Top Off Cost Est Working Draft v11-19.xls

	Description	MATERIAL Unit Meas	Material No. Units	Cost Basis	Unit Cost	Total Material K$	LABOR Labor No. Units	Labor Unit Hours	Labor Total Hours	Craft Code	Labor Rate $/Hr.	Total Labor K$	Total Labor + Material	Overhead Total	Sub Total	TOTALS Cntng %	Cntng K$	Totals K$
1	**ALS Top Off Upgrade**					**2,092.5**						**1,416.4**	**3,508.9**	**492.7**	**4,001.5**	**21%**	**849.7**	**4,851.3**
1.1	**Project Management**					**0.0**						**95.4**	**95.4**	**19.6**	**115.0**	**10%**	**11.5**	**126.5**
	Project Management	ea	0	eu	0	**0.0**	1	624	624	ap	93.65	**58.4**	**58.4**					
		ea	0	eu	0	**0.0**	1	624	624	pc	59.18	**36.9**	**36.9**					
1.2	**Top off Documentation**					**0.0**						**3.7**	**3.7**	**0.8**	**4.5**	**10%**	**0.5**	**5.0**
1.2.1	Complete Top Off Documentation	ea	0	eu	0	**0.0**	1	40	40	ap	93.65	**3.7**	**3.7**					
1.3	**Linac**					**6.0**						**16.7**	**22.7**	**4.0**	**26.7**	**20%**	**5.3**	**32.1**
1.3.1	Diagnostics					**6.0**						**16.7**	**22.7**	**4.0**	**26.7**	**20%**	**5.3**	**32.1**
1.3.1.1	EDI																	
1.3.1.1.1	Integrating Current Transformer EDI	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.3.1.1.2	Beam Intensity Monitor EDI	ea	1	eu	1	**0.0**	1	120	120	ee	80.23	**9.6**	**9.6**					
1.3.1.2	Integrating Current Transformer	ea	1	eu	1000	**1.0**	1	40	40	ei	48.28	**1.9**	**2.9**					
1.3.1.3	Beam Intensity Monitor	ea	1	eu	5000	**5.0**	1	40	40	ei	48.28	**1.9**	**6.9**					
1.4	**Booster**					**1,380.5**						**470.3**	**1,850.9**	**229.4**	**2,080.3**	**19%**	**394.1**	**2,474.4**
1.4.1	Power Supplies					**540.0**						**18.3**	**558.3**	**55.6**	**613.9**	**20%**	**122.8**	**736.7**
1.4.1.1	EDI																	
1.4.1.1.1	Bend EDI	ea	0	eu	0	**0.0**	1	30	30	ee	80.23	**2.4**	**2.4**					
1.4.1.1.2	Quadrupole EDI	ea	0	eu	0	**0.0**	1	30	30	ee	80.23	**2.4**	**2.4**					
1.4.1.1.3	Sextupole EDI	ea	0	eu	0	**0.0**	1	20	20	ee	80.23	**1.6**	**1.6**					
1.4.1.2	Bend Power Supply	ea	1	eu	300000	**300.0**	0	0	0	ee	80.23	**0.0**	**300.0**					
1.4.1.3	Quadrupole Power Supplies	ea	2	eu	100000	**200.0**	0	0	0	ee	80.23	**0.0**	**200.0**					
1.4.1.4	Sextupole Power Supplies	ea	8	eu	5000	**40.0**	0	0	0	ee	80.23	**0.0**	**40.0**					
1.4.1.5	Installation	ea	0	eu	0	**0.0**	3	10	30	ei	48.28	**1.4**	**1.4**					
		ea	0	eu	0	**0.0**	12	6	72	rg	48.95	**3.5**	**3.5**					
		ea	0	eu	0	**0.0**	3	4	12	mu	48.40	**0.6**	**0.6**					
		ea	0	eu	0	**0.0**	3	40	120	el	52.88	**6.3**	**6.3**					
1.4.2	Thin Septum Magnet					**9.4**						**28.3**	**37.7**	**6.7**	**44.4**	**25%**	**11.1**	**55.5**
1.4.2.1	EDI	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.4.2.2	Power Supplies - KSI Replacement	ea	2	eu	3300	**6.6**	1	2	2	ec	69.74	**0.1**	**6.7**					
1.4.2.2.1	Build New PS Interface & Upgrade Glassma	ea	1	eu	250	**0.3**	1	80	80	ei	48.28	**3.9**	**4.1**					
1.4.2.2.2	Replacement Capacitors	ea	10	eu	250	**2.5**	1	40	40	ee	80.23	**3.2**	**5.7**					
1.4.2.3	Magnet Swap Out	ea	0	eu	0	**0.0**	1	80	80	ee	80.23	**6.4**	**6.4**					
		ea	0	eu	0	**0.0**	1	80	80	me	70.49	**5.6**	**5.6**					
		ea	0	eu	0	**0.0**	1	80	80	ma	73.18	**5.9**	**5.9**					
1.4.3	Thick Septum Magnet					**7.1**						**8.9**	**16.0**	**2.5**	**18.6**	**25%**	**4.6**	**23.2**
1.4.3.1	EDI	ea	0	eu	0	**0.0**	1	20	20	ee	80.23	**1.6**	**1.6**					
		ea	0	eu	0	**0.0**	1	20	20	ec	69.74	**1.4**	**1.4**					

1.4.3.2	Power Supplies - KSI Replacement	ea	2	eu	3300	**6.6**	1	2	2	ec	69.74	**0.1**	**6.7**					
1.4.3.2.1	Build New PS Interface & Upgrade Glassma	ea	1	eu	250	**0.3**	1	80	80	ei	48.28	**3.9**	**4.1**					
