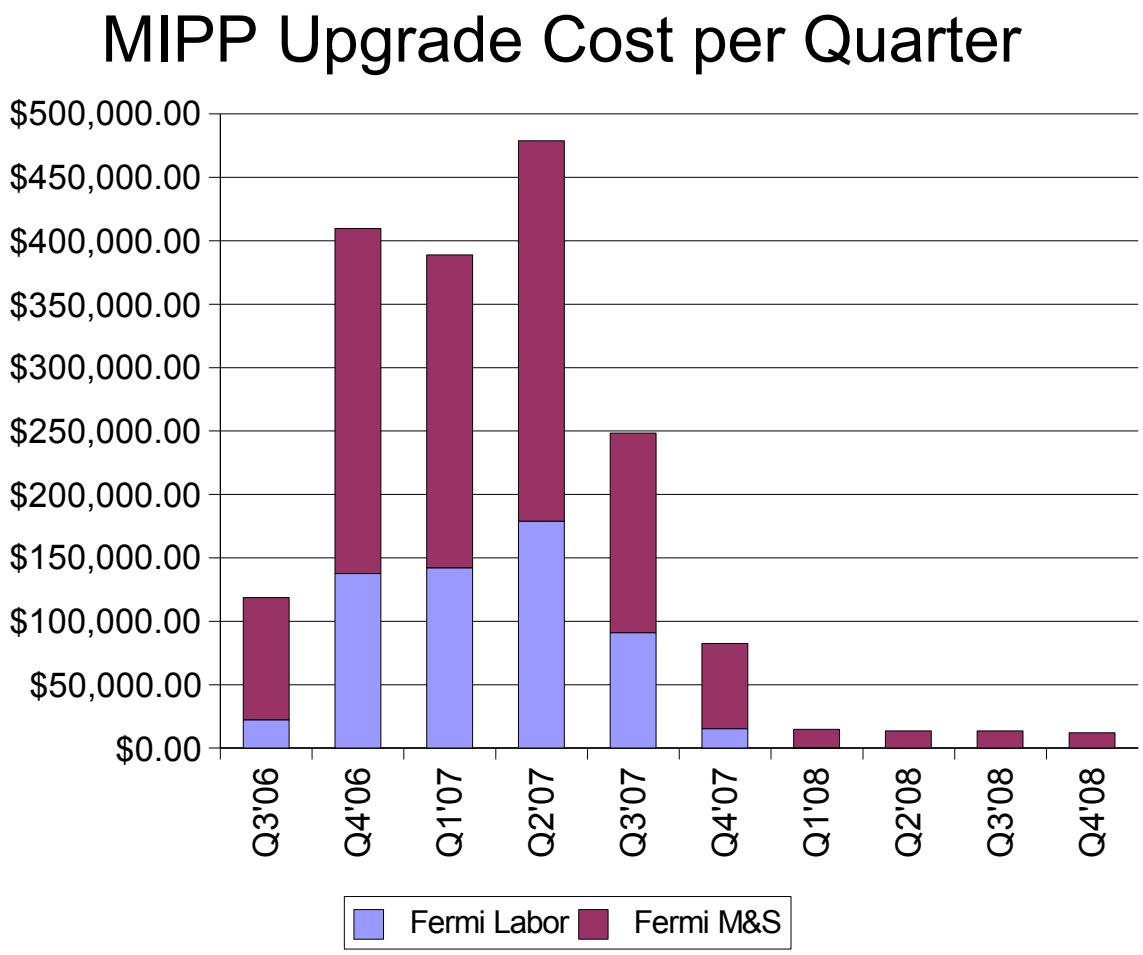
The MIPP Upgrade Project Cost and Schedule

During the preparation of the *Proposal to upgrade the MIPP Experiment* the resources needed for each upgrade task have been determined. This document lists the cost and labor resources needed throughout the project. The full Gantt chart is attached.

The MIPP upgrade project is divided into tasks as shown in the table. The total project cost is ~$2 million. Fermilab M&S accounts for $1.2 million and >20,000 hours of Fermilab Labor add $567,000 for a total Fermilab Base Cost of $1.78 million. We expect In Kind Contributions from collaborating universities and laboratories of $205,000.

WBS	Task Name	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	In Kind	Total Project Cost
0	MIPP Upgrade Totals	$1,214,456	$566,628	$1,781,084	$205,000	$2,003,844
1	Project Management	$55,000	$0	$55,000	$0	$55,000
2	Jolly Green Giant Repair	$279,000	$141,884	$420,884	$0	$438,644
2.1	Jolly Green Giant disassembly/assembly	$80,000	$94,380	$174,380	$0	$192,140
2.2	JGG coil design and fabrication	$199,000	$25,524	$224,524	$0	$224,524
2.3	Ziptrack JGG magnet	$0	$21,980	$21,980	$0	$21,980
3	Improvements on detector hardware	$128,600	$109,114	$237,714	$150,000	$387,714
3.1	Gas System and Slow Controls Upgrade	$40,500	$29,868	$70,368	$0	$70,368
3.1.1	RICH vessel fill automation	$2,500	$5,610	$8,110	$0	$8,110
3.1.2	Methylal bath fill automation	$5,000	$7,228	$12,228	$0	$12,228
3.1.3	P10 supply upgrade	$5,000	$6,664	$11,664	$0	$11,664
3.1.4	TOF wall thermal instrumentation	$2,000	$4,232	$6,232	$0	$6,232
3.1.5	Replacement of CKOV pressure sensors	$2,000	$412	$2,412	$0	$2,412
3.1.6	Beam Ckov vacuum system	$3,000	$1,340	$4,340	$0	$4,340
3.1.7	Calibration and maintenance	$0	$2,952	$2,952	$0	$2,952
3.1.8	Slow Controls infrastructure upgrade	$21,000	$1,430	$22,430	$0	$22,430
3.2	Cryogenic System Upgrade	$68,000	$75,598	$143,598	$0	$143,598
3.2.1	Hydrogen Target transfer line	$13,000	$38,120	$51,120	$0	$51,120
3.2.2	Nitrogen Target	$10,000	$23,260	$33,260	$0	$33,260
3.2.3	Spare Cryocooler	$45,000	$14,218	$59,218	$0	$59,218
3.3	TPC rewind	$9,000	$0	$9,000	$0	$9,000
3.4	Chamber wire repairs	$1,100	$3,648	$4,748	$0	$4,748
3.5	Ckov Photomultiplier tubes	$10,000	$0	$10,000	$0	$10,000
3.6	RICH Photomultiplier tubes	$0	$0	$0	$150,000	$150,000
4	Detector Readout Upgrades	$362,920	$197,918	$560,838	$0	$568,513
4.1	TPC Electronics	$225,920	$150,847	$376,767	$0	$384,442
4.2	Drift Chamber/Wire Chamber electronics	$121,250	$28,718	$149,968	$0	$149,968
4.3	ToF + CKOV electronics board design	$15,750	$18,352	$34,102	$0	$34,102
4.4	Calorimeter migration to Fera electronics	$15,000	$0	$15,000	$0	$15,000
5	Trigger System Upgrade	$145,900	$51,400	$197,300	$0	$208,300
5.1	Interaction Trigger Fpix	$137,100	$38,800	$175,900	$0	$186,900
5.2	Interaction Trigger Board	$8,800	$12,600	$21,400	$0	$21,400
5.3	Other Trigger Upgrades	$0	$0	$0	$0	$0
6	DAQ Software and Hardware Upgrade	$46,686	$38,952	$85,638	$0	$85,638
7	Offline farm Upgrade	$0	$0	$0	$0	$0
8	Beam Line Upgrade	$56,000	$0	$56,000	$0	$56,000
9	Enhanced Veto Wall	$20,110	$1,440	$21,550	$0	$21,550
10	Recoil Detector	$0	$25,920	$25,920	$55,000	$80,920
11	Visitor Support for Russian collaborators	$105,240	$0	$105,240	$0	$105,240

Resource usage over time is shown in the figure and table on this page. The project will take until January 2008 to complete. Resources are needed after that to support Russian collaborators while they stay at Fermilab. The critical time line is given by the JGG repair and TPC upgrade projects. The start times of some of the smaller projects are not critical. These tasks can be scheduled differently to allow flexibility in overall resource usage. Of course any such rescheduling may change the time line.

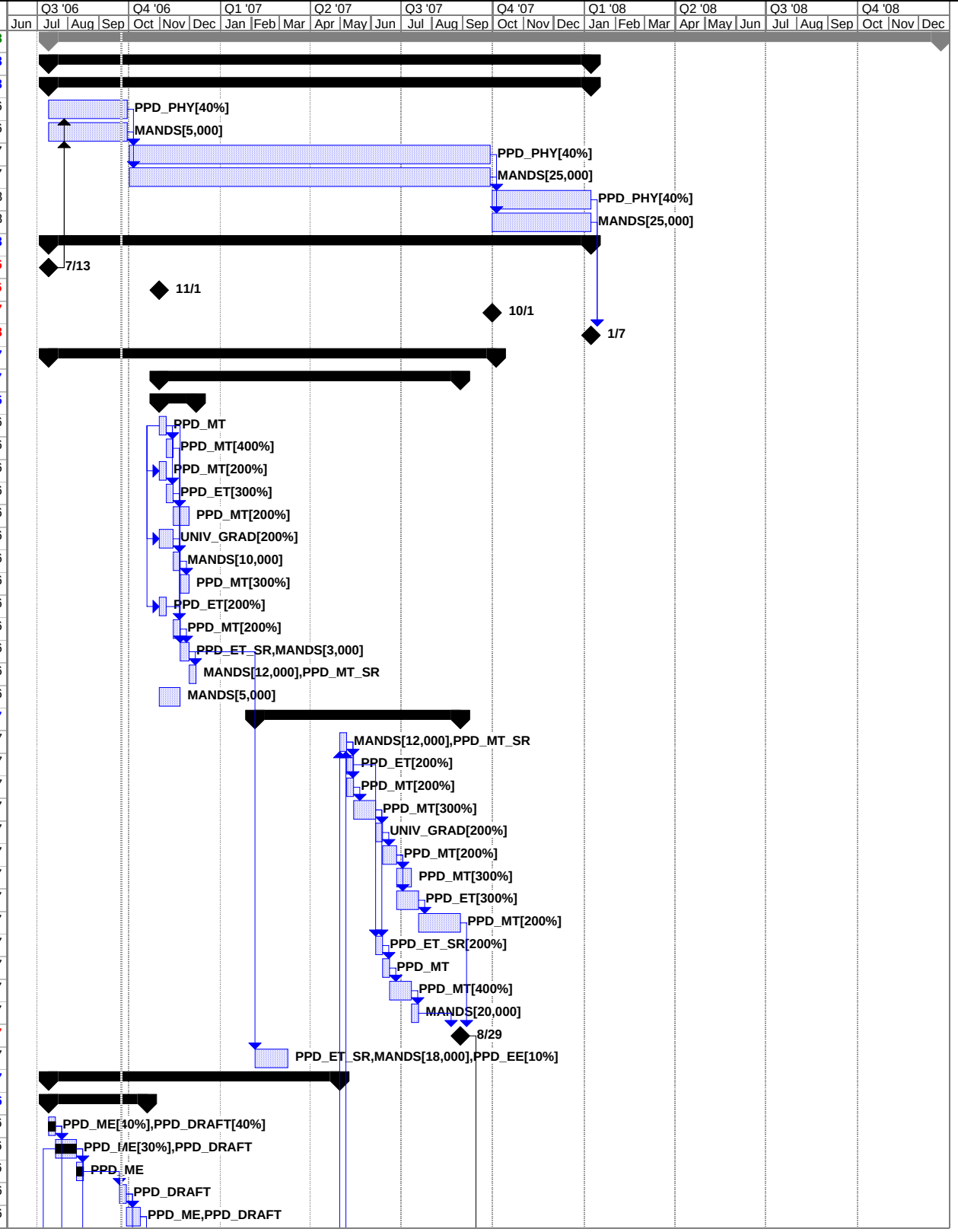


	Cost	Work	Q3'06	Q4'06
Operating	$1,781,084	20,566.02 hrs	$118,646.00	$409,703.00
Fermi Labor	$586,844	19,256.02 hrs	$22,162.00	$137,683.00
Fermi M&S	$1,194,240	1,310 hrs	$96,483.00	$272,021.00
	Q1'07	Q2'07	Q3'07	Q4'07
Operating	$388,956.00	$478,875.00	$248,457.00	$82,499.00
Fermi Labor	$142,014.00	$178,820.00	$90,967.00	$15,198.00
Fermi M&S	$246,942.00	$300,055.00	$157,490.00	$67,301.00
	Q1'08	Q2'08	Q3'08	Q4'08
Operating	$14,799.00	$13,471.00	$13,471.00	$12,208.00
Fermi Labor	$0.00			
Fermi M&S	$14,799.00	$13,471.00	$13,471.00	$12,208.00

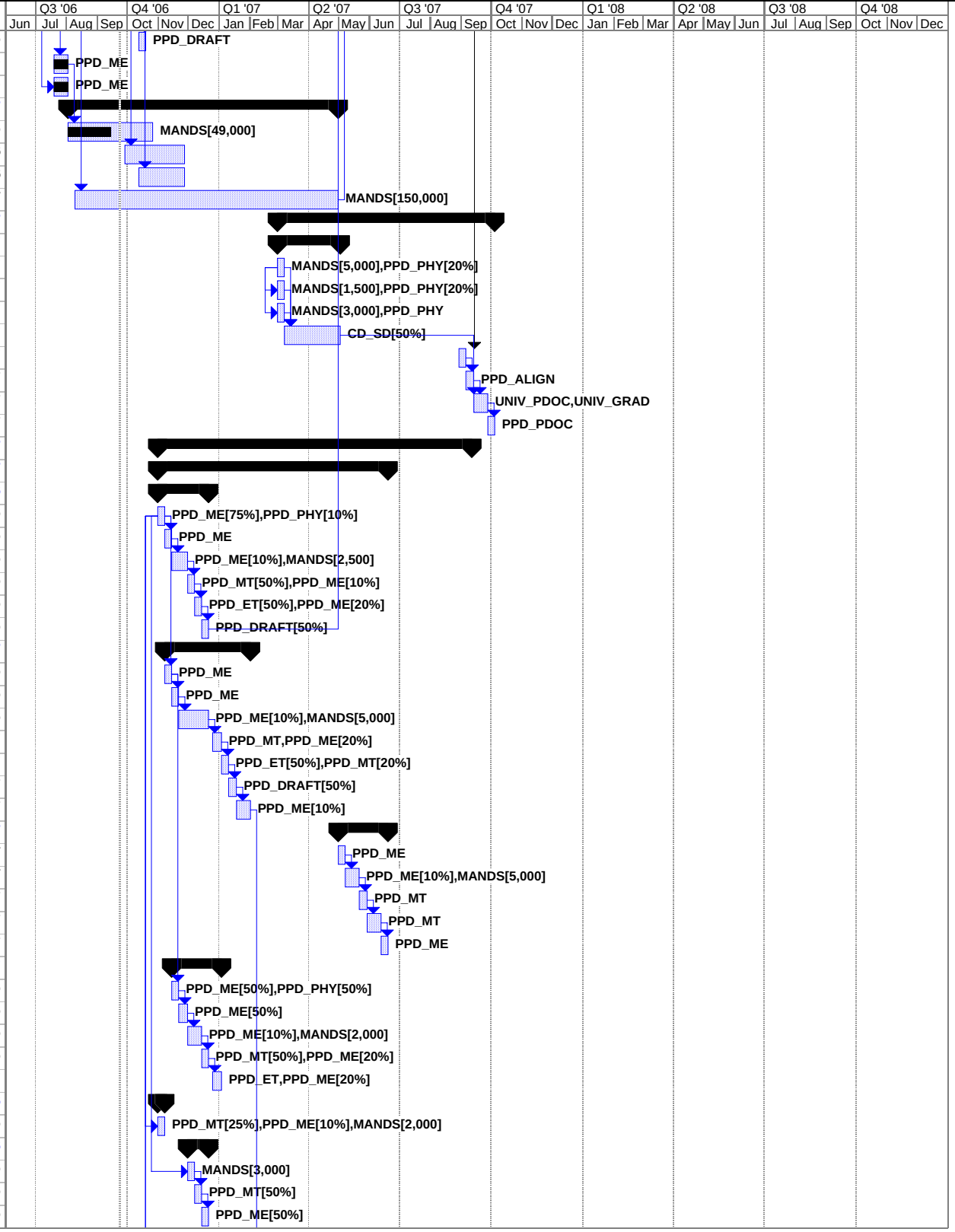
The resource sheet shows the different kinds of labor with the number of work hours. ME, MT, and MT_SR are mechanical engineers, technicians, and senior technicians, respectively. EE, ET, and ET_SR are electrical engineers and technicians. SD is a software designer and CE is a computing engineer. Drafters, welders, and alignment crews are needed also.

Resource	Group	Available	Peak Use	Work
MANDS	Fermi		0/day	1,223,456
CD_CE	Fermi	100%	100%	280 hrs
CD_SD	Fermi	200%	190%	848.8 hrs
PPD_PHY	Fermi	450%	290%	2,757.2 hrs
PPD_ME	Fermi	100%	305%	2,254 hrs
PPD_MT	Fermi	300%	700%	4,010 hrs
PPD_MT_SR	Fermi	150%	150%	200 hrs
PPD_EE	Fermi	250%	221%	2,344.97 hrs
PPD_ET	Fermi	100%	613%	2,891.85 hrs
PPD_ET_SR	Fermi	200%	200%	1,240.4 hrs
PPD_DRAFT	Fermi	200%	200%	1,512 hrs
PPD_PDOC	Fermi	300%	230%	1,172.8 hrs
PPD_ALIGN	Fermi	200%	200%	96 hrs
TD_MACH	Fermi	200%	125%	320 hrs
TD_WELD	Fermi	100%	60%	198 hrs
AD_BEAM	Fermi	100%	100%	200 hrs
CD_PREP	Fermi	100%	100%	160 hrs
Contractor	Fermi	100%	100%	80 hrs
UNIV_PHY	Univ	300%	300%	1,792 hrs
UNIV_GRAD	Univ	600%	600%	5,320 hrs
UNIV_PDOC	Univ	500%	400%	1066 hrs
UNIV_ET	Univ	200%	100%	240 hrs
UNIV_EE	Univ	100%	100%	240 hrs
UNIV_MT	Univ	200%	100%	400 hrs

