CERN-INTERA FUTURE CIRCULAR COLLIDER

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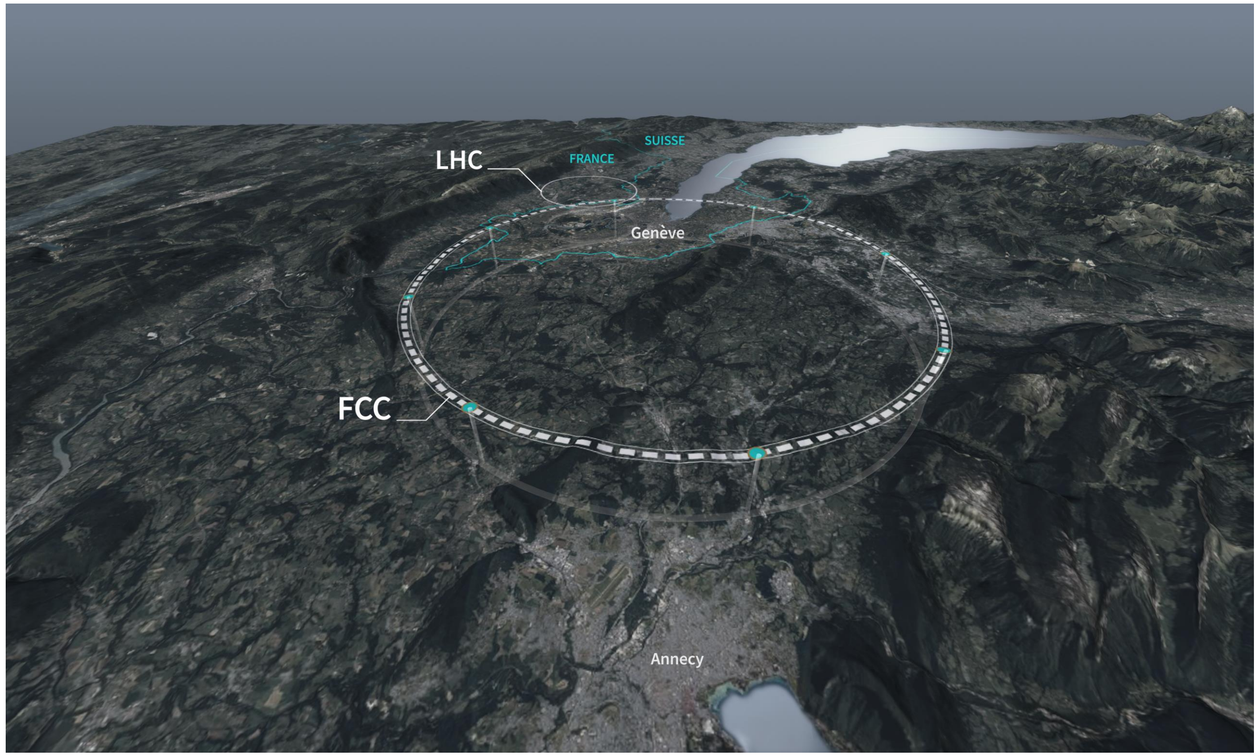
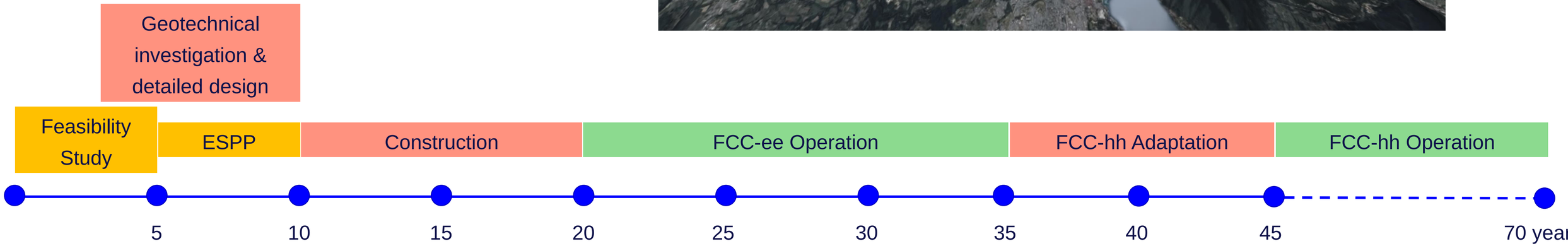
The Future Circular Collider

