HOW GOOD ASSET MANAGEMENT PRACTICES WILL CONTRIBUTE TO ACHIEVING THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

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Abstract: Municipal asset management (AM) and sustainable management of infrastructure are closely aligned. With the Government of Canada and the Federation of Canadian Municipalities (FCM) focusing on AM through their requirements to receive Federal Gas Tax Fund (GTF) and offering funding grants to municipalities in Canada (FCM, 2019). Additionally, the United Nations (UN) recognized the importance of sustainable cities which was demonstrated by creating their UN Sustainable Development (SD) Goals in 2015. Despite the mutual concern between the AM industry and the UN, there has been minimal research demonstrating the linkage between the two. However, the World Council on City Data (WCCD) conducted a study where the indicators found in ISO 37120: 2018 Sustainable development of communities – Indicators for city services (ISO 37120) were mapped to the UN SD Goals (WCCD, 2017). Building on the WCCD study, this paper performs a gap analysis to demonstrate the relationship between the ISO 37120 indicators and the levels of service metrics used in industry; this was done by conducting a case study using data provided by the City of Guelph (City) on their transit service. The results of the gap analysis showed that levels of service performance measures used to measure level of service objectives by the City are broad and could not be directly linked to the ISO 37120 indicators. Conversely, the ISO 37120 Indicators could only be linked to one level of service objective and omitted four of the level of service objectives used to gauge transit service performance. By performing this gap analysis, an opportunity to align levels of service objectives with ISO 37120 and the UN SD Goals is demonstrated.

1   INTRODUCTION

Municipal asset management (AM) is a growing industry in Canada which was realized when the federal government mandated municipalities to report their Tangible Capital Asset (TCA) in order to receive their Federal Gas Tax Fund (GTF) in 2012. This exercise, which was developed by the Public-Sector Accounting Board (PSAB) and is known as PSAB 3150 (FRAS, 2018), was primarily used as a standard process for municipalities to create an inventory of infrastructure and record historical costs. Since PSAB 3150, the federal government has mandated municipalities to form an AM Plan with a focus on level of service, infrastructure condition, asset strategies, risk and decision-making, and financial forecasting. While this was occurring in Canada, the United Nations (UN) were in the process of developing their Sustainable Development (SD) Goals (WCCD, 2017). The purpose of this paper is to demonstrate the relationship between level of service objectives used in AM and the UN SD goals and identify the gaps between the two as well as the opportunities for improvement.

2   BACKGROUND

2.1 Level of Service

According to the International Infrastructure Management Manual (2015), *levels of service* are "key business drivers and influence all AM decisions". Levels of service are the outcomes an organization

delivers and are directly related to the asset management objectives set by the organization. Canadian municipalities are legislated by provincial jurisdictions to provide several services to their citizens, depending on the municipal type (e.g. village, town, and city). When establishing levels of service, the municipality must identify and document it's services to begin assessing metrics related to delivering the service.

In an AM Plan, municipalities create levels of service statements which describe the outputs the agency intends to deliver to customers and other stakeholders and therefore must be written in terms the end user can understand and relate to (IIMM, 2015). These statements are the link between the corporate objectives and the more detailed technical and operational objectives (as depicted in Figure 2-1).
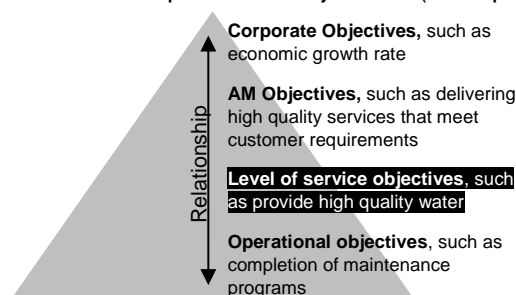

Corporate Objectives, such as economic growth rate

AM Objectives, such as delivering high quality services that meet customer requirements

