Memo

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Subject: Input to Future Transit Provisions Technical Report – 2025 Brampton Transportation Master Plan

Our File: 224199

This memo provides the foundation required to update the Future Transit Provisions Technical Report for the 2025 City of Brampton Transportation Master Plan.

1.0 Introduction

The Transportation Master Plan (TMP) serves as a strategic blueprint, guiding the development of the city's transportation infrastructure to meet the demands of a growing population and to achieve the ambitious transit ridership goals. A key component of the TMP is the "Future Transit Provisions," which outlines the financial and logistical framework necessary to realize the envisioned transit network required to support the mode share target for Brampton. This includes a high-level analysis of fleet expansion, infrastructure enhancements, facility upgrades, and operating costs. These provisions are estimated based on the recommended transit network identified in the TMP, developed in collaboration with HDR through the utilization of the EMME transportation model.

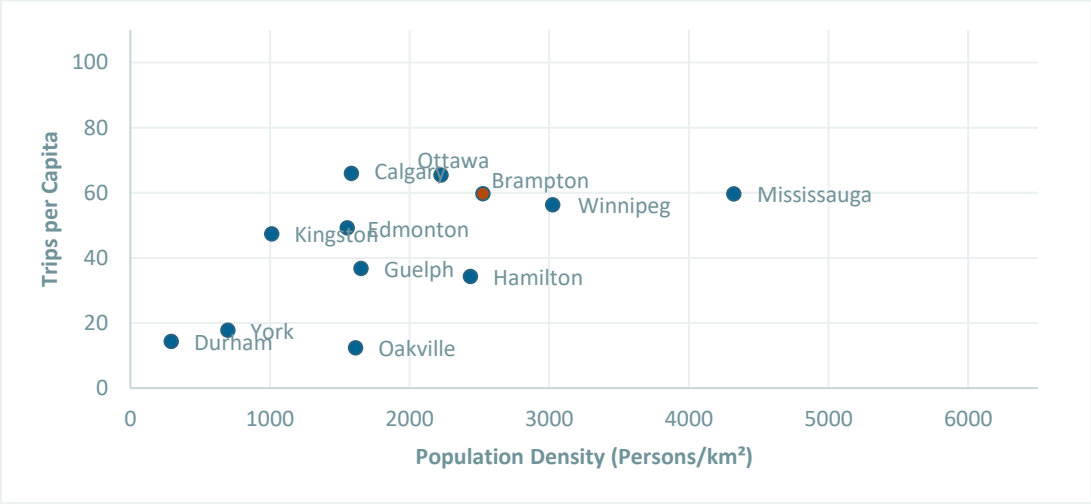
This memo provides the input required for the City to update the Future Transit Provisions document, ensuring that Brampton Transit is well-equipped to support the city's sustainable growth and to enhance the quality of life for all residents.

The financial and logistical framework outlined within this report are based on Brampton Transit current fleet purchases of 40’ hybrid and 60’ clean diesel buses. These costs and associated impacts are well defined at this time. As Brampton Transit continues to plan its transition towards a zero-emission fleet over the next few years, the financial impacts will be updated to reflect these changes.

2.0 Service Utilization Peer Review

In 2023, Brampton Transit experienced approximately 59.7 trips per capita, a significant increase since 2012 when there were 34.7 trips per capita**. Figure 1** presents how various peer cities rate in terms of density and trips per capita. Brampton Transit experiences one of the highest trips per capita, even higher than municipalities that have higher desnities (e.g. Winnipeg and Mississauga). This suggests that continued plans for intensification will result in a higher trips per capita that could exceed other peer systems.

