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The State of Municipal Asset Management in Ontario

An Assessment of AMPs from 84 Municipalities

Prepared for the Association of Municipalities of Ontario
Winter 2022/2023

Research Partner

PSD Citywide is a leader in municipal operational software and advisory services. Managing over $300 billion in municipal assets across North America, PSD Citywide brought to market the only all-in-one software communities can rely on for asset, maintenance, financial, GIS, and permitting management. For more than 20 years, PSD Citywide has put communities first with the userfriendly software platform and expert multi-disciplinary Advisory team of finance, engineering, and municipal practitioners. PSD Citywide's Advisory team helps set up each unique community for continued success by helping to assess, organize, and implement a custom plan of action.

Project Sponsor

The Association of Municipalities of Ontario (AMO) is a non-profit organization representing Ontario municipalities that increases the effectiveness of local governments by bringing forward a common voice to municipal concerns. Through AMO, Ontario's 444 municipalities work together to achieve shared goals and meet common challenges. AMO's policy development initiatives, cost-saving programs, conferences, and training courses provide municipal officials with the tools to succeed, and programs to help optimize value for taxpayer dollars.

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Background

With the introduction of several key pieces of legislation and funding programs over the past decade, Ontario has spearheaded the practice of asset management at the municipal level in Canada. In 2012, the Municipal Infrastructure Investment Initiative (MIII) was established, which required municipalities to complete an Asset Management Plan (AMP) on core infrastructure assets (roads, bridges & culverts, water and wastewater assets). Next, in 2014 the Federal Gas Tax agreements were renewed, which required Ontario municipalities to complete and implement an AMP by the end of 2016. Finally, the Government of Ontario passed the Infrastructure for Jobs and Prosperity Act (Bill 6) in 2015, which had the effect of regulating asset management planning at the local level. This resulted in **O. Reg. 588/17**: Asset Management Planning for Municipal Infrastructure being passed and taking effect in January 2018. This comprehensive regulation requires municipalities to prepare strategic asset management policies, and a series of Asset Management Plans of increasing complexity, with deadlines starting July 1, 2019 and ending July 1, 2025. These deadlines, which were amended in March 2021 due to the COVID-19 Pandemic, include the following milestones:

- **July 1, 2019:** Strategic Asset Management Policy (to be updated every five years).
- **July 1, 2022:** Asset Management Plan for core assets (roads, bridges and culverts, water, wastewater, and stormwater management systems) that identifies the current levels of service and the cost of maintaining those levels of service.
- **July 1, 2024:** Asset Management Plan for all assets that identifies the current levels of service and the cost of maintaining those levels of service.
- **July 1, 2025:** Asset Management Plan for all assets and identifies proposed levels of service, activities that are required to meet proposed levels of service, and a strategy to fund these activities.

During this same time period, multiple funding sources at both the provincial and federal levels were created to assist municipalities in their asset management efforts.

Ontario municipalities can leverage funding from the **Canada Community-Building Fund** (CCBF) - formerly known as the federal Gas Tax Fund - to support their asset management activities and to pursue local infrastructure projects. Through its **administration of the program**, AMO has been supporting municipalities and ensuring that projects are funded through an asset management lens.

Since 2018, the **Municipal Asset Management Program** (MAMP), which is funded by the Government of Canada and delivered by the Federation of Canadian Municipalities, has supported municipalities in strengthening infrastructure investment decisions based on reliable data and sound asset management practices.

Provincially, the **Ontario Community Infrastructure Fund** (OCIF) was introduced by the province in 2014 with the goal of providing small and northern communities with guaranteed, annual, formula-based funding for asset management capacity building activities and infrastructure projects. Additionally, since 2018, the Province of Ontario has funded a series of tools and supports which have been delivered in partnership with the Municipal Finance Officers Association (MFOA) and Asset Management Ontario (AMONTario) to support municipalities in meeting the prescribed timelines under O.Reg. 588/17: Asset Management for Municipal Infrastructure. Notably, the **AMP it Up 3.0 program** is currently being delivered by MFOA and provides municipalities with coaching and assistance, group workshops and communities of practice.

These federal and provincial funding streams have contributed to accelerated asset management implementation in Ontario over the last decade. Permanent and predictable funding for infrastructure, training, and support, has better enabled local governments to improve asset management knowledge and implement better practices. However, as many Ontario municipalities will attest, more can be done to improve the state of asset management at the local level, especially with regards to the remaining O Reg 588/17 deadlines. It is vital to continue building upon the progress made, while addressing infrastructure backlog, to truly ameliorate asset management practices at the local level.

Introduction

This study builds upon the **2015 Roads & Bridges** and **2018 State of Ontario's Infrastructure** studies which examined the infrastructure investment gap of public infrastructure owned by municipalities. These studies highlighted the need for greater investment and planning in municipal infrastructure renewal across the province. Since then, Ontario municipalities have continued to implement asset management best practices and the province has become a leader in municipal level asset management in Canada. However, an in-depth analysis of asset management maturity in Ontario has yet to be completed. This study aims to fill this gap.

The primary objective of this study is to determine asset management sector progress by Ontario municipalities. The overarching purpose of asset management is to deliver an adequate level of service in the most cost-effective manner through the implementation of asset management strategies and best practices- particularly through the development of Asset Management Plans. The development of Asset Management Plans better equips municipalities to sustainably deliver key municipal services within their communities.

To assess the progress of the asset management sector, this report analyzes core components of Asset Management Plans completed by municipalities, and then uses this information to determine asset management maturity. This study also compares the maturity of Asset Management Plans based on population and region.

This study suggests that asset management sector progress has been steadily improving over the last decade, especially with regards to the completing asset inventories and the overall acceptance of asset management practice by municipal administrators and councils. Future improvements in this sector include a greater use of advanced condition assessment and replacement cost methodologies. By doing this, Ontario municipalities will be better equipped to determine and forecast capital spending requirements.

As municipalities continue to update their asset management plans to meet O.Reg 588/17 requirements, the results of this study can serve as a benchmark assessment of asset management progress over time.

Executive Summary & Highlights

This report demonstrates the progress made by Ontario municipalities towards achieving greater asset management maturity and reflects upon the next steps for municipalities as asset management practices evolve. Most notably, there has been a growing acceptance of the practice of asset management by municipal councils and senior level staff, and as a result, municipalities have focused their efforts on establishing reliable asset inventories.

From a policy perspective, there is an evident gap in data management strategies. A centralized asset repository across finance and other departments could help to resolve this missing collaboration. Similarly, the absence of industry standards and protocols for data collection of non-core assets could explain why inflated historical replacement cost methods are most commonly used for non-core asset categories. This lack of industry standards and other regulatory requirements means that municipalities are not required to give non-core asset categories the same attention as their core categories. Similarly, core assets are also prone to variations in assessment methodologies, demonstrating the need for more specific guidance in all asset data areas. By adopting stricter policies and advanced performance metrics, policymakers can assist municipalities in developing more robust levels of service models rather than only encouraging the minimum requirements.

With respect to our sample size, the data sets utilized in this report are based on a limited number of consultations with larger municipalities, making it difficult to provide conclusive statements about the state of asset management for all large municipalities in Ontario. Although the observations in this report may not be reflective of all large municipalities in Ontario, these observations are nonetheless accurate for this report's data set.

Quantitative Assessment

- Based on the data set, there is no significant relationship between the amount of assessed condition data collected and population size.
- Northwestern municipalities have significantly less assessed condition data of their data inventories than all other regions sampled in the data set.
- Condition inspection data is more readily available for above-ground infrastructure, such as for the Road Network and Bridges & Culverts asset categories, whereas a significant proportion of below-ground infrastructure is age-based.
- Engineering studies are the most common type of assessments used to determine Road Network and Bridges & Culverts conditions. Staff assessments are the most common type of condition assessments for all other asset categories.
- Asset types in Road Network and Bridges & Culverts asset categories have the largest portion of user-defined replacement costs. In the majority of Asset Management Plans, municipalities applied user-defined replacement cost valuations for all asset types analyzed in the Storm Network. The majority of Asset Management Plans also had user-defined replacement cost valuations for major elements of the linear Water and Wastewater networks (i.e. mains, maintenance holes, hydrants, valves).
- Inflated historical replacement cost methods are more commonly used for asset types in non-core asset categories.
- The majority of sampled municipalities have met 2022 O.Reg 588/17 phased requirements of developing an AMP that includes core infrastructure and current levels of service.
- For advanced O.Reg 588/17 requirements, the sample indicated there is no relationship between the size of sampled municipalities and the completion of these requirements in all asset categories.

Qualitative Assessment

- While municipalities have made great strides in data collection and the development of complete inventories of their asset portfolios, data quality is limited, which often correlates with the requirements in data governance frameworks and maintenance programs. At the same time, Finance departments have historically been responsible for asset registries, but Public Works and Engineering departments have more consistently collected and maintained data on infrastructure assets and thereby have the most reliable source of asset data organization-wide. For these reasons, it is recommended that policymakers reassess the driving forces behind the absence of accurate, centralized asset repositories that span multiple departments.
- Asset categories that have the most accurate replacement cost data are core linear assets: Roads, Bridges and Culverts, Water, Wastewater, and Stormwater. These categories are involved in a higher number of capital projects and therefore, costing of asset types in these categories are more readily available compared to non-core assets with lower service consequences.
- Non-core asset categories more greatly relied on inflated historical cost replacement methodology due to diversity of asset types.
- In general, the more assessed condition data available increases the overall condition of asset portfolios and diminishes municipalities' capital funding deficits. This is simply based on the reality that assets have been continuously maintained over time through field maintenance activities and are generally in better condition than age analysis alone would predict.

Methodology & Terminology

Summary of Methodology

This study utilizes two primary research methods. The first research method is an in-depth analysis of 84 Asset Management Plans completed by Ontario municipalities between 2020 and 2022. This data included the number of asset classes, condition of assets, condition assessment and replacement cost methodologies, and O.Reg 588/17 compliance levels as available. O.Reg 588/17 compliance is evaluated based on the following criteria: summary of assets, replacement costs of assets, average age of assets, description of municipalities approach to assessing the condition of assets, current levels of service, current performance measures, lifecycle activities needed to maintain current levels of service for 10 years, costs of providing lifecycle activities for 10 years, and growth assumptions. This data was then aggregated to form strictly objective, quantitative conclusions about the sample. While AMO's 2015 Roads & Bridges study and 2018 State of Infrastructure study both analyze the state of municipally owned infrastructure in Ontario, this is the first study that evaluates asset management sector progress by Ontario municipalities.

Asset management sector progress can be assessed through a variety of asset management best practices. Due to legislation that requires all Ontario municipalities to complete AMPs, an assessment of Asset Management Plans provides a picture on asset management sector progress unique to Ontario municipalities who must comply with O.Reg 588/17 requirements. While this study primarily used Asset Management Plans to assess sector progress, it does not omit the importance of other best practices, such as completing asset management strategies, policies, data gap analysis, etc., in contributing to the maturity of an organization's asset management practice.

While all Ontario municipalities are required to complete Asset Management Plans, the lack of a standardized provincial AMP format limits the ability of researchers to conduct an appropriate analysis. PSD Citywide, in working with nearly a quarter of Ontario's municipalities on their Asset Management Plans, was able to complete such an analysis, using a consistent format for all Asset Management Plans completed between 2020 and 2022.