Level of service objectives, such as provide high quality water

Operational objectives, such as completion of maintenance programs

Figure 2-1: Hierarchy of Objectives (IIMM, 2015)

An integral aspect of AM planning is matching the levels of service provided with the expectations of the customer while balancing cost and risk to the agency. The price/performance/risk relationship is demonstrated throughout ISO 55000 (ISO 55000, 2014) and is important to all AM planning. Upon establishing the levels of service statements, organizations need to create performance measures and begin to measure their performance through consultation with stakeholders. Understanding the needs of the community helps organizations shape their level of service objectives, create AM strategies to measure performance, and track how their service is performing against targets or objectives identified. By measuring the performance metrics of the communities' services, organizations can begin linking costs and service risk back to infrastructure and understand the total cost of delivering services (IIMM, 2015). Furthermore, the identified targets and levels of service objectives help define the operational objectives, which provides input to maintenance programs, AM strategies and treatments, in turn delivering to the overall AM and Corporate Objectives (as shown in the relationship in Figure 2-1).

2.2 United Nations Sustainable Development Goals

In 2000, the UN initially established the Millennium Development Goals (MDGs) with clear and concise targets to be met by 2015. According to the UN, the focus of the MDGs was to improve the lives of the world's poorest people (WCCD, 2017). Throughout the 15-year period (2000 to 2015), the MDGs brought public awareness, dedication and mobilization to combat poverty but lacked the standardized and accurate data to measure performance against the established goals. Additionally, the MDGs did not explicitly state the role cities have in monitoring and achieving the MDGs.

Post 2015, the UN understood the role the MDGs played in combatting poverty from 2000 to 2015 but decided that the MDGs should encompass more than poverty, thus creating the UN SD Goals, encompassing the importance of fighting climate change and environmental challenges (WCCD, 2017). Table 1 shows the Sustainability Development Goals developed by the UN in 2015. For each of the goals, the UN has identified targets and indicators to help achieve the goals by 2030.

Table 2-1: Sustainable Development Goals (WCCD, 2017)

Goal	Definition
1 – No Poverty	'End poverty in all its forms everywhere'
2 – Zero Hunger	'End hunger, achieve food security and improved nutrition and promote sustainable agriculture'

Goal	Definition
3 – Good Health and Well-Being	'Ensure healthy lives and promote well-being for all at all ages'
4 – Quality Education	'Ensure inclusive and equitable quality educations and promote lifelong learning opportunities for all'
5 – Gender Equality	'Achieve gender equity and empower all women and girls'
6 – Clean Water and Sanitation	'Ensure availability and sustainable management of water and sanitation for all'
7 – Affordable and Clean Energy	'Ensure access to affordable, reliable, sustainable and modern energy for all.
8 – Decent Work and Economic Growth	'Promote sustained, inclusive economic growth, full and productive employment for all'
9 – Industry, Innovation and Infrastructure	'Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
10 – Reduced Inequalities	'Reduce inequality within and among countries'
11 – Sustainable Cities and Communities	'Make cities and human settlements inclusive, safe, resilient and sustainable'
12 – Responsible Consumption and Production	'Ensure sustainable consumption and production patterns'
13 – Climate Action	'Take urgent action to combat climate change and its impacts'
14 – Life Below Water	'Conserve and sustainably use the oceans, seas, and marine resources for sustainable development'
15 – Life on Land	'Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forest, combat desertification, and halt and reverse land degradation and halt biodiversity loss'
16 – Peace, Justice and Strong Institutions	'Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels'
17 – Partnership for the Goals	'Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development'

Along with these goals are several objectives. The link between the UN SD Goals and Objectives and the ISO 37120:2018 – Sustainable development of communities – Indicators for city services and quality of life indicators was done by WCCD in their report published in 2017.

