



ASSET MANAGEMENT 101

The What,
Why, and
How
For Your
Community

Brought to you by
the Canadian Network
of Asset Managers

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INTRODUCTION

Communities are being challenged to make the best possible decisions with scarce resources for both today's users and future generations. Planning for infrastructure renewals, growth, and new demands amidst increasing service expectations, risk exposure, and financial challenges can put elected officials and community staff in a difficult position. Asset management (AM) can help.

The term 'Asset Management' is likely familiar, and you know there are tools out there to better manage public infrastructure but where do you start? Many towns and cities face similar challenges in how to begin, allocate the staff resources, collect all the data on their infrastructure, and develop asset management plans and integrated policy and procedures accordingly. A lack of funds and staff time, limited political buy-in, and a general misunderstanding of the practices (many which already exist in the organization) are common obstacles that prevent communities across Canada from developing their asset management capabilities despite the fact that doing so can create significant overall savings in time and money.

This booklet has been structured to help you better understand and appreciate the power of asset management, and give you some guidance on how to get started. Whether you are new to the practice or have already been involved in asset management in your community, this guide provides a simple and clear understanding of asset management.

The booklet is part of the Canadian Network of Asset Managers' (CNAM) Asset Management Awareness and Outreach Program, and it is aimed at elected officials and municipal/community staff who are (or should be) involved in municipal asset management. It is written by active members of the infrastructure asset management community and will help you understand:

- What is asset management?
- Why is asset management beneficial to my community and organization?
- How do I get started on a formal asset management approach?

What is your current level of asset management awareness?

Before you begin, please identify your current level of knowledge on the subject of asset management. Using the scale below, which is adapted from the Federation of Canadian Municipalities' AM level of knowledge scale, circle your current level of awareness of asset management.

1	2	3	4	5	6	7
NOTHING	VERY LITTLE	LITTLE	AVERAGE	FAIRLY SOLID	SOLID	EXTENSIVE
This is my first exposure to the subject of asset management.	I have heard it mentioned, but have had no direct exposure to it.	I have been in discussions about it, and I know it's important, but that's about it.	I have a good general idea of why asset management is important.	I have been involved in formalizing asset management in my community.	I work directly on formalizing asset management in my community.	I understand asset management. I could teach it to others.



WHAT IS ASSET MANAGEMENT?



Understanding what asset management is begins with an understanding of the word “asset” in this context. In the broadest sense, an asset is anything that delivers value to your organization and the stakeholders you serve. When we talk about municipal asset management, we typically talk about assets being a piece of publicly-owned infrastructure, for example a road, a water pipe, an indoor or outdoor recreational facility, an office building, etc. Of course, we can also consider other assets of the organization like people, processes, and knowledge. However, this booklet will focus on infrastructure asset management.

The term asset management has been defined in different ways by a variety of government and non-government organizations in Canada. As part of the Leadership in Asset Management Program (LAMP), an initiative delivered by the Federation of Canadian Municipalities, a definition of asset management was created:

Asset management is an integrated approach, involving all organization departments, to effectively manage existing and new assets to deliver services to customers. The intent is to maximize benefits, reduce risks and provide satisfactory levels of service to the community in a sustainable manner – providing an optimum balance. Good asset management practices are fundamental to achieving sustainable communities.

From a practical perspective, asset management is based on a set of fundamentals:

- **Value:** Assets exist to provide value to the organization and its stakeholders.
- **Alignment:** Asset management translates the organizational objectives into technical and financial decisions, plans, and activities.
- **Leadership:** Leadership and workplace culture support achieving plans and goals.
- **Assurance:** Asset management gives assurance that assets will fulfill their required purpose.

“Helping Canadian municipalities make informed decisions on infrastructure investment based on sound asset management practices will make infrastructure dollars go further and will benefit Canadians for years to come.”¹

— **Amarjeet Sohi**, Minister of Infrastructure and Communities

Infrastructure and community services

Fundamentally, infrastructure assets exist to provide services to our communities. Managing our assets to deliver those services is asset management. In order to have sustainable, resilient communities that will thrive now, and for future generations, investing in our asset management efforts cannot be ignored.

Public infrastructure is the foundation for a healthy and vibrant community. Many municipalities define assets by including all physical infrastructure that is necessary to support the social, economic, and environmental services provided by the organization. These asset types include, but are not solely limited to, tangible assets such as buildings, engineering structures, roads, parks, transit, IT networks, water and wastewater systems, and intangible assets such as land, software, data, and intellectual property. Some communities are including “natural assets” within their AM practices, and opting to manage things like land, drainage channels, rivers, and aquifers alongside their more traditional infrastructure assets.

Many of our communities are faced with an aging and quickly deteriorating asset base but have limited revenues to rehabilitate or replace those assets. At the same time, ratepayers, citizens, and businesses within the communities have increased expectations for the level of services received, despite the fact many reject the increases to taxes required in order to pay for the higher levels of service.

Asset management provides communities with the opportunity to do more with less, by providing a structured way of tracking performance, costs and risks to meet service objectives in the most efficient and effective manner.



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Read about the benefits that Canadian communities have experienced with following a structured asset management approach.



Video: Why Invest in Asset Management?

An innovative approach to infrastructure planning benefits Canadian cities and towns.

www.cnam.ca/resources

The history of asset management in Canada

Construction of infrastructure surged across Canada from the 1950-1970's due to growth, modernization, and urbanization following the end of the Second World War. This meant the construction of a lot of roads, bridges, water distribution, wastewater treatment, buildings, schools, hospitals; everything that communities needed. However, the following 30-40 years saw little investment in the sector, failing to provide the necessary investments in proactive and preventative maintenance of our infrastructure. The result is a significant proportion of our assets have fallen into disrepair, and are now in desperate need of substantial rehabilitation and, in some cases, full reconstruction. Nearly 35 per cent of municipal assets are in need of attention, increasing the risk of service disruption.²

It was 2009 when all Canadian municipalities were required to change their financial reporting by incorporating Tangible Capital Assets (TCAs) into their financial statements. This was mandated by the Public Sector Accounting Board (PSAB), and became PSAB Standard 3150. It gave municipalities a better understanding of what assets they owned and their financial value. By accounting for TCAs through recognizing the annual amortization, the asset's rate of "consumption" would be recorded. Not only did this accounting change mean that the presentation of financial statements would be altered, but it also resulted in some municipalities reporting a surplus, or for others, a deficit.

Asset management provides communities with the opportunity to do more with less by providing a system for thoughtful, timely spending on municipal assets.

Then come the catalysts



The population change: Growth and population increase across Canada was 11.2 per cent from 2006 to 2016,³ which was unexpected for many communities and puts a strain on their existing infrastructure. Some communities have experienced population decreases which causes other challenges around rationalizing the asset base.



The challenging municipal funding model: Municipalities only receive eight per cent of every tax dollar collected across Canada,⁴ yet are accountable and responsible for the stewardship of 60 per cent of infrastructure assets in Canada.⁵



The impacts of climate change: Natural disasters have become more prevalent in urban and rural Canadian communities.⁶ These events – like floods, high winds, drought and more – can have a very direct impact on our communities' infrastructure and our ability to provide services.



