Staff Report

Infrastructure and Public Works

Report To: Committee of the Whole
Meeting Date: May 22, 2019
Report Number: CSPW.19.043
Subject: Infrastructure Capital and Operational Program Delivery Models
Prepared by: Reg Russwurm, Director of Infrastructure and Public Works

A. Recommendations

THAT Council receive Staff Report CSPW.19.043 entitled “Infrastructure Capital and Operational Program Delivery Models”;

AND THAT Council direct Staff to develop a business plan to create internal engineering capabilities as outlined in Staff Report CSPW.19.043;

AND THAT Council authorize Staff to utilize external engineering services for Infrastructure and Public Works Department projects within the 2019 Capital Budget with engineering fees identified, and direct Staff to require multi-year design and construction administration assignments to be flexible to enable the Town undertaking the contract administration phase of the assignment internally.

B. Overview

The purpose of this report is to review the models available to the Town to deliver capital and operational projects including considering the concept of developing internal engineering capabilities as requested by Council.

C. Background

Like many municipalities the size of the Town, the vast majority of consulting and engineering services are provided by external engineering consultant firms on a project by project basis. The Infrastructure and Public Works Department (IPW) is responsible for the majority of consulting and engineering assignments within the Town in both number and dollar value. For the purposes of this report consulting services are defined as assignments that result in the completion of various studies, needs assessments, municipal class environmental assessments (MCEA), preliminary design reports, etc. Engineering services occur following once consulting activities are completed and are further defined as design activities resulting in the preparation of construction documents and undertaking contract administration activities to complete construction monitoring and administration. Many consultants offer both consulting and engineering services and will be referred to collectively as engineering consultants.
With respect to the cost of these services, IPW uses “rule of thumb” factors listed below that are based on experience tempered by project specifics. The recent heavy construction activity across Ontario however has caused some projects to have fee structures above these factors.

Consulting Services

- 3% - 5% of expected construction cost of highest cost reasonable project or through an estimate of effort dependent on the range of study and preliminary design warranted for the project

Engineering Services

- Final Design: 6% - 9% of construction estimate based on project complexity
- Contract Administration: 6% of construction cost

After preparing for and completing several studies over the past few years, the Town is poised to enter a phase that will see increased construction activities.

Over the past five year period (2014 – 2018), the IPW operating and capital budget has included 37 new projects1. Of those 12 have been completed and 25 are still underway. Six of the 25 have had no expenditures due to bids exceeding budget, staff resourcing and shifting priorities. The 37 projects had a combined budget of $33.8M of which $13.4M has been spent2. Of the funding spent, $0.67M was for consulting and $1.92M for engineering.

Within IPW’s current five year projected operating and capital program, there are 48 new projects with a total cost of $98.2M. This program contains $3.0M in consulting and $11.4M in engineering fees. To deliver this program, Council has approved the creation of two new dedicated capital project coordinator positions.

With the proposed increase in construction activities, the Town will incur significant costs for engineering consultants to deliver the capital program. For this reason, and that sustaining infrastructure assets over time will become an ever increasing priority for the Town, a review of the models IPW uses to deliver its operating and capital program is warranted.

The primary means by which the Town can deliver its capital program is broadly described through the following models:

1. **Fee for Service**: This is the current model primarily used by the Town. Staff coordinate and project manage professional services contracts.

2. **Selected Assignments using Contracted Staff**: In this model Staff takes on selected assignments of general research or assessments internally using the current Staff

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1 The 37 projects don’t include multi-year projects initiated prior to 2014 but were still active in 2014. The project are those only initiated over 2014 to 2018.
2 Several of the projects are multi-year projects yet to be completed.
complement as time permits or through hiring a contract person for a specific project or set of projects.

3. **Construction Monitoring by Town Staff:** In this model design activities are completed by an engineering consultant on a Fee for Service basis (Model 1) to the point where construction drawings and technical specifications are prepared. At this point, dedicated Town Staff become the contract administrators through to construction completion.

4. **Engineering Design and Contract Administration by Town Staff:** This model contemplates the development of internal engineering capabilities to deliver an entire capital project including both design, construction monitoring and contract administration.

A more detailed discussion on each model is provided in Attachment #1.

**D. Analysis**

There are benefits to using all of the models described above dependent on the nature of the project considered. The Town has had past successes using all four different project delivery models.

