

HI-ECN3.



HI-ECN3 WP4 coordination meeting #8

Jean-Louis GRENARD

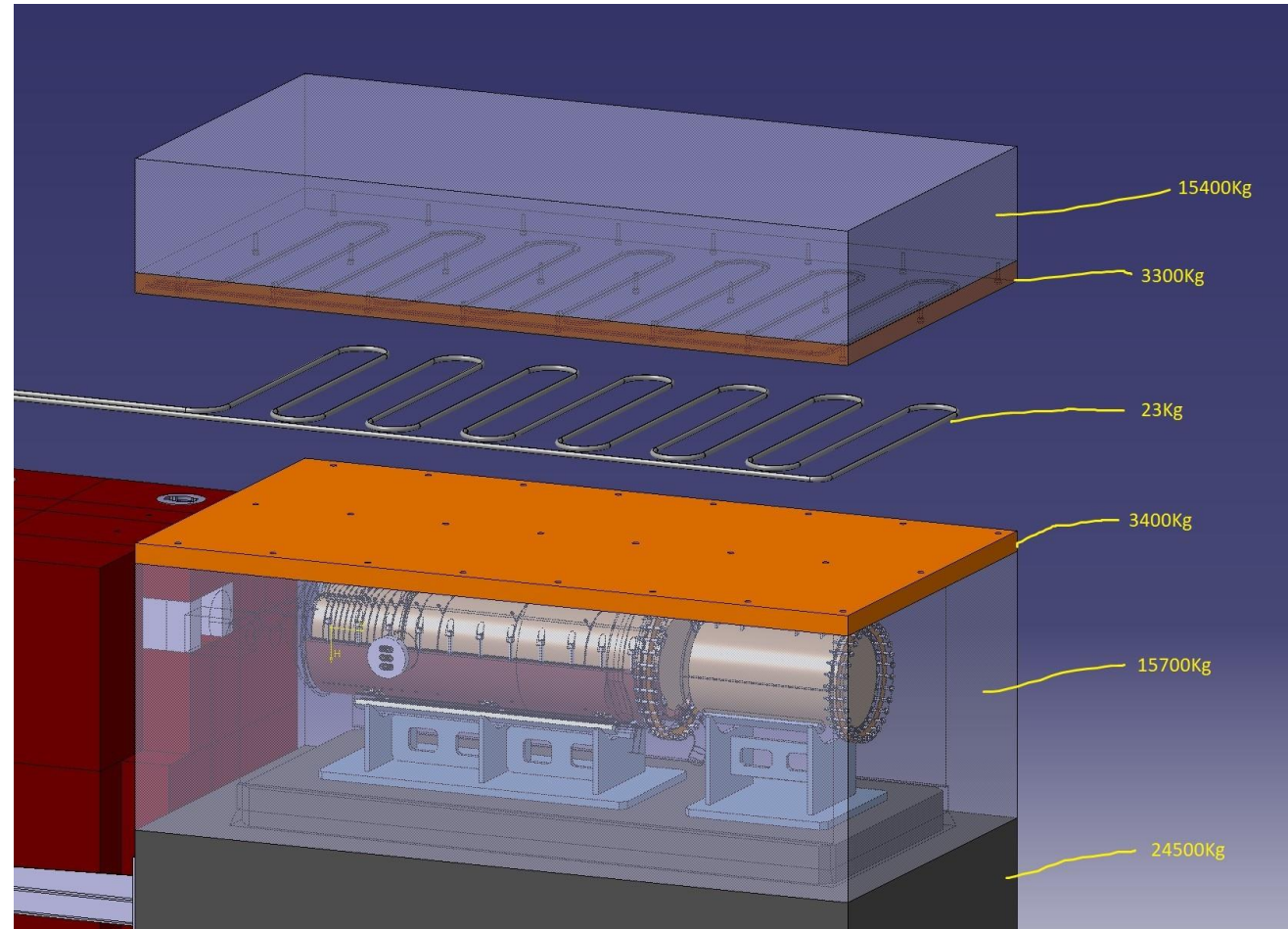
29-1-2025

Agenda

- **Target station updates → Gemma**
- **Target complex building**
- **Target cooling systems → Nikola/ Francesco**
- **Robotic tasks and associated infrastructure requirements → Sergio**
- **Handling studies update → Cristina**
- **P42 and SHiP layout → Beatriz & Pablo**
- **AOB**

