McINTOSH PERRY

Roads Needs Study

Prepared for:
Tay Valley Township
217 Harper Road
Perth, Ontario
K7H 3C6

Prepared by:
McIntosh Perry Consulting Engineers Ltd.
3240 Concession 5A
Perth, Ontario
K7H 3C9

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www.mcintoshperry.com

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LIST OF APPENDICIES

1.0 INTRODUCTION

Council and staff requested that the information on the road system be updated and a comprehensive review done in order for Council to make informed decisions on where to repair and improve the Township's infrastructure. The Road Needs Study provides Council and Senior Staff with an inventory of all roads and a plan to repair and maintain the Municipality's roads, to a satisfactory level of service. The study will also include recommendations in relation to bridges, equipment and housing requirements for the Public Works Department.

The purpose of the Road Needs Study is to inventory and assess the road network within the Municipality from which a financial program for the maintenance and capital improvements can be derived. This study will also be incorporated into the Development Charges Study as well as the Asset Management Plan.

The Road Needs Study will:

- Inform Council on the existing conditions and needs of their road system.
- Formulate the most cost-effective long term maintenance and construction strategy within current/proposed budgetary limitations.
- Provide a projection of the future adequacy of the road systems.
- Provide a suggested year by year work plan for Council (extending 10 years).

The study contains the following:

- Updates to the number of kilometers within the Municipality's Road System.
- Identifies and itemizes the existing condition of the roadways.
- Details recommended improvements to deficient roadways.
- Formulates cost-effective long-term maintenance and capital construction policies within limited budgetary expenditures.
- Projections on the future adequacy of the road system.
- A complete up-to-date detailed map and table of the Township's roadway systems for future reference.
- Itemizes a year by year "suggested" work plan for the Township to use as a frame of reference for future resource allocations.
- Provides some recommendations on bridges and culverts (span 3.0 m or greater), although an assessment of the bridges is beyond the scope of this report.
- Recommended 10-year Capital Improvement Plan using current budget expenditures.
- Identifies capital construction requirements that cannot be realized within the current budget expenditure levels.

Some of the major benefits of conducting a Road Needs Study are:

A. Systematic Approach

- Roads prioritized based on needs.
- Limited resources allocated to cost-effective projects.
- Council can justify why a road was or was not selected for improvements.

B. Long Term Strategy

- Tax dollars will be spent strategically.
- Ten Year Plan spans between terms of Council.
- In the long run, saves Council and staff time in formulating capital program each year.

C. Benchmark

- Can project future adequacy of the road system.
- Can compare with other Municipalities.
- Justification for tax increase and/or shifting priorities to address spending shortfalls.

2.0 STUDY METHODOLOGY

The Ministry of Transportation of Ontario "Inventory Manual for Municipal Roads for Small Lower Tier Municipalities" has been used in preparing this study and is briefly outlined in the sections below.

2.1 Housing Needs

Housing needs are discussed in Section 7.0 of this report.

2.2 Equipment Needs

Equipment needs are assessed in Section 6.0 of this report.

2.3 Road Needs

1. All road sections are listed and their condition rating by road type:

   a) Gravel Roads

   b) Surface Treated or Low Class Bituminous (LCB) Roads

   c) Hot Mix Paved or High Class Bituminous (HCB) Roads

2. Future condition ratings are calculated for each road and from this, predicted maintenance and capital expenditures can be produced. Newly reconstructed roads have a 10 point condition rating, and roads requiring partial reconstruction are assigned 3 points. Roads should not be allowed to go below 3

points due to the severity of the road conditions, e.g. very poor ride, difficult to maintain, usually a safety hazard.

Generally speaking, Tay Valley Township's roads have low traffic volumes, which are consistent throughout its road network with the exception of a few with volumes well above the average. It has been assumed that asphalt roads will need to be resurfaced within 15 years and if not resurfaced, then reconstructed in 30 years. Note that one cannot perpetually resurface and at some point the road must be reconstructed. It has been assumed that a surface treated road has a life expectancy of approximately 15 years before reconstruction is required.

The above noted life cycle assumptions should not have a great impact on the overall assessment of the road network, but some roads may experience slower or faster rates of deterioration. The capital program may need to be adjusted (e.g. A street scheduled for reconstruction in year 10 may have to be moved up in the ten year capital program and vice versa, a street scheduled for year 3 could be pushed back since its condition has not deteriorated as fast as earlier predicted.) to account for this and other factors such as variations in pavement structure, sub-surface conditions, drainage, and truck traffic.

Through regularly measuring the performance of its road system (e.g. Road Needs Study every 5 years, ongoing traffic counts, etc.), the Municipality will be able to better predict the deterioration rates of individual segments and therefore the overall network.

The condition rating for each road type will decrease every year unless maintenance and/or rehabilitation are performed. For gravel roads it is assumed that the condition of the road will be maintained with regular gravel resurfacing. Hard surface roads with no maintenance and/or no rehabilitation (which is not recommended) will need reconstruction within fifteen (15) years[1] for surface treated roads and thirty (30) years for asphalt roads. The following calculations show the rate of deterioration of the three surface types.

Asphalt: $$\frac{\text{10 point condition rating} - \text{3 point condition rating}}{\text{30 year life cycle for reconstructing}} = 0.23$$

Surface Treatment: $$\frac{\text{10 point condition rating} - \text{3 point condition rating}}{\text{15 year life cycle before reconstructing}} = 0.47$$

Gravel: No change in rating with regular maintenance.

[1] Given the assumed low traffic volumes on surface treated roads across Tay Valley Township

Based on the foregoing discussion, Table 1 provides an example of how the condition rating is forecasted for each surface type. In this example, it is assumed that for each road type the road was reconstructed in 2011.

TABLE 1 - FORECASTING CONDITION RATING EXAMPLE

SURFACE TYPE	2011	2012	2013	2014	2015	2016
GRAVEL[1]	10.00	10.00	10.00	10.00	10.00	10.00
SURFACE TREATMENT	10.00	9.53	9.06	8.59	8.12	7.65
ASPHALT	10.00	9.77	9.54	9.31	9.08	8.85

[1]Gravel Roads have a stable unchanging life expectancy, as long as, routine loose top maintenance is performed. Gravel roads will remain this way until improvements are made.

3. The average condition rating is determined for each road type by summing the product of length multiplied by the condition rating and then dividing by the total length of the road system. This will result in an average condition rating for the three road surface types. An example is demonstrated in Table 2 below.

TABLE 2 - AVERAGE CONDITION RATING BY SURFACE TYPE EXAMPLE

STREET	LENGTH (L) (Km)	CONDITION RATING (CR)	PRODUCT L x CR
1	1.00	7.00	7.00
2	2.00	3.00	6.00
3	3.00	5.00	15.00
TOTAL	**6.00**		**28.00**

$$\text{Average Condition Rating} = \frac{28.00}{6.00} = 4.7$$

By combining the three surface types an overall condition rating can be calculated for the total Municipal system. Table 3 is a measure of the condition of the road system.

TABLE 3 – SYSTEM CONDITION

AVERAGE CONDITION RATING	SYSTEM CONDITION
8 to 10	Good structural condition.
	Some local improvements may be needed.
5 to 7	Average structural condition.
	Some continued improvement may be needed.
Less than 5	Poor structural condition.
	Substantial improvement needed throughout total road system.

4. The above noted analysis will determine if or when a road requires improvements within the next ten years.

5. The ten year capital program presented in this report is a tool for Municipal Staff and Council in selecting the ten year program. There may be other factors that must be considered and/or adjusted in order to reflect changes not foreseen at the time of writing this report.

6. To determine the cost of construction, benchmark costs are used and are associated with the type of capital improvement. Average unit costs have been developed based on local construction costs.

   Fixed costs are costs associated with maintenance of the existing road system and include overhead, salaries, etc. Fixed costs are generally met from the Township's budget prior to capital construction funds being allocated. Fixed costs for forecast requirements were derived from historical expenditures.

   This report presents historical information with no adjustment for inflation. For future capital expenditures, the report presents cost estimates in 2013 dollars. At the time of budgeting, the Municipality should adjust capital expenditure by an appropriate cost of inflation.

