Update on Trial Assembly at Ash River ProtoDUNE Cleanroom

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HA Documentation Format

- We are still using the Fermilab HA Format but I have sent an e-mail to Olga to get the CERN Format-which she said is basically the same
- We will then match the detailed procedures which documents the step by step procedures to line up with the HA numbers
- Cole (NOvA Safety Officer) and Curt Lerol (NOvA and Soudan supervisor) will concentrate on this documentation next few weeks

Utilizing the format below, identify hazards and environmental aspects, and their corresponding safety precautions/procedures to mitigate hazards. Use as many sheets as necessary.

HAZARD ANALYSIS HA

Step	Description	Hazards/ Environmental Aspects	Precautions / Safety Procedures
1	Once the CPAs have been unloaded using HA 601 (freight truck receiving and unloading) remove the items. **Note: many items will require the use of the crane and would be in direct guidance with HA 220 (Over Head Crane Operations).**	Pinch points;	Following HA 601 use a pallet jack to remove the package from the truck.
2	Assemble the modular cathode planes by placing them onto the assembly table (these planes are heavy but not to heavy to lift using a minimum number of 2 people). Slide the tongues of the planes into the grooves and screw in the Allen bolts into the pre-tapped holes for proper alignment. The Pin then goes through the planes securing the planes together.	Manual handling of loads (MHL) could result in back pain, pinch points.	Using proper lifting techniques and ensuring that the floor is clear of any tripping hazards will prevent back injury. **Note: employees with existing back pain should restrain from doing this task.** Proper PPE such as the Listed above will lower the risk of pinch points
3	Using guidance from HA 220 connect the spreader bar to the CPA and the spreader bar to the Crane	Debris struck by hazard The material of the CPA is G-10 (A fiberglass based laminate). A material that could snap in half if lifted improperly.	Clamping heavy duty 3inch L channel on the plane seams will prevent the CPA from breaking.

CPA Assembly Installation

HA-1-Unloading pallets of CPA

Once the CPAs have been unloaded using HA 601 (freight truck receiving and unloading) remove the items.

HA-2- Assembly of CPA panels

A. Assemble the modular cathode planes by placing them onto the assembly table (these planes are heavy but not too heavy to lift using a minimum number of 2 people).

B. Slide the tongues of the planes into the grooves and screw in the Allen bolts into the pre-tapped holes for proper alignment. The Pin then goes through the planes securing the planes together.

HA-3-Lifting CPA panel

A. Connect the spreader bar to the CPA and the spreader bar to the Crane.

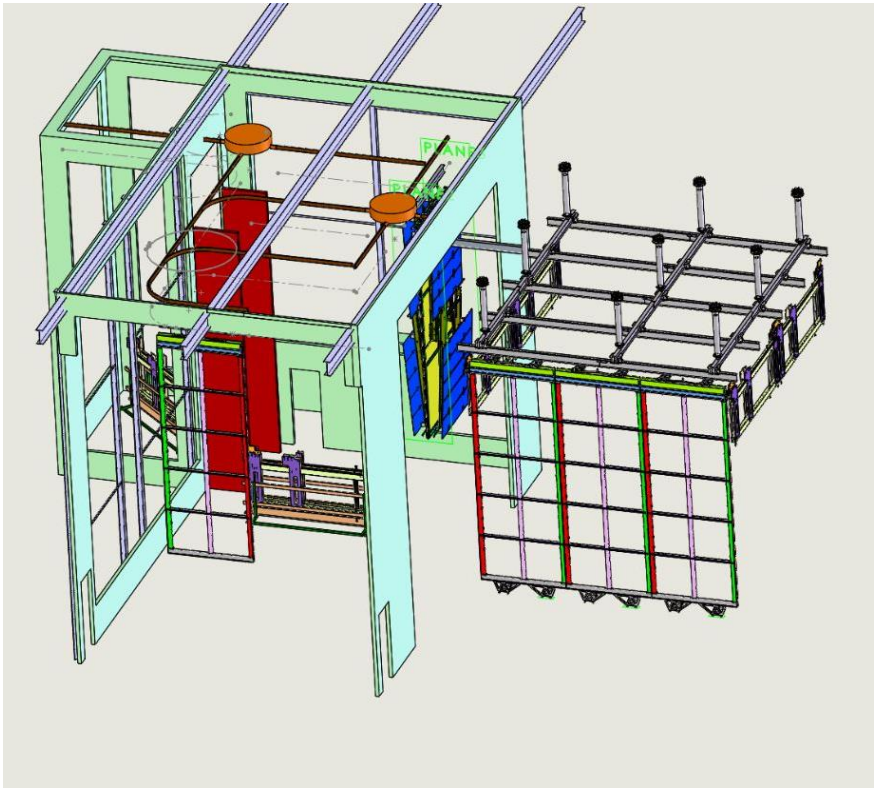
B. Clamping heavy duty 3inch L channel on the plane seams will prevent the CPA from breaking.

