

ALICE ITS Upgrade Water Cooling

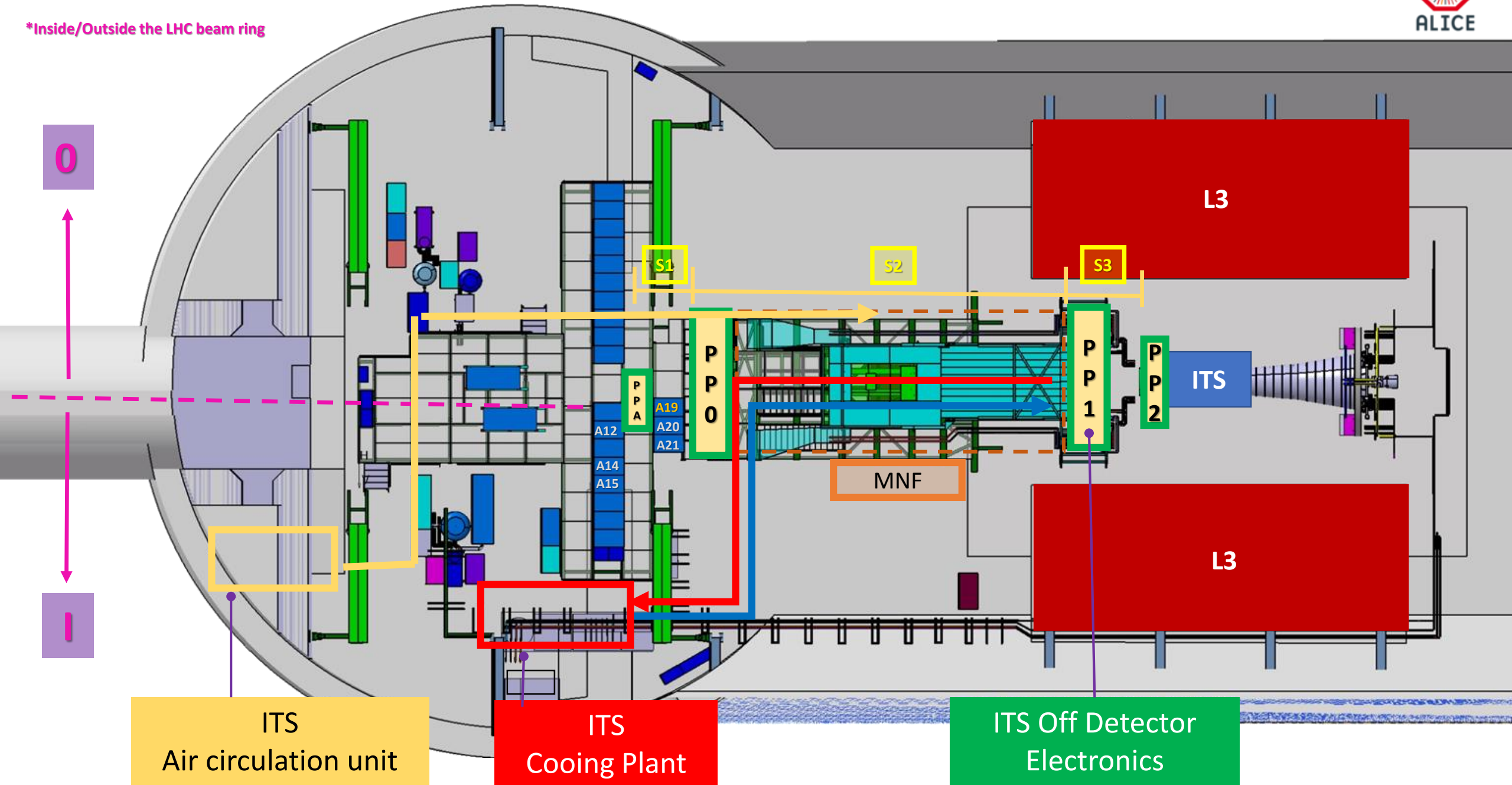
ITS Upgrade Services Review, 23 March 2018



