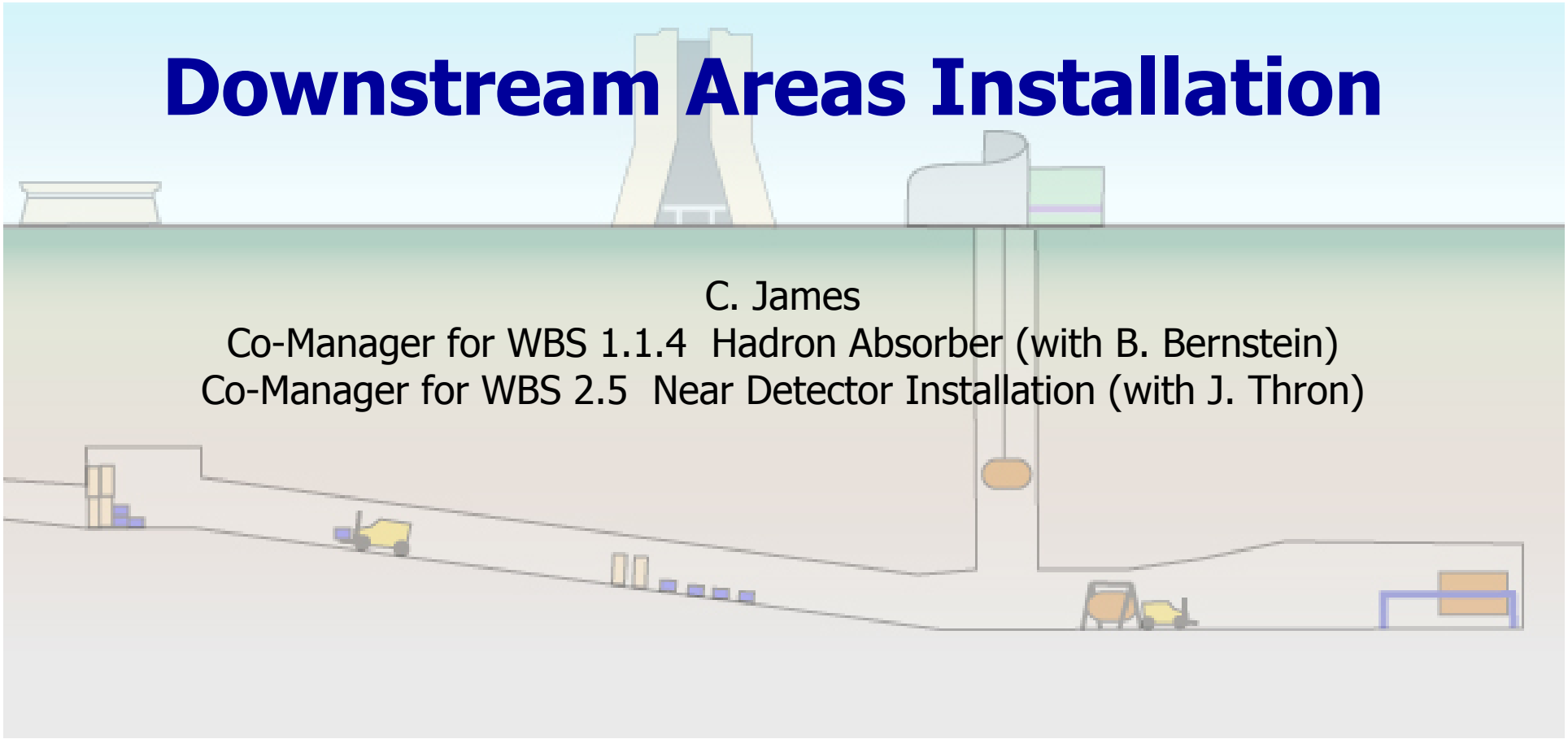
Downstream Areas Installation

C. James
Co-Manager for WBS 1.1.4 Hadron Absorber (with B. Bernstein)
Co-Manager for WBS 2.5 Near Detector Installation (with J. Thron)



