GDE ACCELERATOR ADVISORY PANEL REVIEW

CONVENTIONAL FACILITIES AND SITING GROUP

CFS COLLABORATION EFFORTS

JOHN OSBORNE - CERN

The R&D Plan specified that collaboration with 'similar' projects on areas of synergy

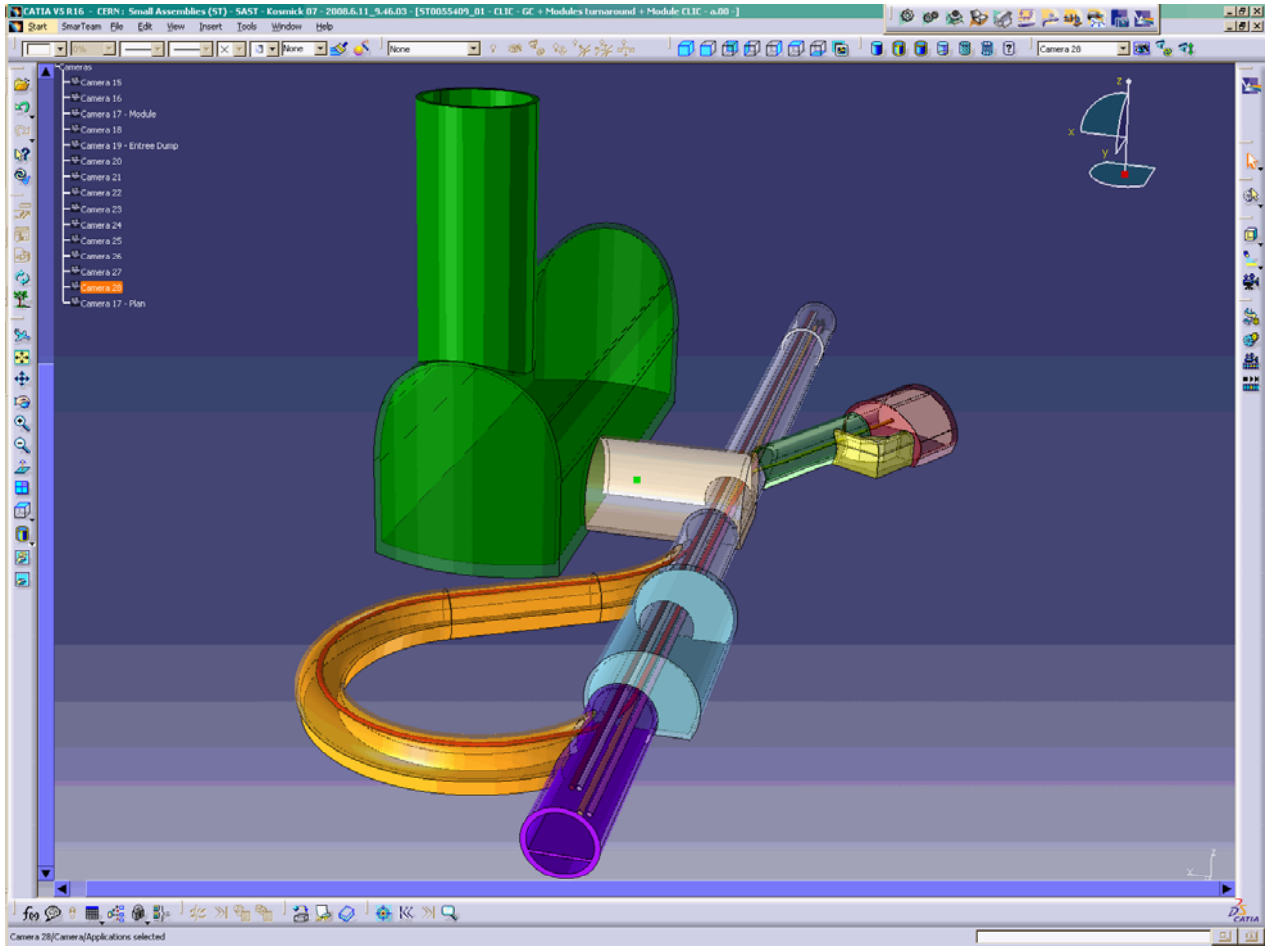
- The aim of these efforts is to improve the RDR baseline and ultimately reduce project costs
- The following collaboration efforts have started during the TDP :
  - CERN : CLIC
  - DESY : EuroXFEL
  - FNAL : Project X

CLIC

- The key CFS areas of synergy identified are :