Overview: Layout



*Inside/Outside the LHC beam ring



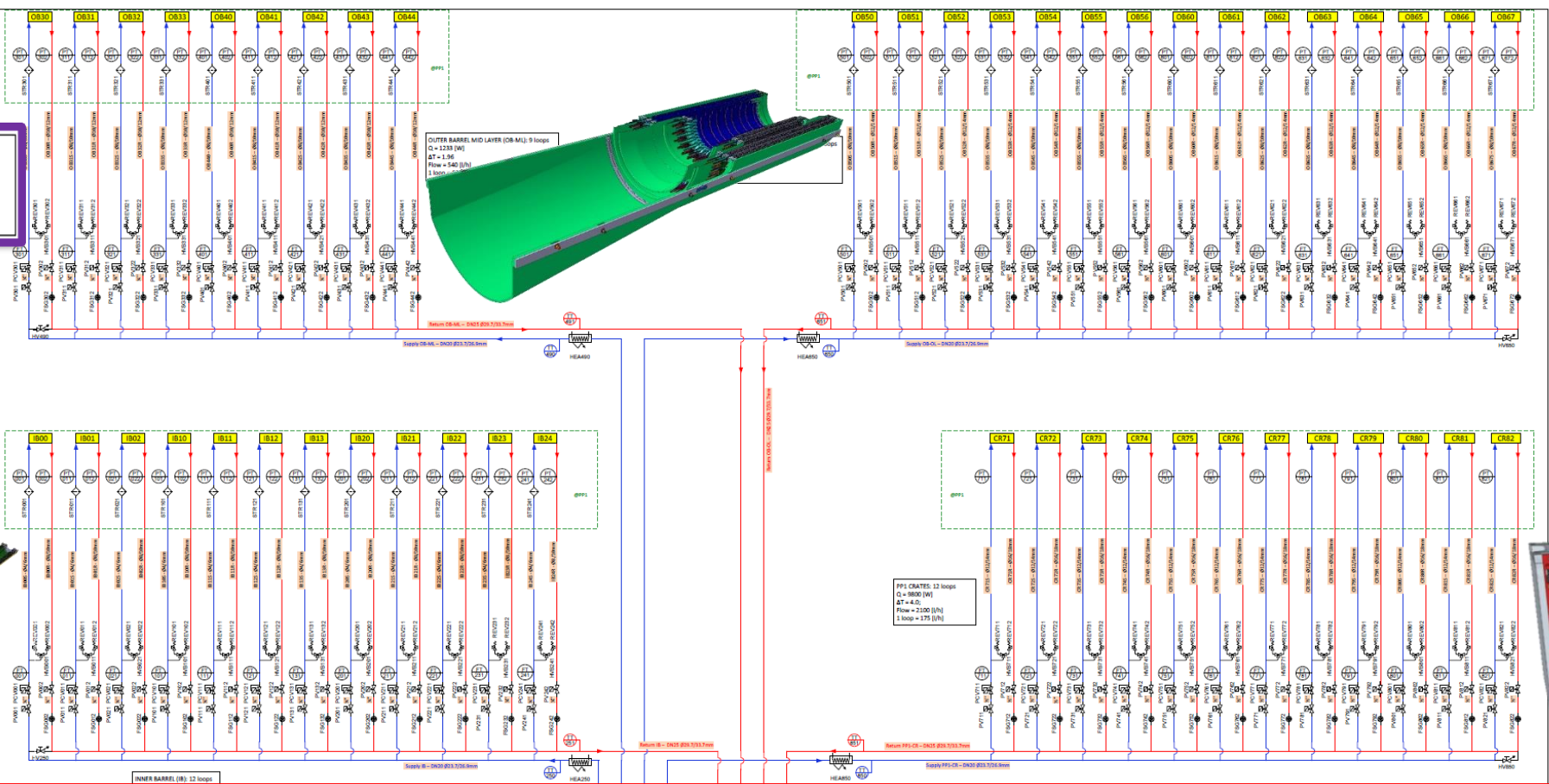
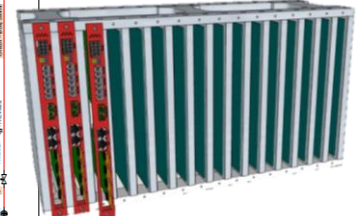
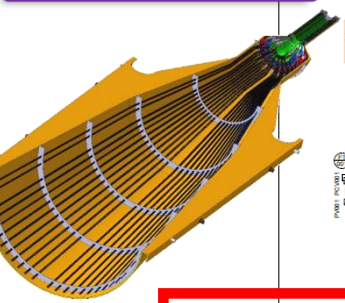
Water Cooling: Plant Piping and Instrumentation Diagram

