

# **PROJECT IMPLEMENTATION**

## **OVERVIEW**

**W. E. Althouse**  
**DECEMBER 11, 1992**

# PROJECT IMPLEMENTATION CURRENT STATUS

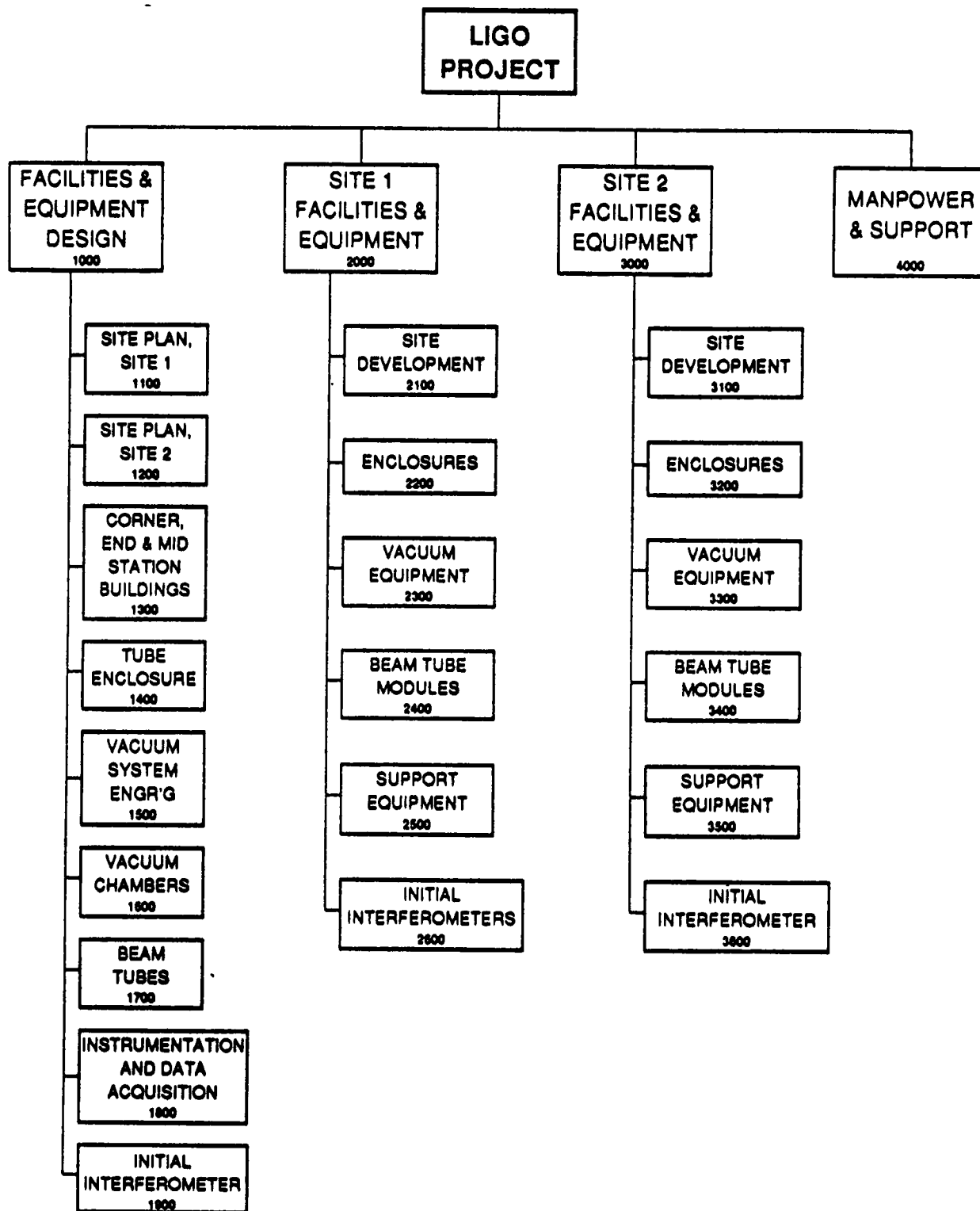
- **FY92 FUNDING:**

<b>President's Budget</b>	<b>\$(23.5 + X) M</b>
<b>Congress appropriates</b>	<b>\$(23.5 + 5) M</b>
<b>NSF allocates</b>	<b>\$(15.9 + 3.2) M</b>

