WBS Number: 3.1 **Description:** Silicon

Institution : **Contact**

Pre-operations, operations and maintenance of the silicon subsystem (pixels, SCT and RODs).

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	10301	0	0	10301	5960	818	1614	1909	3765.2	6625.2

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	1065	1670	1280	175	175	175	175
	63.805	100.051	89.921	16.698	17.133	17.577	18.034
Electrical Engineer R	1405	1888	1599	1702	2283	2130	1714
	152.418	184.175	163.85	173.132	237.528	275.528	152.252
Gen Lab R	0	0	0	0	0	1760	0
	0	0	0	0	0	53.983	0
Mechanical Engineer R	1162	3520	3008	3136	2866	2853	2948
	140.602	388.96	321.128	325.546	305.595	312.116	349.194
Technician R	4441	4720	3843	2577	3417	3732	4373
	310.541	404.086	366.048	210.131	316.778	371.321	473.472

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	47.9	115.6	284.9	418.2	561.7	421.2	322.8
Travel R	58.1	218.6	280.7	121.0	123.0	119.2	261.5

WBS Number: 3.1.1 **Description:** Pixels

Institution : **Contact**

Pre-operations, operations and maintenance for the pixel subsystem.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	6480	0	0	6480	3987	550	1136	808	2578.6	4307.6

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	0	0	400	175	175	175	175
	0	0	37.2	16.698	17.133	17.577	18.034
Electrical Engineer R	200	748	545	520	1370	1340	920
	12.05	43.808	31.506	31.263	133.67	185.956	59.52
Gen Lab R	0	0	0	0	0	1760	0
	0	0	0	0	0	53.983	0
Mechanical Engineer R	1162	3520	3008	3136	2866	2853	2948
	140.602	388.96	321.128	325.546	305.595	312.116	349.194
Technician R	1921	2200	2464	1040	1862	2237	2943
	169.575	263.12	286.416	121.642	226.697	282.072	385.422

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	30.4	89.3	25.9	158.5	301.1	166.3	69.8
Travel R	27.3	188.0	256.2	90.7	100.9	96.6	238.2

WBS Number: 3.1.1.1 **Description:** Pre-operations

Institution : **Contact**

Pre-operations

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1272	0	0	1272	651	287	196	137	532.8	973.6

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	200	748	0	0	0	0	0
	12.05	43.808	0	0	0	0	0
Mechanical Engineer R	1162	3520	0	0	0	0	0
	140.602	388.96	0	0	0	0	0
Technician R	1101	2200	0	0	0	0	0
	89.275	263.12	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	8.0	89.3	0.0	0.0	0.0	0.0	0.0
Travel R	27.3	188.0	0.0	0.0	0.0	0.0	0.0

WBS Number: 3.1.1.1.1 **Description:** SR Building Facilities

Institution : LBNL **Contact**

Preparation of SR building for pixel-specific tasks.

Basis of Estimate: Physicist estimate

Details of Estimate:

Funding for materials, equipment and related items for the SR building are covered under WBS 3.1.4 to be in common with the SCT (and TRT).

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.2 **Description:** Mechanical support

Institution : LBNL **Contact**

Design and other activity related to preoperations of pixel detector after the insertion/installation into the Inner Detector in mid-FY06. LBNL is the lead institution for pixel mechanics and, therefore, has a major role in both installation (not included here) and the follow-up maintenance activities, including preoperations with the other tracker devices, which is scheduled prior to beam-on operation. Mechanical support will be needed to document the installation/insertion procedures, to organize and carefully store the associated tooling and to prepare for removal in case problems occur during the preoperations (or operations) period.

Basis of Estimate: Physicist estimate

Details of Estimate: Eric Anderssen, Neal Hartman and Tom Johnson at CERN. Salary costs, relocation, travel and minor procurements included.

U.S. ATLAS % share of activity: 50.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1021	0	0	1021	601	213	99	108	462.5	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	1162	3520	0	0	0	0	0
	140.602	388.96	0	0	0	0	0
Technician R	590	1760	0	0	0	0	0
	71.39	212.96	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	8.0	83.5	0.0	0.0	0.0	0.0	0.0
Travel R	12.0	92.0	0.0	0.0	0.0	0.0	0.0

WBS Number: 3.1.1.1.2.1 **Description:** Senior Level Engineer

Institution : LBNL **Contact** Not available

Costs for Eric Anderssen

Level of Effort**Basis of Estimate:**

Salary, relocation and travel costs for Eric Anderssen. At CERN in FY07.**Details of Estimate:**

U.S. ATLAS % share of activity: 50.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	254	0	0	254	213	0	41	0	121.0	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	0	1760	0	0	0	0	0
	0	212.96	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	5.0	0.0	0.0	0.0	0.0	0.0
Travel R	0.0	35.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.2.2 **Description:** Junior Level Engineer

Institution : LBNL/UC-Berkeley **Contact** Not available

Cost of Neal Hartman

Basis of Estimate: Level of Effort

Details of Estimate: Salary, relocation and travel for Neal Hartman at CERN

U.S. ATLAS % share of activity: 50.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	214	0	0	214	176	0	38	0	100.0	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	0	1760	0	0	0	0	0
	0	176	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	5.0	0.0	0.0	0.0	0.0	0.0
Travel R	0.0	32.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.2.3 **Description:** Technician Support

Institution : LBNL **Contact** Not available

Tom Johnson and technical support at LBNL

Details of Estimate: Tom Johnson at CERN. Salary, relocation, travel and misc expenses. Technicians at LBNL
$73.5k M&S for fabrication of parts related to completion of service quarter panels and related support structures at CERN. Shipping of parts from LBNL is included.

U.S. ATLAS % share of activity: 50.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	321	0	0	321	0	213	0	108	121.0	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	1760	0	0	0	0	0
	0	212.96	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	73.5	0.0	0.0	0.0	0.0	0.0
Travel R	0.0	25.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.3 **Description:** Electrical support

Institution : LBNL **Contact**

Support of electronics preoperations, test systems, pixel-specific work on RODs. LBNL has major responsibilities for the front end chip and RODs, with other U.S. institutions taking the lead on the flex hybrid (Oklahoma) and opto-hybrid (Ohio State Univ.). European institutions have the lead on the controller chip.

Basis of Estimate: Physicist estimate

Details of Estimate: Electrical tech costs for repairs or rework of services during final assembly and installation.

Minor personnel costs for repair of test equipment that will be used in the final surface assembly.

Equipment costs for testing during final assembly and installation and contributions to common pool for test equipment for pixels.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	250	0	0	250	50	74	97	29	70.4	93.7

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	200	748	0	0	0	0	0
	12.05	43.808	0	0	0	0	0
Technician R	511	440	0	0	0	0	0
	17.885	50.16	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	5.8	0.0	0.0	0.0	0.0	0.0
Travel R	15.3	96.0	0.0	0.0	0.0	0.0	0.0

WBS Number: 3.1.1.1.3.1 **Description:** Electrical Support-LBNL

Institution : LBNL/UC-Berkeley **Contact** Not available

Support of electronics preoperations, test systems, pixel-specific work on RODs. LBNL has major responsibilities for the front end chip and RODs.

Details of Estimate: Electrical tech costs for repairs or rework of services during final assembly and installation.

Minor personnel costs for repair of test equipment that will be used in the final surface assembly.