Figure 1: 2023 Service Utilization: Brampton and Other Comparable Canadian Cities



3.0 Planned Growth

Population and employment growth assumptions have been provided by HDR. The City of Brampton's EMME travel demand model projects ridership and mode share forecasts for 2051. The model predicts a transit mode share of 16%, where a transit trip is any trip was made in whole or in part by a transit mode, including Brampton Transit or GO Transit. Transit demand is assigned and the number of Brampton Transit boardings and GO Transit boardings (at GO stations in Brampton) were forecast by the model. This resulted in 74,313 AM peak boardings to be delivered by Brampton Transit by 2051 (based on the 16% transit mode share). Growth in boardings between 2024 and 2051 was based on transit ridership per capita for each year using data from the EMME model to establish a baseline demand.

Following this, the demand was adjusted to align with the TMP's transit mode share target of 25%, which contrasts with the EMME model's forecasted mode share of 16% for 2051. The 74,313 Brampton Transit boardings was increased proportionately to reflect the difference between the 16% mode share and the target 25% mode share. The results of this adjustment are included in **Table 1** below.

Table 1: Brampton's Planned Growth

Metrics	2024	2031	2041	2051
Population	791,486	835,721	930,007	985,002
Transit Mode Share (EMME)	9.7%	11.3%	13.7%	16.0%
Brampton Transit AM Peak Boardings (EMME)	44,249	50,955	63,464	74,313
Transit Mode Share (Target)	9.7%	13.7%	19.3%	25.0%
Brampton Transit AM Peak Boardings (Target)	44,249	61,446	89,736	116,114

4.0 Infrastructure and Resources

The Infrastructure and Resources section of the Future Transit Provisions document provides a comprehensive overview of the financial requirements necessary to implement the future transit network envisioned for the City of Brampton. This section examines the costs associated with the transit network, including rapid transit and transit priority networks, as well as other essential infrastructure elements such as terminals, vehicle acquisition and refurbishment costs, maintenance and storage facility expenses, and operating costs. These cost estimates are grounded in the preferred transit network developed by HDR, utilizing ridership forecasts from the EMME model, and are further informed by data and insights provided by City staff.

All costs included in this section are provided in 2023 dollars to remain consistent with the City of Brampton 2024 Development Charges Background Study. Inflation has not been factored into future cost projections.

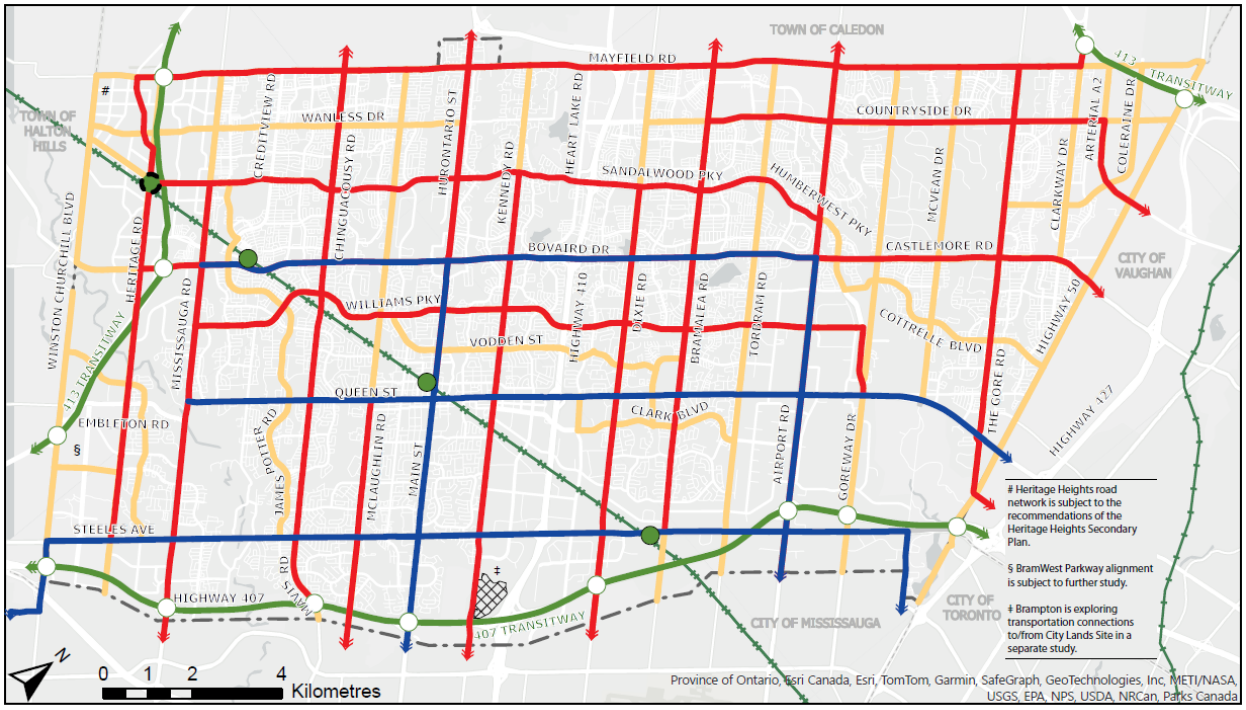
4.1 Rapid Transit and Transit Priority Network

