NuStorm Facility Status at Fermilab







NuStorm Facility Status at Fermilab

- Location of Facility
- Primary Beamline
- MI Abort Line Reconfiguration
- Extraction



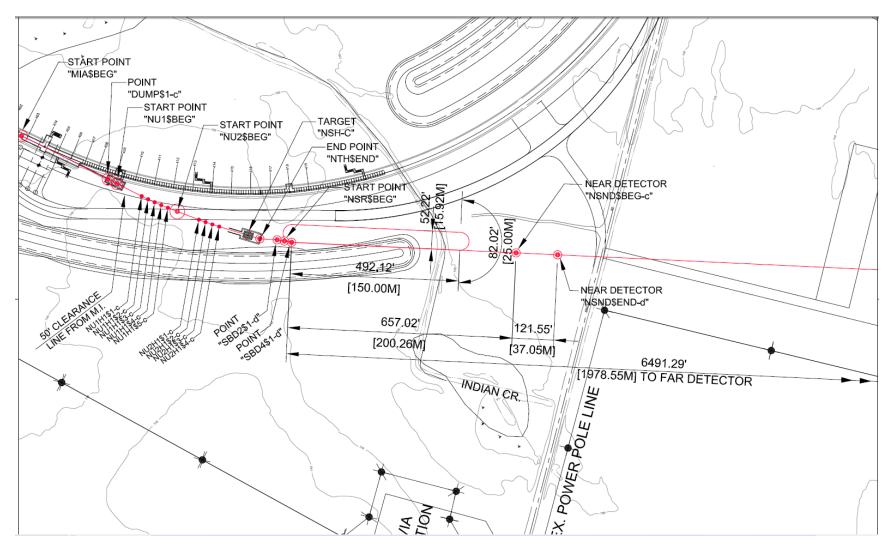
Location of Facility





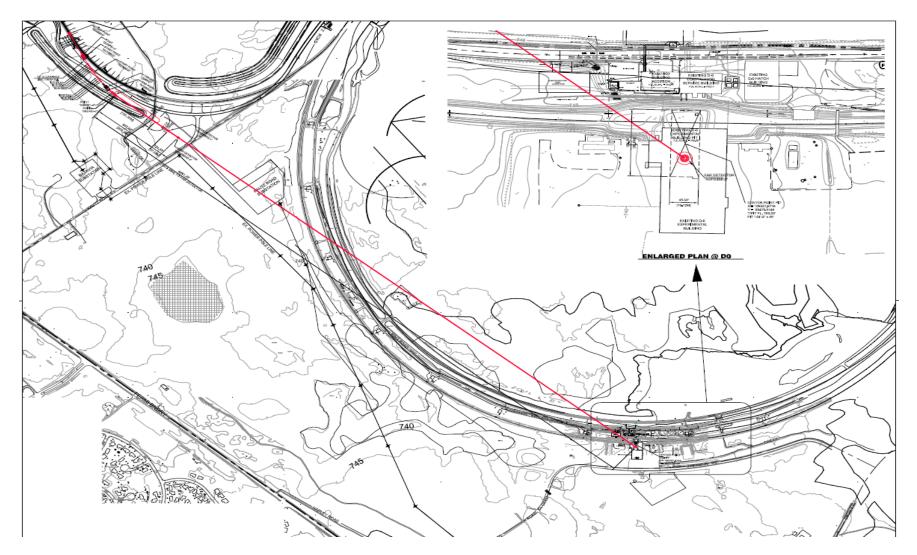


Location of Facility





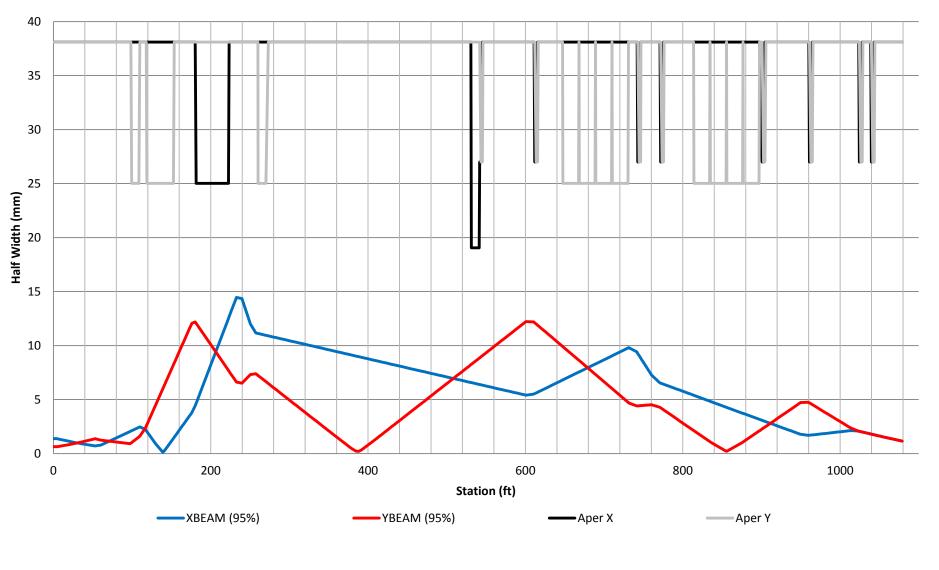
Location of Facility







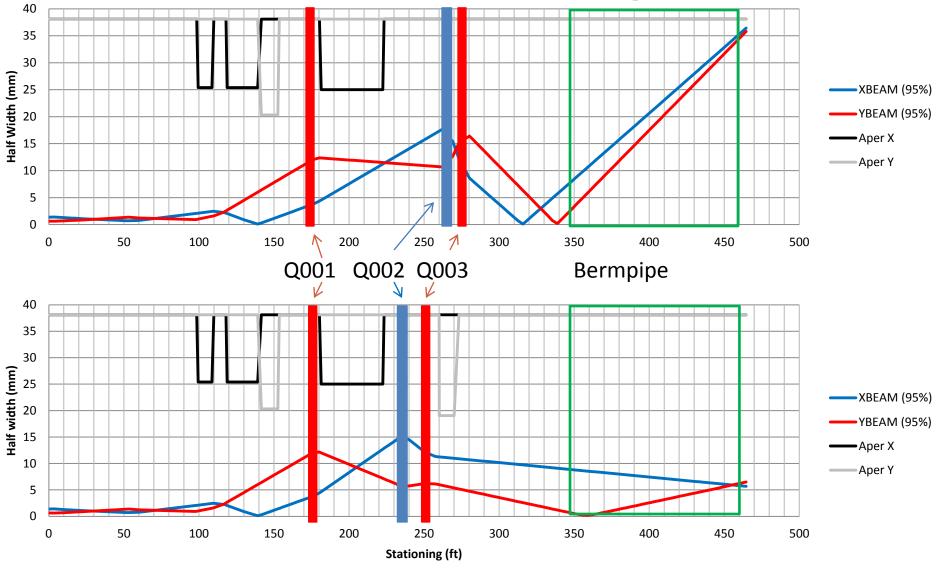
NuStorm Primary Beamline



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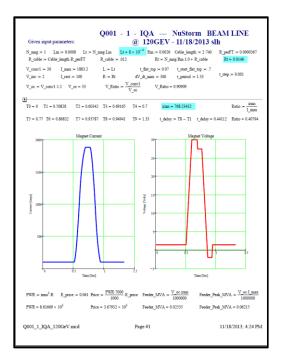
