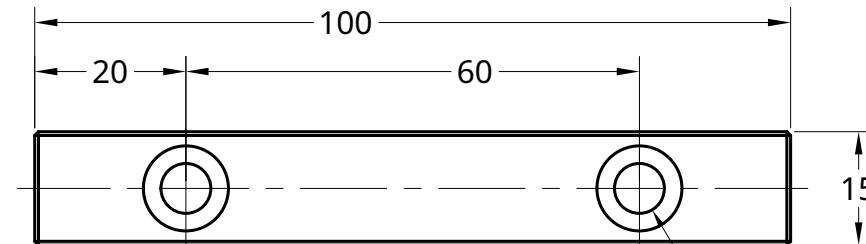
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0.5 X 45°
ALL EDGES

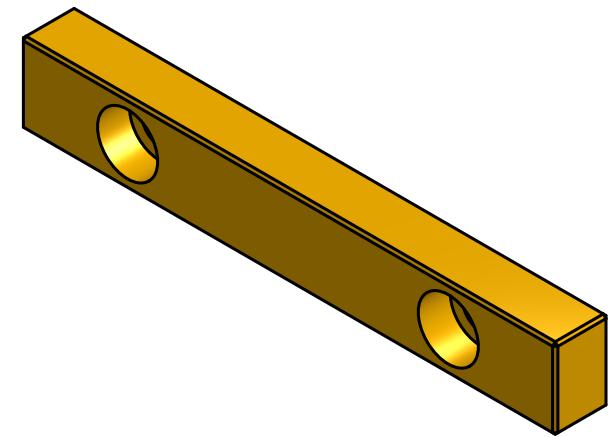


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Ø11.25 ▾6

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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES

XX = ±.0-
XXX = ±.00-
XXXX = ±.000-
SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND
REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN

CHECKED

APPROVED

NAME

DATE

10/16/2019

TITLE

Ferris State University

DRILL UNIT
MAIN ASSEMBLY DETAILS
15 X 10 X 100 KEY

SIZE

A

DWG NO.

BR-549-C-007

REV.

