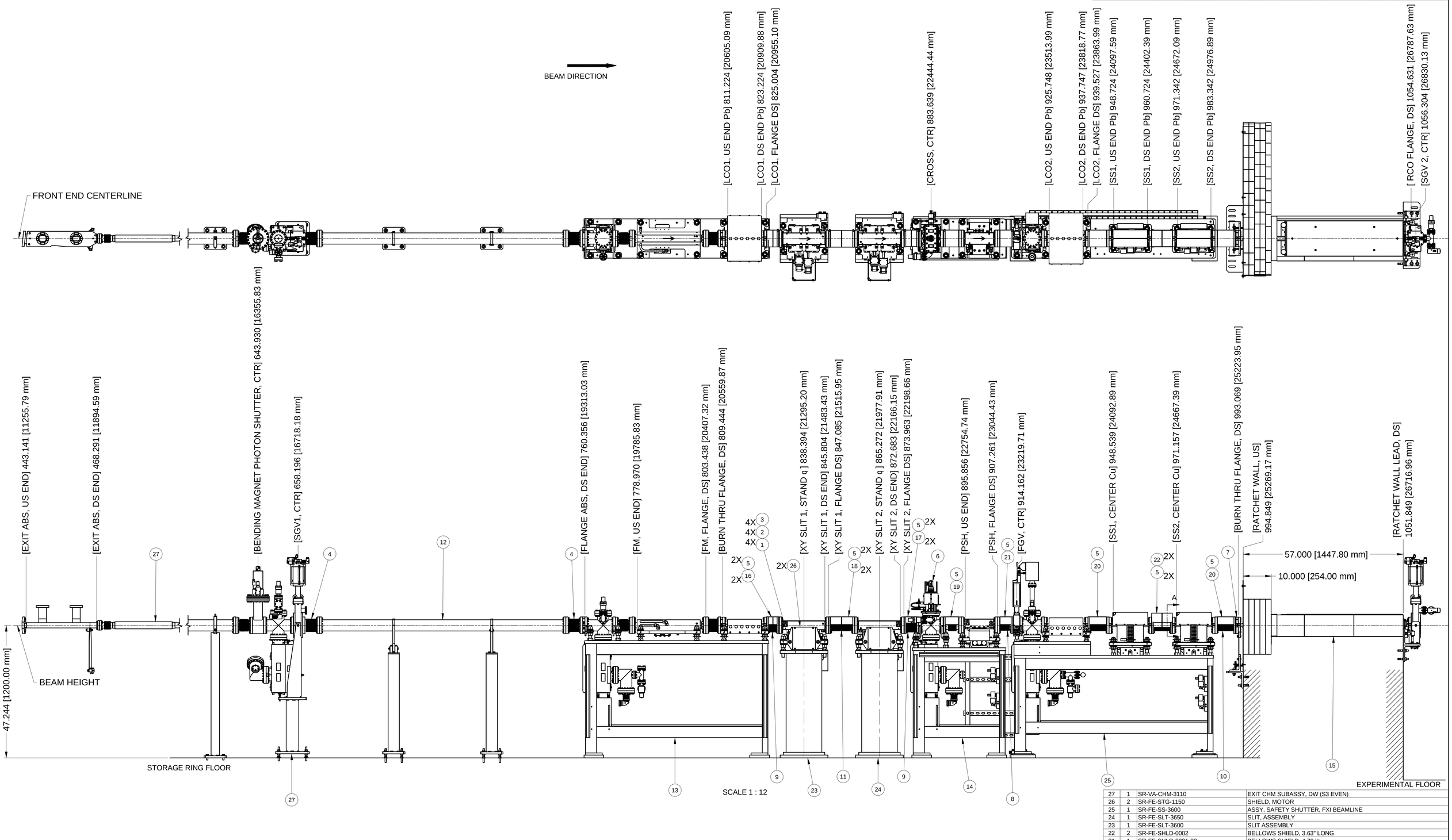
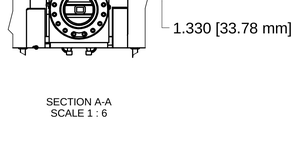
REVISION HISTORY					
REV	DESCRIPTION	DATE	DESIGNER	CHECKED BY	ENGINEER
A	RELEASE PER ECO-004948	4/2017	J TUOZZOLO	CA/ML	C AMUNDSEN





SECTION A-A
SCALE 1 : 6

COMPONENT	RADIATION SAFETY COMPONENT CHECKLIST	TOP OFF SAFETY SYSTEM
EXIT ABSORBER	X	X
FIXED MASK	X	X
BURN THRU FLANGE, LCO1	X	
LEAD COLLIMATOR 1	X	
LEAD COLLIMATOR 2	X	X
SAFETY SHUTTER 1	X	
SAFETY SHUTTER 2	X	
BURN THRU FLANGE, RCO	X	
RATCHET WALL COLLIMATOR	X	

TOP OFF SAFETY CREDITED COMPONENT OR ASSEMBLY. ANY CHANGES TO THIS DRAWING REQUIRES APPROVAL OF THE TECHNICAL AUTHORITY FOR TOP OFF SAFETY.

18-ID BEAMLINE

NOTES:

1. ALL ORDINATE DIMENSIONS ARE FROM MID-PONT OF INSERTION STRAIGHT
2. SEE SHEET 2 AND 3 FOR SURVEY AND ALIGNMENT DIMENSIONS.
3. COMPONENT POSITION TOLERANCE OF ±.008[200] IN X AND Y DIRECTION AND ±.020[500] IS Z DIRECTION (BEAM DIRECTION) UNLESS OTHERWISE NOTED.
4. REFERENCE WATER FLOW DIAGRAM SR-FE-UT-0002, -0003.
5. REFERENCE AIR SCHEMATIC SR-FE-UT-0001.

ITEM	QTY	PART NUMBER	DESCRIPTION
27	1	SR-VA-CHM-3110	EXIT CHM SUBASSY, DW (S3 EVEN)
26	2	SR-FE-STG-1150	SHIELD, MOTOR
25	1	SR-FE-SS-3600	ASSY, SAFETY SHUTTER, FXI BEAMLINE
24	1	SR-FE-SLT-3650	SLIT, ASSEMBLY
23	1	SR-FE-SLT-3600	SLIT ASSEMBLY
22	2	SR-FE-SHLD-0002	BELLOWS SHIELD, 3.63" LONG
21	1	SR-FE-SHLD-0001-08	BELLOWS SHIELD, 4.70 lg.
20	2	SR-FE-SHLD-0001-07	BELLOWS SHIELD, 6.50 lg.
19	1	SR-FE-SHLD-0001-06	BELLOWS SHIELD, 5.50 lg
18	2	SR-FE-SHLD-0001-05	BELLOWS SHIELD, 4.50 lg.
17	2	SR-FE-SHLD-0001-02	BELLOWS SHIELD, 2.50 lg.
16	2	SR-FE-SHLD-0001-01	BELLOWS SHIELD, 2.10 lg.
15	1	SR-FE-RCO-3600	PLUG SHIELD
14	1	SR-FE-PSH-3600	TABLE ASSY, PHOTON SHUTTER, FXI
13	1	SR-FE-MSK-3600	FIXED MASK, ASSY, DW, FXI
12	1	SR-FE-DRFT-1250	DRIFT PIPE, NON CANTED LONG STRAIGHT DW ASSY
11	1	SR-FE-BLW-0044	WELDED, BELLOWS, 6" CF FLG
10	1	SR-FE-BLW-0039	WELDED, BELLOWS, 6" CF FLG
9	2	SR-FE-BLW-0037	WELDED, BELLOWS, 6" CF FLG
8	1	SR-FE-BLW-0023	WELDED, BELLOWS, 6" CF FLG
7	1	SR-FE-ABS-3640	BURN THRU FLANGE, RCO, MODIFIED
6	1	SR-DG-XRF-1000	X-RAY FLAG ASSEMBLY
5	12	PI-CLMP-0056	CLAMP, HOSE, WORM DRIVE, S.S, 4.125" - 7"
4	2	PI-BLW-0021	BELLOWS, FORMED, 4" ID 6" CF FLANGE
3	4	ANSI B18.22.1 - 3/8 - wide - Type B	Plain Washer (Inch)Type A and B
2	4	ANSI B18.21.1 - 0.375	Helical Spring Lock Washers
1	4	ANSI B18.2.1 - 3/8-16 UNC - 0.75	Hex Cap Screw

