

*TONY  
FRANLEY  
(canceled)*



# INSTALLATION OF THE RICH PHOTON SHIELD

procedure name

## PHENIX Procedure No. PP-2.5.5.4-16

Revision: A

Date: 9-28-00

### Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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### Approvals

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PHENIX S E & I    Date

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Cognizant Scientist/Engineer    Date  
/Activity Manager

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PHENIX Safety    Date

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CA-D SAFETY    Date

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*A Frawley*  
\_\_\_\_\_  
Cognizant Scientist/Engineer  
/Activity Manager

\_\_\_\_\_  
PHENIX Safety    Date

\_\_\_\_\_  
CA-D SAFETY    Date

REVISION CONTROL SHEET

LETTER	DESCRIPTION	DATE	WRITTEN BY	APPROVED BY	CURRENT OVERSIGHT
A	Never Issued. A note in the file written by T. Frawley indicates that this procedure was cancelled.	9/28/2000	T. Frawley	n/a	n/a
RETIRED	For posterity a copy of this unreleased procedure is to be filed in the inactive procedure folder	3/20/2007	n/a	D. Lynch, P. Giannotti, R. Pisani for PHENIX	D. Lynch

## **1.0 Purpose and Scope**

The scope of this procedure is those operations that are necessary for installing the lead photon absorber on the central magnet, in front of the PHENIX Ring Imaging Cherenkov Counter (RICH). Operations in this procedure include the following:

1. Drilling and tapping holes in the central magnet that will be used to mount the lead blocks that make up the photon shield.
2. Installing the lead blocks on the central magnet.

## **2.0 Responsibilities**

- 2.1 Florida State University will provide the following items:

The fixture that will be used during drilling and tapping of the bolt holes in the central magnet.

The finished lead blocks that will be mounted to the central magnet.

The lifting attachment for the lead blocks that will be needed during installation.

All of the hardware needed to mount the lead blocks to the central magnet.

- 2.2 BNL will provide:

All required rigging equipment.

A magnetic drill capable of drilling and tapping ½" bolt holes in the magnet steel, along with compatible drills and taps.

The personnel who will perform this procedure.

## **3.0 Prerequisites**

None.

## **4.0 Precautions**

- 4.1 The lead blocks that form the photon shield weigh approximately 500 lbs each, leading to the possibility that improper handling will result in injury or damage to equipment. All operations involving handling of the lead bricks must be performed by qualified personnel.

## 5.0 Procedure

Refer to fig. 1 for the location on the central magnet where the lead blocks are to be installed. Refer to fig. 2 for a drawing showing the fixture to be used to drill and tap the holes in the central magnet. Refer to fig. 3 for a drawing showing a lead block. Refer to fig. 4 for a drawing of the lifting attachment for the lead blocks.

The following procedure has to be performed four times, twice on the north central magnet and twice on the south central magnet. The installations on opposite sides of the beam line are mirror images of each other. The drilling fixture must be rotated 180 degrees to interchange top and bottom when changing from one side of the beam line to the other.

### 5.1. Installing the fixture for drilling and tapping the bolt holes.

The fixture is to be mounted on the 3.15" wide steel collar that forms the outer boundary of the notch in the pole face for the outer magnet coil (see fig. 1). This collar is not continuous, having a gap at the bottom where the magnet return yoke is.

- 5.1.1 The location of the bottom of the fixture must first be established. This is done by measuring with a tape measure a distance of 59.9" from the lower end of the collar. Measure along the outer radius of the collar, and mark the collar. The precision needed here is plus or minus 1/8" or so.
- 5.1.2. Move the drilling fixture into place and align the bottom of the fixture with the mark on the collar established in 5.1.1. Push the drilling fixture against the top of the magnet collar.
- 5.1.3. Clamp the drilling fixture to the magnet collar by tightening down the 1/4"-20 bolts in the side plates of the fixture (see the assembly drawing in fig. 2) until they bite into the magnet steel. Tighten down the bolts on the outer radius first, to draw the inner radius of the fixture hard up against the inner radius of the magnet collar.
- 5.1.4. When all of the bolts in the side plates have been tightened securely, so that the fixture will not lift up against the force exerted during the drilling of the holes in the magnet, the drilling fixture is installed.

### 5.2. Drilling and tapping the bolt holes.

Drilling and tapping is to be done with a magnetic-base drill that will clamp to the steel drilling fixture. The drill will be guided by bushings in the appropriate locations

- 5.2.1. Install a 27/64" ID bushing in the drilling fixture at the first hole to be drilled, and tighten the anti-rotation lock screw. Insert a 27/64" center-drill bit in the magnetic drill chuck.
- 5.2.2. Position the magnetic drill so that the drill is centered on the bushing, and clamp the magnetic base in place. Drill into the magnet collar to a depth

of 1.25". This requires that the drill extend a total of 2.6" below the top of the drill bushing flange.

