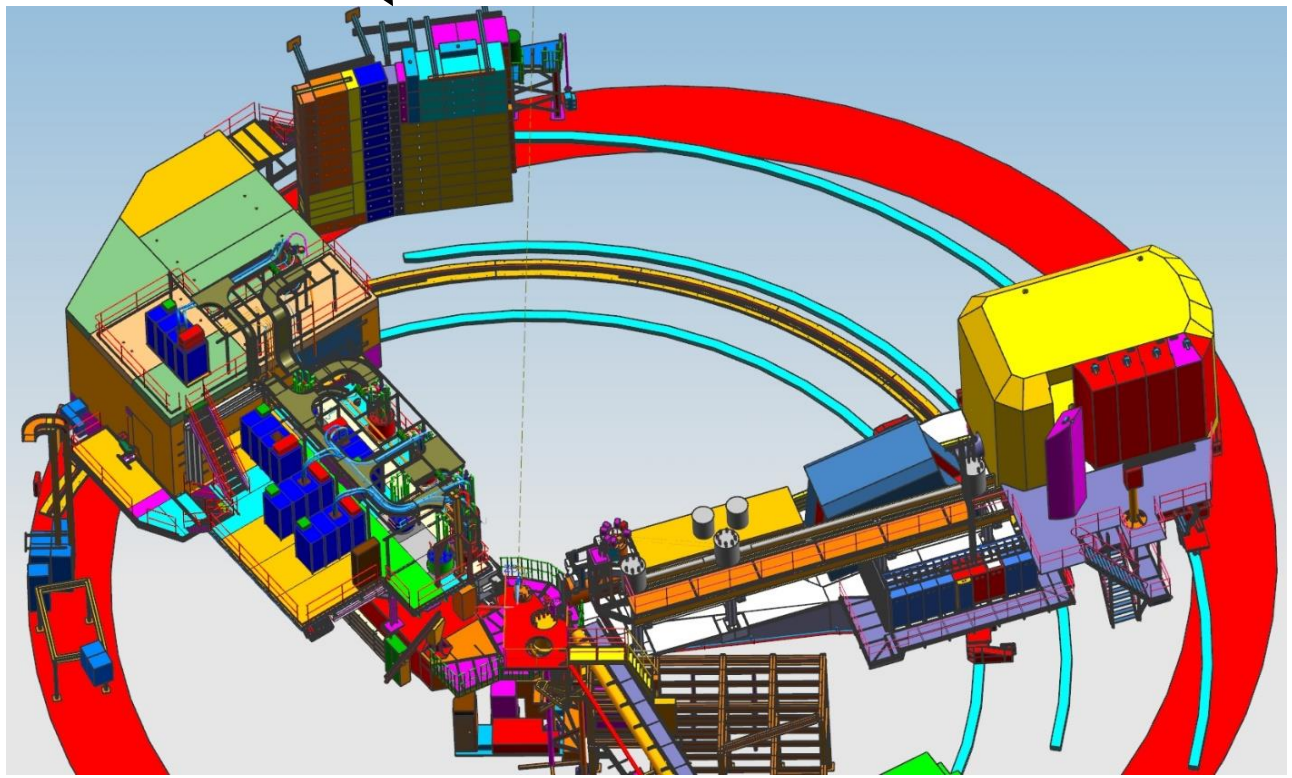
HES & HKS return to Hall C

Dec 13, 2022

Steven Lassiter & Bert Metzger

Hall C Layout

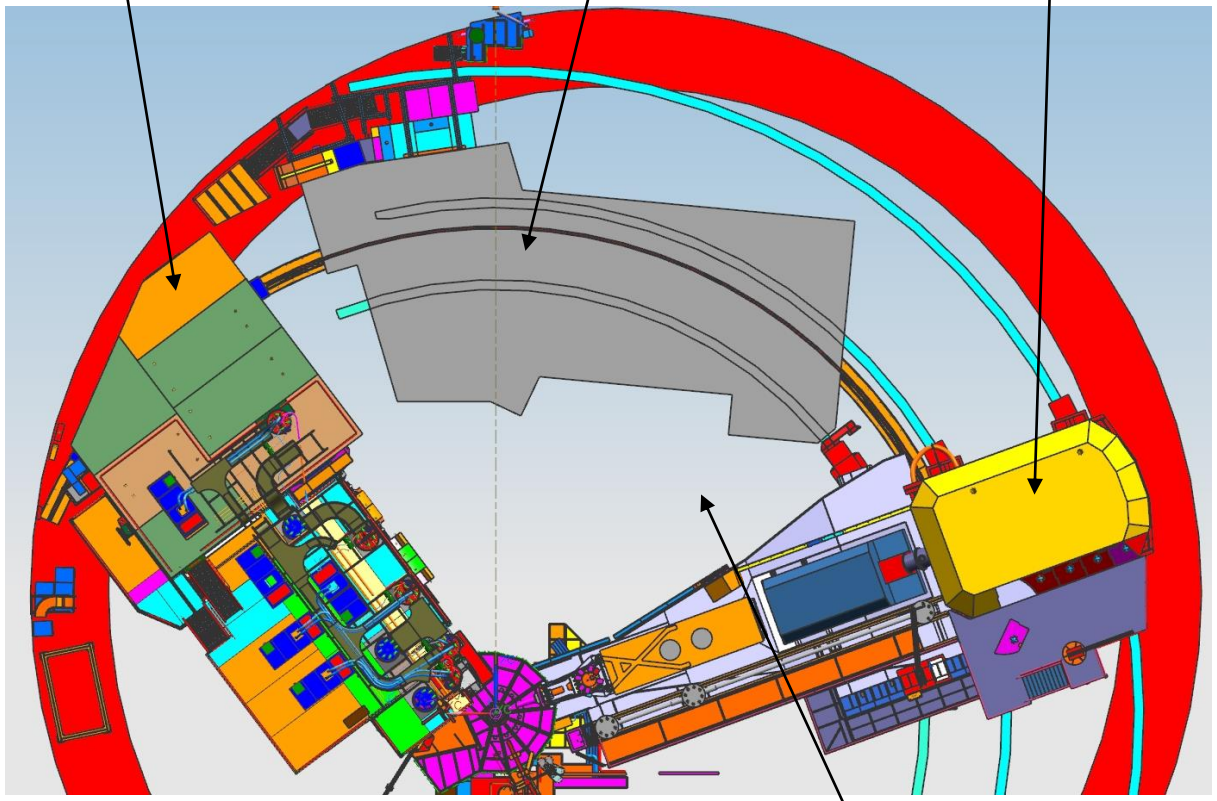
Existing Hall C Rear Shielding Wall
To be Used as the Rear Wall of the
HES Bunker



SHMS at 34°
could go to 38°

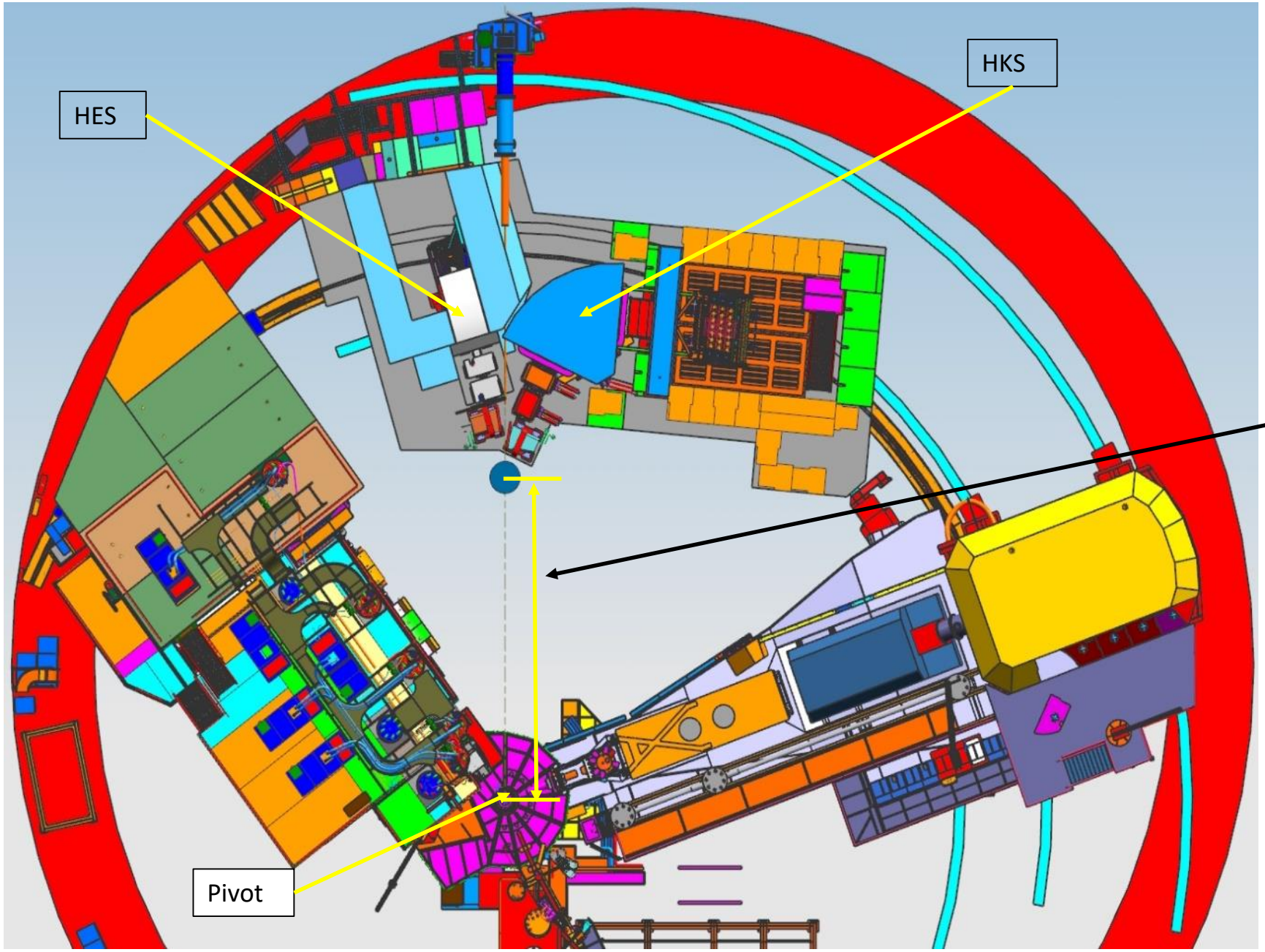
10” Concrete Pad to cover
SHMS and HMS rails

HMS at 70°
could go to 78°



Floor Distance from Beam to
Floor 156” (Ref)

Layout Top view

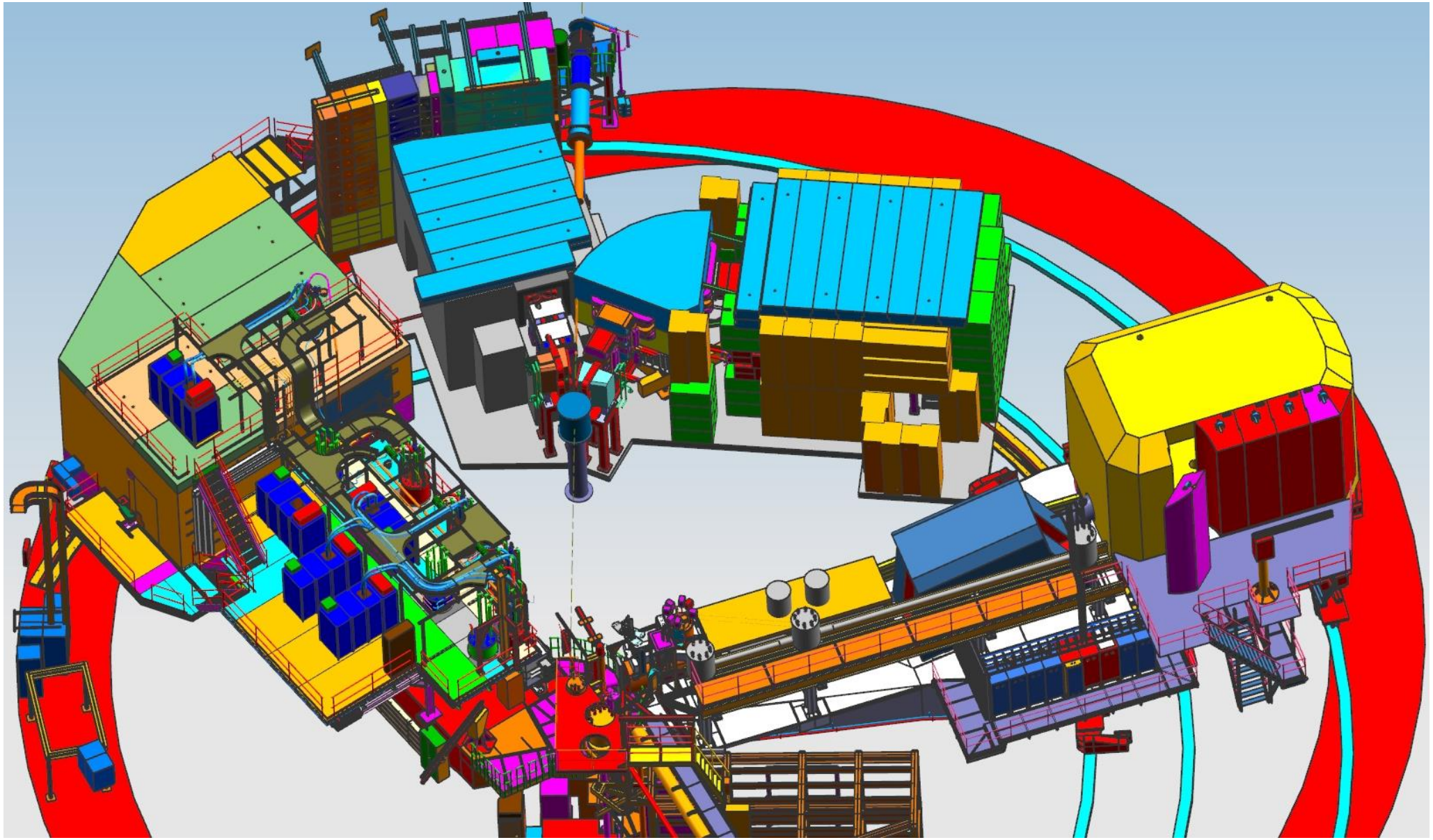


Distance from Pivot to Target Center
11.24m (442.7in)

Will downstream target be too far from last accelerator's corrector magnet?

CPS target will be 6m from pivot.

