Accelerator Working Group 9 Summary

Civil engineering and scheduling

Conveners:	A.Enomoto	(KEK)
	V.Kuchler	(FNAL)
	J.Osborne	(CERN)

Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

Thursday October 21 - Mont Blanc tunnel tour

LHC Cryo Visit Monday 18th Oct

- Purpose of the tour :
  - Get a better understanding of space requirements for Cryo equipment, both on surface & underground
  - Re-establish points of contact between LHC Cryo and ILC CFS experts
  - Learn from LHC experience

Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

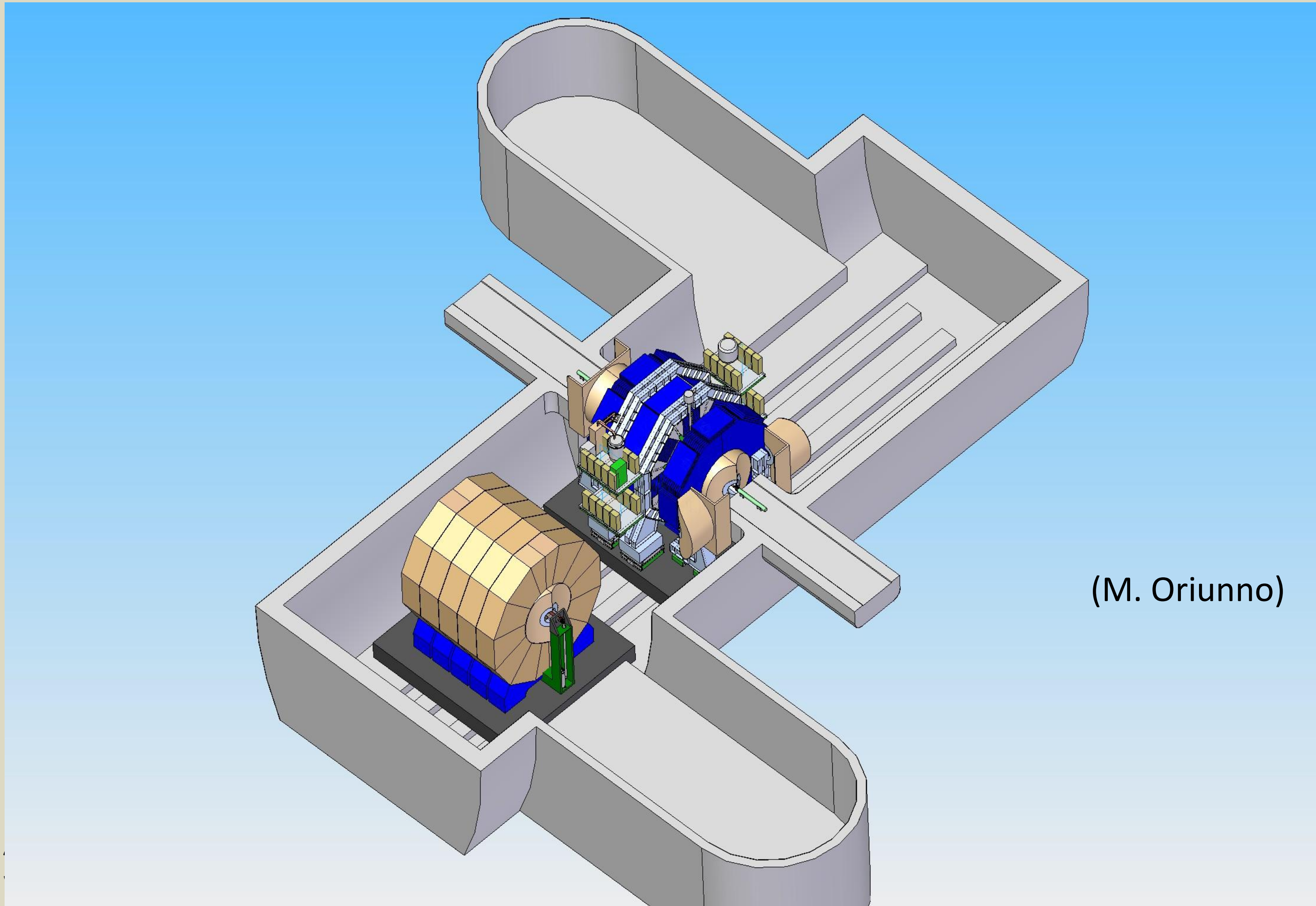
Thursday October 21 - Mont Blanc tunnel tour

General Detector Motion System Issues (Push-Pull @ ILC)

A. Hervé / ETH-Zürich

IWLC2010 – 19 Oct. 2010

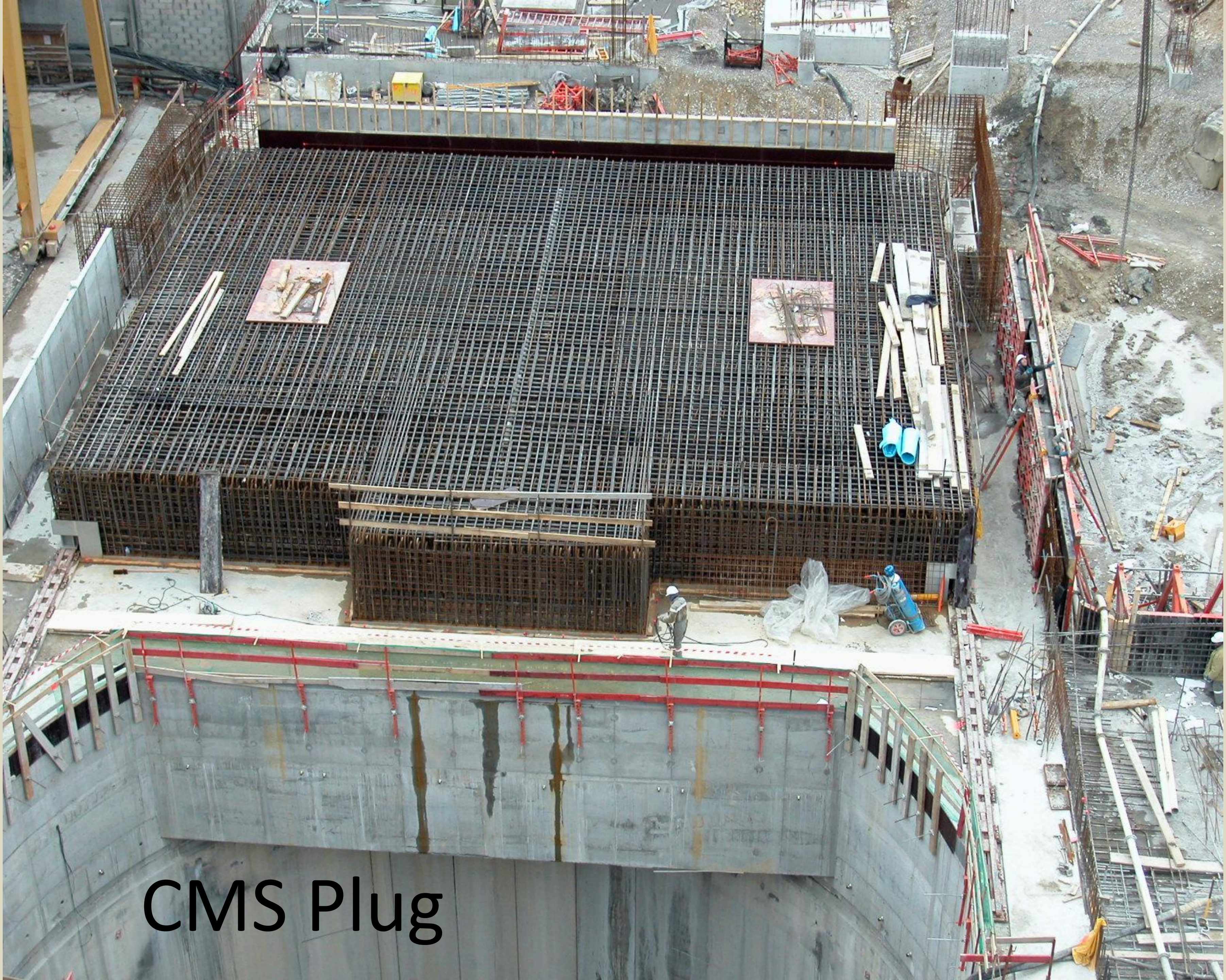
Both detectors on a platform



(M. Oriunno)

Platform cost

- The problem of cost has been mentioned as a possible drawback.
- Indeed, using CMS plug as an example, the cost of each naked platform has been estimated, together with J. Osborne, to 1 MCHF (≠ 1M$).
- However this has to be balanced against other hidden costs that I will mention later (like piling) and clearly against risks.



CMS Plug

Conclusions-I

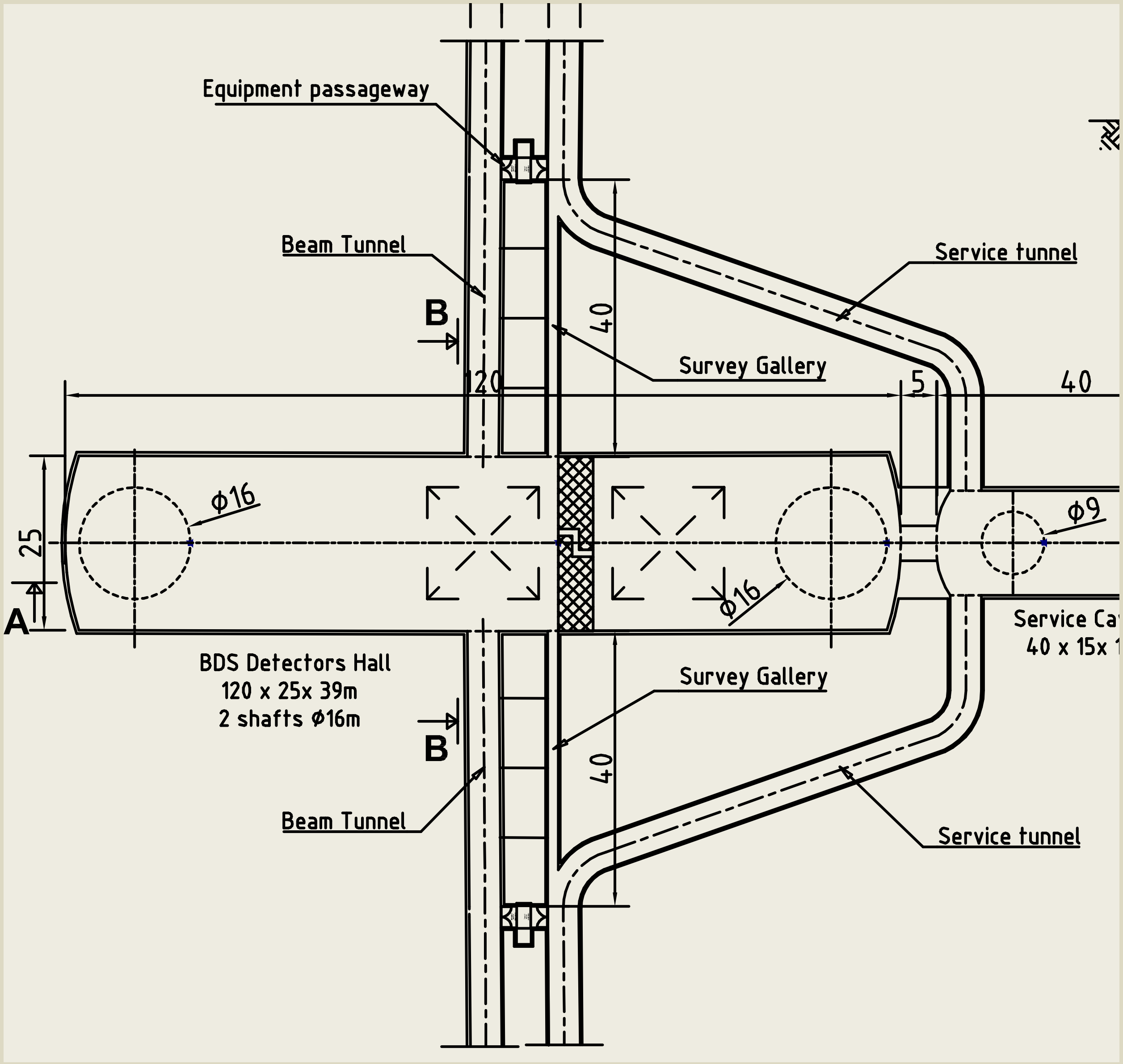
- The push-pull operation to quickly exchange two detectors on IP is an important feature of any LC.
- To be efficient this operation has to be carried out in less than three or four days including precise realignment on beam.
- This is a very challenging and difficult task as this system cannot fail even if local conditions worsen with time.
- The risk of finishing after some years with a non-functioning system must be avoided at all cost.

Brief Overview of Interaction Region Conventional Facilities in RDR Times

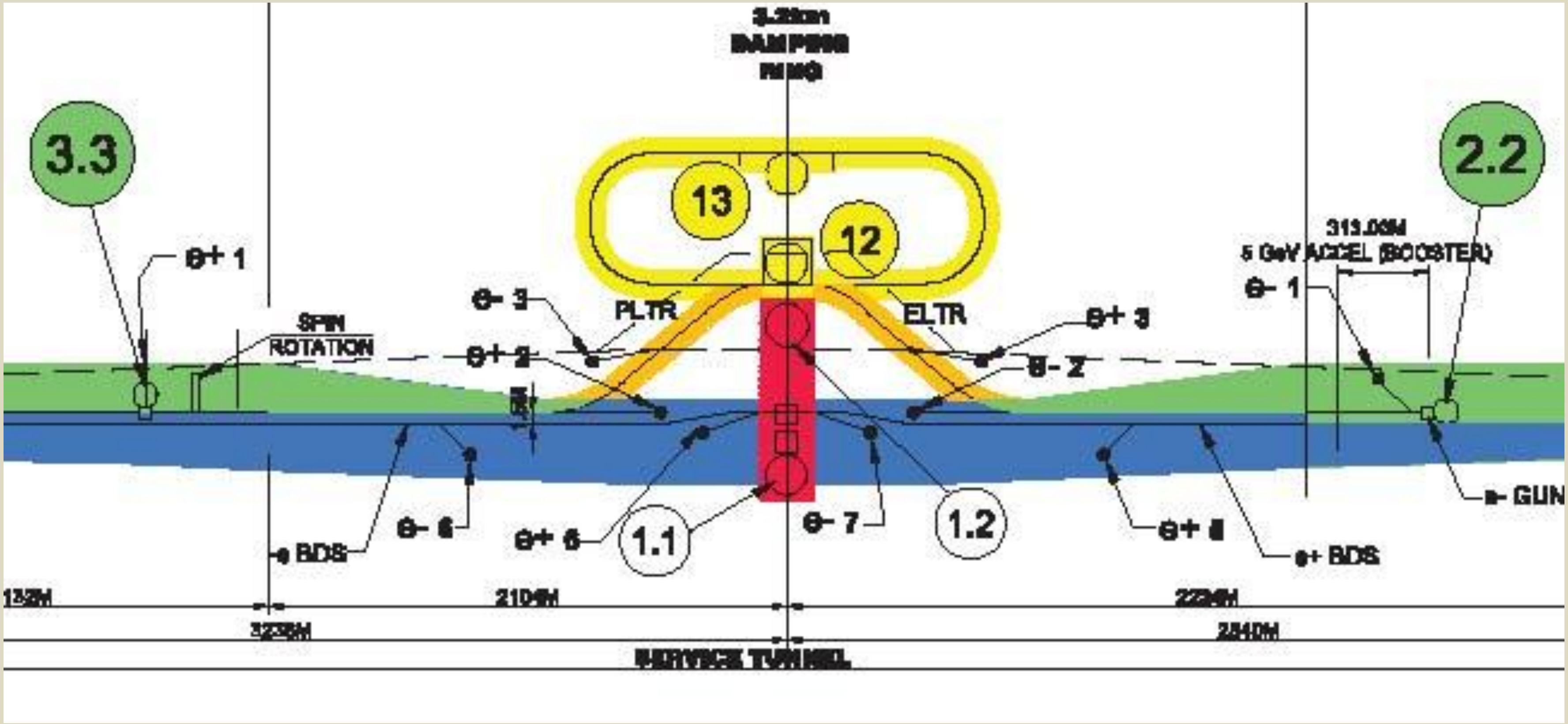
Presenter

Tom Lackowski

RDR Baseline Layouts for Interaction Region



Current Geometry



Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

Thursday October 21 - Mont Blanc tunnel tour

Presentation of the CLIC Experimental Area

Version considered for CDR…

Contributions from

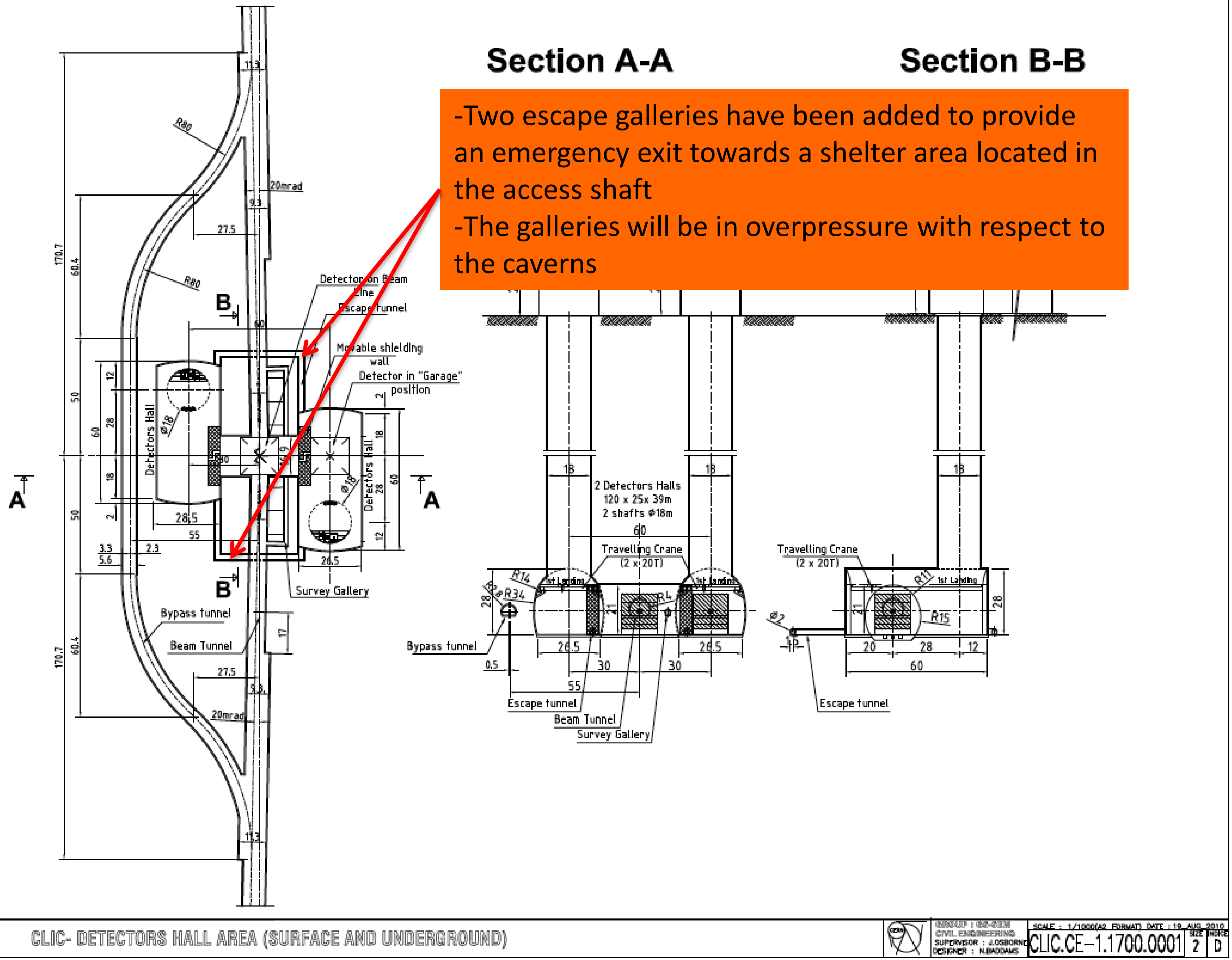
DGS-SC	EN-CV	EN-MEF	GS-SEM	PH-CMX
F Corsanego	*M Nonis*	*M Gastal*	*J Osborne*	*A Gaddi*
			N Baddams	*H Gerwig*
			A Kosmicki	*A Herve*
				N Siegrist

