VERTICAL ACCESS ILC IR LAYOUT for SiD and ILD

CONVENTIONAL FACILITIES AND SITING

V. Kuchler

Overview

- SiD/ILD Engineering and Detector Interface Working Meeting
- Description of Americas/European Regions Detector Hall Configuration for ILC TDR
- Supporting Consultant Work
- Efforts to Collect and Document Criteria
- Summary

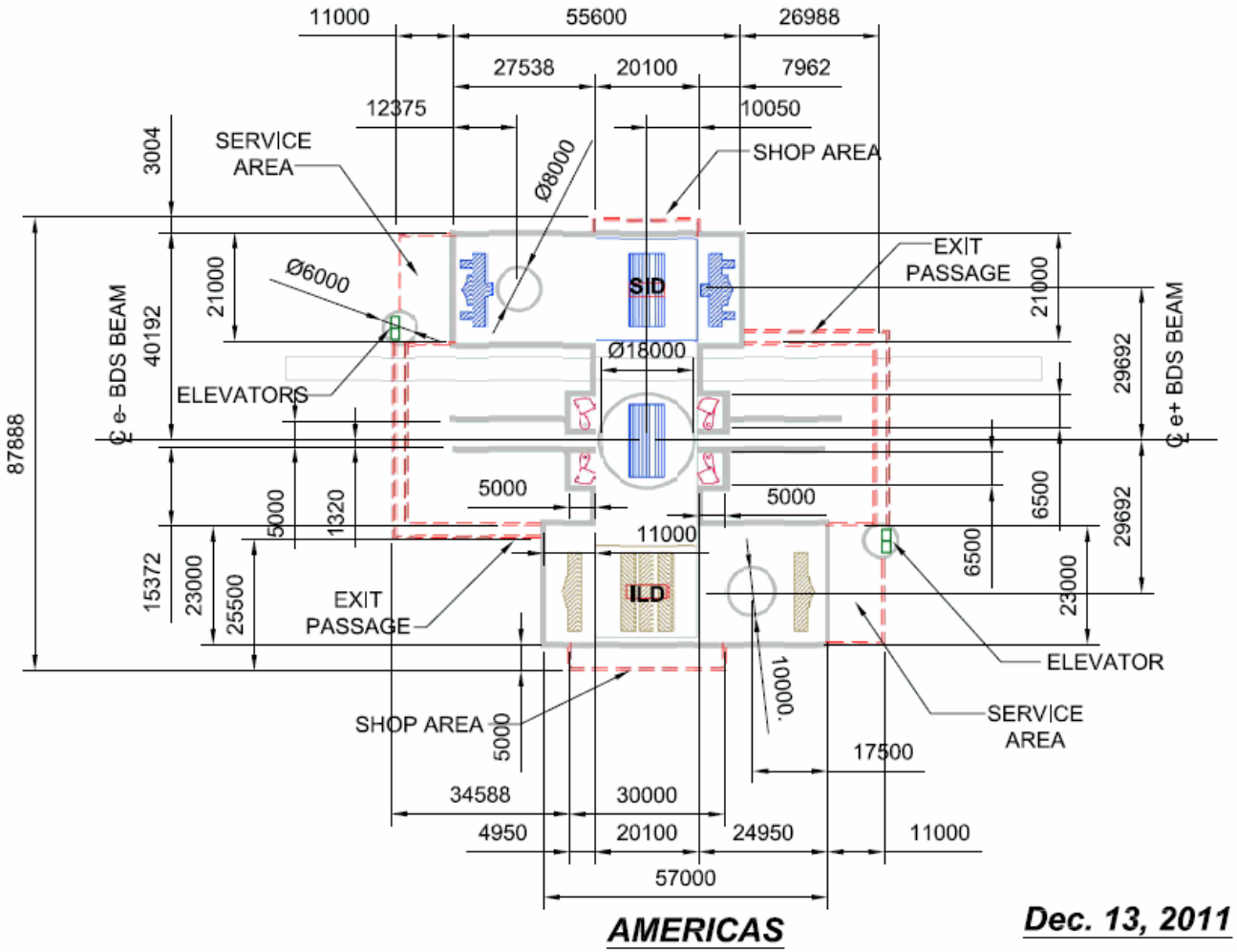
CFS and Detector Interface Working Meeting

- Part of a Pre-Meeting to the SiD Collaboration Meeting Held on Tuesday, December 13
- A Focused Meeting Specifically to Review Work to Date to Develop the ILC IR Hall Design and Finalize Layout
  - SiD and ILD Representatives
  - MDI Representatives
  - Asian, Americas and European CFS Representatives
  - ILC Project Management
- Summary of A/E Consultant (ARUP UK) Support Work
- Status of Asian Region Design for IR Hall in a Mountain Site
- SiD and ILD Installation Models for the Asian Region Mountain Site
- Status of Americas/European Design for IR Hall

