



UNICIPALITY OF

**PORT HOPE**

WORKS & ENGINEERING

# TRANSPORTATION

**Asset Management  
Plan • May 2022**

Version 1.1



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# Introduction

## Background

Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure requires all municipalities to prepare baseline asset management plans for their core municipal infrastructure assets supporting the delivery of drinking water, wastewater, stormwater, and transportation. The Municipality of Port Hope has a developing Asset Management program that is advancing and refining a clear picture of its infrastructure assets and maintaining them responsibly, balancing affordability, risk, and service levels. The Provincial regulation requires the Municipality shift its reporting slightly to present the cost of maintaining all core assets in their present state, with no changes to the service level, for the next 10 years.

To meet the Provincial requirements, the Municipality of Port Hope has created this first version of its **Transportation Asset Management Plan (Transportation AMP)**. It reports the current state of the assets, levels of service provided, strategies, and activities applied by the Municipality, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making.



## Asset Categories and Types

The Transportation AMP satisfies the Provincial requirements for our roads, bridges, and culverts; and also includes other assets that support transportation services. These assets enable and support the movement of people and goods across the municipality in both urban and rural areas. (Assets that support public transit will be covered in a separate, future asset management plan.)

## Transportation Asset Categories and Types

### Arterial Urban



### Arterial Semi-Urban



### Arterial Rural



**Arterial roads** shall have a minimum right-of-way width of 26 metres for 2 lanes and 30 metres for 4 lanes and are designed to facilitate high levels of trip making to and from major trip-generating sectors.

### Collector Urban



### Collector Semi-Urban



### Collector Rural



**Collector roads**, are existing and proposed roads with a minimum of 2 traffic lanes and a right-of-way width of 23 to 26 metres, which are designed to collect and carry local traffic to, and from the arterial roads and to provide access to land.

### Local Urban



### Local Semi-Urban



### Local Rural



**Local roads** are either existing or proposed roads with 2 traffic lanes that are designed primarily to provide access to land. The right-of-way width for a local road shall generally be 20 metres. In newer subdivision proposals, consideration shall be given to allowing local roads with rights-of-way less than 20 metres wide. Local roads should be designed to discourage the movement of through traffic and carry low traffic volumes at low speeds such that the quality of life along the road is good. Notwithstanding the above comments, all roads servicing industrial areas shall have a minimum right-of-way width of 26 metres.

## Bridges



A **bridge** is classified as an overland structure carrying a road, footpath, or railroad across a river, ravine, road, railroad, or other obstacle

## Large Diameter Culverts



**Large Diameter Culverts** are a buried structure which carries a road or footpath allowing water to traverse it's natural path. Often preferred to bridges for there economy, reduced maintenance and flexibility of alignment approaches, they are however restricted by significant volume or size of floating or other debris is anticipated.

### Culverts



**Culverts** are a buried structure which carries a road or footpath while allowing stormwater to pass through.

### Retaining Walls



**Retaining walls** are relatively rigid walls used for supporting soil laterally so that it can be retained at different levels on the two sides

### Guiderails



Intended to steer and "guide" vehicles back onto the road, **guiderails** can be found throughout the Municipality due to the variances in elevation throughout the terrain

## Streetlights



Used in areas of higher traffic volume or risk, a **streetlight** is a light usually mounted on a pole and constituting one of a series, spaced at intervals along the transportation system.

## Traffic Control Signals



**Traffic control signals** are electronic devices that are designed to assign the right of way to the various traffic and pedestrian movements at an intersection

## Pedestrian Concrete Sidewalks



Being a surfaced walkway, separated from the roadway, usually of concrete and following the existing ground surface (not at permanent grade), **sidewalks** are found in certain areas within the urban boundary.



## State of Local Infrastructure

### Inventory and Valuation

The assets covered in the Transportation AMP have a replacement value of approximately **\$391.43 million**. This includes an inventory of over 59 lane kilometers of arterial roads, 151 lane kilometers of collector roads, 481 kilometres of local roads, 20 Bridges, 4 pedestrian bridges and 41 large diameter culverts, (medium culverts units, 4 retaining walls, 42 areas with guiderail that are being collected and will be reported in the 2025 update), and 69 kilometers of sidewalk.

	Roads	Bridges and Bridge Culverts
<b>Inventory</b>	<p><b>Arterial</b></p> <ul style="list-style-type: none"> <li>• 27.8 lane kilometers of 2 lane rural</li> <li>• 7.4 lane kilometers of 2 lane semi-urban</li> <li>• 11.4 lane kilometers of 2 lane urban</li> <li>• 3.9 lane kilometers of 3 lane urban</li> <li>• 8.0 lane kilometers of 4 lane urban</li> </ul> <p><b>Collector</b></p> <ul style="list-style-type: none"> <li>• 99.8 lane kilometers of 2 lane rural</li> <li>• 16.6 lane kilometers of 2 lane semi-urban</li> <li>• 33.8 lane kilometers of 2 lane urban</li> <li>• 0.4 lane kilometers of 4 lane urban</li> </ul> <p><b>Local</b></p> <ul style="list-style-type: none"> <li>• 376.0 lane kilometers of 2 lane rural</li> <li>• 54.0 lane kilometers of 2 semi-urban</li> <li>• 50.6 lane kilometers of 2 lane urban</li> </ul>	<ul style="list-style-type: none"> <li>• 20 Bridges</li> <li>• 4 Pedestrian bridges</li> <li>• 41 Bridge Culverts</li> </ul>
<b>Replacement Costs</b>	<b>\$321,730,410</b>	<b>\$55,675,000</b>

	Other Structures	Sidewalks
<b>Inventory</b>	<ul style="list-style-type: none"> <li>• Medium Culverts</li> <li>• Retaining Walls</li> <li>• Guiderails</li> <li>• 1822 Streetlights</li> <li>• 8 Traffic Control Signals</li> </ul>	<ul style="list-style-type: none"> <li>• 69 kilometers of sidewalk</li> </ul>
<b>Replacement Cost</b>	<p>Units and Replacement costs will be included in the 2025 update for medium culverts, retaining walls and guiderails</p> <p>The 2016 AMP reported a replacement cost of:</p>	<b>\$9,371,182</b>

	Other Structures	Sidewalks
	<b>\$2,964,383</b> for 1654 streetlights and <b>\$1,687,300</b> for the traffic control signals These will be reviewed in the 2025 update.	

Replacement costs for arterial and collector roads are based on benchmark costs for roads projects, as identified in Section 5.4.1 of the 2019 Development Charges Study. Local roads were added to complete the inventory analysis. Costs were adjusted to 2022 using Non-Residential Building Construction Price Index (NRBCPI).