PARTS LIST

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
DIMENSIONS IN BRACKETS [xx.xx] (WHERE PRESENT) ARE MILLIMETERS AND ARE FOR REFERENCE ONLY
INTERPRET DRAWING PER ASME Y14.5-1994 OR ISO 3-1975
DIMENSIONAL TOLERANCE: X. ± 0.060, .X ± 0.030, .XX ± 0.015, .XXX ± 0.005
ANGULAR TOLERANCE: .5~
FINISH: 125
BREAK EDGES & SHARP CORNERS 0.005 MIN. TO 0.030 MAX.

BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN SCIENCE ASSOCIATES
UPTON, NEW YORK, 11973
Exploring Life's Mysteries, Protecting its Future

NSLS-II NATIONAL SYNCHROTRON LIGHT SOURCE II

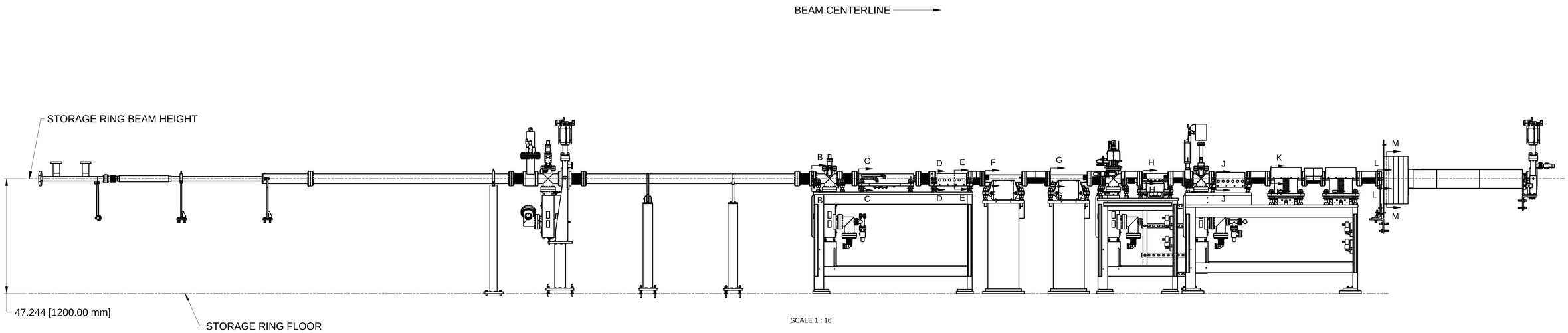
DRAWN BY	J TUOZZOLO	4/12/2017
CHECKED BY	CA/ML	4/2017
VACUUM APPROVAL	C HETZEL	4/2017
ENGINEER APPROVAL	C AMUNDSEN	4/2017
SUPERVISOR APPROVAL	S SHARMA	4/2017
ESH APPROVAL	A ACKERMAN	4/2017
QA APPROVAL	E CHESWICK	4/2017

STORAGE RING
FRONT END
FRONT END, FXI BEAMLINE ASSY

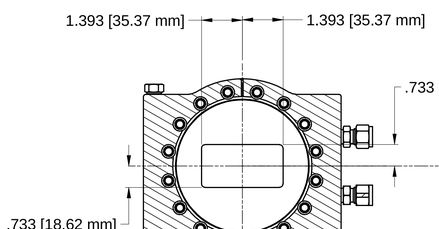
SHEET SIZE: E
DRAWING/PART NUMBER: SR-FE-DW18-1000
REVISION: A

NEXT ASSY:
PROJECT: NSLS-II
THIRD ANGLE PROJECTION
SCALE: SEE DWG VIEW
WBS# 6.13.05.01
ESH&Q RISK LEVEL A-1
SHEET 1 OF 3

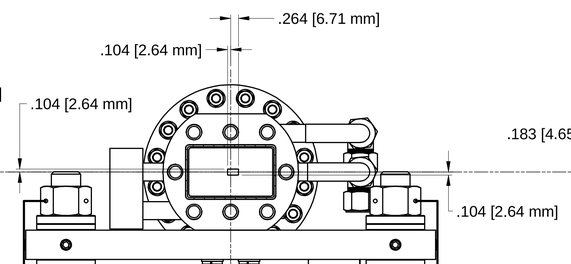
C:\mech-eng\LTS\SR\FE\DW18\SR-FE-DW18-1000.adw