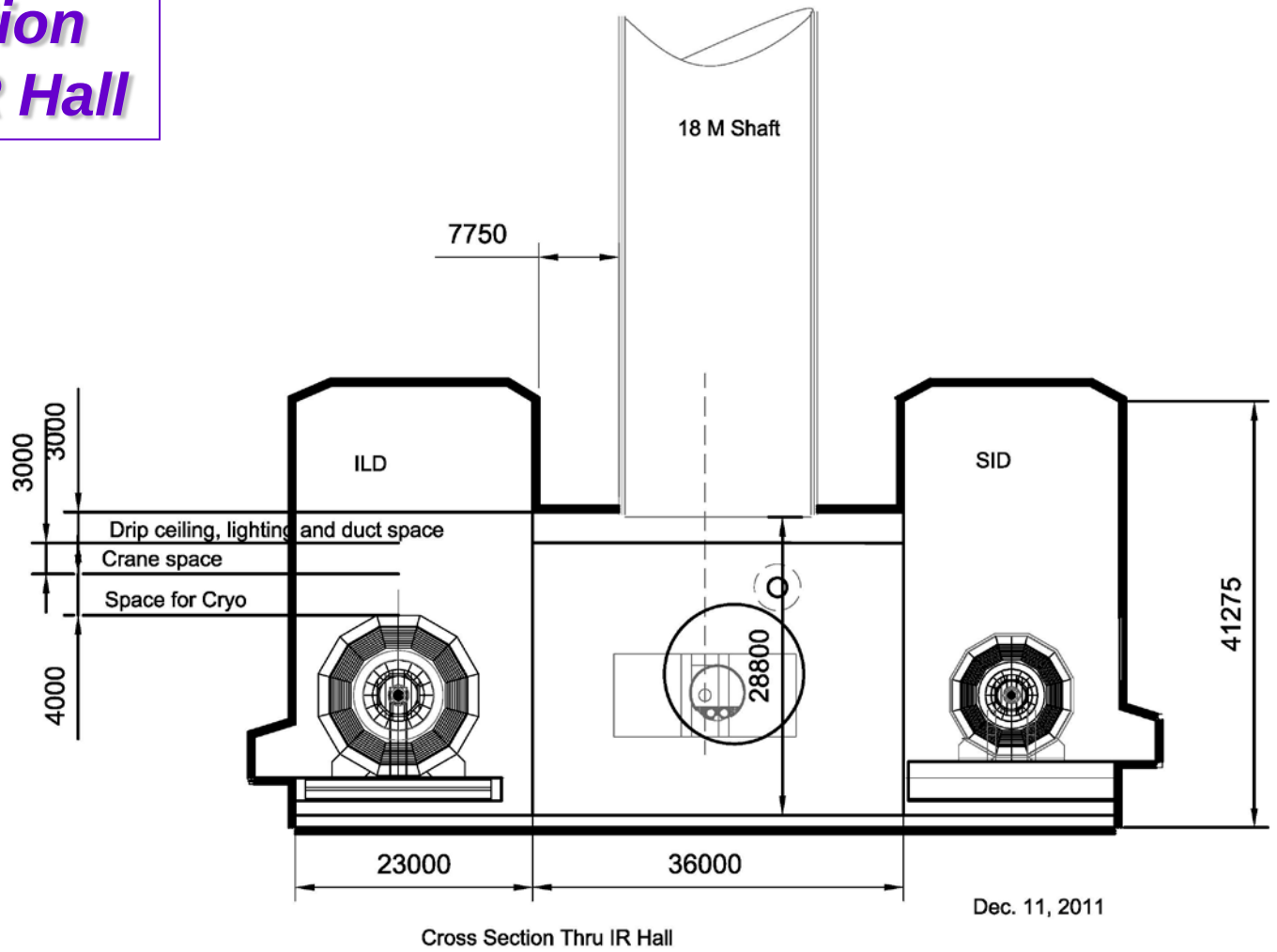
Americas/European Region IR Hall Design

- Fundamentally Different from the Asian Region Approach
- Vertical Shafts Provide Access to the Interaction Hall in the Americas and European Sites
- Requires Substantial Surface Presence for Detector Assembly Building, Gantry Crane and Ancillary Buildings
- Detector Assembly Methods will be Different from the Asian Region Approach
- The Goal for the CFS/ MDI/Detector Meeting was to Finalize the Last Open Criteria for the IR Hall Design for the Americas/European Regions
  - Final IR Hall Dimension Consensus
  - Final Shaft Size and Configuration
  - Resolution of Crane Capacities
  - Responsibility Pac-Man Design and Costing

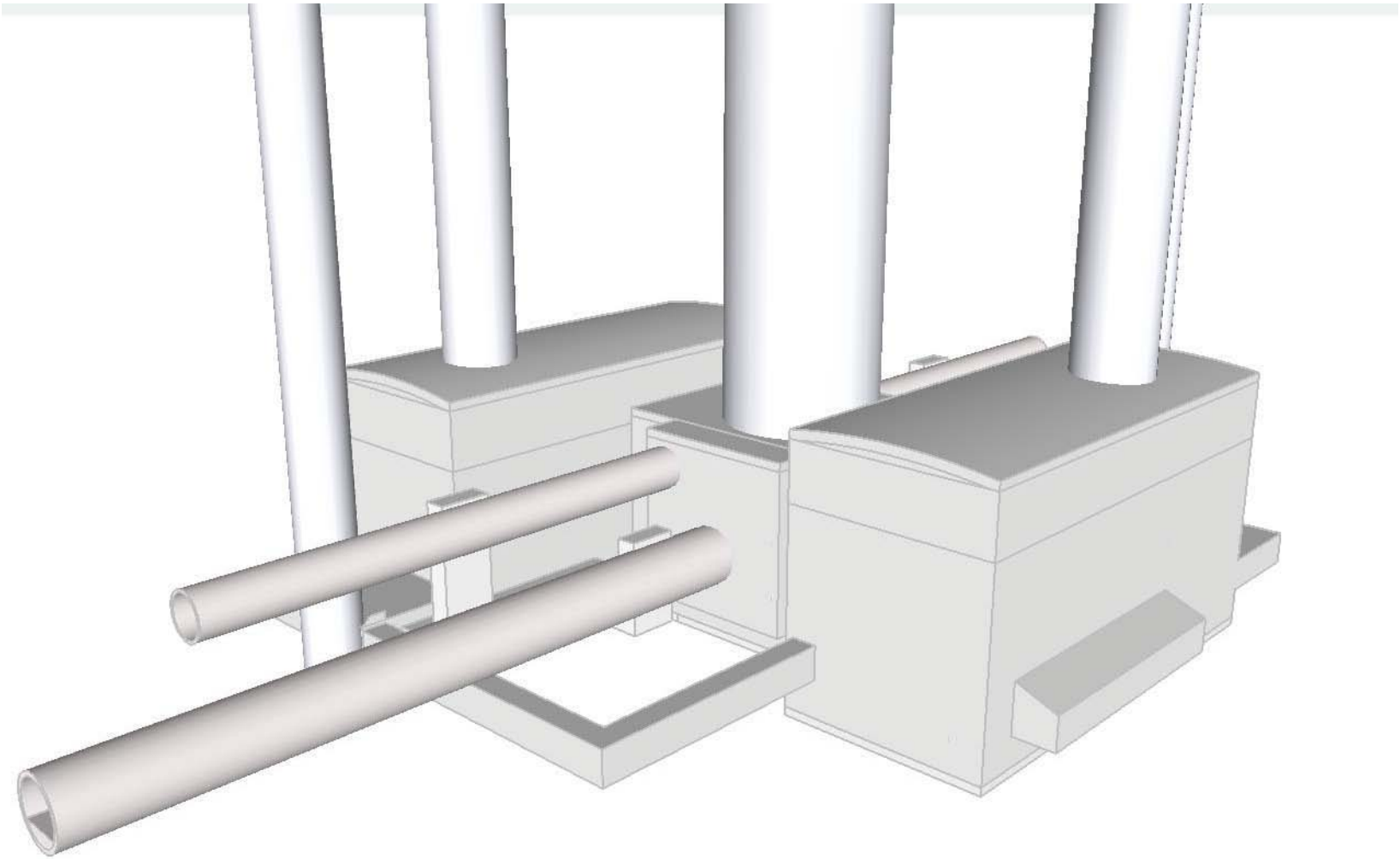
TDR Design for Americas and European ILC IR Hall Design

