Space constrains for calibration systems

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Intro

- Main upcoming goal: TDR!!
  - need to have definite designs, with technical drawings
  - need to consider interfaces with other subsystems, installation feasibility, etc…
  - those designs will be base for calibration prototypes for protoDUNE run post-LS2
- Talk today:
  - New technical drawings repository
  - Discussion on space inside cryo
  - Discussion on space outside cryo

DUNE CAD drawings

- New repository at CERN

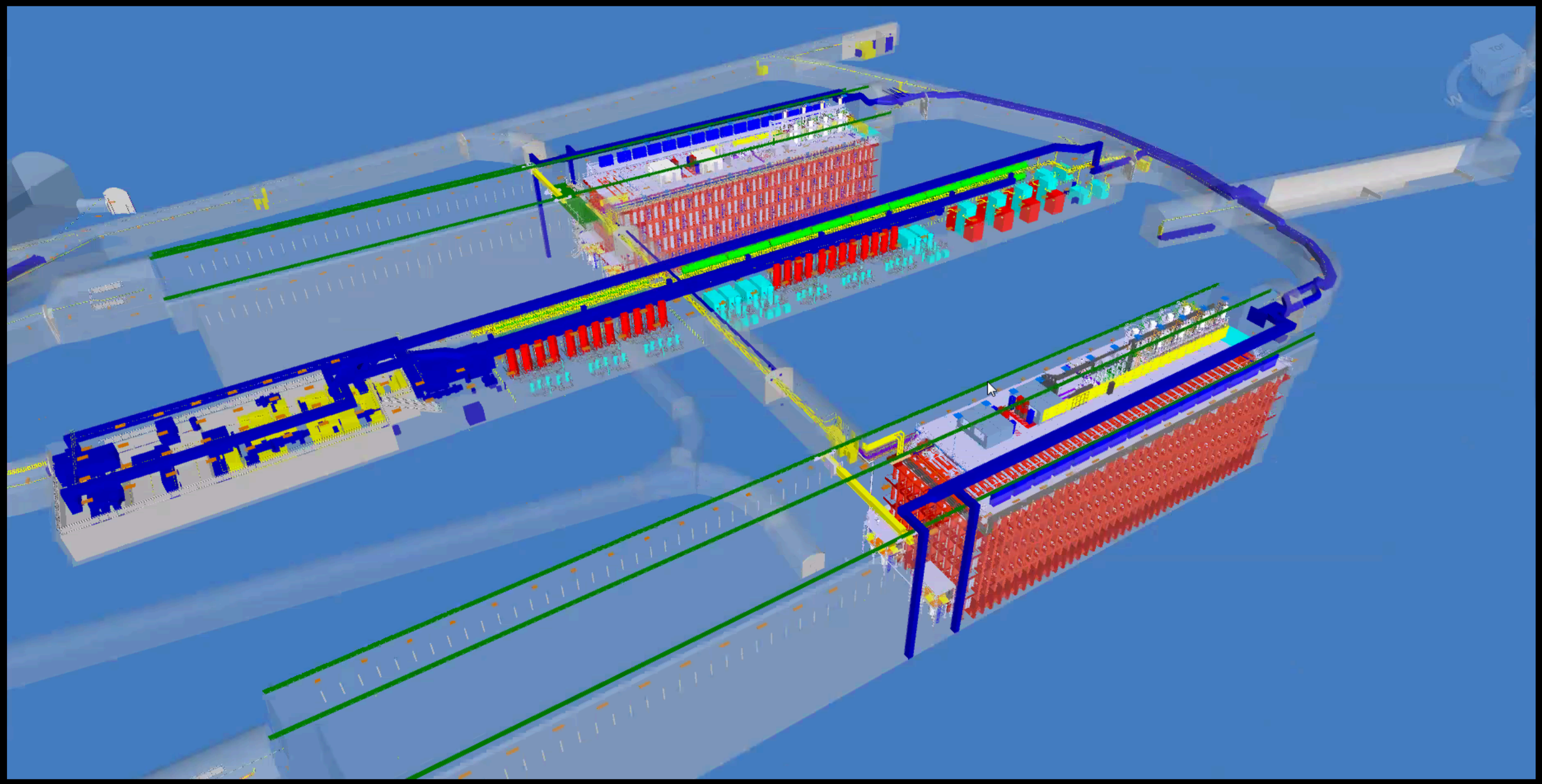
  https://edms.cern.ch/project/CERN-0000193817

  - Pres. by Marzio https://indico.fnal.gov/event/19569/
- New centralized repository will be there
  - ITF, Cavern, cryostat, detector, …
  - All consortia CADs need to go there too
  - Jack Fowler is the configuration control manager, he's in charge of receiving sysbsystems drawings

