

SSC COST BREAKDOWN BY LABOR AND COMPONENT CATEGORIES

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Breakdown of Total SSC Costs

In FY86 dollars the costs break down as follows:

SSC Project	\$3.010B
Experimental Equipment	\$0.715B
R&D	\$0.275B
Pre-operating Costs	<u>\$0.225B</u>
	\$4.225B

SSC PROJECT (\$3.010B in FY86 \$)

The costs break down as follows:

Labor and services	\$ 852M
Industry supplied components and materials	\$1633M
Contingency	\$ 525M

An analysis, based on CDR data, was performed by Vic Bremenkamp, to further break down the first two items. To allow for inflation and for contingency, the numbers that follow should be multiplied by 1.1 (FY86 → FY88) and $(2577 + 525)/2577 = 1.17$, i.e. 1.29 to obtain FY88 figures with contingency. This is of course an approximation; it ignores somewhat different inflation rates for different items and, even more importantly, differences in contingency allowed for various categories.

Labor and Services

Architect Engineer/Construction Management	\$ 92M
On Site Construction (roads, buildings, tunnel)	\$200M
Off Site Shop Fabrication	\$250M
On Site Installation Technicians	\$150M
On Site Management and Supervision	\$160M

The first 3 items represent labor and services provided by private enterprise. The last two items cover mainly in-house (i.e. SSC staff) labor and services.

Industry Supplied Components and Raw Materials

This breakdown is detailed in the two tables below. The first table provides a listing of components that can be grouped into categories exceeding \$5M. The second table lists various items that are better represented as subsystems.

TABLE 1

Industry Supplied Components/Raw Materials

Superconducting Cable		\$ 270M
Alloy (niobium, copper, titanium)	\$ 93M	
Extrusion	12	
Drawn wire	92	
Cabling	73	
Construction Supplies (rebar, concrete, structural steel)		\$ 217M
Cryogenics (compressors, pumps, valves, etc.)		\$ 120M
Electrical (power supplies, distribution lines, transformers, switches, rectifiers, etc.)		\$ 110M
Construction Equipment (tunneling machines, earth movers, trucks, etc.)		\$ 100M
Iron for Magnet Yokes (laminations, cold rolled, low carbon steel) (44,000 tons)		\$ 98M
Tooling (specialized fixtures to standard shop equipment, dies, presses, etc.)		\$ 75M
Materials and Supplies (office supplies, travel, etc.)		\$ 57M
Magnet Collars (6,500 tons stainless steel, Nitronic 40)		\$ 50M
Cold Mass Shells (4,750 tons, 304 stainless steel, rolled)		\$ 29M
Computers (mainframe, minis, p.c.'s, cabling, racks, etc.)		\$ 25M
Special Software		\$ 10M
Instrumentation		\$ 25M

RF Systems (klystrons, cavities, etc.)	\$ 25M
Vacuum Systems (pumps, valves, etc.)	\$ 20M
Vehicles (trucks, vans, forklifts, etc.) (tunnel transport vehicles)	\$ 20M
Bellows (magnet interconnections)	\$ 16M
G-10 (magnet cable spacers, end pieces, etc.)	\$ 15M
Insulating Blankets (mylar, fiberglass, etc.)	\$ 15M
Cryostat Tanks (SA516 steel sheet)	\$ 26.5M
Fiberglass Tape	\$ 10M
Kapton	\$ 9M
Copper (magnet wedges, warm magnet wires)	\$ 8M
Cryogenic Pipes (450 miles)	\$ 7.5M
Aluminum sheets (cryostat heat shields)	\$ 7M
Bore tubes (110 miles, nitronic steel)	\$ 6M
Communication Equipment	\$ 6M
Office Equipment	\$ <u>5M</u>
Total	\$1382M

TABLE 2

Sub-Systems

Injector (drift tubes, tanks, RFQ, etc.)	\$ 52M
Main Ring Magnets Cold Mass Supports (G-10 posts, fittings, etc.)	\$ 43M
Main Ring Special Magnets	\$ 27M
Main Ring Spools (valves, fittings, etc.)	\$ 50M
Main Ring Magnet Interconnections (bus bars, special fittings, etc.)	\$ 29M
Main Ring Injection/Abort	\$ 13M

Main Ring Magnet Survey & Installation (surveying equipment and set-ups)	\$ 11.5M
Main Ring Quench Protection	\$ 8.5M
Miscellaneous Systems	<u>\$ 16M</u>
Total	\$ 250.0M

EXPERIMENTAL EQUIPMENT (\$0.715B in FY86 \$)

This breakdown is based on the initial complement of detectors and computers as postulated in SSC-SR-1023. The actual breakdown was performed by M. Gilchriese.

The figures are in FY86 dollars and no contingency is included. It should be also emphasized that since no design for any detector exists as yet, these figures should be viewed as illustrative rather than as any firm estimate.

TABLE 3

Experimental Equipment

Iron (of various configurations and including installation costs) - 100,000 tons	\$150M
Uranium (assuming it is obtained as scrap from government processing - otherwise multiply price by 6) - 6000 tons	\$ 15M
Silicon detectors and related electronics	\$ 2M
Wire chamber tracking systems (machining, connectors - but not including assembly labor or electronics)	\$ 10M
Superconducting magnets	\$ 10-20M
Cryogenic systems (He, nitrogen, liquid argon)	\$ 10M
Electronics (including trigger systems, fabrication, installation, cables, connectors, components but not design)	\$200M
On-line computing systems (computers, terminals, printers ...)	\$ 10M
Mechanical and electronic engineering (EDIA)	\$ 90M
Off-line computing systems	\$ 70M
Other labor (industry and laboratories)	\$140-150M