Replacement costs for bridges and bridge culverts are based on Appendix A-2: Asset information Summary from the OSIM Inspection Report (HP Engineering, 2019). Replacement cost reflects current geometric standards (i.e., not existing geometry of the structure). Costs were adjusted to 2022 using the NRBCPI.

Replacement costs for sidewalks are based on benchmark project pricing from tenders received for 2022 capital works and are inclusive of removal, base aggregate, and concrete. In correlation to the other asset classes The Transportation AMP replacement costs can be related to the table below.

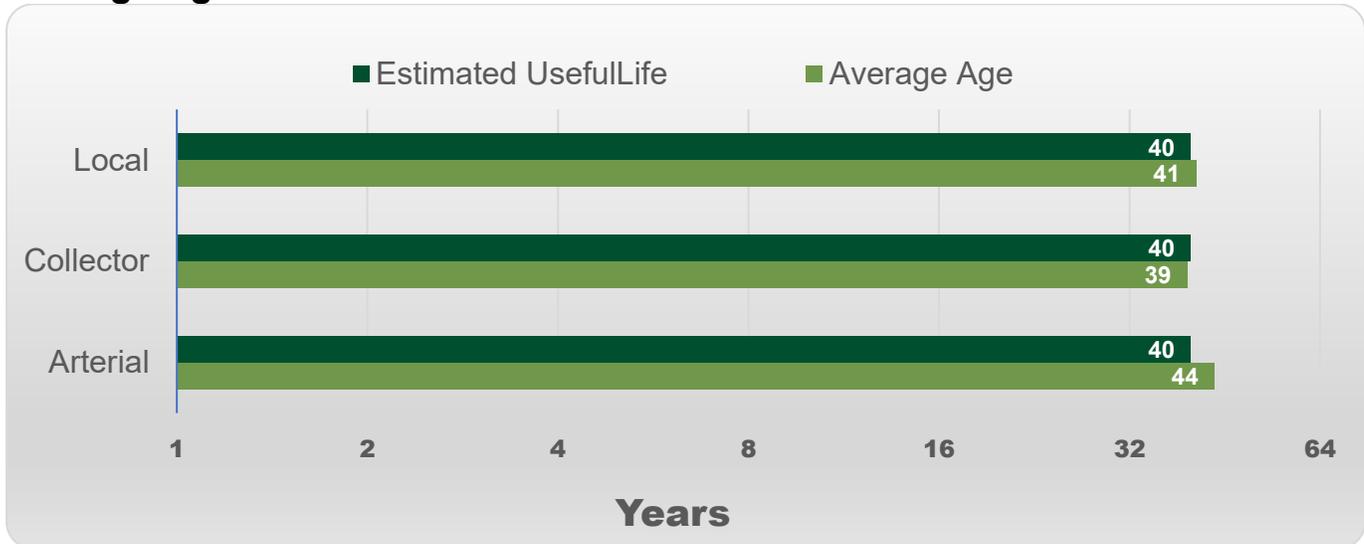


Asset Class	Quantity	Unit	Historical Cost	Replacement Value	Historical (3 year) average of actual annual replacement	Required Annual Lifecycle Cost	Average annual Lifecycle Cost as % of Replacement Cost
<b>Bridges &amp; Culverts</b>	20	each	\$7.23 million	\$55.68 million	0	\$1.13 million	2%
<b>Water Facilities</b>	5	each	\$24.40 million	\$48.27 million	\$0.41 million	\$1.61 million	3%
<b>Wastewater Facilities</b>	6	each	\$40.22 million	\$65.14 million	\$0.13 million	\$1.87 million	3%
<b>Other Facilities</b>	35	each	\$29.62 million	\$58.98 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
<b>Water Linear</b>	96	km	\$30.56 million	\$139.16 million	\$1.79 million	\$1.86 million	2%
<b>Wastewater Linear</b>	83	km	\$17.86 million	\$123.60 million	\$1.36 million	\$2.36 million	2%
<b>Transportation Services</b>	690	km	\$49.27 million	\$321.73 million	\$1.14 million	\$8.04 million	2%
<b>Storm Sewer Linear</b>	66	km	\$17.53 million	\$92.32 million	\$0.34 million	\$1.89 million	2.7% for SWMP & 2.0% for linear
<b>Equipment</b>	140	each	\$2.59 million	\$3.19 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
<b>Land Improvements</b>	208	each	\$9.21 million	\$14.90 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
<b>Technology</b>	29	each	\$2.52 million	\$2.93 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
<b>Vehicles</b>	158	each	\$11.68 million	\$14.26 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
<b>Totals</b>			<b>\$242.68 million</b>	<b>\$940.17 million</b>	<b>\$5.18 million</b>	<b>\$18.74 million</b>	

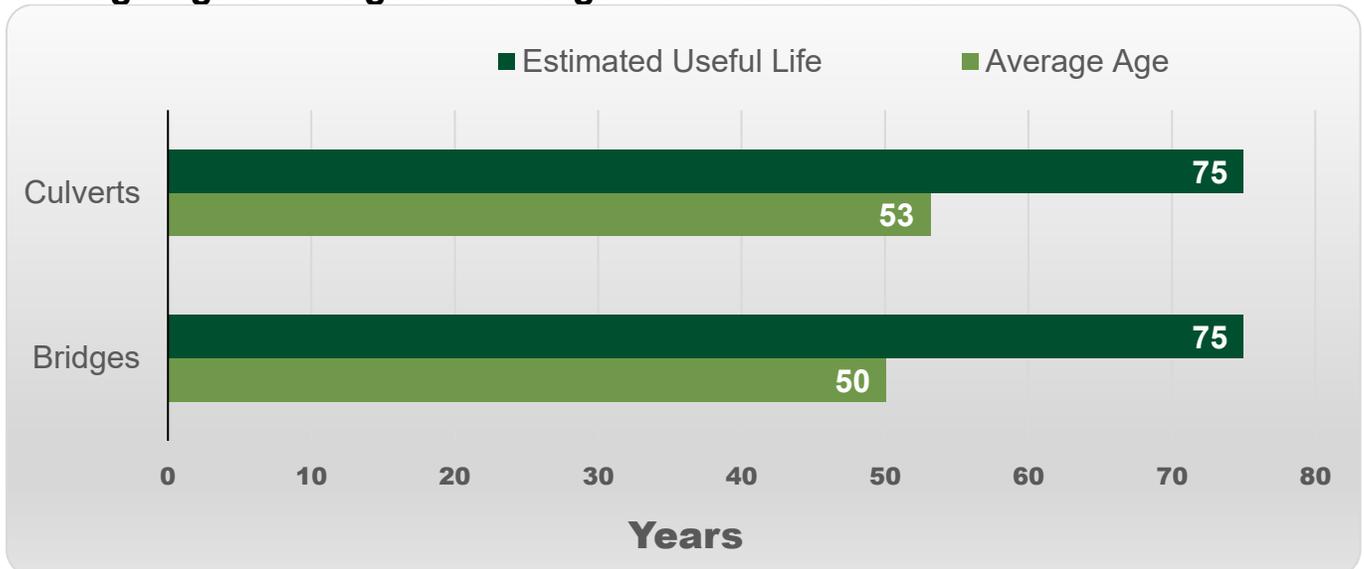
## Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age of the Municipality’s road network, bridges and major culverts is shown in the figure below, however since construction, various assets have been renewed or otherwise maintained to ensure reliable operation. Where construction dates were unavailable in our inventories and GIS mapping, construction dates have been assumed to correspond with other proximate linear infrastructure.