Section A-A

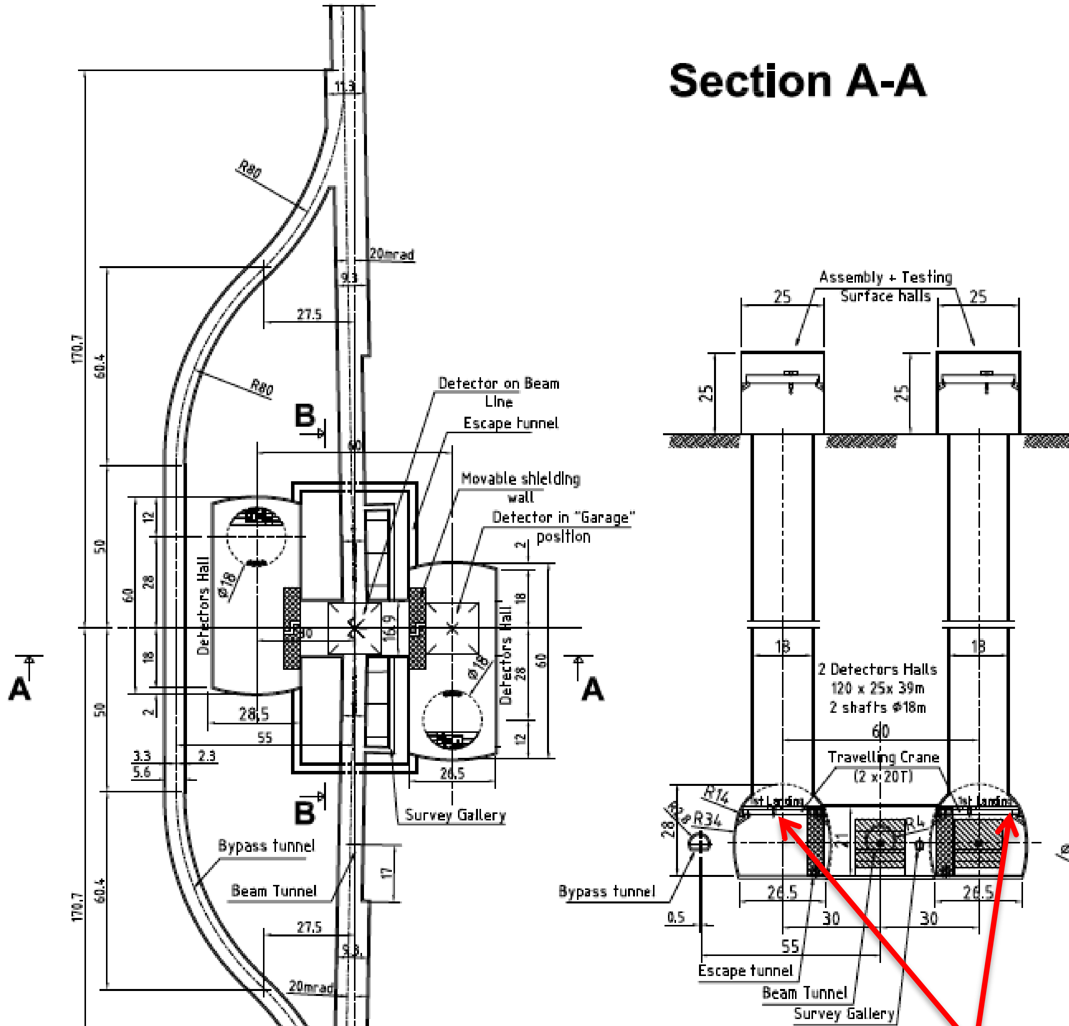
Section B-B

-Two escape galleries have been added to provide an emergency exit towards a shelter area located in the access shaft

-The galleries will be in overpressure with respect to the caverns

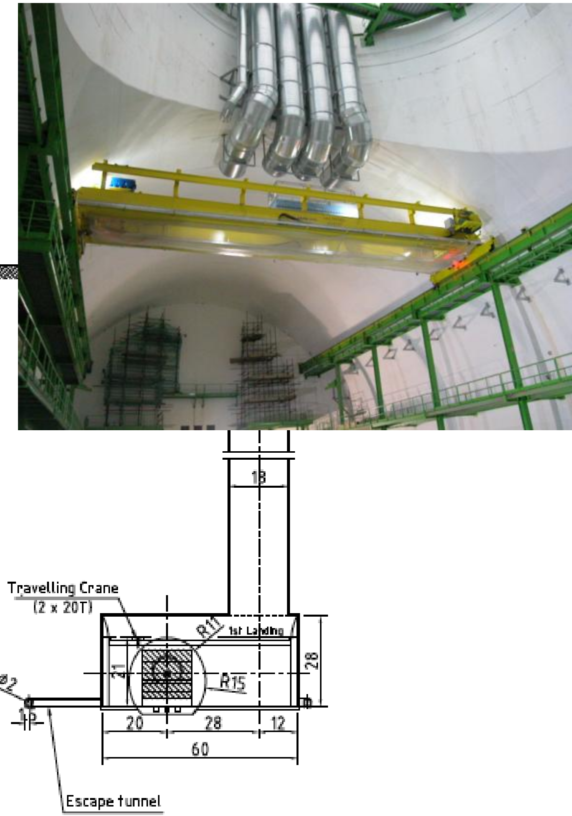


martin.gastal@cern.ch



Section A-A

Section B-B



-One 20ton overhead crane would be installed in each cavern.

-Based on the CMS concept

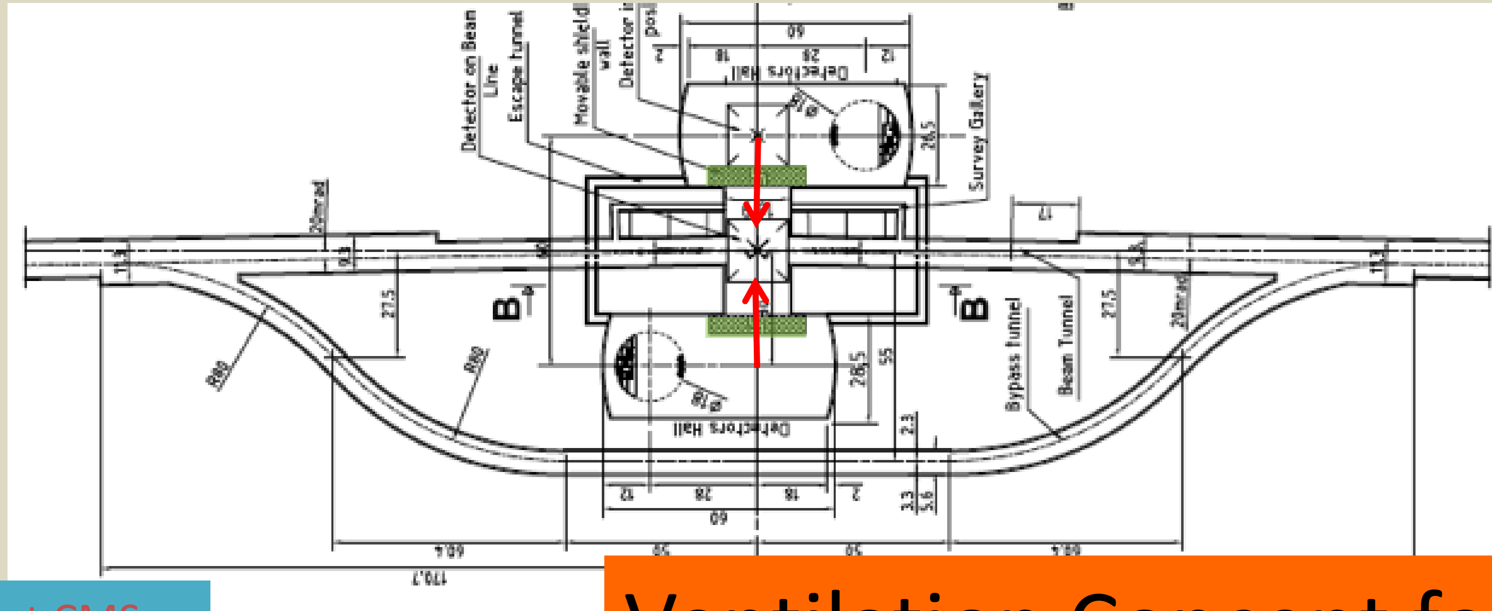
CLIC- DETECTORS HALL AREA (SURFACE AND UNDERGROUND)

CLIC.CE–1.1700.0001

Initial assumption to be confirmed by RP:

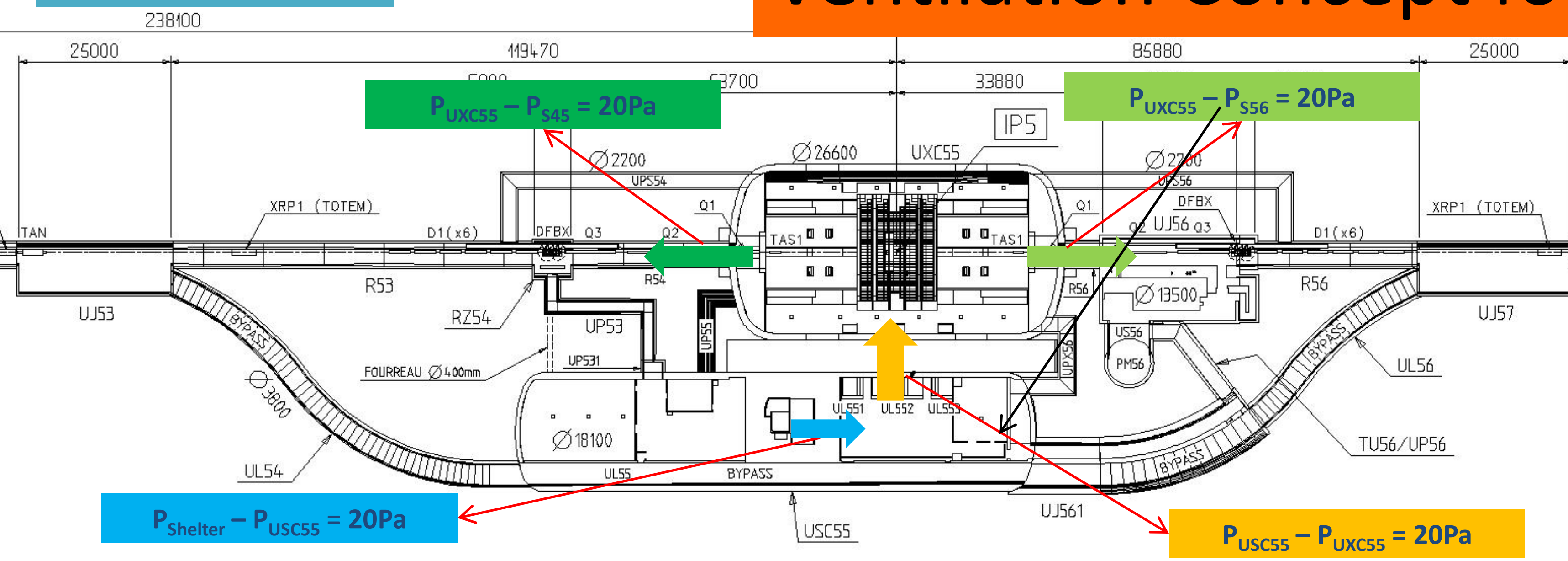
→ The interaction region should be a ventilation sector separated from the caverns

→ Dynamic confinement to be considered

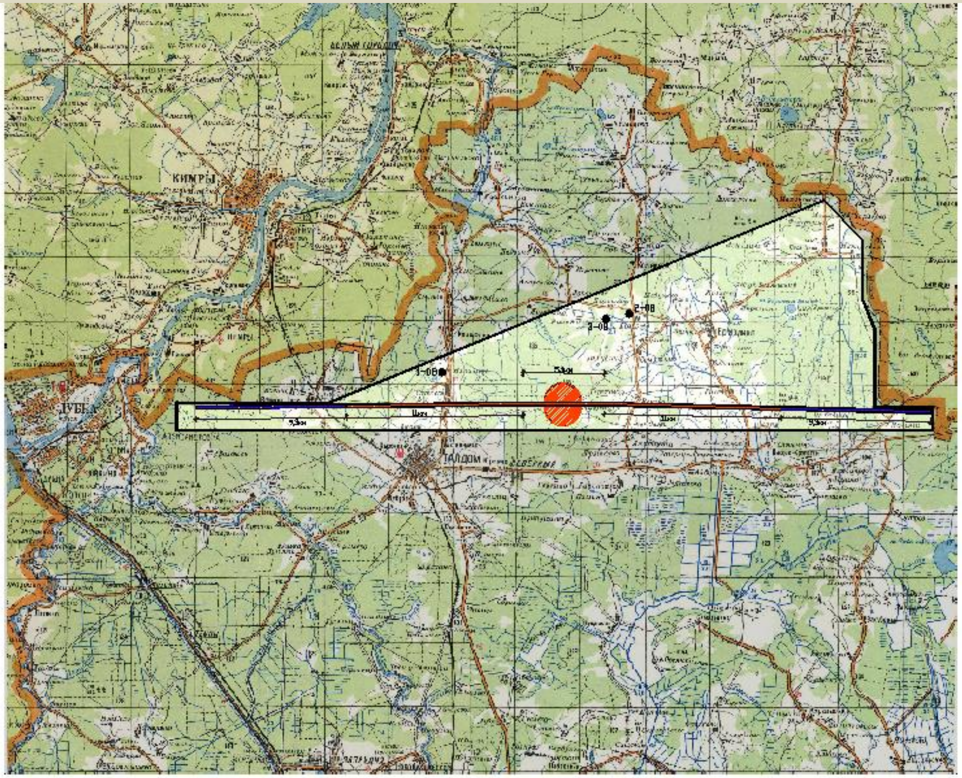


Scheme at CMS

Ventilation Concept for IR



IDENTIFICATION OF OPTIMAL ILC LOCATION FOR DUBNA SAMPLE SITE



Main goal of the work:

to restrict size of the area for further possible geological survey

Main requirements for optimal location:

- minimal populated territory;
- engineering infrastructure of the territory (roads, power sources, etc.);
- results of preliminary geological survey

Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

Thursday October 21 - Mont Blanc tunnel tour

Preparing Schedules for the ILC PIP & TDR

Peter H. Garbincius

Fermilab

CFS at IWLC2010

CICG - Geneve – October 20, 2010

short & sweet summary

more in back-up slides

filename: PIP-Schedule-PHG-20oct2010-CFS.ppt

PIP-schedule(s) should:

- Accommodate multiple governance models
- Accommodate multiple sites (flat vs. mountainous)
- Include pre-construction activities
- Civil Engineering must include ML caverns, tunnel widenings, and Damping Rings
- Illustrate, if not solve, interferences & bottle-necks
- Accommodate early commissioning of e- Source, auxiliary e+ Source, & DRs during construction of ML, RTML & installation of BDS
- Accommodate commissioning of BDS while installing Experiments

