

The logo consists of the letters 'C' and 'F' in a large, white, sans-serif font, positioned in the top-left corner of the slide. The 'C' is on the left and the 'F' is on the right, both partially overlapping the blue header bar and the server rack image on the left.

CF

Computing Facilities

CERN
IT
Department

CERN Computer Centre Upgrade Project

Wayne Salter

HEPiX November 2010

- Current status of CERN Computer Centre (CC)
 - Layout, powering and cooling
- Current issues and anomalies
- Aims of the upgrade project
- Proposed project
 - Layout, powering and cooling
- Project schedule and status
- Summary

- Designed and built in early 1970s
- Fully refurbished around 2000
 - Increased power and improved cooling
- Nominal current capacity: 2.5MW (including 240kW of critical power)
- Extended (usable) capacity: 2.9MW (including 340kW of critical power) forfeiting redundancy for all UPS systems
- On-going project to:
 - Increase the nominal capacity to 3.5MW/600kW with N+1 redundancy
 - Address some issues/anomalies

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Main Computer Room

CERN IT
Department



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CERN Computer Centre Upgrade Project - HEPiX November 2010 - 4



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Cold aisle is cold!

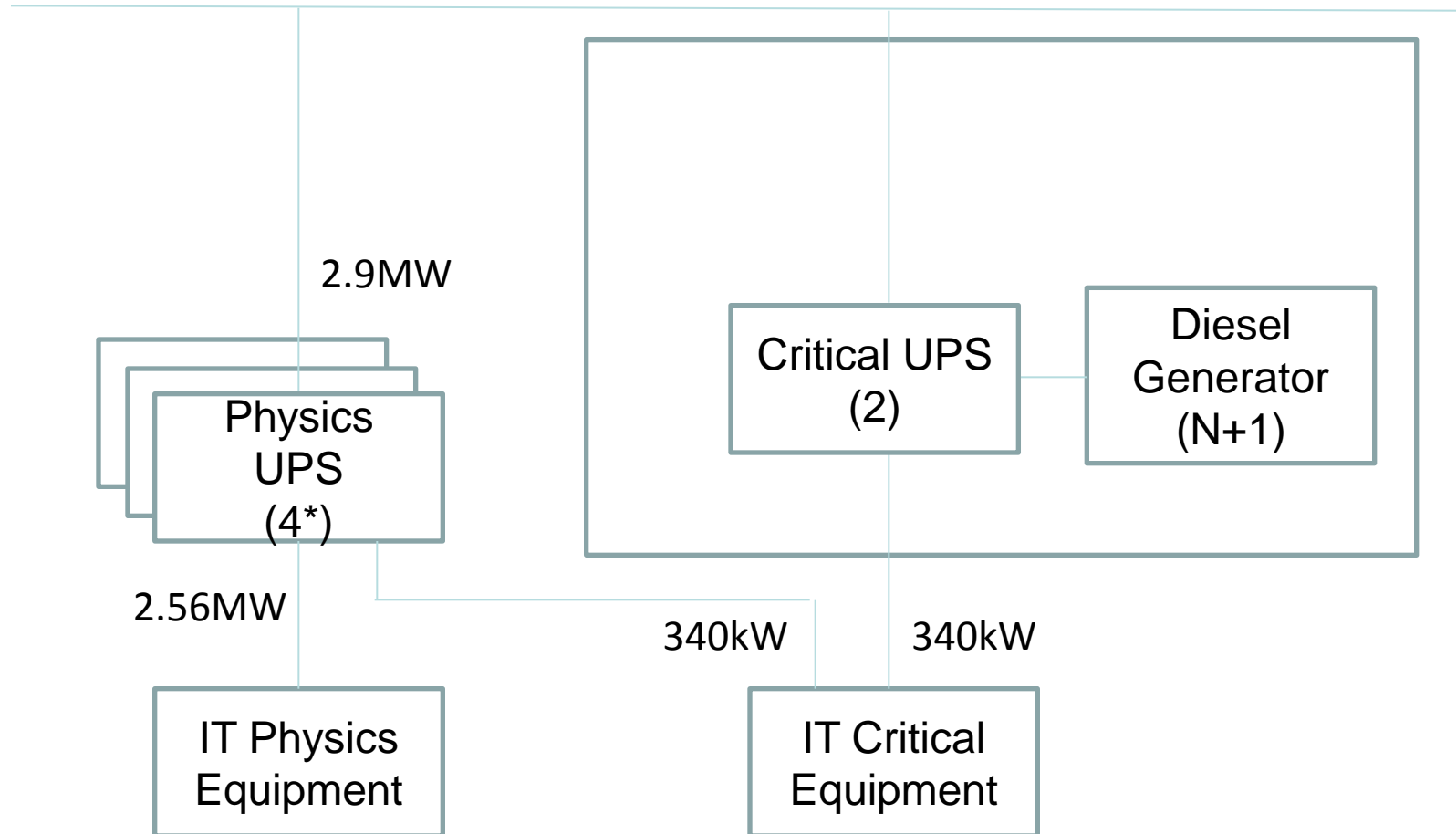


- Main computer room (1600m²)
 - Air cooled racks
 - ~1.9MW
- ‘Vault’ (1400m²)
 - Mixture of air cooled and water cooled racks + tape robots
 - ~640kW
- Room for back up data in separate building (200m²)
 - Mainly tape robots with air cooling
 - ~ 30kW
- Two Telecoms rooms
 - CERN Internet Exchange Point (CIXP) ~ 10kW
- Two types of equipment both on UPS
 - Physics with a single power feed but no diesel backup
 - Critical with dual power feeds and diesel backup

- 3 physics UPS, each with 4*400kVA modules + 1 critical UPS with 2*300kVA modules
- Air cooled installations:
 - IT & Telecoms equipment (capacity up to ~2.5MW), technical areas (mainly UPS rooms)... **and offices**
 - (3+1) Chillers not secured by UPS nor diesel
 - Pumps and AHUs secured by diesel **but not UPS**
 - Water-tank for stored cooling capacity (**a few mins**)
- Water cooled installations:
 - For IT (physics) equipment (capacity up to 800kW)
 - (1+1) Chillers not secured by UPS nor diesel
 - Pumps secured by (physics) UPS
 - Water-tank for stored cooling capacity (~10 mins)

- Cooling for critical UPS room insufficient
- Mixing of critical and physics equipment
 - Location and cooling
- No cooling of CC when running on UPS and insufficient stored cooling capacity when on diesel
- Insufficient critical power available
- Approaching the limit of available power for the building
- No redundancy for critical UPS
- Usage of full 'available' 2.9MW implies loss of redundancy for physics UPS
- A/C of CC coupled to adjacent office building