3   COMPARING ASSET MANAGEMENT OBJECTIVES TO SUSTAINABLE DEVELOPMENT OBJECTIVES

The levels of service objectives discussed in asset management and objectives outlined in the sustainable development goals are often related when discussing the services that civil and municipal infrastructure provide communities. Figure 2-1: Hierarchy of Objectives (IIMM, 2015) demonstrates the clear line of sight from the corporate/strategic objectives to operations objectives, with level of service objectives being crucial in connecting the organization. Similarly, there is a line of sight between the UN SD Goals, the UN objectives, the World Council on City Data (WCCD) objectives and the ISO 37120:2018 – Sustainable cities and communities – Indicators for city services and quality of life (WCCD, 2017).

The following section discusses each of the objectives in greater detail with emphasis on level of service objectives and the study performed by the WCCD. The section further explains the research performed and demonstrates an example of mapping the levels of service and UN SD Goals.

3.1.1   Levels of Service Objectives used in Practice

The relationship from corporate objectives to operational objectives have been clearly demonstrated in AM practice. During the creation of these objectives, municipalities undergo various processes ensuring the municipality is putting the demands of the community at the forefront. Once the objectives have been identified at all four levels (corporate, asset management, levels of service and operations), there are a variety of measures, indicators or targets considered to benchmark and track how the agency is meeting the objectives.

For the purposes of this research, the focus was on the levels of service objectives. To understand and create the levels of service objectives, it is important for a municipality to know their current service being provided (i.e., their benchmark) and identify customer and technical measures and targets against the benchmark (IIMM, 2015). For organizations, these are often created through stakeholder workshops with staff, customer surveys and focus groups (IIMM, 2015).

Throughout Canada, municipalities have varying maturity levels in their levels of service practice. Figure 3-1 from the IIMM 2015 provides a benchmark to score maturity.

Aware	Level of service requirements generally understood but not documented or quantified.
	Asset contribution to organization's objectives and some basic levels of service have been defined.
Basic	Customer Groups defined and requirements informally understood.
	Levels of service and performance measures in place covering a range of service attributes.
Core	Annual reporting against performance targets.
	Customer Group needs analyzed.
Intermediate	Level of service and cost relationship understood.
	Customers are consulted on significant service levels and options.
Advanced	Levels of service are integral to decision-making and business planning.

Figure 3-1: Level of Service AM Maturity Index (IIMM, 2015)

In between "Basic" and "Core" levels of service, metrics such as performance measures, service attributes and performance targets are reported. These levels of service criteria are defined for each service provided by the municipality and linked to physical assets. This is vital to delivering services to communities and understanding the levels of service the organization can afford long-term.

The development of service levels includes identifying user groups and mapping the levels of service objectives to service attributes, performance measures, performance targets and key performance indicators. Figure 3-2 demonstrates the relationship between these metrics.
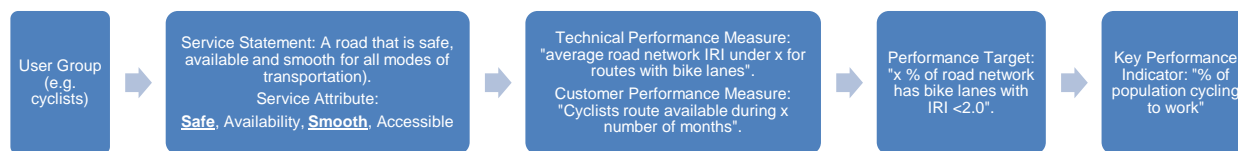
User Group (e.g. cyclists)	→	Service Statement: A road that is safe, available and smooth for all modes of transportation). Service Attribute: **Safe**, Availability, **Smooth**, Accessible	→	Technical Performance Measure: "average road network IRI under x for routes with bike lanes". Customer Performance Measure: "Cyclists route available during x number of months".	→	Performance Target: "x % of road network has bike lanes with IRI <2.0".	→	Key Performance Indicator: "% of population cycling to work"

Figure 3-2: Process for creating level of service metrics

These levels of service attributes can then be related to the UN SD Goals by mapping the common key performance indicators (KPIs) to the ISO 37120 indicators identified for the UN SD Goals.

