

The Corporation of the City of Kawartha Lakes
Council Report

Report Number ENG2017-022

Date: October 24th, 2017
Time: 2:00 p.m.
Place: Council Chambers

Ward Community Identifier: All Wards

Subject: 10-Year Gravel Resurfacing Plan and Gravel Road Rehabilitation Needs

Author Name and Title: Adam Found
Manager of Corporate Assets

Recommendation(s):

RESOLVED THAT Report ENG2017-022, **10-Year Gravel Resurfacing Plan and Gravel Road Rehabilitation Needs**, be received;

THAT the 10-Year Gravel Resurfacing Plan 2018-2027, attached as Appendix A to Report ENG2017-022, be adopted for the purpose of complementing the 5-Year Roads Capital Plan and informing future capital budgets;

THAT forecasted annual expenditure for the Road Lifecycle Extension program within the 5-Year Roads Capital Plan be increased by approximately \$300,000 for 2021 onward to address gravel road rehabilitation needs on an ongoing basis; and

THAT Public Works and Engineering and Corporate Assets staff review options for addressing long-term drainage-related operating and capital needs of roads without storm drains for the purpose of informing proposed post-2018 capital and operating budgets.

Department Head: _____

Financial/Legal/HR/Other: _____

Chief Administrative Officer: _____

Background:

Through a reorganization that took effect January 1st, 2016, the Corporate Assets Division was transferred from the Department of Corporate Services to the newly formed Department of Engineering and Corporate Assets. As a result, the Corporate Assets Division assumed various new responsibilities. One of these is detailed capital forecasting for gravel roads as the 5-Year Roads Capital Plan managed by the Technical Services Division currently meets this need for paved roads only.

For gravel roads, there are two main types of regular capital treatment as follows:

1. Resurfacing: This involves the application of fresh granular “A” gravel to the road surface, typically at an average thickness of 10cm. The new road surface is graded, compacted and treated with calcium chloride. This treatment is designed to address gravel road surface depletion and weakening arising from weather, traffic and winter control operations.
2. Rehabilitation: This involves preparatory capital interventions such as base repair, surface remediation, culvert replacement, roadside berm removal, heavy ditching and heavy brushing. This treatment is designed to address deficiencies, typically drainage-related, which tend to shorten the useful life of a gravel surface.

Based on the 2016 Roads Needs Study, the 2017 Asset Management Plan sets the average capital need for gravel resurfacing at \$1.45M per year. The actual capital expenditure required, however, will fluctuate somewhat from year to year. Given this expected annual need for gravel resurfacing, staff estimate \$300K per year is needed on average to address gravel road rehabilitation needs in advance of resurfacing. The Road Lifecycle Extension capital program is designed to facilitate such preparatory work.

This report seeks direction from Council for establishing a long-term capital plan for gravel resurfacing and for augmenting the 5-Year Roads Capital Plan to include anticipated gravel road rehabilitation needs.

Rationale:

The proposed 10-Year Gravel Resurfacing Plan, attached hereto as Appendix A, and proposed \$300K increase in the expenditure forecast for the Road Lifecycle Extension program are based on the following premises:

1. Inventory: The inventory of assumed gravel roads is based on the 2016 Roads Needs Study and is subject to revision as a result of legal ownership reviews, new information coming forward and service level changes (e.g. paving of a gravel road).

2. Resurfacing: Subject to strategic road section grouping to minimize tender prices and promote resurfacing continuity, the target service level is set by road section as the expected lifecycle of a 10cm gravel road surface by annual average daily traffic (AADT) bracket:
 - a. AADT < 200: 10 years
 - b. $200 \leq \text{AADT} < 300$: 7-8 years
 - c. $300 \leq \text{AADT}$: 5 years

3. Rehabilitation: Through the Road Lifecycle Extension capital program, deficiencies are addressed as needed in advance of resurfacing so as to help ensure new road surfaces attain their expected lifecycle:
 - a. Base repair
 - b. Surface remediation
 - c. Culvert replacement
 - d. Roadside berm removal
 - e. Heavy ditching
 - f. Heavy brushing

