



ILC CFS / CLIC CES Studies for the Interaction Region :

- An action was given at the Geneva Linear Collider Meeting for CFS to develop a more in-depth civil engineering study of the IR
- Linear Collider IR meeting at CERN held on 16 February 2011
- Design Brief for external design specialists
- Kick-off meeting with ARUP is today
- Next steps

Detector movement system and experimental area layout for a Linear Collider

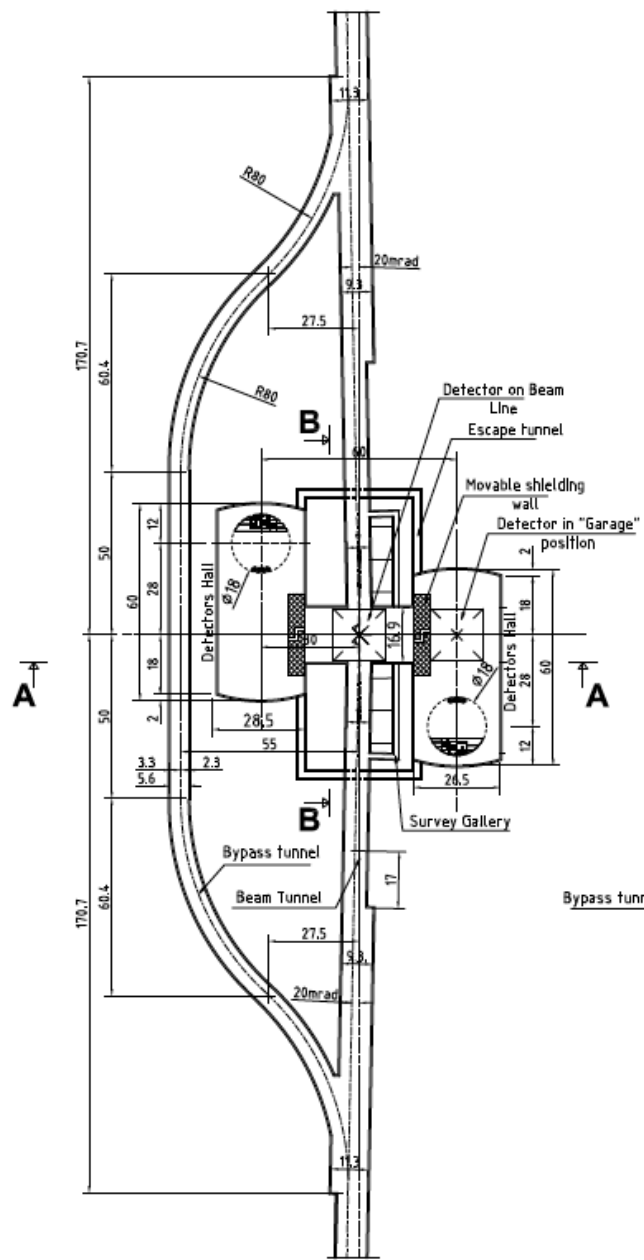
chaired by John Andrew Osborne (CERN)

Wednesday 16 February 2011 from 09:00 to 17:00 (Europe/Zurich)
at CERN (354-1-016)

Participants Jean-Pierre Delahaye; Andrei Dudarev; Konrad Elsener; Andrea Gaddi; Martin Gastal; Lau Gatignon; Jean-Christophe Gayde; Hubert Gerwig; Michael Guinchard; Alain Herve; Mark Jones; Victor Kuchler; H el ene MAINAUD DURAND; Dirk Mergelkuhl; Hermann Schmickler; Steinar Stapnes