For large, technically complex projects and/or ones where Staff resources are not available, the hiring of engineering consultants on a fee for service basis is warranted (Model 1). Where projects are well understood by Staff or skills can be readily obtained, hiring contracted staff on a time/task/project specific basis may be the best fit (Model 2). There can be great added value in having Town Staff undertake construction monitoring and related contract administrative activities (Model 3). Lastly, linear projects that are somewhat routine in nature can be completed by in-house design, construction monitoring and contract administration resources (Model 4).

Staff feel that there are warrants to undertake additional analysis through the preparation of a business plan. The finding will be presented for Council direction prior to the preparation of the 2020 Budget. The 2019 5yr IPW operating and capital program, as proposed within in the 2019 Budget, has sufficient projects to support 4 new engineering staff that would otherwise be assigned to external engineering consultants. There are opportunities to re-prioritize the capital program to optimize the introduction of internal engineering capabilities to insure a consistent workload especially if grant applications are successful which do not permit the use of internal staffing.

The key barriers to expanding internal engineering resources is: i) a commitment to consistently advance a linear capital program; and, ii) workspace for the new Staff. There is typically no shortage of projects that could be done. At times through projects can be delayed due to re-prioritization in deference to other projects or are re-considered for whatever reason such that completion as first anticipated is hindered. Workspace at Town Hall is limited. The addition of upwards of four staff plus administrative support will require the creation and/or the reallocation of workspace at Town Hall or finding another work location.
During the development of a business plan for internal engineering, Staff will consider when there may not be a full workload and/or should the Town wish to additionally grow its capabilities. Staff could be offered to deliver projects in other departments, neighbouring municipalities, and/or to undertake subdivision development projects.

Since there is no expectation that new internal engineering staff will be available to undertake projects planned to commence in 2019, consideration should be given to either commencing the projects using external engineering consultants or deferring the projects one construction season (1 year) until internal resourcing is available. The implication of deference is the ripple effect throughout the 5 year capital plan. Other works and developments dependent on the delivery of a particular project 2019 will also be delayed. The projects planned to commence in 2019 that included engineering fees are listed in Attachment #2. In order to keep moving forward on capital needs, Staff feel that the 2019 IPW projects with engineering fees should advance using external engineering resources. Where projects are multi-year in nature, the Town has the opportunity to commence design using engineering consultants and then utilize internal staff during construction.

**Recommendation**

Staff recommend that Council direct Staff to develop a business plan to create internal engineering capabilities as outlined in Staff Report CSPW.19.043, and that Council authorize Staff to utilize external engineering services for Infrastructure and Public Works Department projects within the 2019 Capital Budget, and direct Staff to require multi-year design and construction administration assignments to be flexible to enable the Town to undertake the contract administration phase of the assignment internally.

**Potential Implementation Schedule**

Although an implementation schedule for internal engineering capabilities will be a key deliverable of the business plan, a potential implementation schedule could be:

- In 2019 - Recruit 1 or 2 fulltime contract administrators late 2019 to start Feb / March 2020 for orientation, tender preparation, procurement, and pre-project preparation. This staff will undertake construction monitoring in 2019 for works designed by engineering consultants.
- In 2020 – Recruit Manager of Infrastructure Engineering, a Design Technologist and perhaps administrative support to commence in-house design Q2 2020.

**Next Steps**

The business plan will be created internally and presented to Council in the fall of 2019. Options will be provided within the plan on how to phase in implementation of internal engineering capabilities.

With respect to several projects commencing in 2019 that Council has requested be reviewed for specific delivery by consulting assignments or internal resources, Staff Report CSPW.19.042 has been prepared to address this question.
E. The Blue Mountains Strategic Plan

Goal #1: Create Opportunities for Sustainability
Objective #5 Improved Visibility and Local Identity

Goal #2: Engage Our Communities & Partners
Objective #1 Improve External Communication with our Constituents
Objective #2 Use Technology to Advance Engagement

Goal #4: Promote a Culture of Organizational & Operational Excellence
Objective #1 To Be an Employer of Choice
Objective #2 Improve Internal Communications Across our Organization
Objective #3 To Consistently Deliver Excellent Customer Service
Objective #4 To Be a Financially Responsible Organization
Objective #5 Constantly Identify Opportunities to Improve Efficiencies and Effectiveness

Goal #5: Ensure Our Infrastructure is Sustainable
Objective #1 Develop a Long-Term Asset Management Plan for the Maintenance, Renewal and Replacement of Existing Infrastructure
Objective #2 Avoid Unexpected Infrastructure Failure and Associated Costs and Liability
Objective #3 Implement Best Practices in Sustainable Infrastructure
Objective #4 Ensure that Infrastructure is Available to Support Development

F. Environmental Impacts

Better designed and constructed infrastructure is less prone to failure leading to fewer spills to the natural environment.