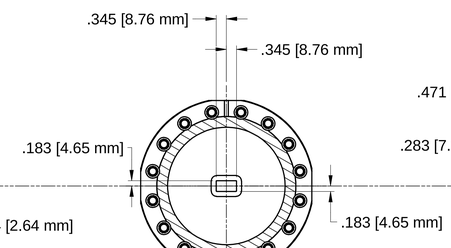
SCALE 1 : 16



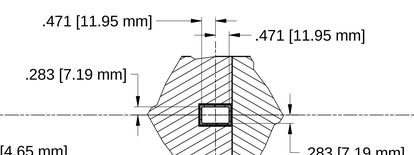
SECTION B-B
FLANGE ABS
SCALE 1 : 2



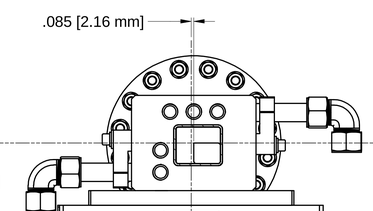
SECTION C-C
FIXED MASK
SCALE 1 : 2



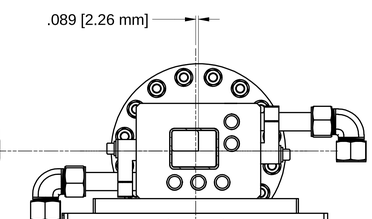
SECTION D-D
BURN THRU 1
SCALE 1 : 2



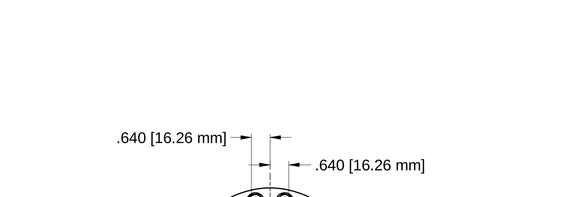
SECTION E-E
LCO1
SCALE 1 : 2



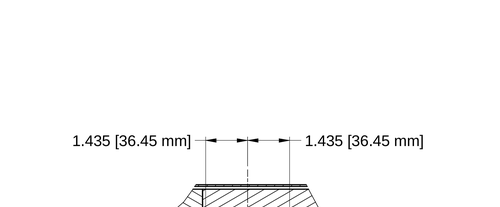
SECTION F-F
SLIT 1
SCALE 1 : 2



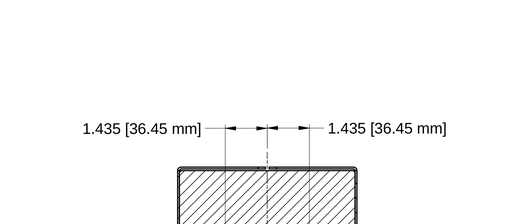
SECTION G-G
SLIT 2
SCALE 1 : 2



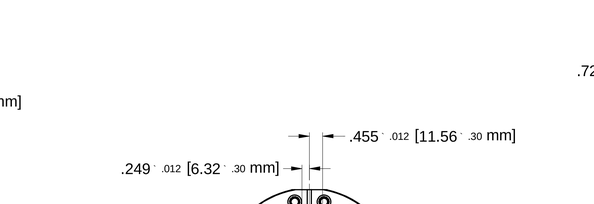
SECTION H-H
PHOTON SHUTTER
SCALE 1 : 2



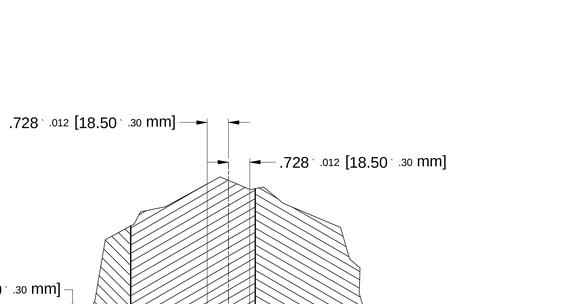
SECTION J-J
LCO2
SCALE 1 : 2



SECTION K-K
SAFETY SHUTTERS
SCALE 1 : 2



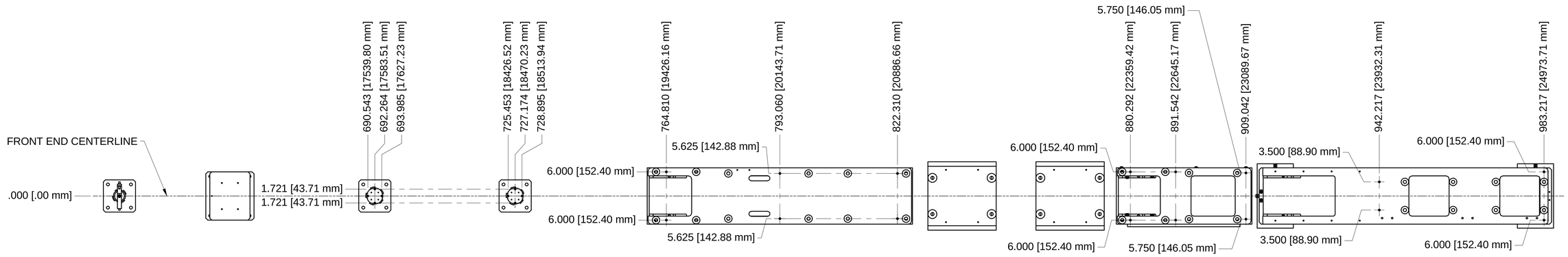
SECTION L-L
BURN THRU 2
SCALE 1 : 2

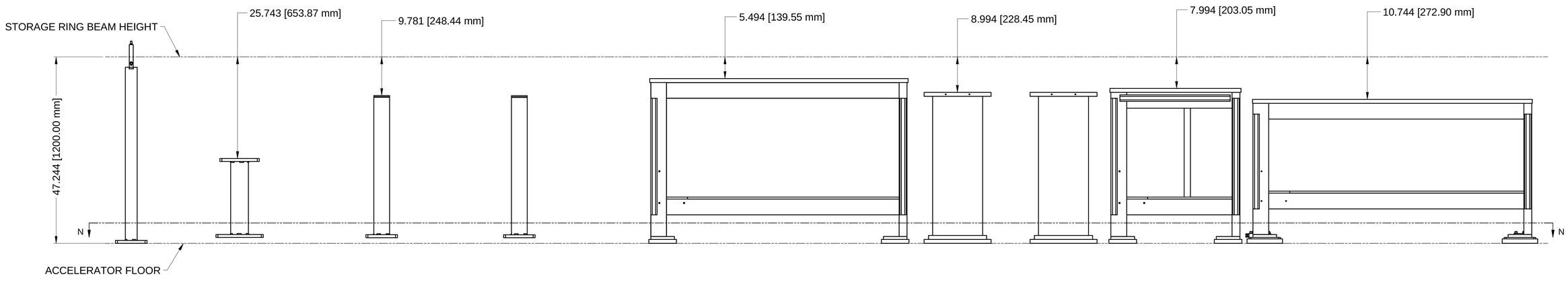


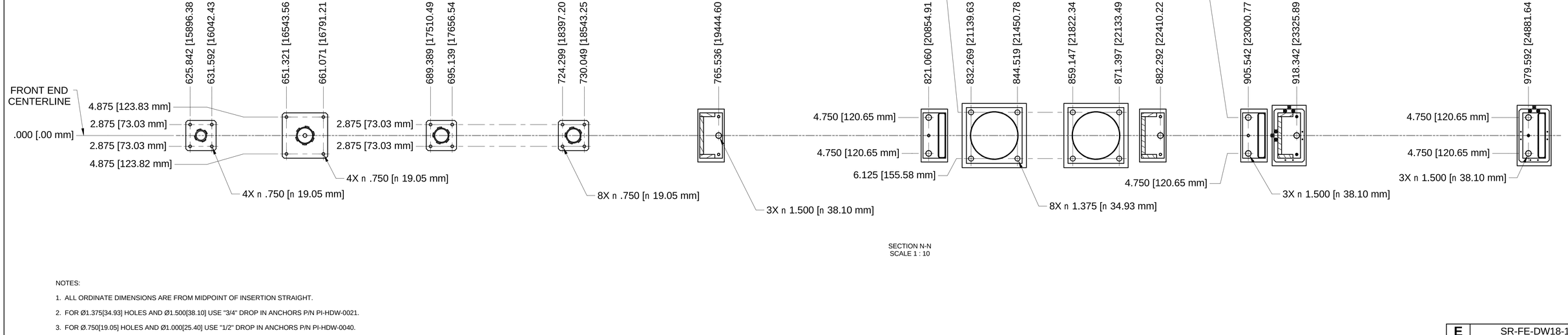
SECTION M-M
RATCHET WALL COLLIMATOR
SCALE 1 : 2

