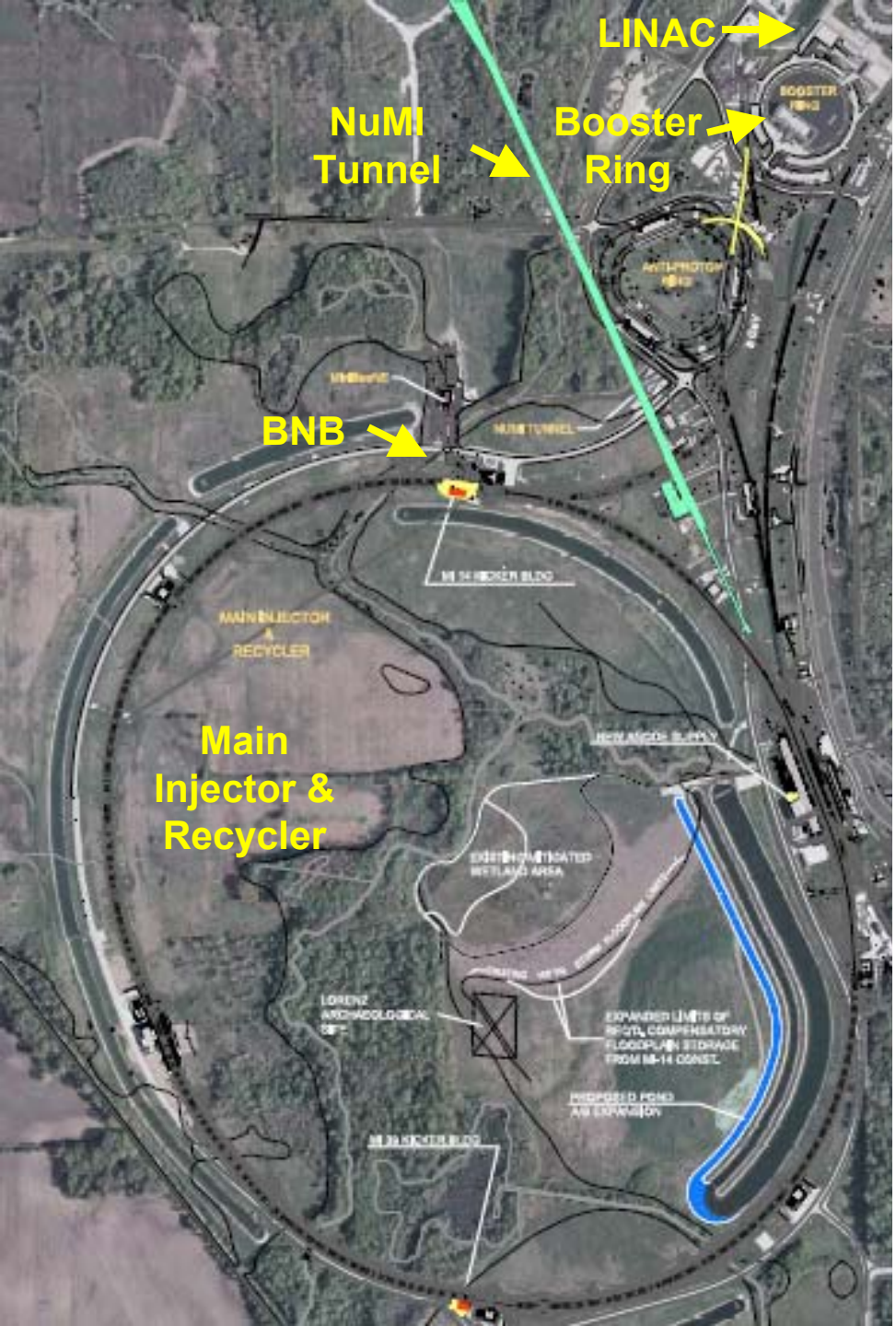

MINU GPP

WBS 1. Main Injector Neutrino Upgrades - Infrastructure Project 6-6-49

Dixon Bogert

APD Department Report – March 7, 2007

Russ Alber - FESS Engineering Support

MINU EXECUTIVE SUMMARY FROM CDR and PEP

The Main Injector Neutrino Upgrade Project (MINU) will provide new service buildings to house new power supplies and new kicker magnet support equipment to support the future increase of the NuMI beam power from 400kW to 700 kW. The use of the accumulator ring for the stacking of protons is made possible as well. The project will require construction of two new service buildings around the Main Injector, MI-14 and MI-39, and one small addition at MI-60 to house an anode power supply. The work would require excavation for installation of penetrations from the new service buildings to the existing Main Injector tunnel, excavation for building foundations at all three locations, utility installation in trenches for power and communication ductbanks, and industrial cooling water (ICW) piping. Floodplain mitigation for the area taken at MI-14 and Space Compensation demolition for the entire area to be constructed is also required.

MINU GPP Project

MINU FUNDING PROFILE FROM CDR and PEP

APD Dept. Report
7 March 2007
Dixon Bogert

	FY07	FY08	TOTAL
Construction	$0	$2,566,000	$2,566,000
EDIA	$340,000	$273,000	$613,000
Management Reserve	$88,000	$859,000	$947,000
Subtotal	$428,000	$3,698,000	$4,126,000
Indirect Costs	$142,000	$594,000	$736,000
TOTAL	**$570,000**	**$4,292,000**	**$4,862,000**

CDR and PEP Title Pages

MINU
Main Injector Neutrino Upgrades
Conceptual Design Report

FESS/Engineering Project No. 6-6-49
February 2007

MINU
Main Injector Neutrino Upgrades
Project Execution Plan

FESS/Engineering Project No. 6-6-49
February 2007

Authors of this document:

Dixon Bogert, Accelerator Division
Russ Alber, FESS/Engineering

Fermilab
Fermi National Accelerator Laboratory
Office of Science / U.S. Department of Energy
Managed by Fermi Research Alliance, LLC

Fermilab
Fermi National Accelerator Laboratory
Office of Science / U.S. Department of Energy
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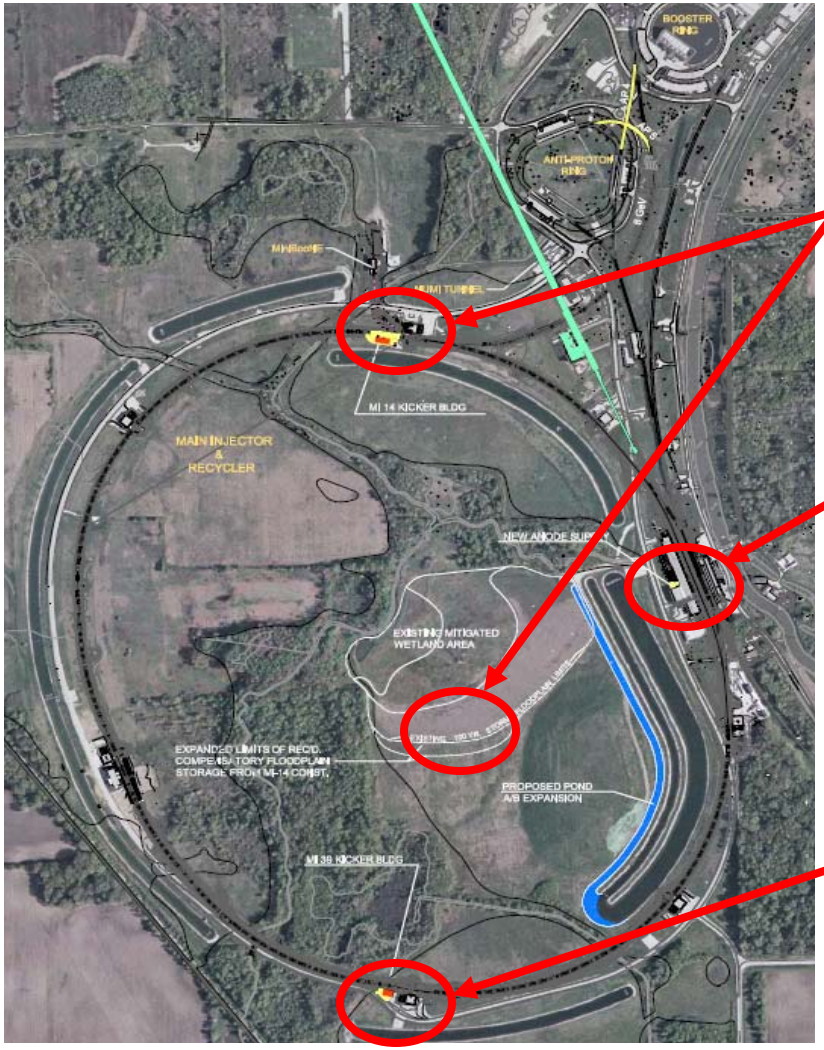
WBS Description & Scope