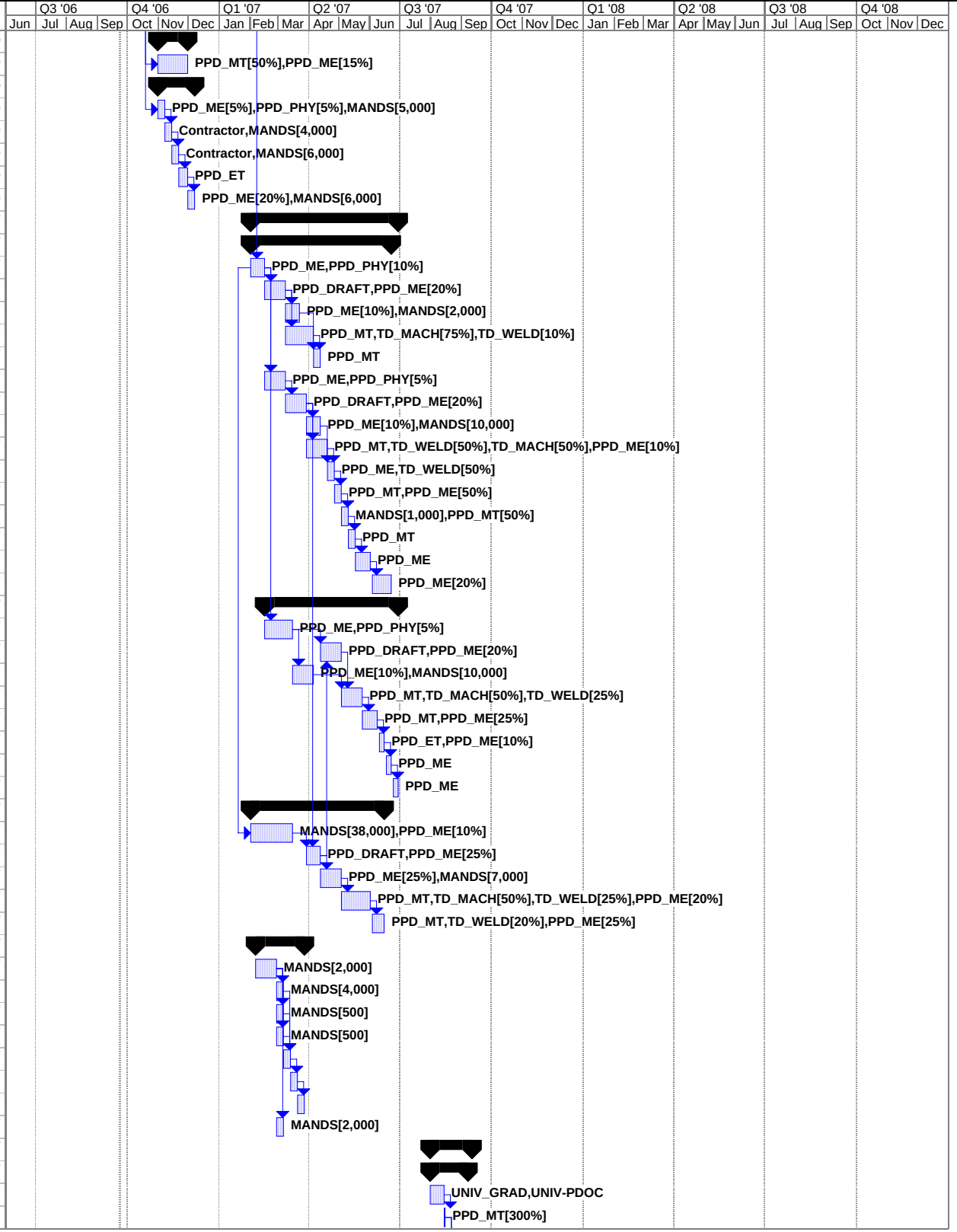
WBS	Name	Duration	Start	Finish
0	MIPP	127.8 wks	Thu 7/13/06	Tue 12/23/08
1	Project Management	74.2 wks	Thu 7/13/06	Mon 1/7/08
1.1	Management Support	74.2 wks	Thu 7/13/06	Mon 1/7/08
1.1.1	Project Management R&D labor - FY06	11.2 wks	Thu 7/13/06	Fri 9/29/06
1.1.2	Project Management R&D M&S - FY06	11.2 wks	Thu 7/13/06	Fri 9/29/06
1.1.3	Project Management R&D labor - FY07	50 wks	Mon 10/2/06	Fri 9/28/07
1.1.4	Project Management R&D M&S - FY07	50 wks	Mon 10/2/06	Fri 9/28/07
1.1.5	Project Management R&D labor - FY08	13 wks	Mon 10/1/07	Mon 1/7/08
1.1.6	Project Management R&D M&S - FY08	13 wks	Mon 10/1/07	Mon 1/7/08
1.2	Milestones	74.2 wks	Thu 7/13/06	Mon 1/7/08
1.2.1	L1 - Start project	0 wks	Thu 7/13/06	Thu 7/13/06
1.2.2	FY07 Funding Approved	0 wks	Wed 11/1/06	Wed 11/1/06
1.2.3	FY08 Funding Approved	0 wks	Mon 10/1/07	Mon 10/1/07
1.2.4	L1 - End Project	0 wks	Mon 1/7/08	Mon 1/7/08
2	Jolly Green Giant Repair	62 wks	Thu 7/13/06	Thu 10/4/07
2.1	Jolly Green Giant disassembly/assembly	41.4 wks	Wed 11/1/06	Wed 8/29/07
2.1.1	JGG Disassembly	5 wks	Wed 11/1/06	Thu 12/7/06
2.1.1.1	Clear out equipment upstream of JGC	1 wk	Wed 11/1/06	Tue 11/7/06
2.1.1.2	Move concrete and beam supports to	1 wk	Wed 11/8/06	Tue 11/14/06
2.1.1.3	Secure & disconnect vacuum from Be	1 wk	Wed 11/1/06	Tue 11/7/06
2.1.1.4	Remove Beam CKOV cable tray & ha	1 wk	Wed 11/8/06	Tue 11/14/06
2.1.1.5	Disconnect Beam CKOV gas system	2 wks	Wed 11/15/06	Thu 11/30/06
2.1.1.6	De-cable TPC	2 wks	Wed 11/1/06	Tue 11/14/06
2.1.1.7	Remove electrical conduit	1 wk	Wed 11/15/06	Tue 11/21/06
2.1.1.8	Move TPC & support stand to side	1 wk	Wed 11/22/06	Thu 11/30/06
2.1.1.9	De-cable JGG controls	1 wk	Wed 11/1/06	Tue 11/7/06
2.1.1.1	Remove hoses from JGG	1 wk	Wed 11/15/06	Tue 11/21/06
2.1.1.1	Remove electrical from JGG	1 wk	Wed 11/22/06	Thu 11/30/06
2.1.1.1	Remove coils (4) from JGG	1 wk	Fri 12/1/06	Thu 12/7/06
2.1.1.1	M&S purchases	3 wks	Wed 11/1/06	Tue 11/21/06
2.1.2	JGG Reassembly	29.2 wks	Mon 2/5/07	Wed 8/29/07
2.1.2.1	Reset coils (2) in JGG	1 wk	Tue 5/1/07	Mon 5/7/07
2.1.2.2	Re-cable JGG controls	1 wk	Tue 5/8/07	Mon 5/14/07
2.1.2.3	Re-hose JGG	1 wk	Tue 5/8/07	Mon 5/14/07
2.1.2.4	Re-install TPC & support stand	3 wks	Tue 5/15/07	Tue 6/5/07
2.1.2.5	Re-cable TPC	1 wk	Wed 6/6/07	Tue 6/12/07
2.1.2.6	Re-connect TPC water and cables	2 wks	Wed 6/13/07	Tue 6/26/07
2.1.2.7	Re-install Beam CKOV vacuum & tes	2 wks	Wed 6/27/07	Wed 7/11/07
2.1.2.8	Re-install Beam CKOV cable tray & h	3 wks	Wed 6/27/07	Wed 7/18/07
2.1.2.9	Re-connect Beam CKOV gas system	6 wks	Thu 7/19/07	Wed 8/29/07
2.1.2.1	Install electrical equipment	1 wk	Wed 6/6/07	Tue 6/12/07
2.1.2.1	Replace equipment upstream of JGG	1 wk	Wed 6/13/07	Tue 6/19/07
2.1.2.1	Re-install concrete and beam support	3 wks	Wed 6/20/07	Wed 7/11/07
2.1.2.1	Re-install electrical conduit	1 wk	Thu 7/12/07	Wed 7/18/07
2.1.2.1	L3 - Jolly Green Giant Coils Repair	0 wks	Wed 8/29/07	Wed 8/29/07
2.1.2.1	Upgrade electrical, 5000A	5 wks	Mon 2/5/07	Fri 3/9/07
2.2	JGG coil design and fabrication	40 wks	Thu 7/13/06	Mon 4/30/07
2.2.1	Design JGG Coil upgrade	14 wks	Thu 7/13/06	Thu 10/19/06
2.2.1.1	Design Aluminum Conductor	1 wk	Thu 7/13/06	Wed 7/19/06
2.2.1.2	Design Coil Packages	3 wks	Thu 7/20/06	Wed 8/9/06
2.2.1.3	Engineer Cooling with FEA Calculatic	1 wk	Thu 8/10/06	Wed 8/16/06
2.2.1.4	Design Pole piece modifications	1 wk	Fri 9/22/06	Thu 9/28/06
2.2.1.5	Design coil supports	2 wks	Fri 9/29/06	Thu 10/12/06



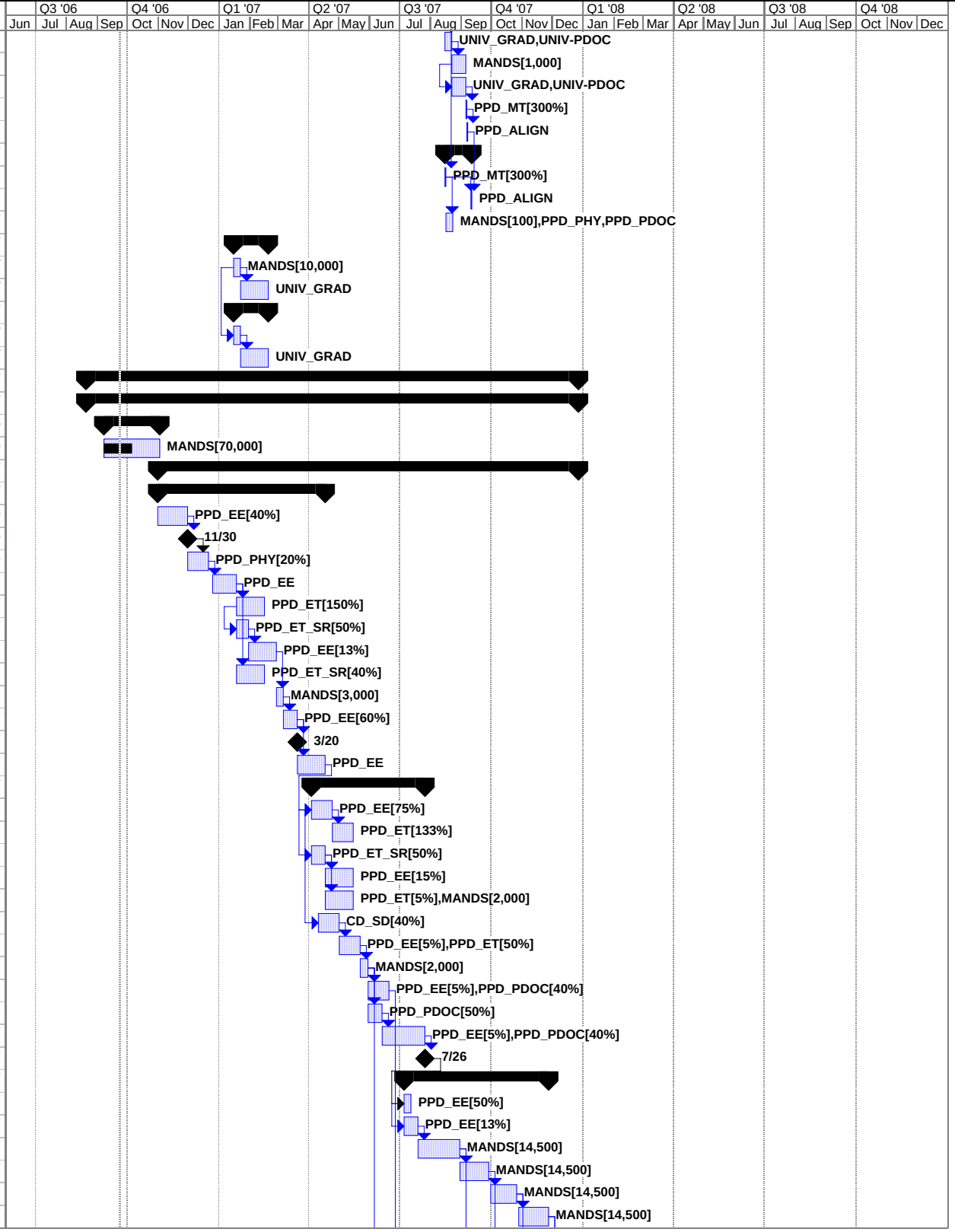
WBS	Name	Duration	Start	Finish
2.2.1.6	Design turn connector plates	1 wk	Fri 10/13/06	Thu 10/19/06
2.2.1.7	Write specifications for aluminum con	2 wks	Thu 7/20/06	Wed 8/2/06
2.2.1.8	Write specifications for manufacturing	2 wks	Thu 7/20/06	Wed 8/2/06
2.2.2	**Purchase JGG coil upgrade materials**	**37 wks**	**Thu 8/3/06**	**Mon 4/30/07**
2.2.2.1	Purchase aluminum conductor	12 wks	Thu 8/3/06	Thu 10/26/06
2.2.2.2	Purchase pole piece modifications	8 wks	Fri 9/29/06	Mon 11/27/06
2.2.2.3	Purchase new coil supports	6 wks	Fri 10/13/06	Mon 11/27/06
2.2.2.4	Fabricate coil sections	36 wks	Thu 8/10/06	Mon 4/30/07
2.3	**Ziptrack JGG magnet**	**30.6 wks**	**Thu 3/1/07**	**Thu 10/4/07**
2.3.1	**Prepare Ziptrack for use**	**9 wks**	**Thu 3/1/07**	**Wed 5/2/07**
2.3.1.1	Purchase and install new Hall Probes	1 wk	Thu 3/1/07	Wed 3/7/07
2.3.1.2	Purchase new Ziptrack control compu	1 wk	Thu 3/1/07	Wed 3/7/07
2.3.1.3	Purchase and install new Camac inte	1 wk	Thu 3/1/07	Wed 3/7/07
2.3.1.4	Update Software to new Hardware	8 wks	Thu 3/8/07	Wed 5/2/07
2.3.2	Move Ziptrack into MC7	1 wk	Thu 8/30/07	Wed 9/5/07
2.3.3	Survey Ziptrack setup	1 wk	Thu 9/6/07	Thu 9/13/07
2.3.4	Ziptrack JGG magnet	2 wks	Fri 9/14/07	Thu 9/27/07
2.3.5	Remove Ziptrack from MC7	1 wk	Fri 9/28/07	Thu 10/4/07
3	**Improvements on detector hardware**	**43 wks**	**Wed 11/1/06**	**Tue 9/11/07**
3.1	**Gas System and Slow Controls Upgrade**	**31.4 wks**	**Wed 11/1/06**	**Tue 6/19/07**
3.1.1	**RICH vessel fill automation**	**7 wks**	**Wed 11/1/06**	**Thu 12/21/06**
3.1.1.1	Design automated fill system	1 wk	Wed 11/1/06	Tue 11/7/06
3.1.1.2	Program PLC and test logic, program	1 wk	Wed 11/8/06	Tue 11/14/06
3.1.1.3	Procure methylal bath parts	2 wks	Wed 11/15/06	Thu 11/30/06
3.1.1.4	Install and leak check mechanical cor	1 wk	Fri 12/1/06	Thu 12/7/06
3.1.1.5	Wire and test electrical components	1 wk	Fri 12/8/06	Thu 12/14/06
3.1.1.6	Update P&ID diagram	1 wk	Fri 12/15/06	Thu 12/21/06
3.1.2	**Methylal bath fill automation and capac**	**11 wks**	**Wed 11/8/06**	**Thu 2/1/07**
3.1.2.1	Design automated fill system	1 wk	Wed 11/8/06	Tue 11/14/06
3.1.2.2	Update PLC and test logic, update HI	1 wk	Wed 11/15/06	Tue 11/21/06
3.1.2.3	Procure Parts	4 wks	Wed 11/22/06	Thu 12/21/06
3.1.2.4	Install and leak check mechanical cor	1 wk	Tue 12/26/06	Wed 1/3/07
3.1.2.5	Wire and test electrical components	1 wk	Thu 1/4/07	Wed 1/10/07
3.1.2.6	Update P&ID program	1 wk	Thu 1/11/07	Thu 1/18/07
3.1.2.7	Update flammable gas safety docume	2 wks	Fri 1/19/07	Thu 2/1/07
3.1.3	**P10 supply upgrade**	**7 wks**	**Tue 5/1/07**	**Tue 6/19/07**
3.1.3.1	Design gas system	1 wk	Tue 5/1/07	Mon 5/7/07
3.1.3.2	Procure parts	2 wks	Tue 5/8/07	Mon 5/21/07
3.1.3.3	Prepare parking space for P10 trailer	1 wk	Tue 5/22/07	Tue 5/29/07
3.1.3.4	Install gas system	2 wks	Wed 5/30/07	Tue 6/12/07
3.1.3.5	Update flammable gas and ODH safe	1 wk	Wed 6/13/07	Tue 6/19/07
3.1.4	**TOF wall thermal instrumentation**	**6 wks**	**Wed 11/15/06**	**Wed 1/3/07**
3.1.4.1	Design thermal instrumentation	1 wk	Wed 11/15/06	Tue 11/21/06
3.1.4.2	Program PLC and test logic, update H	1 wk	Wed 11/22/06	Thu 11/30/06
3.1.4.3	Procure Parts	2 wks	Fri 12/1/06	Thu 12/14/06
3.1.4.4	Install Sensors	1 wk	Fri 12/15/06	Thu 12/21/06
3.1.4.5	Wire, test, and calibrate sensors	1 wk	Tue 12/26/06	Wed 1/3/07
3.1.5	**Replacement of CKOV pressure sensor**	**1 wk**	**Wed 11/1/06**	**Tue 11/7/06**
3.1.5.1	Replacement of CKOV pressure sens	1 wk	Wed 11/1/06	Tue 11/7/06
3.1.6	**Beam Ckov vacuum system**	**3 wks**	**Fri 12/1/06**	**Thu 12/21/06**
3.1.6.1	Procure instruments and fittings	1 wk	Fri 12/1/06	Thu 12/7/06
3.1.6.2	Install and wire instruments	1 wk	Fri 12/8/06	Thu 12/14/06
3.1.6.3	PLC and HMI programming	1 wk	Fri 12/15/06	Thu 12/21/06



