



**City of Hamilton**

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# **Transportation Modelling Review**

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## TABLE OF CONTENTS

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Introduction .....	3
Background .....	4
Existing Practices – Transportation Modelling .....	6
Analysis: Option to Build Internal Resources to Effectively and Efficiently Support Transportation Modelling .....	7
Highlights from City in Motion TMP Review .....	8
Highlights from Performance Audit of External Consultants .....	9
Analysis .....	10
Leading Practices .....	13
Summary of Benefits .....	14
Recommendation .....	15
Appendix A – Proposed Job Description .....	16



## INTRODUCTION

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In June 2019, the Province announced its Audit & Accountability Fund initiative which provides funds to municipalities to engage in a third-party review to help municipalities become more efficient and modernize service delivery. The City of Hamilton was successful in securing funding under this initiative. The City's focus is to review the use of consultants with the objective of reducing consulting costs and bringing expertise in-house.

The consultant will also use an approach that includes but is not limited to:

- ✓ Gather information to review each program area of focus;
- ✓ Conduct interviews and other engagement processes with staff;
- ✓ Review municipal service delivery reviews, best practices;
- ✓ Analysis of key issues and recommendations for service improvements and changes will the goal of finding service delivery efficiencies;
- ✓ Financial implications of the recommendations for consideration during 2020 Budget preparation;
- ✓ Supporting data, analysis and rationale including benchmarking or best practices; and
- ✓ The consultant will review the organizational structure of the focus divisions and identify what should be changed, maintained, modified or eliminated to best deploy internal resources to support recommendations of the review.

## BACKGROUND

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The Transportation Planning Section and several other sections in the City regularly utilize and rely on the results of the City's macro transportation model for both short and long-range planning. This system is used to inform policy direction and decision-making.

The City's macro-level model uses the EMME modelling platform through a software licence for transportation simulation. EMME software is well recognized as a leader in transportation modelling and is used in over half the world's most populous cities.

The Hamilton Model is a full 4-stage transportation model, and thus includes trip generation, trip distribution, modal split, and trip assignment functionality. Trip assignment is undertaken for passenger car, truck, and transit modes. Auto assignment reflects the AM peak hour, while transit is also assigned for AM peak period. Trips are loaded onto the transportation network through traffic zones, which are connected to model nodes via zone connectors strategically located to simulate realistic traffic loading patterns (i.e. zone connectors can represent local roads, commercial property access points, residential neighbourhood entry points, and other points where vehicles can enter the road system).

The software aids transportation planning by graphically plotting, in map format, detailed information about travel flows and to evaluate alternative courses of action using a menu driven software. It is an invaluable tool in transportation planning, especially when its limitations are understood and considered in the decision-making process. Currently, the

In the report - **City of Hamilton Transportation Master Plan Review and Update - Future Travel Demand Modelling Report** – June 2017 by Parsons, the City's travel demand model is a macro-level transportation simulation model, which is capable of:

- Generating trips that use a transportation system;
- Distributing those trips to and from origin-destination traffic zones across the network;
- Dividing the trips by mode of travel (i.e. driver, passenger, transit, etc.); and,
- Assigning the trips to a broad transportation system.

# Transportation Modelling Review

City does not have internal resources to run the model and rely on external consulting services.

The model includes a detailed representation of the City's transportation network with information such travel speeds, distances, and capacities coded in. Forecasts are generated by taking population and employment estimates as an input, while also considering the impact of road network travel times, routing decisions, and mode choices. A transportation simulation model uses advanced algorithms to reflect observed as well as to estimate forecast travel behavior.

Examples of where and how these forecasts are used include:

- Network planning for new growth areas such as SCUBE, AEGD and Waterdown;
- City-wide scenario planning for GRIDS 2.0, including GHG assessments;
- Providing growth rates for localized areas for use in traffic impact studies and Environmental Assessments;
- Supplying various network performance statistics for use in transit planning, road operations reviews and LRT planning/design; and
- Monitoring and reporting on the Transportation Master Plan (TMP).

# EXISTING PRACTICES – TRANSPORTATION MODELLING

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Typically, an assignment consists of working with a consultant to define the scope of modelling, following which the consultant will refine and run the model and extract the results. City staff then review and help interpret the results. There are no staff resources dedicated to supporting transportation modelling; the City extensively relies on consulting services.