HyperNuclear Hall C_11-29-22

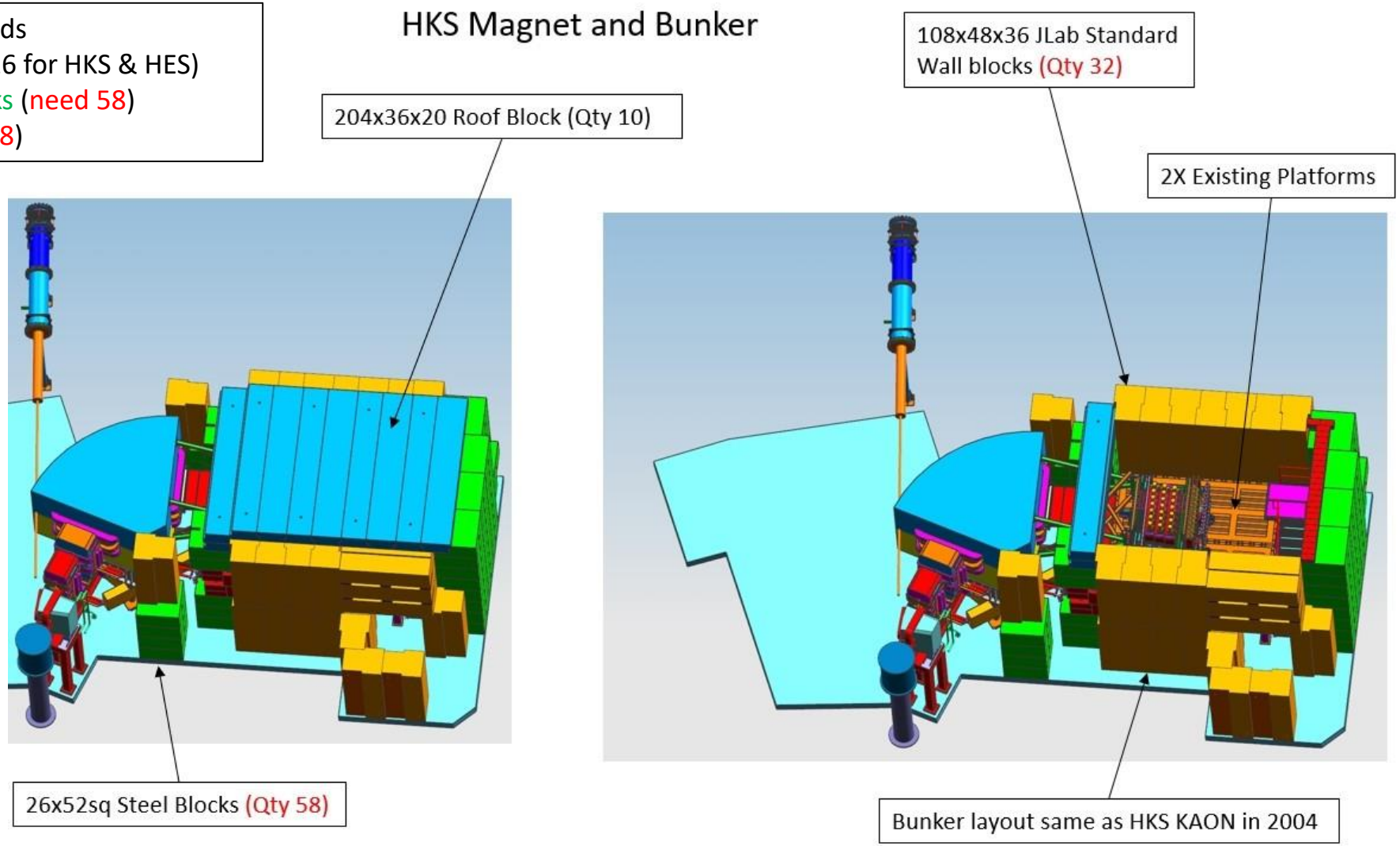


Shielding Block Inventory

JLAB's inventory vs HKS and HES needs
Jlab has 19 204" Roof blocks (need 16 for HKS & HES)
Jlab has 39 Steel 26"x52" Steel blocks (need 58)
Jlab has 19 108" Wall blocks (need 38)

HES will need poured Walls

HKS Magnet and Bunker

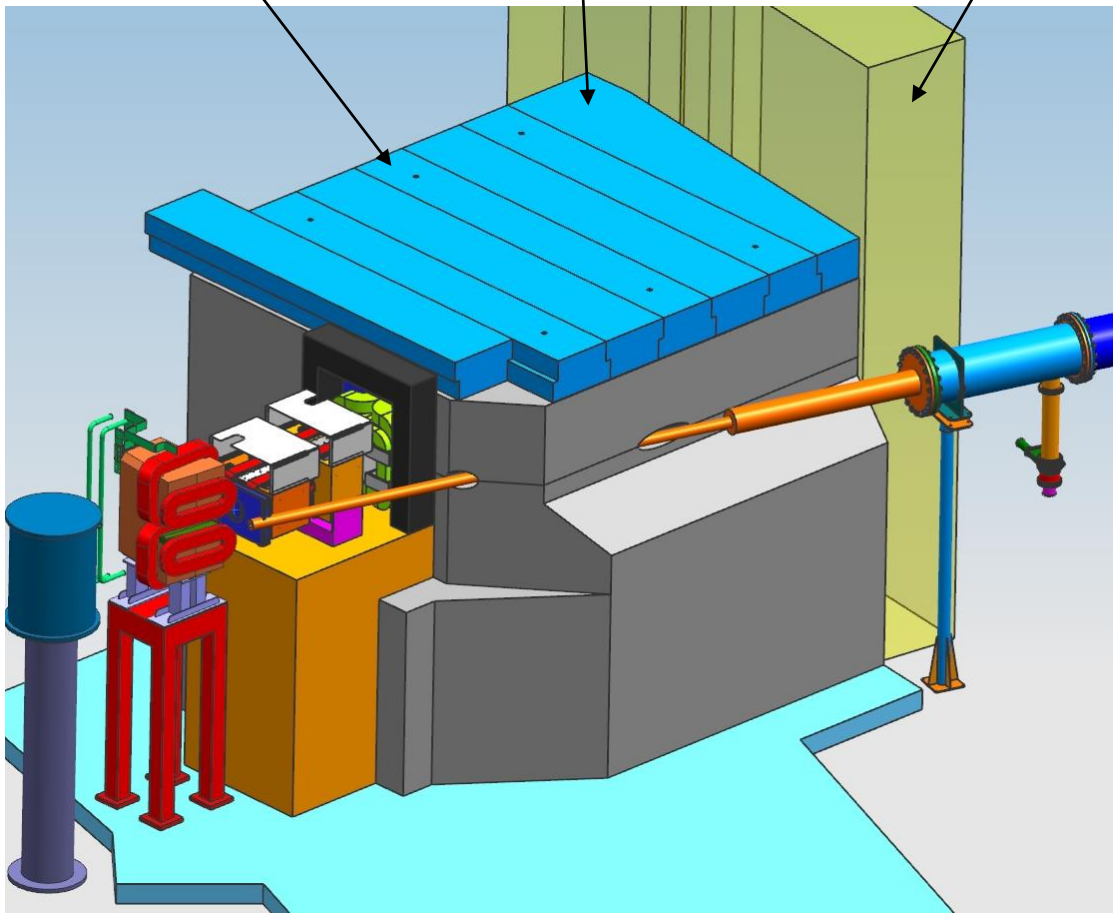


HES Bunker

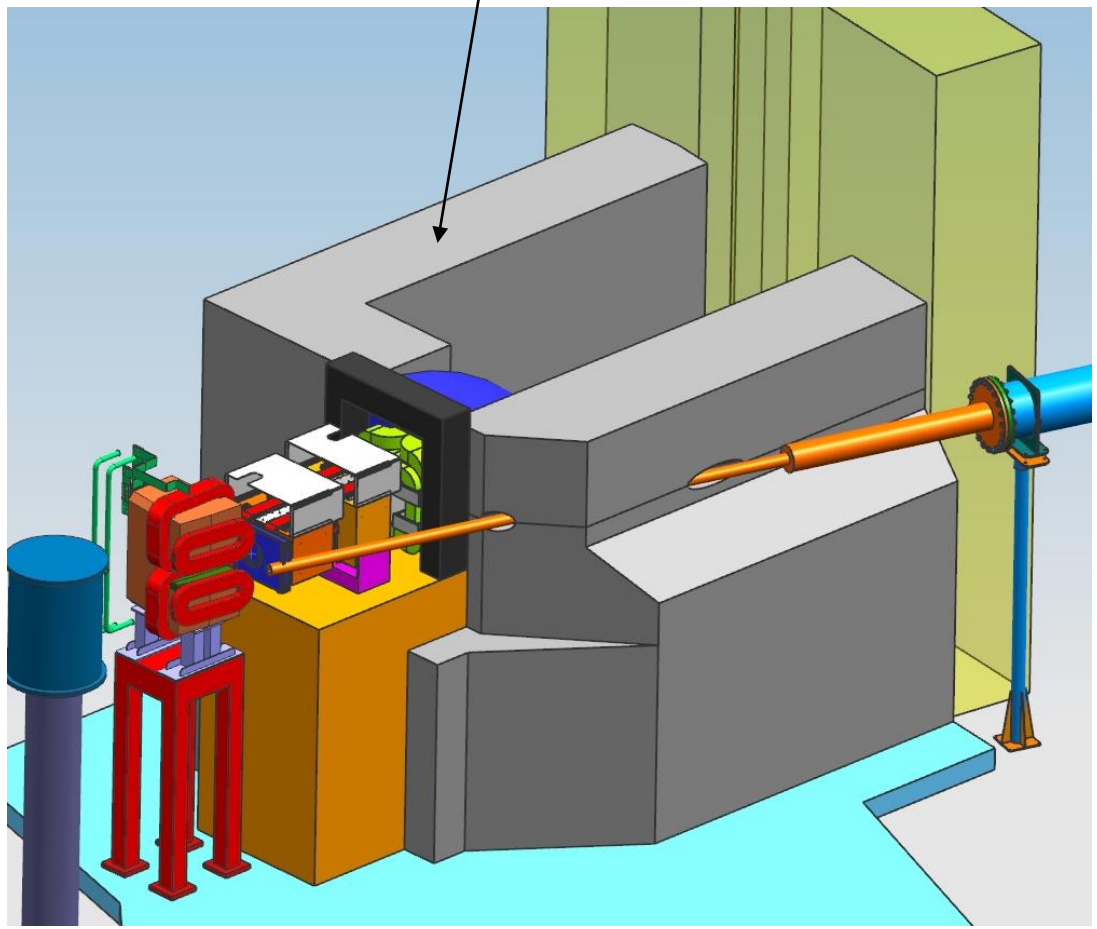
1x Custom Roof Block

204x36x20 Roof Block (Qty 6)

Existing Hall C Rear Wall (Simulated)



48” thick walls Typical. Same as standard JLab wall block (except as noted) see pages 11-17

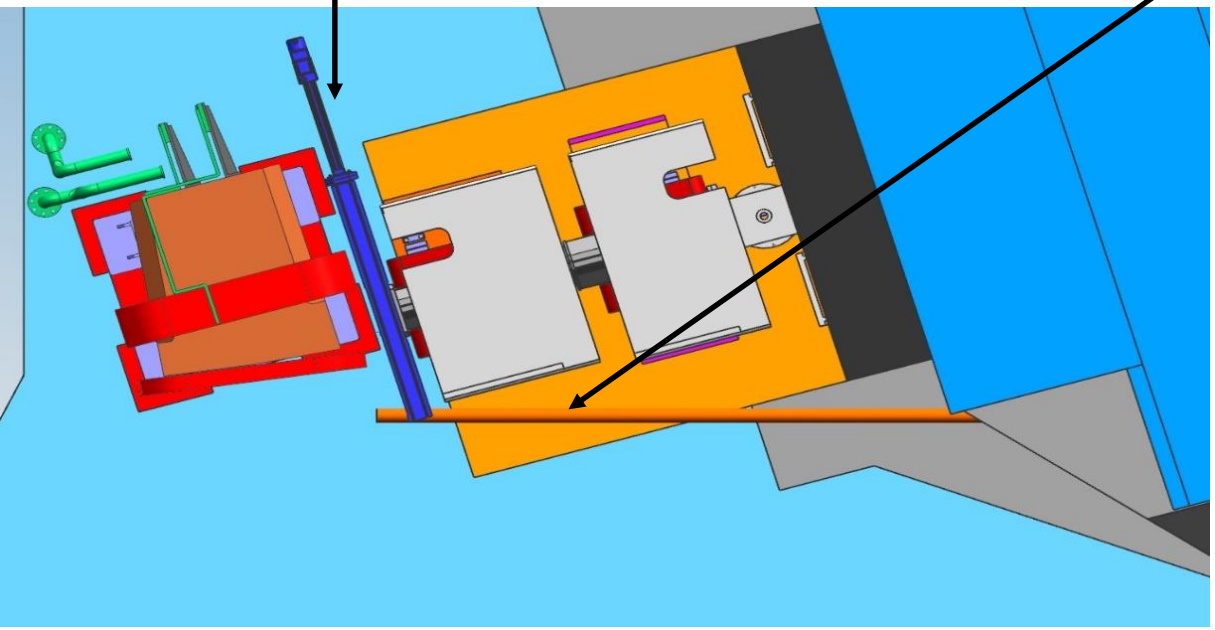


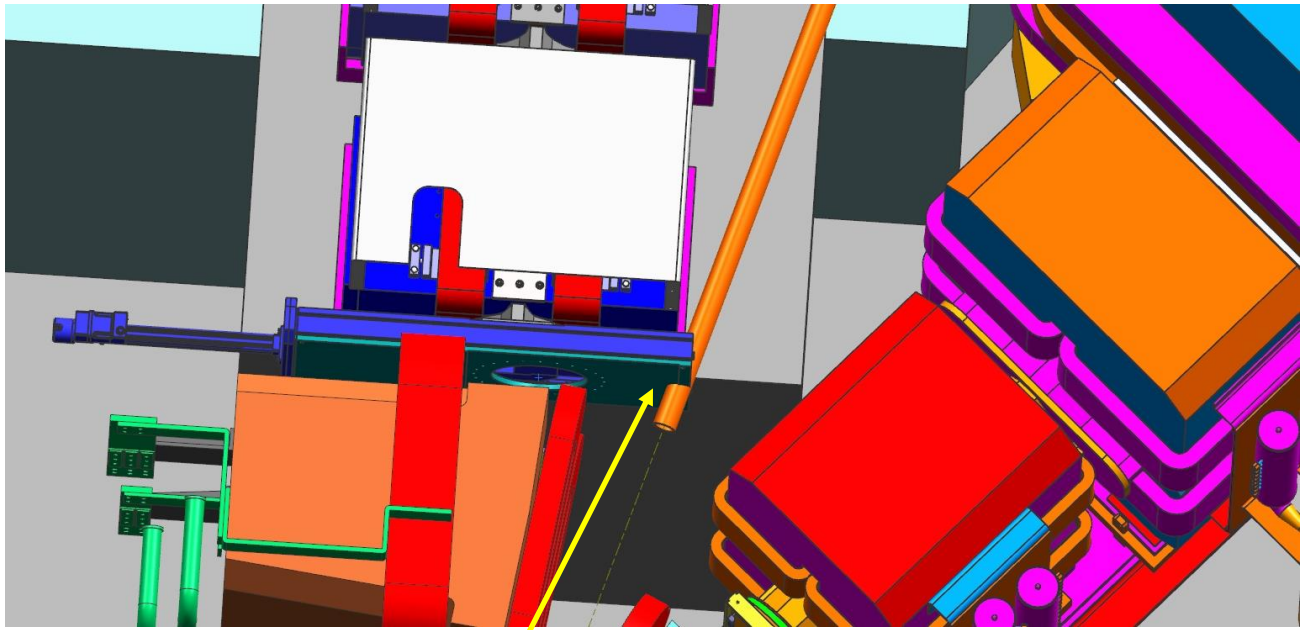
HES and beamline close-up

Possible Reuse of Sieve Slit but only if rotated and even then heavily modified

Sieve Slit assembly rotated

3” OD Beam Pipe Size same as HKS in 2004
Could go to 5.25” OD before contact with Q1