1.4.3.2.2	Replacement Capacitors	ea	1	eu	250	**0.3**	1	40	40	ei	48.28	**1.9**	**2.2**					
1.4.4	Kicker Magnet					**7.7**						**18.6**	**26.3**	**4.6**	**30.9**	**25%**	**7.7**	**38.6**
1.4.4.1	EDI	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
		ea	0	eu	0	**0.0**	1	80	80	ec	69.74	**5.6**	**5.6**					
1.4.4.2	Power Supplies - KSI Spare	ea	2	eu	2600	**5.2**	1	2	2	ec	69.74	**0.1**	**5.3**					
1.4.4.2.1	Build New PS Interface	ea	1	eu	500	**0.5**	1	40	40	ei	48.28	**1.9**	**2.4**					
1.4.4.2.2	Rebuild HV Diode Stacks	ea	1	eu	1000	**1.0**	1	40	40	ei	48.28	**1.9**	**2.9**					
1.4.4.2.3	Kicker Structure Upgrades	ea	1	eu	500	**0.5**	1	40	40	ei	48.28	**1.9**	**2.4**					
1.4.4.2.4	Charge Line Upgrades	ea	1	eu	500	**0.5**	1	80	80	ei	48.28	**3.9**	**4.4**					
1.4.5	RF					**613.2**						**233.0**	**846.2**	**106.9**	**953.1**	**15%**	**143.0**	**1,096.1**
1.4.5.1	EDI Overall system	ea	0	eu	0	**0.0**	1	120	120	ee	80.23	**9.6**	**9.6**					
1.4.5.1.1	EDI HVPS	ea	0	eu	0	**0.0**	1	24	24	ee	80.23	**1.9**	**1.9**					
		ea	0	eu	0	**0.0**	1	60	60	ec	69.74	**4.2**	**4.2**					
1.4.5.1.2	EDI Final Amplifier/Transmitter	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
		ea	0	eu	0	**0.0**	1	120	120	ec	69.74	**8.4**	**8.4**					
1.4.5.1.3	EDI RF Transmission Line	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
		ea	0	eu	0	**0.0**	1	120	120	ec	69.74	**8.4**	**8.4**					
1.4.5.1.4	EDI Controls & Interlocks	ea	0	eu	0	**0.0**	1	80	80	ee	80.23	**6.4**	**6.4**					
		ea	0	eu	0	**0.0**	1	200	200	ec	69.74	**13.9**	**13.9**					
1.4.5.1.5	EDI Radiation Protection	ea	0	eu	0	**0.0**	1	60	60	ec	69.74	**4.2**	**4.2**					
1.4.5.2	High Voltage Power Supply	ea	1	bq 2004	55000	**55.0**	0	0	0	ee	80.23	**0.0**	**55.0**					
1.4.5.2.1	Removal of existing HVPS	ea	1	eu	500	**0.5**	0	0	0	ee	80.23	**0.0**	**0.5**					
1.4.5.2.1.1	Electrician	ea	0	eu	0	**0.0**	2	4	8	el	52.88	**0.4**	**0.4**					
1.4.5.2.1.2	Riggers	ea	1	eu	200	**0.2**	3	4	12	rg	48.95	**0.6**	**0.8**					
1.4.5.2.1.3	Transport to B27	ea	1	eu	500	**0.5**	0	0	0	ee	80.23	**0.0**	**0.5**					
1.4.5.2.2	Install new HVPS	ea	0	eu	0	**0.0**	1	8	8	ee	80.23	**0.6**	**0.6**					
1.4.5.2.2.1	Riggers	ea	1	eu	200	**0.2**	3	4	12	rg	48.95	**0.6**	**0.8**					
1.4.5.2.2.2	Electrician	ea	1	eu	4000	**4.0**	2	160	320	el	52.88	**16.9**	**20.9**					
1.4.5.2.2.3	Electronic Installation Tech	ea	1	eu	1000	**1.0**	1	60	60	ei	48.28	**2.9**	**3.9**					
1.4.5.2.2.4	Electronic Maintenance Tech	ea	0	eu	0	**0.0**	1	40	40	em	48.28	**1.9**	**1.9**					
1.4.5.3	Final Amplifier/Transmitter w/Controller	ea	1	bq 2004	173500	**173.5**	0	0	0	ee	80.23	**0.0**	**173.5**					
1.4.5.3.1	IOT Power Tube w/Amplifier Circuit	ea	1	eu	65000	**65.0**	0	0	0	ee	80.23	**0.0**	**65.0**					
1.4.5.3.2	Removal of existing Transmitter	ea	0	eu	0	**0.0**	1	16	16	ee	80.23	**1.3**	**1.3**					
1.4.5.3.2.1	Electrician	ea	0	eu	0	**0.0**	2	8	16	el	52.88	**0.8**	**0.8**					
1.4.5.3.2.2	Electronic Installation Tech	ea	0	eu	0	**0.0**	2	8	16	el	52.88	**0.8**	**0.8**					
1.4.5.3.2.3	Riggers	ea	1	eu	200	**0.2**	3	4	12	rg	48.95	**0.6**	**0.8**					
1.4.5.3.2.4	Transport to B27	ea	1	eu	500	**0.5**	0	0	0	ee	80.23	**0.0**	**0.5**					
1.4.5.3.3	Install Transmitter on B6 Floor for pre-commission testing w/HVPS	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.4.5.3.3.1	Riggers	ea	1	eu	200	**0.2**	3	4	12	rg	48.95	**0.6**	**0.8**					
1.4.5.3.3.2	Electrician	ea	1	eu	4500	**4.5**	2	16	32	el	52.88	**1.7**	**6.2**					
1.4.5.3.3.3	Electronic Installation Tech	ea	1	eu	1000	**1.0**	2	40	80	ei	48.28	**3.9**	**4.9**					