Outline

Overview of the Areas and What Gets Installed in Them

Who Does the Installing

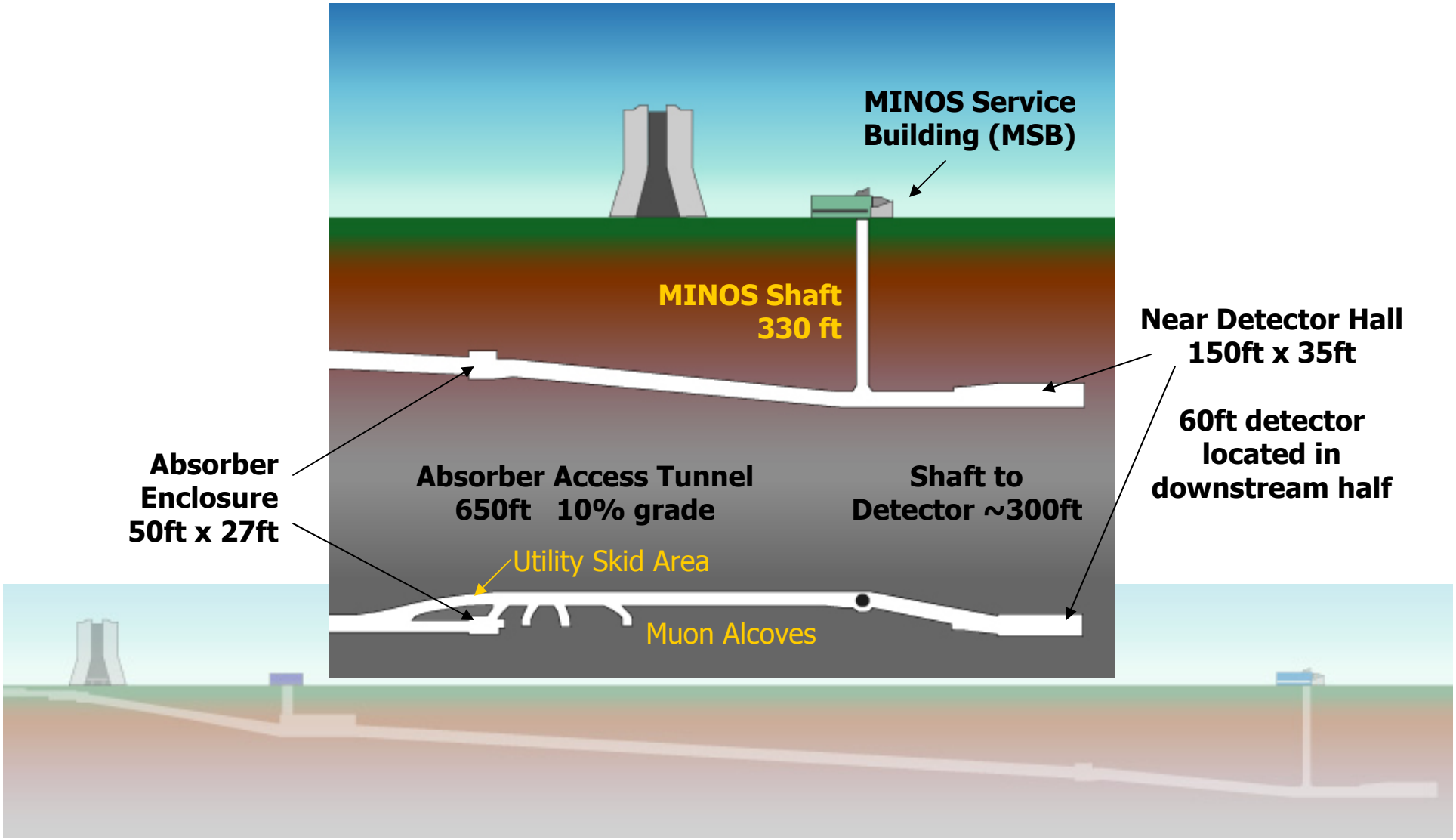
- Personnel
- Planning
- ES&H

Installation Procedures & Tools

- Absorber
- Detector

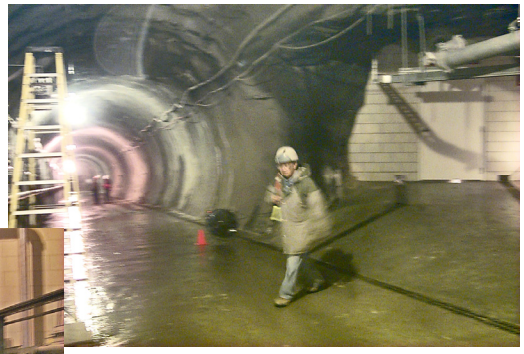
Schedule

Downstream Areas Overview



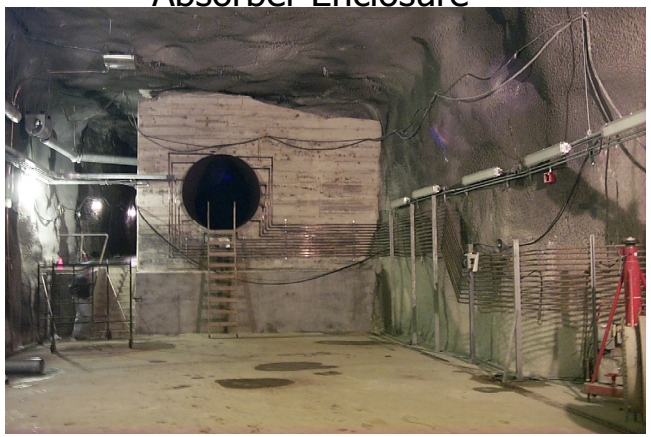
Downstream Areas Overview

Looking down the hill



Looking up the hill

