Region of Waterloo

Transportation Services

Rapid Transit

To:	Sustainability, Infrastructure, and Development Committee
Meeting Date:	September 9, 2025
Report Title:	Stage 2 Rapid Transit Initial Business Case Preliminary Results

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1. Recommendation

For information.

2. Purpose / Issue:

This report presents the preliminary results of the Initial Business Case (IBC) for Stage 2 Rapid Transit to Cambridge. The IBC looks at five options and compares the benefits, costs and potential ridership. These results, combined with public feedback, will be used to make a recommendation to Council in November on the best option for Waterloo Region.

3. Strategic Plan:

The expansion of rapid transit aligns to the transit investment priorities outlined in the Grand River Transit (GRT) Business Plan approved in June 2025. By increasing the speed and reliability of transit services, providing transit service to new areas and making the service easier to use, GRT can support the Region's commitment to grow with care towards one million residents.

Rapid transit service helps achieve each priority of the Strategic Plan:

- **Homes for All** – sustained transit investments promote transit-supportive development and unlock access to affordable housing options across the region.
- **Climate-aligned Growth** – rapid transit reduces greenhouse gas emissions through increased transit usage, while promoting sustainable development, and reduces financial burden of rideshare services or car ownership.
- **Equitable Services and Opportunities** – all day, everyday transit service enhances social and economic resiliency by connecting our residents to community services and supports, and local jobs.
- **Resilient and Future Ready Organization** – a frequent transit network optimizes the transit fleet and staff, making transit operations more efficient.

4. Report Highlights:

- Rapid transit creates communities where residents want to live and work. Stage 1 ION led to more than $5 billion in investment along the Central Transit Corridor (CTC). It also led to more than 18,000 new homes along the corridor between 2011 and 2020.

- Completing the rapid transit line to Cambridge builds on the success of Stage 1 and Stage 2 will bring the same benefits to Cambridge residents.

- Rapid transit to Cambridge can encourage building up and not out, which will help prevent urban sprawl. Rapid transit also provides a sustainable, affordable, and reliable transportation solution to meet our community's future needs.

- The IBC looks at various routes and vehicle types and compares the benefits, costs and potential ridership of these options. It evaluates them on:
  - Strategic benefits
  - Economic benefits
  - Capital cost estimates
  - Operating and maintenance cost estimates

- While the IBC touches on each of the four cases above, the focus of the work is on the strategic and the economic cases and illustrating why we should do the work and the benefits we can anticipate.

- The IBC concludes that extending the LRT from Fairway to Downtown Cambridge provides the greatest economic benefits for Waterloo Region and achieves all the project's strategic goals, while having the highest capital, operating and maintenance costs.

- BRT from Fairway to Downtown Cambridge has lower capital, operating and maintenance costs than LRT but delivers less economic benefit and achieves many, but not all the project's strategic goals.

- The partial LRT options fall short of the economic benefits and fail to achieve the project's strategic goals unlike the full-length options.

- Staff will continue to collect public and stakeholder feedback on the data and the project through to the end of October.

- In November, staff will present a final report, with a summary of all engagement feedback to Regional Council, along with a recommendation on which option to advance to detailed design and pre-construction.

- Following endorsement of the IBC, staff will develop applications for full funding of the project from the federal and provincial governments.

5. Background:

Project Alternatives

As directed by Regional Council this IBC includes various project alternatives for comparison (Appendix A), not just a single project design. Five options were evaluated for the IBC:

Table 1: Initial Business Case Alternatives

ID	Vehicle	From	To	Length (km)	Peak Freq. (min)	Trip time (min)
L1	LRT	Fairway Station	Downtown Cambridge	17	7	29
L2	LRT	Fairway Station	Pinebush Station	11	7	19
L3	LRT	Fairway Station	Delta Station	14.5	7	25
L4	LRT	Preston Station	Downtown Cambridge	10	7	17
B5	BRT	Fairway Station	Downtown Cambridge	17	5	29

L1 – Full LRT extension to Downtown Cambridge

- LRT extended from Fairway Station to Downtown Cambridge, creating one continuous LRT system and a one-seat ride between Conestoga Station and Downtown Cambridge.

L2 - Partial LRT extension to Pinebush Station

- LRT extended from Fairway Station to Pinebush Station.
- This option would require customers to transfer to a bus to reach Downtown Cambridge.

L3 – Partial LRT extension to Delta Station

- LRT extended from Fairway Station to Delta Station.
- This option would require customers to transfer to a bus to reach Downtown Cambridge.

L4 - New, separate LRT service

- LRT from Preston Station to Downtown Cambridge.
- This option includes express bus service between Preston Station and Fairway Station connecting the two LRT systems.

B5 - Full BRT service

- Bus rapid transit (BRT) from Fairway Station to Downtown Cambridge with dedicated and separated lanes for high-frequency, high-capacity buses.
- Customers would need to transfer at Fairway Station to continue using rapid transit.

Rapid Transit Technology – LRT and BRT

Both the LRT and the BRT alternatives in the IBC include dedicated lanes, very frequent and reliable service, high-capacity vehicles and permanent station infrastructure. Both systems represent a significant investment in transit service and a permanent commitment to the rapid transit corridor and station areas.

LRT uses light rail vehicles (LRVs) which can carry 200 passengers, or 400 passengers when two LRVs are coupled together. BRT operates with extra long, high-capacity buses that can carry 85 passengers.

Operating Assumptions

The IBC assumes a maximum LRT service frequency of seven minutes. Each of the LRT alternatives would operate out of the Region's central control facility in Waterloo, but include an additional, smaller maintenance and storage facility. The separate LRT option from Pinebush Station to Downtown Cambridge includes a new operations, maintenance and storage facility. The BRT option includes a new dedicated maintenance and storage facility.

Ridership Forecasts

A ridership forecast to 2051 has been developed using a travel demand model. Many of the economic, social and health benefits of rapid transit are based on total ridership and new riders. The 2051 average daily ridership and afternoon peak hour ridership (one direction) are provided in the following table.

The forecast shows full LRT and BRT have the highest average daily ridership. Full LRT from Fairway to Downtown Cambridge has slightly higher ridership than full BRT, due to the transfer between bus and train at Fairway Station.

Table 2: 2051 Average Daily Ridership

ID	Vehicle	From	To	Peak Hour	Average Daily
L1	LRT	Fairway Station	Downtown Cambridge	2,780	22,300
L2	LRT	Fairway Station	Pinebush Station	1,940	15,500
L3	LRT	Fairway Station	Delta Station	2,560	20,500
L4	LRT	Preston Station	Downtown Cambridge	1,340	10,700
B5	BRT	Fairway Station	Downtown Cambridge	2,570	20,600

Land Use Forecasts

Approved 2041 and 2051 land use forecasts of population and employment were used to develop ridership forecasts and estimate project benefits. The same approved land use forecasts were used for all alternatives. The 2041 and 2051 land use forecasts include growth and development around the stations, in the major transit station areas as identified in the Regional Official Plan.

Initial Business Case (IBC) – Process and Structure

An IBC summarizes and details the capital and lifecycle costs of project alternatives and compares those costs to various quantitative and qualitative benefits. The IBC will inform Regional Council's decision-making, along with public feedback and other considerations. It follows the Ontario Ministry of Transportation (MTO) guidance for Cost-Benefit Analysis and the Metrolinx business case guidance.

