MFOA | MUNICIPAL FINANCE OFFICERS' ASSOCIATION OF ONTARIO

ASSET MANAGEMENT FRAMEWORK

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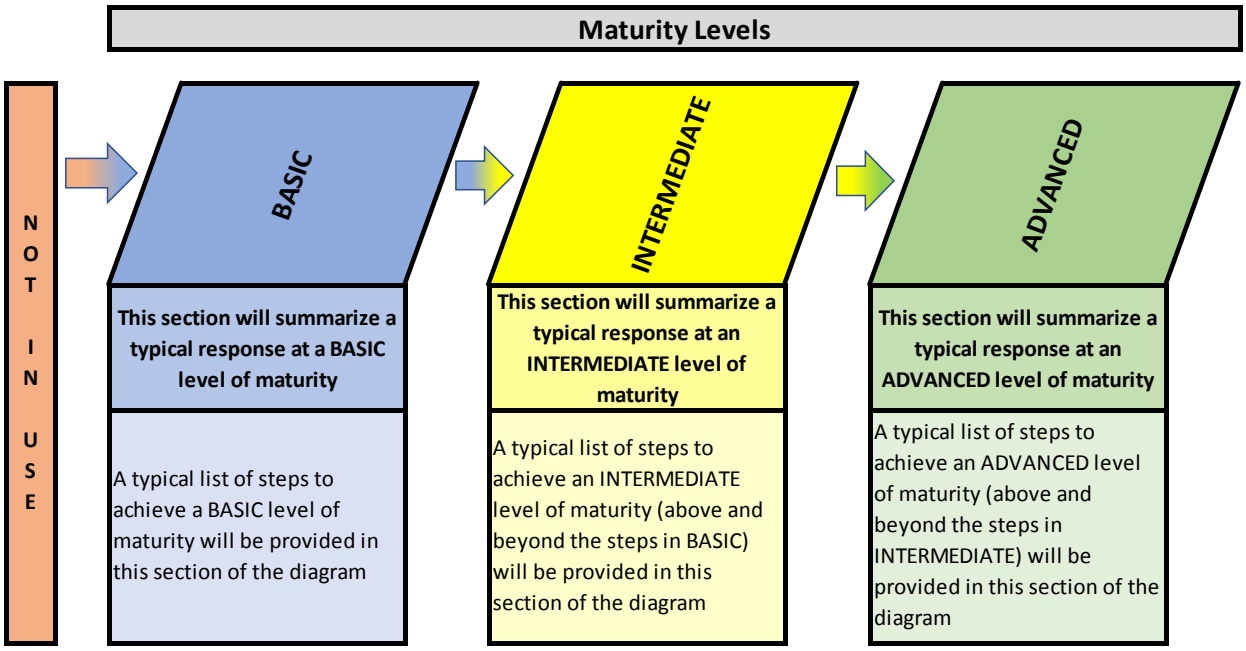
4 Levels of Service

4.1 Using this Framework

This framework is intended for municipalities of all sizes and maturity levels. The use of maturity diagrams within this framework will assist municipalities to identify their current levels of maturity for each AM area. Furthermore, for municipalities that have a desire to move to a higher level of maturity over time, the diagrams will provide potential approaches to doing so. To more easily depict the maturity levels ascribed to specific questions posed within the framework, the following diagram will be utilized for each question:



This document is intended to help municipalities make progress on their asset management planning. By enhancing the readers' understanding of asset management maturity, they can more accurately determine their current, and work toward achieving the desired or appropriate, level of maturity for their municipality.

The asset management framework can be likened to a continuum, whereby municipalities should aim to implement the components described in a subsequent maturity level. For example, municipalities that are not practicing asset management should strive to meet components at the *basic level*, and likewise, municipalities that currently meet the *basic* or *intermediate* levels should strive to advance their practices

to meet the components of the next level. However, it should be noted that during this self-assessment process a municipality may decide to skip over maturity levels (i.e. move from basic to advanced, skipping intermediate). This is perfectly acceptable. Further, not every municipality will need to strive for the highest level of maturity in every area. For example, it may not make sense for a small municipality to meet certain advanced level components.

Readers can use the following descriptions of the maturity levels to guide their assessment throughout the various sections of this framework:

Municipalities that are not undertaking the components described in a particular section of this framework should focus on meeting the *basic leve*l requirements outlined in the maturity level diagram.

At the **basic level of maturity**, a municipality is undertaking the components of asset management shown in blue and will take steps to advance their asset management by implementing the components described under the *intermediate level* heading.

At the **intermediate level of maturity**, a municipality is currently meeting the requirements shown in yellow and to advance their asset management will take steps to implement the components described under the *advanced level* heading.

At the **advanced level of maturity**, a municipality is currently meeting the requirements shown in green.

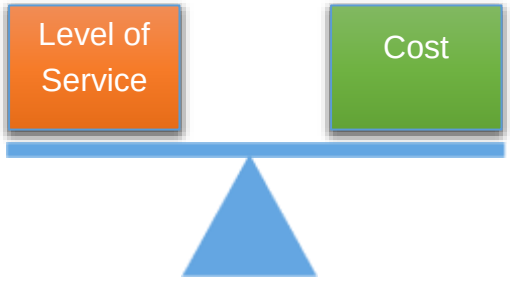
These maturity framework visuals are found throughout this document. Preceding all maturity level diagrams is a self-assessment question for the reader to consider to help determine where their municipality best fits within the framework.

4.2 Overview

Levels of Service (LOS) Analysis is a component of asset management planning that is significant and has a great deal of impact. Municipalities must not lose sight of the fact that its core purpose is to provide services to residents and other stakeholders. Assets help to provide those services and most of the resources devoted to asset management planning are spent on infrastructure. In this respect, physical assets are simply a portion of what is required to deliver the various levels of service as determined by the municipality. The municipality needs to ensure that the infrastructure performs to meet the level of service goals at an affordable and sustainable cost. An objective of an LOS

analysis is to find a balance between the expected level of service and the cost of providing that level of service.

Figure 4-1
Balance between Level of Service and Cost

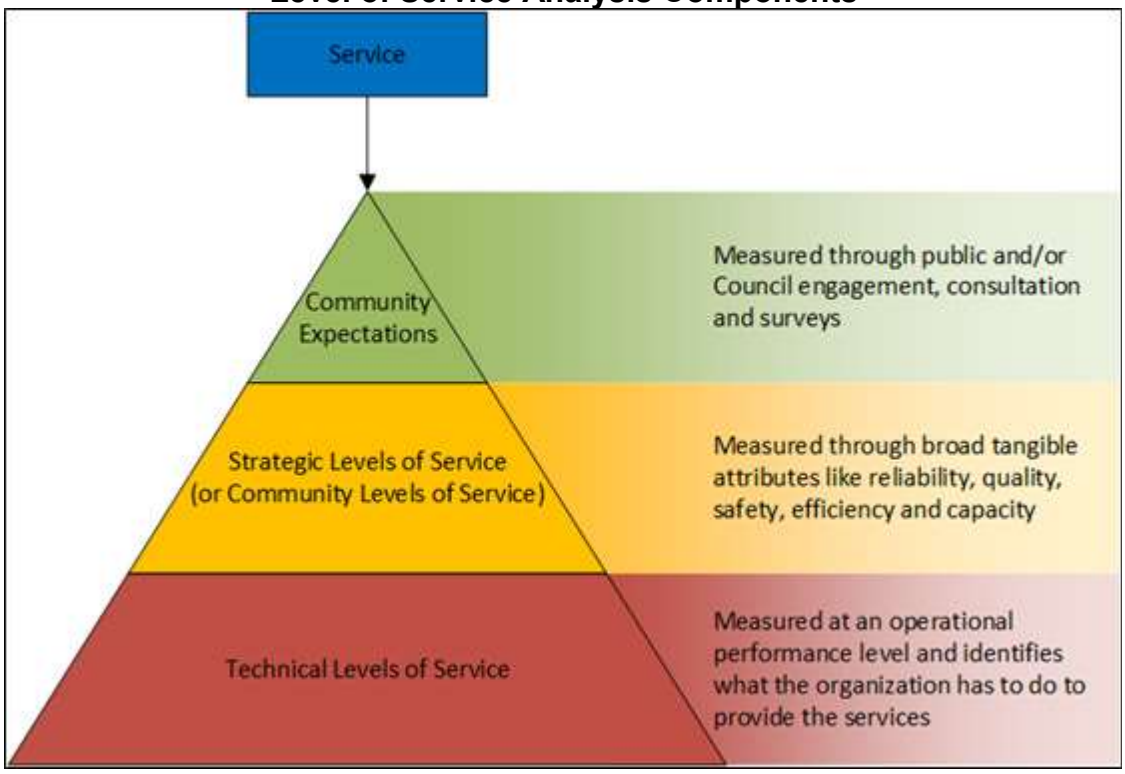


An LOS analysis includes:

- **Service identification** with the identification of assets involved in providing the services and the stakeholders impacted;
- Determination of **community expectations** with respect to services;
- Determination of **strategic levels of service**, based on community expectations (frequently referred to as customer levels of service);
- Determination of **technical levels of service** for each strategic level of service;
- **Comparison** of existing levels of service to expected strategic/technical levels of service;
- Use of **performance measures** to assist in comparing existing service levels to expected levels; and
- An assessment of the lifecycle **cost implications** of moving from existing levels of service to expected (desired) levels of service over a forecast period.

These components of the LOS analysis can be viewed from a hierarchy or pyramid perspective (see Figure 4-2 below), where the technical levels of service are needed to fulfill strategic levels of service, which are needed to satisfy community expectations, which are all based on a particular service or services being provided.

Figure 4-2
Level of Service Analysis Components



The outcome from identifying and determining levels of service can take on many forms, including:

- Qualitative descriptions of services and service levels;
- Identifications of programs, procedures, and/or activities that are required to achieve particular service levels; and
- Performance measures or key performance indicators (KPIs) that can illustrate the progression of service levels (i.e. through trending analysis) and an ultimate objective or target performance measure/KPI for which to strive.

The following sections are designed to assist municipalities understand their level of asset management maturity with respect to developing an LOS analysis within the asset management planning process. Each of the components introduced above are explained in more detail below.

Infrastructure for Jobs and Prosperity (IJPA) Act and O. Reg 588/17 Requirements

O.Reg 588/17 outlines the following requirements with respect to levels of service:

Every municipality shall prepare an asset management plan in respect of its core municipal infrastructure assets by July 1, 2021, and in respect of all of its other municipal infrastructure assets by July 1, 2023.

A municipality's asset management plan must include the following:

a) For each asset category, the current levels of service being provided, determined in accordance with the following qualitative descriptions and technical metrics and based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan:
    i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be.
    ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.

b) The current performance of each asset category, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency, and based on data from at most two calendar years prior to the year in which all information required under this section is included in the asset management plan.

By July 1, 2024, every asset management plan must include the following additional information:

a) For each asset category, the levels of service that the municipality proposes to provide for each of the 10 years following, determined in accordance with the following qualitative descriptions and technical metrics:
    i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be.
    ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.

b) An explanation of why the proposed levels of service are appropriate for the municipality, based on an assessment of the following:

i. The options for the proposed levels of service and the risks associated with those options to the long term sustainability of the municipality.
ii. How the proposed levels of service differ from the current levels of service set out.
iii. Whether the proposed levels of service are achievable.
iv. The municipality's ability to afford the proposed levels of service.

c) The proposed performance of each asset category for each year of the 10-year period, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency.

Please refer to Table 4-15 below in the Performance Measures section for details regarding the contents of "Tables 1 to 5" as per O.Reg 588/17.

4.3 Identifying Services to Provide

In order to determine appropriate LOS, a municipality must first understand what services it provides and what assets are involved in delivering those services.

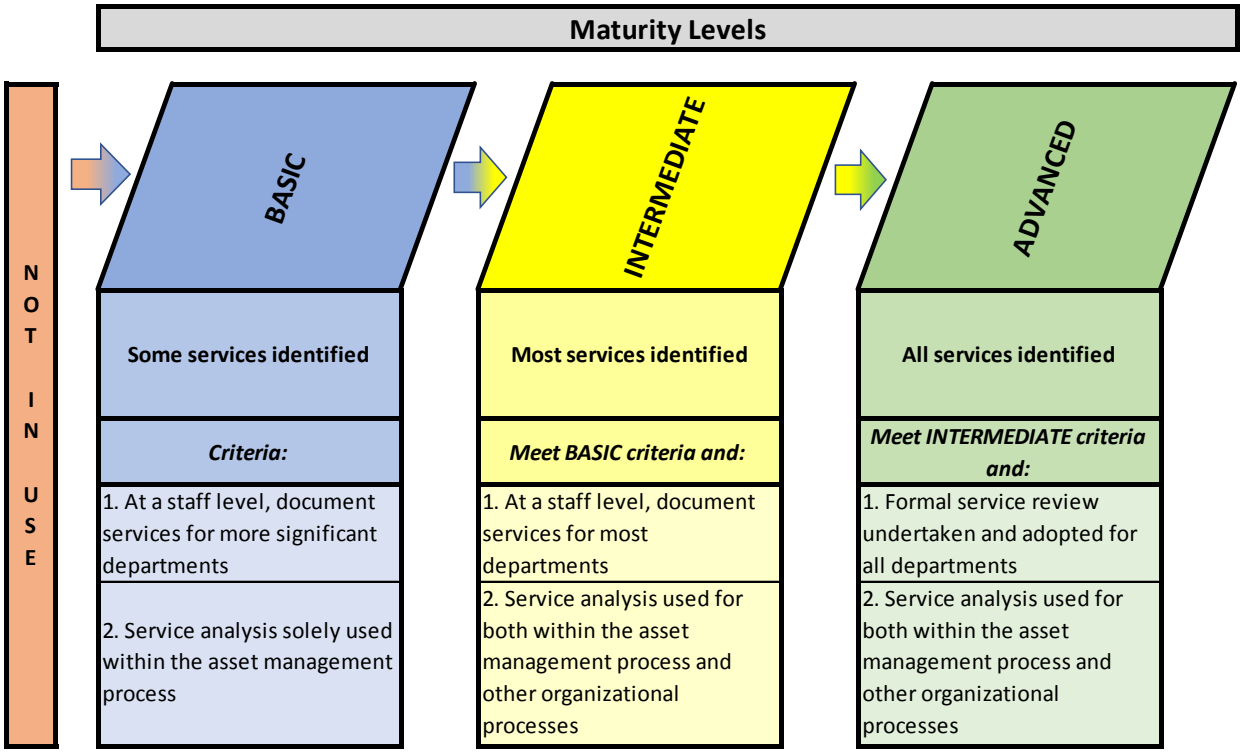
Have your services been determined?

Background

Identifying and determining services to provide is beneficial for several reasons. For asset management planning, identifying services is an important step in developing the LOS analysis. Once the municipality has identified the services it is providing and what services it wishes to provide, then the level of service to be provided can be determined. Service reviews can be undertaken by both formal and informal means and involve a number of stakeholders including staff, Council, and the public.

Levels of Maturity – Service Review

Have your services been determined?



At the **basic level of maturity**, municipalities will identify and determine the service levels of more significant services. Typically, this would occur at the staff level in an informal process and would focus on departments or services such as roads, water, and wastewater. The service analysis will likely only be used within the asset management process in completing an LOS analysis.

At the **intermediate level of maturity**, staff will identify and document most services provided by the municipality. The service analysis will be used in both the asset management process, as well as other organizational processes. At this level, the analysis is likely still informal, however, it would involve input from applicable departments within the municipality.

At the **advanced level of maturity**, all services are identified, documented and service levels determined. This is typically undertaken using a more formal service review process with the results adopted and approved by Council for all departments. This process includes the identification of assets that contribute to providing each service, detailed descriptions in relation to “how” and “why” the services are being provided, and a review of stakeholders impacted by each service area. The service analysis is used in both the asset management process, as well as other organizational processes.

Service Reviews

Given that the asset management planning process is in place to determine how assets will provide services to residents and other stakeholders, the identification of services is a critical “first step” to initiate the LOS analysis. Municipalities provide all of the legally mandated services, as well as a multitude of other services desired by the residents. The development of a “service centric” asset management process entails understanding and answering the following questions for all services:

- What are the services that we think we are to provide?
- What are the services that our customers expect?
- What are the services that we are really providing today?
- What assets are involved in providing each service?

At this stage, a municipality is not identifying how the services should be provided, or the level of that service to be provided. Identifying core services is a process of understanding and documenting the services the municipality provides today and intends to provide going forward, in addition to the assets needed to provide each service. Examples include the following:

Table 4-1
Sample Services and Related Assets

Department	Services	Applicable Assets
Transportation Services	Roads	Road base, surface, bicycle lanes, turning lanes, etc.
	Bridges and Culverts	Structure, deck, surface, etc.
	Sidewalks	Sidewalks
	Streetlights	Poles, fixtures, etc.
	Traffic Lights	Poles, lights, controllers, etc.
	Transit	Vehicles, facilities, equipment, etc.
	Parking	Lots, lights, facilities, equipment, etc.
	Winter Control	Vehicles, equipment
Environmental	Water Distribution	Water mains, wells, pumps, towers, valves, hydrants, etc.
	Water Treatment	Treatment plant (treatment systems, chlorination, pumps, chemical injection and filtration, piping, SCADA, pump houses, etc.
	Wastewater Collection	Mains, pumping systems, manholes, etc.

Department	Services	Applicable Assets
	Wastewater Treatment	Treatment plant (separators, aeration systems, pumps, chemical systems, SCADA, settlement ponds, facilities, etc.)
	Stormwater	Urban: Stormwater mains, catch basins, ponds, headwalls, etc.
		Rural: Open ditches, culverts, ponds, headwalls, etc.
	Solid Waste Collection	Vehicles, transfer stations, weigh scales, containers, etc.
	Solid Waste Disposal	Landfills, monitoring wells, compactors, bulldozers/loaders, etc.
	Solid Waste Diversion	Transfer stations, vehicles, containers, etc.
Protection Services	Fire	Vehicles, equipment, facilities, hydrants, etc.
	Police	Vehicles, equipment, facilities, etc.
	Protective Inspection and Control	
Recreation and Cultural Services	Recreation Facilities	Facilities (arenas, pools, community halls, etc.), vehicles, equipment
	Parks	Vehicles, equipment, facilities, active parks, passive parks, etc.
	Libraries	Facilities, equipment, etc.
	Museums	
Health Services	Public Health/Hospitals	Facilities, equipment, etc.
	Ambulance Services	Facilities, vehicles, equipment, dispatch equipment, etc.
	Cemeteries	Land improvements, facilities, equipment, etc.
Social Services and Social Housing	Assistance to Aged Persons	Facilities, equipment, etc.
	Child Care	Facilities, equipment, etc.
	Housing/Co-op/Rent	Facilities, equipment, etc.
Planning and Development Services	Residential/Industrial/ Commercial/Agriculture	Land, services, etc.
General Government	Administration	Equipment, vehicles, facilities, etc.

