Conventional Facilities and Siting Global Group

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Conventional Facilities and Siting

Organizational Perspective

- ***Conventional Facilities and Siting Group (CFS)***
- ***Established by the ILC Global Design Effort (GDE) as a Global Group with Representation from Each of the Three Global Regions (America's, Europe and Asia)***
- ***Charged (to date) to Identify a Sample Site from Each Region to be Included in a Baseline Configuration Document (BDC) Which has been Completed and to Provide a Credible Scope and Cost Estimate to be Included in a Reference Design Document (RDR) Currently Under Development***

Conventional Facilities and Siting

CURRENT STATUS

- ***Sample Sites in Each Region Have Been Evaluated Using a Site Assessment Matrix Generated Through International Consensus***
- ***Weekly International CFS Video Meetings Continue***
- ***CFS WBS, Dictionary and Internal CFS Review Complete***
- ***Points of Contact with GDE Area System Groups and Technical Systems have been Identified in all Needed Areas***
- ***Current Focus is the Development of the Conventional Facilities Cost Estimate for the America's Region in Conjunction with Parallel European and Asian Efforts***

STRATEGY FOR WBS/COST DEVELOPMENT

- *Clarify WBS Line Item Elements and Dictionary Definitions Including Match Points*
- *Review Level of Detail Hierarchy and Line Item Elements*
- *Complete First Draft Internal (CFS) Review and Incorporate Adjustments as Needed*
- *Update Existing Available Cost Data to Reflect Current Criteria and Populate CFS WBS*
- *Working with Area System Contacts, Develop Schematic Drawings and Criteria on which to Base the CFS Cost Estimating Effort*
- *Iterate Cost Data as More Defined Criteria is Developed*

STRATEGY FOR WBS/COST DEVELOPMENT

CONVENTIONAL FACILITIES 17-02-2006, Europe

WORK BREAK DOWN STRUCTURE
Final Draft Dated 2/2/2006
Rev. 2

				Area systems							
				A1	A2	A3	A4	A5	A6	E	G
				e- source	e+ source	DR	RTML	Main Linac	BDS	Exp'mt	Gen'l &
1.7			**Conventional Facilities**								
1.7.1			**Civil Engineering**								
	1.7.1.1		Engineering, study work and documentation								
		1.7.1.1.1	In-house Engineering								
		1.7.1.1.2	Outsourced Consultancy Services								
	1.7.1.2		Underground Facilities								
		1.7.1.2.1	Shafts	-	-	2 ø18	2 ø18	4 ø18 21.2 ø3.2	2 ø16	2 ø20	-
		1.7.1.2.2	Tunnels	-	-	12.0 ø3.2	12.0 ø5.0	21.2 ø5.0	10.0 ø5.0	-	1.0 ø3.0
		1.7.1.2.3	Halls	-	-	-	-	-	-	2	-
		1.7.1.2.4	Caverns	1	4	2	2	4	6	-	?
		1.7.1.4.5	Miscellaneous works	-	-	-	-	21T, 590G	-	-	-
	1.7.1.3		Surface Structures								
		1.7.1.3.1	Central Lab Buildings	-	-	-	-	-	-	3	-
		1.7.1.3.2	Detector Assembly Buildings	-	-	-	-	-	-	2	-
		1.7.1.3.3	Office Buildings	-	-	-	-	-	1	-	-
		1.7.1.3.4	Service Buildings	-	-	4	4	8	2	1	-
		1.7.1.3.5	Cryo- Equipment Buildings	-	-	-	-	4	-	1	-
		1.7.1.3.6	Control Buildings + offices	-	-	-	-	-	1	1	-
		1.7.1.3.7	Workshops	-	-	2	2	4	1	1	-
		1.7.1.3.8	Site Access Control Buildings	-	-	2	2	4	1	1	-
		1.7.1.3.9	Shaft Access Buildings	-	-	2	2	4	2	-	-
		1.7.1.3.10	Miscellaneous Buildings, incl. cooling towers	-	-	-	-	4	1	1	-
		1.7.1.3.11	User Facilities	-	-	-	-	-	-	2	-
	1.7.1.4		Site Development								
		1.7.1.4.1	Off-site Site work	-	-	2	2	4	-	1	-
		1.7.1.4.2	Network of Monuments	-	-	-	-	-	-	1	-
		1.7.1.4.3	Construction Support	-	-	-	-	-	-	-	-
		1.7.1.4.4	Site Preparation	-	-	2	2	4	-	1	-
		1.7.1.4.5	Utility Distribution								
		1.7.1.4.6	Road, Sidewalks & Parking Areas	-	-	2	2	4	-	1	-
		1.7.1.4.7	Landscaping	-	-	2	2	4	-	1	-
		1.7.1.4.8	Environmental	-	-	2	2	4	-	1	-
		1.7.1.4.9	Miscellaneous Site Works								
1.7.2			**ELECTRICAL**								
	1.7.2.1		Engineering, study work and documentation								
		1.7.2.1.1	In-house Engineering								
		1.7.2.1.2	Outsourced Consultancy Services								
	1.7.2.2		High Voltage Equipment, Power Distribution								
		1.7.2.2.1	Main Substation								
		1.7.2.2.2	Distribution Substations								
		1.7.2.2.3	Medium Voltage Distibution & Transforming Units								
	1.7.2.3		Low Voltage Equipment, Power Distribution								
	1.7.2.4		Emergency Power Sources								
	1.7.2.5		Power Network monitoring								
	1.7.2.6		Power network monitoring								
	1.7.2.7		Communication equipment								
		1.7.2.7.1	Telephone equipment								
		1.7.2.7.2	Public adress and other communication equipment								