### Average Age of Roads



### Average Age of Bridges and Large Diameter Culverts



## Condition Collection

The Municipality assesses the condition of its Transportation assets on a regular basis using a variety of techniques, as summarized in the table below.

Asset Category	Condition Data Collection Techniques	Frequency
<b>Paved Roads</b>	<ol style="list-style-type: none"> <li>1. Vehicle-mounted sensing technology is used to assess road conditions in normal traffic flow. The system utilizes its technology to determine the health of each street and to identify road defects including potholes, bumps, and cracking. This data helps the municipality to identify and prioritize where repairs are needed and to ensure that streets are kept in the best condition.</li> <li>2. Staff also utilize Service Request data and Work order history.</li> <li>3. Visual Inspection (Varies by Road Class)</li> </ol>	<ol style="list-style-type: none"> <li>1. Currently the scans have been completely every four years.</li> <li>2. Varies</li> <li>3. In accordance with O.Reg. 239/02: Minimum Maintenance Standards for Municipal Highways</li> </ol>
<b>Gravel Roads</b>	Visual Inspection	In accordance with O.Reg. 239/02: Minimum Maintenance Standards for Municipal Highways
<b>Bridges and Large Diameter Culverts</b>	In compliance with Ontario Structure Inspection Manual requirements	Every two years.
<b>Medium Culverts</b>	Visual Inspection	Varies (typically reactive)
<b>Guiderails</b>	On-site visual inspection	Varies (typically reactive)
<b>Sidewalks</b>	detailed hazard/maintenance assessment	In accordance with O.Reg. 239 /02: Minimum Maintenance Standards for Municipal Highways

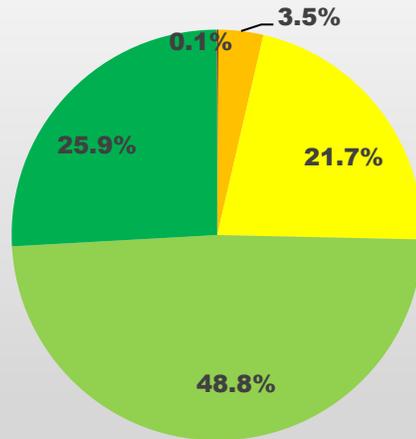
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from “Very Good” to “Very Poor” as shown in the table below. The next update to the AMP in 2025 will summarize condition as weighted inclusive of medium culverts, guiderails, and sidewalks.

## Transportation Condition Indices

Rating	Rating Description	Pavement Condition Index (PCI) for Roads	Condition Index Bridges and Bridge Culverts	Sidewalks
<b>Very Good</b>	<b>Very Good – Fit for Future</b> Well maintained, good condition, new or recently rehabilitated	80-100		5
<b>Good</b>	<b>Good – Adequate for Now</b> Acceptable, generally in mid stage of expected service life	60-79	$70 < \text{BCI} \leq 100$	4
<b>Fair</b>	<b>Fair – Requires Attention</b> Signs of deterioration, requires attention, some elements exhibit deficiencies	40-59	$60 < \text{BCI} \leq 70$	3
<b>Poor</b>	<b>Poor – Increasing potential of affecting service</b> Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-39	$0 < \text{BCI} \leq 60$	2
<b>Very Poor</b>	<b>Very Poor – Unfit for Sustained Service</b> Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.	0 to 19		1

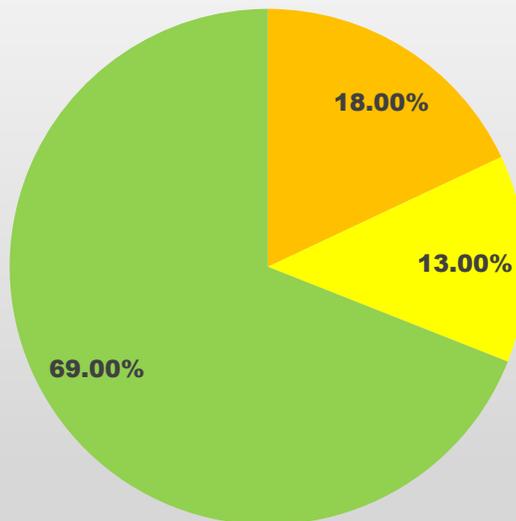
The overall condition of Transportation assets is Good and a breakdown for the various asset types is shown in the figures below.

### Road Condition by Percentage of Overall Length



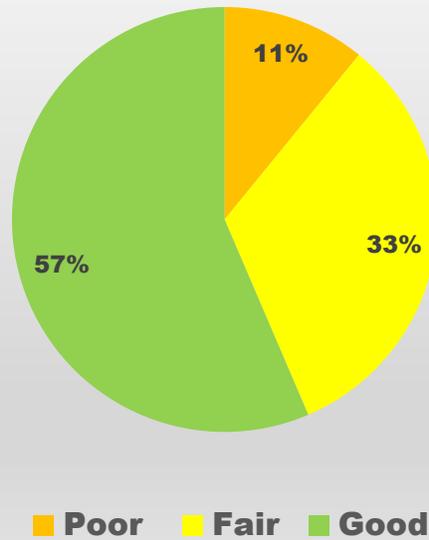
■ Very Poor ■ Poor ■ Fair ■ Good ■ Very Good