OUTER BARREL MID LAYER (OB-ML): 9 loops
 $Q = 1233$ [W]
 $\Delta T = 1.96$
 Flow = 540 [l/h]
 1 loop = 60 [l/h]

INNER BARREL (IB): 12 loops
 $Q = 122$ [W]
 $\Delta T = 0.72$
 Flow = 144 [l/h]
 1 loop = 12 [l/h]

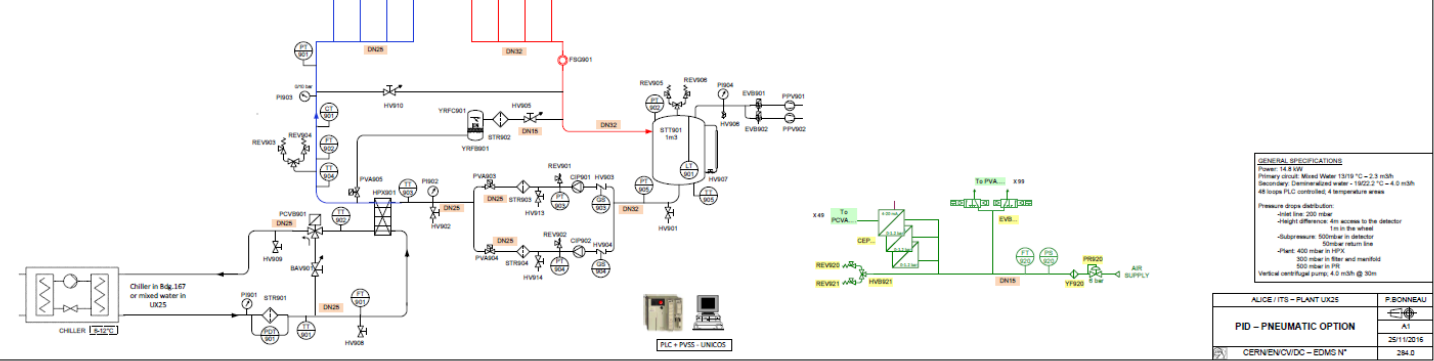
OUTER BARREL OUTER LAYER (OB-OL): 15 loops
 $Q = 3645$ [W]
 $\Delta T = 2.75$
 Flow = 1140 [l/h]
 1 loop = 76 [l/h]

PP1 CRATES: 12 loops
 $Q = 9800$ [W]
 $\Delta T = 4.0$;
 Flow = 2100 [l/h]
 1 loop = 175 [l/h]



