Civil Engineering Study Update

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Introduction

- Experimental Requirements and CE considerations
- Option 1: Alcoves in the UJ 12
- Option 2: Purpose built facility
- Next Steps
Experimental requirements and CE consideration

Requirements:

• Experimental area approx. 500-600 m away from LHC P1 or P5 on the Line of sight (LoS)

• Space for experiments

• Access needed for construction, installation and maintenance

CE considerations:

• Existing infrastructure

• Access for construction

• Disruption to LHC machine

• Geology

• Cost
CE Study Update - Considered options

- Option 1 – UJ12 Alcoves
- Option 2 – Purpose built facility
Option 1 – Alcoves in UJ12

- **Advantages**
  - Lowest cost and disruption

- **Disadvantages**
  - Experiments need to be designed around what is possible
  - Likely only 2-3 alcoves possible around 3mØ
  - Stability of existing cavern
  - All existing services in UJ12 need to be removed (This would include 4 LHC dipole magnets + 1 quadrupole magnet and 40-60m of the QRL cry-line)
Option 2 – Purpose built facility

• **Advantages**
  - Designed around needs of experiments
  - Size/length not constrained
  - Construction access far easier

• **Disadvantages**
  - More expensive
  - Construction still need to be coordinated with LHC shutdowns
Option 2 – Purpose built facility

Proposed Layout

- 65 m long Experimental Cavern located on the LoS, approx. 612 m from IP1
- 9.1 m access shaft located on the top of the cavern
- Safety gallery connecting the cavern to the LHC to avoid dead-end
Option 2 – Underground structures

- 9.7 m wide cavern to allow access for transport and siting of some services
- Experiments centralised on the line of sight, 1.5m above the floor
- Floor parallel to the LoS, 1.25% fall
- Trench under the LAr detector to catch any escaped cold gas
- Concept based on overhead crane serving experiments along cavern length
Option 2 – Underground structures

- 88m deep shaft includes lift and stairs for access and space reserved for transport

- Safety gallery connected to the LHC as per Safety requirements

- Ongoing RP study regarding the accessibility of the cavern during LHC operations and feasibility of the connecting gallery (See next talk by A. Infantino)
Option 2 – Surface buildings

Access building

- Similar in size to SD1 and SD17
- Steel portal frame structure with concrete ground bearing floor
- 2.5 m deep false floor surrounding the shaft
- 25t overhead crane to lower the experiments to the floor level of the cavern
Option 2 – Surface buildings

Service Buildings

- Electrical, cooling and ventilation building adjacent to the access building
- Electrical building designed as a steel frame structure
- Similar size to HL-LHC point 1
- 1.2m deep false floor to allow the services to be distributed into the shaft with a concrete access platform for vehicles to enter the buildings
Preliminary Cost Estimate

• Very preliminary cost estimate prepared for both options

• Cost estimate Class 4 – total could be 50% higher and 30% lower than the given estimate

• Conclusion: purpose-built facility including the needed services would cost about 40M CHF, whereas the UJ12 option would cost about 15MCHF
Next Steps

• Conclude the RP study

• Further input from Integration, Transport, CV, Cryogenic, Radiation Protection and Heath and Safety teams

• Include updated requirements from experiments in a more refined design of the facility

• Choose the preferred option

• Progress with cost estimate and schedule
Thank you!