The levels of service in each area will be added to this analysis in later sections.

More comprehensive service reviews can include additional information, such as why services are being provided, as well as pros/cons associated with providing each

particular service. For example, a municipality may be struggling with the idea of providing serviced industrial land to promote industrial growth. If a municipality decides not to directly provide this service, agreements can be put in place to allow local developers to provide it.

To add to the service identification process, a municipality can decide to include the identification of specific customers and other stakeholders involved in providing services. Common customer/stakeholder groups could include:

- Landowners (i.e. property taxation base);
- External users (e.g. water, wastewater, parks, recreation, library, policing, fire, solid waste, etc.);
- Internal municipal users (e.g. senior management, inter-departmental services, supervisors, technical staff, etc.);
- Elected officials;
- Regulatory agencies;
- Municipal agencies;
- Special interest groups;
- Vendors or business owners; and
- Developers.

As with the service identification outcomes, the list of customers/stakeholders can be enhanced to mention the interests and positions of each of the groups identified as well as how various levels of service may impact them.

4.4 Level of Service Analysis

Having the LOS analysis follow a well-defined process ensures that relevant stakeholders have been consulted and that there is accountability to the established LOS. It also allows for a connection between expected LOS and the cost of providing that service level.

What process was followed in developing the level of service analysis?

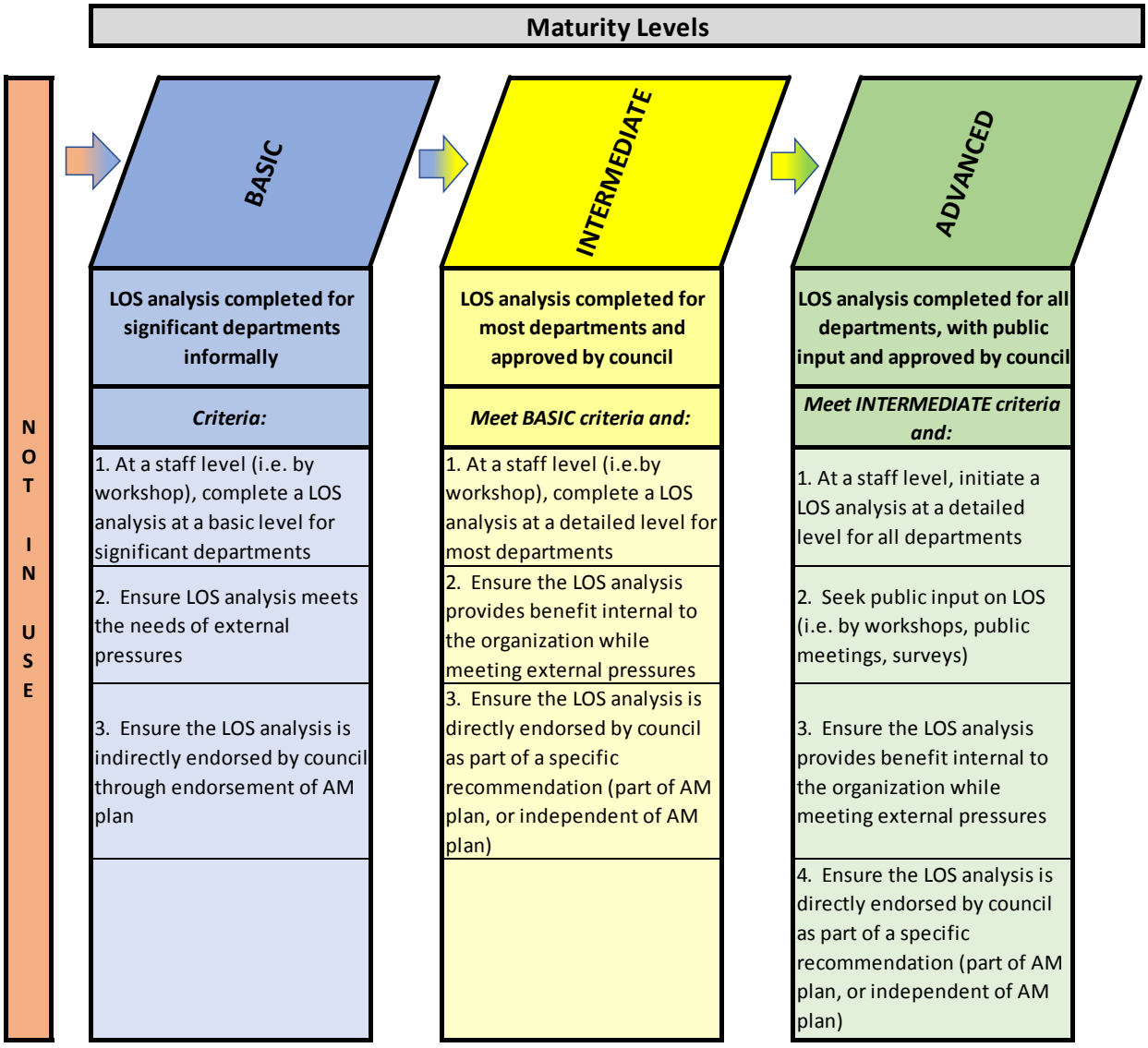
Background

While the later sections in this chapter focus on the specific content of an LOS analysis, this section deals with the steps involved in the process, as well as who is involved.

Levels of service relates to the overall service objectives of the organization. Therefore, it makes sense to consider the involvement of all departments that provide services within the LOS development process. Also, decisions will be made regarding the sources of information to be included in the analysis, which may include input and decisions from technical staff, management, Council, and the public.

Levels of Maturity – Level of Service Analysis

What process was followed in developing the level of service analysis?



At the **basic level of maturity**, the LOS analysis is likely completed for significant departments only. The process is usually conducted informally by a group of staff through workshops, meetings, or similar types of activity. The analysis may be

undertaken at a more cursory or basic level, and is primarily being undertaken due to the external pressures of having an LOS analysis within the organization's asset management plan (i.e. following O.Reg 588/17). Staff should ensure Council endorses the LOS analysis, even if done so indirectly as part of their endorsement of the overall asset management plan.

At the **intermediate level of maturity**, the LOS analysis will now be completed for most departments that provide services. With most departments included in the analysis, representatives from each department provide input in the process. Staff complete a detailed LOS analysis, ensuring both internal organizational objectives and external asset management pressures are addressed. Council should directly endorse the LOS analysis by specific recommendation, either as part of the asset management plan endorsement, or through independent report(s) completed as part of the overall asset management process.

At the **advanced level of maturity**, staff will undertake a detailed LOS analysis for all departments that provide services. Input from the public is sought through the use of workshops, public meetings, and/or surveys. The LOS analysis is undertaken taking into consideration the public input. Both internal organizational objectives and external pressures should be addressed through the LOS analysis. Council should directly endorse the LOS analysis by specific recommendation either as part of the asset management plan endorsement, or through independent report(s) completed as part of the overall asset management process.

What are Levels of Service?

An understanding of the levels of service provided by a municipality is required in order to effectively deliver services using municipal capital assets. Capital assets are only in place to deliver identified services to the community. Therefore, municipal staff and Council should have a strong understanding of the service levels expected by the community, while also taking into consideration what service levels are affordable. Although the community desires for service level can limitless, what the community is willing to pay for is often less so. Through the LOS analysis, community needs and expectations are considered, and also measure against the cost and the willingness to pay.

The IIMM defines LOS as "the defined service quality for a particular service against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental, acceptability and cost".

The IIMM notes that the LOS analysis can be used to:

- Inform customers of the proposed level of service to be offered;
- Develop asset management strategies to deliver the required level of service;
- Measure performance against defined (current and desired) levels of service;
- Identify the costs and benefits associated with the services offered; and
- Enable customers to assess the suitability, affordability, and equity of the services offered.

While these outcomes benefit the asset management process, they can also benefit other organizational processes, such as strategic planning, developing master plans, and the budget development and approval process.

Factors Affecting Levels of Service

A number of factors may affect the level of service delivery for a particular asset type. An organization's policy objectives, community expectations, legislative requirements, and resource constraints are some of the factors that generally influence the level of service. The IIMM provides the following details on some of these factors:

- **Community Expectations**: This factor represents one of the major drivers in setting levels of service. Information is needed about the community's expected level of service and willingness to pay for this service. A balance then needs to be determined between that expected level of service and its associated costs.
- **Legislative requirements**: Legislative standards and regulations affect the way assets are managed. These requirements stipulate the minimum levels of service. Therefore, relevant requirements must be taken into consideration in setting levels of service.
- **Policies and objectives**: Existing policies and objectives should be taken into account when developing levels of service, with care taken to remain aligned with an organization's strategic planning documents.
- **Resource availability and financial constraints**: These constraints play a large role in an organization's ability to provide sustainable levels of service. Therefore, resource constraints play a significant part in determining affordable levels of service.

Current vs. Expected Levels of Service

The concept of comparing current vs. expected LOS is very important to the overall LOS analysis process and will be discussed in more detail in a later section, however, it is being introduced in this section. Current levels of service are essentially the service levels that are being provided by a municipality at the present time. They can be defined through qualitative descriptions, lifecycle cost related programs, and/or performance measures. The current year's budget reflects the cost of providing current levels of service. However, the current year's budget may or may not include adequate funding to maintain current levels of service over time (more on this in the performance measures sections). Information on current levels of service enables an understanding of the difference between the service levels currently being provided and the service levels expected.

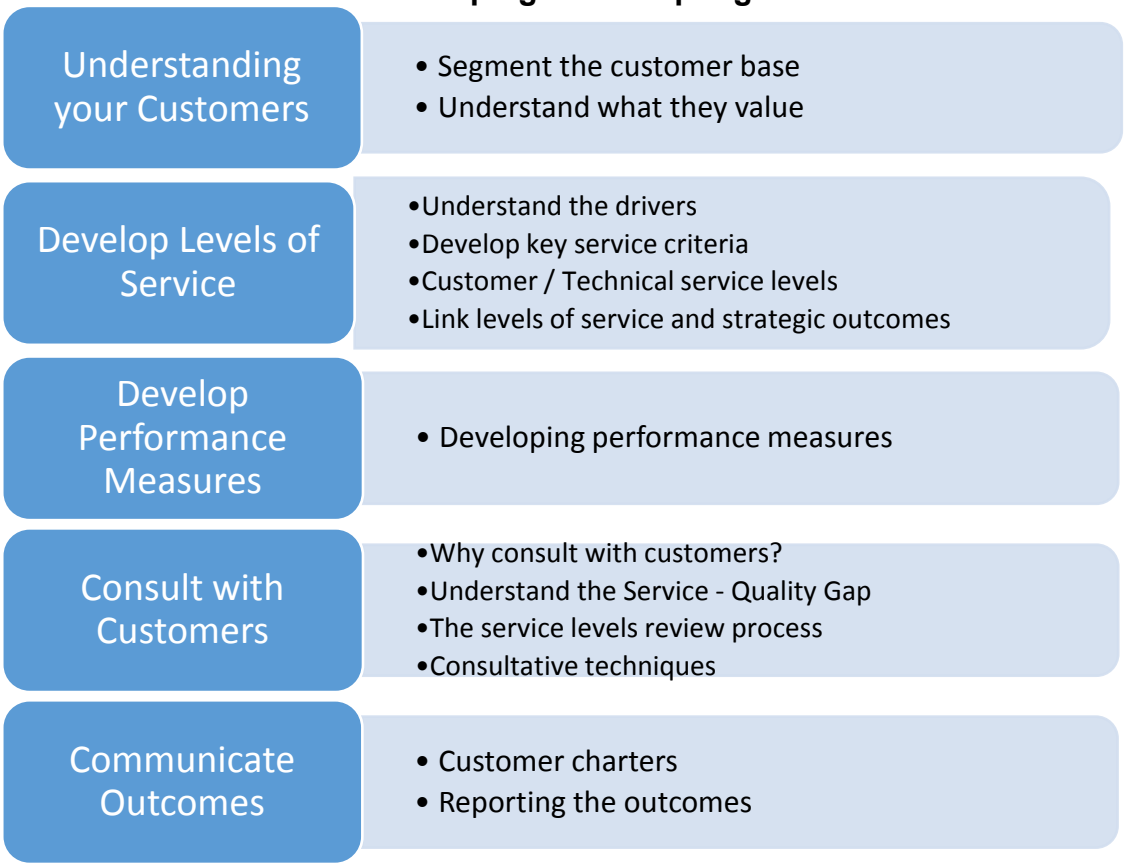
Levels of service are differentiated between:

- **Community Expectations**: Based on what the customer and community expects to receive;
- **Strategic (or Customer) Levels of Service**: Measuring community expectations against attributes such as reliability, quality, safety, efficiency, and capacity. Outlines what the customer will receive from a levels of service standpoint; and
- **Technical Levels of Service**: How the organization provides (or will provide) the levels of service, often using operational or technical measures.

The Process of Developing a Level of Service Analysis

The IIMM defines the process for developing and adopting level of service measures as follows:

Figure 4-3
IIMM Process for Developing and Adopting Levels of Service



Or, in other words, creating an LOS analysis can involve:

1. **Defining Customer Expectations**
   - Understanding your customer and their wants/needs
2. **Developing Levels of Service**
   - Customer vs. technical LOS
   - Current vs. expected LOS
   - Use of performance measures and key performance indicators (KPIs)
3. **Consultation, Communication and Approval**
   - Receiving input on the proposed LOS analysis
   - Communicating the LOS analysis to stakeholders
   - Seeking Council approval of the LOS analysis
4. **Ongoing Review, Updates and Improvements**
   - Updating the LOS analysis, as needed

Defining Customer Expectations

The process of defining customer expectations involve any or all of the following:

- Staff input;
- Use of industry/local knowledge;
- Existing reports that refer to customer expectations;
- Council input; and/or
- Seeking public input.

Involving Council and/or the public in the process of defining customer expectations provides a direct connection between the community and their expectations that may not identified through other sources. Other sources can involve assumptions and estimations of customer expectations. Therefore, direct input from the public can be more accurate, although it requires a more extensive and time-consuming process. Public input can take many forms, including:

- Public meetings;
- Specific workshops or focus groups;
- Comment submissions; and
- Surveys or questionnaires.

Developing Levels of Service

To be effective in developing levels of service, input should be gathered from and communicated to all interested parties. At this point, the services being provided and the community expectations should be documented. Using this information, the applicable departments and staff to include in the LOS discussions can be determined. This section deals only with the process of developing an LOS analysis, and further detail on the actual content of that process will be discussed below in other sections.

Consultation, Communication, and Approval

Once the LOS analysis is complete in “draft form”, decisions should be made regarding the consultation, communication, and/or approval processes that need to occur to finalize the analysis. From a consultation point of view, various stakeholders will be brought into the process to review the draft LOS analysis and provide feedback. These stakeholders may include other staff members, Council, and the public. The approval of the LOS analysis may be simply the discussion and approval at a Council (or

Committee) meeting. A more extensive process may include public workshops or online videos/reports to communicate the LOS analysis to the public and Council before it is discussed and approved. A decision on when to approve the LOS analysis, either as part of an overall asset management plan, or independently of an asset management plan, will also have to be made. An independent approval process puts a lot more focus on the LOS analysis than when noted as part of an overall asset management plan approval discussion. The additional attention may be useful in getting Council and the public to understand and buy into the analysis and its conclusions.

Ongoing Review, Updates and Improvements

The establishment of an LOS analysis is not a one-time occurrence. Rather, it is a constant and evolving process with ongoing consideration to customer expectations, legislative or technological requirements/changes, corporate strategic mission and objectives, and financial opportunities/constraints. It is recommended that municipalities review their LOS on a periodic basis (see Chapter 8 on Continuous Improvements). The frequency of these reviews should be established and followed by staff as part of the Strategic Asset Management Policy (see Chapter 2).

As a municipality moves through the maturity framework to a desired level, it is expected that the amount of public input regarding LOS will likely increase. It is important to note that although seeking public input is important, this input must be considered taking into account financial considerations. Also, the degree of public input in the asset management process will depend on the municipality's capacity to establish a reasonable and meaningful process.

Establishing LOS targets is often an iterative process. The process starts with public (community) expectations of service levels and then measuring these expectations against constraints such as financial considerations, resourcing and affordability. Only after these constraints have been taken into account will it be determined whether public expectations can in fact be approved as expected (target) LOS for the municipality's asset management process.

4.5 Determining Community Expectations

Having a good understanding of community expectations help ensure that the community's true values are reflected in defining LOS in an informed manner.

