Future Circular Colliders (FCC)
Geotechnical & Civil Engineering Studies

ARUP

Scope of Works

- Key aim:
  - Conceptual design study to assist CERN in identifying the geotechnical & civil engineering feasibility of a Future Circular Collider (FCC)
- Key areas:
  - Geological study and creation of ground model.
  - Establish FCC alignment options, layout options and key design requirements.
  - Formulate a decision aid tool and screening procedure to evaluate feasible options.
  - Assessment of options feasibility and identification of most feasible alignment/s.
  - Identification of constructability risks, issues and constraints.

Context

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE

CERN - GS Department

EDMS Nr: 1233485
Group reference: CERN/GS-SE 27 July 2012

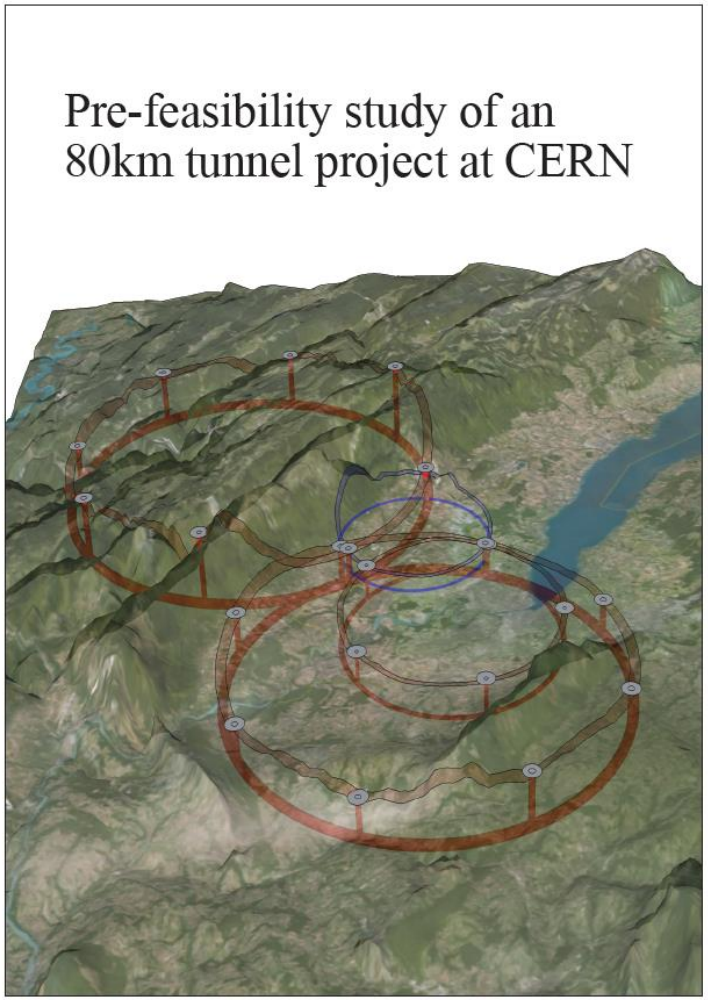
PRE-FEASIBILITY STUDY FOR AN 80KM TUNNEL PROJECT AT CERN

John Osborne (CERN), Caroline Waaijer (CERN), ARUP, GADZ

Abstract

A pre-feasibility study has been performed by CERN civil engineers and two specialist firms, ARUP and GADZ Géotechnique Appliqué Dériaz SA, for the construction of a new particle accelerator ring at CERN. The focus was on the identification of geological, hydrogeological, construction and environmental risks associated with tunnel and shaft excavations for three proposed options, to establish which layout would be most feasible from a construction point of view.

This report presents the findings and recommendations of the pre-feasibility study.