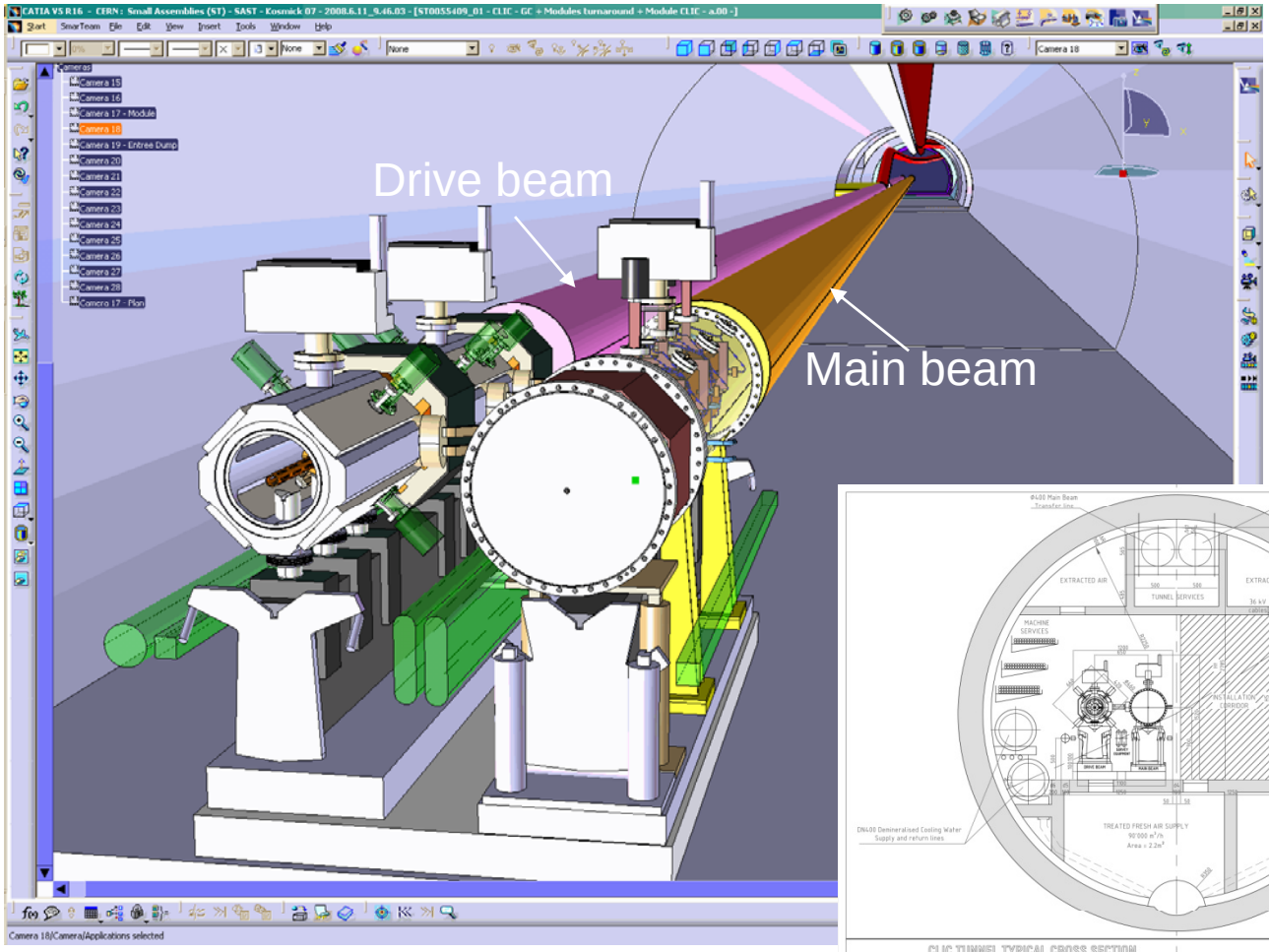
  - 3d modeling for the underground civil engineering
  - Transport & installation of the machine
  - Joint safety document
  - Cooling and Ventilation
  - Interaction region

3d models were produced in 2008 for CLIC:

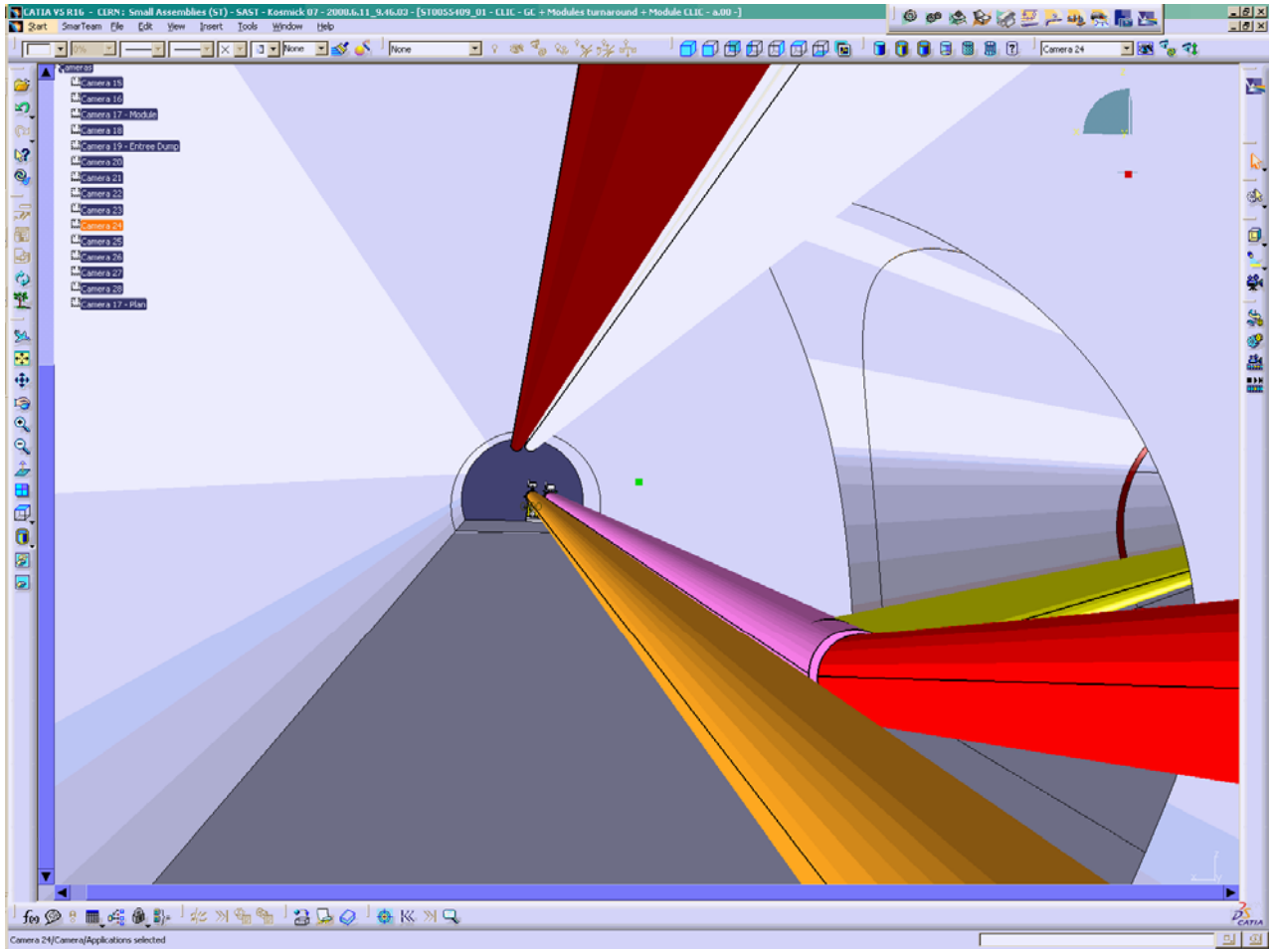


Catia Software

Global Design Effort - CFS



Global Design Effort - CFS

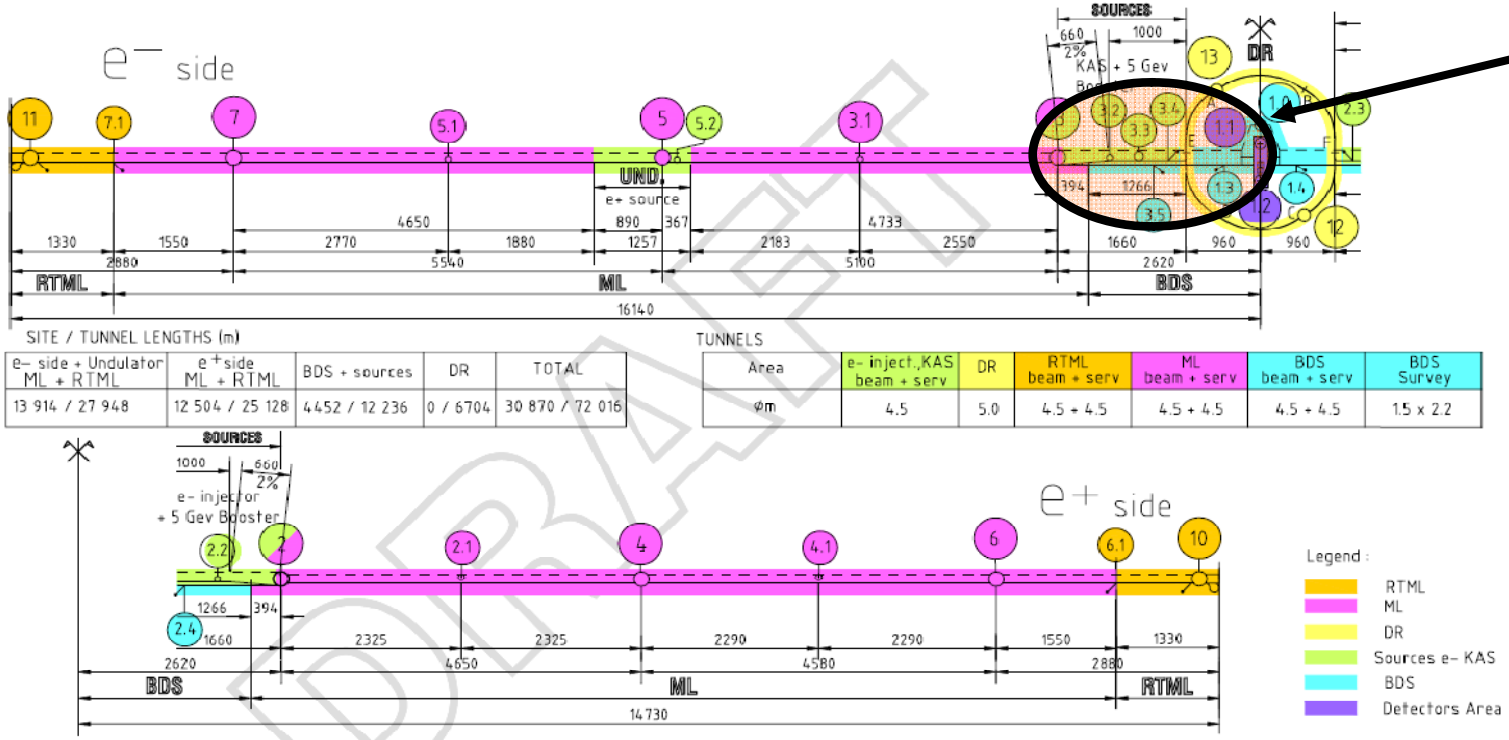


Many issues highlighted eg access problems, conflicts, installation co-ordination etc.

3d models for ILC started in 2009

- Working group established
- Efforts co-ordinated at DESY
- CERN team providing civil engineering models using CATIA software (A.Kosmicki)
- Main Linac / BDS intersection on e- side selected as study area
- Models will be used in decision making process for Minimum Machine

Study area



SITE / TUNNEL LENGTHS (m)

e- side + Undulator ML + RTML	e+ side ML + RTML	BDS + sources	DR	TOTAL
13 914 / 27 948	12 504 / 25 128	4452 / 12 236	0 / 6704	30 870 / 72 016

TUNNELS

Area	e- inject.,KAS beam + serv	DR	RTML beam + serv	ML beam + serv	BDS beam + serv	BDS Survey
⌀m	4.5	5.0	4.5 + 4.5	4.5 + 4.5	4.5 + 4.5	1.5 x 2.2

SHAFTS

Point	1.0	1.1	1.2	2	3	3.3	5.2	4	5	6	7	10	11	12/C	13/A
⌀m	9	16	16	14	14	4	4	14	14	9	9	14	14	9	9