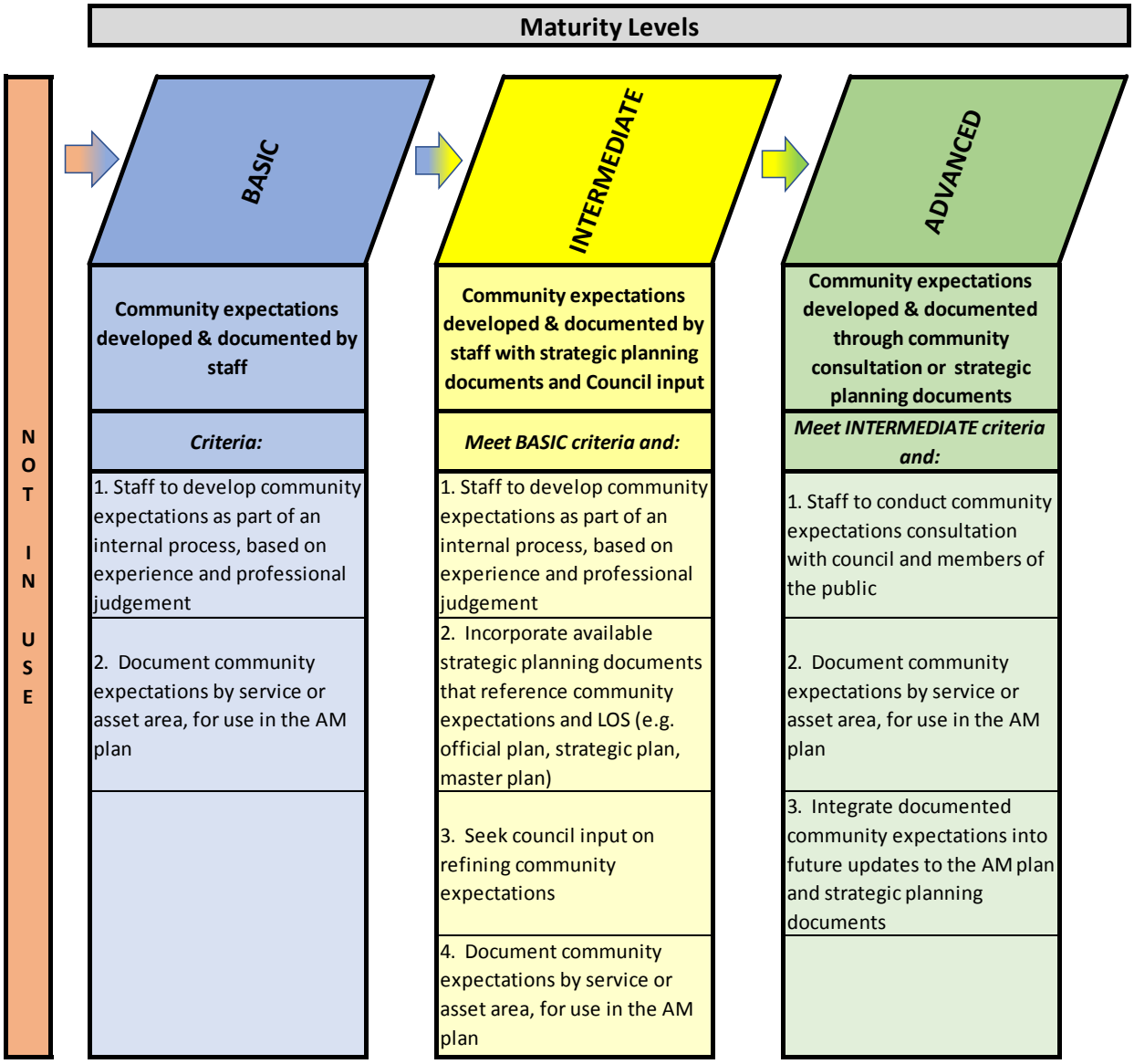
To what extent have community expectations been documented in the LOS analysis?

Background

One of the first steps in the development of an LOS analysis determining what services/service levels the community expects the municipality to provide. While there are different approaches to gathering and utilizing this information, it should be based on the service identification process discussed above. As mentioned previously, community expectations and strategic (customer) levels of service (discussed later) are documented based on how the customer and community receives the service, while technical LOS relates to how staff deliver the service.

Levels of Maturity – Community Expectations

To what extent have community expectations been documented in the LOS analysis?



At the **basic level of maturity**, community expectations are usually developed by staff, as a result of an internal (informal) process and based on staff experience and professional judgment. The community expectations are documented by service/asset area, for use within the asset management plan.

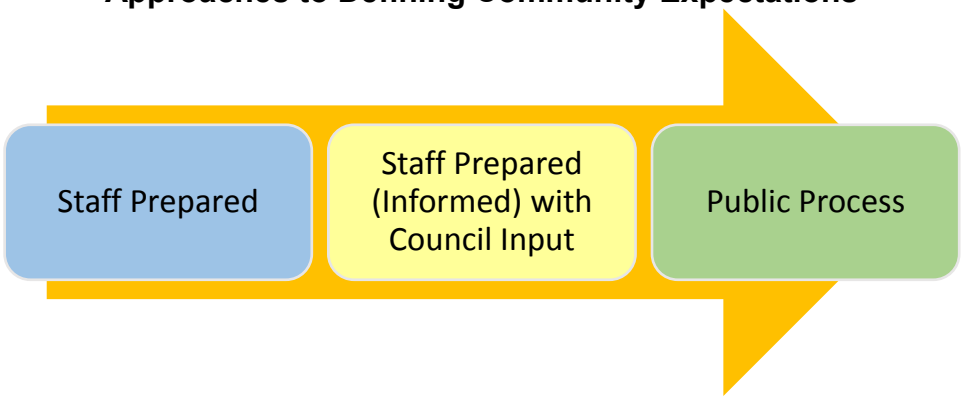
At the **intermediate level of maturity**, staff would still likely develop community expectations, but incorporate existing strategic planning documents (e.g. official plan, strategic plan, master plan, etc.). Council input will also be sought and used to refine community expectations. From this point, community expectations are documented by service/asset area, for use in the asset management plan.

At the **advanced level of maturity**, community consultations are undertaken early in the process, including Council and members of the public, to identify community expectations. The community expectations are documented by service/asset area, for use in the asset management plan. Moving forward, the community expectations are integrated into future updates to the asset management plan, as well as other strategic planning documents.

Developing Community Expectations

The process of developing community expectations can be as simple as staff completing the process or be more in depth and include Council and/or the public in the process. In addition, existing reports, processes, or meeting minutes can be used to inform the process with more detailed information already known regarding community expectations. As illustrated in Figure 4-4 (below), there is potential for increased accuracy in the process and acceptance of the results by Council and the public as the more complex public process is used.

Figure 4-4
Approaches to Defining Community Expectations



The customers who are the ultimate users of the services will have diverse needs and expectations. This underscores the need to understand the customers and connect their divers needs to the level of service being provided. It is beneficial to group the users based on their type and needs when developing community expectations. As part of this process, the community expectations of the various customer groups will need to be consolidated for use in the LOS analysis.

The actual process involved in documenting community expectations is similar, regardless of who is included in the process. It starts with the identification of services

for the municipality (including applicable capital assets involved in providing that service), and then documenting what the community expectations are for each service area. The documentation should be completed in a way that reflects how the community would communicate expectations. While this sounds simplistic, this process will have a significant impact on asset management planning as a whole within the municipality. A misunderstanding of community expectations can result in the development of an asset management plan that does not meet the needs of the community.

Expanding on the table of services discussed previously, the following table provides examples of community expectations for each service area:

Table 4-2
Sample Community Expectations

Department	Services	Applicable Assets	Community Expectations
Transportation Services	Roads	Road base, surface, bicycle lanes, turning lanes, etc.	**"Smooth roads that take me where I need to go without too much congestion"**
	Bridges and Culverts	Structure, deck, surface, etc.	**"Sturdy bridges that take me where I need to go without too much congestion"**
	Sidewalks	Sidewalks	**"Sidewalks that I can walk safely on to key areas of the Community"**
	Streetlights	Poles, fixtures, etc.	**"Streetlights that work so I don't have to walk in the dark"**
	Traffic Lights	Poles, lights, controllers, etc.	**"Traffic lights are placed where needed to ensure smooth and safe traffic flow"**
	Transit	Vehicles, facilities, equipment, etc.	**"Access to public transit to allow me to get where I need to go on a reasonable schedule"**

Department	Services	Applicable Assets	Community Expectations
	Parking	Lots, lights, facilities, equipment, etc.	**"Safe and convenient parking is available, where needed"**
	Winter Control	Vehicles, equipment	**"Able to drive on roads safely in winter conditions"**
Environmental	Water Distribution	Water mains, wells, pumps, towers, valves, hydrants, etc.	**"Clean water, when I need it, that tastes good, has adequate pressure, at a reasonable cost"**
	Water Treatment	Treatment plant (treatment systems, chlorination, pumps, chemical injection and filtration, piping, SCADA, pump houses, etc.	
	Wastewater Collection	Mains, pumping systems, manholes, etc.	**"Wastewater systems that take my waste away and treats it with no harm to the environment"**
	Wastewater Treatment	Treatment plant (separators, aeration systems, pumps, chemical systems, SCADA, settlement ponds, facilities, etc.)	
	Stormwater	Urban: Stormwater mains, catch basins, ponds, headwalls, etc.	**"No flooding on our streets or properties"**
		Rural: Open ditches, culverts, ponds, headwalls, etc.	
	Solid Waste Collection	Vehicles, transfer stations, weigh scales, containers, etc.	**"My garbage and recycling to be picked up each week and processed**

Department	Services	Applicable Assets	Community Expectations
	Solid Waste Disposal	Landfills, monitoring wells, compactors, bulldozers/loaders, etc.	**with no harm to the environment"**
	Solid Waste Diversion	Transfer stations, vehicles, containers, etc.	
Protection Services	Fire	Vehicles, equipment, facilities, hydrants, etc.	**"The fire department to arrive at emergencies as fast as possible with capable firefighters"**
	Police	Vehicles, equipment, facilities, etc.	**"Police will respond to emergencies in a timely manner"**
	Protective Inspection and Control	Vehicles, equipment, facilities, etc.	**"Ability to ensure by-laws are being adhered to"**
Recreation and Cultural Services	Recreation Facilities	Facilities (arenas, pools, community halls, etc.), vehicles, equipment	**"Good recreation facilities to meet the demands of the community"**
			"Access to community halls for community functions"
	Parks	Vehicles, equipment, facilities, active parks, passive parks, etc.	**"Parks that are clean, safe, with playgrounds and open fields"**
	Libraries	Facilities, equipment, etc.	**"All facilities should be accessible"**
	Museums		
Health Services	Public Health/Hospitals	Facilities, equipment, etc.	**"Access to health services to enhance my quality of life"**
	Ambulance Services	Facilities, vehicles, equipment, dispatch equipment, etc.	**"Properly equipped ambulance personnel will be dispatched and arrive on-site when needed"**

Department	Services	Applicable Assets	Community Expectations
	Cemeteries	Land improvements, facilities, equipment, etc.	**"Availability of a well-maintained and private site for interment needs"**
Social Services and Social Housing	Assistance to Aged Persons	Facilities, equipment, etc.	**"Accessible and well-maintained housing for senior citizens"**
	Child Care	Facilities, equipment, etc.	**"Availability of child care services, so parents can pursue their careers"**
	Housing/Co-op/Rent	Facilities, equipment, etc.	**"The community should support opportunities for independent living"**
Planning and Development Services	Residential/Industrial/ Commercial/Agriculture	Land, services, etc.	**"Land should be made ready for development, as needed"**
General Government	Administration	Equipment, vehicles, facilities, etc.	**"A Town Hall that allows me to attend Council meetings, pay taxes and get my questions answered**

It is likely that the community will expect a high level of service in each area, without having an understanding of the financial consequences of providing that level of service. An opportunity to improve the public's understanding of the relationship between service levels and cost can be added to the ongoing development and refinement of community expectations. The public will first need to understand a municipality's asset management process (as well as the implications of plan recommendations) before clearly defined expectations can be received from them. The process of providing the connection between cost and service level will hopefully assist the public understanding which can be used to revise documented community expectations. In a later section, the process of outlining the financial impacts of levels of service will be discussed.

4.6 Developing Strategic (Customer) Levels of Service

Well-defined strategic LOS relate to community expectations and thereby clearly communicate desired customer outcomes. These levels of service are described in a manner that outlines what is being received by the customer.

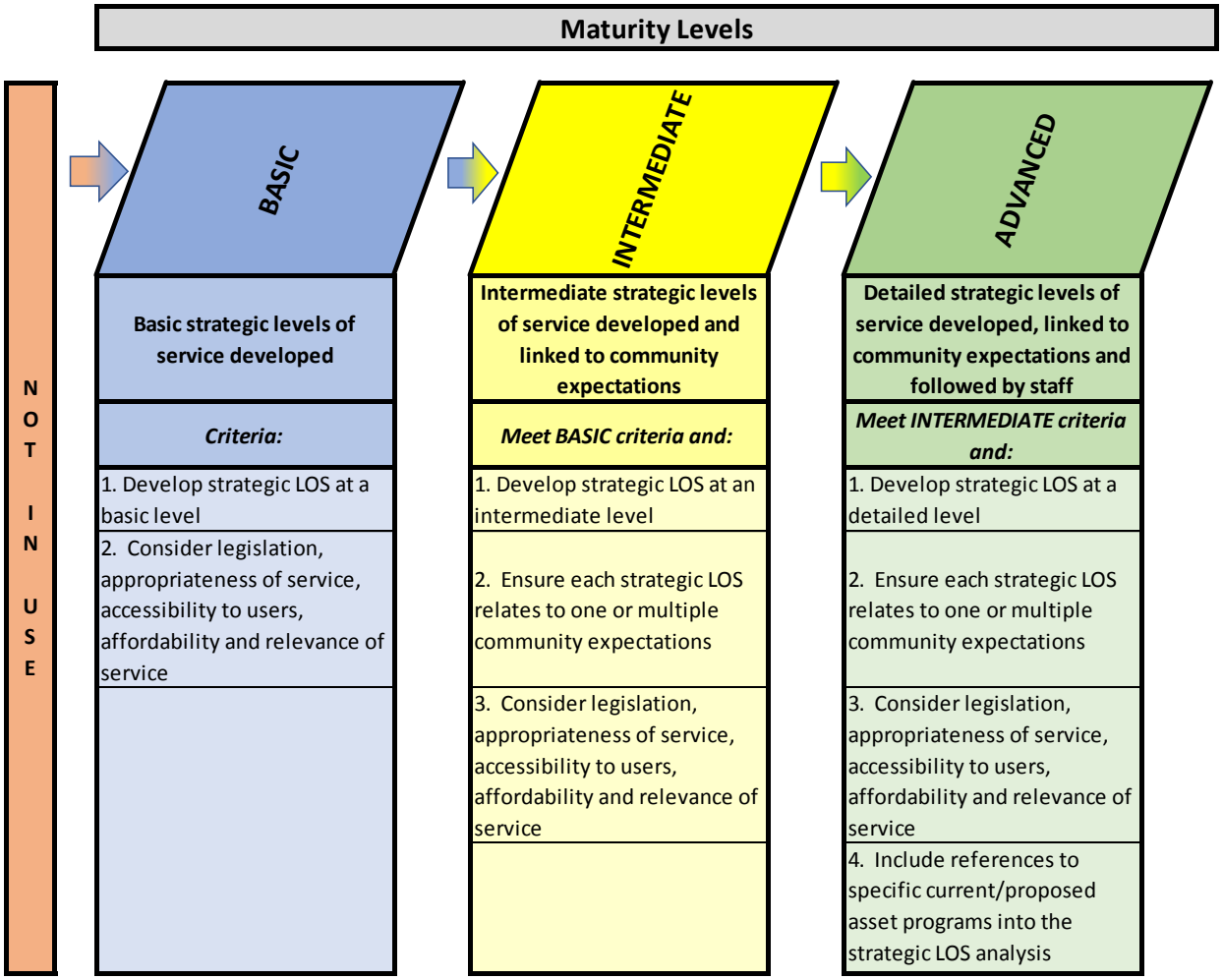
To what extent have strategic (customer) LOS categories been developed and used?

Background

Strategic (or customer) LOS relates to broad issues such as overall outcomes or services for the community. They are recorded in a manner that describes how the customers are receiving the service. This expands on the community expectations discussed earlier and attempts to describe the levels of service in terms of what is actually being provided to the customer from a strategic point of view.

Levels of Maturity – Strategic (Customer) LOS Categories

To what extent have strategic (customer) LOS categories been developed and used?



At the **basic level of maturity**, strategic (customer) LOS will be developed, but only at a high-level, with consideration given to key customer outcomes, including relevant legislation, appropriateness of service, accessibility to users, affordability and relevance of service. At this level, there is not yet direct linkage to community expectations (or the community expectations analysis is incomplete). At a minimum, the legislative requirements outlined in O.Reg 588/17 with respect to customer LOS will be met.

At the **intermediate level of maturity**, municipalities will develop strategic (customer) LOS at a more comprehensive level. Each strategic LOS would be determined with community expectations taken into account and directly linked to the analysis. As with the basic level of maturity, key customer outcomes including relevant legislation, appropriateness of service, accessibility to users, affordability and relevance of service should also be considered.

At the **advanced level of maturity**, detailed strategic LOS will be developed with both community expectations and customer outcomes taken into account. References to specific current and/or proposed asset programs that assist in providing the service will be included in the strategic LOS analysis.

Developing Strategic (Customer) Levels of Service

Strategic LOS (also commonly referred to as customer LOS) are documented based on how the customer and community receives the services provided by the municipality. This differs from technical LOS, which are documented based on how the municipality provides the services. To clarify, strategic (customer) LOS are from the customer's perspective while technical LOS are from the municipality's perspective.

The overview section described the ways in which strategic (customer) LOS can be documented and tracked, including:

- Qualitative descriptions of services and service levels;
- Identifications of programs, procedures and/or activities that are required to achieve particular service levels; and
- Performance measures or key performance indicators (KPIs) that can illustrate the progression of service levels (i.e. through trending analysis) and an ultimate objective or target performance measure/KPI to strive for.

This section focuses on qualitative descriptions of levels of service. Programs/procedures and performance measures will be discussed in later sections.

A number of factors may affect the strategic LOS for a particular asset type. Factors include:

- Customer expectations;
- An organization's policy and objectives;
- Legislative requirements; and
- Resource constraints.

Strategic (customer) LOS define service levels in relation to a range of attributes, for example:

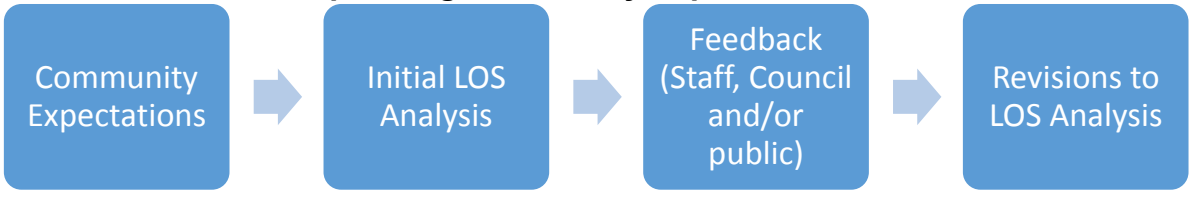
- Reliability;
- Functionality;
- Quantity;

- Quality;
- Responsiveness;
- Safety;
- Capacity;
- Environmental impacts;
- Efficiency;
- Affordability;
- Speed;
- Availability;
- Sustainability;
- Appearance;
- Comfort; and
- Efficiency.

In some cases, these attributes relate to asset performance, and in other cases they describe customer benefit. Customer benefit is very much a strategic (customer) attribute, however, asset performance can be both strategic (customer) LOS and technical LOS. If the customer directly uses the asset (e.g. roads), then the performance of that asset is more related to strategic LOS (i.e. how the customer experiences the service). If, however, the customer does not directly use the asset (e.g. a snow plow is helping provide safe roads, but the plow itself is not directly used by the customer), then the performance of that asset is more related to technical LOS (i.e. how the municipality/staff provide the service).

