

Muon Campus AIP

Change Request Form

CR#:DR011

1) DATE: 10/7/15

2) WBS: DR1

3) Originator: Ken Domann

4) WBS Description of Primary Affected Tasks: Delivery Ring AIP

5) Technical Description & Primary Motivation for Change: This change is necessitated by additional work determined to be necessary to construct the pulsed magnetic septa power supplies as well as constructing the BPM system.

The original plan for the pulse septa power supplies was to build supplies that were similar to the Booster pulsed septa. Many of the parts needed for that plan were no longer available so additional engineering was done. The new design calls for more man power for construction and for testing than was called for in the original design.

A more careful examination of the work to construct the Delivery Ring BPM system has determined that more labor is required than originally estimated. Most of the additional work involves modifying the transition boards to be sensitive to the beam structure that will be seen in the Delivery Ring.

The change to the Delivery Ring budget is an increase of \$385,125 with a corresponding decrease in contingency.

6) Assessment of Cost Impact (Use attachments if needed): See attached.

7) Assessment of Schedule Impact (Use attachments if needed): See attached. No impact to any interface milestones.

8) Secondary Impact & Other Comments: N/A

9) Approvals:

AIP Project Manager:

Gerald Annala

Date: 10/8/15

AIP Project Coordinator:

Marie

Date: 10/8/15

AD Div Director:

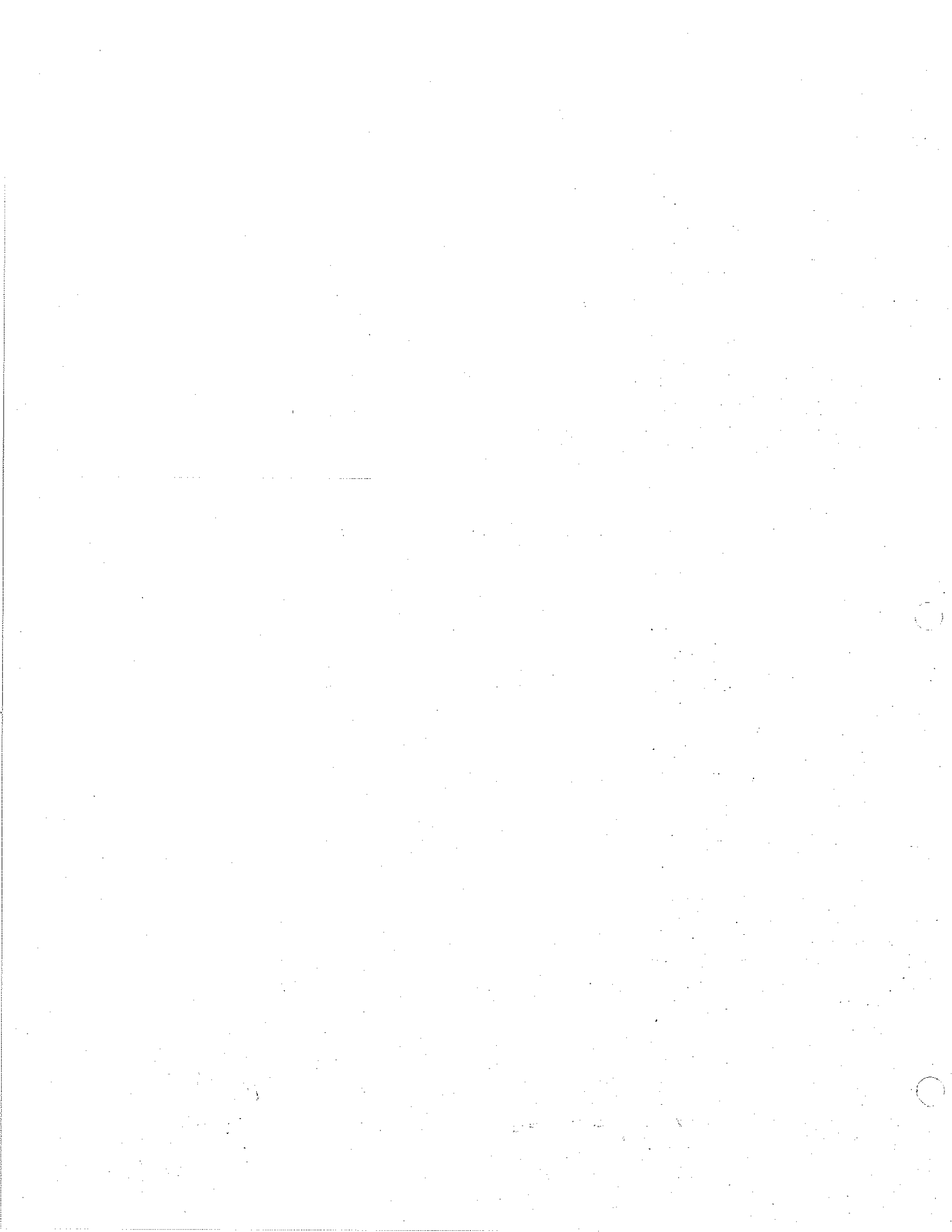
S. Nagar

Date: 10/8/15

Directorate:

S. Nagar

Date: 10/8/15



Delivery Log CR011
Labor Changes

UID	WBS	Name	Old Hours	New Hours	Delta Hours	Comments
1	DR1	Delivery Ring AIP	30667	34307	3640	
69	DR1.05	Delivery Ring Instrumentation	1320	1946	626	
89	DR1.05.01	Instrumentation Design	979	1205	226	
270	DR1.05.01.05	Delivery Ring BPM Software Design	500	600	100	
268	DR1.05.01.07	Delivery Ring BPM System Prototyping	500	600	100	FNAD_CT_SRVCS_SPCCLST
537	DR1.05.01.08	Delivery Ring BPM Design and Layout of Top Plate	8	20	12	FNAD_ELEC_DESIGN_EN
538	DR1.05.01.09	Delivery Ring BPM Specify cables Top Plate to Transition Board	0	4	4	FNAD_ELEC_TECH
539	DR1.05.01.10	Delivery Ring BPM Order Cables	0	4	4	FNAD_ELEC_TECH
540	DR1.05.01.11	Delivery Ring BPM Acceptance test received cables	0	16	16	FNAD_ELEC_TECH
541	DR1.05.01.12	Delivery Ring BPM Design Input Stage for 8 Channel Transition Board	0	60	60	FNAD_ELEC_TECH
542	DR1.05.01.13	Delivery Ring BPM Simulate & Prototype Input Stage	0	4	4	FNAD_ELEC_DESIGN_EN
546	DR1.05.01.14	Delivery Ring BPM Design Bandpass Filter (590 KHz to Operate at Rotation Frequency)	0	8	8	FNAD_ELEC_DESIGN_EN
547	DR1.05.01.15	Delivery Ring BPM Simulate & Prototype Bandpass Filter	0	2	2	FNAD_ELEC_DESIGN_EN
548	DR1.05.01.16	Delivery Ring BPM Order Components for Filter	0	8	8	FNAD_ELEC_DESIGN_EN
550	DR1.05.01.17	Delivery Ring BPM Calculate Gain & Prototype for 8 Channel Transition Board	0	4	4	FNAD_ELEC_TECH
552	DR1.05.01.18	Delivery Ring BPM Design Digital Filter for Digital Down-Converter	0	2	2	FNAD_ELEC_DESIGN_EN
90	DR1.05.02	Instrumentation Implementation	0	2	2	FNAD_ELEC_DESIGN_EN
561	DR1.05.02.06	Delivery Ring BPM Remove 4 db9 Connectors from Inputs of All Transition Boards (24x4=96 connectors)	341	741	400	
559	DR1.05.02.07	Delivery Ring BPM Install New Input Stage (Connector + Transformer)	0	200	200	FNAD_ELEC_TECH
560	DR1.05.02.08	Delivery Ring BPM Replace Input Stage Resistors for All Channels	0	100	100	FNAD_ELEC_TECH
			0	80	80	FNAD_ELEC_TECH