1.4.5.3.3.4	Electronic Maintenance Tech	ea	0	eu	0	**0.0**	2	12	24	em	48.28	**1.2**	**1.2**					
1.4.5.3.3.5	Testing	ea	0	eu	0	**0.0**	2	60	120	ee	80.23	**9.6**	**9.6**					
1.4.5.3.4	Install new Transmitter	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.4.5.3.4.1	Riggers	ea	1	eu	200	**0.2**	3	4	12	rg	48.95	**0.6**	**0.8**					
1.4.5.3.4.2	Electrician	ea	1	eu	1500	**1.5**	2	24	48	el	52.88	**2.5**	**4.0**					
1.4.5.3.4.3	Electronic Installation Tech	ea	1	eu	3000	**3.0**	2	40	80	ei	48.28	**3.9**	**6.9**					
1.4.5.3.4.4	Electronic Maintenance Tech	ea	0	eu	0	**0.0**	2	12	24	em	48.28	**1.2**	**1.2**					
1.4.5.3.4.5	Testing	ea	0	eu	0	**0.0**	2	24	48	ee	80.23	**3.9**	**3.9**					
1.4.5.4	RF Cavity Window	ea	1	eu	50000	**50.0**	1	32	32	ee	80.23	**2.6**	**52.6**					
1.4.5.4.1	Titanium Nitride Coating	ea	2	eu	500	**1.0**	1	88	88	ec	69.74	**6.1**	**7.1**					
1.4.5.1.1	RBS Measurements	ea	2	eu	1000	**2.0**	1	2	2	ec	69.74	**0.1**	**2.1**					
1.4.5.4.2	Power Test/Condition	ea	2	eu	0	**0.0**	1	60	60	ec	69.74	**4.2**	**4.2**					
1.4.5.4.2.1	Vacuum Tech	ea	2	eu	350	**0.7**	2	16	32	mua	48.40	**1.5**	**2.2**					

1.4.5.5	RF Transmission Line	ea	0	eu	0	**0.0**	1	32	32	ee	80.23	**2.6**	**2.6**					
1.4.5.5.1	6 1/8" Coaxial Line	ea	60	ft	120	**7.2**	0	0	0	ee	80.23	**0.0**	**7.2**					
1.4.5.5.2	6 1/8" Coax Elbows	ea	6	eu	1300	**7.8**	0	0	0	ee	80.23	**0.0**	**7.8**					
1.4.5.5.3	6 1/8" to 4 1/16" Adapters	ea	2	eu	2000	**4.0**	0	0	0	ee	80.23	**0.0**	**4.0**					
1.4.5.5.4	WR1800 to 4 1/16" Adapter	ea	1	eu	2500	**2.5**	0	0	0	ee	80.23	**0.0**	**2.5**					
1.4.5.5.5	6 1/8" Coaxial SPDT Switch	ea	1	bq 2004	6800	**6.8**	0	0	0	ee	80.23	**0.0**	**6.8**					
1.4.5.5.6	6 1/8" 75kW Water Cooled RF Loads	ea	2	bq 2004	4743	**9.5**	0	0	0	ee	80.23	**0.0**	**9.5**					
1.4.5.5.7	WR1800 Split Wave Guide Section	ea	1	shop	10000	**10.0**	0	0	0	ee	80.23	**0.0**	**10.0**					
1.4.5.5.8	6 1/8" Coax Hangers & Accesseries	lot	1	eu	2500	**2.5**	1	48	48	ec	69.74	**3.3**	**5.8**					
1.4.5.5.9	Transmission Line Installation	ea	1	eu	0	**0.0**	2	40	80	mui	48.40	**3.9**	**3.9**					
1.4.5.6	Controls & Interlocks	ea	0	eu	0	**0.0**	1	180	180	ee	80.23	**14.4**	**14.4**					
1.4.5.6.1	PLC, Master xmtr Controller, SIL 3	ea	1	eu	34500	**34.5**	1	160	160	cp	87.78	**14.0**	**48.5**					
1.4.5.6.2	Analog Cards	ea	6	eu	800	**4.8**	0	0	0	cp	87.78	**0.0**	**4.8**					
1.4.5.6.3	Boolean Cards	ea	6	eu	400	**2.4**	0	0	0	cp	87.78	**0.0**	**2.4**					
1.4.5.6.4	Backplanes	ea	2	eu	400	**0.8**	0	0	0	cp	87.78	**0.0**	**0.8**					
1.4.5.6.5	Local CPU & Display	ea	1	eu	7000	**7.0**	1	160	160	cp	87.78	**14.0**	**21.0**					
1.4.5.6.6	Electronic Installation Tech	ea	1	eu	5000	**5.0**	2	80	160	ei	48.28	**7.7**	**12.7**					
1.4.5.6.7	Electronic Maintenance Tech	ea	0	eu	0	**0.0**	2	20	40	em	48.28	**1.9**	**1.9**					
1.4.5.6.8	Testing	ea	0	eu	0	**0.0**	2	16	32	ec	69.74	**2.2**	**2.2**					
1.4.5.6.7	Cooling System Instrumentation	ea	1	eu	6000	**6.0**	1	48	48	ei	48.28	**2.3**	**8.3**					
1.4.5.7	Utilities	ea	0	eu	0	**0.0**	1	16	16	ee	80.23	**1.3**	**1.3**					
1.4.5.7.1	Coordination	ea	0	eu	0	**0.0**	1	40	40	ec	69.74	**2.8**	**2.8**					
1.4.5.7.2	480VAC Panel Upgrade	ea	1	eu	3000	**3.0**	2	16	32	el	52.88	**1.7**	**4.7**					
1.4.5.7.3	LCW Cooling Upgrade	ea	1	eu	1500	**1.5**	1	60	60	pb	53.99	**3.2**	**4.7**					
1.4.5.8	Structure Core Drilling	ea	0	eu	0	**0.0**	1	8	8	ec	69.74	**0.6**	**0.6**					
1.4.5.8.1	Enlarge roof penetration for RF feed	ea	1	eu	1200	**1.2**	0	0	0	ee	80.23	**0.0**	**1.2**					
1.4.5.8.2	Add new penetration for circ cooling	ea	1	eu	1000	**1.0**	0	0	0	ee	80.23	**0.0**	**1.0**					
