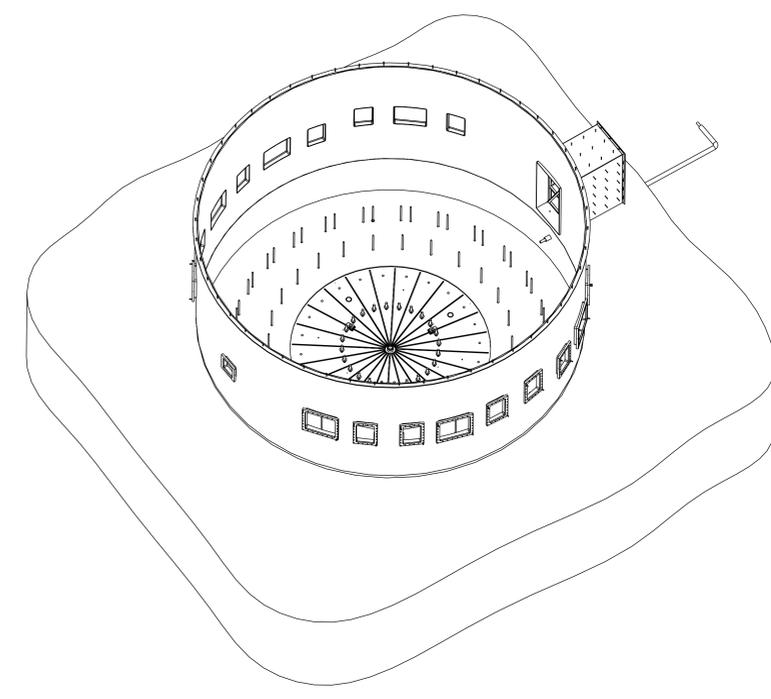
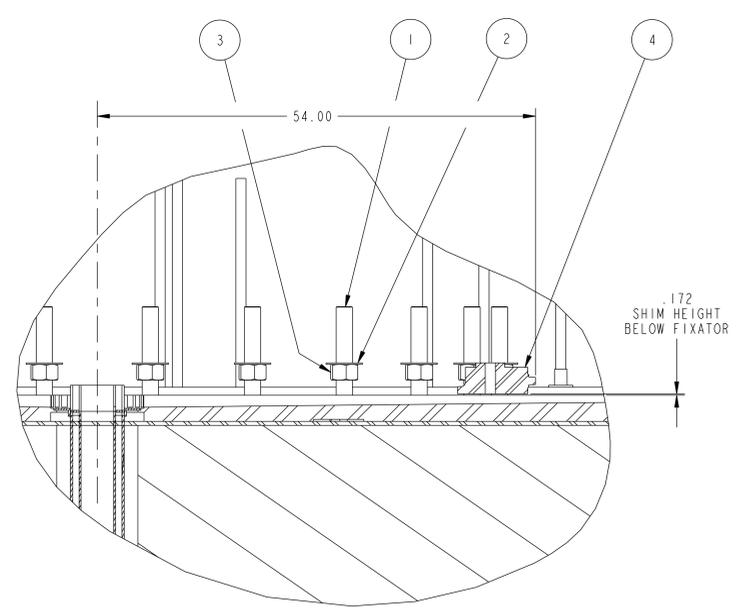


DETAIL X  
SCALE 0.13

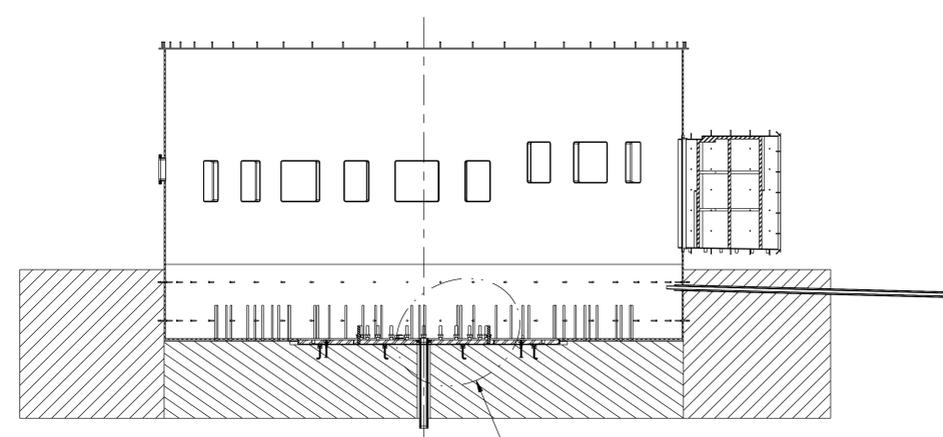
- INSTALLATION SEQUENCE
1. INSTALL STUDS FOR INNER SUPPORT CYLINDER IN BASE PLATE
  2. INSTALL NUT AND WASHER ON EACH STUD
  3. POSITION RK FIXATORS AT THREE LOCATIONS SHOWN BETWEEN STUDS. PLACE FIXATORS ON 0.172 INCH THICK SHIM PLATE.
  4. PLACE GROUT SHIELDS IN TROUGHS OF BASE PLATE



SCALE 0.02



SECTION B-B  
SCALE 0.13



SECTION A-A  
SCALE 0.02

QUALITY VERIFICATION  
MECHANICAL AND STRUCTURAL  
REFERENCE SNS-TS-G002

| QV CLAUSE | DOCUMENTS REQUIRED                 | APPLICABLE TO PART NO. |
|-----------|------------------------------------|------------------------|
| 303       | MATERIAL MILL TEST REPORT          | -                      |
| 325       | MATERIAL SELLER CERT               | -                      |
| 326       | SPECIM. MATERIAL INSPECTION REPORT | -                      |
| 205       | WELDING INSPECTION AND TEST PLAN   | -                      |
| 312       | FIELD INSPECTION AND TEST PLAN     | -                      |
| 321       | WELD AND BRAZE INSPECTION REPORT   | -                      |
| 322       | HEAT TREAT REPORT (W/CERT)         | -                      |
| 310       | LEAK TEST REPORT                   | -                      |
| 315       | CLEANING CERT                      | -                      |
| 318       | DEVIATION REQUEST                  | -                      |
| 319       | NONCONFORMANCE PROCESS             | -                      |
| 323       | DIMENSIONAL REPORT                 | -                      |
| 330       | FUNCTIONAL TEST REPORT             | -                      |
| 100       | DOCUMENTATION                      | -                      |

\* SYMBOL 1 INDICATES APPLICABLE TO ALL PARTS OR ITEMS

| QTY | CAGE CODE              | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION     | MATERIAL | SPECIFICATION | FIND NO. |
|-----|------------------------|-------------------------|---------------------------------|----------|---------------|----------|
| 1   |                        |                         | 4X8 CONCENTRIC REDUCER SCH 40   |          |               | 16       |
| 1   | 106040102M8E8700A006-1 |                         | CV DRAIN LINE SECTION 1 SUBASSY |          |               | 15       |
| 2   | 106040105M8E8700A008-1 |                         | LOWER SHIELD RING ASSY 5        |          |               | 14       |
| 4   | 106040105M8E8700A007-1 |                         | LWER SHIELD RING ASSY 4         |          |               | 13       |
| 3   | 106040105M8E8700A006-1 |                         | LOWER SHIELD RING ASSY 3        |          |               | 12       |
| 1   | 106040105M8E8700A005-1 |                         | LOWER SHIELD RING ASSY 2        |          |               | 11       |
| 1   | 106040105M8E8700A004-1 |                         | LOWER SHIELD RING ASSY 1        |          |               | 10       |
| 1   | 106040105M8E8700A003-1 |                         | LOWER SHIELD DISK SPHERICAL     |          |               | 9        |
| 2   | 106040105M8E8700A002-1 |                         | LOWER SHIELD CENTER DISK 2      |          |               | 8        |
| 4   | 106040105M8E8700A001-1 |                         | LOWER SHIELD CENTER DISK 1      |          |               | 7        |
| 1   | 106040101M8E8700A012-1 |                         | OUTER SUPPORT CYLINDER ASSEMBLY |          |               | 6        |
| 1   | 106040101M8E8700A005-1 |                         | INNER SUPPORT CYLINDER WELDMENT |          |               | 5        |
| 6   |                        |                         | RK 111 FIXATOR                  |          |               | 4        |
| 48  |                        |                         | 2 INCH WASHER                   |          |               | 3        |
| 48  |                        |                         | 2 INCH NUT                      |          |               | 2        |
| 24  |                        |                         | 2 INCH DIAMETER THREADED ROD    |          |               | 1        |

PARTS LIST

DES: D EVERITT 12/01  
 DRW: R TAYLOR 12/01  
 CHK: RR ALLEN 1/02  
 L3: DA EVERITT 1/02  
 L2: T J McMANAMY 1/02

TOLERANCES UNLESS OTHERWISE SPECIFIED:  
 FRACTIONS: :  
 XX DECIMALS: ±.01  
 XXX DECIMALS: ±.005  
 ANGLES: ±0'15"  
 BREAK SHARP EDGES OR MAX.  
 FINISH: 125 RMS UNLESS OTHERWISE SPECIFIED

Oak Ridge National Laboratory  
 operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725  
 Oak Ridge, Tennessee

