Project X Siting Workshop Wrapup

Marc Kaducak
Project X Siting Workshop
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Oversimplified Presentation Synopsis

- Overview – M. Kaducak
  - We need to converge on a layout for the design report. Future iterations are likely.
- Experimental Programs – R. Tschirhart
  - Important to show a single unambiguous layout in design report.
  - Strong programs are possible at 1GeV
  - SNS target/instrument hall-type facility requires a very large footprint (60x90m).
- MI/RR – D. Johnson
  - Favored injection location is MI/RR-10
  - Minimum bend radius at 8GeV is in the range of 700m
  - The above two sub-bullets provide a straightforward starting point for routing the 8GeV transfer line.
- Booster – R.Zwaska
  - Few technical constraints for Booster injection due to repeating lattice patterns
  - A 40-ton absorber block is being installed at Long 13, but it could be moved later if necessary.
  - 1 MW beam transfer through Booster tunnel is “highly suspect” due to insufficient shielding.
- 180 deg. Bends – V. Lebedev
  - At 400MeV the radius of a 180deg bend is quite large (~8.5 m) and implies two tunnels separate by ~17m. Also creates significant beam tuning issues.
- Conventional Facilities – R. Alber
  - Good to stay away from site boundary. Nearby residents complained of noise and light pollution during NuMI construction.
  - No major obstacles to entering Booster from East.
- Possible Evolution of Muon Campus – C. Polly
  - AP-0 could be used for target R&D at 100kW or bypassed
  - Could extend 1Gev 1MW beam thru Muon Campus to new facility with spallation target, neutron physics, possibly neutrinos

Options Considered

Two flavors of sites were considered:

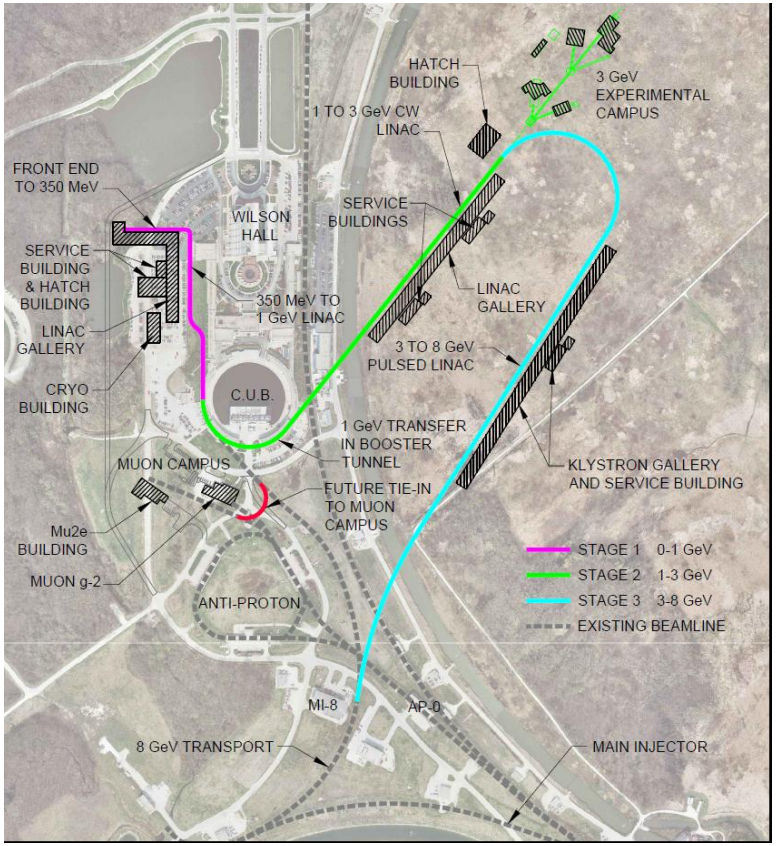
1. Those originating from the parking lot
2. Those originating from the TeV infield

The floor was opened for other out-of-the-box options, but none surfaced.

Note that the conclusions herein are for the purposes of the current design report and will likely continue to evolve.

Parking Lot Linac Options

Description: Build new 1GeV linac in parking lot or in existing linac space. Continue to 3GeV through existing booster or off to the west.