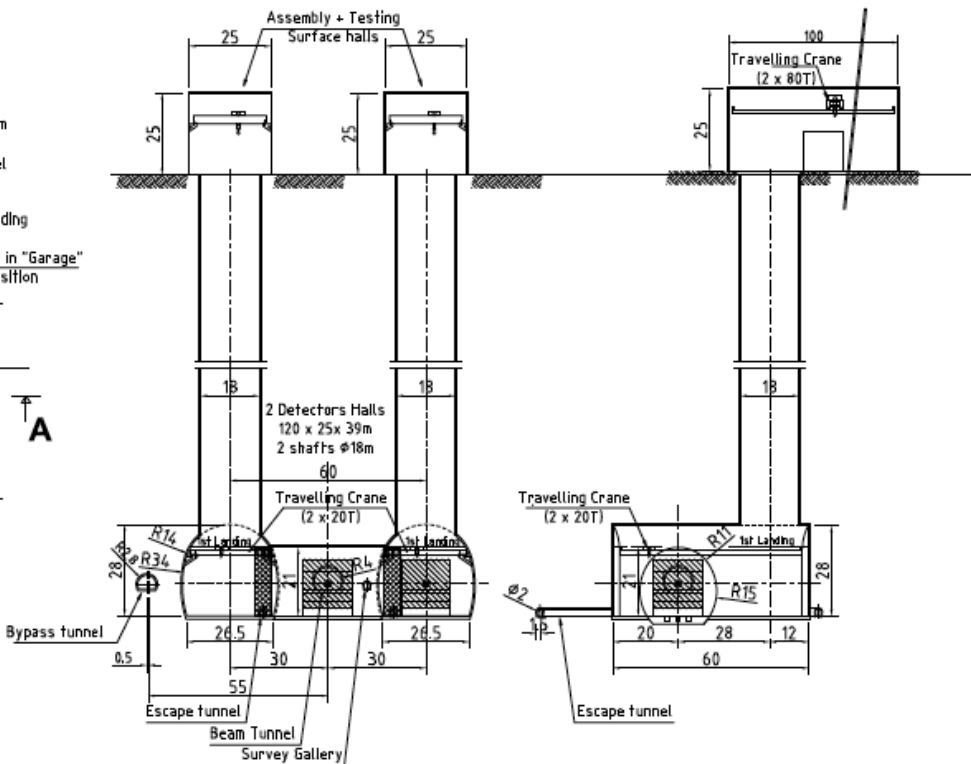
Wednesday 16 February 2011

- 09:00 - 09:05 Introduction 05'
Speaker: Jean-Pierre Delahaye (CERN)
- 09:05 - 09:45 Civil engineering works for Linear Colliders 40'
Speakers: John Andrew Osborne (CERN) , Martin Gastal (CERN) , Victor Kuchler (Fermilab)
- 09:45 - 10:15 Assembling, lowering and moving a 14'000-tonne experiment at CLIC 30'
Speaker: Hubert Gerwig (CERN)
- 10:15 - 10:30 Coffee 15'
- 10:30 - 11:00 Vibration issues at Linear Colliders and consequences for CLIC 30'
Speaker: Andrea Gaddi (CERN)
- 11:00 - 11:30 Reflections on moving and aligning large masses around IP at CLIC 30'
Speaker: Alain Herve (CERN)
- 11:30 - 12:00 CLIC/LHC sub-micron ground motion and vibration measurements 30'
Speaker: Michael Guinchard (CERN)
- 12:00 - 13:30 LUNCH 1h30'
- 13:30 - 14:00 LHC long term ground movement measurements 30'
Speaker: Jean-Christophe Gayde (CERN)
- 14:00 - 14:45 ARUP experience in similar fields 45'
- 14:45 - 16:45 General discussion on future studies 2h00'



