Fermilab

Master Planning Task Force

April 4, 2011

Members

P	Pier Oddone	**P**	Bruce Chrisman	**A**	Steve Holmes	**A**	Greg Bock
P	Vicky White	**P**	Bob Kephart	**P**	Giorgio Apollinari	**P**	Mike Lindgren
P	Roger Dixon	**A**	Steve Wiesenthal	**P**	Randy Ortgiesen	**P**	Young-Kee Kim
A	Patricia McBride	**P**	Steve Dixon				

Guests

P. Czarapata, K. Yurkewicz, R. Ray, C. Polly, B. Casey, M. Bardeen, R. Merchut, S. Lumsden (HOK)

A. Illinois Accelerator Research Center

R. Merchut and S. Lumsden provided a general overview of the status of the project and identified the following specific discussion points:

1. Appearance Issues: The design team is exploring the possibility of utilizing a "rain screen" system for the exterior coating of the low portion of the building. The design team preferred option is a zinc coated panel that would provide a "no maintenance" life cycle. Should this prove too expensive or not meet the Buy American requirements, other options will be investigated.
2. Significance: It was noted by several members of the group that the current renderings provide an appearance that is less than the "jewel like" version shown earlier in the design development. S. Lumsden responded that this most likely due to a rendering issue and that the original intent has not changed. The design team was reminded to incorporate the existing buildings into design vocabulary.
3. Conference Room: The design team presented the results of a previous recommendation to consider incorporating a ~175 person conference room into the design. This "enhanced conference center" includes a rear entry room with both level and tiered seating. The estimated construction cost for this work is $1.2 million. For reference, the original IARC budget included $300k for a divisible conference facility. R. Merchut noted that the furniture for this enhanced conference center is not included in the IARC budget and would require funding from another source.
4. Employee Entry: The design team presented options for the revised employee entry located at the east end of the OTE building, facing north. Two (2) options were discussed. The first consisted of a re-arranged series of spaces that included existing onto the existing catwalk in the CDF Assembly Hall. There were concerns about the traffic flow through workspaces. The second option included a request that the entry space be made larger to accommodate visitor groups. This accommodation would require a widening of the building to handle the groups within the space as well as vestibules for environmental control. This option, estimated to be $100k in construction, also includes the same traffic flow concerns as Option 1. It was noted that Option 2 was developed based on a consultant's recommendation to provide an ADA accessible route for tours in CDF. It was suggested that

it may be a cheaper and more effective option to upgrade the existing non-ADA accessible entry.

5. Lunchroom: The design team presented the latest design of the food service area. The seating on the main floor of the dining area is limited, by exiting, to 49 people with an additional 20 seats on the balcony overlooking the main dining area. This limitation of ~69 people is less than the 175 person capacity of the enhanced conference space. Options for alternate dining spaces were discussed. The impact of the desire for "hot" food service was discussed. Once the "panani" line is crossed from "cold" food to "hot" food, an increase of serving infrastructure is required. The construction estimate for the infrastructure is $200k.

B. Summer Teachers

M. Bardeen indicated that space was need to accommodate seven (7) teachers for eight (8) weeks from late July to early August. M. Lindegren indicated that space may be available in the HIL building while G. Apollinari indicated that he may have space within a trailer. M. Bardeen expressed a desire to provide space that is as welcoming and professional as possible.

C. Mu2e Project

R. Ray provided a general overview of the status of the project and identified the following specific discussion points:

1. General Status: The current design features incorporates the standard architectural vocabulary found in the Main Injector with selected features to accent the entry. Y. Kim noted that perhaps this vocabulary should be considered for the projects within the "Muon Campus" in order to give these experiments their own expression on the Fermilab site.
2. Compatibility: R. Ray noted that the location of the Cryogenic Building could be relocated if necessary in order to share cryogenic services with the proposed G-2 project.
3. LEED Certification: It was noted that while current orders require a LEED Gold rating for new buildings over $5m, the USGBC LEED system was intended to address occupant comfort and that this type of industrial building was not a direct fit for the LEED system. The design team intends to investigate this further and will, at a minimum, pursue the Guiding Principles for High Performance/Sustainable Buildings. A LEED consultant is being retained for further investigation.
4. SLI Impact: With the delay of the SLI funded utility project, the Mu2e design team has investigated alternate method of providing the cooling for the project. This includes the possibility of utilizing the existing Swan Lake cooling loop with some enhancements and well as the use of cooling towers.

D. G-2 Project

C. Polly provided a general overview of the status of the project and identified the following specific discussion points:

1. Location: The current design assumed a location south of the existing Antiproton Target Hall. Based on the Mu2e proposal, two (2) alternate locations were investigated. These locations, on the west and east side of the proposed Mu2e beamline are driven by beam requirements.
2. Magnetic Shielding: The G-2 collaboration performed magnetic field measurement in the vicinity of the alternate location over the past week. The preliminary results appear adequate to meet the project's 100 micro gauss requirements. R. Ray inquired about the impact of the activation of the Mu2e solenoids on the experiment. C. Polly felt that this could be accommodated without impact.

3. Cyrogenic: The G-2 project anticipates utilizing select components of the existing cryogenic system served by the Tevatron. It was noted that these components would be unavailable once the Tevatron is shut down later this year. It was recommended that the G-2 project revisit the assumption and re-plan accordingly.

E. Action Items

1. IARC Enhanced Conference Center. Confirm decision to incorporate enhanced conference center into design.
2. IARC Lunchroom Hot Food. Decision needed by 18APR11 in order to avoid impact on project schedule.
3. IARC Employee Entry. Decision needed by 18APR11 in order to avoid impact on project schedule.

F. Next Meeting

- April 11, 2010
  - Buildings in the NML area – Gary Van Zandbergen (10' + 10')
  - Office needs for the CMS collaboration – Dan Green (10' + 10')
  - Further discussions on IARC: Kitchen, Lecture Hall, Entrance – All (20')