And unrealistic service expectations: Most citizens do not have a full understanding of what their municipal tax goes towards, and the services they get – and that's something that we as municipalities in general need to be better at explaining.

“I’m proud of the leadership being demonstrated by municipalities across the country. Local leaders are embarking on some of the most innovative solutions to address the impacts of climate change and reduce greenhouse gases. At the same time, they are taking steps to strengthen decision-making on infrastructure spending, which has a major impact on the day-to-day lives of their residents.”⁷

— **Jenny Gerbasi**, FCM President

Government support

The Government of Canada recognizes that major funding of infrastructure renewals and new infrastructure assets is required for communities to prosper. Through the ‘Investing in Canada’ plan, the Government of Canada is more than doubling past infrastructure funding to spend \$180 billion from 2016 to 2028.⁸ But without proper asset management practices in place, how do we know we are funding the right infrastructure projects?

From a provincial perspective, there are also efforts to improve infrastructure investments and asset management practices, both at a regional and local community level. More on this in the next section.

Are other countries and industries doing asset management?

Globally, Canada certainly isn’t the only country and population that is affected by infrastructure and service challenges. Countries like New Zealand, Australia and the UK have made great progress on public sector asset management. These are all places we can learn from, and adapt their good practices in Canada.

Other industries are also working on introducing better asset management practices into their organizations, including energy utilities, airports, oil and gas companies, port terminals, railways, and more. Any organization with infrastructure has a lot to gain from improving their AM efforts and formalizing an AM approach to manage their infrastructure and services.

The future of asset management

While we don’t have a crystal ball, we know that AM is here to stay. As a nation, communities and their services are the foundation of our day-to-day lives, even if that’s often forgotten. And infrastructure is crucial for those services to be delivered. Provincial governments across Canada continue to develop and refine AM policy and some have introduced specific legislation. Getting better at AM is an important part of managing our communities that isn’t going away.



WHY IS ASSET MANAGEMENT IMPORTANT FOR YOUR COMMUNITY?

Communities across Canada are already experiencing the benefits of formalizing asset management practices

Small, medium, and large-scale communities across the country are reaping the benefits of a formalized approach to asset management, and you can too.

“Asset management helped us improve our capital planning process, it now takes significantly less time and we have a far more effective and targeted capital investment plan. Capital budgets are now set for 5-20 years and our annual review and revisions ensure our budget forecast is current. Through working with council and public consultation we secured a significant capital investment plan and redirected ~10% of our budget to what we learned was a priority to our community. **We took people through the challenge, explaining that we need to proactively manage and maintain our infrastructure.**”

— **Tony Haddad**, Chief Administrative Officer, Town of Tecumseh, Ont.

“Discussions at budget time have focused more on maintaining our existing assets in a state of good repair than ever before. There has been an **increased awareness on the need to maintain existing assets** and the realization that this comes at a cost.”

— **Patrick Brisson**, AM Program Manager, City of Ottawa, Ont.

“Halton Region’s Corporate Asset Management Plan demonstrates sound stewardship of the Region’s existing assets to **support services at desired levels and to ensure financial sustainability**. It also supports decision making for future investments regarding the construction, operation, maintenance, renewal, replacement, expansion and disposal of infrastructure assets while minimizing risk, and cost to the Region and its residents... The targeted 4.5% rate increase is lower than the 5.2% forecast largely driven by adjustments to the capital financing based on the Asset Management Plan”

— **Halton Region**, Ont., 2018 Budget and Business Plan

“The goal was to bring together the best available information and report to council so that we could begin making more informed decisions on infrastructure replacement. Through the process we learned a lot about gaps in our existing asset data and processes. The report cards **provided the justification we needed for infrastructure investment that was lacking before.**”⁹

— **Joel Shaw**, Infrastructure Engineering Manager, City of Kelowna, B.C.

“**We are ready for major funding announcements – reports and applications can be generated quickly with on hand information.** Incoming Councillors and staff have a solid knowledge of where the municipality stands with its assets and the financial strategy to maintain and replace those assets.”

— Councillor **Liz Welsh**, Town of Petrolia, Ont.

Maybe your community has some service and infrastructure challenges

Do any of these sound familiar?

- Do you know if you are spending too much, or too little, on your infrastructure to deliver services?
- Is your investment in new infrastructure versus maintaining old infrastructure balanced?
- Do you have disconnected functions within your organization and think you can be using your information better?
- Are you struggling to match citizen taxes and rate increases with your investment needs and financial budgets?
- Are you struggling to meet citizen expectations? Do you know what they are?
- Are you struggling to understand what citizens define as priorities and what they are willing or not willing to pay for?
- Are you missing key pieces of information to make decisions?

These are the types of challenges that thoughtful development of asset management practices in your organization can solve.

I heard legislation is coming, and what about funding?

The Government of Canada is serious about the infrastructure challenges we face as a nation. The Canadian Infrastructure Report Card (CIRC) is now collected by Statistics Canada, and was expanded to Canada's Core Public Infrastructure (CCPI) survey,¹⁰ as the federal government understands the importance of having a comprehensive view of the challenge across the country. The Gas Tax Fund was a clear demonstration on the government's commitment to help communities with some of the challenges they face, but it's down to the communities themselves to make sure you are making the right decisions for your own future. Communities need to have a clear understanding of their short, medium, and long-term infrastructure needs and that is why government funding is being allocated to help communities improve their asset management practices.

In 2017, Infrastructure Canada released a five-year, \$50-million funding program with the Federation of Canadian Municipalities (FCM) – the Municipal Asset Management Program (MAMP) – designed to help Canadian municipalities make informed infrastructure investment decisions based on sound asset management practices.¹¹ The FCM MAMP grant fund is available in addition to all the other funding sources that are available to help you with your AM efforts. These funds can help advance your business processes so that you are making well-informed investment decisions on your infrastructure, and setting your community up for a sustainable future. Please visit www.fcm.ca for more information on the MAMP program, some restrictions apply.



www.fcm.ca

The provincial governments have adopted differing approaches to encourage asset management at the community level. Several provinces are making it mandatory for municipalities to have an “Asset Management Plan” (AMP) in order to access provincial infrastructure funding. Some provinces are even considering making AM a legislated requirement for municipalities to follow, ensuring communities develop long term plans that better connect services with the asset base – Ontario Regulation 588/17 was launched at the end of 2017.