The business case is divided into four major sub-cases:

- Strategic Case – Determines the value of addressing a problem or opportunity based on broader, long-term regional goals, plans or policies.
- Economic Case – Assesses the costs and benefits of the project to individuals and the community, and spans the entire project's lifecycle.
- Financial Case – Assesses the overall financial impact of the project, including capital, operations and maintenance, according to the Region's direct costs and revenue only, and not broader community benefits.
- Deliverability and Operations Case – Considers challenges and risks to implementation, construction, integration, procurement, and operating plans.

Strategic Case

The Initial Business Case evaluates the five options against the strategic goals for rapid transit: shaping growth, connecting communities, and moving people.

Shaping growth: Rapid transit supports sustainable and healthy communities and attracts new development around station areas. Rapid Transit would continue to concentrate growth along the CTC, building on the success of Stage 1.

Both LRT and BRT can encourage development and influence land use around stations, generating further economic benefits which increases transit ridership. The extent of development attracted by LRT and BRT depends on various factors, including local context and developer perception. Shortened LRT options that end at Pinebush and Delta miss out on opportunities to attract development to Downtown Cambridge, and Delta Station has limited potential for new development.

Connecting communities: Rapid transit should create a continuous connection from Waterloo to Kitchener to Cambridge. It should strengthen connections between Cambridge and the rest of Waterloo Region and increase access to housing and jobs for Cambridge residents and the rest of the region.

Partial LRT routes do not achieve the strategic goal of connecting Waterloo to Kitchener to Cambridge. Partial LRT routes that end at Pinebush and Delta don't connect to high employment and housing areas in Downtown Cambridge, and Cambridge residents would miss out on important housing and employment opportunities.

Moving people: The option recommended should increase access to rapid transit for more people. It should improve travel time, reliability, and ease of use for existing and new transit riders, supporting the goals of the GRT Business Plan.

Partial LRT routes miss out on important potential for existing and future transit ridership. Partial LRT from Preston to Downtown Cambridge would require multiple transfers for riders travelling to Kitchener, increasing travel time, and reducing ease of use. Only full LRT achieves the original vision of a seamless connection from Waterloo to Kitchener to Cambridge; BRT would require a transfer at Fairway Station.

Economic Case

The economic case evaluates the benefits to existing transit users, new transit users and road users. It also assesses the benefits to Waterloo Region through reduced greenhouse gas emissions, reduced vehicle collisions and improved local air quality.

Existing and new transit users both benefit from rapid transit through reduced travel times. New users who are switching to transit from other modes of travel also benefit from savings on the costs of vehicle ownership and operation. Other road users also benefit from rapid transit due to reduced congestion on roads, which also means less maintenance required on Regional roads.

Full LRT has the highest economic benefit, by delivering the greatest travel time savings, the highest emissions and air quality savings and the greatest reduction to congestion. Partial LRT routes from Fairway to Delta and from Preston to Downtown Cambridge have the lowest economic benefits.

Table 3: Economic Benefits (in $millions)

Benefit	L1	L2	L3	L4	B5
Vehicle	LRT	LRT	LRT	LRT	BRT
From Station	Fairway	Fairway	Fairway	Preston	Fairway
To Station	Downtown	Pinebush	Delta	Downtown	Downtown
Travel Time Savings (Existing Passengers)	370.0	161.3	290.4	27.9	306.7
Travel Time Savings (New Passengers)	176.7	93.1	134.9	66.4	124.3
Reliability Savings	59.7	61.2	59.7	61.2	62.7
Vehicle Operations Savings	143.9	60.2	120.1	58.1	102.0
Emissions Savings	5.3	2.2	4.4	2.2	3.8
Air Quality Savings	1.1	0.5	1.0	0.5	0.8
Collision Reduction	11.3	5.0	9.5	4.8	8.9
Congestion Reduction	34.3	14.3	28.6	13.9	24.3
Health Benefit	130.5	52.9	109.8	-4.6	116.1
Sub-Total Benefits	932.8	450.7	758.4	230.3	749.5
Adjustments					
New Fare Revenue	161.4	65.8	135.9	-5.7	145.0
Auto Maintenance Cost	-3.4	-1.4	-2.8	-1.4	-2.4
Fuel Tax Cost	-22.2	-9.3	-18.5	-9.0	-15.7
Sub-Total Adjustments	135.8	55.1	114.5	-16.1	126.9
Total Economic Benefits	**1,068.6**	**505.8**	**872.9**	**214.2**	**876.4**

Cost Estimates – Capital

Cost consultants have estimated the capital, operations, maintenance and rehabilitation costs for the project alternatives. Capital cost includes construction, vehicles, property, design, project management, testing and commissioning. A Class 4 capital cost estimate was completed based on a 5-10% design and has an estimate range, or accuracy, of -30%/+50%. The estimated construction costs for each alternative are summarized in Table 4.

The estimate does not include financing costs and does not consider the cost and/or risk impacts of sole-sourcing the work. It does not include costs for local bus fleet expansion that would be required to support the LRT system.

Escalation refers to the higher cost of building in the future compared to today due to price increases and inflation.

Full LRT and BRT would both require construction of six new major bridges, grade separations and/or elevated sections. LRT cost is higher than BRT due to construction of the overhead wires, substations, tracks and vehicles.

The current cost estimate is consistent with the capital costs for other recent and current LRT projects in Ontario.

Table 4: Capital Cost Estimate ($millions)

ID	Vehicle	From	To	Capital Cost (2025$)	Escalated Capital Cost (2033$)
L1	LRT	Fairway Station	Downtown Cambridge	3,130	4,300
L2	LRT	Fairway Station	Pinebush Station	2,240	3,045
L3	LRT	Fairway Station	Delta Station	2,840	3,900
L4	LRT	Preston Station	Downtown Cambridge	2,170	2,940
B5	BRT	Fairway Station	Downtown Cambridge	2,165	2,930

Cost Estimate – Operations, Maintenance and Rehabilitation

An analysis of the Stage 2 Rapid Transit operations was conducted and a cost estimate was developed for on-going system operations, maintenance and rehabilitation costs. The table below lists the operations, maintenance and rehabilitation (OM&R) costs on an annual basis.

Table 5: Operation, Maintenance and Rehabilitation Cost Estimate ($millions)

ID	Vehicle	From	To	Annual OM&R Cost (2025$)
L1	LRT	Fairway Station	Downtown Cambridge	23.8
L2	LRT	Fairway Station	Pinebush Station	16.4
L3	LRT	Fairway Station	Delta Station	20.1
L4	LRT	Preston Station	Downtown Cambridge	15.1
B5	BRT	Fairway Station	Downtown Cambridge	16.4

The above cost estimate is in current dollars and does not include cost escalation or inflation. Costs have been averaged on an annual basis because costs will vary over the contract period and rehabilitation only occurs periodically.

Benefit-Cost Ratio

The economic benefits are compared to the capital and operating and maintenance costs through a benefit-cost ratio (BCR), which simplifies the economic benefits and costs down to a single value. The BCR only considers economic benefits expressed in monetary terms; it does not consider all benefits or the strategic goals for rapid transit.

