

# U.S. ATLAS M&&O Estimate

## Cost Book AY\$

U.S. ATLAS M&&O Estimate Cost

12/23/2008

9:05:01 AM

**WBS Number:** 3.1

**Description:** Silicon

**Institution :**

**Contact**

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	11032	0	0	11032	4936	815	1313	3968	3181.4	6625.2

**MANPOWER  
(k\$)  
SUMMARY:**

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Computer Professional R	1065 63.805	1670 100.051	1280 89.921	175 16.698	175 17.133	175 17.577	175 18.034
Electrical Engineer R	1405 152.418	1888 185.641	1759 175.114	1684 173.036	1813 161.222	1212 116.822	1524 141.765
Mechanical Engineer R	1162 195.588	3520 475.024	3008 370.157	2256 247.175	1936 219.389	2726 311.745	2456 327.922
Technician R	4441 318.585	4720 422.038	3721 374.773	1839 128.076	1913 138.229	1707 126.423	2219 199.749

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	217.2	616.6	450.9	615.9	845.5	740.3	600.1
Travel R	58.1	218.6	266.9	116.9	113.5	109.2	177.2

**WBS Number:** 3.1.1

**Description:** Pixels

**Institution :**

**Contact**

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	4928	0	0	4928	2962	553	1090	322	1998.6	4307.6

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Computer Professional R	0 0	0 0	400 37.2	175 16.698	175 17.133	175 17.577	175 18.034
Electrical Engineer R	200 12.05	748 45.274	705 42.77	502 31.167	900 57.364	442 28.904	730 49.033
Mechanical Engineer R	1162 195.588	3520 475.024	3008 370.157	2256 247.175	1936 219.389	2726 311.745	2456 327.922
Technician R	1921 177.619	2200 281.072	2342 295.141	302 39.587	358 48.148	305 42.084	789 111.699

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	30.4	89.3	25.9	52.8	91.1	158.2	11.1
Travel R	27.3	188.0	242.4	86.6	91.4	91.2	153.9

**WBS Number:** 3.1.1.1

**Description:** Pre-operations

**Institution :**

**Contact**

Pre-operations

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1436	0	0	1436	802	300	196	137	626.3	973.6

**MANPOWER  
(k\$)**

**SUMMARY:**

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R	200 12.05	748 45.274	0 0	0 0	0 0	0 0	0 0
Mechanical Engineer R	1162 195.588	3520 475.024	0 0	0 0	0 0	0 0	0 0
Technician R	1101 93.263	2200 281.072	0 0	0 0	0 0	0 0	0 0

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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.

Physicist estimate **Basis of 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).

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

Eric Anderssen, Neal Hartman and Tom Johnson at CERN. Salary costs, relocation, travel **Details of**

**Estimate:**

and minor procurements included.

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1178	0	0	1178	746	225	99	108	551.6	0.0

**MANPOWER (k\$) SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Mechanical Engineer R	1162	3520	0	0	0	0	0
	195.588	475.024	0	0	0	0	0
Technician R	590	1760	0	0	0	0	0
	75.378	224.858	0	0	0	0	0

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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%

<b>Cost Summary:</b> <b>(R)</b>	<b>Base Cost</b> <b>(k\$)</b>	<b>Cont Cost</b> <b>(k\$)</b>	<b>Cont %</b>	<b>Total Cost</b> <b>(k\$)</b>	<b>EDIA Labor</b> <b>(k\$)</b>	<b>Mfg Labor</b> <b>(k\$)</b>	<b>EDIA Matls</b> <b>(k\$)</b>	<b>Mfg Matls</b> <b>(k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	337	0	0	337	296	0	41	0	168.3	0.0

**MANPOWER**  
**(k\$)**

**SUMMARY:**

Mechanical Engineer R

	<b>FY 06</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 07</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 08</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 09</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 10</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 11</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 12</b> <b>(hrs)</b> <b>(k\$)</b>
		0 1760	0	0	0	0	0
		0 296.243	0	0	0	0	0

