

## Zimmerman Trail Tunnel City of Billings

**Location:** Billings, Montana

**Date:** 2010 – 2011

**Structure:** Highway Tunnel

**Length:** Approximately 2,020 – 3,700 feet (615 – 1,126 meters) Depending on Alignment Options Selected

**Cross-Section:** Height: 34.4 feet (10.5 meters)  
Width: 61 Feet (19 meters)

**Geology:** Eagle Sandstone Formation (Very-Fine to Fine-Grained, Cross-Bedded Sand-Stones and Shales) and Telegraph Creek Formation (Shale and Sandy Shale)

**Cost:** --

**Client:** HDR, Inc.

**Owner:** City of Billings, Montana

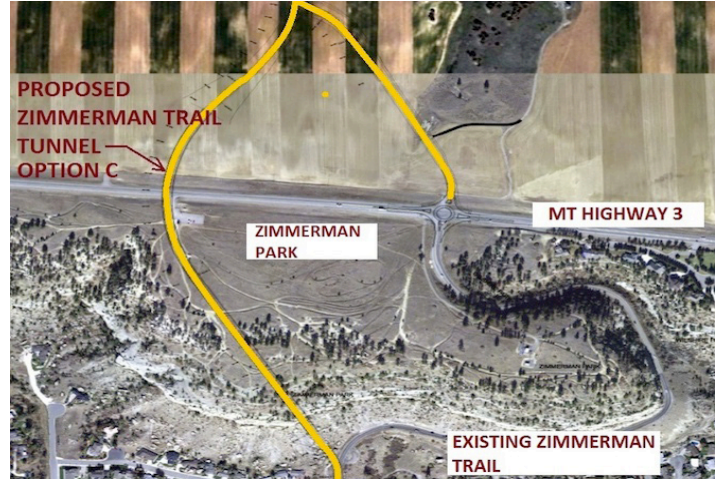


Figure 1. Alignment of Tunnel Option C.

### Tunnel Engineering Feasibility Study:

The Zimmerman Trail Tunnel features one 14 foot (4.3 meters) lane with 8 foot (2.4 meters) shoulder for each direction of traffic. The highway tunnel also allows for a 16 foot (4.9 meter) vertical clearance, an additional 2 feet (0.6 meters) for roadway signage, and 5 foot (1.5 meter) diameter jet fans.

Gall Zeidler Consultants (GZ) developed the tunnel engineering aspects of the feasibility study for the Zimmerman Trail alternatives analysis. The scope of services included input to the alignment studies, review of the geotechnical program, interpretation of the geotechnical data, developing typical cross-sections along with excavation and support measures, and recommendations for waterproofing, final tunnel lining and tunnel ventilation.

The initial rock support was separated into three categories: Portal Rock Support, Ground Class I Rock Support, and Ground Class II Rock Support (Figure 2). The final lining is cast-in-place concrete, reinforcement provided typically in portal area only.

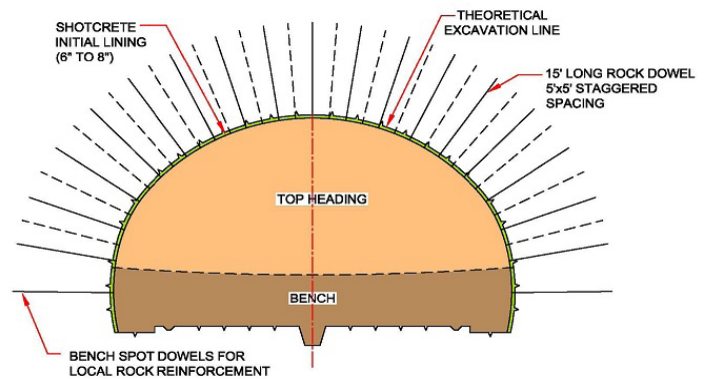


Figure 2. Typical tunnel rock support for the Ground Class II Category.