



NOvA Near Detector Cavern Construction Impacts on MINOS Hall Experiments/Users

August 18, 2010

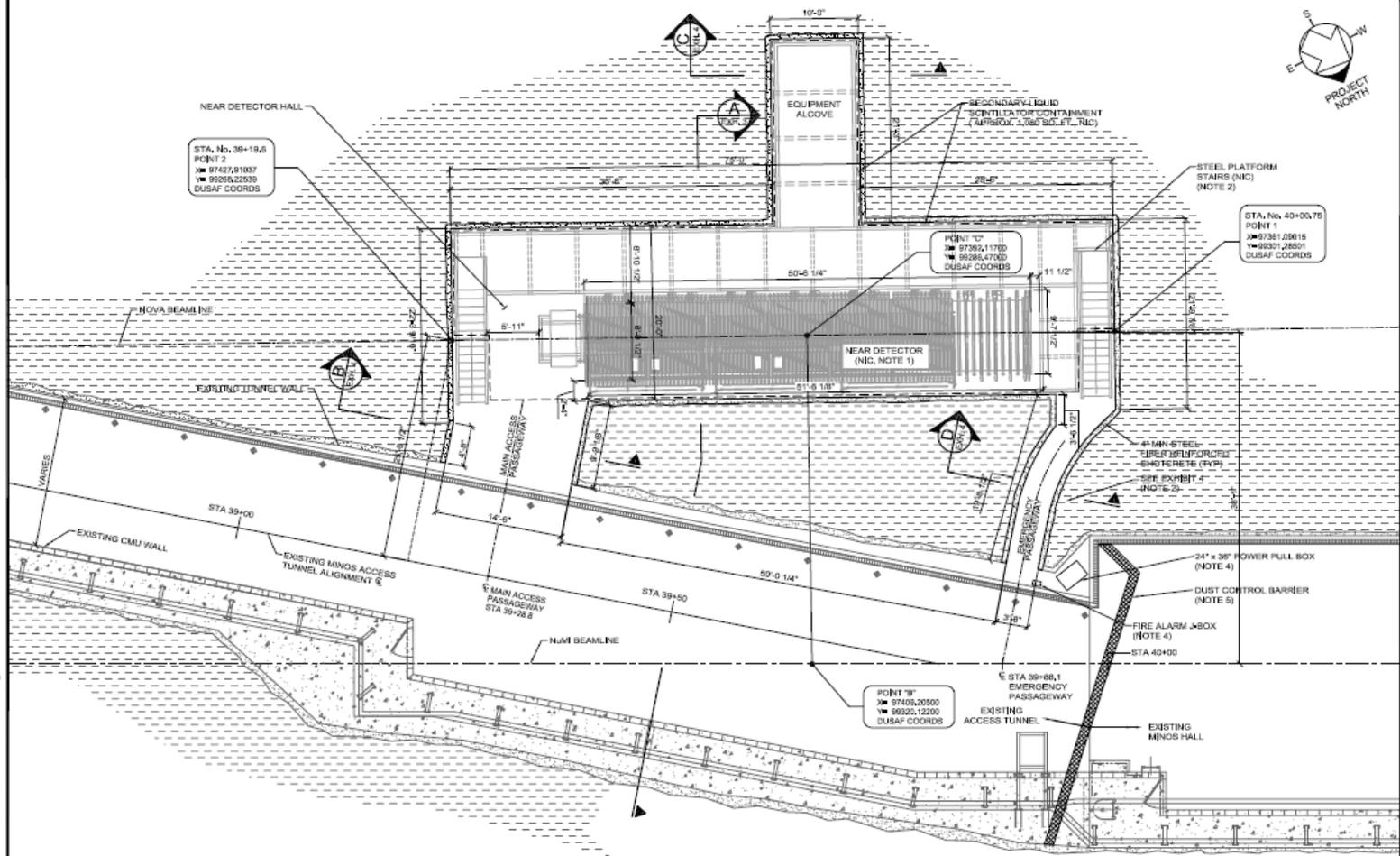
Russ Alber

Dixon Bogert

Jon Hunt



Create a New Cavern for NOvA Near Detector



SCALE:

MWH
175 West Jackson Blvd.
Chicago, IL 60604
(312) 851-2000

**NOVA NEAR DETECTOR HALL
PROJECT DEFINITION REPORT**
PLAN



U.S. DEPARTMENT OF
ENERGY
DATE
JULY 2010
PROJECT NO.
6-7-14
DRAWING NO.
EXHIBIT 2

**PRELIMINARY
NOT FOR CONSTRUCTION**

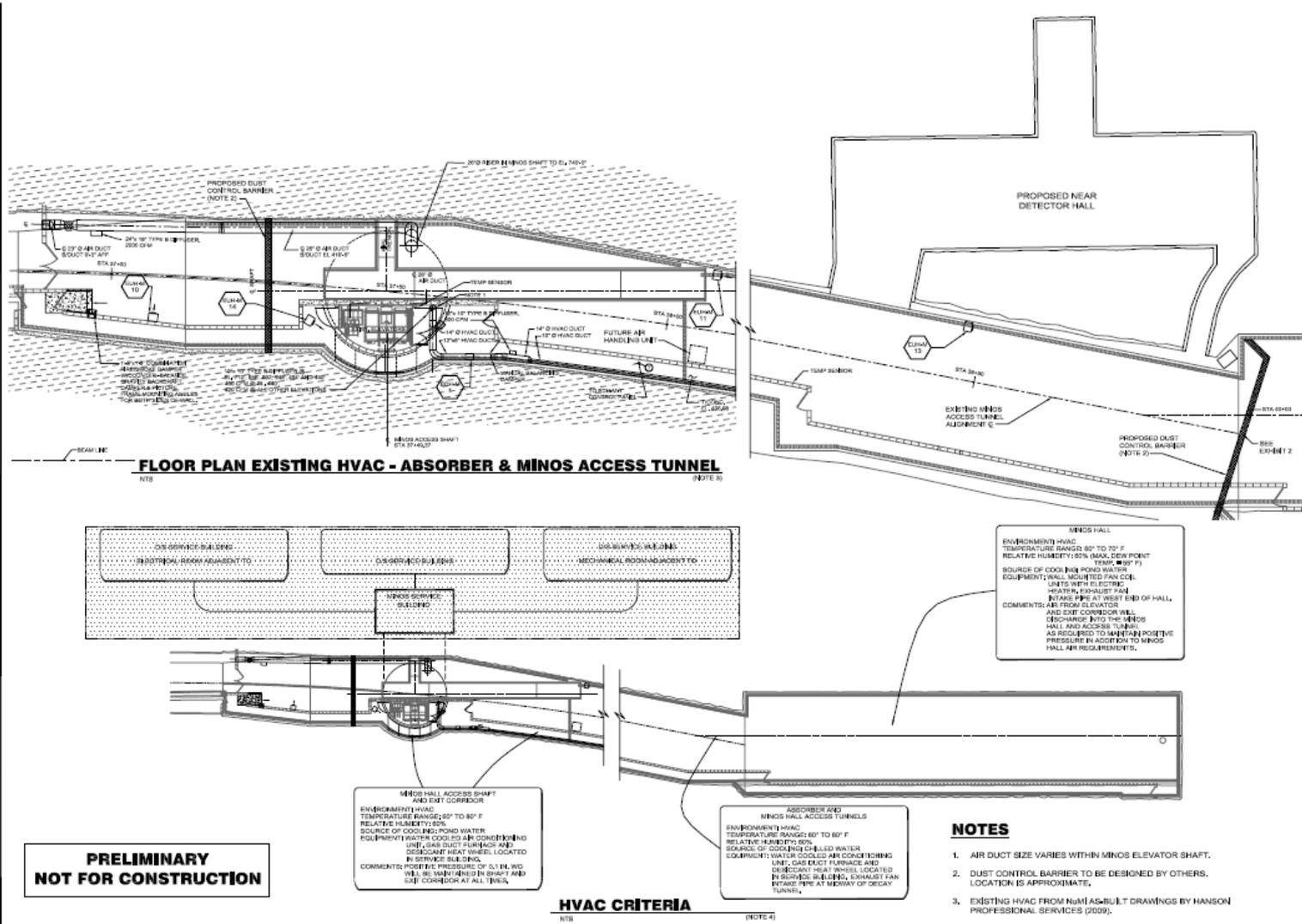
NOTE

1. DIMENSIONS OF NEAR DETECTOR FOR REFERENCE ONLY.
2. NEAR DETECTOR, STEEL PLATFORM, STAIRWELLS, AND LIQUID SCINTILLATOR CONTAINMENT TO BE DESIGNED BY OTHERS.
3. PERIMETER GUTTERS ALONG ALL WALLS AND PASSAGEWAYS NOT SHOWN FOR CLARITY.
4. LOCATIONS OF POWER PULL BOX AND FIRE ALARM J-BOX ARE APPROXIMATE.
5. LOCATION OF DUST CONTROL BARRIER IS APPROXIMATE, FINAL LOCATION AND DESIGN OF BARRIER BY OTHERS.
6. UTILITIES ON WEST WALL BETWEEN STA. 38+00 TO DUST CONTROL BARRIER.

Jul 15, 2010 - 10:28am R:\10079154\Fermilab\EXHIBIT\EXHIBIT 2.dwg



Upstream and Downstream Partition Locations



SCALE:

MWH
 175 West Johnson Blvd.
 CHICAGO, IL 60606

NOVA NEAR DETECTOR HALL PROJECT DEFINITION REPORT
 EXISTING HVAC CRITERIA



DATE: **JULY 2010**
 PROJECT NO: **6-7-14**
 DRAWING NO: **EXHIBIT 6**

Jul 15, 2010 - 10:26am R:\000916\Fermilab\NOVA\BIBITS\EXHIBIT_6.dwg



Status of Cavern Excavation Design and Engineering

There are two design efforts in progress:

1) **Site Preparation** by Hanson Engineering

Locate and identify all impacted utilities

Relocate all impacted utilities

Make all relocated utilities functional

Locate protection partitions – upstream and downstream

Design adequate partitions to protect upstream and downstream areas from construction activities