4. Maintenance: Adequate annual maintenance is provided through roads operations programs so as to minimize rehabilitation and resurfacing needs and help ensure existing road surfaces attain their expected lifecycle:
 - a. Calcium chloride: Average of 1.35 L/m²/year¹
 - b. Grading: 2-4 treatments/year
 - c. Gravel patching: As needed
 - d. Light ditching: As needed
 - e. Light brushing: As needed

As Council and staff are aware, a number of gravel roads failed during the 2016-2017 winter and subsequent thaw, while others emerged in very poor to critical condition. In some cases, gravel roads were practicably impassible, raising concerns regarding property access, emergency response and user risk.

In short, a number of the City's gravel roads deteriorated at an accelerated rate or failed simply because they lacked the strength to withstand a winter and thaw that were atypically strenuous. These are predicable symptoms of chronic underfunding in road resurfacing and lifecycle extension programs as well as road maintenance operations.

While gravel resurfacing temporarily suppresses these symptoms, new gravel road surfaces eventually succumb to the underlying causes, typically drainage-related deficiencies. This manifests as unacceptable attained service levels and risk, accelerated road surface deterioration, road surface failure and increased operating and capital cost pressures. The historical practice of masking the effects underlying gravel road deficiencies with gravel resurfacing is

¹ This has been proposed in the 2018 operating budget as per Council Resolution CR2017-642.

unsustainable, and it is hence incumbent upon the City to find a responsible solution.

Council has already taken the following significant steps toward making the City's gravel road system sustainable:

1. Gravel Resurfacing: A 2017 increase of almost \$400K/year to the gravel resurfacing program to bring program expenditure nearly to the average required level.
2. Calcium Chloride: A proposed 2018 increase of more than \$1.0M/year to bring the average annual application rate of calcium chloride to the required level.
3. 10-Year Financial Plan: Adoption of a long-term financial plan that enables the City to strengthen its financial position and transition to sustainability.

While these measures along with an adequate gravel resurfacing program are necessary for gravel road sustainability, they are insufficient. As already indicated, rehabilitation, where required, is critical to gravel road sustainability. If the service levels, useful lives and lifecycle costs of gravel roads are to meet expectations, deficient road sections must be rehabilitated in advance of resurfacing.

Unfortunately, many years of inadequate resurfacing, rehabilitation and maintenance of the City's gravel roads has accumulated into an estimated \$4.6M backlog of gravel rehabilitation needs. Given this backlog ought to be addressed in advance resurfacing the affected roads, staff has included a 2018-2020 debenture-financed gravel rehabilitation program as a decision unit (RD1814) in the Proposed 2018 Capital Budget.

Staff is supportive of the gravel rehabilitation program decision unit, and has updated the 10-Year Financial Plan to accommodate it. However, the program is absorbable into 10-Year Financial Plan without an increase to forecasted tax increases only if it is debenture-financed. Given the scale of the program, tax levy or capital reserve financing would necessitate increases to future target tax increases. Moreover, given timing and staff resource constraints, the program is administratively manageable only if it is spread across three years or more.

The 10-Year Gravel Resurfacing Plan has been designed to accept seamless superimposition of the rehabilitation program. In large part, road sections scheduled for rehabilitation in one year are in turn scheduled for resurfacing in the next. In a small number of cases, resurfacing is scheduled for later in the planning horizon to maintain strategic road section grouping. The table below provides a summary of the plan, which is based on the detailed plan attached as Appendix A.