G. Financial Impact

Included in the 2019 Approved Capital budget, as shown in Attachment #2, is $769,700 in Engineering. These Engineering costs are included in the overall capital budget of $8,702,200 which is funded from various sources included reserve funds, Development Charges and Property Owners.

H. In Consultation With

Senior Management Team

Sam Dinsmore, Deputy Treasurer / Manager of Accounting and Budgets

I. Public Engagement

The topic of this Staff Report has not been subject to a Public Meeting and/or a Public Information Centre as neither a Public Meeting nor a Public Information Centre are required.
J. Attached

1. Alternate Capital and Operating Program Delivery Models
2. Projects Commencing in 2019 with Engineering Fees

Respectfully submitted,

Reg Russwurm
Reg Russwurm, MBA, P.Eng
Director of Infrastructure and Public Works

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519-599-3131 extension 260
Model 1 - Fee for Service

Engineering consultants are retained on a fee for service basis to undertake project specific study, design and construction administration assignments typically to an upset fee limit. The consultants and engineers are hired though a Request for Proposal process that evaluates both technical capabilities and fee on a weighted basis to determine the successful bidder.

<table>
<thead>
<tr>
<th>Model 1 - Fee For Service</th>
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<tbody>
<tr>
<td><strong>Pros</strong></td>
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<tr>
<td>Provides full flexibility in that if the services are not required, a consulting engineer is not hired.</td>
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<tr>
<td>Provides access to a wide range of skills on an as needed basis.</td>
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<tr>
<td>There are no long term staffing or operating costs.</td>
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This model has proved successful for the Town provided that sufficient oversight effort is made to monitor and manage the engineering consulting firms to ensure they deliver the quality of work expected in the schedule proposed. Staff can manage 4 – 6 engineering and consulting assignments at a time depending on the size and complexity of the project.
Model 2 - Selected Assignments using Contracted Staff

Contracted Staff are hired to work on a specific project or to complete a set assignment for a period of time. The work is generally related to research or assessments.

<table>
<thead>
<tr>
<th>Model 2 - Selected Assignments using Contracted Staff</th>
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<tbody>
<tr>
<td>Pros</td>
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<tr>
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<tr>
<td>Provides full flexibility in that contact staff are not employed if there is no assignment.</td>
</tr>
<tr>
<td>The Town has access to a wide range of skills as needed.</td>
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<tr>
<td>Contract Staff have a lower hourly cost burden than engineering consultants.</td>
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<tr>
<td>Contract Staff have an increased sense of ownership than engineering consultants.</td>
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Past example projects utilizing this model has proven successful. A Waste Diversion Plan (2013) led to the introduction of the current composting program. The Energy Management Plan (2014) found opportunities to reduce energy use.

Staff see opportunities for this model in the delivery of several projects within the 2019 Budget and has prepared a separate report for Council’s consideration.
Model 3 - Construction Monitoring by Town Staff

After the design is completed by an engineering consultant, Town Staff undertake contract preparation, site monitoring, construction administration, public engagement and record keeping. The engineering services agreement will provide for the design engineer to be available for technical advice until the completion of the project.

A tremendous amount of value can be gained by the Town by having experienced fulltime field staff onsite throughout the project to ensure the infrastructure installed meets the Town’s expectation and is properly recorded. Previous projects where IPW has used this model are listed below. Although the projects were highly successful, the experience led to the conclusion that fulltime Staff are necessary because it is difficult and time consuming to accomplish quality construction monitoring and contract administration along with other duties.

i. Indian Circle Sub’n Reconstruction
ii. Camperdown Ditch Re-alignment
iii. Black Bridge Rehabilitation

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<tr>
<th>Model 3 - Construction Monitoring by Town Staff</th>
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<tr>
<td>Pros</td>
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<tr>
<td>Town Staff are compensated at a lower hourly rate than consultants.</td>
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<tr>
<td>Fulltime Staff build a knowledge base of the Town and its infrastructure.</td>
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<tr>
<td>Town Staff have an increased sense of project ownership and responsibility.</td>
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<tr>
<td>Better public engagement happens with Town Staff.</td>
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</table>

