# Estimation of the Representative Annualized Capital and Maintenance Costs of Roads by Functional Class

## REVISED FINAL REPORT

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# ESTIMATION OF THE REPRESENTATIVE ANNUALIZED CAPITAL AND MAINTENANCE COSTS OF ROADS BY FUNCTIONAL CLASS

## REVISED FINAL REPORT

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# EXECUTIVE SUMMARY

This report describes procedures for estimating annualized life-cycle unit costs of roads for different geographical regions of Canada by road functional class. In addition, the report provides data on the size of the Canadian road infrastructure and on traffic using the infrastructure. The work is part of an Investigation of the Full Cost of Transportation, a project initiated by Transport Canada in collaboration with Provincial and Territorial transportation agencies.

This is a revised final report of the final report dated March 31, 2006. Compared to the previous report, this revised report incorporates changes based on comments received from several provincial transportation agencies in 2007 and 2008. Most of the changes constitute improvements in pavement structures, unit construction costs for road infrastructure components, and road geometric parameters.

Annualized road costs for one-lane, one-kilometre-long road sections were developed separately for the following parameters:

- 14 geographical regions – two regions each for Québec, Ontario, and British Columbia, one region for each of the remaining seven provinces, and one combined region for the three Territories.
- 2 jurisdictions within each geographical region – provincial/territorial and municipal.
- 2 types of alignment – rural or urban.
- 4 functional road classes – freeway, arterial, collector, and local.
- 3 types of infrastructure – pavements, bridges, and all other road infrastructure components.
- 4 types of costs – initial construction, maintenance and rehabilitation, routine maintenance, and winter maintenance.

Thus, for example, a separate annualized unit cost estimate, in terms of dollars per one-kilometre-long single traffic lane, is provided for the cost of the initial pavement construction on a rural municipal arterial road located in Northern Ontario.

The estimates of annualized unit costs were carried out using an Excel-based computational model. The model links together individual highway infrastructure components and their unit costs and quantities. The structure of the model is modular to facilitate improved cost estimates if additional data becomes available and to enable what-if sensitivity analysis of model estimates.

Data on the size of Canadian road infrastructure and on traffic using the infrastructure is reported separately for the 14 geographical regions, three jurisdictions (federal, provincial/territorial, and municipal), two types of alignment, and four functional classes. The road inventory data includes road lengths, number of bridges and the corresponding average size of the bridge deck area, and data on the age of pavements and bridges. Traffic data include Annual Average Traffic Volumes for both passenger cars and commercial vehicles.

Annualized cost estimates, road inventory data, and traffic data are based on extensive surveys of federal, provincial, territorial, and municipal agencies, and on engineering judgement. Survey responses were obtained from nearly all senior Canadian transportation agencies and from 15 municipalities. The 15 municipalities included both small and large municipalities, and were distributed across all main geographic regions.

The report also compares the annualized operating and capital costs estimated by the model with annual operating and capital costs reported by all levels of government. The results of the comparison indicate that the model estimates are in line with the expenditures reported by highway agencies.

It is necessary to pay close attention to the comparability of various highway construction and maintenance costs. There is an absence of a common accounting policy among highway infrastructure suppliers, from the provincial level down through the regional authorities and municipalities, which makes direct comparisons difficult. Updating the data, based on common accounting methodology with regards to construction and maintenance costs, would improve the reliability of any future estimate of highway infrastructure cost.

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# 1. INTRODUCTION

## Project Objectives

Applied Research Associates, Inc. (ARA) was retained by Transport Canada to estimate the annualized unit costs by functional class of road for Canadian road infrastructure. The cost estimates should reflect the existing service levels and utilize existing practice of design, construction, rehabilitation, and maintenance of road infrastructure. The cost estimates are to represent all federal, provincial and territorial highways, and selected municipal roads.

The project included two additional tasks:

A/ Identification and classification of Canadian road infrastructure by functional class of the road. Road inventory is to be reported separately for each province or territory, jurisdiction within the province or territory (federal, provincial/territorial, and municipal), by road design features (rural or urban), and by functional class of road.

B/ Estimation of traffic volumes on the road network identified and classified in the course of Task A.

The two additional tasks can be viewed as separate tasks because the estimation of annualized unit road costs is independent of the actual extent of the road infrastructure inventory, and to some extent, of the actual traffic using the infrastructure. For example, it is possible to estimate the total annualized costs (per one-km-long single traffic lane) of an arterial municipal road with urban design features in Ontario without knowing the total length of such roads in Ontario.

## Background

The work described in this report is part of a project on the Investigation of the Full Cost of Transportation. The project was initiated by Transport Canada in collaboration with Provincial and Territorial transportation agencies and is steered by a Task Force reporting to the Policy and Planning Support Committee of the Council of Deputy Ministers Responsible for Transportation and Highway Safety.

The final report for the project *Estimation of the Representative Annualized Capital and Maintenance Costs of Roads by Functional Class* was issued on March 31, 2006. Subsequently, in 2007, representatives of two provinces, Québec and Saskatchewan, have provided additional, more accurate data for the estimation of road costs. Technical experts from Québec also directly worked with the road cost estimation model, updated several model input values for Québec, and compared the updated road costs for Québec with the costs estimated for other provinces.

In order to discuss and improve road cost estimates provided in the March 31, 2006 final report, the Economic Analysis Directorate of Transport Canada has invited the representatives of all Provinces to attend a Technical Workshop on Road Cost Estimation Methodology in Ottawa in March 2008. The Workshop was attended by the representatives of four provinces (Newfoundland, Québec, Ontario, and Manitoba). During the workshop, the cost estimation methodology and the unit costs and quantities of all main infrastructure components were reviewed and discussed. The workshop resulted in a number of recommendations and suggestions on improving the cost estimates contained in the final report of March 31, 2006

**Revised Final Report**

This is a revised final report which supersedes the final report dated March 31, 2006. Compared to the previous report, this revised report incorporates changes based on comments received from several provincial transportation agencies in 2007 and 2008. The main difference between the revised final report and the previous report concerns improvements in the input data used in the computational model.

Considering the extent of additional data provided and the number of recommendations and suggestions received during the March 2008 workshop, the decision was made to revise the final report of March 31, 2006 by issuing the revised final report. Both reports (the revised final report and the previous final report), have the same main title – *Estimation of the Representative Annualized Capital and Maintenance Costs of Roads by Functional Class.*

The revised computational model includes changes in the input data and improved descriptive labels and legends to make the model spreadsheets self-explanatory. The revised computational model does not include any changes to the structure of the model or to computational procedures.

The revised computational model contains the following changes in input data:

*Initial pavement structure*. Examples of changes in input data concerning the initial pavement structure include a reduction of the thickness of asphalt concrete layers in Newfoundland, extensive changes in the initial pavement structure of provincial roads in Québec, changing the surface type of provincial rural roads in Northern Ontario from hot mix asphalt concrete to surface treatment, addition of tack coat as a specific construction activity for Ontario pavements, and changing the pavement surface type of municipal rural collector roads in Saskatchewan from hot-mix asphalt concrete to gravel.

*Pavement preservation action plans*. The changes in the initial pavement structure often required corresponding changes in the subsequent pavement maintenance and rehabilitation plans. There were additional changes in pavement preservation action plans in Québec, Ontario, and Saskatchewan.

*Unit construction costs*. Virtually all changes in the unit construction costs occurred in Québec. The changes concerned the unit costs for constructing and maintaining pavements, bridges, and all other infrastructure components.

*Geometric road design parameters*. The changes in geometric road design parameters included the width of pavement and the width of paved and unpaved shoulders. The majority of changes occurred in Québec and Saskatchewan.

Compared to the previous report, the revised final report includes many updated tables that reflect the changes in the input data, text changes corresponding to the changes in input data, improvements in the description of the computational model, and several editorial changes.

**Reliability of the Representative Cost Estimates**

The cost estimation methodology utilizes many small elements of verifiable data. For example, in the case of the initial pavement costs, the specific data elements identify thickness, width, type, and unit cost of the surface layer on a provincial rural collector road in Northern Ontario. Because the total cost estimation is based on hundreds of data elements (in terms of quantities and unit costs), the total cost estimates should remain reliable even if the estimates for some of the data elements are off. All estimated data elements are identified in the model and can be changed by the user (e.g., if better estimates become available). It is easy for anybody with the basic knowledge of Excel to change input data and re-run the

cost estimation model. Consequently, annualized unit cost estimates can easily be updated using the procedures outlined in the report.

The results presented in this report are based on the information and data available at the end of 2005. Unit construction costs used in the computational model are from 2003. Road infrastructure inventory data are for the most recent year for which data were available, typically for 2004. Traffic characteristics (traffic volumes for cars and commercial vehicles) are typically for year 2003 or for the most recent year for which data were available.

The interpretation of the validity of annualized cost estimates must consider limitations of the input data and assumptions inherent in the computational model. The interpretation of the annualized cost estimates for different road infrastructure components, and particularly the comparison of the annualized cost estimates reported for different jurisdictions, must take into account the average representative nature of the cost estimates. Specific considerations should include the following:

- The average costs used for the estimates may not properly reflect high manpower and equipment mobilization costs at remote locations.
- Construction costs are subject to ongoing significant changes.
- Unit construction and maintenance costs reported by some jurisdictions may not include all relevant expenditures, for example capital cost of heavy equipment and storage facilities.
- The estimation of many construction quantities are speculative and are based on engineering judgement only. Examples include the amount and type of the excavated material required to build a roadbed, or the amount of guide rails per unit road length.
- Differences in the physical characteristics of road functional classes used by different jurisdictions. For example, an arterial road in a province with a low population may have different geometric design characteristics than an arterial road in southern Ontario.

The report also provides a comparison of the estimated annualized representative costs (obtained by the computational model) with the annual expenditures reported by the provincial transportation agencies. The results of such comparisons must be interpreted with caution. In addition to the limitations associated with the estimated annualized costs enumerated above, the results of the comparison also depend on:

- The accounting and reporting procedures employed by the provincial transportation agencies. Provincial agencies do not employ a common accounting methodology defining of the type of costs (e.g., capital costs, maintenance and rehabilitation costs, administrative and overhead costs). Consequently, for example, the comparison of maintenance costs estimated by the model with those reported by many transportation agencies would be misleading if the definition of the maintenance costs differs.
- Road lengths. Total estimated annualized costs depend on assumed size of the road infrastructure. The size of infrastructure assumed by the model and by the transportation agencies may differ.

**Report Organization**

The report consists of 12 primary chapters, five appendices, an addendum, and an MS Excel®-based computational model. All chapters, appendices and the addendum are also available electronically.

Because of the large amount of data constituting the results of this project, most of the project results are given in the appendices. Information concerning provincial and municipal surveys is presented in

Appendix A and B. Results concerning road inventory and traffic data are given in Appendix C; results concerning annualized unit costs by functional class of road are given in Appendix E.

The computational model is a separate electronic document that can be accessed using Microsoft Excel. The computational model, and its user guide, are described in Chapter 9. Appendix D provides a print-out of the main worksheets of the computational model.

The Addendum contains 196 Road Construction Sheets that provide detailed information on the geometric and physical features of all 196 road segments included in the study.

# 2. SURVEY METHODOLOGY

A preliminary literature review at the commencement of this project indicated that the vast majority of the required information and data to complete this project would need to be obtained directly from Canadian transportation agencies. Consequently, a survey of federal, provincial and municipal transportation agencies has been the key component of the study. Agency surveys have been carried out using a network of regional representatives stationed in all major Canadian geographical regions. To maximize the efficiency of the survey, ARA developed a comprehensive survey package consisting of the survey questionnaires and procedures, and carried out pilot surveys, before launching the detailed agency surveys. This chapter describes the survey design, the contents of the survey questionnaires, and outlines the results of the survey.

**Survey Design**

The survey design utilized a network of four regional representatives stationed in four major regions of the country:

- Atlantic Canada;
- Québec;
- Ontario; and
- Western Canada and Prairies.

The ARA regional representatives are professional engineers, with extensive experience in highway engineering, that live and work in the regions. They have been able to establish rapport with the representatives of key provincial and municipal transportation agencies in their regions, and are familiar with local highway technology.

The survey procedure included the following steps:

1. *Development of a summary list of survey data items.* Based on the objectives of the study, ARA developed a comprehensive list of all data items that needed to be obtained through the surveys. Considering the reluctance of people to spend time responding to external surveys, the list was scrutinized to ensure that it contains only essential data items.

2. *Development of survey package.* Data items were grouped into three separate provincial survey questionnaires and one municipal survey questionnaire. The three provincial survey questionnaires were an investment questionnaire, road inventory questionnaire, and a unit cost questionnaire. The grouping was designed to ensure that each questionnaire could be addressed by one specific respondent or an organizational unit within an agency.

3. *Preparation of the list of agencies to survey.* The objective of this task was to survey all provincial and territorial transportation agencies and approximately 20 municipalities representing both large and small communities in all regions of the country. The survey list included not only the names of the agencies, but also the names of specific agency representatives.

4. *Pilot testing.* Pilot testing of the survey package was carried out to ensure that survey questions were unequivocal and practical.

5. *Review and approval of survey package.* The survey package was submitted for review and approval to Transport Canada. Full-scale survey work was carried out after the survey package was pilot-tested and approved.

6. *Survey administration.* The survey questionnaires were sent to specific representatives of transportation agencies rather than to an agency address. Often, the intended recipient of the survey was contacted in advance of sending the survey questionnaires to ensure that the right recipient (and potential respondent) had been selected, and to introduce the survey. The survey questionnaires also included an introductory letter prepared by Transport Canada and a document explaining the purpose of the survey. The mailing of questionnaires was followed by telephone calls and/or personal visits to obtain responses. Survey responses were acknowledged and in may instances followed by clarifying questions. The survey administration was the responsibility of the appropriate regional representatives. The regional representatives also notified the provincial members the Transport Canada Full Cost Investigation Task Force about survey activities in their provinces.

7. *Data recording and analysis*. All survey data were tabulated and analysed. Survey results are presented in the subsequent chapters.

**Survey Package**

In order to provide a customized (province and municipality-specific) survey package, a model survey package, intended for distribution to provincial and municipal transportation agencies, was originally developed for Ontario. The model package was then customized by the regional representatives for other provinces and territories to reflect local provincial and municipal conditions. The model survey package is given in Appendix A.

The model survey package consists of four individual survey packets:

- Provincial Investment Survey;
- Provincial Highway Inventory Survey;
- Provincial Cost Survey; and
- Municipal Survey.

The use of the individual packets was necessary because the different survey packets were directed to different survey respondents within the agencies. In many cases, the four survey packets were further subdivided and sent to different respondents. For example, one part of the Provincial Highway Inventory Survey packet was sent to a respondent responsible for road inventory and the second part to a respondent responsible to bridge inventory.

Table 1 provides a brief description of the model survey package, including information on the administration of the surveys, the description of the individual survey packets, and size of the survey packets.

In addition to the surveys that were part of the survey package, ARA has also carried out an extensive literature review, an internet search of databases posted by Canadian transportation agencies, and consulted many individual experts regarding specific topics. The topics for which additional expert advice was obtained included the cost of winter maintenance, grading (earth work) quantities, and the use of fencing along roadways.

**Table 1. Main Components of the Model Survey Package**

| Name of Survey Packet | How Survey was Administered | Survey Subjects | Main Components of the Survey Packet | Number of Pages |
|---|---|---|---|---|
| Provincial Expenditure Survey (PES) | Centrally by ARA | Routine maintenance costs; winter maintenance costs; access roads (extent and costs) | Introduction letter for PES | 1 |
| | | | Survey Questionnaire PES | 2 |
| | | | Letter from Transport Canada | 1 |
| Provincial Highway Inventory Survey (PHIS) | By Regional Representatives | Extent and classification of roads and bridges; age of roads and bridges; traffic volumes | Introduction letter for PHIS | 1 |
| | | | Survey Questionnaire PHIS | 4 |
| | | | Letter from Transport Canada | 1 |
| Provincial Cost Survey (PCS) | By Regional Representatives | Unit costs of road materials; pavement preservation strategies and costs | Introduction letter for PCS | 1 |
| | | | Survey Questionnaire PCS | 4 |
| | | | Pavement Preservation Plans PCS | 4 to 10 |
| | | | Letter from Transport Canada | 1 |
| Municipal Survey (MS) | By Regional Representatives | Extent and classification of roads and bridges; unit cots costs of highway material; pavement preservation strategies and costs; traffic volumes | Introduction letter for MS | 1 |
| | | | Survey Questionnaire MS | 4 |
| | | | Pavement Preservation Plans MS | 4 |
| | | | Letter from Transport Canada | 1 |

**Survey Results**

The response rate was at least 83 percent for provincial surveys and 60 percent for municipal surveys (Table 2). These response rates are unusually high considering the demanding nature of the surveys and response rates achieved by others. For example, a recent survey of 545 Canadian municipalities (with population of 5,000 people or more) achieved the response rate of 12 percent [1]. The response rate of Ontario municipalities, achieved by the Ontario Roads Coalition, was about 20 percent [2].

**Table 2. Response Rate for Surveys**

| Survey Packet | Number Distributed | Number of Responses Obtained | Response Rate, % |
|---|---|---|---|
| Provincial Expenditure Survey | 12 | 10 | 83% |
| Provincial Highway Inventory Survey | 12 | 11 | 92% |
| Provincial Cost Survey | 12 | 11 | 92% |
| Municipal Survey | 25 | 15 | 60% |

The list of agencies and their representatives that have received the survey is presented in Appendix B.

Survey results are presented in different chapters of the report as summarized in Table 3. All survey responses were inventoried and were submitted to Transport Canada.

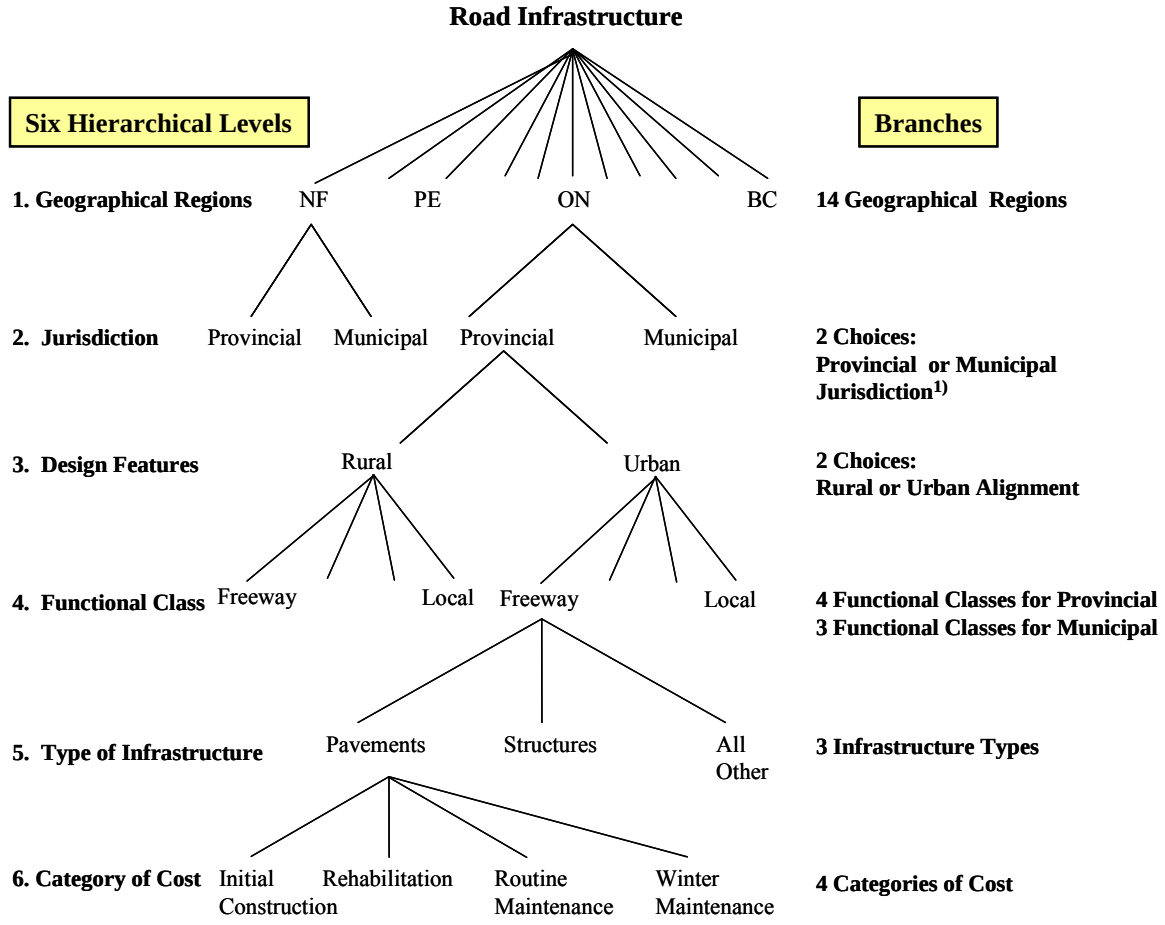
**Table 3. Presentation of Survey Results**

| Type of Survey Data | Chapter No. |
|---|---|
| Road inventory, age of pavements and bridges | 4 |
| Traffic volumes | 5 |
| Unit costs of road infrastructure materials | 8 |
| Pavement preservation strategies and costs | 7 |
| Routine maintenance costs | 8 |
| Winter maintenance costs | 8 |

# 3. CLASSIFICATION OF ROAD INFRASTRUCTURE

This chapter describes the classification procedure used to obtain specific road segments for which the annualized unit road costs were estimated. The specific roadway segments were defined by their geographical location (province, combined territories, or a part of province), jurisdiction (provincial or municipal), road design features (rural or urban), and by functional road class (e.g., arterial or local).

Annualized costs estimated for the specific road segments were further classified by the type of infrastructure (pavements, bridges, and all other components), and by types of costs (initial construction, maintenance and rehabilitation, routine maintenance, and winter maintenance). The overall road classification schema, with six hierarchical levels, is shown in Figure 1.




1) Annualized costs were estimated for two jurisdictions (provincial and federal combined, and municipal). Road inventory data were provided for three jurisdictions (federal, provincial, and municipal

**Figure 1. Classification Schema**

**Classification Types**

The annualized road costs were estimated for specific cost types obtained by classifying the road infrastructure and costs by:

- Type of road;
- Type of infrastructure; and
- Type of cost.

The classification by the type of road used the following four levels:

- Geographical location;
- Jurisdiction;
- Rural or urban road design features; and
- Road functional type.

The classification by the type of infrastructure resulted in the following three categories:

- Pavements;
- Bridges; and
- All other components (earthwork, culverts, safety appurtenances, etc.).

The classification by the type of costs resulted in the following categories:

- Initial construction costs;
- Rehabilitation and maintenance costs;
- Routine maintenance costs; and
- Winter maintenance costs.

**Classification by the Type of Road**

Classification by Geographical Location

For the purpose of estimating annualized costs, the classification by the geographical location recognizes all Provinces (10) and one combined "territory". Northwest Territories, Nunavut, and Yukon Territory were combined into one unit for cost-estimating purposes. In other words, only one set of annualized costs for the three territorial jurisdictions was estimated. However, road inventory, if available, was reported separately for each territory.

The grouping of all three territories for the purpose of estimating annualized costs has several advantages:

- The probability of obtaining key survey data for the combined territory is significantly improved;
- Road infrastructure costs are expected to be similar in all three territories;
- The combined cost estimates are more robust and reliable compared to estimates for individual territories;
- The size of the road network in the individual territories is quite small in comparison with the road network in the individual provinces; and
- The municipal road costs in each of the three territories are governed by one or two municipalities. For example, municipal road costs in Nunavut depend entirely on the City of Iqaluit.

To account for the variation in environmental conditions that exist within a single province, Québec, Ontario, and British Columbia were each subdivided as follows:

- Québec was subdivided into Québec Champlain Plain and Québec Nord (mountainous region typically north of Champlain Plain);
- Ontario was subdivided into Southern Ontario (area south of the French River) and Northern Ontario (area north of the French River); and
- British Columbia was subdivided into Coastal region (including Greater Vancouver, the Fraser Valley, and Vancouver Island) and Interior and Northern BC region (including regions around Kelowna, Kamloops, Prince George, and other regions).

Consequently, there are 14 categories based on geographical location (7 provinces, 6 "half" provinces, and one combined territory).

Initial surveys were carried out for the two Québec geographical regions, Champlain Plain and Québec Nord. However, after encountering difficulties in obtaining reliable information on the differences between the two regions in terms of unit construction costs and quantities, only one set of input data was subsequently used, and only one set of estimated annualized costs was produced for Québec. Nevertheless, the division of Québec into the two geographical regions was preserved throughout the study and is reflected in the computational model. If better data regarding the two Québec regions become available, separate annualized cost estimates can be produced relatively easily.

Classification by Jurisdiction

Classification of road infrastructure by jurisdiction considered the following categories:

- *Federal* – Roads under federal jurisdiction or under the jurisdiction of crown agencies;
- *Provincial* – Roads under provincial or territorial jurisdiction;
- *Municipal* – Roads under municipal jurisdiction;
- *Access roads* – Roads that are located on public (crown) land and are typically constructed and maintained by the private industry to provide access to resources (forest, mineral extraction, recreation areas, etc.); and
- *Private road infrastructure* – Roads built and maintained by private interests.

*Federal Jurisdiction*

There are several federal agencies, or crown agencies, that own road infrastructure including:

- Public Works and Government Services Canada;
- Department of National Defence;
- Parks Canada;
- Indian and Northern Affairs Canada; and
- Federal Bridge Corporation Ltd.

For the estimation of annualized total road costs, road infrastructure under federal jurisdiction was divided into two categories:

- Federal road infrastructure included in the project; and
- Federal road infrastructure not included in the project.

Federal Road Infrastructure Included in the Project

Federal road infrastructure included in the project encompasses roads and bridges under Federal jurisdiction that are maintained by the provinces in which they are located as well as the roads and bridges maintained by the Federal Bridge Corporation Ltd. For the purposes of estimating annualized costs, ARA has "merged" this road infrastructure with the corresponding roads under the individual provincial jurisdictions.

As an example, British Columbia has 9,010 km of provincial rural arterial highways. There are also 1,306 km of rural arterial highways in British Columbia under Federal jurisdiction. For the cost estimating purposes, the two categories of roads were merged and treated equally.

Typically, major roads under federal jurisdiction are maintained by the provinces in which they are located. For example, winter maintenance is completed, or contracted out, by the Province. Construction activities may be paid for by the federal government, but roads are designed according to provincial geometric design standards and built using provincial construction specifications and local materials. Consequently, from the cost point of view, the road cost of an arterial highway is the same whether or not it is under the federal or the provincial jurisdiction.

Federal Road Infrastructure not Included in the Project

Federal road infrastructure not included in the project encompasses local roads serving the First Nations communities, located on reserves, and funded by Indian and Northern Affairs Canada (INAC). Some of these roads are paved and some are gravel roads. The owners of this infrastructure may be the individual First Nations or INAC. These roads are considered to have the predominant characteristics of residential roads and streets.

*Provincial Jurisdiction*

Road infrastructure under provincial jurisdiction includes highways managed by provinces and territories. For the purposes of calculating annualized road costs, provincial road infrastructure also includes Federal Road Infrastructure Included in the Project.

*Municipal Jurisdiction*

Data on road infrastructure under municipal jurisdiction was requested from provincial and territorial sources. We have also obtained data from 15 individual municipalities. All provincial and territorial representatives indicated that they do not track or store complete municipal road infrastructure information in their provinces or territories that is required for the purposes of this study. To obtain data on the overall extent of municipal road infrastructure within a province (or a geographical region), a provincial source, or a source that collects road inventory data from all municipalities within a province, is required. Similarly, to obtain data on the typical municipal unit costs applicable to the whole province, a centralized source is needed.

*Access Roads*

Typically, access roads (or resource access roads) have been built by the industry (e.g., forest companies) on Crown land, and are maintained by the industry. The public has the right to use them, but the industry has no obligation to maintain them for public use. Some access roads that were originally constructed by the industry are now maintained using public money. This report contains an inventory of access roads, but does not contain annualized unit cost estimates for access roads.

*Private Road Infrastructure*

Private road infrastructure is built and maintained by private interests and is not included in the study. Notable private road infrastructure assets include Express Toll Road 407 near Toronto and Confederation Bridge between New Brunswick and Prince Edward Island.

Classification by Road Functional Type

The following classification was used for provincial, territorial, and federal road infrastructure:

*Freeway*: A divided highway with full control of access.
*Arterial*: A two-lane or a multi-lane road that carries significant volumes of long distance traffic at high speeds. There is a high degree of access control.
*Collector*: A two-lane or a multi-lane road that balances traffic flow needs with access. Access to the road is governed by traffic flow considerations and by safety concerns.
*Local***:** A two-lane or a multi-lane road that primarily provides access to local land users. Access to the highway is controlled by safety concerns.

The following classification was used for Municipal Road Infrastructure:

*Arterial***:** Resembles a highway going through a municipality.
*Collector:* Feeds traffic from arterial to the local roads or vice-versa.
*Local:* All other roadways that are not residential streets and are also not arterials and collectors.
*Residential:* Residential streets provide direct access to residences. All municipal roadways that are not arterial, collector or local are residential. Residential roads and streets are not included in the study.

Classification by Rural/Urban Road Design Features

*Rural:* Road with open roadside ditches and typically without curb-and-gutter. Road may have rural road design features even if it is located within municipal boundaries and is classified (by the type of jurisdiction) as a municipal road.

*Urban:* Road has predominantly an urban alignment, including curb and gutter and closed (storm sewer) drainage system. Road is considered to be urban only when more than 50 percent of its design features (alignment) is urban.

**Classification by the Type of Infrastructure Component**

Road infrastructure was grouped into three infrastructure types: pavements, bridges, and all other infrastructure component.

Pavements

Pavements include all material layers above the subgrade soil. Subgrade soil consists of native soil left after the removal of the existing overlaying material, as well as soils used as earth borrow to construct embankment fills or to replace existing unsuitable soils [3]. Pavement costs include pavement subdrains, but do not include the cost of curb-and gutter or the drainage system.

Bridges

For the purposes of this project, bridges also include road tunnels longer than 80 m, retaining walls with the exposed surface area greater than 400 $m^2$, and roadway snow sheds longer than 80 m.

According to the Canadian Bridge Code [4], bridges are structures with the span of at least 6 m and with the top part of the structure directly supporting vehicle loads (i.e., the structure has a bridge deck). A structure without a bridge deck, where the top of the structure is separated from the pavement by a layer of granular material, is a defined in the Canadian Bridge Code as a culvert.

For this study, culverts are defined as structures with a span greater than 0.5 metres, or a pipe with the diameter greater than 0.5 m, buried in soil or covered with a granular fill material. Culverts typically run underneath and across the roadway, connect two opposing ditch lines, and are day-lighted.

Although all Provinces recognize the Canadian Bridge Code regarding the bridge structural design, provincial transportation agencies use their own definitions of bridges when it comes to bridge management (such as maintenance and rehabilitation of bridges and record keeping). In other words, provincial and municipal transportation agencies make independent decisions about the type of structures they want to keep in their bridge management databases. Consequently, bridge data available from provincial databases do not use a uniform definition of bridges and a "bridge" database may also include data on short-span structures and large culverts. This situation complicated the retrieval of bridge data from the provincial and municipal databases.

The definition of a bridge, used by the each responding province, is given in Chapter 4. The definition is in terms of the minimum bridge span in metres. Data in Chapter 4 also include the number and size of the bridges.

All Other Infrastructure Component

All other infrastructure component includes all road infrastructure components that are not a pavement or a bridge, for example, earth work, drainage structures, landscaping and fencing, lighting, and safety and traffic control appurtenances.

**Classification by the Type of Costs**

The following four types of costs were established in view of the budgeting and asset management practices of transportation agencies:

Initial Construction Costs

Initial construction costs are costs incurred during the initial construction of road infrastructure. Initial construction costs do not include the cost of land. Initial construction costs were estimated separately for the three road infrastructure components.

Rehabilitation and Maintenance Cost

Rehabilitation and maintenance costs include all expenditures that provide a measurable and lasting improvement (improvement lasting more than a year) in the condition of a road infrastructure asset and increase the value of the asset. Typically, during the budgeting process, rehabilitation and maintenance costs are assigned to specific projects. Rehabilitation and maintenance costs were estimated separately for the three road infrastructure components.

Routine Maintenance Cost

Routine maintenance costs include expenditures that do not increase asset value (measurably and lastingly). Typically, the cost for routine maintenance of road infrastructure is not assigned to specific projects and is budgeted as a lump sum. Routine maintenance costs include minor repairs such as filling of potholes, minor guide rail repairs and bridge repairs, cutting grass, maintenance of the right-of-way, and the removal of debris. Routine maintenance costs were estimated as a combined cost for all three infrastructure components.

Winter Maintenance Costs

The cost of winter maintenance includes the cost of the field operations for snow removal and ice control and the costs of all other associated and supporting activities and facilities. Winter maintenance costs were estimated as a combined cost for all three infrastructure components.

Statistics Canada Definition of Capital and Maintenance Costs

The above definitions of types of costs differ from the definitions used by Statistics Canada [5]. Statistics Canada defines (a) capital expenditure and repair and (b) maintenance expenditures.

*Capital expenditure* -- Includes modifications, additions and major renovations, and conversions and alterations where either a structural change takes place or the life of an existing asset is extended beyond its normal expectancy. Considering the classification of costs used in this study, capital expenditure, as defined by Statistics Canada, may be an initial construction cost or a maintenance and rehabilitation cost.

*Repair and maintenance expenditure (or repair expenditure)* – According to Statistics Canada [5], repair and maintenance expenditure "…include expenditures which do not extend useful life of the structure, increase its capacity or otherwise raise its capacity and may include the routine care of assets such as snow removal and/or salting and sanding." Considering the classification of costs used in this study, repair and maintenance expenditure, as defined by Statistics Canada, may be a maintenance and rehabilitation cost, routine maintenance cost, or winter maintenance cost.

**Number of Cost Categories**

The theoretical number of possible combinations resulting from the six hierarchical levels of segregation and the number of branches at the six levels (Figure 1) is 1568 different annualized road "unit" costs. For example, an annualized unit cost was estimated for the cost *of initial construction* (type of cost, Level 6) *of pavements* (type of infrastructure, Level 5) *located on rural* (rural/ urban alignment, Level 4) *municipal* (jurisdiction, Level 2) *arterial roads* (functional class, Level 3 *in the interior of British Columbia* (geographical region, Level 1).

Not all combinations of the hierarchical and branch levels probably exist in the field. For example, there was probably no urban provincial freeway in Newfoundland and Labrador in 2003. However, ARA has provided cost estimates for all combinations of hierarchical levels and branches given in Figure 1. The complete set of estimates was provided because it was requested by Transport Canada. It can be argued that the estimation of unit road costs for road categories that do not exist is inappropriate. Nevertheless, it is not always clear if indeed a particular road category exists or is expected to exist in the near future.

As pointed out previously, for provincial roads, some categories may not exist at present, or exist in very limited quantities (e.g., freeways in Newfoundland and Labrador). However, such categories may exist in the future or already exist in very limited quantities. If the situation changes, the estimated annualized costs are already available. For municipal roads, the annualized costs for all combinations (arterial, collector and local, both rural and urban) need to be estimated. The estimates are necessary because the actual segment lengths of the municipal road categories, particularly the division between rural and urban alignments, are not currently known.

The inventory of road infrastructure is further discussed in Chapter 4. Procedures used to estimate unit costs are discussed in Chapters 6 to 9.

# 4. INVENTORY OF ROAD INFRASTRUCTURE

This chapter presents road infrastructure inventory data obtained through the Provincial Inventory Survey and the Municipal Survey. These surveys are described in Chapter 2. Road infrastructure inventory data were classified by geographical location, jurisdiction, rural or urban road design features, functional class, and by the type of infrastructure. Classification procedures are given in Chapter 3.

Road infrastructure data for each Province or Territory are summarized separately in Road Inventory Sheets. An example of a Road Inventory Sheet for Southern Ontario is provided in Table 4. All of the Road Inventory Sheets are given in Appendix C. There is one one-page Road Inventory Sheet per province or territory with the exception of Québec, Ontario, and British Columbia which each have a two-page Road Inventory Sheet. The two-pages are required because each of these provinces was subdivided into two geographic regions.

Each Road Inventory Sheets (Table 4) contains the following data:

- *Road inventory* – includes the length of roads in terms of 2-lane equivalent km[1];
- *Bridge inventory* – includes number of bridges, average bridge size (in terms of square metres of the bridge deck area), and the minimum bridge span (the minimum span the road structure must have to be classified as a bridge);
- *Average age of road infrastructure* – includes the age since the initial construction and the age since rehabilitation for both pavements and bridges; and
- *AADT volumes and AADT volumes of commercial vehicles* – includes Annual Average Daily Traffic (AADT) volumes and the AADT volumes of commercial vehicles (AADTT). Also included are AADT and AADTT ranges. Traffic data are discussed in Chapter 5.

Road infrastructure inventory data are for the most recent year for which data were available, typically for 2004. All of the road inventory sheets are also available in Excel format.

**Data Challenges**

This section contains background information on road infrastructure data summarized on the Road Inventory Sheets. The main data deficiencies are in the area of municipal infrastructure. In particular, ARA has been unable to obtain accurate data on the distribution of municipal roads by rural versus urban alignment for any provincial or territorial jurisdiction.

In general, road lengths reported herein do not include additional lanes at intersections and at interchanges. For freeways, the additional length of on-and-off ramps and acceleration and deceleration lanes is about 5 percent of the total (freeway) length.

<u>Newfoundland and Labrador</u>

ARA received a complete set of provincial road and bridge inventory data classified by the road functional class. Municipal road inventory data were not provided.

[1] A "two-lane equivalent" is a length of road measured as if there were only two lanes. For example, one kilometre of four-lane highway is the equivalent of two kilometres of two-lane equivalent highway.

## Table 4. Example Road Inventory Sheet for Ontario

**Ontario**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | | 2,261 | 2,043 | N/A | N/A |
| Arterial | | 6,120 | 145 | | |
| Collector | | 4,981 | 128 | | |
| Local | 75 | 3,860 | 48 | | |
| Total | 75 | 17,222 | 2,364 | | |

Rural-Urban split for freeways was based on 1995 data

**Bridge inventory for Ontario**

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | | | | | 3.0 |
| Arterial | 7 | | | | | |
| Collector | | | | | | |
| Local | 48 | | | | | |
| Total | 55 | 2646 | | 1000 | | |

**Average age of road infrastructure, years**

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 30.9 |
| | of resurfacing or rehabilitation | 17.6 |
| Bridges | since the time of initial construction | 36 |
| | of rehabilitation | 25 |

**AADT volumes for Southern Ontario, average and range**

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 64,425 | 5,450 - 102,600 | 70,847 | 17,400-410,000 |
| Arterial | 12,053 | 610 - 46,000 | 12,978 | 5,700 - 41,700 |
| Collector | 7,604 | 650 - 50,400 | 5,689 | 2,050-33,300 |
| Local | 9,917 | 150 - 22,300 | | |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 21.6% | 3.0 - 50.8% | 11.5% | 4.2 - 20.0% |
| Arterial | 10.5% | 3.3 - 33.3% | 9.6% | 3.2 - 21.8% |
| Collector | 10.3% | 2.8 - 26.8% | 10.4% | 2.0 - 19.6% |
| Local | 9.6% | 3.9 - 30.4% | | |

Prince Edward Island

Inventory data have not been received from Prince Edward Island. The Prince Edward Island Department of Transportation and Public Works is responsible for over 5,600 of (2-lane equivalent) km of roads [6].

Nova Scotia

A complete set of provincial road and bridge inventory data classified by the road functional class, and the total length of municipal roads have been received from Nova Scotia. Nova Scotia also provided the age of pavements and bridges since the time of the last construction or reconstruction. The original submission of the road length provided by Nova Scotia was changed based on subsequent discussions regarding the split of all arterial roads to freeway and arterial category.

New Brunswick

New Brunswick provided a combined provincial road inventory data for both rural and urban roads, and the total number of provincial bridges. Municipal road inventory data were provided for only roads "for grant" formula. New Brunswick includes freeways in the class of arterial highways.

As indicated on the Road Inventory Sheet for New Brunswick, the road-length data provided are in terms of centreline kilometres. Two-lane equivalent kilometres are about 10 to 20 percent higher for freeway and arterial roads, and about 2 to 10 percent higher for local and collector roads.

Québec

Québec provided provincial road lengths and bridge data classified by functional class, but combined for both southern and northern Québec (Champlain Plain and Québec Nord). Only total municipal road lengths, for southern and northern Québec combined, were provided.

The distinction between northern and southern regions of Québec is unreliable. The MTQ management system is not organized by such a breakdown and therefore some questions in the initial survey questionnaire were difficult to answer. Because of this difficulty, the road inventory data for Québec are provided for one combined region. The Road Inventory Sheet for Quebec still contains a provision for separate reporting of road inventory data in the two regions for the future.

Ontario

Ontario provided a complete set of provincial road length inventory data. Data regarding the municipal road inventory were not provided. The latest year for which Ontario municipal road inventory data were available was 1995. These data were considered to be out of date and are not included in this report

The split between rural and urban roads provided by Ontario Ministry of Transportation (MTO) was adjusted to recognize the definition of the rural and urban design features used in this study and provided in Chapter 3. The data submitted by Ontario were based on the following definition: "All Freeways are appraised as rural even if they are within an urban environment due to speed limit considerations (maximum speed for urban and semi-urban environments is restricted to less than 100 km/h.)."[2] The adjustment was completed using data obtained from Reference 7. The unadjusted, as-submitted Ontario road length data are given in Table 5. Using the MTO definition, there are only 145 km (2-lane equivalent km) of urban freeways in southern Ontario. The corresponding adjusted number is 2,043 km.

[2] Communication with Ontario Ministry of Transportation on June 6, 2005.

Bridge data provided by Ontario are for all road classes combined.

**Table 5. Original Submission of Road Inventory Data by Ontario**

| Provincial Highways, 2-lane equivalent km | | | | |
|---|---|---|---|---|
| **Functional Class** | **Southern Ontario** | | **Northern Ontario** | |
| | **Rural** | **Urban** | **Rural** | **Urban** |
| Freeway | 3,828 | 145 | 331 | 0 |
| Arterial | 2,226 | 87 | 3,894 | 58 |
| Collector | 1,692 | 115 | 3,289 | 13 |
| Local | 160 | 0 | 3,700 | 48 |
| **Total** | **7,906** | **347** | **11,214** | **119** |

Manitoba

Manitoba provided a complete set of provincial road and bridge inventory data. No municipal inventory data were provided. Manitoba's definition of an expressway (freeway) differs from that used in this study. Manitoba defines expressways as "generally multi-lane, divided highways (or highways that may/should be expanded to multi-lane facilities in the next 30 years) that carry large high speed traffic volumes under close free flow conditions. They connect, and sometimes bypass, cities and larger towns."

This definition explains the relatively large length of freeways in Manitoba. It appears that the Manitoba's definition for other road classes does not include forward-looking considerations of future developments.

Saskatchewan

Saskatchewan provided a complete set of provincial and municipal road inventory data. The relatively large length of freeways in Saskatchewan (1,499 2-lane km of rural freeways and 167 2-lane km of urban freeways) is probably caused by the definition of the freeway road functional type used by Saskatchewan.

Saskatchewan has the largest lengths of municipal rural collector roads and municipal rural local roads of all provinces. Municipal rural collector roads include Saskatchewan Class 6 roads[3]. Class 6 roads are all-weather roads that serve as the primary access road to individual rural residents and school bus routes. Municipal rural local roads include Saskatchewan Class 7 roads. Class 7 roads serve as access to farmland and other properties. It is possible that many of the Saskatchewan Class 6 and Class 7 roads would be classified by other jurisdictions as residential or access roads.

Alberta

Road length inventory data (provincial and municipal) were estimated using information supplied by Alberta and summarized in Table 6 and Table 7. Briefly, Alberta road-length inventory data were obtained through an iterative process of evaluating and reconciling data from different sources and submitting them to the representatives of Alberta Transportation for comments. Useful information on municipal roads was obtained from the municipal affairs web site (http://www.municipalaffairs.gov.ab.ca/ms/mfistable/emfis_table.cfm).

[3] According to Saskatchewan Rural Road Classification System developed in 2000 to classify provincial and rural municipal roads.

Both provincial and municipal bridge data are available by road functional class.

British Columbia

British Columbia provided limited provincial road length inventory data. Bridge data and municipal inventory data were not provided. It was assumed that the road-length data provided by British Columbia were in terms of 2-lane equivalent km.

Yukon Territory

Yukon Territory provided a complete set of territorial and municipal road infrastructure inventory data. Information provided is in a broad agreement with information in Reference 6 which states that Yukon Territory has 3,624 kilometres of "trunk" highways and 1,863 kilometres of recreational and multipurpose industrial roads.

Northwest Territories

Northwest Territories provided a complete set of territorial and municipal road infrastructure inventory data.

Nunavut

No road infrastructure data were received from Nunavut.

**Table 6. Background Data for Mapping Alberta Provincial Roads to the Common Road Functional Classes**

| Original Submission[a)] | | Data Provided by Alberta, March 2005 | | | Stantec 2001 data[b)] | | Hwy Classifications Nov 2003 | | | Transport Canada Study [c)] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Length, Centerline km | Class | Length, Centerline km | | Functional Class | Length, Centerline km | Class | 2-lane Km | Centerline | Functional Class | 2-lane Km | |
| | | | Rural | Urban | | | | | | | Rural | Urban |
| Freeway | 242 | Freeway | | 100 | Freeway | 540 | 1A | 5,880.24 | 3,690.44 | Freeway | 208 | 292 |
| Expressway | 1,526.14 | Arterial | 12,690 | | Expressway | 1870 | 1B | 9,703.68 | 9,434.25 | Arterial | 15,418.48 | |
| Multilane | 2,437.92 | | | | Multi-lane art. | 1510 | | | | | | |
| Major arterial | 8,925.84 | | | | Major arterial | 7920 | | | | | | |
| Minor Arterial | 11,064.32 | Collector | 11,800 | | Minor arterial | 9650 | 2 | 11,542.03 | 11,339.58 | Collector | 11,542.03 | |
| Low volume | 5,842.67 | Local | 4,980 | | Low volume | 3260 | 3 | 5,038.49 | 5,505.63 | Local | 5,038.49 | |
| Total | 30,751.61 | Total | 29,570 | | Total | 24,750 | | 32,164.44 | 29,469.89 | Sub-total | 32,207[d)] | 292[d)] |
| | | | | | | | | | | **Total** | **32,499** | |

Notes:
[a)] Data received from Transport Canada in March 2005.
[b)] Stantec's February 13, 2001 Provincial Highway Classification Update
[c)] Data were obtained from File *Hwy Classifications Nov2003* provided by Mr. M. Clulow on June 10, 2005
[d)] Totals provided by Steve Otto / Michael Clulow on June 10, 2005

**Table 7. Background Data for Mapping Alberta Municipal Roads to the Common Road Functional Classes**

| Summary for Cities[a] | | | Local Roads not Including Cities[b] | | | Transport Canada Study[c] | | |
|---|---|---|---|---|---|---|---|---|
| **Functional Class** | **Length[d], km** | **Percentage (of total)** | **Class** | **Length[e], km** | **Percentage (of total)** | **Functional Class** | **2-lane equivalent km** | **Percentage Urban, %** |
| Arterial | 4,133 | 33.1 % | | | | Arterial | 4,133 | 95 |
| Collector | 2,192 | 17.5% | | | | Collector | 2,192 | 85 |
| Local | 6,173 | 49.4 % | Paved | 2,249 | 1.7 | Local | 16,615 | 90 |
| | | | Based | 1,805 | 1.4 | | | |
| | | | Oiled | 6,388 | 4.9 | | | |
| | | | Gravel | 107,301[f] | 82.0 | | | |
| | | | Graded | 13,180[f] | 10.0 | | | |
| **Total** | 12,498 | 100 % | | 130,923 | | | 22,940 | |

Notes
[a] Data received from. Alberta Transportation on May 27, 2005 and subsequently updated by removing 1,069 km of "rear lot lanes" from local roads
[b] Data received from Alberta Transportation on May 27, 2005. Does not include municipal infrastructure.
[c] Suggested data for the current study
[d] Length in 2-lane equivalent kilometres. Original data were in lane kilometres.
[e] Assumed to be in centreline km.
[f] Not included in the total of local municipal roads. It is assumed that these roads are residential roads or streets.

## Roads Excluded from the Study

In accordance with the terms of reference, ARA has not calculated annualized road costs for the following types of roads.

- Federal road infrastructure not included in the project;
- Access roads;
- Residential roads and streets; and
- Private roads.

Federal Road Infrastructure not Included in the Project

Federal road infrastructure not included in the project includes road infrastructure administered by INAC (Table 8) and by the Department of National Defence.

**Table 8. Road Infrastructure Administered by Indian and Northern Affairs Canada**

| Roads or Bridges | Province or Territory | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | NF | PE | NS | NB | QC | ON | MB | SK | AB | BC | YT |
| Centreline km | 25.2 | 8.64 | 75.02 | 90.76 | 480.6 | 2651.94 | 1648.67 | 3264.55 | 3133.35 | 1068.7 | 65.7 |
| No. of bridges | 2 | 1 | 2 | 1 | 6 | 77 | 31 | 16 | 35 | 48 | 0 |

Access Roads

Table 9 provides a summary of currently available data on access roads.

**Table 9. Access Road Information**

| Province or Territory | Description of Access Roads | Length, km |
|---|---|---|
| NL | 17,140 Industry access roads and 3,100 Crown access roads | 20,240 |
| PE | No access roads were reported | |
| NS | Roads on Crown land (516 km) and service roads (140) | 656 |
| NB | Resource Access Roads (127 km). Non-maintained public roads that provide access to woodlots, camps, and cottages (approximately 3,400 km)[a)]. | 3,527 |
| QC | Access to forestry and mineral resources | 60,668 |
| | Hydro Québec | 3,325 |
| | Access to resources | 1,443 |
| | Federal | 536 |
| ON | Assess roads in Ontario are called Forest Assess Roads (FAR). An area-type permit to build FAR is given to the industry by the Ministry of Natural Resources. No systematic inventory of FAR is presently available. | 100,000 |
| MB | Access roads[c)] | 486 |
| SK | None reported | |
| AB | None reported | |
| BC | Unnumbered highways under Provincial jurisdiction[b)] | 30,450 |
| YT | Unspecified | 675 |
| NT | Information on access roads is not available | |
| NU | Information on access roads is not available | |

Notes
Lengths of access roads are given as centreline kilometres.
[a)] Includes Property Access Roads which are built when new construction cuts off access to land.
[b)] In some cases, due to developments over time, access roads originally built by forest companies are maintained by the Province.
[c)] Provide links between population centres, resource developments, recreational areas and other highway classifications designated as provincial roads.

Residential Roads and Private Roads

The terms of reference for this project do not include the collection of any data for residential roads and streets, and for private road infrastructure.

**Pavement Surface Type by Road Functional Class**

In addition to the length of roadway, it was important to estimate the type of pavement surface that was used on the various road functional classes in the 14 geographic regions. A single, typical pavement surface type was assigned to each functional class for the purposes of generating a pavement cross section, initial pavement design, and pavement preservation plan. The pavement surface types used were hot-mix asphalt (HMA), asphalt surface treatment (AST), and gravel surface (Gravel). The pavement type distribution can be seen in Table 10.

**Table 10. Estimated Pavement Surface Types by Functional Class**

| Description and Type of Work Item | Region | Provincial | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local |
| Pavement Surface Type | NL | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |
| | PE | HMA | HMA | HMA | AST | HMA | HMA | HMA | HMA |
| | NS | HMA | HMA | HMA | AST | HMA | HMA | HMA | HMA |
| | NB | HMA | HMA | HMA | AST | HMA | HMA | HMA | HMA |
| | QC-1 | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |
| | QC-2 | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |
| | ON-1 | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |
| | ON-2 | HMA | HMA | HMA | AST | HMA | HMA | HMA | HMA |
| | MB | HMA | HMA | HMA | AST | HMA | HMA | HMA | HMA |
| | SK | HMA | HMA | AST | AST | HMA | HMA | HMA | HMA |
| | AB | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |
| | BC-1 | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |
| | BC-2 | HMA | HMA | HMA | AST | HMA | HMA | HMA | HMA |
| | TR | HMA | HMA | HMA | HMA | HMA | HMA | HMA | HMA |

| Description and Type of Work Item | Region | Municipal | | | | | |
|---|---|---|---|---|---|---|---|
| | | Rural | | | Urban | | |
| | | Arterial | Collector | Local | Arterial | Collector | Local |
| Pavement Surface Type | NL | HMA | HMA | Gravel | HMA | HMA | HMA |
| | PE | HMA | HMA | Gravel | HMA | HMA | HMA |
| | NS | HMA | HMA | Gravel | HMA | HMA | HMA |
| | NB | HMA | HMA | Gravel | HMA | HMA | HMA |
| | QC-1 | HMA | HMA | Gravel | HMA | HMA | HMA |
| | QC-2 | HMA | HMA | Gravel | HMA | HMA | HMA |
| | ON-1 | HMA | HMA | Gravel | HMA | HMA | HMA |
| | ON-2 | HMA | HMA | Gravel | HMA | HMA | HMA |
| | MB | HMA | HMA | Gravel | HMA | HMA | HMA |
| | SK | HMA | Gravel | Gravel | HMA | HMA | AST |
| | AB | HMA | HMA | Gravel | HMA | HMA | HMA |
| | BC-1 | HMA | HMA | Gravel | HMA | HMA | HMA |
| | BC-2 | HMA | HMA | Gravel | HMA | HMA | HMA |
| | TR | HMA | AST | Gravel | HMA | HMA | HMA |

*HMA - Hot Mix Asphalt Concrete Surface*
*AST - Asphalt Surface Treatment*
*Gravel - Gravel Surface*

**Comparison of NRCan Road Lengths with the Study Road Lengths**

Road inventory data, developed by the Natural Resources of Canada (NRCan) study[4], and obtained from Transport Canada on July 18, 2005, were compared with road inventory data reported by provincial transportation agencies. For comparison purposes, NRCan data, reported in lane kilometres, were converted to two-lane equivalent kilometres (by dividing the lane km by two). NRCan study included all public roads. Numbered highways were classified as freeway or expressway/highway, whereas unnumbered highways were primarily classified as collector or local roads.

The comparison of the NRCan road lengths with the road lengths established in this study was done for the following three cases:

- Comparison of total freeway road lengths;
- Comparison of total provincial/territorial road lengths; and
- Comparison of total municipal road lengths.

Comparison of Total Freeway Road Lengths

The freeway functional class was selected for comparison because both NRCan and provincial highway agencies probably use a similar definition of the freeway road functional class. The definition of other road classes was more divergent. The results are presented in Table 11. Data for rural and urban freeways are reported together because NRCan defines rural or urban design features by a geographical location (outside or inside municipal boundaries), whereas the agencies use actual roadway design features.

The results indicate that there are significant differences between the freeway road lengths reported by the NRCan and by the individual provincial and territorial transportation agencies. However, the glaring differences are probably attributable to the differences in the definition of freeways. For example, Manitoba definition of freeways included freeways that are still in planning stages. For the two provinces with most of the freeways, Ontario and Québec, the differences between NRCan and this study are about plus-minus 20 percent.

Comparison of Total Provincial/Territorial Road Length

The comparison of the total provincial/territorial road length was selected because it does not depend on the definition of road functional classes or on the rural – urban split. The results presented in Table 12 indicate a much better agreement between NRCan road lengths and the lengths reported by the agencies than the agreement obtained for freeways. The largest differences occurred for Nova Scotia and New Brunswick. The NRCan study appears to have under-reported the total provincial road lengths for these two provinces by 48 and 66 percent respectively.

[4] NRCan system utilized GIS and provincial input.

**Table 11. Comparison of Road Lengths for Federal and Provincial Freeways**

| Jurisdiction | Road length for freeways 2-lane equivalent km | | |
|---|---|---|---|
| | NRCan [a] km | This study [b] km | Difference % |
| Newfoundland and Labrador | 374 | 0 | +100% |
| Prince Edward Island | 0 | | |
| Nova Scotia | 1,108 | 1,834 | -40% |
| New Brunswick | 1,397 | 0 | |
| Québec | 3,953 | 5,001 | -21% |
| Ontario | 5,144 | 4,304 | 20% |
| Manitoba | 24 | 1,831 | -99% |
| Saskatchewan | 83 | 1,666 | -95% |
| Alberta | 1,032 | 602 | -72% |
| British Columbia | 1,549 | 1,113 | 39% |
| Nunavut | 0 | | |
| Northwest Territories | 0 | | |
| Yukon Territory | 0 | | |

Notes:
[a] Data obtained from Transport Canada on July 18, 2005.
[b] As reported by provincial transportation agencies. The length does not include municipal freeways (if any).

**Table 12. Comparison of Road Lengths for the Total of Federal, Provincial and Territorial Roads**

| Jurisdiction | Road length 2-lane equivalent km | | |
|---|---|---|---|
| | NRCan [a] km | This study [b] km | Difference % |
| Newfoundland and Labrador | 7,063 | 9,722 | -27% |
| Prince Edward Island | 6,001 | ? | |
| Nova Scotia | 7,524 | 22,910 | -66% |
| New Brunswick | 9,128 | 18,028 | -48% |
| Québec | 24,286 | 28,348 | -11% |
| Ontario | 16,203 | 19,661 | -18% |
| Manitoba | 19,188 | 18,693 | 3% |
| Saskatchewan | 32,450 | 26,263 | 25% |
| Alberta | 32,335 | 32,499 | -1% |
| British Columbia | 14,417 | 12,516 | 17% |
| Nunavut | 0 | ? | |
| Northwest Territories | 2,039 | 2,143 | -5% |
| Yukon Territory | 3,577 | 4,760 | 25% |

Notes:
[a] Data obtained from Transport Canada on July 18, 2005.
[b] Obtained in this study as reported by provincial transportation agencies.

Comparison of Total Municipal Road Lengths

Total municipal road lengths reported by NRCan and this study are compared in Table 13. Also shown are corresponding road lengths reported by the Transportation Association of Canada (TAC) in 1995 [8]. This was the last year that Canada-wide road infrastructure data were reported by TAC.

Data presented in Table 13 show large differences between data obtained by different sources. The discrepancies are probably caused by differences in the definition of municipal roads. Municipal roads reported by provinces or territories are probably roads that are recognized and possibly financially supported by provinces or territories. NRCan data may also include residential and access roads. Reference 8 does not provide the definition of municipal roads reported by TAC.

**Table 13. Comparison of Road Lengths for all Municipal Roads**

| Jurisdiction | Road length 2-lane equivalent km | | | |
|---|---|---|---|---|
| | 1995 TAC[a] km | NRCan[b] km | This study[c] km | Difference[d] Percent |
| Newfoundland and Labrador | 4,127 | 12,127 | | |
| Prince Edward Island | 502 | 0 | | |
| Nova Scotia | 2,330 | 19,355 | 2,330 | -93% |
| New Brunswick | 3,185 | 22,182 | | |
| Québec | 90,000 | 119,349 | 61,358 | -58% |
| Ontario | 137,087 | 173,586 | | |
| Manitoba | 64,500 | 65,406 | | |
| Saskatchewan | 172,522 | 173,244 | 181,996 | 5% |
| Alberta | 159,172 | 192,989 | 22,940 | -90% |
| British Columbia | 21,399 | 49,444 | | |
| Nunavut | N/A | 0 | | |
| Northwest Territories | 4,307 | 817 | 40 | -99% |
| Yukon Territory | 4,697 | 2,176 | 28 | -99+ |

Notes:
[a] Based on Reference 8.
[b] Data obtained from Transport Canada on July 18, 2005.
[c] Obtained in this study as reported by provincial transportation agencies.
[d] Between NRCan study and this study.

**Total Composite Inventory**

The total composite inventory of Canadian roads was established by combining information obtained in this study (through the surveys of Canadian transportation agencies), data provided by NRCan, and additional information provided by Transport Canada[5] that included a spreadsheet called crosscheck sheet. The total composite inventory, presented in Table 14, was used in Chapter 11 to compare estimated road infrastructure costs using data generated by this study with expenditures reported by transportation agencies.

[5] Calibration Methodology Regarding Unit Costs, a report received from Transport Canada on November 7, 2005.

## Table 14. Total Composite Inventory of Canadian Roads

| Region | Federal and Provincial | | | | | | | | | Municipal | | | | | | | Total Federal Provncial Municipal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Total | Rural | | | Urban | | | Total | |
| | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | | Arterial | Collector | Local | Arterial | Collector | Local | | |
| NL | 0 | 2,543 | 3,795 | 2,695 | 0 | 0 | 0 | 689 | 9,722 | 807 | 807 | 6,460 | 150 | 150 | 1,203 | 9,579 | 19,300 |
| PE | 0.0 | 1,237.5 | 2,478 | 1,793 | 9 | 103 | 225 | 163 | 6,010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,010 |
| NS | 1,700 | 1,974 | 2,522 | 14,928 | 144 | 167 | 213 | 1,262 | 22,910 | 359 | 359 | 2,868 | 60 | 60 | 484 | 4,190 | 27,100 |
| NB | 250 | 1,690 | 2,764 | 11,967 | 8 | 150 | 225 | 974 | 18,028 | 1,177 | 1,177 | 9,419 | 170 | 170 | 1,359 | 13,472 | 31,501 |
| QC-1 | 3,066 | 7,917 | 11,633 | 75 | 478 | 280 | 146 | 38 | 23,632 | 8,263 | 8,263 | 66,104 | 793 | 793 | 6,347 | 90,563 | 114,195 |
| QC-2 | 341 | 880 | 1,293 | 8 | 1,116 | 652 | 340 | 88 | 4,716 | 855 | 855 | 6,840 | 1,724 | 1,724 | 13,791 | 25,789 | 30,505 |
| ON-1 | 1,930 | 2,226 | 1,692 | 235 | 2,043 | 87 | 115 | 0 | 8,328 | 11,993 | 11,993 | 95,942 | 1,311 | 1,311 | 10,489 | 133,039 | 141,367 |
| ON-2 | 331 | 3,894 | 3,289 | 3,700 | 0 | 58 | 13 | 48 | 11,333 | 1,162 | 1,162 | 9,296 | 2,668 | 2,668 | 21,344 | 38,300 | 49,633 |
| MB | 1,706 | 3,651 | 4,238 | 8,814 | 125 | 33 | 73 | 53 | 18,693 | 6,377 | 6,377 | 51,016 | 414 | 414 | 3,310 | 67,908 | 86,600 |
| SK | 1,499 | 3,165 | 5,263 | 16,063 | 167 | 167 | 0 | 0 | 26,324 | 12,200 | 82,670 | 67,868 | 2,777 | 2,556 | 4,296 | 172,367 | 198,691 |
| AB | 310 | 15,567 | 11,870 | 5,262 | 292 | 0 | 0 | 0 | 33,301 | 17,764 | 17,764 | 142,111 | 1,536 | 1,536 | 12,288 | 193,000 | 226,300 |
| BC-1 | 928 | 491 | 9,010 | 0 | 62 | 64 | 153 | 0 | 10,707 | 3,718 | 3,718 | 29,743 | 589 | 589 | 4,711 | 43,067 | 53,775 |
| BC-2 | 103 | 55 | 1,001 | 0 | 144 | 149 | 357 | 0 | 1,809 | 359 | 359 | 2,869 | 1,193 | 1,193 | 9,544 | 15,516 | 17,325 |
| TR | 0 | 4,874 | 344 | 1,685 | 0 | 0 | 0 | 0 | 6,903 | 0 | 0 | 0 | 20 | 24 | 24 | 68 | 6,971 |
| **Total** | 12,164 | 50,164 | 61,191 | 67,225 | 4,587 | 1,910 | 1,860 | 3,314 | 202,415 | 65,034 | 135,504 | 490,537 | 13,406 | 13,189 | 89,190 | 806,858 | 1,009,273 |

The total composite inventory utilized and combined the best available information from the three sources: the provincial and municipal surveys, the NRCan study, and the crosscheck sheet. In general, federal, provincial and territorial road lengths were obtained from the surveys of transportation agencies because senior transportation agencies have the most reliable highway inventory data. Municipal road lengths were obtained from the NRCan study because this study was the only source of municipal data in many provinces. Also, in general, the total length of the road network (federal, provincial/territorial, and municipal) in a particular region was established using NRCan data. Consequently, the municipal road length in a given geographical region was calculated as the difference between (a) the total length of the road network obtained by NRCan study and (b) the total length of the federal and provincial/territorial road network obtained by surveys of transportation agencies.

Crosscheck sheet data were used to divide provincial roads between rural and urban (for provinces which did not provided pertinent data), and to divide Québec and British Columbia into two geographical regions (QC-1 and QC-2, BC-1 and BC-2).

Notable exceptions from the general rules are summarized in the following:

PE: All road lengths were based on data from NRCan study.
SK: All road lengths were obtained by surveys (data supplied by the Saskatchewan Highways and Transportation).
AB: Municipal rural road lengths were established by considering both survey data and NRCan study data.
TR: All road lengths were obtained by surveys.

# 5. TRAFFIC CHARACTERISTICS

This chapter contains the results of traffic volume estimates carried out for the same road segments for which the representative annualized road costs were estimated. Traffic volume estimates were obtained through the responses to the Provincial Highway Inventory survey and the subsequent communication with the provincial and territorial representatives. The results are presented in the Road Inventory Sheets introduced in Chapter 4 as Table 4**,** and presented in Appendix C. There is one one-page Road Inventory Sheet for each province or territory. Québec, Ontario, and British Columbia have a two-page Road Inventory Sheets because each of these provinces was subdivided into two geographical regions.

**Results**

An example of traffic data reporting format used for the Road Inventory Sheets is shown in Table 15. Table 15 was extracted from the Road Inventory Sheet for Ontario.

**Table 15. Example of Traffic Data Reporting Format**

**AADT volumes for Southern Ontario, average and range**

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 64,425 | 5,450 - 102,600 | 70,847 | 17,400-410,000 |
| Arterial | 12,053 | 610 - 46,000 | 12,978 | 5,700 - 41,700 |
| Collector | 7,604 | 650 - 50,400 | 5,689 | 2,050-33,300 |
| Local | 9,917 | 150 - 22,300 | | |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 21.6% | 3.0 - 50.8% | 11.5% | 4.2 - 20.0% |
| Arterial | 10.5% | 3.3 - 33.3% | 9.6% | 3.2 - 21.8% |
| Collector | 10.3% | 2.8 - 26.8% | 10.4% | 2.0 - 19.6% |
| Local | 9.6% | 3.9 - 30.4% | | |

The following traffic characteristics are reported on the Road Inventory Sheets given in Appendix C:

- Average AADT (Annual Average Daily Traffic) volume;
- Range of AADT volumes;
- Average AADT of commercial vehicles (trucks and buses); and
- Range of AADT of commercial vehicles.

The traffic characteristics are typically for year 2003 or for the most recent year for which data were available.

**The Use and Definition of Traffic Data**

Traffic characteristics, such as traffic speed and volume, are important considerations for classifying road network by functional class. For example, arterial roads are typically associated with high traffic volumes of cars and commercial vehicles and with high traffic speeds. Traffic volumes are also required for estimating road costs per vehicle kilometre of travel.

Road costs per vehicle km of travel depend mainly on traffic volumes rather than on road costs. For example, the cost of a freeway lane is typically about 3 or 4 times higher than the corresponding costs of a traffic lane on a collector road. On the other hand, the traffic volume on a freeway lane can be about 100 times higher than traffic volume on a collector lane. The difference in traffic volumes is even larger for truck traffic. Truck traffic (in terms the Equivalent Single Axle Loads, a measure of pavement damage caused by trucks) can be 1000 times higher on a freeway lane than on a collector lane. Consequently, road costs per vehicle km of travel are effectively governed by the assumptions made regarding traffic volumes.

In order to estimate road costs per vehicle km of travel for different road functional classes and categories, it is necessary to know traffic volumes associated with these classes and categories.

Annual Average Daily Traffic (AADT) Volume

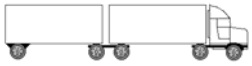
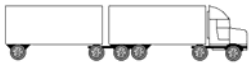
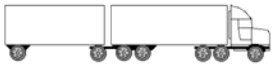
Canadian provincial highway agencies typically estimate AADT using the AASHTO method [9]. According to the AASHTO method, for each month of the year, seven monthly average days of the week are computed. (All Mondays for a month are averaged, all Tuesdays for a month are averaged, etc.) Then the twelve Mondays are averaged, the twelve Tuesdays are averaged, etc. This results in seven yearly average days of the week, which are averaged to obtain an annual average daily volume estimate. AADT volumes are reported as a combined volume for all vehicles (motorcycles, passenger cars, buses, and trucks) and for all traffic lanes in the highway corridor (all lanes in both directions).

AADT of Heavy Vehicles

Canadian provincial highway agencies do not use a standard method to classify highway vehicles. However, the agencies, through their participation in SHRP (Strategic Highway Research Program) and C-SHRP (Canadian SHRP) Long term Pavement Performance Studies, are familiar with and tend to use the United States Federal Highway Administration classification of highway vehicles [10]. This classification is presented in Table 16.

All vehicles listed in Table 16 (Vehicle classes 4 to 13) are considered to be commercial vehicles and are included in the AADT of commercial vehicles given on the Road Inventory Sheets.

**Table 16. FHWA Commercial Vehicle Classification (Based on Reference 10)**

| Vehicle Class | Typical Configuration | Description |
|---|---|---|
| 4 |  | Buses |
| 5 |  | Two-Axle, Six-Tire, Single Unit Trucks |
| 6 |  | Three-Axle Single Unit Trucks |
| 7 |  | Four or More Axle Single Unit Trucks |
| 8 |  | Four or Less Axle Single Trailer Trucks |
| 9 |  | Five-Axle Single Trailer Trucks |
| 10 |  | Six or More Axle Single Trailer Trucks |
| 11 |  | Five or Less Axle Multi-Trailer Trucks |
| 12 |  | Six-Axle Multi-Trailer Trucks |
| 13 |  | Seven or More Axle Multi-Trailer Trucks |

**Data Challenges**

This section contains background information on traffic data summarized in the Road Inventory Sheets given in Appendix C. The main data deficiencies are in the area of traffic volumes on municipal roads. It appears that provincial agencies do not have records of traffic usage on municipal roads. ARA has obtained traffic data from several municipalities. However, traffic data obtained from individual municipalities are insufficient for the estimation of traffic characteristics that would be applicable across the entire municipal road network within a province or a territory.