For more information on AM legislation and funding opportunities for your organization, connect with your asset management Regional Community of Practice and connect with your neighbouring communities. Here’s a list of the asset management associations and working groups across Canada who can help you build your network and support your asset management journey:

REGIONAL ASSET MANAGEMENT COMMUNITIES OF PRACTICE		
British Columbia	Asset Management BC (AMBC)	www.assetmanagementbc.ca
Alberta	Infrastructure Asset Management Alberta (IAMA)	www.assetmanagementab.ca
Saskatchewan	Asset Management Saskatchewan (AM Sask)	www.assetmanagementsk.ca
Yukon	Yukon AM Community of Practice (YAM-CoP)	www.ayc-yk.ca
Other	Manitoba, NWT, Nunavut	(COPs under development)
Quebec	Centre d’expertise et de recherche en infrastructures urbaines (CERIU, Quebec)	www.ceriu.qc.ca
Ontario	Asset Management Ontario (AMOntario) Ontario Coalition For Sustainable Infrastructure (OSCI)	www.amontario.ca www.on-csi.ca
Atlantic	Atlantic Infrastructure Management Network (AIM)	www.aimnetwork.ca
National	Canadian Network of Asset Managers (CNAM)	www.cnam.ca

The legislation side of asset management for communities and the public sector will continue to evolve and change over time.

Isn’t this just a fad? If I ignore it everything will be fine, right?

The facts remain; generally speaking our municipalities are managing aging infrastructure portfolios that are approaching the end of their useful life, most communities do not have the financial means to replace those assets when required, and population growth is forcing our municipalities to expand and citizens are expecting higher levels of service. If these challenges aren’t evident already, they will be soon.

Not acting now will mean the situation will worsen and make it harder to take control of at a later date. Sorry, but you can’t just pretend that this isn’t happening; this isn’t a fad. As a nation our infrastructure position is getting worse, and our communities and future generations will suffer if we continue to defer the problems. You as responsible elected officials and community staff need to take action.

In many provinces you can get funding to support you develop your Asset Management practices, in addition to federal funding!

www.cnam.ca/resources





HOW DO I GET STARTED?



You are already doing some level of asset management

“Everyone is doing some element of asset management; you have to be! But maybe you aren’t following a structured approach. It’s not as daunting as we first thought, we are doing parts of it already.”

— **Travis Rob**, Manager of Operations and Facilities, Fort Frances, Ont.

You are already delivering services to your customers

People turn on their taps and get water. People drive on your roads. People go to the recreation centres and libraries. Peoples call the Fire Department looking for help. Your community is already benefiting from those services.

But, maybe the strain is starting to show. Maybe there are regular interruptions to your water supply due to burst pipes. Maybe you are having to do more repairs on your buses due to the potholes in the roads that don’t get fixed. Maybe there isn’t enough funding to repair the pool deck at the rec centre and cutting services is becoming a reality.

“If you aren’t planning for asset management and managing your assets proactively in line with your services, you are reacting to them and paying more for it as a result. Your under-maintained and old infrastructure will jump up to bite you soon, if it hasn’t already!”

— **Alicia Keating**, Assistant City Treasurer City of Fredericton, N.B.

You are already operating and maintaining your assets

The beat goes on. You are out there operating your assets, fixing them when they break, trying to plan for future maintenance needs. How are you balancing planned versus reactive maintenance? Do you feel like you are always reacting to things breaking?

Asset management is about much more than maintenance and work orders. For more information on this refer to the “Managing Assets vs. Asset Management” by the ISO 55000 Technical Committee, which is available for download at www.cnam.ca/resources.

You are already doing budget planning and setting tax rates, as well as your PSAB 3150/TCA Reporting

Every year you go through the process of setting your budgets and tax rates. Some of you may be managing to move to multi-year budget commitments (having an understanding of your longer term infrastructure needs is a critical component for moving to multi-year budget commitments). Is it just last year +/- three per cent? Maybe it's another year of zero per cent tax increases, and a reduction of budgets to account for inflation? How confident are you in the numbers in your long-term capital plan?

When the Public Sector Accounting Board (PSAB) Standard 3150 came into effect for Canadian municipalities in 2009, it provided a solid base for data collection for a municipality to list, track and update information on their infrastructure. Tangible Capital Asset (TCA) reporting is an annual exercise that is done to satisfy the financial reporting requirements and requires updates on asset acquisition, asset disposal and annual depreciation. While the data collected for PSAB 3150 can be seen as a component to asset management, it does not encompass all relevant information for future planning for a municipality, nor does it account for the services and levels being provided by the infrastructure. PSAB reporting focuses on historical data, but does not take into account current and future costs of infrastructure and new ways of delivering a service through new infrastructure. To put it simply, PSAB 3150 does not equal asset management.

Good asset management needs not just historic financial reporting, but also informed, meaningful and responsible long-term planning. PSAB 3150 is a useful component of good asset management.



Video: Municipal Asset Management and Saskatchewan

Infrastructure for future generations, by Government of Saskatchewan and AM Sask.

www.cnam.ca/resources

“Through the completion of Asset Management Plans, municipalities began marrying fiscal data, generally held within finance, with condition and risk assessments, housed in Engineering/Public Works, to reveal the true picture of municipally owned infrastructure.”¹²

— **Patrick Kelly**, Director of Finance, Township of Wilmot, Ont.

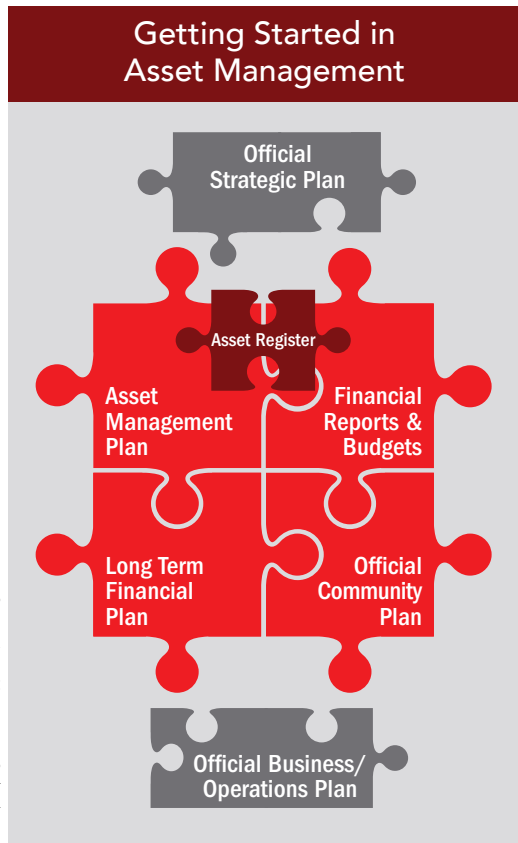
You have various community plans in place already

Asset management is intended to compliment the work you are already doing in your municipality: connecting your various plans and budgets to your strategic objectives.

Asset management can bring everything together

Developing a formal asset management approach will help you connect valuable components and information from across your organization. You need to bring together people and skills across the organization to solve your service and infrastructure problems: engineers, planners, accountants, and elected officials. Asset management is a tried and tested approach to do this! It's a multi-disciplinary effort that will help different departments work together towards your community goals.

Source: Asset Management Saskatchewan



Formalizing your approach to asset management

In 2014, a collection of municipalities from CNAM's membership worked with several leading industry associations to develop the Asset Management Primer (AM Primer) – a document that accompanies the Canadian Infrastructure Report Card. The Primer published a series of recommendations for Canadian communities surrounding their management of infrastructure, with the first two being to develop formal asset management processes and governance in the organization. This section of the booklet will take you through how to take your initial steps in your asset management journey, what you need to do to start formalizing your asset management processes and how to put governance in place.