AR Trial Assembly Schedule

- This week:
  - Remount just top two Field cages and test rotation
  - Trial attempt at using lifting rated winch operated by drill motor to raise and lower a Field Cage
- Over the next few weeks
  - Continue work on HA and Procedure documentation
  - Complete design/order chain driven trolley for DSS Bridge Beam's
  - Complete design/order hand powered lifting winch and trolley
  - Begin mock-up of Cold Electronics boxes, cabling harness and cable tray
- Early February
  - Complete design of lower field cage latch and installation concept
  - Install upper Field cage latch (parts are being manufactured)
- **February week of 13th or 20th**
  - **Hold second Ash River work shop (smaller) and run through the entire TPC installation sequence using access as it would be at CERN**

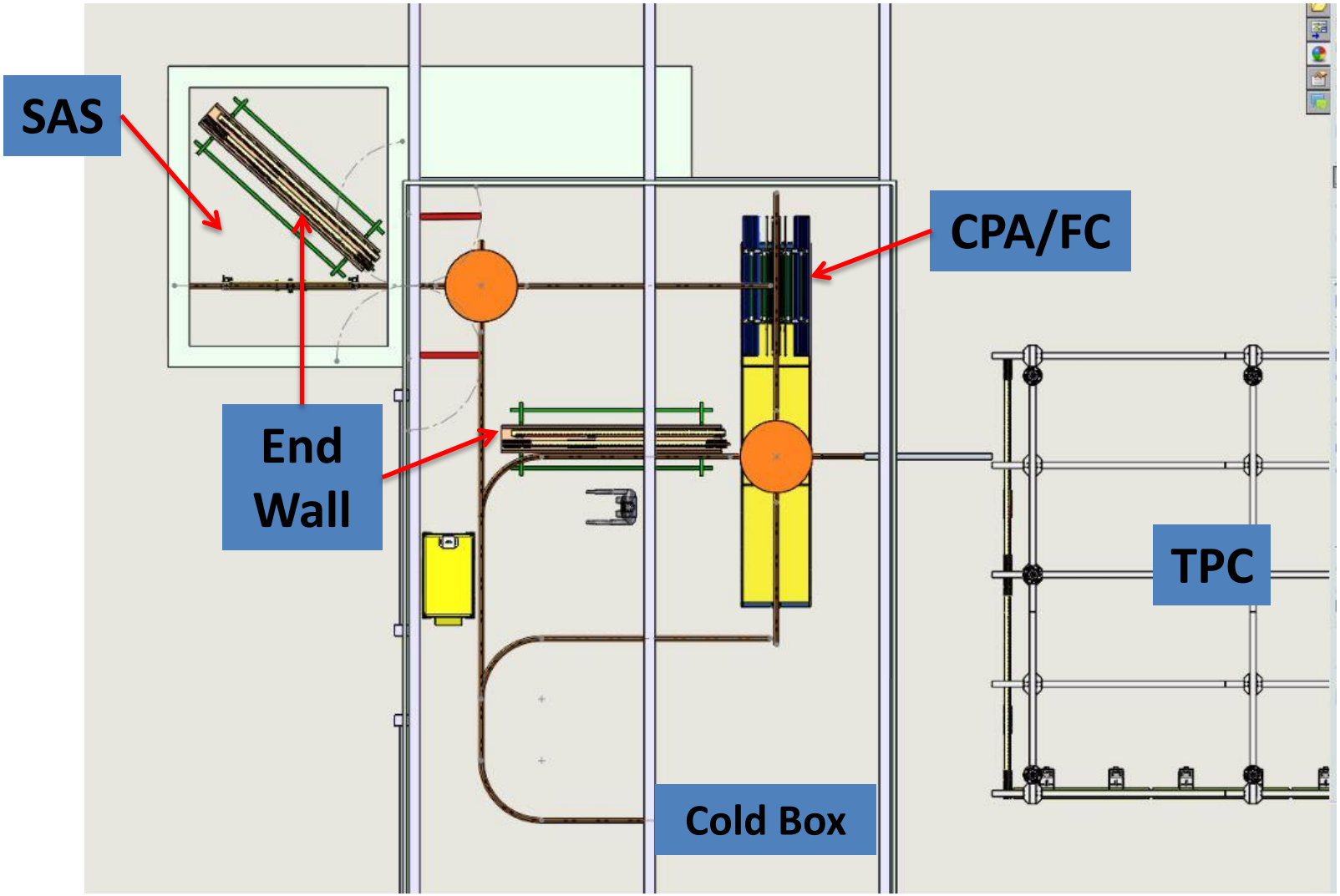
Cleanroom Installation Sequence at CERN

- Bob Flight is doing all the hard work, I'm just paying attention and writing the text for the installation sequence
- Several critical issues need to be worked out with the cleanroom trolley system design for it to allow us install the TPC
- **Do we have motorized trollies to move the components around?**
- **Will we have some kind of hoist available on this trolley to raise End Wall sections, raise CPA or Field Cages in the clean room area? Or does all of that work have to happen in the SAS? It is not clear we can do the End Wall.**



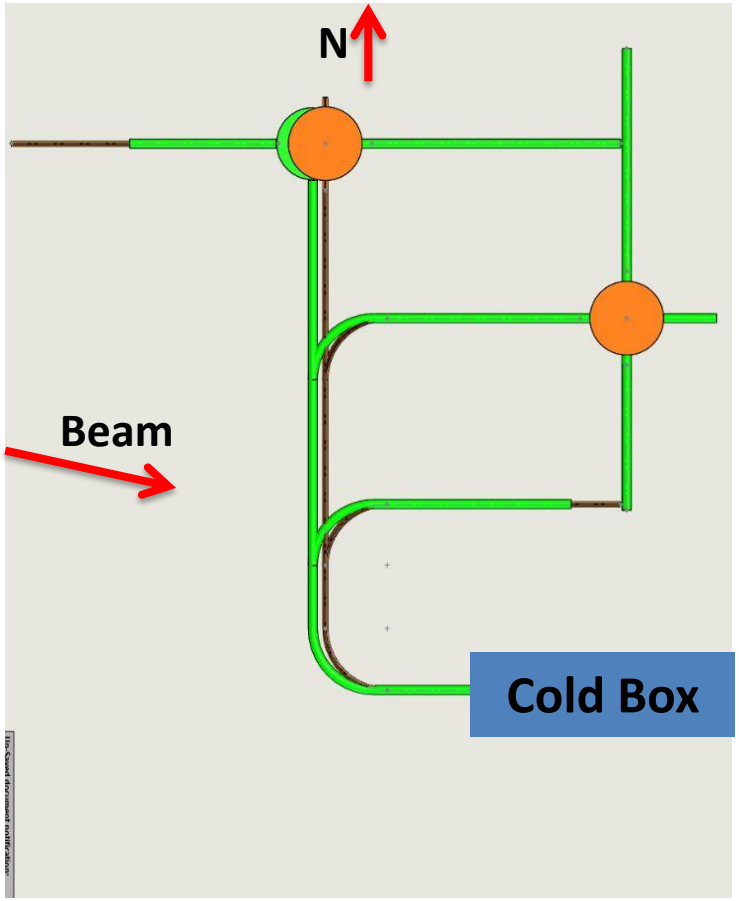
View of the cleanroom and how it feeds into the Cryostat

