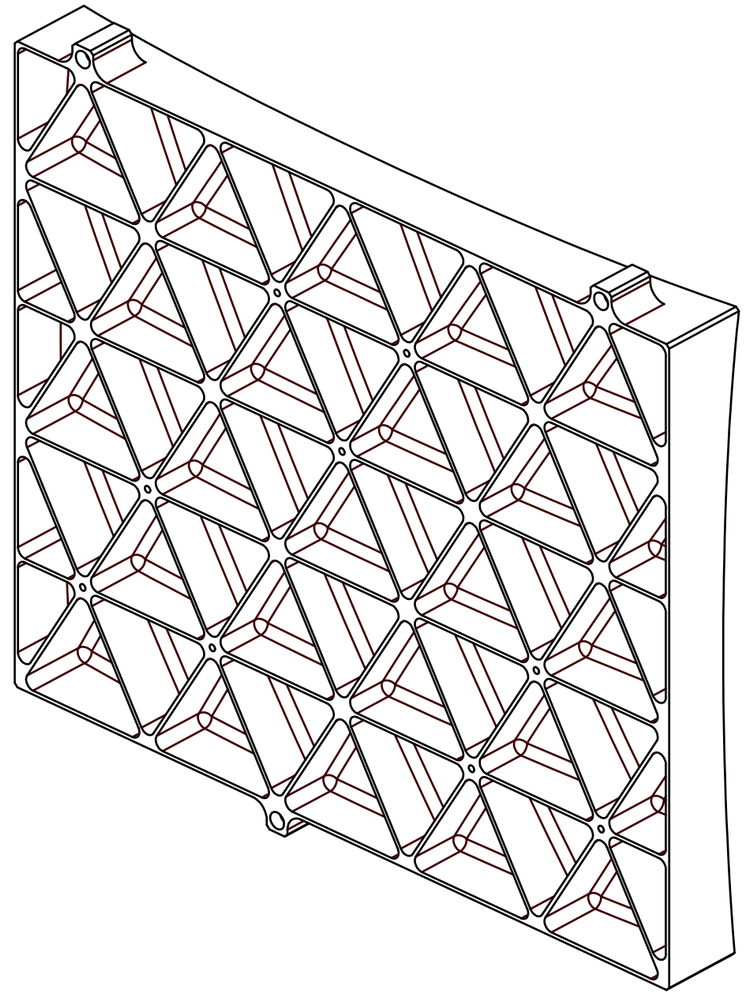
REVISION HISTORY				
REV	DESCRIPTION	DATE	REVISED BY	APPROVED
A	INITIAL RELEASE		A. FERN	N. EMERSON



NOTES:

1) BREAK SHARP EDGES AND DEBURR.

2) ALL MACHINING FILLETS TO BE R.25 MAX UNLESS OTHERWISE SPECIFIED.

3) ALL MACHINED SURFACES TO BE 125 RMS OR BETTER, WITH EXCEPTION OF REFLECTING SURFACE INDICATED BY NOTE 6.

4) 3D MODEL WILL BE PROVIDED AND USED TO MANUFACTURE THIS PART.

5) DRAWING PROVIDES BASIC ENVELOPE DIMENSIONS AND KEY FEATURE CONTROL TOLERANCE CALLOUTS ONLY.

6) ROUGHNESS AND ACCURACY OF INDICATED SURFACE DEFINED IN ATTACHED MIRROR SPEC DOCUMENT. FREEFORM SHAPE DEFINED BY STEP MODEL.

7) MEASUREMENT OF REFLECTING SURFACE TO BE PERFORMED WITH MIRROR SIMPLY SUPPORTED AT THREE LOCATIONS AS INDICATED ON THE REAR SURFACE, USING TOOLING BALL OR SIMILAR TO AVOID UNINTENTIONAL BENDING OF MIRROR DURING MEASUREMENT. ADAPTOR PLATES AT EACH OF THESE THREE LOCATIONS ARE BOLTED TO THE PANEL AT 3 CORRESPONDING BOLTHOLES.

8) THE ADAPTOR PLATES (SUGGESTED PLATE GEOMETRY AS SHOWN) SHOULD BE OFFSET FROM THE BACK OF THE PANEL TO LIMIT THE CONTACT ZONE TO THE AREA AROUND EACH THREADED HOLE

9) SUPPORT OF THE PANEL DURING MACHINING CAN BE EITHER USING THE MEASUREMENT ADAPTOR PLATES, OR BY OTHER APPROPRIATE MEANS AT THE DISCRETION OF THE FABRICATOR.

10) SHEET 6 DEFINES THE OPTICAL CENTER AND COORDINATE SYSTEM ORIENTATION OF THE MIRROR. THIS POSITION AND ORIENTATION TO BE USED FOR CMM MEASUREMENT. Z POSITION OF OPTICAL CENTER IS IN THE PLANE OF THE THREE REFERENCE TABS.

11) TYPICAL (MINIMUM) MACHINING RADIUS SHOWN. A LARGER MACHINING RADIUS BETWEEN RIBS (UP TO 0.375in) IS ACCEPTABLE TO SIMPLIFY MACHINABILITY. STEP MODEL OF MIRROR CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

12) TYPICAL RADIUS SHOWN. RADIUS CAN BE ALTERED TO SIMPLIFY MACHINABILITY. SHARP CORNERS ARE ACCEPTABLE. STEP MODEL CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

13) LARGER MACHINING STEPS ON CURVED BACK SIDE ARE ACCEPTABLE, WITH STEP HEIGHTS UP TO 0.02in WITH PRIOR APPROVAL FROM UA.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

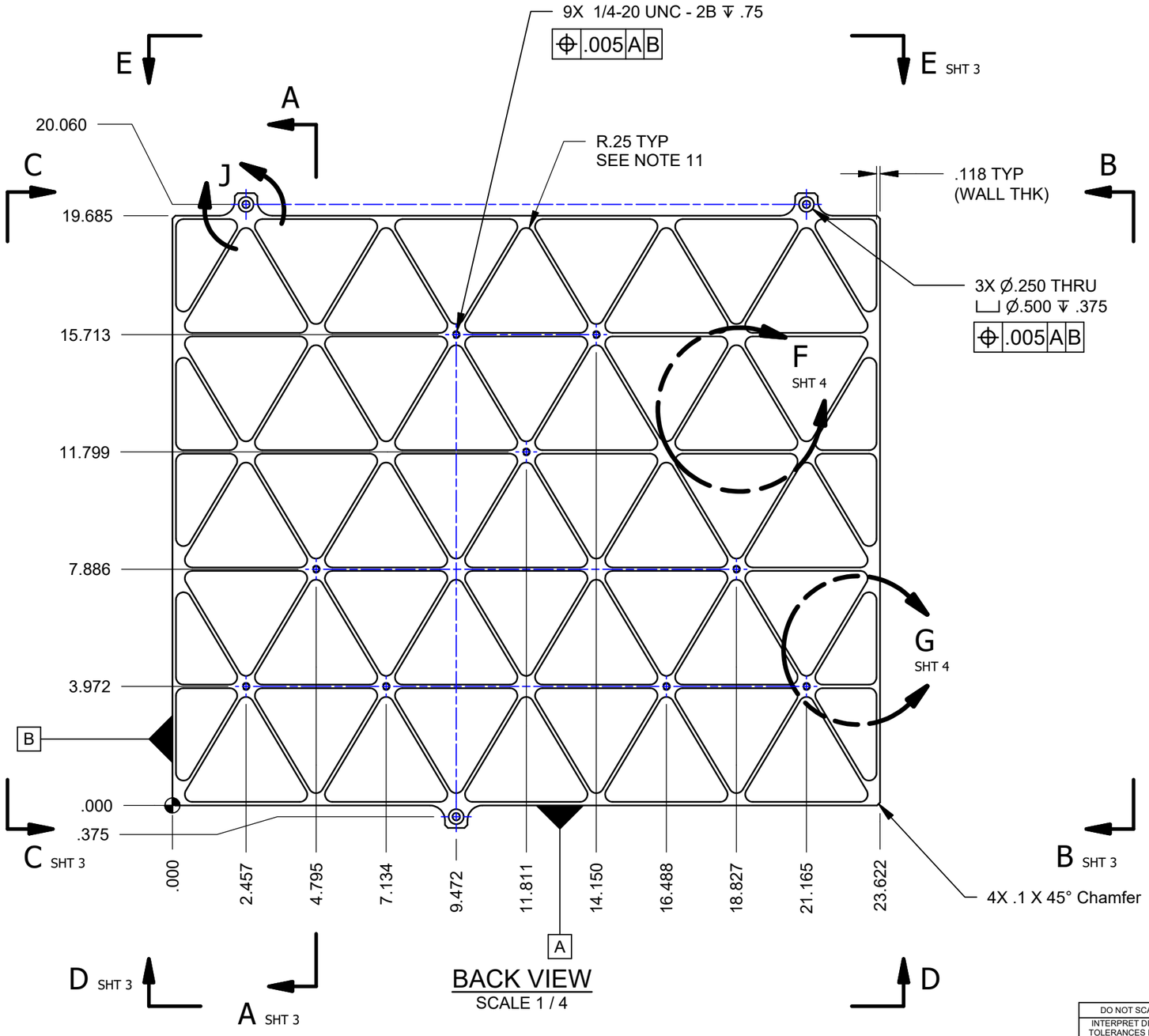
NEXT ASSY	USED ON
	TIME

ASSEMBLY APPLICATION

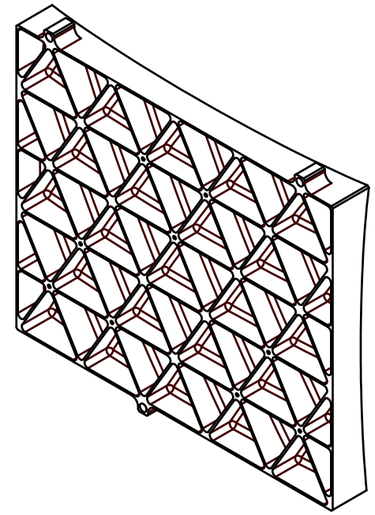
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26624
APPROVED:	DATE:	SHEET 1 OF 6

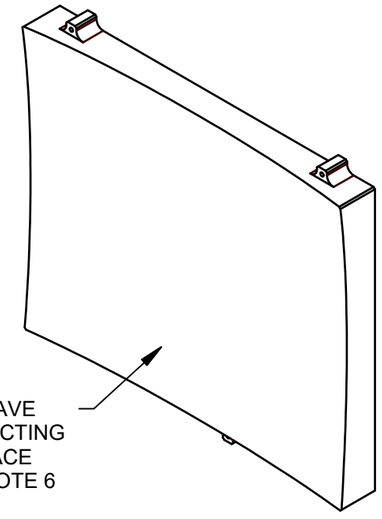
REVISION: A



BACK VIEW
SCALE 1 / 4



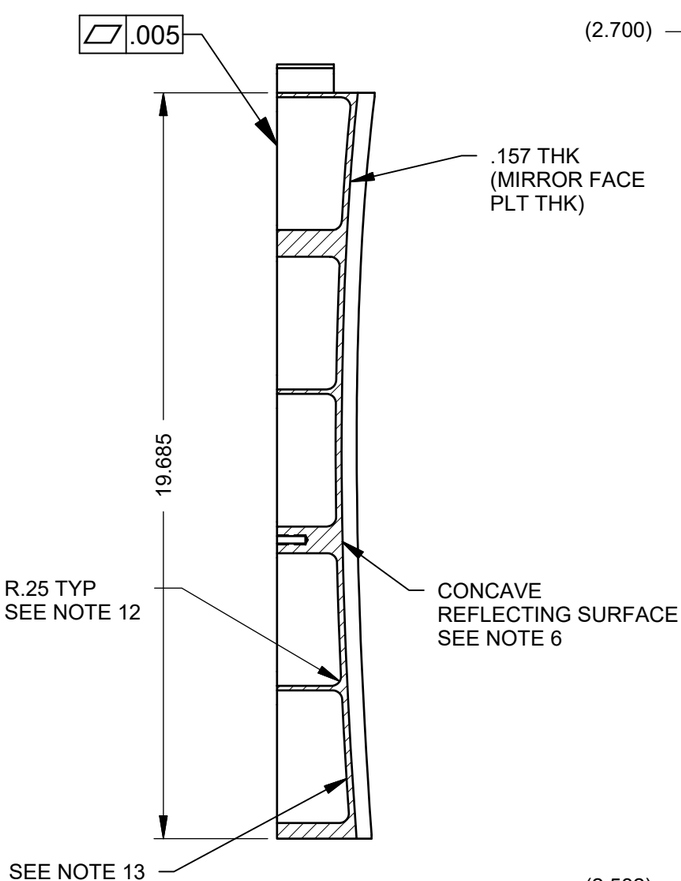
ISO VIEW - BACK
SCALE 1 / 8



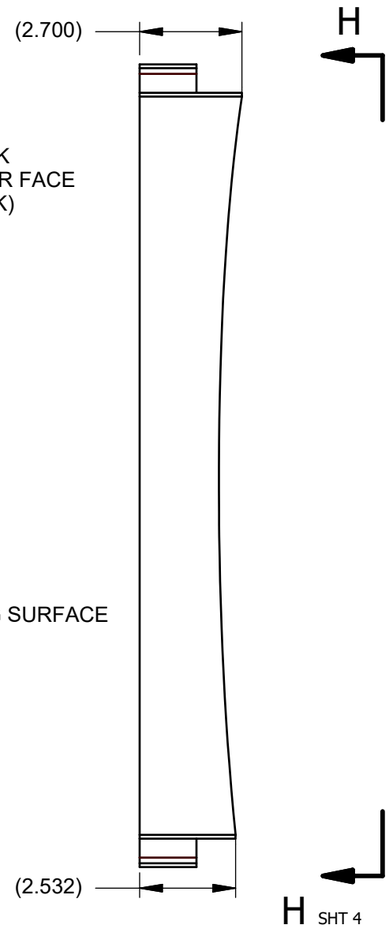
ISO VIEW - FRONT
SCALE 1 / 8

DO NOT SCALE DRAWING INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	THIS DRAWING CREATED IN: ACAD ☐ MECH ☐ IDEAS ☐ INV ■	Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659	
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON	DATE: 5/30/2018
		DESIGNED BY: N. EMERSON	DATE: 5/30/2018
		DRAWN BY: A. FERN	DATE: 5/30/2018
		CHECKED BY: A. FERN	DATE: 5/30/2018
		APPROVED: N. EMERSON	DATE: 5/30/2018
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME	APPROVED:	DATE:
	NEXT ASSY / USED ON	APPROVED:	DATE:
FINISH:	ASSEMBLY APPLICATION	APPROVED:	DATE:

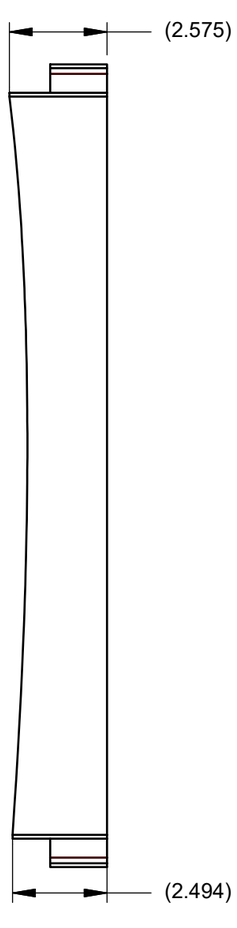
CATEGORY:
PROJECT: TIME
TITLE: MIRROR P1
DRAWING NUMBER: 26624
SHEET 2 OF 6
REVISION: A



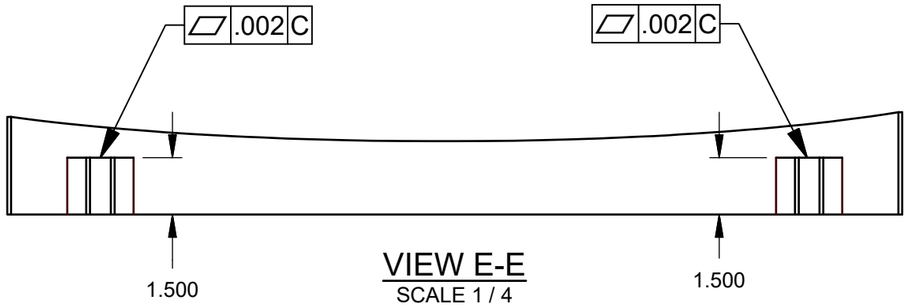
SECTION A-A
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



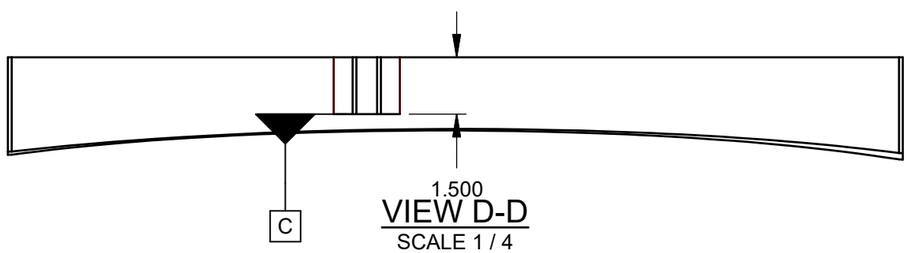
VIEW B-B
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW C-C
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW E-E
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW D-D
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)

NOTE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND CAN NOT BE DISCLOSED WITHOUT THE WRITTEN CONSENT OF STEWARD OBSERVATORY.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:

THIS DRAWING CREATED IN:

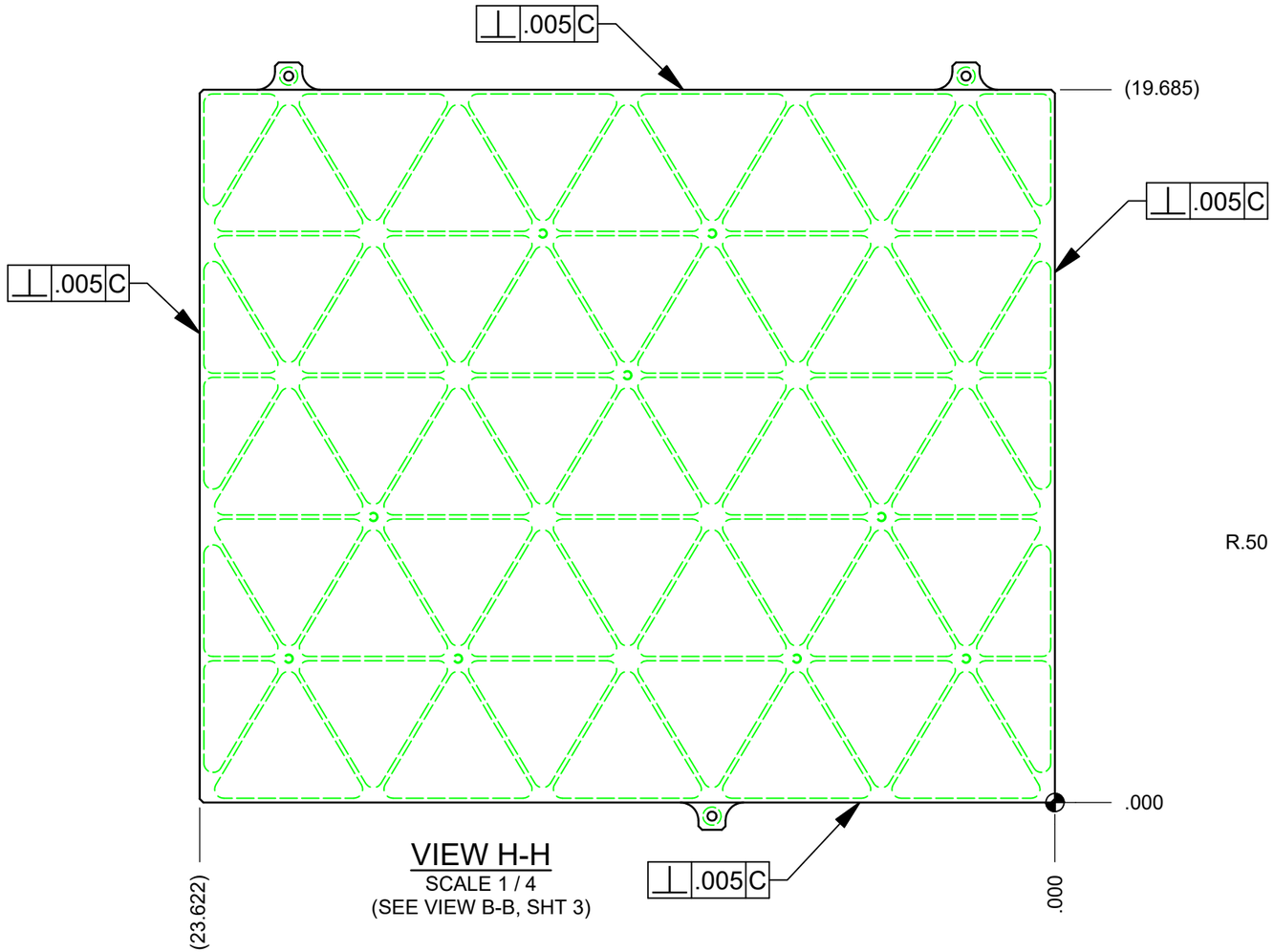
ACAD	MECH	IDEAS	INV
☐	☐	☐	■

	TIME
NEXT ASSY	USED ON
ASSEMBLY APPLICATION	

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

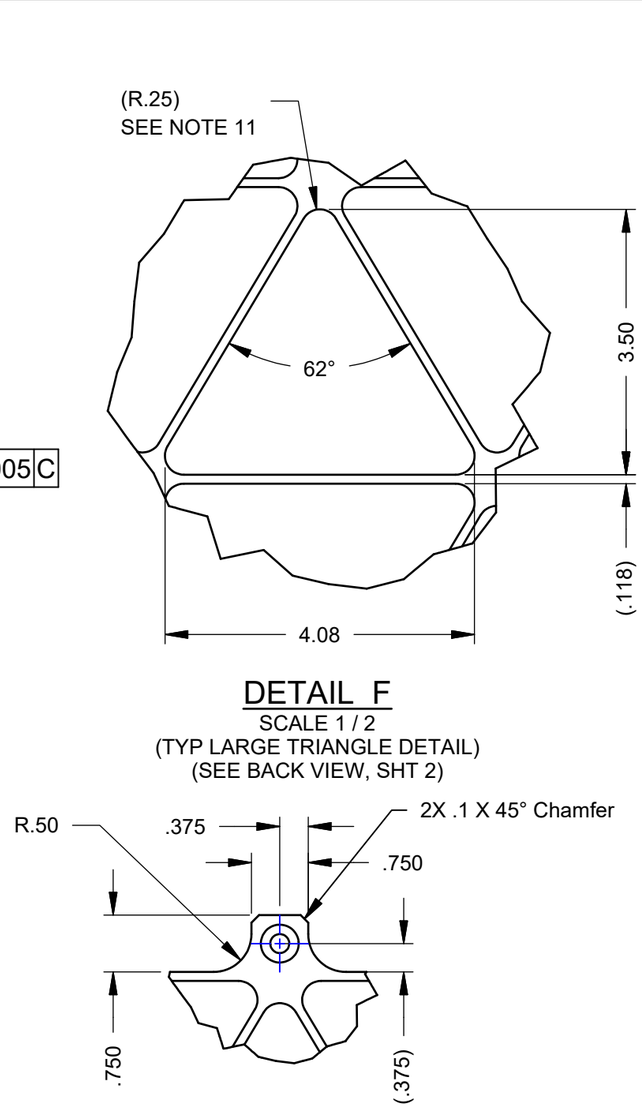
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	
APPROVED:	DATE:	

DRAWING NUMBER: 26624
SHEET 3 OF 6
REVISION: A

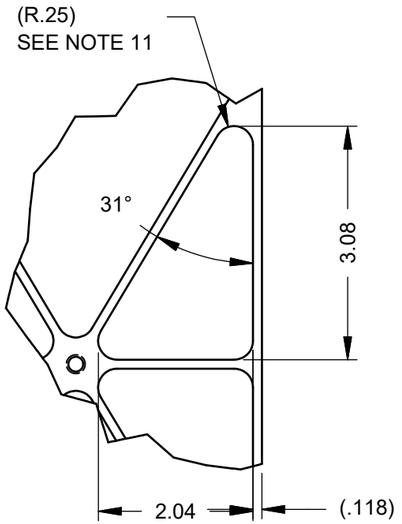


VIEW H-H
SCALE 1 / 4
(SEE VIEW B-B, SHT 3)

DETAIL F
SCALE 1 / 2
(TYP LARGE TRIANGLE DETAIL)
(SEE BACK VIEW, SHT 2)

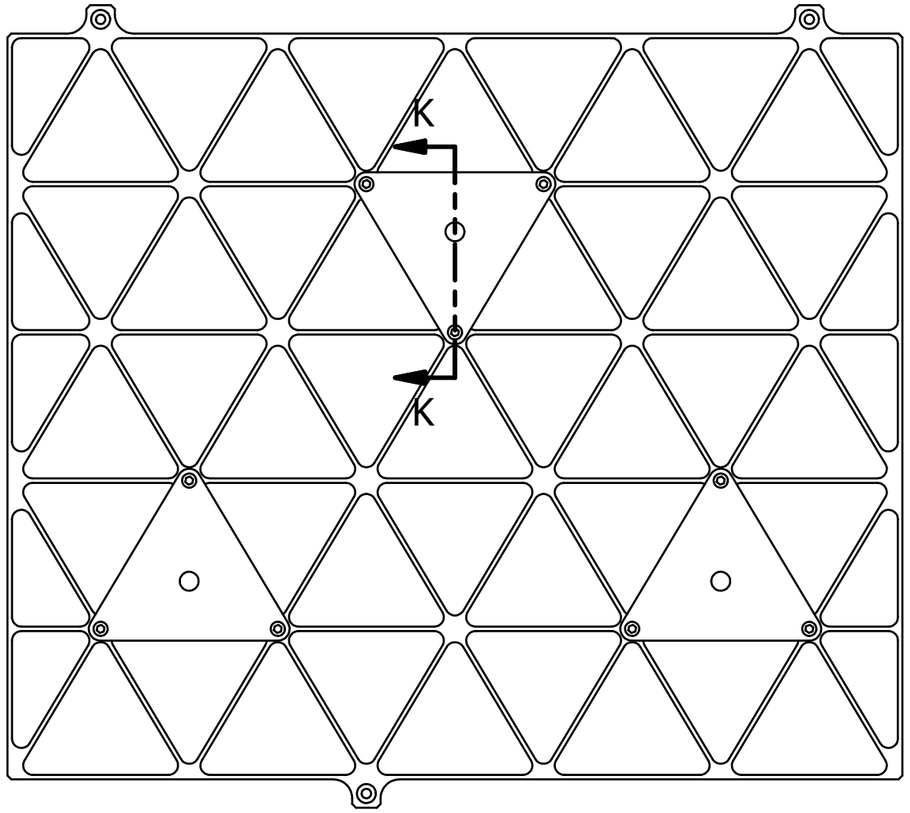


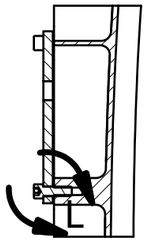
DETAIL J
SCALE 1 / 2
(TYP REFERENCE TAB)
(SEE BACK VIEW, SHT 2)



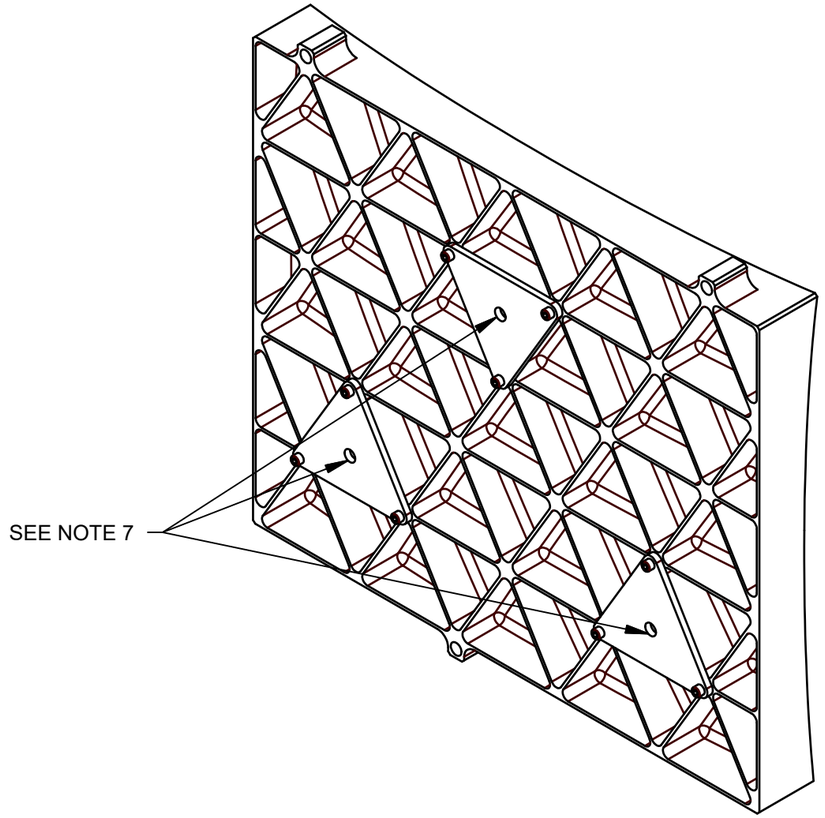
DETAIL G
SCALE 1 / 2
(TYP SMALL TRIANGLE DETAIL)
(SEE BACK VIEW, SHT 2)

