

# Making tracks to Torontonians



Building transit where we need it

by Cherise Burda and Graham Haines



Photo: Roberta Franchuk, The Pembina Institute

Photo: Dominic Ali

# Context

Toronto city council is weighing the merits of two very different rapid transit options: the current plan for light rail transit (LRT) and an alternative subway extension plan recently proposed by Mayor Rob Ford.

Which option will deliver more frequent, reliable and rapid transit – while keeping Toronto fiscally responsible? This report presents an analysis of these two transit options based on six important factors, including potential ridership, ability to serve regions of Toronto, cost and impact on traffic congestion.

Toronto is in a fortunate position. Funding is available for the largest transit expansion in the Greater Toronto Area's (GTA) history. No matter which way the city proceeds, critical transit infrastructure needs to be built. However, with more than \$8 billion at stake during the next 10 years, it is critical that Toronto gets the best value for its investment.

## Toronto transit options

**Option 1: The four LRT "priority projects:"** The province has committed funding for four LRT projects in Toronto, which are part of a bigger transit plan that includes eight important LRT lines to serve the majority of the city.

The funding secured for the four "priority projects" is on the table as Toronto's current transit budget – and city council is deciding whether to continue allocating these funds to the current four LRT projects or to redirect them to an alternative plan. Thus, only the costs and benefits of the four LRT "priority projects" are analyzed in this report.

**Option 2: The proposed subway extension.** This option involves redirecting the committed provincial funding toward extending sections of Toronto's subway system, including converting the Scarborough Rapid Transit (SRT) line to subway.



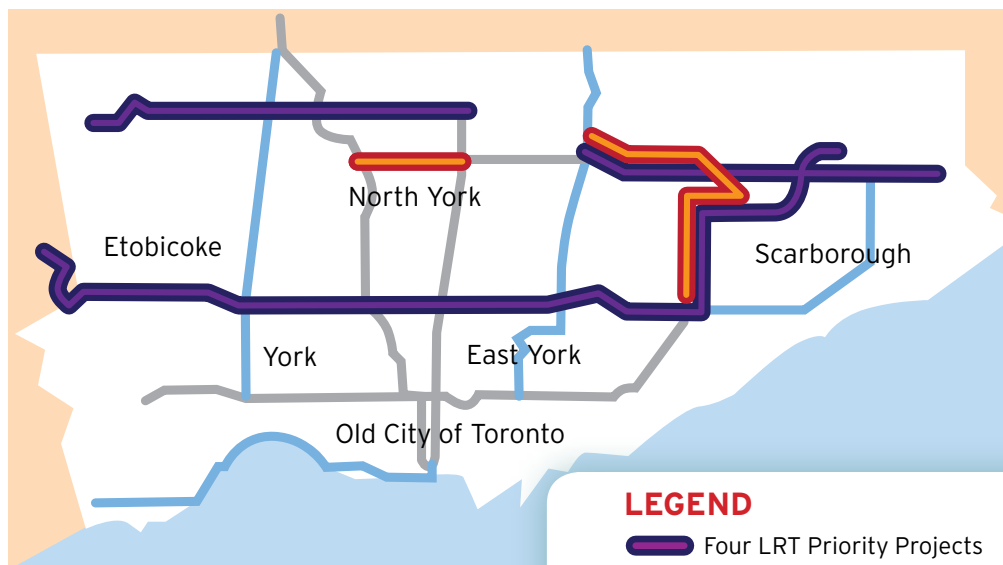
## WHERE WILL IT GO? DESTINATIONS SERVED BY THE TWO TRANSIT OPTIONS

### Proposed subway extension:

- ▶ Scarborough: Sheppard Subway extended from Don Mills subway station to Scarborough city centre.
- ▶ Upgraded service along existing SRT line, converting SRT to subway.
- ▶ North York: Sheppard West extension between Sheppard subway station and Downsview subway station.

### Four LRT priority projects:

- ▶ Scarborough: Sheppard LRT east from Don Mills subway station to city limits at Meadowvale Road.
- ▶ Southeast Scarborough: Upgraded service along SRT, converted to LRT and extended from McCowan station to Malvern town centre.
- ▶ Scarborough-East York-Toronto-York-Etobicoke: Eglinton Crosstown connects the east-west length of the city between Kennedy subway station and Pearson Airport.
- ▶ North York-Etobicoke: Finch West LRT line runs between Finch subway station and Humber College.