### Bridge Condition by Percentage of Total Replacement cost

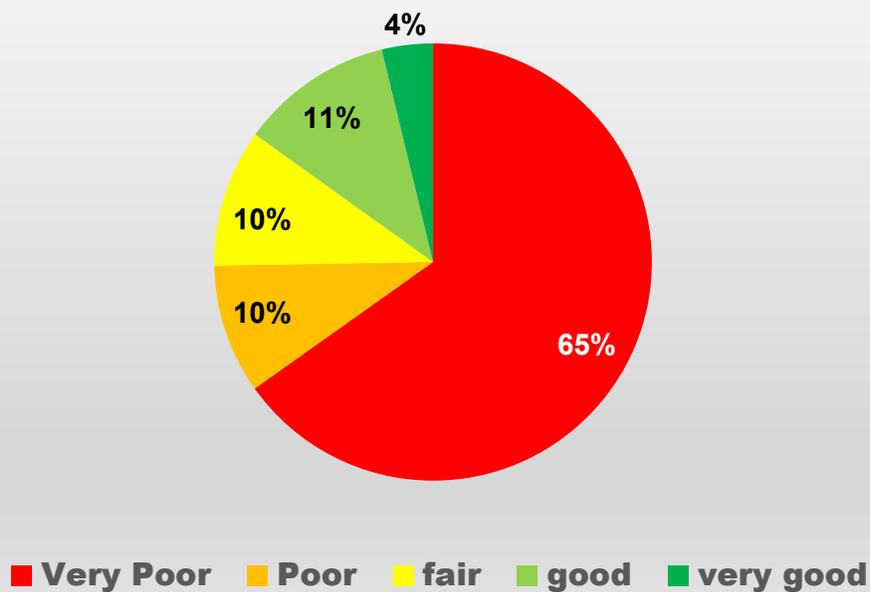


■ Poor ■ Fair ■ Good

### Bridge Culvert Condition by Percentage of Total Replacement Cost



### Sidewalk Condition by Percentage of Overall Length



## Levels of Service

The State of the Infrastructure section of the asset management plan provides an overview of the capital assets that support provision of the Municipality's services. The information presented in that section includes asset quantities, replacement cost valuation, age, and condition.

Physical condition of the assets is not sufficient to comprehensively capture the levels of service provided by the Municipality. To cover aspects of services not directly linked to asset condition, a broader levels of service framework has been developed. The levels of service framework presented in this section of the asset management plan contains the following elements:

- Service attributes which identify relevant aspects or characteristics of a service.
- Level of service statements which describe service attributes from a non-technical point of view.
- Performance measures which enable quantitative measurement to support the level-of-service statements.

For each performance measure, the current performance is reported. The Municipality will track and report on the current performance on an annual basis. In the future, targets for each performance measure will be chosen that balance regulatory requirements, the needs/expectations of service users, and various external trends and pressures, with the cost of delivering the service.

Two sets of tables are provided in each of the following subsections. The first table identifies relevant service attributes and defines the community levels of service for each of those attributes. The service attributes are intended to capture all major aspects that are of interest to the users of a service. The community levels of service include qualitative information such as images of assets providing different levels of service and maps, as well as statements describing what the Municipality intends to deliver, generally described from the user's perspective. The second table describes the performance measure(s) connected to each of the service attributes.

The Transportation AMP establishes preliminary level of service measures and the current level of service being provided. The measures align with both the Municipality's goals and Provincial requirements and recognize that transportation assets should provide:

- A road network that provides connectivity
- Bridges that support a wide range of users and vehicle types
- An active transportation network that is connected and accessible
- Streets and sidewalks, and pathways that offer safety, comfort and mobility for all users of the street regardless of their age, ability, or mode of transportation

- Roads and sidewalks that are clean and clear year round
- A low level of disruption to drivers, pedestrians and cyclists
- Roads, structures, sidewalks, pathways, and other assets that are kept in an acceptable state of repair
- Safe travel for all users
- A low level of greenhouse gas emissions

The Municipality owns and manages a variety of assets that support the provision of Transportation Services and that contribute to the overall level of service provided by the Municipality. These assets are summarized in the State of the Infrastructure section of the asset management plan. The focus for the time being has been placed on the level of service provided by the Municipality's roads and bridges, as these are considered core assets under Ontario Regulation 588/17 and must be included in the Municipality's asset management plan by July 1, 2022. The Municipality's Levels of Service framework for Transportation Services will be expanded over the coming years, to include all transportation assets that contribute in various ways to the overall level of service (e.g., sidewalks, retaining walls, guiderails, traffic signals, streetlights, signs and multi-purpose path).

## Community Qualitative Descriptions

Service Attribute	Community Levels of Service	Qualitative Description
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity. *	The scope of the Municipality's Road network is illustrated by the map in Appendix 1 and 2. The maps show the geographical distribution of municipal roads by surface type and class and identifies locations of the municipality's bridges and structural culverts.
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The Municipality's roads and bridges enable the movement of people and goods within and through the Municipality. In addition to passenger vehicles, the Municipality's roads and bridges also support public transit, commercial truck traffic, movement of agricultural equipment, and reliable emergency vehicle access to all areas of the Municipality. The broader transportation network also supports other transportation modes such as walking, cycling, and horseback riding.

Service Attribute	Community Levels of Service	Qualitative Description
Quality	Description or images that illustrate the different levels of road class pavement condition. *	The transportation network supports comfortable passage of vehicles. Example photos of roads in different condition states are shown in the tables below, respectively. A general description of how each condition state may affect the use of these assets is also provided in these figures.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges.	The transportation network supports comfortable passage of vehicles. Example photos of bridges in different condition states are shown in the tables below, respectively. A general description of how each condition state may affect the use of these assets is also provided in these figures.
Quality	Description or images of the condition of culverts and how this would affect use of the culverts.	The transportation network supports comfortable passage of vehicles. Example photos of culverts in different condition states are shown in the tables below, respectively. A general description of how each condition state may affect the use of these assets is also provided in these figures.

\* Required by Ontario Regulation 588/17.

(1) See Appendix 1 and 2 for maps of the Road Network.

## Technical Metrics

Service Attribute	Performance Measure	2020 2021 Performance
Scope	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality. *	0.7% lane-km / km <sup>2</sup>
Scope	Number of lane-kilometres of collector roads as a proportion of square kilometres of land area of the municipality.	0.5% lane-km / km <sup>2</sup>
Scope	Number of lane-kilometres of local roads as a proportion of square kilometres of land area of the municipality.	1.8% lane-km / km <sup>2</sup>
Scope	Percentage of bridges in the municipality with loading or dimensional restrictions.	15%
Quality	For paved roads in the municipality, the average pavement condition index value.*	72
Quality	For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).*	75
Quality	Percentage of paved roads with a PCI below 30	1%
Quality	For bridges in the municipality, the average bridge condition index value. *	75
Quality	For structural culverts in the municipality, the average bridge condition index value. *	69
Safety	Percentage of walking and cycling infrastructure that provides Low Traffic Stress	Future Measure
Sustainability	Community greenhouse gas emissions from transportation (kt CO <sub>2</sub> e)	Future measure

\* Required by Ontario Regulation 588/17.

