



Edmonton Light Rail Transit System Geotechnical Excavations

Geographical location

Edmonton, Alberta

When it began or was completed

Investigations began in 1962; recent construction ended in 2015.

Why a Canadian geotechnical achievement?

In April 1978, service began on Edmonton's Light Rail Transit System (LRT). Starting with a surface line that led into a tunnel under the city's downtown, Edmonton became the first city in North America to operate such a system. From 1962 to 2015, the cost of this major project was over \$1.8 billion, and continues to grow with future segments being planned.

Tunneling in an urban environment requires small tolerances for settlement to protect surface structures. Edmonton's soil conditions are challenging because of its variability over short distances, and its water-bearing sand pockets and buried sand valleys. Every modern tunneling method has been used in constructing the LRT: an open-face tunnel boring machine; a slurry shield; sequential excavation methods (referred to as the 'new Austrian tunneling method'), and a Lovat earth pressure balance shield. The six LRT stations were constructed using cut and cover with braced concrete cast-in-place tangent pile walls.

A number of consulting engineering firms contributed to the design and construction of the LRT, including UMA (now AECOM), Stantec, Associated, EBA, Thurber and RM Hardy (now Amec Foster Wheeler). The tunneling through varied soil conditions provided many opportunities for geotechnical research at the University of Alberta, initially led by Dan Eisenstein and currently led by Derek Martin. Next year, the LRT will celebrate 40 years of operation. Much of the success of the network is due to the efforts of geotechnical engineers.

Submitted by

Derek Martin (University of Alberta), on behalf of the many geotechnical engineers involved in the project over the past 55 years.

Key Reference

Transportation Research Board. 2013. **Sustaining the Metropolis: LRT and Streetcars for Super Cities.** Transportation Research Circular E-C177, (US) Transportation Research Board, Washington, DC, USA.

Photograph



University of Alberta graduate students on a tour of the LRT excavation site.