Spallation Neutron Source

TARGET SYSTEMS  
 CORE VESSEL INSTALLATION  
 PHASE I

BLDG: 8700 FL: SHT: OF: CLASS: I 9 U  
 106040100M8E8700A011

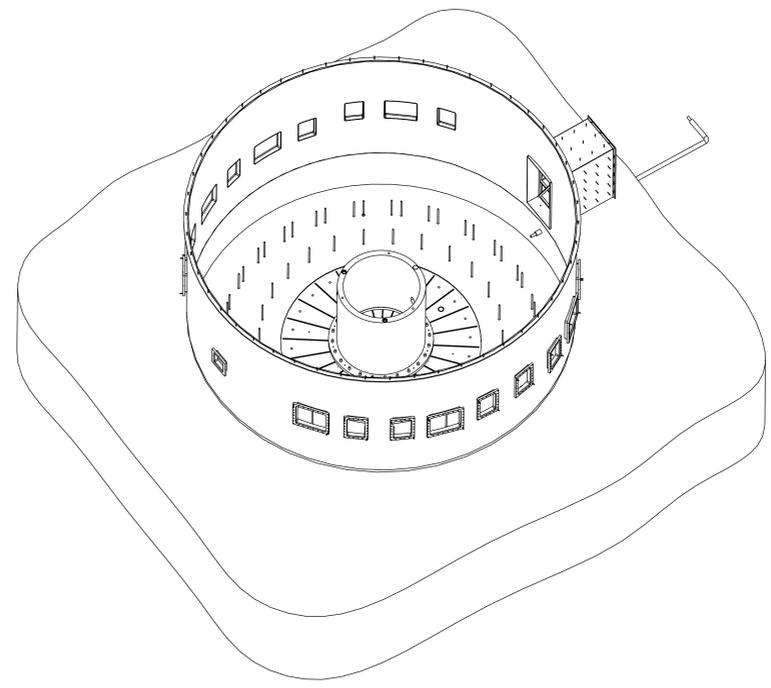
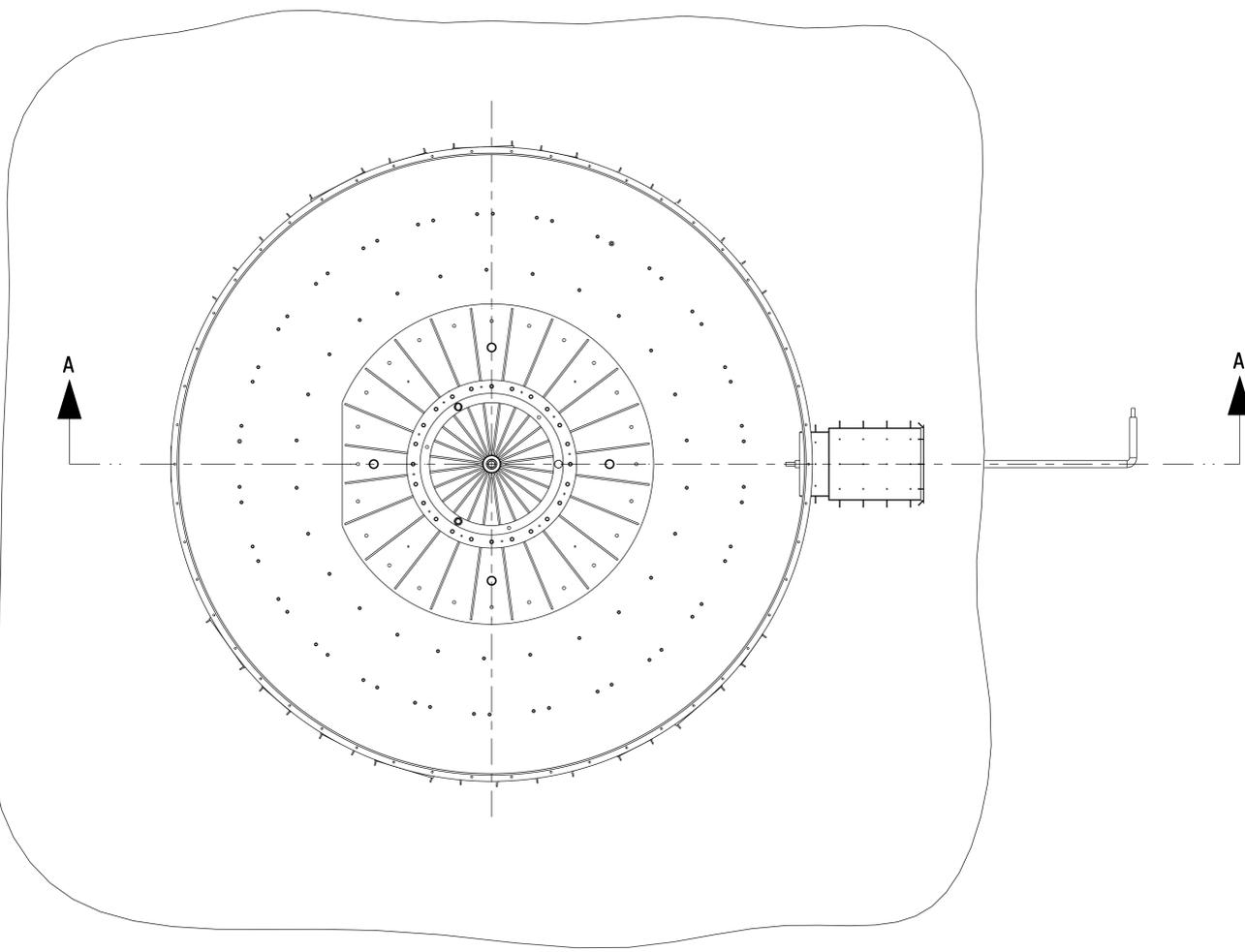
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**P** THIS DRAWING PRODUCED ON PRO-ENGINEER  
 THIS DOCUMENT CONTROLLED BY CHANGE CONTROL SYSTEM...XXXX...  
 SNS PROCEDURE...XXXX...

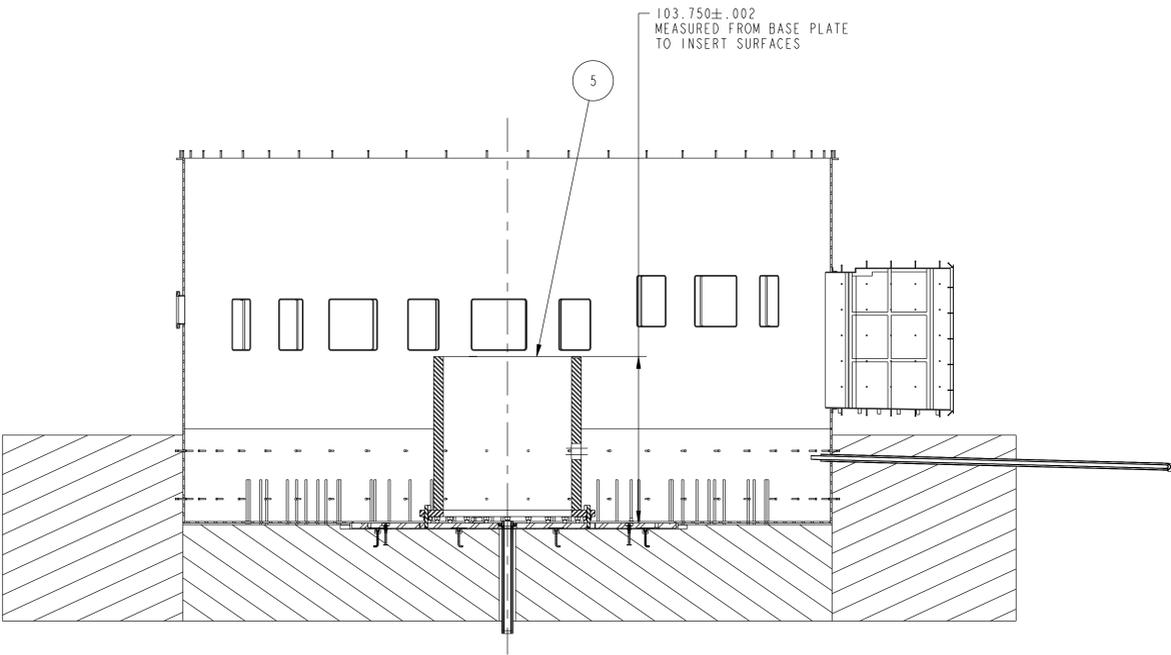
| REV | DATE | BY  | CHK | SECT | DEPT | DATE  | PE | REQ | DOE |
|-----|------|-----|-----|------|------|-------|----|-----|-----|
| 000 |      |     |     |      |      |       |    |     |     |
| 3   |      | RWT |     |      |      | 12/01 |    |     |     |

PRELIMINARY

- INSTALLATION SEQUENCE
1. PLACE INNER SUPPORT CYLINDER OVER STUDS
  2. USING LASER TRACKER, BRING SUPPORT CYLINDER TO PROPER ELEVATION, POSITION, AND ORIENTATION. TOOLING BALL HOLES ARE PROVIDED IN THE TOP OF THE CYLINDER. TOOLING BALLS MUST BE WITHIN 0.005 INCHES OF TRUE POSITION WITH RESPECT TO THE PROTON BEAM LINE AND THE CENTERLINE AXES OF THE MONOLITH
  3. TURN LOWER NUTS TO BRING LOWER WASHERS UP TO BOTTOM OF FLANGE.



SCALE 0.02



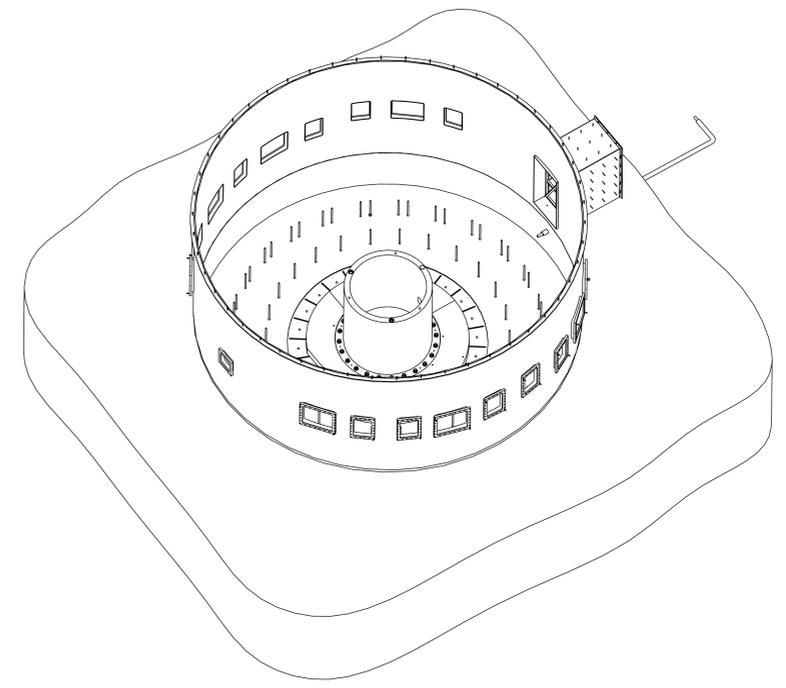
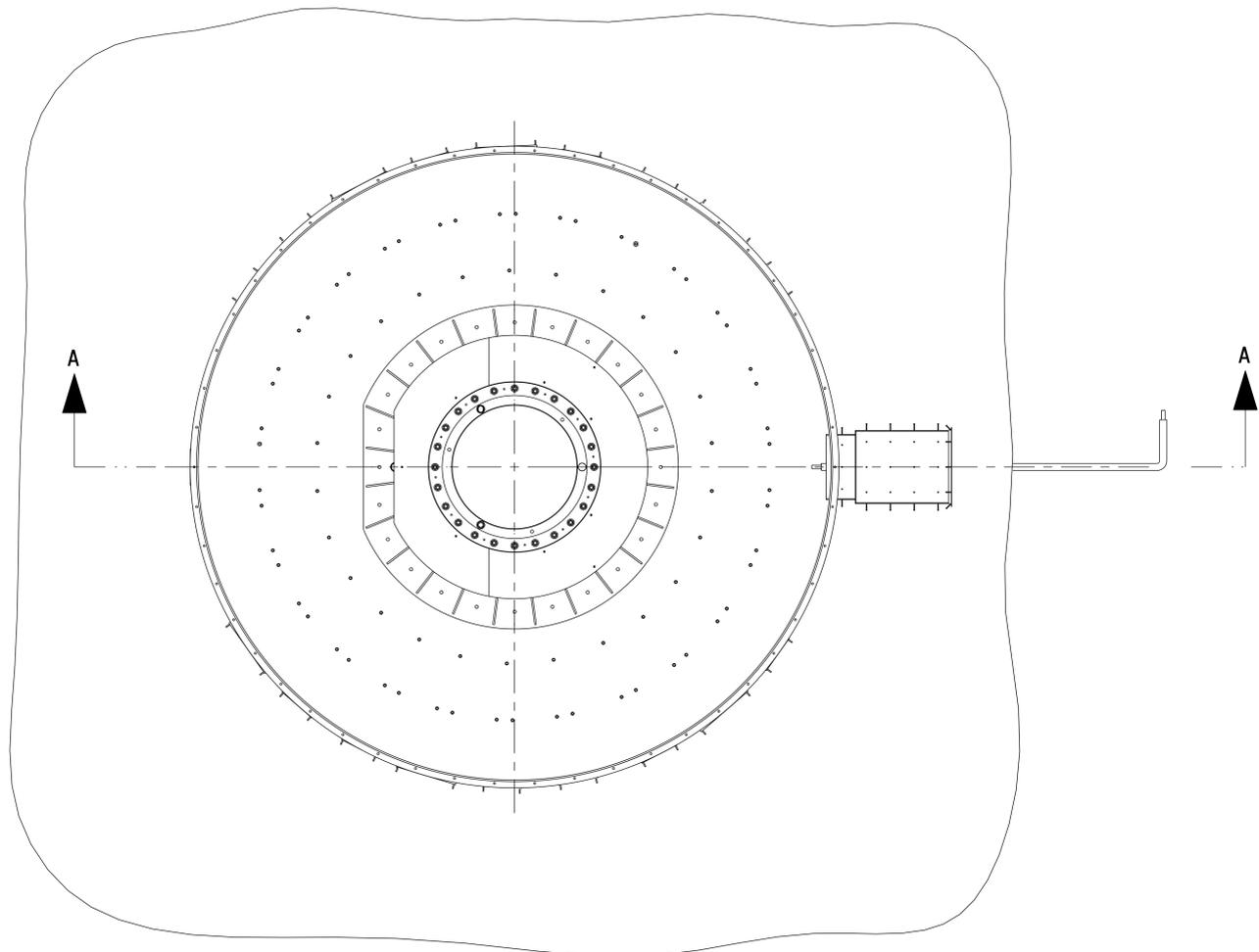
SECTION A-A  
SCALE 0.03

