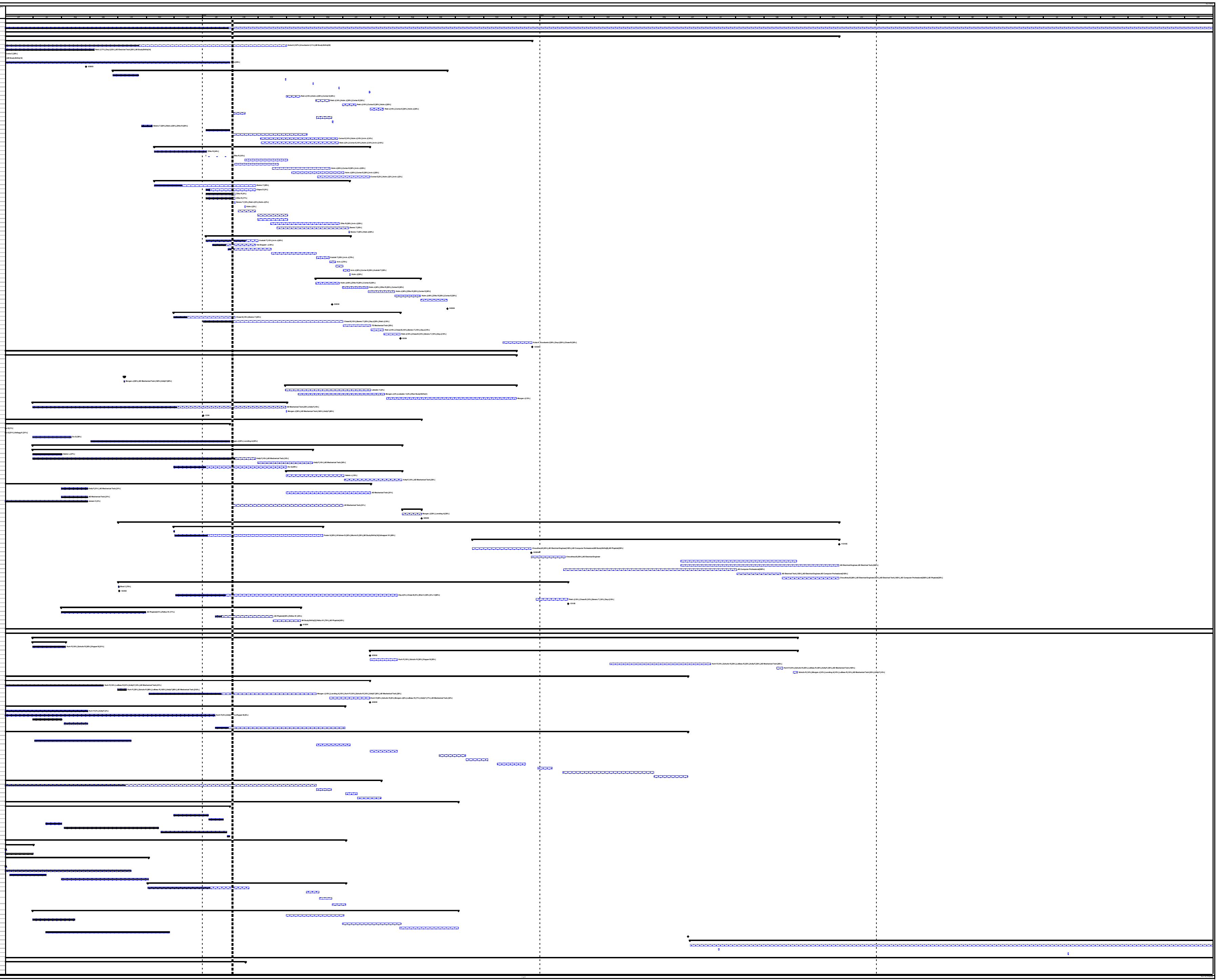
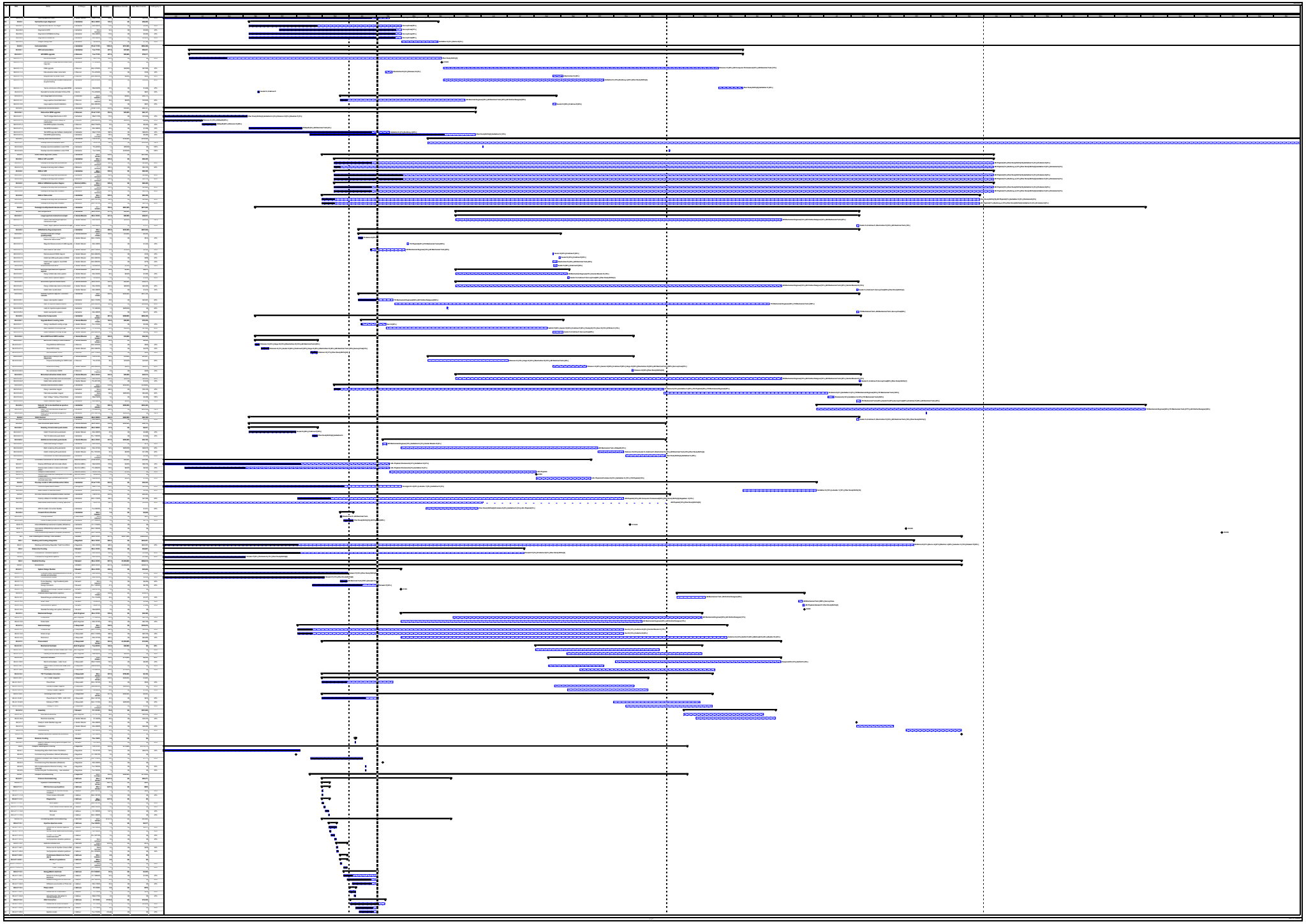
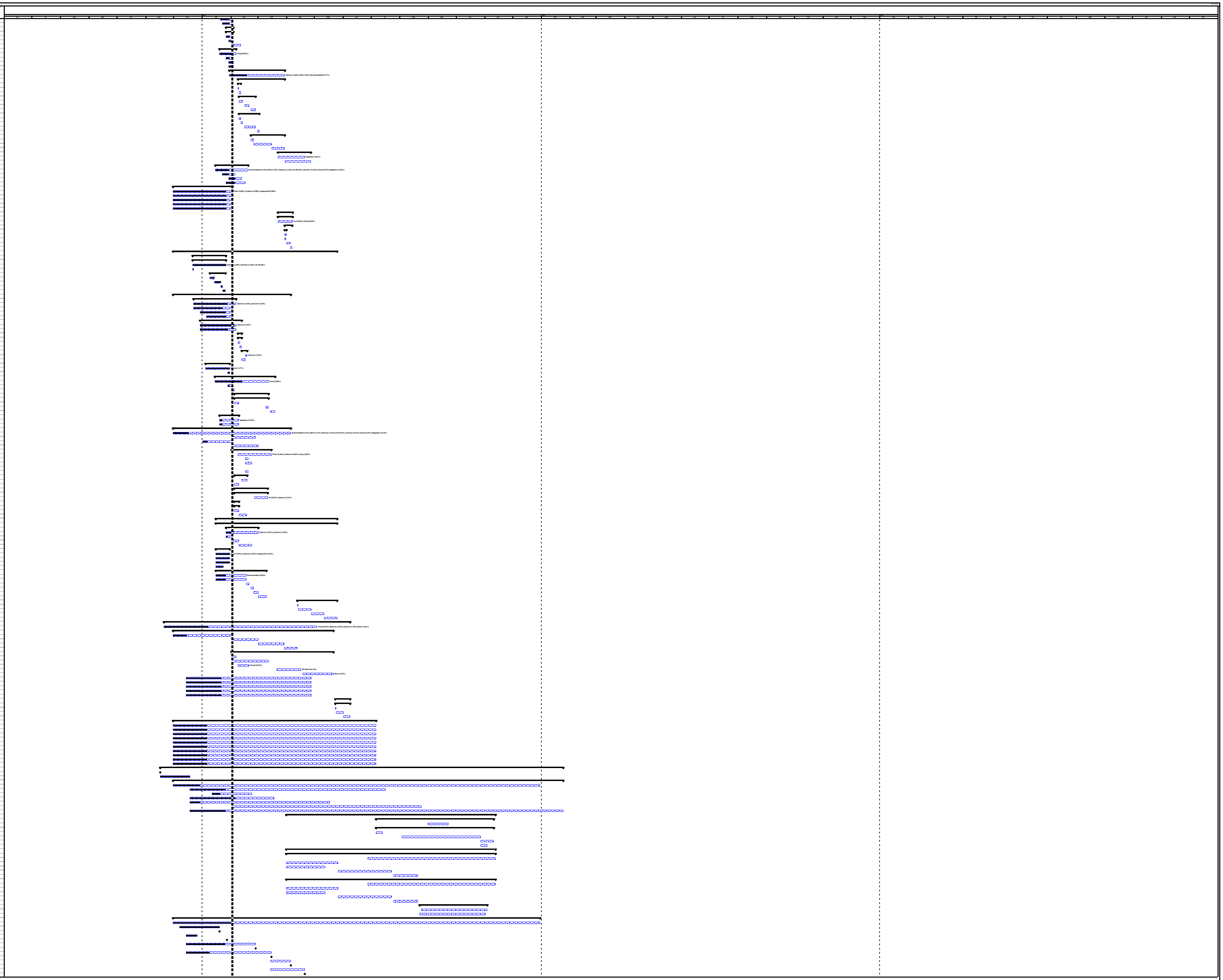
ID	WBS	Name	In Charge	Start	Duration	M&S Base Cost Est.	Labor Base Cost Est.	Contingency %
1	1	**Run II - Jeff Spalding**	**J. Spalding**	**Wed 1/1/03**	**1227 d**	[illegible]	[illegible]	
2	**1.1**	**Operations and Operational Maintenance and Upgrades**	**D. McGinnis/ P. Czarapata**	**Wed 1/1/03**	**1227 d**	**$0**	**$0**	
3	1.1.1	ongoing operations support	D. McGinnis/ P. Czarapata	Wed 1/1/03	1227 d	$0	$0	
4	**26**	**Luminosity Upgrades**	**J. Spalding**	**Wed 1/1/03**	**1164 d**	**$13,158,426**	**$16,974,583**	
5	**26.1**	**Protons on Pbar Target - Ioanis Kourbanis**	**I. Kourbanis**	**Wed 1/1/03**	**729 d**	**$1,911,500**	**$1,191,167**	
6	**26.1.1**	**Slip Stacking**	**R. Pasquinelli**	**Wed 1/1/03**	**500 d**	**$895,000**	**$435,771**	
7	26.1.1.1	Beam Physics Studies	K. Koba	Wed 1/1/03	315 d	$0	$148,030	40%
8	26.1.1.2	High Level RF Beam loading studies	J. Reid	Wed 1/1/03	173 d	$0	$38,683	40%
9	26.1.1.3	High Level RF cavity model	T. Berenc	Wed 1/1/03	95 d	$0	$32,596	40%
10	26.1.1.4	Low Level RF studies	B. Chase	Wed 1/1/03	60 d	$0	$41,077	40%
11	26.1.1.5	Design	T. Dey/B. Chase	Mon 6/2/03	166 d	$0	$21,905	40%
12	26.1.1.6	Design Review (Milestone)	R. Pasquinelli	Thu 8/28/03	0 d	$0	$0	
13	**26.1.1.7**	**High Level RF Upgrade**	**R. Pasquinelli**	**Fri 9/26/03**	**249 d**	**$845,000**	**$85,256**	
14	26.1.1.7.1	PA Modules Procurement (UID 1453, 1528, 1529, 1530)	R. Pasquinelli	Fri 9/26/03	20 d	$0	$0	20%
15	26.1.1.7.2	Receive 1st 20 PA Modules	R. Pasquinelli	Wed 3/31/04	1 d	$119,512	$0	40%
16	26.1.1.7.3	Receive 2nd 20 PA Modules	R. Pasquinelli	Fri 4/30/04	1 d	$119,512	$0	40%
17	26.1.1.7.4	Receive 3rd 20 PA Modules	R. Pasquinelli	Fri 5/28/04	1 d	$119,512	$0	40%
18	26.1.1.7.5	Receive Final 22 PA Modules	R. Pasquinelli	Wed 6/30/04	1 d	$131,464	$0	40%
19	26.1.1.7.6	Test 1st 20 PA Modules	R. Pasquinelli	Thu 4/1/04	11 d	$0	$1,849	60%
20	26.1.1.7.7	Test 2nd 20 PA Modules	R. Pasquinelli	Mon 5/3/04	11 d	$0	$1,849	40%
21	26.1.1.7.8	Test 3rd 20 PA Modules	R. Pasquinelli	Tue 6/1/04	11 d	$0	$1,849	40%
22	26.1.1.7.9	Test Final 22 PA Modules	R. Pasquinelli	Thu 7/1/04	10 d	$0	$1,681	40%
23	26.1.1.7.10	order combiners and couplers (UID 1455)	R. Pasquinelli	Wed 2/4/04	9 d	$0	$0	40%
24	26.1.1.7.11	delivery combiners and couplers	R. Pasquinelli	Tue 5/4/04	13 d	$250,000	$0	40%
25	26.1.1.7.12	Install Combiners & Couplers	R. Pasquinelli	Fri 5/21/04	1 d	$0	$0	40%
26	26.1.1.7.13	modify MI station 2 for 8 RF modules	R. Pasquinelli	Mon 10/27/03	10 d	$0	$5,385	60%
27	26.1.1.7.14	Order Heliax Cable & Connectors	R. Pasquinelli	Mon 1/5/04	19 d	$20,000	$0	40%
28	26.1.1.7.15	Install Cable & Connectors on M&D Shutdown Days	R. Pasquinelli	Mon 2/2/04	60 d	$0	$0	60%
29	26.1.1.7.16	Terminate Tunnel Cables on Shutdown Days	R. Pasquinelli	Thu 3/4/04	60 d	$0	$3,729	60%
30	26.1.1.7.17	Phase Match & Terminate Gallery Ends	R. Pasquinelli	Fri 3/5/04	60 d	$0	$5,042	60%
31	**26.1.1.7.18**	**Modify metering chassis**	**R. Pasquinelli**	**Mon 11/10/03**	**160 d**	**$10,000**	**$15,058**	
32	26.1.1.7.18.1	Document Modified Design of Metering Chassis	R. Pasquinelli	Mon 11/10/03	35 d	$0	$3,219	60%
33	26.1.1.7.18.2	Order Parts & Get PC Boards	R. Pasquinelli	Mon 1/5/04	20 d	$10,000	$0	40%
34	26.1.1.7.18.3	Load PC Boards	R. Pasquinelli	Mon 2/16/04	35 d	$0	$0	60%
35	26.1.1.7.18.4	Machine New Front & Back Panels	R. Pasquinelli	Thu 2/5/04	34 d	$0	$0	60%
36	26.1.1.7.18.5	Assemble Metering Chassis	R. Pasquinelli	Wed 3/17/04	45 d	$0	$5,608	60%
37	26.1.1.7.18.6	Test Metering Chassis	R. Pasquinelli	Wed 4/7/04	40 d	$0	$4,985	60%
38	26.1.1.7.18.7	Install Metering Chassis	R. Pasquinelli	Wed 5/5/04	40 d	$0	$1,246	40%
39	**26.1.1.7.19**	**Redesign Low Level RF Chassis**	**R. Pasquinelli**	**Mon 11/10/03**	**144 d**	**$15,000**	**$23,346**	
40	26.1.1.7.19.1	design low level RF chassis	R. Pasquinelli	Mon 11/10/03	73 d	$0	$12,126	60%
41	26.1.1.7.19.2	PC Board Layout	R. Pasquinelli	Mon 1/5/04	39 d	$0	$212	60%
42	26.1.1.7.19.3	Order Parts for 1st Chassis	R. Pasquinelli	Mon 1/5/04	20 d	$15,000	$408	40%
43	26.1.1.7.19.4	Assemble 1st RH Chassis w/New Configuration	R. Pasquinelli	Mon 1/5/04	23 d	$0	$831	60%
44	26.1.1.7.19.5	Test Design in Test Station	R. Pasquinelli	Thu 2/5/04	1 d	$0	$76	60%
45	26.1.1.7.19.6	Test Design in MI Station #2	R. Pasquinelli	Mon 2/16/04	1 d	$0	$10	40%
46	26.1.1.7.19.7	Fabricate Production PC Boards	R. Pasquinelli	Mon 2/9/04	15 d	$0	$0	60%
47	26.1.1.7.19.8	Load PC Boards	R. Pasquinelli	Mon 3/1/04	25 d	$0	$0	60%
48	26.1.1.7.19.9	Fabricate Cables	R. Pasquinelli	Mon 3/1/04	25 d	$0	$0	60%
49	26.1.1.7.19.10	Assemble RF Chassis	R. Pasquinelli	Mon 3/15/04	55 d	$0	$4,569	60%
50	26.1.1.7.19.11	Test RF Chassis	R. Pasquinelli	Mon 3/22/04	55 d	$0	$4,781	60%
51	26.1.1.7.19.12	Install RF Chassis	R. Pasquinelli	Tue 6/8/04	1 d	$0	$435	40%
52	**26.1.1.7.20**	**Modify control unit and add slave unit**	**R. Pasquinelli**	**Mon 1/5/04**	**111 d**	**$60,000**	**$12,167**	
53	26.1.1.7.20.1	order parts	R. Pasquinelli	Mon 1/5/04	40 d	$60,000	$6,762	40%
54	26.1.1.7.20.2	Modify Two Existing PC Board Layouts	R. Pasquinelli	Mon 1/12/04	34 d	$0	$1,246	60%
55	26.1.1.7.20.3	Fabricate All PC Boards	R. Pasquinelli	Thu 1/29/04	22 d	$0	$0	60%
56	26.1.1.7.20.4	Load PC Boards	R. Pasquinelli	Tue 3/16/04	35 d	$0	$0	60%
57	26.1.1.7.20.5	Assemble First Production Chassis	R. Pasquinelli	Tue 5/4/04	10 d	$0	$2,427	60%
58	26.1.1.7.20.6	Test First Production Chassis	R. Pasquinelli	Tue 5/18/04	5 d	$0	$779	60%
59	26.1.1.7.20.7	Assemble Production Chassis	R. Pasquinelli	Tue 5/25/04	5 d	$0	$0	60%
60	26.1.1.7.20.8	test chassis	R. Pasquinelli	Wed 6/2/04	5 d	$0	$850	60%
61	26.1.1.7.20.9	Install Chassis	R. Pasquinelli	Wed 6/9/04	1 d	$0	$104	40%
62	**26.1.1.7.21**	**Modify existing drivers**	**R. Pasquinelli**	**Mon 5/3/04**	**80 d**	**$0**	**$13,292**	
63	26.1.1.7.21.1	Modify existing drivers 1-5	R. Pasquinelli	Mon 5/3/04	20 d	$0	$3,323	60%
64	26.1.1.7.21.2	Modify existing drivers 6-10	R. Pasquinelli	Tue 6/1/04	20 d	$0	$3,323	60%
65	26.1.1.7.21.3	Modify existing drivers 11-15	R. Pasquinelli	Tue 6/29/04	20 d	$0	$3,323	60%
66	26.1.1.7.21.4	Modify existing drivers 16-18	R. Pasquinelli	Wed 7/28/04	20 d	$0	$3,323	60%
67	26.1.1.7.22	LLRF system completion	R. Pasquinelli	Wed 8/25/04	20 d	$0	$0	60%
68	26.1.1.7.23	Slip Stacking HLRF order deliveries 50%	R. Pasquinelli	Thu 5/20/04	0 d	$0	$0	
69	26.1.1.7.24	HLRF Upgrade complete	R. Pasquinelli	Wed 9/22/04	0 d	$0	$0	
70	**26.1.1.8**	**Upgrade Medium Level RF**	**R. Pasquinelli**	**Mon 12/1/03**	**169 d**	**$50,000**	**$46,994**	
71	26.1.1.8.1	Design vector controller	R. Pasquinelli	Mon 12/1/03	44 d	$0	$7,649	40%
72	26.1.1.8.2	Assemble new VXI and fanback Box & Install Software	R. Pasquinelli	Fri 1/2/04	106 d	$50,000	$34,552	40%
73	26.1.1.8.3	install new vector controller	R. Pasquinelli	Wed 6/2/04	22 d	$0	$1,142	40%
74	26.1.1.8.4	system testing w/o beam	R. Pasquinelli	Fri 7/2/04	9 d	$0	$1,565	60%
75	26.1.1.8.5	system testing with beam	R. Pasquinelli	Fri 7/16/04	12 d	$0	$2,086	60%
76	26.1.1.8.6	MLRF upgrade complete	R. Pasquinelli	Mon 8/2/04	0 d	$0	$0	
77	26.1.1.9	Beam studies with full beam-loading compensation	R. Pasquinelli	Mon 11/22/04	22 d	$0	$41,230	60%
78	26.1.1.10	Slip Stacking Operational	R. Pasquinelli	Thu 12/23/04	0 d	$0	$0	
79	**26.1.2**	**Pbar Target and Sweeping**	**J. Morgan**	**Tue 4/1/03**	**425 d**	**$91,500**	**$102,346**	
80	**26.1.2.1**	**Target**	**J. Morgan**	**Tue 4/1/03**	**425 d**	**$20,000**	**$20,945**	
81	**26.1.2.1.1**	**Alternative target material**	**J. Morgan**	**Tue 4/1/03**	**15 d**	**$0**	**$2,412**	
82	26.1.2.1.1.1	Inconel 600 depletion test	J. Morgan	Tue 4/8/03	4 d	$0	$804	20%
83	26.1.2.1.1.2	Inconel X-750 depletion test	J. Morgan	Tue 4/1/03	5 d	$0	$804	20%
84	26.1.2.1.1.3	Inconel 718 depletion test	J. Morgan	Tue 4/15/03	5 d	$0	$804	20%
85	**26.1.2.1.2**	**Assess graphite target skin**	**J. Morgan**	**Wed 10/8/03**	**1 d**	**$0**	**$681**	
86	26.1.2.1.2.1	Vault access, visual inspection	J. Morgan/C. Kelly	Wed 10/8/03	1 d	$0	$681	20%
87	**26.1.2.1.3**	**Beamline optics**	**J. Morgan**	**Wed 3/31/04**	**174 d**	**$0**	**$7,721**	
88	26.1.2.1.3.1	Develop improved optics	V. Lebedev	Wed 3/31/04	66 d	$0	$1,029	60%
89	26.1.2.1.3.2	Test optics with beam	J. Morgan/V. Lebedev	Wed 4/14/04	66 d	$0	$1,942	40%
90	26.1.2.1.3.3	Identify and correct limiting apertures	J. Morgan	Mon 7/19/04	98 d	$0	$4,750	100%
91	**26.1.2.1.4**	**New target with alternative material**	**C. Kelly**	**Tue 7/1/03**	**189 d**	**$20,000**	**$10,131**	
92	26.1.2.1.4.1	Fabricate new target assembly	C. Kelly	Tue 7/1/03	188 d	$20,000	$9,450	20%
93	26.1.2.1.4.2	Install new target in vault	C. Kelly	Thu 4/1/04	1 d	$0	$681	20%
94	26.1.2.1.4.3	New Target in Operation (Milestone)	J. Spalding	Fri 1/2/04	0 d	$0	$0	
95	**26.1.2.2**	**Beam Sweeping system**	**J. Morgan**	**Tue 4/1/03**	**355 d**	**$71,500**	**$81,401**	
96	**26.1.2.2.1**	**Upstream sweeping system**	**J. Morgan**	**Tue 4/1/03**	**209 d**	**$6,000**	**$31,353**	
97	26.1.2.2.1.1	Complete electrical connections	C. Jensen	Tue 4/1/03	43 d	$3,000	$217	40%
98	26.1.2.2.1.2	Complete interlocks and cabling	Q. Du	Tue 4/1/03	43 d	$3,000	$12,303	40%
99	26.1.2.2.1.3	Test power supply	C. Jensen	Tue 7/1/03	29 d	$0	$4,564	60%
100	26.1.2.2.1.4	Commission system with beam	J. Morgan	Tue 9/2/03	102 d	$0	$14,469	60%
101	**26.1.2.2.2**	**Downstream sweeping system**	**J. Morgan**	**Tue 7/1/03**	**276 d**	**$4,500**	**$28,655**	
102	**26.1.2.2.2.1**	**Revise clamping system**	**L. Valerio**	**Tue 7/1/03**	**209 d**	**$3,000**	**$13,525**	
103	26.1.2.2.2.1.1	Redesign clamping system	L. Valerio	Tue 7/1/03	23 d	$0	$5,737	60%
104	26.1.2.2.2.1.2	Fabricate & Assemble parts	C. Kelly	Tue 7/1/03	165 d	$3,000	$4,133	60%
105	26.1.2.2.2.1.3	Install new clamping system	C. Kelly	Mon 3/1/04	44 d	$0	$3,655	40%
106	26.1.2.2.2.2	Test power supply (upstairs)	C. Jensen	Mon 12/1/03	84 d	$0	$9,562	40%
107	**26.1.2.2.2.3**	**Cooling Analysis and upgrade**	**L. Valerio**	**Thu 4/1/04**	**88 d**	**$1,500**	**$5,568**	
108	26.1.2.2.2.3.1	Analyze Heat Load	L. Valerio	Thu 4/1/04	44 d	$0	$1,912	60%
109	26.1.2.2.2.3.2	Upgrade Water Skid	C. Kelly	Thu 6/3/04	44 d	$1,500	$3,655	60%
110	**26.1.2.2.3**	**General Beam Sweeping**	**J. Morgan**	**Tue 4/1/03**	**317 d**	**$61,000**	**$17,905**	
111	26.1.2.2.3.1	Inventory and procure spares	C. Kelly	Fri 8/1/03	21 d	$5,000	$2,285	60%
112	26.1.2.2.3.2	Build spare magnet	C. Kelly	Thu 4/1/04	65 d	$10,000	$6,854	40%
113	26.1.2.2.3.3	Purchase spare magnet coffin	C. Kelly	Fri 8/1/03	21 d	$10,000	$1,371	40%
114	26.1.2.2.3.4	Purchase power supply spares	C. Jensen	Tue 4/1/03	107 d	$10,000	$1,912	40%
115	26.1.2.2.3.5	Build spare second-stage supplies	C. Kelly	Mon 2/2/04	86 d	$26,000	$5,483	40%
116	**26.1.2.2.4**	**Beam Sweeping Commissioning**	**J. Morgan**	**Thu 8/5/04**	**15 d**	**$0**	**$3,289**	
117	26.1.2.2.4.1	Commission beam sweeping	J. Morgan	Thu 8/5/04	15 d	$0	$3,289	60%
118	26.1.2.2.4.2	Beam Sweeping Operational (Milestone)	J. Spalding	Wed 8/25/04	0 d	$0	$0	
119	**26.1.3**	**MI Upgrades**	**I. Kourbanis**	**Thu 10/2/03**	**538 d**	**$925,000**	**$596,899**	
120	**26.1.3.1**	**MI Dampers**	**W. Foster**	**Mon 12/1/03**	**111 d**	**$0**	**$76,196**	
121	26.1.3.1.1	MI Dampers: hand-off from the FY03 plan - cavity installation in shutdown, electronics developed	W. Foster	Mon 12/1/03	1 d	$0	$0	100%
122	26.1.3.1.2	MI Dampers: Commissioning and FPGA firmware enhancements	W. Foster	Tue 12/2/03	110 d	$0	$76,196	40%
123	**26.1.3.2**	**MI BPM Systems**	**B. Choudhary**	**Wed 10/20/04**	**374 d**	**$900,000**	**$427,397**	
132	[illegible]	MI BPM system complete	B. Webber	Mon 11/21/05	0 d	$0	$0	
124	26.1.3.2.1	MI BPM system design	B. Choudhary	Wed 10/20/04	44 d	$0	$62,582	40%
125	26.1.3.2.2	MI BPM: Review (Milestone)	I. Kourbanis	Wed 12/22/04	0 d	$0	$0	
126	26.1.3.2.3	MI BPM system purchase (UID 1491)	B. Webber	Thu 12/23/04	22 d	$0	$14,089	60%
127	26.1.3.2.4	MI BPM delivery	B. Webber	Fri 6/3/05	88 d	$900,000	$0	40%
128	26.1.3.2.5	MI BPM System assembly	B. Webber	Fri 6/3/05	120 d	$0	$102,000	40%
129	26.1.3.2.6	MI BPM System software	B. Webber	Thu 1/27/05	132 d	$0	$105,600	40%
130	26.1.3.2.7	MI BPM system installation and debug	B. Webber	Wed 8/3/05	33 d	$0	$41,081	40%
131	26.1.3.2.9	MI BPM system commissioning	B. Webber	Wed 9/21/05	44 d	$0	$102,046	60%
133	**26.1.3.3**	**MI 2.5 MHz Acceleration**	**C. Bhat**	**Thu 10/2/03**	**331 d**	**$25,000**	**$93,306**	
134	26.1.3.3.1	MI 2.5 MHz: handoff from FY03 plan is a progress Review in August	C. Bhat	Thu 10/2/03	1 d	$0	$488	20%
135	26.1.3.3.2	Review MI 2.5 MHz Acceleration (Milestone)	C. Bhat	Thu 10/2/03	0 d	$0	$0	
136	26.1.3.3.3	Continuing 2.5 MHz beam studies	C. Bhat	Wed 12/3/03	166 d	$25,000	$89,193	60%
137	26.1.3.3.4	MI 2.5 MHz: Commissioning	C. Bhat	Tue 12/28/04	22 d	$0	$3,825	60%
138	26.1.3.3.5	MI 2.5 MHz Acceleration complete	C. Bhat	Mon 1/31/05	0 d	$0	$0	
139	**26.1.4**	**Booster-MI Cogging**	**W. Pellico**	**Fri 8/1/03**	**178 d**	**$0**	**$56,151**	
140	26.1.4.1	Develop software	W. Pellico	Fri 8/1/03	65 d	$0	$30,944	60%