3.1.2 The World Council on City Data

In 2017, the World Council on City Data (WCCD) underwent a study mapping the UN SD Goals, UN Targets and UN Indicators to the ISO 37120 Indicators, ISO 37120 targets and data collected by ISO 37120 certified cities (WCCD, 2017). This study was performed by mapping the SD Goals to the ISO 37120 target, and then using the associated indicator and data provided by the municipalities to recognize how the agency is contributing to the UN SD Goals. This study was performed with 46 municipalities worldwide (all ISO 37120 certified) with the 17 SD Goals and over 100 UN Targets. Using data from the cities, WCCD was able to score the cities against the targets. Figure 3-3 is an example of how the mapping is demonstrated.

WCCD CITY DATA SUPPORTING SDG 11:
SUSTAINABLE CITIES AND COMMUNITIES

WCCD SUPPORTS THE SDGS

UN TARGETS	UN INDICATORS	WCCD INDICATORS ISO 37120 Certified City Data
11.1 By 2030, ensure **access for all to adequate, safe and affordable housing** and **basic services** and upgrade slums	11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing	Number of homeless per 100,000 population Percentage of city population living in slums Areal size of informal settlements as a percentage of city area Persons per unit Percentage of households that exist without registered legal titles Percentage of city population with potable water supply service Percentage of city population with sustainable access to an improved water source Total domestic water consumption per capita (litres/day) Percentage of population with access to improved sanitation Average annual hours of water service interruption per household Percentage of city population served by wastewater collection Percentage of the city's wastewater that has received no treatment Percentage of the city's wastewater receiving primary treatment Percentage of the city's wastewater receiving secondary treatment Percentage of the city's wastewater receiving tertiary treatment Percentage of city population with authorized electrical service Total residential electrical energy use per capita (kWh/year) Number of nursing and midwifery personnel per 100,000 population Number of physicians per 100,000 population Number of in-patient hospital beds per 100,000 population Response time for emergency response services from initial call Response time for fire department from initial call Response time for police department from initial call Percentage of students completing primary education: survival rate Percentage of students completing secondary education: survival rate Percentage of female school-aged population enrolled in schools Percentage of male school-aged population enrolled in schools

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WORLD COUNCIL ON CITY DATA

WCCD CITY DATA SUPPORTING SDG 11:
SUSTAINABLE CITIES AND COMMUNITIES

WCCD SUPPORTS THE SDGS

UN TARGETS	UN INDICATORS	WCCD INDICATORS ISO 37120 Certified City Data
11.2 By 2030, provide **access to** safe, affordable, accessible and sustainable **transport systems** for all, improving road safety, notably by **expanding public transport**, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities	Percentage of commuters using a travel mode other than a personal vehicle Annual numbers of public transport trips per capita Kilometres of high capacity public transport system per 100,000 population Kilometres of light passenger public transport system per 100,000 population
11.3 By 2030, enhance **inclusive and sustainable urbanization** and **capacity for participatory**, integrated and sustainable human settlement **planning and management** in all countries	11.3.1 Ratio of land consumption rate to population growth rate 11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically	Population density (per square kilometre) Dwelling density (per square kilometre) Jobs/housing ratio Green area (hectares) per 100,000 population Climate type Land area (Square kilometres) Income distribution (Gini Coefficient) Gross capital budget per capita (USD) Voter participation in last municipal election (as a percentage of eligible voters) Number of registered voters as a percentage of the voting age population Citizens' representation: number of local officials elected to office per 100,000 population
11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage	11.4.1 Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed and World Heritage Centre designation), level of government (national, regional and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector and sponsorship)	