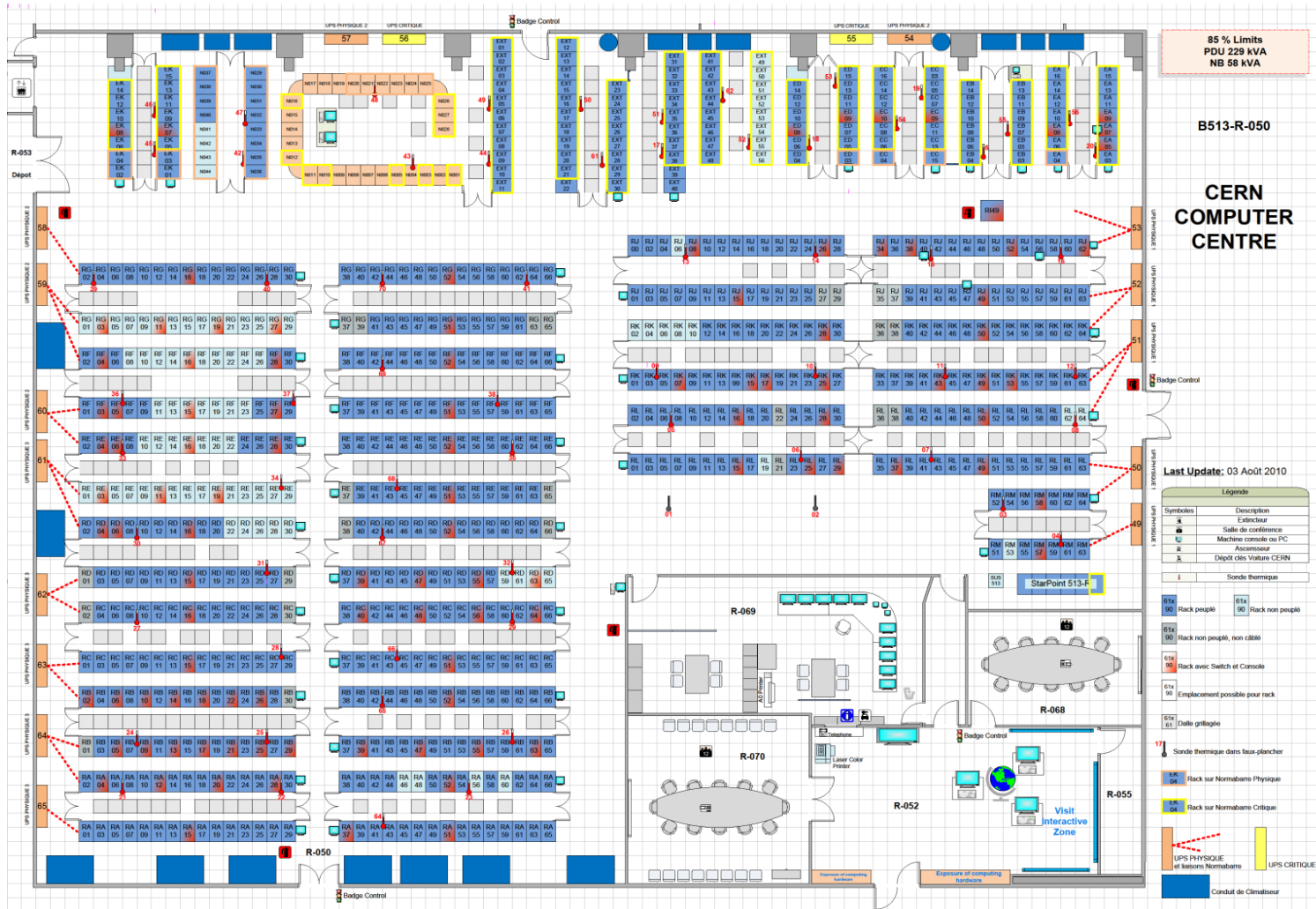
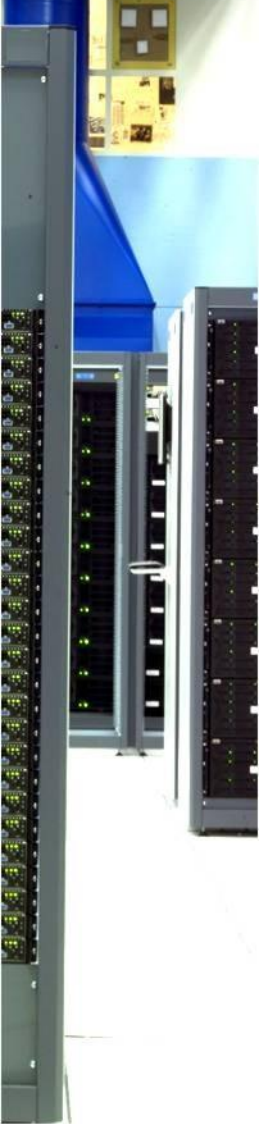
Normal Network