BORINGS

Point	2.1, 3.1, 4.1, 5.1	2.2, 3.2	1.3, 1.4, 2.4, 3.5
⌀m	1.50		

SHAFT BASE CAVERNS

Point	2, 3, 4, 5, 6, 7, 10, 11
(LxWxH) m	49 x 16 x 18 + 3 storeys

MUON WALL WIDENINGS

Point	1.3, 1.4
(LxWxH) m	25 x7x6 +15x7x6

SOURCES CAVERNS

Point	Undulator 5.2	KAS 3.3	2.2, 3.2
(LxWxH) m	21 161m3	6 574m3	7 X 15 X 7.5

DR ALCOVES

Point	12/C, 13/A	B, D, E, F
(LxWxH) m	75 x 10 x 10 + 1 storey	16 x 8 x 8

DETECTORS HALL

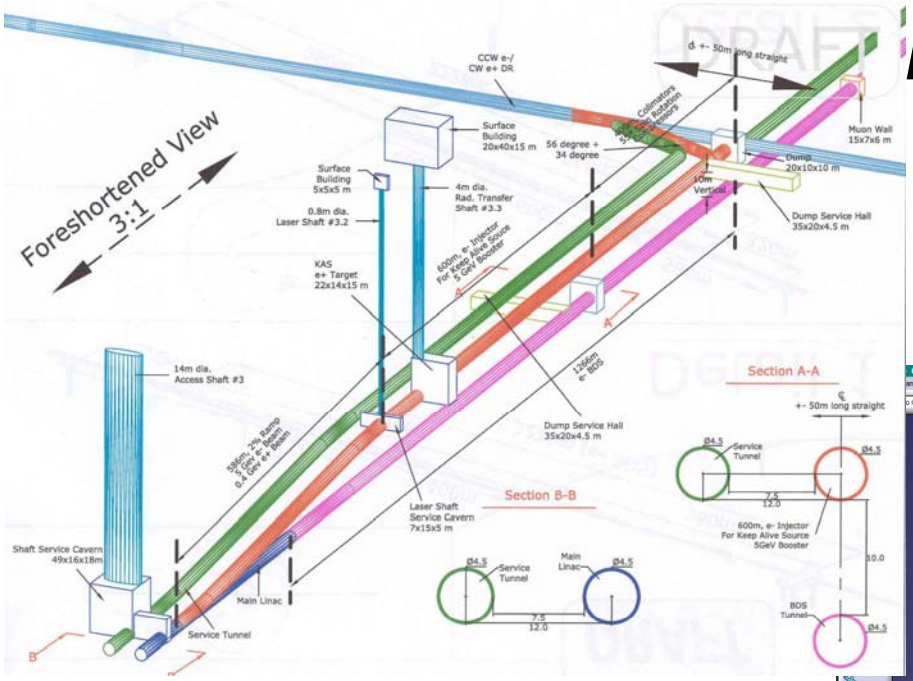
Point	1.1, 1.2	1.0
(LxWxH) m	120 x 25 x 39	40 x 15 x 15

BEAM DUMPS CAVERNS (↖)

Point	SOURCES 2.3, 3.4	RTML 6.1, 7.1, 10, 11	BDS 1.3, 1.4, 2.4, 3.5
(LxWxH) m	5 x 4 x 4		20 x 9 x 15 + 1 storey

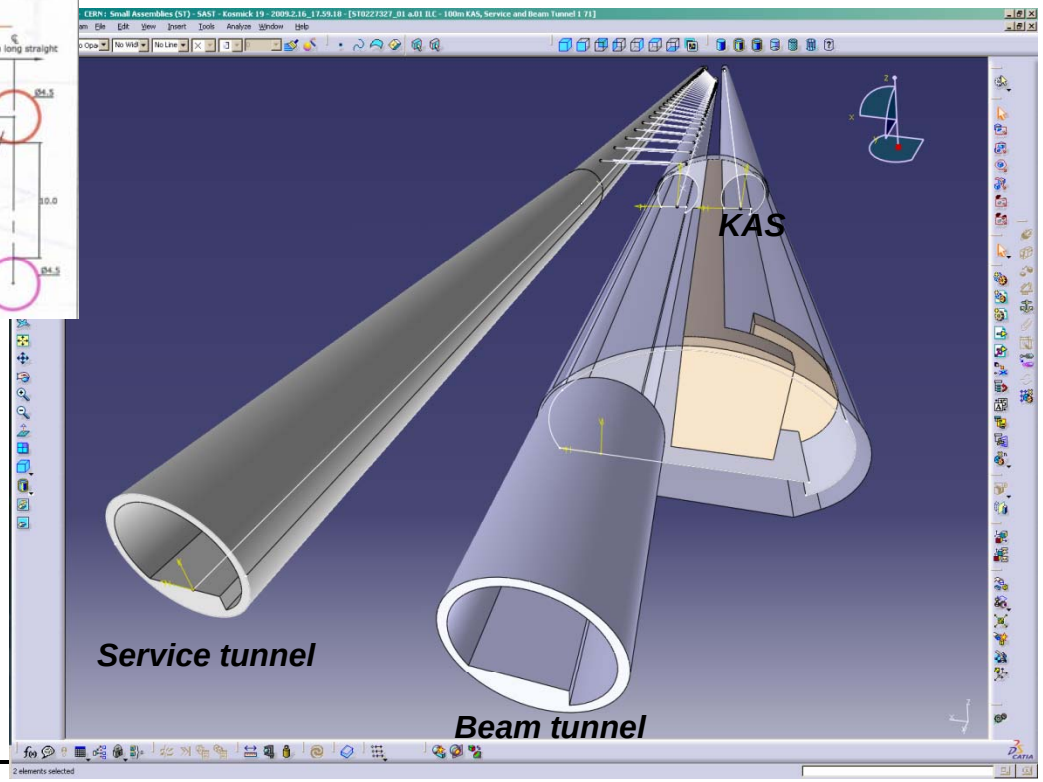
BEAM DUMP SERVICE HALLS (↖)