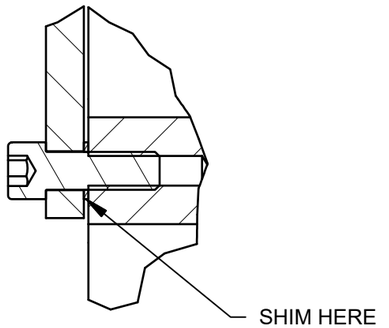
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN: ACAD ☐ MECH ☐ IDEAS ☐ INV ■	Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94		ENGINEER: N. EMERSON — DATE: 5/30/2018 — CATEGORY:
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		DESIGNED BY: N. EMERSON — DATE: 5/30/2018 — PROJECT: TIME DRAWN BY: A. FERN — DATE: 5/30/2018 — TITLE: MIRROR P1 CHECKED BY: A. FERN — DATE: 5/30/2018 APPROVED: N. EMERSON — DATE: 5/30/2018
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME	APPROVED: — DATE:
	NEXT ASSY / USED ON	APPROVED: — DATE: — DRAWING NUMBER: 26624 — SHEET 4 OF 6 — REVISION: A
FINISH:	ASSEMBLY APPLICATION	APPROVED: — DATE:



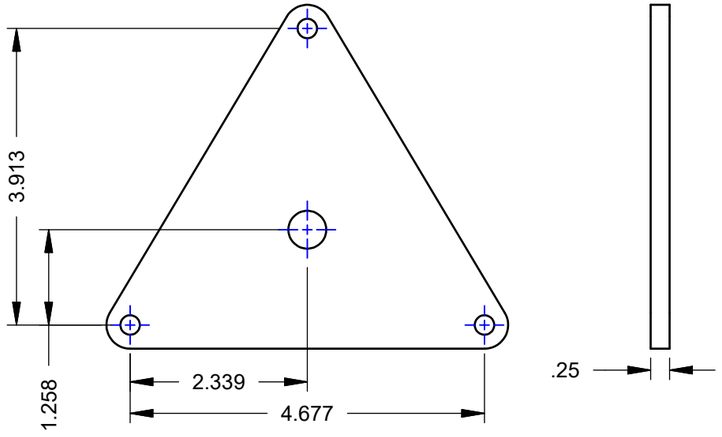


SECTION K-K
SCALE 1/4





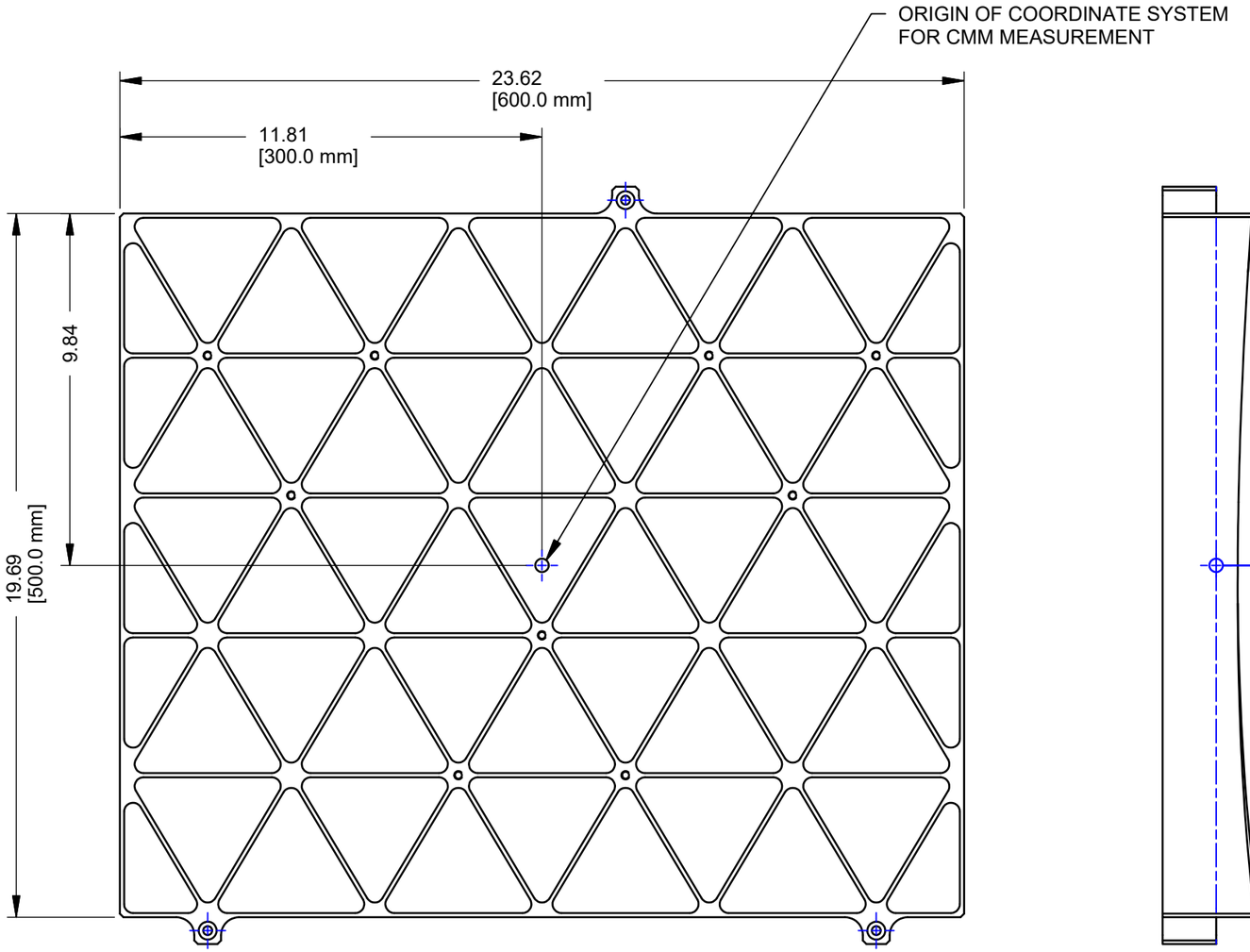
DETAIL L
SCALE 1

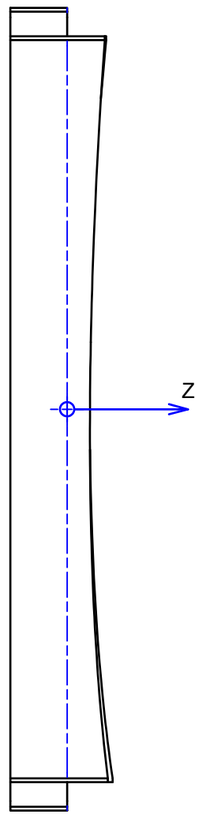


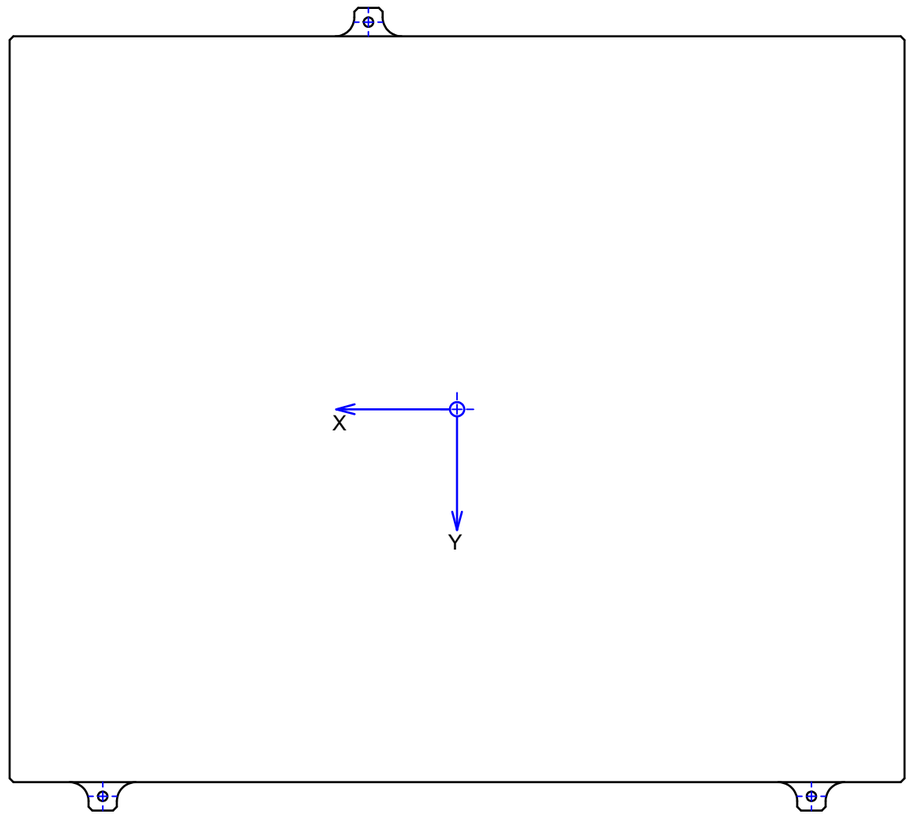
TYPICAL MEASUREMENT ADAPTOR PLATE DIMENSIONS

DO NOT SCALE DRAWING INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	THIS DRAWING CREATED IN: ACAD ☐ MECH ☐ IDEAS ☐ INV ■	Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659	
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON — DATE: 5/30/2018 DESIGNED BY: N. EMERSON — DATE: 5/30/2018 DRAWN BY: A. FERN — DATE: 5/30/2018 CHECKED BY: A. FERN — DATE: 5/30/2018 APPROVED: N. EMERSON — DATE: 5/30/2018 APPROVED: — DATE: APPROVED: — DATE: APPROVED: — DATE:	CATEGORY: PROJECT: TIME TITLE: MIRROR P1
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME NEXT ASSY / USED ON ASSEMBLY APPLICATION		DRAWING NUMBER: 26624 — SHEET 5 OF 6 — REVISION: A
FINISH:			

NOTE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND CAN NOT BE DISCLOSED WITHOUT THE WRITTEN CONSENT OF STEWARD OBSERVATORY.



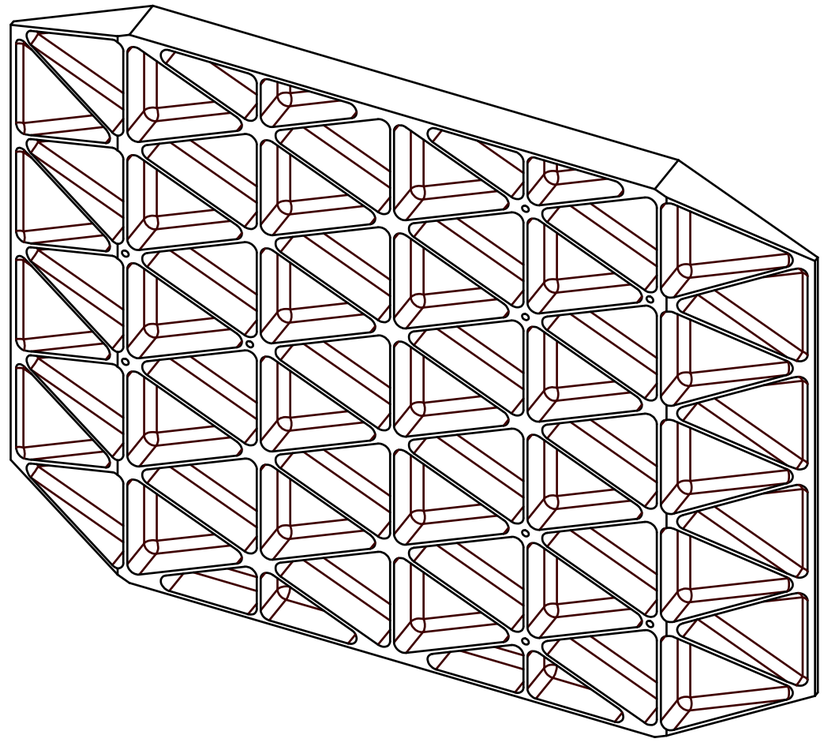




DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH:	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659			
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P1	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26624	SHEET 6 OF 6 / REVISION: A
APPROVED:	DATE:		

REVISION HISTORY				
REV	DESCRIPTION	DATE	REVISED BY	APPROVED
A	INITIAL RELEASE		A. FERN	N. EMERSON



NOTES:

1) BREAK SHARP EDGES AND DEBURR.

2) ALL MACHINING FILLETS TO BE R.25 MAX UNLESS OTHERWISE SPECIFIED.

3) ALL MACHINED SURFACES TO BE 125 RMS OR BETTER, WITH EXCEPTION OF REFLECTING SURFACE INDICATED BY NOTE 6.

4) 3D MODEL WILL BE PROVIDED AND USED TO MANUFACTURE THIS PART.

5) DRAWING PROVIDES BASIC ENVELOPE DIMENSIONS AND KEY FEATURE CONTROL TOLERANCE CALLOUTS ONLY.

6) ROUGHNESS AND ACCURACY OF INDICATED SURFACE DEFINED IN ATTACHED MIRROR SPEC DOCUMENT.

7) MEASUREMENT OF REFLECTING SURFACE TO BE PERFORMED WITH MIRROR SIMPLY SUPPORTED AT THREE LOCATIONS AS INDICATED ON THE REAR SURFACE, USING TOOLING BALL OR SIMILAR TO AVOID UNINTENTIONAL BENDING OF MIRROR DURING MEASUREMENT. ADAPTOR PLATES AT EACH OF THESE THREE LOCATIONS ARE BOLTED TO THE PANEL AT 3 CORRESPONDING BOLTHOLES.

8) THE ADAPTOR PLATES (SUGGESTED PLATE GEOMETRY AS SHOWN) SHOULD BE OFFSET FROM THE BACK OF THE PANEL TO LIMIT THE CONTACT ZONE TO THE AREA AROUND EACH THREADED HOLE

9) SUPPORT OF THE PANEL DURING MACHINING CAN BE EITHER USING THE MEASUREMENT ADAPTOR PLATES, OR BY OTHER APPROPRIATE MEANS AT THE DISCRETION OF THE FABRICATOR.

10) SHEET 6 DEFINES THE OPTICAL CENTER AND COORDINATE SYSTEM ORIENTATION OF THE MIRROR. THIS POSITION AND ORIENTATION TO BE USED FOR CMM MEASUREMENT. Z POSITION OF OPTICAL CENTER IN THE PLANE OF THE REFLECTING SURFACE.

11) TYPICAL (MINIMUM) MACHINING RADIUS SHOWN. A LARGER MACHINING RADIUS BETWEEN RIBS (UP TO 0.375in) IS ACCEPTABLE TO SIMPLIFY MACHINABILITY. STEP MODEL OF MIRROR CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

12) TYPICAL RADIUS SHOWN. RADIUS CAN BE ALTERED TO SIMPLIFY MACHINABILITY. SHARP CORNERS ARE ACCEPTABLE. STEP MODEL CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002

DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

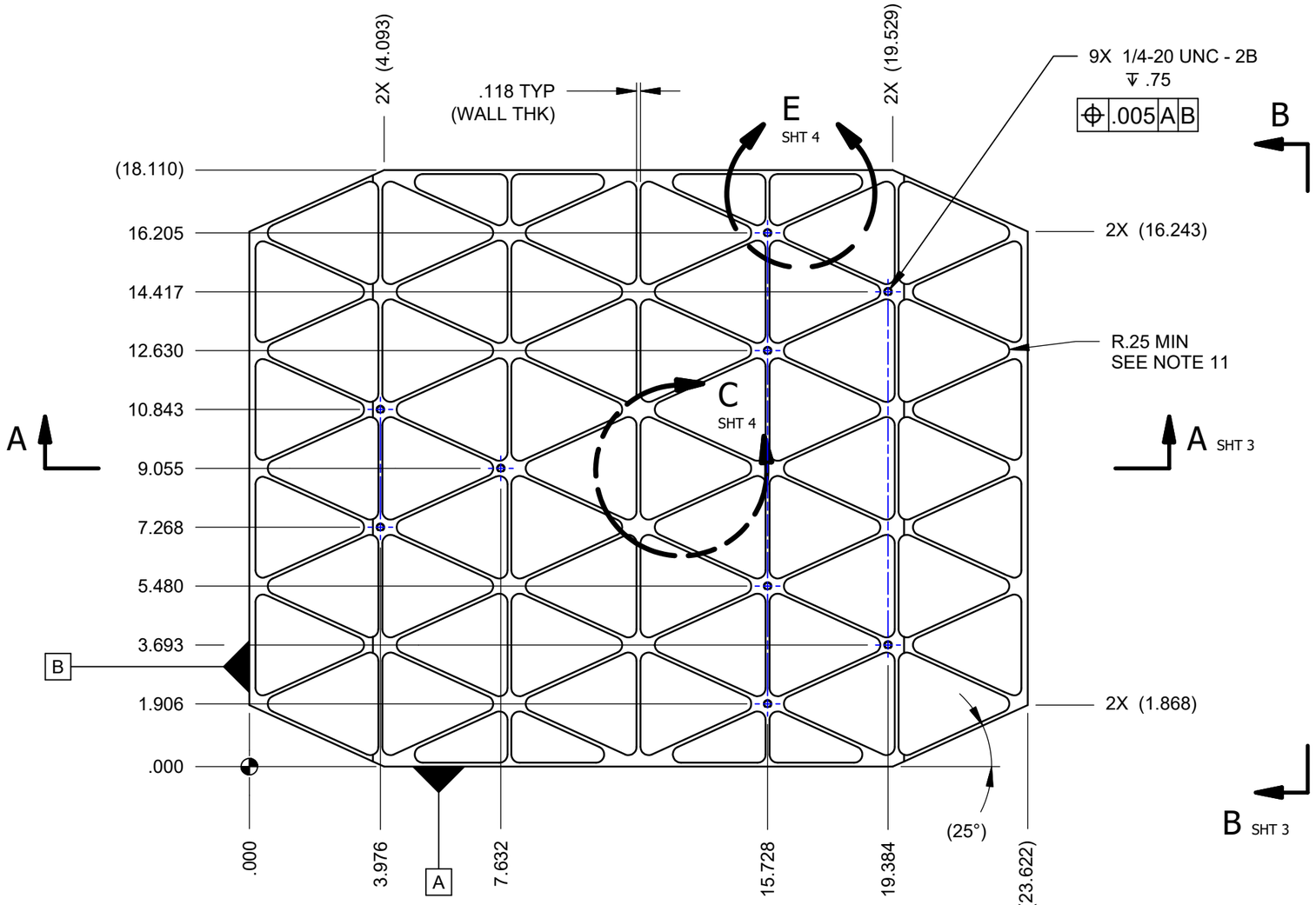
NEXT ASSY	USED ON
	TIME

ASSEMBLY APPLICATION

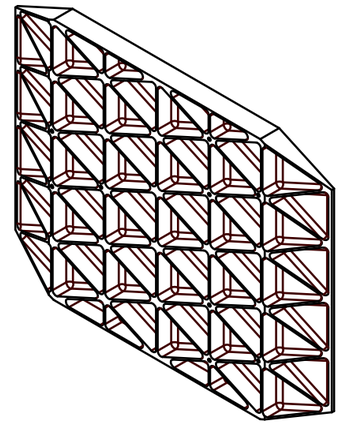
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26630
APPROVED:	DATE:	SHEET 1 OF 6

REVISION: A



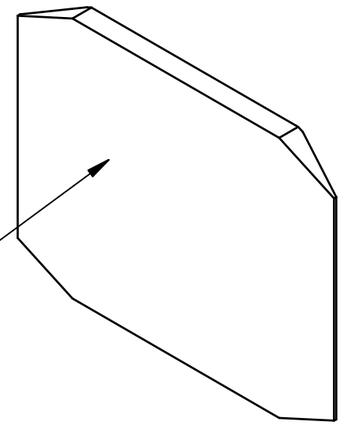
BACK VIEW
SCALE 1 / 4



ISO VIEW - BACK
SCALE 1 / 8

B SHT 3

FLAT
REFLECTING
SURFACE
SEE NOTE 6

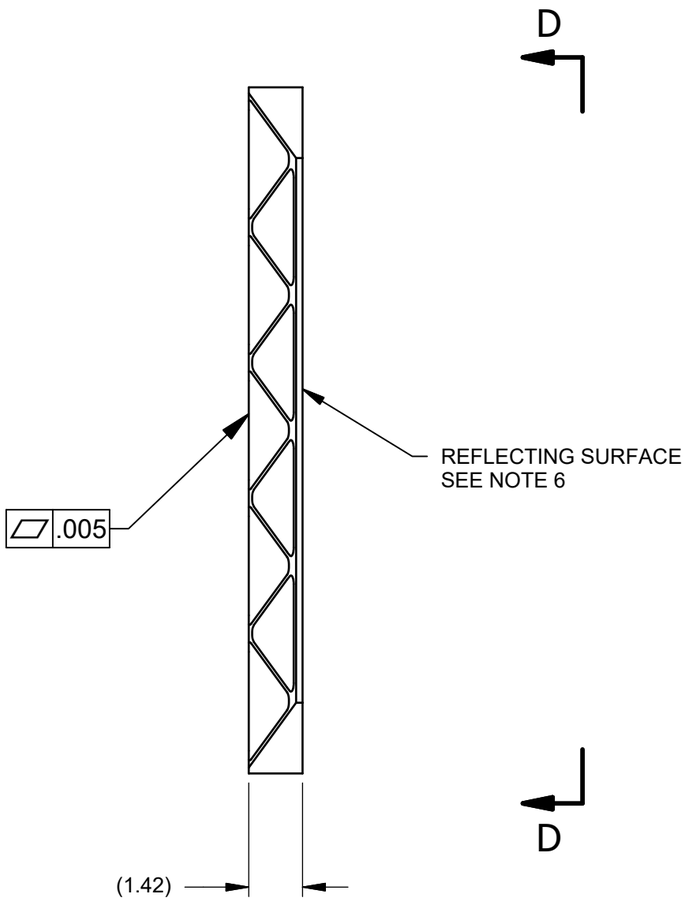


ISO VIEW - FRONT
SCALE 1 / 8

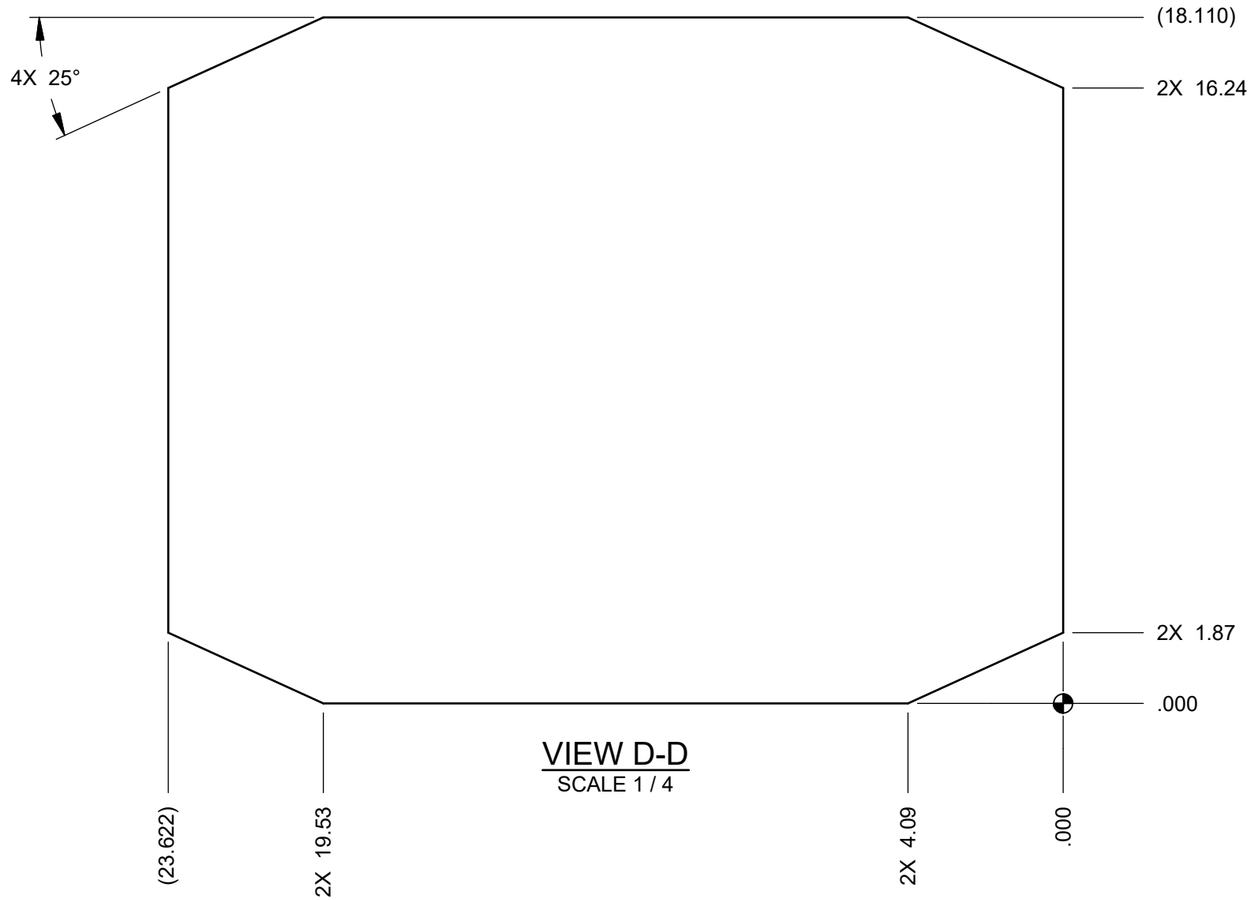
NOTE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND CAN NOT BE DISCLOSED WITHOUT THE WRITTEN CONSENT OF STEWARD OBSERVATORY.