Section A-A

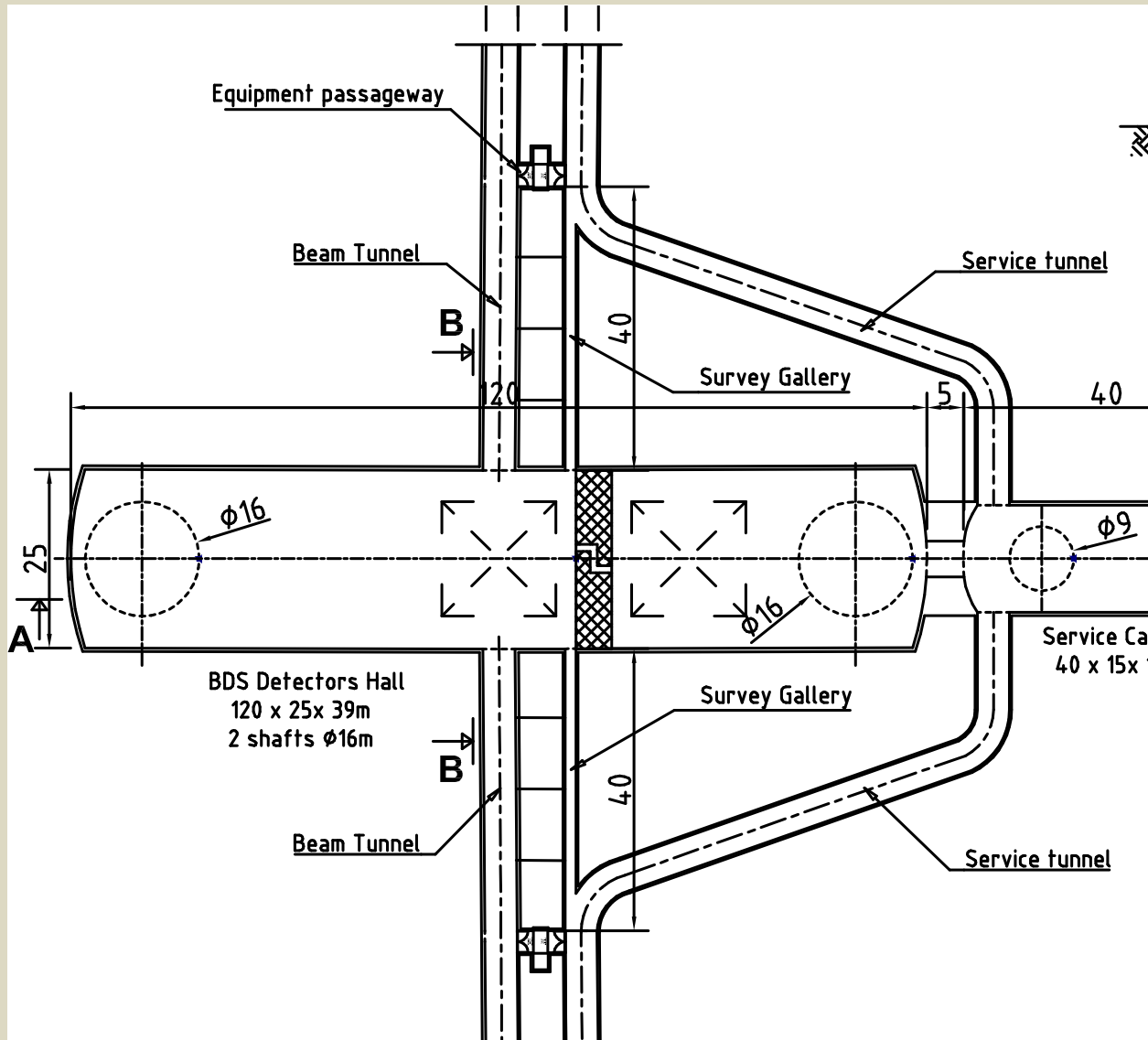
Section B-B



CLIC- DETECTORS HALL AREA (SURFACE AND UNDERGROUND)

	PROJECT : CLIC-CDM CIVIL ENGINEERING SUPERVISOR : J. OSBORNE DESIGNER : N. MADAMAS	SCALE : 1/1000(A2 FORMAT) DATE : 19_AUG_2010 SIZE : THREE
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ILC RDR Baseline Layouts for Interaction Region