**MATERIAL**  
**SUMMARY:**

	<b>FY 06</b> <b>(k\$)</b>	<b>FY 07</b> <b>(k\$)</b>	<b>FY 08</b> <b>(k\$)</b>	<b>FY 09</b> <b>(k\$)</b>	<b>FY 10</b> <b>(k\$)</b>	<b>FY 11</b> <b>(k\$)</b>	<b>FY 12</b> <b>(k\$)</b>
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:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Level of Effort **Basis of Estimate:**

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

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	216	0	0	216	179	0	38	0	101.6	0.0

**MANPOWER  
(k\$)**

**SUMMARY:**

Mechanical Engineer R

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs) (k\$)</b>
	0	1760	0	0	0	0	0
	0	178.781	0	0	0	0	0

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Tom Johnson at CERN. Salary, relocation, travel and misc expenses. Technicians at LBNL [Details of](#)

**Estimate:**

\$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%

<b>Cost Summary:</b> <b>(R)</b>	<b>Base Cost</b> <b>(k\$)</b>	<b>Cont Cost</b> <b>(k\$)</b>	<b>Cont %</b>	<b>Total Cost</b> <b>(k\$)</b>	<b>EDIA Labor</b> <b>(k\$)</b>	<b>Mfg Labor</b> <b>(k\$)</b>	<b>EDIA Matls</b> <b>(k\$)</b>	<b>Mfg Matls</b> <b>(k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	333	0	0	333	0	225	0	108	127.8	0.0

**MANPOWER**  
**(k\$)**

**SUMMARY:**

	<b>FY 06</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 07</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 08</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 09</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 10</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 11</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 12</b> <b>(hrs)</b>
Technician R		0 1760	0	0	0	0	0
		0 224.858	0	0	0	0	0

**MATERIAL**  
**SUMMARY:**

	<b>FY 06</b> <b>(k\$)</b>	<b>FY 07</b> <b>(k\$)</b>	<b>FY 08</b> <b>(k\$)</b>	<b>FY 09</b> <b>(k\$)</b>	<b>FY 10</b> <b>(k\$)</b>	<b>FY 11</b> <b>(k\$)</b>	<b>FY 12</b> <b>(k\$)</b>
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:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

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

**Estimate:**

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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	258	0	0	258	56	75	97	29	74.7	93.7

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R	200	748	0	0	0	0	0
	12.05	45.274	0	0	0	0	0
Technician R	511	440	0	0	0	0	0
	17.885	56.214	0	0	0	0	0

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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.

Electrical tech costs for repairs or rework of services during final assembly and installation. [Details of](#)

**Estimate:**

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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	81	0	0	81	56	0	25	0	31.9	0.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs) (k\$)</b>
Technician R	0	440	0	0	0	0	0
	0	56,214	0	0	0	0	0

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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

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

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

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
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

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

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	40	0	0	40	0	27	13	0	15.2	0.0

**MANPOWER  
(k\$)**

**SUMMARY:**

Electrical Engineer R

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs) (k\$)</b>
	0	440	0	0	0	0	0
	0	26.717	0	0	0	0	0

**MATERIAL**

**SUMMARY:**

Other R

Travel R

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
	0.0	1.3	0.0	0.0	0.0	0.0	0.0
	0.0	9.0	0.0	0.0	0.0	0.0	0.0

**CONTINGENCY  
FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i g n</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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%

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

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

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

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Travel R	0.0	59.0	0.0	0.0	0.0	0.0	0.0

**CONTINGENCY FACTORS:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

None **Details of Estimate:**

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

<b>CONTINGENCY FACTORS:</b>	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

Currently ascribed all to LBNL for convenience, but includes LBNL and all universities. **Details of**

**Estimate:**

Division among LBNL and universities is TBD.