Newfoundland and Labrador

Only traffic data for provincial arterial roads were received.

Prince Edward Island

No traffic data were received from Prince Edward Island.

Nova Scotia

Traffic data were received for provincial roads (per road functional classes).

New Brunswick

No traffic data were received traffic data from New Brunswick.

Québec

Québec provided a complete set of traffic data for provincial roads. The data are reported for one combined region.

Ontario

Ontario provided a complete set of traffic data for provincial roads.

Manitoba

Manitoba provided a complete set of AADT data for provincial roads. Data for the AADT of commercial vehicles were incomplete.

Saskatchewan

Saskatchewan provided a complete set of traffic data for provincial roads.

Alberta

Alberta provided a complete set of traffic data for provincial roads.

British Columbia

No traffic data were received from British Columbia.

Yukon Territory

Yukon Territory provided a fairly complete set of traffic data for territorial roads.

Northwest Territories

Northwest Territories provided a complete set of AADT data for territorial roads. AADT of commercial vehicles was not provided.

Nunavut

No traffic data were received from Nunavut.

# 6. ANALYSIS METHODOLOGY

This chapter describes the methodology for estimating total annualized costs of roads by functional class. The emphasis is on financial or economic aspects of the methodology. The procedures used to estimate the physical features of the road infrastructure and quantities of materials are described in Chapter 7. The procedures used to estimate unit costs of road infrastructure components and materials are described in Chapter 8. Finally, the computational model that provides annualized unit cost estimates is presented in Chapter 9.

**Definitions**

The total annualized costs are defined as the entire cost of providing and maintaining the road infrastructure, and were obtained as the sum of four types of costs:

1. Annualized cost of initial construction for the following three road infrastructure components including:
    - Pavements;
    - Bridges; and
    - All other infrastructure component (items that are not pavements or bridges).
2. Annualized cost of rehabilitation and maintenance activities for the three road infrastructure components including:
    - Pavements;
    - Bridges; and
    - All other infrastructure component.
3. Annualized cost of routine maintenance for all road infrastructure components combined; and
4. Annualized cost of winter maintenance for all road infrastructure components combined.

A schematic diagram showing the four types of costs is given Figure 2. Altogether the total annualized road cost consists of eight cost items:

- Annualised initial pavements construction costs.
- Annualised initial bridge construction costs.
- Annualised initial construction costs for all other component.
- Annualised pavement maintenance and rehabilitation costs.
- Annualised bridge maintenance and rehabilitation costs.
- Annualised maintenance and rehabilitation costs for all other component.
- Annualized routine maintenance costs for all infrastructure components.
- Annualized winter maintenance costs for all infrastructure components.

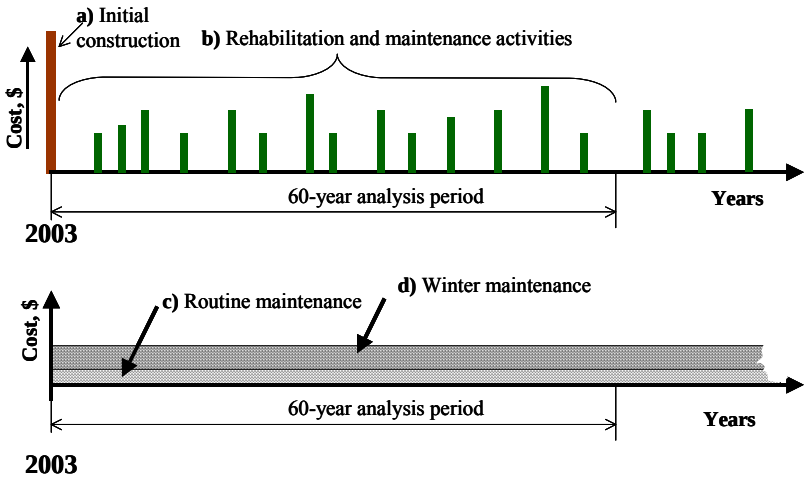



**Figure 2. Cost Streams for the Calculation of Annualized Costs**

## Summary and Principles

Calculation of Annualized Cost

1. Annualized (and annual) costs were estimated in terms of the cost for one traffic lane that is one kilometre long. However, all underpinning estimates and calculations were carried out for one 2-lane equivalent kilometre.
2. Annualized costs were expressed as the Equivalent Uniform Annual Costs (EUAC). In other words, the present worth (PW) of costs was converted into annualized costs over the analysis period. The equations used for the calculation of PW and EUAC are given in the subsequent section of this chapter.
3. The length of the analysis period was 60 years
4. The basic discount rate was 6 percent.
5. A sensitivity analysis was carried out to assess the impact of discount rate on total costs.

Initial Construction Costs

6. Initial construction costs were obtained as the sum of the initial construction costs for the three road infrastructure components (pavements, bridges, and all other infrastructure component).
7. Initial construction costs were calculated as a product of 2003 unit costs and 2003 unit quantities (quantities per one-km-long single traffic lane).
8. Initial construction costs were annualized as outlined in Items 2 to 4.
9. The estimation of the initial construction costs for bridges and all other infrastructure component took into account the average age of infrastructure. The reasons for taking into account the age of road infrastructure and the methodology used are summarized in the next section.

Rehabilitation and Maintenance Costs

10. Rehabilitation and maintenance costs represent the cost of road infrastructure preservation actions that:
    - Significantly improve the condition of the road infrastructure components for at least one year; and
    - Occur during the analysis period.
11. Rehabilitation and maintenance costs were estimated and reported separately for the three road infrastructure components – pavements, bridges, and all other infrastructure component.
12. Rehabilitation and maintenance costs were calculated as a product of 2003 unit costs and 2003 unit quantities.
13. Rehabilitation and maintenance costs were annualized as outlined in Items 2 to 4.

Routine Maintenance Costs

14. Routine maintenance costs represent the cost of maintaining road infrastructure using activities that do not significantly improve the condition of the infrastructure.
15. Routine maintenance costs were estimated for all three road infrastructure components combined.
16. Routine maintenance costs were expressed in terms of 2003 costs.
17. The 2003 annual routine maintenance costs were assumed to occur in each year of the analysis period.
18. Routine maintenance costs were annualized as outlined in Items 2 to 4.

Winter Maintenance Costs

19. Winter maintenance costs represent the cost of snow removal, ice control, and other activities required to maintain roads operational during winter.
20. Winter maintenance costs were estimated for all three road infrastructure components combined.
21. Winter maintenance costs were expressed in terms of 2003/04 costs.
22. The 2003/04 annual winter maintenance costs were assumed to occur in each year of the analysis period.
23. Winter maintenance costs were annualized as outlined in Items 2 to 4.

Estimation of Unit Quantities

24. The estimation of unit quantities was done for one traffic lane that is one km long. For practical purposes, the initial estimation of quantities was done for a 2-lane road facility and the resulting quantities will be divided by two.
25. The estimation of quantities assumed the current (2003) road infrastructure conditions and design parameters. The examples of road infrastructure design parameters include the width of a traffic lane, the width of the paved shoulder (if any), or the slope of earth work in the cuts and fills. The road design parameters differ by jurisdiction (Level 2 in Figure 1, Chapter 3) and by the functional class of the roadway (Level 3).
26. The estimation of quantities for earth work (grading, excavating, and landscaping) assumed the existence of the original terrain features that have not been modified by any previous road construction.
27. The estimation of quantities for clearing and grubbing assumed typical 2003 conditions.

Estimation of Unit Costs

28. Unit construction costs were 2003 costs. These costs are most readily available from the transportation agencies, and were obtained through provincial and municipal surveys (Chapter 2).
29. For the pavement component and for the all other roadway infrastructure component, the initial construction costs and the rehabilitation and maintenance costs were increased by 25 percent to include administrative cost (such as cost of engineering, construction supervision and quality assurance, and sundries and claims).
30. For bridges, the initial construction costs and the future rehabilitation and maintenance costs were increased by 35 percent to include administrative costs (the cost of engineering, construction supervision and quality assurance, and sundries and claims) as well as the cost of building temporary bridges.
31. Routine maintenance costs and winter maintenance costs were increased by 10 percent to reflect administrative costs and in-house costs.

Interpretation of Total Annualized Costs

The total annualized costs include the cost of initial construction of road infrastructure that occurred in the past. The inclusion of the past initial construction costs means that the total annualized costs will not be comparable to the costs an agency may need in the future to preserve road infrastructure. Agencies budget for the future, not for the past. The total annualized costs estimated in this report represent the total theoretical expenditure of providing and maintaining road infrastructure for the users.

**Calculation of Annualized Costs**

Annualized Cost of Initial Construction

To convert initial construction costs to the equivalent uniform annual cost (EUAC), Equation 1 was used.

$$EUAC = \text{Initial Construction Cost}\frac{i(1+i)^n}{(1+i)^n - 1} \qquad \text{Equation 1}$$

Where:

Initial construction cost for pavements, bridges, or all other road infrastructure component, $

i = Discount rate (%/100). The basic computational model incorporates the discount rate equal to 0.06.

n = Number of years of the analysis period. The basic model has n equal to 60 years.

The initial EUAC costs were calculated separately for pavements, bridges, or all other road infrastructure component.

Annualized Cost of Rehabilitation and Maintenance Activities

To convert costs of rehabilitation and maintenance activities to their equivalent present costs, the present worth calculation of costs as defined in Equation 2 was used. To obtain annualized costs (EUAC), Equation 3 was used.

$$PW = \sum_{1}^{k} \text{Cost of Rehabilitation and Maintenance Activities}\frac{1}{(1+i)^n} \qquad \text{Equation 2}$$

$$EUAC = PW \frac{i(1+i)^n}{(1+i)^n - 1}$$ Equation 3

Where:

PW = Present worth value of rehabilitation and maintenance activities, $
i = Discount rate (%/100). The basic model incorporates a discount rate of 0.06.
n = Number of years.
For PW, n is number of years between the base year and a future year.
For EUAC, n is the number of years for which EUAC is calculated.
For EUAC calculation, the computational model uses n equal to 60 years
k = Number of rehabilitation and maintenance activities during the analysis period.

EUAC of rehabilitation and maintenance activities were calculated separately for pavements, bridges, and all other road infrastructure component.

Annualized Cost of Routine Maintenance and Winter Maintenance

The annual costs of routine and winter maintenance activities were also annualized. The calculation of annualized costs was based on Equations 3 and 4. It was assumed that the 2003 routine (or 2003/04 winter) maintenance costs will occur in each year of the analysis period.

$$PW = \sum_{1}^{n} \text{Annual Cost in year n} \frac{1}{(1+i)^n}$$ Equation 4

Where:

Annual Cost = 2003 annual cost of routine maintenance (or 2003/04 annual cost of winter maintenance) in year n
i = Discount rate (%/100). The basic model incorporated 0.06discount rate.
n = The number of years between the base year and the year in which the annual cost occurred.

**Age of Road Infrastructure and its Impact on Road Costs**

The calculation of the EUAC for initial construction using by Equation 1 attributes all initial construction costs to the current 60-year period. However, some of the initial construction costs occurred more than 60 years ago and need not be included in the total annualised cost estimates[6]. This section describes how the initial construction costs were adjusted to exclude initial construction costs that occurred more 60 years ago. The adjustments are based on the average age of main road infrastructure components.

[6] The exclusion of some of the past initial construction costs was initiated by Transport Canada as part of its coordinating role of estimating infrastructure costs of all transportation modes using comparable methodology.

Age of Infrastructure

The average age of road infrastructure (for roads and bridges) was obtained as part of the Provincial Highway Inventory Surveys and the Municipal Surveys. The survey results obtained from the provincial surveys are given in Road Inventory Sheets in Appendix C. The results for both the provincial and municipal surveys are summarized in Table 20

**Table 17. Age of Infrastructure Obtained by Surveys**

| Region | Average Pavement Age, years | | | | Average Bridge Age, years | | | |
|---|---|---|---|---|---|---|---|---|
| | Provincial | | Municipal | | Provincial | | Municipal | |
| | Since Construction | Since Rehabiltation | Since Construction | Since Rehabiltation | Since Construction | Since Rehabilitation | Since Construction | Since Rehabiltation |
| **NL** | | | | | | | | |
| **PE** | | | 75 | 28 | | | | |
| **NS** | | 16 | 24 | 12 | 53 | | | |
| **NB** | | | 30 | 25 | | | | |
| **QC** | | 12.5 | 22 | | 38.2 | 20 | | |
| **ON** | 30.9 | 17.6 | 37 | 22 | 36 | 25 | 34 | 23 |
| **MB** | 45 | 25 | 75 | 35 | | | 32 | 32 |
| **SK** | 30 | 13 | 33 | 23 | 37 | | 42 | |
| **AB** | 34 | 9.9 | | | 34 | 25 | 34 | |
| **BC** | | | | | | | | |
| **TR** | 12 | 12 | 15 | 15 | 23 | 6.5 | 20 | 20 |
| **Average** | **30.4** | **15.1** | **38.9** | **22.9** | **36.9** | **19.1** | **32.4** | **25.0** |

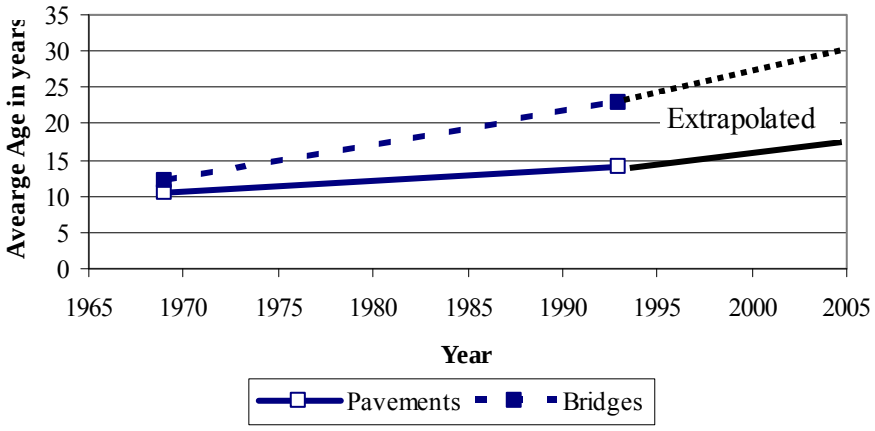
**Origin of municipal data**
PE City of Summerside
NS Regional Municipality of Halifax
NB City of Edmunston. The age is at least the stated age.
QC City of Ville de Longueuil
ON Average of cities of Brampton, Niagara Falls, Ottawa, and Toronto
MB City of Winnipeg
SK Average of cities of Regina and Saskatoon
AB City of Edmonton
TR City of Yellowknife, NT

The average pavement and bridge ages in Table 17 are given for two conditions: The average age since the time of construction and the average age since the time of rehabilitation. For pavements, the average age since the time of construction includes also reconstruction, and the average time since the time of rehabilitation includes also resurfacing. Survey data presented in Table 17 contain many gaps. Attempts to supplement survey data with published data were unsuccessful with the exception of data obtained from a 1996 publication by Transport Canada[7]. However this data, presented in Figure 3, are from 1993 and apparently does not distinguish between the age since the initial construction of the infrastructure and the age since its reconstruction or rehabilitation[8]. Nevertheless, the Transport Canada data are in general agreement with the survey data.

Based on the available data and using engineering judgement, the best estimate of the average age of the main components of Canadian road infrastructure is summarized in Table 21. The average age probably depends on the geographical region. In the absence of better information, the same set of average age data was used for all provinces. A different set of average age data was used for the combined territories.

[7] Richardson, Stephanie, Valuation of the Canadian Road and Highway System, Report TP 12794E, Transport Canada, June 1996.

[8] A recent report by Statistics Canada, *Age of Public Infrastructure Canada* by Valérie Gaudreault and Patric Lemeire, Statistics Canada -- No11-621-MIE2006035, contains a new set of age numbers. However, these are not "age numbers", but expected service lives numbers reported by survey respondents. There is no distinction in the report between the age of pavement since the last resurfacing and the age of the road itself.




Source: Transport Canada, Report TP 12794E, June 1996.

**Figure 3. Average Age of Road Infrastructure**

**Table 18. Average Age of Infrastructure Used in the Model**

| Geographical Region | Average Age Since Construction, years | | | | | |
|---|---|---|---|---|---|---|
| | Pavements | | Bridges | | All Other Component | |
| | Provincial | Municipal | Provincial | Municipal | Provincial | Municipal |
| All Provinces[1)] | 30 | 30 | 37 | 33 | 33 | 31 |
| Combined Territories | 23 | 23 | 23 | 23 | 23 | 23 |

[1)] Computational model accommodates different ages for all geographical regions.

The average provincial age since construction for the all other component, given in Table 18, was estimated to be the mid-point of the average age of pavements and bridges. The provincial average age since construction for bridges is higher than the corresponding municipal age. On the other hand, the raw data in Table 17 suggest that the average municipal age of pavements is higher than the corresponding provincial age. However, it is possible that average age of municipal pavements includes also residential streets, and that the results are unduly influenced by data from the City of Summerside and the City of Winnipeg (75 years in each city). For this reason, the average age of municipal pavements was assumed to be equal to that of the provincial pavements[9].

Accounting for the Age of Infrastructure

The age of infrastructure was used to adjust the initial construction costs that occurred over 60 years ago. For illustrative purposes, let us assume that the average age of roads is 30 years. Let us further assume that the 30-year average occurs because 50 percent of the roads are 60 years old and 50 percent of roads are new. If we included 100 percent of the initial construction costs in the total costs we would assume that 100 percent of roads are new. Yet, returning to the above example, 50 percent of initial construction costs occurred 60 years ago, and these initial costs that occurred 60 years ago are already fully

[9] The removal of the two highest and the two lowest average municipal ages from Table 17 (75, 75, 15, 22) results in the average municipal pavement age since initial construction of 31 years.

depreciated and should not be included again in the current 60-year analysis period. The existing analysis period should include only the 50 percent of the initial construction costs.

The methodology used to adjust the initial construction costs (that are part of the total estimated annualized road cost) was established using the following considerations:

- Recognition of comments received from Transport Canada.
- Systematic utilization of the available data on the age of road infrastructure.
- Transparent and justifiable procedure.
- Compatibility with other cost estimation assumptions.
- Provision for changing the average age of main road infrastructure components by geographical regions.

Computational Methodology

The following methodology was used for the estimation of initial construction costs taking into account the age of road infrastructure.

1. The age of infrastructure was used for the estimation of two types of initial construction costs, namely:
    - Initial construction cost of bridges, and
    - Initial construction costs of all other component of road infrastructure.

    Initial pavement construction costs were not adjusted by age because pavement age seldom exceeds 60 years (the length of the analysis period).

2. Initial construction cost of bridges were calculated using Equation 5:

$$Iinitial\ construction\ cost\ of\ bridges = Initial\ construction\ cost\ of\ new\ bridges \times \left(1 - \frac{Average\ bridge\ age}{60}\right)$$

Equation 5

Where:

Initial construction cost of bridges = Annualized initial construction cost of bridges.

Initial construction cost of new bridges = Annualized initial construction cost of new bridges calculated using Eq.1. Eq. 1, assumes that bridges were built at the beginning of the analysis period and that their cost was annualized over the 60-year analysis period.

Average bridge age = Estimated average bridge age of bridges for a given geographical region (Table 18).

3. Initial construction cost of the all other road component was calculated using the following formula:

$$Initial\ construction\ cost, other = Initial\ construction\ cost; new\ other \times \left(1 - \frac{Average\ age\ of\ roads}{60}\right)$$

Equation 6

Where:

Initial construction cost, other = Annualized initial construction cost for the all other component (such as grading).

Initial construction cost, new other = Annualized initial construction cost of new all other component calculated using Eq. 1. Eq. 1 assumes that that all other component was built at the beginning of the analysis

period and that its cost was annualized over the 60-year analysis period.

Average age of roads = Estimated average bridge age of all other component for a given geographical region (Table 18).

The all other component was defined previously as all roadway items that are not bridges or pavements. The list of these roadway items is provided Chapter 6. The most expensive items are earthwork, grading, and drainage structures. Some of the additional items that are included in the all other component have shorter expected life-spans than 60 years. The inclusion of these additional items, and their use for adjusting the initial annualized construction costs by age, is compatible with other estimating assumptions.

**Pavement Costs**

Pavement costs were calculated as a product of the unit costs presented in Chapter 8 (e.g., cost for one tonne of asphalt concrete) and the unit quantities presented in Chapter 7 (e.g., the number of tonnes of asphalt concrete per one 2-lane equivalent km). Pavement costs were expressed in terms of the cost for a single traffic lane that is one kilometre long.

Initial Construction

The initial pavement construction costs were based on current (2003) pavement designs that are appropriate for the functional class of the road, anticipated traffic loads, and environmental conditions. Pavement designs, developed by ARA, were reviewed by the provincial and municipal agencies to ensure that they reflect current (2003) local practice. Unit costs were obtained through the provincial and municipal surveys.

An example of geometric design features -- for a provincial rural arterial pavement in southern Ontario -- is shown in Table 19. The geometric design features given in Table 19 are needed to establish the quantities of pavement and other materials for cost calculations. An example calculation of EUAC for the initial pavement construction (for a provincial rural arterial pavement in southern Ontario) is given in Table 20.

**Table 19: Example of Geometric Design Features for a Provincial Rural Arterial Highway in Southern Ontario**

| Design feature | Dimension |
|---|---|
| Width of the two traffic lanes, m | 7.50 |
| Total width of both shoulders, m | 6.00 |
| Total width of both paved shoulders, m | 1.00 |
| Average AC thickness of the paved shoulders, mm | 90 |

Rehabilitation and Maintenance

Pavement rehabilitation and maintenance activities were formulated to reflect present economic conditions and present (actual) level of service (pavement serviceability or pavement condition), and were submitted to agency representatives for review. Calculation of EUAC of rehabilitation and maintenance activities for a provincial rural arterial highway in Southern Ontario is given in Table 21.

**Table 20: Example Calculation of EUAC for Initial Pavement Construction. The Example is for a Pavement on a Provincial Rural Arterial Highway in Southern Ontario**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Amount | Quantity per km | Price per unit of quantity | Cost |
|---|---|---|---|---|---|
| Surface | HL-1, "Superpave 12.5 mm FC1", mm (t) | 40 | 750 | $ 68.75 | $ 51,563 |
| Binder | MDBC, "Superpave 19 mm", mm (t) | 60 | 1125 | $ 53.70 | $ 60,413 |
| Extra layer | MDBC, "Superpave 19 mm", mm (t) | 60 | 1125 | $ 53.70 | $ 60,413 |
| OGDL | | | | $ - | $ - |
| Base | Granular A, mm (t) | 150 | 6991 | $ 13.01 | $ 90,951 |
| Subbase | Granular B, mm (t) | 450 | 15206 | $ 6.71 | $ 102,031 |
| Shoulder | HL-1, "Superpave 12.5 mm FC1", mm (t) | 40 | 100 | $ 68.75 | $ 6,875 |
| Shoulder | MDBC, "Superpave 19 mm", mm (t) | 50 | 125 | $ 53.70 | $ 6,713 |
| Subgrade | Subgrade improvement, % area ($m^2$) | | 500 | $ 5.00 | $ 2,500 |
| Subdrains | Includes trenching and outlets, % of occurrence (m) | 0 | | $ 18.00 | $ - |
| Tack Coating | Tack coating, number of applications (m2) | 1 | 7500 | $ 0.26 | $ 1,950 |
| **Total** | *Note: All costs and quantities are for one km long 2-lane equivalent road* | | | | **$ 383,406** |
| **EUAC** | | | | | **$ 23,724** |

**Table 21: Example of Calculation of EUAC for Pavement Maintenance and Rehabilitation Activities. Example is for a Pavement on a Provincial Rural Arterial Highway in Southern Ontario**

| Years after initial construction | Description of pavement layer, Amount (Quantity) | Amount | Quantity per km | Price per unit of quantity | Cost | Net present worth |
|---|---|---|---|---|---|---|
| 5 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 747 |
| 9 | Spot repairs - mill and patch, % Area (m2) | 10 | 750 | $ 7.70 | $ 5,775 | $ 3,418 |
| 15 | Mill AC, mm (t) | 40 | 750 | $ 11.00 | $ 8,250 | $ 3,442 |
| 15 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 21,515 |
| 15 | Resurface with SP 19mm (MDBC), mm (t) | 50 | 938 | $ 53.70 | $ 50,344 | $ 21,007 |
| 19 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 331 |
| 19 | Spot repairs - mill and patch, % Area (m2) | 20 | 1500 | $ 7.70 | $ 11,550 | $ 3,817 |
| 27 | Mill AC, mm (t) | 40 | 750 | $ 11.00 | $ 8,250 | $ 1,711 |
| 27 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 10,692 |
| 27 | Resurface with SP 19mm (MDBC), mm (t) | 50 | 938 | $ 53.70 | $ 50,344 | $ 10,440 |
| 31 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 164 |
| 35 | Spot repairs - mill and patch, % Area (m2) | 20 | 1500 | $ 7.70 | $ 11,550 | $ 1,503 |
| 38 | Mill AC, mm (t) | 40 | 750 | $ 11.00 | $ 8,250 | $ 901 |
| 38 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 5,633 |
| 38 | Resurface with SP 19mm (MDBC), mm (t) | 50 | 938 | $ 53.70 | $ 50,344 | $ 5,499 |
| 42 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 87 |
| 42 | Spot repairs - mill and patch, % Area (m2) | 20 | 1500 | $ 7.70 | $ 11,550 | $ 999 |
| 48 | Mill AC, mm (t) | 100 | 1875 | $ 11.00 | $ 20,625 | $ 1,258 |
| 48 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 3,145 |
| 48 | Resurface with SP 19mm (MDBC), mm (t) | 60 | 1125 | $ 53.70 | $ 60,413 | $ 3,685 |
| 53 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 46 |
| 57 | Spot repairs - mill and patch, % Area (m2) | 10 | 750 | $ 7.70 | $ 5,775 | $ 209 |
| **Total** | *Note: All costs and quantities are for one km long 2-lane equivalent road* | | | | **$ 514,269** | **$ 100,249** |
| **EUAC** | | | | | | **$ 6,203** |

**Bridge Costs**

Bridge costs were estimated in terms of a cost per one meter squared of the bridge deck area. Bridge costs were estimated as a product of 2003 unit costs presented in Chapter 8 (i.e., cost per one square metre of the bridge deck area) and 2003 unit quantities presented in Chapter 7 (i.e., number of square metres of a bridge deck area per one two-lane equivalent km).

Initial Construction

Initial construction costs for bridges were estimated using the procedure shown in Table 22. To obtain initial construction costs per two-lane equivalent km, quantities of bridge deck area per one 2-lane equivalent km were multiplied by the unit costs of the bridge deck area per metre squared.

**Table 22: Schema for Estimation of EUAC for Initial Bridge Construction**

| Provincial functional highway class (rural) | Bridge deck area | | Initial construction costs | | |
|---|---|---|---|---|---|
| | Total | Per 2-lane equivalent km | Unit cost per $m^2$ of bridge deck | Per 2-lane equivalent km | EUAC cost for 2-lane equivalent km |
| *1* | *2* | *3* | *4* | *5* | *6* |
| Freeways | | | | | |
| Arterial | | | | | |
| Collector | | | | | |
| Local | | | | | |

Notes:
Column 1: Similar calculations were completed for other road classes (e.g., municipal and urban)
Column 5: Product of Columns 3 and 4
Column 6: Annualized cost of the cost in Column 5 calculated using Equation 1.

The annualized initial construction costs for bridges were adjusted using Equation 5 to take into account the average age of bridges in a given geographical region.

Rehabilitation and Maintenance

The cost of rehabilitation and maintenance activities for bridges were estimated as the function of typical cost of a bridge rehabilitation treatment (in dollars per square metre of the bridge deck area) and the frequency a typical rehabilitation and maintenance treatment is applied. The calculation procedure used to estimate EUAC costs of rehabilitation and maintenance activities for bridges is outlined in Table 23 and in the following section (as part of the discussion concerning major highway structures).

Major Highway Structures

The bridge costs (cost of initial construction and costs of rehabilitation and maintenance activities) can be supplemented by costs of major highway structures. Major structures were defined to include bridges longer than 200 m (provided that these bridges are not already included in the overall bridge data), tunnels longer than 80 m, retaining walls with the exposed surface area greater than 400 $m^2$, and snow sheds longer than 80 m. The cost of major structures was added to the bridge costs by increasing the overall bridge deck area.

**Table 23. Schema for the EUAC for Bridge Maintenance and Rehabilitation (M&R) Activities**

| Provincial functional highway class | Unit cost for a typical R&M activity (per $m^2$ of bridge deck area) | Estimated typical frequency between R&M activities (years) | Present value of R&M activities (per $m^2$ of bridge deck area) | Bridge deck area for 2-lane equivalent km | Present value of R&M cost for 2-lane equivalent km | EUAC ($ per 2-lane equivalent km) |
|---|---|---|---|---|---|---|
| *1* | *2* | *3* | *4* | *5* | *6* | *7* |
| Freeway | | | | | | |
| Arterial | | | | | | |
| Collector | | | | | | |
| Local | | | | | | |

Notes
Columns 2 and 3: Data obtained through Provincial Cost Inventory Survey or through Municipal Survey
Column 4: Calculated using Equation 2
Column 6: Product of Columns 4 and 5.
Column 7: Annualized cost calculated using Equations 3.

The process involved (a) converting the area of a major highway structures into an equivalent number of square metres of bridge deck area (considering the size of the major structure and cost of the major structure) and (b) including the converted area into the bridge deck area. For example, a 400 m long 2-lane roadway tunnel is 10 m wide, and its construction cost per metre square of the floor area is twice the typical construction cost per metre square of the bridge deck area. In this case, to include the cost of the tunnel as part of the overall bridge deck area, the total bridge deck area was increased by 8,000 square metres (the floor area of the tunnel – 4,000 square metres -–was multiplied by two). This procedure is further discussed in Chapter 7.

**All Other Road Infrastructure Component**

The *all other road infrastructure component* consists of hundreds of individual items. It was not practical to estimate unit costs and quantities for all these individual items. For this reason, the individual items were grouped into main components that were characterized by a set of characteristic items. The characteristic items represent major contract items and were used to account for the cost of all road infrastructure components. The main components and their characteristic items are listed in Table 24.

In addition to the characteristic items, there are many additional supplementary items that influence the cost of the main components. The supplementary items are typically relatively inexpensive or occur infrequently. Some of these supplementary items are listed in Table 24 Column 4. The cost of supplementary items was estimated as a percentage of the total cost of the main components and is given in Table 24, Column 5.

The estimation of costs for the *all other road infrastructure component* using characteristic items is compatible with financial data available from transportation agencies. Typically, transportation agencies can only provide reliable unit costs for characteristic items[10]. In addition to the difficulties of obtaining unit costs for small or infrequently used items (i.e., the additional supplementary items), it is also impractical to estimate quantities for these items.

[10] The procedure is also compatible with cost estimates used by HERS [11]

**Table 24. Description of Characteristics Item for All Other Infrastructure Component**

| Main Component | Characteristic Items | | Supplementary Items | |
|---|---|---|---|---|
| | Description | Unit | Description | Allowance, % |
| *1* | *2* | *3* | *4* | *5* |
| Clearing of vegetation | Clearing and grubbing | $m^2$ | Clearing of brush and trees, removal of top soil. | 20 |
| Grading; earth work | Earth excavation or fill | $m^3$ | Rock face work and rock face protection, earth fill or rock fill required, grading of subgrade and subgrade compaction, removal of boulders underneath subgrade | 10 |
| | Percent of rock excavation/fill | % | | |
| Landscaping | Sodding and top soil | $m^2$ | Staked and unstaked sodding, water for sod, seeding + mulching + top soil, silt fence barriers, rest areas, flow checks | 15 |
| | Top soil | $m^3$ | | |
| Drainage of the right-of-way | Curb and gutter (PCC, straight)* | m | Culverts of larger diameter or size, excavation, bedding and granular back fill for culverts, inspection openings, catch basins, rip-rap on spillways, sedimentation ponds, etc. | 25 |
| | 500 mm pipe culvert + end sections | m | | |
| | 1500 mm wide box culvert | m | | |
| | Storm water sewers | m | | |
| Guard rail and safety appurtenances | Concrete median | m | Anchor blocks for barriers, rumble strips, energy attenuators, truck run-away beds, warning signs | 10 |
| | Steel guardrail at shoulder | m | | |
| | 3-cable guide rail at shoulder | m | | |
| Fencing and gates | Chain link fence | m | Farming and walk gates, anti-glare screens, privacy fences, and noise barriers and berms. | 10 |
| | Wire fence | m | | |
| Lighting; electrical work | High mast | piece | Concrete foundation for poles, luminaries, wiring (power, lighting, ground), rigid ducts or conduits, power supply points and substations, etc. | 50 |
| | Standard mast | piece | | |
| Traffic control | Painting of traffic control lines | km | Traffic control devises (erected or painted signs, traffic lights, truck inspection stations, directional and message signs, etc | 30 |

* Included in pavement costs

The annualized initial construction costs for the all other component were adjusted using Equation 6 to take into account the average age of roads in a given geographical region.

*Example*

An example use of the characteristic items to estimate costs for *all other infrastructure component* is provided for the main component called *traffic control* (last row in Table 24). There are many individual items that constitute the cost of the traffic control component – painting of traffic control lines, traffic and directional signs, shoulder markers, and traffic lights. However, the cost of the traffic control component is accounted for by only one characteristic item called *Painting of traffic control lines.* Painting of traffic control lines is part of the permanent pavement marking, and typically represents the predominant (most frequently occurring and costliest) element of the main component called *traffic control*. To account for the presence of many other items that are part of the traffic control component (e.g., those listed in Table 6 as supplementary items), the cost of *Painting of traffic control lines* was increased by 30 percent.

Initial Construction

The cost of initial construction for the all other road infrastructure component was estimated using the schema shown in Table 25. The unit costs in Table 25 (Column 4) were estimated through provincial and municipal surveys and are presented in Chapter 8.

The quantities in Table 25 (Column 5) were estimated using contract documents for new road construction or reconstruction as discussed in Chapter 7.

**Table 25: Example of Estimation of Costs for Initial Construction for the All Other Component**

| Main component | Characteristic items | Unit | Unit cost | Per two-lane equivalent km | |
|---|---|---|---|---|---|
| | | | | Quantity | Cost |
| *1* | *2* | *3* | *4* | *5* | *6 = 4 x 5* |
| Clearing of vegetation | Clearing and grubbing | $m^2$ | | | |
| Grading; earth work | Earth excavation or fill | $m^3$ | | | |
| | Percent of rock excavation or fill | % | | | |
| Landscaping | Sodding and top soil | $m^2$ | | | |
| | Top soil | $m^3$ | | | |
| Drainage of the right-of-way | Curb and gutter (PCC, straight) | m | | | |
| | 500 mm pipe culvert + end sections | m | | | |
| | 1500 mm wide box culvert | m | | | |
| | Storm water sewers | m | | | |
| Guard rail and safety appurtenances | Concrete median | m | | | |
| | Steel guardrail at shoulder | m | | | |
| | 3-cable guide rail at shoulder | m | | | |
| Fencing and gates | Chain link fence | m | | | |
| | Wire fence | m | | | |
| Lighting | High mast | piece | | | |
| | Standard | piece | | | |
| Traffic control | Painting of traffic control lines | km | | | |

Rehabilitation and Maintenance

The cost of rehabilitation and maintenance activities for the all other road infrastructure component was estimated using the procedure schematically shown in Table 26.

Table 26 lists only the characteristic items that have expected life-span of less than the length of the analyses period (60 years), and will need to be replaced during the analysis period. The cost of replacing these items was used as a proxy for the estimation of costs of maintenance and rehabilitation activities for all items included in the all other road infrastructure component. Present worth was calculated using Equation 2; EUAC (last row in Table 26) was calculated using Equation 3.

**Table 26: Schema for the Estimation of EUAC for Rehabilitation and Maintenance Activities for the All Other Component**

| Main parts | Characteristic item | Unit | Unit cost | Per one, one km-long traffic lane | | |
|---|---|---|---|---|---|---|
| | | | | Life-span, years | Quantity | Cost |
| *1* | *2* | *3* | *4* | *5* | *6* | *7 = 4 x 6* |
| Drainage of the right-of-way | Curb and gutter (PCC, straight) | m | | | | |
| | 500 mm pipe culvert + end sections | m | | | | |
| Guard rail and safety appurtenances | Concrete median | m | | | | |
| | Steel guardrail at shoulder | m | | | | |
| | 3-cable guide rail at shoulder | m | | | | |
| Fencing, Gates | Chain link fence | m | | | | |
| | Wire fence | m | | | | |
| Lighting; electrical work | High mast | piece | | | | |
| | Standard | piece | | | | |
| Present Worth (PW) of rehabilitation and maintenance activities (replaced characteristic items) | | | | | | |
| EUAC of rehabilitation and maintenance activities | | | | | | |

Notes:
Column 4: Based on provincial and municipal cost surveys.
Column 5: The number in Column 5 represents year n in Equation 2.
Column 6: Same as Column 5 in Table 25.

### Routine and Winter Maintenance

The cost of routine and winter maintenance was based on provincial and municipal surveys and expressed in terms of annual costs per single one-km long traffic lane. Routine and winter maintenance costs were segregated by the geographical location, jurisdiction, and the functional road class (Figure 1). Annualized costs of routine and winter maintenance were calculated using Equations 3 and 4. Routine and winter maintenance costs are discussed in Chapter 8.

# 7. PHYSICAL FEATURES OF ROAD INFRASTRUCTURE

This chapter describes procedures that were used to estimate the size of physical features and quantities of the road infrastructure and the results achieved. The estimates were based on the provincial and municipal surveys (described in Chapter 2), the examination of contract documents, and on engineering judgement[11]. The estimates of quantities of road infrastructure were made for the following components:

- Roadway and pavements;
- Bridges; and
- All other road infrastructure component.

Quantities of road infrastructure depend on the geographical location, jurisdiction, road functional class, and alignment (rural versus urban). This necessitated the estimation of over 1,000 different quantities. Only example results of quantities, obtained through surveys or estimated (when survey data were unavailable), are presented herein. The rest of the data are given in Appendix D.

**Roadways and Pavements**

The key step in the estimation of physical features of road infrastructure was the development of Road Construction Sheets. An example of a Road Construction Sheet is presented in Table 27 for a provincial rural arterial road in Southern Ontario. A Road Construction Sheet has three sections:

- *Road Geometric Design* – Pavement and shoulder widths, the width of the paved shoulders, and the thickness of the paved shoulder;
- *Initial Pavement Structure* – Detailed description of the initial pavement structure; and
- *Pavement Preservation Action Plan* – Description of pavement maintenance and rehabilitation treatments during the 60-year analyses period.

Road Construction Sheets were prepared for all road segments for which annualized costs were estimated. As discussed at the end of Chapter 3, annualized unit costs were estimated even for road categories that may not exist or may exist in very small quantities. This necessitated the development of Road Construction Sheets for the full combination of geographical regions, jurisdictions (provincial or municipal), road alignment (rural or urban) and road functional class.

Consequently, considering the 14 geographical locations, 8 types of provincial roads, and 6 types of municipal roads, 196 Road Construction Sheets were developed. All Road Construction Sheets are

[11] Note on Engineering Judgement

Engineering judgement was used throughout this study to estimate values of many input variables for the computational model. The engineering judgement refers to the process of estimating values by interpolating and extrapolating survey data using engineering experience, the experience acquired by professional engineers working for many years in the area of highway transportation. To harness engineering judgement, all input data that may have been initially estimated by a single individual, for example a Regional Representative, were systematically reviewed by the project team consisting of at least the following three individuals, Mr. D. Hein, Dr. J. Hajek, and Mr. D.J. Swan. As the final check, all estimates were reviewed by the Regional Representatives. The role of Regional Representatives is described in Chapter 2.

## Table 27. Example of Road Construction Sheet for Provincial Rural Arterial Roads in Southern Ontario

**Region:** **Ontario, South**
**Category:** **Provincial Rural Arterial**
All quantities and costs are for one km of 2-lane highway

**Geometric Design**

| Design feature | Dimension |
|---|---|
| Width of the two traffic lanes, m | 7.50 |
| Total width of both shoulders, m | 6.00 |
| Total width of both paved shoulders, m | 1.00 |
| Average AC thickness of the paved shoulders, mm | 90 |

**Initial Pavement Structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Amount | Quantity per km | Price per unit of quantity | Cost |
|---|---|---|---|---|---|
| Surface | HL-1, "Superpave 12.5 mm FC1", mm (t) | 40 | 750 | $ 68.75 | $ 51,563 |
| Binder | MDBC, "Superpave 19 mm", mm (t) | 60 | 1125 | $ 53.70 | $ 60,413 |
| Extra layer | MDBC, "Superpave 19 mm", mm (t) | 60 | 1125 | $ 53.70 | $ 60,413 |
| OGDL | | | | $ - | $ - |
| Base | Granular A, mm (t) | 150 | 6991 | $ 13.01 | $ 90,951 |
| Subbase | Granular B, mm (t) | 450 | 15206 | $ 6.71 | $ 102,031 |
| Shoulder | HL-1, "Superpave 12.5 mm FC1", mm (t) | 40 | 100 | $ 68.75 | $ 6,875 |
| Shoulder | MDBC, "Superpave 19 mm", mm (t) | 50 | 125 | $ 53.70 | $ 6,713 |
| Subgrade | Subgrade improvement, % area ($m^2$) | | 500 | $ 5.00 | $ 2,500 |
| Subdrains | Includes trenching and outlets, % of occurrence (m) | 0 | | $ 18.00 | $ - |
| Tack Coating | Tack coating, number of applications (m2) | 1 | 7500 | $ 0.26 | $ 1,950 |
| **Total** | | | | | **$ 383,406** |

**Pavement Preservation Action Plan**

| Years after initial construction | Description of pavement layer, Amount (Quantity) | Amount | Quantity per km | Price per unit of quantity | Cost | Net present worth |
|---|---|---|---|---|---|---|
| 5 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 747 |
| 9 | Spot repairs - mill and patch, % Area (m2) | 10 | 750 | $ 7.70 | $ 5,775 | $ 3,418 |
| 15 | Mill AC, mm (t) | 40 | 750 | $ 11.00 | $ 8,250 | $ 3,442 |
| 15 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 21,515 |
| 15 | Resurface with SP 19mm (MDBC), mm (t) | 50 | 938 | $ 53.70 | $ 50,344 | $ 21,007 |
| 19 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 331 |
| 19 | Spot repairs - mill and patch, % Area (m2) | 20 | 1500 | $ 7.70 | $ 11,550 | $ 3,817 |
| 27 | Mill AC, mm (t) | 40 | 750 | $ 11.00 | $ 8,250 | $ 1,711 |
| 27 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 10,692 |
| 27 | Resurface with SP 19mm (MDBC), mm (t) | 50 | 938 | $ 53.70 | $ 50,344 | $ 10,440 |
| 31 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 164 |
| 35 | Spot repairs - mill and patch, % Area (m2) | 20 | 1500 | $ 7.70 | $ 11,550 | $ 1,503 |
| 38 | Mill AC, mm (t) | 40 | 750 | $ 11.00 | $ 8,250 | $ 901 |
| 38 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 5,633 |
| 38 | Resurface with SP 19mm (MDBC), mm (t) | 50 | 938 | $ 53.70 | $ 50,344 | $ 5,499 |
| 42 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 87 |
| 42 | Spot repairs - mill and patch, % Area (m2) | 20 | 1500 | $ 7.70 | $ 11,550 | $ 999 |
| 48 | Mill AC, mm (t) | 100 | 1875 | $ 11.00 | $ 20,625 | $ 1,258 |
| 48 | Resurface with SP 12.5mm FC1, mm (t) | 40 | 750 | $ 68.75 | $ 51,563 | $ 3,145 |
| 48 | Resurface with SP 19mm (MDBC), mm (t) | 60 | 1125 | $ 53.70 | $ 60,413 | $ 3,685 |
| 53 | Rout and seal, m (m) | | 500 | $ 2.00 | $ 1,000 | $ 46 |
| 57 | Spot repairs - mill and patch, % Area (m2) | 10 | 750 | $ 7.70 | $ 5,775 | $ 209 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Total** | | | | | **$ 514,269** | **$ 100,249** |

presented in the Addendum. The following Road Construction Sheets were prepared for each geographical location:

Provincial rural freeway
Provincial rural arterial road
Provincial rural collector road
Provincial rural local road

Provincial urban freeway
Provincial urban arterial road
Provincial urban collector road
Provincial urban local road

Municipal rural arterial road
Municipal rural collector road
Municipal rural local road

Municipal urban arterial road
Municipal urban collector road
Municipal urban local road

Road Construction Sheets were initially developed by the project team, mainly by the regional representatives. Subsequently, the Sheets were sent to the provincial and municipal agencies for review and modifications. After implementing the changes suggested by the agencies, the project team reviewed all Road Construction Sheets for consistency. Road Construction Sheets reflect the existing practice of design, construction, and maintenance of road infrastructure. Table 28 shows which Road Construction Sheets were reviewed by provincial and municipal agencies.

**Table 28. Review of Road Construction Sheets**

| Jurisdiction | Number of Road Construction Sheets | Reviewed by Provincial Agency | Reviewed by Municipal Agency |
|---|---|---|---|
| NF | 14 | Yes | No |
| PE | 14 | No | No |
| NS | 14 | Yes | Yes |
| NB | 14 | Yes | Yes |
| QC-1 | 14 | Yes | Yes |
| OC-2 | 14 | Yes | No |
| ON-1 | 14 | Yes | Yes |
| ON-2 | 14 | Yes | Yes |
| MB | 14 | Yes | Yes |
| SK | 14 | Yes | Yes |
| AB | 14 | Yes | Yes |
| BC-1 | 14 | No | No |
| BC-2 | 14 | No | No |
| TR | 14 | Some | Some |
| Total | 196 | | |

The final review of Road Construction Sheets occurred during the Technical Workshop on Road Cost Estimation Methodology which took place in Ottawa, in March 2008. The Worksop was organized by the Economic Analysis Directorate of Transport Canada and was attended by the representatives of four provinces (Newfoundland, Québec, Ontario, and Manitoba). At that time, Ontario representatives requested that the Ontario Road Construction Sheets contain (a) the current names of asphalt concrete paving materials (and not only the names of the materials that existed in 2003), and (b) itemized costs of

tack coat applications. Table 20, Table 21, and Table 27, as well as Ontario Road Construction Sheets given in the Addendum, reflect these two changes requested during the Technical Workshop.

The following list provides the correspondence between 2003 names and the currently used names for asphalt concrete paving materials in Ontario:

| **2003 name** | **Current name** |
|---|---|
| Stone Mastic Asphalt | Stone Mastic Asphalt |
| Dense Friction Course (DFC) | Superpave 12.5 FC2 |
| HL-1 | Superpave 12.5 FC1 |
| HL-4 | Superpave 12.5 |
| HL-8 | Superpave 25 |
| Heavy Duty Binder Course (HDBC) | Superpave 19 |
| Medium Duty Binder Course (MDBC) | Superpave 19 |

**Bridges**

The bridge quantities were measured in terms of the bridge deck area in square metres. In order to obtain bridge costs associated with one 2-lane equivalent km of road, the amount of bridge area was expressed in terms of the number of square metres of bridge deck area per 2-lane equivalent km. Table 29 provides a summary of bridge quantities based on provincial and municipal surveys. The number of square metres of bridge deck area, per one 2-lane equivalent km, ranges from 10 to 300.

Typically, bridge survey data received from provincial and municipal agencies were in terms of the total number of bridges and the average bridge deck size. For example, Ontario Ministry of Transportation reported that there are 2,646 bridges with the average bridge deck size of 1,000 $m^2$. (The distribution of bridges into the different road functional classes was not typically available.) Consequently, the total amount of the bridge deck area for provincial bridges in Ontario was 2,646,000 $m^2$. This total bridge deck area was distributed between the road functional classes using engineering judgement and reported using the format presented Table 29.

The distribution of the total bridge deck area was carried out using an estimation process illustrated using Ontario data and summarized in Table 30.

The total number of provincial highways in Ontario (19,586 2-lane equivalent km) was divided into five major road categories (Column 1 in Table 30). The desired distribution of the bridge deck area (Column 4) was established for each major road class using engineering judgement and survey data obtained from jurisdictions that have reported distribution of bridges by road class. For example, considering that the lengths of all road functional classes are equal, 29 percent of all bridges were assigned to urban freeways and 25 percent to rural freeways. Thus, it was expected that the spacing of interchanges on urban freeways is shorter than on rural freeways. The lowest percentage (8 %) was assigned to local roads because they do not have interchanges and generally follow the existing terrain. The desired distribution was adjusted by the actual length of the major road categories (Column 5 is the product of Columns 3 and 4). The resulting distribution of the total bridge deck area (2,646,000 $m^2$) was distributed using the percentage given in Column 6. The bridge deck area per one 2-lane equivalent km was obtained by dividing Column 8 with Column 1.

## Table 29. Quantities of Bridge Deck Area per One 2-Lane Equivalent km Based on Surveys, $m^2$

**Survey Results**

| Quantity of bridge deck ($m^2$-lane km) | | NL | | | | | | NS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | Urban | | Total | | Rural | | Urban | | Total | |
| | | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total |
| Provincial | Freeway | 0.00 | 0% | 0.00 | 0% | | | 354.81 | 38% | 354.81 | 38% | | |
| | Arterial | 49.22 | 40% | 49.22 | 40% | | | 277.11 | 30% | 277.11 | 30% | | |
| | Collector | 7.07 | 11% | 7.07 | 11% | | | 215.41 | 23% | 215.41 | 23% | | |
| | Local | 33.39 | 49% | 33.39 | 49% | | | 92.03 | 10% | 92.03 | 10% | | |
| Provincial average | | | | | | | | | | | | | |
| Municipal | Arterial | | | | | | | | | | | | |
| | Collector | | | | | | | | | | | | |
| | Local | | | | | | | | | | | | |
| Municipal average | | | | | | | | | | | | | |
| Provincial & municipal average | | | | | | | | | | | | | |

| Quantity of bridge deck ($m^2$-lane km) | | QC-1 | | | | | | QC-2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | Urban | | Total | | Rural | | Urban | | Total | |
| | | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total |
| Provincial | Freeway | 412.57 | 47% | 412.57 | 47% | | | 412.57 | 47% | 412.57 | 47% | | |
| | Arterial | 104.99 | 23% | 104.99 | 23% | | | 104.99 | 23% | 104.99 | 23% | | |
| | Collector | 52.70 | 16% | 52.70 | 16% | | | 52.70 | 16% | 52.70 | 16% | | |
| | Local | 4254.10 | 13% | 4254.10 | 13% | | | 4254.10 | 13% | 4254.10 | 13% | | |
| Provincial average | | | | | | | | | | | | | |
| Municipal | Arterial | | | | | | | | | | | | |
| | Collector | | | | | | | | | | | | |
| | Local | | | | | | | | | | | | |
| Municipal average | | | | | | | | | | | | | |
| Provincial & municipal average | | | | | | | | | | | | | |

| Quantity of bridge deck ($m^2$-lane km) | | ON-1 | | | | | | ON-2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | Urban | | Total | | Rural | | Urban | | Total | |
| | | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total |
| Provincial | Freeway | 181.16 | 17% | 210.14 | 21% | | | 181.16 | 17% | | | | |
| | Arterial | 145.79 | 42% | | 40% | | | 145.79 | 42% | | | | |
| | Collector | 133.90 | 31% | 133.90 | 30% | | | 133.90 | 31% | | | | |
| | Local | 57.97 | 10% | | 10% | | | 57.97 | 10% | | | | |
| Provincial average | | | | | | | | | | | | | |
| Municipal | Arterial | | | | | | | | | | | | |
| | Collector | | | | | | | | | | | | |
| | Local | | | | | | | | | | | | |
| Municipal average | | | | | | | | | | | | | |
| Provincial & municipal average | | | | | | | | | | | | | |

| Quantity of bridge deck ($m^2$-lane km) | | MB | | | | | | SK | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | Urban | | Total | | Rural | | Urban | | Total | |
| | | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total | Area | % of Total |
| Provincial | Freeway | 92.06 | 16% | 92.06 | 16% | | | 49.08 | 32% | 49.08 | | 49.08 | 32% |
| | Arterial | 144.28 | 49% | 144.28 | 49% | | | 18.17 | 24% | 18.17 | | 18.17 | 24% |
| | Collector | 81.27 | 33% | 81.27 | 33% | | | 14.04 | 29% | | | 14.04 | 29% |
| | Local | 2.26 | 2% | 2.26 | 2% | | | 2.53 | 16% | | | 2.53 | 16% |
| Provincial average | | | | | | | | | | | | | |
| Municipal | Arterial | | | | | | | | | | | 10.75 | 9% |
| | Collector | | | | | | | | | | | 12.77 | 13% |
| | Local | | | | | | | | | | | 5.90 | 58% |
| Municipal average | | | | | | | | | | | | | |
| Provincial & municipal average | | | | | | | | | | | | | |

| Quantity of bridge deck ($m^2$/2-lane km) | | AB | | | | | |
|---|---|---|---|---|---|---|---|
| | | Rural | | Urban | | Total | |
| | | Area | % of Total | Area | % of Total | Area | % of Total |
| Provincial | Freeway | | | 42.29 | | 42.29 | 0.01 |
| | Arterial | 32.27 | | | | 32.27 | 0.53 |
| | Collector | 25.59 | | | | 25.59 | 0.39 |
| | Local | 11.13 | | | | 11.13 | 0.07 |
| Provincial average | | | | | | | |
| Municipal | Arterial | | | | | | |
| | Collector | | | | | | |
| | Local | | | | | | |
| Municipal average | | | | | | | |
| Provincial & municipal average | | | | | | | |

**Table 30. Example Adjustment of the Bridge Deck Area for the Presence of Major Structures**

| Major road category | Road length[1)], km | Road length, % | Desired distribution of the bridge deck area, % | Desired distribution adjusted by road length | Desired distribution adjusted by road length, % | Resulting distribution of bridge deck area, $m^2$ | Bridge deck area per one 2 –lane equivalent km |
|---|---|---|---|---|---|---|---|
| *1* | *2* | *3* | *4* | *5* | *6* | *8* | *9* |
| Freeway Urban | 2,257 | 12% | 29 | 334.2 | 17.9 | 474,289 | 210.14 |
| Freeway Rural | 2,047 | 10% | 25 | 261.3 | 14.0 | 370,827 | 181.16 |
| Arterial, total | 6,265 | 32% | 20 | 639.7 | 34.3 | 907,956 | 144.93 |
| Collector, total | 5,109 | 26% | 18 | 469.5 | 25.2 | 666,380 | 130.43 |
| Local, total | 3,908 | 20% | 8 | 159.6 | 8.6 | 226,547 | 57.97 |
| Total | 19,586 | 100% | 100 | 1,864.4 | 100 | 2,646,000 | |

1) 2-lane equivalent km

Major Highway Structures

The procedure to account for the additional cost of major structures (large bridges, retaining walls, snow sheds and tunnels) was introduced in Chapter 6. The procedure converts the major structures into an equivalent bridge deck area. For example, this procedure was used to account for the cost of two roadway tunnels in Ontario. The addition of the two tunnels changed the total amount of the total bridge deck area by less than 0.9 percent as outlined in the following example for Ontario.

Ontario provincial bridge deck area in $m^2$ per one 2-lane equivalent km was adjusted to include the contribution (cost) of major structures. The procedure is illustrated Table 31

**Table 31. Example Adjustment of the Bridge Deck Area for the Presence of Major Structures**

| Major road category | Resulting distribution of bridge deck area, $m^2$ | Major Structures, length in m | Floor area of tunnels, $m^2$ | Cost-adjusted floor area, $m^2$ | Total adjusted bridge deck area, $m^2$ | Adjusted bridge deck area per 2 – lane equivalent km |
|---|---|---|---|---|---|---|
| *1* | *2* | *3* | *4* | *5* | *6* | *7* |
| Freeway Urban | 474,289 | | | | 474,289 | 210.14 |
| Freeway Rural | 370,827 | | | | 370,827 | 181.16 |
| Arterial, total | 907,956 | Tunnel, 213 | 2,130 | 5,389 | 913,345 | 145.79 |
| Collector, total | 666,380 | Tunnel, 700 | 7,000 | 17,710 | 684,090 | 133.90 |
| Local, total | 226,547 | | | | 226,547 | 57.97 |
| **Total** | **2,646,000** | | | | **2,669,099** | |

Column 2 in Table 31 corresponds to Column 8 in Table 30. Ontario reported the presence of only two major structures (tunnels) that are listed in Column 3 (Table 31). Long bridges were included in the bridge averages and are not included in Table 31. Floor area of the tunnels (Column 4) was multiplied by 2.53 because MTO estimated that it costs 2.53 times more to build one square metre of a tunnel floor than to build one square metre of a bridge deck (Column 5). The comparison of the adjusted bridge deck area per km (Table 31, Column 6) with the unadjusted bridge deck area per km (Table 30, Column 2) indicates

that the addition of the major structures has only a marginal influence (about 0.9 percent increase in the total bridge deck area)..

The rates of the bridge deck area per one 2-lane equivalent km given in Table 31, Column 7 are also given in Table 29 as quantities based on surveys.

Considering the uncertainties associated with estimating the bridge deck area and bridge unit costs, ARA did not adjust the estimated bridge deck area for the presence of major structures for other provinces. Most of the bridge quantities presented in Table 32 are estimated data because bridge data were not received from several provinces and those that were received were typically combined data for all road functional classes. The adjustment of these estimated numbers for the presence of major structures would be misleading because it would imply a level of detail and thus a degree of precision that is not warranted.

Estimated Bridge Quantities

Data given in Table 29, together with engineering judgement, were used to estimate bridge deck quantities for provincial roads given in Table 32. A similar table of quantities was also developed for municipal roads. A comparison of data presented in Table 29 and Table 32 indicates that data in Table 32 are smoothed-out by considering the distribution of bridge quantities across all jurisdictions.

### All Other Road Infrastructure Component

The quantities for all other infrastructure component were estimated using contract documents (for new road construction or reconstruction) and by engineering judgement.

**Table 32. Example of Estimated Bridge Quantities, $m^2$ of Bridge Deck Area per 2-lane Equivalent km.**

| Description and type of work item | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Area of bridge deck ($m^2$/2-Lane km) | NL | 0 | 49 | 7 | 33 | 0 | 49 | 7 | 33 | 25 | 4 | 5 | 25 | 4 | 10 |
| | PE | 49 | 18 | 14 | 3 | 49 | 18 | 0 | 0 | 9 | 7 | 5 | 9 | 10 | 10 |
| | NS | 177 | 139 | 108 | 46 | 177 | 139 | 108 | 46 | 69 | 54 | 5 | 69 | 54 | 10 |
| | NB | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | QC-1 | 170 | 40 | 55 | 55 | 315 | 100 | 70 | 70 | 50 | 30 | 5 | 55 | 30 | 10 |
| | QC-2 | 170 | 40 | 55 | 55 | 315 | 100 | 70 | 70 | 50 | 30 | 5 | 55 | 30 | 10 |
| | ON-1 | 100 | 90 | 80 | 50 | 120 | 90 | 100 | 35 | 45 | 40 | 5 | 45 | 50 | 10 |
| | ON-2 | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | MB | 92 | 144 | 81 | 2 | 92 | 144 | 81 | 2 | 72 | 41 | 5 | 72 | 41 | 10 |
| | SK | 49 | 18 | 14 | 3 | 49 | 18 | 0 | 0 | 9 | 7 | 5 | 9 | 10 | 10 |
| | AB | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | BC-1 | 100 | 90 | 80 | 50 | 120 | 90 | 100 | 35 | 45 | 40 | 5 | 45 | 50 | 10 |
| | BC-2 | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | TR | 49 | 18 | 14 | 3 | 49 | 18 | 0 | 0 | 9 | 7 | 5 | 9 | 10 | 10 |

As an example, Table 34 and Table 35 provide data on contract documents that were examined to obtain information on typical quantities of road infrastructure items in Ontario. Contract documents typically list quantities for characteristic items only.

Table 33 shows an example of estimated quantities for the All Other Road Infrastructure Component used in the computational model. The example is for only one of the major characteristic items (listed in Table

24) – clearing and grubbing, and only for provincial roads. Similar estimates were carried out for all characteristic items and both for provincial and municipal roads. Additional data on the physical features and quantities of road infrastructure are given in Appendix D.

**Table 33. Estimated Quantities (partial table) for Clearing and Grubbing for Provincial Roads**

| Description and type of work item | Region | Provincial | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local |
| Clearing and grubbing ($m^2$) | NL | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 |
| | PE | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 |
| | NS | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 |
| | NB | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 |
| | QC-1 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 |
| | QC-2 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 |
| | ON-1 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 |
| | ON-2 | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 |
| | MB | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 |
| | SK | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 |
| | AB | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 |
| | BC-1 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 |
| | BC-2 | 6000 | 8000 | 9000 | 9600 | 2500 | 3600 | 5400 | 6800 |
| | TR | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 |

**Table 34. List of Contract Documents Used to Verify Material Quantities in Ontario**

| No | Contract Documents No. | Type of Construction | Hwy. No | Road Class | South or North | Prov. or Mun. | Rural or Urban | Contract Length, km | No. of lanes | Pavement Width, m | Shoulder Width, m | Paved Shoulder width, m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 95-212 | Reconstruction | 520 | L | S | M | R | 11.6 | 2 | 6.50 | 1.0 | 0 |
| 2 | 95-213 | Reconstruction | 17 | A | N | P | R | 19.8 | 2 | 7.50 | 5.5 | 5.5 |
| 3 | 82-51 | New construction | 427 | F | S | P | U | 1.40 | 4 | 7.20 | 5.0 | 5.0 |
| 4 | 2002-4003 | Partial reconstruction | 41 | C | S | P | R | 12.0 | 2 | 7.00 | 4.0 | 1.0 |
| 5 | 96-240 | Partial reconstruction | 16.5 | A | S | P | R | 16.5 | 2 | 7.50 | 4.8 | 1.0 |
| 6 | 95-203 | Partial reconstruction | 11 | A | S | P | R | 14.4 | 2 | 7.5 | 6.0 | 1.0 |
| 7 | 77-133 | 6 to 8 lane widening | 401 | F | S | P | R | 7.8 | 10 | 7.3 | 2.9 | 2.9 |
| 7 | 77-133 | 6 to 8 lane widening | 401 | F | S | P | U | 2.6 | 10 | 6.8 | 2.4 | 2.4 |
| 8 | 2000-0035 | Rehabilitation | 401 | F | S | P | U | 1.2 | 14 | 6.8 | 2.3 | 2.3 |
| 9 | 2002-2021 | Rehabilitation | 401 | F | S | P | U | 8.1 | 15 | 7.5 | 1.5 | 1.5 |
| 10 | 2003-5114 | New construction | 101 | C | N | P | R | 1.4 | 2 | 7.5 | 6.0 | 1.0 |
| 11 | 85-64 | Widening + Rehabilitation | 407 | F | S | P | U | 2.7 | 8 | 7.0 | 2.1 | 2.1 |
| 12 | 2003-4027 | Widening + Rehabilitation | 407 | F | S | P | R | 17.0 | 4 | 7.5 | 4.0 | 4.0 |
| 13 | 96-240* | Widening + Rehabilitation | 11 | A | N | P | R | 16.5 | 2 | 7.5 | 5.8 | 1.0 |
| 14 | 83-27 | New construction | 427 | F | S | P | R | 3.0 | 6 | 7.3 | 1.4 | 1.2 |
| 15 | 83-04 | Widening | 11 | A | S | P | R | 7.8 | 4 | 7.0 | | |
| 16 | 84-66 | Widening | 3 | C | S | P | R | 1.2 | 2 | 7.5 | 5.0 | 1.0 |
| 17 | 84-07 | Widening | 12 | C | S | P | R | 6.9 | 2 | 7.5 | 6.0 | 1.0 |
| 18 | 80-86 | Widening | 62 | L | S | P | R | 0.9 | 2 | 6.5 | 3.0 | 0.0 |

* Material quantities are not included in the contract document

**Table 35. Estimation of Material Quantities Based on Ontario Contract Documents**

| Work Item (supply and install) | | | South | | | | | | | | | | | | | North | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Functional Class | | | F | | | | | | A | | | C | | | L | | A | | C |
| Rural (R) or Urban (U) | | | U | R | U | U | R | R | R | R | R | R | R | R | R | R | R | R | R |
| Contract No* | | | 3 | 14 | 11 | 9 | 7 | 12 | 5 | 6 | 15 | 4 | 16 | 17 | 1 | 18 | 2 | 13 | 10 |
| Clearing and grubbing, 1000's | | $m^2$ | 5.2 | 0 | | | | | | | 4.7 | | 4.4 | | | 3.3 | | | 1.4 |
| Grading | Earth excavation, 1000's | $m^3$ | 45 | 58.5 | | | | | | 30 | | | 17.0 | | | 9.7 | | | 55 |
| | Rock excavation, % of earth | $m^3$ | 0 | 0 | | | | | | | 36 | | 0 | 0 | | 53 | | | |
| | Fill required | $m^3$ | 43 | 56.7 | | | | | | | | | | | | 9.4 | | | 33.4 |
| Land-scaping | Sodding and top soil, 1000's | $m^2$ | 23.8 | 20.2 | | | | | | | | | 2.1 | | | | | | 18.9 |
| | Top soil, 1000's | $m^3$ | 2.0 | 1.4 | | | | | | | | | 1.1 | | | 0.5 | | | 0.95 |
| Drainage | Subdrains | | 380 | 498 | 500 | | | 0 | 137 | 286 | | | | 82 | 46 | 32 | 43 | | 41 |
| | PCC Curb and gutter | m | 802 | 46 | 750 | 1333 | 400 | 28 | 30 | 180 | 48 | | 220 | 423 | 31 | 51 | | | 47 |
| | 500 mm pipe culvert + end sections | m | 17 | 8 | 0 | 0 | 0 | 3.4 | 20+ | 49+ | 63 | | 266 | | 27 | 401 | 29 | 12 2 | 130 |
| | 1500 mm wide box culvert | m | 42 | | | 10 | 25 | 60 | | | | | | | | | | 25 | |
| | Storm water sewers | m | 435 | 351 | 750 | 1000 | 200 | | | 123 | 11.8 | | 20 | 17 | 10 | | | | |
| Guard rail | Concrete median | m | | 83 | 659 | 333 | 250 | | | | | | | | | | | | |
| | Steel guardrail | m | 287 | 166 | 0 | 0 | 0 | 0 | 80 | 25 | 104 | 1037 | 127 | 209 | 27 | 137 | | | 780 |
| | 3-cable guide rail at shoulder | m | 0 | 0 | | | | | 438 | 162 | 185 | | 585 | | 178 | | | | |
| Fencing, Gates | Chain link fence | m | 863 | 90 | 250 | | | | | | | | | | | | | | |
| | Wire fence | m | 118 | 300 | | | | | | | 397 | | 1009 | | | 647 | | | |
| Lighting | High mast | km | 0 | 0 | | 1.4 | 2.3 | | | | | | | | | | | | |
| | Standard | km | 10 | 7 | | | | | | | | | | 5 | | | | | |
| Painting of traffic lanes | | km | | 3.2 | | | 3.87 | 3.7 | 3.96 | 3.5 | | | | | 2.92 | | 3.61 | | |

* See Table 34 for contract numbers

# 8. UNIT COSTS OF ROAD INFRASTRUCTURE COMPONENTS

This chapter describes procedures used to estimate unit costs of all major road infrastructure components and the results achieved. Unit cost estimates were based on provincial and municipal surveys and on engineering judgement. The estimates were carried out for the following components:

- Pavements;
- Bridges;
- All other road infrastructure component;
- Routine maintenance; and
- Winter maintenance.

Unit costs of road infrastructure components depend on the geographical location (e.g., province, part of a province) and on jurisdiction (provincial or municipal). Only example results of unit costs obtained through surveys and estimated unit costs (when survey data were unavailable) are presented herein. The remainder of the unit cost data is given in Appendix D.

**Definition of Unit Costs**

Unit costs include the cost of materials, transportation of the materials to the construction site, the placement of the material, and quality control on the part of the contractor. For example, the unit cost for a granular material includes the cost of the material, its transportation to the construction site, placement and compaction in the field, and testing to ensure that the material is of appropriate quality, and has the required thickness and compaction. The unit costs do not include the cost of engineering, quality assurance carried out by the investor (the owner of the facility under construction), and other administrative costs. For this reason, the following adjustment factors were used to account for overhead costs:

25 percent increase – Pavements and all other infrastructure component. Initial construction costs and the rehabilitation and maintenance costs were increased by 25 percent to include administrative cost (such as cost of planning, programming, budgeting and engineering, construction supervision and quality assurance, and sundries and claims).

35 percent increase – Bridges. The initial construction costs and the future rehabilitation and maintenance costs were increased by 35 percent to include administrative costs (the cost of planning, programming, budgeting and engineering, construction supervision and quality assurance, and sundries and claims) as well as the cost of building temporary bridges.

10 percent increase -- Routine maintenance and winter maintenance costs were increased by 10 percent to reflect administrative costs and in-house costs.

The estimation of unit costs was necessary whenever specific unit cost data were not generated by surveys. To the extent possible, unit costs reported by a provincial agency were left unchanged or were rounded. In some situations, the values were adjusted to take into account costs reported by adjacent jurisdictions, or because, based on engineering judgement, they were considered to be incorrect. Unit costs reported by a municipality were adjusted by considering costs reported by other municipalities located in the same geographical region (a single set of municipal unit costs was used for the entire geographical region), by considering costs reported by adjacent municipalities, and by engineering judgement.

## Pavements

Initial Costs

Unit costs for paving materials and for pavement preservation treatments were included in the Road Construction Sheets (Table 27), and were submitted for review and modifications to provincial and municipal agencies. In addition, ARA also directly asked provincial and municipal agencies for unit costs of pavement materials used for initial pavement construction. Table 36 contains of unit costs for the initial pavement construction obtained from provincial surveys. Table 37 contains corresponding data obtained from municipal surveys.

To obtain unit costs for all geographical locations, jurisdiction and types of costs for which survey data were not available, ARA used the available survey data and engineering judgement to estimate missing survey data. As an example of estimated unit costs, Table 38 provides estimated unit costs for the initial pavement structure for the first nine geographical locations (Newfoundland to Northern Ontario). Unit costs for the rest of the geographical locations are given in Appendix D. Appendix D lists all input data used in the model. Unit costs given in Table 38 are provincial costs; the estimated municipal costs, given in Appendix D, being generally higher.