Equipment costs for testing during final assembly and installation and contributions to common pool for test equipment for pixels.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	75	0	0	75	50	0	25	0	28.5	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	440	0	0	0	0	0
	0	50.16	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	4.5	0.0	0.0	0.0	0.0	0.0
Travel R	0.0	20.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.3.2 **Description:** Electrical Support-OSU

Institution : Ohio State University **Contact** Not available

Support of electronics preoperations, the opto-hybrid.

Labor for OSU in Project for FY07.**Details of Estimate:**

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	78	0	0	78	0	48	0	29	27.6	33.7

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	200	308	0	0	0	0	0
	12.05	18.557	0	0	0	0	0
Technician R	511	0	0	0	0	0	0
	17.885	0	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	15.3	8.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.3.3 **Description:** Electrical Support-UNM

Institution : U of New Mexico **Contact** Not available

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	38	0	0	38	0	25	13	0	14.3	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	440	0	0	0	0	0
	0	25.251	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Travel R	0.0	9.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.3.4 **Description:** Electrical Support-Iowa State

Institution : Iowa State **Contact** Not available

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.3.5 **Description:** Electrical Support-Oklahoma

Institution : Composite U. **Contact** Not available

Electrical support for pre-operations from Rusty Boyd. Project only covers COLA as paid directly by BNL. Use Composite U since overhead is set to zero.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	59	0	0	59	0	0	59	0	0.0	60.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	0.0	59.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.4 **Description:** Software support

Institution : SLAC **Contact**

Support of software systems for preoperations. The various DAQ, calibration, and monitoring programs are being developed by John Richardson, who will become resident at CERN to continue his work during the preoperations, operations and maintenance. He will deal with problems that arise when running the full pixel system within the framework of the whole detector. Documentation is included.

Basis of Estimate: Physicist estimate

Details of Estimate: None

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.1.5 **Description:** Physicist support

Institution : LBNL **Contact**

Physicist support of preoperations and commissioning.

Basis of Estimate: Physicist estimate

Details of Estimate: Currently ascribed all to LBNL for convenience, but includes LBNL and all universities. Division among LBNL and universities is TBD.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	879.8

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2 **Description:** Operations

Institution : **Contact**

Operations during ATLAS data taking. Assumes operations start in FY08.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	2131	0	0	2131	1419	111	578	22	870.5	3334.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	0	0	400	175	175	175	175
	0	0	37.2	16.698	17.133	17.577	18.034
Electrical Engineer R	0	0	80	220	330	160	320
	0	0	4.82	13.599	20.93	10.411	21.364
Mechanical Engineer R	0	0	2728	1936	1936	1936	2728
	0	0	293.128	202.426	207.693	213.08	324.816
Technician R	0	0	0	0	0	0	880
	0	0	0	0	0	0	111.165

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	5.0	0.0	21.1	0.0	0.0
Travel R	0.0	0.0	184.5	67.1	71.4	70.6	171.8

WBS Number: 3.1.1.2.1 **Description:** Mechanical Support

Institution : **Contact**

Mechanical support of operations. LBNL also responsible for complex cabling, cooling services, and support structure. Will deal with problems in these areas. Engineering costs entered at level 6 to accommodate different levels of the same job category. Technician costs entered under maintenance.

Basis of Estimate: Physicist estimate

Details of Estimate: Engineering support is costed in operations (for convenience in database entry) and technician support in maintenance. There are two M.Engs. Neal Hartman as operations and maintenance mechanical engineer in FY08 at CERN, transitioning to cooling expert for ID, not just pixel, through FY09. Other tasks include documentation of installation sequence and results, which will take place in FY08. Eric Anderssen is expected to leave CERN in March/April 08, after the ID endplate is closed, and be needed for consulting part -time after that.

U.S. ATLAS % share of activity: 50.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1487	0	0	1487	1241	0	246	0	706.3	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	0	0	2728	1936	1936	1936	2728
	0	0	293.128	202.426	207.693	213.08	324.816

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	5.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	108.5	17.4	17.9	18.4	66.5

WBS Number: 3.1.1.2.1.1 **Description:** LBNL Junior level engineer

Institution : LBNL/UC-Berkeley **Contact**

Use institute LBNL/UC-Berkeley that has labor rate for junior level engineer

Details of Estimate: Salary and COLA for Neal Hartman, resident at CERN. In FY09 COLA may be covered from ID common operations funds. Keep FY09 COLA estimate in MC.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1045	0	0	1045	927	0	118	0	526.7	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	0	0	1760	1760	1760	1760	1760
	0	0	176	180.576	185.275	190.08	195.026

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	5.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	57.5	10.3	10.5	10.8	11.1

Low Value(>5k, =25k) Notes

This is cost of living adjustment for FY08 only, plus 1 trips to the US and 2 within EU in FY08, and 2US and 2EU in FY09 and out.

This is cost of living adjustment for FY09 and out, which in principle will be covered from CERN ID funds, and therefore none of this should be needed. However, this agreement is at present informal.

This is cost of living adjustment for FY08 only, plus 1 trips to the US and 2 within EU in FY08, and 2US and 2EU in FY09 and out.

This is cost of living adjustment for FY09 and out, which in principle will be covered from CERN ID funds, and therefore none of this should be needed. However, this agreement is at present informal.

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This is cost of living adjustment for FY09 and out, which in principle will be covered from CERN ID funds, and therefore none of this should be needed. However, this agreement is at present informal.

This is cost of living adjustment for FY08 only, plus 1 trips to the US and 2 within EU in FY08, and 2US and 2EU in FY09 and out.

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This is cost of living adjustment for FY08 only, plus 1 trips to the US and 2 within EU in FY08, and 2US and 2EU in FY09 and out.

This is cost of living adjustment for FY08 only, plus 1 trips to the US and 2 within EU in FY08, and 2US and 2EU in FY09 and out.

This is cost of living adjustment for FY09 and out, which in principle will be covered from CERN ID funds, and therefore none of this should be needed. However, this agreement is at present informal.
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This is cost of living adjustment for FY08 only, plus 1 trips to the US and 2 within EU in FY08, and 2US and 2EU in FY09 and out.

CONTINGENCY FACTORS:	***Risk***				***Weight***			**Cont %**
	Technical	**C o s t**	**Schedule**	**Des i gn**	**Technical**	**C o s t**	**Schedule**	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2.1.2 **Description:** LBNL Senior level engineer

Institution : LBNL **Contact**

Details of Estimate:

Use institute LBNLj that has labor rate for senior level engineer

Salary, COLA and relocation for Eric Anderssen, relocating to LBNL in FY09. In FY09 there is some cost for consulting.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	443	0	0	443	314	0	129	0	178.5	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	0	0	968	176	176	176	968
	0	0	117.128	21.85	22.418	23	129.79

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	0.0	0.0	51.0	7.2	7.4	7.6	55.4

Low Value(>5k, =25k) Notes

Additional COLA in FY08 in case of stay extension due to further dealys. Additional travel in FY09. Return to CERN in FY12 for removal.

Additional COLA in FY08 in case of stay extension due to further dealys. Additional travel in FY09. Return to CERN in FY12 for removal.

COLA for months of residence at CERN in FY08 and relocation in FY08. Travel twice to CERN in FY09 and out. Return to CERN in FY12 for removal.

COLA for months of residence at CERN in FY08 and relocation in FY08. Travel twice to CERN in FY09 and out. Return to CERN in FY12 for removal.