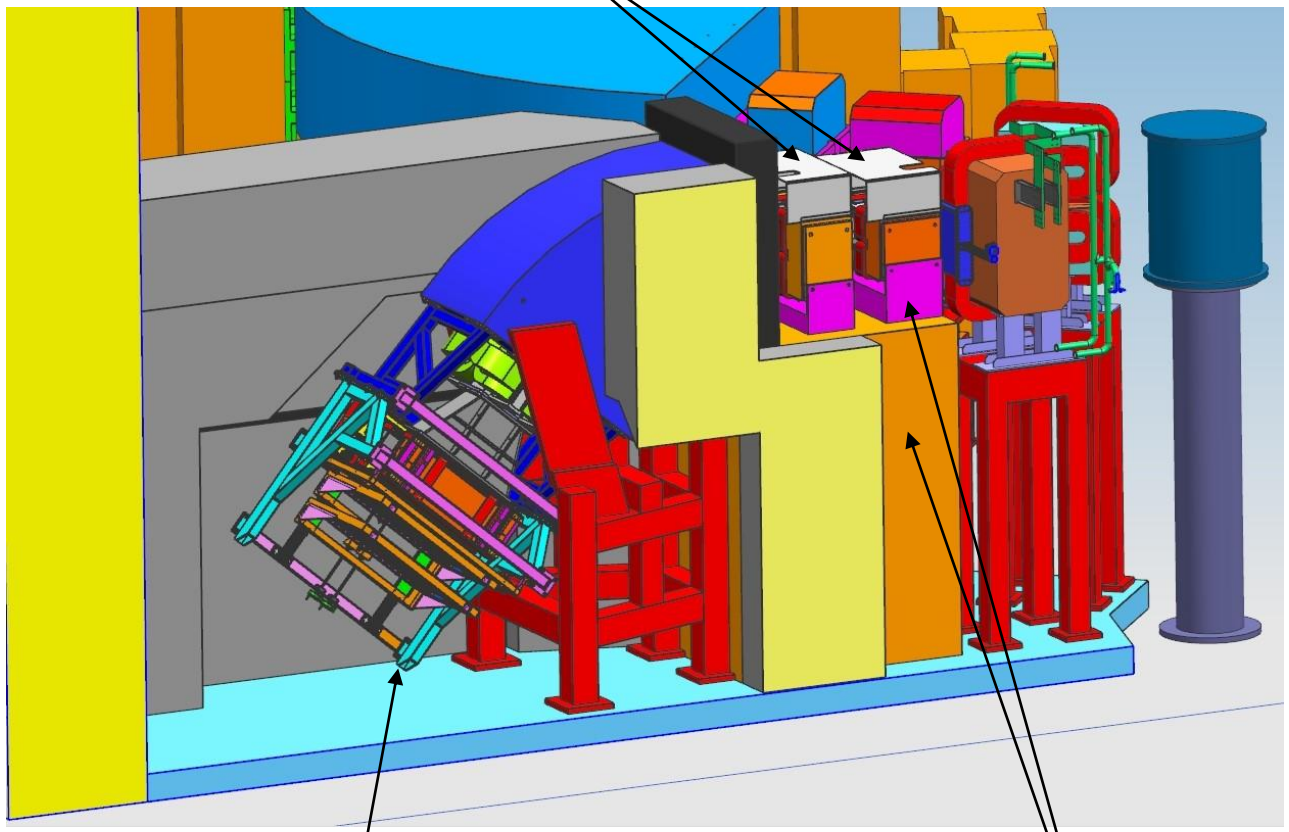




Sieve Slit Bottom Plate modification

HES Magnets and Support

Q1, Q2 Electrical on Upper Side
Magnets rotated 90

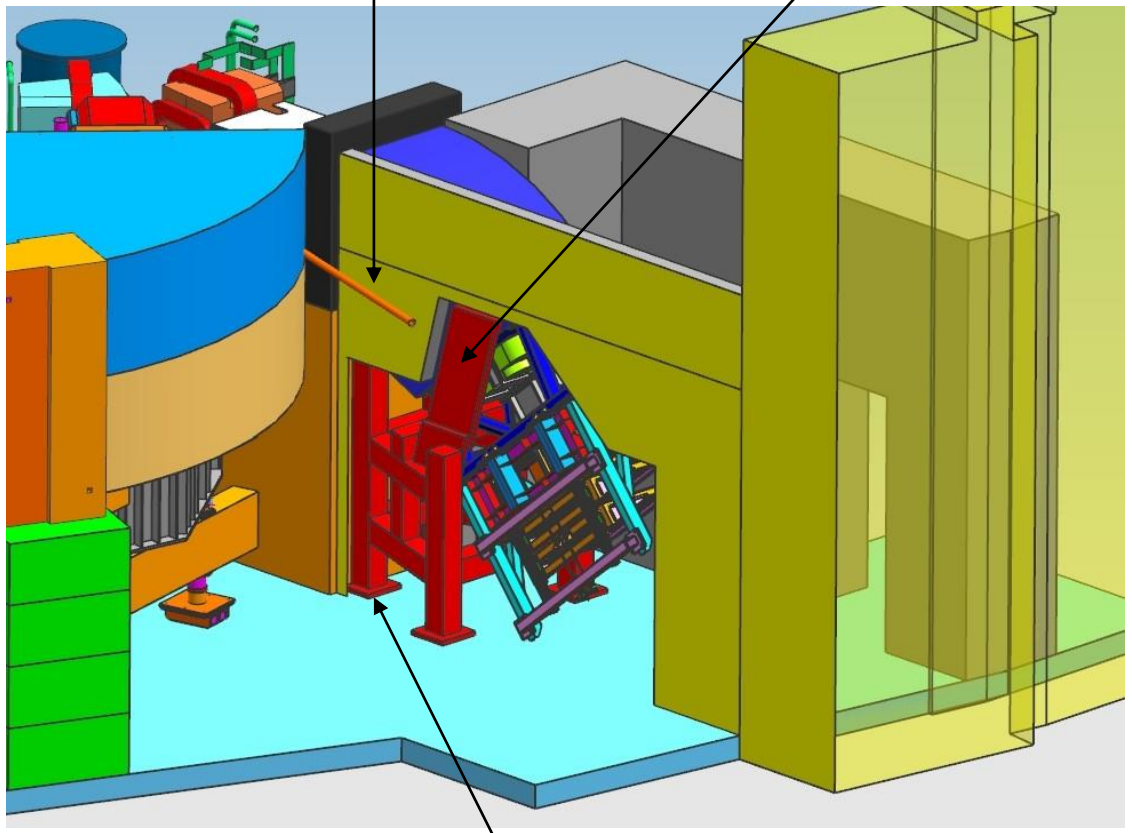


Need to Re-Design Detector Frames for New Load Direction

Q1, Q2 Adjusters and Shield Block

3” Beam Pipe

HES Dipole upper support needs to be thin in this area (affects shielding thickness)



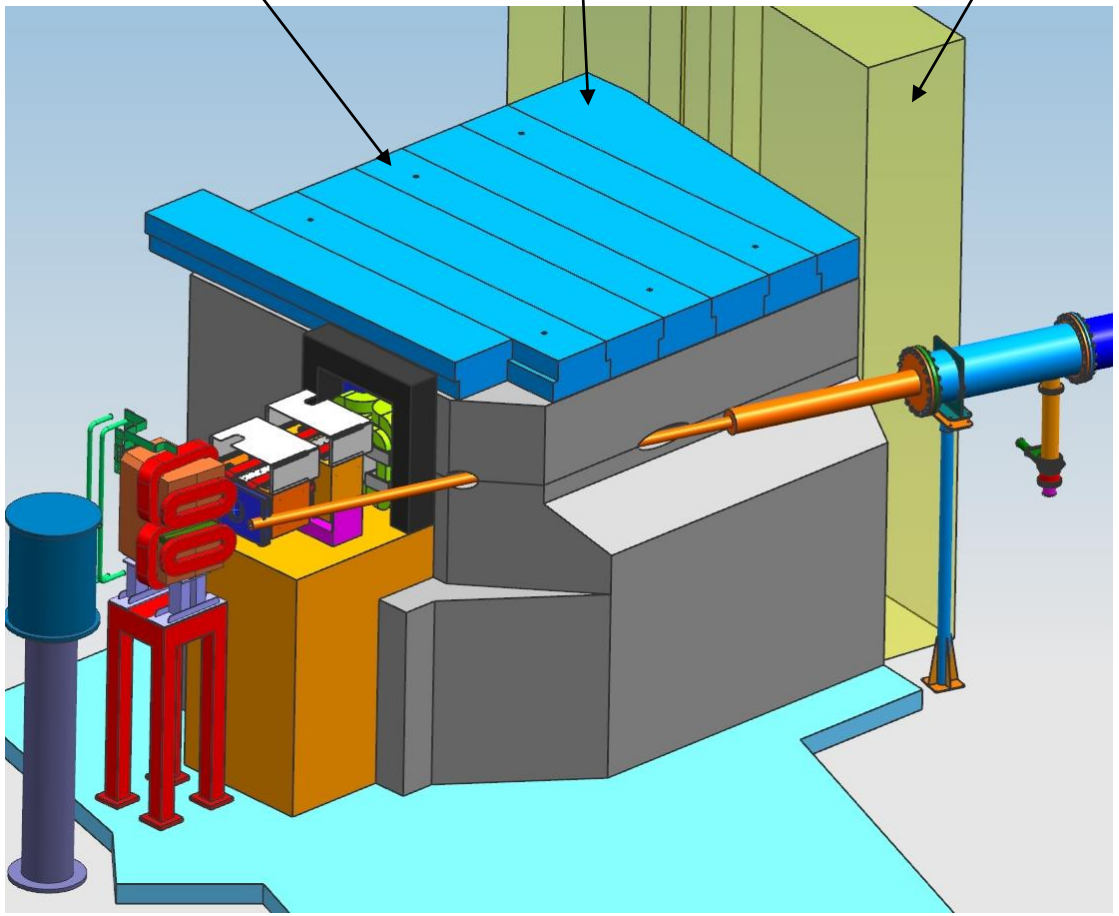
HES Dipole support and adjusters needs to be narrow in this front (affects shielding thickness)

HES Bunker

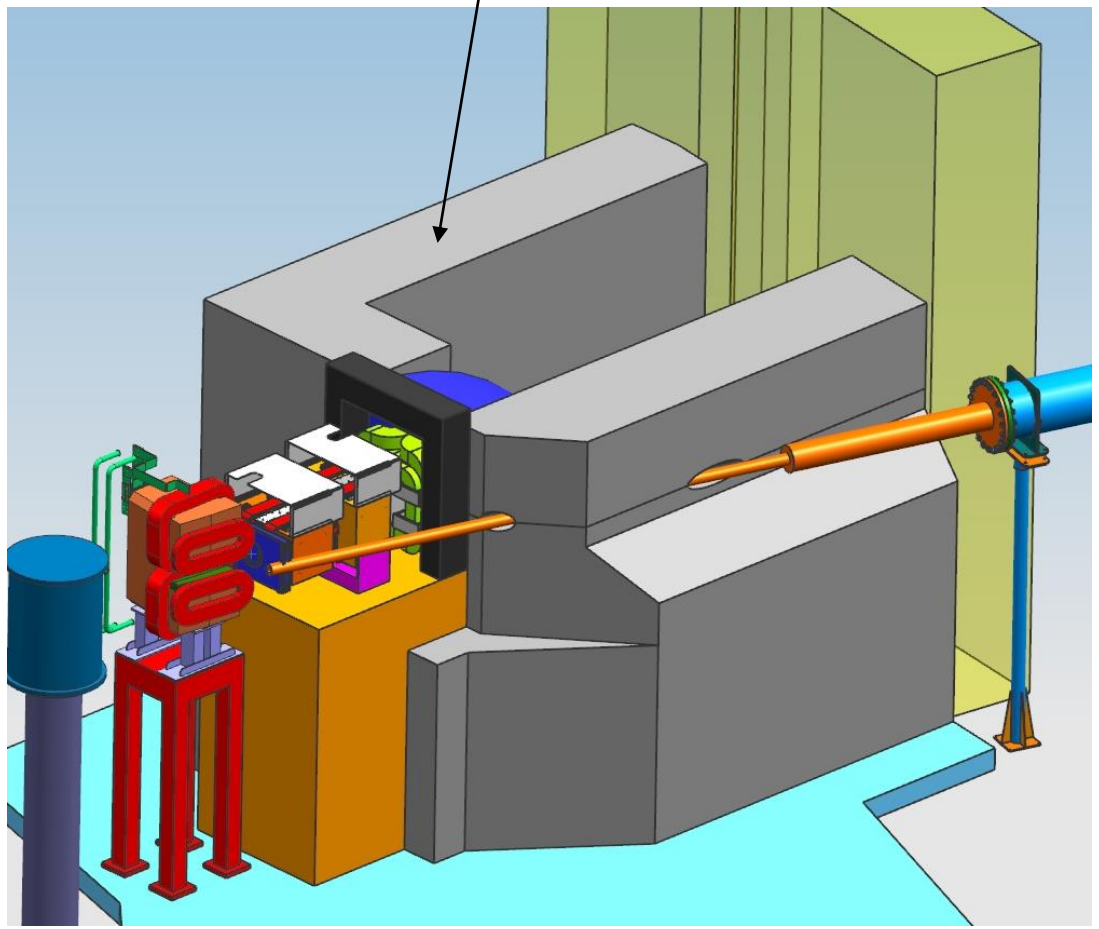
Custom Roof Block

204x36x20 Roof Block (Qty 6)