7. In developing the priority of road improvements, the first consideration for the available funds is for asphalt resurfacing projects, i.e. those road sections with a study year condition rating of 5. This will upgrade those roads at a reasonable cost that if not improved, will continue to deteriorate to a point where only major and costly improvements will restore the structural strength of the road.

   If funds are available after addressing the needs of the roads with a condition rating of 5, they should be applied to the road improvements that would provide the best cost/benefit return. The method used in this study reviews the cost of reconstruction versus the Average Annual Daily Traffic (AADT).

   As an example, if one street is a Dead End and one street is a minor collector, and both cost the same per kilometer to reconstruct, then the minor collector would be selected over the dead end, since it serves more commuters.

   Other factors that may have to be considered are safety, truck traffic, development, economics, social implications, and scheduling construction with other infrastructure works, e.g. County or Ministry of Transportation projects.

3.0 ROAD STANDARDS

Most municipalities in Ontario either adopt or utilize the following manuals in developing their design and construction standards:

- Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads,
- Ontario Provincial Standards (OPS) for Roads and Municipal Services,
- Ontario Traffic Manual, and
- Ministry of Transportation of Ontario, Drainage Management Manual.

Ministry of Transportation of Ontario's Directive B-36, October 1985, applied to municipalities that were applying for subsidies. This directive no longer applies, but its brief format is easy to use and is summarized on the following page. It is McIntosh Perry's recommendation that these standards be followed.

TABLE 4 – GEOMETRIC DESIGN STANDARDS FOR RURAL TWO-LANE ROADS

DESIGN YEAR AADT	DESIGN SPEED (Km/hr)	MAX. GRADE (%)	WIDTH (m)	
			LANE	SHOULDER[3]
2,000 to 1,000	90	6-8	3.25	2.00
	80	6-8	3.25	2.00
	70	6-12	3.00	1.00
	60	6-12	3.00	1.00
1,000 to 400	80	8	3.25[1]	1.00[2]
	70	12	3.00	1.00[2]
	60	12	3.00	1.00[2]
	50	12	3.00	1.00[2]
Less than 400	80	8	3.25[1]	1.00[2]
	70	12	3.00	1.00[2]
	60	12	3.00	1.00[2]
	50	12	2.75	1.00[2]

[1]A 3.0m lane width may be acceptable where type size and volume of trucks are not significant.

[2]0.5m shoulders permitted where there is no foreseeable possibility of the road being paved within a 20-year period. Note: 1.0m shoulder must be used where guide rail is installed.

[3]Shoulder width may be reduced by 0.5m if paved. Shoulder width does not incl. rounding (0.5m).

TABLE 5 – ALIGNMENT STANDARDS

DESIGN SPEED (Km/hr)	MINIMUM[1] CURVE RADIUS (m)	MINIMUM STOPPING DISTANCE (m)	MINIMUM[2] CREST CURVE K (m)	MINIMUM[2] SAG CURVE K (m)	MINIMUM[3] SAG CURVE ILLUMINATED AREAS K (m)
40	55	45	4	8	4
50	90	65	8	12	5
60	130	85	15	18	8
70	190	110	25	25	12
80	250	135	35	30	15
90	340	160	50	40	20

[1]Mininum curve radius based on maximum super elevation of 0.06 m/m.

[2]Minimum curve parameter based on stopping distance

[3]Minimum curve parameter based on comfort criteria. Utilize in illuminated areas only when stopping sight distance requirements are met.

TABLE 6 – GEOMETRIC DESIGN STANDARDS FOR TWO-LANE URBAN ROADS

DESIGN YEAR AADT	DESIGN SPEED (Km/hr)	LANE WIDTH (m)	PARKING LANE WIDTH (m)	MIN. CURB TO CURB DISTANCE (m)	MAXIMUM GRADE (%)
2,000 to 1,000	60-70	3.25	2.50 - 3.00	9.5	6 - 12
	50	3.00	2.50 - 3.00	9.0	8 - 12
Less than 1,000	40-50	2.75 - 3.00	2.50 - 3.00	8.5	8 - 12

Note: The desirable minimum sidewalk width is 1.5m

Table 7 shows the recommended surface type based on AADT. Table 8 on the following page lists other criteria that should be reviewed when selecting road surface type.

TABLE 7 – SURFACE TYPE STANDARDS FOR RURAL ROADS

AADT AT TIME OF CONSTRUCTION	SURFACE TYPE[1]
0 - 400	Gravel
400 - 700	Low Class Bituminous[2]
700 - 1,000	50mm of Hot Mix

[1]The grade upon which the surface type is to be applied is assumed to be structurally adequate. Typically, the base is 150mm Granular 'A' and 300mm Granular 'B', Type II.

[2]Apply surface treatment 0.25m wider than lane width, e.g. for 3.0m lane width, apply 3.25m wide.

TABLE 8 – SUITABILITY OF SURFACE TYPE FOR RURAL ROADS

PARAMETER	GRAVEL	SURFACE TREATMENT	ASPHALT
AADT			
0 - 400	X	X	X
400 - 1,000		X	X
1,000 - 2,000			X
Above 2,000			X
TRUCK TRAFFIC			
0 - 5%	X	X	X
5 - 15%		X	X
Above 15%			X
HIGHWAY CLASSIFICATION			
Local	X	X	X
Collector			X
Arterial			X
ADJACENT LAND USES			
Agricultural	X		X
Commercial			X
Forestry	X	X	X
Industrial			X
Institutional			X
Residential			
5+ Acre Lots	X	X	X
Cluster Development of 2 - 5 Acre Lots			
Front Yard Set Back 15m of less			X
Front Yard Set Back 15m of more		X	X
2 Acre Lot Subdivisions			X

4.0 BENCHMARK COSTS

Benchmark costs are costs associated with capital improvements to the Township's roads. These costs can also be for new road construction or capital expenditure to improve a road to a higher standard. Example, upgrading a gravel road to a surface treated or paved road. Average unit costs have been developed based on local construction costs.

Fixed costs are costs associated with maintenance of the existing road system and include overhead, salaries, etc. Fixed costs are generally met from the Township's budget prior to capital construction funds being allocated. Fixed costs for forecast requirements were derived from historical expenditures.

The Township's equipment was inventoried. The needs and the age of the existing fleet were assessed and a table of anticipated expenditures produced. The report discusses Bridges and Culverts with a span greater

than 3.0m and provides recommendation on the inspection program. A recommendation on the structures themselves is beyond the scope of this report.

The estimated cost for identified improvements to the Township's Road System are calculated on an approximate basis, using average benchmark costs for various items. These costs have been averaged using unit cost information obtained locally. Unit prices are shown in Table 9 below and costs are summarized by construction type in Tables 10 and 11. These costs are based on 2013 dollars and adjustments should be made for inflation for each budget year.

TABLE 9 – UNIT PRICES

ITEM	2013 unit price	
Earth Excavation, Grading	$ 12.00	per cubic metre
Earth Excavation, Ditching	$ 18.00	per metre
Road Widening per Shoulder	$ 32.00	per metre
Removal – Pulverize	$ 1.25	per square metre
Removal – Asphalt	$ 5.00	per square metre
Removal – Mill Wear Course	$ 5.00	per square metre
Removal – Concrete Curb	$ 7.00	per metre
Removal – Concrete Sidewalk	$ 20.00	per square metre
Remove and Replace 16m x 600mm Diameter CSP	$ 6,000.00	each
Granular A	$ 15.00	per tonne
Granular B	$ 14.00	per tonne
Single Surface Treatment (SST)	$ 3.50	per square metre
Double Surface Treatment (DST)	$ 7.00	per square metre
Asphalt – Wear Course	$ 140.00	per tonne
Asphalt – Base Course	$ 140.00	per tonne
Rout & Seal	$ 2.50	per metre
Rejuvenating Oil	$ 1.50	per square metre
Microfil	$ 10.00	per metre
Micro-Surfacing	$ 5.00	per metre
Ultrathin Resurfacing (scratch coat & surface coat)	$ 6.50	per metre
Thin Overlays	$ 11.00	per square metre
Dense Graded Cold Mix	$ 13.00	per square metre
RAP Cold Mix	$ 7.00	per square metre
Tack Coat	$ 1.25	per square metre
Iron Adjustment	$ 600.00	each
Concrete Sidewalk	$ 100.00	per square metre
Concrete Barrier Curb	$ 90.00	per metre
Topsoil & Sod	$ 17.50	per square metre
Topsoil & Seed	$ 6.00	per square metre