Create work specifications

Cost and schedule estimation

2) **Tunnels and Halls** by MWH

Specify new excavation

Do geotechnical investigation

Design rock support

Specify excavation methodology

Create work specifications

Cost and schedule estimation



Status of Cavern Excavation Design and Engineering (Continued)

A third design effort is required but has not started:

3) **Outfitting** (Not yet assigned)

Waiting for further detailed design of the first two phases



Status of Cavern Excavation Design and Engineering

Status:

- 1) Hanson Engineering (Site Prep)
30% design package delivered 4/8/2010 (Posted in FESS ftp)
After in-house review, a meeting on 5/11/2010 to respond
95% design due September 2010
100% package due November 2010

- 2) MWH (Tunnels and Halls)
Final PDR July 16, 2010 (Posted in FESS ftp)
50% Review September 2010
95% Review January 2011
Bid Package ready March 2011

- 3) Not assigned (Outfitting)

Our Assessment: Progress Satisfactory

Status of Hanson Site Prep Design and Engineering

This is the title sheet for Hanson's 30% Review Drawings

NOvA Near Detector Hall SITE PREPARATION AND UTILITY RELOCATION PROJECT NUMBER 6-7-14

* INDICATES SHEETS INCLUDED IN THIS SUBMITTAL

GENERAL

- * G-1 LOCATION PLAN AND DRAWING LIST
- * G-2 GENERAL NOTES AND STANDARD SYMBOLS
- * G-3 PHASING PLAN

ARCHITECTURAL

- * A-19 ARCHITECTURAL SECT & DET. - SHT 11
- * A-20 ARCHITECTURAL SECT & DET. - SHT 12

STRUCTURAL

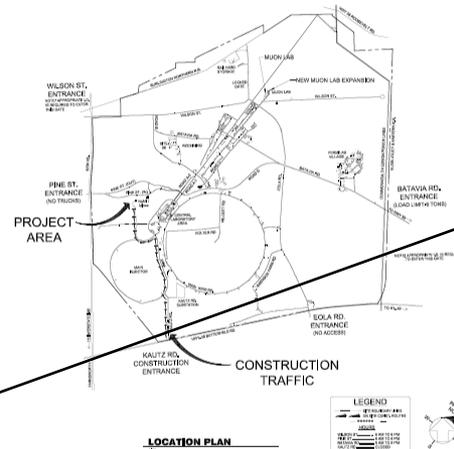
- S1.1 TEMPORARY DUST BARRIER WALL, SECTIONS & DETAILS
- * SS-4 UTILITY SUPPORTS
- SS-5 UTILITY SUPPORTS