Existing Hall C Rear Wall (Simulated)

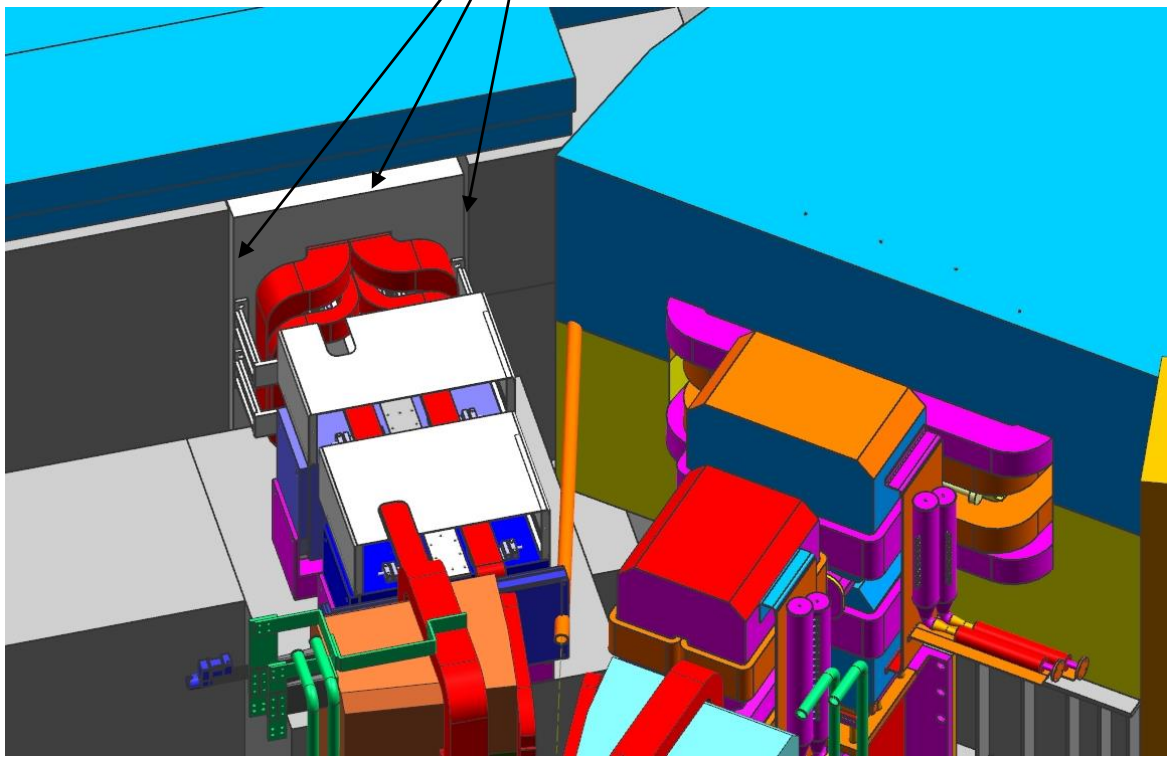


48” thick walls Typical. Same as standard JLab wall block (except as noted) see pages 11-17

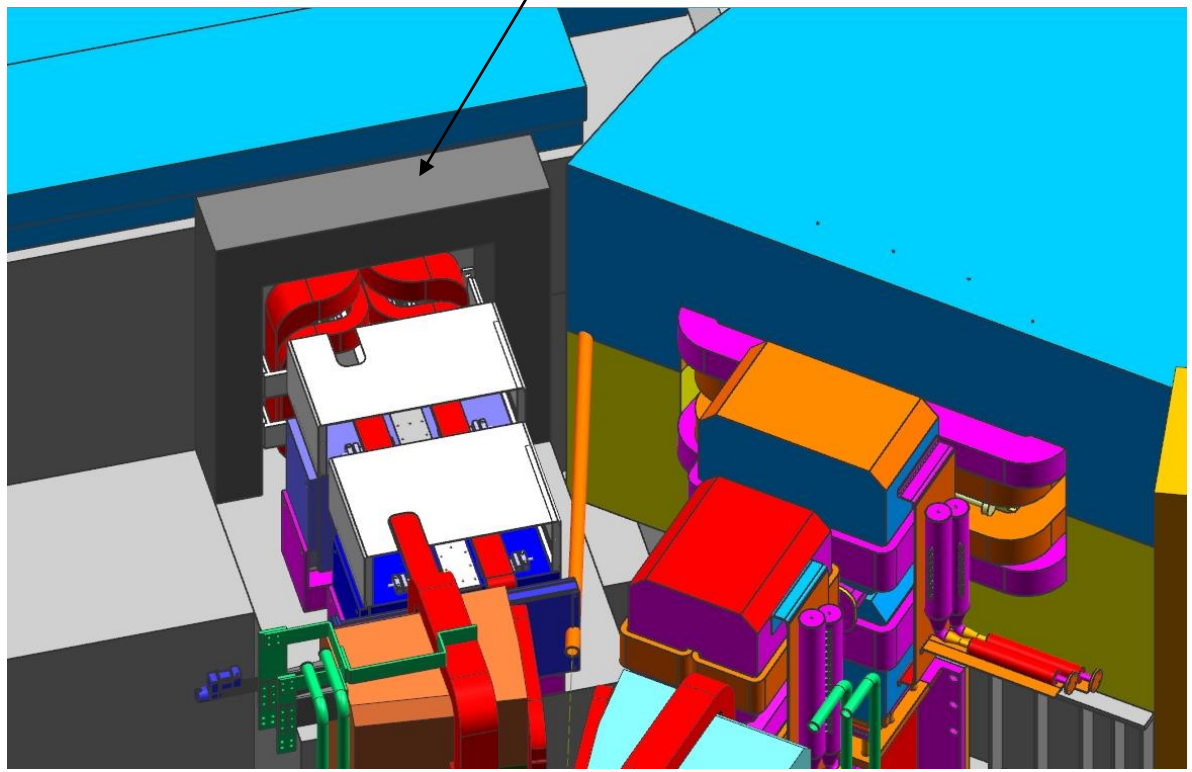


Filling in the gaps

HES Dipole Gap.

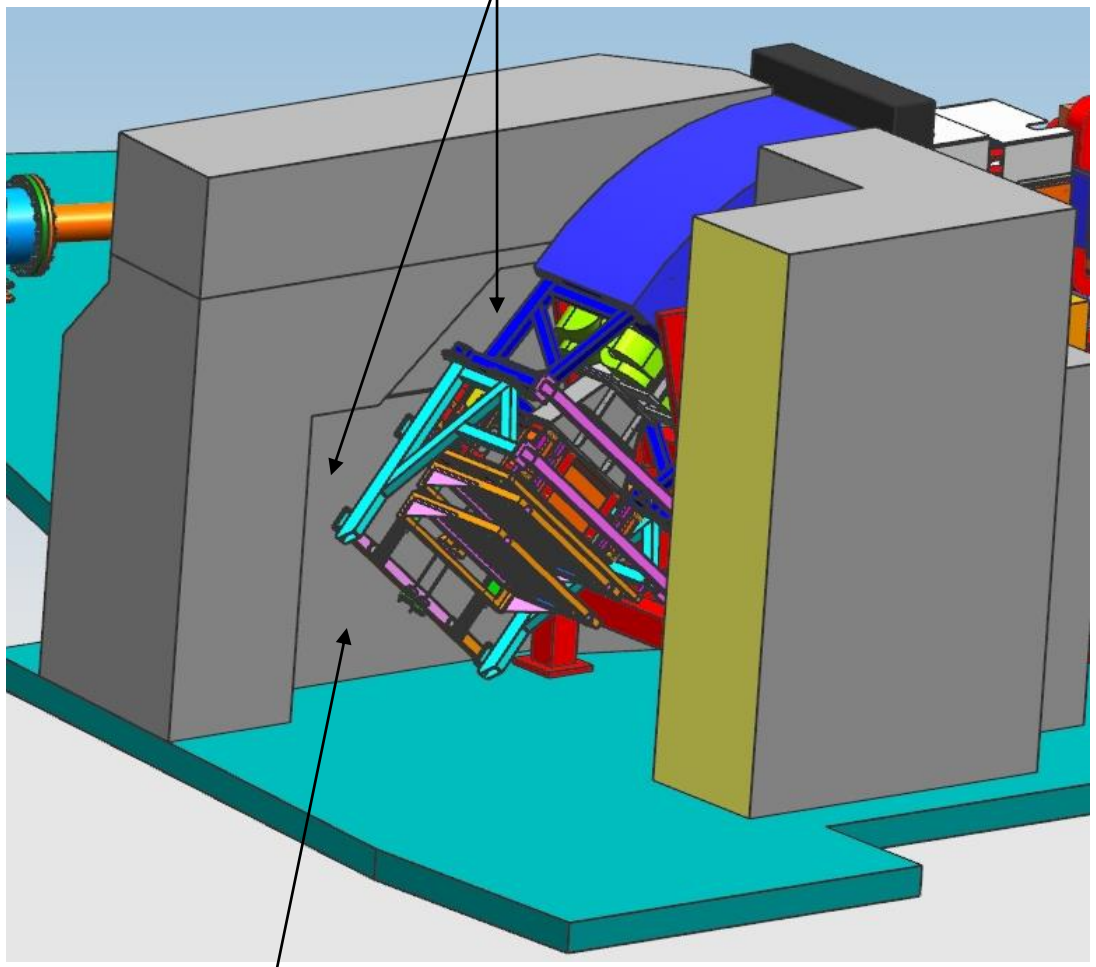


Fill with Pb bricks and steel holding plates
16” of Lead. (Same as SHMS Dipole)



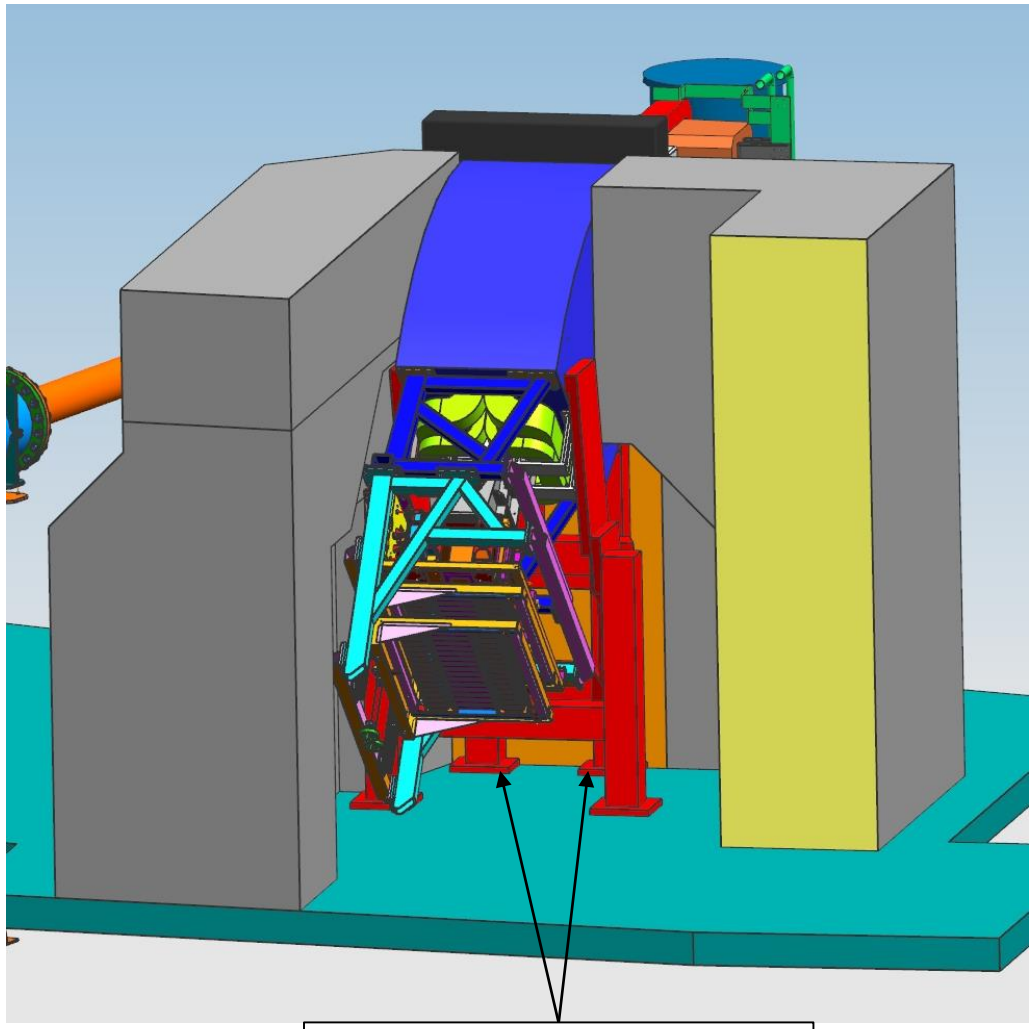
HES Bunker Details

Recess In Concrete for Dipole and Detector Support Frame



24” back access (If needed)