Although PSD Citywide follows a standardized AMP format, the final format and methodology of the AMP are tailored to each municipality based on their organizational needs and objectives. Additionally, availability of data varies among municipalities. As a result, some data sources used in this analysis are not included in all AMPs sampled.

The second research method used in this study is a qualitative analysis of asset management sector progress. This method involved consultations with asset management experts who worked alongside Ontario municipalities to complete their Asset Management Plans. This section of the report provides an in-depth analysis of methodologies used to develop Asset Management Plans and more generally, the acceptance of the practice of asset management by Ontario municipalities.

Replacement Cost Methodologies

AMPs used in this study relied on two methods to determine asset replacement costs:

User-Defined Cost:

- A user-defined, often unit-based cost (e.g. per meter) determined through a review of recent contracts, reports and/or staff estimates.

Historical Cost Inflation:

- Inflation of the asset cost recorded at the time it was initially acquired to today's value using an index (e.g. CPI or NRBCPI).

Asset Condition Methodologies

Average and assessed condition percentages included in this report are weighted values based on replacement cost (not number of assets).

AMPs used in this study relied on two methodologies to determine asset condition:

Assessed Condition

- Engineering or third party studies: Industry standard technique to collect data from the field and to assign a condition rating to it (e.g. Road Needs Study).
- Staff assessments: field assessments conducted by municipal staff.[1]

Age-Based Condition

- determined by age (acquisition date) and service life remaining.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across asset portfolios. The table below outlines the condition rating system used in sample AMPs to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition.

1 For the purpose of this report, field assessments may have been conducted by municipal staff with varying degrees of expertise in their respective fields. As such, PSD Citywide cannot confirm all of these studies are of equal caliber or reliability.

Condition	Description	Criteria	Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or rehabilitated	80-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	60-80
Fair	Reguires attention	Signs of deterioration, some elements exhibit significant deficiences	40-60
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-40
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unsafe	0-20

Although the majority of AMPs use the above rating scale, some plans use asset specific condition rating scales based on industry practice or other customized rating scales. Examples of these rating scales include the Bridge Condition Index (BCI), Facilities Condition Index (FCI), Pavement Condition Index (PCI), and the Pipeline Structural Proficiency Index (SPRI).

Graph Format

The following provides details pertaining to the graph format included in Part I when analyzing availability of assessed condition data, condition data methodologies, and replacement cost methodologies.

- The y axis shows the percentage of municipalities while the labels on the bars show the number of municipalities.
- The x axis breaks down the information by population, region, asset category, or asset type.
- Each x axis group likely contains a different total number of municipalities, based on the sample collected and the availability/consistency of information within AMPs.
- All graphs are looking at the percentage and/or number of municipalities in the sample, not the percentage or number of aggregated assets.
- The greyed out bar in some graphs represents the municipalities whose data was not available or consistent for that component and thereby could not be included.

Terminology

Asset Categories

Asset Categories covered in this report are the most common categories of assets in Ontario municipalities' asset portfolios. Naming structures may differ slightly between Asset Management Plans, but for the purposes of this report, the following asset categories are included:

- Road Network
- Bridges & Culverts
- Water Network
- Storm Network
- Wastewater Network
- Buildings
- Vehicles
- Machinery & Equipment
- Land Improvements

Asset Types

Asset Types refer to segments of assets that belong to specific asset categories. Examples include paved and unpaved roads, maintenance holes, bridges, playgrounds, etc.

Part I: Data Analysis of 84 AMPs

Sample

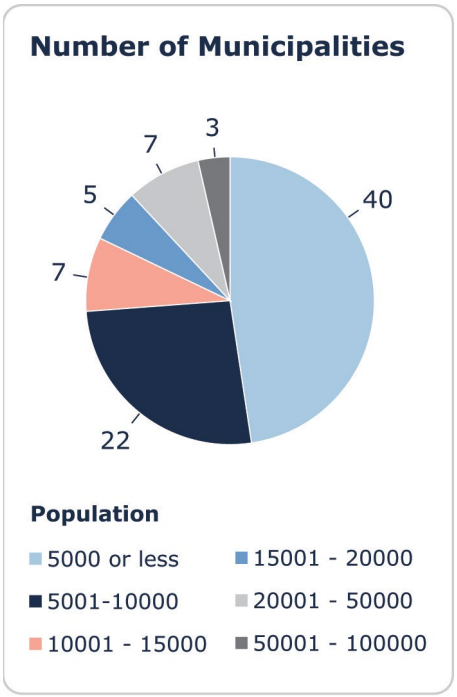

Figure 1. Population Sample

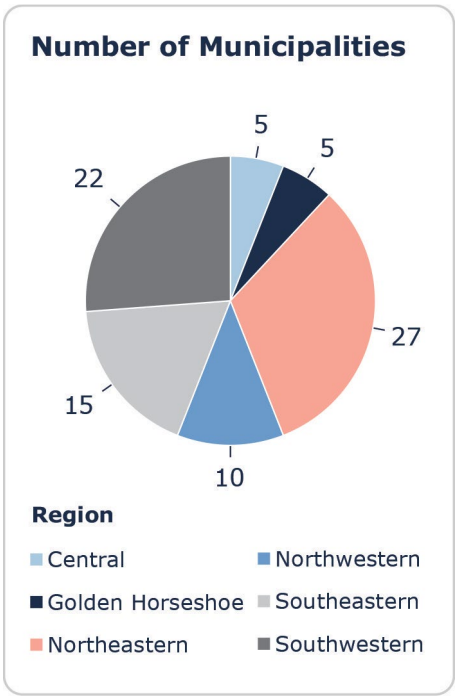

Figure 2. Regional Sample

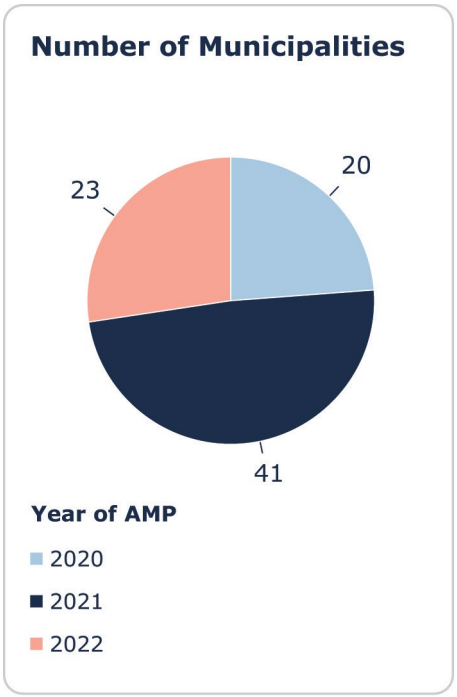

Figure 3. Annual Sample

The research sample consists of 84 Asset Management Plans completed by Ontario municipalities between 2020 and 2022. The objective of this study is to assess asset management sector progress overall, as well as determined by population and region. Figures 1 and 2 showcase the six population and regional groups that were included in the sample set. Figure 1 showcases that the majority of the sample set is made up of Asset Management Plans completed by small (<10,000 population) municipalities. This is due to PSD Citywide assisting primarily smaller municipalities who may lack resources and capacity to complete Asset Management Plans in-house. Figure 2 presents a more diverse sample set in which Asset Management Plans completed by municipalities in both northern and southern regions of Ontario are more equally represented. Municipalities in the Northeast have the greatest representation, while those in the Golden Horseshoe and Central Ontario have the least. Finally, Figure 3 shows that almost 50% of AMPs in the sample were completed in 2021, with the remaining from 2020 or 2022.

Asset Categories

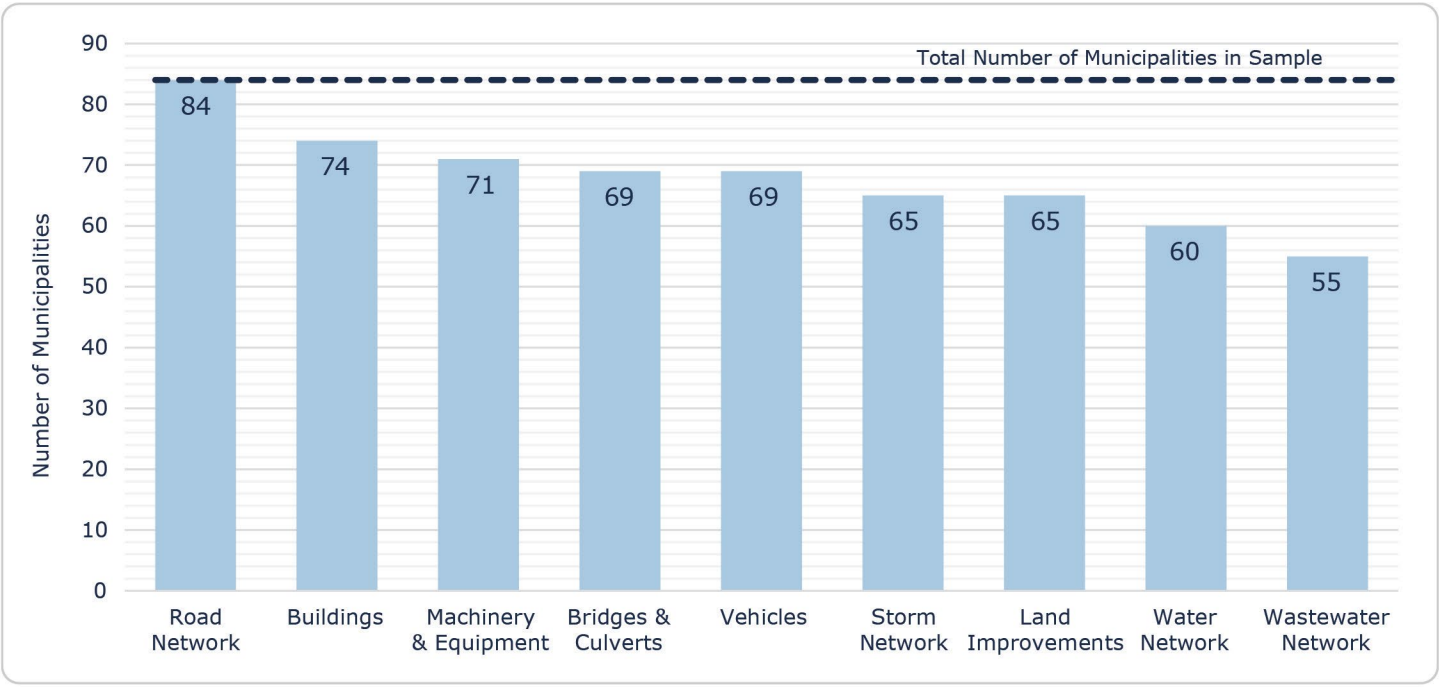

Figure 4. The number of municipalities that have included each asset category in their AMP.

Figure 4 showcases the nine most common asset categories included in the 84 Asset Management Plans of the sample set. The Road Network was present in all sampled Asset Management Plans while the Wastewater Network was present in the least. Although Storm, Water, and Wastewater networks are core asset categories, they may not be present in certain Asset Management Plans simply because not all municipalities provide these services or have jurisdiction over them.

