



For Action

TTC's 2020-2029 Key Capital Investment Priorities: Subway Infrastructure and Accelerated Vehicle Procurements

Date: January 27, 2020

To: TTC Board

From: Chief Vehicles Officer and Interim Chief Financial Officer

Summary

This report recommends key capital investment priorities to be added to the TTC's 2020-2029 Capital Budget & Plan as a result of the TTC Board's request for an accelerated vehicle procurement plan and the subsequent approval by City Council to direct the net increase available through the City Building Fund levy towards the TTC's unfunded needs.

The approved increase will provide \$4.56 billion, which funds the \$500 million for the City's 1/3 share of the Bloor-Yonge Station capacity improvement project, resulting in additional debt funding directed to TTC of \$4.06 billion over the next 10 years. When combined with the availability of a one-time incremental Federal Gas Tax increase of \$167 million, a total of \$4.23 billion in net new funding is now available to the TTC over the next 10 years to allocate to critical unfunded capital investment priorities which City Council directed be included in the 2020-2029 Capital Budget & Plan that was launched on January 10, 2020.

These recommendations are based on the unfunded needs outlined in the TTC's Capital Investment Plan (CIP), which included a total of \$19.21 billion of unfunded infrastructure needs and \$6.88 billion of unfunded vehicle needs over the CIP's 15-Year time horizon.

When evaluating options for where best to apply this significant contribution towards the TTC's unfunded needs, the TTC applied the following criteria to allocate the \$4.23 billion:

1. **Safety/Legislative:** Projects that ensure our infrastructure are in a state-of-good-repair for safety and legislative compliance.
2. **State-of-Good-Repair (SOGR):** Projects that maximize capital assets' capability to operate at full performance levels.
3. **Growth:** Projects that address the current and projected requirement for growth.

This new, seminal investment represents a significant commitment to provide dedicated and sustainable funding for safe, accessible, and reliable public transit in the City of Toronto. The investment advances the City's obligations under the new Toronto-Ontario partnership on transit, as it funds critical investments in state-of-good-repair of the existing subway system over the next 10 years.

As a result, this report recommends \$3.09 billion be allocated to critical subway infrastructure, funding 100% of the 10-year costs for Line 1 and Line 2 state-of-good-repair projects and Capacity Enhancements as well as the Line 2 Automated Train Control Re-signalling project.

In addition, this report recommends the allocation of \$1.14 billion in new funding and the reinvestment of \$474 million from the 2020-2029 Capital Budget & Plan for a total of \$1.61 billion to invest in vehicles. In so doing, it maximizes the use of the new funding to accelerate major vehicle procurements by establishing approximately 1/3 of the total funding for necessary new subway trains, buses, Wheel-Trans buses and streetcars.

By utilizing the City Build Fund to secure full funding, it enables the TTC to begin replacement of its legacy vehicle fleets at the end of their design life.

Finally, this report recommends an amended 2020-2029 Capital Budget & Plan of \$11.92 billion (including transit expansion projects) for the Board's approval. This almost doubles the capital funding over 2019. This also reduces the unfunded portion of the revised CIP of \$35.23 billion to \$20.97 billion as compared to \$26.09 billion previously considered by the Board.

It should be noted that these recommendations are based on a Class 5 order of magnitude estimate. With approval of this report, the scope, schedule, cost estimates and procurement contract strategies will be matured and presented for stage gate approval through planned reporting to the Board later in 2020. In the event full funding is not forthcoming by late 2020 when vehicle procurement decisions are required, TTC staff will revisit its recommendations and report back on alternate strategies.

Recommendations

It is recommended that the TTC Board:

1. Approve key capital priorities for the application of \$4.23 billion in net new funding made available through the dedicated City Building Fund and one-time Federal Gas Tax amount as follows:
 - a. \$3.09 billion to provide full funding between 2020 and 2029 for the following subway infrastructure investments:
 1. \$1.50 billion of the total estimated cost of the \$4.26 billion required to initiate the Line 1 Capacity Enhancement program.

2. \$817 million of the total estimated cost of the \$3.92 billion required to initiate the Line 2 Capacity Enhancement program.
 3. \$623 million of the total estimated cost of the \$877 million required to continue implementation of Line 2 Automatic Train Control (ATC) Re-signalling project.
 4. \$158 million to fully fund Other Subway Infrastructure state-of-good-repair projects.
- b. \$1.14 billion for net new investments toward the procurement of new vehicles and related systems, as follows:

New Subway Trains

1. \$458 million, representing approximately 1/3 of the 10-year cost for 62 trains, to replace the legacy fleet of T1 trains on Line 2 required for delivery in 2026 through 2030, and which will require an additional \$122 million to fund the 1/3 cost between 2030 and 2034.
2. \$165 million, representing approximately 1/3 of the total estimated cost of \$494 million towards procurement of 18 trains to meet growth in ridership demand on Line 1 required for delivery in 2026-2027.

T1 Subway Train Maintenance and Overhaul

3. Subject to the approval of Recommendation 1.b.1, and in lieu of the previously planned T1 life extension overhaul (LEO), that \$74 million be allocated for the state-of-good-repair preventative maintenance of T1 vehicles to ensure they remain safe and reliable until 2030 when they will be fully replaced at end-of-life by the 62 new trains.
4. Subject to the approval of Recommendations 1.b.1 and 1.b.3 that \$474 million approved in the 2020-2029 Capital Budget & Plan for the T1 life extension overhaul (LEO) program provided to prolong the life of the T1 fleet by 10 years beyond its 30-year design life due to lack of available funding be reinvested in the purchase of vehicles.

Bus and Wheel-Trans Buses

5. \$772 million, with \$686 million representing approximately 1/3 of the estimated 10-year cost, towards the procurement of 614 of the 1,575 buses required; \$64 million for eBus charging system infrastructure; and \$22 million to fully fund the next 4 years of Wheel-Trans bus procurements or 232 of the 498 buses required.

