

## Trout Brook Outlet – Phase A, St. Paul, MN

The Trout Brook Outlet – Phase A project is a 2,300 linear foot storm sewer constructed in St. Paul, MN. The project consisted of two ten-foot inside diameter reinforced concrete pipes placed 16 feet apart through soils varying from organics to clays to sands. Four tunnels were required and crossed under heavily traveled railroad tracks at shallow depths. Part of CNA's construction phase services included the type, location and analysis of geotechnical instruments to monitor settlement of ground near railroad tracks and a retaining wall during tunnel excavation and subsequent compaction grouting used to protect structures.

CNA provided the following services to the project:

- Geotechnical report
- Tunnel design
- Plan preparation
- Specification preparation
- Construction submittal review
- Construction monitoring

Shown is the open face heading of a shield for a ten-foot diameter tunnel in a sand and organic transition.



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**Owner — City of St. Paul, MN**

**Completion Date — 1991**

**Construction Cost — Approximately \$3 million**

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

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