1.1 Space Management
(Remove 4000sf somewhere)

1.2 MI-14 Service Building
(2250sf; also floodplain mitigation)

1.4 MI-60 4th Anode
Supply Room
(250sf)

1.3 MI-39 Service Building
(1500sf)

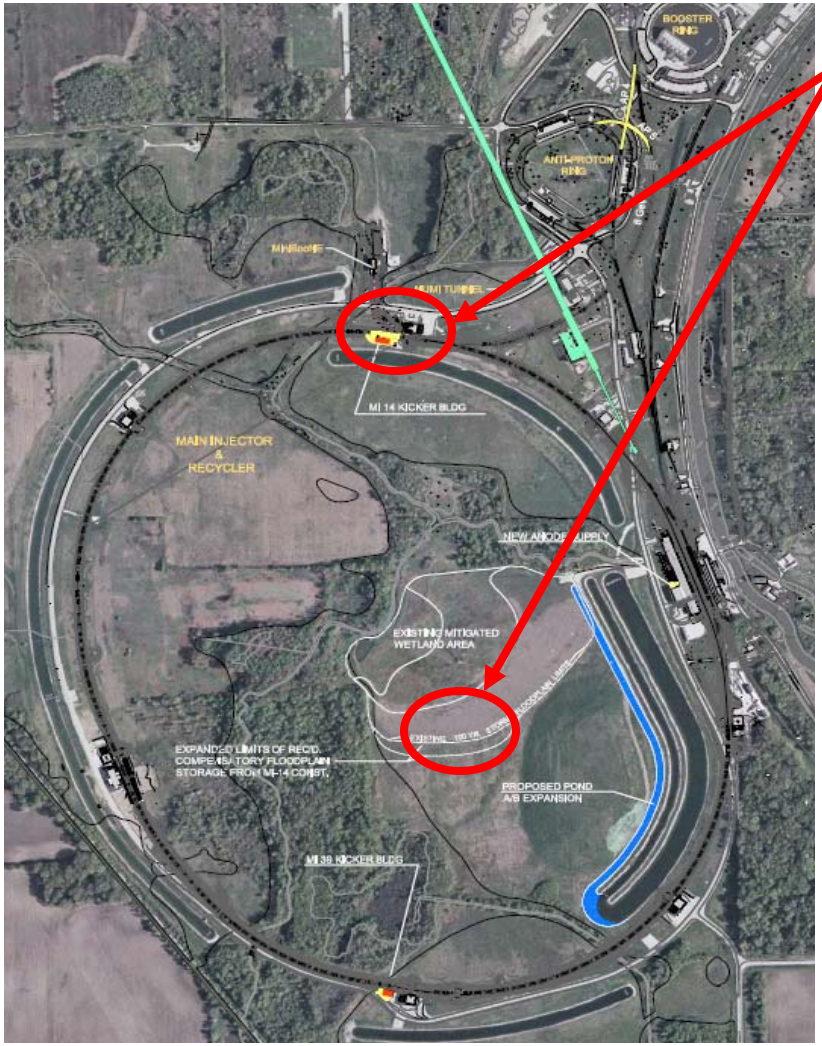
MINU GPP Civil Construction

GPP Project Schedule

1. Project Definition – Preliminary Discussions with local DOE staff
2. Submit GPP Documentation – March 2007
3. GPP Project Approval – March/April 2007
4. Design – FESS and outside AE – Remainder of FY 2007
5. Construction Bid and Award – FY 2008
6. Construction Start – Before/Start FY 2008 shutdown
7. Penetrations complete –End of FY 2008 shutdown
8. All construction complete – Early FY 2009

The shoring to support the Main Injector Precast unit roofs will simultaneously block the aisles to thru transport traffic at MI-14 and MI-39. This will probably last about four weeks, and isolate the “MI-30 Half” of the FMI from the “MI-60 Half” for any delivery or transit.

MI-14 Service Building



1.2 MI-14 Service Building
(2250sf; also floodplain mitigation)

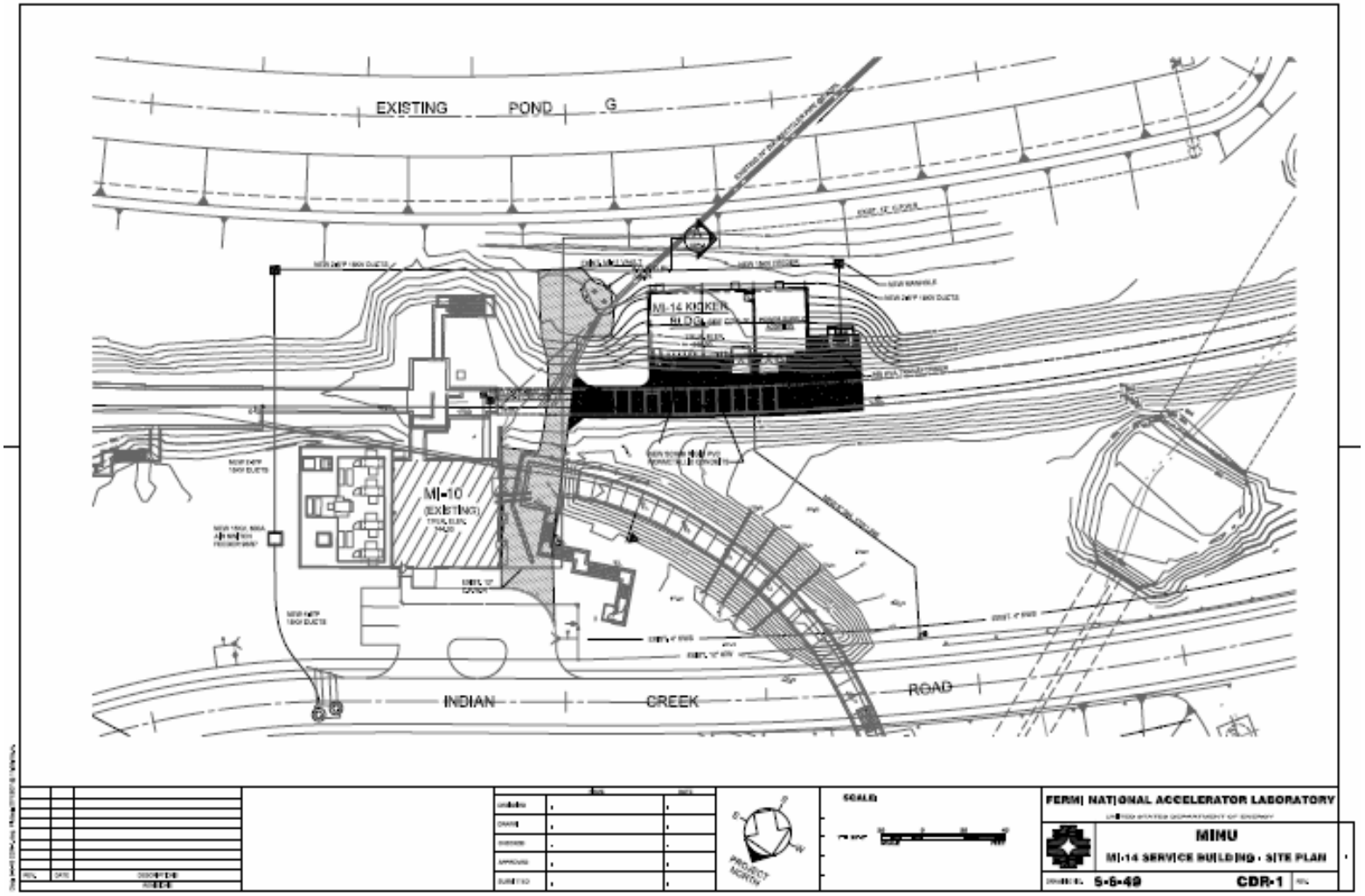
Service Building housing kicker power supplies for 8 GeV Injection into the Recycler Ring, also power supplies for magnets in the 8 GeV injection line, space for fluorinert skids for cooling the kickers. Penetrations must be constructed for kicker cables, cooling water, and fluorinert lines.

Building footprint subtracts from Indian Creek floodplain area; must be mitigated.