Asset Condition

Population

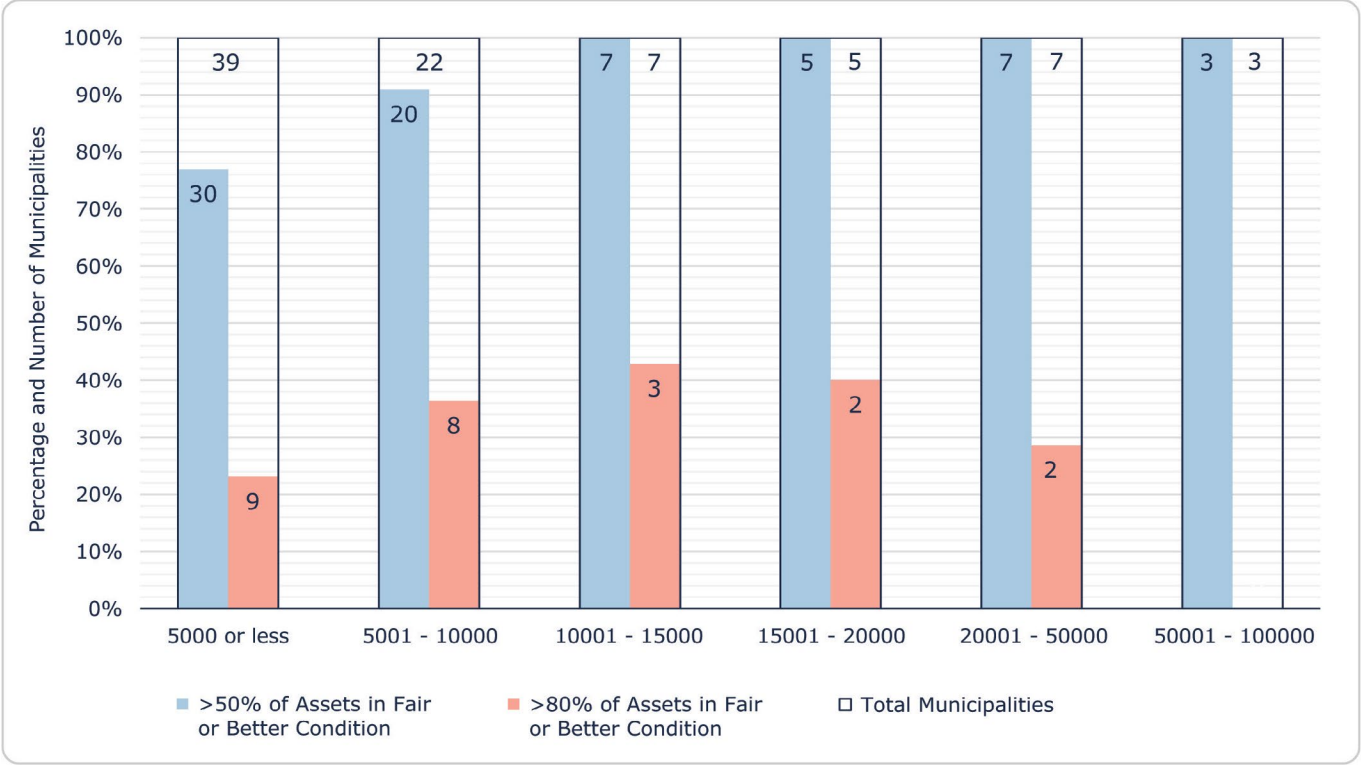

Figure 5. Percentage and number of municipalities that have greater than 50% and 80% of assets in Fair or Better condition, by population.

Region

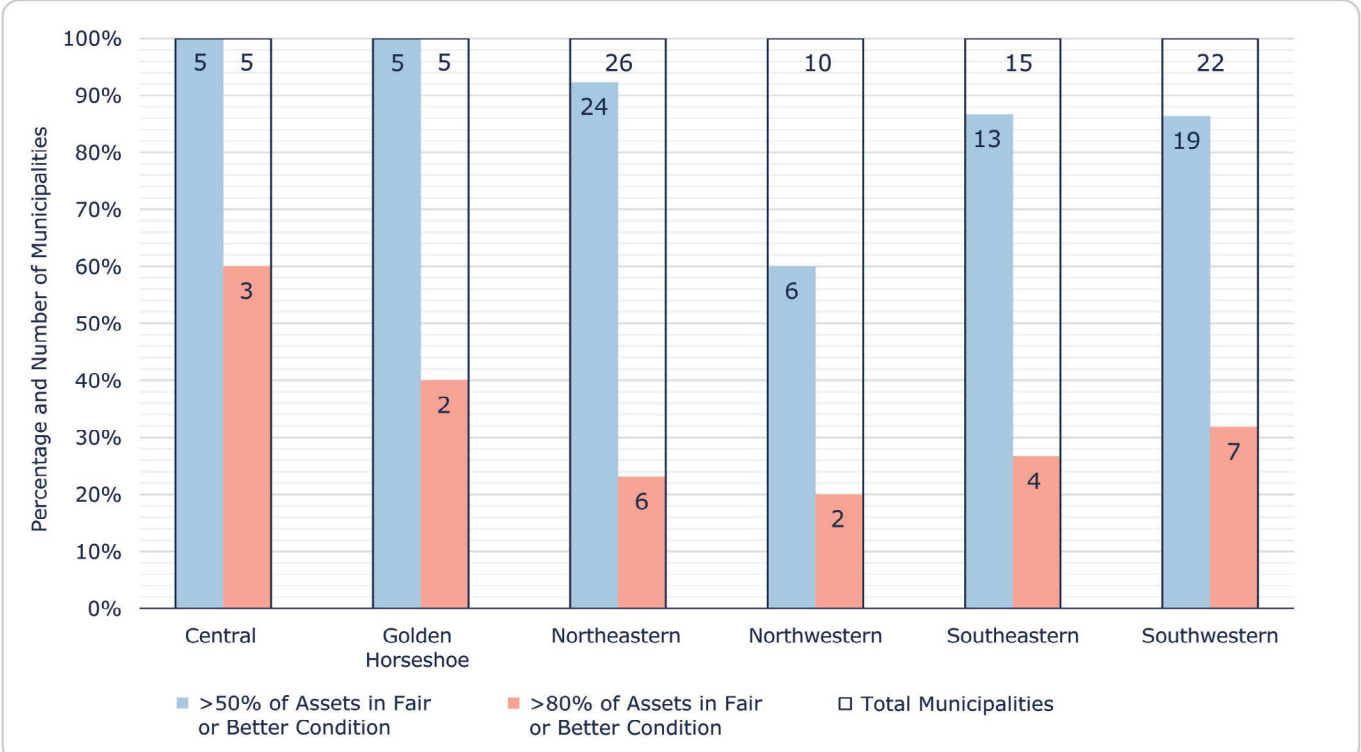

Figure 6. Percentage and number of municipalities that have greater than 50% and 80% of assets in Fair or Better condition, by region.

Availability of Assessed Condition Data

Population

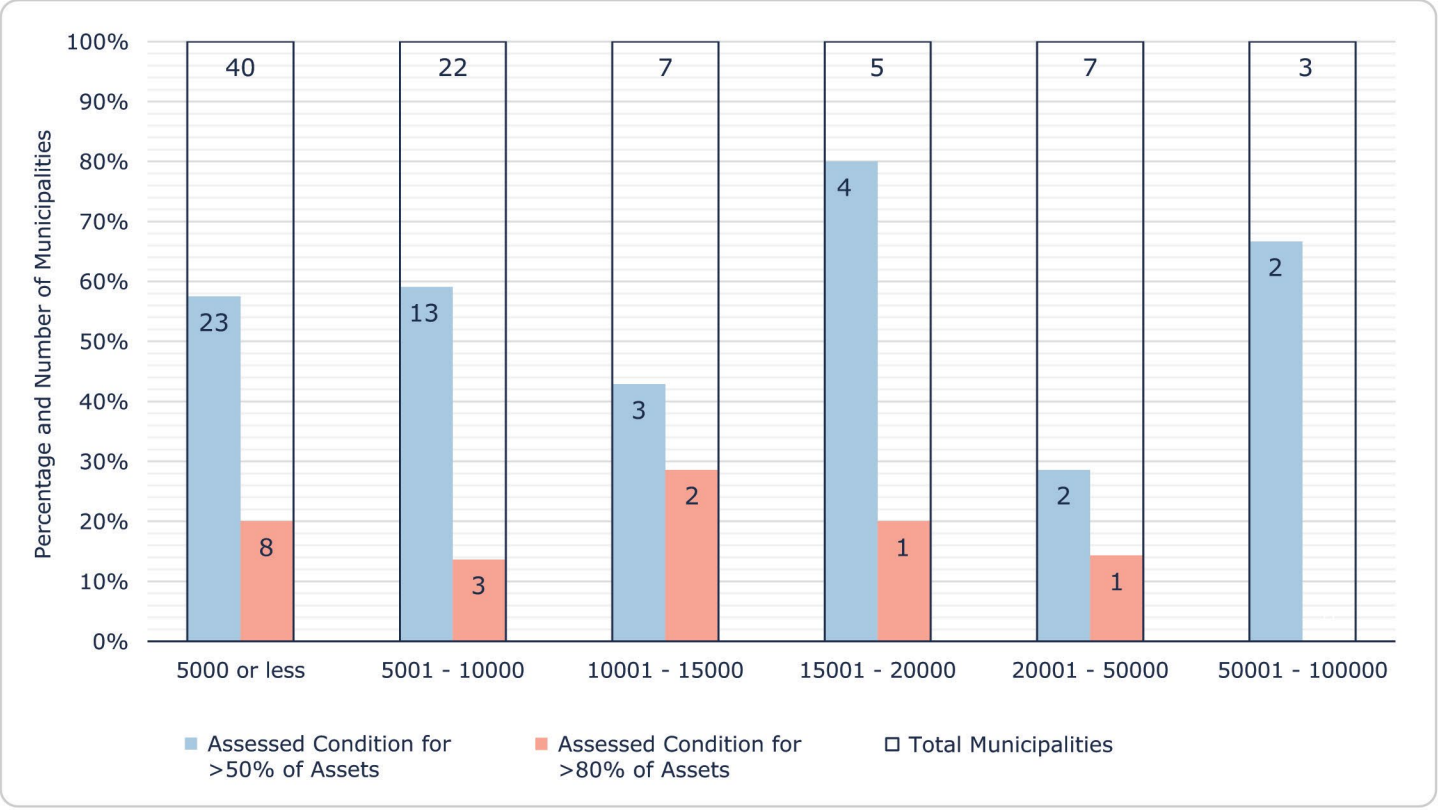

Figure 7. Percentage and number of municipalities that have assessed condition data for more than 50% and 80% of their asset inventory, broken down by population.

Figures 7 and 8 present the availability of assessed conditions for a municipality's entire asset portfolio. Figure 7 demonstrates that there is no clear relationship between the amount of assessed condition data collected by a municipality and their population at the inventory level. There is a similar proportion of municipalities with assessed conditions for >50% of assets for populations of 5,000 or less and 5,000-10,000, while the remaining population groups vary inconsistently. Figure 5 also shows that while a significant proportion of municipalities in each population group have assessed condition for >50% of assets, a much smaller proportion of municipalities have assessed condition for >80% of assets.[3]

3 It should not be stipulated that the 50,001-100,000 population group has less condition data in general due to no municipalities having assessed condition for >80% of assets. This result may be due to the limited representation of large municipalities in the sample set. What can be concluded is that for all population groups, there are less municipalities with condition data available for >80% of assets compared to for >50% of assets.