TABLE 10 – SURFACE TREATMENT OR LOW COST BITUMINOUS (LCB)

CODE	DESCRIPTION	UNIT PRICE ($ per km)
LCB-R1	**Resurfacing** Single surface treatment 6.0m wide	$23,000
LCB-R2	**Partial Depth Reconstruction** Pulverize or scarify, 50-150mm G.A., double surface treatment, 10% spot drainage improvements, culvert replacement & 10% contingency	$126,000
LCB-R3	**Full Depth Reconstruction** Earth exc., 150mm G.A., 300mm G.B., DST, culvert replacement, engineering, geotechnical and 10% contingency	$448,000

TABLE 11 – ASPHALT OR HIGH COST BITUMINOUS (HCB)

CODE	DESCRIPTION	UNIT PRICE ($ per km)
HCB-R1	**Resurfacing** 40mm lift of HL3 asphalt by 6.0m and 10% contingency	$95,000
HCB-R2	**Partial Depth Reconstruction** Pulverize, 50-150mm G.A., 50mm lift of HL4 asphalt, shouldering, 10% spot drainage improvements, culvert replacement & 10% contingency	$193,000
HCB-R3	**Full Depth Reconstruction** Remove asphalt, earth exc., 150mm G.A., 300mm G.B., 50mm Lift of HL4 asphalt, shouldering, culvert replacement, engineering, geotechnical and 10% contingency	$569,000
HCB-R4	**Rout and Seal** Routing of cracks	$4,000
HCB-R6	**Rejuvenating Oil** Oil that penetrates an asphalt surface and restores the Maltene to asphalt ratio.	$10,000
HCB-R7	**Micro surfacing** A slurry composed of polymer modified emulsion, aggregate (often premium friction resistant), and cement	$33,000
HCB-R8	**Ultrathin Resurfacing** A thin lift of fine asphalt (typically 12-25mm) proceeded by a scratch lift.	$43,000
HCB-R12	**Dense Graded Cold Mix** 75mm G.A.	$95,000
HCB-R13	**Rap Cold Mix** 75mm G.A.	$55,000

5.0 HISTORICAL CAPITAL SPENDING

The Public Works Department currently has eight employees in total including the Public Works Manager and an Administrative Assistant. In the summer, typically two students are hired. The 2013 budget for this department is $1,866,600, which is discussed in the following paragraphs.

Road Needs Studies, typically consider maintenance and capital budgets separately. Maintenance activities are routinely performed and maintain the road at the current level of service. Capital expenses improve the structure of the road or replace major pieces of equipment. The ten year plan for 2014 through to 2023 was analyzed based on these two categories. It became apparent when reviewing the budgets that there were fluctuations year to year in spending, and that some items categorized under maintenance may be better categorized under capital. The breakdown is presented in the table below:

TABLE 12 – 2008 TO 2013 EXPENDITURES

CATEGORY	2008	2009	2010	2011	2012	2013
GRAVEL MAINT.	$416,401	$425,868	$420,935	$412,708	$463,074	$393,000
HARDTOP MAINT.	$32,651	$24,561	$26,889	$37,447	$26,070	$38,400
ROADSIDE MAINT.	$29,179	$33,207	$40,710	$55,042	$56,905	$78,000
BRIDGE & CULVERT MAINT.	$34,017	$45,056	$55,453	$59,747	$46,171	$40,700
TRAFFIC OPERATIONS	$23,354	$37,754	$34,073	$30,304	$40,617	$26,000
WINTER CONTROL	$234,873	$183,735	$165,533	$198,701	$268,992	$173,700
STREET LIGHTING	$4,764	$6,013	$5,946	$6,147	$13,439	$7,000
RESERVES - ROADS	$287,500	$287,500	$287,500	$287,500	$287,500	$287,500
RESERVES - BRIDGES	$104,500	$104,500	$104,500	$129,500	$129,500	$129,500
RESERVES - EQUIPMENT	$156,800	$156,800	$156,800	$131,800	$131,800	$131,800
CAPITAL - ROADS	$899,432	$428,234	$401,999	$75,451	$56,595	$266,000
CAPITAL - BRIDGES	$88,840	$113,402	$567,127	$466,204	$29,025	$60,000
CAPITAL - EQUIPMENT	$0	$185,456	$34,574	$252,033	$125,572	$255,000
TOTAL	**$2,312,311**	**$2,032,086**	**$2,302,039**	**$2,142,584**	**$1,675,260**	**$1,886,600**

Gravel resurfacing only temporarily adds strength to the road structure, but over time the material is lost to the roadside through winter plowing, traffic, etc. To replace the loss of gravel, a rule of thumb is 25mm per year. Municipalities typically do not add 25mm each year due to the costs of spreading and compacting, and usually put 50mm every second year or 125mm every five years. Dead end roads with average annual traffic less than 50 vehicles per day, can usually receive half the gravel, i.e. 125mm every 10 years. The average spending over the last six years on gravel road maintenance has been $422,000. In order to assess the adequacy of this spending, we recommend a full road assessment of gravel roads be completed now and then again in three to five years. Based on condition rating comparisons, it can be determined if spending needs to be increased or decreased.

Gravel, asphalt, and bridges and culverts were separated out from the maintenance budget, due to the variation in spending. Asphalt resurfacing can be considered capital, since it can significantly increase

performance and the longevity of the road. Table 13 adjusts the figures in Table 12 to reflect the difference between capital and maintenance.

Table 13 reduces the number of categories to two based on the foregoing discussion. The operational and maintenance budget should be adjusted each year to account for growth and inflation. The spending should be monitored so that the operations and maintenance budget does not get under funded over time. Note that the right type of growth can produce efficiencies in providing services. For example, densification where there is adequate infrastructure.

TABLE 13 – 2008 TO 2013 BUDGETS

CATEGORY	2008	2009	2010	2011	2012	2013
O & M	$742,588	$731,633	$722,650	$762,649	$889,198	$718,400
GRAVEL + CAPITAL	$1,569,723	$1,300,453	$1,579,389	$1,379,935	$786,062	$1,168,200
TOTAL	**$2,312,311**	**$2,032,086**	**$2,302,039**	**$2,142,584**	**$1,675,260**	**$1,886,600**

There are slight variations in spending each year for gravel and capital projects. In 2013, the transfer to road reserve of $287,500, plus the transfer to gas tax reserve of $165,000, gives a budget of approximately $452,500 that is utilized as the benchmark in capital spending when preparing the ten year capital program.

6.0 VEHICLES AND EQUIPMENT

Replacement of vehicles and equipment should be based on maintenance costs and the number of hours used or in the case of half-ton trucks, the mileage. Generally speaking, municipal equipment can be replaced based on the following schedule:

Graders	every 15 years
Single Axle and Tandem Trucks	every 10 years
Loader/Backhoe	every 10 years
Half-Ton Trucks	every 7 years

Based on the foregoing, the Municipality should be spending approximately $165,250 per year on vehicles as demonstrated in Table 14.

