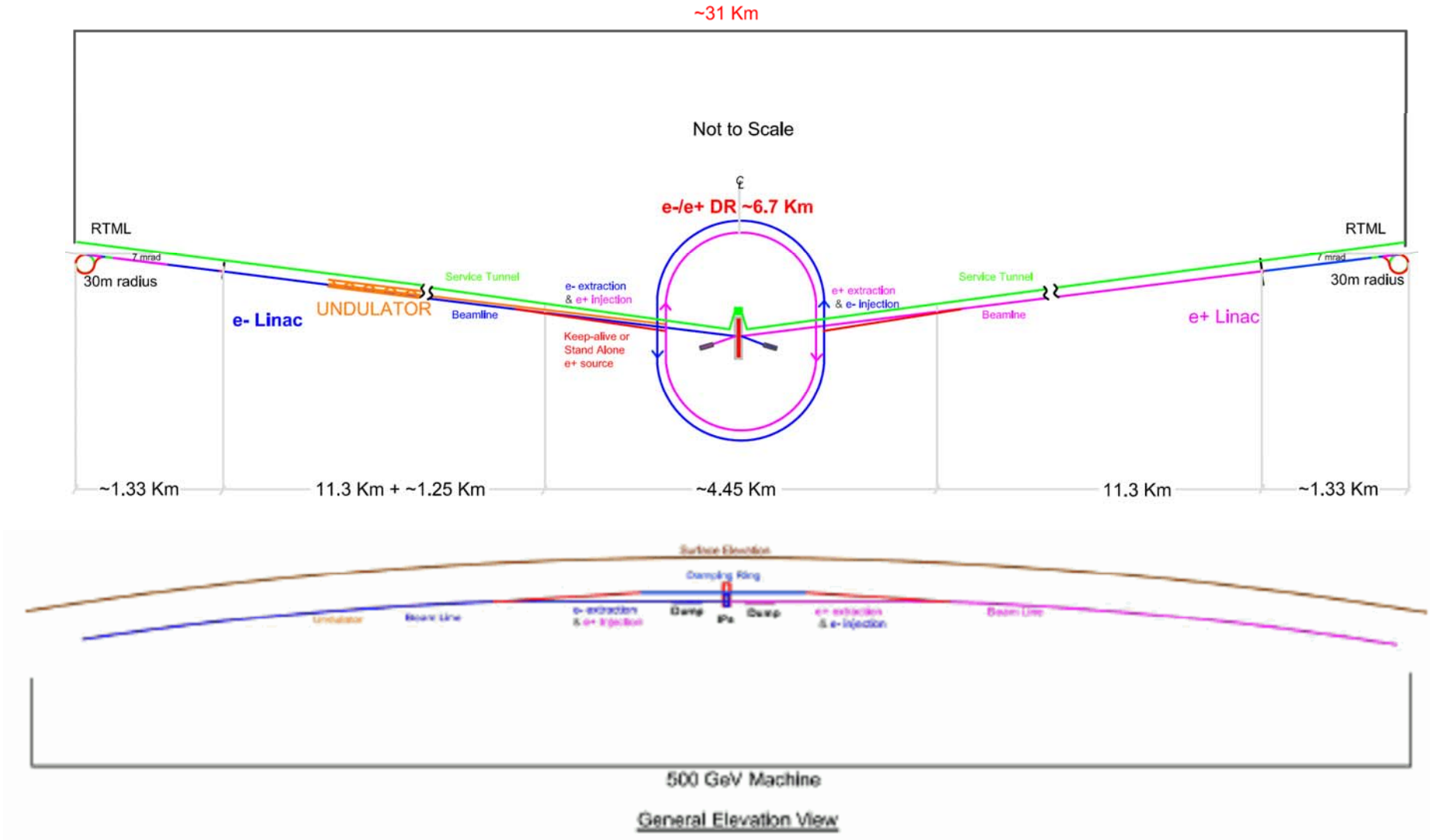
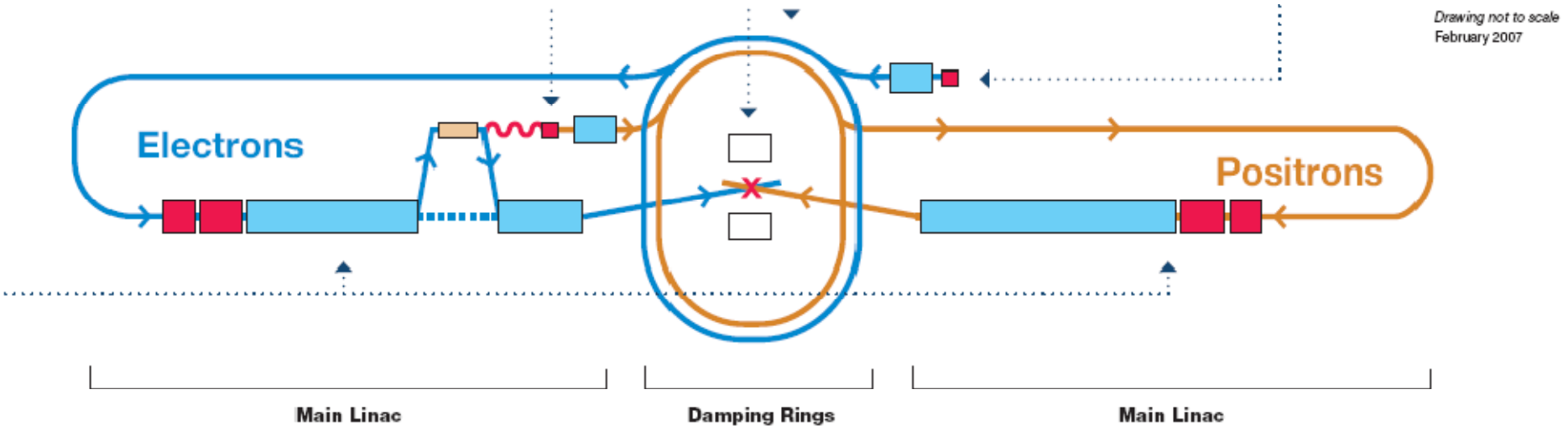
ILC
Value Management Workshop


