BDF Target Complex WP planning

1st Beam Dump Facility (BDF) Targetry Systems Advisory Committee (TSAC)
4-6 March 2025 - CERN

Jean-Louis GRENARD - Gemma HUMPHREYS – CERN - SY-STI-TCD

with the contribution of all the members of HI-ECN3 WP4

Target station – TDR

Design

- **In house design**
  - General integration of the systems 2024-2026
  - Shielding arrangement 2024-2026
  - Target alignment interfaces 2025
- **Design contracts**
  - Chain action roller 2024
  - Push-pull chain mechanism 2024
  - Seals definition 2024-2025
  - Vacuum vessel design study 2025
  - He dismountable connections 2025
  - Feedthroughs 2025

R&D and prototyping

- Chain action rollers 2024-2025
- Seals qualification 2025
- He dismountable connections 2025-2026
- Potential friction less coatings 2024-2026
- Robotic operations validation 2025-2026

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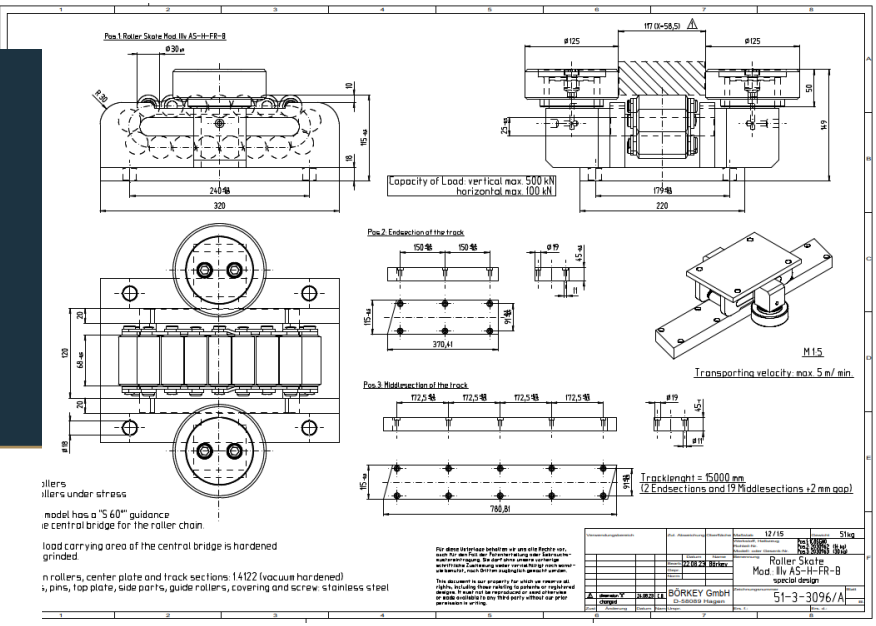
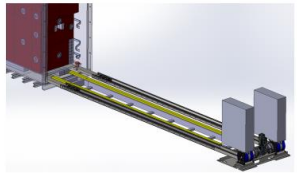


