



CLIC Civil Engineering and Services

- CDR chapter structure
- CE drawings for CDR
- Other services
- Conclusion and next steps

CLIC CDR Chapter

level 1	level 2	level 3	level 4	author
<i>Civil Engineering and Services</i>				
	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)

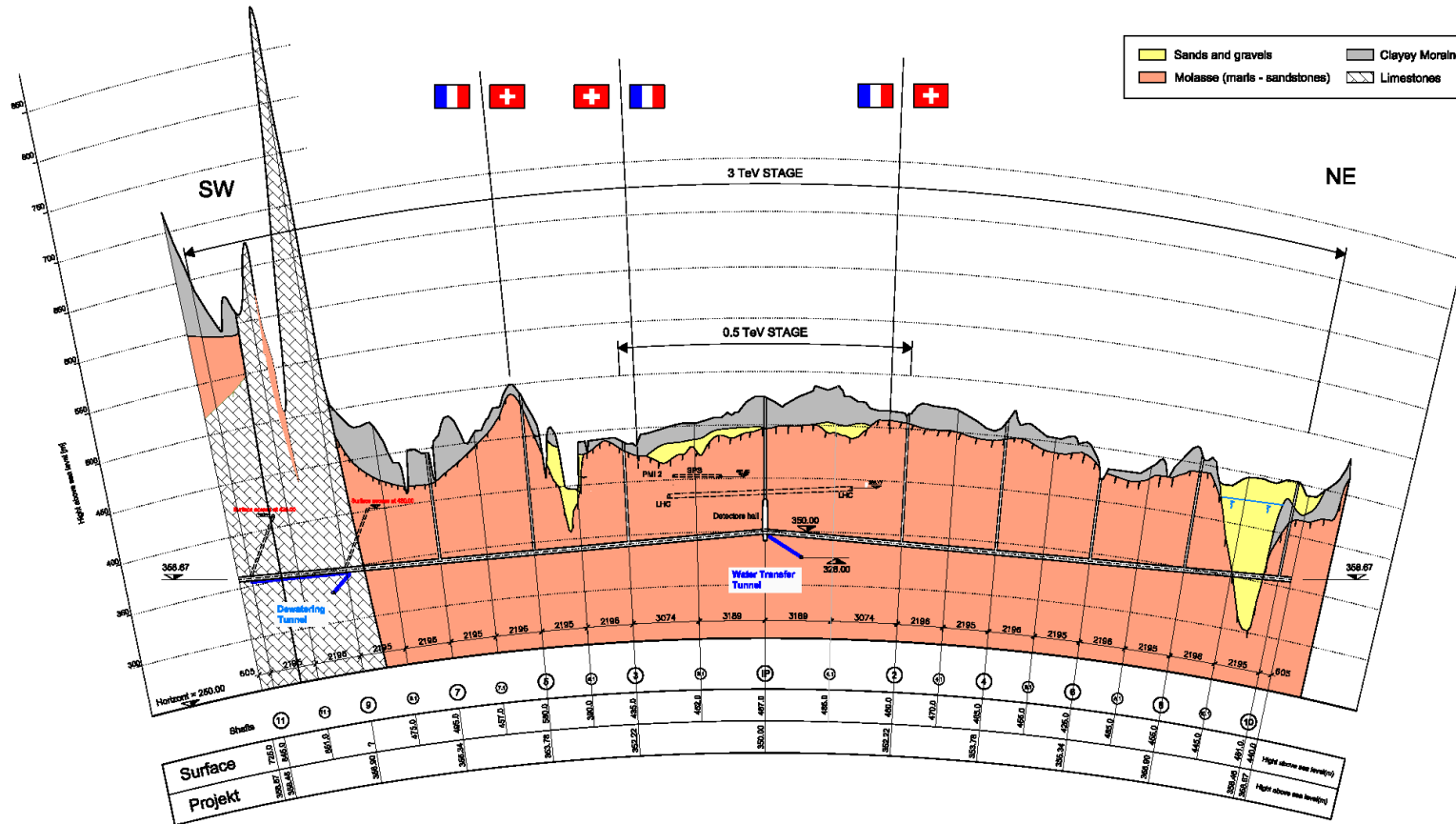
CE Drawings for CDR

- 11 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

Comments

- Most important drawing for costing
- Tunnel length includes all tunnels
- Site length is the amount of land needed to build CLIC
- Colour code:
 - Purple interaction region
 - Blue BDS
 - Green injection complex
 - Dark pink 500Gev option
 - Light pink 3TeV option