The higher unit costs for municipal construction of pavements are caused by a number of factors including smaller-size of construction contracts (compared to provincial contracts), higher costs for the protection of pedestrians and for traffic control during construction, the more frequent need to relocate underground utilities, higher demands for environmental protection, and increased incidence of utility openings and boxes in pavements, etc.

Maintenance and Rehabilitation Costs

Pavement maintenance and rehabilitation unit costs obtained through provincial surveys are summarized in Table 39. Corresponding estimated costs are shown in Table 40. The comparison of unit costs given in Table 39 and Table 40 indicates that survey data provide a reliable guidance for the estimation of unit costs (in Table 40) for provinces that have not provided unit cost data. Table 40 contains provincial unit costs for selected geographical locations only. The purpose of the Table 40 is to provide an example of the type of unit cost estimates required for jurisdictions that have not provided survey data and an example of data used in the computational model. A full version of Table 40 is given in Appendix D.

## Bridges

Initial Construction

Initial unit construction costs for bridges, obtained from provincial surveys are summarized in Table 41. The corresponding estimated costs are shown in Table 42. Estimated costs are based on the survey costs and engineering judgement.

Maintenance and Rehabilitation

The calculation of maintenance and rehabilitation cost for bridges required the knowledge of the unit cost of maintenance and rehabilitation treatments, as well as the frequency of the treatments. Table 43 shows unit maintenance and rehabilitation costs and the frequency of the maintenance and rehabilitation treatments obtained from provincial surveys. The estimated unit costs for maintenance and rehabilitation treatments are given in Table 44.

## Table 36. Unit Costs of Pavement Materials for Initial Construction Obtained from Provincial Surveys

| Pavement Layer | Description of pavement material | Unit Cost from Survey | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NL | NS | ON-1 | ON-2 | QC-1 | QC-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Surface | HMA surface course, premium, t | | $66.54 | $68.88 | $62.23 | $65.00 | $65.00 | | $50.00 | $57.30 | | | |
| | HMA surface course, typical, t | $60.00 | $53.25 | $57.29 | $57.64 | $60.00 | $60.00 | $50.00 | $45.00 | $45.26 | $60.00 | $70.00 | $128.00 |
| | Asphalt surface treatment, $m^2$ | | | | | | | $1.50 | $2.00 | | | | $5.27 |
| | Gravel surface, t | | | | | | | $11.00 | | | | | $12.00 |
| | Gravel shoulder, mm, t | | | | | | | | | | | | |
| Binder | HMA base course, premium, t | | $48.47 | $53.91 | $54.54 | $70.00 | $70.00 | | | $38.33 | | | |
| | HMA base course, typical, t | $57.00 | $48.47 | $49.42 | $49.42 | | | $50.00 | | $37.52 | $55.00 | $60.00 | |
| OGDL | | | | $45.00 | | | | | | | | | |
| Base | Crushed granular base, t | $12.60 | $12.20 | $13.01 | $10.90 | $11.00 | $11.00 | $10.60 | $12.00 | $16.00 | $20.00 | $25.00 | $18.85 |
| Subbase | Granular subbase, t | $10.40 | $11.00 | $6.71 | $7.97 | $6.50 | $6.50 | $8.60 | $10.00 | $11.73 | $12.00 | $20.00 | $13.70 |
| Subdrains | Subdrains, m | | | $18.00 | $20.00 | $115.00 | $115.00 | | | | | | $18.00 |
| Drainage | Closed drainage, m | | $84.00 | | | | | | | | | | $260.00 |

## Table 37. Unit Costs of Pavement Materials for Initial Construction Obtained from Municipal Surveys

**Municipalities**

| Pavement Layer | Description of pavement material | Unit Cost from Survey | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | NS | NB | | ON-1 | | | | ON-2 | TR |
| | | Halifax | Edmunston | Moncton | Brampton | Ottawa | Toronto | Niagara Falls | Thunder Bay | Yellowknife |
| Surface | HMA surface course, premium, t | | | | | $74.00 | | | | $128.00 |
| | HMA surface course, typical, t | $110.00 | $65.00 | $65.75 | $45.00 | $63.00 | $46.00 | $49.42 | $63.00 | $128.00 |
| | Asphalt surface treatment, $m^2$ | | | | | | | | | $5.27 |
| | Gravel surface, mm, t | | | | | | | | | $12.00 |
| | Gravel shoulder, mm, t | | | | | | | | | |
| Binder | HMA base course, premium, t | | | | | | | | | |
| | HMA base course, typical, t | $100.00 | $60.00 | $60.40 | $39.00 | $46.00 | $49.00 | $45.83 | $60.00 | |
| | | | | | | | | | | |
| OGDL | | | | | | | | $45.00 | | |
| Base | Crushed granular base, t | $30.16 | $9.50 | $10.60 | $16.00 | $17.37 | $22.00 | $13.01 | $13.00 | $18.85 |
| Subbase | Granular subbase, t | $24.21 | $9.00 | $11.33 | | $12.75 | $15.00 | $6.71 | $8.50 | $13.70 |
| Subdrains | Subdrains, m | | | | $17.50 | $25.00 | | $18.00 | | $18.00 |
| Drainage | Closed drainage, m | | | | | | | | | $260.00 |

**Table 38. Provincial Unit Costs for the Initial Pavement Construction Estimated from Surveys and Engineering Judgment (Partial Table)**

| Pavement Layer | Description of pavement material | Estimated Unit Cost | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 |
| Surface | HMA surface course, premium, t | $ 65.00 | $ 65.00 | $ 66.54 | $ 65.00 | $ 65.00 | $ 65.00 | $ 68.88 | $ 62.23 |
| | HMA surface course, typical, t | $ 60.00 | $ 50.00 | $ 53.25 | $ 50.00 | $ 60.00 | $ 60.00 | $ 57.29 | $ 57.64 |
| | Asphalt surface treatment, $m^2$ | $ 2.00 | $ 2.00 | $ 2.00 | $ 2.00 | Not used | Not used | $ 2.00 | $ 2.00 |
| | Gravel surface, t | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 |
| | Gravel shoulder, mm, t | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 |
| Binder | HMA base course, premium, t | $ 60.00 | $ 60.00 | $ 48.47 | $ 60.00 | $ 70.00 | $ 70.00 | $ 53.91 | $ 54.54 |
| | HMA base course, typical, t | $ 57.00 | $ 50.00 | $ 48.47 | $ 50.00 | $ 60.00 | $ 60.00 | $ 49.42 | $ 49.42 |
| | | | | | | | | | |
| OGDL | | Not used | Not used | Not used | Not used | Not used | Not used | $ 45.00 | $ 45.00 |
| Base | Crushed granular base, t | $ 12.60 | $ 12.00 | $ 12.20 | $ 12.00 | $ 11.00 | $ 11.00 | $ 13.01 | $ 10.90 |
| Subbase | Granular subbase, t | $ 10.40 | $ 10.00 | $ 11.00 | $ 10.00 | $ 6.50 | $ 6.50 | $ 6.71 | $ 7.97 |
| Subdrains | Subdrains, m | $ 20.00 | $ 20.00 | $ 20.00 | $ 20.00 | $ 20.00 | $ 20.00 | $ 18.00 | $ 20.00 |
| Subbase | Subgrade spot improvement, $m^2$ | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 |

**Table 39. Unit Costs for Pavement Maintenance and Rehabilitation Treatments Obtained from Provincial Surveys**

| Description of Maintanance and Rehabilitation Treatments | Unit Cost from Survey | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NS | ON-1 | ON-2 | QC-1 | QC-2 | MB | AB | BC-1 | BC-2 | TR |
| Crack seal, m | $1.50 | $2.00 | $2.00 | $2.00 | $1.75 | $1.75 | $2.00 | $5.53 | $1.50 | $1.50 | |
| Spot seal, $m^2$ | | | | | | | $1.75 | | | | |
| Seal coat, $m^2$ | | $3.00 | | | | | $1.50 | | | | |
| Spot repairs, Mill 40 to 50 and patch, m2 | $7.00 | $7.35 | $7.70 | $7.50 | $6.50 | $6.50 | $5.80 | | $15.00 | $20.00 | |
| Milling, t | $10.00 | $10.50 | $7.50 | $7.50 | $12.00 | $12.00 | | $3.69 | $4.00 | $5.00 | |
| Milling (about 50 mm), $m^2$ | | $3.50 | | | | | | | | | |
| Reconstruction, m2 | | | | | | | | | | | |
| Microsurfacing or thin overlay, m2 | | $5.00 | | | | | | | | | |
| Recycle AST and replace, m2 | | | | | | | | | | | $13.50 |

**Table 40. Provincial Unit Costs for Pavement Maintenance and Rehabilitation Estimated from Surveys and Engineering Judgment**

| Description of Maintanance and Rehabilitation Treatments | Estimated Unit Cost | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Rout and seal, m | $ 1.50 | $ 2.00 | $ 2.00 | $ 2.00 | $ 1.75 | $ 1.75 | $ 2.00 | $ 2.00 | $ 2.00 | $ 2.00 | $ 5.53 | $ 1.50 | $ 1.50 | $ 2.00 |
| Surface treatment or seal coat, m2 | $ 2.00 | $ 2.00 | $ 3.00 | $ 1.50 | $ 5.00 | $ 5.00 | $ 2.00 | $ 1.96 | $ 1.50 | $ 2.00 | $ 2.00 | $ 2.00 | $ 2.00 | $ 4.00 |
| Spot repairs, mill 40 to 50 and patch, m2 | $ 7.00 | $ 7.50 | $ 7.35 | $ 5.80 | $ 6.50 | $ 6.50 | $ 7.70 | $ 7.50 | $ 5.80 | $ 7.50 | $ 7.50 | $ 15.00 | $ 20.00 | $ 10.00 |
| Milling, t | $ 10.00 | $ 7.50 | $ 10.00 | $ 7.50 | $ 12.00 | $ 12.00 | $ 11.00 | $ 7.50 | $ 7.50 | $ 7.50 | $ 3.69 | $ 4.00 | $ 5.00 | $ 7.50 |
| Resurface with premium HMA, t | $ 60.00 | $ 50.00 | $ 53.25 | $ 65.00 | $ 65.00 | $ 65.00 | $ 75.00 | $ 75.00 | $ 65.00 | $ 65.00 | $ 57.30 | $ 65.00 | $ 70.00 | $ 65.00 |
| Resurface with typical HMA, t | $ 57.00 | $ 50.00 | $ 48.47 | $ 60.00 | $ 60.00 | $ 60.00 | $ 68.88 | $ 62.23 | $ 60.00 | $ 60.00 | $ 38.30 | $ 60.00 | $ 60.00 | $ 60.00 |
| Add to granular base, t | $ 12.60 | $ 12.00 | $ 12.20 | $ 10.60 | $ 15.00 | $ 15.00 | $ 13.00 | $ 10.90 | $ 10.60 | $ 12.00 | $ 16.00 | $ 20.00 | $ 25.00 | $ 12.00 |
| Granular roadway grading, km | $ 250.00 | $ 250.00 | $ 250.00 | $ 250.00 | $ 200.00 | $ 200.00 | $ 250.00 | $ 250.00 | $ 250.00 | $ 250.00 | $ 250.00 | $ 250.00 | $ 250.00 | $ 350.00 |

**Table 41. Initial Bridge Construction Costs Obtained from Provincial Surveys, $ per $m^2$ of the Bridge Deck Area**

| Initial cost, $/$m^2$ of bridge deck | | Initial unit construction cost from survey | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NL | NS | QC-1 | QC-2 | ON-1 | ON-2 | MB | AB | BC-1 | BC-2 | TR |
| Provincial | Freeway | $ - | $ 4,400.00 | $ 3,000.00 | $ 3,000.00 | $ 2,675.00 | $ 3,350.00 | $ 3,700.00 | $ 2,500.00 | $1,800.00 | $1,900.00 | |
| | Arterial | $ 2,500.00 | $ 3,800.00 | $ 3,000.00 | $ 3,000.00 | $ 2,675.00 | $ 3,350.00 | $ 3,300.00 | $ 2,500.00 | $1,800.00 | $1,900.00 | $4,800.00 |
| | Collector | $ 2,500.00 | $ 3,600.00 | $ 3,000.00 | $ 3,000.00 | $ 2,675.00 | $ 3,350.00 | $ 2,500.00 | $ 2,500.00 | $1,800.00 | $1,900.00 | $4,800.00 |
| | Local | $ 2,500.00 | $ 3,100.00 | $ 3,000.00 | $ 3,000.00 | $ 2,675.00 | $ 3,350.00 | $ 2,100.00 | $ 2,500.00 | $1,800.00 | $1,900.00 | $4,800.00 |
| Municipal | Arterial | | | $ 4,000.00 | $ 4,000.00 | | | | | | | |
| | Collector | | | $ 4,000.00 | $ 4,000.00 | | | | | | | |
| | Local | | | $ 4,000.00 | $ 4,000.00 | | | | | | | |

**Table 42. Unit Costs for Initial Bridge Construction, $ $m^2$ of Bridge Deck Area Estimated from Surveys and Engineering Judgment**

| Initial cost, $/$m^2$ of bridge deck | | Estimated Unit Construction Costs, $ | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Provincial | Freeway | $2,500 | $4,000 | $4,400 | $4,000 | $3,000 | $3,000 | $2,675 | $3,350 | $3,700 | $4,000 | $4,000 | $1,800 | $1,900 | $4,800 |
| | Arterial | $2,500 | $3,600 | $3,800 | $3,600 | $3,000 | $3,000 | $2,675 | $3,350 | $3,300 | $3,600 | $3,600 | $1,800 | $1,900 | $4,800 |
| | Collector | $2,500 | $3,000 | $3,600 | $3,000 | $3,000 | $3,000 | $2,675 | $3,350 | $2,500 | $3,000 | $3,000 | $1,800 | $1,900 | $4,800 |
| | Local | $2,500 | $2,600 | $3,100 | $2,600 | $3,000 | $3,000 | $2,675 | $3,350 | $2,100 | $2,600 | $2,600 | $1,800 | $1,900 | $4,800 |
| Municipal | Arterial | $2,800 | $4,000 | $4,200 | $4,000 | $4,000 | $4,000 | $3,000 | $3,700 | $3,600 | $4,000 | $4,000 | $2,000 | $2,100 | $5,300 |
| | Collector | $2,800 | $4,000 | $4,200 | $4,000 | $4,000 | $4,000 | $3,000 | $3,700 | $3,600 | $4,000 | $4,000 | $2,000 | $2,100 | $5,300 |
| | Local | $2,800 | $4,000 | $4,200 | $4,000 | $4,000 | $4,000 | $3,000 | $3,700 | $3,600 | $4,000 | $4,000 | $2,000 | $2,100 | $5,300 |

**Table 43. Top Part: Unit cost of Bridge Maintenance and Rehabilitation Treatments Obtained from Provincial Surveys, $ per $m^2$ of the Bridge Deck Area**

**Bottom Part: Frequency of Bridge Maintenance and Rehabilitation Treatments Obtained from Provincial Surveys, Years**

| Cost of M&R treatments, $/$m^2$ of bridge deck | | Unit M&R Cost from Survey, $ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NL | NS | QC-1 | QC-2 | ON-1 | ON-2 | MB | AB | BC-1 | BC-2 | TR |
| Provincial | Freeway | | $ 500.00 | $ 650.00 | $ 650.00 | $ 750.00 | $ 975.00 | $1,600.00 | $ 9.50 | $ 1,000.00 | $ 1,000.00 | |
| | Arterial | $ 574.00 | $ 400.00 | $ 650.00 | $ 650.00 | $ 666.67 | $ 866.67 | $1,600.00 | $ 9.50 | $ 1,000.00 | $ 1,000.00 | $ 1,028.00 |
| | Collector | $ 500.00 | $ 325.00 | $ 650.00 | $ 650.00 | $ 541.67 | $ 704.17 | $1,600.00 | $ 9.50 | $ 1,000.00 | $ 1,000.00 | $ 1,028.00 |
| | Local | $ 750.00 | $ 250.00 | $ 650.00 | $ 650.00 | $ 450.00 | $ 585.00 | $1,600.00 | $ 9.50 | $ 1,000.00 | $ 1,000.00 | $ 1,028.00 |
| Municipal | Arterial | | | $ 700.00 | $ 700.00 | | | | | | | |
| | Collector | | | $ 700.00 | $ 700.00 | | | | | | | |
| | Local | | | $ 700.00 | $ 700.00 | | | | | | | |

| Frequency between M&R treatments, years | | Frequency between M&R Treatments from Survey, years | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NL | NS | QC-1 | QC-2 | ON-1 | ON-2 | MB | AB | BC-1 | BC-2 | TR |
| Provincial | Freeway | 0 | 17 | 25 | 30 | 30 | 25 | 20 | 4 | 35 | 35 | |
| | Arterial | 25 | 17 | 25 | 30 | 30 | 25 | 20 | 4 | 35 | 35 | 17 |
| | Collector | 25 | 17 | 25 | 30 | 30 | 25 | 20 | 4 | 35 | 35 | 17 |
| | Local | 25 | 17 | 25 | 30 | 30 | 25 | 20 | 4 | 35 | 35 | 17 |
| Municipal | Arterial | | | 20 | 20 | | | | | | | |
| | Collector | | | 20 | 20 | | | | | | | |
| | Local | | | 20 | 20 | | | | | | | |

**Table 44. Unit Costs for Bridge Maintenance and Rehabilitation Estimated from Surveys and Engineering Judgment**

| Cost of M&R treatments, $/m$^2$ of bridge deck | | Estimated Unit M&R Costs, $ | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Provincial | Freeway | $750.00 | $750.00 | $500.00 | $750.00 | $650.00 | $650.00 | $750.00 | $975.00 | $1,600.00 | $750.00 | $750.00 | $1,000.00 | $1,000.00 | $1,028.00 |
| | Arterial | $574.00 | $600.00 | $400.00 | $600.00 | $650.00 | $650.00 | $666.67 | $866.67 | $1,600.00 | $600.00 | $600.00 | $1,000.00 | $1,000.00 | $1,028.00 |
| | Collector | $500.00 | $500.00 | $325.00 | $500.00 | $650.00 | $650.00 | $541.67 | $704.17 | $1,600.00 | $500.00 | $500.00 | $1,000.00 | $1,000.00 | $1,028.00 |
| | Local | $750.00 | $400.00 | $250.00 | $400.00 | $650.00 | $650.00 | $450.00 | $585.00 | $1,600.00 | $400.00 | $400.00 | $1,000.00 | $1,000.00 | $1,028.00 |
| Municipal | Arterial | $650.00 | $675.00 | $450.00 | $700.00 | $700.00 | $700.00 | $750.00 | $950.00 | $1,750.00 | $700.00 | $700.00 | $1,100.00 | $1,100.00 | $1,150.00 |
| | Collector | $650.00 | $675.00 | $450.00 | $700.00 | $700.00 | $700.00 | $750.00 | $950.00 | $1,750.00 | $700.00 | $700.00 | $1,100.00 | $1,100.00 | $1,150.00 |
| | Local | $650.00 | $675.00 | $450.00 | $700.00 | $700.00 | $700.00 | $750.00 | $950.00 | $1,750.00 | $700.00 | $700.00 | $1,100.00 | $1,100.00 | $1,150.00 |

## All Other Road Infrastructure Component

Initial Construction

Unit costs for the initial construction of the all other infrastructure component, obtained from provincial surveys to date are summarized in Table 45. Corresponding estimated costs are shown in Table 46. Estimated costs are based on the survey costs and engineering judgement. A full version of Table 46 is given in Appendix D.

**Table 45. Unit Costs for the Initial Construction of the All Other Component Obtained by Provincial Surveys**

| Work item (supply and install) | | Provincial Costs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Description and type of work item | | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Clearing and grubbing ($m^2$) | | $ 3.00 | $ 3.00 | $ 2.09 | $ 0.80 | $ 0.20 | $ 0.20 | | $ 5.00 | $ 5.00 | |
| Grading | Earth excavation ($m^3$) | $ 5.00 | $ 5.00 | $ 7.15 | $ 5.50 | $ 2.42 | $ 1.45 | | $ 10.00 | $ 10.00 | $ 12.50 |
| | Rock excavation ($m^3$) | $ 17.00 | $ 17.00 | $ 19.56 | $ 86.74 | $ 12.96 | | $ 6.24 | $ 15.00 | $ 15.00 | |
| | Extra fill ($m^3$) | | | $ 6.70 | $ 10.81 | | | | $ 10.00 | $ 10.00 | $ 21.00 |
| Land-Scaping | Sodding and top soil ($m^2$) | $ 5.50 | $ 5.50 | $ 3.32 | $ 4.35 | $ 7.70 | | $ 0.23 | $ 10.00 | $ 10.00 | |
| | Top soil ($m^3$) | $ 9.00 | $ 9.00 | $ 1.80 | $ 2.40 | $ 64.40 | | $ 0.42 | $ 10.00 | $ 10.00 | |
| Drainage | PCC curb and gutter (m) | $ 41.50 | $ 41.50 | $ 50.00 | $ 55.00 | $ 40.32 | | | $ 2,000.00 | $ 2,000.00 | |
| | 500 mm Pipe culvert & end sections (r | $ 130.00 | $ 130.00 | $ 112.21 | $ 139.25 | $ 40.32 | $ 50.00 | $ 126.84 | $ 1,500.00 | $ 1,500.00 | $ 620.00 |
| | 1500 mm wide box culvert (m) | $ 1,450.00 | $ 1,450.00 | $ 1,534.70 | $ 1,700.00 | | | | $ 3,000.00 | $ 3,000.00 | |
| | Storm water sewers (m) | $ 105.00 | $ 105.00 | $ 50.00 | $ 60.00 | | | | $ 3.00 | $ 3.00 | |
| Guard Rail | Concrete median (m) | $ 120.00 | $ 120.00 | $ 200.18 | $ 220.00 | $ 140.00 | | | $ 100.00 | $ 100.00 | |
| | Steel guide rail at shoulder (m) | $ 48.00 | $ 48.00 | $ 65.98 | $ 70.00 | $ 74.00 | | $ 62.80 | | | $ 500.00 |
| | 3-Cable guide rail at shoulder (m) | $ 40.00 | $ 40.00 | $ 15.40 | $ 18.00 | | | $ 130.75 | | | |
| Fencing, Gates | Chain link fence (m) | $ 30.00 | $ 30.00 | $ 44.44 | $ 70.27 | | | | $ 60.00 | $ 60.00 | $ 30.00 |
| | Sound walls and privacy fences (m) | | | | | | | | $ 250.00 | $ 250.00 | |
| | Wire fence (m) | $ 12.00 | $ 12.00 | $ 8.54 | $ 13.09 | $ 4.00 | $ 3.50 | $ 3.98 | $ 15.00 | $ 15.00 | |
| Lighting | High mast (one luminaire mast) | $ 40,000.00 | $ 40,000.00 | $ 29,635.78 | $ 29,000.00 | | | | $ 200,000.00 | $ 200,000.00 | |
| | Standard mast (luminaire) | $ 3,900.00 | $ 3,900.00 | $ 1,297.61 | $ 1,300.00 | $ 2,000.00 | | $ 3,654.00 | $ 150,000.00 | $ 150,000.00 | |
| Painting of Traffic Lanes (m) | | $ 0.40 | $ 0.40 | $ 0.91 | $ 1.03 | $ 300.00 | | | $ 2,000.00 | $ 2,000.00 | |

**Table 46. Unit Costs for the Initial Construction of the All Other Component Used in the Computational Model Estimated from Surveys and Engineering Judgment (Partial Table)**

| Work item (supply and install) | | Provincial Costs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Description and type of work item | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB |
| Clearing and grubbing ($m^2$) | | $ 2.00 | $ 1.00 | $ 2.00 | $ 2.00 | $ 3.00 | $ 3.00 | $ 2.09 | $ 2.00 | $ 1.00 |
| Grading | Earth moving ($m^3$) | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 7.15 | $ 5.50 | $ 2.42 |
| | Rock moving ($m^3$) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 17.00 | $ 17.00 | $ 40.00 | $ 86.74 | $ 50.00 |
| Land-Scaping | Sodding and top soil ($m^2$) | $ 4.00 | $ 4.00 | $ 4.00 | $ 4.00 | $ 5.50 | $ 5.50 | $ 3.32 | $ 4.35 | $ 7.70 |
| | Top soil ($m^3$) | $ 10.00 | $ 10.00 | $ 10.00 | $ 10.00 | $ 9.00 | $ 9.00 | $ 10.00 | $ 15.00 | $ 10.00 |
| Drainage | PCC curb and gutter (m) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 41.50 | $ 41.50 | $ 50.00 | $ 55.00 | $ 40.32 |
| | 500 mm Pipe culvert & end sections (m) | $ 125.00 | $ 100.00 | $ 125.00 | $ 125.00 | $ 130.00 | $ 130.00 | $ 112.21 | $ 139.25 | $ 40.32 |
| | 1500 mm wide box culvert (m) | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,450.00 | $ 1,450.00 | $ 1,534.70 | $ 1,700.00 | $ 2,000.00 |
| | Storm water sewers (m) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 105.00 | $ 105.00 | $ 50.00 | $ 60.00 | $ 50.00 |
| Guard Rail | Concrete median (m) | $ 200.00 | $ 200.00 | $ 200.00 | $ 200.00 | $ 120.00 | $ 120.00 | $ 200.18 | $ 220.00 | $ 140.00 |
| | Steel guiderail (m) | $ 75.00 | $ 75.00 | $ 75.00 | $ 75.00 | $ 48.00 | $ 48.00 | $ 65.98 | $ 70.00 | $ 74.00 |
| | 3-Cable guiderail (m) | $ 15.00 | $ 15.00 | $ 15.00 | $ 15.00 | $ 40.00 | $ 40.00 | $ 15.40 | $ 18.00 | $ 15.00 |
| Fencing, Gates | Chain link fence (m) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 30.00 | $ 30.00 | $ 44.44 | $ 70.27 | $ 50.00 |
| | Wire fence (m) | $ 7.00 | $ 7.00 | $ 7.00 | $ 7.00 | $ 12.00 | $ 12.00 | $ 8.54 | $ 13.09 | $ 4.00 |
| Lighting | High mast (each) | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 40,000.00 | $ 40,000.00 | $ 29,635.78 | $ 29,000.00 | $ 30,000.00 |
| | Standard (each) | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 3,900.00 | $ 3,900.00 | $ 1,297.61 | $ 1,300.00 | $ 2,000.00 |
| Painting of Traffic Lanes (m) | | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 | $ 0.40 | $ 0.40 | $ 0.91 | $ 1.03 | $ 1.00 |

Maintenance and Rehabilitation

Maintenance and rehabilitation costs for the all other infrastructure component were estimated considering the unit costs for the initial construction costs (Table 46). It was assumed that some of the initially constructed components will need replacement during the 60-year analysis period. The estimated initial life spans for the major items of the all other component are given in Table 47.

**Table 47. Life Span of the All Other Infrastructure Component Estimated from Surveys and Engineering Judgment**

| Work item (supply and install) | | Life span in years | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description and type of work Item | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Drainage | PCC curb and gutter | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 500 mm pipe culvert & end sections | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | 1500 mm wide box culvert | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | Storm water sewers | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Guard Rail | Concrete median | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | Steel guiderail | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | 3-Cable guiderail | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Fencing, Gates | Chain link fence | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | Wire fence | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Lighting | High mast | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | Standard | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Painting of Traffic Lanes | | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

**Routine Maintenance Costs**

Routine maintenance includes minor repairs to road infrastructure (such as filling potholes, minor guide rail repairs, minor bridge repairs, and repairs to electrical systems), roadside maintenance (such as cutting grass, litter removal, and maintenance of ditches and drainage channels), maintenance of traffic control devices (such as painting of traffic control lines, maintenance of traffic signs and lights), and miscellaneous expenses (such as cost electricity to operate lighting).

Many factors influence routine maintenance costs. Routine maintenance costs per lane km depend on the width of the traffic lane and the associated features (shoulder type and width, roadside width), traffic volumes, pavement type and condition, age of pavement and other infrastructure components, geographical region, and the level of service.

Data Challenges

*Missing data.* Typically, agencies do not record routine maintenance costs segregated by road functional class. Also ARA did not receive data from some of the provincial agencies.

*Definition of routine maintenance costs*. There is no universally accepted definition of routine maintenance treatments or activities in Canada. For example, some agencies consider sealing of cracks in asphalt concrete pavements to be a routine maintenance activity, whereas other agencies consider this treatment to be a rehabilitation activity requiring capital cost because it was planned in advance and carried out by external forces.

*Accounting for the full cost of routine maintenance*. It is not always clear from the survey responses if the reported routine maintenance costs include all in-house costs. For example, an agency may include in the

routine maintenance costs the labour and material costs for painting of traffic control lines, but not the associated cost for the purchase of the painting equipment and for the facilities to store and maintain the equipment.

*Estimation of the 2-lane equivalent kilometres*. To obtain consistent results, the centreline km reported by some of the survey respondents were converted to 2-lane equivalent kilometres. The conversion was done by considering the network size and its division among arterial, collector, and local roadways.

*Inclusion of residential streets*. Several municipalities reported the total cost of routine maintenance expenditures that included residential streets. Unit routine maintenance expenditures on residential streets are typically lower than for other roads.

*Effect of sidewalks*. Using the survey data obtained from municipalities, it was not always possible to ensure that routine maintenance costs for sidewalks are fully accounted for and excluded from the total cost estimates for routine maintenance.

Survey Data

Unit costs for routine maintenance are summarized in Table 48 in terms of an annual cost per 2-lane equivalent km. In addition, Table 48 provides unit routine maintenance costs obtained from a literature survey and other sources.

Estimated Routine Maintenance Cost

An example of the estimated routine maintenance costs used in the computational model is shown in Table 49. The estimated unit costs are based on survey data and engineering judgement.

**Winter Maintenance Costs**

The cost of winter maintenance includes the cost of the field operations and the costs of all other associated and supporting activities and facilities. The supporting activities and facilities include, for example, storage of salt and winter sand, snow removing equipment, facilities that house the equipment, and weather reporting and communication systems. Pick-up and disposal (or recycling) of winter sand is typically part of the routine maintenance.

There are several factors influencing winter maintenance costs. Winter maintenance costs depend on environmental zone (snow and ice precipitation), the level of service, traffic volumes, and the application of technology to minimize snow drifting (such as geometric highway design, snow fences) and to clear snow and ice (e.g., weather reporting, pavement sensors, pre-wetting of salt, etc.).

Data Challenges

*Missing data.* Typically, agencies do not record winter maintenance costs segregated by road functional class. Also, data was not received from some of the provincial agencies.

*Accounting for full costs*. It is not always clear from survey responses if the reported winter maintenance costs fully account for in-house costs. For example, an agency may report the annual labour and material costs for winter maintenance, but not the associated costs for the purchase and storage of snow removing equipment and for facilities used to store road salt.

**Table 48. Annual Cost of Routine Maintenance Operations Obtained from Surveys**

| Province | Total annual routine maintenance budget, millions of $ | Total length of 2-lane equivalent km | Routine maintenance cost per 2-lane equivalent km, $ | Source and comments |
|---|---|---|---|---|
| NF | 21.0 | 8,898 | 2,360 | **Province**. Budget included administration costs and equipment maintenance cost of $966 per 2-lane equivalent km |
| PE | 0.275 | 156 | 1,762 | **City of Summerside**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.2 |
| NS | 50.0 | 22,789 | 2,194 | **Province**. Includes 8,980 km of gravel roads |
| | 8.07 | 2,318 | 3,483 | Regional Municipality of Halifax. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.3. |
| NB | 42.6 | 17,965 | 1,186 | **Province**. The type of road length is not defined |
| | 1.15 | 250 | 4,604 | **Ville d'Edmunston**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.2 |
| | 1.05 | 796 | 1,324 | City of Moncton. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.2 |
| QC | 125 | 28,273 | 4,421 | **Province** |
| | 10.4 | 2,463 | 4,222 | **City of Ville de Longueuil**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.5. |
| ON | | | 2,666 | **A representative of IMOS** (a private company specializing in road maintenance). Estimates given for Southern Ontario |
| | 2.39 | 3,148 | 759 | **City of Brampton** |
| | 23.77 | 7,057 | 3,369 | **City of Ottawa**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.8 |
| | 2.64 | 854 | 3,097 | **City of Niagara Falls**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.3 |
| MB | 44.6 | 19,112 | 1,167 | **Province**. Only total amount was provided |
| | 17.7 | 8,620 | 2,052 | **City of Winnipeg**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.6 |
| SK | 46.6 | 44,636 | 1,045 | **Province**. Total length includes 25,883 km of local roads |
| | 2.81 | 1,332 | 2,106 | **City of Regina**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.3 |
| AB | | | | |
| BC | 113.75 | 13,074 | 8,700 | **Province**. The type of road length is not defined |
| YT | 6.495 | 4,760 | 1.364 | **Territory** |
| NT | 0.250 | 82 | 3,049 | **City of Yellowknife** |
| California | 767 | 80,000 | 9,587 | **Reference 13**. 35.5 % of the cost is for roadside maintenance. Costs are in USD. |

Note: Province (in the column entitled Comment) means that the data are based on a survey carried out as part of this study.

**Table 49. Annual Unit Routine Maintenance Costs Estimated from Surveys and Engineering Judgment Used in the Computational Model**

| Description and type of Work Item | Regions | Provincial | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local |
| Routine maintenace | NL | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 |
| | PE | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 |
| | NS | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 |
| | NB | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 |
| | QC-1 | $ 3,464 | $ 3,247 | $ 2,930 | $ - | $ 3,680 | $ 3,464 | $ 3,178 | $ - |
| | QC-2 | $ 3,464 | $ 3,247 | $ 2,930 | $ - | $ 3,680 | $ 3,464 | $ 3,178 | $ - |
| | ON-1 | $ 3,500 | $ 3,250 | $ 3,000 | $ 2,750 | $ 3,750 | $ 3,500 | $ 3,250 | $ 3,000 |
| | ON-2 | $ 3,250 | $ 3,000 | $ 2,750 | $ 2,500 | $ 3,500 | $ 3,250 | $ 3,000 | $ 2,750 |
| | MB | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 |
| | SK | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 |
| | AB | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 |
| | BC-1 | $ 3,250 | $ 3,000 | $ 2,750 | $ 2,500 | $ 3,500 | $ 3,250 | $ 3,000 | $ 2,750 |
| | BC-2 | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 |
| | TR | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 |

| Description and type of Work Item | Regions | Municipal | | | | | |
|---|---|---|---|---|---|---|---|
| | | Rural | | | Urban | | |
| | | Arterial | Collector | Local | Arterial | Collector | Local |
| Routine maintenace | NL | $ 2,000 | $ 1,750 | $ 750 | $ 2,250 | $ 2,000 | $ 1,750 |
| | PE | $ 1,850 | $ 1,750 | $ 750 | $ 2,000 | $ 1,900 | $ 1,800 |
| | NS | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | NB | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | QC-1 | $ 3,500 | $ 3,250 | $ 1,250 | $ 3,750 | $ 3,500 | $ 3,250 |
| | QC-2 | $ 3,500 | $ 3,250 | $ 1,250 | $ 3,750 | $ 3,500 | $ 3,250 |
| | ON-1 | $ 3,250 | $ 3,000 | $ 1,000 | $ 3,500 | $ 3,250 | $ 3,000 |
| | ON-2 | $ 3,000 | $ 2,750 | $ 750 | $ 3,250 | $ 3,000 | $ 2,750 |
| | MB | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | SK | $ 2,000 | $ 500 | $ 250 | $ 2,500 | $ 2,250 | $ 2,000 |
| | AB | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | BC-1 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | BC-2 | $ 2,000 | $ 1,850 | $ 1,000 | $ 2,500 | $ 2,250 | $ 2,000 |
| | TR | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |

Note: All costs are per two lane equivalent kilometre.

*Estimation of the 2-lane equivalent kilometres*. To obtain consistent results, we have converted centreline km reported by some of the survey respondents to 2-lane equivalent kilometres. The conversion was done by considering the network size and its division among arterial, collector, and local roadways.

*Inclusion of residential streets*. Several municipalities reported the total cost of winter maintenance expenditures that included residential streets. Unit winter maintenance expenditures for residential streets are typically lower than for other roads.

*Effect of sidewalks*. Using the survey data obtained from municipalities, it was not always possible to ensure that winter maintenance costs for sidewalks are fully accounted for and excluded from the total cost estimates for winter maintenance.

Survey Data

Unit cost data for winter maintenance received to date are summarized in Table 50 in terms of annual costs per 2-lane equivalent km. In addition, Table 50 provides unit winter maintenance costs obtained from a literature survey and other sources.

**Table 50. Annual Cost of Winter Maintenance Operations Obtained from Surveys**

| Province | Total annual routine maintenance budget millions of $ | Total length of 2-lane equivalent km | Routine maintenance cost per 2-lane equivalent km | Comment |
|---|---|---|---|---|
| NF | 60.8 | 8,898 | 6,833 | **Province.** Budget included administration costs and equipment maintenance cost of $1,821per 2-lane equivalent km |
| PE | 0.40 | 156 | 2,564 | **City of Summerside**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.2 |
| NS | 44 | 22,789 | 1,931 | **Province.** Includes 8,980 km of gravel roads |
| | | | $1,087 | **NCHRP Synthesis 344 [12]** |
| | 8.5 | 2,318 | 3,667 | **Regional Municipality of Halifax**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.3. |
| NB | 62.2 | 17,965 | 1,731 | **Province.** Road length is for centreline kilometres |
| | | | 3,600 | **NCHRP Synthesis 344** |
| | 1.25 | 250 | 5,000 | **Ville d'Edmunston**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.2 |
| | 1.05 | 796 | 1,324 | **City of Moncton.** 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.2 |
| QC | 240 | 28,273 | 8,489 | **Province** |
| | | | 10,090 | **NCHRP Synthesis 344 [12]** |
| | 25.3 | 2,463 | 10,275 | **City of Ville de Longueuil**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.5. Cost may include sidewalks. |
| ON | | | 5,333 | **IMOS** (a private company specializing in road maintenance) for Southern Ontario |
| | | | 5,000 to 3,000 | **Ontario Roads Coalition [2]** $5,000 per 2-lane km for Regional roads and about $3,000 for county roads in Southern Ontario |
| | 3.82 | 3,148 | 1,214 | **City of Brampton** |
| | 37,59 | 7,057 | 6,743 | City of Ottawa. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.8 |
| | 0.87 | 344 | 2,543 | **City of Niagara Falls**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.3 |
| MB | 27.0 | 18,626 | 706 | **Province.** Only total amount was provided |
| | 14.2 | 8,620 | 1,646 | **City of Winnipeg**. 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.6 |
| SK | 24.5 | 44,616 | 549 | **Province.** total length includes 25,883 km of local roads |
| | | | 1,375 | **NCHRP Synthesis 344 [12]** |
| | 1.95 | 1,332 | 1,468 | **City of Regina.** 2-lane equivalent km estimated from centreline km by multiplying non-residential roads by 1.3 |
| AB | | | 4,344 | **NCHRP Synthesis 344 [12]**. The cost was the highest cost per lane km in 10 years prior to 96/97. Assumes that NCHRP data are in CND per mile. |
| | | | 12,000 | **NCHRP Synthesis 344 [12]** |
| BC | 113.75 | 13,074 | 16,158 | **Province.** The type of road length is not defined |
| YT | 6.495 | 4,760 | 1,364 | **Territory** |
| YT | 0.325 | 82 | 3,963 | **City of Yellowknife** |
| Minnesota | | | 835 | **NCHRP Synthesis 344 [12]**. In USD |

Note: Province (in the column entitled Comment) means that the data are based on a survey carried out as part of this study.

Estimated Winter Maintenance Cost

Estimated winter maintenance costs used in the computational model are summarized in Table 51. The estimates are based on survey data and engineering judgement. According to Table 51, winter maintenance costs are higher, for the same road functional class, on provincial roads than on municipal roads. The higher costs on provincial roads are probably due to higher winter maintenance standards on provincial roads necessitated by higher traffic volumes and speeds.

**Table 51. Annual Unit Winter Maintenance Costs Estimated from Surveys and Engineering Judgment Used in the Computational Model**

| Description and type of work item | Regions | Provincial | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local |
| Winter maintenance | NL | $ 7,500 | $ 7,000 | $ 6,500 | $ 6,000 | $ 8,000 | $ 7,500 | $ 7,000 | $ 6,500 |
| | PE | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 |
| | NS | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,000 | $ 5,000 | $ 4,500 | $ 4,000 | $ 3,500 |
| | NB | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,000 | $ 5,000 | $ 4,500 | $ 4,000 | $ 3,500 |
| | QC-1 | $ 9,334 | $ 7,468 | $ 6,101 | $ - | $ 11,201 | $ 9,334 | $ 7,168 | $ - |
| | QC-2 | $ 9,334 | $ 7,468 | $ 6,101 | $ - | $ 11,201 | $ 9,334 | $ 7,168 | $ - |
| | ON-1 | $ 6,000 | $ 5,000 | $ 4,000 | $ 4,000 | $ 6,000 | $ 5,500 | $ 5,000 | $ 5,000 |
| | ON-2 | $ 5,500 | $ 4,000 | $ 3,000 | $ 2,000 | $ 5,500 | $ 5,000 | $ 4,500 | $ 4,500 |
| | MB | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 |
| | SK | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 |
| | AB | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,000 | $ 5,000 | $ 4,500 | $ 4,000 | $ 3,500 |
| | BC-1 | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 |
| | BC-2 | $ 5,500 | $ 4,000 | $ 3,000 | $ 2,000 | $ 5,500 | $ 5,000 | $ 4,500 | $ 4,500 |
| | TR | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 |

| Description and type of work item | Regions | Municipal | | | | | |
|---|---|---|---|---|---|---|---|
| | | Rural | | | Urban | | |
| | | Arterial | Collector | Local | Arterial | Collector | Local |
| Winter maintenance | NL | $ 6,500 | $ 6,000 | $ 2,500 | $ 7,000 | $ 6,500 | $ 6,000 |
| | PE | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |
| | NS | $ 3,500 | $ 3,000 | $ 2,500 | $ 4,000 | $ 3,500 | $ 3,000 |
| | NB | $ 3,500 | $ 3,000 | $ 2,500 | $ 4,000 | $ 3,500 | $ 3,000 |
| | QC-1 | $ 7,500 | $ 6,500 | $ 2,500 | $ 8,500 | $ 7,500 | $ 6,500 |
| | QC-2 | $ 7,500 | $ 6,500 | $ 2,500 | $ 8,500 | $ 7,500 | $ 6,500 |
| | ON-1 | $ 4,500 | $ 3,500 | $ 2,500 | $ 5,000 | $ 4,000 | $ 3,500 |
| | ON-2 | $ 4,000 | $ 3,000 | $ 2,000 | $ 4,500 | $ 3,500 | $ 3,000 |
| | MB | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |
| | SK | $ 2,500 | $ 1,500 | $ 500 | $ 3,000 | $ 3,000 | $ 2,500 |
| | AB | $ 3,500 | $ 3,000 | $ 2,500 | $ 4,000 | $ 3,500 | $ 3,000 |
| | BC-1 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |
| | BC-2 | $ 4,000 | $ 3,000 | $ 2,000 | $ 4,500 | $ 3,500 | $ 3,000 |
| | TR | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |

Note: All costs are per two lane equivalent kilometre.

# 9. COMPUTATIONAL MODEL

The calculation of annualized costs was carried out using an Microsoft Excel©-based computational model. The computational model represents the core of the study because it links extensive arrays of input data with the end result: estimated annualized full cost of road infrastructure by representative road classes (per one kilometre of a single traffic lane).

The functional capabilities of the model include the following features:

- Automated linkage between input values and calculated results. For example, it is possible to change a unit construction cost for a specific part of the road infrastructure and the change is automatically reflected in the end result.
- Suitability for sensitivity analysis. For example, it is possible to change key input data in the Universal Input Sheet to carry out sensitivity analysis in terms of the discount rate.
- Aggregation of results. The model enables to aggregate annualized costs and road inventory data across the entire road network or part of the network.
- Modular design. The key input unit cost and quantity data are grouped in specific worksheets for clarity and ease of future modifications.

**Description of the Computational Model**

The model was created in Excel© because of its versatile nature and its ability to facilitate the investigation of the "what if" situations associated with this project. The model allows for the input values to be easily changed with the annualized costs automatically recalculating.

Due to the large number of input parameters associated with the cost of roadway infrastructure, the computational model incorporates a series of workbooks representing the different components of roadway inventory. Each workbook is then subdivided into a series of worksheets that contain the input values, the intermediate calculations, and the required output values.

The main parts of the computational model are shown in the model flowchart in Figure 4. Table 52 outlines the workbooks and worksheets that constitute the computational model. A complete set of input and output tables for the computational model is given in Appendix D.

**How to use the Model**

The computational model used to estimate the representative annualized road costs was developed as a suite of linked Excel© worksheets. Changes in one worksheet are automatically propagated throughout the suite. Thus, changing input data in one worksheet automatically changes the results.

Workbook Linkage

As can be seen in the upper left hand corner of Figure 4, the Main.xls workbook is used to contain not only the universal inputs, but also the summary of the entire roadway infrastructure. This workbook is the central link combining all of the other workbooks.

When opening any of the workbooks, Microsoft© Excel will verify that the user wants to maintain the linkage between the various workbooks. The screen capture from Excel© 2003, given in Figure 5, shows the dialog box used to update workbook connectivity. To work with the computational model, the user should click on the button labelled 'Update' (Figure 5).

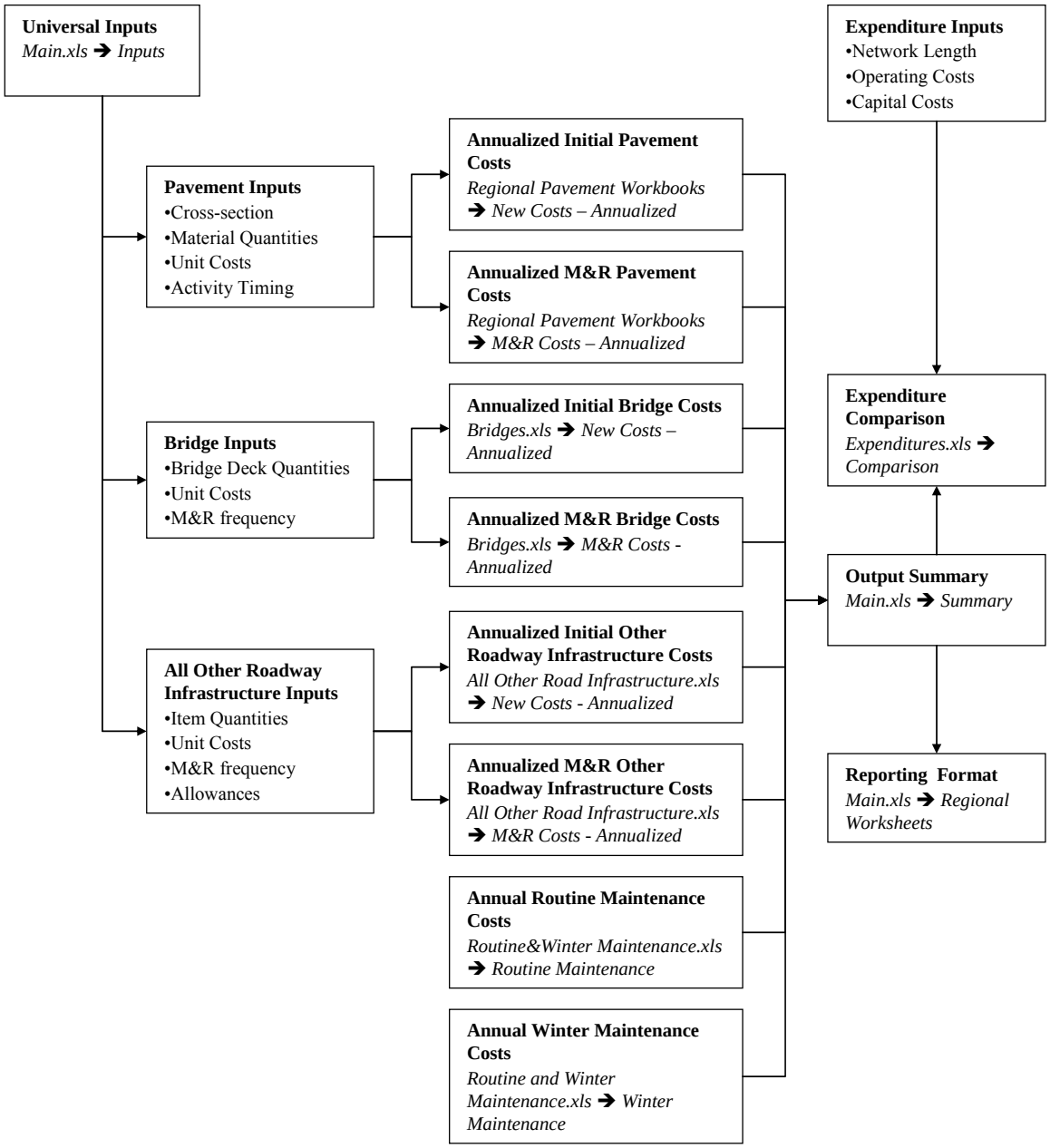



**Figure 4. Computational Model Flowchart**

**Table 52. Description of Computational Model Files**

| Workbook name | Worksheet name | Worksheet description |
|---|---|---|
| Main.xls | Input | This worksheet contains the universal inputs that affect the annualized costs. |
| | Age | This worksheet contains the average age of the infrastructure components. |
| | Raw Summary | This worksheet is used to summarize the annualized costs of all roadway infrastructure components provided in the various other workbooks, in terms of a 2-Lane km roadway. |
| | Summary | This worksheet is used to summarize the deteriorated, adjusted, annualized costs of all roadway infrastructure components per single Lane km roadway. |
| | Region Worksheets (NL, PE, NS, NB, QC-1, QC-2, ON-1, ON-2, MB, SK, AB, BC-2, BC-2, TR) | These worksheets contain the final reporting format. They show the annualized roadway costs per lane km of roadway. |
| Bridges.xls | Quantities | This worksheet contains the values that show the average number of square metres of bridge deck per 2-lane km of roadway. |
| | Unit Costs | This worksheet contains the initial construction cost, the maintenance and rehabilitation costs, and the frequency of the maintenance. |
| | New Costs | This worksheet uses the quantities and unit costs to calculate the cost of new bridges per 2-lane km. |
| | New Costs – Annualized | This worksheet contains the new costs calculated in the previous sheet as an annualized value over the analysis period at the discount rate. |
| | M&R Costs - Annualized | This worksheet contains the annualized costs (per 2-lane km) of all the bridge maintenance and rehabilitation activities within the analysis period annualized over the design period. |
| All Other Road Infrastructure.xls | Unit Costs | This worksheet contains the unit costs of the key items representing all other road infrastructure. |
| | Quantities | This worksheet contains information on the quantity of the various items on the different road categories. |
| | Service Lives | This worksheet contains the expected service lives of the other road infrastructure items. These represent the age at which these items need to be replaced. |
| | Allowances | This worksheet contains the mark up rate that will be used to account for all other road infrastructure components that are not specifically listed. |

| Workbook name | Worksheet name | Worksheet description |
|---|---|---|
| | New Costs | This worksheet has the cost of all key items per 2-lane km. |
| | New Costs – Annualized | This worksheet contains the new costs calculated in the previous sheet as an annualized value over the analysis period at the discount rate. |
| | M&R Costs - Annualized | This worksheet contains the annualized costs (per 2-lane km) of the maintenance and rehabilitation of the key items within the analysis period annualized over the design period. |
| Routine and Winter Maintenance.xls | Routine Maintenance | This worksheet contains the annual cost of performing routing maintenance on a 2-lane km of roadway. |
| | Winter Maintenance | This worksheet contains the annual cost of performing winter maintenance on a 2-lane km of roadway. |
| Pavement_XX.xls (one file for each of the 14 region) | Unit Costs | This worksheet contains the unit cost of all roadway materials and construction activities. |
| | PRF, PRA, PRC, PRL, PUF, PUA, PUC, PUL, MRA, MRC, MRL, MUA, MUC, MUL | These 14 worksheets contain the cross section dimensions, material quantities, and costs associated with the initial construction and the expected maintenance and rehabilitation plan. |
| | Summary | This worksheet contains the annualized initial construction and M&R costs for all of the categories within the province. |
| Expenditures.xls | Expenditure Summary | This worksheet contains the un-depreciated, annualized, adjusted costs of the road infrastructure components per lane km. |
| | Capital and Operating Costs | The worksheet evaluates the estimated capital and operating costs (per lane km) based on the annualized cost and expected frequency of initial construction activities. |
| | Comparison | This worksheet calculates the expected total capital and operating costs based on estimates of network length and compares the prediction to values reported by the provincial and municipal agencies. |

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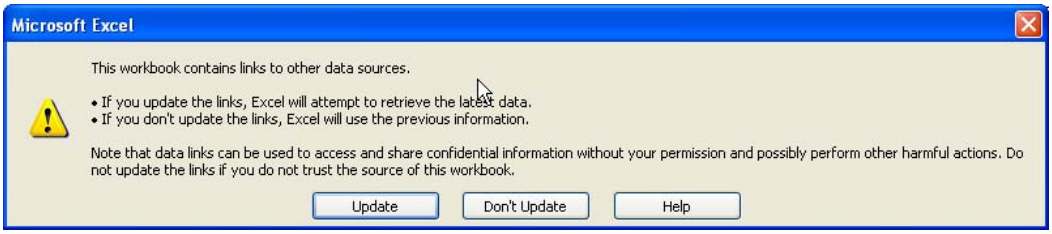


**Figure 5. Dialog Box to Update Workbook Connectivity**

The computational model is designed to read the worksheets located within the same directory as the Main.xls file. To verify the location of the linked workbooks, a list of the linked workbooks can be found by clicking the 'Links' item under the Edit menu.

The easiest way to work with the model and keep all values current in all worksheets is to open the Main.xls workbook first. As values are updated in the linked sheets, they will then automatic update in the Main.xls summaries as well.

Excel will not recalculate values in worksheets that are not currently open. This means that in order to completely recalculate the model after a change in a universal input, such as the discount rate, it is necessary to open all of the pertinent workbooks. Consequently, it is recommended to have all of the workbooks open simultaneously when updating universal inputs.

Protection of Formulas

The computational model contains a large quantity of both model inputs, as well as calculated values. To prevent accidentally over-writing calculated values, the workbooks have all values, except for the model inputs, locked so they cannot be edited.

It is possible to unlock the worksheets within Excel by using the 'Protection' option under the 'Tools' menu. No password has been set-up to further protect the formulas from accidental changes.

In order to simplify long and complicated Excel functions and to make the model easier to trace, custom functions were developed to calculate the EUAC, the present worth, and EUAC of regularly occurring payments. The custom formulas were created with Visual Basic for Applications and are stored within each of the workbooks. The equations for these formulas can be found in Chapter 6. The custom formulas should not be changed.

Layout of Data

Each of the workbooks contains a series of worksheets that represent the various steps in the computational model. The general format of the each work book is that the worksheets flow from left to right in the sequence of unit costs, quantities, service life (if applicable), annualized initial road infrastructure costs, and annualized maintenance and rehabilitation costs.

The summary listing of workbooks and their worksheets, and the description of worksheets, can be found in Table 52. Workbooks deal with major computational blocks such as main infrastructure components (e.g., bridges, or pavements) or with main cost types (e.g., routine and winter maintenance). Worksheets within the workbooks deal with specific parameters such as unit costs. Worksheet tables contain the data for all road infrastructure categories established in Chapter 3. Consequently, all unit costs and quantities

are provided for all the 14 geographical regions and for all 14 possible combinations of geographical regions, jurisdiction, rural-urban alignment, and functional class.

Each workbook starts with a worksheet named Introduction. The Introduction worksheet contains a brief description of the purpose and the structure of the workbook and provides a brief description of all the worksheets contained in the workbook. The objective of the Introduction worksheets is to ensure that the computational model is user-friendly[12].

When applicable, the input data, calculations, and summary results are stored in 14 by 14 tables throughout the computational model. The 14 by 14 tables also contain the unit costs, quantities, service lives, and calculations for the various infrastructure components. Some unit costs were not expected to vary based on the functional class of road and hence are presented in a manner more applicable to the data.

A reporting format was developed in order to facilitate printing the final results of the model. The reporting format consists of one page of results per geographical region and contains the costs for each of the road infrastructure items as well as the total cost. The estimated annualized roadway infrastructure costs are found in the Cost Reporting Sheets in Main.xls file.

[12] The Introduction worksheets were added to all workbooks of the revised computational model. The computational model that accompanied Final Report of March 31, 2006, does not contain the Introduction worksheets.

# 10. ESTIMATED REPRESENTATIVE ANNUALIZED COSTS

This chapter provides estimated representative annualized unit costs for road infrastructure. The costs were estimated for all 196 road segments classified using the classification system described in Chapter 3.

For each of the 196 road segments the following eight separate annualized costs and one combined (total) cost were estimated:

- Initial construction costs for pavements;
- Maintenance and rehabilitation costs for pavements;
- Initial construction costs for bridges;
- Maintenance and rehabilitation costs for bridges;
- Initial construction costs for all other infrastructure;
- Maintenance costs for all other infrastructure:
- Routine maintenance costs;
- Winter maintenance costs; and
- Total costs.

The chapter also includes the results of sensitivity analysis regarding the discount rate.

**Results**

Estimated representative annualized costs are reported using a uniform format of Cost Reporting Sheets. There are 14 Cost Reporting Sheets, one sheet for each geographical region (NL, PE, NS, NB, QC-1, QC-2, ON-1, ON-2, MB, SK, AB, BC-1, BC-2, TR). Each Cost Reporting Sheet provides unit cost estimates for 14 road categories. An example of the Cost Reporting Sheet is shown in Table 53 which provides results for Southern Ontario (ON-1). All Cost Reporting Sheets are given in Appendix E.

There are separate Cost Reporting Sheets for the two Québec geographical regions, Champlain Plain (QC-1) and Québec Nord (QC-2). However, because of the lack of differentiating information (as discussed on Page 11), the estimated annualized costs given in these two Sheets are presently identical.

All cost estimates provided in the Cost Reporting Sheets have the following properties:

- They are annualized 2003 costs for one-kilometre-long single traffic lane.
- The costs include administrative costs as outlined in Chapter 8 (additional 25 percent for pavements and the all other component, 35 percent for bridges, and 10 percent for routine and winter maintenance).
- The costs were calculated using 6 percent discount rate and annualized over 60-year analysis period.
- The costs reflect current design, rehabilitation and maintenance standards and practices.
- The costs do not include the cost of land.
- The costs include all expenditures associated with earth work (grading, excavating, landscaping, etc.) assuming that the original terrain features have not been changed by any previous road construction.
- The cost for clearing the land (clearing and grubbing) assumed the existence of typical 2003 conditions.

## Table 53. Cost Reporting Sheet for Southern Ontario

### Ontario - South

**Pavements - Initial Construction Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 24,627 | $ 25,602 | | |
| Arterial | $ 14,827 | $ 16,739 | $ 14,779 | $ 18,079 |
| Collector | $ 13,436 | $ 15,590 | $ 12,146 | $ 15,209 |
| Local | $ 9,301 | $ 7,936 | $ 2,947 | $ 11,450 |

**Pavements - Maintenance and Rehabilitation Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,026 | $ 2,182 | | |
| Arterial | $ 3,877 | $ 3,877 | $ 2,881 | $ 2,881 |
| Collector | $ 3,686 | $ 3,478 | $ 2,155 | $ 2,155 |
| Local | $ 2,720 | $ 2,720 | $ 314 | $ 2,007 |

**Bridges - Initial Construction Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 4,283 | $ 5,139 | | |
| Arterial | $ 3,854 | $ 3,854 | $ 2,537 | $ 2,537 |
| Collector | $ 3,426 | $ 4,283 | $ 2,255 | $ 2,819 |
| Local | $ 2,141 | $ 1,499 | $ 282 | $ 564 |

**Bridges - Maintenance and Rehabilitation Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 545 | $ 654 | | |
| Arterial | $ 436 | $ 436 | $ 245 | $ 245 |
| Collector | $ 315 | $ 394 | $ 218 | $ 273 |
| Local | $ 164 | $ 115 | $ 27 | $ 55 |

**All Other Road Infrastructure - Initial Construction Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 15,516 | $ 16,084 | | |
| Arterial | $ 11,247 | $ 12,437 | $ 8,273 | $ 9,698 |
| Collector | $ 7,320 | $ 10,576 | $ 6,158 | $ 9,117 |
| Local | $ 3,883 | $ 5,656 | $ 3,667 | $ 6,210 |

**All Other Road Infrastructure - M&R Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 389 | $ 1,439 | | |
| Arterial | $ 449 | $ 1,012 | $ 459 | $ 1,104 |
| Collector | $ 461 | $ 1,076 | $ 493 | $ 1,190 |
| Local | $ 442 | $ 1,150 | $ 492 | $ 1,283 |

**Routine Maintenance Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,925 | $ 2,063 | | |
| Arterial | $ 1,788 | $ 1,925 | $ 1,788 | $ 1,925 |
| Collector | $ 1,650 | $ 1,788 | $ 1,650 | $ 1,788 |
| Local | $ 1,513 | $ 1,650 | $ 550 | $ 1,650 |

**Winter Maintenance Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,300 | $ 3,300 | | |
| Arterial | $ 2,750 | $ 3,025 | $ 2,475 | $ 2,750 |
| Collector | $ 2,200 | $ 2,750 | $ 1,925 | $ 2,200 |
| Local | $ 2,200 | $ 2,750 | $ 1,375 | $ 1,925 |

**Total Road Costs**

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 53,610 | $ 56,464 | | |
| Arterial | $ 39,228 | $ 43,305 | $ 33,438 | $ 39,221 |
| Collector | $ 32,494 | $ 39,935 | $ 27,000 | $ 34,750 |
| Local | $ 22,364 | $ 23,476 | $ 9,655 | $ 25,144 |

*Note: All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

Observations

The following observations are based on the results presented in the Cost Reporting Sheets.

Initial construction costs dominate the total costs. For example, in the case of provincial rural arterial roads in Southern Ontario, the initial construction costs represent about 76 percent of the total cost (Figure 6).

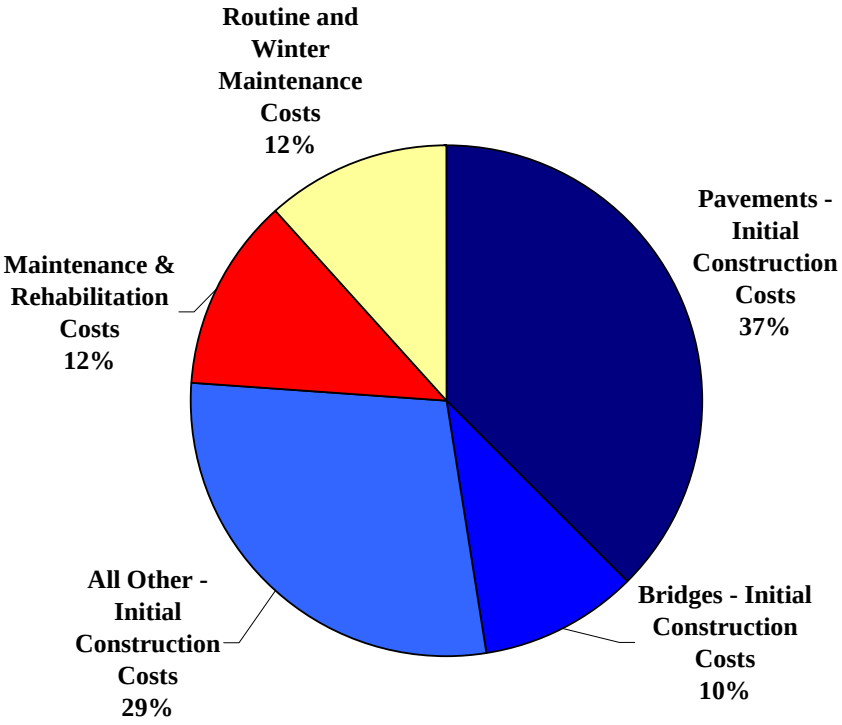


**Figure 6. Distribution of the Total Cost for Provincial Rural Arterial Roads in Southern Ontario**

Considering the initial construction costs alone, the highest initial construction costs are for all other infrastructure component, then for pavements, and lastly for bridges.

All costs tend to increase with the higher functional class of the road. This is expected because, for example, arterial roads are built to higher standards than collector roads (with wider shoulders, longer sight distances, and better quality materials; arterial roads are also maintained at higher standards because of higher traffic volumes and speeds). However, there are few exceptions. For example, according to data given in Table 49, the pavement maintenance and rehabilitation costs for provincial arterial roads in Southern Ontario are higher than the corresponding costs for freeways. This anomaly is caused by the high-standards for the initial pavement construction of freeways in Southern Ontario. By increasing the initial pavement construction costs (initial pavement construction costs for freeways are about 64 percent higher than the corresponding costs for arterial roads), the subsequent pavement maintenance and rehabilitation costs are lowered.

Municipal roads have typically lower costs than the corresponding provincial roads. The difference is mainly in terms of the initial construction costs for the "all other component." Municipal roads typically

follow the existing terrain and municipalities tend to be located on terrain suitable for building roads (and other structures).

In general, urban roads have higher costs than the corresponding rural roads. For example, urban roads have more expensive drainage systems, tend to have more bridges per given road length, and have higher routine and winter maintenance costs.

Winter maintenance costs are typically higher than routine maintenance costs.

Winter maintenance costs are generally at par with the pavement maintenance and rehabilitation costs. In some provinces (e.g., Québec), winter maintenance costs significantly exceed the pavement maintenance and rehabilitation costs.

Because the total road costs include initial construction costs, they do not reflect current spending by transportation agencies.

Updating Costs

Unit costs used in this report are for 2003 construction season. In global terms, a cost update can be accomplished by applying construction cost indicators developed by Statistics Canada to the total road cost. A detailed update would require the assessment and update of all unit cost entries, applicable to a given jurisdiction, in all unit cost tables. All input tables, including unit cost tables are given in Appendix D. It is easy to change input data and re-run the cost estimation model for anyone with the basic knowledge of Excel.

**Sensitivity Analysis**

The majority of input data are in the form of small elements of verifiable and changeable data items. For example, input data are in the form of the thickness of the pavement surface layer (and the unit cost of the layer) for provincial rural arterial roads in Saskatchewan, or in the form of the cost for square metre of a bridge deck on an urban expressway in Southern Québec. If any element of the input data is questionable, the user can easily change the element, re-run the computational model (as outlined in Chapter 9) and assess the impact of the change on the result.

Sensitivity Analysis of the Discount Rate

In order to illustrate the influence of the discount rate on the total costs, and to demonstrate the capabilities of the computational model, a sensitivity analysis of the impact of changing discount rate was carried out.

As an example, the analysis used the rural provincial arterial highway in Southern Ontario. A series of discount rates used was 4, 6, 8, and 10 percent. The results are presented using as “stacked” bar graph given in Figure 7. The Y-axis in Figure 7 shows 2003 annualized costs for one-km long single traffic lane in thousands of dollars.

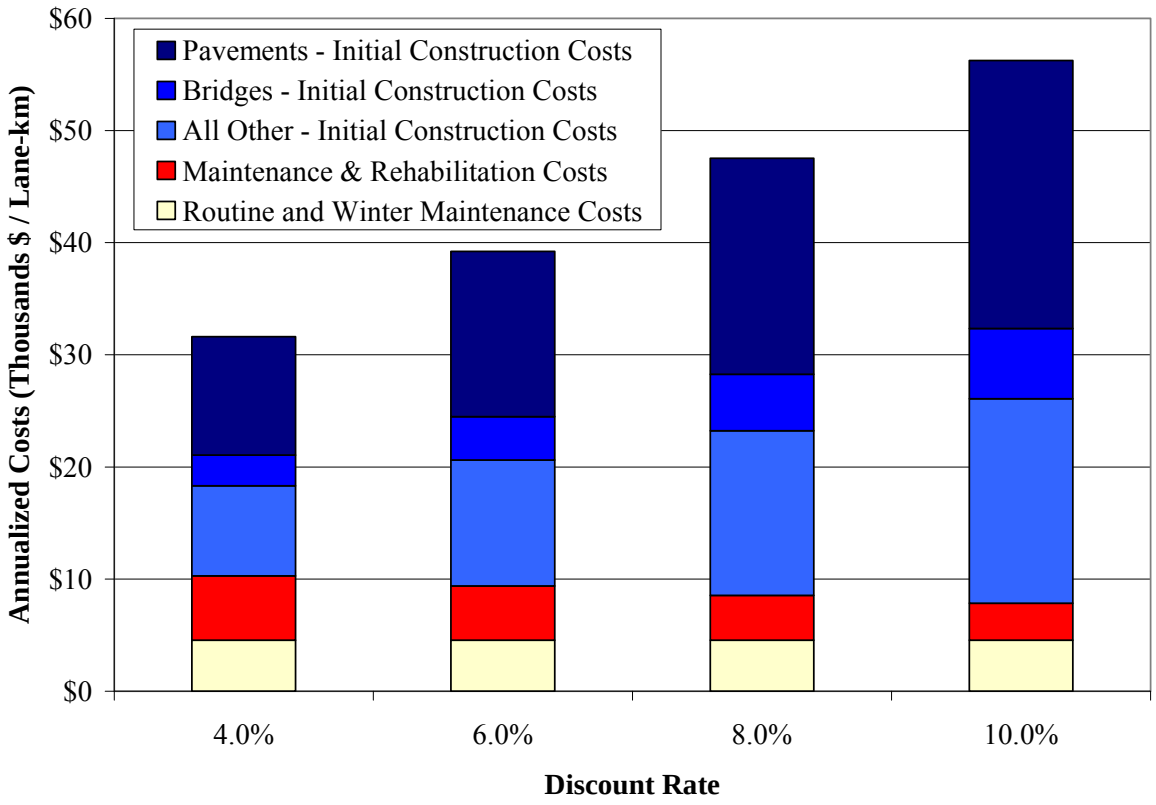


**Figure 7. The Effect of the Discount Rate on Annualized Unit Costs of Rural Provincial Arterial Highways in Southern Ontario**

The initial construction costs dominate the total annualized costs for all discount rates. The annualized initial construction costs increase linearly with the increase in the discount rate. This trend takes place because the payments for the initial construction are incurred at the beginning of the 60-year analysis period and are annualized (recouped) over the analysis period.