Current (Amps)	Present	Future
Q001	2770.5	1883.2
Q002	2828.0	1423.9
Q003	2770.5	853.0

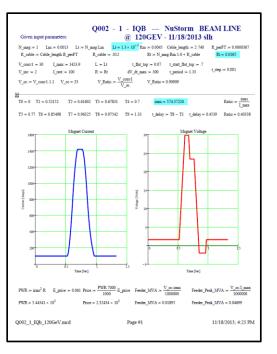
Move Q002 and Q003 upstream by 30' and 23', along with different currents, NS/Abort beam reduces in size through the bermpipe





Current (Amps)	Present	Future
Q001	2770.5	1883.2
Q002	2828.0	1423.9
Q003	2770.5	853.0



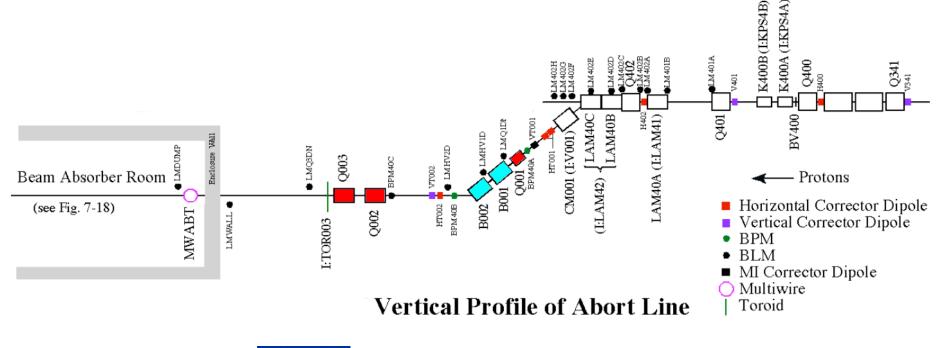




Compiled from Steve Hays*



Current (Amps)	Present	Future
Q001	2770.5	1883.2
Q002	2828.0	1423.9
Q003	2770.5	853.0