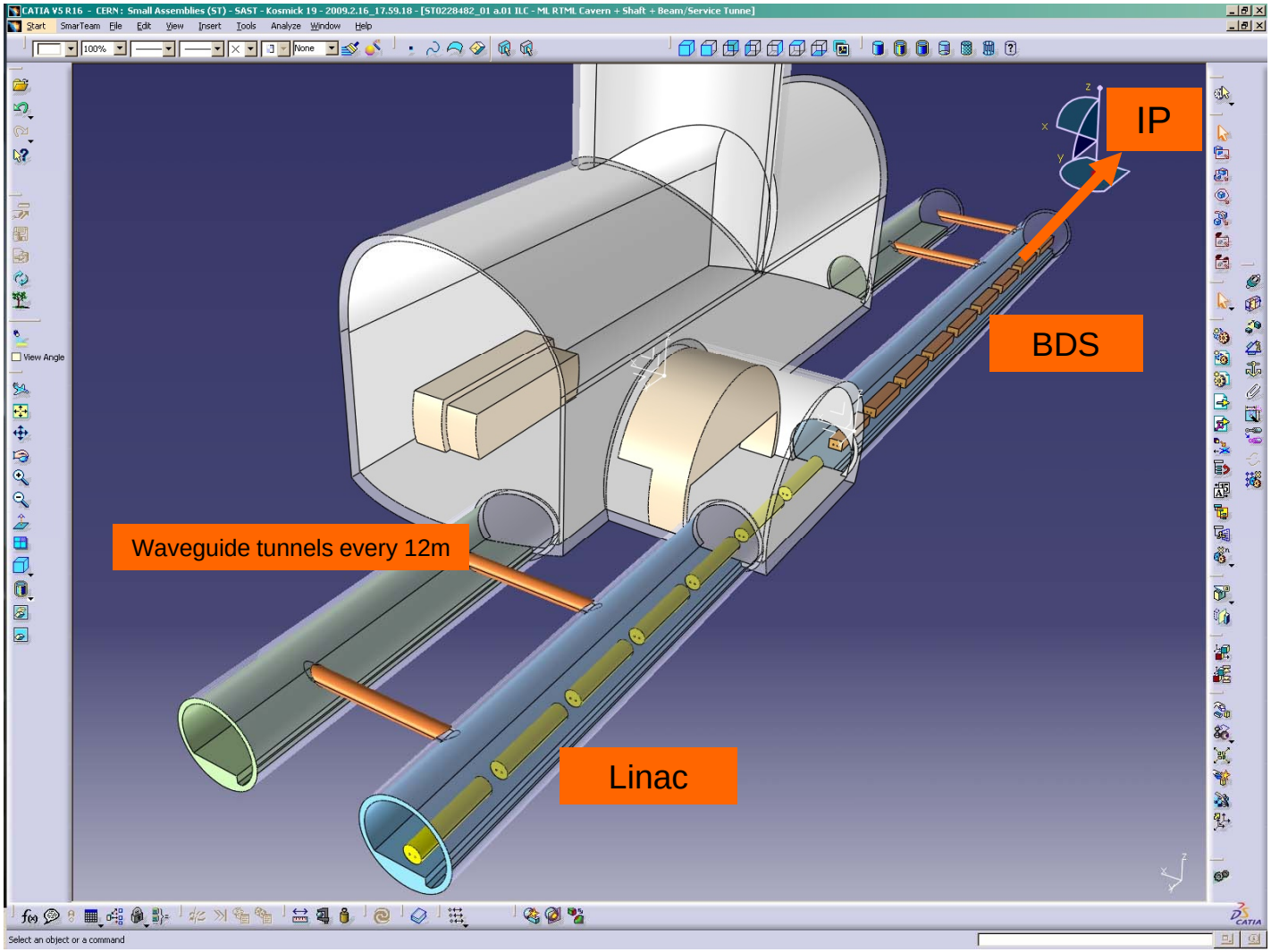
Point	BDS 1.3, 1.4, 2.4, 3.5
(LxWxH) m	30x20x 10



