

DATE: May 12, 2025

REPORT NO: O-07-2025

SUBJECT: **Pavement and Bridge Management Systems – Status Report**

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OVERVIEW:

- Preserving our Township pavement infrastructure is paramount to insuring viable transportation of people and goods.
- At present, the average condition (PCI – Pavement Condition Index) of the Township road network (consisting of 276 centreline kms of hard top pavements) is 72 out of 100.
- The optimal annual resurfacing and reconstruction budget to attain and sustain the network in its current condition is \$2 million per year.
- The funding needed to maintain the Township’s existing bridge inventory (91 Structures) over the next 10 years is forecasted to be \$800,000 per year.
- A strong commitment to these budget levels is desirable to ensure sustainable capital renewal.
- Regular updates to the pavement and bridge condition inspections and the ongoing review of funding levels, results in a sustainable capital renewal program, which ensures that the overall Township road network remains in good repair.

RECOMMENDATION:

1. That, Information Report O-07-2025 titled, “Pavement and Bridge Management Systems – Status Report” dated May 12, 2025, be received for information.

ALIGNMENT TO STRATEGIC PLAN:

Theme # 1

- **Build** a safe, caring, and active community

Theme # 4

- **Foundational:** Advance organizational capacity and effectiveness

BACKGROUND:

Historically, pavement conditions inspections were completed once every five (5) years, with the last inspection taking place in 2019. In 2022, Administration changed this process by undertaking regular pavement inspections each year to implement a more robust pavement management system.

Starting in 2022, pavement condition inspections were completed for one third (1/3rd) of the Township road network each year. Historical condition inspection ratings are used in the Pavement Management System to develop performance prediction models for the deterioration of the pavements. Condition ratings for sections that are not inspected in a particular year are developed from the last available rating and prediction models to estimate the current condition rating for all sections in the Township's pavement database each year. These inspections of the third of the network took place in 2022, 2023, and 2024, so now the entire network had been inspected. Regular yearly inspections provide better information compared to once every 5 years and ensures the development of a sustainable funding models to keep the network in optimal condition.

In addition to our annual Pavement Management System update, biennial (once every 2 years) bridge and major culvert condition inspections and appraisals are preformed to update the Township's Bridge Management System. These biennial inspections are a mandatory requirement for all structures with a span greater than 3 metres and falls under Regulation 104/97.

This report provides the results of the 2024 Pavement Management System update, as well as the 2023 Bridge and Major Culvert inspections / appraisals.

CURRENT SITUATION:

Pavements

The current average condition rating of our pavement network (based on overall pavement area) is 72 out of 100. This rating is referred to as a Pavement Condition Index (PCI).

Schedule A provides a table listed as Table A-1 which provides the ranges of the PCI for each condition category from poor to very good. Figure A-1, also found in Schedule A, shows the distribution ratings (% of overall pavement area for both asphalt & surface treated roads) for the past 3 years (2024, 2023, & 2022). In 2022, only a third (1/3rd) of the network was inspected, while the condition of the other two thirds (2/3rd) of the network were predicted based on the last inspection data that was completed in 2019. As such, the data improved each year, as the next third of the network was inspected, until 2024 when the final third (1/3rd) of the network was inspected. Based the information provided in Schedule A, 43% of the Township's road network is considered to be Very Good, with a PCI above 76. It is important to keep performing these annual inspections each year to

obtain accurate condition inspections and regular updates of our Pavement Management System.

Forecasted analysis, within the Pavement Management System, is used to review alternatives and help estimate either the network condition for set budgets, or the required budget for a set condition. The first analysis (Schedule B) estimates the budget necessary to address “all needs” and assumes that an unlimited budget is available. In this scenario, work would be carried out for all pavements that qualify for “resurfacing” when a critical pavement condition index (PCI) level of 60 is reached. Similarly, construction work for roads qualifying for reconstruction would be undertaken once a minimum PCI of 45 is reached.

This type of analysis is used to assess work backlog and assists in estimating long-term network budget needs. The information, from the 2024 Pavement Management System consultant’s work, is provided in Schedule B shows a current 2025 reconstruction and resurfacing need in the order of \$7 million and \$6 million respectively, for a total of \$13 million. It is important to note that the roads reconstruction and resurfacing allocation 2025, included within the 2025 Capital Budget, is \$3 million and \$1.2 million respectively. This shortfall for this specific year is a result of the overall corporate budget constraints and pressures. The table, as provided through the 2024 Pavement Management System consultant’s work, in Schedule B also summarizes (by year) the total 10-year reconstruction and resurfacing need in the order of \$32.5 million.