The act of defining strategic LOS can involve consolidating customer expectations for a particular service, and setting a level of service (using various descriptive attributes) that attempts to meet customer expectations. Customer expectations are one of the major drivers in setting levels of service (as discussed above), as it is the customer expectations that lays the foundation for service levels established from a strategic point of view. This process can assist in identifying the customer's willingness to pay for particular service levels.

Figure 4-5
Incorporating Community Expectations into LOS



Examples are as follows (attributes are underlined):

Table 4-3
Sample Strategic LOS – Expected

Services	Applicable Assets	Community Expectations	Strategic LOS Expected (Customer Perspective)
Roads	Road base, surface, bicycle lanes, turning lanes, etc.	"Smooth roads that take me where I need to go without too much congestion"	**Safe, reliable roads with adequate capacity**
Bridges and Culverts	Structure, deck, surface, etc.	"Sturdy bridges that take me where I need to go without too much congestion"	**Safe, reliable bridges with adequate capacity**
Sidewalks	Sidewalks	"Sidewalks that I can walk safely on to key areas of the Community"	**Safe sidewalks, access from subdivisions to downtown**
Streetlights	Poles, fixtures, etc.	"Streetlights that work so I don't have to walk in the dark"	**Reliable streetlights**
Traffic Lights	Poles, lights, controllers, etc.	"Traffic lights are placed where needed to ensure smooth and safe traffic flow"	**Reliable traffic lights**
Transit	Vehicles, facilities, equipment, etc.	"Access to public transit to allow me to get where I need to go on a reasonable schedule"	**Reliable and convenient transit services**
Parking	Lots, lights, facilities, equipment, etc.	"Safe and convenient parking is available, where needed"	**Convenient and secure parking locations**
Winter Control	Vehicles, equipment	"Able to drive on roads safely in winter conditions"	**Safe roads in winter**

Services	Applicable Assets	Community Expectations	Strategic LOS Expected (Customer Perspective)
Water Distribution	Water mains, wells, pumps, towers, valves, hydrants, etc.	"Clean water, when I need it, that tastes good, has adequate pressure, at a reasonable cost"	**Quality and efficient water supply, with adequate capacity**
Water Treatment	Treatment plant (treatment systems, chlorination, pumps, chemical injection and filtration, piping, SCADA, pump houses, etc.		
Wastewater Collection	Mains, pumping systems, manholes, etc.	"Wastewater systems that take my waste away and treats it with no harm to the environment"	**Quality wastewater collection, with adequate capacity and no environmental impacts**
Wastewater Treatment	Treatment plant (separators, aeration systems, pumps, chemical systems, SCADA, settlement ponds, facilities, etc.)		
Stormwater	Urban: Stormwater mains, catch basins, ponds, headwalls, etc.	"No flooding on our streets or properties"	**Stormwater system with adequate capacity**
	Rural: Open ditches, culverts, ponds, headwalls, etc.		

Services	Applicable Assets	Community Expectations	Strategic LOS Expected (Customer Perspective)
Solid Waste Collection	Vehicles, transfer stations, weigh scales, containers, etc.	"My garbage and recycling to be picked up each week and processed with no harm to the environment"	**Responsive and efficient solid waste collection system**
Solid Waste Disposal	Landfills, monitoring wells, compactors, bulldozers/loaders, etc.		
Solid Waste Diversion	Transfer stations, vehicles, containers, etc.		
Fire	Vehicles, equipment, facilities, hydrants, etc.	"The fire department to arrive at emergencies as fast as possible with capable firefighters"	**Responsive and quality fire services**
Police	Vehicles, equipment, facilities, etc.	"Police will respond to emergencies in a timely manner"	**Responsive and quality police services**
Protective Inspection and Control	Vehicles, equipment, facilities, etc.	"Ability to ensure by-laws are being adhered to"	**Responsive and quality inspection services**
Recreation Facilities	Facilities (arenas, pools, community halls, etc.), vehicles, equipment	"Good recreation facilities to meet the demands of the community"	**Adequate quantity and quality of recreation facilities**
		"Access to community halls for community functions"	**Reliable, safe community halls**

Services	Applicable Assets	Community Expectations	Strategic LOS Expected (Customer Perspective)
Parks	Vehicles, equipment, facilities, active parks, passive parks, etc.	"Parks that are clean, safe, with playgrounds and open fields"	**Adequate quantity and quality of parks**
Libraries	Facilities, equipment, etc.	"All facilities should be accessible"	**Safe and functional facilities**
Museums			
Public Health/Hospitals	Facilities, equipment, etc.	"Access to health services to enhance my quality of life"	**Available, quality health care**
Ambulance Services	Facilities, vehicles, equipment, dispatch equipment, etc.	"Properly equipped ambulance personnel will be dispatched and arrive on-site when needed"	**Reliable, responsive ambulance service**
Cemeteries	Land improvements, facilities, equipment, etc.	"Availability of a well-maintained and private site for interment needs"	**Available, well-maintained cemeteries**
Assistance to Aged Persons	Facilities, equipment, etc.	"Accessible and well-maintained housing for senior citizens"	**Available, functional housing for senior citizens**
Child Care	Facilities, equipment, etc.	"Availability of child care services, so parents can pursue their careers"	**Available, safe child care service locations**
Housing/Co-op/Rent	Facilities, equipment, etc.	"The community should support opportunities for independent living"	**Available, functional assisted living facilities**

Services	Applicable Assets	Community Expectations	Strategic LOS Expected (Customer Perspective)
Residential/Industrial/ Commercial/Agriculture	Land, services, etc.	"Land should be made ready for development, as needed"	**Available serviced land for development**
Administration	Equipment, vehicles, facilities, etc.	"A Town Hall that allows me to attend Council meetings, pay taxes and get my questions answered	**Safe and functional equipment and facilities**

While the examples in the table above are high level, further descriptions can be included in the identification of the strategic (or customer) LOS, such as expanding on:

- How these service attributes (e.g. reliability, functionality, etc.) will be provided to customers; and
- Breaking down community expectations by defined customer groups.

Table 4-4 (below) is an example of linking the services being provided to the assets providing the service, the defined customer groups impacted by the service and the strategic (customer) LOS established. This example labels the service being provided at a higher level, as "Transportation Services".

Table 4-4
Linking Services, Assets, Customers, and Strategic LOS

Service	Asset Type	Various Customer Groups	Strategic (Customer) LOS
Transportation Services	Road Network	• Drivers of private vehicles • Drivers of public or commercial vehicles • Motorcyclists • Local residents • Commercial • Commuters • Visitors / tourists • Emergency Services / Police • Pedestrians • Cyclists • Recreational use	• Safe, comfortable and efficient transportation system • Safe journey • Smooth ride and clear directions • Efficient, safe, and cost-effective transport of goods and services to and from customers • Cost effective transportation options • Safe access and parking

The IIMM identifies a number of important items to consider when identifying customer service levels:

- All significant activities for each service should be covered;
- The number of service criteria should be manageable and appropriate to the quality and availability of the financial and service level data;
- Service criteria should be recognizable, meaningful and assist the organization to achieve its goals; and
- Levels of service should consider: quality, quantity, safety, capacity, fitness for purpose, aesthetics, reliability, responsiveness, environmental acceptability, and cost.

As previously mentioned strategic (customer) LOS relates to how the customer receives the service, in terms of both tangible and intangible measures and criteria. Further examples of tangible measures that relate specifically to the customer include:

- Appearance of assets (e.g. facilities);
- Frequency of service disruptions;
- Accessibility to users (e.g. 24 hours a day, 7 days a week);
- Availability of a service; and
- Incidences of illness or injury.

Examples of intangible measures include:

- Appropriateness of service;
- Affordability;
- Relevance of the service being provided in terms of demand characteristics, future demographics, current back-logs and where the pressure points are;
- Speed of service; and
- Attitude and ease of dealing with the municipality.

At a strategic level, LOS will generally apply to a generic service, class or large grouping of assets and have a long-term focus. As such, they should refer to levels of services that apply to the whole of that service or asset class. Alternatively, strategic LOS can be set based on specific categories of assets within that class. For example, a municipality may set strategic LOS for water services as “to provide quality and efficient water supply, with adequate capacity”. This generic LOS statement applies to all water supply. If the municipality wanted to break down “water supply” into smaller service categories (e.g. residential vs. non-residential water supply, or large diameter mains vs. smaller diameter mains), specific levels of service could be defined at that level, if there were differing statements to make about LOS in each category.

In order to better understand the community’s expectations and limitations related to levels of service, it can be beneficial to complete a public consultation process. This process will help identify customer expectations, can help link these expectations to strategic (customer) LOS within the LOS analysis, and assist in educating the public on the financial implications of providing particular levels of service. A balance can then be made between the expected LOS and cost.

O.Reg 588/17

The IJPA through O.Reg 588/17 has incorporated some mandatory customer (community) based descriptions for core infrastructure asset categories. As these descriptions are connected with mandatory performance metrics that are to be reported

on in a municipality's AM plan, both have been provided in the Performance Measures section below (see Table 4-15).

4.7 Comparing Strategic Current vs. Expected Levels of Service

Analyzing differences between current and expected LOS allows municipalities to identify areas for improvement, create priorities, and quantify financial impacts.

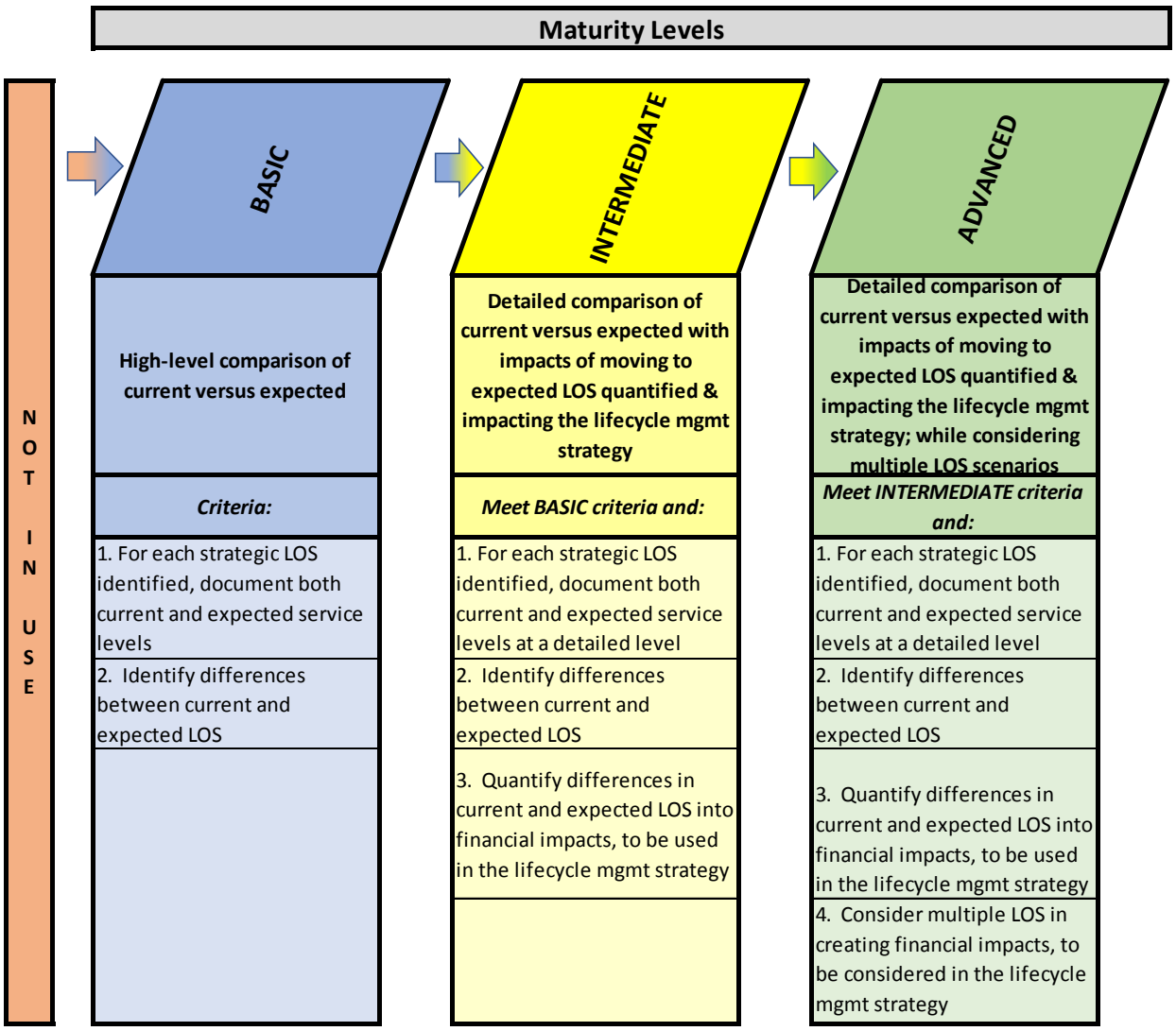
To what extent are current levels of service compared to expected levels of service at a strategic (customer) level?

Background

One of the ultimate goals of asset management planning is to move to (or towards) expected LOS. To evaluate the level of success of the asset management planning process from a level of service perspective, a comparison of current LOS to expected LOS is needed. In this manner, municipalities can identify areas of success, and assess where improvements are required, how to move to expected LOS, and at what cost.

Levels of Maturity: Current LOS vs. Expected LOS at Strategic Level

To what extent are current LOS compared to expected LOS at a strategic level?



At the **basic level of maturity**, municipalities will undertake a high-level comparison of current versus expected strategic LOS at the strategic (customer) level. The comparison is predominantly qualitative (through the use of descriptions) and the results and differences are identified and documented for use in the LOS analysis. At a minimum, the legislative requirements outlined in O.Reg 588/17 with respect to customer LOS will be met.

At the **intermediate level of maturity**, the differences between current and expected strategic LOS are also quantified into asset lifecycle impacts as well as financial impacts, and the results carried forward for implementation within the lifecycle management strategy (see Chapter 5).

At the **advanced level of maturity**, municipalities complete the additional step of considering multiple LOS when quantifying financial impacts, and consider the results within the lifecycle management strategy scenarios (see Chapter 5).

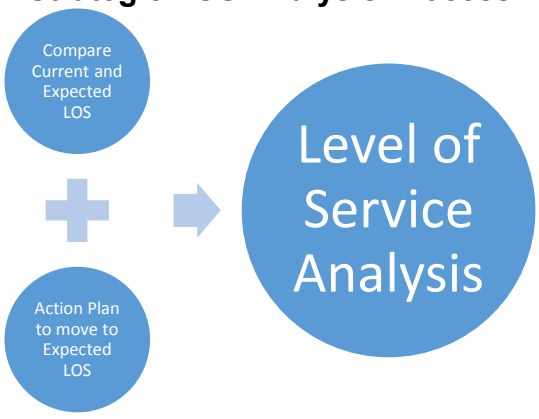
Comparing Current LOS to Expected LOS (Strategic)

As outlined earlier in this chapter, a strategic LOS analysis includes:

- An identification of existing LOS;
- A determination of expected (or desired) LOS; and
- An assessment of the implications of moving from existing LOS to expected (desired) LOS over a forecast period.

Therefore, if current LOS equates to what service level is currently provided, expected LOS outlines the overall objective or target LOS to be reached at some point in time. The amount of time it will take to reach expected LOS depends on the assumptions a municipality makes within the asset management planning process. Using different assumptions will lead to multiple scenarios and multiple timelines within the within the lifecycle management strategy. For example, a municipality could decide to meet expected LOS in a particular area in 10 years. When that scenario is assessed within the Lifecycle Management Strategy (see Chapter 5) and the Financing Strategy (see Chapter 6) and concluded to be too expensive too quickly, the LOS analysis can be updated to include another scenario to reach expected LOS in 15 or 20 years. Alternate scenarios can also represent different (e.g. higher or lower) levels of service.

Figure 4-6
Strategic LOS Analysis Process



This section deals specifically with the comparison of current and expected LOS from a strategic (customer) perspective and the associated financial implications. While the

financial implications are considered in other sections of the asset management plan, identifying gaps in service levels, and understanding how they impact the customer, is critical in assessing these implications within the proper context. Table 4-5 (below) illustrates a high-level comparison of expected LOS (developed in earlier sections) to current LOS. This comparison can support an action plan that outlines what has to be done in order to move towards expected LOS. As noted earlier, the amount of time it takes to implement the action plan and the level of service defined as expected plays a role in assessing the overall financial implications of the LOS analysis. Therefore, both the amount of time and the level of service can be adjusted through the use of multiple LOS scenarios.

Table 4-5
Sample Current Strategic LOS and Action Plans

Services	Strategic LOS Expected (Customer Perspective)	Current LOS	Action Plans
Roads	Safe, reliable roads with adequate capacity	**Roads mostly safe and reliable, with some capacity issues**	**Increased rehabilitation and expansion program**
Bridges and Culverts	Safe, reliable bridges with adequate capacity	**Bridges mostly safe and reliable, with some capacity issues**	**Increased rehabilitation and expansion program**
Sidewalks	Safe sidewalks, access from subdivisions to downtown	**Safe sidewalks, access from most subdivisions to downtown**	**New sidewalk expansion program**
Streetlights	Reliable streetlights	**Reliable streetlights**	**LED program**
Traffic Lights	Reliable traffic lights	**Reliable traffic lights**	**N/A**
Transit	Reliable and convenient transit services	**Transit services mostly reliable and convenient**	**Increased inspection and maintenance**
Parking	Convenient and secure parking locations	**Parking locations convenient and secure**	**N/A**
Winter Control	Safe roads in winter	**Roads safe in winter**	**N/A**

Services	Strategic LOS Expected (Customer Perspective)	Current LOS	Action Plans
Water Distribution Water Treatment	Quality and efficient water supply, with adequate capacity	**Quality and efficient water supply, with adequate capacity**	**Water Rate Study**
Wastewater Collection Wastewater Treatment	Quality wastewater collection, with adequate capacity and no environmental impacts	**Quality wastewater collection, with adequate capacity and no environmental impacts**	**Wastewater Rate Study, Inflow and Infiltration Inspections**
Stormwater	Stormwater system with adequate capacity	**Stormwater system with adequate capacity**	**N/A**
Solid Waste Collection Solid Waste Disposal Solid Waste Diversion	Responsive and efficient solid waste collection system	**Responsive and efficient solid waste collection system**	**N/A**
Fire	Responsive and quality fire services	**Responsive and quality fire services**	**N/A**
Police	Responsive and quality police services	**Responsive and quality police services**	**N/A**
Protective Inspection and Control	Responsive and quality inspection services	**Responsive and quality inspection services**	**N/A**
Recreation Facilities	Adequate quantity and quality of recreation facilities	**Adequate quality of recreation facilities and parks, arenas beyond full capacity**	**Additional ice pad**
	Reliable, safe community halls	**Reliable, safe community halls**	**N/A**
Parks	Adequate quantity and quality of parks	**Adequate quantity and quality of parks**	**N/A**
Libraries Museums	Safe and functional facilities	**Safe and functional facilities, however, not accessible**	**Accessibility program**

Services	Strategic LOS Expected (Customer Perspective)	Current LOS	Action Plans
Public Health/Hospitals	Available, quality health care	**Available, quality health care**	**N/A**
Ambulance Services	Reliable, responsive ambulance service	**Reliable, responsive ambulance service**	**N/A**
Cemeteries	Available, well-maintained cemeteries	**Available, well-maintained cemeteries**	**N/A**
Assistance to Aged Persons	Available, functional housing for senior citizens	**Available, functional housing for senior citizens**	**N/A**
Child Care	Available, safe child care service locations	**Available, safe child care service locations**	**N/A**
Housing/Co-op/Rent	Available, functional assisted living facilities	**Available, functional assisted living facilities, however, upgrades required to meet new fire safety standards**	**N/A**
Residential/Industrial/ Commercial/Agriculture	Available serviced land for development	**Available serviced land for development**	**N/A**
Administration	Safe and functional equipment and facilities	**Safe and functional equipment and facilities**	**Upgrade non-compliant**

In Table 4-5 above, action plan items can be further detailed in terms of timing and costing. For example:

Table 4-6
Sample Strategic Action Plan Scenarios

Action Item	Scenario 1	Scenario 2	Scenario 3
New Sidewalk Expansion Program	Both sides of street, in 5 years: **$100,000 per year**	One side of street, in 5 years: **$50,000 per year**	One side of street, in 10 years: **$25,000 per year**

These scenarios can be used to educate Council and the public on the relationship between levels of service, and costs to provide expected LOS.

