



## Committee of the Whole Report

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**Report Number:** RD2024-006  
**Meeting Date:** November 5, 2024  
**Title:** Calcium Chloride Program for Gravel Roads  
**Description:** An update on the Roads Calcium Chloride Dust Control Program  
**Author and Title:** Chris Porter, Manager, Roads Operations  
Thomas Hopper, Manager, Roads Operations

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### Recommendation(s):

**That** Report RD2024-006, **Calcium Chloride Program for Gravel Roads**, be received; and

**That** this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

**Department Head:** \_\_\_\_\_

**Financial/Legal/HR/Other:** \_\_\_\_\_

**Chief Administrative Officer:** \_\_\_\_\_

**Background:**

At the Committee of the Whole Meeting of January 16, 2024, Council adopted the following resolution:

**CW2024-017**

**Moved By** Councillor Richardson

**Seconded By** Councillor Perry

**That** the Memorandum from Councillor Richardson, **regarding Calcium Chloride Program for Gravel Roads**, be received.

**That** Staff report back to Council by Q3, 2024 with a report on the status of the calcium chloride program for gravel roads, including target and achieved calcium chloride application rates, direct program costs, service and lifecycle cost impacts of the program.

**That** Staff determine whether the program requires adjustment to better minimize gravel road lifecycle costs; and

**That** this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

**Carried**

This report addresses that direction.

The City of Kawartha Lakes has an inventory of approximately 860 kilometers of fully maintained gravel roads. One of the annual maintenance programs for the City's gravel roads is the application of calcium chloride. This program provides two main benefits, base stabilization and dust suppression.

Calcium chloride provides base stabilization by the liquid calcium chloride solution penetrating the road base and coating/lubricating the particles of dust and gravel. This improves the interlocking action and causes the particles to bind together more efficiently. The binding action stabilizes the surface of the road, keeping it dense and compacted resulting in a smoother driving surface for our residents. Base stabilization also leads to additional benefits such as reduced maintenance costs after application is complete as well as higher retention of road material.

Calcium chloride is hygroscopic, meaning it absorbs moisture from the air and surroundings and is able to retain it for prolonged periods. Calcium chloride also reduces the vapour pressure of water making it evaporation resistant resulting in more optimal moisture levels being retained within the road base. All this combined allows the surface to remain in an artificially damp state, reducing airborne dust.

The calcium chloride application program generally starts mid-late spring and finishes in the early part of summer. Liquid calcium chloride works best when it is applied to a road just before it becomes dry. The application will always add moisture to the road but will penetrate better when there is already moisture present. Manufacturers also advise against applying calcium chloride to a road just before or during a heavy rain because the material may wash away.

The program currently uses a mix of internal and external resources; City Staff prepare the roads by grading and shaping them and then a contracted service will supply and apply the calcium chloride using a tanker truck with a rear mounted distribution bar that spreads the liquid evenly over the road. Most other Ontario Municipalities apply calcium chloride to their gravel roads during a similar timeframe so scheduling with common vendors becomes a key part of the programs success. Staff have arranged with the current vendor for four tanker trucks to be dedicated to the City on a daily basis once the program is underway. That said and as mentioned above, inclement weather can delay a planned calcium chloride application and the schedule for the supplier does not bump back so any delays require rescheduling which can prolong the program. Staff work together to share/redirect trucks as able but with all areas are trying to complete the program at the same time, rescheduling is sometimes the only option.

In 2017, report PW2017-006 (Appendix A) was brought forward to Council. The report outlined the state of the program at that time and possible alternatives to improve the program. Council resolved to move forward with an alternative that increased the application rate from 2,000 liters per kilometer (L/km) to 6,000L/km for all roads and also increased the average spread width from 3.6 meters to 4.45 meters. In the years after the application rate was increased, Staff found that residual calcium chloride was retained within the road base resulting in a reduced application being sufficient. Once calcium chloride is properly applied, the road typically will not require grading until the fall, if at all under normal weather conditions.

The Roads Division is cognisant of the environment and strives to perform operations in an environmentally responsible manner. Over application of calcium chloride can cause runoff into ditches. After direction to increase application rates up to 6000 L/km Staff implemented those changes in 2018. We actively monitored the application and determined that our road structure did not need this average amount to stabilize and effectively treat roads. Table 1 shows the target and achieved rates over the past five (5) years as well as the cost for the material used.

Table 1: Calcium Chloride Target and Achieved Average Application Rates\*

Year	2020	2021	2022	2023	2024**
Target (budget) Application Rate (L/km)	5,350	5,350	5,250	4,750	5,150
Achieved Application Rate (L/km)	4,750	4,750	4,472	4,500	4,000
Annual Spend***	\$990,000	\$1,000,000	\$1,080,000	\$1,275,000	\$1,185,000

\* This is an average application rate for all gravel roads. As gravel roads vary in width, the application rate could vary from 3,000 to 6,000 L/km.

\*\* Year to date; final rate and spend are incomplete.