This section assesses the cost of the capital infrastructure enhancements required to bring the preferred transit network to fruition. This section outlines the costs associated with implementing these improvements to support the projected transit demand and achieve the city's transportation objectives. The cost estimates and implementation timelines have been provided by HDR. The cost of Higher Order Transit (HOT) upgrades has been assumed at $55,000,000 per km based on cost estimates used for the 2024 DC Study, validated against other HOT unit costs from sources across the GTA. The cost of Züm upgrades has been assumed to be $2,500,000 per km based on the cost of the most recent Züm project. These estimates include allowances for property and contingencies. The Preferred Transit Network is illustrated in **Figure 2.** Note that some values have been adjusted due to rounding.

The upgrades required for the Preferred Transit Network are summarized in **Table 2**. The table lists three types of infrastructure improvements:

- **High Order Transit:** Conversion of an existing lane to a HOT exclusive lane[1] or widening of a road to create an additional lane for HOT;
- **Special:** Other transit infrastructure improvements including the construction of LRT facilities; and
- **Züm:** Construction of Züm facilities along corridor.

Figure 2: Preferred Transit Network



Recommended 2051 Transit Network

Legend

- Brampton Border

Rail

- Kitchener GO Line
- Existing GO Stations
- Bolton GO Line (CONCEPTUAL)
- New GO Stations (CONCEPTUAL)

Roads

- Highway
- Major Arterial (Regional)
- Major Arterial (City)
- Minor Arterial
- Collector
- Local

Proposed Transit Network

- Higher Order Transit (BRT or LRT)
- Priority Bus or Züm
- Support Corridor
- Provincial Transitway (CONCEPTUAL)
- Transitway Stations (CONCEPTUAL)

[1] Lane conversions could be carried out incrementally over segments and could include a suite of measures from queue jump lanes, high order vehicle lane and transit signal priority.

Table 2: Preferred Transit Network Improvements

Road	From	To	Length (km)	Infrastructure	Assumed Timeline	Total
Main Street South	Steeles Ave	Brampton GO	3.31	Special	2031	$2,800,000,000
Queen Street West	Mississauga Road	Main Street	4.07	Higher Order Transit	2041	$223,850,000
Queen Street East	Main Street	Kennedy Road	2.78	Higher Order Transit	2031	$154,000,000
Queen Street East	Kennedy Road	Highway 410	1.41	Higher Order Transit	2031	$77,550,000
Queen Street East[2]	Highway 410	Highway 50	10.22	Higher Order Transit	2031	$562,100,000
Airport Road	Brampton south boundary	Bovaird Drive	7.07	Higher Order Transit	2041	$387,750,000
Bovaird Drive	Mississauga Road	Airport Road	13.79	Higher Order Transit	2041	$759,000,000
Finch Avenue	Brampton south boundary	Steeles Avenue	1.45	Higher Order Transit	2051	$79,750,000
Main Street North	Brampton GO	Bovaird Drive	2.88	Higher Order Transit	2051	$158,400,000
Steeles Avenue West	Winston Churchill Boulevard	Hurontario Street	8.30	Higher Order Transit	2041	$456,500,000
Steeles Avenue East	Hurontario Street	Bramalea GO	5.20	Higher Order Transit	2031	$286,000,000
Steeles Avenue East	Bramalea GO	Gorewood Drive-Finch Avenue	5.80	Higher Order Transit	2041	$319,000,000
Winston Churchill Boulevard	Brampton south boundary	Steeles Avenue (Lisgar GO)	0.84	Higher Order Transit	2051	$46,750,000