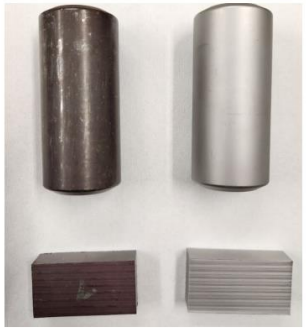
Projet trolley BDF

CHR-22904-EF01-0

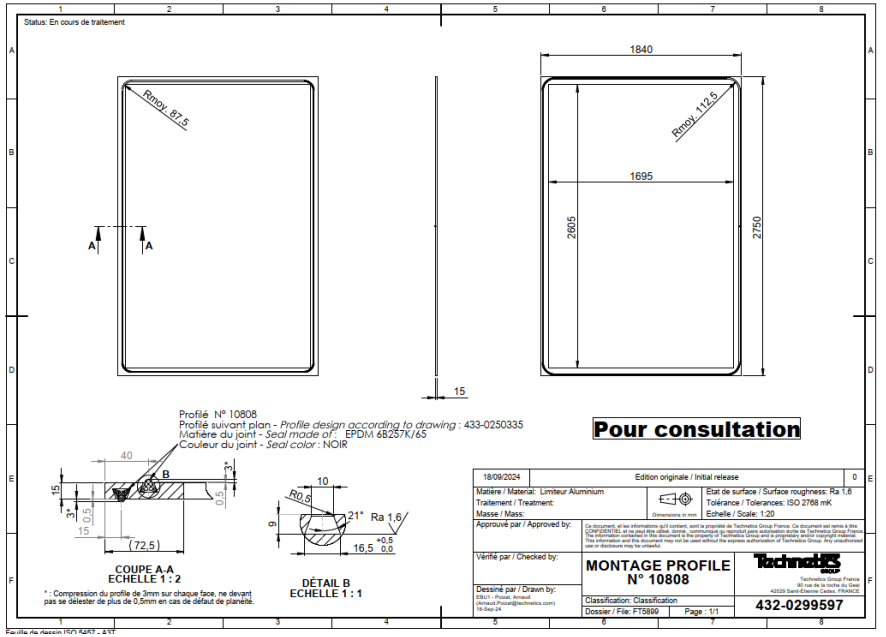
Etude de faisabilité



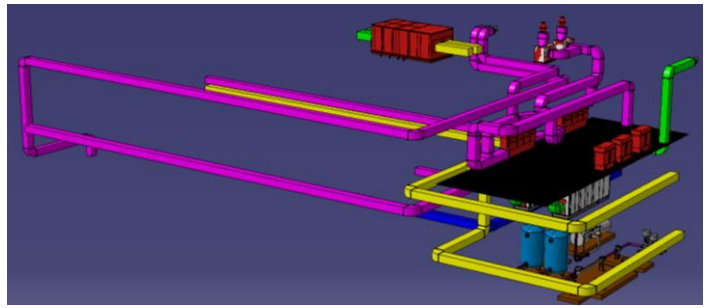
Chain rollers, uncoated Chain rollers, coated



Blocks, uncoated Blocks, coated



Target complex timeline – TDR



Design

- **In house design and specification**
  - Cooling and ventilation systems 2024-2026
  - General integration of the systems and utilities 2024-2026
  - Service cell 2025
  - TCC8 overhead travelling crane 2024-2025
- **Design contracts**
  - Service cell 2025

European Organization for Nuclear Research
Organisation européenne pour la recherche nucléaire

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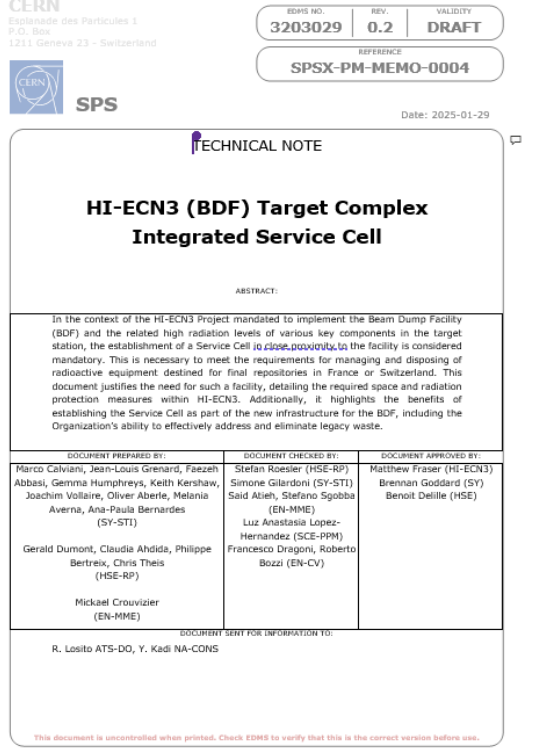
Invitation to Tender

Technical Specification

Replacement of the Electrical Overhead Travelling Crane in TCC8

Abstract

This Technical Specification concerns the replacement of the 30 tonnes Electrical Overhead Travelling crane in the TCC8 tunnel, in France.
The delivery is foreseen over 14 months from notification of award of the Contract.



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SPS

Date: 2025-01-29

TECHNICAL NOTE

HI-ECN3 (BDF) Target Complex Integrated Service Cell

ABSTRACT:

In the context of the HI-ECN3 Project mandated to implement the Beam Dump Facility (BDF) and the related high radiation levels of various key components in the target station, the establishment of a Service Cell in close proximity to the facility is considered mandatory. This is necessary to meet the requirements for managing and disposing of radioactive equipment destined for final repositories in France or Switzerland. This document justifies the need for such a facility, detailing the required space and radiation protection measures within HI-ECN3. Additionally, it highlights the benefits of establishing the Service Cell as part of the new infrastructure for the BDF, including the Organization's ability to effectively address and eliminate legacy waste.