SCALE

1:1

WEIGHT

0.106 kg

SHEET

10 of 20

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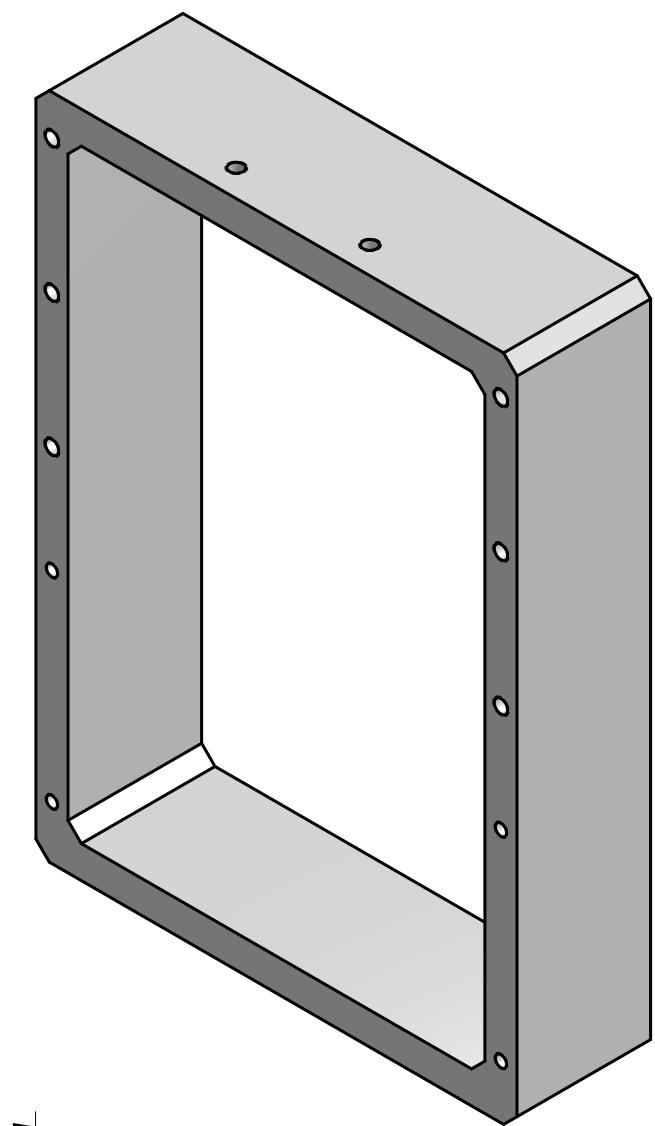
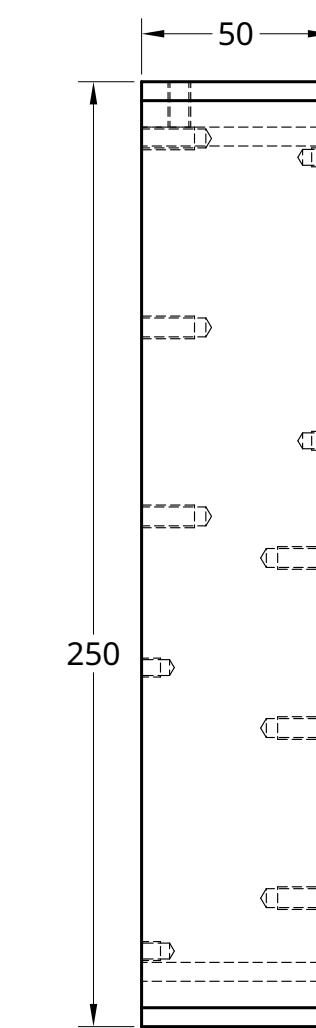
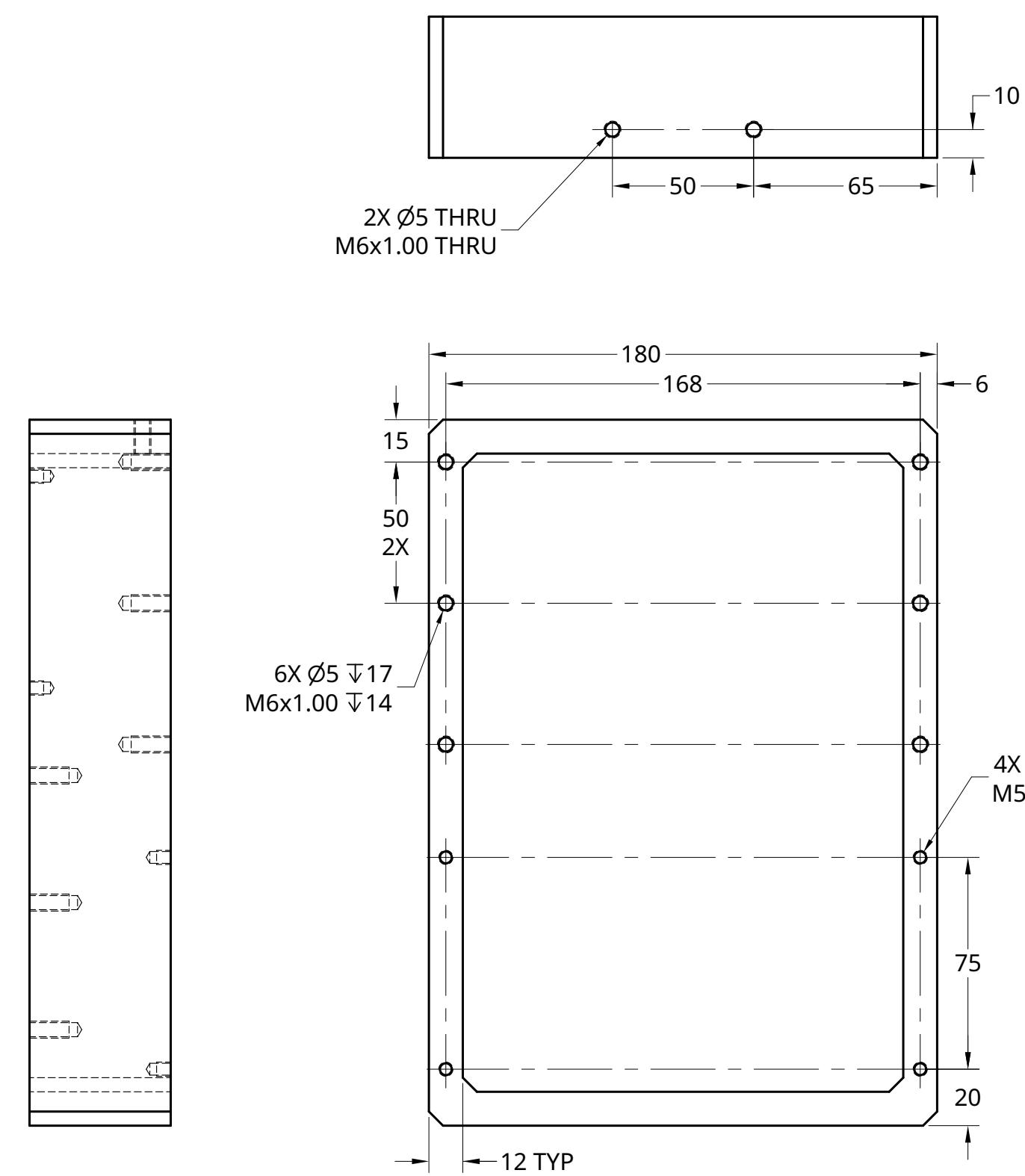
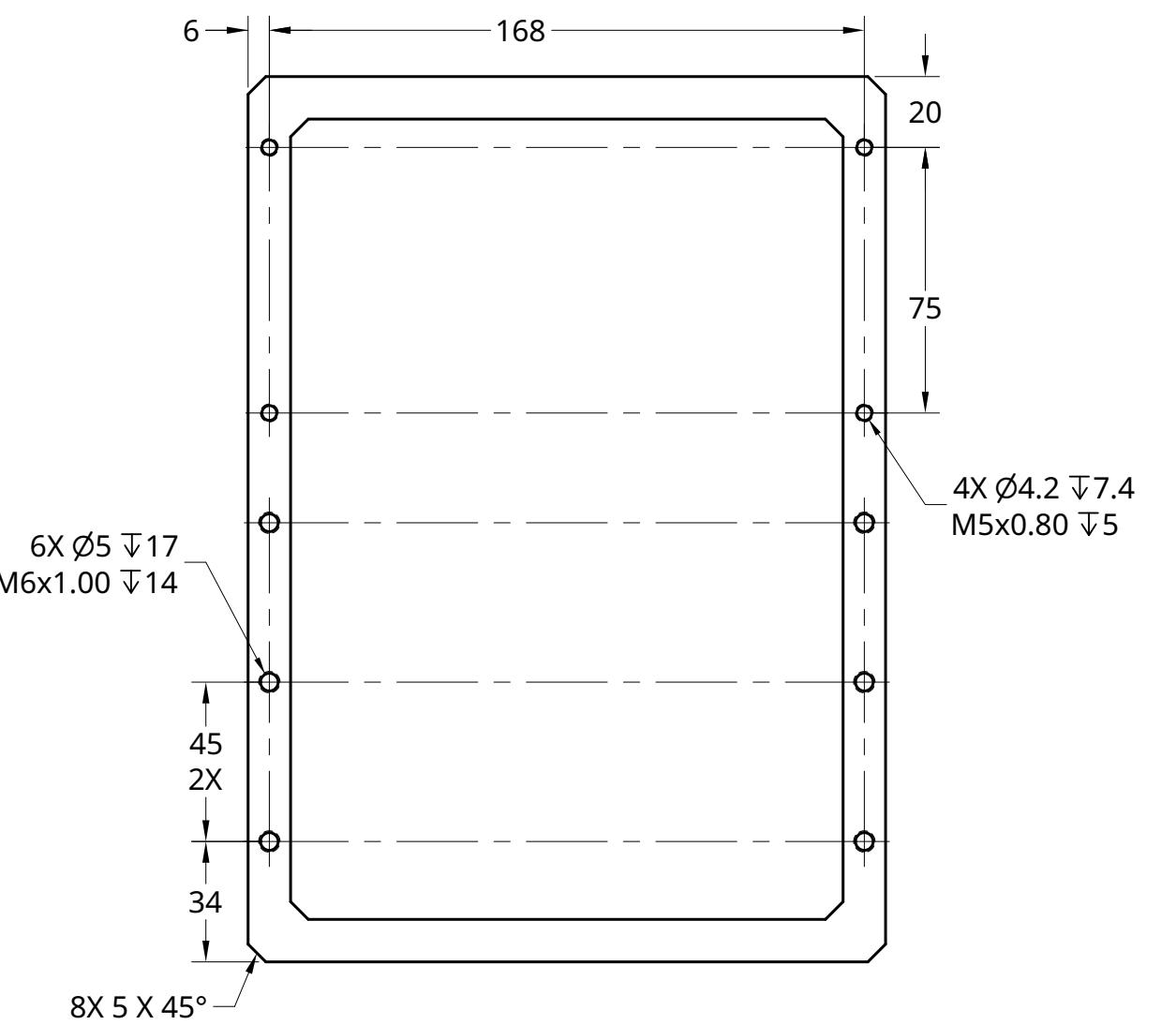
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| UNLESS OTHERWISE SPECIFIED, .XX ± .0-. .XXX ± .00-. .XXXX ± .000-. SURFACE FINISH | NAME DRAWN BRIAN BRADY DATE 10/16/2019 |
| ANGULAR = ± ° FRACTIONAL = ± 1/8 | CHECKED APPROVED |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | |
| THIRD ANGLE PROJECTION | MATERIAL STEEL 1020 |
| | VOLUME 481738 mm³ |
| REV. | DWG NO. BR-549-C-008 |
| SCALE 1:2 | WEIGHT 3.791 kg |
| | SHEET 11 of 20 |