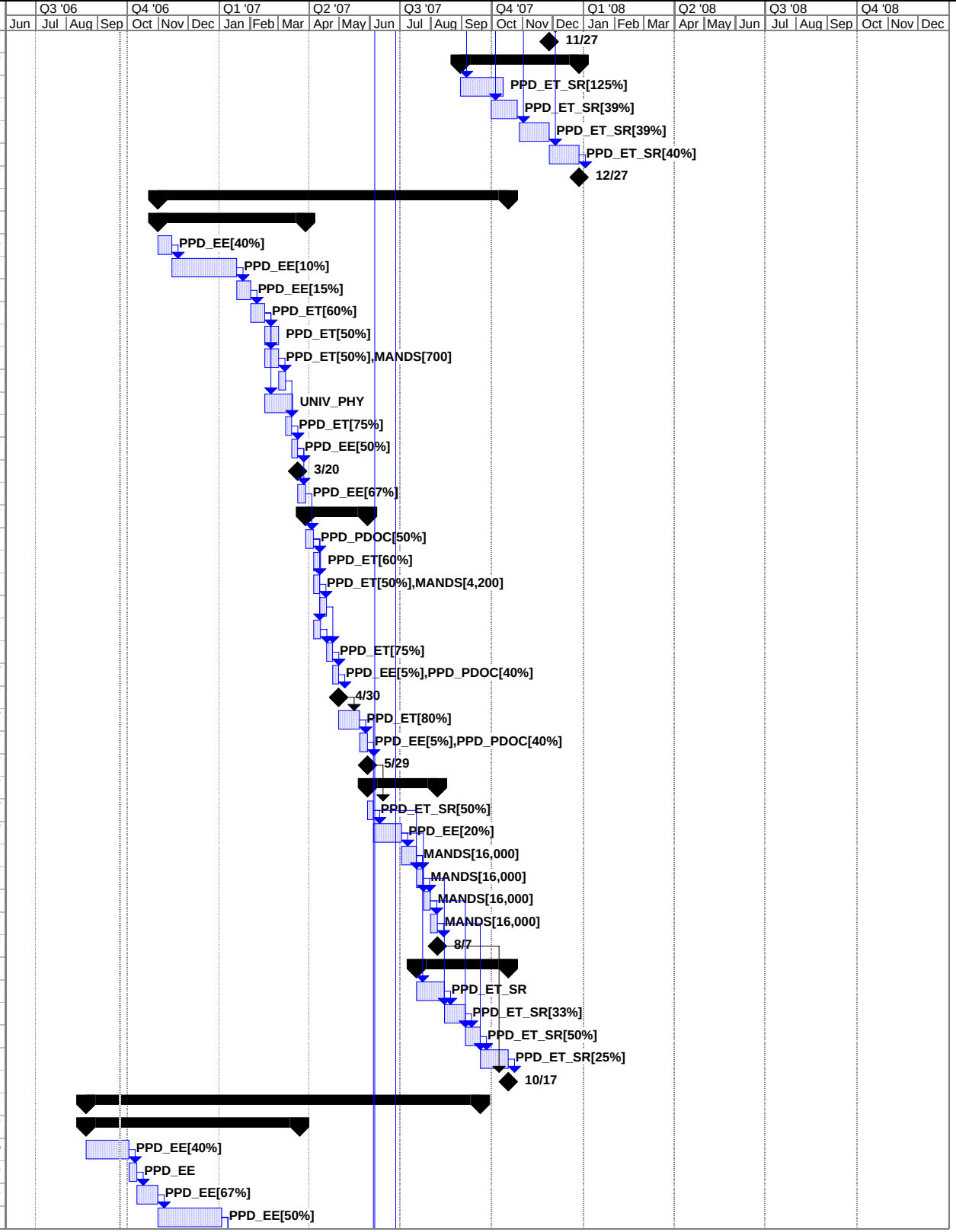
WBS	Name	Duration	Start	Finish
3.1.7	**Calibration and maintenance of slow cc**	**4 wks**	**Wed 11/1/06**	**Thu 11/30/06**
3.1.7.1	Removal, calibration, re-installation o	4 wks	Wed 11/1/06	Thu 11/30/06
3.1.8	**Slow Controls infrastructure upgrade**	**5 wks**	**Wed 11/1/06**	**Thu 12/7/06**
3.1.8.1	Procure cables and terminal blocks	1 wk	Wed 11/1/06	Tue 11/7/06
3.1.8.2	Pull cables from MC7 to MTEST	1 wk	Wed 11/8/06	Tue 11/14/06
3.1.8.3	Pull cables from MC8 to MC7	1 wk	Wed 11/15/06	Tue 11/21/06
3.1.8.4	Terminate cables	1 wk	Wed 11/22/06	Thu 11/30/06
3.1.8.5	Procure additional APACS i/o	1 wk	Fri 12/1/06	Thu 12/7/06
3.2	**Cryogenic System Upgrade**	**21 wks**	**Fri 2/2/07**	**Fri 6/29/07**
3.2.1	**Hydrogen Target transfer line upgrade**	**20 wks**	**Fri 2/2/07**	**Fri 6/22/07**
3.2.1.1	Mechanical Design of new transfer lir	2 wks	Fri 2/2/07	Thu 2/15/07
3.2.1.2	Fabrication drawings for new transfer	3 wks	Fri 2/16/07	Thu 3/8/07
3.2.1.3	Order parts for new transfer line	2 wks	Fri 3/9/07	Thu 3/22/07
3.2.1.4	Fabrication of new transfer line	4 wks	Fri 3/9/07	Thu 4/5/07
3.2.1.5	Assembly of new transfer line	1 wk	Fri 4/6/07	Thu 4/12/07
3.2.1.6	Mechanical design of new support str	3 wks	Fri 2/16/07	Thu 3/8/07
3.2.1.7	Fabrication drawings of support struc	3 wks	Fri 3/9/07	Thu 3/29/07
3.2.1.8	Order parts for support structure	2 wks	Fri 3/30/07	Thu 4/12/07
3.2.1.9	Fabrication of support structure	3 wks	Fri 3/30/07	Thu 4/19/07
3.2.1.1	Installation of support structure	1 wk	Fri 4/20/07	Thu 4/26/07
3.2.1.1	Installation of target assembly and rel	1 wk	Fri 4/27/07	Thu 5/3/07
3.2.1.1	Maintenance of vacuum system and	1 wk	Fri 5/4/07	Thu 5/10/07
3.2.1.1	Helium leak check of target	1 wk	Fri 5/11/07	Thu 5/17/07
3.2.1.1	Safety report update	2 wks	Fri 5/18/07	Fri 6/1/07
3.2.1.1	Safety report review	3 wks	Mon 6/4/07	Fri 6/22/07
3.2.2	**Nitrogen Target**	**19 wks**	**Fri 2/16/07**	**Fri 6/29/07**
3.2.2.1	Design of Nitrogen target	4 wks	Fri 2/16/07	Thu 3/15/07
3.2.2.2	Fabrication drawings for Nitrogen targ	3 wks	Fri 4/13/07	Thu 5/3/07
3.2.2.3	Order parts for Nitrogen target	3 wks	Fri 3/16/07	Thu 4/5/07
3.2.2.4	Fabrication of nitrogen target	3 wks	Fri 5/4/07	Thu 5/24/07
3.2.2.5	Assembly and installation of nitrogen	2 wks	Fri 5/25/07	Fri 6/8/07
3.2.2.6	Wiring of nitrogen target	1 wk	Mon 6/11/07	Fri 6/15/07
3.2.2.7	PLC and HMI programming/testing	1 wk	Mon 6/18/07	Fri 6/22/07
3.2.2.8	Testing and tuning of target system	1 wk	Mon 6/25/07	Fri 6/29/07
3.2.3	**Spare Cryocooler**	**19 wks**	**Fri 2/2/07**	**Fri 6/15/07**
3.2.3.1	Selection and purchase of new cryoc	6 wks	Fri 2/2/07	Thu 3/15/07
3.2.3.2	Make drawings of retrofit cryocool	2 wks	Fri 3/30/07	Thu 4/12/07
3.2.3.3	Order parts to make cryocooler comp	3 wks	Fri 4/13/07	Thu 5/3/07
3.2.3.4	Fabricate parts to make cryocooler cc	4 wks	Fri 5/4/07	Fri 6/1/07
3.2.3.5	Assemble cryocooler	2 wks	Mon 6/4/07	Fri 6/15/07
3.3	**TPC rewind**	**7 wks**	**Wed 2/7/07**	**Tue 3/27/07**
3.3.1	Design and build support hardware for wir	3 wks	Wed 2/7/07	Tue 2/27/07
3.3.2	Purchase new wires	1 wk	Wed 2/28/07	Tue 3/6/07
3.3.3	Remove old wires, clean wire frames	1 wk	Wed 2/28/07	Tue 3/6/07
3.3.4	Upgrade lab6 facility for rewind	1 wk	Wed 2/28/07	Tue 3/6/07
3.3.5	Wind wire planes and insert into TPC	1 wk	Wed 3/7/07	Tue 3/13/07
3.3.6	Restore electrical connections to planes	1 wk	Wed 3/14/07	Tue 3/20/07
3.3.7	Test new wire planes	1 wk	Wed 3/21/07	Tue 3/27/07
3.3.8	purchase tools and supplies	1 wk	Wed 2/28/07	Tue 3/6/07
3.4	**Chamber wire repairs**	**5.8 wks**	**Wed 8/1/07**	**Tue 9/11/07**
3.4.1	**DC4 frequent HV trip diagnostics and re**	**5.6 wks**	**Wed 8/1/07**	**Fri 9/7/07**
3.4.1.1	In-situ source tests with HV	2 wks	Wed 8/1/07	Tue 8/14/07
3.4.1.2	Move DC4 to lab6	0.2 wks	Wed 8/15/07	Wed 8/15/07



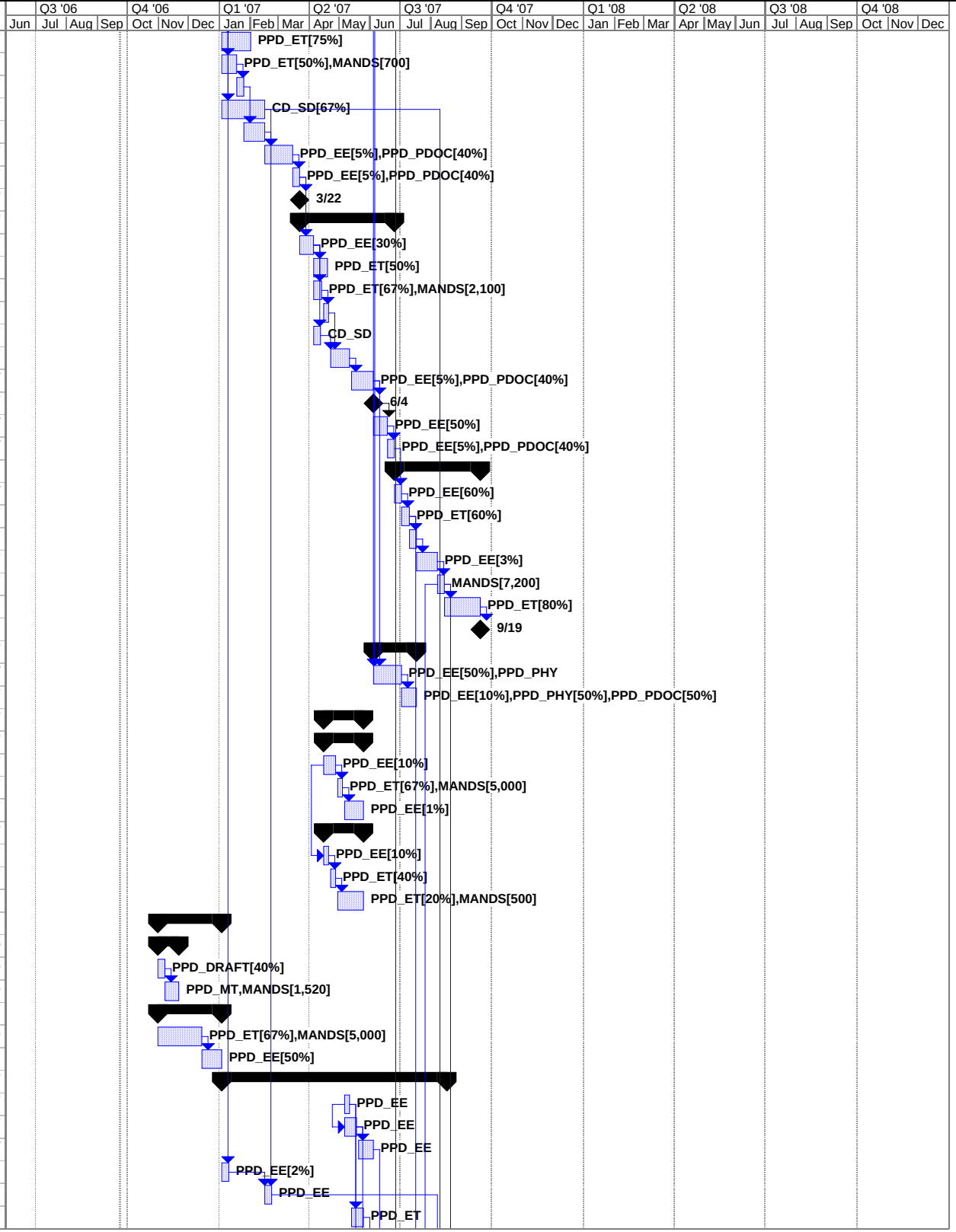
WBS	Name	Duration	Start	Finish
3.4.1.3	inspect chamber, plan repair	1 wk	Thu 8/16/07	Wed 8/22/07
3.4.1.4	replace loose wires (FNAL)	2 wks	Thu 8/23/07	Wed 9/5/07
3.4.1.5	replace loose wires (if this is the reas	2 wks	Thu 8/23/07	Wed 9/5/07
3.4.1.6	Move DC4 back to MC7	0.2 wks	Thu 9/6/07	Thu 9/6/07
3.4.1.7	Align DC4	0.2 wks	Fri 9/7/07	Fri 9/7/07
3.4.2	**PWC5**	**3.6 wks**	**Thu 8/16/07**	**Tue 9/11/07**
3.4.2.1	Move PWC5 to lab6 and spare PWC	0.2 wks	Thu 8/16/07	Thu 8/16/07
3.4.2.2	Align PWC5	0.2 wks	Tue 9/11/07	Tue 9/11/07
3.4.2.3	Replace broken wires in PWC5 to obt	1 wk	Fri 8/17/07	Thu 8/23/07
3.5	**Ckov Photomultiplier tubes**	**5 wks**	**Tue 1/16/07**	**Mon 2/19/07**
3.5.1	Procure pmts for Ckov	1 wk	Tue 1/16/07	Mon 1/22/07
3.5.2	Install pmts and bases in Ckov	4 wks	Tue 1/23/07	Mon 2/19/07
3.6	**RICH Photomultiplier tubes**	**5 wks**	**Tue 1/16/07**	**Mon 2/19/07**
3.6.1	Procure pmts and bases for RICH	1 wk	Tue 1/16/07	Mon 1/22/07
3.6.2	Install pmts and bases in RICH	4 wks	Tue 1/23/07	Mon 2/19/07
4	**Detector Readout Upgrades**	**67.8 wks**	**Mon 8/21/06**	**Thu 12/27/07**
4.1	**TPC Electronics**	**67.8 wks**	**Mon 8/21/06**	**Thu 12/27/07**
4.1.1	**Pasa Altro Chips**	**8 wks**	**Fri 9/8/06**	**Thu 11/2/06**
4.1.1.1	Buy Altro/Pasa Chips from CERN	8 wks	Fri 9/8/06	Thu 11/2/06
4.1.2	**Pasa Altro Cards**	**57.6 wks**	**Wed 11/1/06**	**Thu 12/27/07**
4.1.2.1	**Design and test Pasa Altro card pr**	**22.6 wks**	**Wed 11/1/06**	**Tue 4/17/07**
4.1.2.1	Write Pasa Altro card Requireme	4 wks	Wed 11/1/06	Thu 11/30/06
4.1.2.1	**L3 - Pasa Altro card Requirem**	**0 wks**	**Thu 11/30/06**	**Thu 11/30/06**
4.1.2.1	Write Pasa Altro card Preliminar	3 wks	Fri 12/1/06	Thu 12/21/06
4.1.2.1	Design prototype Pasa Altro car	3 wks	Tue 12/26/06	Thu 1/18/07
4.1.2.1	Layout prototype Pasa Altro car	4 wks	Fri 1/19/07	Thu 2/15/07
4.1.2.1	Prepare bid package for fabricati	1.6 wks	Fri 1/19/07	Tue 1/30/07
4.1.2.1	Select vendor for fabrication and	4 wks	Wed 1/31/07	Tue 2/27/07
4.1.2.1	Create Pasa Altro card test/debu	4 wks	Fri 1/19/07	Thu 2/15/07
4.1.2.1	Receive assembled prototype P	1 wk	Wed 2/28/07	Tue 3/6/07
4.1.2.1	Checkout prototype Pasa Altro (	2 wks	Wed 3/7/07	Tue 3/20/07
4.1.2.1	**L2 - Prototype is functional**	**0 wks**	**Tue 3/20/07**	**Tue 3/20/07**
4.1.2.1	Evaluate performance of prototy	4 wks	Wed 3/21/07	Tue 4/17/07
4.1.2.2	**Design and test pre-production Pa**	**16 wks**	**Wed 4/4/07**	**Thu 7/26/07**
4.1.2.2	Modify Pasa Altro card prototype	3 wks	Wed 4/4/07	Tue 4/24/07
4.1.2.2	Layout pre-production Pasa Altro	3 wks	Wed 4/25/07	Tue 5/15/07
4.1.2.2	Prepare bid package for fabricati	2 wks	Wed 4/4/07	Tue 4/17/07
4.1.2.2	Select vendor for fabrication and	4 wks	Wed 4/18/07	Tue 5/15/07
4.1.2.2	Receive first two pre-production	4 wks	Wed 4/18/07	Tue 5/15/07
4.1.2.2	Revise Pasa Altro card test/debu	3 wks	Wed 4/11/07	Tue 5/1/07
4.1.2.2	Evaluate performance of pre-pro	3 wks	Wed 5/2/07	Tue 5/22/07
4.1.2.2	Receive remaining pre-productio	1 wk	Wed 5/23/07	Wed 5/30/07
4.1.2.2	Test pre-production Pasa Altro c	3 wks	Thu 5/31/07	Wed 6/20/07
4.1.2.2	Test pre-production Pasa Altro c	2 wks	Thu 5/31/07	Wed 6/13/07
4.1.2.2	Evaluate performance of pre-pro	6 wks	Thu 6/14/07	Thu 7/26/07
4.1.2.2	**L3 Milestone: Sign off on Pasa**	**0 wks**	**Thu 7/26/07**	**Thu 7/26/07**
4.1.2.3	**Fabricate production quantities of**	**20 wks**	**Fri 7/6/07**	**Tue 11/27/07**
4.1.2.3	Assemble bid package for fabric	1 wk	Fri 7/6/07	Thu 7/12/07
4.1.2.3	Select vendor for fabrication and	2 wks	Fri 7/6/07	Thu 7/19/07
4.1.2.3	Receive first 25% of production f	6 wks	Fri 7/20/07	Thu 8/30/07
4.1.2.3	Receive second 25% of producti	4 wks	Fri 8/31/07	Fri 9/28/07
4.1.2.3	Receive third 25% of production	4 wks	Mon 10/1/07	Fri 10/26/07
4.1.2.3	Receive fourth 25% of productio	4 wks	Mon 10/29/07	Tue 11/27/07



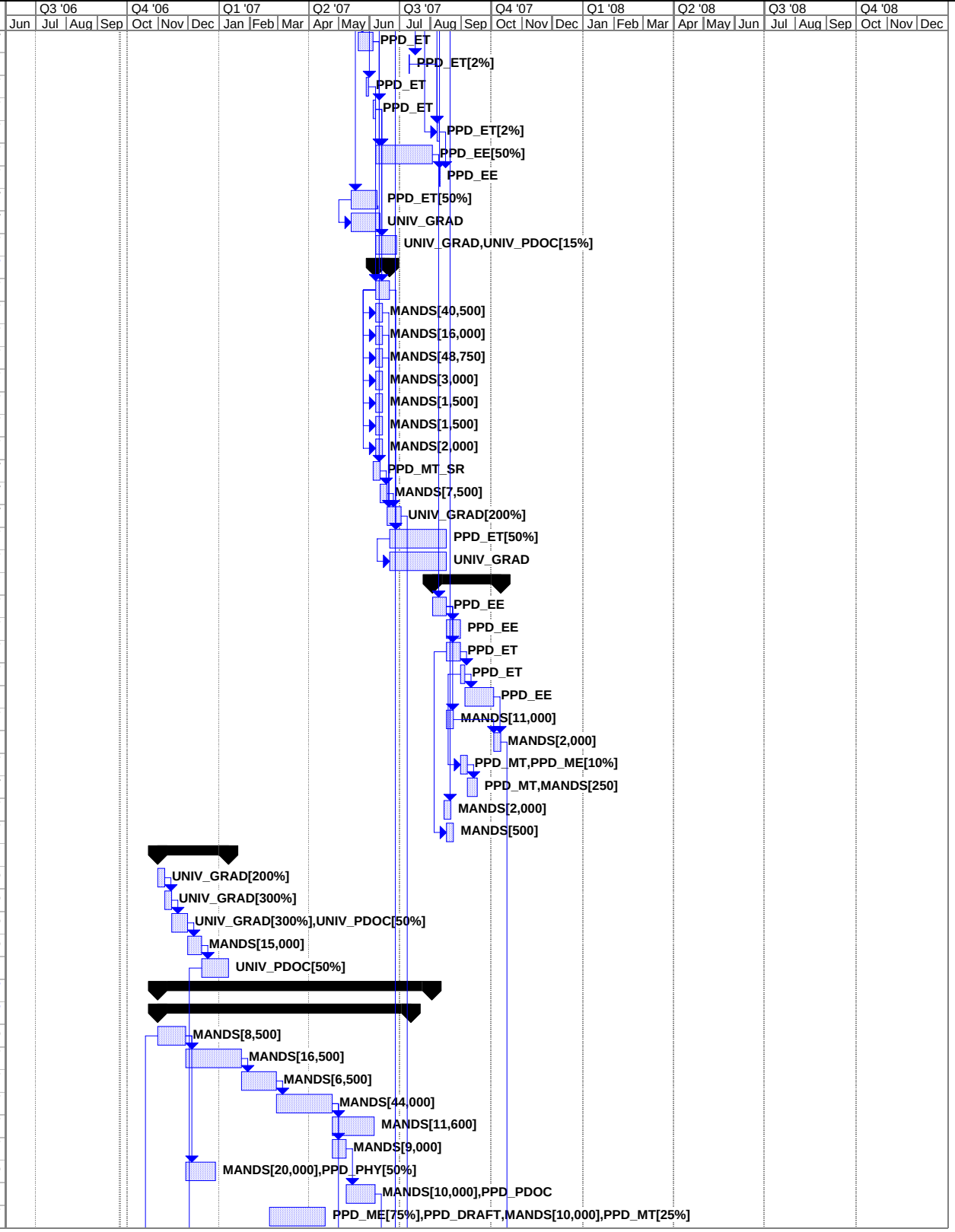
WBS	Name	Duration	Start	Finish
4.1.2.3	**L3 - All production Pasa Altro**	**0 wks**	**Tue 11/27/07**	**Tue 11/27/07**
4.1.2.4	**Checkout production Pasa Altro ca**	**16 wks**	**Fri 8/31/07**	**Thu 12/27/07**
4.1.2.4	Checkout and troubleshoot first 7	6 wks	Fri 8/31/07	Fri 10/12/07
4.1.2.4	Assist in checkout and troublesh	4 wks	Mon 10/1/07	Fri 10/26/07
15.7.2	Assist in checkout and troublesh	4 wks	Mon 10/29/07	Tue 11/27/07
4.1.2.4	Assist in checkout and troublesh	4 wks	Wed 11/28/07	Thu 12/27/07
4.1.2.4	**L2 - Pasa Altro card checkout**	**0 wks**	**Thu 12/27/07**	**Thu 12/27/07**
4.1.3	**Altro Readout buffer Card**	**48.2 wks**	**Wed 11/1/06**	**Wed 10/17/07**
4.1.3.1	**Prototype Altro Readout buffer Car**	**19.8 wks**	**Wed 11/1/06**	**Wed 3/28/07**
4.1.3.1	Write Altro Readout buffer Card	2 wks	Wed 11/1/06	Tue 11/14/06
4.1.3.1	Write Altro Readout buffer Card	8 wks	Wed 11/15/06	Thu 1/18/07
4.1.3.1	Review and, if necessary, revise	2 wks	Fri 1/19/07	Thu 2/1/07
4.1.3.1	Design Altro Readout buffer Car	2 wks	Fri 2/2/07	Thu 2/15/07
4.1.3.1	Layout Altro Readout buffer Car	2 wks	Fri 2/16/07	Thu 3/1/07
4.1.3.1	Order parts for Altro Readout bu	2 wks	Fri 2/16/07	Thu 3/1/07
4.1.3.1	Receive parts for Altro Readout	1 wk	Fri 3/2/07	Thu 3/8/07
4.1.3.1	Develop test/debug software for	4 wks	Fri 2/16/07	Thu 3/15/07
4.1.3.1	Assemble Altro Readout buffer C	0.8 wks	Fri 3/9/07	Wed 3/14/07
4.1.3.1	Checkout Altro Readout buffer C	0.8 wks	Thu 3/15/07	Tue 3/20/07
4.1.3.1	**L3 - Altro Readout buffer Card**	**0 wks**	**Tue 3/20/07**	**Tue 3/20/07**
4.1.3.1	Evaluate performance of Altro R	1.2 wks	Wed 3/21/07	Wed 3/28/07
4.1.3.2	**Pre-Production Altro Readout buff**	**8.6 wks**	**Thu 3/29/07**	**Tue 5/29/07**
4.1.3.2	Make design changes for pre-pr	1.2 wks	Thu 3/29/07	Thu 4/5/07
4.1.3.2	Layout Altro Readout buffer Car	1 wk	Fri 4/6/07	Thu 4/12/07
4.1.3.2	Order parts for Altro Readout bu	0.8 wks	Fri 4/6/07	Wed 4/11/07
4.1.3.2	Receive parts for Altro Readout	1 wk	Thu 4/12/07	Wed 4/18/07
4.1.3.2	Modify test/debug software for A	1 wk	Fri 4/6/07	Thu 4/12/07
4.1.3.2	Assemble Altro Readout buffer C	0.8 wks	Thu 4/19/07	Tue 4/24/07
4.1.3.2	Checkout Altro Readout buffer C	0.8 wks	Wed 4/25/07	Mon 4/30/07
4.1.3.2	**Level 2 Review: Evaluate perf**	**0 wks**	**Mon 4/30/07**	**Mon 4/30/07**
4.1.3.2	Assemble enough Altro Readout	3 wks	Tue 5/1/07	Mon 5/21/07
4.1.3.2	Evaluate performance of Altro R	1 wk	Tue 5/22/07	Tue 5/29/07
4.1.3.2	**L3 - Altro Readout buffer Card**	**0 wks**	**Tue 5/29/07**	**Tue 5/29/07**
4.1.3.3	**Fabricate production quantities of**	**9.8 wks**	**Wed 5/30/07**	**Tue 8/7/07**
4.1.3.3	Assemble bid package for fabric	0.8 wks	Wed 5/30/07	Mon 6/4/07
4.1.3.3	Select vendor for fabrication and	4 wks	Tue 6/5/07	Mon 7/2/07
4.1.3.3	Receive first 25% of production	2 wks	Tue 7/3/07	Tue 7/17/07
4.1.3.3	Receive second 25% of producti	1 wk	Wed 7/18/07	Tue 7/24/07
4.1.3.3	Receive third 25% of production	1 wk	Wed 7/25/07	Tue 7/31/07
4.1.3.3	Receive fourth 25% of productio	1 wk	Wed 8/1/07	Tue 8/7/07
4.1.3.3	**L3 - Production Altro Readout**	**0 wks**	**Tue 8/7/07**	**Tue 8/7/07**
4.1.3.4	**Checkout production Altro Readou**	**13 wks**	**Wed 7/18/07**	**Wed 10/17/07**
4.1.3.4	Check/troubleshoot first 25% of	4 wks	Wed 7/18/07	Tue 8/14/07
4.1.3.4	Check/troubleshoot second 25%	3 wks	Wed 8/15/07	Tue 9/4/07
4.1.3.4	Check/troubleshoot third 25% of	2 wks	Wed 9/5/07	Wed 9/19/07
4.1.3.4	Check/troubleshoot fourth 25%	4 wks	Thu 9/20/07	Wed 10/17/07
4.1.3.4	**L2 - Altro Readout buffer Card**	**0 wks**	**Wed 10/17/07**	**Wed 10/17/07**
4.1.4	**Readout controller/DCB**	**54.4 wks**	**Mon 8/21/06**	**Wed 9/19/07**
4.1.4.1	**Develop prototype Readout contro**	**29.2 wks**	**Mon 8/21/06**	**Thu 3/22/07**
4.1.4.1	Write Readout controller/DCB R	6 wks	Mon 8/21/06	Mon 10/2/06
4.1.4.1	Review and, if necessary, revise	1.2 wks	Tue 10/3/06	Tue 10/10/06
4.1.4.1	Write Readout controller/DCB Pr	3 wks	Wed 10/11/06	Tue 10/31/06
4.1.4.1	Design Readout controller/DCB	8 wks	Wed 11/1/06	Wed 1/3/07