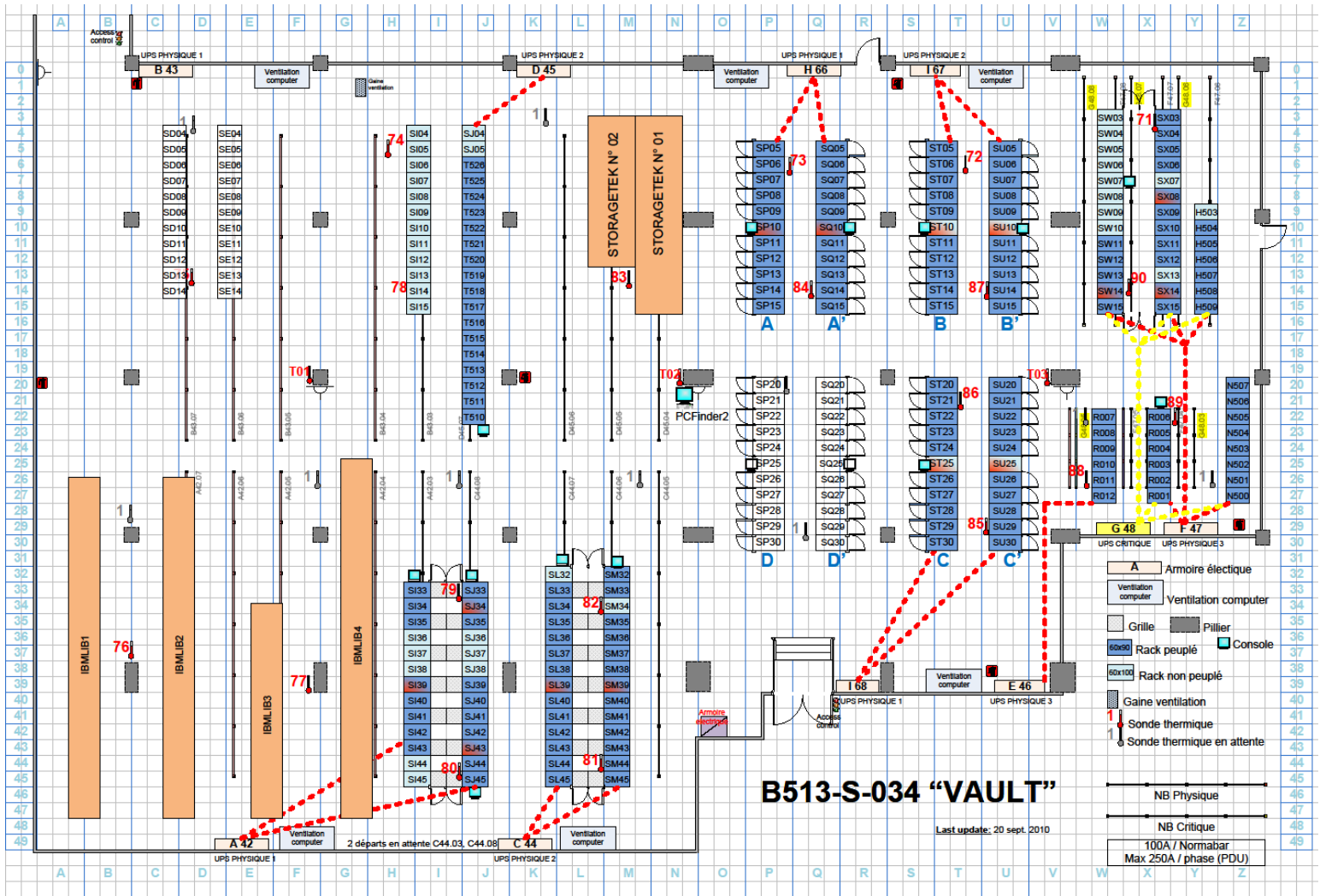


*N+1 redundancy sacrificed to achieve 2.9MW

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Main Computer Room





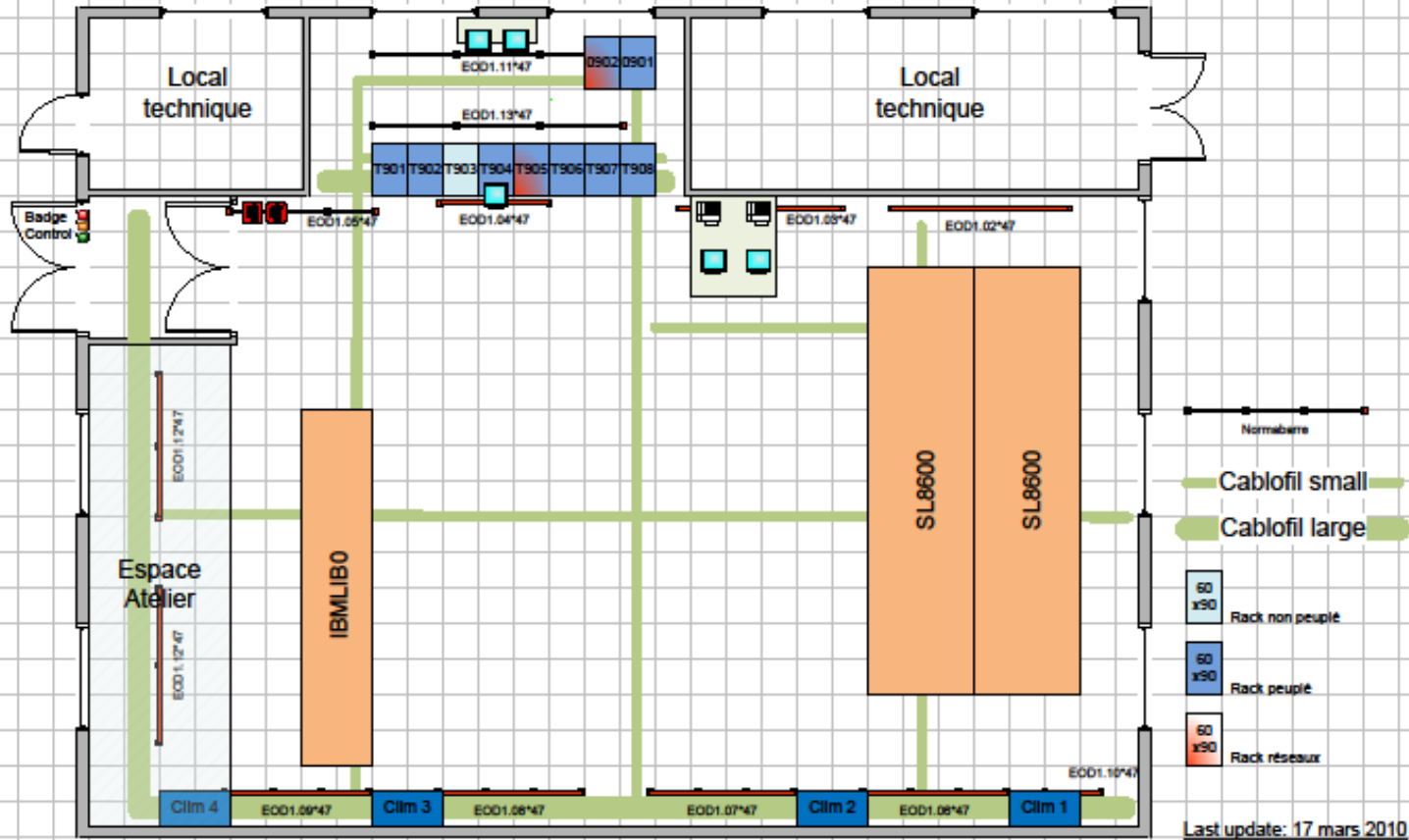
B513-S-034 "VAULT"