COLA for months of residence at CERN in FY08 and relocation in FY08. Travel twice to CERN in FY09 and out. Return to CERN in FY12 for removal.

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Additional COLA in FY08 in case of stay extension due to further dealys. Additional travel in FY09. Return to CERN in FY12 for removal.

COLA for months of residence at CERN in FY08 and relocation in FY08. Travel twice to CERN in FY09 and out. Return to CERN in FY12 for removal.

Additional COLA in FY08 in case of stay extension due to further dealys. Additional travel in FY09. Return to CERN in FY12 for removal.

COLA for months of residence at CERN in FY08 and relocation in FY08. Travel twice to CERN in FY09 and out. Return to CERN in FY12 for removal.
Additional COLA in FY08 in case of stay extension due to further dealys. Additional travel in FY09. Return to CERN in FY12 for removal.
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COLA for months of residence at CERN in FY08 and relocation in FY08. Travel twice to CERN in FY09 and out. Return to CERN in FY12 for removal.
Additional COLA in FY08 in case of stay extension due to further dealys. Additional travel in FY09. Return to CERN in FY12 for removal.

CONTINGENCY FACTORS:	***Risk***				***Weight***			**Cont %**
	Technical	**C o s t**	**Schedule**	**Des i gn**	**Technical**	**C o s t**	**Schedule**	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2.2 **Description:** Electrical Support

Institution : **Contact**

Support of electronics operations.

Basis of Estimate: Physicist estimate

Details of Estimate: Technical support(or equivalent) at about 0.1 FTE from LBNL and minor purchases. Includes contributions to common pool. Assumes additional work on power supplies and HV supplies in FY08 for high luminosity operation, including procurements and travel for engineers from UNM, UOK or OSU. UNM support is costed under maintenance.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	508	0	0	508	71	111	304	22	103.6	329.8

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	80	220	330	160	320
	0	0	4.82	13.599	20.93	10.411	21.364
Technician R	0	0	0	0	0	0	880
	0	0	0	0	0	0	111.165

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	69.0	44.5	48.2	46.9	99.7

WBS Number: 3.1.1.2.2.1 **Description:** Electrical support - LBNL

Institution : LBNL/UC-Berkeley **Contact** Not available

Details of Estimate:

Covers work by electrical technicians during operation phase

This work would be needed for any work related to service panel issues, such as making components for tests in SR1 that support the operation. Contributions to an anticipated operating pool

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	133	0	0	133	0	111	0	22	63.2	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	0	0	0	0	0	880
	0	0	0	0	0	0	111.165

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	0.0	0.0	0.0	0.0	0.0	0.0	22.2

Low Value(>5k, =25k) Notes

Potential contributoins to a pool for resident etech support at CERN.
Potential contributoins to a pool for resident etech support at CERN.
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Potential contributoins to a pool for resident etech support at CERN.
Potential contributoins to a pool for resident etech support at CERN.
Etech travel to CERN in FY12 for removal
Potential contributoins to a pool for resident etech support at CERN.
Etech travel to CERN in FY12 for removal
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Etech travel to CERN in FY12 for removal
Etech travel to CERN in FY12 for removal
Potential contributoins to a pool for resident etech support at CERN.

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	**C o s t**	**Schedule**	**Des i gn**	**Technical**	**C o s t**	**Schedule**	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2.2.2 **Description:** Electrical support - U. of Oklahoma

Institution : Composite U. **Contact** Not available

Support of electrical operations by university of Oklahoma.

Support for Rusty Boyd- COLA in FY08. His salary is covered by Base. Will transition to **Details of Estimate:**
support of SR1 activities for whole ID, not just pixels. Tentative agreement to cover part of COLA by ID in FY09- keep in MC for this estimate.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	269	0	0	269	0	0	269	0	0.0	329.8

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	0.0	0.0	66.6	42.1	43.2	44.3	73.1

Low Value(>5k, =25k) Notes

Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
Part time pixels in FY09-11, Full time again in FY12.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
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COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.
COLA to be partly covered by CERN in FY09-11, but agreement is still tentative at this point.

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2.2.3 **Description:** Electrical support- OSU

Institution : Ohio State University **Contact**

Electrical support of opto board operation

Basis of Estimate: Physicist estimate

Details of Estimate: Includes running tests as needed to understand effects seen in the detector, and support for operation of opto boards in SR1, as well us possible development of special RX plug-ins to recover too low or too high array channels in MC for now (there are presently no such channels in the installed detector).

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	106	0	0	106	71	0	35	0	40.4	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	80	220	330	160	320
	0	0	4.82	13.599	20.93	10.411	21.364

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	2.4	2.5	5.1	2.6	4.4

Low Value(>5k, =25k) Notes

Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
For development of "super RX borad" is this is pursued. Removal in FY12
For development of "super RX borad" is this is pursued. Removal in FY12
For development of "super RX borad" is this is pursued. Removal in FY12
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
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Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
For development of "super RX borad" is this is pursued. Removal in FY12
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
For development of "super RX borad" is this is pursued. Removal in FY12
For development of "super RX borad" is this is pursued. Removal in FY12
For development of "super RX borad" is this is pursued. Removal in FY12
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
For development of "super RX borad" is this is pursued. Removal in FY12
For development of "super RX borad" is this is pursued. Removal in FY12

For development of "super RX borad" is this is pursued. Removal in FY12
For development of "super RX borad" is this is pursued. Removal in FY12
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
For development of "super RX borad" is this is pursued. Removal in FY12
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.
Travel to CERN for yearly opto board status review, and implementation of new RX prototype in FY10.

CONTINGENCY FACTORS:	***Risk***				***Weight***			**Cont %**
	Technical	**C o s t**	**Schedule**	**Des i gn**	**Technical**	**C o s t**	**Schedule**	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2.3 **Description:** Software support

Institution : SLAC **Contact**

Support of software for operations. Tasks described earlier under 3.1.1.1.4. Steady, stable effort required as large data samples are accumulated.

Basis of Estimate: Physicist estimate

Details of Estimate: SLAC software professional to support DSP microcode on RODs for detector calibration.

Support role beyond FY08.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	135	0	0	135	107	0	28	0	60.6	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	0	0	400	175	175	175	175
	0	0	37.2	16.698	17.133	17.577	18.034

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	0.0	0.0	7.0	5.1	5.3	5.4	5.5

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.2.4 **Description:** Physicist support

Institution : LBNL **Contact**

Physicist support of operations.

Basis of Estimate: Physicist estimate

Details of Estimate: Currently all ascribed to LBNL for convenience but includes LBNL and university physicists. Division among LBNL and specific universities is TBD.

U.S. ATLAS % share of activity: 25.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	3004.2

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3 **Description:** Maintenance

Institution : **Contact**

Maintenance activities during ATLAS shutdowns.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	3078	0	0	3078	1917	152	361	649	1175.3	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	465	300	1040	1180	600
	0	0	26.686	17.664	112.74	175.545	38.156
Gen Lab R	0	0	0	0	0	1760	0
	0	0	0	0	0	53.983	0
Mechanical Engineer R	0	0	280	1200	930	917	220
	0	0	28	123.12	97.902	99.036	24.378
Technician R	820	0	2464	1040	1862	2237	2063
	80.3	0	286.416	121.642	226.697	282.072	274.257

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	22.4	0.0	20.9	158.5	280.0	166.3	69.8
Travel R	0.0	0.0	71.8	23.6	29.5	25.9	66.5

WBS Number: 3.1.1.3.1 **Description:** Mechanical support

Institution : **Contact**

Mechanical support of maintenance. Includes connection and testing of cooling in FY08. Includes work for access to services during shutdown beyond FY08, as well as maintenance of SR-1 setup. Technicians are costed in maintenance, while engineers are costed in operations, for convenience. All costs one level down to apply 2 different LBNL and 1 SLAC labor rates

Basis of Estimate: Physicist estimate

Details of Estimate: Technical manpower related to maintenance of US deliverables. Includes salary, relocation, travel and misc. expenses. Technician manpower for operations and maintenance costed here for convenience in database entry. Engineering fully costed under operations. Thereafter contribution to common tech pool.