Absorber Enclosure



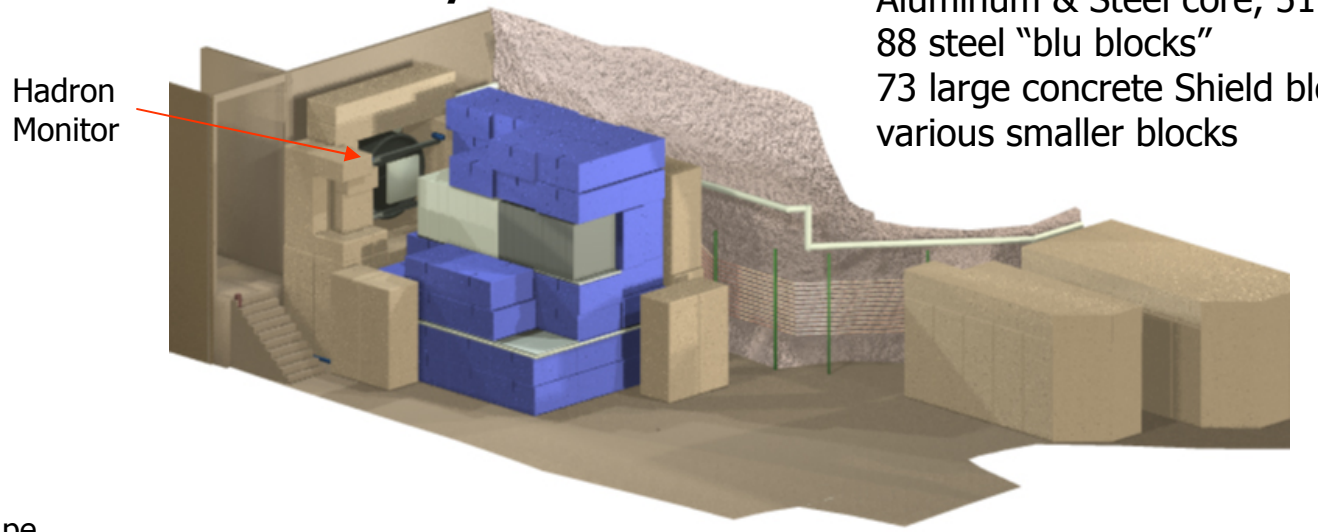
Base of Shaft
Looking upstream

Near Detector Hall

On Detector Platform
Looking upstream

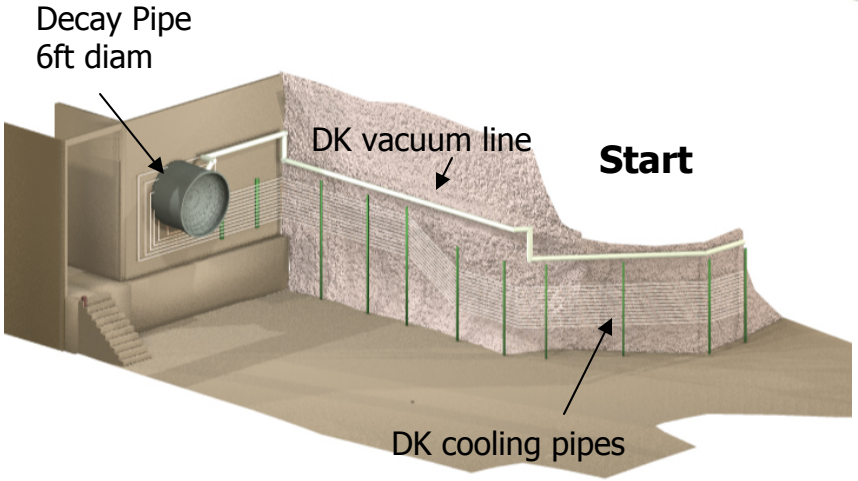
Hadron Absorber

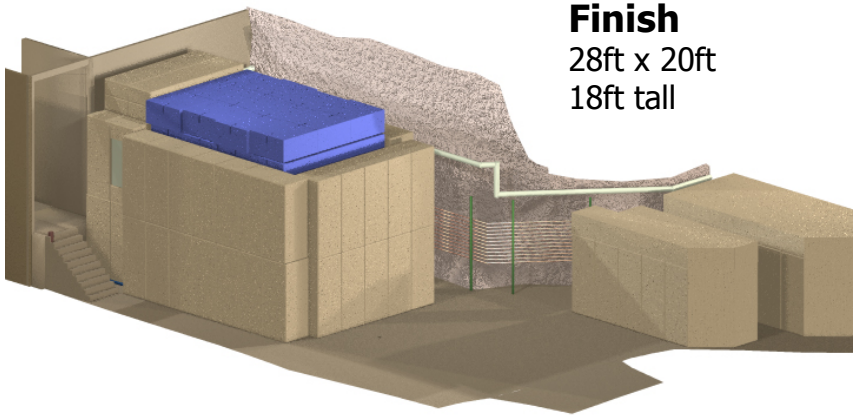
Cut-away View



Aluminum & Steel core, 51" sq, ~16ft deep
88 steel "blu blocks"
73 large concrete Shield blocks (A,B,C,J)
various smaller blocks

