

Area	Item	Notes	Detailed Design		Fab/Assembly @ LO		Installation/Commissioning		Contingency	total cat	T cat +PD	From CoD	Oct 3/03 Diff from Cr
			Labor hrs	Labor \$	Materials/ Supplies	Labor hrs	Labor \$	Materials/ Supplies					
<b>Lick Observatory</b>													
<b>Optics</b>													
	Optical Material		120	\$9,000	\$192,000					\$36,577			
					\$39,860								
	Optical Fabrication					120	\$9,000	\$48,774					
	Optical Coating							\$11,000		\$60,000			
	Installation in cells					80	\$6,000						
	Optical Design Support		40	\$2,800		160	\$11,200						
										\$329,634	\$340,834	\$336,617	\$4,217
<b>Electronics</b>													
			500	\$27,500		543	\$29,865			\$7,974			
	Linux computer w/monitor, etc							\$2,600					
	Spare computer only							\$1,300					
	Galil DMC-2110 controller cards												
	DMC-2110 x 2							\$4,147					
	AMP-1910 x 2							\$1,807					
	*DB14064 I/O extender x 2							\$1,814					
	CABLE-100-1m x 2							\$325					
	Servo Motors x 2							\$2,080					
	Servo Motor Power supply x 2							\$884					
	Network and Power equipment												
	Lantronix terminal server x 2							\$2,600					
	Pulizzi power controller x 2							\$1,950					
	Over Temperature controller x 2							\$780					
	Circuit breakers, etc. x 2							\$520					
	Other components												
	Motor Limit interlock box x 2							\$390					
	Local controls (Local/Remote, E-Stop, etc)							\$130					
	Protheus Flow switch x 2							\$559					
	**Cooling fan control x 2							\$260					
	**Cooling Fans x 2							\$520					
	Circuit boards and components							\$500					
	Parts for secondary defeat							\$1,200					
	Miscellaneous components, wire, etc							\$1,300					
	local control of modual mount							\$600					
										\$83,631	\$92,431	\$39,870	\$52,561
Mechanical Engineering										\$8,320			

attachment points	20	\$1,300								
structure	40	\$2,600								
slides and ball screw translation system	40	\$2,600								
drive system	20	\$1,300								
of prism cells	20	\$1,300								
covers	10	\$650								
handling fixture	20	\$1,300								
electronics enclosure	20	\$1,300								
ME- supervision			156	\$10,140			\$22,490	\$43,290	\$41,600	\$1,690
<b>Mechanical Fab</b>	<b>40</b>	<b>\$2,200</b>								<b>\$8,284</b>
Support weldment, left	A1110		65	\$3,575						
Support weldment, right	A1130		65	\$3,575						
Frame weldment, upper	A1150		48	\$2,640						
Frame weldment, lower	A1160		45	\$2,475						
Ring ,front	A1172		0	\$0						
Ring ,aft	A1173		0	\$0						
Jack stand	A0003		109	\$5,995						
Fiducial mount rail	A1174		2	\$110						
Bearing housing	A1212		3	\$165						
Bearing cap	A1213		2	\$110						
Bearing housing aft	A1214		3	\$165						
Spacer	A1216		2	\$110						
Spacer	A1217		2	\$110						
Sleeve	A1218		1	\$55						
Pulley housing	A1310		4	\$220						
Housing cover	A1311		1.5	\$83						
Cover fwd	A1510		5.5	\$303						
Index fwd	A2014		2	\$110						
Cell fwd	A2020		98	\$5,390						
Cell aft	A2030		98	\$5,390						
<b>Purchased Parts</b>										
Assembly	A0001			\$757						
	A1100			\$4,524						
	A1200			\$10,744						
	A1300			\$1,064						
	A3001			\$1,692						
	DEFINING POINTS			\$8,351						
	Fab Materials			\$5,860						
							\$65,771	\$67,971	\$41,420	\$26,551
<b>Software</b>										<b>\$8,960</b>
Software-CDR investigations		230	\$16,100							
Software-Coding/code check				426	\$29,820					
Software-Slitmask Design Mods				40	\$2,800		\$48,720	\$55,720	\$44,800	\$10,920
<b>Assembly and Testing at Lick</b>										
MF-Assembly				160	\$10,400					
MF-Initial Mechanical Testing				80	\$5,200	\$5,000				
Initial Electronics testing				120	\$7,800					
Pre Ship Tests				480	\$31,200		\$59,600	\$59,600	\$11,200	\$48,400

Reviews		298	\$20,860	\$0	297	\$20,790	\$0				\$12,840	\$41,650	\$62,450	\$62,400	\$50
Shipping	contingency includes commissioning allowance										\$12,635				
containers								150	\$9,750	\$5,200					
freight										\$6,000					
Travel			\$2,500			\$5,000				\$23,375		\$51,825	\$51,825	\$42,075	\$9,750
commissioning															
Optical								40	\$2,600						
Electrical								80	\$5,200						
Mechanical Eng								80	\$5,200						
Mechanical Fab								160	\$10,400						
Software								100	\$7,000						
												\$30,400	\$30,400	\$28,600	\$1,800
Project Management	miss contingency	106.35	\$7,976	\$1,000	160.9	\$12,068	\$1,000	87.5	\$6,563	\$6,000	\$11,784	\$34,606	\$41,686	\$39,221	\$2,465
Totals Lick		1418	\$98,786	\$235,360	3218	\$216,863	\$130,031	150	\$46,713	\$40,575	\$167,374	\$768,327	\$846,207	\$687,803	\$158,404
													\$1,013,581		

**CARA**

Requirements Document															
Defining Points Design															
LRIS Hatch Modification															
Interface Design															
Baseline Rotation/Displacement Software					88	\$5,252									
Baseline Software Desing/Implementation					88	\$15,756									
Interface Control Document															
Safety/Operation/Weight/Balance Reviews		264	\$15,756												
Install Defining Points								124	\$10,741						
Install Electrical/Cooling Provisions								212	\$15,026						
Impliment LRIS Hatch Modification								52	\$7,506						
Acceptance Test Plan Development		20	\$420												
Installation/Testing/Commissioning								324	\$19,327						
Documentation Reviews					124	\$7,353									
Project and Milestone Meetings		60	\$5,515		133.2	\$12,132									
Program Management		32	\$2,971		140	\$6,535									
CARA totals		376	\$24,662		573.2	\$47,028		712	\$52,600			\$124,290	\$187,330	\$187,330	0
PROJECT Totals		1794	\$123,448	\$235,360	3791.2	\$263,891	\$130,031	862	\$99,313	\$40,575	\$167,374	\$892,617	\$1,033,537	\$875,133	\$158,404
c/w contingency												\$1,059,991	\$1,200,911	\$1,044,147	\$156,764

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