RDR SLAC Model

TDP Catia Model

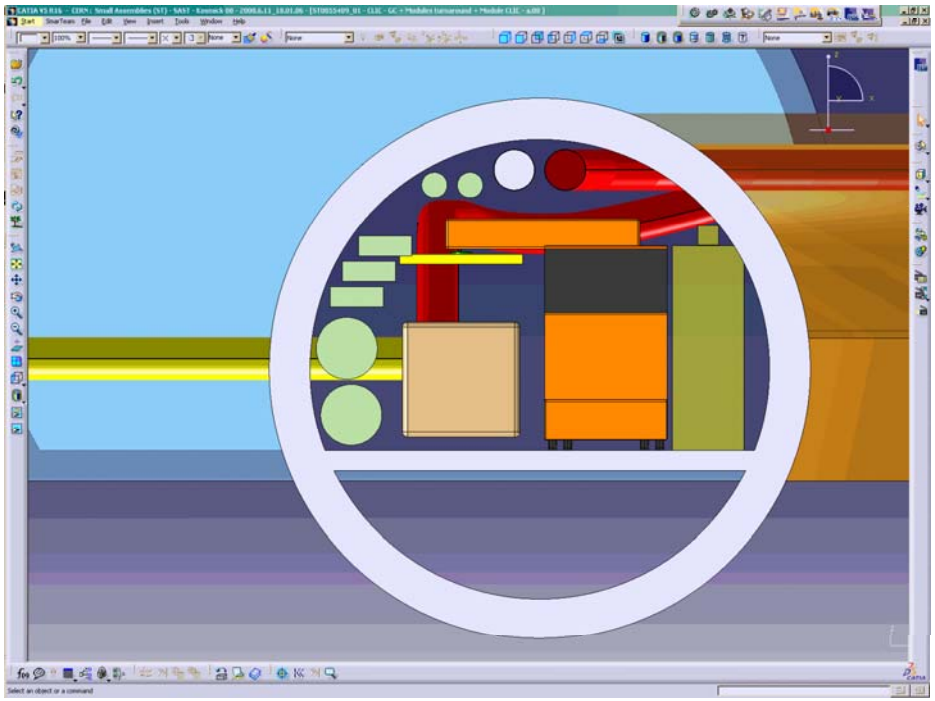




Study area refined to 50m either side of Shaft No. 3

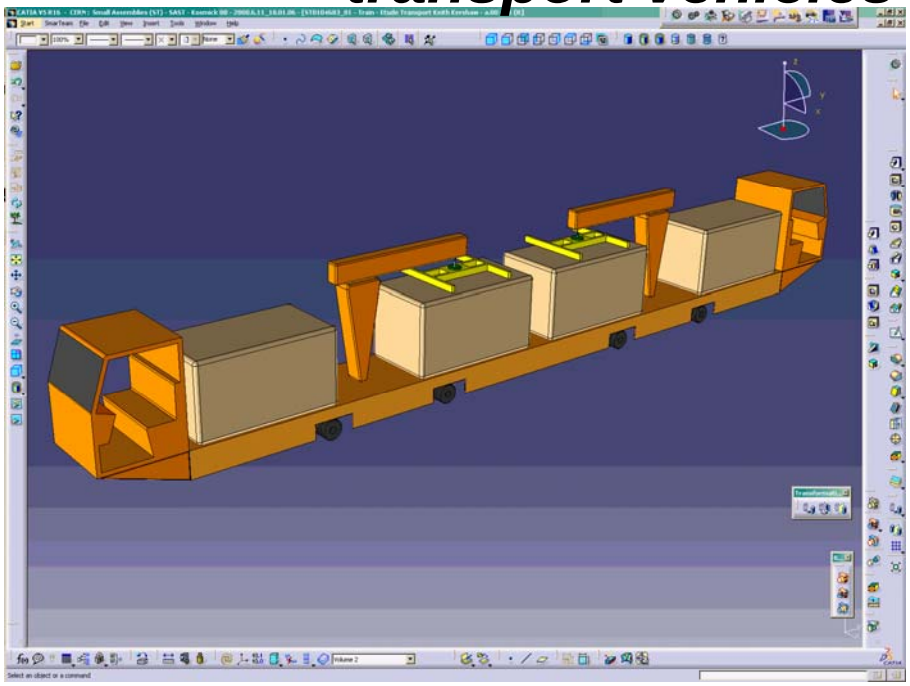
Transport studies for ILC started in 2009

- CLIC transport study performed in 2008 by CERN (Keith Kershaw)
- Aim of the study was to :
  - Review requirements and propose conceptual solution for lowering, underground transport and installation of CLIC modules
  - Use this conceptual design as input into the tunnel integration studies
  - Bear in mind transport of other elements
  - Utilise these studies for new costing exercise
- New study underway for ILC



Typical CLIC tunnel cross section

Assumed CLIC transport vehicles



ILC Transport Studies

- K.Kershaw has started gathering information that exists (input from J.Leibfritz FNAL, A. Enomoto KEK)
  - Impact of slopes, especially on the Asian site needs to be understood and CLIC
  - 1.5 - 2% slope means can use standard vehicles (lowest cost most reliable solution)
  - Up to 7 or 8% slope achievable by reducing capacity to approx one third of nominal
  - Type of transport vehicles ?

ILC / CLIC Joint Safety document

- *Initial idea of having 'a definitive safety note' for a such a project to be built anywhere in the world is proving difficult*
- *It was agreed it would be better if this exercise was used more to collect safety data on similar projects that have been, or are currently under construction in the physics world eg LHC, XFEL, Project X etc.*
- *At CERN S.Weisz and F.Corsanego are starting this process by drafting the 'LHC Chapter'*
- *KEK are producing a similar document for Fire Safety Issues*

Safety issues : eg emergency escapes

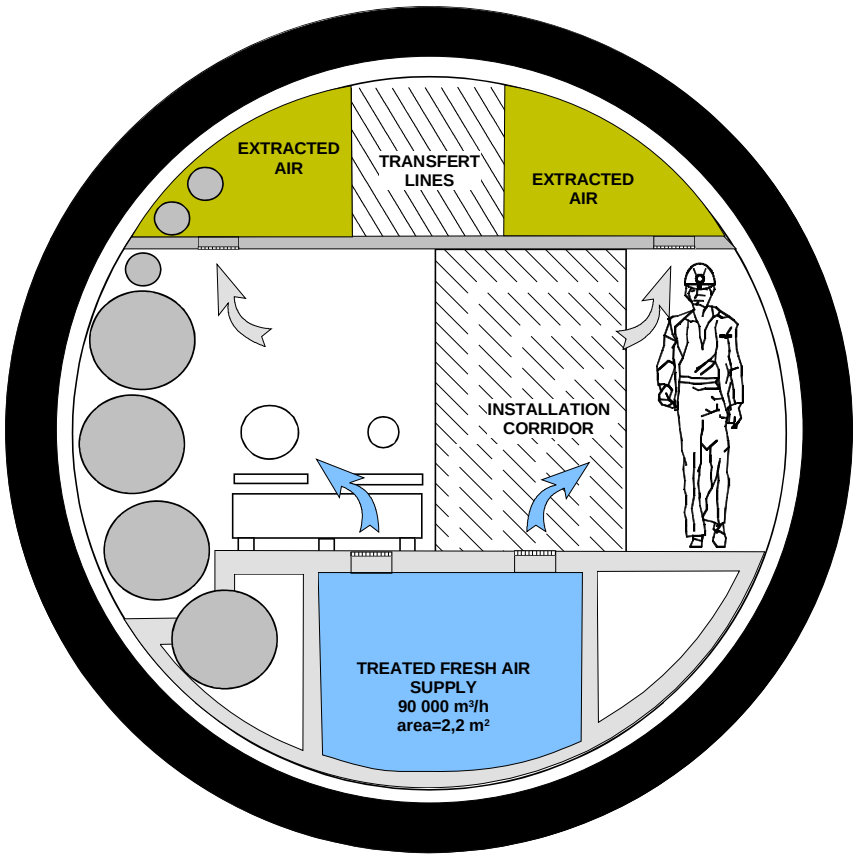
- *As example to demonstrate the difficulty of a 'common' document, LNF in Frascati are proposing a new project (SPAR-X)*
  - *Italian regulations impose emergency escape every 60m !*