The FCC is being studied as the successor to the LHC

- 91km circumference tunnel located in Geneva at the foothills of the Alps
- Feasibility study to be presented at next European Strategy for Particle Physics Update (ESPP)
- Planned construction is foreseen to begin in the early 2030s
- A two-stage operation is planned, first FCC-ee then FCC-hh





FCC Underground Infrastructure

8 surface sites

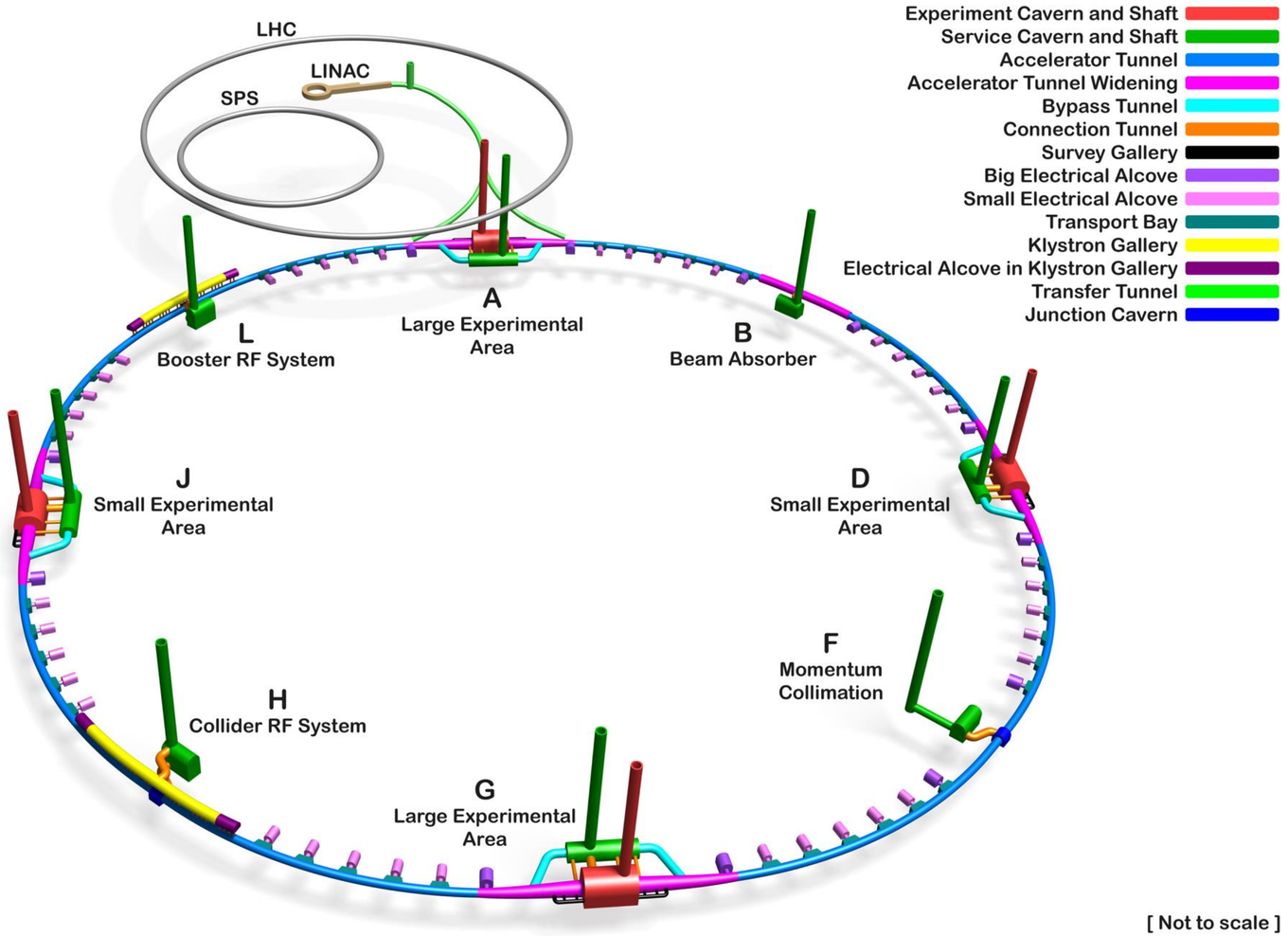
13 shafts

4 experiment caverns

8 service caverns

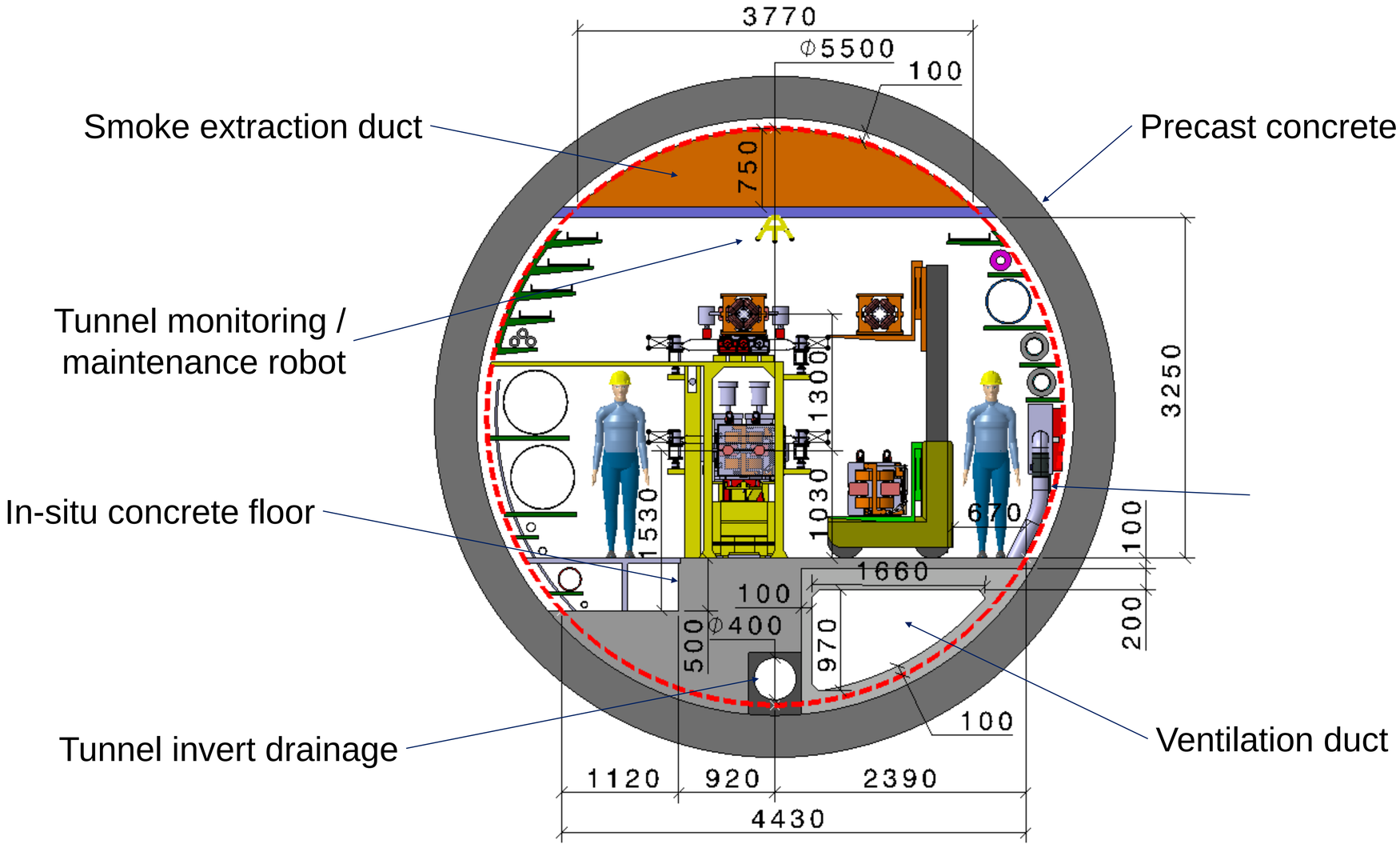
Beam Absorber

A new LINAC



Credit: Angel Navascues Cornago

