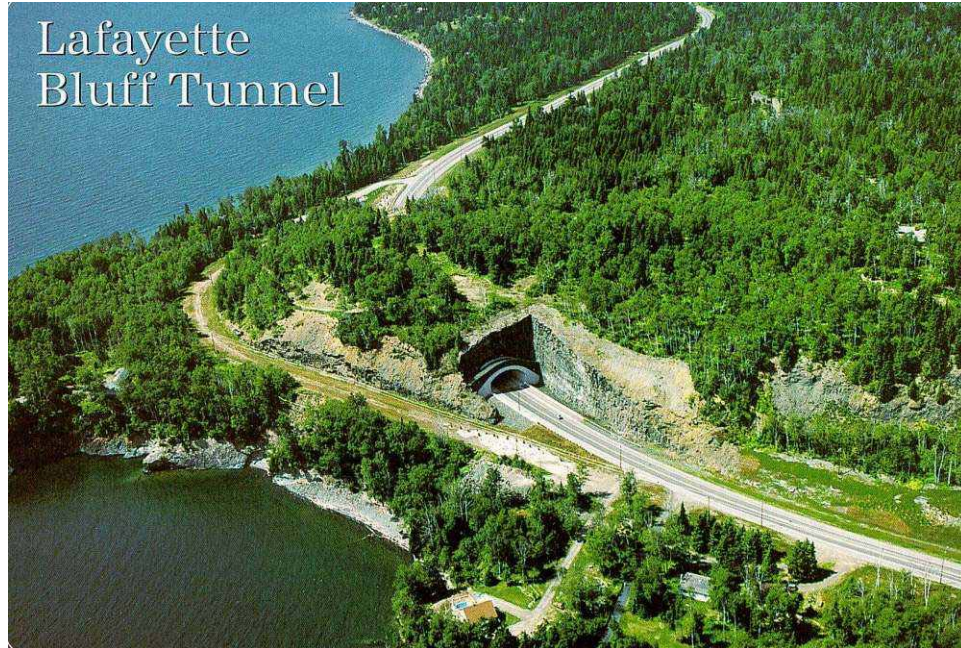


# Lafayette Bluff Highway Tunnel

The Lafayette bluff highway tunnel, located on the environmentally and aesthetically sensitive North Shore of Lake Superior, was opened for traffic in the fall of 1991. The tunnel is part of an 18-year, \$104-million program to upgrade U.S. Route 61 in northeastern Minnesota. The existing highway was threatened by steep, unstable cliffs and contained tight curves not meeting current design standards. The project was the cover and feature article in the November 15, 1990 issue of ENR.



The Minnesota Department of Transportation project consisted of open cut rock slopes for the approaches, 197 ft of portal structures or cut-and-cover tunnel, and 652 ft of mined rock tunnel. The sharp four-degree curve of the new alignment required additional tunnel width to provide sight distance and resulted in a 61 ft wide excavation, making Lafayette Bluff among the widest hard-rock highway tunnels in the United States.

The tunnel was constructed in a closely-jointed, variable-weathered diabase rock mass. Rock cover above the tunnel crown ranged from about 13 ft to about 89 ft. For about 60% of the tunnel length, the cover was less than the tunnel width. A tunnel project was chosen, rather than an open cut project, due to environmental, economic and right-of-way reasons. Tunnel excavation was by controlled blasting, with multiple top headings and benches. Rock support and lining consisted of external portal beams, rockbolts and reinforced shotcrete. A final concrete lining provided structural support for the rock mass and the membrane waterproofing system. Related construction included 4690 ft of roadway, mechanical/electrical systems and a service building.

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**Owner — Minnesota Department of Transportation**

**Completion Date — Opened to Traffic November 1991**

**Construction Cost – Entire Project \$13.8 million**

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