Draft Toronto Transit Commission Asset Management Policy 2025

TTC Asset Management Policy

Our Vision

To deliver reliable, resilient, and sustainable transit services supported by ‘best in class’ Asset Management (AM) in North America.

Our Asset Management Policy

The TTC is adopting a consistent AM approach, aligned with ISO 55001:2024, to build on the foundations of good practice already in place. This Asset Management Policy (“Policy”) articulates the TTC’s AM approach and commitment to implementing great AM practices across our organization for the benefit of all our stakeholders.

This Policy applies to the AM of all TTC infrastructure assets used for the delivery of transit service, including linear infrastructure, revenue and non-revenue vehicles, electrical and communication systems, structures, plant, and buildings. A full list of the assets to which this Policy applies can be found in the TTC Asset Management Plan.

Our Approach

In pursuit of our vision, we will:

- Develop an AM system to ensure that AM is implemented effectively and consistently across the TTC, and in line with other TTC policies.
- Set out asset management objectives and Levels of Service and monitor our performance against them.
- Align with the City of Toronto’s Corporate Asset Management Policy and other strategies, plans, and directives produced by the City, notably the TransformTO Net Zero Strategy.
- Support the City of Toronto’s compliance with O. Reg 588/17, “Asset Management Planning for Municipal Infrastructure.”
- Work with internal and external stakeholders to deliver effective AM, including the City of Toronto, Provincial and Federal government, neighbouring transit agencies, and Metrolinx.
- Develop a decision-making framework that reflects multiple value criteria that are of importance to the TTC and its stakeholders.
- Identify asset risks and perform activities to mitigate them in line with their likelihood and potential impact on the organization.
- Develop and mature our capabilities in the field of AM in line with international best practice, paying particular attention to the skills of our staff and how we manage asset information.
- Develop, and keep up to date, an Asset Management Strategy and asset-level plans, which will set out how we will deliver agreed Levels of Service to our customers.

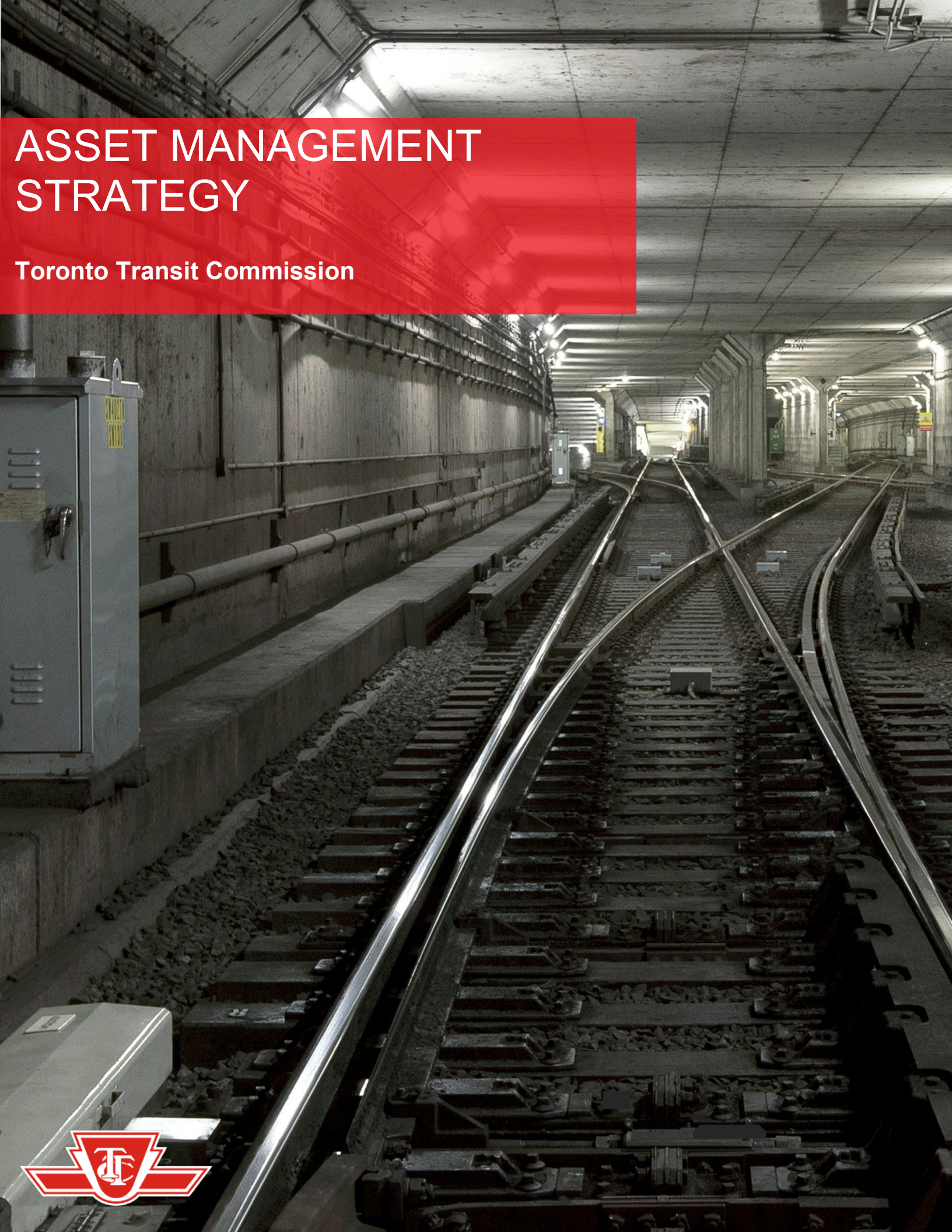
Our Commitment

The TTC Board is committed to developing our organization’s AM capability in line with our organizational Mission and international good practice, and to ensure sufficient resourcing is provided to deliver it. An Enterprise Asset Management program has been established and will be delivered in a co-ordinated manner, considering other improvement initiatives. The program will ensure the development and continual improvement of an effective AM approach.

Signed: (This should be the CEO on behalf of the Board).

Date:

Date of next review:



ASSET MANAGEMENT STRATEGY

Toronto Transit Commission

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Glossary

Term	Abbreviation	Definition
Accessibility for Ontarians with Disabilities Act	AODA	An Ontario Act governing the development, implementation, and enforcement of accessibility standards, including for transit services.
Active Transportation		Modes of transportation that involve physical activity, such as walking, cycling, scootering, or using a wheelchair or mobility aid.
Artificial Intelligence	AI	The ability of a computer to perform tasks commonly associated with human intelligence.
Asset		An item, thing or entity that has potential or actual value to an organization. The value can be tangible or intangible, financial or non-financial, and includes consideration of risks and liabilities. For the purposes of this document, the term refers to physical vehicles, systems, and infrastructure assets that support the delivery of transportation services.
Asset Data and Information		Information on the condition, performance, maintenance history, and life cycle of assets, such as vehicles, facilities, infrastructure, and equipment.
Asset Management	AM	The co-ordinated activity of an organization to realize value from assets. This involves the balancing of costs, opportunities, and risks against the desired performance of assets to achieve organizational objectives.
Asset Management Objectives		High level objectives that reflect our business responsibilities and are aligned with our strategic objectives and priorities.
Asset Management Policy	AM Policy	Document demonstrating commitment to asset management and summarizing the principles adopted in applying asset management to achieve strategic objectives.
Asset Management Plan	AMP	Document specifying activities and resources for implementing the Asset Management Strategy and delivering the Asset Management Objectives.
Asset Management Strategy	AM Strategy	Document setting out the long-term approach to management of the assets, derived from, and consistent with, the Asset Management Policy.
Automatic Train Control	ATC	A train protection system that controls speed in response to external inputs.
Capital Expenditure	Capex	The funds used by the TTC to acquire, upgrade, and maintain its physical assets, including investments in new vehicles, infrastructure projects, facility upgrades, and major repairs.
Closed Circuit Television	CCTV	A video surveillance system that can monitor and record particular areas.

Deterioration		A mathematical representation of the change in condition of an asset over time. Deterioration models are used to understand future asset needs to assist in forecasting.
Enterprise Asset Management	EAM	The management and maintenance of an organization's physical assets throughout their entire life cycle, including activities, such as capital planning, procurement, installation, performance monitoring, maintenance, compliance, risk management, and eventual disposal.
Enterprise Risk Management	ERM	Approach to identify, assess, manage, and monitor risks that could potentially affect our ability to achieve our objectives. Encompasses a wide range of risks, including financial, operational, strategic, and compliance-related risks.
Estimated Service Life	ESL	This is the estimated amount of time (usually in years) that an asset is expected to remain in service from the installation/implementation date and continuing to meet performance targets, before requiring replacement or a major life-extending renewal activity.
Facilities		Garages and maintenance facilities, subway stations, administrative and operational buildings, bus and streetcar stops, and shelters.
Fixed block signalling		A signalling system that divides the track into small sections, creating artificial separation between trains.
Fleet		Revenue vehicles (buses, streetcars, and subway trains), non-revenue vehicles, and the industrial equipment used to service those vehicles.
Headway		The time interval between vehicles moving in the same direction on a particular route. Headway is crucial for ensuring regular and reliable service, minimizing wait times for passengers, and optimizing the flow of transit vehicles.
Heating, Ventilation, and Air Conditioning	HVAC	System to control heating, ventilation, cooling, and air movement in an enclosed space.
Infrastructure		The physical structures and associated facilities that form the foundation of development, and by or through which a public service is provided.
Innovation		Innovation at the TTC is the pursuit of customer-centric solutions, powered by agile lean methodologies, strategic ecosystem partnerships, an unwavering commitment to achieving net zero emissions by 2040, data driven decision-making and considering accessibility, equity across communities, and diversity in every initiative we undertake.
International Standards Organization	ISO	An independent, non-governmental international organization that develops and publishes standards across a wide range of industries.

Internet of Things	IoT	A network of physical devices embedded with sensors, software and network capability, enabling them to collect and share data.
Key Performance Indicator	KPI	A measurable value that is used to monitor and evaluate performance in specific areas or across multiple area.
Levels of Service	LOS	The parameters that reflect the social, political, economic, and environmental outcomes an organization delivers to its stakeholders. The TTC's levels of service framework incorporates statements describing the outputs of its activities, and metrics to evaluate and measure their quality.
Life Cycle		The useful life of an asset from acquisition to disposal, typically expressed in years.
Life Cycle Management Strategy		The set of planned actions that will enable the assets to provide the desired Levels of Service in a sustainable way, while managing risk, at the lowest life cycle cost.
Light Detection and Ranging	LiDAR	A technology that maps objects and their surrounding environments using laser pulses.
Light Rail Transit	LRT	A transportation system based on electrically powered light rail vehicles that operates on a track in a dedicated right-of-way.
Linear Infrastructure		Subway track, Streetcar Way and Overhead Contact System.
Maintenance		Activities that allow assets to meet their required performance objectives, including regularly scheduled inspection and maintenance activities associated with unexpected or unplanned events.
Maximo		Enterprise asset management software adopted by the TTC.
Metrolinx		An agency of the Government of Ontario with the responsibility for co-ordinating and integrating transit in the Greater Toronto and Hamilton Area.
Ontario Regulation 588/17	O. Reg. 588/17	An Ontario Regulation governing asset management planning for municipal infrastructure, including the TTC.
Operating Expenditure	Opex	The ongoing costs required to run the day-to-day operations of the transit system. This includes expenses, such as salaries and wages, fuel, utilities, maintenance, and other operational costs necessary to provide transit services.
Original Equipment Manufacturer	OEM	The manufacturer of equipment used by the TTC to provide its services.
Preventative Maintenance		Regular, routine or regularly scheduled maintenance activities that are intended to keep assets in good working order and prevent or minimize unplanned failures or downtime.
Rapid Transit Line		A high-capacity public transportation system, typically electric, designed for fast and frequent service within urban areas.

Replacement Value		The anticipated amount that an entity would have to pay to replace an asset with a modern equivalent at the present time.
Scarborough Subway Extension	SSE	A 7.8-km extension to Line 2 Bloor-Danforth being built by Metrolinx, extending the line from Kennedy Station through Scarborough City Centre to a terminus at Sheppard Avenue and McCowan Road.
Service Standards		The TTC Service Standards are a systematic and objective means of planning, monitoring, adjusting, and evaluating transit services throughout Toronto. The standards provide a mechanism for measuring the trade-offs between the benefits achieved by providing more service in one location, the inconvenience caused by removing it from another, and the costs of providing those services.
Stakeholder		Any individual, group, or organization that has an interest in or is affected by the TTC's operations, decisions, and policies.
State of Good Repair	SOGR	A condition in which an asset is functioning as designed within its estimated service life, individually and as part of a system. The asset can deliver agreed service levels and is sustained through regular maintenance and replacement programs.
Structures		Box structures, bored tunnels, station structures, bridges, Prince Edward Viaduct (track beams and sidewalks), culverts, retaining walls, and miscellaneous structures.
Supervisory Control and Data Acquisition	SCADA	A control system for processes and equipment that uses real-time data.
Systems		Communications systems, signals, electrical systems, and mechanical systems.
Sustainability		Sustainability at the TTC is the pursuit of impactful action to reduce GHG emissions, increase operational resiliency, responsibly consume limited resources and improve community health and well-being, while maximizing service reliability for our customers.
Sustainable City of Toronto Fleets Plan		Part of the TransformTO strategy, the Fleets Plan sets goal and objectives in addressing climate mitigation and adaptation with strategies for transitioning City Fleets to sustainable, climate resilient, net zero operations.
T1 trains		Trains operated on Line 2, built between 1995 and 2001, and first delivered to the TTC in 1995.
Toronto Rocket trains	TR	Trains operated on Lines 1 and 4, built between 2009 and 2015, and first delivered to the TTC in 2010.
TransformTO		The strategy adopted by the City of Toronto to reduce greenhouse gas emissions to net zero by 2040.
TTC Corporate Plan		Document outlining the organization's key priorities and strategic directions for a five-year period. It supports the

		achievement of the TTC's mandate, vision, and mission statements.
TTC Capital Investment Plan	CIP	A comprehensive strategic document that outlines the TTC's capital needs and priorities. Provides a clear overview of the investments required for state of good repair, capacity building, and service improvements.
TTC Innovation and Sustainability Strategy 2024-2028		A five-year strategic roadmap to embed corporate innovation and environmental sustainability at the TTC, constructing a more innovative and sustainable public transit system.
TTC Real Estate Investment Plan 2022-2036 (On Solid Ground)		Closely linked with the CIP, this plan provides a comprehensive strategic view of the TTC's property portfolio and expected real estate activity through to 2036.
Wheel-Trans		Paratransit service provided by the TTC.
Whole-life Cost	WLC	The total expense of owning an asset over its entire lifespan, from purchase to disposal.
Yonge North Subway Extension	YNSE	An 8-km extension to Line 1 Yonge-University being built by Metrolinx, extending the line from Finch Station through Vaughan and Markham to a terminus in Richmond Hill Centre.

1. Document Control

This document and its contents have been prepared and are intended solely as information for the Toronto Transit Commission and use in relation to the Enterprise Asset Management Project.

AtkinsRéalis assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 66 pages, including the cover.

Document history

Document title: Asset Management Strategy

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
0.1 - 0.5	Initial drafts	CG, DL, CB	CG			
0.6	Draft for SS review	CG, DL, CB	CG	SS		
0.7	Draft for asset groups review	CG, DL, CB	CG	SS, RN		
0.8	Draft for Chiefs' review	CG, DL, EC	CG	SS, GD		
0.9	Draft for TTC review	CG, DL, EC	CG	SS		
0.10	Draft to address comments	CG, DL, EC, AL	RVB	SS, NT, IS		
0.11	Draft to address Exec comments	CG, DL				

Letter from the Board Chair

Transit is the lifeline of our city, connecting communities, supporting economic growth, and enhancing the quality of life for millions of residents and visitors. Fundamental to a successful transit service are its assets; from customer-facing assets, such as vehicles and stations, essential infrastructure, such as tracks and tunnels, to essential enabling assets, such as maintenance equipment. It is imperative that our assets deliver reliable service to Toronto, in a way that is cost-effective and resilient to future growth and the challenges of a changing climate.

This Strategy outlines our approach to asset management, how we will plan for, maintain and enhance our assets, and setting out the actions we will take to improve our asset management maturity. By adopting good practice in asset management, we aim to improve service delivery, financial sustainability, and deliver our mission to provide safe, reliable, efficient, and accessible mass transit.

This strategy aligns with our broader goals of reducing environmental impact and achieving net zero emissions by 2040. Effective asset management is not only about preserving our current assets, but also about planning for the future. It involves integrating innovative technologies and practices that enhance efficiency and sustainability.

Our Asset Management Strategy is a collaborative effort, reflecting input from stakeholders across the TTC and the community. It is designed to be dynamic, adaptable, and responsive to the changing needs of our transit system and the city it serves. Together, we will continue to build a transit system that is robust, resilient, and ready for the challenges and opportunities of the future.

Jamaal Myers
Chair, TTC Board

Letter from the Interim CEO

I am pleased to present the TTC's first Asset Management Strategy. Our assets are vital to delivering the TTC's mission and the strategic directions set out in our Corporate Plan. A consistent, enterprise approach to asset management, as described in this Strategy, will enable the goals in our Corporate Plan.