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Supply

- TCC8 overhead travelling crane 2025-2026

Qualification of subsystems

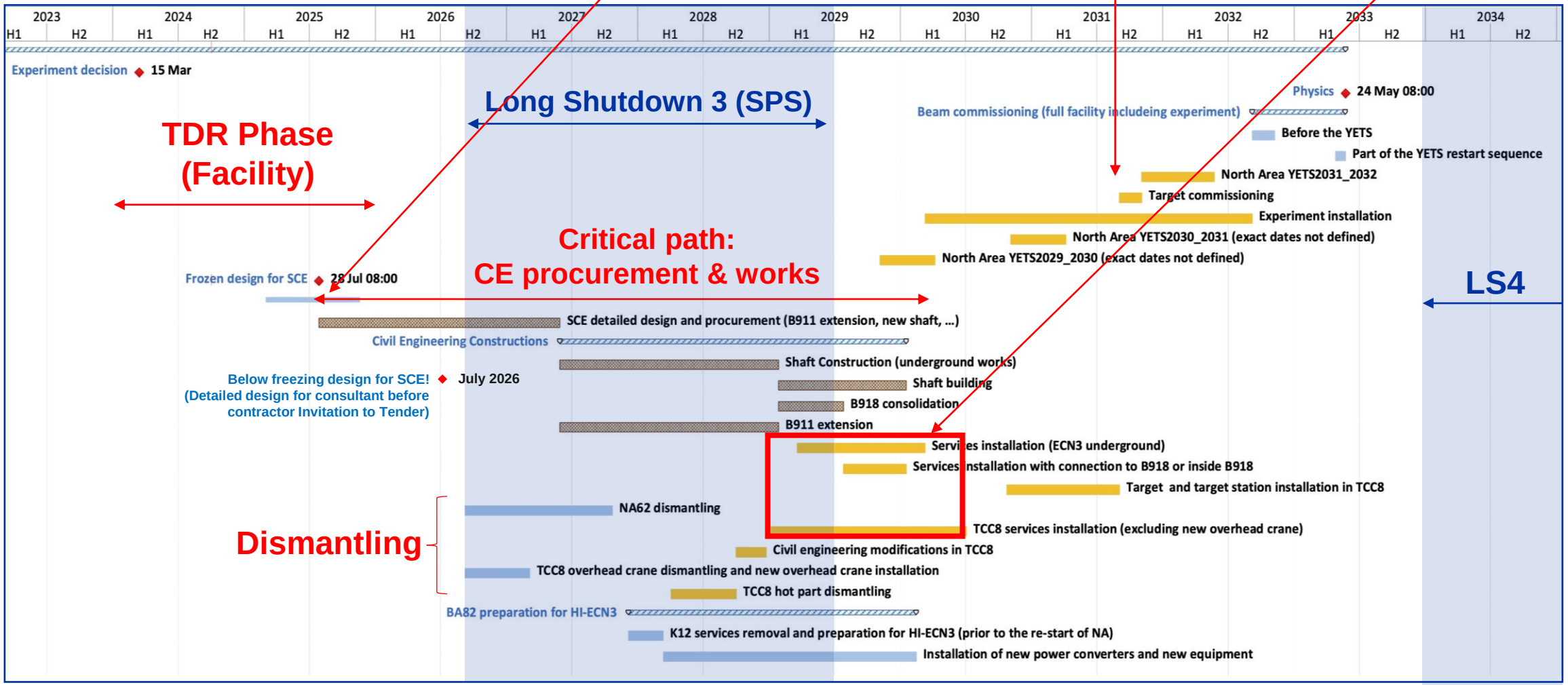
- Pre-assembly of the full target station and test campaign definition 2025-2026

Project Master Schedule

We need to profit of the installation of the utilities in the facility to anticipate subsystem commissioning ahead of installation