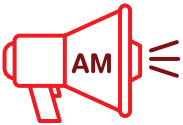
www.cnam.ca/resources

Guide to formalizing asset management in your organization

INITIAL STEPS

1

Be an Asset Management Champion!



2

Build the AM Network in your organization



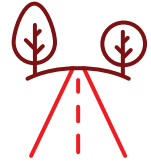
3

Understand your current AM capabilities



4

Start planning your organization's AM journey



ASSET MANAGEMENT COMPETENCIES



RESOURCES TO HELP

AM Community



AM Materials



AM Funding



Initial Steps

Be an asset management Champion!

One common thread in all organizations that have made progress is that someone, or a group, needs to step up to get asset management moving. It doesn't matter if you are a staff member, a manager, or elected official, it's happened many different ways across many different communities. Someone needs to step up. Someone needs to begin to understand what this looks like for your organization. Someone needs to start talking about it. Someone needs to make the management team aware if they aren't already. Asset management is a journey for the organization, it consists of incremental steps towards formalising and optimizing what you are already doing, and it might start with you.

Build the AM Network/Committee in your organization

Identify who needs to be at the table. Asset management is a multi-disciplinary approach involving a variety of functions from your organization. You may need to bring together staff that have never worked together before, create open communication between departments, and forge new working relationships.

“This isn't a one person project. We established a working group of staff from different departments to make sure everyone is contributing. We have shared ownership of the asset management program, and we shared the load across the working group. Anyone can write an AMP report, but the working group helps move our AM practice forward.”

— **Travis Rob**, Manager of Operations and Facilities, Fort Frances, Ont.

Start an asset management network or committee, get together and talk about what asset management can do and what you might try. Build awareness in the organization and start the cultural change and different way of thinking. Discuss how the different departments can share information to make better more collaborative decisions.

Understand your current capabilities, what are you already doing?

It is useful to understand your organization's maturity level with regards to asset management. This isn't brand new and you are already doing some of this.

An assessment will give you a baseline of your current state, from which you can assess your gaps, and areas, which you might want to improve. You can then prioritize your improvements in short, medium, and long-term efforts, knowing that you can't change everything at once. Try to identify areas of the organization that are having success. Look to leverage that success by collaborating with areas that need improvement and would benefit from learning what processes work best.

FCM has produced an Asset Management Readiness Scale, which is available at www.cnam.ca/resources, but there are other assessment tools out there.

Start planning your organization's journey

This isn't going to happen overnight. Put a long term, realistic plan in place, and monitor your progress. You need to look at this as an incremental culture change within your organization. Don't think of asset management as a one-off project or program. Think about it as moving towards evidence-based decision-making considering risks, service levels, investment requirements, and sustainability.

"Asset management isn't a capital project like building a bridge. It's a change in perception and way of working."

— **Gordon Duff**, Treasurer and Deputy CAO, Town of Minto, Ont.

Use your Gap Assessment to start drafting an 'Asset Management Roadmap' to plan out what you will focus on improving over the next one, three, or five years. Keep it simple, and give yourself time. This will not happen overnight.

"It can be overwhelming to look at the asset management system as a whole. Pick small projects and initiatives that will support you getting where you want to go. Pick areas where people are already working to help with some easy wins to get the ball rolling."

— **Scott Quinn**, Engineering and Public Works Manager, County of Kings, N.S.

You should revisit your roadmap to check in on progress and make it more advanced as part of your continuous improvement cycle after a year or longer. Over time you can get more advanced and more refined with your processes, delivering better value to your customers through more effective and efficient decisions, seeing more and more value and benefits as you progress.

What challenges will we face in doing this?

For most communities, you will face a number of common challenges in your asset management journeys, regardless of your size:

- You likely don't have dedicated staff to focus on asset management efforts;
- You don't have all the data or information you need to move forward;
- You have more infrastructure deficit than you can financially resolve;
- You have demands from citizens which are not always aligned with your recommendations; and
- You have elected officials with four-year terms such that visions may change with a significant election.

You have to understand that asset management is a way of doing things. You will be looking at changing the way people do things. This isn't easy, and you will face challenges, but keep going, connect with your peers, make incremental changes, and things will get easier.

“Asset management can be a tough sell in a small municipality with limited staff and many competing priorities. It’s important to create a culture that understands the value of asset management. When you are able to show the organization the valuable information made available through asset management, it becomes something staff and departments can truly appreciate and buy into.”

— **Jeffrey Morrison**, Director, Corporate Services, Town of Essex, Ont.

FOR SMALL SIZE COMMUNITIES	FOR MEDIUM SIZE COMMUNITIES	FOR LARGE SIZE COMMUNITIES
<p>You have a community to manage, services to run, citizens to keep happy, but there are only a few people on your team. How can you find the time and resources to make progress on this on top of all the other priorities?</p> <p>“I only have so many sides and corners to my desk, I’m not sure which corner of the desk this will fit on”</p>	<p>Your asset base and services are becoming significant and complex. This will require you to develop more advanced processes and you’ll have to make more challenging trade off discussions. You might not have the capacity or resources in your organization to manage this increasing complexity.</p> <p>“I know where we’re trying to go, I just don’t know how we’re going to get there”</p>	<p>You might have more resources and capacity than the small communities, but the organization has evolved into a glacier that seems to be impossible to alter the course of and run differently. Changing the culture of the organization and encouraging people to adopt a new way of thinking isn’t easy.</p> <p>“It’s like pushing rope, uphill, in the snow.”</p>

“We’re still a rather large organization but we’ve made a lot of achievements in tearing down silos. When you’ve made a lot of progress, sometimes you have to step back and say, have we dropped anything along the way? This has to do with data and process, but also people and skills.”¹³

— **Bradley Leeman**, Director of Lifecycle Management, City of Edmonton, Alta.

Your Asset Management Roadmap, and the list of things you need to change in the organization to make progress on asset management, will be very broad. It’s not a linear or prescriptive journey that you need to follow, and different journeys work for different organizations. There is no right or wrong way.

Competencies of asset management

For the five AM competencies in this section – which are defined in FCM’s Asset Management Readiness Scale¹⁴ – your organization will have different priorities and appetites to progress certain competencies. Do what works for you, but know that to be good and effective asset managers you should circle back to progress all competencies and complete the various gaps that you identified.

- **People and leadership:** Set up cross-functional groups with clear accountability, and ensuring adequate resourcing and commitment from senior management and elected officials to advance asset management. You need a champion to drive the program, develop the relationships and manage the larger vision and goal while taking measurable steps to get there and build buy-in as you progress

- **Data and information:** Using asset data, performance data, and financial data to support evidence-based decision-making and inform planning exercises.
- **Planning and decision-making:** Documenting and standardizing how the organization sets priorities, invests capital, plans operations and maintenance (O&M) work, and decides on budgets.
- **Policy and governance:** Putting in place a governance structure to ensure vision, and objectives are acted upon, then develop policies and objectives to connect the vision to actions.
- **Contribution to asset management practice:** Training and staff development, sharing knowledge internally and participating in external knowledge sharing.