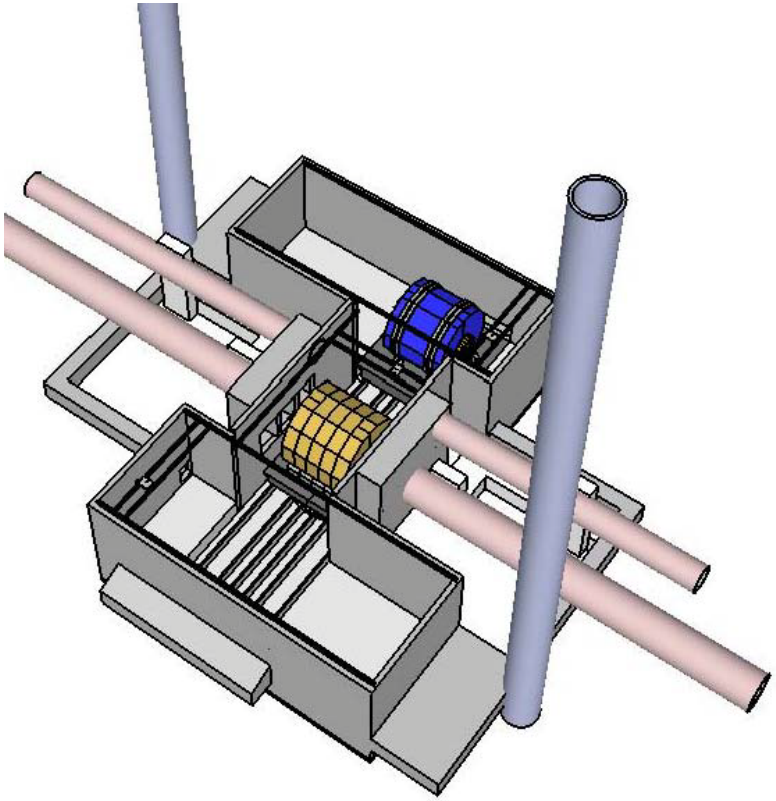


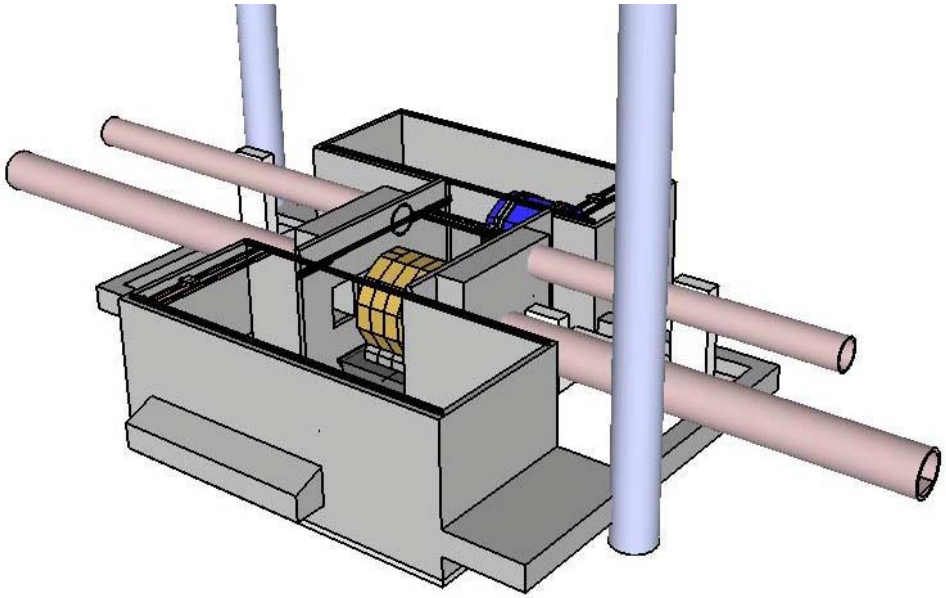
Cross Section Through IR Hall

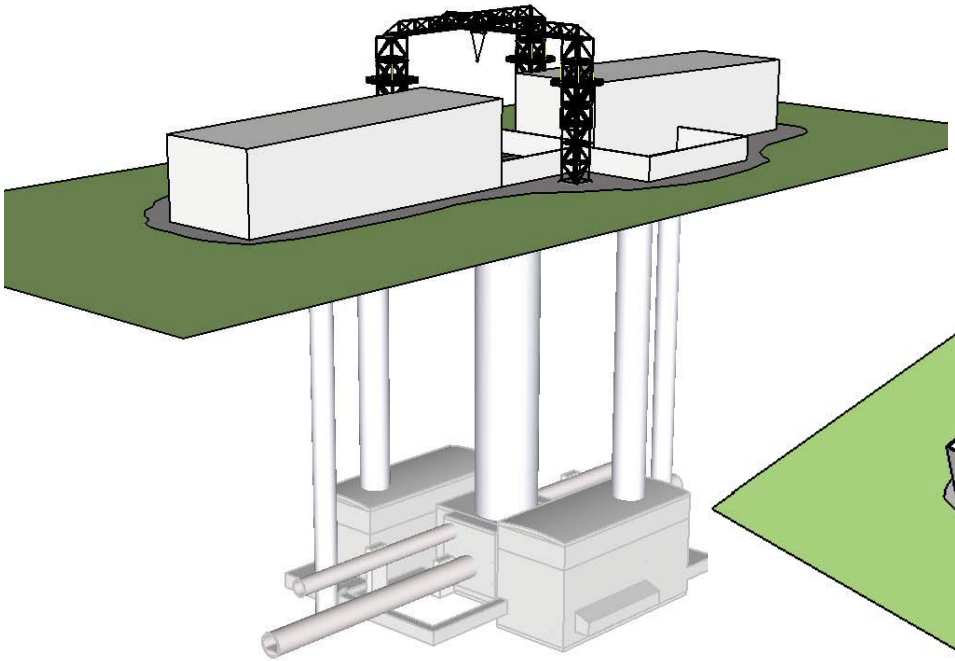


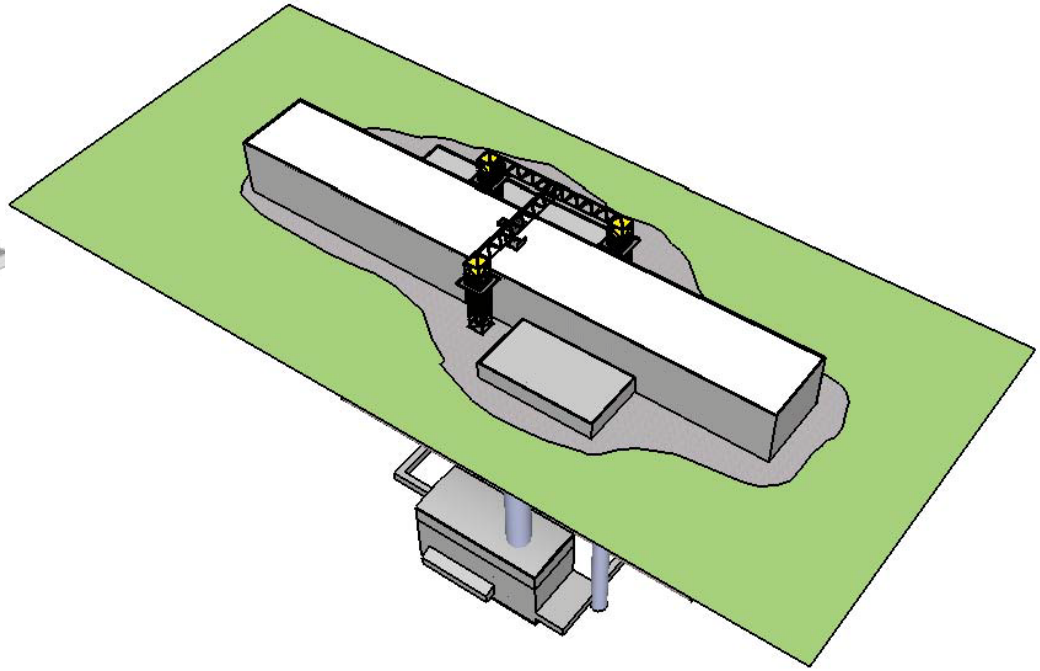
Cross Section Thru IR Hall











Cranes and Platforms

- ILD and SID Platforms in IR Hall
- ILD and SID Platforms in Surface Building
- Additional Cranes in Hall
  - One 40 Ton Crane in Each (SiD/ILD) Garage Area
  - One 100 Ton Crane Over Interaction Region
- Additional Cranes at Surface Buildings
  - 4000 Ton Main Hoist
  - One 250 Ton Crane Over Each (SiD/ILD) Assembly Area
  - Plus 40 Ton Crane Over Each (SiD/ILD) Garage Area Shaft

Pac-Man

- Design and Costing will Continue to be Developed by the MDI/Detector Groups
