Result

	OPTION A: LRT	OPTION B: SUBWAY	OPTION C: HYBRID
Avg. Score	4.71	3.14	3.29

6. Level of Service

Definition:

The transit option must consider the door to door travel time of the end users, including out-of vehicle time (walk, wait and transfer times) in addition to in-vehicle time.

Key Considerations:

In determining the option that provides the best level of service, two key concepts were considered that determine the door to door travel time of end users.

In-vehicle-travel time (IVTT) looks at vehicle speed, and the travel time incurred while in transit. Given the greater distance between station stops, subways reach higher travel speeds than LRT.

Another factor to consider in trip making decisions is the out-of-vehicle travel time (OVTT). Out-of-vehicle travel time constitutes a significant portion of transit travel times, and consists of the walking and driving time to access transit, wait time and transfer times. Research has shown that OVTT is weighted more heavily by trip makers than in-vehicle travel time (usually two or more times higher), in determining their preferred mode.

Option Analysis and Rationale:

Walk Access

LRT (option A), provides a greater level of service when taking into consideration the importance of out-of-vehicle travel time (OVTT). While the subway option provides faster in-vehicle-travel-time, the station stops are further apart in Option B and require longer walk and driving times for transit riders to access the system. It is important to consider the door-to-door trip of transit riders, and the portions of the trip (i.e. access/egress walk times, wait/transfer times) that more strongly influence decisions on the preferred transportation mode. Individuals consider the time it takes to complete the full trip, as opposed to how fast the vehicle travels.

Frequency and Reliability

Research has shown that people use transit when it is accessible (within easy walking or driving distance), frequent, reliable and takes them to their destination in reasonable time. The subway option provides a higher level of reliability. However, the LRT provides a sufficient level of reliability to meet the needs of the area. The investment in LRT or subway will provide an increased level of service to the Sheppard Avenue East area, as both operate on designated right of ways, an improvement over the current bus system that shares the road. All three options presented would improve frequency and reliability of transit service to Scarborough residents.

Improving Walkability

At present the Sheppard Avenue corridor is auto-dominated and there is a need to consider pathways that improve pedestrian access to any new transit line (i.e. LRT or subway). Improvements in urban form and walkability will be necessary, in addition to considering new innovative ways to provide feeders to the transit line.[3]

The LRT option will provide an opportunity to improve streetscaping along the corridor, improve pedestrian life and walkability of the neighbourhood. Integrating transit investment with sound planning is critical.

Results

	OPTION A: LRT	OPTION B: SUBWAY	OPTION C: HYBRID
Avg. Score	4.14	3.57	3.29

Sustainability and Social Impact

7. Equity and Accessibility

Definition:
The transit option must contribute to improved equity and accessibility across several dimensions including gender, income, race, age, and ability, in order to improve:

- social cohesion and access to opportunity;
- transit safety and mobility;
- end user affordability (e.g. fares);
- equity in access to rapid transit across the City

Key Considerations:

