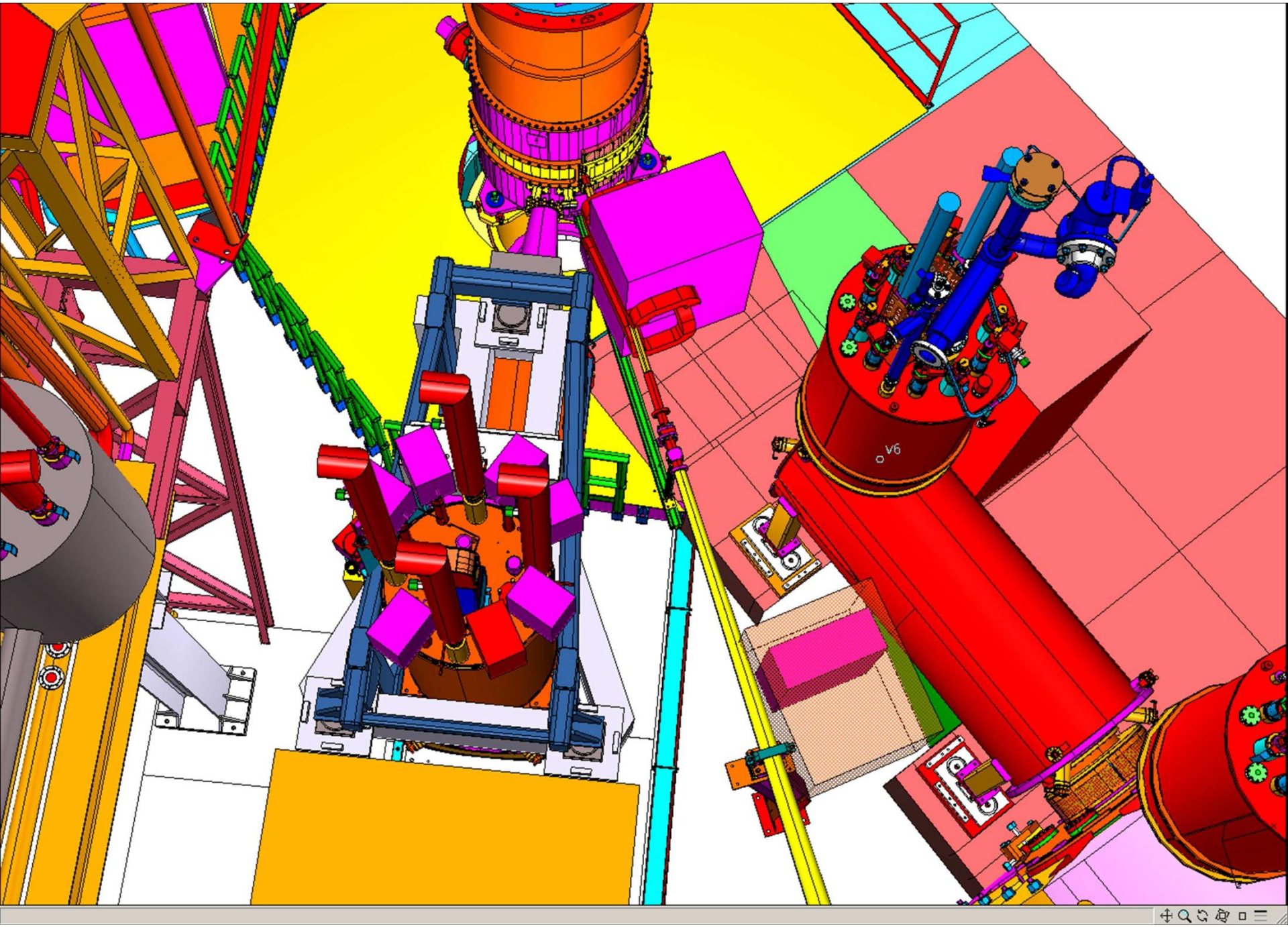