Longitudinal section 1:100'000 / 2000



CLIC									
Longitudinal section									
1:100'000 / 2000									
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Scale	1:100'000	1:50'000	1:25'000	1:12'500	1:6'250	1:3'125	1:1'562	1:781	1:390
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Scale	1:100'000	1:50'000	1:25'000	1:12'500	1:6'250	1:3'125	1:1'562	1:781	1:390

Comments

Long profile for CDR agreed in 2010 :

- Laser straight tunnels (not horizontal like ILC)
- Tunnel passes through the Gland depression i.e. same depth as ILC RDR
- 3TeV machine enters into Limestone rock
- Water transfer from lake needs to be removed

Comments

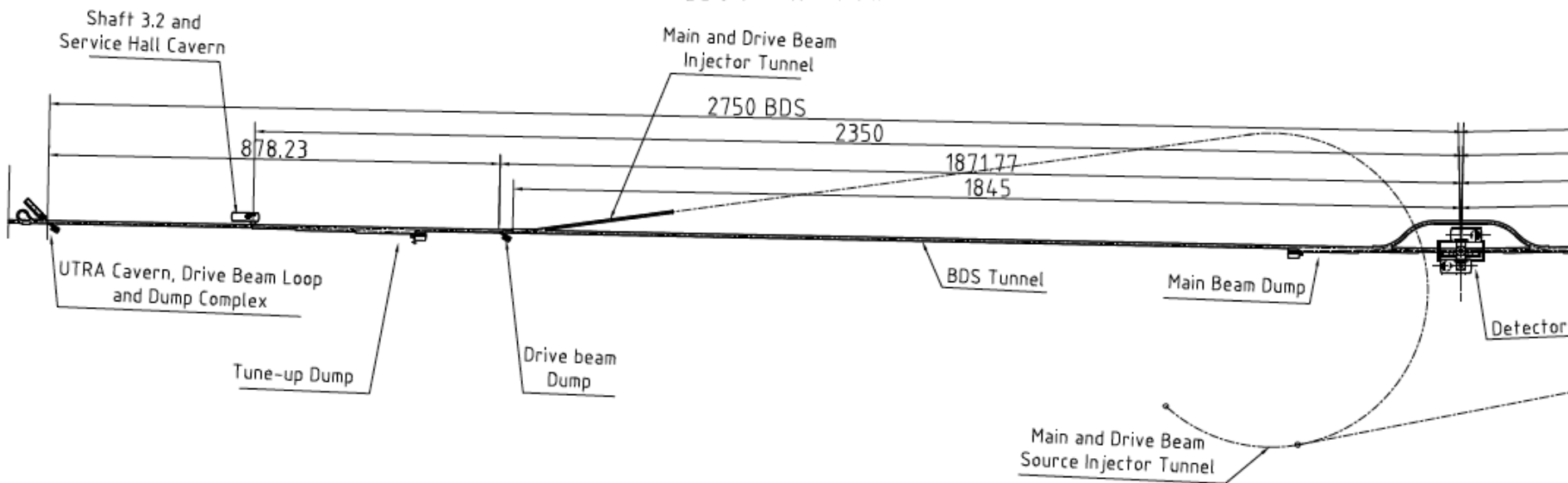
- Cross section has been increased from 4.5m to 5.6m
- 5.6m is the standard size for European subways
- Power converter community requested a lot more space => increase diameter of tunnel
- Use of transversal ventilation
- CV pipes in slab are now isolated from machine by a compressible filler
- Cable trays are not individually labelled for now