Current (Amps)	Present	Future
B2	2964.1	2964.1



	AB2A -	1 - B2 NuStorm BEAM LINE			
Given input parameters:		@ 120GEV - 11/18/2013 slh			
N_mag := 2		= 0.016 Rm := 0.0072 Cable_length := 2.740 R_perFT := 0.0000367 Rt := N_mag.Rm.1.0 + R_cable Rt = 0.0264			
V_conv1 := 150 I_max := 2964.1	L := Lt	t_flat_top := 0.07 t_start_flat_top := .7			
V_inv := 100 I_rest := 100	$\mathbf{R} := \mathbf{R}\mathbf{t}$	dV_dt_max := 1500 t_period := 1.33 t_step := 0.001			
	$V_oc := V_conv1 \cdot 1.1 V_oc = 165 \qquad V_Ratio := \frac{V_conv1}{V_oc} \qquad V_Ratio := 0.90909$				
T0 = 0 T1 = 0.19026 T2 = 0.2885	T3 = 0.65217	T4 = 0.7 $\operatorname{irms} = 1.68235 \times 10^3$ Ratio := $\operatorname{irms} \frac{\operatorname{irms}}{\operatorname{I} \max}$			
T5 = 0.77 T6 = 0.88883 T7 = 1.1303	8 T8 = 1.19881	T9 = 1.33 t_delay := T8 - T1 t_delay = 1.00854 Ratio = 0.56757			
3000 Magnet Curr	ent	2007 Magnet Voltage			
2500		150			
		100			
2000					
(du) 1500	↓	(alba (Vala)			
ő	1				
1000		-50			
500-		- 100			
		- 100-			
0 0.5 Time [Sec]	-				
$PWR = ims^3 R E_price = 0.061 \text{ Price} = \frac{PWR.7000}{1000} E_price Feeder_MVA := \frac{U_oc.ims}{100000} Feeder_MVA := \frac{U_oc.ims}{1000000}$					
	1000	⁴ Feeder_MVA = 0.27759 Feeder_Peak_MVA = 0.48908			
Q003_1_IQB_120GeV.mcd		Page #1 11/18/2013; 4:34 PM			

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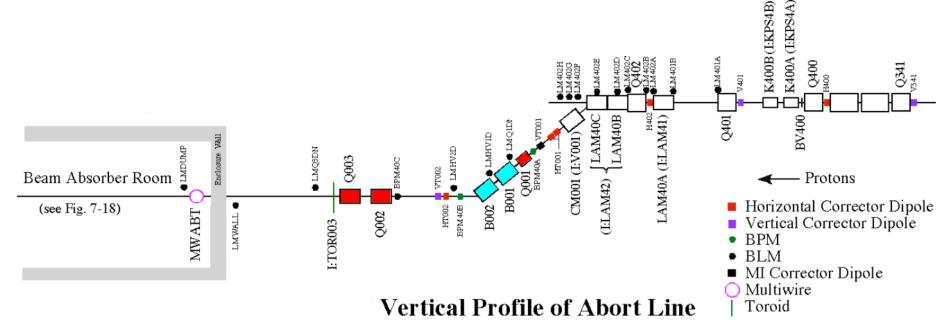
With these changes we are pursuing an Accelerator Improvement Project, or AIP. This AIP will be many focused on converting the Abort line magnets to their own individual power supplies. Currently there are multiple AIPs majority for the Muon Campus here at Fermilab.

- Cryo AIP (Muon Campus)
- Muon Campus Beam Transport
- Muon Campus Delivery Ring AIP
- Muon Campus Recycler RF AIP
- MI Gap Clearing Kickers

Each AIP has a written document called a Project Execution Plan, or PEP. With these calculations completed by Steve Hays of AD Electrical Engineering, we can continue this effort. Currently we are starting to gather this information and propose to AD that the purpose of this AIP is for twofold. First create a simplified extraction line for MI, and second have tunable magnets for NuStorm in the future.

This AIP requires \$105,000 for the power supply, cabling, and electricians. Not all details though have been worked out i.e. location of power supplies, control cards, etc.





Currently MI Abort line has 2 "long" kickers for extraction. These kickers are for full turn at flattop ~5%. NuStorm does not require this type. It requires 3 partial turn kickers such as LBNE style or "short" kickers ~1%.