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		Steward Observatory, University of Arizona
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON	DATE: 5/30/2018
		DESIGNED BY: N. EMERSON	DATE: 5/30/2018
		DRAWN BY: A. FERN	DATE: 5/30/2018
		CHECKED BY: A. FERN	DATE: 5/30/2018
		APPROVED: N. EMERSON	DATE: 5/30/2018
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME	APPROVED:	DATE:
	NEXT ASSY / USED ON	APPROVED:	DATE:
FINISH: NONE	ASSEMBLY APPLICATION	APPROVED:	DATE:

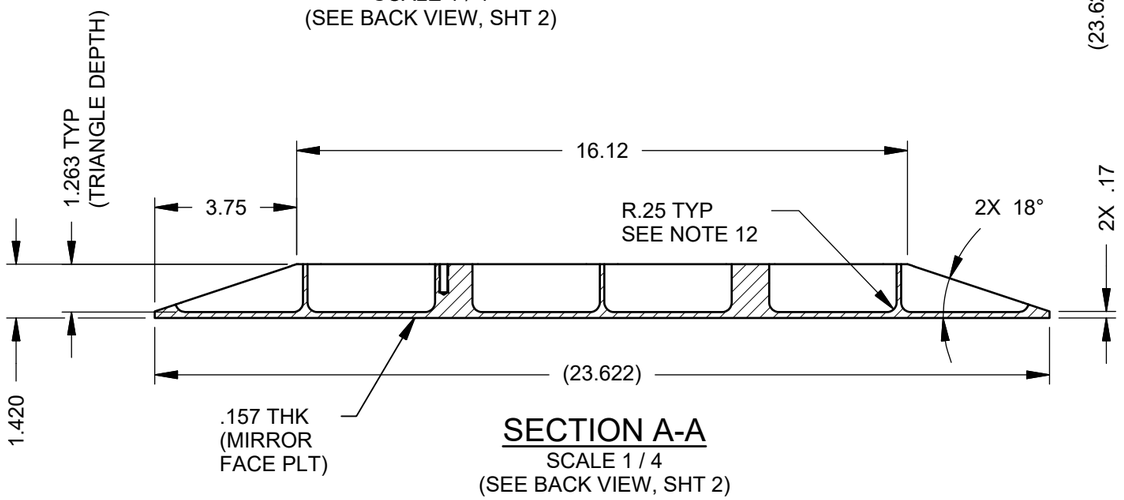
CATEGORY:
PROJECT: TIME
TITLE: MIRROR K1
DRAWING NUMBER: 26630
SHEET 2 OF 6
REVISION: A



VIEW B-B
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW D-D
SCALE 1 / 4



SECTION A-A
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED
LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005
ANGULAR: ± .5°
DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

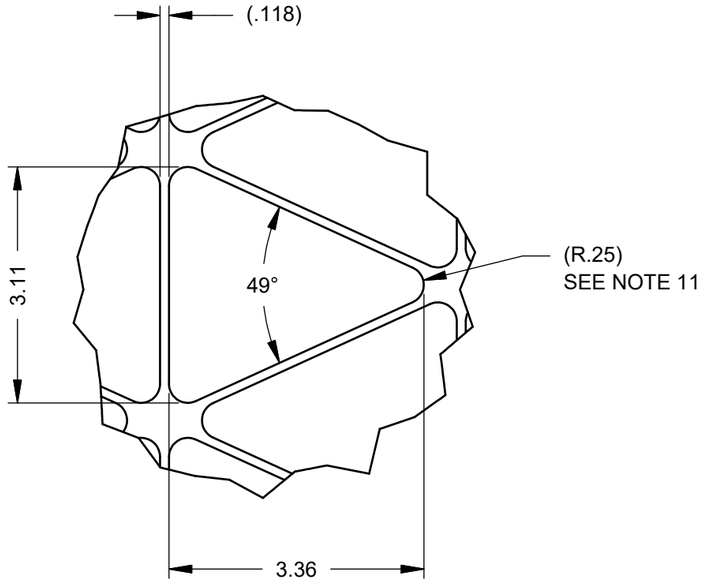
THIS DRAWING CREATED IN:
ACAD ☐ MECH ☐ IDEAS ☐ INV ■

	TIME
NEXT ASSY	USED ON
ASSEMBLY APPLICATION	

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

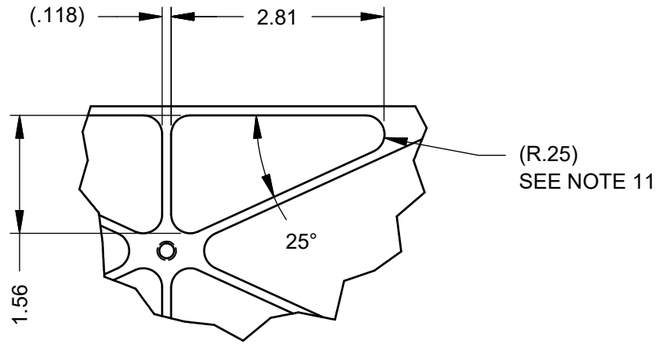
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26630
APPROVED:	DATE:	SHEET 3 OF 6

REVISION: A



DETAIL C

SCALE 1 / 2
(TYP LARGE TRIANGLE DETAIL)
(SEE BACK VIEW, SHT 2)



DETAIL E

SCALE 1 / 2
(TYP SMALL TRIANGLE DETAIL)
(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED
LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005
ANGULAR: ± .5°
DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

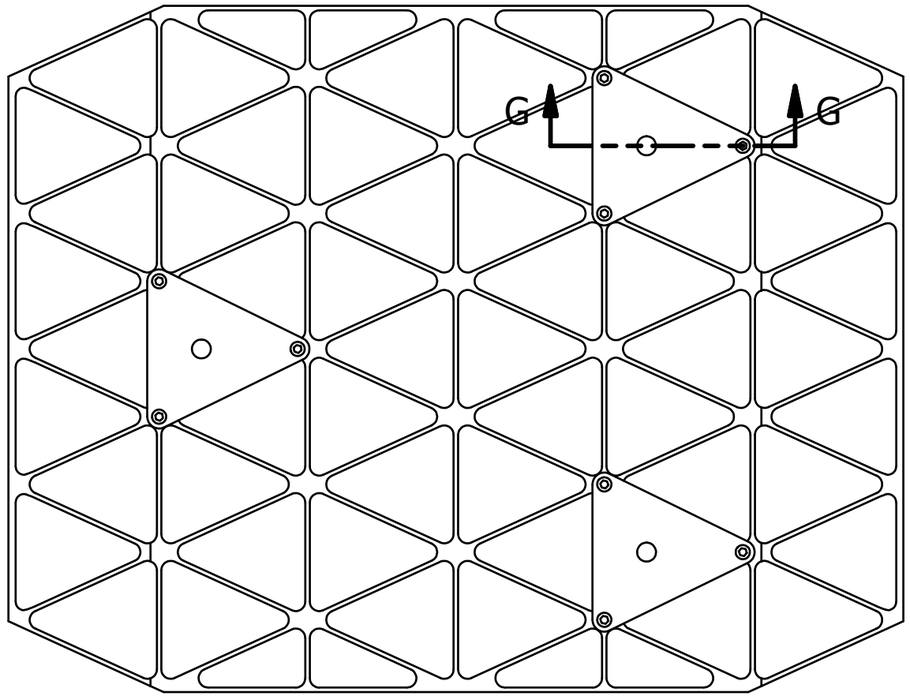
ACAD	MECH	IDEAS	INV
☐	☐	☐	■

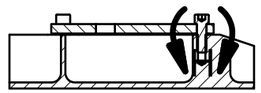
	TIME
NEXT ASSY	USED ON
ASSEMBLY APPLICATION	

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

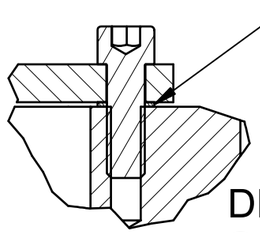
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26630
APPROVED:	DATE:	SHEET 4 OF 6

REVISION: A

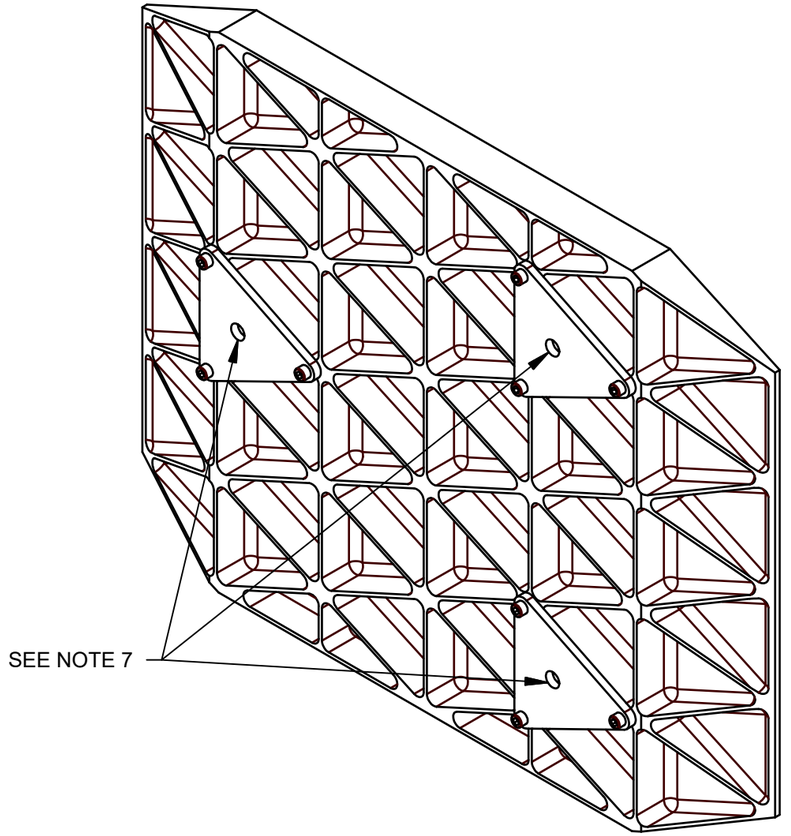


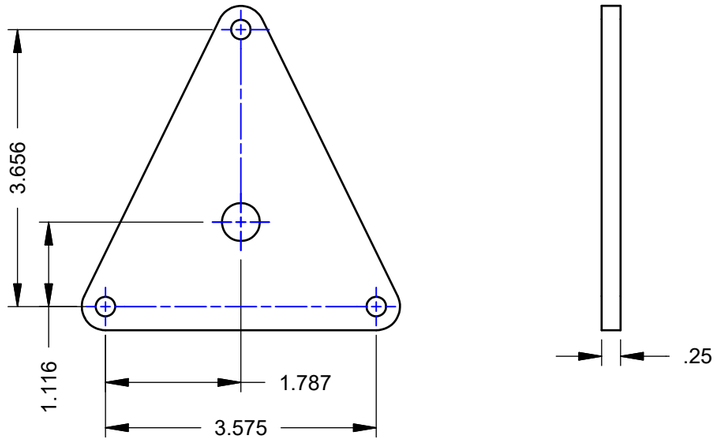


SECTION G-G
SCALE 1/4



DETAIL H
SCALE 1



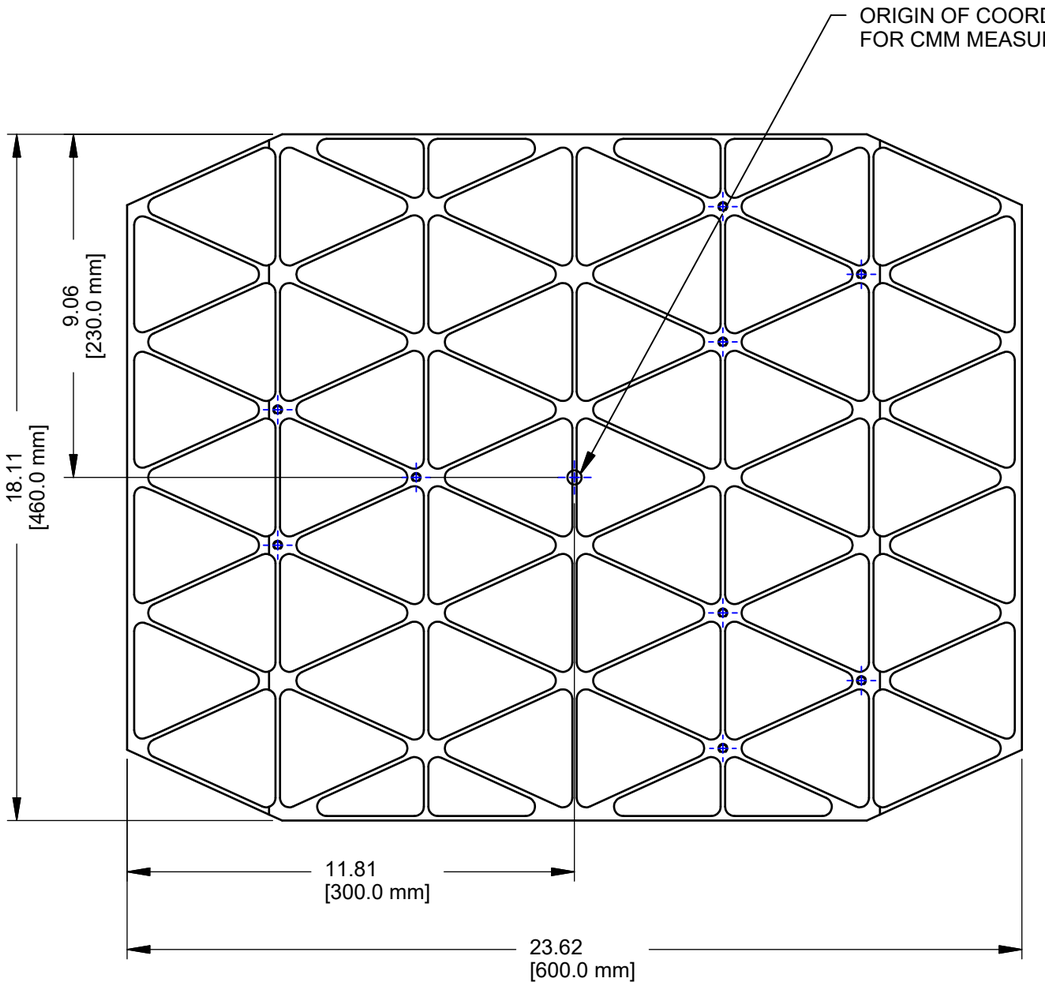


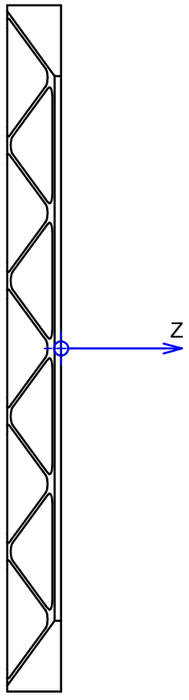
TYPICAL MEASUREMENT ADAPTOR PLATE DIMENSIONS

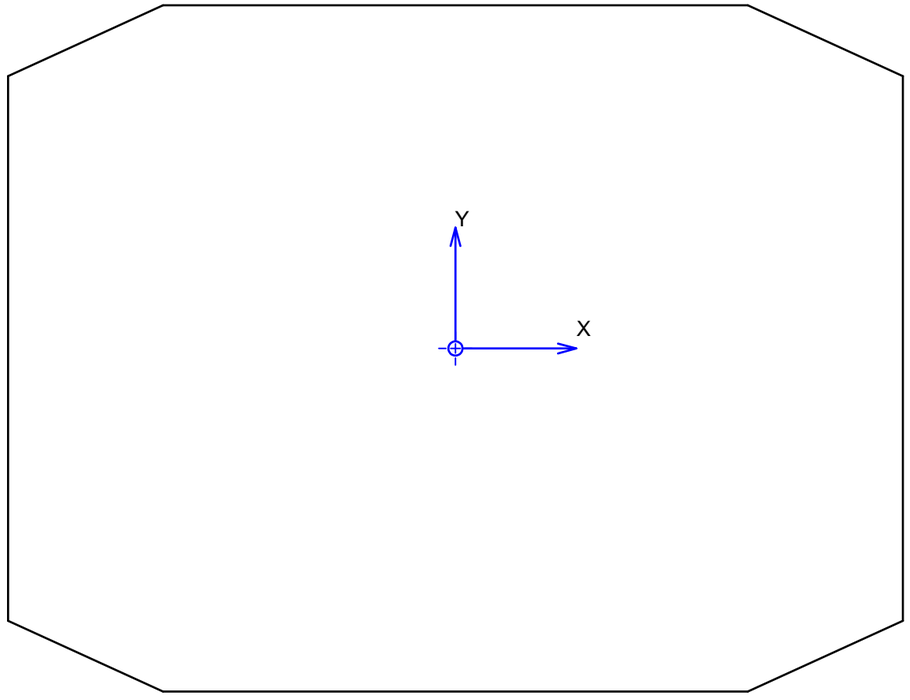
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K1	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26630	SHEET 5 OF 6 / REVISION: A
APPROVED:	DATE:		



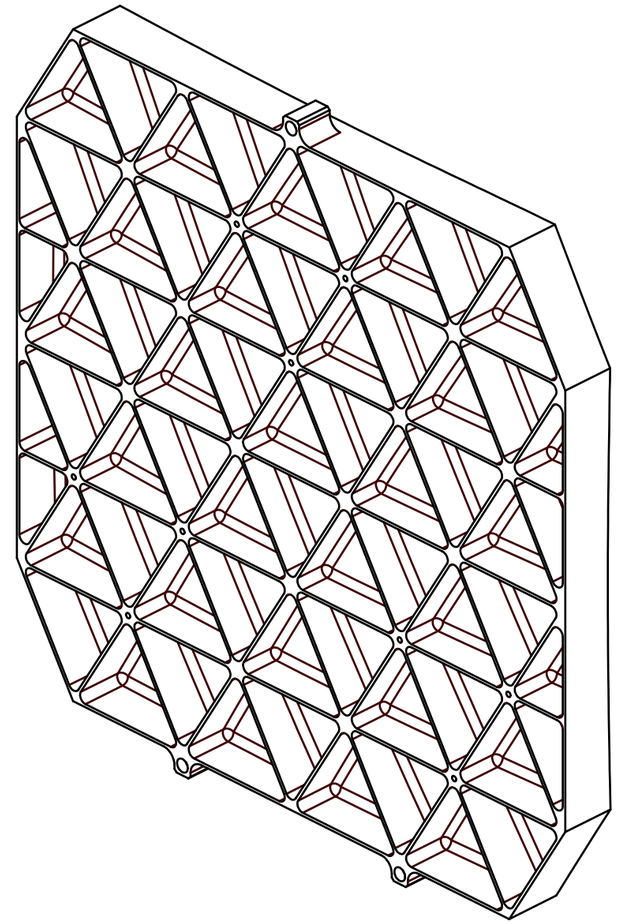




DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659			
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K1	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26630	SHEET 6 OF 6 / REVISION: A
APPROVED:	DATE:		

REVISION HISTORY				
REV	DESCRIPTION	DATE	REVISED BY	APPROVED
A	INITIAL RELEASE		A. FERN	N. EMERSON



NOTES:

1) BREAK SHARP EDGES AND DEBURR.

2) ALL MACHINING FILLETS TO BE R.25 MAX UNLESS OTHERWISE SPECIFIED.

3) ALL MACHINED SURFACES TO BE 125 RMS OR BETTER, WITH EXCEPTION OF REFLECTING SURFACE INDICATED BY NOTE 6.

4) 3D MODEL WILL BE PROVIDED AND USED TO MANUFACTURE THIS PART.

5) DRAWING PROVIDES BASIC ENVELOPE DIMENSIONS AND KEY FEATURE CONTROL TOLERANCE CALLOUTS ONLY.

6) ROUGHNESS AND ACCURACY OF INDICATED SURFACE DEFINED IN ATTACHED MIRROR SPEC DOCUMENT. FREEFORM SHAPE DEFINED BY STEP MODEL.

7) MEASUREMENT OF REFLECTING SURFACE TO BE PERFORMED WITH MIRROR SIMPLY SUPPORTED AT THREE LOCATIONS AS INDICATED ON THE REAR SURFACE, USING TOOLING BALL OR SIMILAR TO AVOID UNINTENTIONAL BENDING OF MIRROR DURING MEASUREMENT. ADAPTOR PLATES AT EACH OF THESE THREE LOCATIONS ARE BOLTED TO THE PANEL AT 3 CORRESPONDING BOLTHOLES.

8) THE ADAPTOR PLATES (SUGGESTED PLATE GEOMETRY AS SHOWN) SHOULD BE OFFSET FROM THE BACK OF THE PANEL TO LIMIT THE CONTACT ZONE TO THE AREA AROUND EACH THREADED HOLE

9) SUPPORT OF THE PANEL DURING MACHINING CAN BE EITHER USING THE MEASUREMENT ADAPTOR PLATES, OR BY OTHER APPROPRIATE MEANS AT THE DISCRETION OF THE FABRICATOR.

10) SHEET 6 DEFINES THE OPTICAL CENTER AND COORDINATE SYSTEM ORIENTATION OF THE MIRROR. THIS POSITION AND ORIENTATION TO BE USED FOR CMM MEASUREMENT. Z POSITION OF OPTICAL CENTER IS IN THE PLANE OF THE THREE REFERENCE TABS.

11) TYPICAL (MINIMUM) MACHINING RADIUS SHOWN. A LARGER MACHINING RADIUS BETWEEN RIBS (UP TO 0.375in) IS ACCEPTABLE TO SIMPLIFY MACHINABILITY. STEP MODEL OF MIRROR CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

12) TYPICAL RADIUS SHOWN. RADIUS CAN BE ALTERED TO SIMPLIFY MACHINABILITY. SHARP CORNERS ARE ACCEPTABLE. STEP MODEL CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

13) LARGER MACHINING STEPS ON CURVED BACK SIDE ARE ACCEPTABLE, WITH STEP HEIGHTS UP TO 0.02in WITH PRIOR APPROVAL FROM UA.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

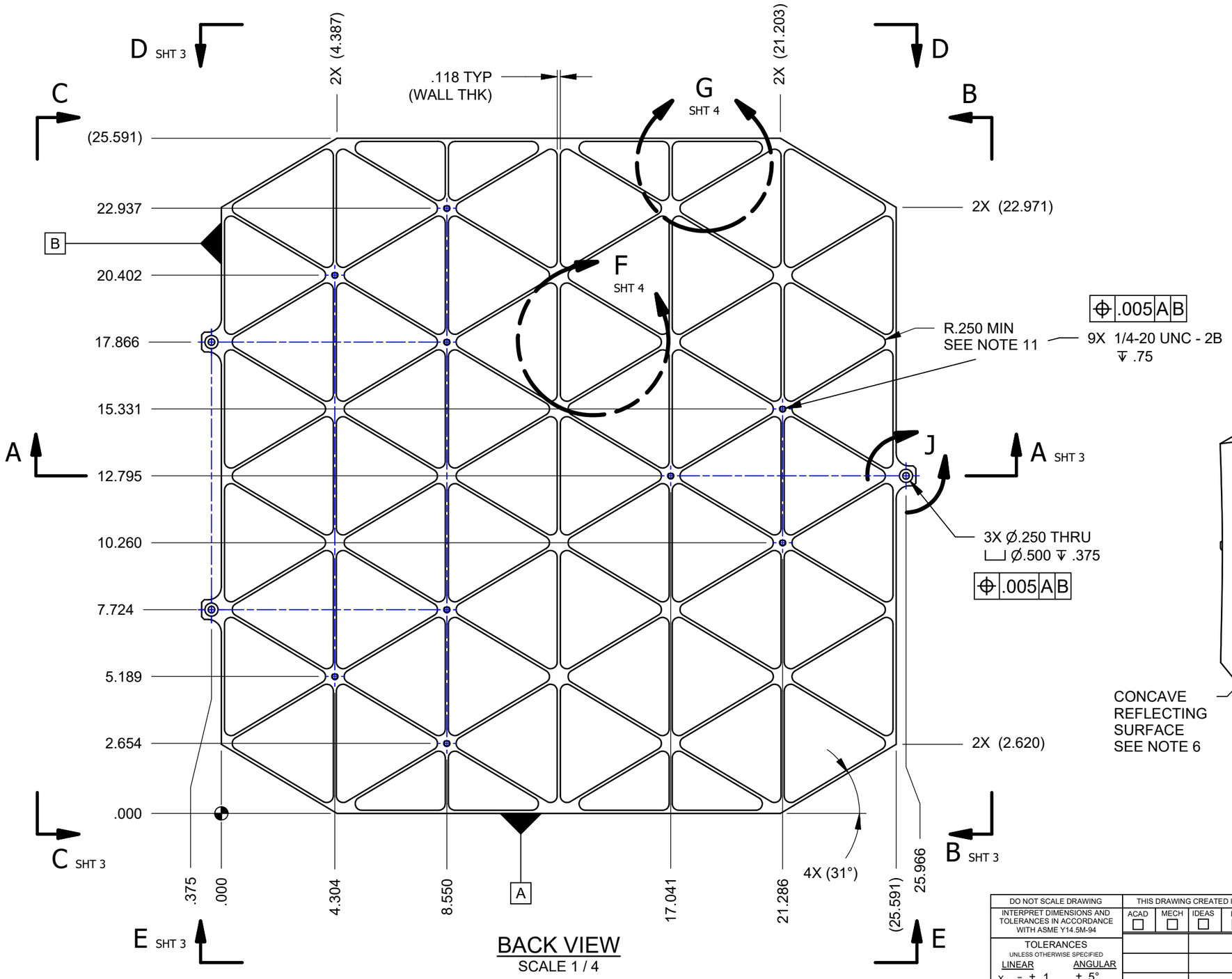
	TIME
NEXT ASSY	USED ON

ASSEMBLY APPLICATION

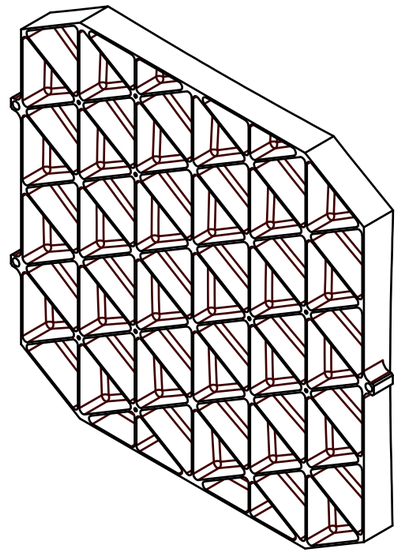
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K2
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26631
APPROVED:	DATE:	SHEET 1 OF 6

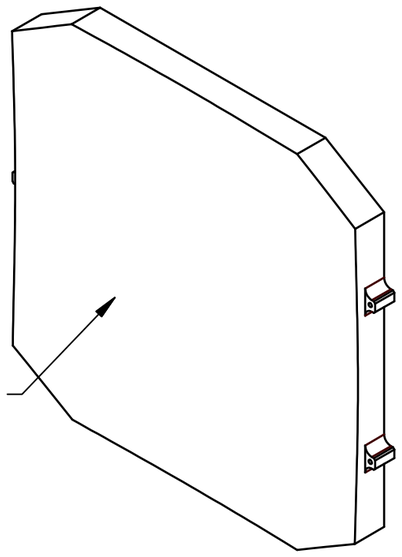
REVISION: A



BACK VIEW
SCALE 1 / 4



ISO VIEW - BACK
SCALE 1 / 8

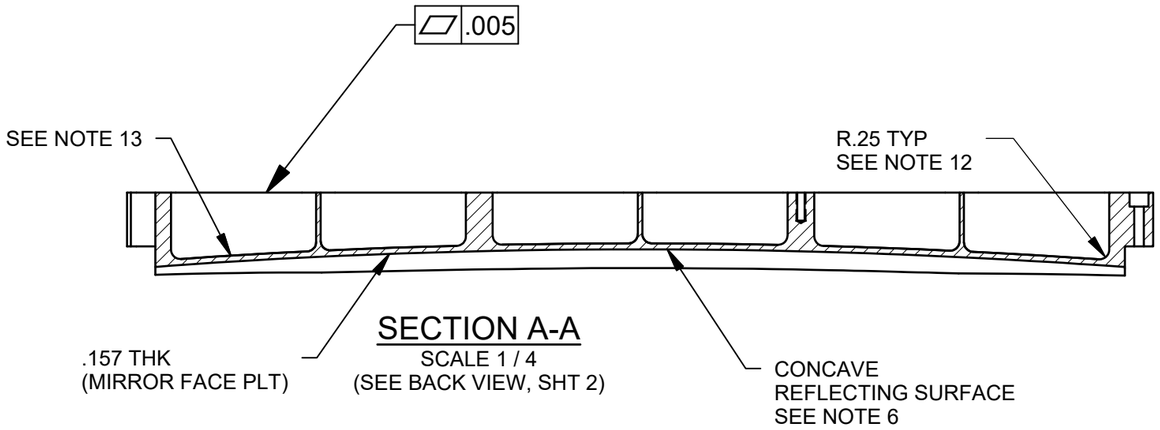


ISO VIEW - FRONT
SCALE 1 / 8

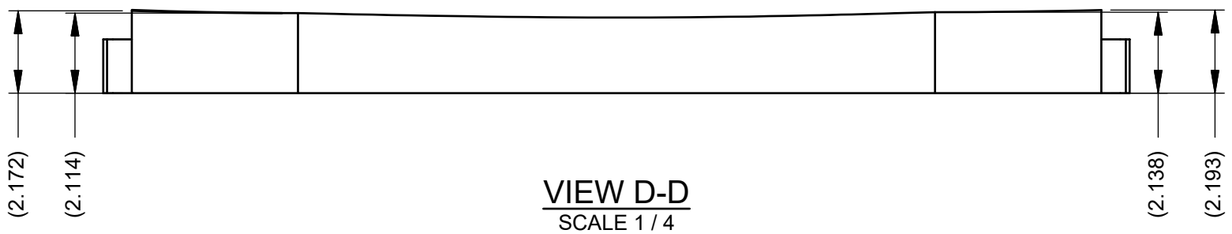
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	NEXT ASSY	USED ON	TIME
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

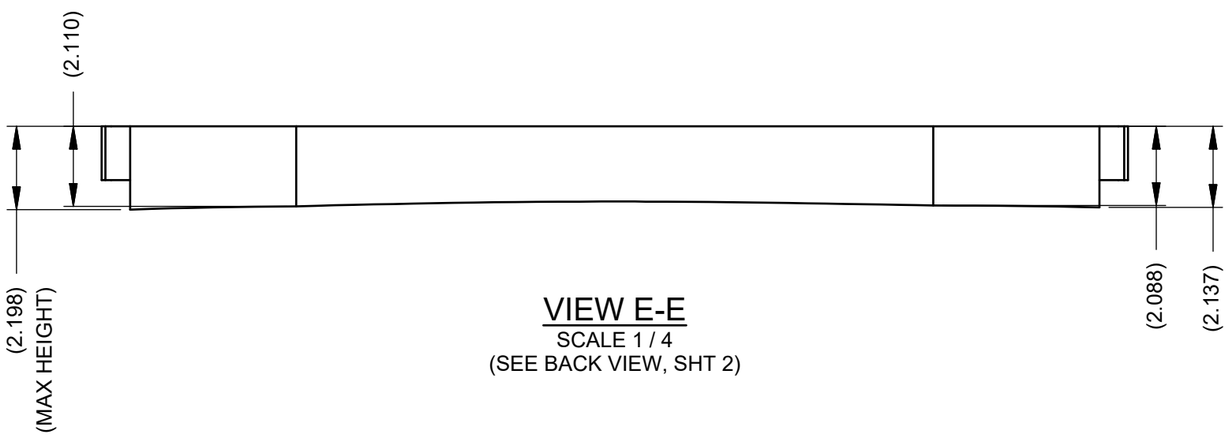
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K2
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26631
APPROVED:	DATE:	SHEET 2 OF 6 / REVISION: A



