CORPORATION OF THE COUNTY OF HURON

ASSET MANAGEMENT PLAN

January 2020

Alternate formats and communication supports are available on request.
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INTRODUCTION

The County of Huron is an upper tier municipal corporation. Huron County, Ontario's West Coast is located along the shores of Lake Huron. The County has a current population of approximately 59,297 people, 28,369 households and covers an area of 3,402 square kilometers. This rural community is the most agriculturally productive county in Ontario, and is a leader in numerous areas of agricultural technology and innovation.

The AMP Team used The "Asset Inventory and Valuation and Asset Management Plan for Road/Bridge Network Infrastructure Building Structures, Vehicle Fleet and Equipment." (This report was presented to County's Committee of the Whole on June 17, 2008, and was moved and seconded to be received). Dillon Consulting Limited (Dillon**),** in association with ASi Technologies Inc. and KPMG, was engaged by the County to develop an inventory of the County's tangible capital assets in accordance with the Canadian Institute of Chartered Accountants Public Sector Accounting Board Section 3150 (PS 3150). The mandate also required the Dillon Team to perform a historical valuation to these same assets as well as calculate the amortized value of the assets. In addition, the County of Huron required the development of an Asset Management Plan for the short and long-term rehabilitation, reconstruction and replacement of these same tangible capital assets.

In order for Council to continue to provide an adequate level of service to their residents, it is essential to have a plan to ensure sustainability of those assets. The County currently builds upon and continually updates original Dillon plan and Property and Housing Services building condition assessments. The County's formal plan is in place for the maintenance, renewal and replacement of all its assets.

What is new for the 2020 Plan?

- The County's asset management plan has been revisited and updated for:
    - Worktech asset management software updated for updated inventory assessments of bridges, roads and large culverts (>2.5m). Updates includes history of expenditures and future rehabilitation needs, including both major and minor expenditures.
    - Large Culverts >3 meters were expanded to include culverts > 2.5 meters as culverts over that size require structural engineering.
    - More information has still being gathered for small culverts which were previously not identified in the County's paper records. The values for these small culverts have not yet been updated in the 2020 plan.
    - Staff are able to have better visibility of the timing of major capital expenditures for the County's linear assets, rather than relying solely of their estimated useful lives, and being able to provide detailed reporting.
    - Integration of Worktech asset management software with GIS

- Development of crystal reports to provide detailed analysis for roads, bridges and large culverts (note, this reporting will be transitioned to SQL reporting)
- In 2019, the County approved it's Strategic Asset Management Policy as required by legislation
- More detailed financing strategy and debt management policy.

What are the future plans for the Asset Management Plan?

This plan is an ever evolving document and will be reviewed and enhanced in the years to come with the timing and enhancements based on the availability of staff resources.

Some specific enhancements will include:

- Determine life cycle costing for existing assets
- Provide future asset assessments in relation to the projected growth in Huron County
- Provide risk based needs assessments and define current and proposed service levels
- Further refinement of the condition ratings for Property Services, Homes for the Aged, Public Works Yards and Social Housing
- Identification and inclusion of asset classes currently not included in the plan, such as IT infrastructure, storm sewers, small culverts, and small driveway culverts etc.
- Develop more comprehensive financing strategies

EXECUTIVE SUMMARY

The infrastructure assets reviewed in this project include:

- 777 kilometers of paved roads and associated storm sewers;
- 82 bridges; 211 large culverts; small culverts are still being inventoried with 144 currently identified; and an estimated 8,934 entrance way steel culverts.
- 4 public works yards
- Housing Services of 16 apartments (including Countyview) and 84 family units
- Property Services of 15 building structures
- 2 Homes for the Aged
- The County's fleet of vehicles and other heavy machinery and equipment.
- Emergency Services fleet of vehicles.

The current estimated replacement value of the County's assets based on current service levels is **$1.1 Billion**. The majority of this falls under the Public Works departments with their infrastructure accounting for approximately 87% of all County assets.

On a per household basis, this represents approximately $39,500 in assets being supported in the County.

Asset expenditure needs over the **next 10 years** are **$240,000,000**, with the majority of requirements being years 6-10. Over the next 21 years, a total of $438 million is estimated (in 2019 $'s).

Strategies will have to be developed to mitigate the immediate needs and long term needs of the County. Strategies will include, increasing the levy, utilizing reserves, reliance on funding from senior levels of government and utilizing debt. A sample funding scenario is provided at the end of this plan, and a debt management policy is being presented to Council along with this 2020 updated plan.

There is a significant amount of work that is still required to move this plan forward, involving implementing an asset management software program, identifying and measuring additional asset categories that should be included in the plan (ie IT infrastructure), regular building condition assessments, refinement of building condition ratings and more detailed analysis of the conditions and replacement costs of the County's bridge and culvert structures.

ROADS INFRASTRUCTURE

Roads Infrastructure

NOTE: THIS SECTION HAS BEEN UPDATED FOR 2020.

What does the County own?

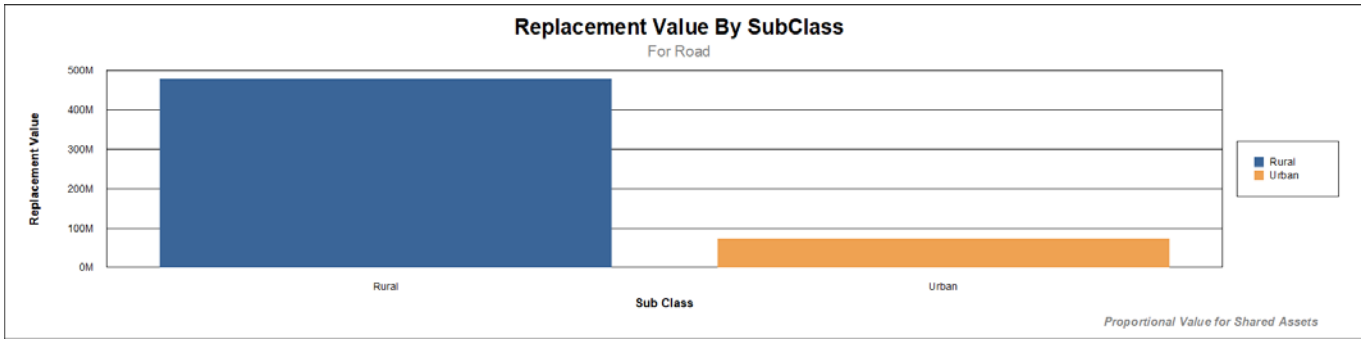
The County of Huron has 33 County Roads with a total of 777 paved lane kilometers. The road infrastructure assessments are carried out in the Public Works department.

What is it worth?

Before managing an asset, it is important to know the value to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, Public Works staff calculated an approximation of the total estimated value of the assets of $550.8 million based on current 2020 valuations.

It is important to note that the value of the roads will require to be updated for the value of ditching, driveway culverts, and guiderails. This are asset types that are currently being inventoried and expect to be in future Asset Management Plan updates.

The following chart shows the breakdown of the replacement valuation of the road network by rural vs urban roads.



What condition is it in?

Condition assessment rating was carried out on the Roads asset network, in consultation with Public Works Department using the PCI (paving condition index) to identify the level of service considered acceptable by staff.

Replacements are based on optimal timing for the cost benefit of rehabilitation vs reconstruction, and also proximity of other road segments requiring paving to maximize the economies of scale for paving contracts. The identified range for optimal rehabilitation is a PCI rating of 6-7.

The current PCI rating for the entire road network for 2020 is 8.5, or in an overall good condition.

The PCI condition rating relates to the condition of the overall road structures and is a rating out of 10. When the rating is between 0 and 3 the item needs to be reconstructed. The **PCI *(Pavement Condition Index)*** rating is a combination of the RCR ***(Ride Comfort Rating)*** and DMI ***(Distress Manifestation Index)***. The RCR can be gathered through a subjective method (drive through at posted speed). The DMI is calculated by combining the density and severity of all distresses. The PCI rating was reported on a scale from 0 to 10 with 10 being a road in perfect condition.

The rating system is as follows:

Excellent:	9– 10	No evident defects
Good:	7 – 8	Slight decline
Fair:	5– 6	Decline asset apparent
Poor:	3– 4	severe decline or failure

What do we need to do for 2020?

List of priority Road projects based on optimal timing for rehabilitation to be included in the 2020 Budget:

Priority Projects		
County Rd. No	**PCI**	**Comments**
County Rd 87	62	Last Rehabiltated in 1999 (CIR). The road is in poor condition with moderate to severe full depth cracking, rutting and insufficient structural strength and requires base remediation.
County Rd 17	77	Last rehabilitated in 1999 (Pad and Pave). The road is in good condition with slight severity cracking and minor rutting. There is no indication of full depth cracking or structural defects. Hot in Place Recycling (HIR) is an appropriate pavement management option at this time. This work can be deferred without immediate impact to service levels, however, deferral will increase life-cycle costs over time.
Seaforth Urban Reconstruction		Design started in 2018, Egmondville reconstruct in 2019, Seaforth reconstruct in 2020. Project shared with Huron East. Note: Budget shown only reflects Huron County Costs. Total estimated project cost including Huron East share and carry-over work for Egmondville Phase I is

		estimated at $8.5M

Gas Tax Agreement incremental requirement annual base threshold – $2,232,399.20.

The following tables highlight the existing reports that are available from our asset management software. Recommended actions, condition ratings and estimated costs can be reported upon for the purposes of the long term asset management planning. Estimated needs for 2020 are included below, with the remainder up to 2029 included in Appendix A.

2020 Road	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$10,523,793
RD0303-00:County Rd 3 (Mill Road) - (to) 330m East of CountyRoad 31 (E. Limit Varna)-to-0.5km W. of Bannockburn Bridge	2000	72	$1,200,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0304-00:County Rd 3 (Mill Road) - (to) 0.5km W. of Bannockburn Bridge-to-E. End of Bannockburn Bridge	2000	70	$550,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0305-00:County Rd 3 (Mill Road) - (to) E. End of Bannockburn Bridge-to-205m West of Taylor Line (W. Limit Brucefield)	2000	70	$2,450,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0308-00:County Rd 3 (Mill Road) - (to) 370m East of Highway 4 (E. Limit Brucefield)-to-142m West of CountyRoad 12 (W. Limit Egmondville)	2001	72	$2,624,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0401-00:County Rd 4 (Albert Street) - (to) Highway 8-to-CountyRoad 8 (Base Line)	2001	68	$2,616,000	**ENG** Engineering Work	$310,000	100%	**$310,000**
RD0504-00:County Rd 5 (Mt. Carmel Drive) - (to) Airport Line-to-Highway 4	1989	74	$1,500,000	**DMS** Double Micro Surfacing	$114,159	100%	**$114,159**
RD1203-01:County Rd 12 (Kippen Road) - (to) Lloyd Eisler Street-to-Highway 8	1999	100	$4,066,346	**U-REC** Urban Reconstruction	$4,066,346	100%	**$4,066,346**
RD1701-01:County Rd 17 (Winthrop Road) - (to) CountyRoad 15 (Londesborough Road)-to-CountyRoad 12 (North Line)	1999	77	$2,392,000	**HIR** Hot-In-Place Recycling	$750,000	100%	**$750,000**
RD1701-02:County Rd 17 (Winthrop Road) - (to) CountyRoad 12 (North Line)-to-CountyRoad 14 (Perth Boundary)	1999	74	$4,132,000	**HIR** Hot-In-Place Recycling	$1,250,000	100%	**$1,250,000**
RD2101-00:County Rd 21 (Airport Line) - (to) Huron Park Rd-to-CountyRoad 10 (Crediton Road)	1998	72	$696,000	**DMS** Double Micro Surfacing	$50,000	100%	**$50,000**
RD3101-00:County Rd 31 (Parr Line) - (to) CountyRoad 84 (Zurich-Hensall Road)-to-Kippen Road	2000	75	$1,636,000	**DMS** Double Micro Surfacing	$203,467	100%	**$203,467**
RD8601-00:County Rd 86 (Amberley Road) - (to) Highway 21-to-310m West of Ross St. (W. Limit Lucknow)	1995	69	$3,668,000	**SprPat** Spray Patching	$145,000	50%	**$72,500**
RD8701-01:County Rd 87 (Harriston Road) - (to) CountyRoad 86 (Amberley Road)-to-CountyRoad 12 (S) (Brussels Line)	1999	62	$5,900,000	**FDR** Full Depth Recycling & Pave	$2,350,000	100%	**$2,350,000**
RD8701-02:County Rd 87 (Harriston Road) - (to) CountyRoad 12 (S) (Brussels Line)-to-CountyRoad 12 (N)(Belmore Line)	1999	62	$350,000	**FDR** Full Depth Recycling & Pave	$145,000	100%	**$145,000**
RD8701-03:County Rd 87 (Harriston Road) - (to) CountyRoad 12 (N)(Belmore Line)-to-CountyRoad 28 (S)(Gorrie Line)	1999	62	$2,800,000	**FDR** Full Depth Recycling & Pave	$1,152,320	100%	**$1,152,320**

When do we need to do it?

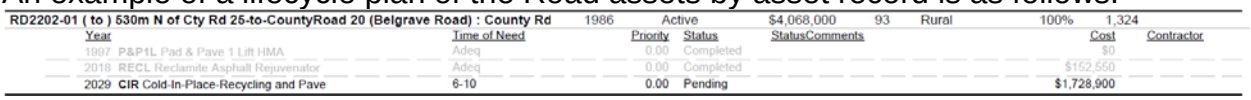
One criterion critical to rating the roads structure for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced. While the useful life of an asset is suitable for accounting purposes, Public Works will base asset replacement and pavement resurfacing on PCI ratings. The Public Works Department has prepared a pavement management strategy and presentation. These documents are being included as an appendix to this plan – Appendix B.

Asset Estimated Useful Life in Years	
Asset Type	Useful Life
Roads Surface	22
Roads Base	50

How much money do we need?

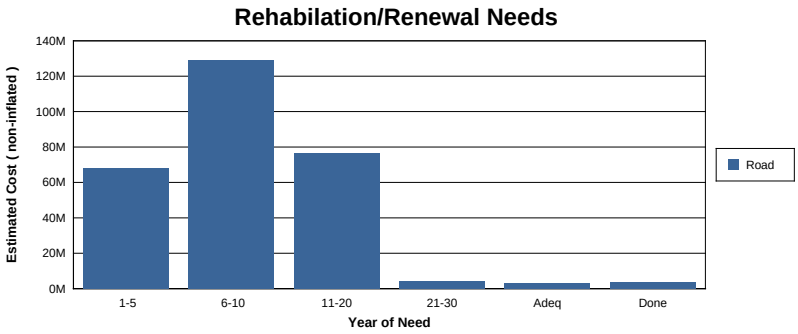
The County's asset management software has been updated to include a significant amount of detail with respect to the linear assets of the County. Details will include previous rehabilitation work along with condition assessments and future year's rehabilitation needs.

An example of a lifecycle plan of the Road assets by asset record is as follows:



RD2202-01 (to) 530m N of Cty Rd 25-to-CountyRoad 20 (Belgrave Road) : County Rd	1986	Active	$4,068,000	93	Rural	100%	1,324	
Year	Time of Need	Priority	Status	StatusComments			Cost	Contractor
1997 P&P1L Pad & Pave 1 Lift HMA	Adeq	0.00	Completed				$0	
2018 RECL Reclamite Asphalt Rejuvenator	Adeq	0.00	Completed				$152,550	
2029 CIR Cold-In-Place-Recycling and Pave	6-10	0.00	Pending				$1,728,900	

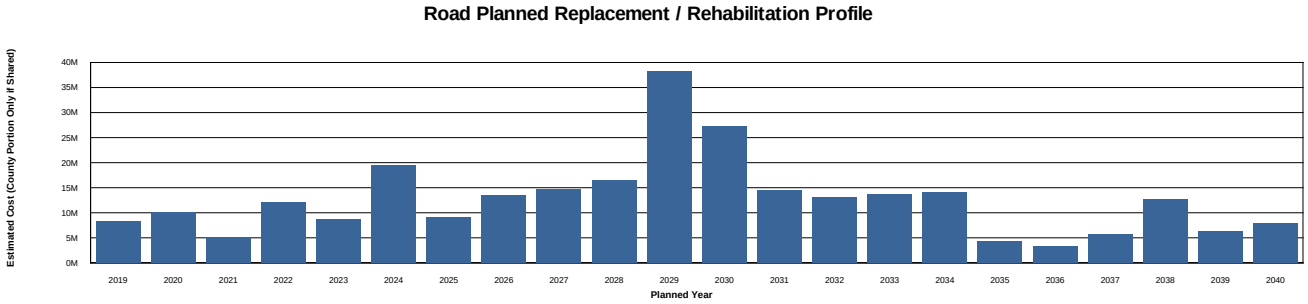
Rehabilitation requirements for the next 30 years are illustrated in the following chart, however, it is important to note that the values past 20 years are understated as they only include major rehab as we are currently manually updating life cycle costs for the next treatments:



	Total	Road
Total	284,775,324.68	284,775,324.68
1-5	67,996,296.92	67,996,296.92
6-10	129,243,450.00	129,243,450.00
11-20	76,682,690.00	76,682,690.00
21-30	4,031,250.00	4,031,250.00
Adeq	2,950,237.76	2,950,237.76
Done	3,871,400.00	3,871,400.00

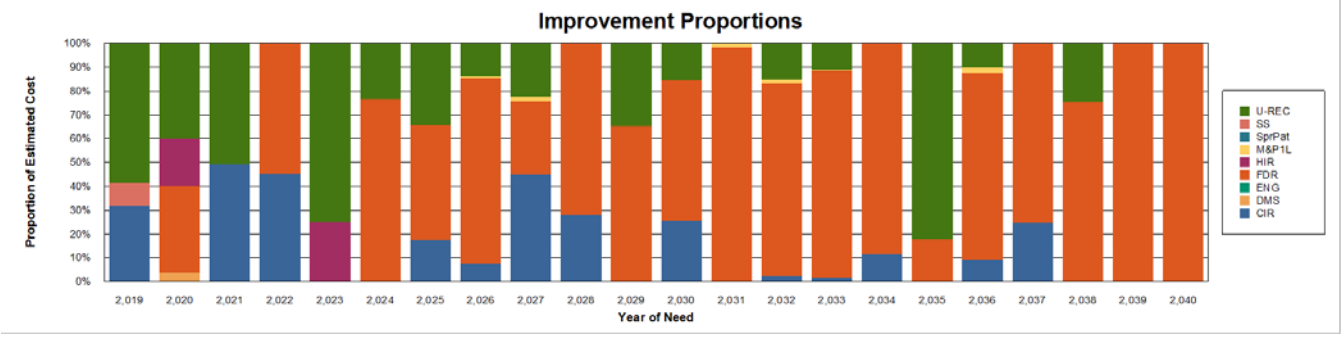
As illustrated in the chart, a total of $285 million is required in the next 30 years to rehabilitate the existing road network. $68 million is required in the next 1-5 years, and $129 million is required in the next 6-10. Annually an average of $9.5 million is required per year.

The following chart shows the rehabilitation needs over the next 20 years by each year:



As seen in this chart, there is a spike in needs for 2024, and then again a more significant spike in rehabilitation needs from 2029-2030. This will prove to be very challenging period for the County as that coincides with the peak rehabilitation needs for the County's bridge and large culvert structures. The work required for 2029 will require to be managed where some projects are moved ahead and some will be required to be deferred to ensure more stable funding.

The following table is the same annual rehabilitation profile, however, it illustrates the nature of the work that is being done based on the Pavement Management Strategy. The goal is to ensure the lowest lifecycle costs for our assets to ensure best value for the residents. The details for the annual work also will be included in Appendix A.



Based on the current stage in the life cycle of our road, much of the required rehabilitation work will be a full depth recycling and pave. The legend in the chart is based on the table below:

Improvement Type	Class	Description
CRK	Rehab to achieve life	Rout and seal existing cracks
M&P1L	Rehab to achieve life	Mill 50 mm - Pave 50 mm
SGR	Rehab to achieve life	Shouldering
CIR	Rehab with Life Extension	Cold-InPlace-Recycling and Pave
FDR	Rehab with Life Extension	Full Depth Recycling & Pave
U-REC	Asset Replacement	Urban Reconstruction
RECL	Rehab to achieve life	Reclamite Asphalt Rejuvenator
P&P1L	Rehab with Life Extension	Pad & Pave 1 Lift HMA
SS	Rehab to achieve life	Slurry Seal
ENG	Engineering Design	Engineering Work
SprPat	Maintenance	Spray Patching
HIR	Rehab with Life Extension	Hot-In-Place Recycling
DMS	Functional Improvement	Double Micro Surfacing

How do we reach sustainability?

The analysis revealed that the average yearly revenue required is $13.01 million to ensure that the level of service is maintained at today's level over the next 20 years for the County's road network. The previous graph also indicates that at that rate of funding the road network needs are expected to be somewhat variable over the next 20 years. Costs are estimated to peak in years 2029-2030 for the road rehabilitation program.

Current depreciation of road assets in our annual financial statements is approximately $5,600,000. The net book value (NBV) of the road network is $58,000,000 as reported in our 2018 financial statements. It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher that what is being reflected in our statements. The net

book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

Currently there is an estimated Public Works reserve balance of $11.5 million which could be utilized for roads/bridges/public works yards.

With a prudent asphalt management plan, despite the base being close to the end of its estimated useful life, the life of the base can be extended out much longer if the asphalt is replaced at the right time (ie PCI above 6), where minimal work is required to maintain it (the base) at acceptable service levels. At a PCI of 5, the base is already damaged and this is the most valuable piece of our infrastructure. This is critical for the long term sustainability of our road network.

What are we spending on roads maintenance?

An important consideration of asset management is the on-going maintenance related expenditures that are being incurred in order to maintain the County's assets. As assets deteriorate, it becomes more expense to maintain those assets, therefore it is important for staff to assess condition ratings to ensure the optimal timing of asset replacement.

Road and roadside maintenance and repair costs, including labour costs, are approximately $1.9 – $2.0 million annually. This does not include any costs for ditching or drainage. More work is required on ditching and drainage as we move forward as we will see an escalation in those costs as those too are reaching end of useful life and will require significant work.

Desired Levels of Service

Key Performance Indicators

Key Indicator:
Pavement Condition Index (PCI), Ride Comfort Rating (RCR), and Distress Manifestation Index (DMI)

Issue:
As roads age, they begin to deteriorate due to exposure to environmental elements such as UV damage, freeze/thaw cycles, vehicle load stresses, and oxidization. As the roads age, they become more brittle and less flexible, creating shrinkage cracks, visual defects, wheel rutting, and potholes.
Allowing the road surface to deteriorate allows the elements to seep into the road base, shortening the life of the road base. The road base is much more expensive to repair.

Potential Impact:
Potential impacts of deteriorating roads include safety hazards, increased number of accidents, increased maintenance costs, load restrictions, poor drainage, increased liability, and increased costs of repairs. Wear and tear on vehicles and reduced fuel economy contributing to greenhouse gas emissions.

Current Controls:
Twice weekly, patrols are carried out to monitor road conditions. If issues are detected, they are repaired immediately, or seasonally, when the Asphalt Foreman will inspect and perform test to determine PCI, DMI, and RCR. Roads have a fairly predictable life span of 18 – 22 years, and during this time, PCI evaluation is completed every 1-2 years, or more often as needs arise.

Preventative Maintenance is also carried out, and if key indicators such as repetitive occurrences of pothole repairs, or crack sealing, can indicate an underlying issue that is further investigated by staff and/or an engineering consultant.

Roads are built and maintained to established standards, such as Ontario Provincial Standards, Transportation Association of Canada Standards, the Ontario Traffic Manuals, Canadian Highway & Bridge Design Code, and Ontario Structure Inspection Manual. Regular inspections are carried out to meet established thresholds. **The established PCI threshold is 6.0.**

Legislation is also in place as a legal framework for road and bridge maintenance. The Public Works department ensures that these requirements are met, such as road construction and maintenance conditions to meet Minimum Maintenance Standards (MMS), as well as the Highway Traffic Act.

In addition to this, requests are received on a regular basis from tax payers, businesses, and agricultural entities for such services as seasonal road maintenance, roadside tree trimming, grass cutting, weed spraying, and garbage and debris clean-up. These requests are integrated into the regular preventative maintenance schedule to accommodate the needs of our constituents.

Action plan:
Continue with preventative maintenance and inspection. As asphalt has a fairly predictable life cycle due to the impacts of environmental elements, preventative maintenance and rehabilitation is planned and budgeted accordingly.

BRIDGE and CULVERTS > 2.5 meters

INFRASTRUCTURE

Bridge and Large Culverts Infrastructure

NOTE: THIS SECTION HAS BEEN UPDATED FOR 2020. Culverts > 2.5 meters have now been included in this section. For the County's asset management purposes, the definition of large culverts has been expanded from >3 meters to >2.5 meters.

What does the County own?

The County of Huron has a total of 82 bridges and 211 large culverts. All asset field assessments are carried out in the Public Works department by internal staff and external engineering firms. These two assets are being grouped together as both types of structures require similar structural inspections, review, analysis, and design efforts.

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, Public Works staff estimated the current value of the large overhead structure assets at $242 million. The current estimates are based on 2019 values and have not be indexed into future values.

The following table lists the total estimated replacement value of the County's more significant structures.

Bridges and Large Culverts Replacement Value	
Structure	Estimated Replacement Cost
Bridges	$ 154,197,000
Large Culverts	$ 87,840,000
Total	**$ 242,037,000**

County Owned Bridges

The County of Huron has 82 bridges for which it is currently responsible to inspect, maintain, and repair and/or replace. The County's percentage of ownership varies from 33% to 100% at each of these sites depending on geographic location within the County. Financial partners may include lower tier municipalities within the County, lower tier municipalities in adjacent Counties, or adjacent Counties themselves.

All Bridges	
County Ownership (%)	Quantity
100%	73

50%	8
33%	1
	82

Since the previous update to the Asset Management Plan, the County has been actively "downloading" bridges to the lower tiers meaning they are no longer maintained by the County and that ownership has been transferred. This process can only take place when a structure falls on a road that does not belong to the County. The County has plans to continue downloading structures that are not on County roads. Currently, seven (7) structures in the inventory are eligible for transfer to the lower tiers. One of those has already been rehabilitated and is awaiting transfer. The structure that is awaiting download is currently under 100% County ownership until the By-Law is ratified.

Downloadable Bridges	
County Ownership (%)	Quantity
100%	3
50%	4
	7

What is it worth?

It is important to know the value of all bridge infrastructure assets to determine if the maintenance dollars spent are justified. The Current Replacement Value (CRV) is calculated by using the total quantity of material and established unit rates as shown above. It is important to remember that the CRV is based on replacing the current structure with an exact replica of what is currently there. The County has a total of 154 million dollars' worth of bridge structures based on current replacement values.

The following table provides additional details on the current Bridge inventory:

Current Replacement Value by Bridge Type				
Asset Class	Quantity	Total Replacement Costs	Average Replacement Cost	Cost per m (length)
Rigid Frame	50	$62,529,000	$1,250,580	$58,200
Slab on I-Girder (Concrete)	17	$50,628,000	$2,978,118	$47,500
T-Beam	6	$14,303,000	$2,383,833	$51,500
Slab on I-Girder (Steel)	5	$14,471,000	$2,894,200	$53,300
Box Beam	2	$3,515,000	$1,757,500	$57,350
Spandrel Arch	1	$4,500,000	$4,500,000	$94,800
Voided Slab	1	$4,251,000	$4,251,000	$53,000
	82	**$154,197,000**	**$1,880,451**	

As shown in the table above, a rigid frame structure has the lowest average replacement cost but also the second highest cost per meter of bridge. In most cases, a rigid frame structure is replaced with either a Box Beam Bridge or Slab on I-Girder (Concrete) bridge which both have a lower cost per meter. Unfortunately, most rigid frames are being replaced with longer spanning structures to accommodate increased hydraulic flows and to avoid blocking the channel so the actual construction cost is greater than the CRV. Therefore, spending money early on rehabilitating rigid frames can help the County minimize the financial impact due to the difference in costs per structure type.

What condition is it in?

In Ontario, structures spanning 3.0m or greater are required to be inspected biennially by a trained Bridge Inspector or licensed Engineer. The inspection shall be performed in accordance with the Ontario Structure Inspection Manual (OSIM) and archives basic inventory data like bridge type, deck length, deck width, skew etc. It also lists any material and structural defects on individual bridge elements with associated quantities, costs, and timelines for repair. These quantities, costs, and timelines change with each inspection and are what Asset Managers use to cost and predict future rehabilitation or replacement.

All bridges in Ontario are rated on a scale from 0-100. This numerical value is known as the Bridge Condition Index (BCI) value. The formula below is how a BCI is calculated for a bridge.

BCI = Current Value / Replacement Value x 100

Where:

Replacement Value = Sum of Element replacement value = Sum of (Element Unit Cost x Element Quantity)

Current Value = Sum of Current Element Value = Sum of (Element Unit Cost x (1.0*E +0.75*G + 0.4*F + 0.0*P)

Where:

E – quantity of element in excellent condition state
G – quantity of element in good condition state
F – quantity of element in fair condition state
P – quantity of element in poor condition state

Simply stated, the BCI is a ratio of current value over replacement value with current value being determined by the condition state of key bridge elements.

The rating system reflects comments and quantities documented in the OSIM form. The Ministry of Transportation Ontario (MTO) has established BCI ranges corresponding to single word descriptors to represent bridge condition. The descriptors and ranges are as follows:

Bridge Condition based on Bridge Condition Index (BCI)

Condition	BCI Range
Excellent	80 – 100
Good	70 – 80
Fair	60 – 70
Poor	0 – 60

The County has an average BCI value of 69 and is in considered fair by MTO standards.

The distribution of the bridges amongst the BCI condition scale is as follows:

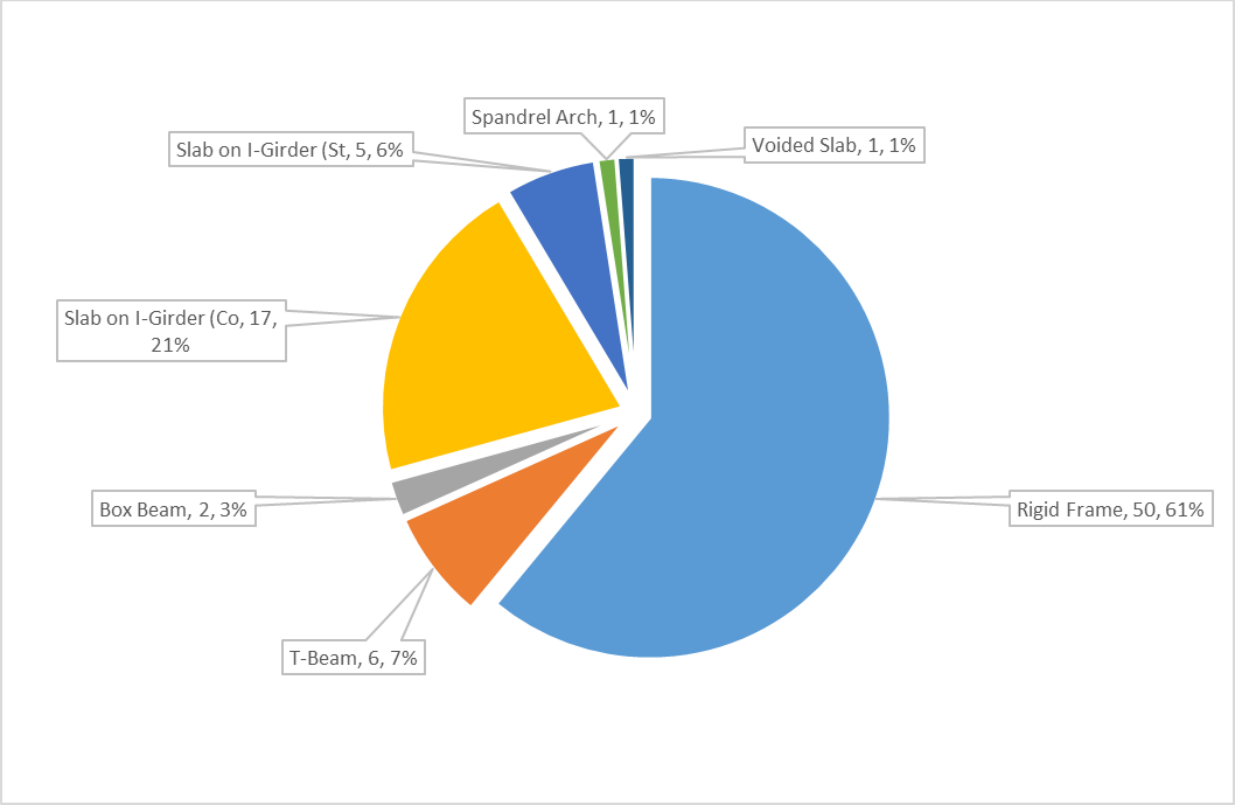
Structure Condition Rating		
BCI Scale	**# of Structures**	**% of Total**
Bridges		
Excellent	1	1%
Good	43	52%
Fair	25	31%
Poor	13	16%
Total Bridges – Avg 69 BCI	**82**	**100%**

When do we need to do it?

According to the Canadian Highway Bridge Design Code (CHBDC) all new structures shall have an expected service life of 75 years. A structure is not expected to reach the ESL if regular maintenance and rehabilitation is not completed. The amount of maintenance and capital investment required to achieve the ESL will vary depending on structure type, quality of materials, traffic volumes, environmental conditions, adequate annual maintenance, drainage, how often the structure is rehabilitated and/or size of capital investments made. Some bridges may be able to reach the ESL with minimal interference while others require substantial investment or early replacement based on the factors outlined above.

Types of Bridges in Huron County

Different types of bridges exhibit different ways in how they deteriorate and the amount of capital required throughout its service life. By understanding the types of structures throughout Huron County, the Public Works Department can select projects that have the greatest opportunity to meet or exceed the expected life of the bridge. Below is a breakdown by bridge type throughout the County.



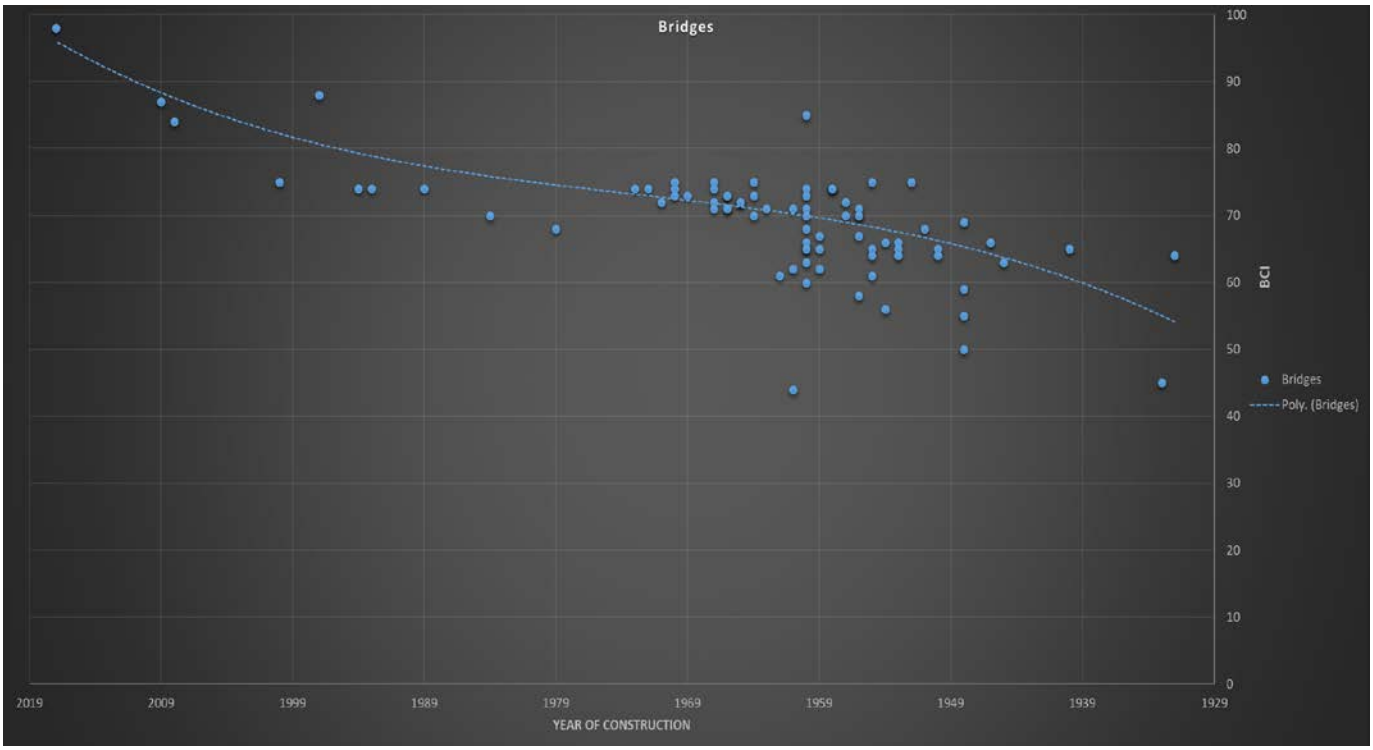
Fortunately for the County, a large portion of our bridges are Rigid Frames. It is generally understood that Rigid Frame bridges will meet the expected service life with regular capital investment as long as the deck is free from chloride contaminated concrete and full concrete barriers are installed to prevent salt spray. Historically the County has done a good job to install full barriers at many of the rigid frame bridges in hopes to achieve or extend the ESL. We are continuing to identify Rigid Frame bridges that are in good condition where a full barrier would be beneficial to extending the ESL.

Deterioration in Bridges

Ideally, the overall bridge condition deteriorates at a predictable rate that the Asset Manager can use to forecast future capital projects. Unfortunately, all bridge inspections are based on judgement, experience of the inspector and interpretation of the OSIM. Therefore bridges do not tend to deteriorate in a linear or predictable manner because the inspector or firm does not remain constant. Additionally, the OSIM is written in a way that forces inspectors to reduce the BCI at ages 5, 15, and 25 regardless of defects found on the bridge. Due to this fact, a bridge deterioration curve should show a quick decline in BCI to year 25 and then begins to level off with minor increases due to capital investments until it reaches a point beyond repair.

The Public Works Department has elected to use a polynomial trendline to the 4th order. This is due to the expected deterioration based on a thorough understanding of OSIM. A 4th order trendline was best suited for the expected deterioration of a bridge because there should be four (4) hills/valleys in the data. The Public Works Department has graphed all bridges in the County showing their year built vs. condition. This will help determine which bridges are

beginning to fall below the deterioration curve. Identifying problem bridges early will allow Public Works to intervene and help the asset achieve its ESL. Below is the graphed trendline for all County owned bridges. As of 2019, anything built in 1944 or earlier has already reached its ESL.

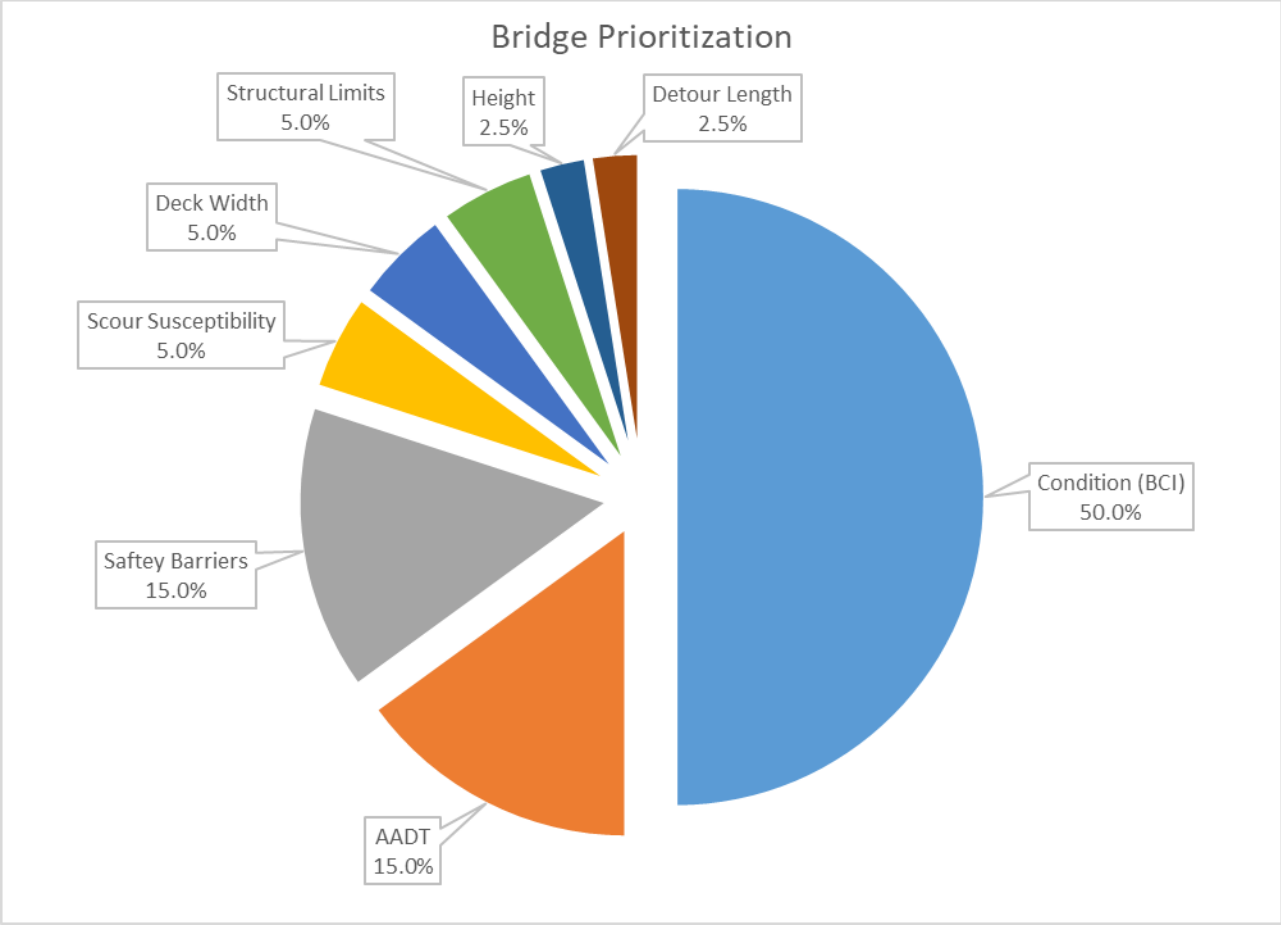


How do we select structures for rehabilitation or replacement?