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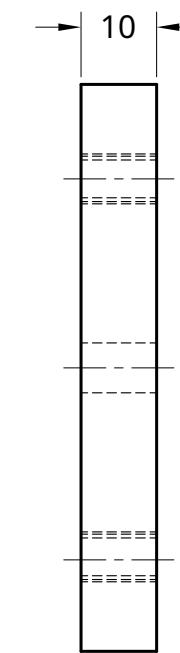
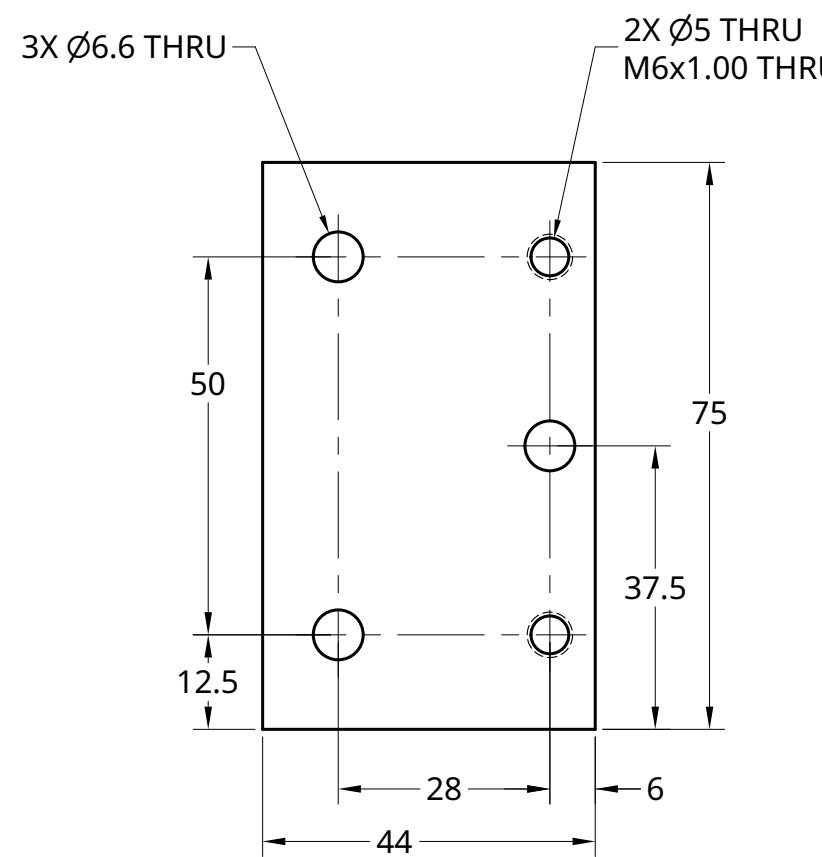
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- ANGULAR = ± ° .XXX = ±.00- FRACTIONAL = ± .XXXX = ±.000- | | | DRAWN | NAME | DATE |
| | | | SURFACE FINISH | BRIAN BRADY | 10/16/2019 |
| | | | CHECKED | | |
| | | | APPROVED | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | THIRD ANGLE PROJECTION | MATERIAL | VOLUME |
| | | | | STEEL 1020 | 31581 mm ³ |
| | | | | SCALE | 1:1 |
| | | | | WEIGHT | 0.249 kg |
| | | | | REV. | |
| | | | | SIZE | DWG NO. |
| | | | | B | BR-549-C-009 |
| | | | | SCALE | 1:1 |
| | | | | WEIGHT | 0.249 kg |
| | | | | REV. | |
| | | | | SHEET | 12 of 20 |

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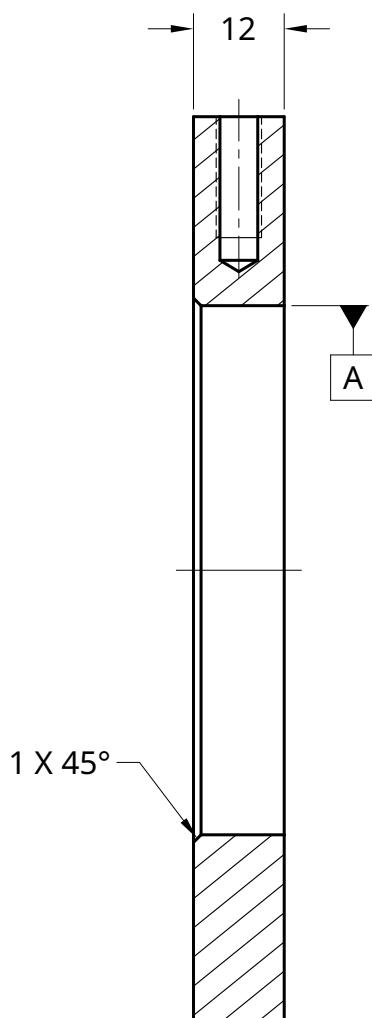
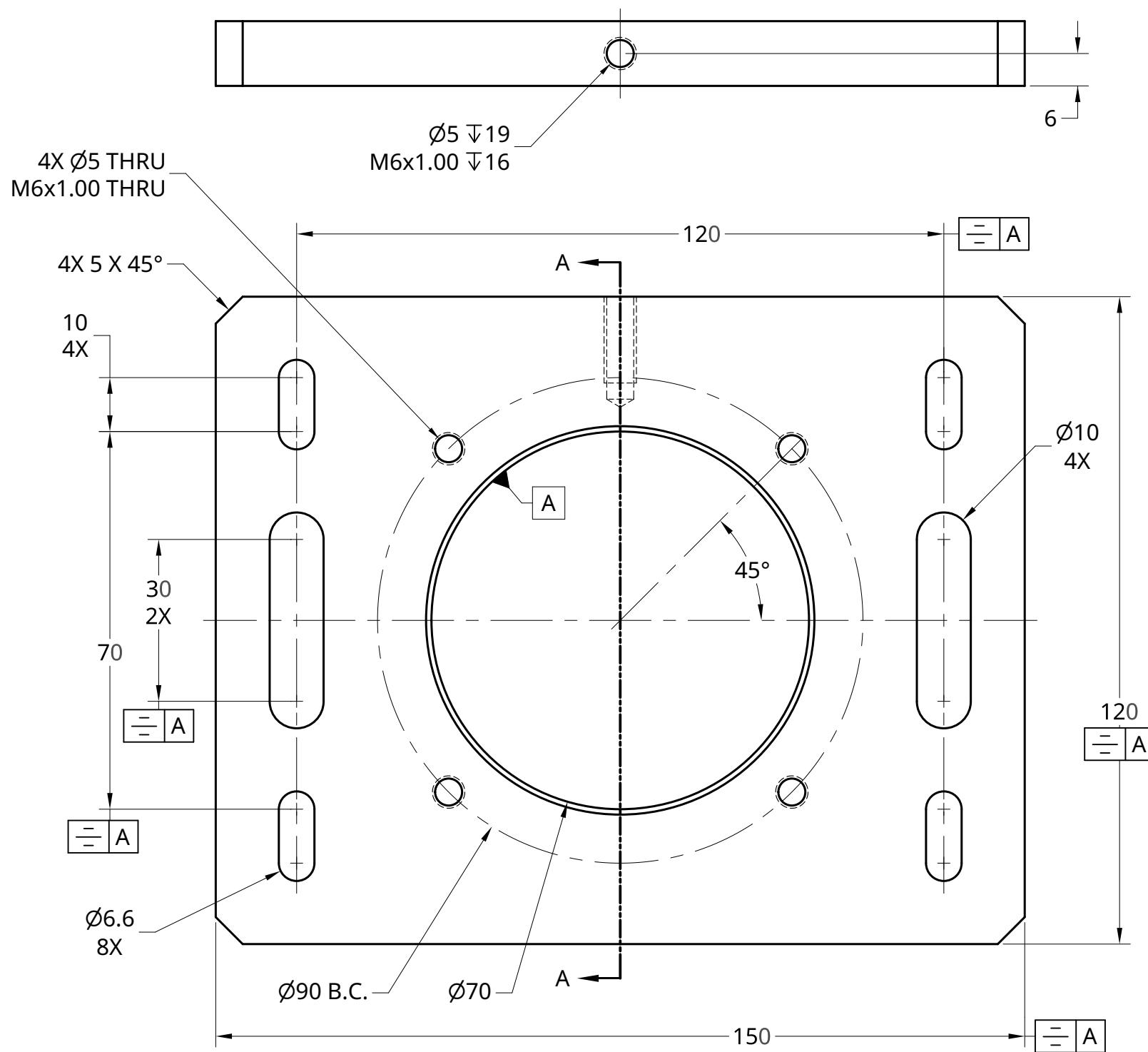
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SECTION A - A