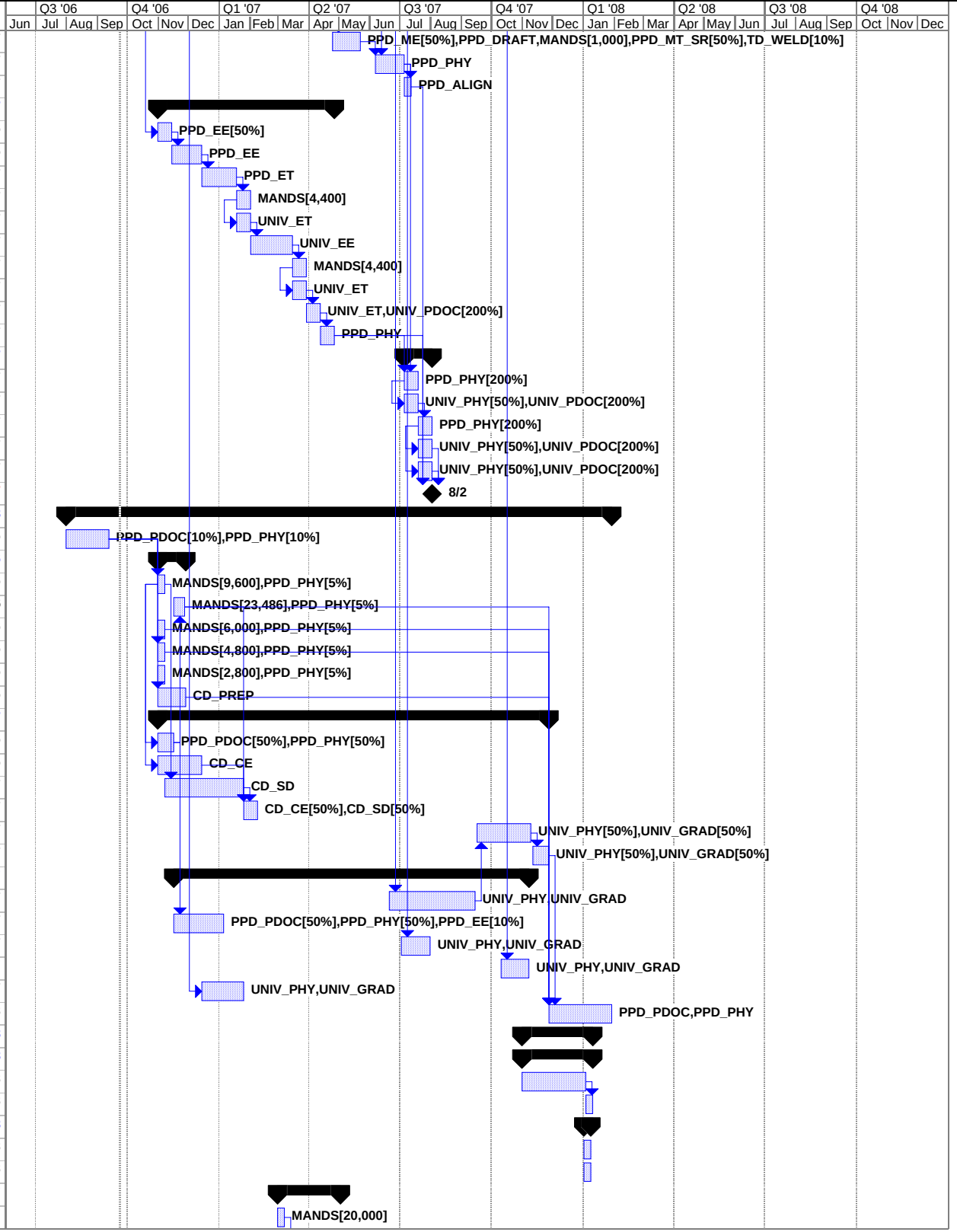
WBS	Name	Duration	Start	Finish
4.1.4.1	Layout Readout controller/DCB :	4 wks	Thu 1/4/07	Thu 2/1/07
4.1.4.1	Order parts for Readout controlle	2 wks	Thu 1/4/07	Thu 1/18/07
4.1.4.1	Receive parts for Readout contr	1 wk	Fri 1/19/07	Thu 1/25/07
4.1.4.1	Write test/debug software for Re	6 wks	Thu 1/4/07	Thu 2/15/07
4.1.4.1	Assemble Readout controller/DC	3 wks	Fri 1/26/07	Thu 2/15/07
4.1.4.1	Checkout Readout controller/DC	4 wks	Fri 2/16/07	Thu 3/15/07
4.1.4.1	Evaluate performance of Readou	1 wk	Fri 3/16/07	Thu 3/22/07
4.1.4.1	**L3 - 1st Readout controller/DC**	**0 wks**	**Thu 3/22/07**	**Thu 3/22/07**
4.1.4.2	**Modify Readout controller/DCB des**	**13.2 wks**	**Fri 3/23/07**	**Mon 6/25/07**
4.1.4.2	Make design changes for pre-pr	2 wks	Fri 3/23/07	Thu 4/5/07
4.1.4.2	Layout Readout controller/DCB p	2 wks	Fri 4/6/07	Thu 4/19/07
4.1.4.2	Order parts for Readout controlle	1.2 wks	Fri 4/6/07	Fri 4/13/07
4.1.4.2	Receive parts for pre-production	1 wk	Mon 4/16/07	Fri 4/20/07
4.1.4.2	Modify test/debug software for R	1 wk	Fri 4/6/07	Thu 4/12/07
4.1.4.2	Assemble Readout controller/DC	3 wks	Mon 4/23/07	Fri 5/11/07
4.1.4.2	Checkout Readout controller/DC	3 wks	Mon 5/14/07	Mon 6/4/07
4.1.4.2	**L3 - Readout controller/DCB p**	**0 wks**	**Mon 6/4/07**	**Mon 6/4/07**
4.1.4.2	Conduct full-crate test of Readou	2 wks	Tue 6/5/07	Mon 6/18/07
4.1.4.2	Evaluate performance of Readou	1 wk	Tue 6/19/07	Mon 6/25/07
4.1.4.3	**Develop production Readout contr**	**12 wks**	**Tue 6/26/07**	**Wed 9/19/07**
4.1.4.3	Make design changes for produc	1 wk	Tue 6/26/07	Mon 7/2/07
4.1.4.3	Make changes to the layout (if n	1 wk	Tue 7/3/07	Tue 7/10/07
4.1.4.3	Assemble bid package for fabric	1 wk	Wed 7/11/07	Tue 7/17/07
4.1.4.3	Select vendor for fabrication and	3 wks	Wed 7/18/07	Tue 8/7/07
4.1.4.3	Receive assembled Readout cor	1 wk	Wed 8/8/07	Tue 8/14/07
4.1.4.3	Checkout and troubleshoot prod	5 wks	Wed 8/15/07	Wed 9/19/07
4.1.4.3	**L2 - Readout controller/DCB p**	**0 wks**	**Wed 9/19/07**	**Wed 9/19/07**
4.1.5	**Full-subrack Test**	**6 wks**	**Tue 6/5/07**	**Tue 7/17/07**
4.1.5.1	Perform a full-subrack test with one s	4 wks	Tue 6/5/07	Mon 7/2/07
4.1.5.2	Conduct DAQ interface tests	2 wks	Tue 7/3/07	Tue 7/17/07
4.1.6	**Low Voltage Power Supplies**	**6 wks**	**Mon 4/16/07**	**Fri 5/25/07**
4.1.6.1	**Low Voltage Power Supplies**	**6 wks**	**Mon 4/16/07**	**Fri 5/25/07**
4.1.6.1	Write the LV Power Supply Requ	2 wks	Mon 4/16/07	Fri 4/27/07
4.1.6.1	Order power supplies for prototy	1 wk	Mon 4/30/07	Fri 5/4/07
4.1.6.1	Revise, if necessary, the Low-vo	3 wks	Mon 5/7/07	Fri 5/25/07
4.1.6.2	**Low Voltage Power Cables**	**6 wks**	**Mon 4/16/07**	**Fri 5/25/07**
4.1.6.2	Write Specification for LV Power	1 wk	Mon 4/16/07	Fri 4/20/07
4.1.6.2	Place order for Low Voltage Pow	1 wk	Mon 4/23/07	Fri 4/27/07
4.1.6.2	Receive and check out Low Volt	4 wks	Mon 4/30/07	Fri 5/25/07
4.1.7	**Packaging, Powering, Monitoring, Cool**	**8 wks**	**Wed 11/1/06**	**Wed 1/3/07**
4.1.7.1	**Pasa Altro Card Cooling mechanic**	**3 wks**	**Wed 11/1/06**	**Tue 11/21/06**
4.1.7.1	mechanical design of cooling rail	1 wk	Wed 11/1/06	Tue 11/7/06
4.1.7.1	assemble cards onto rails	2 wks	Wed 11/8/06	Tue 11/21/06
4.1.7.2	**Test Stand Prototyping**	**8 wks**	**Wed 11/1/06**	**Wed 1/3/07**
4.1.7.2	Build test stand for evaluating de	6 wks	Wed 11/1/06	Thu 12/14/06
4.1.7.2	Specify software requirements fo	2 wks	Fri 12/15/06	Wed 1/3/07
4.2	**Drift Chamber/Wire Chamber electronics**	**31.7 wks**	**Thu 1/4/07**	**Fri 8/17/07**
4.2.1	Design Front end 8ch./16ch. Daughter car	1 wk	Mon 5/7/07	Fri 5/11/07
4.2.2	Circuit design 32 channel TDC card (simila	2 wks	Mon 5/7/07	Fri 5/18/07
4.2.3	Firmware for TDC card FPGA	2 wks	Mon 5/21/07	Mon 6/4/07
4.2.4	Circuit design VME readout card (same as	1 wk	Thu 1/4/07	Wed 1/10/07
4.2.5	Firmware for VME readout card FPGA	1 wk	Fri 2/16/07	Thu 2/22/07
4.2.6	Layout of 8ch./16ch. Daughter cards	2 wks	Mon 5/14/07	Fri 5/25/07



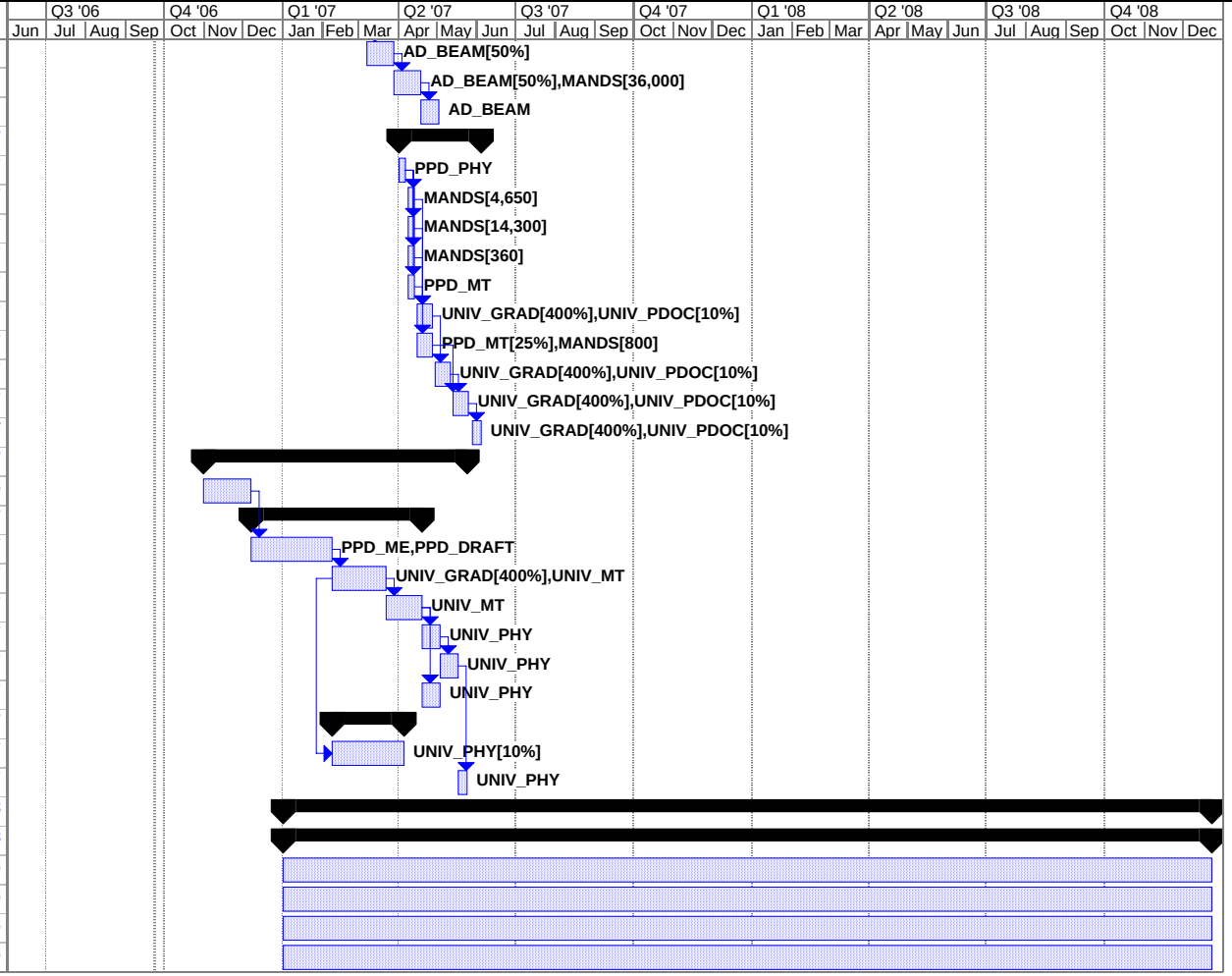
WBS	Name	Duration	Start	Finish
4.2.7	Layout of 32 channel TDC card	2 wks	Mon 5/21/07	Mon 6/4/07
4.2.8	Layout of VME readout card	0.1 wks	Wed 7/11/07	Wed 7/11/07
4.2.9	Assembly of prototype 8/16 channel daugl	0.5 wks	Tue 5/29/07	Thu 5/31/07
4.2.10	Assembly of prototype TDC cards	0.5 wks	Tue 6/5/07	Thu 6/7/07
4.2.11	Assembly of VME readout card	0.5 wks	Wed 8/8/07	Fri 8/10/07
4.2.12	Write microcontroller firmware for TDC car	8 wks	Thu 6/7/07	Fri 8/3/07
4.2.13	Write microcontroller firmware for VME ca	0.1 wks	Fri 8/10/07	Fri 8/10/07
4.2.14	Design and construct daughter card test fi	4 wks	Mon 5/14/07	Mon 6/11/07
4.2.15	Design and construct daughter card test fi	4 wks	Mon 5/14/07	Mon 6/11/07
4.2.16	Write TDC card tester software	3 wks	Thu 6/7/07	Thu 6/28/07
4.2.17	**Procurement**	**2 wks**	**Thu 6/7/07**	**Thu 6/21/07**
4.2.17.	Coordination	2 wks	Thu 6/7/07	Thu 6/21/07
4.2.17.	8 channel amp/discriminator daughte	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.17.	16 channel amp/discriminator daught	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.17.	32 channel TDC cards (325@$150ea	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.17.	VME readout cards (5@$600ea.)	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.17.	Short CAT5 cables (300@$5ea.)	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.17.	Long CAT5 cables (50@$30ea.)	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.17.	power supply, 48V, 2kW (1@$2000e	1 wk	Thu 6/7/07	Thu 6/14/07
4.2.18	Design mechanical support/protection for	1 wk	Tue 6/5/07	Mon 6/11/07
4.2.19	Purchase material for card mounting/mech	1 wk	Tue 6/12/07	Mon 6/18/07
4.2.20	Package/mount TDC cards and install dau	2 wks	Tue 6/19/07	Mon 7/2/07
4.2.21	Production Testing (Fermi)	8 wks	Thu 6/21/07	Fri 8/17/07
4.2.22	Production Testing (Univ)	8 wks	Thu 6/21/07	Fri 8/17/07
4.3	**ToF + CKOV electronics board design**	**9.5 wks**	**Fri 8/3/07**	**Wed 10/10/07**
4.3.1	Circuit design 32 channel TripT + TDC-GF	2 wks	Fri 8/3/07	Fri 8/17/07
4.3.2	Firmware for TripT + TDC-GPX card FPG	2 wks	Fri 8/17/07	Fri 8/31/07
4.3.3	Layout of 32 channel TDC card	2 wks	Fri 8/17/07	Fri 8/31/07
4.3.4	Assembly of prototype TDC cards	0.5 wks	Fri 8/31/07	Tue 9/4/07
4.3.5	Write microcontroller firmware for TDC car	4 wks	Wed 9/5/07	Wed 10/3/07
4.3.6	Procure TDC-GPX chips (58 for ToF + 12	1 wk	Fri 8/17/07	Fri 8/24/07
4.3.7	Manufacture TripT + TDC-GPX cards (9 +	1 wk	Thu 10/4/07	Wed 10/10/07
4.3.8	Design mechanical support for new ToF+(	1 wk	Fri 8/31/07	Fri 9/7/07
4.3.9	Build mechanical support	1 wk	Fri 9/7/07	Mon 9/17/07
4.3.10	Purchase 2 VME readout cards (same as	1 wk	Wed 8/15/07	Tue 8/21/07
4.3.11	Purchase CAT5 cables	1 wk	Fri 8/17/07	Fri 8/24/07
4.4	**Calorimeter migration to Fera electronics**	**9 wks**	**Wed 11/1/06**	**Wed 1/10/07**
4.4.1	Remove old readouts	1 wk	Wed 11/1/06	Tue 11/7/06
4.4.2	Install FERA 4300 ADC's (4 Camac crates	1 wk	Wed 11/8/06	Tue 11/14/06
4.4.3	Install cablels	2 wks	Wed 11/15/06	Thu 11/30/06
4.4.4	Purchase Hytec modules for CAMAC to E	2 wks	Fri 12/1/06	Thu 12/14/06
4.4.5	Set gates, delays, etc.	3 wks	Fri 12/15/06	Wed 1/10/07
5	**Trigger System Upgrade**	**37.6 wks**	**Wed 11/1/06**	**Thu 8/2/07**
5.1	**Interaction Trigger Fpix**	**34.6 wks**	**Wed 11/1/06**	**Thu 7/12/07**
5.1.1	Purchase 22 good sensors for 3 planes fro	4 wks	Wed 11/1/06	Tue 11/28/06
5.1.2	Purchase, bump, thin, and dice 2 fPix 2.1	8 wks	Wed 11/29/06	Tue 1/23/07
5.1.3	Bump and dice sensor wafers	5 wks	Wed 1/24/07	Tue 2/27/07
5.1.4	176 flip-chip placements	8 wks	Wed 2/28/07	Tue 4/24/07
5.1.5	Purchase 22 HDIs, circuit boards, cables,	6 wks	Wed 4/25/07	Tue 6/5/07
5.1.6	Purchase Fpix readout PCI cards and cab	2 wks	Wed 4/25/07	Tue 5/8/07
5.1.7	Design and Purchase cooling system	4 wks	Wed 11/29/06	Thu 12/28/06
5.1.8	Low Voltage and Bias Voltage	4 wks	Wed 5/9/07	Wed 6/6/07
5.1.9	Design and construct mounting hardware	8 wks	Wed 2/21/07	Tue 4/17/07