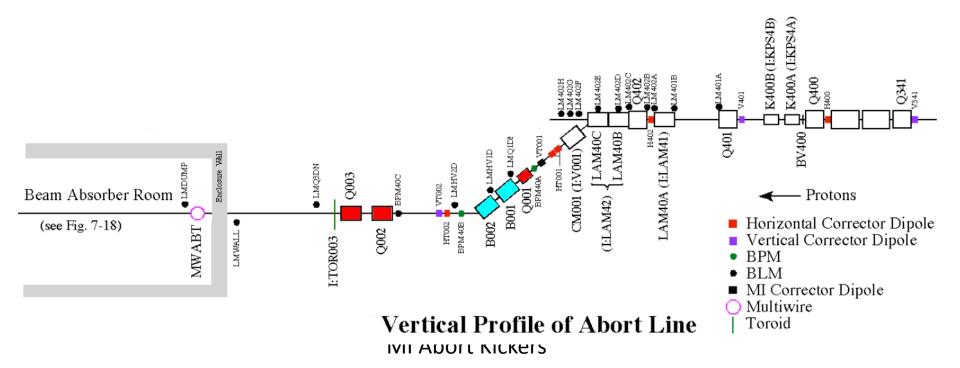
MI Abort Kickers

In order to use the short kickers these two long kickers will need to be moved creating a new bend center...



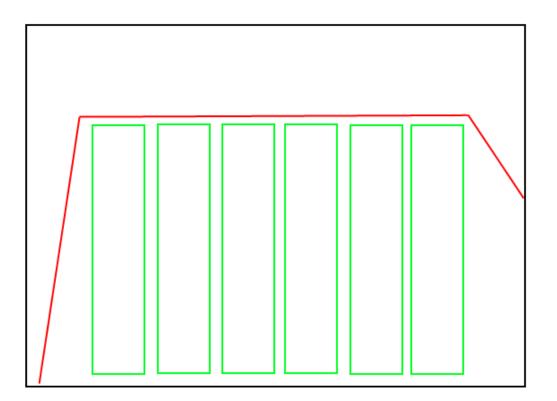


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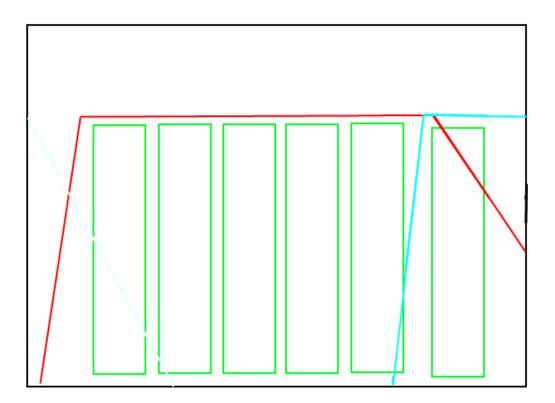




LBNE MI Beam in Booster Batches



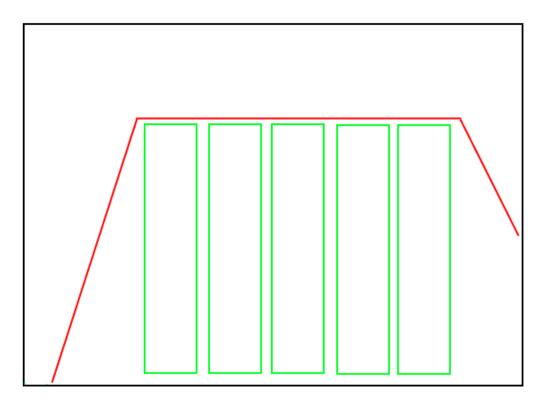




NuStorm Beam extraction at the end deflects the last NuMI/LBNE Beam using Abort Kickers







NuStorm Beam extraction at the beginning with fast rise and fall time kicker doesn't deflect NuMI or LBNE Beam. Basically we are recreating our MI-52 kicker scenario for Collider Operation



NuStorm Facility Status at Fermilab

Needs to be done

- Continue AIP via PEP document
- Research more on Kicker configuration





Thank You

Special thanks to: Steve Hays, Chris Jensen

11/21/2013



Michael Geelhoed AD EBD

Photo by Marty Murphy









With these changes we are pursuing a Accelerator Improvement Project, or AIP. This AIP will be many focused on converting the Abort line magnets to their own individual power supplies. Currently there are multiple AIPs for the Muon Campus here at Fermilab.

- Cryo AIP (Muon Campus) (\$9.74M)
- Muon Campus Beam Transport
- Muon Campus Delivery Ring AIP
- Muon Campus Recycler RF AIP (\$8.6M)
- MI Gap Clearing Kickers (\$4.4M)

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This AIP requires \$105,000 for the power supply, cabling, and electricians. Not all details though have been worked out.



LBNE has cost estimated ~\$6.7 M for 5 kicker magnets fully loaded.