Target station updates - Proximity shielding

- Proximity shielding cooling tentative design
- Cu cooling plate attached to the upper block
- Heat to be extracted from the total mass $\sim 10(-20)$ kW
- Helium cooling (baseline)
- Thermomechanical assessment launched



Target station updates - Shielding

Shielding inventory completed

- As expected, we have the blocks (Cast iron and concrete)
 - <https://edms.cern.ch/document/3185264/1>
 - Evaluation made across different projects (BDF, P42 dump, IBDRS)
- Discussion with BE-EA to organized they will cross check our needs taking in consideration the full picture for the shielding blocks @ CERN
- Need discussion with HSE-RP to set the acceptable dose rate we could accept for reuse (manipulation purpose)
- Preliminary seismic assessment of target station shielding will be launched with HSE

Target station updates – Hadron stopper coil

FS spec drafted

Preliminary TE-MS-C feedback:

- Not in favour of gaseous cooling prefer water → demi water cooling circuit as for other magnets → EN-CV need to check → status?
 - Could be good simplification need to be study
 - We will find a solution to manage potential water leaks
- Coil redundancy could be aimed to ensure reliability
- Type of conductors: **Cu with organic insulation** (Al with non-organic insulation most likely discarded)
- **Optimization of the hadron stopper length ongoing (RP + physic performances)**

Target area - Fire risk assessment

Preliminary discussion with FIRIA team and WP6

- Update of combustibles volumes and associated location in the target area (crane festoon volume)
- Volume of combustibles in the adjacent areas (ECN3, technical gallery, upstream part of TCC8) to be investigated
- We will update hadron stopper coil insulating material in the coming weeks
- Hadron stopper coil insulation could be made of same type of material as other normal conducting magnets
- <https://cernbox.cern.ch/files/spaces/eos/project/h/hi-ecn3/WP4%20-%20Target%20Complex/Safety/Polymer%20volume/polymer%20inventory%20target%20area.xls>
X
- Fire safety concept for service building : <https://edms.cern.ch/document/3214094/0.1>

Target complex building

- Draft identification of flows for personnel and material (Melania) to be updated
- Definition of crane and associated crane coverage and volume (Cristina/Roberto)
- Need to have the cooling station room(s) as part of a sector linked to the machine access system? → discussion on going with AA and WP6 **but in term of space we will reserve the space for a PAD/MAD**
- Installation volumes (crane, cooling systems) work in progress → Cristina talk
- **Building occupancy proposal & changing rooms requirement integrated in the design parameter table**

Target complex building

New revision:

Internal CE for service cell area out of CE scope

Overall building footprint optimized

Length: 56m → 47m

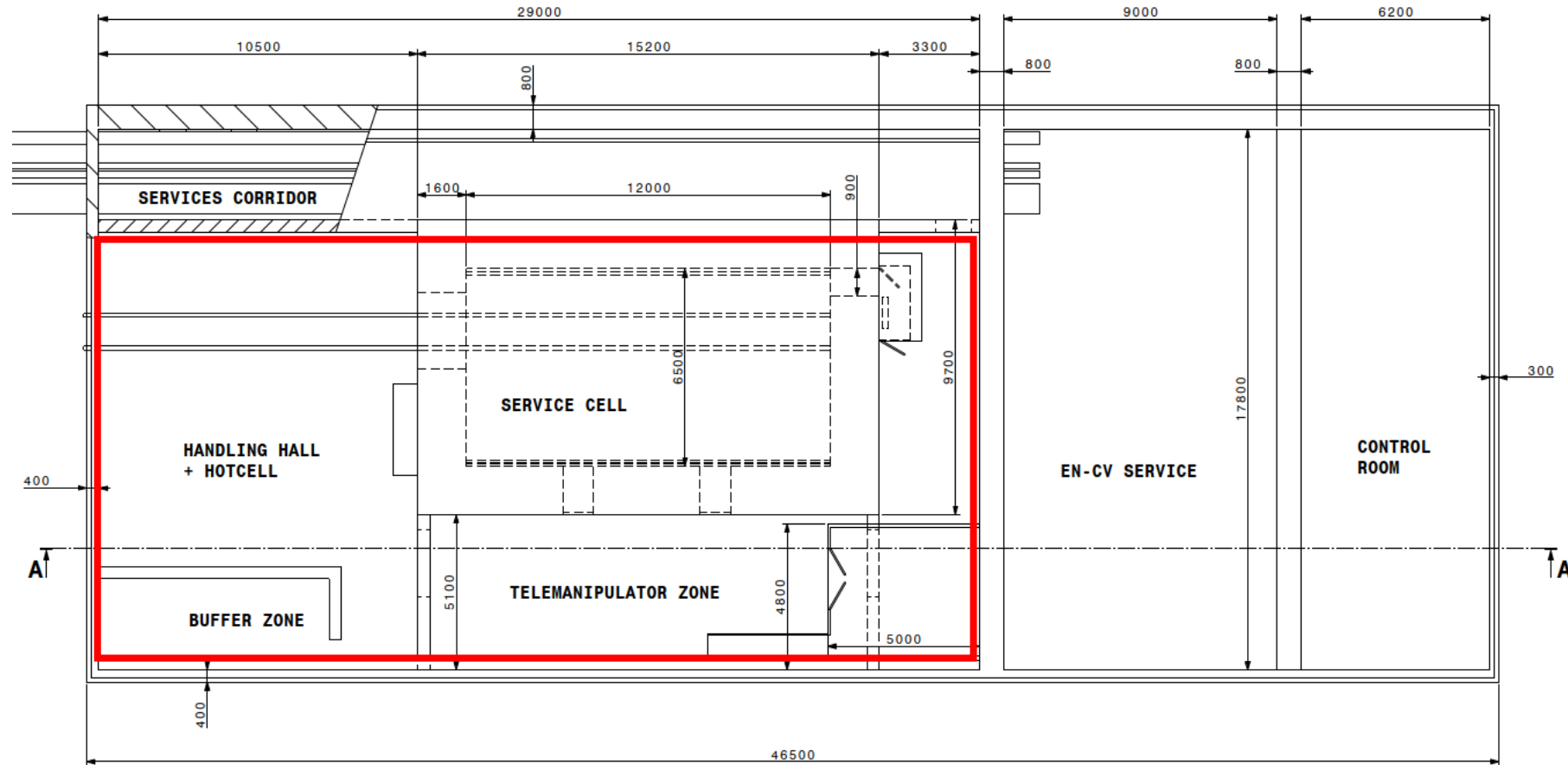
Width: 21m → 19m

1176m² → 900m²

We stay below the previous footprint

New layout drawing:

https://indico.cern.ch/event/1484391/contributions/6255487/attachments/2984484/5255940/2024-11-28__BDF-BUILDING-754_v10.pdf



