Abstract No 22

HALTON ZONE 4 FEEDERMAIN – TUNNELLING A CONFINED AQUIFER BENEATH MAJOR RAILWAYS AND HIGHWAYS

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ABSTRACT

The Halton Zone 4 Feedermain Project involves the installation of approximately 13,000m of trunk watermain from Trafalgar Road and Britannia Road to the Zone 4 Reservoir near Trafalgar Road and No.5 Side Road in towns of Milton and Halton Hills respectively. The watermain was designed to be installed by both open cut and trenchless methodologies and includes 3,100m of 1200mm diameter feedermain, 7070m of twin 900mm diameter feedermain and 2800m of single 900mm feedermain. Approximately, 4080m of the watermains is to be installed by trenchless methods with tunnel diameters ranging from 1800mm to 3500mm. Trenchless crossings include Union Gas transmission lines, Regional intersections, Highway 401, CP Rail Tracks, 16-mile Creek and numerous box culverts.

This presentation will focus on the challenges involved with planning and designing the construction of the 2.5 km of 3500mm diameter tunnel from south of the Canadian Pacific Railway lines on Trafalgar Road, to north of the Steeles Avenue and Trafalgar Road intersection. The tunnel is required to facilitate twin 900mm diameter watermains. The tunnel alignment crosses the Canadian Pacific Railway, a tributary to 16-Mile Creek, Highway 401, the Toronto Premium Outlet Mall, Steels Avenue and two box culverts through a confined artesian aquifer with head pressure 1.5m above grade at the 401-intermediate shaft location. The total length of the tunnel is 2470m with two intermediate shafts, one north and one south of the 401 to facilitate the construction of interconnection chambers. The longest tunnel drive is 1062m from the intermediate shaft north of Highway 401. Currently there is no distribution watermain along Trafalgar Road so all the residents and businesses in the area rely on the aquifer for their water source, for this reason it was imperative to undertake a design that mitigated impacts to the aquifer. Some of the challenges that will be discussed include: determining the tunnel alignment, tunnelling through silty/sands with artesian aquifer conditions, specifying tunneling methodology, depressurizing vs. dewatering for shaft construction and completing a well monitoring programme.

Construction is currently ongoing with 100m of the 3500mm diameter tunnel currently completed as of May 2017.