

A 3D rendering of an ILC (International Linear Collider) particle accelerator structure. The image shows a long, cylindrical tunnel with a series of superconducting cavities. The cavities are illuminated with a vibrant, multi-colored light (red, orange, yellow, green, blue, purple) that creates a sense of depth and motion. The background is dark, making the illuminated structure stand out.

# **ILC**

## **Cost estimates**

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## Cost estimates

# Content

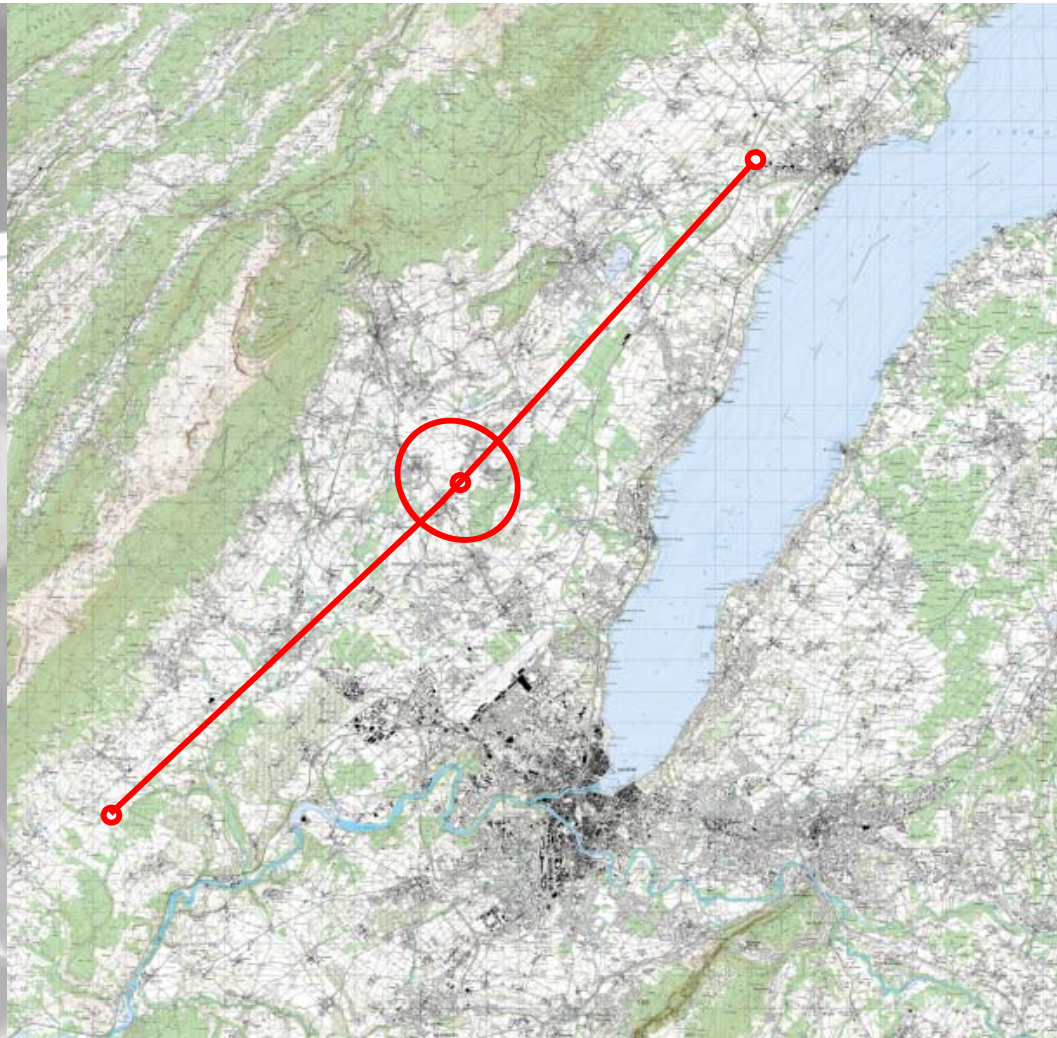
- **Methodology**
- **Cost estimation**
- **Possible Savings**