MINU GPP Project

MI-14 Service Building Plan View

APD Dept. Report
7 March 2007
Dixon Bogert

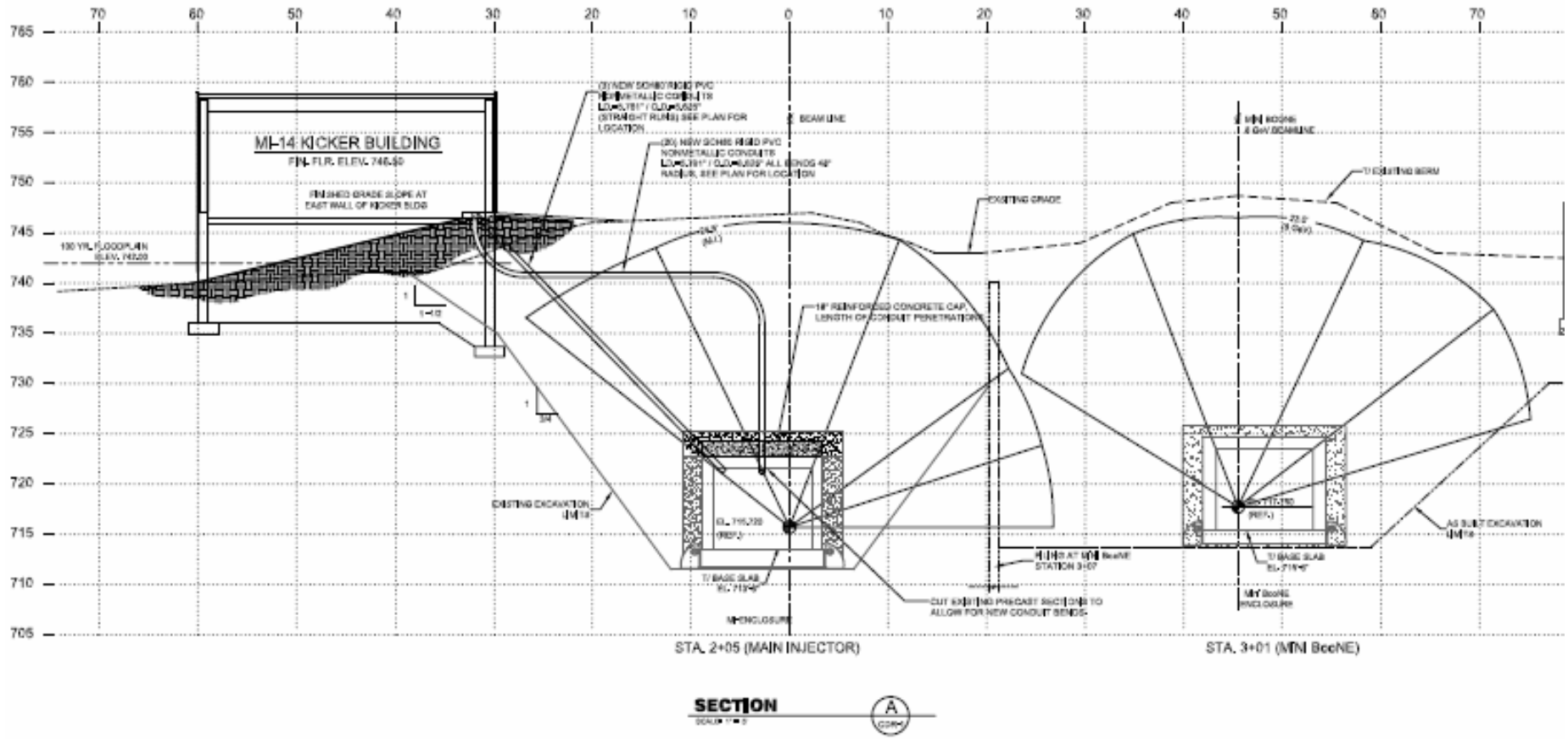


MINU GPP Civil Construction

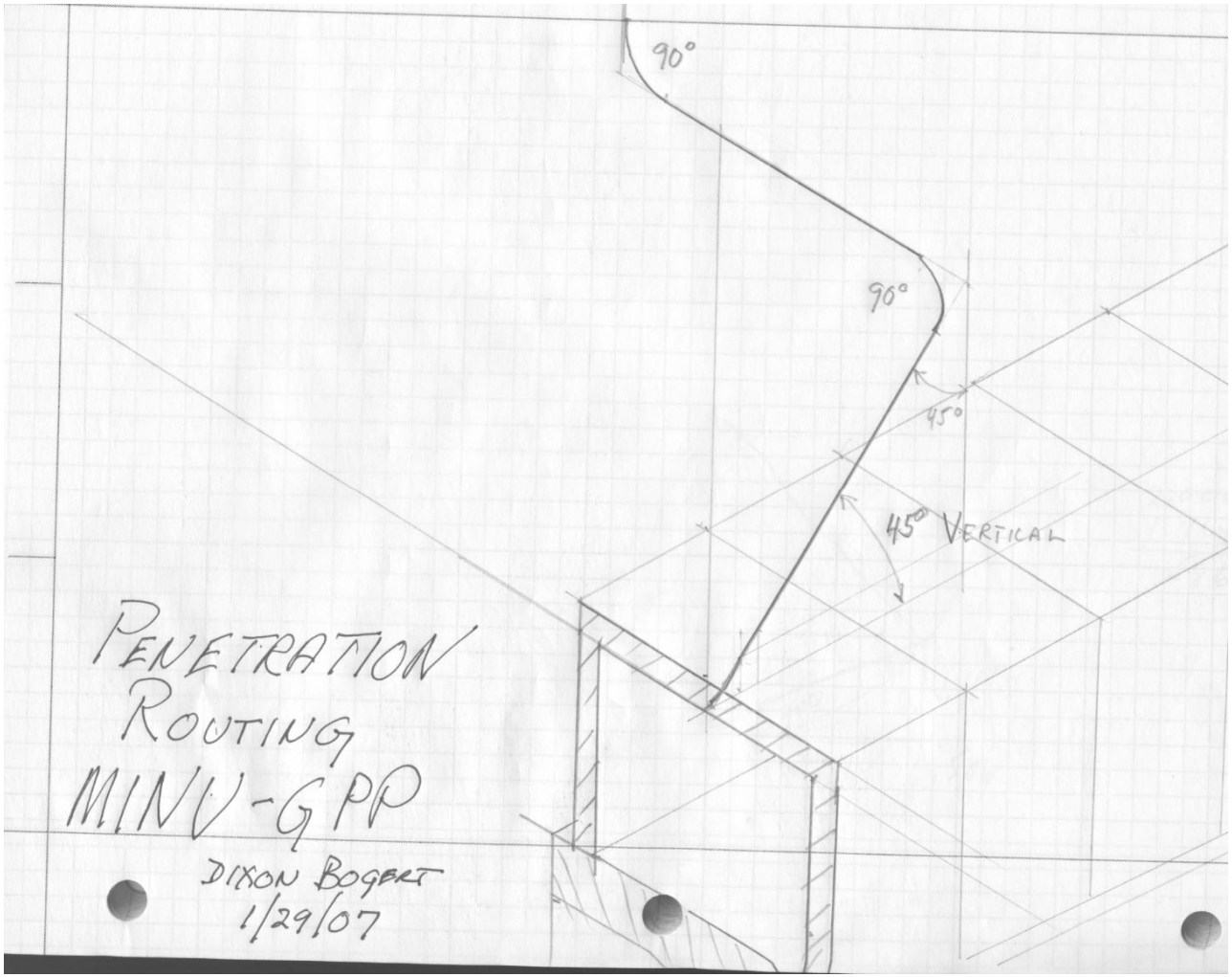
MINU GPP Project

MI-14 Service Building Elevation/Cross Section

APD Dept. Report
7 March 2007
Dixon Bogert



MI-14 Service Building Penetration Routing Sketch



MINU GPP Civil Construction

MI-14 Service Building Preliminary Floor Plan

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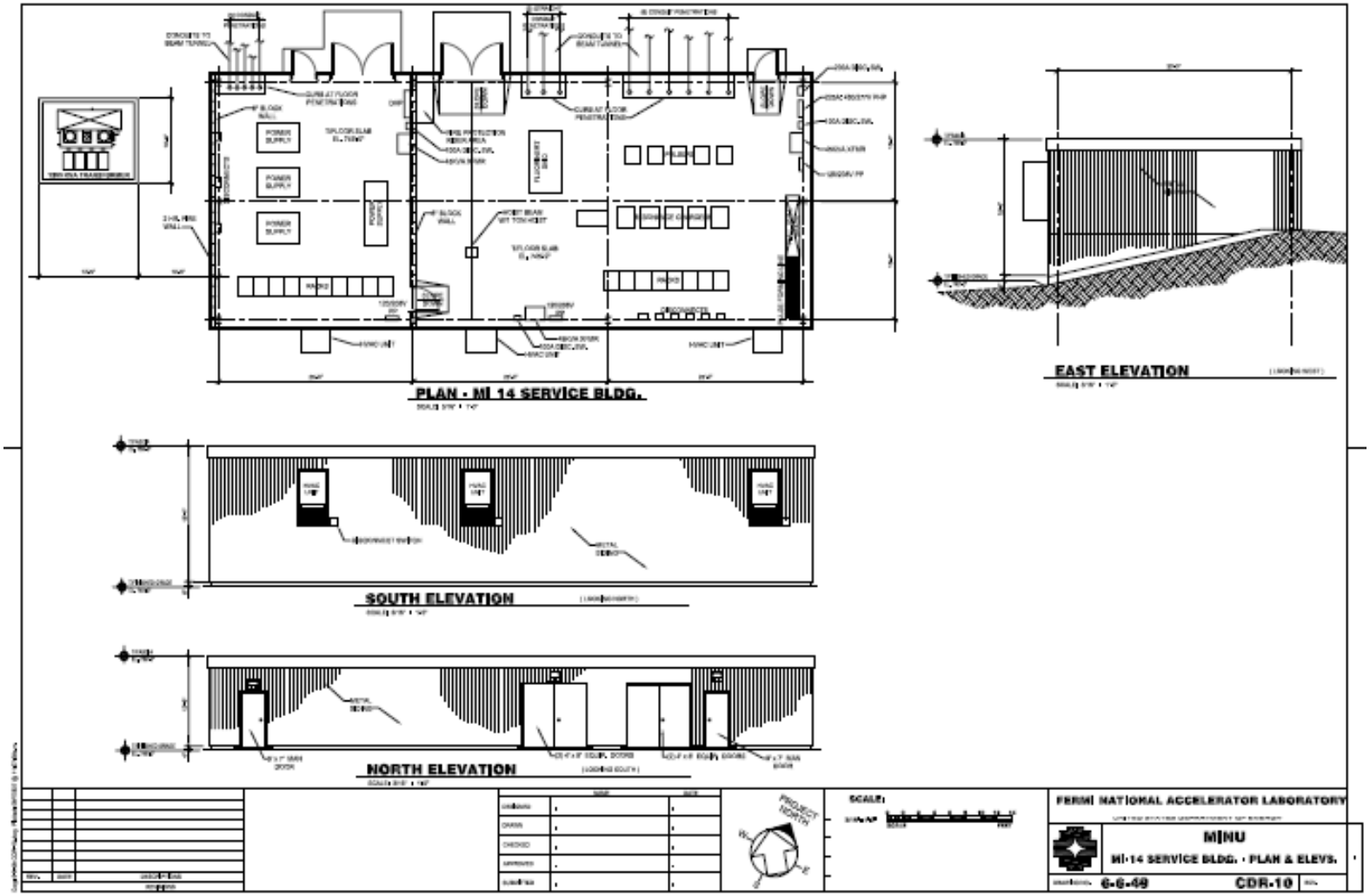


MI-14 Service Building Floodplain Mitigation

APD Dept. Report
7 March 2007
Dixon Bogert

MI-14 Service Building Floodplain Mitigation

Notice of Proposed Action
MI-14 Service Building at Fermi National Accelerator Laboratory (Fermilab)

This notice is prepared in order to comply with U.S. DOE Floodplain and Wetlands Environmental Review notice requirements at 10 CFR Part 1022.12. The proposed project does not impact any wetland areas.

Project Description
Fermilab proposes to construct a new service building to house power supplies for additional kicker magnets and beam line magnets that would be installed in the Main Injector tunnel. The MI-14 Service Building would be located withhin the 100-year floodplain of Indian Creek, a tributary to the Fox River (see map). This is not a high-hazard area as defined in 10 CFR 1022.4, and the floor of the building itself would be constructed two feet above the high water level, so the building and its contents would not be at significant risk. The planned footprint of the building is 2,250 square feet and the total displaced flood storage volume would be 7,800 cubic feet. This area was previously disturbed during construction of the Main Injector (MI). There are no cultural resource values associated with either the proposed MI-14 site or the compensatory storage area.

[Insert figure]

DOE will allow fifteen (15) days for public comment on this proposal. If you have comments about the proposed project, please address them to:

[Address]

MI-14 Service Building Floodplain Mitigation

Floodplain Statement of Findings
MI-14 Service Building at Fermi National Accelerator Laboratory (Fermilab)

This notice is prepared in order to comply with U.S. DOE Floodplain and Wetlands Environmental Review notice requirements at 10 CFR Part 1022.14. A Notice of Proposed Action for the project was published on [date]. This statement of findings incorporates comments received by DOE from members of the public subsequent to the Notice of Proposed Action.

Floodplain Impacts
No significant downstream flood hazards exist in this area. The small volume of storage capacity displaced by the MI-14 service building would be directly mitigated by the excavation of sufficient soil to provide for compensatory flood storage at a 1.5:1 ratio to the volume lost. This would add 11,700 cubic feet of flood water storage. The Main Injector is designed to route all floodwaters in excess of the 100 year storm around the outside of the existing berm, by-passing the infield where the proposed project would be built.