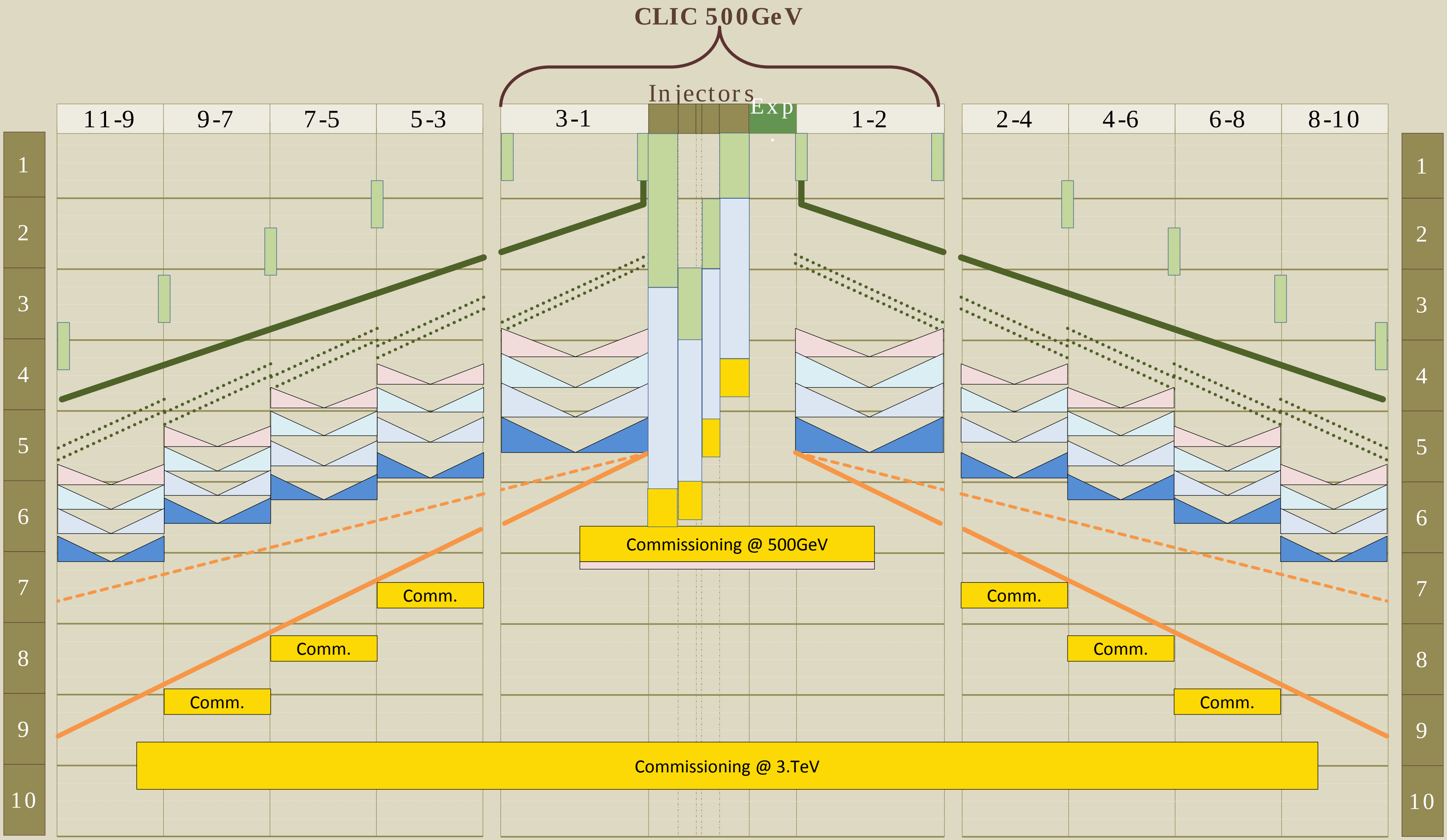
CLIC Schedule

K. Foraz

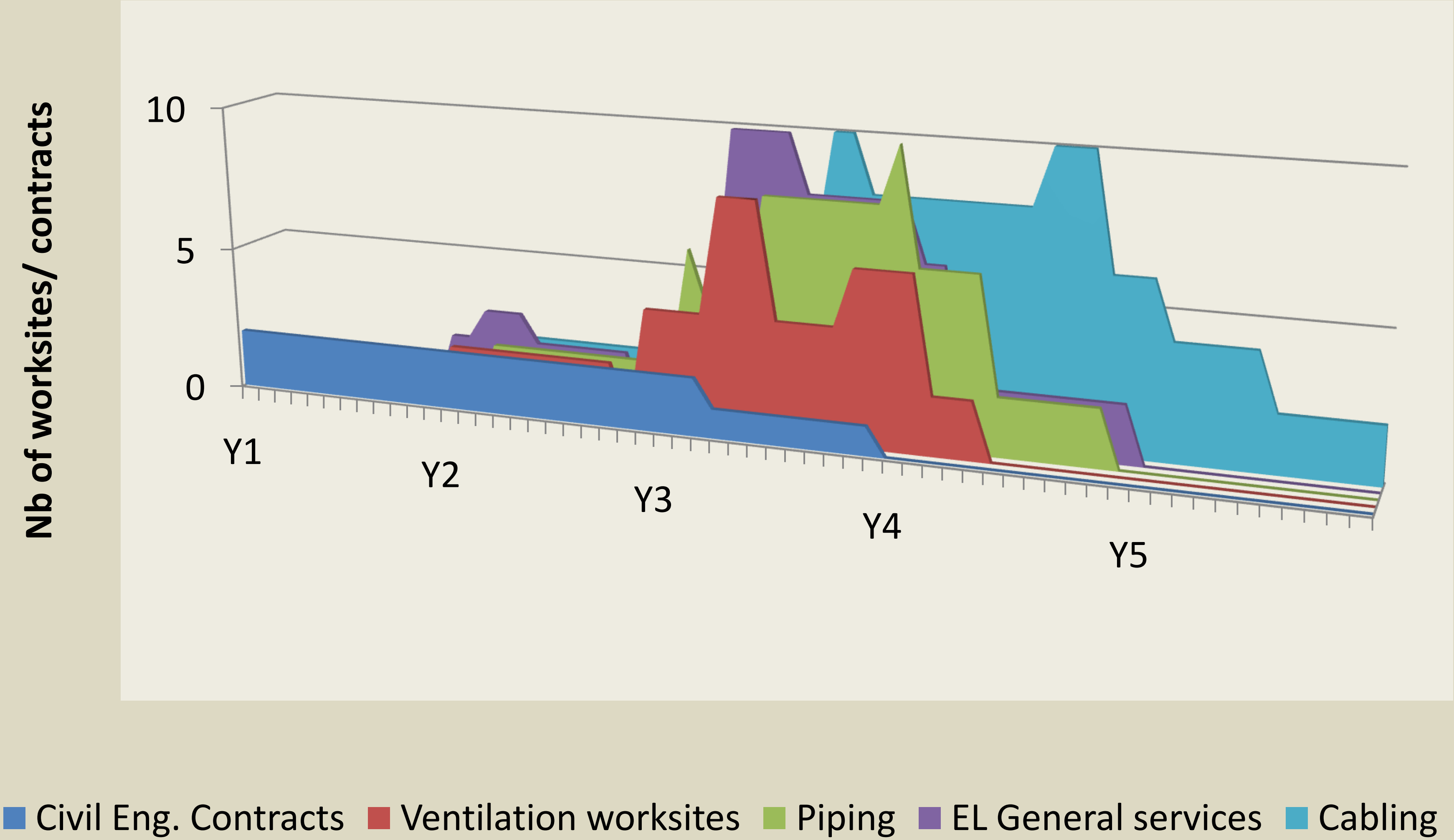
CLIC10 Workshop

18-22 October 2009

General schedule



Injectors - Resources



Construction and Installation of the CLIC Experimental Area

A very first draft schedule

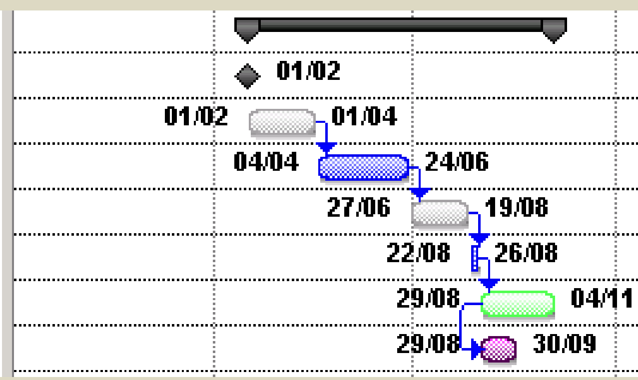
Contributions from

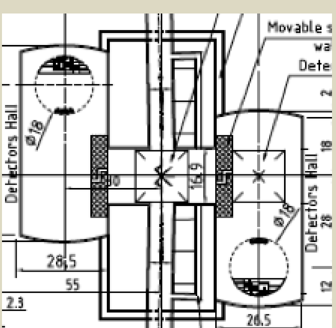
DGS-SC	*EN-CV*	*EN-MEF*	*GS-SEM*	*PH-CMX*
F Corsanego	*M Nonis*	*M Gastal*	*J Osborne*	*A Gaddi*
			N Baddams	*H Gerwig*
			A Kosmicki	*A Herve*
				N Siegrist

Year 4: Completion of Surface Assembly Hall

- Work in the remaining part of the Surface Assembly Hall would have to be interrupted to allow for the concrete and metallic modules to be lowered => 2 halls to be built with a 9 weeks offset
  - A 12 week window is needed to install technical infrastructure:
  - Concrete lift modules
  - Ventilation ducts
  - Cooling pipes
  - Cable trays
  - Metallic staircase
- Impact on work in Detector Hall
  - Construction of the PPull platforms

13	⊟ Shaft access building	**200 days**
14	Shaft Base Cavern construction complete	0 days
15	Concrete slab	9 wks
16	Install shaft with infrastructure	12 wks
17	Build steelworks	8 wks
18	Install overhead crane	1 wk
19	Install cooling and ventilation	10 wks
20	Install EL general services	5 wks

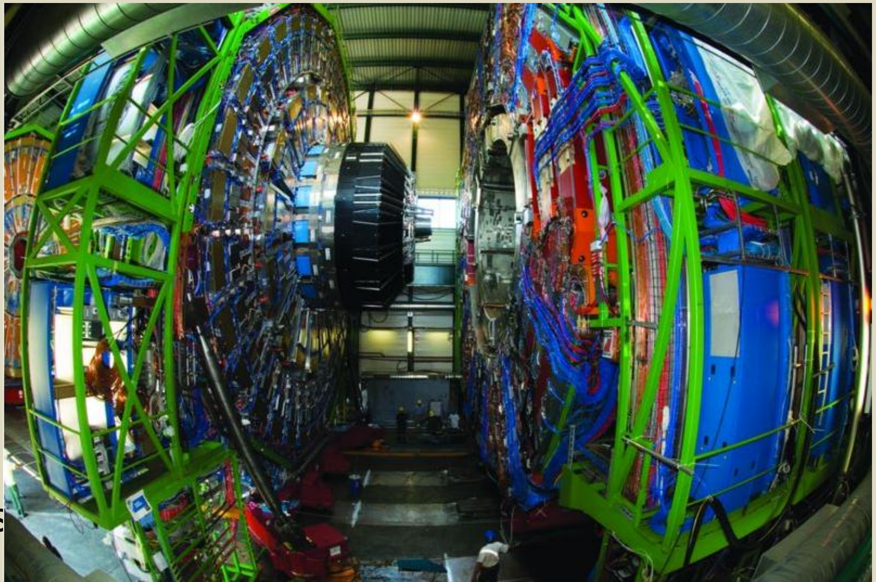


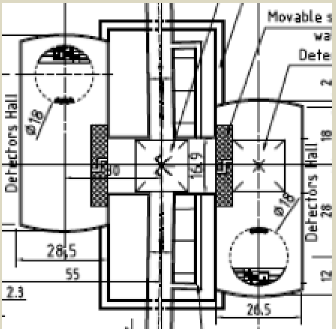


Martin.Gastal@cern.ch

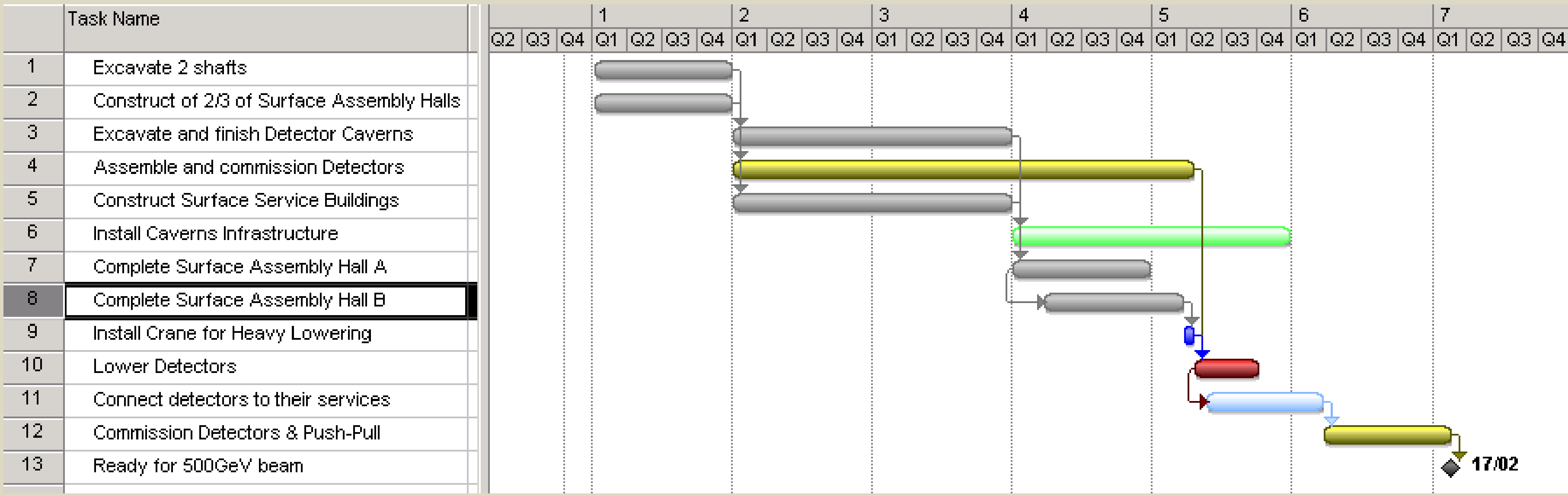
Year 5: Complete installation of cavern infrastructure

- Complete installation of infrastructure and services in 2 experimental caverns and transfer tunnel: 2nd of 2 years
- Installation of gantry crane for detector lowering: 1 month
- Complete detector assembly and commissioning on the surface





Summary Schedule



- Years 4 and 5 should be interesting…

Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

Thursday October 21 - Mont Blanc tunnel tour

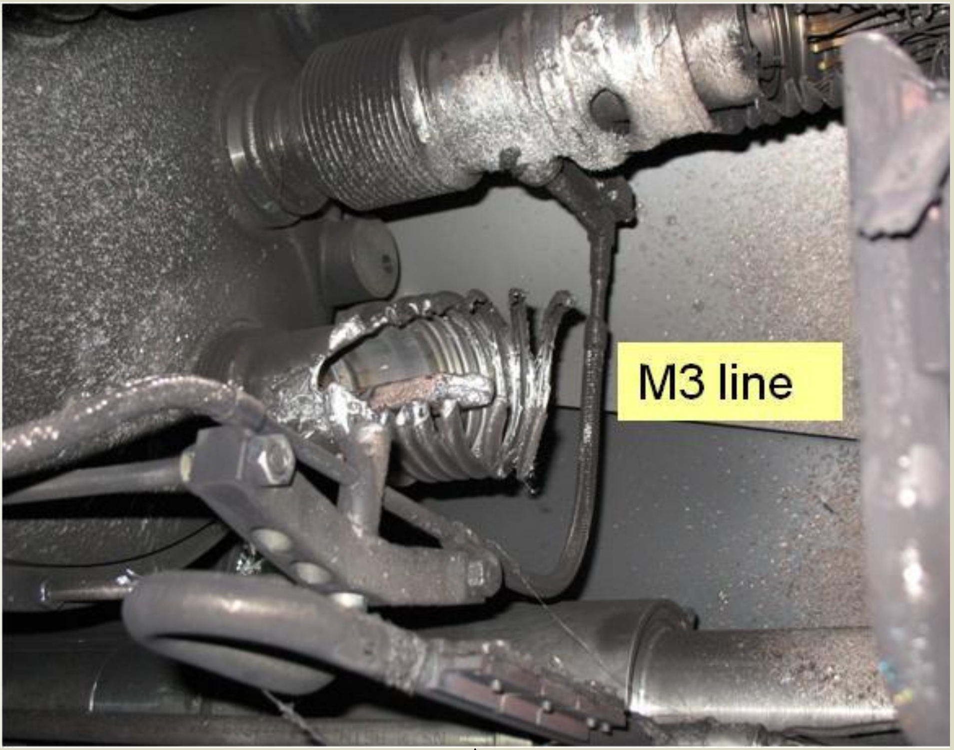
Lessons learnt from LHC Helium Leak and R2E

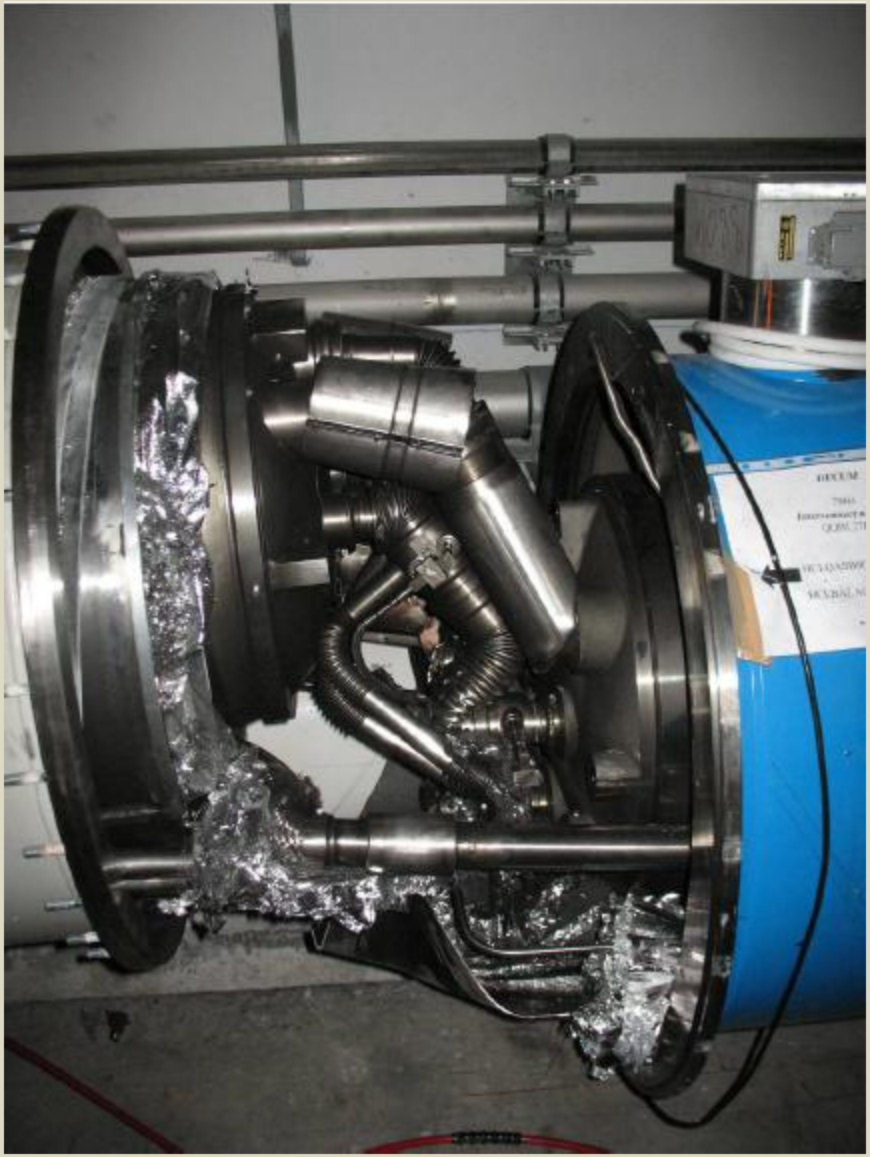
Content

- The September 19th (2008) Accident at LHC
- New Safety Measures in Force
- Impact in the Field and Consequences on Access

- Sensitivity of LHC Electronics to Single Event Effect
- Short Term Actions to Mitigate SEE
- Longer Term Strategies Explored
- Summary

Consequences of September 19th (2008) event in sector 3-4 of the LHC

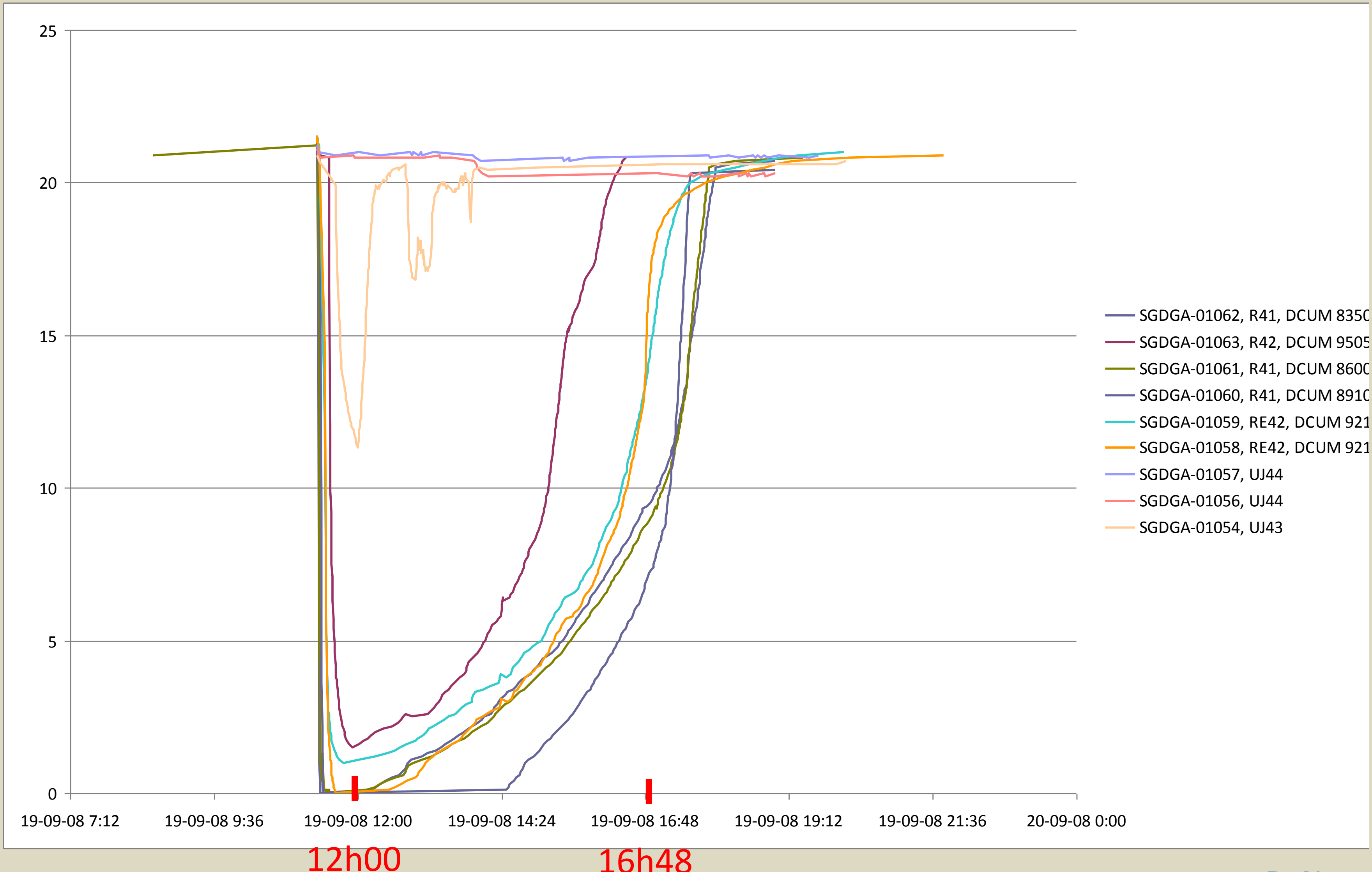




At the faulty connection

Collateral damages due to pressure rise

Oxygen content in the tunnel (sensors on the ceiling)