New Streetcars

6. The remaining \$140 million, representing approximately 1/3 of the total cost for the procurement of 60 new streetcars required to meet projected growth on streetcar routes until 2026.
2. Approve an amended 2020-2029 Capital Budget & Plan of \$11.92 billion and a 15-year Capital Investment Plan of \$35.2 billion.
3. Forward this report to the City's Budget Committee as the amended 2020-2029 Capital Budget & Plan for the Toronto Transit Commission for consideration with the City of Toronto's Capital Budget & Plan scheduled for City Council approval on February 19, 2020.

Financial Summary

At its meeting on December 16, 2019, the TTC Board approved the TTC 2020-2029 Capital Budget & Plan of \$7.41 billion and \$287 million for Transit Expansion Projects including the Scarborough SRT Life Extension, Toronto Waterfront and the completion of the remaining scope of the Toronto-York Spadina Subway Extension projects.

At its meeting on December 17, 2019 City Council approved an incremental tax levy dedicated to providing sustainable funding for Community Housing and Transit. The incremental City Building Fund (CBF) dedicated to transit will help alleviate some of the pressures that encompass the more than \$20 billion of unfunded capital needs identified through TTC's 15-Year Capital Investment Plan (CIP) and 2020-2029 Capital Budget & Plan.

The approved increase will provide \$4.56 billion, which funds the \$500 million for the City's 1/3 share of the Bloor-Yonge Station capacity improvement project, resulting in additional debt funding directed to the TTC of \$4.06 billion over the next 10 years. When combined with the availability of a one-time incremental Federal Gas Tax increase of \$167 million, a total of \$4.23 billion in net new funding is now available to the TTC over the next 10 years to allocate to critical unfunded capital investment priorities which City Council directed be included in the 2020-2029 Capital Budget & Plan that was launched on January 10, 2020. As a result of these changes, the total value of the Commission's 15-Year Capital Investment Plan has been revised to \$35.23 billion versus the \$36.13 billion presented and approved by the Board on December 16, 2019, as summarized in the table below.

Table 1
Revised Capital Investment Plan
(000's)

	Funded	Unfunded	Total
December 16, 2020 - Board Approved:			
2020-2029	7,408,681	19,657,410	27,066,091
2030-2034	<u>2,627,425</u>	<u>6,432,826</u>	<u>9,060,251</u>
Total	10,036,106	26,090,236	36,126,342
Revised with CBF Funding:			
2020-2029	11,637,129	10,623,098	22,260,227
2030-2034	<u>2,627,425</u>	<u>10,345,211</u>	<u>12,972,636</u>
Total	14,264,554	20,968,309	35,232,863
Variance:			
2020-2029	4,228,448	(9,034,312)	(4,805,864)
2030-2034	<u>-</u>	<u>3,912,385</u>	<u>3,912,385</u>
Total	4,228,448	(5,121,927)	(893,479)

* Excludes Expansion Projects

** Funding sources in years 11-15 are based on current levels of city, provincial and federal funding included in the 10-Year Capital Budget & Plan

In summary, of the \$4.23 billion in net new funding, \$3.09 billion fully funds subway infrastructure projects over the next 10 years, and the remaining \$1.14 billion will be applied towards the procurement of new vehicles and related systems.

The acceleration of key projects into the 10-year period reduces these costs and results in an overall net reduction in the total CIP value. The additional funding provided in the first 10 years of the CIP also reduces the unfunded portion to \$10.62 billion but increases the outer five years to \$12.97 billion, of which \$10.35 billion is unfunded by applying current levels of base funding sources in years 11 to 15. In total, the unfunded portion of the CIP has been reduced from \$26.09 billion to \$20.97 billion.

A review of projects in the Capital Investment Plan was undertaken to identify the key priorities and timing of critical investments to allocate the additional \$4.23 billion over the next 10 years. Based on the outcome of this review, it was determined that a total of \$3.09 billion will be allocated to critical subway infrastructure needs for Lines 1 and 2 with the remaining \$1.14 billion directed to the City of Toronto's share of needed vehicle and related systems procurements for new subway trains, buses (conventional and Wheel-Trans) and streetcars. Table 2 below details the allocation the additional funding to key capital project priorities:

Table 2
Funding for Key Capital Project Priorities
(000's)

Project Description	10-Year Capital Investment Plan	Board Approved 10-Year Capital Budget & Plan		Total Net New Funding Allocated	Ammended 2020-2029 10-Year Capital Budget & Plan			Ammended 2020-2034 15-Year Capital Investment Plan		
		\$'000	% Funded		\$'000	% Funded	% Unfunded	\$'000	% Funded	% Unfunded
Subway Infrastructure	3,735,327	641,437	17%	3,093,887	3,735,324	100%	0%	10,237,410	30%	70%
Line 1 Capacity Enhancement	1,502,630	6,900	0%	1,495,730	1,502,630	100%	0%	4,258,801	35%	65%
Line 2 Capacity Enhancement (incl. property)	856,600	39,600	5%	817,000	856,600	100%	0%	3,919,600	22%	78%
Line 2 and Line 4 ATC Resignalling	634,641	11,723	2%	622,918	634,641	100%	0%	876,580	72%	28%
Other Subway Infrastructure	741,456	583,214	79%	158,240	741,454	100%	0%	1,182,429	63%	37%
Vehicles and Related Systems	5,379,362	514,526	10%	1,134,558	1,649,084	30.66%	69.34%	6,600,673	24.98%	75.02%
Purchase of Subway Trains	1,869,801		0.0%	623,267	623,267	33.33%	66.67%	2,236,528	27.87%	72.13%
Replace T1 Trains on Line 2	1,375,383	-	0%	458,461	458,461	33.33%	66.67%	1,742,110	26.32%	73.68%
Growth Trains on Line 1	494,418	-	0%	164,806	164,806	33.33%	66.67%	494,418	33.33%	66.67%
Net offset from T1 Life Extension Overhaul	715,225	473,966		(399,966)	74,000	100.00%	0.00%	74,000	100.00%	0.00%
Delete T1 Life Extension Overhaul (LEO)	715,225	473,966		(473,966)	-	n/a	n/a	-	n/a	n/a
Add T1 Preventative Maintenance		-		74,000	74,000	100.00%	0.00%	74,000	100.00%	0.00%
Purchase of Buses and Wheel-Trans	2,375,633	40,560	2%	771,689	812,249	34.19%	65.81%	3,871,442	20.98%	79.02%
Hybrid-Electric Buses	413,588		0%	271,095	271,095	65.55%	34.45%	413,588	65.55%	34.45%
Electric Buses	1,660,071	6,507	0%	414,836	421,343	25.38%	74.62%	2,962,132	14.22%	85.78%
Bus Charging Systems	187,515	5,000	2%	64,075	69,075	36.84%	63.16%	312,312	22.12%	77.88%
Wheel-Trans Buses	114,459	29,053	16%	21,684	50,737	44.33%	55.67%	183,410	27.66%	72.34%
Purchase of Streetcars	418,703	-	0%	139,568	139,568	33.33%	66.67%	418,703	33.33%	66.67%
Total Allocation of City Building Fund				4,228,445						