1.7 CONVENTIONAL FACILITIES
The Conventional Facilities for the International Linear Collider will include the R&D and Project Development to design and construct the Conventional Facilities required for the ILC.

1.7.1 CIVIL ENGINEERING

1.7.1.1 Engineering, study work and documentation
includes all aspects of Project Management, Architectural, and Engineering services associated with civil engineering as defines in WBS 1.7.1. The project phases starts with the Conceptual Design, design development and contract document preparation through execution and project close-out. Included are required studies, permit applications and technical boards. Also included is the support of the project during review and required reporting functions.

1.7.1.1.1 In-House Engineering provides the project and contract management for the overall study work, engineering, and documentation.

1.7.1.1.2 Outsource Consultancy
Professional service contracts will be employed to accomplish the technical efforts

1.7.1.2 Underground Structure
Underground Structure will include construction of all spaces required to for the electron and positron beam lines the Injectors, Main Linacs, Beam Delivery Systems, Interaction Regions, damping rings, and Rings to Main Linac. Also included are all support tunnels for the operation of the above items.

1.7.1.2.1 Shafts *(equipment and personal)*
will include Ramps and Vertical Shafts constructed for the purpose of equipment and personnel access to the Accelerator and/or Accelerator Support Tunnels as well as between the Accelerator and Support Tunnels. All Access Tunnels will include adequate radiation protection in the form of shielded labyrinths and/or removable "shield doors" with secondary electronic monitoring. Access Tunnels for deep tunnel solutions will be constructed using either Drop Shaft or Raised Bore excavation techniques with reinforced concrete linings through the Glacial Tills and fractured rock zones. Access Tunnels for the near grade solutions will be either ramps and/or shafts constructed using cut and cover excavations techniques and a combination of pre-cast and/or cast in-place concrete enclosures or rock tunneling methods. Access Housing for at grade solutions will include adequate shielding with doors and secondary electronic monitoring.

ILC Conventional Facilities 14
WBS Dictionary 3/2/2006

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CFS/AREA SYSTEM POINTS OF CONTACT

e- Source	***Axel Brachmann – Clay Corvin***
e+ Source	***John Sheppard – Clay Corvin***
Damping Rings	***Andy Wolski – Tom Lackowski***
RTML	***Peter Tennenbaum – Jean-Luc Baldy***
Main Linac	***Hitoshi Hayano - Atsushi Enomoto***
Beam Delivery System	***Andrei Seryi - Fred Asiri***

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CFS/GLOBAL GROUP POINTS OF CONTACT

Commissioning etc	*Tom Himel – Emil Huedem*
Control Systems	*To Be identified as Needed*
Cryogenics	*Laurent Tavian – Jean-Luc Baldy*
CFS	
Installation	*Fred Asiri*

CFS/TECHNICAL SYSTEM POINTS OF CONTACT

Magnet Systems	*Ryuhei Sugahara*

Vacuum Systems, Cryomodules, Cavity Package, RF Power, Instrumentation, Dumps and Collimators, Accelerator Physics will be Identified as Needed

