
A Citizens' Guide to Light Rail



Prepared by the Toronto Environmental Alliance



Toronto Environmental Alliance

Dear Readers:

March 31, 2007

For more than a decade TEA has been campaigning for a network of light rail across the city. That is why we are happy to support the recently announced Toronto Transit City – Light Rail Plan.

With this plan, subway-style Light Rail Transit service can reach all corners of the city. The newly proposed network includes 120 km of service, with a cross-town Eglinton route from Kennedy to the Airport, north-south routes on Don Mills and Jane, as well as service on Morningside, Sheppard East, Finch West, and a West Waterfront route reaching to Long Branch. These routes would attract 175 million riders by 2021. Details of the plan can be viewed at <http://transitcity.ca>.



This is the next step that TEA has been pressing for since the City/TTC *Building a Transit City* report was released in 2005. That report presented a promising vision of an extensive rapid transit network, but it was neither focused nor detailed enough to take any concrete steps forward. The new Transit City - Light Rail Plan presents exactly the kind of concrete vision that can be used to inspire public interest and leverage the needed investments from higher levels of government. And of course, TEA will continue to keep up the pressure on all levels of government to ensure the Toronto Transit City – Light Rail Plan is implemented.

The next step is to put pressure on our provincial and federal politicians to make sure enough money is set aside to make Transit City a reality. Contact your MP and MPP to let them know you support Transit City!

We have created this *Citizen's Guide* for those who would like to know more about Light Rail. Inside you'll find:

- A comparison of Light Rail to other transit modes
- A review of what kinds of rapid transit are best to use where
- Other North American cities that have built Light Rail
- A glossary
- How you can support Transit City

We hope you will find the information useful.



Yours,
The TEA Transit Campaign Team

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Cover photos, top row: Bremen, Germany, photo courtesy Michael Glotz Richter; Melbourne Australia, photo courtesy Adam Carr; bottom row: Germany, photo from www.lra.org; Strasbourg, France, photo courtesy Jean Paul Fournier.

What is LRT and how does it compare to other transit?

WHAT IS LIGHT RAIL TRANSIT (LRT)?



Low floors All-Door Boarding Signal Priority Rights-of-Way Multi-Car Trains Express service

LRT is a versatile mode of transit that can run on the street, in a separate lane down the middle of the road, in a completely protected right-of-way, or in shallow tunnels. In the Toronto context, new LRT's would mostly run in separate lanes in the middle of the road, similar to the streetcars already on Spadina and St. Clair. But LRT is much more than just a streetcar operating in its own lane.

LRT vehicles also have low floors for easy boarding, and they can spend much less time at stops than streetcars because fares are generally paid via machines on the platform, much as the GO trains operate currently. This means when a train comes to a platform all the doors can open at once and boarding happens very quickly. Signal priority also means LRTs can make traffic lights turn green as they approach, so that in the best-implemented systems LRT vehicles only have to stop where they load and unload passengers.

Capacities vary from 6,000 to 15,000 passengers per hour. LRT systems that operate in the mid to high-end of this range, like Calgary's C-Train, offer service that is similar to a subway, but with a typical cost in the range of only \$30-40 million/km, they do so at about one-fifth the cost of subways.

WHAT IS A STREETCAR?



High floors

Mixed traffic

Pay as you board

Local Service

Also called Trams in Europe, streetcars generally provide less reliable service than LRT because they operate in mixed traffic conditions. Older vehicles (as we have in Toronto) are generally high-floor, and fare collection is usually pay-as-you-board which makes service slower than most LRT. In ideal conditions, with two-car trains running every minute and a half, streetcars could have a capacity of about 6,000 people per hour, but the most recent example of this level of service in Toronto was on the Bloor-Danforth line before the construction of the subway in 1966. Typical peak capacities today are closer to 3,500.

WHAT IS BUS RAPID TRANSIT (BRT)?



Signal Priority



Own lane



Low cost infrastructure



Express Service

BRT is a flexible service that can be very similar to LRT, with buses running in separate lanes in the centre of the road, in curbside reserved lanes, or in completely separate busways. BRT can feature all-door boarding, and in cases where BRT operates in mixed traffic, other measures can include advanced green lights, parking bans, and bus bulges so buses stay in the moving lane of traffic. All BRTs are generally given signal priority, for less time spent at intersections. In North America BRT capacity is typically 5,000 people/hour (although Latin America has reached much higher levels.) Typical costs are \$20 million/km, but can also be much higher or lower.

WHAT IS A SUBWAY?