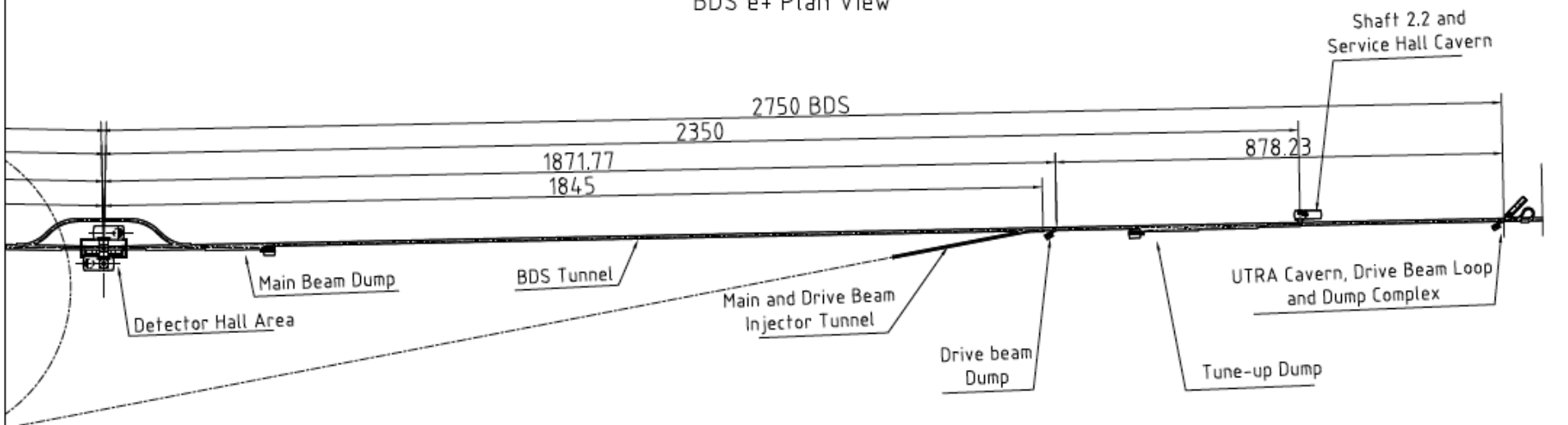
Comments

- Such shafts are located every 5 kms
- Compared to the last version, the cavern was turned around
- 2 transport tunnels were added at the request of Transport Group

