Civil Engineering Aspects of the Forward Physics Facility

9th Forward Physics Facility Meeting, 5th – 6th March 2026

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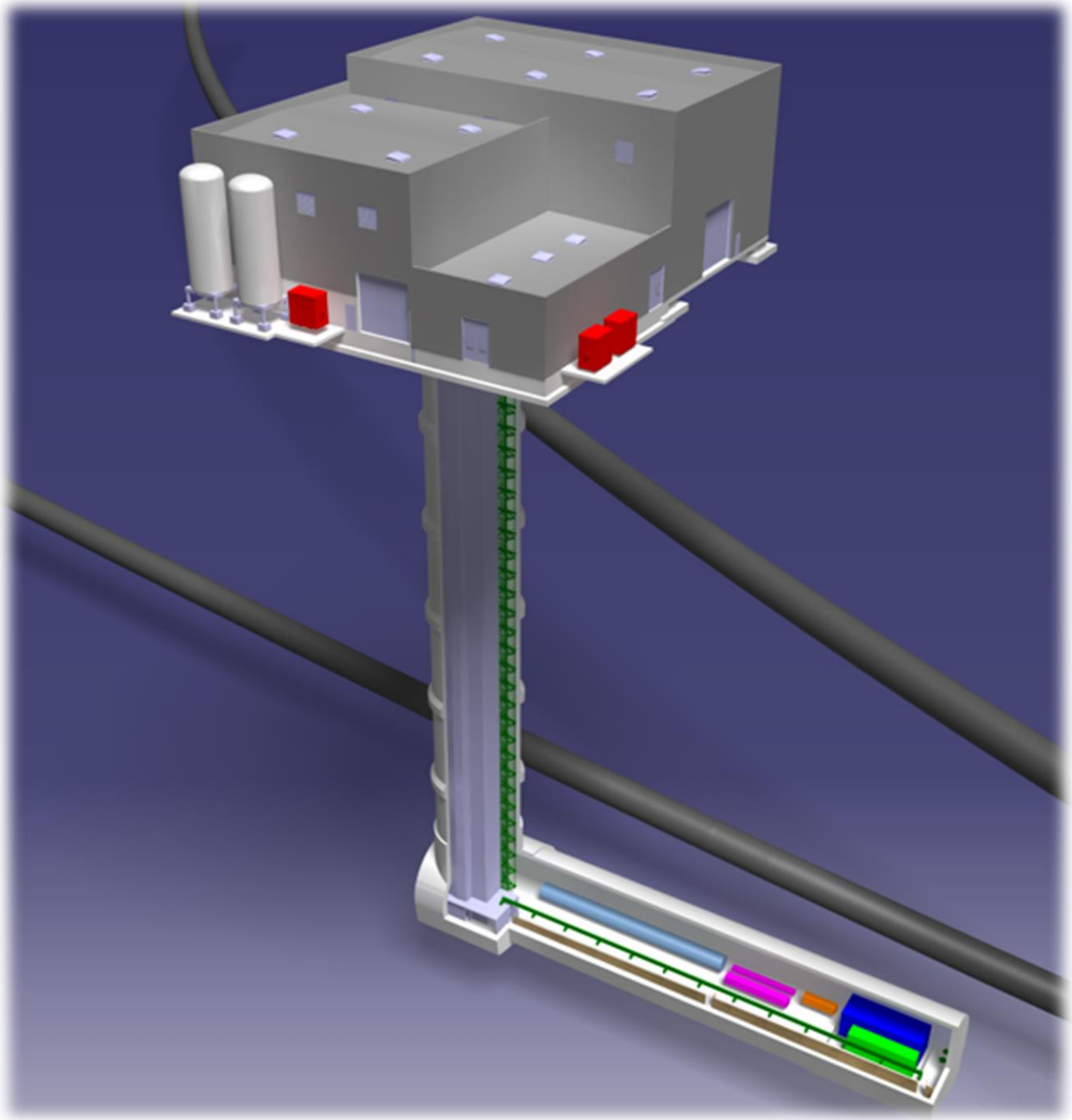
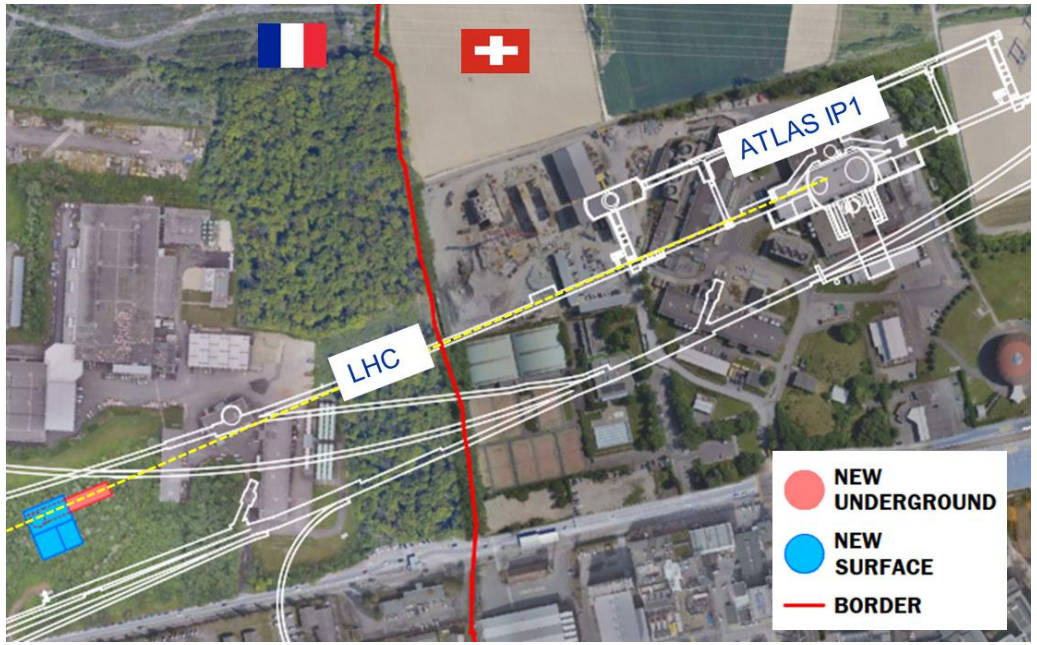
Outline