Summary of 10-Year Gravel Resurfacing Plan 2018-2027			
Year	Length (Km)	Estimated Tonnes	Estimated Cost (2017\$)
2018	103.963	103,530	1,440,102
2019	89.238	100,750	1,401,433
2020	102.220	108,940	1,515,355
2021	96.172	118,070	1,642,354
2022	98.026	103,980	1,446,362
2023	90.670	93,170	1,295,995
2024	88.729	102,620	1,427,444
2025	91.646	103,350	1,437,599
2026	96.528	103,960	1,446,084
2027	100.163	107,150	1,490,457
Average	95.735	104,552	1,454,318

Other Alternatives Considered:

In developing the 10-Year Gravel Resurfacing Plan, staff accounted for various factors such as resurfacing history over the past decade, existing road condition, coordination with rehabilitation needs and capital program acceleration to advance the rectification of deficiencies. Combinations of these were considered by staff as options for the basis of the plan as per the table below.

Summary of Options Considered for the Basis of the 10-Year Gravel Resurfacing Plan 2018-2027						
Option Number	Option	Historical Resurfacing	Road Condition	Rehabilitation Coordination	Even Expenditure	Front-Ended Expenditure
1	Status Quo	√			√	
2	Status Quo Accelerated	√				√
3	Basic Strategic	√	√		√	
4	Basic Strategic Accelerated	√	√			√
5	Advanced Strategic	√	√	√	√	
6	Advanced Strategic Accelerated	√	√	√		√

The importance of addressing the substantial backlog in gravel road rehabilitation needs in advance of gravel resurfacing narrows the potential recommendations down to options 5 and 6. Due to constraints on staff resources to provide contract administration support, staff is specifically recommending option 5. That is, the proposed 10-Year Gravel Resurfacing Plan is based on historical resurfacing, road condition, coordination with rehabilitation and a relatively even level of annual expenditure.

Overall, the 10-Year Gravel Resurfacing Plan represents the best gravel resurfacing forecast developable by staff at this time. Like with other similar capital plans, it is designed to function as a guideline for future capital budgeting

and thus remain flexible in response to changing circumstances. The Proposed 2018 Capital Budget already incorporates the first year of the plan.

As for future gravel road rehabilitation needs not forming part of the \$4.6M backlog, staff are recommending the Road Lifecycle Extension program expenditure forecast in the 5-Year Roads Capital Plan be increased by approximately \$300K to enable these needs to be addressed post-2020 on an ongoing basis. If the expected service levels, useful lives and lifecycle costs of gravel roads are to meet expectations, there is no viable alternative course of action on gravel road rehabilitation.

This report does not seek Council direction respecting the \$4.6M gravel road rehabilitation backlog as there is a decision unit in the Proposed 2018 Capital Budget that addresses this need.

Financial/Operation Impacts:

The average gravel resurfacing expenditure of \$1.45M per year derived from the 2017 Asset Management Plan has been incorporated into the 10-Year Financial Plan. At an average expenditure of \$1.45M per year, the proposed 10-Year Gravel Resurfacing Plan aligns with both these documents, and is thus within the City's ability to fund.

Similarly, the proposed \$300K increase in annual expenditure for the Road Lifecycle Extension program has been incorporated into the capital budget-related updates to the 10-Year Financial Plan, namely the realignment of the capital expenditure transition period. The ongoing amount actually required for this need will be reviewed and adjusted as needed through the annual capital budget process.

The potential financial and operation impacts associated with the final recommendation of this report, if approved by Council, will be addressed through post-2018 budget processes.

Relationship of Recommendation(s) To The 2016-2019 Strategic Plan:

The recommendations of this report align with the following goals of the Corporate Strategic Plan:

- Goal 1 – A Vibrant and Growing Economy: A strong gravel road system helps support commerce and economic growth.
- Goal 2 – An Exceptional Quality of Life: A strong gravel road system helps support quality of life and mobility, especially in rural areas of the City.

- Goal 3 – A Healthy Environment: A strong gravel road system helps support road safety and responsiveness of emergency vehicles.

Consultations:

Supervisor of Technical Services
Manager of Roads Operations, West
Manager of Roads Operations, East
Director of Engineering and Corporate Assets
Director of Public Works

Attachments:

Appendix A: 10-Year Gravel Resurfacing Plan



10-Year Gravel
Resurfacing Plan 201:

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Department Head: Juan Rojas, Director of Engineering and Corporate Assets