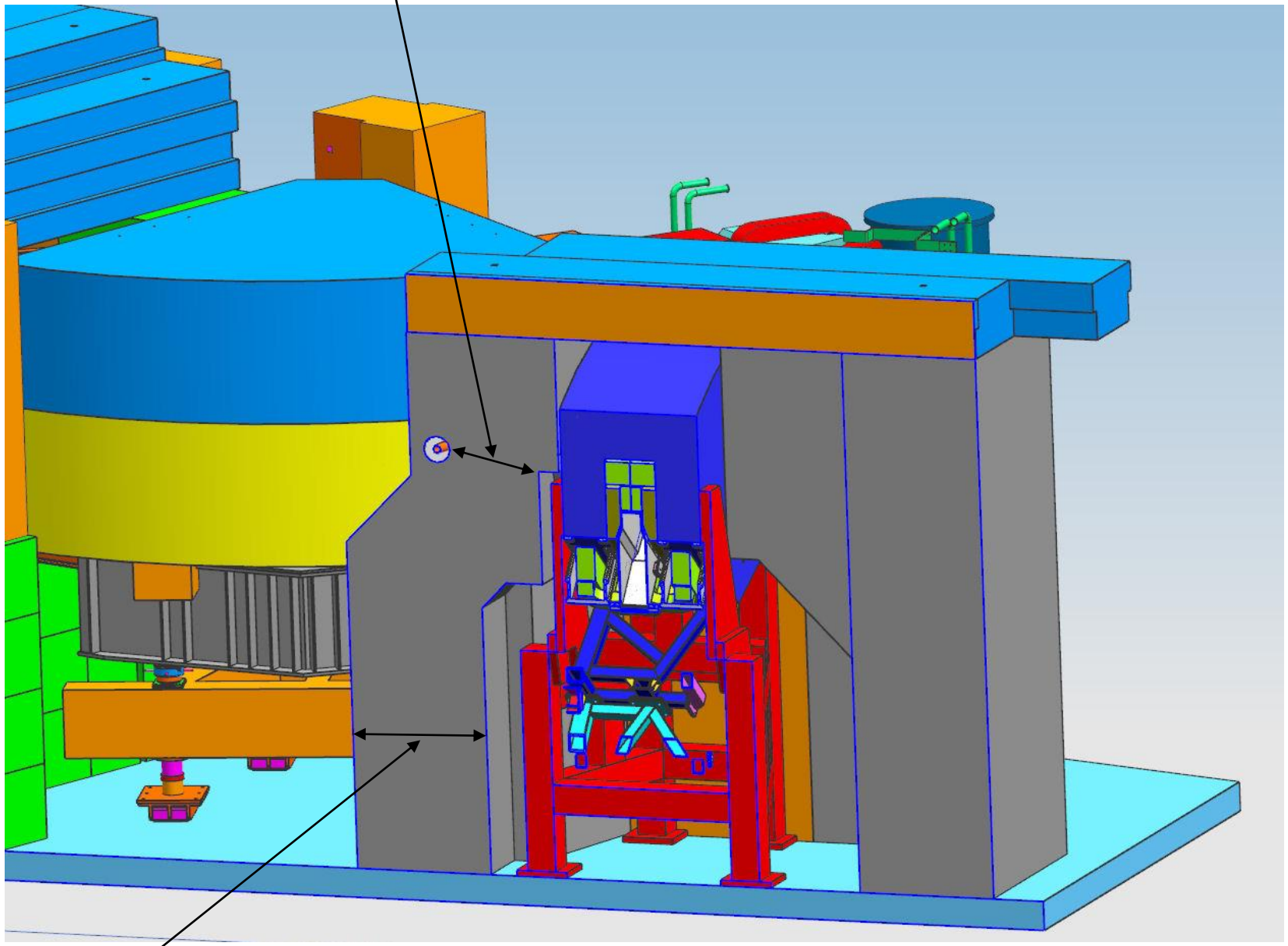
Same as SHMS Bunker and Detectors



Dipole Support Adjusters only Accessible from 2 sides

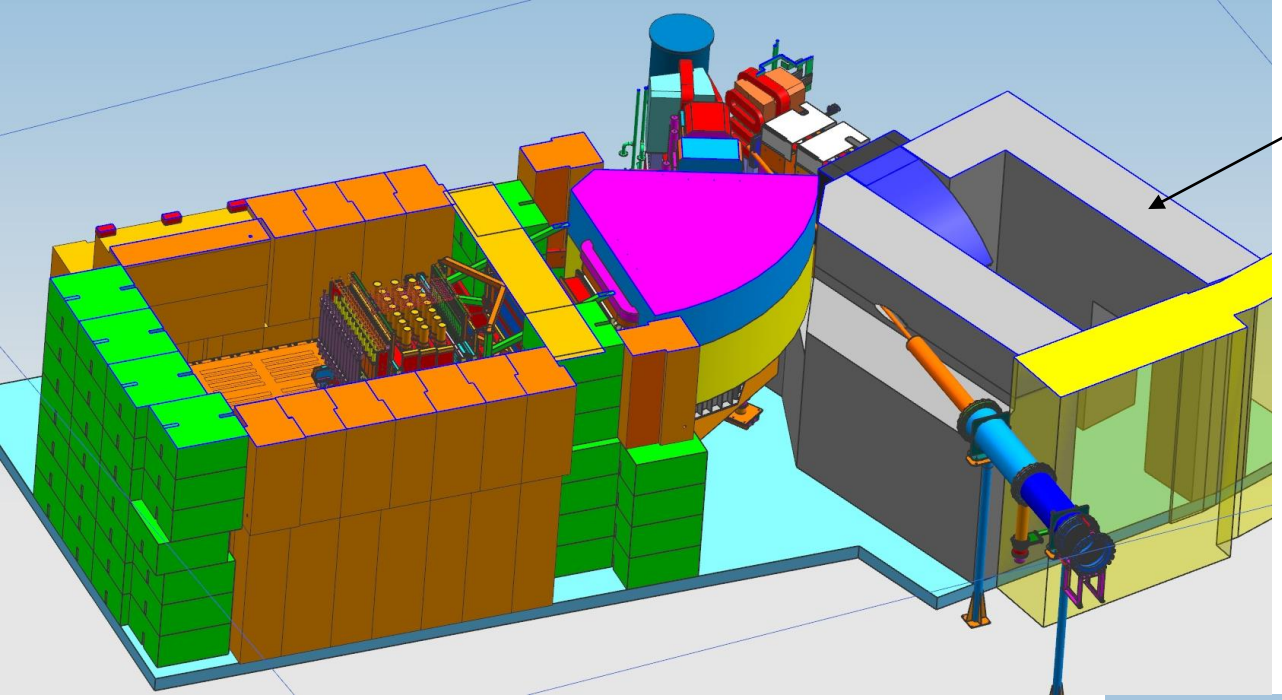
HES Section Cut

Cut Normal to magnet

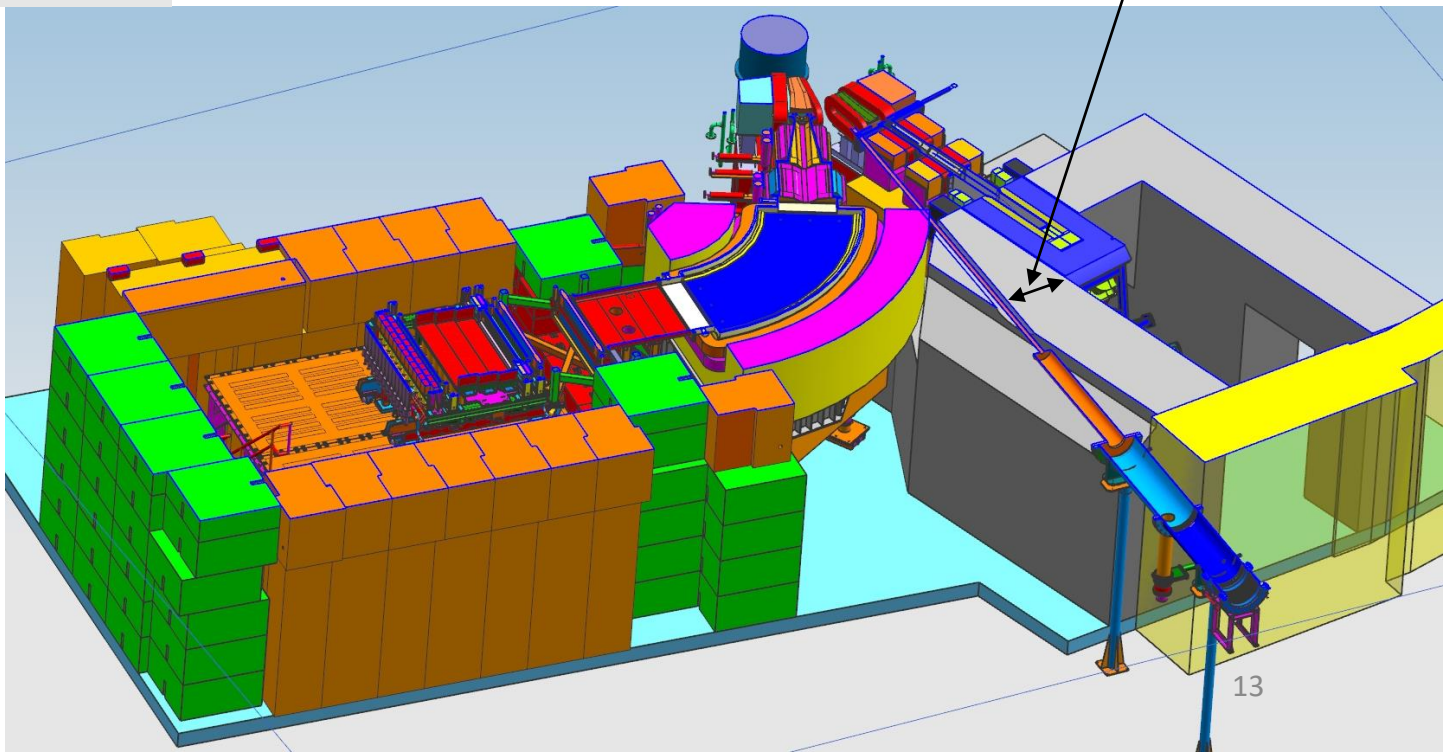


Section Cuts

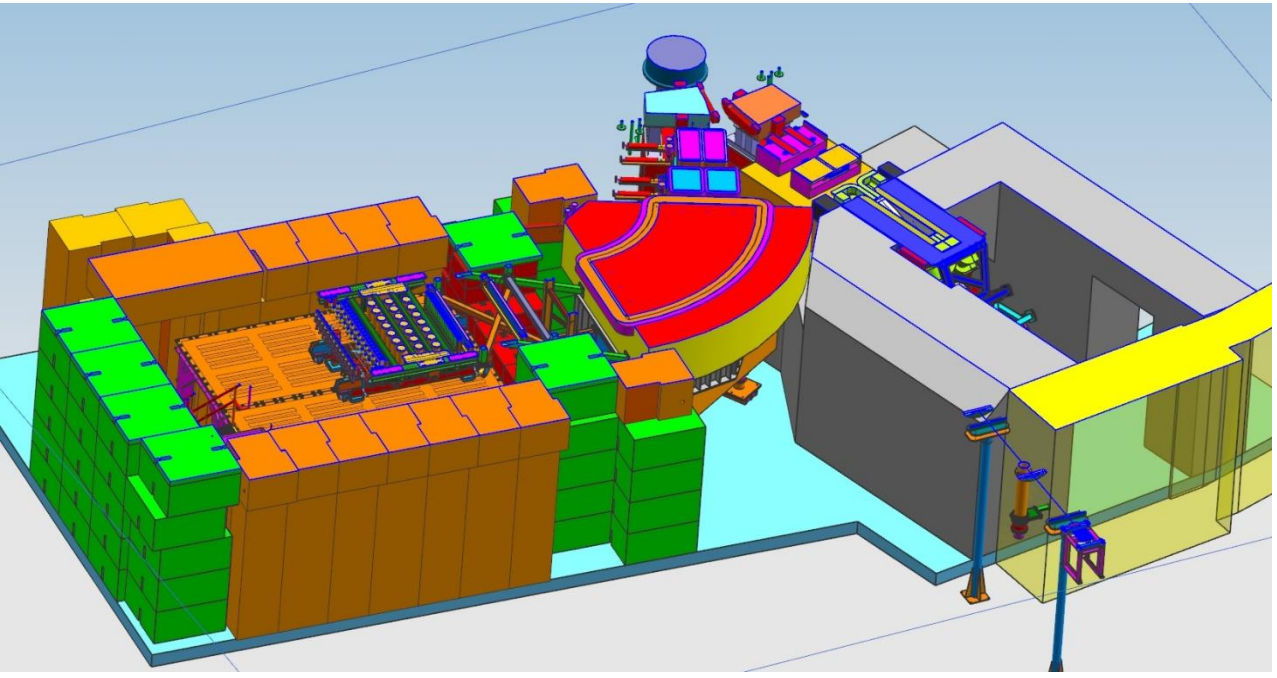
Cut From Beamline 0”



Section cut at +36”