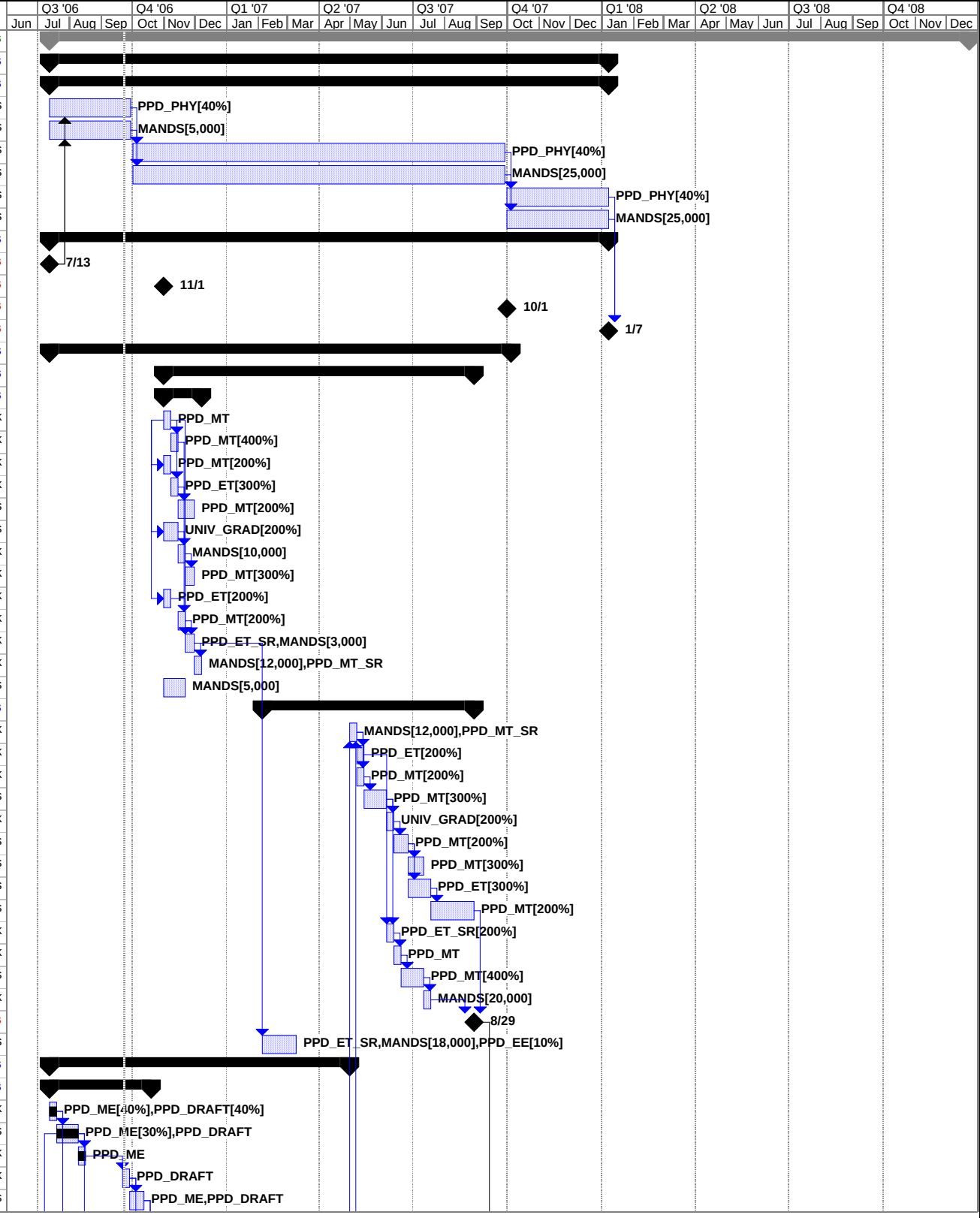
WBS	Name	Duration	Start	Finish
5.1.10	Design and construct mechanical support	4 wks	Wed 4/25/07	Tue 5/22/07
5.1.11	Install Fpix in MC7 and integrate into new	4 wks	Thu 6/7/07	Thu 7/5/07
5.1.12	Survey Fpix detector and target	1 wk	Fri 7/6/07	Thu 7/12/07
5.2	**Interaction Trigger Board**	**25.4 wks**	**Wed 11/1/06**	**Thu 4/26/07**
5.2.1	Develop design specs for interaction Trigg	2 wks	Wed 11/1/06	Tue 11/14/06
5.2.2	Design interaction Trigger Board	4 wks	Wed 11/15/06	Thu 12/14/06
5.2.3	Layout interaction Trigger Board	4 wks	Fri 12/15/06	Thu 1/18/07
5.2.4	Build Interaction Trigger Boards (FNAL)	2 wks	Fri 1/19/07	Thu 2/1/07
5.2.5	Build Interaction Trigger Boards (Univ)	2 wks	Fri 1/19/07	Thu 2/1/07
5.2.6	Program FPGA on Interaction Trigger Boa	6 wks	Fri 2/2/07	Thu 3/15/07
5.2.7	Test, fix, rebuild (FNAL)	2 wks	Fri 3/16/07	Thu 3/29/07
5.2.8	Test, fix, rebuild (Univ)	2 wks	Fri 3/16/07	Thu 3/29/07
5.2.9	Test Interaction Trigger Boards	2 wks	Fri 3/30/07	Thu 4/12/07
5.2.10	Install Trigger board in MC7 and integrate	2 wks	Fri 4/13/07	Thu 4/26/07
5.3	**Other Trigger Upgrades**	**4 wks**	**Fri 7/6/07**	**Thu 8/2/07**
5.3.1	Modify Trigger formation electronics (Fern	2 wks	Fri 7/6/07	Thu 7/19/07
5.3.2	Modify Trigger formation electronics (Univ)	2 wks	Fri 7/6/07	Thu 7/19/07
5.3.3	Rework Trigger fanout to detectors (Fermi	2 wks	Fri 7/20/07	Thu 8/2/07
5.3.4	Rework Trigger fanout to detectors (Univ)	2 wks	Fri 7/20/07	Thu 8/2/07
5.3.5	Beam ToF for low momentum Beam PID	2 wks	Fri 7/20/07	Thu 8/2/07
5.3.6	**L3 - Trigger System Ready For Operatic**	**0 wks**	**Thu 8/2/07**	**Thu 8/2/07**
6	**DAQ Software and Hardware Upgrade**	**74.6 wks**	**Tue 8/1/06**	**Tue 1/29/08**
6.1	Design readout and DAQ upgrade	6 wks	Tue 8/1/06	Tue 9/12/06
6.2	**Hardware**	**3.6 wks**	**Wed 11/1/06**	**Tue 11/28/06**
6.2.1	Power PC5500 VME readout card (2) for T	1 wk	Wed 11/1/06	Tue 11/7/06
6.2.2	Hytec1365v5 for Camac readout	1 wk	Fri 11/17/06	Mon 11/27/06
6.2.3	Fpix readout PC with PCI bus extender	1 wk	Wed 11/1/06	Tue 11/7/06
6.2.4	DAQ cpu and RAID	1 wk	Wed 11/1/06	Tue 11/7/06
6.2.5	Monitoring cpu	1 wk	Wed 11/1/06	Tue 11/7/06
6.2.6	Testing of PREP modules	4 wks	Wed 11/1/06	Tue 11/28/06
6.3	**Software**	**53.6 wks**	**Wed 11/1/06**	**Tue 11/27/07**
6.3.1	Specify Camac command sequences for H	2.4 wks	Wed 11/1/06	Thu 11/16/06
6.3.2	Update event builder	6 wks	Wed 11/1/06	Thu 12/14/06
6.3.3	Adapt SLF to mvme5500	10 wks	Wed 11/8/06	Thu 1/25/07
6.3.4	Ethernet readout of Hytec 1365	2 wks	Fri 1/26/07	Thu 2/8/07
6.3.5	Update rc-Gui, underlying DAQ system	8 wks	Mon 9/17/07	Fri 11/9/07
6.3.6	Update online monitoring and Event Displa	2 wks	Mon 11/12/07	Tue 11/27/07
6.3.7	**Write/Update Detector readout code for**	**48.8 wks**	**Fri 11/17/06**	**Wed 11/7/07**
6.3.7.1	Write readout code for new TPC elec	12 wks	Thu 6/21/07	Fri 9/14/07
6.3.7.2	Assist in debugging readout code for	6 wks	Fri 11/17/06	Fri 1/5/07
6.3.7.3	Write readout code for Chambers	4 wks	Tue 7/3/07	Tue 7/31/07
6.3.7.4	Write readout code for ToF and Ckov	4 wks	Thu 10/11/07	Wed 11/7/07
6.3.7.5	Rewrite readout code for Calorimeter	5 wks	Fri 12/15/06	Thu 1/25/07
6.4	Integrate and Test electronics and software	8 wks	Wed 11/28/07	Tue 1/29/08
7	**Offline farm Upgrade**	**9 wks**	**Thu 11/1/07**	**Thu 1/10/08**
7.1	**CD Farm computing to reconstruct 100 milli**	**9 wks**	**Thu 11/1/07**	**Thu 1/10/08**
7.1.1	Upgrade general purpose farm	8 wks	Thu 11/1/07	Thu 1/3/08
7.1.2	Batch reconstruct MIPP data	1 wk	Fri 1/4/08	Thu 1/10/08
7.2	**Enstore storage for 100 million events**	**1 wk**	**Wed 1/2/08**	**Tue 1/8/08**
7.2.1	Provide storage for raw data [10 TB]	1 wk	Wed 1/2/08	Tue 1/8/08
7.2.2	Provide storage for reconstructed data [10	1 wk	Wed 1/2/08	Tue 1/8/08
8	**Beam Line Upgrade**	**9 wks**	**Thu 3/1/07**	**Wed 5/2/07**
8.1	Purchase hall probes	1 wk	Thu 3/1/07	Wed 3/7/07



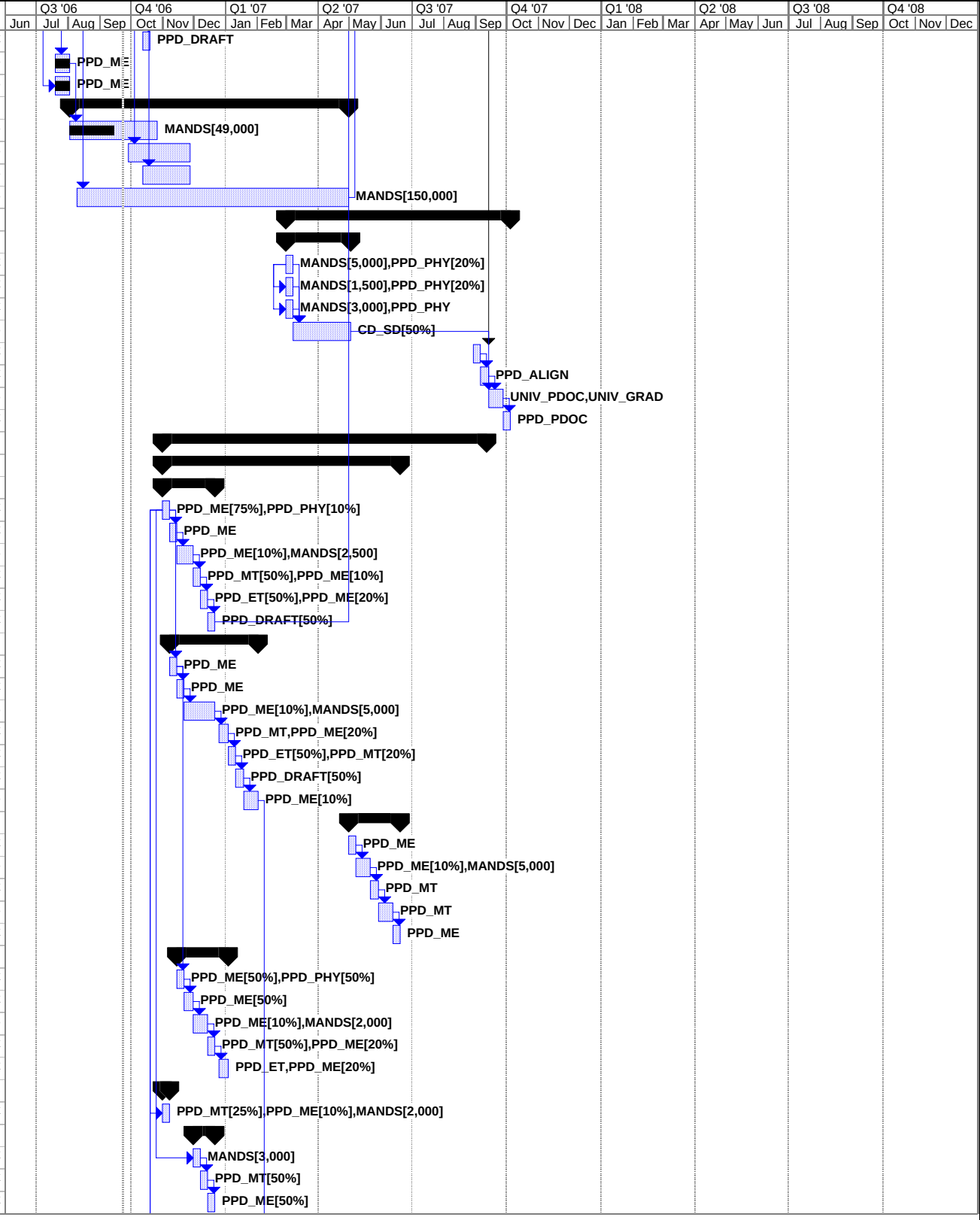
WBS	Name	Duration	Start	Finish
8.2	Install hall probes	3 wks	Thu 3/8/07	Wed 3/28/07
8.3	Install low current power supplies	3 wks	Thu 3/29/07	Wed 4/18/07
8.4	Test probes/beam line	2 wks	Thu 4/19/07	Wed 5/2/07
9	**Enhanced Veto Wall**	**9 wks**	**Mon 4/2/07**	**Mon 6/4/07**
9.1	Develop specifications	1 wk	Mon 4/2/07	Fri 4/6/07
9.2	Purchase Scintillators	1 wk	Mon 4/9/07	Fri 4/13/07
9.3	Purchase PMTs and bases	1 wk	Mon 4/9/07	Fri 4/13/07
9.4	Purchase lightguides	1 wk	Mon 4/9/07	Fri 4/13/07
9.5	Design mechanical support	1 wk	Mon 4/9/07	Fri 4/13/07
9.6	Assemble, glue, wrap Scintillator, pmts	2 wks	Mon 4/16/07	Fri 4/27/07
9.7	Construct mechanical support stand	2 wks	Mon 4/16/07	Fri 4/27/07
9.8	Bench test scintillators with cosmics/source	2 wks	Mon 4/30/07	Fri 5/11/07
9.9	Install in MC7	2 wks	Mon 5/14/07	Fri 5/25/07
9.10	Set up and time in coincidence electronics	1 wk	Tue 5/29/07	Mon 6/4/07
10	**Recoil Detector**	**28 wks**	**Wed 11/1/06**	**Thu 5/24/07**
10.1	Ship 'Plastic Ball' detector to Fermilab	5 wks	Wed 11/1/06	Thu 12/7/06
10.2	**Install plastic ball in MIPP**	**18 wks**	**Fri 12/8/06**	**Thu 4/19/07**
10.2.1	Adapt mounting structure	8 wks	Fri 12/8/06	Thu 2/8/07
10.2.2	Construct MIPP specific mounting support	6 wks	Fri 2/9/07	Thu 3/22/07
10.2.3	Move into MC7	4 wks	Fri 3/23/07	Thu 4/19/07
10.3	Install readout hardware	2 wks	Fri 4/20/07	Thu 5/3/07
10.4	Integrate readout into MIPP DAQ	2 wks	Fri 5/4/07	Thu 5/17/07
10.5	Install PMT High Voltage	2 wks	Fri 4/20/07	Thu 5/3/07
10.6	**Update cryo-safety documentation**	**8 wks**	**Fri 2/9/07**	**Thu 4/5/07**
10.6.1	Design safety system if necessary	8 wks	Fri 2/9/07	Thu 4/5/07
10.7	Test with cosmics/beam	1 wk	Fri 5/18/07	Thu 5/24/07
11	**Visitor Support for Russian collaborators**	**103.2 wks**	**Tue 1/2/07**	**Tue 12/23/08**
11.1	**Two people for two years**	**103.2 wks**	**Tue 1/2/07**	**Tue 12/23/08**
11.1.1	Per Diem ($49 per day)	100 wks	Tue 1/2/07	Tue 12/23/08
11.1.2	Housing on Site ($17 per day)	100 wks	Tue 1/2/07	Tue 12/23/08
11.1.3	Medical Insurance ($70 per month)	100 wks	Tue 1/2/07	Tue 12/23/08
11.1.4	Car ($300 per month -- shared by 2 peopl	100 wks	Tue 1/2/07	Tue 12/23/08