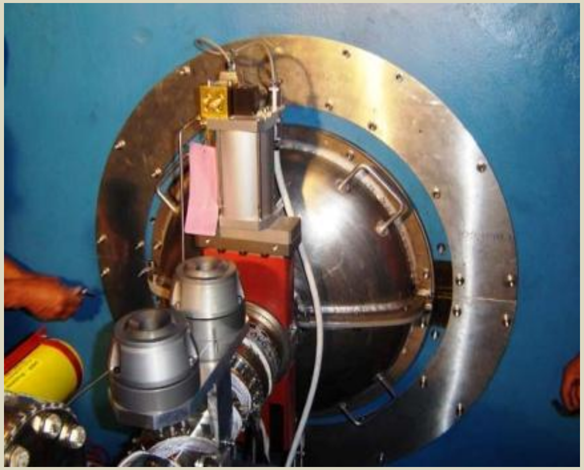
R. Nunes

Some recommendations from the task force :

Sealing of the Experimental Areas (part 1)

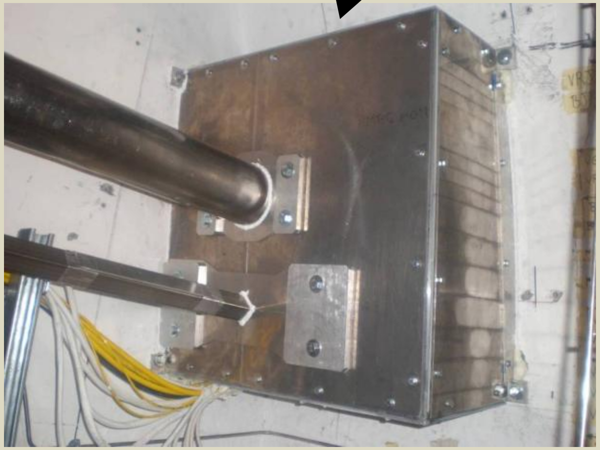
1) Along the beam line

Sealing around the TAS - ATLAS case
built for 110mb (expect <32mb), Tmin 200K,
compatible with ±15mm adjustment

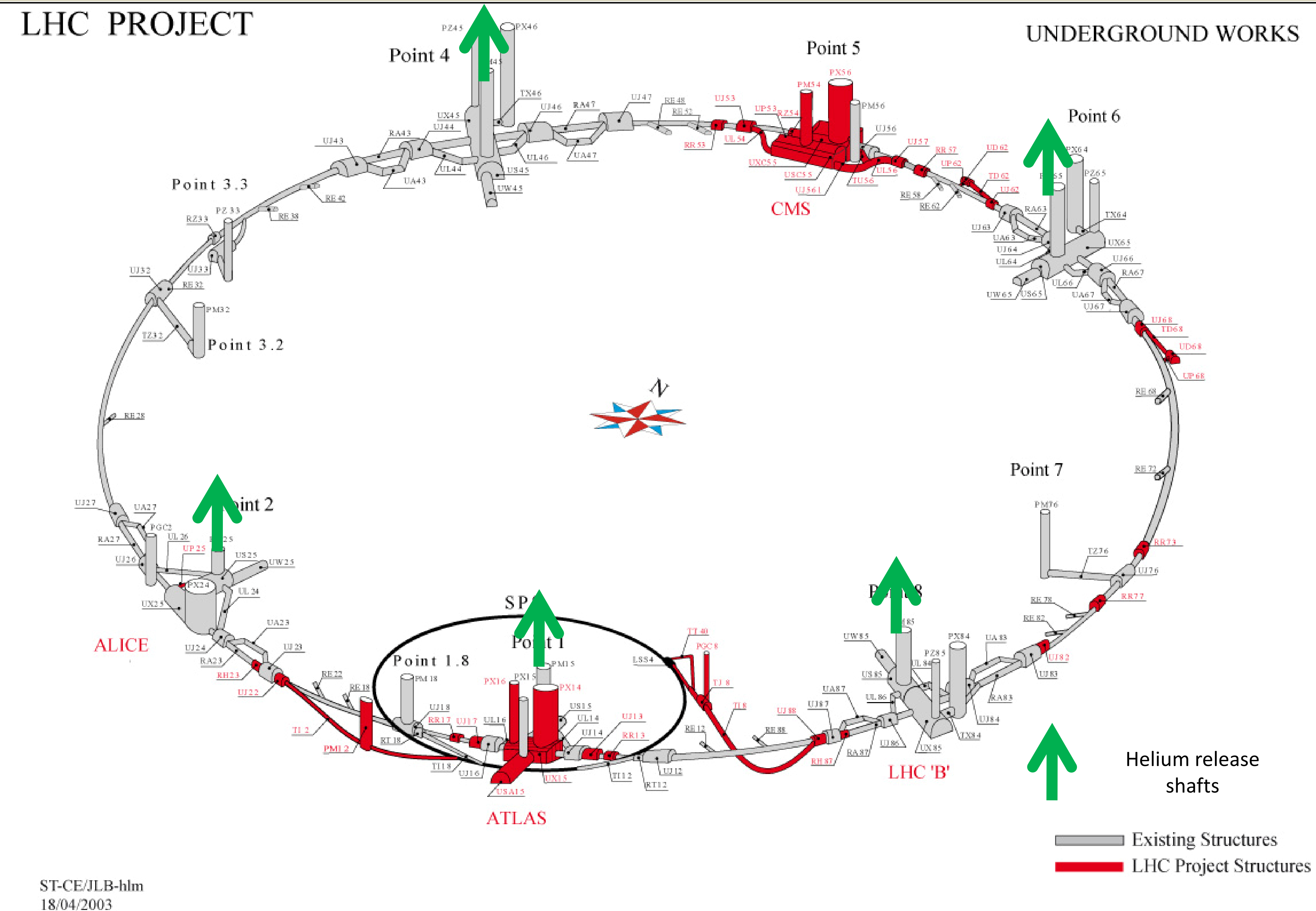


2) Interfaces with survey galleries

ATLAS: UPS caps on survey ducts and doors
built for 110mb
(expect <32mb)
T_{min} 200K
fire resistant



Helium release to surface – MCI ≡ 40kg/sec



Access matrix for the LHC underground

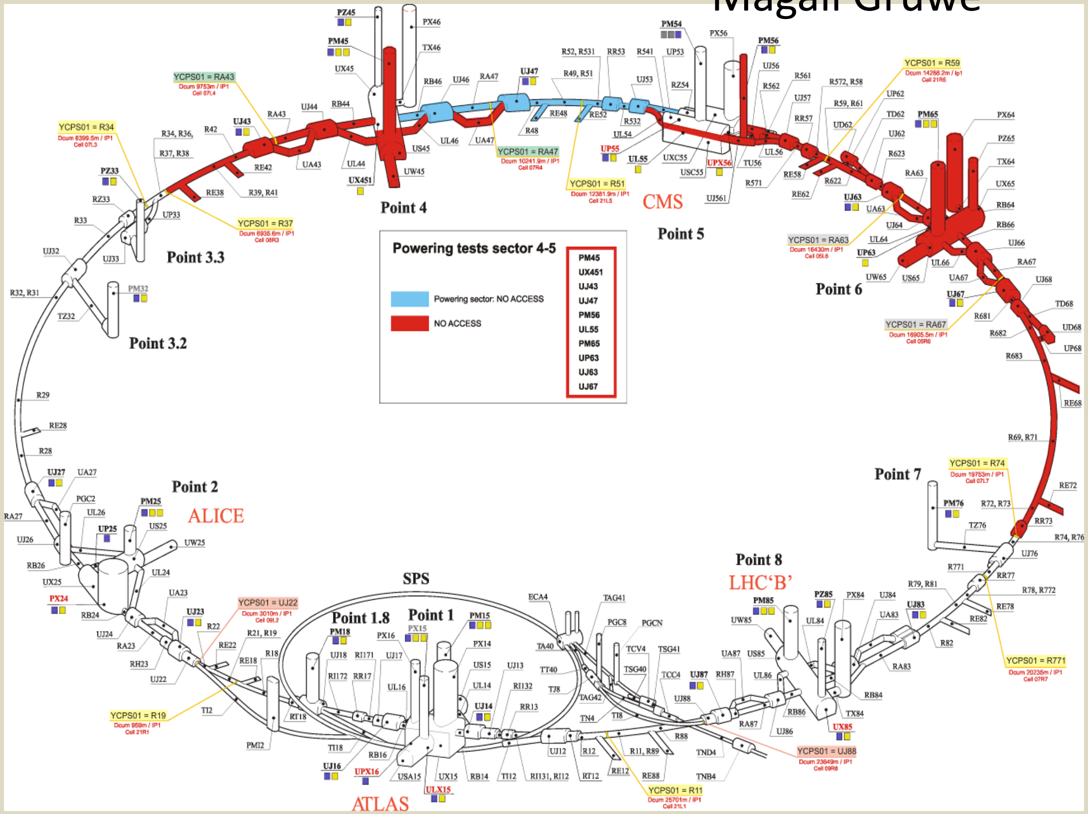
New access restrictions when main magnets are (or could be) powered

Access conditions in LHC are documented in EDMS N°1010617

Magali Gruwe

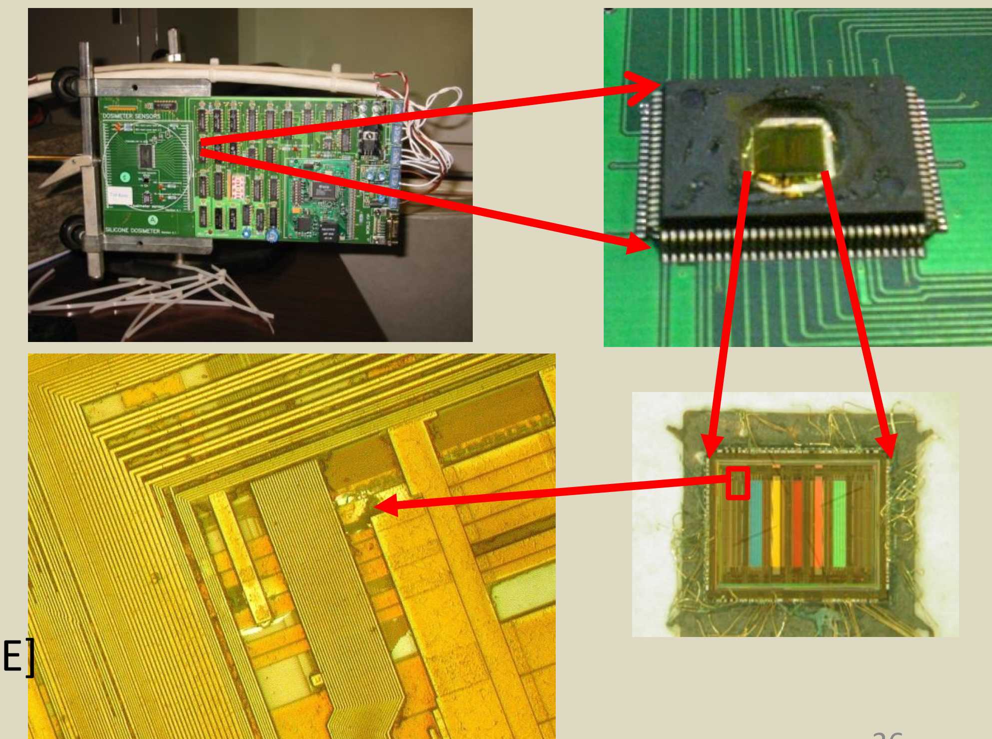
Use of US and PM shafts to evacuate He flow comdemn access to adjacent sector.
In case of sectors linked with saloon doors (6/8), ~half of LHC is closed …

Example of restriction when powering sector 4-5 ➔



R2E - Single Event effects

- Soft Errors (recoverable)
  - Single Event Upset (SEU)
  - Multiple Bit Upset (MBU)
  - Single Event Transient (SET)
  - Single Event functional Interrupt (SEFI)
- Hard Errors (non recoverable)
  - Single Event Latch-up (SEL)
  - Single Event Gate Rupture (SEGR)
  - Single Event Burn-out (SEB)



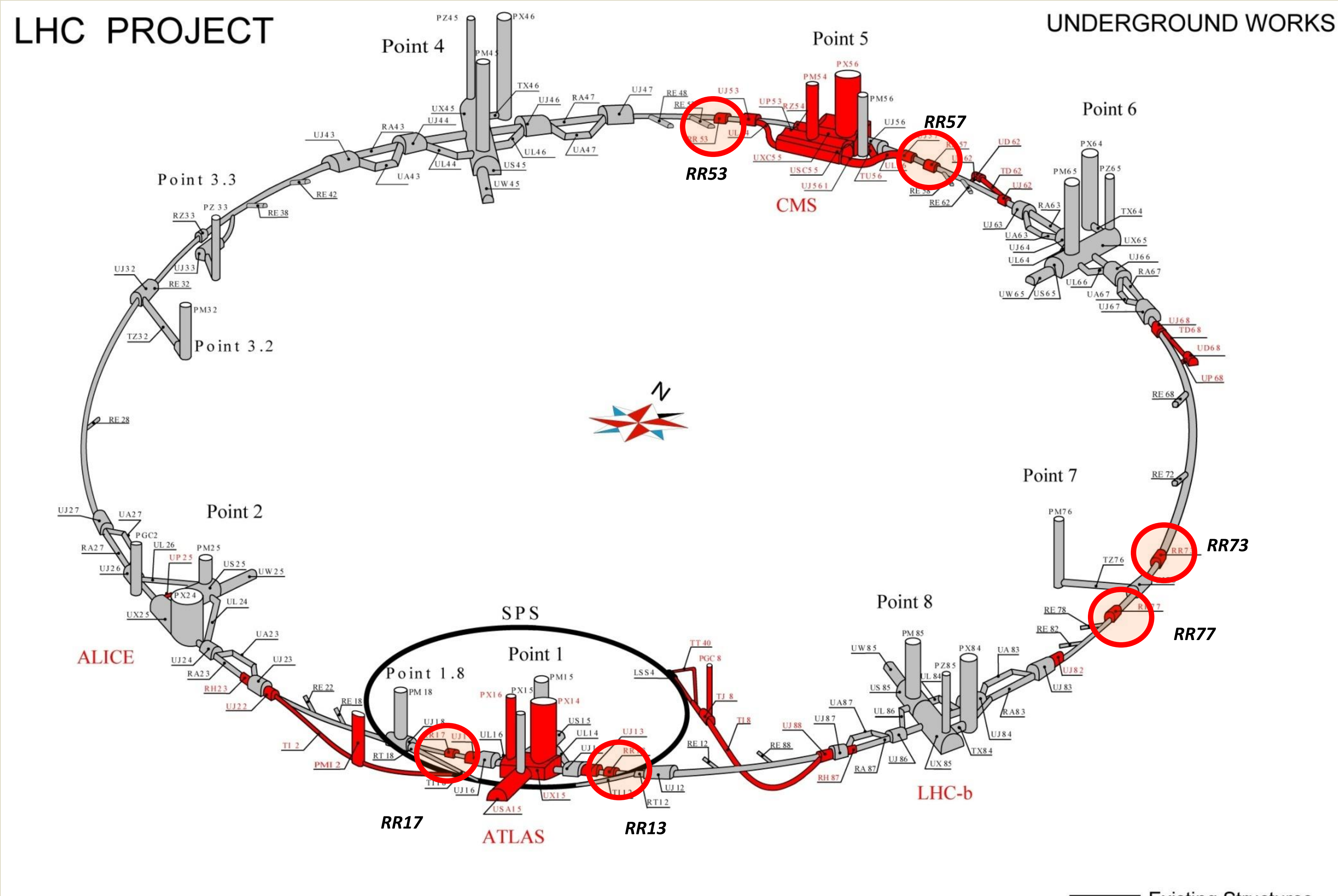
[Photos R. de Olivera EN/ICE]