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

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	2020	0	0	2020	1495	0	525	0	850.5	3334.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
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	160
	0	0	4.82	13.599	20.93	10.411	10.682
Mechanical Engineer R	0	0	2728	1936	1936	1936	2456
	0	0	341.715	213.824	219.389	225.077	327.922

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	5.0	0.0	21.1	0.0	0.0
Travel R	0.0	0.0	164.2	67.1	70.3	69.6	119.0

**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.

Physicist estimate **Basis of Estimate:**

Engineering support is costed in operations (for convenience in database entry) and **Details of Estimate:** 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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1566	0	0	1566	1328	0	238	0	755.6	0.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs) (k\$)</b>
Mechanical Engineer R	0	0	2728	1936	1936	1936	2456
	0	0	341.715	213.824	219.389	225.077	327.922

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	5.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	108.5	9.2	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

Salary and COLA for Neal Hartman, resident at CERN. In FY09 COLA may be covered from [Details of](#)

**Estimate:**

ID common operations funds so is not shown.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1051	0	0	1051	942	0	109	0	535.0	0.0

**MANPOWER (k\$) SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Mechanical Engineer R	0	0	1760	1760	1760	1760	1760
	0	0	178.781	183.429	188.203	193.083	198.107

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	5.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	57.5	2.1	10.5	10.8	11.1

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

- 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 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.
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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.

**CONTINGENCY FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	0	0	0	0	0	0	0	0

**WBS Number:** 3.1.1.2.1.2

**Description:** LBNL Senior level engineer

**Institution :** LBNL

**Contact**

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 [Details of](#)

**Estimate:**

is some cost for consulting.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	515	0	0	515	386	0	129	0	219.5	0.0

**MANPOWER (k\$)**

**SUMMARY:**

Mechanical Engineer R

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
		0	0	968	176	176	696
		0	0	162.934	30.395	31.186	129.815

**MATERIAL SUMMARY:**

Travel R

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
	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.
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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.
- 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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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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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.

**CONTINGENCY FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	0	0	0	0	0	0	0	0

**WBS Number:** 3.1.1.2.2

**Description:** Electrical Support

**Institution :**

**Contact**

Support of electronics operations.

Physicist estimate **Basis of Estimate:**

Technical support(or equivalent) at about 0.1 FTE from LBNL and minor purchases. Includes **Details of**

**Estimate:**

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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	319	0	0	319	60	0	259	0	34.3	329.8

**MANPOWER  
(k\$)**

**SUMMARY:**

Electrical Engineer R

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
	0	0	80	220	330	160	160
	0	0	4.82	13.599	20.93	10.411	10.682

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	0.0	0.0	10.5	0.0	0.0
Travel R	0.0	0.0	48.7	52.7	47.2	45.8	47.0

**WBS Number:** 3.1.1.2.2.1

**Description:** Electrical support - LBNL

**Institution :** LBNL/UC-Berkeley

**Contact** Not available

Covers work by electrical technicians during operation phase

This work would be needed for any work related to service panel issues, such as making [Details of](#)

**Estimate:**

components for tests in SR1 that support the operation. Contributions to an anticipated operating pool

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

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

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

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

<b>CONTINGENCY FACTORS:</b>	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i g n</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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 and

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

Cost Summary: (R)	Base	Cont		Total	EDIA	Mfg	EDIA	Mfg	FTEs	FTEs
	Cost (k\$)	Cost (k\$)	Cont %	Cost (k\$)	Labor (k\$)	Labor (k\$)	Matls (k\$)	Matls (k\$)	R	Other
	226	0	0	226	0	0	226	0	0.0	329.8

**MATERIAL SUMMARY:**

	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
	(k\$)						
Travel R	0.0	0.0	46.3	50.3	42.1	43.2	44.3

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

- 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.
- 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.
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- 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.
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- 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.

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	

**WBS Number:** 3.1.1.2.2.3

**Description:** Electrical support- OSU

**Institution :** Ohio State University

**Contact**

Electrical support of opto board operation

Physicist estimate **Basis of Estimate:**

Includes running tests as needed to understand effects seen in the detector, and support for **Details of**

**Estimate:**

operation of opto boards in SR1. Possible development of special RX plug-ins to recover too low or too high array channels are not included. Funds for this will have to be requested later if needed. (there are presently no such channels in the installed detector).

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	93	0	0	93	60	0	32	0	34.3	0.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R		0	0	80	220	330	160
		0	0	4.82	13.599	20.93	10.682

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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	2.7

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

- 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.
- 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
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- For development of "super RX borad" is this is pursued. Removal in FY12
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- For development of "super RX borad" is this is pursued. Removal in FY12
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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.  
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 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

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

**WBS Number:** 3.1.1.2.3

**Description:** Software support

**Institution :**

**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.

Physicist estimate **Basis of Estimate:**

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

**Estimate:**

Support role beyond FY08.