Clean Room Layout



Minor change in the rail location

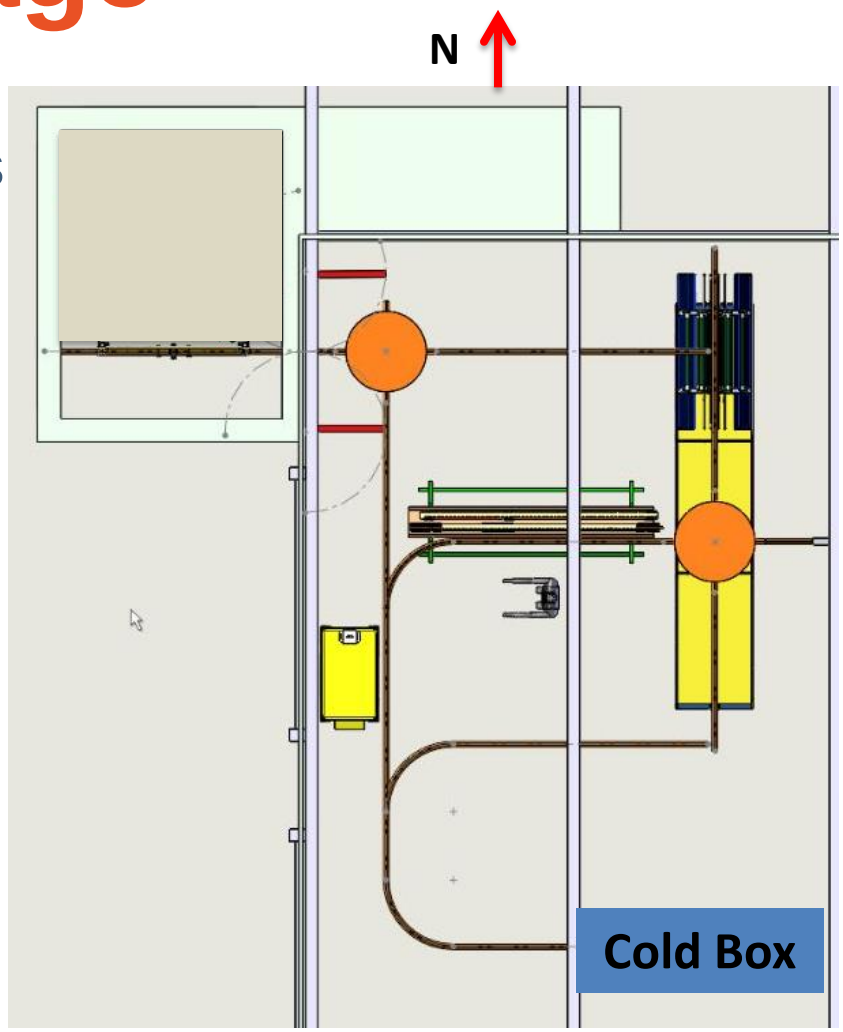
- The upstream rail needs to move 203mm (8”) to the east to allow us to rotate an APA at the first turn table
- The rail in the SAS was extended to the west wall for anchor point
- The third rail was extended so it butts up to the downstream rail
- There are two other rail issues we should look at, how it ends in front of both the TCO and the Cold Box to minimize the load transfer distance