### Levels of Road Class Condition

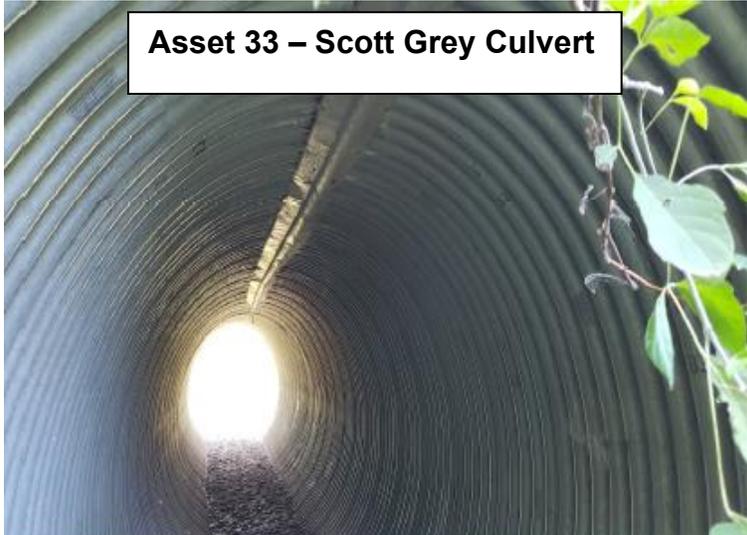
All classifications of road within the municipality are currently evaluated on the same condition scale based on MMS requirements for our Municipal highways. It is recommended that a Roads Need Assessment be completed to determine where different PCI thresholds and associated lifecycle events would prolong differing classifications estimated useful life at the lowest cost while maintaining Transportation service levels.

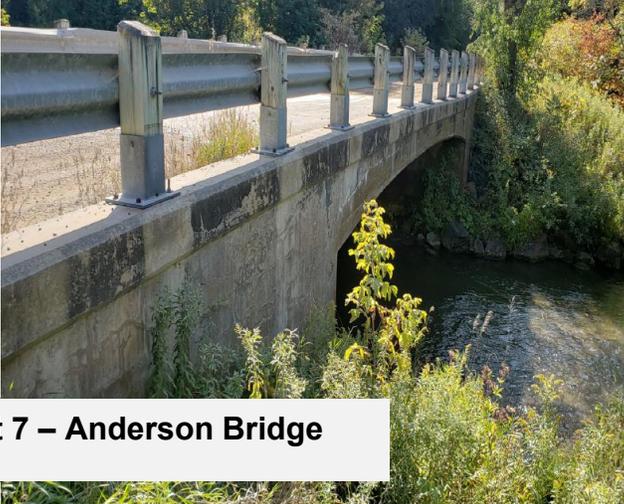
Pavement Condition Index (PCI) Range <sup>1</sup>	Condition State	Example Photo	Description	Maintenance Suggestion
80 < PCI ≤ 100	Excellent		<p>A very smooth ride.                      No major distresses.                      Possibly some crack seal in place.                      No maintenance required.</p>	<p><b>Defer Maintenance:</b>                      Pavement is in good condition and does not require maintenance.</p>

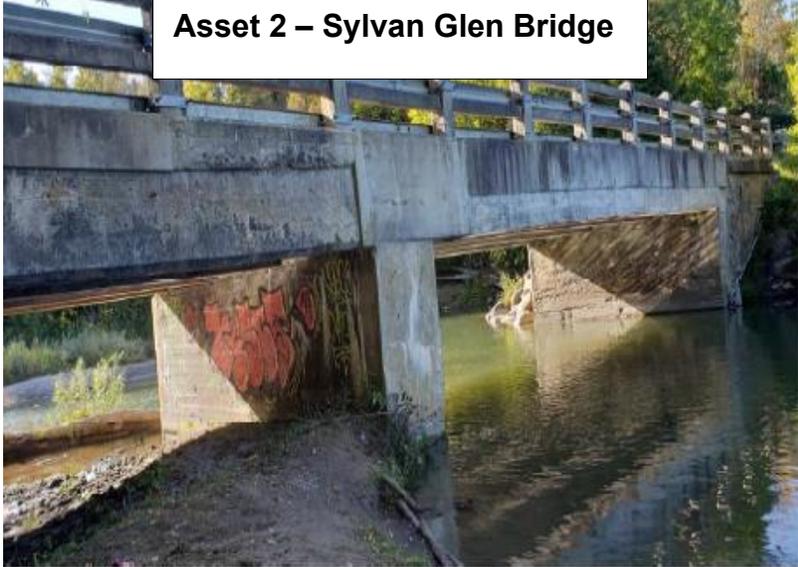
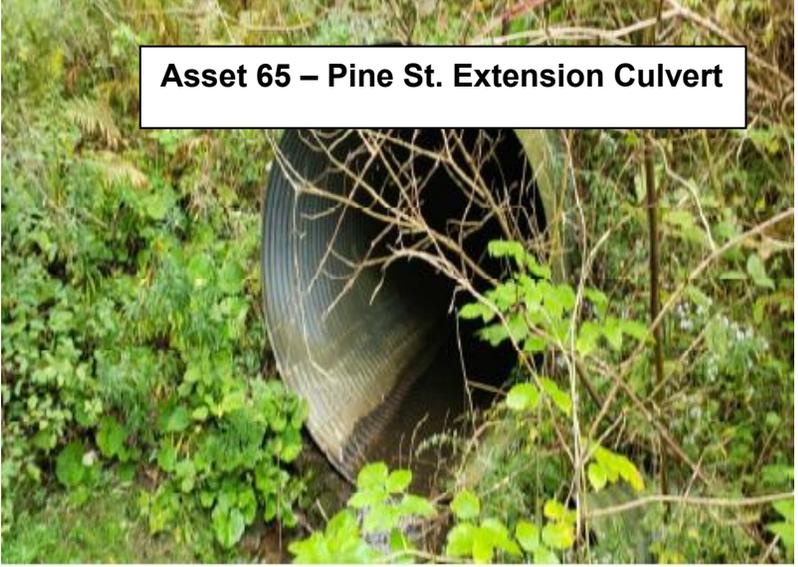
<sup>1</sup> The mapping of PCI values to Condition States (PCI Labels) was established based on the Municipality’s 2018 Roads Asset Management Plan (LAS Roads Assessment Service, 2018).

