

REGIONAL MUNICIPALITY OF OTTAWA-CARLETON
MUNICIPALITÉ RÉGIONALE D'OTTAWA-CARLETON

REPORT
RAPPORT

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DATE 10 September 1998

TO/DEST. Co-ordinator
Corporate Services and Economic Development Committee

FROM/EXP. Environment and Transportation Commissioner

SUBJECT/OBJET **SOUTH OTTAWA COLLECTOR**

DEPARTMENTAL RECOMMENDATIONS

That the Corporate Services and Economic Development Committee and Council approve the following:

- 1. The establishment of a capital project in the amount of \$17,000,000 for the management and implementation of the cleaning and remedial work for the South Ottawa Collector;**
- 2. The transfer of funds in the amount of \$17,000,000 from the Sewer Capital Reserve Fund;**
- 3. The implementation of a fast track procurement process for the cleaning and remedial work associated with the South Ottawa Collector.**

BACKGROUND

In early 1995, the Region put into operation the South Ottawa Collector, a three meter diameter, 7 kilometre inverted siphon sewer, located between the Walkley chamber and the wastewater treatment plant. This project, which was initiated in 1985 was implemented to allow the Region to decommission the Watt's Creek sewage treatment plant in conformity with the 1970 Wastewater Master Plan. In the first few months of its operation, the collector experienced severe solids deposition as a result of low flow velocity in the pipe. In an attempt to address this solids deposition issue in a cost effective manner, various operational scenarios were subsequently evaluated.

During that period, the Region adopted the 1997 Wastewater Master Plan which confirmed that the projected flows would not support a self cleansing velocity in the collector. Accordingly, the consulting firm of Montgomery Watson was retained in late 1997 to determine the most effective, safe, environmentally acceptable and economic means of operating the collector. They have recommended to clean the collector and proceed with infrastructure modifications at a total estimated capital cost of \$15 million.

DISCUSSION

Design Basis of South Ottawa Collector Extension

The South Ottawa Collector Extension was intended to accommodate all flows entering the Walkley chamber, thereby enabling the collection system to meet future increased demands for extension of service area well into the next century. The ultimate design flows and size were determined in consideration of the then current population forecasts and projected development scenarios. The design accommodated a fifty year horizon (2036) with flow projections of 13,000 L/s.

A review of all project documentation is currently underway to determine what factors have led to the current situation of the South Ottawa Collector Extension.

Operation of the South Ottawa Collector Extension

In February 1995, the South Ottawa Collector Extension was put in service by diverting the flows from the Green Creek Collector which runs parallel. In the next two months, a marked decrease in raw sludge and screenings/grit production was observed at the wastewater treatment plant, thereby raising the concern that this decrease was the result of solids deposition in the newly commissioned collector.

The flows were therefore redirected to the Green Creek collector and dewatering of the South Ottawa Collector took place for inspection purposes. It was observed that severe solids deposition had in fact occurred during the past months and sewer gas was being produced rapidly under these conditions. Flows were reintroduced in the collector to minimize gas production and prevent the generation of a corrosive atmosphere within the infrastructure.

During the subsequent months, various operational strategies were attempted to resuspend the solids and flush the collector in the most cost effective manner. These operational efforts were unsuccessful at removing the accumulated solids. To prevent further solids deposition, the operation of the South Ottawa Collector was then limited to significant wet weather events, when flows approach the maximum capacity of the Green Creek Collector.

Despite its limited use, the South Ottawa Collector continues to exhibit significant biological activity which results in production of sewer gas. This gas is vented at the five access points along the length of the collector and does periodically result in odour. These access points are

fenced off, with indication of the safety precautions required. In addition, a regular monitoring program is in place to be able to respond proactively to any change in conditions.

In August of 1998, a defect in the pipe was identified in a wooded ravine. Temporary measures have been taken to minimize sewage leaking into the environment. The site has been secured and is monitored as part of the South Ottawa Collector monitoring program.

Consultant's Findings

The primary study objectives of the assignment to Montgomery Watson included the determination of the most cost effective means of removing the accumulated sediments in the collector and the evaluation, analysis and recommendations of structural and operational modifications to the South Ottawa Collector to prevent reoccurrence of sediment deposition.

