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SCOPE OF WORK CHANGE AND INCREASE IN TOTAL PROJECT BUDGET AUTHORITY WARDEN AVENUE, 16TH AVENUE TO MAJOR MACKENZIE DRIVE TOWN OF MARKHAM

The Transportation Services Committee recommends the adoption of the recommendations contained in the following report dated June 2, 2011, from the Commissioner of Transportation Services.

1. RECOMMENDATIONS

It is recommended that:

1. Council approve the increased scope required for the reconstruction of Warden Avenue (Y.R. 65) from 16th Avenue (Y.R. 73) to Major Mackenzie Drive (Y.R. 25), including increases in the span length of each of the three replacement bridges, unexpected soil conditions that have increased the complexity of the design and construction, increased environmental protection and impact mitigation, and increased traffic noise mitigation requirements.

2. Council authorize increasing the Total Project Budget Authority for the reconstruction of Warden Avenue (Y.R. 65) from 16th Avenue (Y.R. 73) to Major Mackenzie Drive (Y.R. 25) from $13,647,000 to $25,250,000 for all project works, including design, utility relocation, and construction.

3. Council approve the additional design tasks for the reconstruction of Warden Avenue (Y.R. 65) from 16th Avenue (Y.R. 73) to Major Mackenzie Drive (Y.R. 25) that arise from the changes in the scope of the project, at a cost of $364,775, thereby increasing the assignment to McCormick Rankin Corporation from $453,294.39 to $818,069.39.

2. PURPOSE

This report seeks Regional Council authorization to increase the scope of work of the project, increase the Total Project Budget Authority for construction and corresponding increase in design fees for the reconstruction of Warden Avenue from 16th Avenue to Major Mackenzie Drive in the Town of Markham.

This report also updates Regional Council on the status of the *Endangered Species Act* permits required to be obtained from the Ministry of Natural Resources for the watercourse crossings due to the presence of the endangered Redside Dace in the two watercourses that cross Warden Avenue within the project limits.

A context plan and location plan showing the project area is appended to this report (*see Attachments 1 and 2*).

3. BACKGROUND

The Environmental Assessment Study for the project was completed in 2001

A Class Environmental Assessment (Class EA) for improvements to Warden Avenue between Steeles Avenue and Major Mackenzie Drive was completed in 2001.

Regional Council authorized award of the detailed design assignment in October 2005

Regional Council authorized the award of the detailed design assignment for the improvements to Warden Avenue between 16th Avenue and Major Mackenzie Drive to McCormick Rankin Corporation at its meeting on October 27, 2005, at a cost of $453,294.39, not including GST.

It is currently planned to issue the tender for this project at the end of 2011, with construction commencing in 2012 and being completed in 2013.

To date, no revisions to increase the Purchase Order have been made under the authorities granted to staff under the Purchasing By-law

As of this time, no increases have been made to the original Purchase Order amount under the authorities granted to staff under the Purchasing By-law.

Changes in environmental legislation and regulations, the need to address permit requirements and the need to meet the requirements of Regional policies and standards have resulted in the estimated cost for construction increasing to $23M

The 2011 Capital Budget includes total approved funding of $14M for this project.

The construction costs for the project are now estimated to be $22.7M. The changes in the project costs have been driven by a number of factors, the major reasons being changes in environmental legislation, regulations related to watercourse protection and endangered species, and the adoption of the Region's Traffic Noise Mitigation Policy in 2006.

4. ANALYSIS AND OPTIONS

CHANGES IN THE SCOPE OF THE PROJECT

Meander belt studies required by the TRCA have recommended larger bridge structures at the three water course locations

Over time, the exact path of a watercourse within a valley naturally changes due to the erosion of material along the outside of bends in the stream and the deposition of material along the inside of bends. This change in the path of a watercourse is known as meandering, and the space in the stream valley that it takes place in is known as the meander belt.

The widening of Warden Avenue between 16th Avenue and Major Mackenzie Drive includes one crossing of Carlton Creek and three crossings of Berczy Creek, as shown on the *Attachment 2*.

The northernmost crossing of Berczy Creek (Berczy Creek Crossing #3) is located immediately south of the Warden Avenue and Major Mackenzie Drive intersection, and was previously reconstructed to accommodate the widening of Warden Avenue. No work at this crossing is required as part of this project.