By publishing an Asset Management Strategy, the TTC is setting the foundations for asset management in line with international, North American and Ontario good practice.

This Strategy will:

- Articulate our commitment to and objectives for asset management at the TTC.
- Explain our Levels of Service framework and how we will deliver it.
- Articulate our commitment to, and objectives for, asset management at the TTC.
- Set out what asset management means at the TTC, and the benefits effective implementation can provide.
- Provide the basis for more effective asset management decision-making.
- Support the development of holistic, long-term, whole-life planning for capital and operational activities and investments.
- Provide the direction for asset-related activities with line of sight to the Corporate Plan and our Strategic Directions.
- Explain the improvements to our overall asset management capability, being delivered through our Enterprise Asset Management Program.

This strategy has been developed with a focus on ensuring all asset management activities are aligned with the TTC's Vision and Mission, to enable the management of the TTC's assets to deliver the organization's top priorities.

Gregory W. Percy
Interim Chief Executive Officer,
Toronto Transit Commission

2. Introduction

2.1 Purpose of this Asset Management Strategy

As a public transit provider, the TTC manages an extensive network of physical assets, including fleet, linear infrastructure, facilities, structures, and systems. Implementing a holistic approach to managing our assets means that our teams and supply chain will be able to deliver in an aligned, co-ordinated way, providing a seamless, integrated network required by our customers.

In 2024, the TTC published its first Asset Management Plan (AMP) to ensure compliance with O. Reg 588/17. We will issue a further version of the AMP in 2025, alongside this Strategy, and commit to annual AMP updates.

This first version of the TTC's Asset Management (AM) Strategy sets out our long-term approach to managing our assets over the next 10 years. It takes the TTC beyond O. Reg 588/17 requirements to align our organization with international good asset management practice. This AM Strategy enables the successful delivery of the Strategic Directions and objectives outlined in the 2024-2028 Corporate Plan, and the Levels of Service required by our stakeholders (see Section 7).

This Strategy implements the TTC's Asset Management Policy. It describes what asset management means for the TTC, setting out an asset management framework and asset management objectives in support of our Corporate Plan (see sections 0 and 6 for more information). The Strategy also details the improvements that will be made over the coming decade to develop the TTC's asset management capabilities (see section 10).

This Strategy is one of the operational strategies reflected in the Corporate Plan's integrated planning and performance framework (see the right side of Figure 2-1 below). It sets the direction for more detailed asset management planning activities, articulating our asset-level priorities to ensure consistency and alignment across our departments and projects. The contents will be a key influence on decisions made during the life cycles of our assets, the evaluation of actions taken to manage asset risks, and the allocation of resources to address those risks. This Strategy also informs our more detailed Asset Management Plan. Figure 2-1 below sets out the relationship between key asset management documents and the TTC's integrated planning and performance framework:

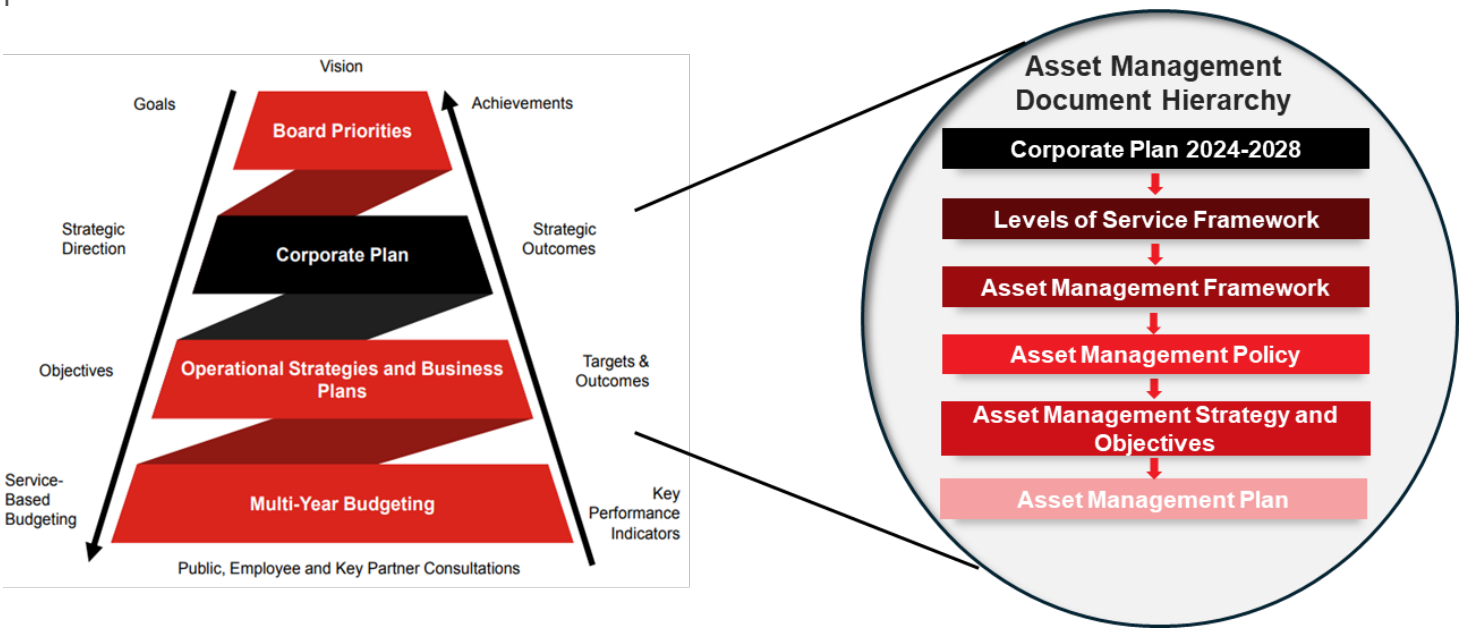


Figure 2-1: TTC's Integrated Planning and Performance Framework (left) and Asset Management Document Hierarchy (right)

In summary, this first edition of the TTC's AM Strategy is a foundational document for our organization. This Strategy implements the strategic direction set out in the Corporate Plan, puts our AM Policy into effect, and sets the TTC-wide AM objectives as well as providing information to our teams that will influence our delivery for years to come.

Producing this Strategy, together with initial versions of the AM Policy and AMP, represents the start of an asset management maturity journey for the TTC. We intend for this document and its companions to enable conversations about our priorities and approach to asset management decision-making as we progressively improve our capabilities. We also intend to update it as we mature those capabilities, aiming for progress, not perfection, with each iteration.

The Strategy will help to ensure the TTC's asset management practices are aligned with international best practice and our corporate goals, supporting our mission to serve the needs of transit riders by providing a safe reliable, efficient and accessible mass public transit service through a seamless integrated network to create access to opportunity for everyone.

2.2 About the TTC

The TTC is the public transit agency responsible for serving Toronto's 630 square kilometres geography. Vital to the mobility of the region, the TTC moves nearly 420 million customer trips annually, enabling access to employment, education, services, and social connection through an integrated mass transit network.

The TTC is the largest public transit system in Canada and the third largest in North America. It is also integrated with neighbouring transit systems, such as Durham Region Transit, York Regional Transit, MiWay in Mississauga, and Ontario's interregional GO Transit system. The TTC functions as one of the agencies of the City of Toronto and is dependent upon the City for both operating and capital funding.

The TTC operates 162 bus routes, 11 streetcar routes, and three subway lines (70 stations). In late 2025, service will be expanded with two additional light rail transit lines (Lines 5 and 6), with the TTC operating 113 light rail stations and stops. Through its Wheel-Trans paratransit service, the TTC provides more than 3.5 million door-to-door trips annually across its Family of Services model.

The TTC is critical to Toronto's success as the economic powerhouse of Canada, and to the health and well-being of the 6.7 million residents of the Greater Toronto Area. Research by the University of Toronto shows that every dollar invested in transit delivers $1.08 in economic and regional benefits and $6.06 in quality-of-life benefits, through reduced congestion, enabling people to get around quickly and reliably, mitigating the impact of climate change and improving air quality. There are also significant social benefits from the TTC's services as 34% of TTC riders are unemployed, 24% earn less than $40,000 a year and 32% do not own a car. Public transit is therefore vital to enabling mobility for all members of our society.

2.3 About our assets

The TTC is an asset-intensive organization with a portfolio value of approximately $39 billion. Our assets are subdivided into the following types:

- **Revenue fleet:** accessible subway trains, streetcars, buses and paratransit vehicles;
- **Non-revenue fleet:** vehicles that deliver operational and maintenance activities;
- **Linear infrastructure**: subway track, streetcar way and overhead contact system;
- **Facilities:** Administrative buildings, maintenance facilities, and passenger facilities and their equipment; (such as elevators and escalators);
- **Structures:** Tunnels, bridges, viaducts, and retaining walls;

- **Systems:** Communications, signalling, IT, and electrical.

Summary information about these assets can be found in Figure 2-2 below, and the sections that follow. Detailed information about these assets, their life cycle plans, risks, and costs can be found in the TTC's Asset Management Plan. High-level strategies for their management can be found in Section 10.2 and 12. Appendix B.

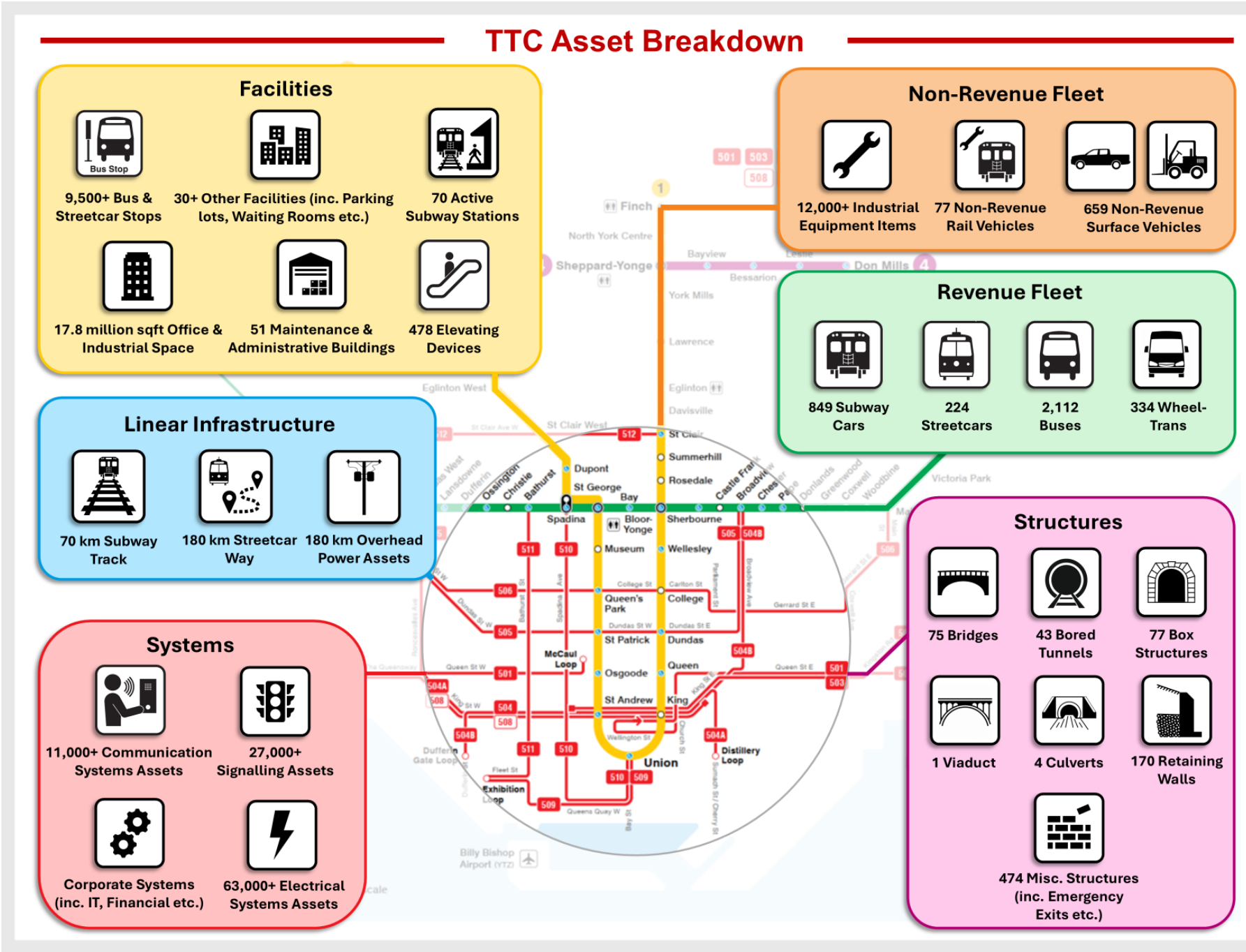
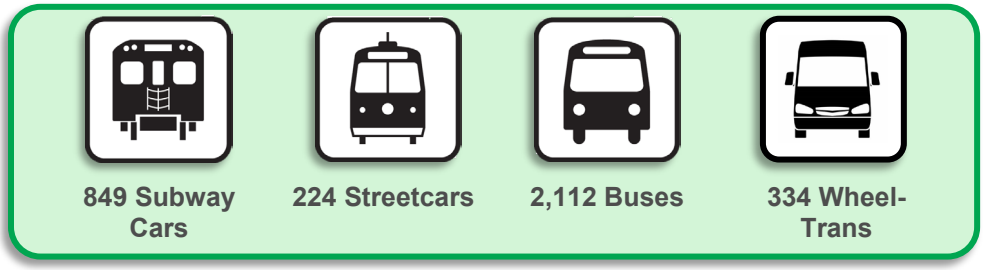


Figure 2-2: TTC Asset Breakdown

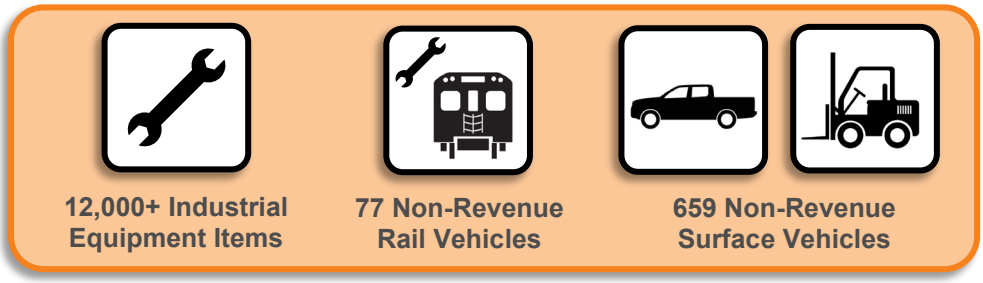
2.3.1 Fleet (Revenue and Non-Revenue)

The TTC's fleet is made up of buses, subway trains, streetcars, Wheel-Trans vehicles that carry more than 423 million annual trips (525 million pre-pandemic). All passenger vehicles are wheelchair or scooter accessible and contain other features, such as next stop announcements, which support seniors and people with disabilities. Subway trains carry up to 1,100 people, produce zero emissions and provide fast connections between downtown Toronto and communities across the city and beyond. The T1 trains used on Line 2 are due to be replaced in the coming years, and the overall fleet size is planned to increase to support the Line 1 and Line 2 extensions and to accommodate projected passenger growth.



Streetcars run along major arteries within the city and provide a further high-capacity, zero-emission mode of transport. Since 2014, Flexity Outlook accessible streetcars have been in operation and feature air conditioning, a wheelchair loading ramp, and provide twice the capacity of the streetcars they replaced. The TTC is increasing the streetcar fleet through the procurement of an additional 60 vehicles, which are all scheduled to be in service by the end of 2025.

The bus network provides broad coverage across the city through 162 daytime and 27 night routes as well as supporting special events and disruptions to the streetcar and subway networks. 50% of the bus fleet will produce zero emissions by 2030, and all buses will be zero-emission by 2040, in line with the Sustainable City of Toronto Fleets Plan. The bus fleet also includes Wheel-Trans vehicles, which provide paratransit service to nearly 43,000 active registrants.



Non-revenue vehicles exist for both the surface and subway fleet to support operational and maintenance activities. Surface vehicles include standard trucks and vans alongside customized units for specific purposes, such as snow clearance, rail sanding and streetcar overhead wire de-icing. Non-revenue subway vehicles support track, structure and signal maintenance, and include newly purchased vehicles as well as decommissioned revenue vehicles that have been converted. Industrial equipment is also used to perform maintenance tasks, and ranges from small, handheld tools to large, bespoke items.