141	26.1.4.2	System testing (parasitic to operations)	W. Pellico	Thu 1/15/04	44 d	$0	$14,892	100%
142	26.1.4.3	Commission Booster-MI cogging	W. Pellico	Thu 3/18/04	22 d	$0	$10,315	60%
143	26.1.4.4	Booster-MI Cogging Operational	W. Pellico	Fri 4/16/04	0 d	$0	$0	
144	**26.2**	**Pbar Acceptance - Steve Werkema**	**S. Werkema**	**Wed 1/1/03**	**1135 d**	**$1,796,960**	[illegible]	
145	**26.2.1**	**Lithium Lens Upgrades**	**J. Morgan**	**Tue 4/1/03**	**1073 d**	**$471,000**	**$580,804**	
146	**26.2.1.1**	**Modifications to existing lens**	**P. Hurh**	**Tue 7/1/03**	**572 d**	**$40,000**	**$46,931**	
147	**26.2.1.1.1**	**Thick septum lens**	**R. Schultz**	**Tue 7/1/03**	**25 d**	**$0**	**$6,365**	
148	26.2.1.1.1.1	Thick septum lens: Analysis and Design	R. Schultz	Tue 7/1/03	25 d	$0	$6,365	40%
149	**26.2.1.1.2**	**Long lithium lens**	**P. Hurh**	**Wed 6/30/04**	**320 d**	**$40,000**	**$40,566**	
150	26.2.1.1.2.1	Decision on long lithium lens (Milestone)	S. Werkema	Wed 6/30/04	0 d	$0	$0	
151	26.2.1.1.2.2	Long Li lens: Design	P. Hurh	Thu 7/1/04	21 d	$0	$6,335	40%
152	26.2.1.1.2.3	Long Li lens: Fabrication and assembly	C. Kelly	Fri 3/18/05	76 d	$35,000	$29,640	40%
153	26.2.1.1.2.4	Long Li lens: Filling	R. Schultz	Thu 9/15/05	5 d	$5,000	$3,882	40%
154	26.2.1.1.2.5	Long Li lens: Testing	C. Kelly	Mon 10/3/05	5 d	$0	$408	60%
155	**26.2.1.2**	**New lens design**	**P. Hurh**	**Tue 4/1/03**	**553 d**	**$156,000**	**$185,139**	
156	**26.2.1.2.1**	**Prototype lens 1**	**P. Hurh**	**Thu 5/15/03**	**284 d**	**$27,000**	**$52,912**	
157	26.2.1.2.1.1	Prototype lens 1: Assembly	C. Kelly	Thu 5/15/03	85 d	$10,000	$16,619	40%
158	26.2.1.2.1.2	Prototype lens 1: Lithium Filling	R. Schultz	Wed 10/1/03	8 d	$5,000	$10,947	40%
159	26.2.1.2.1.3	Prototype lens 1: Testing	C. Kelly	Tue 11/4/03	123 d	$0	$15,557	60%
160	26.2.1.2.1.4	Prototype lens 1: Evaluation	P. Hurh	Tue 5/18/04	31 d	$12,000	$9,790	60%
161	26.2.1.2.1.5	Prototype Lens 1: Completed (Milestone)	P. Hurh	Wed 6/30/04	0 d	$0	$0	
162	**26.2.1.2.2**	**Alternative septum materials**	**P. Hurh**	**Tue 4/1/03**	**297 d**	**$63,000**	**$45,754**	
163	26.2.1.2.2.1	Ti 10-2-3 Preliminary bonding test	P. Hurh	Tue 4/1/03	107 d	$15,000	$1,615	40%
164	26.2.1.2.2.2	Ti 10-2-3 Fatigue Test	P. Hurh	Thu 5/1/03	176 d	$18,000	$5,380	40%
165	26.2.1.2.2.3	Ti 10-2-3 Endurance test	P. Hurh	Tue 7/1/03	23 d	$0	$2,210	40%
166	26.2.1.2.2.4	Coating Lithium dip, endurance	P. Hurh	Mon 8/4/03	30 d	$0	$12,237	40%
167	26.2.1.2.2.5	Mock Lens Bonding	P. Hurh	Thu 1/15/04	99 d	$30,000	$24,331	20%
168	**26.2.1.2.3**	**Prototype lens 2**	**P. Hurh**	**Tue 4/1/03**	**553 d**	**$59,000**	**$78,708**	
169	26.2.1.2.3.1	Prototype lens 2: Report	P. Hurh	Tue 4/1/03	9 d	$0	$1,132	20%
170	26.2.1.2.3.2	Prototype lens 2: Design (preliminary)	P. Hurh	Thu 7/3/03	73 d	$0	$8,137	60%
171	26.2.1.2.3.3	Prototype lens 2: Design (intermediate)	P. Hurh	Tue 5/4/04	26 d	$0	$7,080	60%
172	26.2.1.2.3.4	Prototype lens 2: Design (final)	P. Hurh	Thu 7/1/04	21 d	$0	$7,665	60%
173	26.2.1.2.3.5	Prototype lens 2: Fabrication	C. Kelly	Tue 8/14/04	21 d	$30,000	$3,134	40%
174	26.2.1.2.3.6	Prototype lens 2: Dissect dummy prototype	C. Kelly	Wed 10/13/04	18 d	$6,000	$2,312	60%
175	26.2.1.2.3.7	Prototype lens 2: Assembly	C. Kelly	Tue 11/16/04	21 d	$5,000	$16,065	40%
176	26.2.1.2.3.8	Prototype lens 2: Lithium Filling	R. Schultz	Thu 12/30/04	10 d	$3,000	$7,819	40%
177	26.2.1.2.3.9	Prototype lens 2: Testing	C. Kelly	Wed 1/26/05	71 d	$0	$11,334	60%
178	26.2.1.2.3.10	Prototype lens 2: Evaluation	P. Hurh	Thu 5/5/05	26 d	$15,000	$6,140	60%
179	**26.2.1.2.4**	**New power supply for testing**	**T. Leveling**	**Tue 4/1/03**	**323.27 d**	**$7,000**	**$15,766**	
180	26.2.1.2.4.1	New P/S: Assembly	T. Leveling	Tue 4/1/03	275 d	$5,000	$4,413	40%
181	26.2.1.2.4.2	New P/S: Testing	T. Leveling	Tue 5/4/04	12.27 d	$0	$2,155	60%
182	26.2.1.2.4.3	New P/S: Move to AP-0	T. Leveling	Fri 6/4/04	9.08 d	$2,000	$2,945	40%
183	26.2.1.2.4.4	New P/S: Commission	T. Leveling	Thu 6/17/04	16.92 d	$0	$6,253	60%
184	**26.2.1.3**	**General lens R&D**	**P. Hurh**	**Tue 4/1/03**	**382 d**	**$75,000**	**$112,134**	
185	**26.2.1.3.1**	**Lens autopsies**	**P. Hurh**	**Mon 4/14/03**	**200 d**	**$6,000**	**$13,043**	
186	26.2.1.3.1.1	Lens 20 & 21 report	P. Hurh	Mon 4/14/03	12 d	$0	$681	20%
187	26.2.1.3.1.2	Lens 16, 17 & 18 investigation	P. Hurh	Mon 12/1/03	24 d	$1,000	$1,920	60%
188	26.2.1.3.1.3	Lens 16, 17 & 18 report	P. Hurh	Thu 1/8/04	11 d	$0	$1,087	40%
189	26.2.1.3.1.4	Lens 22 unfill	T. Leveling	Tue 7/15/03	14 d	$1,000	$2,377	40%
190	26.2.1.3.1.5	Lens 22 dissection	T. Leveling	Mon 8/4/03	74 d	$2,000	$2,223	40%
191	26.2.1.3.1.6	Lens 22 investigation	P. Hurh	Mon 11/17/03	45 d	$2,000	$3,932	60%
192	26.2.1.3.1.7	Lens 22 report	P. Hurh	Wed 1/28/04	3 d	$0	$583	40%
193	**26.2.1.3.2**	**Finite Element Analysis studies**	**P. Hurh**	**Tue 4/1/03**	**298 d**	**$30,000**	**$67,807**	
194	**26.2.1.3.2.1**	**Lithium testing**	**P. Hurh**	**Tue 4/1/03**	**65 d**	**$30,000**	**$18,295**	
195	26.2.1.3.2.1.1	Li testing: Tube test (creep)	P. Hurh	Tue 4/1/03	44 d	$10,000	$13,210	60%
196	26.2.1.3.2.1.2	Li testing: Tensile (viscoplastic)	P. Hurh	Tue 4/1/03	65 d	$20,000	$5,085	60%
197	**26.2.1.3.2.2**	**Current lens FEA**	**P. Hurh**	**Tue 4/1/03**	**132 d**	**$0**	**$34,213**	
198	26.2.1.3.2.2.1	Current Lens FEA: Report	P. Hurh	Mon 4/21/03	29 d	$0	$2,356	40%
199	26.2.1.3.2.2.2	Current Lens FEA: EM & thermal	P. Hurh	Tue 4/1/03	44 d	$0	$5,650	40%
200	26.2.1.3.2.2.3	Current Lens FEA: Structural (preliminary)	P. Hurh	Tue 4/1/03	139 d	$0	$16,037	40%
201	26.2.1.3.2.2.4	Current Lens FEA: Structural (first pulse)	P. Hurh	Fri 6/6/03	37 d	$0	$5,085	40%
202	26.2.1.3.2.2.5	Current Lens FEA: Structural (quasistatic)	P. Hurh	Fri 8/1/03	66 d	$0	$5,085	40%
203	**26.2.1.3.2.3**	**Prototype 2 lens FEA**	**P. Hurh**	**Mon 11/3/03**	**147 d**	**$0**	**$15,299**	
204	26.2.1.3.2.3.1	Prototype 2 FEA: EM & thermal	P. Hurh	Mon 11/3/03	73 d	$0	$4,868	40%
205	26.2.1.3.2.3.2	Prototype 2 FEA: Structural (preliminary)	P. Hurh	Fri 4/23/04	10 d	$0	$3,477	40%
206	26.2.1.3.2.3.3	Prototype 2 FEA: Structural (first pulse)	P. Hurh	Fri 5/7/04	10 d	$0	$3,477	40%
207	26.2.1.3.2.3.4	Prototype 2 FEA: Structural (quasistatic)	P. Hurh	Fri 5/21/04	10 d	$0	$3,477	40%
208	**26.2.1.3.3**	**Various technologies R&D**	**P. Hurh**	**Tue 7/1/03**	**316 d**	**$39,000**	**$31,285**	
209	26.2.1.3.3.1	Annular water passage R&D	P. Hurh	Thu 4/1/04	44 d	$10,000	$3,439	100%
210	26.2.1.3.3.2	Water/Li seal tests R&D	P. Hurh	Tue 7/1/03	33 d	$10,000	$7,220	60%
211	26.2.1.3.3.3	Honeitech investigation R&D	P. Hurh	Tue 6/1/04	45 d	$3,000	$6,785	100%
212	26.2.1.3.3.4	Li bellows casting R&D	R. Schultz	Mon 8/2/04	45 d	$12,000	$9,795	100%
213	26.2.1.3.3.5	Transformer modifications R&D	P. Hurh	Tue 7/15/03	96 d	$4,000	$4,047	100%
214	26.2.1.4	New Lens Operational (Milestone)	J. Spalding	Fri 6/10/05	0 d	$0	$0	
215	**26.2.1.5**	**Fabricate new lenses**	**P. Hurh**	**Mon 6/13/05**	**520 d**	**$200,000**	**$238,600**	
216	26.2.1.5.1	Fabricate 4 new lenses (2 per year)	P. Hurh	Mon 6/13/05	520 d	$0	$238,600	100%
217	26.2.1.5.2	Additional Costs for New Lenses 1&2	J. Morgan	Thu 7/14/05	1 d	$100,000	$0	100%
218	26.2.1.5.3	Additional Costs for New Lenses 3&4	J. Morgan	Fri 7/28/06	1 d	$100,000	$0	100%
219	**26.2.2**	**AP2 and Debuncher Acceptance**	**K. Gollwitzer**	**Wed 1/1/03**	**1094 d**	**$1,325,960**	**$1,838,095**	
220	**26.2.2.1**	**Assemble documentation & drawings**	**D. Vander Meulen**	**Wed 1/1/03**	**282 d**	**$0**	**$108,769**	
221	26.2.2.1.1	AP2/Deb Inj Reg Drawing	D. Vander Meulen	Wed 1/1/03	78 d	$0	[illegible]	20%
222	26.2.2.1.2	AP2 Phy Aperture Table	D. Vander Meulen	Wed 1/1/03	98 d	$0	[illegible]	20%

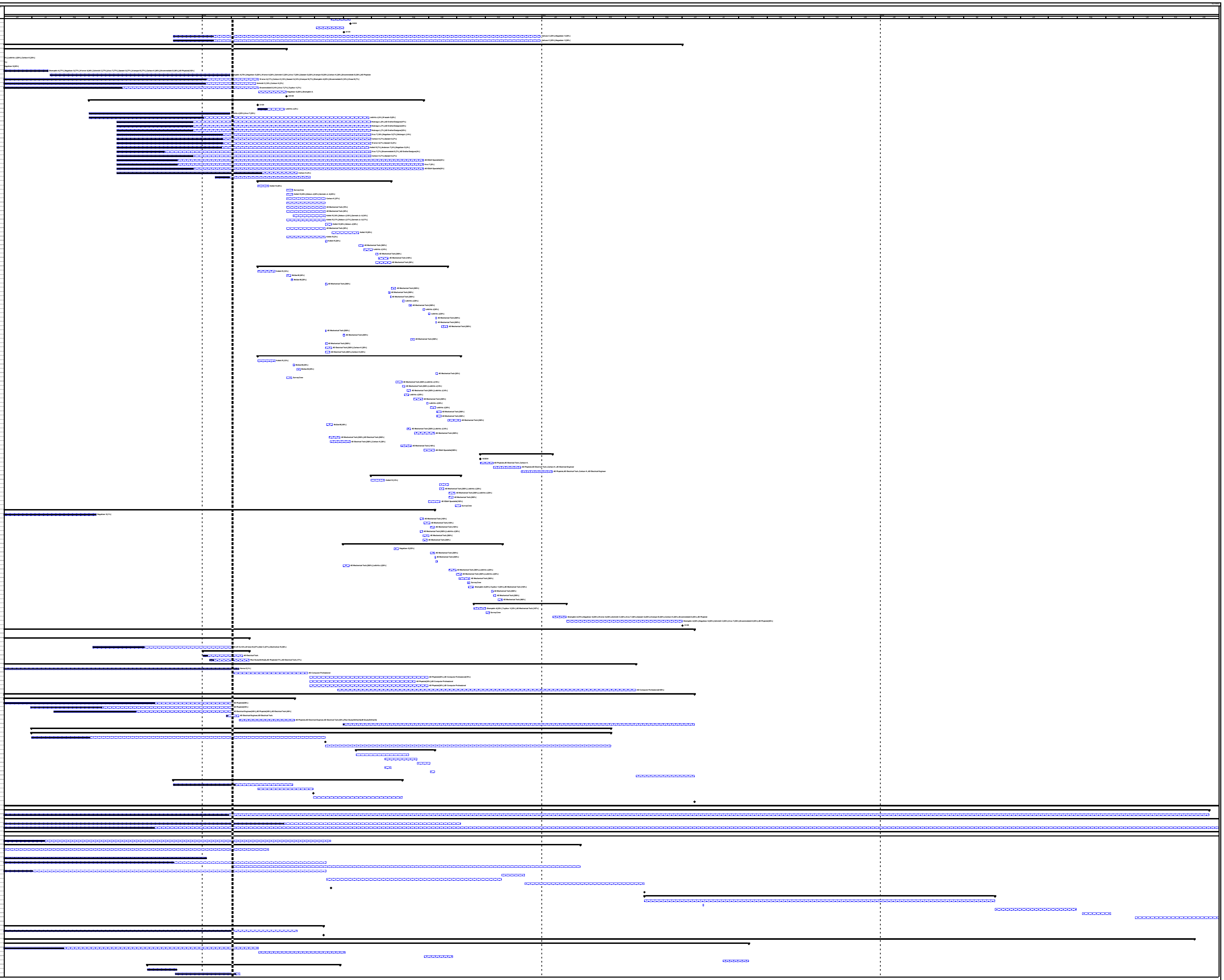




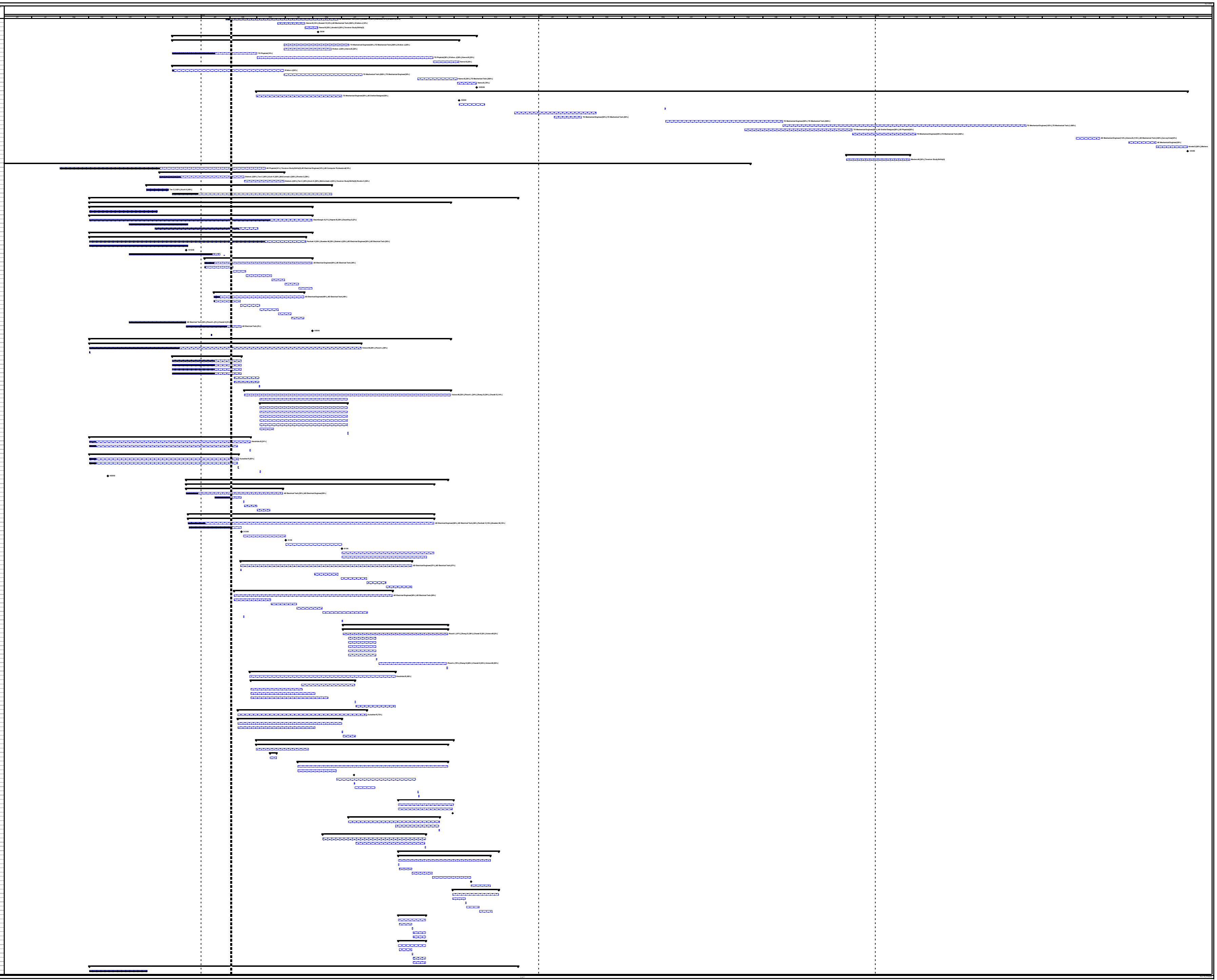
ID	WBS	Name	In Charge	Start	Duration	M&S Base Cost Est.	Labor Base Cost Est.	Contingency %
43	26.3.4.7.1.2.5.4	[illegible]	C. Gattuso	[illegible]	[illegible]	$0	$0	40%
44	26.3.4.7.1.2.5.5	Measure Admittance	C. Gattuso	Fri 1/23/04	7 d	$0	$0	40%
45	26.3.4.7.1.2.5.6	Ramp compensation	C. Gattuso	Tue 1/27/04	6 d	$0	$0	
46	26.3.4.7.1.2.5.6.1	Using Correctors	C. Gattuso	Tue 1/27/04	6 d	$0	$0	
47	26.3.4.7.1.2.5.6.1.1	120 Gev correction	C. Gattuso	Tue 1/27/04	5 d	$0	$0	40%
48	26.3.4.7.1.2.5.6.1.2	150 Gev Correction	C. Gattuso	Fri 1/30/04	3 d	$0	$0	40%
49	26.3.4.7.1.2.5.7	MI Quad compensation loop	C. Gattuso	Wed 2/4/04	6 d	$0	$0	40%
50	26.3.4.7.1.2.6	Lattice measurements	C. Gattuso	Tue 1/20/04	14 d	$0	$2,593	
51	26.3.4.7.1.2.6.1	Resources for Lattice Measurements	C. Gattuso	Tue 1/20/04	14 d	$0	$2,593	40%
52	26.3.4.7.1.2.6.2	Phase advance measurements	C. Gattuso	Tue 1/27/04	5 d	$0	$0	40%
53	26.3.4.7.1.2.6.3	Beta Function measurements	C. Gattuso	Fri 1/30/04	3 d	$0	$0	40%
54	26.3.4.7.1.2.6.4	Dispersion measurements	C. Gattuso	Fri 1/30/04	3 d	$0	$0	40%
55	26.3.4.7.1.2.7	RF systems	C. Gattuso	Fri 1/30/04	42 d	$0	$17,438	
56	26.3.4.7.1.2.7.1	Resources for RF Systems	C. Gattuso	Fri 1/30/04	42 d	$0	$17,438	40%
57	26.3.4.7.1.2.7.2	Modes of operations Protons	C. Gattuso	Mon 2/9/04	36.33 d	$0	$0	
58	26.3.4.7.1.2.7.2.1	Injection/Store	C. Gattuso	Mon 2/9/04	3 d	$0	$0	
59	26.3.4.7.1.2.7.2.1.1	Matching	C. Gattuso	Mon 2/9/04	1 d	$0	$0	40%
60	26.3.4.7.1.2.7.2.1.2	Long. emittance vs Bucket manipulations	C. Gattuso	Tue 2/10/04	2 d	$0	$0	40%
61	26.3.4.7.1.2.7.2.2	Stacking (large/multiple stack trans.)	C. Gattuso	Tue 2/10/04	14 d	$0	$0	
62	26.3.4.7.1.2.7.2.2.1	Matching	C. Gattuso	Tue 2/10/04	4 d	$0	$0	40%
63	26.3.4.7.1.2.7.2.2.2	Long. emittance vs Bucket manipulations	C. Gattuso	Mon 2/16/04	1 wk	$0	$0	40%
64	26.3.4.7.1.2.7.2.2.3	Bucket motion Vs Emittance	C. Gattuso	Mon 2/23/04	1 wk	$0	$0	40%
65	26.3.4.7.1.2.7.2.3	Stacking rapid transfers)	C. Gattuso	Tue 2/10/04	16 d	$0	$0	
66	26.3.4.7.1.2.7.2.3.1	Core partition studies	C. Gattuso	Tue 2/10/04	2 d	$0	$0	40%
67	26.3.4.7.1.2.7.2.3.2	Inj beam distortion routine	C. Gattuso	Thu 2/12/04	2 d	$0	$0	40%
68	26.3.4.7.1.2.7.2.3.3	Gated cooling of inj region	C. Gattuso	Mon 2/16/04	2 wks	$0	$0	40%
69	26.3.4.7.1.2.7.2.3.4	Inj to stash Merging	C. Gattuso	Mon 3/1/04	2 d	$0	$0	40%
70	26.3.4.7.1.2.7.2.4	extraction	C. Gattuso	Mon 2/23/04	26.33 d	$0	$0	
71	26.3.4.7.1.2.7.2.4.1	Matching	C. Gattuso	Mon 2/23/04	3 d	$0	$0	40%
72	26.3.4.7.1.2.7.2.4.2	Long. emittance vs Bucket manipulations	C. Gattuso	Thu 2/26/04	2.67 wks	$0	$0	40%
73	26.3.4.7.1.2.7.2.4.3	Bucket motion Vs Emittance	C. Gattuso	Tue 3/16/04	2 wks	$0	$0	40%
74	26.3.4.7.1.2.8	Long emit growth measurements	C. Gattuso	Tue 3/23/04	25.67 d	$0	$5,762	
75	26.3.4.7.1.2.8.1	Resources for Long Emit Growth Measurements	C. Gattuso	Tue 3/23/04	21 d	$0	$5,762	40%
76	26.3.4.7.1.2.8.2	Proton Diffusion rate	C. Gattuso	Tue 3/30/04	4 wks	$0	$0	40%
77	26.3.4.7.1.2.9	Operating point	C. Gattuso	Thu 1/15/04	24.33 d	$0	$11,339	
78	26.3.4.7.1.2.9.1	Resources for Operating point	C. Gattuso	Thu 1/15/04	24.33 d	$0	$11,339	40%
79	26.3.4.7.1.2.9.2	Chrome Vs Life time	C. Gattuso	Fri 1/23/04	2 wks	$0	$0	40%
80	26.3.4.7.1.2.9.3	Tunes Vs Life time	C. Gattuso	Fri 1/30/04	2 wks	$0	$0	40%
81	26.3.4.7.1.2.9.4	coupling vs lifetime	C. Gattuso	Tue 1/27/04	15 d	$0	$0	40%
82	26.3.4.7.1.2.10	Instrumentation	C. Gattuso	Mon 12/1/03	41 d	$0	$36,508	
83	26.3.4.7.1.2.10.1	Resources for Instrumentation	C. Gattuso	Mon 12/1/03	41 d	$0	$36,508	40%
84	26.3.4.7.1.2.10.2	RWM	C. Gattuso	Mon 12/1/03	8.2 wks	$0	$0	40%
85	26.3.4.7.1.2.10.3	BPM system	C. Gattuso	Mon 12/1/03	2.05 mons	$0	$0	40%
86	26.3.4.7.1.2.10.4	Flying Wire System	C. Gattuso	Mon 12/1/03	41 d	$0	$0	40%
87	26.3.4.7.1.2.10.5	Schottky Calibration	C. Gattuso	Mon 12/1/03	8.2 wks	$0	$0	40%
88	26.3.4.7.1.3	Extraction Commissioning(protons)	C. Gattuso	Tue 3/23/04	12 d	$0	$3,457	
89	26.3.4.7.1.3.1	extraction closure R22	C. Gattuso	Tue 3/23/04	12 d	$0	$3,457	
90	26.3.4.7.1.3.1.1	Resources for extraction closure R22	C. Gattuso	Tue 3/23/04	12 d	$0	$3,457	40%
91	26.3.4.7.1.3.1.2	Commission Beam Line Tuner (BLT)	C. Gattuso	Tue 3/30/04	6 d	$0	$0	
92	26.3.4.7.1.3.1.2.1	Modes of operations	C. Gattuso	Tue 3/30/04	2 d	$0	$0	
93	26.3.4.7.1.3.1.2.1.1	TBT	C. Gattuso	Tue 3/30/04	2 d	$0	$0	40%
94	26.3.4.7.1.3.1.2.2	R22 line	C. Gattuso	Tue 3/30/04	1 d	$0	$0	40%
95	26.3.4.7.1.3.1.2.3	Lambertsons skew quad component R22 line	C. Gattuso	Thu 4/1/04	2 d	$0	$0	40%
96	26.3.4.7.1.3.1.2.4	BPM system	C. Gattuso	Mon 4/5/04	2 d	$0	$0	40%
97	26.3.4.7.2	Pbar Commissioning	C. Gattuso	Mon 12/1/03	122 d	$0	$103,803	
98	26.3.4.7.2.1	Injection Commissioning	C. Gattuso	Mon 12/22/03	21 d	$0	$8,902	
99	26.3.4.7.2.1.1	R22 line tune-up (injection)	C. Gattuso	Mon 12/22/03	21 d	$0	$8,902	
00	26.3.4.7.2.1.1.1	Resources for R22 Line tune up	C. Gattuso	Mon 12/22/03	21 d	$0	$8,902	40%
01	26.3.4.7.2.1.1.2	Time in kickers 304 & 130	C. Gattuso	Mon 12/22/03	1 d	$0	$0	40%
02	26.3.4.7.2.1.1.3	Diagnostics	C. Gattuso	Fri 1/9/04	9.74 d	$0	$0	
03	26.3.4.7.2.1.1.3.1	BPM system	C. Gattuso	Fri 1/9/04	3 d	$0	$0	40%
04	26.3.4.7.2.1.1.3.2	Time in BPM in R22 transfer line	C. Gattuso	Wed 1/14/04	3.38 d	$0	$0	40%
05	26.3.4.7.2.1.1.3.3	Multi wires	C. Gattuso	Wed 1/21/04	2.36 d	$0	$0	40%
06	26.3.4.7.2.1.1.3.4	Toriods	C. Gattuso	Fri 1/23/04	1 d	$0	$0	40%
07	26.3.4.7.2.2	Circulating Beam Commissioning	C. Gattuso	Mon 12/1/03	86 d	$0	$65,166	