- Assignment of Costs - TBD

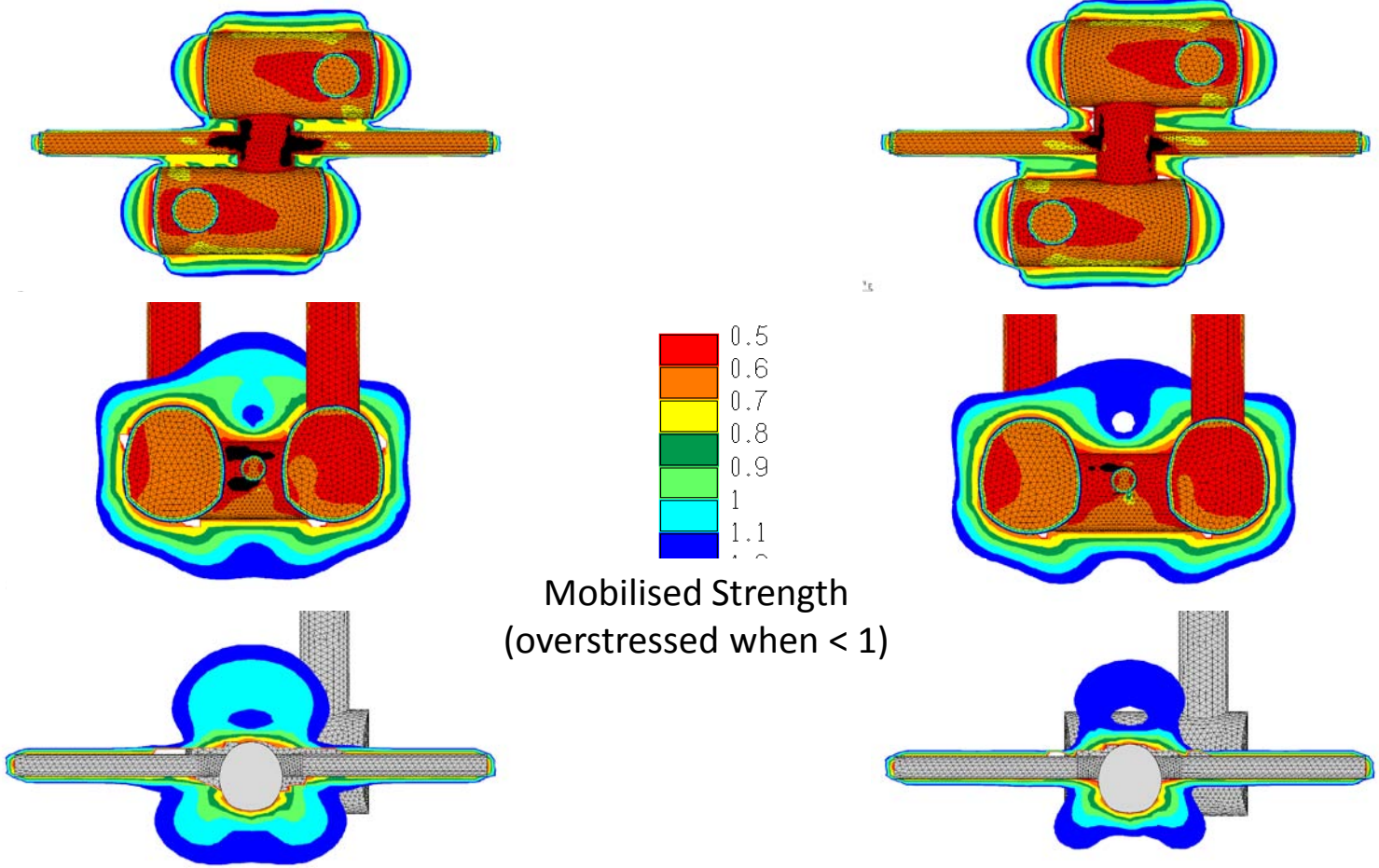
Supporting Consultant Work for IR Hall Design

- Contracts were Developed with ARUP UK to Supplement Americas and European IR Hall Design for Both ILC and CLIC
  - Geotechnical Ground Model Using the CLIC IR Hall Design and CERN Geology
  - Platform Design for Detector Movement in IR Hall with Options for Movement Systems (Applicable to Both ILC and CLIC Detectors)
- J Osborne Provided a Summary of the Work Completed to Date
- Final Reports will be Submitted in Early 2012

Contours of Overstress

Geometry G

Geometry G + 10m



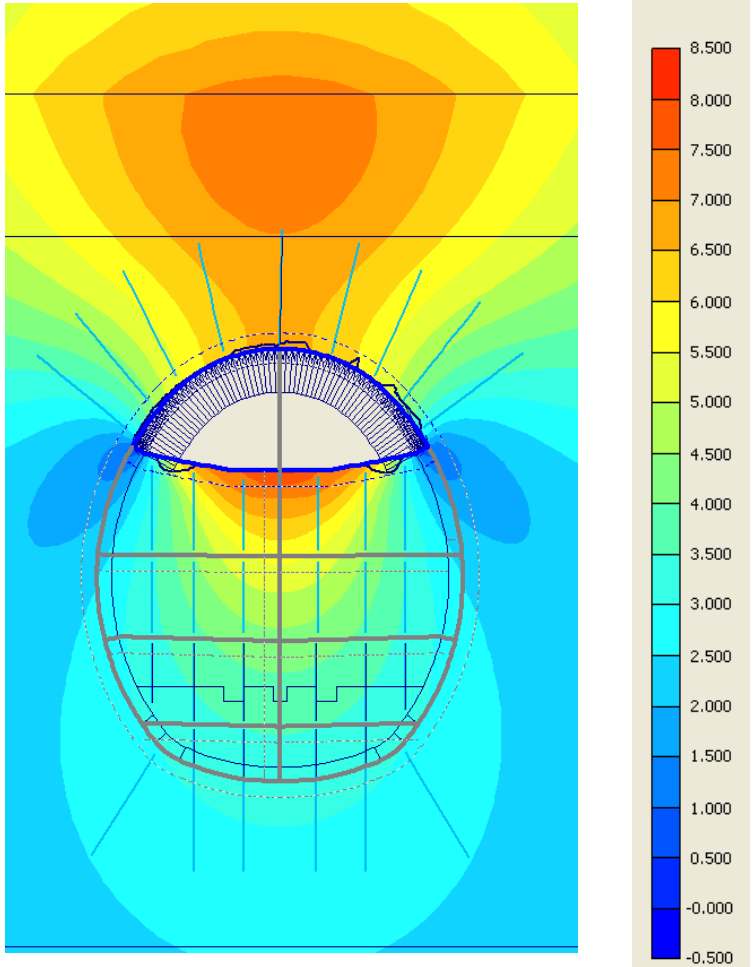
Mobilised Strength
(overstressed when < 1)