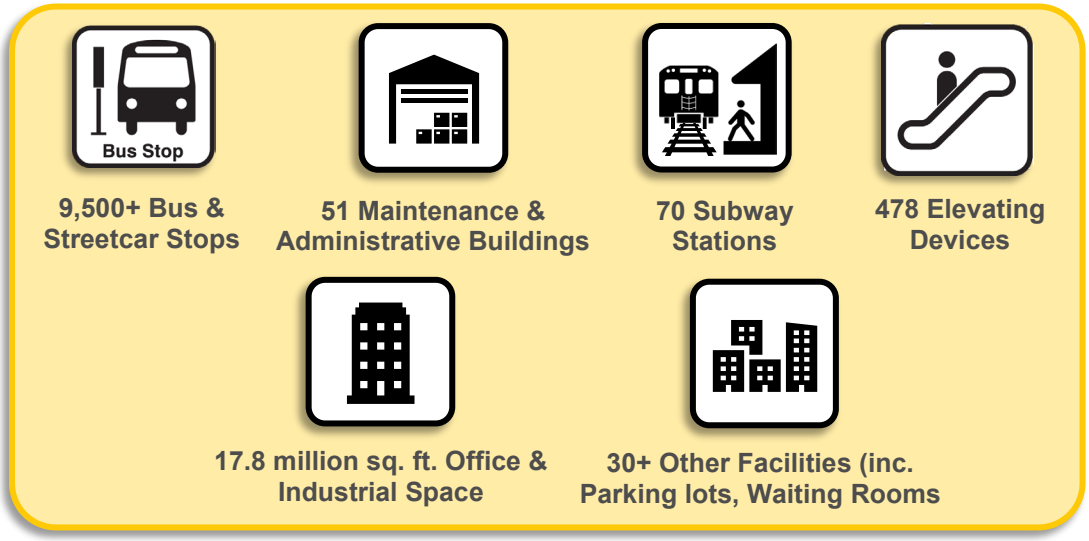
2.3.2 Linear Infrastructure

Linear infrastructure describes the static assets that form part of the subway and streetcar networks. In the case of the subway, this is made up of track, power rail and wayside equipment, such as tunnel ventilation and track lubrication systems. There is 70-km of double-tracked subway route on Lines 1, 2 and 4, and addressing state-of-good-repair requirements is vital to maintaining a reliable service and avoiding restricted speed zones. Both renewal and maintenance activities on subway linear infrastructure are affected by the limited time available to deliver maintenance, given that the subway operates for up to 20 hours a day.

Streetcar linear infrastructure consists of the overhead contact system (OCS) – the system of wires and components installed above the tracks to supply electrical power to the streetcars – and streetcar way, including the length of the mainline and yards.

Each of these is approximately 180 km in length, and most of the system is on Toronto's streets. This means that work on the system needs to be aligned with the City given the impact on road traffic. As with the subway, there is a risk of restricted speed zones being required if the network is not in a sufficient state of good repair, with impacts on reliability and on travel time.

2.3.3 Facilities



The TTC's facilities can be grouped into three broad categories:

- **Administrative facilities**, made up of the TTC's 11 office and administrative centres, which are a mixture of TTC-owned, City-owned and commercially let.
- **Maintenance facilities** – 40 premises, made up of bus garages and shops, streetcar and subway carhouses, and subway yards.

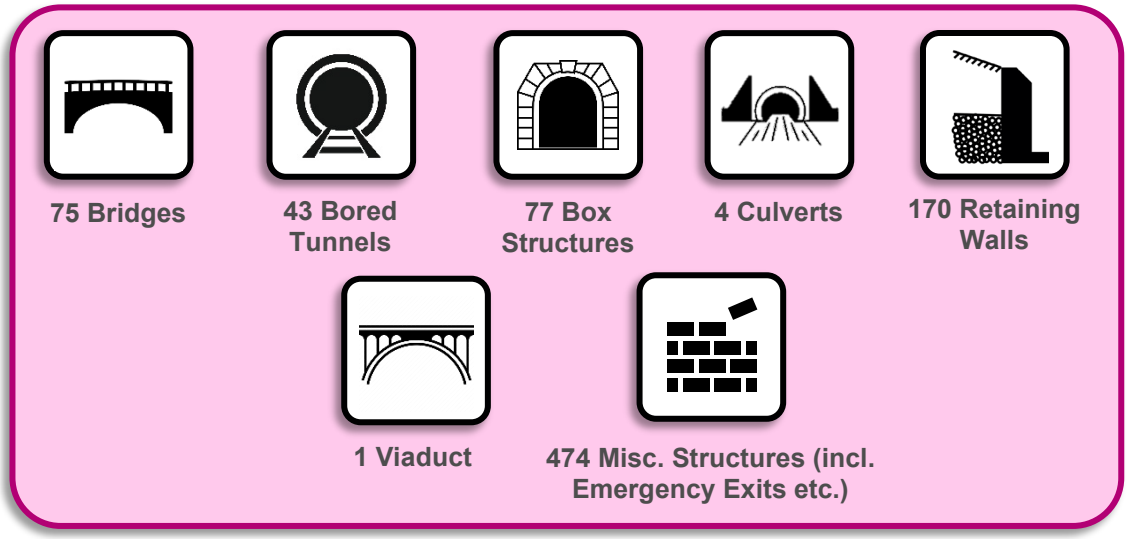
- **Passenger facilities** – 70 subway stations, along with selected bus and streetcar terminals within the station complexes.

Within these facilities exist multiple asset groups, including:

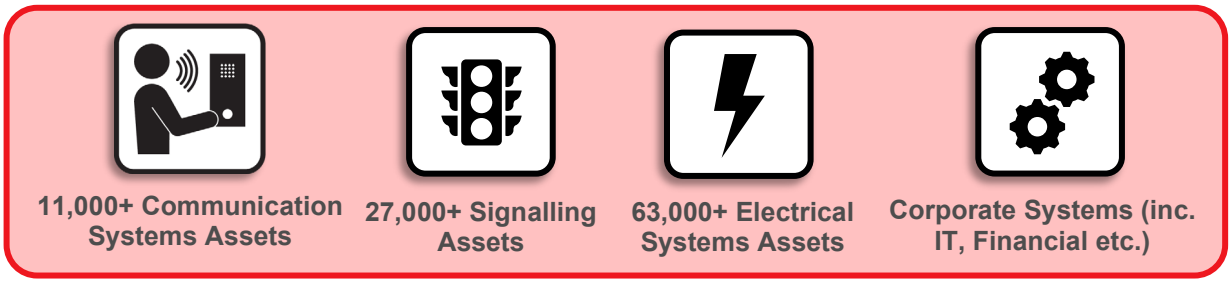
- Equipment for operations and maintenance activities, including cleaning, refuelling, inspection, and maintenance hoists, and waste management.
- Internal finishes, such as walls and floors, along with staircases.
- Mechanical and electrical systems, including elevators, escalators, plumbing, heating, ventilation, and air conditioning (HVAC), lighting and fire protection.
- Paving, landscaping, and parking lots.
- Exterior structures (walls, roofs, windows, and doors).
- High voltage (HV) charging equipment.
- Power storage equipment to support the EV and electric bus fleet.

Each of these asset types has its own specialist asset management considerations, with several being subject to specific areas of investment at present. For example, capital investment will deliver elevator access to all subway stations by 2027 through the Easier Access program. Furthermore, net zero plans are being developed for all facilities by 2027.

2.3.4 Structures



Structures provide the means for the subway and streetcar systems to cross Toronto, in overground, underground and above ground sections. They include 34.1-km of cut-and-cover box structures, 18.1-km of bored tunnels, station boxes, bridges, retaining walls, and the beams and sidewalks on the Prince Edward Viaduct, which carries Line 2. There are also hundreds of smaller structures, such as subway emergency exits, ventilation and access shafts, and pump rooms. A key consideration with these assets is monitoring their condition given the potential impacts of water ingress and other forms of environmental deterioration and wear and tear damage.



2.3.5 Systems

The signalling systems operated on the subway (conventional fixed-block signalling on Lines 2 and 4 and at Wilson and Greenwood yards, automatic train control (ATC) signalling on Line 1 regulates train movements and ensure safe operation, while maintaining the headways required to meet planned service levels. To support increased capacity on Line 2 and reliability of yard operations, Line 2 (and Greenwood Yard) will be converted to ATC to computer-based signalling technology by 2035/2036.

The TTC's electrical supply and distribution systems consist of both traction power to subway lines and high and low voltage systems serving the TTC facilities. The Line 1 and 2 Capacity Enhancement programs require traction power upgrades to accommodate shorter headways. The TTC also operates a variety of communications systems, including CCTV, operational control, public address, access control, radio, SCADA, and vehicle tracking systems.

The assets described in section 2.3 exist to enable the TTC to provide transit service in Toronto and beyond. Their value exists in providing a high-quality transit service to Canada's largest urban centre and economic hub. To ensure the TTC's assets can deliver the best possible service, the TTC has committed to maturing its asset management capability by delivering an EAM program.

3. Purpose and impact of asset management

To deliver value for our stakeholders, TTC staff need to make informed and aligned decisions across the life cycle phases of our assets shown below in Figure 3-1: Asset Life Cycle Phases. From the design and procurement of assets, their operational delivery and maintenance, all the way through to replacement and disposal of assets at the end of their life, asset management connects the many decisions along the way so that our teams work to the same goals.

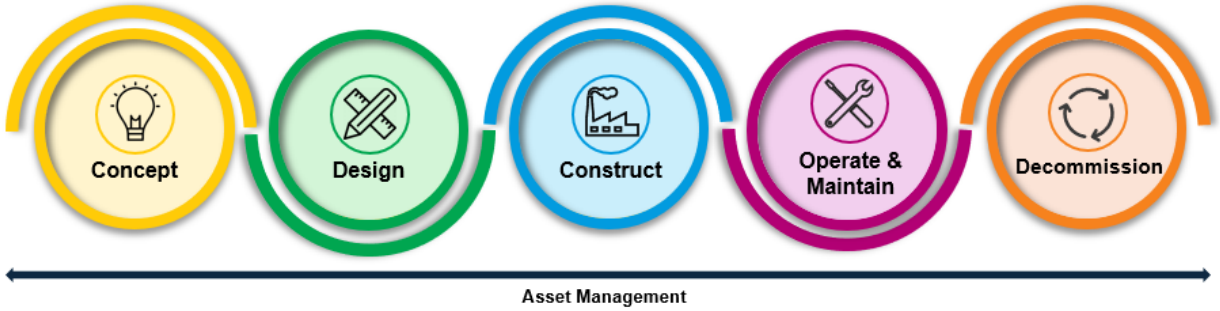


Figure 3-1: Asset Life Cycle Phases

This alignment and co-ordination also occurs through the organizational plans shown in Figure 2-1. In a large organization, aligning all our plans requires progressive changes to policy, planning, decision-making, and processes over several years. This is the approach the TTC is taking with its EAM) program, detailed in section 10.1. The changes usually made in an asset management improvement program allow organizations to make the following shifts[1]:

	Going from:	To:
	Strategy: Informal approaches to asset management that may be inconsistent.	- Clear, approved, and **documented strategies** for managing assets across their **life cycles**.
$	**Finance**: Focus on efficiencies, savings, and operational expense reduction.	- Defining and realizing sustainable, long-term value for the organization as a whole.
	Data: Disparate, low-quality data for decision-making, collected inconsistently, or held inaccessibly. Focus on asset inventory, location and condition.	- Defined **information requirements** for decisions, covering strategic and tactical choices, including stakeholder and customer requirements. - Investment in essential data sources, which are kept current and accessible.
	Decisions: Taken in isolation within a team or department, without assessing risk or understanding impact. Individual or departmental performance is often prioritized.	- Clear **decision-making processes** incorporating the roles and authorities of individuals, teams, and departments, with **documented criteria.** - Decisions that clearly target **organizational goals** with a line of sight to departmental and asset-level KPIs.
	Risks: Managed reactively, assessed subjectively. Risk management unconnected to financial decision-making.	- Documented risk evaluation processes with agreed **risk evaluation criteria**, which are quantitative when possible, and connected to **financial decisions**.

[1] Adapted from TC251's ISO TC251 WG4 MACAM May 2017 EN2.pdf document. TC251 is the technical committee responsible for managing the ISO 5500x series of standards on asset management (see section 2.4.2).

Table 3-A – Changes in organizational approach resulting from the implementation of effective asset management

3.1 Asset management benefits for the TTC

Implementing good asset management practice has the potential to bring multiple benefits to the TTC over time. Typically, organizations experience the following types of benefit:

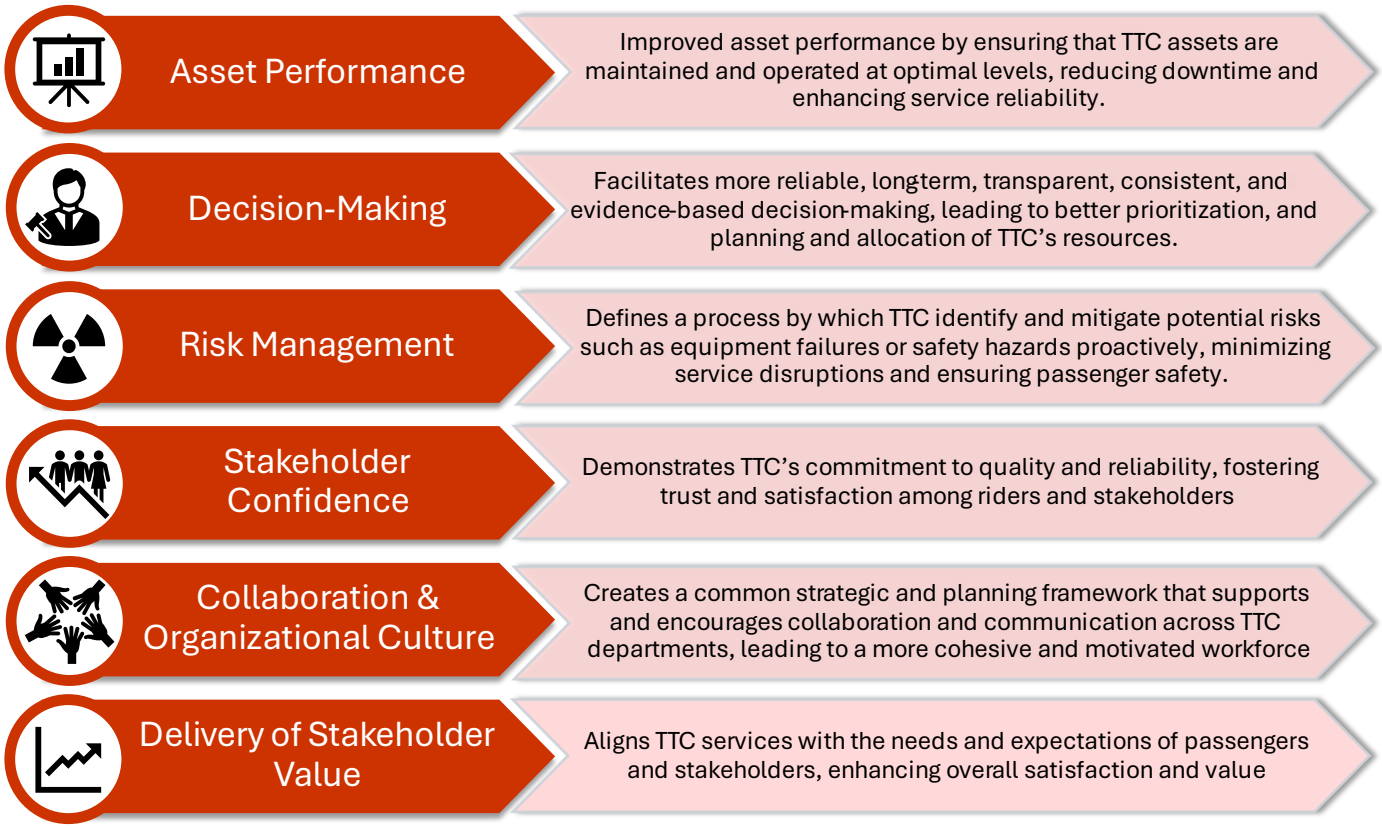


Figure 3-2: TTC Potential Asset Management Benefits

3.2 Asset management standards

The TTC is not alone in seeking to develop and implement more effective asset management. Given the continuous growth in infrastructure, funding deficits, and increased service demands, asset-intensive organizations worldwide are focused on the need to manage infrastructure more holistically. There is a concerted global effort by asset managers to collaborate to develop effective asset management approaches.

The ISO 55000 suite of standards provides a framework to establish asset management policy, strategy, objectives, processes, and governance that guide an organization in achieving its strategic objectives. The standards reflect current good practice in asset management, promoting a culture of proactive and continual improvement that results in an organization realizing value from its assets.

The TTC is committed to this approach and intends on aligning with the requirements set out in the ISO 55000 suite of standards, as articulated in the TTC Asset Management Policy.

Figure 2-3: Image of ISO 55001 (2024) – Asset Management System Requirements

4. TTC's Levels of Service

The TTC has developed a Levels of Service (LOS) framework, which summarizes the combined needs and expectations of our stakeholders (see section 7) into statements of required service.

Our LOS meets the requirements of O. Reg 588/17 and articulate specifically what needs to be delivered by the TTC's transit modes. At their most fundamental level, the LOS represents the TTC's capacity to meet the expected ridership as well as customer expectations with respect to safety, accessibility, reliability, predictability, and comfort. As visualised in Figure 4-1, the LOS framework is linked directly to the commitments in our Corporate Plan. The LOS are enabled by our asset management framework, which establishes the policies, processes, and plans to achieve them.

Figure 4-1: TTC's Asset Management Document Hierarchy, including Levels of Service Framework

At the highest level in the LOS framework, the TTC has developed the Transit Levels of Service shown in Figure 4-2. From these, sub-service specific LOS are aligned. Future Levels of Service are derived based on anticipated changes to these Levels of Service, including ridership growth projections as well as the TTC's future development and service enhancement goals. These are outlined in the Corporate Plan and other published plans, such as the 5-Year Service and Customer Experience Action Plan and the Innovation and Sustainability Strategy 2024-2028. Further detail about the LOS and asset-specific KPIs, measures, and performance can be found in the TTC Asset Management Plan.