E (SHEET SIZE)	SR-FE-DW18-1000 (DRAWING/PART NUMBER)	A (REVISION)
ESH&Q RISK LEVEL A-1		SHEET 2 OF 3

C:\mech-eng\LT\SR\FE\DW18\SR-FE-DW18-1000.dw







SECTION N-N
SCALE 1 : 10

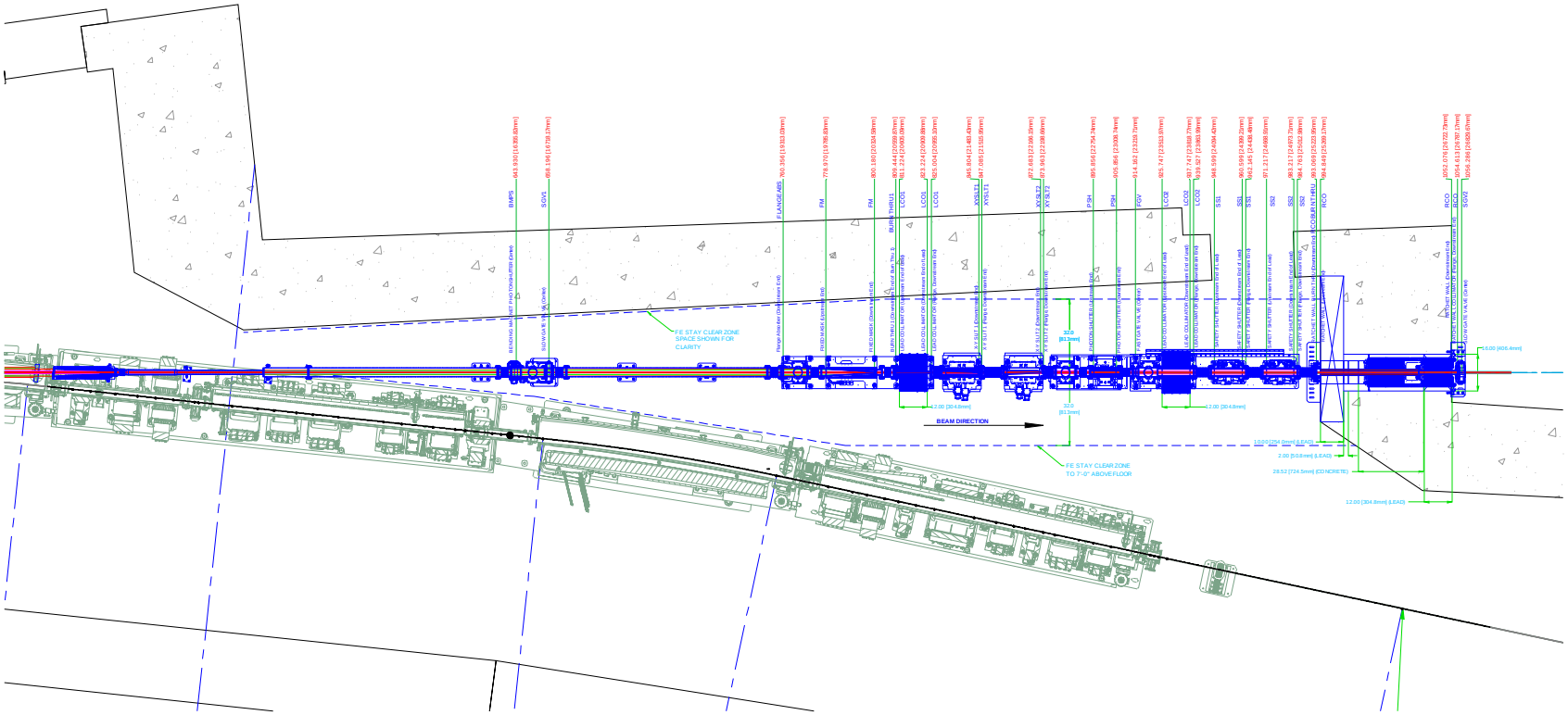
NOTES:

1. ALL ORDINATE DIMENSIONS ARE FROM MIDPOINT OF INSERTION STRAIGHT.
2. FOR Ø1.375[34.93] HOLES AND Ø1.500[38.10] USE "3/4" DROP IN ANCHORS P/N PI-HDW-0021.
3. FOR Ø.750[19.05] HOLES AND Ø1.000[25.40] USE "1/2" DROP IN ANCHORS P/N PI-HDW-0040.

E (SHEET SIZE)	SR-FE-DW18-1000 (DRAWING/PART NUMBER)	A (REVISION)
ES&H/Q RISK LEVEL A-1		SHEET 3 OF 3

C:\mech-eng\LTS\SR\FE\DW18\SR-FE-DW18-1000.dwr

REVISION HISTORY					
REV	DESCRIPTION	DATE	DESIGNER	CHECKED BY	ENGINEER
A	RELEASE PER ECO-001796	4/14	J.F.ABUJANIC	C.AMARITO	A. HUSSAIN
B	RELEASE PER ECO-002952	3/15	J.F.ABUJANIC	C.AMARITO	C.AMUNDSEN
C	REVISED PER ECO-004592	1/2017	J.J.TUOZZOLO	CAMIL	C.AMUNDSEN



NOTE:
1. THE CENTER OF STRAIGHT IS THE ORIGIN FOR ALL DIMENSIONS UNLESS OTHERWISE NOTED.
2. BENDING MAGNET FAN NOT SHOWN, LAYOUT TO BE SUPPLIED BY VACUUM GROUP.

SPECIFICATIONS		SPEC REFERENCE
Project	NEXT	NX-C-XFD-RSI-001
Source	Damping Wiggler (DW)	NX-C-XFD-RSI-001
Beam Line Name	Full Field X-ray Imaging	NX-C-XFD-RSI-001
Abbreviation	FXI	NX-C-XFD-RSI-001
Period of insertion device	100 mm	NX-C-XFD-RSI-001
Long / Short Straight	LONG / 18-ID	NX-C-XFD-RSI-001
Canting Angle	NONE	NX-C-XFD-RSI-001
Length of Source	2x3400 mm	NX-C-XFD-RSI-001
Location of Center of Source 1	-1890.5	SR-ID-DW-1001 RevD
Location of Center of Source 2	+1890.5	SR-ID-DW-1001 RevD
Nominal Radiation Fan (Horizontal)	6.47 mrad	NX-C-XFD-RSI-001
Nominal Radiation Fan (Vertical)	.87 mrad	NX-C-XFD-RSI-001
Fixed Aperture Mask, Outboard Downstream, Aperture (Horizontal)	0.46 mrad (0.33mrad inboard / 0.13mrad outboard)	NX-C-XFD-RSI-001
Fixed Aperture Mask, Outboard Downstream, Aperture (Vertical)	0.26 mrad	NX-C-XFD-RSI-001
Fixed Aperture Mask, Inboard Downstream, Aperture (Horizontal)	N/A	N/A
Fixed Aperture Mask, Inboard Downstream, Aperture (Vertical)	N/A	N/A