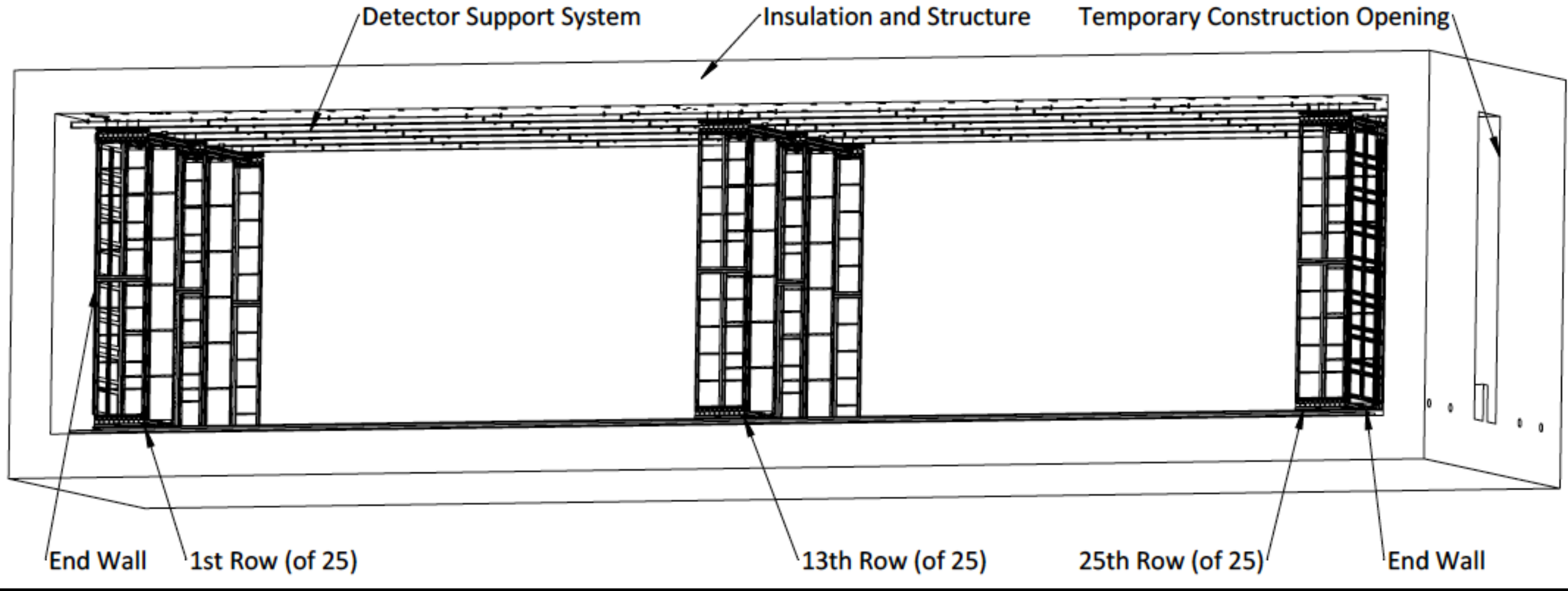
Models already there

Model ID	EDMS #	Version	Content	Released Y/N
CF Caverns and drifts (60% design)	2059806	1	Caverns and drifts civil engineering	N
CF Infrastructure (60% design) ventilation, lights, stairs	2059809	1	Ventilation, lights, bridge, stairs	N
CF - For Discussion	2059812	1	All items currently under discussion	N
Cavern N - Chamber EN: Warm Cryostat SP - Floor and Walls	2051553	1	5 walls and floor, side stairs	N
Cavern N - Chamber EN: Warm Cryostat SP - Roof	2051554	1	Roof with penetrations, hand rails and floor	N
Cavern N - Chamber EN: Warm Cryostat SP - TCO	2051555	1	TCO	N
Cavern N - Chamber EN: Warm Cryostat SP - Mezzanine Structure and Supports	2051556	1	Cryo mezzanine mechanics	N
Cavern N - Chamber EN: Warm Cryostat SP - Mezzanine Platform and Access	2051558	1	Cryo mezzanine platforms and means of access	N
Cavern N - Chamber EN: Warm Cryostat SP - Mezzanine Proximity Cryogenics	2051559	1	Proximity cryogenics and pipes	N
Cavern N - Chamber EN: Warm Cryostat SP - Detector Mezzanine Structure and Supports	2051560	1	Detector mezzanine mechanics	N
Cavern N - Chamber EN: Warm Cryostat SP - Detector Mezzanine Racks and Services	2051561	1	Detector mezzanine racks, cable trays, racks, crosses	N
Cavern N - Chamber EN: Warm Cryostat SP - Internal Cryogenics	2051896	1	Internal cryo piping	N
Cavern N - Chamber EN: Warm Cryostat SP - DSS	2059036	1	Detector Support System	N
Cavern N - Chamber EN: Warm Cryostat SP - APAs	2059804	1	APAs	N
Cavern N - Chamber EN: Warm Cryostat SP - Cathodes and Field Cages	2059873	1	Cathodes, field cages and ground planes	N
Cavern S - Chamber ES: Warm Cryostat SP - Floor and Walls	2060165	1	5 walls and floor, side stairs	N
Cavern S - Chamber ES: Warm Cryostat SP - Roof	2060166	1	Roof with penetrations, hand rails and floor	N
Cavern S - Chamber ES: Warm Cryostat SP - TCO	2060167	1	TCO	N
Cavern S - Chamber ES: Warm Cryostat SP - DSS	2065463	1	Detector Support System	N
Cavern S - Chamber ES: Warm Cryostat SP - Detector APA	2065464	1	APAs	N
Cavern S - Chamber ES: Warm Cryostat SP - Cathodes and Field Cages	2065465	1	Cathodes, field cages and ground planes	N
Cavern S - Chamber ES: Warm Cryostat SP - Mezzanine Structure and Supports	2066325	1	Cryo mezzanine mechanics	N
Cavern S - Chamber ES: Warm Cryostat SP - Mezzanine Platform and Access	2066661	1	Cryo mezzanine platforms and means of access	N
Cavern S - Chamber ES: Warm Cryostat SP - Mezzanine Proximity Cryogenics	2066948	1	Proximity cryogenics and pipes	N
Cavern S - Chamber ES: Warm Cryostat SP - Detector Mezzanine Structure and Supports	2067819	1	Detector mezzanine mechanics	N
Cavern S - Chamber ES: Warm Cryostat SP - Detector Mezzanine Racks and Services	2067822	1	Detector mezzanine racks, cable trays, racks, crosses	N
Cavern S - Chamber ES: Warm Cryostat SP - Internal Cryogenics	2067825	1	Internal cryo piping	N
CUC - Cryogenic equipment and LN2 Dewars	2060511	1	Dewars and piping inside the CUC	N
Complete Assembly (Navis work)	2053096	1	Overall assembly in Navis work file	N
Cranes and Monorails	2059810	1	Bridge crane and monorails	N