CERN ARUP GEOTECHNIQUE APPLIQUEE DERIAZ S.A. GADZ

ARUP

Work Stages

- Stage 1: Development of geological model and GIS alignment decision aid tool
- Stage 2: Identification of key alignment layout optimisation requirements and constructability
- Stage 3: Refinement of above stages and establish concept for Pre-Feasibility Stage

Work Stages

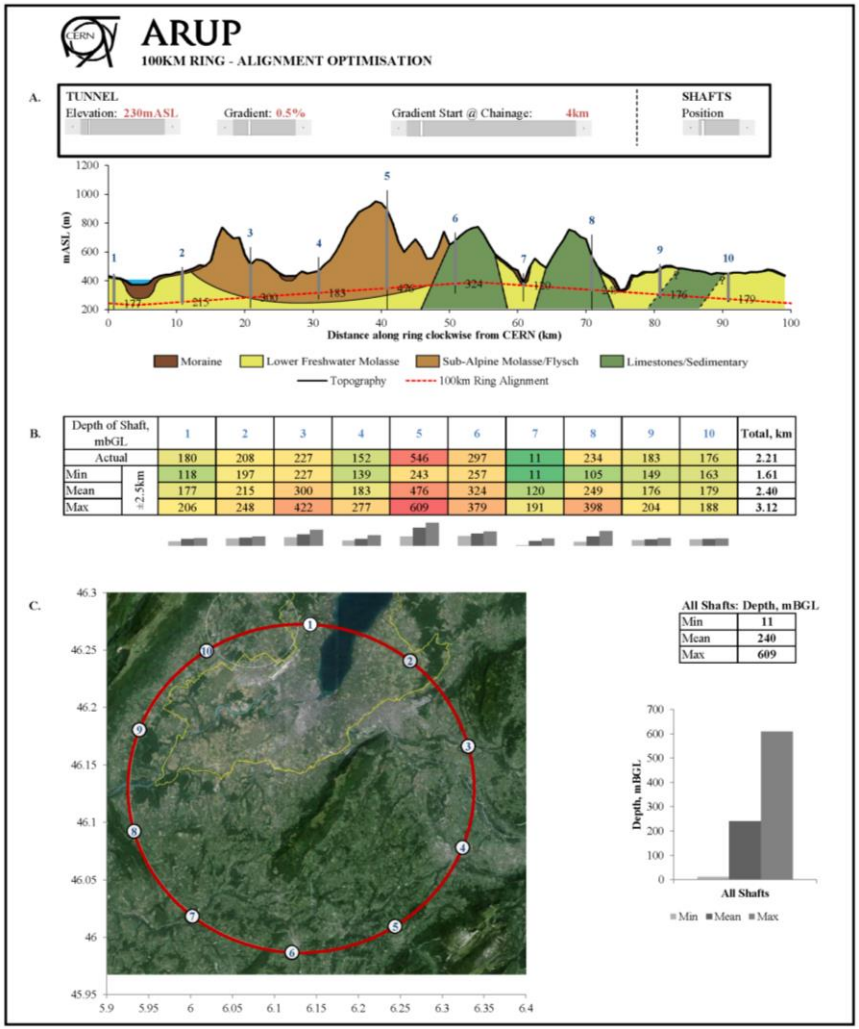
- Stage 1: Development of geological model and GIS alignment decision aid tool
  - Geological Study
  - Integration within GIS platform
  - Development of alignment screening process
  - Workstage Partners:

GEOTECHNIQUE APPLIQUEE DERIAZ S.A.

GADZ

Géosciences pour une Terre durable

brgm



ARUP

Work Stages

- Stage 2: Identification of key alignment layout optimisation requirements and constructability
  - Establish key requirements and criteria for alignment options
  - Identification of key alignment, layout option/s
  - Development of constructability constraints specific to tunnels, shafts, caverns, surface sites, excavation techniques

- Stage 3: Refinement of above stages and establish concept for Pre-Feasibility Stage.
  - Identification of preferred alignment/corridors
  - Conclusion of issues/constraints e.g. fatal flaw/risk register
  - Environmental impact, GI, BoQ for costing & programme in partnership with: AMBERG ENGINEERING

Next Steps

Programme

- Stage 1:

  Feb 2014 → June 2014

- Stage 2:

  July 2014 → Dec 2014

- Stage 3:

  Jan 2015 → May 2015

Progress & Deliverables

- Design workshops and reviews with CERN
- GIS based decision aid tool
- Intermediate and final stage pre-feasibility reports
- Close working with BRGM and local geological experts