Because the loss of flood storage would be replaced at a greater than one-to-one ratio, no negative impacts would result, either in the short term or the long term. The short-term impact would in fact be positive. Erosion control measures would be employed as needed during construction to protect water quality in Indian Creek, and the excavated area would be revegetated to match the existing flora. There should be no effect on floodplain values after restoration.

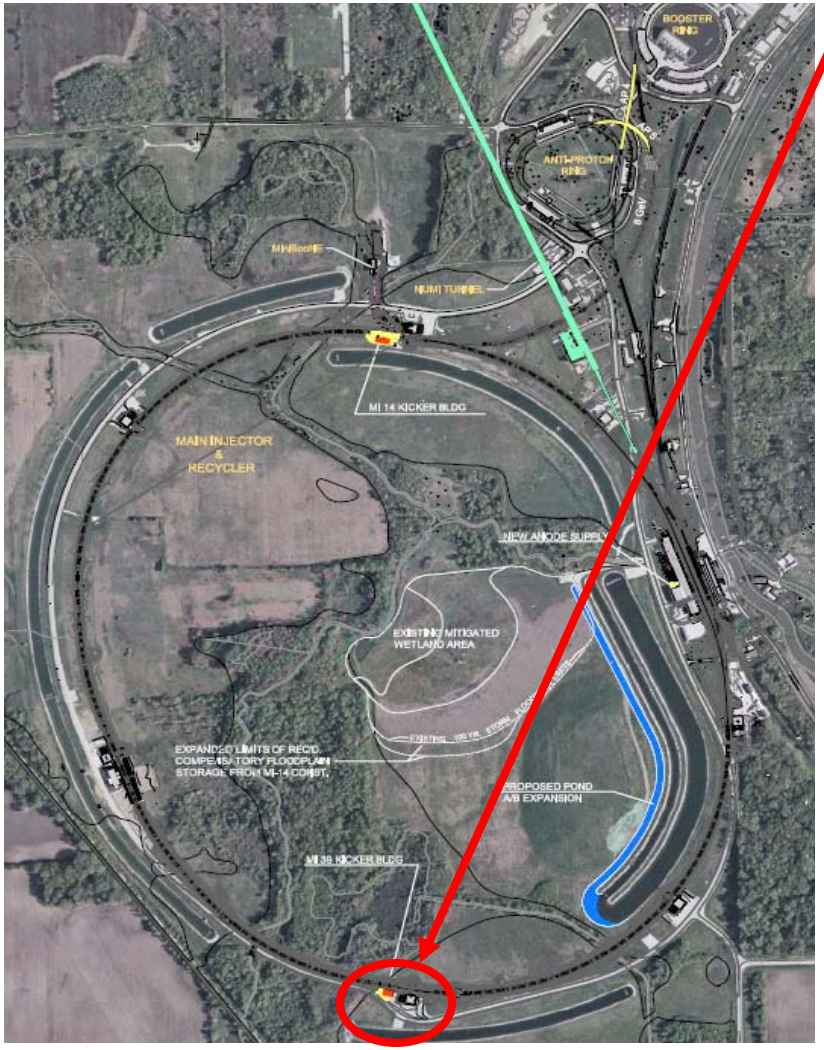
Alternatives
The physics criteria require equipment inside the building to be within 200 ft of the kicker injection location in the Main Injector tunnel. Locations outside the Main Injector berm that meet this distance requirement are already occupied by existing facilities that would remain in service. There is insufficient room adjacent to the existing MI-10 service building to construct an addition of the necessary size to house the proposed MI-14 equipment. The only feasible site for the MI-14 service building, therefore, is inside the MI berm, within the floodplain. Taking no action would not allow attainment of the Laboratory's physics goals and would greatly increase the time required by existing and future experiments to amass their desired data sets.

MI-14 Service Building Specifications (Selected items from CDR)

APD Dept. Report
7 March 2007
Dixon Bogert

- One story building with 11.5’ clear height
- Depressed floor for 30’x 50’ kicker room to contain oil from equipment to mitigate spills
- 30’ x 25’ power supply room
- 16 – 6” conduit penetrations from building to MI enclosure for 8 known and 8 future cable runs for kicker room
- 6-6” conduit penetrations from building to MI enclosure for power supply room
- Straight 6” penetration to MI enclosure for 1.5” LCW supply and return piping, with both pipes in same conduit. Anticipating heat rejection to LCW is 50 kW
- Two 5 inch "straight shot" conduits to the tunnel for installing fluorinert cooling system
- Building power: new 750 kVA , 13.8kV – 480/277V beamline power transformer located adjacent to the building. New 15kV air switch at MI-10 service building, with existing 15kV feeders 96//97 extended from MI-8 Service Building via existing MI ductbank. New 225A, 480/277V feed from MI-10 Service Building to power fluorinert pumps (480V), kicker power supplies, electronics racks, and miscellaneous building loads.
- Communications/controls to be supplied from MI-10 via new ductbank to MI-14
- ICW supply/return from main distribution along Indian Creek Road to serve for fire suppression
- Concrete masonry wall separating power supply and kicker rooms
- Two sets of double doors for entrance into kicker room from outside, with a removable panel at the top of the doors for infrequent loading of tall equipment. Aprons in front of the building should extend 8’ from door.
- One overhead and one single mandoor from outside into power supply room
- Air conditioning and unit heaters serving each of the 2 rooms
- Two 18” cable trays in ceiling of MI enclosure for likely 32 cables to kicker magnets, with maximum 200 ft length of cable from equipment in building to equipment in tunnel

MI-39 Service Building



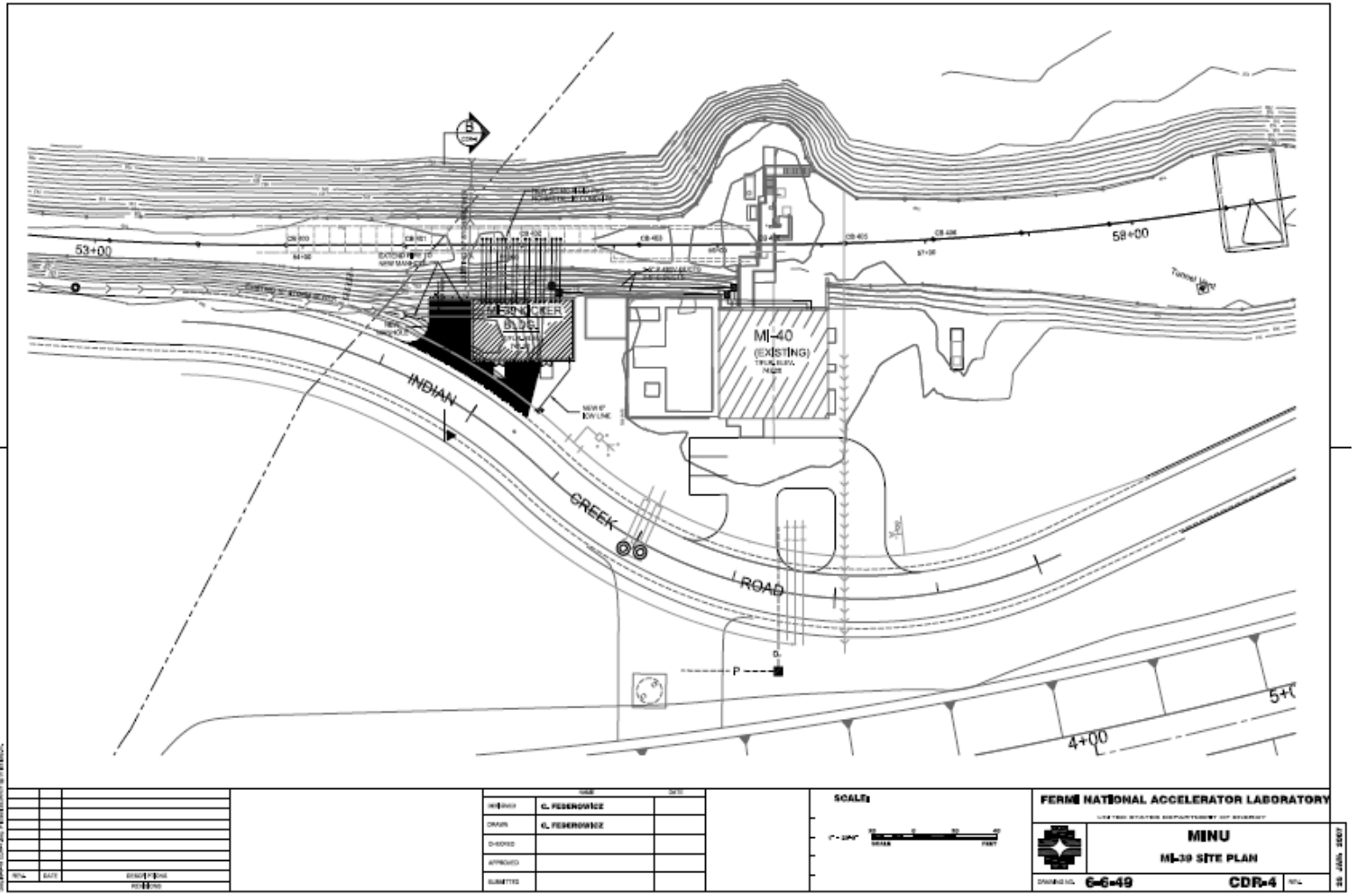
1.3 MI-39 Service Building (1500sf)

Service Building housing kicker power supplies for Recycler Gap Cleaning Kicker, possibly the Recycler Abort Kicker, and space for fluorinert skids for cooling the kickers. Penetrations must be constructed for kicker cables, cooling water, and fluorinert lines.