Full CAD models

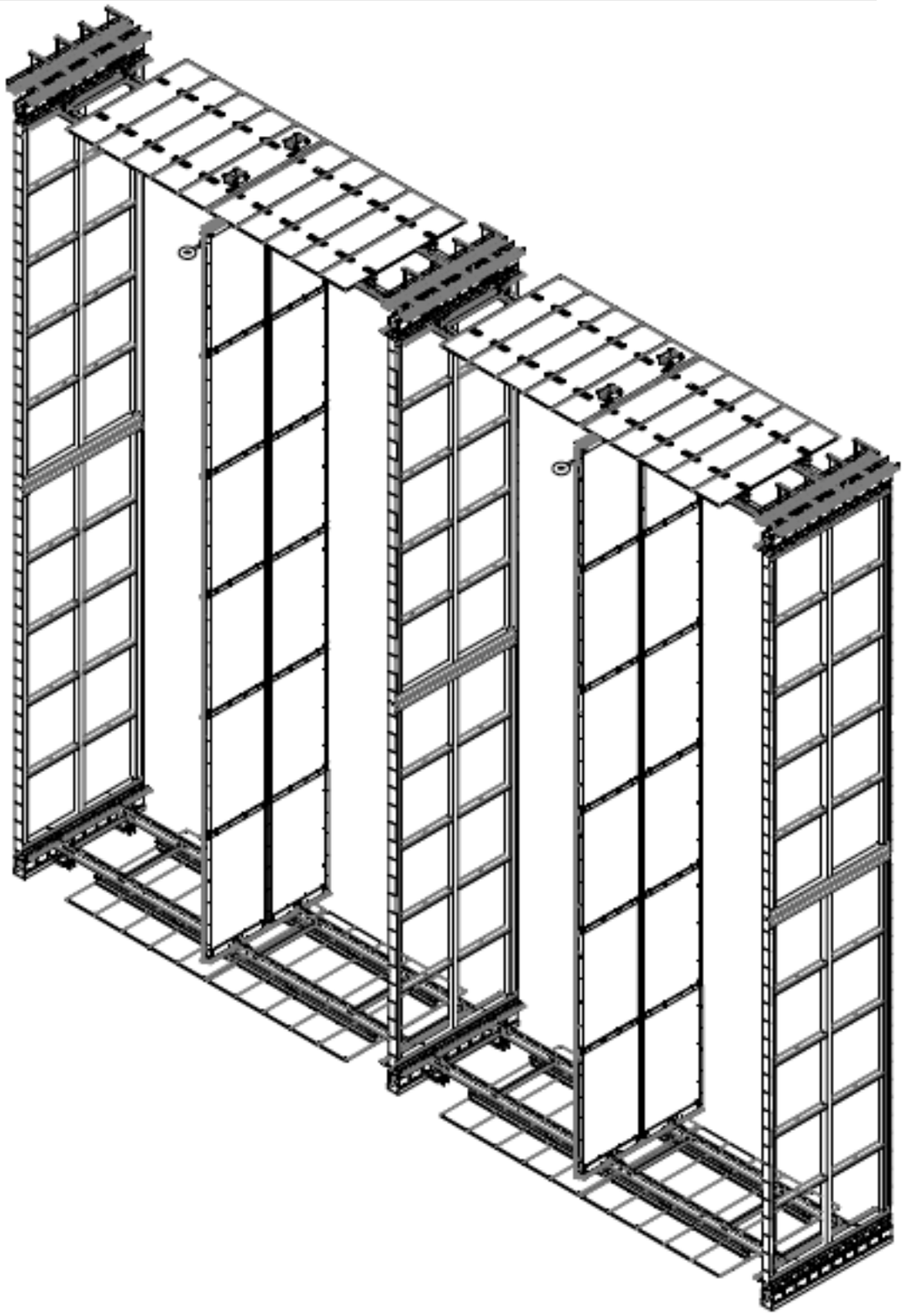


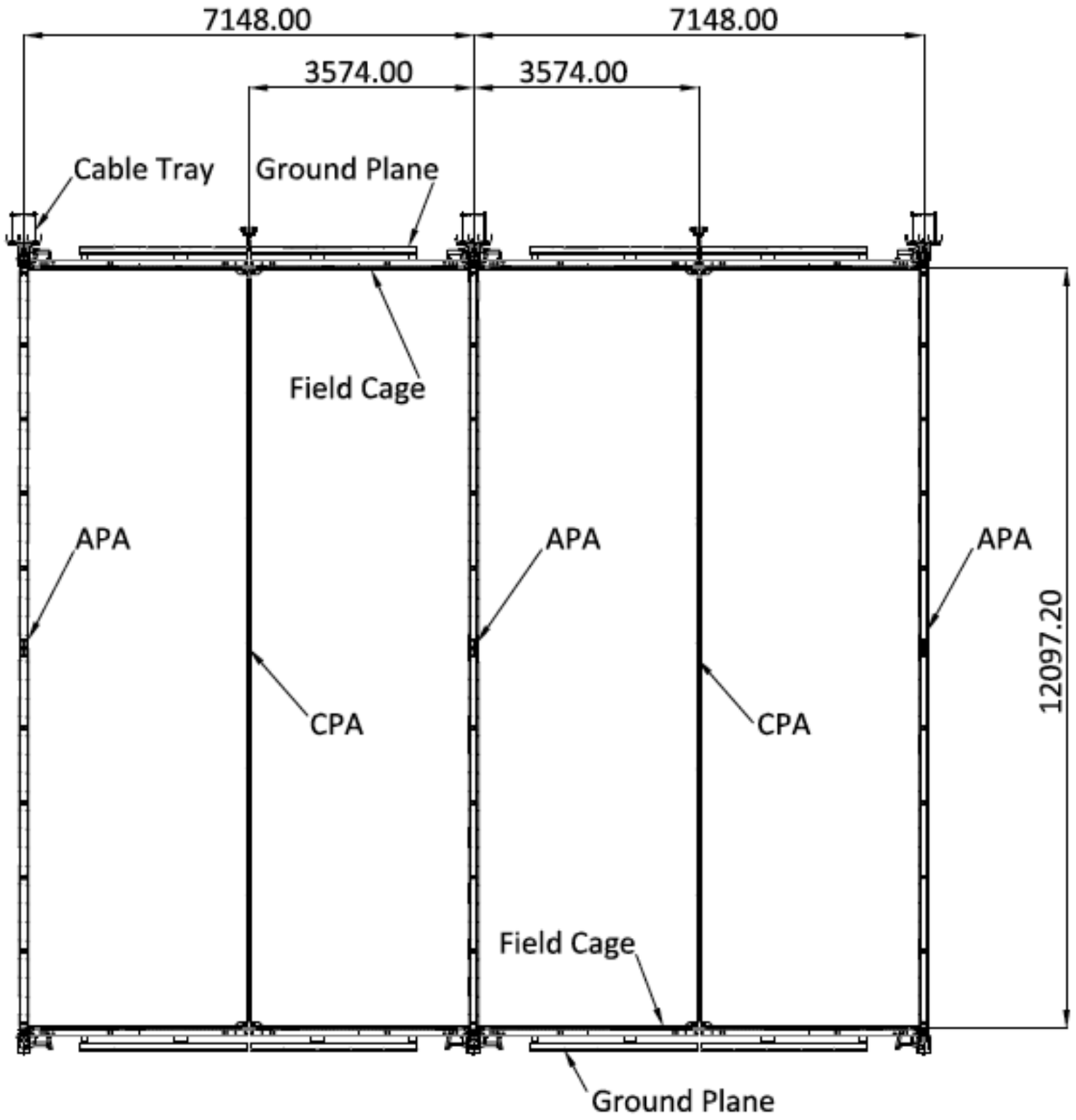
Overview: inside