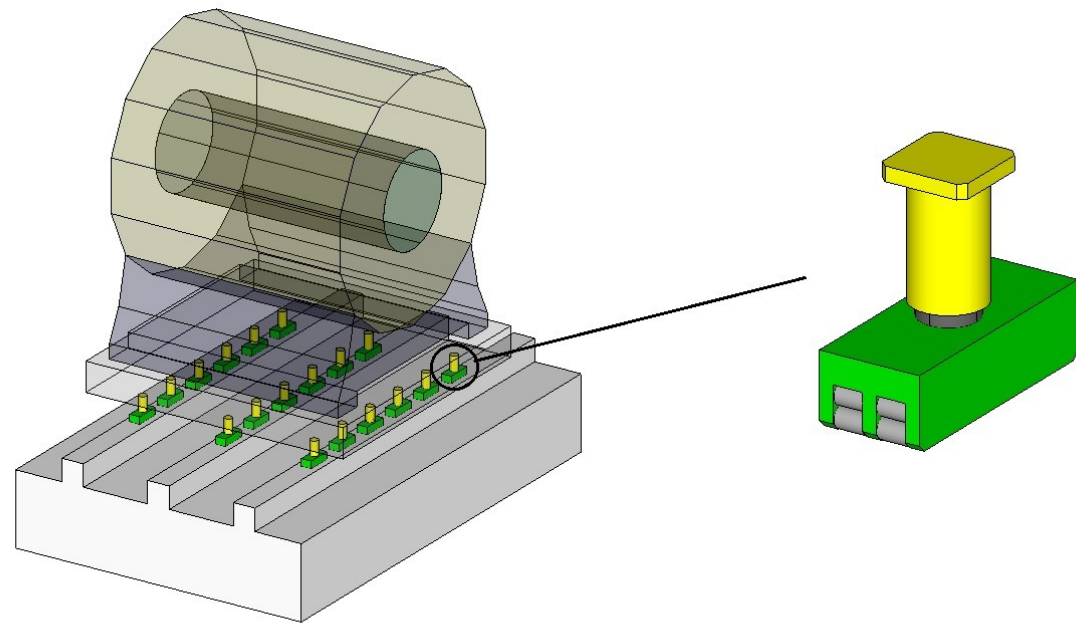
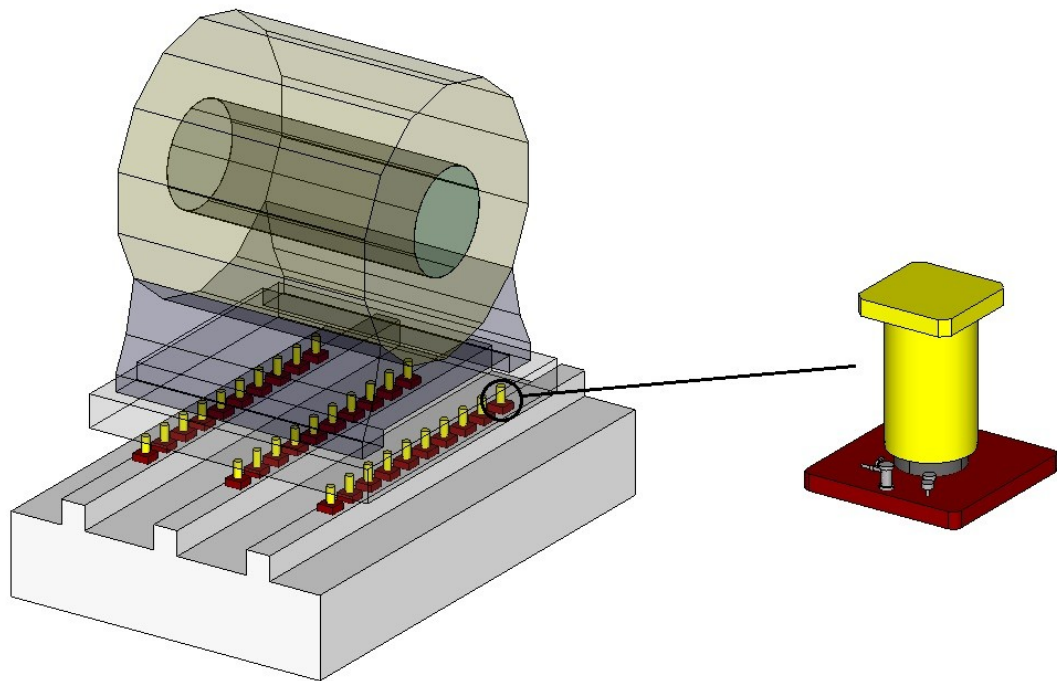
Several 'concerns' have been raised with the ILC RDR layout