Delivery Ring CR011
Labor Changes

UID	WBS	Name	Old Hours	New Hours	Delta Hours	Comments
562	DR1.05.02.09	Delivery Ring BPM Remove & Add Components on Existing Transition Board	0	4	4	New activity
563	DR1.05.02.10	Delivery Ring BPM Test Finished Transition Board	0	14	14	New activity
			0	8	8	
			0	6	6	
564	DR1.05.02.11	Delivery Ring BPM Test Digital Down-Converter System Plate	0	2	2	New activity
			0	2	2	
70	DR1.06	Delivery Ring PS	17005	20019	3014	
73	DR1.06.01	Delivery Ring Pulsed Supplies	15155	18169	3014	
86	DR1.06.01.01	Delivery Ring Septa Supplies	3786	6800	3014	
99	DR1.06.01.01.03	Delivery Ring Septa PS Implementation	3557	6571	3014	
558	DR1.06.01.01.03.05	Delivery Ring Septa PS Assemble & Test Controls Rack	0	280	280	New activity
			0	280	280	
104	DR1.06.01.01.03.09	Delivery Ring Septa PS Power testing	80	392	312	
			80	392	312	
556	DR1.06.01.01.03.12	Delivery Ring Septa PS HV Rack Light Link Development	0	360	360	New activity
			0	360	360	
557	DR1.06.01.01.03.13	Delivery Ring Septa PS HV Rack Light Link Construction	0	280	280	New activity
			0	280	280	
554	DR1.06.01.01.03.15	Delivery Ring Septa Mechanical Construction of Pulser Cabinet	0	1650	1650	New activity
			0	1650	1650	
555	DR1.06.01.01.03.16	Delivery Ring Septa PS Assemble Switches for Pulser Cabinet	0	80	80	New activity
			0	80	80	
522	DR1.06.01.01.03.17	Delivery Ring Septa Design Cable/Stripline Interface	48	100	52	
			48	0	-48	
			0	40	40	
			0	60	60	

Delivery Log CR011
Material Changes

UID	WBS	Name	Start	Finish	Original M&S	New M&S	Delta	Comments
1	DR1	Delivery Ring AIP	10/28/13	9/29/16	\$3,122,075	\$3,141,980	\$19,905	
69	DR1.05	Delivery Ring Instrumentation	11/2/15	8/1/16	\$17,920	\$29,920	\$12,000	
89	DR1.05.01	Instrumentation Design	11/2/15	6/29/16	\$0	\$12,000	\$12,000	
539	DR1.05.01.10	Delivery Ring BPM Order Cables	1/15/16	3/10/16	\$0	\$8,000	\$8,000	New task
548	DR1.05.01.16	Delivery Ring BPM Order Components for Filter	4/18/16	4/20/16	\$0	\$4,000	\$4,000	New task
70	DR1.06	Delivery Ring PS	4/18/14	9/26/16	\$1,513,623	\$1,521,528	\$7,905	
74	DR1.06.02	New DC Supplies	10/1/15	9/8/16	\$141,900	\$149,805	\$7,905	
228	DR1.06.02.02	New DC Supplies Implementation	10/22/15	9/8/16	\$141,900	\$149,805	\$7,905	
229	DR1.06.02.02.01	New DC Supplies Implementation Injection PS	10/22/15	6/6/16	\$11,900	\$13,730	\$1,830	
233	DR1.06.02.02.01.04	Inject PS Procure Inj load cables	10/22/15	11/25/15	\$3,700	\$5,530	\$1,830	
237	DR1.06.02.02.02	Abort Down Bend PS Implementation	10/22/15	12/4/15	\$8,700	\$14,775	\$6,075	
241	DR1.06.02.02.02.03	Procure load cables for Abort PS	10/22/15	11/25/15	\$4,500	\$10,575	\$6,075	