Mu2e Facility

Master Planning Meeting

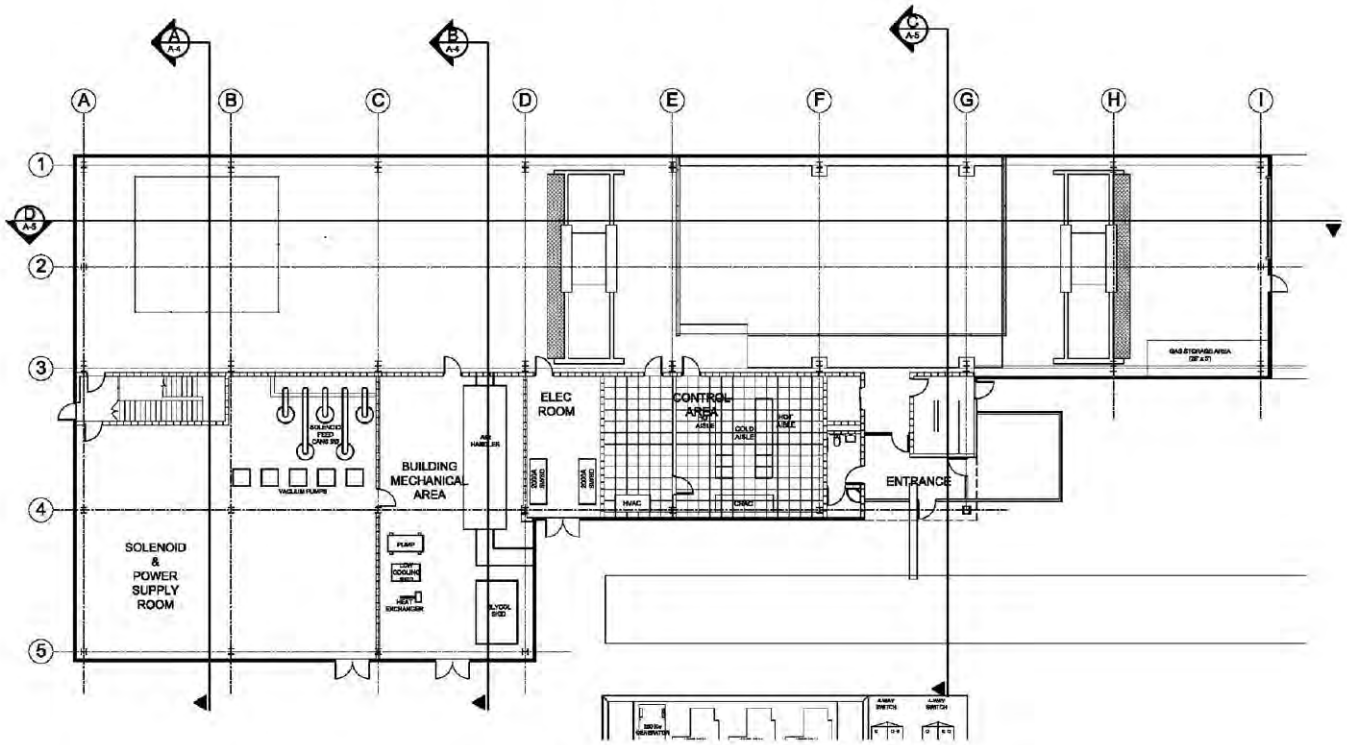
4/4/11

R. Ray
Mu2e Project manager

Mu2e Site

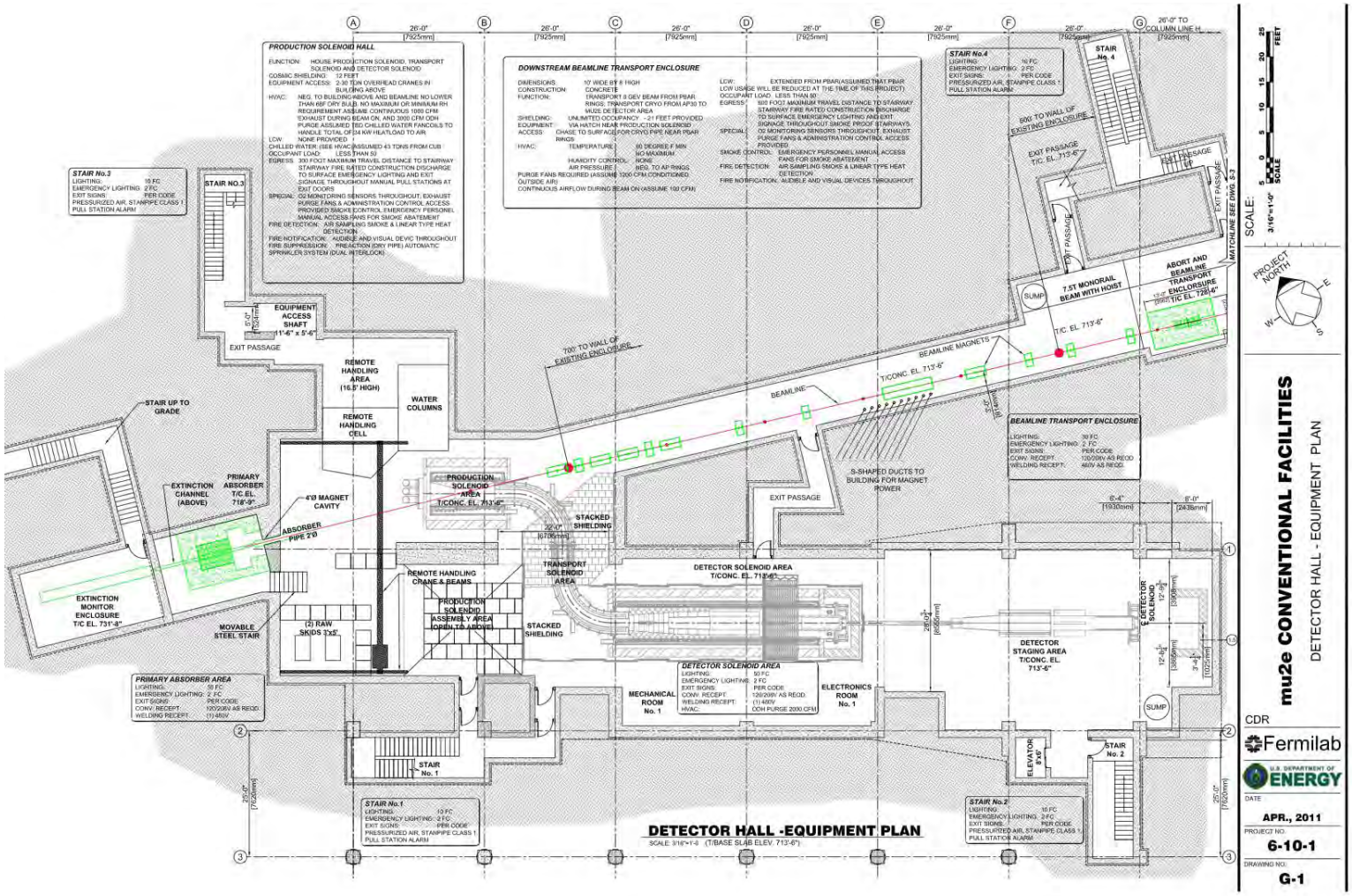
Surface Building

Grade Level

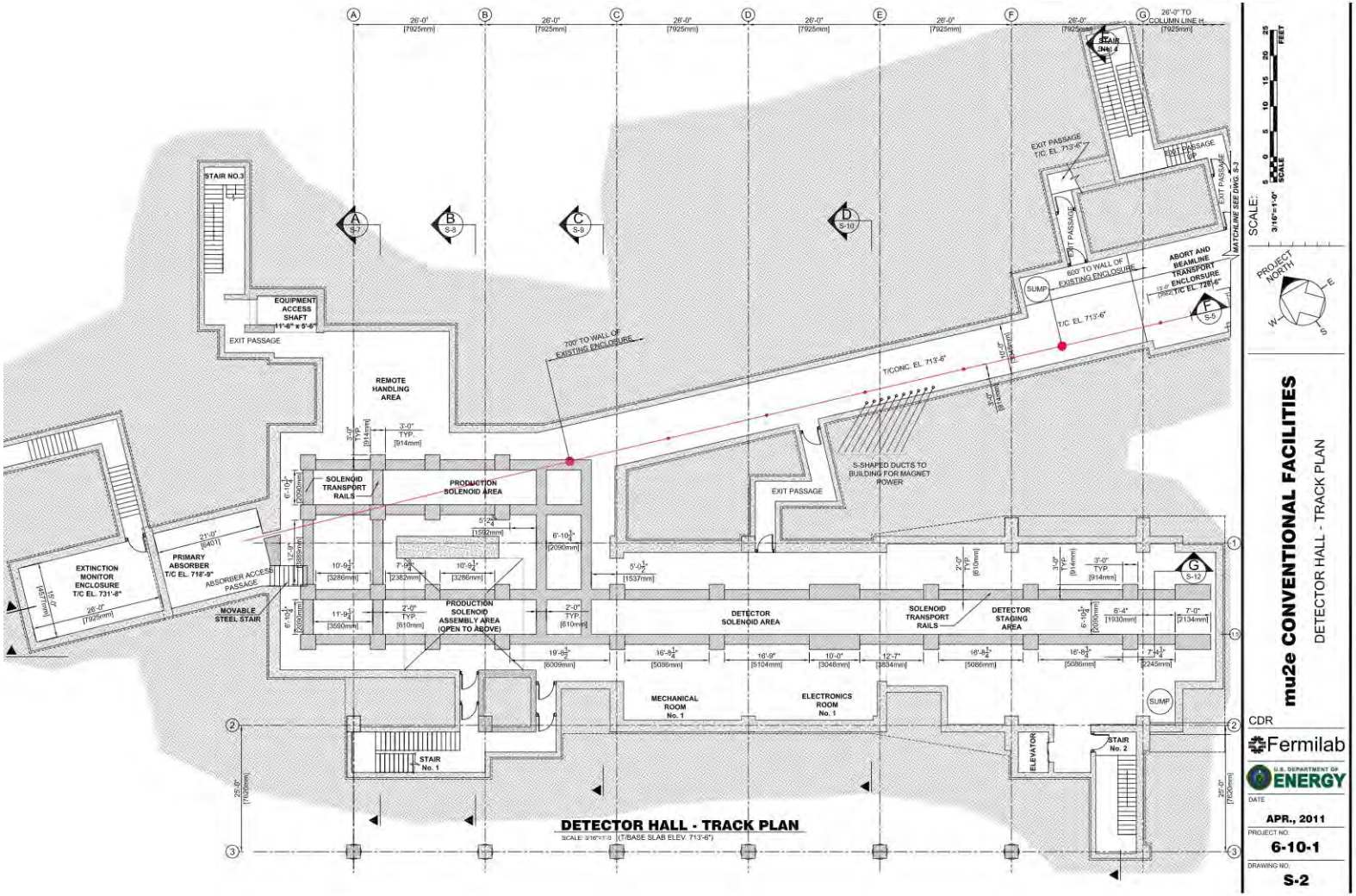


ENLARGED FLOOR PLAN ELEV 746'-6"

