# 3. Asset Condition Rating Methodologies

## 3.1. Road System

The Provincial requirement for AMPs includes asset condition assessment in accordance with standard engineering practices.

The condition of the road system is mandated by provincial legislation by the following:

- Municipal Act 2001, Section 44 (1). The municipality that has jurisdiction over a highway or bridge shall keep it in a state of repair that is reasonable in the circumstances, including the character and location of the highway or bridge. 2001, c. 25, s. 44 (1).
- Regulation 239/02 – Minimum Maintenance Standards for Municipal Highways – is a result of Section 44.

The Town's Road Needs Study (RNS), completed in 2012, was conducted in accordance with the appropriate Provincial guidelines:

- Ministry of Transportation Inventory Manual for Municipal Roads, 1991, and
- Ministry of Transportation Inventory Manual for Municipal Roads and Railway Level Crossings, 1988 (for railway crossings only).

Where necessary, the guidelines as per the above were modified to reflect engineering standards and practices employed by the Town.

Asset Management by its very nature is holistic. Managing a road network based solely on pavement condition would be critically deficient in scope in terms of the information required to make an informed decision as to the improvements required on a road section.

The *Inventory Manual* offers a holistic review of each road section, developing a Time of Need (TON) in six areas that are critical to municipal decision-making:

1. Geometrics
2. Surface Type
3. Surface Width
4. Capacity
5. Structural Adequacy
6. Drainage

For the 2012 RNS, not all elements identified in the Inventory Manual were deemed pertinent to the RNS and so the standard form was modified for the Town's specific use. Where necessary, additional comments with respect to the road environment, existing conditions or past improvement history were recorded. Where possible, road condition issues not otherwise evident during the inspection were identified through discussions with Town staff.

To ensure consistency and integration with the Town's GIS database, the road sections and reference numbers as per the GIS database were employed. Where necessary, existing road sections were further sub-divided to ensure that each section maintained a relatively uniform traffic volume, cross-section, terrain, and environment.

The need to improve an individual road section was determined by comparing the existing physical characteristics of the road system to the minimum tolerable standards, as defined in the Inventory

Manual and/or established in conjunction with Town of Bradford West Gwillimbury road standards and general road guidelines. Should the existing conditions deviate from the standards, a need exists, otherwise, the road is considered adequate.

The condition rating is a score on a 100 point basis that provides an overall indication of the physical condition of the road section as it relates to the individual road elements that were considered in the assessment - the higher the condition rating, the better the road condition. It is the summation of the point ratings for each of the following:

- horizontal alignment (maximum point rating of 10 - low volume marsh and rural sections only),
- vertical alignment (maximum point rating of 10 - low volume marsh and rural sections only),
- surface condition (maximum point rating of 10),
- shoulder width (maximum point rating of 10 - marsh and rural sections only),
- surface width (maximum point rating of 15 - marsh and rural, 25 - urban sections),
- level of service (maximum point rating of 20 - not applicable to low volume marsh/rural sections),
- structural adequacy (maximum point rating of 25),
- drainage (maximum point rating of 10), and
- maintenance demand (maximum point rating of 10 - the rating is inversely related to the actual maintenance demand so low maintenance = high score and high maintenance = low score).

The point ratings for the above were either determined in the field (surface condition, structural adequacy, drainage and maintenance demand), or calculated based on corresponding field measures and in consideration of appropriate design standards (ie. the ratings reflect the degree to which standards are satisfied).

For each identified road section deficiency, the TON was identified – 'NOW', '1 to 5', or '6 to 10' - which was based on minimum acceptable standards and a review of the required road improvements. These individual requirements were further categorized by a Priority Rating and Priority Guide Number. The Priority rating considered the condition rating as well as the traffic volumes on the road section. The Priority Guide Number considered the cost of improving the road section.

The TON is a prediction of the time until the road requires reconstruction, not the time frame until action is required. For example, a road may be categorized as a '6 to 10' year need with a resurfacing improvement need. This road should be resurfaced as soon as possible, to further extend the life expectancy of the road and defer the need to reconstruct.

## 3.2. Structures – Bridges and Culverts (> 3 meter span)

The Provincial requirement for AMPs includes asset condition assessment in accordance with standard engineering practices.

The main objectives of structural inspections, as per the Ontario Structure Inspection Manual, 2008 (OSIM), are:

- to maintain structures in a safe condition,
- to protect and prolong the useful life of structures,
- to identify maintenance, repair and rehabilitation needs of structures, and
- to provide a basis for a structure management system for the planning and funding of the maintenance and rehabilitation of structures.