Full LRT has the highest economic benefits, however BRT has the highest BCR, due to lower capital costs compared to full LRT. LRT to Pinebush and a separate LRT from Preston to Downtown Cambridge don’t have strong BCRs.

Table 6: Benefit-Cost Ratio

ID	Vehicle	From	To	BCR
L1	LRT	Fairway Station	Downtown Cambridge	0.35
L2	LRT	Fairway Station	Pinebush Station	0.25
L3	LRT	Fairway Station	Delta Station	0.33
L4	LRT	Preston Station	Downtown Cambridge	0.11
B1	BRT	Fairway Station	Downtown Cambridge	0.45

Deliverability and Operations

The initial business case includes high level consideration of various challenges, risks, capability, capacity associated with delivering the project and operating the system. On evaluation, none of the risks or challenges of delivering and operating any of the alternatives would exclude them from further consideration. The deliverability and operations case will be further analyzed and developed in the detailed design and pre-construction phases.

6. Communication and Engagement with Area Municipalities and the Public:

Area Municipalities: The City of Cambridge and the City of Kitchener have been key partners throughout the Stage 2 project and are members of the project's Technical Advisory Committee.

Public: Public engagement on the IBC began in mid-August and will run to the end of October. It provides opportunities for residents, partners and area municipalities to share their thoughts and feedback.

Pop-ups, virtual and in-person sessions will be held to allow residents to hear more about rapid transit and ask questions about the benefits and costs of the project. Workshops will be held with stakeholders and community groups to hear what matters to residents they support. Information about the project is available on EngageWR.

A resident survey will be conducted by Ipsos in mid-September.

A detailed summary of the engagement plan, tactics and results will be presented along with the final report in November 2025.

7. Financial Implications:

	Current Year	Future Year(s)
Budget Impact?	No new impact	No new impact
Capital Plan Impact?	No new impact	No new impact

The Region's approved 2025-2034 Rapid Transit Capital Program includes $1,515,000 in 2025 for Phase 2 Environmental Assessment (project #68024) to be funded from the Regional Transportation Master Plan (RTMP) Reserve Fund (61%, $924,150) and from the Development Charge Reserve Fund (39%, $590,850). The budget is sufficient to complete the IBC.

8. Conclusion / Next Steps:

In November, staff will present a final report summarizing the IBC results, along with a summary of feedback from the engagement completed between August and October.

The final report will contain a recommendation on the best option for Stage 2 Rapid Transit to Cambridge, along with next steps to accelerate work through the next phase of the project which is detailed design and pre-construction work.

Upon the endorsement of the IBC, staff will work with federal and provincial governments on an application for full funding for the project.

9. Attachments:

Appendix A: Initial Business Case alternatives

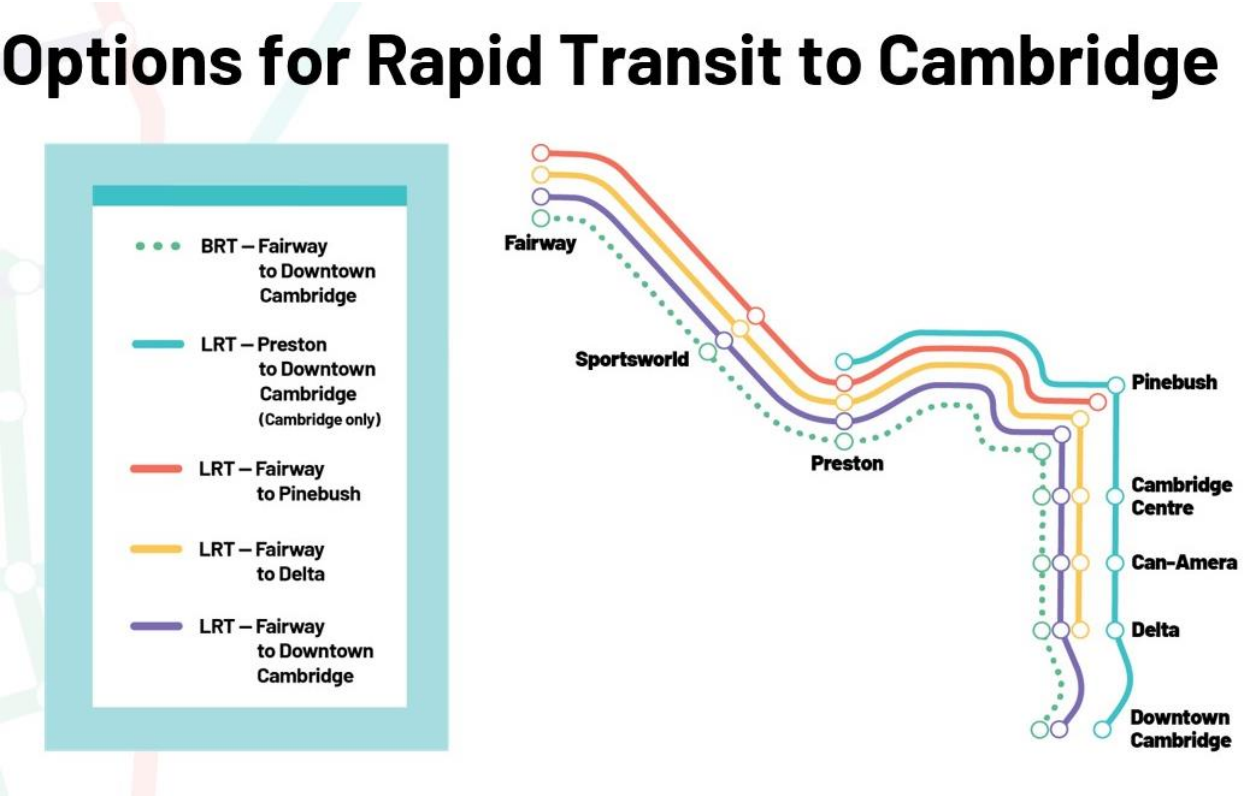
Appendix B: Stage 2 IBC results presentation