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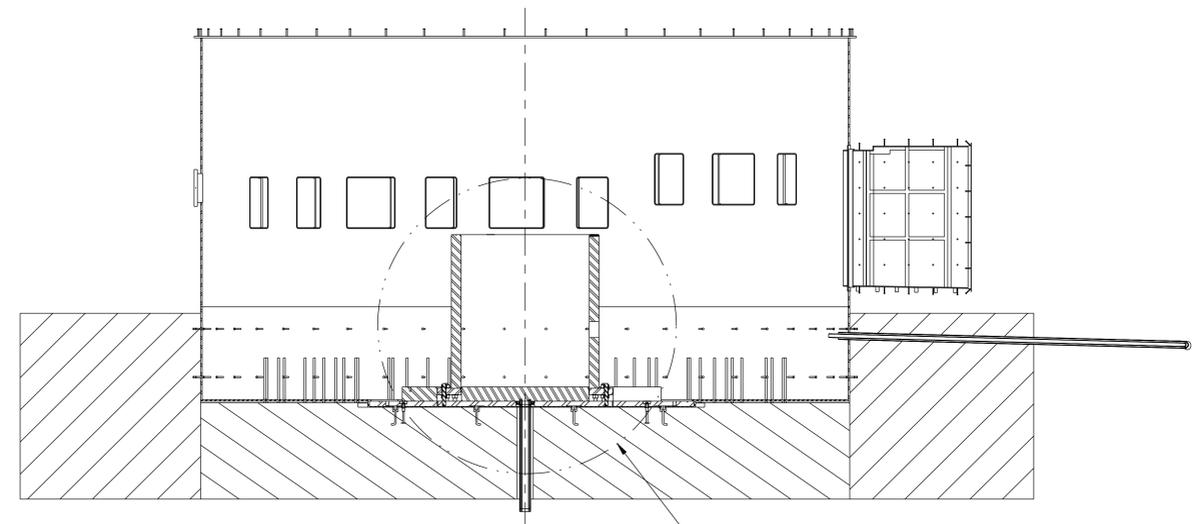
**P** THIS DRAWING PRODUCED ON PRO-ENGINEER

|   |   |    |        |       |
|---|---|----|--------|-------|
| SCALE NOTED<br>TOLERANCES UNLESS OTHERWISE SPECIFIED  | operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725 Oak Ridge, Tennessee |    |        |       |
|   | Spallation Neutron Source   |    |        |       |
| FRACTIONS :<br>XX DECIMALS ± .01<br>XXX DECIMALS ± .005<br>ANGLES ± 0°15'<br>BREAK SHARP EDGES .06 MAX<br>FINISH 125 RMS UNLESS OTHERWISE SPECIFIED | TARGET SYSTEMS<br>CORE VESSEL INSTALLATION<br>PHASE I   |    |        | CLASS |
|   | BLDG  | FL | SHT OF | REV   |
|   | 8700  |    | 2 9    | U     |
| 106040100M8E8700A011  |   |    |        | 000   |

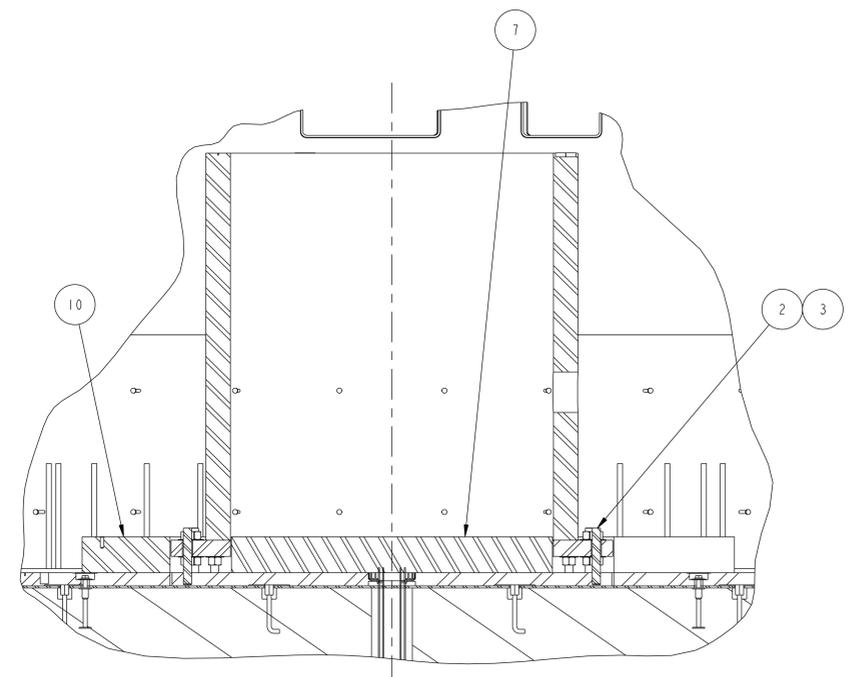
- INSTALLATION SEQUENCE
1. INSTALL WASHERS AND STUDS ON TOP SIDE OF FLANGE. TIGHTEN NUTS TO 30 FT.-LBS TORQUE. MAINTAIN ALIGNMENT DURING TORQUE SEQUENCE.
  2. INSTALL ONE, FIND NO. 7, LOWER SHIELD CENTER DISK 1.
  3. INSTALL ONE, FIND NO. 10, LOWER SHIELD RING ASSY. ALIGN FLAT SIDE TO BE PERPENDICULAR TO PROTON BEAM DIRECTION. INSTALL RING AT ITS SMALLEST OUTSIDE DIMENSIONS BY FORCING PIECES INWARD.
  4. FILL VOID BENEATH CYLINDER FLANGE WITH NON-SHRINK STRUCTURAL GROUT. USE FILL HOLES IN CYLINDER FLANGE.



SCALE 0.02



SECTION A-A  
 SCALE 0.03



DETAIL Y  
 SCALE 0.06

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|--|---|----------------------|----|--------|
| SCALE NOTED<br>TOLERANCES UNLESS OTHERWISE SPECIFIED | Oak Ridge National Laboratory<br>operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725<br>Oak Ridge, Tennessee |                      |    |        |
|  | Spallation Neutron Source   |                      |    |        |
| FRACTIONS  | :   | CLASS                |    |        |
| XX DECIMALS  | ± 0.1   | BLDG                 | FL | SHT OF |
| XXX DECIMALS   | ± 0.05  | 8700                 | 3  | 9      |
| ANGLES   | ± 0°15'   | REV                  | U  | 000    |
| BREAK SHARP EDGES                                    | .06 MAX   | 106040100M8E8700A011 |    |        |
| FINISH   | 125 RMS UNLESS OTHERWISE SPECIFIED  |                      |    |        |

106040100M8E8700A011

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NEXT ASS'Y:

I FINAL ASS'Y:

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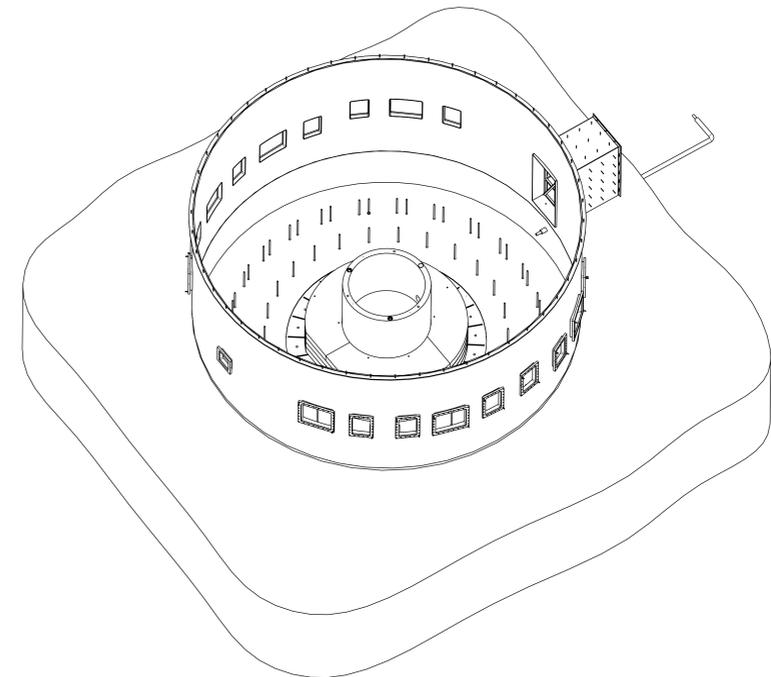
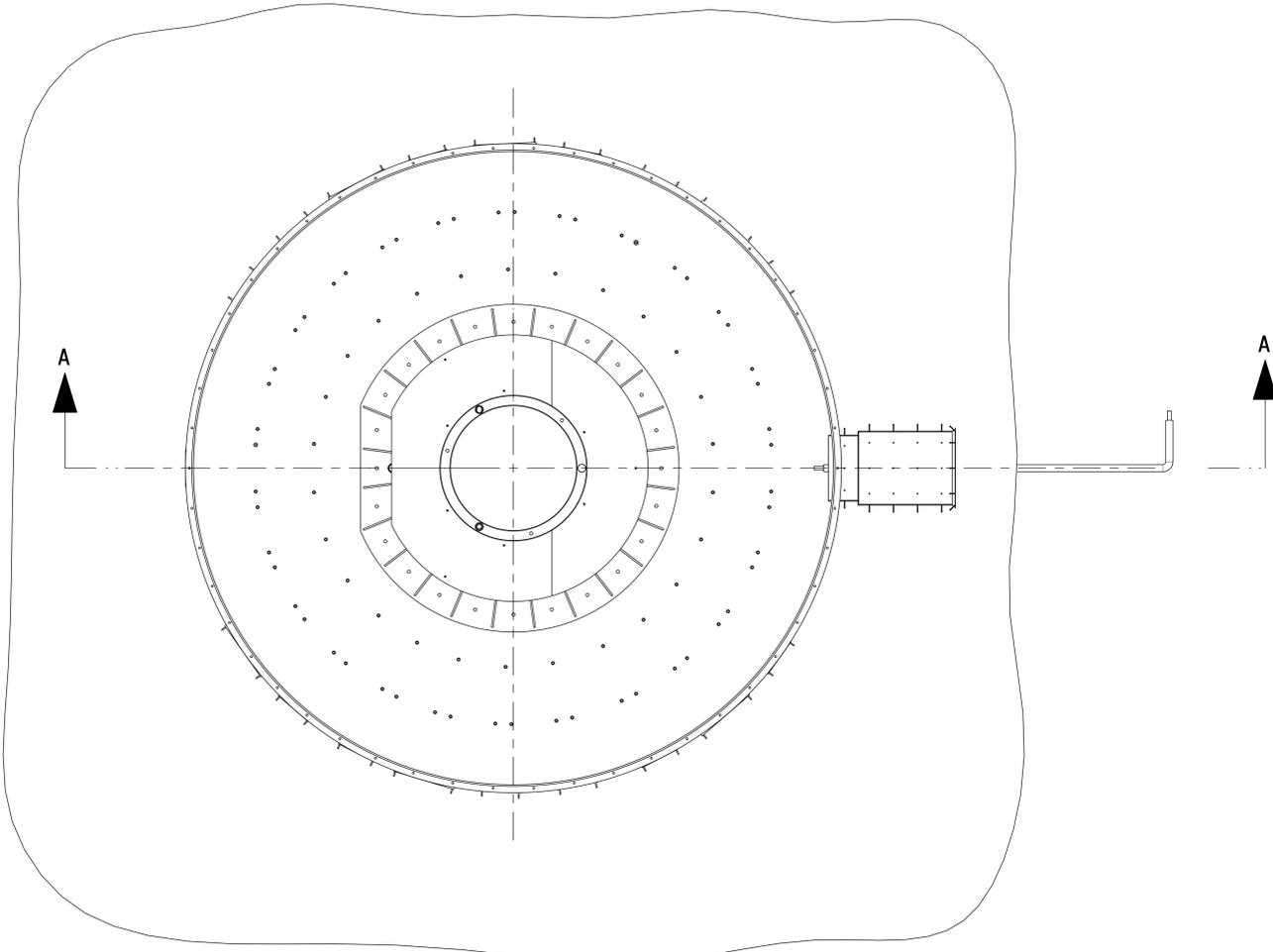
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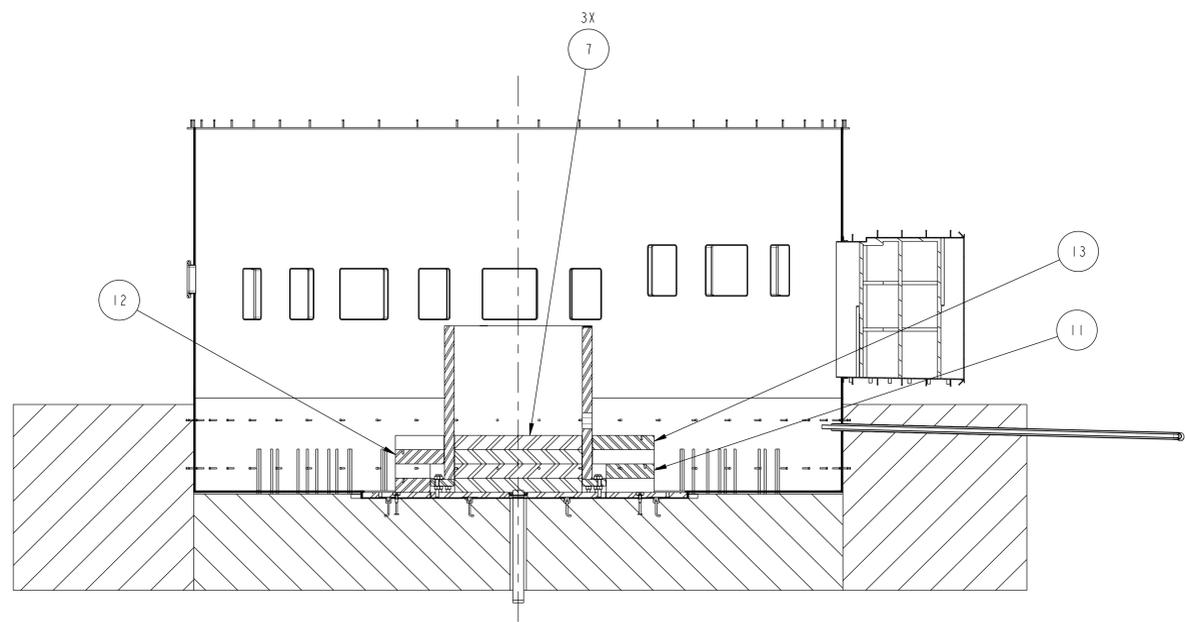
A

INSTALLATION SEQUENCE

1. INSTALL THREE, FIND NO. 7, LOWER CENTER SHIELD DISKS 1. FILL VOID BETWEEN OUTSIDE EDGE OF DISK AND INSIDE DIAMETER OF CYLINDER WITH HIGH DENSITY SHIELDING GROUT.
2. INSTALL ONE, FIND NO. 11, FOLLOWED BY ONE, FIND NO. 12, FOLLOWED BY ONE FIND NO. 13, LOWER SHIELD RING ASSEMBLIES. FORCE RING PIECES TOGETHER TO MAINTAIN MINIMUM OUTSIDE DIMENSIONS. MAINTAIN PERPENDICULARITY OF FLAT SIDE WITH PROTON BEAM DIRECTION.



SCALE 0.02



SECTION A-A  
SCALE 0.03

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**P** THIS DRAWING PRODUCED ON PRO-ENGINEER

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|--|---|----|--------|-------|
| SCALE NOTED<br>TOLERANCES UNLESS OTHERWISE SPECIFIED   | Oak Ridge National Laboratory<br>operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725<br>Oak Ridge, Tennessee |    |        |       |
|  | Spallation Neutron Source   |    |        |       |
| FRACTIONS :<br>XX DECIMALS ±.01<br>XXX DECIMALS ±.005<br>ANGLES ±0°15'<br>BREAK SHARP EDGES .06 MAX<br>FINISH 125 RMS UNLESS OTHERWISE SPECIFIED | <b>TARGET SYSTEMS<br/>CORE VESSEL INSTALLATION<br/>PHASE I</b>  |    |        | CLASS |
|  | BLDG  | FL | SHT OF | REV   |
|  | 8700  | 4  | 9      | U     |
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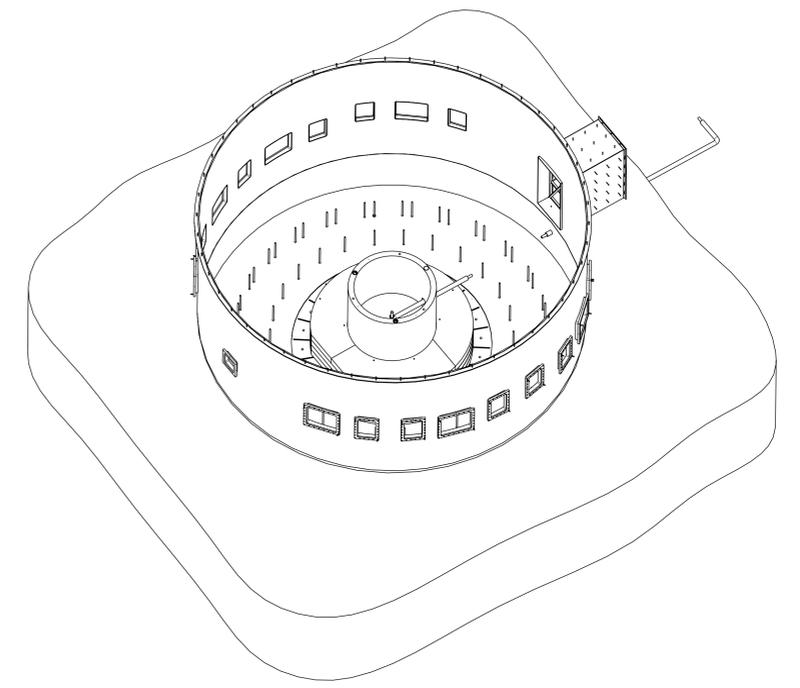
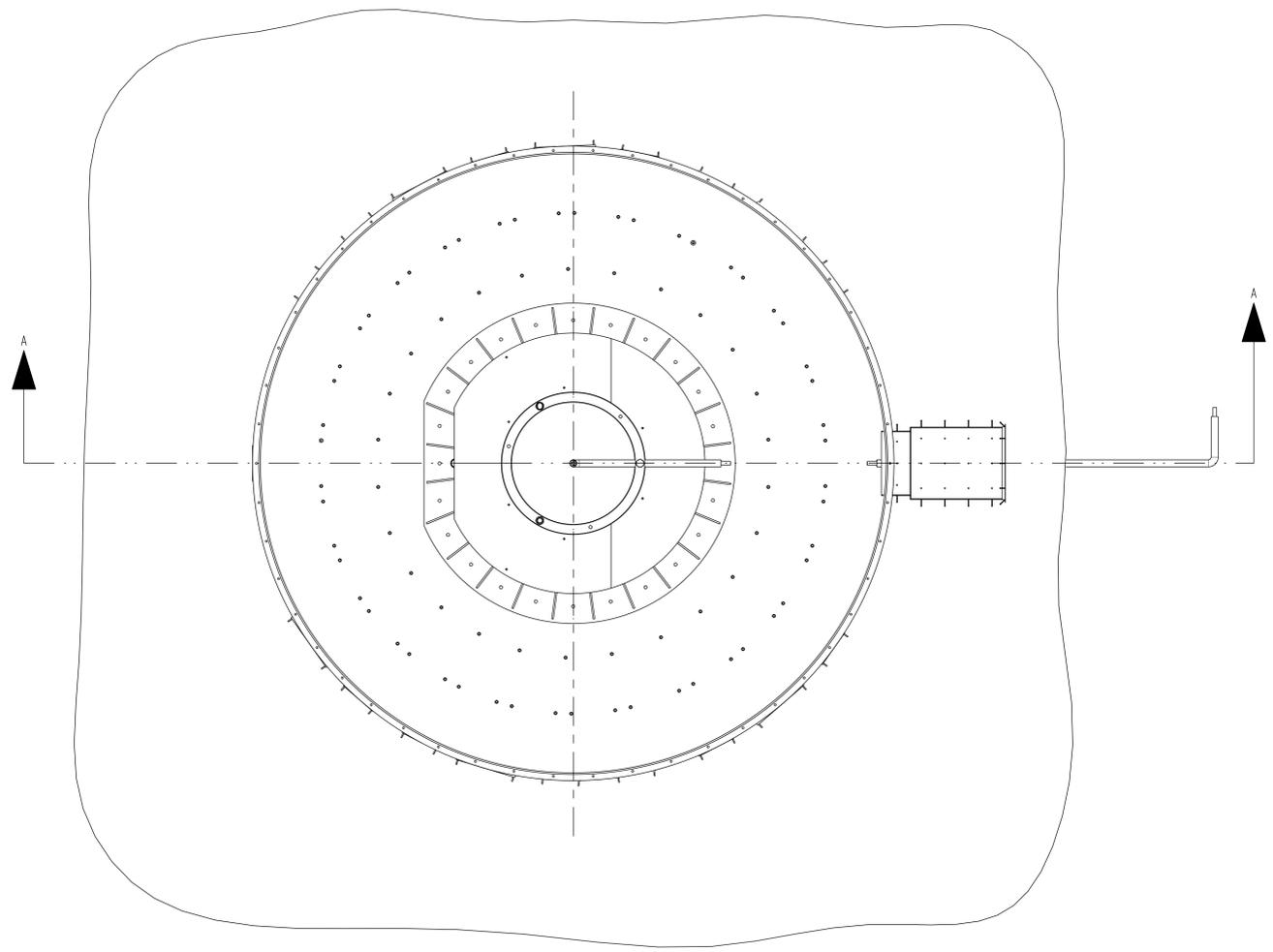
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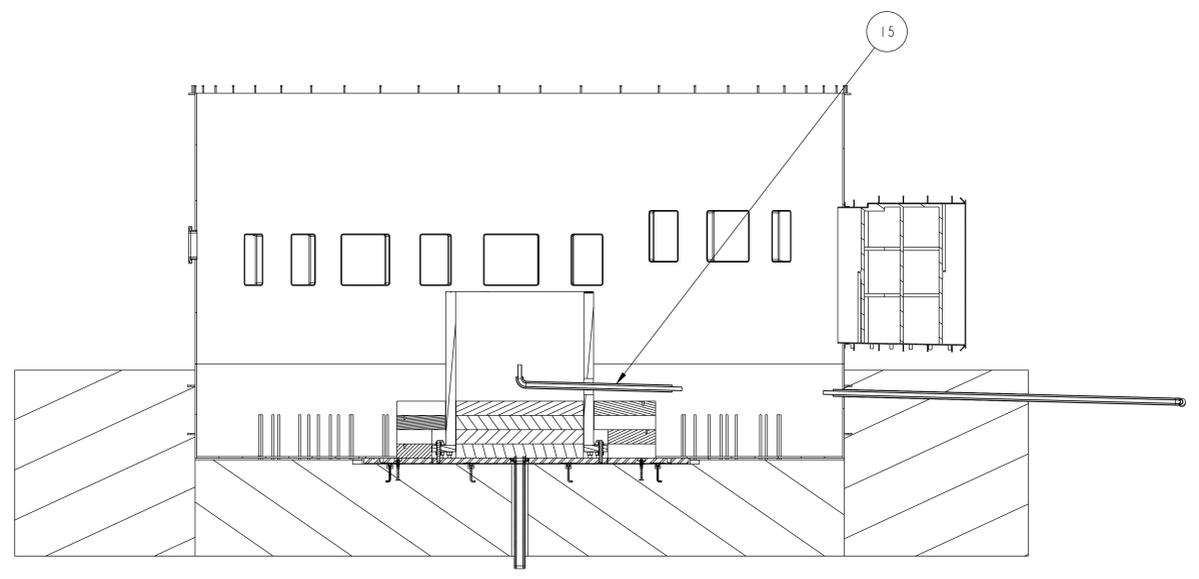
A