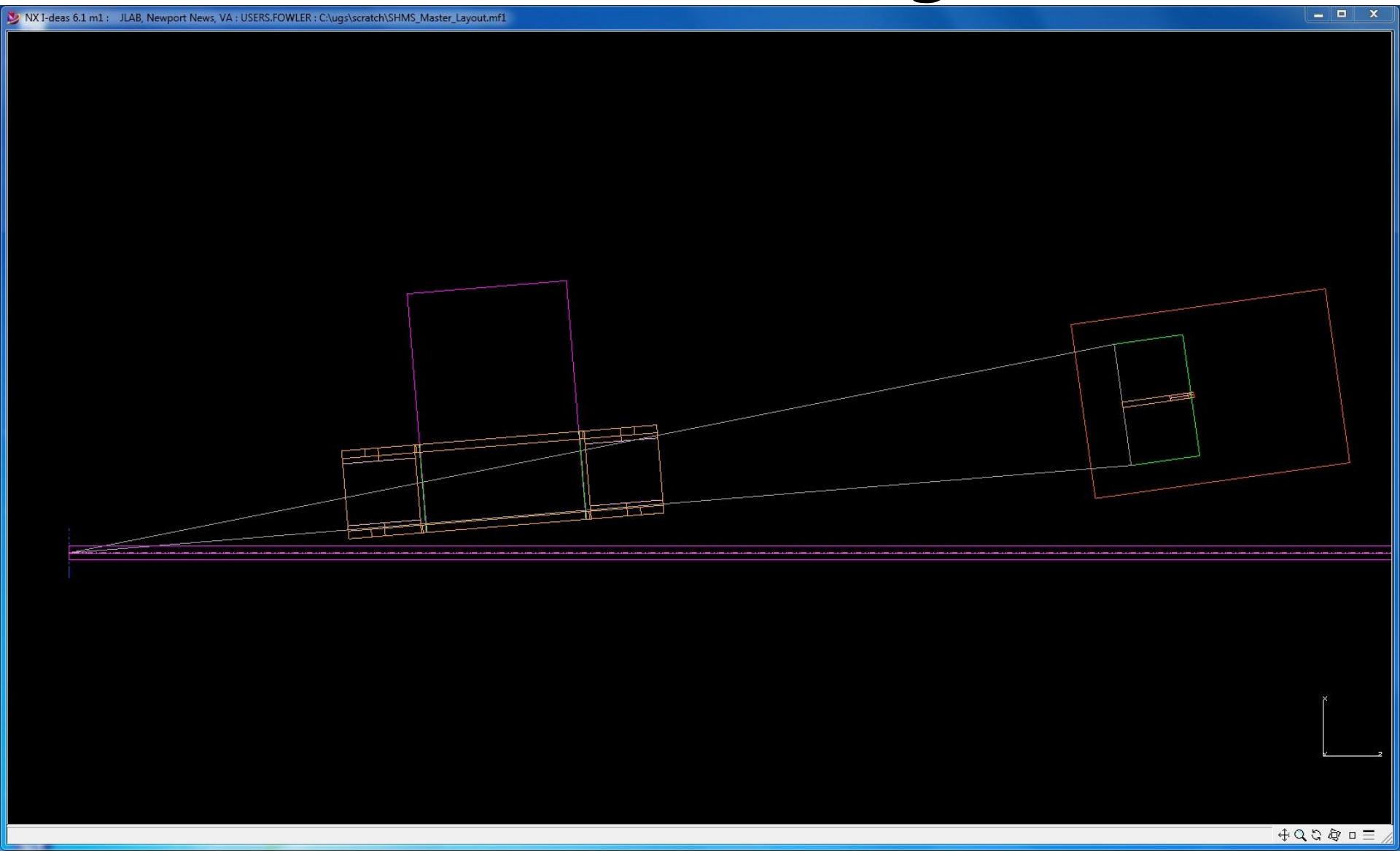
Beam pipe considerations