- 5.2.3. Remove the center-drill bit and replace it with a standard 27/64" drill bit. Finish the hole to a depth of 2.6" below the top of the drill bushing flange.
- 5.2.4. Remove the 27/64" ID bushing and replace it with a 1/2" ID bushing, and tighten the anti-rotation lock screw. Replace the 27/64" drill with a 1/2"-13 tap.
- 5.2.5. Tap the hole to a depth of 1". This requires the tap to extend a total of 2.35" below the top of the drill bushing flange.
- 5.2.6. Move to the next hole in the drilling fixture and repeat steps 5.2.1. through 5.2.5. for that hole, and for all subsequent holes in the drilling fixture.
- 5.2.7. Once all holes are drilled and tapped, remove the drilling fixture from the magnet collar and clean the holes. If necessary, the holes can be finished by hand with a bottom tap.

### 5.3 Installing the lead blocks

The lead shielding blocks have to be installed in order from the lowest to the highest. This is because the area above each block has to be clear for lifting it into place.

- 5.3.1. Screw the 9.25" long studs (provided) into the lowest three tapped holes in the magnet collar. These will accept the first lead block. Install only the studs that will accept the block to be installed, since the area above the block has to be kept clear during installation.
- 5.3.2. Before each lead block is lifted into place, the 3/4" OD SS tubes should be inserted into all three holes in the block – see fig. 3.
- 5.3.3. Bolt the lifting attachments to both sides of the first lead block – see fig. 4.
- 5.3.4. Using the overhead crane, move the block into place over the studs in the lowest three holes in the magnet collar, and rotate the lead brick on the lifting attachment until the holes in the lead block are aligned with the studs in the magnet collar. Slide the lead brick onto the three studs.
- 5.3.5. Place a 1.25" OD 304 stainless steel washer (provided) on the threaded end of the two outside studs (the center stud is inaccessible because of the lifting attachment) and put a nut over it.
- 5.3.6. Remove the lifting attachment from the lead block.

- 5.3.7. Add a washer and nut to the threaded end of the center stud, and tighten all three nuts to 10 in-lbs using a torque wrench.
- 5.3.8. Repeat 5.3.1. through 5.3.7. for the next lead block, locating it immediately above the first. Repeat until all six lead blocks have been installed .

Once all six lead blocks have been mounted in the first location, install six lead blocks in each of the other three locations (see fig. 1), repeating all of the steps in sections 5.1, 5.2 and 5.3 in each location. The drilling fixture will have to be rotated 180 degrees to interchange top and bottom when going from one side of the beam line to the other.

## **6.0 Documentation**

None.

## **7.0 References**

None.

## **8.0 Attachments**

Fig. 1. Schematic showing location of the RICH photon shield on the central magnet.

Fig. 2. Schematic showing the drilling fixture used for drilling and tapping the holes in the central magnet.

Fig. 3. Schematic showing the lead shielding blocks to be installed.

Fig. 4. Schematic showing the lifting attachments for handling the lead blocks during installation.