Main Beam Tunnel



Credit: Fani Valchkova-Georgieva

Shafts

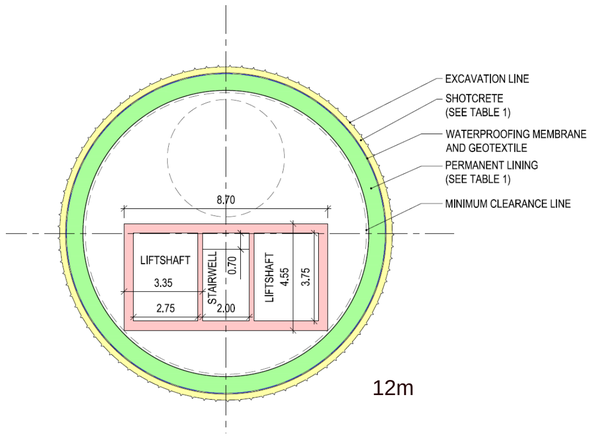
13 Shafts

Depths range from 180m to 400m

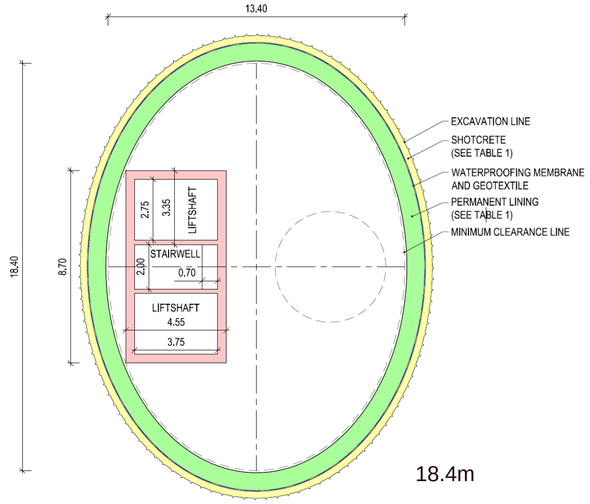
2 x 18.4m elliptical

4 x 18m circular

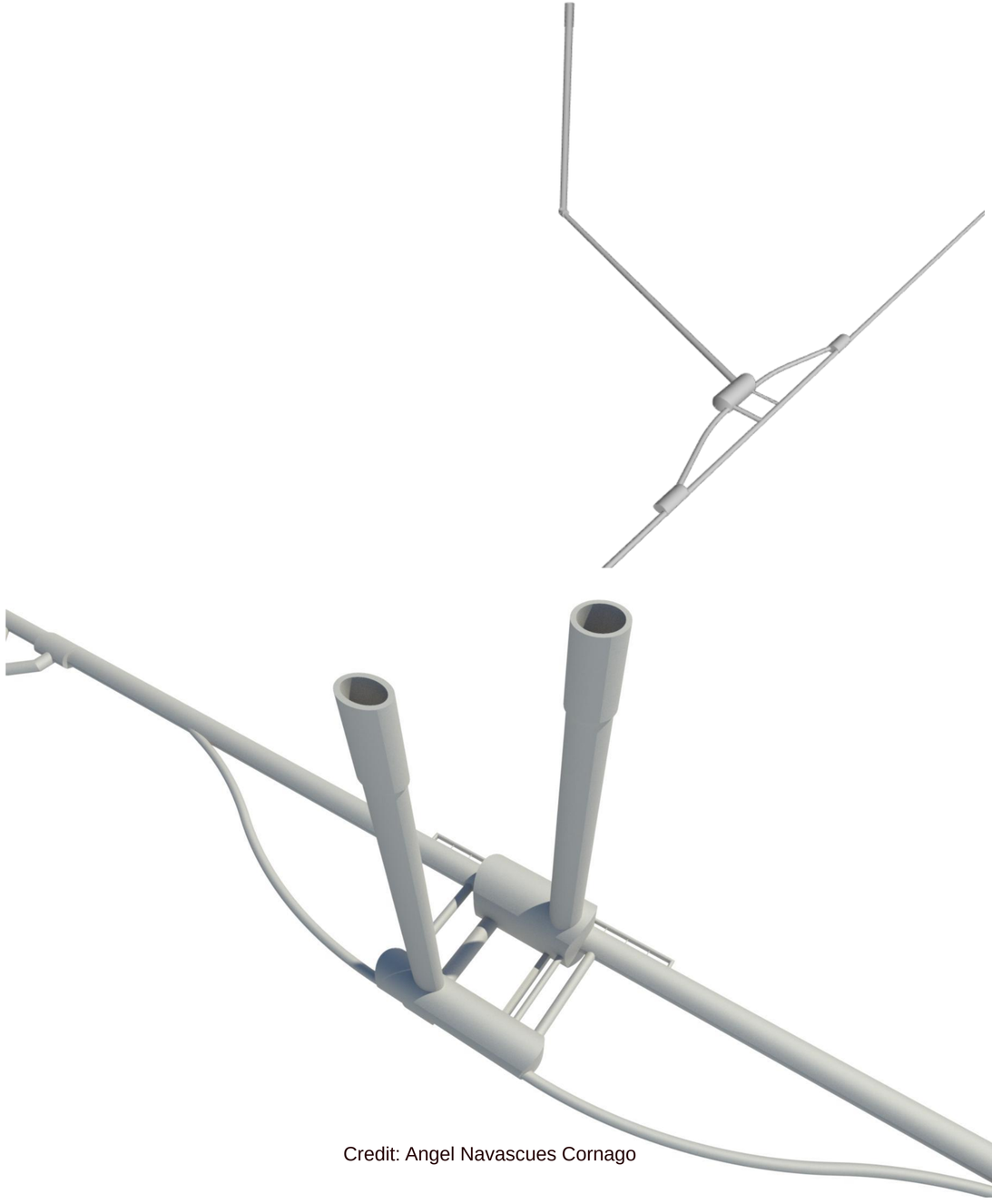
7 x 12m circular



12m