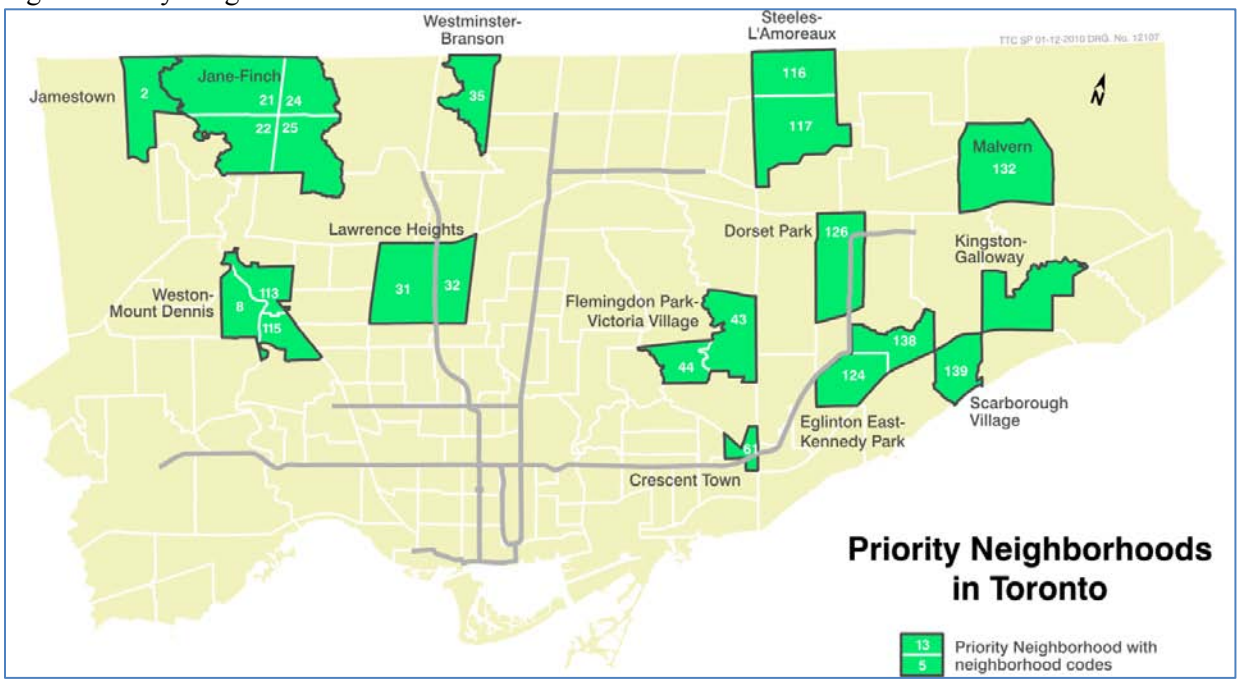
The TTC ridership profile indicates that nearly 60 percent of the system's users are female, 41 percent do not have a driver's license and 34 percent have no vehicle in the household. Also,

[3] These might include "mini-bus" services which connect neighbourhoods to transit stops or stations

66% of current transit users are employed, 32% are students and 43% live in an apartment or condominium.

The route alignments for each option will provide different access points for commuters residing in the Sheppard Avenue East corridor, and provide different levels of connectivity to neighbourhoods within the area (see figures 1 to 3).

Fig.11 Priority Neighbourhoods in Toronto[4]



Option Analysis and Rationale:

Neighbourhood Access

The Panel's preferred option for delivering greater neighbourhood access is the LRT option. The LRT solution provides 24 station stops providing rapid transit access to key segments of the Sheppard Avenue East corridor that are currently underserved.

Under Option A and C, the LRT route alignment will provide access to Sheppard Avenue East extending to Morningside Road. Future north-south rapid transit access to Malvern with connection to Scarborough Centre will be achieved once the Metrolinx planned extension of the S RT connects with the Sheppard East LRT line.

Under the subway option, the SRT extension will not proceed. The route alignment of the subway does not provide access to residents east of Kennedy Road on Sheppard Ave, and will not deliver rapid transit to Malvern, one of the city's Neighbourhood Improvement Areas

[4]Priority Neighbourhoods are now referred to as Neighbourhood Improvement Areas, http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.CD10.3

- The transit plan should address the following transit system considerations:
    - We must get back to thinking about a comprehensive, hierarchical network that best balances coverage, connectivity, frequency and speed.
    - A hierarchical network includes both high capacity trunk lines and feeder services that provide long-distance line-haul and local accessibility.
    - The Yonge Subway is at capacity: we need to very carefully consider how new lines connect to it (if at all).
    - Transit plans must consider the ridership demand for better north-south connection, in order to provide access to employment areas.
    - All technology options should be on the table, including bus rapid transit.

- The assessment criteria used by the Panel (see previous section) should be used to establish the plan's priorities for new transit lines and how they are funded.
    - They provide a comprehensive set of criteria that encompasses transit service and transit system operations, capital and operational funding, planning policies, local community impacts, and broader economic, social and environmental impacts.

- Toronto is not one kind of city, so there must be a diversity of options to meet its transit needs. The transit plan should identify the best solution / option for each neighbourhood.
    - The residents of some neighbourhoods will be more dependent on transit for their daily travel than those in other neighbourhoods.
    - Some areas of the City are planned to accommodate extensive population and employment growth, which should be aligned with appropriate transit.
    - Other areas are stable areas developed at relatively low densities that generate lower potential ridership.