Pavement Condition Index (PCI) Range <sup>1</sup>	Condition State	Example Photo	Description	Maintenance Suggestion
60 < PCI ≤ 79	Good	<p data-bbox="394 373 889 453"><b>Asset 28738 – Gilmour Road</b></p> 	<p data-bbox="1114 596 1321 739">A smooth ride with just a few bumps or depressions.</p>	<p data-bbox="1344 369 1555 436"><b>Preventative Maintenance:</b></p> <p data-bbox="1344 457 1593 961">Pavement is in the early stages of its life-cycle. This is when repairs are cheapest, fastest, and have the greatest long-term benefit. crack seal, joint seal, micro surfacing, slurry sealing, chip seal</p>
40 < PCI ≤ 59	Fair	<p data-bbox="394 1003 930 1071"><b>Asset 28835 – Mastwoods Road</b></p> 	<p data-bbox="1114 1180 1317 1360">A comfortable ride with intermittent bumps or depressions.</p>	<p data-bbox="1344 1003 1572 1037"><b>Rehabilitation:</b></p> <p data-bbox="1344 1058 1593 1495">Pavement needs some form of resurfacing to mitigate the effects of rutting, cracking, and other distresses. Hot-mix overlay, mill and overlay, hot-in-place recycling, hi-float chip seal</p>

Pavement Condition Index (PCI) Range <sup>1</sup>	Condition State	Example Photo	Description	Maintenance Suggestion
25 < PCI ≤ 39	Poor	<p data-bbox="397 394 966 457"><b>Asset 28248 – Rosevear Boulevard</b></p> 	<p data-bbox="1112 493 1323 934">An uncomfortable ride with frequent to extensive bumps or depressions. Cannot maintain the posted speed at lower end of the scale.</p>	<p data-bbox="1344 388 1599 430"><b>Reconstruction:</b></p> <p data-bbox="1344 457 1583 1018">Pavement has endured significant structural damage and a full reconstruction is required to restore the condition. Reclamation, full depth reconstruction, major mill and overlay</p>
0 < PCI ≤ 24	Very Poor	<p data-bbox="397 1144 885 1207"><b>Asset 28891 – Clayton’s Lane</b></p> 	<p data-bbox="1112 1092 1323 1785">A very uncomfortable ride affected by deep and dense potholes, failed patches, and alligator cracking. Cannot maintain the posted speed and must steer constantly to avoid bumps and depressions.</p>	<p data-bbox="1344 1092 1550 1165"><b>End of life replacement</b></p>

Bridge Condition Index (BCI) Range	Condition State	Example Photo Bridge / Culvert within Condition Range	Description	Service Impact
70 < BCI ≤ 100	Good	<div data-bbox="422 430 1169 966">  <p><b>Asset 16 – Barrett Street Bridge</b></p> </div> <div data-bbox="422 987 1169 1522">  <p><b>Asset 33 – Scott Grey Culvert</b></p> </div>	<p>Maintenance is not usually required within the next five years</p>	<p>Common practice lifecycle maintenance events would cause minimal traffic impact. No major work would be scheduled while the asset remains in this condition.</p>

Bridge Condition Index (BCI) Range	Condition State	Example Photo Bridge / Culvert within Condition Range	Description	Service Impact
60 < BCI ≤ 70	Fair	 <p data-bbox="381 751 868 835"><b>Asset 7 – Anderson Bridge</b></p>  <p data-bbox="500 1297 1091 1381"><b>Asset 35 – Dundee Crescent Culvert</b></p>	<p>Maintenance work is usually scheduled within the next five years. This is the ideal time to schedule major bridge repairs to get the most out of bridge spending.</p>	<p>Common practice lifecycle maintenance events would cause minimal traffic impact. No major work would be scheduled while the asset remains in this condition.</p>

Bridge Condition Index (BCI) Range	Condition State	Example Photo Bridge / Culvert within Condition Range	Description	Service Impact
0 < BCI ≤ 60	Poor	<div data-bbox="376 352 1174 919">  <p>Asset 2 – Sylvan Glen Bridge</p> </div> <div data-bbox="376 1041 1174 1608">  <p>Asset 65 – Pine St. Extension Culvert</p> </div>	<p>Maintenance work is usually scheduled within one year.</p>	<p>A staged approach to repairs would have traffic maintained where possible or detours planned for the least amount of time possible. Load restrictions are possible in this condition range as determined on a structure-by-structure basis.</p>

It is important to note that these do not describe how the condition may affect the use of bridges/culverts. This is because the BCI is not used to rate or indicate the safety of a bridge. The BCI rating is a planning tool developed by Ontario Ministry of Transportation that helps schedule maintenance and rehabilitation work.

# Asset Management Strategy

## Practices, Procedures and Tools

The Municipality has well-established overall principles, framework and decision-making approaches for asset management, and these are presented in the 2016 Asset Management Plan. They provide a holistic approach to asset management as demonstrated by the capital investment prioritization process that drives the decision-making towards meeting the desired levels of service at the lowest lifecycle cost.



## Future Demand and Service Enhancement

Port Hope's population is expected to increase to 20,850 people by 2029, an increase of 17.31% over the next 7 years. The Municipality's Official Plan provides the vision for the future growth of the Municipality including areas identified for intensification. Further Projections for the urban area are referenced in Northumberland County's Municipal Comprehensive Review – Long-Term Growth Forecast and Urban Land Needs Analysis which projects growth for the urban area up to 2051. The Official Plan is supported by the Development Charges Study. These strategic documents assist the Municipality to ensure that Transportation services will be available to support future growth.

In addition to the growth and enhancement objectives of the Municipality's master plans, asset management planning also needs to consider the Climate Action Plan goals for both resiliencies to changing climate and reduction of greenhouse gas emissions. Existing assets must be maintained, and new assets brought into service, to meet these various growth and service enhancement objectives.

## Lifecycle Management and Risk

Lifecycle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

In developing the Transportation AMP, a preliminary estimate of future costs was generated based on the preliminary forecast to support events occurring throughout the lifespan of the asset, at this time, this provides the best available information for generating this estimate. It was developed through a collaborative effort of Watson & Associates Economists Ltd. Combined with staff input that aligns with the Municipality's current decision-making and asset capital expenditure processes. The lifecycle activities that will be required over the 10-year period are based on the asset management strategies that are currently captured in the Annual Capital and Operating Budget processes. For transportation assets, this includes operational and maintenance strategies, asset management decision making, lifecycle cost and value optimisation, options analysis, ageing assets strategy, non-infrastructure solutions, capital investment planning, condition assessment programs, as well as consideration of mobility impacts and impacts to other services.

The Municipality applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets but are generally based on the importance of each asset in terms of service delivery/ continuity and the number of users who could be impacted.