08	26.3.4.7.2.2.1	Injection Aperture scans	C. Gattuso	Tue 12/23/03	29 d	$0	$4,351	
09	26.3.4.7.2.2.1.1	Resources for Injection Aperature scans	C. Gattuso	Tue 12/23/03	29 d	$0	$4,351	40%
10	26.3.4.7.2.2.1.2	Set MI counter wave H224:H230:H304	C. Gattuso	Tue 12/23/03	25 d	$0	$0	40%
11	26.3.4.7.2.2.1.3	Set RR counter wave H130:H210:H212	C. Gattuso	Tue 12/30/03	22 d	$0	$0	40%
12	26.3.4.7.2.2.1.4	Verify injection/ extraction positions	C. Gattuso	Tue 1/6/04	19 d	$0	$0	40%
13	26.3.4.7.2.2.2	Injection closure R22	C. Gattuso	Tue 12/30/03	30 d	$0	$1,535	
14	26.3.4.7.2.2.2.1	Resources for injection closure R22	C. Gattuso	Tue 12/30/03	26 d	$0	$1,535	40%
15	26.3.4.7.2.2.2.2	Verify injection/ extraction positions	C. Gattuso	Tue 12/30/03	26 d	$0	$0	40%
16	26.3.4.7.2.2.2.3	Commission Beam Line Tuner (BLT)	C. Gattuso	Mon 2/9/04	4 d	$0	$0	
17	26.3.4.7.2.2.2.3.1	Modes of operations	C. Gattuso	Mon 2/9/04	4 d	$0	$0	
18	26.3.4.7.2.2.2.3.1.1	TBT	C. Gattuso	Mon 2/9/04	2 d	$0	$0	40%
19	26.3.4.7.2.2.2.3.1.2	Flash - Display	C. Gattuso	Wed 2/11/04	2 d	$0	$0	40%
20	26.3.4.7.2.2.3	Energy Match machines	C. Gattuso	Fri 2/13/04	4 d	$0	$512	
21	26.3.4.7.2.2.3.1	Resources for Energy Matching Machines	C. Gattuso	Tue 2/17/04	2 d	$0	$512	40%
22	26.3.4.7.2.2.3.2	Measure energy diff from MI to RR	C. Gattuso	Fri 2/13/04	2 d	$0	$0	40%
23	26.3.4.7.2.2.4	Phase match	C. Gattuso	Mon 1/5/04	19 d	$0	$512	
24	26.3.4.7.2.2.4.1	Resources for Phase Matching	C. Gattuso	Mon 1/5/04	19 d	$0	$512	40%
25	26.3.4.7.2.2.4.2	Adjust Recycler AA marker to minimize phase error	C. Gattuso	Thu 1/29/04	2 d	$0	$0	40%
26	26.3.4.7.2.2.5	Orbit Correction	C. Gattuso	Thu 1/15/04	46 d	$0	$4,408	
27	26.3.4.7.2.2.5.1	Resources for Orbit Correction	C. Gattuso	Thu 1/15/04	41 d	$0	$4,408	40%
28	26.3.4.7.2.2.5.2	verify momentum aperture as set Freq	C. Gattuso	Thu 1/29/04	3 d	$0	$0	40%
29	26.3.4.7.2.2.5.3	verify desired orbit as set	C. Gattuso	Tue 2/3/04	2 d	$0	$0	40%
30	26.3.4.7.2.2.5.4	Ramp compensation	C. Gattuso	Thu 2/5/04	27 d	$0	$0	
31	26.3.4.7.2.2.5.4.1	Using Correctors	C. Gattuso	Thu 2/5/04	27 d	$0	$0	
32	26.3.4.7.2.2.5.4.1.1	120 Gev correction	C. Gattuso	Thu 2/5/04	3 d	$0	$0	40%
33	26.3.4.7.2.2.5.4.1.2	150 Gev Correction	C. Gattuso	Wed 3/10/04	3 d	$0	$0	40%
34	26.3.4.7.2.2.5.5	MI Quad compensation loop	C. Gattuso	Mon 3/15/04	5 d	$0	$0	40%
35	26.3.4.7.2.2.6	Long emit growth measurements	C. Gattuso	Tue 1/20/04	15 d	$0	$4,321	
36	26.3.4.7.2.2.6.1	Resources for Long Emit. Growth Measurements	C. Gattuso	Tue 1/20/04	15 d	$0	$4,321	60%
37	26.3.4.7.2.2.6.2	Pbar Diffusion Rate	C. Gattuso	Tue 1/20/04	3 wks	$0	$0	60%
38	26.3.4.7.2.2.7	Operating point	C. Gattuso	Mon 12/1/03	86 d	$0	$34,015	
39	26.3.4.7.2.2.7.1	Resources for Operation point	C. Gattuso	Mon 12/1/03	86 d	$0	$34,015	40%
40	26.3.4.7.2.2.7.2	Tunes Vs Life time	C. Gattuso	Mon 2/2/04	1 mon	$0	$0	40%
41	26.3.4.7.2.2.7.3	Chrome Vs Life time	C. Gattuso	Fri 1/2/04	1.05 mons	$0	$0	40%
42	26.3.4.7.2.2.7.4	coupling vs lifetime	C. Gattuso	Tue 2/3/04	1 mon	$0	$0	40%
43	26.3.4.7.2.2.8	Instrumentation	C. Gattuso	Mon 2/2/04	31 d	$0	$15,516	
44	26.3.4.7.2.2.8.1	Resources for Instrumentation	C. Gattuso	Mon 2/9/04	26 d	$0	$15,516	40%
45	26.3.4.7.2.2.8.2	RWM	C. Gattuso	Tue 2/17/04	3 d	$0	$0	40%
46	26.3.4.7.2.2.8.3	BPM system	C. Gattuso	Tue 2/17/04	5 d	$0	$0	40%
47	26.3.4.7.2.2.8.4	Beam Line Tuner	C. Gattuso	Mon 2/2/04	1 d	$0	$0	40%
48	26.3.4.7.2.2.8.5	Schottky Calibration	C. Gattuso	Tue 2/17/04	3 d	$0	$0	40%
49	26.3.4.7.2.2.8.6	Toriods	C. Gattuso	Thu 2/5/04	10 d	$0	$0	
50	26.3.4.7.2.2.8.6.1	Ring	C. Gattuso	Fri 2/13/04	4 d	$0	$0	40%
51	26.3.4.7.2.2.8.6.2	transfer line	C. Gattuso	Thu 2/5/04	3 d	$0	$0	40%
52	26.3.4.7.2.3	Extraction Commissioning(Pbars)	C. Gattuso	Thu 2/5/04	26 d	$0	$1,632	
53	26.3.4.7.2.3.1	extraction closure R22	C. Gattuso	Thu 2/5/04	26 d	$0	$1,632	
54	26.3.4.7.2.3.1.1	Resoures for extracton closure R22	C. Gattuso	Fri 2/27/04	10 d	$0	$1,632	40%
55	26.3.4.7.2.3.1.2	Commission Beam Line Tuner (BLT)	C. Gattuso	Thu 2/5/04	3 d	$0	$0	
56	26.3.4.7.2.3.1.2.1	Modes of operations	C. Gattuso	Thu 2/5/04	3 d	$0	$0	
57	26.3.4.7.2.3.1.2.1.1	TBT	C. Gattuso	Thu 2/5/04	3 d	$0	$0	40%
58	26.3.4.7.2.3.1.3	BPM system	C. Gattuso	Tue 2/10/04	6.25 d	$0	$0	40%
59	26.3.4.7.2.4	Recycler Rapid Transfer Commissioning	C. Gattuso	Fri 1/16/04	92 d	$0	$28,102	
60	26.3.4.7.2.4.1	Sequencer modification	C. Gattuso	Fri 1/16/04	92 d	$0	$28,102	
61	26.3.4.7.2.4.1.1	Control system	C. Gattuso	Tue 1/27/04	25 d	$0	$13,596	
62	26.3.4.7.2.4.1.1.1	Resources for controls system	C. Gattuso	Tue 1/27/04	25 d	$0	$13,596	40%
63	26.3.4.7.2.4.1.1.2	Clock Event Designation	C. Gattuso	Tue 1/27/04	1 wk	$0	$0	40%
64	26.3.4.7.2.4.1.1.3	Time Line Generator	C. Gattuso	Tue 2/3/04	1 wk	$0	$0	40%
65	26.3.4.7.2.4.1.1.4	Kicker Timing Changes Modifications	C. Gattuso	Tue 2/10/04	2 wks	$0	$0	40%
66	26.3.4.7.2.4.1.2	Instrumentation	C. Gattuso	Fri 1/16/04	10 d	$0	$9,127	
67	26.3.4.7.2.4.1.2.1	Resources for instrumentation	C. Gattuso	Fri 1/16/04	10 d	$0	$9,127	40%
68	26.3.4.7.2.4.1.2.2	Gated Schottkies	C. Gattuso	Fri 1/16/04	10 d	$0	$0	40%
69	26.3.4.7.2.4.1.2.3	BPM system	C. Gattuso	Fri 1/16/04	2 wks	$0	$0	40%
70	26.3.4.7.2.4.1.2.4	Multi Wire R22 line	C. Gattuso	Fri 1/16/04	1 wk	$0	$0	40%
71	26.3.4.7.2.4.1.3	Cooling system	C. Gattuso	Fri 1/16/04	37.67 d	$0	$5,378	
72	26.3.4.7.2.4.1.3.1	Resources for Cooling System	C. Gattuso	Fri 1/16/04	22 d	$0	$5,378	60%
73	26.3.4.7.2.4.1.3.2	Gated cooling system	C. Gattuso	Fri 1/16/04	22 d	$0	$0	40%
74	26.3.4.7.2.4.1.3.3	transfer function measurements	C. Gattuso	Wed 2/18/04	3 d	$0	$0	40%
75	26.3.4.7.2.4.1.3.4	Signal suppression measurements	C. Gattuso	Mon 2/23/04	3 d	$0	$0	40%
76	26.3.4.7.2.4.1.3.5	Cooling rate measurements	C. Gattuso	Thu 2/26/04	3 d	$0	$0	40%
77	26.3.4.7.2.4.1.3.6	cooling optimization	C. Gattuso	Tue 3/2/04	1.33 wks	$0	$0	40%
78	26.3.4.7.2.4.1.4	Extractions	C. Gattuso	Tue 4/13/04	31 d	$0	$0	
79	26.3.4.7.2.4.1.4.1	Matching	C. Gattuso	Tue 4/13/04	1 d	$0	$0	40%
80	26.3.4.7.2.4.1.4.2	Long. emittance vs Bucket manipulations	C. Gattuso	Wed 4/14/04	2 wks	$0	$0	40%
81	26.3.4.7.2.4.1.4.3	Bucket motion Vs Emittance	C. Gattuso	Wed 4/28/04	2 wks	$0	$0	40%
82	26.3.4.7.2.4.1.4.4	9 batch extraction to fill TEV	C. Gattuso	Wed 5/12/04	2 wks	$0	$0	40%
83	26.3.4.7.3	RF systems	S. Nagaitsev	Fri 11/21/03	135 d	$266,666	$139,375	
84	26.3.4.7.3.1	Resources for RF Front-end Modifications	S. Nagaitsev	Fri 11/21/03	110 d	$0	$124,977	60%
85	26.3.4.7.3.2	RF front-end modifications	S. Nagaitsev	Mon 12/1/03	120 d	$266,666	$14,398	
86	26.3.4.7.3.2.1	Interfacing with Acc RF system	S. Nagaitsev	Mon 12/1/03	41 d	$0	$0	40%
87	26.3.4.7.3.2.2	Cogging	S. Nagaitsev	Tue 2/3/04	1 mon	$0	$0	40%
88	26.3.4.7.3.2.3	RF structure	S. Nagaitsev	Tue 3/2/04	1 mon	$0	$0	40%
89	26.3.4.7.3.2.4	Phase locking	S. Nagaitsev	Tue 3/30/04	2 wks	$0	$0	40%
90	26.3.4.7.3.2.5	Upgrade LLRF front-end	S. Nagaitsev	Mon 2/2/04	80 d	$266,666	$14,398	
91	26.3.4.7.3.2.5.1	Specifications	S. Nagaitsev	Mon 2/2/04	1 wk	$0	$0	60%
92	26.3.4.7.3.2.5.2	Procurement of Diagnostic equipment	S. Nagaitsev	Mon 2/2/04	6 wks	$66,666	$0	60%
93	26.3.4.7.3.2.5.3	Procurement of material	S. Nagaitsev	Mon 2/9/04	2 wks	$200,000	$3,042	60%
94	26.3.4.7.3.2.5.4	Fabrication	S. Nagaitsev	Mon 3/22/04	4 wks	$0	$4,154	100%
95	26.3.4.7.3.2.5.5	Testing	S. Nagaitsev	Mon 4/19/04	5 wks	$0	$7,202	100%
96	26.3.4.7.3.3	Baseline Correction	C. Gattuso	Mon 12/15/03	92 d	$0	$0	60%
97	26.3.4.7.3.4	Beamloading Compensation	C. Gattuso	Mon 12/15/03	92 d	$0	$0	60%
98	26.3.4.7.3.5	Auxilliary ion clearing bucket generator	C. Gattuso	Mon 12/15/03	92 d	$0	$0	60%
99	26.3.4.7.3.6	Beam phase/frequency loop	C. Gattuso	Mon 12/15/03	92 d	$0	$0	60%
00	26.3.4.7.3.7	Longitudinal time domain emittance monitor	C. Gattuso	Mon 12/15/03	92 d	$0	$0	60%
01	26.3.4.7.3.8	Extraction Upgrades	C. Gattuso	Mon 5/24/04	11 d	$0	$0	
02	26.3.4.7.3.8.1	Develop RF stacking states	C. Gattuso	Mon 5/24/04	11 d	$0	$0	
03	26.3.4.7.3.8.1.1	matching	C. Gattuso	Mon 5/24/04	1 d	$0	$0	60%
04	26.3.4.7.3.8.1.2	longitudinal emittance versus bucket manipulation	C. Gattuso	Tue 5/25/04	1 wk	$0	$0	60%
05	26.3.4.7.3.8.1.3	bucket motion versus emittance	C. Gattuso	Wed 6/2/04	1 wk	$0	$0	60%
06	26.3.4.7.4	Beam Physics/modeling	S. Nagaitsev	Mon 12/1/03	150 d	$0	$434,539	
07	26.3.4.7.4.1	Update collider scenarios	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
08	26.3.4.7.4.2	High intensity running(above 100 E10 Pbars) manipulations, extraction	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
09	26.3.4.7.4.3	Chromaticy (optimal with high intensity,cooling)	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
10	26.3.4.7.4.4	Sextupoles (optimal locations, grouping, stop band, ect)	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
11	26.3.4.7.4.5	Longitudinal emittance modeling	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
12	26.3.4.7.4.6	Linear coupling corrections	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
13	26.3.4.7.4.7	Injection upgrade(kicker placement counterwaves)	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
14	26.3.4.7.4.8	Abort line removal	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
15	26.3.4.7.4.9	Broad-band Transvers damper design	S. Nagaitsev	Mon 12/1/03	150 d	$0	$43,212	60%
16	26.3.4.7.4.10	energy matching, all machines	S. Nagaitsev	Mon 12/1/03	150 d	$0	$45,635	60%
17	26.3.4.7.5	RR Vacuum Upgrade	S. Nagaitsev	Mon 11/17/03	294 d	$0	$1,367	
18	26.3.4.7.5.1	FY03 plan includes vacuum work in FY03 shutdown (Milestone)	S. Nagaitsev	Mon 11/17/03	0 d	$0	$0	
19	26.3.4.7.5.2	Evaluation of Vacuum improvements	S. Nagaitsev	Mon 11/17/03	20 d	$0	$905	20%
20	26.3.4.7.5.3	Further Vacuum Work	S. Nagaitsev	Mon 12/1/03	286 d	$0	$462	100%
21	26.3.4.7.5.3.1	Resources for vacuum work	S. Nagaitsev	Mon 12/1/03	272 d	$0	$462	60%
22	26.3.4.7.5.3.2	Electron cooling section installation plan	S. Nagaitsev	Fri 12/19/03	144 d	$0	$0	60%
23	26.3.4.7.5.3.3	flying wire installation	S. Nagaitsev	Mon 1/12/04	6 wks	$0	$0	60%
24	26.3.4.7.5.3.4	commission clearing current monitoring	S. Nagaitsev	Fri 12/19/03	60 d	$0	$0	60%
25	26.3.4.7.5.3.5	TSP upgrade plan	S. Nagaitsev	Fri 12/19/03	102 d	$0	$0	60%
26	26.3.4.7.5.3.6	Upgrade TSP system	S. Nagaitsev	Tue 2/3/04	144 d	$0	$0	60%
27	26.3.4.7.5.3.7	vacuum monitoring and TSP firing	S. Nagaitsev	Fri 12/19/03	272 d	$0	$0	60%
28	26.3.4.8	Recycler Upgrades	S. Nagaitsev	Thu 4/1/04	159 d	$508,332	$151,415	
29	26.3.4.8.1	Transfer lines	S. Nagaitsev	Wed 7/7/04	90 d	$375,000	$24,921	
30	26.3.4.8.1.1	Removal of the abort line lambertsons	S. Nagaitsev	Wed 9/1/04	3 wks	$0	$3,767	60%
31	26.3.4.8.1.2	Reconfigure R22 and R32 Transfer line	S. Nagaitsev	Wed 7/7/04	90 d	$375,000	$21,154	
32	26.3.4.8.1.2.1	Procurement of kicker material	S. Nagaitsev	Wed 7/7/04	1 wk	$375,000	$2,173	60%
33	26.3.4.8.1.2.2	Fabrication of kicker (new spare)	S. Nagaitsev	Wed 8/4/04	3 mons	$0	$12,462	60%
34	26.3.4.8.1.2.3	Testing of kicker	S. Nagaitsev	Thu 10/28/04	2 wks	$0	$4,346	60%
35	26.3.4.8.1.2.4	Procurement of kicker stand material	S. Nagaitsev	Thu 10/28/04	1 wk	$0	$2,173	60%
36	26.3.4.8.2	RR Stochastic cooling system	S. Nagaitsev	Thu 4/1/04	159 d	$133,332	$68,139	
37	26.3.4.8.2.1	Upgrades to stochastic cooling system	S. Nagaitsev	Thu 4/1/04	159 d	$66,666	$40,331	
38	26.3.4.8.2.1.0	Upgrades to stochastic cooling system - Labor hours	S. Nagaitsev	Mon 6/28/04	98 d	$0	$28,808	
39	26.3.4.8.2.1.1	Spefications for upgrade	S. Nagaitsev	Thu 4/1/04	2 mons	$0	$11,523	60%
40	26.3.4.8.2.1.2	Procurement of Diagnostic equipment	S. Nagaitsev	Thu 4/1/04	6 wks	$66,666	$0	60%
41	26.3.4.8.2.1.3	Procurement of material	S. Nagaitsev	Thu 5/27/04	2 mons	$0	$0	60%
42	26.3.4.8.2.1.4	installation of upgrade	S. Nagaitsev	Mon 7/26/04	1 mon	$0	$0	60%
43	26.3.4.8.2.2	Cross talk btw. SC and Schottky pickups	S. Nagaitsev	Thu 4/1/04	159 d	$66,666	$28,808	
44	26.3.4.8.2.2.0	Cross talk btw. SC and Schottky pickups - Labor hours	S. Nagaitsev	Mon 6/28/04	98 d	$0	$28,808	60%
45	26.3.4.8.2.2.1	Spefications for upgrade	S. Nagaitsev	Thu 4/1/04	2 mons	$0	$0	60%
46	26.3.4.8.2.2.2	Procurement of Diagnostic equipment	S. Nagaitsev	Thu 4/1/04	6 wks	$66,666	$0	60%
47	26.3.4.8.2.2.3	Procurement of material	S. Nagaitsev	Thu 5/27/04	2 mons	$0	$0	60%
48	26.3.4.8.2.2.4	installation of upgrade	S. Nagaitsev	Mon 7/26/04	1 mon	$0	$0	60%
49	26.3.4.8.3	Shutdown work for Recycler Upgrades	S. Nagaitsev	Mon 8/23/04	52 d	$0	$57,356	
50	26.3.4.8.3.1	Install TSP upgrades	S. Nagaitsev	Wed 8/25/04	10 wks	$0	$46,971	40%
51	26.3.4.8.3.2	Install transfer line upgrades (spare kicker - no link from 26.3.4.8.1.2.3))	S. Nagaitsev	Mon 8/23/04	10 wks	$0	$10,385	60%
52	26.3.4.9	Management, evaluation and planning	S. Nagaitsev	Mon 12/1/03	272 d	$0	$212,579	
53	26.3.4.9.0	Management, evaluation and planning - Labor hours	S. Nagaitsev	Mon 12/1/03	272 d	$0	$128,049	60%
54	26.3.4.9.1	Vacuum Evaluation	S. Nagaitsev	Mon 12/8/03	26 d	$0	$0	60%
55	26.3.4.9.2	Vacuum performance	S. Nagaitsev	Mon 1/19/04	0 d	$0	$0	
56	26.3.4.9.3	Lifetime Evaluation	S. Nagaitsev	Mon 12/15/03	8 d	$0	$0	60%
57	26.3.4.9.4	Vacuum and Machine admittence	S. Nagaitsev	Tue 1/27/04	0 d	$0	$0	
58	26.3.4.9.5	Transferline Performance Evaluation	S. Nagaitsev	Mon 12/15/03	50 d	$0	$0	60%