The allocation of funding has also accounted for certain dependencies amongst projects. For example, new subway trains are required to maximize the benefit of ATC signalling work on Line 2. As a result, the procurement of new subway trains on Line 2 have been aligned with both the end of life replacement of the T1 fleet and timing for commissioning of ATC on Line 2. The allocation for the purchase of new buses takes into account the need to acquire and install bus charging systems. Consideration to procure additional streetcars was limited to avoid any additional facility costs.

The CBF provides the City's share of funds for vehicle procurements in the 10-year Capital Plan. Historically, the City of Toronto, Province of Ontario, and Government of Canada have co-invested in transit vehicles through funding partnerships, enabling the TTC to replace its legacy fleets at end-of-life and procure additional vehicles to accommodate ridership growth.

This additional funding amends the Board approved 10-Year Capital Budget & Plan to \$11.92 billion (including transit expansion projects) which represents a near doubling in funding from the 2019-2028 Council approved Capital Budget & Plan of \$6.45 billion and makes significant progress on TTC's unfunded capital needs. Cashflows have been aligned to match the timing of when funding sources will be available.

Table 3
2020-2029 Capital Budget & Plan
(000's)

	2020	10-Year Plan	Estimated Future Requirements
Base Capital Budget	996,184	7,408,681	-
Expansion Projects	86,448	287,121	-
Total Board Approved	1,082,632	7,695,802	-
Key Capital Investment Priorities:			
Subway Infrastructure	-	3,093,887	5,967,653
Purchase of Subway Trains	1,761	623,267	122,242
Delete: T1 Life Extension Overhaul (LEO)	(8,966)	(473,966)	-
Add: T1 Preventative Maintenance	-	74,000	-
Purchase of Buses and Wheel-Trans	-	771,689	-
Purchase of Streetcars	1,671	139,568	-
Recommended Capital Budget & Plan	1,077,098	11,924,247	6,089,895

The following projects will require commitments for funding of \$6.09 billion beyond the 10-year window, as summarized in the table above:

- Line 2/4 ATC Re-signalling
- Line 1 Capacity Enhancements
- Line 2 Capacity Enhancements
- T1 Subway Train Replacement
- Purchase of Buses and Wheel-Trans Buses

For cash flow details on the annual distribution of investment across all programs funded by the net new increase in the City Building Fund, please see Table 4.

It should be noted that all cost estimates for infrastructure works and procurement of vehicles and related systems are at a concept screening level (Class 5). With approval of this report, the scope, schedule and cost estimates will be matured and operating impacts identified and presented for stage gate approval through planned reporting to the TTC Board later in 2020.

The Chief Financial Officer has reviewed this report and agrees with the financial impact information.

Equity/Accessibility Matters

Equity

A reliable transit network is critical for equity-seeking groups relying on TTC services to get to work, school, access health services, participate in recreational and cultural services, etc. Studies have shown that people who have less access to public services, including transit, typically have worse economic and health prospects. Access to transit that is equitable, accessible, safe, reliable, and that grows with or ahead of the population will help improve health outcomes, economic prosperity, and equality throughout the City of Toronto, regionally and nationally.

Accessibility

The TTC has a strong organizational commitment to making Toronto's transit system barrier-free and accessible to all. We believe that all customers should enjoy the freedom, independence and flexibility to travel anywhere on the public transit system, regardless of ability. The TTC's commitment to providing accessible transit is at the forefront of its 2018-2022 Corporate Plan and the 2020-2029 Capital Budget & Plan.

The 2020-2029 Capital Budget & Plan includes the TTC's Easier Access Program, which is on track to make all subway stations accessible by 2025 with elevators, wide fare-gates and automatic sliding doors. It also includes several improvements elsewhere across the transit system, including accessible low-floor streetcars, accessible buses, new Wheel-Trans buses, and a growing number of accessible bus and streetcar stops.

Key investment priorities for the procurement of subway trains, buses, Wheel-Trans buses and streetcars, as presented through this report, will make efficient use of resources to replace vehicles at end of life rather than implement life extension programs, add critically needed capacity to the transit system to reduce crowding for customers, and through the application of ever improving designs will help maintain a modern and increasingly inclusive and accessible transit system for all.

Procuring new vehicles provides an opportunity to review and improve designs through the systematic identification and removal of barriers. During new vehicle specification, procurement, design and validation processes, the TTC will continue to ensure new vehicles meet all relevant standards under the Accessibility for Ontarians with Disabilities Act (AODA), leverage international best design practices, and work closely with the Advisory Committee on Accessible Transit (ACAT).