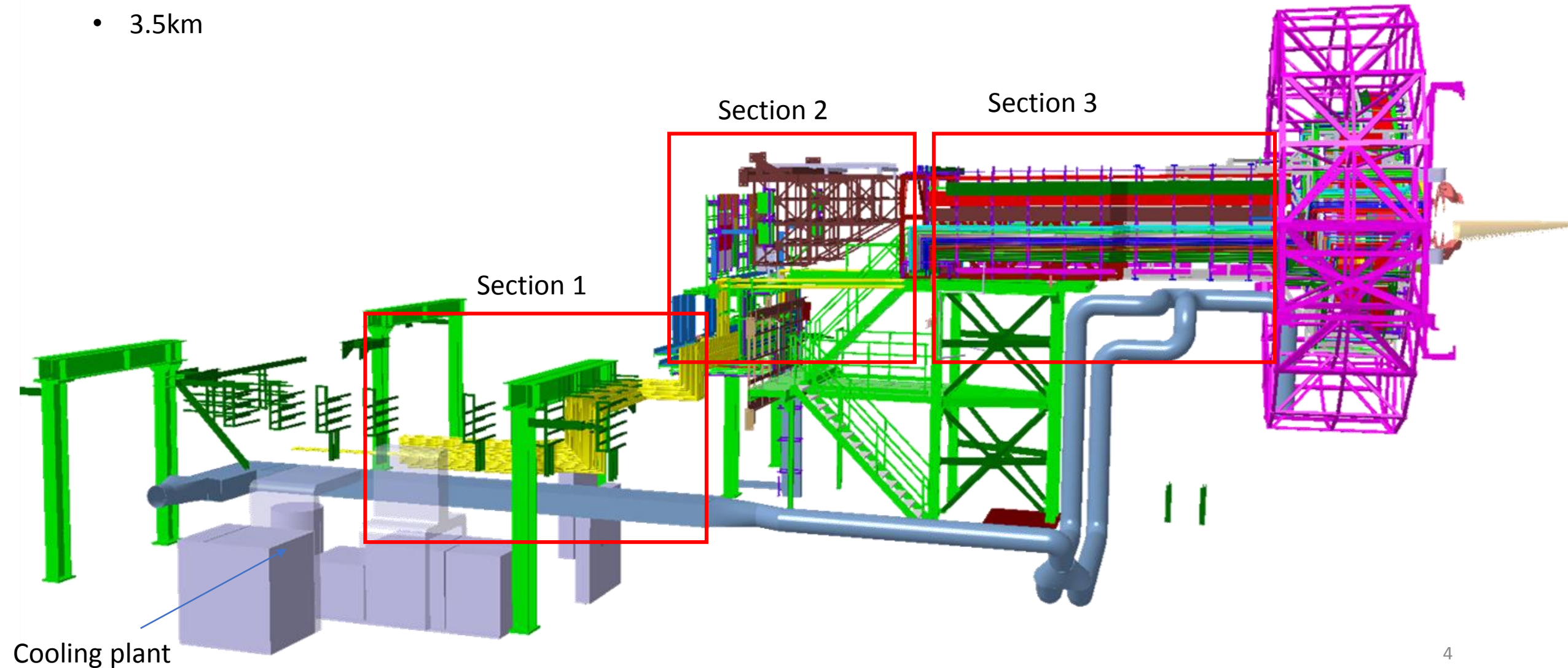
Plant Requirements:

- Pumps redundancy
- ~15kW
- Temp range: 18 to 23°C
- 48 loops
- 4 areas



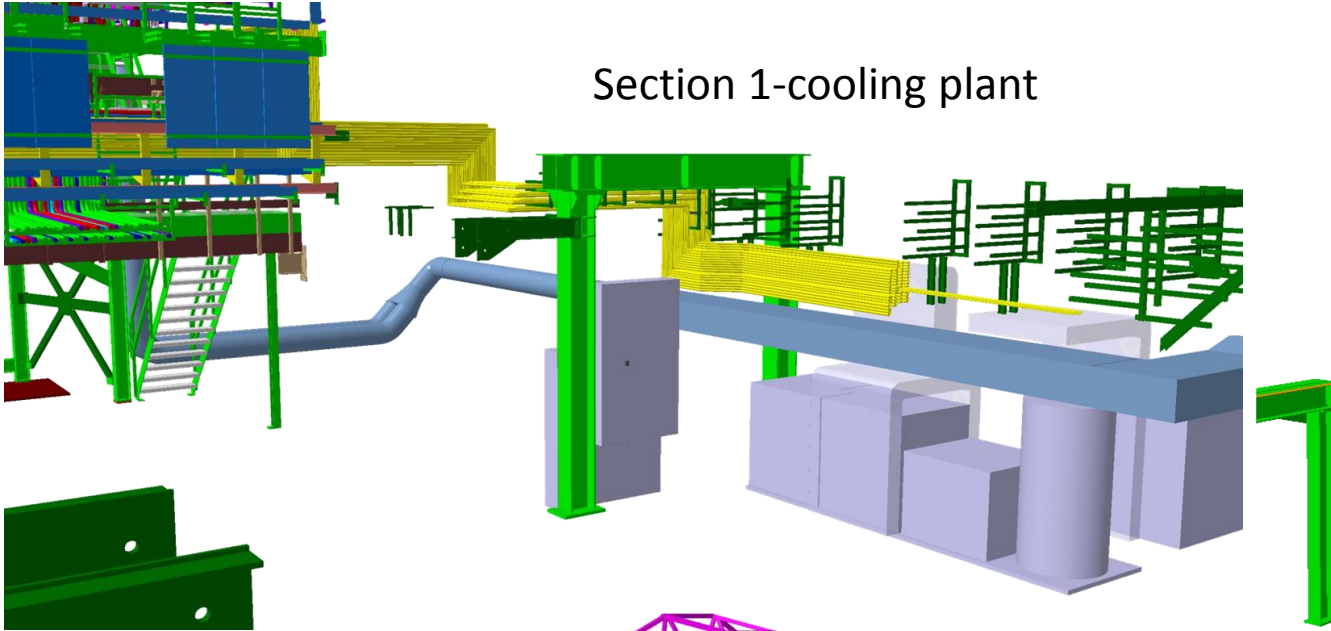
Water Cooling: Installation of the new ITS upgrade lines