The maintenance and rehabilitation costs shown in Figure 7 are the total maintenance and rehabilitation costs for pavements, bridges, and all other road infrastructure component. Maintenance and rehabilitation costs decrease with the increasing discount rate. This trend takes place because the bulk of maintenance and rehabilitation costs occur in the latter part of the analysis period.

The routine maintenance and the winter maintenance costs are annually occurring costs and are unaffected by the discount rate.

# 11. COMPARISON OF MODEL COSTS WITH ANNUAL EXPENDITURES REPORTED BY TRANSPORTATION AGENCIES

Annualized costs required to preserve road infrastructure estimated in this study were compared to average annual expenditures reported by Canadian transportation agencies. The objective of the comparison was to assist in verifying and improving estimated annualized road costs produced by the computational model. This section of the report describes the methodology and the results of the comparison.

The estimated annualized costs required to preserve road infrastructure were obtained by adjusting the total infrastructure costs reported in Chapter 10. The annual expenditures, provided by Transport Canada, were in terms of 5-year-averages of annual capital and operating expenditures reported by all levels of government. The basic premise for the comparison of the costs estimated by the model and the reported expenditures was that there should be a correspondence between the annualized capital and operating costs estimated by the computational model and the average annual capital and operating expenditures reported by all levels of government. The comparison was carried out for individual provinces (and the combined territory), and for both the provincial and municipal networks.

The results of matching the estimated model costs with the annual expenditures provided to the study by Transport Canada should be used with a significant degree of caution. A review of published values of budgets of provincial transportation agencies indicates that there is a very wide variation of the items that agencies include in operating and capital costs. For example, a provincial agency may include the cost of vehicle and driver licensing in the reported operating costs whereas the model's operating costs include only costs for routine and winter maintenance of roads. In addition, there are significant discrepancies in the road lengths and their functional classes for which expenditures were reported and those assumed by the model. The discrepancies in road lengths and their functional classification apply mainly to the municipal sector. Nevertheless, overall, there is a correspondence between the model's costs and the reported expenditures.

**Calculation Procedure**

The calculation model developed in this study was used to estimate the total annualized costs required for preserving, as well as constructing, the Canadian road infrastructure included in the study. Consequently, the total cost includes past construction costs or sunk costs. Annual expenditures reported by government agencies include only expenditures that are needed to cover future expenditures for preserving road infrastructure and for future system expansion. For this reason, the total unit costs calculated by the computational model were adjusted to exclude sunk costs. The adjusted annualized costs were then compared with the annual expenditures reported by the agencies. The comparisons were done in terms of capital and operating costs for both the provincial and municipal sectors.

The calculation procedure used to obtain and compare annual costs is schematically illustrated in Figure 8 as a six-step process. Steps 1 to 4 result in estimated annualized costs that are expected to be compatible with the reported annual expenditures. The last step yields the difference between the capital and operating costs estimated using the computational model and the capital and operating expenditures reported by the agencies. All costs discussed in the following description of the six calculation steps are annualized or annual costs that include overhead costs.

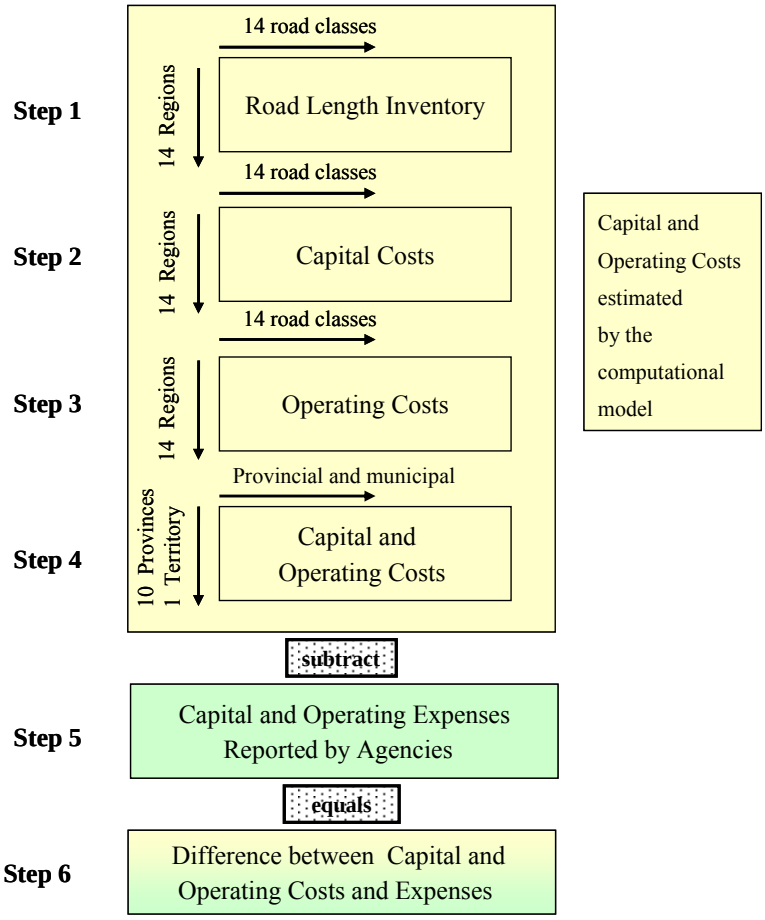


**Figure 8. Schematic Diagram of the Comparison of Costs and Expenditures**

*Step 1 -- Development of Road Length Inventory*

The road length inventory used for the cost comparison was the total composite inventory established in Chapter 6 and given in Table 14. The inventory was established using the best available data obtained from different sources. The inventory is in the form of a matrix with 14 rows representing the 14 geographical regions and 14 columns representing the14 road functional classes (Figure 8).

*Step 2 -- Calculation of Capital Costs*

The objective was to calculate capital costs that would correspond to capital expenditures reported by the agencies. Consequently, the calculation of capital costs included the addition of all maintenance and rehabilitation costs and a portion of the initial construction costs.

Maintenance and rehabilitation costs used in this study were defined as costs for specific preservation activities that are planned at least a year in advance. Consequently these costs are likely to correspond to capital expenditures reported by the agencies. Maintenance and rehabilitation costs – included in the capital costs – consisted of the maintenance and rehabilitation costs for pavements, bridges, and all other infrastructure component.

Initial construction costs included only a portion of the total construction costs that is likely to correspond to that portion of capital expenditures (reported by the agencies) that is used for new (initial) construction. The portion of the initial construction costs that was included in the capital costs was based on the average renewal rate of road infrastructure components. The renewal rate was, in turn, based on the average age of the road infrastructure components established in Chapter 6, and given in Table 17 and Table 18. It was assumed that the existing renewal rate will remain unchanged in the future. For example, if the average age of bridges is 50 years, two percent of bridges are built or rebuilt every year, and the renewal rate of bridges is 0.02. Consequently, the model's capital cost that corresponds to the expenditure capital cost (reported by the agencies) can be calculated as the product of the total initial bridge cost and the renewal rate of 0.02. The calculation formula is given by Equation 6.

$$\sum_{1}^{3} Capital\ \cos t\ of\ a\ component = Initial\ \cos t\ of\ the\ component \times \left( \frac{1}{Average\ age\ of\ the\ component} \right) \quad \text{Equation 6}$$

Where:

| | |
|---|---|
| Capital cost of a component = | The portion of the initial cost of a road infrastructure component that corresponds to the capital cost reported by agencies. |
| Component = | There are three different components, pavements, bridges and all other infrastructure. The summation sign applies to the three components. |
| . Initial cost of the component = | Initial cost of the component as calculated by the computational model and given on Cost Reporting Sheets in Appendix E). |
| Average age of the component = | Estimated average age of the component for a given geographical region (Table 18) |

*Step 3 -- Calculation of Operating Costs*

Operating costs were calculated by adding routine maintenance costs and winter maintenance costs.

*Step 4 – Summation of Capital and Operating Costs*

Capital and operating costs established in Steps 2 and 3 were subdivided by road class, rural and urban design features, and by geographical regions. In Step 4, the disaggregated costs produced by the computational model were summarized to match the level of cost aggregation used by the reporting agencies, namely, capital and maintenance costs per province or territory reported separately for provincial and municipal infrastructure.

*Step 5 – Summary of Capital and Operating Expenditures*

The 5-year-average capital and operating expenditures reported by all levels of government, obtained from Transport Canada, were assembled in a tabular format. The tabular format matched the format of capital and operating costs calculated in Step 4.

*Step 6 – Calculation of the Difference Between Costs and Expenditures*

The difference between the capital and operating costs estimated by the computational model and the capital and operating expenditures reported by the agencies was summarized in a tabular format. The results are presented and discussed in the following section.

**Comparison of Model Costs with Reported Expenditures**

It is necessary to pay close attention to the comparability of various highway construction and maintenance costs. There is an absence of a common accounting policy among highway infrastructure suppliers, from the provincial level down through the regional authorities and municipalities, which makes direct comparisons difficult. Updating the data, based on common accounting methodology with regards to construction and maintenance costs, would improve the reliability of any future estimate of highway infrastructure cost.

The comparison of the annualized costs estimated by the model with the annual expenditures reported by the agencies has been done separately for operating and capital expenses and for provincial and municipal expenses.

Comparison of Provincial Operating Costs

Operating costs include routine road maintenance costs and winter road maintenance costs. Estimated and reported operating costs are compared in Table 54.

**Table 54. Comparison of Annual Provincial Operating Costs**

| Province or Combined Territory | Provincial Operating Cost, millions of dollars | | | Difference Between Reported Expenditures and Costs Estimated by Model, % | |
|---|---|---|---|---|---|
| | Costs Estimated by Model | Reported Expenditures | | | |
| | | Reported by Agency | Survey Results | Reported by Agency | Survey Results |
| NL | 93.4 | 63.0 | | -48% | |
| PE | 30.6 | 50.0 | | 39% | |
| NS | 137.8 | 129.0 | 94.0 | -7% | -47% |
| NB | 90.1 | 139.0 | 104.8 | 35% | 14% |
| QC | 324.8 | 448.0 | 365.0 | 28% | 11% |
| ON | 152.3 | 512.0 | 150.0 | 70% | -2% |
| MB | 76.2 | 155.0 | 71.6 | 51% | -6% |
| SK | 103.2 | 193.0 | | 47% | |
| AB | 220.4 | 359.0 | | 39% | |
| BC | 75.8 | 485.0 | 325.0 * | 84% | 77% |
| TR | 29.4 | 51.0 | | 42% | |
| **Total** | **1,333.9** | **2,584.0** | | 48% | |

* Includes minor betterments

There are two types of *reported expenditures* in Table 54: Expenditures r*eported by agency* that are 5-year-average operating expenses that this study obtained from Transport Canada. Reported expenditures labelled *survey results* were obtained through Provincial Expenditure Surveys (discussed in Chapter 2). There are substantial differences in the values of these two types of expenditures. For example, for Ontario, operating costs *reported by agency* were $512.0 million whereas operating costs *survey results* were $150.0 million. Consequently, the difference between the reported expenditures and the estimated costs, given as a percentage in the last two columns of Table 54, depends on the type of *reported expenditures*.

It is believed that expenditures obtained through the surveys reflect better the definition of operating expenditures used in this study. The survey respondents answered a set of specific questions that contained the definition of operating expenditures. Unfortunately, only five provinces responded to the

expenditure portion of the survey. The survey response obtained from British Columbia was not clear because operating costs included "minor betterments" which were not defined.

*Alternative Sources of Provincial Expenditures*

The possibility of obtaining additional information on provincial and municipal road-related expenditures by examining current provincial budget and expenditure statements available on the Internet was investigated. The results show that budget and expenditure statements available on the Internet are insufficient for reliable classification of various reported expenditure items into the categories of road operating expenditures and road capital expenditures. Two brief examples of challenges encountered are provided for Ontario and Saskatchewan.

Ontario Example

An excerpt from an Ontario expenditure statement, obtained from the Ontario Ministry of Transportation web site http://www.mto.gov.on.ca/english/about/bplan/2002_03.htm#performance is given in Table 55.

**Table 55. Actual Spending by Ontario Ministry of Transportation in 2001/2002**

| Program | Expenditures, millions of dollars | | Staff | Comments by ARA |
|---|---|---|---|---|
| | Operating | Gross Capital | | |
| Transportation Policy and Planning | 139.6 | 131.3 | 140 | May include all transportation modes |
| Provincial Highways Management | 260.0 | 659.7[(a)] | 2,350 | |
| Road User Safety | 189.5 | 0.0 | 1,820 | Mainly driver and vehicle licensing |
| Business Support | 45.2 | 0.0 | 200 | May include all transportation modes |
| Transportation Information and IT | 46.7 | 0.0 | 190 | |
| Total | 681.0 | 791.0 | 4700 | |

(a) Does not include capital expenditures transferred from Ministry of Northern Development and Mines. These expenditures were over $210 million in 2001/02

According to data presented in Table 55, the operating cost for *Provincial Highways Management* in 2001/2002 was $260.0 millions, about 40 percent of the total operating cost ($681.0 million). The reported 5-year-average operating cost, (obtained through the auspices of Transport Canada) given in Table 54, was 512.0 million. The 2002/2003 operating cost, obtained through the Provincial Expenditure Survey, was $150.0 million. It is believed that the last number ($150.0 million) is the most reliable estimate of operating expenditures for provincial road infrastructure in Ontario.

Saskatchewan Example

Expenditure data extracted from Saskatchewan Highways and Transportation web site http://www.gov.sk.ca/finance/budget/budget03/estimates.pdf, are shown in Table 56. The operating expenditure of $193 million given in Table 54 is considerably higher than – what appears to be a corresponding expenditure given in Table 56 – of $59.3 million. However, it is possible that some of the expenditures reported for other programs, such as *Preservation of Transportation System,* belong to the operations.

**Table 56. Estimated Spending by Saskatchewan Highways and Transportation**

| Summary of Expenditures | Estimated Expenditures, millions of dollars | |
|---|---|---|
| | 2003-04 | 2002-03 |
| Preservation of Transportation System | 135.7 | 132.9 |
| Operation of Transportation System | 59.3 | 59.2 |
| Construction of Transportation System | 84.8 | 83.7 |
| Other (Administration, accommodation, policy, etc.) | 16.5 | 17.1 |

Summary

The comparison of (a) operating expenditures available from budget and expenditure statements with (b) operating costs estimated by the model indicates that without an additional guidance from provincial transportation agencies, preferably in the form of answers to the questions given in the Provincial Expenditure Survey, it is not possible to reconcile the differences between the model's operating costs and the expenditures reported by agencies.

There is a very good agreement between the reported expenditures and model costs for jurisdictions for which reported expenditures were obtained by surveys. The exception is Nova Scotia where the model costs are 47 percent higher than the expenditures. The reason for this discrepancy may be that the model assumes higher maintenance standards for local rural roads and perhaps for other roads as well, than the standards used in practice.

Comparison of Provincial Capital Costs

Capital costs include road maintenance costs and rehabilitation costs, and the cost of new road construction. Estimated and reported operating costs are compared in Table 57.

In an ideal situation, if the model overestimates the reported capital expenditures, it means that the province is renewing its road infrastructure at a lower renewal rate than assumed by the model. This would apply to PE, NS, MB, SK, and TR (combined Territories). On the other hand, if the model underestimates the reported capital expenditures, it means that the province is renewing its road infrastructure at a higher renewal rate than assumed by the model. This would apply NL, NB, QC, ON, AB, and BC. However, as discussed in connection with data presented in Table 55 and Table 56, the reported capital expenditures are not considered to be reliable as it is unclear exactly what is included in the capital expenditures reported by the provinces. Also, capital expenditures estimated by the model depend on the assumed renewal rate, that was established as the rate required to maintain the average age of the road infrastructure.

**Table 57. Comparison of Annual Provincial Capital Costs**

| Province or Combined Territory | Provincial Capital Cost, millions of dollars | | Difference Between Reported Expenditures and Costs Estimated by Model, % |
|---|---|---|---|
| | Costs Estimated by Model | Reported Expenditures | |
| NL | 76.3 | 129 | 41% |
| PE | 31.7 | 29 | -9% |
| NS | 185.8 | 49 | -279% |
| NB | 109.6 | 166 | 34% |
| QC | 323.7 | 821 | 61% |
| ON | 233.1 | 931 | 75% |
| MB | 140.9 | 105 | -34% |
| SK | 82.6 | 67 | -23% |
| AB | 211.1 | 268 | 21% |
| BC | 134.0 | 635 | 79% |
| TR | 94.0 | 46 | -104% |
| **Total** | **1,622.7** | **3,246** | **50%** |

The significant influence of the average age on provincial capital costs in Ontario estimated by the model is shown in Figure 9. The average combined age of road infrastructure (for pavements and bridges, see Table 18) was estimated to be 31 years. If the combined age were estimated to be, for example, 20 years, the capital costs would be almost three times higher.

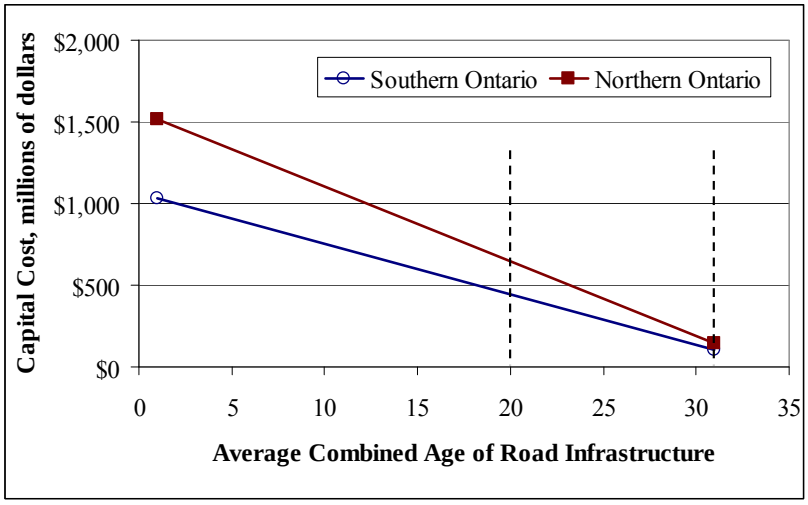


**Figure 9. Influence of Average Combined Age on Capital Costs**

It is also possible that the average ages of road infrastructure assumed by the model are approximately correct, but that the different average ages should be applied to different road classes. Particularly freeways should have a shorter average age than other roads. The shorter average age of freeways would increase the capital costs estimated by the model, particularly in Ontario, Québec, and British Columbia.

The two jurisdictions with salient differences between the estimated costs and reported expenditures are Nova Scotia and the combined Territories. Nova Scotia has about 20 percent larger provincial road network than New Brunswick, and has much larger freeway network. Yet, New Brunswick reported 3.4

times higher capital expenditures than Nova Scotia. The model, with its assumptions of expected costs and quantities, cannot fit both provinces simultaneously. It is possible that the rate of road investments in Nova Scotia is significantly lower than the rate in New Brunswick. The discrepancy for the combined territories are probably caused by the high renewal rate assumed by the model which assumes the average age of road infrastructure of only 23 years (Table 18).

Comparison of Annual Municipal Operating Costs

Municipal operating costs estimated by the model are compared with operating expenditures reported by agencies in Table 58.

**Table 58. Comparison of Annual Municipal Operating Costs**

| Province or Combined Territory | Municipal Operating Cost, millions of dollars | | Difference Between Reported Expenditures and Costs Estimated by Model, % |
|---|---|---|---|
| | Costs Estimated by Model | Reported Expenditures | |
| NL | 50.7 | 61 | 17% |
| PE | - | 8 | |
| NS | 17.8 | 86 | 79% |
| NB | 56.8 | 82 | 31% |
| QC | 789.4 | 1,102 | 28% |
| ON | 876.3 | 1,490 | 41% |
| MB | 237.7 | 158 | -50% |
| SK | 351.1 | 192 | -83% |
| AB | 798.6 | 640 | -25% |
| BC | 239.4 | 374 | 36% |
| TR | 0.4 | 17 | 98% |
| **Total** | **3,418.2** | **4,210** | **19%** |

The challenges and possible discrepancies of working with operating and capital expenditures reported by agencies, discussed in connection with provincial costs, apply also to municipal operating and capital expenditures. For this reason, they need not be repeated herein. However, there are three additional large potential sources of discrepancies between the costs and expenditures on the municipal level as discussed under the following headings:

- Discrepancies due to the differences in the municipal road network.
- Discrepancies due to inclusion of extraneous costs.
- Discrepancies due to the split between capital and maintenance expenditures.

*Discrepancies due to the Differences in the Municipal Road Network*

The municipal operating and capital costs estimated by the model are for the road network defined in Table 14 (Chapter 4). There is a nearly linear relationship between the estimated costs and the size of the network. For example, a ten percent increase in the size of the network results in a 10 percent increase in the estimated operating and capital costs. However, the municipal expenditures reported by the agencies are for the network that has not been defined. It can only be assumed that this road network is similar to the network used for the model estimates given in Table 14. The differences in the network size may lead to insurmountable differences between the estimated costs and reported expenditures. For example, the estimated operating cost in Prince Edward Island is zero because there are no municipal roads in Table 14 for Prince Edward Island. (The NRCan study reported that there are no municipal roads in Prince Edward

Island apart from residential roads and streets). Given that there were no roads reported, there were no operating costs. On the other hand, the reported operating cost given in Table 58 is 8.0 million – given for a network of unknown length and characteristics.

*Discrepancies due to Inclusion of Extraneous Costs*

It is probable that the municipal operating and capital costs reported by agencies include extraneous costs such as costs for residential streets, sidewalks, costs associated with underground utilities and the restoration of cuts in pavements for utilities, and possibly even transit costs. The inclusion of extraneous costs could significantly inflate the reported operating and capital expenditures.

*Discrepancies due to the Split between Capital and Maintenance Expenditures*

The distinction between the operating and maintenance expenditures may not be as rigorously observed on the municipal level as it is observed on the provincial level.

*Summary*

Considering the uncertainties stemming from possible discrepancies in reporting municipal operating expenditures, it would be speculative at best to discuss individual expenditure numbers given in Table 58 at this time.

Comparison of Annual Municipal Capital Costs

Municipal capital costs estimated by the model are compared with capital expenditures reported by agencies in Table 59. In most provinces, the municipal operating costs given in Table 59 are higher then the corresponding municipal capital costs given in Table 58. The reverse is true for provincial costs: Provincial operating costs tend to be lower than provincial capital costs. These trends apply to both costs estimated by the model and those reported by the agencies. This conclusion supports the assumption that the average age of municipal road infrastructure is higher than the average age of provincial road infrastructure (Table 18).

**Table 59. Comparison of Annual Municipal Capital Costs**

| Province or Combined Territory | Municipal Capital Cost, millions of dollars | | Difference Between Reported Expenditures and Costs Estimated by Model, % |
|---|---|---|---|
| | Costs Estimated by Model | Reported Expenditures | |
| NL | 43.7 | 32 | -37% |
| PE | - | 7 | |
| NS | 25.9 | 40 | 35% |
| NB | 54.2 | 43 | -26% |
| QC | 597.2 | 558 | -7% |
| ON | 875.8 | 1,135 | 23% |
| MB | 206.6 | 79 | -161% |
| SK | 594.4 | 96 | -519% |
| AB | 614.0 | 461 | -33% |
| BC | 389.6 | 319 | -22% |
| TR | 0.9 | 11 | 92% |
| **Total** | **3,402.3** | **2,781** | **-22%** |

Comparison of Annual Municipal Total Costs

Total municipal costs were obtained by adding operating costs (Table 58) and capital costs (Table 59). The result is presented in Table 60.

Overall, according to Table 60, the difference between the total municipal costs estimated by the model and the total municipal costs reported by the agencies is about five percent. While this result is very encouraging, there are many discrepancies between the estimated and reported operating and capital costs for individual provinces.

The improvement in the correspondence between the costs estimated by the model and expenditures reported by the agencies requires a two-prong approach including more reliable expenditure data from the agencies and improved estimates from the model. Specific recommendations for improvements in the model are summarized in the following Chapter.

**Table 60. Comparison of Annual Municipal Total Costs**

| Province or Combined Territory | Municipal Total Cost, millions of dollars | | Difference Between Reported Expenditures and Costs Estimated by Model, % |
|---|---|---|---|
| | Costs Estimated by Model | Reported Expenditures | |
| NL | 94.4 | 93 | -2% |
| PE | - | 15 | |
| NS | 43.7 | 126 | 65% |
| NB | 111.0 | 125 | 11% |
| QC | 1,386.6 | 1,660 | 16% |
| ON | 1,752.1 | 2,625 | 33% |
| MB | 444.2 | 237 | -87% |
| SK | 945.4 | 288 | -228% |
| AB | 1,412.6 | 1,101 | -28% |
| BC | 629.0 | 693 | 9% |
| TR | 1.3 | 28 | 95% |
| **Total** | **6,820.5** | **6,991** | **2%** |

# 12. RECOMMENDATIONS

This chapter provides a summary of main recommendations to improve study results. The recommendations are grouped under the following headings:

- General recommendations.
- Identification and sectioning of road infrastructure.
- Cost estimates.
- Comparison of estimated costs and reported expenditures.
- Traffic characteristics.

**General Recommendations**

1. All cost estimates should be updated when more or improved information and data become available. The updates can be easily accomplished using the computational model.

2. The procedures developed in this study for the estimation of the total annualized unit costs of road infrastructure can easily be adapted for the estimation of investments required in various regions of Canada to preserve road infrastructure, or to estimate the level of investments required to maintain road infrastructure at the desired level of service.

3. Results of this study can be used as the basis for the development of marginal costs for vehicle miles of travel for different vehicle types. This favourable situation arises from the development of life-cycle costs for 14 road categories in each geographical region. The 14 categories provide sufficiently detailed cost trends for the development of marginal cost functions [3].

4. The results of the study can be used to allocate annualized road costs to different vehicle types, such as cars and trucks.

**Identification and Sectioning of Road Infrastructure**

5. Ideally, all provincial and territorial jurisdictions should use a similar definition of road functional classes. The use of a uniform definition of road functional classes would eliminate the need to assign agency-specific road classes to the functional classes established in this study. The use of uniform road classes is also recommended on the municipal level.

6. In general, provinces do not maintain the inventory of municipal infrastructure and the extent of the municipal infrastructure is unknown. To obtain the inventory of the municipal infrastructure, it is necessary for provinces, or other provincial-level institutions, to systematically gather and manage municipal infrastructure data.

**Cost Estimates**

7. The accuracy of cost estimates can be improved by dividing the road network into more road categories than the 196 road categories used in this study. There are over 200,000 2-lane equivalent kilometres of provincial and territorial roads in Canada. In this study, this provincial and territorial network was characterized by 112 different road categories. However, virtually each road kilometre has unique cost features. A similar situation exists for the municipal road network where over 650,000 2-lane equivalent kilometres was divided into 84 road categories.

8. Bridge costs can be improved by obtaining data on the distribution of bridges into road functional classes. Most agencies do not have such data and their development will require considerable time and effort. Consideration should be given to the data development well ahead of the expected use.

9. Estimates of quantities (e.g., the expected length of steel guide rail per kilometre of arterial road) should be improved by more rigorous examination of construction documents. For example, HERS estimates [14] were based on detailed examination of more than 2,300 construction projects[13].

10. The cost estimates for terrain changes, and for clearing and grubbing prior to road construction, often constitute a substantial part of capital costs and are particularly difficult to establish. Additional work involving the examination of past construction contracts is needed to obtain more reliable estimates for earth work quantities.

11. Considering that the average age of road infrastructure components has a large impact on the estimated capital costs, age estimates should be improved. In particular, consideration should be given to obtaining (and using) different average ages for different geographical regions and for different road classes (e.g., freeways versus local roads).

**Comparison of Estimated Costs and Reported Expenditures**

12. The improvement in the correspondence between the costs estimated by the model and expenditures reported by the agencies requires a two-prong approach: More reliable expenditure data from the agencies and improved estimates from the computational model.

13. Operating and capital expenditures for road infrastructure reported by agencies need to be judiciously assessed. Transportation agencies do not use common accounting and reporting procedures for reporting annual expenditures. Some of the problems encountered include unclear definitions of operating and capital costs, missing links between road expenditures and the specific road network, and the inclusion of extraneous expenditures.

**Traffic Characteristics**

14. Traffic data presented in Chapter 5 should be improved by securing additional data from provincial and municipal agencies.

15. The reporting of municipal traffic data by province (or by geographical region) masks large differences between traffic characteristics of large and small municipalities. For example, it is questionable to provide an average AADT volume on municipal arterial roads that includes both Toronto and Caledonia, Ontario. It would be preferable to provide traffic characteristics separately for large, medium, and small municipalities.

16. For cost allocation purposes, traffic characteristics should be provided for more than the current two vehicle types (passenger cars and commercial vehicles). The lowest recommended number of vehicle types is 4: Passenger cars and motorcycles, 2 and 3-axle trucks, 5-axles trucks, and 6-and-more-axle trucks.

[13] However, in spite of this large sample size, there were still significant gaps in data [14].

## 13. CONCLUDING REMARKS

This technical report and its findings are based on information provided to ARA by Canadian Transportation Agencies and is supplemented by our experience with economic analysis, life-cycle costing and pavement maintenance and rehabilitation design. While ARA has endeavoured to ensure the accuracy of the information, caution should be exercised when using isolated pieces of information. Canadian Transportation Agencies do not have a standard format of data reporting across the country.

**APPLIED RESEARCH ASSOCIATES, INC.**

Dr. Jerry Hajek, P.Eng.
Principal Engineer

David K. Hein, P.Eng.
Principal Engineer

# 14. REFERENCES


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# Appendix A

# Model Survey Package

This Appendix contains a model survey package. The model survey package was developed to provide customized (province and/or municipality-specific) survey questionnaires. The model survey package was originally developed for Ontario and was then customized by the regional representatives for other provinces and territories to reflect local provincial and municipal conditions.

The model survey package consists of four individual survey packets summarized in the following table.

| **Name of Survey Packet** | **Main Parts of the Survey Packet** | **Number of pages** |
|---|---|---|
| Provincial Expenditure Survey (PES) | Introduction letter from Transport Canada* | 1 |
| | Introduction letter for PES | 1 |
| | Survey Questionnaire, PES | 2 |
| Provincial Highway Inventory Survey (PHIS) | Introduction letter from Transport Canada | 1 |
| | Introduction letter for PHIS | 1 |
| | Survey Questionnaire, PHIS | 4 |
| Provincial Cost Survey (PCS) | Introduction letter from Transport Canada | 1 |
| | Introduction letter for PCS | 1 |
| | Survey Questionnaire, PCS | 4 |
| | Road Inventory Sheet** | 1 |
| Municipal Survey (MS) | Introduction letter from Transport Canada | 1 |
| | Introduction letter for MS | 1 |
| | Survey Questionnaire, MS | 3 |
| | Road Inventory Sheet** | 1 |

Notes:
* This letter is also available in French and the French version of the letter was used in Québec.
** Only one Road Inventory Sheet is included in this Appendix. Typically, there are 5 to 8 Road Inventory Sheets for provincial roads and 6 Road Inventory Sheets for municipal roads.

The electronic version of the model survey package highlights those parts of the package that need to be customized by using a blue font.

The rest of Appendix A provides a copy of the entire survey package arranged in the order used in the above table.

Transport Canada / Transports Canada

Your file Votre référence

Our file Notre référence

February 08, 2005

Dear Sir\Madam:

At the beginning of 2004, a project was initiated by a federal-provincial-territorial Task Force to investigate the "full costs" of transportation, including the financial costs of the provision and use of transport facilities and services, as well as the non-monetary costs of the impacts of congestion delays, accidents and environmental damage. The investigation includes all modes of transport and their networks and services, whether provided by governments or the private sector. The project is expected to take three years to complete.

As part of the project, Transport Canada is seeking to estimate road costs by the various levels of government, including those costs incurred by municipalities. In order to develop the cost estimates of the road network, Transport Canada has engaged the consulting firm Applied Research Associates (ARA). On behalf of the federal-provincial-territorial Task Force, we most sincerely request your full cooperation in assisting the consulting team and Transport Canada in completing this project, and express our appreciation in advance for all the assistance you can provide.

If you have further questions regarding the nature and scope of this project please contact the project manager, Bruno Jacques, at 613-990–5340.

Yours sincerely,

Roger Roy

Roger Roy
Director General
Economic Analysis
Policy Group
Transport Canada

Canada

Transports Canada / Transport Canada

Your file / Votre référence

Our file / Notre référence

Le 8 février 2005

Madame, Monsieur,

Au début de 2004, un projet a été lancé par un groupe de travail fédéral-provincial-territorial afin d'examiner les "coûts totaux" du transport, y compris les coûts financiers liés à la fourniture et à l'usage des installations et des services de transport, ainsi que les coûts non-monétaires des retards dus à la congestion, des accidents et des dommages environnementaux. L'examen porte sur tous les modes de transport ainsi que sur leurs réseaux et services, qu'ils soient fournis par les gouvernements ou le secteur privé. Le projet devrait être complété en trois ans.

Dans le cadre de ce projet, Transports Canada cherche à estimer les coûts liés aux routes pour tous les niveaux de gouvernement, y compris les coûts assumés par les municipalités. Afin de développer des estimations de coûts du réseau routier, Transports Canada a retenu les services de la société d'experts-conseils *Applied Research Associates* (ARA). Au nom du groupe de travail fédéral-provincial-territorial, nous sollicitons très sincèrement votre entière collaboration afin d'aider l'équipe d'experts-conseils et Transports Canada à compléter ce projet. Nous aimerions vous exprimer à l'avance notre gratitude pour toute l'aide que vous pourrez nous accorder.

Si vous avez des questions sur la nature et la portée de ce projet, veuillez communiquer avec le gestionnaire responsable, Monsieur Bruno Jacques, au (613) 990–5340.

Veuillez agréer, Madame, Monsieur, l'expression de mes sentiments distingués,

Roger Roy

Roger Roy
Directeur général
Analyse économique
Groupe des politiques
Transports Canada

Canada

## Introduction Letter for Provincial Expenditure Survey

March, 2005

Mr. Alan Stillar
Team Leader – Federal Provincial Relations
Strategic Policy and Planning Office
Ontario Ministry of Transportation
439 University Ave., 2nd Floor, Suite 200
Toronto, ON M5G 1Y8

**Subject: Study on Representative Capital and Maintenance Costs of Roads**

Dear Mr. Stillar:

As discussed during our recent telephone conversation, Applied Research Associates Inc. (ARA) have been engaged by Transport Canada to work on the above Study. Additional information about this study is provided in the attached letter from Mr. Roger Roy, Director General, Economic Analysis, Transport Canada.

We have already received summary information regarding the extent of the provincial highway network in Ontario through your auspices. However, the study design calls for additional data, including data on access roads and on maintenance expenditures for highways in Ontario. The specific data that we hope to obtain from your office are summarized in the attached survey questionnaire.

If need be, we are prepared to participate actively in the data processing that may be required. Please let me know when and how we can work with you to obtain data for this important study.

Thank you for your help.

Sincerely,

Jerry Hajek, Ph.D., P. Eng.
Principal Engineer

Encl.: A survey questionnaire
A letter from Mr. Roger Roy, Transport Canada

**Study of Representative Capital and Maintenance Costs of Roads**
**Provincial Expenditure Survey, March 2005**

This questionnaire is distributed to the members of the Full Cost Investigation Task Force, Policy Planning and Support Committee. The questionnaire is about infrastructure investments. We respectfully ask you to complete the survey. If some answers require calculations, we are prepared to do them. Thank you for your help.

**Respondent Information**

Name: _____ Title: _____

Agency: _____

Phone: _____ Fax: _____

Email: _____

**Cost of Routine Highway Maintenance**

What is your typical (or 2003) annual budget (or expenditure) for routine maintenance of highways? _____* (Routine maintenance includes minor repairs such as filling potholes, minor guide rail repairs, and minor bridge repairs.)

Are there any additional in-house (material and/or labour) expenditures for routine maintenance?

Yes ☐ No ☐

If Yes, what is the amount of the additional annual in-house expenditures? _____

Is there somebody else in your organization we should contact regarding expenditures on routine maintenance?

Name:_____ Tel. No._____ Email_____

**Cost of Winter Maintenance**

What is your typical (or 2003) annual budget (or expenditure) for winter maintenance (snow removal and ice control)? _____ *

Are there any additional in-house (material and labour) expenditures for winter maintenance?

Yes ☐ No ☐

If Yes, what is the amount of the additional annual in-house expenditures? _____

Is there somebody else in your organization we should contact regarding expenditures on winter maintenance?

Name:_____ Tel. No._____ Email_____

* **Recommended format for reporting expenditures on routine maintenance and winter maintenance**

| Functional class | Routine maintenance | | Winter maintenance | |
|---|---|---|---|---|
| | Southern Ontario | Northern Ontario | Southern Ontario | Northern Ontario |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |
| Total | | | | |

***Freeway***: A divided highway with full control of access.
***Arterial***: A two-lane or a multi-lane highway that carries significant volumes of long distance traffic at high speeds. There is a high degree of access control.
***Collector***: A two-lane or a multi-lane highway that balances traffic flow needs with access. Access to the highway is governed by traffic flow concerns and by safety.
***Local*:** A two-lane or a multi-lane highway that primarily provides access to local land users. Access to the highway is controlled by safety.

**Expenditures on Access Roads**

Access roads are located on public (crown) land and provide access to resources (forest, mineral extraction, recreation areas, etc.). Typically, they are not part of the numbered highway network. Access roads are typically built by the industry, but some may be constructed and maintained using public money.

What is the total length of access roads in your Province? _____

Which percentage of access roads were constructed using public funds? _____

Which percentage of access roads is maintained using public funds? _____

What is your typical (or 2003) annual budget (or expenditure) for the construction and maintenance (summer maintenance only) of access roads? _____

Which percentage of the above budget (or expenditure) is for maintenance only? _____

Are there any restrictions on the use of access roads by general public? Yes ☐ No ☐
If Yes, please describe the restrictions _____

Is there somebody else in your organization we should contact regarding expenditures on access roads?
Name:_____ Tel. No._____ Email_____

Thank you for your participation and help. Please send the completed questionnaire to Jerry Hajek by fax (416-621-4917) or by email Hajek@sprint.ca.

Jerry Hajek, Ph.D., P.Eng., Principal Engineer
Applied Research Associates, Inc.
5401 Eglinton Avenue West, Suite 204
Toronto, Ontario M9C 5K6
Telephone: 416-621-9555; Facsimile: 416-621-4917
Email hajek@sprint.ca

## Introduction Letter for Provincial Highway Inventory Survey

March, 2005

Mr. Sarath Liyanage
Head, Program Planning and Evaluation Office
Program Development Branch, 4th Floor
301 St. Paul Street, St. Catharines
ON L2R 7R4

**Subject: Study on Representative Capital and Maintenance Costs of Roads**

Dear Mr. Liyanage:

As discussed during our recent telephone conversation, Applied Research Associates Inc. (ARA) have been engaged by Transport Canada to work on the above Study. Additional information about this study is provided in the attached letter from Mr. Roger Roy, Director General, Economic Analysis, Transport Canada.

The study is supported by the Council of Deputy Ministers Responsible for Transportation and Highway Safety, and is directed by the Full Cost Investigation Task Force. The Ontario representative on this Task Force is Mr. Alan Stillar, Strategic Policy and Planning Office, Ontario Ministry of Transportation, 439 University Ave., 2nd Floor, Suite 2000, Toronto, ON M5G 1Y8, (416) 212-1931; Alan.Stillar@mto.gov.on.ca.

We have already received summary information regarding the extent of the provincial highway network in Ontario through of Mr. Stillar's auspices. However, the study design calls for additional data on provincial and municipal highways and bridges in Ontario. The data that we seek are summarized in the attached questionnaire.

We do not expect you to have all the answers. I would like to discuss with you the feasibility of obtaining the data and the work required to succeed. We are prepared to participate actively in the data processing that may be required. Please let me know when and how we can work with you to obtain data for this important study.

Thank you for your help.

Sincerely,

Jerry Hajek, Ph.D., P. Eng.
Principal Engineer

Encl.: A letter from Mr. Roger Roy, Transport Canada and a survey questionnaire
cc: Mr. Alan Stillar, Strategic Policy and Planning Office

**Study of Representative Capital and Maintenance Costs of Roads**
**Provincial Highway Inventory Survey, March 2005**

This questionnaire is about the size, type, and age of provincial and municipal infrastructure in Ontario. We respectfully request your assistance in completing the survey. If some answers require calculations, we are prepared to do them. Thank you for your participation in this survey.

**Respondent Information**

Name: _____ Title: _____

Agency: _____

Phone: _____ Fax: _____

Email: _____

Please forward the completed questionnaire to:

Jerry Hajek, Ph.D., P.Eng., Principal Engineer
Applied Research Associates, Inc.
5401 Eglinton Avenue West, Suite 207
Toronto, Ontario M9C 5K6
Telephone: 416-621-9555; Facsimile: 416-621-4917
Email hajek@sprint.ca

**Provincial Highway Inventory**

Please enter the numbers in terms of 2-lane equivalent km.

| **Provincial Highways, 2-lane equivalent km** | | | | |
|---|---|---|---|---|
| **Functional Class** | Southern Ontario | | Northern Ontario | |
| | Rural | Urban | Rural | Urban |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |
| Total | | | | |

***Freeway***: A divided highway with full control of access.
***Arterial***: A two-lane or a multi-lane highway that carries significant volumes of long distance traffic at high speeds. There is a high degree of access control.
***Collector***: A two-lane or a multi-lane highway that balances traffic flow needs with access. Access to the highway is governed by traffic flow considerations and by safety concerns.
***Local*:** A two-lane or a multi-lane highway that primarily provides access to local land users. Access to the highway is controlled by safety concerns.

***Urban*** Highway section has predominantly an urban alignment, including curb and gutter and a closed drainage system.

**Traffic Volumes on Provincial Highways**

Please enter the average 2003 AADT (Annual Average Daily Traffic) volume, and the range of AADT volume, for the highway sections belonging to a given functional class. If you do not have 2003 data, please enter the most recent data.

| **Provincial Highways, Average AADT and AADT range for Year:_____** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Functional Class | Southern Ontario | | | | Northern Ontario | | | |
| | Rural | | Urban | | Rural | | Urban | |
| | Average | Range | Average | Range | Average | Range | Average | Range |
| Freeway | | | | | | | | |
| Arterial | | | | | | | | |
| Collector | | | | | | | | |
| Local | | | | | | | | |

Please enter the 2003 average percentage of commercial vehicles (trucks and buses) and the range of commercial vehicles in the traffic stream. If you do not have 2003 data, please enter the most recent data.

| **Provincial Highways, Percentage of Commercial Vehicles for Year:_____** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Functional Class | Southern Ontario | | | | Northern Ontario | | | |
| | Rural | | Urban | | Rural | | Urban | |
| | Average | Range | Average | Range | Average | Range | Average | Range |
| Freeway | | | | | | | | |
| Arterial | | | | | | | | |
| Collector | | | | | | | | |
| Local | | | | | | | | |

Is there a province-wide database that contains traffic data (traffic volumes, truck percentages) for municipal roadways? If yes, how can we gain access to it? _____

Is there somebody else in your organization we should contact regarding traffic volumes?

Name:_____ Tel. No._____ Email_____

**Inventory of Provincial Highway Bridges**

What is the minimum span of a structure to be classified as a bridge? ☐ 3 m ☐ 6 m Other:_____

**Estimated Number and Size of Highway Bridges**

| **Functional Class*** | **Number of bridges*** | **Estimated average bridge deck size**, $m^2$** |
|---|---|---|
| Freeway | | |
| Arterial | | |
| Collector | | |
| Local | | |
| **Total*** | * | ** |

* If unavailable by functional class, please provide the total number of bridges.
** If unavailable by functional class, please provide an average bridge deck area for all bridges combined.

**Inventory of Major Provincial Highway Structures**

Please complete the following table by listing all major highway structures in Ontario. Major structures include bridges longer than 200 m, tunnels longer than 80 m, retaining walls with the exposed surface are greater than 400 $m^2$, and snow sheds longer than 80 m.

| **Major highway structure** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description of Structure | Size[1)] | Age[2)] | Functional Class[3)] | Southern Ontario | | Northern Ontario | |
| | | | | Rural | Urban | Rural | Urban |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

[1)] Please use m for the length of bridges, tunnels, and snow sheds; $m^2$ for the exposed area of retaining walls.
[2)] Age of the structure in years since the time of the initial construction or a major reconstruction
[3)] Functional class of the highway where the structure is located. Please use the following abbreviations:
F = Freeway, A = Arterial, C = Collector, L = Local.

Is there somebody else in your organization we should contact regarding the inventory of provincial bridges and major structures?
Name:_____ Tel. No._____ Email_____

**Estimated Age of Provincial Highway Infrastructure, years**

| | Years |
|---|---|
| Average age of pavements since the time of the last major reconstruction* | |
| Average age of pavements since the time of the last resurfacing or rehabilitation | |
| Average age of bridges since the time of the initial construction or major reconstruction** | |
| Average time of bridges since the time of a significant maintenance or a rehabilitation action | |

* Typically includes changes to granular layers of the pavement structure. If there was no major reconstruction, please consider the age since the initial construction.
** Typically includes substantial changes in the bridge superstructure.

Is there somebody else in your organization we should contact regarding the age of highway infrastructure?
Name:_____ Tel. No._____ Email_____

**Municipal Roads**

Please enter the numbers in terms of 2-lane equivalent kilometres. (Please do not include residential streets.)

| **Municipal Roads, 2-lane equivalent km** | | |
|---|---|---|
| Functional Class | Southern Ontario | Northern Ontario |
| Arterial | | |
| Collector | | |
| Local | | |
| Total | | |

*Arterial* Resembles a highway going through a municipality.
*Collector* Feeds traffic from an *Arterial* to the *Local* roads or vice-versa.
*Local* All other roadways that are not residential streets and are also not arterial or collector roads.

**Municipal Bridges**

What is the minimum span of a structure to be classified as a bridge? ☐ 3 m ☐ 6 m Other:_____

**Estimated Number and Size of Municipal Highway Bridges**

| **Functional class*** | **Number of bridges*** | **Estimated average bridge deck size**, $m^2$** |
|---|---|---|
| Arterial | | |
| Collector | | |
| Local | | |
| **Total*** | | |

* If unavailable by functional class, please provide the overall total number of bridges.
** If unavailable by functional class, please provide an overall average bridge deck size

Please estimate the percentage of municipal highway bridges that are on residential streets _____

Thank you for your participation and help. Please send the completed survey to Jerry Hajek by fax (416-621-4917).

**Introduction Letter for Provincial Cost Survey**

February 15, 2005

Mr. XXX
Manager, Pavements and Foundations Section
Materials, Engineering, and Research Office
2nd Floor, Central Building
1201 Wilson Avenue
Downsview, ON M3M 1J8

**Subject: Study of Representative Capital and Maintenance Costs of Roads**

Dear Mr. XXX

As discussed during our recent telephone conversation, Applied Research Associates Inc. (ARA) have been engaged by Transport Canada to work on the above Study. Additional information about this study is provided in the attached letter from Mr. Roger Roy, Director General, Economic Analysis, Transport Canada.

The study is supported by the Council of Deputy Ministers Responsible for Transportation and Highway Safety, and is directed by the Full Cost Investigation Task Force. The Ontario representative on this Task Force is Mr. Alan Stillar, Strategic Policy and Planning Office, Ontario Ministry of Transportation, 439 University Ave., 2nd Floor, Suite 2000, Toronto, ON M5G 1Y8, (416) 212-1931; Alan.Stillar@mto.gov.on.ca.

As part of the study, we require information on highway construction costs as summarized in the attached survey questionnaire. The questionnaire deals with miscellaneous highway construction costs, bridge costs, and pavement costs. It is in the last area where we hope to benefit most from your expertise and the expertise of your staff.

I would like to discuss with you the feasibility of obtaining the data, and the work required to succeed. We are prepared to participate actively in the data processing that may be required. Please let me know when and how we can work with you to obtain data for this important study.

Thank you for your help.

Sincerely,

Jerry Hajek, Ph.D., P. Eng.
Principal Engineer

Encl.: A letter from Mr. Roger Roy, Transport Canada and a survey questionnaire.

cc: Mr. Alan Stillar, Strategic Policy and Planning Office

**Provincial Cost Survey, March 2005**

This questionnaire is about typical 2003 highway construction costs. We respectfully request your assistance in completing the survey.

- If you do not have a cost for an item on the list, but have it for a similar item, please provide the cost of the similar item. Also, if your have costs for other than 2003 year, please provide them.
- If you are making key assumptions when estimating costs, please note them on the questionnaire.
- If some answers require calculations, we are prepared to do them.

**Respondent Information**

Name: _____ Title: _____

Agency: _____

Phone: _____ Fax: _____

Email: _____

If you have any questions or concerns please contact:

Jerry Hajek, Ph.D., P.Eng., Principal Engineer
Applied Research Associates, Inc.
5401 Eglinton Avenue West, Suite 207
Toronto, Ontario M9C 5K6
Telephone: 416-621-9555; Facsimile: 416-621-4917
Email hajek@sprint.ca

**Highway Construction Costs**
(2003 supply and install costs)

| **Work Item (supply and install)** | | | **Provincial** | | **Municipal** | |
|---|---|---|---|---|---|---|
| **Description** | **Type** | **Unit** | **South** | **North** | **South** | **North** |
| Clearing and grubbing | | $m^2$ | | Typical change in unit costs compared to South, percent _____% | Typical change in unit costs compared to Provincial costs, percent _____% | Typical change in unit costs compared to South, percent _____% |
| Grading | Earth excavation | $m^3$ | | | | |
| | Rock excavation | $m^3$ | | | | |
| | Extra fill | $m^3$ | | | | |
| Landscaping | Sodding and top soil | $m^2$ | | | | |
| | Seeding + mulching + top soil | $m^2$ | | | | |
| Drainage | Curb and gutter (PCC, straight) | m | | | | |
| | 500 mm pipe culvert + end sections | m | | | | |
| | 1500 mm wide box culvert | m | | | | |
| | Storm water sewers for two-lane road | km | | | | |
| Guard rail | Concrete median | m | | | | |
| | Steel guardrail at shoulder | m | | | | |
| | 3-cable guide rail at shoulder | m | | | | |
| Fencing, Gates | Chain link fence | m | | | | |
| | Wire fence | m | | | | |
| Lighting | High mast | km | | | | |
| | Standard | km | | | | |
| Painting of traffic lanes (for a two-lane highway) | | km | | | | |

**Bridge Construction Costs**

| Highway Functional Class* | Typical New Construction Cost per $m^2$ of Bridge Deck | | | |
|---|---|---|---|---|
| | Provincial | | Municipal | |
| | South | North | South | North |
| Freeway | | Typical change in unit costs compared to South, percent _____% | Typical change in unit costs compared to Provincial costs, percent _____% | Typical change in unit costs compared to South, percent _____% |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |
| **Average*** | * | | | |

* For the definition of Highway Functional Classes, please see the last page.

* If unavailable by highway functional class, please estimate the average cost per $m^2$ of bridge deck for all bridges. combined. If the average cost is not available, please estimate the cost for the most typical bridge type used.

If specific cost information is available by bridge type, and the bridge type correlates with the highway functional class, please provide us with this information.

**Bridge Maintenance and Rehabilitation Treatments in Southern Ontario**

| Highway Functional Class* | Estimated cost for a typical maintenance or rehabilitation treatment† (per $m^2$ of bridge deck area) | | Estimated typical frequency between maintenance and rehabilitation treatments (years) | |
|---|---|---|---|---|
| | Provincial Bridges | Municipal Bridges | Provincial Bridges | Municipal Bridges |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |
| **Average*** | * | * | * | * |

* For the definition of Highway Functional Classes, please see the last page.

* If unavailable by highway functional class, please estimate the overall average cost per $m^2$ of bridge deck.

† Includes major treatments such as installation of cathodic protection, waterproofing of deck, repairs to superstructure, modification/replacement of expansion joints and bearings, and coating of all structural steel in structure.

- Estimated change in typical maintenance or rehabilitation costs in Northern Ontario compared to Southern Ontario _____%
- Estimated change in typical frequency of maintenance or rehabilitation treatments in Northern Ontario compared to Southern Ontario _____%

Do you have any additional information that would enable us to estimate new construction costs, and maintenance and rehabilitation costs, for bridges by highway functional class?

Yes ☐ No ☐ If Yes, how can we obtain the data? _____

Is there somebody else in your organization we should contact regarding the construction and maintenance costs of bridges?

Name:_____ Tel. No._____ Email_____

**Pavement Construction, Maintenance and Rehabilitation Costs**

1996 unit construction costs for paving materials given in the table below were obtained from the MTO's Project Value System (the predecessor of Highway Costing system). The costs are "supply and install" costs.

Would you please:

- Update the table by adding the most recent costs for which data are available (say for 2003) **or** estimate the overall percentage increase in unit costs between 1996 and 2003. _____%

- Estimate the overall difference between provincial unit costs and municipal unit costs. (E.g., to obtain municipal unit costs multiply the provincial units cost by 1.05.)
  Recommended multiplication factor to estimate municipal costs (using provincial costs) is: _____

| Item | Description | Units | 1996 Unit Costs | | 2003 Unit Costs | |
|---|---|---|---|---|---|---|
| | | | South | North | South | North |
| Surface | Open Friction Course | tonne | $66.54 | | | |
| | Dense Friction Course | tonne | $51.50 | $51.50 | | |
| | HL-1 | tonne | $45.78 | $47.84 | | |
| | HL-4 | tonne | $41.52 | $41.52 | | |
| Binder | Heavy Duty Binder | tonne | $41.93 | $45.78 | | |
| | Medium Duty Binder | tonne | $41.93 | $43.91 | | |
| | HL-8 | tonne | $36.72 | $37.44 | | |
| OGDL | Open Graded Drainage Layer | tonne | $31.79 | | | |
| Base | Granular A | tonne | $9.40 | $9.10 | | |
| Subbase | Granular B | tonne | $7.00 | $7.00 | | |
| Subdrains | Includes trenching and outlets, m | m | | | | |

**Unit costs for selected maintenance and rehabilitation actions**

| Description | Units | 1996 Unit Costs | | 2003 Unit Costs | |
|---|---|---|---|---|---|
| | | South | North | South | North |
| Rout and seal | m | $1.50 | $1.50 | | |
| Milling of asphalt pavement | tonne | $10.00 | $10.00 | | |
| Spot repairs of 10 to 20 percent of a section: Milling 40 mm of the surface AC layer and repaving | $m^2$ | $7.00 | $7.00 | | |

**Pavement Preservation Plans**

Attached are nine pages that show typical features of provincial pavements in Ontario. These features include geometric design, pavement design, maintenance and rehabilitation treatments, and typical unit costs for pavement materials and treatments. There are separate pages for freeways, arterial, collector, and local highways, both for northern and southern Ontario. (For the definition of Highway Functional Classes, please see the last page.)

Would you please comment on the appropriateness of the information provided on these pages. Do the features described on the attached pages reflect the pavement technology used on provincial highways in Ontario?

Yes ☐ No ☐ If No, what changes do you recommend? Please provide your comments directly on the attached pages.

**Definition of Highway Functional Classes**

***Freeway***: A divided highway with full control of access.

***Arterial***: A two-lane or a multi-lane highway that carries significant volumes of long distance traffic at high speeds. There is a high degree of access control.

***Collector***: A two-lane or a multi-lane highway that balances traffic flow needs with access. Access to the highway is governed by traffic flow considerations and by safety concerns.

***Local***: A two-lane or a multi-lane highway that primarily provides access to local land users. Access to the highway is controlled by safety concerns.

***Urban*** Highway section has predominantly an urban alignment, including curb and gutter.

Is there somebody else in your organization we should contact regarding pavement features?

Name:_____ Tel. No._____ Email_____

Thank you for your participation and help. Please send the completed survey to Jerry Hajek by fax (416-621-4917) or by email Hajek@sprint.ca.

## Examples of Road Inventory Sheets for Ontario

Road Inventory Sheets were prepared for the following provincial road categories

- Rural and urban freeway in Southern Ontario
- Urban freeway in Northern Ontario
- Rural arterial highway in Southern and Northern Ontario
- Rural and urban collector highway in Southern Ontario
- Rural collector in Northern Ontario
- Rural local highway in Southern and Northern Ontario

As an example, Road Inventory Sheet for rural urban freeway in Southern Ontario is provided on the next page. All completed Road Inventory Sheets for Ontario, as well as for other Provinces, are summarized in Appendix C.

# Example of Road Inventory Sheet for Ontario

**Province:** **Ontario**
**Category:** **Provincial Rural Freeway, South**
Code: ONP RFS
All Quantities and Costs are for one km of 2-lane highway

**Geometric Design**

| Design Feature | Dimension |
|---|---|
| Width of the two traffic lanes, m | 7.50 |
| Total width of both shoulders, m | 7.00 |
| Total width of both paved shoulders, m | 7.00 |
| Average AC thickness of the paved shoulders, mm | 120 |

**Initial Pavement Structure**

| Pavement Layer | Description of Pavement Layer, Amount (Quantity) | Amount | Quantity | Price per Unit of Quantity | Cost |
|---|---|---|---|---|---|
| Surface | Dense Friction Course, mm (t) | 40 | | $73.19 | |
| Binder | Heavy Duty Binder, mm (t) | 80 | | $46.12 | |
| Extra layer | Hl-8, mm (t) | 120 | | $40.39 | |
| Base | Granular A, mm (t) | 200 | | $10.34 | |
| Subbase | Granular B, mm (t) | 450 | | $7.70 | |
| Subdrains | Includes trenching and outlets, m (m) | 1,500 | | $110.00 | |
| OGDL | Open Graded Drainage Layer, mm (t) | 100 | | $34.97 | |
| Drainage | % of section with closed drainage, % (m) | 100 | | $110.00 | |

**Pavement Preservation Action Plan**

| Years after Initial Construction | Description of Maintanance and Rehabil. Treatments, Amount (Quantity) | Amount | Quantity | Price per Unit of Quantity | Cost |
|---|---|---|---|---|---|
| 5 | Rout and seal, m (m) | 500 | | $1.65 | |
| 9 | Spot repairs - mill 40 mm and patch, % ($m^2$) | 10 | | $7.70 | |
| 15 | Mill AC, mm (t) | 40 | | $11.00 | |
| 15 | Resurface with DFC, mm (t) | 40 | | $56.65 | |
| 19 | Rout and seal, m (m) | 500 | | $1.65 | |
| 19 | Spot repairs - mill 40 mm and patch, % ($m^2$) | 20 | | $7.70 | |
| 22 | Mill AC, mm (t) | 80 | | $11.00 | |
| 22 | Resurface with DFC, mm (t) | 40 | | $56.65 | |
| 22 | Resurface with HDB, mm (t) | 40 | | $46.12 | |
| 26 | Rout and seal, m (m) | 500 | | $1.65 | |
| 31 | Spot repairs - mill and patch, % ($m^2$) | 20 | | $7.70 | |
| 36 | Mill AC, mm (t) | 40 | | $11.00 | |
| 36 | Resurface with DFC, mm (t) | 40 | | $56.65 | |
| 39 | Rout and seal, m (m) | 500 | | $1.65 | |
| 39 | Spot repairs - mill 40 mm and patch, % ($m^2$) | 20 | | $7.70 | |
| 43 | Partial depth removal, mm (t) | 160 | | $11.00 | |
| 43 | Resurface with DFC, mm (t) | 40 | | $56.65 | |
| 43 | Resurface with HDB, mm (t) | 80 | | $46.12 | |
| 43 | Resurface with HL-8, mm (t) | 40 | | $40.39 | |
| | | | | | |
| | | | | | |
| | | | | | |

## Introduction Letter for Municipal Survey

February 8, 2005

Mr. XXXXX
Manager, Works Department
Regional Municipality of Durham
825 Conlin Road
P.O. Box 623
ON L1N 6A3

**Subject: Study of Representative Capital and Maintenance Costs of Roads**

Dear Mr. XXXXXX:

As discussed during our recent telephone conversation, Applied Research Associates Inc. (ARA) have been engaged by Transport Canada to work on the above Study. Additional information about this study is provided in the attached letter from Mr. Roger Roy, Director General, Economic Analysis, Transport Canada.

The study is supported by the Federation of Canadian Municipalities and the Council of Deputy Ministers Responsible for Transportation and Highway Safety. The Ontario representative on a Task Force responsible for the study is Mr. Alan Stillar from the Ontario Ministry of Transportation.

As part of this study, we are approaching leading representatives of roadway departments in selected Canadian municipalities and asking them for input regarding the extent and type of roadway infrastructure, the maintenance of pavements and bridges, and the size of roadway construction and maintenance budgets. The information that we seek is summarized in the attached questionnaire.

I would very much appreciate if you would complete the attached survey. If you prefer to do so through an interview, please let me know so that I can arrange a telephone interview or a visit. I would also appreciate the opportunity to discuss some of the material in the questionnaire with you.

Thank you very much for your help.

Sincerely,

Jerry Hajek, Ph.D., P.Eng.
Principal Engineer

Encl.: A copy of a survey questionnaire
Letter from Mr. Roger Roy, Transport Canada

**Study of Representative Capital and Maintenance Costs of Roads**
**Municipal Survey, March 2005**

This questionnaire is distributed to leading representatives of road departments in selected municipalities across Canada. It is about the extent, cost, and funding of municipal road infrastructure. We respectfully request your assistance in completing the survey. If some answers require data processing, we are prepared to do it. Thank you for your help.

**Respondent Information**

Name: _____ Title: _____

Agency: _____

Phone: _____ Fax: _____

Email: _____

Please forward the completed survey to:

Jerry Hajek, Ph.D., P.Eng., Principal Engineer
Applied Research Associates, Inc.
5401 Eglinton Avenue West, Suite 207
Toronto, Ontario M9C 5K6
Telephone: 416-621-9555; Facsimile: 416-621-4917
Email hajek@sprint.ca

**Roadway Inventory**

What is the total length of all your roads not including residential streets? _____
What is the total length of all your roads including residential streets? _____

Are the above numbers in: Centreline km □ 2-lane equivalent km □ lane km □

| Type of Roadway | Percentage of the total roadway length | Which percentage of roadways has urban alignment*? | Average AADT** | | Average percentage of trucks | |
|---|---|---|---|---|---|---|
| | | | Average | Range | Average | Range |
| Arterial Roads | | | | | | |
| Collector Roads | | | | | | |
| Local Roads | | | | | | |

* Urban alignment typically means curb-and-gutter and a closed drainage system.
** Annual Average Daily Traffic volume (in both directions).

*Arterial* Resembles a highway going through a municipality.
*Collector* Feeds traffic from an *Arterial* to the *Local* roads or vice-versa.
*Local* All other roads that are not residential streets and are also not arterials and collectors.
*Urban* Road section has predominantly an urban alignment, including curb and gutter.

Is there somebody else in your organization we should contact regarding the road inventory or traffic data?
Name:_____ Tel. No._____ Email_____

**Inventory of Roadway Bridges**

What is the minimum span of a structure to be classified as a bridge? ☐ 3 m ☐ 6 m Other:_____

**Estimated Number and Size of Bridges**

| **Type of Road*** | **Number of bridges*** | **Estimated average bridge deck size**** | **Estimated average construction cost per $m^2$ of bridge deck†** |
|---|---|---|---|
| Arterial | | | |
| Collectors | | | |
| Local | | | |
| **Total*** | | | |

* If unavailable by road type, please estimate the total number of bridges in your municipality.
** If unavailable by road type, please estimate an average bridge deck area in your municipality.
† If unavailable by road type, please estimate an average construction cost per $m^2$ of bridge deck.

If specific cost information is available by bridge type, and the bridge type correlates with the road type, please provide us with this information.

Is there somebody else in your organization we should contact regarding the inventory of bridges?

Name:_____ Tel. No._____ Email_____

**Estimated Age of Roads and Bridges**

| | Years |
|---|---|
| Average age of pavements since the time of the last major reconstruction* | |
| Average age of pavements since the time of the last resurfacing or rehabilitation | |
| Average age of bridges since the time of the initial construction or major rehabilitation** | |
| Average age of bridges since the time of a significant maintenance or a rehabilitation action | |

* Typically includes changes in granular layers of the pavement structure. If there was no major reconstruction, please consider the age since the initial construction.

** Typically includes substantial changes in the bridge superstructure.

Is there somebody else in your organization we should contact regarding the age of roadway infrastructure?

Name:_____ Tel. No._____ Email_____

**Pavement Design and Maintenance**

Attached are three pages that show typical features of municipal pavements in Southern (Northern) Ontario. These features include geometric design, pavement design, maintenance and rehabilitation treatments, and typical unit costs for pavement materials and treatments. There are separate pages for arterial, collector, and local roads

.

Do the features described on the attached pages properly reflect the use of pavement technology in your municipality?

Yes ☐ No ☐ If No, what changes do you recommend?

Is there somebody else in your organization we should contact regarding pavement features?

Name:_____ Tel. No._____ Email_____

**Cost of Routine Road Maintenance**

What is your typical (or 2003) annual budget (or expenditure) for routine maintenance of roads? _____
(Routine maintenance includes sweeping and minor repairs such as filling potholes, minor guide rail repairs, and minor bridge repairs.)

Are there any additional in-house expenditures (for materials and/or labour) on routine maintenance?

Yes ☐ No ☐

If Yes, what is the amount of the additional annual in-house expenditures? _____

What percentage of the budget (or expenditure) is for residential streets and sidewalks? _____

Is there somebody else in your organization we should contact regarding expenditures on routine road maintenance?

Name:_____ Tel. No._____ Email_____

**Cost of Winter Maintenance for Roads**

What is your typical (or 2003) annual budget (or expenditure) for winter maintenance (snow removal and ice control)? _____

Are there any other additional in-house expenditures (material and labour) on winter maintenance?

Yes ☐ No ☐

If Yes, what is the amount of the additional annual expenditures? _____

What percentage of the budget (or expenditure) is for residential streets and for sidewalks? _____

Is there somebody else in your organization we should contact regarding expenditures on winter maintenance?

Name:_____ Tel. No._____ Email_____

Thank you for your participation and help. Please send the completed survey to Jerry Hajek by fax (416-621-4917) or by email Hajek@sprint.ca.