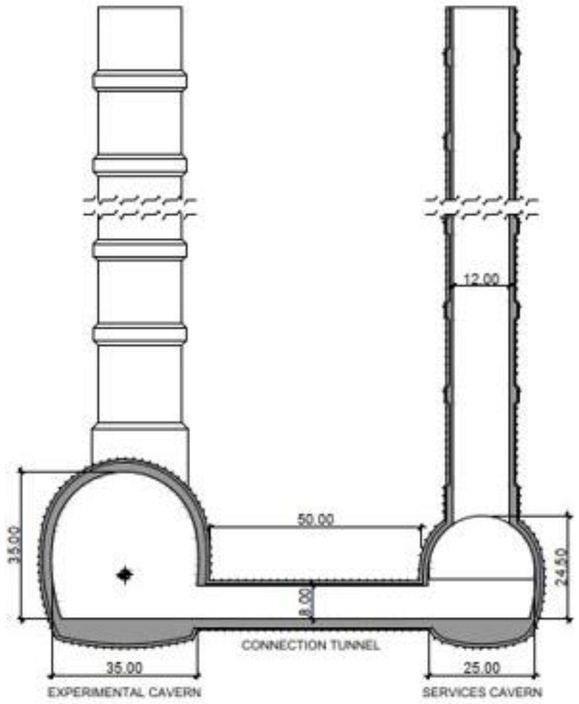


18.4m

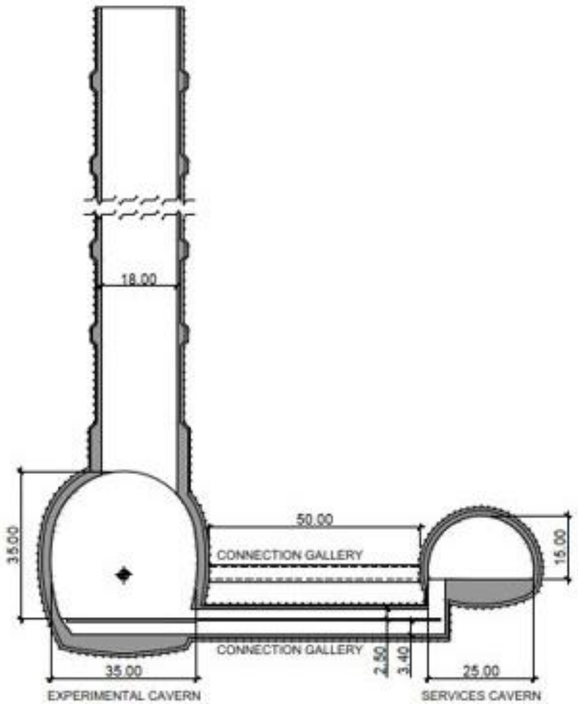


Credit: Angel Navascues Cornago

Caverns



SECTION A-A
1/500



SECTION B-B
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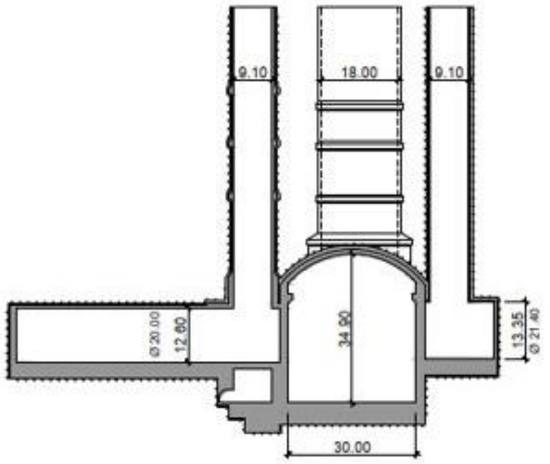
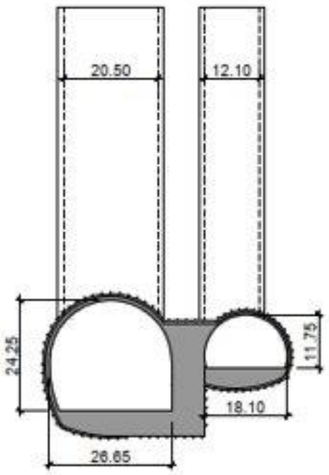
FCC