## Roads

Category	Frequency
Inspection and Condition Assessment	The Municipality completed a condition assessment of its roads in 2018. The condition assessment was completed by Street Scan, utilizing specialized Scan Van vehicles outfitted with an array of sensors that include 2D and 3D cameras. Data collected from the sensors was processed to identify specific road distresses and an overall condition rating for each road segment known as the Pavement Condition Index (PCI).
Major Lifecycle Activities - Operating	The Roads Division is responsible for the upkeep and maintenance of roadways, sidewalks, and boulevards within the Municipality of Port Hope, including winter snow removal.
Major Lifecycle Activities - Capital	Lifecycle rehabilitation (incl. resurfacing) and reconstruction activities for roads are performed as needed, guided by the recommendations identified through condition assessments and, where possible, are aligned with other asset replacements through a coordinated reconstruction program. For long-term capital planning purposes an annual reinvestment rate of 2.5% of replacement cost was utilized to calculate an average annual lifecycle funding target.
Identification of Short-term Priorities	The Municipality obtained a list of lifecycle maintenance and repair suggestions for roads as part of the condition assessment completed in 2018. The list of recommendations developed through the 2018 assessment is supplemented with priorities that are identified through ongoing operations and coordination of lifecycle replacement activities related to underground infrastructure. Furthermore, some road reconstructions are addressed through the federal government's Port Hope Area Initiative which involves the cleanup of historic low-level radioactive waste from various sites in Port Hope.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service for transportation services. The growth-related capital investments related to roads include various road reconstruction, widening, oversizing, and resurfacing projects which are summarized in the Municipality's development charges background study.

## Bridges and Bridge Culverts

Category	Frequency
Inspection and Condition Assessment	The Municipality completes regular assessments of bridges and structural culverts as part of the biennial inspections required by O. Reg. 104/97, following the Ontario Structure Inspection Manual (OSIM). Each bridge and large diameter culvert is assigned a Bridge Condition Index (BCI).
Major Lifecycle Activities - Capital	Lifecycle rehabilitation and replacement of bridges and large diameter culverts is performed as needed, guided by the recommendations identified through condition assessments. For long-term capital planning purposes and budgeting, bridges and culverts are assumed to have a useful life of 75 years, with a minor rehabilitation and a major rehabilitation taking place part-way through the lifecycle, around age 25 and 50, respectively.
Identification of Short-term Priorities	The Municipality develops and updates a prioritized list of lifecycle activities for bridges and culverts using recommendations provided in the biennial inspection reports.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service for transportation services. The growth-related capital investments related to bridges and culverts include two watercourse crossings and are summarized in the Municipality's development charges background study which is updated every five years.

The Municipality continues to invest in maintaining infrastructure and has been increasing its capital investments to align with long-range forecasts available in the 2016 AMP, Development Charges Study and Water & Wastewater Rate Study. The Municipality's existing funding model incurs an annual shortfall to maintain critical infrastructure in a state of good repair. There are annual contributions to the Asset Management Reserve to increase the current funding model. Changes will again impact the financing strategy when the new service levels are defined in the next version of the asset management plans, which are due in 2025.

### Annual Reinvestment required based on Lifecycle Management Strategy costs

Asset Category	Quantity	Unit of Measure	Replacement Cost	Average Annual Lifecycle Cost (Capital)	Average Annual Lifecycle Cost as % of Replacement Cost	2016 Canadian Infrastructure Report Card Reinvestment Rate – Low Target	2016 Canadian Infrastructure Report Card Reinvestment Rate – High Target
Bridges and Large Diameter Culverts	65	each	\$55,675,000	\$1,113,500	2.0%	1.0%	1.5%
Roads	690	Lane-km	\$321,730,410	\$8,043,260	2.5%	2.0%	3.0%
Sidewalk	69	Km	\$9,371,182	Future Update			
Other Structures	Future Update	Future Update	\$4.8 million	Future Update			

## Improvement and Monitoring Plan

Based on the snapshot of current conditions and existing plans presented in the Transportation AMP, areas of potential improvement include:

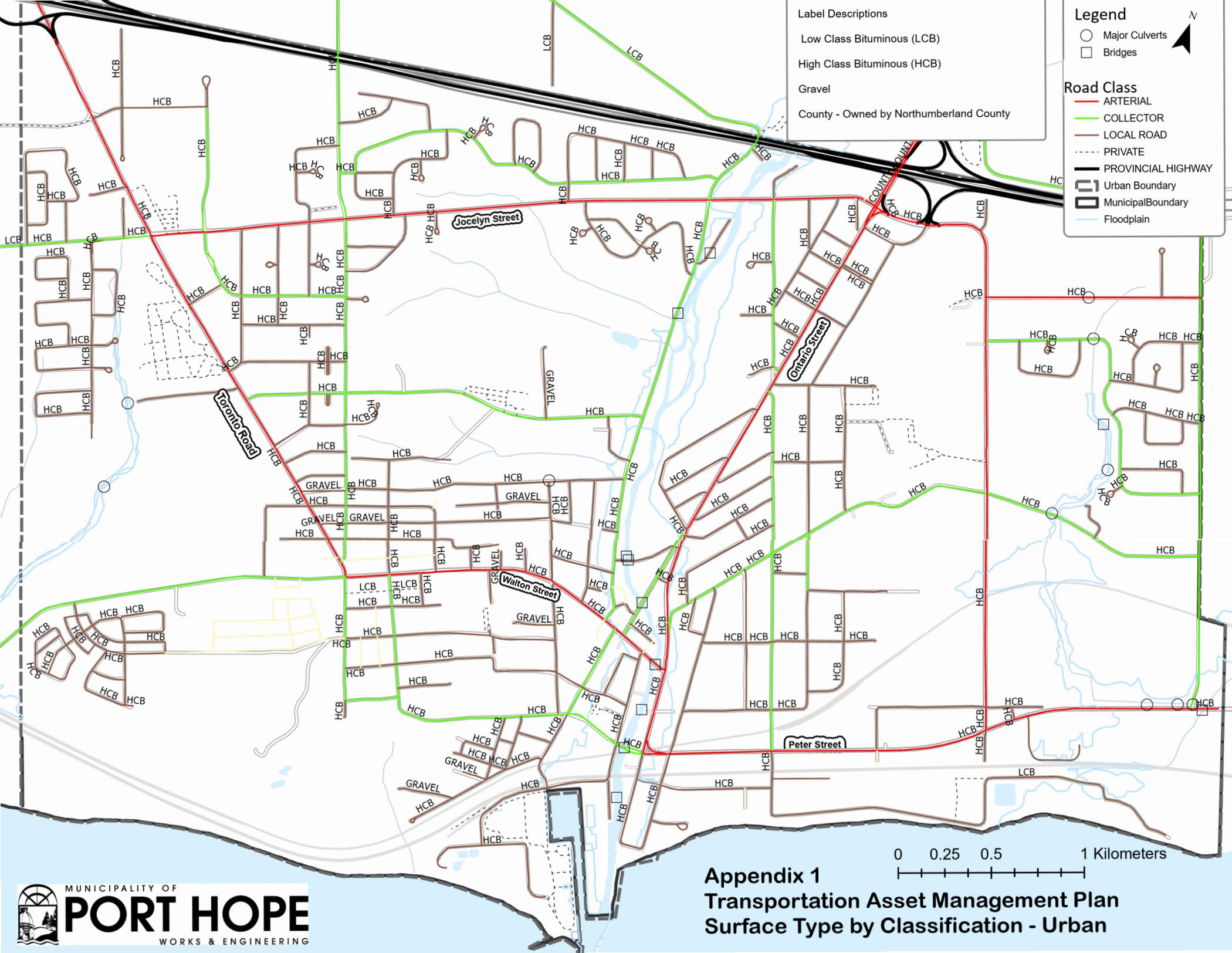
- Asset information, data quality, identify data gaps and record keeping
- Cost estimating
- Level of service measures and targets
- Lifecycle renewal needs forecasting
- Climate change resiliency
- Equity and inclusion