IPW undertakes infrastructure projects that range from linear (roads, sewers, watermains, sidewalks, etc.) to vertical (treatment plants, larger pumping stations, structures, etc.). Linear projects are the “bread and butter” municipal projects that the Town will consistently complete on an annual basis. Vertical projects by their nature are sporadic and more complicated requiring specialized technical skills. Staff therefore recommend that at this time, the Town limit the consideration of this project delivery model to linear works. Depending on the skill mix that the Town may have once this model is implemented, the Town may consider expanding into simpler vertical works projects.
Below is a listing of projects within IPW’s five year capital plan that would be best suited for fulltime staff to undertake contract monitoring activities. This list was compiled utilizing two new staff with a focus on higher profile linear projects where public engagement will be important. One large or 2 or 3 smaller projects will be assigned to each Staff. During the largest projects where several construction crews are working, both Staff may be required at the same time, and/or the Town can make use of engineering co-op students. This Model will work with just one new fulltime position. Two positions are a practical maximum at this time.

It should also be noted that the Elma Street and Victoria Street projects are under consideration for a recently released grant program wherein funding of fulltime Staff may not be an eligible cost. It is not expected that the new field staff positions will be hired before the funding announcement is finalized. As such, should the Town be successful in getting the grant funding, the capital budget can be revised to rationalize the project schedule to take advantage of the internal engineering resources.

The list presented is primary for illustrative purposes based on the current IPW 5 year capital budget. There are opportunities available to rationalize this list for internal engineering capabilities by re-prioritizing the work load. The expected funding available (assigned to engineering consultants) is provided for each project below using the assumption that approximately 6% of construction costs is available to fund fulltime construction monitoring and contract administration staff.

- **2020**
  - Elma Street and Alice Street Reconstruction ($296k)
  - Price’s Sub’n Drainage Diversion ($20k)
  - Price’s Wastewater Servicing Extension ($83k)
  - Peel Street WW Pumping Station Upgrades ($38k)
- **2021**
  - Peel Street Reconstruction ($190k)
  - Birchview Trail Wastewater Extension and Watermain Replacement ($44k)
  - Blue Mountain Drive & Fraser Cres Watermain Connection ($15k)
- **2022**
  - Victoria Street and Louisa Street Reconstruction ($309k)
  - Jozo Weider Boulevard Phase 3 ($108k)
  - Water Distribution Improvements ($150k)
- **2023**
  - Arrowhead Road Reconstruction ($279k)
  - Lakewood Drive Reconstruction ($180k)
  - Clark Street Realignment ($118k)
The potential funding available that would otherwise paid to engineering consultants for construction monitoring and contract administration is $1,830k. If 25% is allocated for specialized inspection and technical support such as geotechnical inspection, material testing, and input from the design engineer, $1,373k is available for 2 Town Staff over 4 years (approx. $172k/staff/yr.) plus allowances for other Town Staff to support the delivery of the project.

Since it’s not practical to consider these positions in place for the 2019 construction season, the list only includes projects that are slated for 2020 and later. The reasons being that there will be lag time from approval to hiring to being project prepared. Therefore, the best time to bring these positions internal is late winter so they can be involved in the preparation of the construction contract and have adequate time to prepare pre-construction documentation and activities.

With these two new positions plus the two new Infrastructure Project Coordinator positions within the 2019 Budget, IPW would have 6 staff members with comparable technical skills reporting the Director of IPW. It is suggested that one of those Staff be designated a project coordinator supervisor to provide mentorship and oversight. The job description of the Infrastructure Project Coordinator positions ensures those positions have field inspections and construction experience to be able to assume some of this work. It may be ultimately possible to reduce this proposed Staff complement to 5 upon more detailed evaluation while still delivering the same number of projects.

Since construction monitoring will primarily take place from late spring to mid fall, off-season utilization will be a concern. When not on a construction site, their time will focus on records management and documentation, preparation of contracts for the upcoming season, scope development of future capital projects, and the use of vacation and lieu time. There may be opportunities to expand their responsibilities beyond strictly construction monitoring but a conservation approach is deemed prudent at this point to limit their scope of work to only construction activities.

To make best use of these staff, the Town will need to commit to capital project delivery and scheduling. When projects are deferred for whatever reason, staff salary costs will still be incurred. Similarly, the scheduling of construction activities during the year will need to be controlled tighter to optimally balance work load. Currently, construction windows are often left to the contractor to offer them an opportunity for flexibility with the goal of better pricing. These priorities will need to be balanced.