U.S. ATLAS % share of activity: 20.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	894	0	0	894	666	0	228	0	378.2	0.0

MANPOWER SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	0	2184	440	492	440	1843
	0	0	254.496	51.464	59.044	54.173	246.466

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	18.4	15.4	15.8	16.2	11.1
Travel R	0.0	0.0	68.8	4.1	4.2	4.3	59.8

WBS Number: 3.1.1.3.1.1 **Description:** Mechanical support- CERN resident tech

Institution : LBNL **Contact**

Basis of Estimate: LBNL labor rates for Tom Johnson, resident at CERN, including expected overtime as part of the hourly labor rate. Each hour entered into manpower implies 1.xx hours actually worked, due to overtime.

Details of Estimate: Physicist estimate

Based on dates of residence at CERN where 1 day = 8 hours. Overtime hours are not explicitly shown, but included via the labor rate.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	474	0	0	474	364	0	111	0	206.7	0.0

MANPOWER SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	0	1056	0	0	0	1760
	0	0	127.776	0	0	0	235.981

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	4.4	0.0	0.0	0.0	11.1
Travel R	0.0	0.0	37.8	0.0	0.0	0.0	55.4

Low Value(>5k, =25k) Notes

COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08
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COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08
COLA for residence at CERN + relocation included in FY08

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	

WBS Number: 3.1.1.3.1.2 **Description:** Mechanical tech. - LBNL visitor

Institution : LBNL/UC-Berkeley **Contact**

LBNL labor average rate for M-techs based at LBNL, including expected overtime as part of the hourly labor rate.
Each hour entered into manpower implies 1.xx hours actually worked, due to overtime. Includes travel to CERN.

Basis of Estimate: Physicist estimate

Details of Estimate: Based on dates of travel to CERN where 1 day = 8 hours. Overtime hours are not explicitly shown, but included via the labor rate.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	395	0	0	395	286	0	109	0	162.2	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	0	968	440	492	440	83
	0	0	110.352	51.464	59.044	54.173	10.485

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	14.0	15.4	15.8	16.2	0.0
Travel R	0.0	0.0	23.0	4.1	4.2	4.3	4.4

Low Value(>5k, =25k) Notes

7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08
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7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08
7 trips with ~3 weeks stays in FY08

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	

WBS Number: 3.1.1.3.1.3 **Description:** Mechanical tech.- SLAC

Institution : SLAC **Contact**

SLAC technician to travel to CERN during the peak cooling connection and testing phase.

Basis of Estimate: Physicist estimate

Details of Estimate: SLAC labor average rate for Jeff Garcia. Includes travel to CERN. Based on dates of monthly rate at SLAC plus travel

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	24	0	0	24	16	0	8	0	9.3	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	0	0	160	0	0	0	0
	0	0	16.368	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Travel R	0.0	0.0	8.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.2 **Description:** Electrical support

Institution : **Contact**

Electrical engineering and technical support of maintenance. U.S. contributions to maintenance of electrical systems, including repairs during shutdowns. Areas of responsibility include cabling plant and HV distribution and

Basis of Estimate: Physicist estimate

Details of Estimate: Due to the cancellation of the 2007 low energy run, the updating of the HV system originally planned for the first shutdown is planned to be carried out before first collisions. This requires mainly electrical engineering to design the bias current measurement boards to be added to HV-PP4 (a US deliverable). Upgrading of the HV granularity to cope with increased leakage current, which involves replacing HV-PP4 and purchasing more power supplies is in FY09 and FY10. Purchase of power supplies is placed under LBNL, but it is simply a US

U.S. ATLAS % share of activity: 20.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	279	0	0	279	137	0	115	27	78.0	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	465	300	600	300	600
	0	0	26.686	17.664	36.248	18.594	38.156

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	2.5	6.7	57.9	5.4	5.5
Travel R	0.0	0.0	3.0	11.3	16.8	13.0	6.6

WBS Number: 3.1.1.3.2.1 **Description:** Electrical support - LBNL

Institution : LBNL **Contact** Not available

Maintenance support of electrical services

Details of Estimate: Support for repairs and testing of electrical services during shutdowns. Contribution to purchase of power supplies (in FY10) is placed under LBNL, but it is simply a US contribution.

U.S. ATLAS % share of activity: 20.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	70	0	0	70	0	0	70	0	0.0	0.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	47.4	0.0	0.0
Travel R	0.0	0.0	0.0	6.2	6.3	6.5	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.2.2 **Description:** Electrical support - U. of Oklahoma

Institution : Composite U. **Contact** Not available

Support of HV electrical system

Details of Estimate: Co-design (with New Mexico) of current measurement units for HV-PP4. Fabrication cost is expected to be paid by pixel project at CERN. Implementation of HV-PP4 upgrade to increase granularity in FY10.

U.S. ATLAS % share of activity: 20.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	27	0	0	27	0	0	0	27	0.0	0.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	5.1	10.5	5.4	5.5

Low Value(>5k, =25k) Notes

Purchases only. COLA for R. Boyd is listed under operations
Purchases only. COLA for R. Boyd is listed under operations
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Purchases only. COLA for R. Boyd is listed under operations
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CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.2.3 **Description:** Electrical Support, U. of New Mexico

Institution : U of New Mexico **Contact**

Support of HV system from U. of New Mexico

Basis of Estimate: Physicist estimate

Details of Estimate: Co-design (with Oklahoma) and implementation of current measurement units for HV-PP4.

Support for sensor monitoring program.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	182	0	0	182	137	0	45	0	78.0	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	465	300	600	300	600
	0	0	26.686	17.664	36.248	18.594	38.156

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	2.5	1.5	0.0	0.0	0.0
Travel R	0.0	0.0	3.0	5.1	10.5	6.5	6.6

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.3 **Description:** Software support

Institution : LBNL **Contact**

Software support of maintenance

Basis of Estimate: Physicist estimate

Details of Estimate: None

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.4 **Description:** Physicist support

Institution : LBNL **Contact**

Physicist support of maintenance.

Basis of Estimate: Physicist estimate

Details of Estimate: Covered under operations

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.5 **Description:** Spares

Institution : LBNL **Contact**

Spare items and parts. By definition these are not included in the initial fabrication or procurements.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	127	0	0	127	0	80	17	30	45.6	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	820	0	0	0	0	0	0
	80.3	0	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	22.4	0.0	0.0	15.4	0.0	0.0	0.0
Travel R	0.0	0.0	0.0	4.1	0.0	0.0	0.0

WBS Number: 3.1.1.3.5.1 **Description:** Mechanics/Services

Institution : LBNL **Contact**

Mechanical elements, cables or coolant system parts or assemblies.