High ridership



Highway-level capacity



High speed



High cost infrastructure

A subway is a high capacity transit mode which must run in tunnels or on a protected right of way. In terms of capacity, subways can carry 30,000 passengers per hour, with a crush load of 40,000-50,000. They are best suited to areas with a high density mixture of homes, jobs, schools, recreation, and shopping facilities. High levels of ridership are required because of the high cost: approximately \$200-\$240 million/km.

WHAT IS AN "INTERMEDIATE CAPACITY TRANSIT SYSTEM?"



The Scarborough RT



Medium cost



Medium capacity

The Scarborough RT is an example of what is sometimes called an "Intermediate Capacity Transit System" or ICTS. Like a subway, ICTS is completely separated from traffic, operating on elevated platforms, in tunnels, or fenced-off rights of way. Similar systems in other cities have been successful, however the capacity in Scarborough has been limited by the number of cars purchased when the system was first built. Currently the RT can carry only 4,000 people per hour. With a proposed upgrade, new larger cars and more frequent service would bring capacity up to 8,000, meeting projected demand to 2021. This upgrade would cost \$360 million for 7.2 km, or \$50 million/km.

What kind of rapid transit is best to use where?

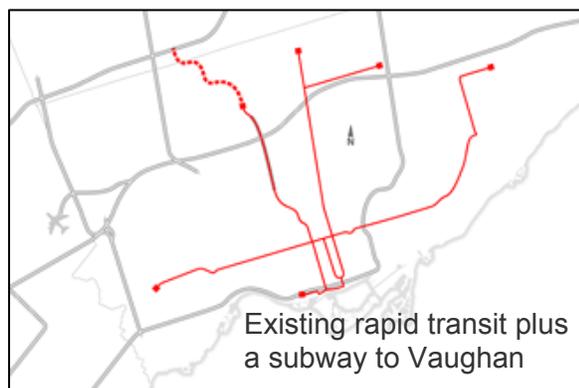
No rapid transit mode is inherently better than another, but their different features, costs, and capacities do mean that each is suited to different uses. Below is a table that identifies recommended conditions for each transit mode.

Mode	Major Features	Capacity	Approximate Cost	Recommended for:
Subways	<ul style="list-style-type: none"> Prepaid fares. Trains run in tunnels, fenced rights of way, and/or elevated sections. 	40,000 people/hour (Roughly equivalent to the 401 highway)	\$200 to \$240 million/km ¹	High density corridors with homes, schools, jobs, recreation, entertainment and shopping.
LRT	<ul style="list-style-type: none"> Separate rights of way on roads. Single or multi-car trains. Usually prepaid boarding. Platforms adjacent to trains for fast boarding Can provide subway-quality service. 	6,000 to 15,000 people/hour	\$30+ million/km ²	Inner suburbs Major streetcar routes
Streetcars	<ul style="list-style-type: none"> Single rail cars operating in mixed traffic. Fare payment while boarding. 	3,500 people/hour	\$6 million/km for track, plus the cost of vehicles ³	High density, generally downtown areas
BRT	<ul style="list-style-type: none"> Buses operating in segregated rights of way, like LRT. 	Up to 5,000 people/hour	\$20 million/km ⁴	Outer suburbs
Scarborough RT	<ul style="list-style-type: none"> Prepaid fares. Capable of automated operation. Runs in fenced rights-of-way. 	4,000 people/hour now; 8,000 with proposed upgrades (Roughly equivalent to the Gardiner.)	\$50 million/km for proposed upgrade ⁵	Medium to low density suburban areas

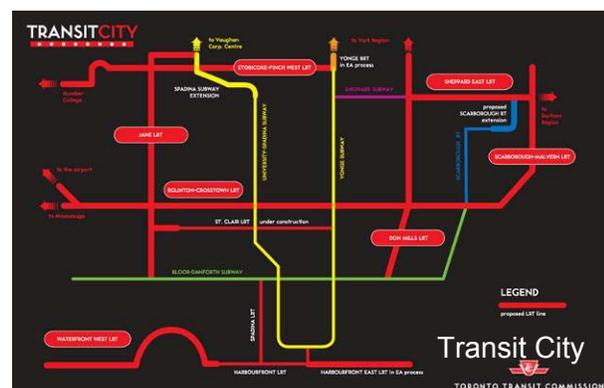
Please note: Costs listed are for order-of-magnitude comparisons only. Inflation will change costs over time and every individual line would have different cost variables (such as bridges, underpasses, vehicles, carhouses, etc.) References: 1 Based on TTC costs for the Sheppard Subway and estimated costs for the Spadina extension; 2 TTC: Toronto Transit City – Light Rail Plan; 3 Consultation with transit experts; 4 TTC: Ridership Growth Strategy; 5 TTC: Scarborough RT Strategic Plan Study Report.