(with thanks to Mike Fowler)

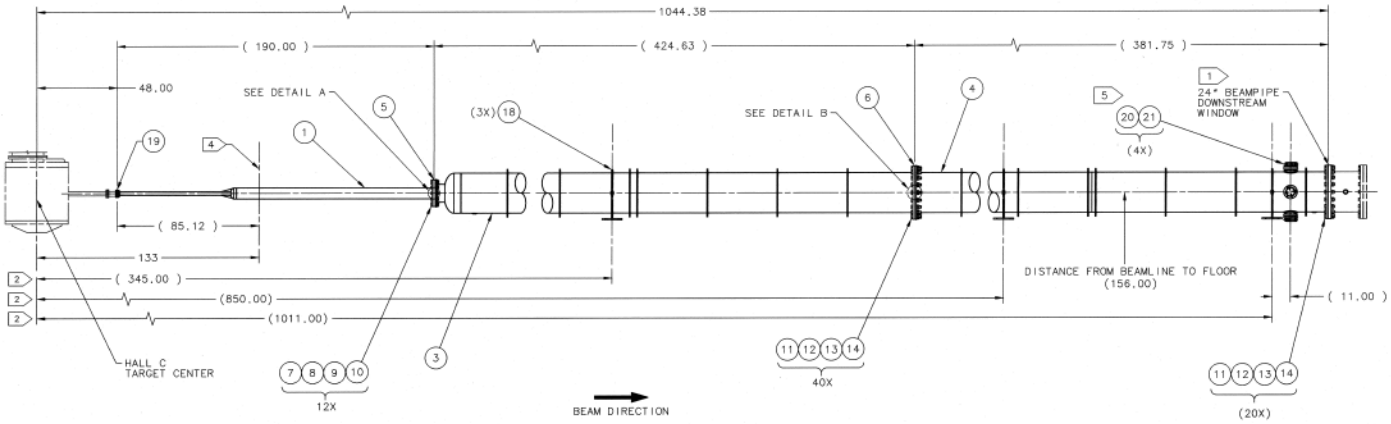

V6

Detector at 8 degrees



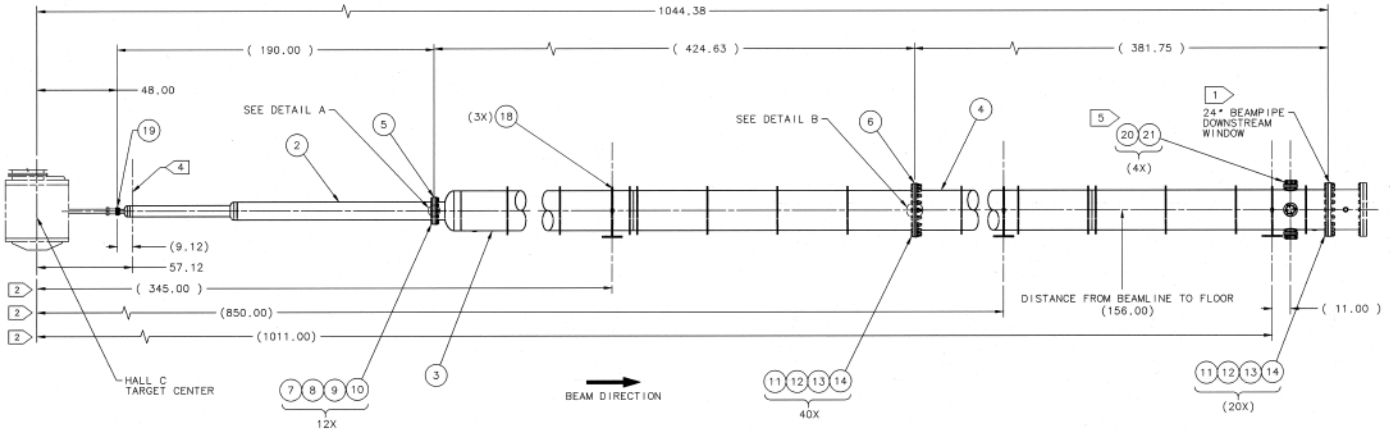
→ Gives some flexibility to increase diameter of beam dump line

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
SH 3-B	A	ADDED: ITEMS 20 THRU 22; NOTES 5 & 6	4/01/04	
SH 2-E		REVISED: UPDATED DRAWING		
ALL		CRB 12APR04	4/14/04	



SMALL ANGLE BEAMPIPE ASSEMBLY-01

SCALE: NONE



LARGE ANGLE BEAMPIPE ASSEMBLY-02

SCALE: NONE

NOTES:

1. 24" BEAMPIPE DOWNSTREAM WINDOW SHALL BE SUPPLIED BY HALL C ENGINEERING. FLANGE ON THE END OF THE BEAMPIPE ASSEMBLY TO BE PROTECTED BY ITEM 15 UNTIL THE DOWNSTREAM WINDOW IS INSTALLED.
2. ALL DIMENSIONS REFERRING TO THIS NOTE ARE FOR LOCATIONS OF PEDESTALS BOLTED TO THE HALL FLOOR. DIMENSIONS ARE TO THE CENTERLINES OF THE PEDESTALS. SEE JLAB DWG 67172-56145
3. ITEMS 16 THRU 18 SHALL BE USED TO INSURE THE BEAMPIPES DO NOT REST ON THE HALL FLOOR WHEN THEY ARE NOT IN USE. ITEM 18 SHALL ALSO BE USED TO MOUNT THE BEAMPIPES ON THE PEDESTALS THAT SHALL BE PROVIDED BY HALL C. SEE SHEET 2 FOR A LAYOUT DEPICTING THE RECOMMENDED LOCATIONS OF THE PIPE SUPPORTS WHEN THE BEAMPIPE SECTIONS ARE DISASSEMBLED.

   INSURE THE FOLLWING QUANTITIES ARE MADE FOR THE SPECIFIED ITEMS:

   A. ITEM 16 - QTY OF 3
   B. ITEM 17 - QTY OF 1
   C. ITEM 18 - QTY OF 6

   PIPE SUPPORT ASSEMBLIES NOT BEING USED TO SUPPORT BEAMPIPE ASSEMBLY -01 OR -02 MAY BE REMOVED DURING THESE CONFIGURATIONS.
4. THE CENTERLINE REFERENCING THIS NOTE IS FOR THE ADJUSTABLE 6" PIPE SUPPORT ASSEMBLY. SEE JLAB DWG 67172-56142 FOR ADDITIONAL INFORMATION.

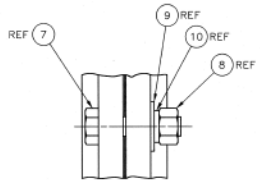
A 5. ITEM 22 TO BE USED ONLY WHEN ITEM 20 IS NOT INSTALLED ON ITEM 4 DURING NORMAL BEAM OPERATIONS.

A 6. SUGGESTED SOURCE OR JLAB APPROVED ALTERNATE:

   A. KURT J LESKER CO
      1515 WORTHINGTON AVE
      CLAIRTON, PA 15025-2700
      PH: 1(800)245-1656

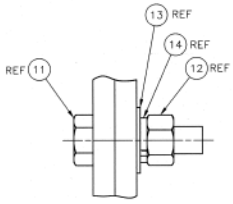
A	4 REF	4 REF	22	KURT J. LESKER CO	CF FLANGE ø8.00 BLANK	-	5,6A
	4	4	21	VAC-500-0133-0001-09	BOLT SET FOR ø8.00 CF FLANGE	-	-
	4	4	20	67229-56110	INNER JACKET; LUMINOSITY MONITOR ASSEMBLY	-	-
	1	1	19	VAC-500-0133-0001-05	BOLT SET FOR ø4.50 CF FLANGE	-	-
	-	-	18	67172-56138	24" PIPE SUPPORT ASSEMBLY	-	2,3
	-	-	17	67172-56137	10" PIPE SUPPORT ASSEMBLY	-	3
	-	-	16	67172-56136	6" PIPE SUPPORT ASSEMBLY	-	3
	1	1	15	67172-56131 ITEM 4	24 INCH FLANGE BLANK	-	1
	40	40	14	McMASTER-CARR 92146A040	WASHER, LOCK, 1.250	-	-
	40	40	13	McMASTER-CARR 92141A040	WASHER, FLAT, 1.250	-	-
	40	40	12	McMASTER-CARR 91845A040	NUT, HEX, 1.250-7UNC	-	-
	40	40	11	McMASTER-CARR 92198A238	BOLT, HEX HEAD 1.250-7UNC X 4.00 LG	-	-
	12	12	10	McMASTER-CARR 92146A037	WASHER, LOCK, .875	-	-
	12	12	9	McMASTER-CARR 92141A037	WASHER, FLAT, .875	-	-
	12	12	8	McMASTER-CARR 91845A335	NUT, HEX, .875-9UNC	-	-
	12	12	7	McMASTER-CARR 92198A888	BOLT, HEX HEAD .875-9UNC X 4.00 LG	-	-
	1	1	6	GARLOCK HELICOFLEX H-307791	HELICOFLEX SPRING SEAL TYPE HN 200 (24 INCH FLANGE)	-	-
	1	1	5	GARLOCK HELICOFLEX H-307790	HELICOFLEX SPRING SEAL TYPE HN 200 (10 INCH FLANGE)	-	-
	1	1	4	67172-56127	SMALL/LARGE ANGLE BEAMPIPE ASSY -SECTION C	-	-
	1	1	3	67172-56126	SMALL/LARGE ANGLE BEAMPIPE ASSY -SECTION B	-	-
	1	-	2	67172-56124	LARGE ANGLE BEAMPIPE ASSY- SECTION A	-	-
	-	1	1	67172-56125	SMALL ANGLE BEAMPIPE ASSY- SECTION A	-	-
	QTY ROUD ASSY	QTY ROUD ASSY	ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	NOTES

