



NOvA Near Detector Infrastructure

WBS 2.8.1

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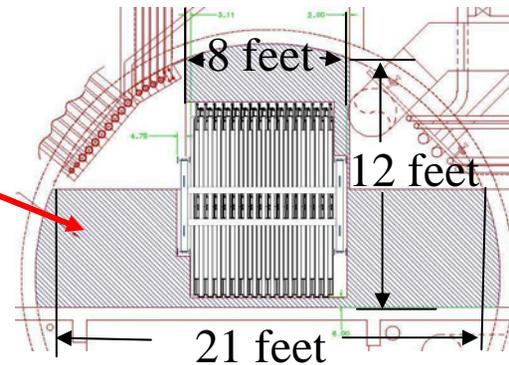
WBS 2.8.1 –Near Detector Infrastructure - Overview

- WBS 2.8.1 contains the **Near Detector elements not included in the underground cavern excavation preparations**
 - **Detector-required specifics feed the infrastructure needs**
 - Best analogy: What one outfits a room with, having been given 4 bare walls, a ceiling & a floor, and before one actually moves in the furniture
- **Several component systems are identical in operation to those used for the IPND**
 - Secondary containment
 - Fire suppression and alert systems
 - Electronics cooling
 - Decision for water or refrigerant will have been made based on IPND experience
 - Electronics power requirements
- **Much is specific to being in an underground environment**
 - Ventilation
 - Limitations on size and weight of equipment going underground
 - Existing sump system limits weight in certain areas



WBS 2.8.1 –Near Detector Infrastructure - Mechanicals

- WBS 2.8.1 Infrastructure Management is responsible to review the physical sizes of all equipment to be used for the installation and operation of the Near Detector and related equipment such that the parameters of the cavern infrastructure meet the needs of the experiment while operating within the envelope of cost and schedule established for the project
 - Crane limit is 15 tons
 - Aperture of shaft is hashed area
- WBS 2.8.1 Infrastructure Management is responsible to make certain infrastructure planned for the Near Detector is compatible with other projects already in the MINOS underground environment
Project Management will be appraised of conflicts at early as possible during the planning stages so that adjudication can occur in a timely and reasonable manner





WBS 2.8.1 –Near Detector Infrastructure - Services

- All services will need to be designed based on load requirements from the specific Level 2 & 3 portions of NOvA responsible for their specific subsystems
 - Lighting
 - Chilled Water
 - Electrical power for all portions of the detector operations
- WBS 2.8.1 Infrastructure Management is responsible to ensure all requirements of NOvA are integrated with the Fermilab & DOE ES&H constraints related to the operational environment
 - Specify safety requirements & related required training
- WBS 2.8.1 Infrastructure Management is responsible to make certain resources for services have been coordinated with other users of the facility so as to not preclude safe and efficient operations



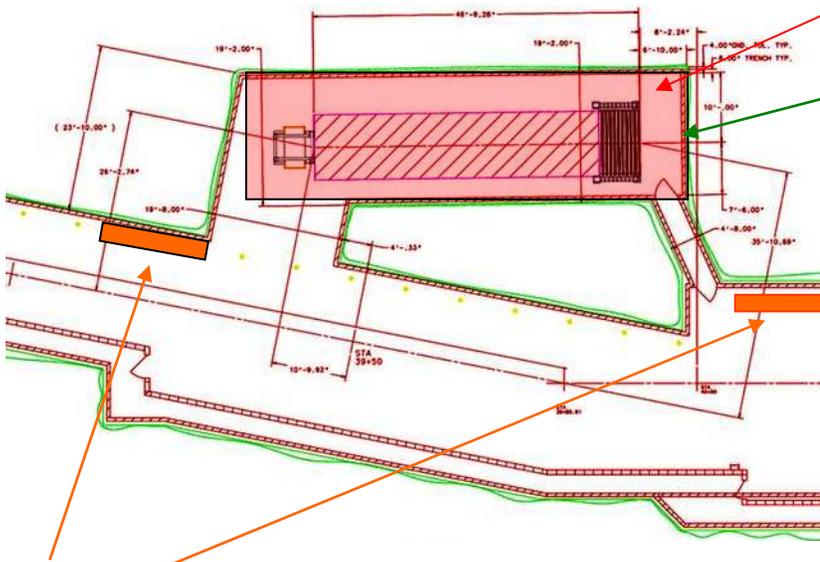
WBS 2.8.1 –Near Detector Infrastructure - Liquid Scintillator

- Secondary Containment

- Must be 100% of the Near Detector volume
- 30,000 gal = 4,000 cubic feet

Requires a footprint of 1,000 square feet

Already ~ met by proposed cavern excavation



Solid wall containment around the detector will work with the exception of passage ways

The above ground containment as used for the IPND will "line" the cavern walls and be lifted on the front edge after block installation. Like the IPND, ladders will provide access over the containment walls.

Fuel bladders can be attached for the remainder of the required volume if there is not enough volume in the cavern for all the liquid scintillator at the possible height of the soft-walled containment



WBS 2.8.1 –Near Detector Infrastructure - Liquid Scintillator

- **Fire Protection**

- Depleted oxygen system used in the IPND is applicable
- FIRUS system required
 - Cables pulled with the DAQ cabling
- Evaluation of fill piping in the main MINOS tunnel
 - Additional fire protection required?
- Door system into cavern
 - Normally open – alarm closes

- **Ventilation**

- Study by competent professional engineer required
 - Ambient ventilation for enclosed cavern
 - Post-fire smoke evacuation
 - Interactions with existing underground systems

- **WBS 2.8.1 Installation Management is responsible to ensure all Fire Protection elements adhere to a prepared and approved life safety evaluation as adopted by the Fermilab management**



WBS 2.8.1 –Near Detector Infrastructure - Survey

- WBS 2.8.1 Infrastructure Management is responsible to oversee the **survey of the cavern location**
Physics requirements will determine the position of the cavern
 - Physical size and location of the detector within the excavation envelope will determine final "center line" for the excavation
- WBS 2.8.1 Infrastructure Management is responsible to **provide the survey grid within the cavern to which the detector will be aligned**
 - The survey system designed for all the NOvA detectors and already in place on the Near Detector modules will control alignment style and precision
- WBS 2.8.1 **Infrastructure Management is responsible for inclusion of all survey and alignment data in the NOvA database system**



WBS 2.8.1 – Near Detector Infrastructure - Schedule

- **Coordination schedule – "global"**
 - Tied to Accelerator Division shutdown schedule
 - Cavern excavation occurs in 2010
 - Infrastructure outfitting nominally occurs in the same shutdown
 - Required design input parameters from other NOvA L2 & L3 tasks ready by FY '08 – many already well understood
 - Electrical needs are a priority on the list
 - Evaluation of surplus power available at the MINOS complex
 - Potential to provide preliminary installation when existing utilities are moved
 - External cooling loop loads
 - Evaluation of available surplus capacity at the MINOS complex
- **Implementation schedule – "synchronicity"**
 - Infrastructure contracts adjusted for scheduling optimization
 - Many basic supply feeds can be done before the cavern excavation
 - Must be examined in terms of cost of splitting work into two packages
 - All basic infrastructure finished before the Near Detector rolls in