SPECIFICATIONS		SPEC REFERENCE
Active Interlock Envelope	AIE-ID-A	PS-C-ASD-SRP-SPC-002
Ray Tracing Procedure		DOC: PS-C-ASD-PRC-147 (VERSION 2)
Bremsstrahlung Source Dimension (Vertical)	+/- 12.5mm	NSLS-II Technical Note No.00020
Bremsstrahlung Source Dimension (Horizontal - Outboard)	+ 37.5mm	NSLS-II Technical Note No.00020
Bremsstrahlung Source Dimension (Horizontal - Inboard)	See Spec Ref	Determined by FE Collimator Apertures
Bremsstrahlung Source Location (Long Straight)	+ 4000mm	NSLS-II Technical Note No.00020
Fixed Mask (Max Horizontal Beam Incidence Angle)	Angle ≤ 4.0°	FEA - Front End (Oct15, 2010)
Fixed Mask (Max Vertical Beam Incidence Angle)	Angle ≤ 2.0°	FEA - Front End (Oct15, 2010)

REFERENCES (NSLS II SHAREPOINT):
1. FRONT END SPECIFICATIONS: NSLS-II GROUP SITES > NSLS-II ACCELERATOR SYSTEMS > MECHANICAL DESIGN AND ENGINEERING > FRONT ENDS > FRONT END REQUIREMENTS.
2. NSLS II TECHNICAL NOTE NUMBER 00020 BREMSSTRAHLUNG RAY TRACING GUIDELINES OR NSLS II BEAMLINES AND FRONT ENDS.
3. NSLS II TECHNICAL NOTE NUMBER 014 PRELIMINARY SHIELDING ESTIMATES FOR NSLS II BEAMLINES AND FRONT ENDS.
4. NSLS II CONTROLLED DOCUMENT NO. NX-C-XFD-RSI-001, (VERSION 5) RSI FOR THE INSERTION DEVICES AND FRONT-ENDS FOR THE NEXT BEAMLINES.
5. ID GROUP INTERFACE CONTROL DRAWING: SR-ID-DW-1001 REV.D.
6. FRONT END RAY TRACING PROCEDURE DOC. PS-C-ASD-PRC-147 (VERSION 4).

HATCH LEGEND
FE Component
Glidcop Component
Lead Component
Poly Component
Moveable Lead Component

FXI, COMPONENT LAYOUT

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS
DIMENSIONS ARE FOR PRIVATE USE ONLY AND MUST BE RETURNED UPON REQUEST
DIMENSIONS TO BE FINAL PRIOR TO CUTTING

DIMENSIONAL TOLERANCE	SURFACE TEXTURE
X ±0.250	Ra 3.2
.X ±0.050	
.XX ±0.025	
.XXX ±0.005	

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P.O. BOX 5000, UPTON, NEW YORK 11973-5000
http://www.bnl.gov

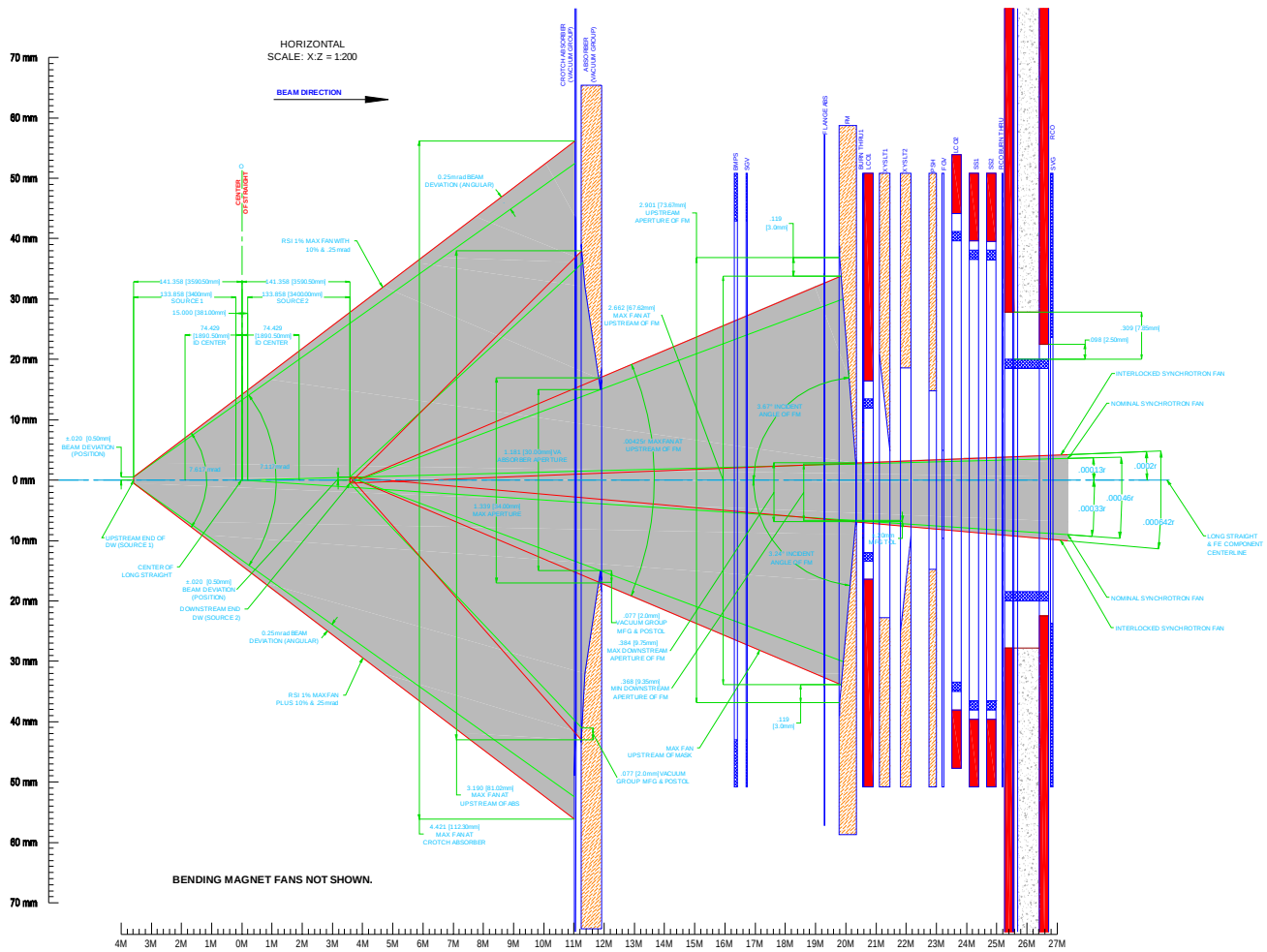
DRAWN BY	J. FABIJANIC	4/14
CHECKED BY	C.AMARITO	4/14
DESIGN BY	R.FLIKIN	4/14
DESIGN CHECKED BY	A. HUSSAIN	4/14
DESIGN APPROVED BY	C. SHARMA	4/14
MECHANICAL ENGINEERING	C. SHARMA	4/14
ELECTRICAL ENGINEERING	A. HUSSAIN	4/14
RADIATION SAFETY	J. SCHROEDER	4/14
ES&H	J. SCHROEDER	4/14