PARTS LIST



DETAIL A

TYPICAL .88 DIA BOLTING DETAIL
SCALE: 1:2



DETAIL B

TYPICAL 1.25 DIA BOLTING DETAIL
SCALE: 1:2

TORQUE TABLE		
BOLT SIZE	HEX HEAD BOLT (70 KSI)	
	FT-LBS UNC	-
5/16	-	-
7/8	64.552	-
1-1/4	81.762	-

EACH SHEET OF MULTI-SHEET DRAWINGS SHALL ALWAYS HAVE THE SAME REVISION LEVEL.

DOCUMENT CONTROL STAMP

MATERIAL: SEE PARTS LIST

FINISH: MACHINED SURFACES 125 / UNLESS OTHERWISE NOTED: DEBURR & BREAK ALL SHARP EDGES

DO NOT SCALE DRAWING

THIRD ANGLE PROJECTION

TRACKING NO.
PROJ: 67170
LDRY: 67172

APPROVALS	DATE
DRAWN: C. BUTLER	12DEC02
CHECKED: C. BUTLER	14APR03
APPROVED: WALTER KELLNER	14APR03
APPROVED: WALTER KELLNER	14APR03

Thomas Jefferson National Accelerator Facility

HALL C
DOWN STREAM CONNECTING BEAM LINE COMPONENTS
SMALL & LARGE ANGLE BEAMPIPE ASSEMBLIES

SIZE: E | DWG. NO.: 67172-56130 | REV.: A

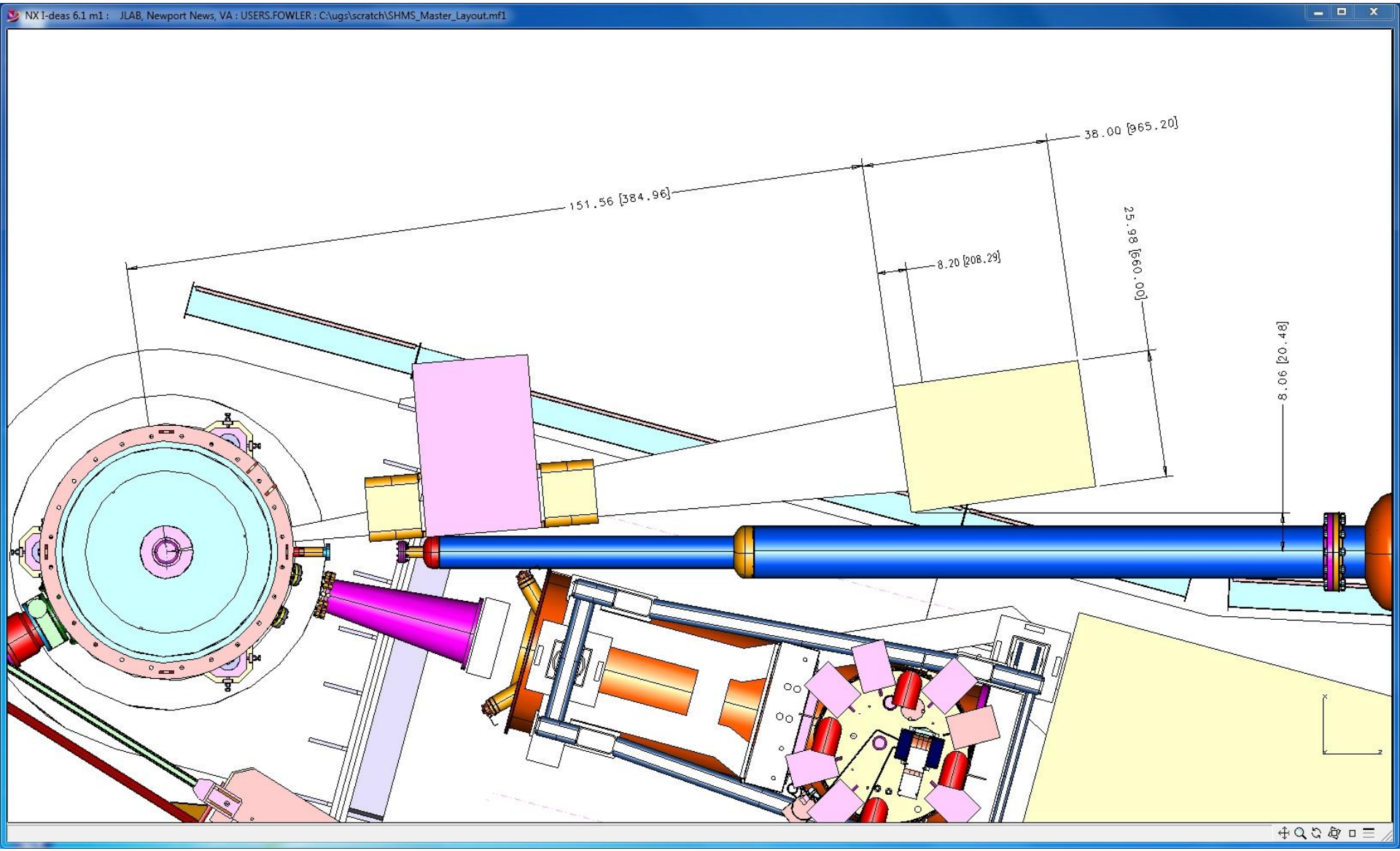
NEXT ASSY USED ON: -- | SHEET 1 OF 2

Beam pipe considerations

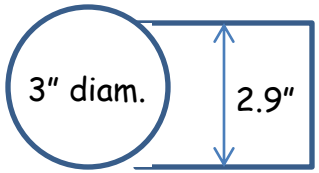
- Small angle beam pipe assembly has diameter of 2 inches up to a distance of 2.96 m → 8.6 mr critical angle
  (HMS can reach down to 10.5 degrees)
- Large angle beam pipe assembly has diameter of 2 inches up to a distance of 1.45 m → 17.5 mr critical angle
  (HMS can reach down to 15 degrees)
- Slot in HMS has vertical dimension of 2.9 inches,
  (relevant up to HMS angles of 15 degrees)
- Front NPS magnet coil (detector) at distance of 1 (4) m