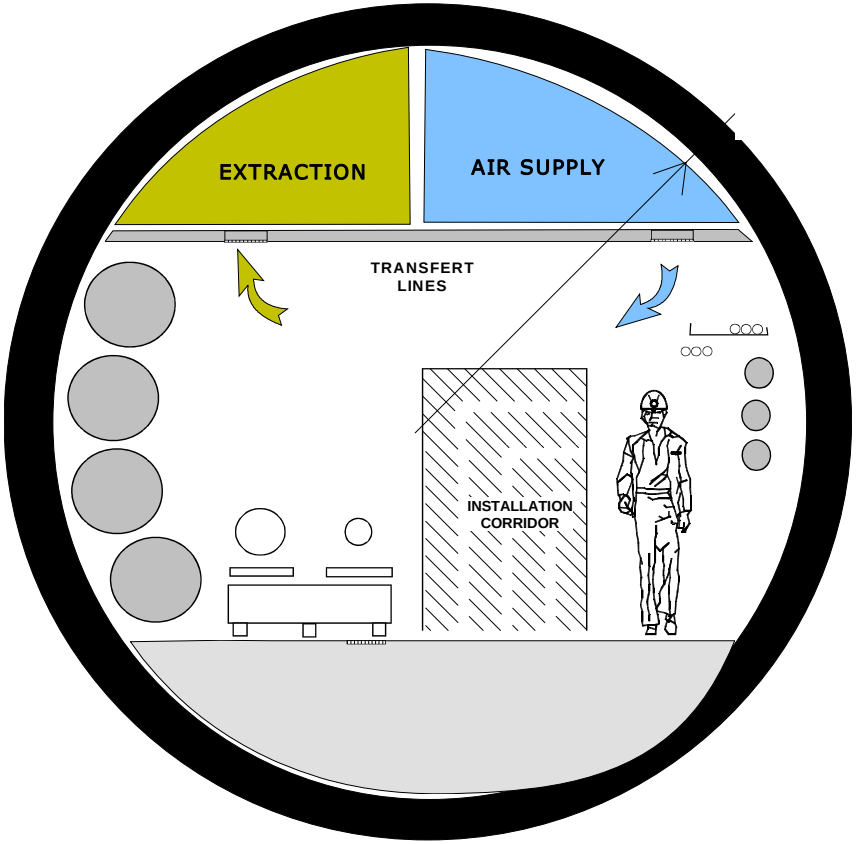
(Could ITER be asked to quantify the changes made from their 'Global Design' to the site specific solution in France, in particular, for matters of safety legislation ??)

ILC / CLIC Cooling and Ventilation

- CERN HVAC engineers are in contact with ILC team.
- CERN CV Group Leader (J.Inigo-Golfin) attended Chicago GDE Nov 08 and assisted in ILC Process Water Value Engineering exercise.
- Monthly CES/CFS webex where HVAC issues are regularly reviewed for both projects
- In 2009, CLIC HVAC studies are concentrating on :
  - Machine Cooling requirments eg possibility of increasing water cooling tolerances to cut costs & reduce pipe sizes
  - Cooling Towers v Water from Lake Solution
- Both projects benefiting from the process