Decision History

On January 24, 2019, the Board approved the TTC's first 15-Year Capital Investment Plan (CIP). The CIP captured TTC's estimate of long-term capital needs and formed a baseline against which future Capital Budgets and Plans would be based. The following link contains the full document entitled: Making Headway: Capital Investments to Keep Transit Moving:

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/January_24/Reports/10_TTC_Capital_Investment_Plan_Supplementary.pdf

At the October 2019 meeting, City Council adopted with amendments the report EX9.1 Toronto-Ontario Transit Update, and directed The City Manager to report back to City Council on funding and financing options for “the reallocation of funds previously approved, identified, or contemplated for the provincial priority projects, for the purposes of state-of-good-repair of the TTC subway network, and other expansion projects.” As outlined in the report, “the Province shall continue to advance the Bloor-Yonge Capacity Enhancement Project through the PTIF 2 ICIP program, and shall fund the Provincial contribution of 33% of the total capital costs of the Bloor-Yonge Capacity Enhancement Project consistent with the PTIF funding formula.”

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.EX9.1>

It was the TTC’s intention to establish CIP priorities for consideration in the 2021 budget process.

On December 12, 2019, the Board adopted the information contained in the 2020 5-Year Service Plan and 10-Year Outlook. The 2020-2029 CIP included the capital investments (unfunded) required to complement the service improvements contained in the Service Plan:

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/December_12/Reports/16_5_Year_Service_Plan_and_10_Year_Outlook.pdf

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/December_12/Reports/Attachment%201%20TTC_5_year_SP_web_accessible_R3.pdf

On December 16, 2019, TTC Board approved the 2020 TTC and Wheel-Trans Operating Budgets, and the 2020-2029 TTC Capital Budget & Plan:

2020 TTC and Wheel-Trans Operating Budgets:

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/December_16/Reports/1_2020_TTC_and_Wheel_Trans_Operating_Budgets.pdf

15-Year Capital Investment Plan and 10-Year Capital Budget & Plan:

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/December_16/Reports/2_TTC_15_Year_Capital_Investment_Plan_and_2020_2029_Capital_Plan.pdf

Budget Presentation:

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/December_16/Reports/1_TTC_Recommended_Budgets_2020_Operating_Budget_2020-2029_Capital.pdf

On December 17, 2019, City Council approved an incremental tax levy dedicated to providing sustainable funding for Community Housing and Transit. The incremental increase to the City Building Fund for transit to help alleviate some of the pressures that encompass the more than \$20 billion of unfunded capital needs identified through TTC's 2020-2029 Capital Budget & Plan and the 15-Year Capital Investment Plan: <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.EX11.26>

In doing so, City Council adopted the following:

1. City Council direct the City Manager and the Chief Financial Officer and Treasurer to develop the 2020 to 2029 tax-supported capital plan incorporating the additional revenue generated by an increase to the City Building Levy for priority transit and housing capital projects; the increase to the City Building Levy would start by adding 1 percent in 2020 and 2021 to the existing 0.5 percent increment, and an additional 1.5 percent annually from 2022-2025, inclusively.

Issue Background

In January 2019, the TTC introduced a 15-Year Capital Investment Plan (CIP) outlining the TTC's comprehensive state-of-good-repair needs, and capital requirements to support asset lifecycle replacement and ridership growth. The CIP outlined capital needs across all TTC asset type categories including streetcars, buses, stations, Wheel-Trans and subway infrastructure. Required capital investments of \$33.5 billion over a 15-year period (2019-2033) were identified based on order of magnitude cost estimates of which \$23.7 billion was unfunded due to limited sources of funding.

On December 16, 2019, staff presented the updated 15-Year CIP with refined cost estimates across each mode requiring investment. The total revised capital investment required over 15 years was \$36.13 billion, of which \$26.09 billion was unfunded. The 10-year 2020-2029 Capital Budget & Plan highlighted the need for \$27.07 billion over the next 10 years, with \$19.66 billion unfunded. The TTC Board approved the budget and plan for utilization of the \$7.41 billion available funding and motioned staff to report back in January with an accelerated procurement plan recommending key investment priorities for subway, bus, and streetcar vehicles.

On December 17, 2019, City of Toronto (City) Council approved an increase in the City Building Fund levy dedicated to Community Housing and Transit. The increase generates \$4.06 billion in additional debt funding over the next 10 years. When combined with a one-time incremental Federal Gas Tax amount of \$0.17 billion, there is now a total of \$4.23 billion in net new funding to the TTC over the next 10 years.

Prior to the Board's motion requesting an accelerated plan that is unconstrained by funding constraints, and prior to the \$4.23 billion in net new funding made available by City Council on December 17, 2019, the TTC had planned on extending the life of the T1 fleet on Line 2 by 10 years through a life extension overhaul (LEO). The LEO was estimated at \$715 million, of which \$474 million was funded through the TTC Board's approval of the 2020-2029 Capital Budget & Plan. Should the accelerated vehicle

procurement plan presented in this report be implemented, the T1 LEO will no longer be required.

This report identifies key capital investment priorities to be added to the TTC's 2020-2029 Capital Budget & Plan in the amount totalling \$4.23 billion.

Comments

When evaluating options for where best to apply this significant contribution towards TTC's \$19.66 billion 10-year unfunded capital needs, the TTC applied the following criteria to allocate the \$4.23 billion:

1. **Safety/Legislative:** Projects that ensure our infrastructure are in a state-of-good-repair for safety and legislative compliance.
2. **State-of-Good-Repair (SOGR):** Projects that maximize capital assets' capability to operate at full performance levels.
3. **Growth:** Projects that address the current and projected requirement for growth.

The sections below provide more detail on the scope, timing, and service impacts of these new investments in subway infrastructure and new vehicle procurements. It also highlights the risk of deferral for the remaining gap in funding for new bus procurements.