### LEGEND

- Four LRT Priority Projects
- Proposed Subway Extension
- Existing Toronto Subway
- Future LRT projects (proposed in The Big Move and Transit City)



# Findings

## Factor 1: Serving Toronto

LRT is cheaper to build than subways, meaning more service can be built per dollar (see Factor 3). As a result, the four LRT priority projects would bring rapid transit to all four corners of Toronto, especially the suburban areas of the city, where currently the only option is the bus. The four LRT lines would bring fast, reliable and frequent transit to the doorsteps of 290,000 more Torontonians than currently have service today.

The proposed subway extension would serve just one region of the city and would bring rapid transit to the doorsteps of 61,000 residences and workplaces in Toronto.

With the current LRT plan, 290,000 more Torontonians would be within 250 metres – or a three-minute walk – of stepping onto a rapid transit train, whereas the subway would only achieve this for 61,000 people.

LRT, or light rail transit, is “rapid transit” – these trains are faster and more reliable than buses or streetcars, but not as expensive to build as subways. LRT costs less than one-third of what subways cost to build per kilometre, making it a cost-effective option within a constrained budget. Because of this lower cost, more rapid transit lines can be built to serve more neighbourhoods and more people.





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TABLE 1: BRINGING TRANSIT TO THE PEOPLE

	Proposed subway plan	Four LRT priority projects
<b>Torontonians served:</b> Number of residences or workplaces within 250 metres of rapid transit <sup>2</sup>	61,000	290,000
<b>Communities served</b>	Scarborough North York	Scarborough East York Etobicoke York Old Toronto Pearson Airport North York
<b>Low-income population connected</b>	7,200 <sup>3</sup>	45,000
<b>Estimated transit trips per year</b>	65 million <sup>4</sup>	126 million <sup>5</sup>



Photo: Derek Tsang, Flickr

## Factor 2: Connecting underserved and low-income neighbourhoods

The neighbourhoods in the northeast and northwest suburbs of Toronto have the highest and fastest-growing percentage of low-income, immigrant, single-parent and children and youth populations in the city.<sup>6</sup> Expanded transportation services are particularly important for low-income residents, many of whom cannot afford vehicles. Workers in these neighbourhoods have to travel further to find employment yet they have the poorest access to rapid transit.<sup>7</sup>

A recent University of Toronto study shows that the lack of access to transit in these regions is a major contributor to growing poverty, and that this trend could be reversed or slowed by providing access to transit.<sup>8</sup>

These regions would be served significantly by the eight lines of the Toronto LRT plan; however, even the four LRT priority projects would bring needed service to these underserved neighbourhoods. The four LRT priority projects would bring transit to more than six times as many low-income residences as the proposed subway extension.

### IN SUMMARY:

- ▶ The lowest income areas of the city are underserved by transit.
- ▶ Lack of transit access is a main cause of this poverty and access to rapid transit would help to reverse this trend.
- ▶ The lowest income areas in Toronto are the northern fringe of North York, and almost all of Etobicoke north of Eglinton Avenue, as well as large parts of the former municipalities of York and East York. The four LRT priority projects would serve four of these regions.



Photo: roozbeh11, Flickr

The Toronto LRT plan would bring transit to more than six times as many low-income residences as the proposed subway plan.

## Serving the Bigger Picture - The Big Move

This report focuses on the extent to which the City of Toronto would be served by either the four LRT priority projects or the proposed subway extension. In addition to directly serving communities in Toronto, the eight LRT lines planned for Toronto (the four funded priority projects and the proposed future lines) are part of a broader transit strategy for the Greater Toronto and Hamilton Area (GTHA).

The Big Move is a 25-year plan to improve transit and transportation in the GTHA; it was unanimously approved in 2008 by the Metrolinx Board, which included the heads of council for the cities of Toronto, Mississauga and Hamilton, along with York Region, Durham Region and Halton Region.<sup>9</sup>

The plan's vision is to double the percentage of people using transit, triple the length of rapid transit, place transit within two kilometres of 75% of the population of the GTHA and significantly reduce greenhouse gas production per capita.

Five initial priority projects were identified to begin the implementation of The Big Move, including the four Toronto LRT projects.<sup>10</sup> The province announced funding for these projects in the spring of 2009.

With funding committed, wide-scale approval and construction already underway on some projects in The Big Move, the four LRT priority projects for Toronto represent a critical component of a comprehensive regional plan.