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

**MANPOWER**

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

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Travel R	0.0	0.0	7.0	5.1	5.3	5.4	5.5

**WBS Number:** 3.1.1.2.3.1

**Description:** Software Support-SLAC

**Institution :** SLAC

**Contact** Not available

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

**MANPOWER  
(k\$)**

**SUMMARY:**

Computer Professional R

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs) (k\$)</b>
	0	0	400	175	175	175	175
	0	0	37.2	16.698	17.133	17.577	18.034

**MATERIAL  
SUMMARY:**

Travel R

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
	0.0	0.0	7.0	5.1	5.3	5.4	5.5

**CONTINGENCY  
FACTORS:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	0	0	0	0	0	0	0	0

**WBS Number:** 3.1.1.2.3.2

**Description:** Software Support-Iowa

**Institution :** Composite U.

**Contact** Not available

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

Currently all ascribed to LBNL for convenience but includes LBNL and university physicists. **Details of**

**Estimate:**

Division among LBNL and specific universities is TBD.

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

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

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

**WBS Number:** 3.1.1.3

**Description:** Maintenance

**Institution :**

**Contact**

Maintenance activities during ATLAS shutdowns.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1472	0	0	1472	665	253	369	185	521.7	0.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R	0	0	625	282	570	282	570
	0	0	37.95	17.568	36.434	18.493	38.351
Mechanical Engineer R	0	0	280	320	0	790	0
	0	0	28.442	33.351	0	86.668	0
Technician R	820	0	2342	302	358	305	789
	84.356	0	295.141	39.587	48.148	42.084	111.699

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	22.4	0.0	20.9	52.8	70.0	158.2	11.1
Travel R	0.0	0.0	78.3	19.5	21.1	21.6	34.9

**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

Physicist estimate **Basis of Estimate:**

Technical manpower related to maintenance of US deliverables. Includes salary, relocation, **Details of**

**Estimate:**

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%

<b>Cost Summary:</b> <b>(R)</b>	<b>Base Cost</b> <b>(k\$)</b>	<b>Cont Cost</b> <b>(k\$)</b>	<b>Cont %</b>	<b>Total Cost</b> <b>(k\$)</b>	<b>EDIA Labor</b> <b>(k\$)</b>	<b>Mfg Labor</b> <b>(k\$)</b>	<b>EDIA Matls</b> <b>(k\$)</b>	<b>Mfg Matls</b> <b>(k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	693	0	0	693	516	0	177	0	293.5	0.0

<b>MANPOWER</b> <b>(k\$)</b>	<b>FY 06</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 07</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 08</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 09</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 10</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 11</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 12</b> <b>(hrs)</b> <b>(k\$)</b>
<b>SUMMARY:</b>							
Technician R	0	0	2184	302	358	305	789
	0	0	274.955	39.587	48.148	42.084	111.699

<b>MATERIAL</b> <b>SUMMARY:</b>	<b>FY 06</b> <b>(k\$)</b>	<b>FY 07</b> <b>(k\$)</b>	<b>FY 08</b> <b>(k\$)</b>	<b>FY 09</b> <b>(k\$)</b>	<b>FY 10</b> <b>(k\$)</b>	<b>FY 11</b> <b>(k\$)</b>	<b>FY 12</b> <b>(k\$)</b>
Other R	0.0	0.0	18.4	15.4	12.1	8.1	5.5
Travel R	0.0	0.0	68.8	4.1	4.2	4.3	28.3



**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.

Physicist estimate **Basis of Estimate:**

Based on dates of travel to CERN where 1 day = 8 hours. Overtime hours are not explicitly **Details of**

**Estimate:**

shown, but included via the labor rate.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	361	0	0	361	265	0	96	0	150.8	0.0

**MANPOWER (k\$) SUMMARY:**

Technician R

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
	0	0	968	302	358	305	84
	0	0	123.672	39.587	48.148	42.084	11.892

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	14.0	15.4	12.1	8.1	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
- 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