Fig. 1

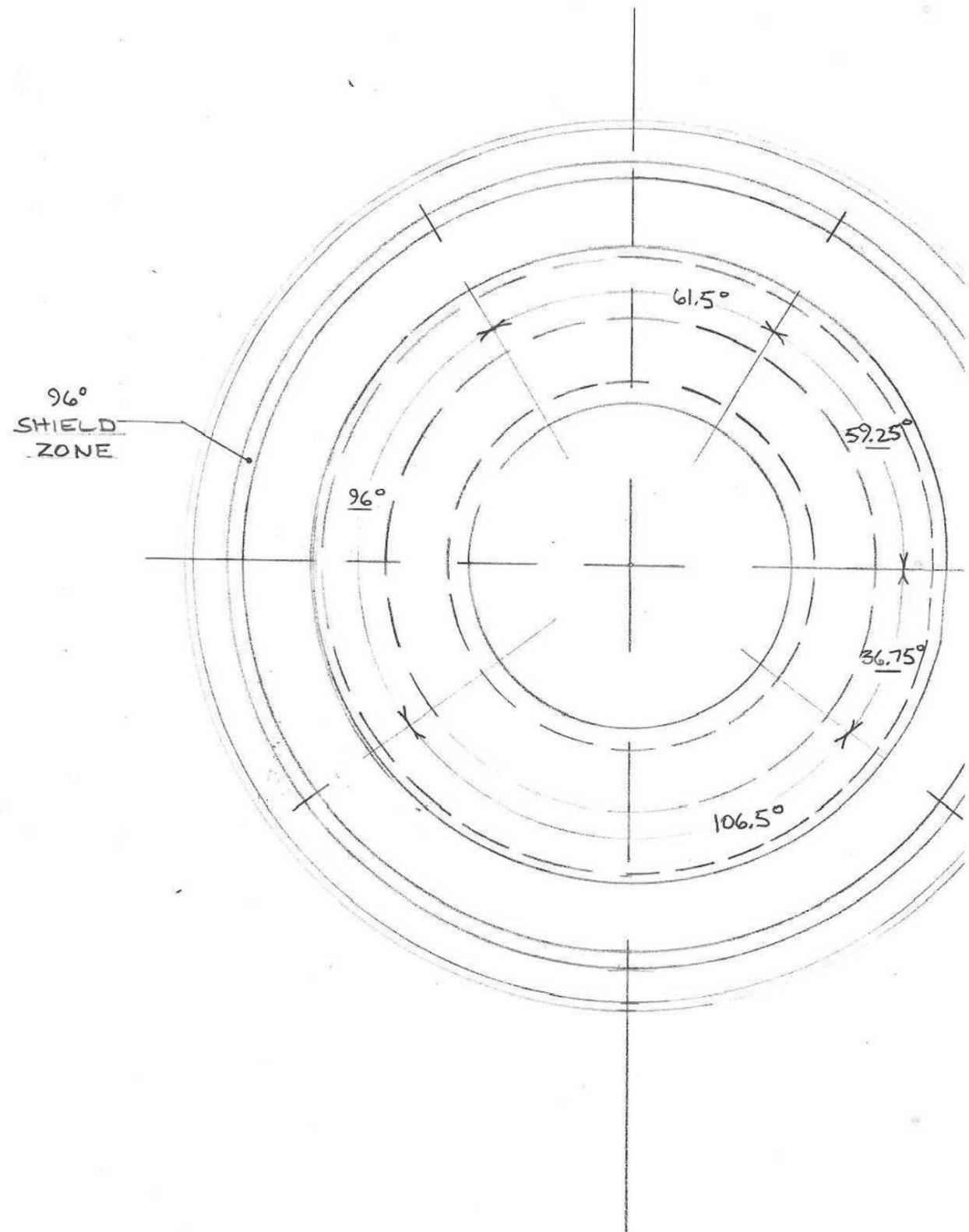
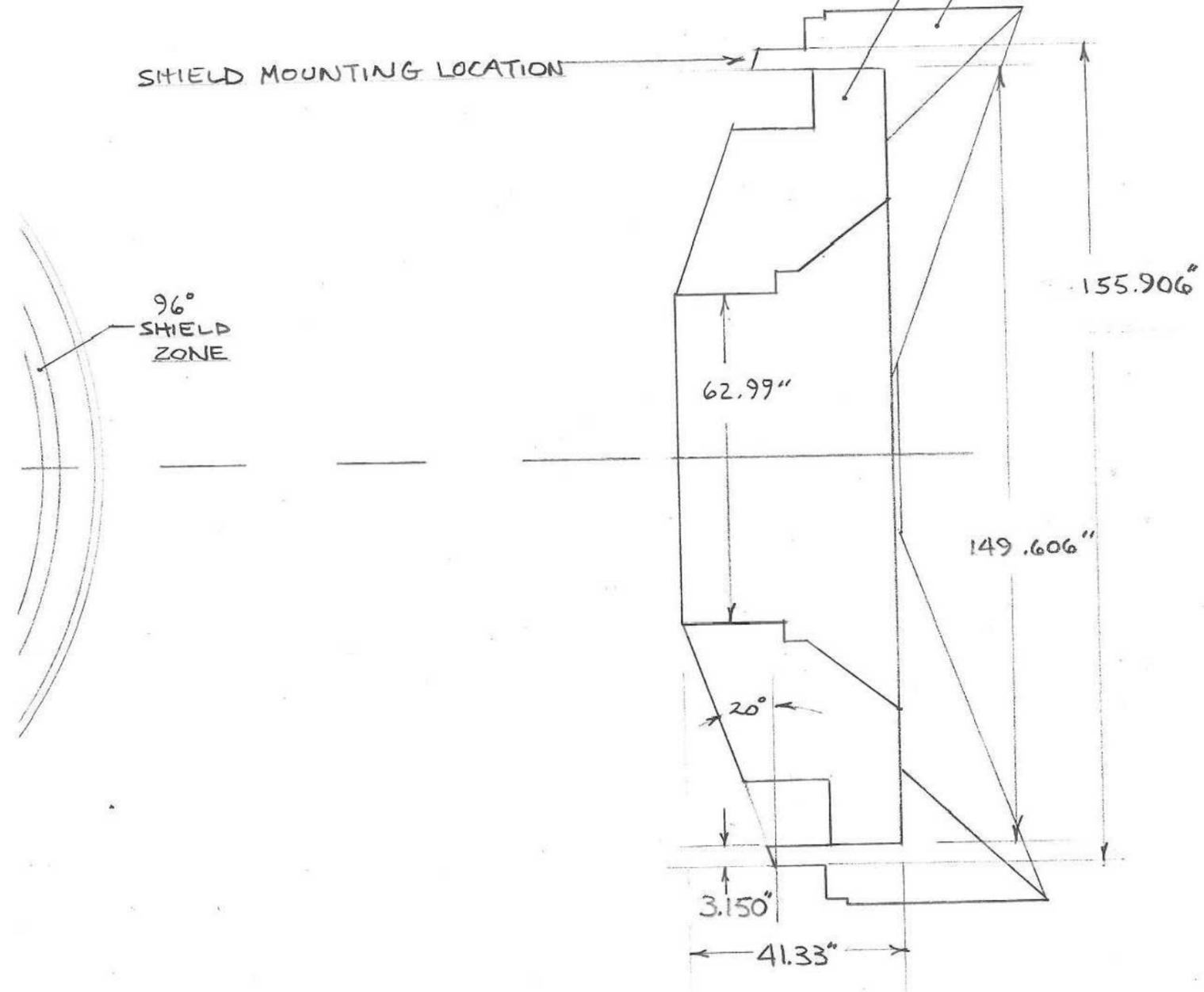