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STRATEGY FOR WBS/CRITERIA DOCUMENTATION

- ***CFS Will Develop Schematic Drawings of Each Area System in Conjunction with Points of Contact and Update as Needed***
- ***CFS WBS and Dictionary will Assist in the Definition and the Establishment of the Boundaries Between CFS and the Area and Technical Systems***
- ***CFS Will Utilize All Points of Contact to Complete Our Internal Criteria Data Sheets for Conventional Facilities Information***
- ***All CFS Data will be Available for Use by All Groups to Provide Consistency of Information Throughout the Project Through CFS Web Address:***
  www.linearcollider.org/wiki/doku.php?id=cfs:cfs_home

Conventional Facilities and Siting

Baseline Deviations Based on Regional Differences

(Based on CCB Review and Approval)

- ***Americas Region Will Review Advantages of Fermilab Site Over a "Greenfield" Site Near DeKalb, IL***
  1. ***Centrally Located Damping Rings***
  2. ***Longer Beam Transport Enclosures***
  3. ***Variations in Surface Presence Between Sites***
- ***Variations in Regional Tunnel Construction Methods***
- ***Variations in Regional Tunnel Access Methods***
- ***Variations in Water Cooling Methods due to Regional Climatic Differences***
- ***Variations in Electrical Infrastructure and Supply Distribution***

REGIONAL PROGRESS* – *Asian Sample Site

SITUATION :

- ***Situated in moderate plateau area with surface grade variation less than 500m. Covered mostly by woods and forests.***
- ***Neighborhood is an agricultural area with only a few local residences.***
- ***No main road with heavy traffic or large river.***
- ***No natural or human-made vibration sources.***
- ***Adequate flat area is available for surface facilities.***

GEOLOGY :

- ***The Sample Site picked up under assistance from geology experts is located in a uniform, solid rock area.***
- ***No active dislocations or faults have been reported.***
- ***Site satisfies all the requirements for ILC site and ensure stable beam operation at the interaction region.***
- ***Because of rigid bed rock, a reinforcement by rock bolts or concrete lining may become unnecessary resulting in cost reduction.***

REGIONAL PROGRESS* – *Asian Sample Site

EXCAVATION :

•The Access Tunnels to access to Main Tunnels will be sloped tunnel at an gradient of 10%, located at an interval of 5 km.

•The tunnel boring machines, utility equipment and accelerator components will be brought down to underground through these Access Tunnels.

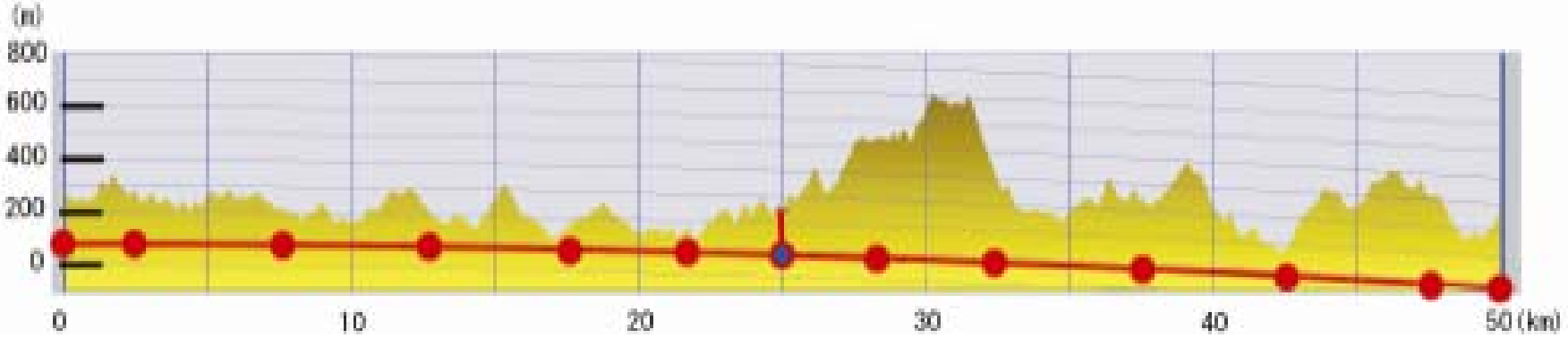
•The thickness of the ground above the tunnel ranges from 40m to 600m.