Investments in Subway Infrastructure (\$3.09 billion)

While this report was requested to focus on key investment priorities for vehicle procurements, funding is required for state-of-good-repair and to enable capacity improvements on Line 1 and 2. These investments are a higher priority than new vehicles as these investments are required to keep the existing system safe and reliable. Therefore, of the \$4.23 billion in additional funding, the first \$3.09 billion (74%) will be committed to subway infrastructure. As a result, this will fund 100% of the 10-year costs for Line 1 and Line 2 state-of-good-repair projects and Capacity Enhancements as well as the Line 2 Automated Train Control Re-signalling project, the latter of which will further increase capacity and improve subway air quality.

This new, seminal investment represents a significant commitment to provide dedicated and sustainable funding for safe, accessible and reliable public transit in the City of Toronto

The TTC will progress with critical state-of-good-repair programs on subway infrastructure assets, including:

- **Subway Track:** The replacement of critical track assets, some of which are in excess of 65 years old, while also ensuring that problematic areas that have consistently led asset erosion or premature failures are addressed with long term solutions.

- **Traction Power and Wayside Communication:** The replacement of all critical traction power and wayside communication components involved in the distribution from substations to cable chambers to cabling are addressed, some of which are in excess of 65 years of in-service life.
- **Track Switches:** The replacement of all required track switch motors as per the TTC's asset management standards, while ensuring funding is available to perform the required life extension strategies on Line 2, 55-year-old critical signaling equipment and to perform the complete removal of the Line 1 legacy signaling system, once the Line 1 ATC work is complete.
- **Tunnel Liners:** To continue addressing station and tunnel water leaks and necessary rehabilitation work on all lines given the demonstrated asset deterioration, after over 65 years of service, in an attempt to preserve other subway assets that are susceptible to the erosion caused by the aforementioned leaks.
- **Asbestos Removal:** To determine the feasibility of accelerating the asbestos removal on Line 1 given the poor condition of the asbestos in and around areas synonymous with water leaks, while expediting the removal of a known hazard for our employees. Advancing the asbestos removal will also accelerate the Line 1 tunnel liner repairs in the 10-year window and to allow the TTC to develop an eventual tunnel liner replacement plan post 2030.

These programs each have critical elements of safety assurance and include end-of-life asset replacement for state-of-good-repair of the subway system. Although additional investment will be required to complete many of these programs, there is now sufficient funding to make needed progress on critical priorities.

This funding will also enable capacity improvements on Line 1 and 2. Specifically, on Line 1, the TTC will pursue the purchase of land and development of the design for a new maintenance and storage facility within York Region to service the growth and expansion on Line 1. Other works that are required as part of the Line 1 Capacity Enhancement program are the upgrade of the fire ventilation at key stations, upgrade of aging traction power and substations to meet growth, review of the impact of growth on key stations to avoid overcrowding and work associated with the fleeting arrangements.

On Line 2 the TTC will also pursue the purchase of the land and development of the design for the new maintenance and storage facility at Western Yard to service the growth and expansion on Line 2. Other works that are required as part of the Line 2 Capacity Enhancement program, include: upgrade of fire ventilation at key stations; upgrade of aging traction power and substations to meet ATC implementation and growth; and modifications at our Greenwood Yard to accommodate the new train fleet.

Investments in Vehicles and Related Systems (\$1.14 billion Net New Funding)

Total investment for procurement of new vehicles requires \$6.21 billion over the next 15 years and \$4.48 billion over the next 10 years. The \$1.14 billion net new funding will be used to accelerate the procurement of new vehicles and related systems.

In summary, the breakdown of the \$1.14 billion is as follows:

- \$623 million (approx. 1/3 of 10-year cost) towards the purchase of 80 new subway trains
- \$750 million towards the purchase of 614 of the 1,575 new buses and charging systems
- \$22 million towards the purchase of 232 of the 498 new Wheel-Trans buses required
- \$140 million towards the purchase of 60 required new streetcars
- \$74 million for T1 Preventative Maintenance
- Less \$474 million for T1 Life Extension Overhaul

Acceleration of New Subway Train Procurements

Prior to this increase in funding, the CIP identified the need for:

- \$494 million for 18 new subway trains to increase capacity on Line 1; and
- \$715 million to extend the life of existing T1 trains on Line 2 from the 30-year design life to 40 years, delaying retirements from 2026 to 2036.

The 18 trains for Line 1 had no funding and the T1 life extension overhaul (LEO) had \$474 million (66%) in funding.

Procuring new vehicles is always the preferred option when sufficient funding is available for investments in both safety critical infrastructure, vehicles, and related systems. The T1 LEO was proposed prior to announcement of the City of Toronto's increase to the City Building Fund as there was, at that time, no ability for the City to commit its share towards procurements of new vehicles (across any of the modes).

The TTC operates its most modern fleet of TR subway trains on Line 1. In 2022, the TTC will complete the ATC installation which, with the reduction of spare ratio, will enable more frequent train service to accommodate demand to approximately 2026. An additional 18 trains are required to restore the spare ratio and accommodate future ridership growth on Line 1. The additional trains will increase capacity by nearly 10% with other infrastructure and operational improvements made through the Line 1 Capacity Enhancement Program. Coupled with the Ontario Line opening in the late-2020s, this additional capacity improvement is expected to accommodate projected demand on Line 1 until the early-2040s, or until the opening of the Line 1 extension which triggers the need for additional vehicles.

On Line 2, the TTC operates T1 subway trains, which have a design life of 30 years. The fleet is 21 to 25 years old. Delivery of replacement trains on Line 2 are required in 2026 to 2030. The estimated cost to replace the T1s is approximately \$1.74 billion. The new trains will be similar to our most recently procured TRs. These trains will adopt an open gangway configuration and be equipped with Automatic Train Control (ATC). These features, with the infrastructure improvements described above will significantly increase capacity to meet projected demands on Line 2 until the mid-2040's.