Fig 1/2



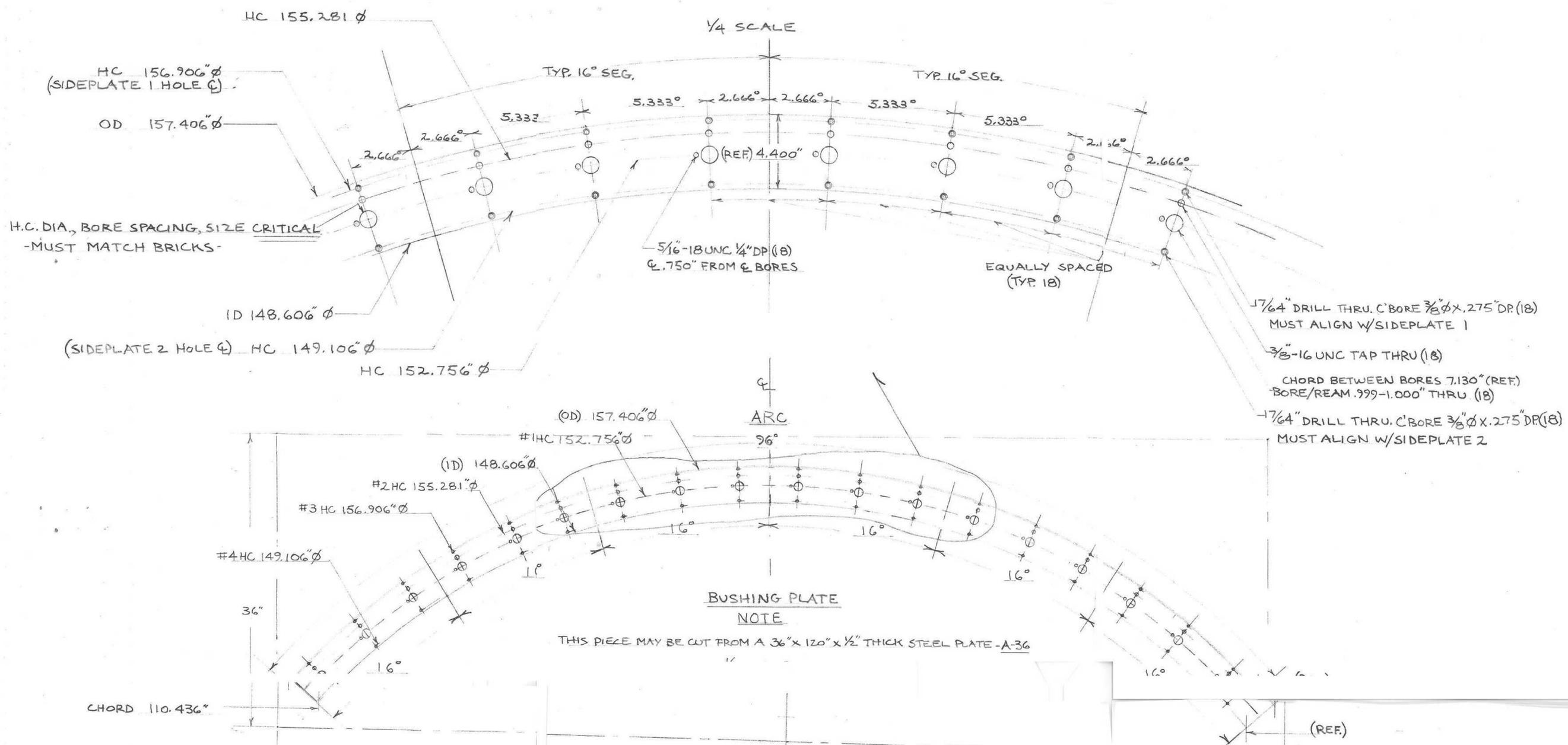
\*SEE RAA 93-104183-0A C5  
ASSY SECTION