Prepared By: Matthew O'Neil, Manager, Rapid Transit Coordination

Reviewed By: Gord Ryan, Director, Rapid Transit

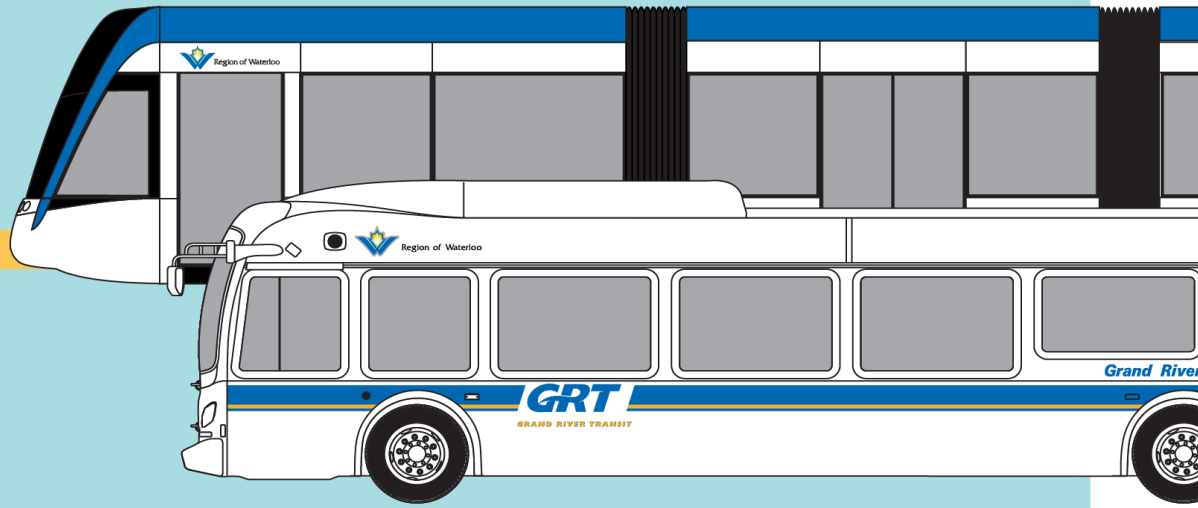
Approved By: Doug Spooner, Commissioner, Transportation Services

Appendix A: Initial Business Case Alternatives



Rapid Transit to Cambridge

Initial Business Case results



Region of Waterloo

GRAND RIVER TRANSIT

Overview

- This presentation presents the results of the Initial Business Case, comparing the benefits and costs of different options for rapid transit:
  - Ridership forecasts
  - Capital cost estimates
  - Operating and maintenance cost estimates
  - Economic benefits and benefit-cost ratios
  - Strategic benefits

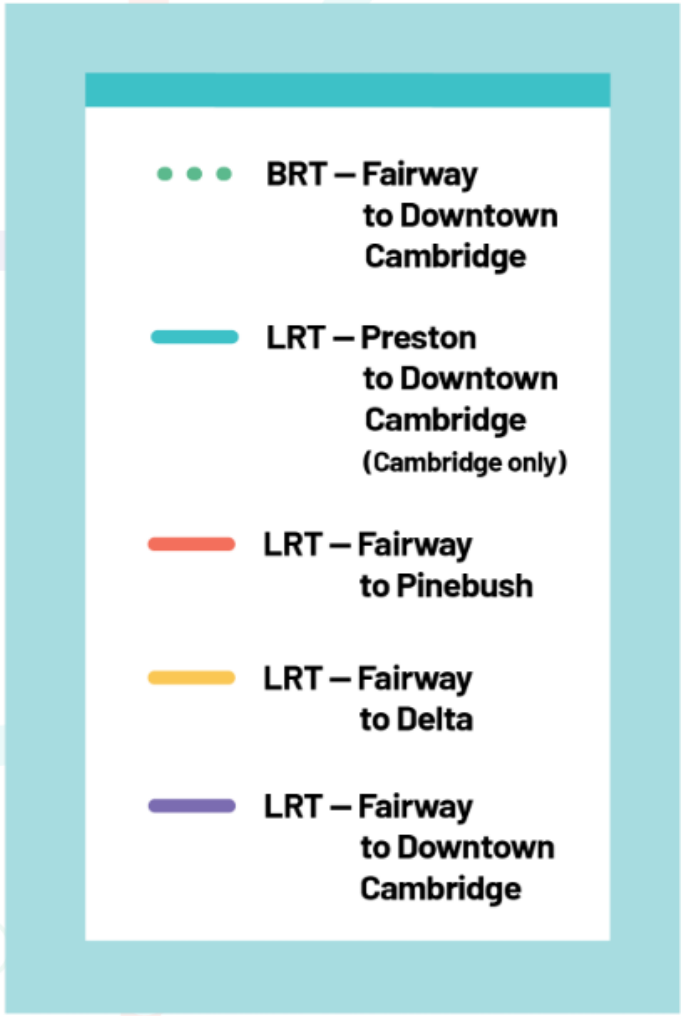
Why rapid transit?

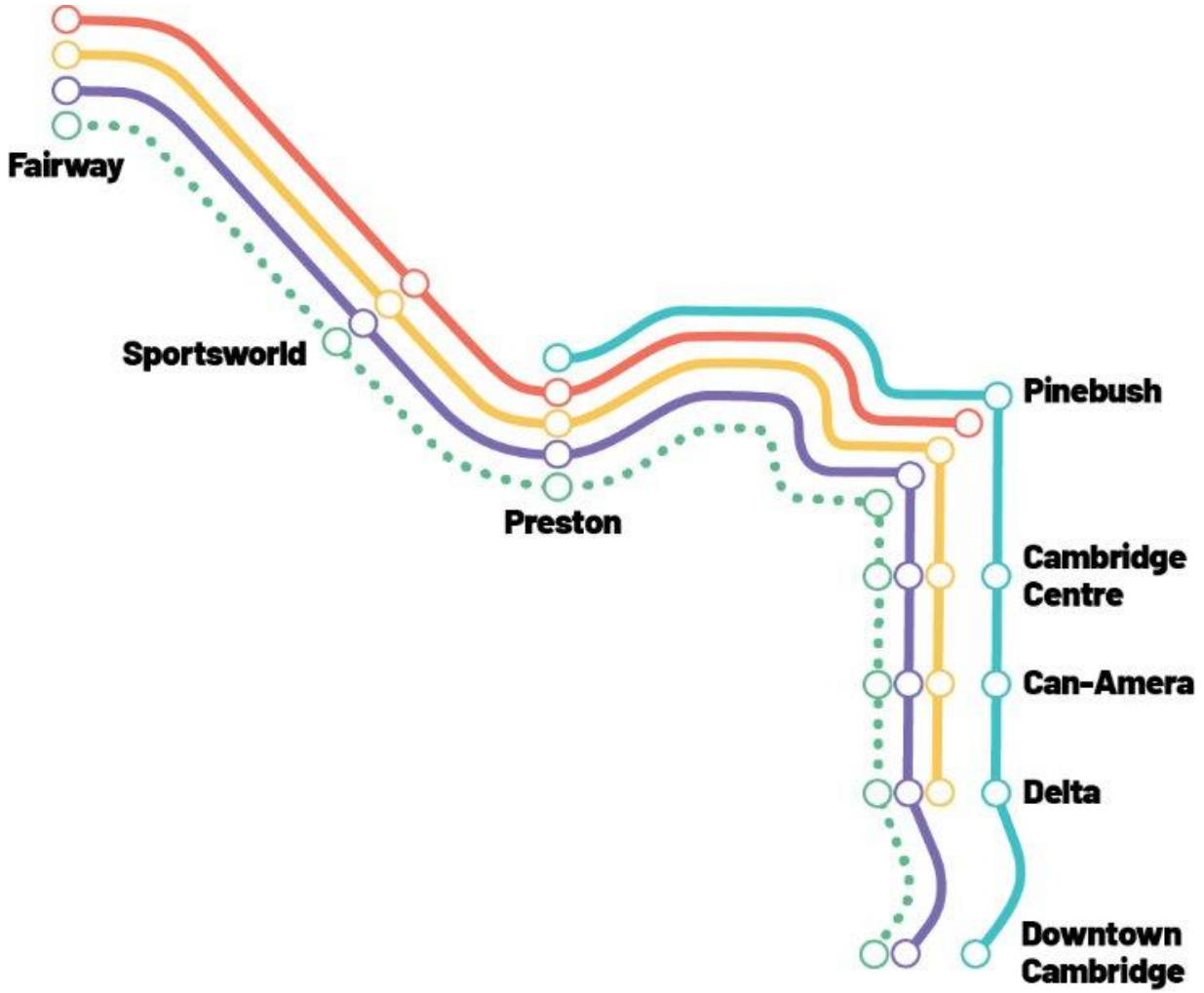
- The Region of Waterloo is preparing to grow to one million residents.
- The existing Route 302 ION Bus will not be able to meet the needs of our community; some form of rapid transit will be needed.
- Dating back to 1976, the vision for rapid transit was a continuous connection from Waterloo to Kitchener to Cambridge.
- Extending rapid transit to Cambridge builds on the success of Stage 1 ION, which led to more than $5 billion in investment along the Central Transit Corridor.
- Rapid transit shapes growth, connects communities and moves people.

