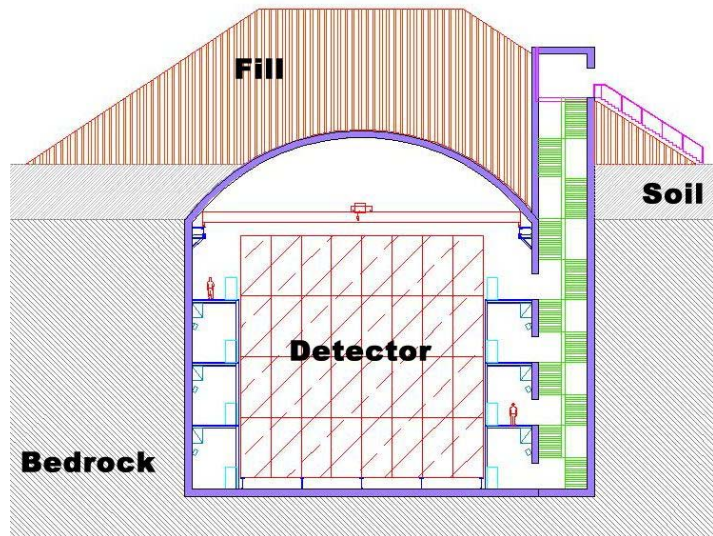


## Off-Axis NuMI Neutrino Detector

A CNA-led team conducted the conceptual design for a so-called “off-axis” neutrino detector located about 10 km off the NuMI neutrino beam in northeastern Minnesota. Four construction alternatives were considered, all having 10 meters of shielding:

- Cut-and-cover in an ore stockpile
- Direct burial on grade
- Cut-and-cover in bedrock
- Mined cavern

The preferred alternative is the cut-and-cover in bedrock structure, illustrated to the right. This alternative has straight, vertical sidewalls and an arched concrete roof founded at the bedrock surface. Structural benefits include the minimal structure required to line the walls and the use of bedrock for the roof arch foundation.



The nominal inside dimensions of the laboratory are 125 meters long, 28 meters wide and 29 meters high (to the peak of the roof arch). Primary access to the laboratory is via an inclined ramp to the loading dock, located at the mezzanine level on the north end. A bridge crane covers both the experimental space and the mezzanine. An elevator provides primary access to the laboratory floor and four egress towers contain utilities and egress stairs to the surface.

Surface systems and components include: a parking lot, access roads, substation, generator, air conditioning units, water well, fire protection tank, fire alarm and smoke control panel, sanitary sewage treatment system, and storm sewer.

Systems and components within the laboratory include: electrical service, emergency power, standard and emergency lighting, HVAC, smoke ventilation, smoke compartmentalization, egress staircase ventilation, domestic water, foundation drain system, plumbing, fire protection, detector support structure and detector support structure.

The estimated project cost is \$26.9 million dollars, including permits, fees, professional services and a 25 percent contingency. The current project development schedule estimates 130 weeks from start of design until beneficial occupancy. The design phase of the project is currently estimated at 38 weeks, and the construction phase of the project is estimated at 92 weeks.

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**Owner — University of Minnesota**

**Completion Date — Study completed 2002**

**Construction Cost — \$27 million**

**CNA**  
**Consulting**  
**Engineers**

2800 University Ave. SE, #102  
Minneapolis, MN 55414  
Ph: (612) 379-8805  
Fax: (612) 379-8160  
E-mail: [bkn@cnaengineers.com](mailto:bkn@cnaengineers.com)