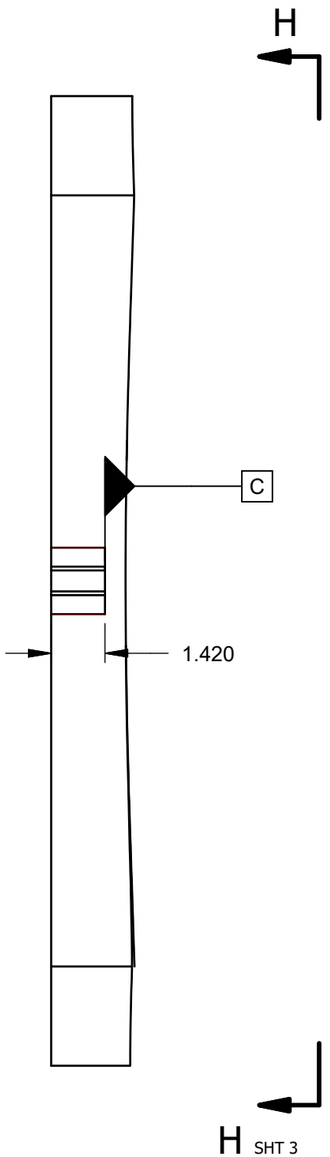
SECTION A-A
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



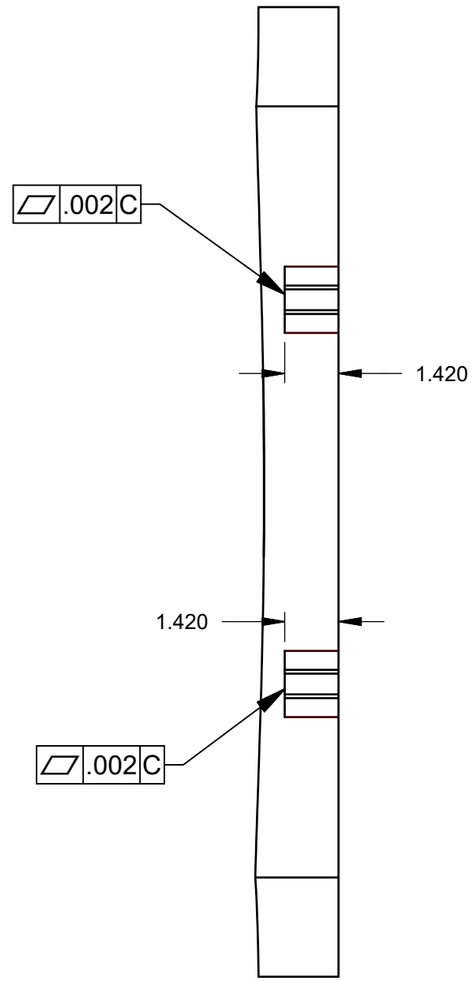
VIEW D-D
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW E-E
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW B-B
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW C-C
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

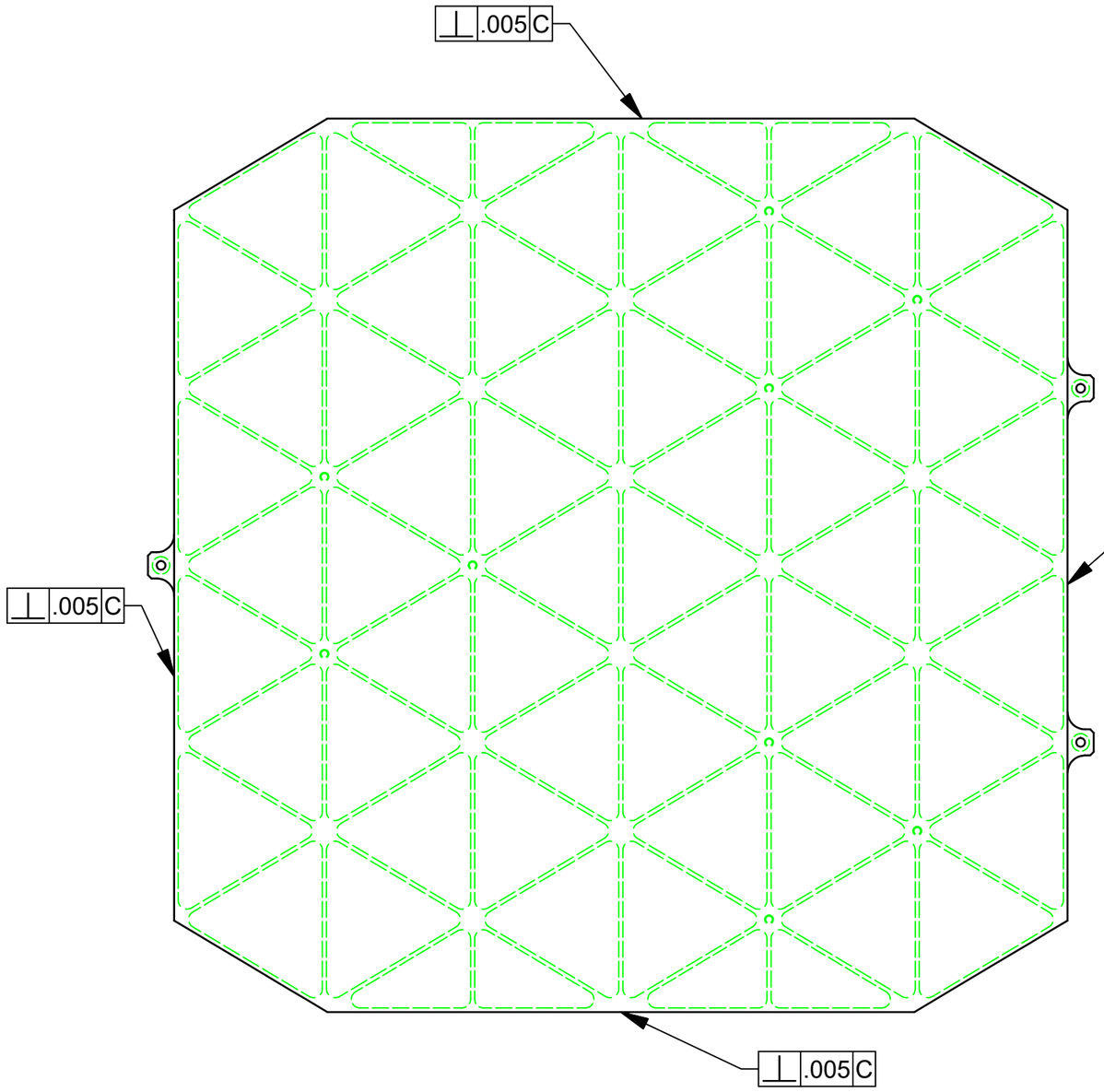
THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

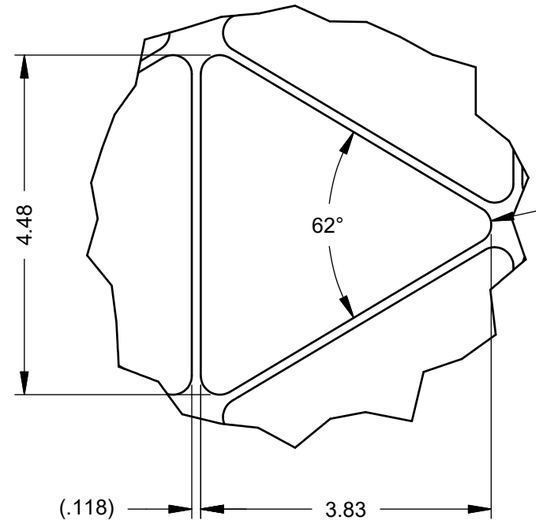
	TIME
NEXT ASSY	USED ON
ASSEMBLY APPLICATION	

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

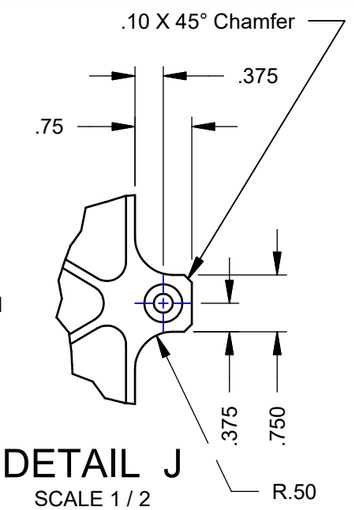
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K2	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26631	SHEET 3 OF 6
APPROVED:	DATE:		REVISION: A



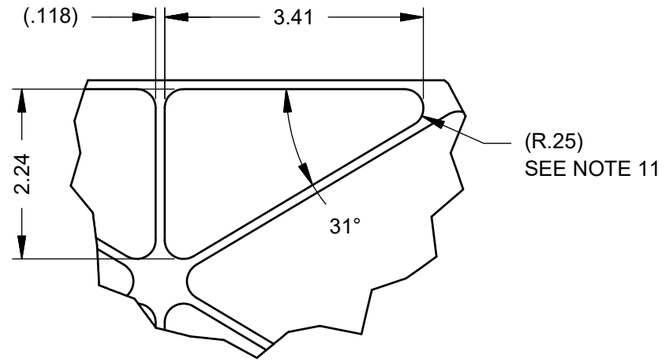
VIEW H-H
SCALE 1 / 4
(SEE VIEW B-B, SHT 3)



DETAIL F
SCALE 1 / 2
(TYP LARGE TRIANGLE DETAIL)
(SEE BACK VIEW, SHT 2)

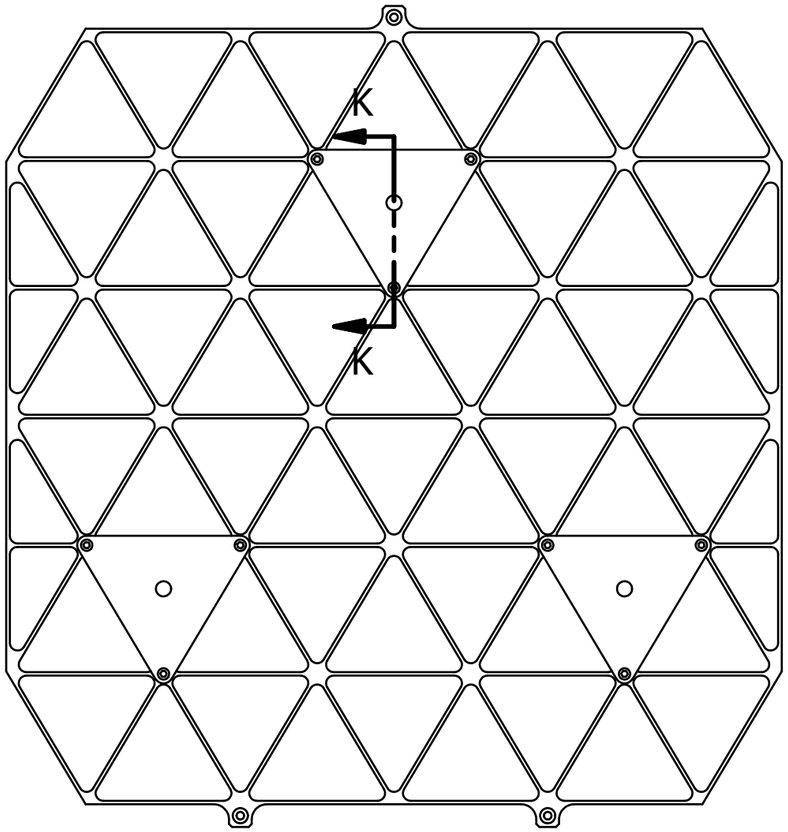


DETAIL J
SCALE 1 / 2
(TYP REFERENCE TAB)
(SEE BACK VIEW, SHT 2)

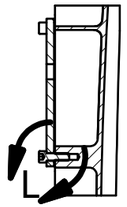


DETAIL G
SCALE 1 / 2
(TYP SMALL TRIANGLE DETAIL)
(SEE BACK VIEW, SHT 2)

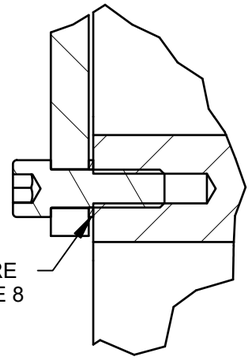
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN: ACAD ☐ MECH ☐ IDEAS ☐ INV ■	Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94		ENGINEER: N. EMERSON — DATE: 5/30/2018 — CATEGORY:
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		DESIGNED BY: N. EMERSON — DATE: 5/30/2018 — PROJECT: TIME
		DRAWN BY: A. FERN — DATE: 5/30/2018 — TITLE: MIRROR K2
		CHECKED BY: A. FERN — DATE: 5/30/2018
		APPROVED: N. EMERSON — DATE: 5/30/2018
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME	APPROVED: — DATE:
	NEXT ASSY / USED ON	APPROVED: — DATE: — DRAWING NUMBER: 26631 — SHEET 4 OF 6 — REVISION: A
FINISH: NONE	ASSEMBLY APPLICATION	APPROVED: — DATE:

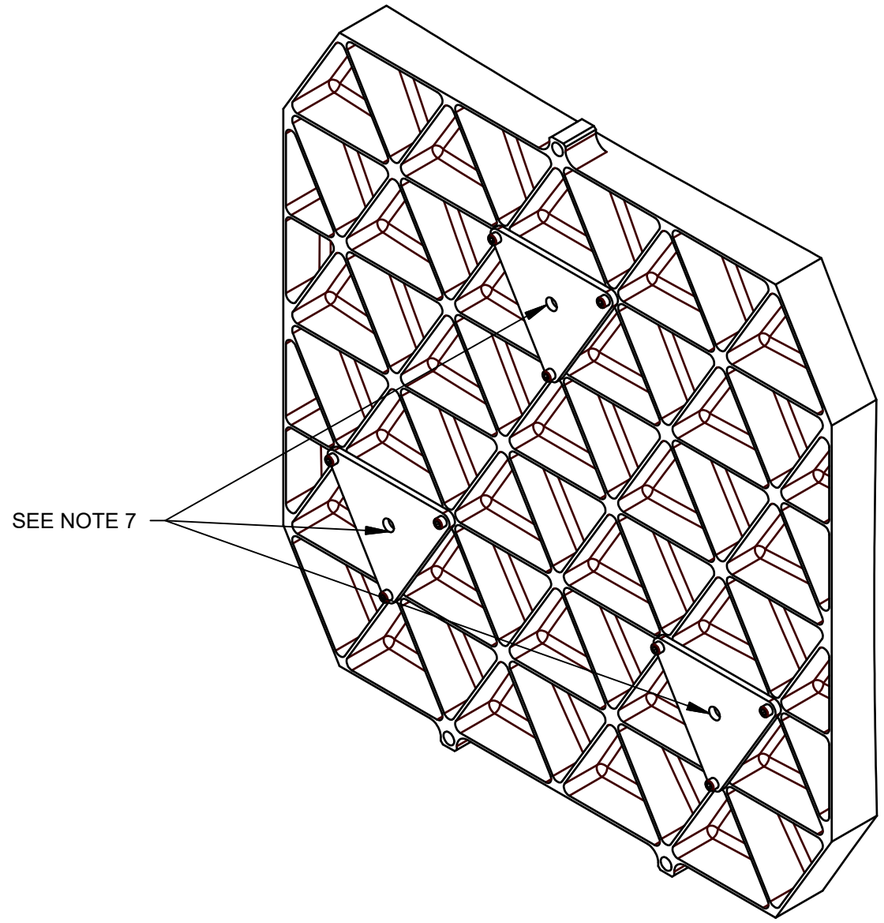


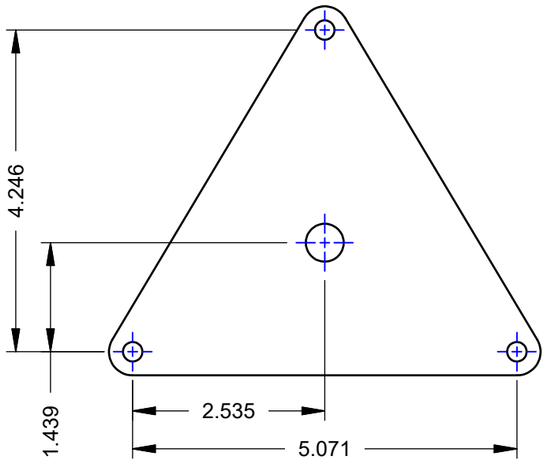
SECTION K-K
SCALE 1/5

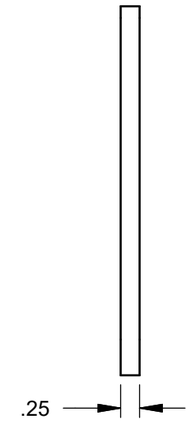


DETAIL L
SCALE 1







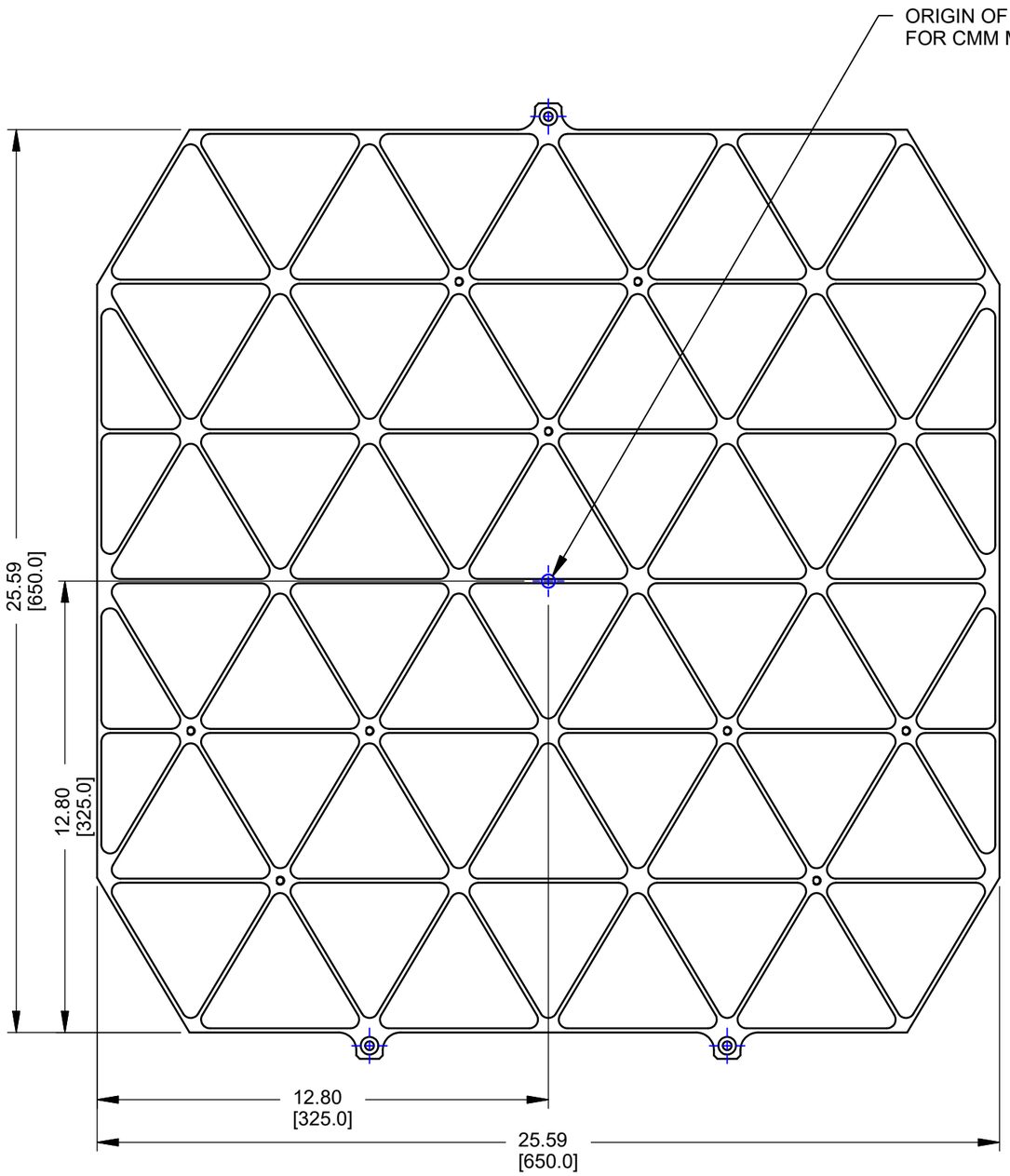


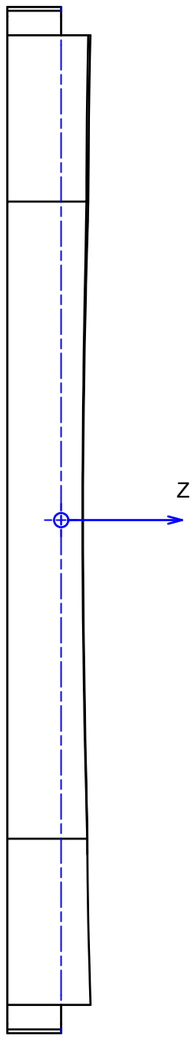
TYPICAL MEASUREMENT ADAPTOR PLATE DIMENSIONS

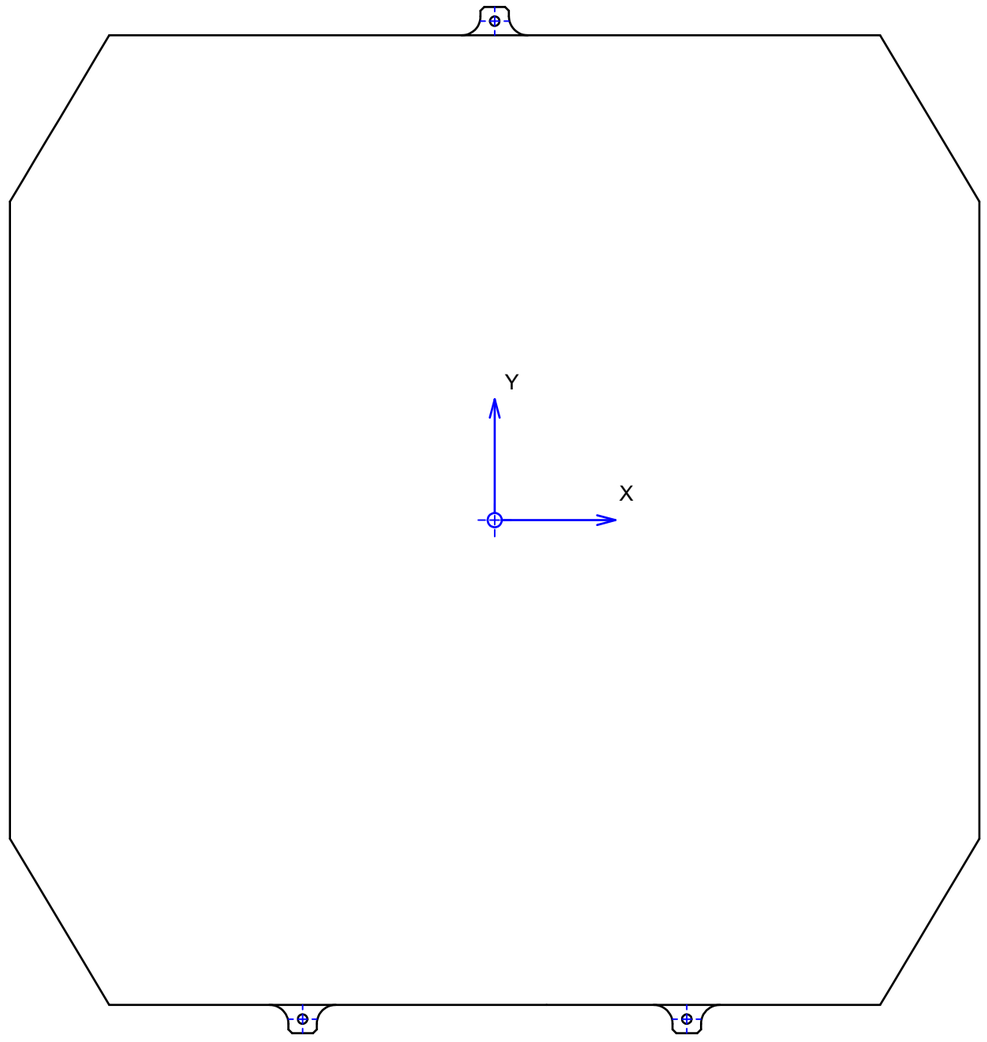
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:			
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐	INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC				
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM			TIME	
FINISH: NONE	NEXT ASSY		USED ON	
	ASSEMBLY APPLICATION			

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K2	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26631	SHEET 5 OF 6 / REVISION: A
APPROVED:	DATE:		



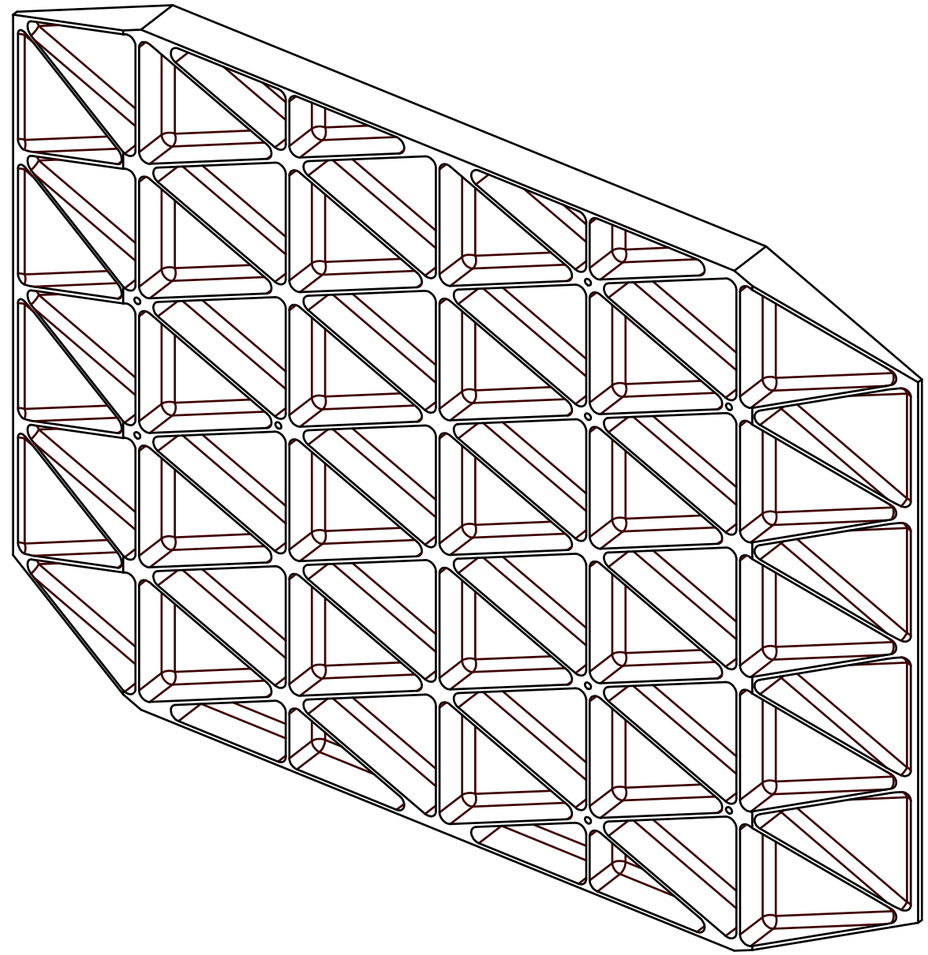




DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659			
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K2	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26631	SHEET 6 OF 6 / REVISION: A
APPROVED:	DATE:		

REVISION HISTORY				
REV	DESCRIPTION	DATE	REVISED BY	APPROVED
A	INITIAL RELEASE		A. FERN	N. EMERSON



NOTES:

1) BREAK SHARP EDGES AND DEBURR.

2) ALL MACHINING FILLETS TO BE R.25 MAX UNLESS OTHERWISE SPECIFIED.

3) ALL MACHINED SURFACES TO BE 125 RMS OR BETTER, WITH EXCEPTION OF REFLECTING SURFACE INDICATED BY NOTE 6.

4) 3D MODEL WILL BE PROVIDED AND USED TO MANUFACTURE THIS PART.

5) DRAWING PROVIDES BASIC ENVELOPE DIMENSIONS AND KEY FEATURE CONTROL TOLERANCE CALLOUTS ONLY.

6) ROUGHNESS AND ACCURACY OF INDICATED SURFACE DEFINED IN ATTACHED MIRROR SPEC DOCUMENT.

7) MEASUREMENT OF REFLECTING SURFACE TO BE PERFORMED WITH MIRROR SIMPLY SUPPORTED AT THREE LOCATIONS AS INDICATED ON THE REAR SURFACE, USING TOOLING BALL OR SIMILAR TO AVOID UNINTENTIONAL BENDING OF MIRROR DURING MEASUREMENT. ADAPTOR PLATES AT EACH OF THESE THREE LOCATIONS ARE BOLTED TO THE PANEL AT 3 CORRESPONDING BOLTHOLES.

8) THE ADAPTOR PLATES (SUGGESTED PLATE GEOMETRY AS SHOWN) SHOULD BE OFFSET FROM THE BACK OF THE PANEL TO LIMIT THE CONTACT ZONE TO THE AREA AROUND EACH THREADED HOLE

9) SUPPORT OF THE PANEL DURING MACHINING CAN BE EITHER USING THE MEASUREMENT ADAPTOR PLATES, OR BY OTHER APPROPRIATE MEANS AT THE DISCRETION OF THE FABRICATOR.