59	26.3.4.9.6	MI to RR Trans >85%, roundtrip <3 pi growth	S. Nagaitsev	Fri 2/27/04	0 d	$0	$0	
60	26.3.4.9.7	Stacking Evaluation	S. Nagaitsev	Mon 12/15/03	61 d	$0	$0	60%
61	26.3.4.9.8	Stacking Performance with 100E10	S. Nagaitsev	Mon 3/15/04	0 d	$0	$0	
62	26.3.4.9.9	Beam Properties Evaluation	S. Nagaitsev	Mon 3/15/04	16 d	$0	$0	60%
63	26.3.4.9.10	Equilibruim Properties at 200 E10	S. Nagaitsev	Mon 4/5/04	0 d	$0	$0	
64	26.3.4.9.11	Rapid Transfer Performance Evaluation	S. Nagaitsev	Mon 3/15/04	27 d	$0	$0	60%
65	26.3.4.9.12	Recycler Rapid Transfer Commissioned	S. Nagaitsev	Tue 4/20/04	0 d	$0	$0	



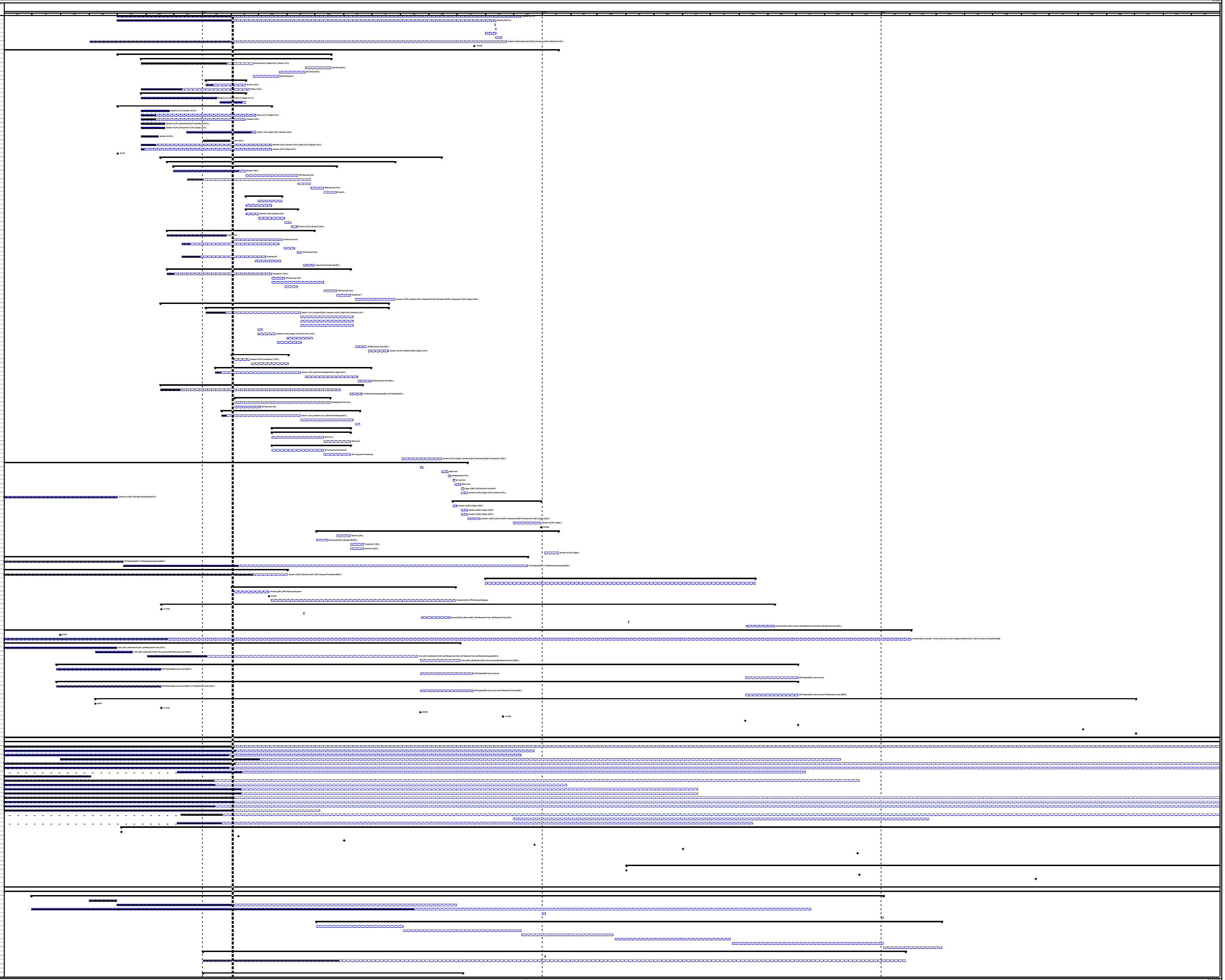
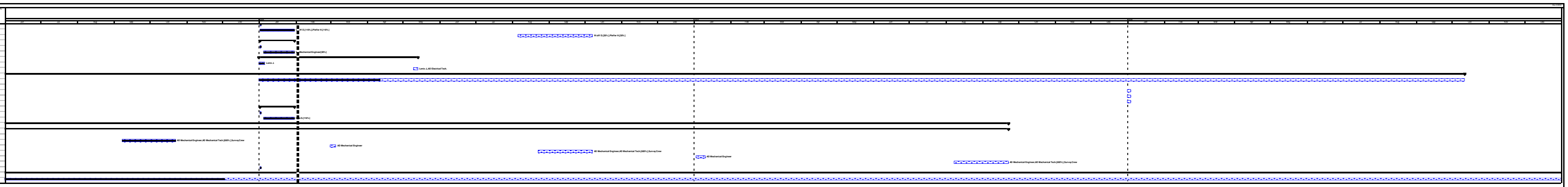
ID	WBS	Name	In Charge	Start	Duration	M&S Base Cost Est.	Labor Base Cost Est.	Contingency %
666	26.3.4.9.13	Extraction Evaluation	S. Nagaitsev	[illegible]	14 d	$0	$0	60%
667	26.3.4.9.14	Extraction Commissioned	S. Nagaitsev	Tue 6/8/04	0 d	$0	$0	
668	26.3.4.9.15	Overall Evaluation	S. Nagaitsev	Mon 5/3/04	21 d	$0	$0	60%
669	26.3.4.9.16	Recycler commissioned for Electron cooling	S. Nagaitsev	Tue 6/1/04	0 d	$0	$0	
670	26.3.4.9.17	Studies planning and Scheduling	S. Nagaitsev	Mon 12/1/03	272 d	$0	$42,265	60%
671	26.3.4.9.18	Shutdown planning and Scheduling	S. Nagaitsev	Mon 12/1/03	272 d	$0	$42,265	60%
672	**26.3.5**	**Electron Cooling**	**S. Nagaitsev**	**Mon 3/3/03**	**567 d**	**$1,356,000**	**$1,700,620**	
673	**26.3.5.1**	**Commission Full Beamline**	**S. Nagaitsev**	**Mon 3/3/03**	**273 d**	**$88,000**	**$543,717**	
674	26.3.5.1.1	Align elements	S. Nagaitsev	Mon 3/17/03	11 d	$0	$8,589	20%
675	26.3.5.1.2	Install Vac. Components	S. Nagaitsev	Mon 3/3/03	33 d	$5,000	$11,740	20%
676	26.3.5.1.3	Leak check	S. Nagaitsev	Thu 4/17/03	11 d	$2,000	$2,048	20%
677	26.3.5.1.4	Bake	S. Nagaitsev	Fri 5/2/03	11 d	$2,000	$2,048	20%
678	26.3.5.1.5	Low-current DC beam transport	S. Nagaitsev	Mon 5/19/03	43 d	$12,000	$132,559	100%
679	26.3.5.1.6	Full current pulsed beam transport	S. Nagaitsev	Mon 7/21/03	132 d	$24,000	$275,982	100%
680	26.3.5.1.7	Commission diagnostics	S. Nagaitsev	Mon 5/19/03	196 d	$30,000	$66,990	60%
681	26.3.5.1.8	Commission NMR loop	S. Nagaitsev	Mon 5/19/03	196 d	$10,000	$10,885	40%
682	26.3.5.1.9	Commission magnetic shielding	S. Nagaitsev	Mon 5/19/03	196 d	$3,000	$19,318	40%
683	26.3.5.1.10	Document best conditions	S. Nagaitsev	Tue 3/2/04	22 d	$0	$13,581	20%
684	26.3.5.1.11	Demonstrate beam properties at Wide Band Lab (Milestone)	S. Nagaitsev	Wed 3/31/04	0 d	$0	$0	
685	**26.3.5.2**	**Design and procure components**	**J. Leibfritz/S. Nagaitsev**	**Mon 9/1/03**	**349 d**	**$1,085,000**	**$197,530**	
686	26.3.5.2.1	Pelletron extension parts received	J. Leibfritz/S. Nagaitsev	Mon 3/1/04	0 d	$0	$0	
687	26.3.5.2.2	Pelletron extension parts unloaded	J. Leibfritz/S. Nagaitsev	Mon 3/1/04	21 d	$5,000	$478	40%
688	26.3.5.2.3	Procure additional parts for tank extension	J. Leibfritz/S. Nagaitsev	Mon 9/1/03	102 d	$30,000	$18,615	60%
689	26.3.5.2.4	New bend chambers	J. Leibfritz/S. Nagaitsev	Mon 9/1/03	207 d	$30,000	$8,157	40%
690	26.3.5.2.5	Supports	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$65,000	$29,311	40%
691	26.3.5.2.6	Transfer line	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$200,000	$21,983	40%
692	26.3.5.2.7	Return line	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$15,000	$21,983	40%
693	26.3.5.2.8	Cooling section	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$70,000	$30,487	40%
694	26.3.5.2.9	Power supplies	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$60,000	$11,169	40%
695	26.3.5.2.10	Controls	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$60,000	$7,692	40%
696	26.3.5.2.11	Vacuum equipment	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	186 d	$130,000	$8,326	40%
697	26.3.5.2.12	Magnetic shields	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$70,000	$12,489	40%
698	26.3.5.2.13	Cables	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	188 d	$260,000	$11,169	40%
699	26.3.5.2.14	Safety systems	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	228 d	$80,000	$4,214	40%
700	26.3.5.2.15	MI-31 Beam permit	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	228 d	$0	$5,432	40%
701	26.3.5.2.16	Modify MI safety documents, procedures	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	228 d	$0	$4,214	40%
702	26.3.5.2.17	New relay racks	J. Leibfritz/S. Nagaitsev	Wed 10/1/03	132 d	$15,000	$1,811	40%
703	26.3.5.2.18	Assemble new relay racks	J. Leibfritz/S. Nagaitsev	Thu 1/15/04	72 d	$5,000	$0	40%
704	**26.3.5.3**	**Disassemble Wideband Facility**	**J. Leibfritz/S. Nagaitsev**	**Mon 3/1/04**	**102 d**	**$37,000**	**$32,550**	
705	26.3.5.3.1	Prepare HA, get approvals, train people	J. Leibfritz/S. Nagaitsev	Mon 3/1/04	10 d	$0	$831	40%
706	26.3.5.3.2	As-Found Alignment	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	5 d	$0	$3,904	40%
707	26.3.5.3.3	Document components, Photos, Labels.	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	5 d	$2,000	$623	40%
708	26.3.5.3.4	Electrical Racks	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	20 d	$2,000	$3,292	60%
709	26.3.5.3.5	Cabling	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	30 d	$5,000	$0	60%
710	26.3.5.3.6	Control Room	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	20 d	$0	$4,362	60%
711	26.3.5.3.7	Water System	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	20 d	$0	$1,246	60%
712	26.3.5.3.8	Cooling Section	J. Leibfritz/S. Nagaitsev	Thu 4/8/04	25 d	$0	$2,492	60%
713	26.3.5.3.9	Transferline	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	20 d	$0	$4,115	60%
714	26.3.5.3.10	Cage	J. Leibfritz/S. Nagaitsev	Thu 5/13/04	5 d	$0	$623	60%
715	26.3.5.3.11	SF6 Piping and Sled	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	20 d	$15,000	$1,246	60%
716	26.3.5.3.12	Pelletron Internal Components	J. Leibfritz/S. Nagaitsev	Thu 5/20/04	20 d	$5,000	$2,077	60%
717	26.3.5.3.13	Counterweight System	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	20 d	$2,000	$166	60%
718	26.3.5.3.14	Service Platform	J. Leibfritz/S. Nagaitsev	Thu 5/13/04	2 d	$0	$125	60%
719	26.3.5.3.15	Catwalk	J. Leibfritz/S. Nagaitsev	Fri 6/18/04	3 d	$0	$1,869	60%
720	26.3.5.3.16	Pelletron Tank	J. Leibfritz/S. Nagaitsev	Wed 6/23/04	8 d	$4,000	$348	60%
721	26.3.5.3.17	Staircase	J. Leibfritz/S. Nagaitsev	Tue 7/6/04	3 d	$0	$1,869	60%
722	26.3.5.3.18	Concrete Blocks	J. Leibfritz/S. Nagaitsev	Fri 7/9/04	7 d	$0	$1,869	60%
723	26.3.5.3.19	Concrete Silo	J. Leibfritz/S. Nagaitsev	Tue 7/6/04	13 d	$0	$2,492	60%
724	**26.3.5.4**	**Transport Components to MI-31**	**J. Leibfritz**	**Mon 3/1/04**	**144 d**	**$24,000**	**$16,882**	
725	26.3.5.4.1	Prepare HA, get approvals, train people	J. Leibfritz	Mon 3/1/04	15 d	$0	$212	40%
726	26.3.5.4.2	Remove SF6 gas from Storage	J. Leibfritz	Thu 4/1/04	3 d	$12,000	$522	60%
727	26.3.5.4.3	SF6 Storage Tank	J. Leibfritz	Tue 4/6/04	2 d	$3,000	$174	60%
728	26.3.5.4.4	Counterweight System	J. Leibfritz	Thu 5/13/04	2 d	$0	$831	60%
729	26.3.5.4.5	Concrete Silo	J. Leibfritz	Fri 7/23/04	3 d	$0	$1,246	60%
730	26.3.5.4.6	Concrete Blocks	J. Leibfritz	Tue 7/20/04	2 d	$0	$831	60%
731	26.3.5.4.7	Staircase	J. Leibfritz	Thu 7/22/04	1 d	$0	$415	60%
732	26.3.5.4.8	Lower Pelletron Tank	J. Leibfritz	Wed 8/4/04	2 d	$3,000	$174	60%
733	26.3.5.4.9	Lower Pelletron Internal Components	J. Leibfritz	Wed 8/11/04	3 d	$0	$1,246	60%
734	26.3.5.4.10	Middle Pelletron Tank	J. Leibfritz	Thu 8/26/04	2 d	$3,000	$174	60%
735	26.3.5.4.11	Upper Pelletron Tank	J. Leibfritz	Wed 9/1/04	2 d	$3,000	$174	60%
736	26.3.5.4.12	Service Platform	J. Leibfritz	Thu 9/9/04	1 d	$0	$415	60%
737	26.3.5.4.13	Catwalk	J. Leibfritz	Thu 9/9/04	1 d	$0	$415	60%
738	26.3.5.4.14	Pelletron Internal Components	J. Leibfritz	Wed 9/15/04	5 d	$0	$2,077	60%
739	26.3.5.4.15	SF6 Piping and Sled	J. Leibfritz	Thu 5/13/04	1 d	$0	$415	60%
740	26.3.5.4.16	Cage	J. Leibfritz	Tue 6/1/04	2 d	$0	$831	60%
741	26.3.5.4.17	Transferline Components	J. Leibfritz	Fri 8/13/04	2 d	$0	$831	60%
742	26.3.5.4.18	Control Room	J. Leibfritz	Thu 5/13/04	2 d	$0	$831	60%
743	26.3.5.4.19	Prepare and stage cable pulls	J. Leibfritz	Thu 5/13/04	5 d	$0	$3,106	60%
744	26.3.5.4.20	Electrical Racks	J. Leibfritz	Thu 5/13/04	3 d	$0	$1,864	60%
745	**26.3.5.5**	**Install Pelletron at MI-31**	**J. Leibfritz/S. Nagaitsev**	**Mon 3/1/04**	**154 d**	**$141,000**	**$56,986**	
746	26.3.5.5.1	Prepare HA, get approvals, train people	J. Leibfritz/S. Nagaitsev	Mon 3/1/04	15 d	$0	$415	40%
747	26.3.5.5.2	SF6 Storage Tank	J. Leibfritz/S. Nagaitsev	Thu 4/8/04	2 d	$4,000	$174	60%
748	26.3.5.5.3	Fill SF6 Storage Tank	J. Leibfritz/S. Nagaitsev	Mon 4/12/04	4 d	$15,000	$869	60%
749	26.3.5.5.4	Counterweight System	J. Leibfritz/S. Nagaitsev	Thu 9/9/04	2 d	$2,000	$208	60%
750	26.3.5.5.5	Survey Component Locations	J. Leibfritz/S. Nagaitsev	Thu 4/1/04	4 d	$0	$3,123	60%
751	26.3.5.5.6	Concrete Silo	J. Leibfritz/S. Nagaitsev	Wed 7/28/04	5 d	$0	$3,333	60%
752	26.3.5.5.7	Concrete Blocks	J. Leibfritz/S. Nagaitsev	Wed 8/4/04	3 d	$0	$2,000	60%
753	26.3.5.5.8	Staircase	J. Leibfritz/S. Nagaitsev	Mon 8/9/04	4 d	$3,000	$2,666	60%
754	26.3.5.5.9	Lower Pelletron Tank	J. Leibfritz/S. Nagaitsev	Fri 8/6/04	3 d	$10,000	$261	60%
755	26.3.5.5.10	Lower Pelletron Internal Components	J. Leibfritz/S. Nagaitsev	Mon 8/16/04	8 d	$10,000	$3,323	60%
756	26.3.5.5.11	Middle Pelletron Tank	J. Leibfritz/S. Nagaitsev	Mon 8/30/04	2 d	$10,000	$174	60%
757	26.3.5.5.12	Upper Pelletron Tank	J. Leibfritz/S. Nagaitsev	Fri 9/3/04	3 d	$10,000	$261	60%
758	26.3.5.5.13	Service Platform	J. Leibfritz/S. Nagaitsev	Fri 9/10/04	3 d	$1,000	$1,246	60%
759	26.3.5.5.14	Catwalk	J. Leibfritz/S. Nagaitsev	Fri 9/10/04	3 d	$1,000	$1,246	60%
760	26.3.5.5.15	Pelletron Internal Components	J. Leibfritz/S. Nagaitsev	Wed 9/22/04	10 d	$10,000	$4,154	60%
761	26.3.5.5.16	SF6 Piping and Sled	J. Leibfritz/S. Nagaitsev	Fri 5/14/04	5 d	$8,000	$869	60%
762	26.3.5.5.17	Cage	J. Leibfritz/S. Nagaitsev	Mon 8/9/04	4 d	$0	$2,666	60%
763	26.3.5.5.18	Transferline Components	J. Leibfritz/S. Nagaitsev	Tue 8/17/04	15 d	$0	$6,231	60%
764	26.3.5.5.19	Control Room	J. Leibfritz/S. Nagaitsev	Mon 5/17/04	10 d	$15,000	$8,308	60%
765	26.3.5.5.20	Electrical Racks	J. Leibfritz/S. Nagaitsev	Tue 5/18/04	15 d	$0	$8,083	60%
766	26.3.5.5.21	Cooling Water + Utilities	J. Leibfritz/S. Nagaitsev	Mon 8/2/04	10 d	$40,000	$2,908	60%
767	26.3.5.5.22	Safety Systems	J. Leibfritz/S. Nagaitsev	Fri 8/27/04	7 d	$2,000	$4,469	60%
768	**26.3.5.6**	**Commission Pelletron**	**S. Nagaitsev**	**Tue 10/26/04**	**50 d**	**$0**	**$68,923**	
769	26.3.5.6.1	Pelletron installed at MI-31 (Milestone)	S. Nagaitsev	Tue 10/26/04	0 d	$0	$0	
770	26.3.5.6.2	Controls	S. Nagaitsev	Wed 10/27/04	10 d	$0	$10,308	60%
771	26.3.5.6.3	Voltage	S. Nagaitsev	Wed 11/10/04	20 d	$0	$29,308	60%
772	26.3.5.6.4	U-Bend Beam	S. Nagaitsev	Fri 12/10/04	20 d	$0	$29,308	60%
773	**26.3.5.7**	**Install E-Cool Transferline**	**J. Leibfritz**	**Thu 7/1/04**	**67 d**	**$48,000**	**$13,969**	
774	26.3.5.7.1	Prepare HA, get approvals, train people	J. Leibfritz	Thu 7/1/04	10 d	$0	$212	40%
775	26.3.5.7.2	Pull cables	J. Leibfritz/S. Nagaitsev	Mon 9/13/04	8 d	$45,000	$0	40%
776	26.3.5.7.3	Stands/Supports	J. Leibfritz	Mon 9/13/04	5 d	$3,000	$2,729	40%
777	26.3.5.7.4	Magnets	J. Leibfritz	Thu 9/23/04	5 d	$0	$2,729	40%
778	26.3.5.7.5	Beamtubes	J. Leibfritz	Thu 9/23/04	3 d	$0	$1,246	40%
779	26.3.5.7.6	Safety Systems	J. Leibfritz	Wed 9/1/04	8 d	$0	$3,831	40%
780	26.3.5.7.7	Alignment	J. Leibfritz	Thu 9/30/04	4 d	$0	$3,123	40%
781	**26.3.5.8**	**Modifications to MI/RR**	**J. Leibfritz**	**Thu 5/1/03**	**341 d**	**$106,000**	**$8,083**	
782	26.3.5.8.1	Prepare HA, get approvals, train people	J. Leibfritz	Thu 5/1/03	90 d	$0	$514	40%
783	26.3.5.8.2	Modify LCW Headers	J. Leibfritz	Mon 8/23/04	4 d	$30,000	$1,246	60%
784	26.3.5.8.3	Modify Bus	J. Leibfritz	Fri 8/27/04	5 d	$70,000	$1,246	60%
785	26.3.5.8.4	Modify Gate	J. Leibfritz	Fri 9/3/04	2 d	$0	$623	40%
786	26.3.5.8.5	Move LEP Magnets	J. Leibfritz	Mon 8/23/04	3 d	$4,000	$1,507	40%
787	26.3.5.8.6	Move BPM's	J. Leibfritz	Thu 8/26/04	5 d	$2,000	$2,077	40%
788	26.3.5.8.7	Remove septum from MI-30	J. Leibfritz	Thu 8/26/04	3 d	$0	$1,869	40%
789	**26.3.5.9**	**Install Cooling Section in RR**	**J. Leibfritz/S. Nagaitsev**	**Tue 6/1/04**	**122 d**	**$17,000**	**$29,891**	
790	26.3.5.9.1	Prepare HA, get approvals, train people	J. Leibfritz/S. Nagaitsev	Mon 7/26/04	5 d	$0	$514	40%
791	26.3.5.9.2	Remove Steel Shielding Plugs	J. Leibfritz/S. Nagaitsev	Fri 9/3/04	2 d	$2,000	$1,246	40%
792	26.3.5.9.3	Install Vac. Spool in Shielding	J. Leibfritz/S. Nagaitsev	Wed 9/8/04	1 d	$0	$623	40%
793	26.3.5.9.4	Fill Shielding with Beads	J. Leibfritz/S. Nagaitsev	Thu 9/9/04	2 d	$5,000	$0	40%
794	26.3.5.9.5	Install Stands	J. Leibfritz/S. Nagaitsev	Tue 6/1/04	5 d	$5,000	$2,512	40%
795	26.3.5.9.6	Install Solenoids	J. Leibfritz/S. Nagaitsev	Thu 9/23/04	6 d	$3,000	$4,260	40%
796	26.3.5.9.7	Install magnets	J. Leibfritz/S. Nagaitsev	Fri 10/1/04	4 d	$2,000	$2,840	40%
797	26.3.5.9.8	Install Vac. System	J. Leibfritz/S. Nagaitsev	Mon 10/4/04	10 d	$0	$6,231	60%
798	26.3.5.9.9	Alignment	J. Leibfritz/S. Nagaitsev	Wed 10/13/04	3 d	$0	$2,342	60%