Example – Top Heading Excavation

Ground Deformations

-Invert deformations are in accordance with measured displacements at CMS.

-Maximum tunnel convergence = 0.2% which is acceptable

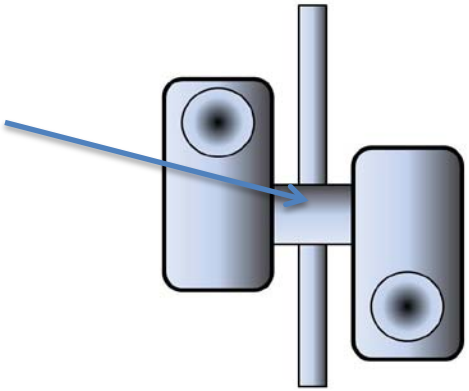


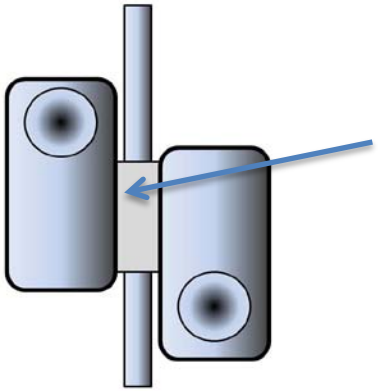
Revision G

Caverns Moved Closer

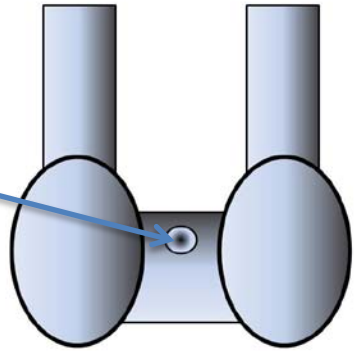
~20m separation

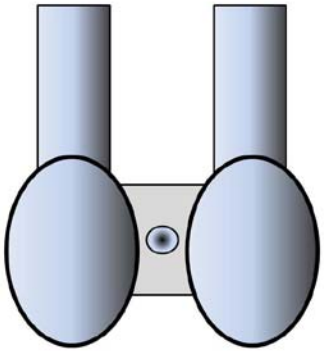
Concrete Pillar, separation governed by detector proximity





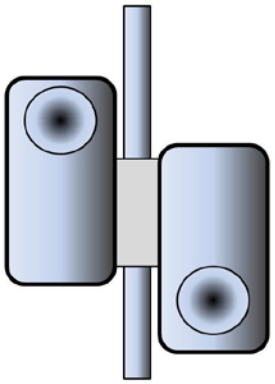
High Stress around IR

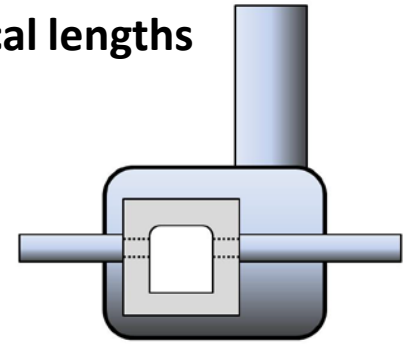


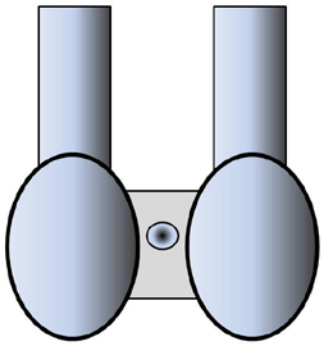


Potential Advantages:

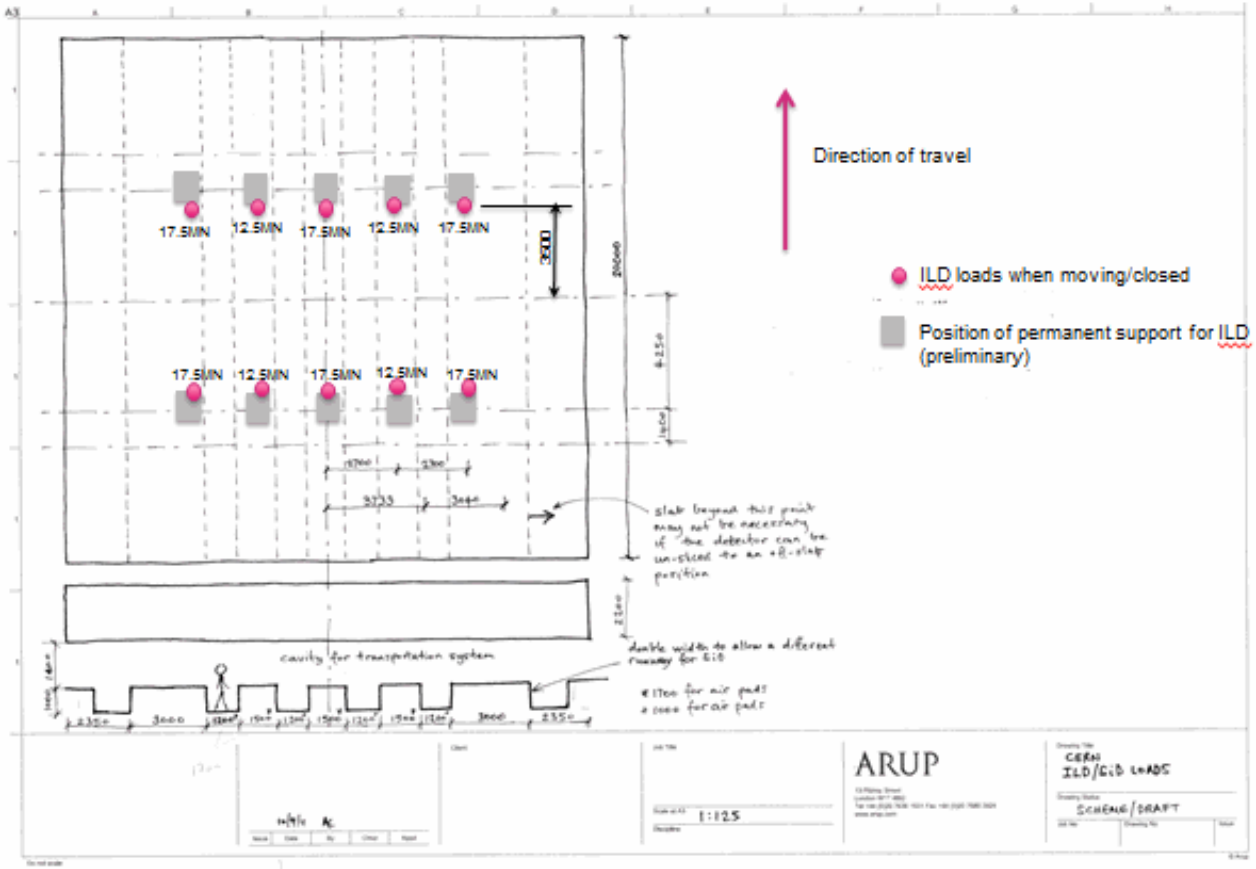
- **Reduces lining stress around caverns**
- **Slab foundations likely to be extremely stiff**
- **Vertical walls at IP, machine/detector interface can be optimised**
- **Slab size potentially independent of detector width**
- **Minimum travel time and umbilical lengths**