Relocation of the UPS

🡐 **Before 2009 in UJ76**

Now in TZ76 🡒

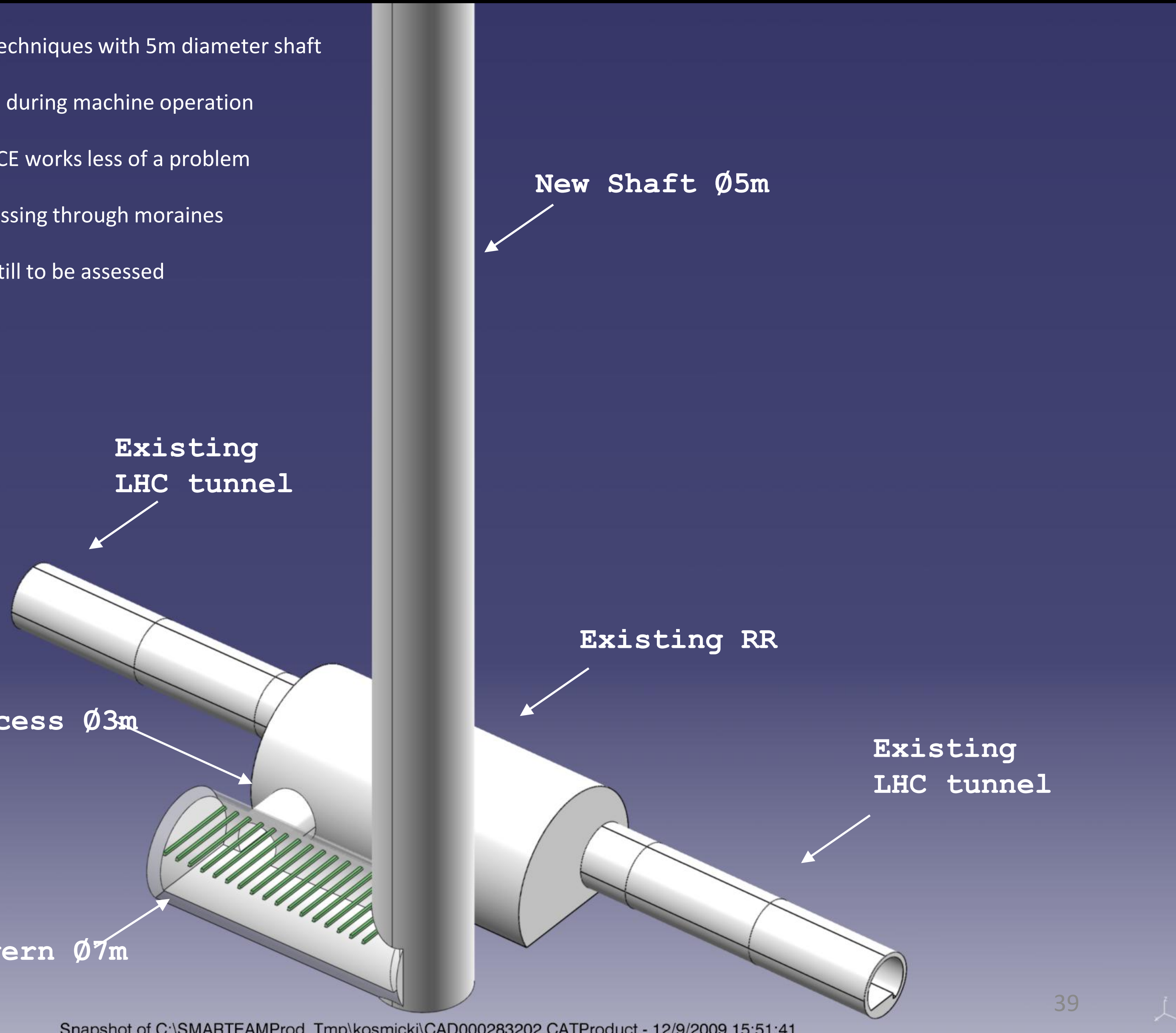
RR caverns with potential radiation concerns for underground electronics



1) New shafts & caverns to re-locate equipment underground

John Osborne

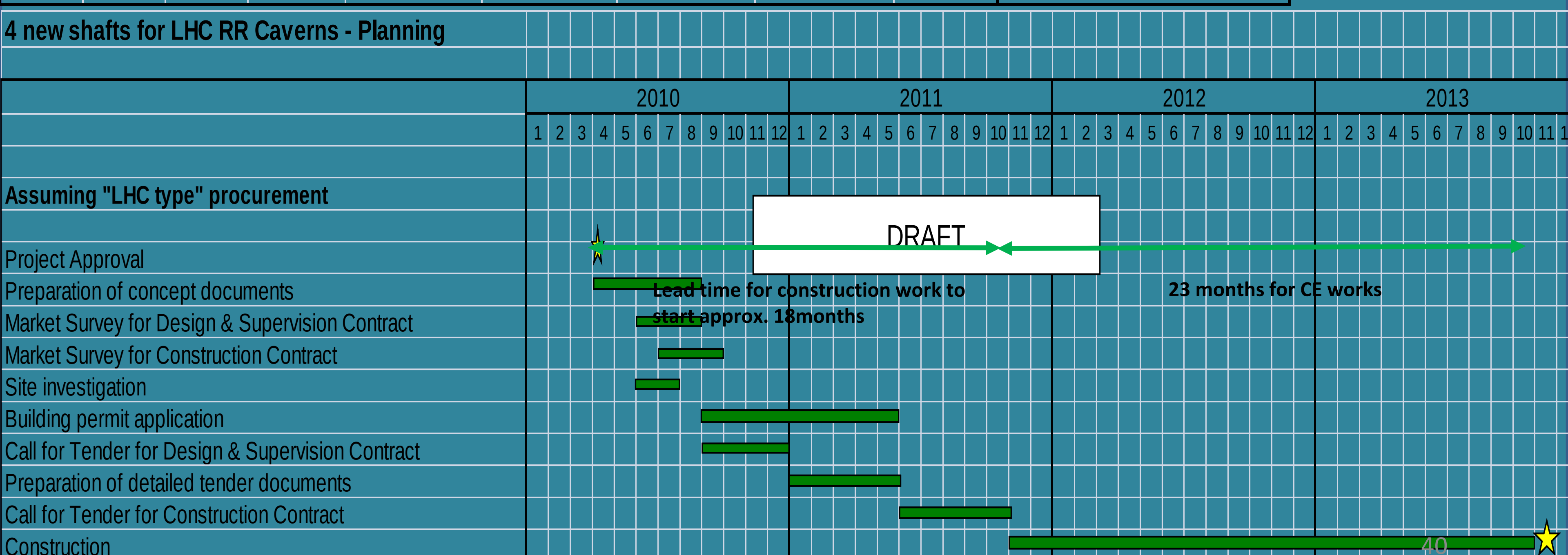
- Traditional shaft excavation techniques with 5m diameter shaft
- Majority of CE work executed during machine operation
- Noise / dust nuisance during CE works less of a problem
- Risk associated with shafts passing through moraines
- Risk to LHC due to vibration still to be assessed



New Shafts and Caverns at Pt1&5: Cost and Schedule

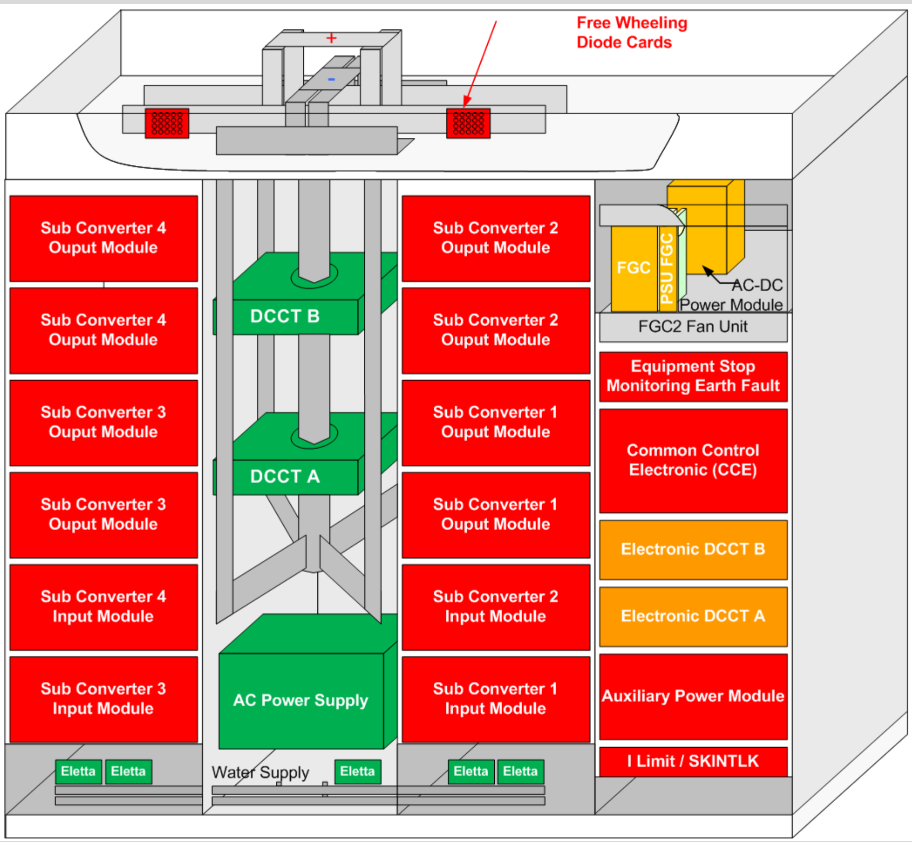
John Osborne GS-SEM

	RR13	RR17	RR53	RR57		
Site Investigation (borehol	50'000		50'000	50'000		150'000
Site Installation	1'000'000		1'500'000			2'500'000
5m diameter shaft	3'500'000	3'500'000	6'000'000	4'000'000		17'000'000
Base Cavern	2'000'000	2'000'000	2'000'000	2'000'000		8'000'000
Access gallery	750'000	750'000	750'000	750'000		3'000'000
10% Contingency for unknown/missing items						3'065'000
12% Consultancy fees						4'045'800
					Total	**CHF 37'760'800**

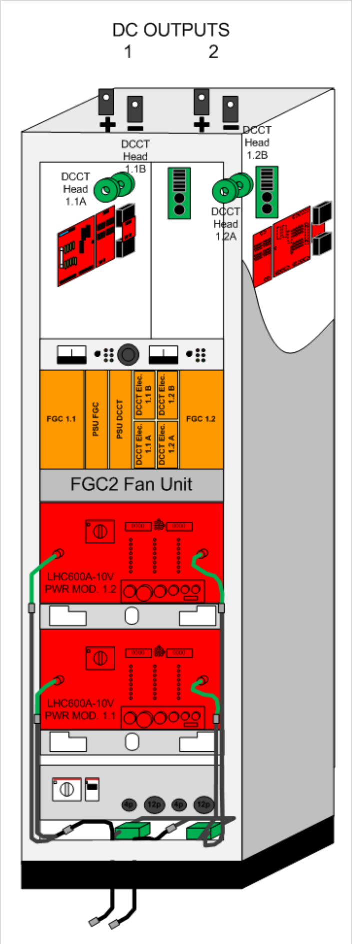


- Overview of unknown or critical Items

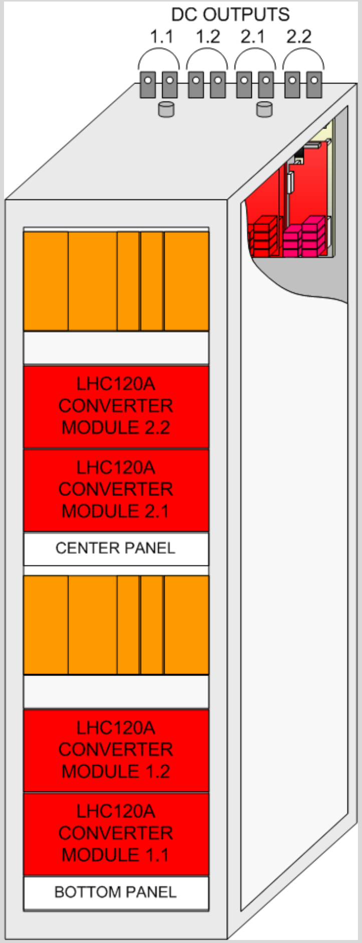
UNKNOWN VS RADIATION
KNOWN or LOW RISK
SAFE VS RADIATION



LHC4-6-8kA-08V



LHC600A-10V



LHC120A-10V

3) Relocation with Supra-Conducting Links

Amalia Ballarino

Assumptions for the present study:

- At P1 and P5 the preferred solution is the re-location of the LHC power converters in surface building . Priority is given to the RRs.

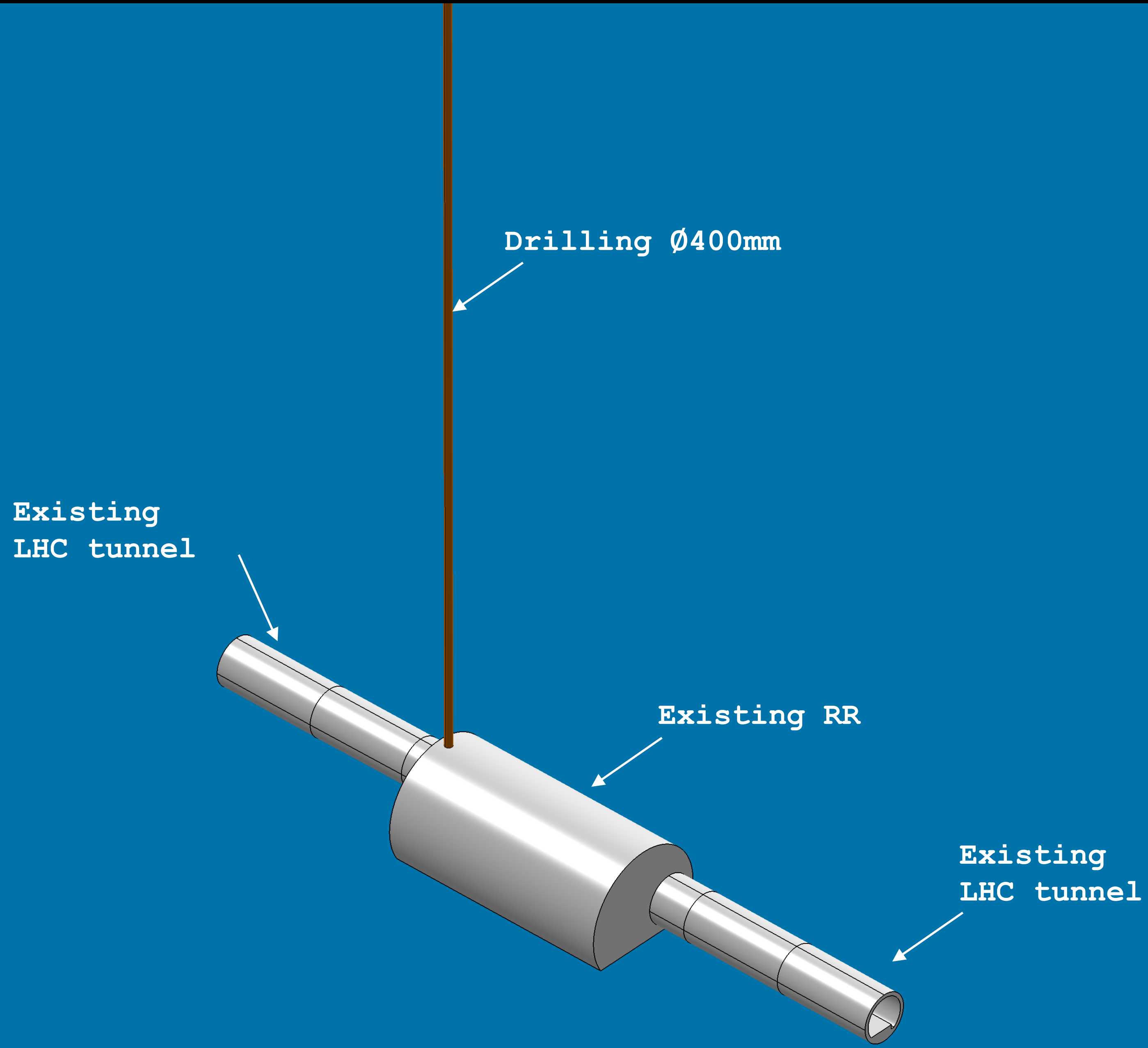
  ↳ **Vertical link**

- At P7 there is the possibility of a re-location in TZ76.

  ↳ **Horizontal link**

(Already done at Pt3 with Nb-Ti at 4.5K, L>400m)

3) Drill vertical boring from new surface building to re-locate equipment



- Relatively quick CE technique
- Only possible for maximum 40cm internal diameter tube down to RR’s, is this sufficient ?
- Risk associated with core this deep eg boulders in moraines, tolerances
- Building permit required for surface buildings

Could envisage horizontal trenches to convey the SC power links into the existing surface buildings at Pt 1 & 5 (+200m of link each time)

Vertical borings and new surface buildings at Pt1&5: Cost and Schedule

John Osborne GS-SEM

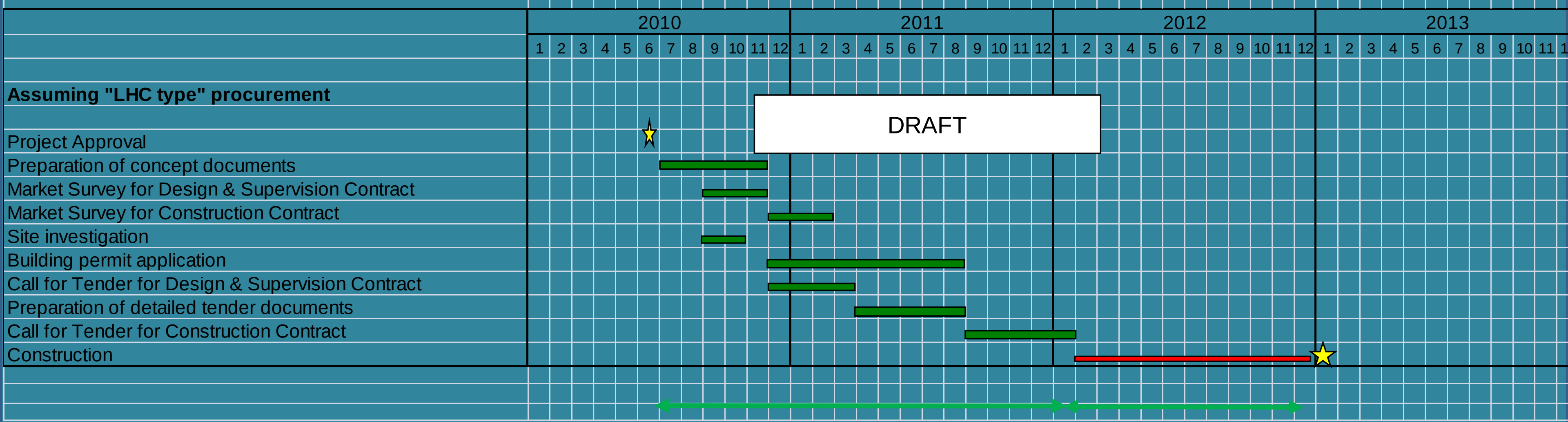
Cost estimate for CE for 40cm borings

	RR13	RR17	RR53	RR57	
Site Investigation (boreholes)	50'000		50'000	50'000	150'000
Site Installation	500'000		1'000'000		1'500'000
40cm core	450'000	450'000	700'000	650'000	2'250'000
Base Cavern modifications	50'000	50'000	50'000	50'000	200'000
Surface Buildings 200m2	1'000'000	1'000'000	1'000'000	1'000'000	4'000'000
10% Contingency for unknown/missing items					810'000
12% Consultancy fees					1'069'200
				Total	CHF 9'979'200

ESTIMATE ACCURACY +/- 20%

	POINT 1	POINT 5
Hauteur	80m	90m
Diametre	40cm	40cm
Morraines	0 à -20m	0 à -50
Molasse	-20m à -	-50m à -90m

4 new 40cm diameter drillings to LHC RR Caverns - Planning



Lead time for construction work to start approx. 18months

12 months for CE works

Summary

Helium release issues and Single Event Effects mitigation are totally different subjects, but the main and obvious lesson is the same: These problems need to be addressed at an early stage of the project, late fixing is difficult, very expensive, long to achieve and usually not fully satisfactory.