- 3 main sections of the piping installation. All with same tubing dimensions.
- Request for quotations (around 130 kCHF) for the installation/welding of total of:
 - n. 96 tubes
 - 3.5km

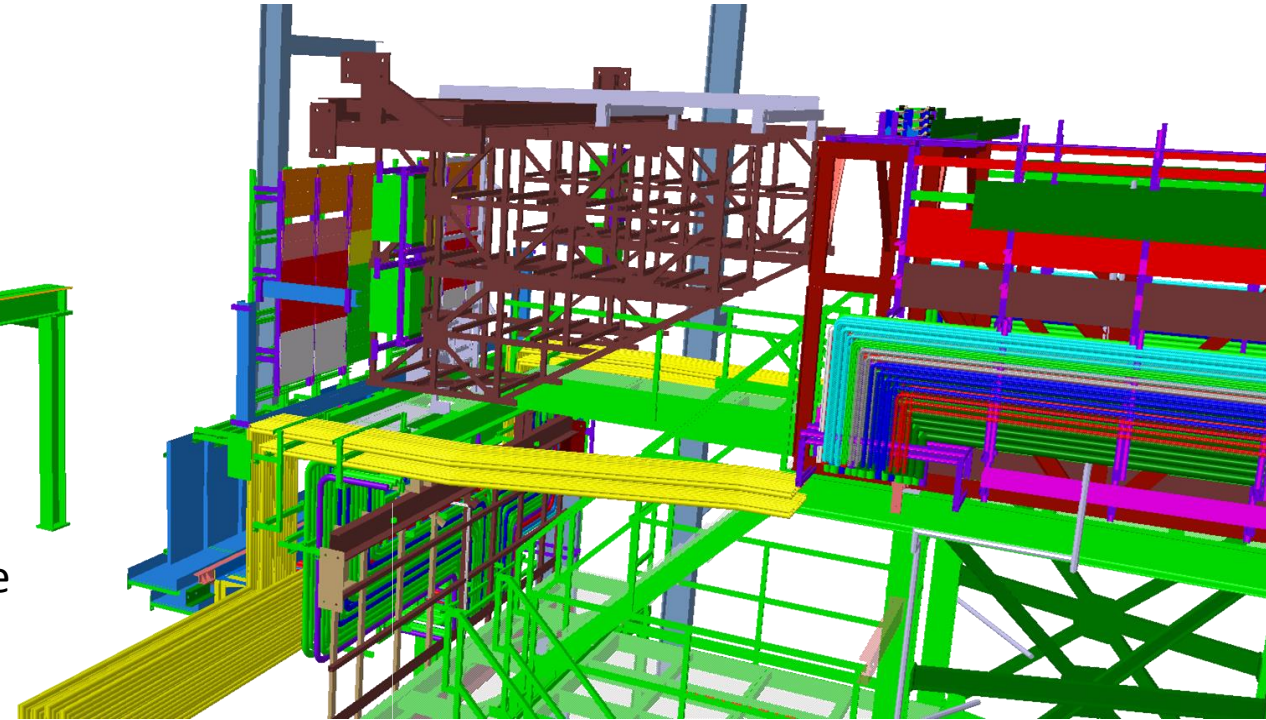


Water Cooling: Installation of the new ITS upgrade lines