Photo: Roberta Franchuk,  
The Pembina Institute





## Factor 3: Getting the most for our money

The provincial government has committed to funding the four priority LRT lines, and has moved forward with a secured budget for phase one to build 52 kilometres of these LRT rapid transit lines at a cost of \$8.73 billion.<sup>11</sup>

The proposed subway extension would build 18 kilometres of subway service<sup>12</sup> for a cost of \$6.2 billion.<sup>13</sup> This analysis does not take into account the potential additional costs of the proposed subway plan, which could be higher since it may require losing money already spent on the LRT plan and cancelling contracts for LRT lines already approved. Contracts worth \$1.38 billion have already been signed for these projects and \$130 million has already been spent.

The completed four priority lines will result in a total of 75 kilometres of LRT – including 70 kilometres of new rapid transit along Sheppard, Eglinton and Finch, and the replacement of the SRT with a new LRT line that extends north of Sheppard.

Phase one of the four LRT projects will build 51.9 kilometres of track, of which 13 kilometres is in tunnel, with 81 stations and stops for \$8.73 billion. However, the tunnel sections of these priority lines are the most cost intensive of the whole plan,<sup>18</sup> making phase one a more costly initial investment relative to the full completion of the four priority projects. Completing the four priority lines in phase two would add another 23 kilometres for an additional investment of only \$1.83 billion.<sup>19</sup>

While phase one of the four LRT projects is the most cost-intensive, it is still far more cost-effective than the proposed subway extension. Phase one of the LRT projects works out to about \$167 million per kilometre, including tunnels, stops and stations, compared to the subway extension plan which works out to about \$344 million per kilometre, including rail yards and conversion of SRT to subway and stations. Therefore, averaged per kilometre of service line, phase one of the four LRT priority projects is just under half the cost of the subway extension plan.



The current LRT plan would deliver more than twice as much service for every dollar invested, compared to the proposed subway plan.

**TABLE 2: TRANSIT BANG FOR OUR BUCK**

	<b>Proposed subway extension</b>	<b>Four LRT priority projects: phase one</b>
Length of transit service	18 km	52 km
Cost	\$6.2 billion	\$8.7 billion
Cost per kilometre for each transit mode	Subway: \$300 million <sup>14</sup>	Surface LRT: \$85 million <sup>15</sup>
Cost per kilometre averaged for each plan	\$344 million (includes all construction – i.e. subway, rail yards)	\$167 million (includes all construction – i.e. tunneled sections, rail yards)
Potential additional costs	\$130 million already spent on current plan  Potential losses in cancellation of \$1.3 billion in signed contracts	
Time to tracks	2020-2021 <sup>16</sup>	2014-2020 <sup>17</sup>
Included in costs	12 km of new subway line  1 km extra line connecting Sheppard Subway to Wilson Yard  New rail yard  Converting the SRT to subway	Sheppard East LRT (12 km)  SRT extension and conversion (10 km)  Eglinton Crosstown LRT (19 km)  Finch LRT (11km)  Required streetcar houses/yards

Furthermore, the proposed subway extension also intends to use buses instead of LRT for areas of Toronto that will not be served by subway. Not only are buses less reliable and convenient (unlike LRT or subway, buses get stuck in traffic), they are more expensive – the City of Calgary has found that buses are approximately six times as costly to operate as LRT.<sup>20</sup>

## GETTING FAST TRANSIT TO TORONTONIANS – FAST

Cancelling the LRT plan and replacing it with the proposed subway extension would mean that Torontonians would have to wait longer for transit, because all of the environmental assessments, design processes, contracts and other procedures would have to be conducted all over again.

For example, the Sheppard East LRT is currently on track to be finished by 2014.<sup>21</sup> If construction of this line is cancelled and a subway is planned instead, construction is unlikely to begin until at least 2014 and it won't be completed until 2020.<sup>22</sup> Given Toronto already lacks transit infrastructure, avoiding delays is critical.



## Factor 4: Relieving traffic congestion

Toronto's congestion problems are caused mainly by lack of adequate transit infrastructure.<sup>23</sup> An effective network of subways, streetcars and frequent buses are available to commuters in Toronto's downtown core, but beyond the core, the majority of commuters have only the option to either drive in gridlock or wait for infrequent buses.

Commuters throughout Toronto deserve the option to choose rapid transit that is reliable, frequent and conveniently located.

Beyond the city itself, one million new people are expected to move into the GTA in the next 10 years, and they will all need to get to work. The right decisions must be made now to ensure traffic and commuting problems do not get worse.

Key to reducing traffic congestion is to provide better options for commuters, including attracting more transit riders. The four LRT priority projects will attract about 126 million rides a year and get 120,000 to 140,000 cars off the road and out of gridlock.<sup>24</sup>

The proposed subway extension will attract about 65 million riders per year, removing between 60,000 and 70,000 cars.