Details of Estimate: Service elements for "vertical slice" debugging system planned for SR-1. This is planned to continue in parallel with the detector operation.

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
21	0	0	21	0	0	17	4	0.0	0.0

MATERIAL SUMMARY:

	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	15.4	0.0	0.0	0.0
Travel R	0.0	0.0	0.0	4.1	0.0	0.0	0.0

Low Value(>5k, =25k) Notes

trip to work on SR1 setup
trip to work on SR1 setup
trip to work on SR1 setup
trip to work on SR1 setup
trip to work on SR1 setup
trip to work on SR1 setup
trip to work on SR1 setup
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parts for SR1 setup
parts for SR1 setup
trip to work on SR1 setup

CONTINGENCY FACTORS:

Risk				*Weight*			Cont %
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.5.2 **Description:** Sensors

Institution : LBNL **Contact**

Procurement of silicon detectors and testing of them.

None**Details of Estimate:**

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.5.3 **Description:** Electronics

Institution : LBNL **Contact**

Procurement and testing of integrated circuit electronics or related test systems

None after FY07**Details of Estimate:**

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
12	0	0	12	0	0	0	12	0.0	0.0

MATERIAL SUMMARY:

	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	10.4	0.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			Cont %
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.5.4 **Description:** Hybrids

Institution : Ohio State University **Contact**

Procurement and testing of flex hybrid and optical hybrid parts and assemblies.

Basis of Estimate: Physicist estimate

Details of Estimate: none after FY07

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
10	0	0	10	0	8	0	3	4.4	0.0

MANPOWER SUMMARY:

	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	220	0	0	0	0	0	0
	7.7	0	0	0	0	0	0

MATERIAL SUMMARY:

	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	2.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.5.5 **Description:** Modules

Institution : LBNL **Contact**

Procurement of parts, assembly and testing for modules.

none after FY07**Details of Estimate:**

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	84	0	0	84	0	73	0	11	41.3	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Technician R	600	0	0	0	0	0	0
	72.6	0	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	10.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.6 **Description:** B-layer Replacement

Institution : **Contact**

US in-kind contributions to the replacement of the B-layer

Details of Estimate: Based on preliminary plan for US contribution to mechanics, sensors and electronics/testing.
Mechanical structure, bump bonding and module assembly and final testing assumed to be done in EU. Some US contribution to disassembly and reassembly of pixel detector.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1778	0	0	1778	1114	71	0	593	673.5	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	0	0	440	880	0
	0	0	0	0	76.492	156.951	0
Gen Lab R	0	0	0	0	0	1760	0
	0	0	0	0	0	53.983	0
Mechanical Engineer R	0	0	280	1200	930	917	220
	0	0	28	123.12	97.902	99.036	24.378
Technician R	0	0	280	600	1370	1797	220
	0	0	31.92	70.178	167.653	227.899	27.791

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	121.1	206.3	144.7	53.2
Travel R	0.0	0.0	0.0	4.1	8.4	8.6	0.0

WBS Number: 3.1.1.3.6.1 **Description:** B-layer Replacement Mechanics

Institution : LBNL/UC-Berkeley **Contact**

Design for BL replacement prototype mechanical supports.

Details of Estimate: Engineering design related to interface of B-layer replacement to LBNL deliverables.Technical labor for disassembly and reassembly of structure. Assumed this work can be carried out at LBNL, in collaboration with personnel at CERN.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	875	0	0	875	655	71	0	148	413.0	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Mechanical Engineer R	0	0	280	1200	930	917	220
	0	0	28	123.12	97.902	99.036	24.378
Technician R	0	0	280	600	930	917	220
	0	0	31.92	70.178	111.607	112.901	27.791

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	28.7	37.9	25.9	19.9
Travel R	0.0	0.0	0.0	4.1	8.4	8.6	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.6.2 **Description:** B-layer Replacement Sensors

Institution : Composite U. **Contact**

Sensor fabrications (3D and planar with active edges) for BL replacement prototypes.

US contribution to the purchase of sensors**Details of Estimate:**

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
53	0	0	53	0	0	0	53	0.0	0.0

MATERIAL SUMMARY:

	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	52.6	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			Cont %
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
0	0	0	0	0	0	0	0

WBS Number: 3.1.1.3.6.3 **Description:** B-layer Replace Electronics

Institution : LBNL **Contact**

Implementation of next generation pixel readout chip (being developed under SLHC upgrade R&D) for B-Layer replacement use.

Details of Estimate:

A full wafer engineering run is needed in FY09 in order to prototype flip chip assemblies on a BL replacement timescale. The cost under the CERN frame contract is estimated at $400-$500K, which would be shared in the usual way (US 20%). There must be a CERN BL replacement project for this to be possible. A second engineering run is added in FY10, with the full production run in FY11. Engineering and technician time for testing is included in FY10, FY11. All design labor is to be covered by upgrade R&D.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	850	0	0	850	458	0	0	392	260.5	0.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	0	0	440	880	0
	0	0	0	0	76.492	156.951	0
Gen Lab R	0	0	0	0	0	1760	0
	0	0	0	0	0	53.983	0
Technician R	0	0	0	0	440	880	0
	0	0	0	0	56.046	114.998	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	92.3	115.8	118.8	33.2

High Value(1 item>25k) Notes

US share of cost of full wafer runs
Chip submissions and test setup parts
Chip submissions and test setup parts
Chip submissions and test setup parts
Chip submissions and test setup parts
Chip submissions and test setup parts
Chip submissions and test setup parts
Chip submissions and test setup parts
US share of cost of full wafer runs
Chip submissions and test setup parts
Chip submissions and test setup parts
Chip submissions and test setup parts

US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
US share of cost of full wafer runs
Chip submissions and test setup parts
Chip submissions and test setup parts

Low Value(>5k, =25k) Notes

Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing
Thinning and dicing

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	**C o s t**	**Schedule**	**Des i gn**	**Technical**	**C o s t**	**Schedule**	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2 **Description:** SCT

Institution : **Contact**

Pre-operations, operations and maintenance for the SCT subsystem.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1466	0	0	1466	953	268	116	129	636.4	1475.3

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	770 58.959	660 50.536	587 44.946	750 58.92	653 52.635	587 48.542	587 49.805
Technician R	2200 107.554	2200 107.554	1159 56.661	1337 67.063	1383 71.176	1323 69.853	1258 68.15

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	5.0	13.3	7.0	9.5	12.4	7.6	7.8
Travel R	18.3	19.0	15.5	21.0	18.9	19.4	19.9

WBS Number: 3.1.2.1 **Description:** Pre-operations

Institution : **Contact**

Pre-operations

Details of Estimate: LBNL and UC Santa Cruz are currently the only US institutions involved in the SCT. We have made an estimate of the division of costs between these two in the subsequent lower levels, but it's the sum that

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	313	0	0	313	269	0	43	0	153.1	568.6

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	770	220	0	0	0	0	0
	58.959	16.845	0	0	0	0	0
Technician R	2200	1760	0	0	0	0	0
	107.554	86.043	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	5.0	2.0	0.0	0.0	0.0	0.0	0.0
Travel R	18.3	9.0	0.0	0.0	0.0	0.0	0.0

WBS Number: 3.1.2.1.1 **Description:** Preoperations - LBNL

Institution : LBNL **Contact**

Physicist and technical staff for preoperations and commissioning

Basis of Estimate: Physicist estimate

Details of Estimate: One LBNL physicist is now resident at CERN working on SCT pre-operations and installation.