\*\*\* This is the cost of the material only. Other costs such as Staff time and internal equipment charges are fixed and would stay within the operating budget regardless of any changes to the calcium chloride program, they would just be reallocated to other roads operations activities.

As can be seen in Table 1, Staff have been lowering the target application rate year to year, as well as the corresponding budget, as conditions have demonstrated the higher application rate is not required. The initial application in recent years has typically been 4,000L/km with the remainder available for fall applications as deemed necessary by

observed road conditions. As the table shows, the fall applications have not been required to reach the target rate.

### **Rationale:**

Maintaining the budget for the application of calcium chloride in the City of Kawartha Lakes is essential to ensure continued effectiveness in dust control, road maintenance, and the overall longevity of our gravel road infrastructure. To support this, please see the following details regarding the use of calcium chloride:

1. While it is difficult to obtain an objective measure on the effectiveness of dust control, one measurement that could be useful is the input of resident concerns also known as cases. Currently the Roads Division aims to have all application of calcium chloride completed by the end of June. This goal is dependent on capital gravel, weather and staff availability. A review completed to compare 2017 to 2024 in regards to cases related specifically to dust on gravel roads treated with calcium chloride found that in 2024, the City of Kawartha Lakes had 66% fewer cases than in 2017 during the period from July 1<sup>st</sup>-October 1<sup>st</sup> of those years.
2. The same review was conducted into grading requests on gravel roads within the same timeframe of July 1<sup>st</sup>-October 1<sup>st</sup> in 2024 resulted in a 21% decrease in cases when compared to July 1<sup>st</sup>- October 1<sup>st</sup> in 2017.
3. In any given year, a variety of factors can affect the amount of calcium chloride that is required to treat gravel roads. Temperature, gravel composition, moisture content, weather conditions, the structure and compaction of the gravel road all play a part in absorption rates of calcium chloride.

### **Other Alternatives Considered:**

Alternative products have been considered by the Roads Division at different times since amalgamation. Although the products reviewed claim equal to or better results in relation to dust suppression and stabilization of the road in comparison of calcium chloride, similar issues have arisen in regards to using these products. The main issues are cost, dependability of reported results and ability to address underlying base issues once materials are applied to the roadway.

City staff are always looking for ways to improve services through reviewing new products and methodologies in relation to road maintenance. As additional products reach the market, our intention is to review these products to determine their viability for use within the City of Kawartha Lakes in order to provide value for the taxpayers dollars. To this point, calcium chloride has consistently demonstrated that its application

is the most effective in relation to both cost and maintaining longevity of gravel road surfaces.

### **Alignment to Strategic Priorities**

Good Government: The City of Kawartha Lakes has an obligation to ensure that we promote continuous improvement and innovation to 'Make It Better' in all service areas. Through the proactive implementation of the City's calcium chloride maintenance program, the Roads Division effectively mitigates customer concerns regarding dust before they develop into significant issues. Staff also review application methods and planning to ensure that the program operates effectively and efficiently. The City also has committed to ensuring that municipal assets are well maintained and well managed. The application of calcium chloride to gravel road surfaces not only controls dust but also supports maintenance activities and extends the overall lifespan of the roadway.

### **Financial/Operation Impacts:**

There are no financial impacts with continuing to administer the application of calcium chloride as the program stands currently. The current cost of the program is included in the operating budget. Staff account for consumer price index (CPI) increases when proposing budgets annually.

The cost for the calcium chloride program did see an increase significantly above CPI in 2023 due to the cost of the product increasing as a result of higher production costs and fuel volatility. Furthermore, in 2023 an additional unit rate was added for trucks carrying less than 20,000L per load in alignment with the contract. Smaller trucks are required on roads that are narrower or have smaller turn around areas where the larger trucks would experience challenges. Prior to the additional rate being added, the supplier worked with the City and provided the smaller trucks at no additional cost but due to rising operational costs the supplier requested the additional rate during the 2023 renewal. Table 2 shows the unit rate percent increases for the past 5 years.

Table 2: Calcium Chloride Unit Cost increases

Year	2020	2021	2022	2023	2024
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Calcium Chloride Cost Per Liter Percent Increase from Prior Year	5.10%	0.86%	4.68%	31.67%	3.41%
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The Capital Gravel Program that is led by Engineering and Corporate Assets has not completed a full cycle since the calcium chloride application rate was increased in 2018. With that said, it is difficult to determine the full impact of the increased rate on lifecycle costs. Engineering and Corporate Assets updated the 10-year Capital Gravel Resurfacing Plan in 2017 and then again in 2020 through Reports ENG2017-022 and CA2020-002 respectively (Appendix B and C to this Report). The annual application rate of calcium chloride was a consideration in the basis of those plans. One promising sign is that since the rate was increased, the Roads Division has had less difficulty with keeping roads in a good state of repair until their planned year within the resurfacing program.

**Consultations:**

Director of Public Works

**Attachments:**



Report PW2017-006

Appendix A – Report PW2017-006



ENG 2017-022

Appendix B – Report ENG2017-022



CA2020-002

Appendix C – Report CA2020-002

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