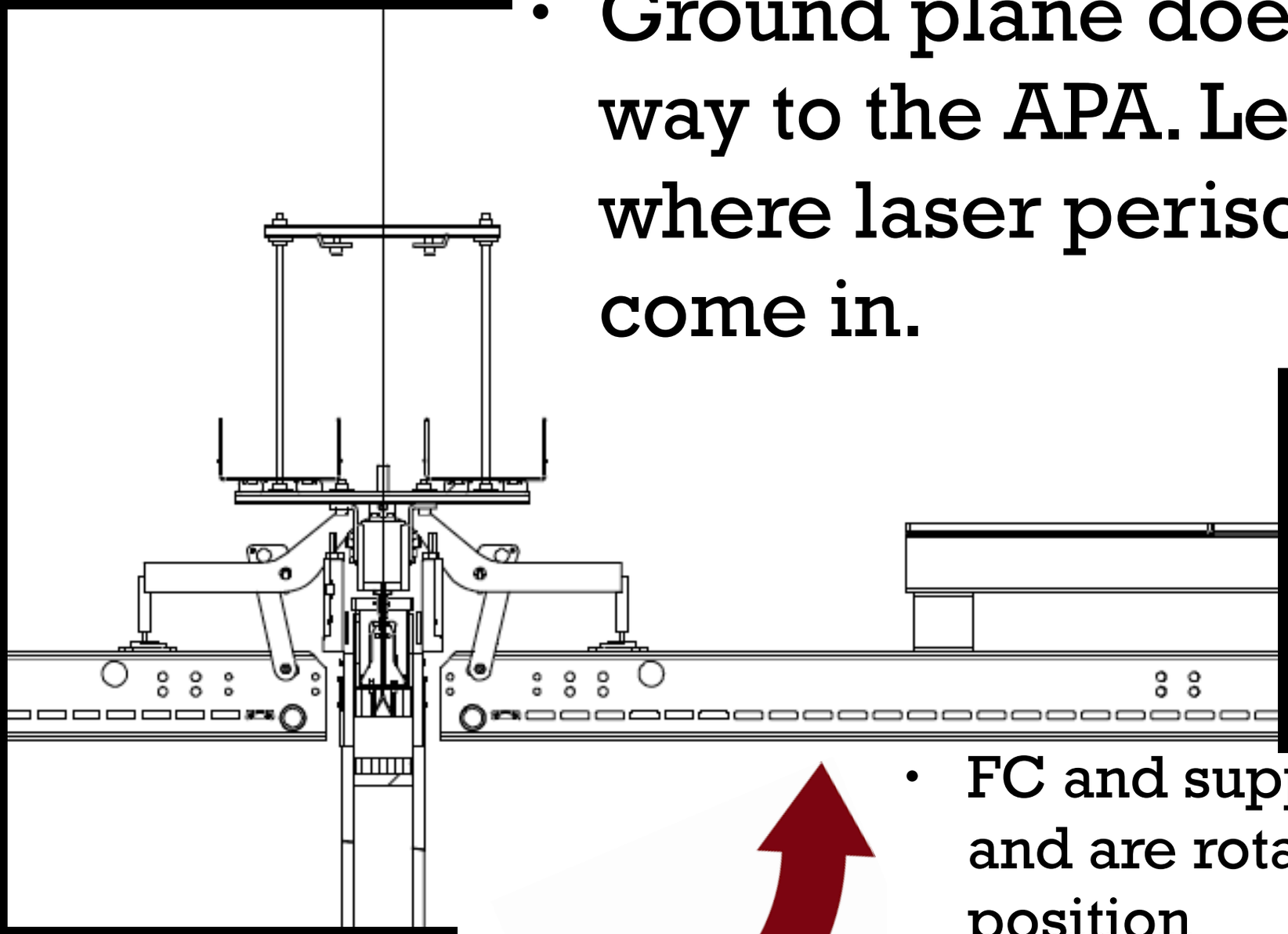
- 25 rows of APA/CPAs
- All enter through TCO
- Lateral positioning not fully settled yet

