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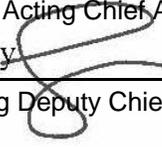
Item No. 14.1.4
Halifax Regional Council
March 8, 2016

TO: Mayor Savage and Members of Halifax Regional Council

Original Signed by 

SUBMITTED BY:

John Traves, Q.C. Acting Chief Administrative Officer

Original Signed by 

Jane Fraser, Acting Deputy Chief Administrative Officer

DATE: February 16, 2016

SUBJECT: Street Traffic Control Annual Pavement Marking (Painting)

ORIGIN

Item 14.1 of the July 21, 2015 meeting of Halifax Regional Council:

MOVED by Councillor Craig, seconded by Deputy Mayor Nicoll that Halifax Regional Council request a staff report that:

- Explains the current street traffic control pavement paint marking policy and procedures as to why the standard is to paint all pavement markings once per year;
- Explains the environment regulatory factors that impact the types of paint used, and further the quality and the application of paint required to ensure maximum durability;
- Explains the Traffic Authority's role, responsibility and, use of and adherence to the national standards;
- Provides options for Regional Council's consideration that could result in street pavement paint marking being done in a more accelerated timeline i.e. more equipment, different paint, etc;
- For clarity the report is to also include, however not be limited to, new and renewed paving projects and crosswalks; and,
- That this report come back to Regional Council in advance of and for consideration during the 2016/2017 budget deliberations.

MOTION PUT AND PASSED UNANIMOUSLY.

LEGISLATIVE AUTHORITY

Part I, Section 21, "Standing, Special and Advisory Committees"; and

Part XII, Section 322 (1), "Street Related Powers" of the HRM Charter: "The Council may design, lay out, open, expand, construct, maintain, improve, alter, repair, light, water, clean, and clear streets in the Municipality".

RECOMMENDATION ON PAGE 2

RECOMMENDATION

It is recommended that Regional Council direct staff to:

1. Where required, perform a fall season re-painting of zebra crosswalks on arterial and major collector roadways outside the downtown core; and
2. Pilot the use of a variety of durable (permanent) pavement marking products in conjunction with capital works and maintenance programs in order to identify products that may prove beneficial to improving the longevity of pavement markings in various applications.

BACKGROUND

An information report submitted to the Transportation Standing Committee on June 25, 2015 entitled "Repainting of Existing Crosswalk Lines a Second Time Each Year" identified that efforts to re-paint zebra crosswalks outside the Downtown Core area, at locations with high vehicle volumes, would require an increase in the current pavement marking contracts of approximately \$45,500 for the current year (2015) and additional operating budget for the remaining two years (2016 and 2017) of the existing three-year contracts. In determining this estimate, the cost to repaint all zebra crosswalks a second time was also determined. Considering current year (2015) costs, it was estimated that the existing pavement marking contracts would need to be increased by approximately \$77,500. The report outlined the difficulties in requiring the contractor to meet this request for the 2015 painting season, which was already underway and also identified logistical issues with expanding the pavement marking program beyond its current scope.

DISCUSSION

Existing Pavement Marking Program

HRM's pavement marking program is undertaken annually. The program begins in May and runs until October, weather depending, and has historically included only a single paint application per season. Both internal staff resources as well as external contractors are employed to carry out the work. Repainting of all yellow and white longitudinal lines is done with a line painting truck operated by HRM staff. All other markings (crosswalks, stop bars, arrows/symbols and hatched areas) are done through contractors using templates and small, hand operated machines. External work is handled under two separate contracts; one covering the west region and the other covering the east/central regions. This past summer was year one of a three year contract.

In 2014, HRM's pavement marking contracts were adjusted to include a second application of all markings in the downtown core areas in the fall. A survey of other Canadian jurisdictions found that HRM's current pavement marking program is similar to typical practices across Canada. Appendix A outlines the information received through the survey and identifies practices used by others.

Approximately half of the responding jurisdictions carry out their pavement marking programs using solely in-house staff resources. The remaining jurisdictions split between a combination of in-house/contractor and contractor only operation. Half of the jurisdictions undertake only a single paint application per program season, with the other half carrying out a second paint application to at least a portion of their inventory (i.e. repainting of crosswalks or business district/down town area or high volume roads, etc.). All jurisdictions that responded undertake their programs within approximately the same time frame, typically between April/May and October/November with exact timelines being dependent on weather.