DEMOLITION

- * PP-9D MINOS HALL - PROCESS SYS. DEMO
- * M-11D MINOS ACCESS TUNNEL HVAC DEMO
- * FP-4D MINOS ACCESS TUNNEL DEMO
- FPE-8D B.A. ACCESS TUNNEL - FIRE DET. DEMO
- FPE-9D MINOS ACCESS - FIRE ETECTION DEMO
- E-19D ACCESS TUNNEL - LTG & RECPT DEMO
- E-20D ACCESS TUNNEL - COND DEMO
- E-21D MINOS ACCESS - LTG & RECPT DEMO

ELECTRICAL

- E-19 ACCESS TUNNEL - LTG & RECPT
- E-19A ACCESS TUNNEL - PHOTOS
- * E-20 MINOS ACCESS TUNNEL - COND LAYOUT
- E-20A MINOS ACCESS TUNNEL - PHOTOS
- * E-21 MINOS ACCESS - LTG & RECPT
- E-21A MINOS ACCESS - PHOTOS
- E-22
- FP-4 MINOS ACCESS TUNNEL
- FPE-8 ACCESS TUNNEL - FIRE DET.
- FPE-9 MINOS ACCESS - FIRE DETECTION
- FPE-10



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- FPE-9 MINOS ACCESS - FIRE DETECTION
- FPE-10

| | | | | | | |
|--|--|---|--|---|--------|--|
| | | PROJECT NO. 06-0020 PROJECT LOCATION: Fermilab, 1111 State Street, Batavia, IL 60010 SHEET NO. 06-0020-01 | | DATE: 06/11/14 DRAWN: AN/ML CHECKED: TBL APPROVED: | SCALE: | ISSUED FOR 30% SUBMITTAL FERMILAB NATIONAL ACCELERATOR LABORATORY NOvA NEAR DETECTOR HALL SITE PREPARATION AND UTILITY RELOCATION LOCATION PLAN & DRAWING LIST SHEET NO. 6-7-14 G-1 |
|--|--|---|--|---|--------|--|

Status of Hanson Site Prep Design and Engineering



These are examples of Title Blocks from some of Hanson's drawings for the relocation and demolition of utilities in the way of the new cavern excavation.