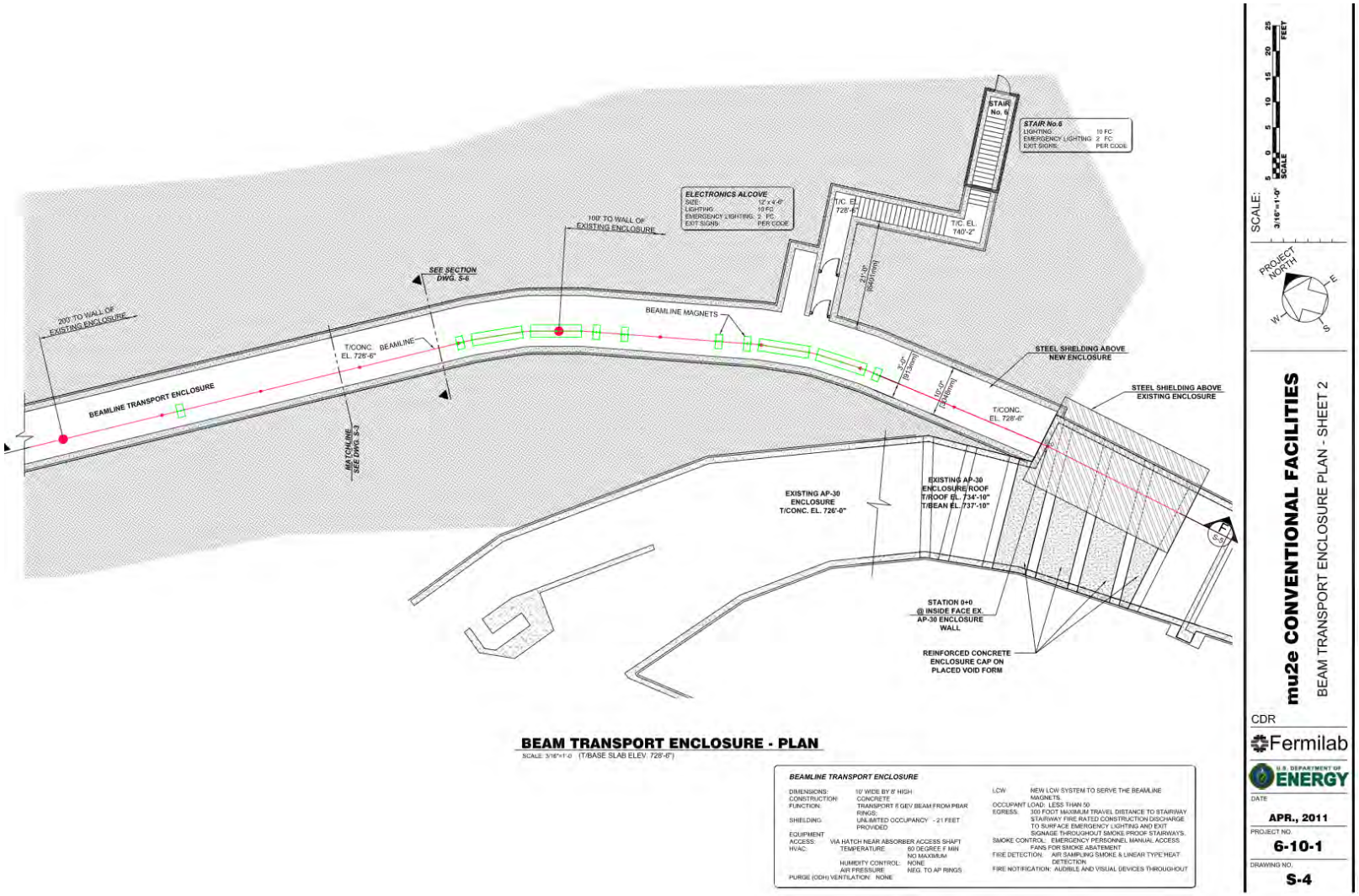
Detector Enclosure



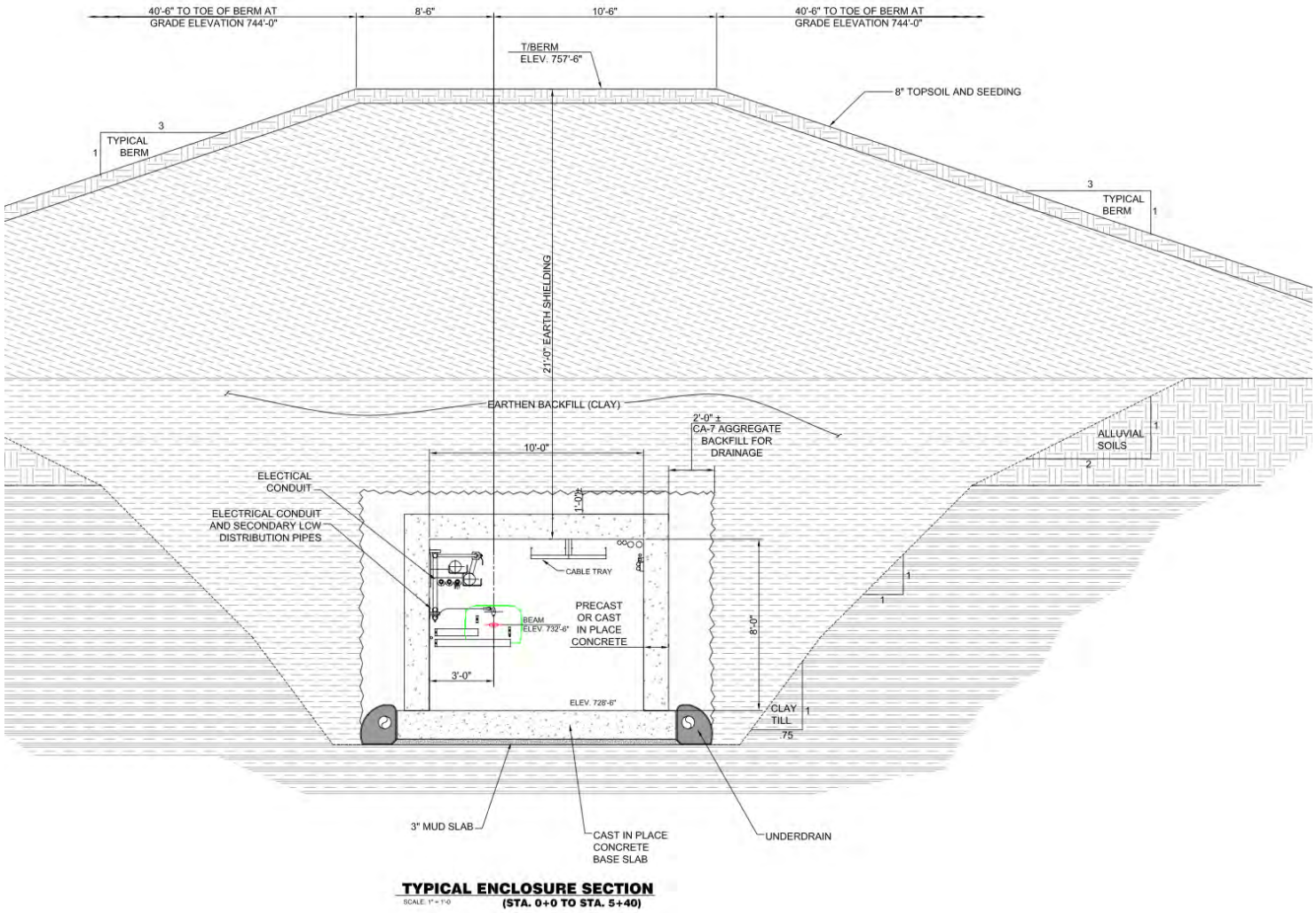
Rails


DETECTOR HALL - TRACK PLAN
SCALE: 3/16"=1'-0" (T/BASE SLAB ELEV. 713'-6")
mu2e CONVENTIONAL FACILITIES
DETECTOR HALL - TRACK PLAN
CDR
Fermilab
U.S. DEPARTMENT OF ENERGY
DATE
APR., 2011
PROJECT NO.
6-10-1
DRAWING NO.
S-2
SCALE:
3/16"=1'-0"
PROJECT NORTH
STAIR NO.3
EQUIPMENT ACCESS SHAFT 11'-6" x 5'-6"
EXIT PASSAGE
REMOTE HANDLING AREA
SOLENOID TRANSPORT RAILS
PRODUCTION SOLENOID AREA
EXTINCTION MONITOR ENCLOSURE T/C EL. 731'-8"
PRIMARY ABSORBER T/C EL. 718'-9"
ABSORBER ACCESS PASSAGE
MOVABLE STEEL STAIR
PRODUCTION SOLENOID ASSEMBLY AREA (OPEN TO ABOVE)
DETECTOR SOLENOID AREA
SOLENOID TRANSPORT RAILS
DETECTOR STAGING AREA
MECHANICAL ROOM No. 1
ELECTRONICS ROOM No. 1
STAIR No. 1
ELEVATOR
STAIR No. 2
SUMP
700' TO WALL OF EXISTING ENCLOSURE
600' TO WALL OF EXISTING ENCLOSURE
T/C EL. 713'-6"
T/CONC. EL. 713'-6"
S-SHAPED DUCTS TO BUILDING FOR MAGNET POWER
ABORT AND BEAMLINE TRANSPORT ENCLOSURE T/C EL. 728'-6"
MATCHLINE SEE DWG. S-3