Last update: 20 sept. 2010



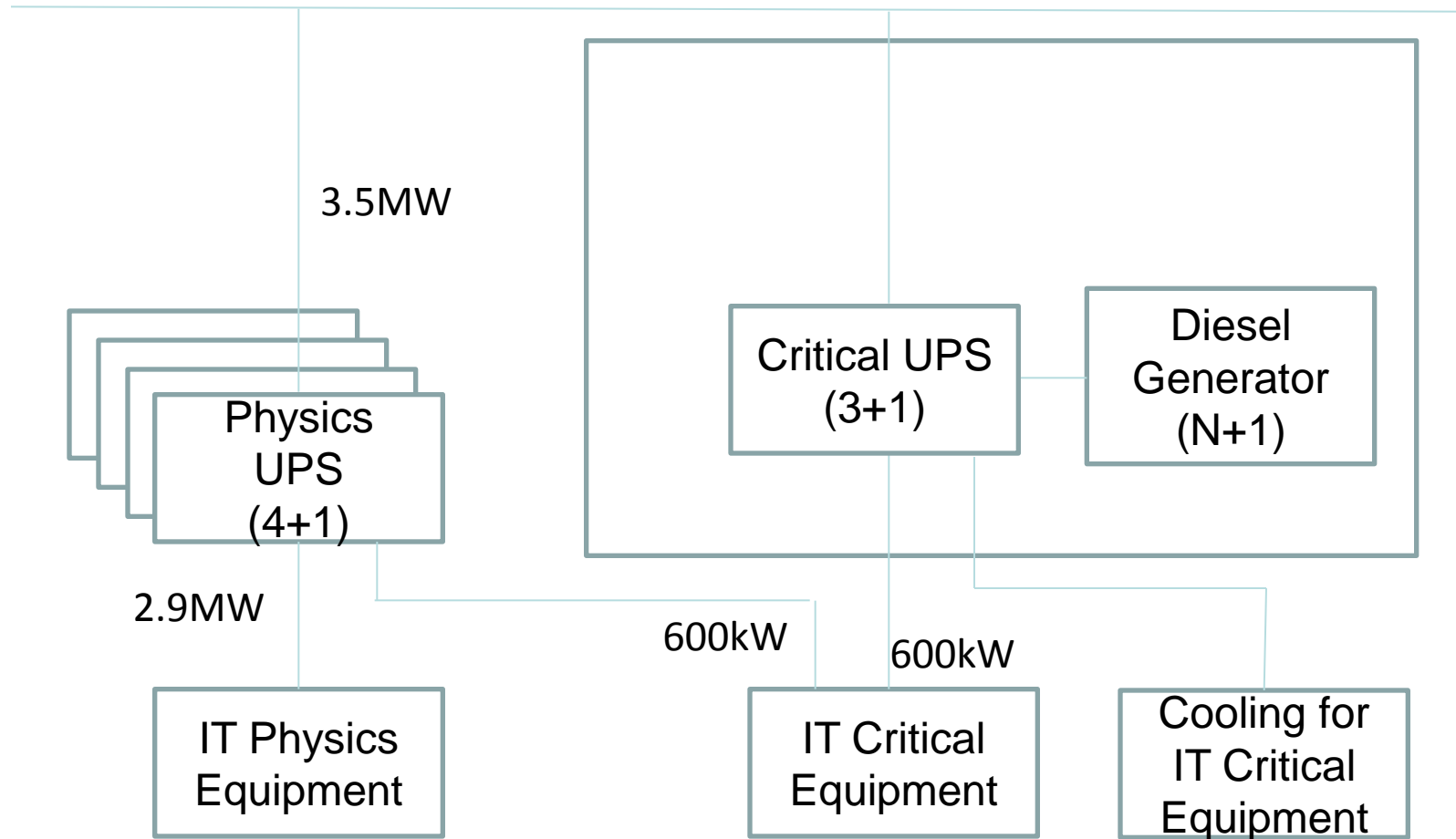


B613-R-001

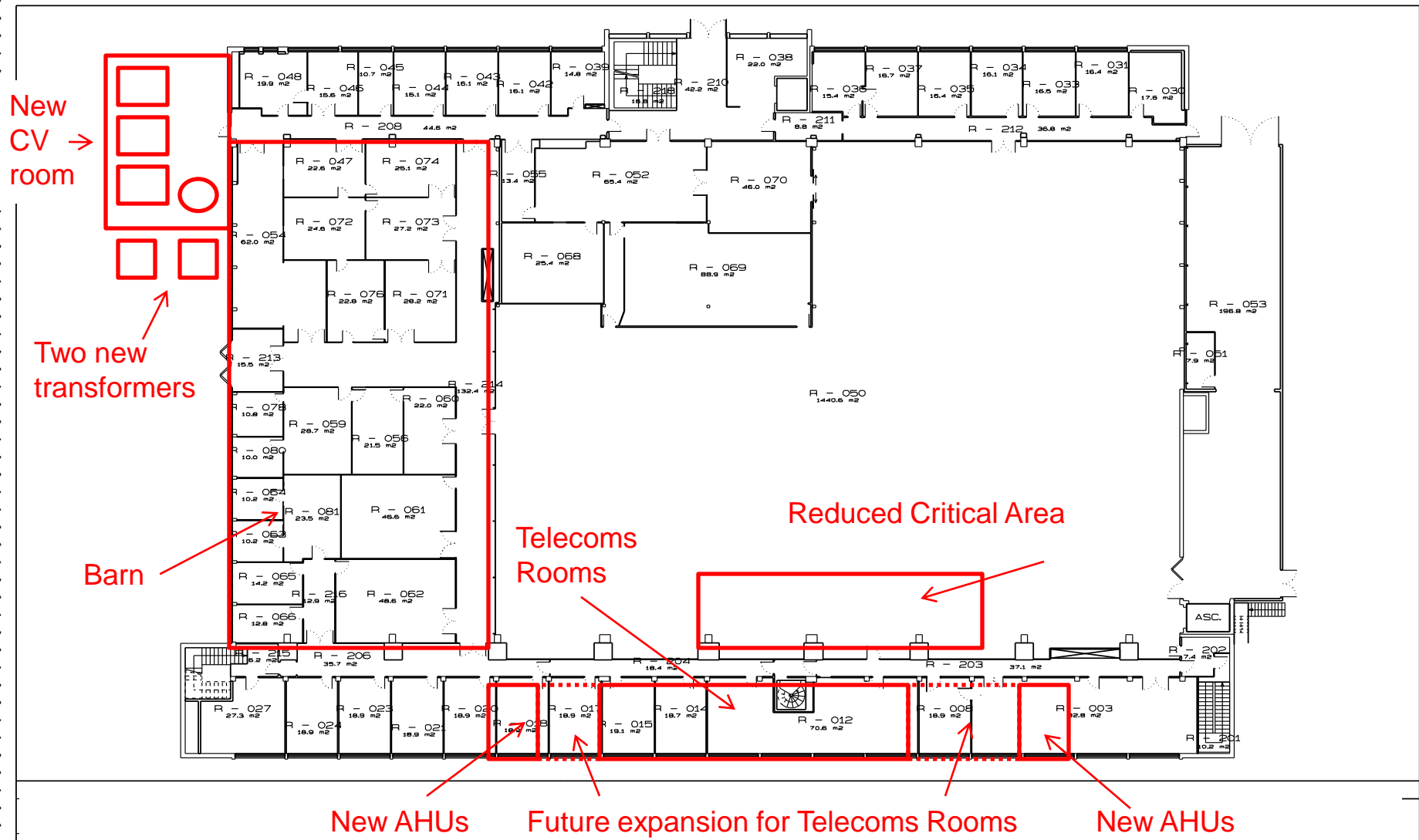


- Solve the cooling issue for the critical UPS room
 - New UPS systems in a different location
- Increase critical UPS capacity to 600kW
- Increase overall power capacity to 3.5MW
- Restore N+1 redundancy for both critical and physics UPS systems
- Secure cooling for critical equipment when running on UPS and extend stored cooling capacity for physics when on diesel
- Decouple the A/C for CC from the adjacent office building