Acceleration of new Bus and Wheel-Trans Bus Procurements

Buses

The TTC's Capital Investment Plan identified the need for \$2.38 billion for the procurement of buses and Wheel-Trans buses (including \$188 million for eBus charging systems). However, there was effectively no funding available in this program.

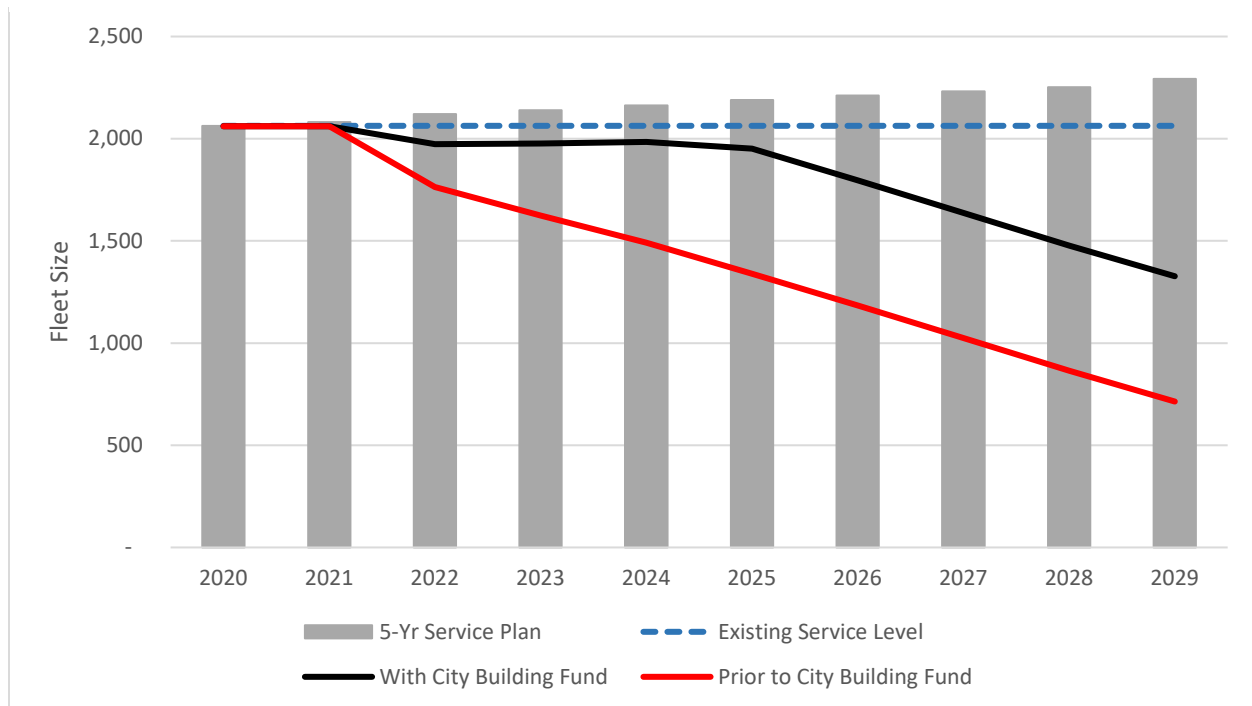
Investment is required for enough bus procurements to:

- Replace vehicles that are retired at end-of-life.
- Grow the fleet consistent with the approved 5-Year Service Plan as approved by the Board on December 12, 2019.
- Continue with industry leading adoption of low and zero emissions buses to improve local air quality, contribute to the City of Toronto's Transform TO target of reducing greenhouse gas emissions 80% by 2040, and realize the projected reduction in total life cycle costs.

As outlined below in Chart 1, the increase in funding now available through the City Building Fund allows the TTC to procure most of the buses required over the next 6 years avoiding what would have otherwise been a significant impact to bus service across the City of Toronto.

It is important to note that even with the \$750 million allocated from the net new funds available through the City Building Fund, there is still a shortfall of buses to meet planned service growth and retirements.

Chart 1: Bus Fleet Size Requirement vs Projected Fleet Size with Net New Investment from City Building Fund



In addition, any deferral of funding for the Green Bus Program will risk meeting targets set by the TTC Board for steady state procurement of zero-emissions buses starting in 2025 and a fully zero-emissions fleet by 2040. This puts at risk the TTC’s contribution to the City of Toronto’s Transform TO Climate Action Plan and realizing benefits to net fuel savings and lower total life cycle costs.

The number of vehicles required for service and associated fleet and procurement quantities do not include the potential increase in fleet by required should the SRT system require decommissioning prior to opening of the Line 2 Extension into Scarborough.

Wheel-Trans

Over half of the Wheel-Trans fleet of 248 vehicles is comprised of recently procured ProMasters that are under 4 years old (useful life is 5 to 7 years). The City Building Fund ensures delivery of new vehicles for the next 4 years. This will allow for the replacement of the legacy ‘Friendly’ fleet by 2022, at which point they will have reached 11 years old, 4 years beyond their design life of 10 years. This new funding will also allow for a modest 1% growth each year to keep pace with population.

Advancement of New Streetcars

Both the July 2018 Board report entitled New Streetcar Program – Resubmission of RFI Results for 60 Additional Streetcars regarding the procurement of additional streetcars

and the 5-year Service Plan, identified the immediate need for 60 additional streetcars for reliability improvements and growth. The 60 streetcars will relieve crowding during peak service, accommodate increases in travel time due to traffic congestion and accommodate projected growth to approximately 2026. The 60 additional streetcars will allow buses that are currently supplementing streetcar service to return to operate on bus routes.

The TTC Capital Investment Plan identified the cost of the 60 streetcars at \$418 million and the cost of associated infrastructure modifications required at TTC's Hillcrest facility (1138 Bathurst Street) in the amount of \$85 million. The existing three streetcar maintenance facilities can accommodate a total of 264 LFLRVs under crush load conditions. It is inefficient to operate under crush load conditions. Therefore, additional storage tracks will be required at TTC's Hillcrest facility.