Action items can include:

- Non-infrastructure items;
- Maintenance items;
- Rehabilitation items/programs;
- Replacement items/programs; and/or
- Expansion items/programs.

Costing Levels of Service Action Plans

The following are required in order to cost levels of service action plans:

a) Well-defined levels of service scenarios and respective action plan items;
b) A clearly defined action plan, including what is needed, where it is needed and why;
c) A process of determining costs and unit rates associated with that action plan; and
d) Accurate cost information.

When including action items within the LOS analysis, municipalities should be mindful of:

- The total cost of implementing the action plan;
- The impact the action plan has on the future lifecycle costs of the applicable assets (more on this in Chapter 5); and
- The impact of the action plan items on projected LOS over the forecast period.

4.8 Developing Technical Levels of Service

Well-defined Technical LOS are linked to strategic LOS and define how the municipality will provide and meet expected strategic LOS. Integrating technical LOS into daily duties of operations staff can raise staff awareness of how their work contributes to providing a specific LOS to the community.

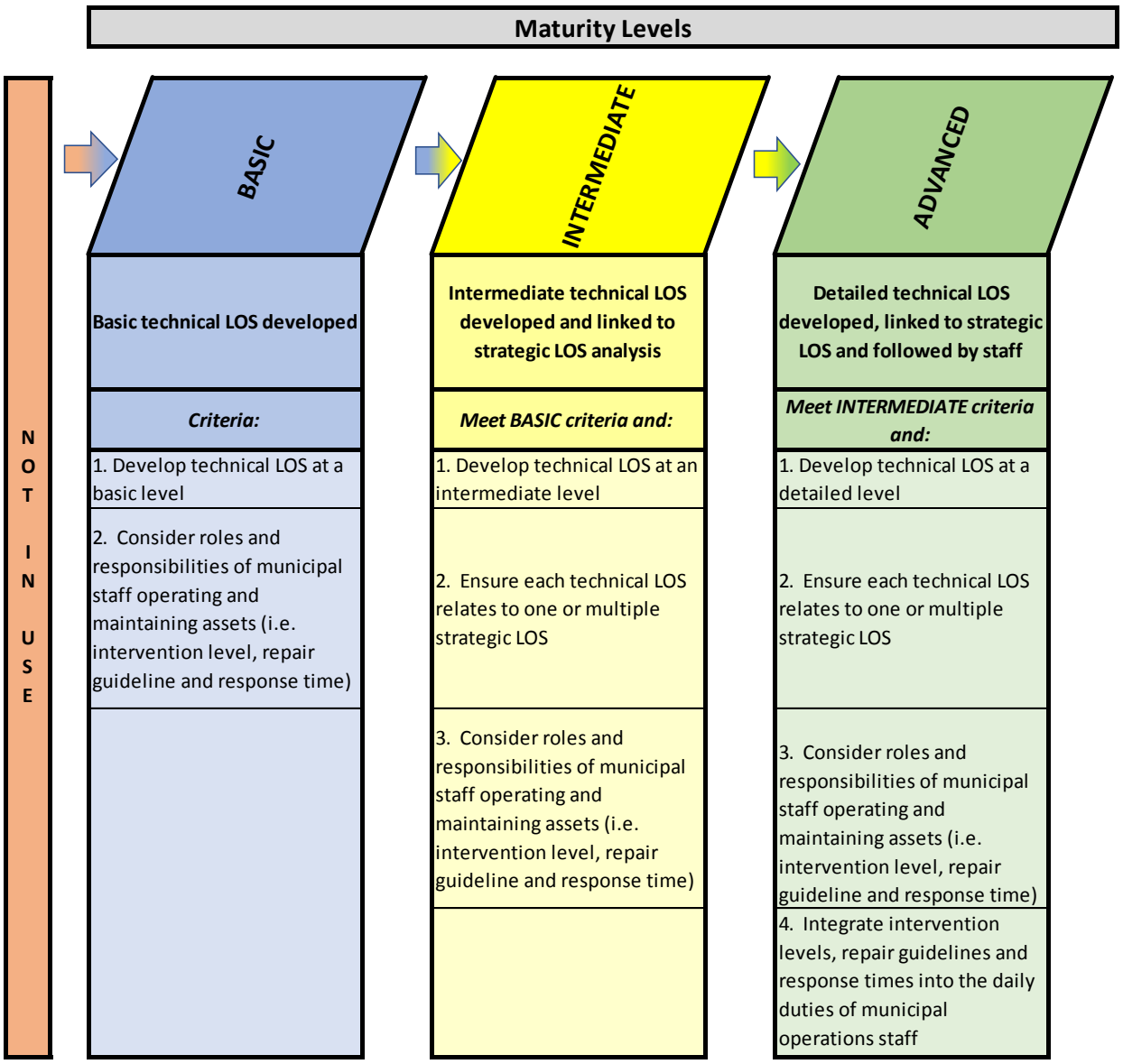
To what extent have technical LOS categories been developed and used?

Background

Technical LOS outline, from a municipal perspective, the services and service levels provided (and to be provided) to the community. This differs from strategic (customer) LOS which are more from the customer's point of view. Technical LOS should be developed and linked to the strategic (customer) LOS as well as the overall customer expectations. Technical LOS will generally be more specific than strategic LOS, relating more to the roles and responsibilities of municipal staff as well as how technical LOS differ within each broad asset category.

Levels of Maturity – Technical LOS Categories

To what extent have technical LOS categories been developed and used?



At the **basic level of maturity**, technical LOS are developed but only at a high level. Consideration is given to roles and responsibilities of municipal staff that operate and maintain assets and provide the services (i.e. intervention levels, repair guidelines and response times). At a minimum, the legislative requirements outlined in O.Reg 588/17 with respect to technical LOS will be met.

At the **intermediate level of maturity**, municipalities will develop technical LOS at a more detailed level. Each technical LOS would be considered in relation to one or more strategic (customer) LOS. Consideration would be given to roles and responsibilities of municipal staff operating and maintaining assets.

At the **advanced level of maturity**, intervention levels, repair guidelines and response times are alo integrated into the daily duties of municipal operations staff. At this level of maturity, operational staff are aware of their contribution to providing levels of service to the community.

Developing Technical Levels of Service

The discussion on strategic (customer) LOS was at a high level in the previous sections, with broad service and asset categories. For example, roads were grouped together into one category, with the following levels of service expectations:

- **Community Expectations:** “Smooth roads that take me where I need to go without too much congestion”; and
- **Strategic (Customer) LOS:** “Safe, reliable roads with adequate capacity”.

Technical LOS are documented in the same manner as strategic (customer) LOS, including:

- Qualitative descriptions of services and service levels;
- Identifications of programs, procedures and/or activities that are required to achieve particular service levels; and
- Performance measures or key performance indicators (KPIs) that can illustrate the progression of service levels (i.e. through trending analysis) and an ultimate objective or target performance measure/KPI to strive for.

This section focuses on the qualitative descriptions and programs needed from a LOS perspective. Performance measures are discussed in later sections.

While the documented structure is similar to strategic (customer) LOS, the focus for measurement has now shifted to the municipality and municipal staff. In setting technical LOS, we will think of service levels from this perspective:

- What is being done by the municipality to provide current LOS?
- What has to be done in the future in order to provide expected LOS?
- Are there performance measures that can assist in describing technical LOS?

Also, similar to strategic (customer) LOS, technical LOS define service levels in relation to a range of attributes, such as:

- Reliability;

- Functionality;
- Quantity;
- Quality;
- Responsiveness;
- Safety;
- Capacity;
- Environmental impacts;
- Efficiency;
- Affordability;
- Speed;
- Availability;
- Sustainability;
- Appearance;
- Comfort; and
- Efficiency.

As discussed in the strategic (customer) LOS section, in some cases these attributes (ab0ve) relate to asset performance, and in other cases they describe customer benefit. Customer benefit is very much a strategic (customer) attribute. However, asset performance can relate to both strategic (customer) LOS and technical LOS. If the customer directly uses the asset (e.g. roads), then the performance of that asset is more related to strategic LOS (i.e. how the customer experiences the service). If the customer does not directly use the asset (e.g. a snow plow helping to provide safe roads, but the plow is not directly used by the customer), then the performance of that asset is more related to technical LOS (i.e. how the municipality/staff provide the service).

Technical levels of service can relate to:

- Legislative compliance;
- Levels of functionality;
- Levels of financial return or asset cost;
- Reduction in the dependency for new asset solutions;
- Specific lifecycle costs (maintenance, rehabilitation, replacement, expansion);
- Levels of asset condition; and
- Risk and safety.

Specifically, technical levels of service are detailed objectives that normally relate to specific services, assets or activities. These may include such things as:

- Design standards;
- Maintenance intervention levels;
- Response times;
- Work activity standards; and/or
- Asset condition standards.

Each technical level of service is intended to ensure a particular service standard is met from a municipal or staff perspective (i.e. what an organization has to do). For example, at what point will we repair, renew or upgrade to meet the strategic (customer) LOS?

When it comes to technical LOS, it now has to be determined how municipal staff will provide this level of service. What's more, "how" may differ, depending on the road type, for example. Roads can be classified into classes or categories such as rural/semi-urban/urban or local/collector/arterial or even paved/unpaved. The technical LOS for each category may be different. For example, the attributes "safe", "reliable", and "adequate capacity" were used to describe strategic LOS. To some municipalities, these attributes can be provided by staff to all roads using the same maintenance, rehabilitation and replacement programs. However, many municipalities will consider an urban or arterial road to have a "higher" level of service than a rural or local road. In many ways, this comes back to the consequence of failure discussions outlined in Chapter 3. The consequence of failure for an arterial road that handles much more traffic at faster speeds is higher than the consequence of failure of a local road with much less traffic and reduced speeds. Differing consequences can result in differing levels of service. Going back to our road example above, providing "safe", "reliable" and "adequate capacity" roads could mean differing action plans depending on the type of road (and the risks associated with that road).

Examples for various asset categories are provided in the table below:

Table 4-7
Example of Varying Technical LOS Levels

Strategic LOS Level	Technical LOS Level
Roads and Bridges	• Local, Collector, Arterial • Rural, Semi-Urban, Urban • MMS classes 1,2,3,4,5,6 • Traffic ranges (High, Med, Low)

Strategic LOS Level	Technical LOS Level
	• By replacement cost (high value, medium value, low value)
Mains (Water, Wastewater, Storm)	• Residential, Non-Residential • By diameter (Small, Med, Large) • By replacement cost (high value, medium value, low value)
Solid Waste	• By replacement cost (high value, medium value, low value)
Facilities	• By replacement cost (high value, medium value, low value) • By the type of service being provided (high, med, low critical service)
Vehicles and Equipment	• By replacement cost (high value, medium value, low value) • By the type of service being provided (high, med, low critical service)
Land Improvements	• By replacement cost (high value, medium value, low value) • By the type of service being provided (high, med, low critical service)

One approach to identifying the correct service or asset breakdown in defining levels of service is to review maintenance, rehabilitation and replacement decisions by asset category.

- Do you perform the exact same maintenance on all roads or does it differ depending on the road type?
- Do you schedule rehabilitation and replacement needs the exact same on all roads or does it differ depending on the road type?

If you perform these lifecycle activities based on a different level or frequency, for example, on arterial roads in comparison to local roads, there is a good chance that LOS should be defined differently for each.

Table 4-8
Sample Expected Technical LOS

Services	Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)
Roads	Safe, reliable roads with adequate capacity	**Average condition rating: Local (5/10), Collector (6/10), Arterial (7/10)**

Services	Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)
		Follow Minimum Maintenance Standards
Bridges and Culverts	Safe, reliable bridges with adequate capacity	**Average condition rating: 7/10**
		Follow Minimum Maintenance Standards
Sidewalks	Safe sidewalks, access from subdivisions to downtown	**Average condition: 7/10**
		Minimize complaints
Streetlights	Reliable streetlights	**Minimize complaints**
Traffic Lights	Reliable traffic lights	**Minimize complaints**
Transit	Reliable and convenient transit services	**Inspect and perform maintenance on vehicles monthly**
		Minimize complaints
Parking	Convenient and secure parking locations	**Minimize complaints**
Winter Control	Safe roads in winter	**Follow MMS**
Water Distribution	Quality and efficient water supply, with adequate capacity	**Meet legislative requirements**
Water Treatment		**Unaccounted for water under 30%**
		Less than 5 main breaks annually, per 100 customers
Wastewater Collection	Quality wastewater collection, with adequate capacity and no environmental impacts	**Meet legislative requirements**
		Minimize incidents of bypass
Wastewater Treatment		**Less than 5 main breaks annually, per 100 customers**
Stormwater	Stormwater system with adequate capacity	**Minimize flooding incidents per 1,000 people**
Solid Waste Collection	Responsive and efficient solid waste collection system	**Minimize complaints**
Solid Waste Disposal		**Inspect and perform maintenance on vehicles monthly**
Solid Waste Diversion		
Fire	Responsive and quality fire services	**Minimize response times**
		Meet legislative requirements

Services	Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)
		Follow vehicle and equipment replacement program
Police	Responsive and quality police services	**Minimize response times**
		Meet legislative requirements
		Follow vehicle and equipment replacement program
Protective Inspection and Control	Responsive and quality inspection services	**Follow vehicle and equipment replacement program**
Recreation Facilities	Adequate quantity and quality of recreation facilities	**Utilization percentages for all facilities to be between 80% and 100%**
	Reliable, safe community halls	**Follow facility maintenance program**
		Minimize complaints
Parks	Adequate quantity and quality of parks	**Provide 1 park per 1,000 residents**
Libraries	Safe and functional facilities	**100% of facilities to pass accessibility standards**
Museums		
Public Health/Hospitals	Available, quality health care	**Meet legislative requirements**
		Follow facility maintenance program
Ambulance Services	Reliable, responsive ambulance service	**Minimize response times**
		Meet legislative requirements
		Follow vehicle and equipment replacement program
Cemeteries	Available, well-maintained cemeteries	**Minimize complaints**
Assistance to Aged Persons	Available, functional housing for senior citizens	**Meet legislative requirements**
		Follow facility maintenance program

Services	Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)
Child Care	Available, safe child care service locations	**Meet legislative requirements** **Follow facility maintenance program**
Housing/Co-op/Rent	Available, functional assisted living facilities	**Meet legislative requirements** **Follow facility maintenance program**
Residential/Industrial/ Commercial/Agriculture	Available serviced land for development	**Minimize complaints**
Administration	Safe and functional equipment and facilities	**Minimize complaints**

Expanding on the examples in the table above, technical LOS can be detailed in a manner to assist municipal staff from a day-to-day operational perspective. For example, “minimizing complaints” can be expanded to include how to deal with complaints, such as:

- Staff will respond to customer complaints within X hours;
- Staff will perform required maintenance on assets within Y days; and
- Staff will provide a response to complaints within Z hours.

It is also important to point out that many of the technical LOS illustrated in the table above refer to a service that can be measured through a key performance indicator or performance measure. For example, a technical LOS objective for water is to have “unaccounted for water under 30%”. This is a performance measure that not only can be measured each year, but can also be analysed over many years to indicate in what direction this measure is trending (e.g. upwards, downwards or staying consistent). This becomes important when discussing performance measures in a later section.

To what extent are technical levels of service followed by operational staff?