BDS e- Plan View



BDS e+ Plan View



CLIC-BDS AREA LAYOUT



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

SCALE : 1/750(A3_FORMAT) DATE : 13_AUG_2010
CLIC.CE-1.1700.0004
SIZE INDEX
3 B

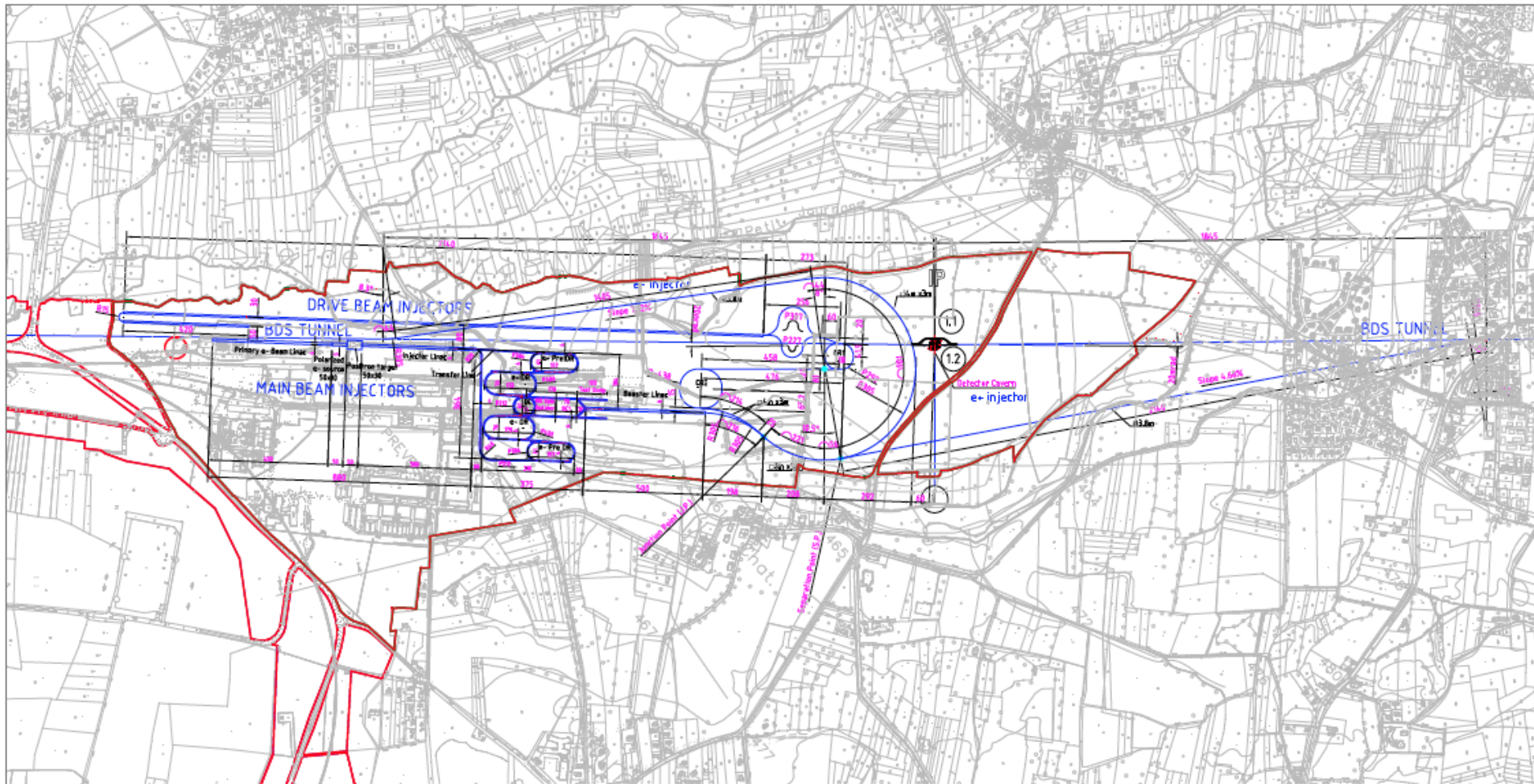
Comments

- Cut and cover tunnels
- No slope in bended region of e^- injector
- Different slopes for e^+ and e^-



Comments

- Turnaround region every 878m
- The size of the facility cavern has increased significantly to host power converter/CV/ EL equipment
- The lengths of the turnaround loops may need to be increased during TDR



INJECTORS TUNNELS	DRIVE BEAM INJECTORS COMPLEX							MAIN BEAM INJECTORS COMPLEX										COMMON TRANSFER TUNNEL J.P. to S.P.	FINAL TRANSFER TUNNELS (((From Separation Point)))			
	LINAC	DL1	DL2	CR 1	CR 2	Transfer Lines	TT to Junction Point	Preliminary e- beam LINAC	Polarized e- source	Positron Target	Transfer Lines	e+/e- Pre DR	e+/e- DR	DL	SpinRotator +BC1+TD	Booster LINAC	TT to Junction Point		e- TT	e+ TT		
Length (l) m	2140 +48+420	227	307	292	438	518	239	400	50	50	768	2x384	2x433	212	2 x 313	500	216	277	945	1449	2196	
Section (w x h) m	6 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	5 x 3	30 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	6 x 3	4 x 3	φ 3.8	φ 3.8	
																				delta e-/e+ = 198m		