799	26.3.5.9.10	Magnetic Measurements	J. Leibfritz/S. Nagaitsev	Thu 10/14/04	4 d	$0	$2,262	60%
800	26.3.5.9.11	Pump Down Vacuum	J. Leibfritz/S. Nagaitsev	Mon 11/8/04	2 d	$0	$831	40%
801	26.3.5.9.12	Leak Check	J. Leibfritz/S. Nagaitsev	Wed 11/10/04	3 d	$0	$1,246	60%
802	26.3.5.9.13	Bake Vac. System	J. Leibfritz/S. Nagaitsev	Mon 11/15/04	5 d	$0	$4,985	40%
803	**26.3.5.10**	**Commission Cooling Section**	**S. Nagaitsev**	**Wed 10/20/04**	**65 d**	**$0**	**$29,685**	
804	26.3.5.10.1	Magnetic Measurements	S. Nagaitsev	Wed 10/20/04	9 d	$0	$5,654	60%
805	26.3.5.10.2	Alignment	S. Nagaitsev	Tue 11/2/04	4 d	$0	$3,123	40%
806	26.3.5.10.3	Commission e-beam	S. Nagaitsev	Thu 1/13/05	10 d	$0	$20,908	100%
807	26.3.5.11	Commission Electron Cooling	S. Nagaitsev	Fri 1/28/05	88 d	$0	$101,403	60%
808	26.3.5.12	Electron Cooling Operational (Milestone)	J. Spalding	Wed 6/1/05	0 d	$0	$0	
809	**26.3.6**	**Rapid Transfers**	**E. Harms**	**Tue 4/1/03**	**555 d**	**$537,000**	**$751,450**	
810	26.3.6.1	Document Fast Transfer scheme	E. Harms	Tue 4/1/03	15 d	$0	$1,096	40%
811	**26.3.6.2**	**Beam Line Regulation**	**E. Harms**	**Tue 4/1/03**	**224 d**	**$12,000**	**$25,029**	
812	26.3.6.2.1	Determine magnetic field tolerance	E. Harms	Tue 4/1/03	5 d	$0	$2,058	60%
813	26.3.6.2.2	Measure and improve power supply regulation	E. Harms	Fri 9/5/03	100 d	$0	$13,644	60%
814	**26.3.6.2.3**	**Ramp waveform control of AP1**	**E. Harms**	**Fri 1/2/04**	**35 d**	**$12,000**	**$9,327**	
815	26.3.6.2.3.1	Build new 465 cards	E. Harms	Fri 1/2/04	20 d	$12,000	$6,231	40%
816	26.3.6.2.3.2	Install and commission new 465 cards	E. Harms	Fri 1/9/04	20 d	$0	$3,096	40%
817	**26.3.6.3**	**RT Software**	**E. Harms**	**Tue 4/22/03**	**496 d**	**$0**	**$243,944**	
818	26.3.6.3.1	Streamline Sequencer	E. Harms	Tue 4/22/03	200 d	$0	$548	60%
819	26.3.6.3.2	465 card application	E. Harms	Mon 2/2/04	60 d	$0	$24,000	60%
820	26.3.6.3.3	Orbit Correction	E. Harms	Mon 4/26/04	90 d	$0	$34,408	60%
821	26.3.6.3.4	Lattice measurement	E. Harms	Mon 4/26/04	80 d	$0	$41,877	60%
822	26.3.6.3.5	TBT correction	E. Harms	Mon 4/26/04	90 d	$0	$47,112	60%
823	26.3.6.3.6	RT: other software	E. Harms	Wed 5/26/04	220 d	$0	$96,000	100%
824	**26.3.6.4**	**Oscillation Feedback and Control**	**E. Harms**	**Sun 6/1/03**	**512 d**	**$0**	**$108,104**	
825	**26.3.6.4.1**	**MI Injection Damper**	**E. Harms**	**Sun 6/1/03**	**216 d**	**$0**	**$107,692**	
826	26.3.6.4.1.1	Specify necessary damper voltage	E. Harms	Sun 6/1/03	167 d	$0	$16,462	60%
827	26.3.6.4.1.2	Determine scope of work	E. Harms	Mon 6/30/03	147 d	$0	$8,231	60%
828	26.3.6.4.1.3	Modifications to low level system	E. Harms	Fri 7/25/03	129 d	$0	$34,777	60%
829	26.3.6.4.1.4	Test low level	E. Harms	Tue 1/27/04	10 d	$0	$6,423	40%
830	26.3.6.4.1.5	Commission Damper System for pbars	E. Harms	Tue 2/10/04	44 d	$0	$41,800	60%
831	26.3.6.4.2	Accumulator Quad pickup	E. Harms	Tue 6/1/04	261 d	$0	$412	60%
832	**26.3.6.5**	**Diagnostics**	**E. Harms**	**Tue 7/1/03**	**428 d**	**$505,000**	**$357,200**	
833	**26.3.6.5.1**	**P1, P2, AP1, AP3 53 MHz BPM upgrade**	**E. Harms**	**Tue 7/1/03**	**428 d**	**$284,000**	**$342,320**	
834	26.3.6.5.1.1	Specify and design transfer line BPM upgrade	E. Harms	Tue 7/1/03	218 d	$0	$377	60%
835	26.3.6.5.1.2	Review specifications and plan for transfer line BPM upgrade	E. Harms	Wed 5/12/04	0 d	$0	$0	
836	26.3.6.5.1.3	P1, P2, AP1, AP3 53 MHz BPM upgrade task	E. Harms	Thu 5/13/04	210 d	$284,000	$341,942	60%
837	**26.3.6.5.2**	**Hall Probes**	**E. Harms**	**Tue 6/15/04**	**59 d**	**$221,000**	**$14,880**	**60%**
838	26.3.6.5.2.0	Hall Probes - Labor hours	E. Harms	Tue 6/15/04	40 d	$0	$12,509	60%
839	26.3.6.5.2.1	Place Orders for Probes (UID 1147)	E. Harms	Fri 7/16/04	25 d	$0	$0	60%
840	26.3.6.5.2.2	Delivery of Probes	E. Harms	Fri 8/20/04	10 d	$221,000	$0	60%
841	26.3.6.5.2.3	Engineer Mechanical Positioning	E. Harms	Fri 7/16/04	5 d	$0	$1,087	40%
842	26.3.6.5.2.4	Installation	E. Harms	Fri 9/3/04	2 d	$0	$1,285	40%
843	26.3.6.6	Commission Fast Transfers	E. Harms	Wed 4/13/05	44 d	$0	$16,077	60%
844	**26.3.6.7**	**8-GeV EnergyMatch Across Complex**	**D. McGinnis**	**Mon 12/1/03**	**170 d**	**$20,000**	**$0**	
845	26.3.6.7.1	DB-MI Phase Alignment	B. Ashmanskas	Mon 12/1/03	88 d	$20,000	$0	60%
846	26.3.6.7.2	Develop complex wide plan for 8Gev energy match	D. McGinnis	Mon 3/1/04	44 d	$0	$0	60%
847	26.3.6.7.3	Review 8Gev energy match plan	D. McGinnis	Thu 4/29/04	0 d	$0	$0	
848	26.3.6.7.4	Study and implement 8-GeV energy match	D. McGinnis	Fri 4/30/04	66 d	$0	$0	60%
849	26.3.6.8	Rapid Transfers Operational (Milestone)	D. McGinnis	Tue 6/14/05	0 d	$0	$0	
850	**26.4**	**Tevatron High Luminosity- Vladimir Shiltsev**	**V Shiltsev**	**Wed 1/1/03**	**1095 d**	**$5,577,960**	**$8,058,865**	
851	**26.4.1**	**Tevatron Task Force**	**V. Lebedev**	**Thu 1/2/03**	**1000 d**	**$0**	**$1,856,039**	
852	26.4.1.1	Tevatron Task Force Work	V. Lebedev	Thu 1/2/03	1000 d	$0	$1,856,039	40%
853	**26.4.2**	**Beam-beam Limitations**	**T. Sen**	**Wed 1/1/03**	**1095 d**	**$5,000**	**$452,692**	
854	26.4.2.1	Beam-beam tracking	T. Sen	Thu 1/2/03	445 d	$5,000	$0	40%
855	26.4.2.2	BB Studies and Analysis	T. Sen	Wed 1/1/03	1095 d	$0	$452,692	60%
856	**26.4.3**	**Active Beam-Beam Compensation**	**V Shiltsev**	**Wed 1/1/03**	**1032 d**	**$1,250,000**	**$1,184,048**	
857	**26.4.3.1**	**BBC: Tevatron Electron Lens**	**V. Shiltsev**	**Wed 1/1/03**	**1032 d**	**$1,250,000**	**$1,077,048**	
858	26.4.3.1.1	TEL-1 beam studies	V. Shiltsev	Wed 1/1/03	348 d	$0	$92,185	60%
859	**26.4.3.1.2**	**TEL-1 upgrades**	**V. Shiltsev**	**Wed 1/1/03**	**531 d**	**$470,000**	**$292,749**	
860	26.4.3.1.2.1	TEL vacuum modifications	V. Sidorov	Wed 1/1/03	301 d	$70,000	$64,200	40%
861	26.4.3.1.2.2	TEL spare collector	V. Sidorov	Mon 3/3/03	44 d	$20,000	$3,825	40%
862	26.4.3.1.2.3	TEL spare HV modulator	H. Pfeffer	Mon 3/3/03	212 d	$30,000	$11,474	40%
863	26.4.3.1.2.4	TEL spare magnets	V. Shiltsev	Tue 4/1/03	283 d	$250,000	$0	40%
864	26.4.3.1.2.5	TEL 18kV modulator	I. Terechkine	Mon 2/2/04	280 d	$70,000	$113,000	40%
865	26.4.3.1.2.6	TEL BPM upgrade	J. Crisp	Mon 3/3/03	304 d	$10,000	$80,982	40%
866	26.4.3.1.2.7	Install second TEL	V. Shiltsev	Fri 11/19/04	15 d	$20,000	$19,269	60%
867	26.4.3.1.3	Assemble and test second (spare) TEL at F48	V. Shiltsev	Fri 5/14/04	132 d	$80,000	$43,055	60%
868	26.4.3.1.4	Beam studies with upgraded TEL	V. Shiltsev	Tue 12/14/04	88 d	$0	$28,972	60%
869	26.4.3.1.5	Review TEL R&D	V. Shiltsev	Tue 5/18/04	0 d	$0	$0	
870	26.4.3.1.6	Decision on second production TEL	V. Shiltsev	Thu 4/21/05	0 d	$0	$0	
871	**26.4.3.1.7**	**Build TEL-2 spare components**	**V. Shiltsev**	**Fri 4/22/05**	**260 d**	**$600,000**	**$451,700**	
872	26.4.3.1.7.1	labor TEL-2	V. Shiltsev	Fri 4/22/05	260 d	$0	$451,700	60%
873	26.4.3.1.7.2	M&S TEL-2	V. Shiltsev	Fri 6/24/05	1 d	$600,000	$0	60%
874	26.4.3.1.8	installation prep two TELs	V. Shiltsev	Fri 5/5/06	60 d	$100,000	$78,162	60%
875	26.4.3.1.9	installation two TELs	V. Shiltsev	Mon 8/7/06	20 d	$0	$28,659	60%
876	26.4.3.1.10	TEL system beam studies and commisioning	V. Shiltsev	Tue 10/3/06	88 d	$0	$61,566	60%
877	26.4.3.1.11	TEL System Operational	J. Spalding	Mon 2/12/07	0 d	$0	$0	
878	**26.4.3.2**	**BBC: Wires**	**T. Sen**	**Tue 4/1/03**	**280 d**	**$0**	**$107,000**	
879	26.4.3.2.1	Wires simulations/analysis	T. Sen	Tue 4/1/03	280 d	$0	$107,000	40%
880	26.4.3.2.2	BBC: Wires - Report Review	T. Sen	Mon 5/10/04	0 d	$0	$0	
881	**26.4.4**	**Increased Helix Separation**	**K. Moore**	**Thu 5/1/03**	**904 d**	**$1,488,300**	**$1,037,434**	
882	**26.4.4.1**	**Develop New Helix**	**Y. Alexahin**	**Thu 5/1/03**	**374.67 d**	**$0**	**$40,992**	
883	26.4.4.1.1	Design new Helix (initial)	J. Johnstone	Thu 5/1/03	208 d	$0	$15,665	20%
884	26.4.4.1.2	Implement new separator protocol	J. Johnstone	Tue 3/2/04	66.67 d	$0	$10,696	60%
885	26.4.4.1.3	Design new Helix using existing spare separators	J. Johnstone	Fri 8/27/04	20 d	$0	$7,315	60%
886	26.4.4.1.4	Design new Helix with mini separators	J. Johnstone	Fri 7/15/05	20 d	$0	$7,315	60%
887	**26.4.4.2**	**Additional Separator Polarity Switches**	**B. Hanna**	**Mon 11/3/03**	**143 d**	**$237,000**	**$54,849**	
888	26.4.4.2.1	Order parts: polarity switches	B. Hanna	Mon 11/3/03	22 d	$165,000	$0	20%
889	26.4.4.2.2	Parts Delivery: polarity switches	B. Hanna	Wed 12/3/03	45 d	$0	$0	20%



ID	WBS	Name	In Charge	Start	Duration	M&S Base Cost Est.	Labor Base Cost Est.	Contingency %
890	26.4.4.2.3	Assemble and test switches	B. Hanna	Wed 1/28/04	40 d	$64,000	$47,313	40%
891	26.4.4.2.4	Install switches in service buildings	B. Hanna	Wed 3/24/04	22 d	$8,000	$6,080	40%
892	26.4.4.2.5	Commission polarity switches	B. Hanna	Fri 4/23/04	10 d	$0	$1,584	40%
893	26.4.4.2.6	Polarity switches operational	B. Hanna	Thu 5/6/04	0 d	$0	$0	
894	**26.4.4.3**	**Existing Spare Separators**	**R. Moore**	**Mon 12/1/03**	**228 d**	**$81,500**	**$213,298**	
901	**1.2.4.4.3.2**	**Improvements to Separator Conditioning and Testing**	**P. Limon**	**Mon 12/1/03**	**215 d**	**$81,500**	**$148,615**	
902	26.4.4.3.2	Upgrade separator test facility	P. Limon	Wed 3/31/04	50 d	$21,500	$41,923	100%
903	26.4.4.3.2.2	Upgrade test stand	P. Limon	Wed 3/31/04	37.5 d	$60,000	$11,827	100%
904	26.4.4.3.2.3	Develop new HV conditioning specs	P. Limon	Mon 12/1/03	61 d	$0	$18,519	40%
905	26.4.4.3.2.4	Develop higher voltage conditioning and operation	P. Limon	Tue 3/2/04	134 d	$0	$72,692	100%
906	26.4.4.3.2.5	Determine maximum operating voltages	P. Limon	Thu 9/9/04	20 d	$0	$3,654	40%
895	**26.4.4.3.1**	**Install Spare Separators To Smooth Helix**	**R. Moore**	**Mon 12/1/03**	**228 d**	**$0**	**$64,683**	
896	26.4.4.3.1.1	Complete conditioning for 1-2 standard separators	R. Moore	Mon 12/1/03	82 d	$0	$8,231	60%
897	26.4.4.3.1.2	Prepare installation for standard separators	R. Moore	Wed 3/31/04	60 d	$0	$37,962	60%
898	26.4.4.3.1.3	Install standard separators	R. Moore	Mon 6/23/04	30 d	$0	$14,654	40%
899	26.4.4.3.1.4	Commission standard separators	R. Moore	Tue 10/5/04	15 d	$0	$3,837	40%
900	26.4.4.3.1.5	New standard separators operational	R. Moore	Mon 10/25/04	0 d	$0	$0	
907	**26.4.4.4**	**New mini separators**	**Ron Moore**	**Mon 3/1/04**	**697 d**	**$1,170,000**	**$728,295**	
908	26.4.4.4.1	Design mini separators	R. Bossart	Mon 3/1/04	66 d	$0	$22,465	60%
909	26.4.4.4.2	Decision to proceed with mini separators	R. Bossart	Wed 10/6/04	0 d	$0	$0	
910	26.4.4.4.3	procure long-lead items for mini separators	R. Bossart	Thu 10/7/04	20 d	$1,000,000	$0	40%
911	26.4.4.4.4	delivery: long-lead items for new separators	R. Bossart	Wed 5/18/05	1 d	$0	$0	40%
912	26.4.4.4.5	Other procurements for new separators	R. Bossart	Mon 12/6/04	60 d	$0	$0	60%
913	26.4.4.4.6	setup separator production	R. Bossart	Tue 1/18/05	22 d	$100,000	$7,060	40%
914	26.4.4.4.7	fabrication+conditioning first new separator	R. Bossart	Thu 5/19/05	88 d	$0	$73,954	40%
915	26.4.4.4.8	fabrication+testing remaining new separators	R. Bossart	Fri 9/23/05	180 d	$0	$471,635	40%
916	26.4.4.4.9	installation design	R. Bossart	Fri 8/12/05	80 d	$0	$72,529	40%
917	26.4.4.4.10	installation fabrication	R. Bossart	Wed 12/7/05	44 d	$50,000	$27,839	60%
918	26.4.4.4.11	new separator installation	B. Hanna	Mon 8/7/06	20 d	$20,000	$42,748	40%
919	26.4.4.4.12	commission new separators	B. Hanna	Tue 10/3/06	22 d	$0	$1,912	40%
920	26.4.4.4.13	new helix commissioning	M. Martens	Thu 11/2/06	22 d	$0	$8,149	40%
921	26.4.4.4.14	New helix operational	M. Martens	Tue 12/5/06	0 d	$0	$0	
922	**26.4.5**	**Luminosity Leveling**	**M. Martens**	**Thu 12/1/05**	**44 d**	**$0**	**$9,054**	
923	26.4.5.1	luminosity leveling beam studies (plan on hold)	M. Martens	Thu 12/1/05	44 d	$0	$9,054	60%
924	**26.4.6**	**Improved Control and Diagnostics**	**J. Steimel**	**Wed 1/1/03**	**993 d**	**$2,463,468**	**$3,809,753**	
925	26.4.6.1	abort gap monitor	H. Cheung	Fri 8/1/03	151 d	$30,000	$31,452	60%
926	**26.4.6.2**	**Tev Dampers**	**J. Steimel**	**Mon 11/17/03**	**90.06 d**	**$0**	**$55,057**	
927	26.4.6.2.1	Develop PLL and notch filter	J. Steimel	Mon 11/17/03	59 d	$0	$35,376	60%
928	26.4.6.2.2	Commission Longitudinal Damper Up Ramp	J. Steimel	Tue 2/17/04	31.06 d	$0	$19,642	60%
929	**26.4.6.3**	**pbar Tune Tracker**	**CY Tan**	**Mon 11/3/03**	**138 d**	**$30,000**	**$10,882**	
930	26.4.6.3.1	Reassemble tunemeter	CY Tan	Mon 11/3/03	18 d	$0	$10,882	60%
931	26.4.6.3.2	Improve measurement technique	CY Tan	Mon 12/1/03	120 d	$30,000	$0	60%
932	**26.4.6.4**	**Tevatron BPM Upgrade**	**S. Wolbers**	**Tue 9/2/03**	**321 d**	**$1,764,018**	**$1,056,895**	
933	**26.4.6.4.1**	**Tev BPM system design**	**J Steimel**	**Tue 9/2/03**	**270 d**	**$102,973**	**$310,492**	**40%**
934	**26.4.6.4.1.1**	**Electronics design**	**Pavlicek**	**Tue 9/2/03**	**167 d**	**$102,973**	**$169,299**	
935	26.4.6.4.1.1.1	Tunnel cable upgrade	Wolbers	Tue 9/2/03	54 d	$102,973	$0	20%
936	**26.4.6.4.1.1.2**	**BLM design**	**Pavlicek**	**Tue 9/2/03**	**167 d**	**$0**	**$21,112**	
937	26.4.6.4.1.1.2.0	BLM - op	Pavlicek	Tue 9/2/03	167 d	$0	$21,112	20%
938	26.4.6.4.1.1.2.1	BLM interface specification	Pavlicek	Wed 10/15/03	44 d	$0	$0	40%
939	26.4.6.4.1.1.2.2	BLM prototype design & testing	Pavlicek	Wed 11/12/03	73 d	$0	$0	40%