Target complex building - Service cell justification

Endorsed by NA-CONS and HI-ECN3 and RWMP steering boards

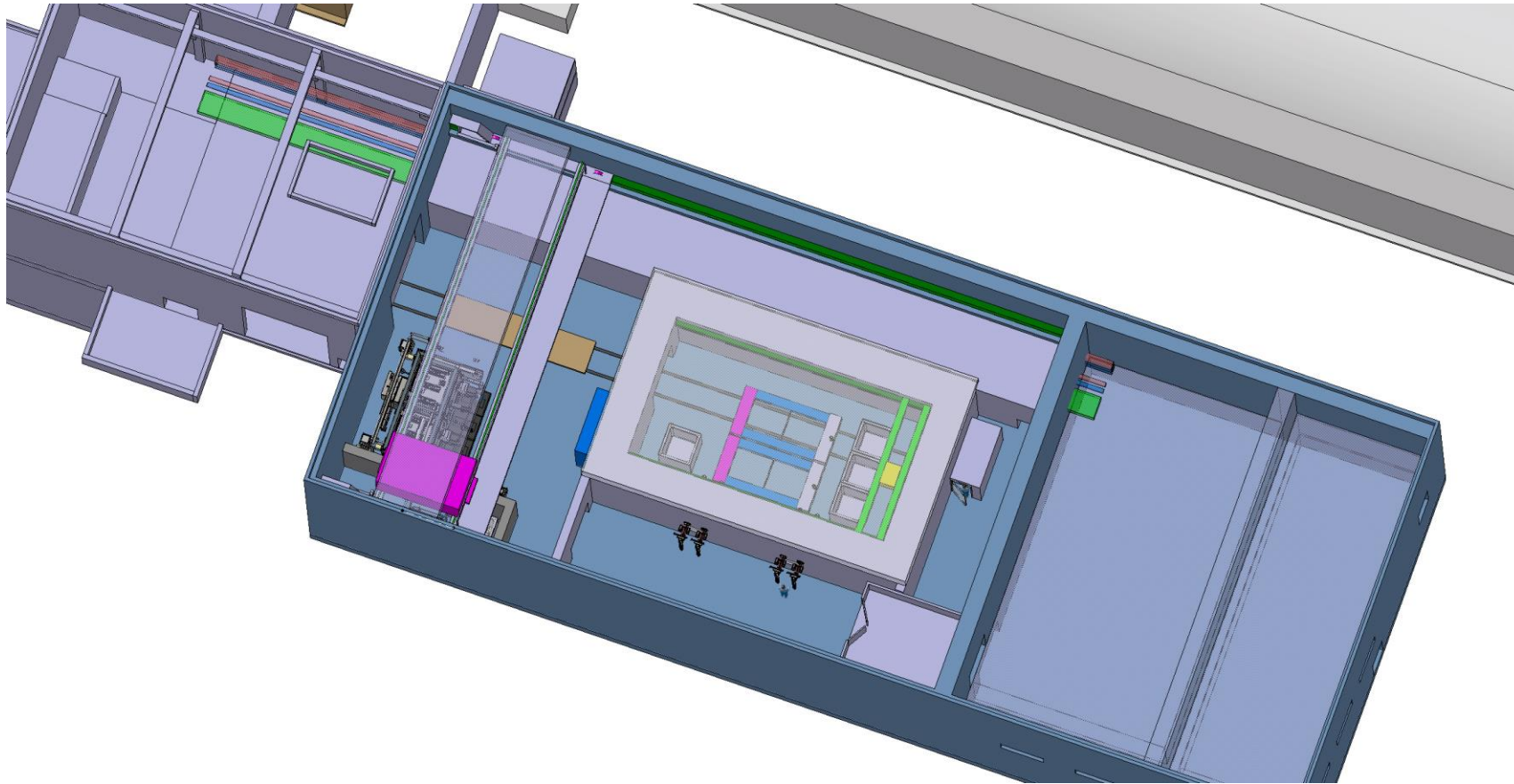
Justification can be found here:

<https://edms.cern.ch/document/3203029/0.1>

Design and process study contract to be place

- Develop further the design of the service cell
 - Develop the processes associated to the cell
- Deliverables end 2025

Target complex building - Service cell size



Designed around the hadron stopper coil (largest object) requirement for final disposal