Next Steps

With approval of this report, the scope, schedule, cost estimates and procurement contract strategies will be matured and presented for stage gate approval through planned reporting to the Board later in 2020. In the event full funding is not forthcoming by late 2020 when vehicle procurement decisions are required, TTC staff will revisit its recommendations and report back on alternate strategies.

Contact

Bem Case
Head of Vehicle Programs
416-397-8375

Signature

Richard Wong
Chief Vehicles Officer

Josie La Vita
Interim Chief Financial Officer

Attachments

Appendix 1 – History of Investments in Vehicle Procurements
Appendix 2 – Amended 2020 – 2029 Capital Budget & Plan Summary

Appendix 1 – History of Investments in Vehicle Procurements

TR Subway Procurement

The Toronto Rocket (TR) subway procurement included 80 new train sets (480 cars):

- Replaced the legacy fleet at end-of-life;
- Improved accessibility;
- Improved reliability;
- Increased energy efficiency; and
- Added capacity to meet ridership growth and improve service reliability through Automatic Train Control.
- Enhanced customer and operator experience through open gangway design, improved climate control, better lighting, full width operator's cabs, etc.

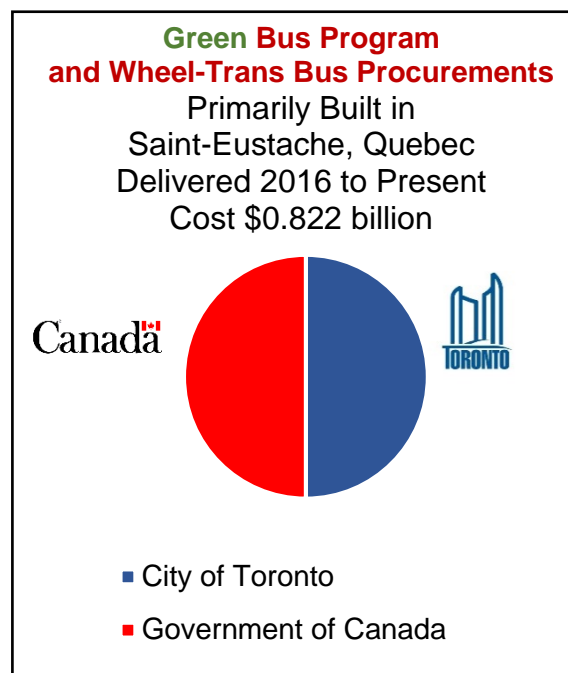


Bus and Wheel-Trans Procurement

The last 4 years of Bus and Wheel-Trans bus procurements included 1,043 new buses and 128 new Wheel-Trans buses, all of which:

- Replaced roughly half of the legacy fleet, which was well beyond the design life;
- Improved reliability;
- Improved accessibility;
- Enhanced customer and operator experience through improved ride quality, improved climate control, better lighting, etc.; and
- Significantly reduced greenhouse gas emissions through low / zero emissions propulsion technology.

The last shipments of buses were in fact transformational as they included 255 of the latest generation hybrid-electric buses and 60 zero-emissions battery electric buses (and associated charging infrastructure), all contributing to the attainment of TTC, municipal, provincial, and national targets for the reduction of greenhouse gas emissions, including the City of Toronto's Transform TO Climate Action Plan.

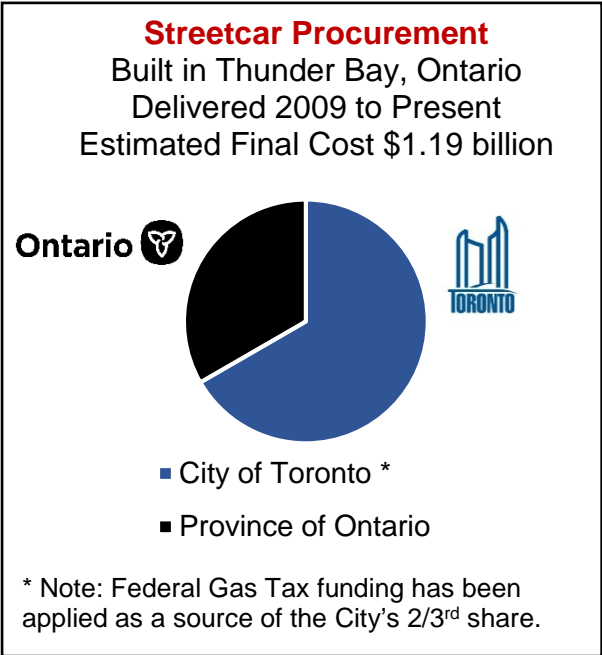


While historical contribution agreements for procurement of buses and Wheel-Trans buses have been funded through 1/3 share between each level of government, recent procurements have largely been funded in equal share by the City of Toronto and through the Government of Canada's Public Transit Infrastructure Fund.

Streetcar Procurement

The new LFLRV Streetcar procurement project, included 204 low-floor light-rail vehicles:

- Replaced the legacy fleet was well beyond the design life;
- Improved reliability;
- Greatly improved accessibility;
- Increased energy efficiency; and
- Enhanced customer and operator experience through improved ride quality, improved climate control, better lighting, full width operator's cabs, etc.