A WORD ON SUBWAYS:

The Yonge and Bloor lines have been huge successes for Toronto, but where density is low, subways can actually cost more to operate than the buses they replace. The Sheppard line has added about \$8 million to TTC operating costs. That means \$8 million is no longer available to provide other transit service. The illustrations below demonstrate two different ways to prioritize investments. The LRT network on the right is more cost effective and will benefit more riders.



8.7 km for \$2.1 billion, 30 million riders



120 km for \$6.1 billion, 175 million riders

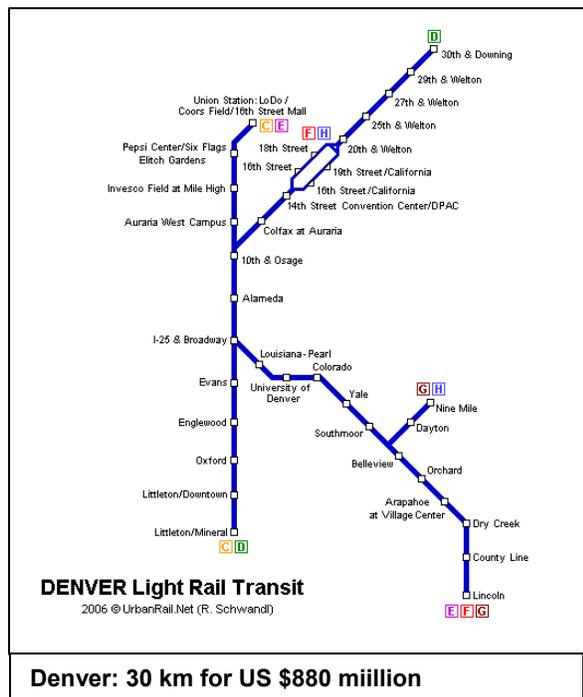
What other cities are doing: The Light Rail Revolution

Minneapolis – In June 2004 Minneapolis St Paul launched their new Hiawatha Light Rail line, offering fast, quiet, service to 17 stations between downtown and a major suburban mall, including stops at two airport terminals along the way. The project cost US \$715 million, and carried 7.9 million passengers in 2005. The City's long-range plans now call for five additional routes by 2020.

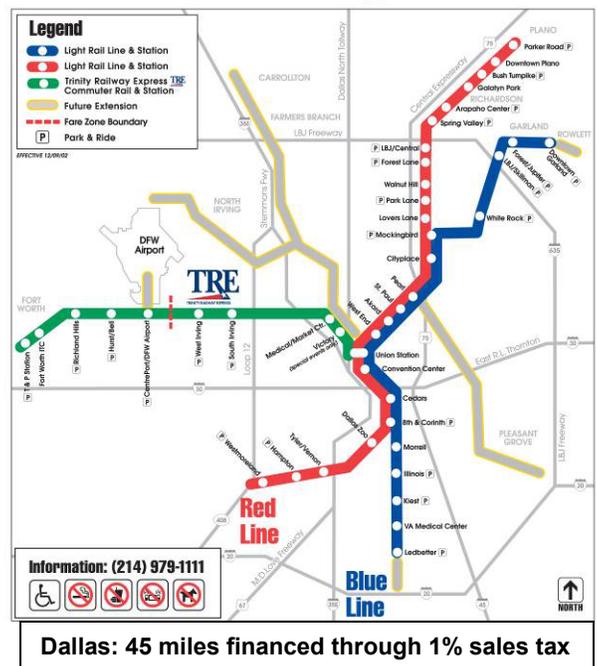
Denver – In November 2006, the City of Denver launched four new lines of light rail service. At a cost of about US\$880 million (roughly comparable to what Toronto spent on the x km Sheppard Subway,) they built 30 kilometres of new LRT and thirteen new stations. Approximately two-thirds of the cost was covered by federal grants. The project was completed under budget and earlier than originally planned.

Dallas – Dallas Area Rapid Transit (DART) operates 45 miles of light rail service that were launched in 1996 and financed primarily through a voter-approved one-cent sales tax. By 2014 the light rail system is slated to more than double, to 93 miles.

These are just three of dozens of cities with new light rail systems, including San Jose, New Jersey, Philadelphia, St Louis, and Salt Lake City. LRT is the fastest growing transit mode in the United States.



DART Rail System



Glossary

BRT: is an acronym for Bus Rapid Transit. See page 3 for a description.