TABLE 14 – LEVEL OF SPENDING ON EQUIPMENT

QTY.	EQUIPMENT	REPLACEMENT COST	LIFE CYCLE (Years)	ANNUAL RESERVES
(1)	**(2)**	**(3)**	**(4)**	**(5) = (1) x (3) / (4)**
1	2012 Dodge RAM 1500 SXT	$28,048	7	$4,007
1	2004 Ford Ranger Truck XL S/CAB 4	$29,288	10	$2,929
1	2007 Ford F150 4X4 S/CAB	$45,558	8	$5,695
1	2011 Chevy Silverado 2500HD 4X4	$35,914	8	$4,489
1	2009 Komatsu Backhoe - 9500kg Class	$135,300	5	$27,060

1	2012 Case Backhoe	$123,639	15	$8,243
1	1988 International Dump	$150,000	29	$5,172
1	2000 Sterling Tandem Dump (Pumper)	$180,000	15	$12,000
1	2001 Sterling Tandem Dump	$180,000	15	$12,000
1	2004 International 7600 Tandem	$183,833	15	$12,256
1	2012 International Tandem Truck 7600 6X4	$190,004	15	$12,667
1	2013 International Tandem Truck 7600 4X4	$207,417	15	$13,828
1	1995 Champion Grader	$250,000	23	$10,870
1	2007 Volvo Grader G960	$239,135	20	$11,957
1	2008 Husqvarna Lawn Mower	$10,000	10	$1,000
1	1995 John Deere Lawn Mower	$10,000	10	$1,000
1	2013 Mitsubishi RVR Compact Utility Vehicle	$23,000	7	$3,286
1	2000 Ariens Snow Blower	$2,500	15	$167
1	1990 Steamers	$5,500	30	$183
1	2007 Brush Head	$4,000	12	$333
1	2002 Ezhauler Trailer	$5,500	12	$458
1	1995 Ford Van	$35,000	10	$3,500
1	2008 Sweeper	$23,680	10	$2,368
	TOTAL			**$155,467**

Note: Values are based on 2013 dollars. Adjustments should be made for inflation for each budget year.

Taking into consideration inflation rates and replacement years based on typical life cycles (shown in Table 14), Table 15 shows the list of equipment and pieces to be replaced.

TABLE 15 – EQUIPMENT INVENTORY AND REPLACEMENT SCHEDULE ($1,000's)

No.	VEHICLE	REPL. YEAR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1	2012 Dodge RAM 1500 SXT	2019						28.05				
2	2004 Ford Ranger Truck XL S/CAB 4	2014	29.29									
3	2007 Ford F150 4X4 S/CAB	2015		45.56								
4	2011 Chevy Silverado 2500HD 4X4	2019						35.91				
5	2009 Komatsu Backhoe - 9500kg Class	2014	135.30					135.30				
6	2012 Case Backhoe	2027										
7	1988 International Dump	2017				150.00						
8	2000 Sterling Tandem Dump (Pumper)	2015		180.00								
9	2001 Sterling Tandem Dump	2016			180.00							
10	2004 International	2019						183.83				

	7600 Tandem											
11	2012 International Tandem Truck 7600 6X4	2027										
12	2013 International Tandem Truck 7600 4X4	2028										
13	1995 Champion Grader	2018					250.00					
14	2007 Volvo Grader G960	2027										
15	2008 Husqvarna Lawn Mower	2018					10.00					
16	1995 John Deere Lawn Mower	2015		10.00								
17	2013 Mitsubishi RVR Compact Utility Vehicle	2020							23.00			
18	2000 Ariens Snow Blower	2015		2.50								
19	1990 Steamers	2020							5.50			
20	2007 Brush Head	2019						4.00				
21	2002 Ezhauler Trailer	2014	5.50									
22	1995 Ford Van	2015		35.00								
23	2008 Sweeper	2018					23.68					
	TOTAL		**170.09**	**273.06**	**180.00**	**150.00**	**283.68**	**387.10**	**28.50**	**0.00**	**0.00**	**0.00**

Note: Values are based on 2013 dollars. Adjustments should be made for inflation for each budget year.

7.0 HOUSING

It is recommended that an assessment study on the buildings be completed. It is recommended that a budget of $20,000 be put into reserves for this study.

8.0 BRIDGES

The Ministry of Transportation of Ontario defines a structure as a bridge or culvert with a span of 3.0 metres or greater. The municipality has twenty-three (23) structures that meet this definition. Structures must be inspected biennially by a professional engineer. The table below presents the ten year capital plan for bridges.

TABLE 16 - BRIDGES ($1,000'S)

No.	DESCRIPTION	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
C15-048	Hunter Side Road										
15-050	Ennis Road										
15-051	Anderson Road		5				30				
15-070	Munro Road										
15-072	Crow Lake	65									
15-075	Doran Road						35				
15-076	Gambles Side Road		18								
15-087	Second Line Road	190									
15-088	Menzies Munro Side Road										
15-089	Upper Scotch Line										
15-090	Upper Scotch Line										
15-091	Noonan's Side Road										
15-092	Adam’s Mill Road		12.5								
15-093	Bowe's Side Road		18								
15-094	Glen Tay Road	16									
15-095	Upper Scotch Line										
C15-096	Glen Tay Road Open Footing										
15-139	Haughians Road										
15-159	Black Lake Road										
15-A01	Allan Mill Road	10	18								
C15-A02	Anglican Church Road										
15-A03	Doran Road		31	224							
15-A04	9th Concession Road										
	Enhanced OSIM						7.5				
	OSIM Inspection	2	11	2	11	2	10	2	11	2	11
	TOTAL	**283**	**113.5**	**226**	**11**	**2**	**82.5**	**2**	**11**	**2**	**11**

9.0 TEN YEAR CAPITAL PLAN FOR ROADS

This section has three sub-sections. The first of which, deals with the existing condition of the road network. The second presents a somewhat optimum Ten Year Capital Plan for Roads. The last section analyzes the adequacy of current spending levels on the road system, and estimates required spending in order to improve the road system average condition rating to be within the acceptable range.

9.1 Condition of Existing Road System

Table 17 presents the length and weighted average condition rating for Gravel Roads, Low Class Bituminous (LCB or surface treatment) and High Class Bituminous (HCB or asphalt) in 2013. Seventy-four percent (74%) of the Township's roads are gravel. For gravel roads, the condition rating should be between 6.0 and 7.0. In order to assess the gravel road assets, a full Roads Needs Study should be completed. This will provide a better overview of the Township's current state of local infrastructure.

The optimum overall condition rating for Low Class Bituminous (LCB or surface treatment) roads based on available pavement preservation treatments and lifecycle analysis is between 5.9 and 6.4. Similarly, for High Class Bituminous (HCB or asphalt) the optimum condition rating is between 6.7 and 7.1. Based on the foregoing, for hard surface roads, a blended average condition rating should be between 6.3 and 6.75. A rating below the above mentioned ranges is an indication that the hard surfaced roads are underfunded.

TABLE 17 – CURRENT CONDITION RATINGS

CATEGORY	2013	
	Km	CR
GRAVEL (YEAR ROUND)	212.89	6.50
LOW CLASS BITUMINOUS	47.72	6.17
HIGH CLASS BITUMINOUS	28.59	5.35
ALL	289.20	

Note: Assumed that gravel roads are maintained at an average weighted condition rating of 6.50.
Appendix A provides a complete assessment of each road segment.

9.2 Ten Year Capital Year Plan for Roads

The Ten Year Program for roads is presented in Table 19. On average, $601,710 is being proposed per year for roads, which is above current spending limits. On average, there is a shortfall of $149,210 per year for the proposed work in the ten year plan.

A life cycle analysis was used to predict the year of resurfacing or reconstruction for Hot Mix and Surface Treated Roads. Due to spending constraints, the following strategy was developed in an effort to best allocate limited resources:

- Higher traffic roads are given priority over lower traffic volume roads.
- For asphalt roads, overlay projects provides the best value for the dollars spent followed by Partial Depth Reconstruction and then lastly, Full Depth Reconstruction
  (i.e. Overlay > Partial Depth > Full Depth Reconstruction)
- For surface treated roads: Roads requiring Partial Depth Reconstruction are given priority over Full Depth Reconstruction, since this provides the best value with limited funds available.

Where funding is available, surface treated roads with a condition rating of 5.0 are considered for the application of a single surface treatment.

- Projects that are geographically close to each other are planned in the same year where feasible. This is more cost effective.

Please note that roads with higher than average traffic volumes or with large volume of truck traffic may deteriorate at a faster rate, and the Township should be prepared to adjust the Program, accordingly. The figures are in 2013 dollars, so the Municipality should account for construction inflation each budget year. Also note that there is anticipated funding revenue of approximately $1,400,000 2014.