INSTALLATION SEQUENCE

1. INSTALL THE CORE VESSEL DRAIN LINE SECTION 1 SUBASSY, (FIND NO. 15), THROUGH THE SIDE OF THE INNER SUPPORT CYLINDER.



SCALE 0.02



SECTION A-A  
SCALE 0.03

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|   |   |    |        |            |
|---|---|----|--------|------------|
| <p>SCALE NOTED</p> <p>TOLERANCES UNLESS OTHERWISE SPECIFIED</p> <p>FRACTIONS :<br/>                 XX DECIMALS ±.01<br/>                 XXX DECIMALS ±.005<br/>                 ANGLES ±0°15'<br/>                 BREAK SHARP EDGES .06 MAX<br/>                 FINISH 125 RMS UNLESS OTHERWISE SPECIFIED</p> | <p><b>ORNL</b> Oak Ridge National Laboratory<br/>                 operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725<br/>                 Oak Ridge, Tennessee</p> <p><b>SN</b> Spallation Neutron Source</p> |    |        |            |
|   | <p>TARGET SYSTEMS<br/>                 CORE VESSEL INSTALLATION<br/>                 PHASE I</p>  |    |        |            |
|   | BLDG  | FL | SHT OF | CLASS      |
|   | 8700  |    | 5 9    | U          |
| <p>106040100M8E8700A011</p>   |   |    |        | REV<br>000 |

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NEXT ASS'Y:

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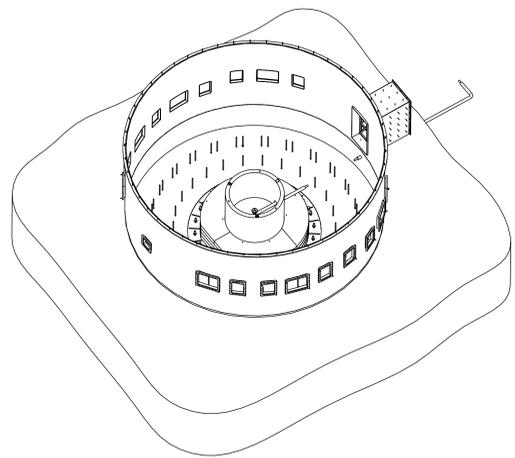
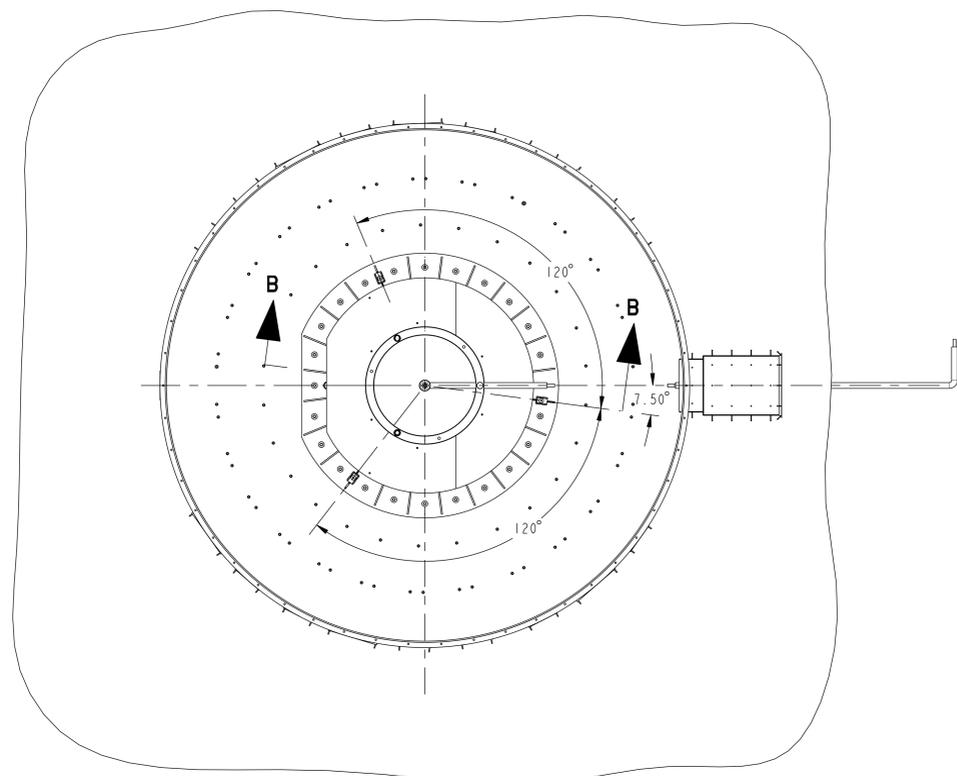
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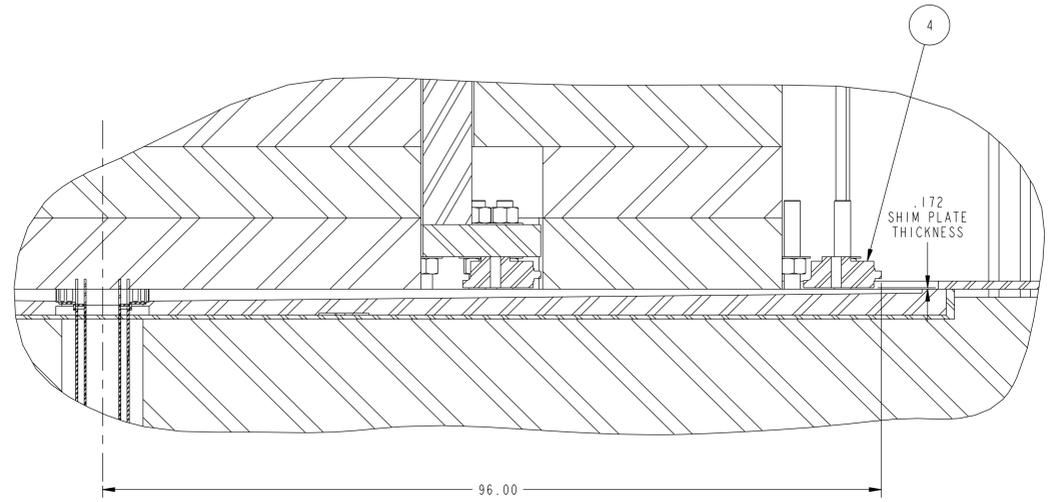
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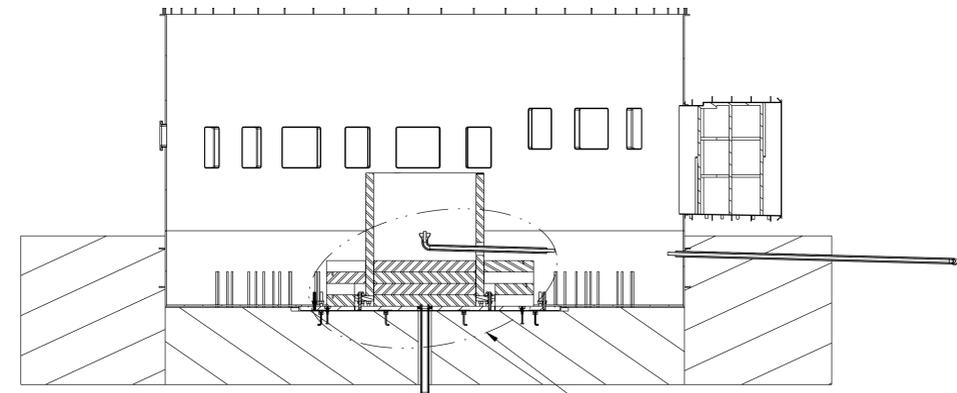
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INSTALLATION SEQUENCE