Labyrinth
30 B blocks
Various smaller blocks

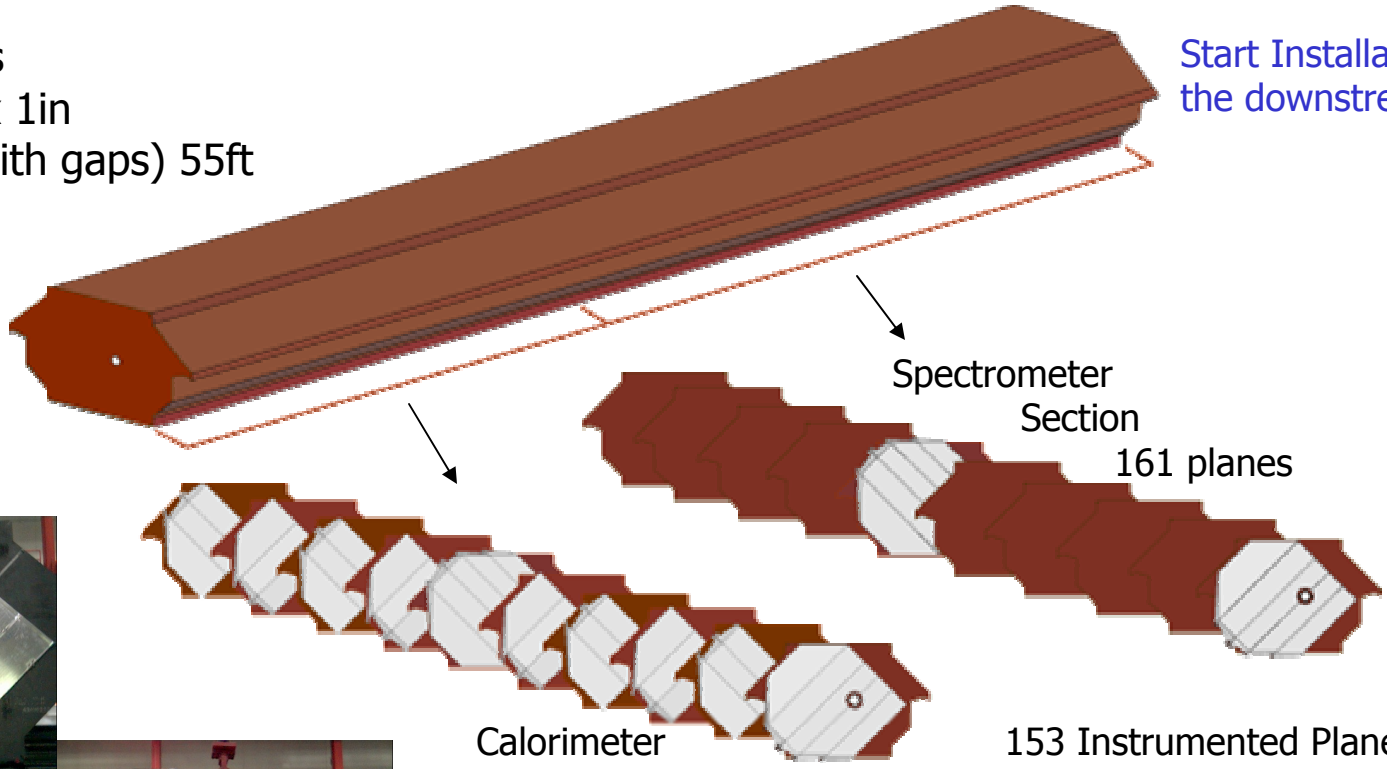




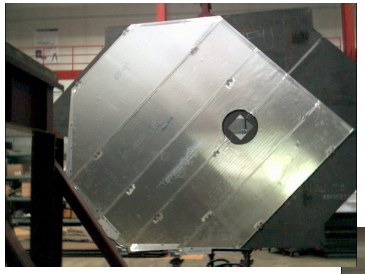
Finish
28ft x 20ft
18ft tall

MINOS Near Detector

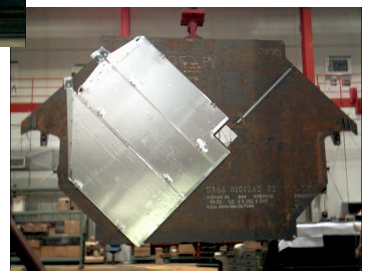
282 steel plates
~20ft x ~12ft x 1in
Final Length (with gaps) 55ft



153 Instrumented Planes
Every 5th plane is a Full through the length of the detector



Full Plane



Partial Plane

MINOS Near Detector

Calorimeter planes (3 of 4 storage racks)

Spectrometer instrumented
Planes (1 storage rack)

Strongback

Installation
Cart

Positioning
fixture

Spectrometer "blank" planes

Installation Teams

Leon Beverly, Floor Manager
M. Mascione, Materials Deliveries

Hadron Absorber

- T&M Steelworkers, crew of 5
- Task Manager D. Miller (PPD)

Near Detector

- PPD Mechanical Techs, crew of 5 to 8
- Group Leader J. Voirin

Electrical, Pipefitter, LAN Contractors in the first few weeks after Beneficial Occupancy
Utililize additional Task Managers as appropriate

Design engineers for consultation, oversight, inspection – as required
Absorber – E. Villegas Utilities – D. Pushka Detector – J. Kilmer

Project Managers, for oversight, task & budget tracking

Installation Planning & ES&H

- The downstream areas Installation Team has weekly meetings, July '03 to present
  - Discuss design issues
  - Develop the overall installation schedule
  - Discuss various features of installation procedures

- Safety Documentation
  - Engineering Notes on all mechanical fixturing & support structures, reviewed by NuMI safety committee
  - Task Managers and Technical Group Leaders develop installation procedures
    - write them up for review by M. Andrews
    - JHA's for specific tasks, as required, also reviewed. Use same template as developed for the Target Areas installations
  - Detector Electronics and readout systems reviewed by NuMI Safety Committee, following a process similar to the former Operational Readiness Clearance

Installation Procedures and Tools
Absorber

Specialized Tools

- New heavy-duty electric forktruck to carry loads up the hill
- All other tools provided by contractors
  - Gantry crane, made from hydraulic lifts and a cross beam, supplied by T&M rigging contractor

Piping Completion

- Contractor and lab Task Manager
- Contractor supplies all tools and materials – we assist in moving materials up the hill