Following is a summary of Montgomery Watson's findings:

- The hydraulic analysis indicates that under present conditions where the South Ottawa Collector operates as a siphon, the shear stress (0.045 N/m^2) and velocities (0.16 m/s) in the South Ottawa Collector are not sufficient to prevent deposition. These values are well below the minimum shear stress of 2 N/m^2 and velocity of 1 m/s required to prevent deposition.
- The maximum hourly wet flow tributary to the Walkley chamber in the 25 year planning horizon (2021) is $4,820 \text{ L/s}$. Under these future conditions, the shear stress (0.17 N/m^2) and velocity (0.32 m/s) are still not sufficient to prevent deposition if no modifications are made and the sewer continues to operate as a siphon. The evidence is extremely strong to indicate that deposition would reoccur, even for future flows unless modifications to the collector and/or changes to the method of conveyance are made.
- The amount of material deposited in the collector is estimated at up to 2,000 tonnes of dry solids.
- The South Ottawa Collector could be blocked by existing and/or new sediment with continued use. As the sediment profile is not uniform, partial scouring of existing material and/ or new deposition could create a blockage of the collector.
- Partial scouring of existing material could also result in a slug of sediments being released to the wastewater treatment plant, thereby presenting a challenge for the solids handling system and potentially resulting in a plant upset.
- Mining is the only sediment removal method that will definitely ensure removal of all of the solids from the South Ottawa Collector, and allow modifications to be made to the structure to assure successful long term operation.

- The most flexible and cost effective alternative to ensure no solids deposition during future operation is the use of the South Ottawa Collector during high rainfall events, with sustained open flow channel. This approach requires the addition of pumps and a wet well to maintain the minimum velocity and shear stress required.
- Actions taken by the Region such as keeping the South Ottawa Collector full, fencing the various shafts and posting signs, are adequate to minimize the risk of corrosion, odour production and as such present minimal risks to the public.

RECOMMENDATION

The Department considers it necessary to proceed in an expedited manner to implement these recommendations to minimize cost associated with further solids deposition, ensure that capacity is available for the forecasted growth, protect the integrity of the Region's wastewater system, prevent a blockage of the sewer system with potential surface and basements flooding consequences as well as to prevent a potential significant treatment plant upset resulting from the sudden release of a plug of solids.

Although measures taken so far have been successful in minimizing risks, any delay in proceeding with the implementation of these recommendations would increase risks of infrastructure damages and upset to the wastewater treatment process, present an environmental challenge as well as impacting our ability to provide reliable wastewater service to the public.

In addition, it is necessary to proceed with the cleaning of the collector to enable access for repairing the pipe defect identified in mid-August. Although temporary measures have been taken to prevent exfiltration of sewage to the environment, future use of the South Ottawa Collector during significant rainfall events will result in further leakage of sewage at that location.

The Department has initiated the procurement process to implement the recommendations contained in the Montgomery Watson's report with a fast track approach.

CONSULTATION

The public consultation process is not applicable.

FINANCIAL IMPLICATIONS

Authority, from the Sewer Capital Reserve Fund, for the required expenditure is required. Implementing these recommendations will require a significant capital expenditure which will ensure the integrity of the wastewater infrastructure, prevent the regional sewer system from surcharging during heavy rainfall events as well as to protect the environment and the quality of life of the public. Seventeen million dollars is being requested at this time to ensure adequate

funds exist to properly manage this project inclusive of GST and external expert advice as required to assist staff. Additional funds may be required depending on the magnitude of repair work required.

*Approved by
M. J. .E. Sheflin, P. Eng.*

FINANCE DEPARTMENT COMMENT

Funds in the amount of \$17 million are available for transfer from the Sewer Capital Reserve Funds to finance the additional capital authority requirement as requested by the Environment and Transportation Department. As of 07 August 1998, the uncommitted balance in the Sewer Capital Reserve Funds is approximately \$100 million. Subject to Council approval.

*Approved by Tom Fedec
on behalf of the Finance Commissioner*