**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.

Physicist estimate **Basis of Estimate:**

SLAC labor average rate for Jeff Garcia. Includes travel to CERN. **Details of Estimate:**

Based on dates of monthly rate at SLAC plus travel

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

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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Travel R	0.0	0.0	8.0	0.0	0.0	0.0	0.0

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

Physicist estimate **Basis of Estimate:**

Due to the cancellation of the 2007 low energy run, the updating of the HV system originally **Details of**

**Estimate:**

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%

<b>Cost Summary:</b> <b>(R)</b>	<b>Base Cost</b> <b>(k\$)</b>	<b>Cont Cost</b> <b>(k\$)</b>	<b>Cont %</b>	<b>Total Cost</b> <b>(k\$)</b>	<b>EDIA Labor</b> <b>(k\$)</b>	<b>Mfg Labor</b> <b>(k\$)</b>	<b>EDIA Matls</b> <b>(k\$)</b>	<b>Mfg Matls</b> <b>(k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	299	0	0	299	149	0	123	27	84.5	0.0

<b>MANPOWER</b> <b>(k\$)</b>	<b>FY 06</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 07</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 08</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 09</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 10</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 11</b> <b>(hrs)</b> <b>(k\$)</b>	<b>FY 12</b> <b>(hrs)</b> <b>(k\$)</b>
<b>SUMMARY:</b>							
Electrical Engineer R	0	0	625	282	570	282	570
	0	0	37.95	17.568	36.434	18.493	38.351

<b>MATERIAL</b> <b>SUMMARY:</b>	<b>FY 06</b> <b>(k\$)</b>	<b>FY 07</b> <b>(k\$)</b>	<b>FY 08</b> <b>(k\$)</b>	<b>FY 09</b> <b>(k\$)</b>	<b>FY 10</b> <b>(k\$)</b>	<b>FY 11</b> <b>(k\$)</b>	<b>FY 12</b> <b>(k\$)</b>
Other R	0.0	0.0	2.5	6.7	57.9	5.4	5.5
Travel R	0.0	0.0	9.5	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

Support for repairs and testing of electrical services during shutdowns. Contribution to [Details of](#)

**Estimate:**

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%

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

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Co-design (with New Mexico) of current measurement units for HV-PP4. Fabrication cost is [Details of](#)

**Estimate:**

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%

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

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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
- Purchases only. COLA for R. Boyd is listed under operations

<b>CONTINGENCY FACTORS:</b>	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i g n</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Physicist estimate **Basis of Estimate:**

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

**Estimate:**

Support for sensor monitoring program.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	202	0	0	202	149	0	53	0	84.5	0.0

**MANPOWER  
(k\$)**

**SUMMARY:**

Electrical Engineer R

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
		0	0	625	282	570	282
		0	0	37.95	17.568	36.434	18.493
							38.351

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	2.5	1.5	0.0	0.0	0.0
Travel R	0.0	0.0	9.5	5.1	10.5	6.5	6.6

**CONTINGENCY  
FACTORS:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Physicist estimate **Basis of Estimate:**

None **Details of Estimate:**

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

Covered under operations **Details of Estimate:**

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	131	0	0	131	0	84	17	30	47.9	0.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Technician R	820	0	0	0	0	0	0
	84.356	0	0	0	0	0	0

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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:** 3.1.1.3.5.2

**Description:** Sensors

**Institution :** LBNL

**Contact**

Procurement of silicon detectors and testing of them.

None **Details of Estimate:**

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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:**

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	12	0	0	12	0	0	0	12	0.0	0.0

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	10.4	0.0	0.0	0.0	0.0	0.0	0.0

**CONTINGENCY FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

none after FY07 **Details of Estimate:**

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	10	0	0	10	0	8	0	3	4.4	0.0

**MANPOWER  
(k\$)  
SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Technician R	220	0	0	0	0	0	0
	7.7	0	0	0	0	0	0

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	2.0	0.0	0.0	0.0	0.0	0.0	0.0

**CONTINGENCY  
FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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:**

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	88	0	0	88	0	77	0	11	43.6	0.0

**MANPOWER  
(k\$)**

**SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Technician R	600	0	0	0	0	0	0
	76.656	0	0	0	0	0	0

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	10.0	0.0	0.0	0.0	0.0	0.0	0.0