1.4.5.9	Spares	ea	0	eu	0	**0.0**	0	0	0	ee	80.23	**0.0**	**0.0**					
1.4.5.9.1	Spare IOT Tube	ea	1	bq 2004	35000	**35.0**	0	0	0	ee	80.23	**0.0**	**35.0**					
1.4.5.9.2	Spare Class A Drive Amplifier	ea	1	bq 2004	20000	**20.0**	0	0	0	ee	80.23	**0.0**	**20.0**					
1.4.5.9.3	Spare RF Cavity Window	ea	1	bq 2004	50000	**50.0**	0	0	0	ee	80.23	**0.0**	**50.0**					
1.4.5.9.4	Misc Spare Parts	lot	1	eu	20000	**20.0**	0	0	0	ee	80.23	**0.0**	**20.0**					
1.4.5.10	Radiation Protection																	
1.4.5.10.1	RSS Chassis	ea	2	eu	3000	**6.0**	1	180	180	ei	48.28	**8.7**	**14.7**					
1.4.5.10.2	X -Connects	ea	0	eu	0	**0.0**	1	40	40	ei	48.28	**1.9**	**1.9**					
1.4.5.10.3	Debug and Test	ea	0	eu	0	**0.0**	1	50	50	ec	69.74	**3.5**	**3.5**					
		ea	0	eu	0	**0.0**	1	40	40	em	48.28	**1.9**	**1.9**					
1.4.6	Diagnostics					**197.7**						**159.7**	**357.4**	**51.9**	**409.3**	**25%**	**102.3**	**511.6**
1.4.6.1	EDI																	
1.4.6.1.1	Bunch Cleaning Kicker System EDI	ea	0	eu	0	**0.0**	1	320	320	see	107.12	**34.3**	**34.3**					
		ea	0	eu	0	**0.0**	1	320	320	ee	80.23	**25.7**	**25.7**					
1.4.6.1.2	Bunch Cleaning Vertical Scraper EDI	ea	0	eu	0	**0.0**	1	72	72	me	70.49	**5.1**	**5.1**					
1.4.6.2	Hardware																	
1.4.6.2.1	Orbit Montitoring System																	
1.4.6.2.1.1	Bergoz Boards	ea	14	eu	5000	**70.0**	0	0	0	ma	73.18	**0.0**	**70.0**					
1.4.6.2.2	Transverse Tune Measurement System																	
1.4.6.2.2.1	Kicker Fabrication	ea	1	eu	10000	**10.0**	1	550	550	ma	73.18	**40.2**	**50.2**					
1.4.6.2.2.2	Oscilloscope	ea	1	eu	35000	**35.0**	0	0	0	ma	73.18	**0.0**	**35.0**					
1.4.6.2.2.3	Installation	ea	0	eu	0	**0.0**	1	60	60	ei	48.28	**2.9**	**2.9**					
		ea	0	eu	0	**0.0**	1	60	60	ma	73.18	**4.4**	**4.4**					
1.4.6.3	Bunch Cleaning																	

	1.4.6.3.1	Kicker System																		
	1.4.6.3.1.1	Kicker Fabrication	ea	1	eu	10000	**10.0**	1	550	550	ma	73.18	**40.2**	**50.2**					
	1.4.6.3.1.2	Amplifier	ea	1	eu	35000	**35.0**	0	0	0	ee	80.23	**0.0**	**35.0**					
	1.4.6.3.1.3	Function Generator	ea	1	eu	25000	**25.0**	0	0	0	ee	80.23	**0.0**	**25.0**					
	1.4.6.3.1.4	Misc Components	ea	1	eu	10000	**10.0**	0	0	0	ee	80.23	**0.0**	**10.0**					
	1.4.6.3.1.5	Installation	ea	0	eu	0	**0.0**	1	60	60	ei	48.28	**2.9**	**2.9**					
	1.4.6.3.2	Vertical Scraper																		
	1.4.6.3.2.1	Limit Switches and Brackets	ea	2	eu	200	**0.4**	1	8	8	ms	69.90	**0.6**	**1.0**					
	1.4.6.3.2.2	Tungston Scraper	ea	1	eu	250	**0.3**	1	6	6	ms	69.90	**0.4**	**0.7**					
	1.4.6.3.2.3	Scraper Mount and Hardware	ea	1	eu	100	**0.1**	1	8	8	ms	69.90	**0.6**	**0.7**					
	1.4.6.3.2.4	Spool Piece	ea	1	eu	100	**0.1**	1	8	8	ms	69.90	**0.6**	**0.7**					
	1.4.6.3.2.5	Misc Components	ea	1	eu	1800	**1.8**	0	0	0	ei	48.28	**0.0**	**1.8**					
	1.4.6.3.2.6	Installation	ea	0	eu	0	**0.0**	1	40	40	mu	48.40	**1.9**	**1.9**					
1.4.7		Bump Magnets					**5.6**						**3.4**	**8.9**	**1.2**	**10.2**	**25%**	**2.5**	**12.7**
1.4.7.1		EDI Electronic I/O	ea	0	eu	0	**0.0**	1	20	20	ee	80.23	**1.6**	**1.6**					
			ea	0	eu	0	**0.0**	1	20	20	ec	69.74	**1.4**	**1.4**					
1.4.7.2		Power Supply Spare	ea	1	eu	2500	**2.5**	1	2	2	ec	69.74	**0.1**	**2.6**					
1.4.7.3		Caps - 20% Spares	ea	77	eu	31.56	**2.4**	1	2	2	mu	48.40	**0.1**	**2.5**					
1.4.7.4		SCR Spares	ea	3	eu	207	**0.6**	1	2	2	ec	69.74	**0.1**	**0.8**					
1.5		**BTS**					**225.2**						**90.2**	**315.3**	**40.2**	**355.5**	**22%**	**77.0**	**432.5**
1.5.1		EDI					**0.0**						**40.0**	**40.0**	**8.2**	**48.3**	**25%**	**12.1**	**60.3**
1.5.1.1		Synchrotron Radiation Monitors EDI	ea	0	eu	0	**0.0**	1	128	128	md	65.68	**8.4**	**8.4**					