Region

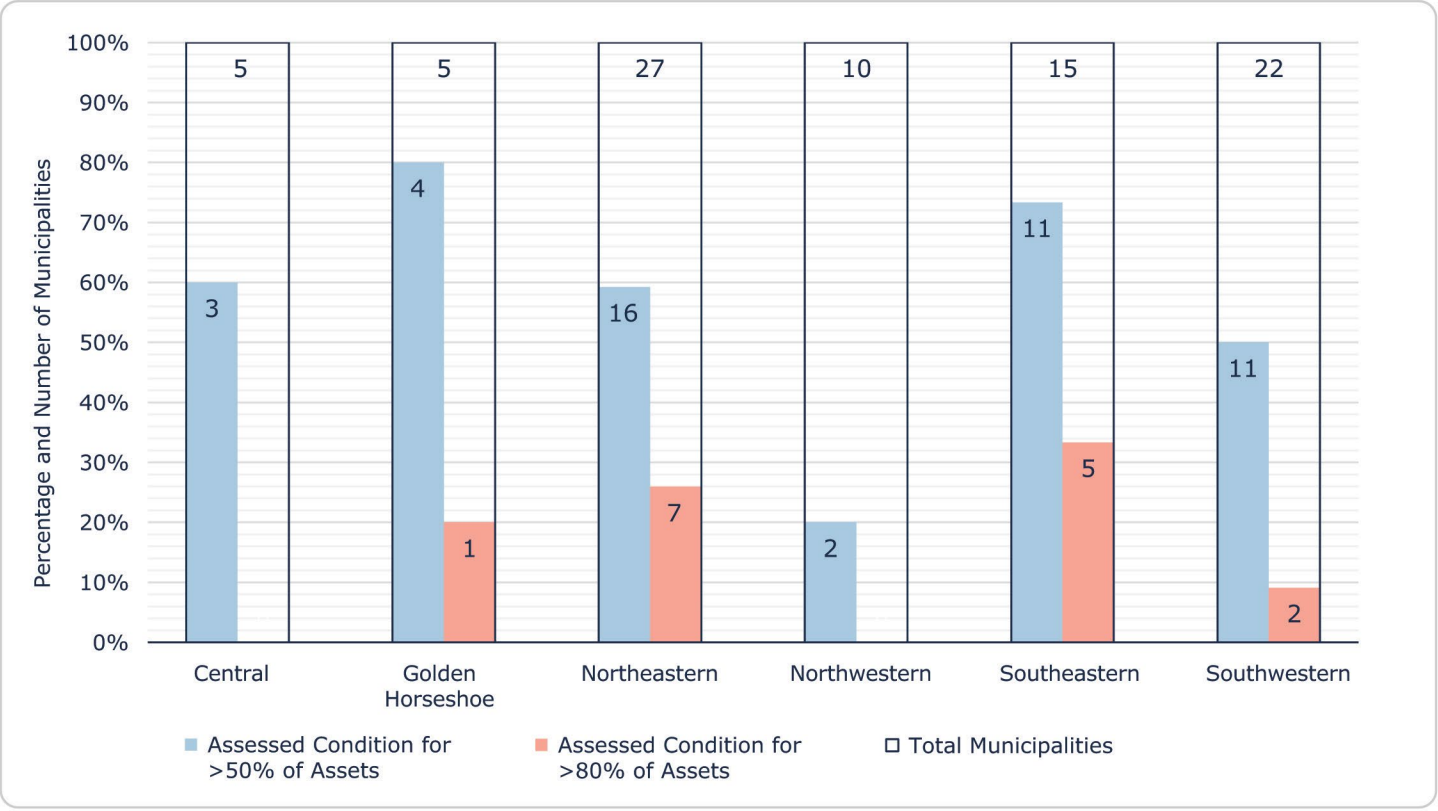

Figure 8. Percentage and number of municipalities that have assessed condition data for more than 50% and 80% of their asset inventory, broken down by region.

Figure 8 indicates no strong relationship between the amount of assessed condition data available and the region of a municipality. However, Figure 8 does show that a smaller proportion of Northwestern municipalities have assessed conditions for >50% of assets compared to all other regions.

Asset Categories

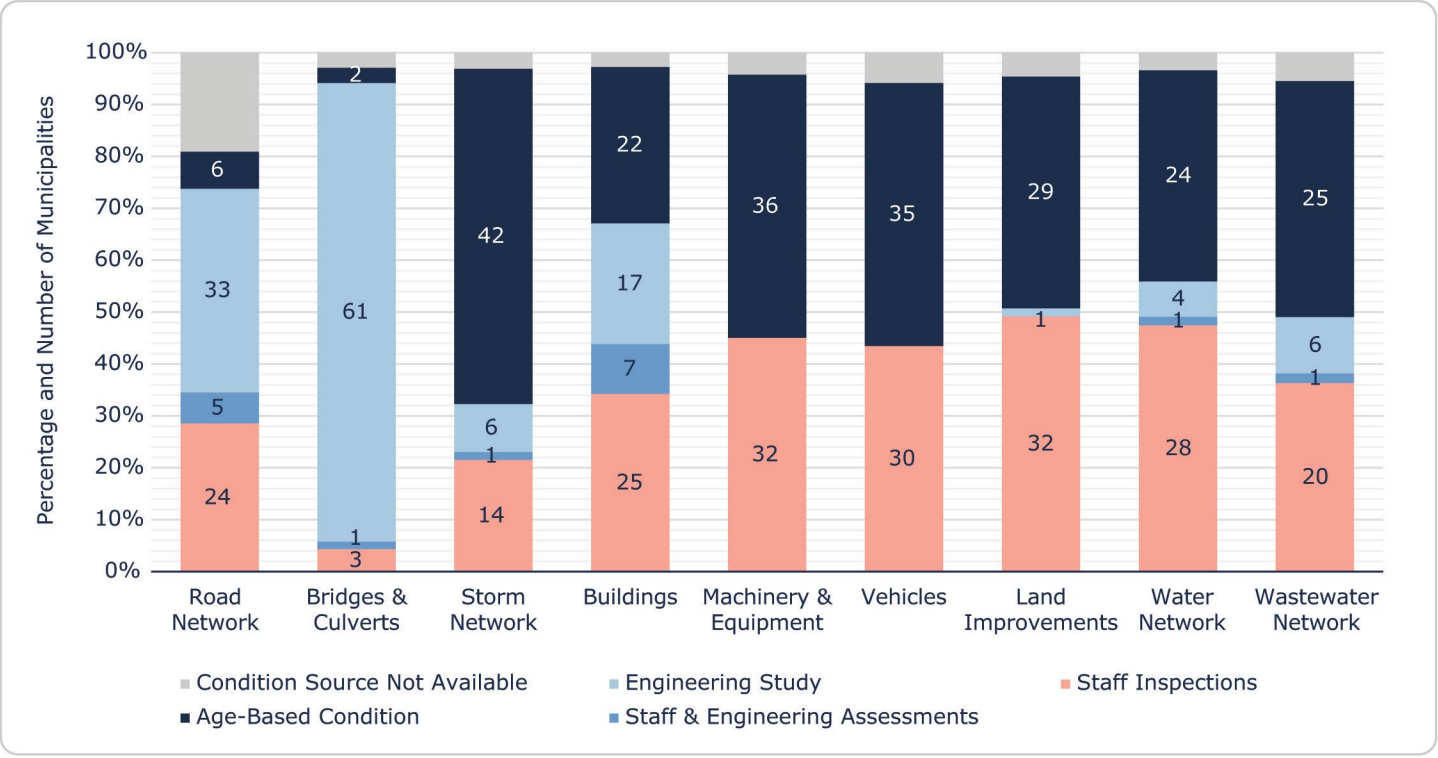

Figure 9. The percentage and number of municipalities with various condition sources, including the types of assessed condition, broken down by asset category.

Figure 9 demonstrates that the Road Network and Bridges & Culverts asset categories yield the highest proportion of municipalities that used assessed conditions. Specifically, the majority of assessed conditions in the Bridges & Culverts asset category is engineering studies, an effect of the regulated Ontario Structure Inspection Manual (OSIM) biannual assessments. In contrast, staff inspections are more prevalent in the Road Network asset category. The Buildings asset category has the third highest proportion of municipalities that used assessed condition. For all other asset categories, condition is significantly determined through age-based calculations. When assessed condition is available, the most prevalent methodology among these asset categories is staff inspections.

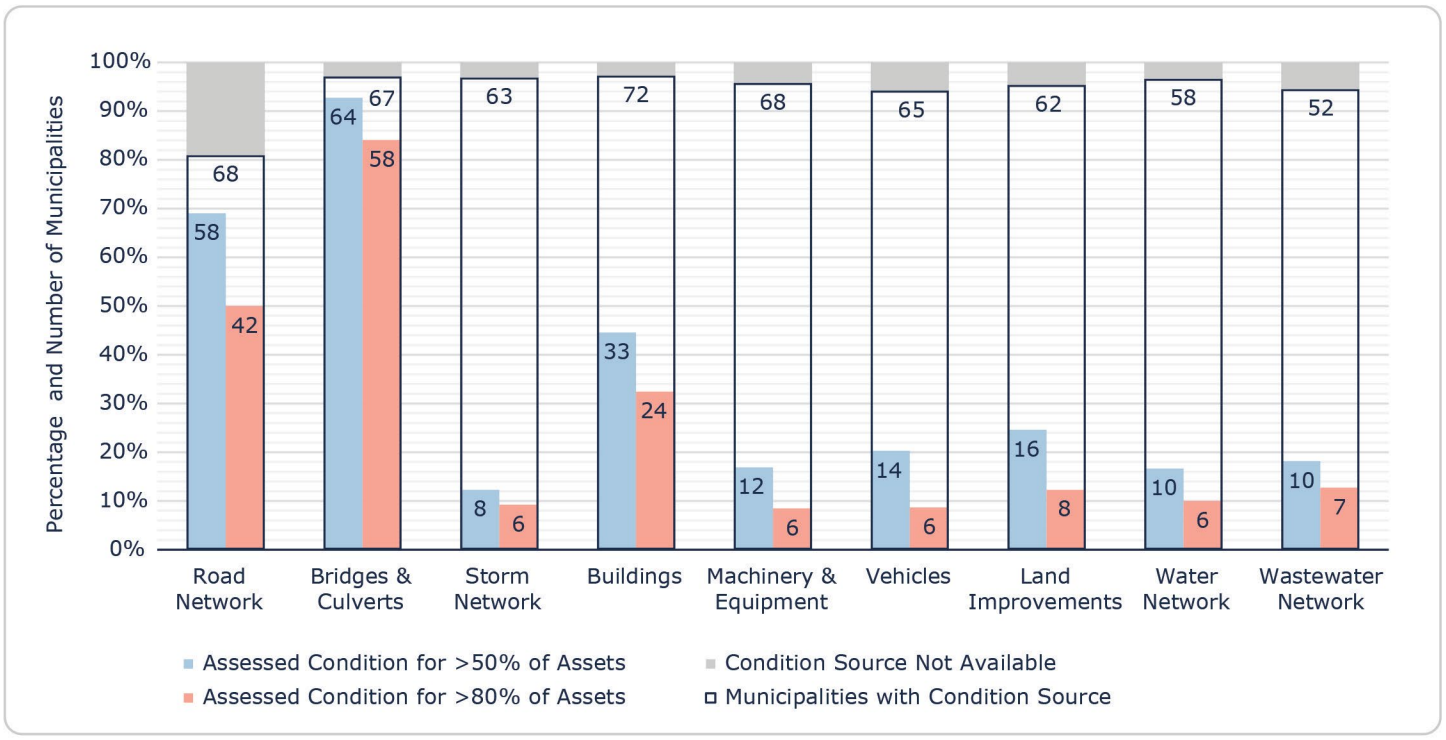

Figure 10. The percentage and number of municipalities that have assessed condition data for over 50% and 80% of assets, broken down by asset category.