Credit: Angel Navascues Cornago

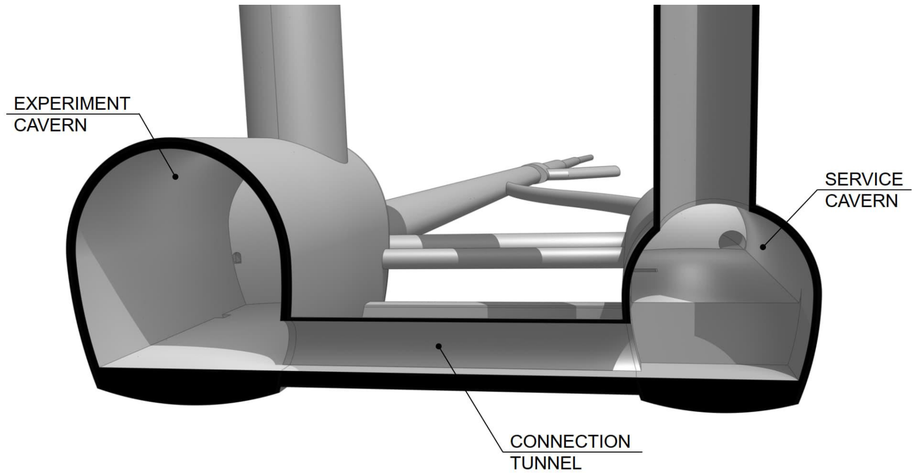


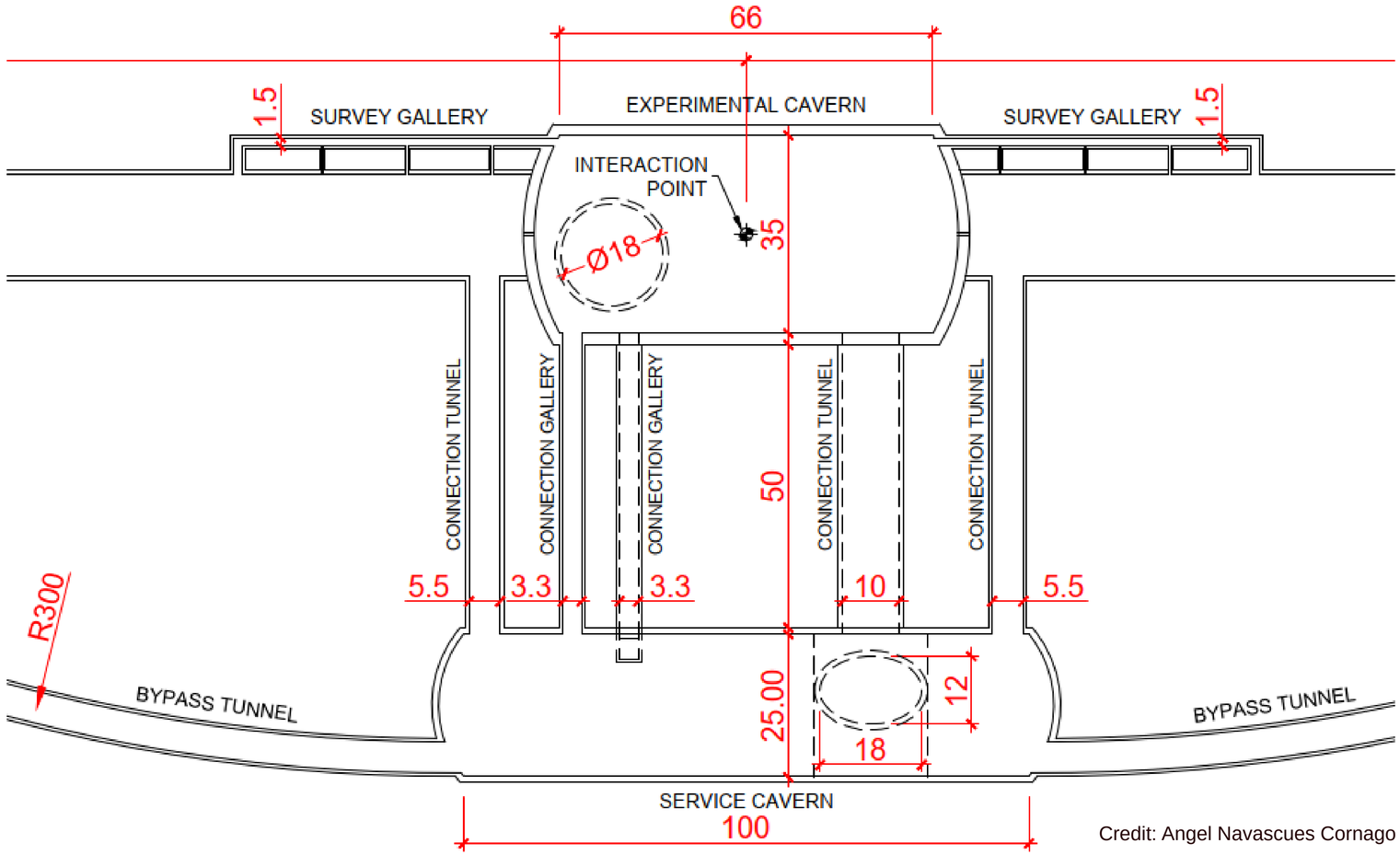
ATLAS (LHC)



CMS (LHC)

Experimental Area





Credit: Angel Navascues Cornago

Site Investigation Studies (i)

ILF/GADZ 2020/21

Definition of ‘Areas of Geological Uncertainty’ for the preferred alignment scenario(s)
Input into footprint exploration –comparison of scenarios and Geological Risks Assessment
Initial proposals of site investigations in targeted areas to reduce the uncertainty of the geological model
Cost estimates and schedule for target site investigation campaign
ILF/GADZ study focused on the construction risks for underground works

Université de Genève 2021-current

Updating 3D geological model
Technical reporting on hydrogeological, tectonic and seismic characteristics of the Geneva region
Data gathering of existing and new data from drilling and geophysics campaigns

Site Investigation Studies (ii)

QUANTUM 2022-2025

Detailed analysis of ‘Areas of Geological Uncertainty’ for the amended alignment and updated geological models
Optimization of proposed SSI campaign scope of works
Preparation of Technical Specifications for SSI Contractor MS and IT
Cost estimates and schedule for SSI
Site visits and preparation of site drawings, survey requirements and works schedules
Act in the role of Engineer during the execution of the Works