The County uses the trendline above to identify bridges suitable for rehabilitation. One widely agreed upon engineering principle is that bridges should be patched, waterproofed, and paved at a maximum every 25 years. While trying to achieve that standard, the County also looks for bridges that are beginning to fall below the trendline. This usually means replacing old substandard barriers and patching areas of poor concrete. Full deck replacements may also be recommended if the area of deck patching is too high and new barriers are required.

When identifying bridges for replacement, the County uses a priority based approach that accounts for condition and risk. This approach is successful because bridges with low BCI's are heavily weighted and typically fall far below the trendline making them unsuitable for rehabilitation. Risk needs to be considered when replacing bridges to avoid catastrophic failure. Bridges with high traffic volumes, substandard barriers, or with high abutments/piers have a greater risk to the public. Age has not been included in the priority rankings.

The following is how the Public Works Department is prioritizing bridge replacements.

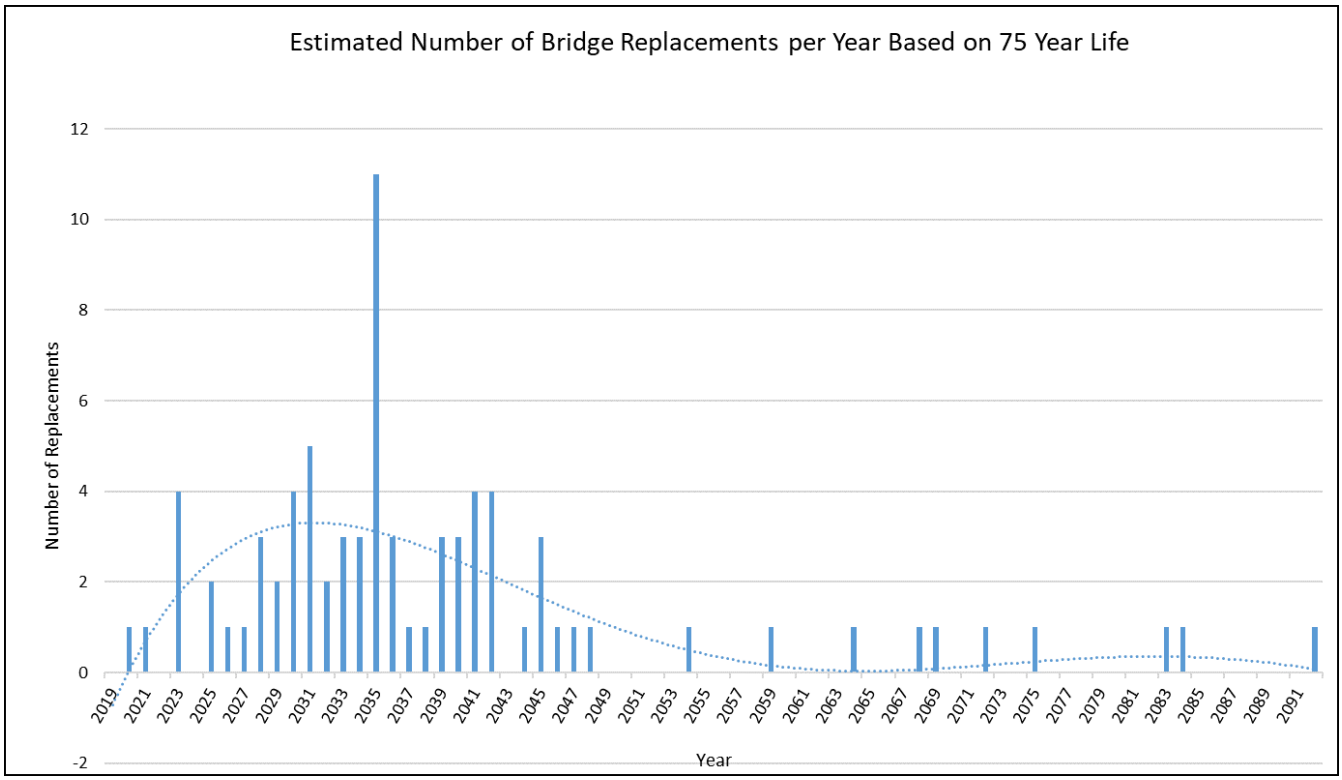


If a bridge ranks high in the replacement priority an Average Annual Cost (AAC) comparison is completed to ensure replacement is preferred. Even though age is not a direct factor into selecting rehabilitation or replacement, having a strong understanding of the County's inventory and aging infrastructure helps make the decision when AAC is close.

How old is the current infrastructure?

One important factor when creating an Asset Management Plan is the medium to long term planning to ensure there will be sufficient capital available to maintain the assets. It is essential to avoid delaying projects so that big clusters of structures need rehabilitation and or replacement at the same time. Not only is it restricted financially but road closures and detours need to be considered as well. Based on an absolute bridge life of 75 years, the graph below illustrates this upcoming cluster of aging bridges which will achieve their 75 expected life. This is a very important graph because it illustrates the large group of structures reaching their ESL at the around the same time.

As of 2019, the County of Huron has an average bridge age of 55.9 years.



It should be noted that bridges often last longer than their useful life with good annual maintenance and it is up to the Asset Manager to select candidates for delayed and early replacements. The tools previously mentioned are ways to help the County prioritize rehabilitations and replacements.

What do we need to do for 2020?

The following table presents the more significant needs for 2020:

Structure	BCI	Rehabilitation
08-06.3 Summerhill Bridge	58	Built = 1959, BCI = 58, Deck Length = 57.6m, 20 year life extension, design in 2020, construction in 2021 Last rehab = 2006 (patch, waterproof, and pave with barrier replacement. Conversion to semi integral abutments)
15-06.9 Westerhout Bridge	64	Built = 1960, BCI = 64, Deck Length = 11.3m, 15 year life extension, design in 2020, construction in 2021 Last rehab = 1992 (patch, waterproof and pave)
15-14.6 Wallace Bridge	59	Built = 1956, BCI = 59, Deck Length = 21.0m, 15 year life extension, design in 2020, construction in 2021
83.14.7 Black Creek Bridge	55	Built = 1948, BCI = 55, Deck Length = 20.1m, 75 year expected life, design in 2019/2020, construction in 2021 Last rehab = 1998 (patch, waterproof, and pave)

83-19.2 Ausable 1 Bridge	55	Built = 1948, BCI = 55, Deck Length = 20.1m, 75 year expected life, design in 2019/2020, construction in 2021 Last rehab = 1998 (patch, waterproof, and pave)

Some of the above projects were included in the 2019 AMP requirements and deferred into 2020, thus not showing in the 2020 table below.

The following tables highlight the existing reports that are available from our asset management software. Recommended actions, condition ratings and estimated costs can be reported upon for the purposes of the long term asset management planning. Estimated needs for 2020 are included below, with the remainder up to 2029 included in Appendix A.

2020 Bridge	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$810,000
RB0010:County Rd 8 (Base Line) - 08-06.3	1959	62	$2,914,000	**ENGdesign** Engineering Design Work	$90,000	100%	**$90,000**
RB0011:County Rd 15 (Londesborough Road)	1960	65	$735,000	**ENGdesign** Engineering Design Work	$15,000	100%	**$15,000**
RB0030:County Rd 15 (Londesborough Road)	1956	58	$1,135,000	**ENGdesign** Engineering Design Work	$15,000	100%	**$15,000**
RB0032:County Rd 1 (Lucknow Line) - 01-24.9	1966	71	$746,000	**ENGdesign** Engineering Design Work	$5,000	100%	**$5,000**
				PWP Patch, Waterproof, Pave	$155,000	100%	**$155,000**
RB0050:County Rd 19(Ethel Line/Brandon	1956	71	$924,000	**PWP** Patch, Waterproof, Pave	$165,000	100%	**$165,000**
				IAG Upgrade guiderail	$30,000	100%	**$30,000**
				RRH Replace Barriers	$175,000	100%	**$175,000**
RB0073:County Rd 87 (Harriston Road) - 87-	1953	64	$2,894,000	**OTH** Approach works to address drainage issues	$160,000	100%	**$160,000**

How much money do we need?

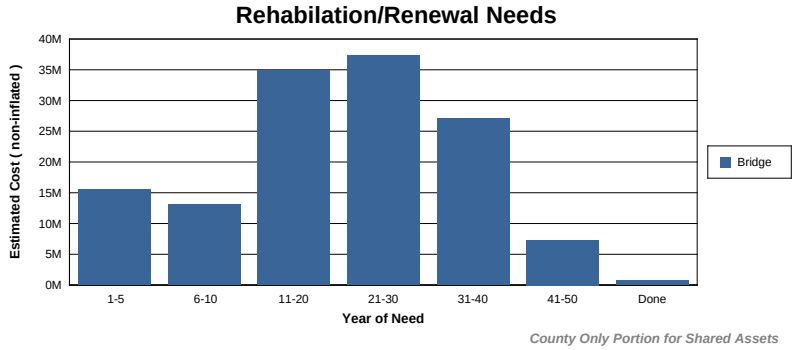
The County's asset management software has been updated to include a significant amount of detail with respect to the linear assets of the County. Details will include previous rehabilitation work along with condition assessments and future year's rehabilitation needs.

Example of Asset Record and Life-cycle plan for a bridge structure. The records have been updated to include what history is available. The records will include major capital needs along with minor rehabilitation or maintenance requirements and engineering.

Bridge	YrBuilt	Status	Replacement Value	Current Condition	Sub Class	Share	AADT	Municipality - Patrol
RB0063 25-17.1 (Dyers Bridge) : County Rd 25 (Blyth Road)	1950	Active	$937,000	67	Rigid Frame	100%	0	North Huron AUBURN

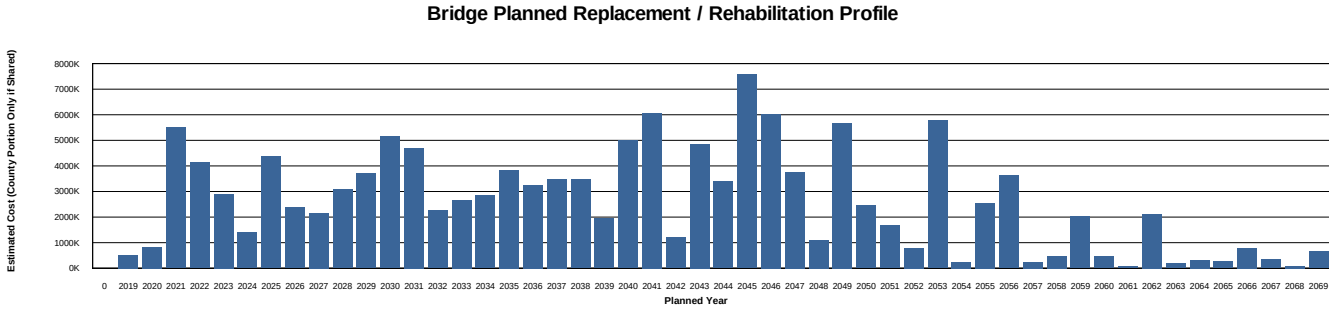
Year	Time of Need	Priority	Status	StatusComments	Cost	Contractor
2009 WAP Waterproof and Pave	Done	0.00	Completed		$0	
2009 RCS Rehabilitation / Replacement of Safety Curbs / Sidewalks	Done	0.00	Completed	New curbs	$0	
2009 RRH Barrier/Parapet Replacement	Done	0.00	Completed		$0	
2036 **ENGdesign** Engineering Design Work	11-20	0.00	Recommended		$100,000	
2037 **RSL** Replace Bridge - Same Location	11-20	0.00	Recommended		$937,000	
2061 **ENGdesign** Engineering Design Work	41-50	0.00	Recommended		$20,000	
2062 **WAP** Waterproof and Pave	41-50	0.00	Recommended		$150,000	

The following table illustrates the estimated rehabilitation needs for the County's bridges over the next 50 years. The total estimated requirements for rehabilitation is $136 million. The majority of the needs are in the next 11-30 years with approximately $101 million being required.

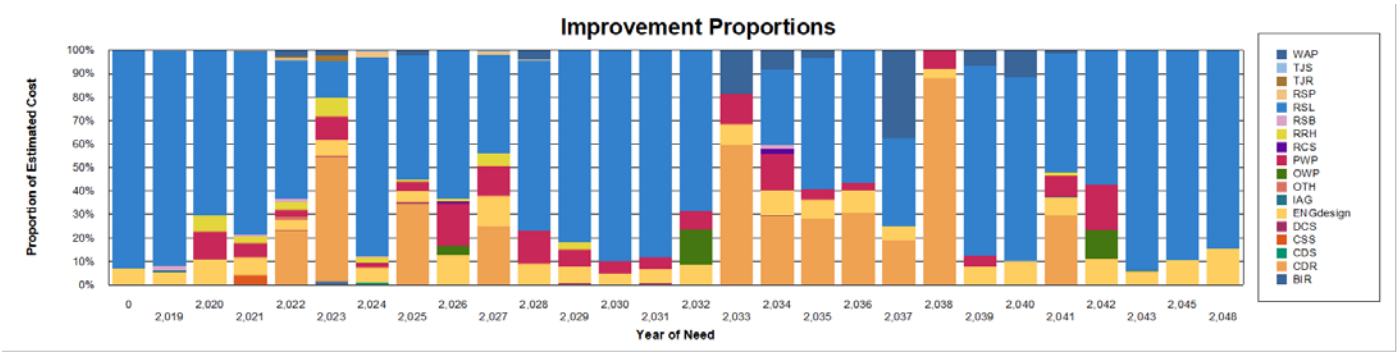


	Total	Bridge
Total	136,048,961.50	136,048,961.50
1-5	15,507,500.00	15,507,500.00
6-10	13,158,900.00	13,158,900.00
11-20	34,896,500.00	34,896,500.00
21-30	37,289,891.50	37,289,891.50
31-40	27,147,420.00	27,147,420.00
41-50	7,331,500.00	7,331,500.00
Done	717,250.00	717,250.00

The rehabilitation needs by year are broken out in the table below, with significant peaks in the early 2020's, 2030's and 2040's.



The following table is the same annual rehabilitation profile, however, it illustrates the nature of the work that is being done based on the current estimated required work to be performed. The goal is to ensure the lowest lifecycle costs for our assets to ensure best value for the residents.



The legend details for the nature of the required work is as follows:

Improvement Type	Description	Class
REB	Remove Existing Bridge	Asset Replacement
RRH	Barrier/Parapet Replacement	Asset Component Replacement
NEW	Build new bridge	Asset Replacement
RNL	Replace Bridge - New Location	Asset Replacement
RSL	Replace Bridge - Same Location	Asset Replacement
TEB	Twin Existing Bridge	Capacity Improvement
RSP	Rehabilitate Superstructure	Rehab to achieve life
RSB	Rehabilitate Substructure	Rehab to achieve life
WSO	Widen Superstructure Only	Capacity Improvement
WSS	Widen Superstructure and Substructure	Capacity Improvement
RRW	Rehabilitate / Replace Retaining Walls	Rehab to achieve life
VCI	Vertical Clearance Improvement	Capacity Improvement
HCI	Horizontal Clearance Improvement	Capacity Improvement
BIR	Bearing Improvement / Replacement	Asset Component Replacement
WSR	Wearing Surface Rehabilitation	Rehab to achieve life
RWS	Removal of Existing Asphalt Wearing Surface and Waterproofing	Rehab to achieve life
CPS	Cathodic Protection System	Functional Improvement
PWP	Patch Waterproof Pave	Rehab to achieve life
LMC	Latex Modified Concrete Overlay	Rehab with Life Extension
OWP	Overlay Waterproof Pave	Rehab with Life Extension
CSR	Coating Steel Railings	Rehab to achieve life
PDR	Partial Deck Replacement	Rehab with Life Extension
WAP	Waterproof and Pave	Rehab to achieve life
TJS	Transverse Exp Joint Seal Replacement	Rehab to achieve life
TJM	Transverse Exp Joint Seal Modification	Rehab to achieve life
TJR	Transverse Exp Joint Replacement	Rehab with Life Extension
LJR	Longitudinal Exp Joint Replacement	Rehab with Life Extension
RCS	Rehabilitation / Replacement of Safety Curbs / Sidewalks	Asset Component Replacement
CSS	Coating Structural Steel	Rehab with Life Extension
C/R	Channel Realignment	Rehab with Life

		Extension
C/I	Channel Improvements	Functional Improvement
SPI	Scour Protection Improvements	Functional Improvement
EIR	Embankment Improvements / Rehabilitation	Functional Improvement
OTH	Other	Non - Standard Improvement
IAB	Install Approach Barrier	Safety Improvements
IAG	Install Approach Guiderail	Safety Improvements
RDI	Enhanced OSIM Inspection	Engineering Design
DCS	Deck Condition Survey	Engineering Design
C/S	Condition Survey of Other Components	Engineering Design
CN/I	Condition Inspection	Engineering Design
MajSR		Rehab to achieve life
Replace	Replace	Asset Replacement
RBC	Replace Bridge with Culvert	Asset Replacement
PPT	Provision for Pedestrian Traffic	Capacity Improvement
CDS	Concrete Deck Soffit Repairs	Rehab to achieve life
CDR	Complete Deck Replacement or Superstructure Replacement	Asset Component Replacement
ENGdesign	Engineering Design Work	Engineering Design

County Owned Large Culverts

The County of Huron has 211 large culverts for which it is currently responsible to inspect, maintain, and repair and/or replace. The County's percentage of ownership varies from 50% to 100% at each of these sites depending on geographic location within the County. Financial partners may include lower tier municipalities within the County, lower tier municipalities in adjacent Counties, or adjacent Counties themselves.

All Culverts	
County Ownership (%)	Quantity
100%	186
50%	25
	211

Since the previous update to the Asset Management Plan, the County has been actively "downloading" bridges to the lower tiers meaning they are no longer maintained by the County and that ownership has been transferred. This process can only take place when a structure falls on a road that does not belong to the County. The County has plans to continue downloading all structures that are not on County roads. Currently, one (1) culvert in the inventory is eligible for transfer to the lower tiers.

Downloadable Culverts	
County Ownership (%)	Quantity
100%	0
50%	1
	1

What is it worth?

It is important to know the value of all infrastructure assets to determine if the maintenance dollars spent are justified. The Current Replacement Value (CRV) is calculated by using the total quantity of material and established unit rates as shown above. It is important to remember that the CRV is based on replacing the current structure with an exact replica of what is currently there. The County has a total of 88 million dollars' worth of large culvert structures based on current replacement values.

The following table provides additional details on the current Bridge inventory:

Current Replacement Value by Culvert Type				
Asset Class	Quantity	Total Replacement Costs	Average Replacement Cost	Cost per m (length)
FRR – Frames Rigid	120	$51,052,000	$425,400	$18,550
FRA – Frames Articulated	34	$15,378,000	$452,300	$18,500
PR – Pipe Round	31	$8,032,000	$259,100	$10,225
BOX – Box	9	$4,918,000	$546,400	$19,460
PA – Pipe Arch	8	$4,076,000	$509,500	$18,960
ARCH – Arch	8	$3,691,000	$461,400	$16,640
OTH - Other	1	$693,000	$693,000	$34,825
	211	**$87,840,000**		

As shown in the table above, a PR – Pipe Round (which is a circular corrugated steel pipe) has the cheapest average cost and cost per linear meter. However, due to its round shape there are limitations to the span sizes because it requires a deeper amount of fill. PR – Pipe Round culverts are smaller in diameter which is why the average replacement cost is the lowest.

What condition is it in?

In Ontario, structures spanning 3.0m or greater are required to be inspected biennially by a trained Bridge Inspector or licensed Engineer. The inspection shall be performed in accordance with the Ontario Structure Inspection Manual (OSIM) and archives basic inventory data like culvert type, length, width, skew etc. It also lists any material and structural defects on individual elements with associated quantities, costs, and timelines for repair. These quantities, costs, and timelines change with each inspection and are what Asset Managers use to cost and predict future rehabilitation or replacement. The County has decided have

inspections on all structures that are 2.44m (8') or larger because the information collected is so valuable and is the first step in establishing a complete Asset Management Plan.

All culverts in Ontario are rated on a scale from 0-100. This numerical value is known as the Bridge Condition Index (BCI) value. The formula below is how a BCI is calculated for a bridge.

BCI = Current Value / Replacement Value x 100

Where:

Replacement Value = Sum of Element replacement value = Sum of (Element Unit Cost x Element Quantity)

Current Value = Sum of Current Element Value = Sum of (Element Unit Cost x (1.0*E +0.75*G + 0.4*F + 0.0*P)

Where:

E – quantity of element in excellent condition state
G – quantity of element in good condition state
F – quantity of element in fair condition state
P – quantity of element in poor condition state

Simply stated, the BCI is a ratio of current value over replacement value with current value being determined by the condition state of key structural elements.

The rating system reflects comments and quantities documented in the OSIM form. The Ministry of Transportation Ontario (MTO) has established BCI ranges corresponding to single word descriptors to represent culvert condition. The descriptors and ranges are as follows:

Culvert Condition based on Bridge Condition Index (BCI)	
Condition	BCI Range
Excellent	80 – 100
Good	70 – 80
Fair	60 – 70
Poor	0 – 60

The County has an average BCI value of 65 and is in considered fair by MTO standards. The distribution of the bridges amongst the BCI condition scale is as follows:

Structure Condition Rating		
BCI Scale	**# of Structures**	**% of Total**
Large Culverts		
Excellent	7	3%
Good	76	36%

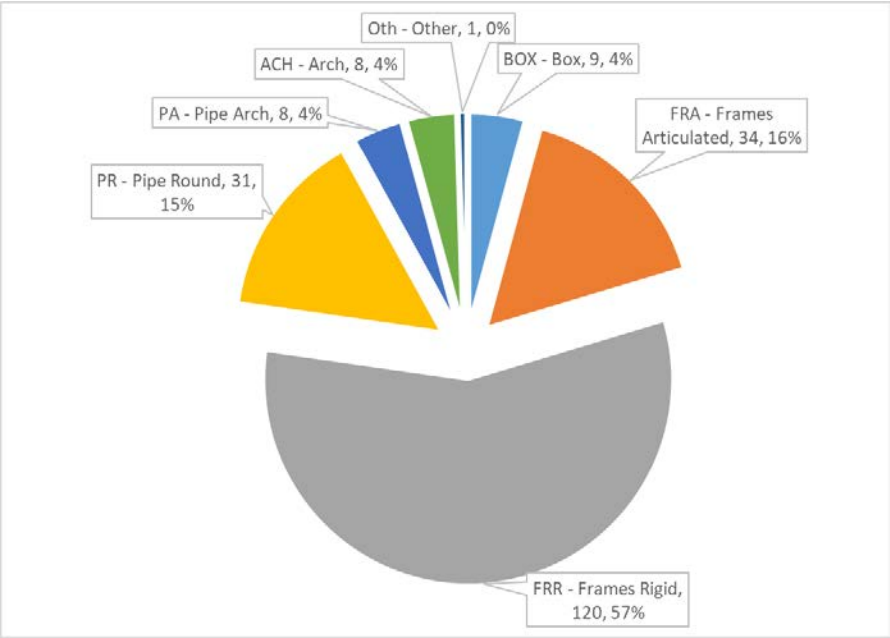
Fair	107	51%
Poor	20	10%
Total Large Culverts – Avg 65 BCI	**211**	**100%**

When do we need to do it?

Section 7 of the Canadian Highway Bridge Design Code (CHBDC) also pertains to buried structures made of metal and reinforced concrete. As per the CHBDC, all new structures shall have an expected service life of 75 years. Throughout Ontario, it is expected than concrete culverts will achieve a 75 service life. However, the industry has widely accepted that steel structures rarely meet this ESL and therefore should have an ESL of 50 years unless a protective coating is applied to the metal upon fabrication.

Types of Culverts in Huron County

Different types of culverts exhibit different ways in how they deteriorate and the amount of capital required throughout its service life. By understanding the types of structures throughout Huron County, the Public Works Department can select projects that have the greatest opportunity to meet or exceed the expected life of the culvert. Below is a breakdown by culvert type throughout the County.



FRR – Frames Rigid and FRA – Frames Articulated are both open footing concrete culverts. Articulated culverts have joints that allow for minor movements in the soils below without cracking the walls of the culvert. Articulated culverts tend to leak from above if they are not waterproofed and show signs of deterioration around the joints. Not many of the County's

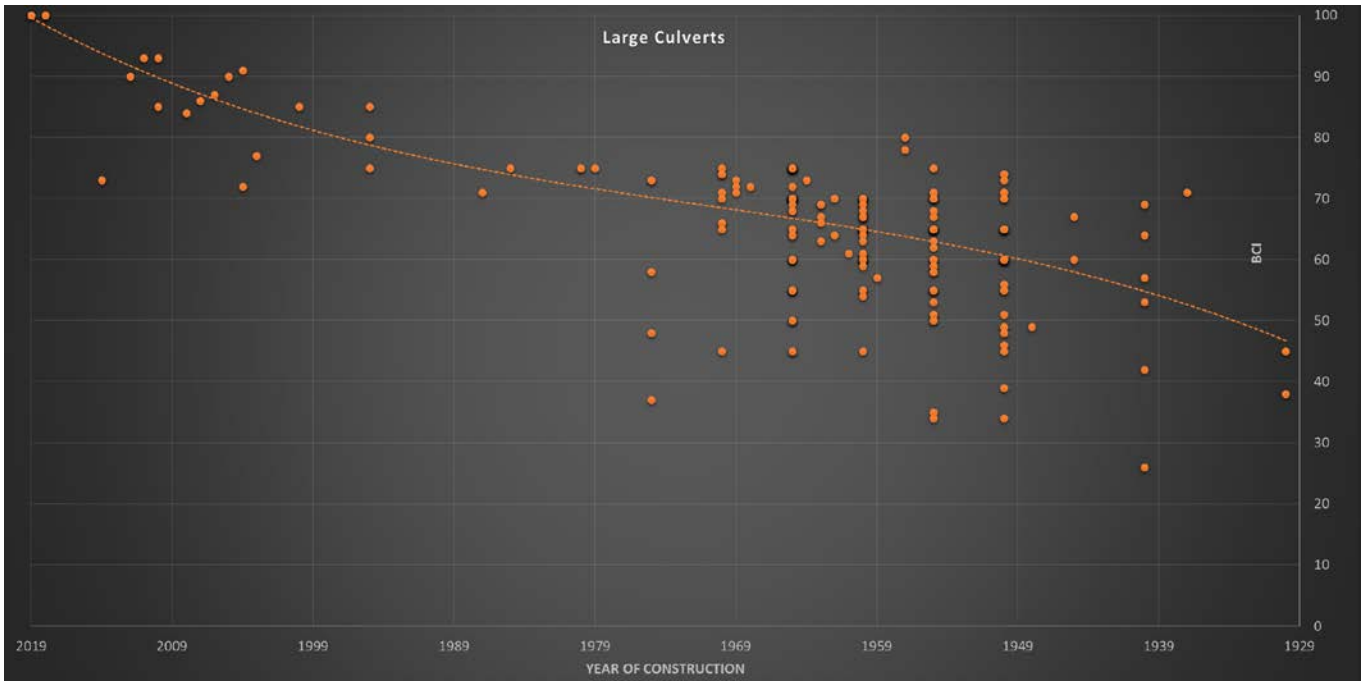
culverts are waterproofed except for newer precast structures. Open footing concrete culverts are susceptible to scour and undermining which may require additional capital to prevent the walls from moving. It is generally accepted that these culvert types will meet the expected service life of 75 years with minor capital improvements.

It should be noted that 40 (19%) of the County's culverts are steel and many of those are only estimated to achieve a 50 year service life as previously mentioned.

Deterioration in Culverts

Ideally, the overall culvert condition deteriorates at a predictable rate that the Asset Manager can use to forecast future capital projects. Unfortunately, all culvert inspections are based on judgement, experience of the inspector and interpretation of the OSIM. Therefore culverts do not tend to deteriorate in a linear or predictable manner because the inspector or firm does not remain constant. Additionally, the OSIM is written in a way that forces inspectors to reduce the BCI at ages 5, 15, and 25 regardless of defects found. Due to this fact, a culvert deterioration curve should show a quick decline in BCI to year 25 and then begins to level off until it reaches a point beyond repair.

The Public Works Department has elected to use a polynomial trendline to the 4th order. This is due to the expected deterioration based on a thorough understanding of OSIM. A 4th order trendline was best suited for the expected deterioration of a culvert because there should be four (4) hills/valleys in the data. The Public Works Department has graphed all culverts in the County showing their year built vs. condition. This will help determine which structures are beginning to fall below the deterioration curve. Identifying problem structures early may allow Public Works to intervene and help the asset achieve its ESL. Below is the graphed trendline for all Large Culverts owned by the County.



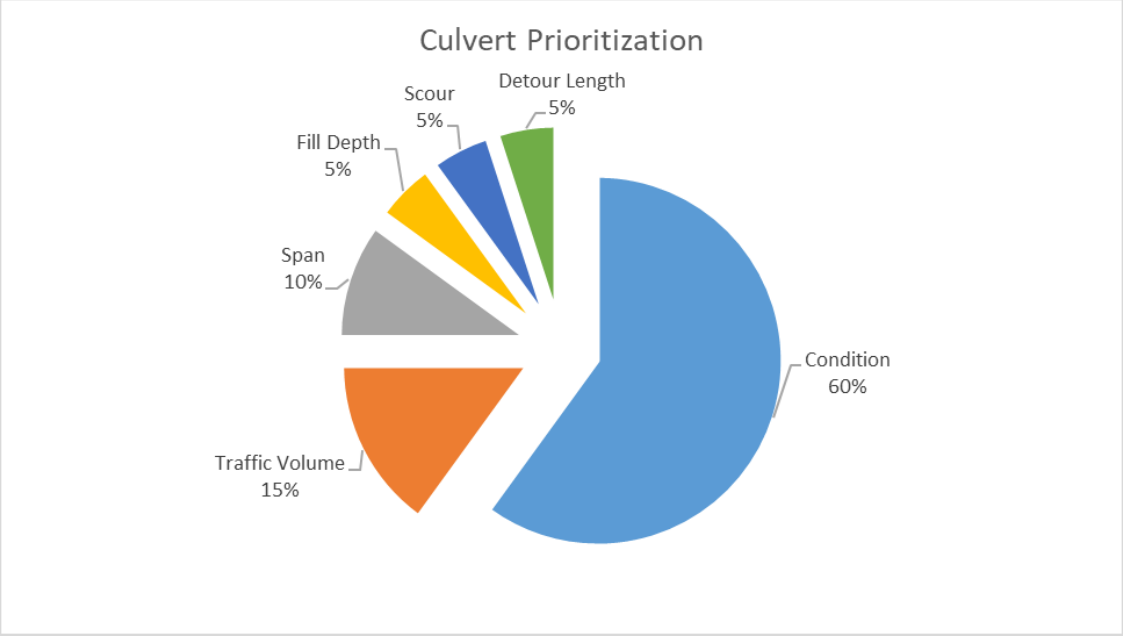
How do we select structures for rehabilitation or replacement?

The County uses the trendline above to identify culverts suitable for rehabilitation. Unlike bridges, there are limited cost effective rehabilitation options available to boost the condition of a culvert which is why culvert rehabilitation occurs less often than bridge rehabilitation.

For concrete culverts, concrete patching tends to be the most common recommendation by Engineers. However, this can be expensive because the work usually requires dewatering and the working conditions are unfavorable in smaller structures. Concrete patching is usually a short to medium term solution because it does not fix whatever is causing the deterioration. For steel culverts, there are even less options for rehabilitation. When steel culverts are severely corroded, exhibit cracking at bolt holes, or are severely deformed replacement is typically recommended. Some culverts may be lined if the hydraulic capacity of the liner is sufficient to convey the design flows.

When identifying culverts for replacement, the County uses a priority based approach that accounts for condition and risk. This approach is successful because culverts with low BCI's are heavily weighted and typically fall far below the trendline making them unsuitable for any type of rehabilitation. Risk needs to be considered when replacing culverts to avoid catastrophic failure. Culverts with high traffic volumes, larger spans, and shallow cover are a greater risk to the public. Age has not been included in the priority rankings.

The following is how the Public Works Department is prioritizing culvert replacements.



Even though age is not a direct factor into selecting rehabilitation or replacement, having a strong understanding of the County's inventory and aging infrastructure helps the Public Works Department make a decision on whether to rehabilitate or replace a culvert.

How old is the current infrastructure?

One important factor when creating an Asset Management Plan is the medium to long term planning to ensure there will be sufficient capital available to maintain the assets. It is essential to avoid delaying projects so that big clusters of structures need rehabilitation and or replacement at the same time. Not only is it restricted financially but road closures and detours need to be considered as well.

As of 2019, the County of Huron has an average culvert age of 55.4 years.

Due to a lack of culvert drawings, the year of construction for many culverts has been estimated by identifying construction methods over time.

What do we need to do for 2020?

The following table presents the more significant needs for 2020:

Structure	**BCI**	**Rehabilitation**
Culvert 04-36.2	69	Replacement of Culvert 04-36.2 Built = 1940, BCI = 69, Span = 2.44m, 75 year expected life, design in 2019/2020, construction in 2020. Last rehab = 2004 (culvert extensions)
Culvert 04-36.0	53	Replacement of Culvert 04-36.0 Built = 1940, BCI = 53, Span = 2.44m, 75 year expected life, design in 2019/2020, construction in 2020. Last rehab = 2004 (culvert extensions)
Culvert 08-14.0	45	Replacement of Culvert 08-14.0 Built = 1970, BCI = 45, Span = 1.83m, 75 year expected life, design in 2020
Replacement of Culvert 17-06.1	35	Replacement of Culvert 17-06.1 Built = 1955, BCI = 35, Span = 2.44m, 75 year expected life, design in 2020, construction in 2021.
Culvert 04-29.4	42	Replacement of Culvert 04-29.4 Built = 1940, BCI = 42, Span = 2.65m, 75 year expected life, design in 2020, construction in 2021.
Culvert 04-29.7	38	Replacement of Culvert 04-29.7 Built = 1940, BCI = 38, Span = 2.75m, 75 year expected life, design in 2020, construction in 2021.
Culvert 86-15.4	26	Replacement of Culvert 86-15.4 Built = 1940, BCI = 26, Span = 3.65m, 75 year expected life, design in 2020, construction in 2021

		Shared project with Bruce County

The following tables highlight the existing reports that are available from our asset management software. Recommended actions, condition ratings and estimated costs can be reported upon for the purposes of the long term asset management planning. Estimated needs for 2020 are included below, with the remainder up to 2029 included in Appendix A.

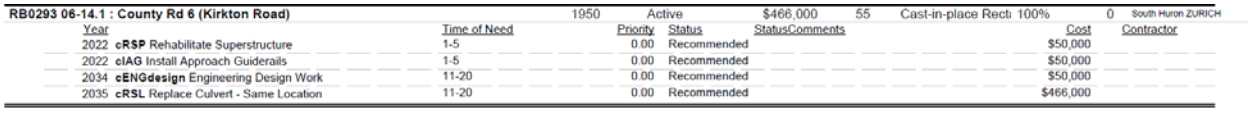
2020	Culvert_Large	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
								$1,040,000
RB0150:County Rd 17 (Winthrop Road) - 17-		1955	35	$350,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0163:County Rd 8 (Base Line/Maitland		1970	45	$225,000	**cENGdesign** Engineering Design Work	$35,000	100%	**$35,000**
RB0280:County Rd 4 (London Road) - 04-29.4		1940	42	$350,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0281:County Rd 4 (London Road) - 04-29.7		1930	38	$350,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0288:County Rd 4 (London Road) - 04-36.0		1940	53	$360,000	**cRSL** Replace Culvert - Same Location	$400,000	100%	**$400,000**
RB0289:County Rd 4 (London Road) - 04-36.2		1940	69	$478,000	**cRSL** Replace Culvert - Same Location	$425,000	100%	**$425,000**
RB0400:County Rd 81 (Grand Bend Line) - 81-07.7		1955	51	$732,000	**cRSB** Rehabilitate Substructure	$0	100%	**$0**
RB0409:County Rd 86 (Amberley Road) - 86-		1940	26	$225,000	**cENGdesign** Engineering Design Work	$60,000	50%	**$30,000**

How much money do we need?

The County's asset management software has been updated to include a significant amount of detail with respect to the linear assets of the County. Details will include previous rehabilitation work along with condition assessments and future year's rehabilitation needs.

The records have been updated to include what history is available. The records will include major capital needs along with minor rehabilitation or maintenance requirements and engineering.

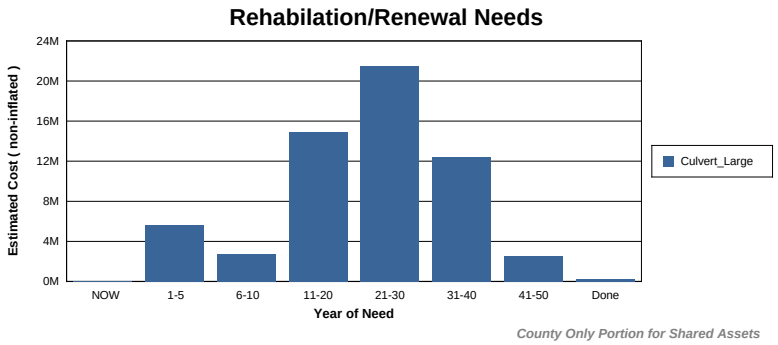
Example of Asset Record and Life-cycle plan for a large culvert structure.



RB0293 06-14.1 : County Rd 6 (Kirkton Road) 1950 Active $466,000 55 Cast-in-place Recta 100% 0 South Huron ZURICH

Year	Time of Need	Priority	Status	StatusComments	Cost	Contractor
2022 **cRSP** Rehabilitate Superstructure	1-5	0.00	Recommended		$50,000	
2022 **cIAG** Install Approach Guiderails	1-5	0.00	Recommended		$50,000	
2034 **cENGdesign** Engineering Design Work	11-20	0.00	Recommended		$50,000	
2035 **cRSL** Replace Culvert - Same Location	11-20	0.00	Recommended		$466,000	

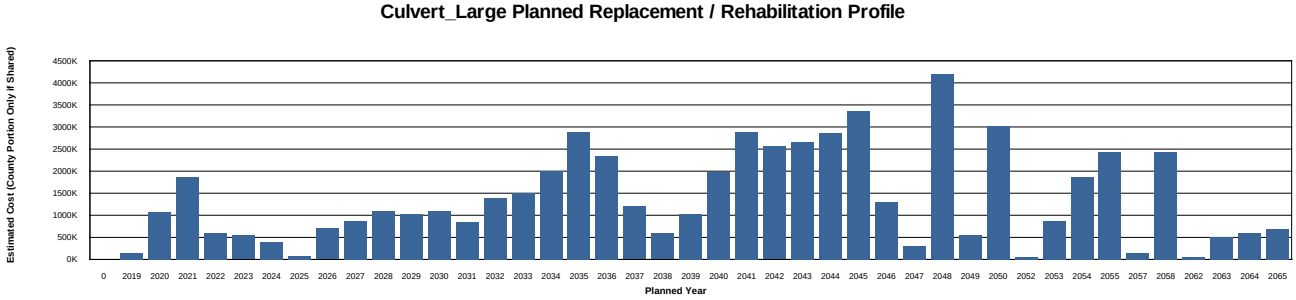
The following table illustrates the estimated rehabilitation needs for the County's large culvert structures over the next 50 years. The total estimated requirements for rehabilitation is $60 million. The majority of the needs are in the next 11-30 years with approximately $45 million being required.



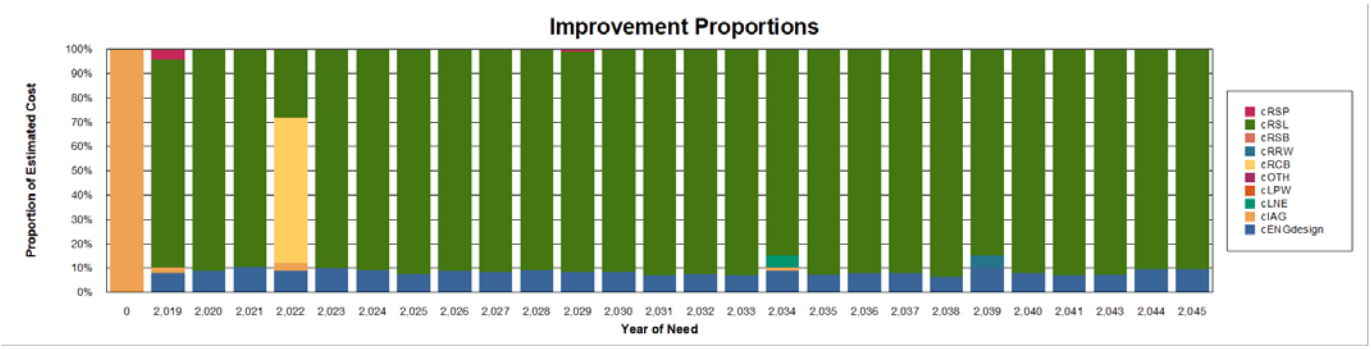
County Only Portion for Shared Assets

	Total	Culvert_Large
Total	60,012,000.00	60,012,000.00
NOW	55,000.00	55,000.00
1-5	5,634,500.00	5,634,500.00
6-10	2,740,000.00	2,740,000.00
11-20	14,921,500.00	14,921,500.00
21-30	21,484,500.00	21,484,500.00
31-40	12,386,500.00	12,386,500.00
41-50	2,515,000.00	2,515,000.00
Done	275,000.00	275,000.00

The rehabilitation needs by year are broken out in the table below, with significant peaks in the 2030's and 2040's.