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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES $.XX = \pm .0-$ $.XXX = \pm .00-$ $XXXX = \pm .000-$ | | NAME | DATE |
| DRAWN | BRIAN BRADY | 10/16/2019 | |
| CHECKED | | | TITLE |
| APPROVED | | | DRILL UNIT |
| DO NOT SCALE DRAWING | | | MAIN ASSEMBLY DETAILS |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | SERVO MOTOR ADAPTER |
| THIRD ANGLE PROJECTION | MATERIAL | VOLUME | |
| | STEEL 8620 | 153887 mm ³ | REV. |

| Ferris State University | | |
|-------------------------|--------------|----------------|
| DRILL UNIT | | |
| MAIN ASSEMBLY DETAILS | | |
| SERVO MOTOR ADAPTER | | |
| SIZE | DWG NO. | REV. |
| B | BR-549-C-010 | |
| SCALE | 1:1 | WEIGHT |
| | | 1.208 kg |
| | | Sheet 13 of 20 |

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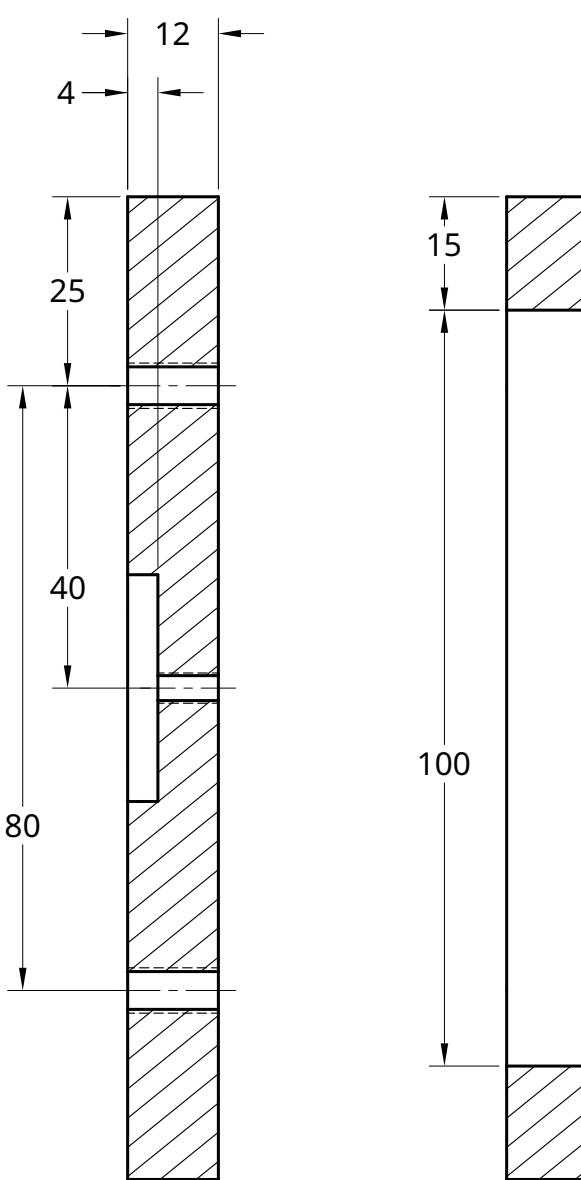
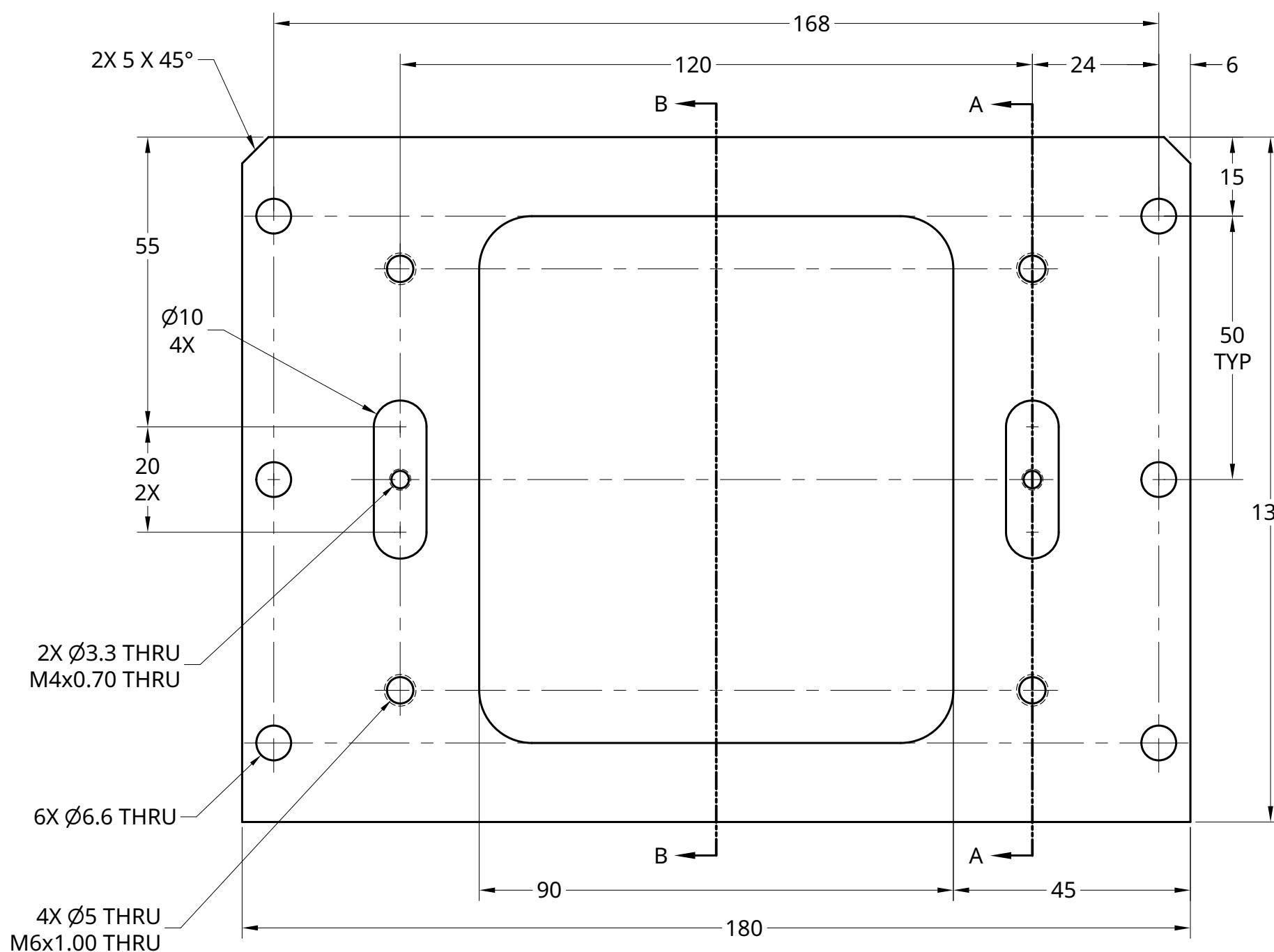
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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00-
.XXXX = ±.000- ANGULAR = ± °
FRACTIONAL = ±

SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN BRIAN BRADY 10/16/2019
CHECKED
APPROVED

NAME DATE
TITLE DRILL UNIT
MAIN ASSEMBLY DETAILS
SERVO MOUNTING PLATE

SIZE B DWG NO. BR-549-C-011 REV.

MATERIAL STEEL 8620 VOLUME 167759 mm³

SCALE 1:1 WEIGHT 1.317 kg SHEET 14 of 20

Ferris State University

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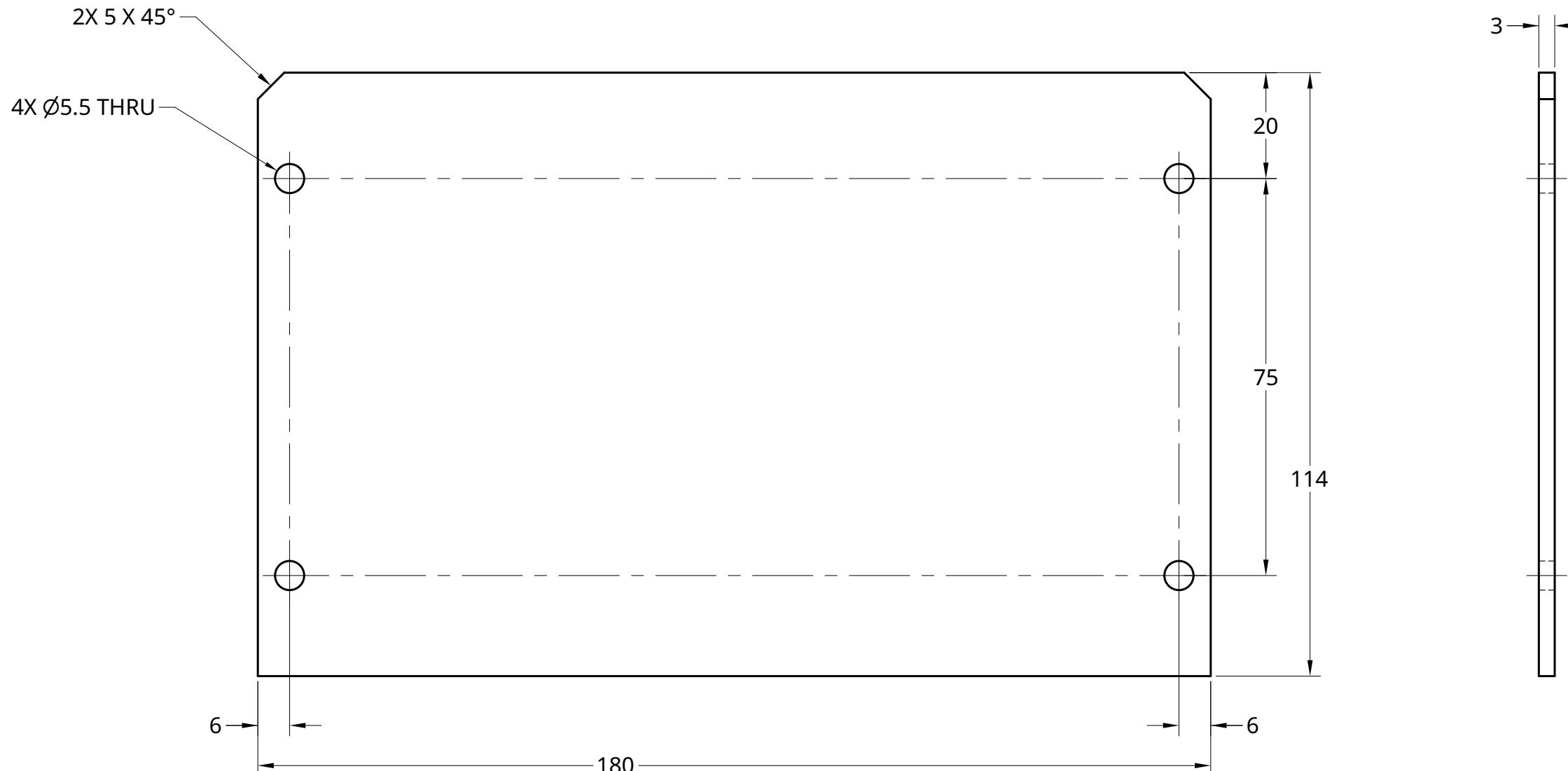
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- .XXX = ±.00- .XXXX = ±.000- ANGULAR = ± ° FRACTIONAL = ± | | | DRAWN | NAME | DATE |
| | | | SURFACE FINISH ✓ | BRIAN BRADY | 10/16/2019 |
| | | | CHECKED | | |
| | | | APPROVED | | |
| DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | | |
| THIRD ANGLE PROJECTION | | | MATERIAL | VOLUME | |
| | | | POLYCARBONATE | 61200 mm³ | |
| | | | SCALE | 1:1 | REV. |
| | | | | WEIGHT | 0.073 kg |
| | | | | SHEET | 15 of 20 |
| | | | | | |