**TABLE 3: TRANSIT GETS CARS OUT OF GRIDLOCK**

Benefits	Proposed subway extension	Four LRT priority projects
Cars off the road	60,000-70,000	120,000-140,000
Transit trips per year	65 million	126 million
Sheppard line (riders/year)	Subway <sup>25</sup> : 41.7 million	LRT <sup>26</sup> : 11.2 million
Scarborough line (rides/year)	Subway <sup>27</sup> : 23.1 million	LRT <sup>28</sup> : 31.2 million
Eglinton LRT line (rides/year)	--	LRT <sup>29</sup> : 66.3 million
Finch LRT line (rides/year)	--	LRT <sup>30</sup> : 17.3 million

The four LRT priority projects would attract 126 million rides each year, getting up to 140,000 cars off the road out of gridlock; the proposed subway extension would attract half as many rides (65 million) and leave up to 70,000 more vehicles stuck in traffic.

## Stuck in traffic

Toronto is, without question, in need of new transit infrastructure. Congestion is having serious impacts on commuters in the Toronto and in the GTA:

- A report by Metrolinx found that more than \$6 billion in the GTA is lost due to congestion.<sup>31</sup>
- An IBM report found that Toronto drivers suffer the second worst traffic-related stress of 20 international cities.<sup>32</sup>
- A report by the Toronto Board of Trade found that commute times in Toronto average 80 minutes – the worst of 19 international cities including Calgary, Los Angeles, London and New York.<sup>33</sup>
- Long commutes are suffered both by the driver stuck in traffic as well as the transit rider without adequate service, especially in the suburbs where the only option is the bus.



Photo: Roberta Franchuk, The Pembina Institute



## Factor 5: Ensuring fiscal responsibility

Subways are convenient, fast and predictable, and transit riders like them. However, with a limited budget, the trade-off is between serving only one corner of the city with a subway line or providing rapid LRT (a vast improvement over bus or streetcar service) to all areas of the city.

Operating costs must be considered as well. The goal should be to provide appropriate capacity to the entire city rather than over-capacity to one region.

The proposed subway extension will provide huge capacity trains to a comparatively small number of people. Not only will it serve only one section of the city, the neighbourhoods it serves do not have a high enough population to justify these large, expensive trains. Consider this:

- ▶ A subway is the most expensive transit option at \$300 million per kilometre vs. \$85 million per kilometre for above-ground LRT.
- ▶ Subways require a minimum population density of 115 people per hectare to be cost effective.
- ▶ The Sheppard subway extension has a population density of around 68 people and jobs per hectare, increasing to 102 by 2031.
- ▶ LRT requires a minimum population density of 70 people per hectare to be cost-effective and is effective for densities of up to 140 people per hectare.



Subways, with their long linking trains, offer a higher capacity than LRT or buses. Subways can carry up to 40,000 passengers per hour per direction, while LRT can carry up to 25,000 and traditional bus service can carry up to 5,000.<sup>34</sup> Subways with the capacity to carry many passengers are critical in Toronto's downtown core where the density requires it. However, in less dense neighbourhoods, the critical factor is not capacity, but level of service – is transit frequent and reliable, or even available at all?

Densities and projected peak ridership along the proposed transit lines and Toronto's existing subway line are detailed in the tables below.

**TABLE 4: APPROPRIATE POPULATION DENSITY FOR EACH TRANSIT MODE**<sup>35</sup>

Transit Line	Current Density*	Projected Density in 2031*	Density Range Suited to Transit Mode**
PROPOSED ROUTES			
Sheppard Extension Subway or LRT	68	102	LRT: 70-140 Subway: 115-195
Eglinton Crosstown LRT	72	82	
Finch West LRT	59	71	
Scarborough RT	Unavailable	Unavailable	
EXISTING ROUTES			
Existing Sheppard Subway	83	113	Subway 115-195
Yonge-University-Spadina Subway	273	341	
Bloor-Danforth Subway	130	157	

\* jobs and people/ hectare

\*\* people/hectare

Photo: istock.com



**TABLE 5: THE APPROPRIATE CAPACITY FOR PROJECTED RIDERSHIP (2031)<sup>36</sup>**

Transit Line	Projected Peak Ridership	Peak Capacity
PROPOSED ROUTES		
Sheppard LRT	3,100	LRT: 10,000-20,000
Eglinton Crosstown LRT	7,800	
Finch West LRT	4,500	Subway: 30,000
Scarborough RT	6,400	
EXISTING ROUTES		
Yonge-University Spadina Subway	25,400	Subway: 30,000
Bloor-Danforth Subway	16,400	
Sheppard Subway	5,900	

As both the density and projected ridership numbers show, Sheppard, Eglinton and Finch are more suited to LRT service than subway. This is even the case along the existing Sheppard subway.