- **FY93 FUNDING:**

<b>President's Budget</b>	<b>\$(48 + X) M</b>
<b>Congress appropriates</b>	<b>\$(38 + 5) M</b>
<b>NSF allocates</b>	<b>?</b>

- **R&D ACTIVITIES TOWARDS LIGO INTERFEROMETERS**
- **DESIGN OF INITIAL INTERFEROMETERS**
- **VACUUM SYSTEM:**
  - **RFP FOR DESIGN OF BEAM TUBE MODULES ISSUED, PROPOSALS RECEIVED UNDER EVALUATION**
  - **RFP FOR DESIGN OF VACUUM EQUIPMENT IN PREPARATION**
- **LAND ACQUISITION (HANFORD & LOUISIANA) UNDERWAY**
- **ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATIONS INITIATED AT HANFORD**
- **LAND (STAKING) SURVEY FOR LIVINGSTON UNDERWAY**

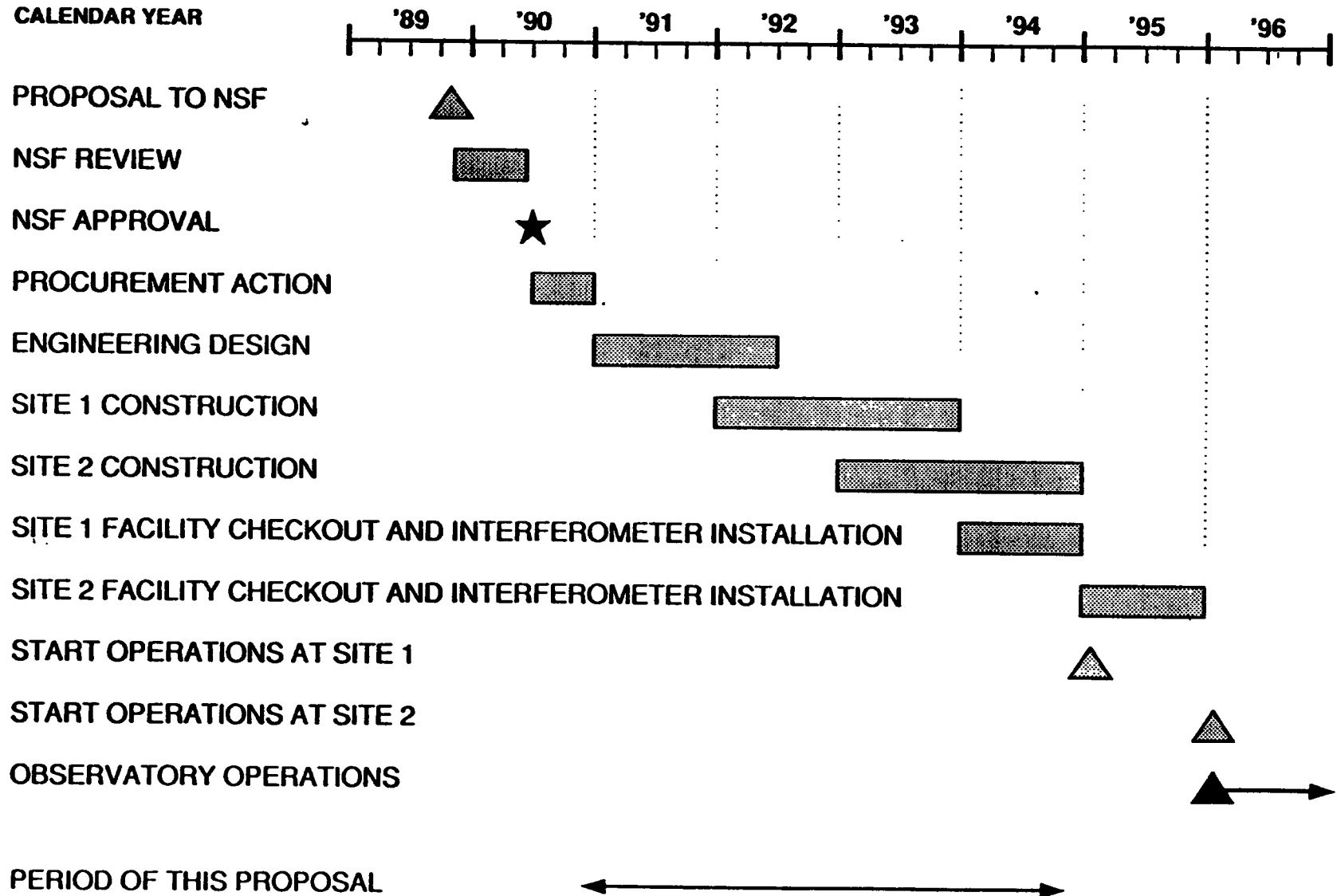


# DESIGN & CONSTRUCTION COSTS

FY89 \$M

	SITE 1	SITE 2
1. LIGO team In-house	12.0	
2. DESIGN	14.4	
3. FACILITIES & EQUIPMENT		
Site development	6.3	5.5