TABLE 18 - TEN YEAR CAPITAL PROGRAM FOR ROAD RECONSTRUCTION ($1,000's)

No.	STREET	Km	Current Condition Rating	Current Surface Type	Planned Improvement Code	Cost ($/km)	Planned Construction Cost ($1,000's)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
083	Allans Side Road	1.80	6.00	LCB	LCB-R1	23000.00	41.40		41.40								
084	Anglican Church Road	3.30	9.00	LCB	LCB-R1	23000.00	75.90							75.90			
085	Armstrong Line	2.50	6.00	LCB	LCB-R1	23000.00	57.50					57.50					
086	Ashby Road	0.58	9.00	LCB	LCB-R1	23000.00	13.34							13.34			
087	Bathurst 7th Concession	2.38	6.00	LCB	LCB-R1	23000.00	54.74				54.74						54.74
088	Cameron Side Road	1.74	5.00	LCB	LCB-R1	23000.00	40.02				40.02						40.02
089	Cameron Side Road	1.74	7.00	LCB	LCB-R1	23000.00	40.02							40.02			
090	Christie Lake North Shore Road	1.25	5.00	LCB	LCB-R1	23000.00	28.75									28.75	
091	Christie Lake North Shore Road	1.45	5.00	LCB	LCB-R1	23000.00	33.35									33.35	
092	Crow Lake Road	3.07	6.00	LCB	LCB-R1	23000.00	70.61										70.61
093	Crozier Road	0.83	6.00	LCB	LCB-R1	23000.00	19.09						19.09				
094	Ferrier Road	0.57	6.00	LCB	LCB-R1	23000.00	13.11										13.11
095	Hanna Road	3.92	3.00	LCB	LCB-R2	126000.00	493.92	493.92									
					LCB-R1	23000.00	90.16								90.16		
096	Iron Mine Road	1.47	6.00	LCB	LCB-R1	23000.00	33.81						33.81				
097	McVeigh Road	0.30	6.00	LCB	LCB-R1	23000.00	6.90										6.90
098	Menzies Munro Side Road	2.57	7.00	LCB	LCB-R1	23000.00	59.11					59.11					
099	Norris Road	0.15	6.00	LCB	LCB-R1	23000.00	3.45			3.45						3.45	
100	Otty Lake Side Road	3.50	5.00	LCB	LCB-R1	23000.00	80.50					80.50					
101	Powers Road	2.10	9.00	LCB	LCB-R1	23000.00	48.30					48.30					
102	Ritchie Side Road	0.88	6.00	LCB	LCB-R1	23000.00	20.24				20.24						20.24
103	Stanley Road	1.87	6.00	LCB	LCB-R1	23000.00	43.01				43.01						43.01
104	Stanleyville Road	1.88	9.00	LCB	LCB-R1	23000.00	43.24									43.24	
105	Upper Scotch Line	4.12	7.00	LCB	LCB-R1	23000.00	94.76						94.76				
106	Walters Lane	0.10	5.00	LCB	LCB-R1/R2	74500.00	7.45			7.45							
					LCB-R1/R2	52500.00	5.25									5.25	
107	Zealand Road	4.10	5.00	LCB	LCB-R1	23000.00	94.30								94.30		
108	Brooke Valley Road	0.29	4.00	HCB	HCB-R1	95000.00	27.55				27.55						
109	Bygrove Lane	0.78	9.00	HCB			0.00										
110	Clarchris Road	0.20	3.00	HCB	HCB-R1/R2	144000.00	28.80			28.80							
111	Clarchris Road	0.50	5.00	HCB	HCB-R1/R2	144000.00	72.00			72.00							
112	Crozier Road	2.20	9.00	HCB			0.00										
113	Glen Tay Road	2.92	8.00	HCB	HCB-R1	95000.00	277.40							277.40			
114	Glen Tay Road	0.42	5.00	HCB	HCB-R1/R2	144000.00	60.48							60.48			
115	Glenn Drive	0.87	4.00	HCB	HCB-R1/R2	144000.00	125.28								125.28		

116	Hanna Road	0.86	4.00	HCB	HCB-R1	95000.00	81.70	**81.70**									
117	Harper Road	2.00	4.00	HCB	HCB-R2	193000.00	386.00		**386.00**								
118	Harper Road	1.10	5.00	HCB	HCB-R3	569000.00	625.90			**625.90**							
119	Harper Road	3.26	4.00	HCB	HCB-R2	193000.00	629.18				**629.18**						
120	Jodi Lane	0.24	5.00	HCB	HCB-R1	95000.00	22.80										**22.80**
121	Keays Road	1.33	4.00	HCB	HCB-R1/R2	144000.00	191.52		**191.52**								
122	Kenyon Road	2.15	4.00	HCB	HCB-R1	95000.00	204.25						**204.25**				
123	Lakewood Road	1.97	3.00	HCB	HCB-R1	95000.00	187.15										**187.15**
124	Maberly Main Street	0.20	4.00	HCB	HCB-R1	95000.00	19.00			**19.00**							
125	McLaren Road	1.99	4.00	HCB	HCB-R1	95000.00	189.05						**189.05**				
126	Muttons Road (Reclaimed)	0.54	3.00	HCB	HCB-R1	95000.00	51.30					**51.30**					
127	Old Brooke Road	0.40	3.00	HCB	HCB-R2	193000.00	77.20				**77.20**						
128	Orchard Crescent	0.85	6.00	HCB	HCB-R1	95000.00	80.75					**80.75**					
129	Otty Lake Side Road	0.65	7.00	HCB	HCB-R2	193000.00	125.45			**125.45**							
130	Park Lane Court	0.22	5.00	HCB	HCB-R1	95000.00	20.90									**20.90**	
131	Posner Lane	0.30	9.00	HCB			0.00										
132	Somerville Drive	0.90	5.00	HCB	HCB-R1	95000.00	85.50				**85.50**						
133	Somerville Drive	0.36	5.00	HCB	HCB-R1	95000.00	34.20				**34.20**						
134	Stanleyville Road	1.25	9.00	HCB			0.00										
-	Roads Needs Study	-	-	-	-	-	20.00					**20.00**					**20.00**
-	Deficiencies Elimination Program	-	-	-	-	-	60.00	**60.00**	**60.00**	**60.00**	**60.00**	**60.00**	**60.00**	**60.00**	**60.00**	**60.00**	**60.00**
-	Gravel Road Upgrades	-	-	-	-	-	-										
							TOTAL	**635.62**	**678.92**	**942.05**	**1,071.64**	**457.46**	**600.96**	**527.14**	**369.74**	**194.94**	**538.58**
							BUDGET	**452.50**	**452.50**	**452.50**	**452.50**	**452.50**	**452.50**	**452.50**	**452.50**	**452.50**	**452.50**
							SHORTFALL	**183.12**	**226.42**	**489.55**	**619.14**	**4.96**	**148.46**	**74.64**	**(82.76)**	**(257.56)**	**86.08**

9.3 Overall Weighted Average Condition Rating

Table 19 shows the overall weighted average condition rating by year. Note that, based on neighbouring Municipalities; it has been assumed that the gravel roads in the Township are consistently being maintained at an average weighted condition rating of approximately 6.5. A full spreadsheet detailing condition rating forecasts by year for each road can be found in Appendix B.

TABLE 19 – WEIGHTED AVERAGE CONDITION RATING SUMMARY

CATEGORY	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
CONDITION RATING (OVERALL)	6.27	6.28	6.23	6.21.	6.24	6.33	6.39	6.38	6.42	6.40	6.47
CONDITION RATING (HARD SURFACE ONLY)	5.64	5.58	5.47	5.42	5.50	5.87	6.10	6.05	6.20	6.11	6.37
CONDITION RATING (GRAVEL ONLY)	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50

10.0 SUMMARY

Table 20 summarizes Capital for the next ten years. The figures shown are Present Value and an appropriate inflationary factor should be applied during budget deliberations for that year.

TABLE 20 – SUMMARY OF CAPITAL ($1,000's)

CATEGORY	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
ROADS	635.62	678.92	942.05	1,072.64	457.46	600.96	527.14	369.74	194.94	538.58
BRIDGES	283.00	113.50	226.00	11.00	2.00	82.50	2.00	11.00	2.00	11.00
HOUSING	-	-	-	-	20.00	-	-	-	-	-
EQUIPMENT	170.09	273.06	180.00	150.00	283.68	387.10	28.50	0.00	0.00	0.00
TOTAL	**1,088.71**	**1,065.48**	**1,348.05**	**1,232.64**	**763.14**	**1,070.56**	**557.64**	**380.74**	**196.94**	**549.58**

There is currently a shortfall in spending in the proposed Capital Program, as shown in Table 21.