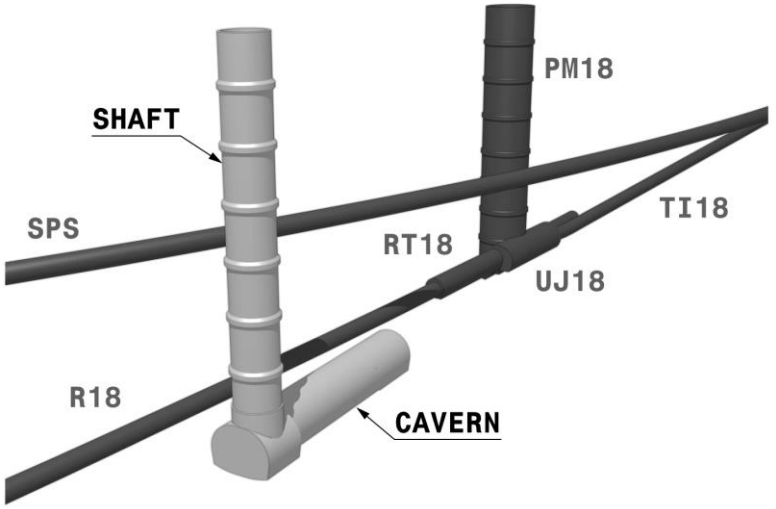
- Overview of Facility
- Site Investigation Works
- Design Recap
- Civil Engineering Cost Estimate
- Updated timeline