Delivery Ring CR0 Activity Changes

UID	WBS	Name	Dur	New Base Start	New Base Finish	Old Base Start	Old Base Finish	Comments
1	DR1	Delivery Ring AIP	734 d	10/28/13	9/29/16	10/28/13	9/29/16	
69	DR1.05	Delivery Ring Instrumentation	187 d	11/2/15	8/1/16	10/1/15	3/11/16	New baseline dates
89	DR1.05.01	Instrumentation Design	165 d	11/2/15	6/29/16	10/1/15	1/8/16	New baseline dates
274	DR1.05.01.01	Delivery Ring BPM Design Oversight	143 d	11/2/15	5/27/16	10/1/15	12/3/15	New baseline dates
273	DR1.05.01.02	Delivery Ring BPM System Design	23 d	11/2/15	12/4/15	10/1/15	10/30/15	New baseline dates
272	DR1.05.01.03	Delivery Ring BPM 2.5MHz Transition Board Design	22 d	12/7/15	1/11/16	11/2/15	12/3/15	New baseline dates
271	DR1.05.01.04	Delivery Ring BPM 2.5MHz Transition Board Layout	22 d	12/7/15	1/11/16	11/2/15	12/3/15	New baseline dates
270	DR1.05.01.05	Delivery Ring BPM Software Design	120 d	12/7/15	5/27/16	11/2/15	12/3/15	New baseline dates
269	DR1.05.01.06	Delivery Ring BPM Digital Downconverter Design	22 d	12/7/15	1/11/16	11/2/15	12/3/15	New baseline dates
268	DR1.05.01.07	Delivery Ring BPM System Prototyping	22 d	5/31/16	6/29/16	12/4/15	1/8/16	New baseline dates
537	DR1.05.01.08	Delivery Ring BPM Design and Layout of Top Plate	6 d	1/7/16	1/14/16	N/A	N/A	New task
538	DR1.05.01.09	Delivery Ring BPM Specify cables Top Plate to Transition Board	6 d	1/7/16	1/14/16	N/A	N/A	New task
539	DR1.05.01.10	Delivery Ring BPM Order Cables	39 d	1/15/16	3/10/16	N/A	N/A	New task
540	DR1.05.01.11	Delivery Ring BPM Acceptance test received cables	33 d	3/11/16	4/26/16	N/A	N/A	New task
541	DR1.05.01.12	Delivery Ring BPM Design Input Stage for 8 Channel Transition Board	23 d	11/2/15	12/4/15	N/A	N/A	New task
542	DR1.05.01.13	Delivery Ring BPM Simulate & Prototype Input Stage	23 d	11/2/15	12/4/15	N/A	N/A	New task
546	DR1.05.01.14	Delivery Ring BPM Design Bandpass Filter (590 KHz to Operate at Rotation Frequency)	3 d	4/13/16	4/15/16	N/A	N/A	New task
547	DR1.05.01.15	Delivery Ring BPM Simulate & Prototype Bandpass Filter	3 d	4/13/16	4/15/16	N/A	N/A	New task
548	DR1.05.01.16	Delivery Ring BPM Order Components for Filter	3 d	4/18/16	4/20/16	N/A	N/A	New task
550	DR1.05.01.17	Delivery Ring BPM Calculate Gain & Prototype for 8 Channel Transition Board	5 d	12/7/15	12/11/15	N/A	N/A	New task
552	DR1.05.01.18	Delivery Ring BPM Design Digital Filter for Digital Down-Converter	5 d	12/7/15	12/11/15	N/A	N/A	New task
565	DR1.05.01.19	Delivery Ring BLM Design Oversight	22 d	1/6/16	2/5/16	N/A	N/A	New task
566	DR1.05.01.20	Delivery Ring BLM Project Design	22 d	1/6/16	2/5/16	N/A	N/A	New task
90	DR1.05.02	Instrumentation Implementation	187 d	11/2/15	8/1/16	10/1/15	3/11/16	New baseline dates
283	DR1.05.02.01	Delivery Ring BPM Implementation Oversight	162 d	11/2/15	6/24/16	10/1/15	12/3/15	New baseline dates
279	DR1.05.02.02	Delivery Ring BPM Electronics purchases	22 d	1/12/16	2/11/16	12/4/15	1/8/16	New baseline dates
281	DR1.05.02.03	Delivery Ring BPM Refurbish	22 d	2/12/16	3/14/16	1/11/16	2/10/16	New baseline dates
282	DR1.05.02.04	Delivery Ring BPM Installation	22 d	6/30/16	8/1/16	2/11/16	3/11/16	New baseline dates
280	DR1.05.02.05	Delivery Ring BPM Documentation	22 d	6/30/16	8/1/16	1/11/16	2/10/16	New baseline dates
561	DR1.05.02.06	Delivery Ring BPM Remove 4 db9 Connectors from Inputs of All Transition Boards (24x4=96 connectors)	39 d	1/7/16	3/2/16	N/A	N/A	New task
559	DR1.05.02.07	Delivery Ring BPM Install New Input Stage (Connector + Transformer)	45 d	2/12/16	4/14/16	N/A	N/A	New task
560	DR1.05.02.08	Delivery Ring BPM Replace Input Stage Resistors for All Channels	3 d	4/13/16	4/15/16	N/A	N/A	New task
562	DR1.05.02.09	Delivery Ring BPM Remove & Add Components on Existing Transition Board	15 d	4/13/16	5/3/16	N/A	N/A	New task
563	DR1.05.02.10	Delivery Ring BPM Test Finished Transition Board	5 d	5/4/16	5/10/16	N/A	N/A	New task

