

DATE OF MEETING JANUARY 22, 2024

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**SUBJECT ROADWAY ASPHALT ASSET MANAGEMENT AND
MAINTENANCE PLAN**

OVERVIEW

Purpose of Report

To obtain the Governance and Priorities Committee direction on asphalt maintenance funding and associated changes to the maintenance plan.

Recommendation

That the Governance and Priorities Committee recommend that Council consider increasing the annual road maintenance budget by \$1.5 million per year as part of the 2025 – 2029 Draft Financial Plan and adjusting the maintenance plan as proposed in the 2022 Pavement Condition Assessment Report, Table D-5.

BACKGROUND

The City of Nanaimo (City) operates and maintains approximately 1,110 lane kilometers of asphalt roadway (517 linear kms). This transportation network serves the commercial, personal and emergency needs of City residents and businesses in a safe, convenient manner. The current replacement value of this asset class is estimated at \$374M (2021) in the City's latest Asset Management Plan.

Nanaimo's Asset Management Plan considers:

1. **Technical Level of Service:** How the organization provides the service using technical terms. For asphalt roadways, the primary mechanism for this component is through the setting of technical standards, Manual of Engineering Standards and Specifications (MoESS), construction inspections and condition assessment (Pavement Quality Index (PQI)).
2. **Customer Level of Service:** How the customer receives and perceives the service. This requires feedback from the community and usually includes metrics such as quality, function and capacity (or use).

The City is required under Provincial regulation to have an Asset Management Plan and has had one in place since 2010. The purpose of this update is to inform the Governance and Priorities Committee (GPC) on the recent work by Staff and consultants to complete the Customer Level of Service work, which augments and informs the Technical Level of Service going forward and to obtain the GPC's direction on changes to the maintenance plan for this asset class.

This work was supported by a grant from Federation of Canadian Municipalities (FCM's) Municipal Asset Management Program

DISCUSSION

Technical Level of Service

The design, material specification and construction of asphalt roadways within the City is governed by the current version of the MoESS. For asphalt roadways, the most significant recent change, is minimum asphalt thickness, which was increased from 50mm to 75mm. This provides for a more robust roadway, extending useful life and reducing maintenance over its lifetime. The most significant contributor to deterioration is through water penetrating to the road base, either through pavement cracks or by flowing under from the edges. Thicker asphalt is more resistant to cracking and water penetration.

Pavement is inspected visually each year to develop the annual maintenance program, which includes:

- sealing of cracks;
- repair of shoulders;
- removal and replacement of local failures (minor patching); and,
- removal and replacement of larger sections of degraded pavement (major patching).

In addition to this maintenance program, capital renewal or replacement is planned. Efforts are made to coordinate capital renewal with utility replacements to maximize the effectiveness of each investment.

A detailed pavement condition assessment is undertaken periodically (every 3-5 years). Using laser measurements and a variety of other specialized equipment, the PQI is calculated for each roadway segment. This index is made up of measurements of Ride Comfort Surface Distress and Structural Adequacy. Each factor can be preferentially weighted in the calculation based on the road classification (Local, Collector, Arterial). In the City's model, Local roads are weighted for surface distress, whereas Collector and Arterial roads are weighted for ride comfort. Weighting is based on expected vehicle speeds and volumes for each classification.

Once pavement conditions are assessed, the values are imported to a Pavement Management System (PMS) that assesses condition against a suite of repair options. Different scenarios can be run based on constraints to repair type and funding available.

The modelling for the Asset Management Plan forecast the average PQI for the City's road network at 72.5. Results from the latest condition assessment indicate that the average PQI is 78. Unexpectedly, the industrial roads are in significantly worse condition than other classifications.

Minimum acceptable PQI scores have been set based on road classification, as follows:

- Mobility Arterial 50
- Urban Arterial 50
- Industrial Collector 45
- Mobility Collector 35
- Urban Collector 35
- Industrial Local 45
- Mobility Local 35
- Urban Local 35

The table below shows the results of the last three inspections. Notably, the average PQI has remained relatively stable with the level of expenditures on maintenance and renewal in this time period.

Year	No. Section	CL-KM	LN-KM	PQI
2022	3,488	512	1,093	78
2017	3,430	508	1,087	79
2013	3,281	496	1,060	77

Results from modelling the 2022 asphalt conditions, at current funding level, indicate that roadway conditions will deteriorate over the next 10 years. Currently, 2% of the City roadways are deficient, relative to the target minimum PQI. In 10 years, 90% of the City's roadways will fail to meet the minimum PQI established.

From a purely technical perspective, to maintain road conditions in their current state, annual funding for maintenance and renewal would need to increase significantly from the current levels to \$13.6M/yr. Any increase from current levels will decrease the amount of roadways failing to meet the minimum PQI.

Customer Level of Service

In 2020, the City engaged Urban Systems to undertake a Customer Level of Service Study. The details of that effort are contained in the attachments, including public engagement results.

One of the key outcomes of the consultation, was that residents understand the importance of asset management as a responsible financial tool, preferring to invest in maintenance to achieve the best fiscal outcome. It was found that there was a small willingness to pay to maintain road conditions, rather than see them deteriorate. Within the focus groups, the willingness to pay was found to be approximately \$40/yr/folio. This would increase overall funding for roadway maintenance by roughly \$1.575M/yr.