P. Lebrun suggests that ILC evaluate the consequences of a ‘hole’ in the cavity, between the helium vessel and the beam vacuum or in the vessel itself, between the helium vessel and the insulating vacuum

CLIC CDR Chapter : J.Osborne for CES WG

level 1	level 2	level 3	level 4	author
Civil Engineering and Services				
	Overview			
	Civil Engineering			J.Osborne
		Location		
		Land Features		
		Geology		
		Construction Methods		
		Central Injection Complex		M.Gastal
		Main Linac		
		Drive Beam Turnarounds		
		Interaction Region and BDS		M.Gastal
		Surface Buildings		
		Site Development		
		Construction Schedule		
	Electricity			
		AC network		C.Jach
	Fluids			M.Nonis
		Water cooling		
		Ventilation		
		Gas Systems		
	Transport and Installation			I.Ruehl & K.Kershaw
		Overview		
		Methodology		
	Safety Systems			
		Access Control Systems		P.Ninin & M.Jonker
		Radiation Safety		T.Otto & S.Mallows
		Fire Safety		F.Corsanego
	Survey and Alignment			H.Mainaud Durand
		Geodesy and Networks		
		Machine Installation and Alignment		

Based on ILC RDR (for costing purposes)

5km from the CERN site, with direct links and a newly constructed tramway gives direct access from Meyrin to the city centre.

Figure 6.2.1-1 : Tram station outside CERN Meyrin site *(new photo to be added with GLOBE)*

The governments of France and Switzerland have long standing agreements concerning the support of particle accelerators in the Geneva region, which make it very likely that the land could be made available free of charge, as they did for previous CERN projects.

6.2.2 Land Features

The proposed location for the accelerator is situated within the Swiss midlands embedded between the high mountain chains of the Alps and the lower mountain chain of the Jura. CERN is situated at the feet of the Jura mountain chain in a plain slightly inclined towards the lake of Geneva. The surface terrain was shaped by the Rhone glacier which once extended from the Alps to the valley of the Rhone. The water of the area flows to the Mediterranean Sea. The absolute altitude of the surface ranges from 430 to 500m with respect to sea level.

The physical positioning for the project has been developed based on the assumption the maximum underground volume possible should be housed within the Molasse rock and should avoid as much as possible any known geological faults or environmentally sensitive areas. In addition, it was assumed that the central injection complex and interaction region, would be built on existing CERN land on the French Prevessin Site. The shafts leading to the on-surface facilities have been positioned in the least populated areas, however, as no real discussions have taken place with the local authorities, the presented layouts can only be regarded as indicative, for costing purposes only. In certain areas, where the shafts would be either extremely deep or if a particularly environmentally sensitive area could not be avoided, inclines access tunnels have been foreseen. Although the typical depth for the tunnel below ground level is in the range of 100-150m, at the French end the main linac is accessed via an inclined tunnel, due to the fact that it is situated is several hundred metres. Similary,

shaft number 5 is also accessed via an inclined tunnel, to avoid surface developments in an environmentally sensitive area.

6.2.3 Geology

Most of the proposed path of CLIC is situated within the Geneva Basin, a sub-basin of the large North Alpine Foreland (or Molasse) Basin. This is a large basin which extends along the entire Alpine Front from South-Eastern France to Bavaria, and is infilled by clastic "Molasse" deposits of Oligocene and Miocene age. The basin is underlain by crystalline basement rocks and formations of Triassic, Jurassic and Cretaceous age. The Molasse, comprising an alternating sequence of marls and sandstones (and formations of intermediate compositions) is overlain by Quatemary glacial moraines related to the Wurmien and Rissien glaciations. The path crosses just below a well known fault at the valley of the Allondon river which is situated South-West of Geneva and filled with sands and gravels. For the 3TeV extension of the project, the tunnel will cross a second valley at Gland, situated North-East of Geneva. The tunnel at the South-West end will enter into some Jurassic limestone.

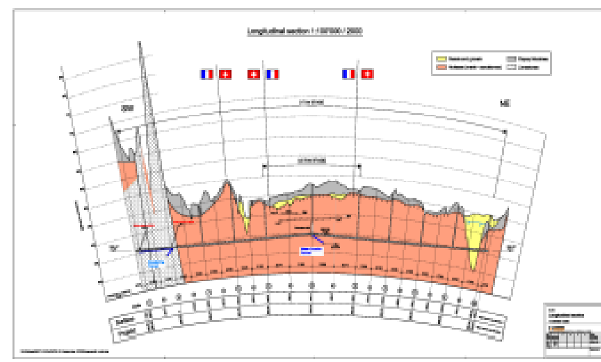


Figure 6.2.3-1 : Longitudinal geological profile (water transfer tunnel to be removed)

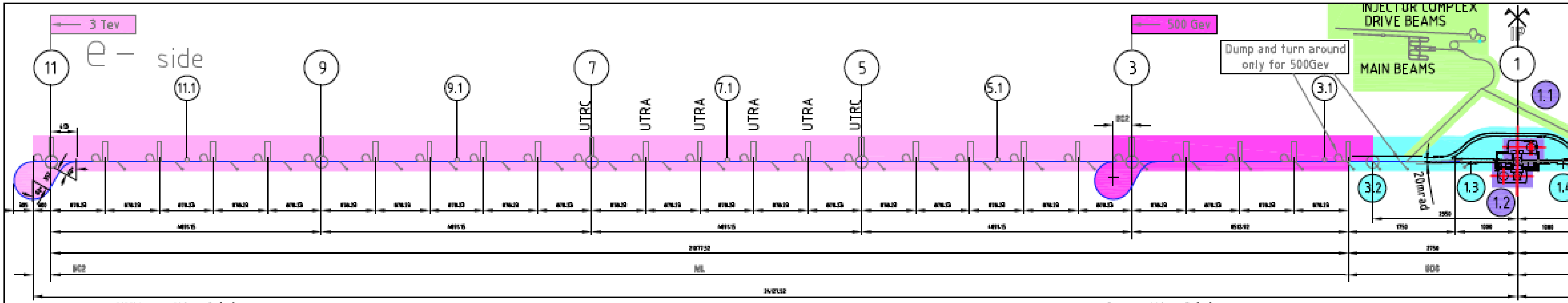
6.2.4 Site Development

As most of the central campus is located on the CERN site at Prevessin, it is assumed for the CDR that the existing facilities such as restaurant, main access, road network etc are sufficient and have not been costed. However, for the parts located outside the existing fenceline, but within CERN property, the following items have been included in the costs :

- Roads and car parks
- Drainage networks

CLIC CDR Chapter for Civil Engineering and Services

- →11 CE drawings have been circulated for approval via CERN EDMS
- →These drawings are now frozen to allowing drafting of CDR and costing exercises
- →Some requested changes will be made later during the Technical Design phase



TUNNEL LENGTHS (m)

	main beam turn-around	BC2	e− side ML	BDS	e+ side ML	TOTAL
500 Gev	3 898	600	3 513	5 500	3 513	17 024
3 Tev	3 898	600	17 565	-	17 565	39 628
Total	7 796	1200	21 078	5 500	21 078	56 652

main + drive beam injector complex
see drawing N° CLIC.CE-1.1799.0002.3

SITE LENGTHS (m)

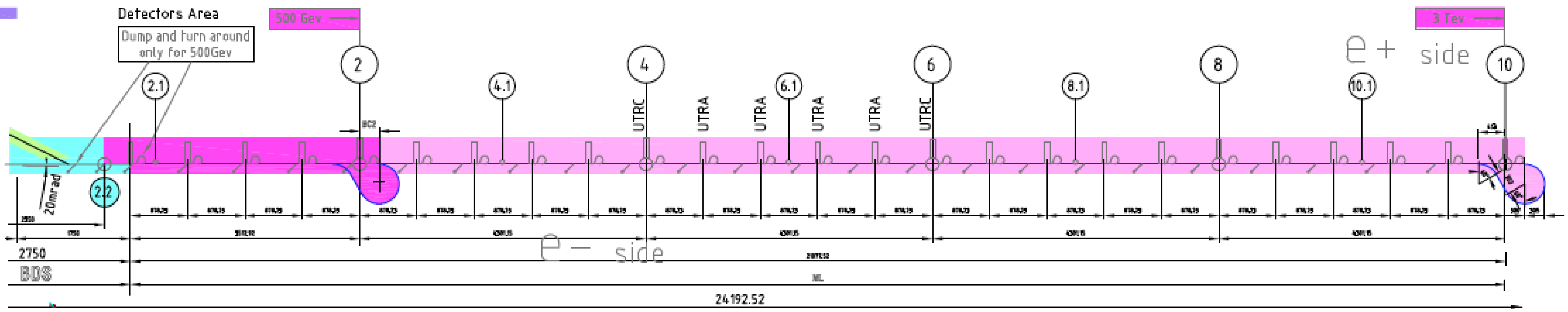
main beam turn-around	BC2	e− side ML	BDS	e+ side ML	TOTAL
610	600	3 513	5 500	3 513	13 736
610	600	17 165	-	17 165	35 540
1 220	1 200	20 678	5 500	20 678	49 276

Legend : 500Gev 3 Tev

- ML
- Main/Drive beam Injectors
- BDS
- Detectors Area

TUNNELS SECTIONS

Area	beam turn-around	e− e+ sides ML	BDS
section dims.	ø3 m	ø5.6m	ø5.6 m



SHAFTS

Point	1.1	1.2	2	2.2	3	3.2	4	5	6	7	8	9	10	11
øm	18	18	9	9	9	9	9	9	9	9	9	9	9	9

SURVEY BORINGS

Point	2.1, 3.1	4.1, 5.1, 6.1, 7.1, 8.1, 9.1, 10.1, 11.1
øm	1.50	

SHAFT BASE CAVERNS (10 UTRC)

Point	2, 3	4, 5, 6, 7, 8, 9, 10, 11
(LxWxH) m	55 x 16 x 18 2 storeys	

UTRA CAVERNS

Number	8 x	8 x	8 x	8 x	8 x
(LxWxH) m	40 x 10 x 7.2	45 x 10 x 7.2	50 x 10 x 7.2	55 x 10 x 7.2	65 x 10 x 7.2

DETECTORS HALL

Point	1.1, 1.2
(LxWxH) m	120 x 25 x 39

MAIN BEAM DUMP CAVERNS & SERVICE HALLS (⁄)

Point	BDS CAVERNS 1.3, 1.4, 2.2, 3.2	BDS SERVICE HALLS 2.2, 3.2
(LxWxH) m	20 x 8 x 14 + 1 storey	49 x 16 x 18 3 storeys

MUON WALL WIDENINGS

Point	1.3, 1.4
(LxWxH) m	25 x9x7.2 +15x9x7.2

CONNECTION CAVERNS

Point	1.3, 1.4
(LxWxH) m	18 x 9 x 7.2

DRIVE BEAM DUMP CAVERNS (\ )

Number	At each UTRAs and UTRCs 10 x	40 x
(LxWxH) m	6 x 9 x 5	

DRIVE BEAM RETURN LOOP

Number	18 x	30 x
(LxWxH) m	63 x 2.4 x 3	

BC2 CAVERNS

Number	2 x	2 x
(LxWxH) m	100 x 10 x 3	

INDICE B: 48 DB sectors modfied to 878.23 m each, Phase 1 - repositionned to shafts 2 / 3 and reduced to 500Gev and drive beam dumps repositionned

UTR = Underground Technical Room

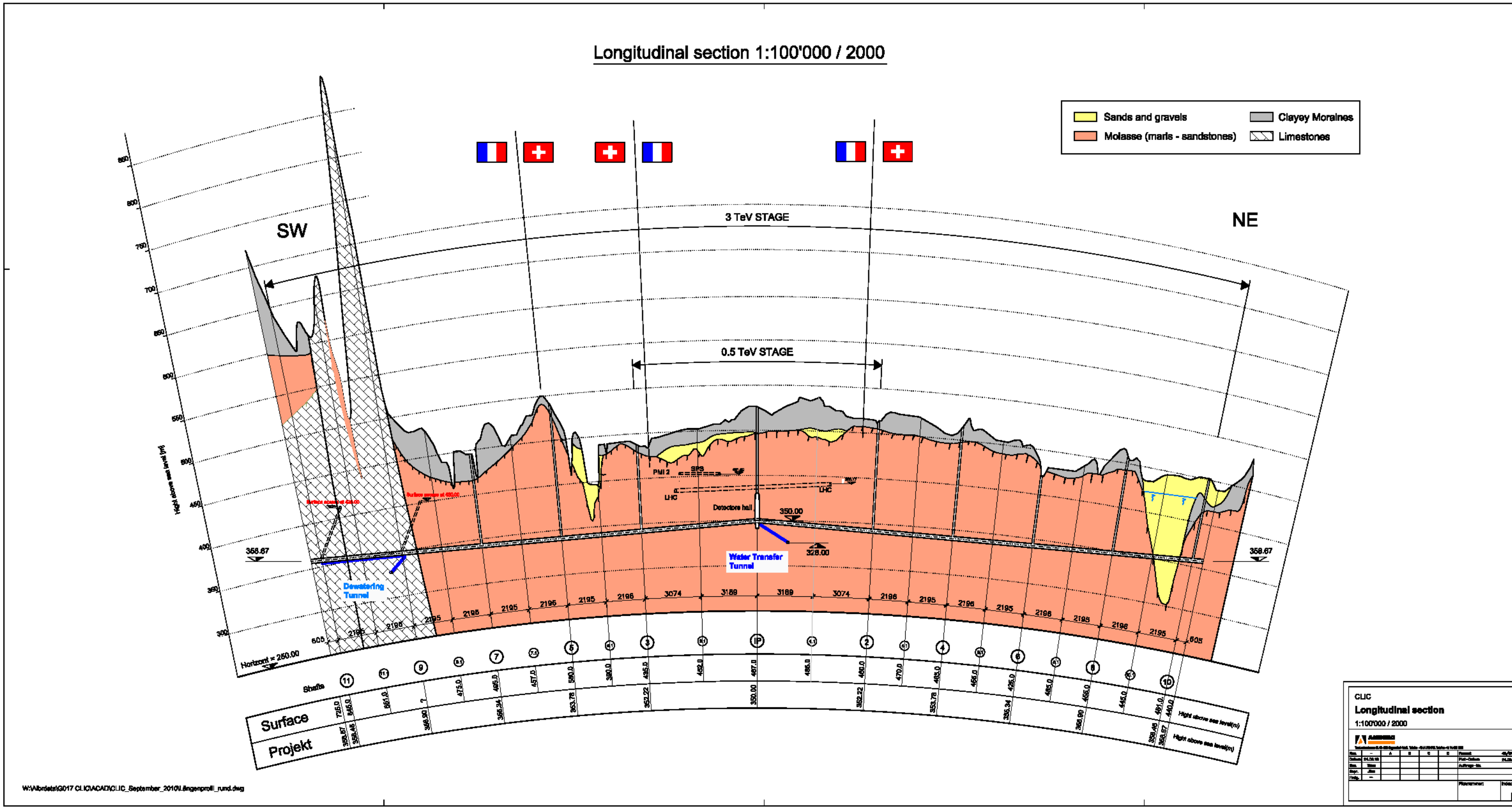
CLIC - UNDERGROUND STRUCTURES SCHEMATIC LAYOUT(COLOURED BY ZONES)