The second analysis, as provided by the 2024 Pavement Management System consultant’s work, is a 10-year pavement condition forecast based on different funding scenarios. Schedule C presents 10-year budget scenarios based on different funding increments. From this Schedule, as calculated by the consultant, it can be seen that an annual road budget of \$2 million results in an average PCI of 68 by year 2034. The target PCI of high 60s to low 70s across the entire Township road network would be appropriate for a road network of this type and size.

Bridges & Major Culvert Structures

Based on the 2023 inspections performed by the consultant, the table below summarizes the Bridge Management System maintenance, rehabilitation, and replacement priority needs in the following categories:

- NOW Needs
- 1 to 5 YEAR Needs
- 6 to 10 YEAR Needs
- ADEQUATE

| | NOW Needs | 1-5 YR Needs | 6-10 YR Needs | TOTAL Needs |
|-------|-----------|--------------|---------------|-------------|
| Total | \$2.9 M | \$9.4 M | \$4.0 M | \$16.3 M |

These needs translate to an average annual funding level of \$1.63 million over the 10-year period, for a total of \$16.3 million. Just like the pavement management system, this total \$16.3 million assumes an unlimited budget is available to address “all needs”. This amount is used to assess the “backlog”.

After each biennial inspection and update to the Bridge Management System, Administrations review each bridge structure and develops a sustainable capital budget forecast to address high priority recommendations for each structure. The 10-year capital program is then developed and refined after each biennial inspection. The total 10 year capital funding allocation that was presented during the 2025 Capital Budget forecast totals \$8 million, which translates to an annual allowance of \$800,000.

The consequences of not implementing a proactive plan and sustainable levels of funding for the Township’s bridge and major culvert assets include:

- Further aging of the Township’s structural infrastructure
- An increase in the amount of backlog work to be completed
- Increased capital expenditures at the time of rehabilitation or replacement
- Unexpected emergency bridge closures affecting the travelling public, businesses, and emergency services
- The possibility of bridge and structure failures

FINANCIAL IMPLICATIONS:

Based on the most recent 2024 Pavement Management System update, the consultant has recommended the funding needed to maintain the Township’s existing pavement inventory over the next 10 years is approximately \$20 million. This translates to an annual allowance of \$2 million applied to a combination of resurfacing and reconstruction. Based on the most recent Bridge Management System update, the funding needed to maintain the Township’s existing bridge inventory over the next 10 years is forecasted to be \$8 million, or \$800,000 per year.

The 10 Year Capital Plan related to the existing road and bridge network, as presented during the 2025 Budget, provides a funding envelop that accommodates the current investment levels as outlined in this report.

In addition to the recommended funding levels noted above, the 10 Year Capital Plan forecast also has an allowance for other capital projects such as capacity expansions, transportation assets, equipment/fleet, and intersection improvements. Therefore, any increase in the road network would result in an additional funding to sustain our infrastructure.

Administration will continue to analyse the results annual Pavement Management System update and biennial bridge inspections (Bridge Management System) and various funding scenarios on an ongoing basis as part of our annual capital budget and forecast process in conjunction with other corporate planning and asset management initiatives.

INTER-DEPARTMENTAL COMMENTS:

This report has been reviewed by the CAO, Director of Corporate Services/CFO, and the Clerk's office.

CONCLUSION:

The results of the Pavement Management System and Bridge Management System updates are used to guide the long-term planning for the road system. Review of specific road segments and bridge/culvert structures are subsequently undertaken in order to prioritize needs within the identified funding envelopes. These reviews incorporate consideration such as:

- Pavement and Bridge Condition Ratings
- Condition of Underground Assets (Watermain, Sanitary & Storm Sewers, etc.)
- Partnerships and/or Commitments with other Agencies (Niagara Region, Neighbouring Municipalities, etc.)
- Transportation Strategy (Masterplans, Strategic Initiatives, etc.)
- Capacity Deficiencies and/or Safety Improvements
- Geometric & Structural Deficiencies
- Overall Community / Network Benefit
- Development / Growth

In order to achieve network sustainability, a strong commitment to these budget levels is desirable to ensure the Township's road and bridge network remain in good condition and that the backlog needs do not increase. Project specific details are presented in the year of budget approval, along with the capital budget forecast, through the annual budget process prior to these investments proceeding.

SCHEDULE A – Current Pavement Condition

SCHEDULE B – Pavement Management System: Unlimited Budget Analysis

SCHEDULE C – Pavement Management System: Various Funding Analysis

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