# Example of Municipal Road Inventory Sheet for Ontario

**Province:** **Ontario**
**Category:** **Municipal Arterial Roadway, South**
Code: ONM AS
All Quantities and Costs are for one km of 2-lane highway

**Geometric Design**

| Design Feature | Dimension |
|---|---|
| Width of the two traffic lanes, m | 7.50 |
| Total width of both shoulders, m | 6.50 |
| Total width of both paved shoulders, m | 5.00 |
| Average AC thickness of the paved shoulders, mm | 80 |

**Initial Pavement Structure**

| Pavement Layer | Description of Pavement Layer, Amount (Quantity) | Amount | Quantity | Price per Unit of Quantity | Cost |
|---|---|---|---|---|---|
| Surface | Hl-1, mm (t) | 40 | | $50.36 | |
| Binder | HL-8, mm (t) | 80 | | $40.39 | |
| Extra layer | | | | | |
| Base | Granular A, mm (t) | 150 | | $10.34 | |
| Subbase | Granular B, mm (t) | 450 | | $7.70 | |
| Subdrains | Includes trenching and outlets, m (m) | 1,000 | | $110.00 | |
| Subgrade | Subgrade improvement, $m^2$ ($m^2$) | | | | |
| Drainage | % of section with closed drainage, % (m) | 50 | | $7.70 | |

**Pavement Preservation Action Plan**

| Years after Initial Construction | Description of Maintanance and Rehabil. Treatments, Amount (Quantity) | Amount | Quantity | Price per Unit of Quantity | Cost |
|---|---|---|---|---|---|
| 5 | Rout and seal, m (m) | 500 | | $1.65 | |
| 10 | Spot repairs - mill and patch, % ($m^2$) | 10 | | $7.70 | |
| 15 | Mill AC, mm (t) | 40 | | $11.00 | |
| 15 | Replace with HL-1, mm (t) | 40 | | $50.36 | |
| 18 | Rout and seal, m (m) | 500 | | $1.65 | |
| 25 | Mill AC, mm (t) | 80 | | $11.00 | |
| 25 | Replace with HL-1, mm (t) | 40 | | $50.36 | |
| 25 | Replace with HL-8, mm (t) | 40 | | $40.39 | |
| 29 | Rout and seal, m (m) | 500 | | $1.65 | |
| 34 | Spot repairs - mill and patch, % ($m^2$) | 20 | | $7.70 | |
| 39 | Mill AC, mm (t) | 40 | | $11.00 | |
| 39 | Replace with HL-1, mm (t) | 40 | | $50.36 | |
| 42 | Rout and seal, m (m) | 500 | | $1.65 | |
| 49 | Full depth removal, mm (t) | 120 | | $11.00 | |
| 49 | Replace with HL-1, mm (t) | 40 | | $45.67 | |
| 49 | Replace with HL-8, mm (t) | 80 | | $40.39 | |
| 49 | Add to Granualar A | 50 | | $11.37 | |
| | | | | | |
| | | | | | |

# Appendix B

# Agency Contact Information

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| Federal Government | Inventory | Dr. D.R. MacLeod<br>Manager, Highways and Bridges<br>Public Works and Government Services, Canada<br>Tel. 818-956-3303, Fax 819-956-389<br>donaldson.macleod@pwgsc.gc.ca |
| Newfoundland and Labrador | Expenditure and Inventory | Wanda Lundrigan<br>Director, Policy and Planning<br>Department of Transportation and Works<br>Confederation Building, West Block<br>PO Box 8700<br>St. John's, NL A1B 4J6<br>(709) 729-5344<br>wlundrigan@gov.nf.ca |
| Newfoundland and Labrador | Cost | Don Brennan, Manager, Materials Engineering |
| PE | Inventory and Cost | Allan H. (Jake) Bartlett<br>Director and Chief Engineer Capital Projects<br>PEI Transportation and Public Works<br>PO Box 2000, Park Street<br>Charlottetown, PE, C1A 7N8<br>(902) 368-5105<br>ahbartlett@gov.pe.ca |
| Nova Scotia | Expenditure | Greg Penny<br>Transportation and Public Works<br>Government of Nova Scotia<br>PO Box 186<br>Halifax, NS B3J 2N2<br>(902) 424-3893<br>PENNYGR@gov.ns.ca |
| Nova Scotia | | William van Lingen, Technical Services Specialist |
| Nova Scotia | | Kent Speiran<br>Manager, Asset Management<br>(902) 424-3510 |
| New Brunswick | Expenditure | Susi Derrah<br>Policy Anaylst<br>Strategic Development<br>Kings Place<br>440 King Street<br>Fredericton, NB E3B 5H8<br>(506) 453-5818<br>Susi.Derrah@gnb.ca |
| New Brunswick | | James Knox, Assistant Director of Paving |
| New Brunswick | | Mike Stanley, Highway Design Assistant Director |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| Québec | Expenditure | Évangéline Lévesque<br>Chef du service Économie et Plan directeur<br>Direction de la planification<br>Ministère des Transports du Québec<br>700, boulevard René Levesque Est, 25e étage<br>Québec, QC G1R 5H1<br>(418) 644-0447 ext. 2321<br>elevesque@mtq.gouv.qc.ca<br>Mme Anne Baril, ing.<br>Chef de service<br>Service des technologies d'exploitation<br>(418) 643-0674 Fax: (418) 644-6963<br>Anne.Baril@mtq.gouv.qc.ca |
| Québec | Inventory and Report Review<br><br><br><br>Inventory | Simon Plante, ing<br>Service Orientations stratégiques<br>418-644-0097 Fax: 418-5287917<br>simon.plante@mtq.gouv.qc.ca<br><br>Mr Bernard Letarte<br>Service des orientations stratégiques<br>Direction de la planification<br>Ministère des Transports du Québec<br>700, boul. René-Lévesque Est, 25e étage<br>Québec (Québec) G1R 5H1<br>Tél. : (418) 643-4606, poste 2306 |
| Québec | Cost | Jocelyn Beaulieuitle, ing<br>Service Orientations stratégiques<br>418-643-7517 Fax: 418-528-7917<br>jocelin.beaulieu@mtq.gouv.qc.ca |
| Ontario | Expenditure | Alan Stillar<br>Team Leader - Federal Provincial Relations<br>Strategic Policy and Planning Office<br>439 University Ave<br>2nd Floor, Suite 200<br>Toronto, ON M5G 1Y8<br>(416) 212-1931<br>Alan.Stillar@mto.gov.on.ca |
| Ontario | Cost | Tom Kazmierowski<br>Pavements & Foundations Section<br>(416) 235-3512<br>tom.kazmierowski@mto.gov.on.ca |
| Ontario | Bridge Inventory and Cost | Tony Merlo<br>Head of Bridge Systems<br>(905) 704-2384<br>tony.merlo@mto.gov.on.ca |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| Ontario | Inventory | Sarath Liyanage, P.Eng.<br>Team Leader, Information Management<br>Program Development Branch, 4th Floor<br>301 St. Paul Street, St. Catherines<br>ON L2R 7R4<br>(905) 704-2623<br>sarath.liyanage@mto.gov.on.ca |
| Manitoba | Expenditure | Amar Chadha<br>Director<br>Transportation Systems Planning and Development<br>Department of Transportation and Government Services<br>15 - 215 Garry Street<br>Winnipeg, MB R3C 3Z1<br>(204) 945-2269<br>AChadha@gov.mb.ca |
| Manitoba | Inventory and Cost | Ray Van Cauwenberghe, P.Eng.<br>Director of Materials and Research<br>12th Floor – 215 Garry Street<br>Winnipeg, Manitoba R3C 3Z1<br>(204) 945-0560<br>RVanCauwen@gov.mb.ca |
| Saskatchewan | Expenditure | Andrew Liu<br>9th Floor, 1855 Victoria Avenue<br>Regina, SK S4P 3V5<br>(306) 787-4784<br>aliu@highways.gov.sk.ca |
| Saskatchewan | Inventory | Allan Widger<br>Executive Director, Engineering Services Branch<br>1630 Park Street<br>Regina, Saskatchewan S4P 3V7<br>(306) 787-4858<br>allan.widger.hi0@govmail.gov.sk.ca |
| Saskatchewan | Cost | P. Jorge Antunes, P.Eng.<br>Senior Engineer<br>1630 Park Street<br>Regina, Saskatchewan S4P 3V7<br>(306) 787-4640<br>jantunes@highways.gov.sk.ca |
| Alberta | Expenditure | Rod Thompson<br>Executive Director, Transportation Policy and Economic Analysis<br>3rd Floor, Twin Atria Building<br>4999 - 98 Avenue<br>Edmonton, AB T6B 2X3<br>(780) 415-0685<br>rod.thompson@gov.ab.ca |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| Alberta | Inventory, Cost and Report Review | Mr. Steve Otto, P.Eng.<br>Roadway Preservation Engineer, Maintenance & Materials<br>Planning, Programming & Technical Services Division<br>1st Floor, Twin Atria Building<br>4999-98 Avenue<br>Edmonton, AB T6B 2X3<br>(780) 422-9972<br>steve.otto@gov.ab.ca |
| British Columbia | Expenditure | Brenda Janke<br>Manager, Economic Analysis<br>Highway Planning Branch, Department of Transportation<br>940 Blanshard Street<br>Victoria, BC V8W 3E6<br>(250) 356-0772<br>Brenda.Janke@gems5.gov.bc.ca |
| British Columbia | Inventory and Cost | Mike Oliver<br>Chief Geotechnical, Materials and Pavements Engineer<br>PO Box 9850, Stn Prov Govt<br>Victoria, BC V8W 9T5<br>(250) 387-3353<br>mike.oliver@gov.ab.ca |
| Northwest Territories | Expenditure, Inventory and Cost | Jim Stevens<br>Director of Planning and Policy<br>Department of Transportation<br>Box 1320<br>Yellowknife, NT X1A 2L9<br>(867) 920-3366<br>jim_stevens@gov.nt.ca |
| Yukon | Expenditure, Inventory and Cost | Robert Magnuson<br>Assistant Deputy Minister of Highways and Public Works<br>Box 2703<br>Whitehorse, YK Y1A 2C6<br>(867) 667-5196<br>robert.magnuson@gov.yk.ca |
| Nunavut | Expenditure, Inventory and Cost | Mathusalah Kunuk<br>Assistant Deputy Minister of Transportation<br>P.O. Box 1000<br>Iqaluit, NU X0A 0H0<br>(867) 975-5925<br>mkunuk@gov.nu.ca |
| City of St. John's, NL | Municipal | John Barry, Art Cheeseman |
| City of Gander, NL | Municipal | Cluney Matchim |
| City of Charlottetown, PE | Municipal | Paul Johnston<br>Manager of Public Works |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| City of Summerside, PE | Municipal | Tony Gallant<br>Assistant Municipal Engineer, Technical Services Department<br>275 Fitzroy Street, 3rd Floor<br>Summerside, PE C1N 1H9<br>(902) 432-1252<br>tgallant@city.summerside.pe.ca |
| City of Halifax, NS | Municipal | Dave Hubley<br>Manager Design and Construction Services<br>(902) 490-4845<br>hubleyd@region.halifax.ns.ca |
| City of Moncton, NB | Municipal | Bruce Tait, Project Engineer<br>655 Rue Main Street<br>Moncton, NB E1C 1E8<br>(506) 383-6709<br>rene.lagace@moncton.org |
| City of Saint John, NB | Municipal | Tim O'Reilly<br>Project Engineer |
| City of Edmunston, NB | Municipal | Laurent Maltais<br>Technical Manager |
| Ville de Longueuil, QC | Municipal | Louis Racicot, Directeur des infrastructures<br>2001 Boulevard Rome<br>Brossard, QC J4W 3K5<br>(450) 463-7000<br>Louis.racicot@ville.longueuil.qc.ca |
| Ville de Montréal, QC | Municipal | André Campeau, Chef de service laboratoire<br>275 Notre-Dame Est<br>Montréal, QC H2Y 1C6<br>(514) 872-3142<br>acampeau@ville.montreal.qc.ca |
| Ville de Laval, QC | Municipal | Mr. Claude Asselin<br>Directeur général<br>1, place du souvenir,<br>C.P. 422, Succursale Saint-Martin<br>Laval, QC H7V 3Z4<br>c.asselin@ville.laval.qc.ca |
| Ville de Québec, QC | Municipal | Mr. Hervé Brosseau<br>Directeur des travaux publics<br>2 Rue des Jardins, H.V.<br>C.P. 700<br>Québec, QC G1R 4S9<br>herve.brosseau@ville.quebec.qc.ca |
| Ville de Gatineau, QC | Municipal | Mr Marc B. Laroche<br>25 Rue Laurier,<br>C.P. 1970, succursale Hull,<br>Gatineau, QC J8X 3Y9<br>laroche.marc@ville.gatineau.qc.ca |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| City of Toronto, ON | Municipal | John Neidra<br>Station 1170, 17th Floor<br>55 John St.<br>Toronto, ON M5V 3C6<br>(416) 338-5377<br>jniedra@city.toronto.on.ca |
| City of Niagara Falls, ON | Municipal | David Watt, C.E.T.<br>Manager of Infrastructure<br>4310 Queen Street<br>Niagara Falls, ON L2E 6X5<br>(905) 356-7521 Ext 4340<br>dwatt@city.niagarafalls.on.ca |
| City of Brampton, ON | Municipal | John Brophy, P.Eng.<br>Director, Maintenance and Operations<br>2 Wellington Street West<br>Brampton, ON L6Y 4R2<br>(905) 874-2553<br>john.brophy@city.brampton.on.ca |
| City of Ottawa, ON | Municipal | Steve Goodman<br>Senior Pavement Engineer<br>110 Laurier Avenue West<br>Ottawa, ON K1P 1J1<br>(613) 580-2424 x28583<br>steve.goodman@ottawa.ca |
| City of Thunder Bay, ON | Municipal | John Husiak, Roads Manager<br>P.O. Box 800<br>Thunder Bay, ON P7C 5K4<br>(807) 684-2195<br>jhusiak@thunderbay.ca |
| County of Grey, ON | Municipal | Gary Shaw<br>595 9th Ave. E<br>Owen Sound, ON N4K 3E3<br>(519) 376-7337<br>gshaw@greycounty.on.ca |
| United Counties of Stormont, Dundas, and Glengarry, ON | Municipal | Donald McDonald<br>County Engineer, Road Department<br>20 Pitt St.<br>Cornwall, ON K6J 3P2<br>(613) 932-1515<br>djmcdonald@sdgcounties.ca |
| City of Winnipeg, MB | Municipal | Aubrey Hope, P.Eng.<br>Department of Public Works<br>106 - 1155 Pacific Avenue<br>Winnipeg, Manitoba, R3E 3P1<br>(204) 986-3619<br>ahope@winnipeg.ca |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| City of Brandon, MB | Municipal | Steve Hayward<br>Department of Engineering<br>410 9th Street<br>Brandon, MB R7A 6A2<br>(204) 729-2215<br>s.hayward@brandon.ca |
| City of Thompson, MB | Municipal | Nathan Steuart<br>Building and Roads Technician<br>City of Thompson<br>226 Mystery Lake Road<br>Thompson, Manitoba R8N 1S6<br>(204) 677-7907<br>nsteuart@city.thompson.mb.ca |
| City of Regina, SK | Municipal | Norm Wong<br>Roadway Engineer, Municipal Engineering Dept.<br>2476 Victoria Avenue<br>P.O. Box 1790<br>Regina, Saskatchewan S4P 3C8<br>(306) 777-7425<br>nwong@regina.ca |
| City of Saskatoon, SK | Municipal | Colin Prang E.I.T.<br>Project Engineer for Roadway preservation<br>222 - 3rd Ave. N.<br>Saskatoon, SK S7K 0J5<br>(306) 975 2270<br>colin.prang@city.saskatoon.sk.ca |
| City of Yorkton, SK | Municipal | Jeffery Humble<br>Director of Planning and Engineering<br>37 - 3rd Avenue North<br>Yorkton, SK S3N 2W3<br>(306) 786-1727<br>jhumble@yorkton.ca |
| City of Calgary, AB | Municipal | Mr. Bill Biensch, P.Eng.<br>Maintenance Project Engineer<br>P.O. Box 2100<br>Station M #31<br>T2P 2M5<br>(403) 268-1098 |
| City of Edmonton, AB | Municipal | Mr. Al Cepas, P.Eng.<br>Pavement Management Engineer, Roadway Maintenance<br>10517-95 Street<br>P.O. Box 2610<br>Edmonton, AB T5J 3R5<br>(780) 496-4676 |

| Jurisdiction | Survey | Contact(s) |
|---|---|---|
| City of Vancouver, BC | Municipal | Don Brynildsen, P.Eng.<br>Assistant City Engineer<br>6th Floor City Hall<br>453 West 12th Avenue<br>V5Y 1V4<br>(604) 873-7313<br>don.brynildsen@vancouver.ca |
| Municipality of Saanich, BC | Municipal | Dal Haftner<br>Sr. Engineering Technician<br>770 Vernon Avenue<br>Victoria, BC V8X 2W7<br>(250) 475-1775 ext. 3459<br>haftnerd@gov.saanich.bc.ca |
| City of Whitehorse, YK | Municipal | George Farrow<br>Engineering and Environmental Services<br>2121 2nd Avenue<br>Whitehorse, YK Y1A 1C2<br>(867) 668-8310<br>george.farrow@city.whitehorse.yk.ca |
| City of Yellowknife, NT | Municipal | Dennis Kefalas<br>Manager, Public Works<br>4807 - 52 Street<br>P.O. Box 580<br>Yellowknife, NT X1A 2N4<br>(867) 920-5639<br>dkefalas@yellowknife.ca |
| City of Iqaluit, NU | Municipal | Brad Sokach<br>Director of Engineering and Planning<br>P.O. Box 460<br>Iqaluit, NU X0A 0H0<br>(867) 975-8501<br>b.sokach@city.iqaluit.nu.ca |

# Appendix C

# Road Inventory Sheets

## Newfoundland and Labrador

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 0.0 | 0 | | N/A | N/A |
| Arterial | 42.1 | 2,501 | | | |
| Collector | 101.8 | 3,693 | | | |
| Local* | 22.6 | 2,672 | 689 | | |
| Total | 166.5 | 8,866 | | | |

*Local roads include 1,595 km of gravel roads

"Secondary " roads (1,314 km) were divided equally between Arterial and Collector roads

### Bridge inventory

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | N/A | | | | 3.0 |
| Arterial | 5 | 181 | | 435 | | |
| Collector | 18 | 87 | | 300 | | |
| Local | 8 | 550 | | 200 | | |
| Total | 31 | 818 | | | | |

### Average age of road infrastructure, years

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | |
| | of resurfacing or rehabilitation | |
| Bridges | since the time of initial construction | |
| | of rehabilitation | |

### AADT volumes, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | 6,000 | 1,300 - 20, 000 | | |
| Collector | | | | |
| Local | | | | |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | 10% | 6 % - 20 % | | |
| Collector | | | | |
| Local | | | | |

**Prince Edward Island**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 0.0 | | | N/A | N/A |
| Arterial | 0.0 | | | | |
| Collector | 24.5 | | | | |
| Local | 16.2 | | | | |
| Total | 40.7 | | | | |

**Bridge inventory**

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | | | | | 3.0 |
| Arterial | | | | | | |
| Collector | 1 | | | | | |
| Local* | | | | | | |
| Total | 1 | | | | | |

**Average age of road infrastructure, years**

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | |
| | of resurfacing or rehabilitation | |
| Bridges | since the time of initial construction | |
| | of rehabilitation | |

**AADT volumes, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**Nova Scotia**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 0.0 | 1,834 | | N/A | N/A |
| Arterial | 0.0 | 2,130 | | | |
| Collector | 80.6 | 2,721 | | | |
| Local | 40.0 | 16,104 | | | |
| Total | 120.6 | 22,789 | | 2,330 | |

*Local roads include 8,980 km of gravel roads

**Bridge inventory**

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | 535 | | | | 3.0 |
| Arterial | | | | | | |
| Collector | 13 | 3550 | | | | |
| Local | 10 | | | | | |
| Total | 23 | | | | | |

**Average age of road infrastructure, years**

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 16 |
| | of resurfasing or rehabilitation | |
| Bridges | since the time of initial construction | 53 |
| | of rehabilitation | |

**AADT volumes, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 3,700 | ? - 22,600 | | |
| Arterial | 3,700 | 150 - ? | 6,900 | 390 - 47,900 |
| Collector | 1,100 | 200 - 5,000 | 3,400 | 200 - 1,350 |
| Local | 500 | 70 - 2,500 | 1,500 | 10 - 24,200 |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 13.2% | 1 - 31% | 10.4% | 3 - 25% |
| Arterial | 13.2% | 1 - 31% | 10.4% | 3 - 25% |
| Collector | 8.8% | 3 - 18% | 8.6% | 3 - 20% |
| Local | | | 5.4% | 1 - 15% |

**New Brunswick**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Provincial Roads [1] | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 0.0 | 2,090 | | | |
| Arterial | 0.0 | | | | |
| Collector | 20.1 | 2,979 | | | |
| Local | 42.5 | 12,896 | | | |
| Total | 62.6 | 17,965 | | | |

1 Provincial data are in terms of centerline km

**Bridge inventory**

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | | | | | 6.0 |
| Arterial | 1 | | | | | |
| Collector | 8 | | | | | |
| Local* | 10 | | | | | |
| Total | 19 | 147 | | 1138 | | |

**Average age of road infrastructure, years**

| | |
|---|---|
| Pavements since the time of construction / reconstruction | |
| of resurfasing or rehabilitation | |
| Bridges since the time of initial construction | |
| of rehabilitation | |

**AADT volumes, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

## Quebec

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | | 3,407 | 1,594 | | |
| Arterial | | 8,797 | 932 | | |
| Collector | | 12,925 | 485 | | |
| Local | 75 | 8 | 125 | | |
| Total | 75 | 25,137 | 3,136 | | |

### Bridge inventory

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | 2 | 1156 | | 1785 | | 3.0 |
| Arterial | | 1134 | 23 | 795 | 0 | |
| Collector | | 1532 | 32 | 461 | 0 | |
| Local | 67 | 606 | 4277 | 934 | 0 | |
| Total | 69 | 4428 | 4332 | | | |

### Average age of road infrastructure, years

| | |
|---|---|
| Pavements since the time of construction / reconstruction | |
| of resurfacing or rehabilitation | 12.5 |
| Bridges since the time of initial construction | 38.2 |
| of rehabilitation | 20 |

### AADT volumes for Southern Quebec, average and range

| Functional Class | Provincial Roads, Southern Quebec | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 10,100 | 1,400 - 60,000 | 33,000 | 4,500 - 95,500 |
| Arterial | 3,800 | 450 - 30,500 | 11,500 | 800 - 43,000 |
| Collector | 2,600 | 130 - 19,000 | 5,700 | 460 - 17,000 |
| Local | 1,600 | 140 - 12,350 | 6,600 | 200 - 59,000 |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads, Southern Quebec | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 18.0% | 10 - 45% | 10.0% | 2 - 40% |
| Arterial | 18.9% | 10 - 45% | 13.0% | 2 - 40% |
| Collector | 13.8% | 2 - 35% | 11.0% | 2 - 30% |
| Local | 11.3% | 1 - 36% | 10.0% | 1 - 17% |

**Quebec (Cont…)**

**Road inventory for Southern and Northern , 2-lane equivalent km**

| Functional Class | Southern Quebec | | | Nothern Quebec | | |
|---|---|---|---|---|---|---|
| | Rural | Urban | Municipal | Rural | Urban | Municipal |
| Freeway | | | | | | |
| Arterial | | | | | | |
| Collector | | | | | | |
| Local | | | | | | |
| Total | | | 4,539 | | | 56,819 |

**Inventory of major structures**

| Description | Jurisdiction | Size (length), m | Functional Class | Alignment | |
|---|---|---|---|---|---|
| | | | | Rural | Urban |
| Tunnel L.-H. Lafontaine | Provincial, S | 1,993 | F | | X |
| Tunnel Ville-Marie | Provincial, S | 6,495 | F | | X |
| Tunnel de Liesse | Provincial, S | 907 | F | | X |
| Tunnel Viger | Provincial, S | 638 | F | | |

**AADT volumes for Northern Quebec, average and range**

| Functional Class | Provincial Roads, Nothern Quebec | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 13,200 | 300 - 61,500 | 33,300 | 3,700 - 95,500 |
| Arterial | 3,900 | 220 - 43,800 | 10,500 | 850 - 44,000 |
| Collector | 3,000 | 130 - 22,200 | 6,700 | 250 - 26,000 |
| Local | 1,650 | 80 - 18,500 | 4,000 | 300 - 59,000 |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads, Nothern Quebec | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 16.0% | 10 - 45% | 10.0% | 2 - 40% |
| Arterial | 16.9% | 10 - 45% | 13.0% | 2 - 40% |
| Collector | 13.0% | 2 - 35% | 11.0% | 2 - 30% |
| Local | 10.9% | 1 - 36% | 10.0% | 1 - 17% |

## Ontario

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | | 2,261 | 2,043 | N/A | N/A |
| Arterial | | 6,120 | 145 | | |
| Collector | | 4,981 | 128 | | |
| Local | 75 | 3,860 | 48 | | |
| Total | 75 | 17,222 | 2,364 | | |

Rural-Urban split for freeways was based on 1995 data

### Bridge inventory for Ontario

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | | | | | 3.0 |
| Arterial | 7 | | | | | |
| Collector | | | | | | |
| Local | 48 | | | | | |
| Total | 55 | 2646 | | 1000 | | |

### Average age of road infrastructure, years

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 30.9 |
| | of resurfacing or rehabilitation | 17.6 |
| Bridges | since the time of initial construction | 36 |
| | of rehabilitation | 25 |

### AADT volumes for Southern Ontario, average and range

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 64,425 | 5,450 - 102,600 | 70,847 | 17,400-410,000 |
| Arterial | 12,053 | 610 - 46,000 | 12,978 | 5,700 - 41,700 |
| Collector | 7,604 | 650 - 50,400 | 5,689 | 2,050-33,300 |
| Local | 9,917 | 150 - 22,300 | | |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 21.6% | 3.0 - 50.8% | 11.5% | 4.2 - 20.0% |
| Arterial | 10.5% | 3.3 - 33.3% | 9.6% | 3.2 - 21.8% |
| Collector | 10.3% | 2.8 - 26.8% | 10.4% | 2.0 - 19.6% |
| Local | 9.6% | 3.9 - 30.4% | | |

**Ontario (Cont…)**

**Road inventory for Southern and Northern Ontario, 2-lane equivalent km**

| Functional Class | Southern Ontario | | Northern Ontario | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | 1,930 | 2,043 | 331 | 0 |
| Arterial | 2,226 | 87 | 3,894 | 58 |
| Collector | 1,692 | 115 | 3,289 | 13 |
| Local | 160 | 0 | 3,700 | 48 |
| Total | 6,008 | 2,245 | 11,214 | 119 |

Rural-Urban split for freeways was based on 1995 data

**AADT volumes for Northern Ontario, average and range**

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 8,934 | 5,500 - 16,600 | | |
| Arterial | 8,014 | 520 -25,600 | 5,851 | 1,100 - 27,400 |
| Collector | 1,681 | 120 - 20,500 | 1,162 | |
| Local | 623 | 30 - 6,200 | 1,070 | 160- 12,500 |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 13.1% | 4.0 - 51.5% | | |
| Arterial | 26.8% | 4.0 - 47.0% | 14.5% | 2.5 - 27.1% |
| Collector | 15.0% | 2.0 - 48.8% | 7.4% | 4.2 - 11.3% |
| Local | 10.5% | 1.7 - 58.0% | 9.2% | 2.3 -23.1% |

## Manitoba

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 0 | 1,706 | 125 | | |
| Arterial | 55 | 3,596 | 33 | | |
| Collector | | 4,238 | 73 | | |
| Local | 12 | 8,802 | 53 | | |
| Total | 67 | 18,342 | 284 | | |

### Bridge inventory

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | 301 | | 560 | | 6.0 |
| Arterial | 3 | 935 | | 560 | | |
| Collector | | 1001 | | 350 | | |
| Local | 5 | 160 | | 195 | | |
| Total | 8 | 2397 | | | | |

### Average age of road infrastructure, years

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 45 |
| | of resurfasing or rehabilitation | 25 |
| Bridges | since the time of initial construction | |
| | of rehabilitation | |

### AADT volumes, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 5,000 | 2,900 - 11,000 | 10,000 | 4,600 - 21,000 |
| Arterial | 3,000 | 700 - 16,000 | 8,000 | 9,000 - 17,000 |
| Collector | 800 | 100 - 6,000 | 8,000 | 5,000 - 17,000 |
| Local | | | | |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 18% | 4.5 - 30% | 9% | |
| Arterial | 9% | 8 - 12% | | |
| Collector | | | | |
| Local | | | | |

## Saskatchewan

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 0.0 | 1,499 | 167 | N/A | N/A |
| Arterial | 0.0 | 3,165 | 167 | 12,200 | 2,777 |
| Collector | 46.9 | 5,216 | | 82,670 | 2,556 |
| Local | 14.1 | 16,049 | | 67,868 | 4,296 |
| Total | 61.0 | 25,930 | 333 | 162,738 | 9,629 |

### Bridge inventory

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | 170 | N/A | 481 | N/A | 6.0 |
| Arterial | | 171 | 204 | 354 | 90 | |
| Collector | 2 | 250 | 306 | 293 | 90 | |
| Local | 31 | 249 | 1381 | 163 | 90 | |
| Total | 33 | 840 | 1891 | | | |

### Average age of road infrastructure, years

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 30 |
| | of resurfasing or rehabilitation | 13 |
| Bridges | since the time of initial construction | 37 |
| | of rehabilitation | |

### AADT volumes, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 2,943 | 250 - 38,800 | | |
| Arterial | 885 | 30 - 12960 | | |
| Collector | 382 | 20 - 7,100 | N/A | N/A |
| Local | 113 | 5 - 2,130 | N/A | N/A |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | 22.1% | 3 - 35% | | |
| Arterial | 15.8% | 1 - 40% | | |
| Collector | 13.0% | 1 - 40% | N/A | N/A |
| Local | 17.7% | 0 - 30% | N/A | N/A |

## Alberta

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | 101.6 | 208 | 292 | N/A | N/A |
| Arterial | 149.0 | 15,418 | | 3,926 | 207 |
| Collector | 327.7 | 11,542 | | 1,863 | 329 |
| Local | 223.2 | 5,038 | | 14,953 | 1,662 |
| Total | 801.5 | 32,207 | 292 | 20,742 | 2,198 |

### Bridge inventory

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | 30 | | | | | 1.5 |
| Arterial | 36 | | | | | |
| Collector | 11 | | | | | |
| Local | 27 | | | | | |
| Total | 104 | 10,350 | | 75 | | |

Bridge Deck Sizedoes not include culverts.

### Average age of road infrastructure, years

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 11.1 |
| | of resurfasing or rehabilitation | 9.9 |
| Bridges | since the time of initial construction | 34 |
| | of rehabilitation | 25 |

### AADT volumes, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | 69,000 | 15,000 - 143,000 |
| Arterial | 4,160 | 700 - 16,000 | 19,500 | 5,000 - 40,000 |
| Collector | 1,160 | 100 - 6,000 | | |
| Local | 320 | 40 - 32,400 | | |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | 8.6% | 2- 40% |
| Arterial | 11.8% | 0 - 50% | 10.8% | 2 - 35% |
| Collector | 10.3% | 0 - 60% | | |
| Local | 9.4% | 0 - 50% | | |

## British Columbia

### Road inventory, 2-lane equivalent km

| Functional Class | Federal Roads | Provincial Roads[1] | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | | 928 | 185 | N/A | N/A |
| Arterial | 1,022 | 491 | 192 | | |
| Collector | 43 | 9,010 | 459 | | |
| Local | 186 | | | | |
| Total | 1,251 | 10,429 | 836 | | |

1 Estimated data

### Bridge inventory

| Functional Class | Number of bridges | | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|---|
| | Federal | Provincial | Municipal | Provincial | Municipal | |
| Freeway | | | | | | 3.0 |
| Arterial | 69 | | | | | |
| Collector | 5 | | | | | |
| Local | 2 | | | | | |
| Total | 76 | | | | | |

### Average age of road infrastructure, years

| | |
|---|---|
| Pavements since the time of construction / reconstruction | |
| of resurfacing or rehabilitation | |
| Bridges since the time of initial construction | |
| of rehabilitation | |

### AADT volumes for Coastal average and range

| Functional Class | Provincial Roads, Southern Ontario | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

### Percent commercial vehicles, average and range

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**British Columbia (Cont…)**

**Road inventory for Coatal and Interior 2-lane equivalent km**

| Functional Class | Southern BC | | Northern BC | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |
| Total | | | | |

**Inventory of major structures**

| Description | Jurisdiction | Size, m | Functional Class | Alignment | |
|---|---|---|---|---|---|
| | | | | Rural | Urban |
| Snow shed | Federal | 258 | Arterial | X | |
| Snow shed | Federal | 588 | Arterial | X | |
| Snow shed | Federal | 269 | Arterial | X | |
| Snow shed | Federal | 183 | Arterial | X | |
| Snow shed | Federal | 212 | Arterial | X | |

**AADT volumes for interior average and range**

| Functional Class | Provincial Roads, Southern | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**Percent commercial vehicles, average and range**

| Functional Class | Provincial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**Northwest Territories**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Territiorial Roads | | Municipal Roads |
|---|---|---|---|---|
| | | Rural | Urban | |
| Freeway | | N/A | | N/A |
| Arterial | | 1,962 | | 20 |
| Collector | | 111 | | 11 |
| Local* | | 70 | | 9 |
| Total | | 2,143 | | 40 |

**Bridge inventory**

| Functional Class | Number of bridges | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|
| | Territorial | Municipal | Territorial | Municipal | |
| Freeway | | | | | |
| Arterial | | | | | |
| Collector | | | | | |
| Local* | | | | | |
| Total | 70 | | 350 | | |

**Average age of road infrastructure, years**

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 12 |
| | of resurfasing or rehabilitation | 12 |
| Bridges | since the time of initial construction | 23 |
| | of rehabilitation | 6.5 |

**AADT volumes, average and range**

| Functional Class | Territiorial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | N/A | N/A | | |
| Arterial | 558 | 130 - 1,490 | | |
| Collector | 690 | 100 - 1,240 | | |
| Local | 455 | 121 - 623 | | |

**Percent commercial vehicles, average and range**

| Functional Class | Territiorial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | N/A | N/A | | |
| Arterial | 19.7% | | | |
| Collector | | | | |
| Local | | | | |

**Yukon Territory**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Territiorial Roads | | Municipal Roads |
|---|---|---|---|---|
| | | Rural | Urban | |
| Freeway | | N/A | | 0 |
| Arterial | | 2,912 | 0 | 0 |
| Collector | | 233 | 0 | 13 |
| Local | | 1,615 | 0 | 15 |
| Total | | 4,760 | 0 | 28 |

**Bridge inventory**

| Functional Class | Number of bridges | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|
| | Territorial | Municipal | Territorial | Municipal | |
| Freeway | | | | | |
| Arterial | 61 | | 782 | | |
| Collector | 7 | | 773 | | |
| Local | 61 | 1 | 105 | 1168 | |
| Total | 129 | | | | |

**Average age of road infrastructure, years**

| | | |
|---|---|---|
| Pavements | since the time of construction / reconstruction | 25 |
| | of resurfasing or rehabilitation | 16 |
| Bridges | since the time of initial construction | 34 |
| | of rehabilitation | 26 |

**AADT volumes, average and range**

| Functional Class | Territiorial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | N/A | N/A | | |
| Arterial | 867 | 85 - 3,704 | | |
| Collector | 362 | 239 - 750 | | |
| Local | | | N/A | N/A |

**Percent commercial vehicles, average and range**

| Functional Class | Territiorial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | N/A | N/A | | |
| Arterial | 3.8% | 1.6 - 5.8% | | |
| Collector | | | | |
| Local | | | | |

**Nunavut**

**Road inventory, 2-lane equivalent km**

| Functional Class | Federal Roads | Territiorial Roads | | Municipal Roads | |
|---|---|---|---|---|---|
| | | Rural | Urban | Rural | Urban |
| Freeway | | | | N/A | N/A |
| Arterial | | | | | |
| Collector | | | | | |
| Local* | | | | | |
| Total | | | | | |

**Bridge inventory**

| Functional Class | Number of bridges | | Av. bridge deck size,$m^2$ | | Min. bridge span, m |
|---|---|---|---|---|---|
| | Territorial | Municipal | Territorial | Municipal | |
| Freeway | | | | | |
| Arterial | | | | | |
| Collector | | | | | |
| Local* | | | | | |
| Total | | | | | |

**Average age of road infrastructure, years**

| | |
|---|---|
| Pavements since the time of construction / reconstruction | |
| of resurfasing or rehabilitation | |
| Bridges since the time of initial construction | |
| of rehabilitation | |

**AADT volumes, average and range**

| Functional Class | Territiorial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

**Percent commercial vehicles, average and range**

| Functional Class | Territiorial Roads | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Average | Range | Average | Range |
| Freeway | | | | |
| Arterial | | | | |
| Collector | | | | |
| Local | | | | |

# Appendix D

# Computational Model

Main.xls - Input

## Universal Inputs

| | | |
|---|---|---|
| Discount Rate | 6.0% | |
| Analysis Period | 60 | Years |

**Cost Adjustment for Design and Administration**

| | |
|---|---|
| Pavements | 25% |
| Bridges | 35% |
| All Other Road Infrastructure | 25% |
| Routine and Winter Maintenance | 10% |

Pavements_NL.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Newfoundland**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $60.00 | $65.00 |
| | Seal coat, % area (m2) | $2.00 | $2.50 |
| | | | |
| | | | |
| Binder | Binder HMA, mm (t) | $57.00 | $50.00 |
| | | | |
| | | | |
| OGDL | | | |
| Base | Granular Base, mm (t) | $12.60 | $12.00 |
| Subbase | Granular Subbase, mm (t) | $10.40 | $10.00 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $20.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.00 |
| | | | |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $1.50 | $2.00 |
| Spot repairs - mill and patch, % Area ($m^2$) | $7.00 | $6.00 |
| Seal coat, % area (m2) | $2.00 | $2.00 |
| Mill AC, mm (t) | $10.00 | $10.00 |
| Resurface with Surface HMA, mm (t) | $60.00 | $66.00 |
| Resurface with Binder HMA, mm (t) | $57.00 | $62.70 |
| Add to Granular Base, mm (t) | $12.60 | $13.86 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.00 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_PE.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Prince Edward Island**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $50.00 | $65.00 |
| | Seal coat, % area (m2) | $2.00 | $2.50 |
| | | | |
| | | | |
| Binder | Binder HMA, mm (t) | $50.00 | $50.00 |
| | | | |
| | | | |
| OGDL | | | |
| Base | Granular Base, mm (t) | $12.00 | $14.00 |
| Subbase | Granular Subbase, mm (t) | $10.00 | $12.00 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $20.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.00 |
| | | | |
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| | | | |

**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.00 |
| Spot repairs - mill and patch, % Area ($m^2$) | $7.50 | $6.00 |
| Seal coat, % area (m2) | $2.00 | $2.00 |
| Mill AC, mm (t) | $7.50 | $10.00 |
| Resurface with Surface HMA, mm (t) | $50.00 | $55.00 |
| Resurface with Binder HMA, mm (t) | $50.00 | $55.00 |
| Add to Granular Base, mm (t) | $12.00 | $13.20 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.00 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_NS.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Nova Scotia**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $53.25 | $110.00 |
| | Seal coat, % area (m2) | $2.00 | $2.50 |
| | | | |
| | | | |
| Binder | Binder HMA, mm (t) | $48.47 | $60.00 |
| | | | |
| | | | |
| OGDL | | | |
| Base | Granular Base, mm (t) | $12.20 | $15.00 |
| Subbase | Granular Subbase, mm (t) | $11.00 | $12.00 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $20.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.00 |
| | | | |
| | | | |
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| | | | |

**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.20 |
| Spot repairs - mill and patch, % Area ($m^2$) | $7.35 | $6.00 |
| Seal coat, % area (m2) | $3.00 | $2.00 |
| Mill AC, mm (t) | $10.00 | $10.00 |
| Resurface with Surface HMA, mm (t) | $53.25 | $110.00 |
| Resurface with Binder HMA, mm (t) | $48.47 | $60.00 |
| Add to Granular Base, mm (t) | $12.20 | $15.00 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.50 |
| Microsurface, % Area (m2) | $4.00 | $4.00 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_NB.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: New Brunswick**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $65.00 | $71.50 |
| | Seal coat, % area (m2) | $1.50 | $1.65 |
| | | | |
| | | | |
| Binder | Binder HMA, mm (t) | $60.00 | $66.00 |
| | | | |
| | | | |
| OGDL | | | |
| Base | Granular Base, mm (t) | $10.60 | $11.66 |
| Subbase | Granular Subbase, mm (t) | $8.60 | $9.46 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
| | | | |
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| | | | |

**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.20 |
| Spot repairs - mill and patch, % Area ($m^2$) | $5.80 | $6.38 |
| Seal coat, % area (m2) | $1.50 | $1.65 |
| Mill AC, mm (t) | $7.50 | $8.25 |
| Resurface with Surface HMA, mm (t) | $65.00 | $71.50 |
| Resurface with Binder HMA, mm (t) | $60.00 | $66.00 |
| Add to Granular Base, mm (t) | $10.60 | $11.66 |
| Spot repairs - spray patch, % Area (m2) | $1.50 | $1.65 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
| | | |
| | | |
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Pavements_QC1.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Quebec, Champlain Plain**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | EG-10, mm (t) | $65.00 | $75.00 |
| | ESG-10, mm (t) | $60.00 | $84.00 |
| | Seal coat, % area (m2) | $0.26 | |
| | | | |
| Binder | ESG-14, mm (t) | $60.00 | $70.00 |
| | GB-20, mm (t) | $70.00 | $75.00 |
| | | | |
| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base MG-20, mm (t) | $11.00 | $11.00 |
| Subbase | Granular Subbase MG-112, mm (t) | $6.50 | $6.50 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $20.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $1.75 | $2.50 |
| Spot repairs - mill and patch, % Area ($m^2$) | $6.50 | $2.40 |
| Mill AC, mm (t) | $12.00 | $13.20 |
| Resurface with EG-10 HMA, mm (t) | $65.00 | $71.50 |
| Resurface with ESG-14 HMA, mm (t) | $60.00 | $66.00 |
| Resurface with GB-20 HMA, mm (t) | $70.00 | $77.00 |
| Add to Granular Base, mm (t) | $15.00 | $16.50 |
| Seal coat, % area (m2) | $5.00 | $5.50 |
| Spot repairs - spray patch, % Area (m2) | $2.20 | $2.42 |
| Granular Roadway Grading, km (km) | $200.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $9,500.00 | $1,000.00 |
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Pavements_QC2.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Quebec, Nord**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | EG-10, mm (t) | $65.00 | $75.00 |
| | ESG-10, mm (t) | $60.00 | $84.00 |
| | Seal coat, % area (m2) | $0.26 | |
| | | | |
| Binder | ESG-14, mm (t) | $60.00 | $70.00 |
| | GB-20, mm (t) | $70.00 | $75.00 |
| | | | |
| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base MG-20, mm (t) | $11.00 | $11.00 |
| Subbase | Granular Subbase MG-112, mm (t) | $6.50 | $6.50 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $20.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $1.75 | $2.50 |
| Spot repairs - mill and patch, % Area ($m^2$) | $6.50 | $2.40 |
| Mill AC, mm (t) | $12.00 | $13.20 |
| Resurface with EG-10 HMA, mm (t) | $65.00 | $71.50 |
| Resurface with ESG-14 HMA, mm (t) | $60.00 | $66.00 |
| Resurface with GB-20 HMA, mm (t) | $70.00 | $77.00 |
| Add to Granular Base, mm (t) | $15.00 | $16.50 |
| Seal coat, % area (m2) | $5.00 | $5.50 |
| Spot repairs - spray patch, % Area (m2) | $2.20 | $2.42 |
| Granular Roadway Grading, km (km) | $200.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $9,500.00 | $1,000.00 |
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Pavements_ON1.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Ontario, South**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | SMA, mm (t) | $75.00 | |
| | DFC, "Superpave 12.5 mm FC2", mm (t) | $68.88 | $74.00 |
| | HL-1, "Superpave 12.5 mm FC1", mm (t) | $68.75 | $74.00 |
| | HL-4, "Superpave 12.5 mm", mm (t) | $45.83 | $54.00 |
| | Double Surface Treatment, % area ($m^2$) | | |
| Binder | HDBC, "Superpave 19 mm", mm (t) | $53.91 | $63.00 |
| | MDBC, "Superpave 19 mm", mm (t) | $53.70 | $63.00 |
| | HL-8, "Superpave 25 mm", mm (t) | $49.42 | $58.00 |
| OGDL | Open Graded Drainage Layer, mm (t) | $45.00 | |
| Base | Granular A, mm (t) | $13.01 | $13.00 |
| Subbase | Granular B, mm (t) | $6.71 | $8.50 |
| Subdrains | Includes trenching and outlets, % of occurrence | $18.00 | $20.00 |
| Tack Coating | Tack Coating, number of applications ($m^2$) | $0.26 | $0.30 |
| Subgrade | Subgrade improvement, % area ($m^2$) | $5.00 | $5.00 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.00 |
| Spot repairs - mill and patch, % Area ($m^2$) | $7.70 | $7.00 |
| Mill AC, mm (t) | $11.00 | $10.00 |
| Resurface with SMA, mm (t) | $75.00 | |
| Resurface with SP 12.5mm FC2, mm (t) | $68.88 | $74.00 |
| Resurface with SP 19mm (MDBC), mm (t) | $53.70 | $63.00 |
| Resurface with SP 19mm (HDBC), mm (t) | $53.91 | $63.00 |
| Resurface with SP 12.5mm FC1, mm (t) | $68.75 | $74.00 |
| Resurface with SP 12.5mm, mm (t) | $45.83 | $54.00 |
| Resurface with SP 25mm, mm (t) | $49.42 | $58.00 |
| Add to Granular Base, mm (t) | $13.01 | $13.00 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_ON2.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Ontario, North**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | SMA, mm (t) | $75.00 | $75.00 |
| | DFC, "Superpave 12.5 mm FC2", mm (t) | $62.23 | $75.00 |
| | HL-1, "Superpave 12.5 mm FC1", mm (t) | $60.20 | $63.00 |
| | HL-4, "Superpave 12.5 mm", mm (t) | $55.08 | $60.59 |
| Binder | HDBC, "Superpave 19 mm", mm (t) | $54.54 | $60.00 |
| | MDBC, "Superpave 19 mm", mm (t) | $53.47 | $60.00 |
| | HL-8, "Superpave 25 mm", mm (t) | $49.42 | $60.00 |
| | Double Surface Treatment, % area ($m^2$) | $2.92 | |
| OGDL | Open Graded Drainage Layer, mm (t) | | $0.00 |
| Base | Granular A, mm (t) | $10.90 | $13.00 |
| Subbase | Granular B, mm (t) | $7.97 | $8.50 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $20.00 |
| Tack Coating | Tack Coating, number of applications ($m^2$) | $0.26 | $0.30 |
| Subbase | Subgrade improvement, % area ($m^2$) | $80.00 | $80.00 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.00 |
| Spot repairs - mill and patch, % Area ($m^2$) | $7.50 | $6.00 |
| Mill AC, mm (t) | $7.50 | $10.00 |
| Resurface with SMA, mm (t) | $75.00 | $75.00 |
| Resurface with SP 12.5mm FC2, mm (t) | $62.23 | $75.00 |
| Resurface with SP 19mm (MDBC), mm (t) | $53.47 | $60.00 |
| Resurface with SP 19mm (HDBC), mm (t) | $54.54 | $60.00 |
| Resurface with SP 12.5mm FC1, mm (t) | $60.20 | $63.00 |
| Resurface with SP 12.5mm, mm (t) | $55.08 | $60.59 |
| Resurface with SP 25mm, mm (t) | $49.42 | $60.00 |
| Add to Granular Base, mm (t) | $10.90 | $13.00 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
| Seal coat, % area (m2) | $1.96 | |
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Pavements_MB.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Manitoba**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $65.00 | $71.50 |
| | Seal coat, % area (m2) | $1.50 | $1.65 |
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| Binder | Binder HMA, mm (t) | $60.00 | $66.00 |
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| OGDL | | | |
| Base | Granular Base, mm (t) | $10.60 | $11.66 |
| Subbase | Granular Subbase, mm (t) | $8.60 | $9.46 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.20 |
| Spot repairs - mill and patch, % Area ($m^2$) | $5.80 | $6.38 |
| Seal coat, % area (m2) | $1.50 | $1.65 |
| Mill AC, mm (t) | $7.50 | $8.25 |
| Resurface with Surface HMA, mm (t) | $65.00 | $71.50 |
| Resurface with Binder HMA, mm (t) | $60.00 | $66.00 |
| Add to Granular Base, mm (t) | $10.60 | $11.66 |
| Spot repairs - spray patch, % Area (m2) | $1.50 | $1.65 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_SK.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Saskatchewan**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $65.00 | $71.50 |
| | Seal coat, % area (m2) | $2.00 | $2.20 |
| | Traffic Gravel (m2) | $0.80 | $0.80 |
| | | | |
| Binder | Binder HMA, mm (t) | $60.00 | $66.00 |
| | | | |
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| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base, mm (t) | $12.00 | $13.20 |
| Subbase | Granular Subbase, mm (t) | $10.00 | $11.00 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $7.50 | $7.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.20 |
| Spot repairs - mill and patch, % Area ($m^2$) | $2.00 | $2.20 |
| Mill AC, mm (t) | $7.50 | $8.25 |
| Resurface with Surface HMA, mm (t) | $65.00 | $71.50 |
| Resurface with Binder HMA, mm (t) | $60.00 | $66.00 |
| Add to Granular Base, mm (t) | $12.00 | $13.20 |
| Seal coat, % area (m2) | $2.00 | $2.20 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.20 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
| Collector road granular repair, km (km) | $3,000.00 | $3,000.00 |
| Local road granular repair, km (km) | $1,800.00 | $1,800.00 |
| Gravel road - clay capping, km (km) | $20,000.00 | $20,000.00 |
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Pavements_AB.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Alberta**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $57.30 | $63.03 |
| | Seal coat, % area (m2) | $2.00 | $2.20 |
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| Binder | Binder HMA, mm (t) | $38.33 | $42.16 |
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| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base, mm (t) | $16.00 | $17.60 |
| Subbase | Granular Subbase, mm (t) | $11.73 | $12.90 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $5.53 | $5.53 |
| Spot repairs - mill and patch, % Area ($m^2$) | $2.00 | $2.20 |
| Mill AC, mm (t) | $3.69 | $4.06 |
| Resurface with Surface HMA, mm (t) | $57.30 | $63.03 |
| Resurface with Binder HMA, mm (t) | $38.33 | $42.16 |
| Add to Granular Base, mm (t) | $16.00 | $17.60 |
| Seal Coat ($m^2$) | $2.00 | $2.20 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.20 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_BC1.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: British Columbia, Coastal**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $65.00 | $71.50 |
| | Seal coat, % area (m2) | $2.00 | $2.20 |
| | | | |
| | | | |
| Binder | Binder HMA, mm (t) | $60.00 | $66.00 |
| | | | |
| | | | |
| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base, mm (t) | $20.00 | $22.00 |
| Subbase | Granular Subbase, mm (t) | $12.00 | $13.20 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $1.50 | $1.65 |
| Spot repairs - mill and patch, % Area ($m^2$) | $15.00 | $16.50 |
| Mill AC, mm (t) | $4.00 | $4.40 |
| Resurface with Surface HMA, mm (t) | $65.00 | $71.50 |
| Resurface with Binder HMA, mm (t) | $60.00 | $66.00 |
| Add to Granular Base, mm (t) | $20.00 | $22.00 |
| Seal coat, % area (m2) | $2.00 | $2.20 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.20 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_BC2.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: British Columbia, Interior**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $70.00 | $77.00 |
| | Seal coat, % area (m2) | $2.00 | $2.20 |
| | | | |
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| Binder | Binder HMA, mm (t) | $60.00 | $66.00 |
| | | | |
| | | | |
| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base, mm (t) | $25.00 | $27.50 |
| Subbase | Granular Subbase, mm (t) | $20.00 | $22.00 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $1.50 | $1.65 |
| Spot repairs - mill and patch, % Area ($m^2$) | $20.00 | $22.00 |
| Mill AC, mm (t) | $5.00 | $5.50 |
| Resurface with Surface HMA, mm (t) | $70.00 | $77.00 |
| Resurface with Binder HMA, mm (t) | $60.00 | $66.00 |
| Add to Granular Base, mm (t) | $25.00 | $27.50 |
| Seal coat, % area (m2) | $2.00 | $2.20 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.20 |
| Granular Roadway Grading, km (km) | $250.00 | $150.00 |
| Granular Roadway Ditching, km (km) | $1,500.00 | $1,000.00 |
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Pavements_TR.xls – Unit Costs

**Initial Provincial Pavement Construction Costs**
**Province: Territories**

**Initial pavement structure**

| Pavement layer | Description of pavement layer, Amount (Quantity) | Unit costs | |
|---|---|---|---|
| | | Provincial | Municipal |
| Surface | Surface HMA, mm (t) | $65.00 | $71.50 |
| | Seal coat, % area (m2) | $2.00 | $2.20 |
| | | | |
| | | | |
| Binder | Binder HMA, mm (t) | $60.00 | $66.00 |
| | | | |
| | | | |
| OGDL | Open Graded Drainage Layer, mm (t) | | |
| Base | Granular Base, mm (t) | $12.00 | $13.20 |
| Subbase | Granular Subbase, mm (t) | $10.00 | $11.00 |
| Subdrains | Includes trenching and outlets, % of occurrence | $20.00 | $22.00 |
| Drainage | Closed drainage, % of occurrence (m) | | |
| Subbase | Subgrade improvement, % area (m2) | $5.00 | $5.50 |
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**Pavement preservation treatments**

| Description of maintenance and rehabilitation treatments | Unit costs | |
|---|---|---|
| | Provincial | Municipal |
| Rout and seal, m (m) | $2.00 | $2.20 |
| Spot repairs - mill and patch, % Area ($m^2$) | $2.00 | $2.20 |
| Mill AC, mm (t) | $7.50 | $8.25 |
| Resurface with Surface HMA, mm (t) | $65.00 | $71.50 |
| Resurface with Binder HMA, mm (t) | $60.00 | $66.00 |
| Add to Granular Base, mm (t) | $12.00 | $13.20 |
| Seal coat, % area (m2) | $2.00 | $2.20 |
| Spot repairs - spray patch, % Area (m2) | $2.00 | $2.20 |
| Granular Roadway Grading, km (km) | $350.00 | $250.00 |
| Granular Roadway Ditching, km (km) | $2,500.00 | $1,500.00 |
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Pavements_NL.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 465,252 | $ 181,571 | $ 181,571 | $ 128,660 | $ 485,252 | $ 201,571 | $ 181,571 | $ 134,169 | $ 176,269 | $ 176,269 | $ 45,346 | $ 215,045 | $ 176,269 | $ 130,398 |
| Annualized Initial Construction Cost | $ 28,788 | $ 11,235 | $ 11,235 | $ 7,961 | $ 30,025 | $ 12,472 | $ 11,235 | $ 8,302 | $ 10,907 | $ 10,907 | $ 2,806 | $ 13,306 | $ 10,907 | $ 8,068 |
| M&R Construction Cost (Not Discounted) | $ 491,250 | $ 362,100 | $ 362,100 | $ 336,450 | $ 491,250 | $ 362,100 | $ 362,100 | $ 336,450 | $ 387,670 | $ 387,670 | $ 30,655 | $ 343,780 | $ 387,670 | $ 379,765 |
| M&R Construction Cost (Discounted) | $ 81,207 | $ 57,726 | $ 57,726 | $ 54,025 | $ 81,207 | $ 57,726 | $ 57,726 | $ 54,025 | $ 61,650 | $ 61,650 | $ 8,537 | $ 60,583 | $ 61,650 | $ 59,142 |
| Annualized M&R Constuction Cost | $ 5,025 | $ 3,572 | $ 3,572 | $ 3,343 | $ 5,025 | $ 3,572 | $ 3,572 | $ 3,343 | $ 3,815 | $ 3,815 | $ 528 | $ 3,749 | $ 3,815 | $ 3,659 |

Pavements_PE.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 366,112 | $ 335,233 | $ 266,701 | $ 169,638 | $ 339,862 | $ 323,000 | $ 217,168 | $ 205,697 | $ 320,150 | $ 280,838 | $ 67,262 | $ 236,092 | $ 221,556 | $ 211,449 |
| Annualized Initial Construction Cost | $ 22,653 | $ 20,743 | $ 16,502 | $ 10,496 | $ 21,029 | $ 19,986 | $ 13,437 | $ 12,728 | $ 19,810 | $ 17,377 | $ 4,162 | $ 14,608 | $ 13,709 | $ 13,084 |
| M&R Construction Cost (Not Discounted) | $ 284,038 | $ 284,038 | $ 284,038 | $ 103,600 | $ 284,038 | $ 284,038 | $ 284,038 | $ 284,038 | $ 316,505 | $ 316,505 | $ 29,500 | $ 316,505 | $ 316,505 | $ 316,505 |
| M&R Construction Cost (Discounted) | $ 53,786 | $ 53,786 | $ 53,786 | $ 23,968 | $ 53,786 | $ 53,786 | $ 53,786 | $ 53,786 | $ 59,683 | $ 59,683 | $ 8,220 | $ 59,683 | $ 59,683 | $ 59,683 |
| Annualized M&R Constuction Cost | $ 3,328 | $ 3,328 | $ 3,328 | $ 1,483 | $ 3,328 | $ 3,328 | $ 3,328 | $ 3,328 | $ 3,693 | $ 3,693 | $ 509 | $ 3,693 | $ 3,693 | $ 3,693 |

Pavements_NS.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 491,156 | $ 269,763 | $ 239,639 | $ 105,949 | $ 511,156 | $ 289,763 | $ 259,639 | $ 147,756 | $ 476,623 | $ 324,358 | $ 72,066 | $ 496,623 | $ 252,612 | $ 227,957 |
| Annualized Initial Construction Cost | $ 30,391 | $ 16,692 | $ 14,828 | $ 6,556 | $ 31,628 | $ 17,929 | $ 16,065 | $ 9,143 | $ 29,491 | $ 20,070 | $ 4,459 | $ 30,729 | $ 15,631 | $ 14,105 |
| M&R Construction Cost (Not Discounted) | $ 335,025 | $ 315,483 | $ 315,483 | $ 114,615 | $ 334,025 | $ 315,483 | $ 315,483 | $ 217,645 | $ 576,969 | $ 557,225 | $ 32,650 | $ 576,969 | $ 557,225 | $ 557,225 |
| M&R Construction Cost (Discounted) | $ 89,136 | $ 70,417 | $ 70,417 | $ 35,317 | $ 89,020 | $ 70,417 | $ 70,417 | $ 52,457 | $ 108,228 | $ 104,547 | $ 9,085 | $ 108,228 | $ 104,547 | $ 104,547 |
| Annualized M&R Constuction Cost | $ 5,515 | $ 4,357 | $ 4,357 | $ 2,185 | $ 5,508 | $ 4,357 | $ 4,357 | $ 3,246 | $ 6,697 | $ 6,469 | $ 562 | $ 6,697 | $ 6,469 | $ 6,469 |

Pavements_NB.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 399,888 | $ 394,300 | $ 231,702 | $ 160,681 | $ 372,800 | $ 394,298 | $ 284,295 | $ 274,406 | $ 314,263 | $ 234,811 | $ 68,355 | $ 259,735 | $ 209,752 | $ 199,974 |
| Annualized Initial Construction Cost | $ 24,743 | $ 24,398 | $ 14,337 | $ 9,942 | $ 23,067 | $ 24,397 | $ 17,591 | $ 16,979 | $ 19,445 | $ 14,529 | $ 4,230 | $ 16,071 | $ 12,979 | $ 12,374 |
| M&R Construction Cost (Not Discounted) | $ 272,250 | $ 272,250 | $ 168,650 | $ 168,650 | $ 272,250 | $ 346,272 | $ 346,272 | $ 346,272 | $ 247,869 | $ 247,869 | $ 26,805 | $ 270,762 | $ 270,762 | $ 270,762 |
| M&R Construction Cost (Discounted) | $ 43,731 | $ 43,731 | $ 31,419 | $ 31,419 | $ 43,731 | $ 65,146 | $ 65,146 | $ 65,146 | $ 44,350 | $ 44,350 | $ 7,480 | $ 47,823 | $ 47,823 | $ 47,823 |
| Annualized M&R Constuction Cost | $ 2,706 | $ 2,706 | $ 1,944 | $ 1,944 | $ 2,706 | $ 4,031 | $ 4,031 | $ 4,031 | $ 2,744 | $ 2,744 | $ 463 | $ 2,959 | $ 2,959 | $ 2,959 |

Pavements_QC-1.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 659,966 | $ 429,302 | $ 357,969 | $ 247,539 | $ 713,472 | $ 474,222 | $ 461,536 | $ 385,125 | $ 307,428 | $ 259,643 | $ 64,486 | $ 327,135 | $ 220,511 | $ 207,151 |
| Annualized Initial Construction Cost | $ 40,836 | $ 26,563 | $ 22,150 | $ 15,317 | $ 44,147 | $ 29,343 | $ 28,558 | $ 23,830 | $ 19,022 | $ 16,066 | $ 3,990 | $ 20,242 | $ 13,644 | $ 12,818 |
| M&R Construction Cost (Not Discounted) | $ 542,952 | $ 400,894 | $ 360,465 | $ 262,480 | $ 548,983 | $ 411,250 | $ 414,155 | $ 349,630 | $ 350,481 | $ 340,169 | $ 35,275 | $ 326,950 | $ 336,325 | $ 326,950 |
| M&R Construction Cost (Discounted) | $ 89,232 | $ 76,878 | $ 88,962 | $ 67,599 | $ 93,426 | $ 80,201 | $ 102,300 | $ 87,078 | $ 66,778 | $ 65,180 | $ 9,806 | $ 63,201 | $ 64,653 | $ 63,201 |
| Annualized M&R Constuction Cost | $ 5,521 | $ 4,757 | $ 5,505 | $ 4,183 | $ 5,781 | $ 4,962 | $ 6,330 | $ 5,388 | $ 4,132 | $ 4,033 | $ 607 | $ 3,911 | $ 4,000 | $ 3,911 |

Pavements_QC-2.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 659,966 | $ 429,302 | $ 357,969 | $ 247,539 | $ 713,472 | $ 474,222 | $ 461,536 | $ 385,125 | $ 307,428 | $ 259,643 | $ 64,486 | $ 327,135 | $ 220,511 | $ 207,151 |
| Annualized Initial Construction Cost | $ 40,836 | $ 26,563 | $ 22,150 | $ 15,317 | $ 44,147 | $ 29,343 | $ 28,558 | $ 23,830 | $ 19,022 | $ 16,066 | $ 3,990 | $ 20,242 | $ 13,644 | $ 12,818 |
| M&R Construction Cost (Not Discounted) | $ 542,952 | $ 400,894 | $ 360,465 | $ 262,480 | $ 548,983 | $ 411,250 | $ 414,155 | $ 349,630 | $ 350,481 | $ 340,169 | $ 35,275 | $ 326,950 | $ 336,325 | $ 326,950 |
| M&R Construction Cost (Discounted) | $ 89,232 | $ 76,878 | $ 88,962 | $ 67,599 | $ 93,426 | $ 80,201 | $ 102,300 | $ 87,078 | $ 66,778 | $ 65,180 | $ 9,806 | $ 63,201 | $ 64,653 | $ 63,201 |
| Annualized M&R Constuction Cost | $ 5,521 | $ 4,757 | $ 5,505 | $ 4,183 | $ 5,781 | $ 4,962 | $ 6,330 | $ 5,388 | $ 4,132 | $ 4,033 | $ 607 | $ 3,911 | $ 4,000 | $ 3,911 |

Pavements_ON-1.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 636,800 | $ 383,406 | $ 347,434 | $ 240,512 | $ 662,026 | $ 432,834 | $ 403,120 | $ 205,206 | $ 382,168 | $ 314,075 | $ 76,211 | $ 467,500 | $ 393,279 | $ 296,084 |
| Annualized Initial Construction Cost | $ 39,402 | $ 23,724 | $ 21,498 | $ 14,882 | $ 40,963 | $ 26,782 | $ 24,943 | $ 12,697 | $ 23,647 | $ 19,434 | $ 4,716 | $ 28,927 | $ 24,334 | $ 18,320 |
| M&R Construction Cost (Not Discounted) | $ 472,469 | $ 514,269 | $ 481,978 | $ 341,301 | $ 376,553 | $ 514,269 | $ 480,953 | $ 341,301 | $ 437,345 | $ 358,048 | $ 29,150 | $ 437,345 | $ 358,048 | $ 339,400 |
| M&R Construction Cost (Discounted) | $ 78,240 | $ 100,249 | $ 95,303 | $ 70,335 | $ 56,431 | $ 100,249 | $ 89,941 | $ 70,335 | $ 74,511 | $ 55,724 | $ 8,124 | $ 74,511 | $ 55,724 | $ 51,898 |
| Annualized M&R Constuction Cost | $ 4,841 | $ 6,203 | $ 5,897 | $ 4,352 | $ 3,492 | $ 6,203 | $ 5,565 | $ 4,352 | $ 4,610 | $ 3,448 | $ 503 | $ 4,610 | $ 3,448 | $ 3,211 |

Pavements_ON-2.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 669,723 | $ 462,012 | $ 448,211 | $ 198,386 | $ 622,561 | $ 488,896 | $ 459,753 | $ 218,304 | $ 430,256 | $ 358,785 | $ 62,457 | $ 512,238 | $ 443,104 | $ 275,900 |
| Annualized Initial Construction Cost | $ 41,440 | $ 28,587 | $ 27,733 | $ 12,275 | $ 38,521 | $ 30,251 | $ 28,448 | $ 13,508 | $ 26,622 | $ 22,200 | $ 3,865 | $ 31,695 | $ 27,417 | $ 17,072 |
| M&R Construction Cost (Not Discounted) | $ 435,820 | $ 494,939 | $ 474,530 | $ 153,076 | $ 362,170 | $ 284,826 | $ 392,186 | $ 373,828 | $ 406,265 | $ 378,887 | $ 29,150 | $ 406,265 | $ 378,887 | $ 344,310 |
| M&R Construction Cost (Discounted) | $ 73,673 | $ 93,788 | $ 89,733 | $ 36,413 | $ 54,369 | $ 51,735 | $ 74,468 | $ 78,335 | $ 67,784 | $ 59,172 | $ 8,124 | $ 67,784 | $ 59,172 | $ 56,095 |
| Annualized M&R Constuction Cost | $ 4,559 | $ 5,803 | $ 5,552 | $ 2,253 | $ 3,364 | $ 3,201 | $ 4,608 | $ 4,847 | $ 4,194 | $ 3,661 | $ 503 | $ 4,194 | $ 3,661 | $ 3,471 |

Pavements_MB.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 388,807 | $ 394,300 | $ 231,702 | $ 160,681 | $ 372,800 | $ 271,105 | $ 192,023 | $ 192,023 | $ 314,263 | $ 234,811 | $ 32,480 | $ 259,735 | $ 209,752 | $ 199,974 |
| Annualized Initial Construction Cost | $ 24,058 | $ 24,398 | $ 14,337 | $ 9,942 | $ 23,067 | $ 16,775 | $ 11,882 | $ 11,882 | $ 19,445 | $ 14,529 | $ 2,010 | $ 16,071 | $ 12,979 | $ 12,374 |
| M&R Construction Cost (Not Discounted) | $ 272,250 | $ 272,250 | $ 168,650 | $ 168,650 | $ 272,250 | $ 272,250 | $ 168,650 | $ 168,650 | $ 247,869 | $ 247,869 | $ 11,828 | $ 270,762 | $ 270,762 | $ 270,762 |
| M&R Construction Cost (Discounted) | $ 43,731 | $ 43,731 | $ 31,419 | $ 31,419 | $ 43,731 | $ 43,731 | $ 31,419 | $ 31,419 | $ 44,350 | $ 44,350 | $ 3,416 | $ 47,823 | $ 47,823 | $ 47,823 |
| Annualized M&R Constuction Cost | $ 2,706 | $ 2,706 | $ 1,944 | $ 1,944 | $ 2,706 | $ 2,706 | $ 1,944 | $ 1,944 | $ 2,744 | $ 2,744 | $ 211 | $ 2,959 | $ 2,959 | $ 2,959 |

Pavements_SK.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 363,924 | $ 413,525 | $ 190,940 | $ 45,427 | $ 450,557 | $ 283,140 | $ 202,945 | $ 200,590 | $ 183,549 | $ 49,800 | $ 24,900 | $ 271,878 | $ 220,756 | $ 48,655 |
| Annualized Initial Construction Cost | $ 22,518 | $ 25,587 | $ 11,815 | $ 2,811 | $ 27,879 | $ 17,519 | $ 12,557 | $ 12,412 | $ 11,357 | $ 3,081 | $ 1,541 | $ 16,823 | $ 13,659 | $ 3,011 |
| M&R Construction Cost (Not Discounted) | $ 287,050 | $ 287,050 | $ 183,450 | $ 48,000 | $ 287,050 | $ 287,050 | $ 238,655 | $ 183,450 | $ 222,838 | $ 124,000 | $ 108,600 | $ 285,414 | $ 285,414 | $ 107,800 |
| M&R Construction Cost (Discounted) | $ 47,185 | $ 47,185 | $ 35,271 | $ 13,183 | $ 47,185 | $ 47,185 | $ 44,096 | $ 35,271 | $ 42,486 | $ 33,164 | $ 24,005 | $ 51,979 | $ 51,979 | $ 24,984 |
| Annualized M&R Constuction Cost | $ 2,920 | $ 2,920 | $ 2,182 | $ 816 | $ 2,920 | $ 2,920 | $ 2,728 | $ 2,182 | $ 2,629 | $ 2,052 | $ 1,485 | $ 3,216 | $ 3,216 | $ 1,546 |

Pavements_AB.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 477,226 | $ 456,419 | $ 410,011 | $ 383,206 | $ 471,764 | $ 459,444 | $ 404,548 | $ 362,743 | $ 370,427 | $ 341,566 | $ 103,177 | $ 266,415 | $ 249,729 | $ 238,250 |
| Annualized Initial Construction Cost | $ 29,529 | $ 28,241 | $ 25,370 | $ 23,711 | $ 29,191 | $ 28,428 | $ 25,032 | $ 22,445 | $ 22,920 | $ 21,135 | $ 6,384 | $ 16,485 | $ 15,452 | $ 14,742 |
| M&R Construction Cost (Not Discounted) | $ 229,768 | $ 229,768 | $ 229,768 | $ 229,768 | $ 229,768 | $ 229,768 | $ 229,768 | $ 229,768 | $ 251,086 | $ 251,086 | $ 37,200 | $ 251,086 | $ 251,086 | $ 251,086 |
| M&R Construction Cost (Discounted) | $ 36,246 | $ 36,246 | $ 36,246 | $ 36,246 | $ 36,246 | $ 36,246 | $ 36,246 | $ 36,246 | $ 48,220 | $ 48,220 | $ 10,334 | $ 48,220 | $ 48,220 | $ 48,220 |
| Annualized M&R Constuction Cost | $ 2,243 | $ 2,243 | $ 2,243 | $ 2,243 | $ 2,243 | $ 2,243 | $ 2,243 | $ 2,243 | $ 2,984 | $ 2,984 | $ 639 | $ 2,984 | $ 2,984 | $ 2,984 |

Pavements_BC-1.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 517,686 | $ 481,367 | $ 433,653 | $ 370,395 | $ 543,611 | $ 507,292 | $ 410,828 | $ 203,526 | $ 529,504 | $ 477,019 | $ 128,972 | $ 340,521 | $ 266,717 | $ 223,878 |
| Annualized Initial Construction Cost | $ 32,032 | $ 29,785 | $ 26,833 | $ 22,918 | $ 33,636 | $ 31,389 | $ 25,420 | $ 12,593 | $ 32,763 | $ 29,516 | $ 7,980 | $ 21,070 | $ 16,503 | $ 13,853 |
| M&R Construction Cost (Not Discounted) | $ 344,200 | $ 344,200 | $ 344,200 | $ 284,075 | $ 344,200 | $ 344,200 | $ 344,200 | $ 344,200 | $ 378,620 | $ 378,620 | $ 29,500 | $ 378,620 | $ 378,620 | $ 378,620 |
| M&R Construction Cost (Discounted) | $ 61,706 | $ 61,706 | $ 61,706 | $ 59,883 | $ 61,706 | $ 61,706 | $ 61,706 | $ 61,706 | $ 67,876 | $ 67,876 | $ 8,220 | $ 67,876 | $ 67,876 | $ 67,876 |
| Annualized M&R Constuction Cost | $ 3,818 | $ 3,818 | $ 3,818 | $ 3,705 | $ 3,818 | $ 3,818 | $ 3,818 | $ 3,818 | $ 4,200 | $ 4,200 | $ 509 | $ 4,200 | $ 4,200 | $ 4,200 |

Pavements_BC-2.xls - Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 666,440 | $ 629,434 | $ 565,403 | $ 297,547 | $ 692,440 | $ 655,434 | $ 538,903 | $ 255,815 | $ 692,377 | $ 621,943 | $ 161,215 | $ 441,250 | $ 352,794 | $ 281,397 |
| Annualized Initial Construction Cost | $ 41,236 | $ 38,947 | $ 34,985 | $ 18,411 | $ 42,845 | $ 40,555 | $ 33,345 | $ 15,829 | $ 42,841 | $ 38,483 | $ 9,975 | $ 27,303 | $ 21,829 | $ 17,412 |
| M&R Construction Cost (Not Discounted) | $ 374,725 | $ 374,725 | $ 374,725 | $ 103,600 | $ 374,725 | $ 374,725 | $ 374,725 | $ 374,725 | $ 412,198 | $ 412,198 | $ 35,275 | $ 412,198 | $ 412,198 | $ 412,198 |
| M&R Construction Cost (Discounted) | $ 67,439 | $ 67,439 | $ 67,439 | $ 23,968 | $ 67,439 | $ 67,439 | $ 67,439 | $ 67,439 | $ 74,183 | $ 74,183 | $ 9,806 | $ 74,183 | $ 74,183 | $ 74,183 |
| Annualized M&R Constuction Cost | $ 4,173 | $ 4,173 | $ 4,173 | $ 1,483 | $ 4,173 | $ 4,173 | $ 4,173 | $ 4,173 | $ 4,590 | $ 4,590 | $ 607 | $ 4,590 | $ 4,590 | $ 4,590 |