Buildings	12.5	8.8
Beam tube enclosure	6.6	6.6
Vacuum equip (except tubes)	22.6	11.6
Beam tubes	13.8	13.8
Support equipment	4.1	3.7
Interferometers	5.0	2.5
	<u>70.9</u>	<u>52.5</u>
TOTAL, FACILITIES & EQUIPMENT	123.4	
4. CONTINGENCY	<u>30.0</u>	
TOTAL	179.8	

# LIGO PROJECT SCHEDULE



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## PROPOSED FUNDING PLAN

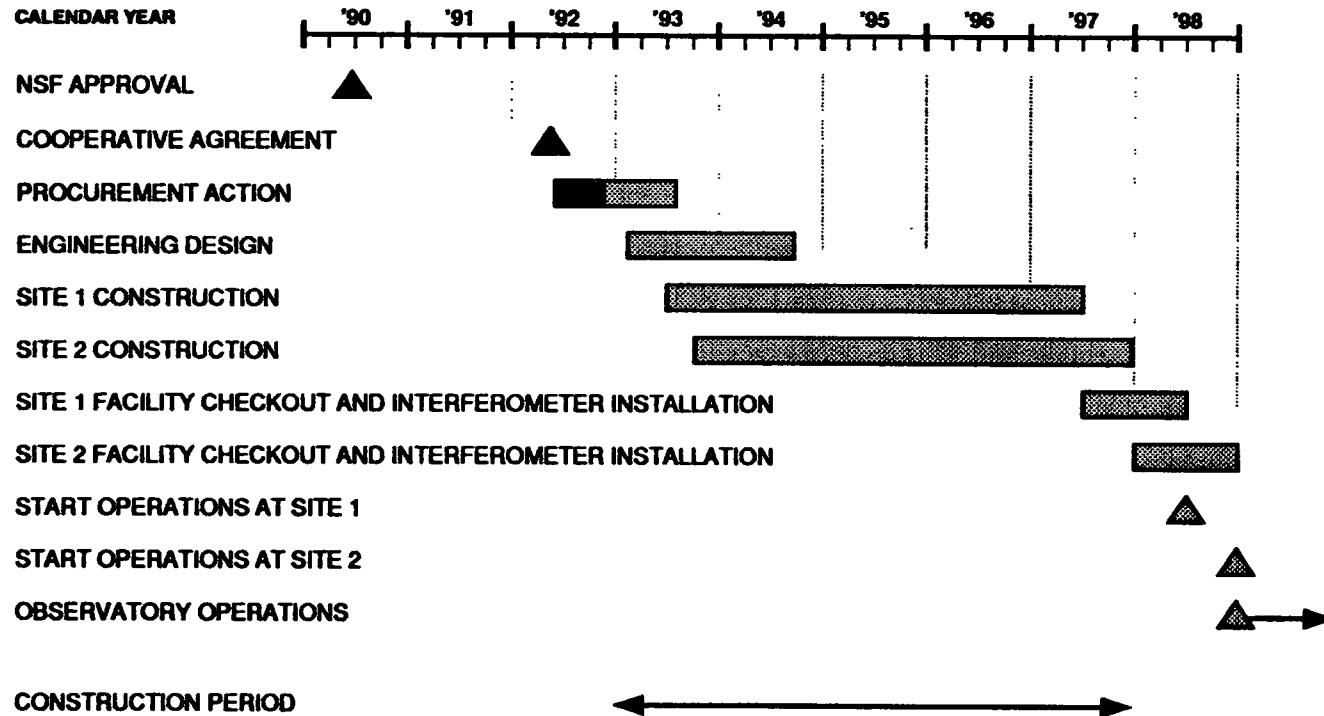
	'91	'92	'93	'94	TOTAL
R&D	3.0	3.0	3.0	3.0	12.0
Design & Construction	44.6	49.4	48.1	37.7	179.8
Remote Site Operations				2.0	2.0
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TOTAL, FY89 \$M	47.6	52.4	51.1	42.7	193.8
Inflation @ 5%/yr	4.9	8.3	11.0	11.8	36.0
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TOTAL, ESCALATED \$M	52.5	60.7	62.1	54.5	229.8