•The Main Tunnel is about 150m deep at the IP.

SCHEMATIC CROSS SECTION OF THE TUNNEL :

It must be noted that this is merely a sample site which is utilized for studies of a facility design, A construction scenario and the project cost . Not to give a false impression of being a candidate site,
maps of the sample site are not shown.

REGIONAL PROGRESS* – *Asian Sample Site



REGIONAL PROGRESS* – *European Sample Sites

Present status

- ***2 Contracts for Civil Engineering Design and Costing are being placed by DESY and CERN to AMBERG Zurich (CE Consultant for TESLA and XFEL)***

  First visits and working meeting in CERN on April 12.

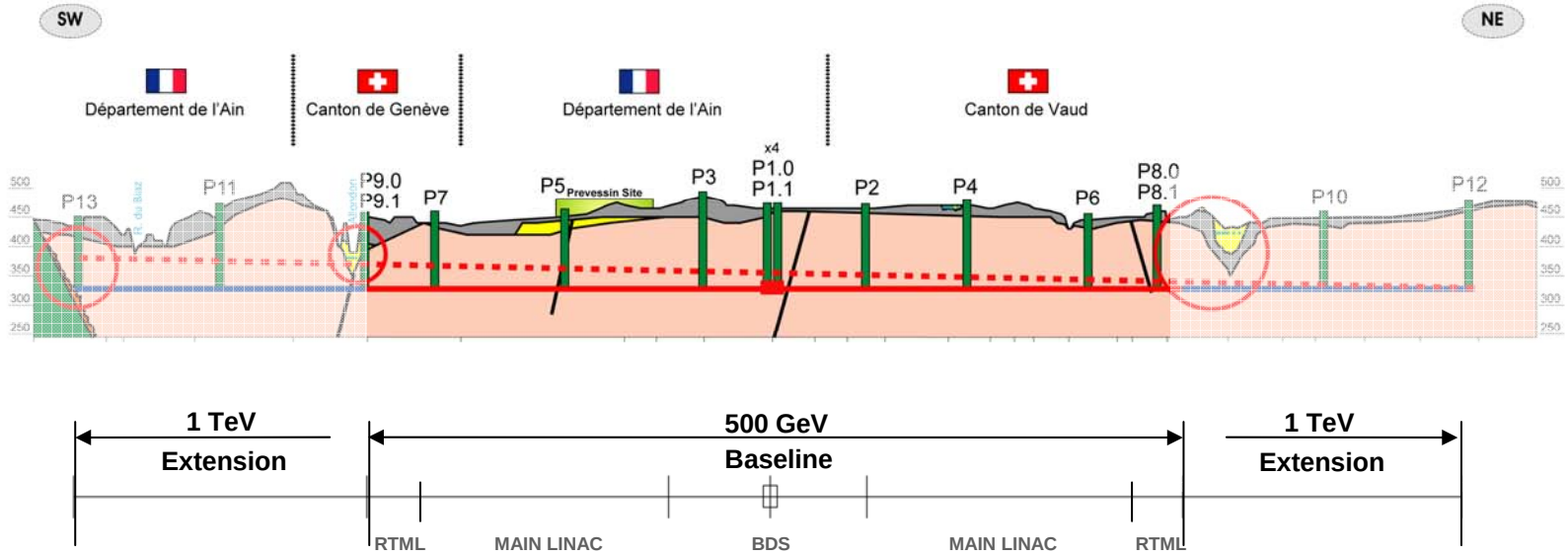
- ***Europe lead region for Electrical equipment, Handling equipment, Survey and Alignment : Design and Costing to be lounched as soon as sufficient data has been collected.***