Based on this information, it is more fiscally responsible to build LRT lines along these routes. The high cost of subways cannot be justified based on either projected ridership or projected densities.



Sacramento LRT. Photo: paulkimo9, Flickr

## Light Rail Transit...

**Is not the same as a streetcar.** Light rail transit often gets compared to Toronto's existing streetcar network. Apart from the fact that some of the proposed LRT lines will run along existing streets, the comparison should largely end there – in reality LRT is much more similar to subway trains than streetcars.

**Does not block traffic.** As with subways, LRT operates in a dedicated right of way isolated from traffic. This means LRT has minimal impact on traffic and vice versa. Additionally, LRT stops/stations are traditionally spaced further apart than streetcar stops (but closer than subways), approximately every 500 metres vs. every 250 metres. These factors combined with signal priority make LRT more predictable, akin to subways instead of streetcars.<sup>37</sup>

**Is faster than streetcars.** As a result of the above factors, LRTs travel much faster than streetcars, approaching the speed of subways. In optimal conditions, LRT trains travel at 25 to 30 km/hr<sup>38</sup>, subways at 30 to 40 km/hr<sup>39</sup> while streetcars travel at 10 to 20 km/hr.<sup>40</sup> These speeds are unlikely to be reached in typical operating conditions but provide a relative comparison between options available.

**Can carry more people than streetcars.** Unlike streetcars, LRT cars/trains can be linked together to provide higher levels of service as needed. LRT has a capacity of up to 25,000 passengers per hour per direction versus 10,000 for streetcar and 40,000 for subways.<sup>41</sup> Actual operating capacities are dependent on speeds, frequency and train length/capacity.

**Is the mode of choice in other cities.** Given the economics and efficiency of LRT, Toronto would not be alone in adopting this system. LRT is already used in major cities around the world, including San Francisco, Amsterdam, Paris and Madrid.

**Is designed for commuting.** The new LRT lines will be different than existing dedicated streetcar right of ways in Toronto, such as the one along St. Clair Avenue. The new LRT lines will feature further distances between stops, and be better suited for commuting purposes.

**Is good for neighbourhoods.** Despite being better for commuting than streetcars, LRTs are still able to better serve communities and local businesses than subways since they mostly are above-ground and have less distance between stops than subways (but more than streetcars).

**Are reliable and can provide frequent service.** Additionally, since each LRT train has a lower capacity than a subway train, LRTs can run more frequently than subways while serving the same peak load.





Photo: istock.com

# Factor 6:

## Reducing pollution and greenhouse gas emissions

Rail transportation produces far fewer greenhouse gas (GHG) emissions than road transportation. Public transportation emits 45 to 95% less smog-causing pollution than travel by private vehicles.<sup>42</sup>

Subways and LRT produce far fewer GHG emissions than diesel buses, and subways produce the fewest. However, per dollar invested, LRTs have a bigger impact on reducing GHG emissions.<sup>43</sup>

TABLE 6: CLEAN AIR BENEFITS

Benefits	Proposed subway extension	Four LRT priority projects
Cars out of traffic during rush-hour <sup>44</sup>	22,000	49,000
GHG emissions reduced (by 2031, tonnes)	75,000	201,000



**TABLE 7: TRANSIT VEHICLE EMISSIONS**

Technology	GHG emissions (tonnes CO <sub>2</sub> e per million passenger km)	GHG emissions per dollar invested (tonnes CO <sub>2</sub> e)
Subways	29	87
LRT	39	39
Buses	116.6	n/a

Based on technology used and private vehicle trips replaced, the four LRT priority projects will result in an almost three-fold improvement in GHG emissions reductions compared to the proposed subway extension – and this calculation does not even consider the emissions produced by the increased number of diesel buses needed to serve regions not served by subway.<sup>45</sup>

## Transit City – A broader LRT plan for Toronto

An independent transit plan was developed by the Toronto Transit Commission (TTC) in 2007, which includes the four priority LRT lines examined in this report as well as four additional LRT lines.

Only the four priority lines are analyzed in detail and compared to the subway extension plan in this report, because it is the current budget allocation to these four lines and investment of \$8.73 billion that is currently on the table.