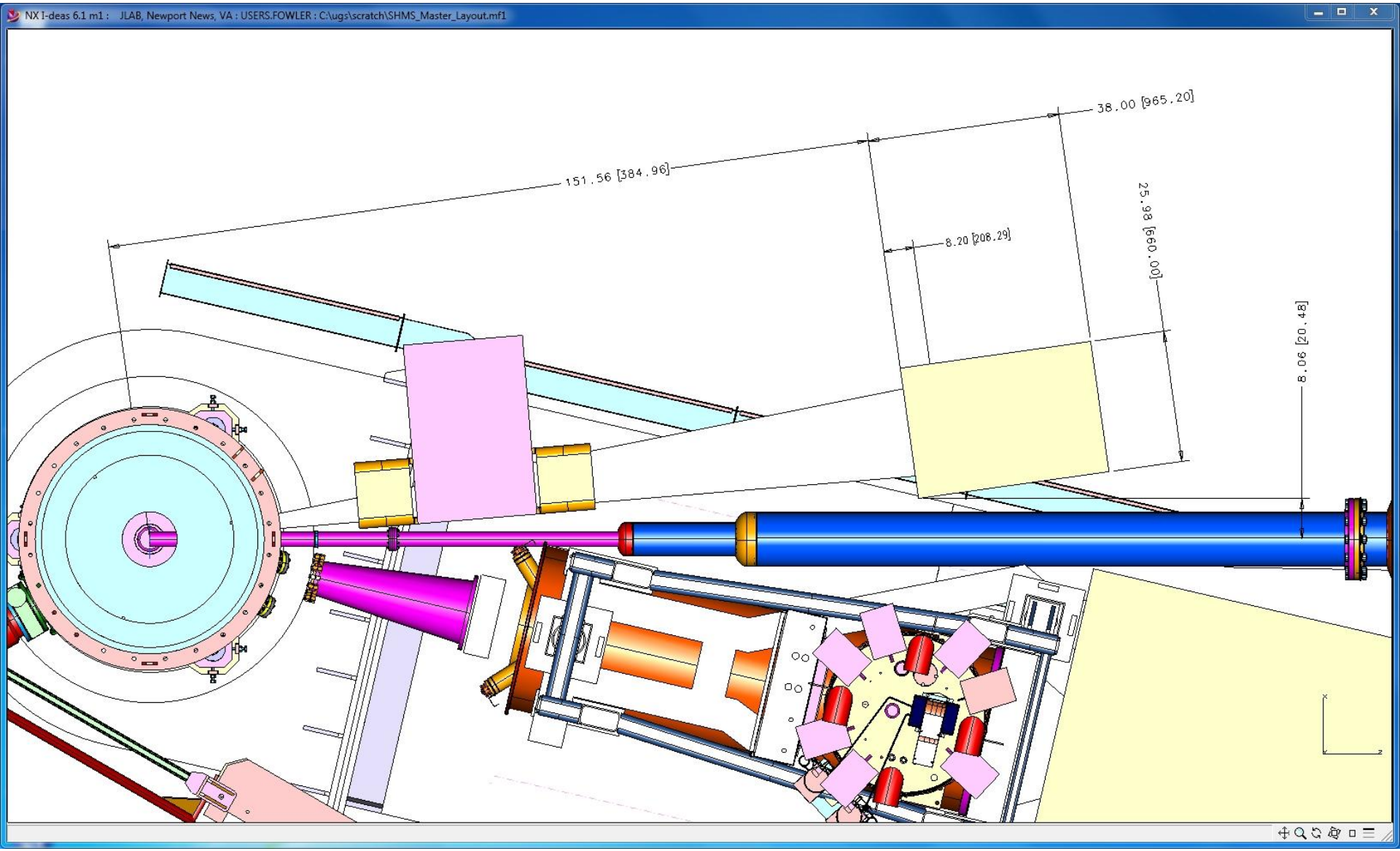
- For NPS at 8 degrees and HMS > 13 degrees:
  - Beam pipe diameter at 1.0 m constrained to <2 inches
  - Beam pipe diameter at 2.3 m constrained to <3 inches
  - Beam pipe diameter at 4.0 m constrained to <6 inches
- critical angle = 25.4, 17.0, 19.0 mr
  → can gain factor of 2? (3 inches at 2.25 m = 17 mr)

Existing large angle beam pipe assembly with NPS at 8 degrees and HMS at 15 degrees



Modified large angle beam pipe assembly with NPS at 8 degrees and HMS at 13 degrees – here modification is 3 inches up to 2.35 m





Beam pipe considerations – our option?

First order, can take "Large Angle Beam Pipe Assembly" and split second section of beam pipe in two, with first half with diameter of 3 inches (0.75 meter long) and second half diameter of 4+ inches.

Critical angle about 17 mr
(twice the critical angle of small angle beam pipe)

In this configuration, HMS can reach down to 13 degrees
If smaller HMS angles are required, one can only fit a 2.5 inch diameter beam pipe in for angles down to ~11 deg
(14 mr critical angle)

→ Some advantages to not push HMS to smallest angles