

rev. #1 22may06 – 500 GeV configuration plus difficult to add later 1 TeV elements

### **What's included in the ILC CONSTRUCTION COST ESTIMATE? What's in/out?**

For the estimate required for Vancouver in late July, 2006, we concentrate only on the cost estimate for the construction project including accelerator and detectors<sup>1</sup>, tooling-up industry for production of ILC quantities of components<sup>2</sup>, and the final engineering designs<sup>3</sup>. The construction project does not include R&D, proof-of-principle (system) test, commissioning, operations, or decommissioning. Estimates for these non-construction categories will be required after Vancouver. The scope of this cost estimate includes the Baseline Configuration for the 500 GeV (250x250) configuration, plus the following components of the upgrade to 1 TeV which would be very difficult to add later: the length and configuration of the tunnels for the beam delivery system, the capacity of the full power beam dumps, and the surface land and underground easements.

<sup>1</sup> The surface land and underground easement procurement costs, public planning, legal documentation and permits are treated differently by the three regions. In the US, these particular costs are not funded by the Department of Energy, but rather by the host state. Therefore, it is important to separate these costs from the other construction cost estimates so that they can be either added-in or presented separately, depending on the audience. In reality, land and easement procurement costs will be highly dependent on the *exact* layout of the project, land parcel by land parcel. This is well beyond the scope of the RDR estimate. It is anticipated that the Conventional Facilities and Siting Global System group will provide only a compilation of the surface sites and the required area for each site, along with the area (length x projected width) of the underground easements required.

Please note that these surface land and underground easement requirements must also include, with proper identification, those needed for the upgrade to the 1 TeV configuration.

<sup>2</sup> The tooling up industry for production of the required quantity of components could be included in the construction cost or in the pre-construction cost, depending on the availability of pre-construction funding and the time pressures of the construction schedule. For definiteness, we will consider this category as part of the construction cost estimate for Vancouver.

<sup>3</sup> There are two types of **final engineering designs**. For example, it is anticipated that an Architectural Engineering firm will likely produce the final civil engineering designs and specifications and to provide construction management. These types of *contracted* design activities would not begin until after project authorization, so they are *included* in the construction cost estimate. It is also desired to perform as much of the in-house, institutional, or laboratory final design work (after completion of the conceptual reference, and technical designs and required R&D) before the project funding authorization, so that bids can be let as soon as possible after construction funding becomes available. If this is

allowed by the regional funding agencies, it would reduce both the cost and labor for the construction project and escalate the start up of construction, once funding is authorized. We request that this *in-house effort* in person-hours be separately identified for inclusion or exclusion in the cost estimate, depending on the audience. The preparation of the Reference Design Report and the Technical Design Report are pre-construction and therefore, not included.

Jean-Pierre Delahaye eloquently states that, “pre-construction includes work that **has to be done before a project is approved**, while construction includes work that **has to wait until project is approved.**” However, there are some items that can fall in between as described above.

R&D is to be interpreted as "Work to demonstrate feasibility and development of related pre-production components, equipment, and subsystems, required to establish proof of principle or feasibility of a novel, untested design." These are the activities monitored by the GDE Research and Development Board. Note that engineering development of devices with well-known design principles should be included under the heading of normal design.

The construction phase for each (sub-)system extends for the authorization of initial funding until the last component is installed and tested for that (sub-)system. Commissioning of that (sub-)system will likely begin on operating funding (not the construction project funding) as soon as that (sub-)system is ready, while construction activities may continue in other sections of the ILC.

Machine operations and decommissioning are not considered part of the construction project cost estimate.

**In/Out Summary Table of Required Cost Estimates**

<u>Type:</u>	included in Construction <u>Cost Estimate</u>	Indefinite Association <u>could be in or out</u>	not part of Construction <u>Cost Estimate</u>
<u>Date Required:</u>	25 June 06	25 June 06	1 September 06
<u>Elements:</u>	accelerator construction	final engineering design (in-house)	R&D
	industrial tool-up	surface land and underground easements	proof-of-principle (systems) test
	final engineering design (contracts)	<b>area</b> requirements 500 GeV & 1 TeV	commissioning
			operating costs decommissioning