CLIC- MAIN / DRIVE BEAM INJECTORS AND EXPERIMENTAL AREA LAYOUT



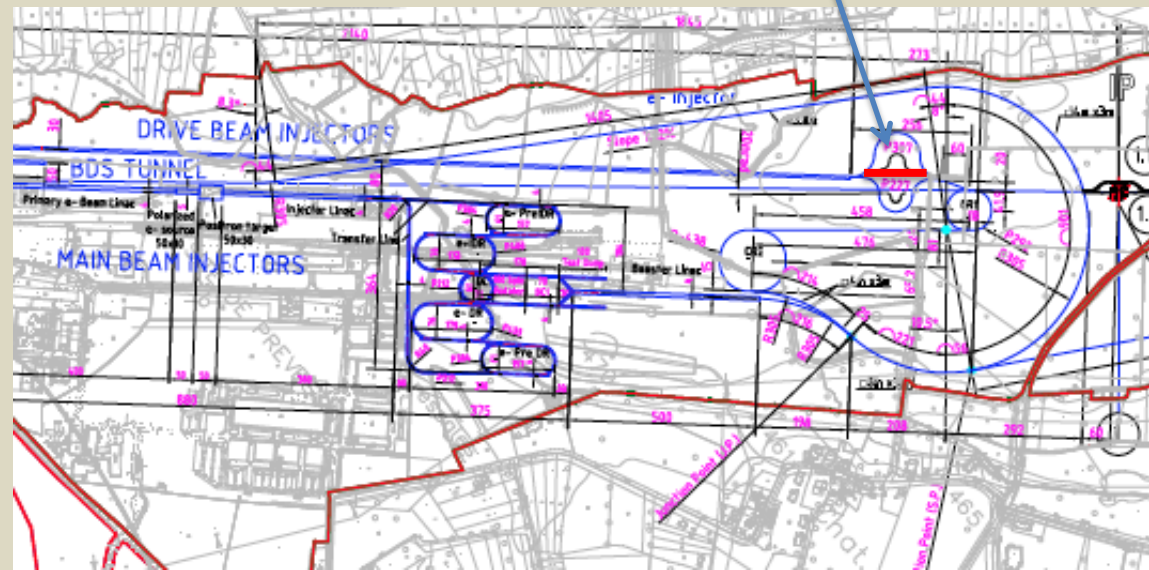
GROUP : GS-SM
CIVIL ENGINEERING
SUPERVISOR : J.OSBORNE
DESIGNER : N.BADDAMS

SCALE : 1/8000(A3_FORMAT) DATE : 16-AUG-2010

CLIC.CE-1.1799.0002 3 1

Comments

- Red lines set-out the limit of CERN land
- Drive beam injection line to be added



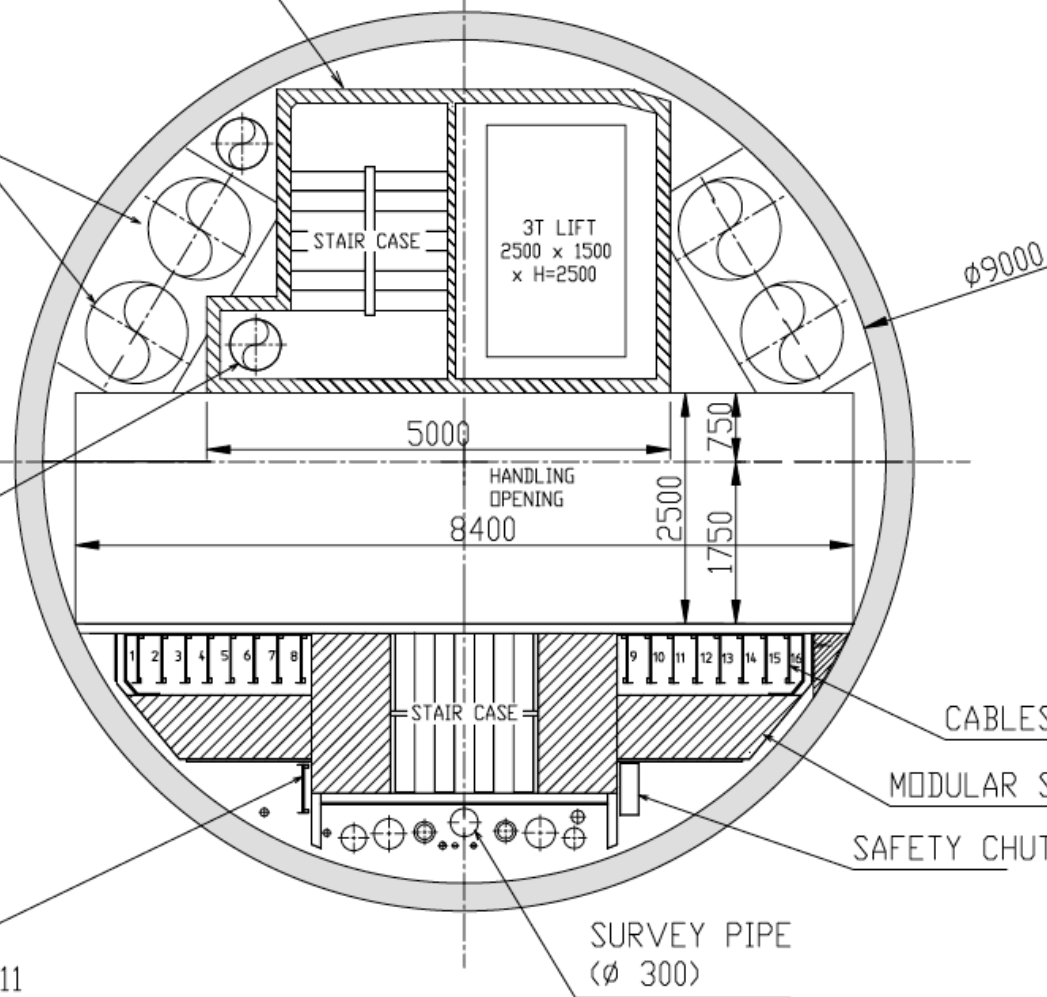
MODULAR CONCRETE STRUCTURE
(SAFE AREA)