## NATURAL FUNDING PLAN

	'91	'92	'93	'94	TOTAL
R&D	3.0	3.0	3.0	3.0	12.0
Design & Construction	29.0	78.3	52.9	19.6	179.8
Remote Site Operations				2.0	2.0
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TOTAL, FY89 \$M	32.0	81.3	55.9	24.6	193.8
Inflation @ 5%/yr	3.3	12.8	12.0	6.8	34.9
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TOTAL, ESCALATED \$M	35.3	94.1	67.9	31.4	228.7

# LIGO PROJECT SCHEDULE

11/92



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# CONSTRUCTION PROPOSAL BUDGET (FY 93 = \$43M)

FY89 \$M

	<u>CY92</u>	<u>CY93</u>	<u>CY94</u>	<u>CY95</u>	<u>CY96</u>	<u>CY97</u>	<u>TOTAL</u>
1. In-house expenditures - R&D	3.0	3.0	3.0	3.0	3.0	3.0	18.0
2. In-house expenditures - D&C	3.0	3.0	3.0	3.0	3.0	3.0	18.0
3. Subcontracted engineering services							
Design	8.0	0.3					8.3
Construction Mgmt. & Supv.		1.2	1.9	1.4	1.4	0.2	6.1
4a. Direct construction - Site 1:							
Site development		6.3					6.3
Buildings			12.5				12.5
Beam tube enclosure		2.4		4.2			6.6
Vacuum equipment (except tube)				11.5	11.1		22.6
Beam tubes		7.5	6.3				13.8
Support equipment						4.1	4.1
Initial Interferometers				3.0	2.0		5.0
4b. Direct construction - Site 2:							
Site development		5.5					5.5
Buildings				8.8			8.8
Beam tube enclosure		2.4			4.2		6.6
Vacuum equipment (except tube)					8.7	2.9	11.6
Beam tubes			11.6	2.2			13.8
Support equipment						3.7	3.7
Initial Interferometer					2.5		2.5
4. Total, direct construction	<u>0.0</u>	<u>24.1</u>	<u>30.4</u>	<u>29.7</u>	<u>28.5</u>	<u>10.7</u>	<u>123.4</u>
SUBTOTAL, Lines 2-4	11.0	28.6	35.3	34.1	32.9	13.9	155.8
5. Contingency @ 20%	2.2	5.7	7.1	6.8	6.6	2.8	31.2
TOTAL, PROPOSAL D&C (sum 2-5) (FY89 \$M)	<u>13.2</u>	<u>34.3</u>	<u>42.4</u>	<u>40.9</u>	<u>39.5</u>	<u>16.7</u>	<u>187.0</u>
6. Added Items:							
Site Investigations	0.9						0.9
NSF (GDP) Inflation factor	1.1154	1.1525	1.1904	1.2295	1.2688	1.3100	
TOTAL (Lines 1-6), GDP-PROJECTED \$M	19.1	43.0	54.0	54.0	53.9	25.8	249.8