Environmental Regulation Considerations

Federal environmental regulations introduced in 2012 stipulate the use of traffic marking paint products that have a low volatile organic compound (VOC) concentration. These regulations restrict the import or manufacture of traffic marking paint products in Canada with VOC concentrations greater than 450 grams per litre (g/L). In addition, the regulations also include seasonal restrictions for traffic paint that require any products used between May 1st and October 15th to have VOC concentrations of 150 g/L or less. In order to be in compliance with Federal regulations, HRM was required to switch from solvent-based to water-based traffic marking paint. HRM currently uses a low temperature, waterborne traffic marking paint for the line truck which has a VOC concentration of approximately 100g/L and paint used by the contractors is a low VOC acrylic paint with VOC concentrations of 148g/L (white) and 115g/L (yellow).

Use of these low VOC traffic marking paints present some challenges in application as this material is more sensitive to temperature and humidity during application. Minimum application temperature to ensure acceptable performance is at least 5°C and maximum humidity must be below 85%. These application requirements result in a narrower window when appropriate painting conditions exist and effectively shorten the available painting season. In addition to the challenges associated with application, these paints are also less durable and susceptible to increased wear from road salt/sand abrasion during winter maintenance operations and in-service conditions.

All contractors employed to carry out the annual pavement marking program are required to follow the application guidelines as presented in the material data sheets for the particular paint being used. These guidelines specify application conditions (temperature, humidity, etc.) as well as appropriate paint application rates and film thickness for the finished product. Once a particular location has been completed by the contractor, HRM staff is dispatched to do an inspection of the work which is limited to a verification of the number and type of markings that were required to be installed and a simple visual inspection of the paint to identify if it appears to have been properly applied (i.e. asphalt does not show through).

Paint manufacturers are aware of jurisdictional concerns with respect to the durability of low VOC paint and are attempting to provide new products. Also, durable markings (cold plastic, thermoplastic, etc.) are an alternative to painted pavement markings such as crosswalk lines or zebra markings. Although typically more durable, they tend to cost six to eight times the average cost of painted markings.

Role of Traffic Authority

The ability of the Traffic Authority to place pavement markings on public roadways is governed under Section 89(1) of the Nova Scotia Motor Vehicle Act (MVA) which indicates that Traffic Authorities may place markings deemed necessary to direct and regulate traffic and to carry out provisions of the Act. In addition, Section 89(2) of the MVA requires that any markings placed by a Traffic Authority must conform to Provincial specifications in order to ensure uniformity in type and application throughout the Province. The Manual of Uniform Traffic Control Devices for Canada (MUTCDC) is the standard adopted by the Nova Scotia Department of Transportation and Infrastructure Renewal and as such, placement of any pavement markings within the Province must conform to the standards within the MUTCDC as it relates to placement, type and color in order to be in compliance with the MVA.

Options

1. Marking Materials

There are a large variety of materials available for pavement markings. Considerations in choosing the appropriate material include, among others: purchase cost, durability, retro-reflectivity, pavement surface condition and material, installation effort and impact (drying time/need for lane closure). Table 1 provides a broad comparison of the most common materials.

Material	Comments
Paint	Water based paint applied either cold or hot is the most commonly used pavement marking. It is low cost with a short drying time, but its visibility under some conditions is not ideal. Traffic and snow plowing can cause it to deteriorate quickly. Oil based paints are somewhat more durable. Glass beads can be added to paint to improve reflectivity. Service life generally 1 year, except on low volume roads.
Thermoplastics	Thermoplastic heated to 200°C is spread on pavement surface. Special application equipment is required. Service life may extend from 4 to 7 years. Significantly higher material and installation cost than paint. Quality is dependent upon pavement surface condition and material.
Epoxy	Applied as a liquid with specialized equipment. Slow drying. Service life of 2 to 4 years. Higher material and installation cost than paint.
Pre-formed (Tapes)	Tape can be inlaid to hot asphalt as part of a new construction. Excellent visibility and retro reflectivity. Service life up to 8 years.