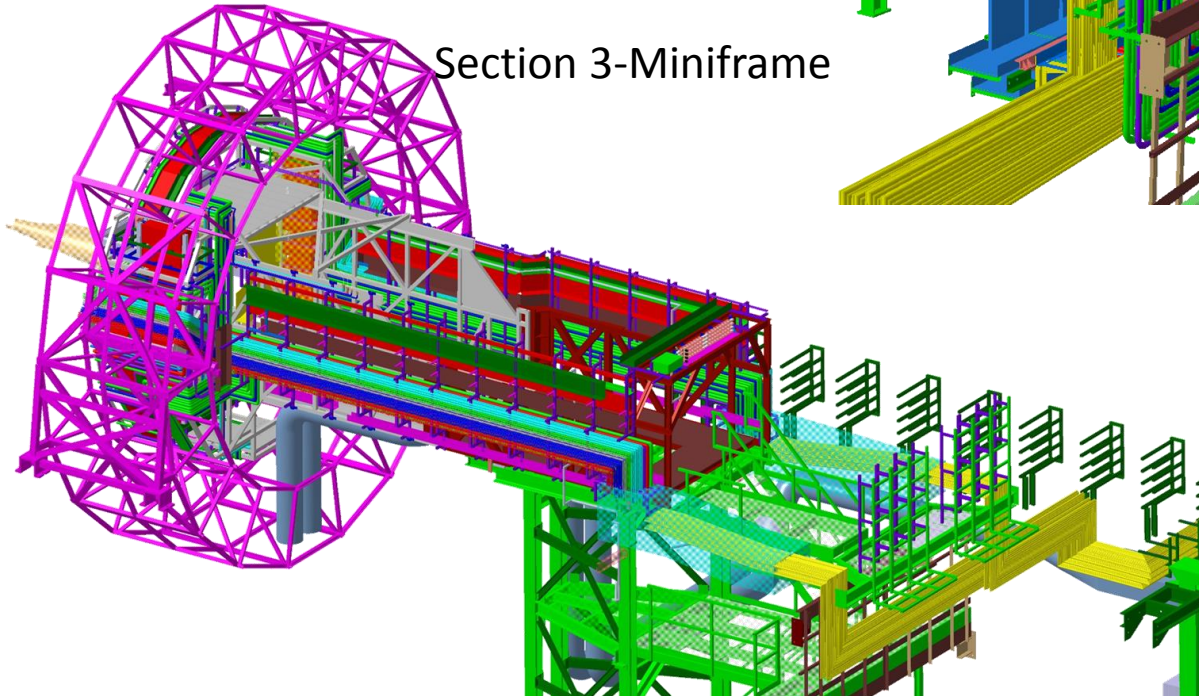
Section 1-cooling plant



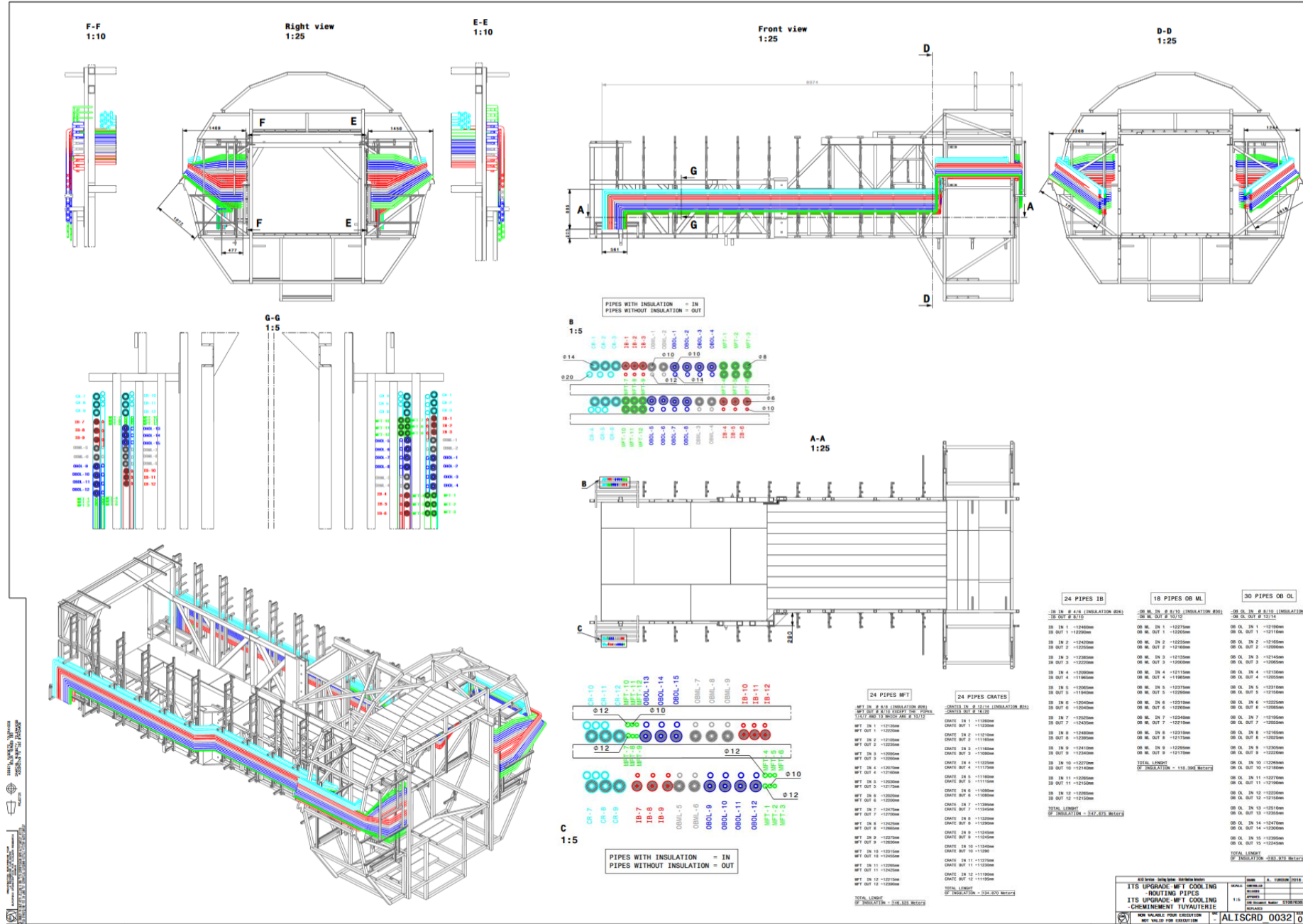
Section 2-PP0



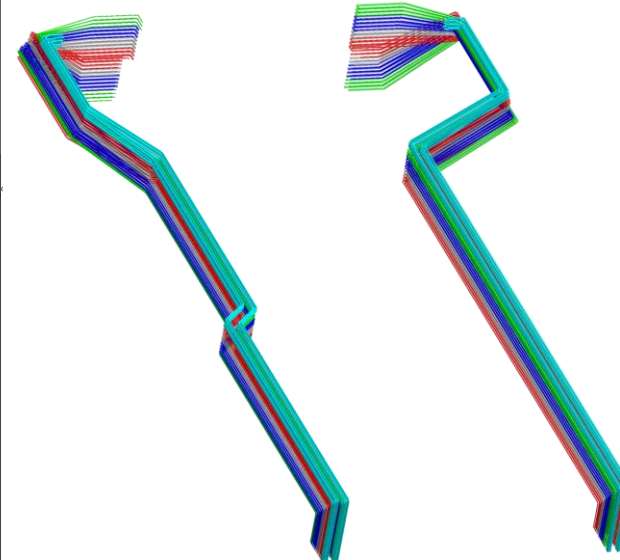
Section 3-Miniframe



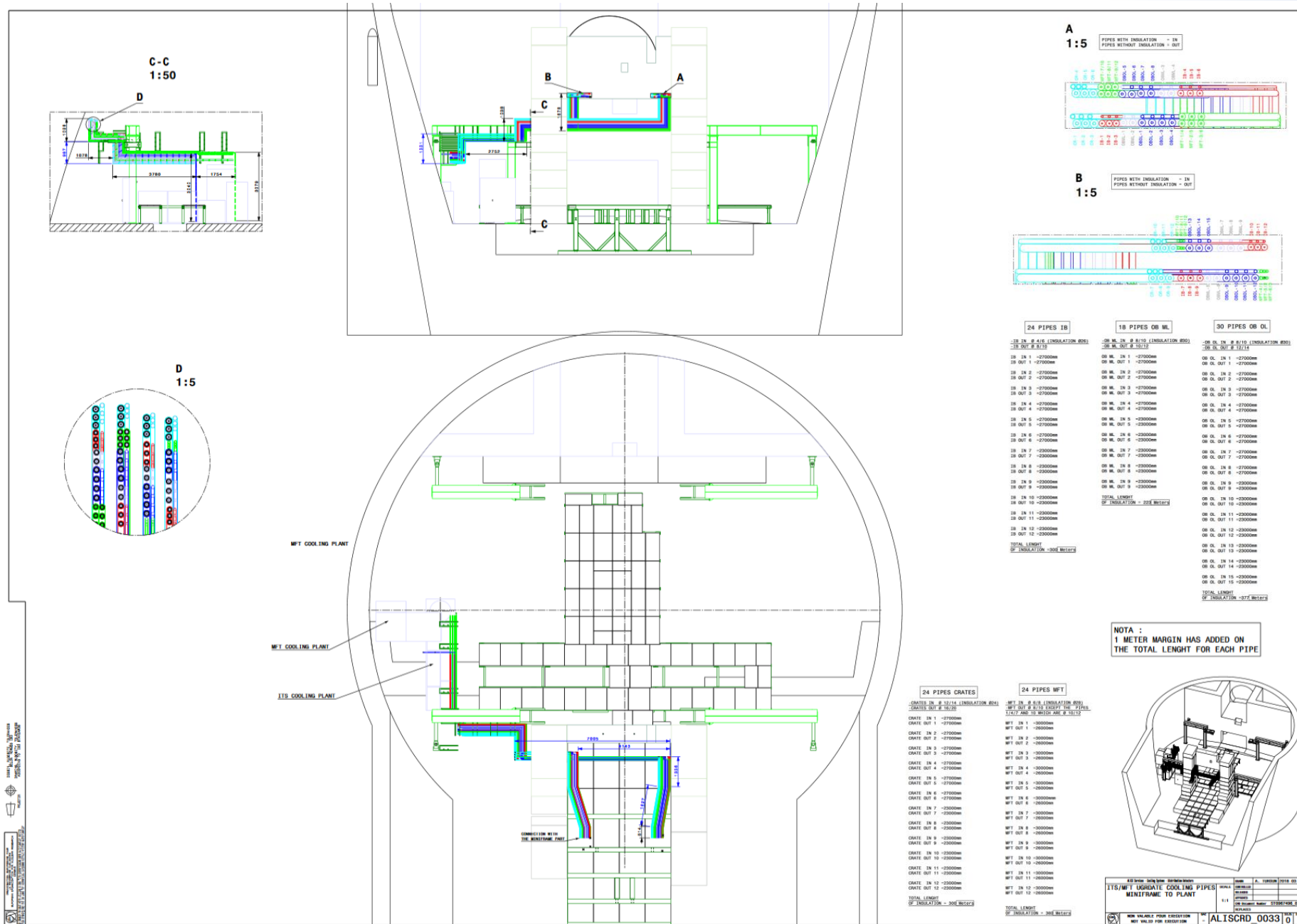
Water Cooling: Miniframe section details



- 24 pipes IB
 - IB IN: 4/6mm
 - IB OUT: 8/10mm
- 18 Pipes OB ML
 - OB ML IN: 8/10mm
 - OB ML OUT: 10/12mm
- 30 Pipes OB OL
 - OB OL IN: 8/10mm
 - OB OL OUT: 12/14mm
- 24 Pipes CRATE
 - CRATE IN: 12/14mm
 - CRATE OUT: 16/20mm



Water Cooling: PPO –plant section details



- 24 pipes IB
 - IB IN: 4/6mm
 - IB OUT: 8/10mm
- 18 Pipes OB ML
 - OB ML IN:8/10mm
 - OB ML OUT:10/12mm
- 30 Pipes OB OL
 - OB OL IN:8/10mm
 - OB OL OUT:12/14mm
- 24 Pipes CRATE
 - CRATE IN:12/14mm
 - CRATE OUT:16/20mm