	TTC's Transportation Services…	Example Future LOS
Transit Levels of Service	…**meet the route and ridership demands** of the travelling public.	Adjustments for expected ridership growth, new routes/services.
	…**are reliable and on-time**, per the posted schedule/service plan.	Enhanced reliability targets.
	…**are safe** to use and operate.	New regulations, new expected safety standards.
	…**accommodate accessibility needs** of all customers.	Expectations for improved accessibility.
	…meet customer expectations for **cleanliness, comfort, and convenience**.	Technology enhancements.
	…are designed in such a way as to **mitigate the environmental impact and build climate resilience** of transportation in the GTA.	Electrification, green initiatives.
	…are undertaken in a **cost-efficient** manner, minimizing the cost to the city for the service provided.	Efficiency improvements.

*Figure 4-2: TTC Transit Levels of Service (Current and **example** future LOS shown)*

5. TTC's Asset Management Framework

Asset management is an enterprise-wide discipline that requires the co-ordination of many parts of the TTC. The framework below indicates how the different components that contribute to asset management at the TTC fit together to deliver the Corporate Plan and the TTC's Levels of Service (see Section 4).

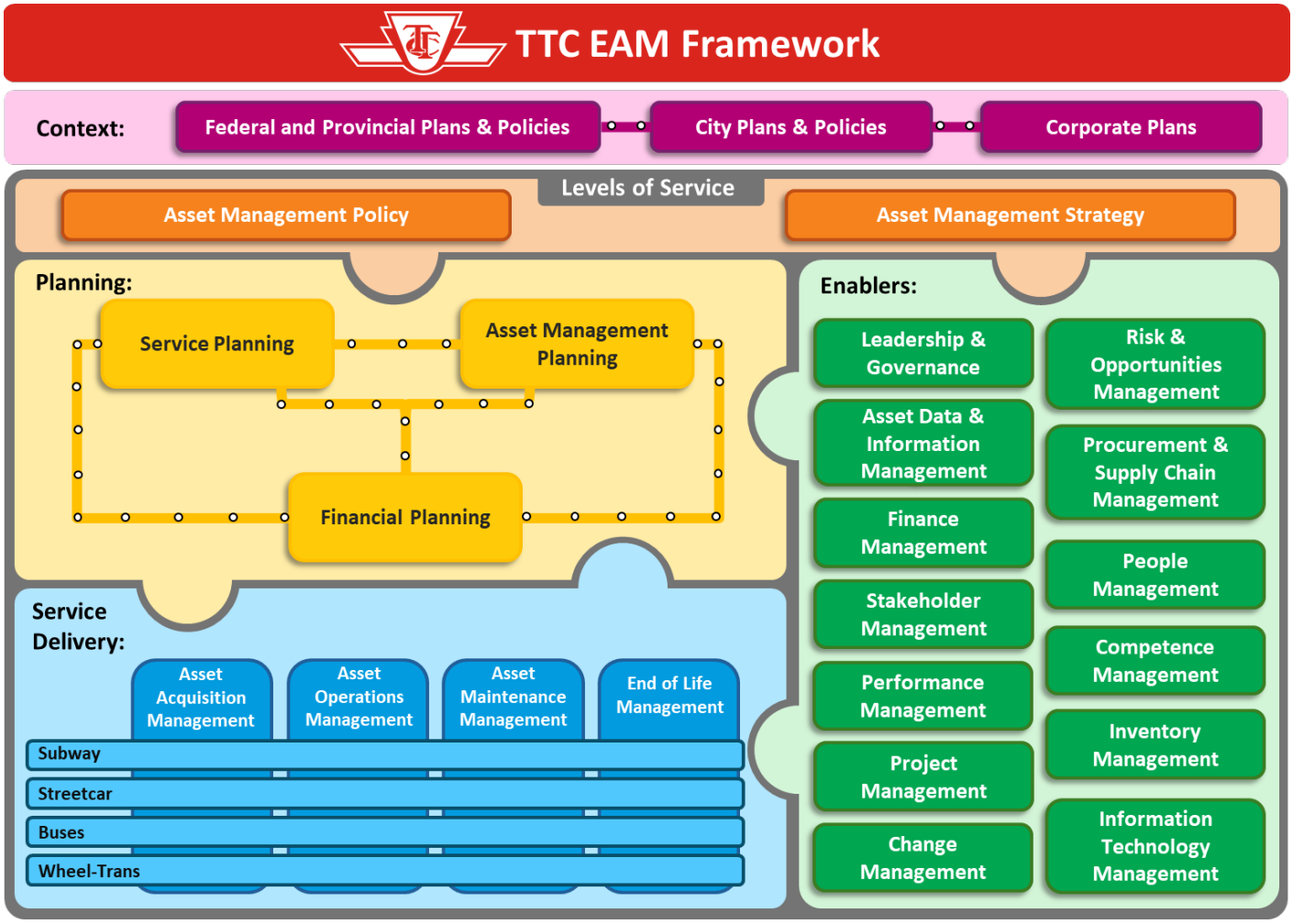


Figure 5-1: TTC Asset Management Framework

The **Context** for asset management comes from the organization's corporate plans, along with plans and policies, which are published by the municipal and provincial governments. These set out the desired outcomes from the TTC's services.

Levels of Service summarize the combined needs and expectations of the travelling public into statements of required service. Delivering our Corporate Plan and Levels of Service through improved asset management is the purpose of the Asset Management Framework.

The **Asset Management Policy** and **Asset Management Strategy** guide the approach to asset management at the TTC. The Asset Management Policy outlines the principles for asset management, and senior commitment to implementing it, ensuring alignment with the organization's corporate plans and government policies. The Asset Management Strategy details the asset management objectives, approaches, and high-level actions required to achieve the objectives and Levels of Service. Both documents facilitate the translation of strategic directions into actionable plans.

- **Asset management plans** set out how assets will be managed across their life cycles, detailing activities required, costs, and risks to delivery. These are directly aligned to service planning to ensure that agreed Levels of Service can be met, and feed into the financial planning process, to support the development of capital and operating budgets. When budgets have been set, asset management plans are updated to reflect which activities are prioritized for delivery against constrained funds.
- Asset management plans direct **Service Delivery** through all stages of the asset life cycle (acquisition, operations, maintenance, and decommissioning).
- The ability to perform planning and delivery activities is supported by a series of **Enablers** that provide the capabilities needed for successful asset management. These include financial management, information management, and people management functions.

6. TTC's Asset Management Objectives

Our Asset Management Objectives are part of our Asset Management Framework. They set out the key asset management improvements needed to deliver our Corporate Plan and Levels of Service (see Section 4) and represent our asset management aspirations for the next 10 years. These Asset Management Objectives are the basis for more specific actions to be developed in more detailed strategies and improvement plans, including those found in section 10. Their alignment with the TTC's Strategic Directions, as described in our Corporate Plan, is also shown.

Theme	Objective	Strategic Direction Alignment
 **Increasing Asset Management (AM) Capability**	**1. Deliver the Enterprise Asset Management Program -** We will develop the TTC's asset management capability over the next decade, by delivering an EAM Program that meets O.Reg 588/17 requirements, aligns to international and Ontario best practice and supports the delivery of our Corporate and Service Plans.	2
	2. Develop Asset Management Competence and Engagement - We will evaluate the asset management skills and competences needed by our teams to deliver their roles and provide access to training where required. We will ensure that our teams and customers receive relevant information about the EAM Program, how it will affect our organization, our service and their work.	2, 4, 3, 5
	3. Encourage Innovation - We will foster a culture of innovation in asset management by encouraging creative solutions, leveraging advanced technologies, promoting collaboration, supporting continuous learning, and encouraging innovative ideas to enhance asset value and performance.	1, 4
	4. Develop Monitoring and Evaluation Approaches - We will develop monitoring and evaluation approaches for our asset management levels of service, as well as broader measures of our asset management capability. We will regularly monitor their progress, taking action to improve and deliver continuous improvement.	2, 4, 5
 **Improving Planning and Decision-Making**	**5. Establish a Decision-making Framework -** We will develop an asset management decision-making framework that sets out criteria for making decisions about our assets during their life cycles, ensuring transparency and consistency in our approach to choices.	2, 4, 3
	6. Develop and Maintain Value-driven Asset–Level Strategies - We will develop and maintain long-term AM strategies for our assets using the best available data. The strategies will identify the actions needed to deliver our objectives and agreed levels of service, incorporate customer priorities, set out the finances needed to manage our assets sustainably, optimize our available resources and identify and manage risks to our objectives and levels of service.	3, 4
	7. Improve Co-ordination with Partners - We will work with our partners and stakeholders, including the City of Toronto, to further develop joint planning and co-ordination of maintenance and improvements on our network, so that we minimize disruption to service and city residents.	2, 4, 5
 **Ensuring TTC's AM is Fit for the Future**	**8. Address Environmental Sustainability -** We will address the resilience and environmental sustainability of our assets by better understanding their vulnerability to climate change impacts and prioritizing related investment, and by creating approaches to reduce greenhouse gas emissions in support of our NetZero 2040 commitment.	1, 2
	9. Improve Asset Management Information and Systems - We will improve our asset management information and its accessibility by developing and implementing asset information and system strategies. This will allow our staff, our Board and the City of Toronto to make better informed choices about delivery to maximize value over the long term.	2, 4

Figure 6-1: TTC's Asset Management Objectives

7. Key Stakeholders

In the development of our Levels of Service, this Strategy, and our Asset Management Objectives, the TTC has considered the needs of its various stakeholder groups and assessed how its approach to asset management can address them.

Our analysis is based upon stakeholder engagement activities that the TTC undertook in support of the development of its Corporate and Service Plans, as well as other needs expressed in policies, strategies, and other publicly available documents from stakeholder groups. A full explanation of how this strategy meets stakeholder needs can be found in section 12. Appendix A. Table 7-A below provides a summary of the requirements:

Stakeholder group	Stakeholder interest
Employees and labour unions	Safe and reliable assets
	Skills development
	Information for decision-making
	Personal safety
Customers and residents	Safe, reliable, frequent, comfortable, and accessible service with clean stations and vehicles
	Real-time updates on schedules and delays
	Jobs for local people
	Civic pride
	Integration with active transportation modes
Government partners (Provincial & Federal)	Encouraging economic growth
	Reducing cost burden on taxpayers
	Helping low-income people
	Job creation and training
	Environmental protection and sustainability
	Design excellence in infrastructure planning
	Accommodating population growth in the Greater Toronto and Hamilton Area
	Financial sustainability for the city
Regional transit partners (Metrolinx & neighbouring regional transit agencies) METROLINX	Co-operation on planning and delivery of construction, operations and maintenance
City of Toronto TORONTO	Growth linked to transit (i.e. transit-oriented development)
	Reduction in greenhouse gas emissions and increasing climate resiliency
	Modal shift from cars to transit
	Economic fairness

Table 7-A: Key stakeholder requirements

8. TTC Funding

The ability of the TTC to deliver its Levels of Service is dependent upon funding as well as effective asset management practices. While some operational funding is generated through fares and other revenue sources, the TTC relies on funding from municipal, provincial and federal government sources for its capital expenditure and to meet the operational expenditure shortfall.

This section provides an overview of funding amounts and sources. Full information on specific funding amounts can be found in the latest version of the TTC Conventional and Wheel-Trans Operating Budgets and the latest version of the TTC Capital Budget and Plan.[2]

8.1 Our financial priorities

Our key priority for investment, as stated in the 2025 Operating Budget, 2025-2034 Capital Budget and Plan, 15-Year Capital Investment Plan, and Real Estate Investment Plan Update, is funding State of Good Repair projects. These projects enable the reliability, safety, and quality of our services. When the TTC's State of Good Repair program is appropriately funded, we are more likely to deliver the Levels of Service set out in our Asset Management Plan.

8.2 Capital expenditure

8.2.1 Funding sources

Pursuant to the Municipal Act 2001, the City of Toronto is responsible for funding the TTC's capital program. This funding is provided via the City Building Fund and Development Charges as well as through debt and reserves. In addition to revenue raised itself, the City also acts as a conduit for funding received from other sources, principally the Provincial and Federal government. Some of this funding is provided on an ongoing basis, such as through the Canada Community Building Fund and the Provincial Gas Tax Fund, along with grants for specific programs. For instance, funding for the replacement of the 55 T1 trains for Line 2 is being split three ways between the City, the Provincial government (through the Ontario-Toronto New Deal Agreement) and the Federal government (via the Canada Public Transit Fund). Similar approaches are being used for the Bloor-Yonge Capacity Improvements Project, and for the procurement of new accessible streetcars and battery-electric buses, through the Investing in Canada Infrastructure Program and Zero Emissions Transit Fund. Capital funding may also be provided by neighbouring regions where capital programs provide service within their areas.

In the 2025 Capital Investment Plan, 65% of funding comes from the City, with 21% from the Federal government and 12% from the Provincial government. 2% comes from other funding sources.

At present, 31% of the 2025-2039 Capital Investment Plan is funded, while the remaining 69% is unfunded. The absence of funding for these activities risk deteriorating asset condition and an inability to meet required Levels of Service. The Corporate Plan seeks to address this gap through improving long-term planning, including the Asset Management Plan, and working with the City, Provincial and Federal governments to develop a sustainable funding model as described in section 8.4.

[2] Please note that the most recent versions of these documents are referenced here at the time of writing this Asset Management Strategy. More current versions may be available on the TTC website at the time of reading, The TTC may also have updated its budget projections at the time of reading.

8.2.2 Expenditure priorities

Capital expenditure is used to fund activities that come under three broad categories:

- **Health and Safety/Legislative**: Activities required to maintain safe operation of the TTC and to meet legislative requirements (i.e. accessibility).
- **State of Good Repair:** Activities to ensure an asset is functioning as designed within its estimated service life, individually and as part of a system. The asset can deliver agreed service levels and is sustained through regular maintenance and replacement programs.
- **Service Improvement/Growth**: Investment to support improvements in Levels of Service.

Activities are identified in each of the TTC's asset investment portfolios. These reflect the TTC's transit modes (subway, streetcar, bus and paratransit), with additional categories for spending to support TransformTO (including the procurement of additional battery-electric buses and related equipment in increased ridership scenarios), network-wide investments (i.e. IT equipment and systems, renewable energy and non-revenue vehicles).

Table 8-A below sets out the split across portfolios in the 2025-2039 Capital Investment Plan:

Portfolio	Percentage of expenditure
Subway	55%
Bus and Wheel-Trans	17%
TransformTO	12%
Facility	8%
Streetcar	5%
Network Wide	3%

Table 8-A: 2025-2039 Capital Investment Plan by Portfolio. Source: Recommended 2025 Operating Budget; 2025-2034 Capital and Budget and Plan, 15-Year Capital Investment Plan, and Real Estate Investment Plan Update, Chart 2.

8.3 Operating expenditure

The principal source of the TTC's operating revenue was historically its own revenue sources, which consisted primarily of customer fares, in addition to revenue from commercial activities, such as rents for retail units in stations.

The revenue-to-cost recovery ratio was one of the highest among North American transit agencies. However, changes in ridership patterns resulting from the COVID-19 pandemic meant the percentage of operating costs covered by customer fares stood at 45% in 2024, which is down from 66% in 2019. As a result, the City has provided additional funding to supplement the farebox revenue. The City also provides the TTC with the proportion of the provincial gas tax, which is set aside for funding transit operations.

In recent years, additional Provincial and Federal funding was provided through the Safe Restart Agreement, which existed to support the reopening of the Canadian economy following the COVID-19 pandemic. This funding ended in 2022, but additional Provincial funding has been provided for transit operations for 2024-2026 through the Ontario-Toronto New Deal Agreement between the Provincial and City governments, with a focus on transit safety and the operation of Lines 5 and 6.

In the 2025 Operating Budget, 49% of funding is from the City, with 38% from passenger revenue and 7% from the Province. 4% comes from the TTC's ancillary revenues, and 2% from reserve funding.

Through the Corporate Plan, the TTC is taking steps to improve value for money in capital and operational activities and to maximize revenue through improved fare compliance and developing non-fare revenue schemes, including parking, advertising, and sponsorship.

8.4 Impact on asset management

The constrained funding environment in which the TTC operates necessitates the appropriate prioritization of spending and the ability to justify funding requests. This is vital to ensuring sufficient money is made available to maintain our Levels of Service.

The TTC is responding to this need through the development of the Levels of Service and Asset Management Objectives in sections 4 and 6 of this document, which are aligned to the organization's corporate priorities.

These will be used to incrementally develop a holistic approach to decision-making, which allows for clearer prioritization of investment needs and will support the development of whole-life costing assessments. This does not mean that all funding shortfalls will immediately be addressed, but will allow for longer-term, transparent, and risk-based choices to be made, with a clearer view of the consequences of underinvestment.

9. Risk management

Risks to assets and asset management delivery pose a threat to the TTC's ability to achieve the objectives of the Corporate Plan and the required Levels of Service. The EAM program team (see section 10.1) will work with TTC colleagues to introduce AM processes to support the identification, evaluation and management of risks in a consistent manner. In addition to asset-level risks, there are broader risks that span groups and asset types. These are summarized in the table below and represent the key challenges to delivering our Asset Management Objectives, our Corporate Plan, and Levels of Service.

