

Subject: Town of Pelham 2023 Pavement Condition and Roads Need Study

Recommendation:

BE IT RESOLVED THAT Council receive Report #2023-0134 Town of Pelham 2023 Pavement Condition and Roads Need Study, for information.

Background:

Applied Research Associates Inc. (ARA) was retained by the Town of Pelham to conduct pavement condition assessments for a road network comprising some 628 inventory sections within the town. (See Appendix A – 2023 Roads Needs Study). Approximately 41 percent (99 km) of the road network is surfaced with asphalt concrete, and the remaining 59 percent (145 km) is surfaced with a single or double surface treatment. The pavement area of the network totals 1,514,904 m².

The scope of work for the assignment included preparation of a work plan; verification of the road inventory; roadway condition survey; construction history update; pavement performance modeling; maintenance and resurfacing need analysis; prioritization analysis and program funding levels; and reporting.

A total of 628 road inventory sections with an overall centre line length of approximately 244 km were included in the study. The roadway sections varied in length from about 8 to 2,147 m. These sections typically represent a road section and are in some cases repeated for different pavement types within a section. A visual pavement condition survey was conducted to establish the Pavement Condition Index (PCI) of each pavement section based on MTO SP-024 for asphalt concrete surface and MTO SP-021 for surface-treated pavement. The fieldwork was completed in the spring of 2023.

Analysis:

All of the pavement sections in the Pelham Road network were inspected in accordance with MTO procedures. Based on the results of the evaluation the average PCI of the High-Class Bituminous Roads (HCB) was 75. The average PCI for

the Lower-Class Bituminous Roads (LCB) was 60. This resulted in an overall network PCI (using a weighted average) of 65.

High-Class Bituminous Roads (HCB) are often found in urban, semi-urban and rural areas with high volume of traffic while Lower-Class Bituminous Roads (LCB) are found in rural areas. In comparison with the Pavement Condition Study conducted in 2019, the average PCI of the High-Class Bituminous Roads (HCB) reduced from 77 to 75. The average PCI for the Lower-Class Bituminous Roads (LCB) reduced from 66 in 2019 to 60 in 2023. The overall network PCI (using a weighted average) reduced from 69 in 2019 to 65 in 2023. See Figure 1 for PCI Rating Distribution Comparison and Figure 2 for PCI Surface Type Comparison.