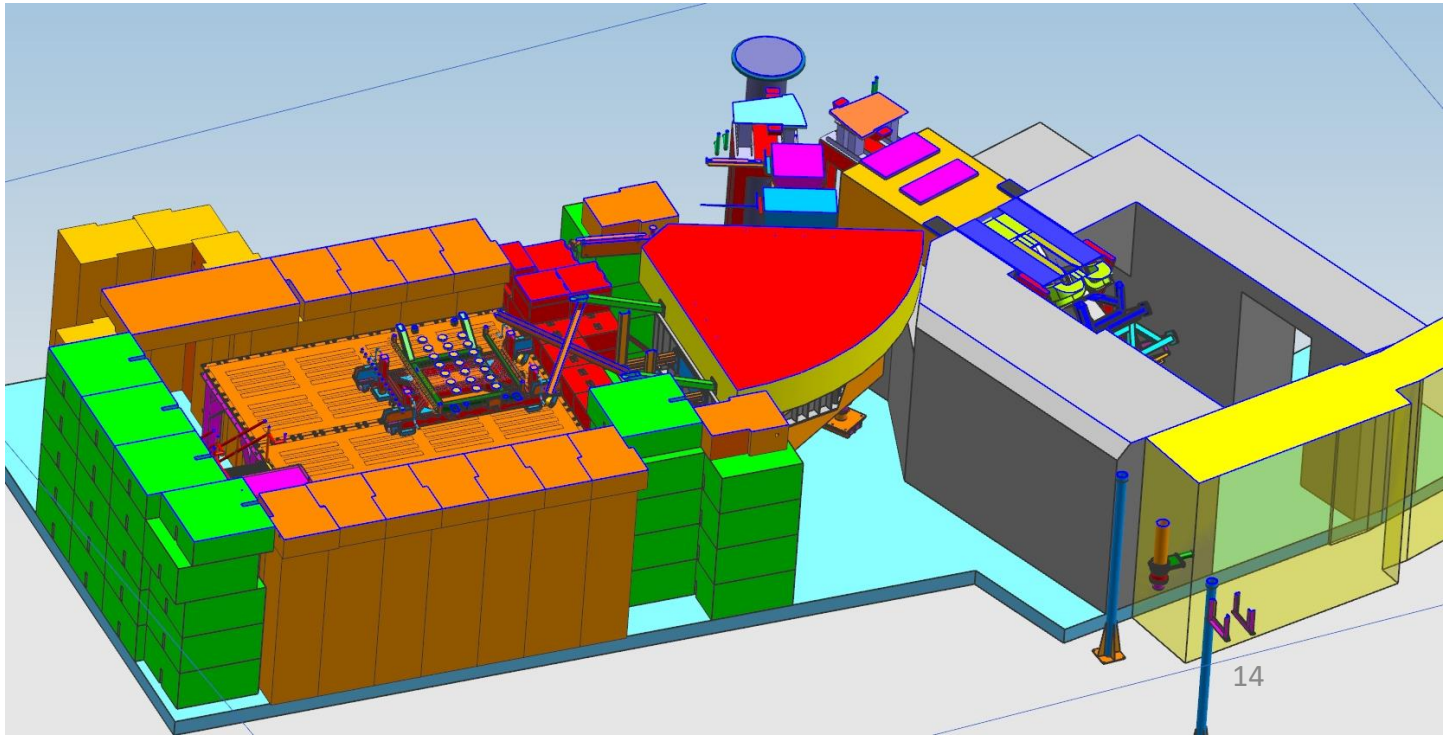


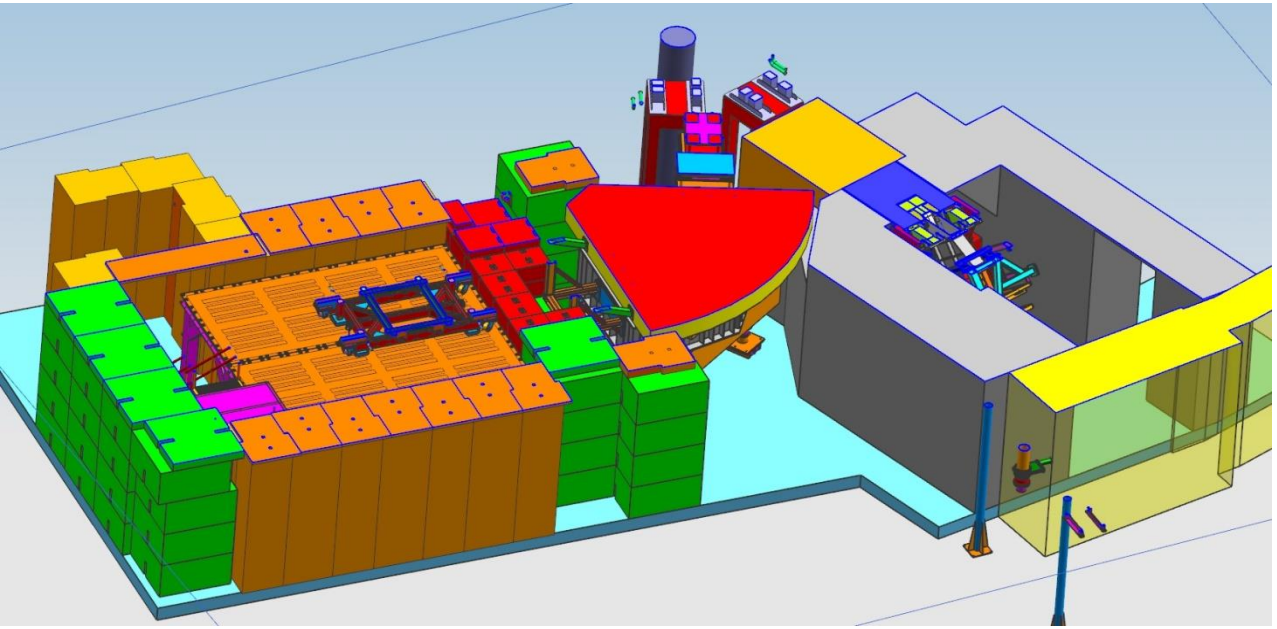
Beamline Section cut at 0”



Section cut at -12” below beam line

Section cut at -24”



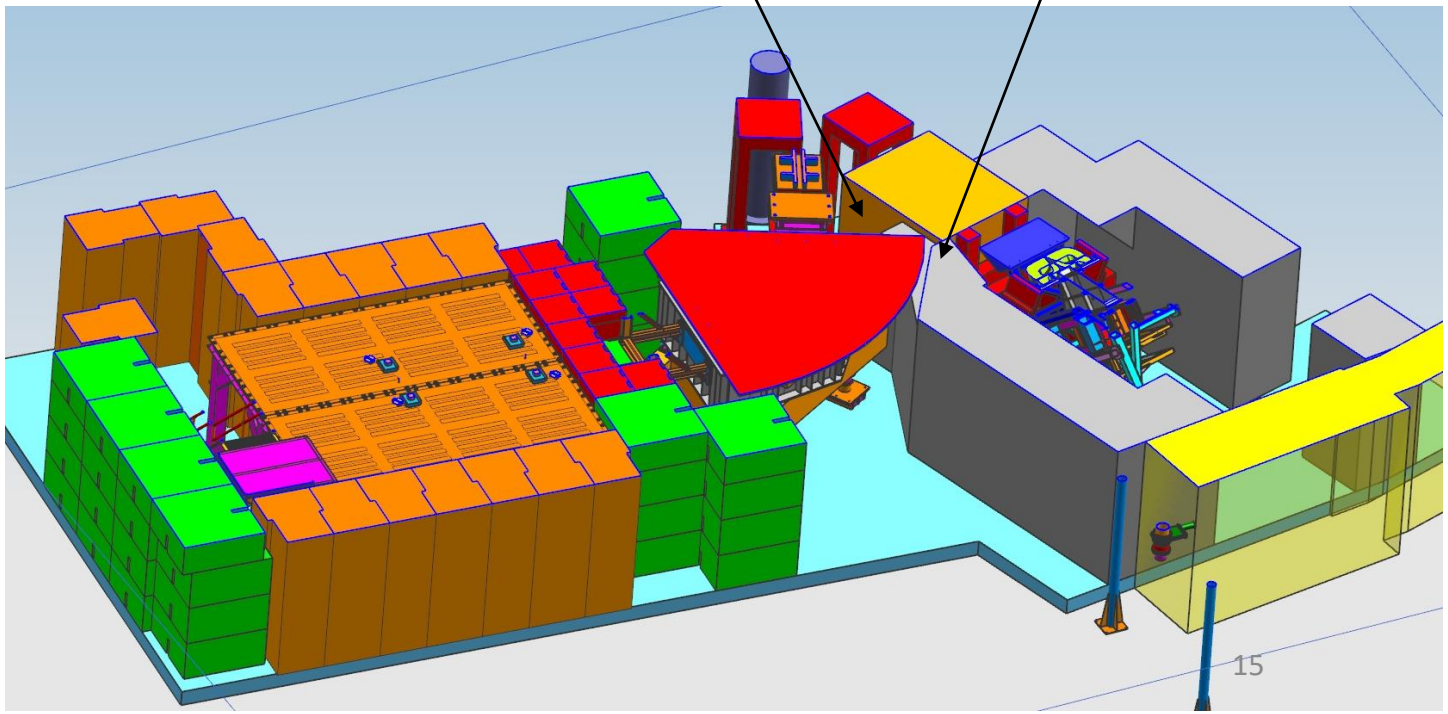


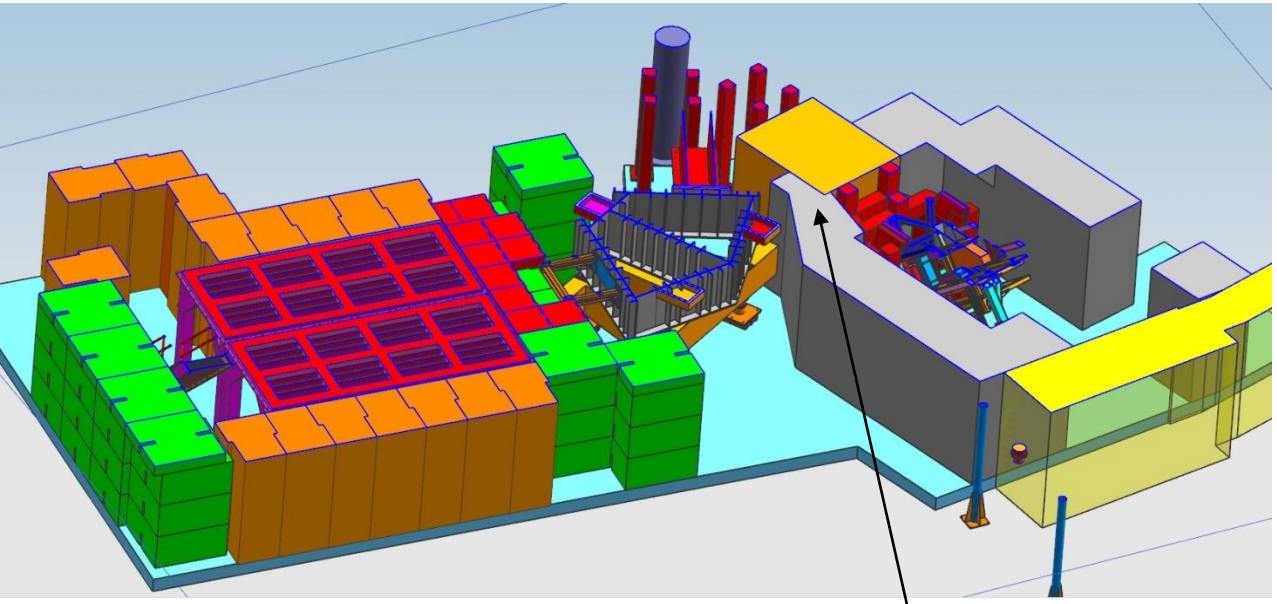
Section cut at -36”

Add Shielding this area

Thin Shielding

Section cut at -48”





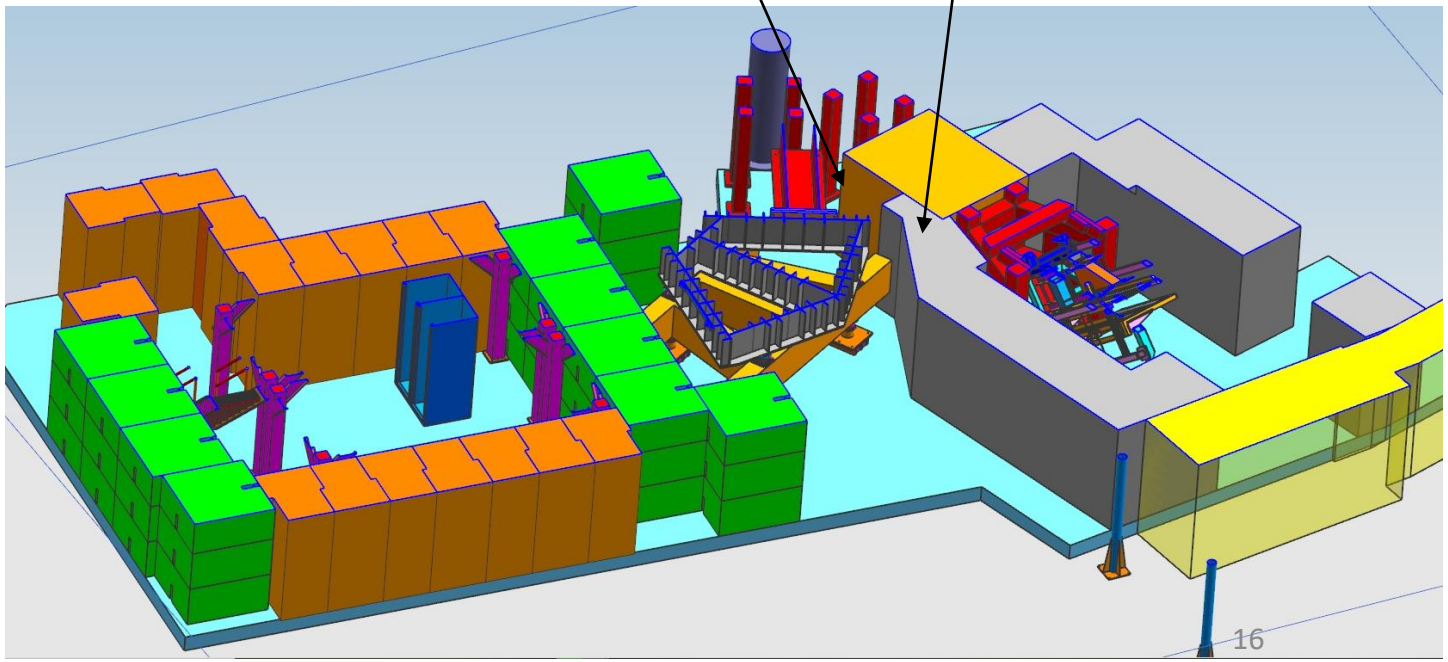
Section cut at -60”

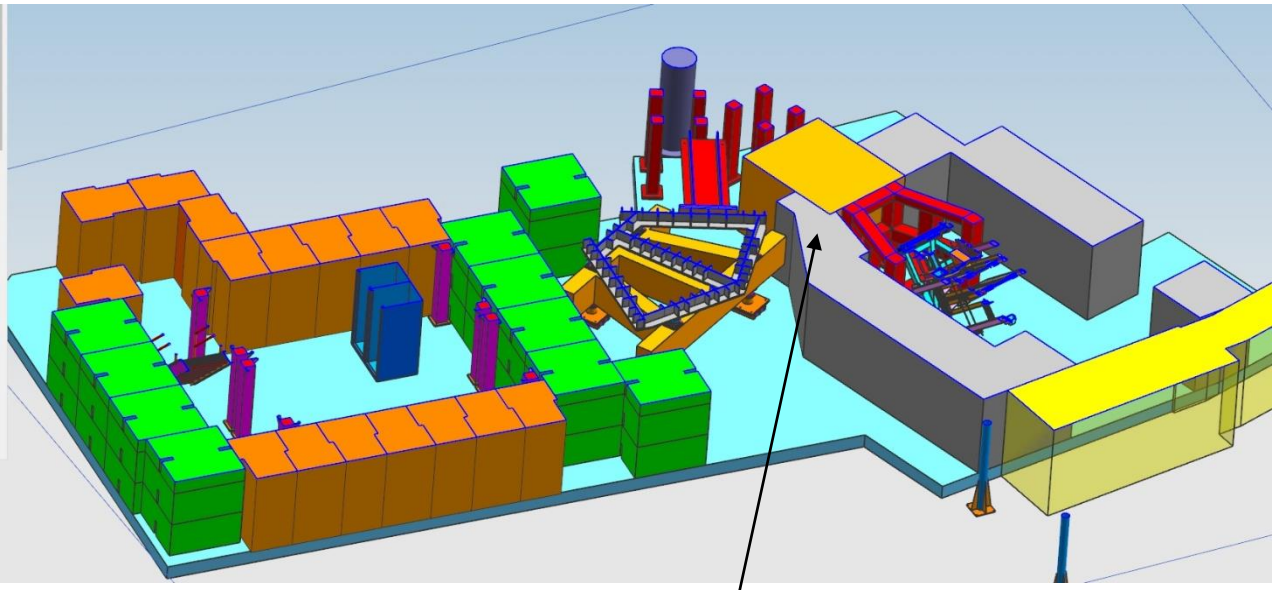
32“ Shielding

Add Shielding this area

32“ Shielding

Section cut at -72”