Delivery Ring CR011 Activity Changes

UID	WBS	Name	Dur	New Base Start	New Base Finish	Old Base Start	Old Base Finish	Comments
564	DR1.05.02.11	Delivery Ring BPM Test Digital Down-Converter System Plate	11 d	1/12/16	1/27/16	N/A	N/A	New task
278	DR1.05.02.12	Delivery Ring BLM Implementation Oversight	22 d	2/8/16	3/8/16	10/1/15	10/30/15	New baseline dates
277	DR1.05.02.13	Delivery Ring BLM Refurbish	22 d	2/8/16	3/8/16	11/2/15	12/3/15	New baseline dates
275	DR1.05.02.14	Delivery Ring BLM Electronics purchases	50 d	3/9/16	5/17/16	12/4/15	1/8/16	New baseline dates
70	DR1.06	Delivery Ring PS	614 d	4/18/14	9/26/16	4/9/14	9/26/16	New baseline dates
73	DR1.06.01	Delivery Ring Pulsed Supplies	614 d	4/18/14	9/26/16	4/9/14	9/26/16	New baseline dates
86	DR1.06.01.01	Delivery Ring Septa Supplies	505 d	9/22/14	9/23/16	8/15/14	8/25/16	New baseline dates
99	DR1.06.01.01.03	Delivery Ring Septa PS Implementation	423 d	1/23/15	9/23/16	11/12/14	8/25/16	New baseline dates
109	DR1.06.01.01.03.04	Delivery Ring Septa PS Assemble Controls Chassis	120 d	6/1/15	11/17/15	2/23/15	8/25/15	New baseline dates
558	DR1.06.01.01.03.05	Delivery Ring Septa PS Assemble & Test Controls Rack	63 d	3/1/16	5/26/16	N/A	N/A	New task
104	DR1.06.01.01.03.09	Delivery Ring Septa PS Power testing	50 d	7/15/16	9/23/16	7/15/16	8/25/16	New baseline dates
556	DR1.06.01.01.03.12	Delivery Ring Septa PS HV Rack Light Link Development	63 d	12/1/15	3/3/16	N/A	N/A	New task
557	DR1.06.01.01.03.13	Delivery Ring Septa PS HV Rack Light Link Construction	42 d	3/4/16	5/2/16	N/A	N/A	New task
101	DR1.06.01.01.03.14	Delivery Ring Septa Electrical Construction of Pulsar Cabinet	170 d	6/10/15	2/15/16	4/8/15	12/10/15	New baseline dates
554	DR1.06.01.01.03.15	Delivery Ring Septa Mechanical Construction of Pulsar Cabinet	110 d	9/1/15	2/11/16	N/A	N/A	New task
555	DR1.06.01.01.03.16	Delivery Ring Septa PS Assemble Switches for Pulsar Cabinet	15 d	9/1/15	9/22/15	N/A	N/A	New task
522	DR1.06.01.01.03.17	Delivery Ring Septa Design Cable/Stripline Interface	22 d	2/1/16	3/1/16	10/1/15	10/30/15	New baseline dates
74	DR1.06.02	New DC Supplies	236 d	10/1/15	9/8/16	10/1/15	9/8/16	
228	DR1.06.02.02	New DC Supplies Implementation	221 d	10/22/15	9/8/16	10/22/15	9/8/16	
229	DR1.06.02.02.01	New DC Supplies Implementation Injection PS	155 d	10/22/15	6/6/16	10/22/15	6/6/16	
233	DR1.06.02.02.01.04	Inject PS Procure Inj load cables	25 d	10/22/15	11/25/15	10/22/15	11/25/15	New baseline dates
237	DR1.06.02.02.02	Abort Down Bend PS Implementation	30 d	10/22/15	12/4/15	10/22/15	12/4/15	
241	DR1.06.02.02.02.03	Procure load cables for Abort PS	25 d	10/22/15	11/25/15	10/22/15	11/25/15	New baseline dates
85	DR1.08	Delivery Ring Installation	554 d	7/18/14	9/29/16	7/18/14	9/29/16	
317	DR1.08.01	Tunnel Installation	554 d	7/18/14	9/29/16	7/18/14	9/29/16	
325	DR1.08.01.01	General Installation	251 d	10/1/15	9/29/16	10/1/15	9/29/16	
298	DR1.08.01.01.02	General Installation Implementation	231 d	10/29/15	9/29/16	10/1/15	9/29/16	New baseline dates
314	DR1.08.01.01.02.10	General Installation Move AP2 line interlocks	25 d	8/15/16	9/19/16	10/1/15	11/4/15	New baseline dates