~31 Km
Not to Scale
e-/e+ DR ~6.7 Km
RTML
RTML
7 mrad
7 mrad
30m radius
30m radius
e- Linac
UNDULATOR
Beamline
Service Tunnel
e- extraction
& e+ injection
Keep-alive or
Stand Alone
e+ source
e+ extraction
& e- injection
Service Tunnel
Beamline
e+ Linac
~1.33 Km
11.3 Km + ~1.25 Km
~4.45 Km
11.3 Km
~1.33 Km
Damping Ring
500 GeV Machine
General Elevation View

RDR General Layout



Major Accomplishments to Date

- *The Global Design Effort (GDE) was Initiated at the Snowmass Conference in August, 2005*
- *Baseline Configuration Document was Completed in December, 2005*
- *Reference Design Report with Full Cost Estimate was Completed in February, 2007*
- *Currently Developing Plans for the Engineering Design Report (EDR)*
- *Conventional Facilities Design has been Focused on Three Sample Sites, One in Each Region*
- *Visit www.linearcollider.org for more Information*

Asian Region Sample Site

Firm and uniform geology.

Large enough area spanning over 50 km.

Absence of active dislocations, wide faults in the neighborhood.

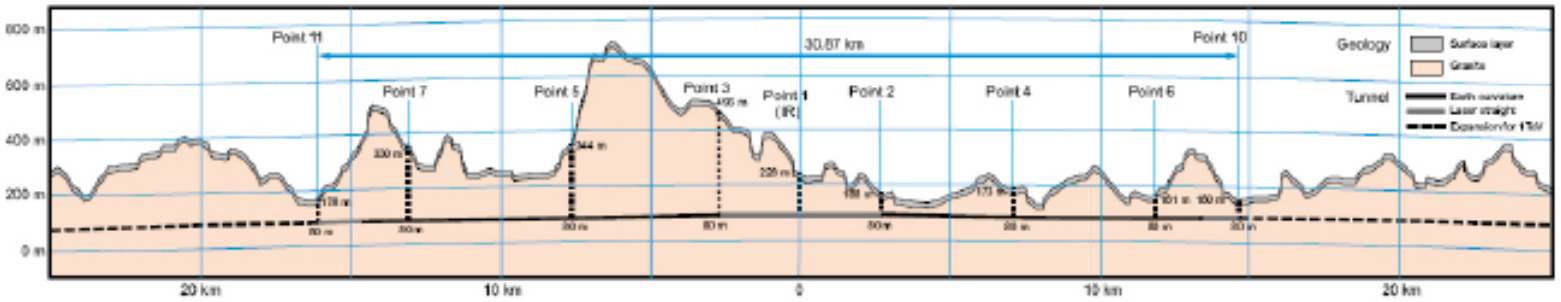
Absence of epicenters of earthquakes exceeding M6 within 50 km from anywhere in the site since AD1500.

Terrain uniformity to maintain the ILC Tunnel depths less than 600 m anywhere. Granite (compressive strength ~100 MPA)

Excavation : TBM (~ 300 m/month)

Finish : shotcrete (partially reinforced with rock-bolts)

Access by sloped tunnel instead of vertical shafts

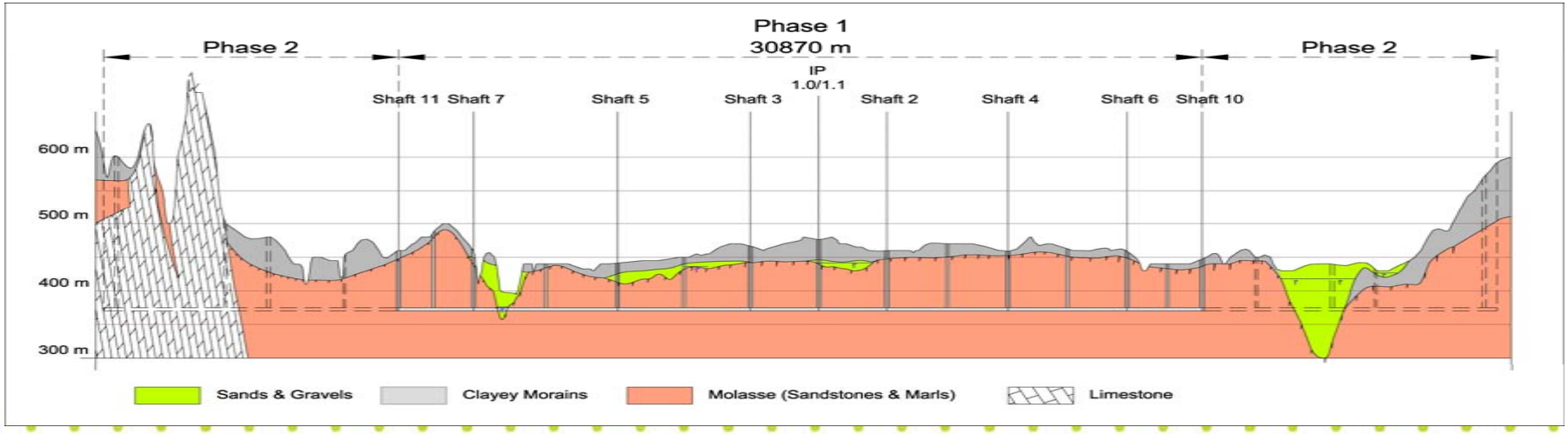


European Region Sample Site

Location : Proximity of CERN existing site with its 400 kV grid connection. Close to the city of Geneva with its international airport, railway and highway network connections.

Geology : Solid and stable bedrock called “molasse” (sandstone), which stretches between the Jura mountains and the Lake of Geneva. A layer of moraines ranges from 0 to 50 m on top of the sandstone. Low seismic activity and no active faults.

