Carrier Tunnel & Pre-Target Scope

- Scope includes:
  - Four (4) B2 Magnets and stands
  - Nine (9) 3Q Magnets (7 @ 120", 2 @ 60") and stands (HQ 113 to HQ 121)
  - One (1) 200 turn bump Dipole Magnet and stands
  - Instrumentation (Eleven (11) BPM's ; Six (6) Multiwires; One (1) Toroid;)
  - Nine (9) Trim Magnets
  - Vacuum Pumps, Beam Pipe Spools
  - Installation Equipment (two specialized transporter carts, winch, bar stock rails for the carts to ride on, etc.)

Sequence Of Tasks

- Alignment Staking
- Magnet Transport Cart Bar-stock Rails, Winch
- Magnet Stands @ two stands per magnet (CT and Pre-Target)
- Carrier Tunnel Transport Cart
- Carrier Quadrupole Magnets
- Remove Carrier Tunnel Transport Cart and Replace with Pre-Target Transport Cart
- B2 Magnets in Pre-Target
- Pre-Target Quadrupole Magnets and Eartley Dipole
- Trim Magnets
- Instrumentation
- Final positioning using alignment surveyors
- LCW Connections, Power Tests, Polarity Checks
- Beam Pipe Spools, Vacuum Pumps, etc.