No further LBNL participation is anticipated.

U.S. ATLAS % share of activity: 0.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	132.5

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.1.2 **Description:** Preoperations - UCSC

Institution : U. of California, Santa Cruz **Contact**

Physicist and technical staff for preoperations of SCT. Responsibilities for UCSC include debug of problems involving U.S.-provided modules and electrical system engineering problems related to grounding, shielding, and power

Basis of Estimate: Physicist estimate

Details of Estimate: EE in FY05 and 100% of FY06 for work on grounding, shielding, responding to questions regarding UCSC deliverables and other preoperations activities. Trips per year to Europe are included.

Technician related to preoperations in UK and CERN, responding to questions about UCSC deliverables, contributing to the testing of UCSC deliverables at CERN and other preoperations activities. Travel and misc

U.S. ATLAS % share of activity: 10.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	313	0	0	313	269	0	43	0	153.1	436.1

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	770	220	0	0	0	0	0
	58.959	16.845	0	0	0	0	0
Technician R	2200	1760	0	0	0	0	0
	107.554	86.043	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	5.0	2.0	0.0	0.0	0.0	0.0	0.0
Travel R	18.3	9.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* Cost	*Risk* Schedule	*Risk* Design	*Weight* Technical	*Weight* Cost	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.1.3 **Description:** Preops - SR building/CERN

Institution : U. of California, Santa Cruz **Contact**

Costs associated with SCT operation in SR building and other assembly/test sites at CERN.

Basis of Estimate: Physicist estimate

Details of Estimate: These costs are covered under 3.1.4 as part of Common Silicon/ID costs

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:

Risk				Weight			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.2.2 **Description:** Operations

Institution : **Contact**

Operations during ATLAS data taking.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	756	0	0	756	683	0	73	0	330.9	638.6

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	367	367	367	367	367
	0	0	28.101	28.832	29.582	30.349	31.139
Technician R	0	0	880	880	880	880	880
	0	0	43.021	44.14	45.289	46.463	47.672

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	2.0	2.1	2.1	2.2	2.2
Travel R	0.0	0.0	9.0	9.2	9.5	9.7	10.0

WBS Number: 3.1.2.2.1 **Description:** LBNL

Institution : LBNL **Contact**

Physicist and technical staff for operations. Continuation of operations activities described under 3.1.2.1.1.

Basis of Estimate: Physicist estimate

Details of Estimate: None

U.S. ATLAS % share of activity: 0.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.2.2 **Description:** UCSC

Institution : U. of California, Santa Cruz **Contact**

Basis of Estimate: Operations support at UCSC. Continuation of operations activities described under 3.1.2.1.2.

Physicist estimate

Details of Estimate: 0.1FTE EE in FY07, 0.1 FTE thereafter. 1 FTE technical support as part of the SCT technical pool. Travel to/from CERN included as well as minor amount for supplies while at CERN.

U.S. ATLAS % share of activity: 10.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	756	0	0	756	683	0	73	0	330.9	638.6

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	0	367	367	367	367	367
	0	0	28.101	28.832	29.582	30.349	31.139
Technician R	0	0	880	880	880	880	880
	0	0	43.021	44.14	45.289	46.463	47.672

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	2.0	2.1	2.1	2.2	2.2
Travel R	0.0	0.0	9.0	9.2	9.5	9.7	10.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.2.3 **Description:** SR building/CERN

Institution : U. of California, Santa Cruz **Contact**

Operations support for SCT at CERN

Basis of Estimate: Physicist estimate

Details of Estimate: These are covered under 3.1.4.

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:

Risk				*Weight*			
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	Cont %
0	0	0	0	0	0	0	0

WBS Number: 3.1.2.3 **Description:** Maintenance

Institution : U. of California, Santa Cruz **Contact**

Maintenance activities during ATLAS shutdowns. This also includes preparations for maintenance.

Basis of Estimate: Physicist estimate

Details of Estimate: Spares are included in this element. We assume 15% spares are required. Routine maintenance operations on the SCT are covered under operations. We assume two interventions, the first in FY07 for 6 months for "minor" repairs and a major intervention for one year in FY11(arbitrary). Technical labor is arbitrarily assigned only to UCSC at this time. FY04 and FY05 figures are for spare modules. Maintenance assumes significant work during the first year of data collection, followed by minor contributions until a significant repair program, assumed to occur in FY11. FY11 program requires removal of SCT and module replacement using spares.

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	397	0	0	397	0	268	0	129	152.5	268.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	440	220	383	286	220	220
	0	33.691	16.845	30.088	23.053	18.193	18.666
Technician R	0	440	279	457	503	443	378
	0	21.511	13.64	22.923	25.887	23.39	20.478

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	11.3	5.0	7.5	10.3	5.4	5.5
Travel R	0.0	10.0	6.5	11.8	9.5	9.7	10.0

WBS Number: 3.1.2.3.1 **Description:** Spares

Institution : **Contact**

Spare items and parts. By definition these are not included in the initial fabrication or procurements. We assume that 15% spare parts/assemblies are needed. We assume that spare parts (ICs, hybrids, detectors, baseboards) are procured in time to produce 15% spare modules at the end of FY05. These costs will, predominantly, be labor. Will be updated at a later date after module construction normalizes.

Details of Estimate: Costs are for approximately 40 spare modules. Costs are scaled from present estimates for production.

It is assumed that spare modules assembled and tested as part of the construction project and the first year of M&O are sufficient for SCT.

A large supply of ABCD chips with 1-bad-channel are being kept in storage should they be needed for more spare modules but there is currently no plan within SCT to build more spares or to purchase other piece parts (e.g. sensors, hybrids baseboards) for furure spares.

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

WBS Number: 3.1.2.3.1.2 **Description:** Hybrid Assembly/Test

Institution : **Contact**

Assembly of hybrids (from Japan) and testing of them.

Details of Estimate: This work is for spare hybrids, needed for the spare modules, described under 3.1.2.3.1.
Breakdown between LBNL and UCSC provided under next two WBS elements.

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

WBS Number: 3.1.2.3.1.2.1 **Description:** Hybrid Assembly/Test -LBNL

Institution : LBNL **Contact**

Basis of Estimate: Parametric estimate

Details of Estimate: All done at UCSC

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.3.1.2.2 **Description:** Hybrid Assembly/Test - UCSC

Institution : U. of California, Santa Cruz **Contact**

Basis of Estimate: Parametric estimate

Details of Estimate: Assumes all hybrids complete

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.3.1.3 **Description:** Module Assembly/Test

Institution : **Contact**

Assembly of barrel modules and testing of them.

Details of Estimate: Assembly costs for modules, using hybrids bonded and tested in U.S. Costs are for labor scaled to production costs, with division between LBNL and UCSC detailed in the next two WBS elements.

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

WBS Number: 3.1.2.3.1.3.1 **Description:** Module Assembly/Test - LBNL

Institution : LBNL **Contact**

Basis of Estimate: Parametric estimate

Details of Estimate: Scaled as %of ETC00 estimate + base program supported labor.