Building requirements need to be frozen

Beam on BDF Target

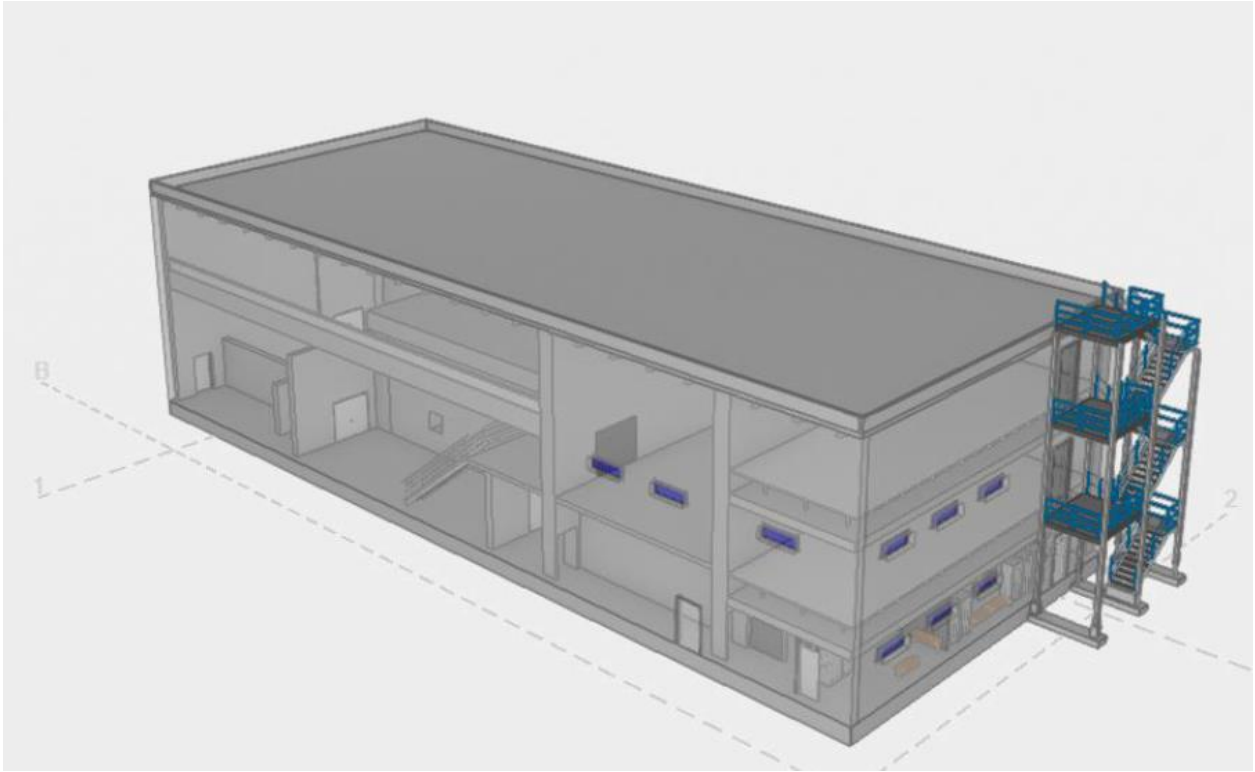


Items on the critical path and risks

Integration of the surface building needs to be frozen for launch of CE detail design study (by consultant) autumn 2025

How we mitigate the risk in term of building definitions:

- One of the main focus of 2024
- Civil engineering part of the integration process
- Iterative preliminary structural assessment by civil engineering as input for integration
- Service cell design completely decoupled from building structure (will be defined as a floor loading and space reservation)
- Cooling and ventilation rooms designed for most demanding scenario (He cooled target)