VENTILATION DUCTS ϕ 1100
FOR BEAM TUNNEL

SAFE AREA
VENTILATION DUCT

POWER CABLES
LADDERS

SHAFTS 1.0 and 2 to 11



CLIC-ML SHAFT (9m-3t Lift) CROSS SECTION

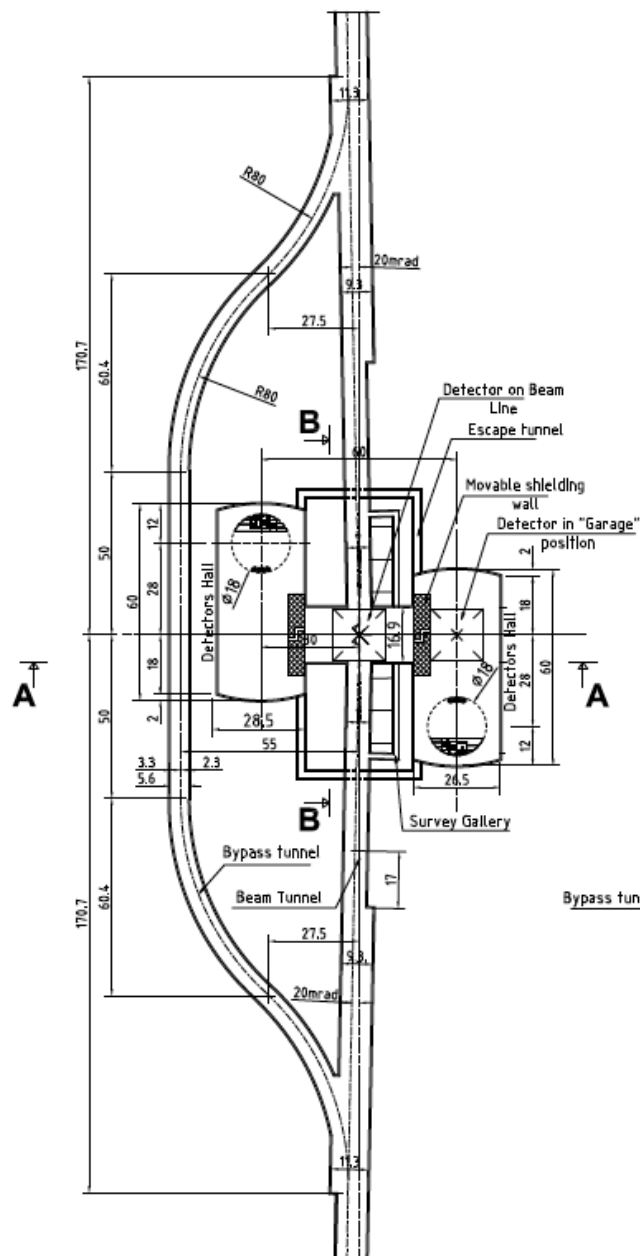


GROUP 1 TS-CE
CIVIL ENGINEERING
SUPERVISOR : J.L.BALDY
DESIGNER : N.BADDAMS

SCALE : 1/50(A3_FORMAT) DATE : 14_MAY_2007
CLIC-.CE-1.1710.0005 3 -

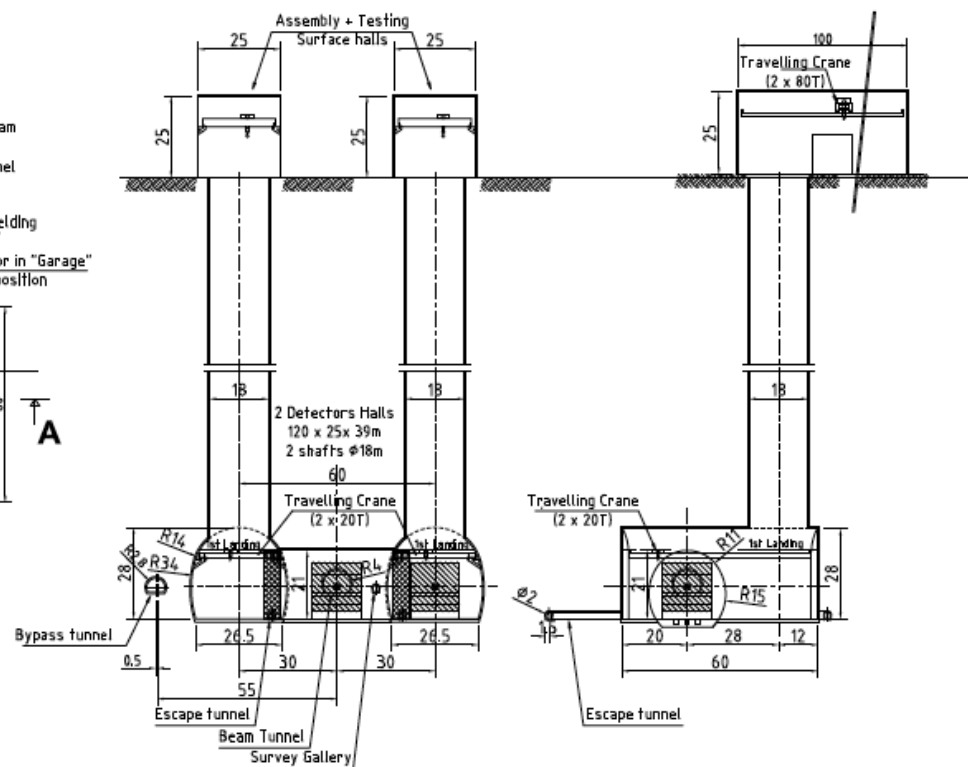
Comments

- Typical cross section for 9m diameter shaft found every 5 km
- Based on LHC design



Section A-A

Section B-B



CLIC- DETECTORS HALL AREA (SURFACE AND UNDERGROUND)



REVISION: 1.00-0001
 CIVIL ENGINEERING
 SUPERVISOR: J. OSBORNE
 DESIGNER: N. BODDAMS

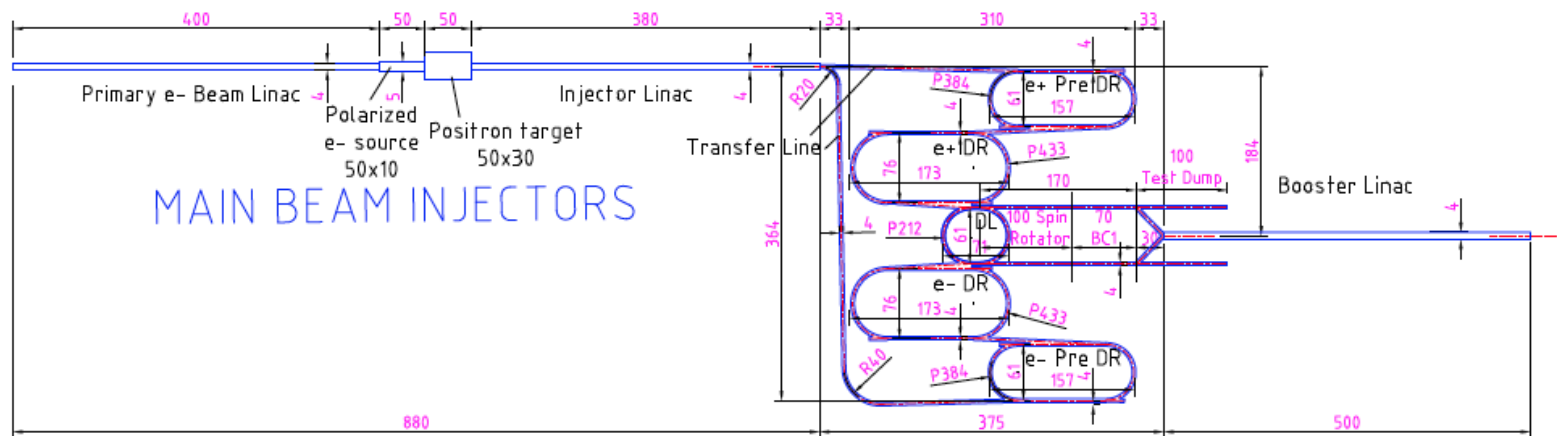
SCALE: 1/1000(A2 FORMAT DATE: 18 AUG 2010)
 CLIC.CE-1.1700.0001 2 D

Comments

- Bypass tunnel now out of the volume of the detector assembly cavern
- Shielding doors to remain as a place holder, detector could be self shielded
- Wall alongside shielding doors have to be flat
- Safety galleries for both caverns have been added
- 2x80t cranes on surface + 2x20t cranes underground, based on CMS site

Comments

- Overview of Injection Complex
- 5m cut and cover tunnels
- Missing information on distance between access shafts
- Drive beam injector building 2.5km long, 30m wide
 - None of these buildings existed for previous costing exercise
- Missing central machine cooling tower - water not coming from lake anymore for CDR option.
 - Both options will still be examined for TDR
- Surface buildings for IR based on CMS