Subsurface Site Investigation Campaign 1

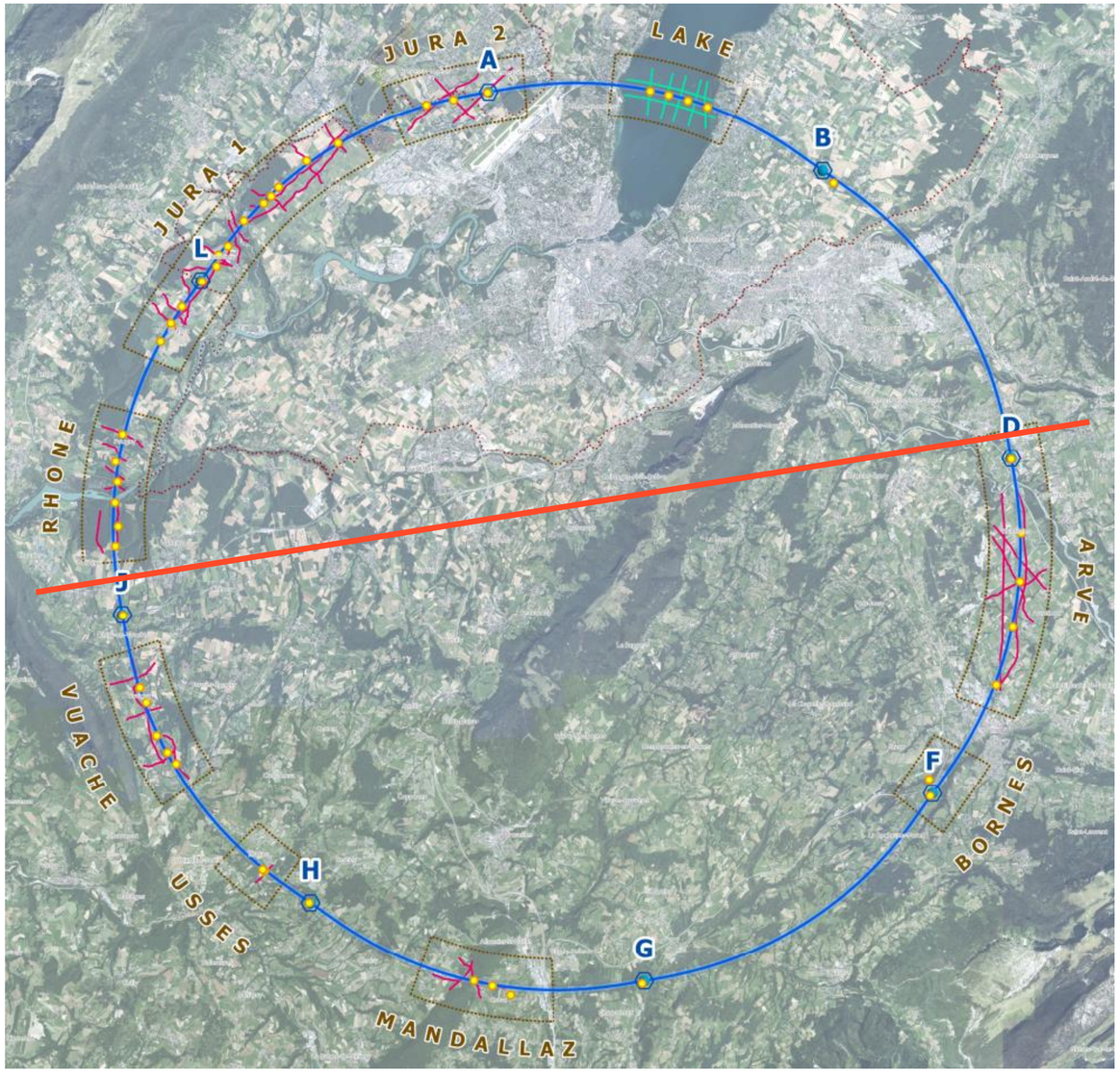
The site investigation campaign will remove some level of uncertainty in current 3D geological model and provide a better understanding of:

- The molasse-moraine and molasse-limestone interfaces along the proposed alignment
- Vertical profiling of shafts for PA, PD, PF and PL

The investigations are split into 2 work packages consist of:

- 2D seismic geophysics
- Fully and partially cored boreholes

The campaign started in October 2024 and will last until December 2025



Site Investigations

Geophysics:

- Total of over 80km of seismic investigation, both seismic reflection and refraction
- Both on land and on the lake

Boreholes:

- 29 boreholes in total
- 4 boreholes on the lake
- Fully and partially cored boreholes
- Some equipped with piezometres

Subsurface Site Investigation Campaign 2

Post-feasibility Investigation Works (i)

- A larger campaign of ground investigations
- Targeted boreholes around the experimental and technical caverns and their access shafts
- Geophysics and boreholes at regular intervals along the entire alignment
- Sufficient in detail to allow for the tender of construction works packages
- Market Survey for Consultant to be launched early Q2 2025 with qualified bidders being invited to tender in Q3 2025
- Consultants to define investigations campaign, produce technical specifications for Invitation to Tender, manage permitting/environmental issues and act as Engineer during works
- Consultant should have expertise in underground design (similar the infrastructure for the FCC), knowledge of the local geology and experience in permitting and environmental studies

Post-feasibility Investigation Works (ii)

- Additional supplementary investigations in areas where gaps still exist to be identified by design consultant
- These will allow the engineer to fully design the full scope of works

Project schedule