DWG. NO. 0020207900 @ 10/12/2000

LOCATION-CENTRAL MAGNET, TYP (2)

RADIATION SHIELD

DRN. 4/23/2000 BY RBC.XSCALE 1/27.



H.C. DIA., BORE SPACING, SIZE CRITICAL  
-MUST MATCH BRICKS-

TYP. 16° SEG. TYP. 16° SEG.

5/16"-18 UNC 1/4" DP (18)  
CL 7.750" FROM CL BORES

EQUALLY SPACED  
(TYP. 18)

1/64" DRILL THRU. C'BORE 3/8" X .275" DP (18)  
MUST ALIGN W/SIDEPLATE 1

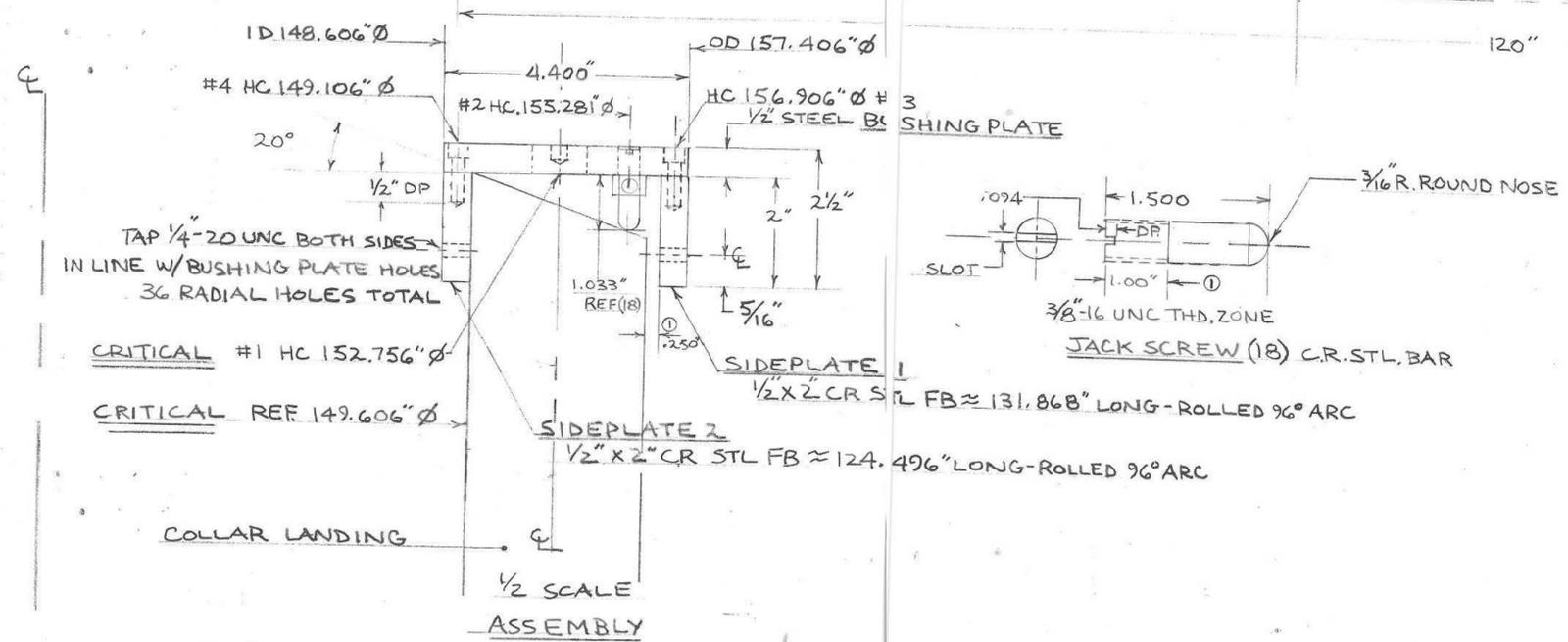
3/8"-16 UNC TAP THRU (18)