MINU GPP Project

MI-39 Service Building Plan View

APD Dept. Report
7 March 2007
Dixon Bogert

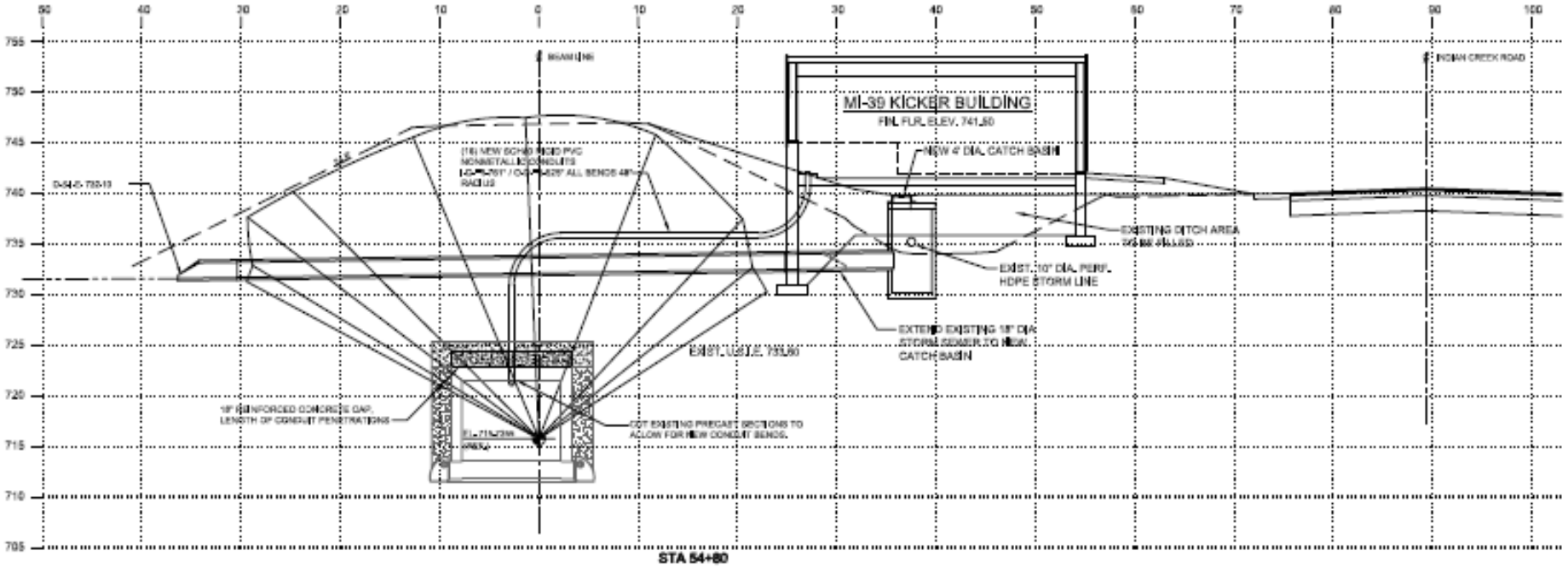


MINU GPP Civil Construction

MINU GPP Project

MI-39 Service Building Elevation/Cross Section

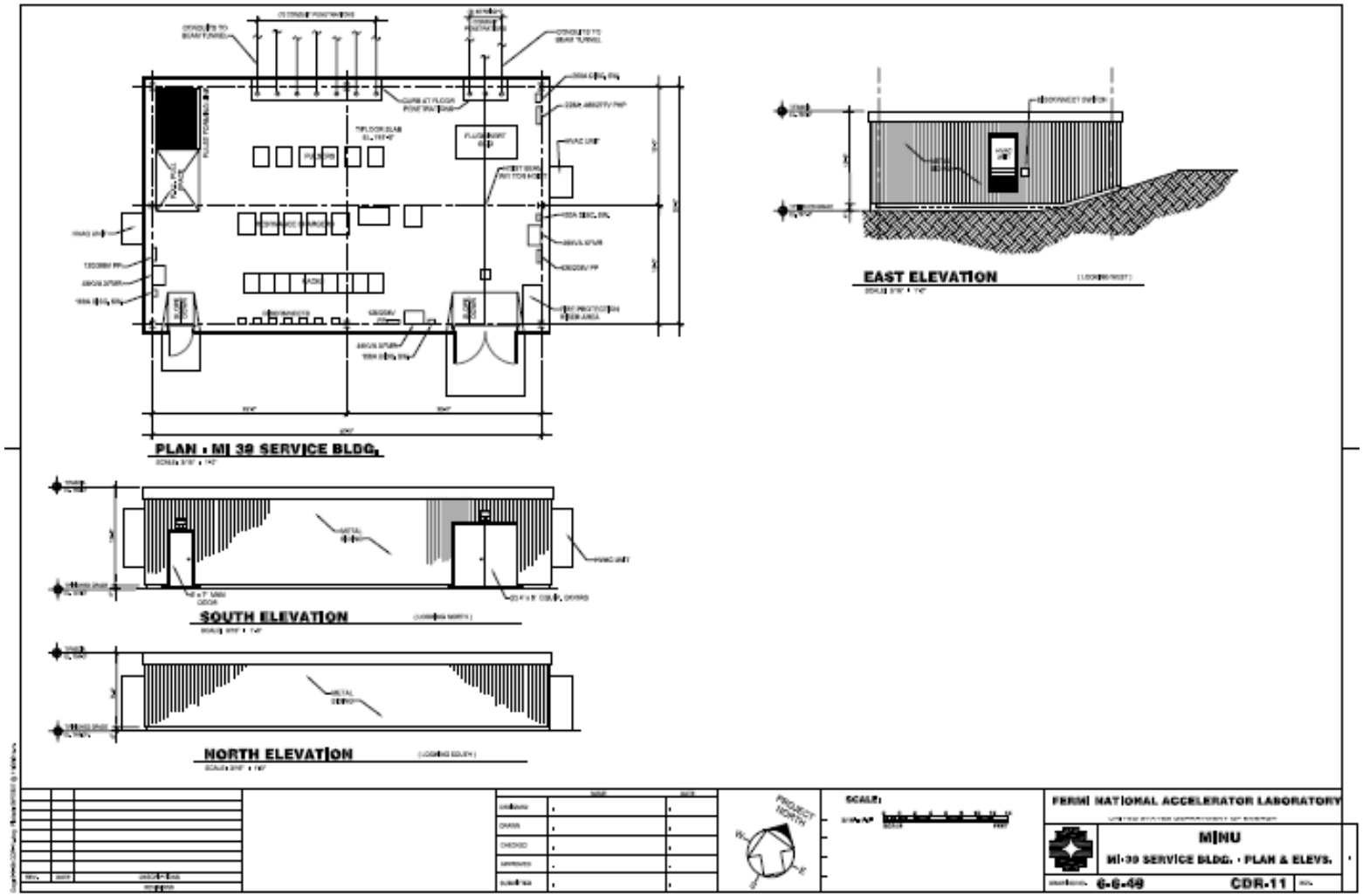
APD Dept. Report
7 March 2007
Dixon Bogert



SECTION B

MI-39 Service Building Preliminary Floor Plan

APD Dept. Report
7 March 2007
Dixon Bogert



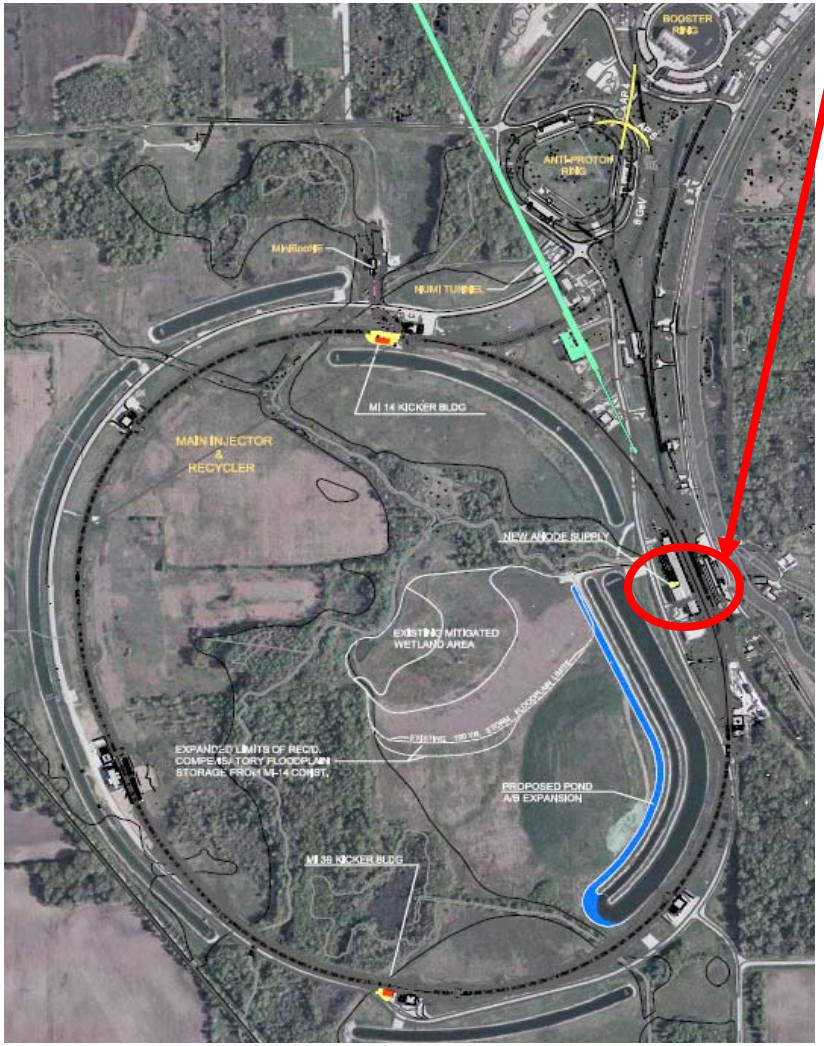
MINU GPP Civil Construction

MI-39 Service Building Specifications (Selected items from CDR)