At the time the design assignment was awarded, it was assumed that the two culvert replacements would be made with structures with spans in the range of 10m to 12m to accommodate the meandering alignments of the streams, hydraulic requirements, and wildlife passage, which was consistent with the results of the Class EA. The Berczy Creek South culvert was assumed to only require lengthening, as per the Class EA.

In 2007, the Toronto and Region Conservation Authority (TRCA) adopted new requirements for the design of new or replacement watercourse crossings. The 2007 *Watercourse Crossing Design and Submission Requirements* recommended new or replacement structures must, if possible, span the entire meander belt width of the watercourse. If this was not feasible, then smaller spans could be considered, as long as they met other criteria set out in the document.

As a result of the new requirements the new single span culverts proposed under the Class EA had to be made much larger. It was also no longer permissible to simply extend the Berczy South culvert; it had to be replaced with an entire new structure.

Meander belt studies were undertaken for the three crossings with the results being that the meander belts were found to be 18.2m wide at the Carlton Creek crossing and approximately 45m wide at both of the Berczy Creek crossings. As it was not feasible to construct structures that large for the Berczy Creek crossings due to the changes that would result to the road grades, staff and our consultants undertook discussions with the

TRCA that resulted in bridge spans for the Berczy Creek crossings that met the secondary design criteria objectives.

Details of the three crossings are shown in Table 1.

Table 1
Watercourse Crossing Details

Crossing Name	Present Configuration	Configuration Assumed in MRC Proposal	Configuration Resulting from 2007 TRCA Design Requirements
Carlton Creek	Twin 1.5m corrugated steel pipe culverts	Replace with 10m – 12m single span culvert	Replace with 19m single span bridge structure
Berczy Creek South	Single 6m x 3m concrete box culvert	Lengthen culvert to accommodate increased road width	Replace with 22m single span bridge structure
Berczy Creek North	Single 5.7m x 3.6m elliptical steel culvert	Replace with 10m - 12m single span culvert	Replace with 25m single span bridge structure

Existing ground conditions require elaborate foundation designs and extensive dewatering for the crossing structures

Due to the changes to much larger crossing structures, the footings for the structures must be larger and more complex than originally envisioned. At the time the design assignment was awarded, it was assumed that the footings for the two replacement culverts could be constructed on simple spread footings or pile-supported footings. Due to the significant change in type and size of the proposed structures, additional geotechnical work was undertaken, the results of which have led to the need to design extensive and complex footings. Each of the six footings, two for each structure, are now designed as large cast-in-place reinforced concrete structures supported by ten 12m-deep caissons.

Recent geotechnical work has also indicated that extensive dewatering will be required during the construction of the footings. The Region will be applying to the Ministry of the Environment (MOE) for Category 3 Permits to Take Water for all three crossings. In addition to the costs to obtain the permits, there will be extensive monitoring requirements during construction imposed by the MOE and TRCA.

Enhanced environmental protection work will be required to address the requirements of environmental legislation and regulations including Butternut trees and Redside Dace

Butternut trees were classified as "Endangered" under the provincial *Endangered Species Act* in 2007. Redside Dace, a species of fish, was classified as "Endangered" under the *Endangered Species Act* in 2009.

Three Butternut trees were identified as being within 30m of the limits of the project. An assessment report had to be completed for each of the trees, to demonstrate that no harm would come to them due to the project. No permits are required related to the Butternut trees.

Both Carlton Creek and Berczy Creek contain Redside Dace. As the construction of the three watercourse crossings will involve work in and around the watercourses, special measures will have to be taken to protect the fish and their habitat, and, per *Endangered Species Act* requirements, the project has to result in a net overall benefit to Redside Dace and its habitat. Further discussion related to Redside Dace and the status of the required *Endangered Species Act* permits is contained in Section B (see below) of this report.

Noise assessment as per the Region's Noise Policy has recommended the installation of noise barriers

In 2006, Regional Council adopted a new policy, York Region Traffic Noise Mitigation Policy for Regional Roads.

A noise assessment study was carried out for this project, which has resulted in approximately 1,300m of noise barriers being required.

Improvements to the intersection of Warden Avenue and Major Mackenzie Drive

The reconstruction of the intersection of Warden Avenue and Major Mackenzie Drive was undertaken as part of the reconstruction of Major Mackenzie Drive from Woodbine Avenue to Kennedy Road in 2007.

