

TO: MAYOR J. LEHMAN AND MEMBERS OF COUNCIL

FROM: R. SUTTON, P. ENG., DIRECTOR OF ENGINEERING

NOTED: R. J. FORWARD, MBA, M.SC., P. ENG., GENERAL MANAGER OF INFRASTRUCTURE AND GROWTH MANAGEMENT

M. PROWSE, CHIEF ADMINISTRATIVE OFFICER

RE: INVESTMENT IN ROADS AND PAVEMENT MANAGEMENT STRATEGIES
(FILE: T06-IN)

DATE: JANUARY 15, 2018

Investment in Roads

The City's pavement assets have a replacement cost of over \$660 million. To look after this valuable asset portfolio, the City employs a range of programs and strategies, from regular road patrols ensuring compliance with minimum maintenance standards to full reconstruction projects and many things in between.

The City has been increasing the investment in roads, particularly in pavement preservation activities, since the 2014 Business Plan. The 2014 Business Plan motion included the following related to local road rehabilitation:

“14-G-017 (12) That the Neighbourhood Road Renewal Program be included in the 2015 and subsequent capital plans at a typical funding level of \$500,000.”

The Neighbourhood Renewal Program (NRP) was developed in 2012 as a framework used to plan for the rehabilitation of local infrastructure. The naming conventions that are used have resulted in some confusion about which capital projects are related to the NRP and which aren't. Nearly all work that is planned on local roads, water mains or sewers, is a result of planning through the NRP. Staff understand the intent of the motion's reference to “Neighbourhood Road Renewal Program” to be an investment specifically in existing local roads.

Table 1 describes historical and future budgeted amounts for the renewal of local roads. These values include all phases of work associated with local roads (eg. design and construction), and focus only on local roads, excluding other transportation related expenses such as sidewalk, traffic signals, streetlights, bridges, and parking lot spending requests, and excluding any type of subsurface infrastructure such as water mains and sewers. The types of projects range from preservation activities like resurfacing, to the local road component of a full right-of-way reconstruction.

The table notes that in the 3 years prior to motion 14-G-017, which established a typical \$500,000 investment in Neighbourhood Road Renewal, the average annual investment in local road renewal was approximately \$670,000, and from the year following the motion to 2017, the investment was well in excess of \$500,000. In the recommended 2018-2027 capital plan, anticipated investment in local roads increases further.

Table 1

Time Period	Average Annual Budgeted Amount – Local Roads
2012-2014 *	\$667,000
2015-2017 **	\$4,000,000
2018-2022	\$8,400,000
2023-2027	\$8,000,000
* Introduction of \$500,000 local road spending	
** Introduction of DIRF	

In 2015, Council approved the creation of the Dedicated Infrastructure Renewal Fund (DIRF), an annual contribution to the City's Tax Capital Reserve to assist in funding the replacement and rehabilitation of Barrie's infrastructure. The DIRF is a 1% incremental increase to the tax rate, which equated to approximately \$2.5 million in 2017. The amounts in Table 1 demonstrate that the increased investment in local roads alone, exceeds the annual DIRF contribution. Note, that this table references just local roads spending, and many other infrastructure assets are also being renewed annually through the DIRF. Additional information is available in Appendix A, describing the budgeted amounts for all classifications of road by year, from 2012 to 2027.

Pavement Management Strategy

In between a road's initial construction, and when it needs full replacement (reconstruction) there are several options that can reduce the total investment required to keep roads in good condition and meet the desired levels of service.

The City regularly collects condition data on the entire road network, and uses this information to plan which roads require investment. This data is combined with data about the condition of subsurface infrastructure (water mains and sewers), and output from master plans which identifies capacity needs associated with roads and pipes, to determine the most appropriate investment strategy for each right-of-way. The last road condition assessment project was in 2014, and through the capital plan staff are recommending an update in 2018.

In general, strategies that are used early on in the life of the pavement when it is still in good condition are less expensive and faster to complete, than strategies that are applied later when the pavement deterioration is more extensive. Given the number of roads that have been constructed in Barrie in the last 30 years, it is important that the City proactively look after them.

Pavement preservation activities are often equated to fixing the roof on your house. Replacing the shingles at regular intervals prevents water from getting into the structural components of the building, which could cause expensive structural damage. Appropriately timed preventative investment in roads, keeps water out of the pavement layers, preventing cracks and other defects from forming.