- One story building with 11.5’ clear height
- Depressed floor in 30’ x 50’ building to contain oil from equipment to mitigate spills
- 16 – 6” conduit penetrations from building to MI enclosure for 8 known and 8 future cable runs
- Straight 6” penetration to MI enclosure for 1.5” LCW supply and return piping, with both pipes in same conduit. Anticipating heat rejection to LCW is 50 kW
- Two 5 inch "straight shot" conduits to the tunnel for installing fluorinert cooling system
- Building power: new 225A, 480/277V feed from MI-40 Service Building to power fluorinert pumps (480V), kicker power supplies, electronics racks, and miscellaneous building loads.
    - Kicker power requirements: Approximately 30 kVA, 208V power with dedicated 45kVA shielded transformer and panelboard
    - Electronics racks: Approximately 10 racks with 2-20A, IP, 120V branch circuits to each.
- Communications/controls to be supplied from MI-40 via new ductbank to MI-39
- ICW supply/return from main distribution along Indian Creek Road to serve for fire suppression
- Two sets of double doors for entrance from outside, with a removable panel at the top of the doors for infrequent loading of tall equipment. Aprons in front of the building should extend 8’ from door.
- Air conditioning and unit heating
- Two 18” cable trays in ceiling of MI enclosure for likely 32 cables to kicker magnets, with maximum 200 ft length of cable from equipment in building to equipment in tunnel

MI-60 Anode Supply Room

APD Dept. Report
7 March 2007
Dixon Bogert

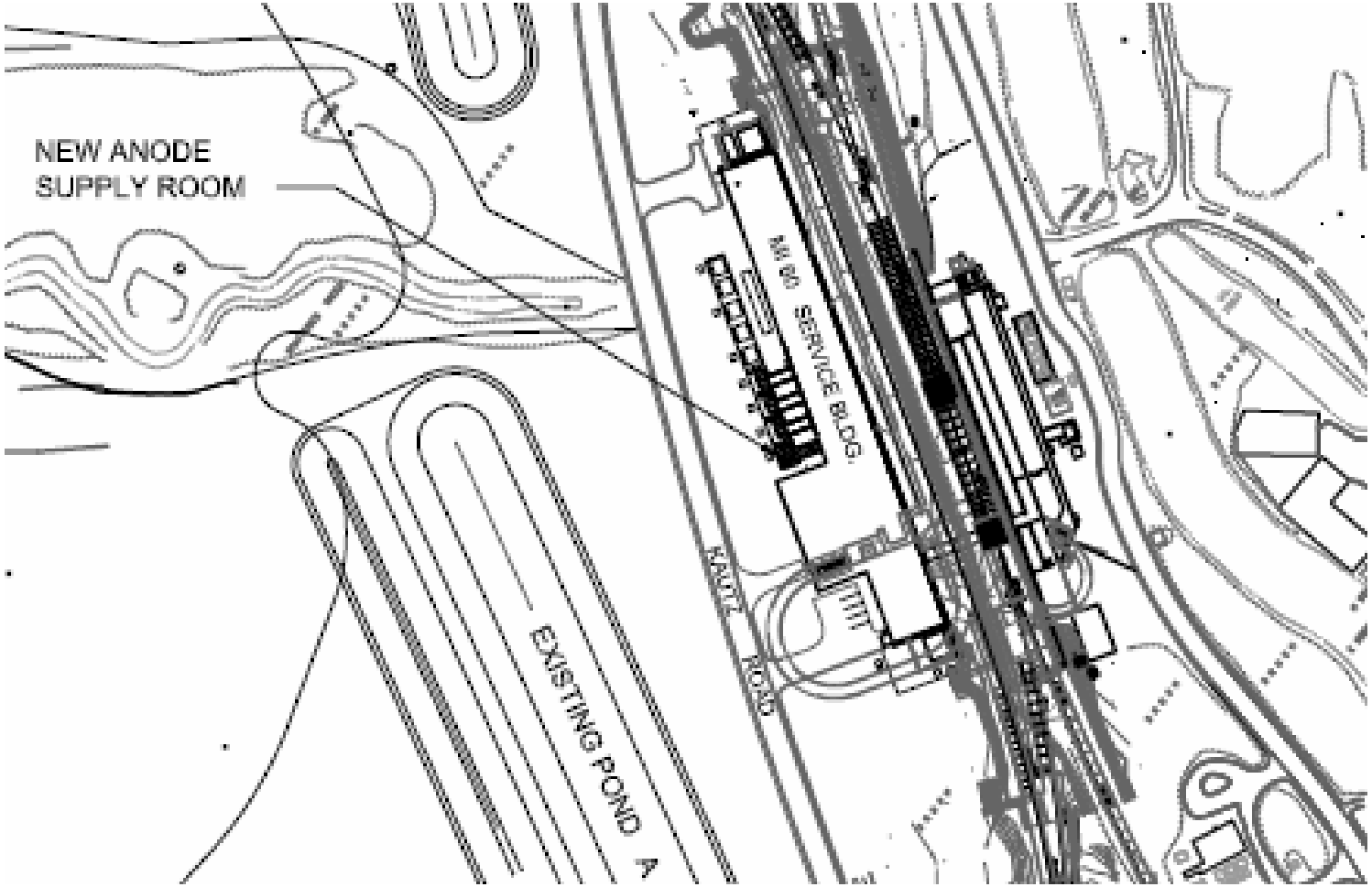


1.4 MI-60 4th Anode Supply Room (250sf)

Six more rf systems; two in the Main Injector and four in the Recycler Ring will be added to the existing 18 systems. This raises the number of rf systems by one third, raising the number of anode supplies from three to four. The functionality of the additional anode supply is identical to the existing three supplies, so the space and enclosure requirements are also identical.

MI-60 Anode Supply Room Location at MI-60

APD Dept. Report
7 March 2007
Dixon Bogert



MINU GPP Project

MI-60 Anode Supply Room Floor and Roof Plan Views

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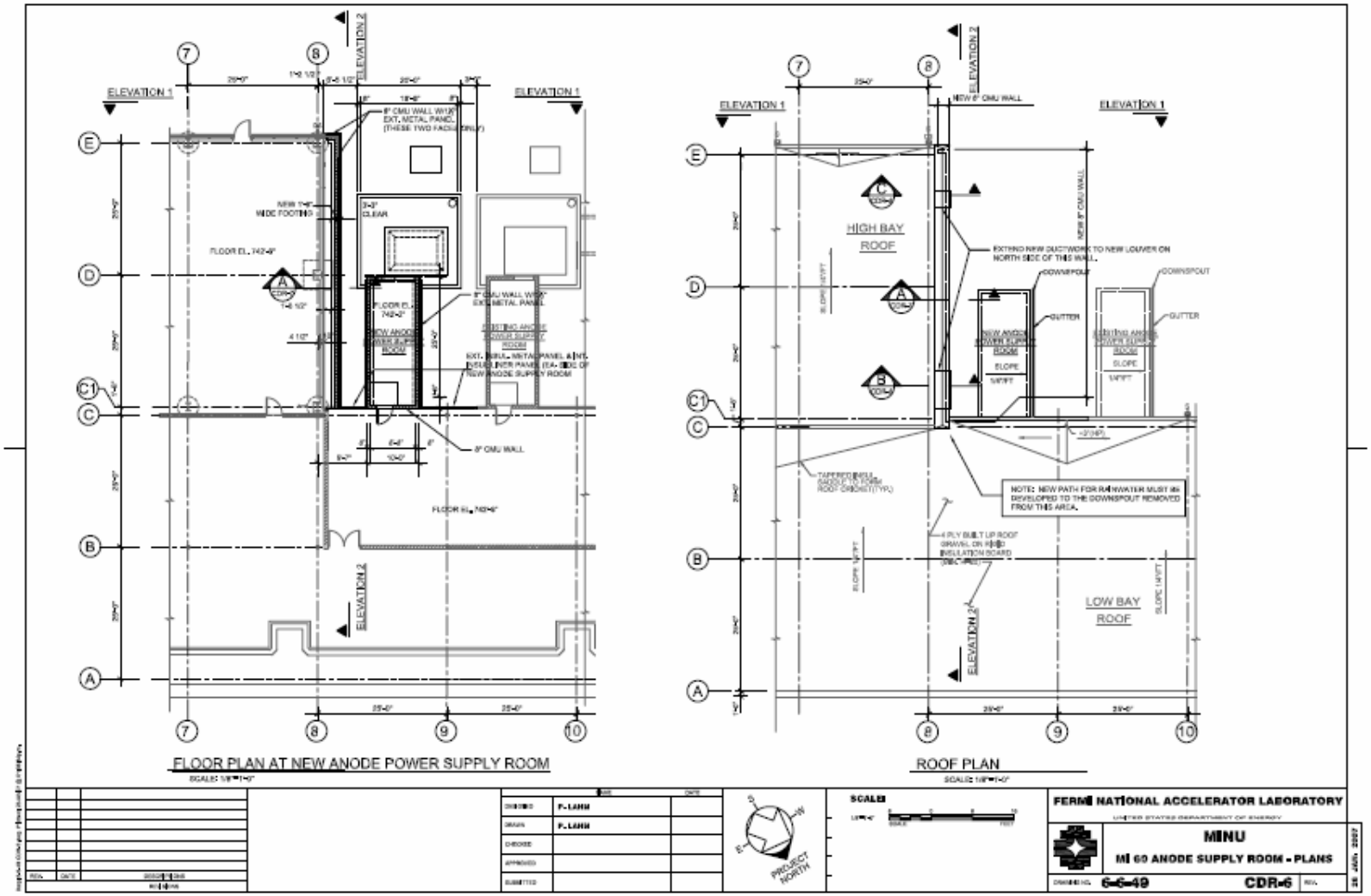
7 March 2007
Dixon Bogert