The following table is the same annual rehabilitation profile, however, it illustrates the nature of the work that is being done based on the current estimated required work to be performed. The goal is to ensure the lowest lifecycle costs for our assets to ensure best value for the residents. Most of the upcoming work is the full replacement of culvert.



The legend details for the nature of the required work is as follows:

Improvement Type	Description	Class
REB	Remove Existing Bridge	Asset Replacement

RRH	Barrier/Parapet Replacement	Asset Component Replacement
NEW	Build new bridge	Asset Replacement
RNL	Replace Bridge - New Location	Asset Replacement
RSL	Replace Bridge - Same Location	Asset Replacement
TEB	Twin Existing Bridge	Capacity Improvement
RSP	Rehabilitate Superstructure	Rehab to achieve life
RSB	Rehabilitate Substructure	Rehab to achieve life
WSO	Widen Superstructure Only	Capacity Improvement
WSS	Widen Superstructure and Substructure	Capacity Improvement
RRW	Rehabilitate / Replace Retaining Walls	Rehab to achieve life
VCI	Vertical Clearance Improvement	Capacity Improvement
HCI	Horizontal Clearance Improvement	Capacity Improvement
BIR	Bearing Improvement / Replacement	Asset Component Replacement
WSR	Wearing Surface Rehabilitation	Rehab to achieve life
RWS	Removal of Existing Asphalt Wearing Surface and Waterproofing	Rehab to achieve life
CPS	Cathodic Protection System	Functional Improvement
PWP	Patch Waterproof Pave	Rehab to achieve life
LMC	Latex Modified Concrete Overlay	Rehab with Life Extension
OWP	Overlay Waterproof Pave	Rehab with Life Extension
CSR	Coating Steel Railings	Rehab to achieve life
PDR	Partial Deck Replacement	Rehab with Life Extension
WAP	Waterproof and Pave	Rehab to achieve life
TJS	Transverse Exp Joint Seal Replacement	Rehab to achieve life
TJM	Transverse Exp Joint Seal Modification	Rehab to achieve life
TJR	Transverse Exp Joint Replacement	Rehab with Life Extension
LJR	Longitudinal Exp Joint Replacement	Rehab with Life Extension
RCS	Rehabilitation / Replacement of Safety Curbs / Sidewalks	Asset Component Replacement
CSS	Coating Structural Steel	Rehab with Life Extension
C/R	Channel Realignment	Rehab with Life Extension
C/I	Channel Improvements	Functional Improvement
SPI	Scour Protection Improvements	Functional Improvement
EIR	Embankment Improvements / Rehabilitation	Functional Improvement

OTH	Other	Non - Standard Improvement
IAB	Install Approach Barrier	Safety Improvements
IAG	Install Approach Guiderail	Safety Improvements
RDI	Enhanced OSIM Inspection	Engineering Design
DCS	Deck Condition Survey	Engineering Design
C/S	Condition Survey of Other Components	Engineering Design
CN/I	Condition Inspection	Engineering Design
MajSR		Rehab to achieve life
Replace	Replace	Asset Replacement
RBC	Replace Bridge with Culvert	Asset Replacement
PPT	Provision for Pedestrian Traffic	Capacity Improvement
CDS	Concrete Deck Soffit Repairs	Rehab to achieve life
CDR	Complete Deck Replacement or Superstructure Replacement	Asset Component Replacement
ENGdesign	Engineering Design Work	Engineering Design

How do we reach sustainability – Bridges and Large Culverts?

The analysis revealed that the average yearly revenue required is $5.15 million to ensure that the level of service is maintained at today's level, over the next 30 years.

It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher than what is being reflected in our statements. The net book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

The current net book value for accounting purposes for the bridges and large culverts is $18,969,000.

The depreciation that we are raising in the levy are based on the historical values, and thus we are not raising anywhere near the amounts required to sustain our assets moving forward.

The County is raising a total of approximately $896,000 in funds (depreciation) through the budget process which falls far short of our annual requirements. There is currently an estimated $11.5 million in the Public Works Reserve fund which could be used for Roads/Bridges/Patrol Yards.

The sustainability of bridges and large culverts will be assessed in total for the Public Works department.

What are we spending on bridge and culvert maintenance?

An important consideration of asset management is the on-going maintenance related expenditures that are being incurred in order to maintain the County's assets. As assets

deteriorate, it becomes more expense to maintain those assets, therefore it is important for staff to assess condition ratings to ensure the optimal timing of asset replacement.

Bridge and culvert maintenance and repair costs, including labour costs, are approximately $300,000 – $350,000 annually. This total includes small culverts as well and large.

Desired Levels of Service

Key Performance Indicators

Key Indicator:
Bridge Condition Index (BCI)

Issue:
As bridges age, they begin to deteriorate due to exposure to environmental elements such as extended water exposure, freeze/thaw cycles, vehicle load stresses, and corrosion/oxidization. Cumulative damage leads to more expensive repairs and rehabilitation if not properly maintained.

Potential Impact:
Potential impacts of deteriorating bridges include road/bridge closures, load restrictions, safety hazards, and increased number of accidents, increased maintenance costs, increased exposure to liability, and increased costs of repairs.

Current Controls:
Annual bridge cleaning and inspection is carried out on each County bridge. The bridges are pressure washed, and assessed for loose concrete. Inspections include examinations of the parapet walls, railings, expansion joints and seals, caulking, guide rail components, catch basins and drainage, bridge bearings, and various other bridge components.

Annual maintenance is carried out by Public Works personnel on small components that can be completed to bring the bridge back to standards, including caulking and patching to ensure that all components are functioning correctly. Preventative maintenance such as tree trimming around the bridge to ensure moisture evaporates from sun exposure, reducing moisture damage.

If repairs are not able to be completed in the current year, they are added to the list of maintenance and rehabilitation projects in the following year or the multi-year plan, and budgeted for accordingly.

Bridges are built and maintained to established standards, such as Ontario Provincial Standards, Transportation Association of Canada Standards, Ontario Traffic Manuals, Canadian Highway & Bridge Design Code, and Ontario Structure Inspection Manual. Regular inspections are carried out to meet established thresholds. The Ontario Structure Inspection Manual (OSIM) inspections are carried out every two years through external engineering firms, and bridges are rated for their conditions. **Our BCI threshold is 50.**

Culverts with 2.5m-6m spans are built and maintained to established standards, such as Canadian Highway and Bridge Design Code, and inspected per the Ontario Structure Inspection Manual. Regular inspections are carried out to meet established thresholds. The

BCI threshold is 50. Ontario Structure Inspection Manual (OSIM) inspections are carried out every two years through external engineering firms, and the culverts are rated for their conditions.

In addition to this, comments and requests are received on a regular basis from tax payers, businesses, and agricultural entities for such issues as bridge repair traffic restrictions, project delays, and detour routes. These comments and requests are integrated into future plans for bridge projects and maintenance activities to accommodate the needs of our constituents.

Action plan:
Continue with preventative maintenance and inspection. Annual inspections and preventative maintenance are key to ensure that small issues are rectified before they develop into major problems that are much more costly to correct. Regular rehabilitation is normally required every 18-22 years, and rehabilitation is planned and budgeted accordingly.

MINOR CULVERTS (<2.5 meters and driveway) INFRASTRUCTURE

Minor Culvert and Driveway Culvert Infrastructure

NOTE: THIS SECTION HAS NOT BEEN UPDATED FOR THE 2020 UPDATE. 2.5 meters is now the cutoff for Major vs Minor Culverts and the information below will be updated in 2019. Additional minor culverts have been identified in our road network through staff's efforts with asset management planning activities and now include a total of 451. These small culverts and driveway culverts continue to be inventoried into 2020 and the figures below are out of date.

What does the County own?

The County of Huron has: 248 Culverts less than 3 meters (CULVERT<3m) and approximately 8,934 driveway culverts.

All asset field assessments are carried out in the Public Works department by internal staff. The results of the detailed inventory assessment of the targeted structures are summarized below. Culverts < 3m have been separated from the culverts > 3 m due to the fact that they are inspected by County staff rather than by external engineering firms.

It is important to note that more work will be required to access the full number of driveway culverts across the County road network. This work will be ongoing into 2017. The figure in the table below is an estimate estimated by the GIS department, consisting of both rural and urban entrances.

Minor Culvert Inventory	
Structure	Quantity
Culverts <3 meter	248
Driveway culverts	8,934

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the culverts<3 m of $131.9 million and $27 million for the driveway culverts/entranceways.

Minor Culvert Replacement Value	
Structure	Value
Culverts <3 meter	$ 131,913,321
Driveway	$ 27,001,440

culverts	
Total	$ 158,914,761

What condition is it in?

Only culverts >3m are rated by engineers, culverts <3m are inspected by staff on a semi-regular basis. These personnel are trained in culvert inspection by the OGRA, and there is at least one certified employee on each patrol.

A comprehensive listing of all minor culverts with a condition rating currently does not exist for the purposes of the asset management plan.

This is one significant gap that we have identified where we will require additional work to identify the condition of the County's minor culvert structures. This will be initiated in 2017 and beyond.

What do we need to do?

Staff have identified a culvert <3 m that is required to be rehabilitated in 2017 due to a failing crown. Culvert 18-3.1 on Cutline will require $1,400,000 in work for 2017 to line existing culvert and to bore a second overflow.

When do we need to do it?

One criterion critical to rating the Culverts structure for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

Asset Useful Life in Years	
Asset Type	Useful Life
CULVERT<3m	75
Driveway Culverts	75

How much money do we need?

We currently do not have a value of the needs for the minor culvert infrastructure above and beyond the $1,400,000 identified for 2017. This will be worked on through 2019 as we further develop our asset management systems.

Simplistically, if we were to calculate the average per year required over the estimated useful life of the minor culverts, the County would require an average investment of $2,018,000 per year to maintain the current number of minor culvert structures.

How do we reach sustainability?

The life cycle analysis revealed that the average yearly revenue required is $2,118,000 to ensure that the level of service is maintained at today's level, over the life of the minor culvert structures.

The funding that is currently being raised through the budget process is approximately $305,000. This falls far short of the amount of funding that will be required to replace these assets as they reach the end of the useful life.

The following table highlights the comparison of current replacement value of the Culvert <3 m and Driveway Culvert network with the historical cost of the original construction value and the remaining net book value set up in the County's financial statements. It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher that what is being reflected in our statements. The net book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

Please note that up to this point, driveway culverts were not set up in our financial statements as assets through the PSAB process. When installed, they are paid for by the property owner and then the County assumes future replacement costs.

Bridges and Culvert >3 m Replacement Current Value vs Historical Cost			
Asset Type	**Current 2016**	**Historical Cost**	**Net Book Value**
Culverts <3 m	$ 131,913,321	$25,113,404	$12,124,534
Driveway culverts	$ 27,001,440	$0	$0
Total	**$158,914,761**	**$25,113,404**	**$12,124,534**

What are we spending on minor culvert maintenance?

We currently do not have sufficient information to be able to assess the expenditures for minor culverts as they are aggregated with the culverts > 3 years in our job costing system.

Desired Levels of Service

Key Performance Indicators

Key Indicator:
To be developed 2019-2021.

Issue:
As the culverts age, they begin to deteriorate due to exposure to environmental elements such as extended salt and water exposure, freeze/thaw cycles, and corrosion/oxidization. As concrete culverts age and defects appear, the structures have more potential for expensive repairs and rehabilitation if not properly maintained.

Potential Impact:
Potential impacts of deteriorating culverts include road closures, load restrictions, safety hazards, accidents, increased maintenance costs, liability, and increased costs of repairs.

Current Controls:

Small culverts with 1m-3m spans are inspected by staff on an as-needed basis. Maintenance can be carried out by Public Works staff on small components that can be completed to bring the culvert back to design standards.

In addition to this, comments and requests are received on a regular basis from tax payers, businesses, and agricultural entities for such issues as structure repair work, traffic restrictions, project delays, and detour routes. These comments and requests are integrated into future plans for culvert projects and maintenance activities to accommodate the needs of our constituents.

Action plan:
Continue with preventative maintenance and enhance the inspection program. Annual inspections and preventative maintenance are key to ensure that small issues are rectified before they develop into major problems that are much more costly to correct. Regular rehabilitation is normally required every 18-22 years, and rehabilitation is planned and budgeted accordingly

PUBLIC WORKS BUILDINGS INFRASTRUCTURE

Public Works Buildings Infrastructure

NOTE: THIS SECTION HAS HAD SOME LIMITED UPDATES FOR 2020 UPDATE.

What does the County own?

The County of Huron has: 4 Public Works patrol yards. Within the patrol yards include salt and sand storage buildings, office/maintenance buildings. The assets are located within the Public Works Buildings network. All asset field assessments are carried out in the Public Works department. The results of the detailed inventory assessment of the targeted structures are summarized below.

PW Patrol Yards
AUBURN WORKS YARD
WINGHAM WORKS YARD
WROXETER WORKS YARD
ZURICH WORKS YARD

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the assets of $13.4 million.

PW Patrol Yard Replacement Value - 2016			
Yard	**Value**		**% of Total**
AUBURN WORKS YARD	$	5,615,120	42%
WINGHAM WORKS YARD	$	2,109,200	16%
WROXETER WORKS YARD	$	3,293,000	25%
ZURICH WORKS YARD	$	2,420,000	17%
TOTAL	**$**	**13,437,320**	100%

What condition is it in?

We currently do not have a sufficient comprehensive condition rating system for the Public Works yards that we can report in confidence to Council and the public.

As part of the plan to move forward, it is being recommended that we engage an engineer to assess the condition ratings of the yards every 5 years.

The following table provides a simplistic view of remaining useful life of the patrol yards based on a weighted average of the individual structures at each yard.

Patrol Yard	% of Remaining Useful Life
Auburn – Main Shop	70%
Auburn – Main Sand Storage	80%
Auburn – Long Shed	75%
Wingham	end of life
Wroxeter – Main Shop	75%
Wroxeter – Storage Shed	40%
Wroxeter – Sand Storage	80%
Zurich	80%

What do we need to do?

PW Yards - Replacement Needs			
Patrol Yard	**Needs 1-5 yrs**	**Needs 6-10 yrs**	**Total**
TOTAL	**$ 2,753,000**	**$ 364,000**	**$3,117,000**

The majority of the costs in years 1-5 are for the Wingham patrol yard - $900,000 for the sand dome and $800,000 for the main shop.

When do we need to do it?

One criterion critical to rating the Public Works Buildings structure for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

Asset Useful Life in Years	
Asset Type	Useful Life
Building works 30yr	30
Building works 60yr	60

Building Equipment	5
Building Exterior	20
Building Interior	20
Building Mechanical	20
Building Electrical	20
Building Site	22

How much money do we need?

This scenario is used to analyze and determine how much money is required on a yearly basis to replace all assets as they become in need of replacement. The following table illustrates the results of our analysis for the Public Works Department.

	2020	2021	2022	2023	2024	2025	2026	2027
TOTALS:	$1,985,000	$307,500	$34,500	$36,000	$93,000	$0	$0	$0

As seen by the table above, 2020-2021 is the peak year based on the staff analysis over the next 8 year period. This is due to the replacement of a number of key structures and site work at the Wingham patrol yard totaling $1.7 million.

How do we reach sustainability?

Staff are projecting an estimated total of $3,117,000 in expenditures over the next 8 years. The bulk of the expense is due to the replacement of the key structures at the Wingham patrol yard.

The current funding being raised each year through the budget process for the Public Works buildings is approx. $181,000 per year. This current level of funding falls far short of our estimated requirements in the next 8 years, thus additional funding is required.

The following table highlights the comparison of current replacement value of the Public Works Patrol Yards with the historical cost of the original construction value and the remaining net book value set up in the County's financial statements. It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher that what is being reflected in our statements. The net book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

Patrol Yard Replacement Current Value vs Historical Cost			
Asset Type	**Current 2016**	**Historical Cost**	**Net Book Value**
Auburn	$ 5,615,120	$3,670,448	$2,653,000

Wingham	$ 2,109,200	$235,727	$106,000
Wroxeter	$ 3,293,000	$1,242,488	$581,000
Zurich	$ 2,420,000	$2,198,707	$1,771,000
Total	**$13,437,320**	**$7,347,370**	**$5,111,000**

There is currently a total of $900,000 set aside in the Public Works reserve for the Wingham Patrol Yard replacement plus $200,000 for an office addition at Auburn. The total estimated reserve is $11.5 million. These funds could be used to manage the funding requirements upcoming for 2020. Additional funding sources will be required for this, whether raised through the levy, reserves or through debt financing.

The sustainability for Public Works will be assessed together as a whole rather than individually.

Desired Levels of Service

Key Performance Indicators

Key Indicator:
Building condition

Issue:
As buildings age, they are subject to deterioration due to exposure to climate, and through usage.

Potential Impact:
If a building declines into poor condition, there may be health and safety issues. Failure to respond to issues may lead to increased damage and more expensive repairs. The building condition will worsen at an accelerated pace if preventative maintenance steps are not taken.

Current Controls:
Inspections are carried out semi-annually. Issues identified are rectified, with smaller repairs being performed by County personnel, while larger issues are addressed by third party providers as needed. Any larger items or items that are coming to the end of their life cycle are often identified several years in advance, such as roofing replacement, and budgeted and scheduled accordingly.

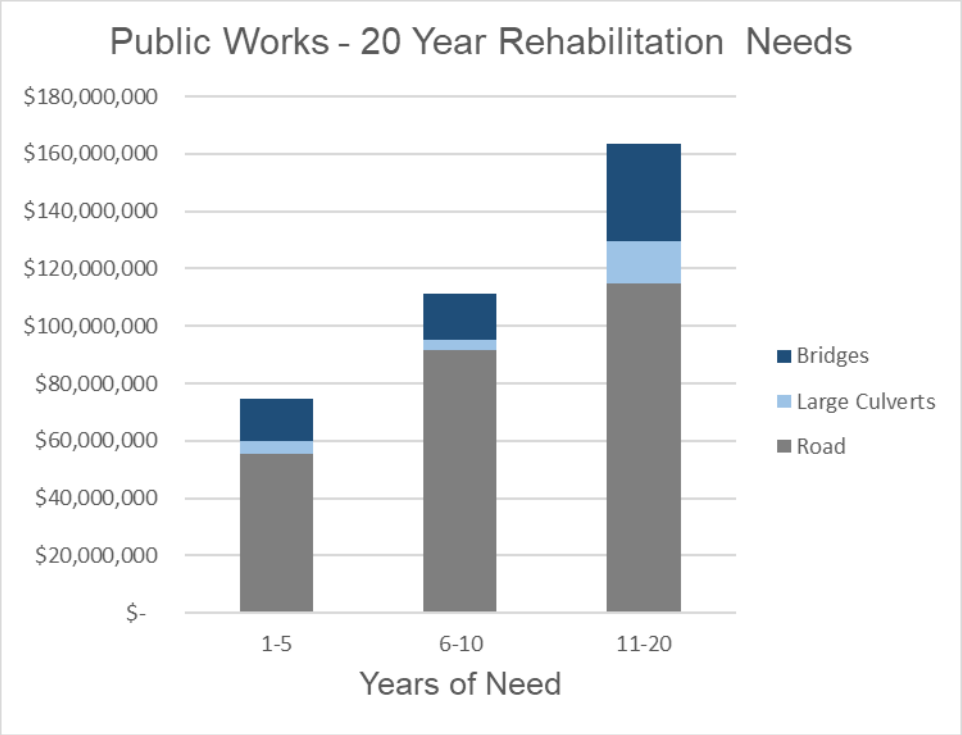
Action plan:
Continue to carry out semi-annual inspections and perform preventative maintenance as required.

Public Works – Summary of Roads, Bridges and Large Culverts

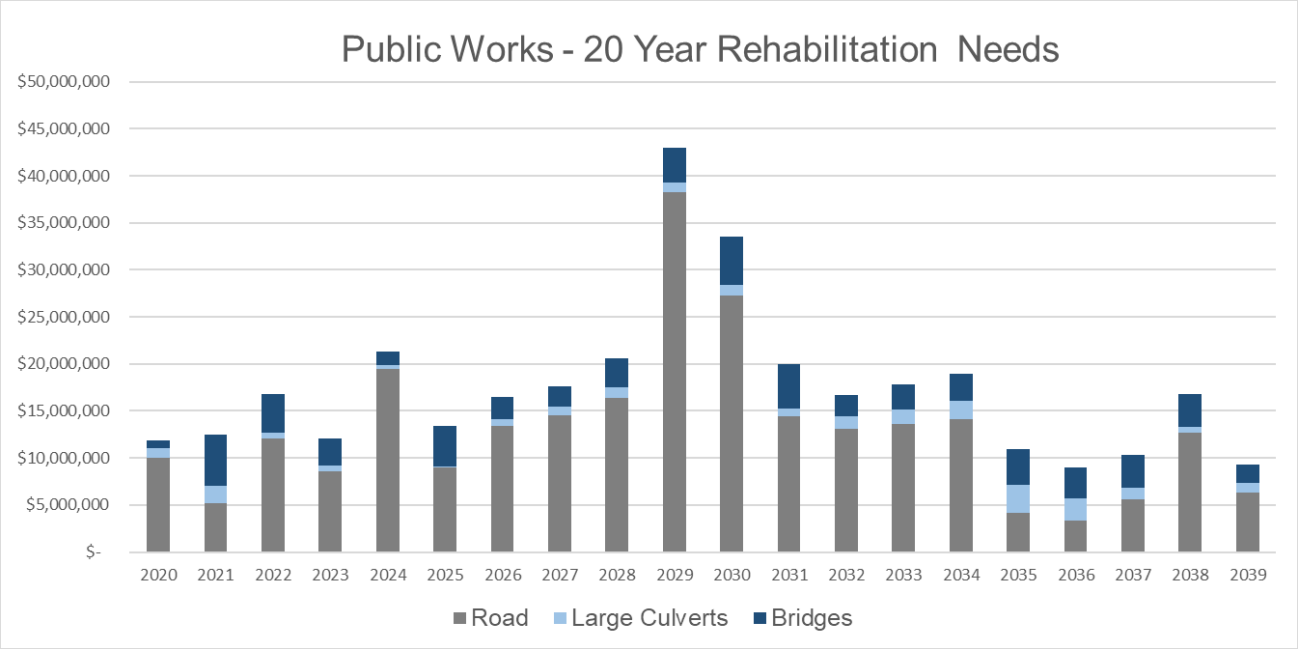
The following table begins to identify the average annual investments required for the County's roads, bridges and large culverts over the next 20 years.

Years	Road	Large Culverts	Bridges	TOTAL
1-5	$ 55,350,107	$ 4,495,000	$14,757,500	$ 74,602,607
6-10	$ 91,626,050	$ 3,765,000	$15,660,000	$111,051,050
11-20	$114,728,080	$ 14,929,000	$33,630,000	$163,287,080
TOTAL	**$261,704,237**	**$ 23,189,000**	**$64,047,500**	**$348,940,737**
Average Annual Investment	**$ 13,085,212**	**$ 1,159,450**	**$ 3,202,375**	**$ 17,447,037**

The following is a chart of the same data:



The requirements broken down by year are illustrated below.



On average, over the next 20 years, Public Works will require an estimated capital budget of $17.4 million for just Road, Bridges and Large Culverts. This does not include the other asset classes, such as small culverts, patrol yards and driveway culverts. More work is required to determine future needs for these asset classes.

Funding will have to be achieved by a combination of levy, reserve, external funding and debt. The needs will be too great to rely on the levy alone. Also, service levels will have to be assessed with Council to determine the service levels of the bridges and culverts (close, load limits etc).

Long term sustainability will be reviewed and enhanced as we move forward into 2020-2021. It is essential that staff develop a long term plan and asset management systems to ensure we have the financial capabilities to meeting the upcoming infrastructure requirements.

The following charts combine the road, bridge and large culvert structures for the County of Huron to better illustrate the upcoming pressures for capital rehabilitation needs.

Asset construction history for the County's roads, bridges and large culverts is as follows:

The majority of the overhead structures were constructed in the 1950's and 1960's and as such we will be experiencing peak rehabilitation periods for these assets as they reach the end of their useful lives.

FLEET

Fleet

What does the County own?

The County of Huron has: approximately 50 vehicles and equipment at a 5 years cycle, 28 vehicles at a 10 years cycle and 17 vehicles at a 15 years cycle. The assets are located within the Fleet network. All asset field assessments are carried out in the Public Works department. The results of the detailed inventory assessment of the targeted structures are summarized below.

County's inventory of Fleet infrastructure in accordance with best practices and current legislation.

Fleet Inventory		
Asset Type	Asset Component	Quantity
Fleet 5 year	Trucks, Vans, Mowers, etc.	54
Fleet 10 year	Tandem Trucks, Tractors, Forklifts, etc.	28
Fleet 15 year	Graders, Backhoes, Large Loaders, etc.	17

Note – The 5, 10 and 15 years classes are based on PSAB Tangible Capital Asset reporting, the actual replacement cycle may vary for each type of equipment/vehicle for anywhere from 3 to 30 years

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the assets of $7.9 million.

Fleet Replacement Value			
Asset Type	**Quantity**	**Original Cost**	**% of Total**
Fleet 5 year	50	$ 1,249,000	16%
Fleet 10 year	28	$ 4,106,000	52%
Fleet 15 year	17	$ 2,527,000	32%
TOTAL	95	**$ 7,882,000**	**100%**

What condition is it in?

Condition assessment rating was carried out on the Fleet asset network, in consultation with Public Works Department, to identify the level of service considered acceptable by staff. The overall result is that the County's Fleet is in a Fair condition. The results of the detailed condition assessment of the targeted assets are summarized below in the table.

Fleet Condition Rating		
Asset Type	**Condition Rating**	
Fleet 5 year	61	Fair
Fleet 10 year	64	Fair
Fleet 15 year	63	Fair
Total	62	Fair

The following table highlights the number of the Fleet vehicles and equipment within each condition rating category.

Condition Rating	**# of Fleet Units**
Poor	33
Fair	30
Good	27
Excellent	5
Total	**95**

The condition rating relates to the age and usage of the overall vehicles or devices group and is a rating out of 100. When the rating is between 30 and 50 the item needs to be replaced. The rating system is as follows:

Excellent:	91 – 100	No evident defects
Good:	70 – 90	Slight decline
Fair:	51 – 69	Decline asset apparent
Poor:	30 – 50	Severe decline or failure

What do we need to do?

Addressing Asset Needs		
Assets	Needs 1-5 yrs	Needs 6-9 yrs
Fleet 5 year	$1,010,000	$830,000

Fleet 10 year	$3,148,000	$2,526,000
Fleet 15 year	$2,104,000	$925,000
TOTAL	**$6,262,000**	**$4,281,000**

2020 priority projects include replacement of 3 tandem trucks, one backhoe, and a new spray patching unit.

When do we need to do it?

One criterion critical to rating the fleet structure for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

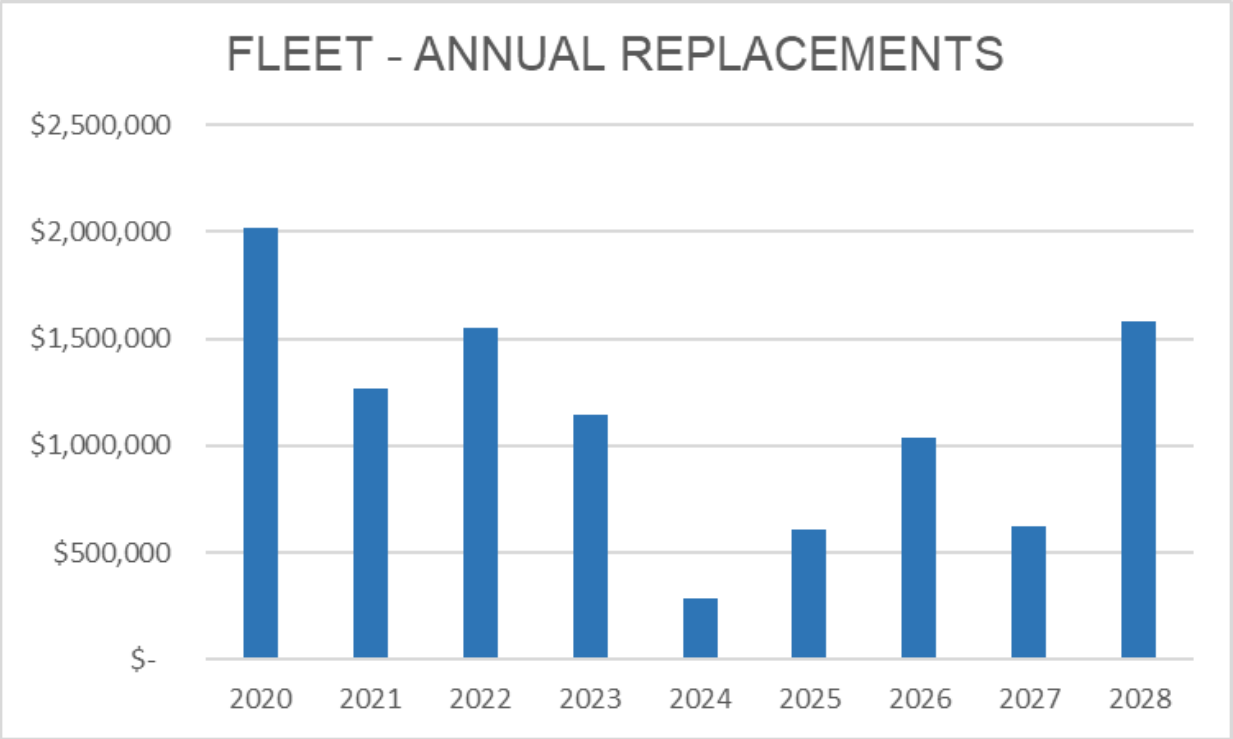
Fleet vehicle maintenance costs are averaging $0.9 - $1.1 million annually:

Note: Fleet maintenance cost figures currently include fuel related expenses in addition to maintenance

How much money do we need?

This scenario is used to analyze and determine how much money is required on a yearly basis to replace all assets as they become in need of replacement. The following graph illustrates the results of our analysis for the Public Works Fleet Department.

Asset Replacement Summary



The average annual investment over the next 9 years is $1,124,500.

How do we reach sustainability?

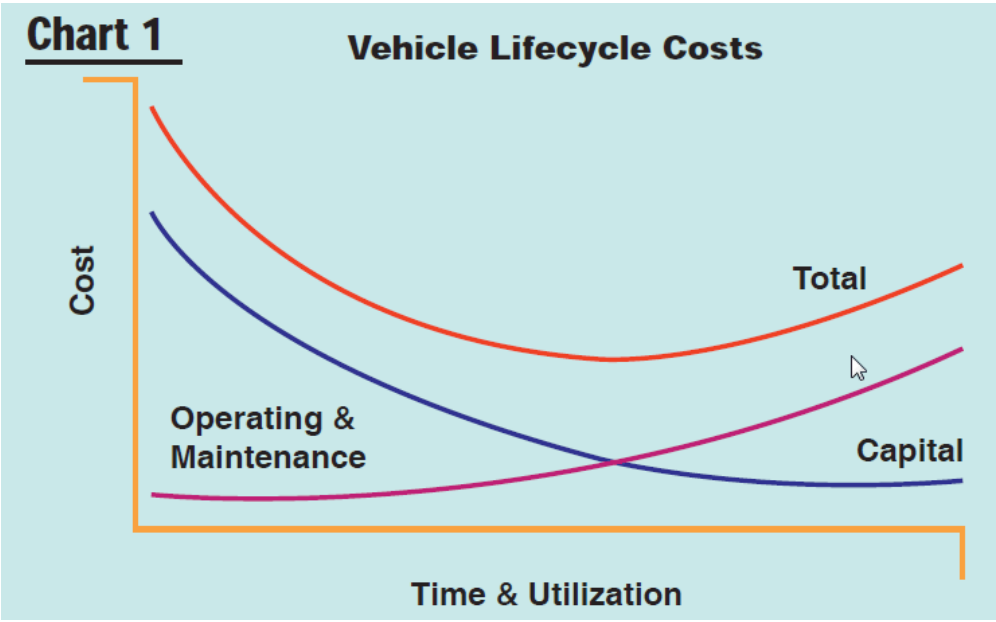
The analysis revealed that the average yearly revenue required is $1,124,500 to ensure that the level of service is maintained at today's level, over the next 9 years. The above graph also indicates that at that rate of funding the network needs are expected to be greater in the next 5 years, primarily due to the addition of some new fleet equipment, including a spray patcher.

With the current Fleet reserve at approximately $5.4 million, and current funding being raised through the budget process, there are sufficient funds available to manage the Fleet replacements over the next 9 year cycle.

Year	Annual Cost	Funding	Reserve Usage	Reserve Balance
2020	$ 2,016,000	$ 1,100,000	$ 916,000	$ 4,484,000
2021	$ 1,268,500	$ 1,100,000	$ 168,500	$ 4,315,500
2022	$ 1,547,500	$ 1,100,000	$ 447,500	$ 3,868,000
2023	$ 1,146,000	$ 1,100,000	$ 46,000	$ 3,822,000
2024	$ 286,500	$ 1,100,000	$ (813,500)	$ 4,635,500
2025	$ 612,000	$ 1,100,000	$ (488,000)	$ 5,123,500
2026	$ 1,040,000	$ 1,100,000	$ (60,000)	$ 5,183,500
2027	$ 1,050,000	$ 1,100,000	$ (50,000)	$ 5,233,500
2028	$ 1,579,000	$ 1,100,000	$ 479,000	$ 4,754,500

Desired Levels of Service

Huron County currently has assets totaling over eight (8) million dollars in licensed and un-licensed equipment. This equipment includes a fleet of 13 tandem trucks, three graders, four one ton trucks, four front end loaders, three tractors, 22 pickups/crew cab pickups, also various specialty equipment for the fleet department and others within the County.
While fleet preventative maintenance is important, effective equipment management should go well beyond fixing a break down. A program is in place that preserves the value of equipment investments, minimizes the incidents of unscheduled repairs, and collect, analyzes, and reports necessary data so that informed and intelligent asset management decisions can be made.
Reliable vehicles and equipment in good working order are essential to ensure roads are maintained in a timely and professional manner. When to replace a vehicle is one of the most significant decisions facing fleet managers. Without a viable and comprehensive replacement program, management is not able to replace equipment when needed at the optimum replacement time as illustrated below in Chart 1.



Over time, vehicle capital costs decline, while vehicle operating costs increase. The combination of these two cost functions produces a U-shaped total cost curve. Ideally, vehicles should be replaced around the time that annual operating costs begin to outweigh annual capital costs – that is, when the total cost curve begins to turn upward. As illustrated by the graph, deferring replacement of vehicles and equipment beyond a certain point actually causes total vehicle costs to rise, making a fleet more costly to own and operate.

A fleet replacement plan can accomplish the following:

1. Less equipment downtime and lower operating/maintenance costs by eliminating high cost intensive vehicles.
2. An assurance that vehicles are rotated out in a planned schedule.
3. Modernize the fleet for peak performance in both technical and employee safety areas.
4. Allows you to document future year funding requirements.

We project that by using our equipment replacement schedule and asset plan that it will bring credibility to the replacement process for prioritizing vehicle replacement funds.

PROPERTY SERVICES INFRASTRUCTURE

Property Services Infrastructure

What does the County own?

The County of Huron has: 3 historical buildings, 4 office buildings, 2 storage buildings, 4 ambulance buildings, 1 transformer building, and 1 pump house building. The assets are located within the Property Services network. All asset field assessments are carried out in the Property Services department. This plan includes the Health and Library Complex which is still under the ownership of the County.

The results of the detailed inventory assessment of the targeted structures are summarized below.

Property Services	
Building Type	**Quantity**
Historical Buildings	3
Office Buildings	4
Transformer Building	1
Storage Buildings	2
Ambulance Stations	4
Pump House	1
TOTAL	**15**

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the assets of $50.9 million.

Property Services Replacement Value		
Building Type	**Replacement Value**	**% of Total**
Historical Buildings	$ 31,147,000	61%
Office Buildings	$ 15,882,000	32%
Transformer Building	$ 50,000	0%
Storage Buildings	$ 902,000	2%
Ambulance Buildings	$ 2,219,000	4%
Pump House Building	$ 657,000	1%
TOTAL	**$ 50,857,000**	**100%**

Note: The Courthouse is included under historical buildings.

What condition is it in?

Condition assessment rating was carried out on the Property Services asset network, in consultation with Property Services department, to identify the level of service considered acceptable by staff. Staff attempted to develop a Facility Condition Rating that would make sense to use for the County's facilities. The rating was developed based on current capital needs relative to the replacement value of the building.

It is important to note that the ratings do not attempt to quantify whether or not the space is functional and efficient.

The following table summarizes the facility ratings:

Building Structure	**Facility Condition Rating**
Court House, Goderich	Fair
Land Registry Building, Goderich	Fair
Storage Building, Clinton	Good
Tuckersmith Ambulance Station, Clinton	Poor
Goderich Ambulance Station	Poor
Exeter Ambulance Station	Poor
Pumphouse and Water Reservoir	Good
Huron County Museum, Goderich	Good
Assessment Office, Goderich	Poor
Jacob Memorial Building, Clinton	Poor
Health & Library Building, Clinton	Good
Wingham Ambulance Station	Fair
Huron County Gaol, Goderich	Poor
Airport Storage Building, Goderich	Critical
Transformer Building, Clinton	Vacant – potential tear down

What do we need to do?

Additional work is required to assess the long term needs on an individual building structure basis, and this work will continue into 2020. Looking at Property Services as a whole, the capital needs are relatively consistent on an annual basis and are limited by the availability of staff resources to manage the projects.

Property Services - Asset Needs		
	Years 1-5	**Years 6-10**
Property Services	$3,645,000	$3,926,000
Annual Average		$757,000

Key priorities for 2020 and beyond are:

Courthouse – north steps replacement
Assessment Office – renovation of 1st floor for Economic Development
Gaol – Install slate roof

This asset management plan update does not factor in any considerations for a new administrative building.

When do we need to do it?

One criterion critical to rating the Property services assets for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

Asset Useful Life in Years	
Asset Type	Useful Life
Building	60
Building Electrical	20
Building Equipment	5
Building Exterior	20
Building Interior	20
Building Mechanical	20
Building Site	22

How much money do we need?

As indicated in the previous table, total expenditures needs over the next 10 years are estimated to be:

Property Services - Asset Needs			
	Years 1-5	**Years 6-10**	**Total**
Property Services	$3,645,000	$3,926,000	$7,571,000
Annual Average		$757,000	

Again, more work is required to provide a more detailed building by building analysis as we move forward for the purposes of this plan.

Maintenance and repairs for property services average $150,000 - $200,000 per year, not including other costs such as snow removal, utilities and life safety systems.

How do we reach sustainability?

The analysis revealed that the average yearly revenue required is $757,000 to ensure that the level of service is maintained at today's level, over the next 10 years. The rate of funding the facility needs are expected to be somewhat constant over the next ten years.

At the end of 2018 capital reserves for facilities were at approximately $6,176,000, and for the ambulance base reserve they were at $1,742,000.

Current funding in the Property Services budget is $633,000.

Property Services - Sustainability	
Current funding	$ 633,000
Required funding	$ 757,000
Annual shortfall	$ 124,000

For 2020, the estimated required work is $1,233,000 which represents a current shortfall of $600,000. The 2020 budget process deferred some of these required capital expenditures into future years. This shortfall (current and 10 year average) can be managed into the future with a combination of small levy increases, deferral of projects, and reserve uses to mitigate the transition to the required annual funding amount.

Also, as buildings reach the end of their useful life, certain structures may not be replaced, therefore, this will be decisions Council will be required to make moving forward. For example, the Gaol has a significant replacement value, but would it ever be or could it ever be replaced?

The following table highlights the comparison of current replacement value of the fleet equipment with the historical cost of the original purchase value and the remaining net book value set up in the County's financial statements. It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher that what is being reflected in our statements. The net book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

Property Services Current Value vs Historical Cost			
Building Type	**Current Value**	**Historical Cost**	**Net Book Value**
Historical Buildings	$ 31,147,000	$8,865,000	$4,392,000
Office Buildings	$ 15,882,000	$5,371,000	$2,244,000
Transformer Building	$ 50,000	$48,546	$6,608
Storage Buildings	$ 902,000	$294,000	$181,000
Ambulance Buildings	$ 2,219,000	$1,471,000	$1,077,000

Pump House Building	$ 657,000	$962,000	$612,000
TOTAL	**$ 50,857,000**	**$17,010,000**	**$8,513,000**

Desired Levels of Service

Key Indicator: *Response time regarding requests for work*

Issue
Calls for work are assessed regarding the level of urgency. The clients who request work include external (MAG, Service Ontario) and internal (the Departments within the Corporation) should receive confirmation of receipt of their work order request within 24 hours, and be provided with an anticipated response time.

Potential Impact
Failure to assess and respond to problems may lead to increased damages if the maintenance concern is not identified within a timely manner. Also, a lack of a timely response to clients may lead to decreased client satisfaction.

Current Controls
The internal clients complete and submit an electronic Property Services Request form. Each PSR is received by the Maintenance Coordinator for Housing and Property Services and the County's Maintenance Technicians and Building Custodians are also able to view the PSR. The work is assigned, and this information is input; once the work is finished, the PSR is marked complete.
The external clients call or email their requests for maintenance service to the Maintenance Coordinator. An electronic work order is created through the Property Services Request form, and the protocols listed above for internal clients also then apply.

Action plan
The Maintenance Coordinator is to continually monitor the status of all PSR's that are incomplete. The continuous monitoring of all incomplete PSR's will help to ensure that work does not remain unfinished or "fall through the cracks".

Key Indicator: *Funding*

Issue - The funding mechanism relies on rental revenue from the County's three external tenants to provide the resources to maintain services for these properties; the remainder of funding required is from the County. There are no additional provincial or federal funds received for Property Services on a regular basis.
It is possible that occasional grant money is made available through agencies such as Heritage Canada, or one-time funding opportunities through the grant process for projects with specific eligibility criteria.