The objective of this report is to inform city council how best to invest the current allocated budget for necessary transit in Toronto. Should a broader, longer-term transit strategy be considered by the City of Toronto and the TTC, the eight lines of the Transit City plan should be examined according to some of the same metrics as are used to compare the LRT priority lines and the proposed subway extension.

The table on the following page shows how the benefits of the current transit options stack up to those of the full Transit City implementation, in particular the ability to connect and bring transit to Torontonians across the city, especially those that need it most.



Portland LRT.  
Photo: TriMet, Flickr

**TABLE 8: BENEFITS OF A FULL TRANSIT PLAN FOR TORONTO**

Benefits	Proposed subway extension	Four LRT priority projects	Transit City - full implementation of all eight LRT lines
Length of transit constructed	18 km	75 km	148 km
Torontonians served: Number of residences or workplaces within 250 metres of rapid transit <sup>46</sup>	61,000	290,000	630,000
Low-income population connected <sup>47</sup>	7,200	45,000	106,000
Communities served	Scarborough North York	Scarborough East York North York Etobicoke York Old Toronto	Scarborough East York North York Etobicoke York Old Toronto
Estimated transit trips per year	65 million <sup>48</sup>	126 million <sup>49</sup>	224 million <sup>50</sup>
Cars off the road	60,000-70,000	120,000-140,000	220,000-240,000
GHG emissions reduced (by 2031, tonnes)	75,000	201,000	327,000
Cost (billions of 2008 dollars)	\$5.7 <sup>51</sup>	\$8.15 (Phase 1) <sup>52</sup> \$9.9 (total) <sup>53</sup>	\$15.8 <sup>54</sup>
Cost (billions of 2010 dollars)	\$6.2 <sup>55</sup>	\$8.7 (Phase 1) <sup>56</sup> \$10.5 (total) <sup>57</sup>	\$17.2 <sup>58</sup>
Cost per km (2010 dollars)	\$344 million	\$140 million	\$116 million

**THE EIGHT TRANSIT CITY LINES ARE:**

- ▶ Sheppard east from Don Mills Station to Meadowvale Road.
- ▶ Scarborough RT converted to LRT and extended northeast to Malvern Town Centre.
- ▶ Finch west from Finch station to Humber College.
- ▶ Eglinton Crosstown from Kennedy station to Pearson Airport.
- ▶ Jane between Bloor and Steeles.
- ▶ Don Mills from Steeles (or further north) to Danforth.
- ▶ East Scarborough/Malvern.
- ▶ Waterfront from Yonge, west to Humber College Lakeshore.