Project Site

- **Proposed location:** 627m from ATLAS IP1 on the French side of CERN land, 10m away from the LHC tunnel



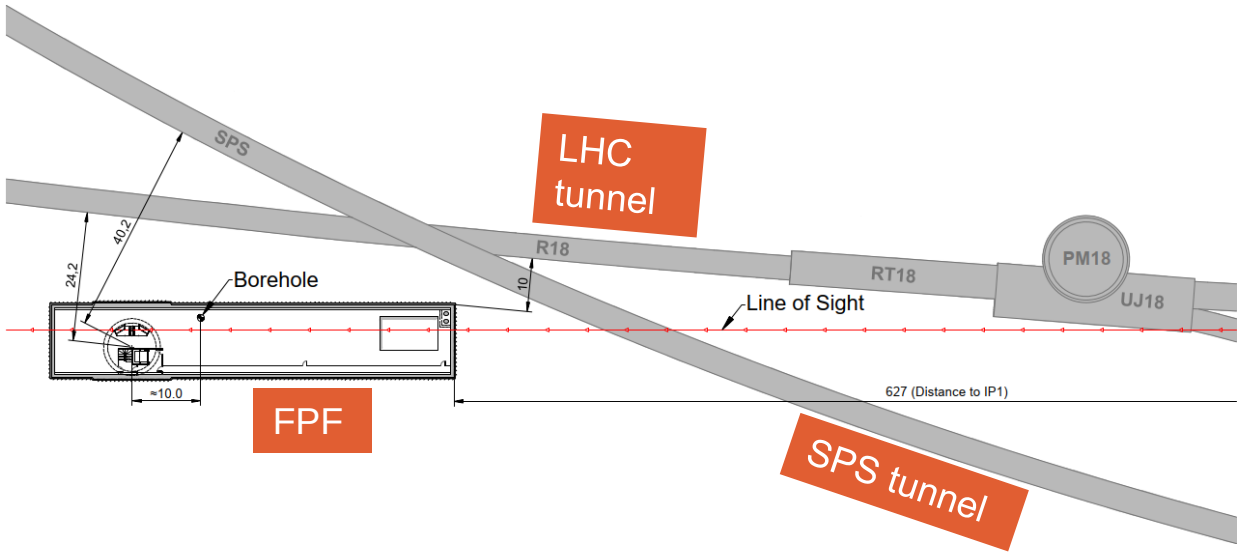


Initial Proposed Design

Purpose built facility

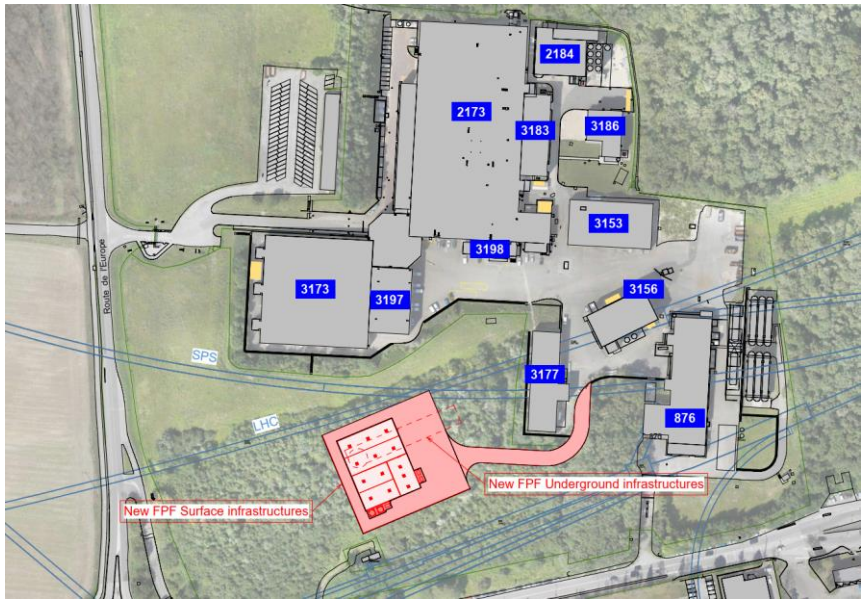
Underground:

- A 75m x 11.8m experimental cavern
- An 84m deep access shaft
- Safety corridor inside the cavern



Above ground:

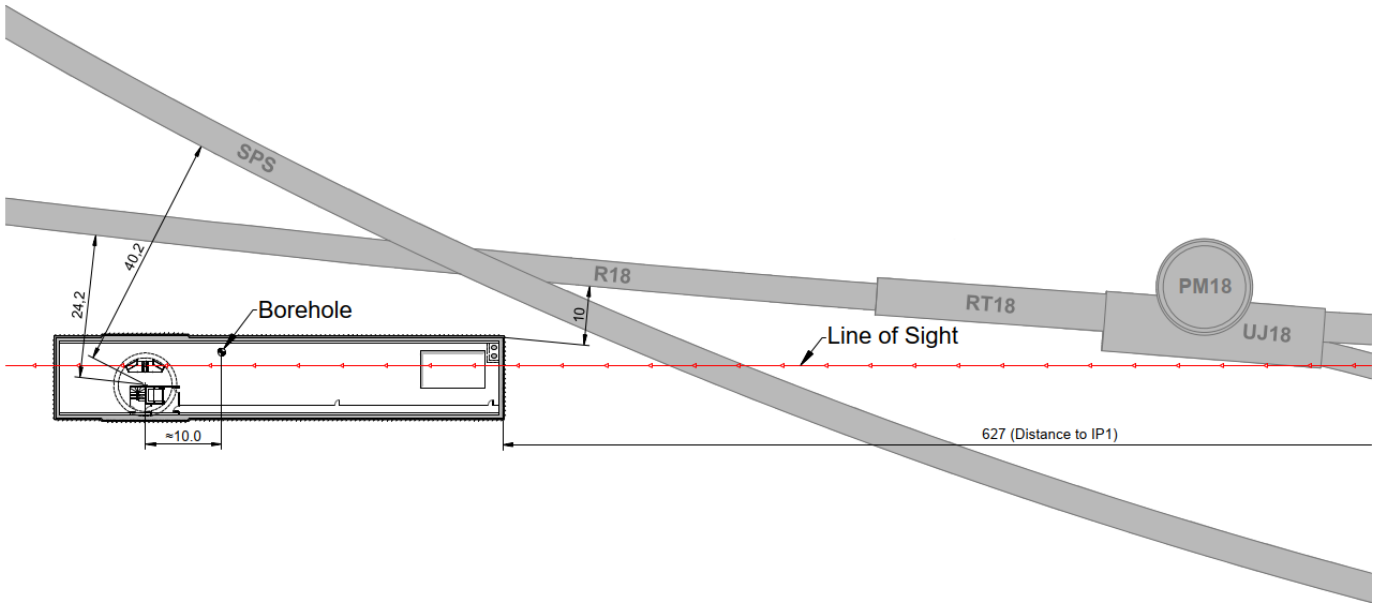
- Access building
- Electrical building
- Cooling & Ventilation building



Forward Physics Facility
Site Investigation Works

- A single new core was drilled the full depth of the proposed shaft, ~100 m deep.
- Shaft located 24m from LHC and 40m from SPS