Capacity: refers to the amount of people that a particular transit mode can carry.

Capital Costs: refers to large, one-time expenses related to providing transit service, such as construction costs or vehicle purchases.

Density: refers to the concentration of people living, working, shopping, entertaining and playing in a given land area.

- High Density: refers to a land area with a very high concentration of land use (example: the downtown core of Toronto)
- Medium Density: refers to a land area with a fair concentration of land use (example: Danforth Avenue)
- Low Density: refers to a land area with a low concentration of land use (example Markham Township)

Headway: refers to the wait time between two vehicles on the same transit route.

ICTS: is an acronym for Intermediate Capacity Transit System. The Scarborough RT is an example of an ICTS. See page 3 for a description.

LRT: is an acronym for Light Rail Transit or Light Rapid Transit. See page 2 for a description.

Mixed Traffic: refers to cars, trucks, transit and cyclists simultaneously using the same road space. For example, when a bus or streetcar must operate in mixed traffic, it can become very difficult to maintain regularly scheduled stops or to move through traffic quickly.

Mode: refers to the different types of public transit technologies (i.e. bus, streetcar, LRT, subway, commuter rail, etc).

Off-Peak Hours: refers to times of day with lower transit ridership, defined by the TTC as:

- Midday: 9am – 3pm
- Early evening: 7pm - 10pm
- Late evening: 10pm – 2am
- Overnight: 2am – 5am

Operating Costs: refers to ongoing expenses related to providing transit service, such as salaries and fuel.

Peak Hours: refers to the periods of highest transit ridership. The TTC defines these times as:

Morning peak period: 6am -9am
Afternoon peak period: 3pm – 7pm

Right-of-Way: refers to a relatively long strip of land or road dedicated to the exclusive use of a particular transit mode (i.e. subway, LRT, Scarborough RT.)

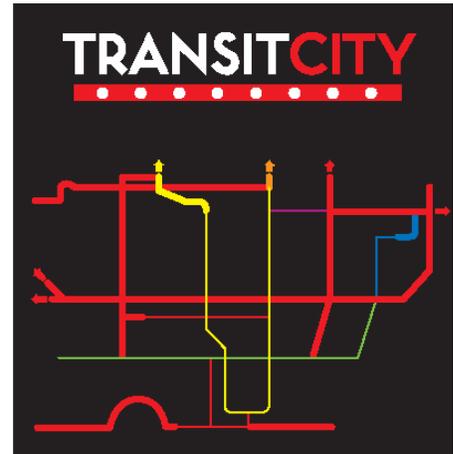
Suburbs: refers to low-density, car-dependent housing communities outside the city core

- Inner suburbs: refers to Scarborough, Etobicoke and North York
- Outer suburbs: Mississauga, Brampton, Markham, Vaughan, Richmond Hill, Pickering, etc

How you can support the Transit City - Light Rail Plan

When the network of light rail lines outlined in the Toronto Transit City – Light Rail Plan is implemented, all corners of the city will have access to fast, reliable, and convenient rapid transit service. The Transit City plan is also cost effective because it can provide subway-style service for as little as one-fifth of the cost of subways. By 2021, the planned routes would attract 175 million riders.

The development of this plan has been a crucial step for improving transit in Toronto, because it presents exactly the kind of concrete vision that can be used to leverage investments from higher levels of government. But in order to ensure these light rail lines get built, more still needs to be done.



TEA will continue to keep up the pressure on all levels of government to make sure the Toronto Transit City – Light Rail Plan is implemented, but we can't do it alone. These are several steps you can take to help make Transit City a reality:

1. Contact your elected officials and tell them Transit City should be a priority. All levels of Government should be investing in transit to make this plan work.
 - You can find your City Councillor's name and contact information at <http://app.toronto.ca/im/council/councillors.jsp>
 - Your Provincial MPP's name and contact information is available at www.ontla.on.ca/web/go2.jsp?Page=/members/members_main&menultem=mpps_header&locale=en
 - Your Federal MP's name and contact information is available at http://canada.gc.ca/directories/direct_e.html#mp
2. During election campaigns, ask your candidates if they support Transit City.
3. Talk to your neighbours and friends about Transit City. More information about the Toronto Transit City - Light Rail Plan is available at transitcity.ca
4. Get your Neighbourhood Association, Residents Association and/or other groups to endorse Transit City. These groups can send letters to elected officials as well.
5. Share this Citizens' Guide to Light Rail. The report can be downloaded from: www.torontoenvironment.org/transit



Thank you!
The TEA Transit Campaign Team