This sounds like a lot, and it doesn't happen overnight, but you can put a multi-year roadmap in place and start to make progress on pieces of the AM puzzle.

People and Leadership

People do asset management. The staff in your organization are critical to progressing asset management. Staff need to work together in cross-functional groups. For some, this can be a big change and a different way of working. Having a planned change management and communication strategy in place will help to change the culture and existing way of thinking in the organization.

“Changing the culture of an organization takes time, but the best way is through education and understanding. Ultimately, our goal is for everyone to have a core competency within asset management.”

— **Shawn Boast**, Manager of Asset Management, Town of Oakville, Ont.

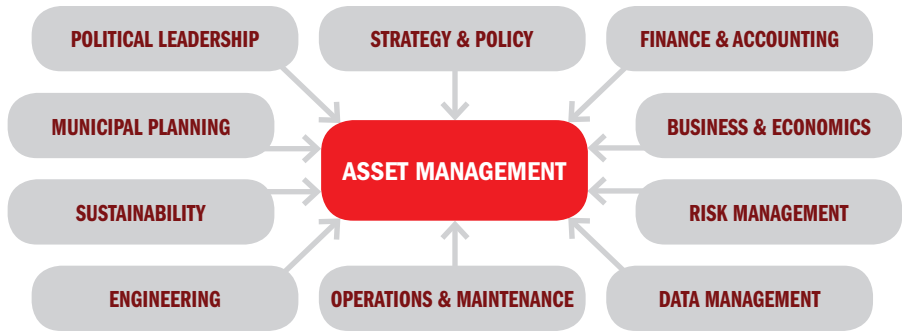
Who is an “Asset Manager”?

While the practice of asset management includes the professional areas of risk, finance, engineering, economics, and information management, asset management practitioners are business strategists who should understand a little about each of these specialties. Asset managers see the big picture, and they need to think about the problems of tomorrow, not just today.

Your educational background and professional experience might have led you to the world of asset management, but it's key for an asset manager to bring the different areas of the organization together to build working relationships across functional silos in an organization. If you are too focused or biased on one particular component of AM or part of the organization, you will struggle to realize the main benefits of asset management. Asset managers should realize the valuable contributions from the various stakeholders around the table.

“By embedding sustainability in our foundation asset management work, local governments will be better equipped to create, maintain, and make decisions about assets. This will improve the long term delivery of community services, minimize financial disruptions, and enhance community resiliency.”

— **Angela Danyluk**, Sustainability Specialist, City of Vancouver, B.C.



How many people does this take?

As mentioned above, you are already doing some of this work within your organization, so you’re not starting from scratch. That said, there will be some extra work to bring components together for you to work more effectively.

	IN-HOUSE OPTION	ADDITIONAL RESOURCES OPTION
PROS	<ul style="list-style-type: none"> • Home-grown approach; build in-house capacity and expertise. • Low costs incurred in starting to get things moving. • Utilizes the internal knowledge of existing staff. 	<ul style="list-style-type: none"> • Additional resources can focus on AM outcomes and serve as the champion to bring existing staff together from across departments. • Municipalities can utilize external expertise with robust asset management experience. • Objective assessment of current practice; experience from other municipalities.
CONS	<ul style="list-style-type: none"> • Not sustainable for most small communities. • You might have to decide what doesn't get done as a result of taking this on. • Staff turnover would result in lost knowledge of AM process. 	<ul style="list-style-type: none"> • Municipalities have limited capacity to hire additional resources (grant funding can help). • Unless the additional resources can help build a sustainable long-term approach to asset management capacity building, if those resources are ever removed, the municipality might not have the ability to continue the work.

The amount of effort or additional resources you need to allocate depends on what competencies you are looking to progress, and how quickly.

Many municipalities work on this over time, growing their asset management efforts organically. You can start small, by formally making the roles and responsibilities of asset management a part of an existing staff members’ role. As the level of effort and complexity evolve, additional, dedicated resources can be a consideration as you build your team.

Start thinking about a senior sponsor to get Leadership support

Many organizations that struggle or stall in the early stages of formalizing their asset management efforts, do so because there isn't senior support for doing it within the organization.

You need to look for management support when formalizing your asset management approach. Top down support from the leadership team is very important. Support from senior management and elected officials will help you work towards securing adequate resources to advance asset management in the organization.



Data and Information

Data and information makes your asset management world spin. You need data about your assets, your services, your performance, your finances and more for effective asset management planning and decision-making. It will take time to get there and collect the data that you need, it's an important part of your asset management journey. But don't wait until your data is perfect, make assumptions and keep moving forward.

"Getting the data is the hardest part, and it's an ongoing effort. It's not a crisis or emergency that you can see and resolve, but you have to set aside time to collect the data you need. You need to make it a priority."

— **Gordon Duff**, Treasurer and Deputy CAO, Town of Minto, Ont.

For most of you, your TCA report will give you a great starting position. It should list out all the capital assets you are responsible for. During your TCA processes, you probably debated what level to record your assets at. What is an asset? Where do you draw the line? The concept of an "Asset Hierarchy" is used by various different industries to provide you with a structured way of consistently breaking down the assets in your organization. Each level of your asset base and the different components will have different renewal points – for example the concrete foundation of your water treatment plant should last 50+ years, but your HVAC systems are only forecast to last 15 years. With this information you can start to create better life cycle investment requirements for your assets.

You might hear people talk about vertical and linear assets. Vertical assets are typically referred to as single location assets like buildings, bridges, treatment plants, etc. Linear assets are typically assets that span an area like underground pipes, roads, etc. Due to their very different nature, they can often be managed in different systems, and Geographic Information Systems (GIS) are often used specifically for linear assets.

Do I need to purchase some kind of application or IT system?

No, you can start with using spreadsheets to get an understanding of what assets you own, maintain, operate, etc. Larger, more expensive systems can help but make sure you have the proper business processes in place to get, and maintain the data needed for those large systems. If using spreadsheets, be careful that you manage access, reduce duplication, share the data, and make appropriate backups.



Understanding your customer level of service

Service performance data is something that municipalities generally find harder to collect and evaluate. As explained in the introduction, assets exist to deliver value to our customers and communities. In the municipal context, we refer to this value to the community as “Levels of Service”. Level of service frameworks help you as an organization measure what the community is receiving, and how effective you are as an organization at delivering those services. The key is understanding the difference between the customer levels of service that the customers actually feel, and the technical levels of service measures that are important to manage your services as an organization, but are too detailed for the community to understand and connect with. Armed with this information, along with the cost of delivering service, you can get into more informed discussions with your community about what they really want from their services, and more importantly what they are willing to pay for.

“Peter Drucker put it best: ‘Quality in a product or service is not what the supplier puts in. It is what the customer gets out and is willing to pay for.’ In a nutshell, the Customer Level of Service describes and measures the service outcomes that citizens get from the municipality for the taxes and rates they pay annually which contribute to their overall quality of life in the community. Our public consultation focus groups provided valuable feedback on satisfaction with and priorities for Utility services and also confirmed that our list of service goals was fairly complete from our customer’s perspective.”