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WORLD COUNCIL ON CITY DATA

WCCD CITY DATA SUPPORTING SDG 11:
SUSTAINABLE CITIES AND COMMUNITIES

WCCD SUPPORTS THE SDGS

UN TARGETS	UN INDICATORS	WCCD INDICATORS ISO 37120 Certified City Data
11.5 By 2030, significantly **reduce the number of deaths** and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product **caused by disasters**, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population 11.5.2 Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	Number of disaster related deaths per 100,000 population
11.6 By 2030, **reduce the adverse** per capita **environmental impacts of cities**, including by paying special attention to air quality, municipal and other **waste management**	11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities 11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)	Fine particulate matter (PM2.5) concentration Particulate matter (PM10) concentration Nitrogen dioxide (NO₂) concentration Sulphur dioxide (SO₂) concentration Ozone (O₃) concentration Greenhouse gas emissions measured in tonnes per capita Energy consumption of public buildings per year (kWh/m2) Percentage of city population with regular solid waste collection (residential) Total collected municipal solid waste per capita Percentage of the city's solid waste that is recycled
11.7 By 2030, provide **universal access to** safe, inclusive and accessible, **green and public spaces**, in particular for women and children, older persons and persons with disabilities	11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities 11.7.2 Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months	Green area (hectares) per 100,000 population Square kilometres of public outdoor recreation space per capita Square kilometres of public indoor recreation space per capita

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WORLD COUNCIL ON CITY DATA

WCCD CITY DATA SUPPORTING SDG 11:
SUSTAINABLE CITIES AND COMMUNITIES

WCCD SUPPORTS THE SDGS

UN TARGETS	UN INDICATORS	WCCD INDICATORS ISO 37120 Certified City Data
11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning	11.a.1 Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city	
11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and **adaptation to climate change, resilience to disasters**, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	11.b.1 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030 11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	Greenhouse gas emissions measured in tonnes per capita Percentage of total energy derived from renewable sources, as a share of the city's total energy consumption Total electrical energy use per capita (kWh/year) Total residential electrical energy use per capita (kWh/year) Total water consumption per capita (litres/day) Percentage of water loss (unaccounted for water) Population Density (per square kilometre) Number of disaster related deaths per 100,000 population Average annual hours of water service interruptions per household Average number of electrical interruptions per customer per year Average length of electrical interruptions (in hours)
11.c Support **least developed countries**, including through financial and technical assistance, in building sustainable and **resilient** buildings utilizing local materials	11.c.1 Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings utilizing local materials	

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WORLD COUNCIL ON CITY DATA

Figure 3-3: Example of mapping the UN Targets and WCCD Indicators (WCCD, 2017)

CON135-5

This demonstrates how the UN Targets are supported by WCCD Indicators and ISO 37120 Certified City Data. While this study was important to understand and benchmark how cities around the world compare to the targets outlined by the UN; it does not demonstrate how asset management, and the management of infrastructure and community services influence the targets outlined by the UN (and vice versa).

3.1.3 Research Performed

The research undertaken involves the completion of a review of levels of service AM objectives for the purpose of and mapping to the UN targets for the SD Goals through the ISO 37120 indicators. This includes reviewing the levels of service objectives for all types of municipal infrastructure that delivers services. Figure 3-4 demonstrates the conceptual relationship between levels of service objectives and UN SD Goals.
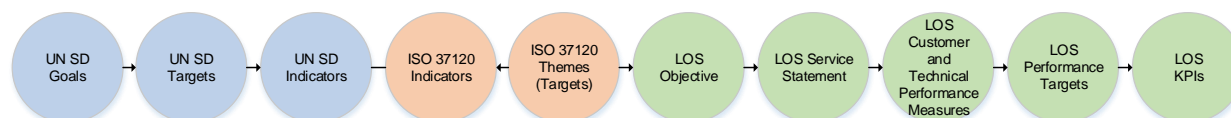

Figure 3-4: Mapping UN SD Goals to LOS Objectives

Following the mapping of the UN targets to the levels of service objectives, a gap analysis was performed to understand the drivers for certain levels of service objectives, reason for being omitted from the UN SD Goals and vice versa.