Decisions about investment in roads must consider balancing a number of factors:

- local, collector and arterial roads as appropriate
- existing roads, versus new or widened roads
- proactive versus reactive activities

The following table describes the City's approach to pavement management, as well as how the recommended 2018 capital plan addresses this issue with a total budget request for roads in 2018 of approximately \$43 million. This includes spending on local, collector, and arterial roads and for all phases of work (design, property, construction etc.). The \$43 million excludes sidewalk, traffic signal, streetlight, bridge, and parking lot spending requests, and also excludes maintenance activities (other than crack sealing listed below) like pot hole filling and patching, which are operating budget items. The proposed spending for 2018 is broken down in Table 2 as follows:

Table 2

Treatment	Application and Benefits	Construction Techniques	Recommended 2018 Capital Plan
Pavement preservation	<ul style="list-style-type: none"> Extend the life of pavement surface assets that are in the very early stages of deterioration. Application to road that are in fair to good condition. Resurfacing preserves and protects the road structure, preventing rapid deterioration in pavement and risks due to unsafe driving conditions. Work can usually be completed within a few days, and is substantially less expensive than full road reconstruction. Design effort and cost is low relative to full reconstruction. 	<ul style="list-style-type: none"> Early life techniques typically involve application of thin, bituminous-based products to existing pavement, through techniques like reclamite, micro surfacing, slurry sealing and fog sealing. Resurfacing involves milling off all, or a portion of the existing asphalt and then placement of a new asphalt surface. 	<p>Pavement preservation (\$3.25 million) includes:</p> <ul style="list-style-type: none"> Planned, proactive activities that will extend the life of the road; often roads appear to be in fair to good condition. \$2.85 million for road resurfacing (2017 locations included St. Vincent from Bell Farm to Duckworth, Hurst from Golden Meadow to Big Bay Point, Ferndale, Worsley), future locations to be determined annually. \$300k for pilot projects using early life techniques like micro surfacing, slurry sealing, pavement rejuvenation. \$100k for crack sealing (operating budget). It should also be noted that the road resurfacing program is recommended to increase in future years of the capital plan, with a phased increase up to \$8.4 million. Pavement preservation is typically funded from the Tax Capital Reserve and is also eligible for Federal Gas Tax.
Reconstruction	<ul style="list-style-type: none"> Required when the road base has failed and reached the end of its life, when subsurface pipes require replacement, or the road is being widened. Necessary in some circumstances, it can be deferred by investing in proactive treatments like those described above. 	<ul style="list-style-type: none"> Removal and replacement of the asphalt surface of a road, and the granular base material. Most expensive way to treat a road, and usually requires at least one full construction season to complete. 	<p>Road reconstruction (\$39.5 million) includes:</p> <ul style="list-style-type: none"> Road reconstruction where widening is the driving factor (eg. Mapleview from Huronia to Country Lane, and Country Lane to Yonge in the future). Road replacement over pipe installation or replacement (eg. Sandringham water main, Glenecho water main). Road reconstruction as part of full right-of-way replacement (eg. Henry Street in 2018, Duckworth Street in 2019, Highland/Mountbatten previously, or a future neighbourhood reconstruction).

Treatment	Application and Benefits	Construction Techniques	Recommended 2018 Capital Plan
Reconstruction (continued)			<ul style="list-style-type: none"> Stand alone road rehabilitation - more extensive/less proactive than resurfacing (eg. Hurst from Cox Mill to Golden Meadow, Anne Street North from Sunnidale to City limit, Bayfield from Coulter/400 to Cundles). Depending on the project driver, reconstruction projects may be funded from a number of sources, including the Tax Capital Reserve, Development Charges, Federal Gas Tax, other grant opportunities, or a combination of the above.
End of life and holding strategies	<ul style="list-style-type: none"> Some roads in the city have failed and are not delivering the expected or desired service, but they aren't planned to be reconstructed in the short term. A holding strategy is a relatively minor investment to achieve a short term service improvement, until more permanent improvements are made. 	<ul style="list-style-type: none"> Asphalt overlays or in-place pulverize and overlay are the most common, these work best on rural cross sections. Partial depth resurfacing on a road that requires full reconstruction can serve as a holding strategy. Localized repairs can be completed by large patches where sections of pavement are cut out and replaced. 	<p>Holding strategies (\$375k) includes:</p> <ul style="list-style-type: none"> Minor investment in a failed pavement to achieve a short term service improvement (approximately 3-8 years) until a more permanent improvement can be completed. Typically the permanent improvement is within the term of the capital plan. Driven by both a need to improve service on a failed surface, and unusually high reactive maintenance costs (pothole filling) by operations crews. \$155k for Huronia Road from Yonge to Little (ultimate construction is planned for 2025/2026). \$220k for end of life program. Holding strategies are funded from the Tax Capital Reserve.