— **Loretta Gette**, Senior Engineer, City of Regina, Sask.

What about asset condition, remaining life, and replacement cost?

Understanding the condition of the assets that you are responsible for is an important component, and municipalities across Canada are moving to utilize a consistent five-point scale when talking generally about their asset bases: very poor, poor, fair, good, and very good.

“One of the biggest challenges many municipalities experienced in completing the survey for the 2012 CIRC was reporting asset condition in a consistent manner. Consistency is important to promote an accurate understanding of the state of Canada’s municipal infrastructure. When all municipalities are on the same page about how to grade the condition of their infrastructure, comparisons become more realistic. In addition, a standardized condition grading system across Canadian municipalities is easily repeatable, enabling comparison of the status of infrastructure condition over time.”

Canadian Infrastructure Report Card

CIRC's condition grading system

Very Good: Fit for the future

Well maintained, good condition, new or recently rehabilitated.

Good: Adequate for now

Acceptable, generally approaching mid stage of expected service life.

Fair: Requires attention

Signs of deterioration, some elements exhibit deficiencies.

Poor: At risk of affecting service

Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration.

Very Poor/Critical:

Unfit for sustained service

Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.

Don't have actual condition data?

That's ok, in your early stages you can use opinions of staff who are familiar with the assets, or even age. The table below from CIRC shows how to translate age and Estimated Service Life (ESL) to a condition grade. This is something you can do with your Asset Inventory and some spreadsheet calculations.

CONDITION GRADE	% OF ESL REMAINING ON ASSET
Very Good	80-100%
Good	60-80%
Fair	40-60%
Poor	20-40%
Very Poor	< 20%

TIP: It's good to sense-check the condition results from the above age/ESL calculation against opinions of your staff who are familiar with the assets and adjust accordingly.

It's not possible for everything in the community to be 'Very Good' and it's not necessary. It's good to have a blend across your asset portfolio.

Understanding the estimated remaining life of an asset – and in our context this is captured in years – is important as this gives you an understanding of when you will have to replace, upgrade, and dispose of this asset. This is different to the engineered design life, as it often doesn't take account of your operating conditions and the actual remaining life could be better or worse.

According to the 2015 AMO Study, The State of Ontario's Roads and Bridges, which analyzed real asset data from 93 municipalities, assets with real condition ratings are performing better than their age and expected useful life would suggest. Where possible, municipalities are encouraged to conduct condition assessments on their assets to obtain a clearer picture of the true state of their infrastructure, allowing for a better-informed asset management strategy.¹⁵

"It's important to be aware of the quality of your data, poor data is going to give you a poor plan. We did condition assessments for certain critical assets and some asset classes, but still used age-based estimate for much of our asset base. As we evolve our asset management practices we will be doing more real-world condition assessments"

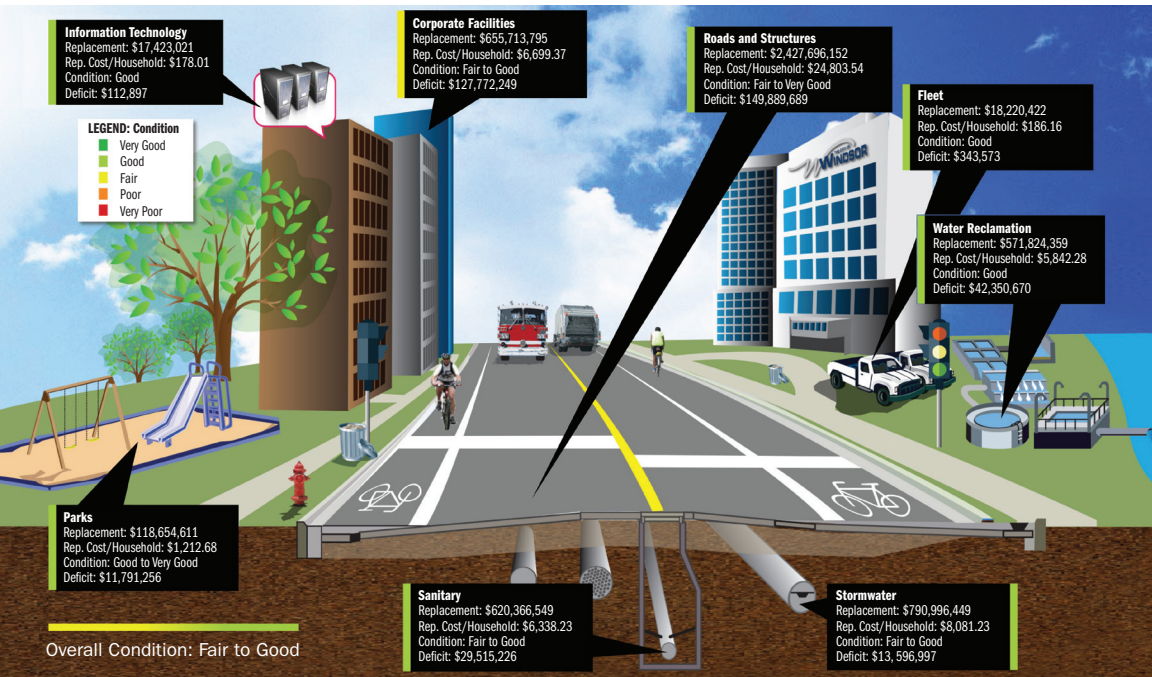
— **Jeffrey Morrison**, Director, Corporate Services, Town of Essex, Ont.

“It’s important to understand the value of your current asset base. It could be alarmingly higher than you think. Through the PSAB TCA reporting, municipalities included debt as liability, however we weren’t offsetting the value of the assets, now with the asset management information it’s in balance. We know what work needs done over the next 10-20 years and we can be ready for it.”

— **Tony Haddad**, Chief Administrative Officer, Town of Tecumseh, Ont.

Note: The financial value of an asset in your TCA Report may be different to the replacement cost that you use in your asset management activities. The numbers can serve a different purpose. Some municipalities opt to manage their Asset Management-Asset Register very separately from their TCA Accounting-Asset Register.

The City of Windsor has developed an infographic that shows the collation of some of their asset management data in an easy-to-explain format. Being able to communicate a clear picture of the infrastructure that your community services depend on, along with condition and financial areas of concerns, is a powerful tool.



Having the data is only part of it: what are you using the data for? Start using it in your processes and think about what data you need to make decisions and you’ll soon see what data is important. The level of accuracy can vary and that’s ok, you just need to be aware.

Planning and Decision-making

This is where it all comes together. How can I make better decisions? How does asset management make it easier for us as an organization to make investment decisions and plan our budgets? Formalizing asset management practices is not intended to remove decision making from those asked to make decisions. Rather, adopting recognized asset management practices is intended to empower decision makers by providing factual information and an appreciation of both short term and long-term impacts.