Target complex service building civil engineering BIM model

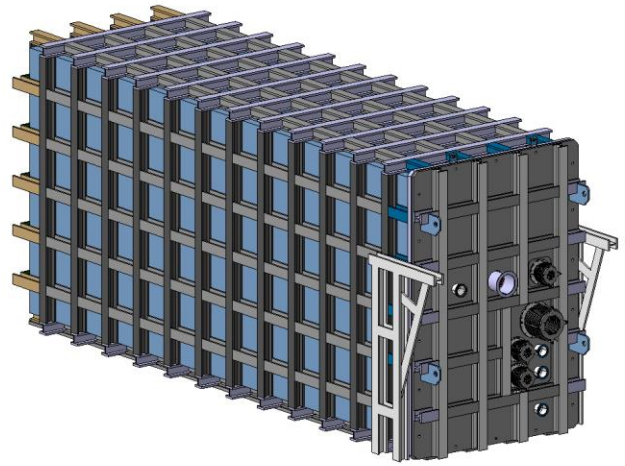
Items on the critical path and risks

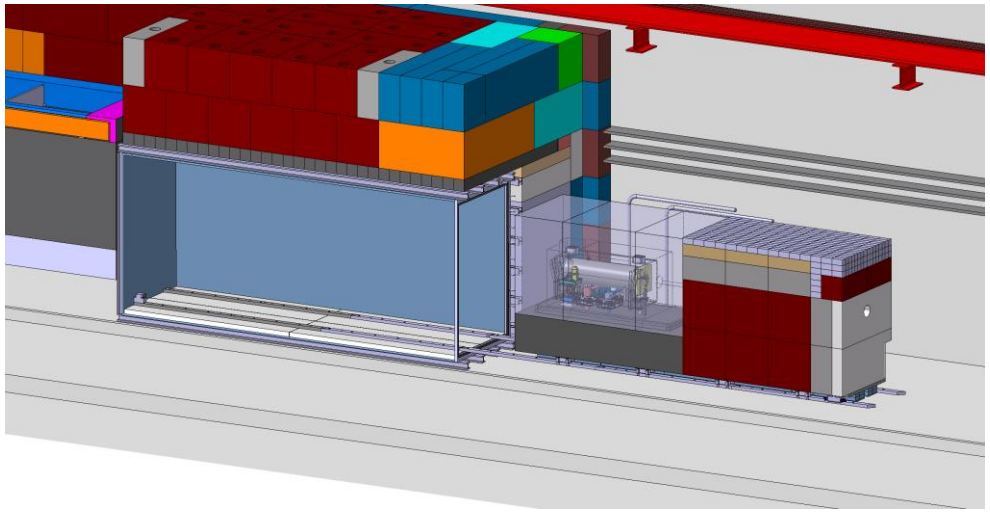
Target station systems

How we will anticipate commissioning of target systems:

- Vacuum vessel designed for full construction and validation at contractor premises
- Full scale pre-assembly of the system before final installation
- Full rehearsal of maintenance and recovery scenarios with the pre-assembly setup (will debug the different scenarios in parallel of area being prepared for final installation)

2028-2030

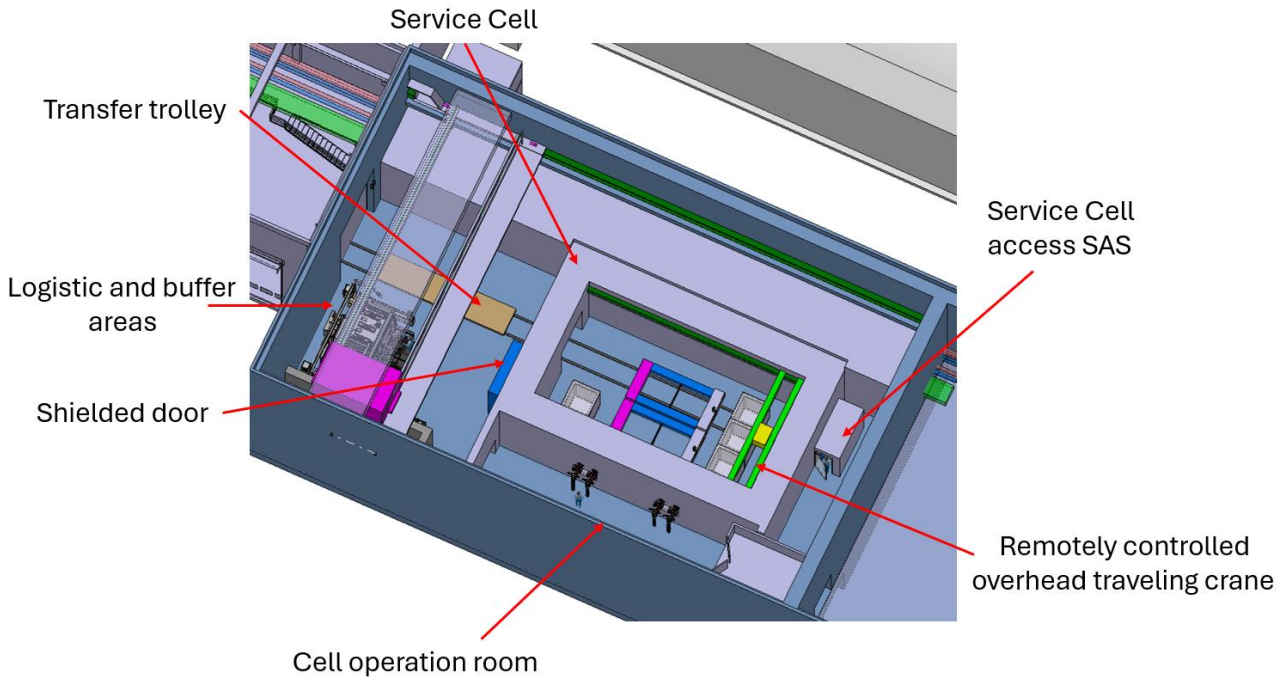




Service cell from BDF towards a CERN wider use

Objective have an area and associated process ready in case we need to prepare the target for final disposal by end of 2031