These risks have been aligned to the TTC's Enterprise Risk Management (ERM) approach, which is consistent with ISO 31000 :2018 on Risk Management.

Risk	Description	Mitigation
1. Aging Asset Base	Due to the increasing age profile of the TTC's assets, there is a risk that maintenance needs will increase. This may lead to a reduction in asset availability following increased failures, and more time out of service for reactive maintenance activities. This will impact our ability to meet Levels of Service. In some cases, there could be an impact on safety where aged assets exhibit higher failure rates and push safety tolerances. **Related Enterprise risks: Worker and Customer Safety, Capital Funding Requirements**	The TTC has developed maintenance plans, which aim to preserve the performance of aged assets and maintain State of Good Repair. The TTC's budget process prioritizes capital and operational projects that support asset safety. The development of a decision-making framework will enable the prioritization of capital investment using AM objectives and provide evidence to support funding cases. **Related Corporate Plan objective: 2.4 (Prioritize Asset State-of-Good Repair to Keep the System Moving Reliably)**
2. Funding Gap	Due to the gap between required capital expenditure and capital and operational funding available, there is a risk that capital and State of Good Repair programs cannot be adequately funded, resulting in the inability of the asset base to meet Levels of Service. This may also lead to increased whole-life asset costs as suboptimal approaches (such as fix-on-fail) are adopted over more effective asset management strategies. **Related enterprise risk: Capital Funding Requirements**	The TTC has developed an Asset Management Plan setting out the level of capital and operational funding required to meet the agreed Levels of Service. Key unfunded capital investment requirements have been set out in the TTC's Capital Investment Plan, and the TTC has sought to demonstrate the value of investment in public transit through research performed with the University of Toronto Mobility Network, which supports budget submissions.

			Related Corporate Plan objective: 5.3 (Forecast Capital Funding Needs for the Long-Term)
3.	**Lack of Certainty relating to Long-Term Funding Framework**	Due to the absence of a long-term framework for capital and operational funding for the TTC, there is a risk that major projects are delayed, impacting the ability to deliver required Levels of Service and having knock-on effects on large programs, which require multiple funding streams to be agreed (i.e. Line 1 and Line 2 capacity enhancements). This will also impact the ability to develop long-term plans for procurement and may result in increased costs and project delays. **Related enterprise risk: Financial Sustainability**	As part of its Asset Management Plan, and in compliance with Ontario Regulation 588/17, the TTC will develop a life cycle management and financial strategy. This strategy will identify the costs associated with meeting proposed Levels of Service, review projected available funding, outline the proposed life cycle activities that can be undertaken within the budget, and detail how the risks associated with this approach will be managed. **Related Corporate Plan objective: 5.4 (Strengthen Partnerships to Advance Toward a Sustainable Funding Model)**
4.	**Inadequate Asset Information Management**	In the absence of standardized and integrated processes to support information management, there is a risk that the TTC has gaps in its asset data. This can hinder the understanding of asset performance and condition as well as management of fault situations. As a result, inconsistent and inaccurate information may be used in decision-making, leading to increased costs from suboptimal decisions and potential delays in the maintenance processes. **Related enterprise risk: Governance and Decision-Making**	The EAM program will deliver an Asset Data and Information Policy, which will outline the requirements and principles for asset information management. Additionally, a data management manual will be developed to detail standards and processes. The Maximo Implementation Program is standardizing the use of IBM Maximo as an enterprise asset management information system across all TTC asset classes. This will support the consistent tracking and management of all asset processes, thereby facilitating activities around performance and condition analysis and planning. **Related Corporate Plan objectives: 4.3 (Embrace Technology to Drive Efficiency and Improve Employee and Customer Experience) and 4.4 (Mature Data Analytics Capacity and Knowledge Management)**

5.	**Ability to Deliver Change**	In the coming years, the TTC will undertake major changes to its asset portfolio. These include the introduction of a new signalling system and new trains on Line 2, transitioning to a 100% battery-electric bus fleet, and assuming responsibility for the operation and some maintenance of Line 5 and Line 6. There is a risk that the changes required to facilities, equipment, skills, and processes may prove overwhelming given the organization's existing budgetary and skills challenges. This could result in delays to the implementation of these projects and incur additional costs. **Related enterprise risk: Strategy Development and Execution**	The EAM department will support change delivery through the promotion of suitable change management approaches within projects. This would involve identifying key stakeholders, assessing change impacts, and developing change and communications plans to mitigate resistance, while incorporating feedback from impacted groups. The department's involvement across programs and organizational groups will also mean it is able to promote co-ordination between change programs. The introduction of a decision-making framework will also support change management by encouraging consideration of the financial and non-financial impacts of change and taking this into account when deciding on how much change is possible at once. **Related Corporate Plan objectives: 3.1 (Build Network Capacity to Support Long-Term Growth to 2041) and 3.2 (Promote Sustainable Transportation Modes Through Seamless Connections)**
6.	**Impacts of Climate Change**	With the increasing frequency and severity of weather events, there is a risk that additional reactive maintenance activities will be required when maintenance windows are shortened due to adverse weather. This may impact performance against Levels of Service. Additionally, the uncertainty around climate change impacts also makes it difficult to plan for an appropriate level of resilience. **Related enterprise risk: Disruption**	The TTC's Innovation and Sustainability Strategy identifies the importance of adapting to climate change. The goal is to build climate resilience by identifying assets vulnerable to extreme weather events, and adopt adaptation measures. The upcoming Climate Adaptation Plan will further build out immediate actions and costs to reduce the frequency, duration, or severity of impacts from extreme weather events. **Related Corporate Plan objective: 3.3 (Minimize Environmental Impacts and Build Resiliency for a Climate-Changed Future)**

7. Supply Chain Challenges	Due to the age and specialized nature of the TTC's assets, historic contract issues, global supply chain shortages, and the introduction of new technologies, there is a risk that the supply chain may not be able to meet the TTC's needs. This may result in asset availability issues relating to obsolescence and availability of materials, along with impacts on cost and delays to program delivery. **Related enterprise risk: Third-Party Vendor Performance**	The TTC Corporate Plan sets out several steps to improve supply chain issues (under the heading "Improve Supplier Relationships, Focus on Performance", including further development of category and materials management strategies, supply chain diversification, and use of shared procurement opportunities with government partners, where beneficial. **Related Corporate Plan objective: 5.1 (Improve Value for Money, Focus on Efficiency)**
8. Insufficient Qualified and Experienced Personnel	Due to the increased amount of capital and maintenance activities required, the competitive local labour market, and the new skills required to manage new types of technology, there is a risk that the TTC may lack sufficiently qualified and experienced personnel to perform required asset management activities. As a result, important capital and maintenance work is delayed, impacting performance. **Related enterprise risk: Recruitment and Retention**	The TTC has committed to developing a workforce plan and strategy, which will address the skills gaps faced in the short-, medium- and long-term. It will also perform a compensation review and develop an employee value proposition to support recruitment and retention. **Related Corporate Plan objective: 1.2 (Adapt to a Changing Labour Market)**
9. Insufficient Access to Right of Way Assets to Perform Maintenance	With the growing need for maintenance and renewal work on our subway and streetcar linear assets, there is a risk that insufficient maintenance access time is provided due to pressure to reduce maintenance windows in favour of short-term service availability and frequency. This could lead to increased degradation of the asset base and an impact on safety, reliability, and service performance. **Related enterprise risk: Disruption**	Develop long-term asset management plans, which balance operations and maintenance priorities and incorporate maintenance and access requirements. Create processes to incorporate these requirements into the development of the service and maintenance plans. Work with other stakeholders (i.e. the City) to ensure sufficient access is provided for maintenance of assets where their co-ordination is required (i.e. for Streetcar Way and OCS). **Related Corporate Plan objective: 2.4 (Prioritize Asset State of Good Repair to Keep the System Moving Reliably)**

10. Improving our asset management capabilities

To deliver the Corporate Plan and Levels of Service, it is necessary for the TTC to improve capabilities across the organization. This is a necessary step in modernizing the TTC and a journey that many other asset-intensive organizations around the globe are also undertaking.

The TTC has initiated the Enterprise Asset Management (EAM) program under the Head of EAM to deliver improvements to its asset management capabilities. This section describes the EAM program that will take several years, leveraging industry standard approaches to improve capability in this area. Information is provided about the program overall, with a focus on the key areas for improvement in relation to asset management planning (section 10.1.1), asset risk management (section 10.1.2), and asset information management (section 10.1.3).

This section also provides information about the strategic plans that need to be developed at an asset level. These asset-level strategies will form the basis for more detailed plans to deliver the required Levels of Service set out in this document and in the TTC's Asset Management Plan.

10.1 TTC's Enterprise Asset Management Program

The EAM program commenced in mid-2023, and began with an assessment of the current state of maturity across the organization, using the 39 Subjects of Asset Management (as developed by the Global Forum for Maintenance and Asset Management and the Institute of Asset Management) as a benchmark. This assessment identified a maturity level against each subject and provided a set of maturity recommendations.

Subsequently, the project detailed a series of asset management capabilities that the TTC should develop and created a project roadmap setting out the work streams required to enable asset management maturity to be improved.

The work streams sit in three groups, which are shown below and in Figure 10-1 – TTC EAM Program:

- **Maturing AM Processes** – This looks at the processes, information, people, and technology, which interact directly with assets. This includes activities across the asset life cycle (acquisition, operations, maintenance, and disposal) as well as those which direct these activities in the form of strategy and plan development, and decision-making mechanisms.
- **Maturing Ways of Working** – In addition to the areas directly interacting with assets, there are a series of business capabilities, which are required to ensure successful asset management. These include ensuring that appropriate governance is in place, data is available and project and change management methodologies are in place. There are also business capabilities where alignment with asset management is required, including IT Services, Finance, People, and Procurement and Category Management. The roadmap plans for collaborative work streams to design and embed aligned ways of working.
- **Embedding AM Improvements** – The activities performed in the other work streams need to be embedded across the TTC groups – primarily those with direct responsibility for assets, i.e. Transportation and Vehicles, Operations and Infrastructure, Engineering, Construction and Expansion, and in the EAM team itself. This embedment activity will take place throughout the life of the EAM program to ensure continual improvement.

TTC Enterprise Asset Management Program Roadmap

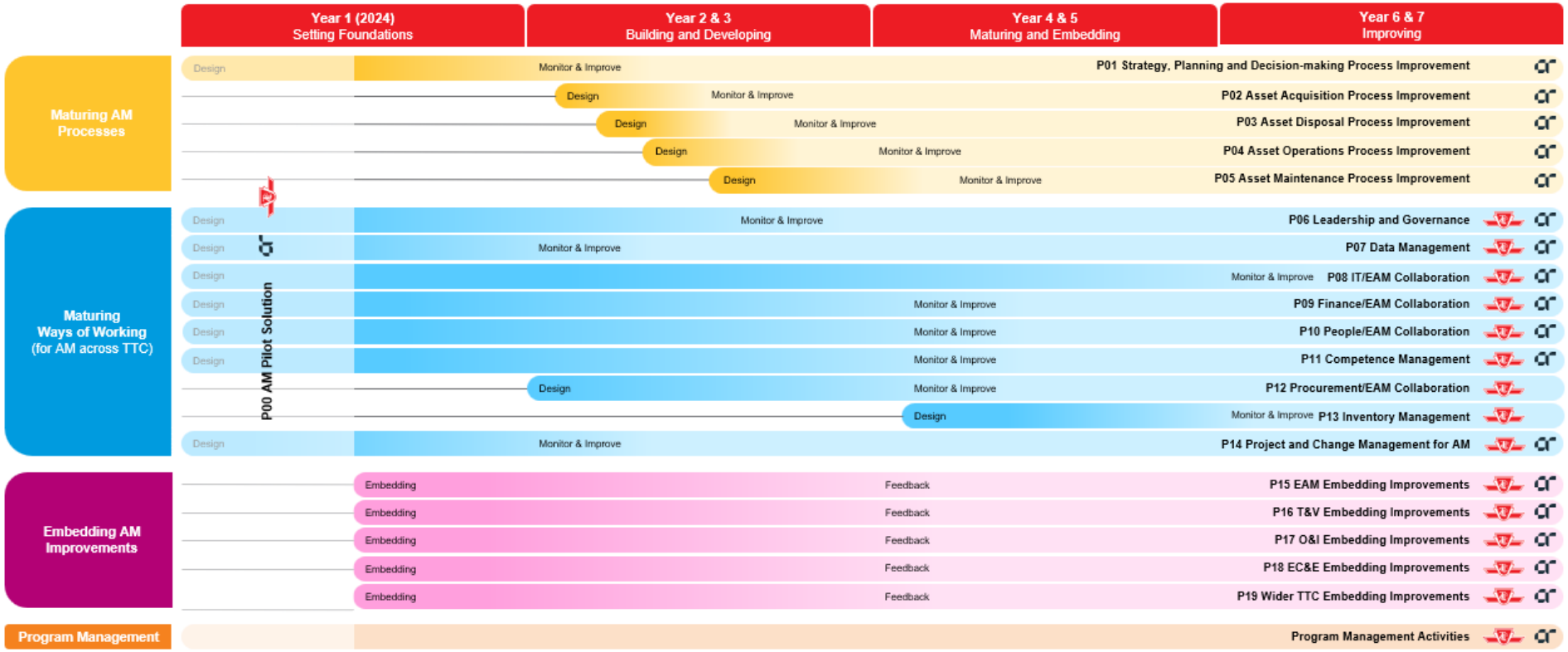


Figure 10-1 – TTC EAM Program Roadmap

TTC Asset Management Maturity Journey

Implementing and embedding the level of change required across the TTC to achieve AM maturity is a long-term process, but value can be driven from outcomes along the way. Figure 10-2 below shows the planned organizational maturity journey through 2030 and beyond:

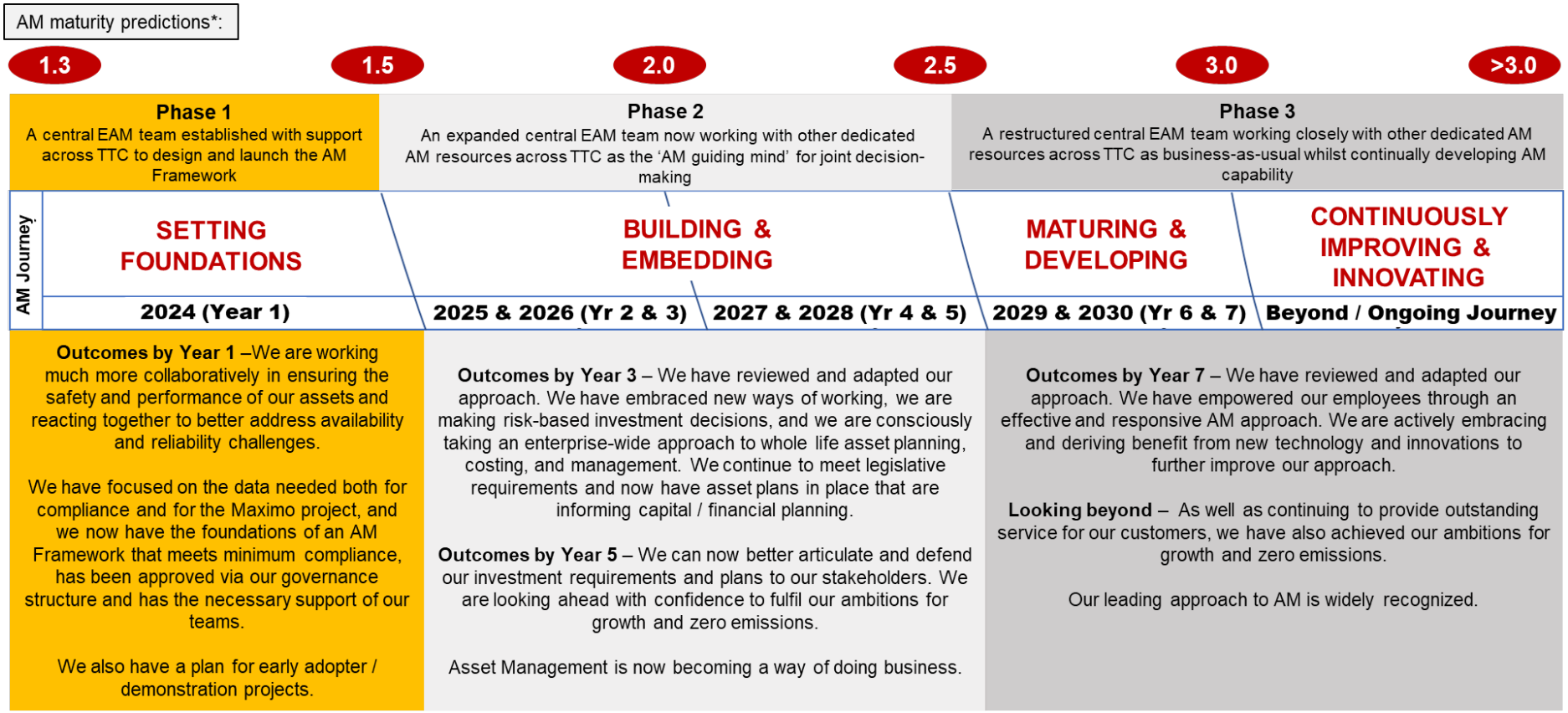


Figure 10-2 – Planned Organizational Maturity Journey

10.2 Focus areas for AM improvement

There are four specific areas of focus for improving our asset management capabilities. These areas are included in our Asset Management Objectives and will be addressed as part of our Roadmap.