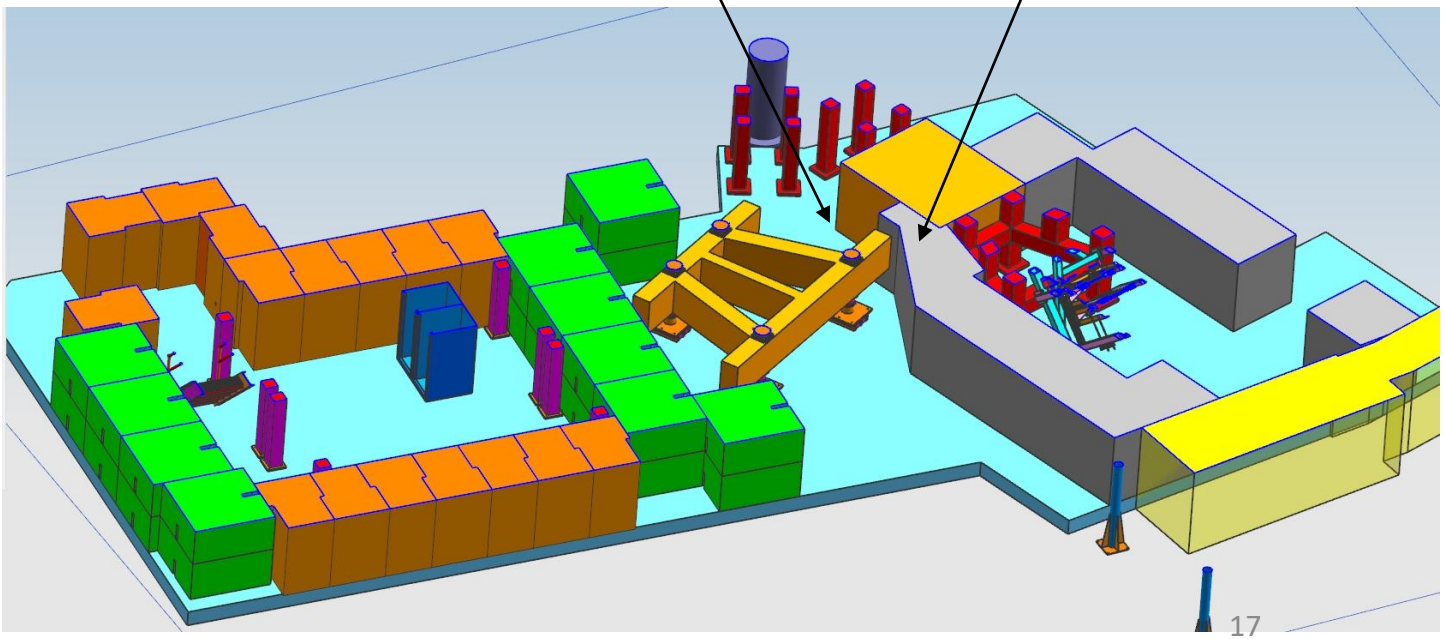
Section cut at -84”

32” of Shielding

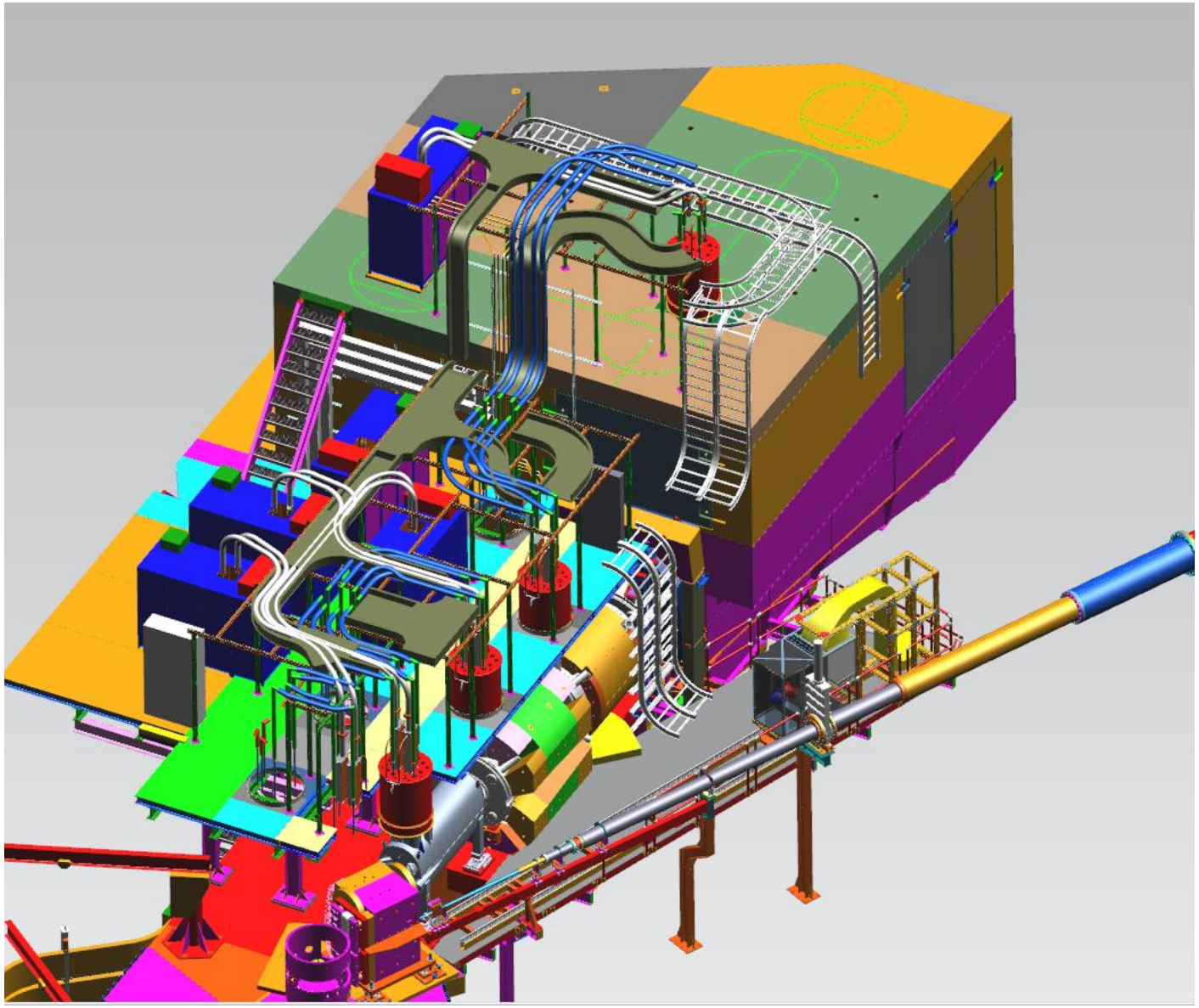
Add Shielding this area

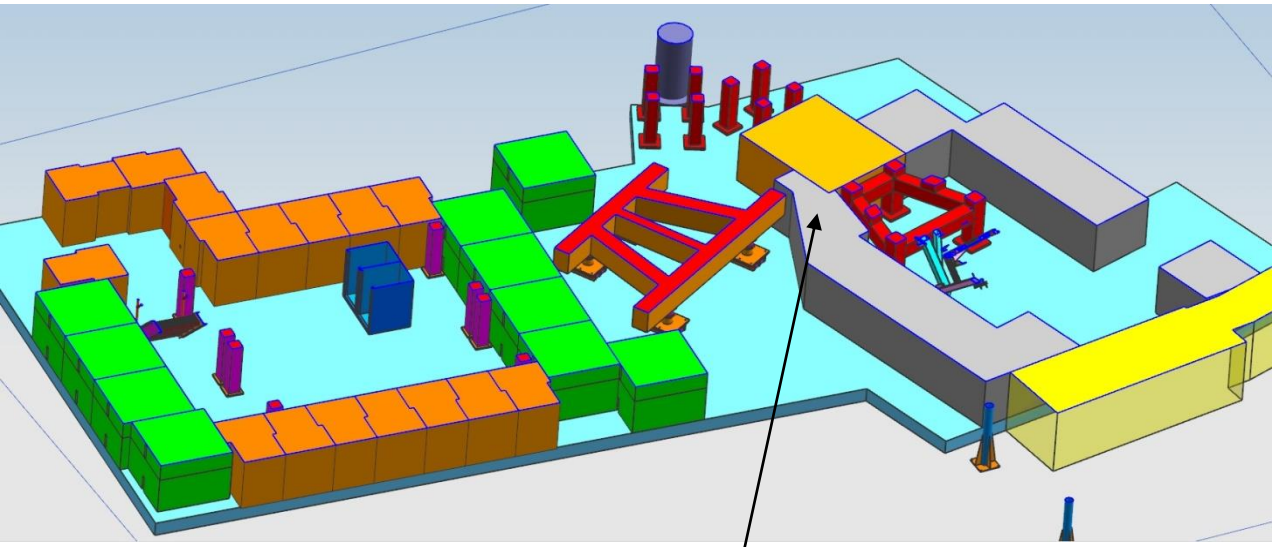
32” of Shielding

Section cut at -96”



NPS Cable Patch Panel
1080 data and HV cables





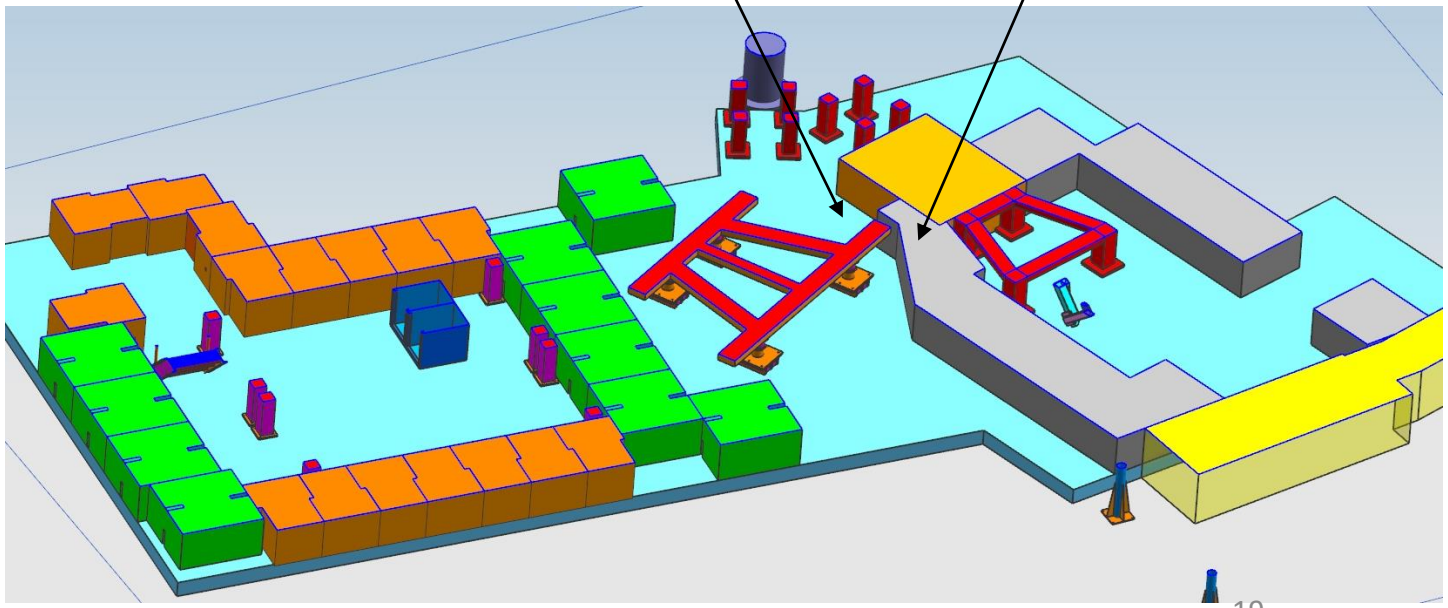
Section cut at -108”

32” of Shielding

Add Shielding this area

32” of Shielding

Section cut at -120”

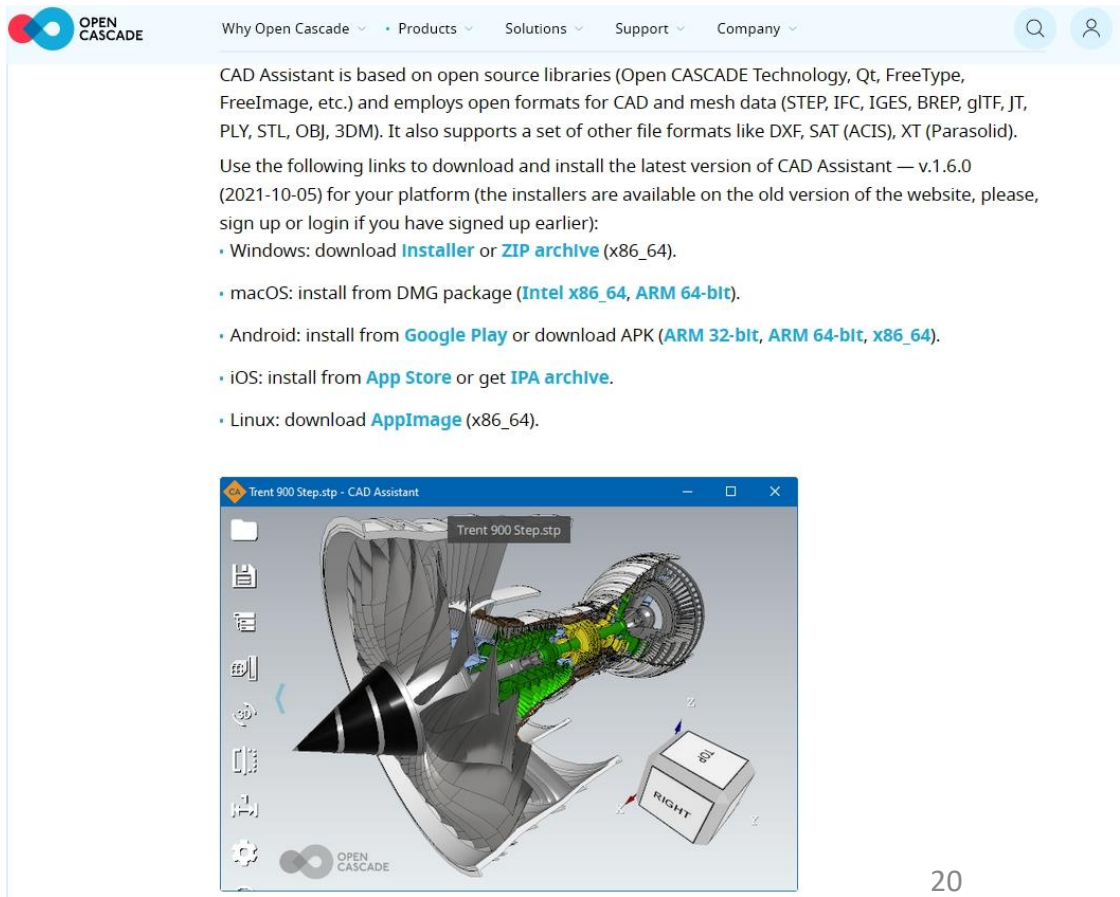


3D Models Available

- JT, STP files (JT are faster for viewing) (STP is for CAD use)
- You can install "CAD Assistant" on your Phone or PC to view JT, STP files
- Phone file download location its in the APP store “CAD Assistant” (free)
- PC file download location https://www.opencascade.com/products/cad-assistant/