10) SHEET 6 DEFINES THE OPTICAL CENTER AND COORDINATE SYSTEM ORIENTATION OF THE MIRROR. THIS POSITION AND ORIENTATION TO BE USED FOR CMM MEASUREMENT. Z POSITION OF OPTICAL CENTER IN THE PLANE OF THE REFLECTING SURFACE.

11) TYPICAL (MINIMUM) MACHINING RADIUS SHOWN. A LARGER MACHINING RADIUS BETWEEN RIBS (UP TO 0.375in) IS ACCEPTABLE TO SIMPLIFY MACHINABILITY. STEP MODEL OF MIRROR CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

12) TYPICAL RADIUS SHOWN. RADIUS CAN BE ALTERED TO SIMPLIFY MACHINABILITY. SHARP CORNERS ARE ACCEPTABLE. STEP MODEL CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

	TIME
NEXT ASSY	USED ON

ASSEMBLY APPLICATION

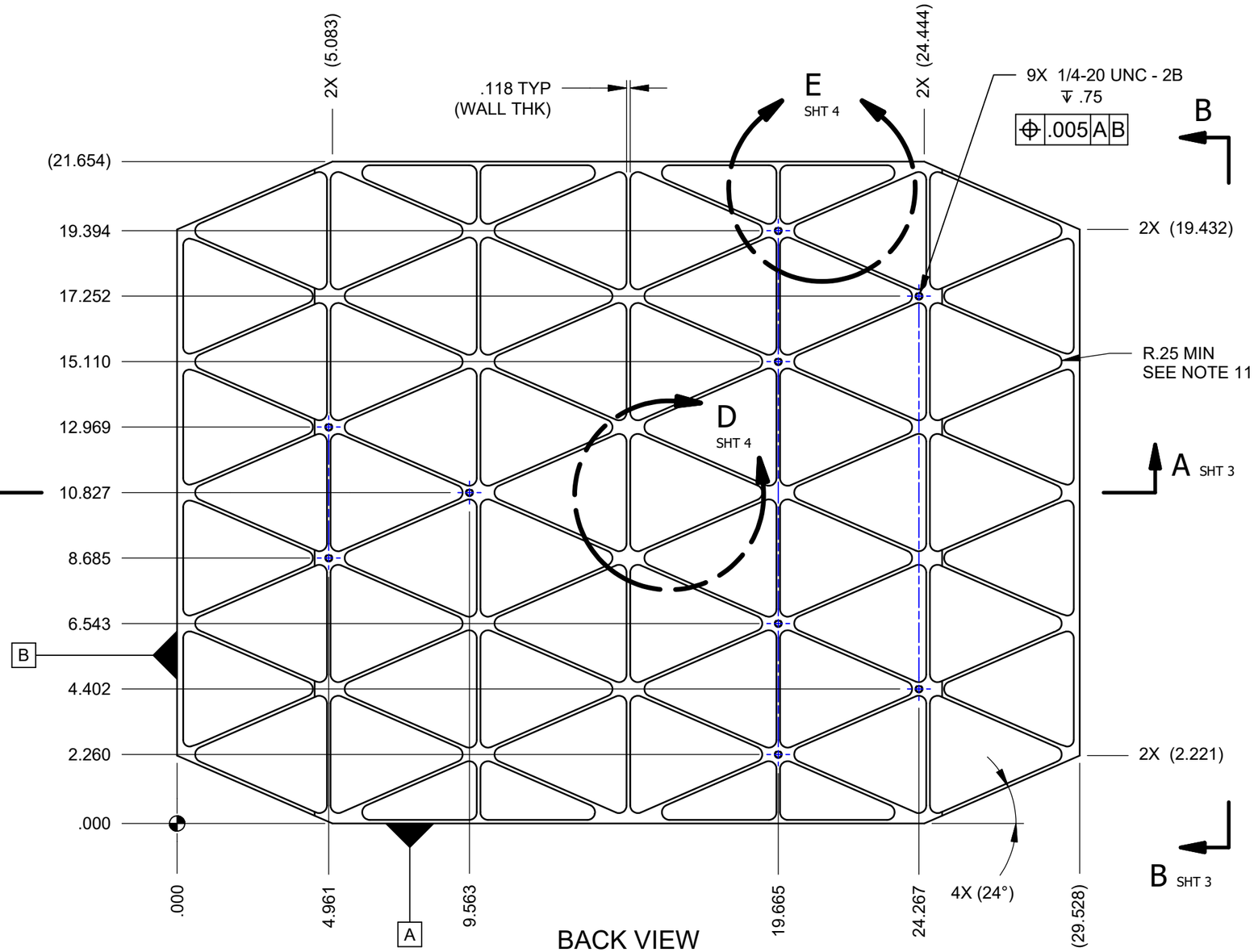
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K3
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	
APPROVED:	DATE:	

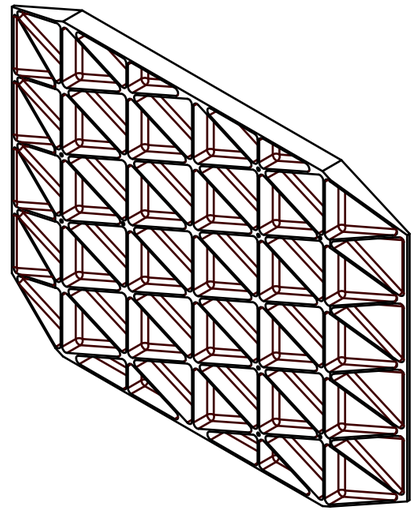
DRAWING NUMBER: 26632

SHEET 1 OF 6

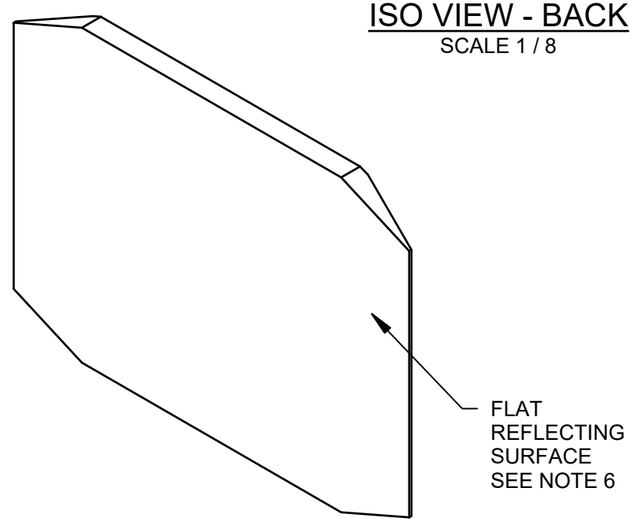
REVISION: A



BACK VIEW
SCALE 1 / 4



ISO VIEW - BACK
SCALE 1 / 8

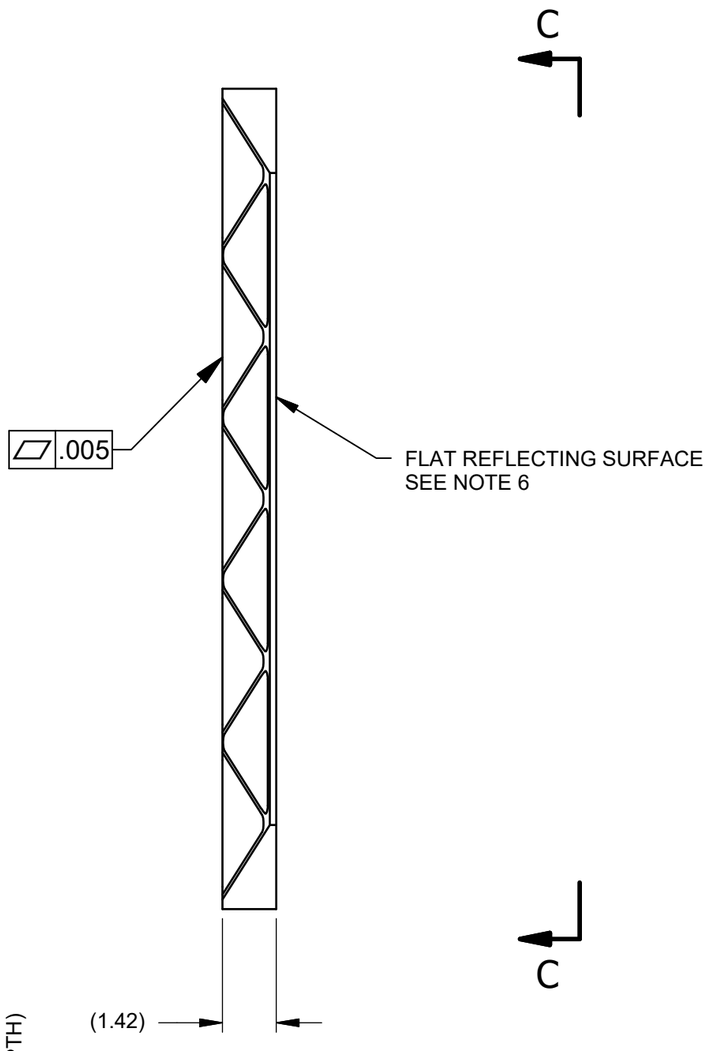


ISO VIEW - FRONT
SCALE 1 / 8

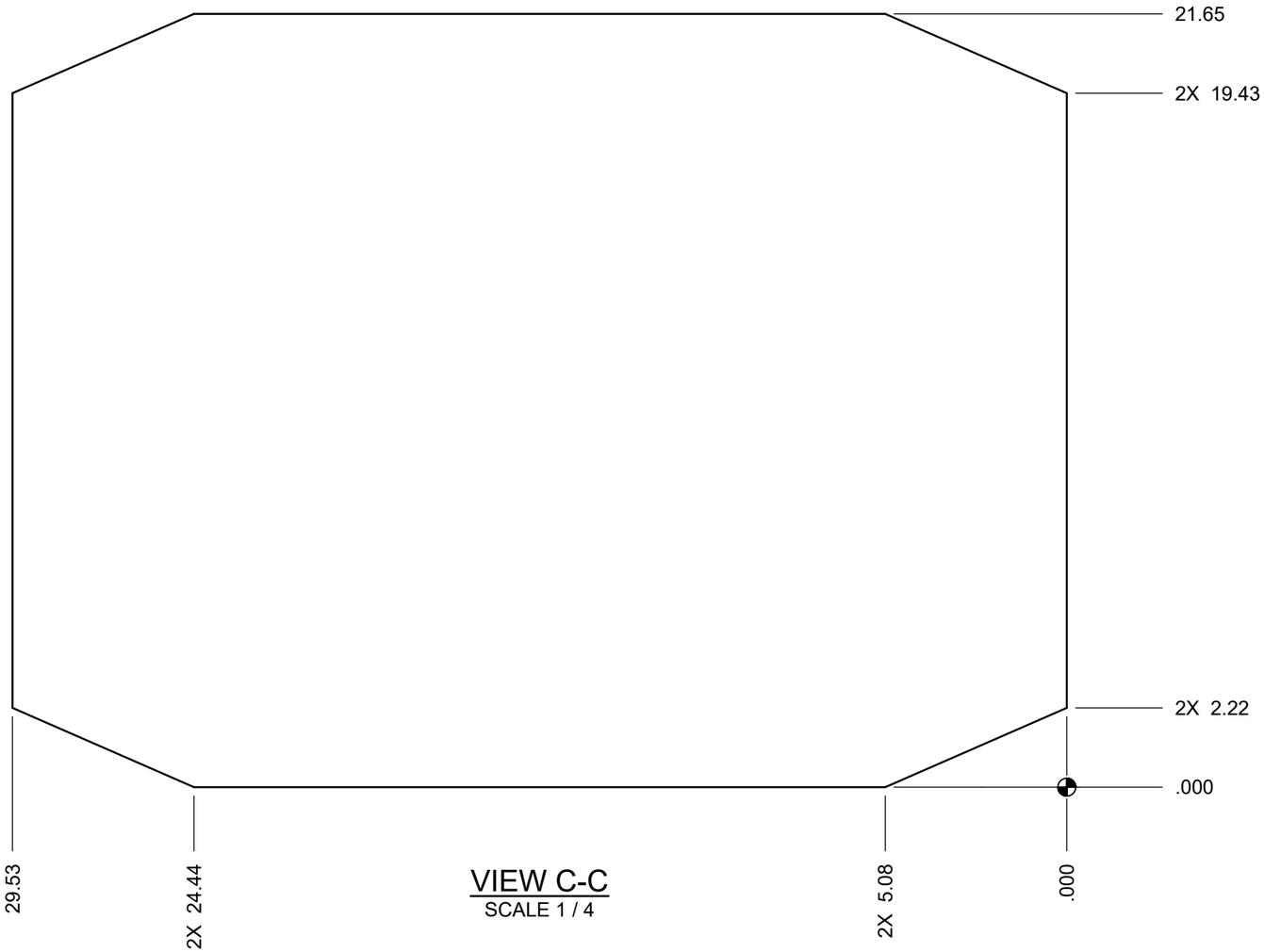
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

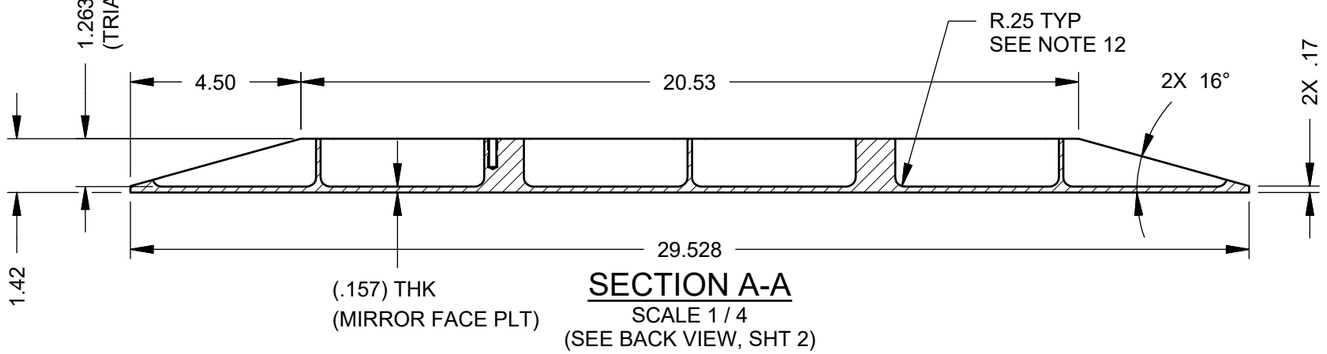
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K3	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26632	SHEET 2 OF 6 / REVISION: A
APPROVED:	DATE:		



VIEW B-B
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)



VIEW C-C
SCALE 1 / 4



SECTION A-A
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)

NOTE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND CAN NOT BE DISCLOSED WITHOUT THE WRITTEN CONSENT OF STEWARD OBSERVATORY.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

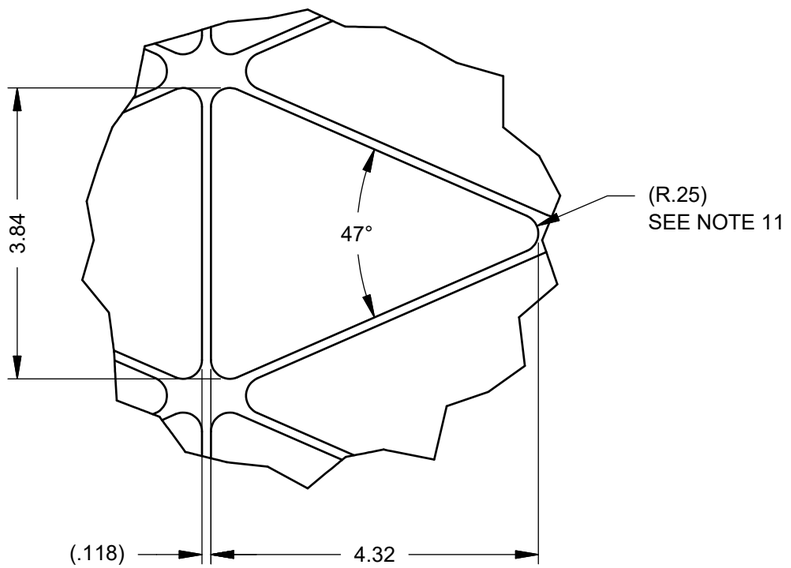
ACAD	MECH	IDEAS	INV
☐	☐	☐	■

	TIME
NEXT ASSY	USED ON
ASSEMBLY APPLICATION	

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K3
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26632
APPROVED:	DATE:	SHEET 3 OF 6

REVISION: A

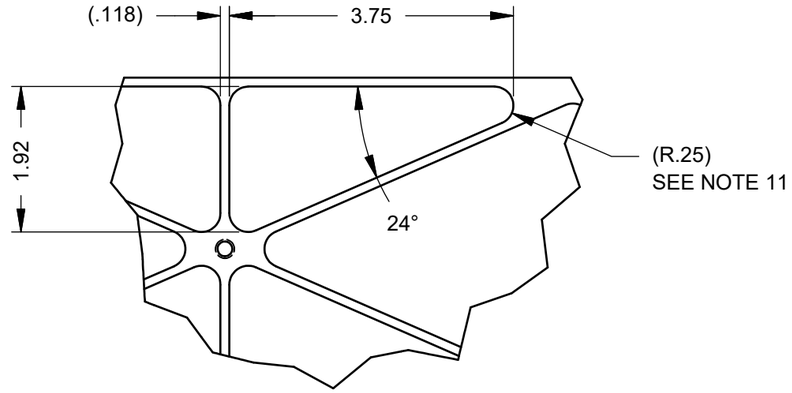


DETAIL D

SCALE 1 / 2

(TYP LARGE TRIANGLE DETAIL)

(SEE BACK VIEW, SHT 2)



DETAIL E

SCALE 1 / 2

(TYP SMALL TRIANGLE DETAIL)

(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002

DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

	TIME
NEXT ASSY	USED ON

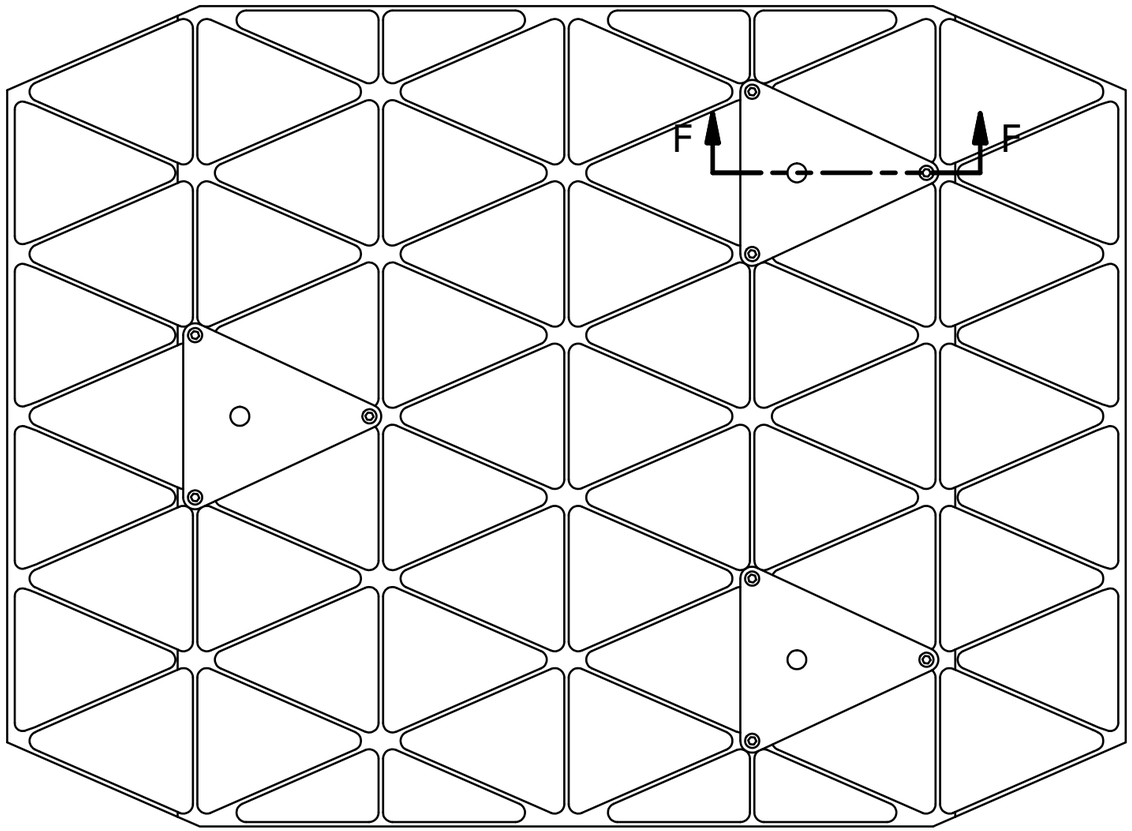
ASSEMBLY APPLICATION

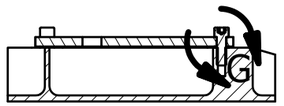
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K3
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26632
APPROVED:	DATE:	

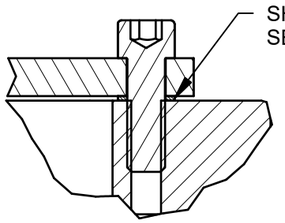
SHEET 4 OF 6

REVISION: A

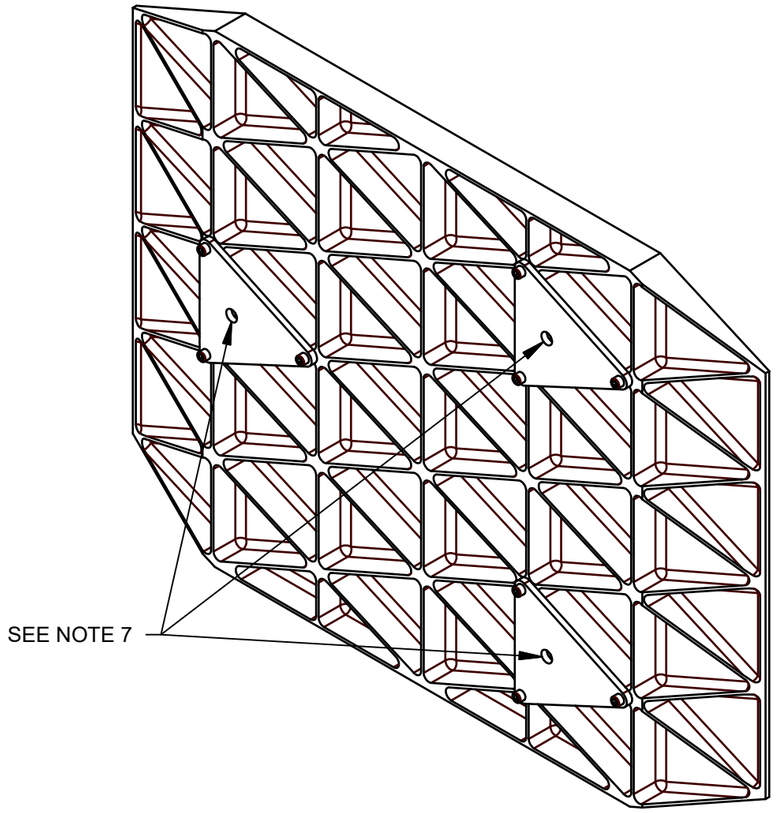


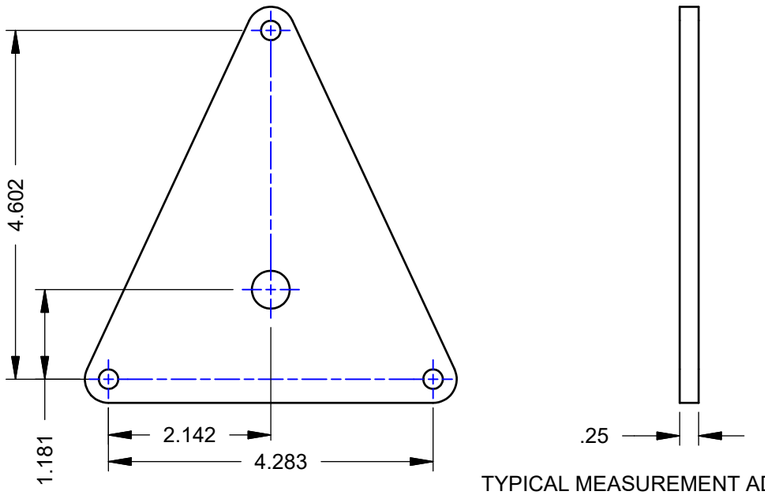


SECTION F-F
SCALE 1/4



DETAIL G
SCALE 1

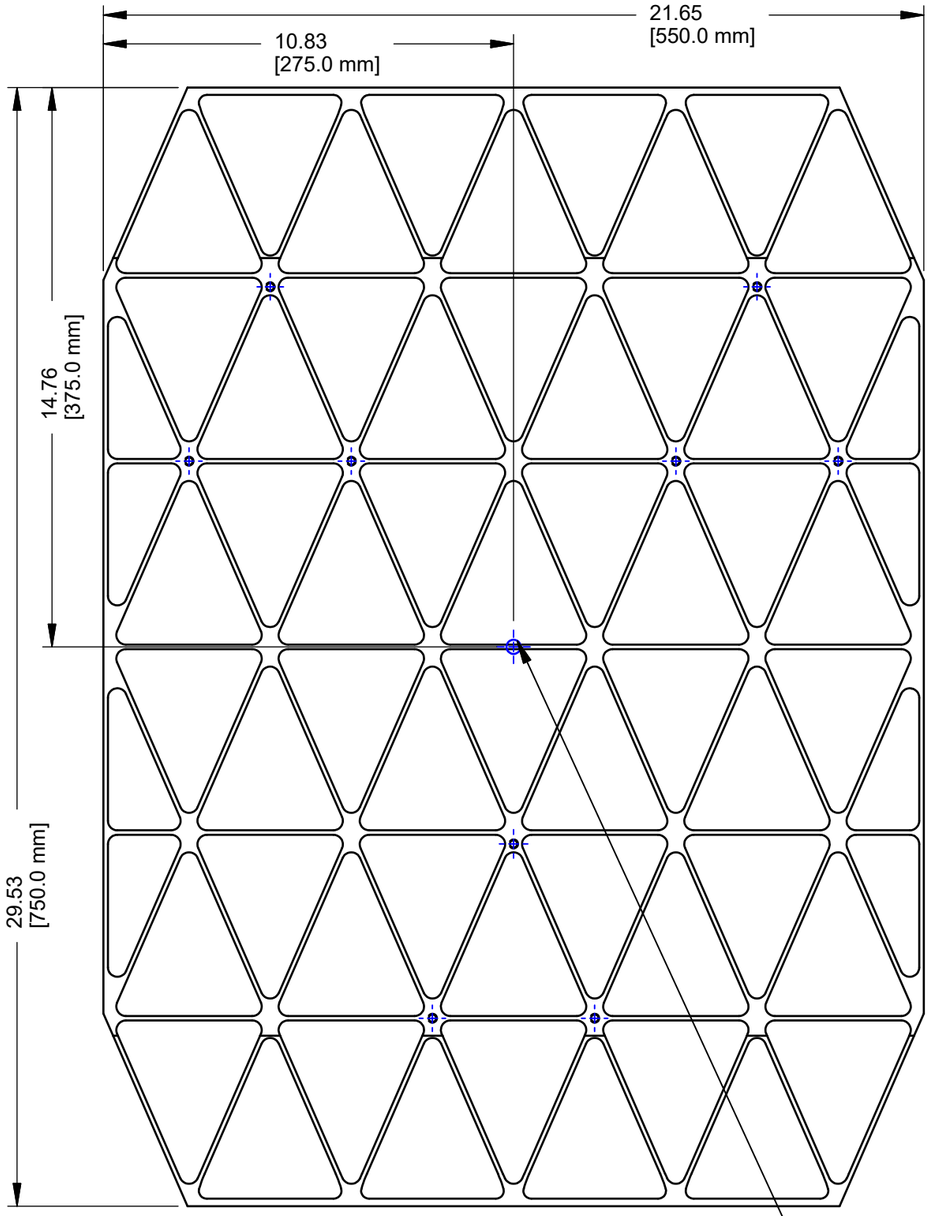


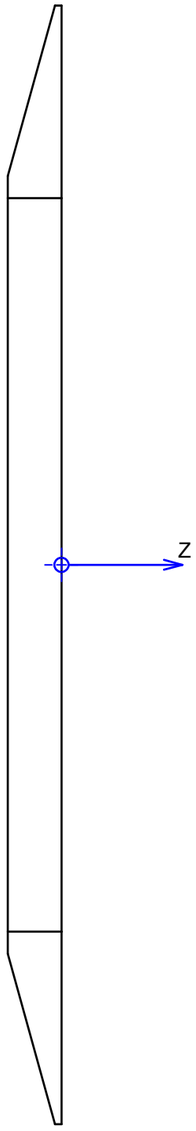


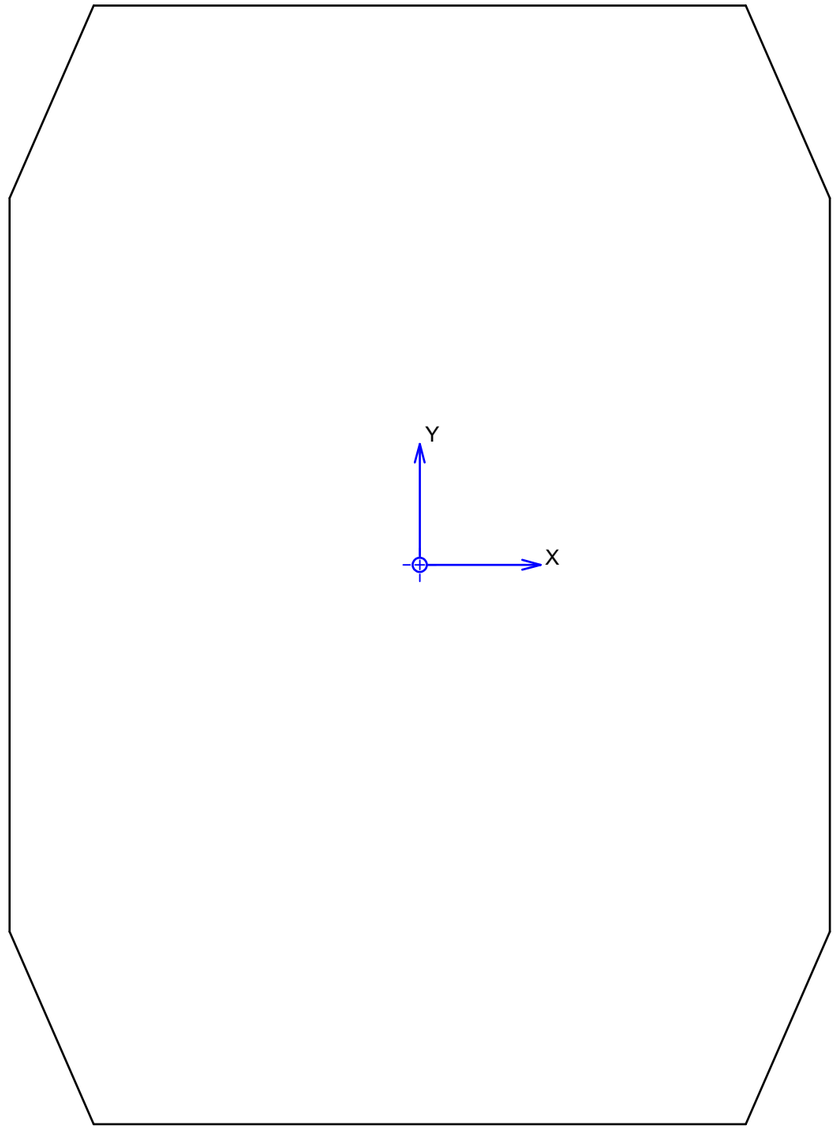
TYPICAL MEASUREMENT ADAPTOR PLATE DIMENSIONS

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659			
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:	
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME	
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K3	
CHECKED BY: A. FERN	DATE: 5/30/2018		
APPROVED: N. EMERSON	DATE: 5/30/2018		
APPROVED:	DATE:		
APPROVED:	DATE:	DRAWING NUMBER: 26632	SHEET 5 OF 6 / REVISION: A
APPROVED:	DATE:		