# Endnotes

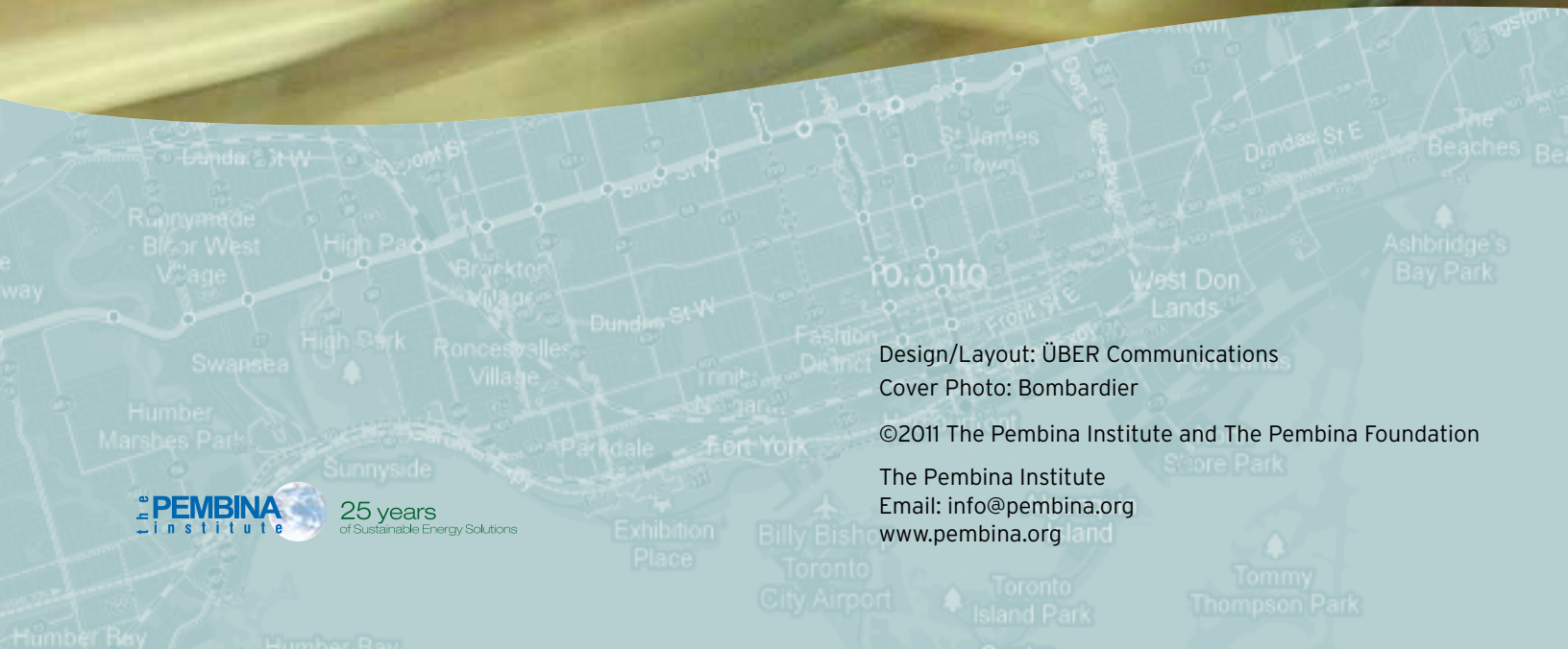
- 1 See Table 2.
- 2 Based on length of new lines multiplied by projected density along them within 250 metres on either side. Metrolinx, *The Big Move: Modelling Backgrounder*, Greater Toronto Transportation Authority (2008), [http://www.metrolinx.com/mx/Docs/big\\_move/RTP\\_Backgrounder\\_Modelling.pdf](http://www.metrolinx.com/mx/Docs/big_move/RTP_Backgrounder_Modelling.pdf)
- 3 Metrolinx, *The Big Move: Modelling Backgrounder*.
- 4 Our calculations account for higher ridership of subways, using numbers from Metrolinx, *The Big Move: Modelling Backgrounder*.
- 5 Calculated from numbers from Metrolinx, *The Big Move: Modelling Backgrounder*.
- 6 J David Hulchanski, *The Three Cities Within Toronto: Income Polarization Among Toronto's Neighbourhoods, 1970 – 2005*, University of Toronto: 2010.
- 7 Ibid.
- 8 Ibid.
- 9 Metrolinx, "Metrolinx Board approves the 5 in 10 Plan," media release, <http://www.newswire.ca/en/releases/archive/May2010/19/c5159.html>
- 10 The fifth is York Region's VIVA Bus Rapid Transit project.
- 11 Escalated to 2010\$ based on 2008\$ figure of \$8.15 billion cited in: J. Robert S. Prichard, Metrolinx, "On Track: Moving Transit Forward in the GTHA," presentation to the Toronto Board of Trade, May 17, 2010.
- 12 Total subway track is 19 kilometres. One kilometre is to link to the Wilson yard and is not actual commuter service.
- 13 The subway plan is estimated at \$6.2 billion (2010\$). Price for the subway plan is based on a cost of 19 kilometres of subway at \$300 million per kilometre and a rail yard at a price of \$500 million.
- 14 Based on price of Spadina Subway extension (8.6 kilometres for \$2.6-billion): TTC, "Spadina Subway Extension: Overview," [http://www3.ttc.ca/About\\_the\\_TTC/Projects\\_and\\_initiatives/Spadina\\_subway\\_extension/Overview.jsp](http://www3.ttc.ca/About_the_TTC/Projects_and_initiatives/Spadina_subway_extension/Overview.jsp).
- 15 Using projected cash-flows for the Sheppard LRT (12 kilometres) and Finch LRT (11 kilometres) projects and assuming 4% yearly escalation, they are expected to cost \$83.2-million and \$86.9-million per kilometre (2010\$); Jack Collins, "Achieving 5 in 10: A Revised Plan for the Big 5 Transit Projects," presentation to Metrolinx Board, [www.metrolinx.com/mx/en/board/20100519/Five\\_in\\_Ten\\_Board\\_web.pdf](http://www.metrolinx.com/mx/en/board/20100519/Five_in_Ten_Board_web.pdf)
- 16 A new EA and design process would be required for both the Sheppard Subway and Scarborough RT-Subway. Construction on the Sheppard Subway could begin in 2014 and Sheppard RT in 2015, completing in 2020 and 2021 respectively. *TTC Briefing Note*, November 2010. Summary available at: Steve Munro, "LRT vs Subway — A TTC View," December 2, 2010, <http://stevemunro.ca/wp-content/uploads/2010/12/201012TTCBriefing.pdf>
- 17 Ibid. Sheppard LRT complete by 2014, Eglinton 2020, Finch 2019 and Scarborough RT 2020.
- 18 Tunnelled section is approximately \$300 million per kilometre compared to \$85 million per kilometre for above-ground LRT. Cost expected to be in line with costs for other underground transit according to "Metrolinx Report Re: UK/Madrid Study Tour – TTC Comments" TTC Memo, January 24, 2008.
- 19 Price quoted is in 2010 dollars. Price in 2008 dollars is \$1.713 billion (\$100 million for Sheppard extension, \$386 million for Scarborough LRT extension, \$460 million for Finch LRT extension and \$767 million for Eglinton LRT extension. Additional extension of Finch LRT to Don Mills not included; Metrolinx, "On Track: Moving Transit Forward in the GTHA."