Normal Network

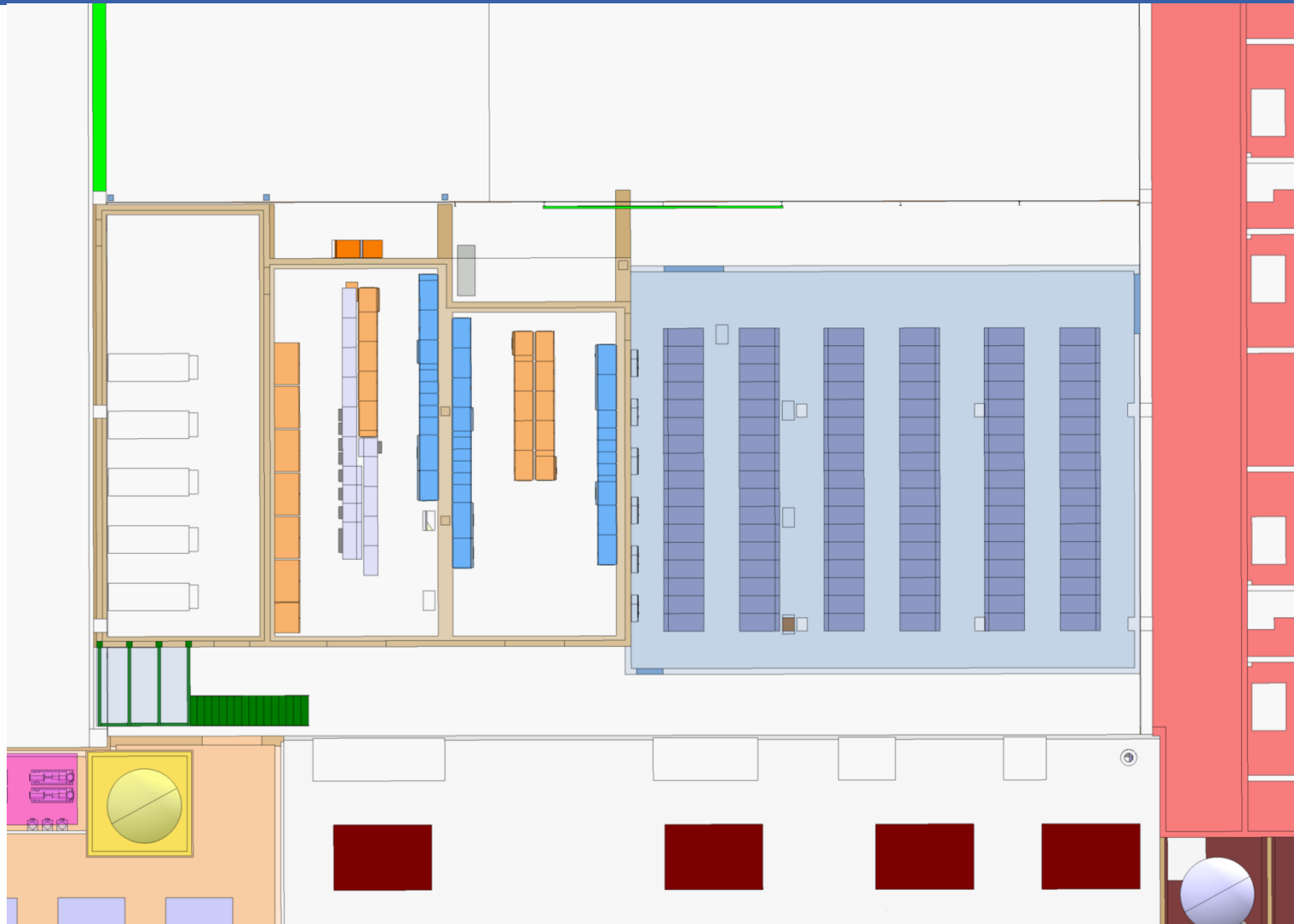


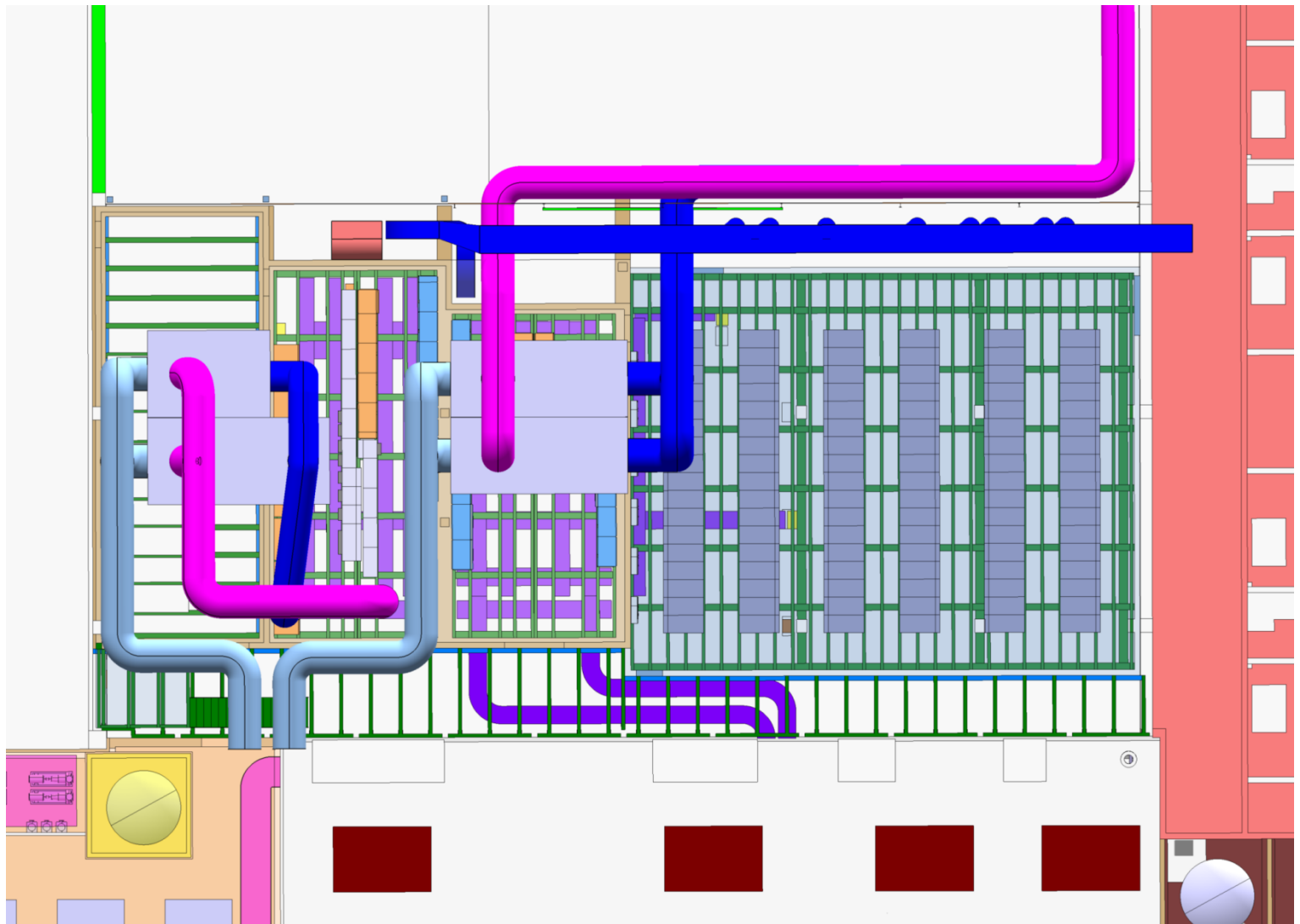
- Barn area of CC building to be converted to house:
 - 3 Electrical rooms
 - An IT room with water cooled racks to house critical equipment (up to 450kW)
 - New ventilation systems for the critical area of the main computer room
- New ventilation systems for the Telecoms rooms will be installed in adjacent offices
- A new partially sunken building for additional chillers and a storage tank for the cooling of the critical areas
- An additional storage tank for extending the stored cooling capacity for physics equipment