CHORD BETWEEN BORES 7.130" (REF.)  
BORE/REAM .999-1.000" THRU (18)

1/64" DRILL THRU. C'BORE 3/8" X .275" DP (18)  
MUST ALIGN W/SIDEPLATE 2

BUSHING PLATE  
NOTE

THIS PIECE MAY BE CUT FROM A 36" X 120" X 1/2" THICK STEEL PLATE -A-36

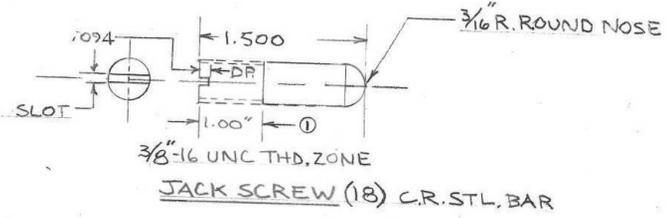


TAP 1/4"-20 UNC BOTH SIDES  
IN LINE W/BUSHING PLATE HOLES  
36 RADIAL HOLES TOTAL

CRITICAL #1 HC 152.756" Ø

CRITICAL REF. 149.606" Ø

1/2 SCALE  
ASSEMBLY



JACK SCREW (18) C.R. STL. BAR

QTY	BILL OF MAT'L'S.	USE
18	1/4"-20 X 3/4" GR 8 HH BOLT	SP. PLATE 2
18	1/4"-20 X 1" GR 8 HH BOLT	SP. PLATE 1
36	1/4"-20 X 3/4" SHCS GR 8	BUSH. PLT.
18	3/4" ID X 1.00" X 3/4" LG. BUSH	SLIP FIT BUSH PLT. *
10	3/4" OD X 2 1/2" ID X 3/4" LG	SLIP FIT BUSH PLT. *
10	3/4" OD X 1/2" ID X 3/4" LG	SLIP FIT BUSH PLT. *
10	3/16"-18 THD LOCK SCR	SLIP FIT BUSH PLT. *
18	3/8"-16 JACKSCREW	BUSH. PLT.
18	3/8"-16 HEX NUT	BUSH. NUT BUSH PLT