Pros:

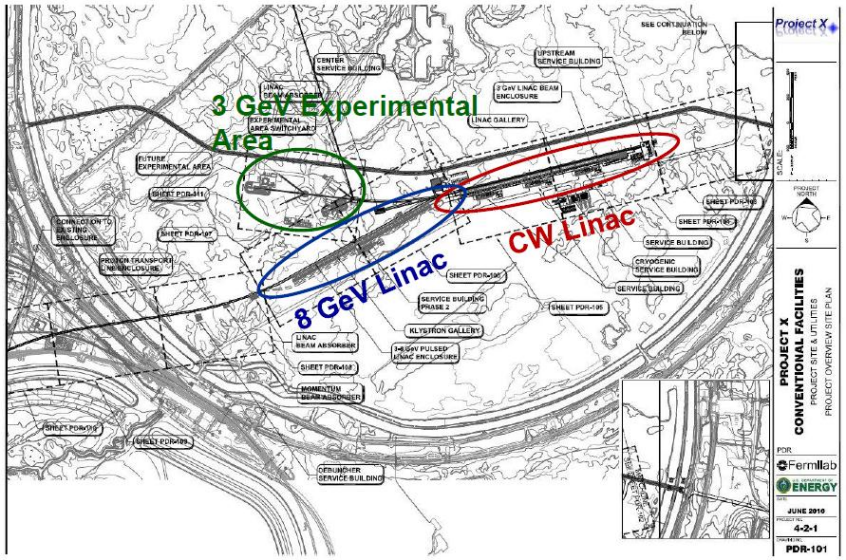
1. 1GeV linac near booster, minimal transfer line, potentially lowest cost for Stage 1.

Cons:

1. Use of southern Booster tunnel arc for 1MW transport to the east into the TeV infield is “highly suspect” due to inadequate shielding (see R. Zwaska talk).
2. Continuation to a 3GeV linac to the west would route the facilities over a very long path around the Muon Campus and LBNE mound with no clear interface to the Muon Campus.
3. Entering MI from the West would point the beam across the site boundary.
4. R. Alber mentioned that NuMI had to address noise and light pollution complaints from nearby residents during construction.

TeV Infield Option #1 - 2010 RDR TeV

Description: Build out all tunnels through 8GeV as planned in 2010 RDR. Only populate 1GeV section with accelerator in Stage 1. Rest would be simple transfer line.



Pros:

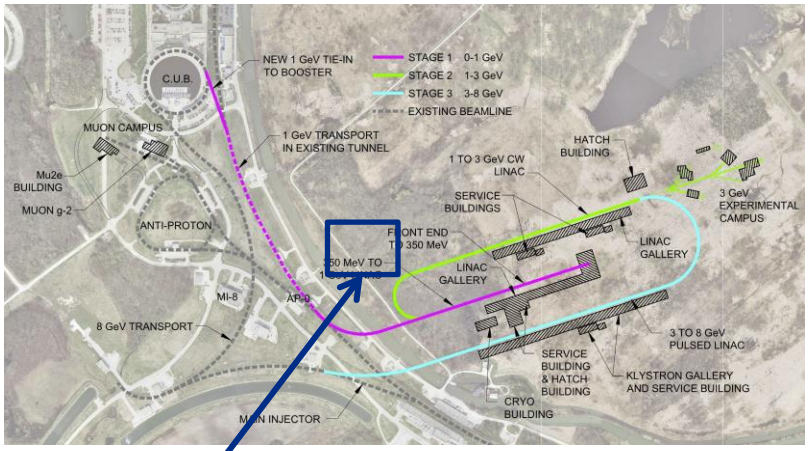
1. Basic design studied in previous RDR.
2. Straightforward upgrade to 3GeV and 8GeV.

Cons:

1. Cost differential compared to other options is probably quite high. Will quantify the estimated difference as a follow-up.
2. Will likely be difficult to justify large investment in far future upgrades.
3. Would not allow for concurrent construction of Stages 2-3 and operation of Stage 1.

TeV Infield Option #2 - Paperclip

Description: Stage 1 Linac pointing at Muon Campus with 1GeV transfer line through existing TeV tunnel to Booster. 1 GeV campus in infield.



Approximate 1 GeV Campus location

Pros:

1. TeV infield allows for variety of accelerator expansion options and experimental campus footprints.
2. Allows for concurrent construction of Stage 2-3 accelerators and operation of Stage 1 (except for final tie-ins).
3. Straightforward path to Muon Campus through AP-0.
4. No obvious show-stopping technical issues identified.

Cons:

1. Wetland mitigation costs (last estimate was $5.5M).
2. Long transfer line to Booster.

Conclusion

Decision: Proceed with paperclip design for 2012 RDR. Orientation shown in presentation will need to be adjusted slightly to show injection at MI/RR-10.