This funding level does not include the benefit of any concurrent projects and the funding brought through those projects. As discussed later, this funding is highly variable, and while effective, cannot be relied upon for regular, ongoing maintenance efforts.

Current Maintenance Plan and Funding

Maintenance of roadways is by the Roads Unit at Public Works. The Roads team consists of 11 positions that are responsible for all maintenance work on the roadways, supplemented by contractors and summer labour, as required.

The 2023 budget included the following for maintenance efforts:

Item	2023 Budget	2023 Forecast Expenditures
General road repairs	\$983k	\$1.05M
Crack Sealing	\$182k	\$115k
Minor patching	\$183k	\$309k
Major patching*	\$400k	\$415k
Total	\$1.75M	\$1.89M

*Most carried out by contractor

A key driver for maintenance expenses is the cost of materials, which is largely tied to the price of oil. Staff have seen significant gains in productivity since purchasing a milling machine in 2018. Increases in productivity mean that more area of roadway can be repaired with the same labour effort.

Current Renewal Plan and Funding

Pavement renewal (also referred to as “road rehab”) is delivered through the annual project plan and includes dedicated roadway renewal and renewals undertaken concurrently with other utility projects. Funding levels for concurrent projects vary from year to year. The 2024 – 2028 Financial Plan includes \$16.4M over the next five years for pavement renewal projects.

In 2023, the following projects were completed:

- Bowen Road, Meredith to Dufferin \$920k
- Needham Street, Old Victoria to View \$69k
- Holyrood Drive, Marlborough to Glenayr \$350k

The City also “inherits” new or rebuilt roads through the development process. During permitting, these opportunities are identified by Staff in accordance with the applicable development bylaws. This helps to provide renewed asphalt roadways at no cost to the taxpayer.

When considering this matter, the GPC should balance the level of investment for this asset class against other competing investment opportunities, while being aware of the level of service requested from users and the technical function of the City’s roadways.

OPTIONS

1. That the Governance and Priorities Committee recommend that Council consider increasing the annual road maintenance budget by \$1.5 million per year as part of the 2025 – 2029 Draft Financial Plan and adjusting the maintenance plan as proposed in the 2022 Pavement Condition Assessment Report, Table D-5.
 - The advantages of this option are that additional maintenance effort can be put towards this asset class to somewhat meet users desired level of service, based on the Customer Level of Service Study.

- The disadvantages of this option is that investment levels will fall short of the full funding required to maintain asphalt roadways in their current condition as modelled in the 2022 Pavement Condition Assessment Report, and as set out in the Asset Management Plan for this asset class.
 - Financial Implications: Increasing the road maintenance budget by an additional \$1.5 million in 2025 would increase the projected property tax increase for 2025 by approximately 1.0%
2. That the Governance and Priorities Committee recommend that Council consider increasing the annual road maintenance budget by \$775,000 per year as part of the 2025 – 2029 Draft Financial Plan and adjusting the maintenance plan as proposed in the 2022 Pavement Condition Assessment Report, Table D-4.
- The advantages of this option are that additional maintenance effort can be put towards this asset class to somewhat meet users desired level of service, based on the Customer Level of Service Study.
 - The disadvantages of this option is that investment levels will fall short of the full funding required to maintain asphalt roadways in their current condition as modelled in the 2022 Pavement Condition Assessment Report, and as set out in the Asset Management Plan for this asset class.
 - Financial Implications: Increasing the road maintenance budget by an additional \$775,000 in 2025 would increase the projected property tax increase for 2025 by approximately 0.52%
3. That the Governance and Priorities Committee recommend that Council consider increasing the annual road maintenance budget by \$250,000 per year as part of the 2025 – 2029 Draft Financial Plan and adjusting the maintenance plan as proposed in the 2022 Pavement Condition Assessment Report, Table D-3.
- The advantages of this option are that additional maintenance effort can be put towards this asset class to somewhat meet users desired level of service, based on the Customer Level of Service Study.
 - The disadvantages of this option is that investment levels will fall short of the full funding required to maintain asphalt roadways in their current condition as modelled in the 2022 Pavement Condition Assessment Report, and as set out in the Asset Management Plan for this asset class.
 - Financial Implications: Increasing the road maintenance budget by an additional \$250,000 in 2025 would increase the projected property tax increase for 2025 by approximately 0.17%.
4. That the Governance and Priorities Committee provide alternate direction to Staff. |

SUMMARY POINTS

- The City is responsible for the maintenance and operation of approximately 517km of asphalt roadway with a replacement value of \$374 million (2021).

- A Customer Level of Service Study was completed which found that users would like to see the roadways maintained in good condition.
- Additional maintenance effort is required to maintain roadways in their current, good condition.

ATTACHMENTS:

Attachment A – Asphalt Levels of Service What We Heard Report, Urban Systems, Oct. 14, 2022

Attachment B – Levels of Service Table, Urban Systems, Feb. 22, 2023

Attachment C – Life Cycle of a Road

Attachment D – 2022 Pavement Condition Assessment Report

Attachment E – Roadway Maintenance – Level of Service and Asset Management, PowerPoint Presentation

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Please use the following link to review Attachment 'D' 2022 Pavement Condition Assessment Report:

https://www.nanaimo.ca/docs/your-government/city-council/meeting-attachments/rpt_pms_20231011_fin.pdf