			ea	0	eu	0	**0.0**	1	16	16	me	70.49	**1.1**	**1.1**					
1.5.1.2		Beam Stopper for Injection Tune Up EDI	ea	0	eu	0	**0.0**	1	76	76	md	65.68	**5.0**	**5.0**					
			ea	0	eu	0	**0.0**	1	4	4	me	70.49	**0.3**	**0.3**					
1.5.1.3		B1 - B4 Bend Power Supplies EDI	ea	0	eu	0	**0.0**	1	30	30	ee	80.23	**2.4**	**2.4**					
1.5.1.4		Double Sided Collimators EDI	ea	0	eu	0	**0.0**	1	8	8	me	70.49	**0.6**	**0.6**					
			ea	0	eu	0	**0.0**	1	192	192	md	65.68	**12.6**	**12.6**					
1.5.1.4		Beam Intensity Monitor EDI	ea	1	eu	1	**0.0**	1	120	120	ee	80.23	**9.6**	**9.6**					
1.5.2		Diagnostics					**12.0**						**10.2**	**22.2**	**3.3**	**25.4**	**25%**	**6.4**	**31.8**
1.5.2.1		Synchrotron Radiation Monitors																	
	1.5.2.1.1	B1 Monitor																	
	1.5.2.1.1.1	Fabrication	ea	1	eu	1000	**1.0**	1	16	16	ms	69.90	**1.1**	**2.1**					
	1.5.2.1.1.2	Installation	ea	0	eu	0	**0.0**	1	32	32	mu	48.40	**1.5**	**1.5**					
	1.5.2.1.2	B3 Monitor																	
	1.5.2.1.2.1	Limit Switches and Brackets	ea	2	eu	200	**0.4**	1	8	8	ms	69.90	**0.6**	**1.0**					
	1.5.2.1.2.2	Mirror Mount	ea	1	eu	100	**0.1**	1	4	4	ms	69.90	**0.3**	**0.4**					
	1.5.2.1.2.3	Mirror	ea	1	eu	150	**0.2**	0	0	0	ee	80.23	**0.0**	**0.2**					
	1.5.2.1.2.4	Spool Piece	ea	1	eu	100	**0.1**	1	16	16	ms	69.90	**1.1**	**1.2**					
	1.5.2.1.2.5	Camera Mount	ea	1	eu	50	**0.1**	1	8	8	ms	69.90	**0.6**	**0.6**					
	1.5.2.1.2.6	Camera and Optics	ea	1	eu	5000	**5.0**	0	0	0	ee	80.23	**0.0**	**5.0**					
	1.5.2.1.2.7	Relocate and Modify Supports	ea	1	eu	100	**0.1**	1	16	16	mu	48.40	**0.8**	**0.9**					
	1.5.2.1.2.8	Installation	ea	1	eu	50	**0.1**	1	48	48	mu	48.40	**2.3**	**2.4**					
	1.5.2.1.3	Beam Intensity Monitor	ea	1	eu	5000	**5.0**	1	40	40	ei	48.28	**1.9**	**6.9**					
1.5.3		Beam Stopper for Injection Tune Up					**3.9**						**6.2**	**10.1**	**1.7**	**11.8**	**25%**	**2.9**	**14.7**
1.5.3.1		Limit Switches and Brackets	ea	2	eu	200	**0.4**	1	16	16	ms	69.90	**1.1**	**1.5**					
1.5.3.2		Mod Pneumatic Linear Feedthrough	ea	0	eu	0	**0.0**	1	8	8	ms	69.90	**0.6**	**0.6**					
			ea	0	eu	0	**0.0**	1	8	8	ma	73.18	**0.6**	**0.6**					
1.5.3.3		Tungston Stop	ea	1	eu	1500	**1.5**	1	16	16	ms	69.90	**1.1**	**2.6**					
1.5.3.4		Stop Mounting Brackets	ea	1	eu	250	**0.3**	1	16	16	ms	69.90	**1.1**	**1.4**					
1.5.3.5		Spool Piece	ea	1	eu	100	**0.1**	1	8	8	ms	69.90	**0.6**	**0.7**					
1.5.3.6		Misc Components	ea	1	eu	1600	**1.6**	0	0	0	ms	69.90	**0.0**	**1.6**					
1.5.3.7		Installation	ea	1	eu	50	**0.1**	1	24	24	mu	48.40	**1.2**	**1.2**					
1.5.4		B1 - B4 Bend Power Supplies					**200.0**						**15.9**	**215.9**	**22.5**	**238.3**	**20%**	**47.7**	**286.0**
1.5.4.1		Procurement	ea	4	eu	50000	**200.0**	0	0	0	ee	80.23	**0.0**	**200.0**					

1.5.4.2	Installation	ea	0	eu	0	**0.0**	4	10	40	ei	48.28	**1.9**	**1.9**					
		ea	0	eu	0	**0.0**	16	6	96	rg	48.95	**4.7**	**4.7**					
		ea	0	eu	0	**0.0**	4	4	16	mu	48.40	**0.8**	**0.8**					
		ea	0	eu	0	**0.0**	4	40	160	el	52.88	**8.5**	**8.5**					
1.5.5	Double Sided Collimators					**9.3**						**17.9**	**27.2**	**4.6**	**31.7**	**25%**	**7.9**	**39.7**
1.5.5.1	Stepper Motor Option 3	ea	4	eu	860	**3.4**	0	0	0	ee	80.23	**0.0**	**3.4**					
1.5.5.2	Limit Switches and Brackets	ea	8	eu	200	**1.6**	1	32	32	ms	69.90	**2.2**	**3.8**					
1.5.5.3	Modify Linear Feedthrough	ea	0	eu	0	**0.0**	1	32	32	ms	69.90	**2.2**	**2.2**					
1.5.5.4	Scraper Mount and Hardware	ea	4	eu	100	**0.4**	1	24	24	ms	69.90	**1.7**	**2.1**					
1.5.5.5	Spool Piece	ea	0	eu	0	**0.0**	1	16	16	ms	69.90	**1.1**	**1.1**					
1.5.5.6	Tee Reducer	ea	2	eu	100	**0.2**	1	16	16	ms	69.90	**1.1**	**1.3**					