The Transportation AMP will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the plan.



## More Information

For more information about asset management, or to learn more about the Municipality's Asset Management Program, please visit [porthope.ca](http://porthope.ca).



**Label Descriptions**

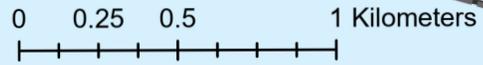
- Low Class Bituminous (LCB)
- High Class Bituminous (HCB)
- Gravel
- County - Owned by Northumberland County

**Legend**

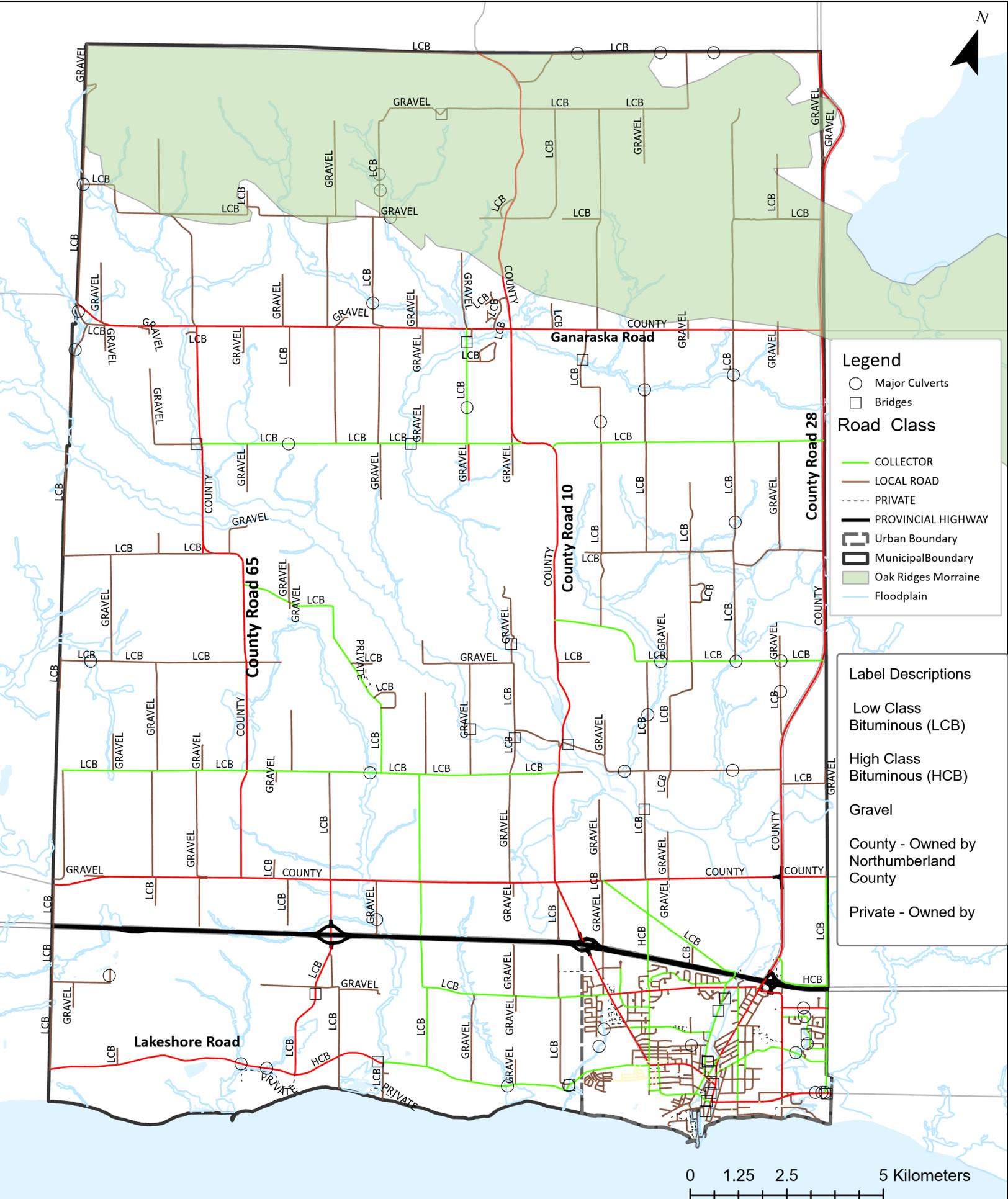
- Major Culverts
- Bridges

**Road Class**

- ARTERIAL
- COLLECTOR
- LOCAL ROAD
- - - PRIVATE
- PROVINCIAL HIGHWAY
- ▭ Urban Boundary
- ▭ Municipal Boundary
- ▭ Floodplain



**Appendix 1**  
**Transportation Asset Management Plan**  
**Surface Type by Classification - Urban**



**Legend**

- Major Culverts
- Bridges

**Road Class**

- COLLECTOR
- LOCAL ROAD
- - - PRIVATE
- PROVINCIAL HIGHWAY

[Dashed Line] Urban Boundary  
 [Thick Dashed Line] Municipal Boundary  
 [Green Area] Oak Ridges Moraine  
 [Blue Area] Floodplain

**Label Descriptions**

- Low Class Bituminous (LCB)
- High Class Bituminous (HCB)
- Gravel
- County - Owned by Northumberland County
- Private - Owned by