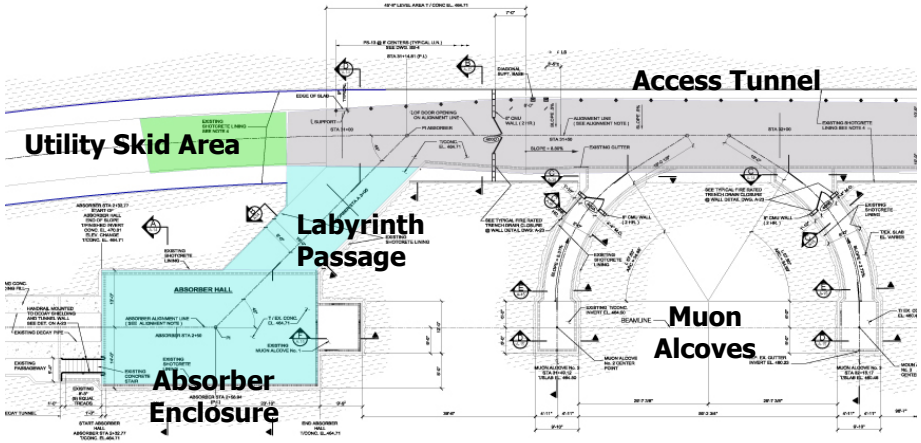
Decay Endcap Installation

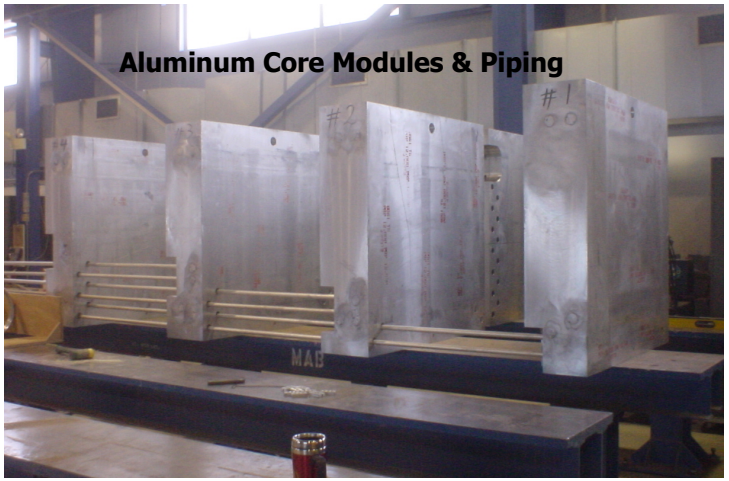
- PPD techs and lab welder
- Use forktruck to both carry the endcap, and hold it in position during welding

Installation Procedures and Tools
Absorber

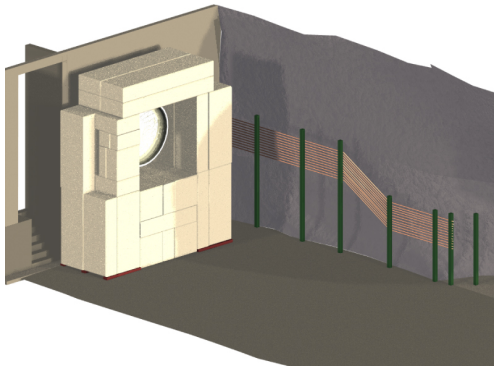
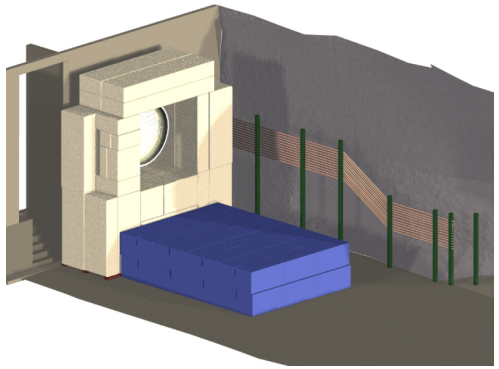
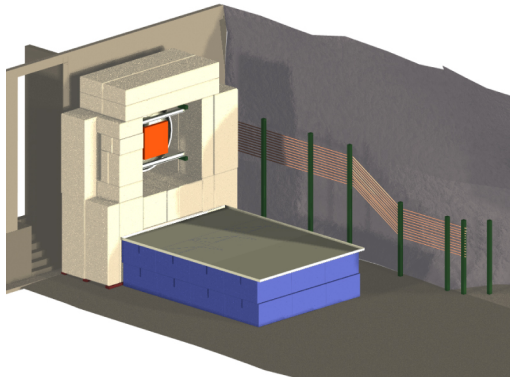
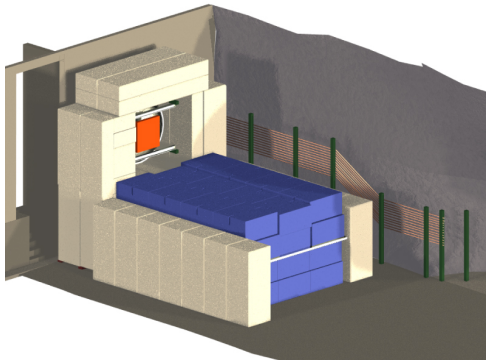
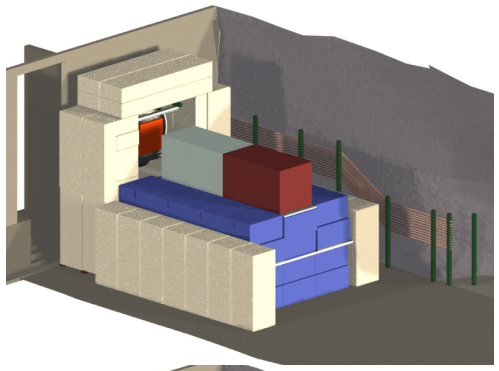
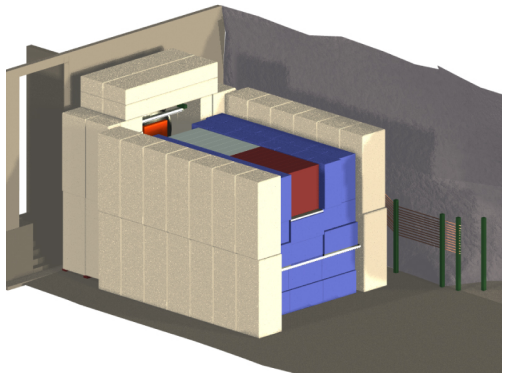
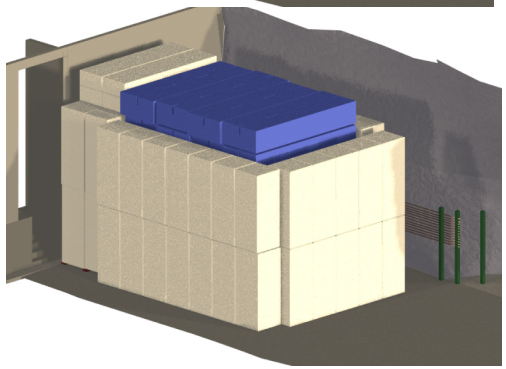
Absorber Installation