Potential Impact
A decrease in funding would result in a loss of services or maintenance repairs and capital projects

Current Controls
All work, both operational and capital, is monitored for efficiencies and cost controls.
The budget is monitored by the internal mechanisms of the County's Treasury Department and the Housing and Property Services Division.

Action plan
The 2020 budget reflects the operational and capital requirements to adequately maintain services and complete the more urgent capital upgrades. The capital work is selected based on recommendations from the building condition assessments along with the practical knowledge of the staff involved

Key Indicator: *Depreciation*

Issue
As the buildings begin to age, the required upkeep is expected to increase to maintain levels of service.

Potential Impact
Although the expected life spans are quite high, in practicality, buildings such as the JMB are currently 60 years old and will require increasing maintenance work to keep the building functional (ie, a HVAC system may have frequent temperature control issues).

Current Controls
By remaining diligent in completing the required repairs, the respective building life spans should be met

Action plan
The concept of building replacement may be a consideration in the future if the required repairs increase substantially for any building.

Key Indicator: *Capital*

Issue
The Building Condition Assessments completed in 2011 indicate a much more substantial requirement for capital repairs than what the County has historically provided for the capital works budget.

Potential Impact
Many projects, in future years, will have to be deferred as the average capital allocation is substantially lower than the cost of the recommended repairs within the Building Condition Assessments.

Current Controls

A thorough analysis of the capital requirements is undertaken by Housing and Property Services to determine which capital projects are able to be funded each year.

Action plan
It is anticipated that the process of completing the County's Asset Management Plan will result in a system within the County that recognizes the need for substantial capital repairs and works toward providing the funding allocations to enable the work to be completed.

Key Indicator: *Preventative Maintenance*

Issue
The role of preventative maintenance plays an important part in the longevity of a building and the cost efficiencies of a building.

Potential Impact
By monitoring building systems, providing a consistent, regular preventative maintenance program will significantly aid in reducing building costs. The cost savings will be realized through fewer system failures over time and the decreased need to replace components and systems.

Current Controls
The role of Preventative Maintenance Technician has develops and implements a preventative maintenance program to ensure the components within the building envelope operate as efficiently as possible, leading to fewer repairs and replacements.

Action plan
The preventative maintenance software allows for work necessary for completion to be tracked and monitored.

Key Indicator: *Energy Savings*

Issue
As energy costs increase, the need to reduce usage is recognized.

Potential Impact
Utility costs have increased substantially and are predicted to continue in this manner.

Current Controls
Building occupants are encouraged to reduce energy costs by keeping windows closed when heat or a/c is on, turning off lights, etc..
Low flush toilets and aerators have been installed, and some energy efficient lighting.

Action plan

The legislated Green Energy Act, O/Reg 397/11 requires all municipalities to have in place energy conservation and demand management plans and Huron County is in compliance with this legislation.

Management Strategies – Property Services

Strategic and Corporate Goals

Infrastructure levels of service are influenced and guided by the County's strategic planning initiative. It is anticipated that the County's strategic plan will provide direction regarding the allocation of resources and the prioritization of how municipal tax dollars will be spent in the future.

Expected Asset Performance

As the buildings continue to ago, the required upkeep is expected to increase to maintain levels of service. The County has an annual allocation for capital projects, with an increase year of approximately 2% spending each year.
The Building Condition Assessment indicates higher costs than are available within the annual capital budget for Property Services. This shortfall may eventually lead to component failures or decreased marketability of the properties. These buildings are substantial capital assets for the County, and the continued upkeep is vital to maintaining, or exceeding the life expectancy of the buildings.

Energy Savings

As energy costs increase, the need to reduce utility consumption is recognized. The *Green Energy Act, O/Reg 397/11* requires all municipalities to have in place energy conservation and demand management plans. The County is compliant with this request. Property Services recognizes the need for continuous energy upgrades, and targets capital and operating projects annually that will provide energy savings.

HOUSING SERVICES INFRASTRUCTURE

Housing Services Infrastructure

What does the County own?

The County of Huron has: 16 Apartments buildings and 84 Family units. These consist of detached dwellings, row townhouses and semi-detached townhouses. The assets are located within the Housing Services network. All asset field assessments are carried out in the Housing and Property Services division. The results of the detailed inventory assessment of the targeted structures are summarized below.

Housing Services	
Building Type	**Quantity**
Apartments	15
Residential Family Units	84
Countyview Apartments	1
TOTAL	**100**

The residential family units are further broken down into:

Family Units	**Quantity**
Single	36
Duplex	38
Row	10
Total	84

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the assets of $56.9 million.

Property Services Replacement Value		
Building Type	**Replacement Value**	**% of Total**
Apartments	$ 37,407,000	57%
Residential Family Units	$ 22,525,000	34%
Countyview	$ 6,174,000	9%
TOTAL	**$ 66,106,000**	**100%**

What condition is it in?

Condition assessment rating was carried out on the Housing Services asset network, in consultation with Social and Property Services department, to identify the level of service considered acceptable by staff.

Staff attempted to develop a Facility Condition Rating that would make sense to use for the County's Housing units. The rating was developed based on current capital needs relative to the replacement value of the building. Please refer to the following table.

Condition Rating	Value	# of Structures
Good	$17,512,000	17
Fair	$18,722,000	48
Poor	$29,871,000	35
TOTAL	**$66,105,000**	**100**

Conditions ratings further refined:

Condition	Apartment	Family	Total
Good	5	12	17
Fair	3	45	48
Poor	8	27	35
Total	16	84	100

More work with respect to refining the condition rating will continue as we move forward into 2020.

What do we need to do?

Additional work is required to assess the long term needs on an individual housing structure basis, and this work will continue into 2020. Looking at Housing Services as a whole, the capital needs over the next 10 years are relatively front loaded in years 1-5, and are limited by the availability of staff resources to manage the projects.

Housing Services - Asset Needs			
	Years 1-5	**Years 6-10**	**Total**
Housing Services	$7,196,000	$3,126,000	$10,322,000
Annual Average			$1,032,000

Priority projects for 2020 and beyond are:

Blyth/Bayfield apartments – generator upgrades
Bristol Terrace Family Units – Exterior insulation and cladding
Building condition assessments and energy audits – multiple sites

When do we need to do it?

One criterion critical to rating the Housing Services assets for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

Asset Useful Life in Years	
Asset Type	Useful Life
Building	60
Building Electrical	20
Building Equipment	5
Building Exterior	20
Building Interior	20
Building Mechanical	20
Building Site	22
Apartments	50
Residential Family Units	30

How much money do we need?

This scenario is used to analyze and determine how much money is required on a yearly basis to replace all assets as they become in need of replacement. The following table illustrates the results of our analysis for the Housing Services department.

Housing Services - Asset Needs			
	Years 1-5	**Years 6-10**	**Total**
Housing Services	$7,196,000	$3,126,000	$10,322,000
Annual Average	$1,439,000	$625,231	$1,032,000

Repairs and maintenance costs for Housing Services have been average $250,000 - $300,000 per year. This does not include operating costs such as utilities, snow removal or janitorial services.

How do we reach sustainability?

The analysis revealed that the average yearly revenue required is $1,032,000 to ensure that the level of service is maintained at today's level, over the next 10 years. The current funding that is being raised through the County levy for Housing Services is $869,000.

It can be assumed that at some point, despite the ongoing rehabilitation of our social housing stock, that the units will have to be torn down and reconstructed. Many units see greater damage and wear than what would normally be expected from a residential deterioration curve. With approximately $60 million in housing units, our current reserve balances fall far short of what will be required in the future. At end of 2018, the reserve balance for Housing is $734,000.

Housing Services - Sustainability	
Current funding	$ 869,000
Required funding – 10 year average	$ 1,032,000
Annual shortfall	$ 163,000

For 2020, required work is estimated to be $880,000, therefore, an increase in the levy of is required. Moving forward, small annual levy increases will be required to ensure long term needs are met.

The following table highlights the comparison of current replacement value of the fleet equipment with the historical cost of the original purchase value and the remaining net book value set up in the County's financial statements. It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher that what is being reflected in our statements. The net book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

Housing Services Current Value vs Historical Cost			
Building Type	**Current Value**	**Historical Cost**	**Net Book Value**
Apartments	$17,512,000	$11,543,982	$ 8,302,244
Residential Family Units	$18,722,000	$ 5,691,975	$ 2,780,677
Countyview	$29,871,000	$ 5,014,010	$ 4,637,959
TOTAL	**$66,105,000**	**$22,249,967**	**$ 15,720,880**

Desired Levels of Service

Desired levels of service

Key Indicator: *Response time to requests for work*

Issue
Calls for work are assessed regarding/based on level of urgency. The clients who request work include social housing tenants.
All tenants should receive confirmation of receipt of work order request within 24 hours, and be provided with an anticipated response time.

Potential Impact
Failure to assess and respond to problems may lead to increased damages if the maintenance concern is not identified within a timely manner. Also, a lack of a timely response to tenants may lead to decreased tenant satisfaction.

Current Controls
The tenants call the office and speak directly with the Maintenance Coordinator. The Maintenance Coordinator creates a work order in the property management software and advises the Maintenance Technician of the work to be completed via a phone call or faxes the work order to the site. When the work is completed, the Maintenance Technician indicates the completion information on the work order and faxes back to the office.

Action Plan
The Maintenance Coordinator is to continually monitor the status of all work orders that are incomplete. The continuous monitoring of all incomplete work orders will help to ensure that work does not remain unfinished or “fall through the cracks”.

Key Indicator: *Funding*

Issue
A variety of housing programs are currently running and funded through different mechanisms. The Huron County Housing Corporation and the five non-profits and one Housing Services cooperative are partially funded through provincial and federal dollars, however, a significant portion is provided by the County. The range of programs within the Investment in Affordable Housing program are cost shared between provincial and federal funding, with administration funding provided.

Potential Impact

A decrease in provincial or federal funding for the Housing Corporation would require an increased investment from the County to continue to meet basic levels of service and maintain service levels.

Current Controls
All work, both operational and capital, is monitored for efficiencies and cost controls.
The programs funded through outside sources have reporting mechanisms in place to provide the Ministry of Housing with program disbursements.
The budget is monitored by the internal mechanisms of the County's Treasury Department and the Housing and Property Services Division.

Action Plan
The 2020 budget reflects the operational and capital requirements to adequately maintain services and complete the more urgent capital upgrades. The capital work is selected based on recommendations from the building condition assessments along with the practical knowledge of the staff involved within capital works.
We continue to maximize additional program funding dollars to offer as many services as possible.

Key Indicator: *Depreciation*

Issue
As the buildings begin to age, the required upkeep is expected to increase to maintain levels of service.

Potential Impact
The expected life spans of the family units are now at approximately 30 years. Many of these single family homes were constructed in the late 1940s and early 1950s, and of basic construction. Over the years, these modest homes have had substantial wear and tear.
The apartment buildings have a predicted life span of approximately 50 years; however, they are beginning to show signs of age and future upkeep is essential.
It is important to note that under the *Housing Services Act, 2011,* Housing levels must remain identical, which means if a unit is removed from the Housing Services stock for any reason, it must be replaced. For example, it is not permissible to sell off a single family home and not replace it with another family unit.

Current Controls
By remaining diligent in completing the required repairs, the building respective life spans should be met.

Action Plan
The concept of building replacement may be a consideration in the future if the required repairs increase substantially for any building.
Social Housing, as a sector, has begun to identify regeneration as an identified solution; however, funding allocations are based on our size and the annual funding provided under the

Affordable Housing Program – Rental Build Component is limited, and would necessitate "trading" funding for multiple years with other Service Manager areas to enable sufficient funding at one time for a new rental build.

Key Indicator: *Capital*

Issue
The Building Condition Assessments completed in 2011 indicate a much more substantial requirement for capital repairs than what the County has historically provided for the capital works budget.

Potential Impact
Many projects, in future years, will have to be deferred as the average capital allocation is substantially lower than the cost of the recommended repairs within the Building Condition Assessments.

Current Controls
A thorough analysis of the capital requirements is undertaken by Housing and Property Services to determine which capital projects are able to be funded each year.

Action Plan
It is anticipated that the process of completing the Asset Management Plan will result in a system within the County that recognizes the need for substantial capital repairs and works toward providing the funding allocations to enable the work to be completed.

Key Indicator: *Preventative Maintenance*

Issue
The role of preventative maintenance plays an important part in the longevity of a building and the cost efficiencies of a building.

Potential Impact
By monitoring building systems, providing a consistent, regular preventative maintenance program will significantly aid in reducing building costs. The cost savings will be realized through fewer system failures over time and the decreased need to replace components and systems.

Current Controls
The role of Preventative Maintenance Technician develops and implements a preventative maintenance program to ensure the components within the building envelope operate as efficiently as possible, leading to fewer repairs and replacements.

Key Indicator: *Energy Savings*

Issue
As energy costs increase, the need to reduce usage is recognized

Potential Impact
Utility costs have increased substantially and are predicted to continue in this manner.

Current Controls
Tenants are encouraged to reduce energy costs by keeping windows closed when heat or a/c is on, turning off lights, etc.
Low flush toilets and aerators have been installed, and some energy efficient lighting.

Action Plan
The legislated Green Energy Act, O/Reg 397/11 requires all municipalities to have in place energy conservation and demand management plans and Huron County is in compliance with this legislation.

Management Strategies – Housing Services

Legislative Requirements

The apartment buildings, detached houses and duplex units managed under the Huron County Housing Corporation are directly influenced by many legislative and regulatory requirements which prevent levels of service from declining below a certain standard, and ensures the total number of Social Housing units does not decrease.

Strategic and Corporate Goals

Infrastructure levels of service are influenced and guided by the County's strategic planning initiative. It is anticipated that the County's strategic plan will provide direction regarding the allocation of resources and the prioritization of how municipal tax dollars will be spent in the future.

Expected Asset Performance

As the buildings begin to age, the required upkeep is expected to increase to maintain levels of service. The detached houses, duplex units and row housing have an expected life span now at approximately 30 years. Many of these houses were constructed in the late 1940s and early 1950s, and are of basic construction. Although upgrades have been completed over the years, such as new windows, bathrooms, kitchens, toilets and insulation, these modest properties have had substantial wear and tear. Any strategic planning involving the County's buildings should include social housing properties. These are substantial asset for the County, and the regeneration of these properties is vital to maintaining, or exceeding life expectancy of the buildings, and retaining legislated service level numbers.

Housing and Homelessness Plan

The Ministry of Housing, under the *Housing Services Act, 2011*, required all service managers to develop a long-term 10 year Housing and Homelessness Plan. The Plan assists in establishing priorities for housing and homelessness services based on targeted consultations and research. Based on a projected need forecast, the Plan makes several recommendations that address homelessness and affordable housing options, and has a strong emphasis on a mixed approach to housing needs. Budget impact will depend greatly on the direction and recommendations of the Housing and Homelessness's Steering Committee and the ongoing and potentially shifting needs of the County. The impact of these recommendations will be brought to County Council as required.

Availability of Finances

Availability of finances will be a key component in maintaining desired levels of service. Housing Services receives provincial and federal grants each year. A review of the funding levels for the five year time frame 2013 – 2017, indicates that the federal/provincial grants provided to the County will decrease by 5.3%. This will require an increased investment from the County to meet basic levels of service.

Energy Savings

As energy costs increase, the need to reduce utility consumption is recognized. The *Green Energy Act, O/Reg 397/11* requires all municipalities to have in place energy conservation and demand management plans. The County is compliant with this request. Housing Services recognizes the need for continuous energy upgrades, and targets capital and operating projects annually that will provide energy savings.

HOMES FOR THE AGED INFRASTRUCTURE

Homes for the Aged Infrastructure

What does the County own?

The County of Huron has 2 Homes for the Aged:

- Huronview Home for the Aged with 120 beds and 20 apartments
- Huronlea Home for the Aged with 64 beds and 20 apartments

All asset field assessments are carried out in the Homes for the Aged staff. The results of the detailed inventory assessment of the targeted structures are summarized below.

What is it worth?

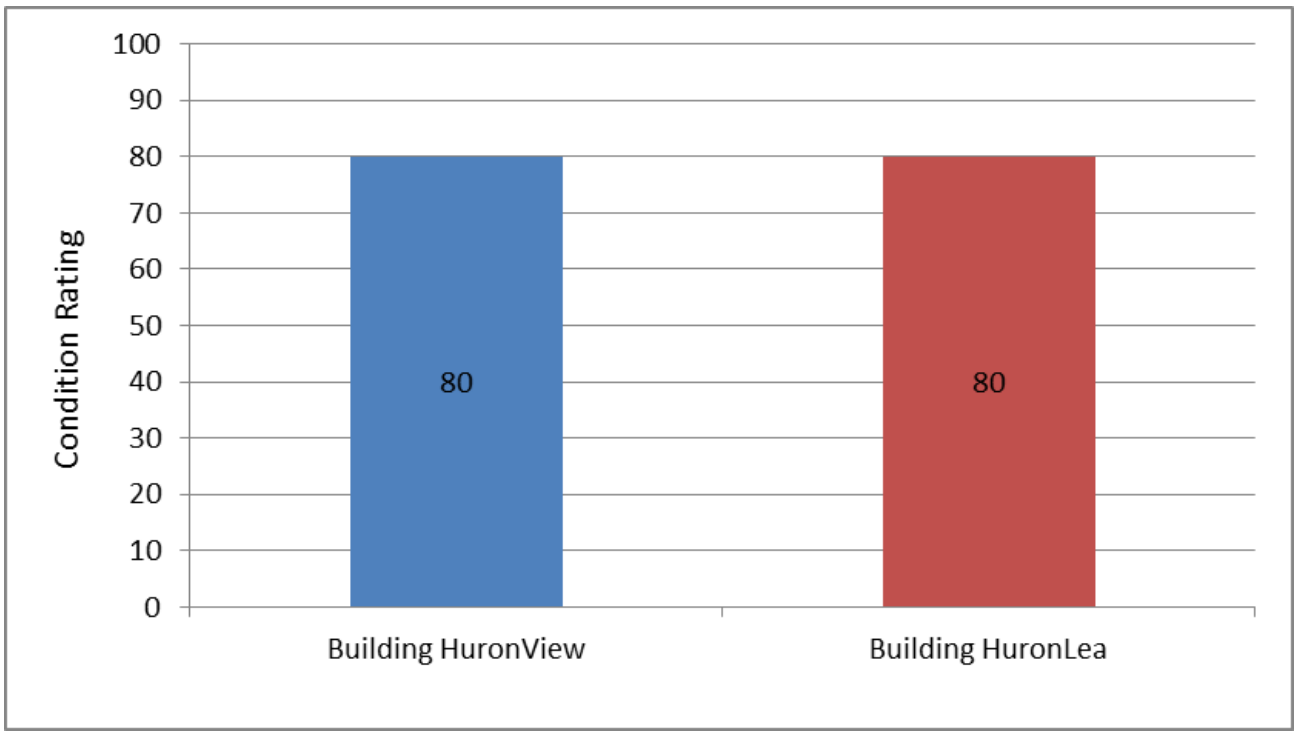
Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the assets of $27.8 million.

Home For The Aged Replacement Value			
Asset Type	**Square Foot**	**2019 Replacement Cost**	**% of Total**
Huronview and Heartland	81,000	$16,200,000	58%
Huronlea and Highland	58,000	$11,600,000	42%
Total		$27,800,000	100%

What condition is it in?

Condition assessment rating was carried out on the Homes for the Aged asset network, in consultation with Homes for the Aged Department, to identify the level of service considered acceptable by staff. The following results were obtained: Huronview and Huronlea are in good condition. The results of the detailed condition assessment of the targeted Assets are summarized below in the graph.

Note: The condition rating below is from the 2013 Asset Management Plan.



The condition rating relates to the age and maintenance of the overall buildings and is a rating out of 100. When the rating is between 30 and 50 the item needs to be replaced. The rating system is as follows:

Excellent:	91 – 100	No evident defects
Good:	70 – 90	Slight decline
Fair:	51 – 69	Decline asset apparent
Poor:	30 – 50	Severe decline or failure

What do we need to do?

Addressing Asset Needs		
Assets	Needs 1-5 yrs	Needs 6-10 yrs
Huronview and Heartland	$ 1,612,251	$ 1,202,750
Huronlea and Highland	$ 1,202,950	$ 745,750
Total	$ 2,815,201	$ 1,948,500

Priority projects for the Homes for the Aged:

- sprinkler system replacements (will be completed in 2020)

- maintaining building mechanical systems
- LED lighting throughout buildings and external lights
- maintaining condition of shingled roof

When do we need to do it?

One criterion critical to rating the Homes for the Aged assets for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

Asset Type - Homes for the Aged	**Useful Life (years)**
Building Envelope	60
Electrical	20
Equipment	5
Exterior	20
Interior	20
Mechanical	20
Site	22

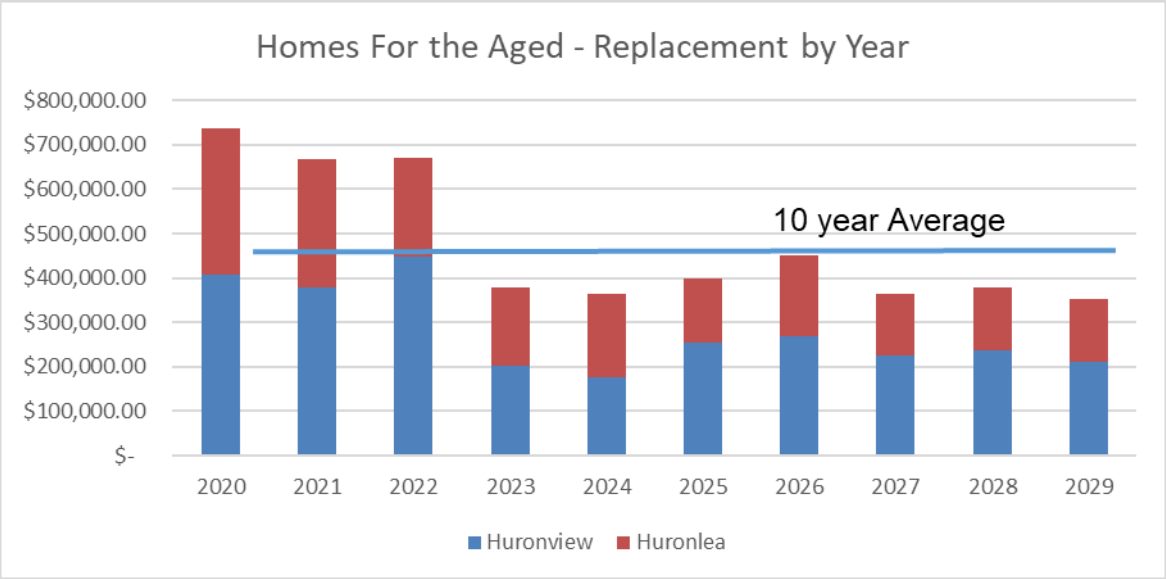
Building and equipment repairs for the Homes over the past 2 years are as follows:

2018: $294,000
2017: $230,000

How much money do we need?

This scenario is used to analyze and determine how much money is required on a yearly basis to replace all assets as they become in need of replacement. The following graph illustrates the results of our analysis for the Homes for the Aged Department.

Asset Replacement Summary



How do we reach sustainability?

The analysis revealed that the average yearly revenue required is $476,000 to ensure that the level of service is maintained at today's level, over the next 10 years. The above graph also indicates that at that rate of funding the network needs are expected to increase in the short term and then level out for the remainder of the 10 year period.

Based on current levels of depreciation being raised through the levy of $787,000, there should be sufficient funds to manage the current replacement cycle of minor building components, providing that projects are deferred into future years to manage the peak. It is important to note, that the current replacement amounts do not account for the future replacement of each Home. The current reserve balance for the Homes is at $1.01 million.

The following table highlights the comparison of current replacement value of the Homes for the Aged with the historical cost of the original purchase value and the remaining net book value set up in the County's financial statements. It is important to note that the County cannot rely solely on depreciation alone to fund its future capital replacement. Inflationary pressures continue to drive future replacement costs higher that what is being reflected in our statements. The net book value is an accounting figure for what value remains for an asset as it depreciates over its estimated useful life.

Homes Replacement Current Value vs Historical Cost			
Asset Type	Current 2019	Historical Cost	Net Book Value

Huronview and Heartland	$16,200,000	$ 13,685,000	$ 7,872,000
Huronlea and Highland	$11,600,000	$ 7,710,000	$ 4,418,000
Total	$27,800,000	**$ 21,395,000**	**$ 12,290,000**

Desired Levels of Service

Homes / Management Strategies

The Homes for the Aged have addressed infrastructure renewal strategies in their 10 year capital plan. The County of Huron's strategic planning initiative could impact the Homes direction in this regard. Should the Homes be required to continue to operate in their original facilities, according to the County's strategic planning initiative, necessary capital and operational measures will continue as outlined in the desired level of service and 10 year capital / operational plan the Homes have developed.

As the MOHLTC regulations change so do the demands on operational and capital improvements to the Homes. As these can be unforeseen budgetary pressures it is vital all departments at the Homes maximize purchasing efficiencies. As part of the budget planning process for the Homes it is recognized there will be upward pressure on various budget lines, at present and in the future, with consumables such as utility costs, resident care products and technology advancements being volatile commodities on the open market.

The Homes continue to address this with partnerships such as Complete Purchasing Services buying group which helps to ensure competitive pricing for a wide variety of products used at the Homes. Other costs saving initiatives are being examined on a regular basis to maximize efficiencies and enhance our purchasing powers, such as the competitive Request for Proposal process in accordance with the County of Huron procurement policy for capital projects.

Huron County Homes for the Aged have been maintained in excellent condition and are well situated to continue to meet the desired levels of service for the foreseeable future with the continued commitment the County of Huron has provided.

The County of Huron is currently responsible for the operation and maintenance of 2 Homes for the Aged which also contains 40 seniors' apartments:

Huronview Home for the Aged - 77722A London Rd. Clinton Ont. - 120 Long Term Care beds and 20 seniors' apartments

Huronlea Home for the Aged - 820 Turnberry St. S. Brussels, Ont. – 64 Long Term Care beds and 20 seniors apartments

Both Homes, built in 1992, have been well maintained and are now at an age when ongoing capital expenditures will be necessary to continue their excellent level of service to the community.

The Homes receive funding from the Ministry of Health and Long - Term Care (MOHLTC) and are governed by the Long- Term Care Homes Act – 2007 which legislates the operational standards the Homes must maintain. The County contributes the additional funds necessary to operate the Homes at a standard the community wishes to maintain.
The Homes have developed a 10 year Operational Plan to forecast approximated operational and capital requirements for the future, with adjustments for inflation.
The following capital assets are tracked to maintain the desired level of service:

HURONVIEW:

Parking Lot Pavement:
The front, apartment, staff parking lots and rear fire access lane was repaved in 2001 and has been well maintained. The staff parking lot was re-paved in 2016 which included additional parking spots. As per the Asset Management Plan, the front parking lot repaving is slated for 2022.

Shingled Roof:
The roof underwent a phased replacement from 2009 to 2011 and is in excellent condition. Some eaves troughs were replaced in 2019. In 2018 $30,000 was spend on shingle replacement. Will monitor remainder of roof and incorporate into asset management plan.

Fire sprinkler system:
In 2019 a full replacement of the fire sprinkler system was started and will finish early 2020. The Homes reserves was utilized for this project.

Main Chiller:
The main chiller unit was replaced in 2012 and is fully operational with no issues to report. The approximate replacement date for this chiller is 25 to 28 years and is beyond the 10 year capital replacement plan.

Heating Boilers:
Huronview has 3 original equipment hot water heating boilers which have been well maintained and one has undergone an emergency re-fitting to be fully functional for the 2013 – 2014 winter seasons. A phased replacement of the other two boilers has been addressed in the 10 year capital plan for 2022.

Domestic Hot Water Boilers:
The original equipment High Temp and Low Temp domestic hot water boilers were replace in 2012 with high efficiency units and are fully operational. Replacement will be address in mechanical upgrades but is beyond the 10 year capital replacement plan.

Diesel Generator:

The diesel generator is original equipment, has been well maintained and is fully operational. Upgrades to the generator were completed in 2016. Replacement for this unit is beyond the 10 year capital replacement plan.

Fire Alarm System:
As part of the replacement of the fire sprinkler system, all smoke and heat sensor equipment will be replaced which includes the fire panels.

Building Automation System (BAS):
This system is a vital component to the heating and ventilation systems at the Home and allows the Homes maintenance staff to monitor, make adjustments and troubleshoot heating and cooling issues. In 2016 the BAS was replaced.

Heartland Apartment Chiller:
In 2012 we installed a 5 ton chiller unit to temper humidity issues in the Heartland apartment corridors. This unit is fully operational and its replacement is beyond the 10 year capital replacement plan.

Commercial Washers:
Huronview laundry department has 2- 60lb Unimac commercial washing units which were replaced 2009 to 2011 are fully operational, are well maintained and their replacement is beyond the 10 year capital replacement plan.

Commercial Dryers:
Huronview laundry department has 3 – 75lb- commercial gas dryers which were replaced 2009 to 2011 are fully operational, are well maintained and their replacement is beyond the 10 year capital replacement plan.

Resident Call Bell System:
This system was replaced 2010 – 2011, is fully operational, well maintained and will require a major upgrade by 2021 which is addressed in the 10 year capital replacement plan.

Security Locks / Resident Wander Guard System:
In compliance with MOHLTC regulated requirements the Home underwent substantive changes to its door locks and egress security systems including an Elpas Wandering Resident System. The system warns staff should a Resident be attempting unauthorized egress from the Home. A major system upgrade will be required in 2021 in order to maintain the legislated and otherwise desired level of service for the Homes Residents.

Building Humidifier System:
In 2012 the Home installed a Nortec, ultra high efficiency, state of the art building humidifier system. As this is new and developing technology there were some engineering issues through the winter of 2011 – 2012. The engineers from Nortec have solved the issues to date and the system will undergo a thorough test through the 2012-2013 winter seasons. Its replacement is beyond the 10 year capital replacement plan.

Sewage Well Station:
The London Road sewage well was built in 1992 and serves several large public facilities including Huron County Health Unit & Library Complex, Huronview and Heartland Apartments, County View Seniors' Apartments and Jacob Memorial Building which houses Social & Property Services. Upgrades were made to the sewage well in 2018, in collaboration with Property Services. The sewage well is serviced by Huron East.

HURONLEA:

Parking Lot Pavement:
The front, apartment, staff parking lots and rear fire access lane was repaved in 2001 and has been well maintained. The staff parking lot was repaved in 2019 which included additional parking spots towards the back of the property.

Shingled Roof:
The roof underwent a phased replacement from 2010 to 2011 and is in excellent condition. Troughs and fascia are also in good condition. In 2019 $50,000 was spent on new shingles and it will be budgeted for $40,000 for 2020.

Fire sprinkler system:
In 2019 a full replacement of the fire sprinkler system was started and will finish early 2020. The Homes reserves was utilized for this project.

Main Chiller:
The main 100Ton chiller unit was replaced in 2015 for an estimated cost of $90,000. Yearly maintenance is noted for the 10 year capital replacement plan.

Heating Boilers:
The 3 stage heating boiler was replaced in 2015 and yearly maintenance is noted for the 10 year capital plan for 2020.

Domestic Hot Water Boilers:
The original equipment High Temp and Low Temp domestic hot water boilers were replaced in 2011 with high efficiency units and are fully operational. Replacement will be addressed in mechanical upgrades but is beyond the 10 year capital replacement plan.

Diesel Generator:
The diesel generator was replaced in 2016 and yearly maintenance is noted in the 10 year capital replacement plan.

Fire Alarm System:

As part of the replacement of the fire sprinkler system, all smoke and heat sensor equipment will be replaced which includes the fire panels.

Building Automation System (BAS):
This system is a vital component to the heating and ventilation systems at the Home and allows the Homes maintenance staff to monitor, make adjustments and troubleshoot heating and cooling issues. In 2016 the BAS system was replaced.

Highland Apartment Chiller:
In 2012 we installed a 5 ton chiller unit to temper humidity issues in the Highland apartment corridors. This unit is fully operational and its replacement is beyond the 10 year capital replacement plan.

Resident Call Bell System:
This system was replaced 2010 – 2011, is fully operational, well maintained and will require a major upgrade by 2021 which is addressed in the 10 year capital replacement plan.

Security Locks / Resident Wander Guard System:
In compliance with MOHLTC regulated requirements the Home underwent substantive changes to its door locks and egress security systems including an Elpas Wandering Resident System. The system warns staff should a Resident be attempting unauthorized egress from the Home. A major system upgrade will be required in 2021 in order to maintain the legislated and otherwise desired level of service for the Homes Residents.

Building Humidifier System:
The system is original equipment and will require complete replacement in 2015. Its replacement is scheduled in the 10 year capital replacement plan.

Both Huronview and Huronlea Homes have historically had excellent support from the County of Huron which has enabled the Home to be maintained at a high level of operational efficiency and a continued commitment by the County will ensure this desired level of service will continue for years to come.

EMERGENCY SERVICES

Emergency Services

What does the County own?

The County of Huron in 2016 has: 11 Ambulances, 3 Rapid Response units, 2 Command Vehicles, 1 Emergency Support Trailer, 16 Defibrillators, 14 Stretchers, 8 Power Load, 11 Stairchairs and 13 Autopulse. The assets are located within the Emergency Services network. All asset field assessments are carried out in the Emergency Services department. The results of the detailed inventory assessment of the targeted structures are summarized below.

ES Fleet Inventory		
Asset Type	**Asset Component**	**Quantity**
Ambulances	Vehicle	11
Rapid Response Units	Vehicle	3
Command Vehicles	Vehicle	2
Defibrillators	Vehicle Equipment	16
Autopulse	Vehicle Equipment	13
Stretchers	Vehicle Equipment	14
Power Load	Vehicle Equipment	8
Stairchair	Vehicle Equipment	11
EM Trailer	Vehicle Equipment	1
Total		**79**

The current estimated useful life of the EMS fleet and equipment is based on a 6 year replacement cycle.

What is it worth?

Before managing an asset, it is important to know the value of the asset to determine if the maintenance dollars spent are justified to protect the asset. Based on the asset valuation process carried out as part of this assignment, the AMP Team, in consultation with staff calculated an approximation of the total estimated value of the assets of $2.96 million.

EMS Fleet Replacement Value			
Asset Type	**Quantity**	**2019 Replacement Cost**	**% of Total**
Ambulances	11	$ 1,920,000	47%
Rapid Response Units	3	$ 255,000	6%
Command Vehicles	2	$ 170,000	4%
Defibrillators	16	$ 595,000	15%
Auto pulse	13	$ 280,000	7%
Stretchers	14	$ 392,000	10%
Power Load	8	$ 396,000	10%
Stair chair	11	$ 52,000	1%
EM Trailer	1	$ 40,000	1%
TOTAL	**79**	**$ 4,100,000**	**100%**

What condition is it in?

Condition assessment rating was carried out on the Emergency Services asset network, in consultation with Emergency Services Department, to identify the level of service considered acceptable by staff. The following results were obtained: the autopulse units are in poor condition, ambulances are in good condition, defibrillators are in fair condition, rapid response units are in good condition, stretchers are in good condition, stairchair are in good condition, trailer is in excellent condition and command vehicles are in poor condition. The results of the detailed condition assessment of the targeted Assets are summarized below in the table.

EMS Fleet Condition Rating		
Asset Type	**Average Condition Rating**	
Ambulances	78	Good
Rapid Response Units	82	Good
Command Vehicles	35	Poor
Defibrillators	66	Fair
Auto pulse	49	Poor
Stretchers	75	Good
Stair chair	76	Good
EM Trailer	100	Excellent

The condition rating relates to the age and usage of the overall vehicles or devices group and is a rating out of 100. When the rating is between 30 and 50 the item needs to be replaced. The rating system is as follows:

Excellent:	91 – 100	No evident defects
Good:	70 – 90	Slight decline
Fair:	51 – 69	Decline asset apparent
Poor:	30 – 50	Severe decline or failure

What do we need to do?

Addressing Asset Needs		
Assets	**Needs 1-5 yrs**	**Needs 6-10 yrs**
Ambulances	$1,600,000	$1,600,000
Rapid Response Units	$250,000	$180,000
Command Vehicles	$160,000	$180,000
Defibrillators	$369,000	$385,000
Autopulse	$210,000	$165,000
Stretchers	$280,000	$280,000
Power Load	$330,000	$330,000
Stairchair	$40,000	$40,000
EM Trailer		$15,000
Total	**$3,239,000**	**$3,175,000**

Annual EMS Fleet and Equipment repairs (including fuel) are averaging approximately $300,000 - $325,000 per year.

When do we need to do it?

One criterion critical to rating the Emergency Services assets for the purposes of developing the AMP is the service life of the structure and its elements. As assets age, infrastructure managers must use experience and judgment to decide when maintenance is no longer cost effective thereby requiring that the structure be replaced.

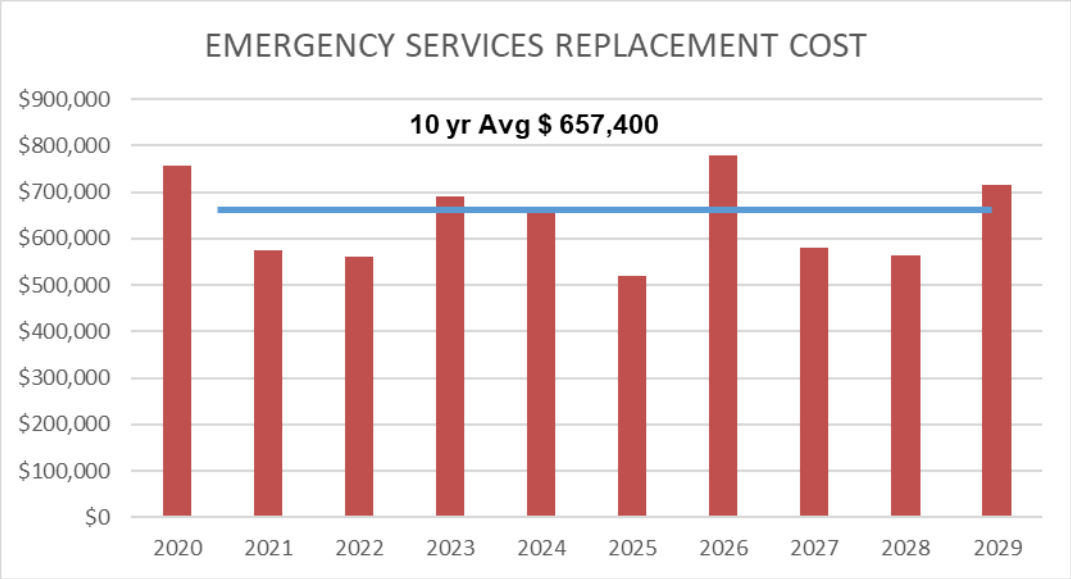
Asset Useful Life in Years	
Asset Type	Useful Life
Ambulances	6
Rapid Response Units	6
Command Vehicles	6
Defibrillators	6
Autopulse	6
Stretchers	6
Stairchair	6

EM Trailer	6

How much money do we need?

This scenario is used to analyze and determine how much money is required on a yearly basis to replace all assets as they become in need of replacement. The following graph illustrates the results of our analysis for the Emergency Services Department.

Asset Replacement Summary



How do we reach sustainability?

The analysis revealed that the average yearly revenue required is $657,400 to ensure that the level of service is maintained at today's level, over the next 10 years. Due to the short term nature of the EMS Fleet, the above graph also indicates that at that rate of funding the network needs are expected to be somewhat constant over the next ten years.

Based on the 2020 deprecation of $570,000 being raised in the levy, there will be additional levy requirements required through the lifecycle of the EMS Fleet, although relatively small in nature relative to some of the County's other infrastructure. These minor shortfalls can easily be made up with levy in a pay as you go approach.

The tables below shows the values at 2018 net book value, which is the historical cost less depreciation. The table also shows the 2019 current value cost to replace. The table illustrates the variance between net book value and current cost. This explains the reason for Emergency Services requiring more funding than just raising deprecation to replace assets at current value.

EMS Fleet Replacement Current Value vs Historical Cost			
Asset Type	**Current 2019**	**Historical Cost**	**Net Book Value**
Ambulances	$1,920,000	$1,670,205	$1,248,000
Rapid Response Units	$255,000	$255,000	$204,000
Command Vehicles	$170,000	$80,000	$10,000
Defibrillators	$595,000	$671,876	$416,500
Auto pulse	$280,000	$212,248	$112,000
Stretchers	$392,000	$135,684	$294,000
Power Load	$396,000	$350,000	$227,500
Stair chair	$52,000	$26,150	$36,400
EM Trailer	$40,000	$15,000	$35,000
TOTAL	**$4,100,000**	**$3,416,163**	**$2,583,400**

Desired Levels of Service

The ambulances in our department cost approximately $160,000.00 each and we have increased the life cycle from 60 to 72 months. These units are used for the transport of patients who are sick and injured. At this time we do not believe that there needs to be more than eight transport ambulances with three spares to meet the needs of the fleet. Should the call volume increase or the response time needs decrease, then there will need to be an adjustment to the fleet compliments.

There are three rapid response units in our fleet which includes one spare. These vehicles are used for first response and help ensure our response time meets County Council decision to ensure a 40% commitment to meeting the 8 minute response for all CTAS 1 returns. As well, there is a Council decision to ensure a 65% commitment to meeting the 17 minute response for all CTAS 2 and a 50% commitment to meeting the 17 minute response for all CTAS 3 responses. There is also a Council decision to ensure a 65% commitment to meeting the 30 minute response for all CTAS 4 calls and finally, there is a Council decision to ensure a 50% commitment to meeting the 30 minute response for all CTAS 5 calls. This obligation indicates that the current vehicle commitment can meet our obligation as determined by County Council.