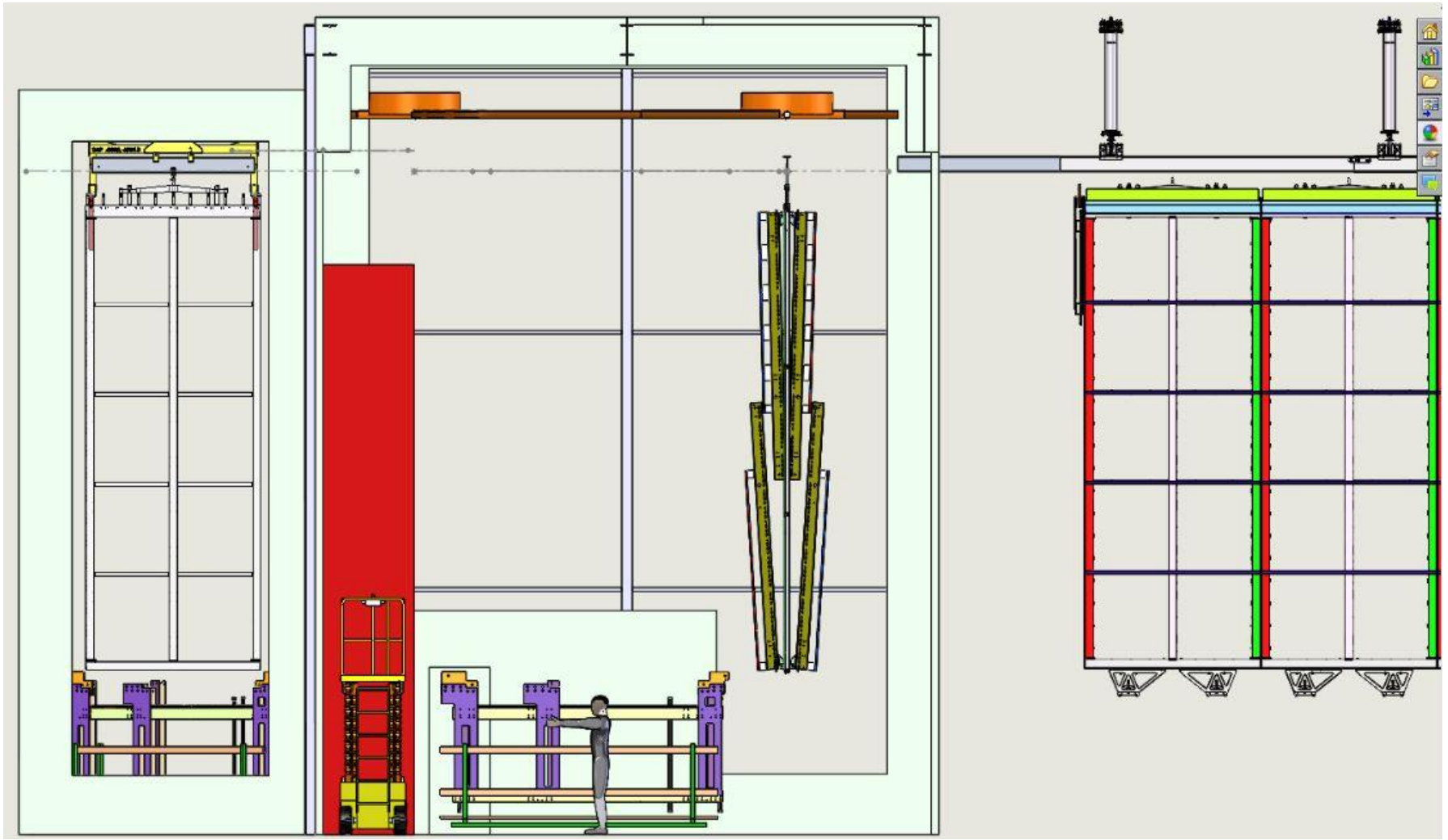
Green was the original drawing
Brown the new location