ILD top loads when moving/closed



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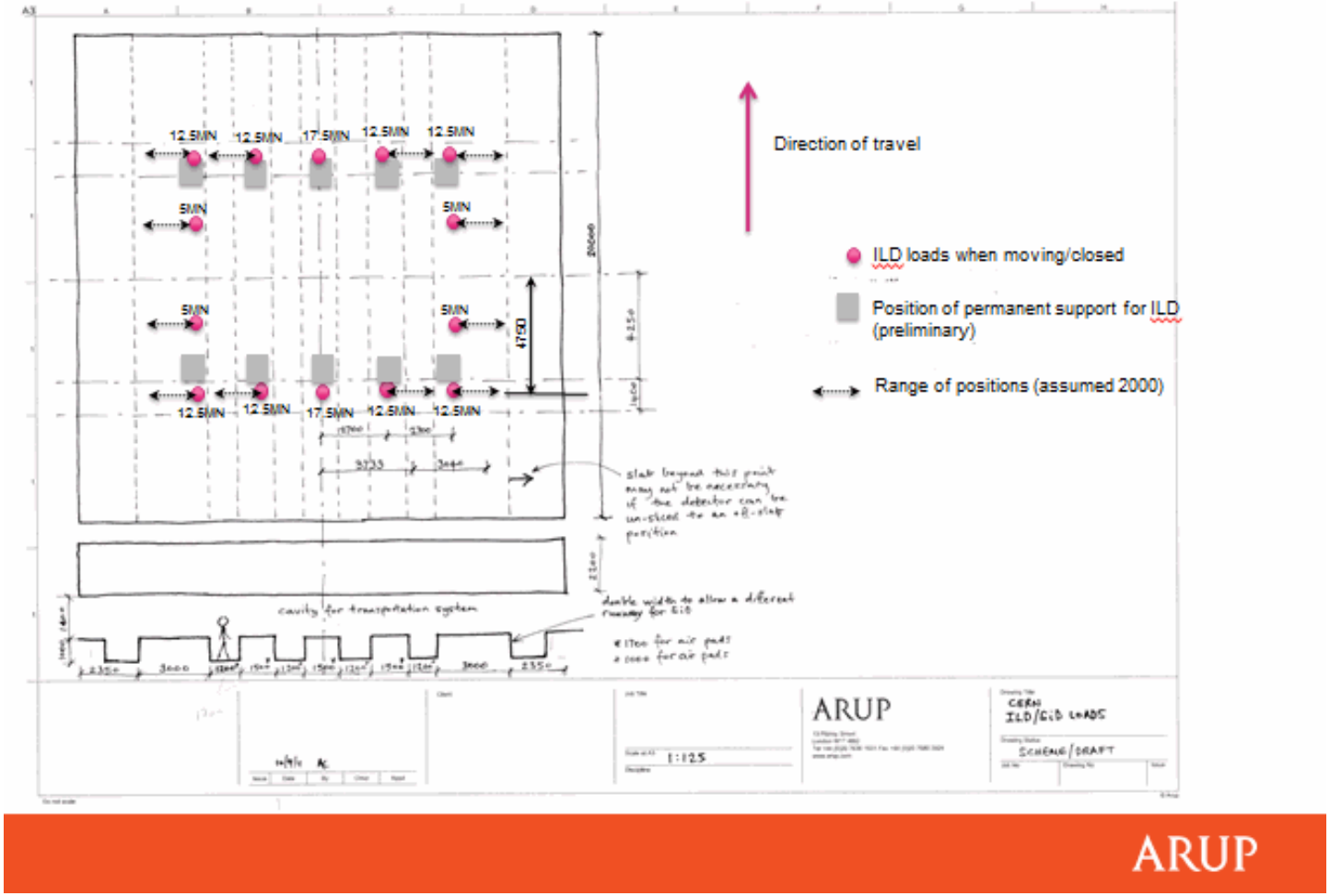
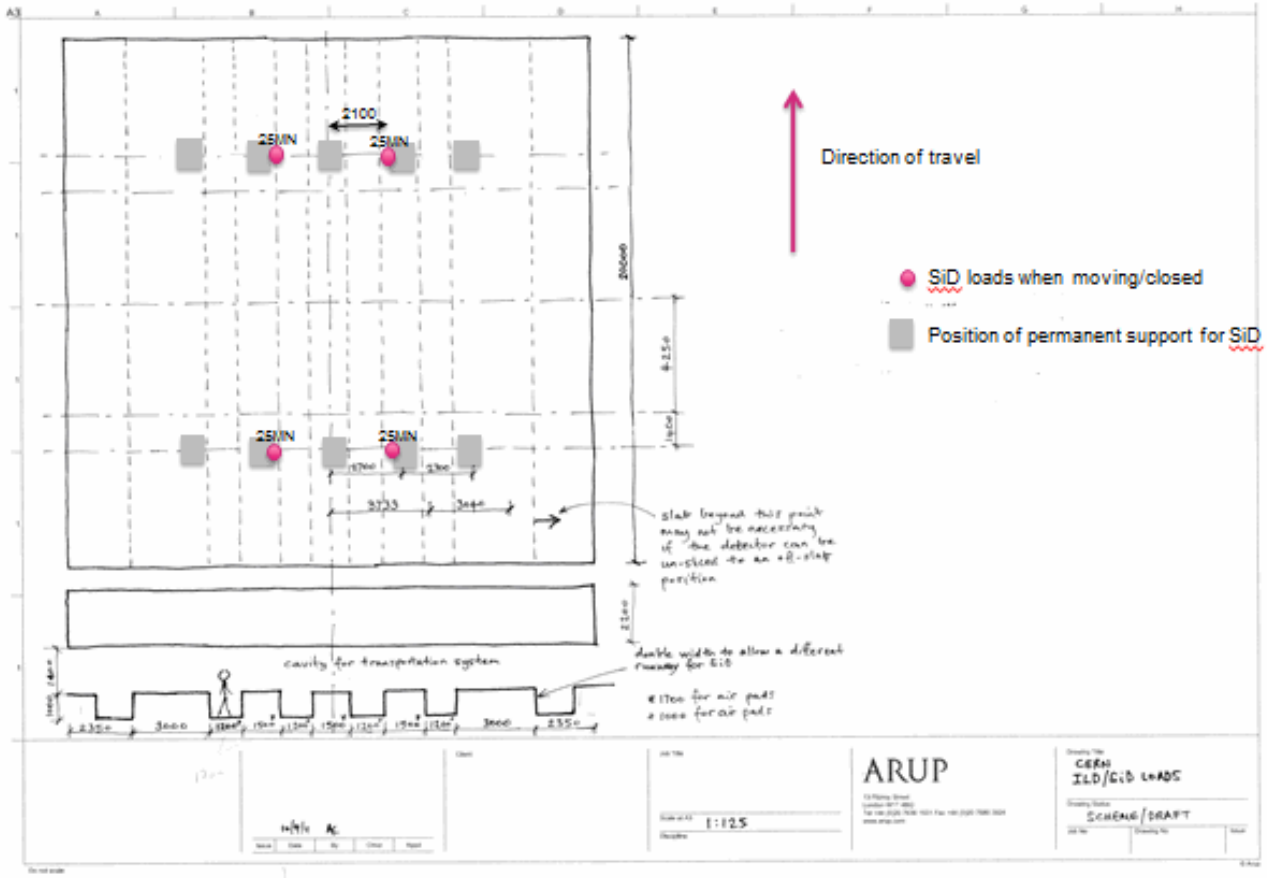
ILD top loads when un-slicing