The Command vehicles are also able to be used as first response vehicles as they carry sufficient equipment to render care until an RRU or ambulance arrives on scene. These vehicles are also used to decrease costs for travel by departmental administrative staff in their

normal duties. These units are also the command units at an incident, thus freeing up a transport unit should it be required.

There are 16 defibrillators for use in the ambulances and RRUs. These units are used to provide a controlled shock to the heart muscle in order to revert the heart to functioning rhythm. These devices are part of the chain of survival and we have had numerous saves in Huron County as a result of the efforts to meet the pre hospital cardiac needs of our citizens.

We have 13 autopulses in our system for providing cardiac compressions during a cardiac arrest. The ability of the unit to do compressions ensures that the patient is receiving the appropriate compressions over the length of the arrest and ensures that the paramedic is safe during the transport of cardiac arrest patients. Keeping health and safety in mind, this ensures paramedics are able to wear their seatbelts in the back of the vehicle rather than standing up trying to do CPR.

Key Performance Indicators

Key Indicator:
Call Volume

Issue:
Increases to the various categories will cause change requirements to the deployment plan and positioning of resources.

Total call Volume (Code 1 – 4 + 8)

2008 – 7,203
2009 – 8,134
2010 – 9,433
2011 – 11,613
2012 – 12,378
2013 – 9,955
2014 – 13,407
2015 – 11,279

Potential Impact:
There is a need to ensure that we have ample vehicles available to meet the needs as assigned by the Central Ambulance Communications Centre (CACC). If the vehicles are not in the area of increasing call volume then either the vehicles positioning needs to be reassigned or there needs to be an increase in the vehicles available.

Current Controls:
The assignment of calls is controlled by the Dispatch. (CACC). CACC's operational policies are controlled by the EHSB (Province) with some input from operators; however, final decision rests with the CACC. The local deployment strategy assists both parties in meeting these objectives.

Action plan:
The call volume is continually monitored through both the Ambulance Dispatching Report System (ADRS) and Huron County's electronic Patient Call Report (EPCR) to ensure that the

call volume increases are assessed and rationalized for spikes in call volume.

Key Indicator:
Response Times

Issue:
The standard for response times in Huron County is 8 minutes for CTAS 1; 17 minutes for CTAS 2; 17 minutes for CTAS 3; 30 minutes for CTAS 4 and 30 minutes for a CTAS 5. This changed in 2011 from the previous 90th percentile for Huron County of 17 minutes 22 seconds for all responses.

Potential Impact:
Increased high priority calls from hospitals (Code 4 response) results in that unit being committed and unable to respond to other calls while en-route. This creates a need for increased vehicles as the originally assigned unit on a code 4 cannot be diverted even if they drive by a second code 4.

Current Controls:
The assignment of calls is controlled by the Dispatch. (CACC). The local service monitors the response time and takes appropriate steps to ensure that the response times meet the agreement and adjusts their actions based on the results.

Action plan:
Should call volume increase or we are unable to meet the agreed upon response times, an adjustment to both the location of vehicles and/or the number of vehicles available is determined and appropriate approvals are obtained to make these changes occur.

Asset Failure:
What is the likelihood of a major asset failure and what would be the impact to the service and the County? As an example, what happens when we delay purchasing and what is recommended to mitigate the deficiency? (i.e. – vehicle out of service due to usability resulting in increased response times, with an inferior patient outcome due to the delay in patient contact and care being rendered.

Action Plan:
To ensure appropriate redundancy is built in to reduce the likelihood of a major asset being totally unserviceable, it is important to have ample backup vehicles to replace the said unit and the ability to have the asset serviced in a timely fashion. As an example, if an engine was damaged and needed to be replaced, we would need our maintenance facility to be able to have the engine repaired and the vehicle back on the road in short order. This requires preferred servicing as well as having ample spare units available to replace the frontline vehicle. Further, an agreement with peripheral services to ensure that if necessary a spare can be obtained on short notice.

The impact on the service would be an increased response time and/or calls not serviced in the time limits established within the standards and approved by Council. The impact on the County would be that there citizens are not receiving appropriate care as provided in the provincially published timelines and could result in litigation and increased concerns being raised.

FINANCIAL ANALYSIS and SUSTAINABILITY

The County has a significant amount of infrastructure under its control, with current estimates of replacement value at approximately $1.1 billion in 2019. These figures are not adjusted for future inflation. Our current tax base (weighted assessment) is $9.6 billion. This represents a significant burden on our tax base to manage and maintain such a significant level of

infrastructure – 11 cents on the dollar of weighted assessment. Looking at it per household, Huron County supports approx. $39,500 in infrastructure per household.

The following table provides the replacement value details by department and asset type. Note: This table was updated for all assets except for the small culverts and driveway culverts as more work is required to inventory and assess those assets.

County of Huron - Asset Replacement Value

Department	Asset Type	Total Qty	Current Replacement Cost	% of Total
Public Works	Road Surface	777 km	$550,800,000	49.10%
Public Works	Bridges	82	$154,197,000	13.75%
Public Works	Culverts-Large	211	$87,840,000	7.83%
Public Works	Culverts-Small	248	$131,913,321	11.76%
Public Works	Driveway culverts	8,934	$27,001,440	2.41%
Public Works	Auburn Patrol Yard	1	$5,615,120	0.50%
Public Works	Wingham Patrol Yard	1	$2,109,200	0.19%
Public Works	Wroxeter Patrol Yard	1	$3,293,000	0.29%
Public Works	Zurich Patrol Yard	1	$2,420,000	0.22%
Public Works	Fleet 5 year	50	$1,249,000	0.11%
Public Works	Fleet 10 year	28	$4,106,000	0.37%
Public Works	Fleet 15 year	17	$2,527,000	0.23%
Property Services	Historical Buildings	3	$31,147,000	2.78%
Property Services	Office Buildings	4	$15,882,000	1.42%
Property Services	Transformer Building	1	$50,000	0.00%
Property Services	Storage Buildings	2	$902,000	0.08%
Property Services	Ambulance Stations	4	$2,219,000	0.20%
Property Services	Pump House	1	$657,000	0.06%
Housing Services	Apartments	15	$37,407,000	3.33%
Housing Services	Residential Family Units	84	$22,525,000	2.01%
Housing Services	Countyview	1	$6,174,000	0.55%
Homes for the Aged	Huronview and Heartland	1	$16,200,000	1.44%
Homes for the Aged	Huronlea and Highland	1	$11,600,000	1.03%
EMS	Ambulances	11	$1,920,000	0.17%
EMS	Rapid Response Units	3	$255,000	0.02%
EMS	Command Vehicles	2	$170,000	0.02%
EMS	Defibrillators	16	$595,000	0.05%
EMS	Auto pulse	13	$280,000	0.02%
EMS	Stretchers	14	$198,000	0.02%
EMS	Power Load	8	$396,000	0.04%
EMS	Stair chair	11	$42,000	0.00%
EMS	EM Trailer	1	$15,000	0.00%
TOTAL			**$1,121,705,081**	**100%**
Historical Cost			**$570,640,288**	

The most significant assets fall under the Public Works department with approximately 87% of the estimated replacement value. It is important to note that the historical cost of the assets are significantly less than what it would cost to replace them today.

However, it is important to note, that not all of the existing assets would be replaced today, or at the same service level. As the County moves forward with its asset management planning, decisions will have to be made on the existing levels of service. For example, are their certain bridges that could be closed with minimal impact to traffic patterns?

As seen by the historical costs, when raising funds for infrastructure, you need more than the levy raised from deprecation to keep up with the needs of the County and to keep the level of service at the standards the County feels confident with. Current deprecation alone does not cover our future replacement needs.

The next table calculates what it would cost per year if we were to base the annual replacement on the estimated useful life of the assets for the non-linear assets, along with the better forecasts for the linear assets.

County of Huron - Asset Replacement/Rehabilitation/Renewal Value per Year				
Department	**Asset Type**	**Estimated Service Life**	**Current Replacement Cost**	**Repl. Cost/Year**
Public Works	Roads	Next 20 years	$273,000,000	$13,650,000
Public Works	Bridges	Next 30 years	$101,000,000	$3,366,667
Public Works	Culverts-Large	Next 30 years	$45,000,000	$1,500,000
Public Works	Culverts-Small	75	$131,913,321	$1,758,844
Public Works	Driveway culverts	40	$27,001,440	$675,036
Public Works	Auburn Patrol Yard	60	$5,615,120	$93,585
Public Works	Wingham Patrol Yard	60	$2,109,200	$35,153
Public Works	Wroxeter Patrol Yard	60	$3,293,000	$54,883
Public Works	Zurich Patrol Yard	60	$2,420,000	$40,333
Public Works	Fleet 5 year	5	$1,249,000	$249,800
Public Works	Fleet 10 year	10	$4,106,000	$410,600
Public Works	Fleet 15 year	15	$2,527,000	$168,467
Property Services	Historical Buildings	60	$31,147,000	$519,117
Property Services	Office Buildings	40	$15,882,000	$397,050
Property Services	Transformer Building	60	$50,000	$833
Property Services	Storage Buildings	60	$902,000	$15,033
Property Services	Ambulance Stations	60	$2,219,000	$36,983
Property Services	Pump House	20	$657,000	$32,850
Housing Services	Apartments	50	$37,407,000	$748,140
Housing Services	Residential Family Units	30	$22,525,000	$750,833
Housing Services	Countyview	50	$6,174,000	$123,480
Homes for the Aged	Huronview and Heartland	60	$16,200,000	$270,000
Homes for the Aged	Huronlea and Highland	60	$11,600,000	$193,333
EMS	Ambulances	6	$1,920,000	$320,000
EMS	Rapid Response Units	6	$255,000	$42,500
EMS	Command Vehicles	6	$170,000	$28,333
EMS	Defibrillators	6	$595,000	$99,167
EMS	Auto pulse	6	$280,000	$46,667
EMS	Stretchers	6	$198,000	$33,000
EMS	Power Load	6	$396,000	$66,000
EMS	Stair chair	6	$42,000	$7,000
EMS	EM Trailer	6	$15,000	$2,500
TOTAL			**$747,868,081**	**$25,736,187**

As seen by this table, if we were to replace all assets we have today, at the same standard or level of service, the County would require to fund approximately $25.7 million per year to set aside for future replacement. While not all of the assets above may be replaced to their current service level, the opportunities for this are limited and will not make a meaningful difference to the bottom line.

Moreover, knowing that the bulk of the bridge and culvert network were constructed during the 1940's and 1950's, a significant amount of work will be required through 2030's-2050's. Therefore, just looking at an annual amount based on the lifecycle cost doesn't make sense as we have not been setting aside any significant amount of funding for bridge replacement up to

this point in time and to start now based on the figures above would not get us to where we need to be.

Therefore, we will see a significant peak in needs shortly beginning in the current 10 year replacement cycle. This peak will have to be managed by a combination of levy, debt, reserves and service level review.

The table below shows the County's consolidated needs for the next ten years. This is an estimated forecast amount, as desired level of services can change; driven by the needs of the community, and or changes in legislation, or changes due to unforeseen circumstances.

Estimated Capital Needs (1-10 years)			
Department	**Asset Type**	**Needs 1-5 yrs**	**Needs 6-10 yrs**
Public Works	Roads	$55,350,000	$91,626,000
Public Works	Bridges and Culverts-Large	$19,252,500	$19,425,000
Public Works	Small Culverts and Driveway	$7,650,000	$4,500,000
Public Works	Patrol Yards	$2,753,000	$364,000
Public Works	Fleet	$6,262,000	$4,281,000
Property Services	Property Services	$3,645,000	$3,926,000
Housing Services	Housing Services	$7,196,000	$3,126,000
Homes for the Aged	Huronview and Heartland	$1,612,000	$1,203,000
Homes for the Aged	Huronlea and Highland	$1,203,000	$746,000
EMS	Ambulances/Equipment	$3,239,000	$3,175,000
TOTAL		**$108,162,500**	**$132,372,000**
Average per year		$21,632,500	$26,474,400
Total 10 year average			$24,053,450

The needs over the next 10 years are rear loaded with greater replacement needs in years 6-10. This is driven by the needs of the roads infrastructure rehabilitation requirements.

The County of Huron staff used several different resources to build the 10 year asset plan for the consolidated financial portion of the asset management plan. The County staff worked together to build a consolidated plan, but the plan is still in the preliminary stages, so this is a starting point. The asset management plan committee aims to see the plan implemented into asset software to be able to fully benefit from the plan.

As asset conditions change throughout the asset life cycle, the plan can be updated, making financial analyses more uniformed for staff. Utilizing asset management software makes yearly updates more efficient and accurate for providing reports and modelling to Council, Ministry, and the Public. This remains outstanding and is one of the top priorities moving forward to address.

The next table looks at what our potential debt capacity could be given current limits as established by the Ministry of Municipal Affairs, currently at annual repayment limit of $12,687,067. It is important to note that the repayment of debt will also drive up our current levy. Based on current interest rates, a 1% increase in the levy would support approx. $6.0 - $7.6 million in debt, depending on the term.

TERM	Rate	25% Annual Repayment Limit	12.5% Annual Repayment Limit	6.25% Split between AMP/Other	Debt raised with 1% Levy Impact
5Y	2.79%	$59,235,476	$ 29,617,738	$14,808,869	$1,946,519
10Y	3.14%	$109,004,459	$ 54,502,230	$27,251,115	$3,581,964
15Y	3.31%	$150,273,033	$ 75,136,517	$37,568,258	$4,938,078
20Y	3.40%	$184,564,426	$ 92,282,213	$46,141,107	$6,064,918
25Y	3.55%	$210,943,433	$ 105,471,717	$52,735,858	$6,931,751
30Y	3.58%	$234,218,559	$ 117,109,280	$58,554,640	$7,696,588
Levy Impact (%)		30%	15%		

Currently the County does not carry any debt, however, it is an important consideration in moving forward to address the pending peak for the County's bridge and culvert program, and potentially a consolidated County administration building. Debt alone will not solve our pending asset management deficits, it will have to be an integral part of a four pronged approach – senior government funding, reserves, debt and County levy.

Significant challenges remain for the County in addressing our needs moving forward, however, staff require time and resources to truly assess what the needs are going to be 10-30 years down the road. This includes asset management software, ongoing building condition assessments, and also allocating a portion of the current gas tax funding to support our asset management needs.

FINANCING STRATEGY – 2020 - 2040

Staff have developed a financing strategy which will effectively address the upcoming infrastructure needs through to 2040. This strategy uses a combination of annual County levy increases for its capital, reserves

The table below looks at a potential scenario which can be used to address the County's asset needs in the long term. Leveraging reserves, County levy with annual levy increases, senior government funding, and debenture financing the County should be able to adequately fund the short and long term needs of the County.

Assumptions used in the Financing Strategy

- Extrapolated needs for Homes for the Aged, Housing and Property Services, and EMS based on 10 year averages.
- Does not included Public Works Fleet, as that is self-funding
- Does not include any inflationary pressures for future capital expenses, based on 2019 valuations.
- Consistent annual funding levels for OCIF and Gas Tax Funding
- Does not include any costs for a new Administration Facility
- Reserve usage is from the Public Works reserve and three Capital reserves
- Debentures – Serial, 20 year term for amortization, a 3.5% interest rate consistent for each year
- The capital requirements in 2029 and 2030 were partially deferred through to 2036.
- The capital requirements does not include any costs for the small culverts, once included into the plan, will increase the annual expenditure requirements.

The following table shows the estimated capital needs for a 21 year period – 2020 – 2040. Total capital needs are estimated at $437,969,000, with the peak needs in 2029-2030. For the purposed of the strategy, some costs from these peak periods have been deferred through to 2036 in order to effectively manage peak needs.

Year	Capital Needs	Deferrals (illustrative)	Revised Capital Needs
2020	$ 18,365,000		$ 18,365,000
2021	$ 17,974,000		$ 17,974,000
2022	$ 20,213,000		$ 20,213,000
2023	$ 20,355,000		$ 20,355,000
2024	$ 24,995,000		$ 24,995,000
2025	$ 15,771,000		$ 15,771,000
2026	$ 24,412,000		$ 24,412,000
2027	$ 19,834,000		$ 19,834,000
2028	$ 22,260,000		$ 22,260,000
2029	$ 45,814,000	$ (20,000,000)	$ 25,814,000
2030	$ 35,257,000	$ (10,000,000)	$ 25,257,000
2031	$ 22,989,000	$ 5,000,000	$ 27,989,000
2032	$ 19,535,000	$ 5,000,000	$ 24,535,000
2033	$ 20,569,000	$ 5,000,000	$ 25,569,000
2034	$ 21,810,000	$ 5,000,000	$ 26,810,000
2035	$ 13,707,000	$ 5,000,000	$ 18,707,000
2036	$ 11,730,000	$ 5,000,000	$ 16,730,000
2037	$ 13,086,000		$ 13,086,000
2038	$ 19,582,000		$ 19,582,000
2039	$ 12,036,000		$ 12,036,000
2040	$ 17,675,000		$ 17,675,000
TOTAL	**$ 437,969,000**		**$ 437,969,000**

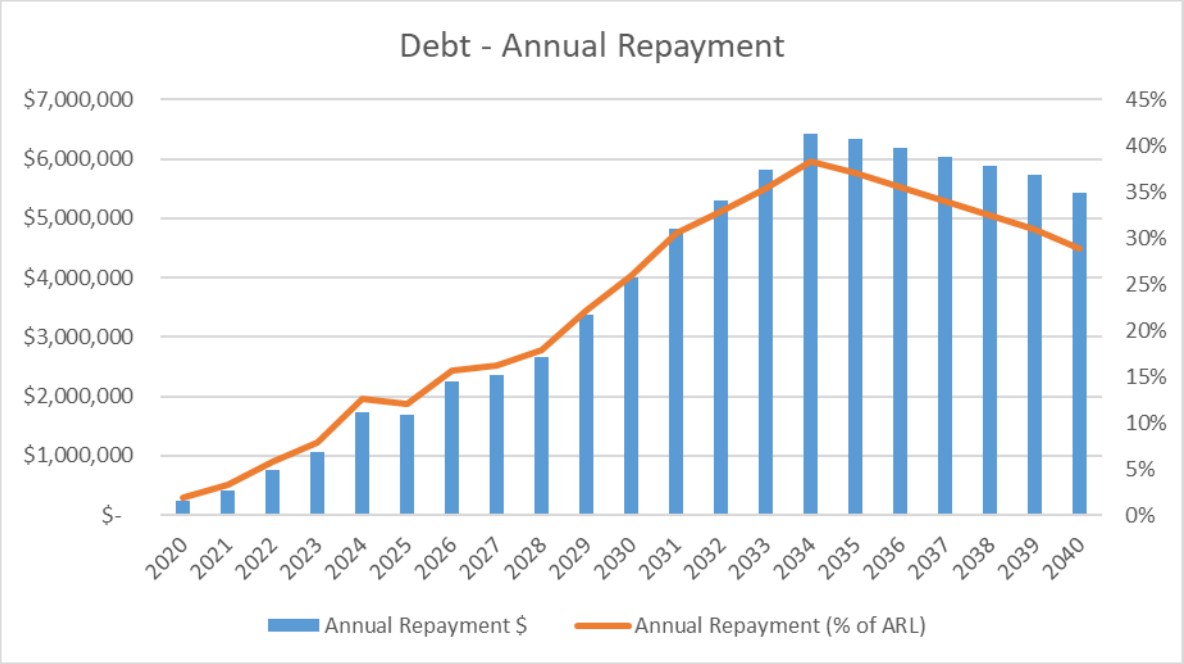
The following table illustrates one scenario developed by staff which addresses the future requirements using a combination of Levy, Senior Government Funding, Reserves and Debentures. The current funding in the County's budget is insufficient for the upcoming needs, therefore, staff have applied an annual 3% increase in annual capital funding through to 2033. This increases the capital budget from $9,257,000 (current) to $13,595,000 in annual funding from the County levy. Reserve usage of $16.9 million and $86.7 million in debentures are required to address the upcoming capital needs. Depending on what is approved in the 2020 budget for capital may impact the chart below and will have to be updated accordingly.

			Financing			
Year	**Adjusted Capital**		**Capital Funding (3% increase to 2033)**	**Senior Government**	**Reserves**	**Debentures**
2020	$ 18,365,000		$ 9,257,000	$ 4,218,000	$ 2,000,000	$ 2,890,000
2021	$ 17,974,000		$ 9,535,000	$ 4,299,000	$ 2,000,000	$ 2,140,000
2022	$ 20,213,000		$ 9,821,000	$ 4,299,000	$ 2,000,000	$ 4,093,000
2023	$ 20,355,000		$ 10,116,000	$ 4,381,000	$ 2,000,000	$ 3,858,000
2024	$ 24,995,000		$ 10,419,000	$ 4,381,000	$ 2,000,000	$ 8,195,000
2025	$ 15,771,000		$ 10,732,000	$ 4,381,000	$ 658,000	$ -
2026	$ 24,412,000		$ 11,054,000	$ 4,381,000	$ 2,000,000	$ 6,977,000
2027	$ 19,834,000		$ 11,386,000	$ 4,381,000	$ 2,000,000	$ 2,067,000
2028	$ 22,260,000		$ 11,728,000	$ 4,381,000	$ 2,000,000	$ 4,151,000
2029	$ 25,814,000		$ 12,080,000	$ 4,381,000	$ 230,000	$ 9,123,000
2030	$ 25,257,000		$ 12,442,000	$ 4,381,000		$ 8,434,000
2031	$ 27,989,000		$ 12,815,000	$ 4,381,000		$ 10,793,000
2032	$ 24,535,000		$ 13,199,000	$ 4,381,000		$ 6,955,000
2033	$ 25,569,000		$ 13,595,000	$ 4,381,000		$ 7,593,000
2034	$ 26,810,000		$ 13,595,000	$ 4,381,000		$ 8,834,000
2035	$ 18,707,000		$ 13,595,000	$ 4,381,000		$ 731,000
2036	$ 16,730,000		$ 13,595,000	$ 4,381,000	$ (1,246,000)	$ -
2037	$ 13,086,000		$ 13,595,000	$ 4,381,000	$ (4,890,000)	$ -
2038	$ 19,582,000		$ 13,595,000	$ 4,381,000	$ 1,606,000	$ -
2039	$ 12,036,000		$ 13,595,000	$ 4,381,000	$ (5,940,000)	$ -
2040	$ 17,675,000		$ 13,595,000	$ 4,381,000	$ (301,000)	$ -
TOTAL	**$ 437,969,000**		**$ 253,344,000**	**$ 91,674,000**	**$ 6,117,000**	**$ 86,834,000**

The following table illustrates the debenture financing, including, new annual debt, repayments, annual accumulated balance and interest. It also illustrates the annual repayment and the annual repayment in relation to the Annual Repayment Limit as established by the Ministry. The County is recommending a total Annual Repayment Limit of 50% of the established limit with 25% allocated to Asset Management Requirements and an additional 25% if required to respond to emergencies, peak period asset management pressures, and/or to meet senior government funding opportunities.

Debenture - 3.5% Serial 20 year							
Year	**Beginning**	**New**	**Repayment**	**Ending**	**Interest**	**Annual Repayment (AR)**	**AR Limit**
2020		$ 2,890,000	$ (144,500)	$ 2,745,500	$ 99,000	$ 243,500	2%
2021	$ 2,745,500	$ 2,140,000	$ (251,500)	$ 4,634,000	$ 167,000	$ 418,500	3%
2022	$ 4,634,000	$ 4,093,000	$ (456,150)	$ 8,270,850	$ 297,000	$ 753,150	6%
2023	$ 8,270,850	$ 3,858,000	$ (649,050)	$ 11,479,800	$ 413,000	$ 1,062,050	8%
2024	$ 11,479,800	$ 8,195,000	$ (1,058,800)	$ 18,616,000	$ 670,000	$ 1,728,800	13%
2025	$ 18,616,000	$ -	$ (1,058,800)	$ 17,557,200	$ 633,000	$ 1,691,800	12%
2026	$ 17,557,200	$ 6,977,000	$ (1,407,650)	$ 23,126,550	$ 834,000	$ 2,241,650	16%
2027	$ 23,126,550	$ 2,067,000	$ (1,511,000)	$ 23,682,550	$ 855,000	$ 2,366,000	16%
2028	$ 23,682,550	$ 4,151,000	$ (1,718,550)	$ 26,115,000	$ 944,000	$ 2,662,550	18%
2029	$ 26,115,000	$ 9,123,000	$ (2,174,700)	$ 33,063,300	$ 1,195,000	$ 3,369,700	22%
2030	$ 33,063,300	$ 8,434,000	$ (2,596,400)	$ 38,900,900	$ 1,407,000	$ 4,003,400	26%
2031	$ 38,900,900	$ 10,793,000	$ (3,136,050)	$ 46,557,850	$ 1,684,000	$ 4,820,050	31%
2032	$ 46,557,850	$ 6,955,000	$ (3,483,800)	$ 50,029,050	$ 1,812,000	$ 5,295,800	33%
2033	$ 50,029,050	$ 7,593,000	$ (3,863,450)	$ 53,758,600	$ 1,949,000	$ 5,812,450	35%
2034	$ 53,758,600	$ 8,834,000	$ (4,305,150)	$ 58,287,450	$ 2,115,000	$ 6,420,150	38%
2035	$ 58,287,450	$ 731,000	$ (4,341,700)	$ 54,676,750	$ 1,990,000	$ 6,331,700	37%
2036	$ 54,676,750	$ -	$ (4,341,700)	$ 50,335,050	$ 1,838,000	$ 6,179,700	35%
2037	$ 50,335,050	$ -	$ (4,341,700)	$ 45,993,350	$ 1,686,000	$ 6,027,700	34%
2038	$ 45,993,350	$ -	$ (4,341,700)	$ 41,651,650	$ 1,534,000	$ 5,875,700	32%
2039	$ 41,651,650	$ -	$ (4,341,700)	$ 37,309,950	$ 1,382,000	$ 5,723,700	31%
2040	$ 37,309,950	$ -	$ (4,197,200)	$ 33,112,750	$ 1,232,000	$ 5,429,200	29%

Based on the scenario above, the County will maintain its annual repayment limit within the established goal of 50%, with the peak debt in 2034 at 38% of our annual repayment limit. As no new debt is estimated after 2034, the annual repayment limit will decrease each year after that. This will still allow the County to maintain some flexibility for additional debt for emergencies or other requirements. The chart below illustrates the annual repayment in both dollars and %.



The County currently has approximately $16.9 million in its Public Work's reserve and three capital reserves. These funds will be required to be leveraged over the next 9 years in order to assist in addressing our asset management funding pressures to allow the capital levy funding to increase to required levels. After the peak period through 2034, there will be some years where the capital needs are estimated to be low. During these periods, there will be an opportunity to re-establish some of those reserves.

County Capital Reserve Usage			
Year	**Beginning**	**Usage**	**Ending**
2020	$16,889,724	$(2,000,000)	$14,889,724
2021	$14,889,724	$(2,000,000)	$12,889,724
2022	$12,889,724	$(2,000,000)	$10,889,724
2023	$10,889,724	$(2,000,000)	$ 8,889,724
2024	$ 8,889,724	$(2,000,000)	$ 6,889,724
2025	$ 6,889,724	$ (658,000)	$ 6,231,724
2026	$ 6,231,724	$(2,000,000)	$ 4,231,724
2027	$ 4,231,724	$(2,000,000)	$ 2,231,724
2028	$ 2,231,724	$(2,000,000)	$ 231,724
2029	$ 231,724	$ (230,000)	$ 1,724
2030	$ 1,724	$ -	$ 1,724
2031	$ 1,724	$ -	$ 1,724
2032	$ 1,724	$ -	$ 1,724
2033	$ 1,724	$ -	$ 1,724
2034	$ 1,724	$ -	$ 1,724
2035	$ 1,724	$ -	$ 1,724
2036	$ 1,724	$ 1,246,000	$ 1,247,724
2037	$ 1,247,724	$ 4,890,000	$ 6,137,724
2038	$ 6,137,724	$(1,606,000)	$ 4,531,724
2039	$ 4,531,724	$ 5,940,000	$10,471,724
2040	$10,471,724	$ 301,000	$10,772,724

There will some impacts to the County levy as a result of increased capital funding being raised through the annual budget process, as well funding for the annual repayment (principal and interest). The annual levy is required to be increased by approximately 1.57% annually through to 2033 in order to finance the required asset management expenditures. Given that the plan does not include small culverts, it would be expected that this requirement would be increased upwards to approximately 2% annually. These estimates will be updated as our asset management plan evolves.

All other operating budget increases or funding cuts excluded, it is estimated that the County levy will be required to increase to $52 million by the mid 2030's in order to finance our infrastructure.

County Levy Impact					
Year	**Annual Capital Funding Increase**	**Annual Repayment Increase**	**County Levy Increase**	**County Levy**	**Annual Levy % Increase**
2020	$ -	$ 243,500	$ 243,500	$41,934,156	0.58%
2021	$ 278,000	$ 175,000	$ 453,000	$42,387,156	1.08%
2022	$ 286,000	$ 334,650	$ 620,650	$43,007,806	1.46%
2023	$ 295,000	$ 308,900	$ 603,900	$43,611,706	1.40%
2024	$ 303,000	$ 666,750	$ 969,750	$44,581,456	2.22%
2025	$ 313,000	$ (37,000)	$ 276,000	$44,857,456	0.62%
2026	$ 322,000	$ 549,850	$ 871,850	$45,729,306	1.94%
2027	$ 332,000	$ 124,350	$ 456,350	$46,185,656	1.00%
2028	$ 342,000	$ 296,550	$ 638,550	$46,824,206	1.38%
2029	$ 352,000	$ 707,150	$ 1,059,150	$47,883,356	2.26%
2030	$ 362,000	$ 633,700	$ 995,700	$48,879,056	2.08%
2031	$ 373,000	$ 816,650	$ 1,189,650	$50,068,706	2.43%
2032	$ 384,000	$ 475,750	$ 859,750	$50,928,456	1.72%
2033	$ 396,000	$ 516,650	$ 912,650	$51,841,106	1.79%
2034	$ -	$ 607,700	$ 607,700	$52,448,806	1.17%
2035	$ -	$ (88,450)	$ (88,450)	$52,360,356	-0.17%
2036	$ -	$ (152,000)	$ (152,000)	$52,208,356	-0.29%
2037	$ -	$ (152,000)	$ (152,000)	$52,056,356	-0.29%
2038	$ -	$ (152,000)	$ (152,000)	$51,904,356	-0.29%
2039	$ -	$ (152,000)	$ (152,000)	$51,752,356	-0.29%
2040	$ -	$ (294,500)	$ (294,500)	$51,457,856	-0.57%
Average increase to 2033					1.57%

APPENDIX A – Public Works Expenditures (2021 – 2029)

APPENDIX B – Public Works Pavement Management Strategy

APPENDIX A

Summary of Assets

2020 Bridge	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$810,000
RB0010:County Rd 8 (Base Line) - 08-06.3 (Summerhill Bridge)	1959	62	$2,914,000	**ENGdesign** Engineering Design Work	$90,000	100%	**$90,000**
RB0011:County Rd 15 (Londesborough Road) - 15-06.9 (Westerhout Bridge)	1960	65	$735,000	**ENGdesign** Engineering Design Work	$15,000	100%	**$15,000**
RB0030:County Rd 15 (Londesborough Road) - 15-14.6 (Wallace Bridge)	1956	58	$1,135,000	**ENGdesign** Engineering Design Work	$15,000	100%	**$15,000**
RB0032:County Rd 1 (Lucknow Line) - 01-24.9 (Cookes Bridge)	1966	71	$746,000	**ENGdesign** Engineering Design Work	$5,000	100%	**$5,000**
				PWP Patch, Waterproof, Pave	$155,000	100%	**$155,000**
RB0050:County Rd 19(Ethel Line/Brandon Rd/Molesworth) - 19-18.3 (Browns Bridge)	1956	71	$924,000	**PWP** Patch, Waterproof, Pave	$165,000	100%	**$165,000**
				IAG Upgrade guiderail	$30,000	100%	**$30,000**
				RRH Replace Barriers	$175,000	100%	**$175,000**
RB0073:County Rd 87 (Harriston Road) - 87-07.4 (Wroxeter Bridge)	1953	64	$2,894,000	**OTH** Approach works to address drainage issues	$160,000	100%	**$160,000**

2020 Culvert_Large	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$1,040,000
RB0150:County Rd 17 (Winthrop Road) - 17-06.1	1955	35	$350,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0163:County Rd 8 (Base Line/Maitland Terrace) - 08-14.0	1970	45	$225,000	**cENGdesign** Engineering Design Work	$35,000	100%	**$35,000**
RB0280:County Rd 4 (London Road) - 04-29.4	1940	42	$350,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0281:County Rd 4 (London Road) - 04-29.7	1930	38	$350,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0288:County Rd 4 (London Road) - 04-36.0	1940	53	$360,000	**cRSL** Replace Culvert - Same Location	$400,000	100%	**$400,000**
RB0289:County Rd 4 (London Road) - 04-36.2	1940	69	$478,000	**cRSL** Replace Culvert - Same Location	$425,000	100%	**$425,000**
RB0400:County Rd 81 (Grand Bend Line) - 81-07.7	1955	51	$732,000	**cRSB** Rehabilitate Substructure	$0	100%	**$0**
RB0409:County Rd 86 (Amberley Road) - 86-15.4	1940	26	$225,000	**cENGdesign** Engineering Design Work	$60,000	50%	**$30,000**

2020 Road	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$10,523,793
RD0303-00:County Rd 3 (Mill Road) - (to) 330m East of CountyRoad 31 (E. Limit Varna)-to-0.5km W. of Bannockburn Bridge	2000	72	$1,200,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0304-00:County Rd 3 (Mill Road) - (to) 0.5km W. of Bannockburn Bridge-to-E. End of Bannockburn Bridge	2000	70	$550,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0305-00:County Rd 3 (Mill Road) - (to) E. End of Bannockburn Bridge-to-205m West of Taylor Line (W. Limit Brucefield)	2000	70	$2,450,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0308-00:County Rd 3 (Mill Road) - (to) 370m East of Highway 4 (E. Limit Brucefield)-to-142m West of CountyRoad 12 (W. Limit Egmondville)	2001	72	$2,624,000	**ENG** Engineering Work	$15,000	100%	**$15,000**
RD0401-00:County Rd 4 (Albert Street) - (to) Highway 8-to-CountyRoad 8 (Base Line)	2001	68	$2,616,000	**ENG** Engineering Work	$310,000	100%	**$310,000**

RD0504-00:County Rd 5 (Mt. Carmel Drive) - (to) Airport Line-to-Highway 4	1989	74	$1,500,000	**DMS** Double Micro Surfacing	$114,159	100%	**$114,159**
RD1203-01:County Rd 12 (Kippen Road) - (to) Lloyd Eisler Street-to-Highway 8	1999	100	$4,066,346	**U-REC** Urban Reconstruction	$4,066,346	100%	**$4,066,346**
RD1701-01:County Rd 17 (Winthrop Road) - (to) CountyRoad 15 (Londesborough Road)-to-CountyRoad 12 (North Line)	1999	77	$2,392,000	**HIR** Hot-In-Place Recycling	$750,000	100%	**$750,000**
RD1701-02:County Rd 17 (Winthrop Road) - (to) CountyRoad 12 (North Line)-to-CountyRoad 14 (Perth Boundary)	1999	74	$4,132,000	**HIR** Hot-In-Place Recycling	$1,250,000	100%	**$1,250,000**
RD2101-00:County Rd 21 (Airport Line) - (to) Huron Park Rd-to-CountyRoad 10 (Crediton Road)	1998	72	$696,000	**DMS** Double Micro Surfacing	$50,000	100%	**$50,000**
RD3101-00:County Rd 31 (Parr Line) - (to) CountyRoad 84 (Zurich-Hensall Road)-to-Kippen Road	2000	75	$1,636,000	**DMS** Double Micro Surfacing	$203,467	100%	**$203,467**
RD8601-00:County Rd 86 (Amberley Road) - (to) Highway 21-to-310m West of Ross St. (W. Limit Lucknow)	1995	69	$3,668,000	**SprPat** Spray Patching	$145,000	50%	**$72,500**
RD8701-01:County Rd 87 (Harriston Road) - (to) CountyRoad 86 (Amberley Road)-to-CountyRoad 12 (S) (Brussels Line)	1999	62	$5,900,000	**FDR** Full Depth Recycling & Pave	$2,350,000	100%	**$2,350,000**
RD8701-02:County Rd 87 (Harriston Road) - (to) CountyRoad 12 (S) (Brussels Line)-to-CountyRoad 12 (N)(Belmore Line)	1999	62	$350,000	**FDR** Full Depth Recycling & Pave	$145,000	100%	**$145,000**
RD8701-03:County Rd 87 (Harriston Road) - (to) CountyRoad 12 (N)(Belmore Line)-to-CountyRoad 28 (S)(Gorrie Line)	1999	62	$2,800,000	**FDR** Full Depth Recycling & Pave	$1,152,320	100%	**$1,152,320**

2021 **Bridge**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$5,662,500
RB0008:County Rd 3 (Mill Road) - 03-10.4 (Bannockburn Bridge)	1962	61	$2,628,000	**ENGdesign** Engineering Design Work	$90,000	100%	**$90,000**
				DCS Deck Condition Survey	$20,000	100%	**$20,000**
RB0010:County Rd 8 (Base Line) - 08-06.3 (Summerhill Bridge)	1959	62	$2,914,000	**CSS** Coating Structural Steel	$450,000	100%	**$450,000**
				RSB Rehabilitate Substructure	$60,000	100%	**$60,000**
				RSP Patch soffit	$60,000	100%	**$60,000**
RB0011:County Rd 15 (Londesborough Road) - 15-06.9 (Westerhout Bridge)	1960	65	$735,000	**RRH** Barrier/Parapet Replacement	$175,000	100%	**$175,000**
				PWP Patch, Waterproof, Pave	$150,000	100%	**$150,000**
RB0027:County Rd 83 (Dashwood Road) - 83-19.2 (Ausable River Bridge 1)	1948	50	$2,400,000	**RSL** Replace Bridge - Same Location	$2,400,000	100%	**$2,400,000**
RB0030:County Rd 15 (Londesborough Road) - 15-14.6 (Wallace Bridge)	1956	58	$1,135,000	**RRH** Barrier/Parapet Replacement	$175,000	100%	**$175,000**
				PWP Patch, Waterproof, Pave	$150,000	100%	**$150,000**
RB0052:County Rd 13 (Bayfield Road) - 13-09.7 (Tricks Creek Bridge)	1964	70	$681,000	**ENGdesign** Engineering Design Work	$25,000	100%	**$25,000**
RB0060:County Rd 22 (Donnybrook Line) - 22-06.4 (Donnybrook Bridge)	1965	72	$3,611,000	**ENGdesign** Engineering Design Work	$75,000	100%	**$75,000**
RB0067:County Rd 83 (Dashwood Road) - 83-14.7 (Black Creek Bridge)	1948	55	$1,600,000	**RSL** Replace Bridge - Same Location	$1,600,000	100%	**$1,600,000**
RB0069:County Rd 86 (Amberley Road) - 86-32.8 (Zetland Bridge)	1965	72	$3,871,000	**DCS** Deck Condition Survey	$30,000	100%	**$30,000**
				ENGdesign Engineering Design Work	$120,000	100%	**$120,000**
RB0073:County Rd 87 (Harriston Road) - 87-07.4 (Wroxeter Bridge)	1953	64	$2,894,000	**ENGdesign** Engineering Design Work	$20,000	100%	**$20,000**
RB0090:Line 183 - Boundary Bridge #23	1961	44	$325,000	**ENGdesign** Engineering Design Work	$125,000	50%	**$62,500**

2021 **Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$1,875,000

							$1,875,000
RB0150:County Rd 17 (Winthrop Road) - 17-06.1	1955	35	$350,000	**cRSL** Replace Culvert - Same Location	$350,000	100%	**$350,000**
RB0163:County Rd 8 (Base Line/Maitland Terrace) - 08-14.0	1970	45	$225,000	**cRSL** Replace Culvert - Same Location	$275,000	100%	**$275,000**
RB0186:County Rd 86 (Amberley Road) - 86-02.4	1930	45	$450,000	**cENGdesign** Engineering Design Work	$100,000	50%	**$50,000**
RB0280:County Rd 4 (London Road) - 04-29.4	1940	42	$350,000	**cRSL** Replace Culvert - Same Location	$400,000	100%	**$400,000**
RB0281:County Rd 4 (London Road) - 04-29.7	1930	38	$350,000	**cRSL** Replace Culvert - Same Location	$550,000	100%	**$550,000**
RB0409:County Rd 86 (Amberley Road) - 86-15.4	1940	26	$225,000	**cRSL** Replace Culvert - Same Location	$500,000	50%	**$250,000**