Connection to Pbar



External Beamline

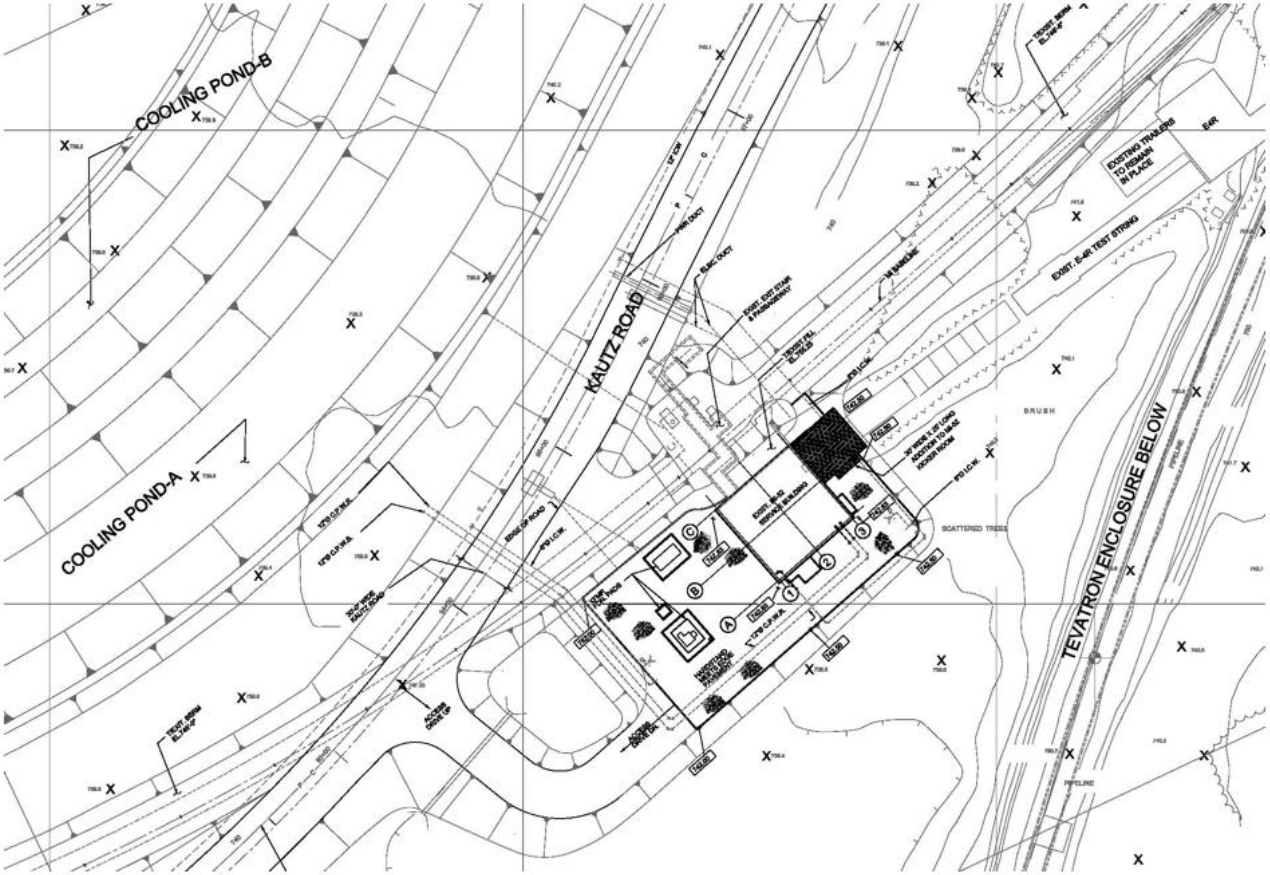


Mu2e

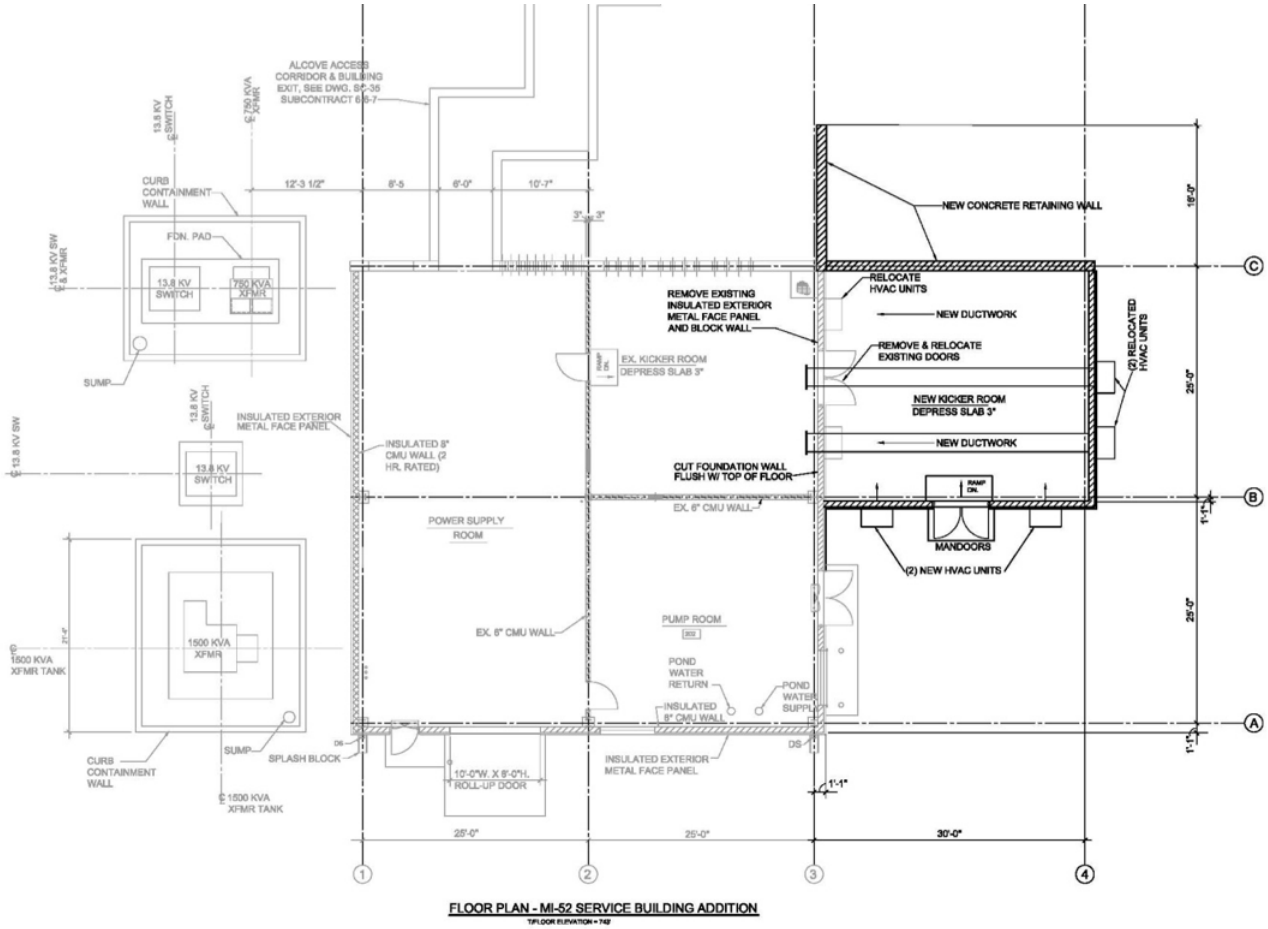
Mu2e

Mu2e

MI-52 Site Plan



MI-52 Extension



FLOOR PLAN - MI-52 SERVICE BUILDING ADDITION

Site Utilities

Roads and Hardstands

- 800LF of removed Kautz Road
- 1400LF of new Kautz Road
- 350 LF of new Well Pond Road
- 350LF of new Access Road
- 15,000SF of Parking and Hardstand

Piped Utilities

- 1,085 LF DWS
- 525 LF Sanitary Sewer
- 1085 LF 10” ICW
- 550 LF 6” ICW
- 1370 LF Chilled Water S&R

Electrical Power

- Three feeders from MSS:
- 16,700 new 15KV cable
- 5 new configuration switches
- 6 new -1500KVA Transformers
- Electrical / Comm. Duct Bank 1250 LF

Environmental

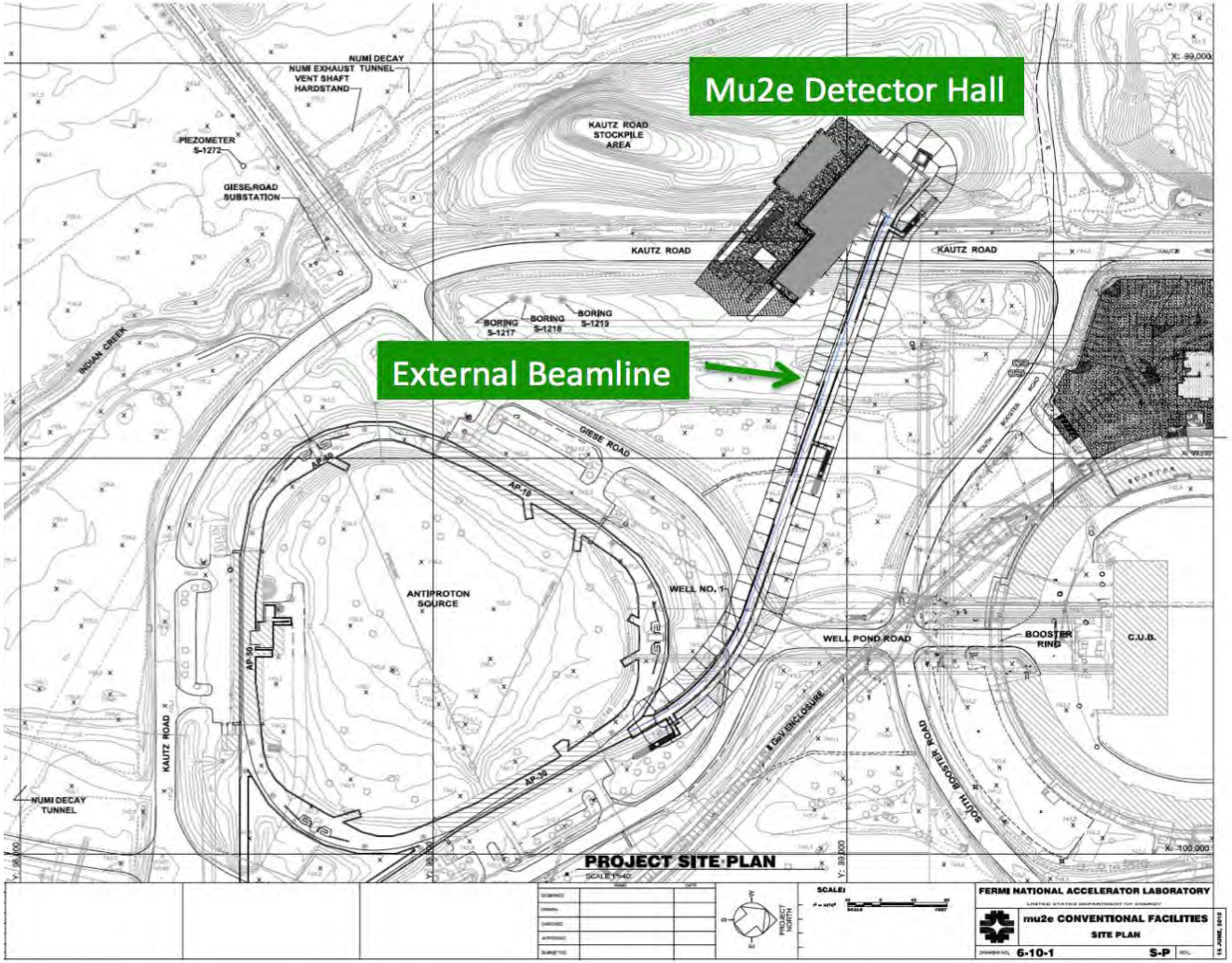
- Flood Plain and Wetland delineation is complete.
- The project will disturb low grade wetlands.
- Pursuing Wetland Assessment to apply for CX Determination.
- Corp of Engineer “Wetland” permit has been initiated

Sustainability

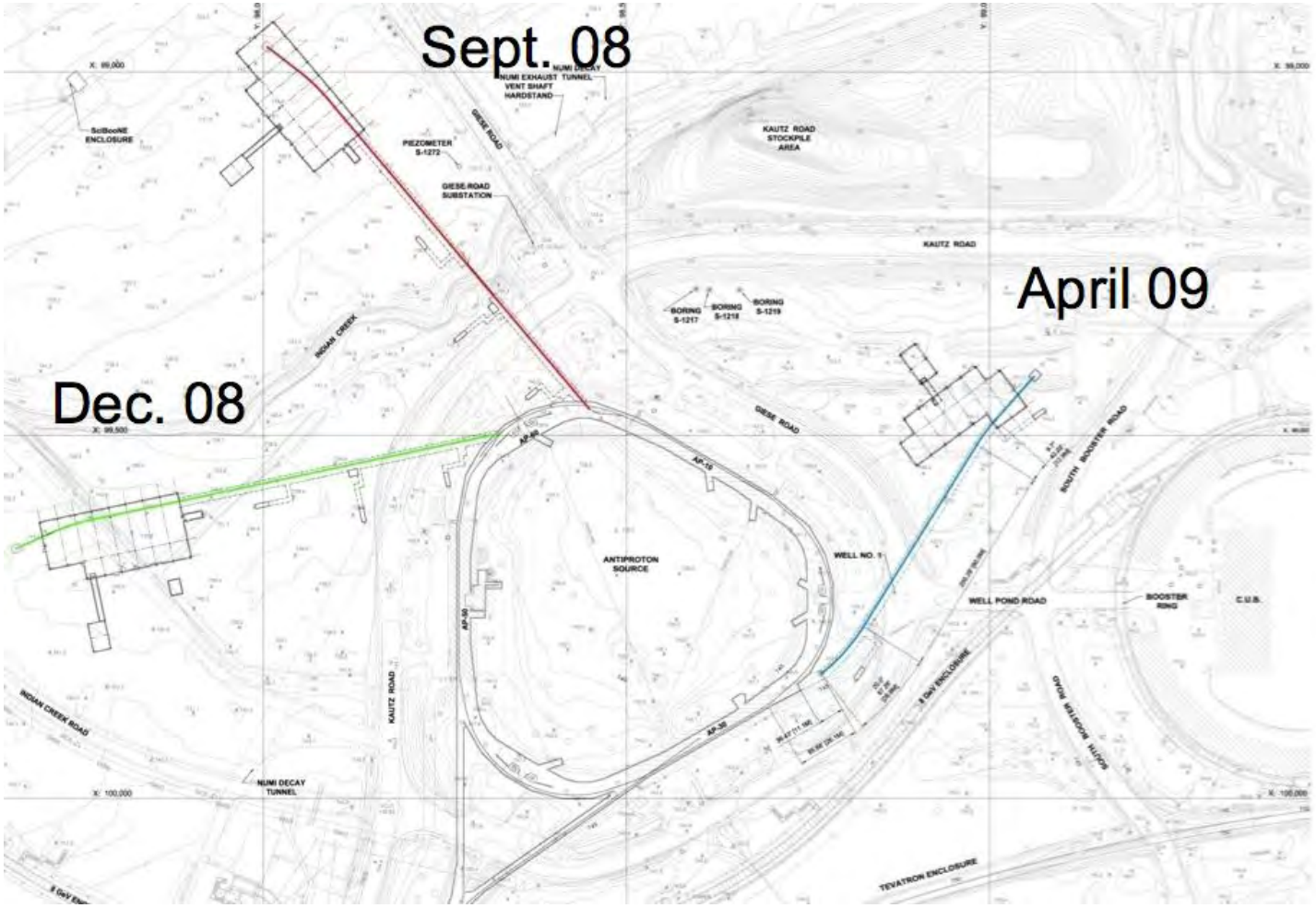
- Pursuing DOE Exemption LEED Gold Certification
- Will Comply with Guiding Principles.