**CONTINGENCY  
FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Based on preliminary plan for US contribution to mechanics, sensors and electronics/testing. [Details of](#)

**Estimate:**

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.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	348	0	0	348	0	169	51	128	95.8	0.0

**MANPOWER (k\$) SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Mechanical Engineer R	0	0	280	320	0	790	0
	0	0	28.442	33.351	0	86.668	0
Technician R	0	0	158	0	0	0	0
	0	0	20.186	0	0	0	0

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	0.0	15.4	0.0	144.7	0.0
Travel R	0.0	0.0	0.0	0.0	0.0	4.3	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.

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	220	0	0	220	0	169	51	0	95.8	0.0

**MANPOWER  
(k\$)**

**SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Mechanical Engineer R	0	0	280	320	0	790	0
	0	0	28.442	33.351	0	86.668	0
Technician R	0	0	158	0	0	0	0
	0	0	20.186	0	0	0	0

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	0.0	15.4	0.0	25.9	0.0
Travel R	0.0	0.0	0.0	0.0	0.0	4.3	0.0

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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:**

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

A full wafer engineering run is needed in FY09 in order to prototype flip chip assemblies on [Details of](#)

**Estimate:**

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.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	128	0	0	128	0	0	0	128	0.0	0.0

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	0.0	0.0	0.0	118.8	0.0

**High Value(1 item>25k) Notes**

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

**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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1454	0	0	1454	953	262	116	123	632.7	1475.3

**MANPOWER  
(k\$)  
SUMMARY:**

	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R	770 58.959	660 50.536	587 44.946	750 58.92	653 52.635	567 46.888	587 49.805
Technician R	2200 107.554	2200 107.554	1159 56.661	1337 67.063	1383 71.176	1230 64.943	1258 68.15

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	5.0	13.3	7.0	9.5	9.2	7.6	7.8
Travel R	18.3	19.0	15.5	21.0	18.9	18.1	19.9

**WBS Number:** 3.1.2.1

**Description:** Pre-operations

**Institution :**

**Contact**

Pre-operations

LBNL and UC Santa Cruz are currently the only US institutions involved in the SCT. We [Details of](#)

**Estimate:**

have made an estimate of the division of costs between these two in the subsequent lower levels, but it's the sum that

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

**MANPOWER  
(k\$)**

**SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
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:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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

Physicist estimate **Basis of Estimate:**

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

**Estimate:**

No further LBNL participation is anticipated.

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

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

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**CONTINGENCY FACTORS:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Physicist estimate **Basis of Estimate:**

EE in FY05 and 100% of FY06 for work on grounding, shielding, responding to questions **Details of**

**Estimate:**

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%

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

<b>MANPOWER</b> <b>(k\$)</b>	<b>FY 06</b> <b>(hrs)</b>	<b>FY 07</b> <b>(hrs)</b>	<b>FY 08</b> <b>(hrs)</b>	<b>FY 09</b> <b>(hrs)</b>	<b>FY 10</b> <b>(hrs)</b>	<b>FY 11</b> <b>(hrs)</b>	<b>FY 12</b> <b>(hrs)</b>
<b>SUMMARY:</b>							
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

<b>MATERIAL</b>	<b>FY 06</b>	<b>FY 07</b>	<b>FY 08</b>	<b>FY 09</b>	<b>FY 10</b>	<b>FY 11</b>	<b>FY 12</b>
<b>SUMMARY:</b>							
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

<b>CONTINGENCY</b> <b>FACTORS:</b>	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

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

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

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

**WBS Number:** 3.1.2.2

**Description:** Operations

**Institution :**

**Contact**

Operations during ATLAS data taking.

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

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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.

Physicist estimate **Basis of Estimate:**

None **Details of Estimate:**

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

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

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

**WBS Number:** 3.1.2.2.2

**Description:** UCSC

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

**Contact**

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

Physicist estimate **Basis of Estimate:**

0.1FTE EE in FY07, 0.1 FTE thereafter. 1 FTE technical support as part of the SCT **Details of Estimate:** 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%

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

**MANPOWER (k\$) SUMMARY:**

	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
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:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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:**

	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Physicist estimate **Basis of Estimate:**

These are covered under 3.1.4. **Details of Estimate:**

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

Spares are included in this element. We assume 15% spares are required. Routine **Details of Estimate:** 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.