CLIC- MAIN BEAM INJECTORS DELAY LOOP LAYOUT



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

SCALE : 1/1000(A3_FORMAT) DATE : 5-AUG-2010

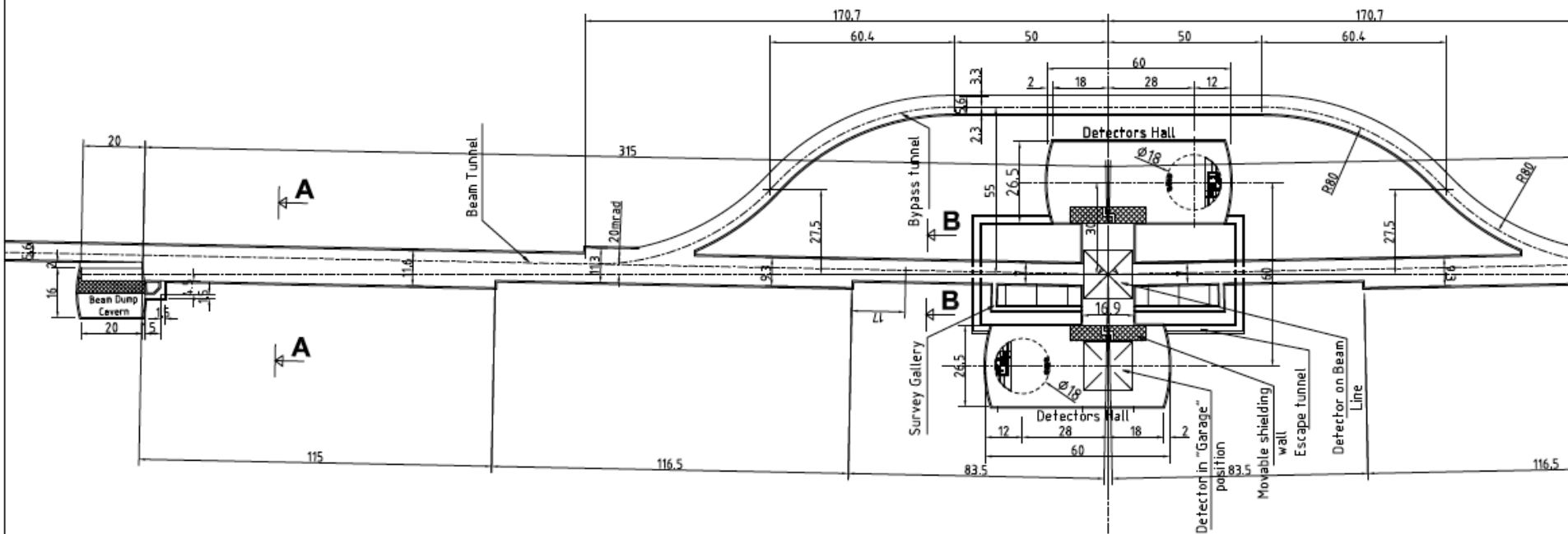
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3 C

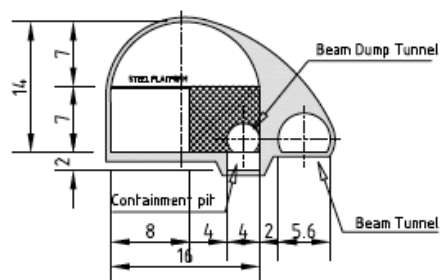
Comments

- Many changes were introduced but design is now converging

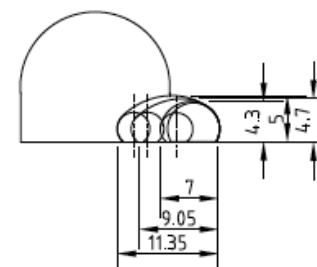
Plan View



Section A-A



Section B-B



CLIC-BDS MAIN BEAM DUMPS



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

SCALE : 1/1000(A3_FORMAT) DATE : 16_AUG_2010
CLIC.CE-1.1700.0003 SIZE 3 INDEX D

Comments

- BDS length was changed because the tunnel got wider. If we want to maintain a 2m thick shielding at the Beam dump cavern, the BDS has to become longer
- No other changes can be envisaged for the CDR



Conclusions and roadmap

- First Draft of the CES Chapter has been submitted
 - HVAC section difficult to finalise because of heat loads uncertainties
- CDR draft for CES Chapter here :
 - \\cern.ch\dfs\Workspaces\i\ILC\CLIC\CDR\CES_Chapter
- CES Costing planned for end of November