Position marked by CERN survey team



Forward Physics Facility
Site Investigation Works

- Drilling machine in place

- Works started

- Core samples

Site Investigation Works
Results and Recommendations

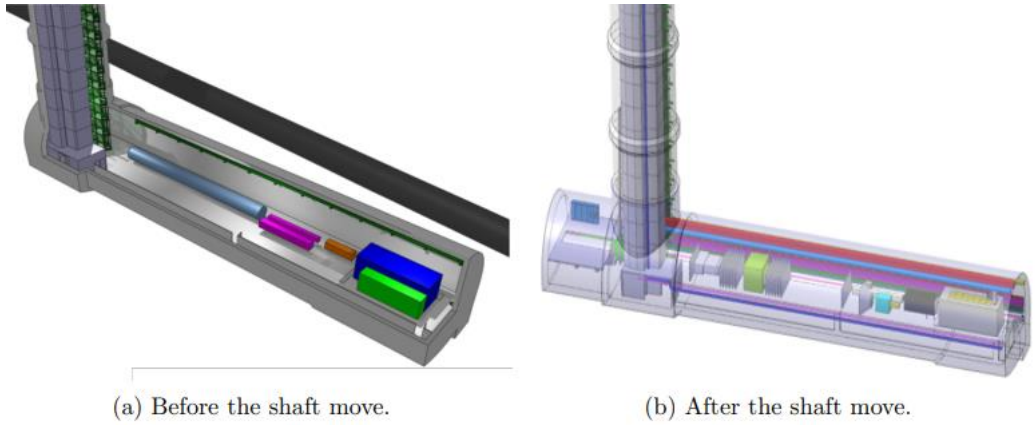
Results	Recommendations
Ground found mostly competent for tunnelling purposes.	N/A
Signs of hydrocarbons were found in the soft sandstone at depths between 84 and 90 m.	1) Excavation material contaminated with liquid hydrocarbons will require specific spoil management. 2) Underground tunnels and works in contact with soils contaminated with hydrocarbons will require specialised waterproofing membrane.
Foundations of the surface buildings will sit within competent moraine.	N/A
No water table has been identified. Overall the ground is not very permeable.	N/A
Vertical swelling test carried out showed a high swelling potential.	Swelling pressures to be considered during the design of the final lining.
Slight elevation of fluoride levels shown in the existing backfill material.	Existing backfill material will need to be disposed of at appropriate facilities.

SUMMARY

- The results of the site investigation were broadly positive
- Favourable ground conditions noted and no water table identified.
- Correct management of hydrocarbons, fluoride, and swelling potential still needed
- can be addressed during the design phase.

