

Clause 10 in Report No. 12 of Committee of the Whole was adopted, without amendment, by the Council of The Regional Municipality of York at its meeting held on September 22, 2016.

10

Direct Purchase of Contractor Services for Sewer Rehabilitation
Pilot Project in the City of Markham

Committee of the Whole recommends adoption of the following recommendations contained in the report dated August 11, 2016 from the Commissioner of Environmental Services:

1. Council authorize the award of a contract to Michels Canada Co. to conduct a pilot for sewer rehabilitation purposes, pursuant to the direct purchase provisions of the Purchasing Bylaw, until December 31, 2017, at a total cost not to exceed \$2,250,000, excluding applicable taxes.
2. The Commissioner of Environmental Services be authorized to execute the Agreement on behalf of the Region.

Report dated August 11, 2016 from the Commissioner of Environmental Services now follows:

1. Recommendations

It is recommended that:

1. Council authorize the award of a contract to Michels Canada Co. to conduct a pilot for sewer rehabilitation purposes, pursuant to the direct purchase provisions of the Purchasing Bylaw, until December 31, 2017, at a total cost not to exceed \$2,250,000, excluding applicable taxes.
2. The Commissioner of Environmental Services be authorized to execute the Agreement on behalf of the Region.

2. Purpose

This report seeks Council authority for York Region to enter into an agreement with Michels Canada Co. (Michels) to rehabilitate two sections of sewer totaling 210 metres of the existing York Durham Sewage System (YDSS) on 16th Avenue in the City of Markham using the GeoSpray™ lining system manufactured by Milliken Infrastructure Solutions, LLC (Milliken) under direct purchase provisions in Section 9 of the Purchasing Bylaw No. 2014-53. The bylaw requires Council authorization for direct purchases of goods, services or construction if the total cost exceeds one hundred thousand dollars (\$100,000).

In this case, Michels is the only entity reasonably capable of performing the application since it is the only trained and licensed installer of the GeoSpray™ lining product for sewer rehabilitation work in Canada by Milliken.

3. Background

Three kilometres of the York Durham Sewage System in the City of Markham require rehabilitation

York Region owns, operates and maintains over 280 kilometres of sanitary sewer and more than 1,400 maintenance holes located throughout York Region. As the Region continues to grow in population, aging infrastructure requires effective management to ensure continued sustainable services and responsible conveyance of wastewater for treatment.

In service since 2003, the York Durham Sewage System on 16th Avenue is a 2,642 mm diameter sewer installed with a tunnel boring machine at depths ranging from 35 metres to 47 metres below ground surface.

As part of the Region's asset management program, asset inspections are completed on an ongoing basis to identify rehabilitation needs required to manage and maintain critical sewer infrastructure.

Closed Circuit Television (CCTV) investigations were completed in 2006, 2007 and 2011 on key segments of the York Durham Sewage System on 16th Avenue in the City of Markham as part of the Region's planned CCTV inspection program. Based on this inspection data, specific sewer sections were recommended for rehabilitation to reduce infiltration and address sewer structural integrity and soil stability around the pipe. In addition, high water table conditions and high groundwater pressures are suspected to contribute to sewer degradation. The CCTV investigations identified three kilometres of sewer for rehabilitation. Since there were no signs of imminent structural issues, it was

determined that there was no emergency need for rehabilitation; however, with prudent asset management, long-term rehabilitation was programmed to be completed within the following 10 years. This would maintain long-term viability of the infrastructure.

4. Analysis and Options

Recommended rehabilitation methodology at 30 per cent detailed design was estimated at \$60 million

In October 2013, the Region retained consulting services of AECOM Canada Limited (AECOM) through Request for Proposal P-13-81 to complete detailed design to rehabilitate three kilometres of existing trunk sanitary sewer. A preliminary design report was completed in December 2014 and recommended rehabilitation of the trunk sanitary sewer by cured-in-place-pipe lining (CIPP) or sliplining.

During 30 per cent detailed design in March 2015, AECOM recommended using 2,250 mm diameter glass fibre reinforced plastic (GRP) sliplining method that would require four 6-metre diameter construction access shafts up to 50 metres deep to insert GRP liner into pipe sections.