© DWG. NO. 0020207901

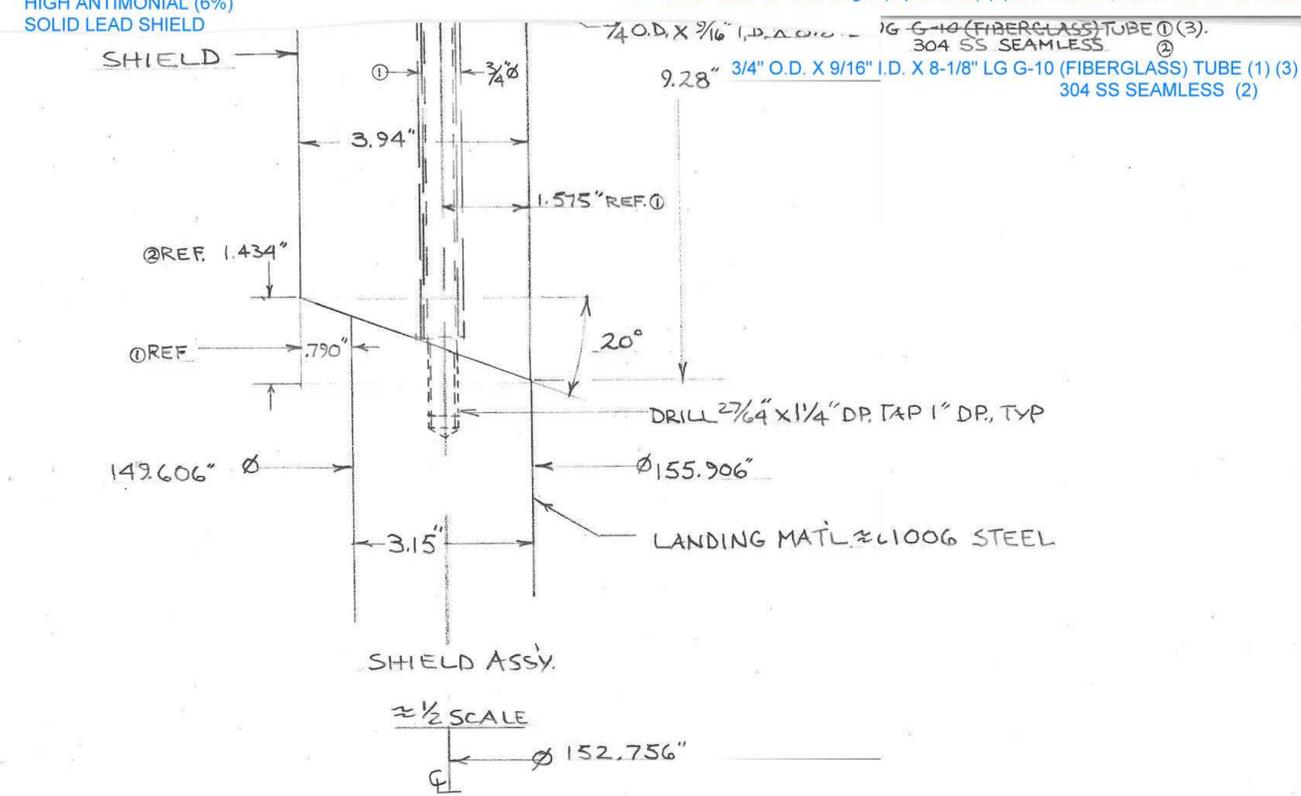
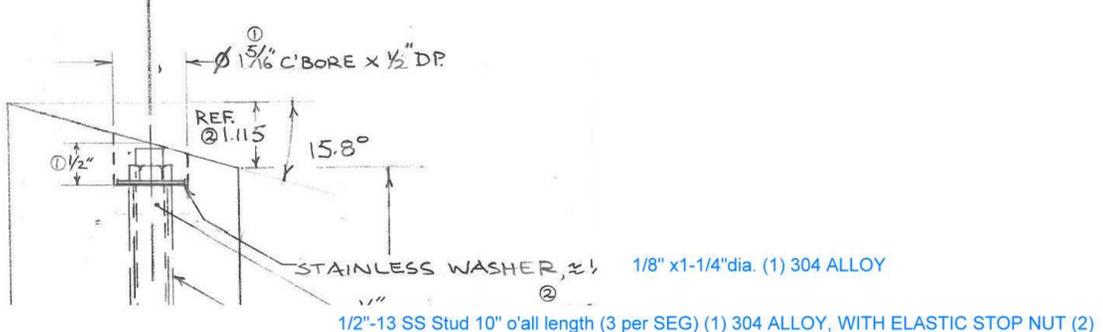
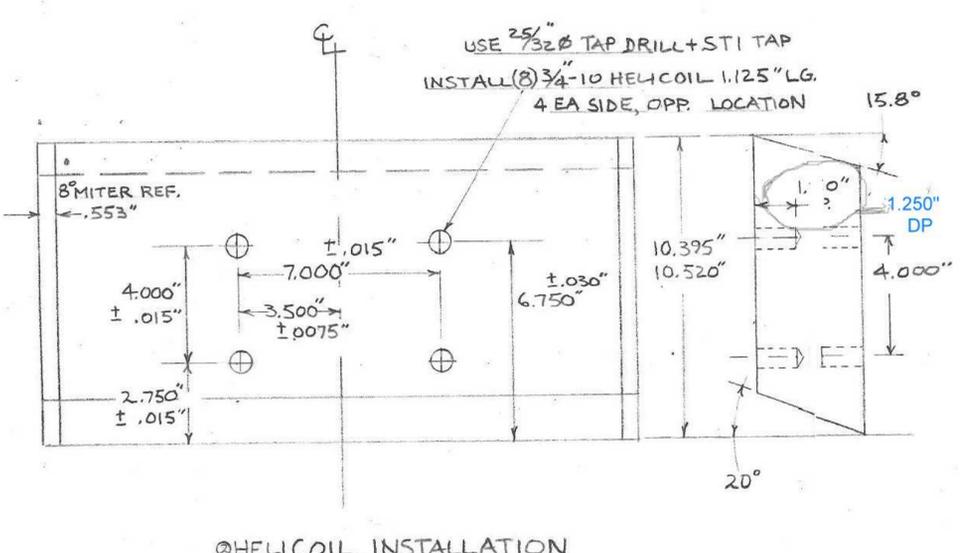
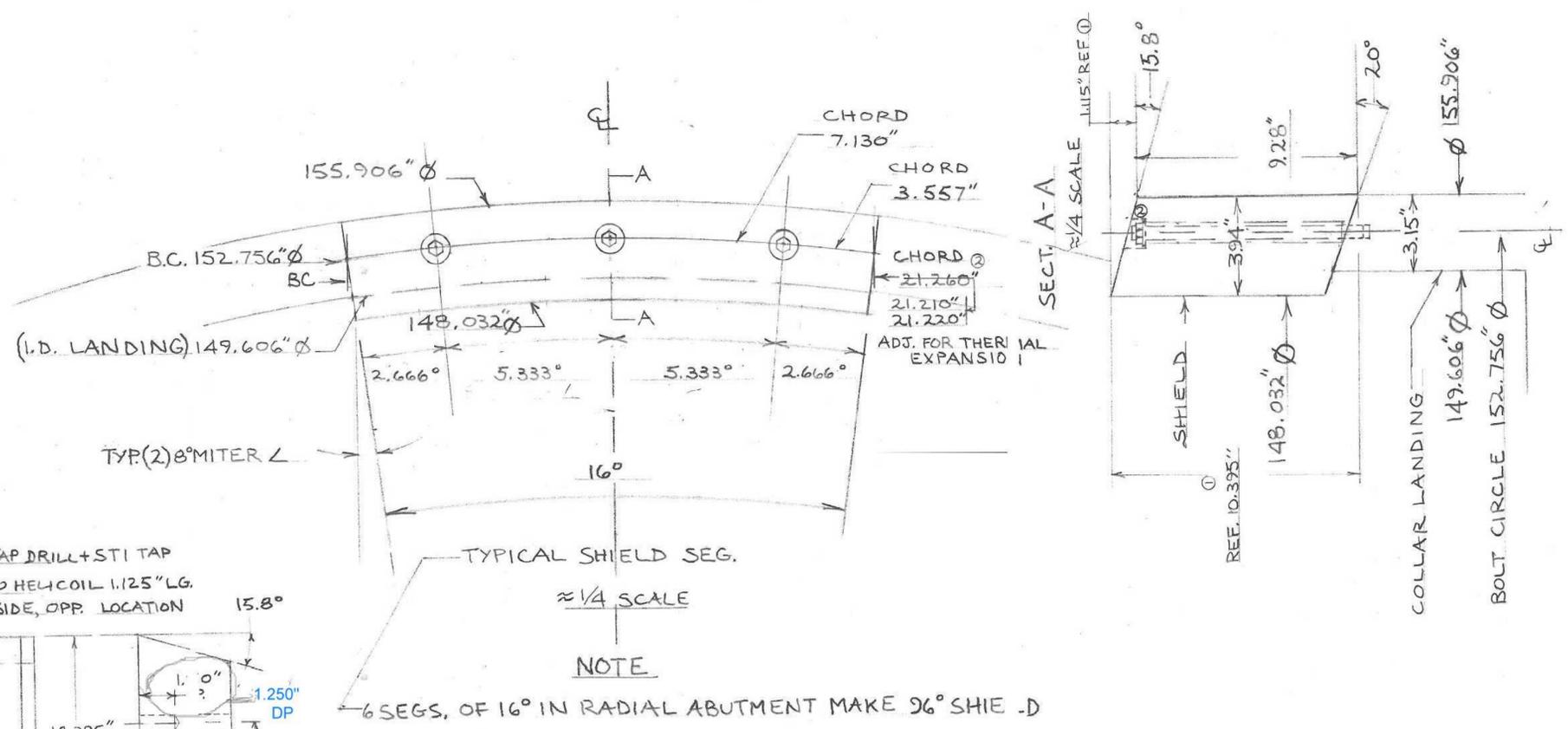
FIELD DRILLING JIG  
CENTRAL MAGNET SHIELD

DETAILS & ASSEMBLY

DRN. 8/8/2000 RBC-FSU

REVISION
① 8/17/2000
② 10/12/2000

Fig. 3



DWG. NO. 002020790<sup>2</sup>

1 SEGMENT  
CENTRAL MAGNET SHIELD  
CONCEPTUAL SKETCH  
DRN. 7/21/2000 RBC-FSU.

REVISION	
1	8/17/2000
2	10/12/2000