- ***Europe also collecting data to set up CFS supply and work time schedule***

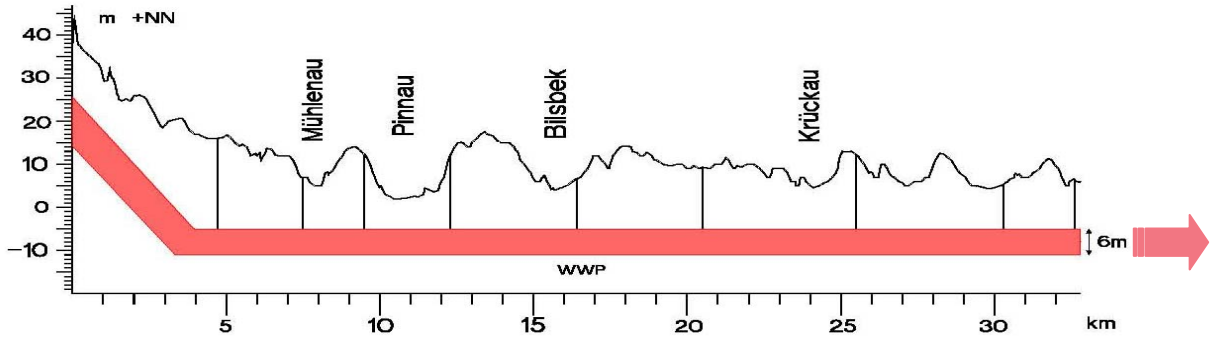
REGIONAL PROGRESS – European Sample Sites

- *Reminder of longitudinal sections*

CERN



DESY



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REGIONAL PROGRESS* – *Americas Sample Site

- ***Site located in Northeast Illinois.***
- ***Tunnel placed in a north-south alignment, in the top half of the Galina/Platteville dolomitic limestone stratum. This rock stratum is structurally stable and relatively dry.***
- ***Potential sites under consideration range from being centered on Fermilab to a site 30 KM to the west of Fermilab.***
- ***RFP for consultant engineers have been issued and contracts are being prepared. The main tasks to be performed will focus on the development of cost models.***