2. Installation Resources

For linear pavement markings installed by in-house staff, there is currently only one specialized line-painting vehicle in the Halifax fleet. Based on the existing quantity of line marking, the truck must be operated for 42 shifts per season. While in theory an additional line-painting vehicle would allow this work to be achieved in half as many calendar days, the cost of acquisition, maintenance and storage would be difficult to justify for such limited use. Alternatively, staff proposes to focus on ensuring the existing vehicle is well-maintained and ready for use prior to the start of the painting season; and, training additional staff and so that the vehicle can be operated for as many shifts per week as weather and traffic conditions permit.

All transverse and symbol markings are performed by contractors. Additional contracted resources could be acquired to facilitate a greater quantity of work being completed when weather conditions are favourable. However, in the past there has been limited competition for these contracts and contractors may be challenged to find additional skilled workforce and acquire additional capital equipment for a shorter contract duration.

3. Changes to Materials and Practices to Create a Longer Re-marking Service window

By using a combination of some longer life marking materials in new construction and second applications of paint in high-wear maintenance applications, it may be possible to reduce the volume of re-marking necessary in the late spring/early summer window. This would reduce the risk of adverse weather conditions prolonging the period before worn markings can be refreshed.

In addition, internal improvements underway in the maintenance of record drawings and accurate quantities to guide the pavement marking program will improve the effectiveness of both internal and contracted crews.

Staff will continue to investigate advancements made by paint manufacturers in order to identify potential alternatives to the products currently being used which could provide improved durability and/or expanded application conditions. Also, staff will investigate and consider the use of various durable pavement marking materials as part of different capital works projects, such as:

- Zebra markings as part of upcoming RA-5 crosswalk upgrade projects
- Bicycle / sharrow markings for bikeway projects
- Stop bar and crosswalk lines on intersection upgrade and paving projects

Costs associated with the use of durable (permanent) markings would be included as part of the project budget at the time of design and tendering.

FINANCIAL IMPLICATIONS

The 2016/17 Proposed Capital Budget includes an expanded Street Recapitalization program (Project #CR000005) which includes the funding for the initial pavement marking application on the new pavements. There are sufficient funds within this budget to accommodate the piloting of durable marking materials in a number of different applications. In addition, due to the greater length of roads being repaved, there are sufficient funds in the 2016/17 Proposed Operating budget (R747-6399) to provide a second application of paint to all zebra crosswalks on arterial and major collector roadways, both inside and outside the downtown core.

COMMUNITY ENGAGEMENT

Community engagement was not conducted in the preparation of this report.

ENVIRONMENTAL IMPLICATIONS

Volatile organic compound (VOC) emissions from consumer and commercial products are a significant contributing factor in the creation of air pollution in urban areas. The use of consumer and commercial products results in emissions of VOCs from solvent-based products, and to a lesser extent, water-based products. These emissions contribute to the formation of ground-level ozone and fine particulate matter, which form smog. Smog is known to have adverse effects on human health and the environment.

Air pollution has been shown to have a significant adverse impact on human health, including premature deaths, hospital admissions and emergency room visits. Studies indicate that air pollution is associated with an increased risk of lung cancer and heart disease.

Scientific evidence also indicates that ground level ozone can have a detrimental impact on the environment. This impact can lead to reductions in agricultural crop and commercial forest yields, reduced growth and survivability of tree seedlings, and increased plant susceptibility to disease, pests, and other environmental stresses (e.g. harsh weather).

ALTERNATIVES

The following alternatives are provided for consideration by Regional Council:

1. Direct staff to expand the current pavement marking program contracts to include repainting of all zebra crosswalks, a second time each year, where required, at an additional cost of approximately \$77,500.
2. Direct staff to continue with the pavement marking program as per current practice.
3. Direct staff to undertake negotiations with the contractors to explore opportunities to expedite the painting of the contracted work.

ATTACHMENTS

Appendix 1 Survey of Pavement Marking Practices of Other Canadian Jurisdictions

A copy of this report can be obtained online at <http://www.halifax.ca/council/agendasc/cagenda.php> then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 902.490.4210, or Fax 902.490.4208.