1.5.5.7	Modify Yellow Guards	ea	0	eu	0	**0.0**	1	16	16	ms	69.90	**1.1**	**1.1**					
1.5.5.8	Misc Components	ea	1	eu	3620	**3.6**	0	0	0	ee	80.23	**0.0**	**3.6**					
1.5.5.9	Installation	ea	1	eu	50	**0.1**	1	104	104	ee	80.23	**8.3**	**8.4**					
1.6	**Storage Ring**					**263.5**						**328.5**	**592.0**	**93.0**	**685.0**	**21%**	**144.3**	**829.3**
1.6.1	Bump Magnets					**0.0**						**4.5**	**4.5**	**0.9**	**5.4**	**25%**	**1.4**	**6.8**
1.6.1.1	EDI	ea	0	eu	0	**0.0**	1	30	30	ee	80.23	**2.4**	**2.4**					
		ea	0	eu	0	**0.0**	1	30	30	ec	69.74	**2.1**	**2.1**					
1.6.1.3	Power Supplies	ea	0	eu	76800	**0.0**	0	20	0	em	48.28	**0.0**	**0.0**					
1.6.1.3.1	Installation	ea	0	eu	0	**0.0**	0	40	0	ei	48.28	**0.0**	**0.0**					
1.6.2	Thin Septum Magnet					**6.1**						**7.2**	**13.3**	**2.1**	**15.3**	**25%**	**3.8**	**19.2**
1.6.2.1	EDI	ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.6.2.3	Power Supplies - KSI Replacement	ea	1	eu	3300	**3.3**	1	2	2	ec	69.74	**0.1**	**3.4**					
1.6.2.3.1	Build New PS Interface & Upgrade Glassma	ea	1	eu	250	**0.3**	1	80	80	ei	48.28	**3.9**	**4.1**					
1.6.2.3.2	Replacement Capacitors	ea	10	eu	250	**2.5**	0	0	0	ee	80.23	**0.0**	**2.5**					
1.6.3	Thick Septum Magnet					**6.1**						**8.9**	**15.0**	**2.4**	**17.4**	**25%**	**4.4**	**21.8**
1.6.3.1	EDI	ea	0	eu	0	**0.0**	1	20	20	ee	80.23	**1.6**	**1.6**					
		ea	0	eu	0	**0.0**	1	20	20	ec	69.74	**1.4**	**1.4**					
1.6.3.3	Power Supplies - KSI Replacement	ea	1	eu	3300	**3.3**	1	2	2	ec	69.74	**0.1**	**3.4**					
1.6.3.3.1	Build New PS Interface & Upgrade Glassma	ea	1	eu	250	**0.3**	1	80	80	ei	48.28	**3.9**	**4.1**					
1.6.3.3.2	Replacement Capacitors	ea	10	eu	250	**2.5**	1	40	40	ei	48.28	**1.9**	**4.4**					
1.6.4	Radiation Protection					**175.9**						**286.4**	**462.3**	**75.9**	**538.2**	**20%**	**107.6**	**645.9**
1.6.4.1	Collimation System - Vertical Scraper																	
1.6.4.1.1	Limit Switches and Brackets	ea	12	eu	200	**2.4**	1	72	72	ms	69.90	**5.0**	**7.4**					
1.6.4.1.2	Component Fabrication	ea	6	eu	500	**3.0**	1	540	540	ms	69.90	**37.7**	**40.7**					
1.6.4.1.3	Misc. Components	ea	6	eu	917	**5.5**	0	0	0	ee	80.23	**0.0**	**5.5**					
1.6.4.1.4	Assemble and Test	ea	0	eu	0	**0.0**	1	180	180	mu	48.40	**8.7**	**8.7**					
1.6.4.1.5	Installation	ea	6	eu	50	**0.3**	1	108	108	ee	80.23	**8.7**	**9.0**					
1.6.4.2	Injection Interlock																	
1.6.4.2.1	SR Current Monitoring																	
1.6.4.2.1.1	RSS Chassis	ea	2	eu	5000	**10.0**	1	120	120	ei	48.28	**5.8**	**15.8**					
1.6.4.2.1.2	Installation	ea	0	eu	0	**0.0**	1	80	80	el	52.88	**4.2**	**4.2**					
1.6.4.2.1.3	Debug and Test	ea	0	eu	0	**0.0**	1	40	40	ec	69.74	**2.8**	**2.8**					
		ea	0	eu	0	**0.0**	1	40	40	em	48.28	**1.9**	**1.9**					
1.6.4.2.2	Injection System Upgrades																	
1.4.5.2.2.1	RSS Chassis	ea	2	eu	4000	**8.0**	1	160	160	ei	48.28	**7.7**	**15.7**					
1.4.5.2.2.2	Installation	ea	0	eu	0	**0.0**	1	100	100	ei	48.28	**4.8**	**4.8**					
		ea	0	eu	0	**0.0**	1	40	40	el	52.88	**2.1**	**2.1**					
1.4.5.2.2.3	Debug and Test	ea	0	eu	0	**0.0**	1	40	40	ec	69.74	**2.8**	**2.8**					
		ea	0	eu	0	**0.0**	1	20	20	ec	69.74	**1.4**	**1.4**					
1.6.4.2.3	Injection Energy Monitoring																	
1.6.4.2.3.1	DanPhysics	ea	2	eu	15000	**30.0**	0	0	0	ec	69.74	**0.0**	**30.0**					
1.6.4.2.3.2	RSS Chassis	ea	2	eu	2000	**4.0**	1	120	120	ei	48.28	**5.8**	**9.8**					

1.6.4.2.3.3	Installation	ea	0	eu	0	**0.0**	1	80	80	el	52.88	**4.2**	**4.2**					
1.6.4.2.3.4	Debug and Test	ea	0	eu	0	**0.0**	1	40	40	ec	69.74	**2.8**	**2.8**					