- Notes:
- D&C = Design & Construction
  - Sales/local taxes (~\$7M FY89 dollars) not included
  - Assumes maximum funding of \$54M per year

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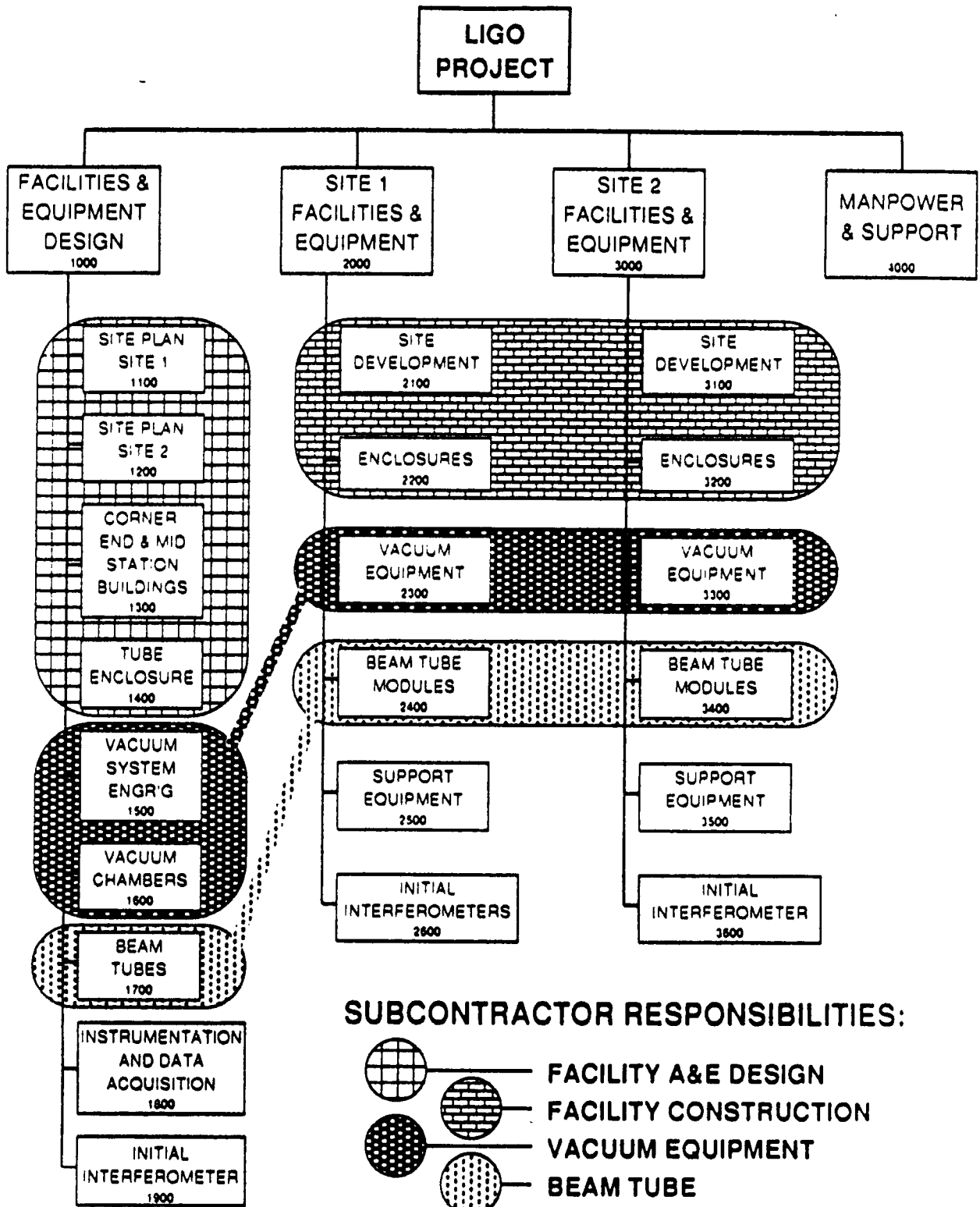
# CONSTRUCTION PROPOSAL BUDGET (FY 93 = \$20M)