Entrance of large equipment via a side shielded door

Final assessment of the service cell space in the coming weeks

Tentative floor load capacity in the service cell area 16t/m^2 (driven by the cell walls) → impact on the CE structure

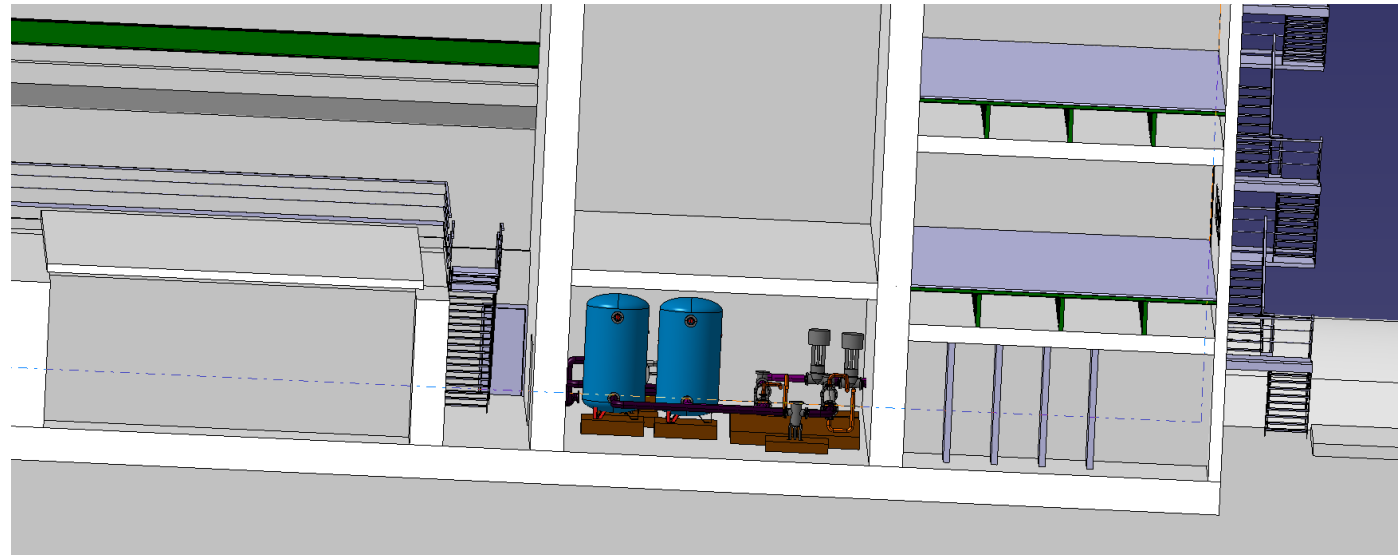
Target complex building – Cooling and ventilation size

Ground floor cooling room: $9 \times 15,5=139,5\text{m}^2$

1rst floor ventilation room: $9 \times 17,8=160,2\text{m}^2$

Pending space feedback from EN-CV

Floor capacity $5\text{t}/\text{m}^2$? update?