Summary

Looking forward the City's asset base will continue to grow, and the need for a proactive approach to managing those assets will be key to ensuring that the City is able to deliver services to the public in a responsible and cost effective manner. Continued investment in various forms of pavement management is and will continue to be essential to maintaining service levels and managing risk.

If there are any questions please contact Kelly Oakley at extension 4451 or by email at kelly.oakley@barrie.ca.

Appendix A

Year	Local Roads	Collector Roads	Arterial Roads	Total Roads	Infrastructure	Capital Plan Total
2012	\$ 1,060,000	\$ 1,705,000	\$ 2,526,500	\$ 5,541,500	\$ 44,855,000	\$ 88,138,876
2013	\$ 154,000	\$ 534,600	\$ 3,712,000	\$ 4,400,600	\$ 20,311,000	\$ 49,441,680
2014	\$ 785,900	\$ 2,242,500	\$ 4,672,800	\$ 7,701,200	\$ 25,477,000	\$ 59,040,300
2015	\$ 2,420,500	\$ 1,488,592	\$ 9,077,272	\$ 12,986,364	\$ 32,276,000	\$ 65,015,290
2016	\$ 4,599,333	\$ 1,964,333	\$ 11,953,786	\$ 17,954,805	\$ 40,924,000	\$ 76,150,084
2017	\$ 5,269,890	\$ 4,241,143	\$ 15,571,826	\$ 25,103,859	\$ 64,756,000	\$112,349,810
2018	\$ 4,108,750	\$ 1,971,333	\$ 37,044,223	\$ 43,067,639	\$ 82,865,000	\$173,301,511
2019	\$ 3,069,083	\$ 3,197,393	\$ 40,349,715	\$ 46,616,192	\$ 89,574,000	\$168,872,956
2020	\$ 4,503,333	\$ 7,038,083	\$ 83,145,916	\$ 94,687,333	\$190,269,000	\$247,146,784
2021	\$ 11,302,833	\$ 5,937,223	\$ 46,195,251	\$ 63,482,708	\$132,491,000	\$203,711,038
2022	\$ 19,189,083	\$ 6,178,333	\$ 25,709,083	\$ 51,076,500	\$112,057,000	\$218,339,500
2023	\$ 12,305,207	\$ 7,727,833	\$ 30,125,173	\$ 50,158,214	\$129,406,000	\$265,723,634
2024	\$ 10,743,727	\$ 5,926,103	\$ 10,483,071	\$ 27,152,901	\$ 92,556,000	\$127,725,976
2025	\$ 6,180,172	\$ 9,101,853	\$ 22,534,819	\$ 37,816,844	\$101,190,000	\$128,704,844
2026	\$ 6,117,748	\$ 4,224,122	\$ 18,470,021	\$ 28,811,892	\$ 76,370,000	\$134,613,532
2027	\$ 4,593,433	\$ 5,584,333	\$ 10,705,333	\$ 20,883,100	\$ 68,455,000	\$193,075,425

Similar to Tables 1 and 2, the amounts listed against roads above 2 exclude sidewalks, traffic signals, streetlights, bridges, and parking lot spending requests, and also exclude maintenance activities which are operating budget items. The infrastructure totals include roads, sidewalks, traffic signals, streetlights, bridges, parking lots, water, wastewater and stormwater infrastructure. All amounts include all phases of work (design, property, construction, etc.).

The road resurfacing program addresses local, collector and arterial roads, however the specific locations are determined annually for the following construction season. For the purposes of the data presented here, the future allocation of this program has been assumed based on typical division of funding as follows: 45% to local roads, 30% to collector roads and 25% to arterial roads. In reality the percentage allocated to each road classification will vary from year to year, but on average will align with this breakdown.

The roads investment peaks in 2020, and this aligns with the overall trend of the capital plan. Despite the fact that the gross budget amounts decline over the last few years of the capital plan, there is still a balance between the amounts budgeted for local, collector and arterial roads.