First, we want to have a consistent and repeatable process that is documented and standardized in the organization. This might start off in one area of the organization then be adopted by other areas. It might not be perfect, but doing things consistently and transparently is a major step forward. We need a structured way of understanding everything that we should be acting on, projects we should be doing, and a mechanism to prioritize those projects and decide what we can, and can't afford or are unable to do.

Developing a prioritized investment plan requires you to set criteria around what you evaluate your projects on. What is important to your organization, your community, and customers? And that's not trivial to answer. But imagine your organization having criteria defined and agreed that would help you articulate how important Project A is in your organization compared to Project B.

“Our investment planning process allows us to consistently prioritize projects that support Utility service goals and have a conversation about the residual risks of unfunded projects.” — **Loretta Gette**, Senior Engineer, City of Regina, Sask.

Risk is a great tool for helping you to prioritize investments on your existing asset base. As per the ISO 31000 Risk Management standard, level of risk is defined as a function of likelihood (what are the chances that an event will happen) and consequence (if an event happens how bad will the effects be). What is the risk of not repairing that bridge now? What is the risk of not upgrading the storm drains? What is the risk of not replacing the arena roof?

One municipality we spoke to said it like this: “You can connect your Emergency Management Planning activities with your asset management efforts. Use your criticality assessments and flow that analysis into your asset management work to evaluate critical infrastructure.”

Risk and Criticality are different, but often confused. High criticality assets are those with high 'consequence' of failure, criticality shouldn't account for 'likelihood'.

Asset Management Plans (AMPs) have evolved to become very useful planning and communication tools for communities. They bring together some of the components we have discussed into a story that can be understood by staff, management, elected officials and community.

“Your Asset Management Plan is valuable communication tool. It can be easily demonstrated to the public why specific roads are being revitalized (or not) or the need for a property tax increase or in Petrolia's case, why we saw the need to create an Infrastructure sustainability fund in 2015 and were able to decrease our sewage rates in 2018”

— Councillor **Liz Welsh**, Town of Petrolia, Ont.



Video: Asset Management Plans in Ontario with the Federal Gas Tax Fund

www.cnam.ca/resources

Furthermore, many municipalities are sharing their AMPs publicly online to help communicate the challenges with their communities. Just search online for “municipal asset management plan” and there are lots of examples you can learn from.

Once your investment needs reflect your level of service requirements for your community, you can set your capital and operating budgets based on what you need to do, and develop more accurate long term financial requirements. Simple, right? We know it’s not that easy, but it’s an important shift to move away from budgets being set based on historical values to needs-based capital and operating budgets. In the real world there are limits, but as asset managers you can acquire the information to articulate what effect that gap between your budget limit and needs-based budget will be on the services your organization provides and the community you serve.

Policy and Governance

Through the AM competencies discussed in the last few pages, you will be starting to improve your AM processes and practices. But it’s important to formalize these changes and ‘lock them in’ to your organization, so that things don’t slip back to the old way of working. Putting in place policy, strategy and governance components helps solidify asset management within the organization. These components are referred to as Strategic Asset Management elements.

Policy

The AM Policy outlines why asset management is important to the organization, what services and assets are to be considered in scope for AM activities, and the principle statements for implementing AM within the organization. Having the AM Policy signed off by top management and approved by council sends a very clear message to the organization that AM is important and what needs to be considered when implementing it. Make sure you share and communicate your AM Policy with your organization as part of your change management effort.

The principle statements in the AM Policy are of utmost importance as they define the approach to asset management that staff throughout the organization are expected to follow.

Integrating with Sustainability

Some municipalities are including “Natural Assets” within their AM practices, and opting to manage things like land, drainage channels, rivers and aquifers, alongside their more traditional infrastructure assets.

They define this within the scope of their AM Policy to make it clear to staff in the organization.

“The level of effort isn’t in writing the AM Policy, but in spending time on communicating with the Management Team and Council on what needs to be in the AM Policy and why.” — **Patrick Brisson**, AM Program Manager, City of Ottawa, Ont.

Strategy and Framework

You need to start documenting the HOW. How are you going to enable the principles you’ve outlined in your policy? What are you doing to define your service performance objectives? How are you actually going to make asset management happen in your organization?

“An Asset Management Strategy defines the municipality’s asset management objectives and strategies on achieving the Policy requirements. The strategy is focused on improving the municipality’s asset management practices.” **AM Primer**

The AM Strategy – sometimes referred to as a Strategic Asset Management Plan (SAMP) – is an important tool in developing your management system for asset management. It builds a clear line of sight between your organizational objectives and your asset management efforts, demonstrating how AM will help you to meet your goals. It describes the key asset management processes, tools, and documents that your staff will use to implement your AM policy. And it shows what you are doing and the resources you are allocating to improving your AM practices. The AM Strategy document is a good place to include your Asset Management Roadmap that captures your five-year plan on how you are working to improve your asset management processes and improve upon the gaps in your practices.

“Don’t underestimate your AM Strategy, it can be a significant document. The AM Policy is more conceptual, and the AM Strategy is HOW you put things into practice”
— **Fernando Smith-Avendano**, City of Airdrie, Alta.

Frameworks are often illustrated graphically – a great way of presenting the different components and elements of asset management that you are working on and how they connect. Asset Management British Columbia (AMBC) has developed a framework that establishes a high-level, systematic approach that supports local governments in moving toward service, asset and financial sustainability through an asset management process. AMBC has produced a detailed document that accompanies the graphic and explains how a municipality can work through each process.



Source: Sustainable Service Delivery Framework, Asset Management BC

ISO 55000 Standard

As asset management globally has grown in recent decades, it was inevitable that a standard would emerge. In 2014, ISO 55000 was published by the International Organization for Standardization (ISO). ISO 55000 defines what the management system for asset management is, and by management system, they mean your formalized approach to asset management. What processes, resources, IT systems, and other resources do you use to manage your asset management efforts?

It's important to note, the standard does not tell you HOW to do asset management, it just tells you WHAT you need to cover. And this WHAT is a checklist that an auditor would use to validate your organization's performance. For the municipal world, ISO 55000 certification is not crucial, but it does articulate good asset management practice and is a very useful tool and checklist to align our efforts with.

An asset can be anything that delivers value to your organization. In the context of this booklet, we are focusing on assets being physical infrastructure, but the ISO 55000 standard is designed to apply to a wide range of 'assets' to your organization.

Governance

It is important to think about who is accountable for asset management in your organization. Who is making sure that this is happening, and that the right people are responsible for the right parts of your asset management journey? This takes time to get right and varies by individual organizations, as there will be existing structures and accountabilities in your organization that you will need to align with.

In the 'Initial Steps' we suggested forming an AM Committee – they can be a very useful group to govern and steer your asset management efforts across your organization.

The 'People and Leadership' competency also plays a significant role here as having a Senior Sponsor in place is an important part of your AM Governance.

Measurement and Monitoring

It might take years to measure financial returns, but within a short time you can measure improvements in any of the asset management competencies and start to see how some of the more significant benefits will be realized. Use a Gap Assessment tool to measure your progress along your journey.

Do I need to improve all components at the same time, and to the same level of maturity?