Depth of main tunnels : average ~ 100 m

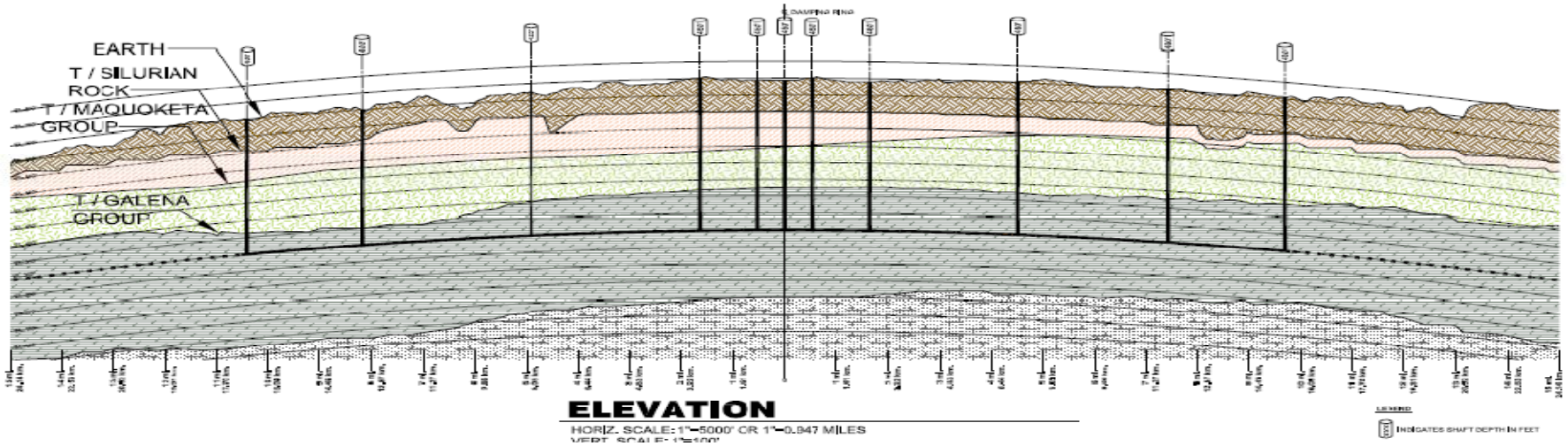


Americas Region Sample Site

Location : in solid rock, close to existing institute, close to the city of Chicago and international airport, close to railway and highway networks.

Geology : Glacially derived deposits overlaying Bedrock. The concerned rock layers are from top to bottom the Silurian dolomite, Maquoketa dolomitic shale, and the Galena-Platteville dolomites.

Depth of main tunnels : Average ~ 135 m



Salient Design Features

- *Bored Tunnels (4.5 m Finished Diameter) and Excavated Underground Caverns are Provided to House the e- and e+ Sources, Injectors and Transfer Lines*
- *Two Separate Damping Rings are Housed in a Single Bored Tunnel (5.0 m Finished Diameter)*
- *Two Parallel Bored Tunnels (4.5 m Finished Diameter) are Provided to House the Main Linac, RTML and Beam Delivery Enclosures*
- *Penetrations and Transfer Walkways are Provided at Required Intervals Between the Beam and Service Tunnels*
- *Shafts are Located at Primary Access Points and Spaced at 5 km Intervals along the Main Linacs (Major Shafts have 9 m and 14 m Finished Diameters)*
- *Note, CERN and Americas Solution Utilizes Vertical Shafts while the Asian Solution Utilizes Sloped Access Tunnels due to Local Surface Elevations*

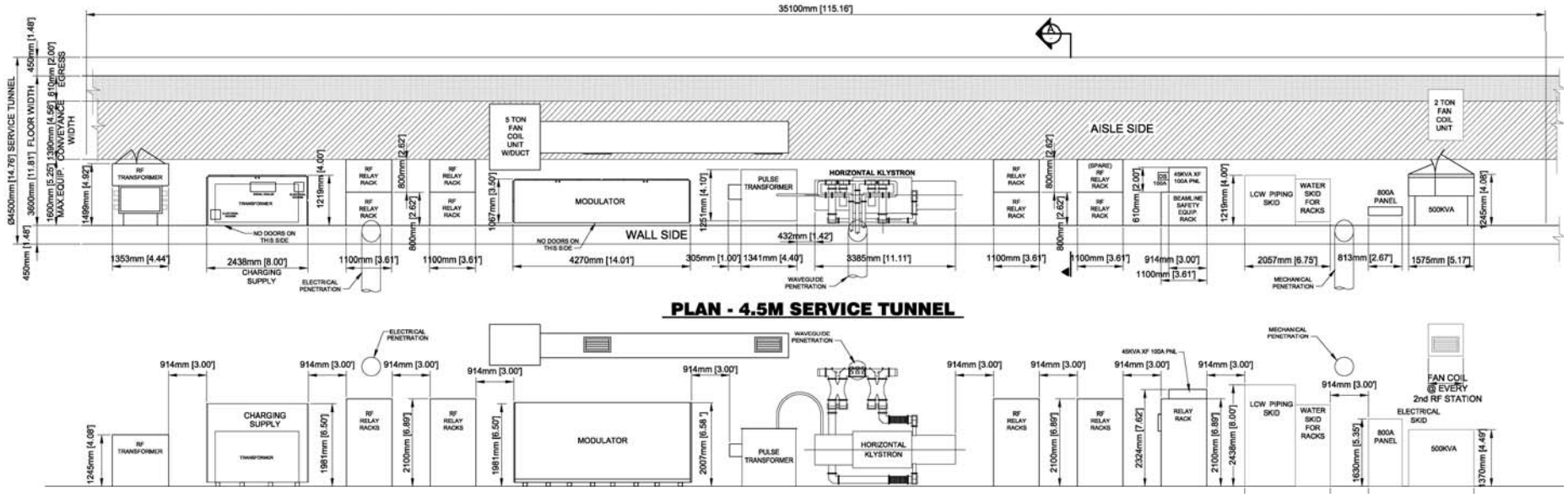
Salient Design Features

- *At the Base of Access Shafts and to Accommodate Various Equipment Placement, Alcoves and Caverns are Excavated as Required*
- *The Experimental Hall is a Single Cavern (with an Adjacent Service Cavern) to House Two Detectors in a Push-Pull Configuration*
- *Main Linac Tunnels Follow the Earth's Curvature While the Beam Delivery Tunnels are Laser Straight*
- *There are Variations in Tunnel Lining Requirements*
  - ***Americas Tunnels are Lined Over 20% of the Length for Waterproofing Integrity***
  - ***Asian Tunnels are finished with Shotcrete. Lining is not required.***
  - ***European-CERN Tunnels are 100% Lined (prefabricated segments) for Structural Integrity***
- *Local Geology Affects the Shape (and Volume) of Underground Caverns*