Backup Slides

Why does the building have to go in the middle of a road?



Some sites we have evaluated



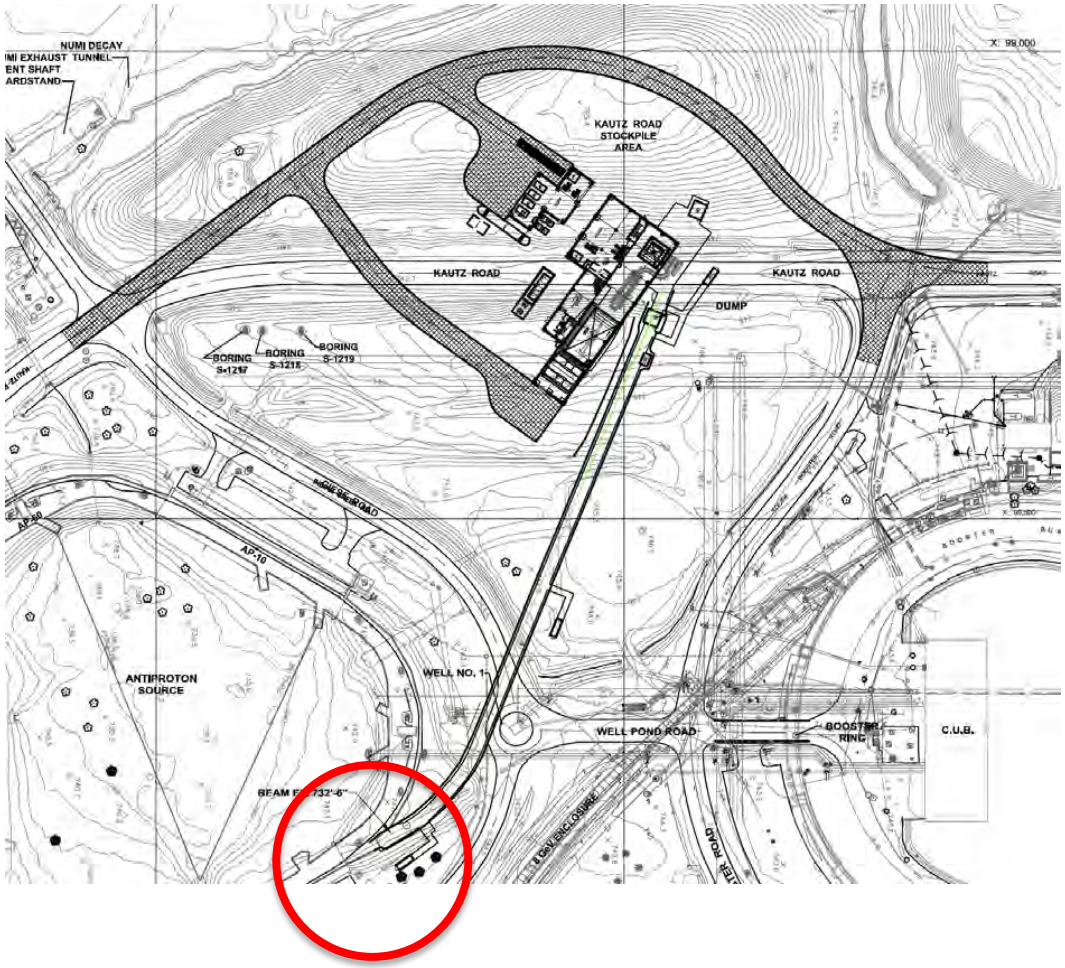
Constraints

There are several factors that come into play when considering the location of Mu2e:

- Where can we connect to the Debuncher Ring?
- Beam requirements for the AC Dipole
- Wetlands and Indian Creek.

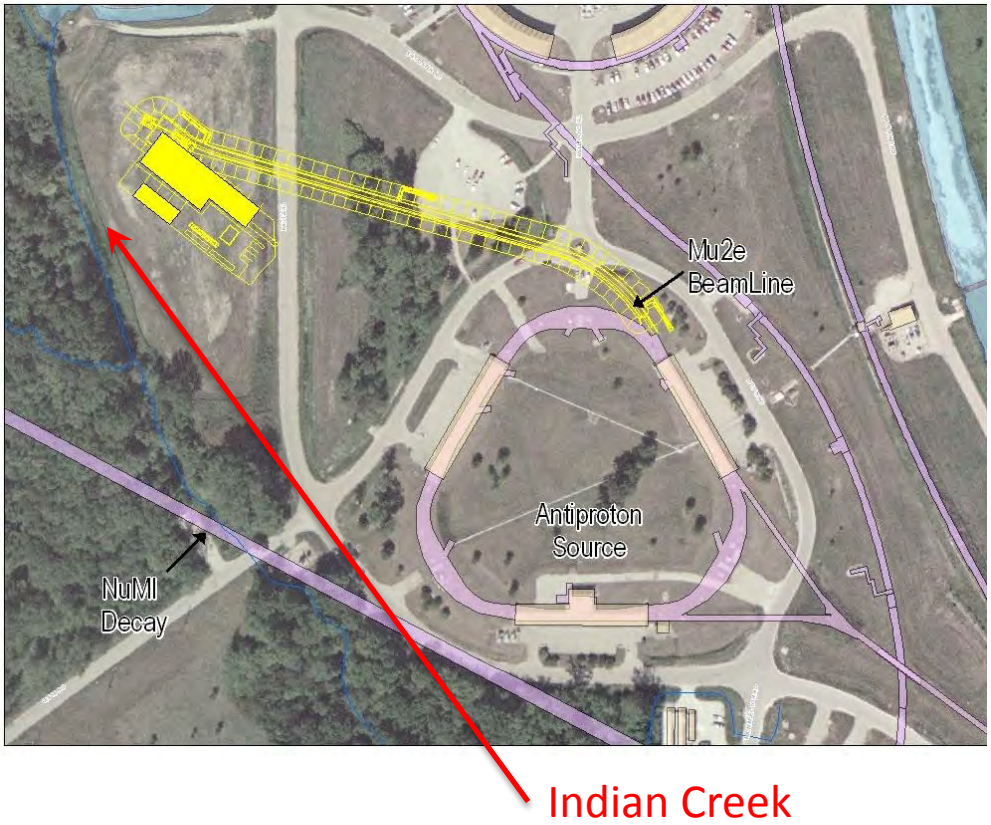
Debuncher Connection

- There is only one good location for connecting to the Debuncher Ring.
  - An existing beamline from the Booster connects to the pbar source at this location, so a stub allowing easy connection to the Debuncher with minimal demolition already exists.
- AD/PBAR experts who have walked the tunnel tell us that connecting anywhere else is extremely difficult and costly.
  - Other locations require significant demolition, relocation of A/D line, significant splicing and relocation of cables, power busses, etc.