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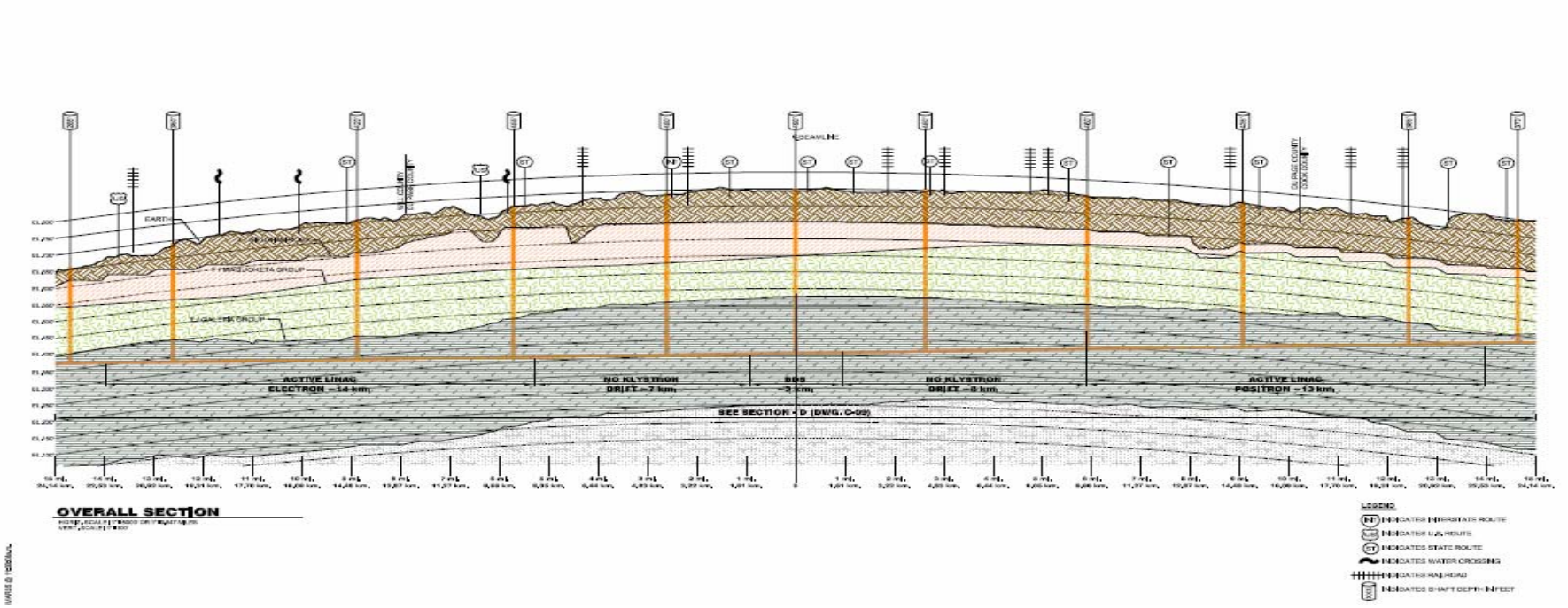
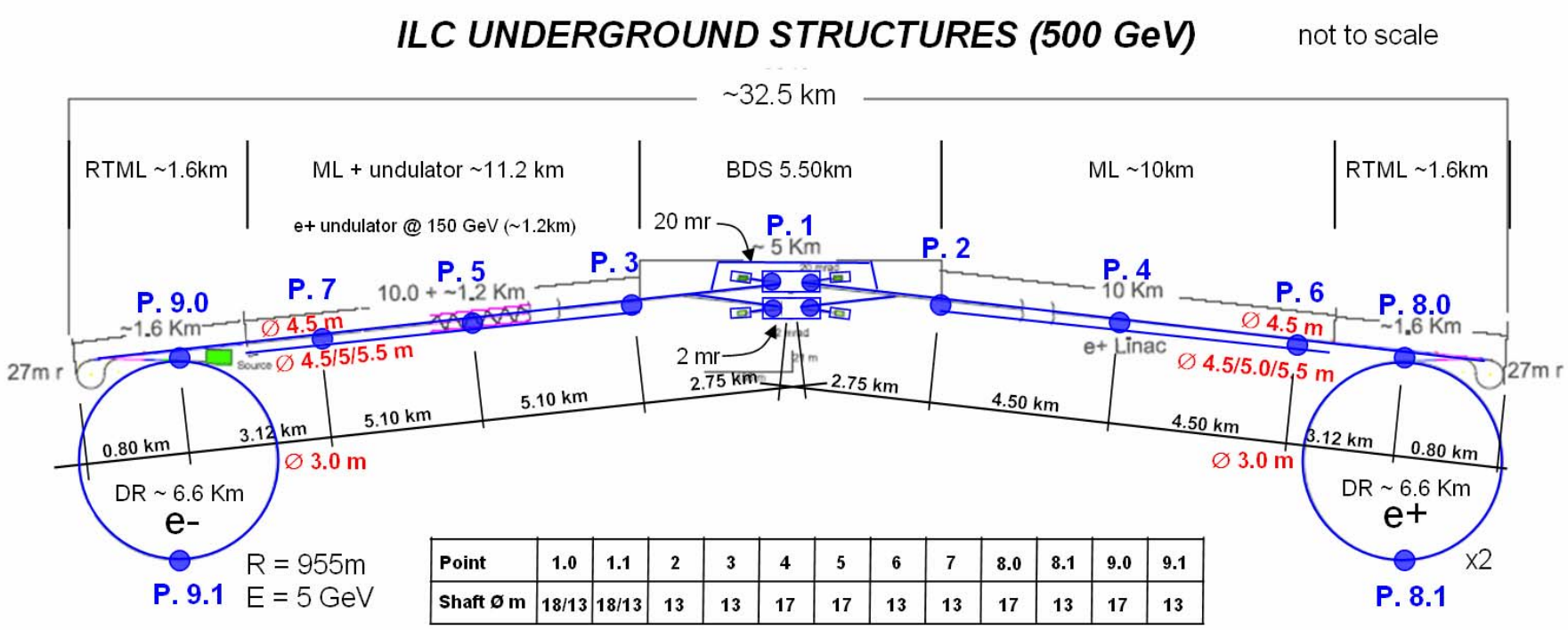
REGIONAL PROGRESS *– Americas Sample Site*