- JT, STP files download location https://userweb.jlab.org/~metzger/HyperNuclear

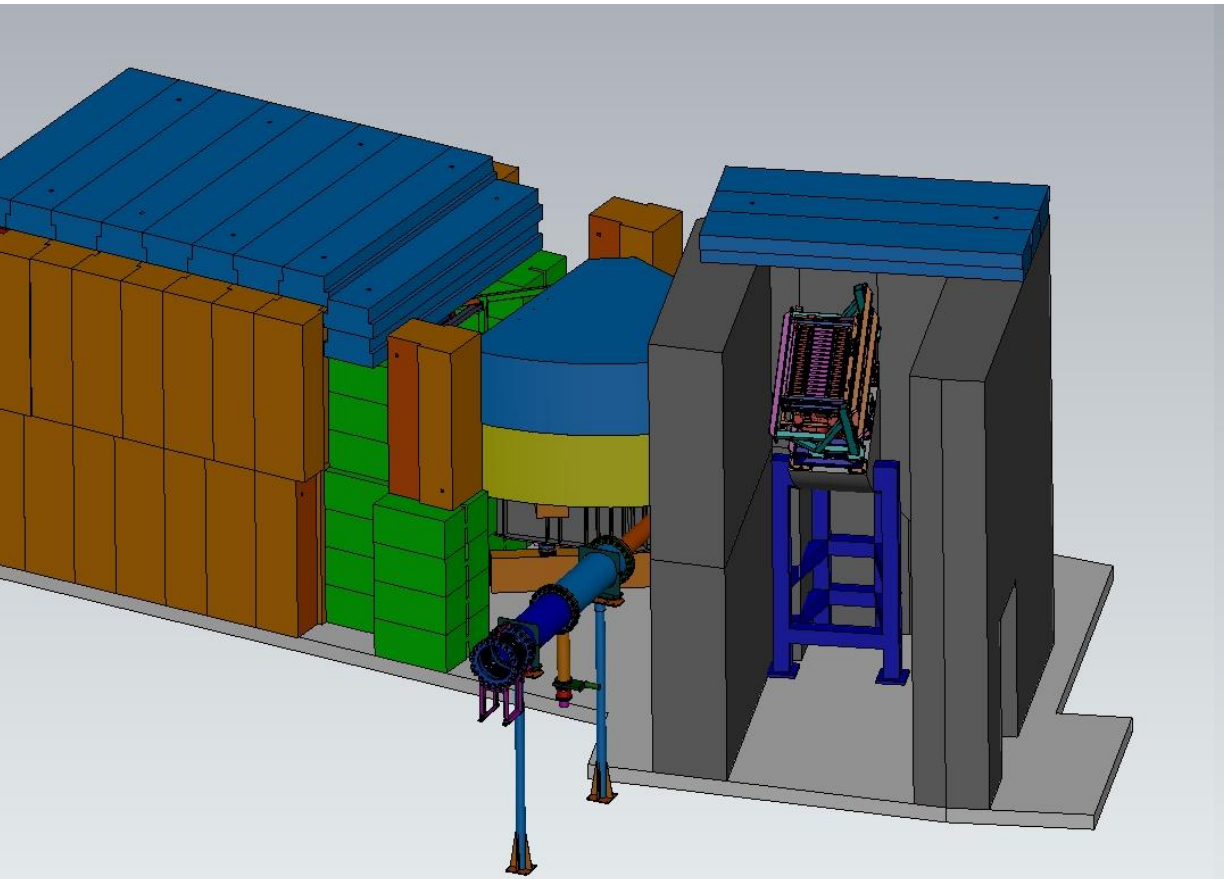
CAD Assistant Website

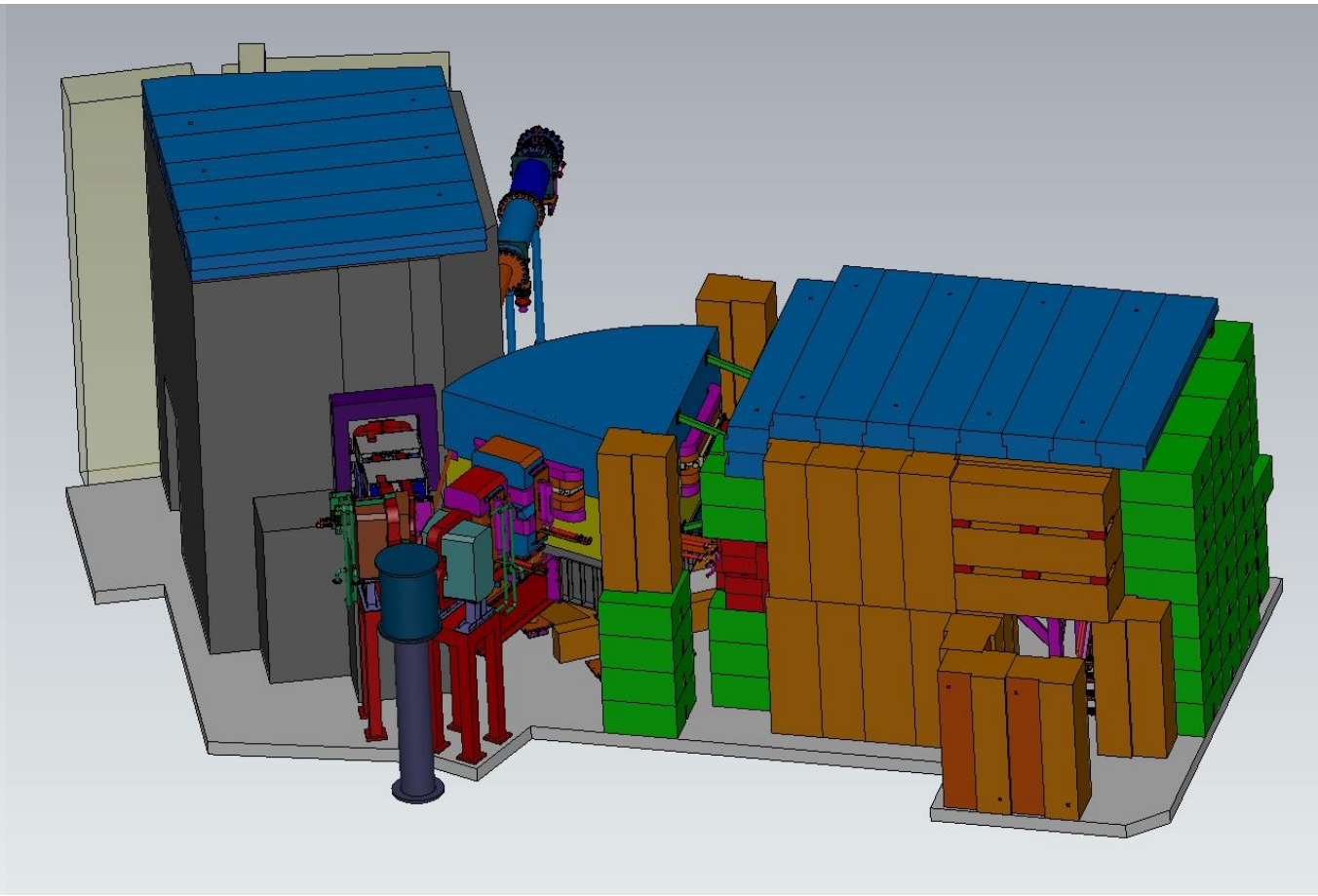


Conclusion

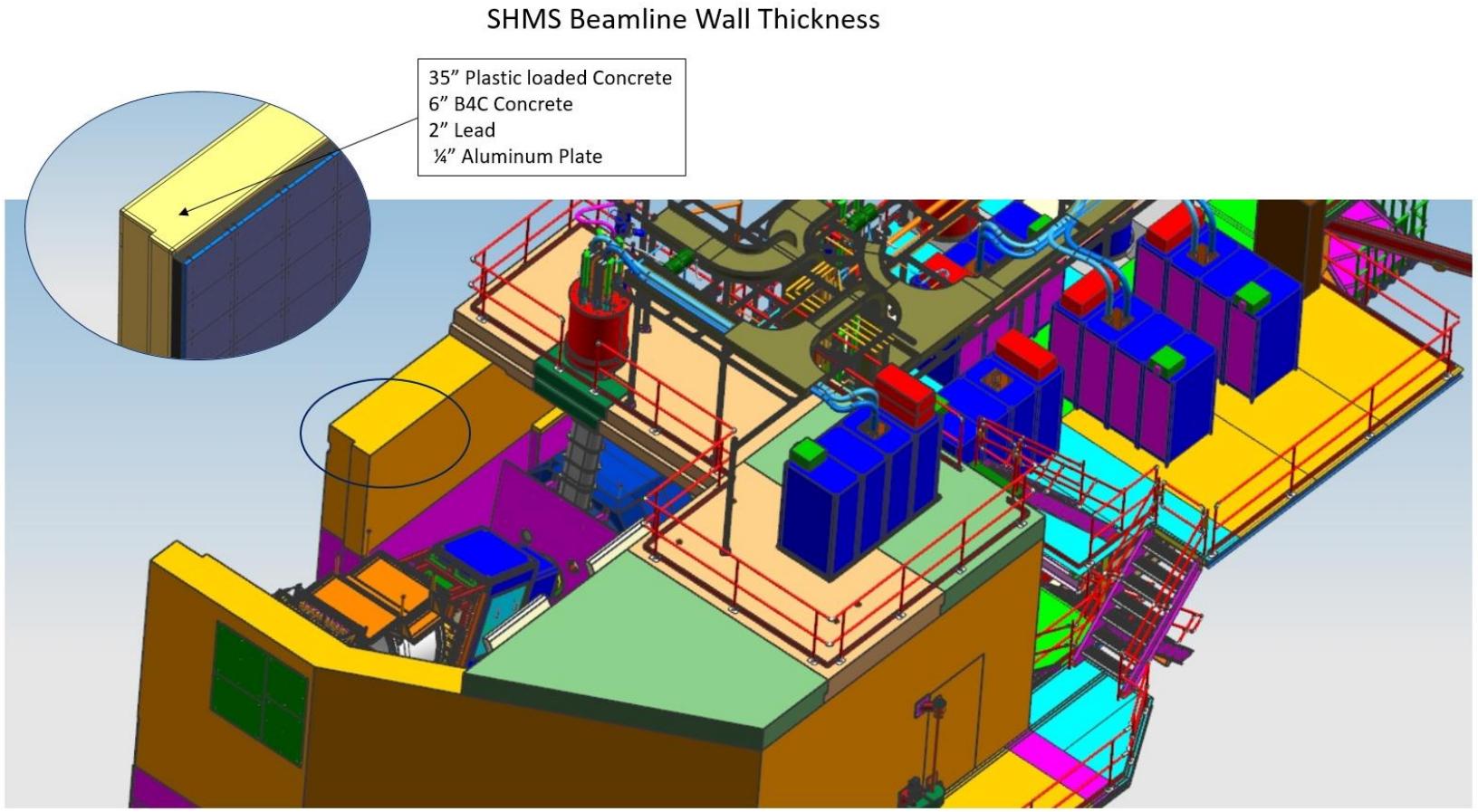
- Shield Blocks inventory may be insufficient for current layout
- Shielding needs to be simulated for effectiveness.
- Target being 11.24m downstream of pivot, may need an updated girder for beam steering.
- Layout doesn’t show any major hurdles.

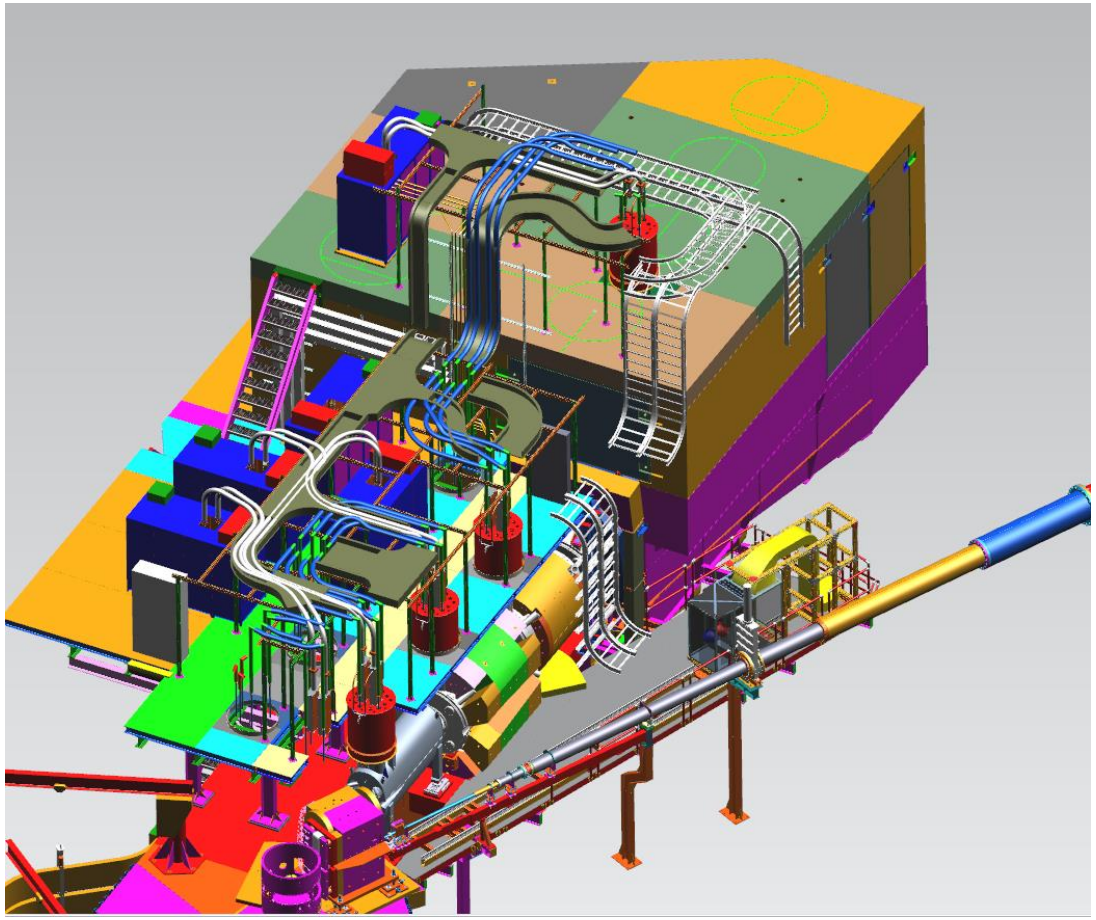
HES with an upward bend
Conceptional





SHMS Shield Hut Composition and Thickness



NPS Patch Panel cabling routing could be used for Hypernuclear

~1080 data and HV patch panel