

Facility Modifications & Preparation (FMP)

Cost and Schedule Breakout Presentation NSF Review of Advanced LIGO Project

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LIGO-G060219-00-M

- Procure new Vacuum System components - 2K to 4K conversion at LHO, large diameter mode cleaner tubes for relocation of 6 HAM chambers – both sites. \$2.8M
- Procure class 100 clean room space for assembly and installation. \$2.7M
- Provide workspace and storage. Convert staging building into clean room space. LHO example: need to prepare 3000 sq ft high bay to accept Class 100 clean rooms. Modify warehouse to provide clean, air conditioned storage for assembled components ~ 1500 sq ft. \$0.9M
- Procure installation fixtures and tooling not provided by subsystems. \$0.8M
- Refurbish existing optics lab space, laser safety mods, purchase bake ovens, cleaning supplies. \$0.6M
- Management and planning \$0.5M

FMP Work Breakdown Structure

WBS	WBS Description
LIGO.4	Advanced LIGO
LIGO.4.01	FMP Facility Modifications & Preparation
LIGO.4.01.1	FMP Management for Facil Mod & Prep
LIGO.4.01.2	FMP Facil Prep & Staging/Installation Planning
LIGO.4.01.2.1	FMP Staging & Facility Preparation
LIGO.4.01.2.2	FMP Installation Fixtures
LIGO.4.01.2.3	FMP Installation & Test Planning
LIGO.4.01.2.4	FMP Equip/Matls for Staging & Install
LIGO.4.01.3	FMP Clean Rooms
LIGO.4.01.4	FMP Vacuum Equip Design, Procure Fab
LIGO.4.01.5	FMP Vacuum Equipment Bake & Cleaning
LIGO.4.01.5.1	FMP Vacuum Bake Ovens
LIGO.4.01.5.2	FMP Vacuum Chamber Cleaning Equipment

FMP Schedule Highlights

Activity ID	Activity Description	Funding Agency	Early Start	Early Finish	Fiscal Year											
					FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14				
LIGO.4.01 FMP Facility Modifications & Preparation																
+ LIGO.4.01.1 FMP Management for Facil Mod & Prep																
		NSF	01OCT07	02SEP11												
LIGO.4.01.2 FMP Facil Prep & Staging/Installation Plann																
+ LIGO.4.01.2.1 FMP Staging & Facility Preparation																
		NSF	01OCT07	02SEP11												
+ LIGO.4.01.2.2 FMP Installation Fixtures																
		NSF	01OCT07	19FEB10												
+ LIGO.4.01.2.3 FMP Installation & Test Planning																
		NSF	01OCT07	25JAN11												
+ LIGO.4.01.2.4 FMP Equip/Matls for Staging & Install																
		NSF	01APR08	13AUG10												
+ LIGO.4.01.3 FMP Clean Rooms																
		NSF	29NOV07	15OCT10												
+ LIGO.4.01.4 FMP Vacuum Equip Design, Procure Fab																
		NSF	02FEB10	17SEP10												
LIGO.4.01.5 FMP Vacuum Equipment Bake & Cleaning																
+ LIGO.4.01.5.1 FMP Vacuum Bake Ovens																
		NSF	29NOV07	10APR08												
+ LIGO.4.01.5.2 FMP Vacuum Chamber Cleaning Equipment																
		NSF	02FEB10	25MAY10												

FMP Major Milestones/Interfaces

ID	Milestone Description	Early Start	Early Finish
FM-MS0110	Start Facility Mods	01-Oct-07	
FM-M50160	Clean Rooms Ready for SEI/SUS Assembly		14-Oct-08
FM-MS0140	LLO Facil Mods & Prep - Ready for Install		15-Oct-10
FM-MS0150	LHO Facil Mods & Prep - Ready for Install		15-Oct-10
IN-M00030	IFO1 Shutdown LLO Install begins		25-Jan-11
IN-M00035	IFO2 and IFO3 Shutdown LHO install begins		02-Sep-11

FMP Cost by WBS

Subsystem Summary at WBS Level 5

WBS / System: 4.01 FMP

2006 Base Year Dollars

FUNDING AGENCY

Last Mod Date: 29-Mar-06

WBS	WBS Description	Hours	Labor \$	Travel \$	Equip \$	Subtotal	Conting \$	Cont %	Total \$
NSF									
4.01.1	FMP Management for Facil Mod & Prep	1,763	145,741	9,480	0	155,221	21,731	14.0%	176,952
4.01.2.1	FMP Staging & Facility Preparation	8,180	268,373	28,440	498,601	795,415	143,175	18.0%	938,589
4.01.2.2	FMP Installation Fixtures	2,713	257,242	11,376	458,623	727,240	116,358	16.0%	843,599
4.01.2.3	FMP Installation & Test Planning	3,146	295,572	0	0	295,572	41,380	14.0%	336,952
4.01.2.4	FMP Equip/Matls for Staging & Install		0	0	232,809	232,809	32,593	14.0%	265,402
4.01.3	FMP Clean Rooms	500	70,393	0	2,288,608	2,359,001	377,440	16.0%	2,736,441
4.01.4	FMP Vacuum Equip Design, Procure & Fab	280	34,872	0	2,156,500	2,191,372	612,484	27.9%	2,803,856
4.01.5.1	FMP Vacuum Bake Ovens	50	7,039	0	180,000	187,039	44,045	23.5%	231,084
4.01.5.2	FMP Vacuum Chamber Cleaning Equipment	40	1,810	0	60,000	61,810	12,362	20.0%	74,172
Subtotal		16,672	1,081,042	49,296	5,875,141	7,005,479	1,401,568	20.0%	8,407,047
Total		16,672	1,081,042	49,296	5,875,141	7,005,479	1,401,568	20.0%	8,407,047

FMP Staffing Profile

RESOURCE	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	TOTAL FTE YRS
Engineer / Sr. Technician	1.72	0.99	0.78	0.40					3.89
Craft Laborer	0.41	0.41	0.41	0.26					1.49
Mgt/Senior Personnel	0.14	0.07	0.06	0.02					0.29
Post-Doctoral Fellow	0.21	0.21	0.21	0.06					0.69
Sr Engineer	0.59	0.55	0.60	0.36					2.10
Sr Scientist	0.09	0.09	0.09	0.03					0.30
Technician	0.15	0.15	0.15	0.05					0.50
TOTAL	3.31	2.47	2.30	1.18					9.26

- **Low technical risk**
- **Assembly of subsystems depends on this workspace.**
- **Will need to fit “noisy” construction activities around operating IFO schedules.**
- **Safety – assembly and on site transport of heavy components (8000 pounds for assembled BSC system).
New laser safety issues – higher power in test labs.**
- **Track and store many parts – will need some manpower and an inventory system to control incoming materials as well as completed components.**
- **Small quantities of cleaning fluids to be stored and disposed of. Not new for us.**