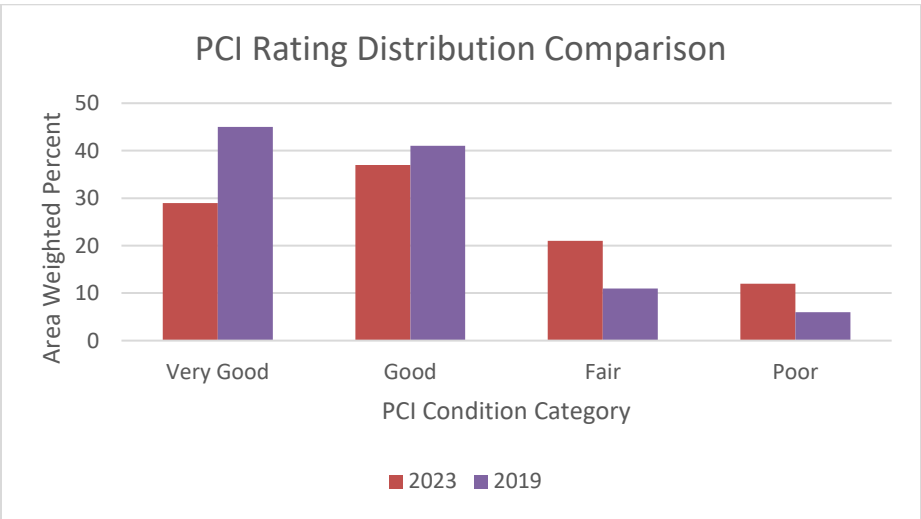


Figure 1: PCI Rating Distribution Comparison

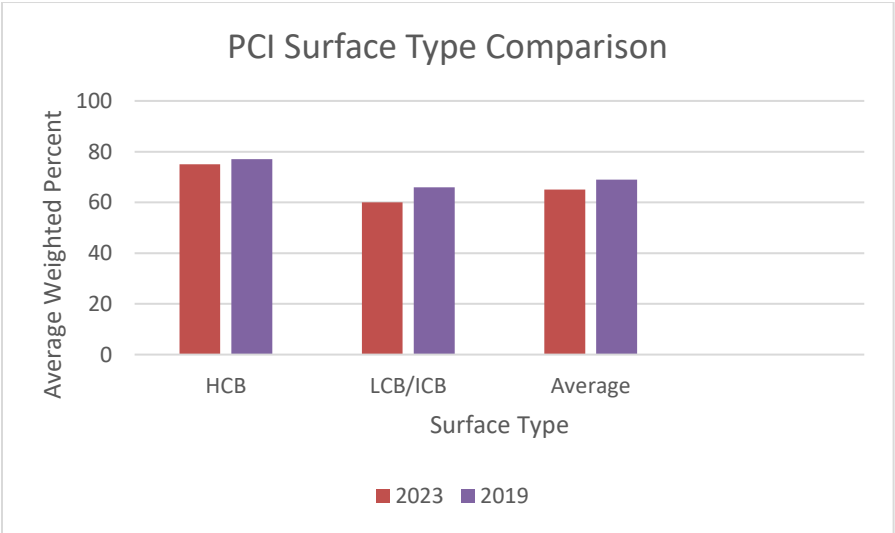


Figure 2: PCI Surface Type Comparison

All roadways will deteriorate over time. Deterioration is a combination of load-related effects (traffic) and environmental-related effects (moisture, freeze/thaw, thermal movements, etc.). The rate of deterioration will depend on the number and magnitude of the loading and the impact of environmental effects on the pavement structure materials and subgrade. While the focus of the pavement management system is to provide timely intervention to address pavement distress in a cost-effective manner, eventually, it becomes necessary to reconstruct the pavement. In order to cost-effectively maintain a pavement network, it is necessary to strike a balance between resurfacing and reconstruction. If an agency continues to use resurfacing as the primary strategy for poorly performing pavements, either the service life of the treatment will get shorter and shorter or the magnitude of the treatment, and hence the cost will have to increase to maintain a reasonable service life. Eventually, all pavements will require a more significant treatment such as reconstruction.

The overall condition of the Town of Pelham Road network is good with a current average network-weighted PCI of 65. The percentage of roadways in the entire network in the very good category (PCI > 75) is 29 percent. The percentage of roadway areas in the "poor" category (PCI less than 50) is 12 percent. The consultant's report recommends that the Town consider adopting a formal pavement preservation program to assist in keeping roadways in good condition. This would require an evaluation of appropriate pavement preservation techniques and trigger values and a budget dedicated to pavement preservation. Many agencies have adopted this approach and have found that by using timely pavement preservation techniques, they are able to improve their overall network condition and then use the cost savings to begin to address their reconstruction backlog.

Implementation of a formal pavement preservation program has been a major priority for many agencies over the past 10 to 15 years. With mounting priorities to improve the level of service for the transportation infrastructure coupled with stagnant or reducing budgets, a simple rehabilitation and capital program has been recognized as sufficient to address the increasing backlog of work. A pavement preservation program focuses on "keeping good roads good" as a first priority over roadway expansion, rehabilitation, and reconstruction. It consists of the application of relatively low-cost treatments to roads that are still in fair to good condition above the pavement condition index value that would trigger rehabilitation, i.e. 60 out of 100. These treatments are usually restricted to pavements with condition ratings of 65 to 75 with low severity distresses and extents as a first priority. Once all of the immediate needs (this year) activities are funded the remaining funding is used for the traditional rehabilitation program followed by more expensive reconstruction work.

The financial considerations section in this report reviews the current level of funding as well as anticipated levels of investment to maintain the road network.

Financial Considerations:

There are no direct financial implications with respect to this report given that it is a report received for information only. Funding scenarios have been identified below which may impact future capital budgets.

The first analysis completed for the Town estimates the necessary budget to maintain the network in the ideal condition. This "needs analysis" assumes an unlimited budget is available and will perform all resurfacing and reconstruction actions necessary to meet the performance goals. This means that all pavements qualified for resurfacing are selected for treatment when they reach the critical PCI level of 60 out of 100 and that all roads qualifying for reconstruction are reconstructed once they reach a minimum PCI of 45. This type of analysis is used to estimate the backlog of work and help estimate the necessary budget required to improve the network over the long term. The result of the needs analysis is summarized in Table 2-11 and in Figure 2-15 of the consultant's report (see Appendix A). The unrestricted budget would increase the network average PCI from 65 in 2023 to 85 in 2033 and require an average annual budget of about \$10.5 million.

A second analysis was completed based on the current approved capital budget for road resurfacing and reconstruction of \$1 M per year and assuming that this level of investment will continue over the next 10 years. The results are provided in Table 2-12 and Figure 2-16 of the consultant's report (see Appendix A). Over the 10 years, this budget would result in a 2033 average network PCI of 30.

A third analysis was completed based on maintaining the current network average PCI of 65. The results of the analysis are presented in Table 2-13 and Figure 2-17 of the consultant's report (see Appendix A). This scenario would require an annual budget for road resurfacing and reconstruction of approximately \$6 million over the next 10 years.

Finally, a fourth analysis was completed based on upgrading and maintaining the current network average of network PCI to an overall average of 72. The results of the analysis are presented in Table 2-14 and Figure 2-18 of the consultant's report (see Appendix A). This scenario would require an annual budget for road resurfacing and reconstruction of approximately \$7.4 million.

The above analysis demonstrates that even at the current approved level of investment in the road network the result will be poorer road conditions, higher operational maintenance costs, increased risk to the Town, and lower levels of service.

Alternatives Reviewed:

There are no alternatives for review as this is a report for information purposes only.

Strategic Plan Relationship: Infrastructure Investment and Renewal

Maintaining a safe and reliable road network is critical to the Town of Pelham to ensure the safe and efficient movement of all forms of transportation. Proper maintenance and investment in road infrastructure will ensure that the condition of our road network is sustained.

Consultation:

There was a consultation with the Corporate Services Department in the preparation of this report.

Other Pertinent Reports/Attachments:

Appendix A – Town of Pelham 2023 Roads Needs Study

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