NSLS II
NEW YORK STATE SYNCHROTRON LIGHT SOURCE II

STORAGERING
FRONT END, FXI BEAMLINE
RAY TRACING

NEXT ASSY:	N/A	
PROJECT:	NSLS-II	
SCALE:	SEE DWG VIEW	
WBS#	1.03.04.07.03	
SIZE	E	
DWG NO.	SR-FE-DW18-1001	
REV NO.	C	
ES&H RISK LEVEL	A1	
SHEET 1	OF 7	

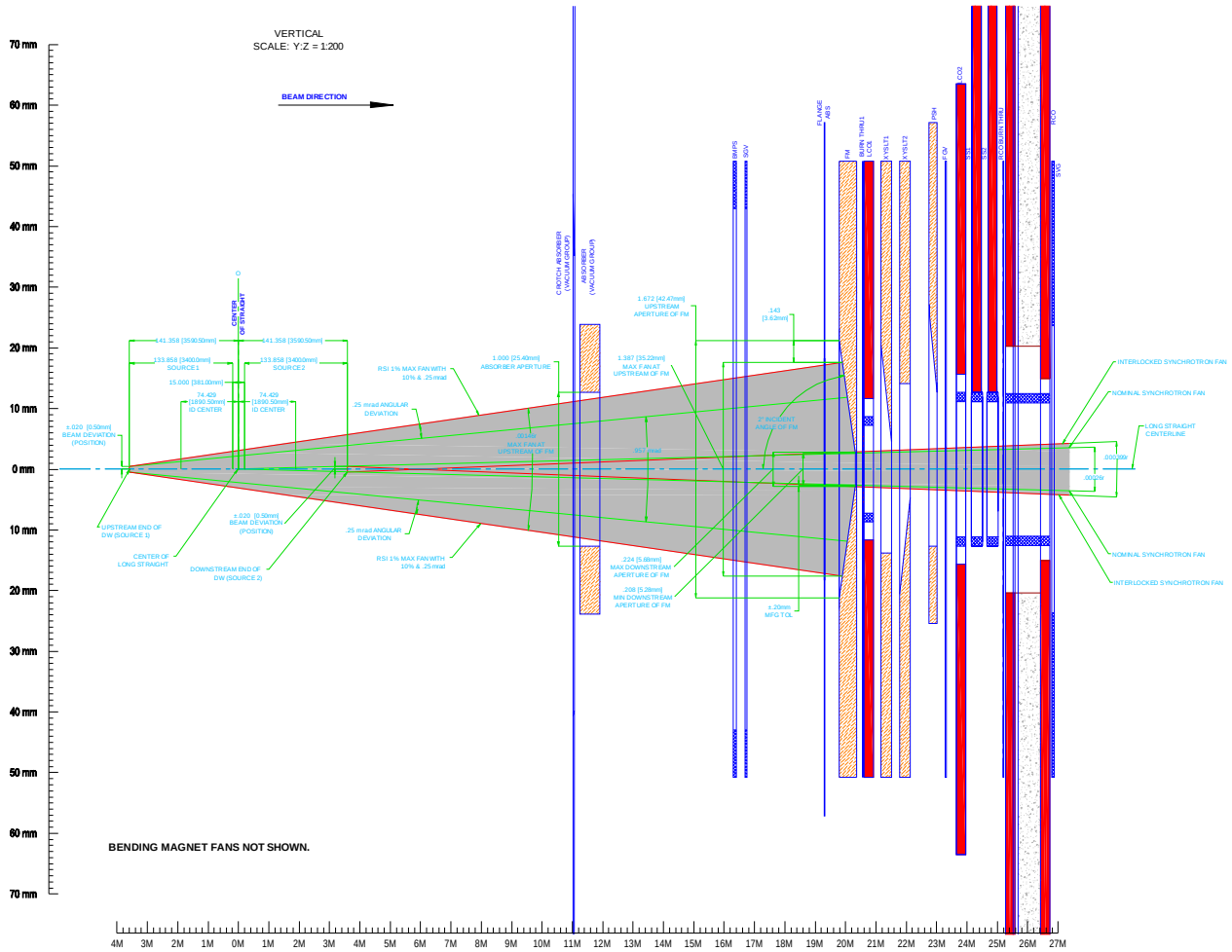
RELEASED – EFFECTIVE

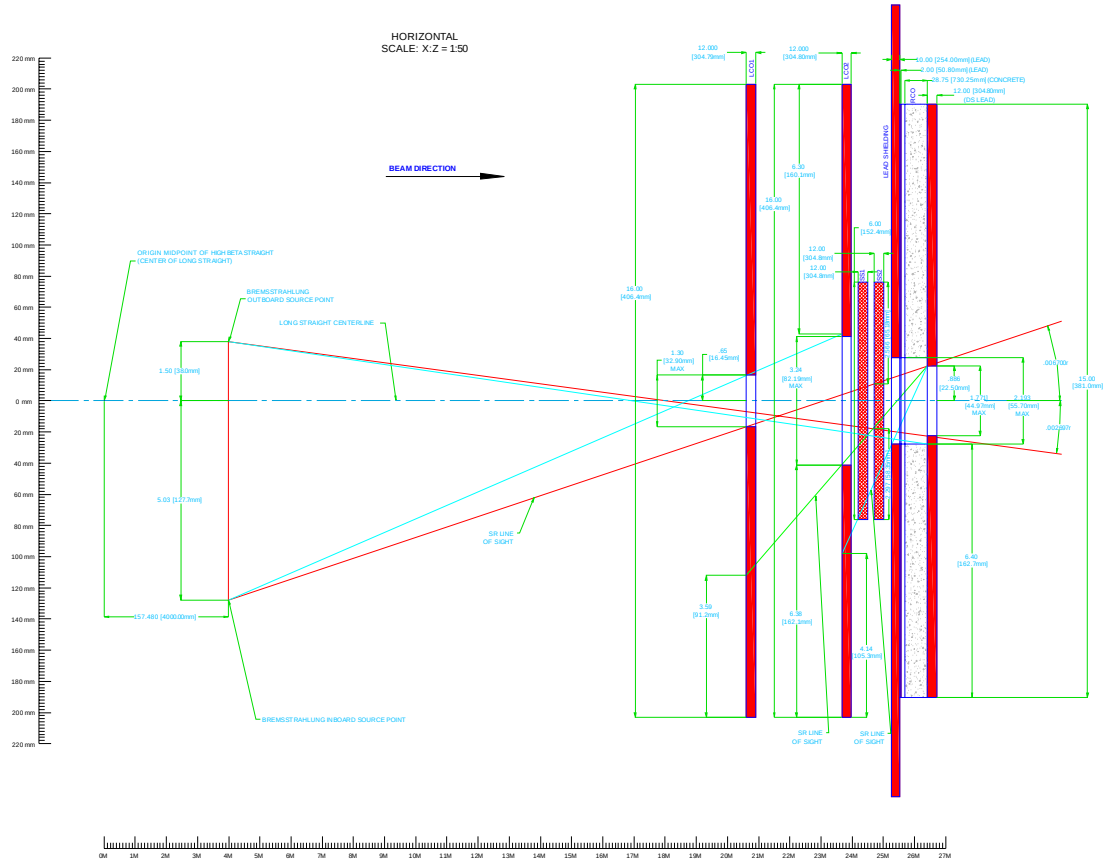


FXI, INTERLOCKED SYNCHROTRON RAY TRACING HORIZONTAL

E	SR-FE-DW18-1001	C
SIZE/RISK LEVEL A1		SHEET 2 OF 7

RELEASED – EFFECTIVE

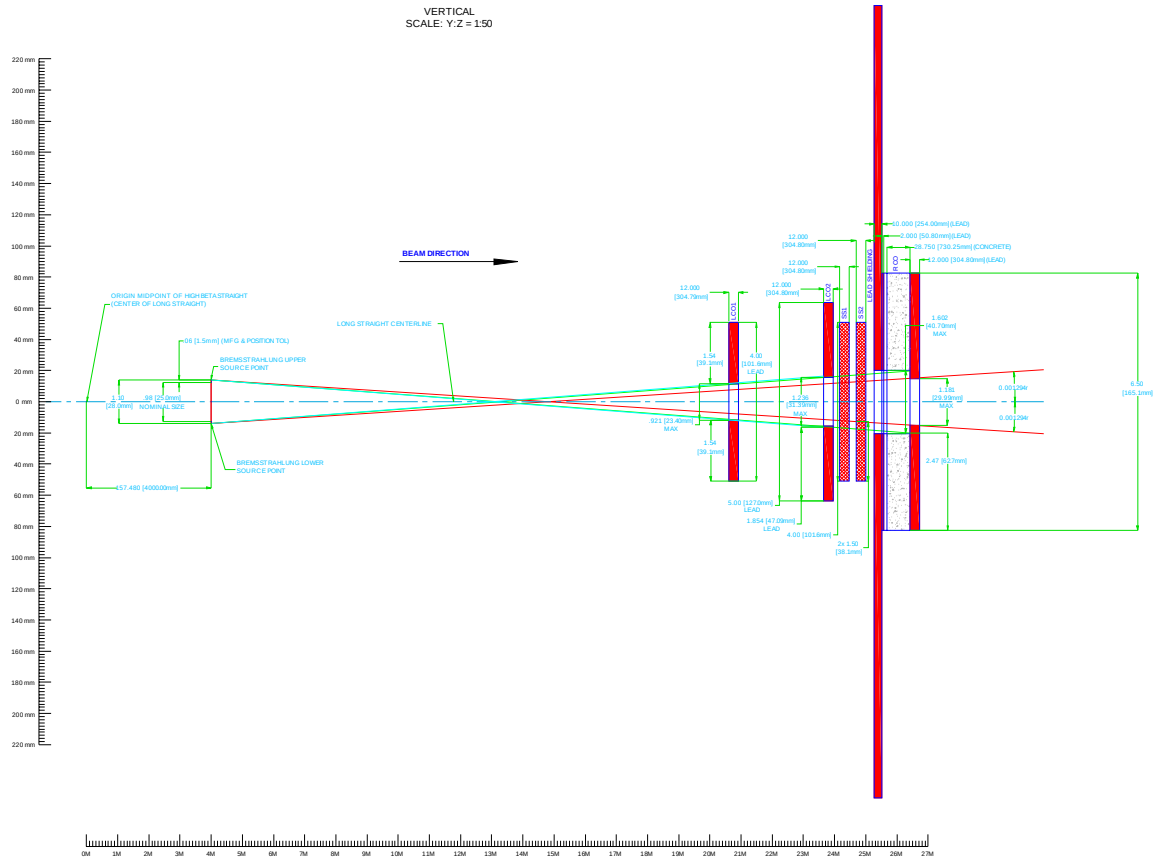

VERTICAL
SCALE: Y:Z = 1:200
BEAM DIRECTION
70 mm
60 mm
50 mm
40 mm
30 mm
20 mm
10 mm
0 mm
10 mm
20 mm
30 mm
40 mm
50 mm
60 mm
70 mm
4M 3M 2M 1M 0M 1M 2M 3M 4M 5M 6M 7M 8M 9M 10M 11M 12M 13M 14M 15M 16M 17M 18M 19M 20M 21M 22M 23M 24M 25M 26M 27M
CENTER OF LONG STRAIGHT
441.358 [3590.50mm]
441.358 [3590.50mm]