New ILC baseline needs to be agreed

<p>Transport mechanism</p> <p>1,1</p>	<p>Excess pore pressure, cyclic load degradation</p> <p>1,2</p>	<p>to limit to 0.5g during transport</p> <p>1,3</p>	<p>Influences Cavern geometry</p> <p>1,4</p>
<p>EDZ & creep may adversely affect tolerances</p> <p>2,1</p>	<p>Ground Behaviour</p> <p>2,2</p>	<p>Damping characteristics reduced with > yield, softening</p> <p>2,3</p>	<p>Profiles to minimise EDZ, creep, load asymmetry</p> <p>2,4</p>
<p>Probably minor</p> <p>3,1</p>	<p>Probably minor</p> <p>3,2</p>	<p>Vibration effects</p> <p>3,3</p>	<p>Foundation to provide adequate damping characteristics</p> <p>3,4</p>
<p>Adequate space required for chosen mechanism</p> <p>4,1</p>	<p>Methods to minimise EDZ and provide early cover to Molasse</p> <p>4,2</p>	<p>To avoid design that amplifies vibrations</p> <p>4,3</p>	<p>Construction & design</p> <p>4,4</p>

Task 1 - The design of the underground concrete platforms required to transport each of the two Linear Collider Detectors on and off the beam-line position.

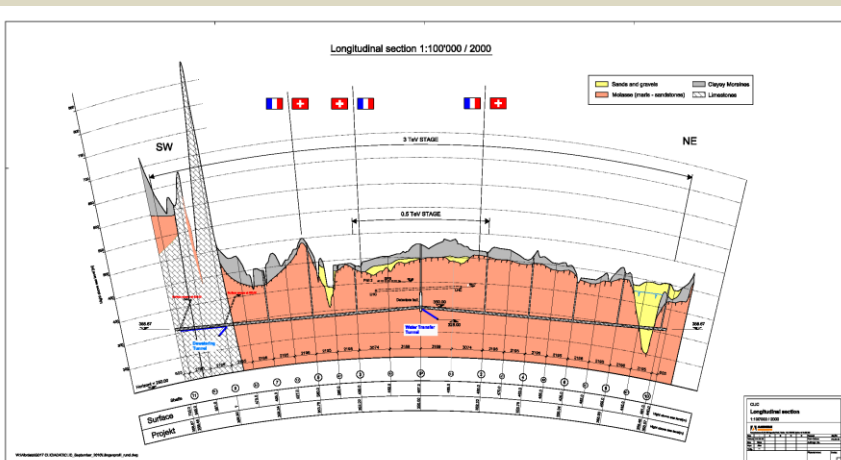
- Two platforms would be required, one for each detector.
- Load of each detector, excluding platforms, of approximately 14,000tons
- Intermediate supports determined by the preferred movement system.
- Platform movement on/off the beamline to be moved over a period of the order of five hours,
- Up to 20 movements per year during machine operation.
- Accelerations of the detector during movement to be limited to 0.5g
- ~~Location of the platforms to within +/- 1mm and +/- 0.1 milli-rads of their target location relative to final focus quadrupole base slab.~~