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	385	0	0	385	0	262	0	123	148.8	268.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R	0	440	220	383	286	200	220
	0	33.691	16.845	30.088	23.053	16.539	18.666
Technician R	0	440	279	457	503	350	378
	0	21.511	13.64	22.923	25.887	18.48	20.478

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	11.3	5.0	7.5	7.1	5.4	5.5
Travel R	0.0	10.0	6.5	11.8	9.5	8.4	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.

Costs are for approximately 40 spare modules. Costs are scaled from present estimates for [Details of](#)

**Estimate:**  
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 future spares.

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	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.

This work is for spare hybrids, needed for the spare modules, described under 3.1.2.3.1. [Details of](#)

**Estimate:**

Breakdown between LBNL and UCSC provided under next two WBS elements.

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	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**

Parametric estimate **Basis of Estimate:**

All done at UCSC **Details of Estimate:**

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

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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**

Parametric estimate **Basis of Estimate:**

Assumes all hybrids complete **Details of Estimate:**

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

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Assembly costs for modules, using hybrids bonded and tested in U.S. Costs are for labor [Details of](#)

**Estimate:**

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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	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**

Parametric estimate **Basis of Estimate:**

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

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

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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**

Parametric estimate **Basis of Estimate:**

All done at LBL **Details of Estimate:**

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

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Physicist estimate **Basis of Estimate:**

We assume normal operations and minor maintenance manpower is covered under **Details of Estimate:** 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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	385	0	0	385	0	262	0	123	148.8	0.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
Electrical Engineer R	0	440	220	383	286	200	220
	0	33.691	16.845	30.088	23.053	16.539	18.666
Technician R	0	440	279	457	503	350	378
	0	21.511	13.64	22.923	25.887	18.48	20.478

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	11.3	5.0	7.5	7.1	5.4	5.5
Travel R	0.0	10.0	6.5	11.8	9.5	8.4	10.0

<b>CONTINGENCY FACTORS:</b>	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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).

The ROD is very complex both from a firmware and software reference. After the fabrication [Details of](#)

**Estimate:**

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 the 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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	1127	0	0	1127	1021	0	107	0	550.2	842.3

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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	12.5	13.0	9.0	7.2	1.6	0.0	2.2
Travel R	12.5	11.6	9.0	9.2	3.2	0.0	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.

Wisconsin, Iowa State and LBNL are currently the institutions involved in the RODs pre-[Details of](#)

**Estimate:**

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 in a short time.

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

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

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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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, Madison

**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).

Physicist estimate **Basis of Estimate:**

SCT ROD fabrication will be completed in January FY05, pixel fabrication in late FY05. The **Details of**

**Estimate:**

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 functionality or compatibility with developing software. Frequency of requests are expected to decrease 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%

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

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

**MATERIAL  
SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Physicist estimate **Basis of Estimate:**

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

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 code 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 addition 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%

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i g n</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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

Physicist estimate **Basis of Estimate:**

Physicist manpower only **Details of Estimate:**

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

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

<b>CONTINGENCY FACTORS:</b>	<b>Risk</b>				<b>Weight</b>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Wisconsin, Iowa State and LBNL are currently the institutions involved in the RODs. The [Details of](#)

**Estimate:**

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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	669	0	0	669	619	0	51	0	321.8	550.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs) (k\$)</b>	<b>FY 07 (hrs) (k\$)</b>	<b>FY 08 (hrs) (k\$)</b>	<b>FY 09 (hrs) (k\$)</b>	<b>FY 10 (hrs) (k\$)</b>	<b>FY 11 (hrs) (k\$)</b>	<b>FY 12 (hrs)</b>
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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	9.0	7.2	1.6	0.0	2.2
Travel R	0.0	0.0	9.0	9.2	3.2	0.0	3.3