- Preliminary design study contract 2025
- Procurement process 2026-2028
- Design and construction 2028-2030
- Commissioning 2030-2031
- Development of CERN wider use from 2031

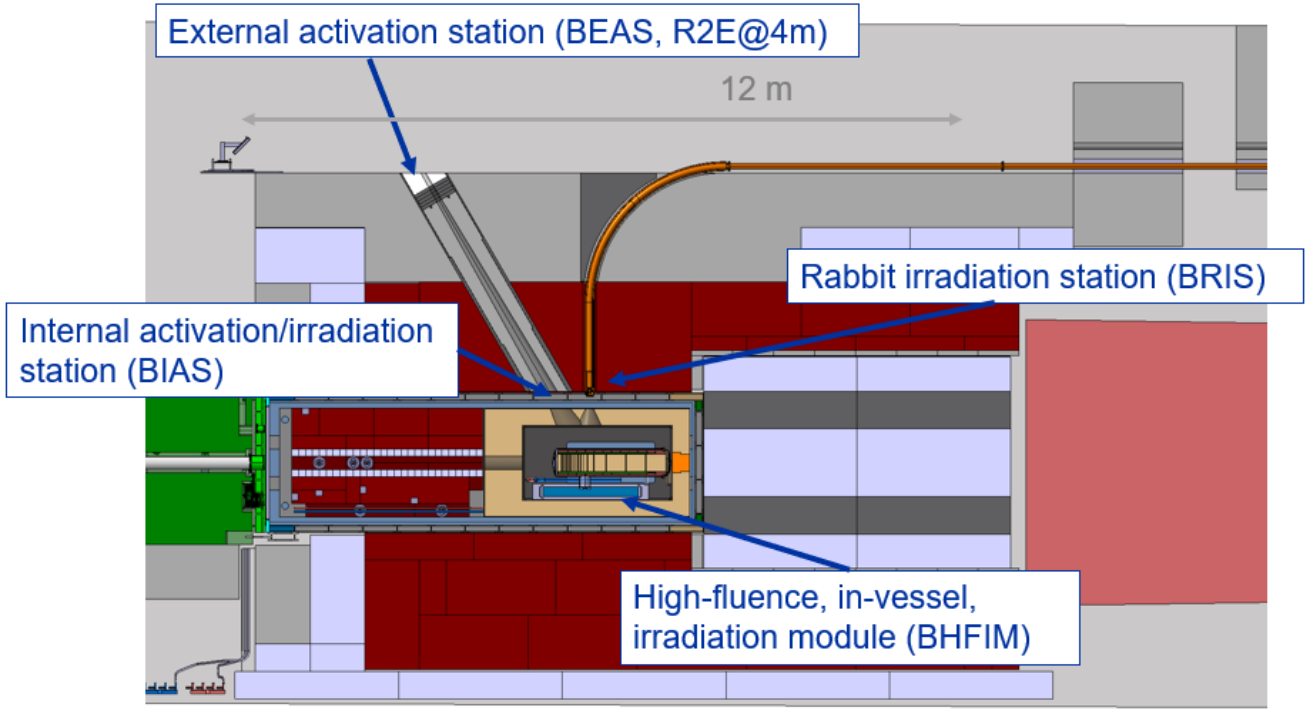


Optionnal features

Irradiation stations

All penetrations in the different shielding layers need to be foreseen at construction

- Review of opportunities held in **2024**
- Active discussions with parasitic ‘’experiment(s)’’ setups to stress them on position and envelops definition objective → mid 2025
- Reuse detail design studies of other facilities as design inputs
- Then final implementation could be staged



Concluding remarks

Many **design co-activities** beneficial for a fast development

We are on good track to provide all key inputs for CE to launch the detail design study by the end of 2025

A strategy has been developed **to test sub systems prior to the installation** thanks to the **pre-assembly** on surface before **final installation** in the underground

More **detail schedule** will be delivered as part of the TDR