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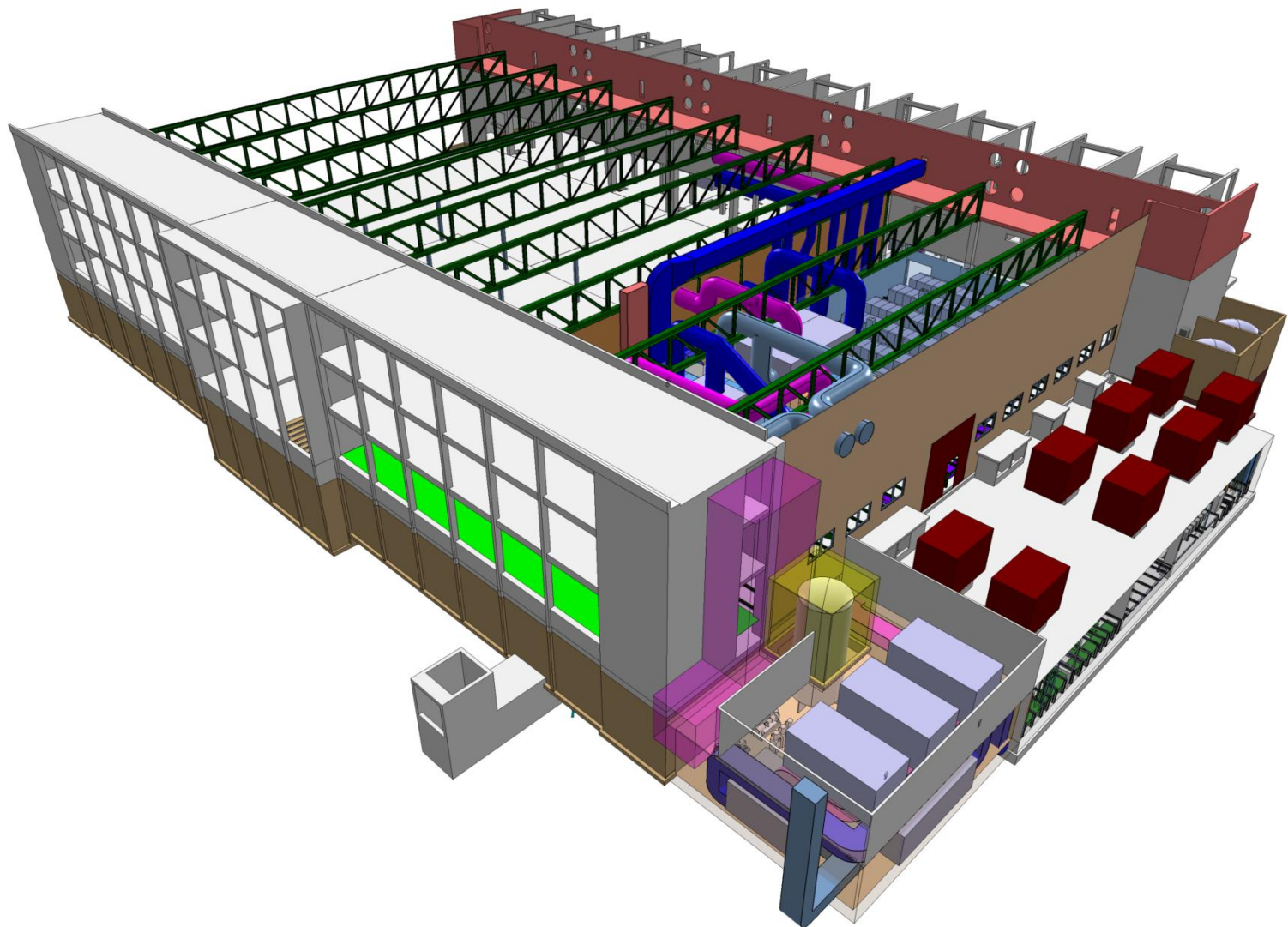
Layout - I