It is important to note that during this exercise, it was discovered that levels of service objectives and their associated performance measures used by municipalities often vary, as there is no clear standard. Thus, a case study was performed with a municipality considered 'Intermediate' on the Level of Service Maturity Index showed in Figure 3-1.

4 CASE STUDY

The case study undertaken involved mapping of UN SD Goals to levels of service objectives used in practice and identifying gaps between levels of service and the UN SD Goals. This was completed by examining data from the City of Guelph (City) and their recent Level of Service Development project (City of Guelph, 2018). The City has an approximate population of 150,000 (theSpec, 2017) and has been developing its AM program over several years.

4.1 Project Description

Based on the data provided by the municipality (Asset Levels of Service Development Technical Memorandum #3: Final Report, 2018), the project scope included:

- Identifying the service area asset portfolios;
- Conducting a best practice review;
- Creating a public engagement strategy;
- Developing the level of service framework;
- Developing the level of service attributes;
- Costing the service levels; and
- Predictive modelling of service levels.

Through discussions with industry practitioners and reviewing other agencies' public documentation on levels of service, the City appeared to be one of the more advanced in Canada as many municipalities have only begun to document their level of service requirements.

4.1.1   Services Identified

The municipality aggregated themselves into sixteen (16) services (Service Area Asset Portfolios, 2018).

1. Culture, Tourism and Community Investment
2. Facilities Management
3. Fire Rescue
4. Fleet
5. Information Technology (IT)
6. Paramedic Services
7. Parking
8. Parks, Forestry and Open Spaces
9. Police
10. Recreation
11. Roads and Right-of-Way
12. Solid Waste
13. Stormwater
14. Transit
15. Wastewater
16. Water

From the sixteen presented, each service has their own performance measures and targets as described in the municipality's Technical Memorandum #2: Levels of Service Framework Development (2018).

4.2   Mapping the City's level of service objectives to UN SD Goals

For the case study, the City's performance measures were reviewed against the ISO 37120 indicators and compared to the UN SD Indicators. At this time, the city's level of service performance is primarily measured on the condition of the assets as this information was readily available. As an example, the transit measures have been mapped to UN SD Goal 11 using the ISO 37120 Transportation indicators. Presently, the City's transit performance is based on the estimated service life (ESL) of the asset, as shown in Table 4-1. A performance score is then calculated by dividing the remaining useful life (RUL) by the ESL and receiving a score from 0 to 1. The performance of these assets is classified in Table 4-2.

Table 4-1: Performance Measure for Assets (Asset Levels of Service Development, 2018)

Asset Type	ESL (years)
Arboc – Low Floor Mobility, Chrysler PROMASTER-6 Pass, Ford Transit Conversion	7
Bus Stops	10
NOVA LFS Bus	12
Equipment, VIA Station	20
Transit Facility Substructures	60
Other Transit Facility Assets	30

Table 4-2: Performance Category Scale (Asset Levels of Service Development, 2018)

Performance	Performance Category	Description
0.8 – 1.00	7	**Fit for future** – The assets in the system is generally in very good condition, typically new or recently rehabilitated.
0.6 – 0.79	10	**Adequate for now** – Some assets elements show general signs of deterioration that require attention. A few elements exhibit deficiencies.
0.4 – 0.59	12	**Requires Attention** – The assets in the system shows general signs of deterioration and require attention with some elements exhibiting significant deficiencies.
0.2 – 0.39	20	**At Risk** – The assets in the system are in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
< 0.2	60	**Unfit for Sustained Service** – The assets in the system are below standard condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which may be affecting service or increasing risks.

In addition to the current performance of assets, the City's technical and customer targets, as well as customer performance targets have either been established or are under review. A public engagement strategy was conducted as part of the City's Level of Service Development project, suggesting that more community inputs may be established in the future.