133.858 [3400.0mm]
SOURCE 1
133.858 [3400.0mm]
SOURCE 2
15.000 [381.00mm]
74.429 [1890.50mm]
ID CENTER
74.429 [1890.50mm]
ID CENTER
±.020 [0.50mm]
BEAM DEVIATION
(POSITION)
UPSTREAM END OF
DW (SOURCE 1)
CENTER OF
LONG STRAIGHT
DOWNSTREAM END OF
DW (SOURCE 2)
±.020 [0.50mm]
BEAM DEVIATION
(POSITION)
.25 mrad ANGULAR
DEVIATION
RSI 1% MAX FAN WITH
10% & .25 mrad
.25 mrad ANGULAR
DEVIATION
RSI 1% MAX FAN WITH
10% & .25 mrad
1.000 [25.40mm]
ABSORBER APERTURE
.50 mrad
MAX FAN AT
UPSTREAM OF FM
C NOTCH ABSORBER
(VACUUM GROUP)
ABSORBER
(VACUUM GROUP)
1.387 [35.22mm]
MAX FAN AT
UPSTREAM OF FM
.952 mrad
.224 [5.68mm]
MAX DOWNSTREAM
APERTURE OF FM
.208 [5.28mm]
MIN DOWNSTREAM
APERTURE OF FM
1.672 [42.47mm]
UPSTREAM
APERTURE OF FM
.143
[3.63mm]
2° INCIDENT
ANGLE OF FM
±.20mm
MFG TOL
BAPS
50V
FLANGE
AXIS
FM
BURN THRU1
VSLT1
VSLT2
FSH
FGV
C-C2
FSE
FSE
FSE