Pavements_TR-2.xls – Summary

| | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | | Rural | | | Urban | | |
| Item | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial Construction Cost | $ 287,388 | $ 195,478 | $ 183,388 | $ 138,884 | $ 227,851 | $ 195,478 | $ 183,388 | $ 138,884 | $ 215,025 | $ 114,135 | $ 63,418 | $ 237,025 | $ 223,727 | $ 210,741 |
| Annualized Initial Construction Cost | $ 17,782 | $ 12,095 | $ 11,347 | $ 8,594 | $ 14,098 | $ 12,095 | $ 11,347 | $ 8,594 | $ 13,305 | $ 7,062 | $ 3,924 | $ 14,666 | $ 13,843 | $ 13,040 |
| M&R Construction Cost (Not Discounted) | $ 317,125 | $ 317,125 | $ 185,875 | $ 185,875 | $ 317,125 | $ 317,125 | $ 317,125 | $ 185,875 | $ 204,463 | $ 204,463 | $ 33,100 | $ 335,713 | $ 335,713 | $ 335,713 |
| M&R Construction Cost (Discounted) | $ 49,230 | $ 49,230 | $ 35,727 | $ 35,727 | $ 49,230 | $ 49,230 | $ 49,230 | $ 35,727 | $ 39,300 | $ 39,300 | $ 9,282 | $ 53,440 | $ 53,440 | $ 53,440 |
| Annualized M&R Constuction Cost | $ 3,046 | $ 3,046 | $ 2,211 | $ 2,211 | $ 3,046 | $ 3,046 | $ 3,046 | $ 2,211 | $ 2,432 | $ 2,432 | $ 574 | $ 3,307 | $ 3,307 | $ 3,307 |

Bridges.xls - Quantities

| Description and type of work item | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Area of bridge deck ($m^2$/2-Lane km) | NL | 0 | 49 | 7 | 33 | 0 | 49 | 7 | 33 | 25 | 4 | 5 | 25 | 4 | 10 |
| | PE | 49 | 18 | 14 | 3 | 49 | 18 | 0 | 0 | 9 | 7 | 5 | 9 | 10 | 10 |
| | NS | 177 | 139 | 108 | 46 | 177 | 139 | 108 | 46 | 69 | 54 | 5 | 69 | 54 | 10 |
| | NB | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | QC-1 | 170 | 40 | 55 | 55 | 315 | 100 | 70 | 70 | 50 | 30 | 5 | 55 | 30 | 10 |
| | QC-2 | 170 | 40 | 55 | 55 | 315 | 100 | 70 | 70 | 50 | 30 | 5 | 55 | 30 | 10 |
| | ON-1 | 100 | 90 | 80 | 50 | 120 | 90 | 100 | 35 | 45 | 40 | 5 | 45 | 50 | 10 |
| | ON-2 | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | MB | 92 | 144 | 81 | 2 | 92 | 144 | 81 | 2 | 72 | 41 | 5 | 72 | 41 | 10 |
| | SK | 49 | 18 | 14 | 3 | 49 | 18 | 0 | 0 | 9 | 7 | 5 | 9 | 10 | 10 |
| | AB | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | BC-1 | 100 | 90 | 80 | 50 | 120 | 90 | 100 | 35 | 45 | 40 | 5 | 45 | 50 | 10 |
| | BC-2 | 80 | 72 | 64 | 40 | 96 | 72 | 80 | 28 | 36 | 32 | 5 | 36 | 40 | 10 |
| | TR | 49 | 18 | 14 | 3 | 49 | 18 | 0 | 0 | 9 | 7 | 5 | 9 | 10 | 10 |

Bridges.xls – Unit Costs

| Description and type of work item | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial construction cost ($/m$^2$) | NL | $ 2,500.00 | $2,500.00 | $2,500.00 | $2,500.00 | $2,500.00 | $2,500.00 | $2,500.00 | $2,500.00 | $2,800.00 | $2,800.00 | $2,800.00 | $2,800.00 | $2,800.00 | $2,800.00 |
| | PE | $ 4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | NS | $ 4,400.00 | $3,800.00 | $3,600.00 | $3,100.00 | $4,400.00 | $3,800.00 | $3,600.00 | $3,100.00 | $4,200.00 | $4,200.00 | $4,200.00 | $4,200.00 | $4,200.00 | $4,200.00 |
| | NB | $ 4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | QC-1 | $ 3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | QC-2 | $ 3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | ON-1 | $ 2,675.00 | $2,675.00 | $2,675.00 | $2,675.00 | $2,675.00 | $2,675.00 | $2,675.00 | $2,675.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 | $3,000.00 |
| | ON-2 | $ 3,350.00 | $3,350.00 | $3,350.00 | $3,350.00 | $3,350.00 | $3,350.00 | $3,350.00 | $3,350.00 | $3,700.00 | $3,700.00 | $3,700.00 | $3,700.00 | $3,700.00 | $3,700.00 |
| | MB | $ 3,700.00 | $3,300.00 | $2,500.00 | $2,100.00 | $3,700.00 | $3,300.00 | $2,500.00 | $2,100.00 | $3,600.00 | $3,600.00 | $3,600.00 | $3,600.00 | $3,600.00 | $3,600.00 |
| | SK | $ 4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | AB | $ 4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $3,600.00 | $3,000.00 | $2,600.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | BC-1 | $ 4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | BC-2 | $ 4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 | $4,000.00 |
| | TR | $ - | $4,800.00 | $4,800.00 | $4,800.00 | $4,800.00 | $4,800.00 | $4,800.00 | $4,800.00 | $5,300.00 | $5,300.00 | $5,300.00 | $5,300.00 | $5,300.00 | $5,300.00 |
| Maintenance and rehabilitation construction cost ($/m$^2$) | NL | $ 750.00 | $ 574.00 | $ 500.00 | $ 750.00 | $ 750.00 | $ 574.00 | $ 500.00 | $ 750.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 |
| | PE | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 675.00 | $ 675.00 | $ 675.00 | $ 675.00 | $ 675.00 | $ 675.00 |
| | NS | $ 500.00 | $ 400.00 | $ 325.00 | $ 250.00 | $ 500.00 | $ 400.00 | $ 325.00 | $ 250.00 | $ 450.00 | $ 450.00 | $ 450.00 | $ 450.00 | $ 450.00 | $ 450.00 |
| | NB | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 |
| | QC-1 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 |
| | QC-2 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 650.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 |
| | ON-1 | $ 750.00 | $ 666.67 | $ 541.67 | $ 450.00 | $ 750.00 | $ 666.67 | $ 541.67 | $ 450.00 | $ 750.00 | $ 750.00 | $ 750.00 | $ 750.00 | $ 750.00 | $ 750.00 |
| | ON-2 | $ 975.00 | $ 866.67 | $ 704.17 | $ 585.00 | $ 975.00 | $ 866.67 | $ 704.17 | $ 585.00 | $ 950.00 | $ 950.00 | $ 950.00 | $ 950.00 | $ 950.00 | $ 950.00 |
| | MB | $ 1,600.00 | $1,600.00 | $1,600.00 | $1,600.00 | $1,600.00 | $1,600.00 | $1,600.00 | $1,600.00 | $1,750.00 | $1,750.00 | $1,750.00 | $1,750.00 | $1,750.00 | $1,750.00 |
| | SK | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 |
| | AB | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 750.00 | $ 600.00 | $ 500.00 | $ 400.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 | $ 700.00 |
| | BC-1 | $ 1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,100.00 | $1,100.00 | $1,100.00 | $1,100.00 | $1,100.00 | $1,100.00 |
| | BC-2 | $ 1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,000.00 | $1,100.00 | $1,100.00 | $1,100.00 | $1,100.00 | $1,100.00 | $1,100.00 |
| | TR | $ 1,028.00 | $1,028.00 | $1,028.00 | $1,028.00 | $1,028.00 | $1,028.00 | $1,028.00 | $1,028.00 | $1,150.00 | $1,150.00 | $1,150.00 | $1,150.00 | $1,150.00 | $1,150.00 |
| Maintenance and rehabilitation frequency (Years) | NL | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | PE | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | NS | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| | NB | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | QC-1 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 20 | 20 | 20 | 20 | 20 | 20 |
| | QC-2 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 20 | 20 | 20 | 20 | 20 | 20 |
| | ON-1 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | ON-2 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | MB | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | SK | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | AB | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | BC-1 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | BC-2 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | TR | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |

Bridges.xls – New Costs

| Description and type of work item | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Initial bridge construction cost ($/2-Lane km) | NL | $ - | $ 123,046 | $ 17,669 | $ 83,487 | $ - | $ 123,046 | $ 17,669 | $ 83,487 | $ 68,906 | $ 9,894 | $ 14,000 | $ 68,906 | $ 9,894 | $ 28,000 |
| | PE | $ 196,327 | $ 65,403 | $ 42,130 | $ 6,575 | $ 196,327 | $ 65,403 | $ - | $ - | $ 36,335 | $ 28,087 | $ 20,000 | $ 36,335 | $ 40,000 | $ 40,000 |
| | NS | $ 780,587 | $ 526,516 | $ 387,731 | $ 142,653 | $ 780,587 | $ 526,516 | $ 387,731 | $ 142,653 | $ 290,969 | $ 226,177 | $ 21,000 | $ 290,969 | $ 226,177 | $ 42,000 |
| | NB | $ 320,000 | $ 259,200 | $ 192,000 | $ 104,000 | $ 384,000 | $ 259,200 | $ 240,000 | $ 72,800 | $ 144,000 | $ 128,000 | $ 20,000 | $ 144,000 | $ 160,000 | $ 40,000 |
| | QC-1 | $ 510,000 | $ 120,000 | $ 165,000 | $ 165,000 | $ 945,000 | $ 300,000 | $ 210,000 | $ 210,000 | $ 200,000 | $ 120,000 | $ 20,000 | $ 220,000 | $ 120,000 | $ 40,000 |
| | QC-2 | $ 510,000 | $ 120,000 | $ 165,000 | $ 165,000 | $ 945,000 | $ 300,000 | $ 210,000 | $ 210,000 | $ 200,000 | $ 120,000 | $ 20,000 | $ 220,000 | $ 120,000 | $ 40,000 |
| | ON-1 | $ 267,500 | $ 240,750 | $ 214,000 | $ 133,750 | $ 321,000 | $ 240,750 | $ 267,500 | $ 93,625 | $ 135,000 | $ 120,000 | $ 15,000 | $ 135,000 | $ 150,000 | $ 30,000 |
| | ON-2 | $ 268,000 | $ 241,200 | $ 214,400 | $ 134,000 | $ 321,600 | $ 241,200 | $ 268,000 | $ 93,800 | $ 133,200 | $ 118,400 | $ 18,500 | $ 133,200 | $ 148,000 | $ 37,000 |
| | MB | $ 340,618 | $ 476,131 | $ 203,172 | $ 4,743 | $ 340,618 | $ 476,131 | $ 203,172 | $ 4,743 | $ 259,708 | $ 146,284 | $ 18,000 | $ 259,708 | $ 146,284 | $ 36,000 |
| | SK | $ 196,327 | $ 65,403 | $ 42,130 | $ 6,575 | $ 196,327 | $ 65,403 | $ - | $ - | $ 36,335 | $ 28,087 | $ 20,000 | $ 36,335 | $ 40,000 | $ 40,000 |
| | AB | $ 320,000 | $ 259,200 | $ 192,000 | $ 104,000 | $ 384,000 | $ 259,200 | $ 240,000 | $ 72,800 | $ 144,000 | $ 128,000 | $ 20,000 | $ 144,000 | $ 160,000 | $ 40,000 |
| | BC-1 | $ 400,000 | $ 360,000 | $ 320,000 | $ 200,000 | $ 480,000 | $ 360,000 | $ 400,000 | $ 140,000 | $ 180,000 | $ 160,000 | $ 20,000 | $ 180,000 | $ 200,000 | $ 40,000 |
| | BC-2 | $ 320,000 | $ 288,000 | $ 256,000 | $ 160,000 | $ 384,000 | $ 288,000 | $ 320,000 | $ 112,000 | $ 144,000 | $ 128,000 | $ 20,000 | $ 144,000 | $ 160,000 | $ 40,000 |
| | TR | $ - | $ 87,204 | $ 67,408 | $ 12,139 | $ 235,592 | $ 87,204 | $ - | $ - | $ 48,144 | $ 37,215 | $ 26,500 | $ 48,144 | $ 53,000 | $ 53,000 |

Bridges.xls – New Costs Annualized

| Description and type of work item | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Annual bridge construction cost ($/2-Lane km) | NL | $ - | $ 7,614 | $ 1,093 | $ 5,166 | $ - | $ 7,614 | $ 1,093 | $ 5,166 | $ 4,264 | $ 612 | $ 866 | $ 4,264 | $ 612 | $ 1,733 |
| | PE | $ 12,148 | $ 4,047 | $ 2,607 | $ 407 | $ 12,148 | $ 4,047 | $ - | $ - | $ 2,248 | $ 1,738 | $ 1,238 | $ 2,248 | $ 2,475 | $ 2,475 |
| | NS | $ 48,299 | $ 32,579 | $ 23,991 | $ 8,827 | $ 48,299 | $ 32,579 | $ 23,991 | $ 8,827 | $ 18,004 | $ 13,995 | $ 1,299 | $ 18,004 | $ 13,995 | $ 2,599 |
| | NB | $ 19,800 | $ 16,038 | $ 11,880 | $ 6,435 | $ 23,760 | $ 16,038 | $ 14,850 | $ 4,505 | $ 8,910 | $ 7,920 | $ 1,238 | $ 8,910 | $ 9,900 | $ 2,475 |
| | QC-1 | $ 31,557 | $ 7,425 | $ 10,209 | $ 10,209 | $ 58,473 | $ 18,563 | $ 12,994 | $ 12,994 | $ 12,375 | $ 7,425 | $ 1,238 | $ 13,613 | $ 7,425 | $ 2,475 |
| | QC-2 | $ 31,557 | $ 7,425 | $ 10,209 | $ 10,209 | $ 58,473 | $ 18,563 | $ 12,994 | $ 12,994 | $ 12,375 | $ 7,425 | $ 1,238 | $ 13,613 | $ 7,425 | $ 2,475 |
| | ON-1 | $ 16,552 | $ 14,897 | $ 13,241 | $ 8,276 | $ 19,862 | $ 14,897 | $ 16,552 | $ 5,793 | $ 8,353 | $ 7,425 | $ 928 | $ 8,353 | $ 9,281 | $ 1,856 |
| | ON-2 | $ 16,583 | $ 14,924 | $ 13,266 | $ 8,291 | $ 19,899 | $ 14,924 | $ 16,583 | $ 5,804 | $ 8,242 | $ 7,326 | $ 1,145 | $ 8,242 | $ 9,158 | $ 2,289 |
| | MB | $ 21,076 | $ 29,461 | $ 12,571 | $ 293 | $ 21,076 | $ 29,461 | $ 12,571 | $ 293 | $ 16,070 | $ 9,051 | $ 1,114 | $ 16,070 | $ 9,051 | $ 2,228 |
| | SK | $ 12,148 | $ 4,047 | $ 2,607 | $ 407 | $ 12,148 | $ 4,047 | $ - | $ - | $ 2,248 | $ 1,738 | $ 1,238 | $ 2,248 | $ 2,475 | $ 2,475 |
| | AB | $ 19,800 | $ 16,038 | $ 11,880 | $ 6,435 | $ 23,760 | $ 16,038 | $ 14,850 | $ 4,505 | $ 8,910 | $ 7,920 | $ 1,238 | $ 8,910 | $ 9,900 | $ 2,475 |
| | BC-1 | $ 24,750 | $ 22,275 | $ 19,800 | $ 12,375 | $ 29,700 | $ 22,275 | $ 24,750 | $ 8,663 | $ 11,138 | $ 9,900 | $ 1,238 | $ 11,138 | $ 12,375 | $ 2,475 |
| | BC-2 | $ 19,800 | $ 17,820 | $ 15,840 | $ 9,900 | $ 23,760 | $ 17,820 | $ 19,800 | $ 6,930 | $ 8,910 | $ 7,920 | $ 1,238 | $ 8,910 | $ 9,900 | $ 2,475 |
| | TR | $ - | $ 5,396 | $ 4,171 | $ 751 | $ 14,577 | $ 5,396 | $ - | $ - | $ 2,979 | $ 2,303 | $ 1,640 | $ 2,979 | $ 3,279 | $ 3,279 |

Bridges.xls – M&R Costs Annualized

| Description and type of work item | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Annual bridge maintenance and rehabilitation construction cost ($/2-Lane km) | NL | $ - | $ 502 | $ 63 | $ 445 | $ - | $ 502 | $ 63 | $ 445 | $ 284 | $ 41 | $ 58 | $ 284 | $ 41 | $ 116 |
| | PE | $ 932 | $ 276 | $ 178 | $ 26 | $ 932 | $ 276 | $ - | $ - | $ 155 | $ 120 | $ 85 | $ 155 | $ 171 | $ 171 |
| | NS | $ 3,076 | $ 1,922 | $ 1,214 | $ 399 | $ 3,076 | $ 1,922 | $ 1,214 | $ 399 | $ 1,081 | $ 840 | $ 78 | $ 1,081 | $ 840 | $ 156 |
| | NB | $ 1,519 | $ 1,093 | $ 810 | $ 405 | $ 1,822 | $ 1,093 | $ 1,012 | $ 283 | $ 638 | $ 567 | $ 89 | $ 638 | $ 709 | $ 177 |
| | QC-1 | $ 1,964 | $ 462 | $ 635 | $ 635 | $ 3,640 | $ 1,155 | $ 809 | $ 809 | $ 886 | $ 531 | $ 89 | $ 974 | $ 531 | $ 177 |
| | QC-2 | $ 1,964 | $ 462 | $ 635 | $ 635 | $ 3,640 | $ 1,155 | $ 809 | $ 809 | $ 886 | $ 531 | $ 89 | $ 974 | $ 531 | $ 177 |
| | ON-1 | $ 808 | $ 646 | $ 467 | $ 242 | $ 970 | $ 646 | $ 584 | $ 170 | $ 364 | $ 323 | $ 40 | $ 364 | $ 404 | $ 81 |
| | ON-2 | $ 1,387 | $ 1,109 | $ 801 | $ 416 | $ 1,664 | $ 1,109 | $ 1,001 | $ 291 | $ 608 | $ 540 | $ 84 | $ 608 | $ 675 | $ 169 |
| | MB | $ 3,728 | $ 5,843 | $ 3,291 | $ 91 | $ 3,728 | $ 5,843 | $ 3,291 | $ 91 | $ 3,195 | $ 1,800 | $ 221 | $ 3,195 | $ 1,800 | $ 443 |
| | SK | $ 932 | $ 276 | $ 178 | $ 26 | $ 932 | $ 276 | $ - | $ - | $ 161 | $ 124 | $ 89 | $ 161 | $ 177 | $ 177 |
| | AB | $ 1,519 | $ 1,093 | $ 810 | $ 405 | $ 1,822 | $ 1,093 | $ 1,012 | $ 283 | $ 638 | $ 567 | $ 89 | $ 638 | $ 709 | $ 177 |
| | BC-1 | $ 805 | $ 725 | $ 644 | $ 403 | $ 966 | $ 725 | $ 805 | $ 282 | $ 398 | $ 354 | $ 44 | $ 398 | $ 443 | $ 89 |
| | BC-2 | $ 644 | $ 580 | $ 515 | $ 322 | $ 773 | $ 580 | $ 644 | $ 225 | $ 319 | $ 283 | $ 44 | $ 319 | $ 354 | $ 89 |
| | TR | $ 1,750 | $ 648 | $ 501 | $ 90 | $ 1,750 | $ 648 | $ - | $ - | $ 362 | $ 280 | $ 199 | $ 362 | $ 399 | $ 399 |

All Other Road Infrastructure.xls – Unit Costs

| Work item (supply and install) | | Provincial Costs | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description and type of work item | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Clearing and grubbing ($m^2$) | | $ 2.00 | $ 1.00 | $ 2.00 | $ 2.00 | $ 3.00 | $ 3.00 | $ 2.09 | $ 2.00 | $ 1.00 | $ 1.00 | $ 2.00 | $ 5.00 | $ 5.00 | $ 3.00 |
| Grading | Earth moving ($m^3$) | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 7.15 | $ 5.50 | $ 2.42 | $ 1.45 | $ 2.50 | $ 5.00 | $ 5.00 | $ 12.50 |
| | Rock moving ($m^3$) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 17.00 | $ 17.00 | $ 40.00 | $ 86.74 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 100.00 |
| Land-Scaping | Sodding and top soil ($m^2$) | $ 4.00 | $ 4.00 | $ 4.00 | $ 4.00 | $ 5.50 | $ 5.50 | $ 3.32 | $ 4.35 | $ 7.70 | $ 4.00 | $ 4.00 | $ 10.00 | $ 10.00 | $ 10.00 |
| | Top soil ($m^3$) | $ 10.00 | $ 10.00 | $ 10.00 | $ 10.00 | $ 9.00 | $ 9.00 | $ 10.00 | $ 15.00 | $ 10.00 | $ 10.00 | $ 10.00 | $ 10.00 | $ 10.00 | $ 10.00 |
| Drainage | PCC curb and gutter (m) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 41.50 | $ 41.50 | $ 50.00 | $ 55.00 | $ 40.32 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 75.00 |
| | 500 mm Pipe culvert & end sections (m) | $ 125.00 | $ 100.00 | $ 125.00 | $ 125.00 | $ 130.00 | $ 130.00 | $ 112.21 | $ 139.25 | $ 40.32 | $ 50.00 | $ 60.00 | $ 250.00 | $ 500.00 | $ 620.00 |
| | 1500 mm wide box culvert (m) | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,450.00 | $ 1,450.00 | $ 1,534.70 | $ 1,700.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 3,000.00 | $ 3,000.00 | $ 3,000.00 |
| | Storm water sewers (m) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 105.00 | $ 105.00 | $ 50.00 | $ 60.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 75.00 |
| Guard Rail | Concrete median (m) | $ 200.00 | $ 200.00 | $ 200.00 | $ 200.00 | $ 120.00 | $ 120.00 | $ 200.18 | $ 220.00 | $ 140.00 | $ 200.00 | $ 200.00 | $ 100.00 | $ 100.00 | $ 200.00 |
| | Steel guiderail (m) | $ 75.00 | $ 75.00 | $ 75.00 | $ 75.00 | $ 48.00 | $ 48.00 | $ 65.98 | $ 70.00 | $ 74.00 | $ 75.00 | $ 75.00 | $ 75.00 | $ 75.00 | $ 500.00 |
| | 3-Cable guiderail (m) | $ 15.00 | $ 15.00 | $ 15.00 | $ 15.00 | $ 40.00 | $ 40.00 | $ 15.40 | $ 18.00 | $ 15.00 | $ 15.00 | $ 15.00 | $ 15.00 | $ 15.00 | $ 75.00 |
| Fencing, Gates | Chain link fence (m) | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 30.00 | $ 30.00 | $ 44.44 | $ 70.27 | $ 50.00 | $ 50.00 | $ 50.00 | $ 60.00 | $ 60.00 | $ 30.00 |
| | Wire fence (m) | $ 7.00 | $ 7.00 | $ 7.00 | $ 7.00 | $ 12.00 | $ 12.00 | $ 8.54 | $ 13.09 | $ 4.00 | $ 3.50 | $ 7.00 | $ 15.00 | $ 15.00 | $ 15.00 |
| Lighting | High mast (each) | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 40,000.00 | $ 40,000.00 | $ 29,635.78 | $ 29,000.00 | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 | $ 30,000.00 |
| | Standard (each) | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 3,900.00 | $ 3,900.00 | $ 1,297.61 | $ 1,300.00 | $ 2,000.00 | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 1,500.00 | $ 2,500.00 |
| Painting of Traffic Lanes (m) | | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 | $ 0.40 | $ 0.40 | $ 0.91 | $ 1.03 | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 |

| Work item (supply and install) | | Municipal Costs | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description and type of work item | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Clearing and grubbing ($m^2$) | | $ 2.20 | $ 1.10 | $ 2.20 | $ 2.20 | $ 2.20 | $ 2.20 | $ 2.30 | $ 2.20 | $ 1.10 | $ 1.10 | $ 2.20 | $ 5.50 | $ 5.50 | $ 3.30 |
| Grading | Earth moving ($m^3$) | $ 5.50 | $ 5.50 | $ 5.50 | $ 5.50 | $ 5.50 | $ 5.50 | $ 7.87 | $ 6.05 | $ 2.66 | $ 1.60 | $ 2.75 | $ 5.50 | $ 5.50 | $ 13.75 |
| | Rock moving ($m^3$) | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 44.00 | $ 95.41 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 110.00 |
| Land-Scaping | Sodding and top soil ($m^2$) | $ 4.40 | $ 4.40 | $ 4.40 | $ 4.40 | $ 4.40 | $ 4.40 | $ 3.65 | $ 4.79 | $ 8.47 | $ 4.40 | $ 4.40 | $ 11.00 | $ 11.00 | $ 11.00 |
| | Top soil ($m^3$) | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 16.50 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 | $ 11.00 |
| Drainage | PCC curb and gutter (m) | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 60.50 | $ 44.35 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 82.50 |
| | 500 mm Pipe culvert & end sections (m) | $ 137.50 | $ 110.00 | $ 137.50 | $ 137.50 | $ 137.50 | $ 137.50 | $ 123.43 | $ 153.18 | $ 44.35 | $ 55.00 | $ 66.00 | $ 275.00 | $ 550.00 | $ 682.00 |
| | 1500 mm wide box culvert (m) | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,688.17 | $ 1,870.00 | $ 2,200.00 | $ 2,200.00 | $ 2,200.00 | $ 3,300.00 | $ 3,300.00 | $ 3,300.00 |
| | Storm water sewers (m) | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 66.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 82.50 |
| Guard Rail | Concrete median (m) | $ 220.00 | $ 220.00 | $ 220.00 | $ 220.00 | $ 220.00 | $ 220.00 | $ 220.20 | $ 242.00 | $ 154.00 | $ 220.00 | $ 220.00 | $ 110.00 | $ 110.00 | $ 220.00 |
| | Steel guiderail (m) | $ 82.50 | $ 82.50 | $ 82.50 | $ 82.50 | $ 82.50 | $ 82.50 | $ 72.58 | $ 77.00 | $ 81.40 | $ 82.50 | $ 82.50 | $ 82.50 | $ 82.50 | $ 550.00 |
| | 3-Cable guiderail (m) | $ 16.50 | $ 16.50 | $ 16.50 | $ 16.50 | $ 16.94 | $ 16.94 | $ 16.94 | $ 19.80 | $ 16.50 | $ 16.50 | $ 16.50 | $ 16.50 | $ 16.50 | $ 82.50 |
| Fencing, Gates | Chain link fence (m) | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 55.00 | $ 48.88 | $ 77.30 | $ 55.00 | $ 55.00 | $ 55.00 | $ 66.00 | $ 66.00 | $ 33.00 |
| | Wire fence (m) | $ 7.70 | $ 7.70 | $ 7.70 | $ 7.70 | $ 7.70 | $ 7.70 | $ 9.39 | $ 14.40 | $ 4.40 | $ 3.85 | $ 7.70 | $ 16.50 | $ 16.50 | $ 16.50 |
| Lighting | High mast (each) | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 32,599.36 | $ 31,900.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 | $ 33,000.00 |
| | Standard (each) | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,427.37 | $ 1,430.00 | $ 2,200.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 1,650.00 | $ 2,750.00 |
| Painting of Traffic Lanes (m) | | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.00 | $ 1.13 | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.10 | $ 1.10 |

| Description and type of work item | | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Clearing and grubbing ($m^2$) | | NL | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 | 4275 | 5100 | 6000 | 1275 | 1680 | 2250 |
| | | PE | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 | 1425 | 1700 | 2000 | 425 | 560 | 750 |
| | | NS | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 | 4275 | 5100 | 6000 | 1275 | 1680 | 2250 |
| | | NB | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 | 2850 | 3400 | 4000 | 850 | 1120 | 1500 |
| | | QC-1 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 | 2850 | 3400 | 4000 | 850 | 1120 | 1500 |
| | | QC-2 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 | 2850 | 3400 | 4000 | 850 | 1120 | 1500 |
| | | ON-1 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 | 2850 | 3400 | 4000 | 850 | 1120 | 1500 |
| | | ON-2 | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 | 4275 | 5100 | 6000 | 1275 | 1680 | 2250 |
| | | MB | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 | 1425 | 1700 | 2000 | 425 | 560 | 750 |
| | | SK | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 | 1425 | 1700 | 2000 | 425 | 560 | 750 |
| | | AB | 1500 | 2000 | 2250 | 2400 | 625 | 900 | 1350 | 1700 | 1425 | 1700 | 2000 | 425 | 560 | 750 |
| | | BC-1 | 3000 | 4000 | 4500 | 4800 | 1250 | 1800 | 2700 | 3400 | 2850 | 3400 | 4000 | 850 | 1120 | 1500 |
| | | BC-2 | 6000 | 8000 | 9000 | 9600 | 2500 | 3600 | 5400 | 6800 | 5700 | 6800 | 8000 | 1700 | 2240 | 3000 |
| | | TR | 4500 | 6000 | 6750 | 7200 | 1875 | 2700 | 4050 | 5100 | 4275 | 5100 | 6000 | 1275 | 1680 | 2250 |
| Grading | Material moved ($m^3$) | NL | 100000 | 65000 | 35000 | 10000 | 100000 | 65000 | 45000 | 12500 | 75000 | 20000 | 5000 | 75000 | 25000 | 7500 |
| | | PE | 25000 | 15000 | 10000 | 2500 | 25000 | 15000 | 15000 | 4000 | 10000 | 7500 | 1500 | 10000 | 10000 | 2500 |
| | | NS | 100000 | 65000 | 35000 | 10000 | 100000 | 65000 | 45000 | 12500 | 75000 | 20000 | 5000 | 75000 | 25000 | 7500 |
| | | NB | 50000 | 40000 | 25000 | 5000 | 50000 | 40000 | 35000 | 3500 | 25000 | 15000 | 2500 | 25000 | 20000 | 4000 |
| | | QC-1 | 50000 | 40000 | 25000 | 5000 | 50000 | 40000 | 35000 | 3500 | 25000 | 15000 | 2500 | 25000 | 20000 | 4000 |
| | | QC-2 | 50000 | 40000 | 25000 | 5000 | 50000 | 40000 | 35000 | 3500 | 25000 | 15000 | 2500 | 25000 | 20000 | 4000 |
| | | ON-1 | 50000 | 40000 | 25000 | 5000 | 50000 | 40000 | 35000 | 3500 | 25000 | 15000 | 2500 | 25000 | 20000 | 4000 |
| | | ON-2 | 100000 | 65000 | 35000 | 10000 | 100000 | 65000 | 45000 | 12500 | 75000 | 20000 | 5000 | 75000 | 25000 | 7500 |
| | | MB | 25000 | 15000 | 10000 | 2500 | 25000 | 15000 | 15000 | 4000 | 10000 | 7500 | 1500 | 10000 | 10000 | 2500 |
| | | SK | 25000 | 15000 | 10000 | 2500 | 25000 | 15000 | 15000 | 4000 | 10000 | 7500 | 1500 | 10000 | 10000 | 2500 |
| | | AB | 25000 | 15000 | 10000 | 2500 | 25000 | 15000 | 15000 | 4000 | 10000 | 7500 | 1500 | 10000 | 10000 | 2500 |
| | | BC-1 | 50000 | 40000 | 25000 | 5000 | 50000 | 40000 | 35000 | 3500 | 25000 | 15000 | 2500 | 25000 | 20000 | 4000 |
| | | BC-2 | 150000 | 85000 | 50000 | 15000 | 150000 | 85000 | 60000 | 17500 | 50000 | 35000 | 7500 | 50000 | 40000 | 10000 |
| | | TR | 100000 | 65000 | 35000 | 10000 | 100000 | 65000 | 45000 | 12500 | 75000 | 20000 | 5000 | 75000 | 25000 | 7500 |
| Grading | Rock % of material moved (%) | NL | 20 | 20 | 10 | 10 | 20 | 20 | 10 | 10 | 15 | 15 | 10 | 15 | 15 | 10 |
| | | PE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NS | 20 | 20 | 10 | 10 | 20 | 20 | 10 | 10 | 15 | 15 | 10 | 15 | 15 | 10 |
| | | NB | 10 | 10 | 5 | 5 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | | QC-1 | 10 | 10 | 5 | 5 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | | QC-2 | 10 | 10 | 5 | 5 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | | ON-1 | 10 | 10 | 5 | 5 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | | ON-2 | 20 | 20 | 10 | 10 | 20 | 20 | 10 | 10 | 15 | 15 | 10 | 15 | 15 | 10 |
| | | MB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | SK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | AB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-1 | 10 | 10 | 5 | 5 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | | BC-2 | 50 | 50 | 30 | 30 | 50 | 50 | 30 | 30 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | TR | 20 | 20 | 10 | 10 | 20 | 20 | 10 | 10 | 15 | 15 | 10 | 15 | 15 | 10 |

All Other Road Infrastructure.xls – Quantities (Cont…)

| Description and type of work item | | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Land-scaping | Sodding & top soil ($m^2$) | NL | 500 | 250 | 225 | 200 | 4000 | 2800 | 2800 | 1750 | 300 | 262.5 | 225 | 5250 | 3600 | 2812.5 |
| | | PE | 250 | 125 | 112.5 | 100 | 2000 | 1400 | 1400 | 875 | 100 | 87.5 | 75 | 1750 | 1200 | 937.5 |
| | | NS | 500 | 250 | 225 | 200 | 4000 | 2800 | 2800 | 1750 | 300 | 262.5 | 225 | 5250 | 3600 | 2812.5 |
| | | NB | 1000 | 500 | 450 | 400 | 8000 | 5600 | 5600 | 3500 | 400 | 350 | 300 | 7000 | 4800 | 3750 |
| | | QC-1 | 1000 | 500 | 450 | 400 | 8000 | 5600 | 5600 | 3500 | 400 | 350 | 300 | 7000 | 4800 | 3750 |
| | | QC-2 | 1000 | 500 | 450 | 400 | 8000 | 5600 | 5600 | 3500 | 400 | 350 | 300 | 7000 | 4800 | 3750 |
| | | ON-1 | 1000 | 500 | 450 | 400 | 8000 | 5600 | 5600 | 3500 | 400 | 350 | 300 | 7000 | 4800 | 3750 |
| | | ON-2 | 500 | 250 | 225 | 200 | 4000 | 2800 | 2800 | 1750 | 300 | 262.5 | 225 | 5250 | 3600 | 2812.5 |
| | | MB | 250 | 125 | 112.5 | 100 | 2000 | 1400 | 1400 | 875 | 100 | 87.5 | 75 | 1750 | 1200 | 937.5 |
| | | SK | 250 | 125 | 112.5 | 100 | 2000 | 1400 | 1400 | 875 | 100 | 87.5 | 75 | 1750 | 1200 | 937.5 |
| | | AB | 250 | 125 | 112.5 | 100 | 2000 | 1400 | 1400 | 875 | 100 | 87.5 | 75 | 1750 | 1200 | 937.5 |
| | | BC-1 | 1000 | 500 | 450 | 400 | 8000 | 5600 | 5600 | 3500 | 400 | 350 | 300 | 7000 | 4800 | 3750 |
| | | BC-2 | 100 | 50 | 45 | 40 | 800 | 560 | 560 | 350 | 80 | 70 | 60 | 1400 | 960 | 750 |
| | | TR | 500 | 250 | 225 | 200 | 4000 | 2800 | 2800 | 1750 | 300 | 262.5 | 225 | 5250 | 3600 | 2812.5 |
| Land-scaping | Top soil ($m^2$) | NL | 9500 | 4750 | 4275 | 3800 | 1000 | 1200 | 1200 | 1750 | 5700 | 4987.5 | 4275 | 0 | 900 | 937.5 |
| | | PE | 4750 | 2375 | 2137.5 | 1900 | 500 | 600 | 600 | 875 | 1900 | 1662.5 | 1425 | 0 | 300 | 312.5 |
| | | NS | 9500 | 4750 | 4275 | 3800 | 1000 | 1200 | 1200 | 1750 | 5700 | 4987.5 | 4275 | 0 | 900 | 937.5 |
| | | NB | 19000 | 9500 | 8550 | 7600 | 2000 | 2400 | 2400 | 3500 | 7600 | 6650 | 5700 | 0 | 1200 | 1250 |
| | | QC-1 | 19000 | 9500 | 8550 | 7600 | 2000 | 2400 | 2400 | 3500 | 7600 | 6650 | 5700 | 0 | 1200 | 1250 |
| | | QC-2 | 19000 | 9500 | 8550 | 7600 | 2000 | 2400 | 2400 | 3500 | 7600 | 6650 | 5700 | 0 | 1200 | 1250 |
| | | ON-1 | 19000 | 9500 | 8550 | 7600 | 2000 | 2400 | 2400 | 3500 | 7600 | 6650 | 5700 | 0 | 1200 | 1250 |
| | | ON-2 | 9500 | 4750 | 4275 | 3800 | 1000 | 1200 | 1200 | 1750 | 5700 | 4987.5 | 4275 | 0 | 900 | 937.5 |
| | | MB | 4750 | 2375 | 2137.5 | 1900 | 500 | 600 | 600 | 875 | 1900 | 1662.5 | 1425 | 0 | 300 | 312.5 |
| | | SK | 4750 | 2375 | 2137.5 | 1900 | 500 | 600 | 600 | 875 | 1900 | 1662.5 | 1425 | 0 | 300 | 312.5 |
| | | AB | 4750 | 2375 | 2137.5 | 1900 | 500 | 600 | 600 | 875 | 1900 | 1662.5 | 1425 | 0 | 300 | 312.5 |
| | | BC-1 | 19000 | 9500 | 8550 | 7600 | 2000 | 2400 | 2400 | 3500 | 7600 | 6650 | 5700 | 0 | 1200 | 1250 |
| | | BC-2 | 1900 | 950 | 855 | 760 | 200 | 240 | 240 | 350 | 1520 | 1330 | 1140 | 0 | 240 | 250 |
| | | TR | 9500 | 4750 | 4275 | 3800 | 1000 | 1200 | 1200 | 1750 | 5700 | 4987.5 | 4275 | 0 | 900 | 937.5 |
| Drainage | Curb and gutter (PCC, Straight) (m) | NL | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | PE | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | NS | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | NB | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | QC-1 | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | QC-2 | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | ON-1 | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | ON-2 | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | MB | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | SK | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | AB | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | BC-1 | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | BC-2 | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |
| | | TR | 50 | 70 | 90 | 110 | 1600 | 1800 | 1900 | 2000 | 70 | 90 | 110 | 1800 | 1900 | 2000 |

| Description and type of work item | | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Drainage | 500 mm Pipe culvert & end sections (m) | NL | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | PE | 5 | 25 | 75 | 125 | 2.5 | 12.5 | 37.5 | 62.5 | 30 | 90 | 150 | 15 | 45 | 75 |
| | | NS | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | NB | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | QC-1 | 39 | 22 | 15.5 | 0 | 27 | 22 | 10 | 0 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | QC-2 | 39 | 22 | 15.5 | 0 | 27 | 22 | 10 | 0 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | ON-1 | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | ON-2 | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | MB | 5 | 25 | 75 | 125 | 2.5 | 12.5 | 37.5 | 62.5 | 30 | 90 | 150 | 15 | 45 | 75 |
| | | SK | 5 | 25 | 75 | 125 | 2.5 | 12.5 | 37.5 | 62.5 | 30 | 90 | 150 | 15 | 45 | 75 |
| | | AB | 5 | 25 | 75 | 125 | 2.5 | 12.5 | 37.5 | 62.5 | 30 | 90 | 150 | 15 | 45 | 75 |
| | | BC-1 | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| | | BC-2 | 5 | 25 | 75 | 125 | 2.5 | 12.5 | 37.5 | 62.5 | 30 | 90 | 150 | 15 | 45 | 75 |
| | | TR | 10 | 50 | 150 | 250 | 5 | 25 | 75 | 125 | 60 | 180 | 300 | 30 | 90 | 150 |
| Drainage | 1500 mm Wide box culvert (m) | NL | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | PE | 10 | 7.5 | 5 | 5 | 5 | 3.75 | 2.5 | 2.5 | 7 | 4.5 | 4.5 | 3.5 | 2.5 | 2 |
| | | NS | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | NB | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | QC-1 | 13 | 11 | 9 | 0 | 6 | 7 | 20 | 0 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | QC-2 | 13 | 11 | 9 | 0 | 6 | 7 | 20 | 0 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | ON-1 | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | ON-2 | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | MB | 10 | 7.5 | 5 | 5 | 5 | 3.75 | 2.5 | 2.5 | 7 | 4.5 | 4.5 | 3.5 | 2.5 | 2 |
| | | SK | 10 | 7.5 | 5 | 5 | 5 | 3.75 | 2.5 | 2.5 | 7 | 4.5 | 4.5 | 3.5 | 2.5 | 2 |
| | | AB | 10 | 7.5 | 5 | 5 | 5 | 3.75 | 2.5 | 2.5 | 7 | 4.5 | 4.5 | 3.5 | 2.5 | 2 |
| | | BC-1 | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| | | BC-2 | 10 | 7.5 | 5 | 5 | 5 | 3.75 | 2.5 | 2.5 | 7 | 4.5 | 4.5 | 3.5 | 2.5 | 2 |
| | | TR | 20 | 15 | 10 | 10 | 10 | 7.5 | 5 | 5 | 14 | 9 | 9 | 7 | 5 | 4 |
| Drainage | Storm water sewers for 2-Lane road (m) | NL | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | PE | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | NS | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | NB | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | QC-1 | 27 | 23 | 13 | 0 | 250 | 275 | 290 | 0 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | QC-2 | 27 | 23 | 13 | 0 | 250 | 275 | 290 | 0 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | ON-1 | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | ON-2 | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | MB | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | SK | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | AB | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | BC-1 | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | BC-2 | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |
| | | TR | 110 | 90 | 50 | 30 | 1000 | 1100 | 1150 | 1200 | 110 | 50 | 30 | 1100 | 1150 | 1200 |

| Description and type of work item | | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Guiderail | Concrete barrier (m) | NL | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | PE | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NS | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NB | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-1 | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-2 | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-1 | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-2 | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MB | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | SK | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | AB | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-1 | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-2 | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | TR | 120 | 0 | 0 | 0 | 350 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Guiderail | Steel guiderail (m) | NL | 15 | 200 | 160 | 80 | 12 | 25 | 20 | 10 | 200 | 160 | 80 | 12.5 | 10 | 5 |
| | | PE | 2.5 | 80 | 16 | 8 | 2 | 10 | 2 | 1 | 80 | 16 | 8 | 5 | 1 | 0.5 |
| | | NS | 15 | 200 | 160 | 80 | 12 | 25 | 20 | 10 | 200 | 160 | 80 | 12.5 | 10 | 5 |
| | | NB | 10 | 160 | 160 | 80 | 8 | 20 | 20 | 10 | 160 | 160 | 80 | 10 | 10 | 5 |
| | | QC-1 | 12 | 190 | 190 | 0 | 10 | 24 | 24 | 0 | 160 | 160 | 80 | 10 | 10 | 5 |
| | | QC-2 | 12 | 190 | 190 | 0 | 10 | 24 | 24 | 0 | 160 | 160 | 80 | 10 | 10 | 5 |
| | | ON-1 | 10 | 160 | 160 | 80 | 8 | 20 | 20 | 10 | 160 | 160 | 80 | 10 | 10 | 5 |
| | | ON-2 | 15 | 200 | 160 | 80 | 12 | 25 | 20 | 10 | 200 | 160 | 80 | 12.5 | 10 | 5 |
| | | MB | 2.5 | 80 | 16 | 8 | 2 | 10 | 2 | 1 | 80 | 16 | 8 | 5 | 1 | 0.5 |
| | | SK | 2.5 | 80 | 16 | 8 | 2 | 10 | 2 | 1 | 80 | 16 | 8 | 5 | 1 | 0.5 |
| | | AB | 2.5 | 80 | 16 | 8 | 2 | 10 | 2 | 1 | 80 | 16 | 8 | 5 | 1 | 0.5 |
| | | BC-1 | 10 | 160 | 160 | 80 | 8 | 20 | 20 | 10 | 160 | 160 | 80 | 10 | 10 | 5 |
| | | BC-2 | 20 | 320 | 160 | 80 | 16 | 40 | 20 | 10 | 240 | 160 | 80 | 15 | 10 | 5 |
| | | TR | 15 | 200 | 160 | 80 | 12 | 25 | 20 | 10 | 200 | 160 | 80 | 12.5 | 10 | 5 |
| Guiderail | 3-Cable guide rail (m) | NL | 0 | 325 | 200 | 100 | 0 | 0 | 0 | 0 | 225 | 140 | 70 | 0 | 10 | 30 |
| | | PE | 0 | 52 | 20 | 10 | 0 | 0 | 0 | 0 | 45 | 14 | 7 | 0 | 1 | 3 |
| | | NS | 0 | 325 | 200 | 100 | 0 | 0 | 0 | 0 | 225 | 140 | 70 | 0 | 10 | 30 |
| | | NB | 0 | 260 | 200 | 100 | 0 | 0 | 0 | 0 | 180 | 140 | 70 | 0 | 10 | 30 |
| | | QC-1 | 0 | 260 | 200 | 100 | 0 | 0 | 0 | 0 | 180 | 140 | 70 | 0 | 10 | 30 |
| | | QC-2 | 0 | 260 | 200 | 100 | 0 | 0 | 0 | 0 | 180 | 140 | 70 | 0 | 10 | 30 |
| | | ON-1 | 0 | 260 | 200 | 100 | 0 | 0 | 0 | 0 | 180 | 140 | 70 | 0 | 10 | 30 |
| | | ON-2 | 0 | 325 | 200 | 100 | 0 | 0 | 0 | 0 | 225 | 140 | 70 | 0 | 10 | 30 |
| | | MB | 0 | 52 | 20 | 10 | 0 | 0 | 0 | 0 | 45 | 14 | 7 | 0 | 1 | 3 |
| | | SK | 0 | 52 | 20 | 10 | 0 | 0 | 0 | 0 | 45 | 14 | 7 | 0 | 1 | 3 |
| | | AB | 0 | 52 | 20 | 10 | 0 | 0 | 0 | 0 | 45 | 14 | 7 | 0 | 1 | 3 |
| | | BC-1 | 0 | 260 | 200 | 100 | 0 | 0 | 0 | 0 | 180 | 140 | 70 | 0 | 10 | 30 |
| | | BC-2 | 0 | 520 | 200 | 100 | 0 | 0 | 0 | 0 | 270 | 140 | 70 | 0 | 10 | 30 |
| | | TR | 0 | 325 | 200 | 100 | 0 | 0 | 0 | 0 | 225 | 140 | 70 | 0 | 10 | 30 |

| Description and type of work item | | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Fencing & gates | Chain link fence (m) | NL | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | PE | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NS | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NB | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-1 | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-2 | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-1 | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-2 | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MB | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | SK | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | AB | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-1 | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-2 | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | TR | 30 | 0 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fencing & gates | Wire fence (m) | NL | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | PE | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NS | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NB | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-1 | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-2 | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-1 | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-2 | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MB | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | SK | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | AB | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-1 | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-2 | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | TR | 600 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lighting | High mast (each) | NL | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | PE | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NS | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | NB | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-1 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | QC-2 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-1 | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ON-2 | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MB | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | SK | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | AB | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-1 | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | BC-2 | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | TR | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

All Other Road Infrastructure.xls – Quantities (Cont…)

| Description and type of work item | | Region | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Lighting | Standard (each) | NL | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | PE | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | NS | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | NB | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | QC-1 | 0.5 | 1 | 2 | 0 | 2.5 | 5 | 4 | 0 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | QC-2 | 0.5 | 1 | 2 | 0 | 2.5 | 5 | 4 | 0 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | ON-1 | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | ON-2 | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | MB | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | SK | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | AB | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | BC-1 | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | BC-2 | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| | | TR | 1 | 2 | 3 | 4 | 4.5 | 8 | 6 | 6 | 4 | 5 | 2 | 10 | 8 | 6 |
| Painting of traffic lanes (m) | | NL | 3200 | 4200 | 3000 | 2800 | 3200 | 1440 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | PE | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | NS | 3200 | 4200 | 3000 | 2800 | 3200 | 1440 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | NB | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | QC-1 | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | QC-2 | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | ON-1 | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | ON-2 | 3200 | 4200 | 3000 | 2800 | 3200 | 1440 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | MB | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | SK | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | AB | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | BC-1 | 3200 | 3500 | 3000 | 2800 | 3200 | 1200 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | BC-2 | 3200 | 5250 | 3000 | 2800 | 3200 | 1800 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |
| | | TR | 3200 | 4200 | 3000 | 2800 | 3200 | 1440 | 1100 | 1000 | 2800 | 2400 | 2000 | 1200 | 1100 | 1100 |

All Other Road Infrastructure.xls – Service Lives

| Work item (supply and install) | | Region | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description and type of work Item | | NL | PE | NS | NB | QC-1 | QC-2 | ON-1 | ON-2 | MB | SK | AB | BC-1 | BC-2 | TR |
| Clearing and grubbing ($m^2$) | | | | | | | | | | | | | | | |
| Grading | Earth moving ($m^3$) | | | | | | | | | | | | | | |
| | Rock moving ($m^3$) | | | | | | | | | | | | | | |
| Land-Scaping | Sodding and top soil ($m^2$) | | | | | | | | | | | | | | |
| | Top soil ($m^3$) | | | | | | | | | | | | | | |
| Drainage | PCC curb and gutter (m) | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 500 mm Pipe culvert & end sections (m) | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | 1500 mm wide box culvert (m) | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | Storm water sewers (m) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Guard Rail | Concrete median (m) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | Steel guiderail (m) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | 3-Cable guiderail (m) | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Fencing, Gates | Chain link fence (m) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | Wire fence (m) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Lighting | High mast (each) | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | Standard (each) | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Painting of Traffic Lanes (m) | | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