Delivery Ring Pre CR011 CAP

Control Account		FY12	FY13	FY14	FY15	FY16	FY17	Cumulative
A1304.01.02.02 Delivery Ring Project Management Oversight - FY14								
	Scheduled	0.00	0.00	202,519.42	0.00	0.00	0.00	202,519.42
A1304.01.02.03 Delivery Ring Project Management Oversight - FY15								
	Scheduled	0.00	0.00	5,745.92	172,223.05	0.00	0.00	177,968.96
A1304.01.02.04 Delivery Ring Project Management Oversight - FY16								
	Scheduled	0.00	0.00	0.00	5,306.01	195,501.07	0.00	200,807.08
A1304.02 Collider Equipment Removal & Configuration								
	Scheduled	0.00	0.00	284,664.11	55,662.49	0.00	0.00	340,326.60
A1304.03 Delivery Ring Electrical Infrastructure								
	Scheduled	0.00	0.00	184,257.84	231,245.75	81,883.71	0.00	497,387.30
A1304.04 Delivery Ring Controls								
	Scheduled	0.00	0.00	337,819.33	57,692.73	2,612.25	0.00	398,124.31
A1304.05 Delivery Ring Instrumentation								
	Scheduled	0.00	0.00	0.00	0.00	197,414.49	0.00	197,414.49
A1304.06.01.01 Septa Supplies								
	Scheduled	0.00	0.00	8,821.22	648,340.49	132,729.64	0.00	789,891.35
A1304.06.01.02 Inj Kicker Power Supply								
	Scheduled	0.00	0.00	230,517.90	535,764.96	439,270.07	0.00	1,205,552.93
A1304.06.01.03 Abort Kicker Power Supply								
	Scheduled	0.00	0.00	83,910.98	507,491.84	719,341.96	0.00	1,310,744.78
A1304.06.02 New DC Supplies								
	Scheduled	0.00	0.00	0.00	0.00	391,266.10	0.00	391,266.10
A1304.07.01 Delivery Ring Repurposed Magnets								
	Scheduled	0.00	0.00	0.00	0.00	15,735.71	0.00	15,735.71
A1304.07.02 Delivery Ring Inj C Magnet								
	Scheduled	0.00	0.00	8,322.95	7,741.38	253,876.76	0.00	269,941.09
A1304.07.03 Delivery Ring Inj Kicker Magnet Refurbishment								
	Scheduled	0.00	0.00	1,497.74	0.00	86,075.79	0.00	87,573.53
A1304.07.04 Delivery Ring Magnetic Septa Magnets (1 spare)								
	Scheduled	0.00	0.00	0.00	0.00	396,176.95	0.00	396,176.95
A1304.08.01 Tunnel Installation								
	Scheduled	0.00	0.00	40,477.84	145,057.51	615,988.95	0.00	801,524.30
A1304.08.02 Cable Installation								
	Scheduled	0.00	0.00	0.00	0.00	179,494.91	0.00	179,494.91
Grand Total								
	Scheduled	0.00	0.00	1,388,555.25	2,366,526.21	3,707,368.36	0.00	7,462,449.82