**WBS Number:** 3.1.3.2.1

**Description:** Wisconsin

**Institution :** University of Wisconsin, Madison

**Contact**

Operations support via Wisconsin

Physicist estimate **Basis of Estimate:**

The profile is based on engineering judgment. **Details of Estimate:**

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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	669	0	0	669	619	0	51	0	321.8	204.0

<b>MANPOWER (k\$) SUMMARY:</b>	<b>FY 06 (hrs)</b>	<b>FY 07 (hrs)</b>	<b>FY 08 (hrs)</b>	<b>FY 09 (hrs)</b>	<b>FY 10 (hrs)</b>	<b>FY 11 (hrs)</b>	<b>FY 12 (hrs)</b>
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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	9.0	7.2	1.6	0.0	2.2
Travel R	0.0	0.0	9.0	9.2	3.2	0.0	3.3

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

**WBS Number:** 3.1.3.2.2

**Description:** LBNL

**Institution :** LBNL

**Contact**

LBNL operations support

Physicist estimate **Basis of Estimate:**

0.25 FTE computer scientist/engineer in FY07 dropping to 0.1 FTE thereafter. The profile is **Details of**

**Estimate:**

to address the expected needs found during the first physics data taking.

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

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

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

Physicist estimate **Basis of Estimate:**

Physicists only **Details of Estimate:**

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

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

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

**WBS Number:** 3.1.3.3

**Description:** Maintenance

**Institution :** University of Wisconsin, Madison

**Contact**

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

Physicist estimate **Basis of Estimate:**

Zeroed out labor moved to operations. **Details of Estimate:**

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%

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

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
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, Madison

**Contact**

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

Parametric estimate **Basis of Estimate:**

Zeroed out see 3.1.3.1.1 **Details of Estimate:**

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

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

<b>MATERIAL SUMMARY:</b>	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

**WBS Number:** 3.1.3.3.2

**Description:** Personnel/materials

**Institution :** University of Wisconsin, Madison

**Contact**

Personnel and materials for maintenance operations.

Physicist estimate **Basis of Estimate:**

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

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

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

<b>CONTINGENCY FACTORS:</b>	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	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.

Estimates are derived from CERN estimates assuming US silicon is 14% of total costs [Details of](#)

**Estimate:**

(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%

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	3523	0	0	3523	0	0	0	3523	0.0	0.0

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	169.3	501.0	409.0	546.4	743.6	574.5	579.1

**WBS Number:** 3.1.4.1

**Description:** Pre-operations

**Institution :** LBNL

**Contact**

Pre-operations before first LHC collisions.

Based on estimates done by ID project leader and ATLAS. Ascribed here to LBNL. [Details of Estimate:](#)

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

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

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

**WBS Number:** 3.1.4.2

**Description:** Maintenance Operations

**Institution :** BNL-common

**Contact**

Maintenance and operations during ATLAS data taking and beam off periods

Estimates derived from those made by ID Project Leader and ATLAS. Both Pixels and SCT [Details of](#)

**Estimate:**

are covered here.

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

<b>Cost Summary: (R)</b>	<b>Base Cost (k\$)</b>	<b>Cont Cost (k\$)</b>	<b>Cont %</b>	<b>Total Cost (k\$)</b>	<b>EDIA Labor (k\$)</b>	<b>Mfg Labor (k\$)</b>	<b>EDIA Matls (k\$)</b>	<b>Mfg Matls (k\$)</b>	<b>FTEs R</b>	<b>FTEs Other</b>
	3523	0	0	3523	0	0	0	3523	0.0	0.0

**MATERIAL SUMMARY:**

	<b>FY 06 (k\$)</b>	<b>FY 07 (k\$)</b>	<b>FY 08 (k\$)</b>	<b>FY 09 (k\$)</b>	<b>FY 10 (k\$)</b>	<b>FY 11 (k\$)</b>	<b>FY 12 (k\$)</b>
Other R	169.3	501.0	409.0	546.4	743.6	574.5	579.1

**CONTINGENCY FACTORS:**

	<i>Risk</i>				<i>Weight</i>			<b>Cont %</b>
	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	<b>Des i gn</b>	<b>Technical</b>	<b>C o s t</b>	<b>Schedule</b>	
	0	0	0	0	0	0	0	0