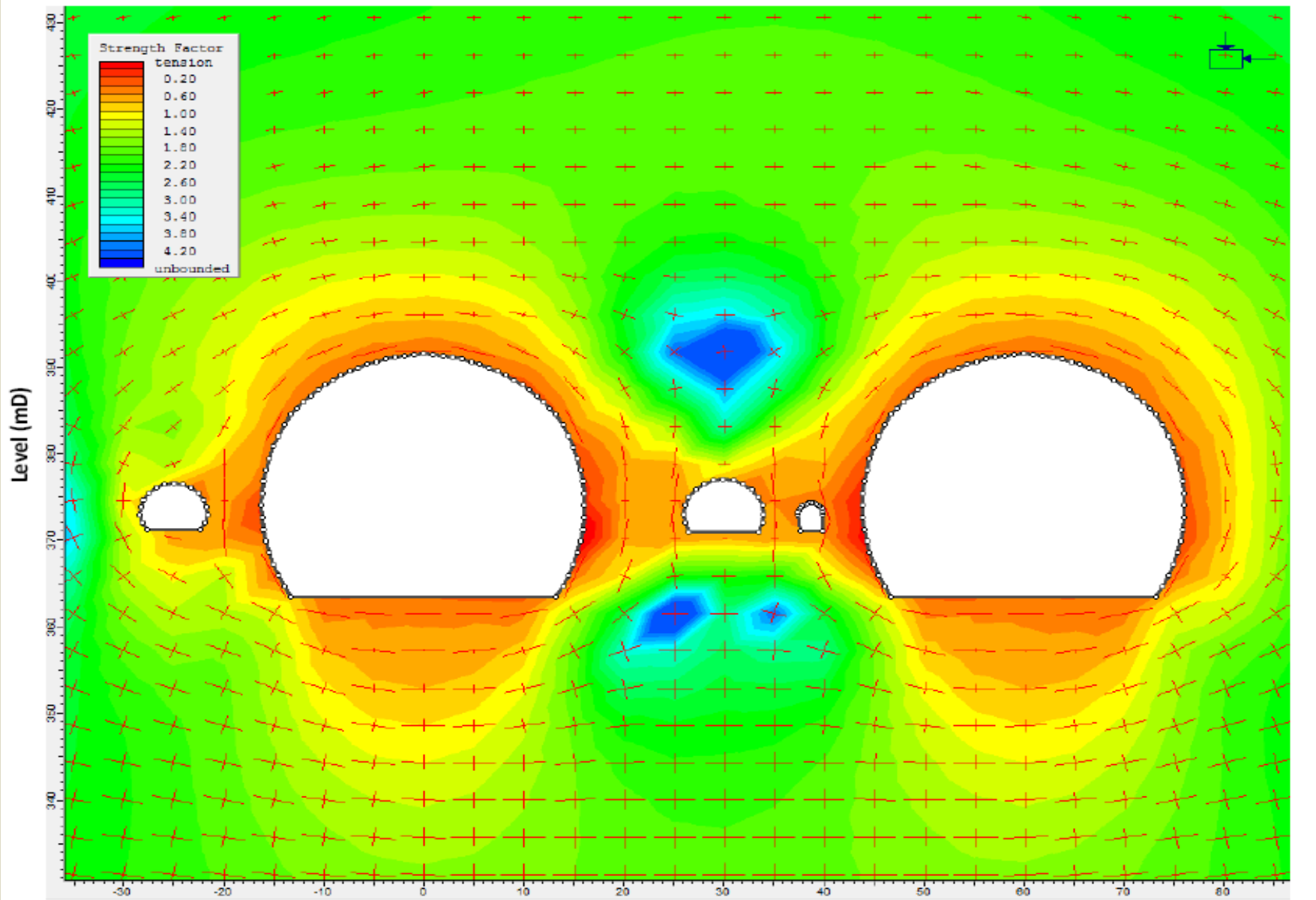


Air pads v Rollers for concrete platform movement will be further analysed

Task 2 - A detailed study of the potential behaviour of the rock mass surrounding the experimental area during the estimated 20-year life span of the machine.

- Experience from other cavern rock related mass conditions should be taken into account e.g LHC.
- 2D and 3D effects to be assessed.
- The study should assume that the experimental area is to be built in CERN geology, in the Molasse Rock
- The long-term behaviour of the excavation





2d and 3d models will be developed for CLIC to do a “Time-dependant” state analysis.

Possible 2nd phase use of these models for ILC layouts/geology.

Task 3 - Passive isolation slab design

- Required maximum relative rms displacement of the beams is 0.1nm.
- Below 4Hz, vibration can be mitigated by active systems through steering the beam.
- Provide passive isolation at the end of each accelerator tunnel, where the beams emerge from the tunnel before entering the detector.
- Slab could be approximately 50 – 100 tons of concrete, resting on several springs and dampers – this will be assessed through our evaluation, as outlined below.