Options for Rapid Transit to Cambridge

- The Initial Business Case considers five options:
  - **Full LRT service**: LRT extended from Fairway Station to downtown Cambridge, creating one continuous LRT route
  - **Partial LRT service**: Shortened LRT routes that would connect to the remaining stations by express bus
    - Fairway Station to Pinebush Station
    - Fairway Station to Delta Station
    - Preston to Downtown Cambridge
  - **BRT service**: Dedicated and separated lanes for high-frequency buses from Fairway Station to Downtown Cambridge
    - Customers would need to transfer at Fairway Station between bus and train

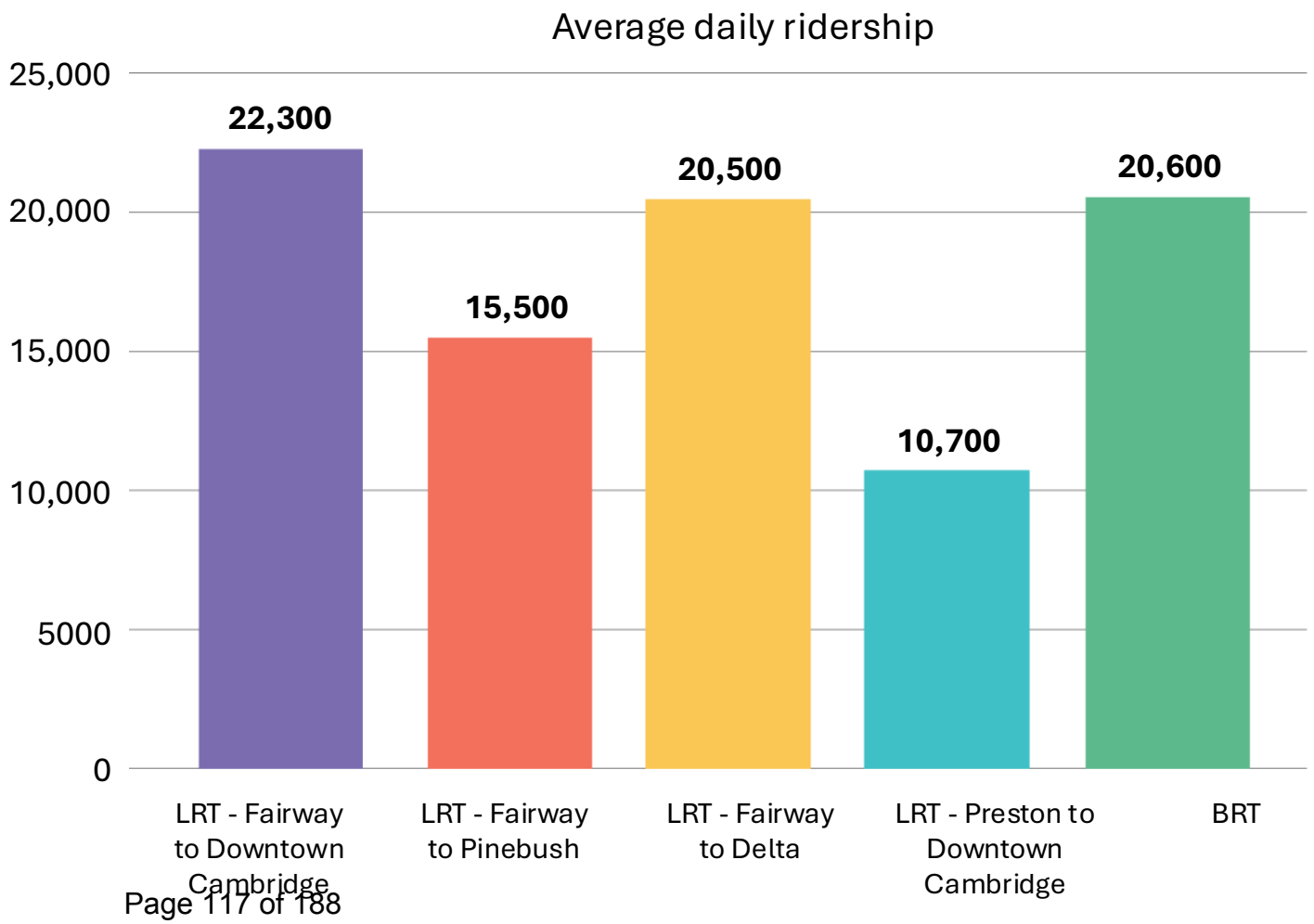
Options for Rapid Transit to Cambridge





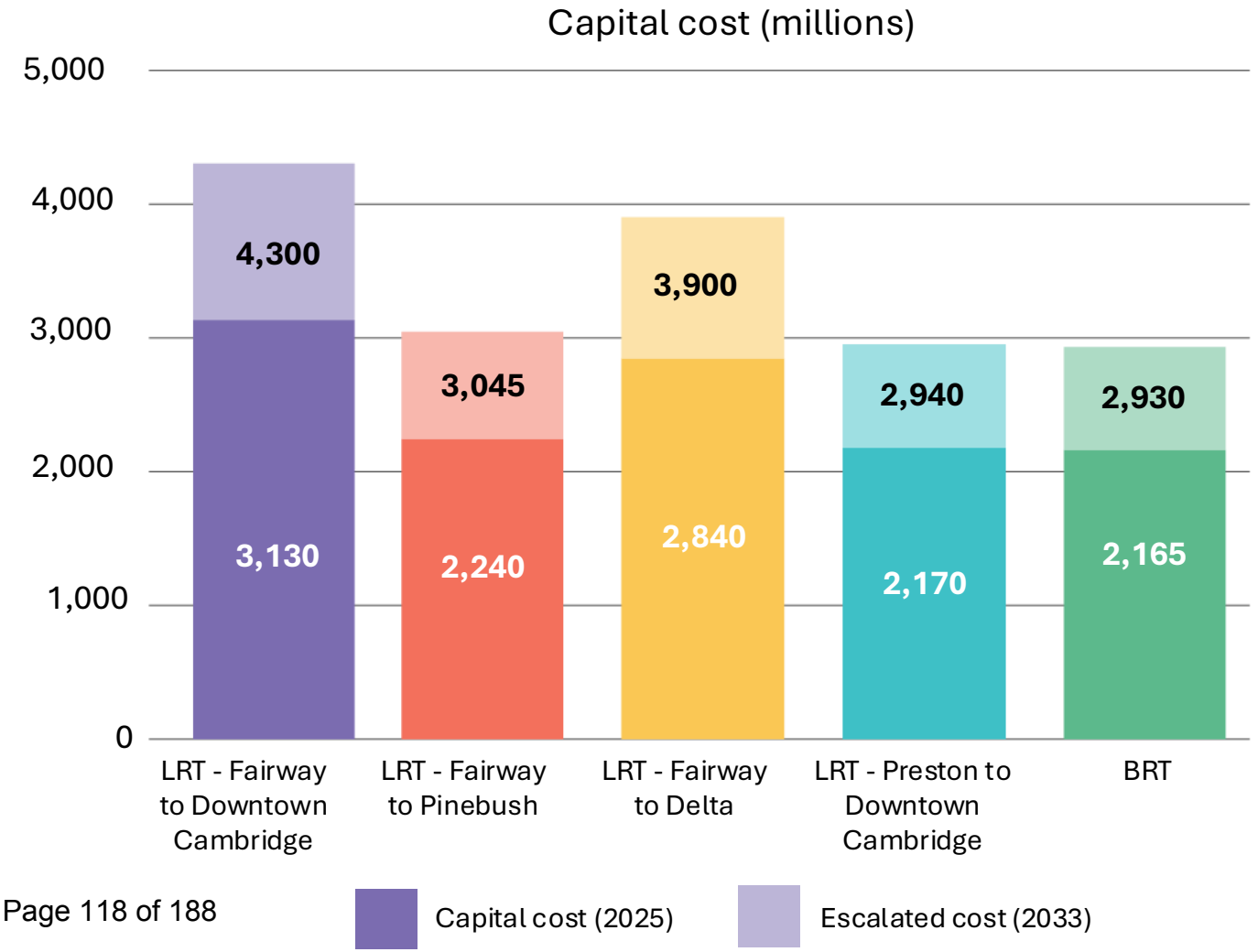
2051 ridership forecast

- Full LRT and BRT have the highest average daily ridership.