Target complex building

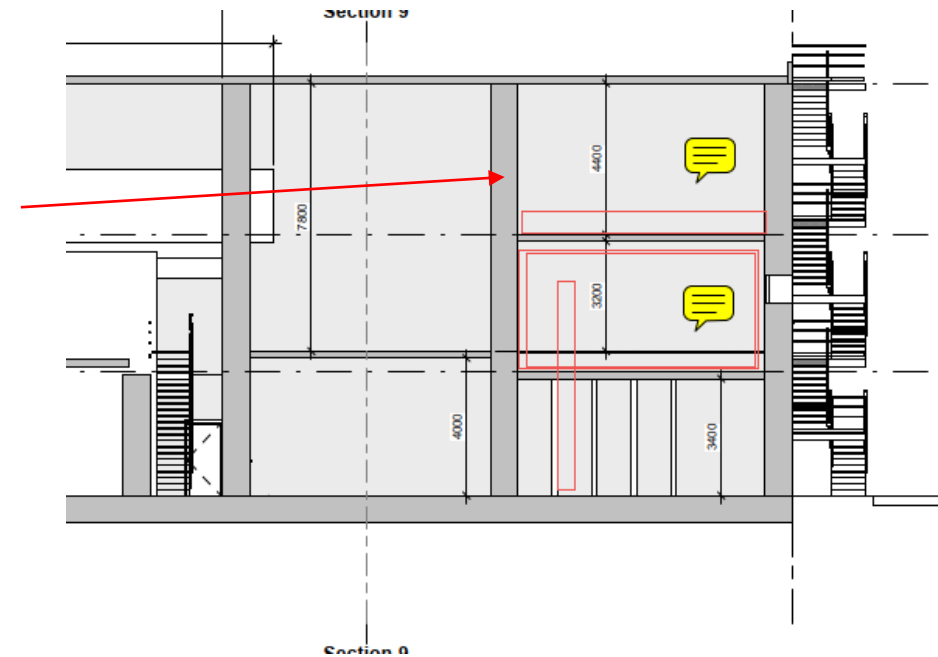
Needs in term of control racks - update:

- 1 RP monitoring
- 2 target control
- 1 IT network
- 1 beam instrumentation
- 1 access system
- 3 safety systems to be integrated in a "safe room"
- ~~1 machine protection (probably will be located in BA82 TBC)~~
- 1 spare
- Other needs?

80cm False floor to be considered

Size: $6 \times 17,8 = 106,8 \text{m}^2$

Floor capacity 250kg/m²?



Target complex building

Machine protection links

We need to define which system need to be connected to machine protection systems:

- Target cooling skid: temperature, flow, impurities in He?
- Target thermocouples
- RP monitors?
- **BLMs?**

→ Mike talk for tentative interlocks for the target

Else?

Target complex building

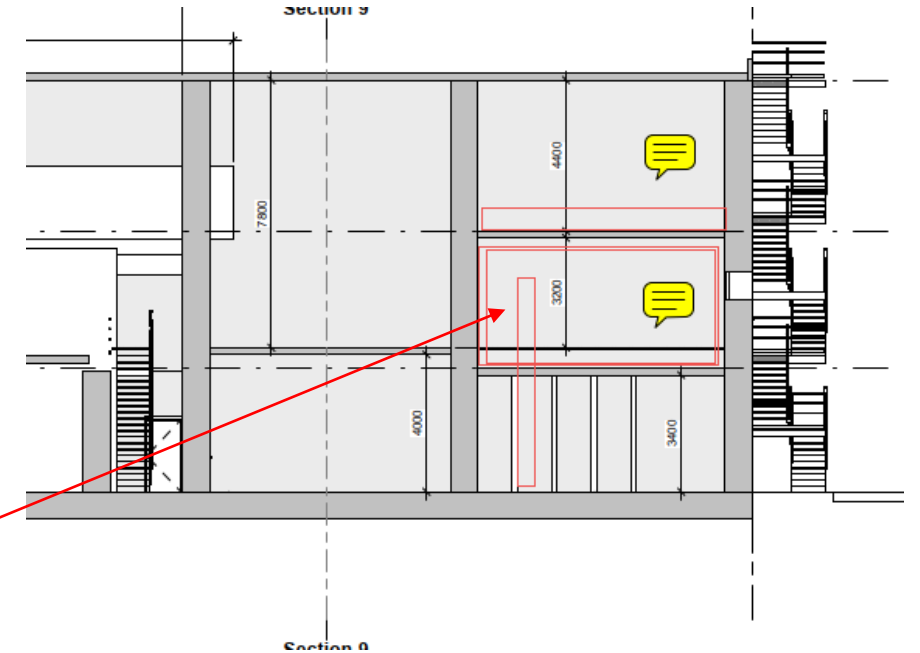
Power distribution

Need a preliminary power estimates:

- Crane(s) 60-80kW
- Cooling station ~150-200kW?
- Ventilation systems ~150-200kW?
- Service cell ~1kW
- Control racks ~2kW
- Primary vacuum pumps ~4kW
- Electrical distribution (sockets, lights)
- Else?