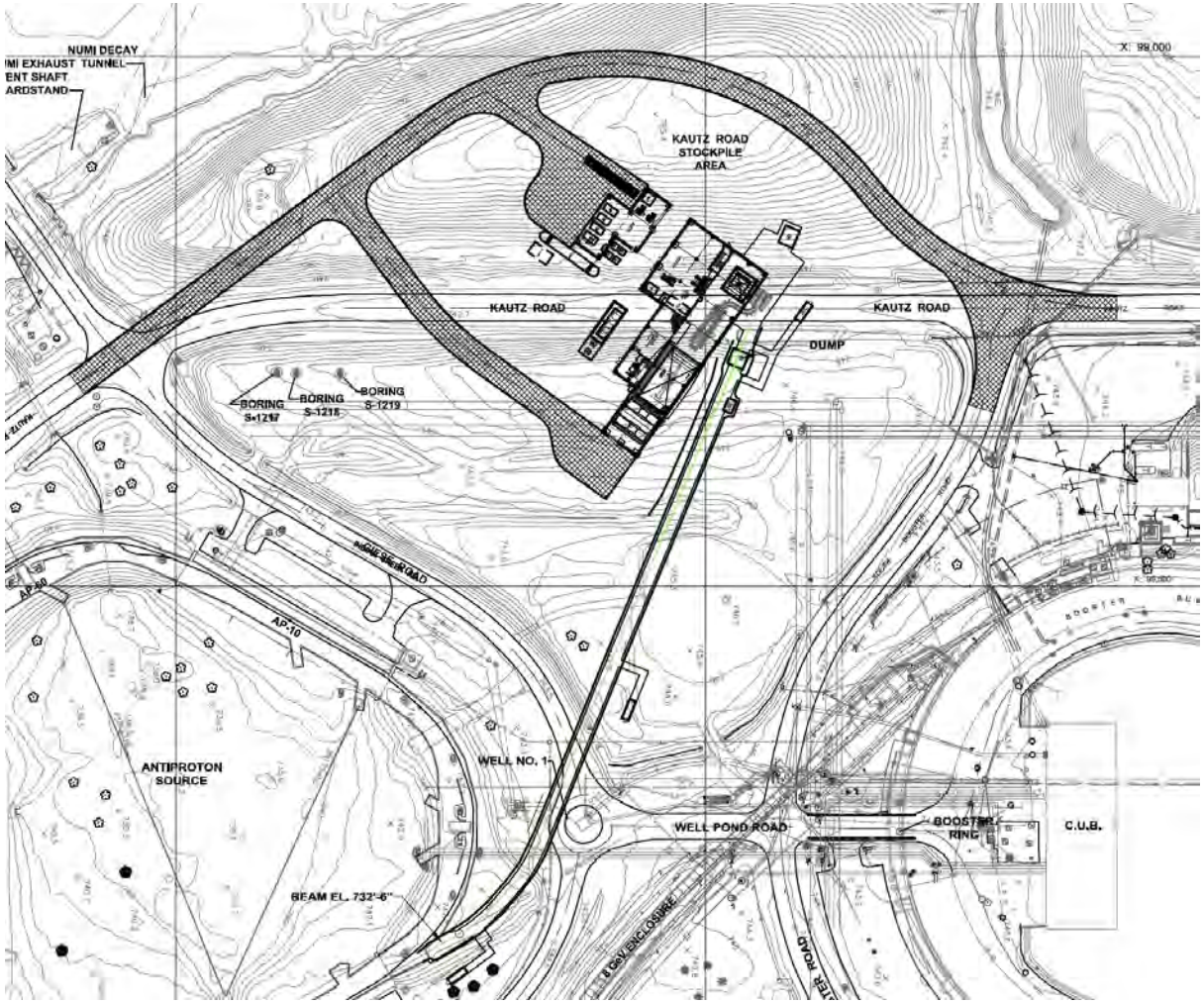
Length of beamline

- An AC dipole, located in the external beamline, is required to extinguish beam between pulses that can cause background.
- Significant optics is required to properly prepare the beam for the AC dipole.
  - Large betatron function in the bend plane
- This is very advanced optics. Not a simple transfer line.
- Also not a gold plated beam line. We don't cancel the derivative of the dispersion at the target, something we would do if we had more space.



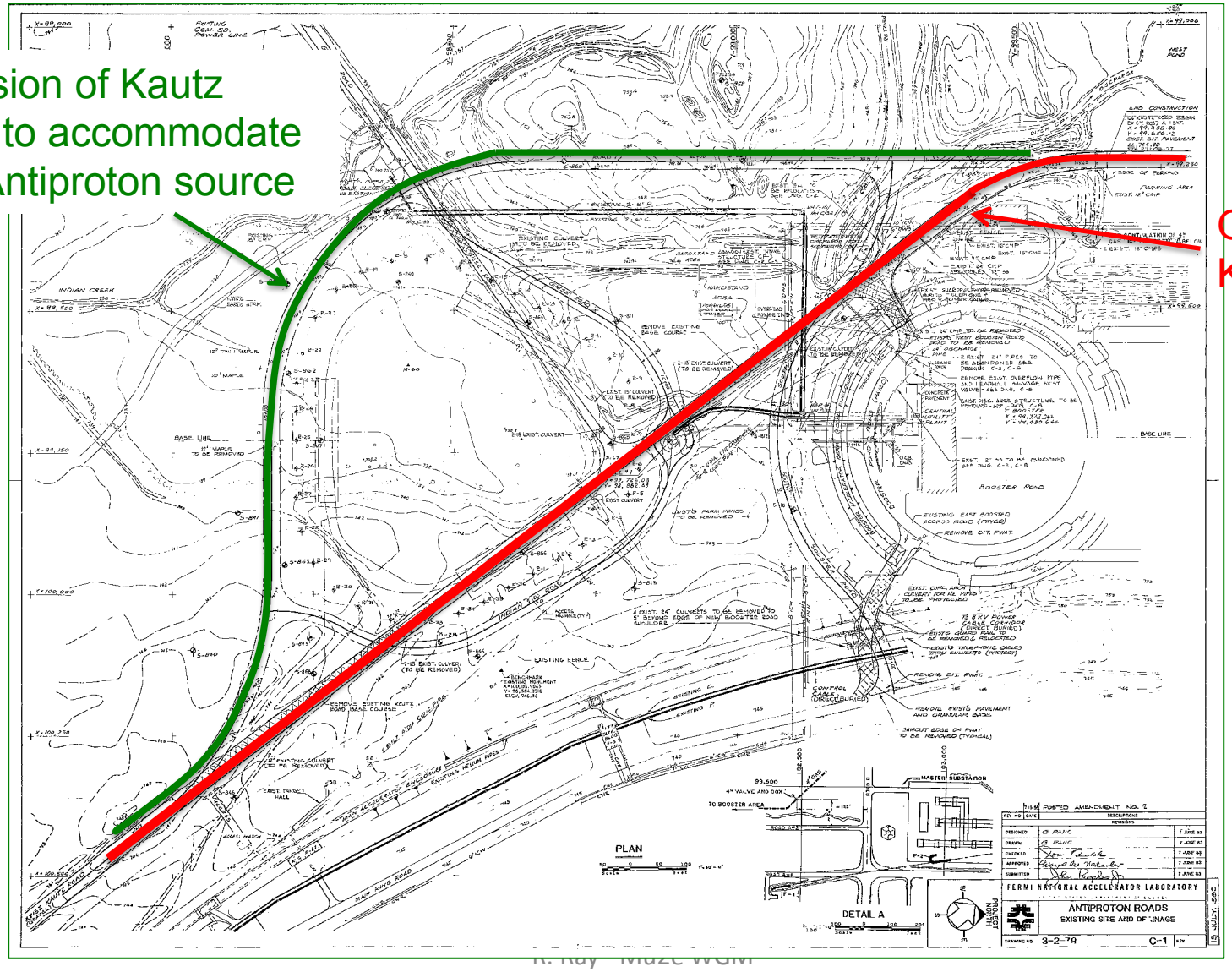
Current Location

- We were able to squeeze some space out of the upstream bends. Can't gain anymore without reducing β_x.
- Reducing β_x increases the cost and technical risk associated with the AC dipole.
- The current location minimizes the cost and the project risk. Any other location will increase the cost.



Precedent for diversion of Kautz Road

Diversion of Kautz Road to accommodate new Antiproton source



Original Kautz Road

Muon g-2 Experimental Hall

Chris Polly

Planning Meeting

April 4, 2011

U.S. DEPARTMENT OF ENERGY

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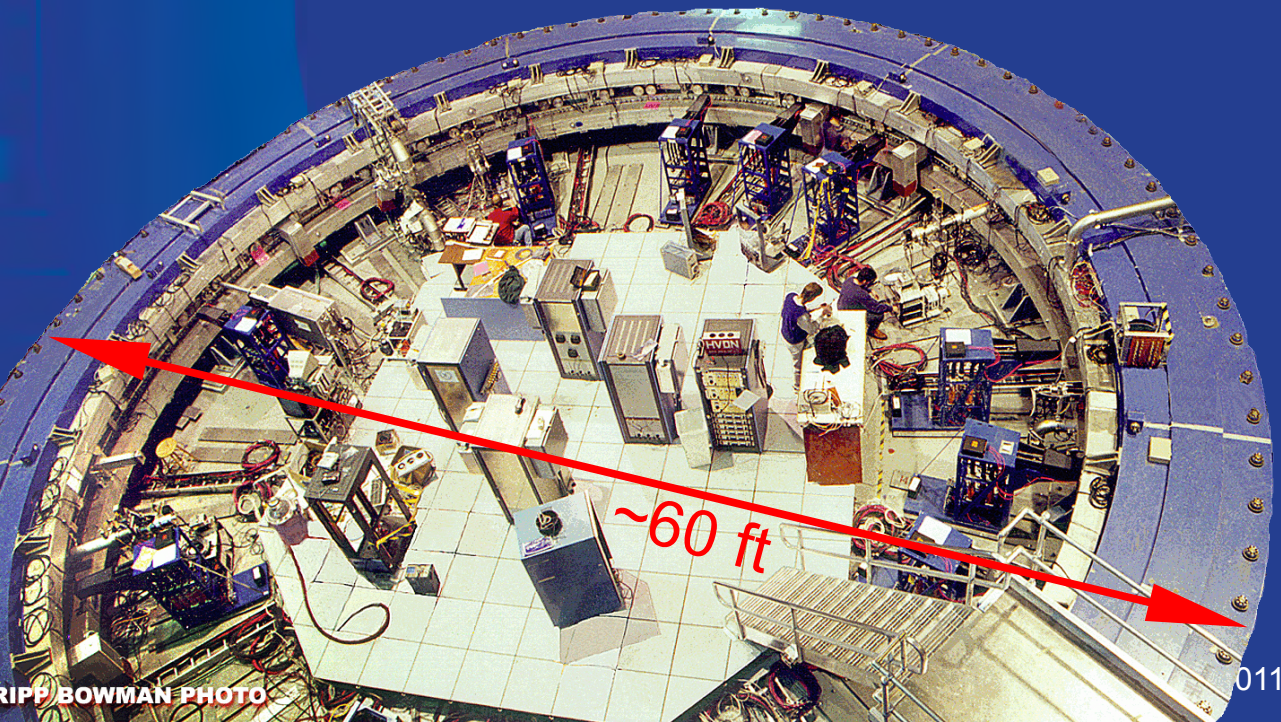
Muon g-2 (E989) Building constraints...size

- Need building large enough to house BNL E821 apparatus
  - → Have designed a 70' x 80' high-bay
  - → Coils monolithic + 30 T crane coverage → no interior supports
- Also require a low bay area 50' x 50'
  - → Power supplies for magnet and beamline, lab space for ongoing work, counting house, restroom, etc.