Delivery Ring Post CR011 CAP

Control Account		FY12	FY13	FY14	FY15	FY16	FY17	Cumulative
A1304.01.02.02 Delivery Ring Project Management Oversight - FY14	Scheduled	0.00	0.00	202,519.42	0.00	0.00	0.00	202,519.42
A1304.01.02.03 Delivery Ring Project Management Oversight - FY15	Scheduled	0.00	0.00	5,745.92	172,223.05	0.00	0.00	177,968.96
A1304.01.02.04 Delivery Ring Project Management Oversight - FY16	Scheduled	0.00	0.00	0.00	5,306.01	195,501.07	0.00	200,807.08
A1304.02 Collider Equipment Removal & Configuration	Scheduled	0.00	0.00	284,664.11	55,662.49	0.00	0.00	340,326.60
A1304.03 Delivery Ring Electrical Infrastructure	Scheduled	0.00	0.00	184,257.84	231,245.75	81,883.71	0.00	497,387.30
A1304.04 Delivery Ring Controls	Scheduled	0.00	0.00	337,819.33	57,692.73	2,612.25	0.00	398,124.31
A1304.05 Delivery Ring Instrumentation	Scheduled	0.00	0.00	0.00	0.00	283,740.78	0.00	283,740.78
A1304.06.01.01 Septa Supplies	Scheduled	0.00	0.00	8,821.22	685,282.98	384,293.92	0.00	1,078,398.12
A1304.06.01.02 Inj Kicker Power Supply	Scheduled	0.00	0.00	230,517.90	535,764.96	439,270.07	0.00	1,205,552.93
A1304.06.01.03 Abort Kicker Power Supply	Scheduled	0.00	0.00	83,910.98	507,491.84	719,341.96	0.00	1,310,744.78
A1304.06.02 New DC Supplies	Scheduled	0.00	0.00	0.00	0.00	401,557.88	0.00	401,557.88
A1304.07.01 Delivery Ring Repurposed Magnets	Scheduled	0.00	0.00	0.00	0.00	15,735.71	0.00	15,735.71
A1304.07.02 Delivery Ring Inj C Magnet	Scheduled	0.00	0.00	8,322.95	7,741.38	253,876.76	0.00	269,941.09
A1304.07.03 Delivery Ring Inj Kicker Magnet Refurbishment	Scheduled	0.00	0.00	1,497.74	0.00	86,075.79	0.00	87,573.53
A1304.07.04 Delivery Ring Magnetic Septa Magnets (1 spare)	Scheduled	0.00	0.00	0.00	0.00	396,176.95	0.00	396,176.95
A1304.08.01 Tunnel Installation	Scheduled	0.00	0.00	40,477.84	145,057.51	615,988.95	0.00	801,524.30
A1304.08.02 Cable Installation	Scheduled	0.00	0.00	0.00	0.00	179,494.91	0.00	179,494.91
Grand Total	Scheduled	0.00	0.00	1,388,555.25	2,403,468.70	4,055,550.70	0.00	7,847,574.65

Delivery Ring CR011 Project Plan Milestones

Delivery Ring

WBS	Name	Base St	Base Fin
DR1.01.03	Delivery Ring Project Plan Milestones	11/1/13	9/29/16
DR1.01.03.01	Project Start	11/1/13	11/1/13
DR1.01.03.02	Begin Disassembly of Accumulator	4/1/14	4/1/14
DR1.01.03.03	Controls Links to Ring Buildings Established	9/9/14	9/9/14
DR1.01.03.08	Collider Equipment Removal Complete	3/20/15	3/20/15
DR1.01.03.09	Electrical Infrastructure Upgrades Complete	1/29/16	1/29/16
DR1.01.03.10	Magnet Construction Complete	8/11/16	8/11/16
DR1.01.03.11	Installation Complete	9/29/16	9/29/16
DR1.01.03.12	Project Complete	9/29/16	9/29/16