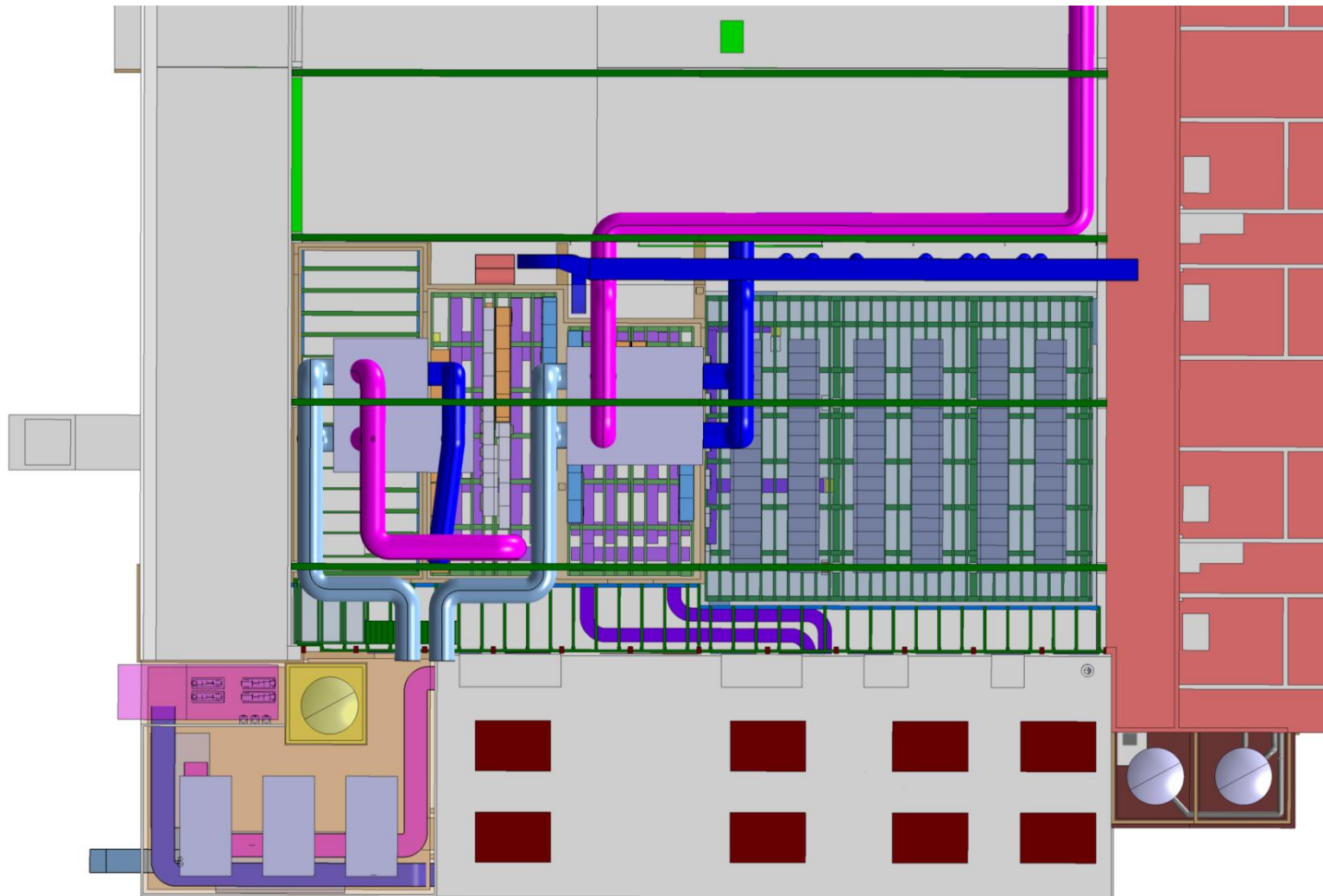




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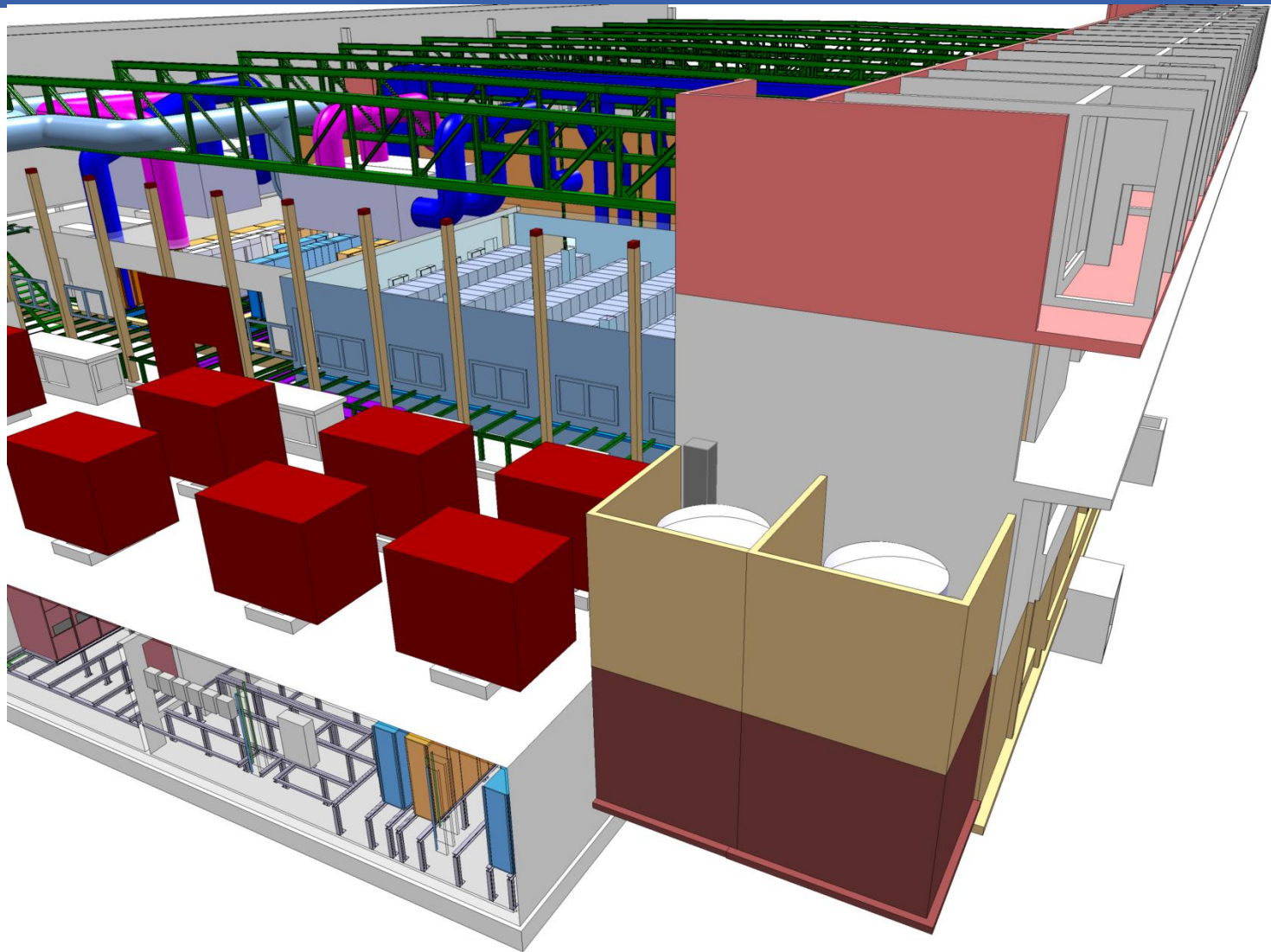
Layout - III