Muon g-2 (E989) Building constraints...location

- Beam comes out here
- Muon g-2 sites
- Current large exp halls

Low-energy beams require a much denser lattice for transport, no way to even get 8 GeV primary beam to

Need building in proximity to pbar

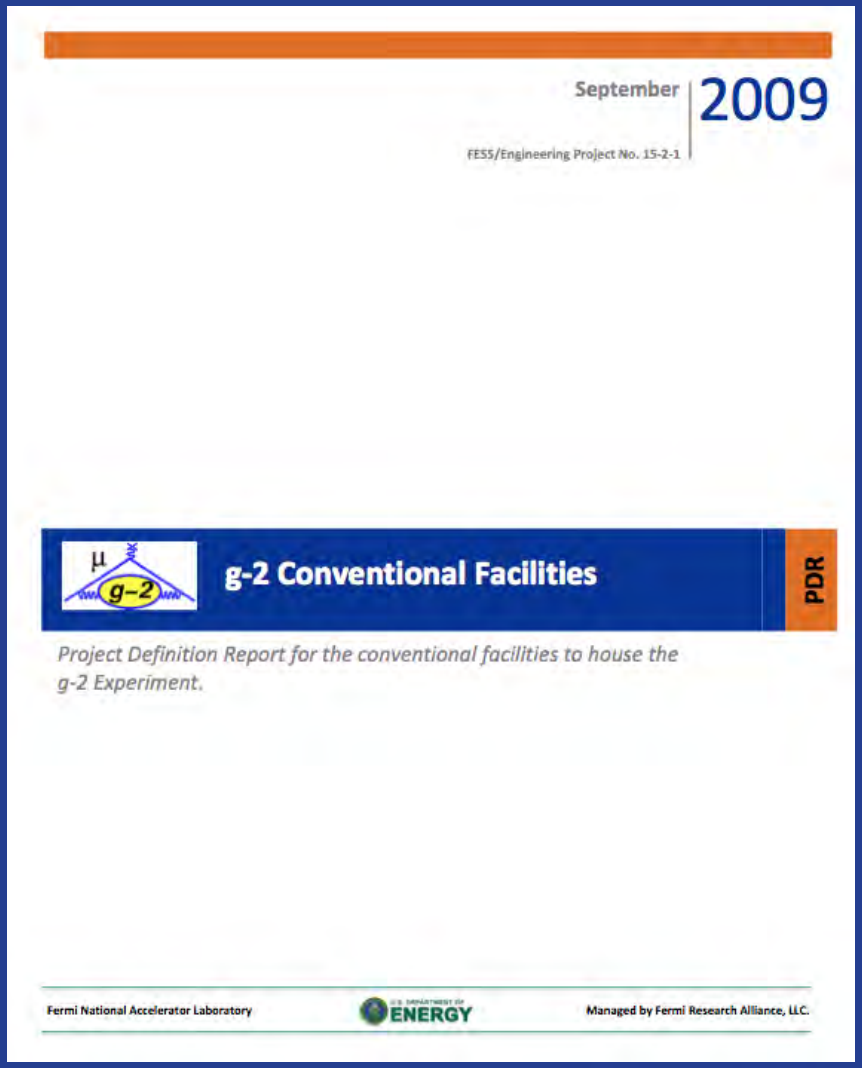
Project Definition Report for Conventional Facilities

PDR Funding Profile

	Fiscal Year 1	Fiscal Year 2	Total
Construction	$350,000	$3,677,000	$4,027,000
EDIA	$620,000	$266,000	$886,000
Management Reserve	$243,000	$983,000	$1,226,000
Space Management	$0	$450,000	$450,000
Subtotal	$1,213,000	$5,376,000	$6,589,000
Indirect Costs	$287,000	$124,000	$411,000
TOTAL	**$1,500,000**	**$5,500,000**	**$7,000,000**

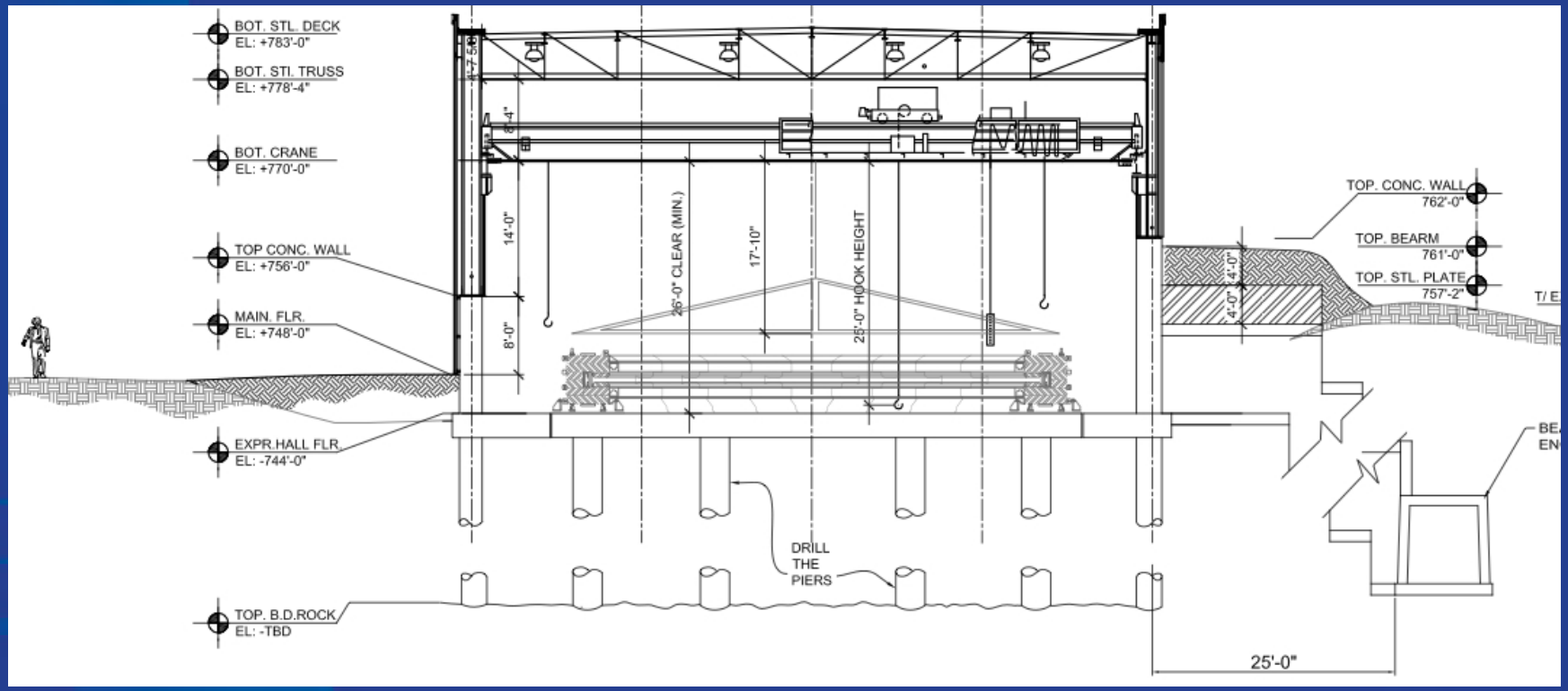
- Includes building + connecting tunnel
- $450K space management now waived

R. Alber, FESS/Engineering
G. Contreras, FESS/Engineering
E. Huedem, FESS/Engineering
J. Hunt, FESS/Engineering
J. Niehoff, FESS/Engineering
S. Stoica, Rempe-Sharpe & Associates



Elevation view of building + tunnel

- Floor has to support 650 T apparatus...piers to bedrock
- Added stability by separating floor from rest of building
- Temperature control to +/- 2 F...no differential heating of ring