CPA and Field Cage

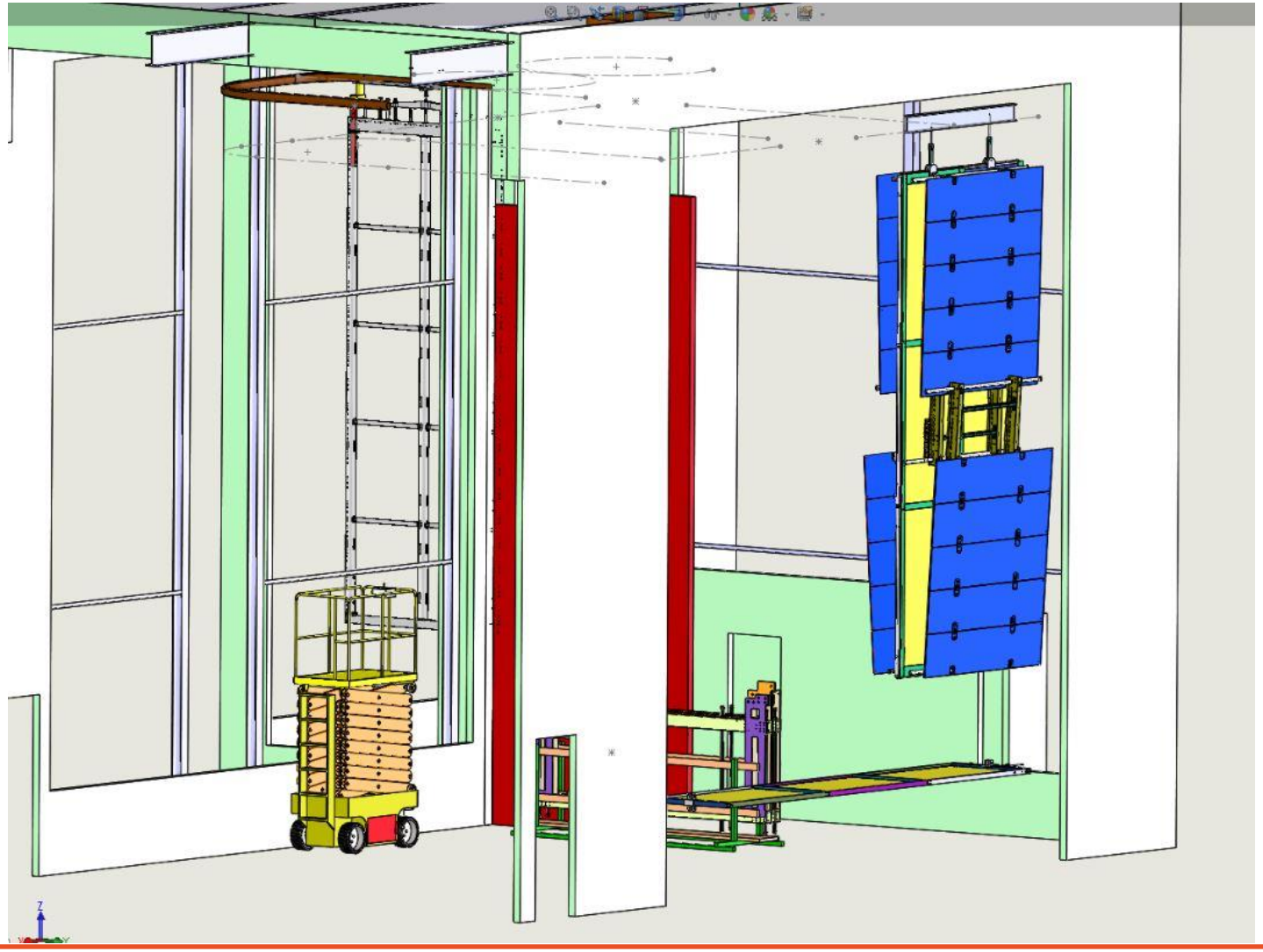
- The three CPA sections are bolted together on the yellow table and it is lifted via hoist and positioned in front of the SAS entrance rail
- Field cage sections are lifted via hoist in the clean room
  - Left Top FC, then CPA rotated
  - Right Top FC
  - Right Bottom FC, then CPA rotated
- It is then ready to be moved thru the TCO into the cryostat