2021 **Road**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$7,639,950
RD0203-02:County Rd 2 (Goshen Street South) - (to) 120m South of South St. (S. Limit Zurich)-to-CountyRoad 84 (Zurich-Hensall Road)	1981	62	$1,008,000	**ENG** Engineering Work	$0	100%	**$0**
RD0303-00:County Rd 3 (Mill Road) - (to) 330m East of CountyRoad 31 (E. Limit Varna)-to-0.5km W. of Bannockburn Bridge	2000	72	$1,200,000	**CIR** Cold-InPlace-Recycling and Pave	$288,000	100%	**$288,000**
RD0304-00:County Rd 3 (Mill Road) - (to) 0.5km W. of Bannockburn Bridge-to-E. End of Bannockburn Bridge	2000	70	$550,000	**CIR** Cold-InPlace-Recycling and Pave	$97,200	100%	**$97,200**
RD0305-00:County Rd 3 (Mill Road) - (to) E. End of Bannockburn Bridge-to-205m West of Taylor Line (W. Limit Brucefield)	2000	70	$2,450,000	**CIR** Cold-InPlace-Recycling and Pave	$624,600	100%	**$624,600**
RD0308-00:County Rd 3 (Mill Road) - (to) 370m East of Highway 4 (E. Limit Brucefield)-to-142m West of CountyRoad 12 (W. Limit Egmondville)	2001	72	$2,624,000	**CIR** Cold-InPlace-Recycling and Pave	$1,526,400	100%	**$1,526,400**
RD0401-00:County Rd 4 (Albert Street) - (to) Highway 8-to-CountyRoad 8 (Base Line)	2001	68	$2,616,000	**U-REC** Urban Reconstruction	$1,800,000	100%	**$1,800,000**
RD8403-01:County Rd 84 (Zurich-Hensall Road) - (to) 150m East of East St. (E. Limit Zurich)-to-CountyRoad 31 (Parr Line)	2000	67	$2,750,000	**FDR** Full Depth Recycling & Pave	$1,350,000	100%	**$1,350,000**
RD8403-02:County Rd 84 (Zurich-Hensall Road) - (to) CountyRoad 31 (Parr Line)-to-190m West of Elizabeth St. (W. Limit Hensall)	2000	74	$4,000,000	**FDR** Full Depth Recycling & Pave	$1,916,250	100%	**$1,916,250**
RD8602-01:County Rd 86 (Amberley Road) - (to) 125m East of Walter St. (E. Limit Lucknow)-to-CountyRoad 22 (Donnybrook Line)	1995	67	$1,650,000	**SprPat** Spray Patching	$45,000	50%	**$22,500**
RD8602-02:County Rd 86 (Amberley Road) - (to) CountyRoad 22 (Donnybrook Line)-to-Beecroft Line	1995	46	$370,000	**SprPat** Spray Patching	$10,000	50%	**$5,000**
RD8602-03:County Rd 86 (Amberley Road) - (to) Beecroft Line-to-Norman Line	1995	45	$740,000	**SprPat** Spray Patching	$10,000	100%	**$10,000**

2022 **Bridge**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$5,355,000
RB0008:County Rd 3 (Mill Road) - 03-10.4 (Bannockburn Bridge)	1962	61	$2,628,000	**CDR** Complete Deck Replacement or Superstructure Replacement	$1,300,000	100%	**$1,300,000**
RB0014:County Rd 10 (Crediton Road) - 10-16.2 (Crediton Bridge)	1955	61	$2,786,000	**DCS** Deck Condition Survey	$25,000	100%	**$25,000**
RB0043:County Rd 16 (Newry Road) - 16-20.0 (Cunningham Bridge)	1993	74	$3,742,000	**ENGdesign** Engineering Design Work	$15,000	100%	**$15,000**

RB0046:County Rd 12 (Brussels Line/Turnberry Street) - 12-38.1 (Brussels Bridge)	1956	70	$2,550,000	**IAG** Install Approach Guiderail	$25,000	100%	**$25,000**
RB0052:County Rd 13 (Bayfield Road) - 13-09.7 (Tricks Creek Bridge)	1964	70	$681,000	**RRH** Barrier/Parapet Replacement	$175,000	100%	**$175,000**
				PWP Patch, Waterproof, Pave	$100,000	100%	**$100,000**
RB0060:County Rd 22 (Donnybrook Line) - 22-06.4 (Donnybrook Bridge)	1965	72	$3,611,000	**TJR** Transverse Exp Joint Replacement	$75,000	100%	**$75,000**
				RSP Rehabilitate Superstructure	$50,000	100%	**$50,000**
				RRH Barrier/Parapet Replacement	$225,000	100%	**$225,000**
				RSB Rehabilitate Substructure	$100,000	100%	**$100,000**
				PWP Patch, Waterproof, Pave	$250,000	100%	**$250,000**
RB0062:County Rd 25 (Blyth Road) - 25-12.6 (Patterson/Auburn Bridge)	1954	56	$4,579,000	**DCS** Deck Condition Survey	$35,000	100%	**$35,000**
RB0065:County Rd 31 (Sharpes Creek Line) - 31-26.6 (Foresters Bridge)	1984	70	$5,773,000	**ENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0069:County Rd 86 (Amberley Road) - 86-32.8 (Zetland Bridge)	1965	72	$3,871,000	**CDR** Complete Deck Replacement or Superstructure Replacement	$2,800,000	100%	**$2,800,000**
RB0073:County Rd 87 (Harriston Road) - 87-07.4 (Wroxeter Bridge)	1953	64	$2,894,000	**RSB** Rehabilitate Substructure	$60,000	100%	**$60,000**
				RSP Rehabilitate Superstructure	$60,000	100%	**$60,000**
RB0097:County Rd 7 (Howick-Turnberry Road) - 07-13.0 (Danes Bridge)	1965	72	$637,000	**ENGdesign** Engineering Design Work	$10,000	100%	**$10,000**

2022 **Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$607,500
RB0186:County Rd 86 (Amberley Road) - 86-02.4	1930	45	$450,000	**cRCB** Replace Culvert with Bridge	$1,000,000	50%	**$500,000**
RB0293:County Rd 6 (Kirkton Road) - 06-14.1	1950	55	$466,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**
				cIAG Install Approach Guiderails	$50,000	100%	**$50,000**
RB0360:County Rd 86 (Amberley Road) - 86-20.1	1960	67	$181,500	**cENGdesign** Engineering Design Work	$15,000	50%	**$7,500**
RB0443:County Rd 87 (Harriston Road) - 87-12.0		51	$450,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**

2022 **Road**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$8,848,875
RD0402-00:County Rd 4 (London Road) - (to) CountyRoad 8 (Base Line)-to-216m S of CountyRoad 15 (S. Limit Londesborough)	1984	73	$7,000,000	**FDR** Full Depth Recycling & Pave	$3,363,750	100%	**$3,363,750**
RD8402-00:County Rd 84 (Zurich Main Street) - (to) 162m West of Walnut St. (W. Limit Zurich)-to-150m East of East St. (E. Limit Zurich)	2000	49	$3,216,000	**ENG** Engineering Work	$0	100%	**$0**
RD8404-00:County Rd 84 (King Street) - (to) 190m West of Elizabeth St. (W. Limit Hensall)-to-Highway 4	2000	69	$2,640,000	**ENG** Engineering Work	$0	100%	**$0**
RD8601-00:County Rd 86 (Amberley Road) - (to) Highway 21-to-310m West of Ross St. (W. Limit Lucknow)	1995	69	$3,668,000	**FDR** Full Depth Recycling & Pave	$6,877,500	50%	**$3,438,750**
RD8602-01:County Rd 86 (Amberley Road) - (to) 125m East of Walter St. (E. Limit Lucknow)-to-CountyRoad 22 (Donnybrook Line)	1995	67	$1,650,000	**FDR** Full Depth Recycling & Pave	$3,093,750	50%	**$1,546,875**
RD8602-02:County Rd 86 (Amberley Road) - (to) CountyRoad 22 (Donnybrook Line)-to-Beecroft Line	1995	46	$370,000	**CIR** Cold-InPlace-Recycling and Pave	$333,000	50%	**$166,500**
RD8602-03:County Rd 86 (Amberley Road) - (to) Beecroft Line-to-Norman Line	1995	45	$740,000	**CIR** Cold-InPlace-Recycling and Pave	$333,000	100%	**$333,000**

2023 **Bridge**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$1,505,000
RB0040:County Rd 7 (Howick-Turnberry Road) - 07-00.9 (Lower Maitland)	1963	71	$2,559,000	**ENGdesign** Engineering Design Work	$40,000	100%	**$40,000**
RB0041:County Rd 7 (Howick-Turnberry Road) - 07-04.8 (Fitchs Bridge)	1957	70	$3,509,000	**ENGdesign** Engineering Design Work	$35,000	100%	**$35,000**
RB0043:County Rd 16 (Newry Road) - 16-20.0 (Cunningham Bridge)	1993	74	$3,742,000	**PWP** Patch, Waterproof, Pave	$100,000	100%	**$100,000**
				TJR Transverse Exp Joint Replacement	$80,000	100%	**$80,000**
RB0062:County Rd 25 (Blyth Road) - 25-12.6 (Patterson/Auburn Bridge)	1954	56	$4,579,000	**ENGdesign** Engineering Design Work	$150,000	100%	**$150,000**
RB0065:County Rd 31 (Sharpes Creek Line) - 31-26.6 (Foresters Bridge)	1984	70	$5,773,000	**RRH** Barrier/Parapet Replacement	$250,000	100%	**$250,000**
				WAP Waterproof and Pave	$200,000	100%	**$200,000**
				TJR Transverse Exp Joint Replacement	$100,000	100%	**$100,000**

RB0083:Bannockburn Line - Boundary Bridge #14	1973	74	$1,686,000	**ENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0090:Line 183 - Boundary Bridge #23	1961	44	$325,000	**RSL** Replace Bridge - Same Location	$650,000	50%	**$325,000**
RB0097:County Rd 7 (Howick-Turnberry Road) - 07-13.0 (Danes Bridge)	1965	72	$637,000	**RRH** Barrier/Parapet Replacement	$175,000	100%	**$175,000**

2023	**Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$542,500
RB0261:County Rd 15 (Kinburn Line) - 15-22.1		1975	37	$488,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0360:County Rd 86 (Amberley Road) - 86-20.1		1960	67	$181,500	**cRRW** Rehabilitate/Replace Retaining Walls/Wingwalls	$85,000	50%	**$42,500**
RB0443:County Rd 87 (Harriston Road) - 87-12.0			51	$450,000	**cRSL** Replace Culvert - Same Location	$450,000	100%	**$450,000**

2023	**Road**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$8,612,260
RD0203-02:County Rd 2 (Goshen Street South) - (to) 120m South of South St. (S. Limit Zurich)-to-CountyRoad 84 (Zurich-Hensall Road)		1981	62	$1,008,000	**U-REC** Urban Reconstruction	$1,008,000	100%	**$1,008,000**
RD0403-00:County Rd 4 (Londesboro Main Street) - (to) 216m S of CountyRoad 15 (S. Limit Londesborough)-to-37m Nof Anthonys Line (N. Limit Londesborough)		1984	70	$2,160,000	**HIR** Hot-In-Place Recycling	$0	100%	**$0**
RD1503-00:County Rd 15 (Kings Road) - (to) 167m West of CountyRoad 4 (W. Limit Londesborough)-to-CountyRoad 4 (London Road)		1992	40	$260,000	**HIR** Hot-In-Place Recycling	$17,231	100%	**$17,231**
RD1504-00:County Rd 15 (Kings Road) - (to) CountyRoad 4 (London Road)-to-640m E of Cty Rd 4		2002	66	$1,536,000	**HIR** Hot-In-Place Recycling	$66,035	100%	**$66,035**
RD8301-00:County Rd 83 (Dashwood Road) - (to) Highway 21-to-174m West of Elma St. (W. Limit Dashwood)		1998	86	$5,750,000	**HIR** Hot-In-Place Recycling	$847,308	100%	**$847,308**
RD8303-01:County Rd 83 (Dashwood Road) - (to) 180m East of Lane St. (E. Limit Dashwood)-to-CountyRoad 2 (Goshen Line)			80	$980,000	**HIR** Hot-In-Place Recycling	$143,374	100%	**$143,374**
RD8303-02:County Rd 83 (Dashwood Road) - (to) CountyRoad 2 (Goshen Line)-to-462m West of Francis St. (W. Limit Exeter)			80	$5,820,000	**HIR** Hot-In-Place Recycling	$1,005,774	100%	**$1,005,774**
RD8304-00:County Rd 83 (Thames Road West) - (to) 462m West of Francis St. (W. Limit Exeter)-to-Highway 4		199	64	$2,472,000	**HIR** Hot-In-Place Recycling	$76,538	100%	**$76,538**
RD8402-00:County Rd 84 (Zurich Main Street) - (to) 162m West of Walnut St. (W. Limit Zurich)-to-150m East of East St. (E. Limit Zurich)		2000	49	$3,216,000	**U-REC** Urban Reconstruction	$2,808,000	100%	**$2,808,000**
RD8404-00:County Rd 84 (King Street) - (to) 190m West of Elizabeth St. (W. Limit Hensall)-to-Highway 4		2000	69	$2,640,000	**U-REC** Urban Reconstruction	$2,640,000	100%	**$2,640,000**

2024	**Bridge**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$1,400,000
RB0005:County Rd 4 (London Road) - 04-08.4 (Londesborough Bridge)		1933	45	$4,500,000	**DCS** Deck Condition Survey	$40,000	100%	**$40,000**
RB0008:County Rd 3 (Mill Road) - 03-10.4 (Bannockburn Bridge)		1962	61	$2,628,000	**RRH** Replace barriers	$225,000	100%	**$225,000**
					PWP Patch, waterproof, and pave	$200,000	100%	**$200,000**
RB0012:County Rd 8 (Base Line) - 08-09.2 (Sheppards Bridge)		1950	64	$667,000	**CDS** Concrete Deck Soffit Repairs	$100,000	100%	**$100,000**
RB0040:County Rd 7 (Howick-Turnberry Road) - 07-00.9 (Lower Maitland)		1963	71	$2,559,000	**RRH** Barrier/Parapet Replacement	$225,000	100%	**$225,000**
					PWP Patch, Waterproof, Pave	$200,000	100%	**$200,000**
RB0041:County Rd 7 (Howick-Turnberry Road) - 07-04.8 (Fitchs Bridge)		1957	70	$3,509,000	**RSB** Rehabilitate Substructure	$50,000	100%	**$50,000**
					RSP Rehabilitate Superstructure	$100,000	100%	**$100,000**
RB0042:County Rd 16 (Morris Road) - 16-06.3 (Hoggs Bridge)		1957	72	$2,250,000	**ENGdesign** Engineering Design Work	$30,000	100%	**$30,000**
RB0053:County Rd 16 (Morris Road) - 16-02.8 (Cleggs Bridge)		1961	71	$3,056,000	**ENGdesign** Engineering Design Work	$25,000	100%	**$25,000**
RB0083:Bannockburn Line - Boundary Bridge #14		1973	74	$1,686,000	**RSP** Rehabilitate Superstructure	$130,000	100%	**$130,000**
					TJS Transverse Exp Joint Seal Replacement	$75,000	100%	**$75,000**

2024	**Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$400,000
RB0225:County Rd 7 (Howick-Turnberry Road) - 07-18.4		1960	69	$566,000	**cRSB** Rehabilitate Substructure	$0	100%	**$0**
RB0261:County Rd 15 (Kinburn Line) - 15-22.1		1975	37	$488,000	**cRSL** Replace Culvert - Same Location	$400,000	100%	**$400,000**

Location

2024 Road	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$16,824,375
RD0302-00:County Rd 3 (Mill Road) - (to) 155m west of CountyRoad 31 (W. Limit Varna)-to-330m East of CountyRoad 31 (E. Limit Varna)	1988	78	$1,200,000	**U-REC** Urban Reconstruction	$1,200,000	100%	**$1,200,000**
RD0306-00:County Rd 3 (Mill Road West) - (to) 205m West of Taylor Line (W. Limit Brucefield)-to-Highway 4	2000	66	$1,536,000	**U-REC** Urban Reconstruction	$1,260,000	100%	**$1,260,000**
RD0404-00:County Rd 4 (London Road) - (to) 37m N of Anthonys Line (N. Limit Londesborough)-to-CountyRoad 25 (Blyth Road)	1984	63	$3,860,000	**FDR** Full Depth Recycling & Pave	$1,867,500	100%	**$1,867,500**
RD2801-00:County Rd 28 (Gorrie Road) - (to) CountyRoad 34 (PerthRoad 178)-to-192m South of James St. (S. Limit Gorrie)	1985	74	$5,670,000	**FDR** Full Depth Recycling & Pave	$2,655,000	100%	**$2,655,000**
RD2802-00:County Rd 28 (Victoria Street) - (to) 192m South of James St. (S. Limit Gorrie)-to-CountyRoad 87 (Harrison Road)	2005	78	$2,448,000	**U-REC** Urban Reconstruction	$2,100,000	100%	**$2,100,000**
RD3004-00:County Rd 30 (Fordwich Line) - (to) CountyRoad 87 (Harrison Road)-to-CountyRoad 7 (Howick-Turnberry Road)	1984	60	$4,500,000	**FDR** Full Depth Recycling & Pave	$2,298,750	100%	**$2,298,750**
RD3005-00:County Rd 30 (Fordwich Line) - (to) CountyRoad 7 (Howick-Turnberry Road)-to-Howick-Minto Line (Wellington Boundary)	1988	60	$5,900,000	**FDR** Full Depth Recycling & Pave	$2,775,000	100%	**$2,775,000**
RD8606-01:County Rd 86 (Amberley Road) - (to) 0.3 km W. of CR 12-to-CountyRoad 34 (PerthRoad 178)	1999	70	$6,150,000	**FDR** Full Depth Recycling & Pave	$1,582,500	100%	**$1,582,500**
RD8606-02:County Rd 86 (Amberley Road) - (to) CountyRoad 34 (PerthRoad 178)-to-CountyRoad 19 (Molesworth Line)	1999	70	$1,500,000	**FDR** Full Depth Recycling & Pave	$382,500	100%	**$382,500**
RD8606-03:County Rd 86 (Amberley Road) - (to) CountyRoad 19 (Molesworth Line)-to-123m West of Road 175 (Perth Boundary)	1999	70	$2,900,000	**FDR** Full Depth Recycling & Pave	$703,125	100%	**$703,125**

2025 Bridge	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$4,360,000
RB0001:County Rd 83 (Thames Road) - 83-25.0 (Ausable River East Bridge)	1948	59	$1,259,000	**ENGdesign** Engineering Design Work	$100,000	100%	**$100,000**
RB0006:County Rd 4 (Queen Street) - 04-15.6 (Blyth Brook Bridge)	1994	74	$653,000	**ENGdesign** Engineering Design Work	$25,000	100%	**$25,000**
RB0009:County Rd 17 (Winthrop Road) - 17-06.4 (Winthrop Bridge)	1953	65	$1,258,000	**ENGdesign** Engineering Design Work	$20,000	100%	**$20,000**
RB0018:County Rd 28 (McIntosh Line) - 28-10.1 (Farrish Bridge)	1966	73	$833,000	**ENGdesign** Engineering Design Work	$20,000	100%	**$20,000**
RB0026:County Rd 3 (Mill Road) - 03-18.1 (Brucefield Bridge)	2000	75	$562,000	**ENGdesign** Engineering Design Work	$25,000	100%	**$25,000**
RB0033:County Rd 1 (Lucknow Line) - 01-29.6 (Beckers Bridge)	1960	68	$1,024,000	**ENGdesign** Engineering Design Work	$25,000	100%	**$25,000**
RB0042:County Rd 16 (Morris Road) - 16-06.3 (Hoggs Bridge)	1957	72	$2,250,000	**PWP** Patch, Waterproof, Pave	$200,000	100%	**$200,000**
				RRH Barrier/Parapet Replacement	$100,000	100%	**$100,000**
RB0044:County Rd 12 (Kippen Road) - 12-11.7 (Egmondville Bridge)	1948	69	$1,445,000	**ENGdesign** Engineering Design Work	$145,000	100%	**$145,000**
RB0053:County Rd 16 (Morris Road) - 16-02.8 (Cleggs Bridge)	1961	71	$3,056,000	**PWP** Patch, Waterproof, Pave	$200,000	100%	**$200,000**
RB0062:County Rd 25 (Blyth Road) - 25-12.6 (Patterson/Auburn Bridge)	1954	56	$4,579,000	**CDR** Complete Deck Replacement or Superstructure Replacement	$3,500,000	100%	**$3,500,000**

2025 Culvert_Large	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$75,000
RB0103:County Rd 31 (Sharpes Creek Line) - 31-32.1	1975	58	$658,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0202:County Rd 86 (Amberley Road) - 86-08.5	1950	46	$225,000	**cENGdesign** Engineering Design Work	$50,000	50%	**$25,000**
RB0257:County Rd 4 (London Road) - 04-24.0	1955	65	$609,000	**cRSB** Rehabilitate Substructure	$0	100%	**$0**
RB0404:County Rd 83 (Dashwood Road) - 83-11.4	1948	49	$513,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**

2025 Road	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$9,005,550
RD0105-00:County Rd 1 (Southampton Street) - 92m South of James St. (S. Dungannon)-to-50m North of Proudfoot Ave (N. Dungannon)	1990	70	$1,776,000	**U-REC** Urban Reconstruction	$1,776,000	100%	**$1,776,000**
RD0107-00:County Rd 1 (Lucknow Line) - 850 m S. of Cty Rd. 86-to-680m South of CountyRoad 86 (Bruce Boundary)	1990	81	$480,000	**U-REC** Urban Reconstruction	$480,000	100%	**$480,000**

RD1201-01:County Rd 12 (Kippen Road) - (to) Highway 4-to-CountyRoad 32 (Staffa Road)	1983	75	$4,050,000	**FDR** Full Depth Recycling & Pave	$2,137,500	100%	**$2,137,500**
RD1201-02:County Rd 12 (Kippen Road) - (to) CountyRoad 32 (Staffa Road)-to-350m S. of Egmondville Bridge	1983	79	$4,600,000	**FDR** Full Depth Recycling & Pave	$2,186,250	100%	**$2,186,250**
RD1202-00:County Rd 12 (Kippen Road) - (to) 350m S. of Egmondville Bridge-to-Egmondville Bridge	1992	41	$840,000	**U-REC** Urban Reconstruction	$840,000	100%	**$840,000**
RD1901-00:County Rd 19 (McNaught Line) - (to) CountyRoad 25 (Blyth Road)-to-CountyRoad 16 (Newry Road)	2002	82	$3,524,000	**CIR** Cold-InPlace-Recycling and Pave	$1,585,800	100%	**$1,585,800**

2026	**Bridge**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$2,375,000
RB0001:County Rd 83 (Thames Road) - 83-25.0 (Ausable River East Bridge)		1948	59	$1,259,000	**RSL** Replace Bridge - Same Location	$1,300,000	100%	**$1,300,000**
RB0006:County Rd 4 (Queen Street) - 04-15.6 (Blyth Brook Bridge)		1994	74	$653,000	**PWP** Patch, Waterproof, Pave	$150,000	100%	**$150,000**
RB0009:County Rd 17 (Winthrop Road) - 17-06.4 (Winthrop Bridge)		1953	65	$1,258,000	**RCS** Rehabilitation / Replacement of Safety Curbs / Sidewalks	$75,000	100%	**$75,000**
					PWP Patch, Waterproof, Pave	$150,000	100%	**$150,000**
RB0018:County Rd 28 (McIntosh Line) - 28-10.1 (Farrish Bridge)		1966	73	$833,000	**RRH** Barrier/Parapet Replacement	$50,000	100%	**$50,000**
					PWP Patch, Waterproof, Pave	$150,000	100%	**$150,000**
RB0026:County Rd 3 (Mill Road) - 03-18.1 (Brucefield Bridge)		2000	75	$562,000	**PWP** Patch, Waterproof, Pave	$175,000	100%	**$175,000**
RB0028:County Rd 15 (Londesborough Road) - 15-03.6 (Bob Edgar Bridge)		1989	74	$5,044,000	**ENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0033:County Rd 1 (Lucknow Line) - 01-29.6 (Beckers Bridge)		1960	68	$1,024,000	**PWP** Patch, Waterproof, Pave	$250,000	100%	**$250,000**
RB0088:Line 183 - Boundary Bridge #20		1971	72	$412,000	**ENGdesign** Engineering Design Work	$25,000	50%	**$12,500**
RB0089:Line 183 - Boundary Bridge #22		1960	63	$311,500	**ENGdesign** Engineering Design Work	$25,000	50%	**$12,500**

2026	**Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$700,000
RB0103:County Rd 31 (Sharpes Creek Line) - 31-32.1		1975	58	$658,000	**cRSL** Replace Culvert - Same Location	$400,000	100%	**$400,000**
RB0158:County Rd 14 (Perth Road 181) - 14-14.3		1975	48	$225,000	**cENGdesign** Engineering Design Work	$50,000	50%	**$25,000**
RB0202:County Rd 86 (Amberley Road) - 86-08.5		1950	46	$225,000	**cRSL** Replace Culvert - Same Location	$450,000	50%	**$225,000**
RB0291:County Rd 6 (Kirkton Road) - 06-08.4		1950	49	$543,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0345:County Rd 16 (Morris Road) - 16-00.4		1955	71	$683,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**

2026	**Road**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
								$13,410,100
RD1206-00:County Rd 12 (Brussels Line) - (to) CountyRoad 25 (Blyth Road)-to-Walton Road (N. Limit Walton)		1989	86	$1,872,000	**U-REC** Urban Reconstruction	$1,872,000	100%	**$1,872,000**
RD1303-00:County Rd 13 (Bayfield Road) - (to) 200m W. of Telephone Rd-to-Devon Street (S. Limit Clinton)		1984	61	$696,000	**M&P1L** Mill 50 mm - Pave 50 mm	$58,000	100%	**$58,000**
RD1502-00:County Rd 15 (Londesborough Road) - (to) CountyRoad 8 (Base Line)-to-167m West of CountyRoad 4 (W. Limit Londesborough)		1992	80	$2,164,000	**CIR** Cold-InPlace-Recycling and Pave	$1,002,600	100%	**$1,002,600**
RD1603-00:County Rd 16 (Newry Road) - (to) Burgess St. (E. Limit Brussels)-to-408m East of Henfryn Line (Perth Boundary)		2002	92	$10,500,000	**FDR** Full Depth Recycling & Pave	$5,103,750	100%	**$5,103,750**
RD2504-01:County Rd 25 (Blyth Road) - (to) CountyRoad 12 (N)(Brussels Line)-to-CountyRoad 12 (S) (North Line)		1989	83	$485,000	**FDR** Full Depth Recycling & Pave	$255,000	100%	**$255,000**
RD2504-02:County Rd 25 (Blyth Road) - (to) CountyRoad 12 (S) (Brussels Line)-to-CountyRoad 19(McNaught Line)		1989	83	$7,400,000	**FDR** Full Depth Recycling & Pave	$3,573,750	100%	**$3,573,750**
RD2504-03:County Rd 25 (Blyth Road) - (to) CountyRoad 19(McNaught Line)-to-CountyRoad 14 (PerthRoad 180)		1989	83	$550,000	**FDR** Full Depth Recycling & Pave	$303,750	100%	**$303,750**
RD2504-04:County Rd 25 (Blyth Road) - (to) CountyRoad 14 (PerthRoad 180)-to-Road 174 (Perth Boundary)		1989	83	$2,450,000	**FDR** Full Depth Recycling & Pave	$1,241,250	100%	**$1,241,250**

2027	**Bridge**	**Year Built**	**Estimated Replacement**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**

		Condition	Value				
							$2,160,000
RB0019:County Rd 30 (Patrick Street) - 30-05.9 (Fordwich Bridge)	1954	66	$2,165,000	**ENGdesign** Engineering Design Work	$125,000	100%	**$125,000**
RB0020:County Rd 30 (Fordwich Line) - 30-08.7	1958	74	$874,000	**ENGdesign** Engineering Design Work	$20,000	100%	**$20,000**
RB0028:County Rd 15 (Londesborough Road) - 15-03.6 (Bob Edgar Bridge)	1989	74	$5,044,000	**TJS** Transverse Exp Joint Seal Replacement	$25,000	100%	**$25,000**
				PWP Patch, Waterproof, Pave	$250,000	100%	**$250,000**
RB0034:County Rd 4 (London Road) - 04-25.6 (Belgrave Bridge)	1932	64	$479,000	**ENGdesign** Engineering Design Work	$75,000	100%	**$75,000**
RB0044:County Rd 12 (Kippen Road) - 12-11.7 (Egmondville Bridge)	1948	69	$1,445,000	**RSL** Replace Bridge - Same Location	$1,500,000	100%	**$1,500,000**
RB0048:County Rd 12 (Belmore Line) - 12-57.3 (Salem Creek Bridge)	1997	88	$682,000	**ENGdesign** Engineering Design Work	$30,000	100%	**$30,000**
RB0088:Line 183 - Boundary Bridge #20	1971	72	$412,000	**RRH** Barrier/Parapet Replacement	$100,000	50%	**$50,000**
				RSP Rehabilitate Superstructure	$25,000	50%	**$12,500**
RB0089:Line 183 - Boundary Bridge #22	1960	63	$311,500	**RRH** Barrier/Parapet Replacement	$100,000	50%	**$50,000**
				RSP Rehabilitate Superstructure	$25,000	50%	**$12,500**
RB0091:Line 17 - Boundary Bridge #24	1979	68	$335,500	**ENGdesign** Engineering Design Work	$20,000	50%	**$10,000**

2027 **Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$875,000
RB0132:County Rd 4 (London Road) - 04-09.6	1955	58	$606,000	**cRSB** Rehabilitate Substructure	$0	100%	**$0**
RB0133:County Rd 4 (London Road) - 04-10.5	1955	34	$450,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0158:County Rd 14 (Perth Road 181) - 14-14.3	1975	48	$225,000	**cRSL** Replace Culvert - Same Location	$450,000	50%	**$225,000**
RB0182:County Rd 84 (Zurich-Hensall Road) - 84-09.0	1950	34	$525,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0233:County Rd 4 (London Road) - 04-01.6	1965	69	$623,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**
RB0291:County Rd 6 (Kirkton Road) - 06-08.4	1950	49	$543,000	**cRSL** Replace Culvert - Same Location	$550,000	100%	**$550,000**

2027 **Road**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$14,572,900
RD0201-01:County Rd 2 (Bronson Line) - (to) CountyRoad 5 (Mt. Carmel Road)-to-CountyRoad 10 (Crediton Road)	1989	92	$3,050,000	**FDR** Full Depth Recycling & Pave	$1,548,750	100%	**$1,548,750**
RD0203-01:County Rd 2 (Bronson Line) - (to) CountyRoad 83 (Dashwood Road)-to-120m South of South St. (S. Limit Zurich)	1981	89	$3,092,000	**CIR** Cold-InPlace-Recycling and Pave	$1,391,400	100%	**$1,391,400**
RD0301-00:County Rd 3 (Mill Road) - (to) Highway 21-to-155m West of CountyRoad 31 (W. Limit Varna)	1987	97	$5,900,000	**FDR** Full Depth Recycling & Pave	$2,958,750	100%	**$2,958,750**
RD1505-00:County Rd 15 (Londesborough Road) - (to) 640m E of Cty Rd 4-to-CountyRoad 17 (Winthrop Road)	2002	88	$3,824,000	**CIR** Cold-InPlace-Recycling and Pave	$1,720,800	100%	**$1,720,800**
RD2803-00:County Rd 28 (McIntosh Line) - (to) CountyRoad 87 (Harrison Road)-to-CountyRoad 7 (Howick-Turnberry Road)	2000	84	$2,452,000	**CIR** Cold-InPlace-Recycling and Pave	$1,103,400	100%	**$1,103,400**
RD2804-00:County Rd 28 (McIntosh Line) - (to) CountyRoad 7 (Howick-Turnberry Road)-to-Bruce Boundary	1998	75	$1,628,000	**CIR** Cold-InPlace-Recycling and Pave	$732,600	100%	**$732,600**
RD3002-00:County Rd 30 (Patrick Street) - (to) Edward Street (S. Limit of Fordwich)-to-North St. (N. Limit of Fordwich)		85	$1,700,000	**M&P1L** Mill 50 mm - Pave 50 mm	$209,000	100%	**$209,000**
RD3110-00:County Rd 31 (Sharpes Creek Line) - (to) 1.7km N. of Hwy 8-to-CountyRoad 15 (Londesborough Road)	1990	89	$2,824,000	**CIR** Cold-InPlace-Recycling and Pave	$1,270,800	100%	**$1,270,800**
RD3111-01:County Rd 31 (Londesborough Road) - (to) CountyRoad 15 (Londesborough Road)-to-CountyRoad 1 (S) (Benmiller Line)	1990	96	$692,000	**CIR** Cold-InPlace-Recycling and Pave	$311,400	100%	**$311,400**
RD3111-02:County Rd 31 (Londesborough Road) - (to) CountyRoad 1 (S) (Benmiller Line)-to-83m W. of Cty Rd 1 (North)	1990	87	$1,416,000	**U-REC** Urban Reconstruction	$1,416,000	100%	**$1,416,000**
RD3114-00:County Rd 31 (Saltford Road) - (to) Westmount Line (E. Limit Saltford)-to-770 m E of Hwy 21		81	$680,000	**M&P1L** Mill 50 mm - Pave 50 mm	$62,000	100%	**$62,000**
RD3115-00:County Rd 31 (Saltford Road) - (to) 770 m E of Hwy 21-to-Highway 21		82	$1,848,000	**U-REC** Urban Reconstruction	$1,848,000	100%	**$1,848,000**

2028 **Bridge**	**Year Built**	**Estimated Replacement**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**

		Condition	Value				
							$3,070,000
RB0003:Nile Road - Boundary Bridge #11	1970	73	$900,000	**ENGdesign** Engineering Design Work	$5,000	100%	**$5,000**
RB0014:County Rd 10 (Crediton Road) - 10-16.2 (Crediton Bridge)	1955	61	$2,786,000	**ENGdesign** Engineering Design Work	$150,000	100%	**$150,000**
RB0019:County Rd 30 (Patrick Street) - 30-05.9 (Fordwich Bridge)	1954	66	$2,165,000	**RSL** Replace Bridge - Same Location	$2,165,000	100%	**$2,165,000**
RB0020:County Rd 30 (Fordwich Line) - 30-08.7	1958	74	$874,000	**PWP** Patch, Waterproof, Pave	$250,000	100%	**$250,000**
RB0035:County Rd 4 (London Road) - 04-32.9	1960	60	$3,129,000	**ENGdesign** Engineering Design Work	$150,000	100%	**$150,000**
RB0036:County Rd 4 (London Road) - 04-33.2	1960	65	$2,029,000	**ENGdesign** Engineering Design Work	$125,000	100%	**$125,000**
RB0048:County Rd 12 (Belmore Line) - 12-57.3 (Salem Creek Bridge)	1997	88	$682,000	**PWP** Patch, Waterproof, Pave	$150,000	100%	**$150,000**
RB0091:Line 17 - Boundary Bridge #24	1979	68	$335,500	**RSP** Rehabilitate Superstructure	$25,000	50%	**$12,500**
				PWP Patch, Waterproof, Pave	$125,000	50%	**$62,500**

2028 Culvert_Large

	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$1,090,000
RB0133:County Rd 4 (London Road) - 04-10.5	1955	34	$450,000	**cRSL** Replace Culvert - Same Location	$450,000	100%	**$450,000**
RB0182:County Rd 84 (Zurich-Hensall Road) - 84-09.0	1950	34	$525,000	**cRSL** Replace Culvert - Same Location	$525,000	100%	**$525,000**
RB0299:County Rd 16 (Morris Road) - 16-10.9	1960	60	$542,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0325:County Rd 12 (Belmore Line) - 12-64.3	1962	70	$420,000	**cENGdesign** Engineering Design Work	$40,000	100%	**$40,000**
RB0461:County Rd 86 (Amberley Road) - 86-20.8	1950	48	$325,000	**cENGdesign** Engineering Design Work	$50,000	50%	**$25,000**

2028 Road

	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$16,425,750
RD0101-00:County Rd 1 (Benmiller Line) - Highway 8 to CountyRoad 31 (Londesborough Road)	1986	95	$2,986,000	**FDR** Full Depth Recycling & Pave	$1,447,500	100%	**$1,447,500**
RD0408-00:County Rd 4 (London Road) - (to) Belgrave Bridge 4-25.6 (N. Limit Belgrave)-to-CountyRoad 86 (Amberley Road)	1993	94	$6,140,000	**FDR** Full Depth Recycling & Pave	$2,973,750	100%	**$2,973,750**
RD0410-00:County Rd 4 (London Road) - (to) North St. West (N. Limit Wingham)-to-Huron Bruce Road	1993	97	$5,750,000	**FDR** Full Depth Recycling & Pave	$2,636,250	100%	**$2,636,250**
RD0501-00:County Rd 5 (Greenway Road) - (to) TriCounty Bridge-to-CountyRoad 81 (Grand Bend Line)		93	$3,850,000	**FDR** Full Depth Recycling & Pave	$952,500	100%	**$952,500**
RD0502-00:County Rd 5 (Mt. Carmel Drive) - (to) Grand Bend Road-to-CountyRoad 2 (Bronson Line)	1996	91	$4,900,000	**FDR** Full Depth Recycling & Pave	$1,211,250	100%	**$1,211,250**
RD2201-00:County Rd 22 (Donnybrook Line) - (to) CountyRoad 25 (Blyth Road)-to-530m N of Cty Rd 25	1986	73	$505,000	**CIR** Cold-InPlace-Recycling and Pave	$95,400	100%	**$95,400**
RD2202-01:County Rd 22 (Donnybrook Line) - (to) 530m N of Cty Rd 25-to-CountyRoad 20 (Belgrave Road)	1986	93	$4,068,000	**CIR** Cold-InPlace-Recycling and Pave	$1,830,600	100%	**$1,830,600**
RD2202-02:County Rd 22 (Donnybrook Line) - (to) CountyRoad 20 (Belgrave Road)-to-CountyRoad 86 (Amberley Road)	1986	89	$3,288,000	**CIR** Cold-InPlace-Recycling and Pave	$1,479,600	100%	**$1,479,600**
RD3001-00:County Rd 30 (Fordwich Line) - (to) CountyRoad 34 (PerthRoad 178)-to-Edward St . (S Limit of Fordwich)	1984	85	$3,850,000	**FDR** Full Depth Recycling & Pave	$1,886,250	100%	**$1,886,250**
RD3106-00:County Rd 31 (Parr Line) - (to) CountyRoad 13 (Bayfield Road)-to-Rail Bridge (S. Limit Holmesville)	2003	87	$2,148,000	**CIR** Cold-InPlace-Recycling and Pave	$1,143,000	100%	**$1,143,000**
RD3112-00:County Rd 31 (Londesborough Road) - (to) 83m W. of Cty Rd 1 (North)-to-Falls Reserve Road	1986	75	$312,000	**cIR** Cold-InPlace-Recycling and Pave	$23,400	100%	**$23,400**
RD3401-00:County Rd 34 (Perth Road 178) - (to) CountyRoad 86 (Amberley Road)-to-CountyRoad 28 (Gorrie Line)		82	$1,490,000	**FDR** Full Depth Recycling & Pave	$746,250	100%	**$746,250**

2029 Bridge

	Year Built	Condition	Estimated Replacement Value	Recommended Work Summary	Estimated Total Cost	County Portion	County Cost
							$3,695,000
RB0003:Nile Road - Boundary Bridge #11	1970	73	$900,000	**RRH** Barrier/Parapet Replacement	$120,000	100%	**$120,000**
RB0005:County Rd 4 (London Road) - 04-08.4 (Londesborough Bridge)	1933	45	$4,500,000	**ENGdesign** Engineering Design Work	$275,000	100%	**$275,000**

RB0014:County Rd 10 (Crediton Road) - 10-16.2 (Crediton Bridge)	1955	61	$2,786,000	**RSL** Replace Bridge - Same Location	$2,800,000	100%	**$2,800,000**
RB0034:County Rd 4 (London Road) - 04-25.6 (Belgrave Bridge)	1932	64	$479,000	**RSL** Replace Bridge - Same Location	$500,000	100%	**$500,000**

2029 **Culvert_Large**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$1,025,000
RB0263:County Rd 15 (Kinburn Line) - 15-24.6	1960	60	$577,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**
RB0299:County Rd 16 (Morris Road) - 16-10.9	1960	60	$542,000	**cRSL** Replace Culvert - Same Location	$550,000	100%	**$550,000**
RB0325:County Rd 12 (Belmore Line) - 12-64.3	1962	70	$420,000	**cRSP** Rehabilitate Superstructure	$50,000	100%	**$50,000**
				cLPW Lengthen Culvert - Platform Width Needed	$0	100%	**$0**
RB0344:County Rd 15 (Kinburn Line) - 15-25.6	1970	66	$463,000	**cRSP** Rehabilitate Superstructure	$50,000	100%	**$50,000**
RB0367:County Rd 20 (Belgrave Road) - 20-15.1	1965	75	$481,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**
RB0407:County Rd 83 (Dashwood Road) - 83-17.1	1955	59	$492,000	**cENGdesign** Engineering Design Work	$50,000	100%	**$50,000**
RB0438:County Rd 86 (Amberley Road) - 86-59.5	1965	72	$308,500	**cRSB** Rehabilitate Substructure	$0	50%	**$0**
RB0461:County Rd 86 (Amberley Road) - 86-20.8	1950	48	$325,000	**cRSL** Replace Culvert - Same Location	$650,000	50%	**$325,000**
RB0462:County Rd 30 (Fordwich Line) - 30-02.4	1960	63	$695,000	**cRSP** Rehabilitate Superstructure	$0	100%	**$0**

2029 **Road**	**Year Built**	**Condition**	**Estimated Replacement Value**	**Recommended Work Summary**	**Estimated Total Cost**	**County Portion**	**County Cost**
							$38,211,750
RD0104-00:County Rd 1 (Lucknow Line) - Hawkins Road-to-92m South of James St. (S. Dungannon)		99	$1,765,000	**FDR** Full Depth Recycling & Pave	$858,750	100%	**$858,750**
RD0106-01:County Rd 1 (Lucknow Line) - 50m North of Proudfoot Ave (N. Dungannon)-to-CountyRoad 20 (Belgrave Road)	1990	99	$3,974,000	**FDR** Full Depth Recycling & Pave	$1,912,500	100%	**$1,912,500**
RD0106-02:County Rd 1 (Lucknow Line) - CountyRoad 20 (Belgrave Road)-to-850 m S. of Cty Rd. 86	1990	99	$5,500,000	**FDR** Full Depth Recycling & Pave	$2,730,000	100%	**$2,730,000**
RD0405-00:County Rd 4 (Queen Street) - (to) CountyRoad 25 (Blyth Road)-to-285m North of North St. (N. Limit Blyth)	1994	99	$3,984,000	**U-REC** Urban Reconstruction	$3,984,000	100%	**$3,984,000**
RD0406-01:County Rd 4 (London Road) - (to) 285m North of North St. (N. Limit Blyth)-to-CountyRoad 16 (Morris Road)	1991	100	$5,400,000	**FDR** Full Depth Recycling & Pave	$2,662,500	100%	**$2,662,500**
RD0406-02:County Rd 4 (London Road) - (to) CountyRoad 16 (Morris Road)-to-Parker Drive (S. Limit Belgrave)	1991	100	$1,100,000	**FDR** Full Depth Recycling & Pave	$570,000	100%	**$570,000**
RD0407-00:County Rd 4 (London Road) - (to) Parker Drive (S. Limit Belgrave)-to-Belgrave Bridge 4-25.6 (N. Limit Belgrave)	1993	99	$1,920,000	**U-REC** Urban Reconstruction	$1,920,000	100%	**$1,920,000**
RD0601-01:County Rd 6 (Kirkton Road) - (to) Highway 4-to-CountyRoad 11 (Hern Line)	1996	99	$6,000,000	**FDR** Full Depth Recycling & Pave	$3,063,750	100%	**$3,063,750**
RD0601-02:County Rd 6 (Kirkton Road) - (to) CountyRoad 11 (Hern Line)-to-Highway 23	1996	99	$5,100,000	**FDR** Full Depth Recycling & Pave	$2,388,750	100%	**$2,388,750**
RD0801-00:County Rd 8 (Base Line) - (to) CountyRoad 4 (London Road)-to-Lobb Road	1991	100	$4,400,000	**FDR** Full Depth Recycling & Pave	$2,197,500	100%	**$2,197,500**
RD0802-01:County Rd 8 (Base Line) - (to) Lobb Road-to-CountyRoad 15 (Benmiller Road)	1987	95	$3,500,000	**FDR** Full Depth Recycling & Pave	$1,863,750	100%	**$1,863,750**
RD0802-02:County Rd 8 (Base Line/Maitland Terrace) - (to) CountyRoad 15 (Londesborough Road)-to-CountyRoad 25 (Blyth Road)	1987	96	$4,500,000	**FDR** Full Depth Recycling & Pave	$2,156,250	100%	**$2,156,250**
RD1208-00:County Rd 12 (Brussels Line/Turnberry Street) - (to) Raymond Ct. (S. Limit Brussels)-to-520m North of George St. (N. Limit Brussels)	1984	99	$7,344,000	**U-REC** Urban Reconstruction	$7,344,000	100%	**$7,344,000**
RD2503-00:County Rd 25 (Blyth Road) - (to) CountyRoad 4 (London Road)-to-CountyRoad 12 (N)(Belmore Line)	1993	95	$9,460,000	**FDR** Full Depth Recycling & Pave	$4,560,000	100%	**$4,560,000**

APPENDIX B

HURON COUNTY

Public Works Department

Pavement Management Program 2020 Update

HURON COUNTY

Public Works Dept.