One APA/CPA row





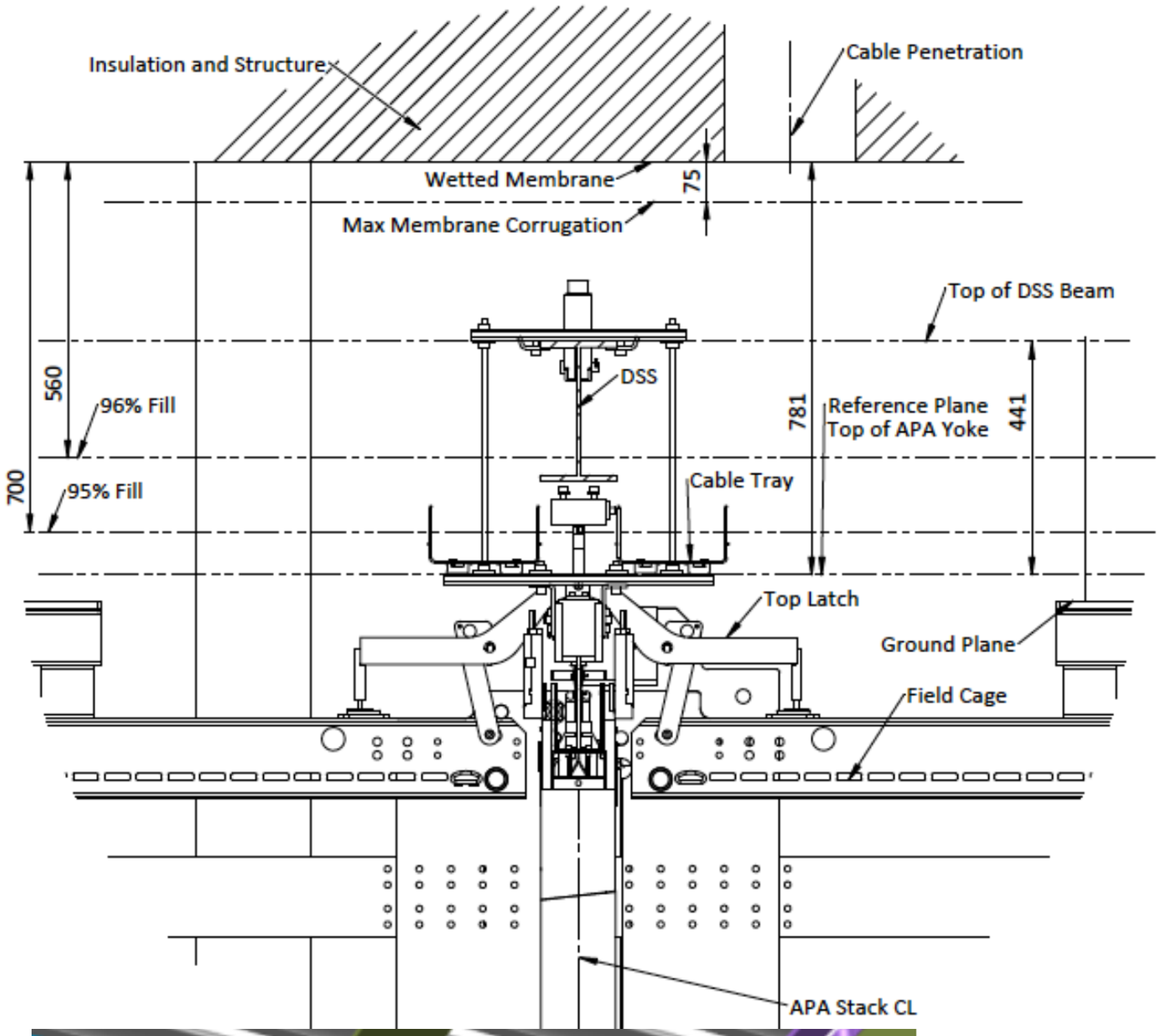
row top, detail

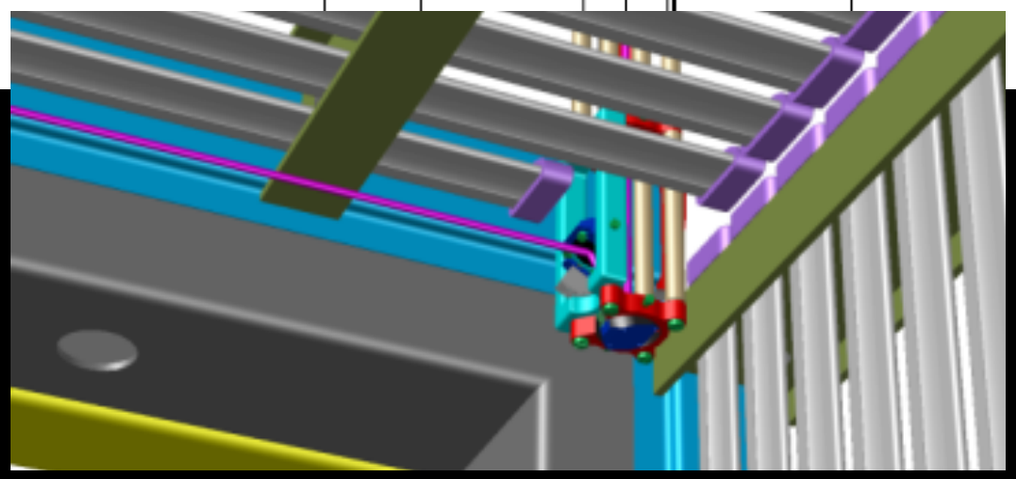


- Ground plane does not go all the way to the APA. Leaves a gap where laser periscope could come in.

- FC and support come in vertically and are rotated 90 deg into final position
- Hard to think of any fixed system within FC and ground plane…