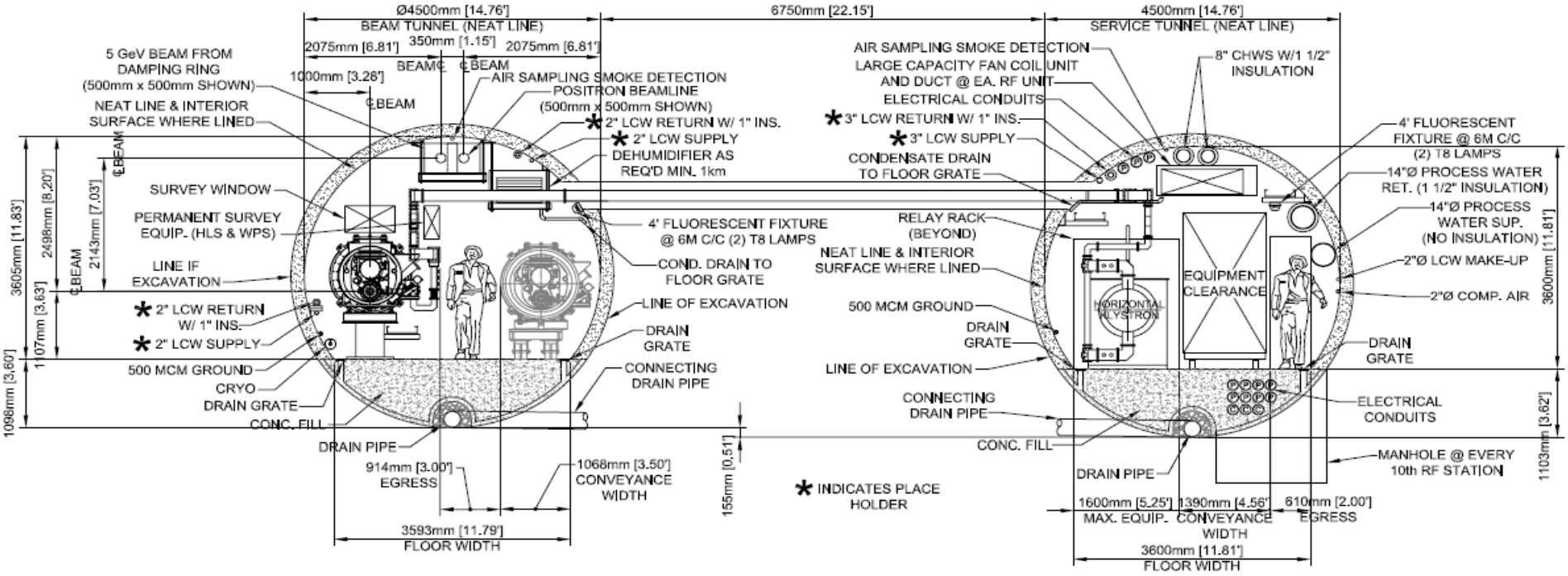
EXTENT OF CONSTRUCTION

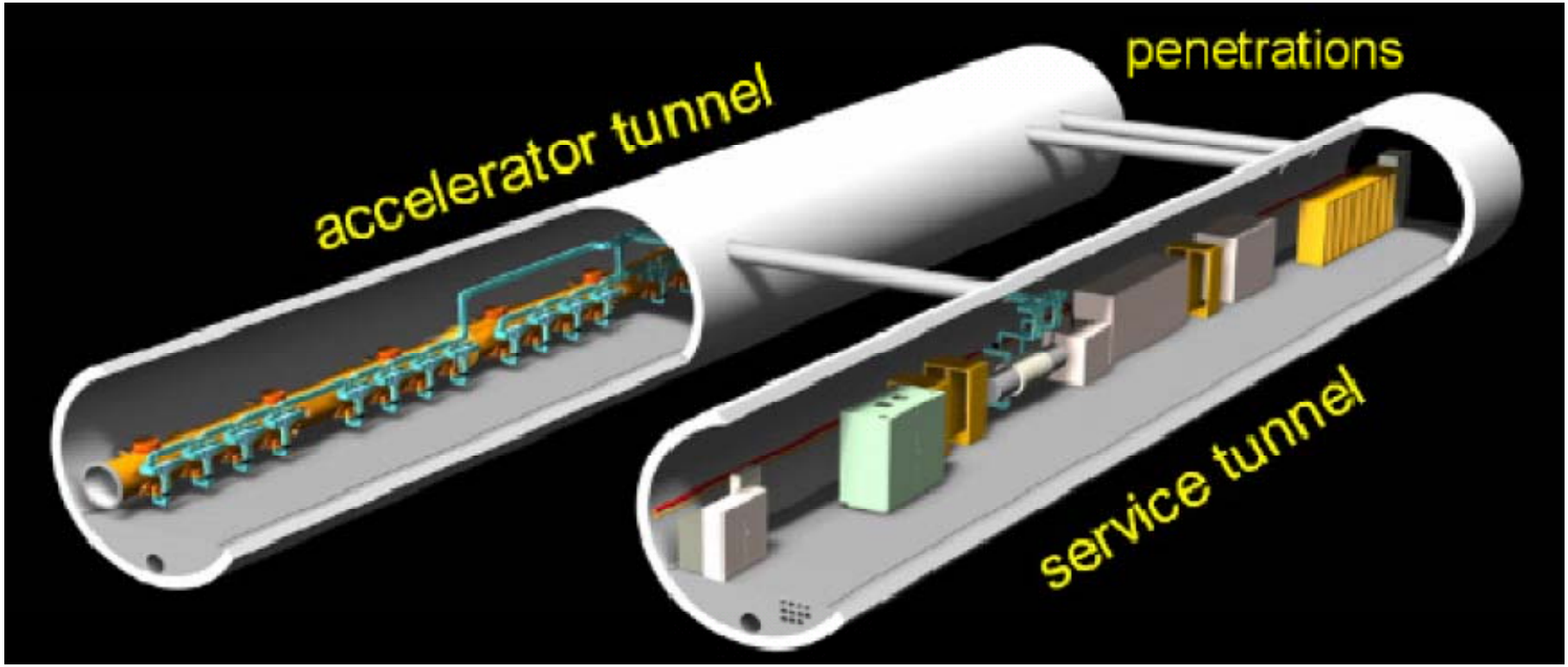
- *66 km of 4.5 m dia. Tunnels - 1,048,500 m^3*
- *6.6 km of 5.0 m dia. Tunnels - 129,600m^3*
- *13 Access Shafts - 213,800 m^3*
- *Interaction Hall - 116,200 m^3*
- *Additional support Alcoves and Caverns - 248,900 m^3*
- *92 Surface Buildings - 57,000 m^2*
- *Total Excavation Equal to the Volume of 6.5 Wilson Halls*