[2] Outcomes of the Queen Street Highway 7 BRT Planning Study, currently being completed by Metrolinx should inform future cost estimates and phasing for this project.

Road	From	To	Length (km)	Infrastructure	Assumed Timeline	Total
Airport Road	Bovaird Drive	Sandalwood Parkway	0.90	Züm	2041	$2,250,000
Airport Road	Sandalwood Parkway	Mayfield Road	3.40	Züm	2051	$8,500,000
Bovaird Drive	Heritage Road	Mississauga Road	1.40	Züm	2051	$3,500,000
Bramalea Road	Steeles Avenue / Bramalea GO	Bovaird Drive	6.20	Züm	2031	$15,500,000
Bramalea Road	Bovaird Drive	Mayfield Road	4.30	Züm	2031	$10,750,000
Castlemore Road	Airport Road	Highway 50	6.30	Züm	2041	$15,750,000
Chinguacousy Road	Sandalwood Parkway	Mayfield Road	2.70	Züm	2041	$6,750,000
Countryside Drive / Arterial A2	Bramalea Road	Highway 50	10.90	Züm	2051	$27,250,000
Dixie Road	Brampton south boundary	Steeles Avenue	1.95	Züm	2-41	$4,875,000
Dixie Road	Steeles Avenue	Bovaird Drive	6.30	Züm	2041	$15,750,000
Dixie Road	Bovaird Drive	Sandalwood Parkway	1.60	Züm	2041	$4,000,000
Heritage Road	Steeles Avenue	Mayfield Road	10.40	Züm	2041	$26,000,000
Hurontario Street	Sandalwood Parkway	Mayfield Road	2.50	Züm	2031	$6,250,000
Humberwest Parkway	Williams Parkway	Queen Street	1.55	Züm	2041	$3,875,000
Kennedy Road	Brampton south boundary	Queen Street	5.55	Züm	2031	$13,875,000

Road	From	To	Length (km)	Infrastructure	Assumed Timeline	Total
Kennedy Road	Queen Street	Sandalwood Parkway	5.10	Züm	2031	$12,750,000
Mavis Road	Steeles Avenue	Highway 407	1.95	Züm	2041	$4,875,000
Mayfield Road	Heritage Road	Clarkway Drive	20.60	Züm	2051	$51,500,000
McLaughlin Road	Brampton south boundary	Queen Street	4.70	Züm	2051	$11,750,000
Mississauga Road	Bovaird Drive	Mayfield Road	4.30	Züm	2041	$10,750,000
Mississauga Road	Brampton south boundary	Queen Street	4.89	Züm	2041	$12,225,000
Sandalwood Parkway	Heritage Road	Airport Road	15.40	Züm	2041	$38,500,000
The Gore Road	Highway 50	Mayfield Road	9.60	Züm	2041	$24,000,000
Williams Parkway	Mississauga Road	Humberwest Parkway	15.60	Züm	2041	$39,000,000

A summary of the preferred transit network improvements is provided in **Table 3.** It is noted that the future decades are estimated to have considerably lower costs.