Design Recommendations 2024

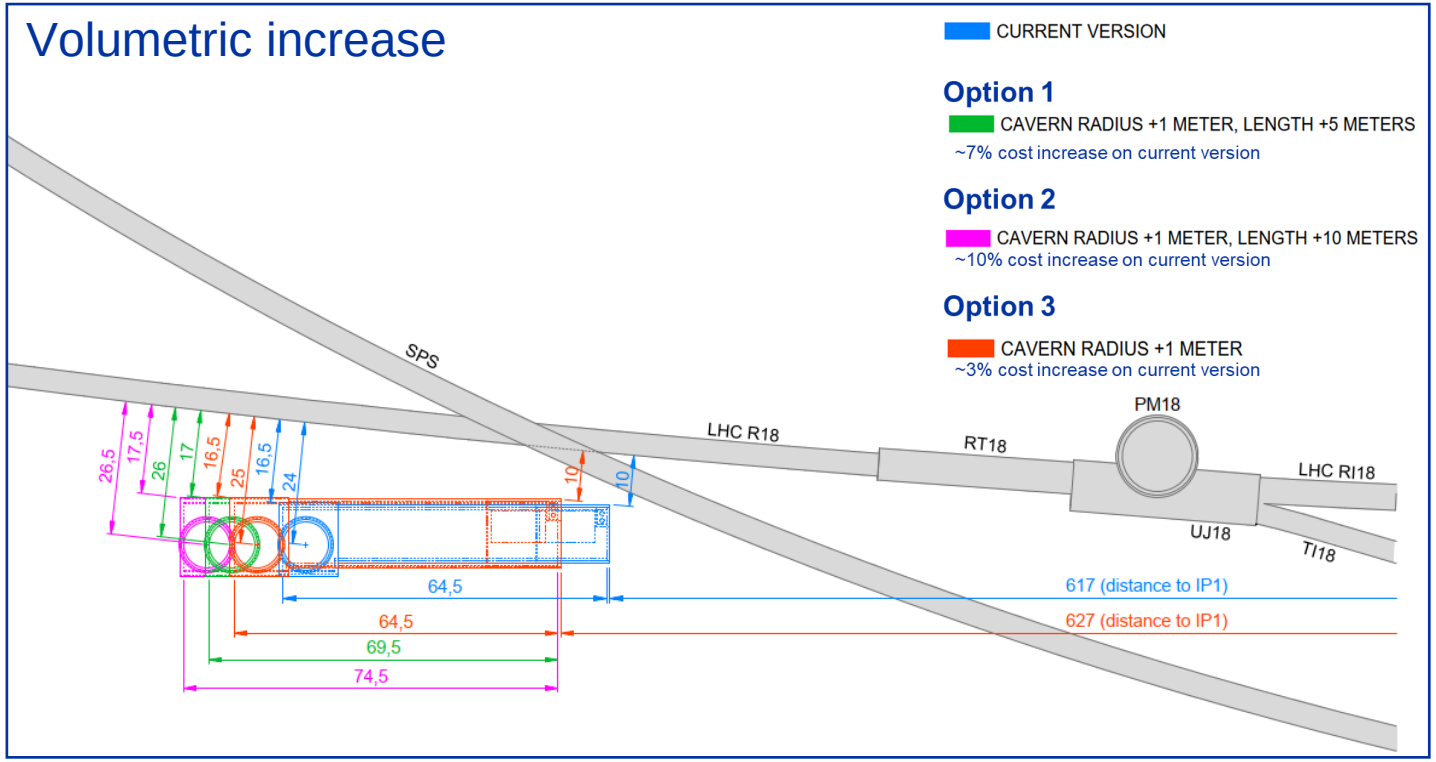
Relocation of shaft



(a) Before the shaft move.

(b) After the shaft move.

Volumetric increase



Design changes were captures in the FPF PBC Note in July 2024

Civil Engineering Cost Estimate

Ref.	Work Package	Cost [CHF]	Percentage of the CE Works
1.	Underground Works	12,392,344.00	35%
1.1	Preliminary activities	1,845,000.00	5.2%
1.2	Access shaft	4,424,143.00	12.5%
1.3	Experimental Cavern	6,123,201.00	17.3%
2.	Surface Works	6,727,231.00	19%
2.1	General items	720,776.00	2.0%
2.2	Topsoil and earthworks	702,227.00	2.0%
2.3	Roads and network	796,122.00	2.3%
2.4	Buildings	4,508,106.00	12.8%
2.4.1	Access building	2,224,786.00	6.3%
2.4.2	Cooling and ventilation building	1,497,350.00	4.2%
2.4.3	Electrical Building	563,689.00	1.6%
2.4.5	External platforms	222,281.00	0.6%
3.	General items	11,815,899.00	33.4%
4.	Miscellaneous	4,397,504.00	12.4%
	TOTAL CE WORKS	35,332,978.00	100.0%