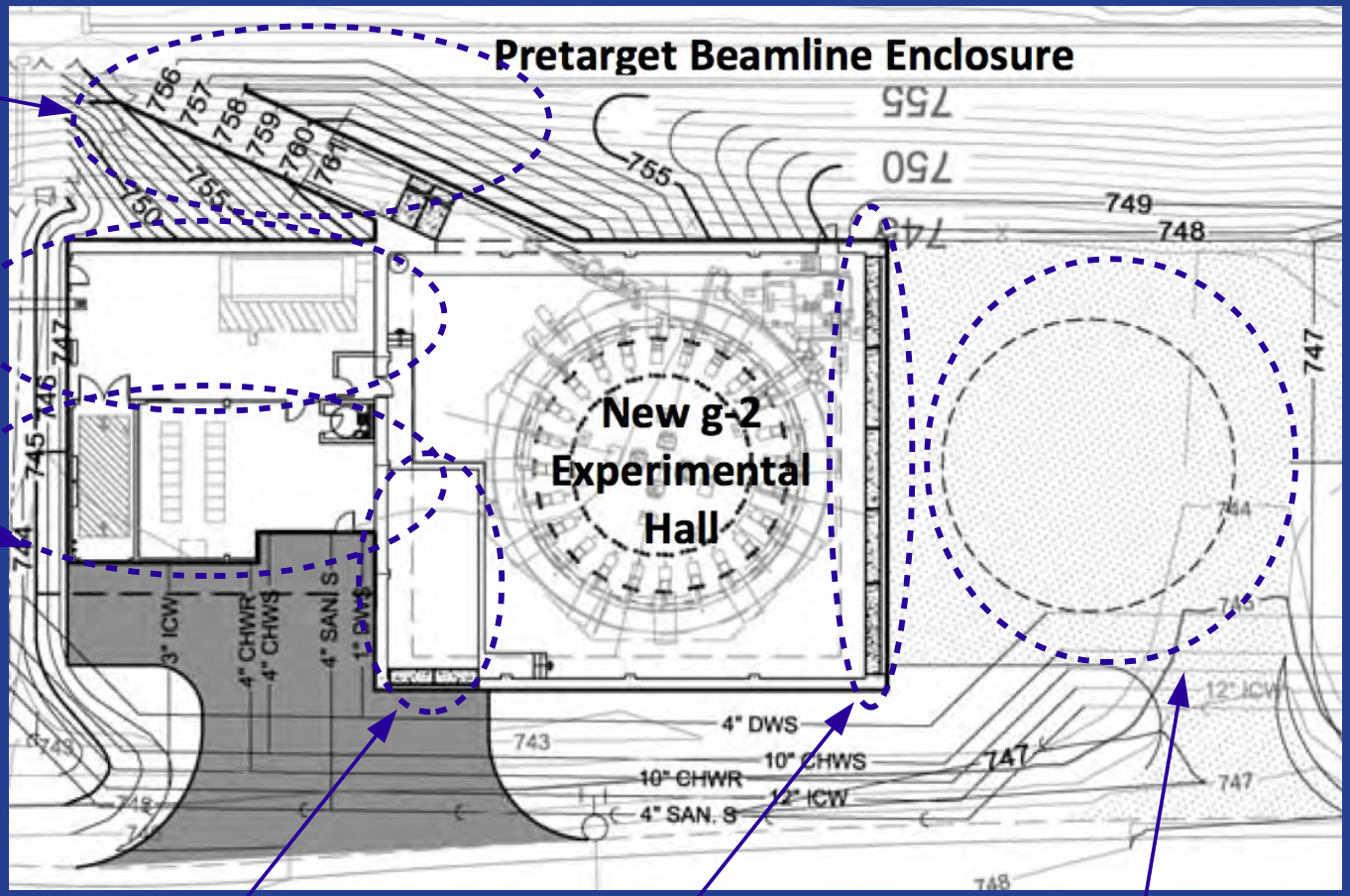
Original site (OS) considered in PDR

Aerial view of building with features

Connecting Tunnel

Power Supplies & Mechanicals

Counting House/ Working Area



Internal Loading Dock

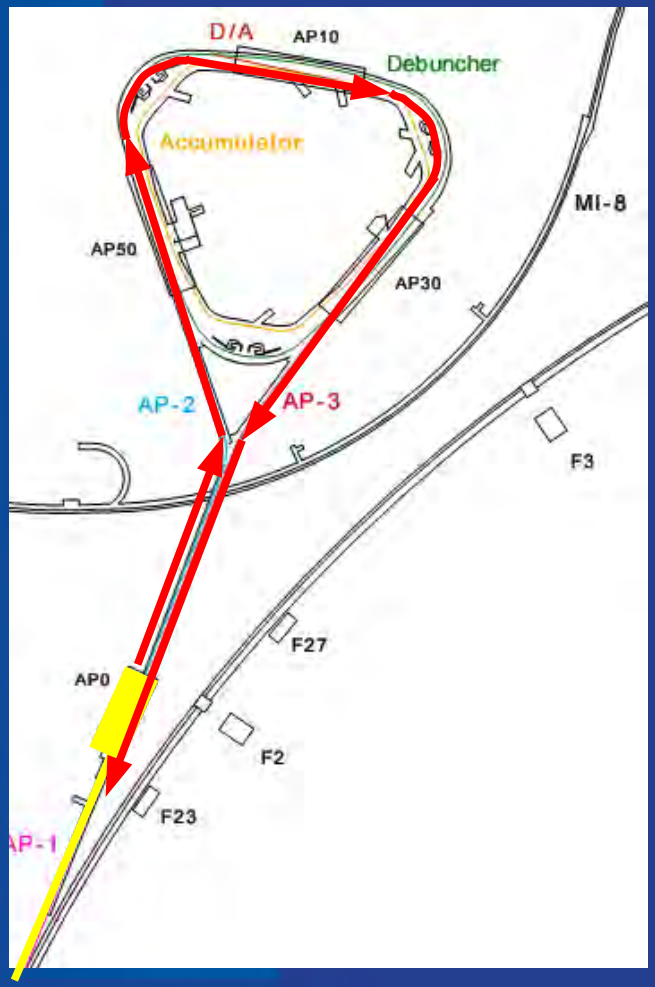
Removable Shielding Wall & Mailslot

Hard stand for staging the three cryostats

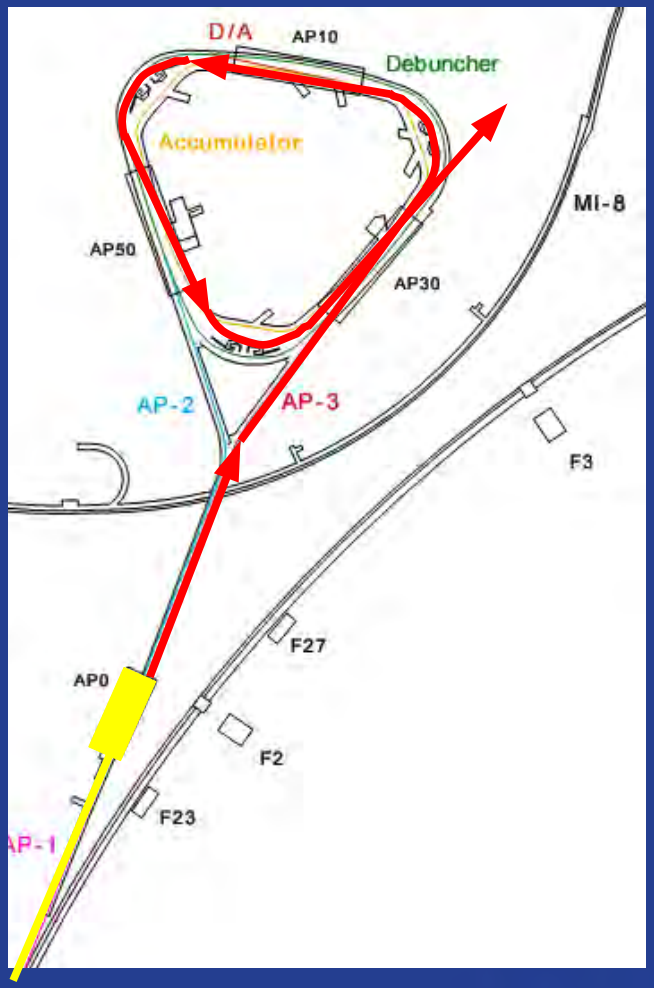
Rendering in OS location

Have been considering an alternate site

Original Site (OS)



Muon Campus (MC)



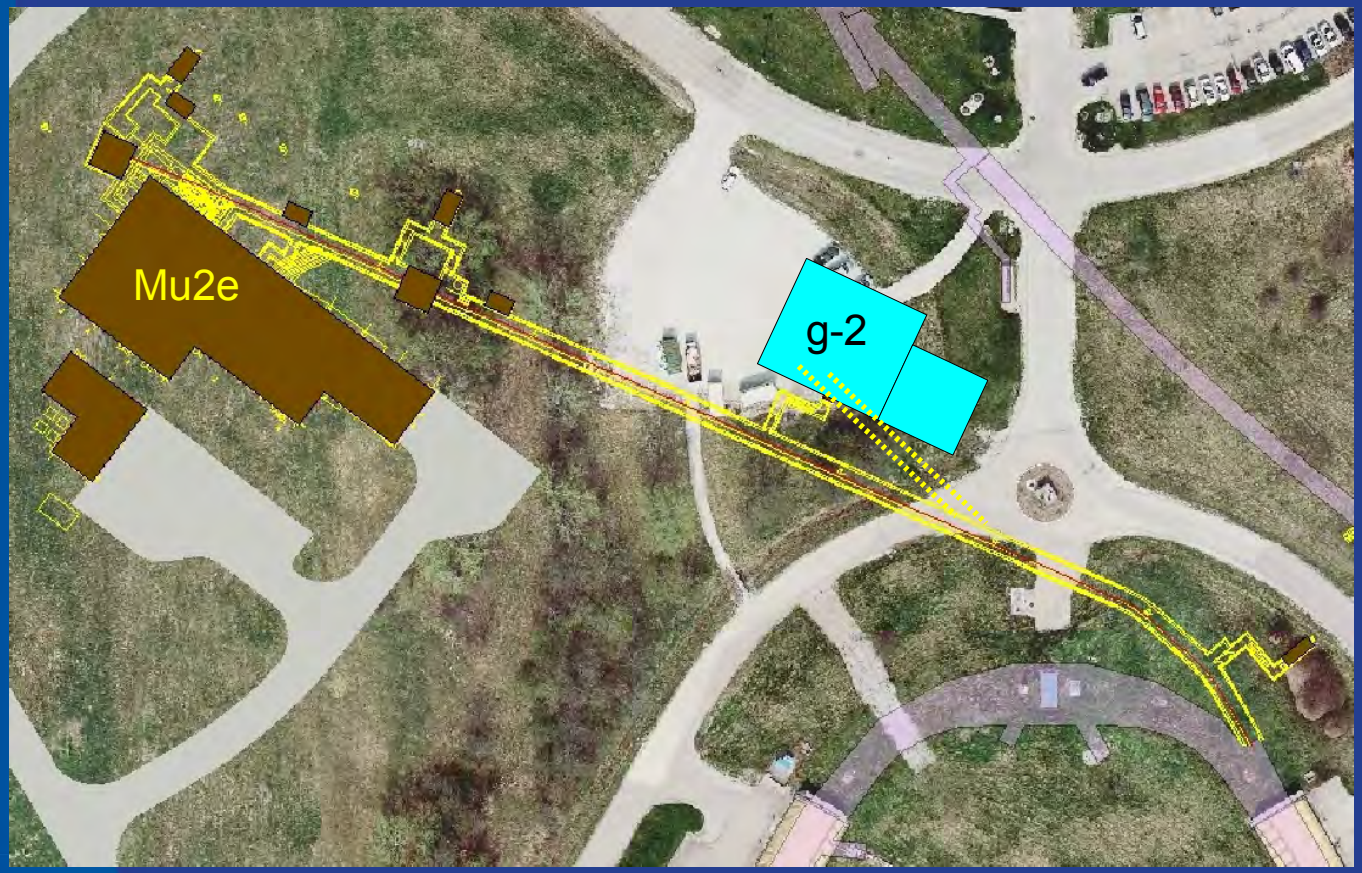
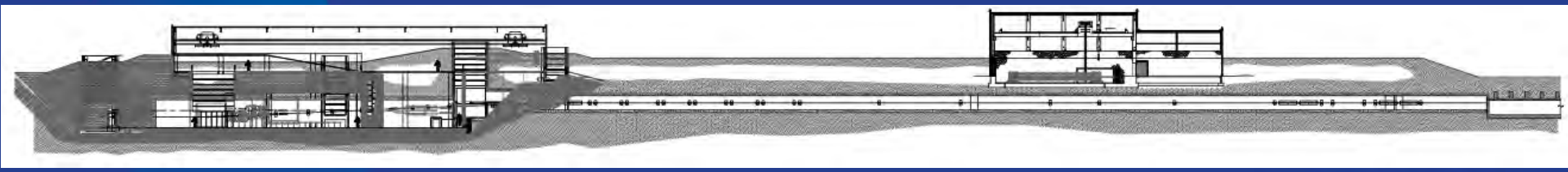
Muon campus

Existing:
- 13.8kV Switch
- Transformer
- Feeder & Duct

Proposed:
- 13.8kV Switch
- Transformer
- Feeder
- Feeder & Duct

Muon g-2 hall can be placed on either side of tunnel...without interfering with utility corridors

Updated (7 Mar 2011) site map showing existing and planned utility corridors

Fermilab

Muon campus