The following table provides a summary of the 2020 Capital Budget for transportation modelling work to be undertaken which represents a portion of the overall study budgets. This includes environmental assessment (EA), and other related transportation planning projects.

Transportation Modelling	2020 Budget
Rymal Road - EA	\$ 20,000
GRIDS - 2.0 - 2041 Planning Horizon	\$ 180,000
LINC/RHVP Feasibility	\$ 30,000
Glancaster EA	\$ 15,000
Twenty Road EA	\$ 15,000
Book Rd EA	\$ 15,000
Total	\$ 275,000

# ANALYSIS: OPTION TO BUILD INTERNAL RESOURCES TO EFFECTIVELY AND EFFICIENTLY SUPPORT TRANSPORTATION MODELLING

There are several reports that the City has prepared and/or have been prepared by consultants that support the need to consider the addition of internal resources to support Transportation Modelling. These reports include but are not limited to:

- City of Hamilton report - City in Motion TMP Review and Update – June 2018
- City of Hamilton Performance Audit Report 2016-03 – Use of External Consultants



## Highlights from City in Motion TMP Review

In the City of Hamilton report - City in Motion TMP Review and Update – June 2018, it was recommended that when new information becomes available through Transportation Tomorrow Survey (TTS) and Stats Canada and as changes to population and employment projections are available, the road network or other changes occur, the proactive management and monitoring of the model should be undertaken.

Further as stated in the City in Motion report, “City in Motion requires regular monitoring in order to meet its targets of success.” The report noted the following actions items with respect to transportation modelling:

- ***Create in-house transportation modelling and data analysis capacity*** to support transportation decision and planning needs, and the monitoring of TMP outcomes.
- Update the City's travel demand forecast to reflect the updates from the revised Growth-Related Integrated Development Strategy (GRIDS).
- Implement the proposed monitoring program for the TMP and report to Council on a regular basis.
- Conduct regular reviews of the Transportation Master Plan.



## Highlights from Performance Audit of External Consultants

A City of Hamilton Performance Audit Report 2016-03 – Use of External Consultants was presented in 2017 which provides relevant background with respect to the use of consultants in the City. The purpose of this audit was to assess the process used to procure, manage and use external consultants operated with due regard to the ***economy, efficiency and effectiveness***.

- ***Efficiency*** was assessed by reviewing the need for consulting services, whether alternatives were considered, knowledge was transferred to staff and if the cost will reoccur in the future.
- ***Effectiveness*** was assessed by determining whether deliverables were used by management to provide benefit to the City.
- ***Economy*** was assessed by evaluating whether the consultant's work added value to the organization, was economically justified and identifying any instances of waste.

The audit report found that management was not consistently preparing a business case analysis to support the need to hire a consultant. A recommendation from the auditor was that the senior leadership team identify opportunities for insourcing and cost savings.

## Analysis

Based on the above noted criteria in the audit and the City in Motion Report action items, the ongoing use of consulting services for transportation modelling was determined by staff to be an excellent example of a service where a cost/benefit analysis is warranted to determine the most appropriate approach for service delivery. This was the case, particularly with regard to efficiency opportunities given that the service is ongoing in nature with a strong preference to have the ability to readily and efficiently respond to changes in assumptions, run alternative scenarios and identify the impact of new studies on transportation management decision-making.

For a number of years, there has been a service-delivery gap related to the management of the City's Travel Demand Model (the model). As identified in the City in Motion report, there is a need to build internal capacity which currently does not exist. As a result, challenges associated with increased external consulting fees, quality control and oversight, consistency and delays in providing responses to internal and external customers have been experienced.

In 2020, approximately \$275,000 was included in the capital budget (embedded as part of individual project budgets) for outside consulting services for various transportation studies that require updates to reflect the most current studies and available information. These costs can be mitigated fully, or in part, by the availability of internal resources with the expertise to update the transportation model as new information becomes available. The following table summarizes the Capital Budget associated with Transportation Modelling.

## Transportation Modelling Review

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The 2021-2025 Capital Budget for projects requiring transportation modelling range between \$175,000 to \$200,000 annually.

Without internal resources, the City must rely on the timing and availability of the consultants to undertake the analysis and upload the data at an hourly rate exceeding internal staff costs. Approximately 10% of the outside consulting costs are attributed to model initiation to familiarize themselves with the model. This would not be required if the work was undertaken by internal resources fully familiar with the model. Further, with a fixed consultant budget, staff may experience some limitations on the extent to which alternative models can be generated.