Although sliplining is a reasonable solution in accordance with the terms of reference for this engineering assignment, staff identified several concerns with the proposed approach, including:

- Significant traffic and public impacts requiring increased stakeholder management for resident and public impact
- Large access shafts in ground conditions with a high water table
- Utility relocation of existing and above-ground utilities at access shaft locations and pipeline diameter reduction at pinch points
- Increased construction risk due to high water table
- Estimated construction costs of more than \$60 million

Considering the above factors, staff determined that it would be prudent to review innovative and alternative solutions that can lower risk, impacts and costs.

Aldea Services LLC was retained to complete Value Engineering and Peer Review Analysis to investigate innovative solutions

Due to significant costs and potential impacts, staff determined that it was appropriate to obtain a peer review of the proposed design solution and conduct a thorough value engineering analysis to determine other viable alternatives.

The objective of the analysis was to complete an evaluation based on review of all existing project information to identify “lowest risk, best technical and best value solution available” for rehabilitation of the existing trunk sanitary sewer. Key requirements of the proposed rehabilitation solution are to minimize disruption, reduce construction risks, reduce capital cost, and minimize impact on hydraulic capacity of the sewer.

The Region retained Aldea Services LLC (Aldea) through a formal Request for Proposal to complete the Value Engineering and Peer Review analysis in November 2015.

An innovative approach for the Value Engineering exercise was to engage contractors to propose innovative solutions

Scope of work for the Value Engineering and Peer Review comprised a review of the proposed rehabilitation approach and evaluation of alternative rehabilitation methods available in the marketplace able to achieve project objectives.

A Request for Expressions of Interest was released in March 2016 to obtain information from vendors, contractors and/or product suppliers on available alternative rehabilitation methods, given project constraints, risks and technical issues.

Seven expression of interest proposals were received and evaluated against design and construction criteria for the rehabilitation solution. Six of the seven expression of interest submissions proposed some variations of sliplining technology that would result in similar impacts and costs as those presented by AECOM at the 30 per cent detailed design stage.

An innovative solution was proposed by Michels Canada Co.

One submission provided a viable alternative rehabilitation method that uses GeoSpray™ (a geopolymer mortar lining product) that essentially constructs a new pipe within the existing sewer. A comprehensive comparison between technologies was completed and advantages of the GeoSpray™ lining are as follows:

- Existing access maintenance holes can be used to install the lining, minimizing overall traffic and public impacts
- Significantly lowers construction costs to \$24 million for GeoSpray™ from \$60 million for glass fibre reinforced plastic sliplining, (potential savings of \$36 million)
- Reduced construction footprint
- Eliminates need for utility relocations
- Reduces construction risk since high water table is not impacted
- Flow diversion or internal flow bypass can be used to avoid expensive external flow bypass pumping

Michels Canada Co. submitted an expression of interest that proposed to supply and install a product manufactured and supplied by Milliken Infrastructure Solutions, LLC.

GeoSpray™ has been used throughout the United States for pipe rehabilitation since 2011

The United States Environmental Protection Agency (EPA) successfully demonstrated the viability of using GeoSpray™ for rehabilitation of large-diameter sewers in May 2014 and published its findings in December 2014.

GeoSpray™ is a patented product and has been used for pipe and maintenance hole rehabilitation applications throughout the United States since 2011 (approximately 11.4 kilometres of pipe). Sewer pipe size applications range from 825 mm to over 3,000 mm in diameter. Maintenance hole installations range in size from 600 mm to 2,500 mm in diameter. Examples of projects with similar conditions to the 16th Avenue Sanitary Sewer are as follows:

- City of Springfield, Massachusetts - installed 847 metres of 1,675 mm diameter sanitary sewer
- Connecticut Department of Transportation - installed 170 metres of 1,825 mm diameter sanitary sewer on Interstate 95
- Fort Worth Storm Water Management, Texas - installed 287 metres of 2,025 mm x 2,125 mm storm arch pipe
- Hidalgo County Drainage District, Texas - installed 1.35 kilometres of 2,890 mm diameter storm sewer

Completion of pilot sections to prove methodology will reduce risks to the Region

Although the material has been successfully used previously to complete pipe rehabilitation, site-specific conditions for the pilot project, in particular the high groundwater pressures and infiltration, may pose additional challenges to implementation.