		ea	0	eu	0	**0.0**	1	20	20	em	48.28	**1.0**	**1.0**					
1.6.4.2.4	Extraction Trigger Inhibit																	
1.6.4.2.4.1	RSS Chassis	ea	1	eu	6000	**6.0**	1	80	80	ei	48.28	**3.9**	**9.9**					
1.6.4.2.4.2	Installation	ea	0	eu	0	**0.0**	1	80	80	el	52.88	**4.2**	**4.2**					
1.6.4.2.4.3		ea	0	eu	0	**0.0**	1	20	20	em	48.28	**1.0**	**1.0**					
		ea	0	eu	0	**0.0**	1	20	20	em	48.28	**1.0**	**1.0**					
1.6.4.3	Beamline/Shutter Interlock	ea	0	eu	0	**0.0**	0	0	0	ee	80.23	**0.0**	**0.0**					
1.6.4.3.1	Radiation Monitors, Detectors	ea	4	eu	2700	**10.8**	0	0	0	ee	80.23	**0.0**	**10.8**					
1.6.4.3.2	Radiation Monitors, Controllers	ea	28	eu	1300	**36.4**	0	0	0	ee	80.23	**0.0**	**36.4**					
1.6.4.3.3	RSS Chassis	ea	14	eu	3000	**42.0**	1	800	800	ei	48.28	**38.6**	**80.6**					
1.6.4.3.4	Installation	ea	0	eu	0	**0.0**	1	300	300	el	52.88	**15.9**	**15.9**					
1.6.4.3.5	Debug and Test	ea	0	eu	0	**0.0**	1	10	10	ec	69.74	**0.7**	**0.7**					
		ea	0	eu	0	**0.0**	1	60	60	em	48.28	**2.9**	**2.9**					
1.6.4.4	EDI																	
1.6.4.4.1	SR Current Monitoring EDI	ea	0	eu	0	**0.0**	1	160	160	ec	69.74	**11.2**	**11.2**					
		ea	0	eu	0	**0.0**	1	120	120	ee	80.23	**9.6**	**9.6**					
1.6.4.4.2	Injection System Upgrade EDI	ea	0	eu	0	**0.0**	1	400	400	ec	69.74	**27.9**	**27.9**					
1.6.4.4.3	Injection Energy Monitoring EDI	ea	0	eu	0	**0.0**	1	160	160	ec	69.74	**11.2**	**11.2**					
		ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.6.4.4.4	Extraction Trigger Inhibit EDI	ea	0	eu	0	**0.0**	1	120	120	ec	69.74	**8.4**	**8.4**					
		ea	0	eu	0	**0.0**	1	40	40	ee	80.23	**3.2**	**3.2**					
1.6.4.4.5	Beamline Upgrade EDI	ea	0	eu	0	**0.0**	1	360	360	ec	69.74	**25.1**	**25.1**					
1.6.4.4.6	Vertical Scrapers EDI	ea	0	eu	0	**0.0**	1	8	8	me	70.49	**0.6**	**0.6**					
		ea	0	eu	0	**0.0**	1	160	160	md	65.68	**10.5**	**10.5**					
1.6.4.5	Temporary Rad Shileding for Testing	ea	2	eu	5000	**10.0**	0	0	0	md	65.68	**0.0**	**10.0**					
		ea	1	eu	7500	**7.5**	0	0	0	md	65.68	**0.0**	**7.5**					
1.6.6	Diagnostics					**75.5**						**21.4**	**96.9**	**11.7**	**108.6**	**25%**	**27.1**	**135.7**
1.6.6.1	Storage Ring Bunch Purity Monitor																	
1.6.6.1.1	Detector	ea	1	eu	8000	**8.0**	0	0	0	ee	80.23	**0.0**	**8.0**					
1.6.6.1.2	Discriminator	ea	1	eu	4000	**4.0**	0	0	0	ee	80.23	**0.0**	**4.0**					
1.6.6.1.3	Time to Amplitude Converter	ea	1	eu	8000	**8.0**	0	0	0	ee	80.23	**0.0**	**8.0**					
1.6.6.1.4	Multi-Channel Analyzer	ea	1	eu	8000	**8.0**	0	0	0	ee	80.23	**0.0**	**8.0**					
1.6.6.1.5	Misc Components	ea	1	eu	4000	**4.0**	0	0	0	ee	80.23	**0.0**	**4.0**					
1.6.6.2	X-Ray Option																	
1.6.6.2.1	EDI	ea	0	eu	0	**0.0**	1	70	70	md	65.68	**4.6**	**4.6**					
1.6.6.2.2	X-Ray Port	ea	1	eu	2500	**2.5**	1	35	35	mu	48.40	**1.7**	**4.2**					
1.6.6.2.3	Installation	ea	0	eu	0	**0.0**	1	180	180	mu	48.40	**8.7**	**8.7**					
1.6.6.3	Storage Ring Cleaning System Upgrade																	
1.6.6.3.1	Function Generator	ea	1	eu	25000	**25.0**	0	0	0	mu	48.40	**0.0**	**25.0**					
1.6.6.4	Bunch By Bunch Current Monitor																	
1.6.6.4.1	EDI	ea	0	eu	0	**0.0**	1	80	80	ee	80.23	**6.4**	**6.4**					
1.6.6.4.2	Oscillosope	ea	1	eu	15000	**15.0**	0	0	0	mu	48.40	**0.0**	**15.0**					
1.6.6.4.3	Misc Components	ea	1	eu	1000	**1.0**	0	0	0	mu	48.40	**0.0**	**1.0**					
1.7	**Controls and Timing**					**217.3**						**389.1**	**606.4**	**101.0**	**707.4**	**30%**	**214.3**	**921.7**
1.7.1	User Gateing Signal					**31.0**						**124.4**	**155.4**	**28.6**	**184.0**	**25%**	**46.0**	**230.0**
1.7.1.1	EDI	ea	0	eu	0	**0.0**	1	150	150	ee	80.23	**12.0**	**12.0**					
