

## MINOS Far Detector Laboratory—Neutrino Experiment

The MINOS Far Detector Laboratory, part of the Fermi National Accelerator Laboratory's NuMI project, was completed in the fall of 2002. The project is located at Soudan Underground Mine State Park, a historic underground iron ore mine now operated by the State of Minnesota Department of Natural Resources. The cavern is 2340 ft deep in a metamorphosed basalt locally called greenstone.

CNA is the prime consultant to the University of Minnesota, with responsibility for feasibility study, site selection and investigation, space planning, design, and construction services for this large, underground physics laboratory in northern Minnesota. Other team members provide mechanical, electrical, and architectural services.



The 270-ft long cavern was excavated by drill and blast methods and mucked by front end loader and the historic mine hoist. The excavation sequence consists of twin top-heading pilot tunnels followed by removal of the top heading pillar and finally the bench. Initial support and final lining consists of full length resin grouted rockbolts, and both reinforced and plain shotcrete. The performance of the rock and support systems were tracked with single point extensometers, convergence measurements, sounding and visual inspections.

Cavern outfitting in preparation for a 6,000 ton steel detector includes installation of a bridge crane, steel structures, electrical systems, ventilation systems, materials handling systems and reinforced concrete floors.

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**Owner — University of Minnesota, School of Physics & Astronomy**

**Completion Date — 2002**

**Construction Cost — \$5 million**

**CNA**  
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