Based on the data provided, the following was mapped as an example of the research being conducted.

UN SD Goal 11: Sustainable Cities and Communities

UN SD Target 11.2: By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

UN SD Indicator 11.2.1: Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities

As shown in Figure 3-3, the UN SD Indicator is then mapped to four ISO 37120 Indicators. Table 4-3

Table 4-3: Mapping the UN SD Goals, ISO 37120 and Level of Service (WCCD, 2017 & Transit Level of Service Framework, 2018)

ISO 37120 Indicator	Indicator Type	ISO 37120 Themes (Targets)	LOS Objective	LOS Performance Measures	Direct (D) or Indirect (I)	LOS Targets	LOS Performance Indicator
18.1 Kilometres of high capacity public transport system per 100,000 population	Core	Transportation	Providing a transit system that serves the needs of the community	**Customer:** 1) % of transit fleet network that is FADM/AODA 2) Annual ridership volumes. **Technical:** 1) % of bus routes with priority lanes 2) Average bus stop spacing 3) % of bus routes below the target loading per hour 4) # of service hours per year	I I D I I I	**Customer:** 1) TBD 2) TBD **Technical:** 1) To be determined 2) 400 to 500 metres 3) To be determined 4) to be determined	Accessibility
18.2 Kilometres of light passenger public transport system per 100,000 population							
18.3 Annual number of public transport trips per capita							
18.5 Percentage of commuters using a travel mode to work other than a personal vehicle (supporting indicator)	Supporting						

5   Discussion

When reviewing Table 4-3, it is evident that there are gaps in the City's inaugural level of service objective, performance measures, and targets when comparing to ISO 37120 Indicators. In this example, many of the indicators identified by ISO 37120 for UN SD Goal 11, target 11.2 are related to accessible transit and are classified by the City under level of service performance indicator 'accessibility'. Currently, the City's accessibility performance measures are broad and not directly correlated to the ISO 37120 Indicators as noted in the column titled 'Direct (D) or Indirect (I)'.

Conversely, although not shown in Table 4-3, the same can be said for gaps in the Transportation ISO 37120 indicators. When reviewing the City's level of service documents for Transit, there are several key performance indicators that are not reflected in the ISO 37120 indicators, these include: i) cost efficient; ii) Quality; iii) Convenient; iv) Reliability; and v) Environmental Stewardship.

Canadian municipalities have only begun their asset management journey, are not considered 'advanced' in their level of service best practice (as defined by IIMM 2015) and are in the process of incorporating level of service into their decision-making. The analysis performed provides an opportunity for municipalities to align their level of service objectives with the ISO 37120 Indicators, along with the UN SD Goals from the beginning – without limiting themselves strictly to the ISO 37120 indicators. Using the City of Guelph as an example, the City could modify their accessible performance measures to align directly with the ISO 37120 indicator without negatively impacting the other indicators used by the City to measure their transit service performance.

6   Conclusion

From the literature review and initial development of mapping level of service objectives to UN SD Goals, it is evident that many municipalities in Canada have an opportunity to consider the UN SD Goals, Targets and Indicators as well as the ISO 37120 Indicators and Themes when either creating their inaugural level

of service objectives or refining their future objectives. After levels of service objectives' have been created in alignment with ISO 37120 and the UN SD Goals, municipalities can advance their AM planning from a sustainable development lens. As noted in Figure 2-1: Hierarchy of Objectives (IIMM, 2015), the level of service objectives guide decision-making regarding management of municipal infrastructure, directly impacting lifecycle strategies, asset treatments, condition assessments, operational and maintenance planning, corporate and strategic objectives, and eventually long-term financial planning. Assuming municipalities are pursuing sustainable development goals in their AM practice, using the UN SD Goals allows municipalities to participate in WCCD benchmarking, which would be beneficial in comparing their practice to similar organizations. In turn, guiding municipalities towards a more sustainable future.

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