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.3.1.3.2 **Description:** Module Assembly/Test - UCSC

Institution : U. of California, Santa Cruz **Contact**

Basis of Estimate: Parametric estimate

Details of Estimate: All done at LBL

U.S. ATLAS % share of activity: 15.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.2.3.2 **Description:** Manpower/materials

Institution : U. of California, Santa Cruz **Contact**

Manpower and materials for maintenance. Activities described under 3.1.2.3 and represent a continuation of preoperation responsibilities described under 3.1.2.1.2. Repair activities assumed primarily for first year of data-taking and major intervention in FY11.

Basis of Estimate: Physicist estimate

Details of Estimate: We assume normal operations and minor maintenance manpower is covered under operations. Manpower and materials here are for significant interventions, which we assume will occur in FY07(to fix problems seen in first run) and then again in FY11 for a major intervention to likely replace modules (spares). US maintenance expenses (apart from contribution to common pool) are included here.

U.S. ATLAS % share of activity: 10.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	397	0	0	397	0	268	0	129	152.5	0.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Electrical Engineer R	0	440	220	383	286	220	220
	0	33.691	16.845	30.088	23.053	18.193	18.666
Technician R	0	440	279	457	503	443	378
	0	21.511	13.64	22.923	25.887	23.39	20.478

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	11.3	5.0	7.5	10.3	5.4	5.5
Travel R	0.0	10.0	6.5	11.8	9.5	9.7	10.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3 **Description:** RODs

Institution : **Contact**

Pre-operations, operations and maintenance for the RODs. Costs include fabrication of spare RODs. WBS 3.1.3.1 contains cost for pre-operations (FY 05-07). WBS 3.1.3.2 contains cost for operations (FY 07-12). WBS 3.1.3.3 contains the spare RODs (FY 03-04) and repair of RODs (FY 07-12).

Details of Estimate:

The ROD is very complex both from a firmware and software reference. After the fabrication and installation a key concern is maintaining the expertise need to perform upgrades and maintenance. If the key expertise is lost it will be costly to support the RODs in the pre operation and operation phases. For example to bring up new firmware (VHDL) expertise will require 6 to 9 months of effort; and he software expertise will require 4 to 7 months of effort. If this were to happen it would severely hamper with large delays the efforts to operate the RODs in the pre-operation and maintenance phases. Experience has shown that as users use the ROD they find that new functionality is required in the firmware and software. Much effort has been put into defining the functionality with participation of users and reviews of the functionality but as users use the ROD they develop with experience and new and important changes in functionality are found. These changes are currently ongoing in the pre-operation phase and are expected in the early operation phase as the RODs functionality is fully understood and tested in the

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1140	0	0	1140	1021	0	119	0	550.2	842.3

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	1065	1670	880	0	0	0	0
	63.805	100.051	52.721	0	0	0	0
Electrical Engineer R	435	480	467	432	260	203	207
	81.409	89.831	87.398	82.949	51.223	41.03	42.927
Technician R	320	320	220	200	172	172	172
	33.412	33.412	22.971	21.426	18.905	19.396	19.9

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	12.5	13.0	9.0	7.2	5.3	4.3	2.2
Travel R	12.5	11.6	9.0	9.2	3.2	3.2	3.3

WBS Number: 3.1.3.1 **Description:** Pre-operations

Institution : **Contact**

Pre-operations. To provide technical expertise to deal with ROD issues (for example; VHDL improvements) as the system is significantly exercised and used. Note: RODs are a 100% U.S. responsibility during construction.

Details of Estimate:

Wisconsin, Iowa State and LBNL are currently the institutions involved in the RODs pre-operation. The division of labor and materials at lower levels is a best estimate at this time of the division among these institutions, but the sum is the more relevant number. Maintaining a viable support base for the ROD software and firmware needs to be maintained or the users will not be able to use the RODs in an effective way. As new functionality or defects are defined it is very important the correction be made is a short time.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	458	0	0	458	402	0	56	0	228.4	292.3

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	1065	1670	0	0	0	0	0
	63.805	100.051	0	0	0	0	0
Electrical Engineer R	435	480	0	0	0	0	0
	81.409	89.831	0	0	0	0	0
Technician R	320	320	0	0	0	0	0
	33.412	33.412	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	12.5	13.0	0.0	0.0	0.0	0.0	0.0
Travel R	12.5	11.6	0.0	0.0	0.0	0.0	0.0

WBS Number: 3.1.3.1.1 **Description:** Wisconsin

Institution : University of Wisconsin, Madision **Contact**

Support of RODs at CERN for preoperations. Most of the SCT RODs will be used in this phase. A smaller number of pixel RODs will be used (the number is still in the definition phase).

Basis of Estimate: Physicist estimate

Details of Estimate: SCT ROD fabrication will be completed in January FY05, pixel fabrication in late FY05. The completion of project in FY05 allows for lower cost for EE and ET labor in FY05. Spares are also fabricated in FY05. Labor is for VHDL, software and technicians. Spares are fabricated in FY 05. Travel and miscellaneous expenses, Licenses are included. Currently there is a request about every 2 weeks for changes that improve the functionally or compatibility with developing software. Frequency of requests are expected to decrees to about 1 request a month by the end of FY 06. There are also request to develop VHDL/software to correct for emerging needs such as more extensive error counting in VHDL and software. This would be a significant change to the ROD and use large portion of the free space in the FPGAs. An other example is to correct on the fly for loss of synchronization of the events from the front-end modules due to bit errors in the modules. This change is not in the requirement but some effort has been made in the architecture allow for the correction. More of this class of significant changes are expected with experience with the use of the RODs at the assemble sites. It is important to maintain the expertise of ROD personnel to respond in a timely way to the well-justified needs of the user community.

Project Costs

Labor

435 EE hours per year for FY (06)

320 ET hours per year for FY (06)
1065 CP hours per year for FY (05-06)

Material cost include overhead, cost book entries do not.

8.9k$ Low level expenses (parts etc.)FY 06.

12k$ travel) for trips (1 short and 1 long) to the user sites as needed.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	458	0	0	458	402	0	56	0	228.4	80.4

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	1065	1670	0	0	0	0	0
	63.805	100.051	0	0	0	0	0
Electrical Engineer R	435	480	0	0	0	0	0
	81.409	89.831	0	0	0	0	0
Technician R	320	320	0	0	0	0	0
	33.412	33.412	0	0	0	0	0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	12.5	13.0	0.0	0.0	0.0	0.0	0.0
Travel R	12.5	11.6	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.1.2 **Description:** LBNL

Institution : LBNL **Contact**

Support of RODs in use for macro assembly testing, pixels and for commissioning

Basis of Estimate: Physicist estimate

Details of Estimate: 0.25 FTE of software support for pixel/SCT-specific code.

The DSP C code needs to support the needs of the user community in a timely way with personnel with expertise in the code. This come is composed on primitives in the ROD the support calibration, read/write to variables etc. The examples in 3.1.3.1 will need code to support the VHDL function. In additions the user community will define new operations that will need DSP code to carry out the new operations.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	22.9

CONTINGENCY FACTORS:	Risk: Technical	Risk: Cost	Risk: Schedule	Risk: Design	Weight: Technical	Weight: Cost	Weight: Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.1.3 **Description:** Iowa State

Institution : Iowa State **Contact**

Support of RODs in use for macro assembly testing before 1st collisions and for commissioning

Basis of Estimate: Physicist estimate

Details of Estimate: Physicist manpower only

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	189.0

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.2 **Description:** Operations

Institution : **Contact**

Operations during ATLAS data taking. Continuation of effort described in 3.1.3.1 through initial data collection. Effort tapers off significantly after this period.