MINU GPP Civil Construction

MI-60 Anode Supply Room Elevations

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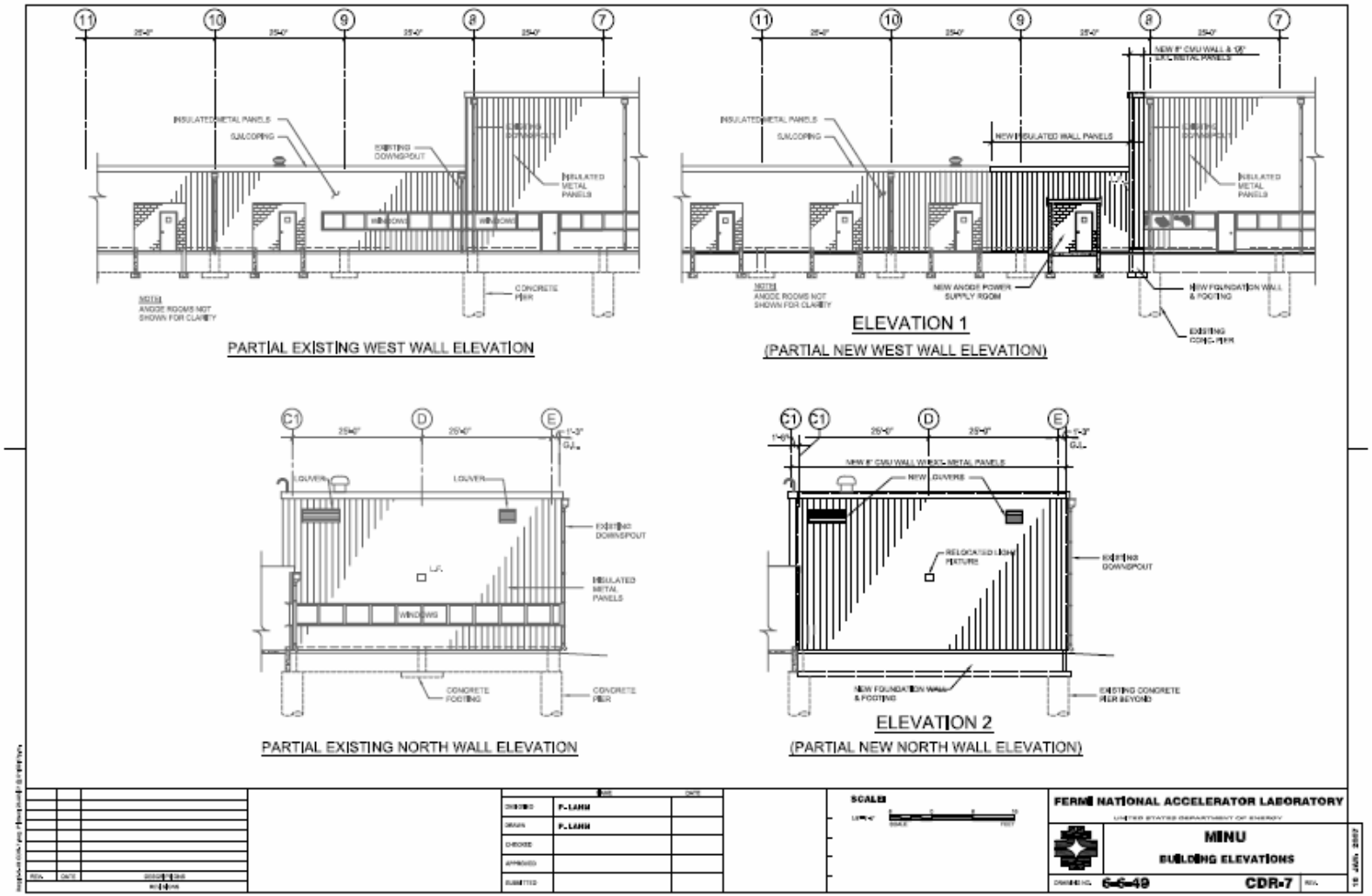
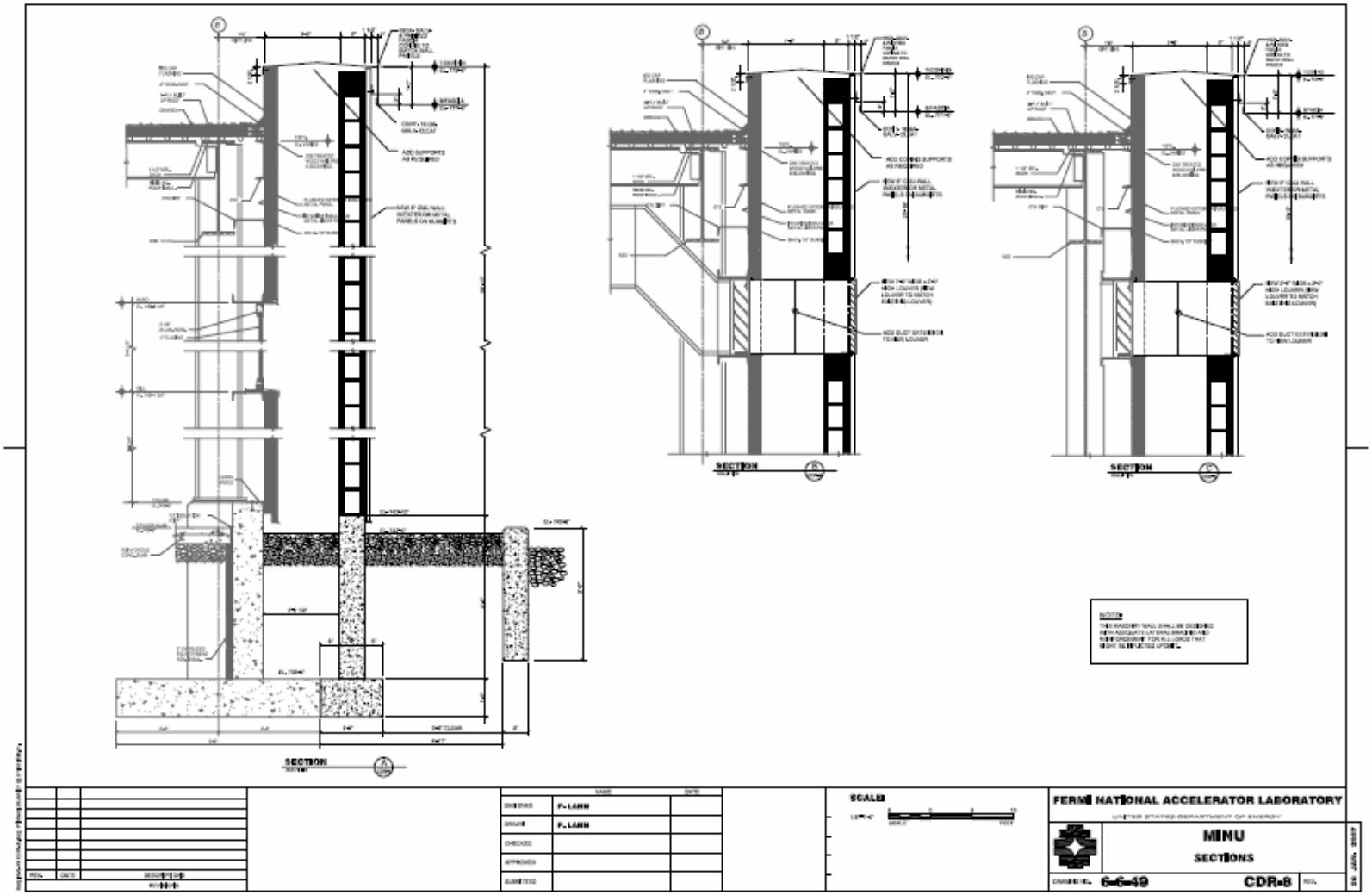
7 March 2007
Dixon Bogert



MI-60 Anode Supply Room Fire Wall Sections

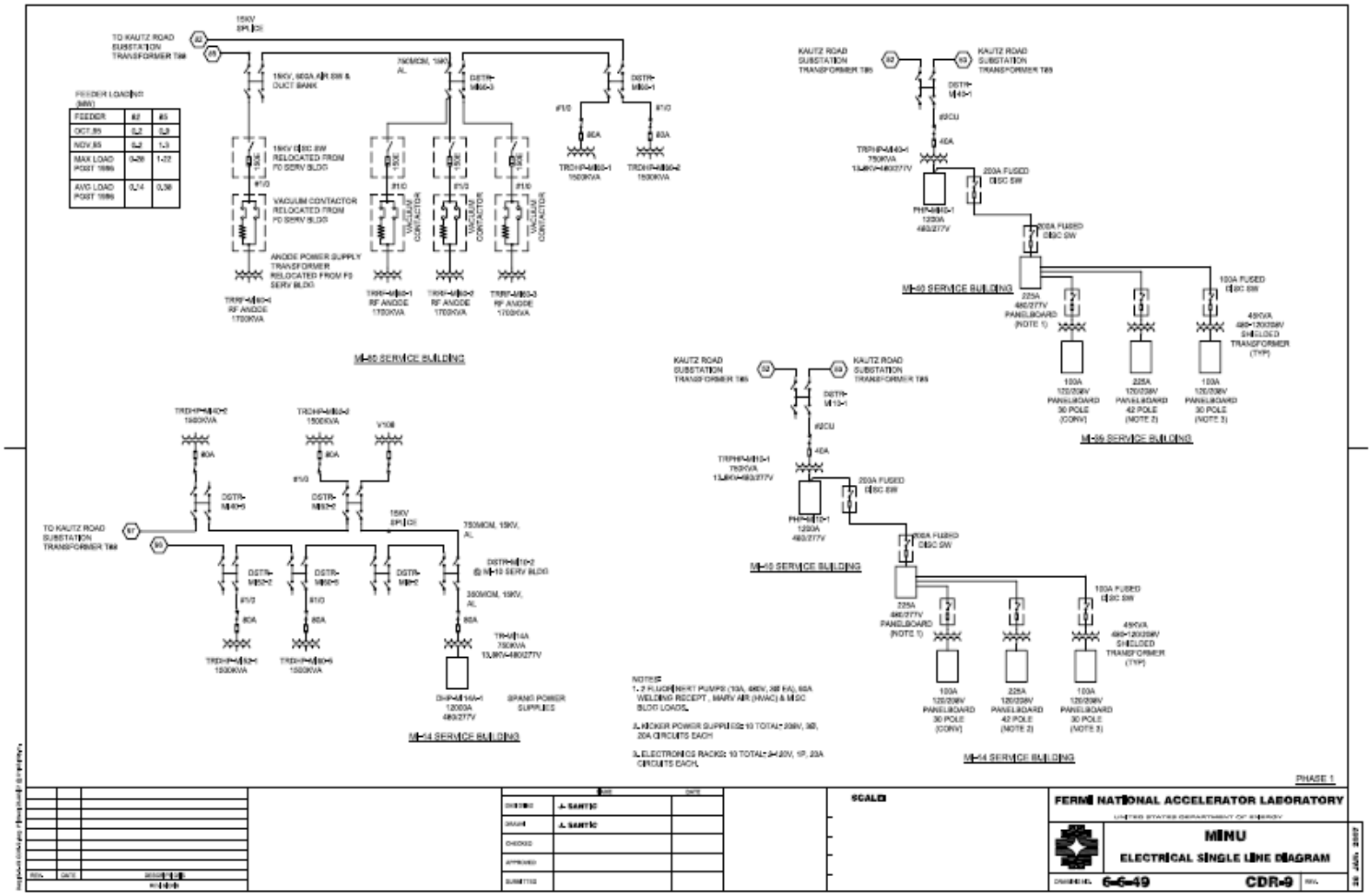
APD Dept. Report
7 March 2007
Dixon Bogert