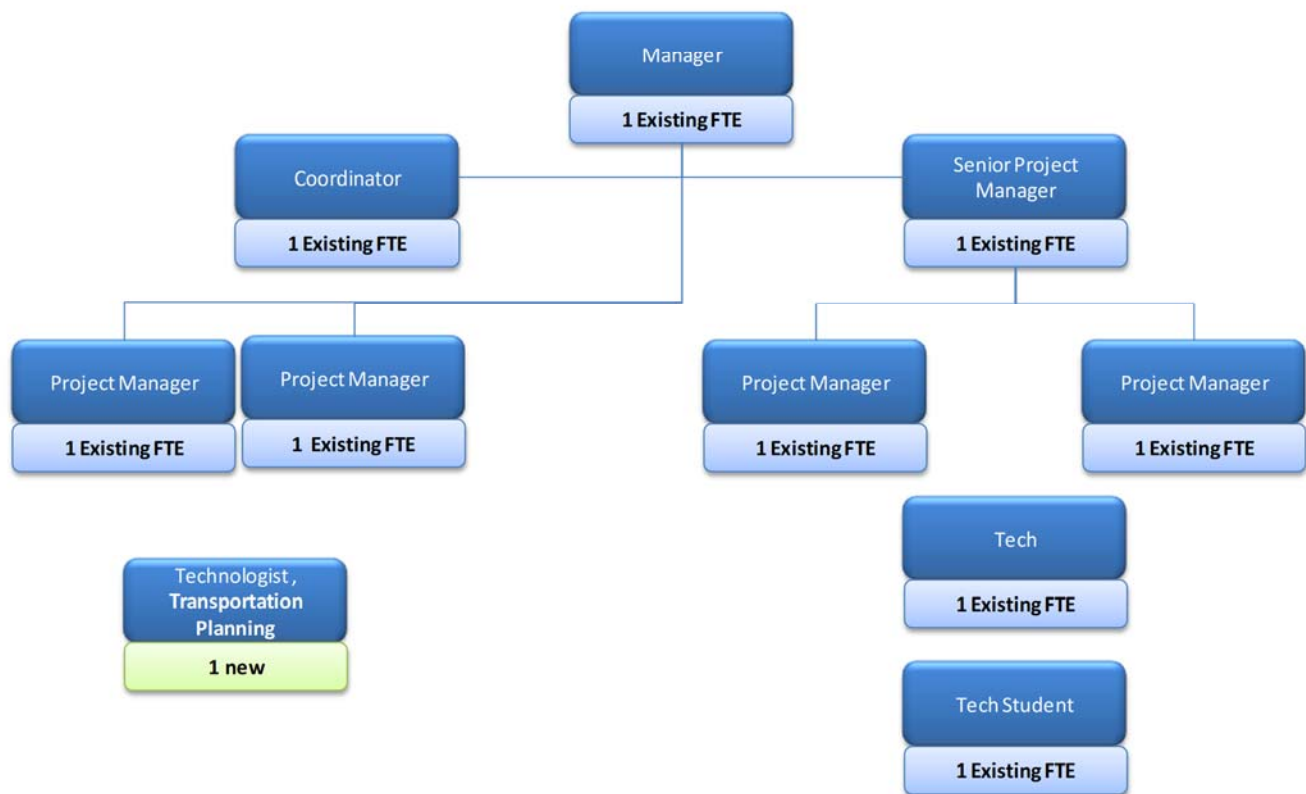
Alternatively, the estimated salary for an internal staff position is \$90,000 plus benefits for a total cost of approximately \$111,000 based on information provided by the City (subject to human resource development of a job description). Based on future capital budgets, the projected annual savings would be in the range of \$64,000-\$89,000. This position would also be responsible for monitoring and maintaining the model to ensure information is as up to date as possible to improve responsiveness to transportation planning activities and take a more responsive approach to transportation activities and a more proactive approach to transportation planning scenarios.

It should be noted that there may be transition period while staff are fully trained on the modelling and there may be some continued external resources required for initial model review.

# Transportation Modelling Review

The following is the Organization Structure of the existing resources as well as a recommendation to hire a Transportation Planning Technologist.