Main Linac Plan and Elevation



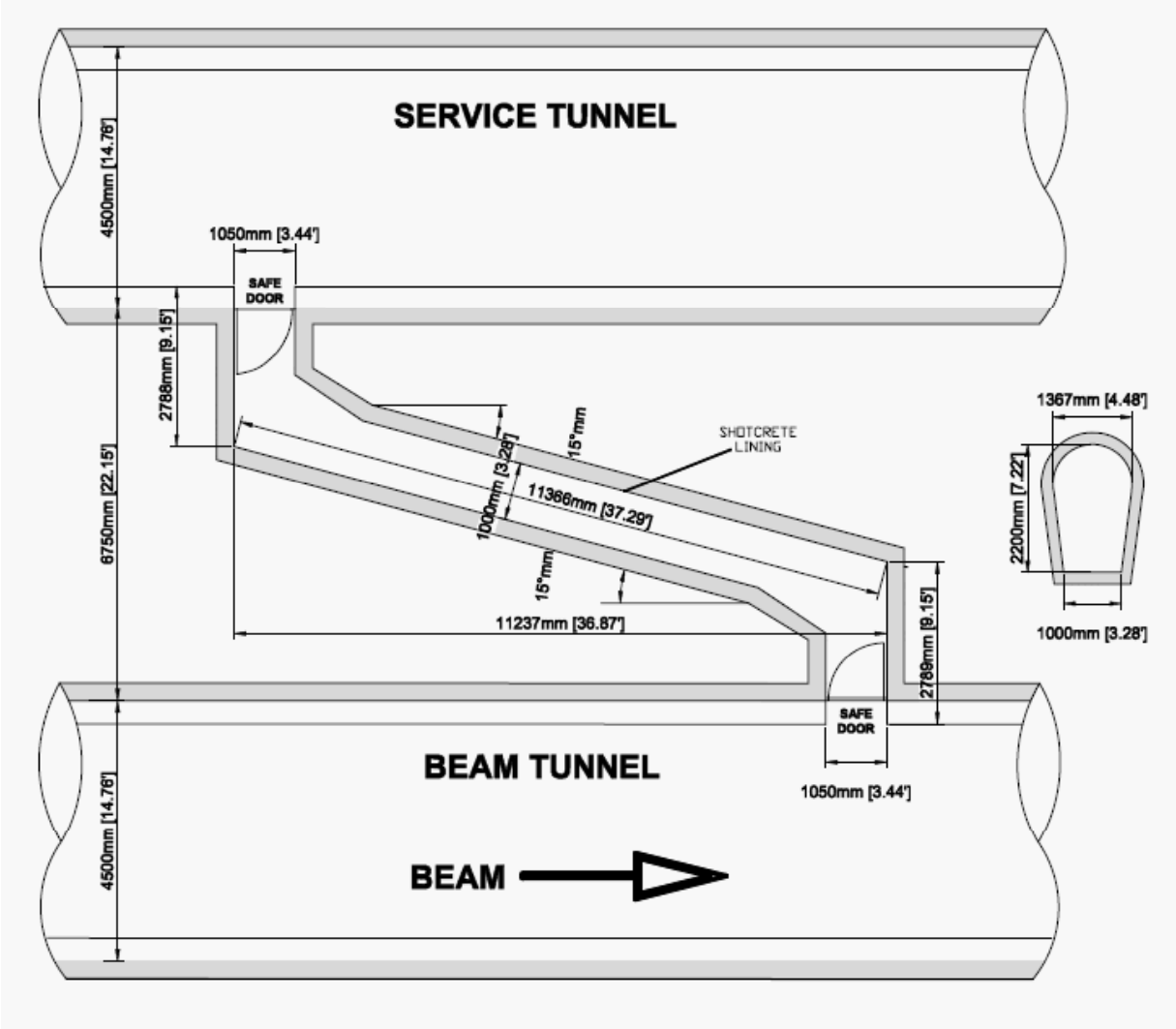
Typical Section Through
Main Linac and Support Tunnels