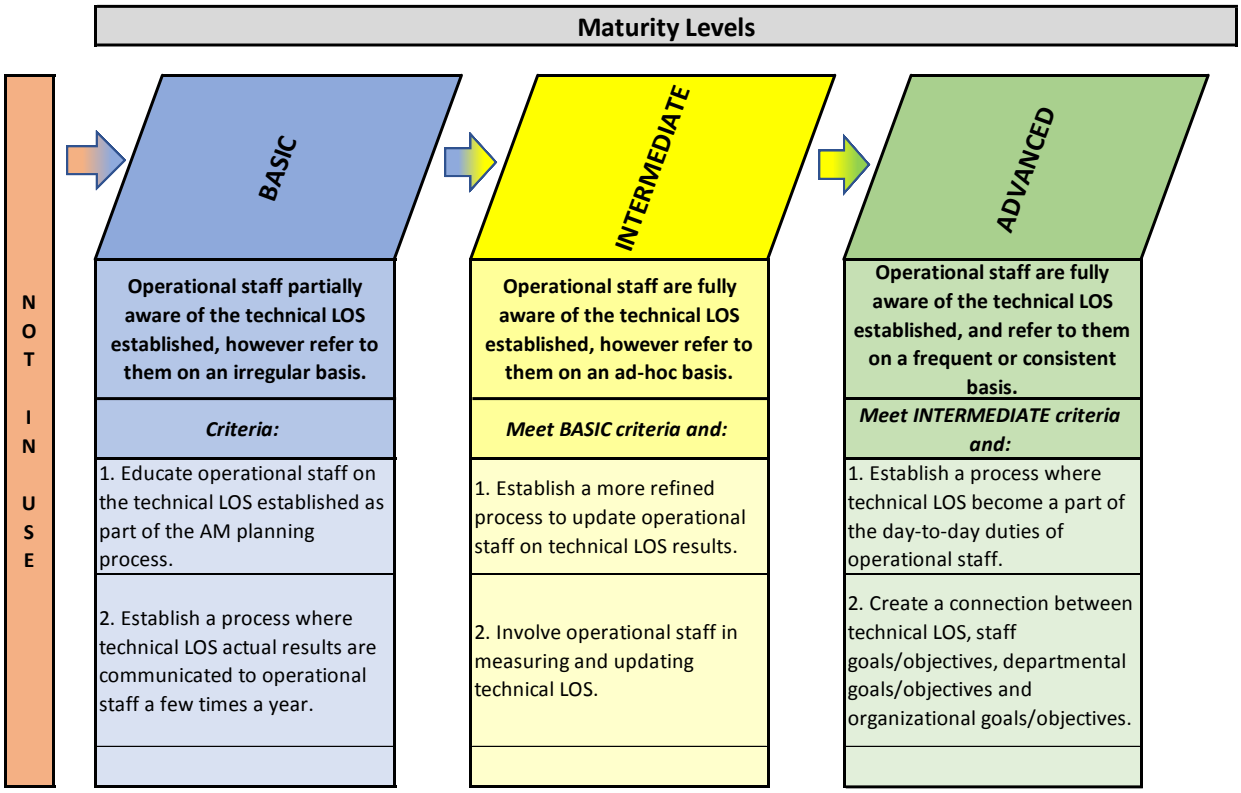
Background

Operational staff play a key role in providing various services within a municipality. The day-to-day activities of these staff contribute to the overall goals and objectives of their individual divisions and departments. They also contribute to the goals and objectives of the organization as a whole as outlined in the municipality’s strategic planning document. Linking these operational activities to the technical LOS analysis provides a

direct connection between the levels of service being provided (or expected to be provided) and the effort (time, resourcing, cost, etc.) from the operational staff to provide those service levels.

Levels of Maturity

To what extent are technical levels of service followed by operational staff?



At the **basic level of maturity**, operational staff will have a high-level understanding of the technical LOS established as part of the AM planning process. This will be in the form of a high-level educational process as well as communication to relay updated results (i.e. actual technical LOS results) a few times a year.

At the **intermediate level of maturity**, operational staff will have a more detailed understanding of technical LOS established within the municipality. At this level, operational staff participate in measuring technical LOS on an annual basis.

At the **advanced level of maturity**, operational staff will have their day-to-day duties linked to the technical LOS within their department. In addition, there is a direct connection between the technical LOS and goals and objectives of the employees, the department/division and the organization as a whole.

Operational Activities and Technical Levels of Service

Technical LOS was discussed in detail in the previous section. This section relates to the integration of these technical LOS into the activities performed by operational staff. This integration allows for the ability to relate the actions of staff to the over-arching goals and objectives of the department, or even the organization as a whole. This can provide an approach to evaluating staff performance in meeting these goals/objectives. What's more, having operational staff educated and informed on technical LOS established within the AM planning process provides additional benefits, such as staff "buy-on" on the AM process.

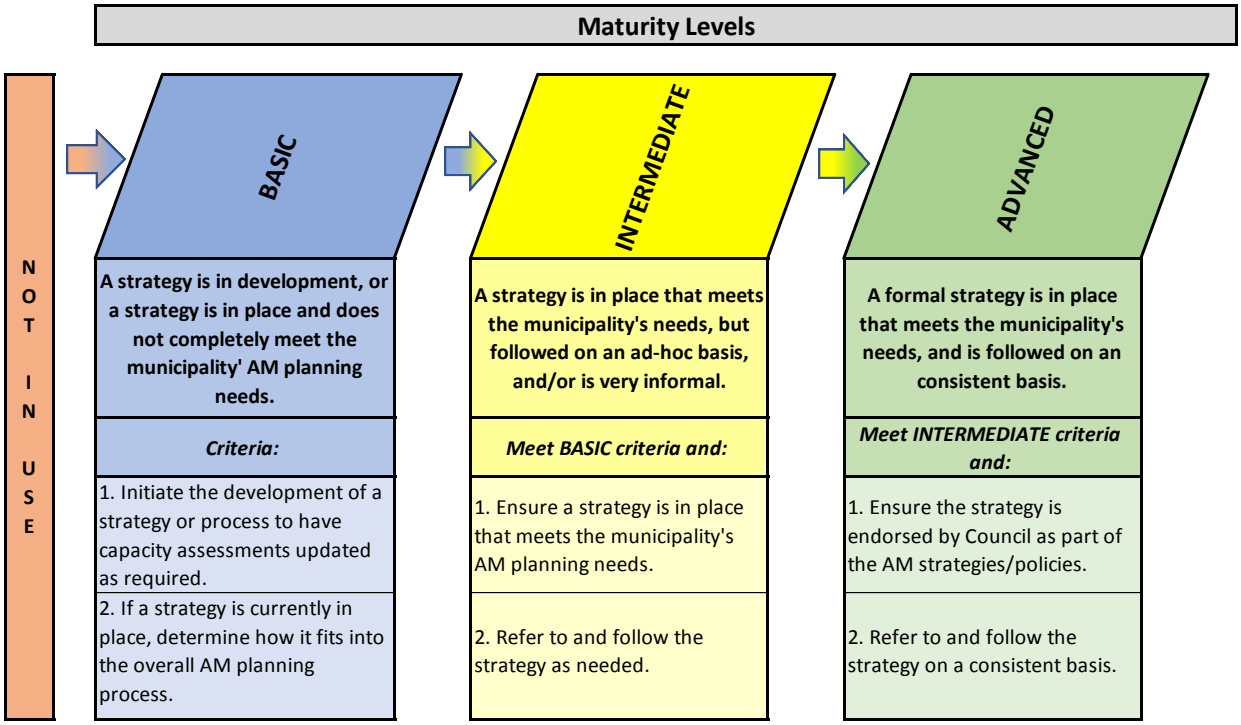
Do you have a strategy in place to determine when and how service capacity assessments are updated?

Background

Service capacity data provides critical information on municipal assets, as it relates to the maximum service each asset can provide in its current state. Having this data updated on a consistent basis assists in providing service levels at expected levels.

Levels of Maturity

Do you have a strategy in place to determine when and how service capacity assessments are updated?



At the **basic level of maturity**, municipalities initiate the development of a strategy or process to have capacity assessments updated, as required. If a strategy is currently in place, municipalities at this level will need to determine how it fits into the overall asset management planning process.

At the **intermediate level of maturity**, municipalities ensure a strategy is in place that meets its asset management planning needs and refer to it as needed.

At the **advanced level of maturity**, municipalities ensure the strategy is endorsed by Council and refer to it on a consistent basis.

Updating Service Capacity Assessments

As described above, an asset's service capacity refers to the "maximum output" an asset can provide on a consistent basis. Examples are as follows:

- Roads & Bridges: Traffic Volumes;
- Water, Wastewater & Storm: Flows;
- Solid Waste: Utilization or storage capacity;
- Vehicles/Equipment: Kilometers or hours;

As time passes, or as assets are used or improved, their service capacities may also change. This makes the service capacity attribute as important to update as the condition rating or replacement cost of the asset.

A strategy or process to follow to ensure service capacity data remains accurate and consistent ensures that this information can be relied upon within the asset management planning process. This process can be as simple as the need to reassess or recalculate service capacity annually, in addition to when significant events (i.e. asset addition, disposal, improvement, and write-off) occur.

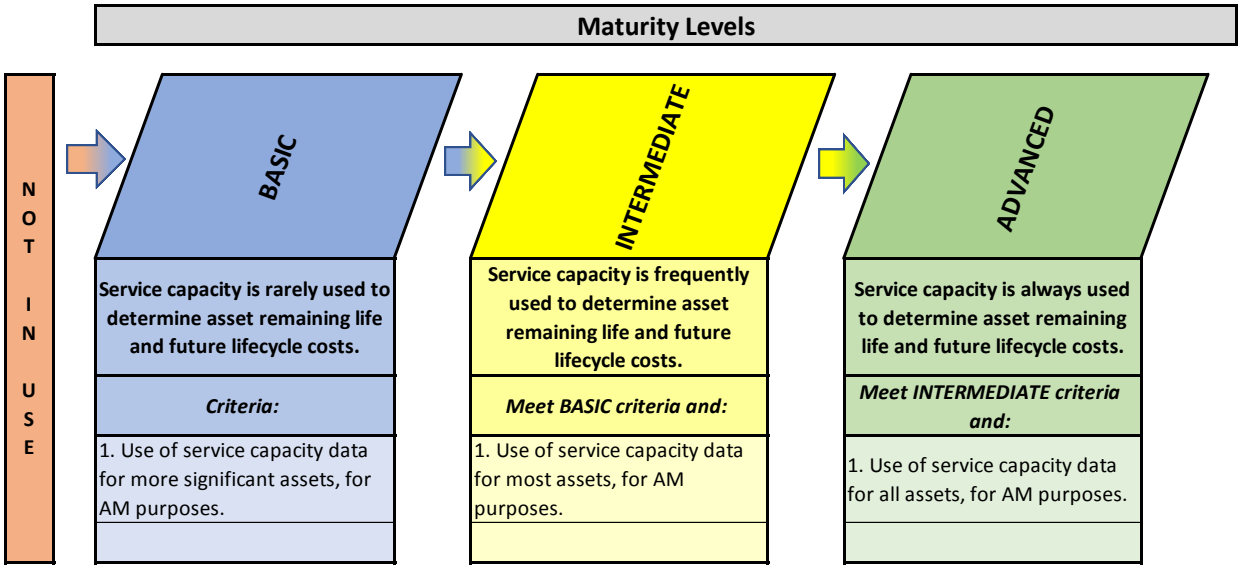
To what extent is service capacity data used to determine asset remmaining life and future lifecycle costs?

Background

Incorporating service capacity data within the technical LOS analysis provides critical information to assess asset remaining life and future lifecycle costs required. As discussed in Chapter 3, an asset can "fail" based on its condition, but also based on not providing the needed capacity to provide a service.

Levels of Maturity

To what extent is service capacity data used to determine asset remaining life and future lifecycle costs?



At the basic level of maturity, municipalities use service capacity data for more significant assets.

At the intermediate level of maturity, municipalities use service capacity data for most assets.

At the advanced level of maturity, municipalities use service capacity data for all assets.

Use of Service Capacity Data

Service capacity data can be used within the AM planning process in many ways, including:

- It is an asset attribute that can be maintained within a municipality's asset register (see Chapter 3);
- It can form part of the "risk" calculation discussed in Chapter 3;
- Can form part of the level of service analysis (i.e. technical LOS) discussed within this chapter, including the tracking and trending of this data to determine if assets can provide services at desired levels (see the performance measures section below); and
- It can be a direct criteria within the Lifecycle Management Strategy (Chapter 4) to determine timing of lifecycle costs. For example, an asset rehabilitation can be accelerated within the forecast period due to the fact that the current service capacity will not sustain desired service levels.

4.9 Comparing Technical Current vs. Expected Levels of Service

Analyzing differences between current and expected technical LOS allows municipalities to create operational plans for moving towards expected service levels.

To what extent are you comparing current LOS to expected LOS at a technical level?

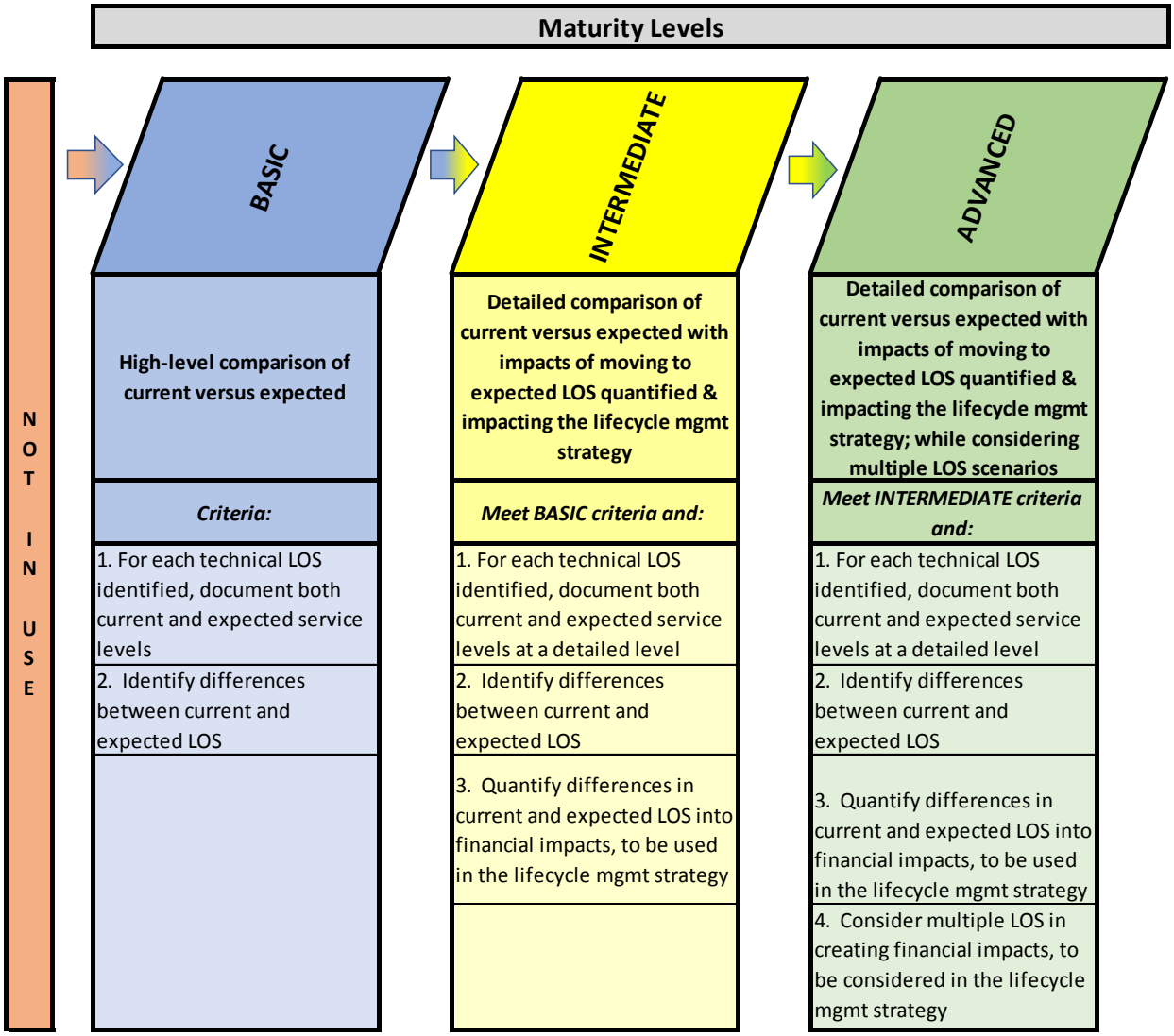
Background

Comparing current LOS to expected LOS at the technical level not only provides a mechanism to outline action plans to move towards expected LOS, but also assists the

municipality from an operation perspective, by outlining what has to occur at a staff level to meet expected service levels.

Levels of Maturity: Current LOS vs. Expected LOS (Technical)

To what extent are you comparing current LOS to expected LOS at a technical level?



At the **basic level of maturity**, municipalities undertake a high-level comparison of current versus expected technical LOS. The results and differences should be identified and documented within the LOS analysis. At a minimum, the legislative requirements outlined in O.Reg 588/17 with respect to technical LOS should be met.

At the **intermediate level of maturity**, the differences between current and expected technical LOS are quantified into financial impacts and utilized within the lifecycle management strategy (see Chapter 5).

At the **advanced level of maturity**, municipalities take the additional step of considering multiple LOS when quantifying financial impacts and consider the results within the lifecycle management strategy (see Chapter 5).

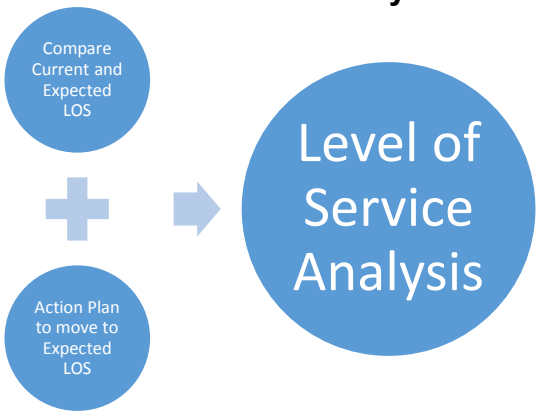
Comparing Current LOS to Expected LOS (Technical)

As outlined earlier in this chapter, a technical LOS analysis includes:

- An identification of existing LOS;
- A determination of expected (or desired) LOS; and
- An assessment the implications of moving from existing LOS to expected (desired) LOS over a forecast period.

Therefore, if current LOS equates to what service level is currently provided, expected LOS outlines the overall objective or target LOS to be reached at some point in time. The amount of time it will take to reach expected LOS depends on the assumptions a municipality makes within the asset management planning process. Using different assumptions will lead to multiple scenarios and multiple timelines within the within the lifecycle management strategy. For example, a municipality could decide to meet expected LOS in a particular area in 10 years. When that scenario is assessed within the Lifecycle Management Strategy (see Chapter 5) and the Financing Strategy (see Chapter 6) and concluded to be too expensive too quickly, the LOS analysis can be updated to include another scenario to reach expected LOS in 15 or 20 years. Alternate scenarios can also represent different (e.g. higher or lower) levels of service.

Figure 4-7
Technical LOS Analysis



This section deals specifically with the comparison of current and expected LOS from a technical perspective as well as the associated financial implications. While the financial implications are used in other sections of the asset management plan, identifying gaps in service levels is critical in assessing these implications. The table below illustrates a high-level comparison of expected LOS (developed in earlier sections) to current LOS. With this comparison in place, an action plan can be established that outlines what has to be done in order to move towards expected LOS. As mentioned earlier, the amount of time it takes to implement the action plan and the expected level of service is a factor in assessing the overall financial implications of the LOS analysis, therefore both the amount of time and the level of service can be adjusted through the use of multiple LOS scenarios.