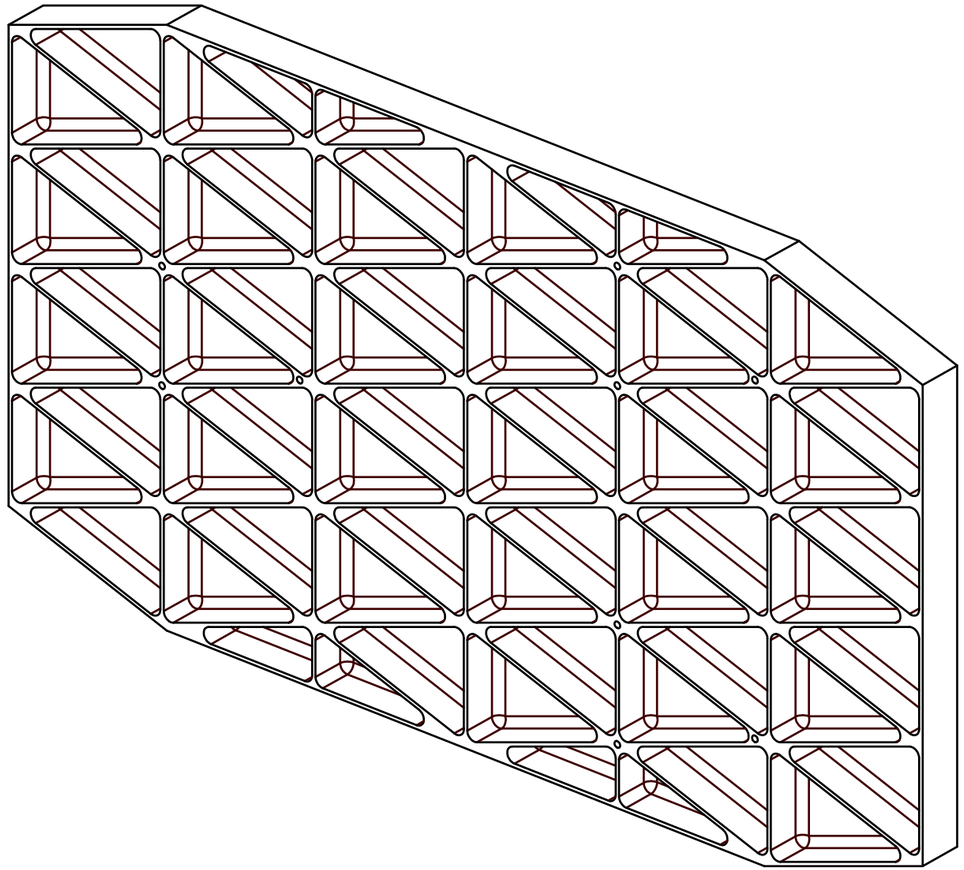


DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	NEXT ASSY	USED ON	TIME
FINISH: NONE	ASSEMBLY APPLICATION		

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR K3
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26632
APPROVED:	DATE:	SHEET 6 OF 6 — REVISION: A

REVISION HISTORY				
REV	DESCRIPTION	DATE	REVISED BY	APPROVED
A	INITIAL RELEASE		A. FERN	N. EMERSON



NOTES:

1) BREAK SHARP EDGES AND DEBURR.

2) ALL MACHINING FILLETS TO BE R.25 MAX UNLESS OTHERWISE SPECIFIED.

3) ALL MACHINED SURFACES TO BE 125 RMS OR BETTER, WITH EXCEPTION OF REFLECTING SURFACE INDICATED BY NOTE 6.

4) 3D MODEL WILL BE PROVIDED AND USED TO MANUFACTURE THIS PART.

5) DRAWING PROVIDES BASIC ENVELOPE DIMENSIONS AND KEY FEATURE CONTROL TOLERANCE CALLOUTS ONLY.

6) ROUGHNESS AND ACCURACY OF INDICATED SURFACE DEFINED IN ATTACHED MIRROR SPEC DOCUMENT.

7) MEASUREMENT OF REFLECTING SURFACE TO BE PERFORMED WITH MIRROR SIMPLY SUPPORTED AT THREE LOCATIONS AS INDICATED ON THE REAR SURFACE, USING TOOLING BALL OR SIMILAR TO AVOID UNINTENTIONAL BENDING OF MIRROR DURING MEASUREMENT. ADAPTOR PLATES AT EACH OF THESE THREE LOCATIONS ARE BOLTED TO THE PANEL AT 3 CORRESPONDING BOLTHOLES.

8) THE ADAPTOR PLATES (SUGGESTED PLATE GEOMETRY AS SHOWN) SHOULD BE OFFSET FROM THE BACK OF THE PANEL TO LIMIT THE CONTACT ZONE TO THE AREA AROUND EACH THREADED HOLE

9) SUPPORT OF THE PANEL DURING MACHINING CAN BE EITHER USING THE MEASUREMENT ADAPTOR PLATES, OR BY OTHER APPROPRIATE MEANS AT THE DISCRETION OF THE FABRICATOR.

10) SHEET 6 DEFINES THE OPTICAL CENTER AND COORDINATE SYSTEM ORIENTATION OF THE MIRROR. THIS POSITION AND ORIENTATION TO BE USED FOR CMM MEASUREMENT. Z POSITION OF OPTICAL CENTER IN THE PLANE OF THE REFLECTING SURFACE.

11) TYPICAL (MINIMUM) MACHINING RADIUS SHOWN. A LARGER MACHINING RADIUS BETWEEN RIBS (UP TO 0.375in) IS ACCEPTABLE TO SIMPLIFY MACHINABILITY. STEP MODEL OF MIRROR CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

12) TYPICAL RADIUS SHOWN. RADIUS CAN BE ALTERED TO SIMPLIFY MACHINABILITY. SHARP CORNERS ARE ACCEPTABLE. STEP MODEL CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002

DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

	TIME
NEXT ASSY	USED ON
ASSEMBLY APPLICATION	

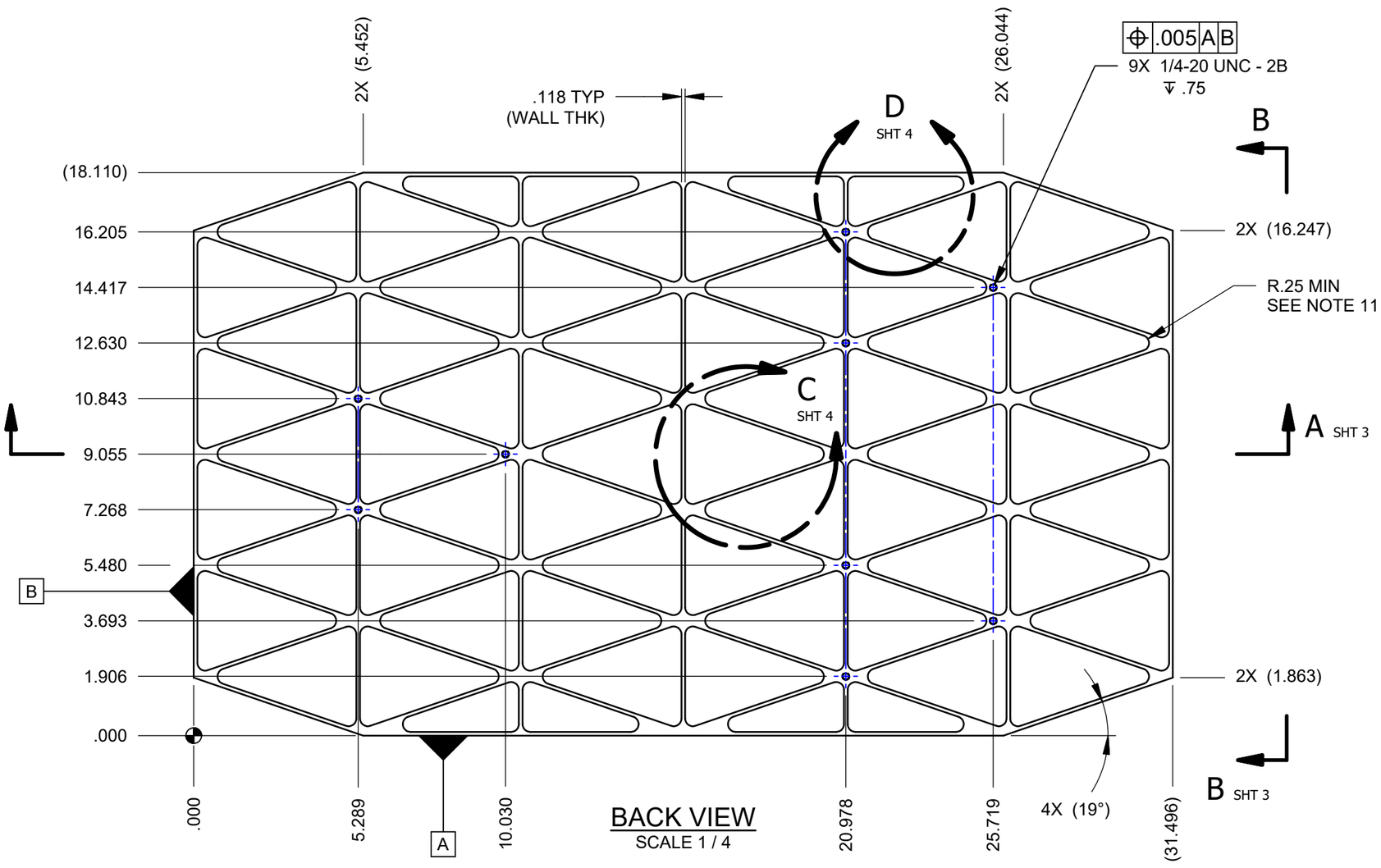
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR F1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	
APPROVED:	DATE:	

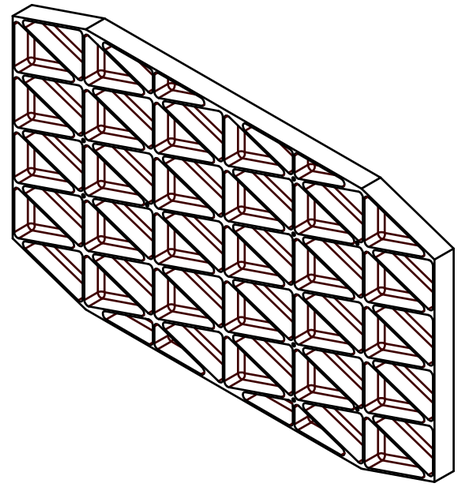
DRAWING NUMBER: 26633

SHEET 1 OF 6

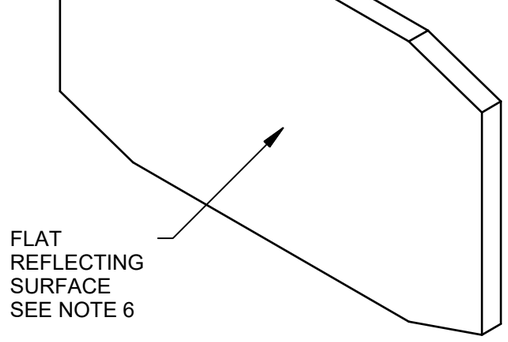
REVISION: A



BACK VIEW
SCALE 1 / 4



ISO VIEW - BACK
SCALE 1 / 8



ISO VIEW - FRONT
SCALE 1 / 8

NOTE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND CAN NOT BE DISCLOSED WITHOUT THE WRITTEN CONSENT OF STEWARD OBSERVATORY.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED
LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005
ANGULAR: ± .5°
DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV

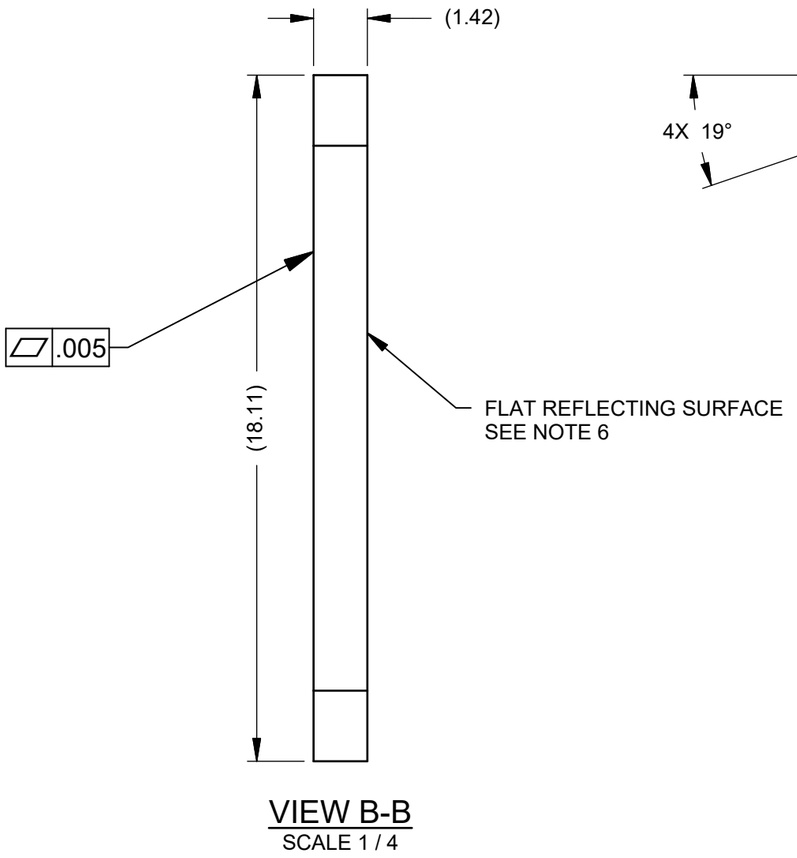
NEXT ASSY	USED ON
	TIME

ASSEMBLY APPLICATION

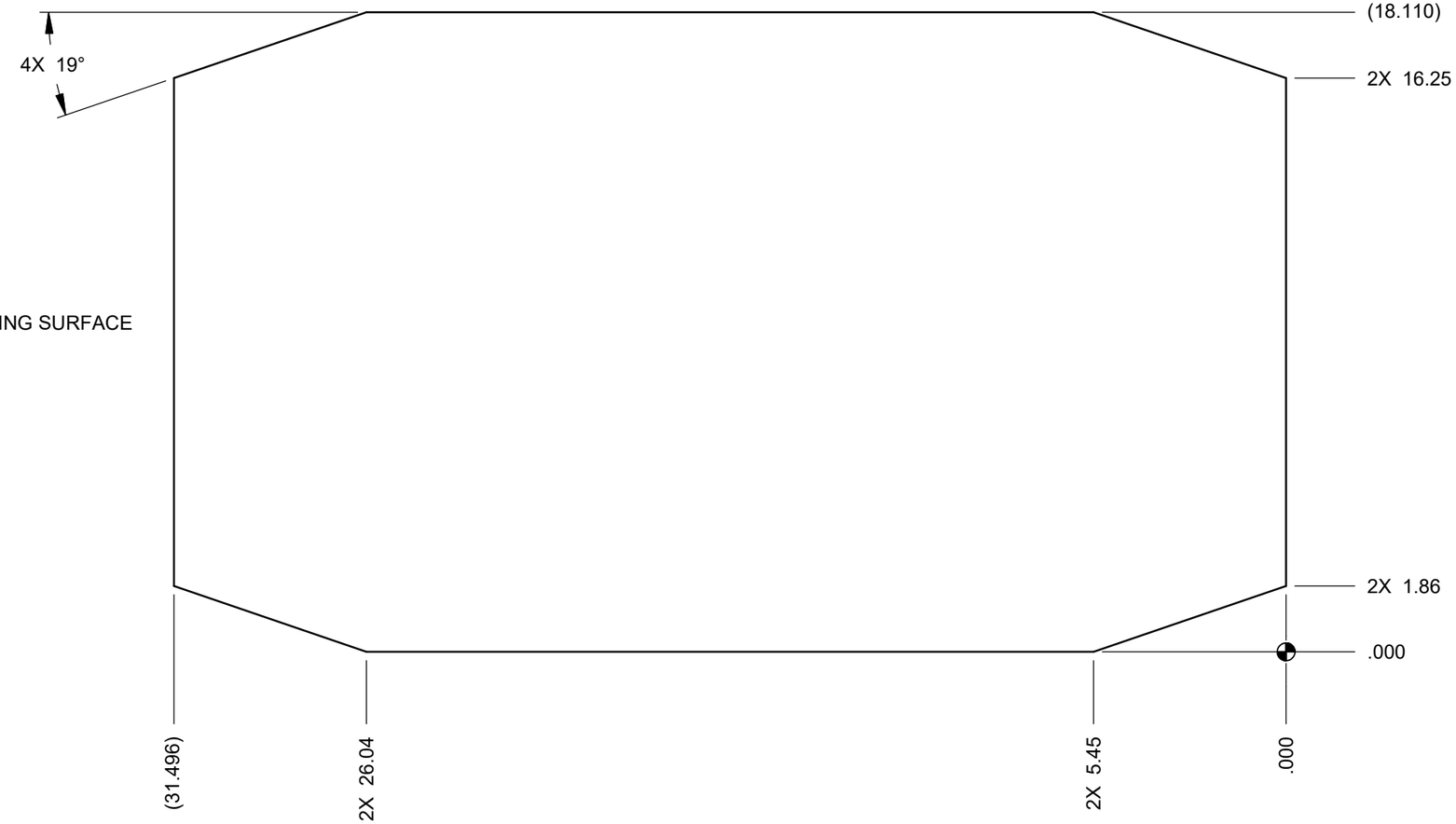
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

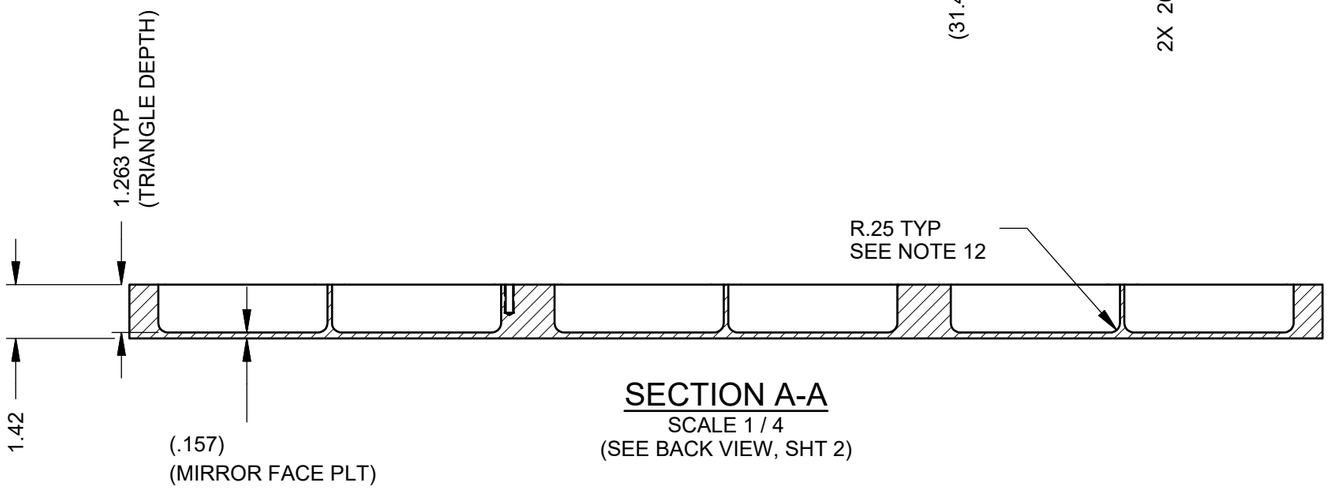
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR F1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26633
APPROVED:	DATE:	SHEET 2 OF 6

REVISION: A



VIEW B-B
SCALE 1 / 4

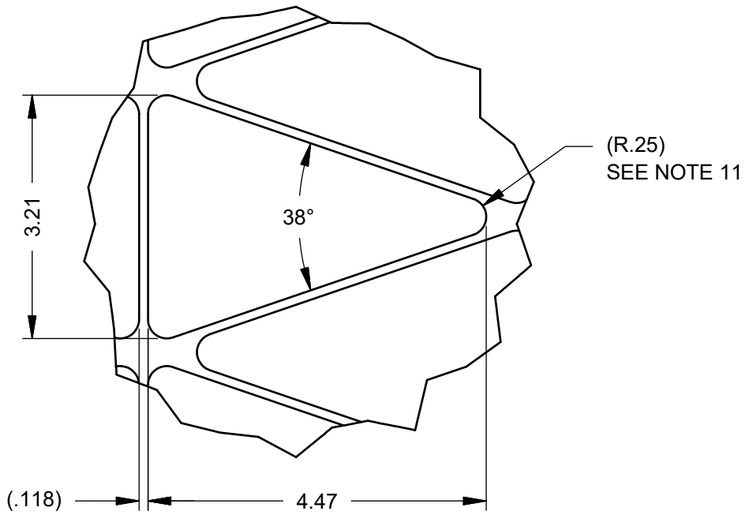




SECTION A-A
SCALE 1 / 4
(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		Steward Observatory, University of Arizona
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON	DATE: 5/30/2018
		DESIGNED BY: N. EMERSON	DATE: 5/30/2018
		DRAWN BY: A. FERN	DATE: 5/30/2018
		CHECKED BY: A. FERN	DATE: 5/30/2018
		APPROVED: N. EMERSON	DATE: 5/30/2018
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME	APPROVED:	DATE:
	NEXT ASSY / USED ON	APPROVED:	DATE:
FINISH: NONE	ASSEMBLY APPLICATION	APPROVED:	DATE:

CATEGORY:
PROJECT: TIME
TITLE: MIRROR F1
DRAWING NUMBER: 26633
SHEET 3 OF 6
REVISION: A

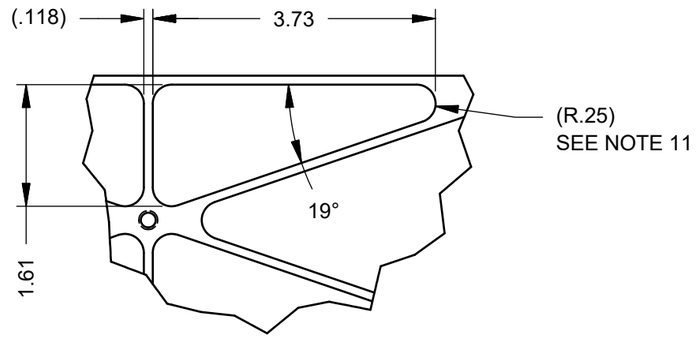


DETAIL C

SCALE 1 / 2

(TYP LARGE TRIANGLE DETAIL)

(SEE BACK VIEW, SHT 2)



DETAIL D

SCALE 1 / 2

(TYP SMALL TRIANGLE DETAIL)

(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± .5°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002

DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

TIME

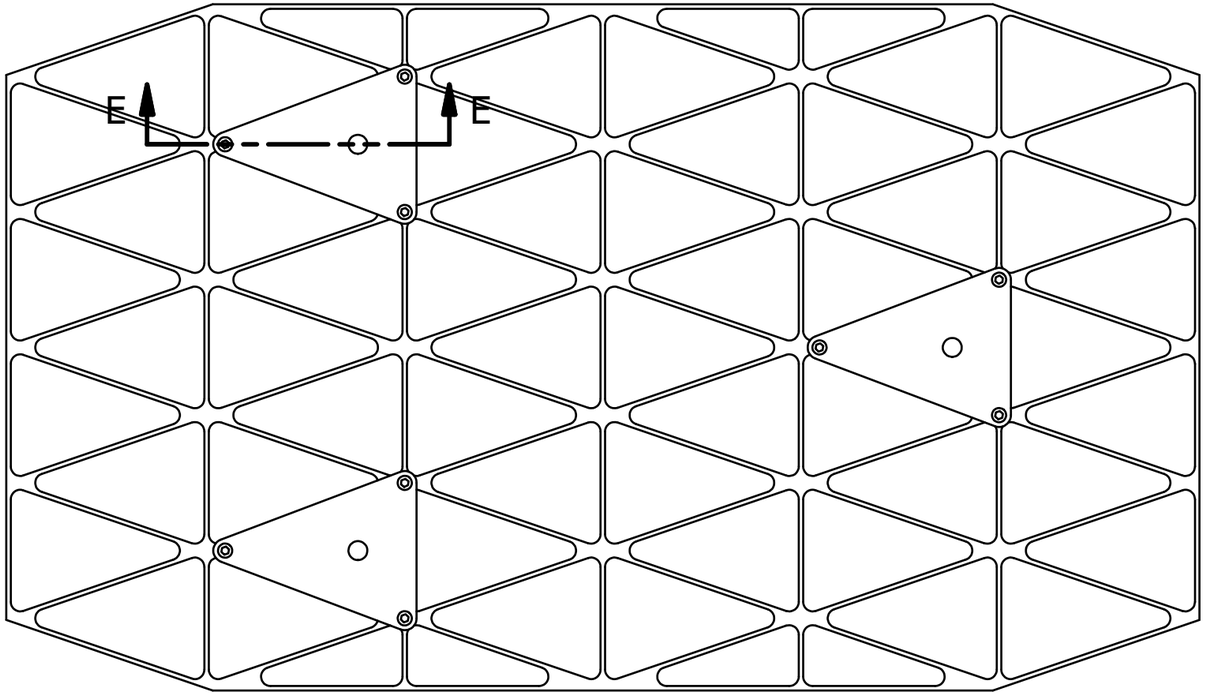
NEXT ASSY | USED ON

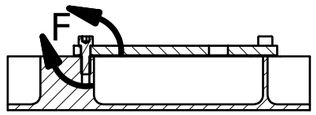
ASSEMBLY APPLICATION

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

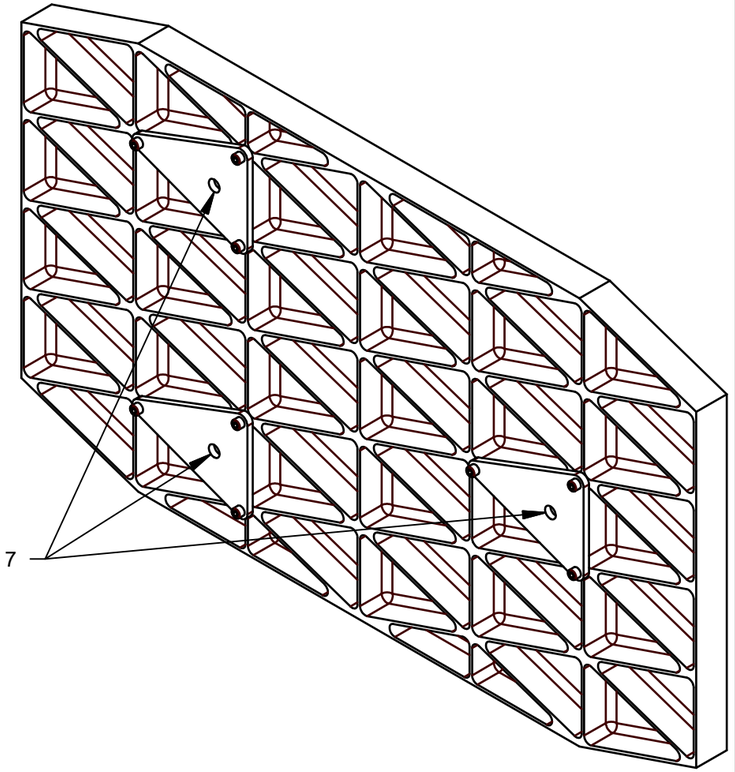
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR F1
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26633
APPROVED:	DATE:	SHEET 4 OF 6