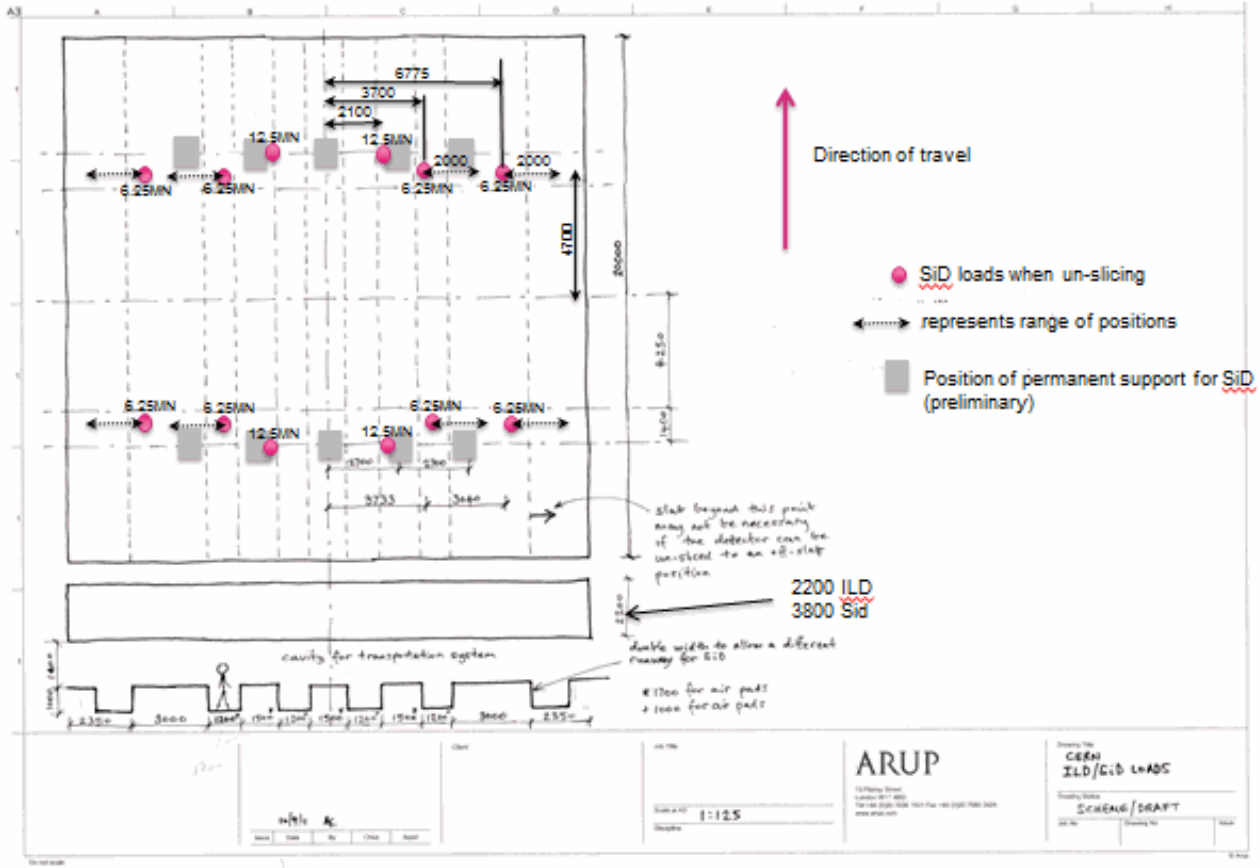


SiD top loads when moving/closed



ARUP

SiD top loads when un-slicing



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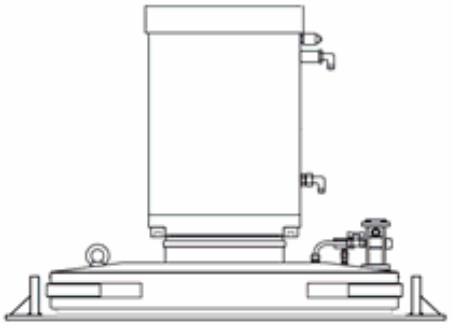
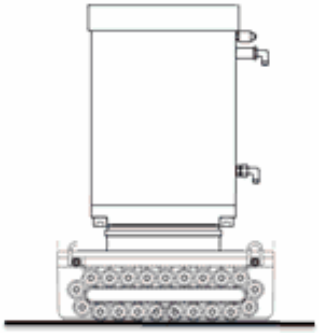
The movement support system

Air pads or rollers





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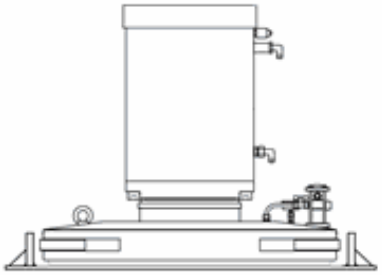
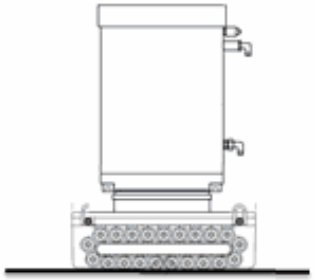
Comparison ot the two