Region staff and Aldea believe that it would be prudent to prove the product's performance and reliability under site-specific conditions prior to completing detailed design for the entire three kilometres of sewer. Implementing the pilot study will not only reduce tender/construction risks but will also mitigate re-engineering, should site-specific conditions prove too challenging for product application.

The sections selected for the pilot study addresses most critical defects

The selected sections of sewer totaling 210 metres have areas of active heavy infiltration and longitudinal cracks on the internal sewer surface providing optimal conditions to evaluate product performance (see Attachment 1). Its performance will provide information on how effective this product will be at reducing inflow and infiltration and how it withstands structural integrity compared to other products.

During the one-year warranty period provided under the pilot study, staff and Aldea will monitor, review and evaluate performance of the GeoSpray™ lining to ensure that the product performs under site-specific conditions. If application methods, constructability and performance are successfully proven under the pilot study, the Region will proceed with the design of the York Durham Sewage System 16th Avenue Rehabilitation Project, indicating the use of geopolymer mortar lining as the specified method. It is also noted that the long-term performance of this product has been reviewed and documented in project case studies completed by the U.S. Environmental Protection Agency.

Detailed analysis and results of the pilot study can help to inform future product selection processes for other pipe rehabilitation projects within the Region and potentially other municipalities throughout Ontario.

Link to key Council-approved plans

This project will optimize and sustain critical infrastructure systems capacity through reduced quantity of inflow and infiltration on Regional wastewater systems in accordance with the goals of the *2015-2019 Strategic Plan*.

5. Financial Implications

10 Year Capital Plan has adequate Capital Spending Authority for rehabilitation of existing sanitary sewer

Total construction cost for the pilot study is estimated at \$2,250,000, excluding HST.

Adequate Capital Spending Authority is included in the approved 2016 Budget to award the assignment to undertake the pilot study. The capital cost for this asset management project will be funded through the wastewater user rate.

Potential savings on near-term rehabilitation projects could add up to \$100 million

For this three-kilometre section of sewer, installing the geopolymer liner has the potential to reduce rehabilitation costs by approximately two-thirds, which translates to a reduction of nearly \$36 million for this section alone. Successful application of this technology on near-term projects, where appropriate (namely, the existing Southeast Collector and York Durham Sewage System Ninth Line Sewer), could add up to more than \$100 million in cost savings. Furthermore, results of this pilot study could also be used to inform future asset management decisions for the balance of the Region's 280 kilometres of sanitary sewer.

Portions of the pilot study may be funded through the Clean Water and Wastewater Fund

This pilot project was endorsed by Council as a candidate for funding under the Clean Water and Wastewater Fund in Clause 11 in Report No. 11 of Committee of the Whole that was adopted without amendment on June 23, 2016. Staff will be preparing submissions to obtain funding for a portion of the work under the Clean Water and Wastewater Fund if, and when, there are opportunities to submit.

6. Local Municipal Impact

Rehabilitation of the York Durham Sewage System in Markham provides increased redundancy, serviceability and reliability. This project benefits upstream local municipalities (Towns of Aurora, East Gwillimbury, Newmarket, Richmond Hill and the City of Markham) as the existing sewer collects and conveys sanitary flows for treatment to the Duffin Creek Plant in the City of Pickering.

The York Durham Sewage System on 16th Avenue Rehabilitation Project is located within Markham. City staff will be consulted to ensure smooth project implementation and to alleviate potential construction concerns during construction phase. A construction risk management strategy will be developed to minimize impacts to residents and businesses in the general vicinity of the work.

7. Conclusion

It is recommended that Michels Canada Co. be engaged for rehabilitation of two sections of sewer totaling 210 metres of the York Durham Sewage System on 16th Avenue in the City of Markham as a pilot project by using GeoSpray™ lining manufactured by Milliken Infrastructure Solutions, LLC.

For more information on this report, please contact Mike Rabeau, Director, Capital Planning and Delivery, Environmental Services at ext.75157.