Transportation Planning Org Chart (Nov / 2019)



A summary of duties and responsibilities for a new transportation planning technologist has been included in Appendix A as a starting position upon which a detailed job description would be developed.

## Leading Practices

Single tier and regional municipalities with a population greater than 250,000 in the GTHA were contacted to determine whether the municipality had dedicated internal resources to support transportation planning modelling functions. The following municipalities responded to the survey, reflecting the large urban municipalities typically have internal transportation modelling resources:

- ✓ Durham Region – 1 FTE
- ✓ Peel Region – 3 FTEs
- ✓ City of Brampton – 1 FTE
- ✓ City of Mississauga – 1 FTE
- ✓ City of Vaughan – 1 FTE

## SUMMARY OF BENEFITS

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Creating in-house transportation modelling and data analysis capacity to support transportation decision-making and planning needs and monitoring of outcomes will provide the following benefits:

- Respond to staff and Council inquiries in a timely manner and modify assumptions and changes in forecasting and sensitivity analysis on an ongoing basis, providing additional flexibility and support for decision-making;
- Provide regular updates to the EMME model on a timely basis;
- Work more closely with the respective departments providing more flexibly than consulting services to make modifications and run alternative scenarios.

### Annual Savings

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**Reduced reliance on external resources, a savings of approximately \$64,000 - \$89,000 annually;**

- Improved quality control on an ongoing area where future modelling will continue to be required;
- The position can also assist the management of development reviews and potential impacts and tolerances within the transportation network based on proposed Zoning and Official Plan amendments;
- Potential to offer additional complimentary mapping and GIS services support;
- Retain knowledgeable staff that can more quickly respond to changes in strategic directions.
- Sufficient management oversight currently available in the existing Transportation Management organization structure.

## RECOMMENDATION

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1. It is recommended that the City hire a Transportation Planning Technologist position to provide the necessary resources to improve responsiveness to transportation planning activities and undertake a more proactive approach to planning scenarios. There is an anticipated cost savings of approximately \$64,000 - \$89,000 by decreasing or eliminating the need for external consultants.

## APPENDIX A – PROPOSED JOB DESCRIPTION

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### PRIMARY FUNCTION:

Responsible for researching, developing and maintaining transportation forecasting and modelling capabilities for the City, and applying transportation models and other specialized analysis to support policies and guide implementation of multimodal transportation solutions.

### REPORTS TO:

Manager, Transportation Planning

### DIRECTION EXERCISED:

Periodically provides direction and guidance to technical staff, clerical staff & students.

### POSITION DUTIES:

- Develop innovative applications that support a multi-modal approach to transportation planning, consistent with the City's Strategic Plan and Transportation Master Plan.
- Direct the application of transportation models and analytics to planning, engineering and transit studies.
- Maintain, modify and operate a computerized travel demand forecasting model.
- Keep current with technical advances and knowledge of transportation modelling issues, methods and techniques, and update the City's modelling needs accordingly.



# Transportation Modelling Review

- Conduct transportation network analysis to support the implementation of a multi-modal transportation network for the City, including updates to the City's Official Plan, Transportation Master Plan, Development Charges By-law, and other studies.
- Produce, interpret and communicate the results and the transportation and land use implications from modelling assignments to support Environmental Assessment studies, benefits/business case analyses and traffic impact studies.
- Participate in studies dealing with transportation planning matters conducted by the City, other agencies, or consultants by directing the application of the City's transportation modelling, providing relevant data and information for these studies, and reviewing the findings of these studies. Provide comments in terms of modelling needs, methodologies, capacity analyses and transportation planning.
- Undertake research to support the continual development of the City's travel demand forecasting model. Assess and make recommendations on transportation modelling software and planning modelling systems.
- Maintain a transportation monitoring program, including assembly and manipulation of a variety of data inputs, and establishing and maintaining a transportation planning information database for Brampton, adjacent municipalities, other agencies, and the public, dealing with historical employment and population projections, and transportation network characteristics and factors.
- Liaise with other City Departments and external agencies in developing and implementing the City's transportation modelling program.
- Represent the Transportation Planning Division on internal and external committees for transportation planning projects and studies.
- Attend and represent the Transportation Planning Division at Council, Committees, public meetings, Ontario Municipal Board hearings, as needed.
- Provide professional and technical expertise on transportation modelling and planning matters in response to requests from various stakeholders.