| | | | | | |
|---|-----------|---------|--|--|--|
|  HANSON PROJECT NO. - 08C0113 Hanson Professional Services Inc. 1826 South 81st Street Springfield, MO 65703-2888 Office Nationwide | DESIGNED | ATK | |  SCALE: 1/4"=10' 1/2"=20' 1"=40' SCALE | FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY  NOVA NEAR DETECTOR HALL SITE PREPARATION AND UTILITY RELOCATION ARCHITECTURAL SECT & DETSHT 11 DRAWING NO. 6-7-14 A-19 REV. 08-Apr-2010 |
| | DRAWN | SKB | | | |
| | CHECKED | ATK/TKL | | | |
| | APPROVED | TKL | | | |
| | SUBMITTED | | | | |
|  HANSON PROJECT NO. - 08C0113 Hanson Professional Services Inc. 1826 South 81st Street Springfield, MO 65703-2888 Office Nationwide | DESIGNED | ATK | |  SCALE: 1/4"=10' 1/2"=20' 1"=40' SCALE | FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY  NOVA NEAR DETECTOR HALL SITE PREPARATION AND UTILITY RELOCATION ARCHITECTURAL SECT. & DET. SHT-12 DRAWING NO. 6-7-14 A-20 REV. 08-Apr-2010 |
| | DRAWN | SKB | | | |
| | CHECKED | ATK/TKL | | | |
| | APPROVED | TKL | | | |
| | SUBMITTED | | | | |
|  HANSON PROJECT NO. - 08C0113 Hanson Professional Services Inc. 1826 South 81st Street Springfield, MO 65703-2888 Office Nationwide | DESIGNED | ATK | |  SCALE: 1/4"=10' 1/2"=20' 1"=40' SCALE | PART OF PROJECTS 6-7-6 & 6-7-8 FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY  NOVA NEAR DETECTOR HALL SITE PREPARATION AND UTILITY RELOCATION MINOS ACCESS TUNNEL - COND LAYOUT DRAWING NO. 6-7-14 E-20 REV. 08-Apr-2010 |
| | DRAWN | SKB | | | |
| | CHECKED | ATK/TKL | | | |
| | APPROVED | TKL | | | |
| | SUBMITTED | | | | |
|  HANSON PROJECT NO. - 08C0113 Hanson Professional Services Inc. 1826 South 81st Street Springfield, MO 65703-2888 Office Nationwide | DESIGNED | ATK | |  SCALE: 1/4"=10' 1/2"=20' 1"=40' SCALE | FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY  NOVA NEAR DETECTOR HALL SITE PREPARATION AND UTILITY RELOCATION MINOS ACCESS - LTG & RECPT DRAWING NO. 6-7-14 E-21 REV. 08-Apr-2010 |
| | DRAWN | SKB | | | |
| | CHECKED | ATK/TKL | | | |
| | APPROVED | TKL | | | |
| | SUBMITTED | | | | |
|  HANSON PROJECT NO. - 08C0113 Hanson Professional Services Inc. 1826 South 81st Street Springfield, MO 65703-2888 Office Nationwide | DESIGNED | ATK | |  SCALE: 1/4"=10' 1/2"=20' 1"=40' SCALE | FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY  NOVA NEAR DETECTOR HALL SITE PREPARATION AND UTILITY RELOCATION MINOS ACCESS TUNNEL DEMO DRAWING NO. 6-7-14 FP-4D REV. 08-Apr-2010 |
| | DRAWN | SKB | | | |
| | CHECKED | ATK/TKL | | | |
| | APPROVED | TKL | | | |
| | SUBMITTED | | | | |



Status of Hanson Site Prep Design and Engineering

Hanson's 30% Design included a discussion of the construction of the large temporary wall needed to isolate the MINOS Cavern and the experiments located in the MINOS cavern.

Fermi National Accelerator Laboratory
NOvA Near Detector Hall
FESS Project 6-7-14

30% Submittal
Temporary Wall Conceptual Design
April 9, 2010

Hanson Professional Services Inc.

I:\09jobs\09E0115\Admin\Project Management\ Temporary wall thought process.doc



Discussion of Methodology and Impacts

1. Electrical Utilities located on the west wall of the access passage will re-routed and relocated from a point just downstream of the shaft “up and over” to the east wall on top of the egress passage existing utilities. They will then run downstream to the MINOS Hall where they will again go “up and back over” to the panels currently serviced. New conduit will be installed, and in all probability whole new wiring runs will be pulled, all during operations prior to shutdown. Then in a relatively quick operation the existing wiring will be cut upstream and downstream, the new wiring connected, and service restored. This probably will be a very few days interruption at most.
2. At present, MWH intends to require the excavation contractor to have no impact on the existing NuMI MINOS water systems. What water is needed by the construction contractor will be brought down the MINOS shaft, and all construction water will be collected in a NEW sump near the work, and pumped by a mine pump to the surface to a treatment/settling system.



A Road-header





Discussion of Methodology and Impacts (2)

3. MWH intends to specify that excavation will be accomplished using a road-header (previous slide.) The intention is that it should not be necessary to utilize “drill and blast” for the construction of the enlarged cavern. The road-header teeth should chip the shale (rock strata of the MINOS Hall and also the new cavern) relatively easily. There may be some vibration transmitted through the rock from the chewing teeth, but generally no severe shocks or impacts are expected. The road-header teeth will probably be sprayed with water to minimize dust for the miners. This is the water that will be brought down the shaft and collected in the new sump.

4. The new sump will be below floor level, and therefore NOT in the shale. The excavation in the Galena-Platteville dolomite is probably not efficient with the road-header. Drill and “cracker?”