10.2.1 Asset Management Decision-Making

In addition to developing asset-level strategies to enable more effective decision-making (see section 10.2.2), the TTC also plans to create a strategic asset management decision-making framework. Its purpose is to establish a more holistic, long-term approach to investment planning across asset types. It will be delivered through work stream P01 (Strategy, Planning and Decision-Making Process Improvement) as set out in Figure 10-1.

10.2.2 Asset Management Planning

The TTC has already developed an enterprise-level Asset Management Plan (AMP), which meets the requirements of O. Reg 588/17, and which sets out the life cycle activities, costs, and risks for key asset types.

The TTC will develop more detailed asset-level strategies, which set out more specifically how these life cycle activities will be delivered, enabling operational decision-making and informing investment planning decisions. This capability will be delivered through work stream P01 (Strategy, Planning and Decision-Making Process Improvement) as set out in Figure 10-1. The asset strategy statements included in section 10. and 12. Appendix B are the starting point for these more detailed asset-level strategies.

10.2.3 Asset Risk Management

An approach to asset risk management that is common across the organization and aligned to the TTC's Asset Management Objectives is necessary to ensure that risks are adequately identified, prioritized, managed, and reported in a way that enables an effective use of resources across the TTC.

The EAM program will develop an Asset Risk Management Framework, which will set out the approach to risk management and detail roles and responsibilities across the different groups. This approach will be aligned with the TTC's Enterprise Risk Management (ERM) approach, in order to support line of sight in risk management and enable the escalation of risks, where necessary. This will be delivered through work stream P01 (Strategy, Planning and Decision-Making Process Improvement) as set out in Figure 10-1.

10.2.4 Asset Information

The TTC recognizes that high-quality asset information is critical to the effectiveness of asset management activities, and that the value it provides to the organization should be reflected in the amount invested in asset information management. As such, the TTC will identify the asset information required to achieve its Asset Management Objectives and Levels of Service, and the Asset Data and Information Policy shall be used to guide the way in which asset information is managed.

The TTC also recognizes the need for suitable IT systems to support information management processes. It is in the process of implementing Maximo across key asset types. Maximo is an enterprise asset management information system that supports life cycle activities. The TTC will also review other systems requirements to perform the activities supporting its Asset Management Objectives. This includes the evaluation of new technologies as they become available, such as improvements in real-time condition and performance monitoring and technologies, which improve the ability to evaluate and generate insights from data. Asset

information activities will be delivered through work streams P07 (Data Management) and P08 (IT/EAM Collaboration) as set out in Figure 10-1.

While overall responsibility for asset information standards sits with the EAM program, individual groups and departments will be responsible for the information they create and use, and they will incorporate this into their business planning and work activities.

10.3 Asset-level strategic statements

These strategic statements set out actions the TTC would like to take to develop asset management capability at an asset level during the next five to 10 years. They set the direction for more detailed planning to achieve our Asset Management Objectives in section 6, and meet the Levels of Service described in section 4.

They have been split into a series of statements, which apply to **all** the TTC's asset classes, and those which apply to a particular asset class can be found in section 12. Appendix B. More information about the detailed asset interventions can be viewed in the Asset Management Plan.

10.3.1 Strategic statements applying to all asset classes

Delivery area	
Asset-level Strategies	We will develop asset-level strategies for each asset class, setting out how asset Levels of Service will be met, the approach to life cycle management and options for investment to meet service levels, and identify and mitigate key risks, leveraging decision-making tools, where appropriate.
SOGR	We will define the State of Good Repair for each asset class in relation to the level of service it is required to provide and seek to maintain assets in a condition commensurate with SOGR.
Configuration management	We will develop an approach to managing the configurations of our assets in each asset class, including the management of configuration changes, to provide additional controls around cost, maintenance, compliance, safety, reliability, and performance.
Skills	We will define the skills and competences needed to manage each asset class and undertake training and recruitment programs to ensure we have sufficient trained personnel.
Data	We will identify the data required to make more effective decisions about each asset class and develop a resourced approach to consistently collect and manage it.
Demand	We will assess the needs for each asset class, including changes in demand, and use this to inform planning and decision-making.
Resilience	Our asset-level strategies will incorporate the need to adapt to climate change, understanding their vulnerability to extreme weather events, and designing mitigating actions to reduce their impact on services and assets.
Supply Chain	We will review the ability of our supply chain to support across the life cycle of each asset class, and develop commercial strategies to ensure resilience and improve cost performance.
Compliance	Our asset-level strategies will include content that addresses compliance with relevant legislation, policies, and strategies, including the AODA Integrated Accessibility Standards and TransformTO Net Zero Strategy.
Customer Satisfaction	We will incorporate customer views and feedback into the life cycle management approach we develop for our assets.

11. Asset Management Governance

The TTC has established an asset management governance approach, which sets out the high-level responsibilities for the EAM program within the organization.

11.1 TTC Board

The TTC Board is responsible for:

- Approval of the TTC Asset Management Policy, Strategy, and Plan; and
- Endorsement of the TTC Capital and Operating Budgets and recommendation to City of Toronto Council to approve.

11.2 Executive Committee

The Executive Committee holds ultimate responsibility for the success of asset management within the TTC, and ensuring that the intended results are achieved. The Chief Capital Officer acts as the executive sponsor for asset management, acting as a champion for asset management at the TTC, and supporting the asset management transformation from the Board and Executive level downwards within the organization.

11.3 Head of EAM

The Head of EAM is responsible for:

- Defining the activities required to deliver the AM Strategy and Objectives, as well as compliance with O. Reg. 588/17;
- Monitoring the performance of the TTC against the AM Objectives and managing asset management change and transformation activities; and
- Acting as Chair of the Project Steering Committee and ensuring it executes its responsibilities.

12. Conclusion

This first edition of the TTC's Asset Management Strategy has highlighted the critical role of our assets in delivering a safe, sustainable, and accessible public transit system, in support of our Corporate Plan and Levels of Service.

Together with our Asset Management Policy and Asset Management Plan, this document lays the foundations for an Asset Management Framework upon which the TTC can develop its capabilities. This document needs to be followed with action, and its content helps set the direction for an organization, which plans and delivers more holistically, more transparently, and for the long-term, using and improving our data for this purpose.

We are committed to maintaining and improving our transit network and our asset management capability. To ensure the continued relevance and accuracy of this document, it will be reviewed regularly and updated as our asset management approach matures, or when significant changes to our corporate approach or our asset base make it necessary.

Continual improvement includes incorporating the feedback of our stakeholders. If you would like to offer feedback or suggestions about this Strategy, you are welcome to contact us using the details on the TTC website. Thank you for your engagement with this Strategy.

Appendix A. Key Stakeholders

Further to section 7, the table below details how the TTC's approach to asset management supports the requirements for each of its key stakeholder groups:

Stakeholder group	Stakeholder interests	How TTC asset management supports stakeholder interests
Employees and labour unions 	Safe and reliable assets	▪ Sets Levels of Service for each asset so that the condition required to deliver safety and reliability is understood and managed in decisions (see the AMP for further information). ▪ Sets the framework for asset-level planning. These detailed plans set out the life cycle activities required to deliver safe assets and provide evidence for investment.
	Skills development	▪ Long-term asset management planning will establish the activities needed to meet Levels of Service. ▪ This information informs the TTC's comprehensive Workforce Plan and Strategy, and learning and development plan.
	Information for decision-making	▪ An Asset Data and Information Policy has been developed, which will set out the requirements and principles around asset information management. In addition, a data management manual was created, and a data gap analysis is being completed against this. It will provide the basis for the TTC to ensure all information required to support those working with assets is in place.
	Personal safety	▪ Assets that exist for employee safety will be included in asset management plans, with set Levels of Service to ensure service can be provided.
Customers and residents 	Safe, reliable, frequent, comfortable, and accessible service with clean stations and vehicles	▪ Assets that exist for customer safety and facility cleanliness will be included as part of asset management plans, with set Levels of Service and AMPs to ensure service can be provided. ▪ AMPs will contain a Levels of Service reflecting agreed service standards in the Annual and Five-Year Service Plans and the Accessibility Plan. ▪ The strategy sets a framework for the development of AMPs, which set out asset life cycle activities and provide the evidence required to support investment in capital and maintenance activities to ensure asset reliability in line with required Levels of Service. ▪ Inclusion of reliability, safety and accessibility as objectives and factors in the decision-making framework.
	Real-time updates on schedules and delays	▪ Assets supporting real-time updates to be included in AMPs, with Levels of Service, etc. ▪ Our strategy statements commit to incorporating customer views and feedback into the life cycle management approach we develop for our assets.
	Jobs for local people	▪ AM Planning will provide the case for investment in transit, thereby supporting the creation of jobs directly and indirectly. It will also set out the needs for capital and maintenance activities, supporting the TTC in putting together resourcing plans, which will include training and recruitment needs, both through direct employment and in their supply chain.
	Civic pride	▪ AM Objectives and the Levels of Service contained within AMPs will reflect the transit priorities of the Mayor, City Council, and the TTC Board, who all answer to Toronto citizens.
	Integration with active transportation modes	▪ Assets that support active transportation (i.e. bicycle storage) to be included in AMPs.

Government partners (provincial & federal) 	Encouraging economic growth	▪ AM Strategy supports effective cost-benefit analysis of all asset projects, considering long-term impacts on the economy.
	Reducing cost burden on taxpayers	▪ AM Strategy supports efforts to reduce whole-life cost, and thereby deliver cost efficiencies in the capital and operating budgets.
	Helping low-income people	▪ AM Planning will provide the case for investment in transit, providing improvements in existing service and opportunities for new service for people who rely on transit.
	Job creation and training	▪ AM Planning will provide the case for investment in transit, thereby supporting the creation of jobs directly and indirectly. It will also set out the needs for capital and maintenance activities, supporting the TTC in putting together resourcing plans, which will include training and recruitment needs, both through direct employment and in their supply chain.
	Environmental protection	▪ Environmental goals will be included in the AM Objectives, and environmental impact will be part of the value framework for decision-making.
	Design excellence in infrastructure planning	▪ Through the implementation of whole-life costing, the case for robust design practices will be evident and encouraged across the TTC's projects.
	Accommodating population growth in the GTA	▪ AM Planning will incorporate demand analysis reflecting population increase and related land use and city planning changes.
	Financial sustainability for the City	▪ AM Planning will provide details of long-term financial needs, allowing financing decisions to be made. ▪ AM Strategy supports efforts to reduce whole-life cost, and thereby deliver cost efficiencies in the capital and operating budgets. ▪ The AM Strategy will enable linkages between Levels of Service and cost to be seen, allowing the City to make decisions on their chosen Levels of Service and support considerations around funding sources.
Regional transit partners (Metrolinx & neighbouring regional transit agencies)  METROLINX	Co-operation on planning and delivery of construction, operations, and maintenance.	▪ AMPs will incorporate the TTC's responsibilities in relation to the management of assets on Lines 5 and 6. ▪ The TTC will work with Metrolinx and neighbouring transit agencies on joint asset management planning, through the interface set up by the Head of EAM. ▪ Asset data will be co-ordinated through TTC/Metrolinx interfaces. ▪ The TTC to provide input to life cycle asset management activities to ensure AM objectives of both Metrolinx and the TTC are met, looking at whole-life cost, risk, etc.
City of Toronto TORONTO	Growth linked to transit (i.e. transit-oriented development)	▪ AM Strategy supports effective cost-benefit analysis of all asset projects, considering long-term impacts on the economy.
	Reduction in greenhouse gas emissions	▪ Environmental goals will be included in the AM Objectives and environmental impact will be part of the value framework for decision-making.
	Modal shift to from cars to transit	▪ AMPs to incorporate projects incorporating modal shift.
	Economic fairness	▪ AM Planning will provide the case for investment in transit, providing improvements in existing service and opportunities for new service for people who rely on transit.

Appendix B. Asset-Level Strategic Statements

Further to section 10.3, these tables provide summary information about each of our asset classes and set out the strategic approaches to be adopted in their management over the next decade. They serve as the starting point for more detailed asset-level strategies, which will be developed and refined over the coming 5-10 years.

Table 12-A – Buses

Buses	
Asset Headlines	**Planned Investment to 2034**
• 2,112 accessible buses: diesel, hybrid, and electric • 162 regular and 27 overnight routes • 268 Wheel-Trans buses • Condition ranging from 'Good' to 'Adequate'	• $1.2 billion for new battery-electric buses • $18.5 million for new Wheel-Trans buses • $753.4 million for bus overhaul to maintain state of good repair

Key Risks

1. Funding shortfalls for battery-electric bus procurement post-2025 will lead to increased operating expenditure, due to an increase in maintenance required on the aging fleet. Service will be impacted through a deviation from proper life cycle management and potential fix-on-fail maintenance routines.
2. Funding shortfalls for bus overhauls will result in preventative maintenance programs no longer being implemented, leading to a reliance on fix-on-fail maintenance and subsequent impacts on service.
3. Adapting to electrification across the Bus Maintenance and Shops Department and wider organization requires modification, conceptual change and a new maintenance approach to delivering service across the fleet, facilities, workforce skills processes, service, and support equipment.
4. The supply chain has little operating experience with supplied equipment due to electrification, which causes longer lead times, higher costs, and lower reliability and availability of materials to maintain the revenue bus fleet. The supply chain is further disrupted by the lingering effects of the COVID-19 pandemic by long lead times for many critical spare parts, leading to compressed design schedules allowing submission of bills of materials well in advance of work starting. This lead time reduces resilience and increases warehousing costs.
5. Configuration inconsistencies across the fleet has led to exponential complexity and difficulty in material management, training, diagnosing, and overall management of such a diverse fleet. Introduction of further variations to the fleet would increase risk to meeting the required service levels.

Delivery area	Bus Asset Management Strategy
Sustainability	In line with the Innovation and Sustainability Strategy, we will only procure battery-electric buses as they reach end of life, with a fully zero emission fleet by 2040, and will develop the required skills, tools, and capabilities to maintain those assets.
Growth	We will review the size of our bus fleet to ensure it is able to deliver the service plan reliably over the coming years. If necessary, we will increase the size of the bus fleet to meet the needs of the service plan and customer demand.

Spares	We will develop a spares strategy for buses, which balances cost and service resilience and develop plans to have sufficient spares.

Table 12-B – Subway Track

Subway Track	
Asset Headlines	**Planned Investment to 2034**
• 70 kilometres of mainline subway track • 3 active lines • 2 categories of track – 'Mainline' and 'Yard' tracks • 5 sub-asset categories: Rail, Ties, Ballast, Slab Track, Fasteners, and Switches • Condition ranging from 'Excellent' to 'Marginal'	• $359.7 million for subway track to maintain state of good repair between 2025-2034 • $230.5 million to maintain state of good repair between 2035-2039

Key Risks

1. Shortfalls in funding results in deferred maintenance and the ability to perform preventive maintenance that the system requires to deliver on customer LOS expectations, leading to restricted speed zones. Compounding the problem is the fact that aging assets, such as those included in subway track require a more intense maintenance regime, with deferred maintenance further increasing risk.
2. Issues with data quality and a low asset condition confidence indicates that the condition data used for investment planning across the Subway Track asset class do not reflect the realistic investment need, with a greater value likely to be required than can be reported using data collated in the current asset management planning process.
3. Short time windows to perform maintenance during non-revenue hours reduces the capacity to deliver work. A backlog is more likely to develop if the required maintenance and renewal activities cannot be completed during the window, and track issues that lead to restricted speed zones will take longer to fix.

Subway Track Asset Management	
Journey times	In developing our asset management plans, we will consider the trade-off between the impact of line closures for maintenance works and the impact of restricted speeds where maintenance work has been delayed or deferred.
Inspections & Maintenance	We will document a robust inspections and maintenance plan to ensure the safety and reliability of subway tracks and extend the asset lifespan; taking steps where possible to minimize disruptions to passenger service.
Reliability and service recovery	We will enhance the resilience of our subway tracks by implementing advanced materials, such as composite ties and leveraging innovative engineering practices, conducting regular stress tests, and developing comprehensive emergency response plans. Continuous assessment of track condition and performance to refine investment strategies is another exercise we plan to act on.
Renewal	Considering track condition, increased wear through higher train frequencies and the backlog of track replacement work, we will increase the volume of track replacement delivered annually to reduce asset failures.

Table 12-C – Industrial Equipment

Industrial Equipment	
Asset Headlines	**Planned Investment to 2034**
• Over 9,000 small industrial equipment items • Over 2,500 large industrial equipment items	• $1.5 million funded investment between 2025-2034, with $2.7 million SOGR gap

Key Risks

1. High-cost industrial equipment has limited redundancy. Equipment, such as train washers, vehicle hoists, and wheel turn machines are critical to service delivery. Long-term loss of this equipment risks affecting service availability and/or quality.
2. The criticality of industrial equipment to maintaining service delivery is not always well understood or documented, primarily due to a lack of data of the Industrial Equipment asset base. Therefore, it is difficult to prioritize investment for Industrial Equipment and link this to service delivery.
3. Lack of suitable vendors to design, build, and manufacture the industrial equipment needed by the TTC risks delays in obtaining the equipment necessary to maintain service delivery.
4. Lack of sufficiently skilled resources to support the process of procuring and specifying equipment risks further delays in obtaining the necessary equipment.