Table 4-9
Sample Current Technical LOS and Action Plans

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Action Plans
Safe, reliable roads with adequate capacity	Average condition rating: Local (5/10), Collector (6/10), Arterial (7/10)	**Local: 4/10 Collector: 4/10 Arterial: 5/10**	**Increase funding to road rehabilitation and replacement programs**
	Follow Minimum Maintenance Standards	**Following MMS**	**N/A**
	Average condition rating: 7/10	**Current: 6/10**	**Increase bridge rehabilitation program**

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Action Plans
Safe, reliable bridges with adequate capacity	Follow Minimum Maintenance Standards	**Following MMS**	**N/A**
Safe sidewalks, access from subdivisions to downtown	Average condition: 7/10	**Current: 6/10**	**Increase sidewalk program**
	Minimize complaints	**Current: 5 complaints**	**N/A**
Reliable streetlights	Minimize complaints	**Current: 8 complaints**	**N/A**
Reliable traffic lights	Minimize complaints	**Current: 3 complaints**	**N/A**
Reliable and convenient transit services	Inspect and perform maintenance on vehicles monthly	**Inspection and maintenance plan followed**	**Increase maintenance funding**
	Minimize complaints	**Current: 14 complaints**	**N/A**
Convenient and secure parking locations	Minimize complaints	**Current: 3 complaints**	**N/A**
Safe roads in winter	Follow MMS	**Compliant with MMS**	**N/A**
Quality and efficient water supply, with adequate capacity	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Unaccounted for water under 30%	**Unaccounted for water: 35%**	**Implement watermain looping program**
	Less than 5 main breaks annually, per 100 customers	**Breaks per 100 customers: 2**	**N/A**
Quality wastewater collection, with adequate capacity and no environmental impacts	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Minimize incidents of bypass	**Incidents of bypass: 0**	**N/A**
	Less than 5 main breaks annually, per 100 customers	**Breaks per 100 customers: 20**	**Implement CCTV inspection program**

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Action Plans
Stormwater system with adequate capacity	Minimize flooding incidents per 1,000 people	**Flooding Incidents: 0**	**N/A**
Responsive and efficient solid waste collection system	Minimize complaints	**Current: 32 complaints**	**Review routes to reduce complaints**
	Inspect and perform maintenance on vehicles monthly	**Inspection and maintenance plan followed**	**N/A**
Responsive and quality fire services	Minimize response times	**Response times within requirements**	**N/A**
	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Follow vehicle and equipment replacement program	**Maintenance and replacement plan followed but underfunded**	**Increase funding to equipment replacement**
Responsive and quality police services	Minimize response times	**Response times within requirements**	**N/A**
	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Follow vehicle and equipment replacement program	**Maintenance and replacement plan followed but underfunded**	**Increase funding to equipment replacement**
Responsive and quality inspection services	Follow vehicle and equipment replacement program	**Maintenance and replacement plan followed**	**N/A**

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Action Plans
Adequate quantity and quality of recreation facilities	Utilization percentages for all facilities to be between 80% and 100%	**Ice Pad: 99% utilized, demand for more capacity**	**Expand to 2 ice pads**
Reliable, safe community halls	Follow facility maintenance program	**Inspection and maintenance plan followed**	**N/A**
	Minimize complaints	**Current: 5 complaints**	**N/A**
Adequate quantity and quality of parks	Provide 1 park per 1,000 residents	**Currently 0.8 parks per 1,000 residents**	**1 new active park**
Safe and functional facilities	100% of facilities to pass accessibility standards	**40% of facilities pass accessibility standards**	**Accelerate accessibility compliance rehab program**
Available, quality health care	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Follow facility maintenance program	**Inspection and maintenance plan followed but underfunded**	**Increase funding to facility maintenance**
Reliable, responsive ambulance service	Minimize response times	**Response times within requirements**	**N/A**
	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Follow vehicle and equipment replacement program	**Inspection and maintenance plan followed**	**N/A**
Available, well-maintained cemeteries	Minimize complaints	**Current: 10 complaints**	**Increase frequency of grass cutting**
Available, functional housing for senior citizens	Meet legislative requirements	**Meeting legislative requirements**	**N/A**

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Action Plans
	Follow facility maintenance program	**Inspection and maintenance plan followed**	**N/A**
Available, safe child care service locations	Meet legislative requirements	**Meeting legislative requirements**	**N/A**
	Follow facility maintenance program	**Inspection and maintenance plan followed**	**N/A**
Available, functional assisted living facilities	Meet legislative requirements	**New legislative requirements related to fire safety not being met in all facilities**	**Immediately replace components creating non-compliance**
	Follow facility maintenance program	**Inspection and maintenance plan followed**	**N/A**
Available serviced land for development	Minimize complaints	**Current: 1 complaint**	**N/A**
Safe and functional equipment and facilities	Minimize complaints	**Current: 2 complaints**	**N/A**

In the table above, action plan items can be detailed out further in terms of timing and costing. For example:

Table 4-10
Sample Technical Action Plan Scenarios

Action Item	Scenario 1	Scenario 2	Scenario 3
CCTV Inspection Program	All wastewater mains inspected in 2 years: **$250,000 per year**	All wastewater mains inspected in 5 years: **$100,000 per year**	All wastewater mains inspected in 10 years: **$50,000 per year**

These scenarios can be helpful in educating Council and the public on the relationship between levels of service, and costs to provide expected LOS. In the table above, the risks associated with delaying the CCTV inspection program can also be discussed.

Action items can include:

- Non-infrastructure items;
- Maintenance items;
- Rehabilitation items/programs;
- Replacement items/programs; and/or
- Expansion items/programs.

Costing Levels of Service Action Plans

The following steps are required to cost levels of service action plans:

- Well-defined levels of service scenarios and respective action plan items;
- A clearly defined action plan, including what is needed, where it is needed, and why;
- A process of determining costs and unit rates associated with that action plan; and
- Accurate cost information.

When including action items within the LOS analysis, municipalities should be mindful of:

- The total cost of implementing the action plan;
- The impact the action plan has on the future lifecycle costs of the applicable assets (more on this in Chapter 5); and
- The impact of the action plan items on projected LOS over the forecast period.

4.10 Performance Measures

Performance measures quantify the strategic and technical LOS measures, to enable a meaningful tracking of performance over time. This is important to ensure that the municipality is trending in the right direction towards established LOS targets.

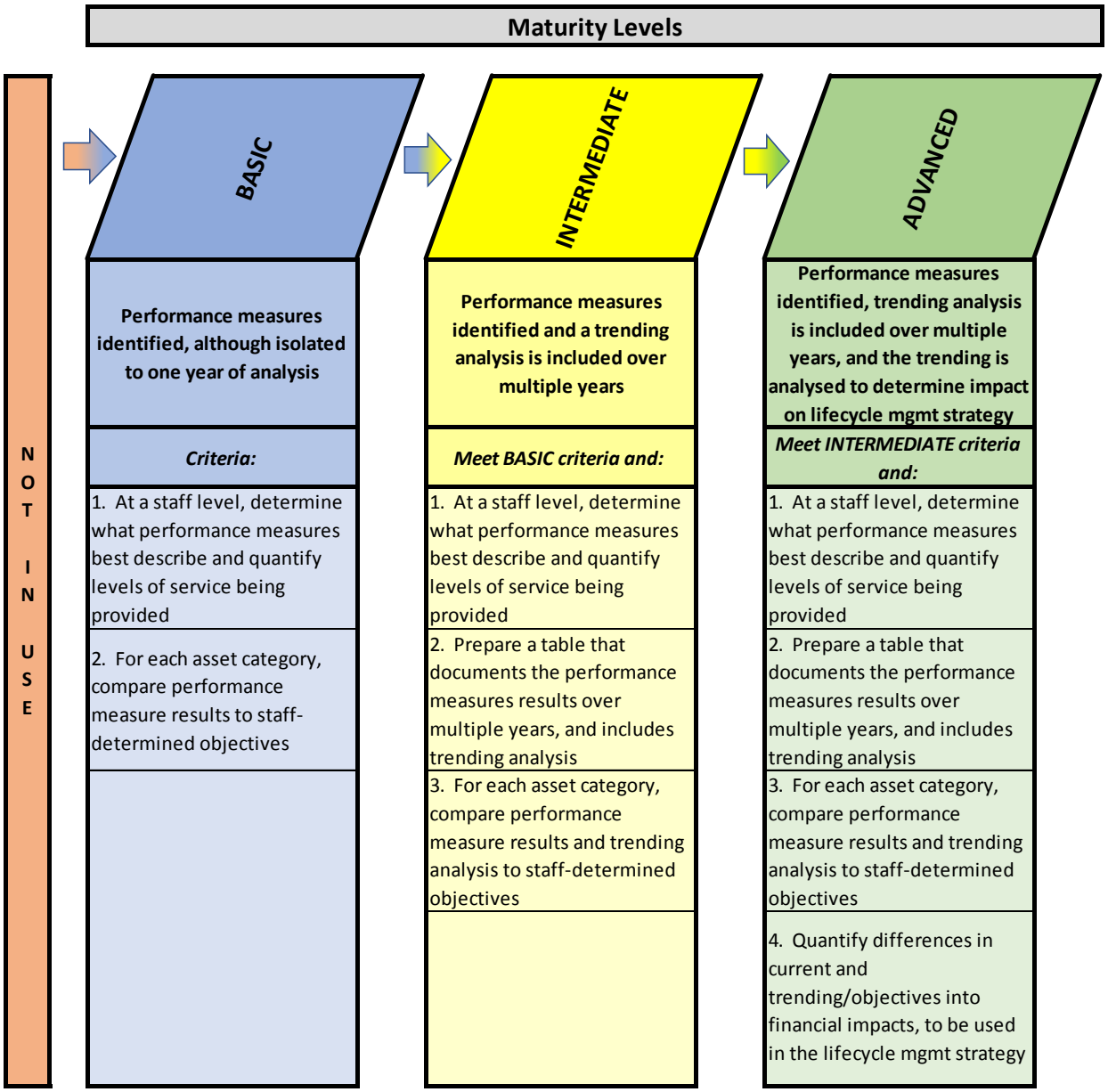
To what extent is the LOS analysis incorporating performance measures?

Background

The technical LOS described in earlier sections are often quantified through the use of performance measures. Strategic (customer) LOS can also be quantified using performance measures. Performance measures allow municipalities to track levels of service over a number of years, which can provide a better understanding of how successful their lifecycle management strategies (e.g. long-term forecasts) have been in the past. With the correct tools, performance measures can also be used to project future levels of service. This information can inform better decision making for future long-term plans.

Levels of Maturity – LOS Performance Measures

To what extent is the LOS analysis incorporating performance measures?



At the **basic level of maturity**, staff typically identify and calculate performance measures they deemed to be appropriate. At a minimum, performance measures outlined in O.Reg 588/17 are used. For each asset category, the results of the performance measures are compared to staff-determined objectives. The scope of analysis is usually focused on one year.

At the **intermediate level of maturity**, similar analyses are undertaken, and would also highlight trends in performance measures over multiple years. This can be accomplished through the use of a table that outlines performance measures over

multiple years. For each asset category, performance measure results and trending analysis can be compared to staff-determined objectives.

At the **advanced level of maturity**, after completing the steps outlined above in the intermediate level, the differences between current performance measure results and performance measure objectives are quantified into financial impacts and should be used within the lifecycle management strategy (see Chapter 5).

Performance Measures

Previous sections of this chapter explored elements of defining levels of service from a qualitative point of view and assessing the associated financial implications. Performance measures or key performance indicators (KPIs) are another method of documenting and assessing levels of service. Performance measures provide a quantitative basis for analysis which enables trend analysis to determine if a municipality is moving towards or away from specified LOS objectives. For example, the use of condition ratings from a performance measure perspective allows municipalities to see what condition their assets are in now and also whether that condition rating is getting better or worse over time.

Performance measures are developed to assess the overall performance of assets, service delivery and/or business efficiency. These measures can assist in identifying action items (e.g. capital investment decisions, resource allocations, etc.) needed to move towards expected service level objectives. Technical LOS measures are needed for justification of operational decisions and to support capital investment decisions, while strategic (customer) measures are required to assess asset performance in terms of services provided to the customer. In both cases, performance measures used by a municipality should be meaningful, transparent, constant/consistent and easily measurable.

Performance measures can be used to support both the strategic and technical LOS developed for each service area. Having that direct link between the qualitative LOS measure and the quantitative performance measure provides strength and verification to the LOS analysis. This way it’s possible to identify where a level of service isn’t being met and any trends that arise over time. For example, the strategic (customer) LOS “road assets will be accessible 24 hours a day, 7 days a week” can be supported by a performance measure that tracks the “number of road or bridge closures due to poor asset condition”. In this example, if the number of road/bridge closures due to poor asset condition are increasing year over year, it indicates that the municipality is moving

further away from its expected LOS objective. Essentially, a performance measure provides an indication of how well the level of service is being delivered. Below is a table expanding the technical LOS discussions in earlier section to include potential performance measures to track over time.

Table 4-11
Sample Performance Measures

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Performance Measure
Safe, reliable roads with adequate capacity	Average condition rating: Local (5/10), Collector (6/10), Arterial (7/10)	Local: 4/10 Collector: 4/10 Arterial: 5/10	**Average condition rating**
	Follow Minimum Maintenance Standards	Following MMS	**Number of MMS non-compliance events**
Safe, reliable bridges with adequate capacity	Average condition rating: 7/10	Current: 6/10	**Average condition rating**
	Follow Minimum Maintenance Standards	Following MMS	**Number of MMS non-compliance events**
Safe sidewalks, access from subdivisions to downtown	Average condition: 7/10	Current: 6/10	**Average condition rating**
	Minimize complaints	Current: 5 complaints	**Number of complaints**
Reliable streetlights	Minimize complaints	Current: 8 complaints	**Number of complaints**
Reliable traffic lights	Minimize complaints	Current: 3 complaints	**Number of complaints**
Reliable and convenient transit services	Inspect and perform maintenance on vehicles monthly	Inspection and maintenance plan followed	**Number of Out-of-Service days**
	Minimize complaints	Current: 14 complaints	**Number of complaints**
Convenient and secure parking locations	Minimize complaints	Current: 3 complaints	**Number of complaints**
Safe roads in winter	Follow MMS	Compliant	**MMS Statistics**

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Performance Measure
Quality and efficient water supply, with adequate capacity	Meet legislative requirements	Meeting legislative requirements	**Number of days of Boil Water Advisory**
	Unaccounted for water under 30%	Unaccounted for water: 35%	**% unaccounted for water**
	Less than 5 main breaks annually, per 100 customers	Breaks per 100 customers: 2	**Main breaks per 100 customers**
Quality wastewater collection, with adequate capacity and no environmental impacts	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Minimize incidents of bypass	Incidents of bypass: 0	**Number of incidents of bypass**
	Less than 5 main breaks annually, per 100 customers	Breaks per 100 customers: 20	**Main breaks per 100 customers**
Stormwater system with adequate capacity	Minimize flooding incidents per 1,000 people	Flooding Incidents: 0	**Number of flooding incidents per 1,000 residents**
Responsive and efficient solid waste collection system	Minimize complaints	Current: 32 complaints	**Number of complaints**
	Inspect and perform maintenance on vehicles monthly	Inspection and maintenance plan followed	**Number of Out-of-Service days**
Responsive and quality fire services	Minimize response times	Response times within requirements	**Response times**
	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Follow vehicle and equipment replacement program	Maintenance and replacement plan followed but underfunded	**Number of Out-of-Service days**

Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Performance Measure
Responsive and quality police services	Minimize response times	Response times within requirements	**Response times**
	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Follow vehicle and equipment replacement program	Maintenance and replacement plan followed but underfunded	**Number of Out-of-Service days**
Responsive and quality inspection services	Follow vehicle and equipment replacement program	Maintenance and replacement plan followed	**Number of Out-of-Service days**
Adequate quantity and quality of recreation facilities	Utilization percentages for all facilities to be between 80% and 100%	Ice Pad: 99% utilized, demand for more capacity	**Facility capacity utilized**
Reliable, safe community halls	Follow facility maintenance program	Inspection and maintenance plan followed	**Number of days amenities unavailable**
	Minimize complaints	Current: 5 complaints	**Number of complaints**
Adequate quantity and quality of parks	Provide 1 park per 1,000 residents	Currently 0.8 parks per 1,000 residents	**Parks per 1,000 residents**
Safe and functional facilities	100% of facilities to pass accessibility standards	40% of facilities pass accessibility standards	**Percentage of facilities meeting accessibility standards**
Available, quality health care	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Follow facility maintenance program	Inspection and maintenance plan followed but underfunded	**Number of deficiencies identified**
Reliable, responsive ambulance service	Minimize response times	Response times within requirements	**Response times**

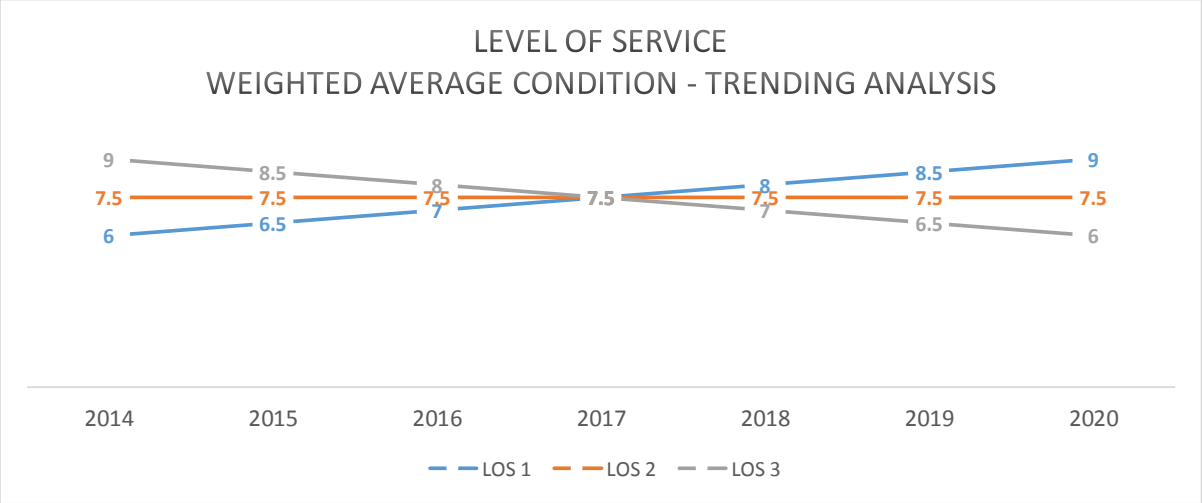
Strategic LOS Expected (Customer Perspective)	Technical LOS Expected (Staff Perspective)	Current LOS	Performance Measure
	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Follow vehicle and equipment replacement program	Inspection and maintenance plan followed	**Number of Out-of-Service days**
Available, well-maintained cemeteries	Minimize complaints	Current: 1 complaint	**Number of complaints**
Available, functional housing for senior citizens	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Follow facility maintenance program	Inspection and maintenance plan followed	**Number of deficiencies identified**
Available, safe child care service locations	Meet legislative requirements	Meeting legislative requirements	**N/A**
	Follow facility maintenance program	Inspection and maintenance plan followed	**Number of deficiencies identified**
Available, functional assisted living facilities	Meet legislative requirements	New legislative requirements related to fire safety not being met in all facilities	**Number of deficiencies identified**
	Follow facility maintenance program	Inspection and maintenance plan followed	**Number of deficiencies identified**
Available serviced land for development	Minimize complaints	Current: 1 complaint	**Number of complaints**
Safe and functional equipment and facilities	Minimize complaints	Current: 2 complaints	**Number of complaints**

In each of the performance measure examples above, a municipality can use an overall performance objective and trending analysis to measure its progress in moving towards expected LOS.