As McCormick Rankin Corporation was already working on the design for Warden Avenue from 16th Avenue to Major Mackenzie Drive, they were requested to undertake the design for the reconstruction of the intersection for inclusion in the Major Mackenzie Drive contract.

Growing traffic volumes have resulted in the need to include provisions for possible future traffic signals at two intersections not originally included in the design project

Growing traffic volumes along Warden Avenue resulted in the Region determining that the intersections of Warden Avenue and Glenbourne Park Drive and of Warden Avenue and Cachet Parkway (south intersection) will meet the warrants for signalization in the future. Infrastructure necessary for the future signalization will be installed as part of this project.

Proposed repair of storm damage at a sewer outlet near the intersection of Warden Avenue and Major Mackenzie Drive has been included in the project work

During the reconstruction of Major Mackenzie Drive in 2007 a storm outfall was constructed at the southwest corner of Major Mackenzie Drive and Warden Avenue. During a later storm, a partial failure of this outfall occurred. The work to repair the outfall has been included as part of the Warden Avenue project.

Town of Markham Requirements

Due to a request from the Town of Markham, the project was expanded to include the reconstruction of a section of Cachet Parkway (north) east of Warden Avenue to alleviate a drainage concern.

Permits from the Ministry of Natural Resources required under the new Redside Dace Endangered Species legislation are still outstanding

Redside Dace were classified as an endangered species by the Ministry of Natural Resources (MNR) in 2009. As a result, permits under the *Endangered Species Act* are required for any work that would affect the fish or its habitat.

Clause 17(2)(c) of the *Endangered Species Act* states that the Minister may issue a permit for work that would harm an endangered species and/or its habitat if:

- Reasonable alternatives have been considered.
- Reasonable steps to minimize adverse effects on individual members of the species will be taken.
- An overall benefit to the species will be achieved.

Region staff and our consultants have been working with the MNR since mid-2009 to obtain permits for this project under the *Endangered Species Act*. Ministry staff have indicated they are generally satisfied that reasonable alternatives have been considered and that reasonable steps have been identified to minimize adverse effects to the species. The issue still to be resolved is the amount of “overall benefit to the species” that the

project is to provide. The *Endangered Species Act* does not define or quantify the "overall benefit to the species".

The Region's design proposes to provide adequate protection and enhancement to the natural environment through construction work in the amount of $10M within the Region's right–of-way

The designs for the three watercourse crossings will provide significant long-term enhancements to the natural environment that will benefit Redside Dace, and protection of both fish and its habitat during construction.

Proposed permanent enhancements to the natural environment include:

- Creation of a net 977 m^2 (10,500 sq. ft) of new valley habitat.
- Replacement of small culverts with large bridges that will result in the removal of the barriers to fish passage that currently exist at these three locations.
- Improving fluvial geomorphology (i.e. natural stream flows) and reducing erosion at, up- and down-stream of the crossings.
- Creation of natural channels under the bridges to replace the current flows through steel or concrete culverts.
- Considerable riparian plantings.

Proposed protection of the natural environment include:

- Isolating the watercourses from the rest of the construction sites so that the only times there is any effects on the watercourses is when actual "work in the water" has to occur.
- Timing all works in or near the watercourses to occur when they will have the least effect on the fish and its habitat.

The construction of the three watercourse crossings and associated environmental protection work is estimated to cost $10M of the $23M estimated for this project.

The only significant negative impacts to Redside Dace and/or its habitat associated with the proposed works are the temporary loss of habitat that will occur during construction when the old culverts are removed. However, as the work areas will be isolated from the rest of the watercourses with the removal work occurring in the dry, the size of the temporary habitat loss will be limited to approximately 267 m^2. This loss in habitat will be temporary and will be immediately replaced with approximately 1,244 $m^2$of new habitat, resulting in the net permanent increase of habitat of 977 m^2.

As a requirement for a permit under the Redside Dace Endangered Species legislation, the Ministry of Natural Resources is demanding the Region undertake additional improvements to the natural environment beyond the Region's Right of Way

While MNR staff have acknowledged that the proposed crossings will improve the natural environment and habitat for Redside Dace, they have taken the position that the proposed works only mitigate harm to Redside Dace and do not provide an overall benefit to the species.