Industrial Equipment Asset Management	
Growth	We will upgrade and integrate new industrial equipment where necessary at bus, subway, and streetcar facilities to accommodate additional vehicles, and the new equipment required to support battery-electric buses and new subway train types. We will develop the required skills, tools, and capabilities to maintain those assets.
Criticality	We will establish the criticality of industrial equipment in relation to delivering maintenance to ensure the service of the related assets and reflect that criticality in our asset management planning.
Inspections and Maintenance	We will establish the condition of all critical industrial equipment by enhancing our inspection and monitoring program. This will include regular condition assessments so we can ensure timely replacement of equipment.

Table 12-D – Streetcar Fleet

Streetcar Fleet	
Asset Headlines	**Planned Investment to 2034**
• Recently renewed streetcar fleet • 233 Low Floor Light Rail Vehicles (LFLRV). • Average asset age of five years. • Overall condition of fleet is 'Good' (average condition score 2.06).	• $144.2 million funded for purchase of new vehicles • $197.5 million funded with a further $412.3 million in funding required for streetcar overhaul to uphold state of good repair between 2025 and 2039 • $107.5 million of intergovernmental funding for streetcars and the Hillcrest expansion will be provided between 2025-2034

Key Risks

1. As the LFLRV fleet approaches the age at which mid-life overhaul is due, there is a risk that without proper funding for the overhaul program there will be a reliance upon fix-on-fail maintenance regimes leading to service disruption. Furthermore, existing maintenance facilities are not sufficient to support the required work.
2. Some of the equipment on streetcars currently has components that are now obsolete, resulting in equipment failure with no possibility of replacement of the appropriate component.
3. Many of the components on streetcars can only be obtained from a single supplier. If the component is out of stock or they are unable to fulfil the request, there are no alternative suppliers available with the current procurement arrangements. Having a single supplier also risks cost escalation and unaffordability.
4. Other suppliers who may be able to supply parts or components are being prevented from doing so due to contractual arrangements with the OEM, risking a delay in acquiring parts.
5. Some equipment on the TTC streetcars is bespoke to those vehicles and can be expensive to develop and replace. This also means that equipment is not readily available when required and streetcars may remain out of service for longer than is necessary.
6. Due to increasing obsolescence and single-source suppliers, there is a need to increase the technical workforce, but there is a risk that these technical resources will not be readily available, which may limit the ability of the Streetcar Maintenance team to undertake the work required to maintain service.

Streetcar Fleet Asset Management	
Growth	To meet growing demand on the streetcar network, we will increase our capacity with 60 new streetcars by 2026, including additional capacity to store, maintain and operate them through our investments in the Hillcrest Facility and Yard and Russell Carhouse.
Overhaul	We will use our asset management planning process to ensure that a mid-life overhaul program is developed, which maintains Levels of Service and provides value for money relative to other maintenance options.
Design for Maintenance	Future specifications for streetcars will seek to avoid the use of bespoke parts, and we will specify a minimum of two alternative components for replacement parts.

Table 12-E – Streetcar Overhead Contact System (OCS)

Streetcar Overhead Contact System (OCS)

Asset Headlines

- Tangent – 95 km (double track)
- Intersection and loops – 106km
- Underpass (15 in total) and Tunnels (2 in total) – 1.5km
- Yards – 20km
- Trough – 1.28km
- Section Breaker – 103
- Pole ~ 5320
- Self-Tensioners – 82
- Door Bridges – 51
- Sectioners – 582
- Diodes – 203
- Track Switches – 671 (including OH & SCW)
  - OH Switches ~ 350
- SCW Switches – 671
- Contact Wire Assemblies
  - Average asset age 8.5 years
- Traction Power
  - Positive Feeders – 403km
  - Negative Feeders – 51km
  - Duct Bank
  - Cable Chambers
  - Average asset age of 55 years.
- Asset condition ranging from 'Excellent' to 'Good'

Planned Investment to 2034

- $96.3 million funded capital on OCS between 2025-2034
- $191.7 million required between 2025-2034 to maintain LOS

Key Risks

1. Asset condition and value data has low confidence ratings due to significant missing data while it is loaded into Maximo. Life cycle investment models are immature and not likely to reflect the true investment needs for the OCS class. Continued effort is required to add historic asset data to the asset management system and adopt the use of Maximo, as intended.
2. Significant shortfalls in funding to replace key sub-asset groups may lead to deferred maintenance, which will increase the risk of asset failure and delay the pantograph-only conversion during the overhead rehabilitation program.
3. With limited access to the network each year, OCS teams must make the most of the available maintenance windows. The team completed more preventative maintenance activities than planned in 2024; this must continue and also apply to capital work.

Streetcar OCS Asset Management

Renewal	We will enhance OCS system reliability through complete overhead network upgrade from legacy trolley pole to pantograph OCS by 2045. This will minimize pantograph damage and reduce service disruption, resulting in a safer and more dependable streetcar service.
Data	We will develop and use a centralized database of Overhead Operations assets across department to ensure an accurate and complete asset database is available, including a centralized switch inventory, for the purpose of operational decision-making and optimize resource allocation. We will collect and track appropriate and relevant data regarding fail-to-operate switch emergency calls, including but not limited to switch IDs, number of calls, and their results. Data will then be collected to perform root cause analyses and investigation with the goal of reducing the number of fail-to-operate switch emergency calls.

Stakeholder Engagement	We will engage with our stakeholders with the aim of increasing access to our network for maintenance, in a way which minimizes delays and maximizes network availability. We will develop a stakeholder charter, which will identify internal/external stakeholders and communication methodologies to prioritize their needs along with ours.
Growth	We will build and expand loops as necessary to facilitate multimodal integration and support modal shift to public transit, including at the future Park Lawn GO Station. Additionally, we will proceed with the East Harbour and Waterfront West and East streetcar extensions, subject to funding availability and plan approvals.
Inspections and Maintenance	We will adopt a condition monitoring process with defined inspection frequencies, and we will introduce new tools and technologies (i.e. LiDAR, AI automated inspection and IoT sensors) to perform real-time condition monitoring. We will develop a maintenance framework which focuses on high-risk components and key failure modes, to avoid unplanned outages.
Cost effectiveness	We will adopt strategies that allow asset life extension where this reduces whole-life cost. We will introduce new technologies, which will allow for remote monitoring and condition assessments, removing the need to mobilize maintenance crews for unnecessary or no trouble found calls. We will optimize the entire streetcar OCS network with full pantograph mode operation to eliminate legacy trolley pole hardware causing failure and reduce carbon usage as a measure of cost effectiveness.
Performance monitoring	We will perform periodic reviews of actual versus planned performance and use the information to improve our asset management strategies and planning.
Risk	We will adopt a standardized approach to risk assessment and monitoring across the department to improve risk identification and prioritization across different risk categories.

Table 12-F – Streetcar Way (SCW)

Streetcar Way (SCW)

Asset Headlines		Planned Investment to 2034
Track Tangent/Curved Track • Carstops • Rail • Wayside Lubrication – 90 • Track Drains – 465 • Expansion Joints – 108 • Track Substructure • Track Structure	Special Trackwork ○ Track Structure • Track Substructure • Switch – 666 • Mate • Frog • Closure Rail – 33 • Diamond Average asset age of 20 years. Condition ranging from 'Excellent' to 'Marginal'	• $474.1 million planned capital investment between 2025-2034 to maintain SOGR • $371.7 million additional investment required between 2025-2034 to sustain LOS

Key Risks

1. Currently, the Streetcar Way Operations team is under-resourced, posing significant threat to the service levels of the Streetcar Way operations department. Streetcar Way Engineering is also under-resourced. Service disruptions, reduced maintenance and slow response times may come as a result.
2. Lack of approved funding for tangent track assets results in an insufficient renewal rate and could lead to restricted speed zones/slow orders, weekend/multi-day service diversions or closures, and emergency service interruptions. Even when attempting to utilize more operating resources within preventive or corrective maintenance programs, the TTC may find it necessary to plan and prioritize the renewal of some rail corridors at the expense of others.
3. The specialized nature of Streetcar Way assets can result in risks related to the supply of materials. In the case of manganese casting used for Streetcar Way, the TTC risks a monopoly from one supplier, which in turn risks service if this supplier cannot provide the required materials.
4. There is a significant risk that right-of-way access problems will prevent our teams from delivering the required work to keep Streetcar Way in a State of Good Repair. Streetcar assets are in shared City space, and to deliver most works requires extensive forward planning with the City of Toronto, its inhabitants, and other services. While we have good relationships and work continuously with these third parties, there remains a risk that the TTC will not be able to obtain sufficient access to deliver all the required works.

SCW Asset Management

Stakeholder Engagement	We will engage with our stakeholders with the aim of increasing access to our network for maintenance, in a way that minimizes delays and maximizes network availability. We will develop a stakeholder charter, which will identify internal/external stakeholders and communication methodologies to prioritize their needs along with ours.
Inspections and Maintenance	We will implement advanced scheduling and communication technologies to optimize Streetcar Way linear infrastructure asset inspection and maintenance planning.
Cost effectiveness	We will target renewals to ensure they provide the greatest return on investment through the development of a strategic funding allocation plan.

Performance monitoring	We will create leading KPIs to manage potential speed restrictions and service diversions or closures, and emergency service interruptions.
Risk	We will prioritize critical track rehabilitation through a data-driven risk assessment matrix to maintain asset reliability, safety, and operational efficiency.

Table 12-G – Subway Fleet

Subway Fleet

Asset Headlines	Planned Investment to 2034
143 Fully Accessible Subway Trains (formed from a total of 849 subway cars) Two generations of vehicle: 61 T1 Rapid Transit Trains (368 cars), and 82 TR Toronto Rocket Trains (480 cars) Average age: T1 Rapid Transit – 25 years; Toronto Rocket Train – 10 years Average Condition Score 'Good': T1 Rapid Transit – 2.05; Toronto Rocket Train – 2.12	• $390.4 million and $217.5 million has been planned for TR and T1 subway car SOGR programs respectively between 2025-2034 • $283.8 million investment planned for Line 1 subway car purchases to support growth • $2.2 billion investment planned for the replacement of Line 2 subway cars

Key Risks

1. Aging assets require increased maintenance to counteract the higher fault rate. As a greater number of assets move toward end-of-life, the increased maintenance demand poses a risk of reduced service, as more vehicles are taken for repair at a given time.
2. An aging fleet has the resultant impact that much of the technology on board the vehicles is obsolete or nearing obsolescence, which removes access to spare components, causing difficulty with maintenance and subsequently impacting service.
3. Global supply chain disruption and lingering effects from the COVID-19 pandemic have contributed to very long lead times (greater than one year) for many critical spare parts. Bills of materials are now typically submitted two years before work starts, which compresses design schedules, reduces resilience, and increases warehousing costs.
4. TR SOGR funding interruption in 2026-2028 risks inability to deliver SOGR work, which elevates risk of service disruptions. T1 vehicles are also approaching the end of design life with no fully funded replacement program. Funding interruptions prevent development of long-term relationships with supply partners, increasing supply chain challenges and costs.
5. Challenges around retention and recruitment of appropriate talent risks a shortfall in the required numbers of personnel to undertake the activities required to maintain service and SOGR. An increase in rail construction has led to a decrease in the talent pool available locally.
6. There is a risk to the available capacity on Line 1 if funding is not received for new trains or life extension programs.

Subway Fleet Asset Management

Renewal	To maintain a reliable service, in light of the long-term condition prognosis of our T1 trains we will retire them from service and replace them with 55 new subway trains on Line 2. Until the new trains can be introduced, we will develop a life-extension program for the T1 fleet, aiming to maintain Levels of Service and manage costs.
Growth	To maintain headways following the Scarborough Subway Extension and the Yonge North Subway Extension, we will purchase an additional 15 trains, funded by Metrolinx. To accommodate predicted passenger growth, we will contract for an option to purchase 25 trains for Line 1 (by 2032), and a separate option for a further 17 trains to accommodate growth on both Lines 1 and 2 (post-2032). New trains will be specified to have additional passenger capacity than T1s to allow more passengers to be carried. They will also be specified to support ATC signalling, enabling reduced headways and allowing more trains to operate.

Table 12-H – Non-Revenue Vehicles

Non-Revenue Vehicles	
Asset Headlines	**Planned Investment to 2034**
659 Non-Revenue Surface Vehicles and Equipment (automotive on-road vehicles, off-road equipment and trailers) 77 Non-Revenue Rail Vehicles including, but not limited to, tunnel leak cars, asbestos crew cars, ballast cars, snow blowers, flatcars, and inspection vehicles Average age: Surface Vehicles and Equipment – 10.2 years; Rail Vehicles – 18.2 years	• $64.1 million investment planned for the purchase of surface non-revenue vehicles between 2025-2034 • $62.9 million in investment planned for the purchase of rail non-revenue vehicles between 2025-2034

Key Risks

1. Current funding levels will not facilitate a fleet that has an average age of 'mid-life', so certain vehicles are exceeding their life expectancy. Funding is required for vehicle purchases, but also for resources to produce vehicle specifications. There is a risk of an increase in associated maintenance costs and faults and that service levels cannot be maintained as the fleet requires additional maintenance and repair.
2. There is currently a low-medium risk that as the number of EV vehicles in service increases (as the TTC transition to an EV fleet) they may not be supported by an appropriate level of EV charging facilities and other infrastructure to support effective maintenance and repair activities. The performance and reliability of this new evolving technology is also not yet well understood. This may lead to delays and a reduction in the availability of the non-revenue fleet and adversely impact the service levels of these vehicles.
3. Spatial requirements within the Duncan facility do not meet current and future fleet requirements, with the existing facility likely to be insufficient to undertake work efficiently on an expanded fleet.
4. Difficulties and complexities in communicating requirements is impacting procurement timescales. Current procurement leads are approaching 30 weeks, far exceeding targets of 16-18 weeks, which negatively impacts the ability to put out a scheduled service.
5. Delays to the repair and modification of existing rail vehicles and the acquisition of new vehicles may result in a shortfall of necessary resources to undertake essential repairs and maintenance to subway infrastructure, resulting in a reduction in performance of the subway service.
6. The non-revenue rail fleet has grown over the years, but the resources available to maintain the fleet has remained constant, leading to a lack of resources to implement and improve preventative maintenance programs.

Non-Revenue Vehicles Asset Management	
Sustainability	In line with the Innovation and Sustainability Strategy, we will work to identify zero emissions alternatives to our surface non-revenue vehicles (including non-electric options where appropriate) and develop plans to replace our conventionally fuelled fleet.
Inspections and Maintenance	We will establish the condition of non-revenue vehicles by implementing an inspection and monitoring program. This will include regular condition assessments so we can ensure timely replacement of equipment. We will invest in improving preventative maintenance of our subway workcars to allow additional use and improve service reliability.
Spares	We will develop a spares strategy for non-revenue vehicles, which balances cost and service resilience and produce plans to have sufficient spares.

Table 12-I – Facility Services

Facility Services	
Asset Headlines	**Planned Investment to 2034**
• 459 Elevators/Escalators • 42,000+ individual assets currently tracked	• $78.5 million investment on the elevator overhaul program between 2025-2034 • $49.6 million investment on the escalator replacement program between 2025-2034

Key Risks

1. If unfunded maintenance is not undertaken in a timely manner, risks exist ranging from Occupational Health and Safety violations, works refusals and/or partial to full closure of facilities, which could affect service depending on the impacted facility.
2. Escalators and elevators operating beyond their design life could result in increased downtime (due to obsolete parts), the need for additional maintenance, potential non-compliance with the Accessibility for Ontarians with Disabilities Act and increased station crowding.
3. Investment is required in existing infrastructure to redesign plumbing layouts as often elevating devices can be impacted by flooding resulting in costly repairs, lengthy downtimes, and accelerated deterioration. New construction must follow the TTC design specifications, which keeps the plumbing separate from the elevating devices.
4. Subway sanitary, storm and track pumps and pumping system are more than 20 years and are approaching their end of useful life, which leads to an increased risk of failure, which can increase the chance of flooding and the shutting down of washrooms and other facilities. A program to replace and rehabilitate these pumps is currently unfunded.
5. Maintenance facilities' HVAC systems approaching end of service life, with a replacement program currently unfunded. Failure to replace these systems could lead to lost efficiency and higher energy consumption, a higher likelihood of failure, a reduction in indoor air quality and a higher likelihood of non-compliance with regulation.
6. Many of the roof assets at TTC facilities exceed the normal life expectancy, which can lead to excessive maintenance costs, deterioration of building structures, and detrimental effects on mechanical and electrical equipment through prolonged exposure to moisture. The replacement and rehabilitation program is currently underfunded.

Facility Services Asset Management	
Growth	We will review future demand and consider this when defining the performance requirements and needs for facility services assets, with a particular focus on the Line 1 Capacity Enhancement Program and the Bloor-Yonge Station Improvements Program. To improve response times and increase efficiency in delivery of maintenance, we will review our locations for maintenance delivery and consider increasing the number of satellite maintenance facilities across the city.
Accessibility	We will ensure all our subway stations remain accessible following the completion of Phase 2 of the Easier Access Program in 2027.
Safety	We will improve fire safety at subway stations through the Fire Ventilation Upgrades program (due to complete in 2033).