CERN

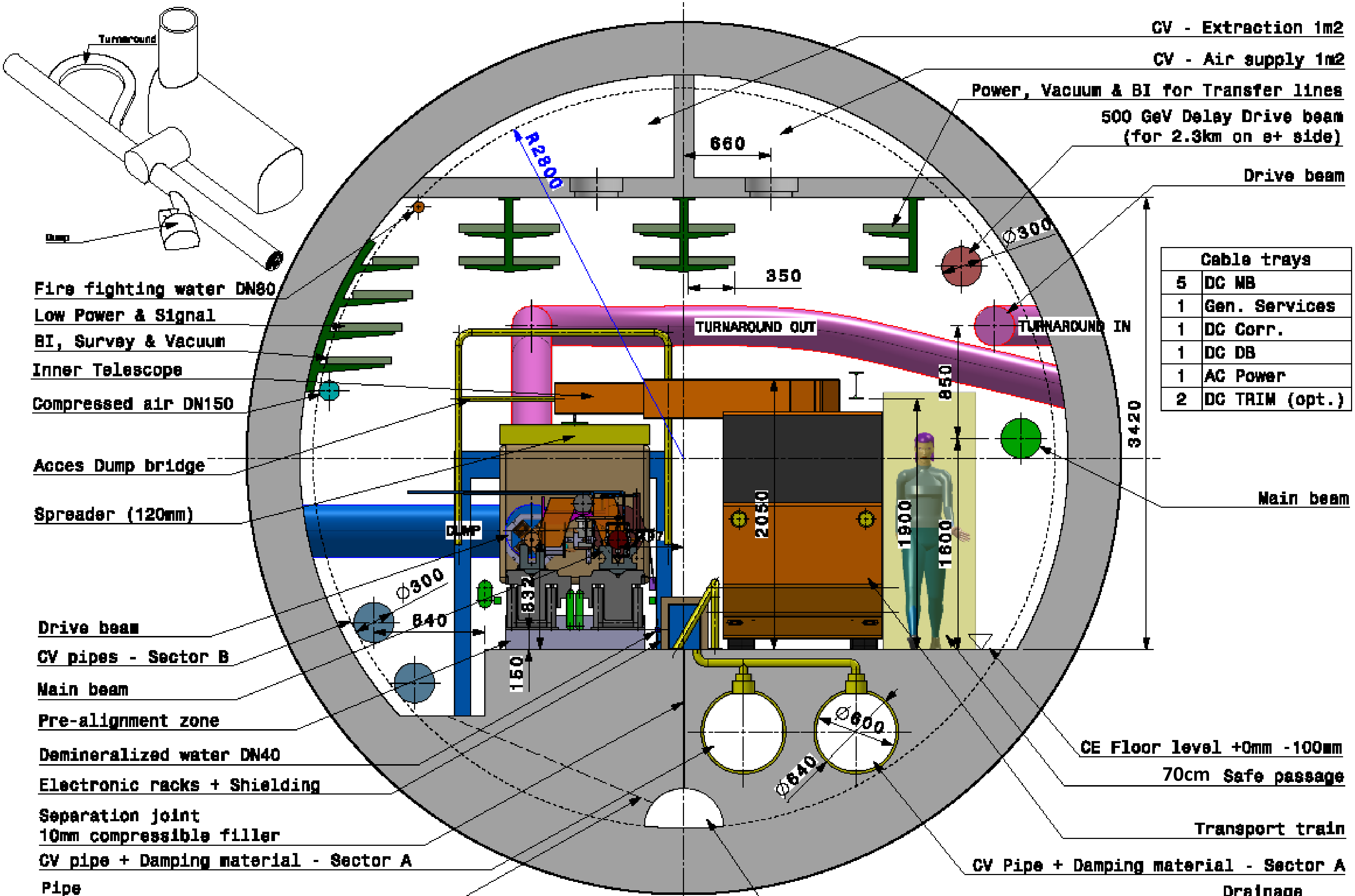
GROUP : GS-SEM
CIVIL ENGINEERING
SUPERVISOR : J.OSBORNE
DESIGNER : N.BADDAMS

SCALE : 1/62500(A3_FORMAT) DATE : 13_AUG_2010

CLIC.CE-1.1749.0003 SIZE 3 INDICE G

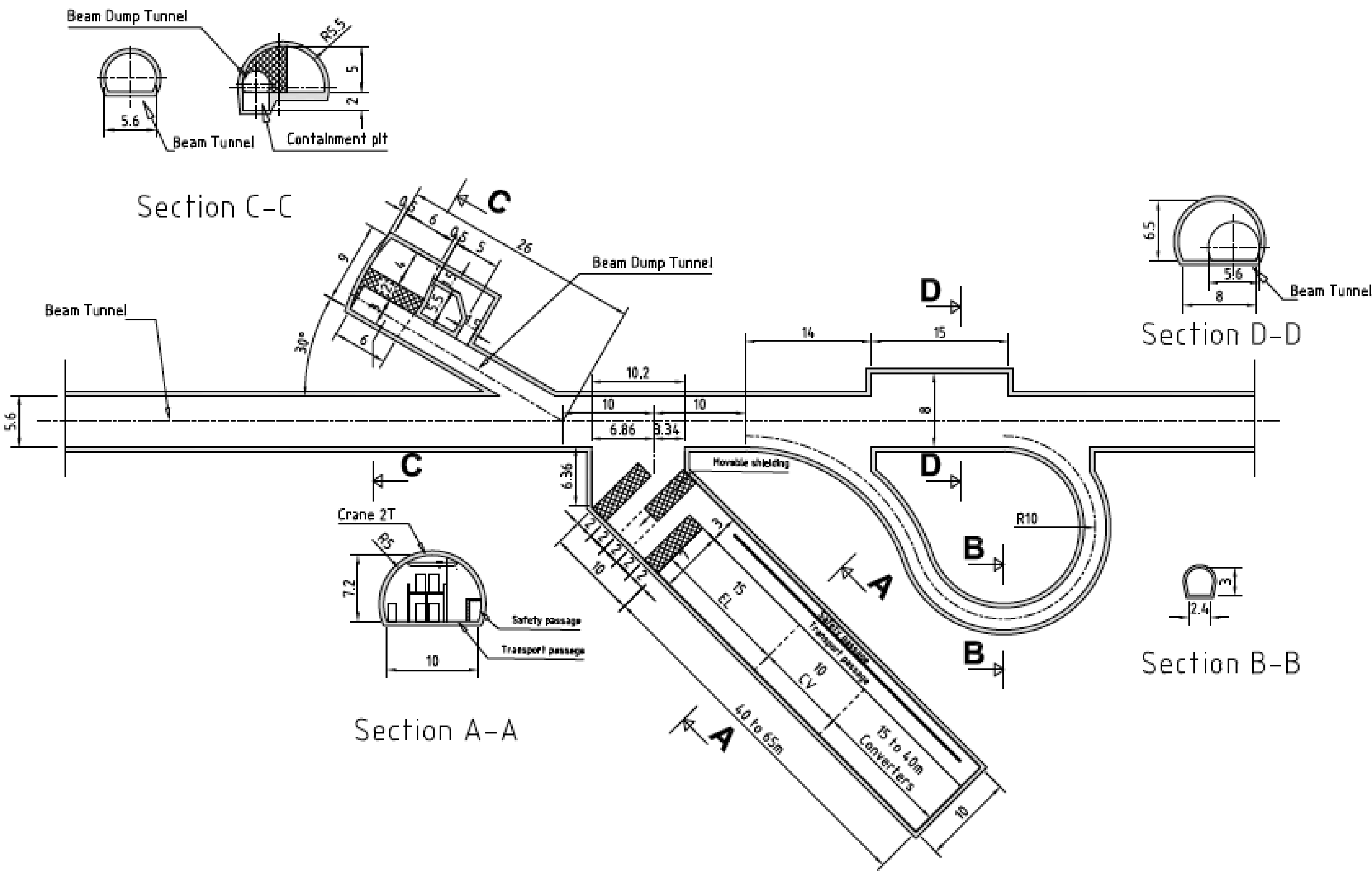


Longitudinal section 1:100'000 / 2000
Sands and gravels
Clayey Moraines
Molasse (marls - sandstones)
Limestones
SW
NE
3 TeV STAGE
0.5 TeV STAGE
Detectors hall
Water Transfer Tunnel
Dewatering Tunnel
Shafts
Surface
Projekt
CLIC
Longitudinal section
1:100'000 / 2000

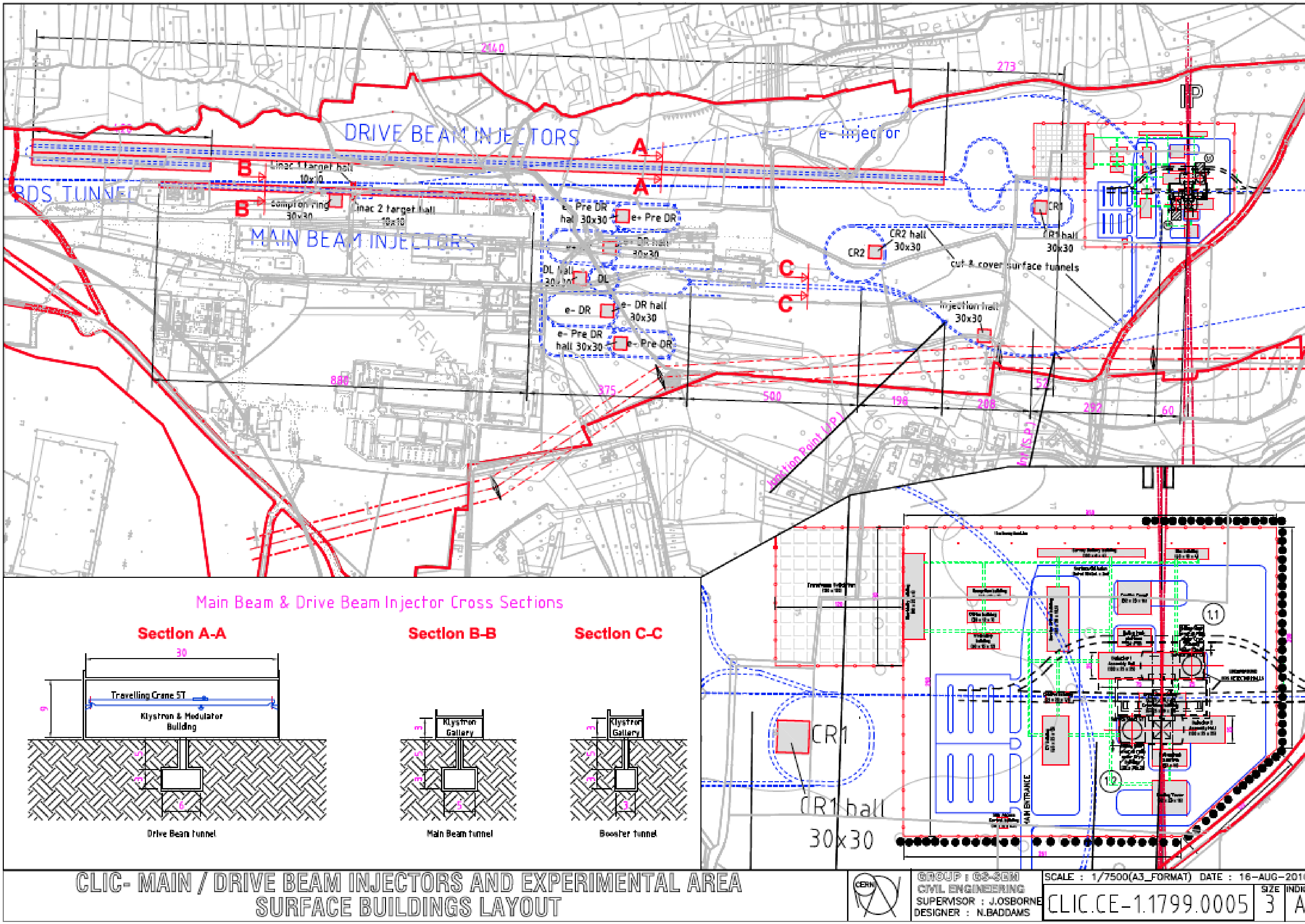


Cable trays	
5	DC MB
1	Gen. Services
1	DC Corr.
1	DC DB
1	AC Power
2	DC TRIM (opt.)

CLIC - Typical Cross Section - Diameter 5600mm - Junction with Turnaround - 1:25
Draft - J.Osborne / A.Kosmicki - August 9th 2010



CLIC - UTRA CAVERN, DRIVE BEAM LOOP AND BEAM DUMP	CERN	GROUP : GS-SEM CIVIL ENGINEERING SUPERVISEUR : J.OSBORNE DESIGNER : N.BADDAMS	SCALE : 1/500(A3_FORMAT) DATE : 17_AUG_2010 CLIC-.CE-1.1710.0002	SIZE 3 INDICE B

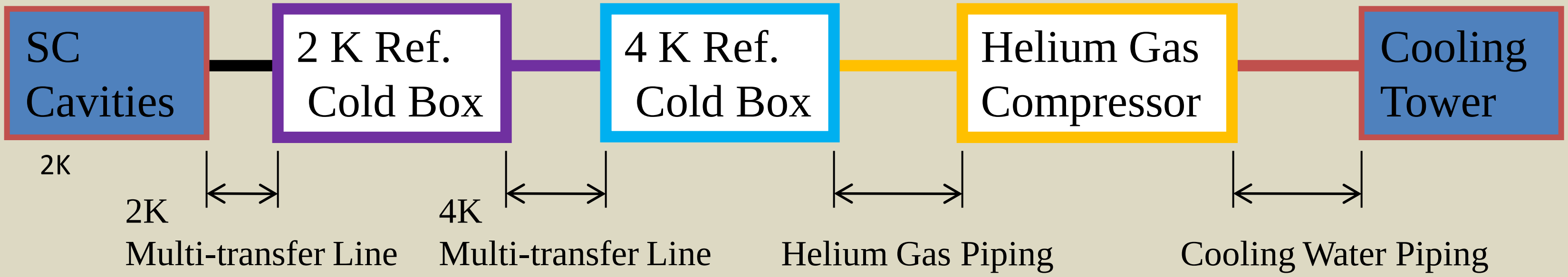

DRIVE BEAM INJECTORS
e- injector
IP
BDS TUNNEL
MAIN BEAM INJECTORS
Linac 1 target hall 10x10
Compton ring 30x30
Linac 2 target hall 10x10
e+ Pre DR hall 30x30
e+ Pre DR
e+ DR hall 30x30
DL hall 30x30
DL
e- DR
e- DR hall 30x30
e- Pre DR hall 30x30
e- Pre DR
CR2
CR2 hall 30x30
CR1
CR1 hall 30x30
cut & cover surface tunnels
Injection hall 30x30
Injection Point (I.P.)
A
B
C
2140
273
880
375
500
198
208
52
292
60
Main Beam & Drive Beam Injector Cross Sections
Section A-A
Section B-B
Section C-C
Travelling Crane 5T
Klystron & Modulator Building
Klystron Gallery
Drive Beam tunnel
Main Beam tunnel
Booster tunnel
MAIN ENTRANCE
CLIC- MAIN / DRIVE BEAM INJECTORS AND EXPERIMENTAL AREA SURFACE BUILDINGS LAYOUT
GROUP : GS-SEM
CIVIL ENGINEERING
SUPERVISOR : J.OSBORNE
DESIGNER : N.BADDAMS
SCALE : 1/7500(A3_FORMAT)
DATE : 16-AUG-2010
CLIC.CE-1.1799.0005
SIZE 3
INDICE A

Cryogenic cavern in Asian site

- Conceptual design of the cryogenic system
- Layout of the cryogenic plant for site A & B
- New layout of the cryogenic system
- Storage of helium inventory
- Cooling water for cryogenic system
- Summary & Future Plan

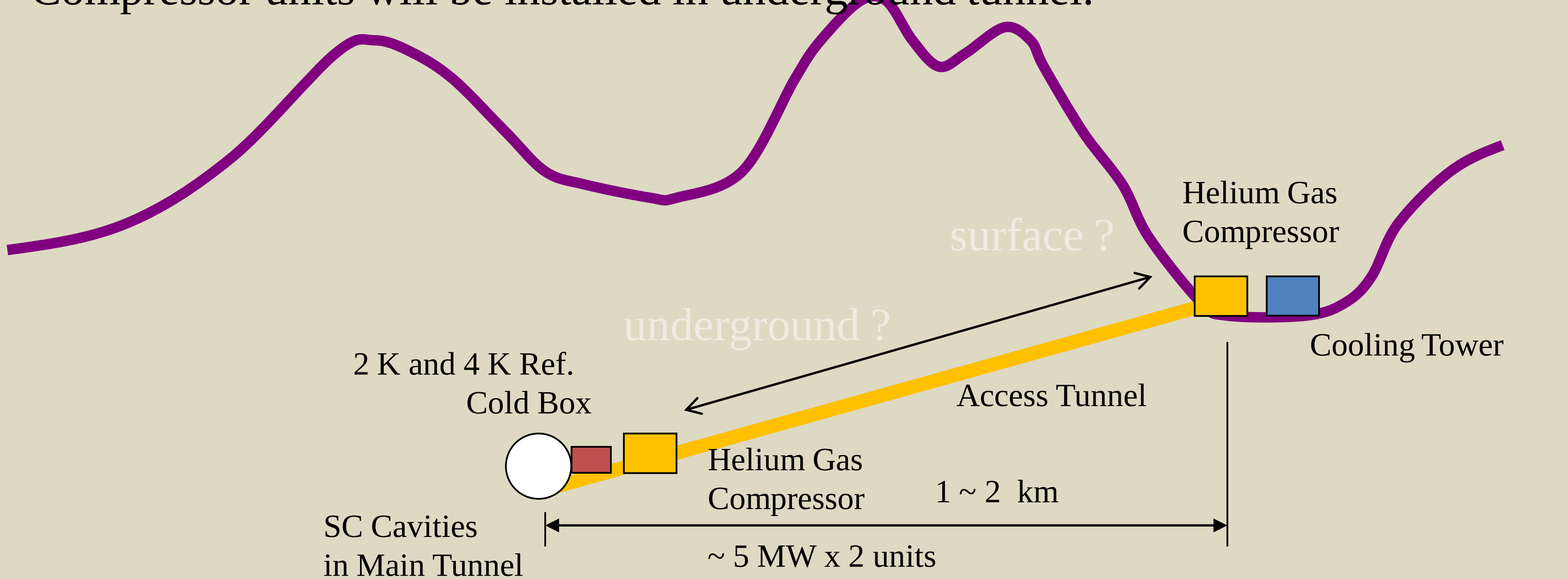
KEK
K. Hosoyama

Conceptual Design of Cryogenic System 1



There are many option of layout of main components:

•4K cold boxes will be installed in the large caverns at the end of access.
•Compressor units will be installed in underground tunnel.



Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

Thursday October 21 - Mont Blanc tunnel tour

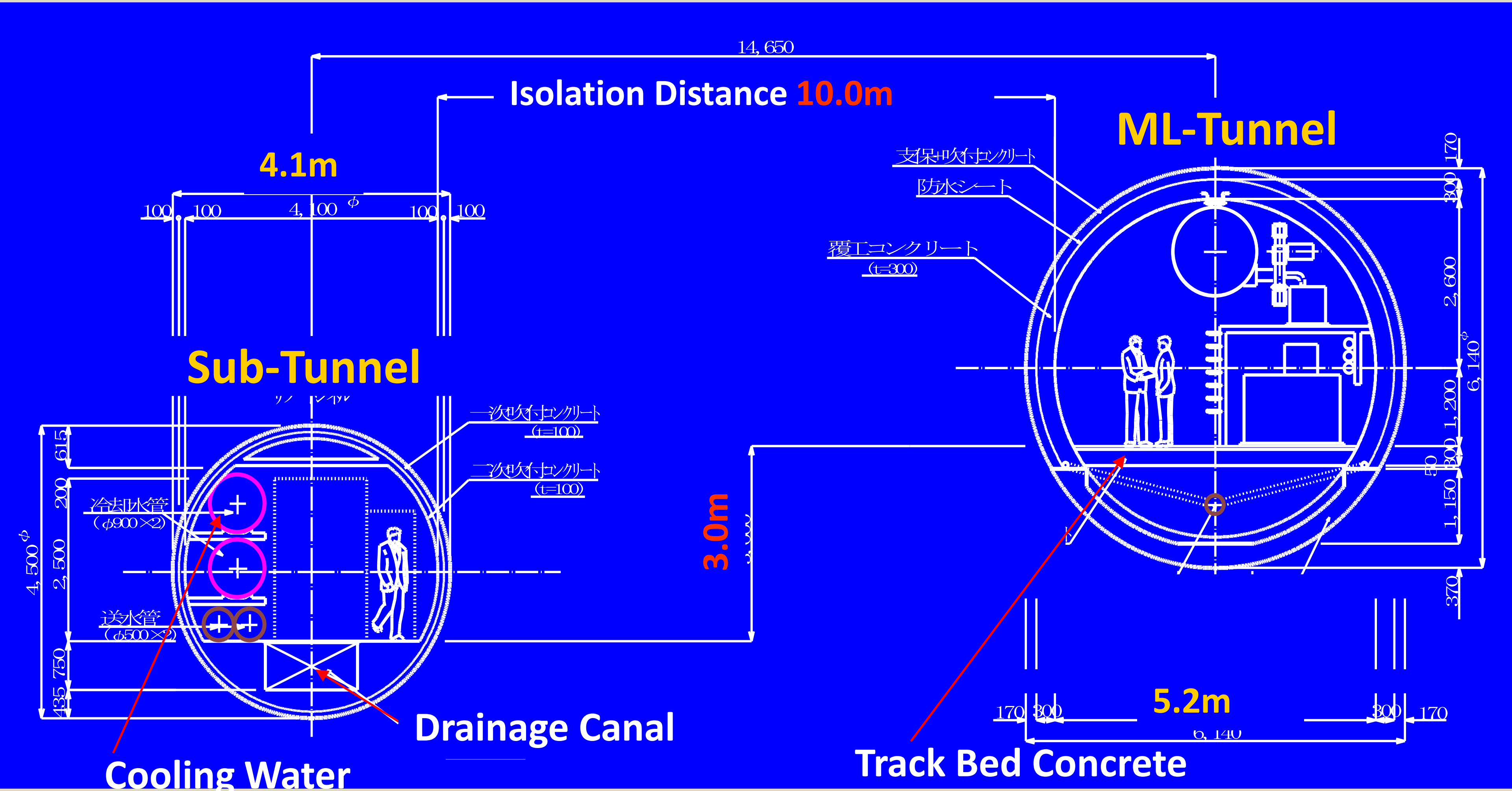
Design Progress

for Asian Single Tunnel Configuration

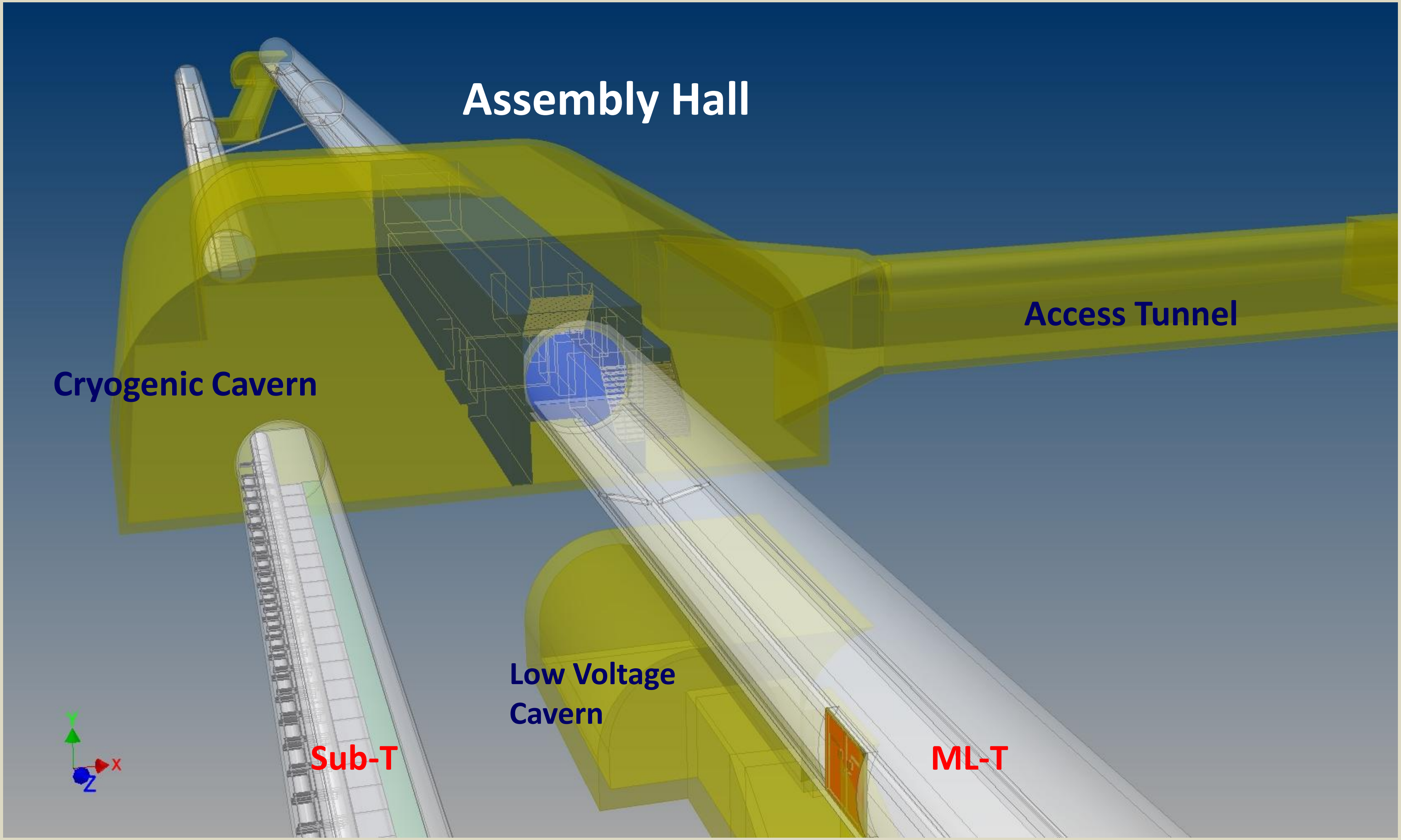
Masanobu Miyahara

KEK

Tunnel Spacing (ML-T & Sub-T)



Main Linac Facilities



Comparison of Construction Cost
TBM and NATM

- ***TBM Execution***

  - High Speed Excavation (low cost excavation) will be Possible in case of the Good geological Condition

  - Not Economical in a Short Distance Execution, Because the Portion of TBM Machine Cost is Large

  - As for the Tunneling of TBM Excavation, a Merit is bigger in case of Long-Distance Execution more than 10km

- ***NATM Execution***

  - Construction Cost doesn't Depend on Excavation Distance as much as TBM, because General-use Machines are Applied.