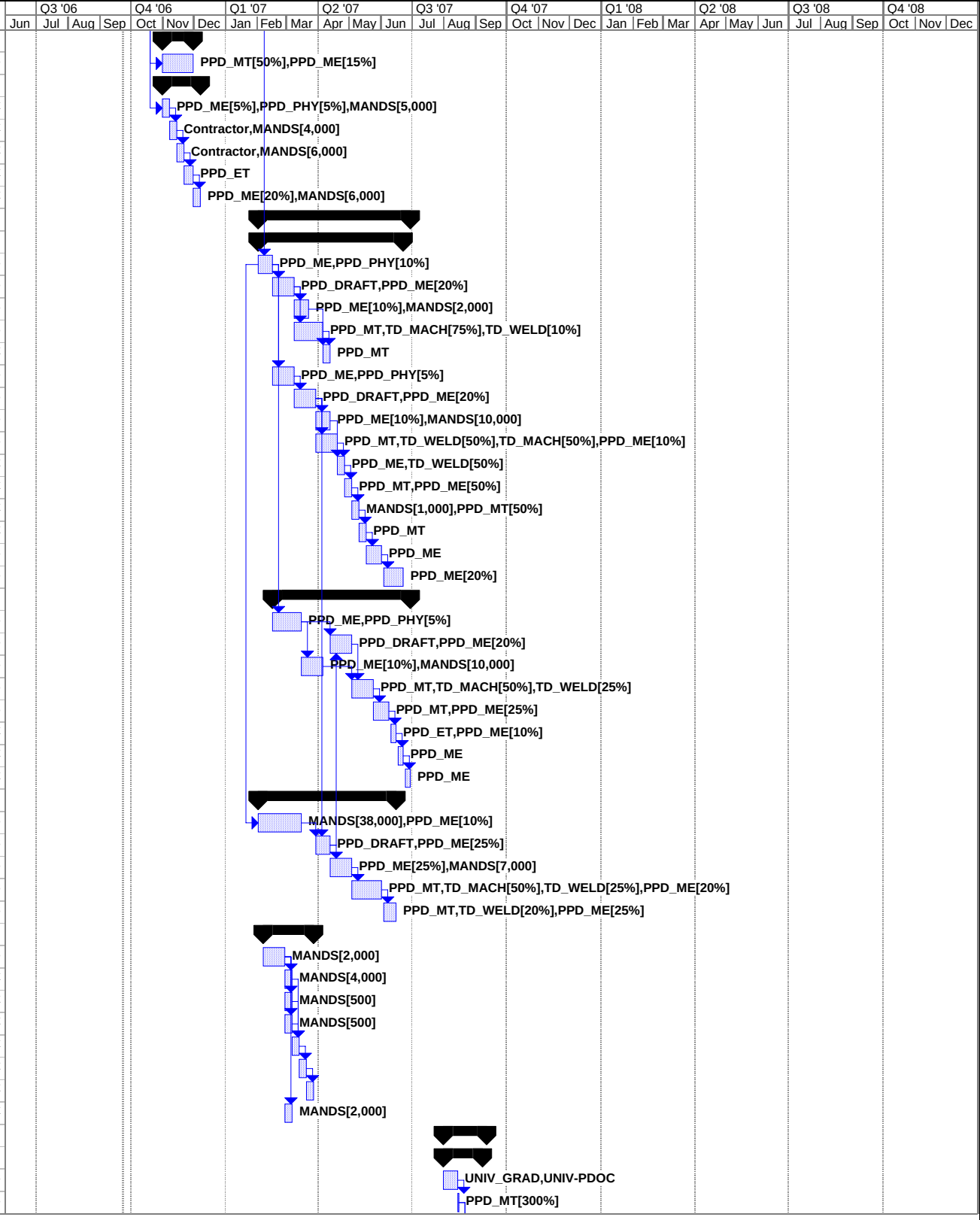
WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
0	$1,214,456	$566,628	$1,781,084	$2,003,844	$205,000	127.8 wks
1	$55,000	$0	$55,000	$55,000	$0	74.2 wks
1.1	$55,000	$0	$55,000	$55,000	$0	74.2 wks
1.1.1	$0	$0	$0	$0	$0	11.2 wks
1.1.2	$5,000	$0	$5,000	$5,000	$0	11.2 wks
1.1.3	$0	$0	$0	$0	$0	50 wks
1.1.4	$25,000	$0	$25,000	$25,000	$0	50 wks
1.1.5	$0	$0	$0	$0	$0	13 wks
1.1.6	$25,000	$0	$25,000	$25,000	$0	13 wks
1.2	$0	$0	$0	$0	$0	74.2 wks
1.2.1	$0	$0	$0	$0	$0	0 wks
1.2.2	$0	$0	$0	$0	$0	0 wks
1.2.3	$0	$0	$0	$0	$0	0 wks
1.2.4	$0	$0	$0	$0	$0	0 wks
2	$279,000	$141,884	$420,884	$438,644	$0	62 wks
2.1	$80,000	$94,380	$174,380	$192,140	$0	41.4 wks
2.1.1	$30,000	$23,960	$53,960	$62,880	$0	5 wks
2.1.1.1	$0	$960	$960	$1,440	$0	1 wk
2.1.1.2	$0	$3,840	$3,840	$5,760	$0	1 wk
2.1.1.3	$0	$1,920	$1,920	$2,880	$0	1 wk
2.1.1.4	$0	$3,000	$3,000	$4,500	$0	1 wk
2.1.1.5	$0	$3,840	$3,840	$5,760	$0	2 wks
2.1.1.6	$0	$0	$0	$0	$0	2 wks
2.1.1.7	$10,000	$0	$10,000	$17,000	$0	1 wk
2.1.1.8	$0	$2,880	$2,880	$4,320	$0	1 wk
2.1.1.9	$0	$2,000	$2,000	$3,000	$0	1 wk
2.1.1.10	$0	$1,920	$1,920	$2,880	$0	1 wk
2.1.1.11	$3,000	$1,800	$4,800	$6,600	$0	1 wk
2.1.1.12	$12,000	$1,800	$13,800	$18,300	$0	1 wk
2.1.1.13	$5,000	$0	$5,000	$6,500	$0	3 wks
2.1.2	$50,000	$70,420	$120,420	$138,180	$0	29.2 wks
2.1.2.1	$12,000	$1,800	$13,800	$13,800	$0	1 wk
2.1.2.2	$0	$2,000	$2,000	$3,000	$0	1 wk
2.1.2.3	$0	$1,920	$1,920	$2,880	$0	1 wk
2.1.2.4	$0	$8,640	$8,640	$12,960	$0	3 wks
2.1.2.5	$0	$0	$0	$0	$0	1 wk
2.1.2.6	$0	$3,840	$3,840	$5,760	$0	2 wks
2.1.2.7	$0	$5,760	$5,760	$8,640	$0	2 wks
2.1.2.8	$0	$9,000	$9,000	$13,500	$0	3 wks
2.1.2.9	$0	$11,520	$11,520	$17,280	$0	6 wks
2.1.2.10	$0	$3,600	$3,600	$5,400	$0	1 wk
2.1.2.11	$0	$960	$960	$1,440	$0	1 wk
2.1.2.12	$0	$11,520	$11,520	$17,280	$0	3 wks
2.1.2.13	$20,000	$0	$20,000	$32,000	$0	1 wk
2.1.2.14	$0	$0	$0	$0	$0	0 wks
2.1.2.15	$18,000	$9,860	$27,860	$38,190	$0	5 wks
2.2	$199,000	$25,524	$224,524	$224,524	$0	40 wks
2.2.1	$0	$25,524	$25,524	$25,524	$0	14 wks
2.2.1.1	$0	$1,296	$1,296	$1,296	$0	1 wk
2.2.1.2	$0	$6,108	$6,108	$6,108	$0	3 wks
2.2.1.3	$0	$1,720	$1,720	$1,720	$0	1 wk
2.2.1.4	$0	$1,520	$1,520	$1,520	$0	1 wk
2.2.1.5	$0	$6,480	$6,480	$6,480	$0	2 wks



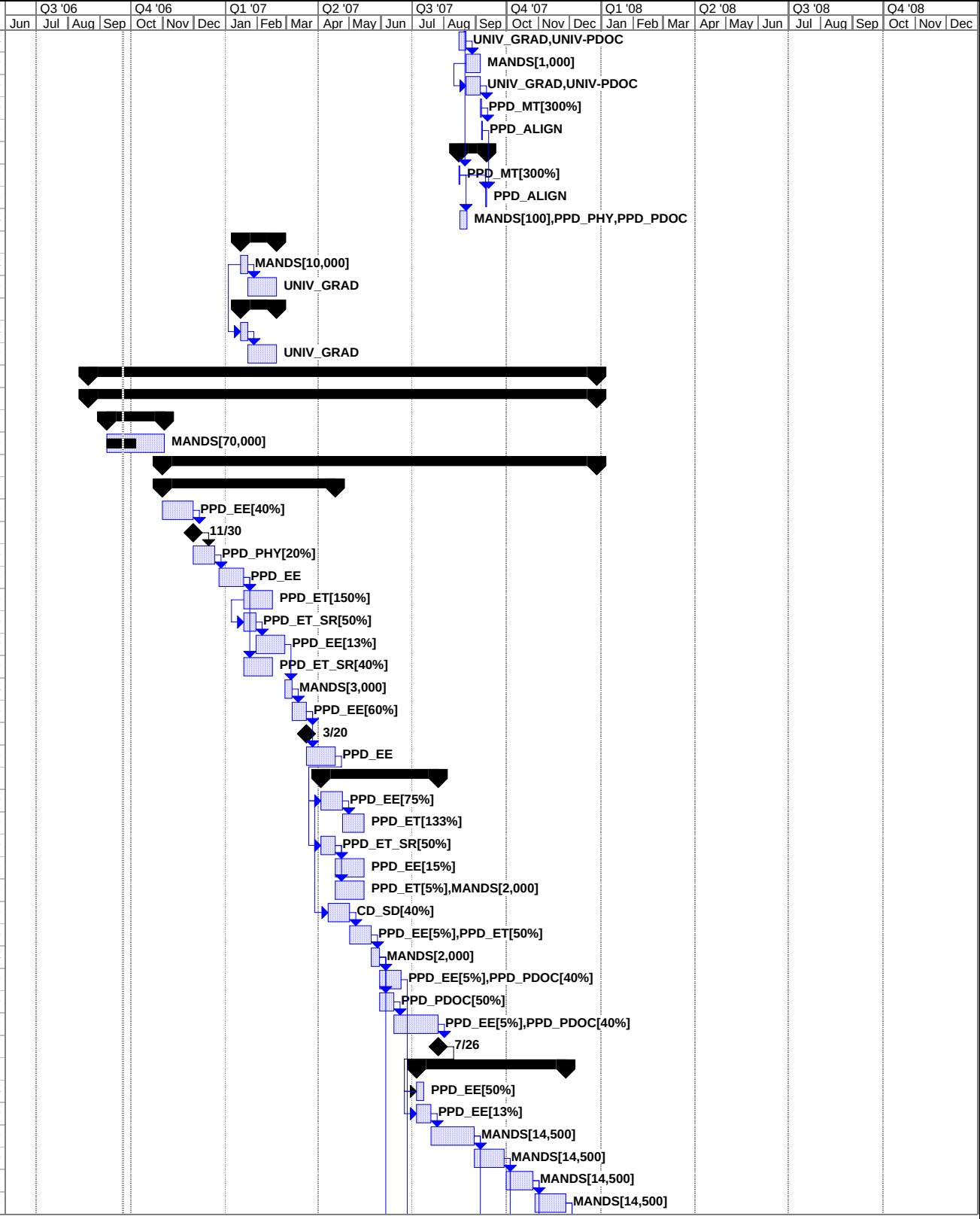
WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
2.2.1.6	$0	$1,520	$1,520	$1,520	$0	1 wk
2.2.1.7	$0	$3,440	$3,440	$3,440	$0	2 wks
2.2.1.8	$0	$3,440	$3,440	$3,440	$0	2 wks
2.2.2	**$199,000**	**$0**	**$199,000**	**$199,000**	**$0**	**37 wks**
2.2.2.1	$49,000	$0	$49,000	$49,000	$0	12 wks
2.2.2.2	$0	$0	$0	$0	$0	8 wks
2.2.2.3	$0	$0	$0	$0	$0	6 wks
2.2.2.4	$150,000	$0	$150,000	$150,000	$0	36 wks
2.3	**$0**	**$21,980**	**$21,980**	**$21,980**	**$0**	**30.6 wks**
2.3.1	**$0**	**$17,180**	**$17,180**	**$17,180**	**$0**	**9 wks**
2.3.1.1	$0	$5,000	$5,000	$5,000	$0	1 wk
2.3.1.2	$0	$1,500	$1,500	$1,500	$0	1 wk
2.3.1.3	$0	$3,000	$3,000	$3,000	$0	1 wk
2.3.1.4	$0	$7,680	$7,680	$7,680	$0	8 wks
2.3.2	$0	$0	$0	$0	$0	1 wk
2.3.3	$0	$4,800	$4,800	$4,800	$0	1 wk
2.3.4	$0	$0	$0	$0	$0	2 wks
2.3.5	$0	$0	$0	$0	$0	1 wk
3	**$128,600**	**$109,114**	**$237,714**	**$387,714**	**$150,000**	**43 wks**
3.1	**$40,500**	**$29,868**	**$70,368**	**$70,368**	**$0**	**31.4 wks**
3.1.1	**$2,500**	**$5,610**	**$8,110**	**$8,110**	**$0**	**7 wks**
3.1.1.1	$0	$1,290	$1,290	$1,290	$0	1 wk
3.1.1.2	$0	$1,720	$1,720	$1,720	$0	1 wk
3.1.1.3	$2,500	$344	$2,844	$2,844	$0	2 wks
3.1.1.4	$0	$652	$652	$652	$0	1 wk
3.1.1.5	$0	$844	$844	$844	$0	1 wk
3.1.1.6	$0	$760	$760	$760	$0	1 wk
3.1.2	**$5,000**	**$7,228**	**$12,228**	**$12,228**	**$0**	**11 wks**
3.1.2.1	$0	$1,720	$1,720	$1,720	$0	1 wk
3.1.2.2	$0	$1,720	$1,720	$1,720	$0	1 wk
3.1.2.3	$5,000	$688	$5,688	$5,688	$0	4 wks
3.1.2.4	$0	$1,304	$1,304	$1,304	$0	1 wk
3.1.2.5	$0	$692	$692	$692	$0	1 wk
3.1.2.6	$0	$760	$760	$760	$0	1 wk
3.1.2.7	$0	$344	$344	$344	$0	2 wks
3.1.3	**$5,000**	**$6,664**	**$11,664**	**$11,664**	**$0**	**7 wks**
3.1.3.1	$0	$1,720	$1,720	$1,720	$0	1 wk
3.1.3.2	$5,000	$344	$5,344	$5,344	$0	2 wks
3.1.3.3	$0	$960	$960	$960	$0	1 wk
3.1.3.4	$0	$1,920	$1,920	$1,920	$0	2 wks
3.1.3.5	$0	$1,720	$1,720	$1,720	$0	1 wk
3.1.4	**$2,000**	**$4,232**	**$6,232**	**$6,232**	**$0**	**6 wks**
3.1.4.1	$0	$860	$860	$860	$0	1 wk
3.1.4.2	$0	$860	$860	$860	$0	1 wk
3.1.4.3	$2,000	$344	$2,344	$2,344	$0	2 wks
3.1.4.4	$0	$824	$824	$824	$0	1 wk
3.1.4.5	$0	$1,344	$1,344	$1,344	$0	1 wk
3.1.5	**$2,000**	**$412**	**$2,412**	**$2,412**	**$0**	**1 wk**
3.1.5.1	$2,000	$412	$2,412	$2,412	$0	1 wk
3.1.6	**$3,000**	**$1,340**	**$4,340**	**$4,340**	**$0**	**3 wks**
3.1.6.1	$3,000	$0	$3,000	$3,000	$0	1 wk
3.1.6.2	$0	$480	$480	$480	$0	1 wk
3.1.6.3	$0	$860	$860	$860	$0	1 wk



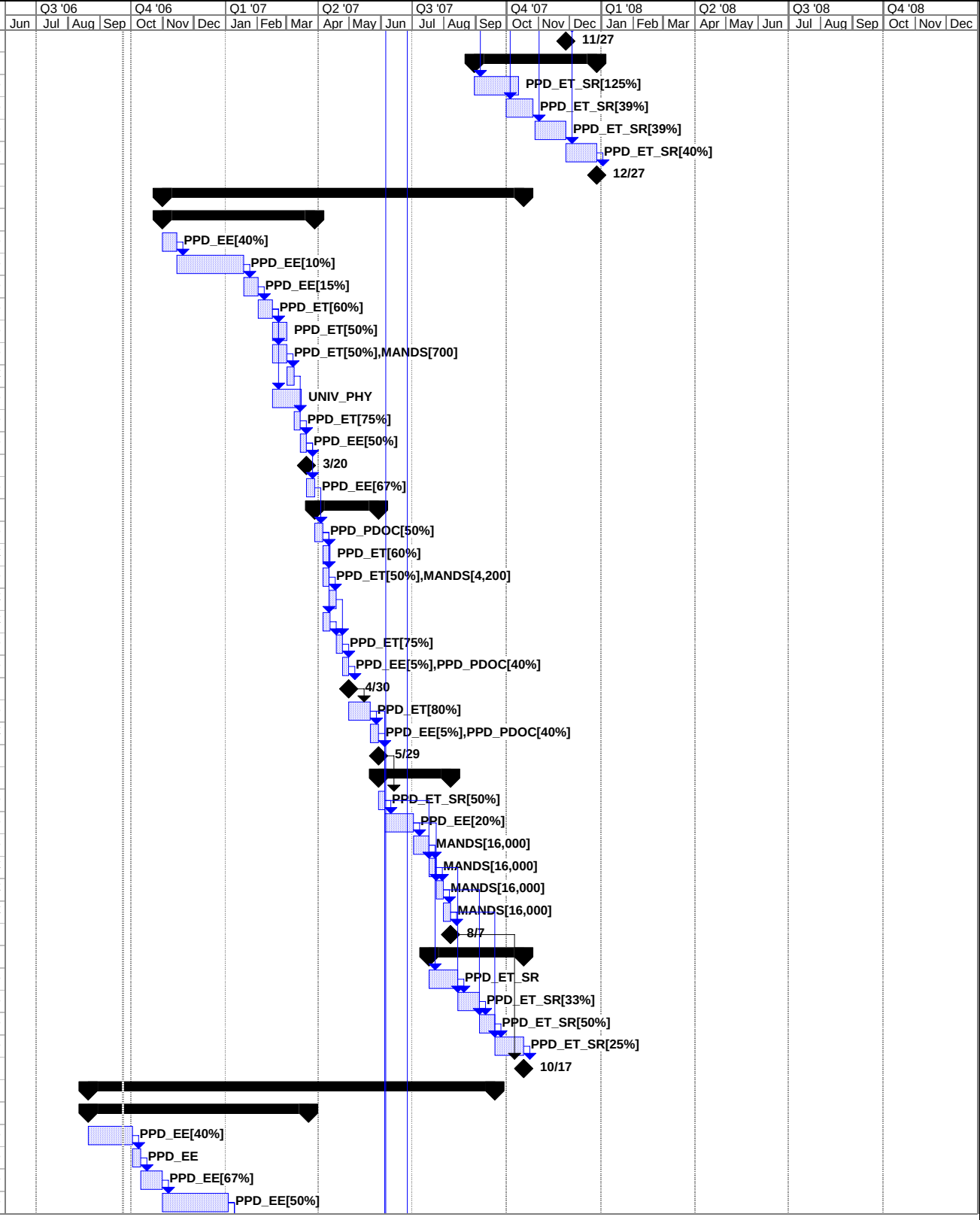
WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
3.1.7	$0	$2,952	$2,952	$2,952	$0	4 wks
3.1.7.1	$0	$2,952	$2,952	$2,952	$0	4 wks
3.1.8	$21,000	$1,430	$22,430	$22,430	$0	5 wks
3.1.8.1	$5,000	$86	$5,086	$5,086	$0	1 wk
3.1.8.2	$4,000	$0	$4,000	$4,000	$0	1 wk
3.1.8.3	$6,000	$0	$6,000	$6,000	$0	1 wk
3.1.8.4	$0	$1,000	$1,000	$1,000	$0	1 wk
3.1.8.5	$6,000	$344	$6,344	$6,344	$0	1 wk
3.2	$68,000	$75,598	$143,598	$143,598	$0	21 wks
3.2.1	$13,000	$38,120	$51,120	$51,120	$0	20 wks
3.2.1.1	$0	$3,440	$3,440	$3,440	$0	2 wks
3.2.1.2	$0	$5,592	$5,592	$5,592	$0	3 wks
3.2.1.3	$2,000	$344	$2,344	$2,344	$0	2 wks
3.2.1.4	$0	$3,840	$3,840	$3,840	$0	4 wks
3.2.1.5	$0	$960	$960	$960	$0	1 wk
3.2.1.6	$0	$5,160	$5,160	$5,160	$0	3 wks
3.2.1.7	$0	$5,592	$5,592	$5,592	$0	3 wks
3.2.1.8	$10,000	$344	$10,344	$10,344	$0	2 wks
3.2.1.9	$0	$3,396	$3,396	$3,396	$0	3 wks
3.2.1.10	$0	$1,720	$1,720	$1,720	$0	1 wk
3.2.1.11	$0	$1,820	$1,820	$1,820	$0	1 wk
3.2.1.12	$1,000	$480	$1,480	$1,480	$0	1 wk
3.2.1.13	$0	$960	$960	$960	$0	1 wk
3.2.1.14	$0	$3,440	$3,440	$3,440	$0	2 wks
3.2.1.15	$0	$1,032	$1,032	$1,032	$0	3 wks
3.2.2	$10,000	$23,260	$33,260	$33,260	$0	19 wks
3.2.2.1	$0	$6,880	$6,880	$6,880	$0	4 wks
3.2.2.2	$0	$5,592	$5,592	$5,592	$0	3 wks
3.2.2.3	$10,000	$516	$10,516	$10,516	$0	3 wks
3.2.2.4	$0	$2,880	$2,880	$2,880	$0	3 wks
3.2.2.5	$0	$2,780	$2,780	$2,780	$0	2 wks
3.2.2.6	$0	$1,172	$1,172	$1,172	$0	1 wk
3.2.2.7	$0	$1,720	$1,720	$1,720	$0	1 wk
3.2.2.8	$0	$1,720	$1,720	$1,720	$0	1 wk
3.2.3	$45,000	$14,218	$59,218	$59,218	$0	19 wks
3.2.3.1	$38,000	$1,032	$39,032	$39,032	$0	6 wks
3.2.3.2	$0	$3,900	$3,900	$3,900	$0	2 wks
3.2.3.3	$7,000	$1,290	$8,290	$8,290	$0	3 wks
3.2.3.4	$0	$5,216	$5,216	$5,216	$0	4 wks
3.2.3.5	$0	$2,780	$2,780	$2,780	$0	2 wks
3.3	$9,000	$0	$9,000	$9,000	$0	7 wks
3.3.1	$2,000	$0	$2,000	$2,000	$0	3 wks
3.3.2	$4,000	$0	$4,000	$4,000	$0	1 wk
3.3.3	$500	$0	$500	$500	$0	1 wk
3.3.4	$500	$0	$500	$500	$0	1 wk
3.3.5	$0	$0	$0	$0	$0	1 wk
3.3.6	$0	$0	$0	$0	$0	1 wk
3.3.7	$0	$0	$0	$0	$0	1 wk
3.3.8	$2,000	$0	$2,000	$2,000	$0	1 wk
3.4	$1,100	$3,648	$4,748	$4,748	$0	5.8 wks
3.4.1	$1,000	$2,112	$3,112	$3,112	$0	5.6 wks
3.4.1.1	$0	$0	$0	$0	$0	2 wks
3.4.1.2	$0	$576	$576	$576	$0	0.2 wks