Ferris State University

DRILL UNIT
MAIN ASSEMBLY DETAILS
UPPER COVER PLATE - SERVO

BR-549-C-012

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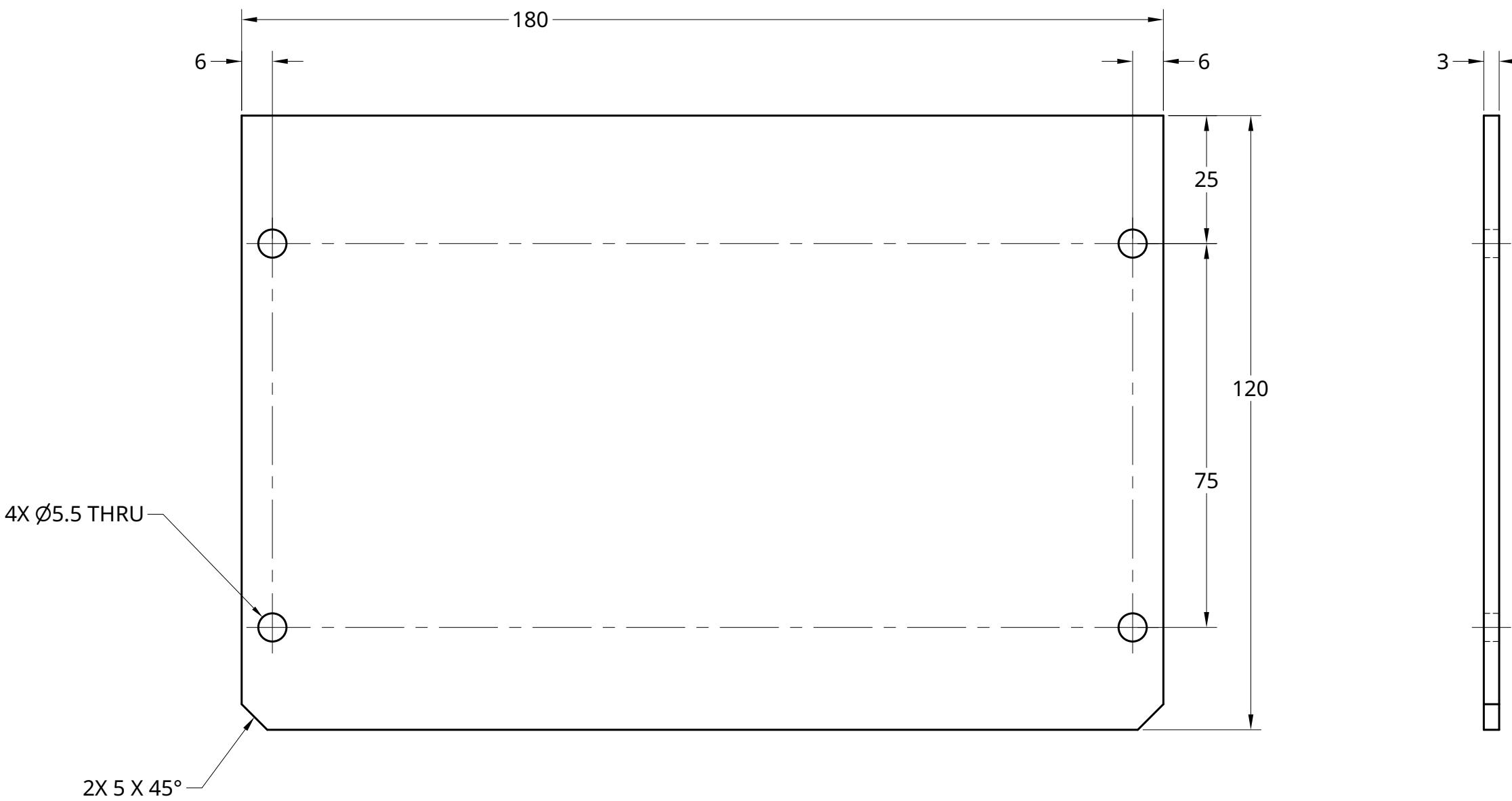
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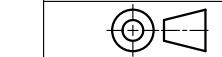
UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00-
.XXXX = ±.000- ANGULAR = ± °
FRACTIONAL = ±

SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND
REMOVE BURRS

THIRD ANGLE PROJECTION



DRAWN BY BRIAN BRADY DATE 10/16/2019

CHECKED

APPROVED

Ferris State University
DRILL UNIT
MAIN ASSEMBLY DETAILS
LOWER COVER PLATE - SERVO

SIZE DWG NO.

BR-549-C-013

REV.

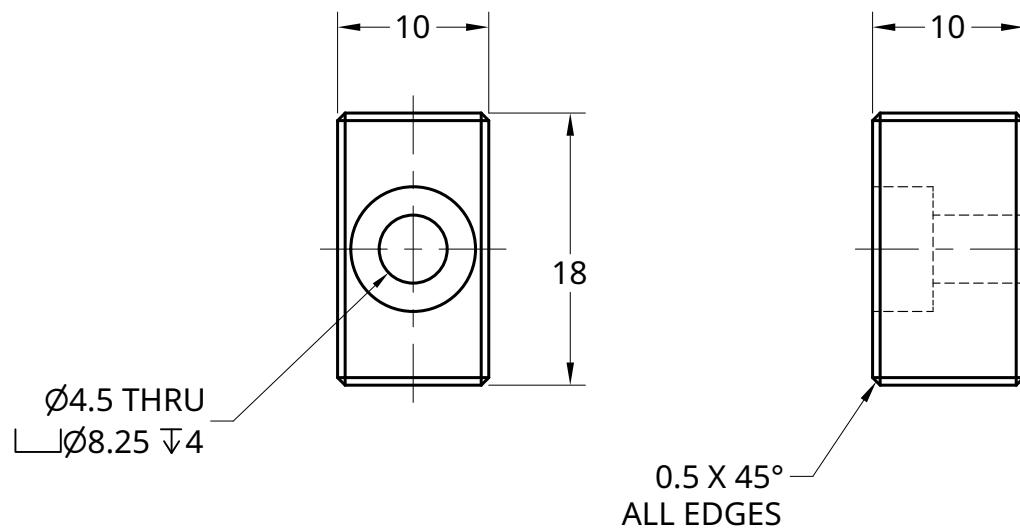
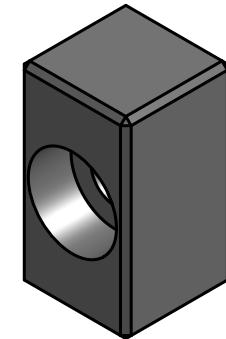
SCALE 1:1 WEIGHT 0.077 kg SHEET 16 of 20