Summary

Design Study toward the Next Stage

We need :

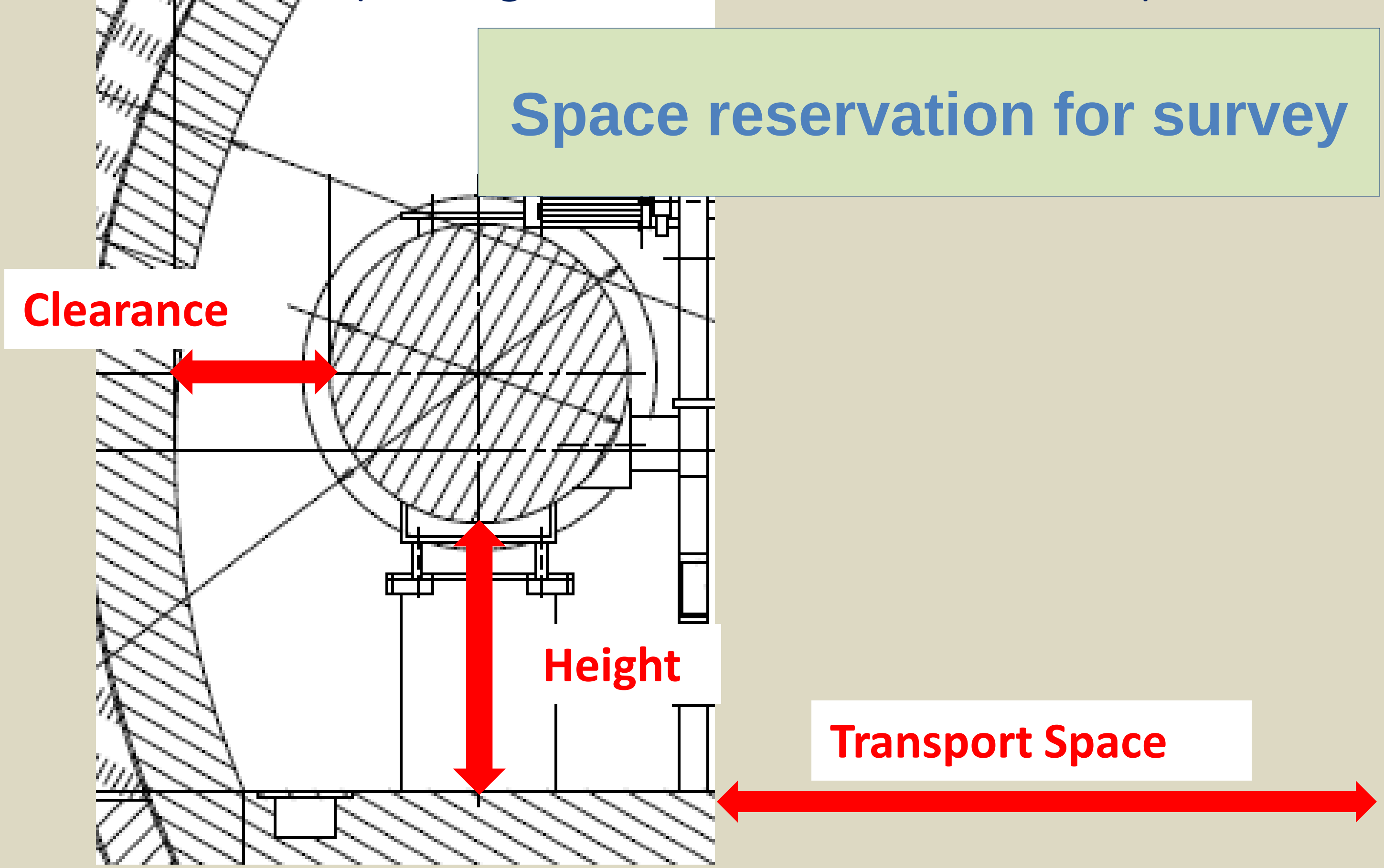
- ***to Investigate in a General Viewpoint about the Various Caverns Layout and Cross Section of the Main Linac Tunnel***
- ***to Develop more Detailed Design Study about the Cooling Water System, Air conditioning System, Cryogenic System and Power Supply System.***
- ***to do an Adapted Design Study in the Geological and Geographical Condition of the Concrete Candidate Site (Two) in Japanese Mountainous Region***

ML Single Tunnel Cross Section

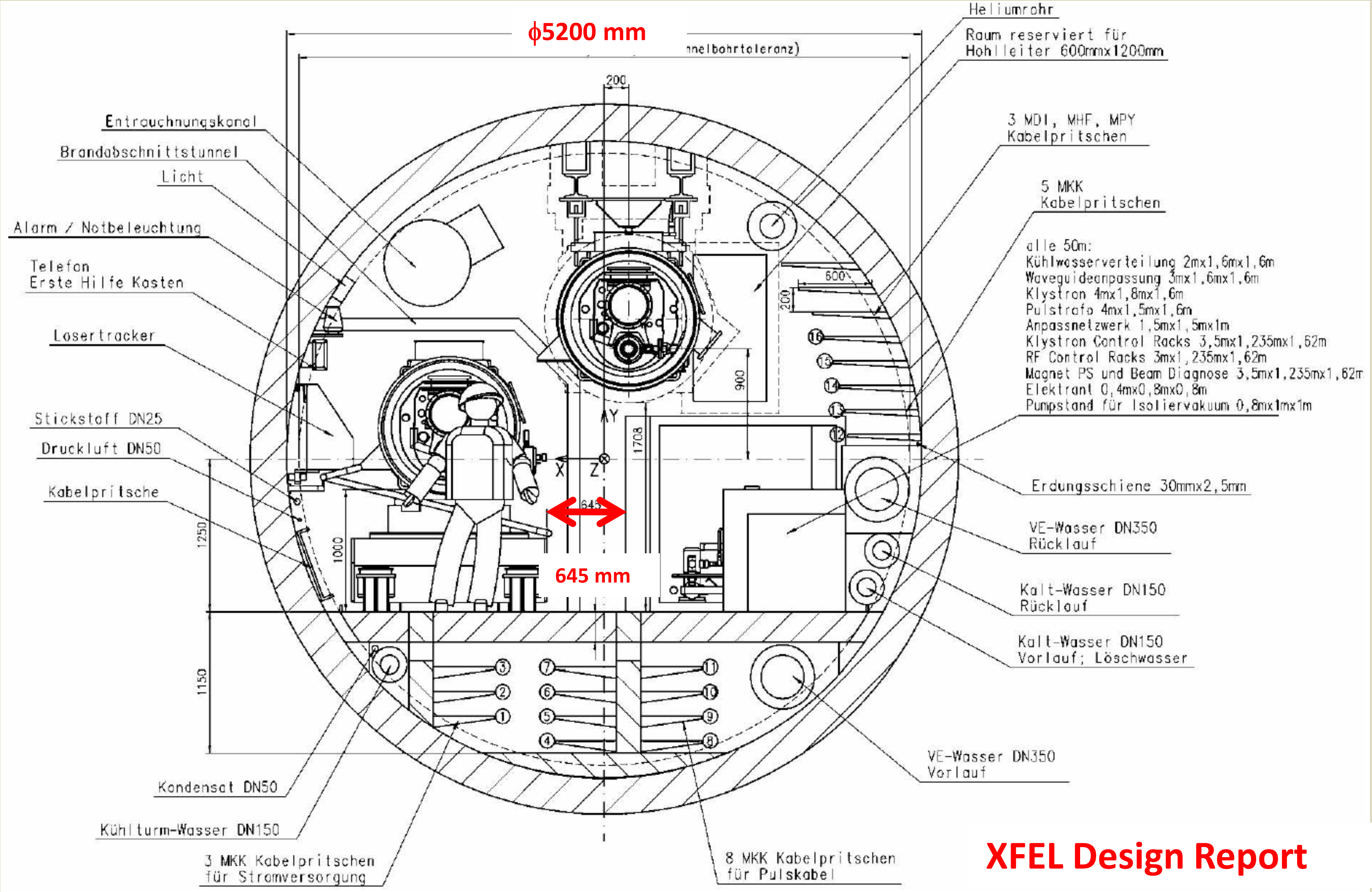
GDE Asian Regional Team
KEK
A. Enomoto

Determination of Tunnel Diameter

(for Single Tunnel in floor-mount DRFS)



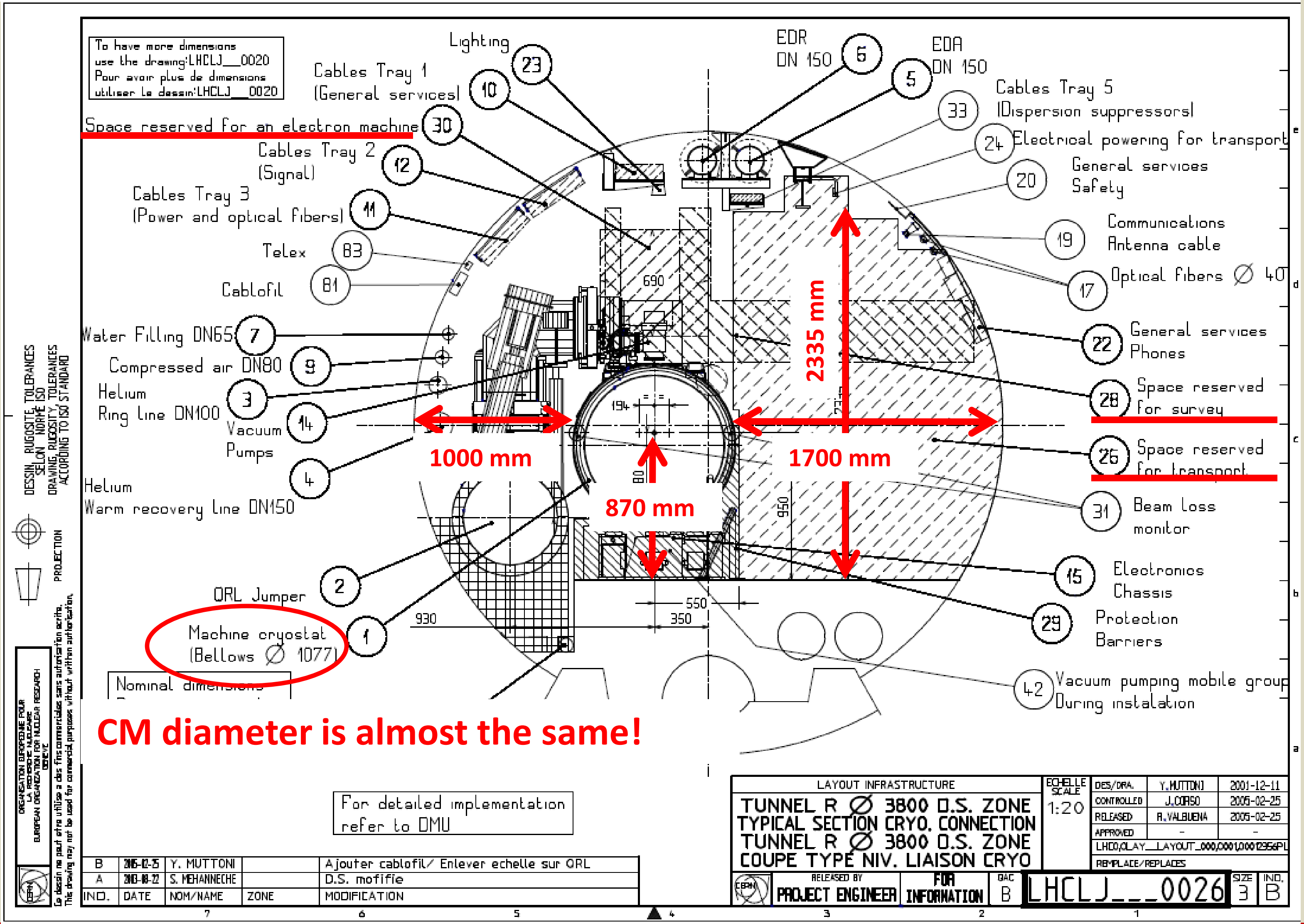
Ceiling CM Example
Euro-XFEL @DESY



XFEL Design Report

Floor CM Example

LHC ϕ3800 Tunnel



CM diameter is almost the same!

Monday October 18 - Morning – LHC Cryo tour

Tuesday October 19

Joint Session with WG-5 and ECFA

Pushpull Concept – A.Herve

Pushpull SiD - M. Oriunno

Pushpull ILD – U. Schneekloth

ILC IR Conventional Facilities Overview - T. Lackowski

Wednesday October 20

Interaction Region Criteria - Joint Session with WG – 5 and ECFA

ILC MDI – A.Seryi

CLIC MDI – L. Gatignon

CLIC Interaction Region CES Layout- M. Gastal

IR Configuration for the Shallow Site Near Dubna – A. Dudarev

Overall ILC/CLIC Scheduling

ILC Project Schedule – P. Garbincius

CLIC Project Schedule Status – K. Foraz & M.Gastal

CFS Internal Budget and Planning

Asian , European and Americas Region Budget Status and Work Plan -A. Enomoto, J.Osborne, V.Kuchler

Cryogenic System Review

Lessons from the LHC Helium Release and Radiation to Electronics – S. Weisz

CLIC CES Chapter for CDR – J. Osborne

Cryogenic Systems for Asian Sites – K. Hosoyama

Main Linac Tunnel Dimensioning - Joint Session with WG - 3

Design Progress for Asian Single Tunnel Configuration – M. Miyahara

Review of Main Linac Tunnel Dimensioning – A. Enomoto

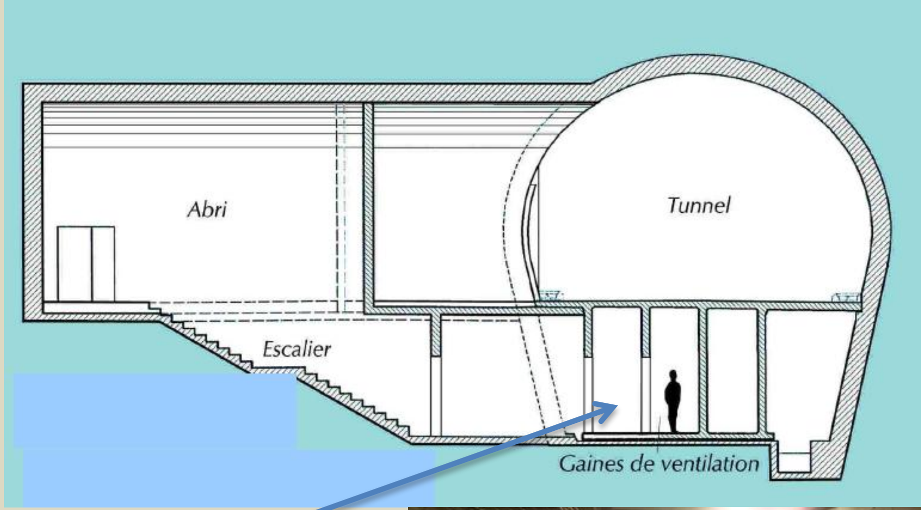
Thursday October 21 - Mont Blanc tunnel tour

Mont Blanc tunnel visit Thurs 21 Oct

- Tunnel stats :
  - Road tunnel linking Chamonix (France) and Courmayeur (Italy)
  - 8.6m diameter tunnel 11.6km long , with up to 2000m overburden
  - Major accident 24th March 1999 : Fire started on a Belgium lorry transported 9 tons of margarine from France to Italy
  - After 6 minutes into tunnel other vehicles flashed and he stopped to investigate the smoke
  - Fire lasted 56 hours with temperatures up to 1000 deg C in which 40 people died
  - Took 5 days to cool down to allow access
  - Tunnel closed for 3 years for repairs $480m

Mont Blanc tunnel visit
New measures since accident :

- computerized detection equipment
- Emergency escape alcove every 300m, leading to underfloor escape tunnel
- fire station in the middle of the tunnel complete with double cabbed fire trucks
- Emergency escape tunnel runs longitudinaly throughout the length of the tunnel with clean oxygen supply
- Any people in the security bays now have video contact with the control centre, so they can communicate with the people trapped inside and inform them about what is happening in the tunnel more clearly
- remote site for cargo safety inspection was created on each side: Aosta (I) and Passy-Le Fayet (F). Here all trucks are inspected well before the tunnel entrance. The same areas are also used as staging areas, to smooth the peaks of commercial traffic.
- Major impact on tunnel design and construction ever since



Some conclusions and roadmap

- Technical design of the detector movement system needs to get going in collaboration with detector groups and MDI
- The impact of lessons learnt from LHC Helium release and R2E issues need to be better understood by the ILC project
- First Draft of the CLIC CES Chapter has been submitted (any feedback welcome !) Costing planned for end of November
- Asian site design progressing very well

Thank You