Appendix 2 – Amended 2020 – 2029 Capital Budget & Plan Summary

Appendix 2

Amended 2020 – 2029 Capital Budget and Plan Summary

(000's)

Project Description	2020 Budget	2021 Plan	2022 Plan	2023 Plan	2024 Plan	2025 Plan	2026 Plan	2027 Plan	2028 Plan	2029 Plan	2020 - 2029 Total
ATC Resignalling	65,000	62,000	79,723	99,289	65,000	100,000	100,000	100,000	100,000	100,000	871,012
Bridges And Tunnels-Variou	34,852	37,562	43,958	45,845	46,476	48,043	46,284	48,395	49,220	59,279	459,914
Bus Overhaul	51,247	36,977	51,619	83,045	-	-	-	-	-	-	222,888
Communications	17,306	16,585	15,699	13,859	9,819	9,845	11,301	11,954	12,582	12,729	131,679
Computer Equipment & Software	106,477	118,877	77,869	39,983	23,930	17,123	8,725	7,546	7,772	8,600	416,902
Corporate Initiatives	10,780	10,780	10,780	10,780	10,780	10,780	10,780	10,780	10,780	10,780	107,800
Easier Access-Phase III	59,357	76,444	85,467	99,369	87,386	66,775	53,313	-	-	-	528,111
Environmental Programs	6,986	9,947	7,397	4,795	4,000	8,618	8,853	9,093	9,490	9,710	78,889
Equipment-Variou	33,395	76,225	38,816	16,672	45,027	17,455	15,700	17,708	17,340	17,340	295,678
Fare System	15,975	7,785	-	-	-	-	-	-	-	-	23,760
Finishes-Variou	17,755	52,535	45,865	9,597	7,900	900	900	900	900	900	138,152
Fire Ventilation Upgrade	16,844	41,790	48,879	52,587	56,682	-	-	-	-	-	216,782
Kipling Station Improvements	113	-	-	-	-	-	-	-	-	-	113
Leslie Barns	3,232	9,312	5,000	-	-	-	-	-	-	-	17,544
McNicol New Bus Garage Facility	37,820	27,190	-	-	-	-	-	-	-	-	65,010
On-Grade Paving Rehabilitation	9,466	14,941	20,054	11,711	11,317	9,890	10,038	10,189	10,342	13,121	121,069
Other Buildings & Structures Projects	121,897	113,088	229,771	290,494	189,449	74,592	451,130	527,269	393,221	481,702	2,872,612
Other Furniture And Office Equipment	444	276	154	320	141	305	157	149	302	35	2,283
Other Maintenance Equipment	3,118	1,541	1,233	1,191	1,206	1,221	1,237	1,264	1,293	1,356	14,660
Power Dist./Electric Systems-Variou	7,590	8,628	13,978	17,108	20,682	26,049	26,551	19,842	8,345	8,828	157,601
Purchase of Subway Cars	7,201	4,790	8,309	18,089	31,854	118,267	126,346	134,323	83,687	99,043	631,910
Purchase Automotive Non-Revenue Vehicles	5,885	10,748	6,297	6,297	-	-	-	-	-	-	29,227
Purchase of Wheel-Trans Buses	17,462	11,591	5,781	15,903	-	-	-	-	-	-	50,737
Purchase of Buses	7,118	611	233,393	151,982	154,661	145,895	-	-	-	-	693,659
Purchase of Streetcars	73,192	25,809	53,795	3,423	63,747	12,387	4,667	-	-	-	237,020
Purchase Rail Non-Revenue Vehicles	7,453	2,553	12,113	6,484	-	-	-	-	-	-	28,603
Rail Non Revenue Vehicle Overhaul	5,584	6,407	4,300	5,792	4,855	4,482	1,913	-	-	-	33,333
Revenue & Fare Handling Equipment	5,450	3,750	3,250	2,250	1,800	1,200	400	400	1,300	300	20,100
Service Planning	19,116	19,368	16,735	15,518	8,149	5,609	2,800	2,800	2,800	2,800	95,695
Sheppard Subway	3,705	-	-	-	-	-	-	-	-	-	3,705
Signal Systems	13,451	14,160	14,384	15,057	13,050	11,908	8,220	4,675	4,833	5,024	104,762
Streetcar Overhaul	500	-	961	1,531	1,257	16,224	15,916	-	-	-	36,389
Subway Car Overhaul	37,545	32,411	34,796	30,168	10,000	20,000	20,000	1,500	25,733	47,242	259,395
Subway Track	27,774	28,161	28,131	28,380	28,947	37,472	39,821	41,507	42,437	45,775	348,404
Surface Track	43,120	53,386	38,665	35,967	34,958	19,411	18,854	14,972	13,051	13,335	285,719
Tools And Shop Equipment	7,973	4,612	2,457	2,462	1,862	3,488	2,145	2,660	3,222	3,359	34,240
TR Yard And Tail Track Accommodation	45,118	61,472	44,746	39,081	17,470	1,375	-	-	-	-	209,262
Traction Power-Variou	23,832	25,764	19,764	20,924	22,397	28,556	28,843	29,967	30,088	32,540	262,675
Transit Shelters & Loops	455	545	545	545	545	545	545	545	545	565	5,380
Yards And Roads-Variou	3,063	5,394	7,996	-	-	-	-	-	-	-	16,453
Yonge-Bloor Capacity Improvements	16,000	50,000	57,000	75,000	150,000	300,000	300,000	245,000	215,000	100,000	1,508,000
Total Base Capital Budget & Plan	990,650	1,084,015	1,369,680	1,271,498	1,125,347	1,118,414	1,315,439	1,243,437	1,044,283	1,074,362	11,637,126
SRT Life Extension	18,176	19,644	13,248	4,050	4,062	3,347	2,837	-	-	-	65,364
Toronto York Spadina Subway Extension (TYSSE)	63,172	56,656	47,492	500	-	-	-	-	-	-	167,820
Waterfront Toronto	5,100	12,637	36,200	-	-	-	-	-	-	-	53,937
Total Expansion Projects	86,448	88,937	96,940	4,550	4,062	3,347	2,837	-	-	-	287,121
Total Capital Budget & Plan	1,077,098	1,172,952	1,466,620	1,276,048	1,129,409	1,121,761	1,318,276	1,243,437	1,044,283	1,074,362	11,924,247