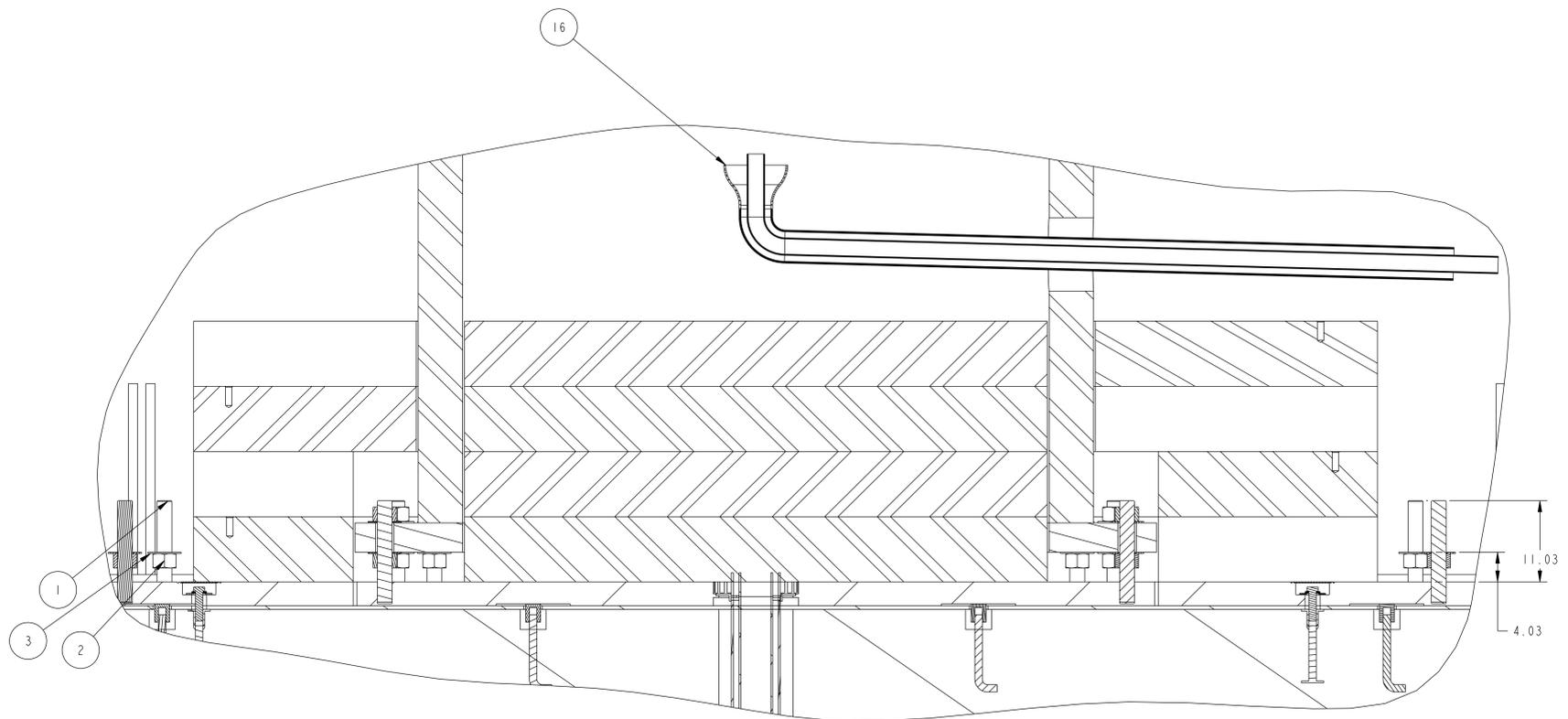
1. WELD THE 4X8 CONCENTRIC REDUCER (FIND NO. 16) TO THE OUTER PIPE OF THE DRAIN LINE.
2. INSTALL STUDS IN BASE PLATE FOR OUTER SUPPORT CYLINDER.
3. INSTALL NUT AND WASHER ON EACH STUD.
4. POSITION RK FIXATORS (FIND NO. 4) AT THREE LOCATIONS BETWEEN STUDS. PLACE FIXATORS ON 0.172 INCH THICK SHIM PLATE.
5. PLACE GROUT SHIELDS IN TROUGHS OF BASE PLATE



SECTION B-B  
SCALE 0.13



SECTION A-A  
SCALE 0.02



DETAIL X  
SCALE 0.125

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| TOLERANCES UNLESS OTHERWISE SPECIFIED     | Spallation Neutron Source   |        |
| FRACTIONS                                 | TARGET SYSTEMS  |        |
| XX DECIMALS ±.01                          | CORE VESSEL INSTALLATION  |        |
| XXX DECIMALS ±.005                        | PHASE I   |        |
| ANGLES ±0°15'                             | BLDG  | FL     |
| BREAK SHARP EDGES .06 MAX                 | 8700  | SHT OF |
| FINISH 125 RMS UNLESS OTHERWISE SPECIFIED | 6   | 9      |
|   | CLASS   |        |
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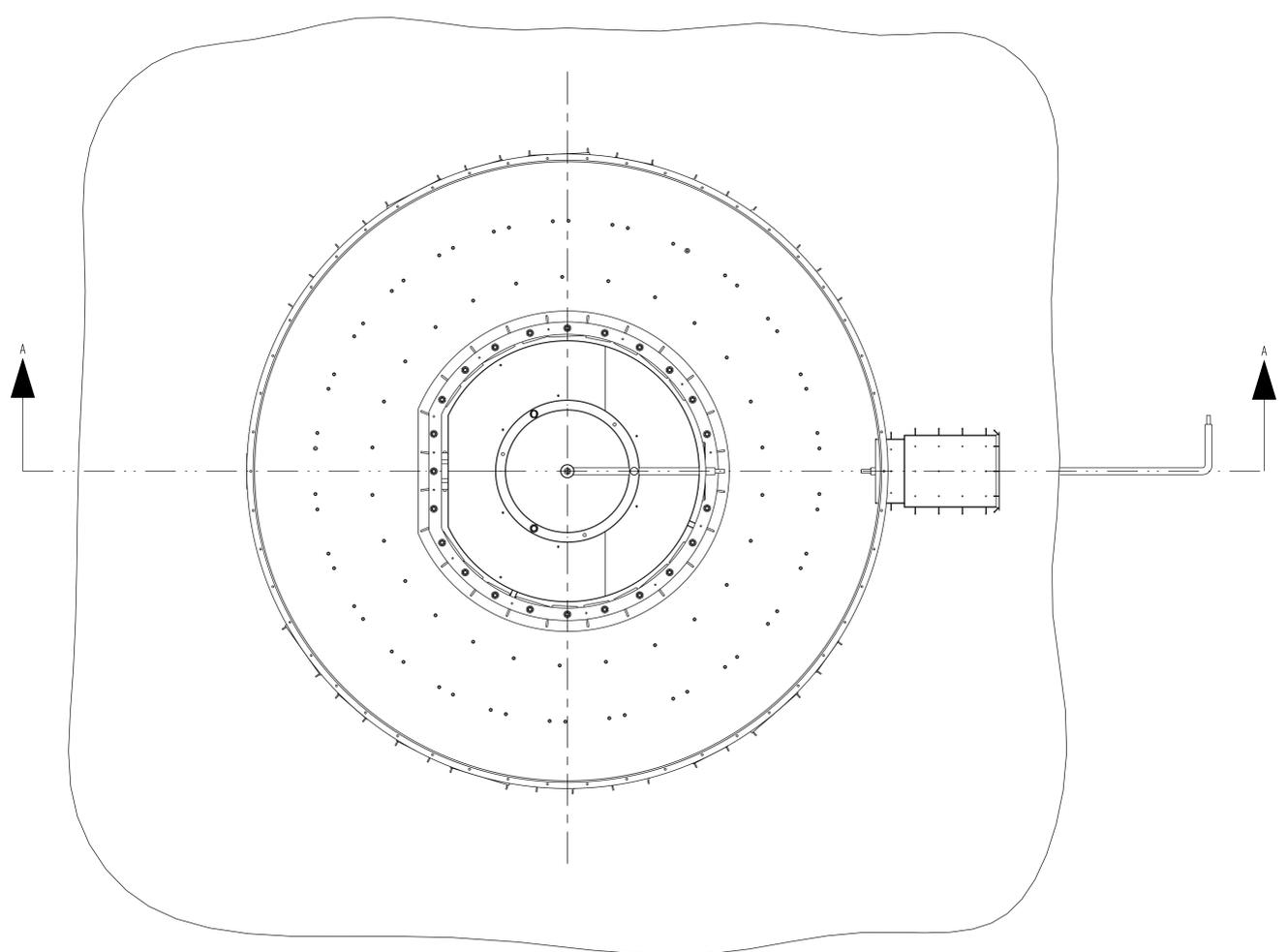
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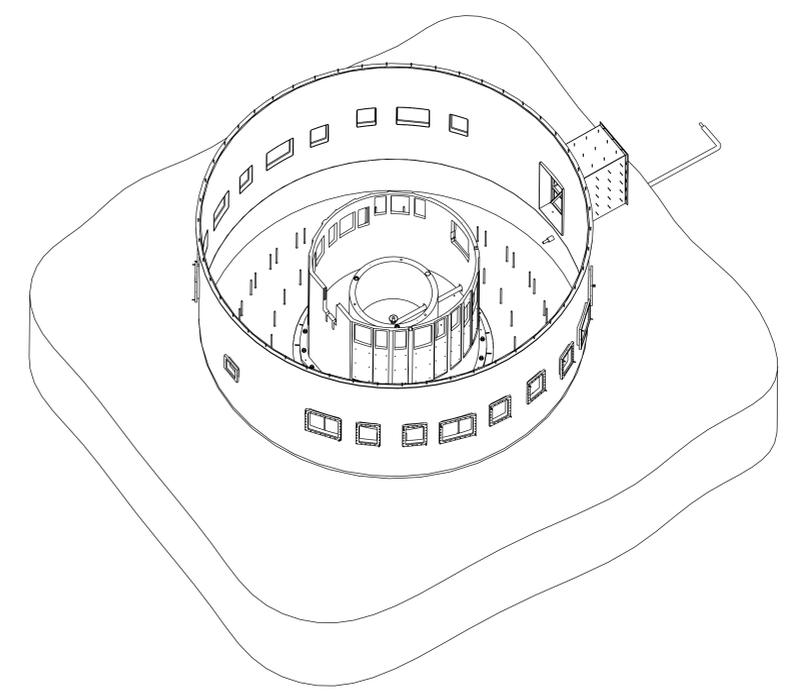
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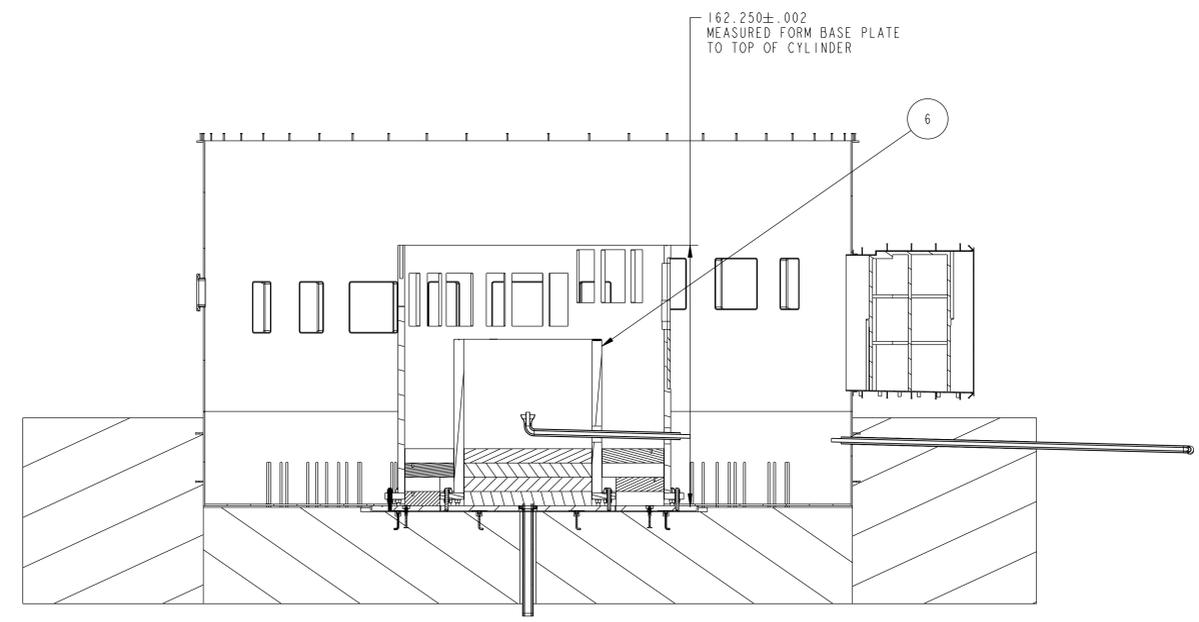
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- INSTALLATION SEQUENCE
1. PUSH DRAINLINE INWARD TO ALLOW FOR INSTALLATION OF OUTER SUPPORT CYLINDER.
  2. PLACE OUTER SUPPORT CYLINDER OVER STUDS.
  3. PUSH DRAIN LINE THROUGH SIDE OF OUTER SUPPORT CYLINDER.
  4. USING LASER TRACKER, BRING SUPPORT CYLINDER TO PROPER ELEVATION, POSITION, AND ORIENTATION. TOOLING BALLS HOLES ARE PROVIDED ON THE TOP EDGE OF THE SUPPORT CYLINDER. TOOLING BALLS MUST BE WITHIN 0.005 INCHES OF TRUE POSITION WITH RESPECT TO THE PROTON BEAM LINE AND THE CENTERLINE AXES OF THE MONOLITH.
  5. TURN LOWER NUTS TO BRING WASHERS UP TO BOTTOM OF CYLINDER FLANGE.
  6. FILL VOID BETWEEN OUTER EDGE OF LOWER SHIELD RING ASSEMBLIES AND INNER SURFACE OF OUTER SUPPORT CYLINDER WITH HIGH DENSITY SHIELDING GROUT.