Schematic View of the ILC



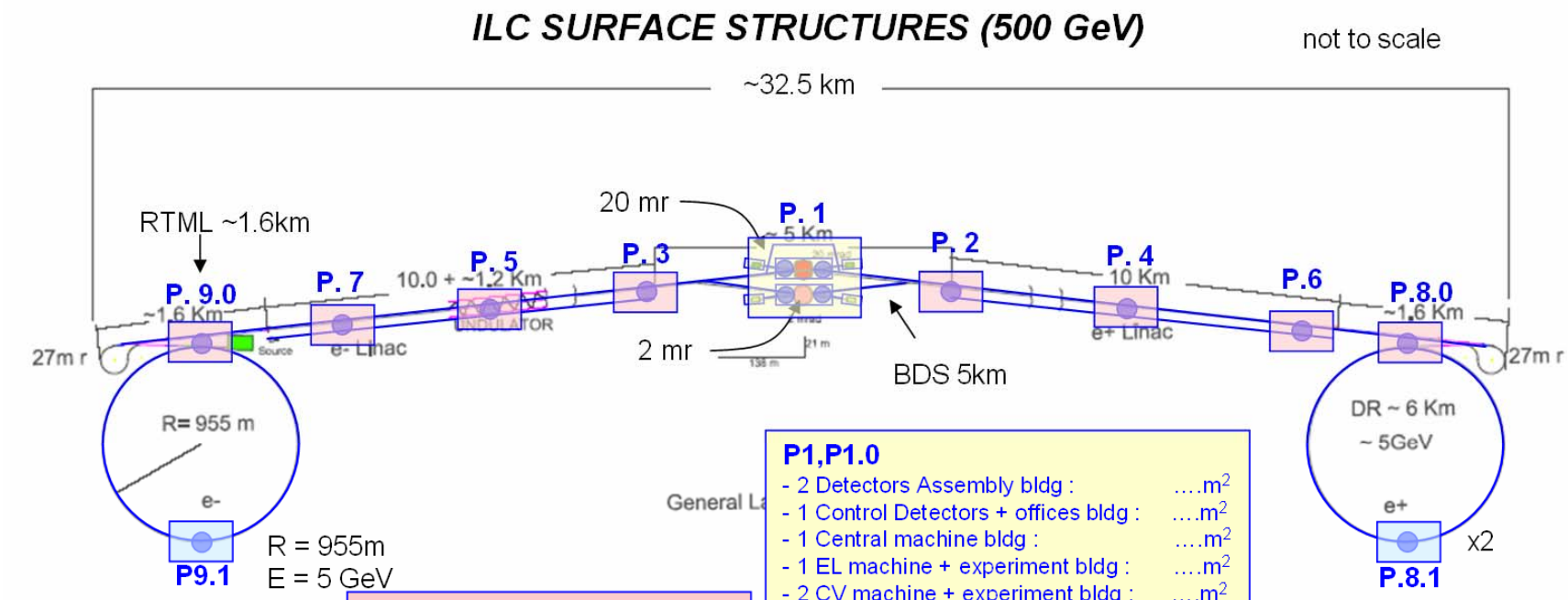
Point	1.0	1.1	2	3	4	5	6	7	8.0	8.1	9.0	9.1
Shaft Ø m	18/13	18/13	13	13	17	17	13	13	17	13	17	13

Among CFS Group duties :

- ***Ask appropriate questions ASAP (avoid late surprises)***
- ***Keep the cost of the CFS within acceptable limit***

● Shaft

Schematic View of the ILC



P1,P1.0

- 2 Detectors Assembly bldg :	....m²
- 1 Control Detectors + offices bldg :	....m²
- 1 Central machine bldg :	....m²
- 1 EL machine + experiment bldg :	....m²
- 2 CV machine + experiment bldg :	....m²
- 1 Cryo machine + experiment bldg :	....m²
- 1 Cooling towers M+D :	....m²
- 1 Experiment area access bldg :	....m²
- 2 Machine/Detectors Access bldg :	....m²
- 1 Office + machine + technical bldg :	....m²
- 1 Central laboratory bldg :	....m²
- 1 Fire Brig. + Safety + Medical bldg :	....m²
- 1 Reception building :	....m²
- 1 Hostel :	....m²
- 1 Central Workshop M+D :	....m²

P2,P3,P4,P5,P6,P7,P8.0,P9.0

- Offices bldg :	....m²
- Workshop :	....m²
- EL bldg :	....m²
- CV bldg :	.....m²
- Cryo compressor :	....m²
- Cooling Towers :	....m²
- Shaft Access bldg :	....m²
- Site Access bldg :	....m²
- Pers. facilities bldg :	....m²

P8.1,P9.1

- Workshop :	....m²
- EL bldg :	.....m²
- CV bldg :	....m²
- Shaft Access bldg :	....m²
- Site Access bldg :	....m²

CFS Group

Typical Criteria Sheet

ILC - Main Linac Tunnel Specification Sheet (DRAFT)

FNAL, Mar 3, 2006 DRAFT

BEAM TUNNEL

(BASIS OF CURRENT BEAM TUNNEL CROSS SECTIONAL LAYOUT)