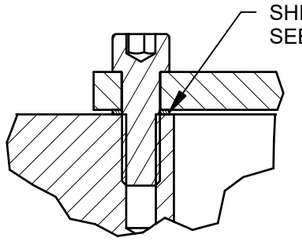
REVISION: A



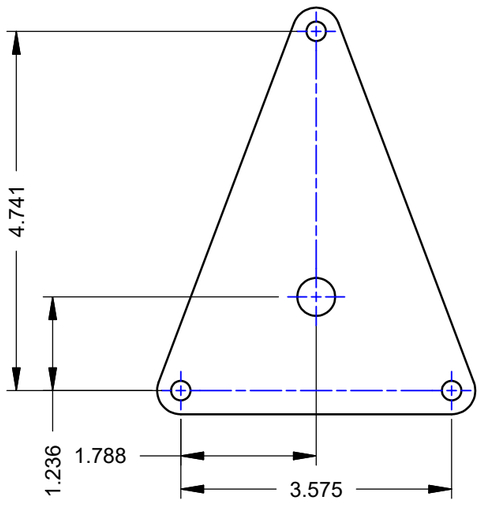


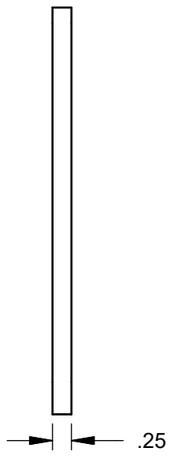
SECTION E-E
SCALE 1/4





DETAIL F
SCALE 1

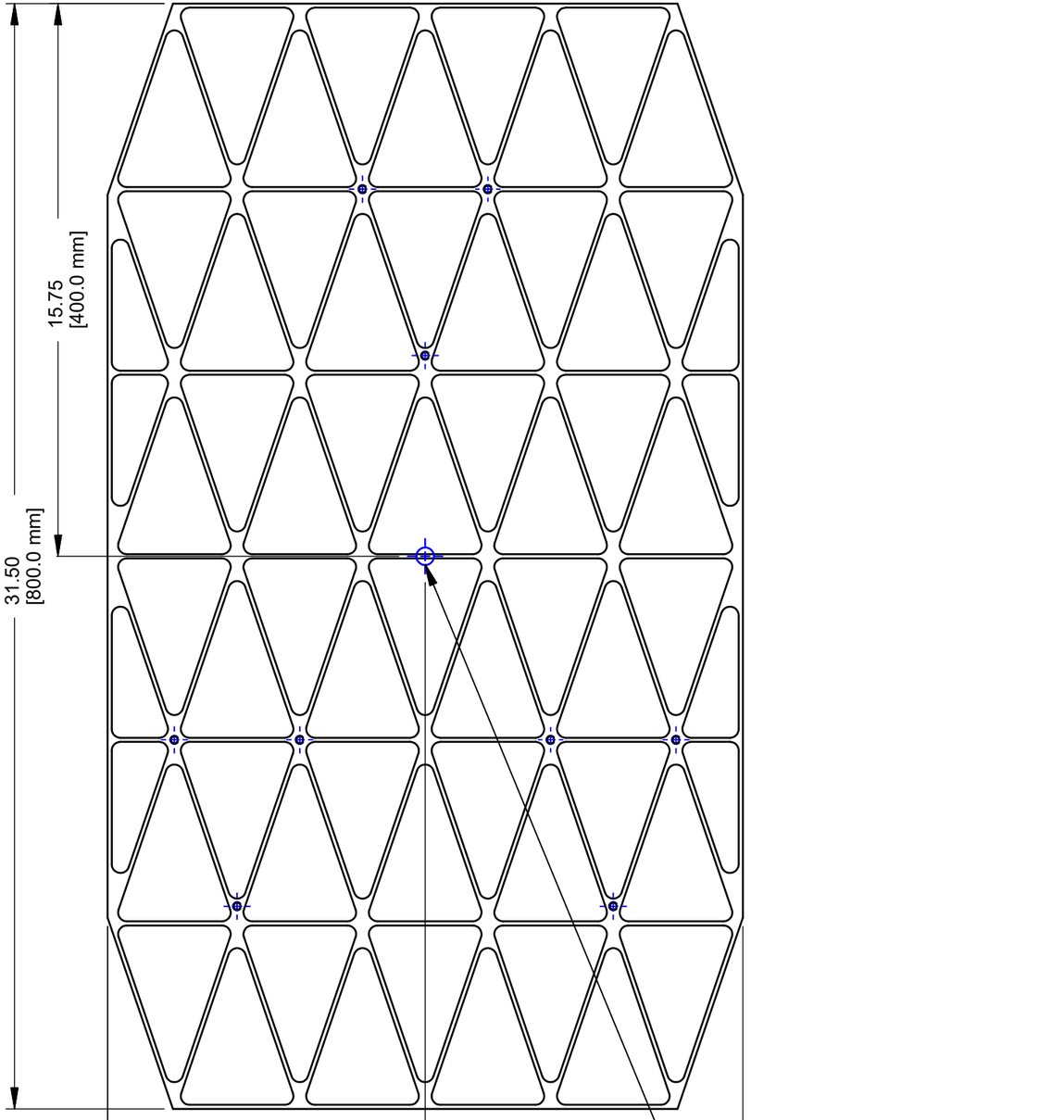


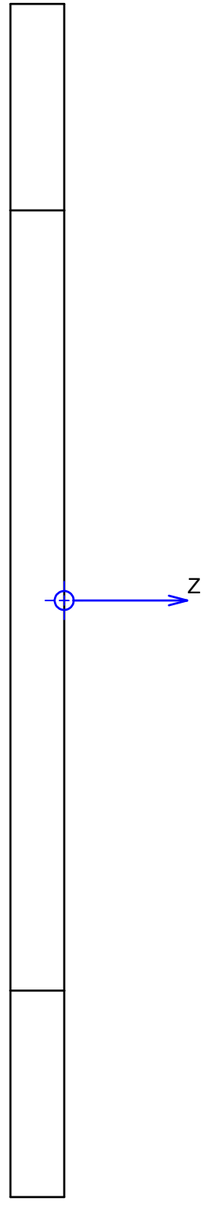


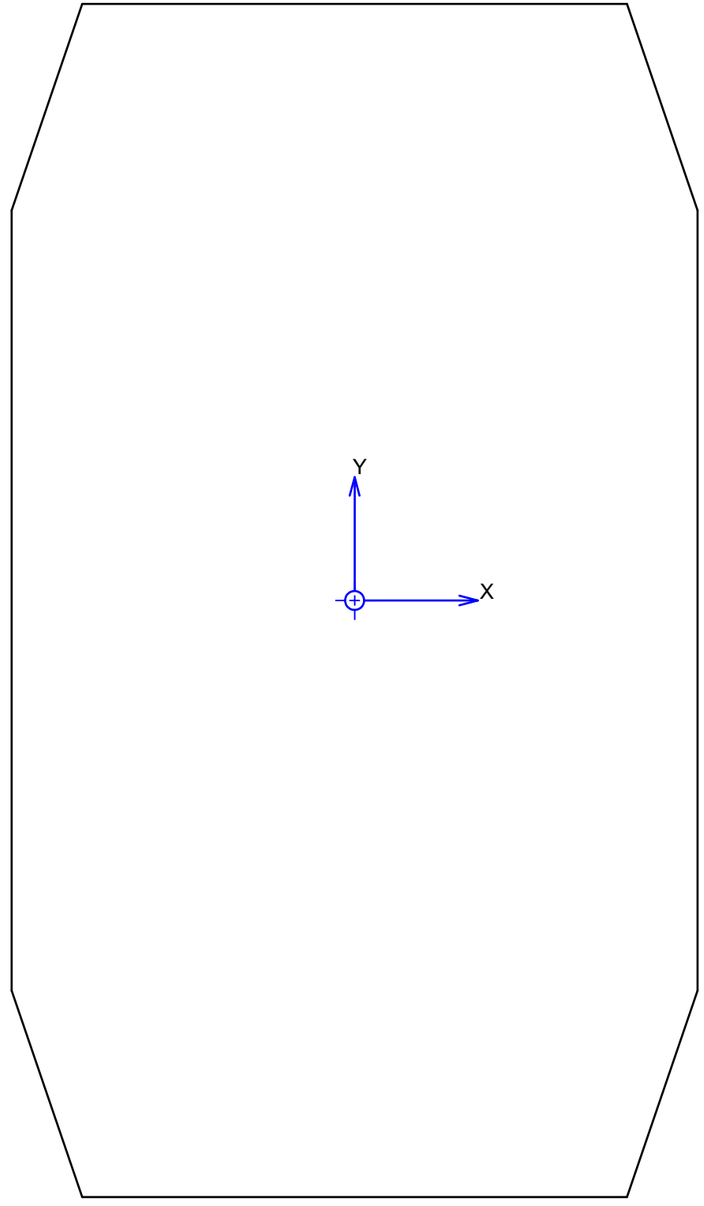
TYPICAL MEASUREMENT ADAPTOR PLATE DIMENSIONS

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:	Steward Observatory, University of Arizona	
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■	933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659	
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON	DATE: 5/30/2018
		DESIGNED BY: N. EMERSON	DATE: 5/30/2018
		DRAWN BY: A. FERN	DATE: 5/30/2018
		CHECKED BY: A. FERN	DATE: 5/30/2018
		APPROVED: N. EMERSON	DATE: 5/30/2018
	TIME	APPROVED:	DATE:
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	NEXT ASSY / USED ON	APPROVED:	DATE:
FINISH: NONE	ASSEMBLY APPLICATION	APPROVED:	DATE:

CATEGORY:
PROJECT: TIME
TITLE: MIRROR F1
DRAWING NUMBER: 26633
SHEET 5 OF 6
REVISION: A







DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		Steward Observatory, University of Arizona
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± .5° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON	DATE: 5/30/2018
		DESIGNED BY: N. EMERSON	DATE: 5/30/2018
		DRAWN BY: A. FERN	DATE: 5/30/2018
		CHECKED BY: A. FERN	DATE: 5/30/2018
		APPROVED: N. EMERSON	DATE: 5/30/2018
		APPROVED:	DATE:
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME	APPROVED:	DATE:
	NEXT ASSY / USED ON	APPROVED:	DATE:
FINISH: NONE	ASSEMBLY APPLICATION		

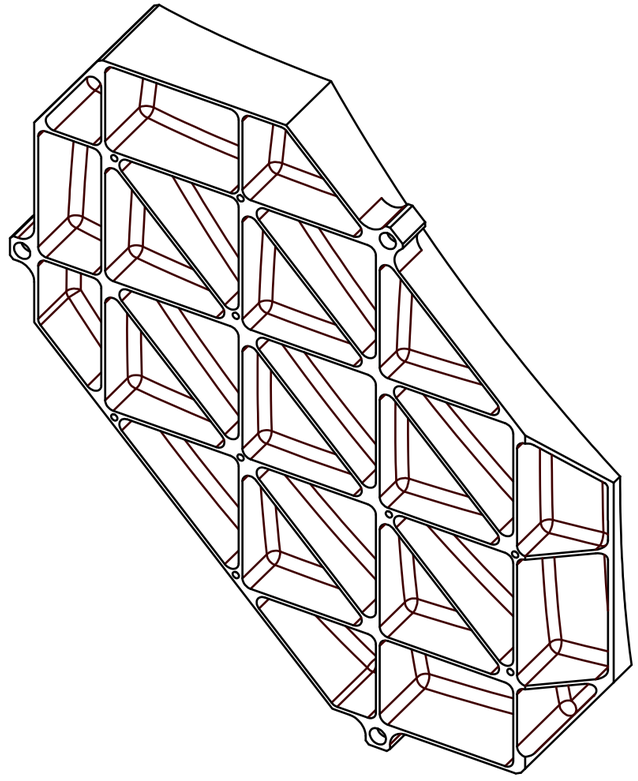
CATEGORY:

PROJECT: TIME

TITLE: MIRROR F1

DRAWING NUMBER: 26633 | SHEET 6 OF 6 | REVISION: A

REVISION HISTORY				
REV	DESCRIPTION	DATE	REVISED BY	APPROVED
A	INITIAL RELEASE		A. FERN	N. EMERSON



NOTES:

1) BREAK SHARP EDGES AND DEBURR.

2) ALL MACHINING FILLETS TO BE R.25 MAX UNLESS OTHERWISE SPECIFIED.

3) ALL MACHINED SURFACES TO BE 125 RMS OR BETTER, WITH EXCEPTION OF REFLECTING SURFACE INDICATED BY NOTE 6.

4) 3D MODEL WILL BE PROVIDED AND USED TO MANUFACTURE THIS PART.

5) DRAWING PROVIDES BASIC ENVELOPE DIMENSIONS AND KEY FEATURE CONTROL TOLERANCE CALLOUTS ONLY.

6) ROUGHNESS AND ACCURACY OF INDICATED SURFACE DEFINED IN ATTACHED MIRROR SPEC DOCUMENT. FREEFORM SHAPE DEFINED BY STEP MODEL.

7) MEASUREMENT OF REFLECTING SURFACE TO BE PERFORMED WITH MIRROR SIMPLY SUPPORTED AT THREE LOCATIONS AS INDICATED ON THE REAR SURFACE, USING TOOLING BALL OR SIMILAR TO AVOID UNINTENTIONAL BENDING OF MIRROR DURING MEASUREMENT. ADAPTOR PLATES AT EACH OF THESE THREE LOCATIONS ARE BOLTED TO THE PANEL AT 3 CORRESPONDING BOLTHOLES.

8) THE ADAPTOR PLATES (SUGGESTED PLATE GEOMETRY AS SHOWN) SHOULD BE OFFSET FROM THE BACK OF THE PANEL TO LIMIT THE CONTACT ZONE TO THE AREA AROUND EACH THREADED HOLE

9) SUPPORT OF THE PANEL DURING MACHINING CAN BE EITHER USING THE MEASUREMENT ADAPTOR PLATES, OR BY OTHER APPROPRIATE MEANS AT THE DISCRETION OF THE FABRICATOR.

10) SHEET 7 DEFINES THE OPTICAL CENTER AND COORDINATE SYSTEM ORIENTATION OF THE MIRROR. THIS POSITION AND ORIENTATION TO BE USED FOR CMM MEASUREMENT. Z POSITION OF OPTICAL CENTER IS IN THE PLANE OF THE THREE REFERENCE TABS.

11) TYPICAL (MINIMUM) MACHINING RADIUS SHOWN. A LARGER MACHINING RADIUS BETWEEN RIBS (UP TO 0.375in) IS ACCEPTABLE TO SIMPLIFY MACHINABILITY. STEP MODEL OF MIRROR CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

12) TYPICAL RADIUS SHOWN. RADIUS CAN BE ALTERED TO SIMPLIFY MACHINABILITY. SHARP CORNERS ARE ACCEPTABLE. STEP MODEL CAN BE UPDATED ON REQUEST TO INCORPORATE PREFERRED RADIUS.

13) LARGER MACHINING STEPS ON CURVED BACK SIDE ARE ACCEPTABLE, WITH STEP HEIGHTS UP TO 0.02in WITH PRIOR APPROVAL FROM UA.

DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± 1°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002
DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

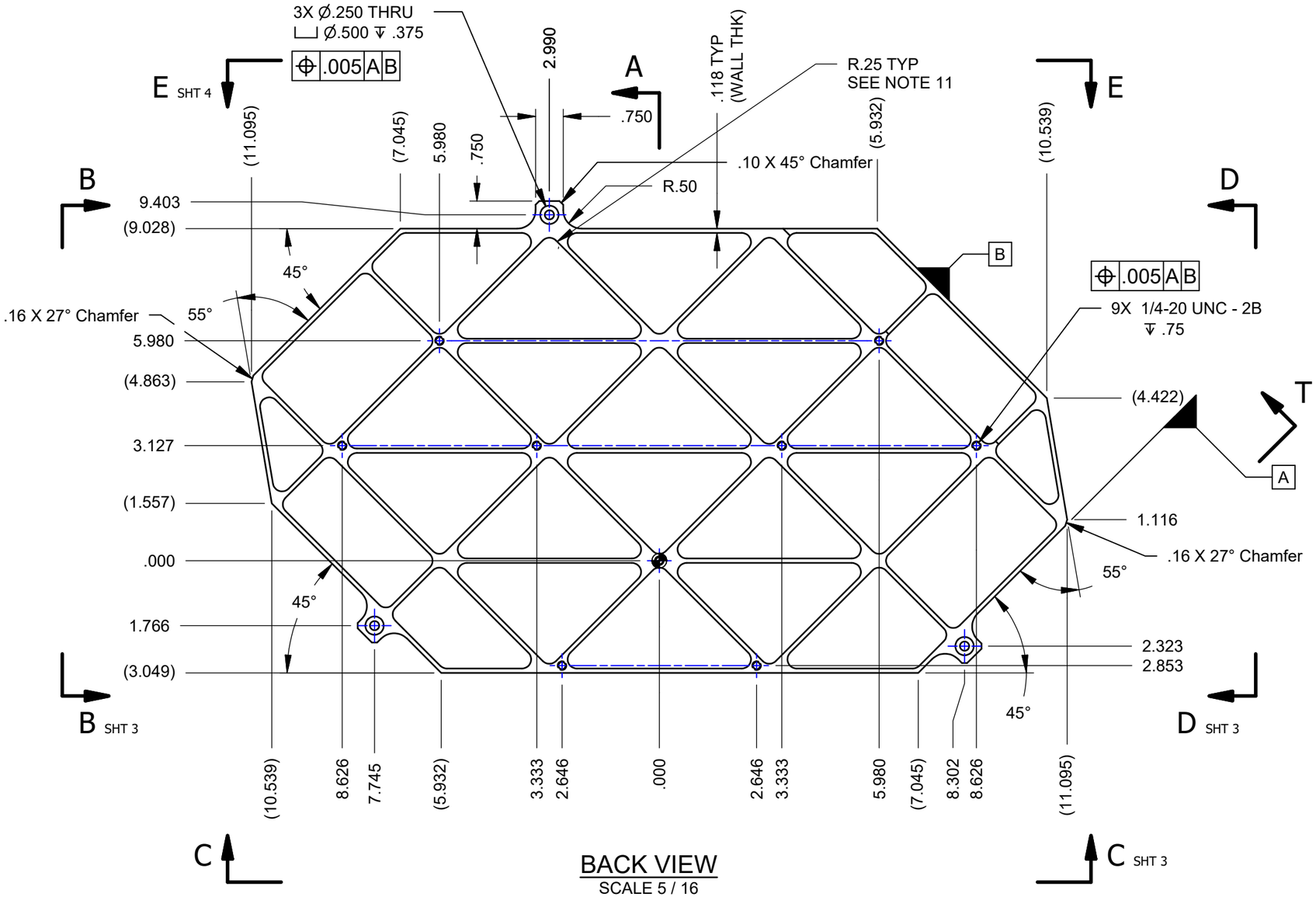
NEXT ASSY	USED ON
	TIME

ASSEMBLY APPLICATION

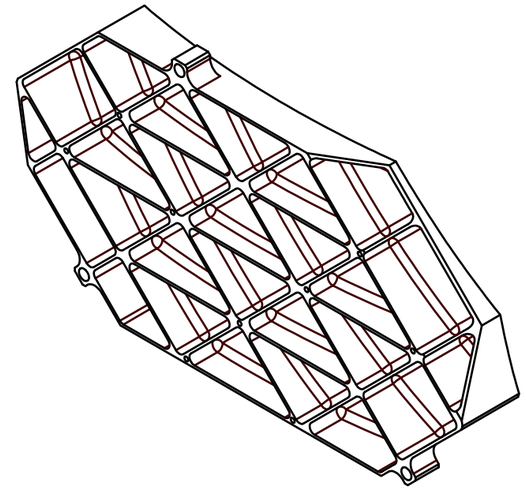
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P2
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26634
APPROVED:	DATE:	SHEET 1 OF 7

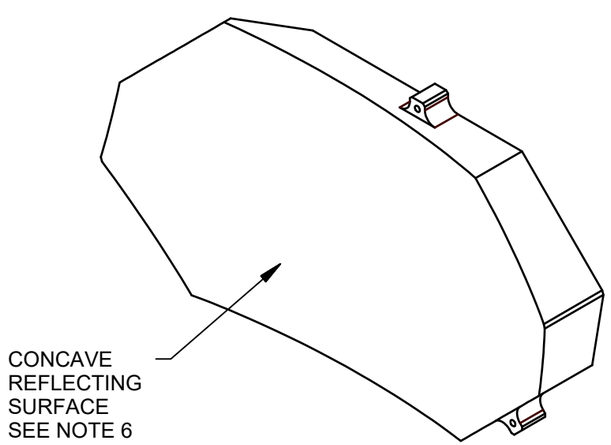
REVISION: A



BACK VIEW
SCALE 5 / 16

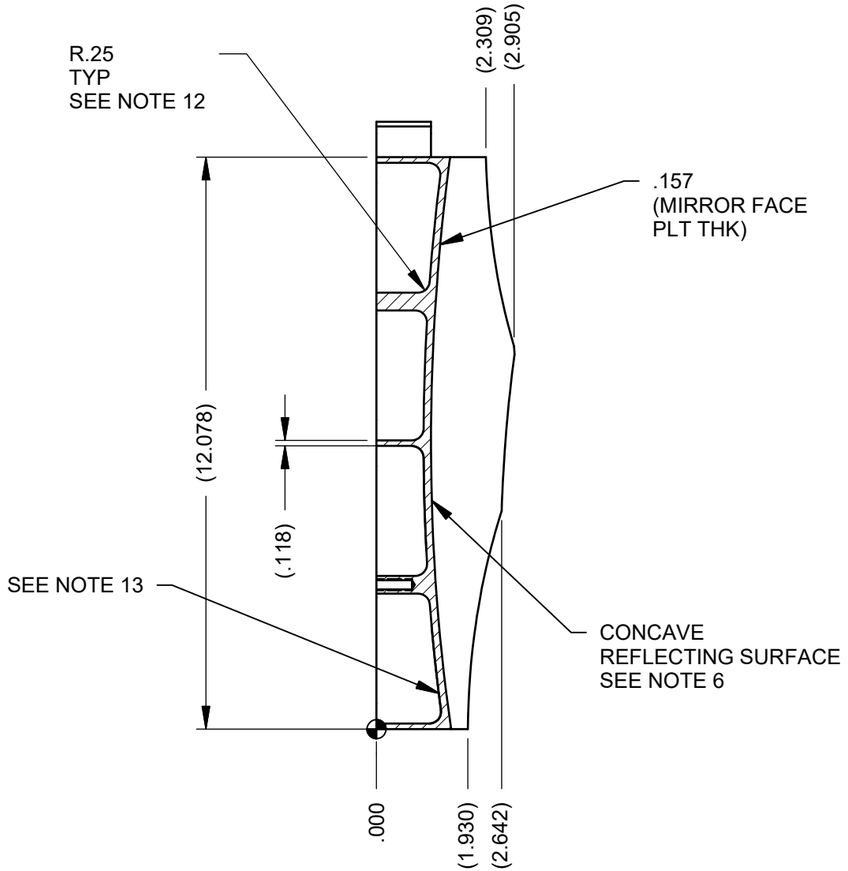


ISO VIEW - BACK
SCALE 3 / 16

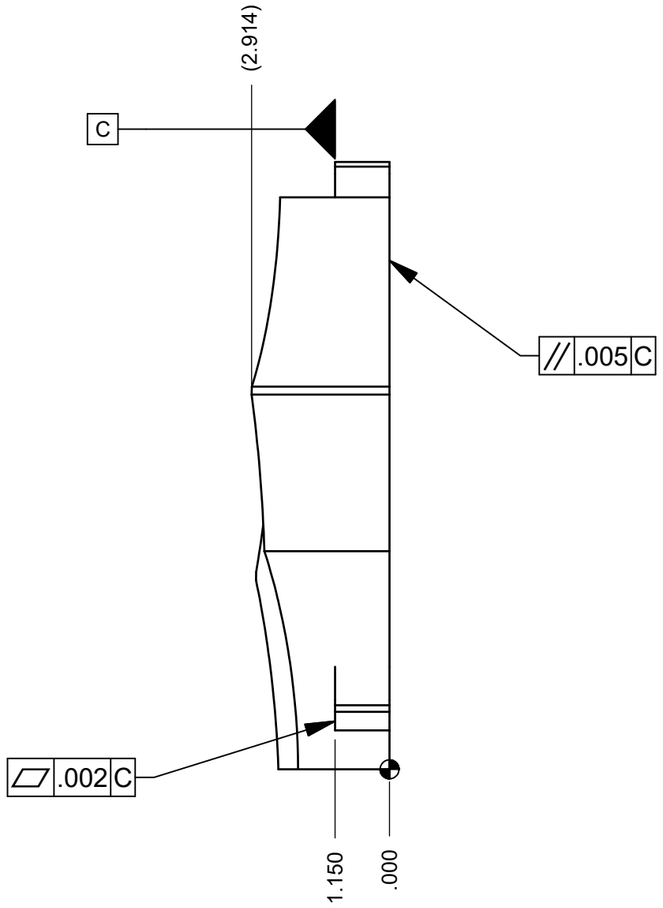


ISO VIEW - FRONT
SCALE 3 / 16

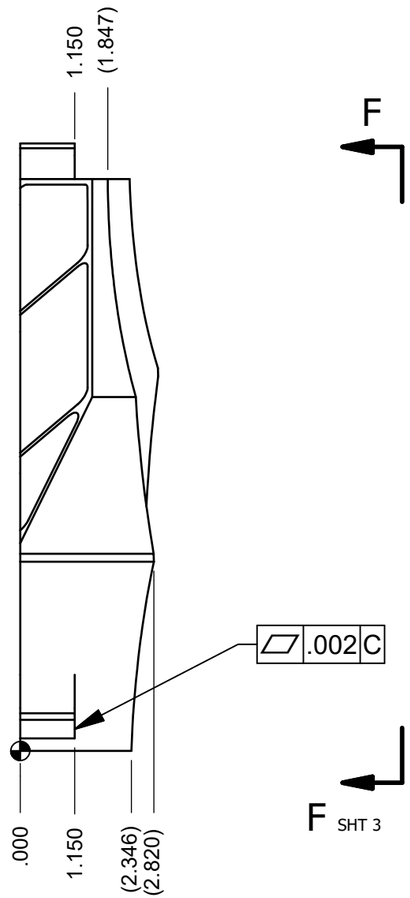
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		ENGINEER: N. EMERSON — DATE: 5/30/2018 — CATEGORY:
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± 1° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			DESIGNED BY: N. EMERSON — DATE: 5/30/2018 — PROJECT: TIME
			DRAWN BY: A. FERN — DATE: 5/30/2018 — TITLE: MIRROR P2
			CHECKED BY: A. FERN — DATE: 5/30/2018
			APPROVED: N. EMERSON — DATE: 5/30/2018
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	APPROVED: — DATE:
	NEXT ASSY	USED ON	APPROVED: — DATE: — DRAWING NUMBER: 26634 — SHEET 2 OF 7 — REVISION: A
FINISH: NONE	ASSEMBLY APPLICATION		APPROVED: — DATE:



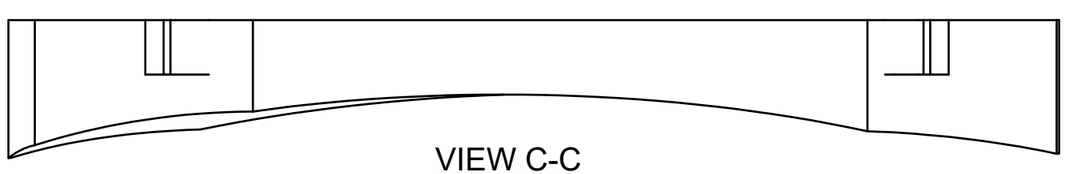
SECTION A-A
SCALE 5 / 16
(SEE BACK VIEW, SHT 2)