TABLE 21 – SHORTFALL IN CAPITAL SPENDING ($1,000's)

DESCRIPTION	CURRENT AVERAGE	REQUIRED	SHORTFALL
ROADS	452.50	601.71	-149.21
BRIDGES	117.00	74.40	42.60
HOUSING	0.00	20.00	-20.00
EQUIPMENT	142.10	147.24	-5.14
TOTAL	**711.60**	**843.35**	**-131.75**

It will be important for the Municipality to address any spending shortfalls sooner than later, since insufficient funding of capital projects will mean ever increasing maintenance costs.

This Draft Report is respectfully re-submitted on December 10th, 2013.

Adam O'Connor, P. Eng.
McIntosh Perry Consulting
(613) 267-6524 Ext. 225
a.oconnor@mcintoshperry.com

APPENDIX A

ROAD APPRAISALS

APPENDIX A - TABLE 1 - 2013 ROAD APPRAISALS - GRAVEL SURFACE

No.	Road Name	From	To	Length
001	11th Line South Sherbrooke	Zealand Road	County Road 36	4.26
002	Allan's Mill Road	County Road 10	Upper Scotch Line	1.20
003	Amyot Road	Doran Road	Red Branch Road	1.19
004	Anderson Side Road	Bennett Lake Side Road	End of Maint	3.29
005	Armour Road	County Road 10	Ferrier Road	0.56
006	Armstrong Line	Ent 618	Clear Lake Lane 21	2.44
007	Bathurst 2nd Concession	County Road 6	Menzies Munro SR	3.24
008	Bathurst 5th Concession	Highway 7	Dead End	11.54
009	Bathurst 6th Concession	Dead End	County Road 511	4.64
010	Bathurst 7th Concession	Harper Road	County Road 511	4.00
011	Bathurst 7th Concession	McVeigh Road	Dead End	0.15
012	Bathurst 9th Concession	Boundary Road	Dead End	7.24
013	Bathurst Line East	County Road 12	West Limit Lot 14	2.15
014	Bathurst Line West (Seasonal)	9th Concession Dalhousie	Dead End	8.27
015	Bathurst Upper 4th Concession	Perkins Road	Tysick Road	5.71
016	Black Lake Road	Powers Road	Dead End	5.05
017	Bolingbroke Station Road (Seasonal)	Crow Lake Road	Dead End	2.19
018	Bowes Side Road	County Road 6	Upper Scotch Line	2.97
019	Brooke Valley Road	Christie Lake North Shore Road	End of Pavement	7.84
020	Brooke Valley Road	Highway 7	Anglican Church Road	0.36
021	Charlton Road	Zealand Road	11 Line S. Sherbrooke	1.63
022	Christie Lake North Shore Road	Christie Lane	Dead End	3.68
023	Clarchris Road	Harper Road	End of pavement	4.04
024	Cook's Road	Highway 7	Old Brooke Road	0.14
025	Crosby Road (Seasonal)	County Road 6	Boundary	1.91
026	Dokken Road	McVeigh Road	Dead End	2.74
027	Doran Road	Highway 7	End of Maintenance	8.30
028	Elliott Road	Bath Upper 4th Concession	Christie L North Shore Road	1.91
029	Ennis Road	County Road 19	Dead End	6.25
030	Fagan Lake Road	County Road36	Doran Road	3.28
031	Fall Crescent	County Road 7	County Road 7	0.44
032	Ferrier Road	Narrows Locks Road (County Road 14)	Dead End	4.30

APPENDIX A - TABLE 1 - 2013 ROAD APPRAISALS - GRAVEL SURFACE

No.	Road Name	From	To	Length
033	Ferrier Road E	Otty Lake SR	Dead End	0.67
034	Gambles Side Road	Bath Upper 4th Concession	Bath 5th Concession	1.49
035	Greer Road	McNaughton Road	Fagan Lake Road	1.66
036	Hunter Side Road	Bolton creek	Bennett Lake Side Road	0.75
037	Keays Road	Harper Road	Dead End	0.61
038	Kelford Road	County Road 10	Upper scotch Line	0.19
039	Kelford Road N	Bowes Side Road	Dead End	0.22
040	Kelford Road S	Upper Scotch Line	Dead End	0.07
041	Kirkham Road	Highway 7	Doran Road	2.47
042	Leonard Side Road	County Road 6	Dead End	1.68
043	Long Lake Road	County Road 21	County Road 14 (Narrows Locks Road)	4.86
044	Maberly Station Road	County Road 36	Dead End	1.17
045	MacKey Line Road	County Road 7 (Fallbrooke Road)	Dead End	2.92
046	Mackler Side Road	Ferrier Road	Stanley Road	1.48
047	McLaren Point	Stanley Road	Dead End	0.67
048	McParland Road (Seasonal)	Scotch Line (County Road 10)	Dead End	2.23
049	McNaughton Road	County Road 19 (Eleventh Line)	Old Burke Road	4.81
050	McVeigh Road	Doran Road	Bath 7th Concession	7.76
051	Merkley Road	Narrows Locks Road	Narrows Locks Road	8.01
052	Mill Road	County Road 7 (Fallbrooke Road)	Dead End	0.44
053	Miller Bay Road	County Road 21 (Elm Grove Road)	Blair Poole Farm Road	0.17
054	Miller Lane	Glen Tay Road	Dead End	0.21
055	Miners Point Road	Narrows Locks Road	Dead End	4.89
056	Mitchell Side Road (Seasonal)	Bennett Lake Road	Bolton Creek	1.25
057	Munro Road	Armstrong Road	Dead End	0.95
058	Noonan Side Road	Upper Scotch Line	Menzies Munro Side Road	2.95
059	Norris Road	Muttons Road	Dead End	1.35
060	North Burgess 8th Concession	Otty Lake SR	Dead End	0.86
061	North Mac Lane	Christie Lake North Shore Road	Dead End	0.89
062	Old Brooke Road	Highway 7	Brooke Valley Road	7.92
063	Old Burke Road	County Road 19	McNaughton Road	1.70
064	Old Morris Road	Bathurst 9th Concession	Keays Road	1.13

APPENDIX A - TABLE 1 - 2013 ROAD APPRAISALS - GRAVEL SURFACE

No.	Road Name	From	To	Length
065	Palmer Road	Tysick Road	Dead End	0.23
066	Patterson Road	Christie Lake North Shore	Turn Around	0.14
067	Perkins Road	County Road 6	Bath Upper 4th Concession	1.47
068	Powers Road	Stanleyville Road	Dead End	1.12
069	Powers Road	Narrows Lock Road	Dead End	1.12
070	Pratt Road	County Road 36	Dead End	1.24
071	Railway Siding Road	Maberly Station Road	Dead End	0.22
072	Rideau Lake Road	County Road 21 (Elm Grove Road)	Dead End	2.05
073	Ritchie Side Road	Crozier Road	Boundary	2.61
074	Rutherford Side Road	McVeigh Road	Bath 5th Concession	4.27
075	Stanley Road	Mackler SR	Narrows Locks Road (County Road 14)	2.70
076	Star Hill Road	Narrows Locks Road	Dead End	0.43
077	Strong Side Road	Old Brooke Road	Highway 7	1.22
078	Tamarack Road	Old Brooke Road	Brooke Valley Road	1.72
079	Township Boundary Road	Highway 511	Drummond 10 Concession	2.43
080	Trueloves Road	Anglican Church Road	Dead End	0.56
081	Tysick Road	Bathurst Upper 4th Concession	Brooke Valley Road	1.32
082	Tysick Road	Menzies Munro Side Road	Dead End	2.70
	TOTAL KILOMETERS			**212.89**