There is work space in the IPW area for the two proposed IPW Capital Project Coordinators. Although the dedicated construction monitoring staff will have mostly field work during the construction season, there will be needs for workspace to maintain paperwork and for off-season activities. Conceptually office space for these roles can be accommodated on at least a short time basis at an operations building.
Model 4 - Design and Construction Administration with new Town Staff

This model contemplates the development of internal engineering capabilities to deliver an entire capital project including both design, construction monitoring and contract administration. It builds on Model 3 outlined previously. Similar to Model 3, the concept discussed is for linear works and simple mechanical projects because vertical works are by their nature more complicated and require specialized skills. It is expected that technical specialists will still be required to support the internal engineering capabilities. Those areas would likely include geotechnical, topographical survey, storm water management, environmental scientists, arbourists, etc.

IPW have undertaken both the design and contract administration of past projects with success without the use of external engineers being retained by the Town. These have consisted of design - tender - build projects as well as design – build projects, such as:

i. Hester Street Parking Lot
ii. Lakeshore Wastewater Pumping Station Replacement
iii. Hazardous Waste Sorting and Storage Addition
iv. Ravenna Cold Storage Building

<table>
<thead>
<tr>
<th>Model 4 - Design and Construction Administration with new Town Staff</th>
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<tbody>
<tr>
<td><strong>Pros</strong></td>
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<tr>
<td>Staffing costs will be lower than hiring engineering consultant on an hourly basis.</td>
</tr>
<tr>
<td>Fulltime Staff build a knowledge base of the Town and its infrastructure, and will have a better appreciation of the inter-relation of various capital projects over time.</td>
</tr>
<tr>
<td>The skills obtained through internal engineering staff will enhance the technical support available for operations.</td>
</tr>
<tr>
<td>Final design work and drafting support provide value-added work for contract administration Off-season work for CA’s</td>
</tr>
</tbody>
</table>
The staffing complement considered in this model includes a licensed engineer, a design technologist and 2 construction monitors (from Model 3). The engineering office will be able to design and construct 1 large and 2 to 3 small projects per year. There may be an opportunity to expand this workload but at this point a conservative approach is being taken.

Given the growth in the Staff complement, the licensed engineer would become the Manager of Infrastructure Engineering with 7 engineering design, construction, and contract administration Staff reporting to this role consisting of current and proposed positions. There may be opportunities to optimize this staff complement.

Typically the engineering fees related to design and administrate linear works is 12 – 15% of the estimated construction cost based on the project’s complexity and the need for specialists. To take a simplistic and conservative approach for illustrative purposes, the same projects presented within the Model 3 discussion will be considered here as well. Using 12% of the construction, the potential funding available that would otherwise paid to an engineering consultant is $3,660k. If 25% is allocated for specialized inspection and technical support, $2,745k is available for 4 Town Staff over 4 years (approx. $172k/staff/yr.) plus allowances for other Town Staff to support the delivery of the project. Consideration will also be required around the need for administrative support.
<table>
<thead>
<tr>
<th>Project</th>
<th>Engineering</th>
<th>Total Project Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretty Valley Culvert Replacement</td>
<td>$ 90,000</td>
<td>$ 831,300</td>
</tr>
<tr>
<td>Water and Wastewater Electrical System Protection</td>
<td>$ 25,000</td>
<td>$ 480,700</td>
</tr>
<tr>
<td>Water Treatment Plant Equipment Replacement</td>
<td>$ 15,000</td>
<td>$ 380,000</td>
</tr>
<tr>
<td>Bulk Water Meter Installation Program</td>
<td>$ 3,000</td>
<td>$ 25,000</td>
</tr>
<tr>
<td>Substandard Watermain Replacement Program</td>
<td>$ 24,000</td>
<td>$ 134,000</td>
</tr>
<tr>
<td>Water Pressure Zone 4C Distribution Improvements</td>
<td>$ 145,100</td>
<td>$ 736,200</td>
</tr>
<tr>
<td>Drake's Path Watermain Servicing Extension</td>
<td>$ 54,500</td>
<td>$ 454,600</td>
</tr>
<tr>
<td>Price's Subdivision Drainage Diversion</td>
<td>$ 31,000</td>
<td>$ 262,000</td>
</tr>
<tr>
<td>Price's Subdivision Wastewater Servicing</td>
<td>$ 207,500</td>
<td>$ 1,729,600</td>
</tr>
<tr>
<td>Peel Street SPS Upgrades</td>
<td>$ 74,600</td>
<td>$ 621,300</td>
</tr>
<tr>
<td>TWWTP Headworks Expansion</td>
<td>$ 100,000</td>
<td>$ 3,047,500</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$769,700</strong></td>
<td><strong>$8,702,200</strong></td>
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