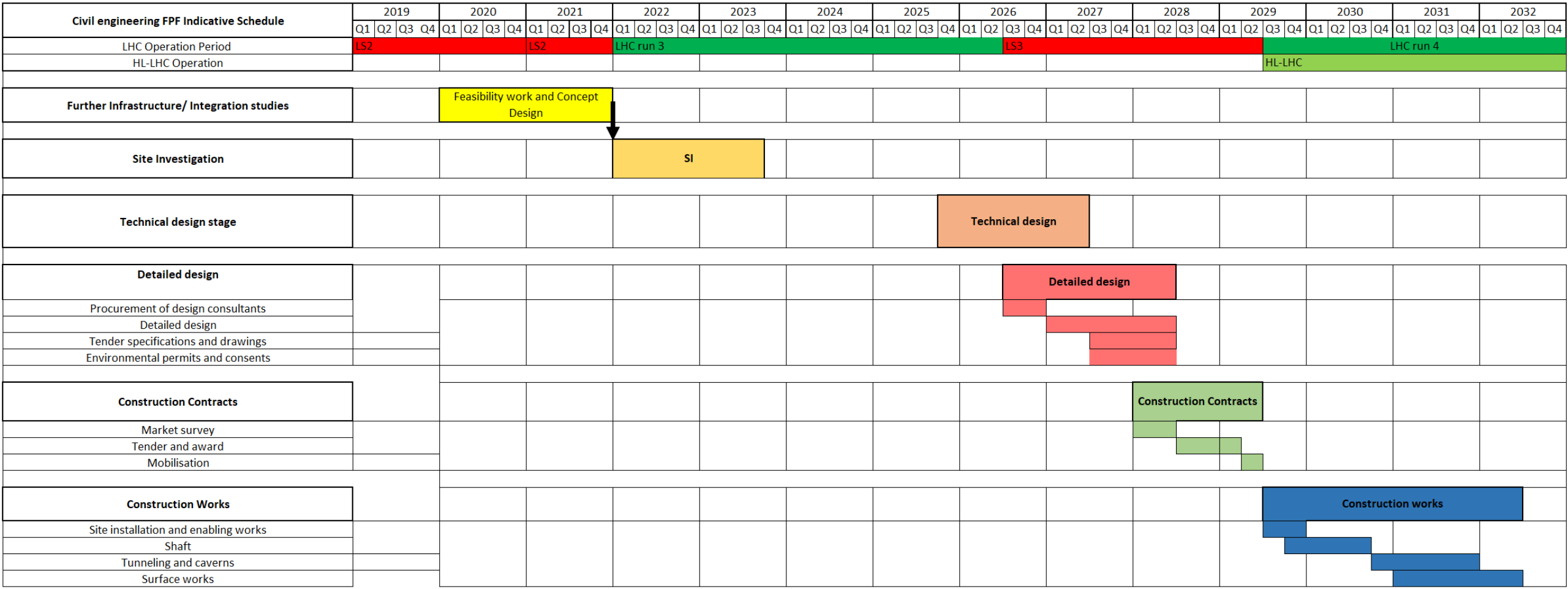
Assumptions

1. Services not included
2. Technical galleries not included
3. Cranes not included
4. Access building as a conventional steel portal frame structure with cladding, only one floor
5. CV Building as a reinforced concrete building, only one floor
6. Finished floor level at 450m ASL
7. Sectional doors not included
8. Unit costs are based on a combination of Hi-Lumi (2018), Faser (2018), SPS Tunnel eye enlargement
9. Inflation figures have been taken dating from 2017-T4, with 2021 as the benchmark year

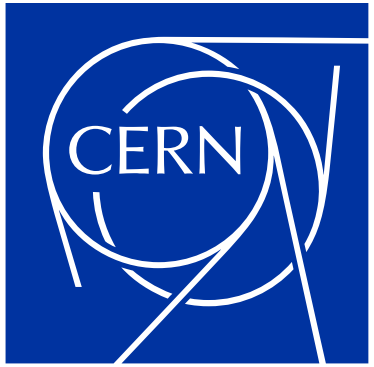
- Latest cost estimate from September 2024 following enlargement of cavern by 10m and 1m radius
- Previous costs were reviewed by external consultants, and adjusted according to advice
- Findings from site investigation has been incorporated
- Inflation since last (2021) estimate
- Previous declared cost estimate was 27.5MCHF

Estimation class 4
Expected accuracy range: L: -10% to -20%
H: +20% to +30%

Updated 2025 Proposed Civil Engineering Schedule



NB Very early stage estimate for schedule



Thank you!

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