APPENDIX A - TABLE 2 - 2013 ROAD APPRAISALS - LOW CLASS BITUMINOUS SURFACE

No.	Road Name	From	To	Length	Condition Rating
083	Allans Side Road	Scotch Line (County Road 10)	Ferrier Road	1.80	6.00
084	Anglican Church Road	Highway 7	Highway 7	3.30	9.00
085	Armstrong Line	Highway 7	Ent 618	2.50	6.00
086	Ashby Road	Iron Mine Road	Lanark Highlands Bndy	0.58	9.00
087	Bathurst 7th Concession	McVeigh Road	Harper Road	2.38	6.00
088	Cameron Side Road	County Road 6	Concession Road 4	1.74	5.00
089	Cameron Side Road	Concession Road 4	Highway 7	1.74	7.00
090	Christie Lake North Shore Road	County Road 6	1.2km W of County Road 6	1.25	5.00
091	Christie Lake North Shore Road	1.2km W of County Road 6	200m W of Christie Lane	1.45	5.00
092	Crow Lake Road	County Road 36	Boundary	3.07	6.00
093	Crozier Road	Ritchie Road	100m W of Crozier Road A	0.83	6.00
094	Ferrier Road	Allans Side Road	Mackler Side Road	0.57	6.00
095	Hanna Road	County Road 36	Elly Tysick Road	3.92	3.00
096	Iron Mine Road	County Road 12	Lanark Highlands Boundary	1.47	6.00
097	McVeigh Road	Concession Road 7	300m W of Concession 7	0.30	6.00
098	Menzies Munro Side Road	Upper Scotch Line	County Road 6	2.57	7.00
099	Norris Road	Harper Road	Muttons Road	0.15	6.00
100	Otty Lake Side Road	Top of Hill (#823)	Kenyon Road	3.50	5.00
101	Powers Road	Stanleyville Road	Narrows Lock Road	2.10	9.00
102	Ritchie Side Road	County Road 36	Crozier Road	0.88	6.00
103	Stanley Road	Pike Lake Route 1	Narrows Locks Rd (County Road 14)	1.87	6.00
104	Stanleyville Road	Stanley Road	Powers Road	1.88	9.00
105	Upper Scotch Line	County Road 10	Menzies Munro Side Road	4.12	7.00
106	Walters Lane	Narrow Cross-Section	100m W	0.10	5.00
107	Zealand Road	County Road 36	Boundary	4.10	5.00
	WEIGHTED AVERAGE CONDITION RATING				**6.17**
	TOTAL KILOMETERS				**48.17**

APPENDIX A - TABLE 3 - 2013 ROAD APPRAISALS - HIGH CLASS BITUMINOUS SURFACE

No.	Road Name	From	To	Length	Condition Rating
108	Brooke Valley Road	End of Pavement	Old Brooke Road	0.29	4.00
109	Bygrove Lane	Crozier Road	Cul de Sac	0.78	9.00
110	Clarchris Road	County Road 511	200m W of 511	0.20	3.00
111	Clarchris Road	200m W of 511	End of Pavement	0.50	5.00
112	Crozier Road	100m W of Crozier Road A	Cul de Sac Subdivision	2.20	9.00
113	Glen Tay Road	County Road 6	County Road 10	2.92	8.00
114	Glen Tay Road	Highway 7	County Road 6	0.42	5.00
115	Glenn Drive	Elm Grove Road	Elm Grove Rd	0.87	4.00
116	Hanna Road	Elly Tysick Road	County Rd 6	0.86	4.00
117	Harper Road	Highway 7	2km N of Highway 7	2.00	4.00
118	Harper Road	2km N of Highway 7	3.1km N of Highway 7	1.10	5.00
119	Harper Road	3.1km N of Highway 7	Keays Road	3.26	4.00
120	Jodi Lane	Sommerville Drive	Cul de Sac	0.24	5.00
121	Keays Road	County Road 7	Harper Road	1.33	4.00
122	Kenyon Road	Otty Lake Side Road	Lakewood Road	2.15	4.00
123	Lakewood Road	Kenyon Road	Cul de Sac	1.97	3.00
124	Maberly Main Street	County Road 36	Highway 7	0.20	4.00
125	McLaren Road	Lakewood Road	End of Crescent	1.99	4.00
126	Muttons Road (Reclaimed)	Norris Road	Harper Road	0.54	3.00
127	Old Brooke Road	Highway 7	Brooke Valley Road	0.40	3.00
128	Orchard Crescent	Scotch Line	Scotch Line	0.85	6.00
129	Otty Lake Side Road	Scotch Line	Top of Hill	0.65	7.00
130	Park Lane Court	Sommerville Drive	Cul de Sac	0.22	5.00
131	Posner Lane	Bygrove Lane	Dead End	0.30	9.00
132	Somerville Drive	Jodi Lane	County Road 6	0.90	5.00
133	Somerville Drive	Glen Tay Road	Jodi Lane	0.36	5.00
134	Stanleyville Road	County Road 10	Stanley Road	1.25	9.00
	WEIGHTED AVERAGE CONDITION RATING				**5.34**
	TOTAL KILOMETERS				**28.75**

APPENDIX B

FORECAST CONDITION RATINGS BY YEAR

McINTOSH PERRY Consulting Engineers Ltd.

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TABLE 1 - FORECAST CONDITION RATINGS BY YEAR - LOW CLASS BITUMINOUS SURFACE

No.	STREET	FROM	TO	Km	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
083	Allans Side Road	Scotch Line (County Road 10)	Ferrier Road	1.80	6.00	5.53	**7.50**	7.03	6.56	6.09	5.62	5.15	4.68	4.21	3.74
084	Anglican Church Road	Highway 7	Highway 7	3.30	9.00	8.53	8.06	7.59	7.12	6.65	6.18	**7.50**	7.03	6.56	6.09
085	Armstrong Line	Highway 7	Ent 618	2.50	6.00	5.53	5.06	4.59	4.12	**7.50**	7.03	6.56	6.09	5.62	5.15
086	Ashby Road	Iron Mine Road	Lanark Highlands Bndy	0.58	9.00	8.53	8.06	7.59	7.12	6.65	6.18	**7.50**	7.03	6.56	6.09
087	Bathurst 7th Concession	McVeigh Road	Harper Road	2.38	6.00	5.53	5.06	4.59	**7.50**	7.03	6.56	6.09	5.62	5.15	**7.50**
088	Cameron Side Road	County Road 6	Concession Road 4	1.74	5.00	4.53	4.06	3.59	**7.50**	7.03	6.56	6.09	5.62	5.15	**7.50**
089	Cameron Side Road	Concession Road 4	Highway 7	1.74	7.00	6.53	6.06	5.59	5.12	4.65	4.18	**7.50**	7.03	6.56	6.09
090	Christie Lake North Shore Road	County Road 6	1.2km W of County Road 6	1.25	5.00	4.53	4.06	3.59	3.12	3.00	3.00	3.00	3.00	**7.50**	7.03
091	Christie Lake North Shore Road	1.2km W of County Road 6	200m W of Christie Lane	1.45	5.00	4.53	4.06	3.59	3.12	3.00	3.00	3.00	3.00	**7.50**	7.03
092	Crow Lake Road	County Road 36	Boundary	3.07	6.00	5.53	5.06	4.59	4.12	3.65	3.18	3.00	3.00	3.00	**7.50**
093	Crozier Road	Ritchie Road	100m W of Crozier Road A	0.83	6.00	5.53	5.06	4.59	4.12	3.65	**7.50**	7.03	6.56	6.09	5.62
094	Ferrier Road	Allans Side Road	Mackler Side Road	0.57	6.00	5.53	5.06	4.59	4.12	3.65	3.18	3.00	3.00	3.00	**7.50**
095	Hanna Road	County Road 36	Elly Tysick Road	3.92	3.00	**7.50**	7.03	6.56	6.09	5.62	5.15	4.68	**7.50**	7.03	6.56
096	Iron Mine Road	County Road 12	Lanark Highlands Boundary	1.47	6.00	5.53	5.06	4.59	4.12	3.65	**7.50**	7.03	6.56	6.09	5.62
097	McVeigh Road	Concession Road 7	300m W of Concession 7	0.30	6.00	5.53	5.06	4.59	4.12	3.65	3.18	3.00	3.00	3.00	**7.50**
098	Menzies Munro Side Road	Upper Scotch Line	County Road 6	2.57	7.00	6.53	6.06	5.59	5.12	**7.50**	7.03	6.56	6.09	5.62	5.15
099	Norris Road	Harper Road	Muttons Road	0.15	6.00	5.53	5.06	**7.50**	7.03	6.56	6.09	5.62	5.15	**7.50**	7.03
100	Otty Lake Side Road	Top of Hill (#823)	Kenyon Road	3.50	5.00	4.53	4.06	3.59	3.12	**7.50**	7.03	6.56	6.09	5.62	5.15
101	Powers Road	Stanleyville Road	Narrows Lock Road	2.10	9.00	8.53	8.06	7.59	7.12	**7.50**	7.03	6.56	6.09	5.62	5.15
102	Ritchie Side Road	County Road 36	Crozier Road	0.88	6.00	5.53	5.06	4.59	**7.50**	7.03	6.56	6.09	5.62	5.15	**7.50**
103	Stanley Road	Pike Lake Route 1	Narrows Locks Rd (County Road 14)	1.87	6.00	5.53	5.06	4.59	**7.50**	7.03	6.56	6.09	5.62	5.15	**7.50**
104	Stanleyville Road	Stanley Road	Powers Road	1.88	9.00	8.53	8.06	7.59	7.12	6.65	6.18	5.71	5.24	**7.50**	7.03
105	Upper Scotch Line	County Road 10	Menzies Munro Side Road	4.12	7.00	6.53	6.06	5.59	5.12	4.65	**7.50**	7.03	6.56	6.09	5.62
106	Walters Lane	Narrow Cross-Section	100m W	0.10	5.00	4.53	4.06	**7.50**	7.03	6.56	6.09	5.62	5.15	**7.50**	7.03
107	Zealand Road	County Road 36	Boundary	4.10	5.00	4.53	4.06	3.59	3.12	3.00	3.00	3.00	**7.50**	7.03	6.56
	WEIGHTED AVERAGE CONDITION RATING				**5.82**	**5.77**	**5.41**	**5.27**	**5.04**	**5.64**	**5.73**	**5.63**	**5.91**	**5.88**	**6.22**
	TOTAL KILOMETERS				**48.17**	**48.17**	**48.17**	**48.17**	**48.17**	**48.17**	**48.17**	**48.17**	**48.17**	**48.17**	**48.17**