Ministry staff have provided suggestions for what they consider to be works that would provide an overall benefit to the species, which include:

- Retrofit a number of existing Town of Markham Stormwater Management facilities along Carlton and Berczy Creeks.
- Restoring fish passage along approximately 2.5km of Carlton Creek from Warden Avenue to Personna Boulevard to restore passage to formerly occupied habitat.
- Enhance habit for between 500m – 1,000m anywhere along Carlton Creek or Berczy Creek, with locations to be determined in consultation with the MNR.

Ministry staff do not have any scientific or regulatory basis for these suggestions and they all involve work outside of the Region's right-of-way on lands owned by the Town of Markham or that are in private ownership. The suggestions are the opinion of staff at the local MNR District office on what they feel will provide an appropriate amount of "overall benefit" to the species. Staff have not determined the scope of work and associated costs to undertake the works as the works are outside of the project limits and are on land owned by others.

Regional staff are now preparing to tender the contract with some risk associated with not having the MNR permits

While the Region supports protecting and improving the environment in many ways including the Official Plan, the Greening Strategy, and the Sustainability Strategy, staff continue to question the requirement of the MNR that the Region conduct additional habitat enhancements works outside of the limits of this project.

In Canada, Redside Dace are found mainly in small streams in the GTA area. The species has become endangered in Ontario mainly due to loss of habitat over the last 50 years due to development. The Region is willing to undertake a very significant amount of work to both mitigate harm to Redside Dace due to our project, and to provide enhancements to the fish and its habitat through work on the project within the limits of our right-of-way, but it is simply not justifiable to require the Region to enhance the environment of these watercourses on lands owned by others when the Region is already providing an overall benefit through the project on lands the Region does own.

While Regional staff will continue to exchange information with senior staff at the MNR, the project will otherwise be ready to tender in the fall of 2011. Regional staff propose to proceed with the tender at risk in order to allow for the successful bidder to order and take possession of the structural components of the work allowing a spring 2012 construction start.

CHANGES TO THE SCOPE OF THE DETAILED DESIGN ASSIGNMENT

The changes to the scope of the project have resulted in an increase in the scope of the detailed design assignment and a corresponding increase in the cost

The additional design work undertaken due to the changes in the scope of the project pertains to addressing:

- Changing environmental legislation and regulations.
- Noise Assessment Study and design of noise barriers.
- Public Information Centre and presentation to Town of Markham Council.
- Design for repairs to storm sewer outlet at Major Mackenzie Drive and Warden Avenue.
- Design for reconstruction of intersection of intersection of Major Mackenzie Drive and Warden Avenue and for future signalization of two local street intersections along Warden Avenue.
- Various small items outside of scope of original assignment.

Changing environmental legislation and requirements and related changes in the project design - $162,701

New TRCA watercourse design criteria have resulted in the replacement of the existing culverts at all three watercourse crossings with large span bridges, changes in design of the footings, and the need to obtain Permits To Take Water for dewatering at all three crossing locations.

The classification of Butternut trees and Redside Dace as “endangered” resulted in the need to prepare assessment reports regarding the three Butternut trees located close to the project and to apply for ESA permits for the three watercourse crossings.

The total costs associated with the TRCA and MNR requirement changes is $162,701.

Noise Assessment Study and design of the recommended noise barriers were undertaken due to adoption of Region Traffic Noise Policy - $56,646

Due to the adoption in 2006 of the Traffic Noise Mitigation Policy, a noise assessment study was required to be undertaken for this project. The results of that Study were that

approximately 1,300m of noise fence was required to be designed for inclusion in the tender package for the project.

The costs for the noise assessment study and for the design of noise barriers is $56,646.

During the course of the assignment it was determined that a Public Information Centre and presentation to Town of Markham Council should be undertaken - $7,600

Due to a request from Town of Markham Council, a Public Information Centre was held in 2009 and a presentation was made to Markham Council in 2010 to present the preliminary design for the project.

The cost for these two events is $7,600.

During the course of the assignment, McCormick Rankin Corporation was requested to undertake the design for works at three intersections the reconstruction of the intersection of Major Mackenzie Drive and Warden Avenue and provisions for future signals at two intersections with local streets on Warden Avenue - $39,304

During the course of the assignment McCormick Rankin Corporation was requested to undertake the design for the reconstruction of the Major Mackenzie Drive and Warden Avenue intersection so that the work could be included in the Major Mackenzie Drive contract.