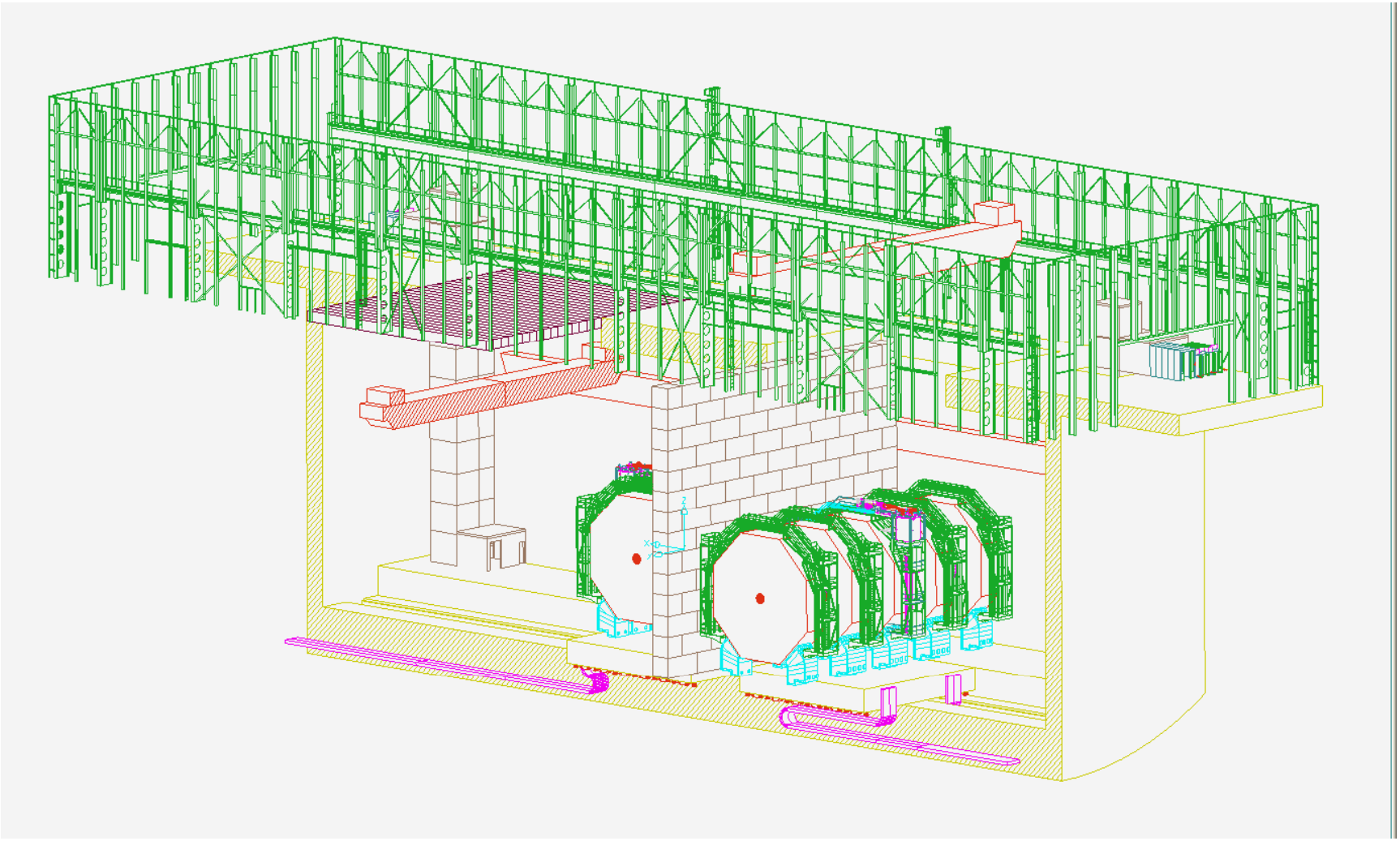
CLIC VENTILATION ALTERNATIVES





ILC / CLIC Interaction Region Infrastructure

- Both interaction regions identical at the moment
- 3d models for CLIC & ILC detector halls produced in 2008 (using old Euclid Software) at CERN
- Dubna shallow site alternative examined
- CLIC detector community will be providing new input in the summer for further improvements



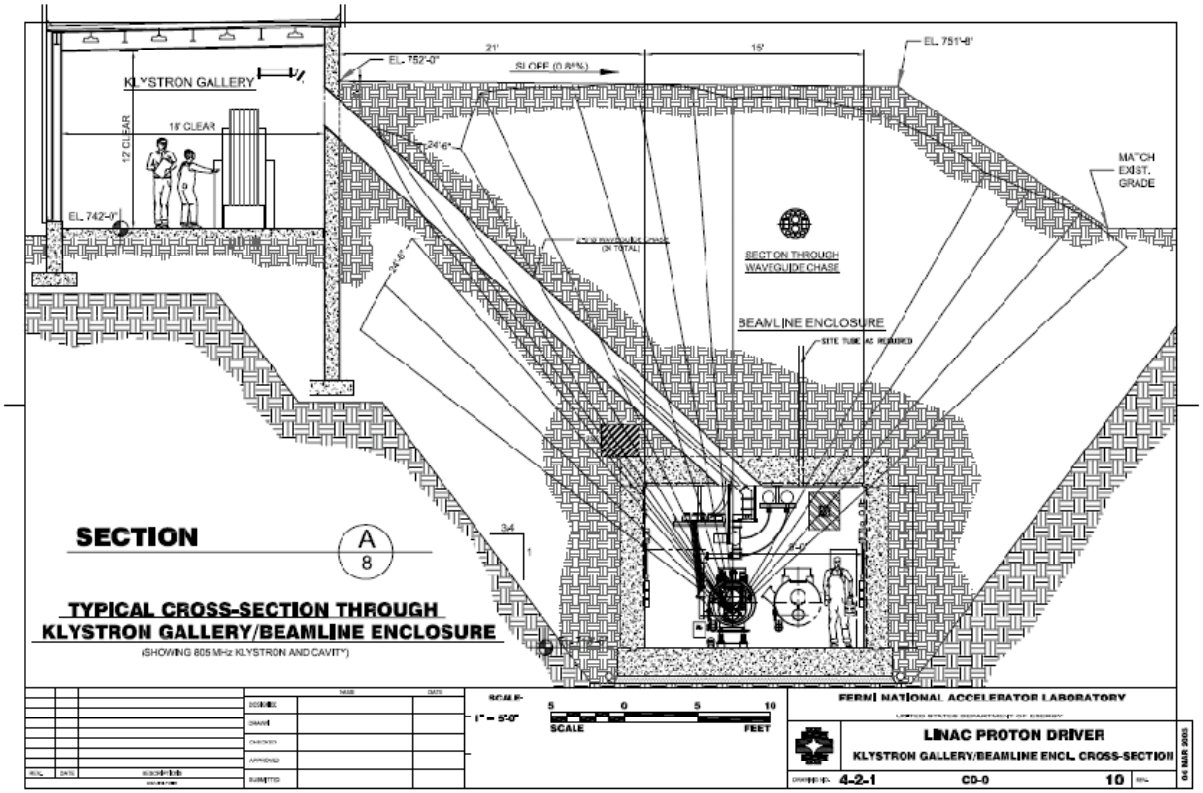
3d model of 'Shallow site' Experimental Hall

ILC / XFEL Collaboration

- First Meeting held at DESY 7 December 2008
- Major cost drivers were reviewed, including how technical requirements were established
- Key areas investigated :
  - Tunnel fire and smoke protection
  - High Voltage electrical distribution
  - DC Power distribution
  - Water Cooling systems
  - Air cooling systems
- Very useful two-way transfer of knowledge
- Next Meeting end of May, in particular to look at Civil Engineering design and Contract Strategy

ILC / Project X

- **Resources permitting, it is hoped to establish link persons during 2009**



Summary

Planned collaboration efforts during TDP (09):

- **CLIC :**
  - Continue 3d models to assist in Mimimum Machine decisions
  - Transport Studies for ILC (iterative process)
  - Joint ILC/CLIC Safety document
  - Develop new design improved design for Interaction Region
- **XFEL:**
  - Meeting already scheduled for end on May to further understand processes, especially civil engineering.
- **Project X:**
  - Improve links during this year