Task 4 - Review of the Experimental Area design

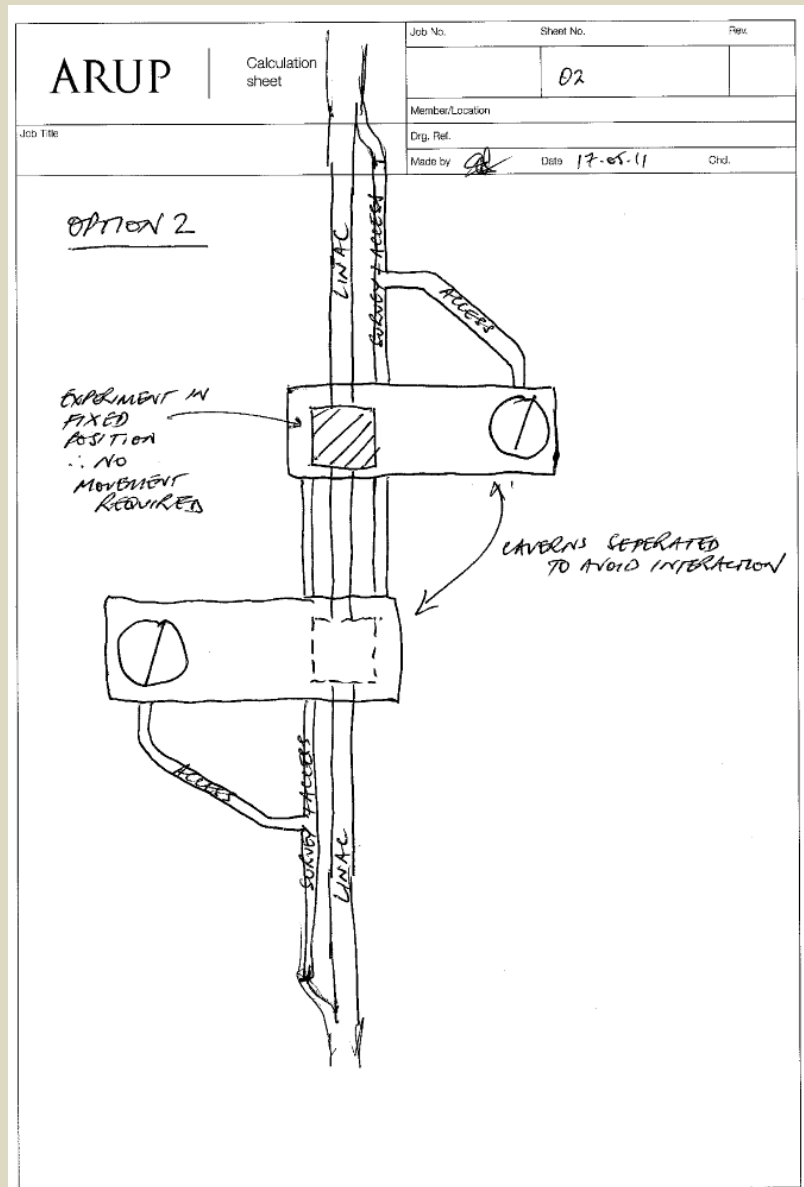
- Layout of the shafts/cavern based on available geotechnical information and current space proofing.
- Review of suitability of various strata depths for cavern location

To get this study going, ARUP have prepared a list of questions including a 'brainstorming' proposal for the IR layout.

To be discussed this afternoon.....

For example, ARUP have made a 'brainstorming' proposal for the IR layout :

To be discussed this afternoon.....



Budget for this Linear Collider IR study :

- FNAL (Task 1) CERN (Task 2)

Some key decisions for ILC were resolved at Eugene meeting :

- Are both detectors using the “concrete” platform strategy : Yes
- Are the level of the platforms the same ?
- For the overall layout :
 - Gantry crane capacity in the experimental hall ?
 - Should shafts be directly over the cavern or offset ?
 - Self shielding detectors : Yes for ILC



Next Steps

- ARUP's now ready to proceed with :
 - Task 1 - funded by FNAL
 - Task 2 - funded by CERN
- This study will be of benefit to both ILC and CLIC projects
- Design Criteria to be established at this meeting


14:00 - 16:30

CFS Discussion

Discussion und experimental hall issues with ILC-CFS, SID and ARUP

Conveners: Karsten Buesser (DESY) , Toshiaki Tauchi (KEK)

Location: Salle Bleue

Material: [Webex Info](#) 

14:00 **Introduction** 30'

Speaker: John Andrew Osborne (CERN)

14:30 **Push-pull Platform Studies and Simulations** 30'

Speaker: Marco Oriunno (SLAC National Accelerator Laboratory)

15:00 **Status of IR Design for CLIC** 30'

Speakers: Hubert Gerwig (CERN) , Andrea Gaddi (CERN)

Material: [Slides](#)  

15:30 **Discussion** 1h00'