McCormick Rankin Corporation was also requested to undertake the design works necessary to install the underground infrastructure that would allow for the possible future signalization of the intersections of Warden Avenue and Glenbourne Park Drive and Warden Avenue and Cachet Parkway (south).

The cost for the design of these intersections is $39,304.

The design for the repairs to a sewer outlet at the intersection of Major Mackenzie Drive and Warden Avenue - $30,454

During the course of this design project, a partial failure occurred at a storm outfall along Major Mackenzie Drive located just west of Warden Avenue. The design and construction of the repair work has been included in the Warden Avenue reconstruction project.

The cost for the design is $30,454.

During the course of the assignment, a number of other issues had to be addressed that were outside of the original scope of the assignment – $68,070

A number of other issues have come up during the design of the project that are outside of the scope of the original assignment. These issues and costs are listed in Table 2.

Table 2
Other Issues Addressed and Associated Fees

Issue	Fee
Entrance design for 9977 Warden Avenue	$14,544
Changes in landscape design due to requests from the Town of Markham	27,826
Structural assessment of hydro poles to carry streetlighting	4,500
Additional geotechnical for pavement design	16,200
Test holes to locate existing utilities	5,000
Total	**$68,070**

The additional work and associated fees in the amount of $364,775 have been reviewed and are considered fair and reasonable

The additional work categories and corresponding fees are summarized in Table 3.

Table 3
Summary of Additional Work and Corresponding Fees

Area of Scope Change	Fee
Environmental Legislation and Regulations	$162,701
Noise Assessment Study and noise barrier design	56,646
Public Information Centre and Presentation	7,600
Design for outfall repair	30,454
Design for intersection improvements	39,304
Miscellaneous additional work items	68,070
Total	**$364,775**

Staff have reviewed the request for additional fees and consider it fair and reasonable for the following reasons:

- The scope of the project has changed significantly since the design assignment was awarded and could not have been foreseen at the time of award.
- McCormick Rankin Corporation's original proposal was based on the Environmental Study Report prepared in 2001 and the current construction cost estimate is $22.7M.
- While the increase in fees is considerable, the overall design costs of $818,069 for the project represents only 3.6% of the construction cost of $22.7M.

5. FINANCIAL IMPLICATIONS

The construction cost estimate for the project has increased to $22.7M

Due to the changes in the scope of the project, the construction cost estimate has increased to $22.7M. The majority of this increase is due to the change in the proposed work at the three water crossings. In 2009, before the change to large bridges had been determined, it was estimated that the work at the three crossings would cost approximately $2.5M. It is now estimated that the costs for the three bridge structures will be approximately $10M.

The project includes $2.1M of works that are being constructed for the Town of Markham on a cost-recovery basis.

Council authorization is required to increase the approved Total Project Budget Authority for the project to $25M

The current approved Total Project Budget Authority for design, property, utility relocations, construction, contract administration and inspection is $13,647,000.

Council authorization is required to increase the Total Project Budget Authority for the project to $25,250,000 to complete the project including design, utility relocations and construction.

This project is being funded at 90% from development charges and 10% from tax levy.

6. LOCAL MUNICIPAL IMPACT

Town of Markham requirements including a multi-use path, sidewalks, streetscaping, and illumination are included in the project.

The Town has also requested that the Region reconstruct a short section of Cachet Parkway (north) east of Warden Avenue and construct a storm sewer along Cachet Parkway to Warden Avenue to alleviate an ongoing drainage problem. To avoid having two storm sewers on Warden Avenue from the Cachet Parkway intersection to the sewer outlet, a shared storm sewer will be constructed.

Road improvements to Warden Avenue between 16th Avenue and Major Mackenzie Drive will address transportation servicing deficiencies in York region, specifically in the Town of Markham.

7. CONCLUSION

Changes in environmental legislation and regulations, the need to address permit requirements and the need to meet the requirements of Regional policies and standards have resulted in the scope of the construction project increasing to $23M. In order to address and design for this significant change in scope, additional design fees are required.

It is recommended that Council approve the increased scope of work of the project, the increased Total Project Budget Authority for the project and the corresponding increase in design fees for the reconstruction of Warden Avenue from 16th Avenue to Major Mackenzie Drive in the Town of Markham.

For more information on this report, please contact Paul Jankowski, General Manager of Roads at Ext. 5901.

The Senior Management Group has reviewed this report.