		ea	0	eu	0	**0.0**	1	320	320	ee	80.23	**25.7**	**25.7**					
1.7.1.2	Head End Unit	ea	1	eu	1000	**1.0**	1	56	56	ee	80.23	**4.5**	**5.5**					
1.7.1.3	Distribution Chassis	ea	12	eu	500	**6.0**	12	24	288	ei	48.28	**13.9**	**19.9**					
		ea	0	eu	0	**0.0**	12	4	48	el	52.88	**2.5**	**2.5**					
1.7.1.4	User Chassis	ea	48	eu	500	**24.0**	48	24	1152	ei	48.28	**55.6**	**79.6**					
		ea	0	eu	0	**0.0**	48	4	192	el	52.88	**10.2**	**10.2**					
1.7.2	Linac and Booster Timing					**1.0**						**27.0**	**28.0**	**5.7**	**33.7**	**20%**	**6.7**	**40.4**
1.7.2.1	EDI	ea	0	eu	0	**0.0**	1	80	80	ee	80.23	**6.4**	**6.4**					

				ea	0	eu	0	**0.0**	1	240	240	ec	69.74	**16.7**	**16.7**					
	1.7.2.2		Fabricate Modules	ea	2	eu	500	**1.0**	1	80	80	ei	48.28	**3.9**	**4.9**					
1.7.3			Controls					**184.3**						**223.6**	**407.9**	**63.8**	**471.7**	**33%**	**155.6**	**627.3**
	1.7.3.1		IOCs																	
		1.7.3.1.1	Booster Digital PS Controls/Diagnostics	ea	1		24660	**24.7**	**2**	8	16	cp	87.78	**1.4**	**26.1**					
					0		0	**0.0**	**1**	4	4	ec	69.74	**0.3**	**0.3**					
					0		0	**0.0**	**1**	4	4	ei	48.28	**0.2**	**0.2**					
		1.7.3.1.2	Booster Small Magnet Controls/BPMs	ea	4		24660	**98.6**	2	8	16	cp	87.78	**1.4**	**100.0**					
				ea	0		0	**0.0**	1	80	80	ec	69.74	**5.6**	**5.6**					
				ea	0		0	**0.0**	1	40	40	ei	48.28	**1.9**	**1.9**					
		1.7.3.1.3	Booster Scraper control (vme)	ea	1		7700	**7.7**	2	8	16	cp	87.78	**1.4**	**9.1**					
		1.7.3.1.4	Booster RF	ea	1		15080	**15.1**	2	8	16	cp	87.78	**1.4**	**16.5**					
		1.7.3.1.5	BTS Collimator (vme)	ea	1		7700	**7.7**	2	8	16	cp	87.78	**1.4**	**9.1**					
		1.7.3.1.6	SR Collimator controls (vme)	ea	2		7700	**15.4**	2	8	16	cp	87.78	**1.4**	**16.8**					
	1.7.3.2		Develop Digital PS Control Specifications	ea	0		0	**0.0**	2	40	80	cp	87.78	**7.0**	**7.0**					
	1.7.3.3		Develop Digital PS Controls	ea	0		0	**0.0**	6	40	240	cp	87.78	**21.1**	**21.1**					
	1.7.3.4		Digital PS Control Prototype/Spare	ea	1		15000	**15.0**	0	0	0	cp	87.78	**0.0**	**15.0**					
	1.7.3.5		Software Ramping	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
	1.7.3.6		CR Applications																	
		1.7.3.6.1	Booster RF Control	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.2	Booster Tuneup	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.3	Booster Bunch Cleaning	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.4	Booster Scraper Control	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.5	Booster BPM Display	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.6	Booster Current Monitor	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.7	BTS Synchrotron Light Monitor	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.8	SR Collimator Controls	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.9	Radiation Monitoring (Upgrade)	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
		1.7.3.6.10	Linac BIM	ea	1		150	**0.2**	3	40	120	cp	87.78	**10.5**	**10.7**					
		1.7.3.6.11	SR Bunch by Bunch Current Monitor	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
	1.7.3.7		Documentation	ea	0		0	**0.0**	4	40	160	cp	87.78	**14.0**	**14.0**					
1.7.4			RF Controls					**1.0**						**14.0**	**15.0**	**3.0**	**18.0**	**33%**	**6.0**	**24.0**
	1.7.4.1		Transmitter IFC	ea	1		500	**0.5**	2	40	80	cp	87.78	**7.0**	**7.5**					
	1.7.4.2		Interlock Chassis IFC	ea	1		500	**0.5**	2	40	80	cp	87.78	**7.0**	**7.5**					
1.8			**Commissioning and Start Up**					**0.0**						**22.5**	**22.5**	**4.6**	**27.1**	**10%**	**2.7**	**29.8**
1.8.1			Commissioning - Start Up	ea	0		0	**0.0**	6	40	240	ap	93.65	**22.5**	**22.5**					