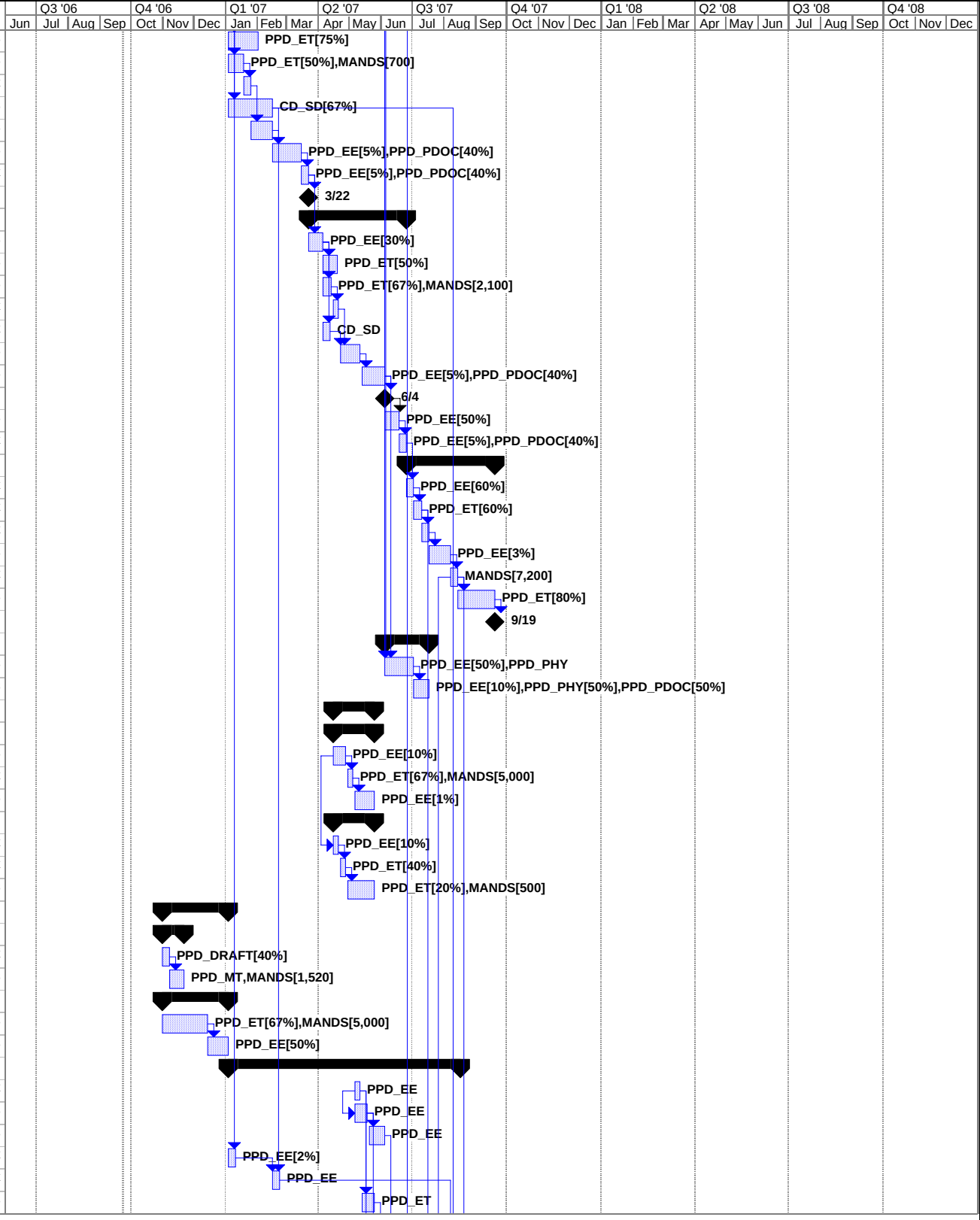
WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
3.4.1.3	$0	$0	$0	$0	$0	1 wk
3.4.1.4	$1,000	$0	$1,000	$1,000	$0	2 wks
3.4.1.5	$0	$0	$0	$0	$0	2 wks
3.4.1.6	$0	$576	$576	$576	$0	0.2 wks
3.4.1.7	$0	$960	$960	$960	$0	0.2 wks
3.4.2	**$100**	**$1,536**	**$1,636**	**$1,636**	**$0**	**3.6 wks**
3.4.2.1	$0	$576	$576	$576	$0	0.2 wks
3.4.2.2	$0	$960	$960	$960	$0	0.2 wks
3.4.2.3	$100	$0	$100	$100	$0	1 wk
3.5	**$10,000**	**$0**	**$10,000**	**$10,000**	**$0**	**5 wks**
3.5.1	$10,000	$0	$10,000	$10,000	$0	1 wk
3.5.2	$0	$0	$0	$0	$0	4 wks
3.6	**$0**	**$0**	**$0**	**$150,000**	**$150,000**	**5 wks**
3.6.1	$0	$0	$0	$150,000	$150,000	1 wk
3.6.2	$0	$0	$0	$0	$0	4 wks
4	**$377,920**	**$197,918**	**$575,838**	**$583,513**	**$0**	**67.8 wks**
4.1	**$225,920**	**$150,847**	**$376,767**	**$384,442**	**$0**	**67.8 wks**
4.1.1	**$70,000**	**$0**	**$70,000**	**$70,000**	**$0**	**8 wks**
4.1.1.1	$70,000	$0	$70,000	$70,000	$0	8 wks
4.1.2	**$65,000**	**$67,102**	**$132,102**	**$139,777**	**$0**	**57.6 wks**
4.1.2.1	**$3,000**	**$28,070**	**$31,070**	**$33,884**	**$0**	**22.6 wks**
4.1.2.1.1	$0	$2,752	$2,752	$3,413	$0	4 wks
4.1.2.1.2	**$0**	**$0**	**$0**	**$0**	**$0**	**0 wks**
4.1.2.1.3	$0	$0	$0	$0	$0	3 wks
4.1.2.1.4	$0	$5,160	$5,160	$6,708	$0	3 wks
4.1.2.1.5	$0	$6,000	$6,000	$7,800	$0	4 wks
4.1.2.1.6	$0	$1,440	$1,440	$1,872	$0	1.6 wks
4.1.2.1.7	$0	$894	$894	$1,163	$0	4 wks
4.1.2.1.8	$0	$2,880	$2,880	$3,744	$0	4 wks
4.1.2.1.9	$3,000	$0	$3,000	$3,750	$0	1 wk
4.1.2.1.10	$0	$2,064	$2,064	$2,683	$0	2 wks
4.1.2.1.11	**$0**	**$0**	**$0**	**$0**	**$0**	**0 wks**
4.1.2.1.12	$0	$6,880	$6,880	$8,944	$0	4 wks
4.1.2.2	**$4,000**	**$15,728**	**$19,728**	**$21,425**	**$0**	**16 wks**
4.1.2.2.1	$0	$3,870	$3,870	$5,031	$0	3 wks
4.1.2.2.2	$0	$3,990	$3,990	$5,187	$0	3 wks
4.1.2.2.3	$0	$1,800	$1,800	$2,340	$0	2 wks
4.1.2.2.4	$0	$1,032	$1,032	$1,342	$0	4 wks
4.1.2.2.5	$2,000	$200	$2,200	$2,760	$0	4 wks
4.1.2.2.6	$0	$2,304	$2,304	$2,995	$0	3 wks
4.1.2.2.7	$0	$1,758	$1,758	$2,285	$0	3 wks
4.1.2.2.8	$2,000	$0	$2,000	$2,500	$0	1 wk
4.1.2.2.9	$0	$258	$258	$335	$0	3 wks
4.1.2.2.10	$0	$0	$0	$0	$0	2 wks
4.1.2.2.11	$0	$516	$516	$671	$0	6 wks
4.1.2.2.12	**$0**	**$0**	**$0**	**$0**	**$0**	**0 wks**
4.1.2.3	**$58,000**	**$1,307**	**$59,307**	**$63,190**	**$0**	**20 wks**
4.1.2.3.1	$0	$860	$860	$1,118	$0	1 wk
4.1.2.3.2	$0	$447	$447	$581	$0	2 wks
4.1.2.3.3	$14,500	$0	$14,500	$18,125	$0	6 wks
4.1.2.3.4	$14,500	$0	$14,500	$18,125	$0	4 wks
4.1.2.3.5	$14,500	$0	$14,500	$18,125	$0	4 wks
4.1.2.3.6	$14,500	$0	$14,500	$18,125	$0	4 wks



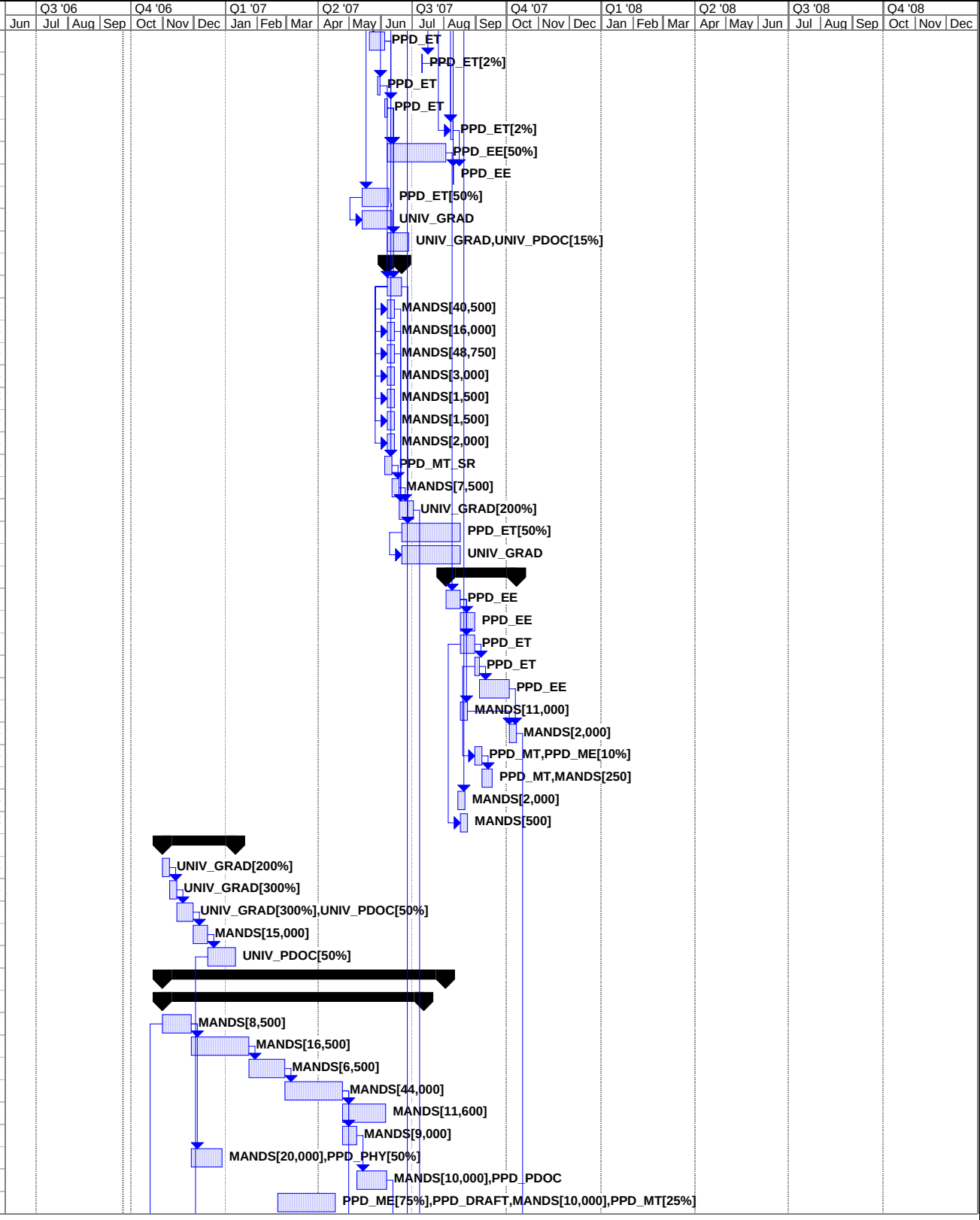
WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
4.1.2.3.7	$0	$0	$0	$0	$0	0 wks
4.1.2.4	$0	$21,996	$21,996	$26,046	$0	16 wks
4.1.2.4.1	$0	$13,500	$13,500	$17,550	$0	6 wks
4.1.2.4.2	$0	$2,808	$2,808	$3,650	$0	4 wks
15.7.2	$0	$2,808	$2,808	$3,650	$0	4 wks
4.1.2.4.4	$0	$2,880	$2,880	$3,744	$0	4 wks
4.1.2.4.5	$0	$0	$0	$0	$0	0 wks
4.1.3	$68,900	$27,972	$96,872	$99,032	$0	48.2 wks
4.1.3.1	$700	$9,139	$9,839	$10,254	$0	19.8 wks
4.1.3.1.1	$0	$1,376	$1,376	$1,789	$0	2 wks
4.1.3.1.2	$0	$1,376	$1,376	$1,789	$0	8 wks
4.1.3.1.3	$0	$516	$516	$671	$0	2 wks
4.1.3.1.4	$0	$1,200	$1,200	$1,560	$0	2 wks
4.1.3.1.5	$0	$1,000	$1,000	$1,300	$0	2 wks
4.1.3.1.6	$700	$1,000	$1,700	$2,000	$0	2 wks
4.1.3.1.7	$0	$0	$0	$0	$0	1 wk
4.1.3.1.8	$0	$0	$0	$0	$0	4 wks
4.1.3.1.9	$0	$600	$600	$780	$0	0.8 wks
4.1.3.1.10	$0	$688	$688	$894	$0	0.8 wks
4.1.3.1.11	$0	$0	$0	$0	$0	0 wks
4.1.3.1.12	$0	$1,383	$1,383	$1,798	$0	1.2 wks
4.1.3.2	$4,200	$4,155	$8,355	$9,075	$0	8.6 wks
4.1.3.2.1	$0	$0	$0	$0	$0	1.2 wks
4.1.3.2.2	$0	$600	$600	$780	$0	1 wk
4.1.3.2.3	$4,200	$400	$4,600	$4,720	$0	0.8 wks
4.1.3.2.4	$0	$0	$0	$0	$0	1 wk
4.1.3.2.5	$0	$0	$0	$0	$0	1 wk
4.1.3.2.6	$0	$600	$600	$780	$0	0.8 wks
4.1.3.2.7	$0	$69	$69	$89	$0	0.8 wks
4.1.3.2.8	$0	$0	$0	$0	$0	0 wks
4.1.3.2.9	$0	$2,400	$2,400	$3,120	$0	3 wks
4.1.3.2.10	$0	$86	$86	$112	$0	1 wk
4.1.3.2.11	$0	$0	$0	$0	$0	0 wks
4.1.3.3	$64,000	$2,096	$66,096	$66,509	$0	9.8 wks
4.1.3.3.1	$0	$720	$720	$936	$0	0.8 wks
4.1.3.3.2	$0	$1,376	$1,376	$1,789	$0	4 wks
4.1.3.3.3	$16,000	$0	$16,000	$16,000	$0	2 wks
4.1.3.3.4	$16,000	$0	$16,000	$16,000	$0	1 wk
4.1.3.3.5	$16,000	$0	$16,000	$16,000	$0	1 wk
4.1.3.3.6	$16,000	$0	$16,000	$16,000	$0	1 wk
4.1.3.3.7	$0	$0	$0	$0	$0	0 wks
4.1.3.4	$0	$12,582	$12,582	$14,742	$0	13 wks
4.1.3.4.1	$0	$7,200	$7,200	$9,360	$0	4 wks
4.1.3.4.2	$0	$1,782	$1,782	$2,317	$0	3 wks
4.1.3.4.3	$0	$1,800	$1,800	$2,340	$0	2 wks
4.1.3.4.4	$0	$1,800	$1,800	$2,340	$0	4 wks
4.1.3.4.5	$0	$0	$0	$0	$0	0 wks
4.1.4	$10,000	$41,284	$51,284	$55,400	$0	54.4 wks
4.1.4.1	$700	$28,678	$29,378	$31,868	$0	29.2 wks
4.1.4.1.1	$0	$4,128	$4,128	$5,366	$0	6 wks
4.1.4.1.2	$0	$2,064	$2,064	$2,683	$0	1.2 wks
4.1.4.1.3	$0	$3,457	$3,457	$4,494	$0	3 wks
4.1.4.1.4	$0	$6,880	$6,880	$8,944	$0	8 wks