- Pre-stage all blocks underground, line up along the Access Tunnel
  - Do this while waiting for piping contractor to complete work within enclosure
  - Intense use of shaft crane for ~2wks, little use of shaft crane after that
- Deliver blocks to Absorber Enclosure using forktruck
- Place blocks using gantry crane
- Core blocks pre-assembled at MAB, to 2 Al sections and 3 steel sections
- Absorber RAW piping connections (between Core and skid piping) by lab welder
- Crack stuffing, Tyvek wrapping (for retardation of air flow) by T&M after stacking is complete
- Labyrinth blocks staged and installed after Absorber is complete





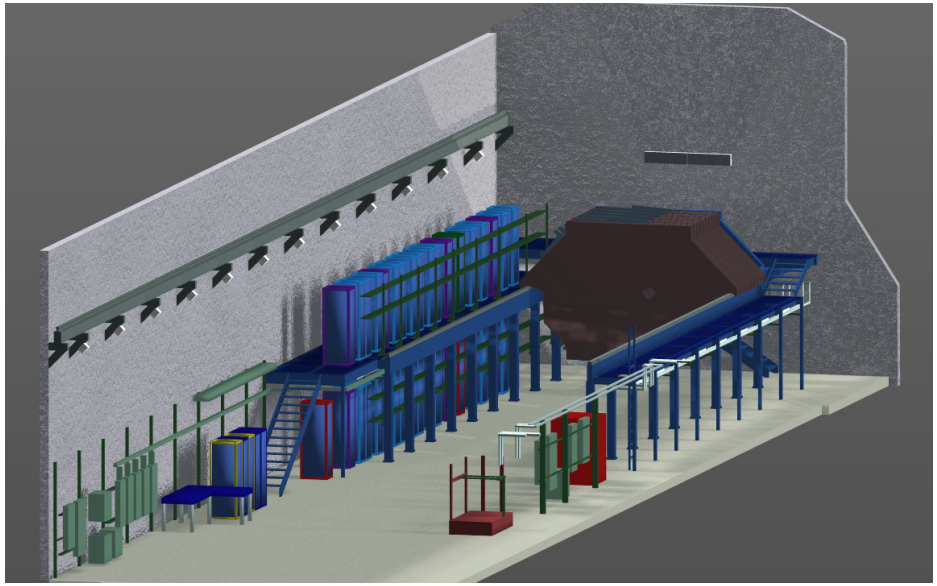
Installation Procedures and Tools
Absorber

Installation Procedures and Tools
Near Detector

Detector Installation

- Survey work required to align positioning rails (~1 week network, ~1 week rails)
- Deliver cart underground
  - requires large truck crane, with hook lowered through MSB roof hatch
- Electrical work required before first set of readout racks can be installed. 8wks @ 2 electricians per day, 6wks with some double shifting
- Spectrometer Planes – 5 per day
  - only one of these is instrumented
  - 1 truck trip per day
- Calorimeter Planes – 2 per day
  - All are instrumented
  - 1 truck trip per day
- Install coil after detector is complete
- Delivery of coil pieces requires large truck crane, similar to cart delivery