SCALE 0.02



SECTION A-A  
 SCALE 0.03

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|  | Spallation Neutron Source   |    |        |       |
| FRACTIONS :<br>XX DECIMALS ± 0.1<br>XXX DECIMALS ± 0.005<br>ANGLES ± 0°15'<br>BREAK SHARP EDGES .06 MAX<br>FINISH 125 RMS UNLESS OTHERWISE SPECIFIED | TARGET SYSTEMS<br>CORE VESSEL INSTALLATION<br>PHASE I   |    |        | CLASS |
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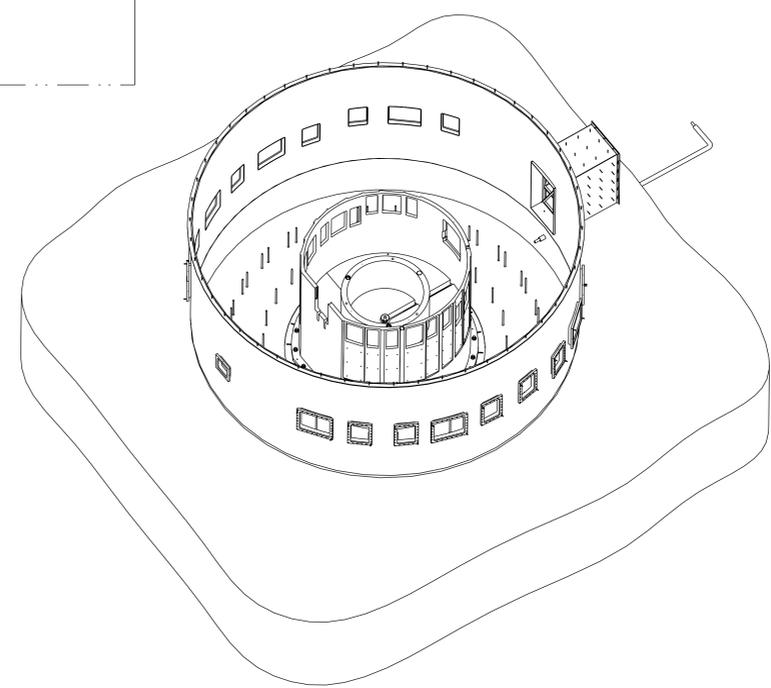
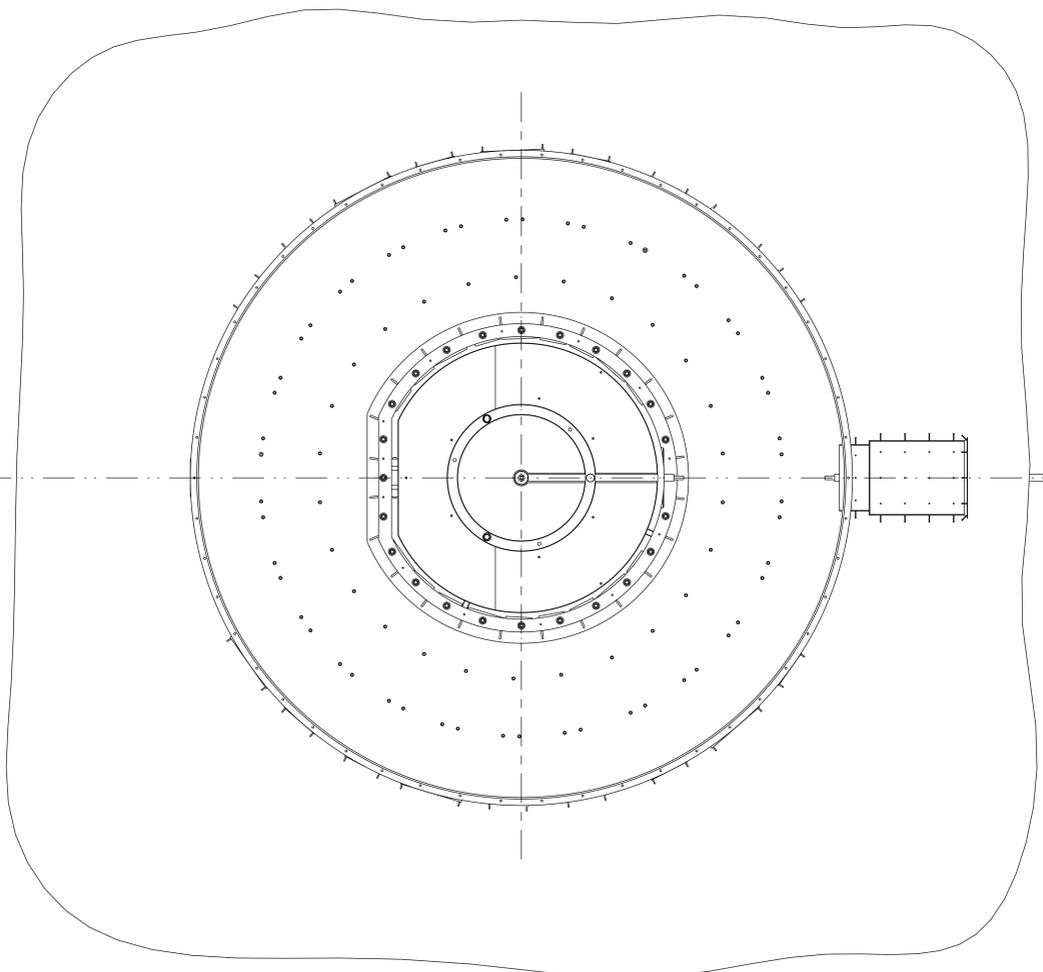
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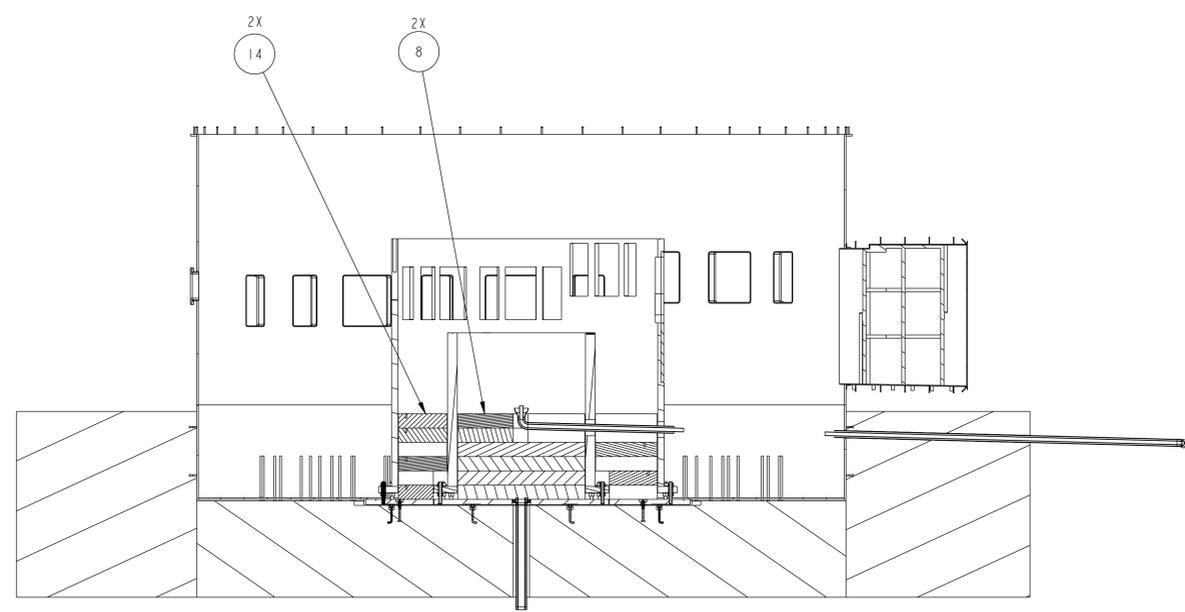
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INSTALLATION SEQUENCE

1. INSTALL WASHERS AND NUTS ON TOP SIDE OF CYLINDER FLANGE. TIGHTEN NUTS TO 30 FT.-LBS. TORQUE. MAINTAIN ALIGNMENT DURING TORQUE SEQUENCE.
2. DAM-UP OUTSIDE DIAMETER OF CYLINDER FLANGE, AND FILL VOID BENEATH WITH NON-SHRINK, STRUCTURAL GROUT. USE FILL HOLES IN CYLINDER FLANGE.
3. POSITION DRAINLINE IN CENTER OF CYLINDERS.
4. INSTALL TWO, FIND NO. 8, INNER DISKS. FILL VOID BETWEEN OUTER EDGE OF DISK AND INNER SURFACE OF INNER SUPPORT CYLINDER WITH HIGH DENSITY SHIELDING GROUT.
5. INSTALL TWO, FIND NO. 14, LOWER SHIELD RING ASSEMBLIES. FILL VOID BETWEEN OUTER EDGE OF RING AND INNER SURFACE OF OUTER SUPPORT CYLINDER WITH HIGH DENSITY SHIELDING GROUT.