System/Component Description	Quantity (per RF Unit)	Size (WxLxH) (meters)	Source of Information/Comments
Cryomodule with Quad	1	1.6 width x 11.72 Length	Current Design of Type IV from FNAL 3-D Model
Cryomodule without Quad	2	1.6 width x 10.45 Length	Current Design of Type IV from FNAL 3-D Model
Interconnect Between Cyromodules	2	0.85 Length	Current Design of Type IV from FNAL 3-D Model
Cryogenic System	1	-	Cryogenic distribution lines are shown in cross-section (size needs to be verified). Cryogenic turn-around/disconnect will most likely require an alcove. This is not considered for the typical cross-section layout.
Vacuum System	?	?	Details to be determined.
Waveguide System	1	-	No detailed info. at this time. WR650 system put in dwg. As a placeholder, but lacks real information. Also, need to consider installation through penetration connecting tunnels.
Cable Tray	4	0,5	This is an estimate at this time. Four 0.5m (18") wide, divided
Positron Beamline	1	50 cm full width Quad with 15cm tube at one Quad per Cryomodule	50 cm full width Quad with 15cm tube at one Quad per Cryomodule *(C.Adolphsen Email 2-23-2006)*
Convenience, Welding & Charging Receptacles. Other?		Aisle Wall & Back Wall @ Intervals TBD	Capacity, Location & Function to be determine
Area, Emergency, Exit & Task Lighting	-	Energy Efficient Support & Backup Lighting is required	Capacity, Location & Intensity to be determine
Water (Deionized/Low Conductivity Water)	2	Two 50mm (2") Supply and Return from the service tunnel skid (placeholder only)	Placeholder
Other Utilities	-	Assumed as One 50mm (2") Compressed Air and One 50mm (2") Nitrogen	Placeholder

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NEAR TERM MILESTONES

- ***April*** *- Identify Site Dependent and Site Independent Elements of CFS WBS. Distribute the Effort Equally Between the Three Regions and Review Results. Identify Areas of the Cost Estimate that Require Further Definition and Revision and Needed Input from Area Systems*
- ***May*** *- Continued Data Collection and Cost Development with a Full CFS Internal Review of First Draft Cost Estimate*
- ***June*** *- Provide First Full Draft CFS Cost Data to Design and Cost Board and Area System Groups Prior to Vancouver GDE Meeting in July, 2006*
- ***July*** *- GDE Meeting and Review of Work to Date*
- ***August Thru November*** *- Review and Continue to Refine the Complete CFS Cost Estimate Incorporating Adjustments and Inputs from Area and Technical Systems as Required and Complete CFS Portion of the Reference Design Report for Submission at the Valencia GDE Meeting in November, 2006*

Toward Regional "Bid to Host" Documents

- *There are Many Questions and Regional Distinctions*
- *Anticipated Time Frame - 3 Years (2007 thru 2009) ?*
- *What Will Constitute a Bid to Host Document ?*
- *Who Will Receive, Review and Accept a Bid to Host Document ?*
- *What/Who's Guidelines Should Be Used in the Development of Such a Document ?*
- *These Questions Need Some Early Guidance in Order to Develop a Credible Cost Estimate for the Work that Would Need to be Accomplished*

Basic Information Can Be Identified

- *More Information than a Reference Design Report*
- *Less Information than a Conceptual Design Report*
- *A Fully Developed Preliminary Conventional and Machine Design and Cost Estimate*
- *Specific Site Location and Description*
- *Geologic Investigation and Information*
- *Environmental Considerations*
- *Social and Political Consensus*
- *Full Understanding of Regional Contributions that Would be Used to Offset Total Project Costs*

Conventional Facilities and Siting

Summary

- ***There is A lot of Work to Do, but a Considerable Amount of Cost Data Already Exists and is being used as a Starting Point***
- ***The CFS Group as a Whole is Working Well Together and Can Be Supported by Regional Consultant Efforts***
- ***Working Sessions Were Incorporated into the Bangalore Agenda the CFS Group Did Use Them to Establish Avenues of Communication with the Various Area System Groups***
- ***The Time Between Vancouver and Valencia will be Spent Refining Our Cost Estimate and Formatting the Data on Which it is Based***
- ***The CFS Group will Identify Costs that Could Reasonably be Included as Part of a Regional Bid to Host the ILC***