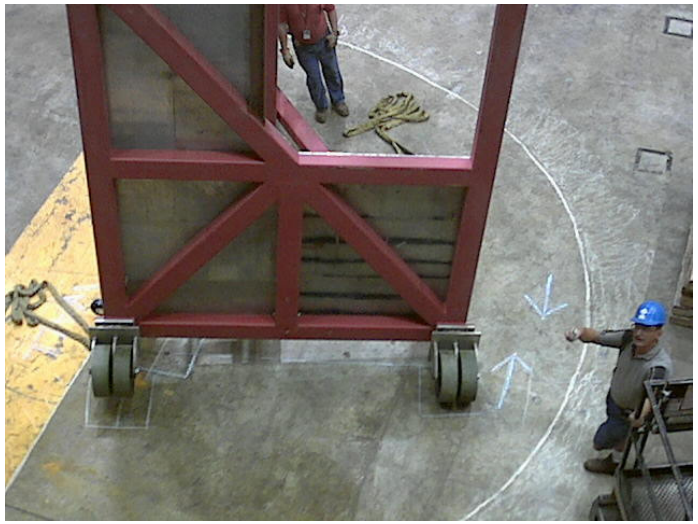
Installation Procedures and Tools
Near Detector

Specialized Tools

- Strongback & Installation Cart with Positioning Fixture
  - Have practiced handing planes using these tools
  - Have also practised the maneuvers necessary to get the cart underground

Standard Tools

- Small electric forktruck to tow cart – exists, and designated for our use
- 2 Man-lifts for reaching upper parts of installed planes – exist, and designated for our use
- Safety harnesses for working around the top of the shaft, in hand. Need to set anchors in floor of MSB in the first days after Beneficial Occupancy
- Safety harnesses for working on upper parts of installed planes, in hand
- Training procedure for collaborator-installers for proper use of man-lift and safety harness, which they will use when cabling instrumented planes



Installation Procedures and Tools
Near Detector

Load up at New Muon.
For Spectrometer section, 1 strongback with an instrumented plane, and a stack of 4 blank steel planes. Some prep work on the blanks requires 3 PPD Mech techs at New Muon to get the next day's planes ready, while 5 other techs get today's planes underground.
For Calorimeter section, 2 strongbacks, both with instrumented planes – 5 techs total.
Both strongbacks fit on one trailer (a particular trailer)

Drive to MINOS Service Building
Take up about 1.5 lanes. Experimented last August, with 3 possible routes. Best route, from point of view of BSS Driver and Security, is NM→Eola Rd→C-0→ Ring Road→back of High Rise→Giese Rd entrance to MINOS site.
Will have Security escort to assist at intersections, and along the Ring Road.
~5 miles, took about 15 minutes.
1 trip per day, generally between 8am and 9am.

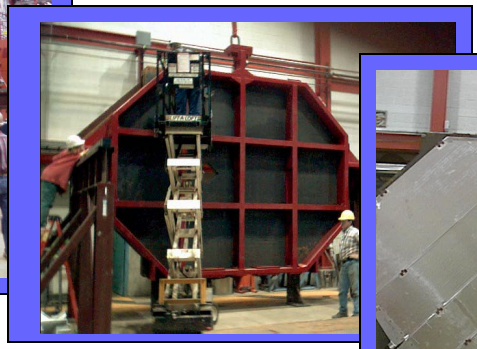
Lay planes on floor of MSB.
Picked up flat off the truck, and laid flat on the floor, using building crane.
Blank planes stacked, with cribbing between.
Blanks picked up one at a time and placed on an empty stongback when it's time to take one underground.
Sufficient floor space for 2 strongbacks and a stack of steel plates.

Installation Procedures and Tools
Near Detector

Take a Plane Underground
Pick up a single plane on a strongback, using the Shaft Crane.
Procedure is the same for instrumented or blank.
Position over shaft, and lower.
~9 minute trip.

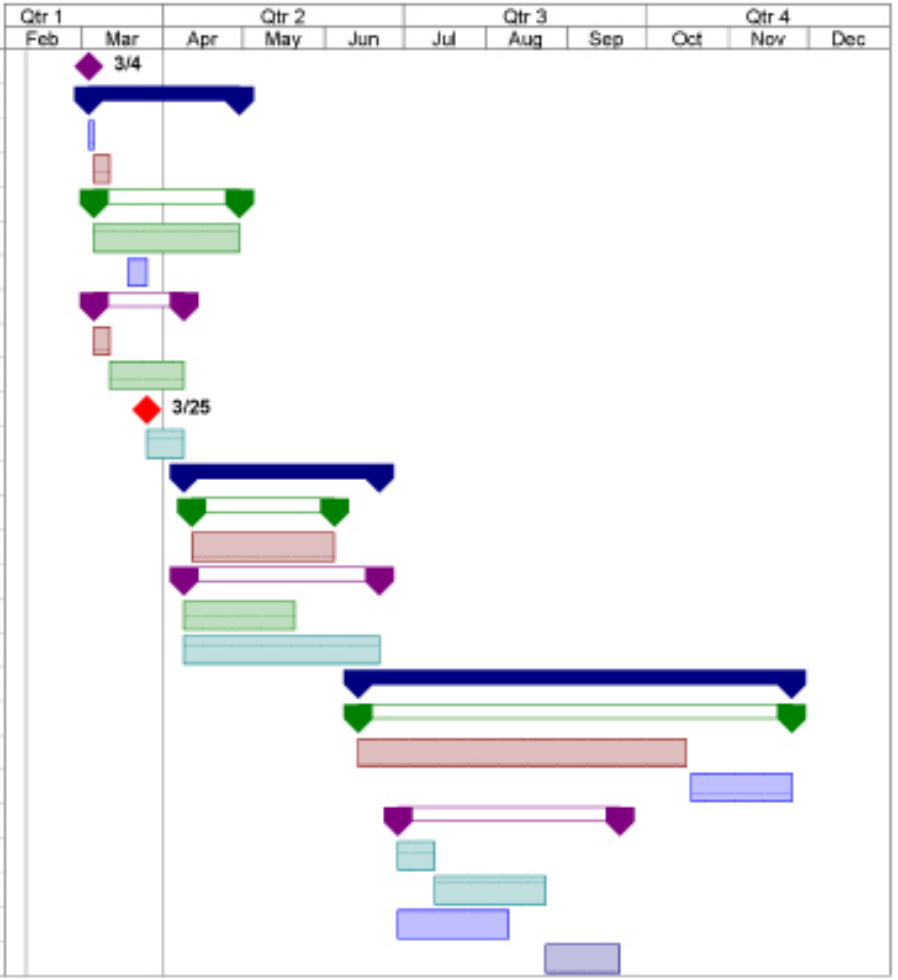
Transfer plane from strongback to cart.
Cart is waiting at shaft base.
Strongback never leaves the shaft crane hook.