Figure 10 builds off of Figure 9 by only showing the municipalities that have assessed conditions for certain threshold percentages of assets. The same trends in categories are present, but in general, the proportion of Asset Management Plans with assessed conditions for these thresholds are smaller because the percentage of assets is more restrictive. Bridges & Culverts have the highest proportion of municipalities with assessed conditions for greater than 50% of assets in that class, followed by the Road Network and Buildings, with the Storm Network having the lowest.

Condition Data Methodologies

Asset Categories

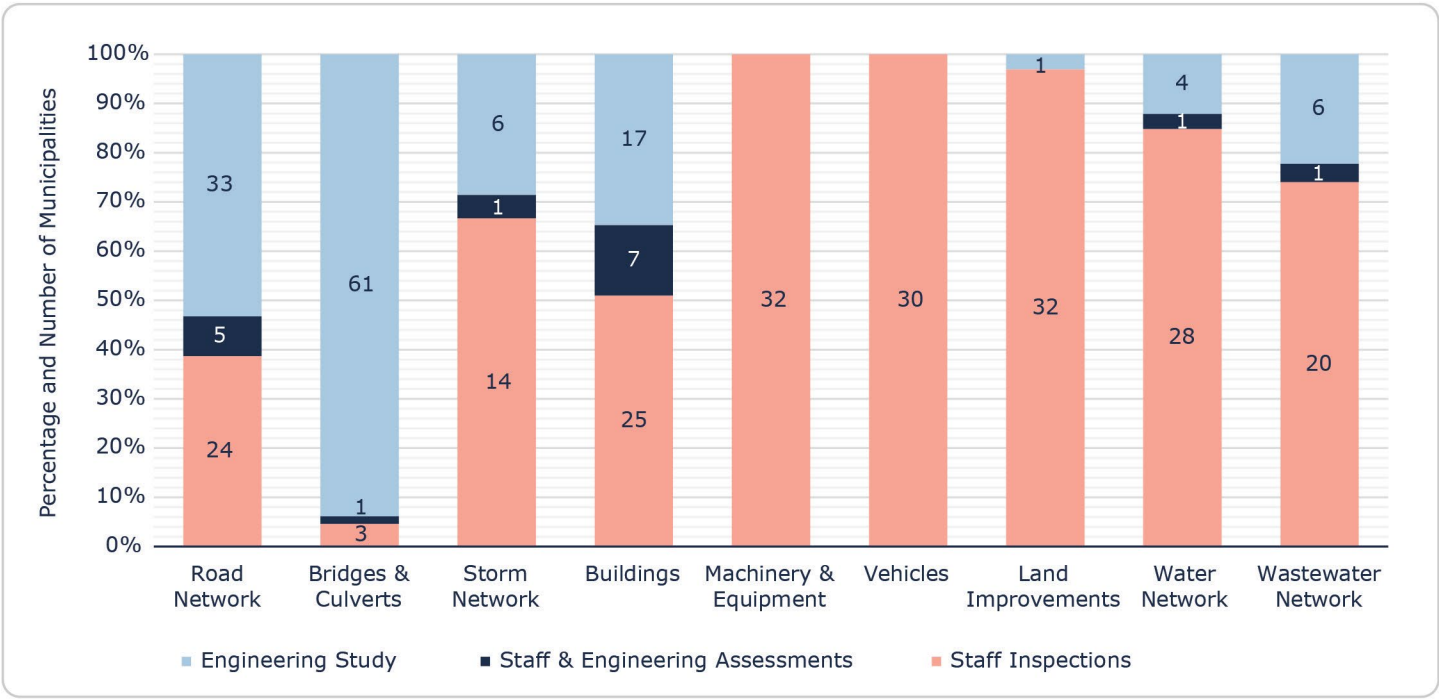

Figure 11. Types of assessed condition sources for each asset category.

Figure 11 presents the condition assessment methodologies of assessed condition data only, as determined in Figure 9. Bridges & Culverts has the highest proportion of municipalities that use engineering studies conducted on its assets followed by the Road Network. For all other asset categories with assessed condition, staff inspections is the most common assessment method. Specifically for Machinery & Equipment and Vehicle asset categories, staff assessments are exclusively used to determine assessed condition when age-based methods are not used.

Replacement Cost Methodologies

The following graphs showcase the replacement cost methodologies of asset types in each asset category.

Core Assets

Road Network and Bridges & Culverts

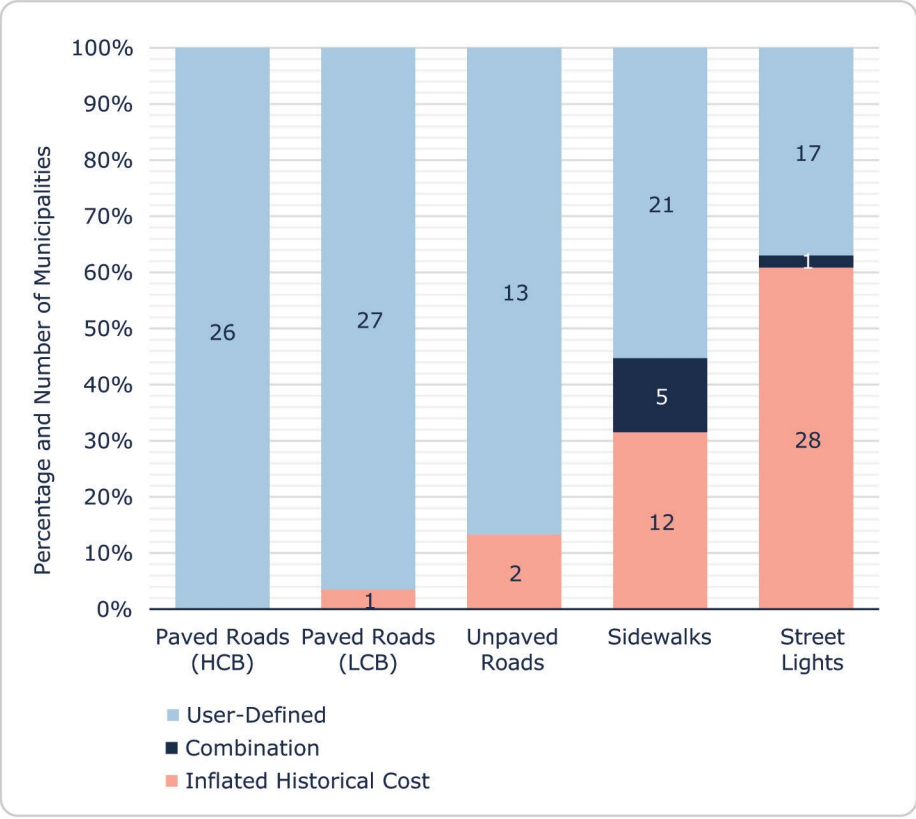

Figure 12. Replacement cost methodologies of Road Network asset types.

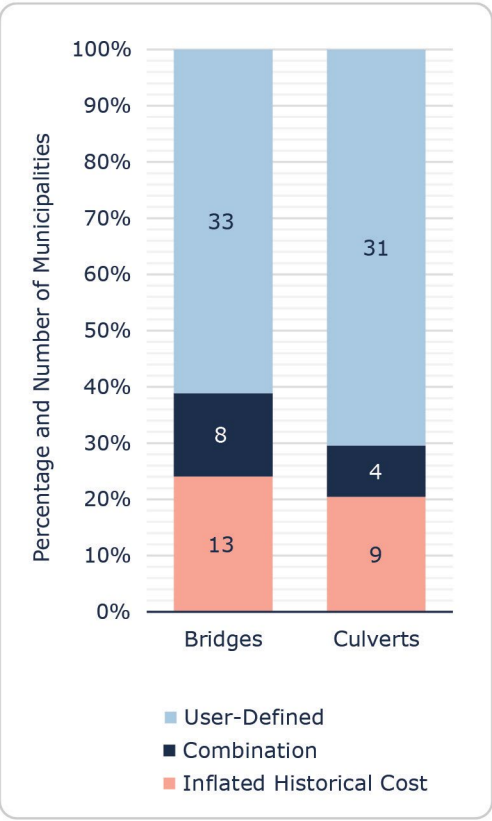

Figure 13. Replacement cost methodologies of Bridges & Culverts asset types.

Figure 12 and 13 demonstrate that user-defined replacement valuations are commonly used by municipalities for asset types in the Road Network and Bridges & Culverts asset categories. A higher proportion of municipalities applied user-defined methodologies for road assets specifically, while a combination of inflated historical cost and user-defined methodologies are used for road appurtenances. The majority of municipalities in the sample reported the use of user-defined methodologies when determining replacement cost valuations for both bridges and culverts.

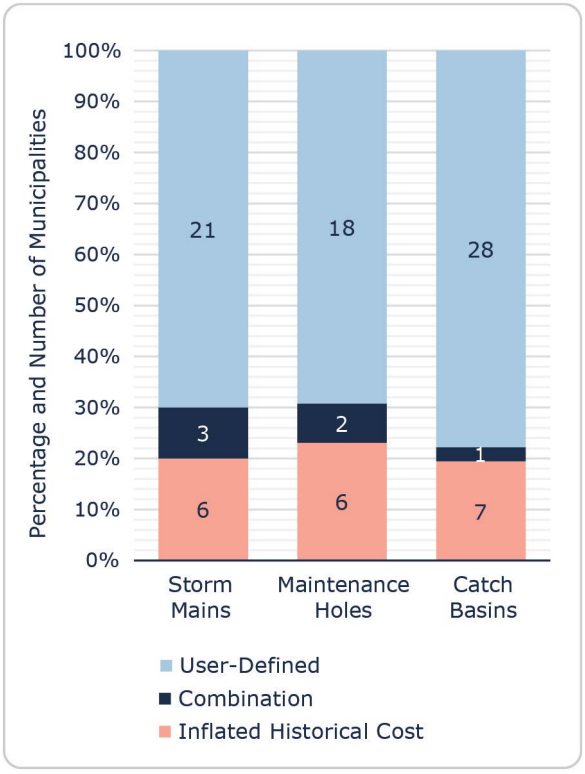

Figure 14. Replacement cost methodologies of Storm Network asset types.