Absolutely not. Make targeted improvements to specific components as part of your Asset Management Roadmap, one component at a time is totally fine. As an organization you might decide you don't need to be top of the class in every competency. Different things are appropriate for different organizations.

Contribution to AM Practice

The FCM's Asset Management Maturity Scale lists this as the final competency and is focused around training staff and sharing knowledge.

Training and Development

As you can see from this booklet, the discipline of asset management is a very broad topic. There is lots of learning material available and more is being developed constantly. People learn in different ways and there are many different mechanisms for your organization to consider, including reading materials, webinars and videos online, on-the-job training, formal courses and much more. When looking at training material and courses, make sure it's on the area of asset management that you are looking for. Asset management is a broad topic, so check that your learning objectives will be met. For more information please go to www.cnam.ca/resources.

Over time, you can develop a competency framework to formally capture the AM skills you need across your organization and put training plans in place to help staff fill the gaps.

Knowledge Sharing

Within your own organization there is a lot of very valuable information within the minds of your staff. Think about how you can share that good knowledge from staff across to others in the organizations. Become an organization that has a culture of knowledge sharing between staff, and between departments.

It is also important to look externally from your organization. What are your peer organizations doing and how are others in the industry progressing their asset management practices? Others can learn from your efforts, and you can also benefit from others' experiences.

Conclusion

Asset management is a long term effort that takes time. It can be a big change and different way of working for some communities so make incremental improvements, monitor your progress, and adjust your plan as needed. Setup your AM Working Group/Committee and have them monitor progress against your Asset Management Roadmap.

"Asset management is a continuous quality improvement process. This ongoing Process is incremental and scalable, involving; Assessing capacity, demand and results, Planning what needs to be done, and Implementing the plans. This continually informs how to enhance and expand the Process."

Asset Management British Columbia (AMBC)



RESOURCES

Help is out there

Other municipalities have gone through this journey before, and the AM community can help! Reach out and connect with peers in other municipalities to find out what they are doing. There is lots of material publicly available already that you can leverage and use as examples that you can follow. For example, some internet searching will unveil a wave of municipal Asset Management Plans (AMPs) and Policies that you can look at, view other municipalities RFP's for asset management support services, and much more. These are things you can access and tweak for your organization rather than build from scratch.

“Municipalities are great at sharing information with each other. We leveraged information from other municipalities in our asset management efforts and it helped us make a huge leap forward.”

— **Melissa Osborne**, Senior Manager of Asset Planning, City of Windsor, Ont.

It's fine to get outside help from consultants, but municipal/organization staff needs to be involved in the process and understand what is being done. Otherwise reports and deliverables can be written, but then sit on the shelves. Work collaboratively with the consultants and use it as an opportunity to train up your own staff by working more closely with partners.

CNAM's Annual Conference and Events

The Canadian Network of Asset Manager's (CNAM) Annual Conference takes place every May and moves across Canada every year. It is attended by hundreds of public sector asset management professionals, both those brand new to the field, and others who have been involved for decades. Presentations and workshop topics cover the full scope of asset management topics. More information on the CNAM conference and other events at www.cnam.ca.

“The City of Kelowna started its corporate asset management program 6 years ago and as the manager of this new initiative I struggled with where and how to get started. Through my exhaustive research I stumbled upon the Canadian Network of Asset Managers (CNAM) and attended their 2012 conference in Montreal. Attending this conference and my continued involvement with CNAM and my Regional AM Community of Practice (AMBC) was a turning point for the City of Kelowna's Asset Management Program and quickly advanced our program from innocence to mature within a relatively short time.”

— **Joel Shaw**, Infrastructure Planning Manager, City of Kelowna, B.C.

Community of Practice Materials and Resources

The asset management community across Canada has developed a wealth of information to date, with more to be produced in the future. Please visit www.cnam.ca/resources for a list of current AM materials and resources that we will keep up to date.

Funding is out there

As mentioned earlier in the booklet, funding is out there to support you in your asset management efforts. Senior levels of government are supportive of asset management and long-term funding channels have been established to help you make progress. We have published some information on www.cnam.ca/resources.

- Federation of Canadian Municipalities (FCM) – Municipal Asset Management Program (MAMP)
- Infrastructure Canada – Federal Gas Tax Fund

Many provinces also have their own specific asset management support channels available, each of which are unique to your geography. We recommend you contact your Regional AM Community of Practice for asset management funding opportunities that are available to you.

REGIONAL ASSET MANAGEMENT COMMUNITIES OF PRACTICE		
British Columbia	Asset Management BC (AMBC)	www.assetmanagementbc.ca
Alberta	Infrastructure Asset Management Alberta (IAMA)	www.assetmanagementab.ca
Saskatchewan	Asset Management Saskatchewan (AM Sask)	www.assetmanagementsk.ca
Yukon	Yukon AM Community of Practice (YAM-CoP)	www.ayc-yk.ca
Other	Manitoba, NWT, Nunavut	(COPs under development)
Quebec	Centre d'expertise et de recherche en infrastructures urbaines (CERIU, Quebec)	www.ceriu.qc.ca
Ontario	Asset Management Ontario (AMOntario) Ontario Coalition For Sustainable Infrastructure (OSCI)	www.amontario.ca www.on-csi.ca
Atlantic	Atlantic Infrastructure Management Network (AIM)	www.aimnetwork.ca
National	Canadian Network of Asset Managers (CNAM)	www.cnam.ca

Did this Booklet help?

So how did you do? Did this AM Awareness Booklet help build your understanding of AM?

Now that you've read this booklet, please assess your level of knowledge.

1	2	3	4	5	6	7
NOTHING	VERY LITTLE	LITTLE	AVERAGE	FAIRLY SOLID	SOLID	EXTENSIVE
This is my first exposure to the subject of asset management.	I have heard it mentioned, but have had no direct exposure to it.	I have been in discussions about it, and I know it's important, but that's about it.	I have a good general idea of why asset management is important.	I have been involved in formalizing asset management in my community.	I work directly on formalizing asset management in my community.	I understand asset management. I could teach it to others.



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The booklet is brought to you by: The Canadian Network of Asset Managers (CNAM) is the association of public infrastructure asset management in Canada. Our government and private sector members develop policy, tools and technologies, which improve the level of service for public infrastructure assets in every province and territory. CNAM shares that knowledge with other members and stakeholders through our online resources, the annual conference and various committees and events.

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Endnotes

- 1 https://www.canada.ca/en/office-infrastructure/news/2017/12/municipalities_toreceivefundingfor72infrastructureinitiativesacr.html
- 2 http://canadianinfrastructure.ca/downloads/Canadian_Infrastructure_Report_2016.pdf
- 3 <https://www.statcan.gc.ca/pub/12-581-x/2017000/pop-eng.htm>
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- 5 <https://fcm.ca/home/issues/about-the-issue-x6245.htm>
- 6 <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/vltn-dsstr-fnncl-ssstnc-2016-17/index-en.aspx>
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- 15 https://www.amo.on.ca/AMO-PDFs/Gas_Tax/Roads-and-Bridges/Roads-and-Bridges-Study-March-2015.aspx



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