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Representative Project

Jefferson East Combined Sewer Relief Program, Winnipeg

Winnipeg's Basement Flood Relief and Combined Sewer Overflow Relief Project was initiated in 1977 to mitigate basement flooding, and improve surface water quality by reducing the frequency of combined sewer overflows. The installation of separate storm and sanitary sewers was considered the most cost effective solution.

As the excavation moves forward, concrete pipe is jacked behind the cutting face of the auger until it reaches the reception shaft.

The first phase of the $100 million dollar project included the Jefferson East residential area that follows the Red River through Winnipeg's North End. One of the streets in the development follows the primary dyke that has protected the area from flooding since the 1950s. Open cut excavation was not an option because of existing buried and surface infrastructure and close proximity to the primary dyke. Trenchless installation methods were most appropriate for the new sewers.

Borland Construction was the successful contractor for Contracts 2 and 3 of the Jefferson East development. The contractor used a combination of trenchless methods to install 600mm to 900mm diameter pipelines through the granular deposits. Due to low cohesion and high strength, granular soils are more difficult to tunnel than fine soils. The added pressures associated with the soil conditions were considered when determining drive distances.

Throughout the project the drive lengths ranged between 70m and 114m. The accuracy of each drive was recorded and never exceeded 5mm on the vertical or horizontal axis. Pilot tubes were pushed from the access shaft to the reception shaft, and monitored with a survey instrument to maintain line and grade. Once line and grade were established, a 400mm

The axial design calculations for the pipe were checked according to ASCE 27-00.

auger with a steel casing was attached to the pilot tube to excavate the soil for the concrete pipeline. As the excavation moved forward, concrete pipe was jacked behind the cutting face until it reached the reception shaft.

Drive lengths were a major concern, since added skin friction increased the axial pressure. Plywood rings were fabricated to help pack the joints and cushion the load at the joints. Steel banding was used on the outside of the bell to increase the tensile strength of the joints. Design procedures outlined in ASCE 27-00 were used to calculate the maximum permissible jacking thrust and compressive stress for both concentric and eccentric loading conditions, and the angular deviation from the centreline and the associated eccentricity of the jacking thrust force (the angle off the centreline that results in eccentric conditions).

The calculations showed that the drives had to be as close to concentric as possible, so that the maximum axial thrust capacity of the pipe was not exceeded. The eccentric thrust capacity of the pipe is lower than the maximum thrust of the microtunneling machine, therefore an eccentric drive was not an option. The accuracy and precision of Borland's excavation method allowed for longer drive lengths and increased efficiency at a lesser cost. The success of the project strongly suggests that the trenchless method for replacing pipelines and failing culverts is an approach for all seasons.

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Location:	Winnipeg, Manitoba
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Producer:	Inland Pipe, Winnipeg Facility
Contractor:	Borland Construction
Design:	AECOM
Photo Credit:	Borland Construction