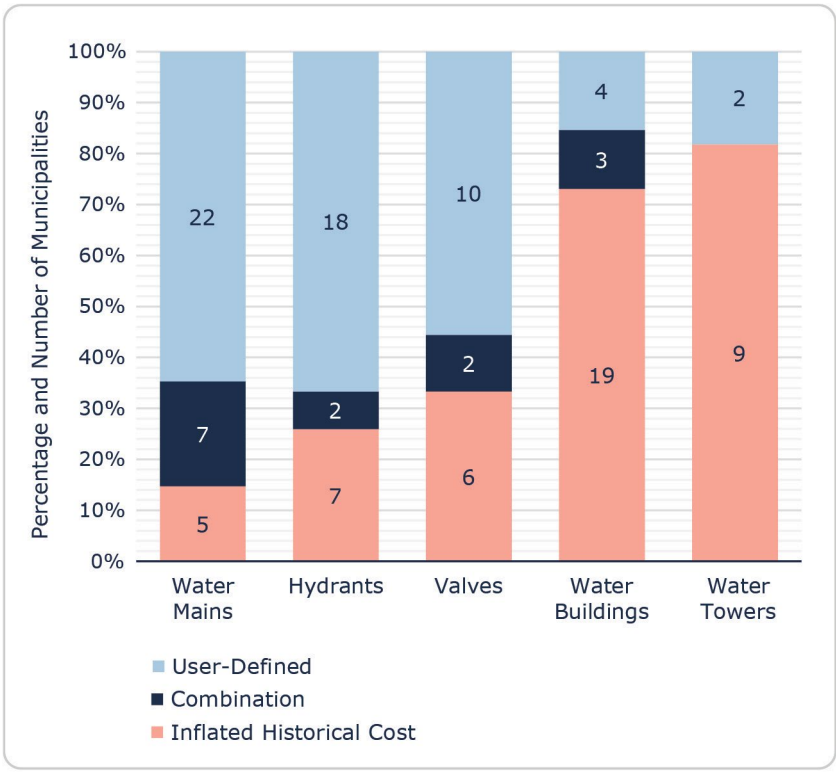

Figure 15. Replacement cost methodologies of Water Network asset types.

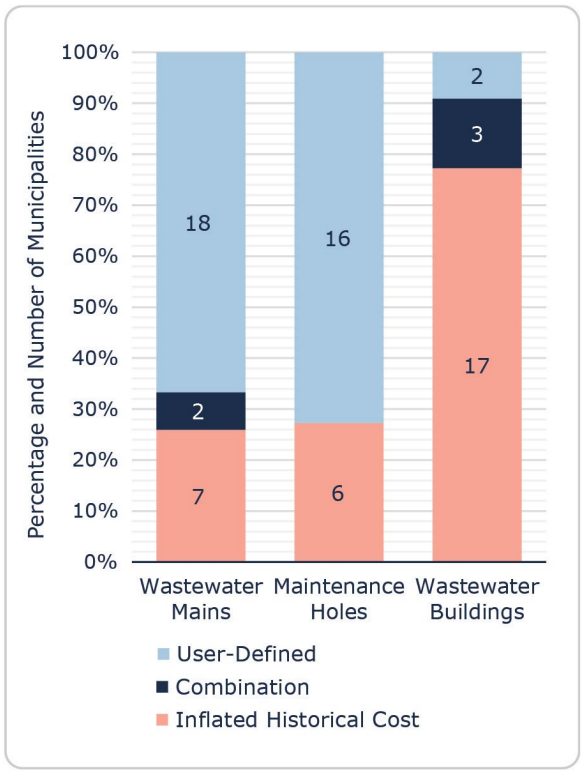

Figure 16. Replacement cost methodologies of Wastewater Network asset types.

Figures 14, 15, and 16 demonstrate that both inflated historical cost and user-defined replacement cost methodologies are used for underground assets. In the majority of Asset Management Plans, municipalities applied user-defined replacement cost valuations for all asset types analyzed in the Storm Network. Moreover, the majority of Asset Management Plans also had user-defined replacement cost valuations for major elements of the linear Water and Wastewater networks (i.e. mains, maintenance holes, hydrants, valves). In contrast, inflated historical cost replacement valuations were commonly determined for water and wastewater buildings.

Non-Core Asset Categories

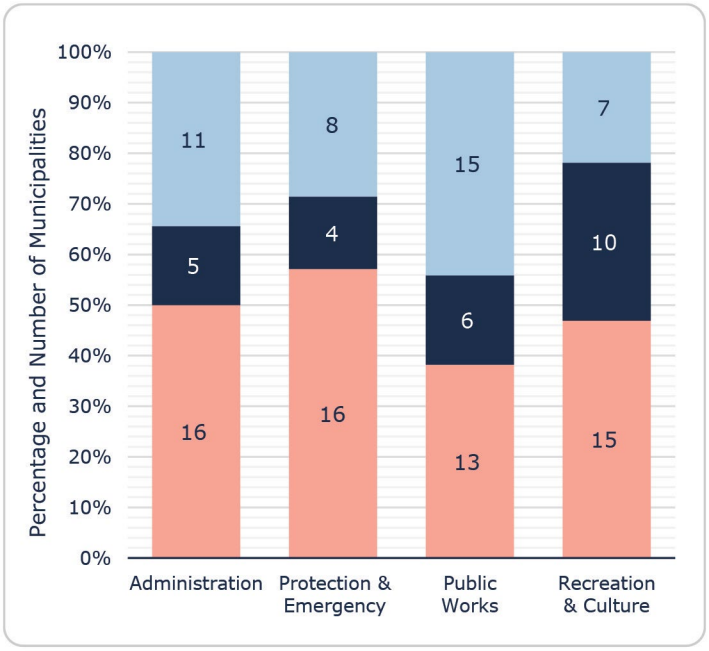

Figure 17. Replacement cost methodologies of Buildings asset types.

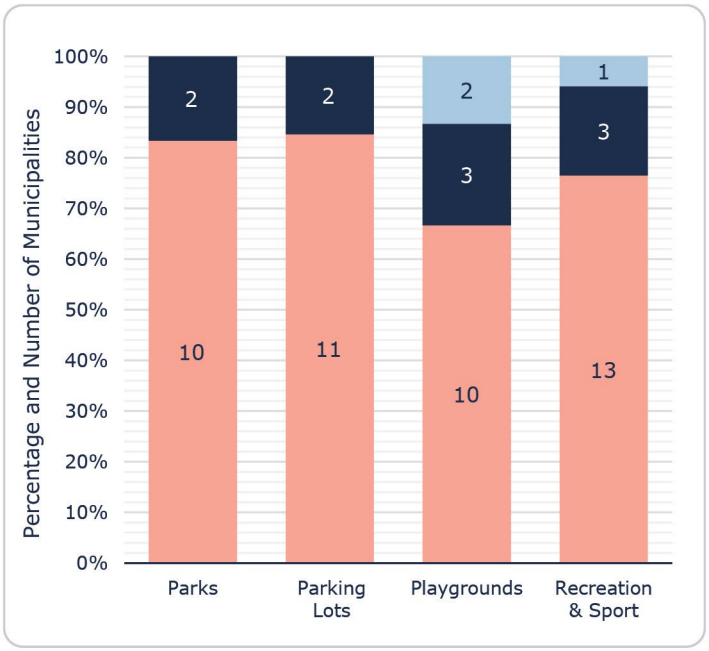

Figure 18. Replacement cost methodologies of Land Improvements asset types.

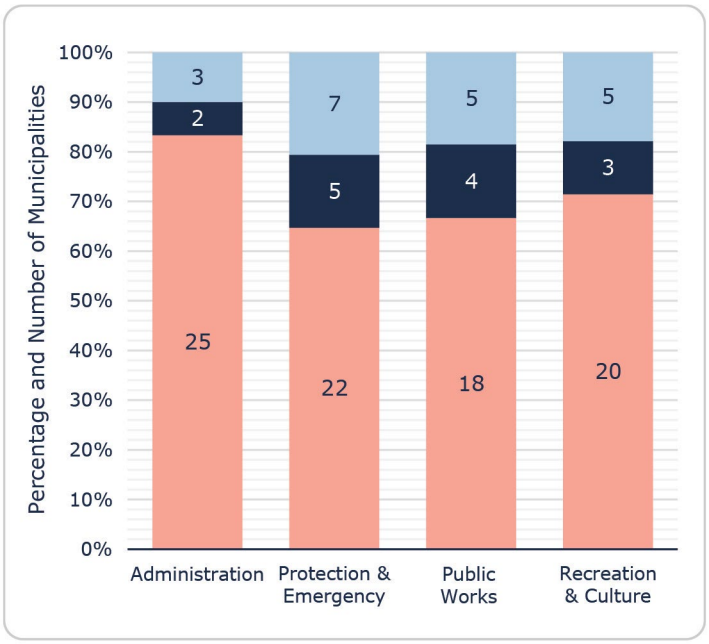

Figure 19. Replacement cost methodologies of Machinery & Equipment asset types.

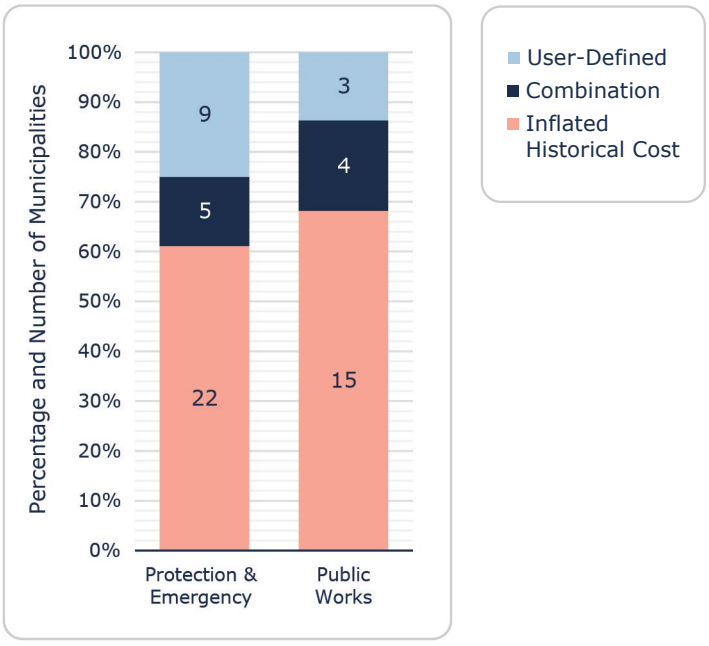

Figure 20. Replacement cost methodologies of Vehicles asset types.

Figures 17, 18, 19, and 20 demonstrate that inflated historical replacement cost methods are more commonly used for asset types in non-core asset categories. Among all asset categories, Buildings asset types have the highest prevalence of municipalities using user-defined replacement costs.