940	**26.4.6.4.1.1.3**	**BPM design**	**Pavlicek**	**Tue 9/2/03**	**167 d**	**$0**	**$144,475**	
941	**26.4.6.4.1.1.3.1**	**BPM core electronics**	**Pavlicek**	**Tue 9/2/03**	**162 d**	**$0**	**$101,312**	
942	26.4.6.4.1.1.3.1.0	BPM core electronics - op	Pavlicek	Tue 9/2/03	162 d	$0	$101,312	20%
943	26.4.6.4.1.1.3.1.1	Core electronics investigation	Pavlicek	Tue 9/2/03	75 d	$0	$0	40%
944	26.4.6.4.1.1.3.1.2	Core HW technical choice review complete	Wolbers	Tue 12/16/03	0 d	$0	$0	
945	26.4.6.4.1.1.3.1.3	Core electronics specification	Pavlicek	Wed 10/15/03	73 d	$0	$0	40%
946	**26.4.6.4.1.1.3.2**	**BPM Timing Card**	**Pavlicek**	**Mon 1/5/04**	**84 d**	**$0**	**$21,582**	
947	26.4.6.4.1.1.3.2.0	BPM Timing Card - op	Pavlicek	Mon 1/5/04	84 d	$0	$21,582	20%
948	26.4.6.4.1.1.3.2.1	Timing card investigation	Pavlicek	Mon 1/5/04	22 d	$0	$0	40%
949	26.4.6.4.1.1.3.2.2	Timing card specification	Pavlicek	Thu 2/5/04	10 d	$0	$0	40%
950	26.4.6.4.1.1.3.2.3	Timing card prototype design & simulation	Pavlicek	Thu 2/19/04	20 d	$0	$0	40%
951	26.4.6.4.1.1.3.2.4	Prototype layout	Pavlicek	Thu 3/18/04	10 d	$0	$0	40%
952	26.4.6.4.1.1.3.2.5	Prototype production	Pavlicek	Thu 4/1/04	11 d	$0	$0	40%
953	26.4.6.4.1.1.3.2.6	Timing card prototype testing	Pavlicek	Fri 4/16/04	11 d	$0	$0	40%
954	**26.4.6.4.1.1.3.3**	**BPM Calibration Card**	**Pavlicek**	**Thu 1/15/04**	**69 d**	**$0**	**$21,582**	
955	26.4.6.4.1.1.3.3.0	BPM Calibration Card - op	Pavlicek	Thu 1/15/04	69 d	$0	$21,582	20%
956	26.4.6.4.1.1.3.3.1	Calibration card specification & investigation	Pavlicek	Thu 1/15/04	20 d	$0	$0	40%
957	26.4.6.4.1.1.3.3.2	Calibration card prototype design & simulation	Pavlicek	Fri 2/13/04	15 d	$0	$0	40%
958	26.4.6.4.1.1.3.3.3	Prototype layout	Pavlicek	Fri 3/5/04	14 d	$0	$0	40%
959	26.4.6.4.1.1.3.3.4	Prototype production	Pavlicek	Thu 3/25/04	10 d	$0	$0	40%
960	26.4.6.4.1.1.3.3.5	Calibration card prototype testing	Pavlicek	Thu 4/8/04	10 d	$0	$0	40%
961	26.4.6.4.1.1.4	Install HW/prototype SW test stand at tevatron	Pavlicek	Wed 10/15/03	42 d	$0	$3,396	40%
962	26.4.6.4.1.1.5	Install second test stand at FCC with proto HW/Acnet	Pavlicek	Tue 12/16/03	39 d	$0	$415	40%
963	26.4.6.4.1.1.6	Electronics design review complete	Pavlicek	Fri 4/30/04	0 d	$0	$0	
964	26.4.6.4.1.1.7	Begin system commissioning plan	Pavlicek	Mon 11/2/04	1 d	$0	$0	20%
965	**26.4.6.4.1.2**	**Front end DAQ SW design**	**Votava**	**Tue 9/2/03**	**270 d**	**$0**	**$104,133**	
966	**26.4.6.4.1.2.1**	**BPM SW specification-frontend DAQ**	**Votava**	**Tue 9/2/03**	**203 d**	**$0**	**$45,200**	
967	26.4.6.4.1.2.1.0	BPM SW specification-frontend DAQ - op	Votava	Tue 9/2/03	203 d	$0	$45,200	20%
968	26.4.6.4.1.2.1.1	Begin SW design	Votava	Tue 9/2/03	1 d	$0	$0	20%
969	**26.4.6.4.1.2.1.2**	**Online interface**	**Votava**	**Mon 12/1/03**	**50 d**	**$0**	**$0**	
970	26.4.6.4.1.2.1.2.1	ACNET Name Mapping - BPM & BLM	Votava	Mon 12/1/03	50 d	$0	$0	40%
971	26.4.6.4.1.2.1.2.2	Data Structures - BPM & BLM	Votava	Mon 12/1/03	50 d	$0	$0	40%
972	26.4.6.4.1.2.1.3	Hardware interface	Votava	Mon 12/1/03	50 d	$0	$0	40%
973	26.4.6.4.1.2.1.4	Internals - BPM & BLM	Votava	Mon 12/1/03	50 d	$0	$0	40%
974	26.4.6.4.1.2.1.5	Diagnostics, test suite, and simulations	Votava	Fri 2/6/04	19 d	$0	$0	40%
975	26.4.6.4.1.2.1.6	Calibration	Votava	Fri 2/6/04	19 d	$0	$0	40%
976	26.4.6.4.1.2.2	BPM SW specification-frontend DAQ - review complete	Votava	Thu 3/4/04	1 d	$0	$0	
977	**26.4.6.4.1.2.3**	**BPM SW design - frontend DAQ**	**Votava**	**Tue 2/17/04**	**157 d**	**$0**	**$58,933**	
978	26.4.6.4.1.2.3.0	BPM SW design - frontend DAQ - op	Votava	Tue 2/17/04	157 d	$0	$58,933	20%
979	26.4.6.4.1.2.3.1	Architectural Diagram with data flows	Votava	Fri 3/5/04	66 d	$0	$0	40%
980	**26.4.6.4.1.2.3.2**	**Functional description of components**	**Votava**	**Fri 3/5/04**	**66 d**	**$0**	**$0**	
981	26.4.6.4.1.2.3.2.1	Diagnostics	Votava	Fri 3/5/04	66 d	$0	$0	40%
982	26.4.6.4.1.2.3.2.2	Calibration	Votava	Fri 3/5/04	66 d	$0	$0	40%
983	26.4.6.4.1.2.3.2.3	Readout (bpm and blm) (need hardware design complete)	Votava	Fri 3/5/04	66 d	$0	$0	40%
984	26.4.6.4.1.2.3.2.4	Configuration and control	Votava	Fri 3/5/04	66 d	$0	$0	40%
985	26.4.6.4.1.2.3.2.5	Test suite/verification	Votava	Fri 3/5/04	66 d	$0	$0	40%
986	26.4.6.4.1.2.3.2.6	Simulation	Votava	Fri 3/5/04	11 d	$0	$0	40%
987	26.4.6.4.1.2.4	BPM SW design - frontend DAQ - review complete	Votava	Tue 6/8/04	1 d	$0	$0	20%
988	**26.4.6.4.1.3**	**Online SW design**	**Hendricks**	**Tue 9/2/03**	**118 d**	**$0**	**$10,080**	
989	26.4.6.4.1.3.0	Online SW Design - op	Hendricks	Tue 9/2/03	118 d	$0	$10,080	20%
990	26.4.6.4.1.3.1	BPM SW specification - online	Hendricks	Tue 9/2/03	108 d	$0	$0	40%
991	26.4.6.4.1.3.2	BPM SW specification-online-review complete	Hendricks	Mon 2/23/04	1 d	$0	$0	
992	**26.4.6.4.1.4**	**Offline SW design**	**Kutschke**	**Tue 9/2/03**	**109 d**	**$0**	**$26,880**	
993	26.4.6.4.1.4.0	Offline SW Design - op	Kutschke	Tue 9/2/03	109 d	$0	$26,880	20%
994	26.4.6.4.1.4.1	BPM SW specification - offline	Kutschke	Tue 9/2/03	108 d	$0	$0	40%
995	26.4.6.4.1.4.2	BPM SW specification-offline-review complete	Kutschke	Tue 2/10/04	1 d	$0	$0	
996	26.4.6.4.1.5	Tev BPM: SW Specification complete	J. Steimel	Fri 3/5/04	1 d	$0	$0	
997	26.4.6.4.2	TevBPM: Requirements Review (Milestone)	S. Wolbers	Mon 9/22/03	0 d	$0	$0	
998	**26.4.6.4.3**	**Tev BPM system fabrication**	**S. Wolbers**	**Tue 12/16/03**	**196 d**	**$1,661,045**	**$269,803**	**60%**
999	**26.4.6.4.3.1**	**Electronics fabrication**	**Pavlicek**	**Tue 12/16/03**	**185 d**	**$1,661,045**	**$138,146**	
1000	**26.4.6.4.3.1.1**	**BLM Fabrication**	**Pavlicek**	**Tue 12/16/03**	**70 d**	**$16,965**	**$22,481**	
1001	26.4.6.4.3.1.1.0	BLM interface card - op	Pavlicek	Tue 12/16/03	70 d	$0	$22,481	20%
1002	26.4.6.4.3.1.1.1	BLM interface PO preparation	Pavlicek	Fri 1/16/04	20 d	$0	$0	40%
1003	26.4.6.4.3.1.1.2	BLM PO complete	Pavlicek	Mon 2/16/04	1 d	$16,965	$0	20%
1004	26.4.6.4.3.1.1.3	BLM interface card delivery	Pavlicek	Tue 2/17/04	10 d	$0	$0	40%
1005	26.4.6.4.3.1.1.4	BLM interface card QC	Pavlicek	Tue 3/2/04	10 d	$0	$0	40%
1006	**26.4.6.4.3.1.2**	**BPM Fabrication**	**Pavlicek**	**Thu 12/18/03**	**183 d**	**$1,257,140**	**$113,665**	
1007	**26.4.6.4.3.1.2.1**	**BPM core electronics**	**Pavlicek**	**Thu 12/18/03**	**183 d**	**$1,022,400**	**$70,704**	
1008	26.4.6.4.3.1.2.1.0	BPM core electronics - op	Pavlicek	Thu 12/18/03	183 d	$0	$70,704	20%
1009	26.4.6.4.3.1.2.1.1	Core electronics PO preparation	Pavlicek	Fri 12/19/03	36 d	$0	$0	40%
1010	26.4.6.4.3.1.2.1.2	Core electronics PO complete	Pavlicek	Fri 2/13/04	0 d	$1,022,400	$0	20%
1011	26.4.6.4.3.1.2.1.3	Core electronics 1st modified board support	Pavlicek	Mon 2/16/04	34 d	$0	$0	40%
1012	26.4.6.4.3.1.2.1.4	Core electronics 1st modified board delivered	Pavlicek	Thu 4/1/04	0 d	$0	$0	
1013	26.4.6.4.3.1.2.1.5	Core electronics 1st board production at Echotek	Pavlicek	Fri 4/2/04	42 d	$0	$0	40%
1014	26.4.6.4.3.1.2.1.6	Core electronics 1st production board available	Pavlicek	Tue 6/1/04	0 d	$0	$0	
1015	26.4.6.4.3.1.2.1.7	Core electronics boards QC	Pavlicek	Wed 6/2/04	70 d	$0	$0	60%
1016	26.4.6.4.3.1.2.1.8	Core electronics board delivered	Pavlicek	Wed 6/2/04	65 d	$0	$0	60%
1017	**26.4.6.4.3.1.2.2**	**BPM Timing Card**	**Pavlicek**	**Fri 2/13/04**	**130 d**	**$75,400**	**$22,481**	
1018	26.4.6.4.3.1.2.2.0	BPM Timing card - op	Pavlicek	Fri 2/13/04	130 d	$0	$22,481	40%
1019	26.4.6.4.3.1.2.2.1	Timing card PO complete	Pavlicek	Fri 2/13/04	1 d	$75,400	$0	20%
1020	26.4.6.4.3.1.2.2.2	Timing card board layout	Pavlicek	Mon 5/3/04	20 d	$0	$0	40%
1021	26.4.6.4.3.1.2.2.3	Timing card pilot (1 or 2 boards)	Pavlicek	Tue 6/1/04	20 d	$0	$0	40%
1022	26.4.6.4.3.1.2.2.4	Timing card production	Pavlicek	Tue 6/29/04	14 d	$0	$0	40%
1023	26.4.6.4.3.1.2.2.5	BPM Timing card QC	Pavlicek	Tue 7/20/04	20 d	$0	$0	40%
1024	**26.4.6.4.3.1.2.3**	**BPM Calibration Card**	**Pavlicek**	**Fri 2/6/04**	**120 d**	**$109,340**	**$22,481**	
1025	26.4.6.4.3.1.2.3.1	BPM Calibration card - op	Pavlicek	Fri 2/6/04	120 d	$0	$22,481	20%
1026	26.4.6.4.3.1.2.3.2	Calibration card PO preparation	Pavlicek	Fri 2/6/04	28 d	$109,340	$0	20%
1027	26.4.6.4.3.1.2.3.3	Calibration card board layout	Pavlicek	Wed 3/17/04	20 d	$0	$0	40%
1028	26.4.6.4.3.1.2.3.4	Calibration card pilot (1 or 2 boards)	Pavlicek	Wed 4/14/04	20 d	$0	$0	40%
1029	26.4.6.4.3.1.2.3.5	Calibration card production & QC	Pavlicek	Wed 5/12/04	34 d	$0	$0	60%
1030	26.4.6.4.3.1.3	BPM consolidated crate PO complete	Pavlicek	Mon 2/16/04	1 d	$436,940	$0	20%
1031	26.4.6.4.3.1.4	Promote Tevatron and FCC test stand to production HW	Pavlicek	Wed 6/2/04	1 d	$0	$0	20%
1032	**26.4.6.4.3.2**	**Front end DAQ SW fabrication**	**Votava**	**Thu 6/3/04**	**80 d**	**$0**	**$81,257**	
1033	**26.4.6.4.3.2.1**	**Frontend DAQ implementation document**	**Votava**	**Thu 6/3/04**	**80 d**	**$0**	**$32,760**	
1034	26.4.6.4.3.2.1.0	Frontend DAQ implementation document - op	Votava	Thu 6/3/04	80 d	$0	$32,760	20%
1035	26.4.6.4.3.2.1.1	API	Votava	Wed 6/9/04	21 d	$0	$0	40%
1036	26.4.6.4.3.2.1.2	Class diagram	Votava	Wed 6/9/04	21 d	$0	$0	40%
1037	26.4.6.4.3.2.1.3	Task name	Votava	Wed 6/9/04	21 d	$0	$0	40%
1038	26.4.6.4.3.2.1.4	Sequence diagram	Votava	Wed 6/9/04	21 d	$0	$0	40%
1039	26.4.6.4.3.2.1.5	Appendix with scripts, diagnostic & build instructions	Votava	Wed 6/9/04	21 d	$0	$0	40%
1040	26.4.6.4.3.2.2	Frontend DAQ implementation document - review complete	Votava	Fri 7/9/04	1 d	$0	$0	40%
1041	26.4.6.4.3.2.3	Implementation of Frontend DAQ SW	Votava	Mon 7/12/04	52.71 d	$0	$48,497	40%
1042	26.4.6.4.3.2.4	Frontend DAQ SW code complete	Votava	Thu 9/23/04	1 d	$0	$0	
1043	**26.4.6.4.3.3**	**Online SW fabrication**	**Hendricks**	**Mon 2/23/04**	**112 d**	**$0**	**$21,600**	
1044	26.4.6.4.3.3.0	Online SW Fabrication - op	Hendricks	Mon 2/23/04	112 d	$0	$21,600	20%
1045	**26.4.6.4.3.3.1**	**Implementation of Online SW**	**Hendricks**	**Tue 2/24/04**	**80 d**	**$0**	**$0**	
1046	26.4.6.4.3.3.1.1	Acnet interface and libraries	Hendricks	Mon 4/19/04	41 d	$0	$0	40%
1047	26.4.6.4.3.3.1.2	Data display applications	Hendricks	Tue 2/24/04	40 d	$0	$0	40%
1048	26.4.6.4.3.3.1.3	Electronics test and calibration application	Hendricks	Tue 2/24/04	50 d	$0	$0	40%
1049	26.4.6.4.3.3.1.4	User analysis & ops integration apps	Hendricks	Tue 2/24/04	60 d	$0	$0	40%
1050	26.4.6.4.3.3.2	Online SW code complete	Hendricks	Wed 6/16/04	1 d	$0	$0	
1051	26.4.6.4.3.3.3	Online SW integration	Hendricks	Thu 6/17/04	30 d	$0	$0	40%
1052	**26.4.6.4.3.4**	**Offline SW fabrication**	**Kutschke**	**Tue 2/10/04**	**99 d**	**$0**	**$28,800**	
1053	26.4.6.4.3.4.0	Offline SW - op	Kutschke	Tue 2/10/04	99 d	$0	$28,800	20%
1054	**26.4.6.4.3.4.1**	**BPM Offline SW-Implementation**	**Kutschke**	**Tue 2/10/04**	**80 d**	**$0**	**$0**	
1055	26.4.6.4.3.4.1.1	Standard offline SW	Kutschke	Tue 2/10/04	80 d	$0	$0	40%
1056	26.4.6.4.3.4.1.2	Transform Lebedev tools to console app	Kutschke	Tue 2/10/04	60 d	$0	$0	40%
1057	26.4.6.4.3.4.2	Offline SW code complete	Kutschke	Wed 6/2/04	1 d	$0	$0	
1058	26.4.6.4.3.4.3	Offline SW testing and integration	Kutschke	Thu 6/3/04	10 d	$0	$0	40%
1059	**26.4.6.4.4**	**Tev BPM system installation**	**Physicist**	**Mon 3/1/04**	**151 d**	**$0**	**$84,296**	**60%**
1060	**26.4.6.4.4.1**	**Electronics installation**	**Pavlicek**	**Mon 3/1/04**	**147 d**	**$0**	**$29,656**	
1061	26.4.6.4.4.1.1	Prepare service buildings for new BPMs	Wolbers	Mon 3/1/04	41 d	$0	$8,515	40%
1062	**26.4.6.4.4.1.2**	**BLM - installation**	**Pavlicek**	**Tue 3/16/04**	**5 d**	**$0**	**$519**	
1063	26.4.6.4.4.1.2.1	BLM interface card installation and testing - op	Pavlicek	Tue 3/16/04	5 d	$0	$519	40%
1064	**26.4.6.4.4.1.3**	**BPM - Installation**	**Pavlicek**	**Thu 4/15/04**	**114 d**	**$0**	**$6,544**	
1065	26.4.6.4.4.1.3.0	BPM - Installation - op	Pavlicek	Thu 4/15/04	114 d	$0	$6,544	20%
1066	26.4.6.4.4.1.3.1	Fully loaded prototype crate installation and testing	Pavlicek	Thu 4/15/04	30 d	$0	$0	40%
1067	26.4.6.4.4.1.4	First production quality crate available at Tevatron	Pavlicek	Tue 6/15/04	0 d	$0	$0	
1068	26.4.6.4.4.1.5	Testing, QC, and validation	Pavlicek	Thu 5/27/04	60 d	$0	$0	60%
1069	26.4.6.4.4.1.6	Design validation complete	Pavlicek	Tue 6/15/04	1 d	$0	$0	20%
1070	26.4.6.4.4.1.7	Tev BPM system HW/SW integration testing	Pavlicek	Wed 6/16/04	15 d	$0	$14,077	40%
1071	26.4.6.4.4.1.8	All Tev BPM crates functionally available	Wolbers	Mon 8/23/04	1 d	$0	$0	20%
1072	26.4.6.4.4.1.9	System commissioning plan complete	Wolbers	Tue 8/24/04	1 d	$0	$0	
1073	**26.4.6.4.4.2**	**Front end DAQ SW installation**	**Votava**	**Mon 8/2/04**	**43 d**	**$0**	**$31,080**	
1074	26.4.6.4.4.2.0	Front end DAQ Integration - op	Votava	Mon 8/2/04	43 d	$0	$31,080	40%
1075	26.4.6.4.4.2.1	Online interface testing with limited HW	Votava	Mon 8/2/04	42 d	$0	$0	40%
1076	26.4.6.4.4.2.2	Full system test complete	Votava	Wed 9/29/04	0 d	$0	$0	
1077	**26.4.6.4.4.3**	**Online SW installation**	**Hendricks**	**Wed 6/9/04**	**69 d**	**$0**	**$6,600**	
1078	26.4.6.4.4.3.0	Online SW Installation - op	Hendricks	Wed 6/9/04	69 d	$0	$6,600	40%
1079	26.4.6.4.4.3.1	SW integration with HW - online	Hendricks	Fri 7/30/04	32 d	$0	$0	40%
1080	26.4.6.4.4.3.2	Online SW integration complete	Hendricks	Wed 9/15/04	1 d	$0	$0	40%