- Full LRT from Fairway to downtown Cambridge has slightly higher ridership than full BRT.
- The transfer between bus and train at Fairway Station explains the ridership difference between LRT and BRT.



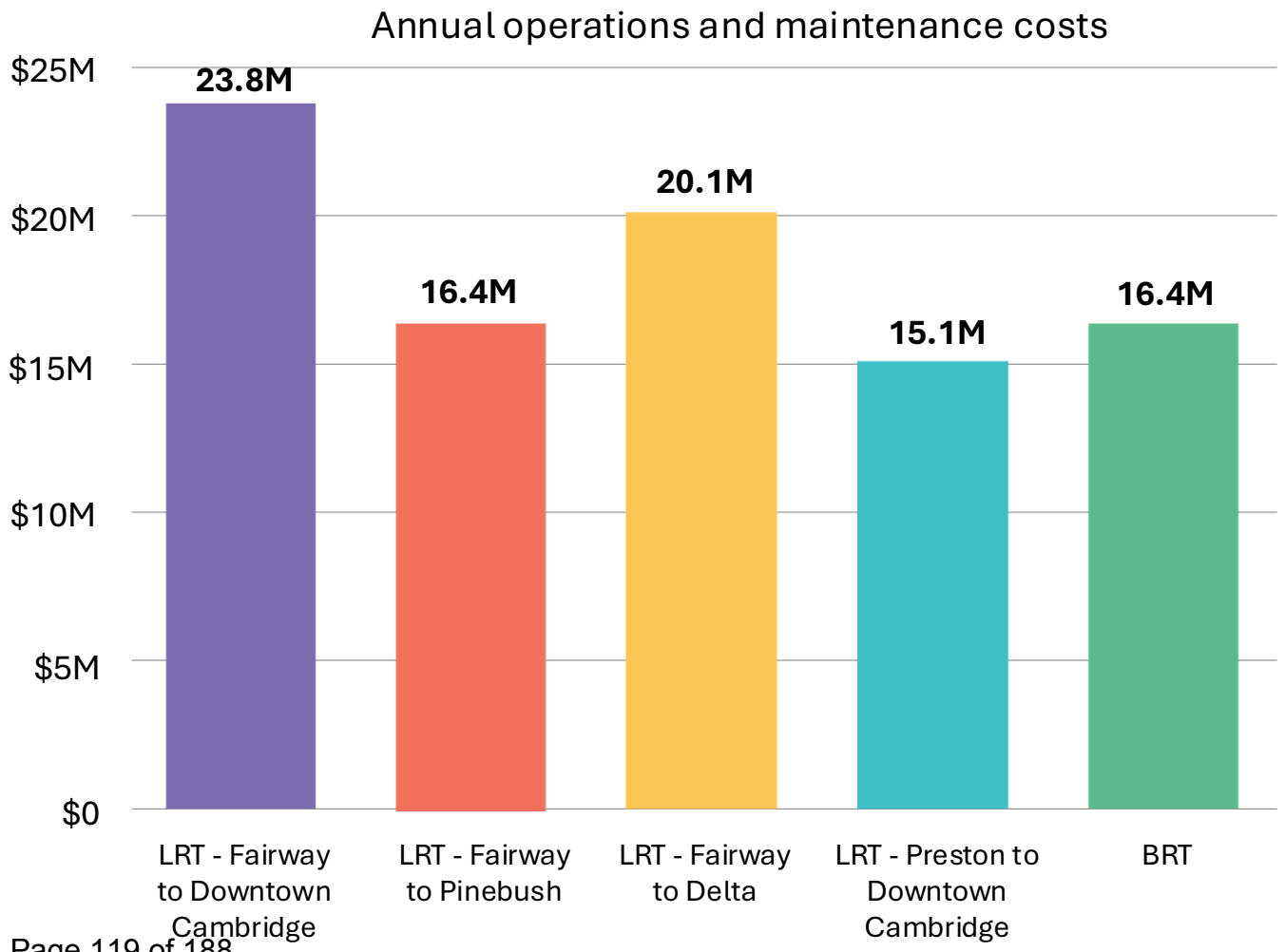
Preliminary capital cost estimates

- Capital cost includes construction, vehicles, property, design, project management, testing and commissioning.
- The graph shows the capital cost of the different options in today's dollars, as well as the escalated cost in 2033 dollars.
  - Escalation refers to the higher cost of building in the future vs today due to price increases and inflation.
- Full LRT and BRT would both require construction of six new major bridges, grade separations and/or elevated sections.
- LRT cost is higher than BRT due to construction of the overhead wires, substations, tracks and vehicles.