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Appendix 1:
Survey of Pavement Marking Practices of Other Canadian Jurisdictions

Jurisdiction	Pavement Marking Practice
Fredericton	<ul style="list-style-type: none"> • Repainting done annually and includes the entire jurisdiction • All crosswalks painted twice as well as lines in the downtown business district repainted a second time as needed • Program carried out in-house with a 3 person crew using a line truck and a truck for arrows/crosswalks • Painting typically completed in September with line work done first, then crosswalks and then arrows • Crosswalks are prioritized to paint school zones and downtown business district first
Mississauga	<ul style="list-style-type: none"> • Repainting done annually and includes the entire jurisdiction • White longitudinal lines, yellow longitudinal lines in heavy volume areas and signalized intersections are painted twice • Two in-house crews of 2 paint all-way stop bars and crosswalks, the rest of the program is contracted out with an inspector assigned to direct/inspect the contractor • Time to complete the entire program is weather dependant, but typically done in 7 months
St. John's	<ul style="list-style-type: none"> • Repainting is done annually and includes the entire jurisdiction • Lane lines, centre lines and zebra crosswalks painted twice • Entire program is done in-house with 21 staff (two 3-person centre line crews, six 2-person intersection crews and one 3-person crew for thermoplastic) • Program begins April 1st (weather permitting) and second painting typically begins end of August
Yukon (Yukon Territory)	<ul style="list-style-type: none"> • Repainting is done annually and includes approximately half of the jurisdiction (centre line / edge line on surfaced highway) • High traffic area near Whitehorse is done twice per year • Program is carried out in-house with a 4-person crew • Program begins in mid-April with a preliminary assessment. Painting begins in early May with completion typically by early October
Ministère des Transports du Québec (Province of Quebec)	<ul style="list-style-type: none"> • Repainting is done annually and includes the entire jurisdiction with waterborne paint, except on new asphalt where epoxy resins are used • Additional painting is only done on new pavement applications where alkyd paint was applied after October 15th. The second application is done over the winter months, if needed, to maintain visibility of the pavement marking. • Approximately 75% of the program is carried out in-house using 9 crews on 8 trucks (one truck for epoxy resins, seven trucks for waterborne paint) • Program carried out from April to October
Cambridge	<ul style="list-style-type: none"> • Repainting is done annually and includes the entire jurisdiction • All pavement markings are painted only once per season • Entire program is carried out by contractor using different crews for lane lines, intersection markings and symbols • Program carried out between May and November
Vancouver	<ul style="list-style-type: none"> • Repainting is done annually and includes centre line and edge lines for the entire jurisdiction • Crosswalks are re-marked every 3-7 years depending on location and wear while other markings are re-done on a case-by-case basis and are subject to funding • Program begins in early June and ends in early October
NSTIR (Province of NS)	<ul style="list-style-type: none"> • Repainting is done annually and includes the entire jurisdiction (except for edge lines on Route Highways which are done every second year) • Pavement markings are painted only once per season • Program is carried out using four line trucks (three in-house and one

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	<p>contracted out) for longitudinal lines. Crosswalks, stop bars and arrows/symbols carried out in-house</p> <ul style="list-style-type: none"> • Program begins in May and ends in October/November
Winnipeg	<ul style="list-style-type: none"> • Repainting is done annually and includes the entire jurisdiction • Pavement markings are painted twice per season with some high volume roads receiving a third application • Program is carried out in-house using one lane line crew, four crosswalk crews and one stencil crew • Program begins in May and ends in November
NBTI (Province of NB)	<ul style="list-style-type: none"> • Repainting is done annually on roads with AADT greater than 1000, every other year on roads with AADT between 500-1000 and no striping on roads with AADT less than 500 • Painting is only carried out once per year. Some repainting may be done at select locations (roundabout or new paving projects) that require touch-up in the fall • Program is carried out in-house using one pre-marking crew, two large paint truck crews, one small paint truck crew and one utility crew (arrows, stop bars, cross hatching) • Program begins in early May with pre-marking and ends by mid to late October
British Columbia (Province of BC)	<ul style="list-style-type: none"> • Repainting is done annually on approximately 65% of the line inventory • Painting is only carried out once per year • Program is carried out by contractor in five separate contract areas • Depending on the area of the Province, the program typically runs from the beginning of April to the end of October