Background – Paving Program

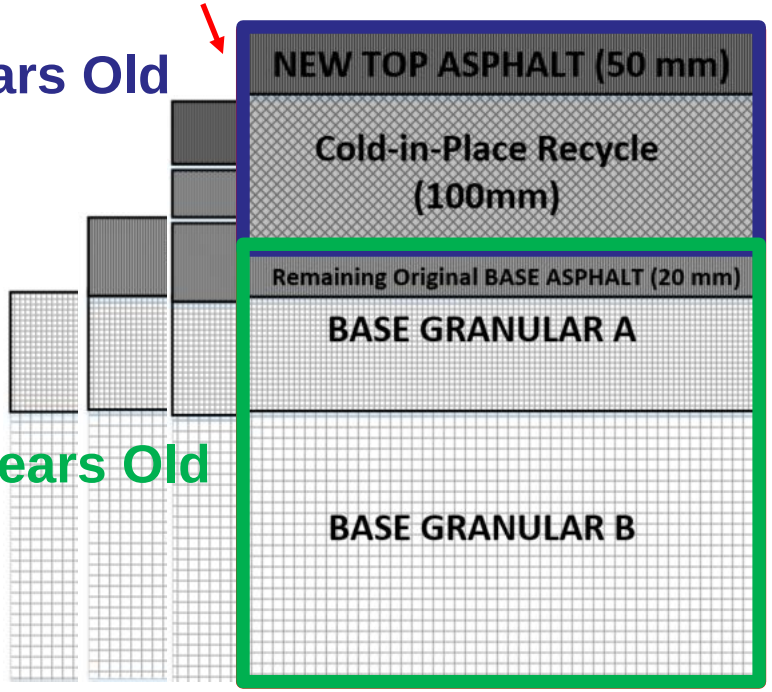
- When the County of Huron began paving roads they adopted a staged paving program.
- This type of paving program constructs a road over a period of decades vs. an un-staged program such as the Province of Ontario, which constructs its roads over a period of months.
- The staged program was felt to be more economical than the unstaged.

HURON COUNTY

This is what many of our roads are now

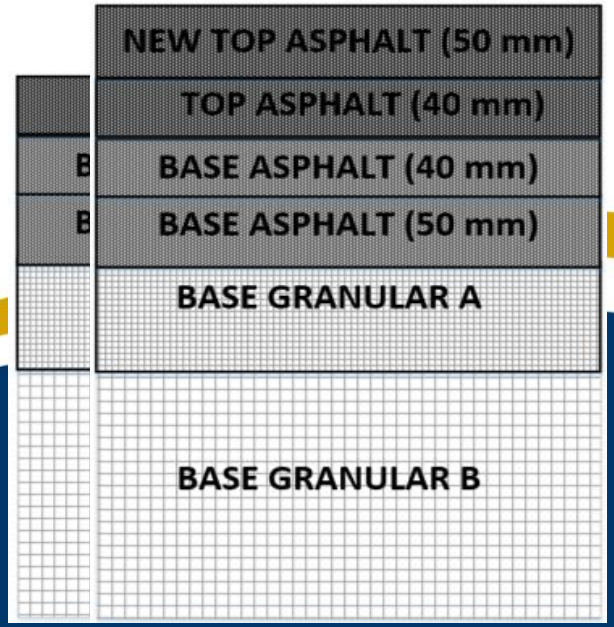
Staged Paving Program.

- Prepare a proper base including a waiting period for additional settlement over a year or two.
- Install the first asphalt base course - 50mm thickness.
- After a period of approximately 5 years, install the second asphalt base course 30mm thickness immediately followed by a 40mm asphalt surface course. Originally this was intended to last 15 years, but is normally stretched to 20 years.
- Recycle 100mm depth and surface with a 50mm of asphalt overlay.
- Total thickness 170mm of asphalt



Unstaged Paving Program

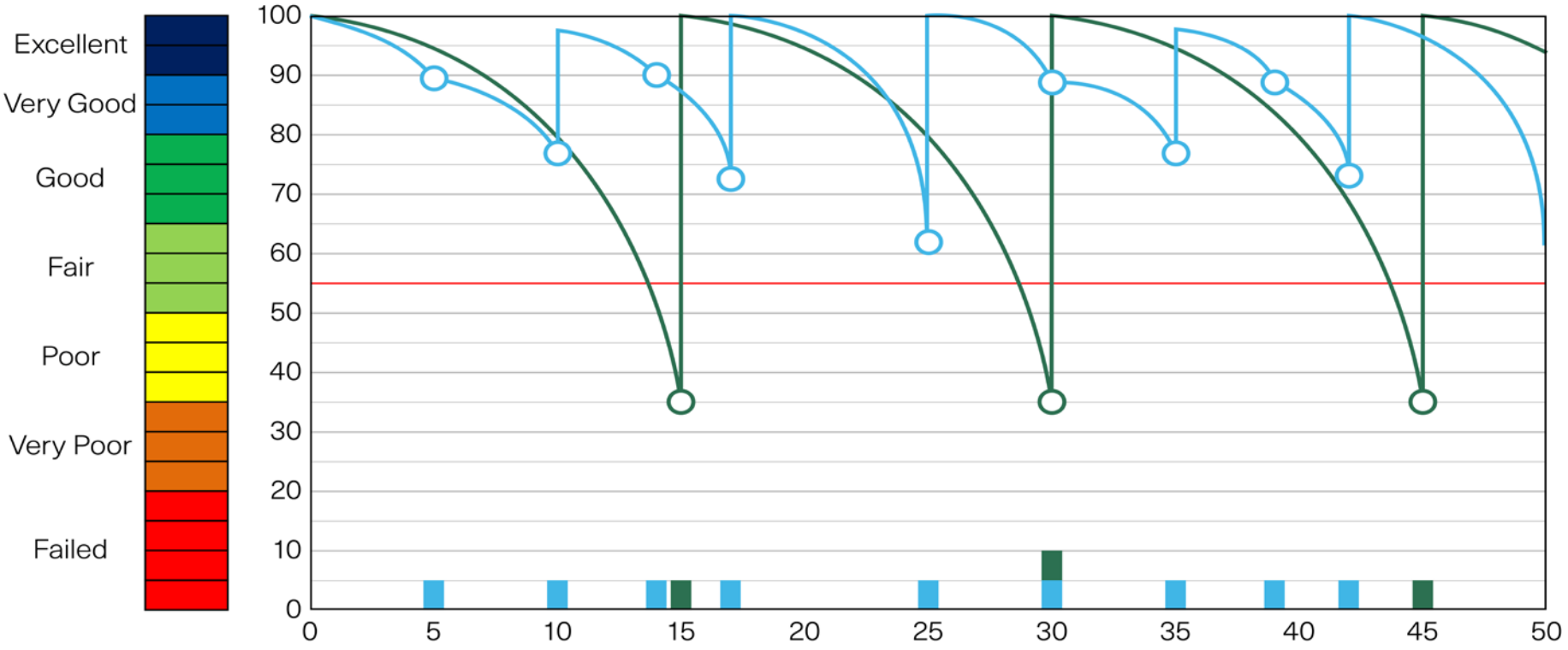
- Prepare a proper base prior to paving.
- Install the first asphalt base course 50mm thickness, followed by second 40mm base course, followed by 40mm surface course.
- Return in 20 years to install 50mm surface course.



Public Works Department

Pavement Lifecycle (Deterioration) Curve

Preservation vs. Rehabilitation



Preservation Strategy:

Years 5, 14, 30 & 39:	Crack Sealing
Years 10 & 35:	Micro Surfacing (Double)
Years 17 & 42:	Chip Seal
Year 25:	Mill & Pave

Total Cost*/SY Over 50 Years = $37.20

Rehabilitation Strategy:

Year 15:	Unstabilized FDR plus 4" HMA Overlay
Year 30:	Unstabilized FDR plus 4" HMA Overlay
Year 45:	Unstabilized FDR plus 4" HMA Overlay

Total Cost*/SY Over 50 Years = $63.00

*present day costs

Road Deterioration Factors

- Construction
  - Supporting Soils
  - Quality of Granular Base Materials
  - Compaction of Granular Base
  - Quality of Asphalt Cement
  - Quality of Aggregate
  - Granular Proportions
  - Placing, rolling, temperature, moisture, humidity, etc…
  - Binding between layers
- Operationally
  - Traffic
    - Axle Loadings
    - Riding edge of pavement
    - Tire Pressure
  - Oxidation of AC
    - Loss of surface aggregates
  - Thermal Expansion/Contraction
  - Cracks
    - Water
    - freeze/thaw cycles
    - Vibration
  - Drainage

Pavement Management Options

Preservation

- Surface treatments/coatings
  - Reverse or reduce oxidation of AC
  - May provide hard wearing surface
  - Seal cracks reducing water penetration
- Many options available

Rehabilitation

- Removal or recycling all or some asphalt and/or base granular material.
- Improves structural support
- Many options available

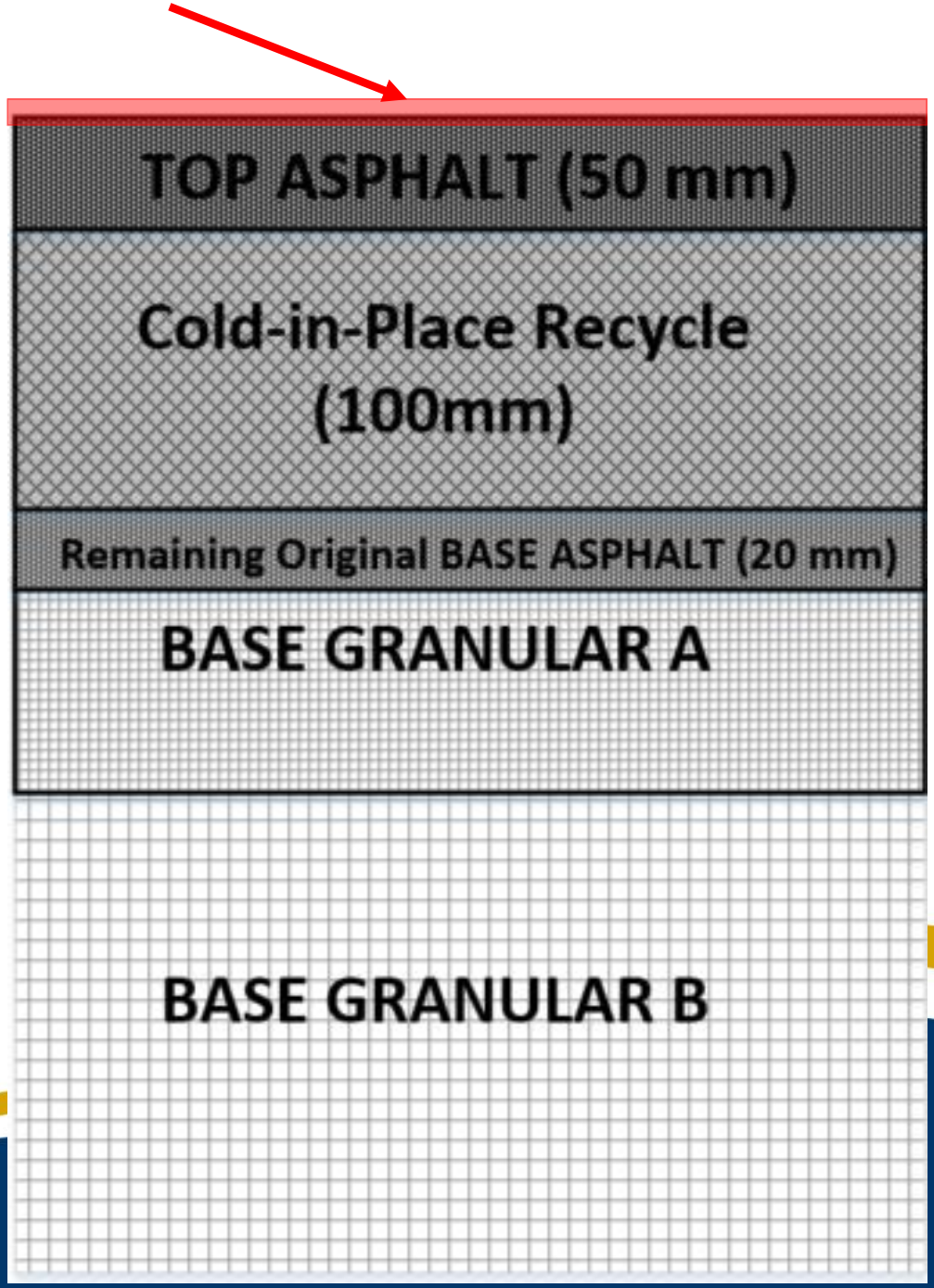
What is the right option?

- **It depends on what the current state of the road and condition of layers and materials underneath.**

- Generally
  - keep the road as good as possible using suitable preservation options.
  - Rehabilitate to address the stresses the road is experiencing

Preservation Options

- Crack sealing, fog seal, reclamite, slurry seal, microsurfacing, cape seal.
- Each have varying costs and benefits. Ranges in annualized cost between $3,000 - $12,000 per km Life Cycle Cost.
- Some are good options for Huron County Roads.



Rehabilitation Options

- **Mill & Pave**
  - Cheapest option
    - $110k / km Capital
    - $9.2k / km / year Life Cycle Cost
  - Suitable when ALL layers underneath are still sound.
  - Generally this is **only** viable option for urban roads (with curb & gutter).
  - *Least environmentally friendly*

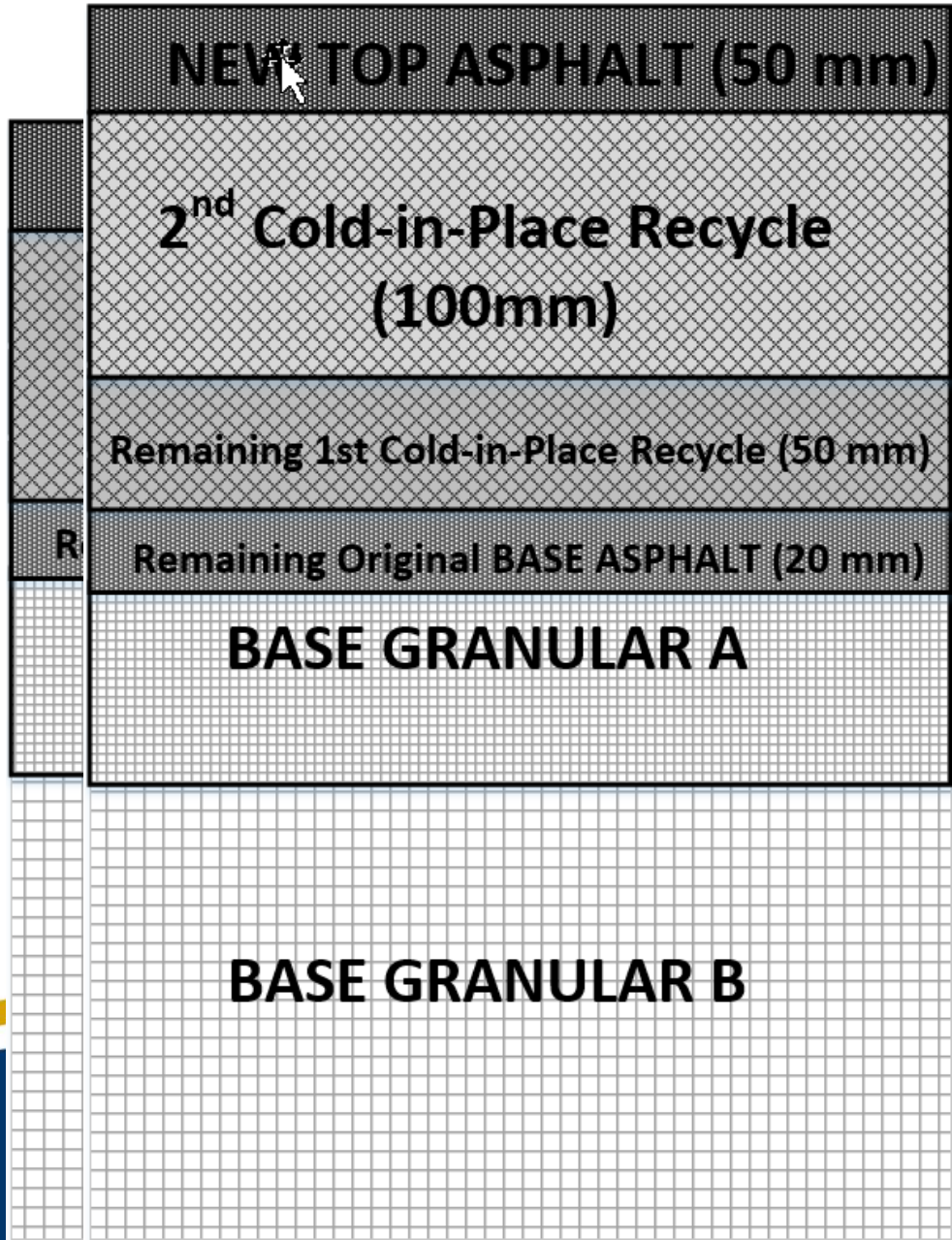
Haul Milled Asphalt (RAP) away and stockpile

Rehabilitation Options

- **Hot-in-Place Recycling**
  - Next cheapest option
    - $115k / km Capital
    - $9.6k / km / year Life Cycle Cost
  - Suitable when ALL layers underneath are still sound.
  - ***Becoming available in Ontario starting 2020.***

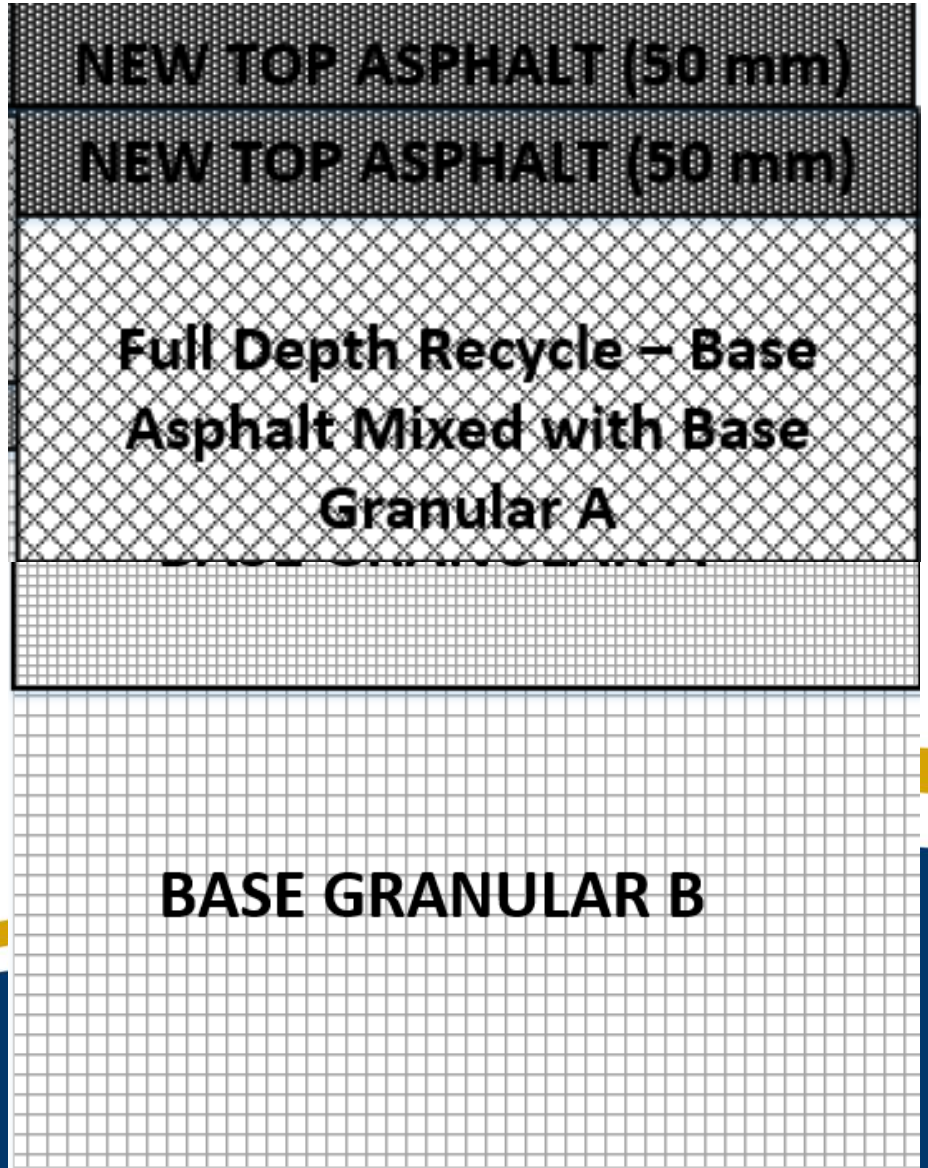
Rehabilitation Options

- **Cold-in-Place Recycling**
  - Moderate Cost
    - $167k / km Capital
    - $11.2k / km / year Life Cycle Cost *under ideal conditions.*
  - Suitable when base is in very good condition **AND** prior recycled materials can be re-mixed into a strong asphalt.
  - A second CIP is rarely done in the industry. If it is, it does not perform as well.



Rehabilitation Options

- **Full Depth Recycling**
  - Higher Capital Cost but SAME or better Life Cycle cost as CIP
    - $205k / km Capital
    - $11.3k / km / year Life Cycle Cost
  - Suitable when base has been compromised and significant pavement defects exist (rutting, potholes, deep cracks, etc..).



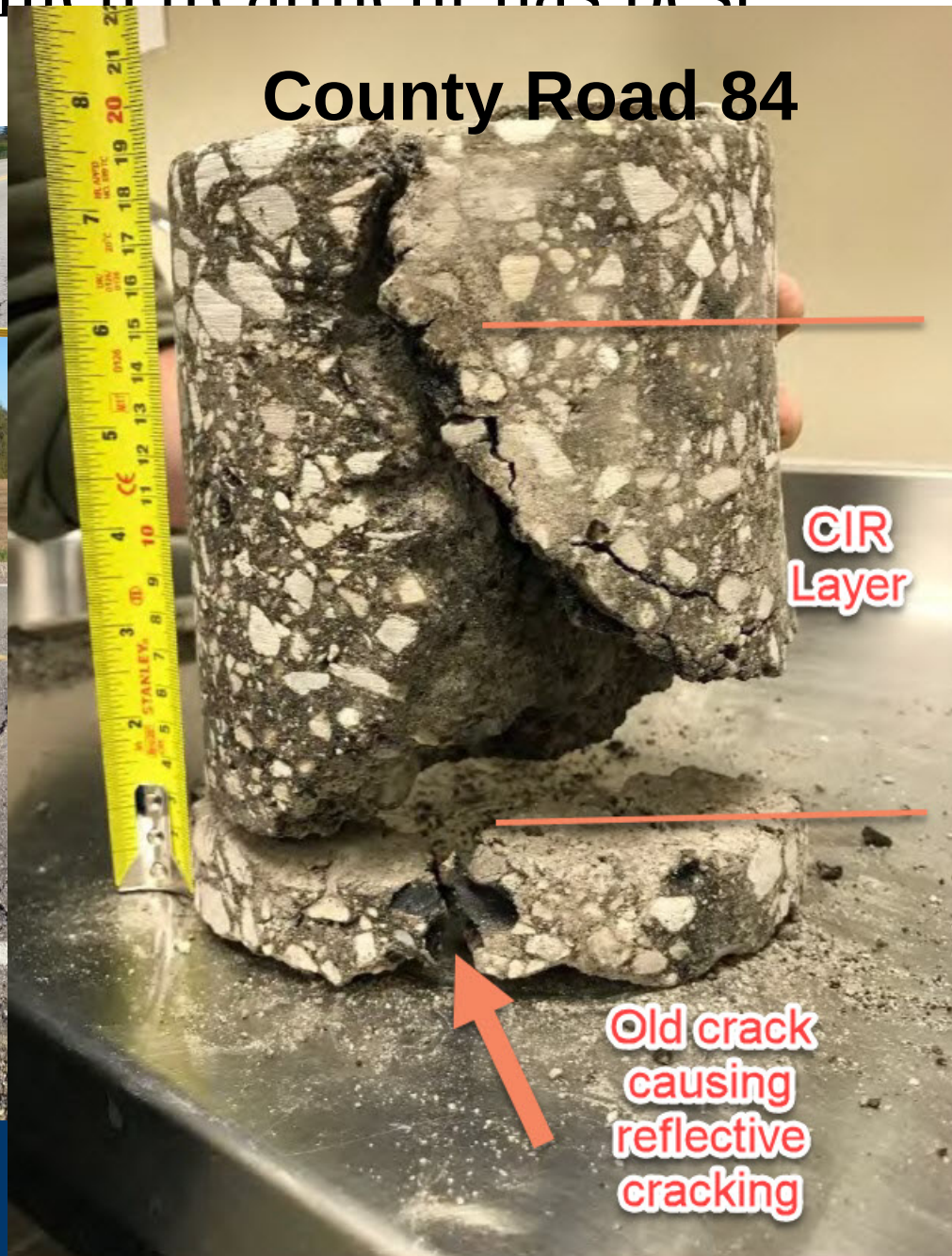
There is no one treatment solution to every road

County Road 30

- CIP in 2006
- After 7 years the road showed signs of stress.
- Road and base is progressively failing at 13 years (2019).
- An example of a County road that CIP is not a good choice and likely was not the best choice in 2006 having a life-cycle cost of over $16k/year

So how do we know which treatment has best value?

- Regular Pavement condition Assessments.
- Tracking condition in our Asset Management System.
- Testing core samples of asphalt and base materials.
- Measuring actual thickness of asphalt layers.



County of Huron
Public Works Department

Questions?

HURON COUNTY

CORPORATION OF THE COUNTY OF HURON

TO: Chair and Members of Council - Day 2
FROM: Imran Khalid, P.Eng. – Project Manager (Roads) Mike Hausser, P.Eng. – Manager of Public Works
DATE: 1/8/2020
SUBJECT:

RECOMMENDATION:

RECOMMENDED MOTION
THAT:
The Council of the County of Huron receives the report by Mike Hausser, Manager of Public Works and Imran Khalid, Project Manager - Roads, dated January 8, 2020, titled Pavement Management Program, as presented for information;
AND FURTHER THAT:
The Council of the County of Huron endorses the pavement management program as outlined in this report and that it falls within the approved Strategic Asset Management Policy;
AND FURTHER THAT:
The Council of the County of Huron directs staff to prepare future pavement management capital and operating budgets that maintain the current Level of Service with the lowest life-cycle cost strategy as outlined in this report;
AND FURTHER THAT:
The Council of the County of Huron directs staff to prepare the 2020 capital and operating budget to support an in-house spray patching program to repair road defects to be implemented in 2020.

BACKGROUND:

Huron County undertook a significant road building program in the 1990s in which many of the roads were upgraded to paved two-lane arterial roads with wide shoulders to support residents, agriculture, and commercial activities in the County. A number of other roads were downloaded to the County from the Province and subsequently maintained by County Public Works at this same standard.

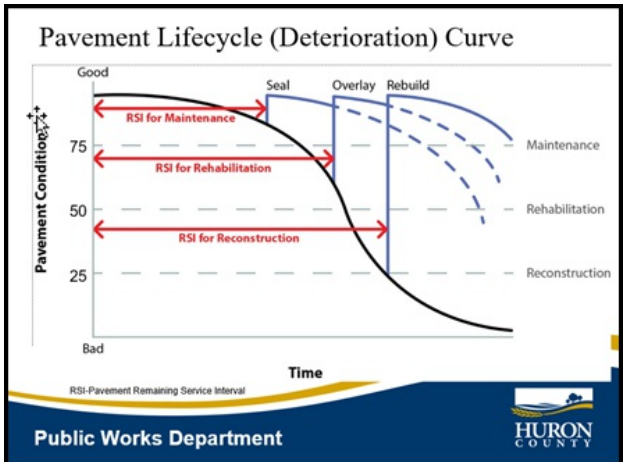
At that time, the County determined that the roads should be re-constructed using a staged methodology in which the road base and drainage was constructed with a base of asphalt and one top-coat of asphalt as the first stage. A scheduled pavement program was then implemented in which the majority of top-coat of asphalt was cold-in-place recycled followed by an additional layer of new hot mix asphalt. This method provided an economical means to build the asphalt to full depth of 100mm+ over a period of decades.

At this time, all County roads within the County have full depth of asphalt and have reached the point in their life-cyle where the pavements and bases are in various stages of degradation.

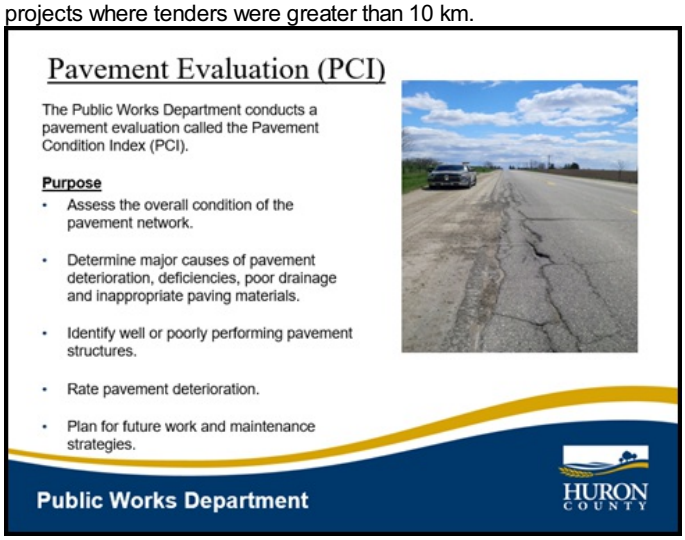
To best protect the investment made in the road base in the 1990s and to renew roads that were downloaded from the Province a revised strategy for pavement management is needed.

Overall, the performance and conditions of the County road network is considerably better than most roads of same age in comparison to other jurisdictions. This is attributed to quality construction, high quality local granular materials, and good drainage infrastructure.

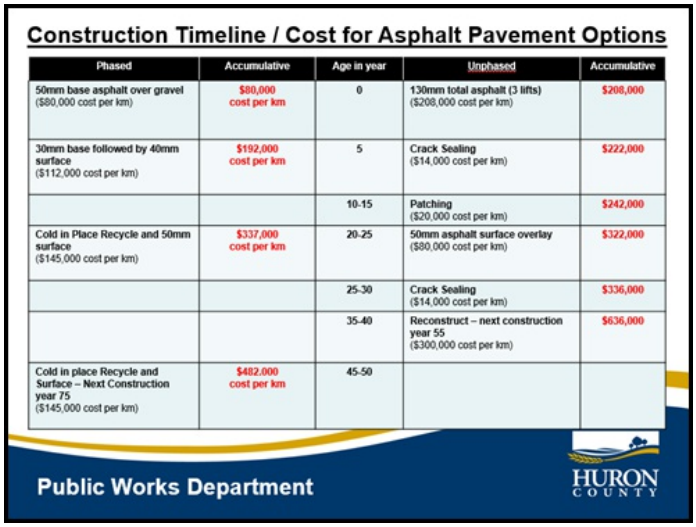
In 2016, Council was provided a presentation by Public Works that introduced pavement lifecycles and the need to consider various preservation and renewal before the road has degraded to the point where it requires a full reconstruction. The latter being the most disruptive and costly option.



This presentation also identified the need to consider road renewal based on condition assessments using the PCI method
This presentation also identified the value of tendering larger pavement projects to achieve best value for contracted pavement renewal projects where tenders were greater than 10 km.



The pavement management strategy presented a specific pavement management strategy which included crack sealing, patching, and cold-in-place recycling (CIR), followed by additional crack sealing and then a re-construction.



It was also suggested that additional CIR renewal could be applied prior to full re-construction to further effectively delay the cost of full base reconstruction.
The paving schedule was built based on this presentation, an initial pavement condition assessment, and incorporating an additional round of CIR for all County roads.

COMMENTS:

Asset Management

Over the past few years, the focus has shifted to a more comprehensive asset management approach as per Ontario Regulation 533/17. This has prompted additional focus on life-cycle management of all County infrastructure assets and has provided a more comprehensive understanding of the condition of assets. This knowledge provides a new perspective on the best value renewal options.

Pavement Condition Assessment

With respect to pavements and roads, Public Works staff have adopted and refined in-house pavement condition assessments which follow a systematic industry standard process combined with low-cost mobile phone technology to provide annual pavement condition assessments. This process is detailed in Appendix A. Additionally, core sampling of road asphalt and base granular materials have provided insight in the current performance and an improved understanding of what state of degradation the

materials have provided insight in the current performance and an improved understanding of what state of degradation the pavements and bases are.

This has enabled staff to research industry best practices that align with the needs of the roads of Huron County and meet the intent of maintaining the current levels of service with the lowest life-cycle cost to the tax payers of the County.

Pavement Management Options
There have been significant changes to the petro-chemical industry which has dramatically changed the quality of Asphalt Cement over the past 20 years. These changes have spawned the need to adjust additives including the use of recycled components that have had varying positive and negative effects on the overall life of pavements over the past 30 years. As such, the use of the 'tried-and-true' strategy of the past, is not necessarily the best option today or tomorrow as the process may be the same, but the materials or components have changed over time yielding very different results.

The technology associated with producing the components and the processes associated with paving and pavement mixes continues to evolve. In this light, there is an ongoing need to evaluate and adjust based on industry best practices, changes in pavement raw materials, and experiences.

There are two categories of treatment for pavements to improve or extend their life. In each of these categories, specific treatments and processes have evolved and continue to evolve based on availability of materials (granular, petro-chemicals, additives, polymers, etc…).

Pavement Preservation
These are treatments applied to pavements that can be applied at any time to slow down degradation of the pavement surface. It can be applied to newer pavements to slow down oxidation or to reduce/prevent surface wear (similar to re-staining a wooden fence or applying an epoxy coating to a concrete floor). Some treatments may also be used as a 'holding strategy' to slightly improve the pavement appearance or temporarily address surface defects on mass rather than continual individual repair by operations staff.

The latter is a means to meet Provincial Minimum Maintenance Standards and reduce re-active repairs of potholes by operations staff, however, it is only a temporary measure and is the 'better than nothing' approach when funding is limited.

Details of the various pavement preservation techniques our outlined in Appendix B.

Pavement Renewal
There are many more intrusive techniques which range from removing some amount of asphalt and replacing it (mill and pave), re-using some of it and adding new asphalt on top (Cold-in-Place or Full-Depth-Recycling), to re-using the top layer (Hot-in-Place Recycling). There are also variations of these basic options.

Each treatment can be an option for any road, however, their effectiveness, are each dependent on the strength and condition of the granular base that provides the support for traffic. A road that has signs of base weakness (alligator cracks with some displacement) requires some base remediation offered by Full-Depth-Recycling. A road that has surface raveling with only surface cracking and more than 150mm of total asphalt thickness could be either cold-in-place or hot-in-place recycled or milled and paved.

The best of those options can only be determined by sampling the existing asphalt and base granular properties and mix designs that will provide adequate strength for the traffic loadings of that particular road.

Details of the various pavement renewal techniques are outlined in Appendix C.

Appendix E outline the details for several sample pavement management strategies having different objectives. A summary of those strategies are provided in the table below:

Summary of Pavement Management Strategies

Strategy	Description	Average Annual life Cycle Cost per km of road	Sustainable average annual capital funding required (775 km road)
2016 Strategy	Multiple Cold-in-Place Renewals with patching where required. Variation of 'Phase-Build' Strategy.	$22,444	$17,394,000
A1 – Industry Best Practices Scenario 1	Optimized Maintaining PCI maintained above 60 for all roads.	$17,313	$13,417,575
A2 -Industry Best Practices Scenario 2	Optimized Maintaining PCI maintained above 60 for all roads.	$18,611	$14,423,525
B – re-active lowest short term cost perspective	Cheapest short-term fix strategy with PCI dropping as low as 45 with 25% of roads below 60	$22,833	$17,895.575
C – run to failure	Least Effort – run to failure. PCI dropping as low as 45 with 25% of roads below 60	$16,700	$12,942,500

Both strategy A1 and A2 are Industry Best Practices providing significant flexibility using a combination of lower cost pavement

Both strategy A1 and A2 are Industry Best Practices providing significant flexibility using a combination of lower cost pavement preservation treatments and major rehabilitation treatments that can be altered based on needs of roads and other infrastructure with minor impacts to Level of Service. Both of these strategies provide the lowest liabilities and lowest overall life-cycle cost for pavements maintaining the current level of service with Pavement Condition Indexes (PCI) above 60. Implementing this strategy is estimated to reduce the annual sustainable funding levels for the County Road network by approximately $3.4M – a 20% reduction in sustainable funding needs for the County road network in comparison to the current strategy implemented in 2016.

Other strategies (B and C) either result in higher life-cycle costing of pavement management, compromise the levels of service, substantially increase level of risk in liabilities, and increased operational efforts to address road defects in accordance with MMS timelines.

Pavement Repair Options

Pavement repairs are performed by staff or by contract services as directed by staff to address localized defects such as open seams, potholes, cracking. The Ontario Minimum Maintenance Standard (MMS) identifies specifically what thresholds (i.e. size and depth of pothole) defects can considered a hazard to road users and must be repaired within a prescribed period of time.

Ideally, pavement defects are repaired before it reaches the point where it is considered a hazard. A repair of a small defect is less costly and an early repair significantly slows down the rate of the damage caused by water entering the defect or the damage caused by vibration ad impact of vehicles.

A detailed listing of various repair options are listed in Appendix G.

Through trials, Huron County Public Works has had very positive results using the spray patch method which effectively fills, seals, and smooths small holes, open seams, and cracks in the pavement. This method is being successfully done by other jurisdictions including Bruce County who has their equipment operating the entire summer season on County and Local Roads. There are no contracted services available to undertake this work in our area. Contractors are available from other jurisdictions but are unable to provide the service as-needed through the summer.

It is estimated that investing in the equipment and operations staff will reduce the sustainable annual road capital renewal funding need by $1.1M. This represents an 8% cost reduction in life-cycle pavement management costs.

In addition, there is a chronic challenge in attracting and retaining qualified equipment operators. Particularly in the winter months where the County is required to meet MMS response to winter conditions. The County relies on a number of returning retired staff to operate plows as well as seasonal part-time individuals in the construction or agriculture business that do not have full time work through the winter months. It is also heavily reliant on staff to cover unfilled positions to meet the standards by working overtime and accumulating a significant number of Time Off in Lieu (TOIL) up to the limits set out under the Commercial Vehicle Operator Regulations (CVOR).

Each year, it is getting more difficult to fill shift schedules with a growing limited number of qualified staff willing to work on a temporary basis. This is an industry wide issue that is faced by many municipal jurisdictions and contractors alike.

Limited qualified plow operator staffing challenges have been exasperated in 2019 as the only contract plow service operating out of Zurich is no longer offering this service. This has increased temporary staffing level requirements out of Zurich for the winter months to operate the truck previously operated by contracted services.

Implementing a spray patching program with two summer staff will enable the County to post 2 full time positions as the winter positions are funded from the existing winter operating budget. The two individuals who do spray patching in the summer would be assigned to plow or patrol out of the Zurich Patrol where contract plow services are no longer being provided. Full-time positions with benefits are a means to attract and retain the staff needed to maintain the County road network in both summer and winter.

OTHERS CONSULTED:

Steve Lund, P.Eng, Director of Public Works
Finance Committee

IT IMPACTS

FINANCIAL IMPACTS

As outlined in the body and within the Appendices of this report.