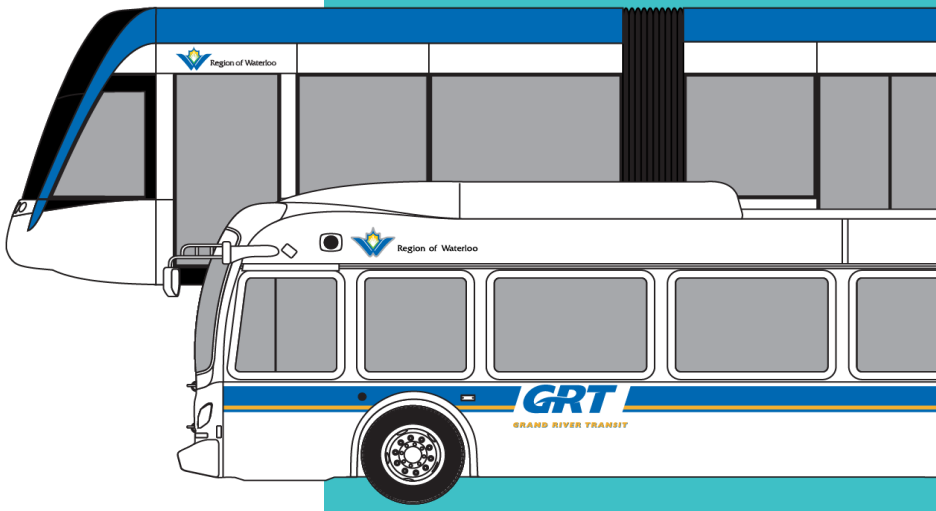
Operating and maintenance costs

- Operations and maintenance costs include vehicle and system operations, vehicle maintenance, civil and track maintenance, administration and management.
- Shorter alternatives have lower annual costs.
- Full BRT costs less than full LRT.



Benefits of rapid transit

- The Initial Business Case focuses on the benefits of rapid transit in two primary areas:
  - **Economic benefits**
    - The overall benefits to Waterloo Region of the different options
    - These benefits are monetized and expressed in dollar values
  - **Strategic benefits**
    - How the investment will achieve Regional goals and shape a positive future
    - These benefits are not discussed in monetary terms

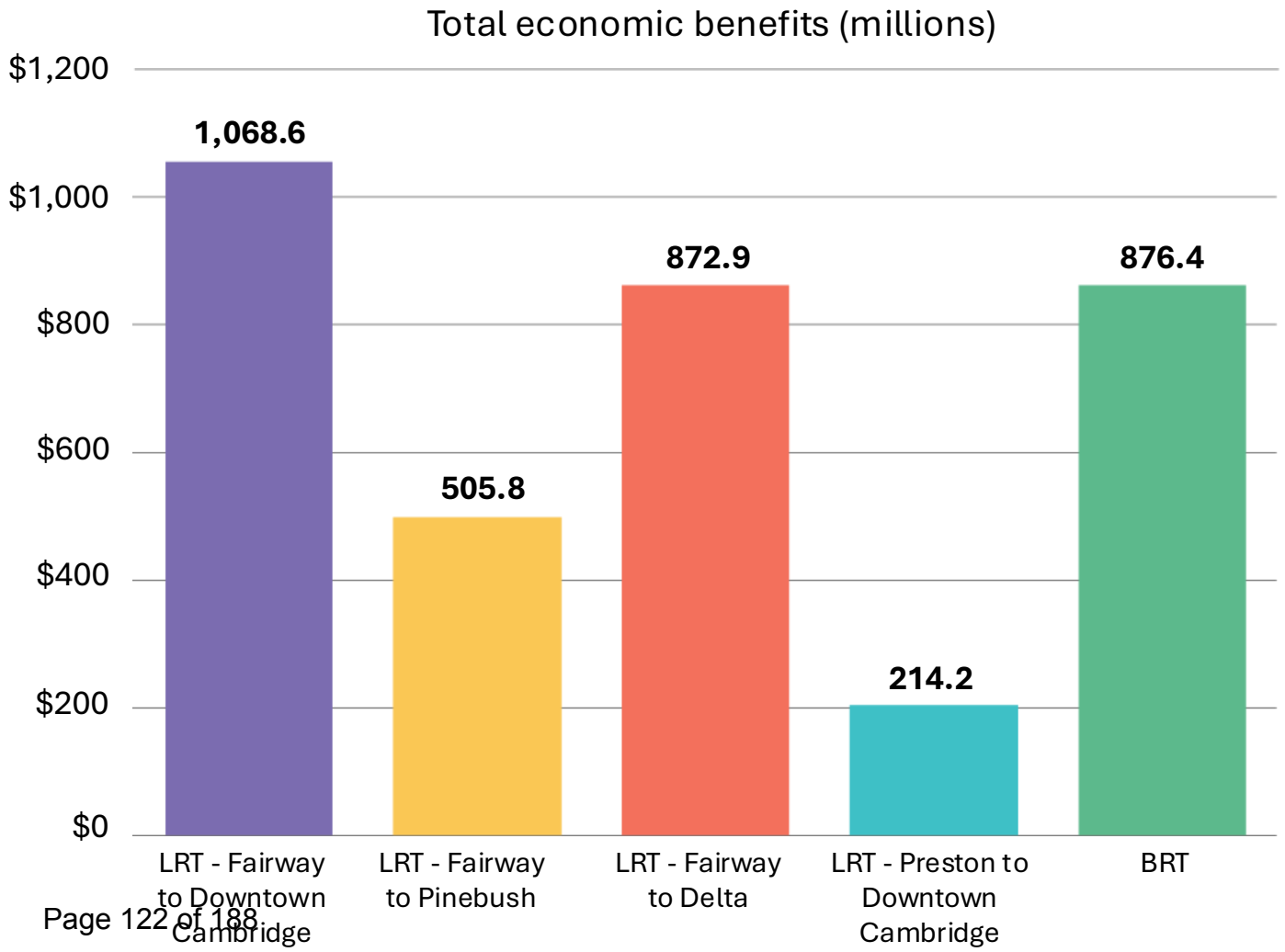


Economic benefits

- The economic benefits evaluated for the five different options include:
  - Growth in transit ridership and transit mode share
  - Travel time savings for new and existing transit riders
  - Improvements to transit reliability
  - Reduction in kilometers travelled by personal vehicles and reduction in greenhouse gas emissions
  - Reduction in traffic congestion
  - General health benefits

Economic benefits

- Full LRT has the highest economic benefit:
  - Greatest travel time savings
  - Highest emissions and air quality savings
  - Greatest reduction to congestion
- Partial LRT from Fairway to Pinebush, and from Preston to Downtown Cambridge have the lowest economic benefits.



Benefit-cost ratios

- Economic benefits are compared to capital and operating and maintenance costs through a benefit-cost ratio (BCR).
  - A BCR reduces the economic benefits and costs down to a single value to help compare different options.
- The BCR only considers economic benefits expressed in monetary terms; it does not consider all project benefits or the strategic goals for rapid transit.
- Full LRT has the highest economic benefits.
- Full BRT has the highest BCR, due to lower capital costs compared to full LRT.
- Partial LRT routes don't have strong BCRs.