MINU GPP Civil Construction

MINU GPP
Electrical Single Line Drawings

APD Dept. Report
7 March 2007
Dixon Bogert



MINU GPP Civil Construction

MINU GPP
Cost Estimate

		Base Cost	Management Reserve	Indirect Costs	Subtotal
1.1	Title 1 ED&I				
1.2	Title 2 ED&I	$340,000	$102,000	$84,000	$526,000
1.3	Title 3 ED&I	$160,000	$48,000	$69,000	$277,000
2.1	Title 1 Administration				
2.2	Title 2 Administration	$85,000	$26,000	$37,000	$148,000
2.3	Title 3 Administration	$28,000	$8,000	$12,000	$48,000
3.1	Fixed Price Construction	$2,228,000	$668,000	$465,000	$3,361,000
3.2	Space Management	$217,000	$65,000	$45,000	$327,000
3.3	Pre-procurement	$121,000	$30,000	$24,000	$175,000
	TOTALS	**$3,179,000**	**$947,000**	**$736,000**	**$4,862,000**

Summary

- The MINU GPP Civil Construction is relatively straightforward. If funding is provided and approval is given for construction of the penetrations and footings at MI-14 and MI-39 during the summer shutdown of 2008, then the rest of the work as well as the anode supply room can be accomplished independently of the accelerator operating schedule. This would permit the completion of the kicker buildings by early FY09.

SciBooNE Civil Construction

SciBooNE is an experiment that is moving the “SciBar” Detector from Japan to the United States for a test run before returning it to Japan for installation at JPARC.

The detector is now being installed 100 meters downstream of the MiniBooNE Target at MI-12.

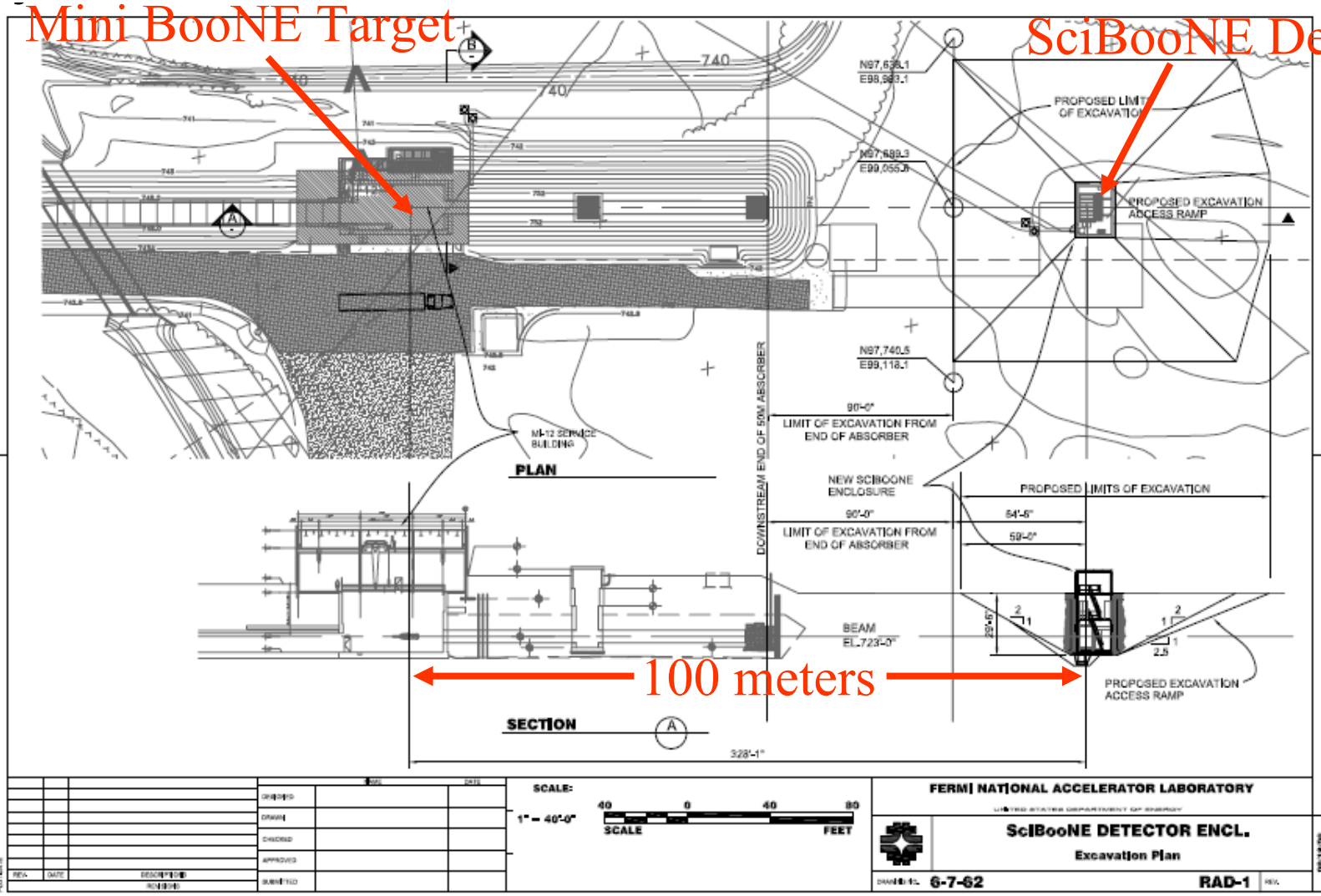
The excavation for the detector enclosure started in late September, and was completed in early February.

The design is shown in the following two slides, and a “fish-eye” view of the completed work follows.

SciBooNE Civil Construction

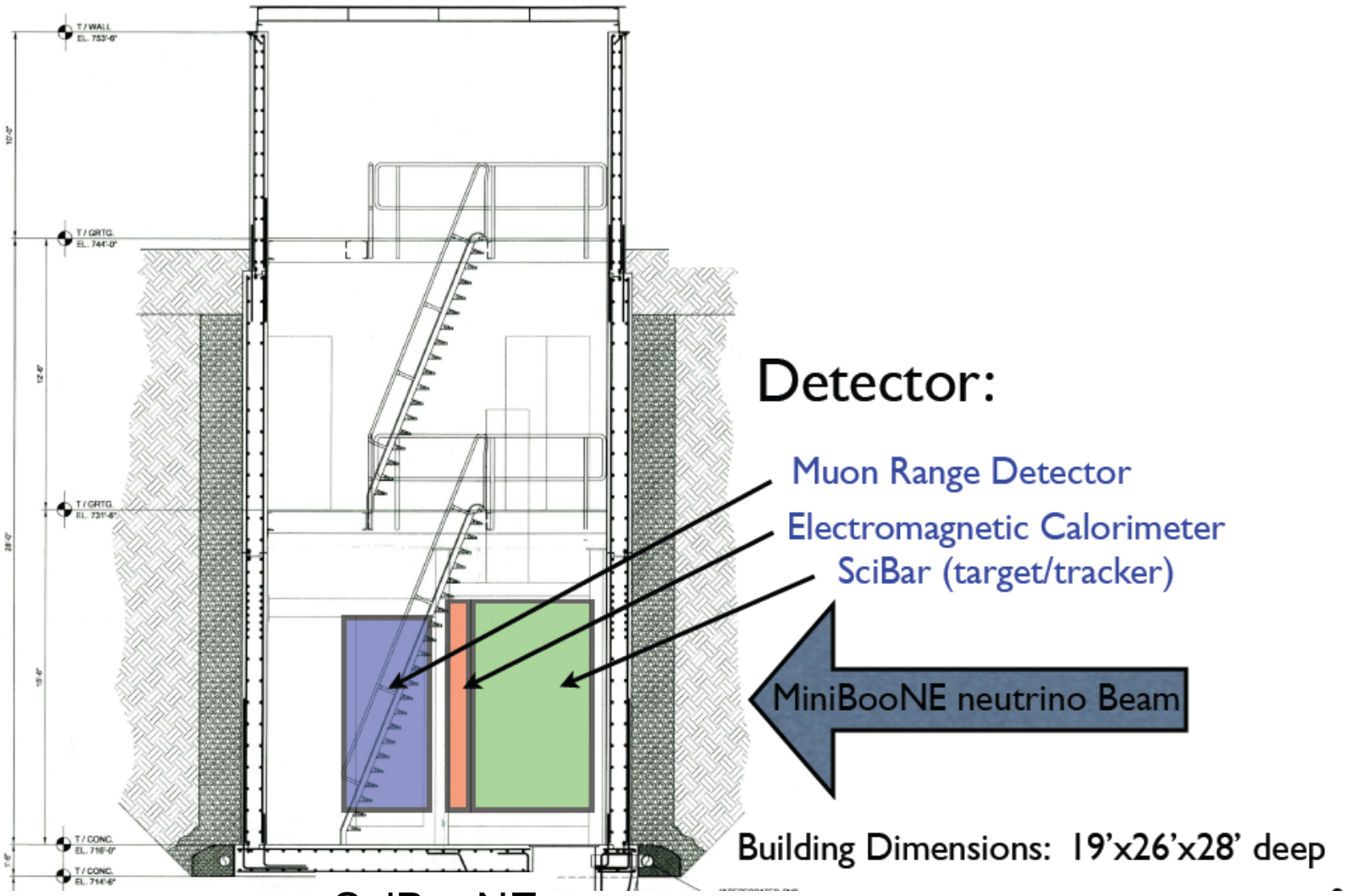
APD Dept. Report
7 March 2007
Dixon Bogert

- Mini BooNE Target



SciBooNE Civil Construction

SciBooNE Detector



SciBooNE **Civil Construction**

SciBooNE Building Completed