1081	**26.4.6.4.4.4**	**Offline SW installation**	**Kutschke**	**Wed 5/12/04**	**78 d**	**$0**	**$16,960**	
1082	26.4.6.4.4.4.0	Offline SW Installation - op	Kutschke	Wed 5/12/04	78 d	$0	$16,960	40%
1083	26.4.6.4.4.4.1	SW integration with HW - offline	Kutschke	Thu 6/17/04	52 d	$0	$0	40%
1084	26.4.6.4.4.4.2	Offline SW integration complete	Kutschke	Tue 8/31/04	1 d	$0	$0	40%
1085	**26.4.6.4.5**	**Tev BPM system commissioning**	**M Martens**	**Mon 8/2/04**	**78 d**	**$0**	**$71,399**	**60%**
1086	**26.4.6.4.5.1**	**Electronics commissioning**	**Pavlicek**	**Mon 8/2/04**	**71 d**	**$0**	**$46,819**	
1087	26.4.6.4.5.1.0	Electronics Commissioning - op	Pavlicek	Mon 8/2/04	71 d	$0	$46,819	20%
1088	26.4.6.4.5.1.1	Begin system commissioning	Wolbers	Mon 8/2/04	1 d	$0	$0	
1089	26.4.6.4.5.1.2	Commissioning on production test stand	Pavlicek	Tue 8/3/04	10 d	$0	$0	40%
1090	26.4.6.4.5.1.3	Phase one system commissioning	Pavlicek	Tue 8/17/04	15 d	$0	$0	40%
1091	26.4.6.4.5.1.4	Full scale system commissioning	Pavlicek	Wed 9/8/04	30 d	$0	$0	40%
1092	26.4.6.4.5.1.5	Electronics comissioning complete	Pavlicek	Tue 10/19/04	0 d	$0	$0	
1093	26.4.6.4.5.1.6	TBPM Maintenance manual	Wolbers	Wed 10/20/04	15 d	$0	$0	40%
1094	**26.4.6.4.5.2**	**Front end DAQ SW commissioning**	**Votava**	**Thu 9/30/04**	**36 d**	**$0**	**$11,520**	
1095	26.4.6.4.5.2.0	Front end DAQ SW Commissioning - op	Votava	Thu 9/30/04	36 d	$0	$11,520	40%
1096	26.4.6.4.5.2.1	Front end DAQ SW System Testing	Votava	Thu 9/30/04	10 d	$0	$0	40%
1097	26.4.6.4.5.2.2	Frontend DAQ SW released	Votava	Thu 10/14/04	1 d	$0	$0	40%
1098	26.4.6.4.5.2.3	TBPM user guide - frontend DAQ SW	Wolbers	Fri 10/15/04	10 d	$0	$0	40%
1099	26.4.6.4.5.2.4	TBPM programmer guide - frontend DAQ SW	Wolbers	Fri 10/29/04	10 d	$0	$0	40%
1100	**26.4.6.4.5.3**	**Online SW commissioning**	**Hendricks**	**Mon 8/2/04**	**22 d**	**$0**	**$4,200**	
1101	26.4.6.4.5.3.0	Online SW Commissioning - op	Hendricks	Mon 8/2/04	22 d	$0	$4,200	40%
1102	26.4.6.4.5.3.1	Online SW validation testing	Hendricks	Tue 8/3/04	10 d	$0	$0	40%
1103	26.4.6.4.5.3.2	Online SW released	Hendricks	Tue 8/17/04	1 d	$0	$0	40%
1104	26.4.6.4.5.3.3	TBPM user guide - online SW	Hendricks	Wed 8/18/04	10 d	$0	$0	40%
1105	26.4.6.4.5.3.4	TBPM programmer guide - online SW	Hendricks	Wed 8/18/04	10 d	$0	$0	40%
1106	**26.4.6.4.5.4**	**Offline SW commissioning**	**Hendricks**	**Mon 8/2/04**	**22 d**	**$0**	**$9,057**	
1107	26.4.6.4.5.4.0	Offline SW Commissioning - op	Hendricks	Mon 8/2/04	22 d	$0	$9,057	40%
1108	26.4.6.4.5.4.1	Offline SW validation testing	Kutschke	Tue 8/3/04	10 d	$0	$0	40%
1109	26.4.6.4.5.4.2	Offline SW released	Kutschke	Tue 8/17/04	1 d	$0	$0	40%
1110	26.4.6.4.5.4.3	TBPM user guide - offline SW	Kutschke	Wed 8/18/04	10 d	$0	$0	40%
1111	26.4.6.4.5.4.4	TBPM programmer guide - offline SW	Kutschke	Wed 8/18/04	10 d	$0	$0	40%
1112	**26.4.6.4.6**	**Tev BPM project management**	**Wolbers**	**Tue 9/2/03**	**321 d**	**$0**	**$320,706**	
1113	26.4.6.4.6.1	System Requirements Document	Wolbers	Tue 9/2/03	45 d	$0	$19,342	20%



ID	WBS	Name	In Charge	Start	Duration	M&S Base Cost Est.	Labor Base Cost Est.	Contingency %
114	26.4.6.4.6.2	Technical Coordination	Wolbers	Wed 10/1/03	300 d	$0	[illegible]	40%
115	26.4.6.4.6.3	System design support	Wolbers	Wed 10/1/03	283 d	$0	$24,692	40%
116	26.4.6.4.6.4	End system commissioning with fully loaded HW/SW	Wolbers	Thu 11/11/04	1 d	$0	$0	40%
117	26.4.6.4.6.5	BPM HW/SW system validation review	Wolbers	Fri 11/12/04	1 d	$0	$0	40%
118	26.4.6.4.6.6	Ongoing TevBPM support plan	Wolbers	Mon 11/1/04	10 d	$0	$0	40%
119	26.4.6.4.6.7	Project post-mortem study	Wolbers	Fri 11/12/04	5 d	$0	$0	40%
120	26.4.6.4.6.8	Project management support	Wolbers	Tue 9/2/03	311 d	$0	$185,404	40%
121	26.4.6.4.6.9	Tev BPM Upgrade Operational	Wolbers	Tue 10/19/04	0 d	$0	$0	
122	26.4.6.5	**Tevatron IPM**	**A. Jansson**	**Thu 5/1/03**	**429 d**	**$269,450**	**$449,286**	
123	26.4.6.5.1	**Pre-production**	**A. Jansson**	**Wed 10/1/03**	**157 d**	**$5,000**	**$42,700**	
124	26.4.6.5.1.1	**MCP test stand**	**A. Jansson**	**Mon 10/27/03**	**140 d**	**$2,000**	**$5,031**	
125	26.4.6.5.1.1.1	Complete test stand	A. Jansson	Mon 10/27/03	80 d	$2,000	$2,562	40%
126	26.4.6.5.1.1.2	Measure gain uniformity	A. Jansson	Wed 4/21/04	20 d	$0	$823	40%
127	26.4.6.5.1.1.3	Quantify saturation effects	A. Jansson	Wed 3/24/04	20 d	$0	$823	40%
128	26.4.6.5.1.1.4	Test calibration source	A. Jansson	Wed 2/25/04	20 d	$0	$823	40%
129	26.4.6.5.1.2	**QIE test stand**	**A. Jansson**	**Mon 1/5/04**	**30 d**	**$1,000**	**$1,095**	
130	26.4.6.5.1.2.1	FE cable tests	A. Jansson	Mon 1/5/04	30 d	$1,000	$1,095	40%
131	26.4.6.5.1.3	RF tests	A. Jansson	Mon 10/27/03	78 d	$0	$812	40%
132	26.4.6.5.1.4	**Serializer rad tests**	**A. Jansson**	**Mon 10/27/03**	**74 d**	**$2,000**	**$3,494**	
133	26.4.6.5.1.4.1	Build test setup	A. Jansson	Mon 10/27/03	54 d	$2,000	$3,494	40%
134	26.4.6.5.1.4.2	Run test	A. Jansson	Tue 1/20/04	20 d	$0	$0	40%
135	26.4.6.5.1.5	**Specifications**	**A. Jansson**	**Wed 10/1/03**	**111 d**	**$0**	**$32,768**	
136	26.4.6.5.1.5.1	Finalize FE card spec	A. Jansson	Mon 10/27/03	20 d	$0	$2,539	40%
137	26.4.6.5.1.5.2	In-vacuum FE cabling spec	A. Jansson	Mon 10/27/03	83 d	$0	$5,215	40%
138	26.4.6.5.1.5.3	Out vaccum FE cabling spec	A. Jansson	Mon 10/27/03	74 d	$0	$2,608	40%
139	26.4.6.5.1.5.4	Finalize buffer card spec	A. Jansson	Mon 10/27/03	20 d	$0	$3,842	40%
140	26.4.6.5.1.5.5	Finalize timing spec	A. Jansson	Mon 10/27/03	20 d	$0	$3,842	40%
141	26.4.6.5.1.5.6	Finalize detector spec	A. Jansson	Mon 12/15/03	50 d	$0	$3,842	40%
142	26.4.6.5.1.5.7	Finalize magnet spec	A. Jansson	Mon 10/27/03	15 d	$0	$617	40%
143	26.4.6.5.1.5.8	Vacuum spec	A. Jansson	Fri 1/2/04	20 d	$0	$247	40%
144	26.4.6.5.1.5.9	Spec FE software	A. Jansson	Mon 10/27/03	94 d	$0	$6,631	40%
145	26.4.6.5.1.5.10	Spec user interface	A. Jansson	Mon 10/27/03	94 d	$0	$3,385	40%
146	26.4.6.5.1.5.11	Tev IPM Design Review, decision to proceed (Milestone)	A. Jansson	Wed 10/1/03	0 d	$0	$0	
147	26.4.6.5.2	**Production**	**A. Jansson**	**Mon 11/17/03**	**207 d**	**$255,550**	**$282,146**	
148	26.4.6.5.2.1	**DAQ**	**A. Jansson**	**Mon 11/24/03**	**167 d**	**$57,050**	**$146,964**	
149	26.4.6.5.2.1.1	**FE card**	**A. Jansson**	**Mon 12/1/03**	**121 d**	**$31,050**	**$35,596**	
150	26.4.6.5.2.1.1.1	FE card design	A. Jansson	Mon 12/1/03	51 d	$0	$10,865	40%
151	26.4.6.5.2.1.1.2	FE card layout	A. Jansson	Tue 2/17/04	40 d	$0	$8,308	40%
152	26.4.6.5.2.1.1.3	FE card parts procurement	A. Jansson	Tue 12/16/03	90 d	$30,050	$0	40%
153	26.4.6.5.2.1.1.4	FE card PC board procurement	A. Jansson	Tue 4/13/04	10 d	$1,000	$0	40%
154	26.4.6.5.2.1.1.5	FE card board assembly	A. Jansson	Tue 4/27/04	10 d	$0	$2,077	40%
155	26.4.6.5.2.1.1.6	FE card final test	A. Jansson	Tue 5/11/04	10 d	$0	$4,346	40%
156	26.4.6.5.2.1.2	**FE cabling**	**A. Jansson**	**Tue 2/17/04**	**29 d**	**$7,000**	**$0**	
157	26.4.6.5.2.1.2.1	In-vacuum FE cabling procurement	A. Jansson	Mon 3/1/04	20 d	$4,000	$0	40%
158	26.4.6.5.2.1.2.2	Out vaccum FE cabling procurement	A. Jansson	Tue 2/17/04	20 d	$3,000	$0	40%
159	26.4.6.5.2.1.3	**FE power supply**	**A. Jansson**	**Tue 2/17/04**	**40 d**	**$2,000**	**$1,521**	
160	26.4.6.5.2.1.3.1	Design FE power supply	A. Jansson	Tue 2/17/04	10 d	$0	$1,087	40%
161	26.4.6.5.2.1.3.2	FE power parts procurement	A. Jansson	Tue 3/2/04	20 d	$2,000	$0	40%
162	26.4.6.5.2.1.3.3	Assemble FE power supply	A. Jansson	Tue 3/30/04	5 d	$0	$0	40%
163	26.4.6.5.2.1.3.4	Test FE power supply	A. Jansson	Tue 4/6/04	5 d	$0	$435	40%
164	26.4.6.5.2.1.4	**Buffer card**	**A. Jansson**	**Mon 11/24/03**	**106 d**	**$12,000**	**$57,389**	
165	26.4.6.5.2.1.4.1	Buffer card board Design	A. Jansson	Mon 11/24/03	39 d	$0	$16,950	40%
166	26.4.6.5.2.1.4.2	Buffer card board Layout	A. Jansson	Mon 2/2/04	40 d	$0	$8,308	40%
167	26.4.6.5.2.1.4.3	Buffer card parts procurement	A. Jansson	Wed 12/10/03	70 d	$9,600	$0	20%
168	26.4.6.5.2.1.4.4	Buffer card PC board procurement	A. Jansson	Mon 3/29/04	10 d	$400	$0	20%
169	26.4.6.5.2.1.4.5	Buffer card assembly	A. Jansson	Mon 4/12/04	5 d	$0	$1,039	40%
170	26.4.6.5.2.1.4.6	Buffer card FPGA coding	A. Jansson	Wed 12/10/03	60 d	$0	$26,077	40%
171	26.4.6.5.2.1.4.7	PCI64 PC procurement	A. Jansson	Fri 2/27/04	20 d	$2,000	$0	20%
172	26.4.6.5.2.1.4.8	Buffer card final test	A. Jansson	Mon 4/19/04	10 d	$0	$5,215	40%
173	26.4.6.5.2.1.5	**Timing fanout system**	**A. Jansson**	**Mon 11/24/03**	**134 d**	**$5,000**	**$25,450**	
174	26.4.6.5.2.1.5.1	Timing fanout board design(s)	A. Jansson	Mon 11/24/03	74 d	$0	$16,950	40%
175	26.4.6.5.2.1.5.2	Timing fanout board layout	A. Jansson	Tue 3/16/04	10 d	$0	$2,077	40%
176	26.4.6.5.2.1.5.3	Timing fanout parts procurement	A. Jansson	Tue 3/16/04	40 d	$4,500	$0	40%
177	26.4.6.5.2.1.5.4	Timing fanout PC board procurement	A. Jansson	Tue 3/30/04	10 d	$500	$0	40%
178	26.4.6.5.2.1.5.5	Timing fanout board assembly	A. Jansson	Tue 5/11/04	10 d	$0	$2,077	40%
179	26.4.6.5.2.1.5.6	Timing fanout final test	A. Jansson	Tue 5/25/04	10 d	$0	$4,346	40%
180	26.4.6.5.2.1.6	DAQ system test	A. Jansson	Mon 6/14/04	30 d	$0	$30,808	40%
181	26.4.6.5.2.2	**Detector (mech)**	**A. Jansson**	**Mon 11/17/03**	**167 d**	**$198,500**	**$63,661**	
182	26.4.6.5.2.2.1	**Detector**	**A. Jansson**	**Mon 1/5/04**	**136 d**	**$102,500**	**$37,021**	
183	26.4.6.5.2.2.1.1	Mechanical detector design	A. Jansson	Mon 1/5/04	73 d	$0	$31,235	40%
184	26.4.6.5.2.2.1.2	Manufacture detector parts	A. Jansson	Fri 4/16/04	40 d	$32,000	$0	40%
185	26.4.6.5.2.2.1.3	Manufacture Vacuum Chamber & Spool Pieces	A. Jansson	Fri 4/16/04	40 d	$20,000	$0	20%
186	26.4.6.5.2.2.1.4	Procurement detector parts	A. Jansson	Fri 4/16/04	40 d	$24,000	$0	40%
187	26.4.6.5.2.2.1.5	Microchannel Plate Procurement	A. Jansson	Mon 3/1/04	5 d	$10,000	$0	20%
188	26.4.6.5.2.2.1.6	Anode board design	A. Jansson	Mon 3/1/04	15 d	$0	$1,921	40%
189	26.4.6.5.2.2.1.7	Power Supplies for Sweep Field & MCP	A. Jansson	Thu 4/1/04	20 d	$12,500	$0	20%
190	26.4.6.5.2.2.1.8	Procurement anode board	A. Jansson	Mon 3/22/04	20 d	$4,000	$0	40%
191	26.4.6.5.2.2.1.9	Assemble detector	A. Jansson	Mon 6/14/04	10 d	$0	$1,039	40%
192	26.4.6.5.2.2.1.10	Test detector	A. Jansson	Mon 6/28/04	15 d	$0	$2,827	40%
193	26.4.6.5.2.2.2	**Vacuum**	**A. Jansson**	**Mon 2/2/04**	**45 d**	**$17,000**	**$1,269**	
194	26.4.6.5.2.2.2.1	Define leak rate and pump capacity	A. Jansson	Mon 2/2/04	15 d	$0	$1,269	40%
195	26.4.6.5.2.2.2.2	Procurement vacuum components	A. Jansson	Mon 2/23/04	30 d	$17,000	$0	40%
196	26.4.6.5.2.2.3	**Movable detector stands**	**A. Jansson**	**Thu 1/15/04**	**116 d**	**$12,000**	**$12,554**	
197	26.4.6.5.2.2.3.1	Design detector stands	A. Jansson	Thu 1/15/04	65 d	$0	$11,515	40%
198	26.4.6.5.2.2.3.2	Manufacture/procure detector stand parts	A. Jansson	Wed 4/21/04	40 d	$12,000	$0	20%
199	26.4.6.5.2.2.3.3	Assemble detector stands	A. Jansson	Thu 6/17/04	10 d	$0	$1,039	40%
200	26.4.6.5.2.2.4	**Magnets**	**A. Jansson**	**Mon 11/17/03**	**146 d**	**$52,000**	**$2,996**	
201	26.4.6.5.2.2.4.1	Magnet procurement	A. Jansson	Mon 11/17/03	135 d	$52,000	$0	20%
202	26.4.6.5.2.2.4.2	Magnet delivery tests	A. Jansson	Tue 6/8/04	10 d	$0	$2,996	40%
203	26.4.6.5.2.2.5	**Magnet power supplies**	**A. Jansson**	**Thu 2/5/04**	**73 d**	**$13,000**	**$6,231**	
204	26.4.6.5.2.2.5.1	Build filters	A. Jansson	Thu 2/5/04	73 d	$6,600	$2,077	20%
205	26.4.6.5.2.2.5.2	Build controller	A. Jansson	Thu 2/5/04	20 d	$6,400	$4,154	20%
206	26.4.6.5.2.2.6	**Magnet stands**	**A. Jansson**	**Thu 1/22/04**	**106 d**	**$2,000**	**$3,610**	
207	26.4.6.5.2.2.6.1	Design Magnet stands (produce drawings)	A. Jansson	Thu 1/22/04	61 d	$0	$3,610	40%
208	26.4.6.5.2.2.6.2	Magnet stand parts procurement	A. Jansson	Fri 4/16/04	40 d	$1,000	$0	20%
209	26.4.6.5.2.2.6.3	Build magnet stands	A. Jansson	Mon 6/14/04	5 d	$1,000	$0	20%
210	26.4.6.5.2.3	**Software**	**A. Jansson**	**Tue 3/16/04**	**60 d**	**$0**	**$48,000**	
211	26.4.6.5.2.3.1	**Frontend software**	**A. Jansson**	**Tue 3/16/04**	**60 d**	**$0**	**$24,000**	
212	26.4.6.5.2.3.1.1	Code FE software	A. Jansson	Tue 3/16/04	40 d	$0	$16,000	40%
213	26.4.6.5.2.3.1.2	Test FE software	A. Jansson	Tue 5/11/04	20 d	$0	$8,000	40%
214	26.4.6.5.2.3.2	**ACNET user interface**	**A. Jansson**	**Tue 3/16/04**	**60 d**	**$0**	**$24,000**	
215	26.4.6.5.2.3.2.1	Code user interface	A. Jansson	Tue 3/16/04	40 d	$0	$16,000	40%
216	26.4.6.5.2.3.2.2	Test user interface	A. Jansson	Tue 5/11/04	20 d	$0	$8,000	40%
217	26.4.6.5.2.4	Full system test w/o beam	A. Jansson	Tue 8/3/04	30 d	$0	$29,504	40%
218	26.4.6.5.3	**Installation**	**A. Jansson**	**Thu 5/1/03**	**366 d**	**$8,900**	**$78,881**	
219	26.4.6.5.3.1	Cable pulls	A. Jansson	Mon 8/23/04	3 d	$7,900	$0	40%
220	26.4.6.5.3.2	Magnet (magnet stands) installation	A. Jansson	Wed 9/15/04	5 d	$0	$1,039	40%
221	26.4.6.5.3.3	Connect cooling water	A. Jansson	Wed 9/22/04	3 d	$1,000	$623	20%
222	26.4.6.5.3.4	Magnet survey	A. Jansson	Mon 9/27/04	2 d	$0	$1,582	40%
223	26.4.6.5.3.5	Detector (+stands) installation	A. Jansson	Wed 9/29/04	5 d	$0	$1,039	40%
224	26.4.6.5.3.6	Motor control installation	A. Jansson	Wed 10/6/04	3 d	$0	$464	40%
225	26.4.6.5.3.7	DAQ installation	A. Jansson	Wed 10/6/04	5 d	$0	$4,483	40%