All Other Road Infrastructure.xls – Allowances

| Work item (supply and install) Description and type of work Item | | Allowances (%) |
|---|---|---|
| Clearing and grubbing ($m^2$) | | 20 |
| Grading | Earth moving ($m^3$) | 10 |
| | Rock moving ($m^3$) | 10 |
| Land-Scaping | Sodding and top soil ($m^2$) | 15 |
| | Top soil ($m^3$) | 15 |
| Drainage | PCC curb and gutter (m) | 25 |
| | 500 mm Pipe culvert & end sections (m) | 25 |
| | 1500 mm wide box culvert (m) | 25 |
| | Storm water sewers (m) | 25 |
| Guard Rail | Concrete median (m) | 10 |
| | Steel guiderail (m) | 10 |
| | 3-Cable guiderail (m) | 10 |
| Fencing, Gates | Chain link fence (m) | 10 |
| | Wire fence (m) | 10 |
| Lighting | High mast (each) | 50 |
| | Standard (each) | 50 |
| Painting of Traffic Lanes (m) | | 30 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Clearing and grubbing ($m^2$) | | NL | $ 10,800 | $ 14,400 | $ 16,200 | $ 17,280 | $ 4,500 | $ 6,480 | $ 9,720 | $ 12,240 | $ 11,286 | $ 13,464 | $ 15,840 | $ 3,366 | $ 4,435 | $ 5,940 |
| | | PE | $ 1,800 | $ 2,400 | $ 2,700 | $ 2,880 | $ 750 | $ 1,080 | $ 1,620 | $ 2,040 | $ 1,881 | $ 2,244 | $ 2,640 | $ 561 | $ 739 | $ 990 |
| | | NS | $ 10,800 | $ 14,400 | $ 16,200 | $ 17,280 | $ 4,500 | $ 6,480 | $ 9,720 | $ 12,240 | $ 11,286 | $ 13,464 | $ 15,840 | $ 3,366 | $ 4,435 | $ 5,940 |
| | | NB | $ 7,200 | $ 9,600 | $ 10,800 | $ 11,520 | $ 3,000 | $ 4,320 | $ 6,480 | $ 8,160 | $ 7,524 | $ 8,976 | $ 10,560 | $ 2,244 | $ 2,957 | $ 3,960 |
| | | QC-1 | $ 10,800 | $ 14,400 | $ 16,200 | $ 17,280 | $ 4,500 | $ 6,480 | $ 9,720 | $ 12,240 | $ 7,524 | $ 8,976 | $ 10,560 | $ 2,244 | $ 2,957 | $ 3,960 |
| | | QC-2 | $ 10,800 | $ 14,400 | $ 16,200 | $ 17,280 | $ 4,500 | $ 6,480 | $ 9,720 | $ 12,240 | $ 7,524 | $ 8,976 | $ 10,560 | $ 2,244 | $ 2,957 | $ 3,960 |
| | | ON-1 | $ 7,524 | $ 10,032 | $ 11,286 | $ 12,038 | $ 3,135 | $ 4,514 | $ 6,772 | $ 8,527 | $ 7,863 | $ 9,380 | $ 11,035 | $ 2,345 | $ 3,090 | $ 4,138 |
| | | ON-2 | $ 10,800 | $ 14,400 | $ 16,200 | $ 17,280 | $ 4,500 | $ 6,480 | $ 9,720 | $ 12,240 | $ 11,286 | $ 13,464 | $ 15,840 | $ 3,366 | $ 4,435 | $ 5,940 |
| | | MB | $ 1,800 | $ 2,400 | $ 2,700 | $ 2,880 | $ 750 | $ 1,080 | $ 1,620 | $ 2,040 | $ 1,881 | $ 2,244 | $ 2,640 | $ 561 | $ 739 | $ 990 |
| | | SK | $ 1,800 | $ 2,400 | $ 2,700 | $ 2,880 | $ 750 | $ 1,080 | $ 1,620 | $ 2,040 | $ 1,881 | $ 2,244 | $ 2,640 | $ 561 | $ 739 | $ 990 |
| | | AB | $ 3,600 | $ 4,800 | $ 5,400 | $ 5,760 | $ 1,500 | $ 2,160 | $ 3,240 | $ 4,080 | $ 3,762 | $ 4,488 | $ 5,280 | $ 1,122 | $ 1,478 | $ 1,980 |
| | | BC-1 | $ 18,000 | $ 24,000 | $ 27,000 | $ 28,800 | $ 7,500 | $ 10,800 | $ 16,200 | $ 20,400 | $ 18,810 | $ 22,440 | $ 26,400 | $ 5,610 | $ 7,392 | $ 9,900 |
| | | BC-2 | $ 36,000 | $ 48,000 | $ 54,000 | $ 57,600 | $ 15,000 | $ 21,600 | $ 32,400 | $ 40,800 | $ 37,620 | $ 44,880 | $ 52,800 | $ 11,220 | $ 14,784 | $ 19,800 |
| | | TR | $ 16,200 | $ 21,600 | $ 24,300 | $ 25,920 | $ 6,750 | $ 9,720 | $ 14,580 | $ 18,360 | $ 16,929 | $ 20,196 | $ 23,760 | $ 5,049 | $ 6,653 | $ 8,910 |
| Grading | Earth moved ($m^3$) | NL | $ 440,000 | $ 286,000 | $ 173,250 | $ 49,500 | $ 440,000 | $ 286,000 | $ 222,750 | $ 61,875 | $ 385,688 | $ 102,850 | $ 27,225 | $ 385,688 | $ 128,563 | $ 40,838 |
| | | PE | $ 137,500 | $ 82,500 | $ 55,000 | $ 13,750 | $ 137,500 | $ 82,500 | $ 82,500 | $ 22,000 | $ 60,500 | $ 45,375 | $ 9,075 | $ 60,500 | $ 60,500 | $ 15,125 |
| | | NS | $ 440,000 | $ 286,000 | $ 173,250 | $ 49,500 | $ 440,000 | $ 286,000 | $ 222,750 | $ 61,875 | $ 385,688 | $ 102,850 | $ 27,225 | $ 385,688 | $ 128,563 | $ 40,838 |
| | | NB | $ 247,500 | $ 198,000 | $ 130,625 | $ 26,125 | $ 247,500 | $ 198,000 | $ 182,875 | $ 18,288 | $ 143,688 | $ 86,213 | $ 14,369 | $ 143,688 | $ 114,950 | $ 22,990 |
| | | QC-1 | $ 247,500 | $ 198,000 | $ 130,625 | $ 26,125 | $ 247,500 | $ 198,000 | $ 182,875 | $ 18,288 | $ 143,688 | $ 86,213 | $ 14,369 | $ 143,688 | $ 114,950 | $ 22,990 |
| | | QC-2 | $ 247,500 | $ 198,000 | $ 130,625 | $ 26,125 | $ 247,500 | $ 198,000 | $ 182,875 | $ 18,288 | $ 143,688 | $ 86,213 | $ 14,369 | $ 143,688 | $ 114,950 | $ 22,990 |
| | | ON-1 | $ 353,925 | $ 283,140 | $ 186,794 | $ 37,359 | $ 353,925 | $ 283,140 | $ 261,511 | $ 26,151 | $ 205,473 | $ 123,284 | $ 20,547 | $ 205,473 | $ 164,379 | $ 32,876 |
| | | ON-2 | $ 484,000 | $ 314,600 | $ 190,575 | $ 54,450 | $ 484,000 | $ 314,600 | $ 245,025 | $ 68,063 | $ 424,256 | $ 113,135 | $ 29,948 | $ 424,256 | $ 141,419 | $ 44,921 |
| | | MB | $ 66,550 | $ 39,930 | $ 26,620 | $ 6,655 | $ 66,550 | $ 39,930 | $ 39,930 | $ 10,648 | $ 29,282 | $ 21,962 | $ 4,392 | $ 29,282 | $ 29,282 | $ 7,321 |
| | | SK | $ 39,875 | $ 23,925 | $ 15,950 | $ 3,988 | $ 39,875 | $ 23,925 | $ 23,925 | $ 6,380 | $ 17,545 | $ 13,159 | $ 2,632 | $ 17,545 | $ 17,545 | $ 4,386 |
| | | AB | $ 68,750 | $ 41,250 | $ 27,500 | $ 6,875 | $ 68,750 | $ 41,250 | $ 41,250 | $ 11,000 | $ 30,250 | $ 22,688 | $ 4,538 | $ 30,250 | $ 30,250 | $ 7,563 |
| | | BC-1 | $ 247,500 | $ 198,000 | $ 130,625 | $ 26,125 | $ 247,500 | $ 198,000 | $ 182,875 | $ 18,288 | $ 143,688 | $ 86,213 | $ 14,369 | $ 143,688 | $ 114,950 | $ 22,990 |
| | | BC-2 | $ 412,500 | $ 233,750 | $ 192,500 | $ 57,750 | $ 412,500 | $ 233,750 | $ 231,000 | $ 67,375 | $ 242,000 | $ 169,400 | $ 36,300 | $ 242,000 | $ 193,600 | $ 48,400 |
| | | TR | $ 1,100,000 | $ 715,000 | $ 433,125 | $ 123,750 | $ 1,100,000 | $ 715,000 | $ 556,875 | $ 154,688 | $ 964,219 | $ 257,125 | $ 68,063 | $ 964,219 | $ 321,406 | $ 102,094 |
| Grading | Rock moved ($m^3$) | NL | $ 1,100,000 | $ 715,000 | $ 192,500 | $ 55,000 | $ 1,100,000 | $ 715,000 | $ 247,500 | $ 68,750 | $ 680,625 | $ 181,500 | $ 30,250 | $ 680,625 | $ 226,875 | $ 45,375 |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 1,100,000 | $ 715,000 | $ 192,500 | $ 55,000 | $ 1,100,000 | $ 715,000 | $ 247,500 | $ 68,750 | $ 680,625 | $ 181,500 | $ 30,250 | $ 680,625 | $ 226,875 | $ 45,375 |
| | | NB | $ 275,000 | $ 220,000 | $ 68,750 | $ 13,750 | $ 275,000 | $ 220,000 | $ 96,250 | $ 9,625 | $ 75,625 | $ 45,375 | $ 7,563 | $ 75,625 | $ 60,500 | $ 12,100 |
| | | QC-1 | $ 93,500 | $ 74,800 | $ 23,375 | $ 4,675 | $ 93,500 | $ 74,800 | $ 32,725 | $ 3,273 | $ 75,625 | $ 45,375 | $ 7,563 | $ 75,625 | $ 60,500 | $ 12,100 |
| | | QC-2 | $ 93,500 | $ 74,800 | $ 23,375 | $ 4,675 | $ 93,500 | $ 74,800 | $ 32,725 | $ 3,273 | $ 75,625 | $ 45,375 | $ 7,563 | $ 75,625 | $ 60,500 | $ 12,100 |
| | | ON-1 | $ 220,000 | $ 176,000 | $ 55,000 | $ 11,000 | $ 220,000 | $ 176,000 | $ 77,000 | $ 7,700 | $ 60,500 | $ 36,300 | $ 6,050 | $ 60,500 | $ 48,400 | $ 9,680 |
| | | ON-2 | $ 1,908,280 | $ 1,240,382 | $ 333,949 | $ 95,414 | $ 1,908,280 | $ 1,240,382 | $ 429,363 | $ 119,268 | $ 1,180,748 | $ 314,866 | $ 52,478 | $ 1,180,748 | $ 393,583 | $ 78,717 |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 275,000 | $ 220,000 | $ 68,750 | $ 13,750 | $ 275,000 | $ 220,000 | $ 96,250 | $ 9,625 | $ 75,625 | $ 45,375 | $ 7,563 | $ 75,625 | $ 60,500 | $ 12,100 |
| | | BC-2 | $ 4,125,000 | $ 2,337,500 | $ 825,000 | $ 247,500 | $ 4,125,000 | $ 2,337,500 | $ 990,000 | $ 288,750 | $ 605,000 | $ 423,500 | $ 90,750 | $ 605,000 | $ 484,000 | $ 121,000 |
| | | TR | $ 2,200,000 | $ 1,430,000 | $ 385,000 | $ 110,000 | $ 2,200,000 | $ 1,430,000 | $ 495,000 | $ 137,500 | $ 1,361,250 | $ 363,000 | $ 60,500 | $ 1,361,250 | $ 453,750 | $ 90,750 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Land-scaping | Sodding & top soil ($m^2$) | NL | $ 2,300 | $ 1,150 | $ 1,035 | $ 920 | $ 18,400 | $ 12,880 | $ 12,880 | $ 8,050 | $ 1,518 | $ 1,328 | $ 1,139 | $ 26,565 | $ 18,216 | $ 14,231 |
| | | PE | $ 1,150 | $ 575 | $ 518 | $ 460 | $ 9,200 | $ 6,440 | $ 6,440 | $ 4,025 | $ 506 | $ 443 | $ 380 | $ 8,855 | $ 6,072 | $ 4,744 |
| | | NS | $ 2,300 | $ 1,150 | $ 1,035 | $ 920 | $ 18,400 | $ 12,880 | $ 12,880 | $ 8,050 | $ 1,518 | $ 1,328 | $ 1,139 | $ 26,565 | $ 18,216 | $ 14,231 |
| | | NB | $ 4,600 | $ 2,300 | $ 2,070 | $ 1,840 | $ 36,800 | $ 25,760 | $ 25,760 | $ 16,100 | $ 2,024 | $ 1,771 | $ 1,518 | $ 35,420 | $ 24,288 | $ 18,975 |
| | | QC-1 | $ 6,325 | $ 3,163 | $ 2,846 | $ 2,530 | $ 50,600 | $ 35,420 | $ 35,420 | $ 22,138 | $ 2,024 | $ 1,771 | $ 1,518 | $ 35,420 | $ 24,288 | $ 18,975 |
| | | QC-2 | $ 6,325 | $ 3,163 | $ 2,846 | $ 2,530 | $ 50,600 | $ 35,420 | $ 35,420 | $ 22,138 | $ 2,024 | $ 1,771 | $ 1,518 | $ 35,420 | $ 24,288 | $ 18,975 |
| | | ON-1 | $ 3,818 | $ 1,909 | $ 1,718 | $ 1,527 | $ 30,544 | $ 21,381 | $ 21,381 | $ 13,363 | $ 1,680 | $ 1,470 | $ 1,260 | $ 29,399 | $ 20,159 | $ 15,749 |
| | | ON-2 | $ 2,501 | $ 1,251 | $ 1,126 | $ 1,001 | $ 20,010 | $ 14,007 | $ 14,007 | $ 8,754 | $ 1,651 | $ 1,444 | $ 1,238 | $ 28,889 | $ 19,810 | $ 15,476 |
| | | MB | $ 2,214 | $ 1,107 | $ 996 | $ 886 | $ 17,710 | $ 12,397 | $ 12,397 | $ 7,748 | $ 974 | $ 852 | $ 731 | $ 17,046 | $ 11,689 | $ 9,132 |
| | | SK | $ 1,150 | $ 575 | $ 518 | $ 460 | $ 9,200 | $ 6,440 | $ 6,440 | $ 4,025 | $ 506 | $ 443 | $ 380 | $ 8,855 | $ 6,072 | $ 4,744 |
| | | AB | $ 1,150 | $ 575 | $ 518 | $ 460 | $ 9,200 | $ 6,440 | $ 6,440 | $ 4,025 | $ 506 | $ 443 | $ 380 | $ 8,855 | $ 6,072 | $ 4,744 |
| | | BC-1 | $ 11,500 | $ 5,750 | $ 5,175 | $ 4,600 | $ 92,000 | $ 64,400 | $ 64,400 | $ 40,250 | $ 5,060 | $ 4,428 | $ 3,795 | $ 88,550 | $ 60,720 | $ 47,438 |
| | | BC-2 | $ 1,150 | $ 575 | $ 518 | $ 460 | $ 9,200 | $ 6,440 | $ 6,440 | $ 4,025 | $ 1,012 | $ 886 | $ 759 | $ 17,710 | $ 12,144 | $ 9,488 |
| | | TR | $ 5,750 | $ 2,875 | $ 2,588 | $ 2,300 | $ 46,000 | $ 32,200 | $ 32,200 | $ 20,125 | $ 3,795 | $ 3,321 | $ 2,846 | $ 66,413 | $ 45,540 | $ 35,578 |
| Land-scaping | Top soil ($m^2$) | NL | $ 109,250 | $ 54,625 | $ 49,163 | $ 43,700 | $ 11,500 | $ 13,800 | $ 13,800 | $ 20,125 | $ 72,105 | $ 63,092 | $ 54,079 | $ - | $ 11,385 | $ 11,859 |
| | | PE | $ 54,625 | $ 27,313 | $ 24,581 | $ 21,850 | $ 5,750 | $ 6,900 | $ 6,900 | $ 10,063 | $ 24,035 | $ 21,031 | $ 18,026 | $ - | $ 3,795 | $ 3,953 |
| | | NS | $ 109,250 | $ 54,625 | $ 49,163 | $ 43,700 | $ 11,500 | $ 13,800 | $ 13,800 | $ 20,125 | $ 72,105 | $ 63,092 | $ 54,079 | $ - | $ 11,385 | $ 11,859 |
| | | NB | $ 218,500 | $ 109,250 | $ 98,325 | $ 87,400 | $ 23,000 | $ 27,600 | $ 27,600 | $ 40,250 | $ 96,140 | $ 84,123 | $ 72,105 | $ - | $ 15,180 | $ 15,813 |
| | | QC-1 | $ 196,650 | $ 98,325 | $ 88,493 | $ 78,660 | $ 20,700 | $ 24,840 | $ 24,840 | $ 36,225 | $ 96,140 | $ 84,123 | $ 72,105 | $ - | $ 15,180 | $ 15,813 |
| | | QC-2 | $ 196,650 | $ 98,325 | $ 88,493 | $ 78,660 | $ 20,700 | $ 24,840 | $ 24,840 | $ 36,225 | $ 96,140 | $ 84,123 | $ 72,105 | $ - | $ 15,180 | $ 15,813 |
| | | ON-1 | $ 218,500 | $ 109,250 | $ 98,325 | $ 87,400 | $ 23,000 | $ 27,600 | $ 27,600 | $ 40,250 | $ 96,140 | $ 84,123 | $ 72,105 | $ - | $ 15,180 | $ 15,813 |
| | | ON-2 | $ 163,875 | $ 81,938 | $ 73,744 | $ 65,550 | $ 17,250 | $ 20,700 | $ 20,700 | $ 30,188 | $ 108,158 | $ 94,638 | $ 81,118 | $ - | $ 17,078 | $ 17,789 |
| | | MB | $ 54,625 | $ 27,313 | $ 24,581 | $ 21,850 | $ 5,750 | $ 6,900 | $ 6,900 | $ 10,063 | $ 24,035 | $ 21,031 | $ 18,026 | $ - | $ 3,795 | $ 3,953 |
| | | SK | $ 54,625 | $ 27,313 | $ 24,581 | $ 21,850 | $ 5,750 | $ 6,900 | $ 6,900 | $ 10,063 | $ 24,035 | $ 21,031 | $ 18,026 | $ - | $ 3,795 | $ 3,953 |
| | | AB | $ 54,625 | $ 27,313 | $ 24,581 | $ 21,850 | $ 5,750 | $ 6,900 | $ 6,900 | $ 10,063 | $ 24,035 | $ 21,031 | $ 18,026 | $ - | $ 3,795 | $ 3,953 |
| | | BC-1 | $ 218,500 | $ 109,250 | $ 98,325 | $ 87,400 | $ 23,000 | $ 27,600 | $ 27,600 | $ 40,250 | $ 96,140 | $ 84,123 | $ 72,105 | $ - | $ 15,180 | $ 15,813 |
| | | BC-2 | $ 21,850 | $ 10,925 | $ 9,833 | $ 8,740 | $ 2,300 | $ 2,760 | $ 2,760 | $ 4,025 | $ 19,228 | $ 16,825 | $ 14,421 | $ - | $ 3,036 | $ 3,163 |
| | | TR | $ 109,250 | $ 54,625 | $ 49,163 | $ 43,700 | $ 11,500 | $ 13,800 | $ 13,800 | $ 20,125 | $ 72,105 | $ 63,092 | $ 54,079 | $ - | $ 11,385 | $ 11,859 |
| Drainage | Curb and gutter (PCC, Straight) (m) | NL | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | PE | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | NS | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | NB | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | QC-1 | $ 2,594 | $ 3,631 | $ 4,669 | $ 5,706 | $ 83,000 | $ 93,375 | $ 98,563 | $ 103,750 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | QC-2 | $ 2,594 | $ 3,631 | $ 4,669 | $ 5,706 | $ 83,000 | $ 93,375 | $ 98,563 | $ 103,750 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | ON-1 | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | ON-2 | $ 3,438 | $ 4,813 | $ 6,188 | $ 7,563 | $ 110,000 | $ 123,750 | $ 130,625 | $ 137,500 | $ 5,294 | $ 6,806 | $ 8,319 | $ 136,125 | $ 143,688 | $ 151,250 |
| | | MB | $ 2,520 | $ 3,528 | $ 4,536 | $ 5,544 | $ 80,640 | $ 90,720 | $ 95,760 | $ 100,800 | $ 3,881 | $ 4,990 | $ 6,098 | $ 99,792 | $ 105,336 | $ 110,880 |
| | | SK | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | AB | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | BC-1 | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | BC-2 | $ 3,125 | $ 4,375 | $ 5,625 | $ 6,875 | $ 100,000 | $ 112,500 | $ 118,750 | $ 125,000 | $ 4,813 | $ 6,188 | $ 7,563 | $ 123,750 | $ 130,625 | $ 137,500 |
| | | TR | $ 4,688 | $ 6,563 | $ 8,438 | $ 10,313 | $ 150,000 | $ 168,750 | $ 178,125 | $ 187,500 | $ 7,219 | $ 9,281 | $ 11,344 | $ 185,625 | $ 195,938 | $ 206,250 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Drainage | 500 mm Pipe culvert & end sections (m) | NL | $ 1,563 | $ 7,813 | $ 23,438 | $ 39,063 | $ 781 | $ 3,906 | $ 11,719 | $ 19,531 | $ 10,313 | $ 30,938 | $ 51,563 | $ 5,156 | $ 15,469 | $ 25,781 |
| | | PE | $ 625 | $ 3,125 | $ 9,375 | $ 15,625 | $ 313 | $ 1,563 | $ 4,688 | $ 7,813 | $ 4,125 | $ 12,375 | $ 20,625 | $ 2,063 | $ 6,188 | $ 10,313 |
| | | NS | $ 1,563 | $ 7,813 | $ 23,438 | $ 39,063 | $ 781 | $ 3,906 | $ 11,719 | $ 19,531 | $ 10,313 | $ 30,938 | $ 51,563 | $ 5,156 | $ 15,469 | $ 25,781 |
| | | NB | $ 1,563 | $ 7,813 | $ 23,438 | $ 39,063 | $ 781 | $ 3,906 | $ 11,719 | $ 19,531 | $ 10,313 | $ 30,938 | $ 51,563 | $ 5,156 | $ 15,469 | $ 25,781 |
| | | QC-1 | $ 6,338 | $ 3,575 | $ 2,519 | $ - | $ 4,388 | $ 3,575 | $ 1,625 | $ - | $ 10,313 | $ 30,938 | $ 51,563 | $ 5,156 | $ 15,469 | $ 25,781 |
| | | QC-2 | $ 6,338 | $ 3,575 | $ 2,519 | $ - | $ 4,388 | $ 3,575 | $ 1,625 | $ - | $ 10,313 | $ 30,938 | $ 51,563 | $ 5,156 | $ 15,469 | $ 25,781 |
| | | ON-1 | $ 1,403 | $ 7,013 | $ 21,039 | $ 35,066 | $ 701 | $ 3,507 | $ 10,520 | $ 17,533 | $ 9,257 | $ 27,772 | $ 46,287 | $ 4,629 | $ 13,886 | $ 23,143 |
| | | ON-2 | $ 1,741 | $ 8,703 | $ 26,109 | $ 43,516 | $ 870 | $ 4,352 | $ 13,055 | $ 21,758 | $ 11,488 | $ 34,464 | $ 57,441 | $ 5,744 | $ 17,232 | $ 28,720 |
| | | MB | $ 252 | $ 1,260 | $ 3,780 | $ 6,300 | $ 126 | $ 630 | $ 1,890 | $ 3,150 | $ 1,663 | $ 4,990 | $ 8,316 | $ 832 | $ 2,495 | $ 4,158 |
| | | SK | $ 313 | $ 1,563 | $ 4,688 | $ 7,813 | $ 156 | $ 781 | $ 2,344 | $ 3,906 | $ 2,063 | $ 6,188 | $ 10,313 | $ 1,031 | $ 3,094 | $ 5,156 |
| | | AB | $ 375 | $ 1,875 | $ 5,625 | $ 9,375 | $ 188 | $ 938 | $ 2,813 | $ 4,688 | $ 2,475 | $ 7,425 | $ 12,375 | $ 1,238 | $ 3,713 | $ 6,188 |
| | | BC-1 | $ 3,125 | $ 15,625 | $ 46,875 | $ 78,125 | $ 1,563 | $ 7,813 | $ 23,438 | $ 39,063 | $ 20,625 | $ 61,875 | $ 103,125 | $ 10,313 | $ 30,938 | $ 51,563 |
| | | BC-2 | $ 3,125 | $ 15,625 | $ 46,875 | $ 78,125 | $ 1,563 | $ 7,813 | $ 23,438 | $ 39,063 | $ 20,625 | $ 61,875 | $ 103,125 | $ 10,313 | $ 30,938 | $ 51,563 |
| | | TR | $ 7,750 | $ 38,750 | $ 116,250 | $ 193,750 | $ 3,875 | $ 19,375 | $ 58,125 | $ 96,875 | $ 51,150 | $ 153,450 | $ 255,750 | $ 25,575 | $ 76,725 | $ 127,875 |
| Drainage | 1500 mm Wide box culvert (m) | NL | $ 37,500 | $ 28,125 | $ 18,750 | $ 18,750 | $ 18,750 | $ 14,063 | $ 9,375 | $ 9,375 | $ 28,875 | $ 18,563 | $ 18,563 | $ 14,438 | $ 10,313 | $ 8,250 |
| | | PE | $ 18,750 | $ 14,063 | $ 9,375 | $ 9,375 | $ 9,375 | $ 7,031 | $ 4,688 | $ 4,688 | $ 14,438 | $ 9,281 | $ 9,281 | $ 7,219 | $ 5,156 | $ 4,125 |
| | | NS | $ 37,500 | $ 28,125 | $ 18,750 | $ 18,750 | $ 18,750 | $ 14,063 | $ 9,375 | $ 9,375 | $ 28,875 | $ 18,563 | $ 18,563 | $ 14,438 | $ 10,313 | $ 8,250 |
| | | NB | $ 37,500 | $ 28,125 | $ 18,750 | $ 18,750 | $ 18,750 | $ 14,063 | $ 9,375 | $ 9,375 | $ 28,875 | $ 18,563 | $ 18,563 | $ 14,438 | $ 10,313 | $ 8,250 |
| | | QC-1 | $ 23,563 | $ 19,938 | $ 16,313 | $ - | $ 10,875 | $ 12,688 | $ 36,250 | $ - | $ 28,875 | $ 18,563 | $ 18,563 | $ 14,438 | $ 10,313 | $ 8,250 |
| | | QC-2 | $ 23,563 | $ 19,938 | $ 16,313 | $ - | $ 10,875 | $ 12,688 | $ 36,250 | $ - | $ 28,875 | $ 18,563 | $ 18,563 | $ 14,438 | $ 10,313 | $ 8,250 |
| | | ON-1 | $ 38,368 | $ 28,776 | $ 19,184 | $ 19,184 | $ 19,184 | $ 14,388 | $ 9,592 | $ 9,592 | $ 29,543 | $ 18,992 | $ 18,992 | $ 14,771 | $ 10,551 | $ 8,441 |
| | | ON-2 | $ 42,500 | $ 31,875 | $ 21,250 | $ 21,250 | $ 21,250 | $ 15,938 | $ 10,625 | $ 10,625 | $ 32,725 | $ 21,038 | $ 21,038 | $ 16,363 | $ 11,688 | $ 9,350 |
| | | MB | $ 25,000 | $ 18,750 | $ 12,500 | $ 12,500 | $ 12,500 | $ 9,375 | $ 6,250 | $ 6,250 | $ 19,250 | $ 12,375 | $ 12,375 | $ 9,625 | $ 6,875 | $ 5,500 |
| | | SK | $ 25,000 | $ 18,750 | $ 12,500 | $ 12,500 | $ 12,500 | $ 9,375 | $ 6,250 | $ 6,250 | $ 19,250 | $ 12,375 | $ 12,375 | $ 9,625 | $ 6,875 | $ 5,500 |
| | | AB | $ 25,000 | $ 18,750 | $ 12,500 | $ 12,500 | $ 12,500 | $ 9,375 | $ 6,250 | $ 6,250 | $ 19,250 | $ 12,375 | $ 12,375 | $ 9,625 | $ 6,875 | $ 5,500 |
| | | BC-1 | $ 75,000 | $ 56,250 | $ 37,500 | $ 37,500 | $ 37,500 | $ 28,125 | $ 18,750 | $ 18,750 | $ 57,750 | $ 37,125 | $ 37,125 | $ 28,875 | $ 20,625 | $ 16,500 |
| | | BC-2 | $ 37,500 | $ 28,125 | $ 18,750 | $ 18,750 | $ 18,750 | $ 14,063 | $ 9,375 | $ 9,375 | $ 28,875 | $ 18,563 | $ 18,563 | $ 14,438 | $ 10,313 | $ 8,250 |
| | | TR | $ 75,000 | $ 56,250 | $ 37,500 | $ 37,500 | $ 37,500 | $ 28,125 | $ 18,750 | $ 18,750 | $ 57,750 | $ 37,125 | $ 37,125 | $ 28,875 | $ 20,625 | $ 16,500 |
| Drainage | Storm water sewers for 2-Lane road (m) | NL | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | PE | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | NS | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | NB | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | QC-1 | $ 3,544 | $ 3,019 | $ 1,706 | $ - | $ 32,813 | $ 36,094 | $ 38,063 | $ - | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | QC-2 | $ 3,544 | $ 3,019 | $ 1,706 | $ - | $ 32,813 | $ 36,094 | $ 38,063 | $ - | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | ON-1 | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | ON-2 | $ 8,250 | $ 6,750 | $ 3,750 | $ 2,250 | $ 75,000 | $ 82,500 | $ 86,250 | $ 90,000 | $ 9,075 | $ 4,125 | $ 2,475 | $ 90,750 | $ 94,875 | $ 99,000 |
| | | MB | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | SK | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | AB | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | BC-1 | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | BC-2 | $ 6,875 | $ 5,625 | $ 3,125 | $ 1,875 | $ 62,500 | $ 68,750 | $ 71,875 | $ 75,000 | $ 7,563 | $ 3,438 | $ 2,063 | $ 75,625 | $ 79,063 | $ 82,500 |
| | | TR | $ 10,313 | $ 8,438 | $ 4,688 | $ 2,813 | $ 93,750 | $ 103,125 | $ 107,813 | $ 112,500 | $ 11,344 | $ 5,156 | $ 3,094 | $ 113,438 | $ 118,594 | $ 123,750 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Guiderail | Concrete barrier (m) | NL | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 15,840 | $ - | $ - | $ - | $ 46,200 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 15,840 | $ - | $ - | $ - | $ 46,200 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 26,424 | $ - | $ - | $ - | $ 77,069 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 29,040 | $ - | $ - | $ - | $ 84,700 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 18,480 | $ - | $ - | $ - | $ 53,900 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 13,200 | $ - | $ - | $ - | $ 38,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 13,200 | $ - | $ - | $ - | $ 38,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 26,400 | $ - | $ - | $ - | $ 77,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Guiderail | Steel guiderail (m) | NL | $ 1,238 | $ 16,500 | $ 13,200 | $ 6,600 | $ 990 | $ 2,063 | $ 1,650 | $ 825 | $ 18,150 | $ 14,520 | $ 7,260 | $ 1,134 | $ 908 | $ 454 |
| | | PE | $ 206 | $ 6,600 | $ 1,320 | $ 660 | $ 165 | $ 825 | $ 165 | $ 83 | $ 7,260 | $ 1,452 | $ 726 | $ 454 | $ 91 | $ 45 |
| | | NS | $ 1,238 | $ 16,500 | $ 13,200 | $ 6,600 | $ 990 | $ 2,063 | $ 1,650 | $ 825 | $ 18,150 | $ 14,520 | $ 7,260 | $ 1,134 | $ 908 | $ 454 |
| | | NB | $ 825 | $ 13,200 | $ 13,200 | $ 6,600 | $ 660 | $ 1,650 | $ 1,650 | $ 825 | $ 14,520 | $ 14,520 | $ 7,260 | $ 908 | $ 908 | $ 454 |
| | | QC-1 | $ 634 | $ 10,032 | $ 10,032 | $ - | $ 528 | $ 1,267 | $ 1,267 | $ - | $ 14,520 | $ 14,520 | $ 7,260 | $ 908 | $ 908 | $ 454 |
| | | QC-2 | $ 634 | $ 10,032 | $ 10,032 | $ - | $ 528 | $ 1,267 | $ 1,267 | $ - | $ 14,520 | $ 14,520 | $ 7,260 | $ 908 | $ 908 | $ 454 |
| | | ON-1 | $ 726 | $ 11,612 | $ 11,612 | $ 5,806 | $ 581 | $ 1,452 | $ 1,452 | $ 726 | $ 12,774 | $ 12,774 | $ 6,387 | $ 798 | $ 798 | $ 399 |
| | | ON-2 | $ 1,155 | $ 15,400 | $ 12,320 | $ 6,160 | $ 924 | $ 1,925 | $ 1,540 | $ 770 | $ 16,940 | $ 13,552 | $ 6,776 | $ 1,059 | $ 847 | $ 424 |
| | | MB | $ 204 | $ 6,512 | $ 1,302 | $ 651 | $ 163 | $ 814 | $ 163 | $ 81 | $ 7,163 | $ 1,433 | $ 716 | $ 448 | $ 90 | $ 45 |
| | | SK | $ 206 | $ 6,600 | $ 1,320 | $ 660 | $ 165 | $ 825 | $ 165 | $ 83 | $ 7,260 | $ 1,452 | $ 726 | $ 454 | $ 91 | $ 45 |
| | | AB | $ 206 | $ 6,600 | $ 1,320 | $ 660 | $ 165 | $ 825 | $ 165 | $ 83 | $ 7,260 | $ 1,452 | $ 726 | $ 454 | $ 91 | $ 45 |
| | | BC-1 | $ 825 | $ 13,200 | $ 13,200 | $ 6,600 | $ 660 | $ 1,650 | $ 1,650 | $ 825 | $ 14,520 | $ 14,520 | $ 7,260 | $ 908 | $ 908 | $ 454 |
| | | BC-2 | $ 1,650 | $ 26,400 | $ 13,200 | $ 6,600 | $ 1,320 | $ 3,300 | $ 1,650 | $ 825 | $ 21,780 | $ 14,520 | $ 7,260 | $ 1,361 | $ 908 | $ 454 |
| | | TR | $ 8,250 | $ 110,000 | $ 88,000 | $ 44,000 | $ 6,600 | $ 13,750 | $ 11,000 | $ 5,500 | $ 121,000 | $ 96,800 | $ 48,400 | $ 7,563 | $ 6,050 | $ 3,025 |
| Guiderail | 3-Cable guide rail (m) | NL | $ - | $ 5,363 | $ 3,300 | $ 1,650 | $ - | $ - | $ - | $ - | $ 4,084 | $ 2,541 | $ 1,271 | $ - | $ 182 | $ 545 |
| | | PE | $ - | $ 858 | $ 330 | $ 165 | $ - | $ - | $ - | $ - | $ 817 | $ 254 | $ 127 | $ - | $ 18 | $ 54 |
| | | NS | $ - | $ 5,363 | $ 3,300 | $ 1,650 | $ - | $ - | $ - | $ - | $ 4,084 | $ 2,541 | $ 1,271 | $ - | $ 182 | $ 545 |
| | | NB | $ - | $ 4,290 | $ 3,300 | $ 1,650 | $ - | $ - | $ - | $ - | $ 3,267 | $ 2,541 | $ 1,271 | $ - | $ 182 | $ 545 |
| | | QC-1 | $ - | $ 11,440 | $ 8,800 | $ 4,400 | $ - | $ - | $ - | $ - | $ 3,354 | $ 2,609 | $ 1,304 | $ - | $ 186 | $ 559 |
| | | QC-2 | $ - | $ 11,440 | $ 8,800 | $ 4,400 | $ - | $ - | $ - | $ - | $ 3,354 | $ 2,609 | $ 1,304 | $ - | $ 186 | $ 559 |
| | | ON-1 | $ - | $ 4,404 | $ 3,388 | $ 1,694 | $ - | $ - | $ - | $ - | $ 3,354 | $ 2,609 | $ 1,304 | $ - | $ 186 | $ 559 |
| | | ON-2 | $ - | $ 6,435 | $ 3,960 | $ 1,980 | $ - | $ - | $ - | $ - | $ 4,901 | $ 3,049 | $ 1,525 | $ - | $ 218 | $ 653 |
| | | MB | $ - | $ 858 | $ 330 | $ 165 | $ - | $ - | $ - | $ - | $ 817 | $ 254 | $ 127 | $ - | $ 18 | $ 54 |
| | | SK | $ - | $ 858 | $ 330 | $ 165 | $ - | $ - | $ - | $ - | $ 817 | $ 254 | $ 127 | $ - | $ 18 | $ 54 |
| | | AB | $ - | $ 858 | $ 330 | $ 165 | $ - | $ - | $ - | $ - | $ 817 | $ 254 | $ 127 | $ - | $ 18 | $ 54 |
| | | BC-1 | $ - | $ 4,290 | $ 3,300 | $ 1,650 | $ - | $ - | $ - | $ - | $ 3,267 | $ 2,541 | $ 1,271 | $ - | $ 182 | $ 545 |
| | | BC-2 | $ - | $ 8,580 | $ 3,300 | $ 1,650 | $ - | $ - | $ - | $ - | $ 4,901 | $ 2,541 | $ 1,271 | $ - | $ 182 | $ 545 |
| | | TR | $ - | $ 26,813 | $ 16,500 | $ 8,250 | $ - | $ - | $ - | $ - | $ 20,419 | $ 12,705 | $ 6,353 | $ - | $ 908 | $ 2,723 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Fencing & gates | Chain link fence (m) | NL | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 990 | $ - | $ - | $ - | $ 19,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 990 | $ - | $ - | $ - | $ 19,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 1,467 | $ - | $ - | $ - | $ 29,330 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 2,319 | $ - | $ - | $ - | $ 46,378 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 1,650 | $ - | $ - | $ - | $ 33,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 1,980 | $ - | $ - | $ - | $ 39,600 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 1,980 | $ - | $ - | $ - | $ 39,600 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 990 | $ - | $ - | $ - | $ 19,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fencing & gates | Wire fence (m) | NL | $ 4,620 | $ - | $ - | $ - | $ 385 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 4,620 | $ - | $ - | $ - | $ 385 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 4,620 | $ - | $ - | $ - | $ 385 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 4,620 | $ - | $ - | $ - | $ 385 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 7,920 | $ - | $ - | $ - | $ 660 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 7,920 | $ - | $ - | $ - | $ 660 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 5,636 | $ - | $ - | $ - | $ 470 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 8,639 | $ - | $ - | $ - | $ 720 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 2,640 | $ - | $ - | $ - | $ 220 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 2,310 | $ - | $ - | $ - | $ 193 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 4,620 | $ - | $ - | $ - | $ 385 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 9,900 | $ - | $ - | $ - | $ 825 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 9,900 | $ - | $ - | $ - | $ 825 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 9,900 | $ - | $ - | $ - | $ 825 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Lighting | High mast (each) | NL | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ 42,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ 42,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ 155,588 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ 152,250 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ 157,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Lighting | Standard (each) | NL | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | PE | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | NS | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | NB | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | QC-1 | $ 2,925 | $ 5,850 | $ 11,700 | $ - | $ 14,625 | $ 29,250 | $ 23,400 | $ - | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | QC-2 | $ 2,925 | $ 5,850 | $ 11,700 | $ - | $ 14,625 | $ 29,250 | $ 23,400 | $ - | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | ON-1 | $ 1,946 | $ 3,893 | $ 5,839 | $ 7,786 | $ 8,759 | $ 15,571 | $ 11,678 | $ 11,678 | $ 8,564 | $ 10,705 | $ 4,282 | $ 21,411 | $ 17,128 | $ 12,846 |
| | | ON-2 | $ 1,950 | $ 3,900 | $ 5,850 | $ 7,800 | $ 8,775 | $ 15,600 | $ 11,700 | $ 11,700 | $ 8,580 | $ 10,725 | $ 4,290 | $ 21,450 | $ 17,160 | $ 12,870 |
| | | MB | $ 3,000 | $ 6,000 | $ 9,000 | $ 12,000 | $ 13,500 | $ 24,000 | $ 18,000 | $ 18,000 | $ 13,200 | $ 16,500 | $ 6,600 | $ 33,000 | $ 26,400 | $ 19,800 |
| | | SK | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | AB | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | BC-1 | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | BC-2 | $ 2,250 | $ 4,500 | $ 6,750 | $ 9,000 | $ 10,125 | $ 18,000 | $ 13,500 | $ 13,500 | $ 9,900 | $ 12,375 | $ 4,950 | $ 24,750 | $ 19,800 | $ 14,850 |
| | | TR | $ 3,750 | $ 7,500 | $ 11,250 | $ 15,000 | $ 16,875 | $ 30,000 | $ 22,500 | $ 22,500 | $ 16,500 | $ 20,625 | $ 8,250 | $ 41,250 | $ 33,000 | $ 24,750 |
| Painting of traffic lanes (m) | | NL | $ 4,160 | $ 5,460 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,872 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | PE | $ 4,160 | $ 4,550 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,560 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | NS | $ 4,160 | $ 5,460 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,872 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | NB | $ 4,160 | $ 4,550 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,560 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | QC-1 | $ 1,664 | $ 1,820 | $ 1,560 | $ 1,456 | $ 1,664 | $ 624 | $ 572 | $ 520 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | QC-2 | $ 1,664 | $ 1,820 | $ 1,560 | $ 1,456 | $ 1,664 | $ 624 | $ 572 | $ 520 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | ON-1 | $ 3,786 | $ 4,141 | $ 3,549 | $ 3,312 | $ 3,786 | $ 1,420 | $ 1,301 | $ 1,183 | $ 3,644 | $ 3,123 | $ 2,603 | $ 1,562 | $ 1,431 | $ 1,431 |
| | | ON-2 | $ 4,285 | $ 5,624 | $ 4,017 | $ 3,749 | $ 4,285 | $ 1,928 | $ 1,473 | $ 1,339 | $ 4,124 | $ 3,535 | $ 2,946 | $ 1,767 | $ 1,620 | $ 1,620 |
| | | MB | $ 4,160 | $ 4,550 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,560 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | SK | $ 4,160 | $ 4,550 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,560 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | AB | $ 4,160 | $ 4,550 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,560 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | BC-1 | $ 4,160 | $ 4,550 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,560 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | BC-2 | $ 4,160 | $ 6,825 | $ 3,900 | $ 3,640 | $ 4,160 | $ 2,340 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| | | TR | $ 4,160 | $ 5,460 | $ 3,900 | $ 3,640 | $ 4,160 | $ 1,872 | $ 1,430 | $ 1,300 | $ 4,004 | $ 3,432 | $ 2,860 | $ 1,716 | $ 1,573 | $ 1,573 |
| Total of All Other Roadway Infrastructure | | NL | $ 1,749,480 | $ 1,144,435 | $ 503,485 | $ 244,853 | $ 1,871,966 | $ 1,237,313 | $ 721,449 | $ 402,071 | $ 1,229,022 | $ 441,852 | $ 219,673 | $ 1,318,063 | $ 627,604 | $ 374,846 |
| | | PE | $ 261,486 | $ 151,983 | $ 115,849 | $ 77,155 | $ 440,098 | $ 289,149 | $ 299,055 | $ 252,010 | $ 129,940 | $ 105,512 | $ 73,365 | $ 280,742 | $ 293,819 | $ 260,922 |
| | | NS | $ 1,749,480 | $ 1,144,435 | $ 503,485 | $ 244,853 | $ 1,871,966 | $ 1,237,313 | $ 721,449 | $ 402,071 | $ 1,229,022 | $ 441,852 | $ 219,673 | $ 1,318,063 | $ 627,604 | $ 374,846 |
| | | NB | $ 839,518 | $ 607,128 | $ 381,908 | $ 219,088 | $ 882,536 | $ 678,109 | $ 553,764 | $ 323,454 | $ 398,354 | $ 306,075 | $ 197,255 | $ 478,569 | $ 456,006 | $ 330,440 |
| | | QC-1 | $ 617,860 | $ 442,142 | $ 307,137 | $ 140,832 | $ 616,727 | $ 487,162 | $ 461,919 | $ 196,433 | $ 398,441 | $ 306,143 | $ 197,289 | $ 478,569 | $ 456,010 | $ 330,455 |
| | | QC-2 | $ 617,860 | $ 442,142 | $ 307,137 | $ 140,832 | $ 616,727 | $ 487,162 | $ 461,919 | $ 196,433 | $ 398,441 | $ 306,143 | $ 197,289 | $ 478,569 | $ 456,010 | $ 330,455 |
| | | ON-1 | $ 891,575 | $ 646,277 | $ 420,645 | $ 223,136 | $ 924,225 | $ 714,651 | $ 607,753 | $ 325,025 | $ 442,602 | $ 329,451 | $ 196,195 | $ 518,852 | $ 487,748 | $ 332,229 |
| | | ON-2 | $ 2,670,822 | $ 1,732,170 | $ 693,187 | $ 320,162 | $ 2,778,167 | $ 1,826,561 | $ 962,383 | $ 500,504 | $ 1,810,645 | $ 624,117 | $ 281,140 | $ 1,889,068 | $ 846,491 | $ 453,861 |
| | | MB | $ 186,969 | $ 111,832 | $ 84,371 | $ 62,946 | $ 337,969 | $ 232,156 | $ 238,215 | $ 217,080 | $ 100,513 | $ 76,999 | $ 58,344 | $ 234,926 | $ 240,954 | $ 226,106 |
| | | SK | $ 167,489 | $ 96,533 | $ 75,236 | $ 62,705 | $ 345,249 | $ 232,136 | $ 239,699 | $ 234,046 | $ 89,735 | $ 70,202 | $ 59,703 | $ 239,162 | $ 249,489 | $ 246,402 |
| | | AB | $ 200,536 | $ 116,571 | $ 90,424 | $ 70,035 | $ 375,098 | $ 250,698 | $ 259,113 | $ 241,488 | $ 104,734 | $ 83,212 | $ 66,311 | $ 252,634 | $ 263,552 | $ 251,600 |
| | | BC-1 | $ 888,690 | $ 660,915 | $ 443,400 | $ 296,940 | $ 930,308 | $ 741,198 | $ 623,218 | $ 388,750 | $ 451,864 | $ 371,696 | $ 285,497 | $ 554,659 | $ 522,654 | $ 398,874 |
| | | BC-2 | $ 4,678,015 | $ 2,726,305 | $ 1,176,625 | $ 489,565 | $ 4,831,218 | $ 2,810,815 | $ 1,489,118 | $ 655,538 | $ 997,420 | $ 766,046 | $ 337,733 | $ 1,103,132 | $ 961,164 | $ 484,234 |
| | | TR | $ 3,578,650 | $ 2,476,373 | $ 1,169,450 | $ 605,935 | $ 3,757,760 | $ 2,535,717 | $ 1,487,698 | $ 773,223 | $ 2,691,183 | $ 1,024,683 | $ 574,173 | $ 2,759,721 | $ 1,259,146 | $ 730,887 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Clearing and grubbing ($m^2$) | | NL | $ 668 | $ 891 | $ 1,002 | $ 1,069 | $ 278 | $ 401 | $ 601 | $ 757 | $ 698 | $ 833 | $ 980 | $ 208 | $ 274 | $ 368 |
| | | PE | $ 111 | $ 149 | $ 167 | $ 178 | $ 46 | $ 67 | $ 100 | $ 126 | $ 116 | $ 139 | $ 163 | $ 35 | $ 46 | $ 61 |
| | | NS | $ 668 | $ 891 | $ 1,002 | $ 1,069 | $ 278 | $ 401 | $ 601 | $ 757 | $ 698 | $ 833 | $ 980 | $ 208 | $ 274 | $ 368 |
| | | NB | $ 446 | $ 594 | $ 668 | $ 713 | $ 186 | $ 267 | $ 401 | $ 505 | $ 466 | $ 555 | $ 653 | $ 139 | $ 183 | $ 245 |
| | | QC-1 | $ 668 | $ 891 | $ 1,002 | $ 1,069 | $ 278 | $ 401 | $ 601 | $ 757 | $ 466 | $ 555 | $ 653 | $ 139 | $ 183 | $ 245 |
| | | QC-2 | $ 668 | $ 891 | $ 1,002 | $ 1,069 | $ 278 | $ 401 | $ 601 | $ 757 | $ 466 | $ 555 | $ 653 | $ 139 | $ 183 | $ 245 |
| | | ON-1 | $ 466 | $ 621 | $ 698 | $ 745 | $ 194 | $ 279 | $ 419 | $ 528 | $ 487 | $ 580 | $ 683 | $ 145 | $ 191 | $ 256 |
| | | ON-2 | $ 668 | $ 891 | $ 1,002 | $ 1,069 | $ 278 | $ 401 | $ 601 | $ 757 | $ 698 | $ 833 | $ 980 | $ 208 | $ 274 | $ 368 |
| | | MB | $ 111 | $ 149 | $ 167 | $ 178 | $ 46 | $ 67 | $ 100 | $ 126 | $ 116 | $ 139 | $ 163 | $ 35 | $ 46 | $ 61 |
| | | SK | $ 111 | $ 149 | $ 167 | $ 178 | $ 46 | $ 67 | $ 100 | $ 126 | $ 116 | $ 139 | $ 163 | $ 35 | $ 46 | $ 61 |
| | | AB | $ 223 | $ 297 | $ 334 | $ 356 | $ 93 | $ 134 | $ 200 | $ 252 | $ 233 | $ 278 | $ 327 | $ 69 | $ 91 | $ 123 |
| | | BC-1 | $ 1,114 | $ 1,485 | $ 1,671 | $ 1,782 | $ 464 | $ 668 | $ 1,002 | $ 1,262 | $ 1,164 | $ 1,388 | $ 1,634 | $ 347 | $ 457 | $ 613 |
| | | BC-2 | $ 2,228 | $ 2,970 | $ 3,341 | $ 3,564 | $ 928 | $ 1,337 | $ 2,005 | $ 2,525 | $ 2,328 | $ 2,777 | $ 3,267 | $ 694 | $ 915 | $ 1,225 |
| | | TR | $ 1,002 | $ 1,337 | $ 1,504 | $ 1,604 | $ 418 | $ 601 | $ 902 | $ 1,136 | $ 1,047 | $ 1,250 | $ 1,470 | $ 312 | $ 412 | $ 551 |
| Grading | Material moved ($m^3$) | NL | $ 27,225 | $ 17,696 | $ 10,720 | $ 3,063 | $ 27,225 | $ 17,696 | $ 13,783 | $ 3,829 | $ 23,865 | $ 6,364 | $ 1,685 | $ 23,865 | $ 7,955 | $ 2,527 |
| | | PE | $ 8,508 | $ 5,105 | $ 3,403 | $ 851 | $ 8,508 | $ 5,105 | $ 5,105 | $ 1,361 | $ 3,743 | $ 2,808 | $ 562 | $ 3,743 | $ 3,743 | $ 936 |
| | | NS | $ 27,225 | $ 17,696 | $ 10,720 | $ 3,063 | $ 27,225 | $ 17,696 | $ 13,783 | $ 3,829 | $ 23,865 | $ 6,364 | $ 1,685 | $ 23,865 | $ 7,955 | $ 2,527 |
| | | NB | $ 15,314 | $ 12,251 | $ 8,083 | $ 1,617 | $ 15,314 | $ 12,251 | $ 11,316 | $ 1,132 | $ 8,891 | $ 5,334 | $ 889 | $ 8,891 | $ 7,113 | $ 1,423 |
| | | QC-1 | $ 15,314 | $ 12,251 | $ 8,083 | $ 1,617 | $ 15,314 | $ 12,251 | $ 11,316 | $ 1,132 | $ 8,891 | $ 5,334 | $ 889 | $ 8,891 | $ 7,113 | $ 1,423 |
| | | QC-2 | $ 15,314 | $ 12,251 | $ 8,083 | $ 1,617 | $ 15,314 | $ 12,251 | $ 11,316 | $ 1,132 | $ 8,891 | $ 5,334 | $ 889 | $ 8,891 | $ 7,113 | $ 1,423 |
| | | ON-1 | $ 21,899 | $ 17,519 | $ 11,558 | $ 2,312 | $ 21,899 | $ 17,519 | $ 16,181 | $ 1,618 | $ 12,714 | $ 7,628 | $ 1,271 | $ 12,714 | $ 10,171 | $ 2,034 |
| | | ON-2 | $ 29,948 | $ 19,466 | $ 11,792 | $ 3,369 | $ 29,948 | $ 19,466 | $ 15,161 | $ 4,211 | $ 26,251 | $ 7,000 | $ 1,853 | $ 26,251 | $ 8,750 | $ 2,780 |
| | | MB | $ 4,118 | $ 2,471 | $ 1,647 | $ 412 | $ 4,118 | $ 2,471 | $ 2,471 | $ 659 | $ 1,812 | $ 1,359 | $ 272 | $ 1,812 | $ 1,812 | $ 453 |
| | | SK | $ 2,467 | $ 1,480 | $ 987 | $ 247 | $ 2,467 | $ 1,480 | $ 1,480 | $ 395 | $ 1,086 | $ 814 | $ 163 | $ 1,086 | $ 1,086 | $ 271 |
| | | AB | $ 4,254 | $ 2,552 | $ 1,702 | $ 425 | $ 4,254 | $ 2,552 | $ 2,552 | $ 681 | $ 1,872 | $ 1,404 | $ 281 | $ 1,872 | $ 1,872 | $ 468 |
| | | BC-1 | $ 15,314 | $ 12,251 | $ 8,083 | $ 1,617 | $ 15,314 | $ 12,251 | $ 11,316 | $ 1,132 | $ 8,891 | $ 5,334 | $ 889 | $ 8,891 | $ 7,113 | $ 1,423 |
| | | BC-2 | $ 25,524 | $ 14,463 | $ 11,911 | $ 3,573 | $ 25,524 | $ 14,463 | $ 14,293 | $ 4,169 | $ 14,974 | $ 10,482 | $ 2,246 | $ 14,974 | $ 11,979 | $ 2,995 |
| | | TR | $ 68,063 | $ 44,241 | $ 26,800 | $ 7,657 | $ 68,063 | $ 44,241 | $ 34,457 | $ 9,571 | $ 59,662 | $ 15,910 | $ 4,211 | $ 59,662 | $ 19,887 | $ 6,317 |
| Grading | Rock % of material moved (%) | NL | $ 68,063 | $ 44,241 | $ 11,911 | $ 3,403 | $ 68,063 | $ 44,241 | $ 15,314 | $ 4,254 | $ 42,114 | $ 11,230 | $ 1,872 | $ 42,114 | $ 14,038 | $ 2,808 |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 68,063 | $ 44,241 | $ 11,911 | $ 3,403 | $ 68,063 | $ 44,241 | $ 15,314 | $ 4,254 | $ 42,114 | $ 11,230 | $ 1,872 | $ 42,114 | $ 14,038 | $ 2,808 |
| | | NB | $ 17,016 | $ 13,613 | $ 4,254 | $ 851 | $ 17,016 | $ 13,613 | $ 5,956 | $ 596 | $ 4,679 | $ 2,808 | $ 468 | $ 4,679 | $ 3,743 | $ 749 |
| | | QC-1 | $ 5,785 | $ 4,628 | $ 1,446 | $ 289 | $ 5,785 | $ 4,628 | $ 2,025 | $ 202 | $ 4,679 | $ 2,808 | $ 468 | $ 4,679 | $ 3,743 | $ 749 |
| | | QC-2 | $ 5,785 | $ 4,628 | $ 1,446 | $ 289 | $ 5,785 | $ 4,628 | $ 2,025 | $ 202 | $ 4,679 | $ 2,808 | $ 468 | $ 4,679 | $ 3,743 | $ 749 |
| | | ON-1 | $ 13,613 | $ 10,890 | $ 3,403 | $ 681 | $ 13,613 | $ 10,890 | $ 4,764 | $ 476 | $ 3,743 | $ 2,246 | $ 374 | $ 3,743 | $ 2,995 | $ 599 |
| | | ON-2 | $ 118,076 | $ 76,750 | $ 20,663 | $ 5,904 | $ 118,076 | $ 76,750 | $ 26,567 | $ 7,380 | $ 73,060 | $ 19,483 | $ 3,247 | $ 73,060 | $ 24,353 | $ 4,871 |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 17,016 | $ 13,613 | $ 4,254 | $ 851 | $ 17,016 | $ 13,613 | $ 5,956 | $ 596 | $ 4,679 | $ 2,808 | $ 468 | $ 4,679 | $ 3,743 | $ 749 |
| | | BC-2 | $ 255,237 | $ 144,634 | $ 51,047 | $ 15,314 | $ 255,237 | $ 144,634 | $ 61,257 | $ 17,867 | $ 37,435 | $ 26,204 | $ 5,615 | $ 37,435 | $ 29,948 | $ 7,487 |
| | | TR | $ 136,127 | $ 88,482 | $ 23,822 | $ 6,806 | $ 136,127 | $ 88,482 | $ 30,628 | $ 8,508 | $ 84,228 | $ 22,461 | $ 3,743 | $ 84,228 | $ 28,076 | $ 5,615 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Land-scaping | Sodding & top soil ($m^2$) | NL | $ 142 | $ 71 | $ 64 | $ 57 | $ 1,139 | $ 797 | $ 797 | $ 498 | $ 94 | $ 82 | $ 70 | $ 1,644 | $ 1,127 | $ 881 |
| | | PE | $ 71 | $ 36 | $ 32 | $ 28 | $ 569 | $ 398 | $ 398 | $ 249 | $ 31 | $ 27 | $ 23 | $ 548 | $ 376 | $ 294 |
| | | NS | $ 142 | $ 71 | $ 64 | $ 57 | $ 1,139 | $ 797 | $ 797 | $ 498 | $ 94 | $ 82 | $ 70 | $ 1,644 | $ 1,127 | $ 881 |
| | | NB | $ 285 | $ 142 | $ 128 | $ 114 | $ 2,277 | $ 1,594 | $ 1,594 | $ 996 | $ 125 | $ 110 | $ 94 | $ 2,192 | $ 1,503 | $ 1,174 |
| | | QC-1 | $ 391 | $ 196 | $ 176 | $ 157 | $ 3,131 | $ 2,192 | $ 2,192 | $ 1,370 | $ 125 | $ 110 | $ 94 | $ 2,192 | $ 1,503 | $ 1,174 |
| | | QC-2 | $ 391 | $ 196 | $ 176 | $ 157 | $ 3,131 | $ 2,192 | $ 2,192 | $ 1,370 | $ 125 | $ 110 | $ 94 | $ 2,192 | $ 1,503 | $ 1,174 |
| | | ON-1 | $ 236 | $ 118 | $ 106 | $ 94 | $ 1,890 | $ 1,323 | $ 1,323 | $ 827 | $ 104 | $ 91 | $ 78 | $ 1,819 | $ 1,247 | $ 974 |
| | | ON-2 | $ 155 | $ 77 | $ 70 | $ 62 | $ 1,238 | $ 867 | $ 867 | $ 542 | $ 102 | $ 89 | $ 77 | $ 1,788 | $ 1,226 | $ 958 |
| | | MB | $ 137 | $ 68 | $ 62 | $ 55 | $ 1,096 | $ 767 | $ 767 | $ 479 | $ 60 | $ 53 | $ 45 | $ 1,055 | $ 723 | $ 565 |
| | | SK | $ 71 | $ 36 | $ 32 | $ 28 | $ 569 | $ 398 | $ 398 | $ 249 | $ 31 | $ 27 | $ 23 | $ 548 | $ 376 | $ 294 |
| | | AB | $ 71 | $ 36 | $ 32 | $ 28 | $ 569 | $ 398 | $ 398 | $ 249 | $ 31 | $ 27 | $ 23 | $ 548 | $ 376 | $ 294 |
| | | BC-1 | $ 712 | $ 356 | $ 320 | $ 285 | $ 5,693 | $ 3,985 | $ 3,985 | $ 2,490 | $ 313 | $ 274 | $ 235 | $ 5,479 | $ 3,757 | $ 2,935 |
| | | BC-2 | $ 71 | $ 36 | $ 32 | $ 28 | $ 569 | $ 398 | $ 398 | $ 249 | $ 63 | $ 55 | $ 47 | $ 1,096 | $ 751 | $ 587 |
| | | TR | $ 356 | $ 178 | $ 160 | $ 142 | $ 2,846 | $ 1,992 | $ 1,992 | $ 1,245 | $ 235 | $ 205 | $ 176 | $ 4,109 | $ 2,818 | $ 2,201 |
| Land-scaping | Top soil ($m^2$) | NL | $ 6,760 | $ 3,380 | $ 3,042 | $ 2,704 | $ 712 | $ 854 | $ 854 | $ 1,245 | $ 4,462 | $ 3,904 | $ 3,346 | $ - | $ 704 | $ 734 |
| | | PE | $ 3,380 | $ 1,690 | $ 1,521 | $ 1,352 | $ 356 | $ 427 | $ 427 | $ 623 | $ 1,487 | $ 1,301 | $ 1,115 | $ - | $ 235 | $ 245 |
| | | NS | $ 6,760 | $ 3,380 | $ 3,042 | $ 2,704 | $ 712 | $ 854 | $ 854 | $ 1,245 | $ 4,462 | $ 3,904 | $ 3,346 | $ - | $ 704 | $ 734 |
| | | NB | $ 13,520 | $ 6,760 | $ 6,084 | $ 5,408 | $ 1,423 | $ 1,708 | $ 1,708 | $ 2,490 | $ 5,949 | $ 5,205 | $ 4,462 | $ - | $ 939 | $ 978 |
| | | QC-1 | $ 12,168 | $ 6,084 | $ 5,476 | $ 4,867 | $ 1,281 | $ 1,537 | $ 1,537 | $ 2,241 | $ 5,949 | $ 5,205 | $ 4,462 | $ - | $ 939 | $ 978 |
| | | QC-2 | $ 12,168 | $ 6,084 | $ 5,476 | $ 4,867 | $ 1,281 | $ 1,537 | $ 1,537 | $ 2,241 | $ 5,949 | $ 5,205 | $ 4,462 | $ - | $ 939 | $ 978 |
| | | ON-1 | $ 13,520 | $ 6,760 | $ 6,084 | $ 5,408 | $ 1,423 | $ 1,708 | $ 1,708 | $ 2,490 | $ 5,949 | $ 5,205 | $ 4,462 | $ - | $ 939 | $ 978 |
| | | ON-2 | $ 10,140 | $ 5,070 | $ 4,563 | $ 4,056 | $ 1,067 | $ 1,281 | $ 1,281 | $ 1,868 | $ 6,692 | $ 5,856 | $ 5,019 | $ - | $ 1,057 | $ 1,101 |
| | | MB | $ 3,380 | $ 1,690 | $ 1,521 | $ 1,352 | $ 356 | $ 427 | $ 427 | $ 623 | $ 1,487 | $ 1,301 | $ 1,115 | $ - | $ 235 | $ 245 |
| | | SK | $ 3,380 | $ 1,690 | $ 1,521 | $ 1,352 | $ 356 | $ 427 | $ 427 | $ 623 | $ 1,487 | $ 1,301 | $ 1,115 | $ - | $ 235 | $ 245 |
| | | AB | $ 3,380 | $ 1,690 | $ 1,521 | $ 1,352 | $ 356 | $ 427 | $ 427 | $ 623 | $ 1,487 | $ 1,301 | $ 1,115 | $ - | $ 235 | $ 245 |
| | | BC-1 | $ 13,520 | $ 6,760 | $ 6,084 | $ 5,408 | $ 1,423 | $ 1,708 | $ 1,708 | $ 2,490 | $ 5,949 | $ 5,205 | $ 4,462 | $ - | $ 939 | $ 978 |
| | | BC-2 | $ 1,352 | $ 676 | $ 608 | $ 541 | $ 142 | $ 171 | $ 171 | $ 249 | $ 1,190 | $ 1,041 | $ 892 | $ - | $ 188 | $ 196 |
| | | TR | $ 6,760 | $ 3,380 | $ 3,042 | $ 2,704 | $ 712 | $ 854 | $ 854 | $ 1,245 | $ 4,462 | $ 3,904 | $ 3,346 | $ - | $ 704 | $ 734 |
| Drainage | Curb and gutter (PCC, Straight) (m) | NL | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | PE | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | NS | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | NB | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | QC-1 | $ 160 | $ 225 | $ 289 | $ 353 | $ 5,136 | $ 5,778 | $ 6,099 | $ 6,420 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | QC-2 | $ 160 | $ 225 | $ 289 | $ 353 | $ 5,136 | $ 5,778 | $ 6,099 | $ 6,420 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | ON-1 | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | ON-2 | $ 213 | $ 298 | $ 383 | $ 468 | $ 6,806 | $ 7,657 | $ 8,083 | $ 8,508 | $ 328 | $ 421 | $ 515 | $ 8,423 | $ 8,891 | $ 9,359 |
| | | MB | $ 156 | $ 218 | $ 281 | $ 343 | $ 4,990 | $ 5,613 | $ 5,925 | $ 6,237 | $ 240 | $ 309 | $ 377 | $ 6,175 | $ 6,518 | $ 6,861 |
| | | SK | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | AB | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | BC-1 | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | BC-2 | $ 193 | $ 271 | $ 348 | $ 425 | $ 6,188 | $ 6,961 | $ 7,348 | $ 7,734 | $ 298 | $ 383 | $ 468 | $ 7,657 | $ 8,083 | $ 8,508 |
| | | TR | $ 290 | $ 406 | $ 522 | $ 638 | $ 9,281 | $ 10,442 | $ 11,022 | $ 11,602 | $ 447 | $ 574 | $ 702 | $ 11,486 | $ 12,124 | $ 12,762 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Drainage | 500 mm Pipe culvert & end sections (m) | NL | $ 97 | $ 483 | $ 1,450 | $ 2,417 | $ 48 | $ 242 | $ 725 | $ 1,209 | $ 638 | $ 1,914 | $ 3,190 | $ 319 | $ 957 | $ 1,595 |
| | | PE | $ 39 | $ 193 | $ 580 | $ 967 | $ 19 | $ 97 | $ 290 | $ 483 | $ 255 | $ 766 | $ 1,276 | $ 128 | $ 383 | $ 638 |
| | | NS | $ 97 | $ 483 | $ 1,450 | $ 2,417 | $ 48 | $ 242 | $ 725 | $ 1,209 | $ 638 | $ 1,914 | $ 3,190 | $ 319 | $ 957 | $ 1,595 |
| | | NB | $ 97 | $ 483 | $ 1,450 | $ 2,417 | $ 48 | $ 242 | $ 725 | $ 1,209 | $ 638 | $ 1,914 | $ 3,190 | $ 319 | $ 957 | $ 1,595 |
| | | QC-1 | $ 392 | $ 221 | $ 156 | $ - | $ 271 | $ 221 | $ 101 | $ - | $ 638 | $ 1,914 | $ 3,190 | $ 319 | $ 957 | $ 1,595 |
| | | QC-2 | $ 392 | $ 221 | $ 156 | $ - | $ 271 | $ 221 | $ 101 | $ - | $ 638 | $ 1,914 | $ 3,190 | $ 319 | $ 957 | $ 1,595 |
| | | ON-1 | $ 87 | $ 434 | $ 1,302 | $ 2,170 | $ 43 | $ 217 | $ 651 | $ 1,085 | $ 573 | $ 1,718 | $ 2,864 | $ 286 | $ 859 | $ 1,432 |
| | | ON-2 | $ 108 | $ 539 | $ 1,616 | $ 2,693 | $ 54 | $ 269 | $ 808 | $ 1,346 | $ 711 | $ 2,133 | $ 3,554 | $ 355 | $ 1,066 | $ 1,777 |
| | | MB | $ 16 | $ 78 | $ 234 | $ 390 | $ 8 | $ 39 | $ 117 | $ 195 | $ 103 | $ 309 | $ 515 | $ 51 | $ 154 | $ 257 |
| | | SK | $ 19 | $ 97 | $ 290 | $ 483 | $ 10 | $ 48 | $ 145 | $ 242 | $ 128 | $ 383 | $ 638 | $ 64 | $ 191 | $ 319 |
| | | AB | $ 23 | $ 116 | $ 348 | $ 580 | $ 12 | $ 58 | $ 174 | $ 290 | $ 153 | $ 459 | $ 766 | $ 77 | $ 230 | $ 383 |
| | | BC-1 | $ 193 | $ 967 | $ 2,900 | $ 4,834 | $ 97 | $ 483 | $ 1,450 | $ 2,417 | $ 1,276 | $ 3,829 | $ 6,381 | $ 638 | $ 1,914 | $ 3,190 |
| | | BC-2 | $ 193 | $ 967 | $ 2,900 | $ 4,834 | $ 97 | $ 483 | $ 1,450 | $ 2,417 | $ 1,276 | $ 3,829 | $ 6,381 | $ 638 | $ 1,914 | $ 3,190 |
| | | TR | $ 480 | $ 2,398 | $ 7,193 | $ 11,988 | $ 240 | $ 1,199 | $ 3,597 | $ 5,994 | $ 3,165 | $ 9,495 | $ 15,825 | $ 1,582 | $ 4,747 | $ 7,912 |
| Drainage | 1500 mm Wide box culvert (m) | NL | $ 2,320 | $ 1,740 | $ 1,160 | $ 1,160 | $ 1,160 | $ 870 | $ 580 | $ 580 | $ 1,787 | $ 1,149 | $ 1,149 | $ 893 | $ 638 | $ 510 |
| | | PE | $ 1,160 | $ 870 | $ 580 | $ 580 | $ 580 | $ 435 | $ 290 | $ 290 | $ 893 | $ 574 | $ 574 | $ 447 | $ 319 | $ 255 |
| | | NS | $ 2,320 | $ 1,740 | $ 1,160 | $ 1,160 | $ 1,160 | $ 870 | $ 580 | $ 580 | $ 1,787 | $ 1,149 | $ 1,149 | $ 893 | $ 638 | $ 510 |
| | | NB | $ 2,320 | $ 1,740 | $ 1,160 | $ 1,160 | $ 1,160 | $ 870 | $ 580 | $ 580 | $ 1,787 | $ 1,149 | $ 1,149 | $ 893 | $ 638 | $ 510 |
| | | QC-1 | $ 1,458 | $ 1,234 | $ 1,009 | $ - | $ 673 | $ 785 | $ 2,243 | $ - | $ 1,787 | $ 1,149 | $ 1,149 | $ 893 | $ 638 | $ 510 |
| | | QC-2 | $ 1,458 | $ 1,234 | $ 1,009 | $ - | $ 673 | $ 785 | $ 2,243 | $ - | $ 1,787 | $ 1,149 | $ 1,149 | $ 893 | $ 638 | $ 510 |
| | | ON-1 | $ 2,374 | $ 1,781 | $ 1,187 | $ 1,187 | $ 1,187 | $ 890 | $ 594 | $ 594 | $ 1,828 | $ 1,175 | $ 1,175 | $ 914 | $ 653 | $ 522 |
| | | ON-2 | $ 2,630 | $ 1,972 | $ 1,315 | $ 1,315 | $ 1,315 | $ 986 | $ 657 | $ 657 | $ 2,025 | $ 1,302 | $ 1,302 | $ 1,012 | $ 723 | $ 579 |
| | | MB | $ 1,547 | $ 1,160 | $ 773 | $ 773 | $ 773 | $ 580 | $ 387 | $ 387 | $ 1,191 | $ 766 | $ 766 | $ 596 | $ 425 | $ 340 |
| | | SK | $ 1,547 | $ 1,160 | $ 773 | $ 773 | $ 773 | $ 580 | $ 387 | $ 387 | $ 1,191 | $ 766 | $ 766 | $ 596 | $ 425 | $ 340 |
| | | AB | $ 1,547 | $ 1,160 | $ 773 | $ 773 | $ 773 | $ 580 | $ 387 | $ 387 | $ 1,191 | $ 766 | $ 766 | $ 596 | $ 425 | $ 340 |
| | | BC-1 | $ 4,641 | $ 3,481 | $ 2,320 | $ 2,320 | $ 2,320 | $ 1,740 | $ 1,160 | $ 1,160 | $ 3,573 | $ 2,297 | $ 2,297 | $ 1,787 | $ 1,276 | $ 1,021 |
| | | BC-2 | $ 2,320 | $ 1,740 | $ 1,160 | $ 1,160 | $ 1,160 | $ 870 | $ 580 | $ 580 | $ 1,787 | $ 1,149 | $ 1,149 | $ 893 | $ 638 | $ 510 |
| | | TR | $ 4,641 | $ 3,481 | $ 2,320 | $ 2,320 | $ 2,320 | $ 1,740 | $ 1,160 | $ 1,160 | $ 3,573 | $ 2,297 | $ 2,297 | $ 1,787 | $ 1,276 | $ 1,021 |
| Drainage | Storm water sewers for 2-Lane road (m) | NL | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | PE | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | NS | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | NB | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | QC-1 | $ 219 | $ 187 | $ 106 | $ - | $ 2,030 | $ 2,233 | $ 2,355 | $ - | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | QC-2 | $ 219 | $ 187 | $ 106 | $ - | $ 2,030 | $ 2,233 | $ 2,355 | $ - | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | ON-1 | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | ON-2 | $ 510 | $ 418 | $ 232 | $ 139 | $ 4,641 | $ 5,105 | $ 5,337 | $ 5,569 | $ 562 | $ 255 | $ 153 | $ 5,615 | $ 5,870 | $ 6,126 |
| | | MB | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | SK | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | AB | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | BC-1 | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | BC-2 | $ 425 | $ 348 | $ 193 | $ 116 | $ 3,867 | $ 4,254 | $ 4,447 | $ 4,641 | $ 468 | $ 213 | $ 128 | $ 4,679 | $ 4,892 | $ 5,105 |
| | | TR | $ 638 | $ 522 | $ 290 | $ 174 | $ 5,801 | $ 6,381 | $ 6,671 | $ 6,961 | $ 702 | $ 319 | $ 191 | $ 7,019 | $ 7,338 | $ 7,657 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Guiderail | Concrete barrier (m) | NL | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 980 | $ - | $ - | $ - | $ 2,859 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 980 | $ - | $ - | $ - | $ 2,859 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 1,635 | $ - | $ - | $ - | $ 4,769 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 1,797 | $ - | $ - | $ - | $ 5,241 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 1,143 | $ - | $ - | $ - | $ 3,335 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 817 | $ - | $ - | $ - | $ 2,382 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 817 | $ - | $ - | $ - | $ 2,382 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 1,634 | $ - | $ - | $ - | $ 4,764 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Guiderail | Steel guiderail (m) | NL | $ 77 | $ 1,021 | $ 817 | $ 408 | $ 61 | $ 128 | $ 102 | $ 51 | $ 1,123 | $ 898 | $ 449 | $ 70 | $ 56 | $ 28 |
| | | PE | $ 13 | $ 408 | $ 82 | $ 41 | $ 10 | $ 51 | $ 10 | $ 5 | $ 449 | $ 90 | $ 45 | $ 28 | $ 6 | $ 3 |
| | | NS | $ 77 | $ 1,021 | $ 817 | $ 408 | $ 61 | $ 128 | $ 102 | $ 51 | $ 1,123 | $ 898 | $ 449 | $ 70 | $ 56 | $ 28 |
| | | NB | $ 51 | $ 817 | $ 817 | $ 408 | $ 41 | $ 102 | $ 102 | $ 51 | $ 898 | $ 898 | $ 449 | $ 56 | $ 56 | $ 28 |
| | | QC-1 | $ 39 | $ 621 | $ 621 | $ - | $ 33 | $ 78 | $ 78 | $ - | $ 898 | $ 898 | $ 449 | $ 56 | $ 56 | $ 28 |
| | | QC-2 | $ 39 | $ 621 | $ 621 | $ - | $ 33 | $ 78 | $ 78 | $ - | $ 898 | $ 898 | $ 449 | $ 56 | $ 56 | $ 28 |
| | | ON-1 | $ 45 | $ 719 | $ 719 | $ 359 | $ 36 | $ 90 | $ 90 | $ 45 | $ 790 | $ 790 | $ 395 | $ 49 | $ 49 | $ 25 |
| | | ON-2 | $ 71 | $ 953 | $ 762 | $ 381 | $ 57 | $ 119 | $ 95 | $ 48 | $ 1,048 | $ 839 | $ 419 | $ 66 | $ 52 | $ 26 |
| | | MB | $ 13 | $ 403 | $ 81 | $ 40 | $ 10 | $ 50 | $ 10 | $ 5 | $ 443 | $ 89 | $ 44 | $ 28 | $ 6 | $ 3 |
| | | SK | $ 13 | $ 408 | $ 82 | $ 41 | $ 10 | $ 51 | $ 10 | $ 5 | $ 449 | $ 90 | $ 45 | $ 28 | $ 6 | $ 3 |
| | | AB | $ 13 | $ 408 | $ 82 | $ 41 | $ 10 | $ 51 | $ 10 | $ 5 | $ 449 | $ 90 | $ 45 | $ 28 | $ 6 | $ 3 |
| | | BC-1 | $ 51 | $ 817 | $ 817 | $ 408 | $ 41 | $ 102 | $ 102 | $ 51 | $ 898 | $ 898 | $ 449 | $ 56 | $ 56 | $ 28 |
| | | BC-2 | $ 102 | $ 1,634 | $ 817 | $ 408 | $ 82 | $ 204 | $ 102 | $ 51 | $ 1,348 | $ 898 | $ 449 | $ 84 | $ 56 | $ 28 |
| | | TR | $ 510 | $ 6,806 | $ 5,445 | $ 2,723 | $ 408 | $ 851 | $ 681 | $ 340 | $ 7,487 | $ 5,990 | $ 2,995 | $ 468 | $ 374 | $ 187 |
| Guiderail | 3-Cable guide rail (m) | NL | $ - | $ 332 | $ 204 | $ 102 | $ - | $ - | $ - | $ - | $ 253 | $ 157 | $ 79 | $ - | $ 11 | $ 34 |
| | | PE | $ - | $ 53 | $ 20 | $ 10 | $ - | $ - | $ - | $ - | $ 51 | $ 16 | $ 8 | $ - | $ 1 | $ 3 |
| | | NS | $ - | $ 332 | $ 204 | $ 102 | $ - | $ - | $ - | $ - | $ 253 | $ 157 | $ 79 | $ - | $ 11 | $ 34 |
| | | NB | $ - | $ 265 | $ 204 | $ 102 | $ - | $ - | $ - | $ - | $ 202 | $ 157 | $ 79 | $ - | $ 11 | $ 34 |
| | | QC-1 | $ - | $ 708 | $ 545 | $ 272 | $ - | $ - | $ - | $ - | $ 208 | $ 161 | $ 81 | $ - | $ 12 | $ 35 |
| | | QC-2 | $ - | $ 708 | $ 545 | $ 272 | $ - | $ - | $ - | $ - | $ 208 | $ 161 | $ 81 | $ - | $ 12 | $ 35 |
| | | ON-1 | $ - | $ 273 | $ 210 | $ 105 | $ - | $ - | $ - | $ - | $ 208 | $ 161 | $ 81 | $ - | $ 12 | $ 35 |
| | | ON-2 | $ - | $ 398 | $ 245 | $ 123 | $ - | $ - | $ - | $ - | $ 303 | $ 189 | $ 94 | $ - | $ 13 | $ 40 |
| | | MB | $ - | $ 53 | $ 20 | $ 10 | $ - | $ - | $ - | $ - | $ 51 | $ 16 | $ 8 | $ - | $ 1 | $ 3 |
| | | SK | $ - | $ 53 | $ 20 | $ 10 | $ - | $ - | $ - | $ - | $ 51 | $ 16 | $ 8 | $ - | $ 1 | $ 3 |
| | | AB | $ - | $ 53 | $ 20 | $ 10 | $ - | $ - | $ - | $ - | $ 51 | $ 16 | $ 8 | $ - | $ 1 | $ 3 |
| | | BC-1 | $ - | $ 265 | $ 204 | $ 102 | $ - | $ - | $ - | $ - | $ 202 | $ 157 | $ 79 | $ - | $ 11 | $ 34 |
| | | BC-2 | $ - | $ 531 | $ 204 | $ 102 | $ - | $ - | $ - | $ - | $ 303 | $ 157 | $ 79 | $ - | $ 11 | $ 34 |
| | | TR | $ - | $ 1,659 | $ 1,021 | $ 510 | $ - | $ - | $ - | $ - | $ 1,263 | $ 786 | $ 393 | $ - | $ 56 | $ 168 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Fencing & gates | Chain link fence (m) | NL | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 61 | $ - | $ - | $ - | $ 1,225 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 61 | $ - | $ - | $ - | $ 1,225 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 91 | $ - | $ - | $ - | $ 1,815 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 143 | $ - | $ - | $ - | $ 2,870 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 102 | $ - | $ - | $ - | $ 2,042 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 123 | $ - | $ - | $ - | $ 2,450 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 123 | $ - | $ - | $ - | $ 2,450 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 61 | $ - | $ - | $ - | $ 1,225 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fencing & gates | Wire fence (m) | NL | $ 286 | $ - | $ - | $ - | $ 24 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 286 | $ - | $ - | $ - | $ 24 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 286 | $ - | $ - | $ - | $ 24 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 286 | $ - | $ - | $ - | $ 24 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 490 | $ - | $ - | $ - | $ 41 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 490 | $ - | $ - | $ - | $ 41 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 349 | $ - | $ - | $ - | $ 29 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 535 | $ - | $ - | $ - | $ 45 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 163 | $ - | $ - | $ - | $ 14 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 143 | $ - | $ - | $ - | $ 12 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 286 | $ - | $ - | $ - | $ 24 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 613 | $ - | $ - | $ - | $ 51 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 613 | $ - | $ - | $ - | $ 51 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 613 | $ - | $ - | $ - | $ 51 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Lighting | High mast (each) | NL | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ 2,599 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ 2,599 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ 9,627 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ 9,421 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ 9,745 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Lighting | Standard (each) | NL | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | PE | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | NS | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | NB | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | QC-1 | $ 181 | $ 362 | $ 724 | $ - | $ 905 | $ 1,810 | $ 1,448 | $ - | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | QC-2 | $ 181 | $ 362 | $ 724 | $ - | $ 905 | $ 1,810 | $ 1,448 | $ - | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | ON-1 | $ 120 | $ 241 | $ 361 | $ 482 | $ 542 | $ 963 | $ 723 | $ 723 | $ 530 | $ 662 | $ 265 | $ 1,325 | $ 1,060 | $ 795 |
| | | ON-2 | $ 121 | $ 241 | $ 362 | $ 483 | $ 543 | $ 965 | $ 724 | $ 724 | $ 531 | $ 664 | $ 265 | $ 1,327 | $ 1,062 | $ 796 |
| | | MB | $ 186 | $ 371 | $ 557 | $ 743 | $ 835 | $ 1,485 | $ 1,114 | $ 1,114 | $ 817 | $ 1,021 | $ 408 | $ 2,042 | $ 1,634 | $ 1,225 |
| | | SK | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | AB | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | BC-1 | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | BC-2 | $ 139 | $ 278 | $ 418 | $ 557 | $ 626 | $ 1,114 | $ 835 | $ 835 | $ 613 | $ 766 | $ 306 | $ 1,531 | $ 1,225 | $ 919 |
| | | TR | $ 232 | $ 464 | $ 696 | $ 928 | $ 1,044 | $ 1,856 | $ 1,392 | $ 1,392 | $ 1,021 | $ 1,276 | $ 510 | $ 2,552 | $ 2,042 | $ 1,531 |
| Painting of traffic lanes (m) | | NL | $ 257 | $ 338 | $ 241 | $ 225 | $ 257 | $ 116 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | PE | $ 257 | $ 282 | $ 241 | $ 225 | $ 257 | $ 97 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | NS | $ 257 | $ 338 | $ 241 | $ 225 | $ 257 | $ 116 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | NB | $ 257 | $ 282 | $ 241 | $ 225 | $ 257 | $ 97 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | QC-1 | $ 103 | $ 113 | $ 97 | $ 90 | $ 103 | $ 39 | $ 35 | $ 32 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | QC-2 | $ 103 | $ 113 | $ 97 | $ 90 | $ 103 | $ 39 | $ 35 | $ 32 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | ON-1 | $ 234 | $ 256 | $ 220 | $ 205 | $ 234 | $ 88 | $ 81 | $ 73 | $ 225 | $ 193 | $ 161 | $ 97 | $ 89 | $ 89 |
| | | ON-2 | $ 265 | $ 348 | $ 249 | $ 232 | $ 265 | $ 119 | $ 91 | $ 83 | $ 255 | $ 219 | $ 182 | $ 109 | $ 100 | $ 100 |
| | | MB | $ 257 | $ 282 | $ 241 | $ 225 | $ 257 | $ 97 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | SK | $ 257 | $ 282 | $ 241 | $ 225 | $ 257 | $ 97 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | AB | $ 257 | $ 282 | $ 241 | $ 225 | $ 257 | $ 97 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | BC-1 | $ 257 | $ 282 | $ 241 | $ 225 | $ 257 | $ 97 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | BC-2 | $ 257 | $ 422 | $ 241 | $ 225 | $ 257 | $ 145 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| | | TR | $ 257 | $ 338 | $ 241 | $ 225 | $ 257 | $ 116 | $ 88 | $ 80 | $ 248 | $ 212 | $ 177 | $ 106 | $ 97 | $ 97 |
| Total of All Other Roadway Infrastructure | | NL | $ 108,250 | $ 70,813 | $ 31,153 | $ 15,150 | $ 115,829 | $ 76,560 | $ 44,640 | $ 24,878 | $ 76,047 | $ 27,340 | $ 13,592 | $ 81,556 | $ 38,833 | $ 23,194 |
| | | PE | $ 16,180 | $ 9,404 | $ 7,168 | $ 4,774 | $ 27,231 | $ 17,891 | $ 18,504 | $ 15,593 | $ 8,040 | $ 6,529 | $ 4,540 | $ 17,371 | $ 18,180 | $ 16,145 |
| | | NS | $ 108,250 | $ 70,813 | $ 31,153 | $ 15,150 | $ 115,829 | $ 76,560 | $ 44,640 | $ 24,878 | $ 76,047 | $ 27,340 | $ 13,592 | $ 81,556 | $ 38,833 | $ 23,194 |
| | | NB | $ 51,946 | $ 37,566 | $ 23,631 | $ 13,556 | $ 54,608 | $ 41,958 | $ 34,265 | $ 20,014 | $ 24,648 | $ 18,939 | $ 12,205 | $ 29,612 | $ 28,216 | $ 20,446 |
| | | QC-1 | $ 38,231 | $ 27,358 | $ 19,004 | $ 8,714 | $ 38,160 | $ 30,144 | $ 28,582 | $ 12,154 | $ 24,654 | $ 18,943 | $ 12,207 | $ 29,612 | $ 28,216 | $ 20,447 |
| | | QC-2 | $ 38,231 | $ 27,358 | $ 19,004 | $ 8,714 | $ 38,160 | $ 30,144 | $ 28,582 | $ 12,154 | $ 24,654 | $ 18,943 | $ 12,207 | $ 29,612 | $ 28,216 | $ 20,447 |
| | | ON-1 | $ 55,167 | $ 39,989 | $ 26,028 | $ 13,807 | $ 57,187 | $ 44,220 | $ 37,605 | $ 20,111 | $ 27,386 | $ 20,385 | $ 12,140 | $ 32,104 | $ 30,180 | $ 20,557 |
| | | ON-2 | $ 165,259 | $ 107,179 | $ 42,891 | $ 19,810 | $ 171,901 | $ 113,020 | $ 59,548 | $ 30,969 | $ 112,035 | $ 38,618 | $ 17,396 | $ 116,887 | $ 52,377 | $ 28,083 |
| | | MB | $ 11,569 | $ 6,920 | $ 5,221 | $ 3,895 | $ 20,912 | $ 14,365 | $ 14,740 | $ 13,432 | $ 6,219 | $ 4,764 | $ 3,610 | $ 14,536 | $ 14,909 | $ 13,990 |
| | | SK | $ 10,363 | $ 5,973 | $ 4,655 | $ 3,880 | $ 21,363 | $ 14,364 | $ 14,832 | $ 14,482 | $ 5,552 | $ 4,344 | $ 3,694 | $ 14,798 | $ 15,437 | $ 15,246 |
| | | AB | $ 12,408 | $ 7,213 | $ 5,595 | $ 4,333 | $ 23,209 | $ 15,512 | $ 16,033 | $ 14,942 | $ 6,480 | $ 5,149 | $ 4,103 | $ 15,632 | $ 16,307 | $ 15,568 |
| | | BC-1 | $ 54,988 | $ 40,895 | $ 27,436 | $ 18,373 | $ 57,563 | $ 45,862 | $ 38,562 | $ 24,054 | $ 27,959 | $ 22,999 | $ 17,665 | $ 34,320 | $ 32,340 | $ 24,681 |
| | | BC-2 | $ 289,456 | $ 168,692 | $ 72,805 | $ 30,292 | $ 298,935 | $ 173,921 | $ 92,140 | $ 40,562 | $ 61,716 | $ 47,400 | $ 20,897 | $ 68,257 | $ 59,473 | $ 29,962 |
| | | TR | $ 221,432 | $ 153,227 | $ 72,361 | $ 37,493 | $ 232,514 | $ 156,899 | $ 92,052 | $ 47,844 | $ 166,519 | $ 63,403 | $ 35,527 | $ 170,760 | $ 77,911 | $ 45,224 |