Strategic goals

- Shape growth
  - Build sustainable and healthy communities
  - Increase opportunities for transit-oriented development
  - Concentrate growth along the Central Transit Corridor
- Connect communities
  - Realize the original vision for rapid transit and create a continuous connection from Waterloo to Kitchener to Cambridge
  - Strengthen connections between Cambridge and the rest of Waterloo Region
  - Increase access to housing and employment opportunities
- Move people
  - Increase access to rapid transit for more people
  - Support the goals of the GRT Business Plan and improve travel time, reliability and ease of use for transit users

Strategic benefits

Shaping growth

- Both LRT and BRT can encourage development and influence land use around stations, generating further economic benefits which in turn generates more transit ridership.
  - The extent of development attracted by LRT and BRT depends on various factors, including local context and developer perception.
- Shortened LRT options that end at Pinebush and Delta miss out on opportunities to attract development to Downtown Cambridge.
- Delta Station has limited potential for new development.

Strategic benefits

Connecting communities

- Partial LRT routes do not achieve the strategic goal of connecting Waterloo to Kitchener to Cambridge.
- Partial LRT routes that end at Pinebush and Delta don't connect to high employment and housing areas in Downtown Cambridge.
- Cambridge residents would miss out on important housing and employment opportunities.

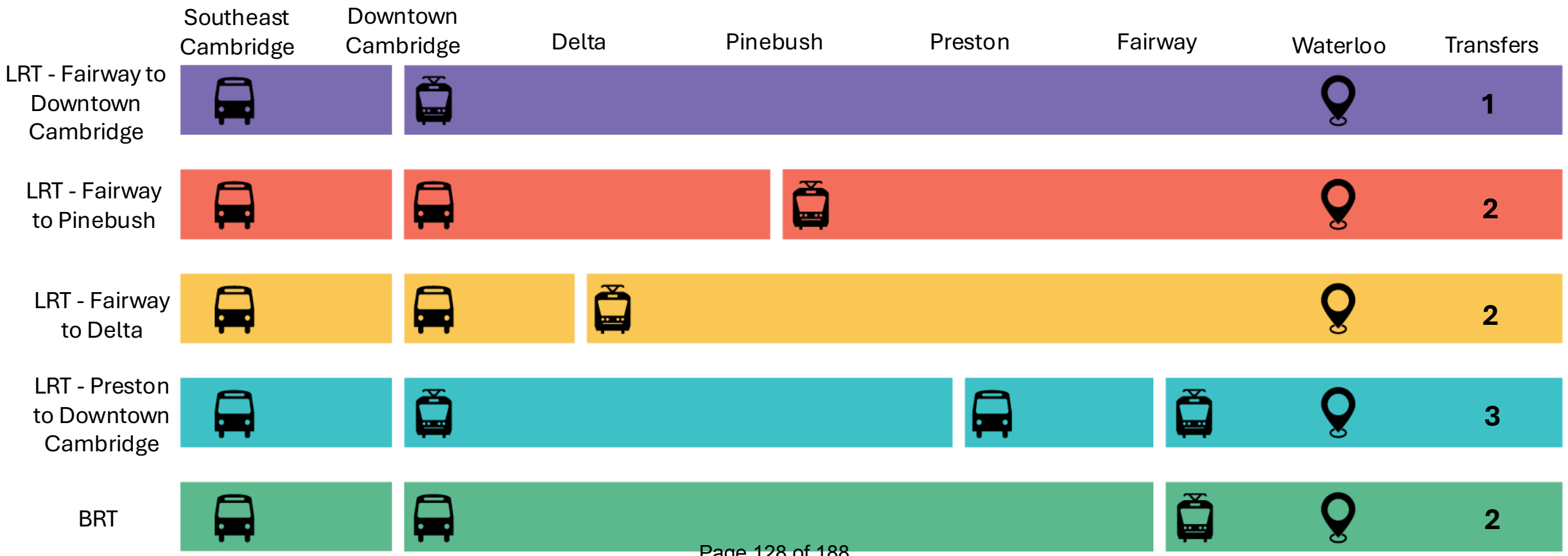
Strategic benefits

Moving people

- Partial LRT routes miss out on important potential for existing and future transit ridership.
- Partial LRT from Preston to Downtown Cambridge would require multiple transfers for riders travelling to Kitchener, increasing travel time and reducing ease of use.
- Only full LRT achieves the original vision of a seamless connection from Waterloo to Kitchener to Cambridge; BRT would require a transfer at Fairway Station.

Strategic benefits

Example customer journey from Southeast Cambridge to Waterloo and the transfers required

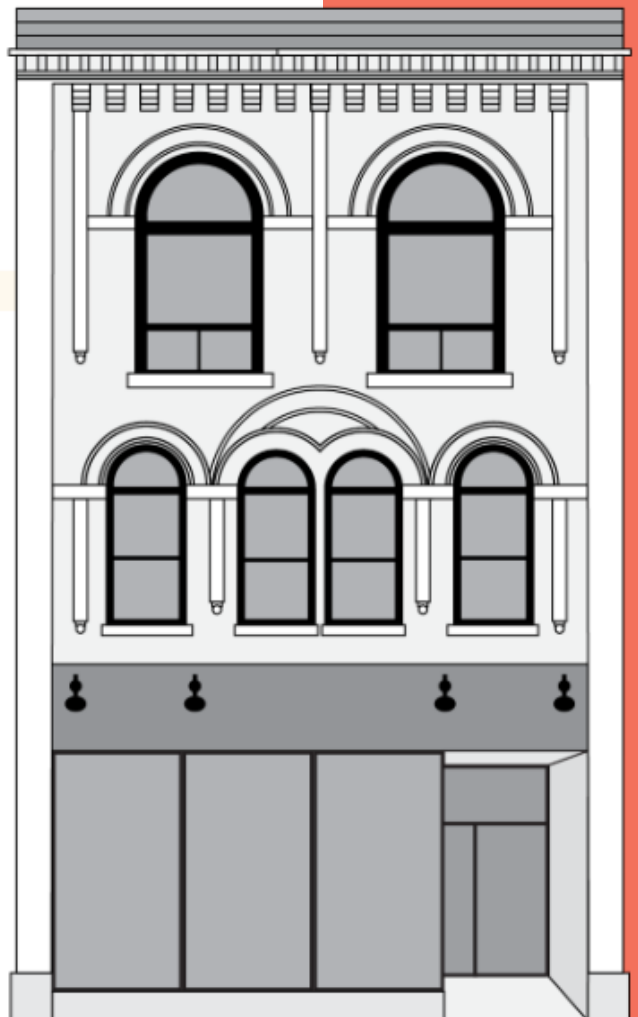


What does this mean?

- LRT has a higher cost to build and operate, but delivers the greatest economic benefits to Waterloo Region and achieves the strategic goals of rapid transit.
- BRT has lower costs than LRT but delivers less economic benefit and achieves many, but not all the project's strategic goals.
- The partial LRT options fall short of the economic benefits and fail to achieve the project's strategic goals, unlike the full-length options.
  - Missing potential to shape development and missing important connections to employment and housing areas
  - No continuous connection from Waterloo to Kitchener to Cambridge
  - Leaving residents near Downtown Cambridge without direct access to rapid transit, or requiring multiple transfers

Public engagement

- Public engagement so far:
  - Virtual kick-off session on Aug. 19
  - 11 in-person sessions
  - More than 900 survey responses on Engage Waterloo Region
- Visit Engage Waterloo Region to see the schedule of upcoming sessions or to share your thoughts
- An Ipsos survey will be conducted in the coming weeks



What comes next?

Questions?

Let's connect Cambridge.