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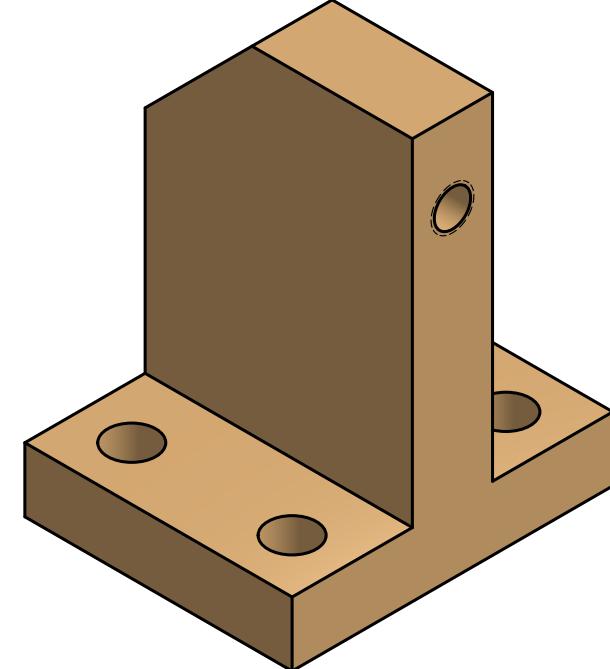
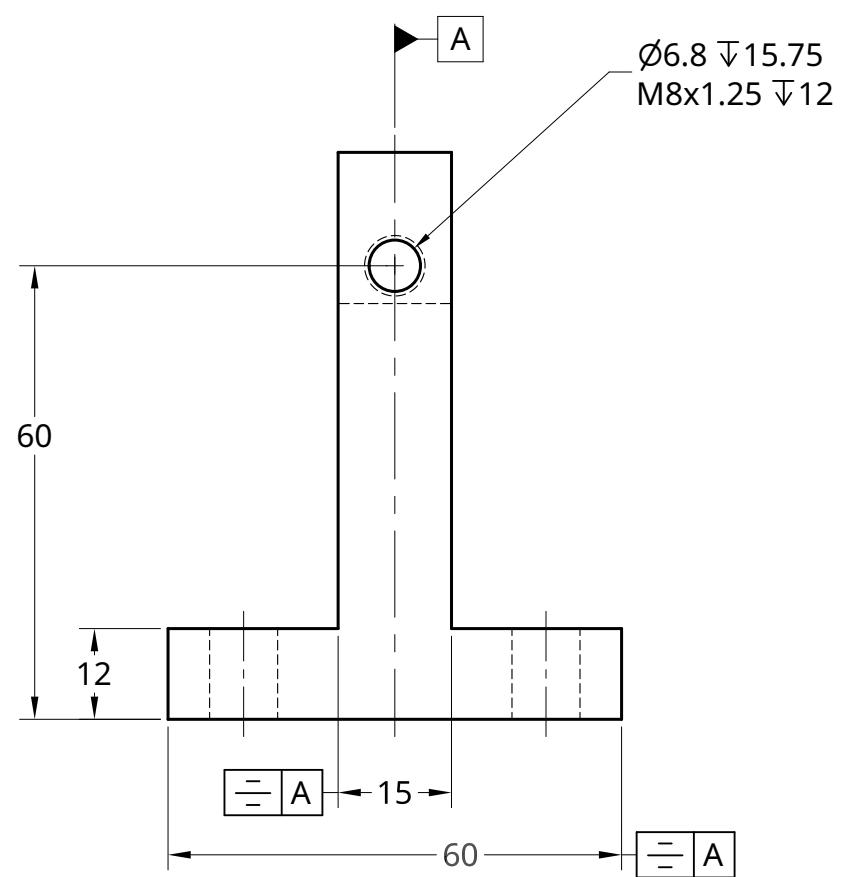
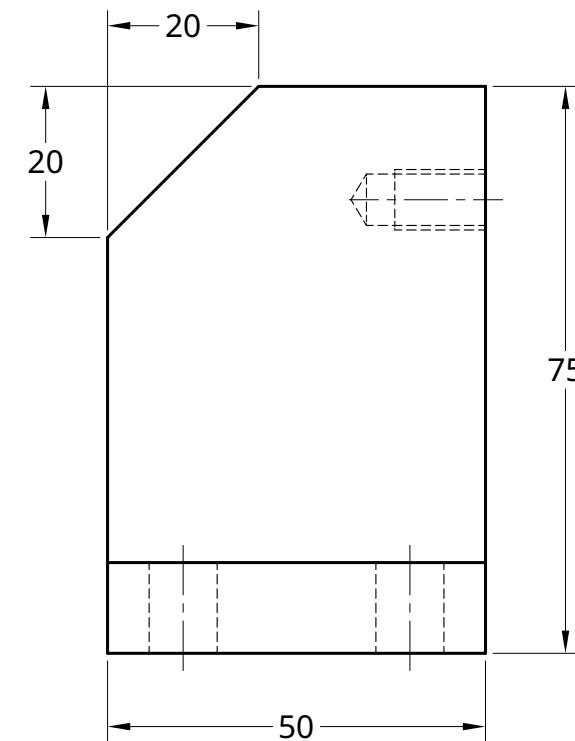
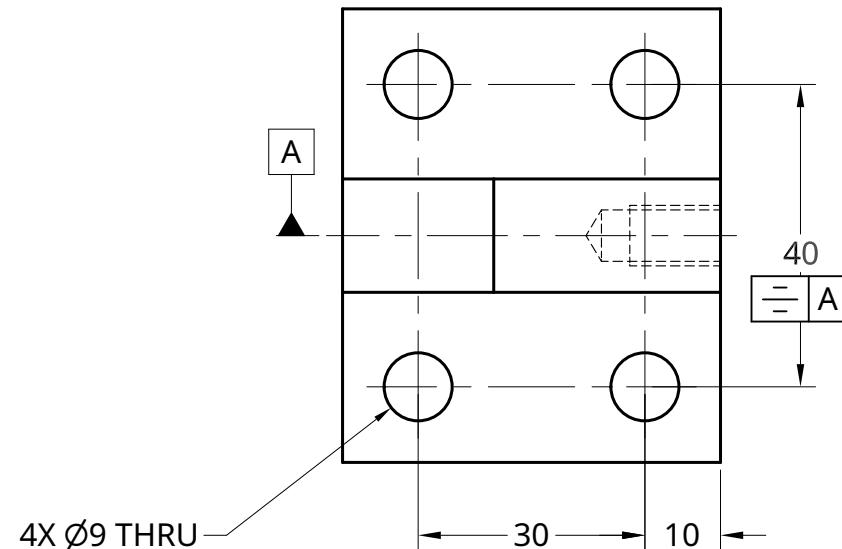
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|---|--|---|---|
| <small>UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES</small> <small>.XX = ±.0- XXX = ±.00- XXXX = ±.000- SURFACE FINISH ✓</small> | | <small>DRAWN</small> <small>BRIAN BRADY</small> <small>10/16/2019</small> | <small>NAME</small> <small>DATE</small> |
| <small>CHECKED</small> <small>APPROVED</small> | | | |
| <small>DO NOT SCALE DRAWING</small> <small>BREAK ALL SHARP EDGES AND REMOVE BURRS</small> | | | |
| <small>THIRD ANGLE PROJECTION</small> | | <small>MATERIAL</small> <small>STEEL 4130</small> | <small>VOLUME</small> <small>1472 mm³</small> |
| | | <small>SIZE</small> A <small>DWG NO.</small> BR-549-C-014 <small>REV.</small> | |
| | | <small>SCALE</small> 2:1 <small>WEIGHT</small> 0.012 kg <small>SHEET</small> 17 of 20 | |

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UNLESS OTHERWISE SPECIFIED,
DIMENSIONS ARE IN INCHES
.XX = ±.0-
.XXX = ±.00- ANGULAR = ± °
.XXXX = ±.000- FRACTIONAL = ±
SURFACE FINISH ✓

DO NOT SCALE DRAWING

BREAK ALL SHARP EDGES AND REMOVE BURRS

THIRD ANGLE PROJECTION



NAME: BRIAN BRADY DATE: 10/16/2019
DRAWN BY: CHECKED BY: APPROVED BY:

TITLE: DRILL UNIT
MAIN ASSEMBLY DETAILS
STOP BRACKET - REAR

SIZE: B DWG NO.: BR-549-C-015 REV.:

MATERIAL: STEEL 1020 VOLUME: 76600 mm³

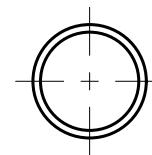
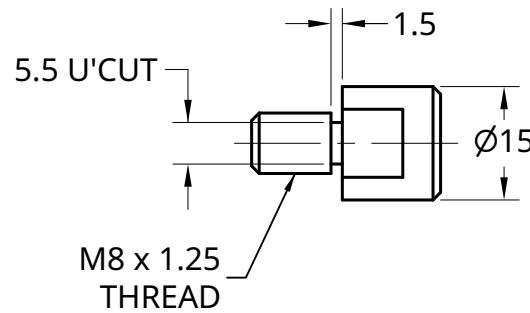
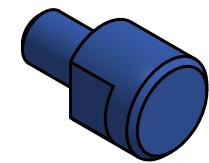
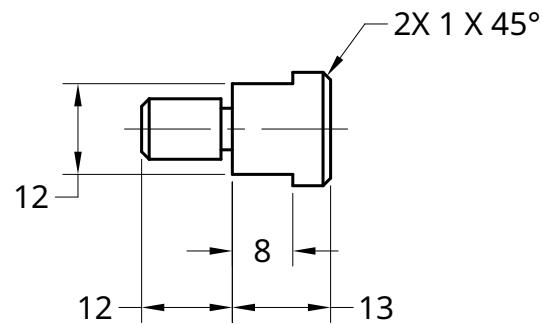
SCALE: 1:1 WEIGHT: 0.603 kg SHEET: 18 of 20

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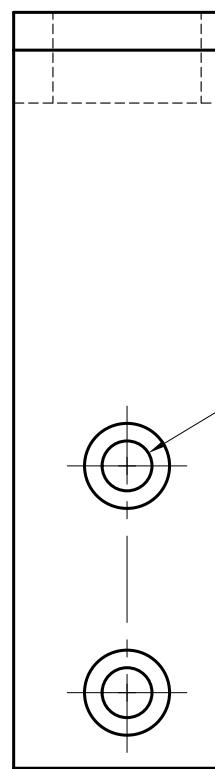
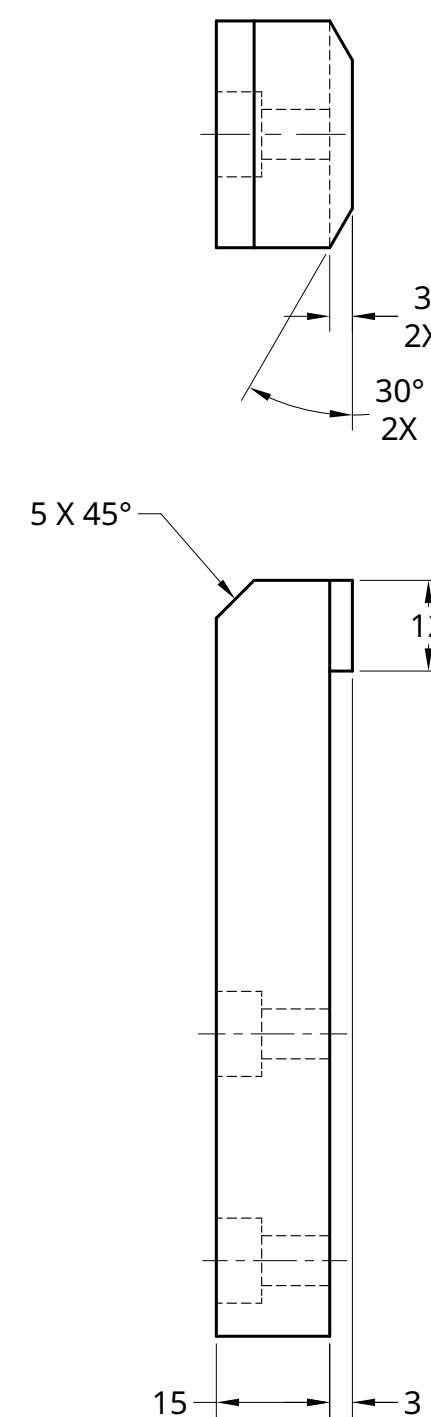
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES XX = ±.0- XXX = ±.00- XXXX = ±.000- SURFACE FINISH ✓ | | NAME DRAWN BRIAN BRADY | DATE 10/16/2019 |
| ANGULAR = ± ° FRACTIONAL = ± | | CHECKED | |
| APPROVED | | | |
| DO NOT SCALE DRAWING | | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | |
| THIRD ANGLE PROJECTION | MATERIAL STEEL 4130 | VOLUME 2680 mm³ | SIZE A DWG NO. REV. |
| | | | BR-549-C-016 |
| | SCALE 1:1 | WEIGHT 0.021 kg | SHEET 19 of 20 |

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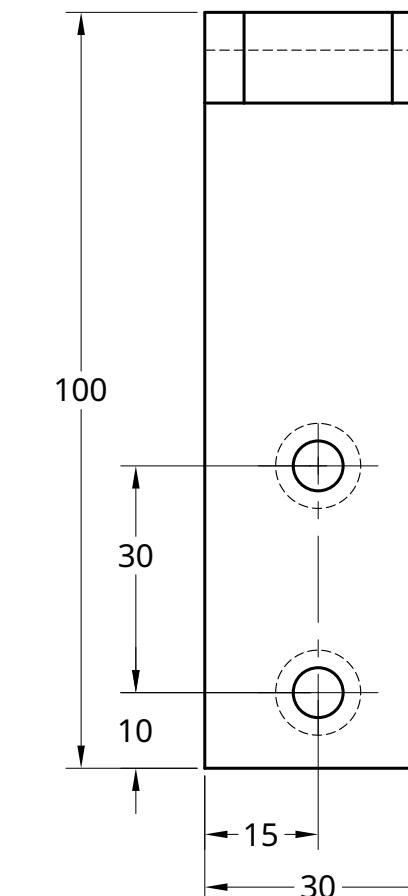
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2X Ø6.6 THRU
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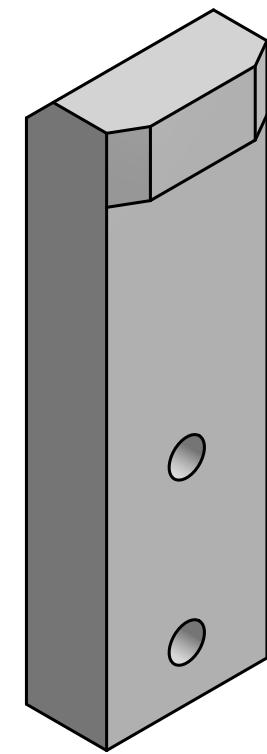
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| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.0- XXX = ±.00- ANGULAR = ± ° XXXX = ±.000- FRACTIONAL = ± | | DRAWN | NAME | DATE |
| SURFACE FINISH | ✓ | CHECKED | | |
| DO NOT SCALE DRAWING | | APPROVED | | |
| BREAK ALL SHARP EDGES AND REMOVE BURRS | | | | |
| THIRD ANGLE PROJECTION | | MATERIAL | VOLUME | |
| | | STEEL 4130 | 43709 mm ³ | REV. |
| | | SCALE | 1:1 | WEIGHT |
| | | | | 0.343 kg |
| | | | | 20 of 20 |
| Ferris State University | | | | |
| DRILL UNIT | | | | |
| MAIN ASSEMBLY DETAILS | | | | |
| STOP BAR - FRONT | | | | |
| SIZE | | DWG NO. | BR-549-C-017 | |

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