To achieve these objectives, detailed visual inspections of the following structures shall be inspected every two years (biennially) in accordance with the OSIM or equivalent methodology:

- All bridges, culverts, and tunnels with spans of 3 meters or greater.
- All retaining walls.
- All movable bridges.

The Municipal Bridge Appraisal Data Entry System (MBADES) is identified as an equivalent methodology. The Town's Municipal Bridge Inspection, 2010, was completed in general accordance with the OSIM.

Structural inspections shall be in accordance with the following regulations:

- 104/97, 472/10 Standards for Bridges.
- Regulation 103/97 Standard to determine Allowable Gross Weight for bridges and 160/02, 278/06 and 472/10 (Amending 104/97).

The condition of the structures inventory is further mandated by Provincial Legislation by the following:

- Municipal Act 2001, Section 44 (1). The municipality that has jurisdiction over a highway or bridge shall keep it in a state of repair that is reasonable in the circumstances, including the character and location of the highway or bridge. 2001, c. 25, s. 44 (1).
- Regulation 239/02 – Minimum Maintenance Standards for Municipal Highways - is a result of Section 44.

The Town's bridges were prioritized based on their need for rehabilitation or replacement. Each structure was given a priority of high, medium, or low depending on the severity of the damage and structural defects that are of concern:

- high priority indicates that rehabilitation or replacement is necessary within the next year,
- medium priority indicates that repairs are required and should be undertaken within the next 1 to 5 years, and
- low priority indicates that repairs may be needed but are not urgent.

## 3.3. Structures – Road Crossing Culverts (< 3 meter span)

The purpose of the Town's Culvert Inventory & Assessment Report, 2012 was to document the existing network of crossing culverts, sized 900mm to 2.99m in diameter. Culverts of 3.0m or greater are otherwise addressed through the Town's bridge inspection program. The culvert inventory was completed in accordance with the Ontario Structure Inspection Manual (OSIM) which involves an element by element analysis of the structure. The OSIM sets standards for detailed visual inspection and

condition rating of structures and their components. It provides a uniform inspection approach for all structures in Ontario. A detailed visual inspection is defined in the OSIM as follows:

An element by element "close-up" visual assessment of material defects, performance deficiencies and maintenance needs of a structure. Close-up is defined as "a distance close enough to determine the condition of the element".

Elements are reviewed and their condition is assessed based on observations made by the inspector. The condition is then quantified and categorized as excellent, good, fair, or poor. Action may be required if elements are partially or wholly in poor condition. Maintenance needs, repair work, and/or large scale repairs are then specified as well as time-of-need and associated costs, to assist the municipality with prioritization of the work.

## 3.4. Water, Wastewater and Stormwater Linear

The available GIS databases do not include condition data for the water, wastewater, and stormwater linear assets. However, the databases did include construction dates and material types for most of the assets within the respective asset groups.

Pipe material types have generally accepted life expectancies, which were drawn from various industry publications and Asset Management Plans.

Based on the construction dates and life expectancies, the estimated remaining life was calculated and applied to a subjected rating schedule, adopted from the Canadian Infrastructure Report Card (Table 3.1).

For the water linear assets, a history of main breaks can be a predictor of future breaks or other failures. Watermain breaks are recorded through the Town's DWQMS Watermain Break Form (WD-023) and GIS database. The break history data can be used to estimate whether the expected physical life of the pipes should be reduced, according to the following table:

Table 3.2: Watermain Break Reduction Factors

| Number of Previous Breaks | Effective Life Reduction Factor |
|---|---|
| None | 1 |
| 1 | 0.8 |
| 2 | 0.5 |
| >2 | 0.2 |

For example, if a PVC watermain has a maximum potential life of 75 years and is 25 years old, it would have 50 years estimated remaining life, or approximately 67% life remaining; 'Good' condition. However, if the same pipe had 2 breaks within its history, the estimated remaining life would be 25 years ((75-25) x 0.5), or approximately 33% life remaining; 'Poor' condition and recommended replacement.