Discussion of Methodology and Impacts (3)

5. Access to the MINOS Hall, and “emergency egress” will be reversed during construction activities. The regular access to the MINOS Hall will be through the existing emergency egress passage, which will not be altered in any respect. There will be “emergency doors” constructed as part of the upstream and downstream partitions. Emergency (secondary) egress will be through the construction area. It should be noted that the emergency route may be dirty, uneven, and perhaps the location of a small mining railroad track from the new cavern entrance to the shaft base. Large equipment delivery down the shaft will be limited, and the doors in the partition wall will not be oversize.

6. The existing air service to the MINOS Hall downshaft will be maintained, and air outflow will continue to be by the downstream shaft (in the middle of Pine Street.)



Discussion of Methodology and Impacts (4)

7. The MINOS shaft crane will be under the control of the contractor, and will be the primary lift and delivery system for the contractor. In the case of emergency service for the existing sump system, the contractor will need to give way. Other use of the shaft crane will usually have to be “off hours”, and the partition door limitations will limit deliveries, as will floor surface conditions.
8. The personnel elevators will be shared with the contractor’s staff.
9. The pre-construction of the partition walls should not impact operations, but door sizes will limit the size of delivered items once built into the walls.
10. The upstream crane stop in the MINOS Hall may need to be relocated slightly downstream until the partition wall is removed.



Discussion of Methodology and Impacts (5)

11. After the cavern excavation is completed, the excavation contractor will demobilize and “Outfitting” will begin. The partitions may then be removed. Outfitting will consist of installing the final lights, electrical, fire suppression (including restoration in the access way,) final HVAC, etc. As each of these systems is completed and brought “on-line” there may be brief interruptions while “tie-in” is accomplished. There will not be particular time urgency, and mutually acceptable times may be selected for utility interruptions for the “tie-in” process.



The MWH Final PDR



FERMI NATIONAL ACCELERATOR LABORATORY

Subcontract No. 588643

***NOvA Near Detector Hall
Tunnels and Hall***

Project No. 6-7-14

PROJECT DEFINITION REPORT

Rev. 1

July 16, 2010

PREPARED BY:



*NOvA Near Detector Hall
Tunnels and Hall*

Project Definition Report

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List of Exhibits

| | |
|-----------|--|
| Exhibit 1 | Vicinity Plan, Location Plan and General Notes |
| Exhibit 2 | Plan |
| Exhibit 3 | Near Detector Hall - Section, Sheet 1 of 2 |
| Exhibit 4 | Near Detector Hall - Sections, Sheet 2 of 2 |
| Exhibit 5 | Excavation Sequence |
| Exhibit 6 | Existing HVAC Criteria |

Appendices

| | |
|------------|--|
| Appendix A | Near Detector Parameters |
| Appendix B | Selected Geology and Geotechnical References |
| Appendix C | Opinion of Probable Construction Costs |
| Appendix D | Construction Schedule |
| Appendix E | Review Comments and Responses |





The MWH Final PDR – Cost and Schedule

Table 3 - Engineer's Opinion of Probable Construction Cost

| | |
|---|--------------------|
| Surface Mobilization/Demobilization | \$418,030 |
| Underground Mobilization/Demobilization | \$862,950 |
| Underground Construction | \$2,050,360 |
| Subtotal | \$3,331,342 |
| Contingency 30% | \$999,403 |
| Subtotal | \$4,330,745 |
| Escalation to Midpoint of Construction Two Years at 3.0% | \$259,850 |
| Engineer's Opinion of Probable Construction Cost | \$4,590,590 |

Rev.: 1
Date: 07/16/2010

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10.3 SCHEDULE

A construction schedule has been developed based on the general scope of work and assumed construction means, methods, and sequence described herein. The schedule is included in **Appendix D** and indicates a total duration from the time of the contract award through major underground construction of approximately 10-1/2 months. The duration of underground construction activities to complete the Tunnels and Hall is approximately 8 months. The major project milestones include:

- Award of Contract July 1, 2011
- Begin Site Prep/Mobilization January 3, 2012
- Begin Underground Excavation May 7, 2012
- Complete Near Detector Hall October 22, 2012

The preliminary construction schedule requires a careful sequential construction approach. With this approach the schedule indicates the Tunnels and Hall construction would be complete in October 2012.