Item	Description	Cost
Spray Patch Equipment Purchase	One time equipment purchase. Deprecation included in annual operating cost as outlined in Appendix D	$407,000
Revenue from local municipalities	Spray patching services provided to local municipalities on local roads	($10,000)
Spray Patch Annual Operating Cost	As outlined in Appendix D for staff, equipment, supplies	$252,700
Impact on sustainable road capital funding requirements. *	As outlined in Appendix G	($1,118,135) estimated
Net annual savings	**Operating cost vs annual sustainable capital funding needs**	**$855,435 - estimated**
Impact on sustainable road capital funding requirements. **	As detailed on Appendix E	$(3,473,000) estimated

* NOTE: This is a not a reduction of current capital expenditures, it is a reduction in the funding needed to sustain pavements and roads in the County if a spray patching program was implemented as part of the road maintenance program within the operating budget.

** NOTE: This is not a reduction of current capital expenditures, it is a reduction in the funding needed to sustain pavements and roads in the County adopted Industry Best Practices Pavement Management practices as outlined in this report as opposed to the current CIR only strategy.

Implementing both the pavement patching program in the operating budget reduces the annual sustainable funding of County roads from $17,394,000 to $12,803,000 – representing a 26% reduction.

COUNCIL PRINCIPLES

Long-term fiscal sustainability, Economic prosperity, Service excellence

SMT VALUES

Integrity, Trust, Support, Respect, Honesty

SMT MANTRAS

Put team members first, Yes, if....., Tell me how it's good for Huron County, Have honest conversations

ATTACHMENTS:

	Description	Type	Upload Date	File Name
	Appendix A - Pavement			20191218-

	Condition Assessment Program	Backup Material	11/22/2019	20191218-PavementManagement-AppendixA.pdf
	Appendix B - Pavement Preservation Options	Backup Material	11/22/2019	20191218-PavementManagement-AppendixB.pdf
	Appendix C - Pavement RenewalOptions	Backup Material	11/22/2019	20191218-PavementManagement-AppendixC.pdf
	Appendix D - Pavement Repair Options	Backup Material	11/22/2019	20191218-PavementManagement-AppendixD.pdf
	Appendix E - Pavement Management Strategies	Backup Material	11/22/2019	20191218-PavementManagement-AppendixE.pdf
	Appendix F - Example of Good Renewal Strategy Applied on Wrong Road	Backup Material	11/22/2019	20191218-PavementManagement-AppendixF.pdf
	Appendix G - Impact of Spray Patching Program on Capital	Backup Material	11/22/2019	20191218-PavementManagement-AppendixG.pdf

Appendix A – Pavement Condition Assessment Program

The County Pavement Condition Assessment Program has adopted industry best practices and is performed annually by technical staff within the Public Works Department.

Public Works has made use of a mobile phone app enabling staff to objectively assess the condition of roads. This is a very cost effective and effective means of obtaining this information on a regular basis at significantly lower costs then what can be provided through professional services.

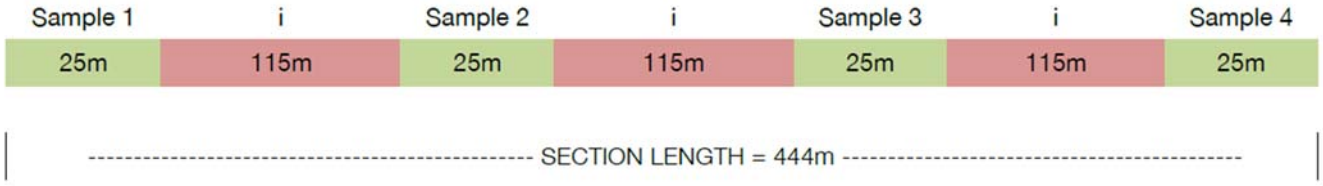
This tool has two modes of operation:

- PCI (Pavement Condition Index) – a measure of pavement defects
- RCI (Riding Comfort Index) – a measure of how rough the road feels to the road user

TotalPave PCI

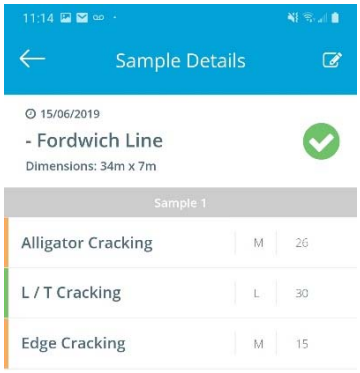
TotalPave PCI (Pavement Condition Index) application installed on a mobile phone allows our staff to efficiently produce PCI values in the field using a mathematical model instead of a subjective observation (as previously done by PW). The mathematical model utilized is in compliance with ASTM D6433 (Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys). It ensures that the condition ratings collected in the field are consistent between different users and year over year.

The process involves taking a county road section and dividing it into sublots (samples) to be evaluated. The size and frequency of the sublots depends on the length and the width of the road section being evaluated. The following image shows a sample section 444 m in length

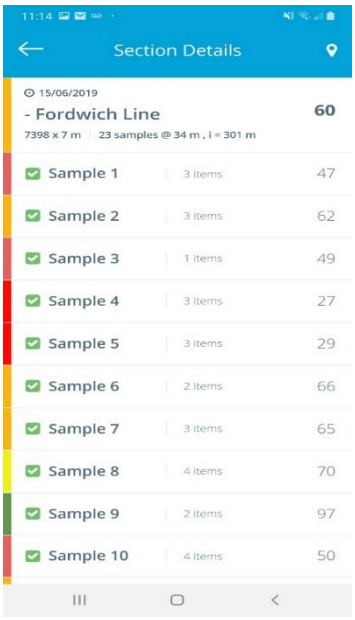


being divided into 4 sample sublots (25 m long each)to be evaluated

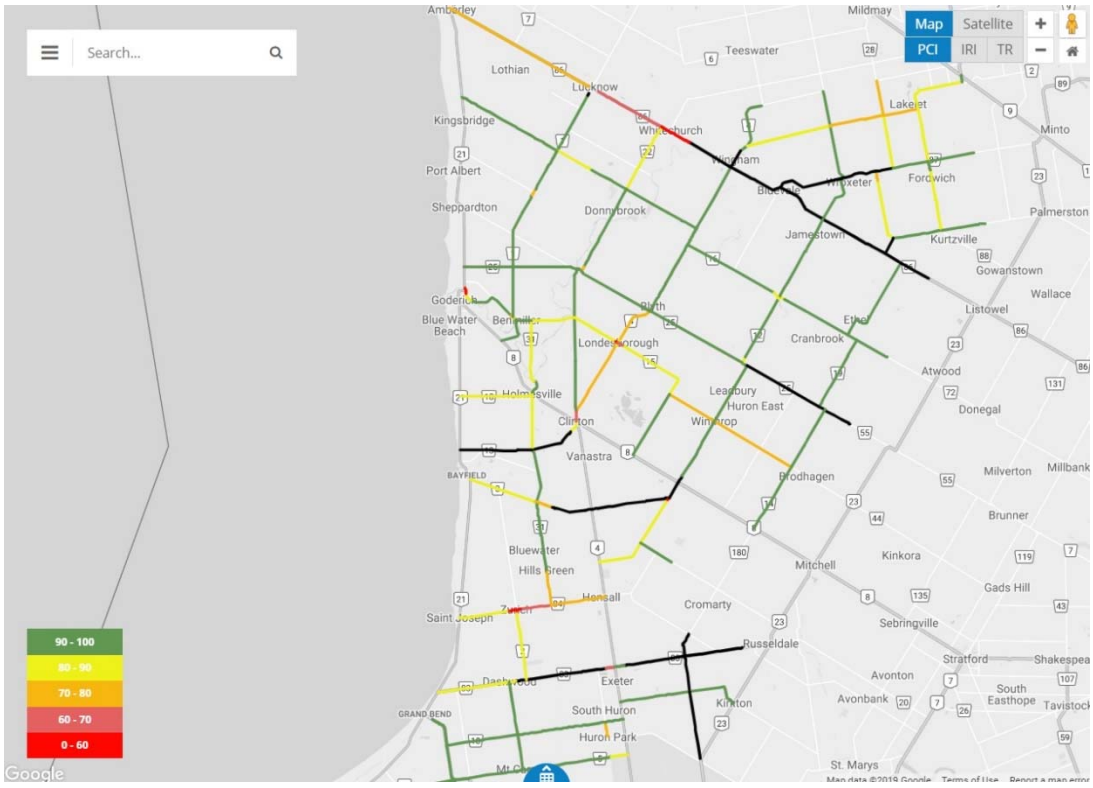
For each sample sublot, a staff member is required to measure the severity and length/area of each type distress observed within that sublot. The image on the right shows three different distresses observed within a sample sublot, their severity (M for Moderate and L for Low) and the measured length of the observed.



Once all the samples sublots have been rated, the app generates an average PCI rating for the entire road section. The image on the right shows the sample sublots evaluated for a road section and their respective individual PCI ratings, as well as the average PCI rating for the entire road section (60). Individual sublots are also colour coded on the left to indicate their condition rating.

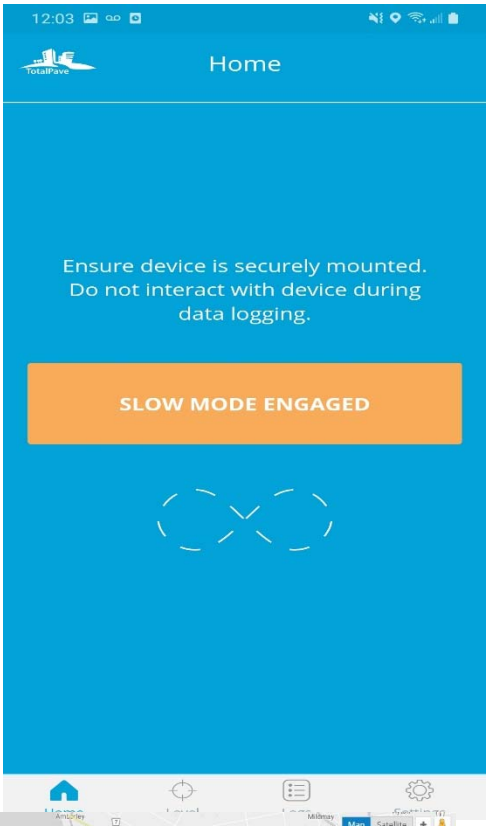


After evaluating the road sections, the output of the assessments can be viewed in the web portal for the app from a desktop computer which shows the condition ratings of the different county road sections as show in the map below. The results of the analysis are downloaded and transferred to the County Asset Management Systems (Worktech & GIS) for additional reporting and analysis supporting Asset Management Activities.

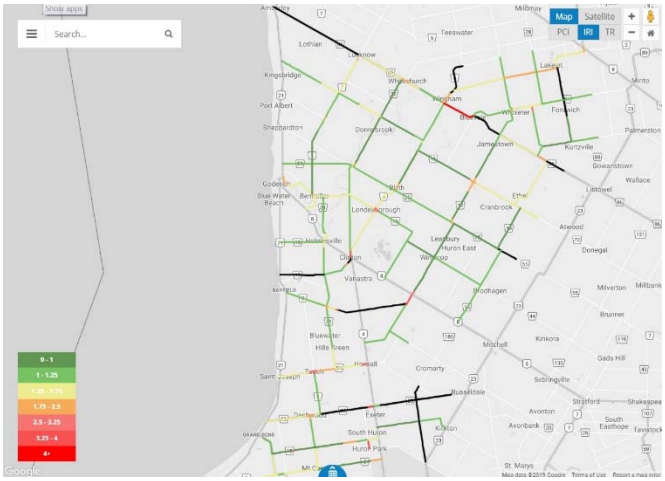


TotalPave IRI

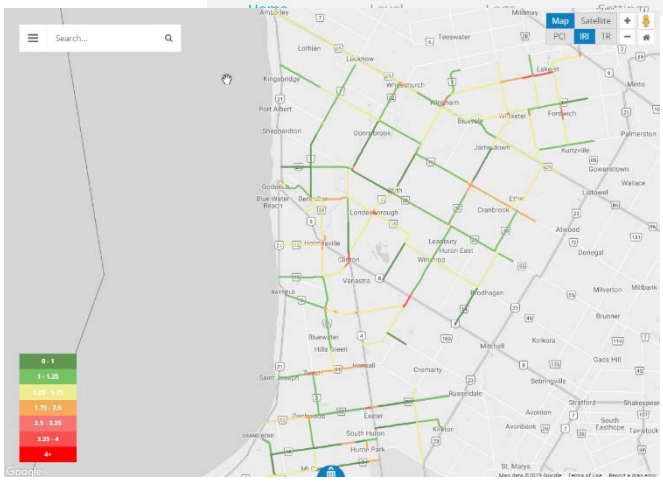
IRI (International Roughness Index) is an industry standard measure of estimating the roughness of a road by measuring longitudinal road profiles. The County has been using TotalPave IRI to evaluate the roughness and ride performance of the County roads during the summer and winter months. For this application, a smartphone is mounted on to the windshield of a County vehicle using a rigid mount. The user can then start collecting data by activating the data collection and driving over the county roads to be evaluated. The app is able to use the speed of the vehicle and the smartphone's built in GPS and magnetometer to produce the IRI (International Roughness Index) values. The image on the right shows the smartphone during data collection mode of the IRI.



Once the data has been collected using the mobile phone, it can be viewed on the web portal. The following images show the IRIs of the County road network in the summer and winter months respectively. Collecting IRIs in Summer and comparing with Winter allows us to evaluate which roads have full depth cracks allowing water into the base that contributes to frost heave and a faster rate of road degradation.



Summer RCI



Winter RCI

Appendix B – Pavement Preservation Options

The following outlines the most common pavement preservation options available in Ontario at this time.

Treatment Option	Intended Purpose	Description	Life Extension	Cost	Avg Annual Cost per km (Best case)
Fog Seal	Asphalt Rejuvenation	Light application of asphalt emulsion to the surface on aged and oxidized pavement surface. Rejuvenates the existing pavement. Mitigates water penetration.	1 – 2 years	$12,300 / km	$12,300
Reclamite	Asphalt Rejuvenation	Light application of maltene to the surface on aged and oxidized pavement surface. Rejuvenates the existing pavement. Mitigates water penetration. Restores AC in pavement (contains maltene)	3 – 5 years	$13,530 / km	$2,700
Slurry Seal	Crack Filling / Correcting Raveling	Mixture of asphalt emulsion and aggregate (sand sized) over an existing hard top surface to fill minor cracks, improve friction and provide a new wearing surface. Better suited for low volume roads.	3 – 6+ years	$36,900 / km	$6,150
Microsurfacing	Rut and Crack Filling / Minor re-profiling	Mixture of polymer modified emulsion and high quality aggregate, applied over an existing hard top surface in single or multiple coats. Can be used for filling low to moderate severity cracks, low severity rutting and improving surface friction. Better suited for medium to high volume roads.	5 – 7+ years	$57,400 / km	$8,200
Cape Seal	Crack Filling, Correcting minor alligator cracking.	Cape Seal is a mixture of Chip Seal applied with either slurry or microsurfacing. Provides the benefits of a chip seal without the danger of loose stones etc. Considered a suitable alternative for moderate severity distresses that cannot be addressed by slurry seal or microsurfacing alone (such as low severity alligator cracking).	6 – 8 years	$61,500 to $73,800 / km	$7,700

Appendix C – Pavement Renewal Options

The following outline the most common pavement renewal options available in Ontario at this time.

Treatment Option	Intended Purpose	Description	Anticipated Service Life	Cost	Avg Annual Cost per km (Best case)	Road Base Impact
Mill & Pave	New Driving surface at low cost	Remove the existing asphalt surface and pave with new asphalt surface. Pros: Cost effective (cheapest rehabilitation alternative) Cons: Environmentally unfriendly (asphalt cant be recycled), reflective cracking (high likelihood)	8 – 12 years	$110,700 / km	$9,200	None
Hot In Place Recycling	New Driving surface at low cost by recycling existing asphalt (top lift only)	Recycle the existing asphalt (top lift only). Removes existing pavement (top 50 mm) by heating, addition of a rejuvenating agent and placing the recycled mix back as a surface course. Pros: 100 % Recycled material, reduced GHG emission, similar to mill and pave but doesn't require hauling away milled material. Cons: Reflective Cracking (high likelihood).	8 – 12 years	$114,800 / km	$9,600	None

Cold In Place Recycling	Recycle Existing Asphalt	Recycle the existing asphalt (partial depth) with an injection of asphalt emulsion. Pave with one or two lifts of new hot mix asphalt. Suitable for roads that are structurally sufficient with low – moderate severity distresses. Pros: Cost effective, environmentally friendly Cons: Reflective Cracking (low to medium likelihood). Requires mix design that may fail if CIR strategy is repeated.	12 – 15 years	$167,200 / km	$11,200	None
Full Depth Recycling	Recycle existing asphalt and granulars, improve structural capacity by strengthening the base.	Recycle the existing asphalt and granulars (full depth) by pulverizing and paving with hot mix asphalt. Price depends on which options are utilized: • Use of stabilizing agent such as foamed (expanded) asphalt or portland cement. • Pre-milling required or not • Paving with one or two lifts of Hot Mix Asphalt. Pros: Strengthens the existing base, long service life, no possibility of reflective cracking. Cons: Expensive, may require detouring or driving on granular surface,	15 – 18 years	$204,000 / km to $260,000 / km	$11,333	Base is improved likely extending the life of the base by approximately 40 years.

Full Reconstruction	Reconstruct the road with new base, subbase and asphalt.	Excavate and remove existing asphalt, granular materials (base and subbase) and hauled away from site. Reconstruct the road with new granular materials and asphalt surface. The reconstructed road will be restored to design grade (pavement grades increase with each rehabilitation). Horizontal and vertical design elements will be re-evaluated.	18 – 20 years	$451,000 / km	$22,550	Base is replaced resulting in a new life cycle of 50 years

Appendix D – Pavement Repair Options

The following outlines the most common pavement repair options.

Repair Method	Description	Life of Repair	Estimated Cost	Avg annual cost per m^2 (best case scenario)	Limitations of method.
Cold Mix	Simple emulsion/fine aggregate mix applied cold provided in bulk from local suppliers. Material bonds poorly and is often required to be repeated multiple times.	4 hrs to 1 yr	$15 / m^2	$15.00 / yr	Only effective in dry weather on distinct potholes.
Enhanced Cold Mix	Enhance emulsion/fine aggregate provided in small quantities. Material bonds better, and under ideal conditions may be a long-term repair for small deeper potholes.	1 day to 2 yrs	$90 / m^2	$45.00 / yr	Only effective on distinct potholes.
Crack Sealing	A hot rubberized liquid poured into cracks to prevent water from entering asphalt layers and/or road base.	1 to 3 yrs			Must be manually removed prior to subsequent asphalt renewals.
Spray Patch	Defect is blown dry, heated and layered with emulsion and stone chip. Forms a long lasting seal and cap over cracks, holes, and seams.	1 to 3 yrs	$1.24 / m^2	$0.41 / yr	Deep potholes will need to be patched first. Not currently available.
Hot Mix Patch	Old asphalt is milled out and replaced with new hot mix.	5 to10 yrs	$45 / m^2	$4.50 / yr	Only large patches can be done by contract and only in summer months. Small defects are repaired by replacing whole lane of asphalt.

All of the repair methods listed in the table on the prior page are used within Huron County. Most recently the spray patch method has been provided by Bruce County Staff as a trial in 2017 and 2018 as contracted services are locally un-available. Unfortunately, Bruce County is not able to continue offering this service to Huron County as Bruce County is fully committed with work on their own roads as well as local roads of their lower tiers.

This method has proven to be very effective at sealing cracked pavement, open seams, and capping defects repaired by cold-mix. Where it has been applied, it has significantly reduced the rate of localized pavement/base degradation enabling a deferral of road renewal.

The spray patch method has proven to be the most effective repair method at a very low cost, however, it is not available via contract. This method will require the County to purchase a spray patch unit and hire additional staff to operate it.

This repair method is also in demand by municipalities within the County on local roads and there is a strong interest by the lower tier public works managers to have the County provide this service to them on an as-needed basis. The following tables outline the capital investment and operating cost to enable County PW to spray patch County and Lower tier roads as-needed.

Spray Patch Estimated Capital Investment

	Units	**Estimated Purchase Cost**	Life Span	Annual Depreciation
Purchase of Spray Patching Equipment	1	$ 350,000	15 yrs	$ 23,333
20,000 Ltr - Onsite Emulsion Tank and Footing	1	$ 25,000	15 yrs	$ 1,667
Traffic Control Truck	1	$ 32,000	10 yrs	$ 3,200
Total		**$ 407,000**		**$ 28,200**

Spray Patch Estimated Operating Cost

	Estimated Hourly Cost	Annual Hours	Total Annual	Equipment	Materials	Salary & Benefits	Services
Spray Truck	$ 100.00	800	$80,000	$80,000			
Emulsion	$ 65.40	800	$52,320		$ 52,320		
Stone Chip	$ 18.20	800	$14,560		$ 14,560		
Annual Tank Winterization	$ 1.88	1	$ 1,500				$ 1,500
Operator spray patch unit	$ 50.00	800	$40,000			$ 40,000	
Backup Operator / Traffic Control	$ 50.00	800	$40,000			$ 40,000	
Traffic control truck	$ 30.00	800	$24,000				
Tank & Footing Depreciation	$ 0.40	800	$ 320				$ -
Estimated Revenue – Service to Local Municipalities	**($316)**	**32**	**($10,000)**				
Total	**$ 315.88**		**$242,700**	**$ 80,000**	**$ 66,880**	**$ 80,000**	**$ 1,500**
Cost per day	**$ 3,155**						
Cost per m^2	**$ 1.24**						

Note that it is intended that work done on lower tier roads is done as a shared service and on demand and would be billed to the lower tier based on actual costs providing a revenue to the County to offset the cost of the capital investment and annual operating expenses. This is an unknown quantity at this time and the service demand (and revenue potential) is likely higher then presented in the figures above.

Appendix E – Pavement Management Strategies

The following strategies are presented based on the information available on the County road network as well as information available in the industry. All costs shown in this appendix are for a representative 10 km section of arterial rural road reflecting the vast majority of road that the County maintains. Many of the same pavement strategies also apply to the urban sections of road, however, underground infrastructure life-cycles often define the schedule of full re-construction of the road above them. Each strategy is showing a life-cycle series of treatments over a 100 year period to provide a full perspective of life-cycle management of the road transportation network. All costs are shown based on 2019 values without inflation.

2016 Pavement Management Strategy

The strategy presented to Huron County Council in 2016 involves exclusively the Cold-In-Place rehabilitation method of pavements.

Rehab/Preservation Strategy	Year	Years since previous treatment	Cost
Initial Construction	1	0	$4,510,000
CIR	15	15	$1,672,800
CIR	27	12	$1,672,800
Reconstruction	39	12	$4,510,000
CIR	54	15	$1,672,800
CIR	66	12	$1,672,800
Reconstruction	78	12	$4,510,000
CIR	93	15	$1,672,800
CIR	105	12	$1,672,800
Total			$23,566,800

All costs are based on estimated from 2019. Inflation has not been accounted for.

TWO Reconstructions required over a 100 year period.

Most County Roads are around here

Average cost per year per km: $22,444

Our Mission: We cultivate a healthy environment for prosperous living.

While this is a sound strategy when all roads perform equally over time, recent work through Asset Management initiatives have revealed that this strategy can work in limited cases.

A second CIR (or even first CIR) is appropriate when the road base has not degraded and asphalt materials in the existing surface of the road yields appropriate strength when recycled. This can only be determined by sampling and testing both asphalt and base prior to determining which renewal strategy will provide the best return on investment.

It is also clear that CIR renewal is not always yielding the same life extension of the pavement and the second CIR renewal is achieving even less life extension as the first. While there some examples where a full 20 years life extension has been achieved using CIR, there are a number of examples where considerably less is being achieved.

As such, CIR has a higher than anticipated annual cost of maintaining pavements at the level of service expected (PCI > 60) when presented to Council in 2016. The chart on this page reflects what is the typical life extensions based on the information available at this time.

A1 Strategy - Industry Best Practice – Scenario 1

This strategy applies asset management best practices commonly referred to as: 'the right treatment, at the right time, on the right road'.

Rehab/Preservation Strategy	Year	Years since previous treatment	Anticipated PCI before Treatment	Anticipated PCI after Treatment	Cost
Initial Construction	-	0	--	100	$4,510,000
Asphalt Rejuvenator	12	12	78	78	$132,020
CIR	20	8	62	95	$1,672,800
Slurry Seal	32	12	73	73	$369,000
FDR	40	8	60	100	$2,665,000
Asphalt Rejuvenator	52	12	78	78	$132,000
CIR	63	11	60	95	$1,672,800
Microsurfacing	75	12	71	78	$651,900
Reconstruction	83	8	60	100	$4,510,000
Asphalt Rejuvenator	95	12	78	78	$132,020
		Total			$16,447,540

LOS "A" – Summary:
Over a 100 year period:

- 3 x Asphalt Rejuvenator
- 1 x Slurry Seal
- 1 x Microsurfacing
- 2 x CIR
- 1 x FDR
- 1 x Reconstruction

Average cost per year per km: $17,313

PCI always > 60

Our Mis

This particular strategy is suitable on a road where the first CIR is performing very well showing surface oxidation and very few surface defects, however, the base is not fully achieving a full 50 year life expectation requiring a base remediation at 40 years and a reconstruction at 83 years of age.

In this scenario, there are a number of preservation techniques applied to achieve a low overall annual cost of providing a road at a high service level through the entire life of the road.

Note: This is a representative example of what treatments might be applied to a section of road based on actual condition of road and base. Each section of road degrades differently based on traffic loadings, construction, and a number of variables with materials, and drainage conditions. As such, actual treatments applied on a particular road will vary based on information available at the time of need.

A2 Strategy – Industry Best Practice – Scenario 2

This strategy applies asset management best practices commonly referred to as: 'the right treatment, at the right time, on the right road'.

Rehab/Preservation Strategy	Year	Years since previous treatment	Anticipated PCI before Treatment	Anticipated PCI after Treatment	Cost
Initial Construction	-	0	--	100	$4,510,000
Asphalt Rejuvenator	12	12	78	78	$132,020
CIR	20	8	62	95	$1,672,800
HIR	32	12	73	95	$1,148,000
Slurry Seal	42	10	78	78	$369,000
FDR	50	8	60	100	$2,665,000
Asphalt Rejuvenator	62	12	78	78	$132,000
CIR	70	8	62	95	$1,672,800
HIR	82	12	73	95	$1,148,000
Microsurfacing	92	10	71	78	$651,900
Reconstruction	100	8	60	100	$4,510,000
		Total			$18,611,520

LOS "A" – Summary:
Over a 100 year period:

- 2 x Asphalt Rejuvenator
- 1 x Slurry Seal
- 1 x Microsurfacing
- 2 x CIR
- 2 x HIR
- 1 x FDR
- 1 x Reconstruction

Average cost per year per km: $18,611

PCI always > 60

This particular strategy is suitable on a road where the first CIR is performing very well, but the top layer of new asphalt laid on top of the initial CIR is not performing as well. In this case that layer is fully recycled in place using Hot-in-Place (HIR).

The base of this particular road is achieving a full 50 year life prior to being renewed using Full Depth Recycling (FDR) and delaying a full reconstruction to the 100 year mark.

In this scenario, there are a number of preservation techniques applied to achieve a low overall annual cost of providing a road at a high service level through the entire life of the road.

Note: This is a representative example of what treatments might be applied to a section of road based on actual condition of road and base. Each section of road degrades differently based on traffic loadings, construction, and a number of variables with materials, and drainage conditions. As such, actual treatments applied on a particular road will vary based on information available at the time of need.

B Strategy – Cheapest Short Term Fix Strategy

This strategy is common amongst municipalities in which road budgets are constrained to only enable the cheapest treatment that can be done in each year.

Rehab/Preservation Strategy	Year	Years since previous treatment	Anticipated PCI before Treatment	Anticipated PCI after Treatment	Cost
Initial Construction	-	0	--	100	$4,510,000
Slurry Seal	12	12	78	78	$369,000
Microsurfacing	16	4	66	70	$651,900
Mill & Pave 1 lift	21	5	58	90	$1,100,000
Slurry Seal	31	10	65	65	$369,000
Microsurfacing	35	4	55	60	$651,900
Mill & Pave 1 lift	40	5	45	85	$1,100,000
FDR	50	10	49	100	$2,665,000
				Total	$11,416,800

LOS "B" – Summary:
Over a 100 year period:

- 4 x Slurry Seal
- 4 x Microsurfacing
- 4 x Mill & Pave
- 1 x Reconstruction
- 1 x FDR
- No CIR

Average cost per year per km: $22,833

PCI < 60 @ 25th percentile

Lowest PCI over 100 years: 45

This is typically a re-active approach based on public complaints or best-efforts to spread limited funding on some form of treatment to the most roads possible. This is commonly referred to as the 'make the road look black' method.

In this scenario, short term results are achieved that satisfy the public in the short term. It achieves a low cash-flow capital funding level after the road is constructed, however, a full reconstruction is needed much earlier resulting in a much higher cost to the tax payer in the long term. It typically results in a larger portion of roads in a state lower than the current service levels at any given time.

Additionally, there is a very significant operational cost involved having crews continually identifying and filling potholes and other defects. There is also significant systems that must be implemented to track road defects and ensure crews are dispatched to each defect on a timeline defined within the MMS. Without those processes and systems in place, the County has a significant liability risk as there is a high probability of receiving a higher number of claims that would be difficult to defend.

This is a common state in many urban and rural jurisdictions and there is opportunity to improve service levels and lower costs in the long term an increase in capital funding and up-front investments.

C Strategy – Lowest Effort Strategy

This strategy is common amongst municipalities having minimal staff or expertise in pavement management.

Rehab/Preservation Strategy	Year	Years since previous treatment	Anticipated PCI before Treatment	Anticipated PCI after Treatment	Cost
Initial Construction	1	0	--	100	$4,510,000
CIR	25	25	45	100	$1,672,800
FDR	45	20	45	100	$2,665,000
CIR	70	25	45	100	$1,672,800
Reconstruction	90	20	45	100	$4,510,000
				Total	$15,030,600

LOS "C" – Summary:

- 2 x CIR
- 1x FDR
- 1 x Reconstruction

Average cost per year per km: $16,700

PCI < 60 @ 25th percentile

Lowest PCI over 100 years: 45

This is commonly known as the 'run-to-failure' approach in which roads are renewed only when they have effectively failed and are no longer maintainable in a good state of repair and meet minimum maintenance standards (MMS).

In this scenario, while the capital cost appears relatively low, there is a very significant operational cost involved having crews continually identifying and filling potholes and addressing other defects. There is also significant systems that must be implemented to track road defects and ensure crews are dispatched to each defect on a timeline defined within the MMS. Without those processes and systems in place, an increased level of risk is exists as there is a high probability of receiving a higher number of claims that would be difficult to defend.

This is a common strategy in many urban and rural jurisdictions and is very difficult to achieve higher service levels without significant increase in capital funding.

Appendix F – Example of Good Renewal Strategy applied on Wrong Road

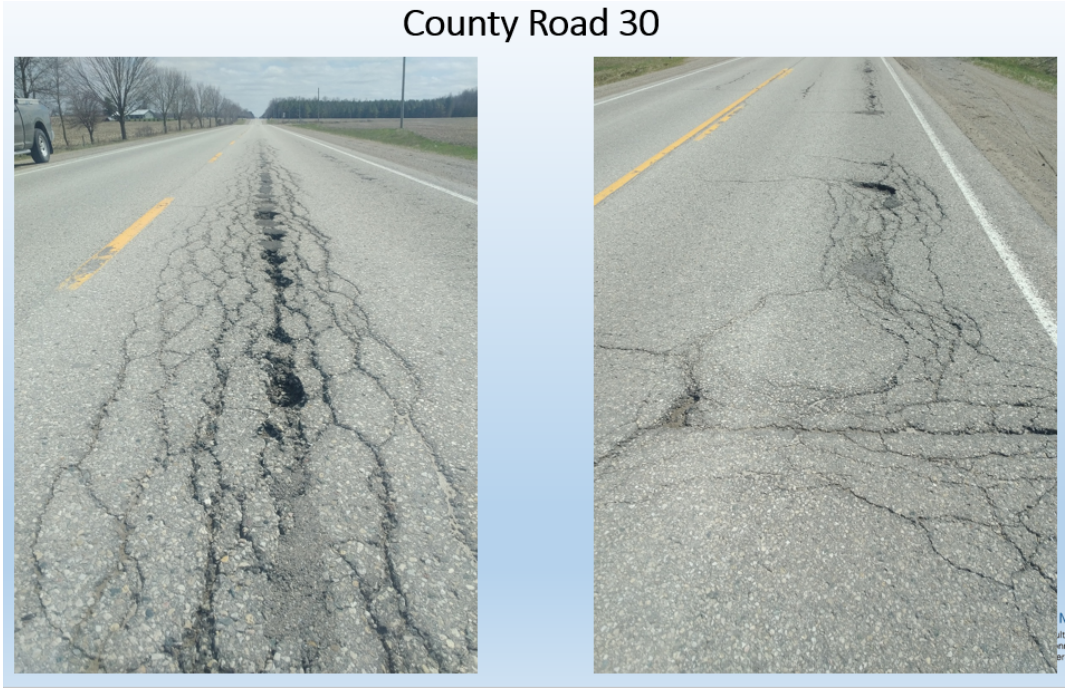
Throughout the industry and in every jurisdiction, there are many, many examples of where a good pavement treatment has been applied resulting in poor results. In the majority of instances, it is a result of either a 'better than nothing' method of pavement management, or it is due to a mis-match between treatment and the actual road & base condition. Commonly known as the 'right treatment on the wrong road or the wrong time'.

A common analogy would be painting water damaged drywall in a house without replacing the blistered sections of drywall. While it may initially look OK, within a few months, the paint is likely to peel, and the drywall will likely further blister and crumble.

In the context of pavements, applying a micro-pavement treatment on a road that has significant cracks and some rutting will look good the first summer, however, within 2 years (or less), the cracking will re-appear and the surface layer of paving will de-laminate, and high-points will be scraped off by plows. In this case significant distresses are likely to appear in the 3rd year. If the micro-pavement was applied to a road that was still structurally sound, this treatment would have likely deferred any significant distresses for 10 years or more.

In Huron County, Cold-in-place pavement renewal has been a very successful strategy in the phased-construction of most of the roads, however, it is not the universal solution. There are several examples where cold-in-place (a good treatment option) has been applied where it is not yielding the same results as it has in other places.

County road 30 was re-constructed in 1988 with an initial layer of asphalt. In 2006, as per the phased construction strategy, it was cold-in-place recycled (CIR) with a top lift of asphalt.



On this particular road, surface distresses began to appear in 2012 (7 years after CIR) and exponentially

increased starting in 2016 (11 years after paving). These particular stresses are a clear indication that base has deteriated and the structure of the road is compromised.

While CIR renewal could be repeated on this road, it is likely to degrade quickly given the condition of the road base. If CIR were applied to this road, it is likely that it would show significant stresses within 5 years.

In this case, the best value treatment would be a full depth recycle and new asphalt. Applying Asset Management and Financial principals, the following demonstrates the value of this assessment.

VALUE ANALYSIS
COUNTY ROAD 30
FROM COUNTY ROAD 7 TO FORDWICH LINE (7.4 KM)

REHAB STRATEGY	TOTAL COST ($)	TOTAL ANTICIPATED LIFE (in years)	COST / KM ($)	COST / YEAR OF LIFE ($) For 7.4 km section of this road
FDR AND PAVE Mill 50 mm existing asphalt Pulverize 250 mm Pave 110 mm	$ 1,822,481.00	18	$ 246,281.22	$ 101,248.94
CIR AND PAVE CIR 120 mm Pave 50 mm	$ 1,311,149.91	10	$ 177,182.42	$ 131,114.99
MILL & PAVE Mill 50 mm Pave 50 mm	$ 917,036.15	8	$ 123,923.80	$ 114,629.52
COMPARITIVE VALUE ANALYSIS for 2006 work				
FDR AND PAVE (2006) Pulverize 250 mm Pave 110 mm	$ 1,652,953.92	18	$ 223,372.15	$ 91,830.77
CIR AND PAVE (2006) CIR 120 mm Pave 50 mm	$ 1,285,734.00	12	$ 173,747.84	$ 107,144.50

A value analysis is often conducted as a decision support tool to help understand the best value treatment (return on investment) for a partcular section of road. At this point in time, based on the condition of the road and information we have for the road, it is estimated that three different rehabiltation options should be considered. Each of them provide benefit and each would have varying life expectancy based on existing condition of the road base, drainage, and layers of asphalt. In this scenario, it is estimated that full depth recycling method would provide a longer life as it rehabilitates a base that has been compromised. Both a CIR and Mill & Pave options are cheaper up-front capital costs, but neither of them resolve the underlying issue of a failing base and would yield limited results. This analysis clearly shows the best return on investment is the FDR option having a lower annual cost.

For a comparison, the same analysis is shown for the same section of road prior to the CIR that was applied. The decision to undertake CIR in 2006 was based on an assumption that the base was sound and CIR would last 18+ years. While CIR on some roads has provided 18+ years of service, this is not the case for all roads. Through the progressive implementation of Asset Management at the County, a more comprehensive road and condition database has been implemented and staff now has ready access to information that provides the ability to make better informed decisions of pavement rehabilitation options than was available in the past.

Appendix G – Impact of Spray Patching Program on Capital

Implementing a regular and ongoing spray patching program to pro-actively treat pavement defects is estimated to reduce the sustainable funding requirements for roads by approximately $1.1M annually as outlined in the chart on the next page.

With a capital investment of $407,000 and an annual operating cost of $252,700, the return on investment (ROI) is approximately 5 months.

NOTE: The current capital funding is well below the sustainable levels required to sustain the County road network. Implementing a spray patching program does not equate to a $1.1M reduction in the road capital funding in the current budgets.

Treatment	Cost / km	Treatment Life	Strategy Cost per KM per year	Spray Patch Cost / km	Pavement Life Extension Years with Spray Patch	Treatment cost / km / year with spray patch life extension	Annual Avg Savings with Spray Patch life extension / km	Annual Savings on Capital Funding for entire Road network
Mill & Pave	$ 110,700	12	$ 9,225	$ 1,500	1	$ 8,631	$ 594	$ 445,673
Hot in Place Recycling	$ 114,800	12	$ 9,567	$ 1,500	1	$ 8,946	$ 621	$ 465,385
Cold-in-Place	$ 167,200	15	$ 11,147	$ 1,500	1	$ 10,544	$ 603	$ 452,188
Full Depth Recycling	$ 204,000	18	$ 11,333	$ 1,500	1	$ 10,816	$ 518	$ 388,158
Full Reconstruction	$ 451,000	20	$ 22,550	$ 1,500	1	$ 21,548	$ 1,002	$ 751,786
							Avg Annual Savings	$ 500,637.76

Treatment	Cost / km	Treatment Life	Strategy Cost per KM per year	Spray Patch Cost / km	Pavement Life Extension Years with Spray Patch	Treatment cost / km / year with spray patch life extension	Annual Avg Savings with Spray Patch life extension / km	Annual Savings on Capital Funding for entire Road network
Mill & Pave	$ 110,700	12	$ 9,225	$ 1,500	2	$ 8,121	$ 1,104	$ 827,679
Hot in Place Recycling	$ 114,800	12	$ 9,567	$ 1,500	2	$ 8,414	$ 1,152	$ 864,286
Cold-in-Place	$ 167,200	15	$ 11,147	$ 1,500	2	$ 10,012	$ 1,135	$ 851,176
Full Depth Recycling	$ 204,000	18	$ 11,333	$ 1,500	2	$ 10,350	$ 983	$ 737,500
Full Reconstruction	$ 451,000	20	$ 22,550	$ 1,500	2	$ 20,636	$ 1,914	$ 1,435,227
							Avg Annual Savings	$ 943,173.61

Treatment	Cost / km	Treatment Life	Strategy Cost per KM per year	Spray Patch Cost / km	Pavement Life Extension Years with Spray Patch	Treatment cost / km / year with spray patch life extension	Annual Avg Savings with Spray Patch life extension / km	Annual Savings on Capital Funding for entire Road network
Mill & Pave	$ 110,700	12	$ 9,225	$ 1,500	3	$ 7,680	$ 1,545	$ 1,158,750
Hot in Place Recycling	$ 114,800	12	$ 9,567	$ 1,500	3	$ 7,953	$ 1,613	$ 1,210,000
Cold-in-Place	$ 167,200	15	$ 11,147	$ 1,500	3	$ 9,539	$ 1,608	$ 1,205,833
Full Depth Recycling	$ 204,000	18	$ 11,333	$ 1,500	3	$ 9,929	$ 1,405	$ 1,053,571
Full Reconstruction	$ 451,000	20	$ 22,550	$ 1,500	3	$ 19,804	$ 2,746	$ 2,059,239
							Avg Annual Savings	$ 1,337,478.78

Treatment	Cost / km	Treatment Life	Strategy Cost per KM per year	Spray Patch Cost / km	Life Extension Years with Spray Patch	Treatment cost / km / year with spray patch life extension	Savings with Spray Patch life extension / km	Annual Savings on Capital Funding for entire Road network
Mill & Pave	$ 110,700	12	$ 9,225	$ 1,500	4	$ 7,294	$ 1,931	$ 1,448,438
Hot in Place Recycling	$ 114,800	12	$ 9,567	$ 1,500	4	$ 7,550	$ 2,017	$ 1,512,500
Cold-in-Place	$ 167,200	15	$ 11,147	$ 1,500	4	$ 9,116	$ 2,031	$ 1,523,158
Full Depth Recycling	$ 204,000	18	$ 11,333	$ 1,500	4	$ 9,545	$ 1,788	$ 1,340,909
Full Reconstruction	$ 451,000	20	$ 22,550	$ 1,500	4	$ 19,042	$ 3,508	$ 2,631,250
							Avg Annual Savings	$ 1,691,250.90

Avg network savings assuming a range of treatments and range of life extensions	$ 1,118,135.26