Details of Estimate:

Wisconsin, Iowa State and LBNL are currently the institutions involved in the RODs. The division of labor and materials at lower levels is a best estimate at this time of the division among these institutions, but the sum is the more relevant number. The operation phase covers the period of FY 07-12. The Effort is broken down as shown below:

WBS 3.1.3.2.1 Wisconsin, Firmware cost for the period 2007-2012,
WBS 3.1.3.2.2 LBL, DSP code effort for the period 2007-2012,
WBS 3.1.3.2.3 Iowa State, Software for the period 2007-2012.

Running of the detector for physics starts in 2007. There will be much learning with beam on during this period. New and interesting problems will be found in all of the ATLAS software and hardware. Those new problems that effect the ROD at the input our output will need to be addressed. It is expected that changes will have to be made to the VHDL and C code. The personnel with excellent knowledge of the ROD firmware and software will address these problems. The Effort is largest in FY 07, about half in FY 08 and down to a minimum from FY 09 to FY 12. This profiling is needed to meet the large needs in the beginning and then the lower needs for the following period.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	682	0	0	682	619	0	63	0	321.8	550.0

MANPOWER (k$) SUMMARY:	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	0	0	880	0	0	0	0
	0	0	52.721	0	0	0	0
Electrical Engineer R	0	0	467	432	260	203	207
	0	0	87.398	82.949	51.223	41.03	42.927
Technician R	0	0	220	200	172	172	172
	0	0	22.971	21.426	18.905	19.396	19.9

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	9.0	7.2	5.3	4.3	2.2
Travel R	0.0	0.0	9.0	9.2	3.2	3.2	3.3

WBS Number: 3.1.3.2.1 **Description:** Wisconsin

Institution : University of Wisconsin, Madision **Contact**

Operations support via Wisconsin

Basis of Estimate: Physicist estimate

Details of Estimate: The profile is based on engineering judgment.
Labor for software is held at a high level through FY07 and then drops to zero in FY 11. The profile should support the ROD software in the intense period of early running.
Engineering is more advanced and can start to taper off in FY 07 and continue at a low level through FY 15.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	682	0	0	682	619	0	63	0	321.8	204.0

MANPOWER SUMMARY: (k$)	FY 06 (hrs) (k$)	FY 07 (hrs) (k$)	FY 08 (hrs) (k$)	FY 09 (hrs) (k$)	FY 10 (hrs) (k$)	FY 11 (hrs) (k$)	FY 12 (hrs)
Computer Professional R	0	0	880	0	0	0	0
	0	0	52.721	0	0	0	0
Electrical Engineer R	0	0	467	432	260	203	207
	0	0	87.398	82.949	51.223	41.03	42.927
Technician R	0	0	220	200	172	172	172
	0	0	22.971	21.426	18.905	19.396	19.9

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	9.0	7.2	5.3	4.3	2.2
Travel R	0.0	0.0	9.0	9.2	3.2	3.2	3.3

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.2.2 **Description:** LBNL

Institution : LBNL **Contact**

LBNL operations support

Basis of Estimate: Physicist estimate

Details of Estimate: 0.25 FTE computer scientist/engineer in FY07 dropping to 0.1 FTE thereafter. The profile is to address the expected needs found during the first physics data taking.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	72.4

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.2.3 **Description:** Iowa State

Institution : Iowa State **Contact**

Iowa State operations support

Basis of Estimate: Physicist estimate

Details of Estimate: Physicists only

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	273.6

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.3 **Description:** Maintenance

Institution : University of Wisconsin, Madision **Contact**

Maintenance activities during ATLAS shutdowns. This also includes preparations for maintenance.

Basis of Estimate: Physicist estimate

Details of Estimate: Zeroed out labor moved to operations.

Spares. 0.25 technical support ascribed to Wisconsin. Physicist labor covered under operations. Also includes later costs for debugging and repair of problem boards during running from FY07 on.

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WBS Number: 3.1.3.3.1 **Description:** Spares

Institution : University of Wisconsin, Madision **Contact**

Spare items and parts. By definition these are not included in the initial fabrication or procurements.

Basis of Estimate: Parametric estimate

Details of Estimate: Zeroed out see 3.1.3.1.1

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.3.3.2 **Description:** Personnel/materials

Institution : University of Wisconsin, Madision **Contact**

Personnel and materials for maintenance operations.

Basis of Estimate: Physicist estimate

Details of Estimate: Zero out and moved all cost to operations

U.S. ATLAS % share of activity: 100.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk*				*Weight*			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 3.1.4 **Description:** Common Silicon/ID

Institution : **Contact**

Pre-operation, operations and maintenance for the common silicon or ID activities.

Details of Estimate: Estimates are derived from CERN estimates assuming US silicon is 14% of total costs (without spares). This includes both pixel and SCT support of SR building, infrastructure, maintenance and operations. Costs to outfit SR building, which will be used for preoperations and maintenance. Includes clean space, ventilation, cabling, data readout, power, and gas systems. Estimated costs are based upon project leader estimates, after scrutiny group agreement. Equipment needs have been carefully detailed and costs estimated. Estimates after June 2002 are based upon CERN compiled estimates. These numbers are derived from ATLAS_B_sept05_v13.xls, ID sharing agreement (14% Silicon/7% TRT), and US sharing percentage based upon authorship

U.S. ATLAS % share of activity: 14.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	1215	0	0	1215	0	0	243	972	0.0	0.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	243.0	243.0	243.0	243.0	243.0

WBS Number: 3.1.4.1 **Description:** Pre-operations

Institution : LBNL **Contact**

Pre-operations before first LHC collisions.

Details of Estimate: Based on estimates done by ID project leader and ATLAS. Ascribed here to LBNL.

U.S. ATLAS % share of activity: 14.00%

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0

WBS Number: 3.1.4.2 **Description:** Maintenance Operations_BNL

Institution : BNL-common **Contact**

Maintenance and operations during ATLAS data taking and beam off periods

Details of Estimate: Estimates derived from those made by ID Project Leader and ATLAS. Both Pixels and SCT are covered here.

U.S. ATLAS % share of activity: 14.00%

Cost Summary: (R)

Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
972	0	0	972	0	0	0	972	0.0	0.0

MATERIAL SUMMARY:

	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	0.0	243.0	243.0	243.0	243.0

CONTINGENCY FACTORS:

Risk				*Weight*			Cont %
Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
0	0	0	0	0	0	0	0

WBS Number: 3.1.4.3 **Description:** Maintenance Operations_Nevis

Institution : Columbia U. (Nevis Laboratory) **Contact** Not available

Maintenance and operations during ATLAS data taking and beam off periods

Cost Summary: (R)	Base Cost (k$)	Cont Cost (k$)	Cont %	Total Cost (k$)	EDIA Labor (k$)	Mfg Labor (k$)	EDIA Matls (k$)	Mfg Matls (k$)	FTEs R	FTEs Other
	243	0	0	243	0	0	243	0	0.0	0.0

MATERIAL SUMMARY:	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)
Other R	0.0	0.0	243.0	0.0	0.0	0.0	0.0

CONTINGENCY FACTORS:	*Risk* Technical	*Risk* C o s t	*Risk* Schedule	*Risk* Des i gn	*Weight* Technical	*Weight* C o s t	*Weight* Schedule	Cont %
	0	0	0	0	0	0	0	0