- 20 \$0.27/passenger for LRT vs \$1.50/passenger for bus according to the City of Calgary. This is dependent on loading factors, gas prices and electricity prices. Calgary Transit, *Light Rail Transit in Calgary: The First 25 Years*, [http://www.calgarytransit.com/pdf/Calgarys\\_LRT\\_1st\\_25Years\\_TRB\\_revised.pdf](http://www.calgarytransit.com/pdf/Calgarys_LRT_1st_25Years_TRB_revised.pdf)
- 21 *TTC Briefing Note*, November 2010.
- 22 Ibid.
- 23 "OECD Territorial Reviews: Toronto, Canada," April 4, 2010. [http://www.oecd.org/document/1/0,3343,en\\_2649\\_34413\\_43985281\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/1/0,3343,en_2649_34413_43985281_1_1_1_1,00.html)
- 24 Based on projected densities. Metrolinx, *The Big Move: Modelling Backgrounder*.
- 25 Based on Metrolinx modelling of Sheppard LRT and existing Sheppard subway. Assumes ridership scales based on trips/km/density. Ibid.
- 26 Ibid.
- 27 Based on Metrolinx modelling of existing Sheppard subway and future Scarborough LRT. Assumes that ridership scales based on trips/km.
- 28 Ibid.
- 29 Ibid.
- 30 Based on Metrolinx modelling of Finch LRT. Scaled length from 22.8 kilometres to 17 kilometres. Ibid.
- 31 Metrolinx, *Costs of Road Congestion in the Greater Toronto and Hamilton Area: Impact and Cost Benefit Analysis of the Metrolinx Draft Regional Transportation Plan*, 2008.
- 32 IBM, *The Globalization of Congestion: IBM 2010 Commuter Pain Survey*, 2010, [http://www-03.ibm.com/press/us/en/attachment/32017.wss?fileId=ATTACH\\_FILE1&fileName=Globalization%20of%20Traffic.pdf](http://www-03.ibm.com/press/us/en/attachment/32017.wss?fileId=ATTACH_FILE1&fileName=Globalization%20of%20Traffic.pdf)
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- 42 On average, 95% less carbon monoxide, 90% less volatile organic compounds and about 45% less carbon dioxide and nitrogen oxide, per passenger mile, as travel by private vehicles. R. Shapiro, K. Hassett, and F. Arnold, *Conserving Energy and Preserving the Environment: The Role of Public Transportation* (American Public Transportation Association, 2002), 9, [http://www.publictransportation.org/pdf/reports/shapiro\\_report.pdf](http://www.publictransportation.org/pdf/reports/shapiro_report.pdf).
- 43 See Table 25 from *Driving Down Carbon* (The Pembina Institute, 2010): <http://pubs.pembina.org/reports/driving-down-carbon-report.pdf> for conversions from MJ/100 PTK to GHG emissions per tonne. Invested costs are conservative at subways three times more than LRT for these calculations.
- 44 Based on peak hour boardings and assumes an auto occupancy of 1.25, Metrolinx, *The Big Move: Modelling Backgrounder*.
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- 46 Based on length of new lines multiplied by projected density along them within 250 metres on either side. Ibid.
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- 48 Our calculations account for higher ridership of subways, using numbers from Metrolinx, *The Big Move: Modelling Backgrounder*.
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- 50 Calculated from Ibid.
- 51 The subway plan is estimated at \$6.2 billion (2010\$) or 'more than \$8 billion' on an escalated basis. Price for the subway plan is based on a cost of 19 kilometres of subway at \$300 million per kilometre and a rail yard at a price of \$500 million.
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# Making tracks to Torontonians

Building transit where we need it



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