Sustainability	In line with the Innovation and Sustainability Strategy, we will replace natural gas HVAC equipment in buildings with electric alternatives, such as ground- and air-source heat pumps. We will also develop zero-carbon transition plans for each TTC facility by 2027, which will include a variety of measures, including energy efficiency retrofits and greenhouse gas emission reduction measures, such as green roofs and microgeneration.

Table 12-J – Maintenance Facilities

Maintenance Facilities	
Asset Headlines	**Planned Investment to 2034**
• Operate 24 hours a day, seven days a week • 14 bus garages, one bus shop, five streetcar carhouses, 13 subway carhouses, seven yards. • Total replacement value $2.9 billion	• $1.0 billion capital investment planned on maintenance and administrative facilities between 2025-2034 • $5.2 million capital investment planned on service and systems facilities between 2025-2034 • $2.0 billion capital investment planned on facilities sub-assets between 2025-2034

Key Risks

1. If unfunded maintenance is not undertaken in a timely manner, risks exist ranging from Occupational Health and Safety violations, works refusals and/or partial to full closure of facilities, which could affect service depending on the impacted facility.
2. Escalators and elevators operating beyond their design life could result in increased downtime (due to obsolete parts), the need for additional maintenance, potential non-compliance with the Accessibility for Ontarians with Disabilities Act and increased station crowding.
3. Investment is required in existing infrastructure to redesign plumbing layouts as often elevating devices can be impacted by flooding resulting in costly repairs, lengthy downtimes and accelerated deterioration. New construction must follow the TTC design specifications, which keeps the plumbing separate from the elevating devices.
4. Subway sanitary, storm and track pumps. and pumping system are more than 20 years and are approaching their end of useful life, which leads to an increased risk of failure, which can increase the chance of flooding and the shutting down of washrooms and other facilities. A program to replace and rehabilitate these pumps is currently unfunded.
5. Maintenance facilities' HVAC systems approaching end of service life, with a replacement program currently unfunded. Failure to replace these systems could lead to lost efficiency and higher energy consumption, a higher likelihood of failure, a reduction in indoor air quality and a higher likelihood of non-compliance with regulation.
6. Many of the roof assets at TTC facilities exceed the normal life expectancy, which can lead to excessive maintenance costs, deterioration of building structures and detrimental effects on mechanical and electrical equipment through prolonged exposure to moisture. The replacement and rehabilitation program is currently underfunded.

Maintenance Facilities Asset Management	
Growth	We will plan for our maintenance facilities assets to support service growth and improvement, including through the commissioning of a new bus garage, expansions of existing garage and carhouses (including the modification of Hillcrest to provide maintenance and storage facilities for 25 streetcars), and improvements in train maintenance and storage facilities at Greenwood Yard to support the replacement of T1 trains and Line 2 capacity. Additionally, a new train maintenance and storage facility will be constructed as part of the Line 1 Capacity Enhancement Project.
Sustainability	In line with the Innovation and Sustainability Strategy, we will establish the EV charging facilities and infrastructure necessary to support the maintenance and operation of the growing electric vehicle fleet and develop a procurement plan for its implementation.

Table 12-K – Electrical Supply and Distribution

Electrical Supply and Distribution	
Asset Headlines	**Planned Investment to 2034**
• AC Power Systems (includes High Voltage, Low Voltage, and Traction Power distribution assets) • 63,000+ assets in total with average ages ranging between 10 and 40 years • Condition ranging between 'Good' and 'Marginal'	• $277.9 million to be spent on renewal and service improvement between 2024 and 2033

Key Risks

1. Consistent replacement and maintenance of aging substation equipment as part of our State of Good Repair is required. If an appropriate pace is not maintained, a backlog of aging and potentially unreliable equipment will develop.
2. Asset condition and value data has low confidence ratings, leading to life cycle investment models, which are immature and unvalidated.
3. Significant shortfalls in funding exists for the replacement of key sub-asset groups.
4. The analysis undertaken in the AMP on the evaluation of operating budget requirements does not take into account the extent to which ES&D maintenance and engineering staff are required to support extra-departmental projects. This suggests that the actual operating budgets required to sustain SOGR are higher than presented.
5. Irrespective of the availability of funding, there are significant constraints to delivering the necessary infrastructure life cycle activities for electrical supply and distribution assets. These constraints include limited access windows for performing maintenance and upgrades, which are often restricted to non-operational hours to minimize service disruptions, and limited availability of workcars and maintenance equipment. Additionally, the onboarding and training of new engineering or electrician staff required to execute these activities can be time-consuming, further delaying project timelines.

Electrical Supply and Distribution Asset Management	
Growth	We will plan for our electrical supply and distribution assets to support service growth and improvement, particularly for the Line 1 and Line 2 capacity enhancement projects.

Table 12-L – Signal Systems

Signal Systems	
Asset Headlines	**Planned Investment to 2034**
• Primary objective to prevent collisions, derailments, and manage safe separation and orderly movement of rolling stock along railway tracks • Includes 77 various components (of varying quantities) all working together to regulate train movements • Average age ranging between nine and 59 years for different types of components • Condition ranging from 'Very Good' to 'Adequate'	• $833.2 million capital investment planned on renewal and service improvement between 2025-2034

Key Risks

1. The analysis undertaken in the AMP on the evaluation of operating budget requirements does not consider the extent to which Signals maintenance and engineering staff are required to support extra-departmental projects. This suggests that the actual operating budgets required to sustain SOGR are higher than presented.
2. Current operational budget limitations have resulted in deprioritizing the collection of operational data in support of maintaining ongoing maintenance operations. Crucial data regarding the performance of the signalling system and status changes is not currently available or limited due to the absence of adequate recording of essential events, performance monitoring, and preventative diagnostic of signal assets failures. This results in increased troubleshooting time due to the lack of data to pinpoint the root cause of a malfunctioning system as well as the lack of data available for analysis at a remote location prior to intervention crews being dispatched to the field.
3. Legacy and CBI signalling equipment has been discontinued by their original manufacturer, with their replacement requiring engineering and manufacturing effort to design, test, and certify they are safe to use for their application, and to secure an adequate quantity of spares until the signalling system gets decommissioned. This will result in higher operating and maintenance costs and could result in a drop off in performance of the subway line through delays and line closures.
4. Aging infrastructure requires ongoing significant capital investment to address and maximize efficiency of SOGR activities for conventional and computer-based signalling systems.
5. Asset condition and value data has low confidence ratings, leading to life cycle investment models that are immature and unvalidated.
6. The high levels of complexity and interdependencies in systems assets means that it is often difficult to assess the true cost of future life cycle activities. It may not be possible to replace a single subsystem without incurring knock-on requirements to undertake upgrades of connecting systems, reducing the effective useful life of key systems and/or result in inaccuracies in our financial models. Furthermore, the ultimate effects of increasing complexity in new modern systems are often underestimated when evaluating expected ongoing maintenance costs.

Signal Systems Asset Management	
Growth	We will plan for our signal systems assets to support service growth and improvement, particularly for the Line 1 and Line 2 capacity enhancement projects. We will upgrade Line 2 signalling system to ATC and Greenwood Yard to computer-based signalling technology.

Inspections and Maintenance	We will continue to perform regular inspections and signal asset condition assessments so we can ensure timely corrective maintenance or replacement of equipment.
Renewal	To ensure the fixed-block signalling on Line 2 and in Wilson and Greenwood Yards continues to support a reliable service, we will continue to renew/refurbish switch machines and source switch machines of modular/modern technology for testing and validation within the TTC subway environment.
Spares	We will analyze and maintain inventories of signal spares, including procuring new and retrofitting parts and equipment salvaged from decommissioned Line 1 conventional signalling.

Table 12-M – Passenger Facilities

Passenger Facilities	
Asset Headlines	**Planned Investment to 2034**
• 70 subway stations • Five passenger pick-up and drop-off points • 72 third-party entrance connections • Two bus and coach terminals • 15 Wheel-Trans hubs	• $2.1 billion capital investment planned on passenger facilities for renewals, growth and service improvement between 2025-2034

Key Risks

1. If unfunded maintenance is not undertaken in a timely manner, risks exist ranging from Occupational Health and Safety violations, works refusals and/or partial to full closure of facilities, which could affect service depending on the impacted facility.
2. Escalators and elevators operating beyond their design life could result in increased downtime (due to obsolete parts), the need for additional maintenance, potential non-compliance with the Accessibility for Ontarians with Disabilities Act and increased station crowding.
3. Investment is required in existing infrastructure to redesign plumbing layouts as often elevating devices can be impacted by flooding resulting in costly repairs, lengthy downtimes and accelerated deterioration. New construction must follow the TTC design specifications, which keeps the plumbing separate from the elevating devices.
4. Subway sanitary, storm and track pumps, and pumping system are more than 20 years and are approaching their end of useful life, which leads to an increased risk of failure, which can increase the chance of flooding and the shutting down of washrooms and other facilities. A program to replace and rehabilitate these pumps is currently unfunded.
5. Maintenance facilities' HVAC systems approaching end of service life, with a replacement program currently unfunded. Failure to replace these systems could lead to lost efficiency and higher energy consumption, a higher likelihood of failure, a reduction in indoor air quality and a higher likelihood of non-compliance with regulation.
6. Many of the roof assets at TTC facilities exceed the normal life expectancy, which can lead to excessive maintenance costs, deterioration of building structures and detrimental effects on mechanical and electrical equipment through prolonged exposure to moisture. The replacement and rehabilitation program is currently underfunded.

Passenger Facilities Asset Management	
Growth	We will plan for our passenger facilities to support service growth and improvement, including through the Line 1 and Line 2 capacity enhancement projects and the Bloor-Yonge Capacity Improvements program.
Safety	We will ensure all stations have at least two exists by 2033 through the Stations Second Exits program.

Table 12-N – Communication Systems

Communications Systems	
Asset Headlines	**Planned Investment to 2034**

• Assets include approximately 20 communications systems representing safety and mission critical systems:
  • Safety systems (CCTV, public address, passenger assistance intercom, fire signal receiving centre, train door monitoring)
  • Security systems (access control systems)
  • Operations communications networks (synchronous optical network, operations local network, transit control network)
  • Radio systems (TETRA, Subway Car Radio system, Subway Radio antenna system)
  • Transit Control integrated communications system, voice recording system, RF ID Tags
  • SCADA (field device monitoring, Emergency Trip, Permanent work area warning system, elevator/escalator remote monitoring system)
	• $134.8 million of planned investment between 2025-2034 for renewals and service improvement of communications systems

Key Risks

1. Significant shortfalls in both operational and capital funding threaten communications system service quality and availability. Deprioritization of monitoring system upgrades (ex: OPSLAN/TCN NMS software) results in lack of understanding of operational risk.
2. The analysis undertaken in AMP of the evaluation of operating budget requirements does not consider the extent to which Communications Maintenance and Engineering staff are required to support extra-departmental projects. This suggests that the actual operating budgets required to sustain SOGR are higher than presented.
3. Asset condition and value data has low confidence ratings, leading to life cycle investment models that are immature and unvalidated.
4. The high levels of complexity and interdependencies in systems assets means that it is often difficult to assess the true cost of future lifecycle activities. It may not be possible to replace a single subsystem without incurring knock-on requirements to undertake upgrades of connecting systems, reducing the effective useful life of key systems and/or result in inaccuracies in our financial models. Furthermore, the ultimate effects of increasing complexity in new modern systems are often underestimated when evaluating expected ongoing maintenance costs.
5. Delays in capital replacements (re-engineering) of aged systems introduce operational risk as obsolete components cannot be replaced.
6. Lead times for communications project execution are significant, require appropriate design and project management timelines as well as potential onboarding of staff. Appropriate funding must be identified and committed well in advance of required execution deadlines.
7. The current financial operating environment within the communications group has ongoing maintenance activities occasionally funded through capital projects. This can lead to misunderstandings in the true cost of sustaining maintenance activities.

8. Current procurement strategies are heavily weighted toward the lowest Bidder, and do not have strong mechanisms to assess or weigh the risks to ongoing maintainability and total life cycle costs. This can lead to reduced system total life value, and unanticipated increased maintenance operating costs.

Communications Systems Asset Management	
Customer Experience	We will improve the customer experience at stations through upgrading PA systems, passenger assistance intercoms, and CCTV coverage as part of the Stations Transformation program.
Growth	We will establish a new Major Control Centre to provide Transit Control with the systems needed to manage an expanding network. We will upgrade our operations computer networks to ensure increased capacity and reliability to meet the TTC's growing data needs.
Safety	We will improve radio communications within the subway system by upgrading the distributed antenna system in all stations and tunnels.
System Renewal and Modernization	To ensure we can operate services safely and reliably, we will continue to upgrade systems, such as radio, ICS, SCADA, and TDM.

Table 12-O - Structures

Structures	
Asset Headlines	**Planned Investment to 2034**

• Assets include:
  ○ Box Structures – 77, 33.2km
  ○ Bored Tunnels – 43, 18.1km
  ○ Stations - 76
  ○ Bridges - 75
  ○ Culverts - four
  ○ Retaining Walls – 170, 11.6km
  ○ Miscellaneous Structures – 474
• The beams and sidewalks on the subway level of the Prince Edward Viaduct are also included
	• $485.8 million capital investment planned between 2025-2034 for civil structures

Key Risks

1. Aging Infrastructure: Many structural assets were built decades ago, requiring extensive maintenance and replacement to meet current safety standards. Increased maintenance demands could strain available resources and funding.
2. Environmental Stressors: Exposure to varying weather conditions, temperature extremes, and urban pollutants accelerates asset degradation. There are rising concerns about climate resilience and the need for adaptive strategies to mitigate potential impacts.
3. Operational Constraints: Maintenance windows are often limited by operational schedules, necessitating efficient planning and execution.
4. Limited staffing and resource availability pose challenges to timely inspections and repairs.

Structures Asset Management	
Growth	We will convert the Line 3 right-of-way to a Busway by 2027, to improve transit service in Scarborough following the closure of Line 3 and ahead of the completion of the Scarborough Subway Extension.
Inspections and Maintenance	We will implement a robust inspection and maintenance regime focused on identifying and addressing potential structural issues before they escalate. We will investigate the use of non-invasive monitoring technologies (i.e. drones, sensors) for real-time, non-intrusive data collection and analysis, which avoids impacting service. We develop a preventive maintenance schedule that prioritizes high-risk assets and ensures consistent upkeep focusing on addressing minor issues early to avoid costly repairs and prolonged service disruptions.
Resilience	We will enhance resilience with durable, climate-resistant materials and design adaptations that account for future environmental changes. We will plan for extreme weather events with robust emergency response strategies and adaptive maintenance practices.
Renewal	To improve performance, safety, and efficiency, we will adopt a strategy to gradually renew and upgrade aging structures.

	We prioritize projects that offer the highest return on investment in terms of safety, service reliability, and cost savings.
Sustainability	In line with the Innovation and Sustainability Strategy, we will incorporate sustainable design principles, such as energy-efficient materials and low-impact construction practices.
Innovation	In line with the Innovation and Sustainability Strategy, we plan to optimize asset management processes by leveraging technological advancements i.e. City Information Modelling (CIM) and digital twins.

Appendix C. Supporting documents

City of Toronto (2019) *Toronto Municipal Code, Chapter 279, Toronto Transit Commission.*

City of Toronto (2023) *2024 Program Summary: Toronto Transit Commission* (published as a budget note to the 2024 City Budget)

City of Toronto (2024) *2024 Operating Budget and 2024-2033 Capital Budget and Plan: Briefing to Budget Committee.* (Presentation to City Budget Committee dated January 17, 2024)

City of Toronto (2023) *Sustainable City of Toronto Fleets Plan, 2023 Update.*

Government of Ontario (2001) *Municipal Act 2001.*

Government of Ontario (2018) *Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure*

Government of Ontario (2023) *Terms of the New Deal Between Ontario and Toronto.*

ISO (2024) *ISO 55001 :2024 Asset Management – Asset Management System – Requirements.*

ISO (2017) *Asset Management*, *Managing Assets in the context of Asset Management*

TTC (2025) *Recommended 2025 Operating Budget; 2025-2034 Capital and Budget and Plan, 15-Year Capital Investment Plan, and Real Estate Investment Plan Update* (Report to TTC Board dated January 10, 2025).

TTC (2024) *2023 Annual Report.*

TTC (2024) *Asset Management Plan.*

TTC (2023) *TTC Conventional and Wheel-Trans Operating Budgets and 2024-2033 Capital Budget and Plan*

TTC (2024) *Enterprise Risk Management Framework.*

TTC (2024) *Innovation and Sustainability Strategy, 2024-2028.*

TTC (2024) *Moving Toronto, Connecting Communities: TTC Corporate Plan, 2024-2028 & Beyond.*

TTC (2024) *5-Year Service and Customer Experience Action Plan*

TTC (2023) *TTC 15-Year Capital Investment Plan, Real Estate Investment Plan Update, and 2023-2032 Capital Budget & Plan*

University of Toronto Mobility Network (2023) *Benefits of Transit Investment Interim Findings, Phase 2.* (Presentation to TTC Board dated December 20, 2023).