Pull Cart into Hall
Install Plane onto Detector



Schedule

	Start
Underground Occupancy	Thu 3/4/04
Dnst Inst - Phase 1	Thu 3/4/04
Access Control Setup, Checkout of Areas	Thu 3/4/04
Move Installation Equipment Underground	Sat 3/6/04
Near Hall Area	Sat 3/6/04
Electrical, Network, LCW, Racks	Sat 3/6/04
First Planes Installed - Test of Handling Procedures	Fri 3/19/04
Absorber Area	Sat 3/6/04
Install Dnst DK Endcap & Skids	Sat 3/6/04
Install Piping in Enclosure (Vacuum & RAW)	Fri 3/12/04
DK Vacuum Test (Weekend)	Thu 3/25/04
Stage Absorber Materials Underground	Fri 3/26/04
Dnst Inst - Phase 2	Fri 4/9/04
Near Hall Area	Mon 4/12/04
Spectrometer Plane Installation (5 per day)	Mon 4/12/04
Absorber Area	Fri 4/9/04
Install Piping around Skids	Fri 4/9/04
Install Absorber Shielding (T&M)	Fri 4/9/04
Dnst Inst - Phase 3	Mon 6/14/04
Near Hall Area	Mon 6/14/04
Calorimeter Plane Installation (2 per day)	Mon 6/14/04
Magnet Coil Installation	Mon 10/18/04
Absorber Area	Tue 6/29/04
Absorber Wrapping & Crack Sealing	Tue 6/29/04
Labyrinth Installation	Tue 7/13/04
Hadron & Muon Monitor Installation (Collaborators)	Tue 6/29/04
Controls Work on Skids	Tue 8/24/04



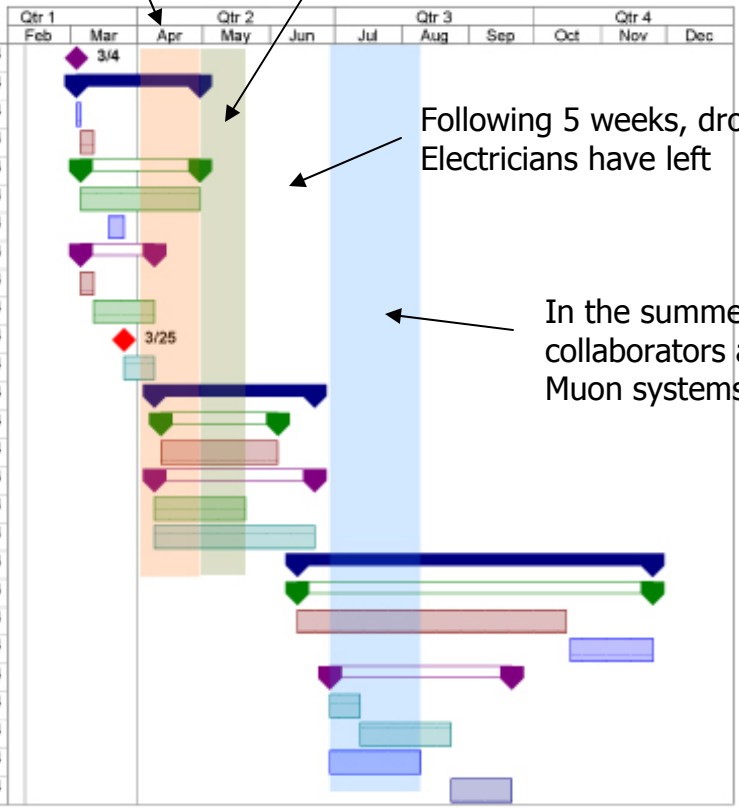
How Many People Underground

Count up all Tech Crews including Team Leader, T&M/Contractor crews including their accompanying Task Mgr, plus 4 more to account for Floor Mgr and Project Mgrs.

For example – most crowded Weeks 4,5,6,7 – 22 people: 6 PPD crew, 6 T&M and Task Mgr, 3 Pipefitter and Task Mgr, 3 Electrician and Task Mgr, plus Floor Mgr and 3 Project Mgrs

Following 3 weeks, drops to 19 – Electricians have left

Following 5 weeks, drops further to 16 Electricians have left

In the summer it picks up, as collaborators arrive to install Muon systems

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