All Other Road Infrastructure.xls – M&R Costs Annualized

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Clearing and grubbing ($m^2$) | | NL | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Grading | Material moved ($m^3$) | NL | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Grading | Rock % of material moved (%) | NL | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Land-scaping | Sodding & top soil ($m^2$) | NL | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Land-scaping | Top soil ($m^2$) | NL | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Drainage | Curb and gutter (PCC, Straight) (m) | NL | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | PE | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | NS | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | NB | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | QC-1 | $ 28 | $ 39 | $ 50 | $ 61 | $ 894 | $ 1,006 | $ 1,062 | $ 1,118 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | QC-2 | $ 28 | $ 39 | $ 50 | $ 61 | $ 894 | $ 1,006 | $ 1,062 | $ 1,118 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | ON-1 | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | ON-2 | $ 37 | $ 52 | $ 67 | $ 81 | $ 1,185 | $ 1,333 | $ 1,407 | $ 1,481 | $ 57 | $ 73 | $ 90 | $ 1,467 | $ 1,548 | $ 1,629 |
| | | MB | $ 27 | $ 38 | $ 49 | $ 60 | $ 869 | $ 977 | $ 1,032 | $ 1,086 | $ 42 | $ 54 | $ 66 | $ 1,075 | $ 1,135 | $ 1,195 |
| | | SK | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | AB | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | BC-1 | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | BC-2 | $ 34 | $ 47 | $ 61 | $ 74 | $ 1,077 | $ 1,212 | $ 1,279 | $ 1,347 | $ 52 | $ 67 | $ 81 | $ 1,333 | $ 1,407 | $ 1,481 |
| | | TR | $ 50 | $ 71 | $ 91 | $ 111 | $ 1,616 | $ 1,818 | $ 1,919 | $ 2,020 | $ 78 | $ 100 | $ 122 | $ 2,000 | $ 2,111 | $ 2,222 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Drainage | 500 mm Pipe culvert & end sections (m) | NL | $ 13 | $ 63 | $ 189 | $ 314 | $ 6 | $ 31 | $ 94 | $ 157 | $ 83 | $ 249 | $ 415 | $ 42 | $ 125 | $ 208 |
| | | PE | $ 5 | $ 25 | $ 75 | $ 126 | $ 3 | $ 13 | $ 38 | $ 63 | $ 33 | $ 100 | $ 166 | $ 17 | $ 50 | $ 83 |
| | | NS | $ 13 | $ 63 | $ 189 | $ 314 | $ 6 | $ 31 | $ 94 | $ 157 | $ 83 | $ 249 | $ 415 | $ 42 | $ 125 | $ 208 |
| | | NB | $ 13 | $ 63 | $ 189 | $ 314 | $ 6 | $ 31 | $ 94 | $ 157 | $ 83 | $ 249 | $ 415 | $ 42 | $ 125 | $ 208 |
| | | QC-1 | $ 51 | $ 29 | $ 20 | $ - | $ 35 | $ 29 | $ 13 | $ - | $ 83 | $ 249 | $ 415 | $ 42 | $ 125 | $ 208 |
| | | QC-2 | $ 51 | $ 29 | $ 20 | $ - | $ 35 | $ 29 | $ 13 | $ - | $ 83 | $ 249 | $ 415 | $ 42 | $ 125 | $ 208 |
| | | ON-1 | $ 11 | $ 56 | $ 169 | $ 282 | $ 6 | $ 28 | $ 85 | $ 141 | $ 75 | $ 224 | $ 373 | $ 37 | $ 112 | $ 186 |
| | | ON-2 | $ 14 | $ 70 | $ 210 | $ 350 | $ 7 | $ 35 | $ 105 | $ 175 | $ 92 | $ 277 | $ 462 | $ 46 | $ 139 | $ 231 |
| | | MB | $ 2 | $ 10 | $ 30 | $ 51 | $ 1 | $ 5 | $ 15 | $ 25 | $ 13 | $ 40 | $ 67 | $ 7 | $ 20 | $ 33 |
| | | SK | $ 3 | $ 13 | $ 38 | $ 63 | $ 1 | $ 6 | $ 19 | $ 31 | $ 17 | $ 50 | $ 83 | $ 8 | $ 25 | $ 42 |
| | | AB | $ 3 | $ 15 | $ 45 | $ 75 | $ 2 | $ 8 | $ 23 | $ 38 | $ 20 | $ 60 | $ 100 | $ 10 | $ 30 | $ 50 |
| | | BC-1 | $ 25 | $ 126 | $ 377 | $ 629 | $ 13 | $ 63 | $ 189 | $ 314 | $ 166 | $ 498 | $ 830 | $ 83 | $ 249 | $ 415 |
| | | BC-2 | $ 25 | $ 126 | $ 377 | $ 629 | $ 13 | $ 63 | $ 189 | $ 314 | $ 166 | $ 498 | $ 830 | $ 83 | $ 249 | $ 415 |
| | | TR | $ 62 | $ 312 | $ 936 | $ 1,560 | $ 31 | $ 156 | $ 468 | $ 780 | $ 412 | $ 1,235 | $ 2,059 | $ 206 | $ 618 | $ 1,029 |
| Drainage | 1500 mm Wide box culvert (m) | NL | $ 226 | $ 169 | $ 113 | $ 113 | $ 113 | $ 85 | $ 56 | $ 56 | $ 174 | $ 112 | $ 112 | $ 87 | $ 62 | $ 50 |
| | | PE | $ 113 | $ 85 | $ 56 | $ 56 | $ 56 | $ 42 | $ 28 | $ 28 | $ 87 | $ 56 | $ 56 | $ 43 | $ 31 | $ 25 |
| | | NS | $ 226 | $ 169 | $ 113 | $ 113 | $ 113 | $ 85 | $ 56 | $ 56 | $ 174 | $ 112 | $ 112 | $ 87 | $ 62 | $ 50 |
| | | NB | $ 226 | $ 169 | $ 113 | $ 113 | $ 113 | $ 85 | $ 56 | $ 56 | $ 174 | $ 112 | $ 112 | $ 87 | $ 62 | $ 50 |
| | | QC-1 | $ 142 | $ 120 | $ 98 | $ - | $ 65 | $ 76 | $ 218 | $ - | $ 174 | $ 112 | $ 112 | $ 87 | $ 62 | $ 50 |
| | | QC-2 | $ 142 | $ 120 | $ 98 | $ - | $ 65 | $ 76 | $ 218 | $ - | $ 174 | $ 112 | $ 112 | $ 87 | $ 62 | $ 50 |
| | | ON-1 | $ 231 | $ 173 | $ 115 | $ 115 | $ 115 | $ 87 | $ 58 | $ 58 | $ 178 | $ 114 | $ 114 | $ 89 | $ 63 | $ 51 |
| | | ON-2 | $ 256 | $ 192 | $ 128 | $ 128 | $ 128 | $ 96 | $ 64 | $ 64 | $ 197 | $ 127 | $ 127 | $ 98 | $ 70 | $ 56 |
| | | MB | $ 150 | $ 113 | $ 75 | $ 75 | $ 75 | $ 56 | $ 38 | $ 38 | $ 116 | $ 74 | $ 74 | $ 58 | $ 41 | $ 33 |
| | | SK | $ 150 | $ 113 | $ 75 | $ 75 | $ 75 | $ 56 | $ 38 | $ 38 | $ 116 | $ 74 | $ 74 | $ 58 | $ 41 | $ 33 |
| | | AB | $ 150 | $ 113 | $ 75 | $ 75 | $ 75 | $ 56 | $ 38 | $ 38 | $ 116 | $ 74 | $ 74 | $ 58 | $ 41 | $ 33 |
| | | BC-1 | $ 451 | $ 338 | $ 226 | $ 226 | $ 226 | $ 169 | $ 113 | $ 113 | $ 347 | $ 223 | $ 223 | $ 174 | $ 124 | $ 99 |
| | | BC-2 | $ 226 | $ 169 | $ 113 | $ 113 | $ 113 | $ 85 | $ 56 | $ 56 | $ 174 | $ 112 | $ 112 | $ 87 | $ 62 | $ 50 |
| | | TR | $ 451 | $ 338 | $ 226 | $ 226 | $ 226 | $ 169 | $ 113 | $ 113 | $ 347 | $ 223 | $ 223 | $ 174 | $ 124 | $ 99 |
| Drainage | Storm water sewers for 2-Lane road (m) | NL | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | PE | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | NS | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | NB | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | QC-1 | $ 12 | $ 10 | $ 6 | $ - | $ 110 | $ 121 | $ 128 | $ - | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | QC-2 | $ 12 | $ 10 | $ 6 | $ - | $ 110 | $ 121 | $ 128 | $ - | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | ON-1 | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | ON-2 | $ 28 | $ 23 | $ 13 | $ 8 | $ 252 | $ 277 | $ 290 | $ 302 | $ 30 | $ 14 | $ 8 | $ 305 | $ 319 | $ 333 |
| | | MB | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | SK | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | AB | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | BC-1 | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | BC-2 | $ 23 | $ 19 | $ 10 | $ 6 | $ 210 | $ 231 | $ 241 | $ 252 | $ 25 | $ 12 | $ 7 | $ 254 | $ 266 | $ 277 |
| | | TR | $ 35 | $ 28 | $ 16 | $ 9 | $ 315 | $ 346 | $ 362 | $ 378 | $ 38 | $ 17 | $ 10 | $ 381 | $ 398 | $ 416 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Guiderail | Concrete barrier (m) | NL | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 53 | $ - | $ - | $ - | $ 155 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 53 | $ - | $ - | $ - | $ 155 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 98 | $ - | $ - | $ - | $ 285 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 62 | $ - | $ - | $ - | $ 181 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 44 | $ - | $ - | $ - | $ 129 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 44 | $ - | $ - | $ - | $ 129 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 89 | $ - | $ - | $ - | $ 259 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Guiderail | Steel guiderail (m) | NL | $ 22 | $ 293 | $ 235 | $ 117 | $ 18 | $ 37 | $ 29 | $ 15 | $ 323 | $ 258 | $ 129 | $ 20 | $ 16 | $ 8 |
| | | PE | $ 4 | $ 117 | $ 23 | $ 12 | $ 3 | $ 15 | $ 3 | $ 1 | $ 129 | $ 26 | $ 13 | $ 8 | $ 2 | $ 1 |
| | | NS | $ 22 | $ 293 | $ 235 | $ 117 | $ 18 | $ 37 | $ 29 | $ 15 | $ 323 | $ 258 | $ 129 | $ 20 | $ 16 | $ 8 |
| | | NB | $ 15 | $ 235 | $ 235 | $ 117 | $ 12 | $ 29 | $ 29 | $ 15 | $ 258 | $ 258 | $ 129 | $ 16 | $ 16 | $ 8 |
| | | QC-1 | $ 11 | $ 178 | $ 178 | $ - | $ 9 | $ 23 | $ 23 | $ - | $ 258 | $ 258 | $ 129 | $ 16 | $ 16 | $ 8 |
| | | QC-2 | $ 11 | $ 178 | $ 178 | $ - | $ 9 | $ 23 | $ 23 | $ - | $ 258 | $ 258 | $ 129 | $ 16 | $ 16 | $ 8 |
| | | ON-1 | $ 13 | $ 206 | $ 206 | $ 103 | $ 10 | $ 26 | $ 26 | $ 13 | $ 227 | $ 227 | $ 114 | $ 14 | $ 14 | $ 7 |
| | | ON-2 | $ 21 | $ 274 | $ 219 | $ 110 | $ 16 | $ 34 | $ 27 | $ 14 | $ 301 | $ 241 | $ 120 | $ 19 | $ 15 | $ 8 |
| | | MB | $ 4 | $ 116 | $ 23 | $ 12 | $ 3 | $ 14 | $ 3 | $ 1 | $ 127 | $ 25 | $ 13 | $ 8 | $ 2 | $ 1 |
| | | SK | $ 4 | $ 117 | $ 23 | $ 12 | $ 3 | $ 15 | $ 3 | $ 1 | $ 129 | $ 26 | $ 13 | $ 8 | $ 2 | $ 1 |
| | | AB | $ 4 | $ 117 | $ 23 | $ 12 | $ 3 | $ 15 | $ 3 | $ 1 | $ 129 | $ 26 | $ 13 | $ 8 | $ 2 | $ 1 |
| | | BC-1 | $ 15 | $ 235 | $ 235 | $ 117 | $ 12 | $ 29 | $ 29 | $ 15 | $ 258 | $ 258 | $ 129 | $ 16 | $ 16 | $ 8 |
| | | BC-2 | $ 29 | $ 469 | $ 235 | $ 117 | $ 23 | $ 59 | $ 29 | $ 15 | $ 387 | $ 258 | $ 129 | $ 24 | $ 16 | $ 8 |
| | | TR | $ 147 | $ 1,955 | $ 1,564 | $ 782 | $ 117 | $ 244 | $ 196 | $ 98 | $ 2,151 | $ 1,721 | $ 860 | $ 134 | $ 108 | $ 54 |
| Guiderail | 3-Cable guide rail (m) | NL | $ - | $ 136 | $ 84 | $ 42 | $ - | $ - | $ - | $ - | $ 103 | $ 64 | $ 32 | $ - | $ 5 | $ 14 |
| | | PE | $ - | $ 22 | $ 8 | $ 4 | $ - | $ - | $ - | $ - | $ 21 | $ 6 | $ 3 | $ - | $ 0 | $ 1 |
| | | NS | $ - | $ 136 | $ 84 | $ 42 | $ - | $ - | $ - | $ - | $ 103 | $ 64 | $ 32 | $ - | $ 5 | $ 14 |
| | | NB | $ - | $ 109 | $ 84 | $ 42 | $ - | $ - | $ - | $ - | $ 83 | $ 64 | $ 32 | $ - | $ 5 | $ 14 |
| | | QC-1 | $ - | $ 290 | $ 223 | $ 111 | $ - | $ - | $ - | $ - | $ 85 | $ 66 | $ 33 | $ - | $ 5 | $ 14 |
| | | QC-2 | $ - | $ 290 | $ 223 | $ 111 | $ - | $ - | $ - | $ - | $ 85 | $ 66 | $ 33 | $ - | $ 5 | $ 14 |
| | | ON-1 | $ - | $ 111 | $ 86 | $ 43 | $ - | $ - | $ - | $ - | $ 85 | $ 66 | $ 33 | $ - | $ 5 | $ 14 |
| | | ON-2 | $ - | $ 163 | $ 100 | $ 50 | $ - | $ - | $ - | $ - | $ 124 | $ 77 | $ 39 | $ - | $ 6 | $ 17 |
| | | MB | $ - | $ 22 | $ 8 | $ 4 | $ - | $ - | $ - | $ - | $ 21 | $ 6 | $ 3 | $ - | $ 0 | $ 1 |
| | | SK | $ - | $ 22 | $ 8 | $ 4 | $ - | $ - | $ - | $ - | $ 21 | $ 6 | $ 3 | $ - | $ 0 | $ 1 |
| | | AB | $ - | $ 22 | $ 8 | $ 4 | $ - | $ - | $ - | $ - | $ 21 | $ 6 | $ 3 | $ - | $ 0 | $ 1 |
| | | BC-1 | $ - | $ 109 | $ 84 | $ 42 | $ - | $ - | $ - | $ - | $ 83 | $ 64 | $ 32 | $ - | $ 5 | $ 14 |
| | | BC-2 | $ - | $ 217 | $ 84 | $ 42 | $ - | $ - | $ - | $ - | $ 124 | $ 64 | $ 32 | $ - | $ 5 | $ 14 |
| | | TR | $ - | $ 679 | $ 418 | $ 209 | $ - | $ - | $ - | $ - | $ 517 | $ 322 | $ 161 | $ - | $ 23 | $ 69 |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Fencing & gates | Chain link fence (m) | NL | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 18 | $ - | $ - | $ - | $ 352 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 18 | $ - | $ - | $ - | $ 352 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 26 | $ - | $ - | $ - | $ 521 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 41 | $ - | $ - | $ - | $ 824 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 29 | $ - | $ - | $ - | $ 587 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 35 | $ - | $ - | $ - | $ 704 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 35 | $ - | $ - | $ - | $ 704 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 18 | $ - | $ - | $ - | $ 352 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fencing & gates | Wire fence (m) | NL | $ 82 | $ - | $ - | $ - | $ 7 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ 82 | $ - | $ - | $ - | $ 7 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ 82 | $ - | $ - | $ - | $ 7 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ 82 | $ - | $ - | $ - | $ 7 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ 141 | $ - | $ - | $ - | $ 12 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ 141 | $ - | $ - | $ - | $ 12 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ 100 | $ - | $ - | $ - | $ 8 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ 154 | $ - | $ - | $ - | $ 13 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ 47 | $ - | $ - | $ - | $ 4 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ 41 | $ - | $ - | $ - | $ 3 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ 82 | $ - | $ - | $ - | $ 7 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ 176 | $ - | $ - | $ - | $ 15 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ 176 | $ - | $ - | $ - | $ 15 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ 176 | $ - | $ - | $ - | $ 15 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Lighting | High mast (each) | NL | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | PE | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NS | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | NB | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-1 | $ - | $ - | $ - | $ - | $ 253 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | QC-2 | $ - | $ - | $ - | $ - | $ 253 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-1 | $ - | $ - | $ - | $ - | $ 936 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | ON-2 | $ - | $ - | $ - | $ - | $ 916 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | MB | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | SK | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | AB | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-1 | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | BC-2 | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | TR | $ - | $ - | $ - | $ - | $ 947 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

| Description and type of Work Item | | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Lighting | Standard (each) | NL | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | PE | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | NS | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | NB | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | QC-1 | $ 32 | $ 63 | $ 126 | $ - | $ 158 | $ 315 | $ 252 | $ - | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | QC-2 | $ 32 | $ 63 | $ 126 | $ - | $ 158 | $ 315 | $ 252 | $ - | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | ON-1 | $ 21 | $ 42 | $ 63 | $ 84 | $ 94 | $ 168 | $ 126 | $ 126 | $ 92 | $ 115 | $ 46 | $ 231 | $ 185 | $ 138 |
| | | ON-2 | $ 21 | $ 42 | $ 63 | $ 84 | $ 95 | $ 168 | $ 126 | $ 126 | $ 92 | $ 116 | $ 46 | $ 231 | $ 185 | $ 139 |
| | | MB | $ 32 | $ 65 | $ 97 | $ 129 | $ 145 | $ 259 | $ 194 | $ 194 | $ 142 | $ 178 | $ 71 | $ 356 | $ 284 | $ 213 |
| | | SK | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | AB | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | BC-1 | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | BC-2 | $ 24 | $ 48 | $ 73 | $ 97 | $ 109 | $ 194 | $ 145 | $ 145 | $ 107 | $ 133 | $ 53 | $ 267 | $ 213 | $ 160 |
| | | TR | $ 40 | $ 81 | $ 121 | $ 162 | $ 182 | $ 323 | $ 242 | $ 242 | $ 178 | $ 222 | $ 89 | $ 444 | $ 356 | $ 267 |
| Painting of traffic lanes (m) | | NL | $ 105 | $ 138 | $ 99 | $ 92 | $ 105 | $ 47 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | PE | $ 105 | $ 115 | $ 99 | $ 92 | $ 105 | $ 39 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | NS | $ 105 | $ 138 | $ 99 | $ 92 | $ 105 | $ 47 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | NB | $ 105 | $ 115 | $ 99 | $ 92 | $ 105 | $ 39 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | QC-1 | $ 42 | $ 46 | $ 39 | $ 37 | $ 42 | $ 16 | $ 14 | $ 13 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | QC-2 | $ 42 | $ 46 | $ 39 | $ 37 | $ 42 | $ 16 | $ 14 | $ 13 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | ON-1 | $ 96 | $ 105 | $ 90 | $ 84 | $ 96 | $ 36 | $ 33 | $ 30 | $ 92 | $ 79 | $ 66 | $ 40 | $ 36 | $ 36 |
| | | ON-2 | $ 108 | $ 142 | $ 102 | $ 95 | $ 108 | $ 49 | $ 37 | $ 34 | $ 104 | $ 89 | $ 75 | $ 45 | $ 41 | $ 41 |
| | | MB | $ 105 | $ 115 | $ 99 | $ 92 | $ 105 | $ 39 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | SK | $ 105 | $ 115 | $ 99 | $ 92 | $ 105 | $ 39 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | AB | $ 105 | $ 115 | $ 99 | $ 92 | $ 105 | $ 39 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | BC-1 | $ 105 | $ 115 | $ 99 | $ 92 | $ 105 | $ 39 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | BC-2 | $ 105 | $ 173 | $ 99 | $ 92 | $ 105 | $ 59 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| | | TR | $ 105 | $ 138 | $ 99 | $ 92 | $ 105 | $ 47 | $ 36 | $ 33 | $ 101 | $ 87 | $ 72 | $ 43 | $ 40 | $ 40 |
| Total of All Other Roadway Infrastructure | | NL | $ 622 | $ 865 | $ 789 | $ 759 | $ 2,381 | $ 1,643 | $ 1,737 | $ 1,860 | $ 861 | $ 848 | $ 849 | $ 1,779 | $ 1,920 | $ 2,077 |
| | | PE | $ 484 | $ 430 | $ 333 | $ 371 | $ 2,307 | $ 1,552 | $ 1,626 | $ 1,724 | $ 448 | $ 353 | $ 399 | $ 1,699 | $ 1,796 | $ 1,908 |
| | | NS | $ 622 | $ 865 | $ 789 | $ 759 | $ 2,381 | $ 1,643 | $ 1,737 | $ 1,860 | $ 861 | $ 848 | $ 849 | $ 1,779 | $ 1,920 | $ 2,077 |
| | | NB | $ 615 | $ 756 | $ 789 | $ 759 | $ 2,375 | $ 1,628 | $ 1,737 | $ 1,860 | $ 776 | $ 848 | $ 849 | $ 1,775 | $ 1,920 | $ 2,077 |
| | | QC-1 | $ 498 | $ 712 | $ 615 | $ 210 | $ 1,676 | $ 1,271 | $ 1,458 | $ 1,131 | $ 778 | $ 850 | $ 850 | $ 1,775 | $ 1,920 | $ 2,078 |
| | | QC-2 | $ 498 | $ 712 | $ 615 | $ 210 | $ 1,676 | $ 1,271 | $ 1,458 | $ 1,131 | $ 778 | $ 850 | $ 850 | $ 1,775 | $ 1,920 | $ 2,078 |
| | | ON-1 | $ 623 | $ 718 | $ 738 | $ 708 | $ 2,303 | $ 1,619 | $ 1,722 | $ 1,840 | $ 734 | $ 788 | $ 788 | $ 1,767 | $ 1,903 | $ 2,053 |
| | | ON-2 | $ 756 | $ 915 | $ 838 | $ 822 | $ 2,818 | $ 1,824 | $ 1,931 | $ 2,070 | $ 906 | $ 899 | $ 920 | $ 1,980 | $ 2,137 | $ 2,315 |
| | | MB | $ 450 | $ 432 | $ 295 | $ 300 | $ 2,035 | $ 1,324 | $ 1,365 | $ 1,435 | $ 446 | $ 299 | $ 302 | $ 1,445 | $ 1,504 | $ 1,580 |
| | | SK | $ 478 | $ 446 | $ 315 | $ 326 | $ 2,321 | $ 1,560 | $ 1,616 | $ 1,702 | $ 461 | $ 322 | $ 334 | $ 1,705 | $ 1,781 | $ 1,875 |
| | | AB | $ 519 | $ 448 | $ 322 | $ 339 | $ 2,324 | $ 1,561 | $ 1,620 | $ 1,708 | $ 464 | $ 332 | $ 351 | $ 1,707 | $ 1,786 | $ 1,883 |
| | | BC-1 | $ 909 | $ 989 | $ 1,091 | $ 1,186 | $ 2,490 | $ 1,744 | $ 1,888 | $ 2,073 | $ 1,033 | $ 1,209 | $ 1,376 | $ 1,904 | $ 2,106 | $ 2,334 |
| | | BC-2 | $ 698 | $ 1,220 | $ 978 | $ 1,073 | $ 2,389 | $ 1,708 | $ 1,831 | $ 2,017 | $ 1,030 | $ 1,097 | $ 1,264 | $ 1,825 | $ 2,044 | $ 2,285 |
| | | TR | $ 1,133 | $ 3,522 | $ 3,349 | $ 2,989 | $ 3,036 | $ 2,781 | $ 3,094 | $ 3,421 | $ 3,644 | $ 3,705 | $ 3,508 | $ 2,938 | $ 3,421 | $ 3,929 |

Routine and Winter Maintenance.xls – Routine Maintenance

| Description and type of Work Item | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Routine maintenace | NL | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 1,750 | $ 750 | $ 2,250 | $ 2,000 | $ 1,750 |
| | PE | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 | $ 1,850 | $ 1,750 | $ 750 | $ 2,000 | $ 1,900 | $ 1,800 |
| | NS | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | NB | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | QC-1 | $ 3,464 | $ 3,247 | $ 2,930 | $ - | $ 3,680 | $ 3,464 | $ 3,178 | $ - | $ 3,500 | $ 3,250 | $ 1,250 | $ 3,750 | $ 3,500 | $ 3,250 |
| | QC-2 | $ 3,464 | $ 3,247 | $ 2,930 | $ - | $ 3,680 | $ 3,464 | $ 3,178 | $ - | $ 3,500 | $ 3,250 | $ 1,250 | $ 3,750 | $ 3,500 | $ 3,250 |
| | ON-1 | $ 3,500 | $ 3,250 | $ 3,000 | $ 2,750 | $ 3,750 | $ 3,500 | $ 3,250 | $ 3,000 | $ 3,250 | $ 3,000 | $ 1,000 | $ 3,500 | $ 3,250 | $ 3,000 |
| | ON-2 | $ 3,250 | $ 3,000 | $ 2,750 | $ 2,500 | $ 3,500 | $ 3,250 | $ 3,000 | $ 2,750 | $ 3,000 | $ 2,750 | $ 750 | $ 3,250 | $ 3,000 | $ 2,750 |
| | MB | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | SK | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 | $ 2,000 | $ 500 | $ 250 | $ 2,500 | $ 2,250 | $ 2,000 |
| | AB | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | BC-1 | $ 3,250 | $ 3,000 | $ 2,750 | $ 2,500 | $ 3,500 | $ 3,250 | $ 3,000 | $ 2,750 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |
| | BC-2 | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 3,000 | $ 2,750 | $ 2,500 | $ 2,250 | $ 2,000 | $ 1,850 | $ 1,000 | $ 2,500 | $ 2,250 | $ 2,000 |
| | TR | $ 1,800 | $ 1,600 | $ 1,400 | $ 1,200 | $ 2,000 | $ 1,800 | $ 1,600 | $ 1,400 | $ 2,000 | $ 1,850 | $ 750 | $ 2,500 | $ 2,250 | $ 2,000 |

Note: All costs are per two lane equivalent kilometre.

Routine and Winter Maintenance.xls – Winter Maintenance

| Description and type of work item | Regions | Provincial | | | | | | | | Municipal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural | | | | Urban | | | | Rural | | | Urban | | |
| | | Freeway | Arterial | Collector | Local | Freeway | Arterial | Collector | Local | Arterial | Collector | Local | Arterial | Collector | Local |
| Winter maintenance | NL | $ 7,500 | $ 7,000 | $ 6,500 | $ 6,000 | $ 8,000 | $ 7,500 | $ 7,000 | $ 6,500 | $ 6,500 | $ 6,000 | $ 2,500 | $ 7,000 | $ 6,500 | $ 6,000 |
| | PE | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |
| | NS | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,000 | $ 5,000 | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,500 | $ 3,000 | $ 2,500 | $ 4,000 | $ 3,500 | $ 3,000 |
| | NB | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,000 | $ 5,000 | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,500 | $ 3,000 | $ 2,500 | $ 4,000 | $ 3,500 | $ 3,000 |
| | QC-1 | $ 9,334 | $ 7,468 | $ 6,101 | $ - | $ 11,201 | $ 9,334 | $ 7,168 | $ - | $ 7,500 | $ 6,500 | $ 2,500 | $ 8,500 | $ 7,500 | $ 6,500 |
| | QC-2 | $ 9,334 | $ 7,468 | $ 6,101 | $ - | $ 11,201 | $ 9,334 | $ 7,168 | $ - | $ 7,500 | $ 6,500 | $ 2,500 | $ 8,500 | $ 7,500 | $ 6,500 |
| | ON-1 | $ 6,000 | $ 5,000 | $ 4,000 | $ 4,000 | $ 6,000 | $ 5,500 | $ 5,000 | $ 5,000 | $ 4,500 | $ 3,500 | $ 2,500 | $ 5,000 | $ 4,000 | $ 3,500 |
| | ON-2 | $ 5,500 | $ 4,000 | $ 3,000 | $ 2,000 | $ 5,500 | $ 5,000 | $ 4,500 | $ 4,500 | $ 4,000 | $ 3,000 | $ 2,000 | $ 4,500 | $ 3,500 | $ 3,000 |
| | MB | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |
| | SK | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 | $ 2,500 | $ 1,500 | $ 500 | $ 3,000 | $ 3,000 | $ 2,500 |
| | AB | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,000 | $ 5,000 | $ 4,500 | $ 4,000 | $ 3,500 | $ 3,500 | $ 3,000 | $ 2,500 | $ 4,000 | $ 3,500 | $ 3,000 |
| | BC-1 | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |
| | BC-2 | $ 5,500 | $ 4,000 | $ 3,000 | $ 2,000 | $ 5,500 | $ 5,000 | $ 4,500 | $ 4,500 | $ 4,000 | $ 3,000 | $ 2,000 | $ 4,500 | $ 3,500 | $ 3,000 |
| | TR | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,500 | $ 3,000 | $ 3,000 | $ 2,500 | $ 2,500 | $ 2,500 | $ 2,000 | $ 3,000 | $ 3,000 | $ 2,500 |

Note: All costs are per two lane equivalent kilometre.

# Appendix E

# Cost Reporting Sheets

## Newfoundland and Labrador

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 17,992 | $ 18,766 | | |
| Arterial | $ 7,022 | $ 7,795 | $ 6,817 | $ 8,316 |
| Collector | $ 7,022 | $ 7,022 | $ 6,817 | $ 6,817 |
| Local | $ 4,976 | $ 5,189 | $ 1,754 | $ 5,043 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 389 | $ 1,488 | | |
| Arterial | $ 541 | $ 1,027 | $ 538 | $ 1,112 |
| Collector | $ 493 | $ 1,086 | $ 530 | $ 1,200 |
| Local | $ 474 | $ 1,162 | $ 530 | $ 1,298 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,140 | $ 3,140 | | |
| Arterial | $ 2,232 | $ 2,232 | $ 2,384 | $ 2,343 |
| Collector | $ 2,232 | $ 2,232 | $ 2,384 | $ 2,384 |
| Local | $ 2,089 | $ 2,089 | $ 330 | $ 2,287 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,513 | $ 1,650 | | |
| Arterial | $ 1,375 | $ 1,513 | $ 1,100 | $ 1,238 |
| Collector | $ 1,238 | $ 1,375 | $ 963 | $ 1,100 |
| Local | $ 1,100 | $ 1,238 | $ 413 | $ 963 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ - | $ - | | |
| Arterial | $ 1,970 | $ 1,970 | $ 1,295 | $ 1,295 |
| Collector | $ 283 | $ 283 | $ 186 | $ 186 |
| Local | $ 1,337 | $ 1,337 | $ 263 | $ 526 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 4,125 | $ 4,400 | | |
| Arterial | $ 3,850 | $ 4,125 | $ 3,575 | $ 3,850 |
| Collector | $ 3,575 | $ 3,850 | $ 3,300 | $ 3,575 |
| Local | $ 3,300 | $ 3,575 | $ 1,375 | $ 3,300 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ - | $ - | | |
| Arterial | $ 339 | $ 339 | $ 192 | $ 192 |
| Collector | $ 42 | $ 42 | $ 28 | $ 28 |
| Local | $ 301 | $ 301 | $ 39 | $ 78 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 30,445 | $ 32,577 | | |
| Arterial | $ 19,916 | $ 21,532 | $ 22,972 | $ 24,637 |
| Collector | $ 8,762 | $ 12,555 | $ 8,259 | $ 11,731 |
| Local | $ 4,261 | $ 6,997 | $ 4,106 | $ 7,006 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 57,605 | $ 62,022 | | |
| Arterial | $ 37,245 | $ 40,533 | $ 38,874 | $ 42,982 |
| Collector | $ 23,647 | $ 28,445 | $ 22,466 | $ 27,020 |
| Local | $ 17,837 | $ 21,887 | $ 8,810 | $ 20,501 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Prince Edward Island

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 14,158 | $ 13,143 | | |
| Arterial | $ 12,964 | $ 12,491 | $ 12,381 | $ 9,130 |
| Collector | $ 10,314 | $ 8,398 | $ 10,861 | $ 8,568 |
| Local | $ 6,560 | $ 7,955 | $ 2,601 | $ 8,177 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 302 | $ 1,442 | | |
| Arterial | $ 269 | $ 970 | $ 280 | $ 1,062 |
| Collector | $ 208 | $ 1,016 | $ 220 | $ 1,122 |
| Local | $ 232 | $ 1,078 | $ 249 | $ 1,193 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,080 | $ 2,080 | | |
| Arterial | $ 2,080 | $ 2,080 | $ 2,308 | $ 2,308 |
| Collector | $ 2,080 | $ 2,080 | $ 2,308 | $ 2,308 |
| Local | $ 927 | $ 2,080 | $ 318 | $ 2,308 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,513 | $ 1,650 | | |
| Arterial | $ 1,375 | $ 1,513 | $ 1,018 | $ 1,100 |
| Collector | $ 1,238 | $ 1,375 | $ 963 | $ 1,045 |
| Local | $ 1,100 | $ 1,238 | $ 413 | $ 990 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,143 | $ 3,143 | | |
| Arterial | $ 1,047 | $ 1,047 | $ 683 | $ 683 |
| Collector | $ 675 | $ - | $ 528 | $ 752 |
| Local | $ 105 | $ - | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,650 | $ 1,925 | | |
| Arterial | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Collector | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Local | $ 1,100 | $ 1,375 | $ 1,100 | $ 1,375 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 629 | $ 629 | | |
| Arterial | $ 186 | $ 186 | $ 105 | $ 105 |
| Collector | $ 120 | $ - | $ 81 | $ 115 |
| Local | $ 17 | $ - | $ 58 | $ 115 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 4,551 | $ 7,659 | | |
| Arterial | $ 2,645 | $ 5,032 | $ 2,429 | $ 5,248 |
| Collector | $ 2,016 | $ 5,204 | $ 1,972 | $ 5,492 |
| Local | $ 1,343 | $ 4,386 | $ 1,371 | $ 4,877 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 28,026 | $ 31,671 | | |
| Arterial | $ 21,941 | $ 24,969 | $ 20,578 | $ 21,285 |
| Collector | $ 18,025 | $ 19,724 | $ 18,308 | $ 21,052 |
| Local | $ 11,384 | $ 18,110 | $ 6,486 | $ 19,787 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Nova Scotia

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 18,994 | $ 19,768 | | |
| Arterial | $ 10,432 | $ 11,206 | $ 18,432 | $ 19,206 |
| Collector | $ 9,267 | $ 10,041 | $ 12,544 | $ 9,769 |
| Local | $ 4,097 | $ 5,714 | $ 2,787 | $ 8,816 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 389 | $ 1,488 | | |
| Arterial | $ 541 | $ 1,027 | $ 538 | $ 1,112 |
| Collector | $ 493 | $ 1,086 | $ 530 | $ 1,200 |
| Local | $ 474 | $ 1,162 | $ 530 | $ 1,298 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,447 | $ 3,443 | | |
| Arterial | $ 2,723 | $ 2,723 | $ 4,185 | $ 4,185 |
| Collector | $ 2,723 | $ 2,723 | $ 4,043 | $ 4,043 |
| Local | $ 1,366 | $ 2,029 | $ 351 | $ 4,043 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,513 | $ 1,650 | | |
| Arterial | $ 1,375 | $ 1,513 | $ 1,100 | $ 1,375 |
| Collector | $ 1,238 | $ 1,375 | $ 1,018 | $ 1,238 |
| Local | $ 1,100 | $ 1,238 | $ 413 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 12,497 | $ 12,497 | | |
| Arterial | $ 8,430 | $ 8,430 | $ 5,469 | $ 5,469 |
| Collector | $ 6,208 | $ 6,208 | $ 4,251 | $ 4,251 |
| Local | $ 2,284 | $ 2,284 | $ 395 | $ 789 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,475 | $ 2,750 | | |
| Arterial | $ 2,200 | $ 2,475 | $ 1,925 | $ 2,200 |
| Collector | $ 1,925 | $ 2,200 | $ 1,650 | $ 1,925 |
| Local | $ 1,650 | $ 1,925 | $ 1,375 | $ 1,650 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,076 | $ 2,076 | | |
| Arterial | $ 1,297 | $ 1,297 | $ 730 | $ 730 |
| Collector | $ 819 | $ 819 | $ 567 | $ 567 |
| Local | $ 269 | $ 269 | $ 53 | $ 105 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 30,445 | $ 32,577 | | |
| Arterial | $ 19,916 | $ 21,532 | $ 22,972 | $ 24,637 |
| Collector | $ 8,762 | $ 12,555 | $ 8,259 | $ 11,731 |
| Local | $ 4,261 | $ 6,997 | $ 4,106 | $ 7,006 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 71,837 | $ 76,249 | | |
| Arterial | $ 46,915 | $ 50,203 | $ 55,352 | $ 58,913 |
| Collector | $ 31,436 | $ 37,007 | $ 32,862 | $ 34,724 |
| Local | $ 15,502 | $ 21,618 | $ 10,010 | $ 24,808 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## New Brunswick

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 15,465 | $ 14,417 | | |
| Arterial | $ 15,248 | $ 15,248 | $ 12,153 | $ 10,045 |
| Collector | $ 8,960 | $ 10,994 | $ 9,081 | $ 8,112 |
| Local | $ 6,214 | $ 10,612 | $ 2,643 | $ 7,733 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 384 | $ 1,485 | | |
| Arterial | $ 473 | $ 1,017 | $ 485 | $ 1,109 |
| Collector | $ 493 | $ 1,086 | $ 530 | $ 1,200 |
| Local | $ 474 | $ 1,162 | $ 530 | $ 1,298 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,691 | $ 1,691 | | |
| Arterial | $ 1,691 | $ 2,519 | $ 1,715 | $ 1,849 |
| Collector | $ 1,215 | $ 2,519 | $ 1,715 | $ 1,849 |
| Local | $ 1,215 | $ 2,519 | $ 289 | $ 1,849 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 990 | $ 1,100 | | |
| Arterial | $ 880 | $ 990 | $ 1,100 | $ 1,375 |
| Collector | $ 770 | $ 880 | $ 1,018 | $ 1,238 |
| Local | $ 660 | $ 770 | $ 413 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 5,123 | $ 6,148 | | |
| Arterial | $ 4,150 | $ 4,150 | $ 2,706 | $ 2,706 |
| Collector | $ 3,074 | $ 3,842 | $ 2,406 | $ 3,007 |
| Local | $ 1,665 | $ 1,166 | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,475 | $ 2,750 | | |
| Arterial | $ 2,200 | $ 2,475 | $ 1,925 | $ 2,200 |
| Collector | $ 1,925 | $ 2,200 | $ 1,650 | $ 1,925 |
| Local | $ 1,650 | $ 1,925 | $ 1,375 | $ 1,650 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,025 | $ 1,230 | | |
| Arterial | $ 738 | $ 738 | $ 431 | $ 431 |
| Collector | $ 547 | $ 683 | $ 383 | $ 478 |
| Local | $ 273 | $ 191 | $ 60 | $ 120 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 14,610 | $ 15,358 | | |
| Arterial | $ 10,566 | $ 11,801 | $ 7,446 | $ 8,945 |
| Collector | $ 6,646 | $ 9,637 | $ 5,721 | $ 8,523 |
| Local | $ 3,813 | $ 5,629 | $ 3,687 | $ 6,176 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 41,763 | $ 44,179 | | |
| Arterial | $ 35,946 | $ 38,939 | $ 27,961 | $ 28,661 |
| Collector | $ 23,631 | $ 31,842 | $ 22,503 | $ 26,332 |
| Local | $ 15,964 | $ 23,974 | $ 9,373 | $ 20,679 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Quebec - Champlain Plain

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 25,522 | $ 27,592 | | |
| Arterial | $ 16,602 | $ 18,339 | $ 11,889 | $ 12,651 |
| Collector | $ 13,843 | $ 17,849 | $ 10,041 | $ 8,528 |
| Local | $ 9,573 | $ 14,894 | $ 2,494 | $ 8,011 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 311 | $ 1,047 | | |
| Arterial | $ 445 | $ 794 | $ 486 | $ 1,109 |
| Collector | $ 384 | $ 911 | $ 531 | $ 1,200 |
| Local | $ 131 | $ 707 | $ 531 | $ 1,299 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,451 | $ 3,613 | | |
| Arterial | $ 2,973 | $ 3,102 | $ 2,582 | $ 2,444 |
| Collector | $ 3,440 | $ 3,956 | $ 2,521 | $ 2,500 |
| Local | $ 2,614 | $ 3,368 | $ 379 | $ 2,444 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,905 | $ 2,024 | | |
| Arterial | $ 1,786 | $ 1,905 | $ 1,925 | $ 2,063 |
| Collector | $ 1,612 | $ 1,748 | $ 1,788 | $ 1,925 |
| Local | $ - | $ - | $ 688 | $ 1,788 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 8,165 | $ 15,130 | | |
| Arterial | $ 1,921 | $ 4,803 | $ 3,759 | $ 4,135 |
| Collector | $ 2,642 | $ 3,362 | $ 2,255 | $ 2,255 |
| Local | $ 2,642 | $ 3,362 | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 5,134 | $ 6,161 | | |
| Arterial | $ 4,107 | $ 5,134 | $ 4,125 | $ 4,675 |
| Collector | $ 3,355 | $ 3,942 | $ 3,575 | $ 4,125 |
| Local | $ - | $ - | $ 1,375 | $ 3,575 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,326 | $ 2,457 | | |
| Arterial | $ 312 | $ 780 | $ 598 | $ 658 |
| Collector | $ 429 | $ 546 | $ 359 | $ 359 |
| Local | $ 429 | $ 546 | $ 60 | $ 120 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 10,752 | $ 10,733 | | |
| Arterial | $ 7,694 | $ 8,478 | $ 7,448 | $ 8,945 |
| Collector | $ 5,345 | $ 8,039 | $ 5,722 | $ 8,524 |
| Local | $ 2,451 | $ 3,418 | $ 3,688 | $ 6,177 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 56,567 | $ 68,756 | | |
| Arterial | $ 35,841 | $ 43,335 | $ 32,812 | $ 36,680 |
| Collector | $ 31,051 | $ 40,353 | $ 26,792 | $ 29,416 |
| Local | $ 17,840 | $ 26,295 | $ 9,590 | $ 24,164 |

*Note: All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Quebec - Nord

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 25,522 | $ 27,592 | | |
| Arterial | $ 16,602 | $ 18,339 | $ 11,889 | $ 12,651 |
| Collector | $ 13,843 | $ 17,849 | $ 10,041 | $ 8,528 |
| Local | $ 9,573 | $ 14,894 | $ 2,494 | $ 8,011 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 311 | $ 1,047 | | |
| Arterial | $ 445 | $ 794 | $ 486 | $ 1,109 |
| Collector | $ 384 | $ 911 | $ 531 | $ 1,200 |
| Local | $ 131 | $ 707 | $ 531 | $ 1,299 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,451 | $ 3,613 | | |
| Arterial | $ 2,973 | $ 3,102 | $ 2,582 | $ 2,444 |
| Collector | $ 3,440 | $ 3,956 | $ 2,521 | $ 2,500 |
| Local | $ 2,614 | $ 3,368 | $ 379 | $ 2,444 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,905 | $ 2,024 | | |
| Arterial | $ 1,786 | $ 1,905 | $ 1,925 | $ 2,063 |
| Collector | $ 1,612 | $ 1,748 | $ 1,788 | $ 1,925 |
| Local | $ - | $ - | $ 688 | $ 1,788 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 8,165 | $ 15,130 | | |
| Arterial | $ 1,921 | $ 4,803 | $ 3,759 | $ 4,135 |
| Collector | $ 2,642 | $ 3,362 | $ 2,255 | $ 2,255 |
| Local | $ 2,642 | $ 3,362 | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 5,134 | $ 6,161 | | |
| Arterial | $ 4,107 | $ 5,134 | $ 4,125 | $ 4,675 |
| Collector | $ 3,355 | $ 3,942 | $ 3,575 | $ 4,125 |
| Local | $ - | $ - | $ 1,375 | $ 3,575 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,326 | $ 2,457 | | |
| Arterial | $ 312 | $ 780 | $ 598 | $ 658 |
| Collector | $ 429 | $ 546 | $ 359 | $ 359 |
| Local | $ 429 | $ 546 | $ 60 | $ 120 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 10,752 | $ 10,733 | | |
| Arterial | $ 7,694 | $ 8,478 | $ 7,448 | $ 8,945 |
| Collector | $ 5,345 | $ 8,039 | $ 5,722 | $ 8,524 |
| Local | $ 2,451 | $ 3,418 | $ 3,688 | $ 6,177 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 56,567 | $ 68,756 | | |
| Arterial | $ 35,841 | $ 43,335 | $ 32,812 | $ 36,680 |
| Collector | $ 31,051 | $ 40,353 | $ 26,792 | $ 29,416 |
| Local | $ 17,840 | $ 26,295 | $ 9,590 | $ 24,164 |

*Note: All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Ontario - South

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 24,627 | $ 25,602 | | |
| Arterial | $ 14,827 | $ 16,739 | $ 14,779 | $ 18,079 |
| Collector | $ 13,436 | $ 15,590 | $ 12,146 | $ 15,209 |
| Local | $ 9,301 | $ 7,936 | $ 2,947 | $ 11,450 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,026 | $ 2,182 | | |
| Arterial | $ 3,877 | $ 3,877 | $ 2,881 | $ 2,881 |
| Collector | $ 3,686 | $ 3,478 | $ 2,155 | $ 2,155 |
| Local | $ 2,720 | $ 2,720 | $ 314 | $ 2,007 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 4,283 | $ 5,139 | | |
| Arterial | $ 3,854 | $ 3,854 | $ 2,537 | $ 2,537 |
| Collector | $ 3,426 | $ 4,283 | $ 2,255 | $ 2,819 |
| Local | $ 2,141 | $ 1,499 | $ 282 | $ 564 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 545 | $ 654 | | |
| Arterial | $ 436 | $ 436 | $ 245 | $ 245 |
| Collector | $ 315 | $ 394 | $ 218 | $ 273 |
| Local | $ 164 | $ 115 | $ 27 | $ 55 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 15,516 | $ 16,084 | | |
| Arterial | $ 11,247 | $ 12,437 | $ 8,273 | $ 9,698 |
| Collector | $ 7,320 | $ 10,576 | $ 6,158 | $ 9,117 |
| Local | $ 3,883 | $ 5,656 | $ 3,667 | $ 6,210 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 389 | $ 1,439 | | |
| Arterial | $ 449 | $ 1,012 | $ 459 | $ 1,104 |
| Collector | $ 461 | $ 1,076 | $ 493 | $ 1,190 |
| Local | $ 442 | $ 1,150 | $ 492 | $ 1,283 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,925 | $ 2,063 | | |
| Arterial | $ 1,788 | $ 1,925 | $ 1,788 | $ 1,925 |
| Collector | $ 1,650 | $ 1,788 | $ 1,650 | $ 1,788 |
| Local | $ 1,513 | $ 1,650 | $ 550 | $ 1,650 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,300 | $ 3,300 | | |
| Arterial | $ 2,750 | $ 3,025 | $ 2,475 | $ 2,750 |
| Collector | $ 2,200 | $ 2,750 | $ 1,925 | $ 2,200 |
| Local | $ 2,200 | $ 2,750 | $ 1,375 | $ 1,925 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 53,610 | $ 56,464 | | |
| Arterial | $ 39,228 | $ 43,305 | $ 33,438 | $ 39,221 |
| Collector | $ 32,494 | $ 39,935 | $ 27,000 | $ 34,750 |
| Local | $ 22,364 | $ 23,476 | $ 9,655 | $ 25,144 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Ontario - North

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 25,900 | $ 24,076 | | |
| Arterial | $ 17,867 | $ 18,907 | $ 16,639 | $ 19,809 |
| Collector | $ 17,333 | $ 17,780 | $ 13,875 | $ 17,136 |
| Local | $ 7,672 | $ 8,442 | $ 2,415 | $ 10,670 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,849 | $ 2,103 | | |
| Arterial | $ 3,627 | $ 2,001 | $ 2,621 | $ 2,621 |
| Collector | $ 3,470 | $ 2,880 | $ 2,288 | $ 2,288 |
| Local | $ 1,408 | $ 3,029 | $ 314 | $ 2,169 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 4,291 | $ 5,149 | | |
| Arterial | $ 3,862 | $ 3,862 | $ 2,503 | $ 2,503 |
| Collector | $ 3,433 | $ 4,291 | $ 2,225 | $ 2,782 |
| Local | $ 2,145 | $ 1,502 | $ 348 | $ 695 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 936 | $ 1,123 | | |
| Arterial | $ 749 | $ 749 | $ 410 | $ 410 |
| Collector | $ 541 | $ 676 | $ 365 | $ 456 |
| Local | $ 281 | $ 197 | $ 57 | $ 114 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 46,479 | $ 48,347 | | |
| Arterial | $ 30,144 | $ 31,787 | $ 33,844 | $ 35,310 |
| Collector | $ 12,063 | $ 16,748 | $ 11,666 | $ 15,822 |
| Local | $ 5,572 | $ 8,710 | $ 5,255 | $ 8,483 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 472 | $ 1,762 | | |
| Arterial | $ 572 | $ 1,140 | $ 566 | $ 1,237 |
| Collector | $ 524 | $ 1,207 | $ 562 | $ 1,336 |
| Local | $ 514 | $ 1,294 | $ 575 | $ 1,447 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,788 | $ 1,925 | | |
| Arterial | $ 1,650 | $ 1,788 | $ 1,650 | $ 1,788 |
| Collector | $ 1,513 | $ 1,650 | $ 1,513 | $ 1,650 |
| Local | $ 1,375 | $ 1,513 | $ 413 | $ 1,513 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,025 | $ 3,025 | | |
| Arterial | $ 2,200 | $ 2,750 | $ 2,200 | $ 2,475 |
| Collector | $ 1,650 | $ 2,475 | $ 1,650 | $ 1,925 |
| Local | $ 1,100 | $ 2,475 | $ 1,100 | $ 1,650 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 85,739 | $ 87,509 | | |
| Arterial | $ 60,671 | $ 62,982 | $ 60,435 | $ 66,154 |
| Collector | $ 40,526 | $ 47,706 | $ 34,143 | $ 43,395 |
| Local | $ 20,067 | $ 27,161 | $ 10,477 | $ 26,741 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Manitoba

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 15,036 | $ 14,417 | | |
| Arterial | $ 15,248 | $ 10,484 | $ 12,153 | $ 10,045 |
| Collector | $ 8,960 | $ 7,426 | $ 9,081 | $ 8,112 |
| Local | $ 6,214 | $ 7,426 | $ 1,256 | $ 7,733 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 281 | $ 1,272 | | |
| Arterial | $ 270 | $ 827 | $ 279 | $ 903 |
| Collector | $ 184 | $ 853 | $ 187 | $ 940 |
| Local | $ 187 | $ 897 | $ 189 | $ 988 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,691 | $ 1,691 | | |
| Arterial | $ 1,691 | $ 1,691 | $ 1,715 | $ 1,849 |
| Collector | $ 1,215 | $ 1,215 | $ 1,715 | $ 1,849 |
| Local | $ 1,215 | $ 1,215 | $ 132 | $ 1,849 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 990 | $ 1,100 | | |
| Arterial | $ 880 | $ 990 | $ 1,100 | $ 1,375 |
| Collector | $ 770 | $ 880 | $ 1,018 | $ 1,238 |
| Local | $ 660 | $ 770 | $ 413 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 5,453 | $ 5,453 | | |
| Arterial | $ 7,623 | $ 7,623 | $ 4,881 | $ 4,881 |
| Collector | $ 3,253 | $ 3,253 | $ 2,749 | $ 2,749 |
| Local | $ 76 | $ 76 | $ 338 | $ 677 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,650 | $ 1,925 | | |
| Arterial | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Collector | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Local | $ 1,100 | $ 1,375 | $ 1,100 | $ 1,375 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,516 | $ 2,516 | | |
| Arterial | $ 3,944 | $ 3,944 | $ 2,157 | $ 2,157 |
| Collector | $ 2,221 | $ 2,221 | $ 1,215 | $ 1,215 |
| Local | $ 62 | $ 62 | $ 149 | $ 299 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,254 | $ 5,882 | | |
| Arterial | $ 1,946 | $ 4,040 | $ 1,879 | $ 4,391 |
| Collector | $ 1,468 | $ 4,146 | $ 1,439 | $ 4,504 |
| Local | $ 1,095 | $ 3,778 | $ 1,091 | $ 4,226 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 30,872 | $ 34,256 | | |
| Arterial | $ 32,978 | $ 31,250 | $ 25,539 | $ 27,251 |
| Collector | $ 19,447 | $ 21,644 | $ 18,778 | $ 22,256 |
| Local | $ 10,609 | $ 15,598 | $ 4,668 | $ 18,247 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Saskatchewan

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 14,074 | $ 17,424 | | |
| Arterial | $ 15,992 | $ 10,950 | $ 7,098 | $ 10,514 |
| Collector | $ 7,384 | $ 7,848 | $ 1,926 | $ 8,537 |
| Local | $ 1,757 | $ 7,757 | $ 963 | $ 1,882 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 299 | $ 1,450 | | |
| Arterial | $ 278 | $ 975 | $ 288 | $ 1,066 |
| Collector | $ 197 | $ 1,010 | $ 201 | $ 1,113 |
| Local | $ 204 | $ 1,064 | $ 209 | $ 1,172 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,825 | $ 1,825 | | |
| Arterial | $ 1,825 | $ 1,825 | $ 1,643 | $ 2,010 |
| Collector | $ 1,364 | $ 1,705 | $ 1,283 | $ 2,010 |
| Local | $ 510 | $ 1,364 | $ 928 | $ 966 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 990 | $ 1,100 | | |
| Arterial | $ 880 | $ 990 | $ 1,100 | $ 1,375 |
| Collector | $ 770 | $ 880 | $ 275 | $ 1,238 |
| Local | $ 660 | $ 770 | $ 138 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,143 | $ 3,143 | | |
| Arterial | $ 1,047 | $ 1,047 | $ 683 | $ 683 |
| Collector | $ 675 | $ - | $ 528 | $ 752 |
| Local | $ 105 | $ - | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,650 | $ 1,925 | | |
| Arterial | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Collector | $ 1,375 | $ 1,650 | $ 825 | $ 1,650 |
| Local | $ 1,100 | $ 1,375 | $ 275 | $ 1,375 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 629 | $ 629 | | |
| Arterial | $ 186 | $ 186 | $ 109 | $ 109 |
| Collector | $ 120 | $ - | $ 84 | $ 120 |
| Local | $ 17 | $ - | $ 60 | $ 120 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,915 | $ 6,008 | | |
| Arterial | $ 1,680 | $ 4,040 | $ 1,677 | $ 4,470 |
| Collector | $ 1,309 | $ 4,171 | $ 1,312 | $ 4,663 |
| Local | $ 1,091 | $ 4,073 | $ 1,116 | $ 4,606 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 25,524 | $ 33,505 | | |
| Arterial | $ 23,263 | $ 21,662 | $ 13,973 | $ 21,877 |
| Collector | $ 13,193 | $ 17,265 | $ 6,433 | $ 20,083 |
| Local | $ 5,444 | $ 16,403 | $ 4,064 | $ 11,972 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Alberta

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 18,455 | $ 18,244 | | |
| Arterial | $ 17,651 | $ 17,768 | $ 14,325 | $ 10,303 |
| Collector | $ 15,856 | $ 15,645 | $ 13,209 | $ 9,658 |
| Local | $ 14,819 | $ 14,028 | $ 3,990 | $ 9,214 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,402 | $ 1,402 | | |
| Arterial | $ 1,402 | $ 1,402 | $ 1,865 | $ 1,865 |
| Collector | $ 1,402 | $ 1,402 | $ 1,865 | $ 1,865 |
| Local | $ 1,402 | $ 1,402 | $ 400 | $ 1,865 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 5,123 | $ 6,148 | | |
| Arterial | $ 4,150 | $ 4,150 | $ 2,706 | $ 2,706 |
| Collector | $ 3,074 | $ 3,842 | $ 2,406 | $ 3,007 |
| Local | $ 1,665 | $ 1,166 | $ 376 | $ 752 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,025 | $ 1,230 | | |
| Arterial | $ 738 | $ 738 | $ 431 | $ 431 |
| Collector | $ 547 | $ 683 | $ 383 | $ 478 |
| Local | $ 273 | $ 191 | $ 60 | $ 120 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,490 | $ 6,528 | | |
| Arterial | $ 2,029 | $ 4,363 | $ 1,958 | $ 4,722 |
| Collector | $ 1,574 | $ 4,509 | $ 1,555 | $ 4,926 |
| Local | $ 1,219 | $ 4,202 | $ 1,239 | $ 4,703 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 325 | $ 1,453 | | |
| Arterial | $ 280 | $ 976 | $ 290 | $ 1,067 |
| Collector | $ 201 | $ 1,013 | $ 207 | $ 1,116 |
| Local | $ 212 | $ 1,068 | $ 219 | $ 1,177 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,513 | $ 1,650 | | |
| Arterial | $ 1,375 | $ 1,513 | $ 1,100 | $ 1,375 |
| Collector | $ 1,238 | $ 1,375 | $ 1,018 | $ 1,238 |
| Local | $ 1,100 | $ 1,238 | $ 413 | $ 1,100 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,475 | $ 2,750 | | |
| Arterial | $ 2,200 | $ 2,475 | $ 1,925 | $ 2,200 |
| Collector | $ 1,925 | $ 2,200 | $ 1,650 | $ 1,925 |
| Local | $ 1,650 | $ 1,925 | $ 1,375 | $ 1,650 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 33,807 | $ 39,404 | | |
| Arterial | $ 29,824 | $ 33,383 | $ 24,600 | $ 24,668 |
| Collector | $ 25,816 | $ 30,669 | $ 22,292 | $ 24,213 |
| Local | $ 22,340 | $ 25,219 | $ 8,072 | $ 20,580 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## British Columbia - Coastal

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 20,020 | $ 21,023 | | |
| Arterial | $ 18,616 | $ 19,618 | $ 20,477 | $ 13,169 |
| Collector | $ 16,770 | $ 15,888 | $ 18,447 | $ 10,315 |
| Local | $ 14,324 | $ 7,871 | $ 4,988 | $ 8,658 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 568 | $ 1,556 | | |
| Arterial | $ 618 | $ 1,090 | $ 646 | $ 1,190 |
| Collector | $ 682 | $ 1,180 | $ 756 | $ 1,317 |
| Local | $ 741 | $ 1,296 | $ 860 | $ 1,459 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,386 | $ 2,386 | | |
| Arterial | $ 2,386 | $ 2,386 | $ 2,625 | $ 2,625 |
| Collector | $ 2,386 | $ 2,386 | $ 2,625 | $ 2,625 |
| Local | $ 2,316 | $ 2,386 | $ 318 | $ 2,625 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,788 | $ 1,925 | | |
| Arterial | $ 1,650 | $ 1,788 | $ 1,100 | $ 1,375 |
| Collector | $ 1,513 | $ 1,650 | $ 1,018 | $ 1,238 |
| Local | $ 1,375 | $ 1,513 | $ 413 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 6,404 | $ 7,685 | | |
| Arterial | $ 5,764 | $ 5,764 | $ 3,383 | $ 3,383 |
| Collector | $ 5,123 | $ 6,404 | $ 3,007 | $ 3,759 |
| Local | $ 3,202 | $ 2,241 | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,650 | $ 1,925 | | |
| Arterial | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Collector | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Local | $ 1,100 | $ 1,375 | $ 1,100 | $ 1,375 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 543 | $ 652 | | |
| Arterial | $ 489 | $ 489 | $ 269 | $ 269 |
| Collector | $ 435 | $ 543 | $ 239 | $ 299 |
| Local | $ 272 | $ 190 | $ 30 | $ 60 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 15,465 | $ 16,190 | | |
| Arterial | $ 11,502 | $ 12,899 | $ 8,446 | $ 10,367 |
| Collector | $ 7,716 | $ 10,846 | $ 6,948 | $ 9,769 |
| Local | $ 5,168 | $ 6,765 | $ 5,336 | $ 7,456 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 48,825 | $ 53,342 | | |
| Arterial | $ 42,399 | $ 45,683 | $ 38,321 | $ 34,028 |
| Collector | $ 36,000 | $ 40,547 | $ 34,414 | $ 30,971 |
| Local | $ 28,497 | $ 23,637 | $ 13,420 | $ 23,484 |

*Note: All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## British Columbia, Interior

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 25,773 | $ 26,778 | | |
| Arterial | $ 24,342 | $ 25,347 | $ 26,776 | $ 17,064 |
| Collector | $ 21,865 | $ 20,841 | $ 24,052 | $ 13,643 |
| Local | $ 11,507 | $ 9,893 | $ 6,235 | $ 10,882 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 436 | $ 1,493 | | |
| Arterial | $ 763 | $ 1,068 | $ 643 | $ 1,140 |
| Collector | $ 611 | $ 1,145 | $ 686 | $ 1,278 |
| Local | $ 671 | $ 1,261 | $ 790 | $ 1,428 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 2,608 | $ 2,608 | | |
| Arterial | $ 2,608 | $ 2,608 | $ 2,869 | $ 2,869 |
| Collector | $ 2,608 | $ 2,608 | $ 2,869 | $ 2,869 |
| Local | $ 927 | $ 2,608 | $ 379 | $ 2,869 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,513 | $ 1,650 | | |
| Arterial | $ 1,375 | $ 1,513 | $ 1,100 | $ 1,375 |
| Collector | $ 1,238 | $ 1,375 | $ 1,018 | $ 1,238 |
| Local | $ 1,100 | $ 1,238 | $ 550 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 5,123 | $ 6,148 | | |
| Arterial | $ 4,611 | $ 4,611 | $ 2,706 | $ 2,706 |
| Collector | $ 4,099 | $ 5,123 | $ 2,406 | $ 3,007 |
| Local | $ 2,562 | $ 1,793 | $ 376 | $ 752 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 3,025 | $ 3,025 | | |
| Arterial | $ 2,200 | $ 2,750 | $ 2,200 | $ 2,475 |
| Collector | $ 1,650 | $ 2,475 | $ 1,650 | $ 1,925 |
| Local | $ 1,100 | $ 2,475 | $ 1,100 | $ 1,650 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 435 | $ 522 | | |
| Arterial | $ 391 | $ 391 | $ 215 | $ 215 |
| Collector | $ 348 | $ 435 | $ 191 | $ 239 |
| Local | $ 217 | $ 152 | $ 30 | $ 60 |

### All Other Road Infrastructure - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 81,409 | $ 84,075 | | |
| Arterial | $ 47,445 | $ 48,915 | $ 18,643 | $ 20,619 |
| Collector | $ 20,476 | $ 25,914 | $ 14,319 | $ 17,966 |
| Local | $ 8,520 | $ 11,408 | $ 6,313 | $ 9,051 |

### Total Road Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 120,322 | $ 126,300 | | |
| Arterial | $ 83,734 | $ 87,203 | $ 55,153 | $ 48,464 |
| Collector | $ 52,895 | $ 59,916 | $ 47,190 | $ 42,164 |
| Local | $ 26,603 | $ 30,827 | $ 15,772 | $ 27,792 |

*Note:* *All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

## Territories

### Pavements - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 11,114 | $ 8,812 | | |
| Arterial | $ 7,560 | $ 7,560 | $ 8,316 | $ 9,166 |
| Collector | $ 7,092 | $ 7,092 | $ 4,414 | $ 8,652 |
| Local | $ 5,371 | $ 5,371 | $ 2,453 | $ 8,150 |

### All Other Road Infrastructure - M&R Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 708 | $ 1,897 | | |
| Arterial | $ 2,201 | $ 1,738 | $ 2,278 | $ 1,836 |
| Collector | $ 2,093 | $ 1,933 | $ 2,316 | $ 2,138 |
| Local | $ 1,868 | $ 2,138 | $ 2,193 | $ 2,456 |

### Pavements - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,904 | $ 1,904 | | |
| Arterial | $ 1,904 | $ 1,904 | $ 1,520 | $ 2,067 |
| Collector | $ 1,382 | $ 1,904 | $ 1,520 | $ 2,067 |
| Local | $ 1,382 | $ 1,382 | $ 359 | $ 2,067 |

### Routine Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 990 | $ 1,100 | | |
| Arterial | $ 880 | $ 990 | $ 1,100 | $ 1,375 |
| Collector | $ 770 | $ 880 | $ 1,018 | $ 1,238 |
| Local | $ 660 | $ 770 | $ 413 | $ 1,100 |

### Bridges - Initial Construction Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ - | $ 6,068 | | |
| Arterial | $ 2,246 | $ 2,246 | $ 1,240 | $ 1,240 |
| Collector | $ 1,736 | $ - | $ 958 | $ 1,365 |
| Local | $ 313 | $ - | $ 683 | $ 1,365 |

### Winter Maintenance Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,650 | $ 1,925 | | |
| Arterial | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Collector | $ 1,375 | $ 1,650 | $ 1,375 | $ 1,650 |
| Local | $ 1,100 | $ 1,375 | $ 1,100 | $ 1,375 |

### Bridges - Maintenance and Rehabilitation Costs

| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 1,181 | $ 1,181 | | |
| Arterial | $ 437 | $ 437 | $ 245 | $ 245 |
| Collector | $ 338 | $ - | $ 189 | $ 269 |
| Local | $ 61 | $ - | $ 135 | $ 269 |

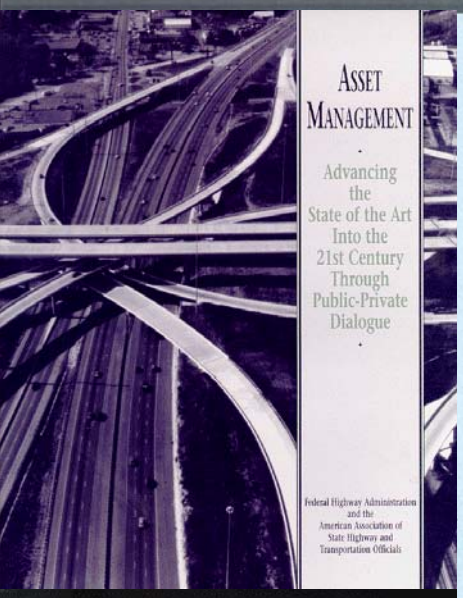
### All Other Road Infrastructure - Initial Construction Costs

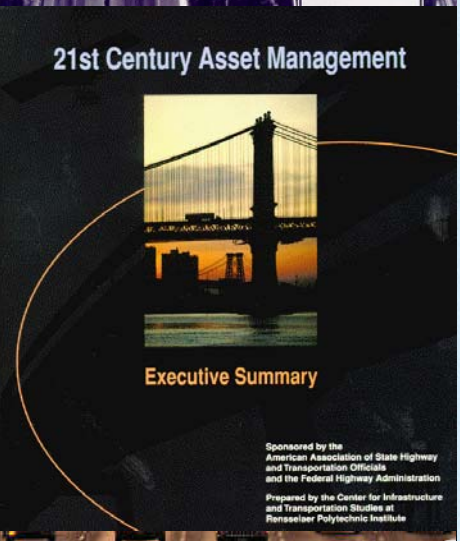
| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 85,343 | $ 89,615 | | |
| Arterial | $ 59,056 | $ 60,472 | $ 64,179 | $ 65,814 |
| Collector | $ 27,889 | $ 35,479 | $ 24,437 | $ 30,028 |
| Local | $ 14,450 | $ 18,440 | $ 13,693 | $ 17,430 |

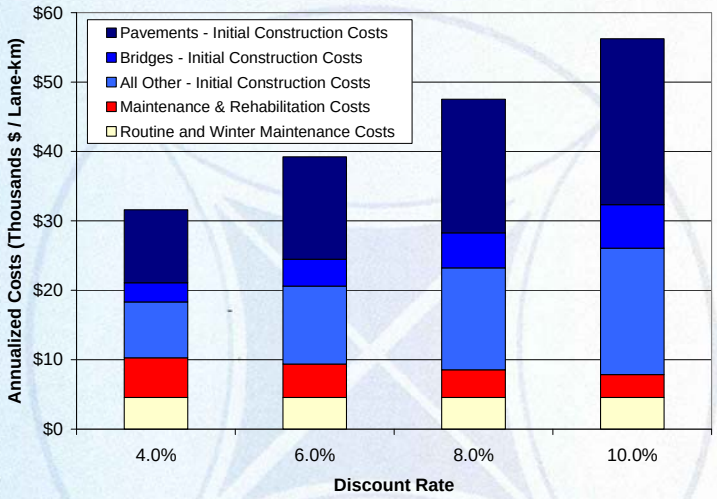
### Total Road Costs

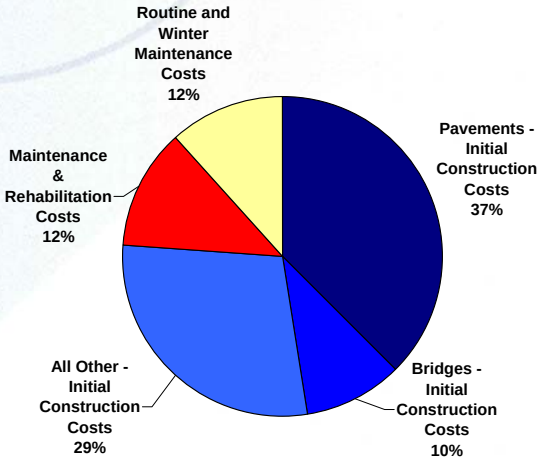
| Functional Class | Provincial | | Municipal | |
|---|---|---|---|---|
| | Rural | Urban | Rural | Urban |
| Freeway | $ 102,890 | $ 112,501 | | |
| Arterial | $ 75,659 | $ 76,997 | $ 80,252 | $ 83,393 |
| Collector | $ 42,675 | $ 48,938 | $ 36,226 | $ 47,407 |
| Local | $ 25,205 | $ 29,476 | $ 21,027 | $ 34,211 |

*Note: All costs reported in the above tables are annualized costs (using 6 percent discount rate and 60-year analysis period) for one one-km-long traffic lane.*

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