Air pads or rollers





Pads	Rollers
Min 50 required	Min 18 required
No hardened track->can accommodate minor steps	Specialist hardened and flattened track
Design for 1% friction	Design for 3% friction
Pressure infrastructure	Larger propulsion infrastructure
Run-away	Higher friction ->less run-away
Extra complication of air system	

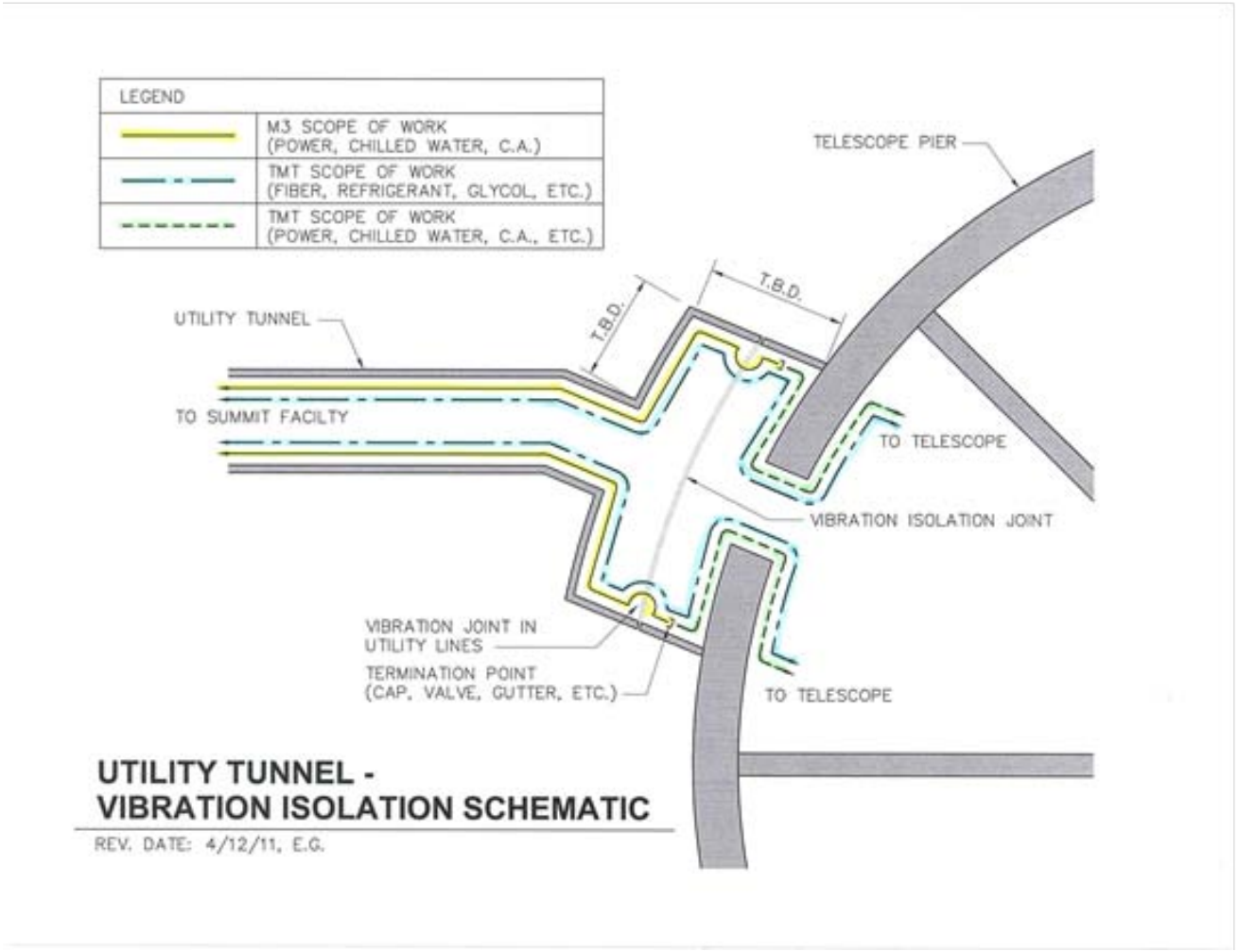
ARUP

Consultant Summary

- CERN Geology was the Basis of the Analysis
- Floor and Platform Design (Using CERN Geology) can Meet the Deflection Limits Required by ILC/CLIC Detector Groups
- CLIC IR Hall Configuration can Benefit by a Central Pillar Design at the Interaction Point
- Rock Strength for the Americas (Limestone) and Asian Region (Granite) Geology is Stronger than the CERN Mollasse
- Platform Design has been Completed and is Applicable for Both ILC and CLIC Detectors
- Additional Contracts will be Established with ARUP UK
  - Survey of Air Pad and Hillman Roller Installations Moving Loads Equivalent to ILC/CLIC Detector Loads
  - Geotechnical Analysis of ILC IR Hall Configuration in the Americas Region Limestone Geology

Criteria Documentation

- F Asiri Described the Interface Control Document Used to Document Criteria for the Thirty Meter Telescope (TMT) Currently Being Designed for a Site in Hawaii
- This Format can be Used During the Preliminary Design Stage as well
- Information for both the SiD and ILD Detectors will be Documented Using this Format
  - F Asiri will Work with the SiD Detector Group
  - T Lackowski will Work with the ILD Detector Group
- After Review and Consensus by both the Detector Groups and CFS, Criteria will be Entered into the ILC EDMS System


LEGEND
M3 SCOPE OF WORK (POWER, CHILLED WATER, C.A.)
TMT SCOPE OF WORK (FIBER, REFRIGERANT, GLYCOL, ETC.)
TMT SCOPE OF WORK (POWER, CHILLED WATER, C.A., ETC.)
TELESCOPE PIER
T.B.D.
T.B.D.
UTILITY TUNNEL
TO SUMMIT FACILTY
TO TELESCOPE
VIBRATION ISOLATION JOINT
VIBRATION JOINT IN UTILITY LINES
TERMINATION POINT (CAP, VALVE, GUTTER, ETC.)
TO TELESCOPE
UTILITY TUNNEL - VIBRATION ISOLATION SCHEMATIC
REV. DATE: 4/12/11, E.G.

1. INTRODUCTION

This is the SiD Structure (STR) to IR detector Hall Interface Control Document.

The intended audience for this document are:

- The SiD Structure design team
- The CFS design team

This document is a living document and will be updated to account for changes and upgrades to the IR Detector Hall and the SiD structure designs.

Summary

- Interaction and Exchange Between the MDI/Detector Groups and the CFS Group has been Extremely Productive
- The CFS Group Now has the Fundamental Criteria Required to Produce the ILC TDR
  - Americas, European and Asian Dimensional Requirements for IR Hall Design
  - Crane Coverage Requirements have been Established
  - Detector Assembly Schemes for Both Asian Mountain Region w/Horizontal Access and Americas and European Region w/Vertical Shaft Access have been Considered and are Understood
- The CFS Group Now has the Information Needed to Proceed with the ILC TDR