FXI, BREMSSTRAHLUNG
RAY TRACING , HORIZONTAL

E	SR-FE-DW18-1001	C
ESH&Q RISK LEVEL A1		SHEET 4 OF 7

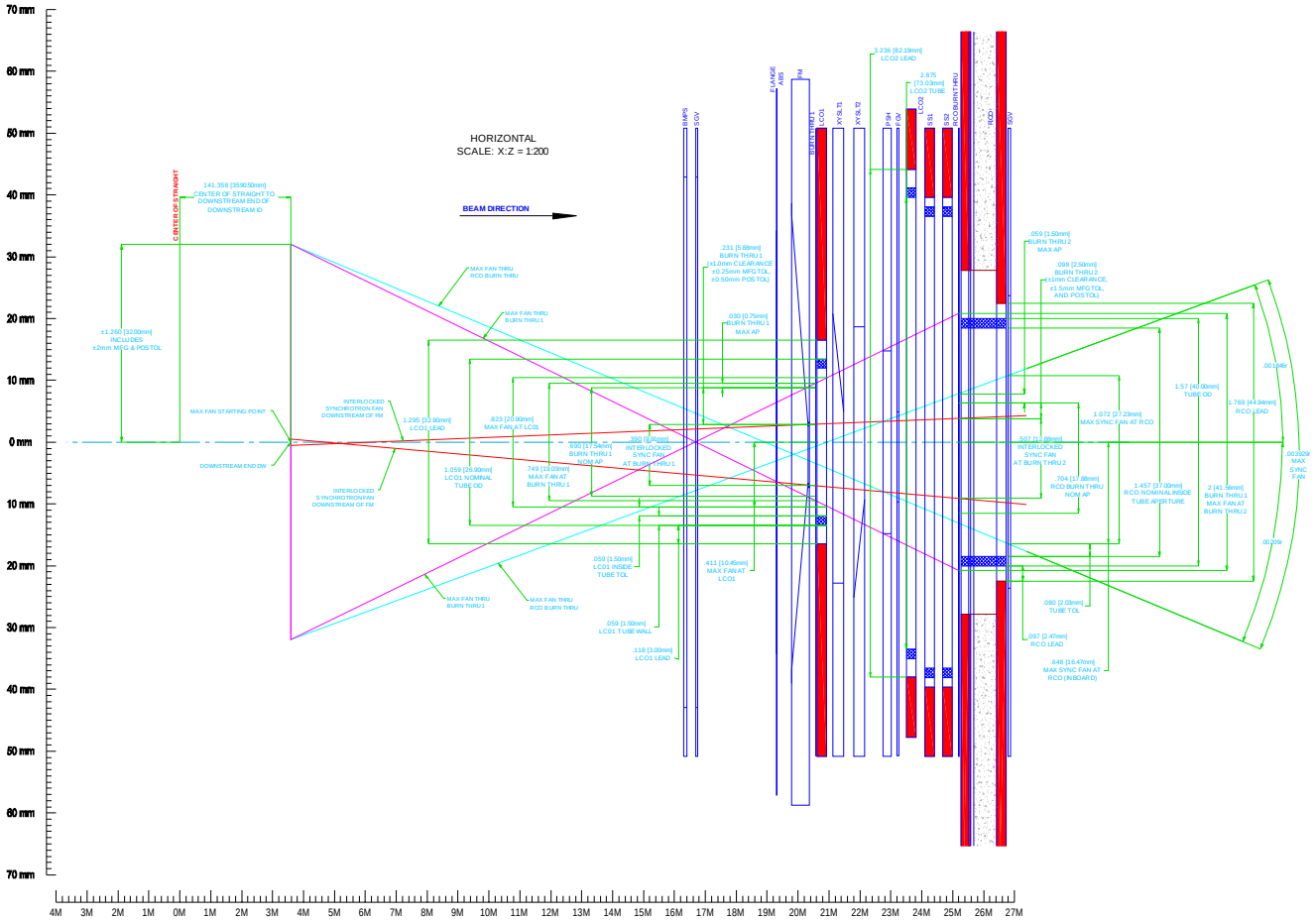
RELEASED – EFFECTIVE



FXI, BREMSSTRAHLUNG
RAY TRACING , VERTICAL

E	SR-FE-DW18-1001	C
E.SHAD. RISK LEVEL A1		SHEET 5 OF 7

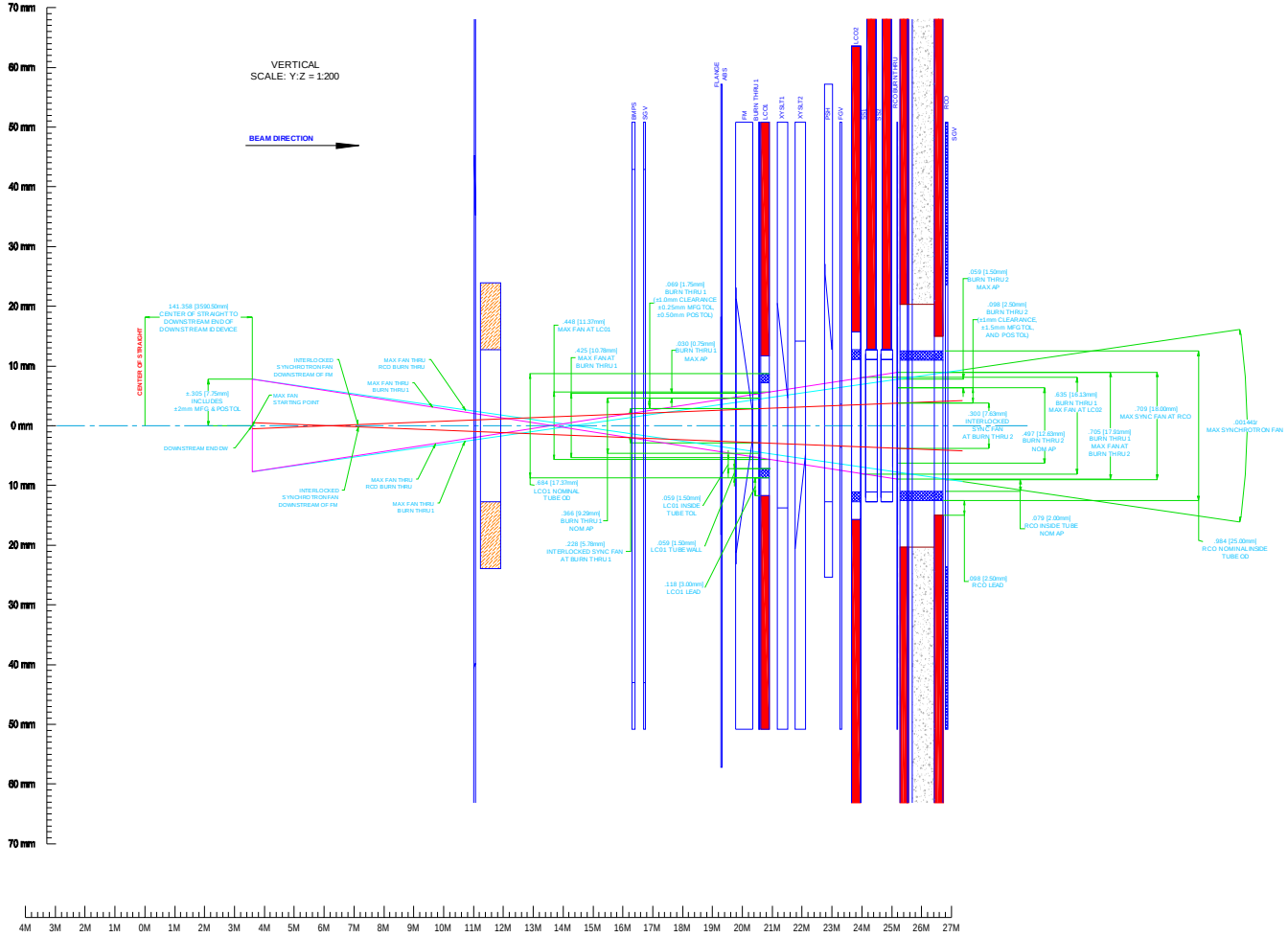
RELEASED – EFFECTIVE



FXI, MAX SYNCHROTRON RAY TRACING HORIZONTAL

E	SR-FE-DW18-1001	C
E-SHAD RISK LEVEL A1	SHEET 6	OF 7

RELEASED – EFFECTIVE



FXI, MAX SYNCHROTRON RAY TRACING VERTICAL

E	SR-FE-DW18-1001	C
ESHSD RISK LEVEL A1		SHEET 7 OF 7

RELEASED – EFFECTIVE