## Cost estimates

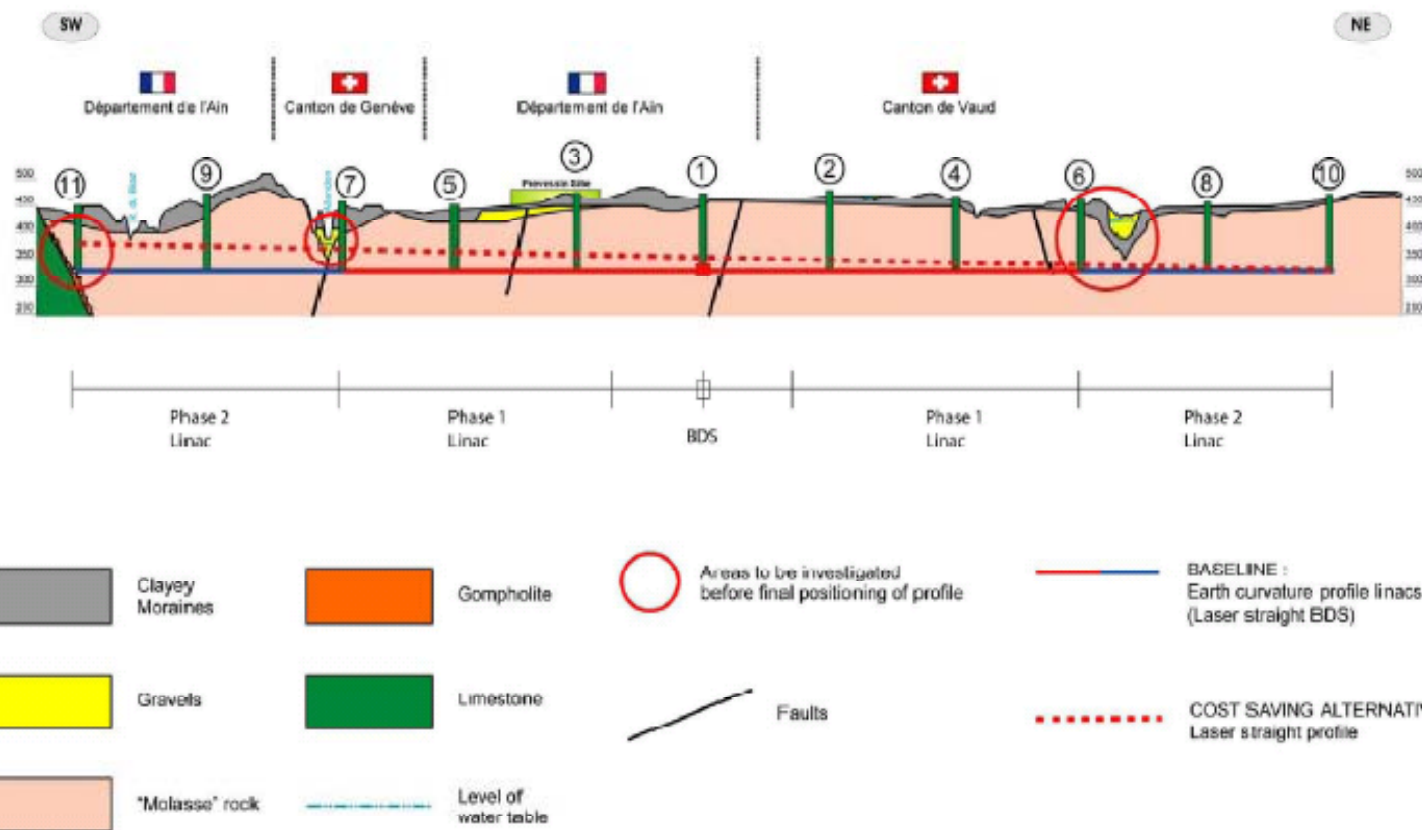
### Experience from:

- **TESLA**
- **XFEL**
- **LHC**
- **Swiss contractors**

## General Layout of the ILC project site of CERN



# Longitudinal Profile of the ILC project site of CERN



## Methodology 1

- **Base: preliminary study**
- **construction is subdivided in structures of same sizes and same utilisation**
- **Standard profiles were developed for each structure (including the inner lining)**
- **For each of these standard profiles following main items are evaluated in quantity and price:**

## Methodology 2

- **Labour for workmanship (below senior level)**
- **Tunnel excavation, mucking and disposal**
- **Rock support by means of segmental linings or rock bolts with reinforced shotcrete**
- **Full sealing of the caverns and halls, as well as collecting and diverting of dropping water in the remaining structures.**
- **Inner lining considering nominal reinforcement**

## Methodology 3

- **Implementation of an invert with sufficient bearing capacity to withstand the probable swelling pressure of the present molasse**
- **Connection works to the neighbouring lots**

→ **about 2/3 of the final costs are covered**

→ **further costing positions were added (in percentage)**

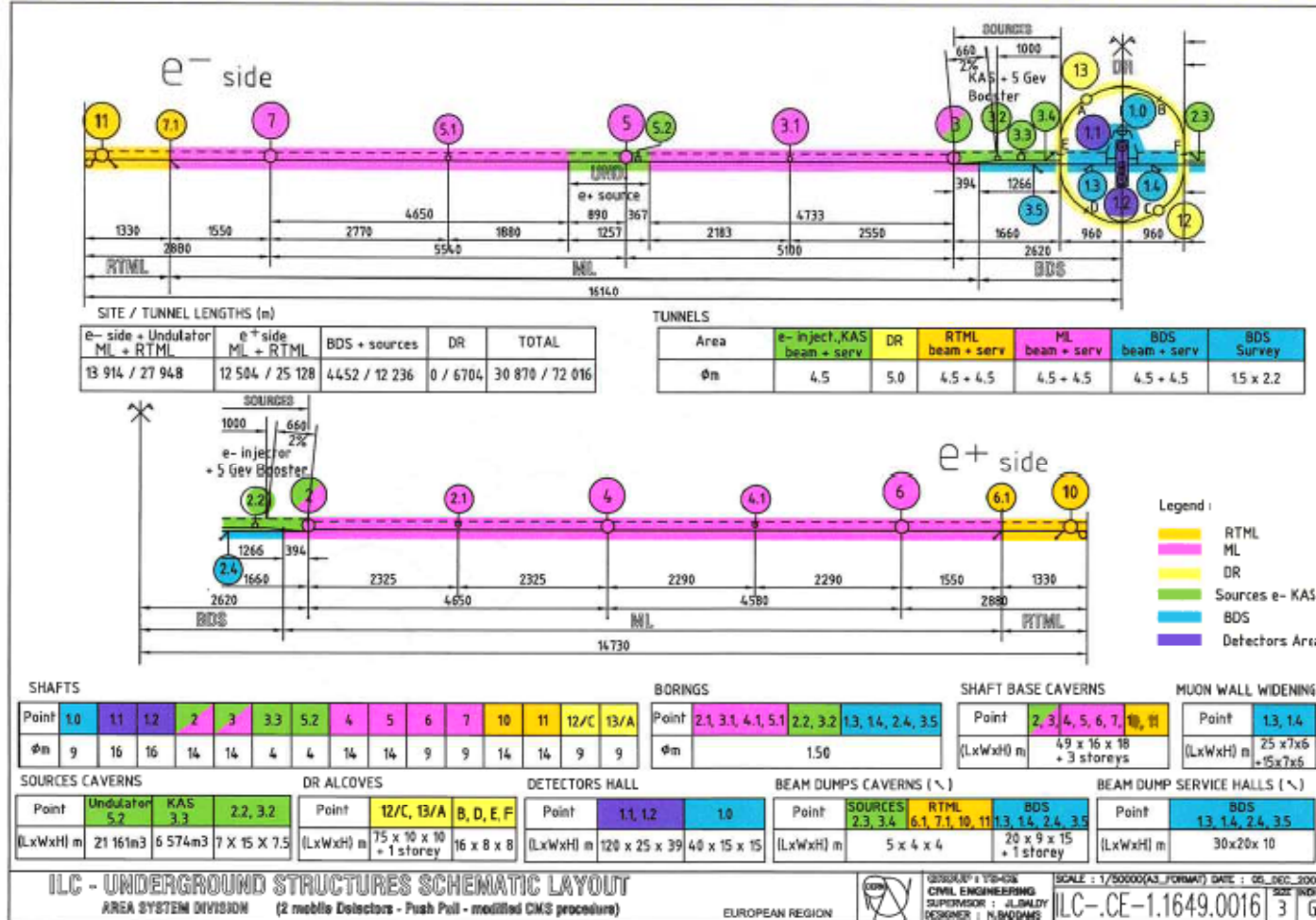


## Methodology 4

- **Drainage including the pumping stations at the shaft bases**
- **Quality control**
- **Auxiliary measures such as pre–investigations, pre–injections, ground improvement, further niches, separated fire-zones**
- **Installations for construction works**
- **Surcharge for senior personnel, maintenance and operation of the workshops and site installations, insurance etc.**

## Methodology 5

- **construction costs for each structure**
- **These construction costs have been allocated to the respective sections such as the main linac, BDS, .....**
- **The costs for the needed steel supporting constructions, the engineering costs including the geological investigations and site supervision were considered as a percentages surcharge of the totals of the sections.**
- **Final costs**