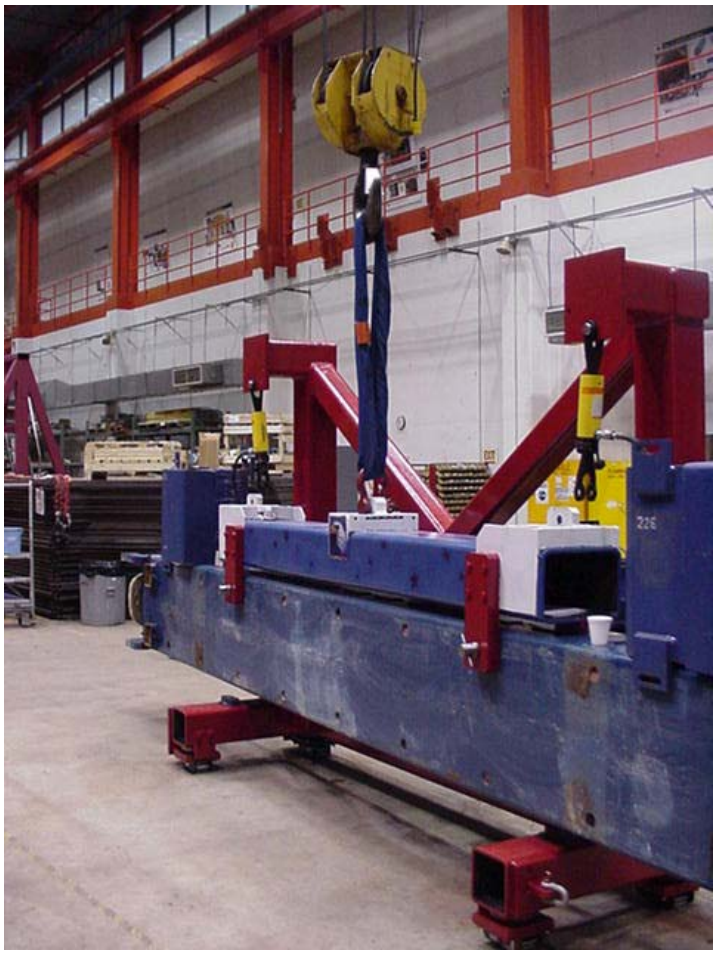
Interfaces and Constraints

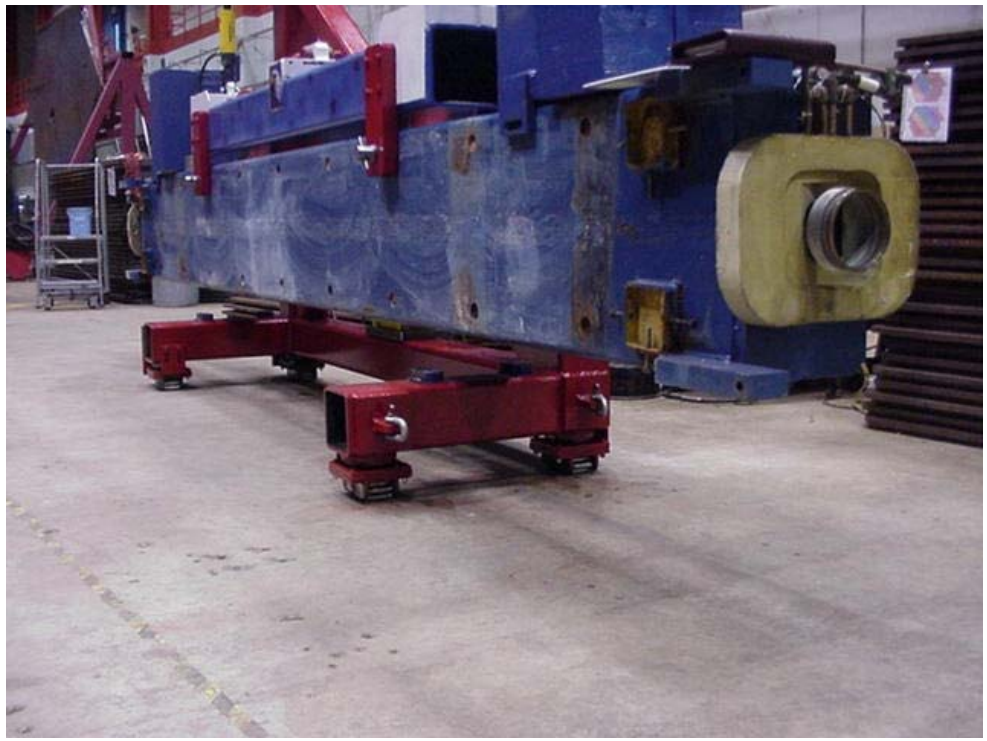
- All items installed from the Target Hall using MI-65, The Target Shaft (Requires Beneficial Occupancy Post SB&O)
- All items must pass thru the Target Hall and need to be choreographed with 1.1.2 installation in the Target Hall.
- It is preferable, but not required, to start at the U.S. end and work down.
- Floor which has only spot measured, is quite varied. Mandate from BD/MSD to use MI stands with limited adjustment range requires great care to be sure the magnets can be put where they need to go.
- Hatch between the target hall and the beam-line is only ~1 inch longer that the B2 magnet assemblies. (The beam-line didn't use B2 magnets when the hatch was sized).
- Occupancy is Limited in CT and Pre-Target to 5 people – enough to do the job.
- It should be possible to remove and replace a single magnet in either CT or Pre-Target without removing the magnets downstream.

Specialized Equipment

- Installation on Sloped Floors without the benefit of the magnet movers is new to Fermilab and requires specialized equipment to perform this work safely and efficiently. Equipment is assembled and being tested now. HA for actual installation to be developed as part of the testing.
- Installation cart for CT must fit within very tight quarters but only needs to handle 3Q magnets at 8000 # each.
- Installation cart for the Pre-target has more head height, but needs to handle 25,000# B2 magnets in addition to 3Q's and the 200 turn bump magnet.
- Lifting fixtures for the pre-target installation cart will also be used to lower the magnets down the shaft.
- Both installation carts use hydraulic cylinders for lifting and lowering, thereby gaining fine adjustment and will allow the use of existing portable hydraulic pumps.

B2 Lifting Fixture Under Load Test w/ Pre-Target Installation Cart





Summary

- Plan for installing NuMI CT and Pre-Target works on paper, but 100% of the total work remains to be performed.
- Specialized equipment designs are completed and built. Testing remains to be completed.
- Should easily have all equipment in place and tested before B.O.
- Mayling Wong (a PPD Mechanical Engineer), together with Vic Majdanski (a PPD Design Drafter) are leading the effort to create the area drawings (integration drawings) for the CT and Pre-Target Area. Scope includes all of the items listed in this presentation and the existing conditions we expect to inherit from the SB&O effort.
- Will Prepare a HA for the testing, will adapt that HA for use in the tunnel.