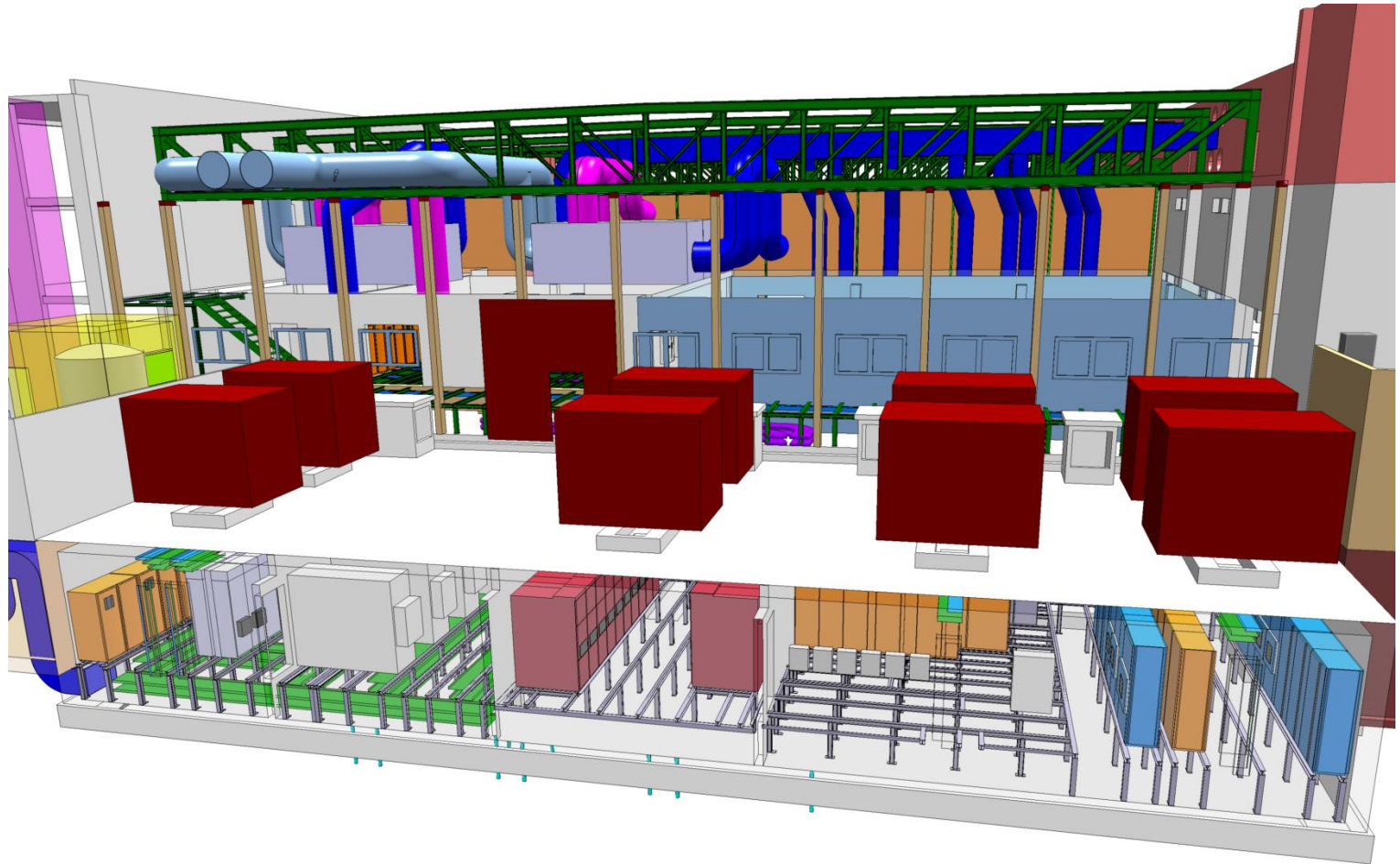
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Layout - V



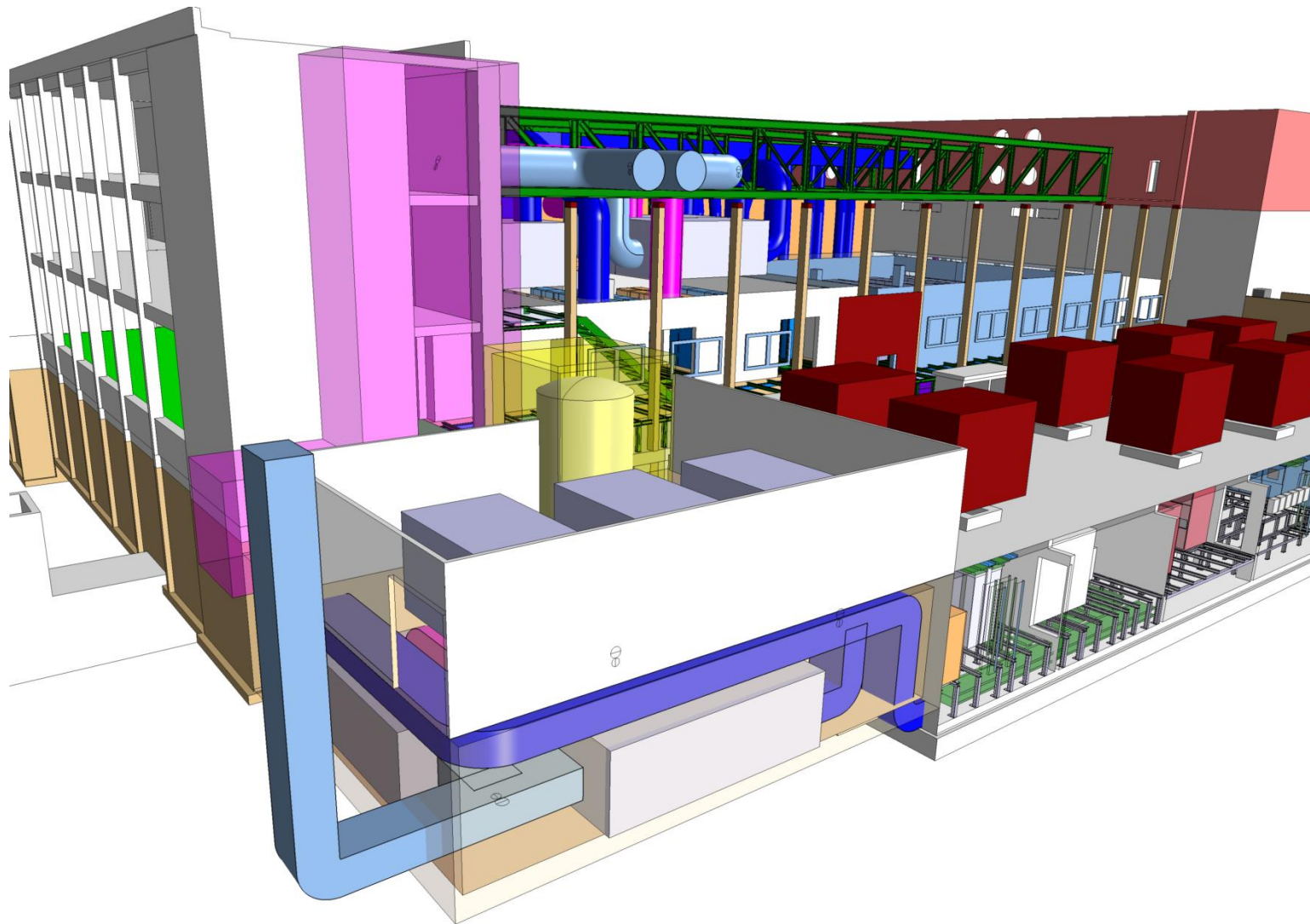
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Layout - VI



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Layout - VII



- All Market Surveys already launched
- RFPs in process of being released
- 'Barn' cleared of IT equipment end of October
- 'Barn' to be cleared of electrical and other installations end of 2010
- Adjudication of contracts at March FC
- CE works to be completed July 2011
- EL+CV installations Aug/2011-May/2012
- Increased physics power available March 2012 and increased critical power June 2012

- CERN CC was not designed for today's IT equipment
- Major upgrade already performed in 2000
- Further upgrade in progress:
 - To maximize the capacity of the CC
 - To resolve some outstanding issues
- Increased capacity to be available mid-2012
- Last increase in capacity foreseen with today's technology
- Other solutions will be required for any future increases in required computing capacity