Table 3: Cost for Transit Priority Network Infrastructure Upgrades

Year	Special	Higher Order Transit	Züm	Total
2025-2031	$2,800,000,000	$1,079,650,000	$59,125,000	$ 3,938,775,000
2032-2041	$0	$2,146,100,000	$208,600,000	$ 2,354,700,000
2042-2051	$0	$284,900,000	$102,500,000	$ 387,400,000
TOTAL	**$2,800,000,000**	**$3,510,650,000**	**$370,225,000**	**$ 6,680,875,000**

4.2 Other Infrastructure and Technology Costs

City staff have recommended setting aside approximately $25,000,000 per decade, averaging $2,500,000 annually, for additional transit infrastructure and technology expenses, including updates to transit communication and fare collection systems. These estimates do not account for software upgrade costs related to the network improvements mentioned earlier.

Furthermore, an annual allocation of $1,000,000 has been assumed for the growth, replacement, and refurbishment of bus shelters. Starting in 2030, a provision of $2,000,000 per year has been included for the replacement of Züm stations. While it is anticipated that these costs will rise as the network expands, the exact increase is uncertain. Therefore, an average approach has been adopted, with a total estimated annual cost of $3,500,000 prior to 2030 and $5,500,000 from 2030 onwards (including Züm station replacement).

It should be noted that these costs were not included in the Transit Development Charge Background Study. A summary of costs is provided in **Table 4.**

Table 4: Additional Transit Infrastructure / Technology Costs

Year	Total Cost
2025-2031	$28,500,000
2032-2041	$55,000,000
2042-2051	$55,000,000

4.3 Fleet

The number of peak vehicles is calculated by dividing the target AM peak hour boardings by an average of 71 boardings per vehicle. This was completed for the 2025 to 2051 horizons, increasing the fleet size based on year-over-year ridership (boardings) growth. A spare ratio of 27.6% was also used to calculate total fleet requirements, which applied this ratio to the growth in peak vehicles to determine the growth in spares.

Approximately 80% of existing vehicles are 40ft buses, with the remaining 20% are 60ft buses. Brampton Transit will transition towards a 60% to 40% ratio split in total fleet makeup to better align with operational necessity and to minimize spatial impact on storage limitations over the next 10-15 year horizon. This will require an even higher proportion new fleet to be 60ft buses to achieve this total target.

Growth vehicles were added to the existing fleet to determine the total fleet size for each horizon year.

Buses have an estimated lifespan of 18 years, with replacement buses equating to those introduced 18 years prior. To maintain the fleet, it is estimated that 6.3% of vehicles will require refurbishment annually.

Please also note that the impact on fleet requirements due to the transition to zero emission buses has not been considered.

Table 5 summarizes the vehicle resources required for each of the key study years.

Table 5: Transit Bus Resource Requirements

Year	AM Peak Transit Ridership	Peak Demand Vehicles*	Adjusted Peak Vehicles**	Spare Vehicles	Total 40'	Total 60'	Total Fleet
2024	44,249	623	418	115	424	109	533
2025	45,171	658	452	125	452	125	577
2031	61,446	865	660	182	609	233	842
2041	89,736	1,264	1,058	292	914	436	1,350
2051	116,114	1,635	1,430	395	1,199	626	1,825

**Reflects the number of peak vehicles required to achieve 71 AM peak boardings per peak vehicle*

*** Adjusted to reflect the existing number of vehicles currently in the fleet as a starting point.*

The current cost for a 40ft hybrid bus is $1,550,000, and a 60ft diesel bus is $1,600,000. The city is working towards creating an electrified fleet. These costs do not consider the costs of a fully electrified fleet. Refurbishment costs are estimated at $225,000 per vehicle, with an additional $8,000,000 per year assumed for the cost of hybrid batteries, engines, transmissions, hybrid systems, and articulated joints. These costs are based on existing vehicle requirements and costs, which are subject to updates through each of the future 5- Year Brampton Transit Business Plan cycles. Costs are based on 2023 dollars and do not include increases due to inflation.