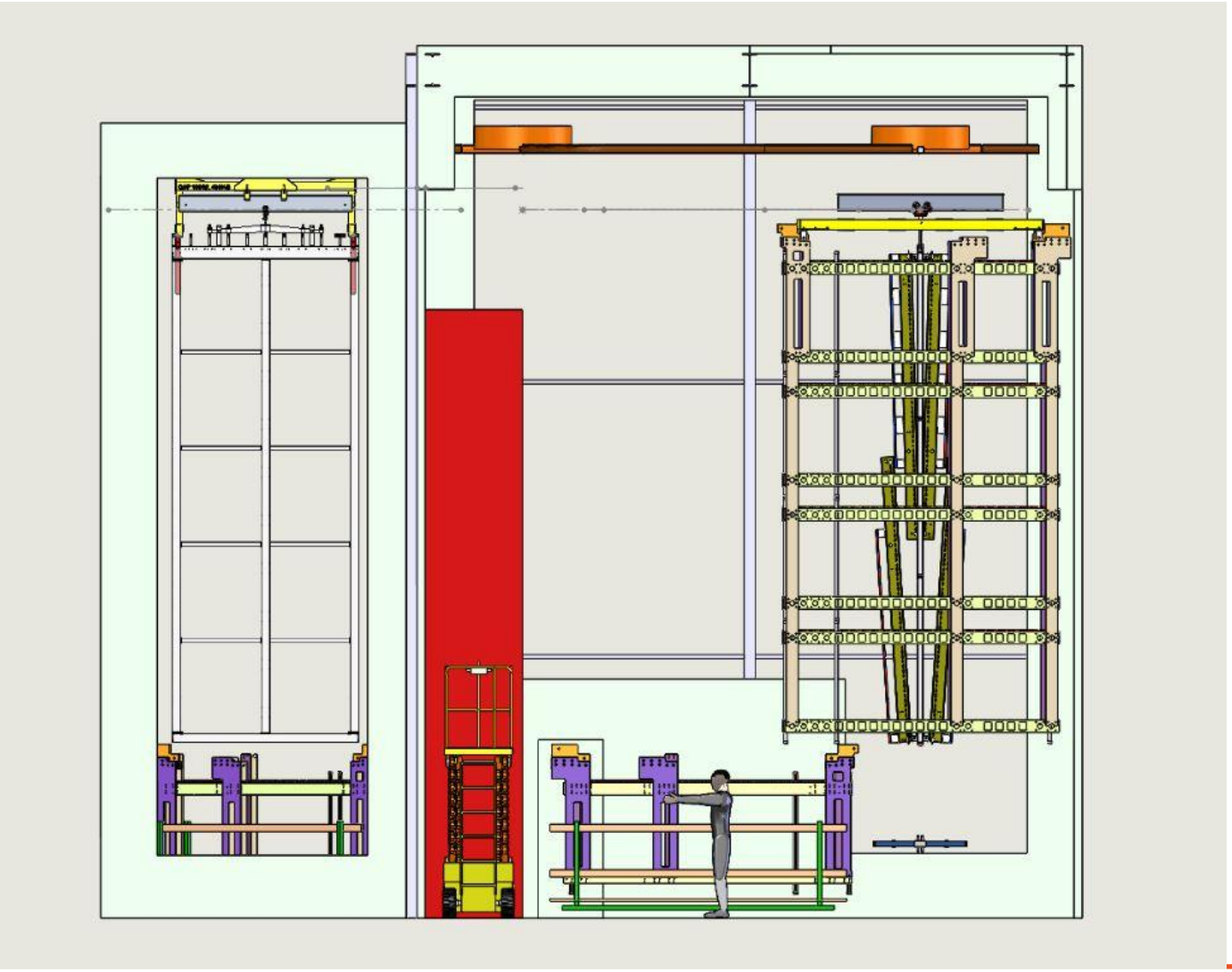
Completed CPA/FC



CPA/FC hanging on SS Beam



Completed End Wall



One More Dimension Comment

- When Bob moved the upstream rail and turn table to the east 8” it was under the assumption that the wall was ~100mm (4”) thick. Really what needs to be defined is the rail needs to be a minimum of 1203mm (47.37”) from the wall or any components hanging on it like conduit
- If the installation plan changes and the End Walls are completed outside the cleanroom we need to add ~150mm (6”) to the width to lower a completed wall and hang it on the rails.