O.Reg 588/17 Compliance

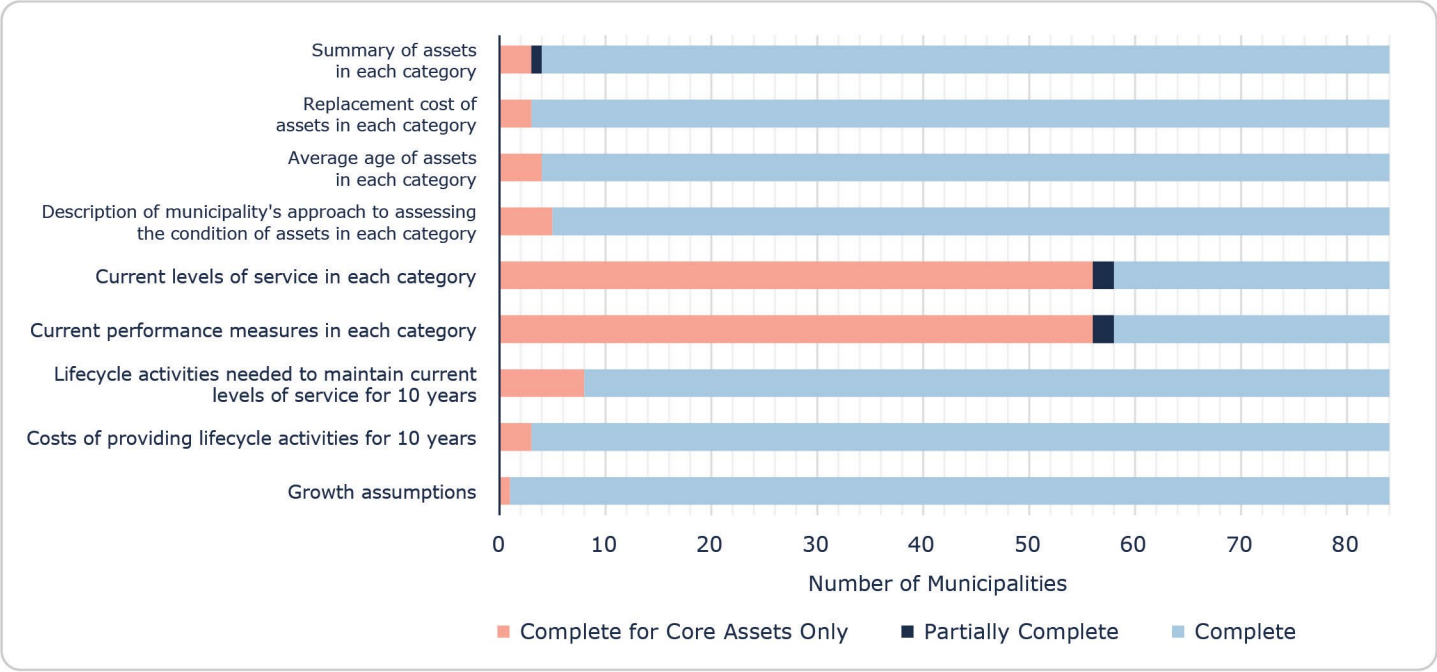

Figure 21. The number of municipalities that have completed specific O.Reg 588/17 requirements.

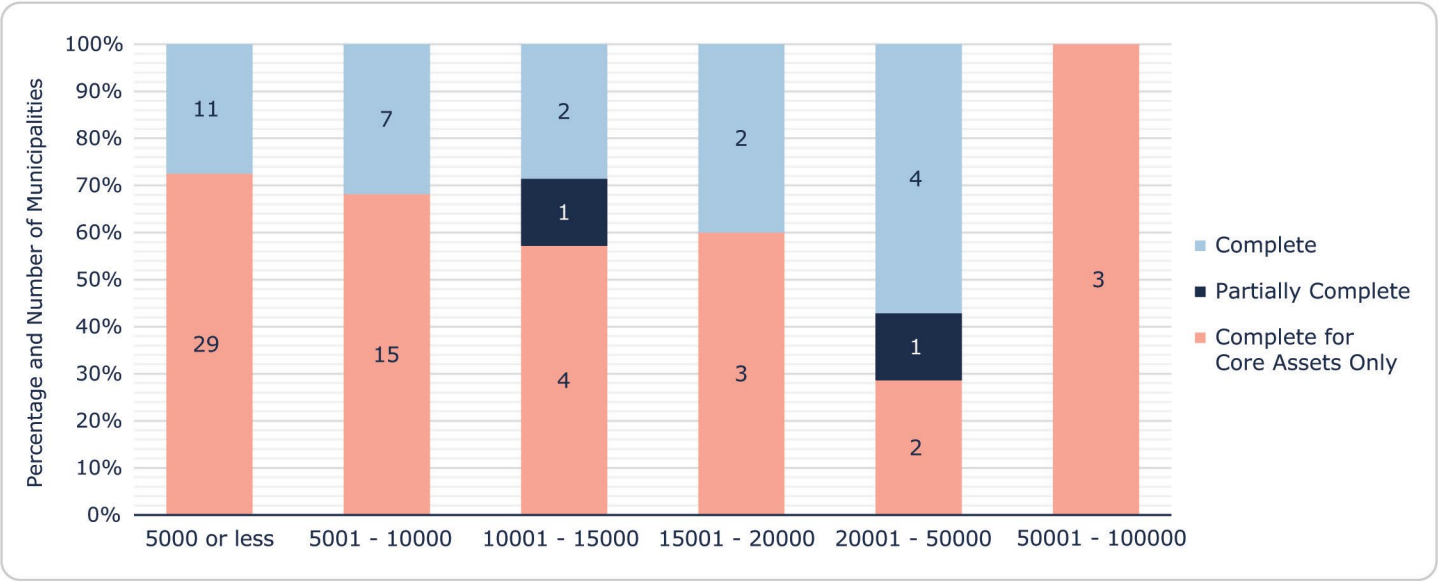

Figure 22. The percentage and number of municipalities that have completed the "Current levels of service" O.Reg 588/17 requirement, by population size.

Figure 21 demonstrates that the majority of sampled municipalities have met seven key O.Reg 588/17 requirements for all asset categories in their Asset Management Plans. Two advanced requirements that resulted in more varied results pertain to "Current Levels of Service" and "Current Performance Measures," with 26 sampled municipalities having met these requirements for all asset categories (as required by 2024), while the majority of municipalities have only completed the bare minimum requirements for core asset categories (as required by 2022). Notably, even among the municipalities that have met the current levels of service requirements, many municipalities have only included 3-5 Key Performance Indicators per asset class.

Although this is compliant with the regulations, from a management perspective, this does not provide as much insight or value as it could if more Key Performance Indicators were completed.

Figure 22 provides a summary of compliance with the Current Levels of Service requirement by population size. The graph shows that each population group had municipalities that completed the requirement only for core assets. The 20,001 - 50,000 population group had the highest proportion of sampled municipalities who have met the requirement for all asset categories. However, municipalities sampled in the largest population group only completed the requirement for core assets. The same results were found for the Current Performance Measures requirement as municipalities that only completed one for core assets did the same for the other. In effect, there is not a strong relationship between the size of sampled municipalities and the completion of Current Levels of Service and Current Performance Measures O.Reg 588/17 requirements for all asset categories.

Part II: A Qualitative Assessment of Asset Management Maturity

This section provides a qualitative assessment of asset management maturity. In consultation with asset management experts who assisted in the development of the 84 Asset Management Plans analyzed in this report, this section provides greater insight and discussion into the completeness and quality of asset management data, as well as the overall acceptance of asset management practices in Ontario.

Completeness and Quality of Asset Inventories

Accurate and reliable data is the cornerstone of effective asset management. There are five core data points that are required as a minimum for the successful development of Asset Management Plans: asset acquisition, asset useful life as per industry standards, replacement cost, condition, and remaining useful life. However, in order to truly have a successful Asset Management Plan and improve asset management practices within the municipality, there are other components that must be considered. Namely, successful asset management in a municipality should include the following components: Strategy & Planning, Organization & People, Asset Management Decision Making, Risk Management, and Levels of Service. While this section is primarily focused on the Asset Data & Information component, interpersonal skills such as HR capacity and Council dynamics should not be overlooked as they play an integral role in the development and maintenance of strong Asset Management Plans and practices.

Asset inventories are the first source of asset management data. In 2009, Canadian municipalities began collectively creating asset inventories when the Public Sector Accounting Board introduced PS 3150, which required tangible capital assets to be reported in financial statements. This was the first regulated exercise that required municipalities to begin collecting data about their assets. Since then, Ontario municipalities have been proactive in building complete inventories of their non-core asset categories as well. Additionally, Ontario municipalities have begun moving away from pooled assets common of asset inventories submitted in compliance with PS 3150 in 2009 and have instead included all asset types in their registries.

Through the PS 3150 process, Ontario municipalities gained a general understanding of the importance of establishing an inventory of the assets they own. However, the quality of the data that exists within asset inventories requires substantial maintenance to ensure accuracy and reliability. Currently, there are no data governance regulations that require Ontario municipalities to implement data governance or maintenance programs with respect to asset inventories. This has resulted in poor data quality, regardless of the size or region of the municipality.

Poor data quality is largely a result of multiple data inventories and inadequate record keeping, stemming from asset management data being in the hands of multiple departments. While Finance departments have historically been responsible for asset registries, Public Works and Engineering departments more commonly collect and maintain data on municipal assets and in effect, have the most up-to-date data of assets organization-wide.

Consolidating data from multiple departments into one single registry is critical to ensure that asset management planning activities are utilizing accurate, up to date data from a single source. Smaller municipalities have greater opportunity for collaboration across departments in this respect, whereas communication between departments is more difficult in larger municipalities, possibly making data consolidation more difficult to achieve.

Ontario municipalities are now beginning to recognize the importance of data quality following the completion of their first O.Reg 588/17 compliant Asset Management Plans. Low data quality results in misled and inaccurate outcomes. When completing Asset Management Plans, PSD Citywide consultants found that when municipalities have more accurate and reliable data, their infrastructure deficit is likely to be smaller than what strictly age-based analyses suggest. The following two sections explore the quality of financial data and performance data - two critical data points essential when practicing asset management - more specifically.

Relevance and Accuracy of Asset Management Financial Data

Replacement Cost Methodologies

Financial data is vital to the practice of asset management and forms the basis for determining replacement costs used to project capital replacement and rehabilitation needs of asset portfolios. These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. Replacement costs should reflect the current total costs associated with the full replacement or reconstruction of an asset and include the combined costs of materials, labour, engineering, and administration. Further, as asset management practices and municipalities continue to mature, a reproduction cost will need to be considered as opposed to just a replacement cost. This reproduction cost would factor in emerging elements in asset management practices such as growth requirements, service enhancements, new technologies, and climate change resiliency.

Ensuring that financial data is accurate is critical - when financial data is unreliable, replacement cost inaccuracies compound. The more accurate replacement cost valuation is for every single asset, the better an organization will understand the true financial projections of future requirements, and overall, the cost of an organization’s capital funding gap.

A noted limitation of this report is the use of a variety of industry approaches to generate replacement cost methodologies, current replacement values (CRVs), and estimate asset condition. While municipalities are likely to rely on multiple approaches to gauge their asset condition, this report only distinguishes between assessed conditions (combining staff inspections and engineering studies together) and age-based assessments. Similarly, replacement cost methodologies only distinguish between user-defined costs and historical cost inflations, despite many kinds of studies existing within these two categories. As a result, more attention could be given to determining how municipalities establish age-based estimates, as well as how they calculate current replacement values. This is not to say municipal data for condition assessments are not comparable to each other, but that the differences in data quality need to be further investigated. By adopting more prescriptive regulations and standardizing inflation indices, policymakers can guide municipalities to obtain more standardized, comparable data models that are less prone to variation rather than simply encouraging the minimum requirements.

In addition to submitting asset inventories, the PS 3150 regulation also required municipalities to establish loose replacement cost projections of their tangible capital assets. While this was an important exercise in better managing municipal assets, the relevance and accuracy of replacement costs diminish overtime. Since first developing replacement cost projections in 2009, municipalities have relied on Consumer Prices Indexes to inflate the costs of their assets, a methodology termed historical cost inflation. Historical cost inflation is typically used in the absence of reliable unit cost data. It is a fairly reliable method for recently purchased and/or constructed assets where the cost is reflective of the total capital costs that municipalities incur. As assets age, and new market conditions, products and technologies impact procurement costs and construction methods, cost inflation becomes a less reliable technique to determine replacement cost and valuations become increasingly inaccurate year over year.