Middle APA

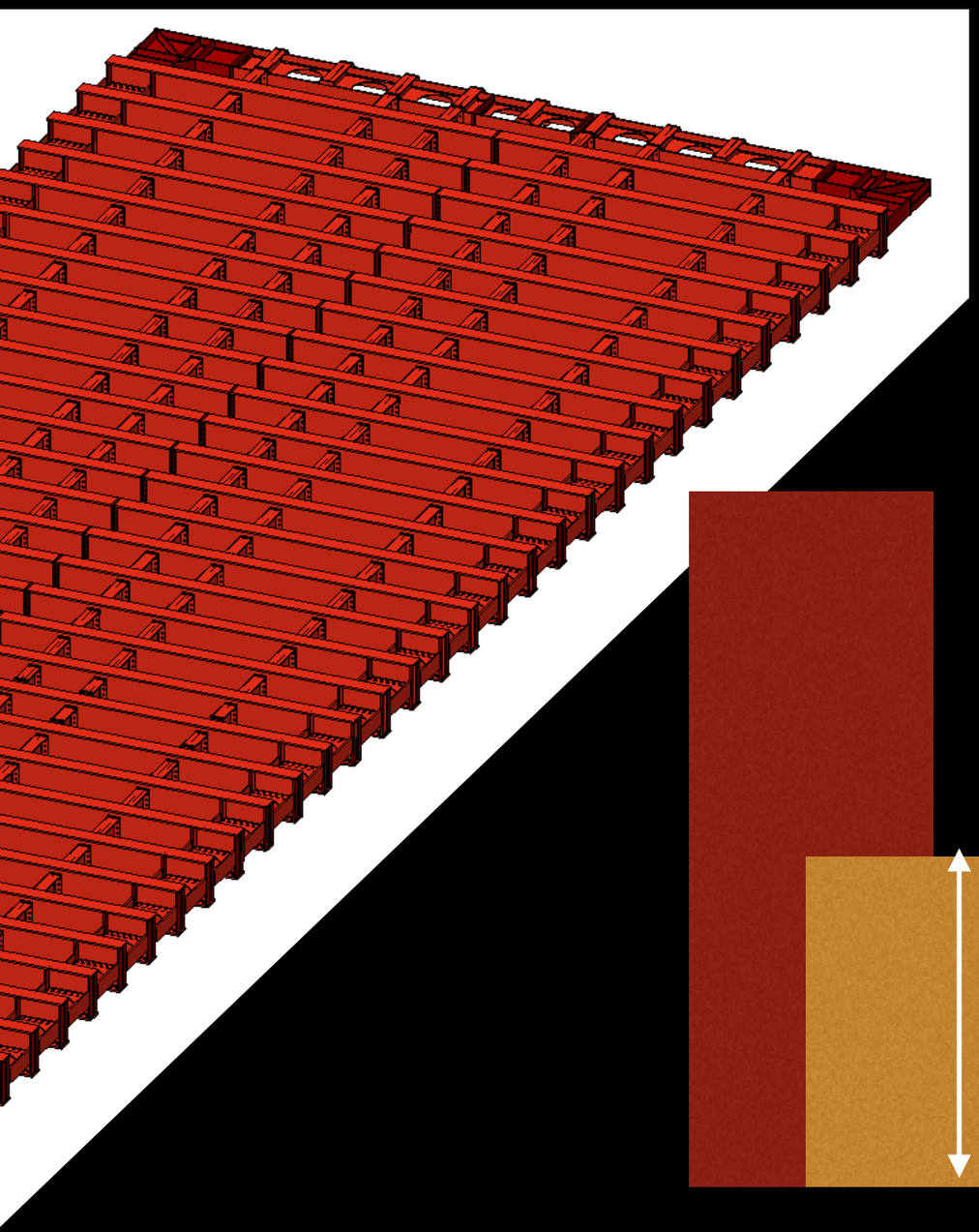




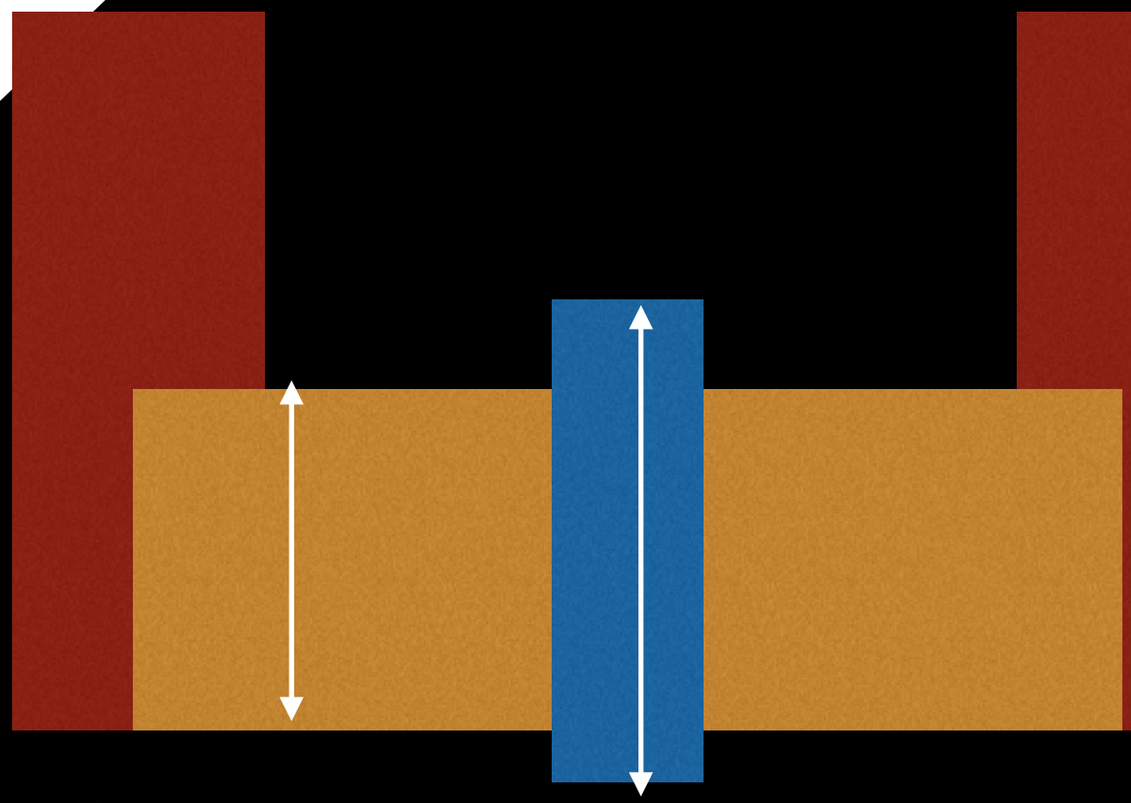
- Laser Periscope (SBND-style) would need to extend about 1.2 m below the “wetted membrane”

[B. Yu, CTF meeting, Oct. 24, 2017]