The Importance of Trending

If a municipality states “we have an average condition rating on our park structures of 7.5 and an objective of 9.0, they can safely say they are currently not meeting expected LOS. However, what this municipality doesn’t know is whether or not they are “trending” towards or away from the 9.0 condition objective. The graph below shows 3 different situations this municipality could be in:

Figure 4-8
Example of LOS Trending Analysis – Weighted Average Condition



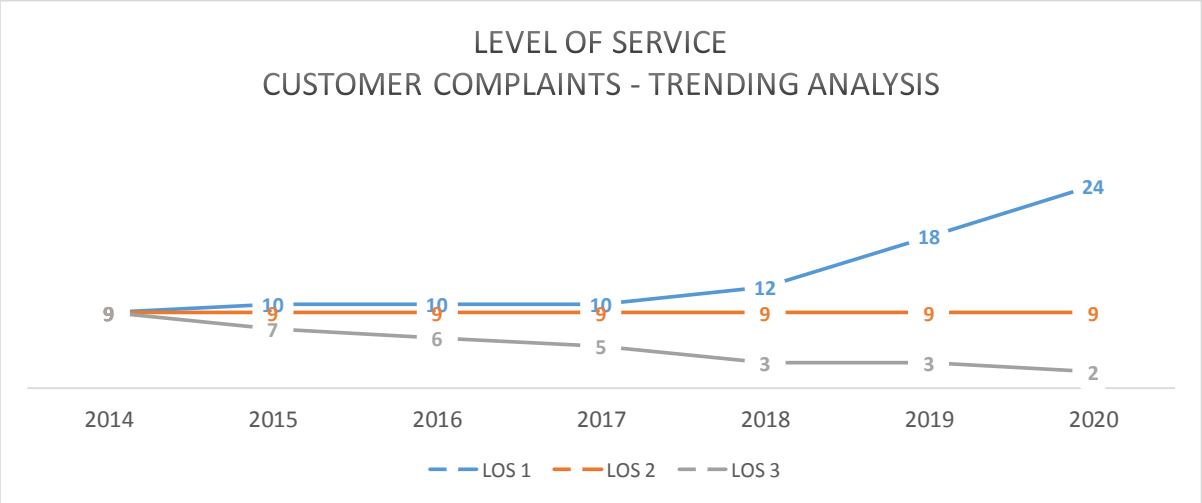
- LOS 1 (Blue): The municipality’s average condition rating is trending upwards;
- LOS 2 (Orange): The municipality’s average condition rating is remaining constant; and
- LOS 3 (Gray): The municipality’s average condition rating is trending downwards.

The municipality will not have enough information to know whether funding increases are needed for their park structures if all they know is that the current average condition rating is 7.5. Use of the trending analysis to complement this information assists in making that decision.

This trending analysis can be useful for any performance measure. The graph below illustrates the use of trending for the purpose of tracking customer complaints. This type

of graph may be useful to project future potential complaints under a scenario whereby a particular maintenance or rehabilitation program is not implemented.

Figure 4-9
Example of LOS Trending Analysis – Customer Complaints



Performance measures can be categorized into groups (such as the attributes shown below).

- Quality;
- Reliability / Responsiveness;
- Customer Service;
- Sustainability;
- Safety;
- Accessibility; and
- Affordability

Customer performance measures should measure how the customer receives the service.

Technical measures provide an overall picture of organizational performance

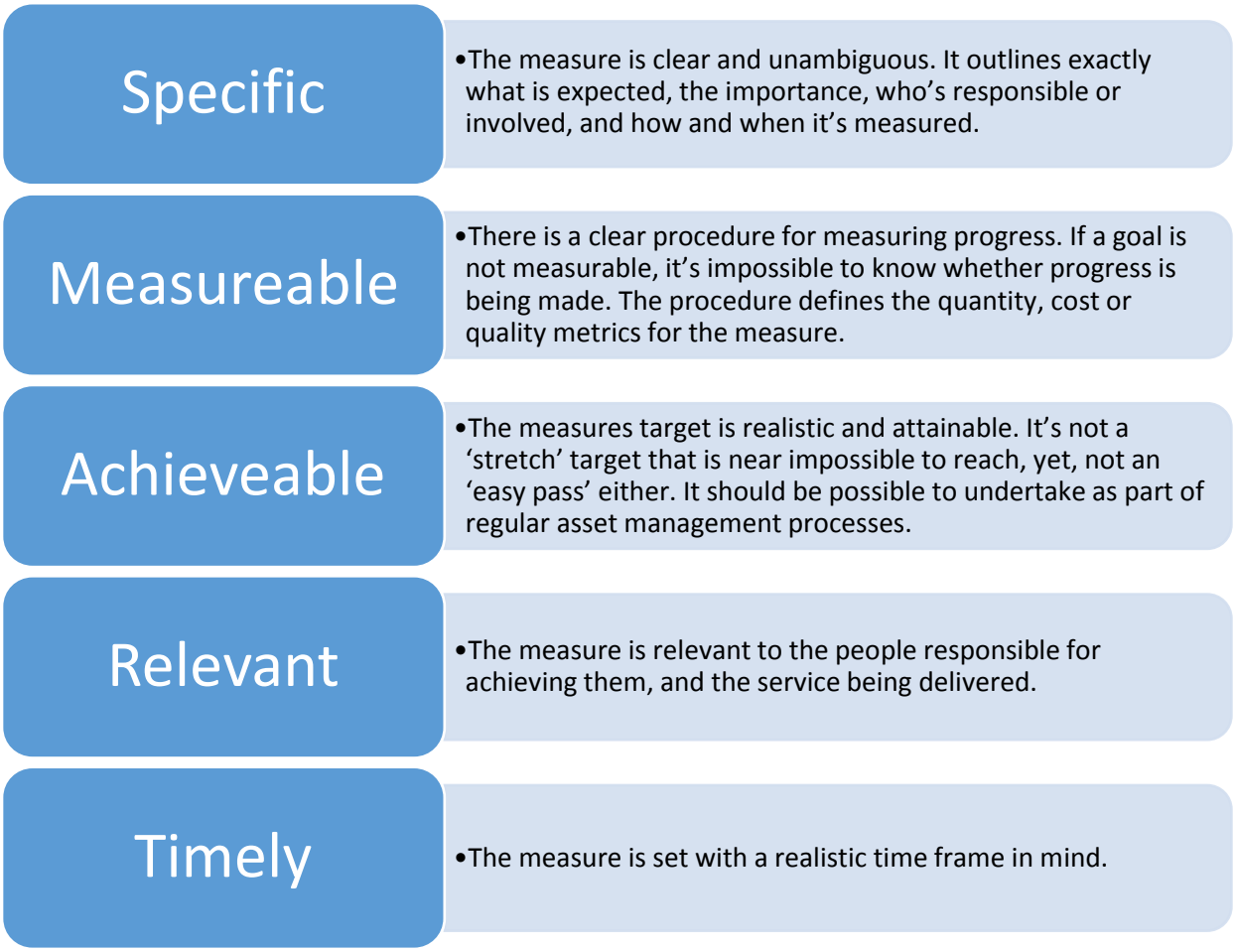
Some important things to keep in mind when deciding on performance measures to incorporate into an asset management process. Ensure they are:

- Repeatable;
- Consistent;
- Relevant to the level of service and customer base;
- They are within your control;
- Well defined (how to calculate, what to include/exclude, etc.)
- That consideration is given to industry standards; and

- The time and cost associated with tracking and recording the measure is considered against the value attained.

The ISO 55002 also highlights the need for levels of service and performance measures to be SMART:

Figure 4-10
ISO 55002 SMART Performance Measures



The following table provides some examples of performance measures (related to both strategic and technical LOS):

Table 4-12
Sample SMART Performance Measures

Service	Performance Measure Examples
All Assets	• Average condition assessment (by asset type or group) • Percentage of assets at or above a specified condition rating (by asset type or group) • Return on investment

Service	Performance Measure Examples
	• Operating cost per asset (or by length of asset) • Customer complaints • Response times • Availability of service (or # service disruptions) • Proportion of unplanned vs. planned maintenance each year (e.g. facilities, roads, bridges)
Roads	• Total accidents per year, per 1,000 population, relating to road conditions • Travel time or intersection delays • Percent of signs found missing or ineffective during annual inspections • Non-compliance events (or %) with Minimum Maintenance Standards
Bridges and Culverts	• Operating cost per m² of surface area • Percent of bridges with adequate load limits • Non-compliance events (or %) with Minimum Maintenance Standards
Facilities	• Proportion of the population living within x km of a community centre or fire hall • Percentage of facilities that meet accessibility standards • User fees as a percentage of market rates • User fees as a percentage of full cost recovery rates • Operating and maintenance costs recovered from user charges • Utilization percentages of ice pads, pools, etc. • Frequency of cleaning and maintenance activities • Number of reported accidents per year
Solid Waste	• Percent of properties that receive regular waste/recycling collection • Average volume of waste per household, per year
Stormwater	• Number of blockages or flooding incidents per year (with # residents affected) • Number of times roads closed due to flooding per year (or length of closure time)
Water	• Watermain breaks per km of pipe • Number of boil water advisories (with # residents affected) • Planned vs. unplanned shutdowns or disruptions

Service	Performance Measure Examples
	• Length of time of shutdowns or disruptions • % unaccounted for water (water billed vs. water produced) • Pressure at connection • Storage capacity • Water consumption by customer type • Percentage of facility sites with backup power • Number of incidents not in compliance with legislation
Wastewater	• Incidents of bypass • Percentage of wastewater bypassed treatment • Number of wastewater backups • Infiltration rate • Wastewater billed vs. wastewater treated • Percentage of facility sites with backup power • Number of incidents not in compliance with legislation

Prepared drawing some examples from the IIMM Manual

The following is an example of strategic (customer) levels of service performance measures for a road network.

Table 4-13
Sample Strategic LOS Performance Measures – Road Network

Key Performance Measure	Strategic Level of Service	Performance Measure Process	Performance Target
Quality	Well-maintained and suitable transport services	Customer complaints	< 30 complaints per annum for all transport asset categories
Customer Satisfaction	Condition of local roads	Customer Survey	Score >= 6 out of 10 in Annual Customer Survey
Customer Satisfaction	Condition of sidewalks	Customer Survey	Score >= 6 out of 10 in Annual Customer Survey
Accessibility	Road assets will be accessible 24 hours a day, 7 days a week	No. of road or bridge closures due to degraded asset condition	< 10 per annum

Key Performance Measure	Strategic Level of Service	Performance Measure Process	Performance Target
Function	Road line marking is well maintained	Customer Survey	Score >= 6 out of 10 in Annual Customer Survey
Function	Bridges (pedestrian and vehicular) provide safe and equitable access to all parts of the municipality to meet community needs	No. of complaints relating to bridges	< 10 per annum
Responsiveness	Response time to customer requests	Time taken to close requests	> 80% of all requests adequately responded to within target

The following is an example of technical levels of service performance measures for a road network.

Table 4-14
Sample Technical LOS Performance Measures – Road Network

Key Performance Measure	Strategic Level of Service	Performance Measure Process	Performance Target
Condition: Sealed Roads	Condition assessment of road network every 5 years	Condition Assessment	On average Pavement Condition Index and Surface Condition Index to be in condition 6 (out of 10) or better, with 10 being the best
Condition: Sidewalks	Condition assessment of sidewalk network every 5 years	Condition Assessment	On average, footpath network to be in condition 7 (out of 10) or better, with 10 being the best
Condition: Curbs	Condition assessment of curbs every 5 years	Condition Assessment	On average, curbs to be in condition 6 (out of 10) or better, with 10 being the best

Condition: Bridges	Bridge Inspection every 2 years	Condition Assessment	On average, bridge network to be in condition 6 (out of 10) or better, with 10 being the best

Table 4-15
LOS Metrics for Core Infrastructure Required Under O.Reg 588/17

Water Assets (Table 1)

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system. 2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	1. Percentage of properties connected to the municipal water system. 2. Percentage of properties where fire flow is available.
Reliability	Description of boil water advisories and service interruptions.	1. The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system. *2.* The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.

Wastewater Assets (Table 2)

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	Percentage of properties connected to the municipal wastewater system.
Reliability	1. Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes. 2. Description of the frequency and	1. The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.

	volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches. 3. Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. 4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3. 5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.	2. The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. 3. The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.

Stormwater Management Assets (Table 3)

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	1. Percentage of properties in municipality resilient to a 100-year storm. 2. Percentage of the municipal stormwater management system resilient to a 5-year storm.

Roads Assets (Table 4)

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.
Quality	Description or images that illustrate the different levels of road class pavement condition.	1. For paved roads in the municipality, the average pavement condition index value. 2. For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).

Bridges and Culverts Assets (Table 5)

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Percentage of bridges in the municipality with loading or dimensional restrictions.
Quality	1. Description or images of the condition of bridges and how this would affect use of the bridges. 2. Description or images of the condition of culverts and how this would affect use of the culverts.	1. For bridges in the municipality, the average bridge condition index value. 2. For structural culverts in the municipality, the average bridge condition index value.

Documentation

With respect to performance measures, it is important to have controls in place to ensure they are calculated in an accurate and consistent manner from year to year. Given the dynamic nature of municipalities (and asset management), it is recommended that documentation be kept that includes:

1. Which performance measures are to be calculated;
2. Which performance measures are associated with which assets;
3. How often they are to be calculated;
4. How (specifically) they are to be calculated (all variables in the calculation); and
5. All assumptions made in the calculation of each performance measure.

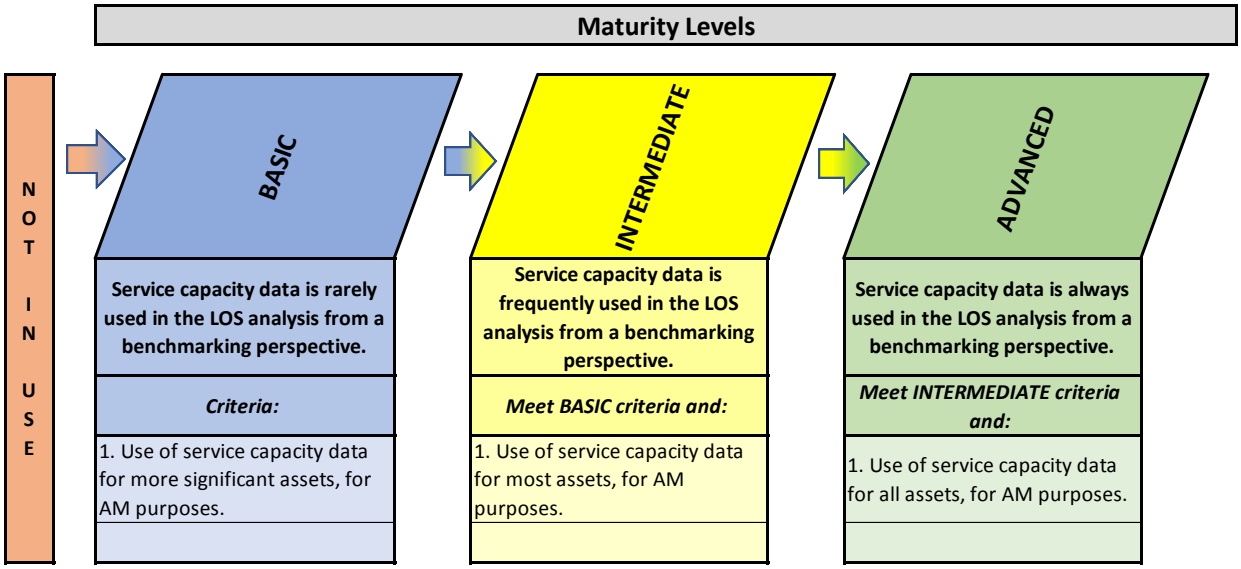
To what extent is service capacity data used in the LOS analysis with respect to benchmarking over multiple years?

Background

In the technical LOS section above, the concept of service capacity was introduced and the importance of using this data within the AM process was stressed. The ability to track this data over time allows municipalities to trend anticipated service capacities in the future, as well as assist in making more informed AM decisions.

Levels of Maturity

To what extent is service capacity data used in the LOS analysis with respect to benchmarking over multiple years?



At the **basic level of maturity**, municipalities use the service capacity data in the LOS analysis for more significant assets and typically only for asset management purposes.

At the **intermediate level of maturity**, municipalities use the service capacity data in the LOS analysis from a benchmarking perspective for many of the assets.

At the **advanced level of maturity**, municipalities use the service capacity data in the LOS analysis for all its assets.

Benchmarking Service Capacity Data

The concept of utilizing performance measures through trending was discussed in previous sections above. This is just as applicable in the use of service capacity data. Figure 4-9 graphically shows how trending data can assist in making decisions within the AM planning process. This graph could be useful in projecting out potential service capacity if a particular maintenance or rehabilitation program is not implemented. For example, if a municipality is considering an expansion to a water or wastewater plant, understanding the capacity of those plants is imperative to determining the timing and extent of the expansion.

4.11 Resources and References

Institute of Public Works Engineering Australasia (IPWEA), NAMS.PLUS Asset Management, https://www.ipwea.org/communities/assetmanagement/namsplus

IPWEA, 2014, Practice Note 8: Levels of Service & Community Engagement, http://www.ipwea.org/publications/bookshop/ipweabookshop/practicenotes/pn8

IPWEA, 2015, International Infrastructure Management Manual, https://www.ipwea.org/publications/bookshop/ipweabookshop/iimm

International Organization for Standardization (ISO), 2014, ISO 55000:2014, Asset management – Overview, principles and terminology, http://www.iso.org/iso/catalogue_detail?csnumber=55088