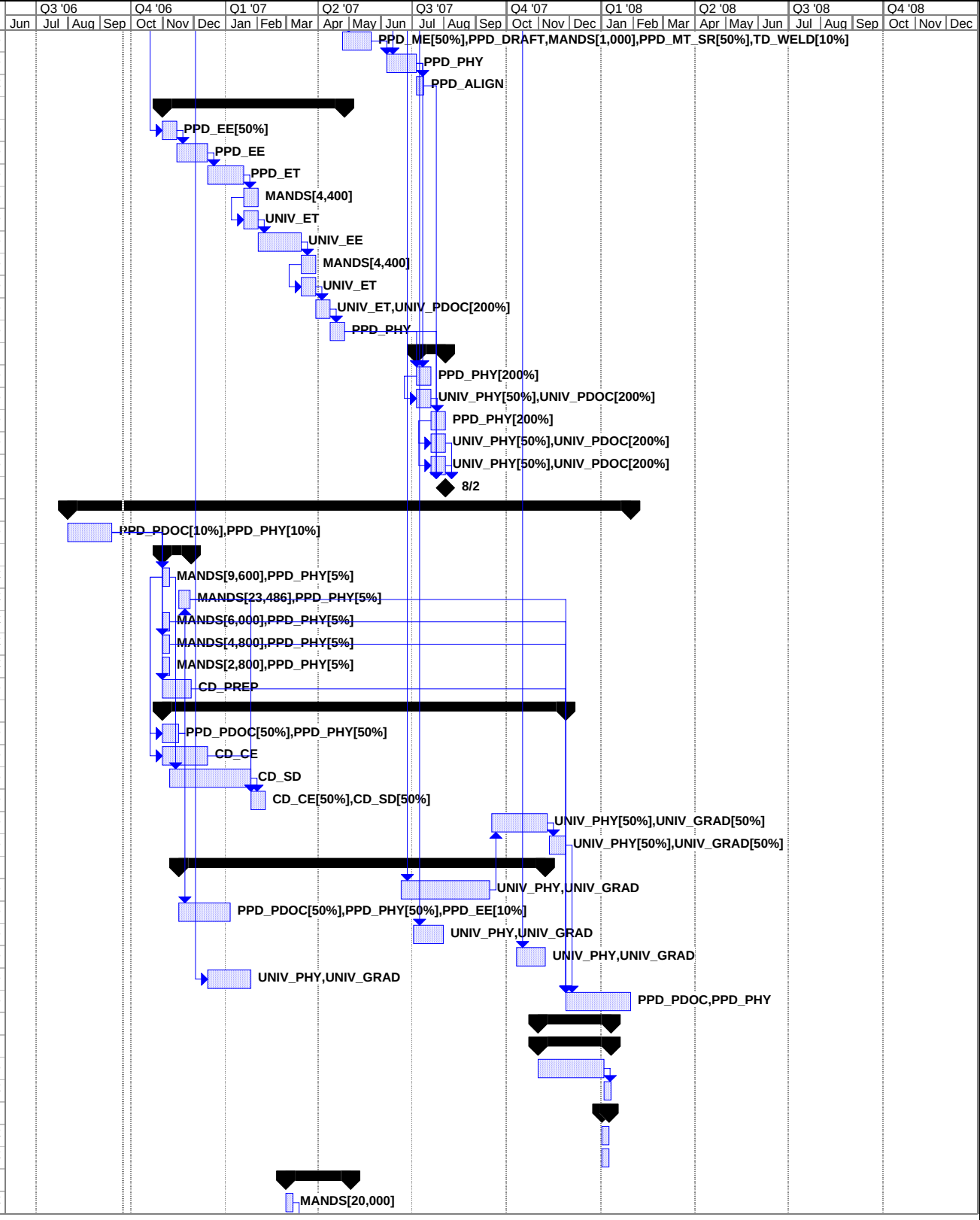
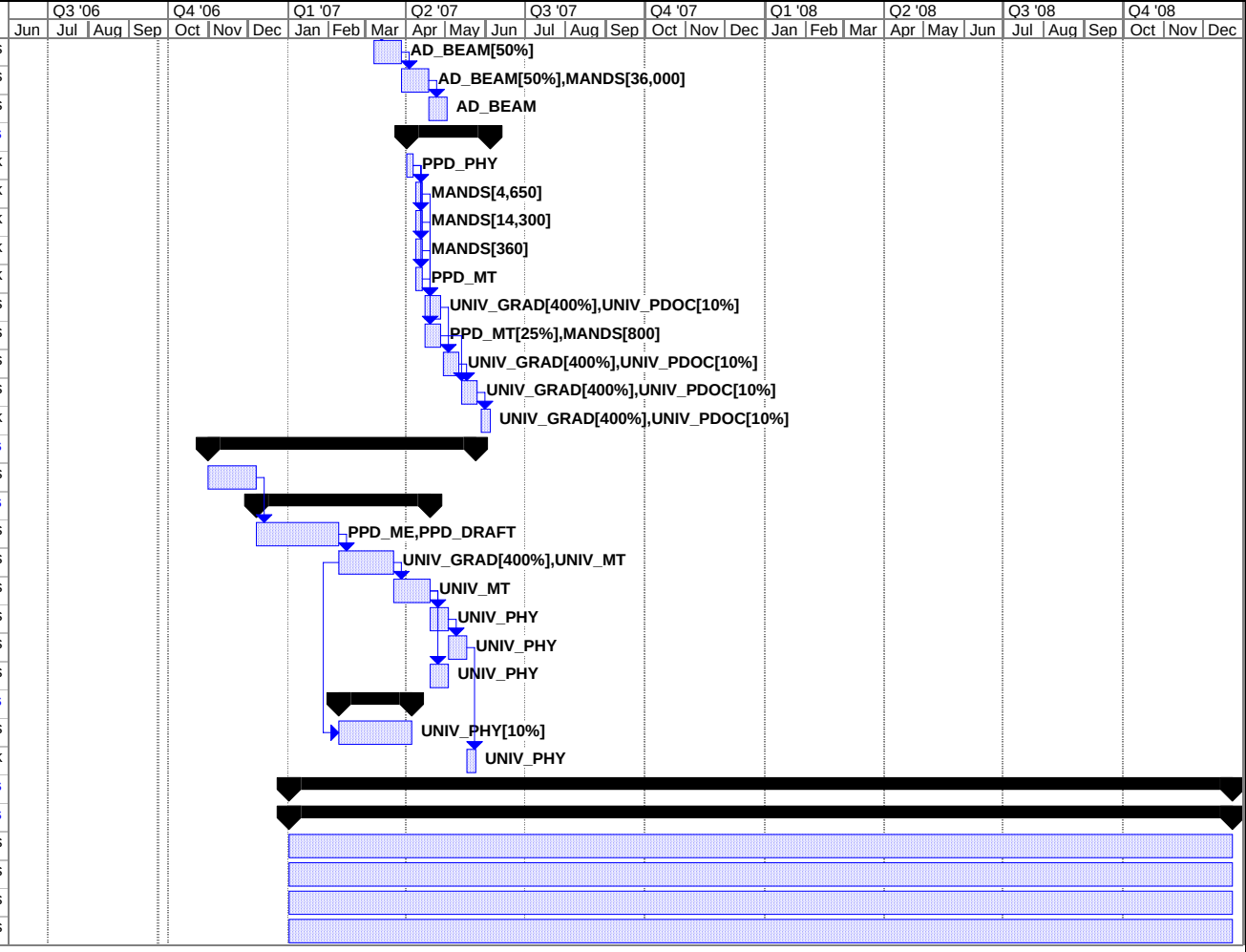
WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
4.1.4.1.5	$0	$3,000	$3,000	$3,900	$0	4 wks
4.1.4.1.6	$700	$1,000	$1,700	$2,175	$0	2 wks
4.1.4.1.7	$0	$0	$0	$0	$0	1 wk
4.1.4.1.8	$0	$7,718	$7,718	$10,034	$0	6 wks
4.1.4.1.9	$0	$0	$0	$0	$0	3 wks
4.1.4.1.10	$0	$344	$344	$447	$0	4 wks
4.1.4.1.11	$0	$86	$86	$112	$0	1 wk
4.1.4.1.12	$0	$0	$0	$0	$0	0 wks
4.1.4.2	$2,100	$6,820	$8,920	$10,021	$0	13.2 wks
4.1.4.2.1	$0	$1,032	$1,032	$1,342	$0	2 wks
4.1.4.2.2	$0	$1,000	$1,000	$1,300	$0	2 wks
4.1.4.2.3	$2,100	$804	$2,904	$3,670	$0	1.2 wks
4.1.4.2.4	$0	$0	$0	$0	$0	1 wk
4.1.4.2.5	$0	$1,920	$1,920	$2,496	$0	1 wk
4.1.4.2.6	$0	$0	$0	$0	$0	3 wks
4.1.4.2.7	$0	$258	$258	$335	$0	3 wks
4.1.4.2.8	$0	$0	$0	$0	$0	0 wks
4.1.4.2.9	$0	$1,720	$1,720	$2,236	$0	2 wks
4.1.4.2.10	$0	$86	$86	$112	$0	1 wk
4.1.4.3	$7,200	$5,787	$12,987	$15,987	$0	12 wks
4.1.4.3.1	$0	$1,032	$1,032	$1,342	$0	1 wk
4.1.4.3.2	$0	$600	$600	$780	$0	1 wk
4.1.4.3.3	$0	$0	$0	$0	$0	1 wk
4.1.4.3.4	$0	$155	$155	$201	$0	3 wks
4.1.4.3.5	$7,200	$0	$7,200	$9,000	$0	1 wk
4.1.4.3.6	$0	$4,000	$4,000	$5,200	$0	5 wks
4.1.4.3.7	$0	$0	$0	$0	$0	0 wks
4.1.5	$0	$3,784	$3,784	$4,816	$0	6 wks
4.1.5.1	$0	$3,440	$3,440	$4,472	$0	4 wks
4.1.5.2	$0	$344	$344	$447	$0	2 wks
4.1.6	$5,500	$2,438	$7,938	$9,428	$0	6 wks
4.1.6.1	$5,000	$1,066	$6,066	$7,517	$0	6 wks
4.1.6.1.1	$0	$344	$344	$447	$0	2 wks
4.1.6.1.2	$5,000	$670	$5,670	$7,121	$0	1 wk
4.1.6.1.3	$0	$52	$52	$67	$0	3 wks
4.1.6.2	$500	$1,372	$1,872	$2,237	$0	6 wks
4.1.6.2.1	$0	$172	$172	$224	$0	1 wk
4.1.6.2.2	$0	$400	$400	$520	$0	1 wk
4.1.6.2.3	$500	$800	$1,300	$1,665	$0	4 wks
4.1.7	$6,520	$8,268	$14,788	$17,244	$0	8 wks
4.1.7.1	$1,520	$2,528	$4,048	$5,004	$0	3 wks
4.1.7.1.1	$0	$608	$608	$790	$0	1 wk
4.1.7.1.2	$1,520	$1,920	$3,440	$4,396	$0	2 wks
4.1.7.2	$5,000	$5,740	$10,740	$13,196	$0	8 wks
4.1.7.2.1	$5,000	$4,020	$9,020	$11,476	$0	6 wks
4.1.7.2.2	$0	$1,720	$1,720	$2,236	$0	2 wks
4.2	$121,250	$28,719	$149,969	$149,969	$0	31.7 wks
4.2.1	$0	$1,720	$1,720	$1,720	$0	1 wk
4.2.2	$0	$3,440	$3,440	$3,440	$0	2 wks
4.2.3	$0	$3,440	$3,440	$3,440	$0	2 wks
4.2.4	$0	$34	$34	$34	$0	1 wk
4.2.5	$0	$1,720	$1,720	$1,720	$0	1 wk
4.2.6	$0	$2,000	$2,000	$2,000	$0	2 wks



WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
4.2.7	$0	$2,000	$2,000	$2,000	$0	2 wks
4.2.8	$0	$2	$2	$2	$0	0.1 wks
4.2.9	$0	$500	$500	$500	$0	0.5 wks
4.2.10	$0	$500	$500	$500	$0	0.5 wks
4.2.11	$0	$10	$10	$10	$0	0.5 wks
4.2.12	$0	$6,880	$6,880	$6,880	$0	8 wks
4.2.13	$0	$172	$172	$172	$0	0.1 wks
4.2.14	$500	$500	$1,000	$1,000	$0	4 wks
4.2.15	$0	$0	$0	$0	$0	4 wks
4.2.16	$0	$0	$0	$0	$0	3 wks
4.2.17	**$113,250**	**$0**	**$113,250**	**$113,250**	**$0**	**2 wks**
4.2.17.1	$0	$0	$0	$0	$0	2 wks
4.2.17.2	$40,500	$0	$40,500	$40,500	$0	1 wk
4.2.17.3	$16,000	$0	$16,000	$16,000	$0	1 wk
4.2.17.4	$48,750	$0	$48,750	$48,750	$0	1 wk
4.2.17.5	$3,000	$0	$3,000	$3,000	$0	1 wk
4.2.17.6	$1,500	$0	$1,500	$1,500	$0	1 wk
4.2.17.7	$1,500	$0	$1,500	$1,500	$0	1 wk
4.2.17.8	$2,000	$0	$2,000	$2,000	$0	1 wk
4.2.18	$0	$1,800	$1,800	$1,800	$0	1 wk
4.2.19	$7,500	$0	$7,500	$7,500	$0	1 wk
4.2.20	$0	$0	$0	$0	$0	2 wks
4.2.21	$0	$4,000	$4,000	$4,000	$0	8 wks
4.2.22	$0	$0	$0	$0	$0	8 wks
4.3	**$15,750**	**$18,352**	**$34,102**	**$34,102**	**$0**	**9.5 wks**
4.3.1	$0	$3,440	$3,440	$3,440	$0	2 wks
4.3.2	$0	$3,440	$3,440	$3,440	$0	2 wks
4.3.3	$0	$2,000	$2,000	$2,000	$0	2 wks
4.3.4	$0	$500	$500	$500	$0	0.5 wks
4.3.5	$0	$6,880	$6,880	$6,880	$0	4 wks
4.3.6	$11,000	$0	$11,000	$11,000	$0	1 wk
4.3.7	$2,000	$0	$2,000	$2,000	$0	1 wk
4.3.8	$0	$1,132	$1,132	$1,132	$0	1 wk
4.3.9	$250	$960	$1,210	$1,210	$0	1 wk
4.3.10	$2,000	$0	$2,000	$2,000	$0	1 wk
4.3.11	$500	$0	$500	$500	$0	1 wk
4.4	**$15,000**	**$0**	**$15,000**	**$15,000**	**$0**	**9 wks**
4.4.1	$0	$0	$0	$0	$0	1 wk
4.4.2	$0	$0	$0	$0	$0	1 wk
4.4.3	$0	$0	$0	$0	$0	2 wks
4.4.4	$15,000	$0	$15,000	$15,000	$0	2 wks
4.4.5	$0	$0	$0	$0	$0	3 wks
5	**$145,900**	**$51,400**	**$197,300**	**$208,300**	**$0**	**37.6 wks**
5.1	**$137,100**	**$38,800**	**$175,900**	**$186,900**	**$0**	**34.6 wks**
5.1.1	$8,500	$0	$8,500	$10,625	$0	4 wks
5.1.2	$16,500	$0	$16,500	$16,500	$0	8 wks
5.1.3	$6,500	$0	$6,500	$8,125	$0	5 wks
5.1.4	$44,000	$0	$44,000	$55,000	$0	8 wks
5.1.5	$11,600	$0	$11,600	$14,500	$0	6 wks
5.1.6	$9,000	$0	$9,000	$11,250	$0	2 wks
5.1.7	$20,000	$0	$20,000	$25,000	$0	4 wks
5.1.8	$10,000	$0	$10,000	$12,500	$0	4 wks
5.1.9	$10,000	$20,880	$30,880	$30,880	$0	8 wks



WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
5.1.10	$1,000	$13,120	$14,120	$14,120	$0	4 wks
5.1.11	$0	$0	$0	$0	$0	4 wks
5.1.12	$0	$4,800	$4,800	$4,800	$0	1 wk
5.2	**$8,800**	**$12,600**	**$21,400**	**$21,400**	**$0**	**25.4 wks**
5.2.1	$0	$1,720	$1,720	$1,720	$0	2 wks
5.2.2	$0	$6,880	$6,880	$6,880	$0	4 wks
5.2.3	$0	$4,000	$4,000	$4,000	$0	4 wks
5.2.4	$4,400	$0	$4,400	$4,400	$0	2 wks
5.2.5	$0	$0	$0	$0	$0	2 wks
5.2.6	$0	$0	$0	$0	$0	6 wks
5.2.7	$4,400	$0	$4,400	$4,400	$0	2 wks
5.2.8	$0	$0	$0	$0	$0	2 wks
5.2.9	$0	$0	$0	$0	$0	2 wks
5.2.10	$0	$0	$0	$0	$0	2 wks
5.3	**$0**	**$0**	**$0**	**$0**	**$0**	**4 wks**
5.3.1	$0	$0	$0	$0	$0	2 wks
5.3.2	$0	$0	$0	$0	$0	2 wks
5.3.3	$0	$0	$0	$0	$0	2 wks
5.3.4	$0	$0	$0	$0	$0	2 wks
5.3.5	$0	$0	$0	$0	$0	2 wks
5.3.6	**$0**	**$0**	**$0**	**$0**	**$0**	**0 wks**
6	**$46,686**	**$38,952**	**$85,638**	**$85,638**	**$0**	**74.6 wks**
6.1	$0	$0	$0	$0	$0	6 wks
6.2	**$46,686**	**$0**	**$46,686**	**$46,686**	**$0**	**3.6 wks**
6.2.1	$9,600	$0	$9,600	$9,600	$0	1 wk
6.2.2	$23,486	$0	$23,486	$23,486	$0	1 wk
6.2.3	$6,000	$0	$6,000	$6,000	$0	1 wk
6.2.4	$4,800	$0	$4,800	$4,800	$0	1 wk
6.2.5	$2,800	$0	$2,800	$2,800	$0	1 wk
6.2.6	$0	$0	$0	$0	$0	4 wks
6.3	**$0**	**$38,952**	**$38,952**	**$38,952**	**$0**	**53.6 wks**
6.3.1	$0	$0	$0	$0	$0	2.4 wks
6.3.2	$0	$14,400	$14,400	$14,400	$0	6 wks
6.3.3	$0	$19,200	$19,200	$19,200	$0	10 wks
6.3.4	$0	$4,320	$4,320	$4,320	$0	2 wks
6.3.5	$0	$0	$0	$0	$0	8 wks
6.3.6	$0	$0	$0	$0	$0	2 wks
6.3.7	**$0**	**$1,032**	**$1,032**	**$1,032**	**$0**	**48.8 wks**
6.3.7.1	$0	$0	$0	$0	$0	12 wks
6.3.7.2	$0	$1,032	$1,032	$1,032	$0	6 wks
6.3.7.3	$0	$0	$0	$0	$0	4 wks
6.3.7.4	$0	$0	$0	$0	$0	4 wks
6.3.7.5	$0	$0	$0	$0	$0	5 wks
6.4	$0	$0	$0	$0	$0	8 wks
7	**$0**	**$0**	**$0**	**$0**	**$0**	**9 wks**
7.1	**$0**	**$0**	**$0**	**$0**	**$0**	**9 wks**
7.1.1	$0	$0	$0	$0	$0	8 wks
7.1.2	$0	$0	$0	$0	$0	1 wk
7.2	**$0**	**$0**	**$0**	**$0**	**$0**	**1 wk**
7.2.1	$0	$0	$0	$0	$0	1 wk
7.2.2	$0	$0	$0	$0	$0	1 wk
8	**$56,000**	**$0**	**$56,000**	**$56,000**	**$0**	**9 wks**
8.1	$20,000	$0	$20,000	$20,000	$0	1 wk



WBS	Fermi M&S Cost	Fermi Labor Cost	Base Cost in FY06 $	Total Project Cost	In Kind Contributions	Duration
8.2	$0	$0	$0	$0	$0	3 wks
8.3	$36,000	$0	$36,000	$36,000	$0	3 wks
8.4	$0	$0	$0	$0	$0	2 wks
9	**$20,110**	**$1,440**	**$21,550**	**$21,550**	**$0**	**9 wks**
9.1	$0	$0	$0	$0	$0	1 wk
9.2	$4,650	$0	$4,650	$4,650	$0	1 wk
9.3	$14,300	$0	$14,300	$14,300	$0	1 wk
9.4	$360	$0	$360	$360	$0	1 wk
9.5	$0	$960	$960	$960	$0	1 wk
9.6	$0	$0	$0	$0	$0	2 wks
9.7	$800	$480	$1,280	$1,280	$0	2 wks
9.8	$0	$0	$0	$0	$0	2 wks
9.9	$0	$0	$0	$0	$0	2 wks
9.10	$0	$0	$0	$0	$0	1 wk
10	**$0**	**$25,920**	**$25,920**	**$80,920**	**$55,000**	**28 wks**
10.1	$0	$0	$0	$20,000	$20,000	5 wks
10.2	**$0**	**$25,920**	**$25,920**	**$35,920**	**$10,000**	**18 wks**
10.2.1	$0	$25,920	$25,920	$25,920	$0	8 wks
10.2.2	$0	$0	$0	$10,000	$10,000	6 wks
10.2.3	$0	$0	$0	$0	$0	4 wks
10.3	$0	$0	$0	$25,000	$25,000	2 wks
10.4	$0	$0	$0	$0	$0	2 wks
10.5	$0	$0	$0	$0	$0	2 wks
10.6	**$0**	**$0**	**$0**	**$0**	**$0**	**8 wks**
10.6.1	$0	$0	$0	$0	$0	8 wks
10.7	$0	$0	$0	$0	$0	1 wk
11	**$105,240**	**$0**	**$105,240**	**$105,240**	**$0**	**103.2 wks**
11.1	**$105,240**	**$0**	**$105,240**	**$105,240**	**$0**	**103.2 wks**
11.1.1	$71,540	$0	$71,540	$71,540	$0	100 wks
11.1.2	$24,820	$0	$24,820	$24,820	$0	100 wks
11.1.3	$1,680	$0	$1,680	$1,680	$0	100 wks
11.1.4	$7,200	$0	$7,200	$7,200	$0	100 wks