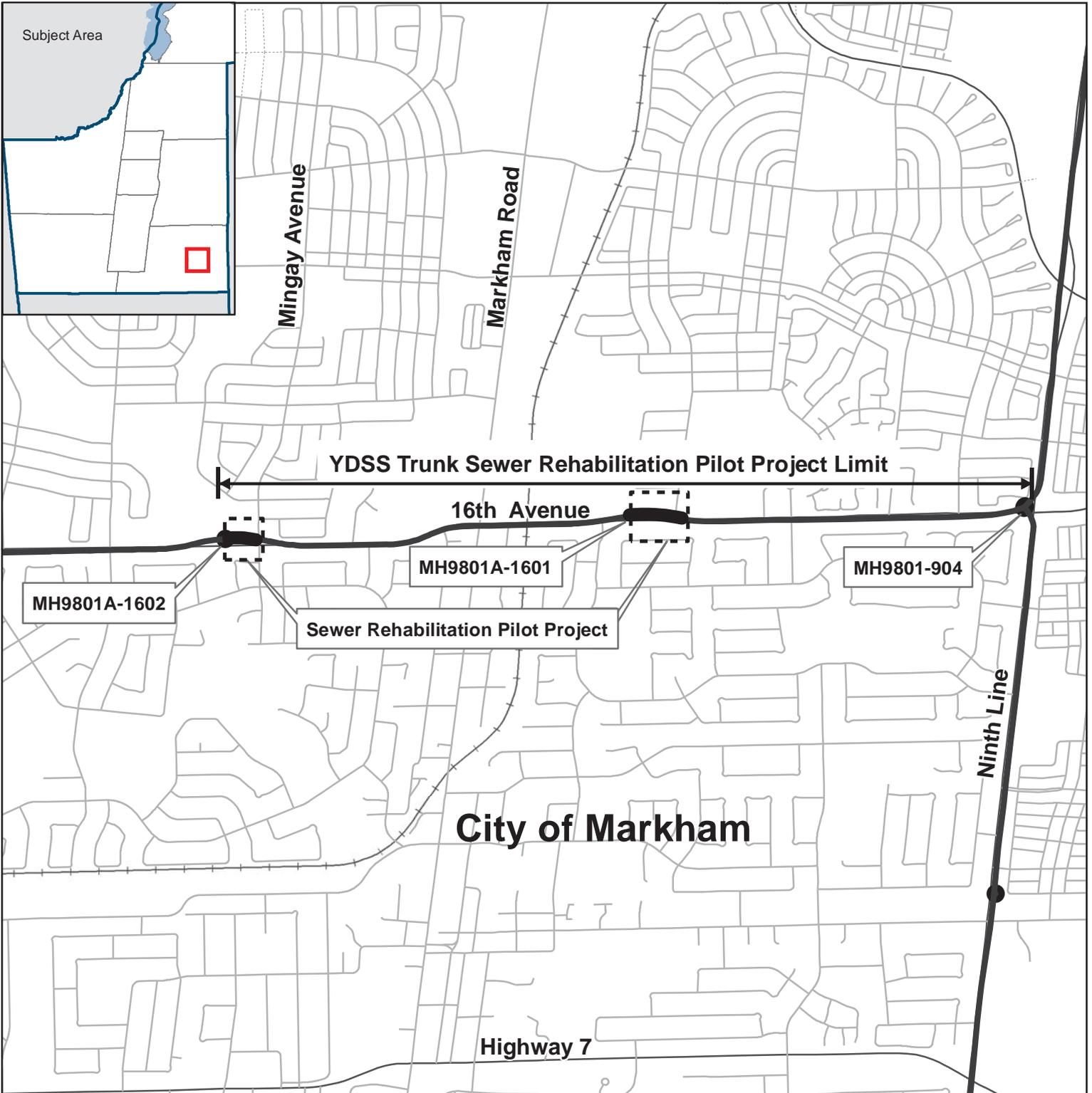
The Senior Management Group has reviewed this report.

August 11, 2016

Attachment

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Accessible formats or communication supports are available upon request



LOCATION PLAN

Direct Purchase of Contractor Services for Sewer Rehabilitation Pilot Project in the City of Markham
 Report of the Commissioner of Environmental Services
 September 8, 2016

Legend

-  Wastewater Maintenance Hole
-  York Durham Sewage System
-  Pilot Project Section



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