

Reflections on the Successful Slip lining of the Humber Sanitary Trunk Sewer

Constructed in 1959, the Humber Sanitary Trunk conveys wastewater collected from Etobicoke, on the north west side of Toronto to the Humber Treatment Plant where wastewater is treated and discharged to Lake Ontario. The section of the Humber STS between MH 320-24 and MH 320-15 lies within the Humber River Valley and land belonging to the Toronto and Region Conservation Authority. It passes through five City Parks which comprise baseball diamonds, children's playgrounds, paved walking and cycling trails, traverses through natural ravine environment with mature trees and forest and crosses the Humber River in three separate locations.

In 2009, routine inspection of this 2,4 km length of sewer found substantial H₂S corrosion of the pipe fabric. Observed defects included softened concrete, exposed aggregate, exposed and heavily corroded reinforcing steel as well as corroded ladders, platforms and appurtenances within the associated maintenance holes. The City of Toronto engaged Jacobs to perform detailed design and services during construction to rehabilitate the Humber STS, to restore structural integrity and extend the remaining useful life of this critical section of the trunk sewer network by a minimum 100 years.

The sewer is a reinforced concrete pipe, measuring 1500 mm to 1650 mm in diameter, laid at depths of between 5 and 13 m below grade with drops at some maintenance holes. The maintenance holes are located on the banks of the river within the 2-year flood line and are subject to inundation during the snow melt and periods of heavy rain. The goals of the rehabilitation were to provide a corrosion resistant barrier and extend the sewer service life whilst minimizing disturbance to stakeholders and the natural environment.

Through a comprehensive evaluation Jacobs selected slip lining as the preferred rehabilitation method to address the observed conditions. Slip lining is a trenchless technology which can be installed in live flows, avoiding the need for temporary above ground by-pass thereby reducing disturbance within the park setting and the risk of spills to the environment from the complex river crossings.

This paper will describe the design considerations, engineering challenges and the calculated balance between risk and cost which led to this innovative solution. It will discuss some of the constructability challenges that City of Toronto, Jacobs and the Contractor Southland Renda of Canada JV successfully overcame to deliver the slip lining component of this project on time and within budget.