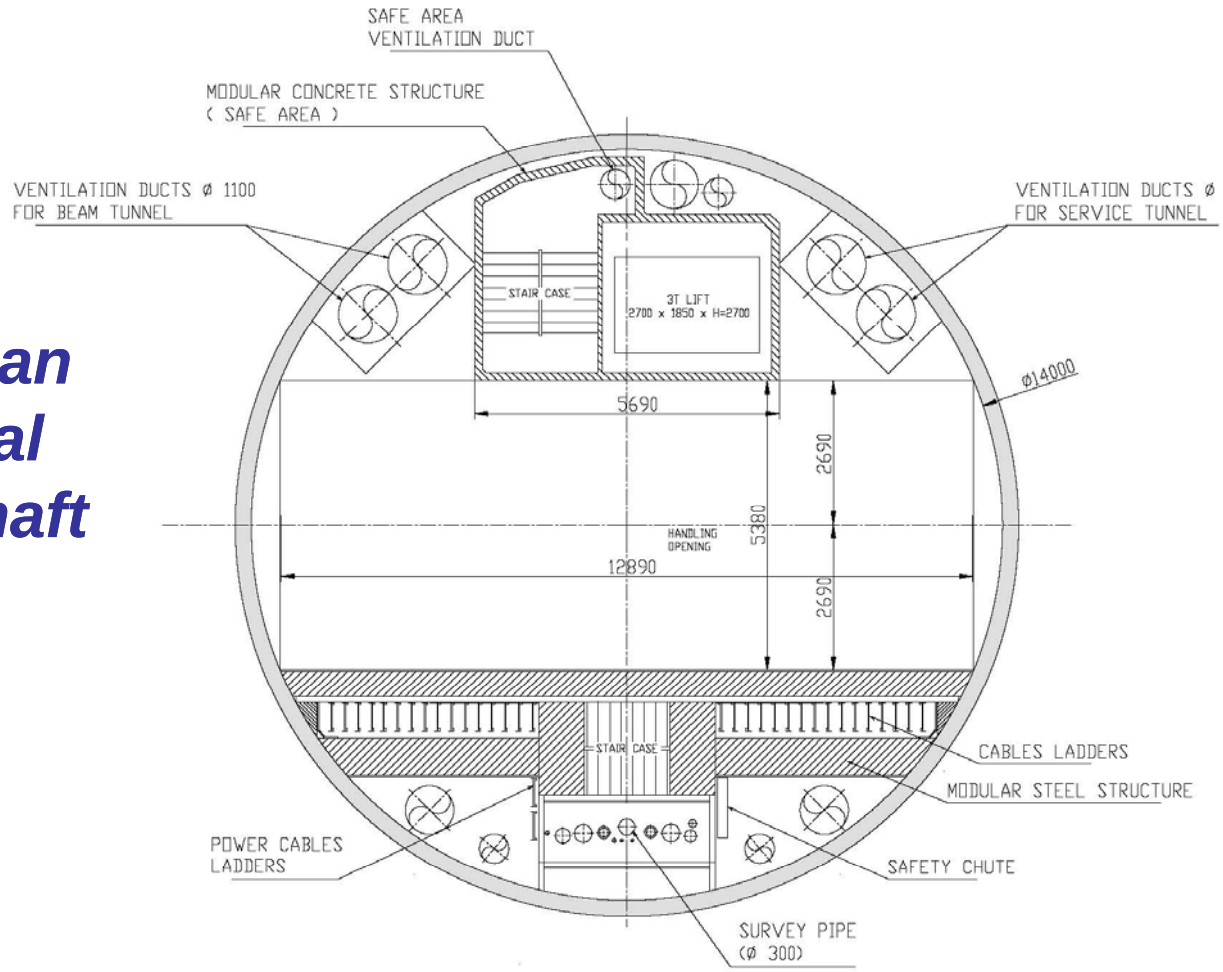


3-D Image of Main Linac Tunnel Configuration

Plan View Of Personnel Crossover Between Main Linac and Support Tunnel

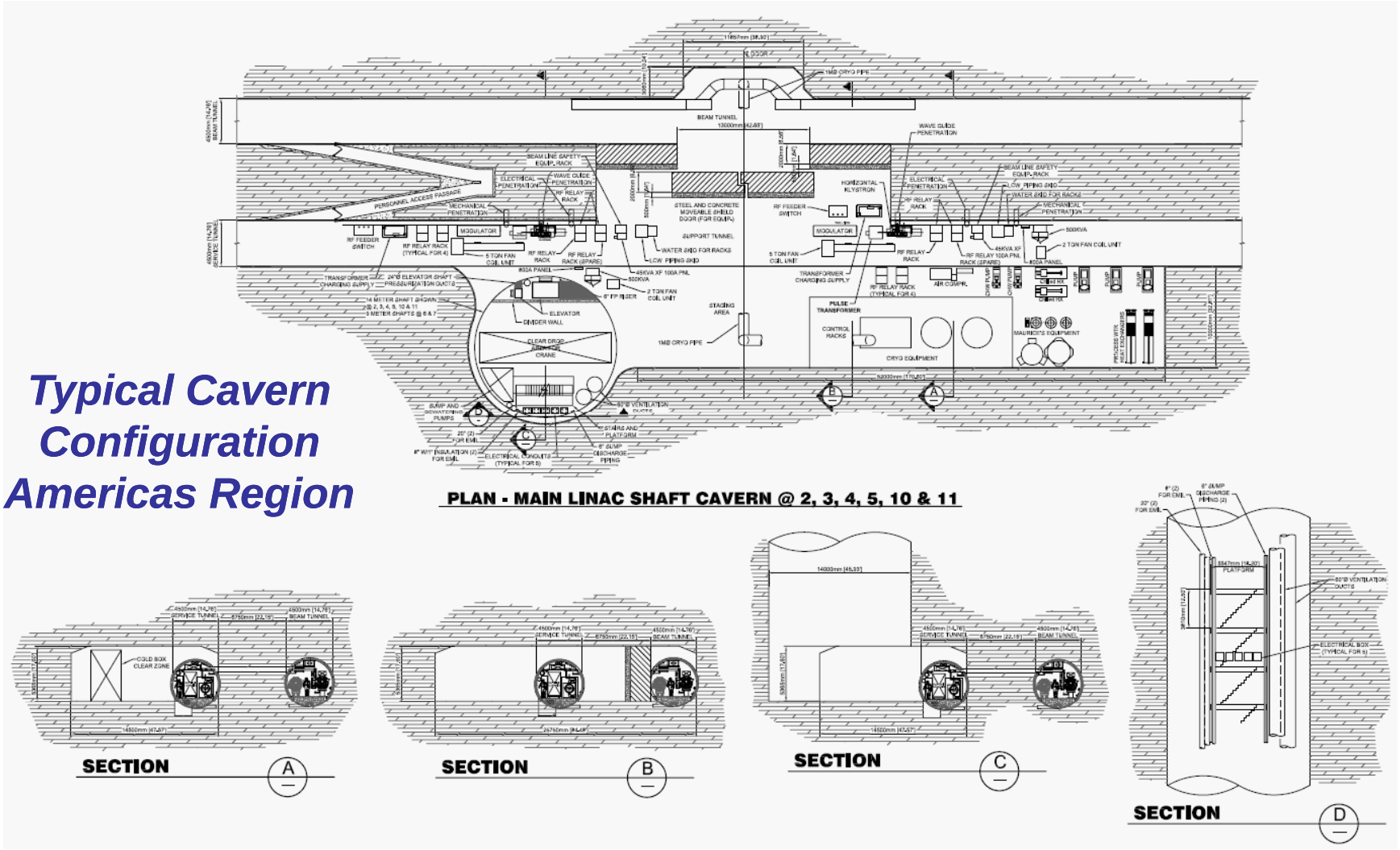


Typical Plan At Vertical Access Shaft

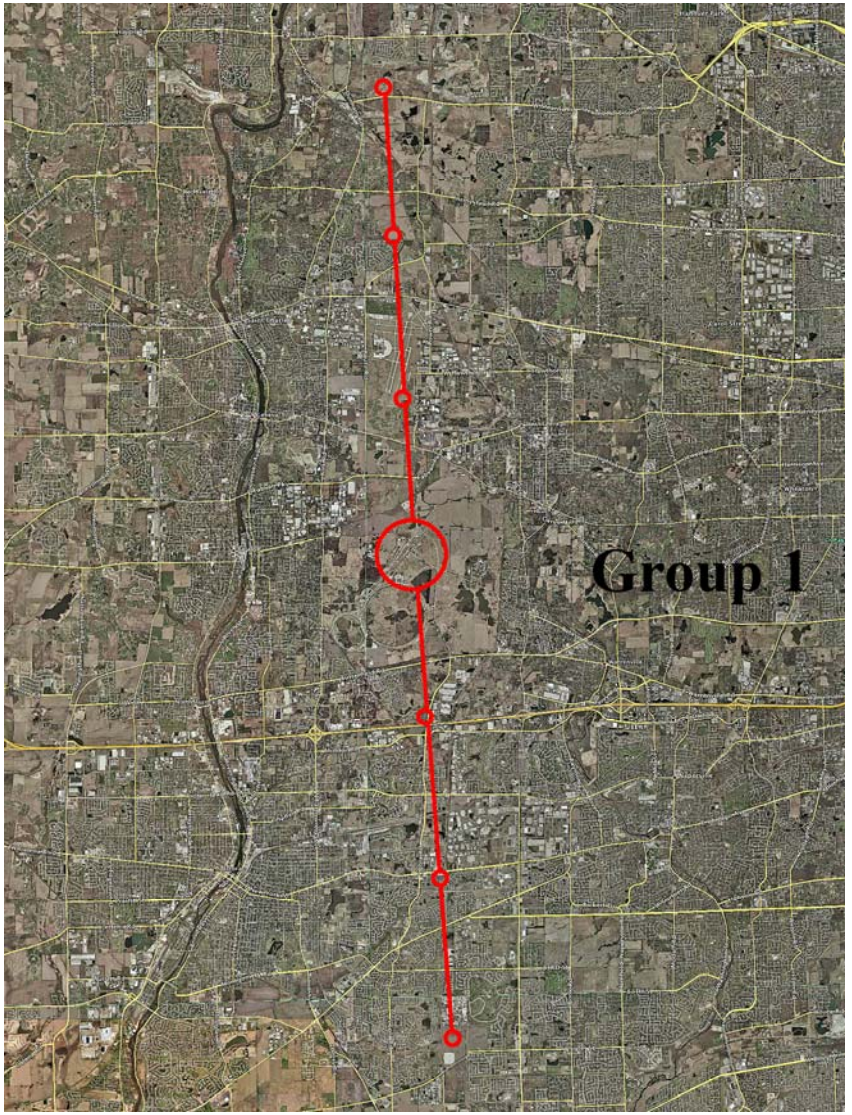


ML SHAFTS 2, 3, 4, 5
AND RTML SHAFTS 10, 11

Typical Cavern Configuration Americas Region



Sample Alignment Centered on the Existing Fermilab Site



Summary
RDR "Value" Costs

CFS Site Independent Costs are Included

Site Dependent Costs

Total Value Cost (FY07)