FY89 \$M

	<u>CY92</u>	<u>CY93</u>	<u>CY94</u>	<u>CY95</u>	<u>CY96</u>	<u>CY97</u>	<u>TOTAL</u>
1. In-house expenditures - R&D	3.0	3.0	3.0	3.0	3.0	3.0	18.0
2. In-house expenditures - D&C	3.0	3.0	3.0	3.0	3.0	3.0	18.0
3. Subcontracted engineering services							
Design	8.0	0.3					8.3
Construction Mgmt. & Supv.		0.3	1.6	1.9	1.5	0.8	6.1
4a. Direct construction - Site 1:							
Site development		5.1	1.2				6.3
Buildings			12.5				12.5
Beam tube enclosure			2.4		4.2		6.6
Vacuum equipment (except tube)				2.7	17.0	2.9	22.6
Beam tubes			9.9	3.9			13.8
Support equipment						4.1	4.1
Initial Interferometers					3.0	2.0	5.0
4b. Direct construction - Site 2:							
Site development		3.2	2.3				5.5
Buildings				8.8			8.8
Beam tube enclosure			2.4		4.2		6.6
Vacuum equipment (except tube)						11.6	11.6
Beam tubes				13.8			13.8
Support equipment						3.7	3.7
Initial Interferometer						2.5	2.5
4. Total, direct construction	<u>0.0</u>	<u>8.3</u>	<u>30.7</u>	<u>29.2</u>	<u>28.4</u>	<u>26.8</u>	<u>123.4</u>
SUBTOTAL, Lines 2-4	11.0	11.9	35.3	34.1	32.9	30.6	155.8
5. Contingency @ 20%	2.2	2.4	7.1	6.8	6.6	6.1	31.2
TOTAL, PROPOSAL D&C (sum 2-5) (FY89 \$M)	<u>13.2</u>	<u>14.3</u>	<u>42.4</u>	<u>40.9</u>	<u>39.5</u>	<u>36.7</u>	<u>187.0</u>
6. Added items:							
Site Investigations	0.9						0.9
NSF (GDP) Inflation factor	1.1154	1.1525	1.1904	1.2295	1.2688	1.3100	
TOTAL (Lines 1-6), GDP-PROJECTED \$M	19.1	19.9	54.0	54.0	53.9	52.0	252.9

- Notes:
- D & C = Design & Construction
  - Sales/local taxes (~\$7M FY 89 dollars) not included
  - Assumes maximum funding of \$54M per year

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## **CIVIL DESIGN AND CONSTRUCTION**

- **DESIGN/BUILD CONTRACT WITH RESERVATIONS TO:**
  - **APPROVE DESIGN**
  - **APPROVE CONSTRUCTION BID PACKAGE**
  - **APPROVE SELECTION OF LOCAL CONTRACTORS**
  - **APPROVE CONSTRUCTION CONFORMANCE TO DESIGN, CONTRACT REQUIREMENTS**
- **SEPARATE CONTRACTOR(S) WILL ASSIST WITH CONFORMANCE MONITORING**
- **LIGO RESIDENT ENGINEER MONITORS PROGRESS AND RESOLVES PROBLEMS LOCALLY**

## **SYSTEM INTEGRATION**

- **PRESENT FUNDING/SCHEDULING UNCERTAINTIES MAKE IT PRUDENT THAT WE ASSUME ROLE**