# Cost estimation

## underground construction costs in k€

	e- source	e+ source	DR	RTML	Main Linac	BDS	Experiment
Damping Ring Tunnel e-	763	763	102'552				
RTML e-				51'180			
ML e-	9'994	41'530			231'184		
BDS e-	46'054	10'021			16'511	61'316	57'828
BDS e+	31'827	35'814			15'635	55'552	12'689
ML e+		9'480			215'923		
RTML e+				47'671			
metallic structure	3'478	3'830	4'024	3'879	18'805	4'586	2'767
underground construction	92'116	101'438	106'576	102'730	498'058	121'453	73'284
engineering	9'312	10'254	10'773	10'385	50'347	12'277	7'408
<b>total underground</b>	<b>101'428</b>	<b>111'692</b>	<b>117'349</b>	<b>113'114</b>	<b>548'404</b>	<b>133'730</b>	<b>80'692</b>
							<b>1'206'410</b>

# Cost estimation

## surface construction costs in k€

	e- source	e+ source	DR	RTML	Main Linac	BDS	Experiment
buildings + site develop.	13'023	13'739	42'337	25'959	76'379		64'773
engineering	1'221	1'317	4'625	2'955	8'925		7'677
<b>total surface</b>	<b>14'245</b>	<b>15'056</b>	<b>46'963</b>	<b>28'913</b>	<b>85'304</b>		<b>72'450</b>
							<b>262'931</b>

## civi engineering construction costs in k€


<b>total surface + underground</b>	<b>115'673</b>	<b>126'749</b>	<b>164'312</b>	<b>142'028</b>	<b>633'708</b>	<b>133'730</b>	<b>153'142</b>
							<b>1'469'341</b>

## List of possible savings (Vancouver to Valencia) in k€

- reduction of diameter and conventional advance in BDS (reason: new layout): 103'496
- single detector hall (mobile-push-pull): 37'983
- common e+ bypass in one beam tunnel: impossible
- suppression of shaft and cavern 8: 15'600
- suppression of shaft and cavern 9 and linking gallery: 8'300

## List of possible savings (Vancouver to Valencia) in k€

- all damping rings in a single tunnel incl. change of bypass (e- and e+ connections between DR and BDS): 140'788
  - suppression of 1.2 km (ML e+ ): 21'528
  - reduction of surface buildings (nearby existing High Energy Physics Laboratory): 72'825
  - extension of time schedule by 1 year (not considered so far): 30'631
- total savings: 394'958 from Vancouver to Valencia



**Thank you very much  
for your attention**