Table 6 summarizes the cost of fleet growth and maintenance.

Table 6: Cost of Fleet Growth and Maintenance

Year	Growth & Replacement Vehicles	Refurbishment	Total Cost	Average Annual Cost
2025-2031	$863,280,818	$126,356,969	$989,637,787	$141,376,827
2031-2041	$1,077,468,348	$238,283,248	$1,315,751,596	$131,575,160
2041-2051	$1,528,829,275	$308,066,339	$1,836,895,614	$183,689,561

4.4 Maintenance Facilities and Transit Terminals

The City of Brampton Development Charge Transit Background sheet identifies the electrification of various buildings as well as the construction of new facilities and terminals as future costs. The following projects have been identified:

- Third Transit Facility Electrification and Expansion;
- On-Street Charging Equipment;
- Sandalwood Transit Facility Electrification Retrofit;
- Clark Transit Facility Electrification Retrofit;
- New Transit Terminals (2);
- Mayfield West Transit Hub/Terminal;
- Fourth Transit Facility + Electrification; and
- Fifth Transit Facility + Electrification

The net municipal costs of these facilities and terminals, as identified in the 2024-2033 Transit Capital Plan are summarized in **Table 7**. Costs are subject to change as projects progress.

Table 7: City Cost of Maintenance and Storage Facilities

Year	Facility	Net Municipal Project Cost	Total Municipal Cost
2025-2031	Third Transit Facility Electrification	$75,000,000	$297,833,333
	On-Street Charging Equipment	$31,500,000	
	Sandalwood Transit Facility Electrification Retrofit	$30,000,000	
	Clark Transit Facility Electrification Retrofit	$30,000,000	

	New Transit Terminals (2)	$20,000,000	
	Mayfield West Transit Hub/Terminal	$3,000,000	
	Third Transit Facility Expansion	$108,333,333	
2032-2041	Fourth Transit Facility + Electrification	$166,667,000	$166,667,000
2041-2051	Fifth Transit Facility + Electrification	$166,667,000	$166,667,000

4.5 Summary of Capital Costs

All the costs identified above are summarized in

Table 8.

Table 8: Summary of Capital Costs

Year	Network ($M)	Fleet ($M)	Facilities and Terminals ($M)	Other Infrastructure / Technology ($M)	Total Municipal Cost ($M)	Average Annual ($M)
2025-2031	$3,939	$990	$298	$29	$5,255	$751
2031-2041	$2,355	$1,316	$167	$55	$3,892	$389
2041-2051	$387	$1,837	$167	$55	$2,446	$245
Total	**$6,681**	**$4,142**	**$631**	**$139**	**$11,593**	**N/A**

4.6 Operating Costs

Operating costs are directly related to revenue vehicle-km and hours of service. With more vehicles in service to achieve the significantly higher improved service levels to meet projected demand and mode share targets, it will cost more to operate the system. As ridership grows, services are improved to accommodate the demand and therefore ridership growth is directly related to the amount of service provided. The hourly operating cost has been assumed to be $156.18 based on recently reported operating costs.

Operating costs for the key horizon years are provided in **Table 9.** Service hours and operating cost requirements will be updated through upcoming Brampton Transit 5-year business plan cycles as detailed service plans are developed to meet growing ridership demand. Note that operating costs do not reflect higher operation and maintenance costs of rail-based higher-order transit services and

infrastructure (e.g. LRT).

Table 9: Operating Costs

Year	Annual Service Hours	Annual Operating Cost	Annual Revenue (50% R/C)	Net Annual Operating Cost
2025	1,503,418	$234,803,836	$117,401,918	$117,401,918
2031	2,194,756	$342,777,019	$171,388,509	$171,388,509
2041	3,519,900	$549,738,031	$274,869,015	$274,869,015
2051	4,755,499	$742,713,782	$371,356,891	$371,356,891