4.80 B ILC Units Shared

+

1.82 B Units Site Specific

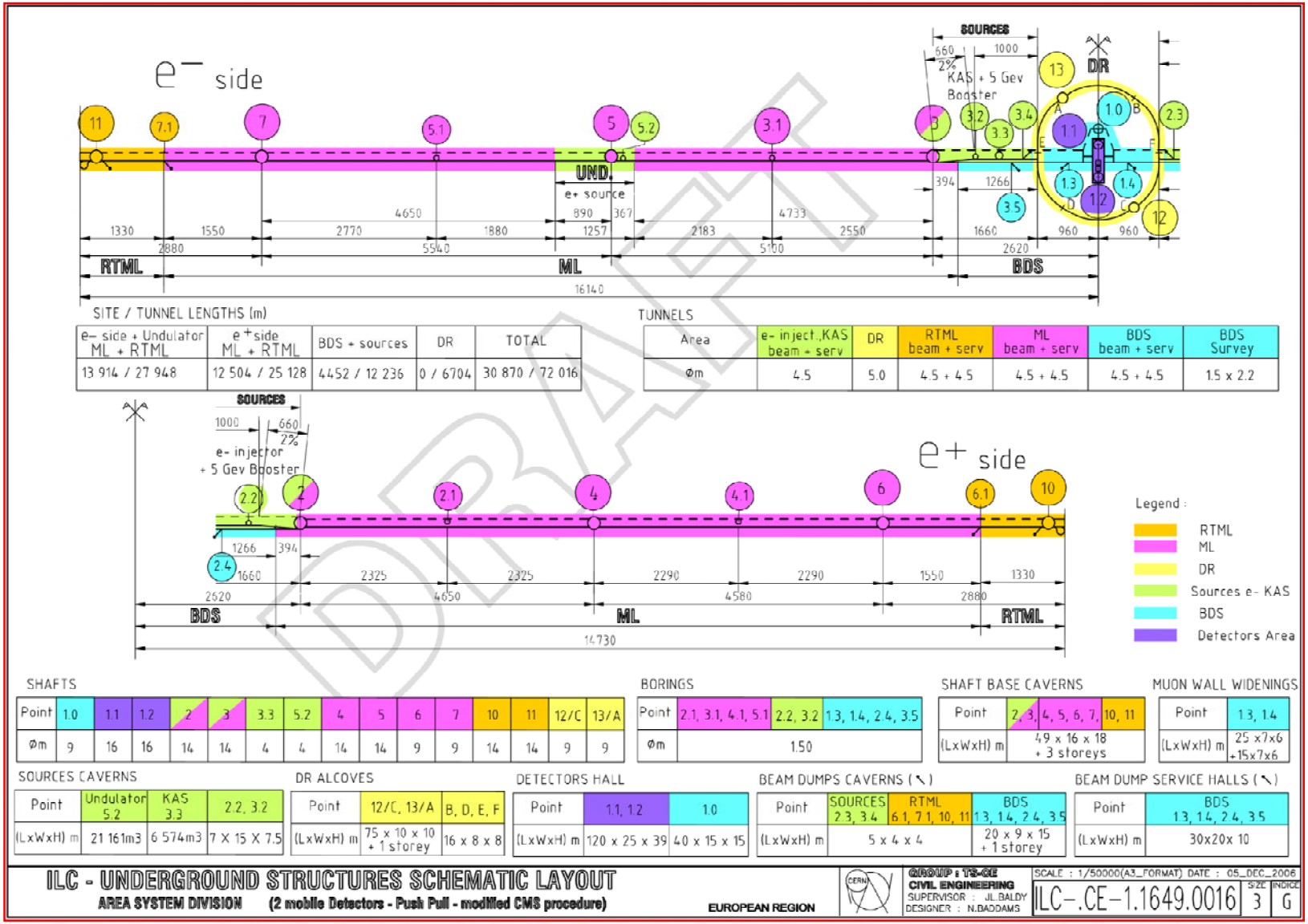
+

14.1 K person-years

("explicit" labor = 24.0 M person-hrs @ 1,700 hrs/yr)

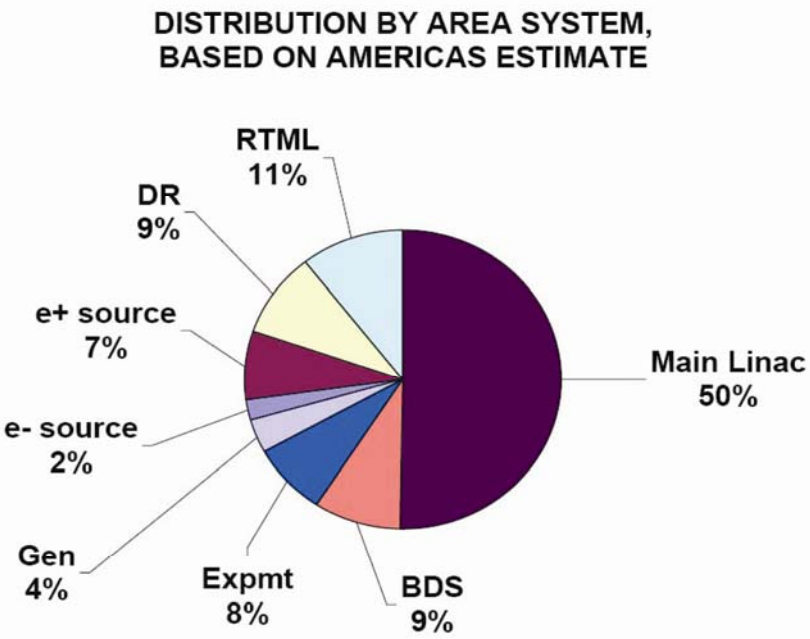
1 ILC Unit = $ 1 (2007)

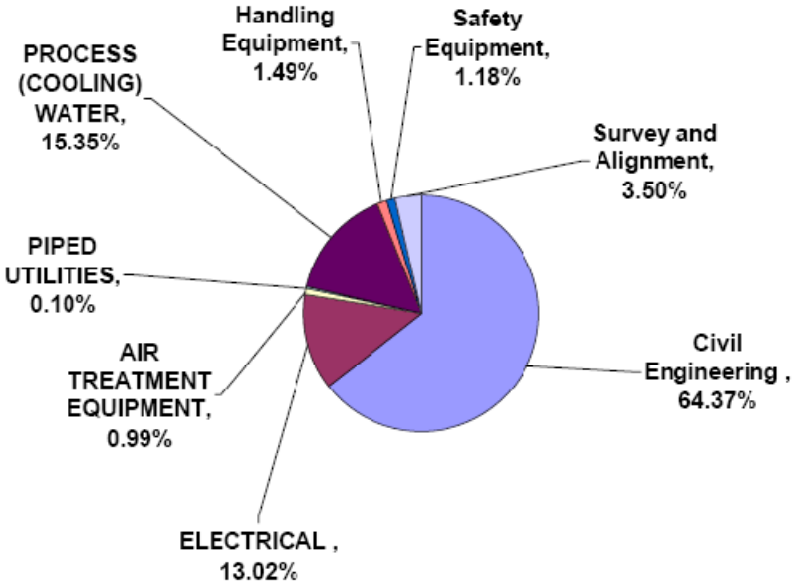
Underground Structures Allocation Scheme



RDR Cost Overview

Total CFS Costs and Statistics





Americas Cost Distribution

WBS Cost Distribution