VIEW B-B
SCALE 5 / 16
(SEE BACK VIEW, SHT 2)



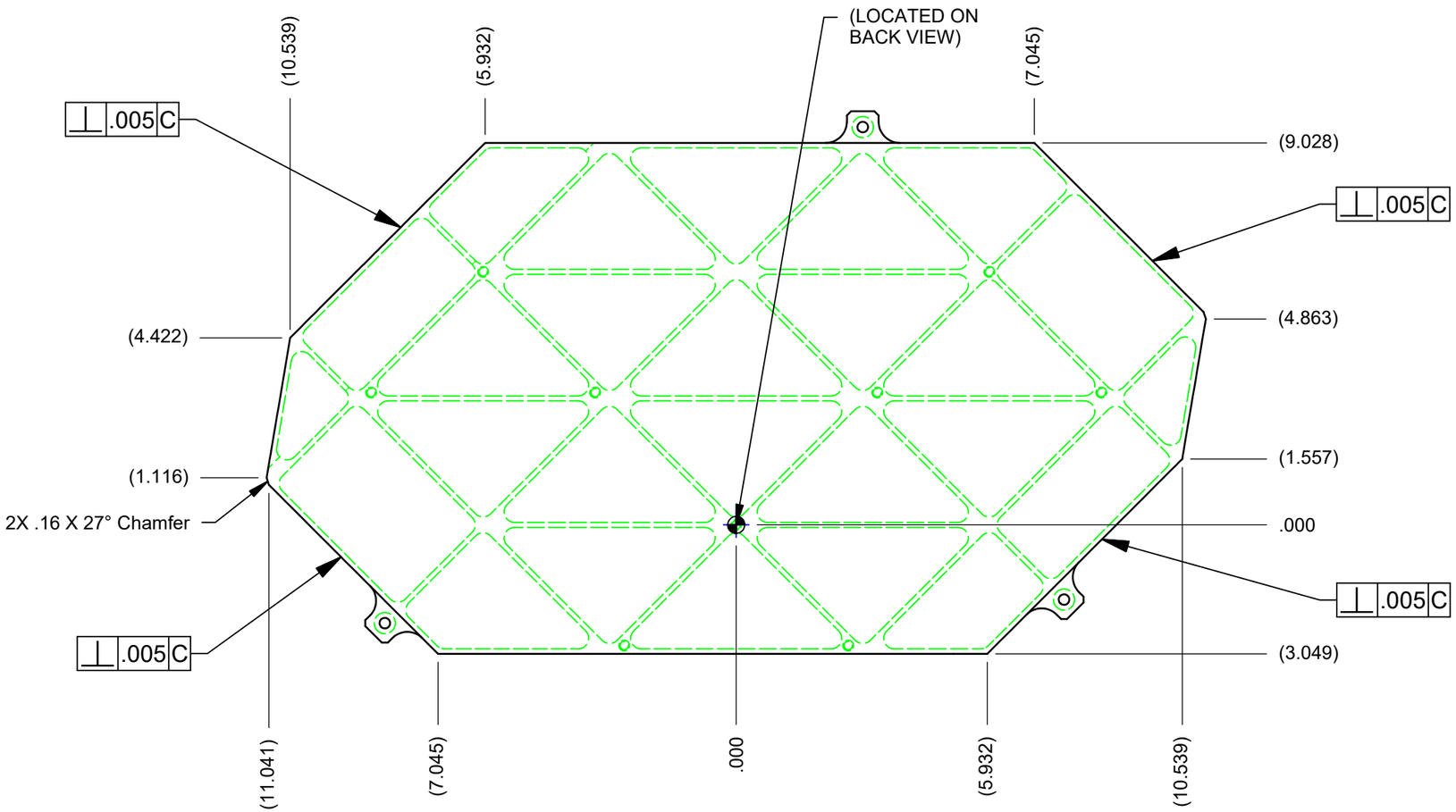
VIEW D-D
SCALE 5 / 16
(SEE BACK VIEW, SHT 2)



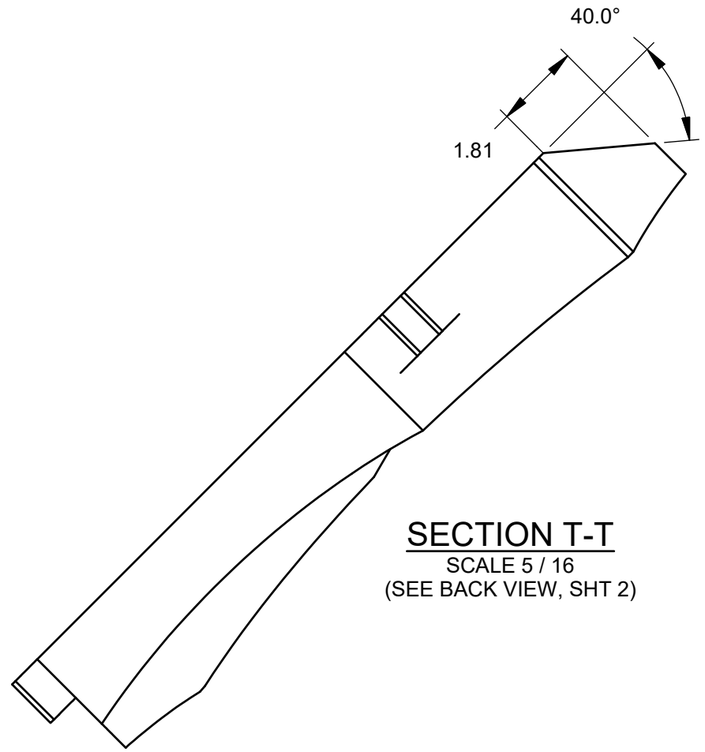
VIEW C-C
SCALE 5 / 16
(SEE BACK VIEW, SHT 2)

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		Steward Observatory, University of Arizona
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐ MECH ☐ IDEAS ☐ INV ■		933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± 1° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		ENGINEER: N. EMERSON	DATE: 5/30/2018
		DESIGNED BY: N. EMERSON	DATE: 5/30/2018
		DRAWN BY: A. FERN	DATE: 5/30/2018
		CHECKED BY: A. FERN	DATE: 5/30/2018
		APPROVED: N. EMERSON	DATE: 5/30/2018
	TIME	APPROVED:	DATE:
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	NEXT ASSY / USED ON	APPROVED:	DATE:
FINISH: NONE	ASSEMBLY APPLICATION	APPROVED:	DATE:

CATEGORY:
PROJECT: TIME
TITLE: MIRROR P2
DRAWING NUMBER: 26634
SHEET 3 OF 7
REVISION: A



VIEW F-F
SCALE 5 / 16
(SEE VIEW D-D, SHT 3)



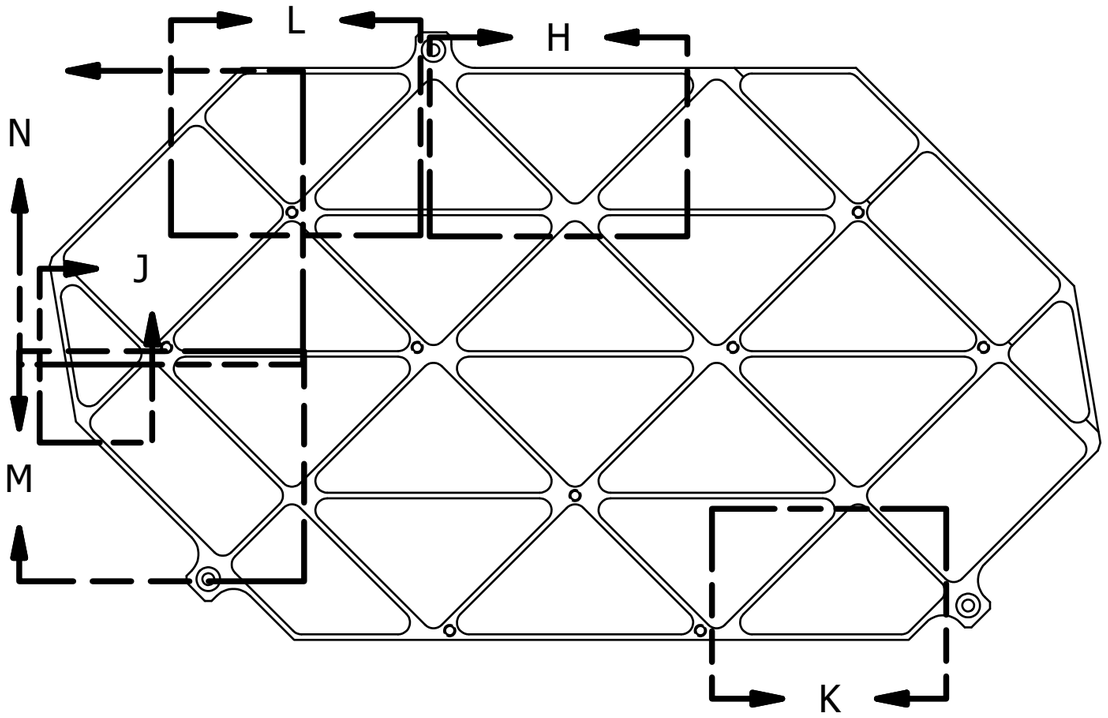
SECTION T-T
SCALE 5 / 16
(SEE BACK VIEW, SHT 2)

G

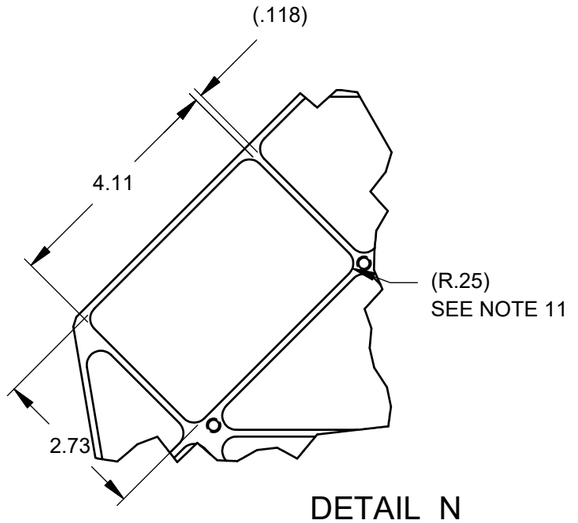
VIEW E-E
SCALE 5 / 16
(SEE BACK VIEW, SHT 2)

G SHT 4

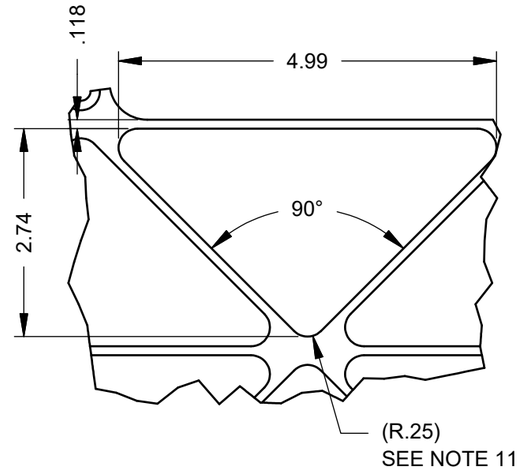
DO NOT SCALE DRAWING	THIS DRAWING CREATED IN: ACAD ☐ MECH ☐ IDEAS ☐ INV ■	Steward Observatory, University of Arizona 933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94		ENGINEER: N. EMERSON — DATE: 5/30/2018 — CATEGORY:
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± 1° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC		DESIGNED BY: N. EMERSON — DATE: 5/30/2018 — PROJECT: TIME DRAWN BY: A. FERN — DATE: 5/30/2018 — TITLE: MIRROR P2 CHECKED BY: A. FERN — DATE: 5/30/2018 APPROVED: N. EMERSON — DATE: 5/30/2018 APPROVED: — DATE:
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM	TIME NEXT ASSY — USED ON	APPROVED: — DATE: — DRAWING NUMBER: 26634 — SHEET 4 OF 7 — REVISION: A
FINISH: NONE	ASSEMBLY APPLICATION	APPROVED: — DATE:



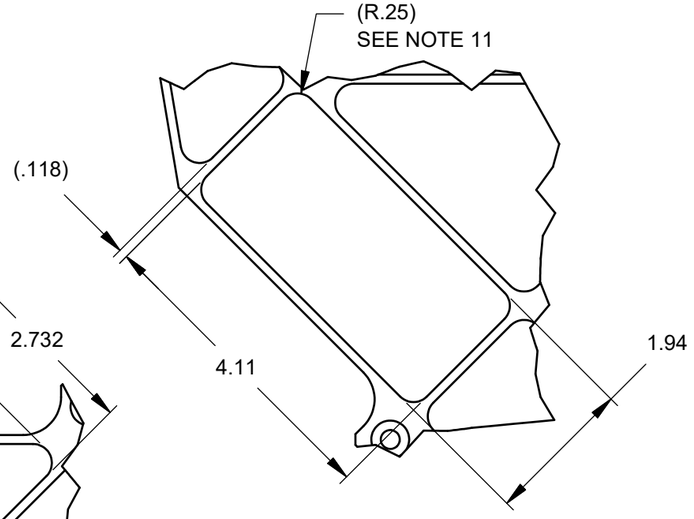
VIEW G-G
SCALE 5 / 16
(SEE VIEW E-E, SHT 4)



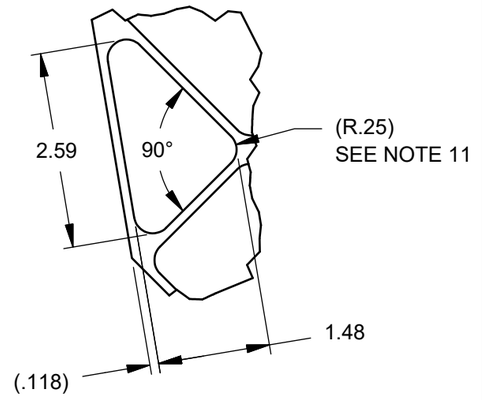
DETAIL N
SCALE 3 / 8
(2 PLACES)



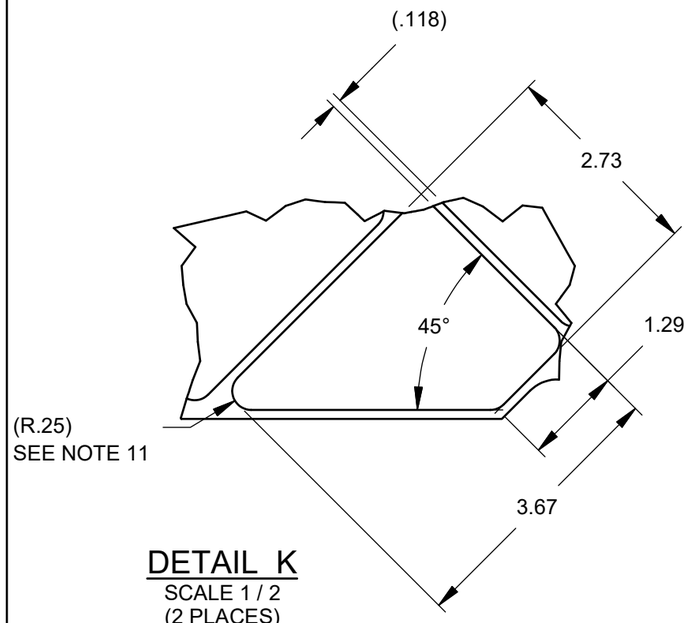
DETAIL H
SCALE 1 / 2
(TYP LARGE TRIANGLE DETAIL)



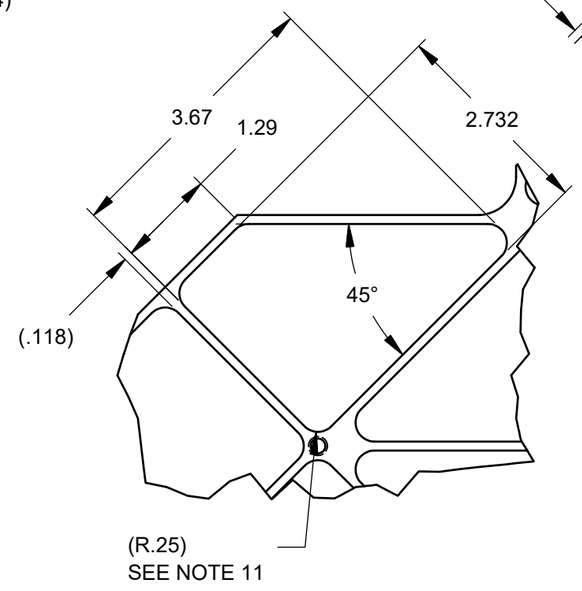
DETAIL M
SCALE 1 / 2
(2 PLACES)



DETAIL J
SCALE 1 / 2
(TYP SM TRIANGLE DETAIL)



DETAIL K
SCALE 1 / 2
(2 PLACES)

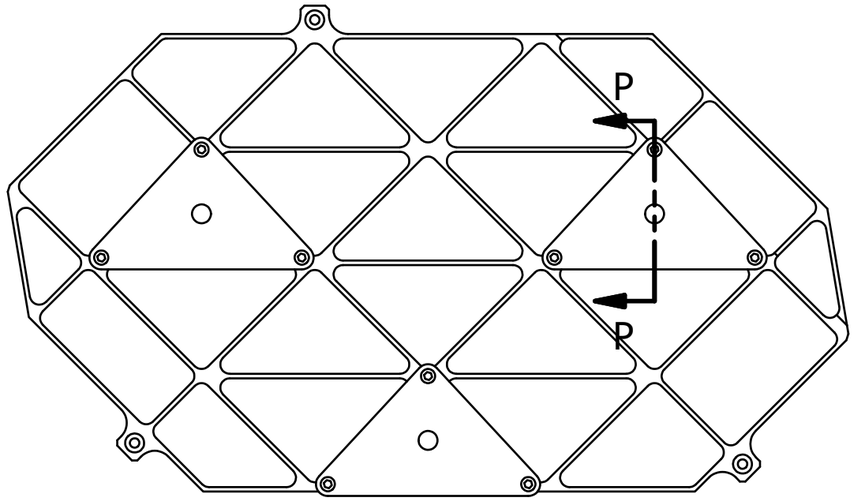


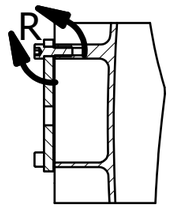
DETAIL L
SCALE 1 / 2
(2 PLACES)

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐ / INV ■
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± 1° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC			
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM		TIME	
	NEXT ASSY	USED ON	
FINISH: NONE	ASSEMBLY APPLICATION		

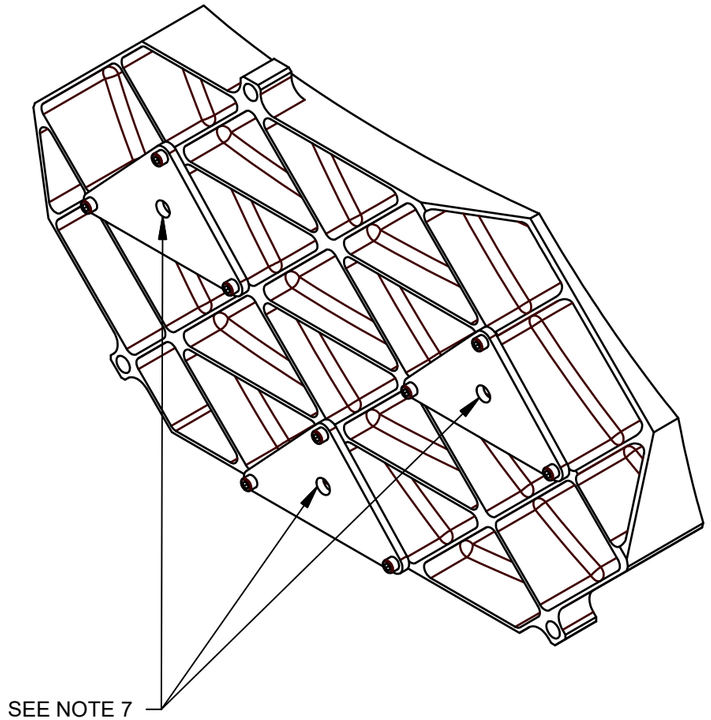
Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

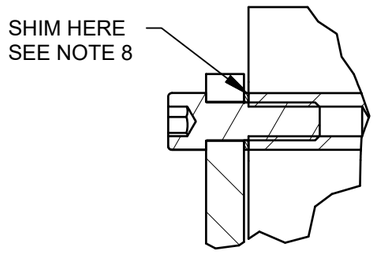
ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P2
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26634
APPROVED:	DATE:	SHEET 5 OF 7
		REVISION: A



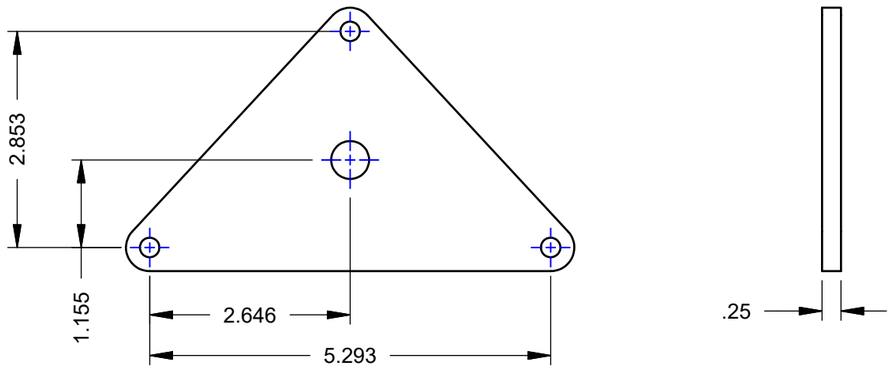


SECTION P-P
SCALE 1/4





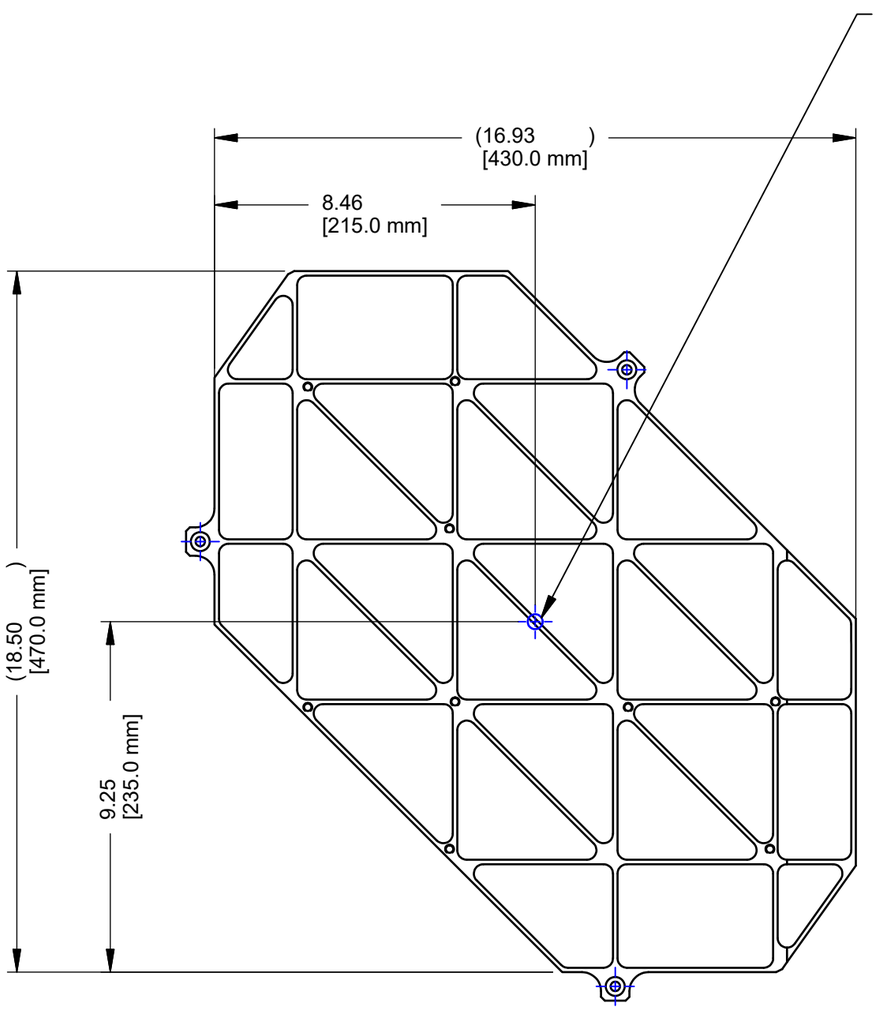
DETAIL R
SCALE 1

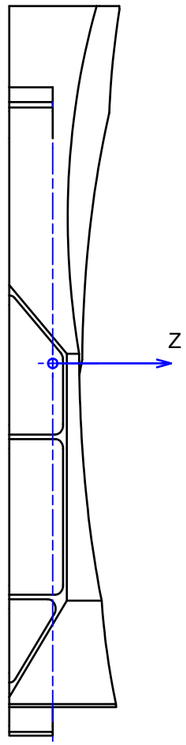


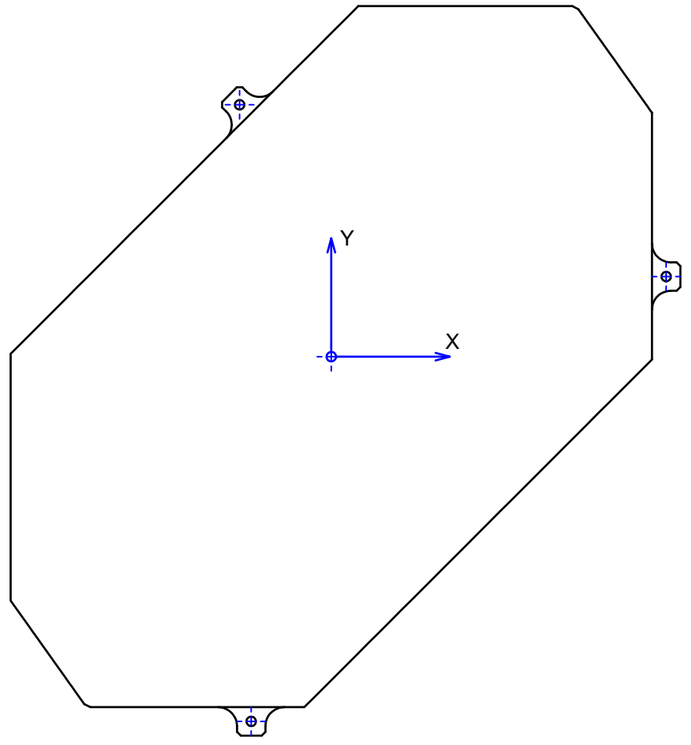
TYPICAL MEASUREMENT ADAPTOR PLATE DIMENSIONS

NOTE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND CAN NOT BE DISCLOSED WITHOUT THE WRITTEN CONSENT OF STEWARD OBSERVATORY.

DO NOT SCALE DRAWING	THIS DRAWING CREATED IN:				Steward Observatory, University of Arizona		
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94	ACAD ☐	MECH ☐	IDEAS ☐	INV ■	933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659		
TOLERANCES UNLESS OTHERWISE SPECIFIED LINEAR: .X = ± .1, .XX = ± .01, .XXX = ± .005 ANGULAR: ± 1° DIAMETRICAL: SEE SPEC S-002 DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC					ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
					DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
					DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P2
					CHECKED BY: A. FERN	DATE: 5/30/2018	
					APPROVED: N. EMERSON	DATE: 5/30/2018	
MATERIAL: MIC-6 OR EQUIV CAST ALUMINUM			TIME		APPROVED:	DATE:	
	NEXT ASSY		USED ON		APPROVED:	DATE:	DRAWING NUMBER: 26634
FINISH: NONE	ASSEMBLY APPLICATION				APPROVED:	DATE:	SHEET 6 OF 7 — REVISION: A







DO NOT SCALE DRAWING

INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-94

TOLERANCES
UNLESS OTHERWISE SPECIFIED

LINEAR	ANGULAR
.X = ± .1	± 1°
.XX = ± .01	
.XXX = ± .005	

DIAMETRICAL: SEE SPEC S-002

DIMENSIONS ARE IN INCHES / DIMENSIONS IN [ ] ARE METRIC

MATERIAL:
MIC-6 OR EQUIV
CAST ALUMINUM

FINISH:
NONE

THIS DRAWING CREATED IN:

ACAD	MECH	IDEAS	INV
☐	☐	☐	■

NEXT ASSY	USED ON
	TIME

ASSEMBLY APPLICATION

Steward Observatory, University of Arizona
933 N. Cherry Avenue, Tucson, AZ 85721 (520)621-7659

ENGINEER: N. EMERSON	DATE: 5/30/2018	CATEGORY:
DESIGNED BY: N. EMERSON	DATE: 5/30/2018	PROJECT: TIME
DRAWN BY: A. FERN	DATE: 5/30/2018	TITLE: MIRROR P2
CHECKED BY: A. FERN	DATE: 5/30/2018	
APPROVED: N. EMERSON	DATE: 5/30/2018	
APPROVED:	DATE:	
APPROVED:	DATE:	DRAWING NUMBER: 26634
APPROVED:	DATE:	SHEET 7 OF 7

REVISION: A