In the last five years, Ontario municipalities have begun to implement more reliable replacement cost methodologies. The user-defined methodology involves municipal staff determining asset replacement costs based on industry standards and likewise, the cost per unit methodology utilizes costing from capital projects and engineering studies. As a best practice, these methodologies may also consider associated soft costs, such as administration and design, that contribute to costs of asset replacement. Most importantly, both methodologies attempt to determine the true cost of capital to replace assets.

Population Size and Region

While user-defined methodologies yield more accurate financial data than inflated historical costs, using user-defined methodologies to determine replacement costs requires more resources and capacity. For this reason, municipalities with larger populations are more likely to implement these methodologies to a greater degree. Larger municipalities also undertake more capital projects, which provides up-to-date market prices of assets that can be used to more accurately determine replacement cost valuations. In contrast, smaller municipalities lack resources and capacity required of acquiring user-defined replacement costs and do not have as many capital projects per year across all asset categories to source updated replacement costs from as well.

Asset Categories

Among all assets, categories that have the most accurate replacement cost data are core linear assets which include, Roads, Bridges and Culverts, Water, Wastewater, and Stormwater. Replacement costs can be derived from recent tender prices or quotes from vendors. These categories are involved in a higher number of capital projects and therefore, costing of asset types in these categories are readily available. Additionally, these types of assets often have less variability in the unit cost estimates due to the standardized nature of, for example, road development, compared to, for instance, the variable design standards for different kinds of facilities.

More specifically, the Road Network and Bridges & Culverts asset categories commonly undertake routine engineering studies (i.e. Roads Needs Studies and OSIM condition assessments). While these studies pertain more to the condition of the assets, they sometimes also provide costing details, providing another information source when deriving replacement cost valuations.

In contrast, generating replacement costs for non-core asset categories is more complicated. Generally, non-core asset categories tend to rely heavily upon historical cost replacement methodologies. However, for certain non-core assets such as Facilities, there are other, more accurate options available. Specifically, there are vendors available for Facilities assets to generate reliable replacement costs based on industry standards and component-level replacement cost breakdowns. This tends to produce more accurate replacement costs than relying on historical cost methodology alone. For other non-core asset classes, such as Land Improvements and Equipment & Machinery, there is an absence of an industry-standard approach to replacement cost methodologies, meaning there are fewer options available to generate replacement cost estimates aside from using historical replacement costs. This can lead to inflated estimates and overall less accurate information for replacement costs in these non-core asset categories.

Relevance and Accuracy of Asset Management Performance Data

Performance Methodologies

Performance data is critical to understanding the infrastructure deficit that exists within a community. Asset condition is the most common type of performance metric currently used by Ontario municipalities when developing Asset Management Plans. Accurate and strong infrastructure investments rely on good condition assessments of municipal asset portfolios and incomplete or limited understanding of asset condition can mislead long-term planning and decision-making. In combination with replacement cost data, accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

Municipalities rely on two different methodologies to determine the condition of assets: age based condition and assessed condition.

Assessed condition is the most accurate methodology in determining asset condition as it reflects the true condition of the asset and its ability to perform its functions. Condition of assets can be determined either through engineering studies or by municipal staff. In the absence of assessed condition data, asset age taken with its approximate service life remaining determines asset condition. This methodology is highly inaccurate as age can misstate the true condition of assets, making assessments essential to accurate asset management planning.

Population Size and Region

Traditionally, smaller and remote municipalities have had limited condition data on their assets compared to larger municipalities. This was largely due to a lack of resources and capacity. Engineering studies in which industry experts conduct assessments on the state of assets are often expensive and require lengthy RFP processes. Further, staff assessments require specialized knowledge and dedicated time. However, in the past five years, smaller municipalities have made significant progress in collecting more condition data. Based on the sample, there was no clear relationship between the amount of condition data collected and population size (Figure 5). That being said, some larger municipalities have implemented routine inspections for their condition data every four to five years, while some smaller municipalities have only started collecting data for the first time, making it much less likely for them to have established cyclical assessments. Though it is important to recognize that there has been progress made by smaller municipalities by collecting their condition data, it is also important to note that these processes are not as entirely formalized as other, typically larger municipalities tend to be.

However, an outlier does exist for Northwestern regions, who have the lowest percentage of municipalities with assessed condition for over 50% of assets and no municipalities that have assessed condition for over 80% of assets. The anomaly can be attributed to a limited access of professional industry condition assessments in more remote areas of Ontario.

Despite municipalities gathering more assessed condition data altogether, the percentage of assessed condition of overall asset portfolios is still limited. The analysis showed that a significant portion of municipalities in the sample had assessed condition for over 50% of their asset portfolio, but dropped substantially compared to assessed condition metrics for 80% of asset portfolios.

Asset Categories

The amount of assessed condition data collected for each asset category varies. Primarily, Roads and Bridges & Culverts asset categories have the greatest amount of assessed condition available. Most municipalities in Ontario have condition assessments completed on their Road category, known as a "Roads Need Study", as it is a shared best practice and is relatively inexpensive. Likewise, Ontario municipalities are required to perform biennial inspections for bridges and culverts over 3m using the Ontario Structure Inspection Manual (OSIM).

Based on the sample, there is very limited condition data available in all other asset categories. The category with the third highest condition data collected, though very limited, is Facilities. Over the past decade, municipalities have begun collecting more condition data on Facilities, however as a best practice, this category requires a more sophisticated condition assessment protocol. Most commonly, the condition of a facility is examined as a single entity rather than an entity with multiple components whose conditions may all vary. Using a componentized approach to assessing the condition of facilities more accurately captures the condition of asset types such as the roof, windows, floor, furnace, etc.. These asset types have different lifecycles and replacement costs, and employing a more sophisticated condition assessment methodology is required to best determine the condition of a facility altogether. The current industry standard of facilitation condition assessments is the UNIFORMAT II classification system which is based on three levels of componentization.[4]

Relevancy of Condition Assessments

The duration in which condition assessments should be conducted varies among asset categories. Just as the accuracy of replacement cost valuations diminish on varying timelines, the relevance of condition assessments depends on the life of the assets and the speed at which they deteriorate.

Following industry best practice, road and facility assessments should be completed every five years. In contrast, underwater infrastructure such as maintenance holes and sewer mains have longer lifespans and should be assessed every ten years. In general, ten percent or less of the lifespan of an asset is a good indicator of the duration in which condition assessments should be completed.

Implementing condition assessment programs that have scheduled condition assessment timelines for each asset category and asset type based on industry best practice will ensure that assessments stay relevant and accurate.

4 https://www.uniformat.com/index.php/unifrmt-ii/past-site-articles/99-background-on-uniformat-ii-the-astm-e1557-building-standard

Advanced Performance Metrics

Beyond condition, there are a variety of advanced metrics that can be used to determine the performance of assets. Examples include utilization, accessibility, efficiency, sustainability, functionality, and capacity. These advanced performance metrics provide more detailed information regarding the condition of assets and consider the condition of assets from a resident perspective. These metrics are particularly useful when determining levels of service, and in particular, when developing prospective levels of service.

The collection of advanced performance metrics by Ontario municipalities is very limited. These metrics are difficult and often expensive to collect. When advanced performance metrics are collected, primarily by large municipalities (20,000+), they are commonly used in Master Plans and have yet to be utilized in asset management planning to a significant extent. Many municipalities have only just begun to centralize and document these key performance indicators. However, the collection of advanced performance metrics is expected to increase with the nearing of the O.Reg 588/17 2025 deadline requiring all municipalities to complete prospective levels of service for all asset categories.

Overall Acceptance of the Asset Management Practice

As a practice, asset management has become more widely embraced among Ontario municipal staff and elected officials over the past decade and particularly in the past five years. This shift in acceptance can be attributed both to regulation and overall greater knowledge of the asset management practice. As Ontario municipalities meet O.Reg 588/17 requirements and are seeing concrete deliverables, the value and importance of asset management of overall management and maintenance of assets becomes evident. Likewise, the Federation of Canadian Municipalities' Municipal Asset Management Program, in addition to grant funding, provided widespread training programs in collaboration with their communities of practice and other participating partners. Associations such as AMO have been instrumental in educating municipalities not only on the value of asset management, but also have provided guidance on how to meet regulatory requirements and implement asset management best practices.

While asset management implementation has increased across the province, municipality size does have an impact on its uptake. Larger municipalities have more resources to create dedicated asset managers to champion the value of asset management and coordinate asset management best practices and initiatives. While smaller municipalities recognize the importance of asset management, their uptake of the practice is limited by capacity and resource restraints.

Some of the biggest new advocates of asset management are elected officials. In recent years, elected officials have become increasingly in favor of Asset Management Plans, both as a communication tool and its usefulness in addressing the infrastructure deficit. Asset Management Plans offer clear and concise public messaging and communication points, such as providing tailored metrics on each household's share of infrastructure, of typically complex asset management principles and findings. When presenting Asset Management Plans to councils, PSD Citywide consultants have found that the Financial Strategy section of an AMP is of particular interest, providing specifics into the scope of potential property tax increases.

Conclusion

Through both a quantitative and qualitative assessment of sector progress, the findings of this report reveal that Ontario municipalities are steadily progressing towards greater asset management maturity. There has been significant progress in asset inventories and the overall acceptance of the Asset Management practices by municipal councils and senior level staff. Specifically, municipalities have more complete data inventories than ever before, especially in regard to underground infrastructure, and no longer have pooled datasets that were common of asset registries submitted for PS 3150 compliance in 2009. Furthermore, the practice of asset management has become more widely accepted and encouraged within municipal level governance. Councils and senior staff have begun leveraging Asset Management Plans as valuable resources to communicate complex infrastructure deficits and to support short and long-term planning and decision-making.

This momentum in asset management maturity must continue in order for the value of asset management to be fully realized. While Ontario municipalities' asset inventories are more complete, the management and governance of these inventories must be prioritized to ensure greater data quality and the consolidation of all asset inventories into one single registry used organization-wide.

Moreover, the application of advanced condition assessments and user-defined replacement cost valuations across all asset categories must increase. Financial and performance data are the two most important and critical data points required to project future asset requirements and make strong infrastructure investments. Currently, Ontario municipalities across all population sizes and regions in the sample data set do not have enough assessed condition and user-defined replacement costs to have an accurate evaluation of their infrastructure deficits. Road Networks and Bridges & Culverts are the only two asset categories that have adequate assessed condition data and replacement cost valuations.

Asset Management Plans are living documents that should be updated regularly as additional asset and financial data becomes available. Ontario municipalities have a strong foundation to grow in asset management maturity by implementing advanced asset management strategies into their existing Asset Management Plans created in compliance with O.Reg 588/17. As Ontario municipalities continue to work towards completing forthcoming 2024 and 2025 requirements, even greater sector progress can be expected over time.

Municipal resources will need to be leveraged with continued provincial and federal support to sustain the growth in asset management maturity. Permanent and predictable federal funding – aligned with municipal asset management plans – through the CCBF, for example, has proven vital in allowing the sector to build on progress made, while addressing infrastructure backlog.