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

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TABLE 2 - FORECAST CONDITION RATINGS BY YEAR - HIGH CLASS BITUMINOUS SURFACE

No.	STREET	FROM	TO	Km	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
108	Brooke Valley Road	End of Pavement	Old Brooke Road	0.29	4.00	3.77	3.54	3.31	**7.50**	7.27	7.04	6.81	6.58	6.35	6.12
109	Bygrove Lane	Crozier Road	Cul de Sac	0.78	9.00	8.77	8.54	8.31	8.08	7.85	7.62	7.39	7.16	6.93	6.70
110	Clarchris Road	County Road 511	200m W of 511	0.20	3.00	3.00	3.00	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62	6.39
111	Clarchris Road	200m W of 511	End of Pavement	0.50	5.00	4.77	4.54	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62	6.39
112	Crozier Road	100m W of Crozier Road A	Cul de Sac Subdivision	2.20	9.00	8.77	8.54	8.31	8.08	7.85	7.62	7.39	7.16	6.93	6.70
113	Glen Tay Road	County Road 6	County Road 10	2.92	8.00	7.77	7.54	7.31	7.08	6.85	6.62	**8.00**	7.77	7.54	7.31
114	Glen Tay Road	Highway 7	County Road 6	0.42	5.00	4.77	4.54	4.31	4.08	3.85	3.62	**8.00**	7.77	7.54	7.31
115	Glenn Drive	Elm Grove Road	Elm Grove Rd	0.87	4.00	3.77	3.54	3.31	3.08	3.00	3.00	3.00	**7.50**	7.27	7.04
116	Hanna Road	Elly Tysick Road	County Rd 6	0.86	4.00	**7.50**	7.27	7.04	6.81	6.58	6.35	6.12	5.89	5.66	5.43
117	Harper Road	Highway 7	2km N of Highway 7	2.00	4.00	3.77	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62	6.39	6.16
118	Harper Road	2km N of Highway 7	3.1km N of Highway 7	1.10	5.00	4.77	4.54	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62	6.39
119	Harper Road	3.1km N of Highway 7	Keays Road	3.26	4.00	3.77	3.54	3.31	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62
120	Jodi Lane	Sommerville Drive	Cul de Sac	0.24	5.00	4.77	4.54	4.31	4.08	3.85	3.62	3.39	3.16	3.00	**7.50**
121	Keays Road	County Road 7	Harper Road	1.33	4.00	3.77	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62	6.39	6.16
122	Kenyon Road	Otty Lake Side Road	Lakewood Road	2.15	4.00	3.77	3.54	3.31	3.08	3.00	**7.50**	7.27	7.04	6.81	6.58
123	Lakewood Road	Kenyon Road	Cul de Sac	1.97	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	**7.50**
124	Maberly Main Street	County Road 36	Highway 7	0.20	4.00	3.77	3.54	**7.50**	7.27	7.04	6.81	6.58	6.35	6.12	5.89
125	McLaren Road	Lakewood Road	End of Crescent	1.99	4.00	3.77	3.54	3.31	3.08	3.00	**7.50**	7.27	7.04	6.81	6.58
126	Muttons Road (Reclaimed)	Norris Road	Harper Road	0.54	3.00	3.00	3.00	3.00	3.00	**7.50**	7.27	7.04	6.81	6.58	6.35
127	Old Brooke Road	Highway 7	Brooke Valley Road	0.40	3.00	3.00	3.00	3.00	**7.50**	7.27	7.04	6.81	6.58	6.35	6.12
128	Orchard Crescent	Scotch Line	Scotch Line	0.85	6.00	5.77	5.54	5.31	5.08	**7.50**	7.27	7.04	6.81	6.58	6.35
129	Otty Lake Side Road	Scotch Line	Top of Hill	0.65	7.00	6.77	6.54	**8.00**	7.77	7.54	7.31	7.08	6.85	6.62	6.39
130	Park Lane Court	Sommerville Drive	Cul de Sac	0.22	5.00	4.77	4.54	4.31	4.08	3.85	3.62	3.39	3.16	**7.50**	7.27
131	Posner Lane	Bygrove Lane	Dead End	0.30	9.00	8.77	8.54	8.31	8.08	7.85	7.62	7.39	7.16	6.93	6.70
132	Somerville Drive	Jodi Lane	County Road 6	0.90	5.00	4.77	4.54	4.31	**7.50**	7.27	7.04	6.81	6.58	6.35	6.12
133	Somerville Drive	Glen Tay Road	Jodi Lane	0.36	5.00	4.77	4.54	4.31	**7.50**	7.27	7.04	6.81	6.58	6.35	6.12
134	Stanleyville Road	County Road 10	Stanley Road	1.25	9.00	8.77	8.54	8.31	8.08	7.85	7.62	7.39	7.16	6.93	6.70
	WEIGHTED AVERAGE CONDITION RATING				**5.34**	**5.25**	**5.56**	**5.66**	**6.27**	**6.25**	**6.72**	**6.75**	**6.68**	**6.50**	**6.63**
	TOTAL KILOMETERS				**28.75**	**28.75**	**28.75**	**28.75**	**28.75**	**28.75**	**28.75**	**28.75**	**28.75**	**28.75**	**28.75**

OVERALL WEIGHTED AVERAGE CONDITION RATING	***6.27***	***6.25***	***6.23***	***6.21***	***6.24***	***6.33***	***6.39***	***6.38***	***6.42***	***6.40***	***6.47***
TOTAL KILOMETERS FOR ALL SURFACE TYPES	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***	***289.81***

WEIGHTED AVERAGE CONDITION RATING (HARD SURFACE ONLY)	***5.64***	***5.58***	***5.47***	***5.42***	***5.50***	***5.87***	***6.10***	***6.05***	***6.20***	***6.11***	***6.37***
TOTAL HARD SURFACE KILOMETERS	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***	***76.92***

WEIGHTED AVERAGE CONDITION RATING (GRAVEL ONLY - ASSUMED)	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**	**6.50**
TOTAL GRAVEL KILOMETERS	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**	**212.89**

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com