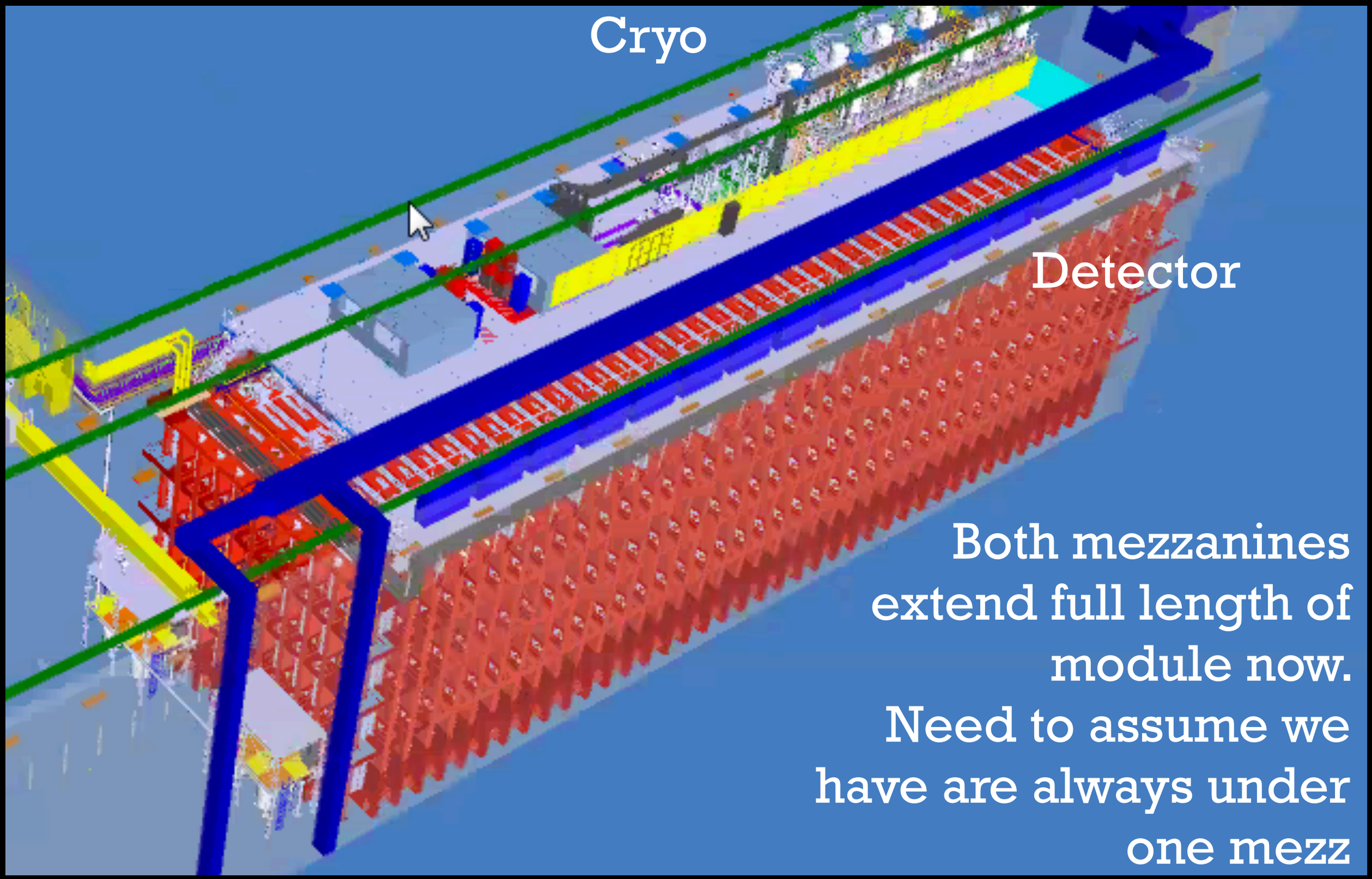
Roof of cryostat and feedthrough



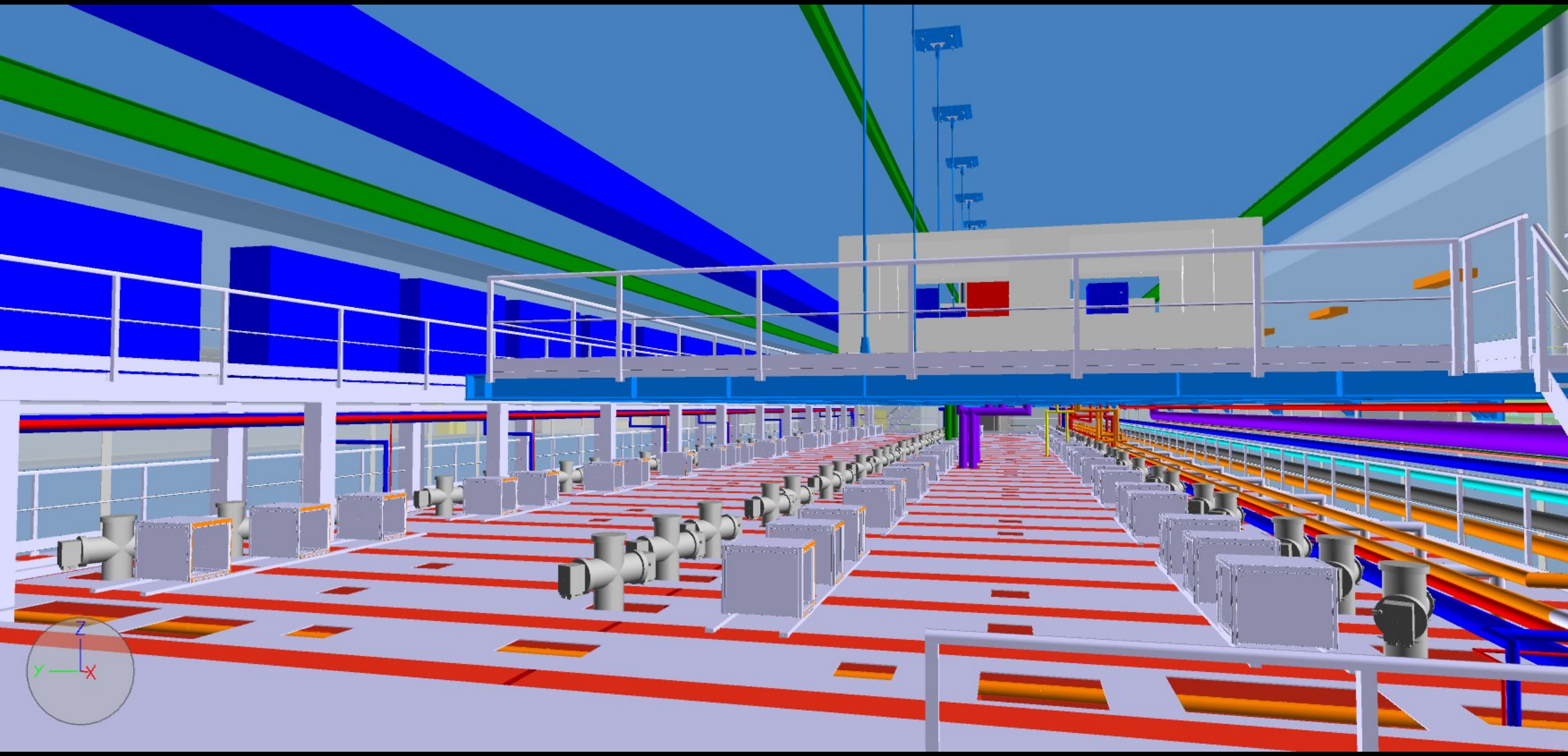
- Full height: 1920 mm
  - inc. structure+insulation



Mezzanines



Both mezzanines extend full length of module now.
Need to assume we have are always under one mezz



Typically 2.2 m high, but depending on location there can be several impediments, like pipes, etc…

Space on top of feedthroughs

- Above feedthrough, below structure I-beam: ~ 800 mm
- Above I-beam, below mezzanine: ~ 2 m
- But length of laser periscope must be at least 2.4 m. May need to break it in two.