226	26.4.6.5.3.8	Spec and test DAQ scheme	K. Nguyen	Thu 5/1/03	107 d	$0	$69,173	60%
227	26.4.6.5.4	**Commissioning**	**A. Jansson**	**Mon 9/27/04**	**65 d**	**$0**	**$27,839**	
228	26.4.6.5.4.1	Test magnets, power supplies	A. Jansson	Mon 9/27/04	5 d	$0	$2,115	40%
229	26.4.6.5.4.2	Test HV	A. Jansson	Wed 10/6/04	5 d	$0	$2,115	40%
230	26.4.6.5.4.3	Test gas bump	A. Jansson	Wed 10/6/04	5 d	$0	$2,115	40%
231	26.4.6.5.4.4	Test DAQ	A. Jansson	Wed 10/13/04	10 d	$0	$6,839	40%
232	26.4.6.5.4.5	System evaluation w beam	A. Jansson	Wed 12/1/04	20 d	$0	$14,454	40%
233	26.4.6.5.4.6	IPM Operational	A. Jansson	Thu 12/30/04	0 d	$0	$0	
234	26.4.6.5.5	**Documentation**	**A. Jansson**	**Mon 5/3/04**	**177 d**	**$0**	**$17,919**	
235	26.4.6.5.5.1	Document FE card	A. Jansson	Tue 5/25/04	10 d	$0	$2,173	40%
236	26.4.6.5.5.2	Document buffer card	A. Jansson	Mon 5/3/04	10 d	$0	$4,346	40%
237	26.4.6.5.5.3	Document timing fanout	A. Jansson	Wed 6/9/04	10 d	$0	$2,173	40%
238	26.4.6.5.5.4	Document FE software	A. Jansson	Wed 6/9/04	10 d	$0	$2,000	40%
239	26.4.6.5.5.5	Document test & commissioning results	A. Jansson	Tue 1/4/05	10 d	$0	$7,227	40%
240	26.4.6.6	**B-field diagnostics**	**P. Bauer**	**Wed 1/1/03**	**495 d**	**$40,000**	**$846,154**	
241	26.4.6.6.1	B-field diagnostics (initial)	P. Bauer	Wed 1/1/03	195 d	$20,000	$338,462	40%
242	26.4.6.6.2	B-field diagnostics (continuing)	P. Bauer	Wed 10/8/03	300 d	$20,000	$507,692	60%
243	26.4.6.7	**1.7 GHz Schottky Detector**	**A. Jansson**	**Mon 3/3/03**	**274 d**	**$30,000**	**$65,154**	
244	26.4.6.7.1	Upgrade Schottky detector electronics and software	A. Jansson	Mon 3/3/03	274 d	$30,000	$65,154	60%
245	26.4.6.8	**Head-tail Monitor**	**V. Ranjbar**	**Mon 11/1/04**	**200 d**	**$50,000**	**$0**	
246	26.4.6.8.1	Build pingers for head-tail monitor	V. Ranjbar	Mon 11/1/04	200 d	$50,000	$0	100%
247	26.4.6.9	**Tev BLM-Abort upgrade**	**S Pordes**	**Mon 2/2/04**	**170 d**	**$250,000**	**$94,873**	
248	26.4.6.9.1	Develop specs and plan	S Pordes	Mon 2/2/04	30 d	$0	$16,742	60%
249	26.4.6.9.2	Review BLM-Abort upgrade Specifications	S Pordes	Fri 3/12/04	0 d	$0	$0	
250	26.4.6.9.3	Upgrade BLM-Abort system	S Pordes	Mon 3/15/04	140 d	$250,000	$78,131	60%
251	26.4.7	**Tevatron Vacuum Improvements**	**B. Hanna**	**Mon 11/17/03**	**453 d**	**$90,000**	**$12,354**	
252	26.4.7.1	FY03 plan includes FY03 shutdown (Milestone)	B. Hanna	Mon 11/17/03	0 d	$0	$0	
253	26.4.7.2	FY04: purchase additional ion pumps	B. Hanna	Mon 4/19/04	1 d	$45,000	$0	40%
254	26.4.7.3	FY04: install ion pumps	B. Hanna	Tue 8/24/04	22 d	$0	$8,005	40%
255	26.4.7.4	FY05: purchase additional ion pumps	B. Hanna	Mon 4/4/05	1 d	$45,000	$0	40%
256	26.4.7.5	FY05: install ion pumps	B. Hanna	Tue 8/9/05	22 d	$0	$4,349	40%
257	26.4.8	**Tevatron Alignment**	**R. Stefanski**	**Wed 1/1/03**	**775 d**	**$281,000**	**$898,492**	
258	26.4.8.1	Review Tevatron Alignment Plans (Milestone)	R. Stefanski	Fri 8/1/03	0 d	$0	$0	
259	26.4.8.2	Orbit/aperture optimization	J. Annala	Wed 1/1/03	775 d	$0	$321,000	60%
260	26.4.8.3	**Tevatron On-line Level System**	**J. Volk**	**Mon 3/3/03**	**403 d**	**$181,000**	**$290,877**	
261	26.4.8.3.1	On-line survey preparations	R. Stefanski	Mon 3/3/03	149 d	$25,000	$79,477	60%
262	26.4.8.3.2	On-line survey installation - 1	R. Stefanski	Mon 9/8/03	30 d	$0	$45,762	60%
263	26.4.8.3.3	On-line survey assembly - 2	J. Volk	Mon 11/3/03	200 d	$156,000	$119,877	60%
264	26.4.8.3.4	On-line survey installation - 2	R. Stefanski	Mon 8/23/04	30 d	$0	$45,762	60%
265	26.4.8.4	**Magnet Alignment**	**R. Stefanski**	**Mon 7/28/03**	**550 d**	**$100,000**	**$118,385**	
266	26.4.8.4.1	Tev alignment 03	R. Stefanski	Mon 7/28/03	80 d	$80,000	$39,462	60%
267	26.4.8.4.2	Tev alignment 04	R. Stefanski	Mon 8/23/04	40 d	$20,000	$39,462	60%
268	26.4.8.4.3	Tev alignment 05	R. Stefanski	Mon 8/8/05	40 d	$0	$39,462	60%
269	26.4.8.5	**SC Coil Realignment/Smart Bolts**	**D. Harding**	**Mon 7/28/03**	**550 d**	**$0**	**$168,231**	
270	26.4.8.5.1	Smart bolts 03	R. Stefanski	Mon 7/28/03	80 d	$0	$56,077	60%
271	26.4.8.5.2	Smart bolts 04	R. Stefanski	Mon 8/23/04	40 d	$0	$56,077	60%
272	26.4.8.5.3	Smart bolts 05	R. Stefanski	Mon 8/8/05	40 d	$0	$56,077	60%
273	26.5	**Shutdowns**	**J. Appel**	**Mon 9/8/03**	**771 d**	**$0**	**$0**	
274	26.5.1	Start Summer 03 Shutdown	J. Appel	Mon 9/8/03	0 d	$0	$0	
275	26.5.2	Finish Summer 03 Shutdown	J. Appel	Mon 11/17/03	0 d	$0	$0	
276	26.5.3	Start Summer 04 Shutdown	J. Appel	Mon 8/23/04	0 d	$0	$0	
277	26.5.4	Finish Summer 04 Shutdown	J. Appel	Fri 11/19/04	0 d	$0	$0	
278	26.5.5	Start Summer 05 Shutdown	J. Appel	Mon 8/8/05	0 d	$0	$0	
279	26.5.6	Finish Summer 05 Shutdown	J. Appel	Mon 10/3/05	0 d	$0	$0	
280	26.5.7	Start Summer 06 Shutdown	J. Appel	Mon 8/7/06	0 d	$0	$0	
281	26.5.8	Finish Summer 06 Shutdown	J. Appel	Mon 10/2/06	0 d	$0	$0	
282	26.6	**Project Management - Jeff Spalding**	**J. Spalding**	**Wed 1/1/03**	**1164 d**	**$0**	**$1,438,032**	
283	26.6.1	**Management Oversight**	**J. Spalding**	**Wed 1/1/03**	**1100 d**	**$0**	**$1,438,032**	
284	26.6.1.1	Overall Project Management	William Spalding	Thu 1/2/03	1093 d	$0	$515,856	40%
285	26.6.1.2	Project Management for Slip Stacking	Ioanis Kourbanis	Thu 1/2/03	500 d	$0	$20,865	40%
286	26.6.1.3	Project Management for Pbar Target and Sweeping	Jim Morgan	Thu 1/2/03	490 d	$0	$12,981	40%
287	26.6.1.4	Project Management for MI Upgrades	Ioanis Kourbanis	Fri 8/1/03	580 d	$0	$20,285	40%
288	26.6.1.5	Project Management for Lithium Lens Upgrades	Jim Morgan	Thu 1/2/03	1100 d	$0	$18,989	40%
289	26.6.1.6	Project Management for AP2 and Debuncher Acceptance	Keith Gollwitzer	Thu 1/2/03	1080 d	$0	$268,405	40%
290	26.6.1.7	Project Management for Stacking and Cooling Integration	Dave McGinnis	Wed 1/1/03	700 d	$0	$38,273	40%
291	26.6.1.8	Project Management for Debuncher Cooling	Paul Derwent	Wed 1/1/03	170 d	$0	$5,309	40%
292	26.6.1.9	Project Management for Stacktail Cooling	Paul Derwent	Wed 1/1/03	740 d	$0	$61,319	40%
293	26.6.1.10	Project Management for Recycler Stacking and Cooling	Dan Broemmelsiek	Wed 1/1/03	520 d	$0	$52,536	40%
294	26.6.1.11	Project Management for Electron Cooling	Sergei Nagaitsev	Wed 1/1/03	620 d	$0	$70,795	40%
295	26.6.1.12	Project Management for Rapid Transfers	Elvin Harms	Wed 1/1/03	620 d	$0	$53,407	40%
296	26.6.1.13	Project Management for Tevatron Task Force	Valeri Lebedev	Wed 1/1/03	1093 d	$0	$45,269	40%
297	26.6.1.14	Project Management for Beam-beam Limitations	Tanaji Sen	Thu 1/2/03	1093 d	$0	$45,269	40%
298	26.6.1.15	Project Management for BBC: Tevatron Electron Lens	Vladimir Shiltsev	Wed 1/1/03	1040 d	$0	$86,012	40%
299	26.6.1.16	Project Management for BBC: Wires	Tanaji Sen	Thu 1/2/03	340 d	$0	$5,209	40%
300	26.6.1.17	Project Management for Large Beam-beam Separation	R Moore	Wed 1/1/03	1060 d	$0	$67,759	40%
301	26.6.1.18	Project Management for Luminosity Leveling	Mike Martens	Wed 12/1/04	365 d	$0	$12,552	40%
302	26.6.1.19	Project Management for Improved Diagnostics	J Steimel	Wed 1/1/03	660 d	$0	$36,942	40%
303	26.6.2	**Project Milestones**	**J. Spalding**	**Mon 10/6/03**	**971 d**	**$0**	**$0**	
304	26.6.2.1	Review: Tevatron Upgrade Plan	J. Spalding	Mon 10/6/03	0 d	$0	$0	
305	26.6.2.2	Review Recycler Commissioning Plan	J. Spalding	Mon 2/9/04	0 d	$0	$0	
306	26.6.2.3	Review Recycler+E-Cooling Commissioning & Integration	J. Spalding	Tue 6/1/04	0 d	$0	$0	
307	26.6.2.4	Start Phase 2 (Milestone)	J. Spalding	Thu 12/23/04	0 d	$0	$0	
308	26.6.2.5	Start Phase 3 (Milestone)	J. Spalding	Wed 6/1/05	0 d	$0	$0	
309	26.6.2.6	Start Phase 4 (Milestone)	J. Spalding	Tue 12/6/05	0 d	$0	$0	
310	26.6.2.7	Start Phase 5 (Milestone)	J. Spalding	Mon 2/12/07	0 d	$0	$0	
311	26.6.2.8	End Project	J. Spalding	Fri 8/17/07	0 d	$0	$0	
312	26.6.3	**Milestones with Contingency**	**J. Spalding**	**Fri 4/1/05**	**596 d**	**$0**	**$0**	
313	26.6.3.1	Start Phase 2 contingency (Milestone)	J. Spalding	Fri 4/1/05	0 d	$0	$0	
314	26.6.3.2	Start Phase 3 contingency (Milestone)	J. Spalding	Thu 12/8/05	0 d	$0	$0	
315	26.6.3.3	Start Phase 4 contingency (Milestone)	J. Spalding	Fri 6/16/06	0 d	$0	$0	
316	26.6.3.4	Start Phase 5 contingency (Milestone)	J. Spalding	Fri 8/17/07	0 d	$0	$0	
317	27	**Maintenance and Reliability - Paul Czarapata**	**P. Czarapata**	**Wed 1/1/03**	**1037 d**	**$3,303,000**	**$1,005,106**	
318	27.1	**2003 White Paper/Vulnerability Report**	**P. Czarapata**	**Wed 1/1/03**	**1004 d**	**$2,735,000**	**$664,147**	
319	27.1.1	**Linac 7835 Amplifier Tubes**	**P. Czarapata**	**Tue 7/1/03**	**628 d**	**$1,600,000**	**$93,077**	
320	27.1.1.1	Linac 7835 Amplifier Tubes: Funding (FY03)	P. Czarapata	Mon 9/1/03	21 d	$150,000	$0	40%
321	27.1.1.2	Linac 7835 Amplifier Tubes: Funding (FY04)	P. Czarapata	Wed 10/1/03	252 d	$450,000	$0	40%
322	27.1.1.3	Linac 7835 Amplifier Tubes: Labor	P. Czarapata	Tue 7/1/03	578 d	$0	$93,077	40%
323	27.1.1.4	Linac 7835 Amplifier Tubes: Further Funding (FY05)	P. Czarapata	Sat 1/1/05	1 d	$500,000	$0	60%
324	27.1.1.5	Linac 7835 Amplifier Tubes: Further Funding (FY06)	P. Czarapata	Mon 1/2/06	1 d	$500,000	$0	60%
325	27.1.2	**Orbit Bump Magnets**	**P. Czarapata**	**Mon 5/3/04**	**462 d**	**$150,000**	**$292,795**	
326	27.1.2.1	Orbit Bump Magnets Design	D. Harding	Mon 5/3/04	66 d	$0	$30,589	40%
327	27.1.2.2	Orbit Bump Magnets Procurement M&S Cost	D. Harding	Thu 8/5/04	88 d	$150,000	$4,562	40%
328	27.1.2.3	Orbit Bump Magnets: Fab #1	D. Harding	Fri 12/10/04	66 d	$0	$55,465	40%
329	27.1.2.4	Orbit Bump Magnets: Test #1, design mods	D. Harding	Mon 3/21/05	88 d	$0	$49,335	40%
330	27.1.2.5	Orbit Bump Magnets: Fab #2-6	D. Harding	Mon 7/25/05	110 d	$0	$126,712	40%
331	27.1.2.6	Orbit Bump Magnets: Test #2-6	D. Harding	Wed 1/4/06	44 d	$0	$24,132	40%
332	27.1.3	**Booster RF: LLRF**	**B. Chase**	**Fri 1/2/04**	**520 d**	**$100,000**	**$226,000**	
333	27.1.3.1	Booster RF: LLRF M&S Costs	B. Chase	Tue 1/4/05	1 d	$100,000	$0	40%
334	27.1.3.2	Booster RF: LLRF Labor	B. Chase	Fri 1/2/04	520 d	$0	$226,000	100%
335	27.1.4	Booster RF: HLRF	P. Czarapata	Mon 1/1/07	1 d	$0	$0	40%
336	27.1.5	Booster RF: Cavities	P. Czarapata	Mon 1/1/07	1 d	$0	$0	40%
337	27.1.6	**MI&Beams: Dipole and Quad PS Transformers**	**P. Czarapata**	**Fri 1/2/04**	**196 d**	**$230,000**	**$38,246**	**40%**



ID	WBS	Name	In Charge	Start	Duration	M&S Base Cost Est.	Labor Base Cost Est.	Contingency %
338	27.1.6.1	MI&Beams: Dipole and Quad PS Transformers: M&S	P. Czarapata	Fri 1/2/04	1 d	[illegible]	$0	40%
339	27.1.6.2	MI&Beams: Dipole and Quad PS Transformers Order - Labor	P. Czarapata	Fri 1/2/04	20 d	$0	$19,123	40%
340	27.1.6.3	MI&Beams: Dipole and Quad PS Transformers Test - Labor	P. Czarapata	Fri 8/6/04	44 d	$0	$19,123	40%
341	**27.1.7**	**MI Kicker Vacuum Tubes**	**P. Czarapata**	**Fri 1/2/04**	**20 d**	**$5,000**	**$2,390**	
342	27.1.7.1	MI Kicker Vacuum Tubes: Cost	P. Czarapata	Fri 1/2/04	1 d	$5,000	$0	40%
343	27.1.7.2	MI Kicker Vacuum Tubes: Labor	P. Czarapata	Mon 1/5/04	19 d	$0	$2,390	40%
344	**27.1.8**	**Tev lowBeta PS Magnetics**	**P. Czarapata**	**Thu 1/1/04**	**94 d**	**$30,000**	**$2,077**	
345	27.1.8.1	Tev lowBeta PS Magnetics: M&S	J. Lentz	Thu 1/1/04	2 d	$30,000	$415	40%
346	27.1.8.2	Tev lowBeta PS Magnetics: Labor	J. Lentz	Mon 5/10/04	4 d	$0	$1,662	40%
347	**27.1.9**	**Tev Centrifugal Cold Compressors**	**P. Czarapata**	**Wed 1/1/03**	**951 d**	**$100,000**	**$0**	
348	27.1.9.1	Tev Centrifugal Cold Compressors: M&S	P. Czarapata	Thu 1/1/04	700 d	$100,000	$0	40%
349	27.1.9.2	Tev Centrifugal Cold Compressors: Labor	P. Czarapata	Wed 1/1/03	1 d	$0	$0	40%
350	27.1.10	Infrastructure: 345-KV Switchgear KRS	P. Czarapata	Sun 1/1/06	1 d	$200,000	$0	20%
351	27.1.11	Infrastructure: 345-KV Switchgear MMS	P. Czarapata	Sun 1/1/06	1 d	$300,000	$0	20%
352	27.1.12	Infrastructure: 345-KV MMS Transformer	P. Czarapata	Sun 1/1/06	1 d	$0	$0	20%
353	**27.1.13**	**Harmonic Filter Damping Resistors**	**S. Hays**	**Fri 1/2/04**	**20 d**	**$20,000**	**$9,562**	
354	27.1.13.1	Harmonic Filter Damping Resistors: M&S	S. Hays	Fri 1/2/04	1 d	$20,000	$0	20%
355	27.1.13.2	Harmonic Filter Damping Resistors: Labor	S. Hays	Mon 1/5/04	19 d	$0	$9,562	40%
356	**27.2**	**Maintenance Improvements**	**P. Czarapata**	**Tue 4/1/03**	**625 d**	**$568,000**	**$250,212**	
357	**27.2.1**	**Replace Tevatron Stands**	**R. Stefanski**	**Tue 4/1/03**	**625 d**	**$268,000**	**$250,212**	
358	27.2.1.1	Replace Rusting Tevatron Stands: M&S_03	R. Stefanski	Tue 4/1/03	5 d	$108,000	$2,173	40%
359	27.2.1.2	Replace Tevatron Stands and other alignment: Labor_03	R. Stefanski	Mon 9/8/03	20 d	$0	$81,231	60%
360	27.2.1.3	Replace Rusting Tevatron Stands: M&S_04	R. Stefanski	Mon 3/1/04	5 d	$60,000	$2,173	40%
361	27.2.1.4	Replace Tevatron Stands and other alignment: Labor_04	R. Stefanski	Mon 8/23/04	20 d	$0	$81,231	60%
362	27.2.1.5	Replace Rusting Tevatron Stands: M&S_05	R. Stefanski	Mon 1/3/05	5 d	$100,000	$2,173	40%
363	27.2.1.6	Replace Tevatron Stands and other alignment: Labor_05	R. Stefanski	Mon 8/8/05	20 d	$0	$81,231	60%
364	27.2.2	Booster Collimator	P. Czarapata	Fri 1/2/04	1 d	$300,000	$0	40%
365	**27.3**	**Project Management Oversight**	**P. Czarapata**	**Wed 1/1/03**	**1037 d**	**$0**	**$90,748**	
366	27.3.1	Project Management for Maintenance and Reliability	P. Czarapata	Wed 1/1/03	1037 d	$0	$90,748	40%