Table 3.1: Asset Condition Categories

| Category | Definition | Subjective Ratings |
|---|---|---|
| Very Good:<br>Fit for the future | The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention. | Greater than 80% remaining useful life – then reviewed by asset experts for validation and/or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information. |
| Good:<br>Adequate for now | The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies. | 60 – 79.9% remaining useful life - then reviewed by asset experts for validation and/or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information. |
| Fair:<br>Requires attention | The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies. | 40 – 59.9% remaining useful life - then reviewed by asset experts for validation and/or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information. |
| Poor:<br>At risk | The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. | 20 – 39.9% remaining useful life - then reviewed by asset experts for validation and/or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information. |
| Very Poor:<br>Unfit for sustained service | The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service. | Less than 20% remaining useful life - then reviewed by asset experts for validation and/or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information. |

## 3.5. Stormwater Management Facilities

The Town is currently preparing a comprehensive stormwater management (SWM) master plan in accordance with the Lake Simcoe Protection Plan, the Lake Simcoe Region Conservation Authority (LSRCA) Guidelines for the Development and Implementation of Comprehensive Stormwater Management Master Plans in the Lake Simcoe Watershed and the Municipal Class Environmental Assessment Process.

The SWM master plan will contain the Operation and Maintenance (O&M) manual for each SWM facility. Each O&M manual will list the visual inspections, assessments, and maintenance activities required to ensure the SWM facility continues to meet storm discharge water quality and quantity objectives as well as maintain storm pond design capacity. A log of inspections and maintenance will be kept as part of the SWM master plan.

## 3.6. Fleet

The Town's vehicles, machinery, specialized equipment and attachments are subject to scheduled maintenance programs with condition assessments. Inspections and maintenance are performed according to manufacturer's specifications and by an authorized dealer or licenced mechanic. Additional inspections are conducted on an as-need basis.

The Town is currently implementing a computerized maintenance management system (CMMS) that will schedule, track and log the inspections, maintenance and repair history for most of the Town's fleet and equipment. Scheduled maintenance programs will ensure that fleet assets meet or exceed their potential life expectancies.

## 3.7. Facilities

The Town maintains a number of facilities and properties which it owns, operates and leases. Facilities can be divided into components, including, but not limited to:

- Boilers
- Building Automation System
- Concrete Foundation
- Generators
- HVAC
- Lighting
- Parking Lot
- Roof

Each component can have its own maintenance programs. Some component maintenance programs that are regulated and regularly scheduled include, but are not limited to:

- Technical Standards & Safety Authority (refrigeration units, elevating devices, amusement devices, boilers and pressure vessels),
- Simcoe Muskoka District Health Unit (food safety, air quality),
- life safety equipment (sprinklers, fire extinguishers, defibrillators, etc.),
- planned visual inspections, and
- internal health and safety inspections.

Some premier facilities require regular inspections and checks performed by internal staff (i.e. pool, ice, compressors). Specialized equipment is inspected and maintained as per manufacturer's specifications. Additional condition assessments are conducted on an as-need basis for individual components (i.e. roof, foundation). All major facility components are maintained in order to meet or exceed the potential life expectancy of the component.

## 3.8. Parks

The Town's municipal parks and open spaces are maintained to ensure the provision of safe and quality environments for the citizens living in the Town. Planned visual inspections, condition assessments and maintenance are scheduled for parks, parkettes, open spaces, wood lots, sports fields, playgrounds, washrooms, trails and pathways, outdoor rinks, municipal boulevards, islands and walkways. Maintenance programs are documented in the Parks and Open Spaces Service Manual and follow industry standards (i.e. Canadian Standards Association (CSA)) where applicable.

Planned visual inspections and maintenance activities will ensure that parks and park structures continue to preserve areas of high ecological and aesthetic domain and provide sustainable educational and leisure use spaces that will continue to meet or exceed their expected service lives.

## 3.9. Transit

The Town's transit system assets consist of busses, bus stops (pads), signs and shelters. Most of the assets are operated and maintained under agreement to contractors.

- Busses are leased to an operator who also perform regularly scheduled maintenance. Inspections and maintenance are performed according to manufacturer's specifications and by an authorized dealer or licenced mechanic. Additional inspections are conducted on an as-need basis. Regular inspections and maintenance activities will ensure that the transit fleet meet or exceed their potential life expectancies.
- Bus stops consist of concrete pads installed between the sidewalk and curb. Winter control (snow clearing, salt/sand) is carried out by a contractor. Maintenance of the pad is the responsibility of the Town. Inspections are performed regularly on the pads and in conjunction with regular sidewalk inspections.
- Shelters are contracted out and will be owned by the Town at the end of the agreement. The agreement covers the installation of the shelter, glass cleaning and repairs.
- Signs at the bus stops are installed, removed and repaired by the Town and the transit routes evolve. They are informational signs and not subject to retro-reflectivity standards.