Main contributors

Update needed

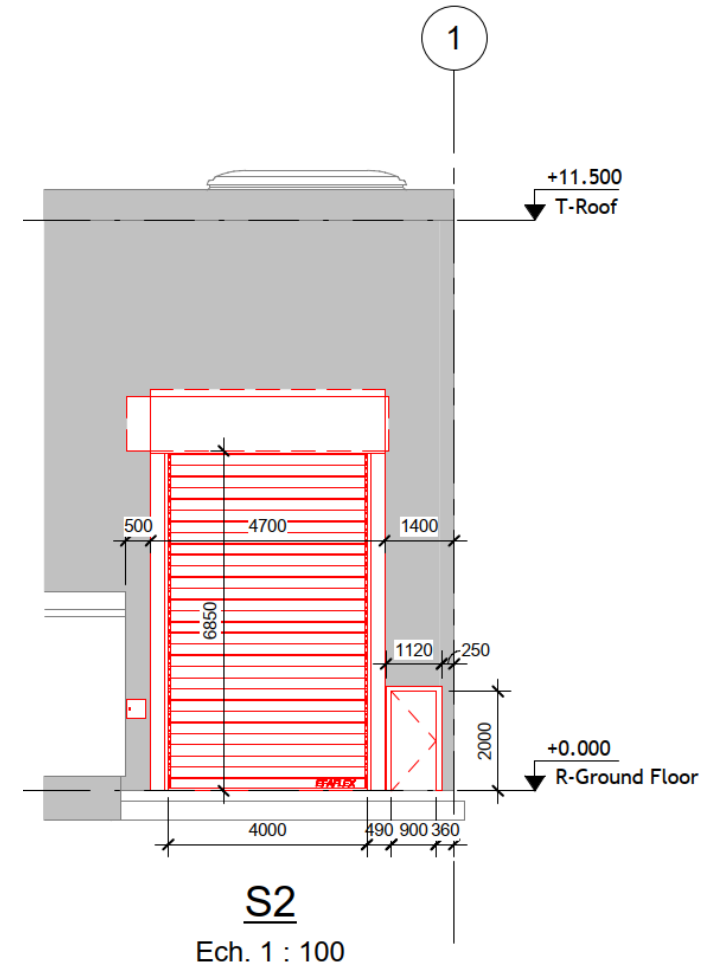


Secured network needs linked to failure modes:

- Target cooling accident maintenance case LOCA
- Building ventilation (keeping pressure cascades in case of black out)
- Power room at 1st floor

Target complex building – 911 modification

- Green light from different stakeholders
- SCE design office detail design completed included temporary rearrangement of the road in front of 911
- Presented en validated at ICEA : 6th December
- <https://indico.cern.ch/event/1485956/>
- ECR in circulation new version in preparation following comments (clarifications)
- <https://edms.cern.ch/document/3173295/0.1>
- Scheduling of activities ongoing (WP6)



BDF/SHiP Power converters

Slowly converging to a new baseline

- Joint effort between HI-ECN3 and NA-CONS
- Most likely no need to have PCs in/attached to the new target complex building
- Reusing existing PCs
- New Power Converters located in BA82
- **Final feedback mainly linked to demi water cooling capacity**

AOB

**Beam line / experiment skeleton definition → MADX file received
beamline skeleton to be built and integrate in 3d → Beatriz**

https://indico.cern.ch/event/1485956/contributions/6263857/attachments/2981845/5250382/P42Layout_ICEA_4.pptx

3d models organization → Beatriz

https://indico.cern.ch/event/1485956/contributions/6263889/attachments/2981849/5250390/3DOrganization_ICEA_4.pptx



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