SCALE 0.02



SECTION A-A  
SCALE 0.03

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**P** THIS DRAWING PRODUCED ON PRO-ENGINEER

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|--|---|----|--------|-------|
| SCALE NOTED<br>TOLERANCES UNLESS OTHERWISE SPECIFIED   | operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725 Oak Ridge, Tennessee |    |        |       |
|  | Spallation Neutron Source   |    |        |       |
| FRACTIONS :<br>XX DECIMALS ±.01<br>XXX DECIMALS ±.005<br>ANGLES ±0°15'<br>BREAK SHARP EDGES .06 MAX<br>FINISH 125 RMS UNLESS OTHERWISE SPECIFIED | TARGET SYSTEMS<br>CORE VESSEL INSTALLATION<br>PHASE I   |    |        | CLASS |
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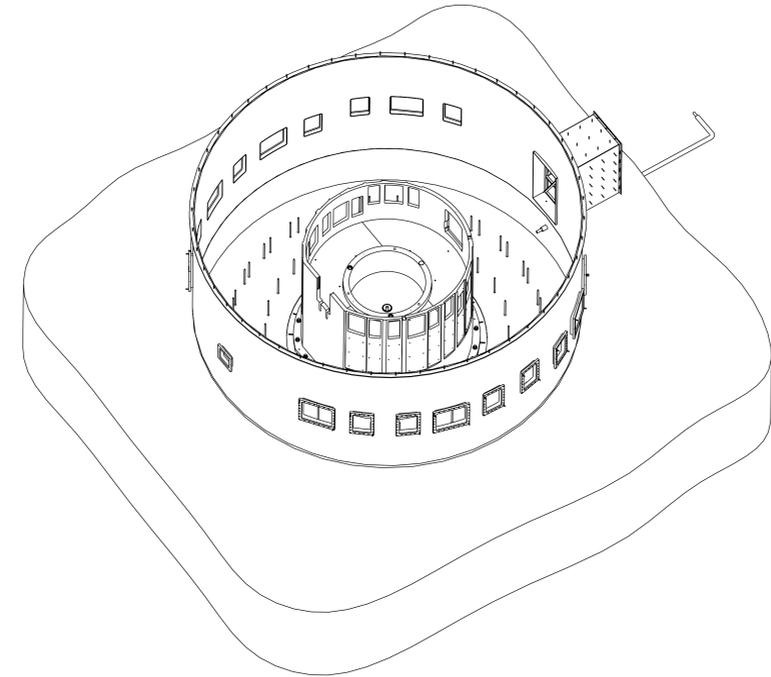
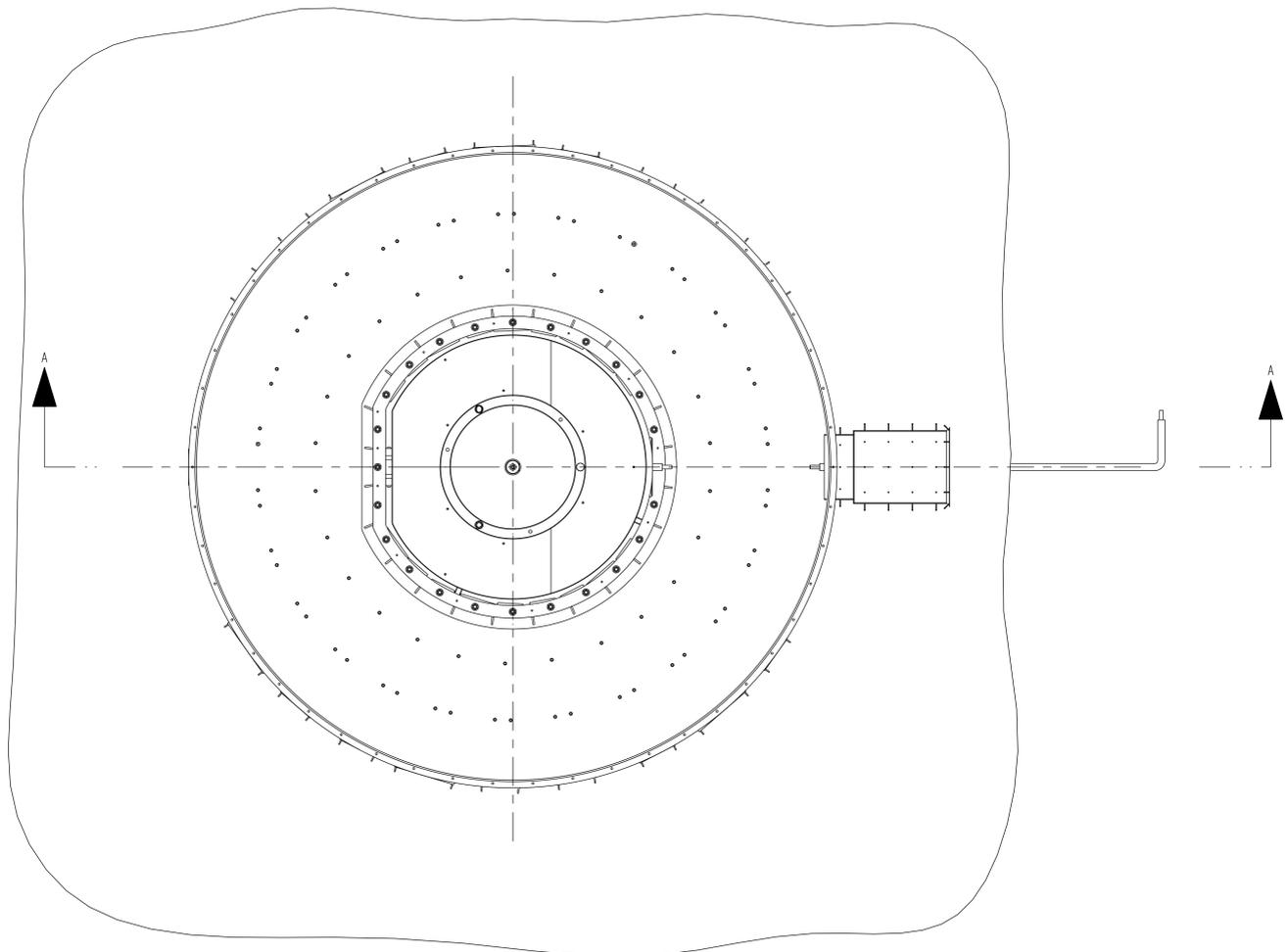
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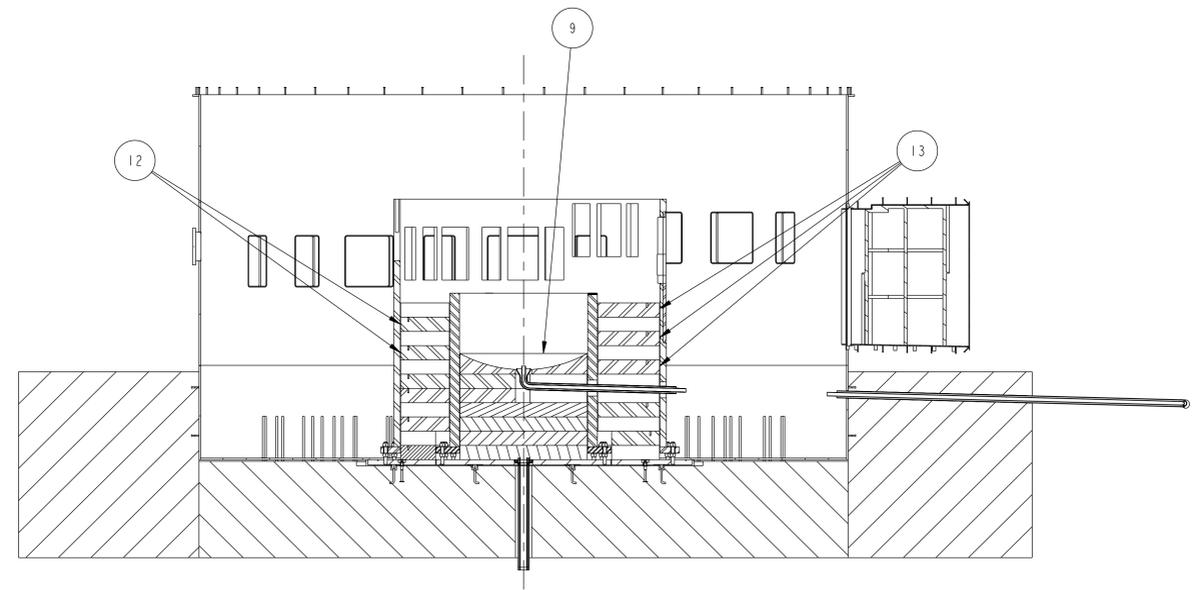
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INSTALLATION SEQUENCE

1. INSTALL FIND NO. 9, DISK WITH SPHERICAL SURFACE. GROUT TO INNER SUPPORT CYLINDER AS BEFORE.
2. INSTALL THREE, FIND NO. 13, AND TWO, FIND NO. 12, RING ASSEMBLIES IN ALTERNATING SEQUENCE BEGINNING WITH FIND NO. 13. GROUT TO OUTER SUPPORT CYLINDER AS BEFORE.



SCALE 0.02



SECTION A-A  
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**P** THIS DRAWING PRODUCED ON PRO-ENGINEER

|  |   |                      |    |        |
|--|---|----------------------|----|--------|
| SCALE NOTED<br>TOLERANCES UNLESS OTHERWISE SPECIFIED | Oak Ridge National Laboratory<br>operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725<br>Oak Ridge, Tennessee |                      |    |        |
|  | Spallation Neutron Source   |                      |    |        |
| FRACTIONS  | :   |                      |    |        |
| XX DECIMALS  | ± 01  |                      |    |        |
| XXX DECIMALS   | ± 005   |                      |    |        |
| ANGLES   | ± 0°15'   |                      |    |        |
| BREAK SHARP EDGES                                    | .06 MAX   |                      |    |        |
| FINISH   | 125 RMS UNLESS OTHERWISE SPECIFIED  |                      |    |        |
|  |   | BLDG                 | FL | SHT OF |
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