- Developing the transit plan must include a comprehensive public consultation process to recognize the benefits of transit as well as its impacts on the local community.
    - The first round of consultation for the five year review of the Official Plan and the ongoing input being received from stakeholders and the general public could provide a useful starting point.
    - Transit's role in connecting areas of the City is an important theme of comments received so far, and has been identified as a key issue in recent surveys conducted by City Planning as part of the 5-Year Review.

A Sustainable Funding Plan for Transit

An earlier Section of this report, 'Financial Considerations,' has outlined possible elements of a sustainable long-term funding plan for transit in Toronto and the GTA. Key considerations include:

- Provincial and Federal partners must come to the table to help address sustainable funding for transit.
    - A key Federal and Provincial contribution would be to facilitate dedicated revenue streams not presently available to the City or Metrolinx.

- Other partners could also be involved in developing sustainable funding for transit through the involvement of the Federation of Canadian Municipalities and the Canadian Urban Transit Association.
    - This is more than a Toronto or GTA issue: transit is an important element of infrastructure for successful cities.

- A wide range of revenue tools should be examined, including those outlined in KPMG's report.
    - Potential revenue tools will have a greater or lesser impact on the City's on-going ability to fund its services,

- The funding plan must be aligned with Metrolinx's investment strategy for the 'Big Move'.
    - Many of the potential revenue tools should be implemented region-wide, since Metrolinx is planning a regional transit system.
    - They may also present competitiveness issues for the City's businesses if they are only implemented in Toronto.

- There are opportunities for private sector involvement, particularly through Public Private Partnerships (P3s) that recognize an increasing appetite for private sector involvement in the delivery of transit.

- The City should also look at opportunities to leverage Infrastructure Ontario in future transit expansion projects.

9. RECOMMENDATIONS

The recommendations of the Expert Panel are summarized as follows:

1. Council:

    a. Confirm that Light Rail Transit(LRT) is the preferred rapid transit mode for Sheppard Avenue East, from Don Mills to Morningside, and confirm the Sheppard Avenue East LRT as a priority transit line within the approved Metrolinx '5 in 10 plan'.

    b. Request the City Manager to develop a communication plan which outlines the significance of transit's role in city building, on Sheppard Avenue East and across the city.

2. Council:
    a. Request the province, through Metrolinx, to accelerate the preparation of the investment strategy for the "Big Move" transit expansion plan.

3. Council request the:

    a. City Manager to develop, for Council's consideration and approval, a comprehensive transit plan, that:
        i. is consistent with Metrolinx's Big Move;
        ii. integrates equitable economic development and other city-building strategies;
        iii. recognizes the context of the current 5 year Official Plan review; and
        iv. can ultimately be woven into the City's Official Plan.

    b. City Manager to develop a comprehensive public consultation process that provides residents and businesses an opportunity to participate and inform the development of a sustainable transit plan, including funding options, for the City of Toronto.

    c. City Manager to develop an intergovernmental strategy in support of a sustainable transit plan; working with the Federal and Provincial governments (including P3 project delivery), along with appropriate municipal associations (e.g. Federation of Canadian Municipalities), to seek a commitment to the type of long-term tri-partite funding commitment discussed in this report.

10. APPENDICES

Appendix A: Option A, LRT from Don Mills to Morningside

The following is a summary prepared by TTC staff for the Panel's consideration.

Light Rail Transit: Applicability in the Sheppard Avenue Corridor

High-quality transit is a vital contributor to the health and prosperity of cities. By bringing workers, shoppers, students, and residents within convenient access of employment, retail, educational, and cultural opportunities, transit stimulates economic growth, attracts business, supports employment, provides accessibility for people with mobility limitations, increases land values, and reduces congestion and pollution.
Light-rail transit (LRT) – electrically-powered high-capacity transit vehicles which run on the surface, in their own rights-of-way, but which share intersections with all other road users, as shown in the picture below -- has become established world-wide as a preferred transportation technology for situations which require greater capacity and higher quality than bus service, but which do not warrant the very-high capacity or expense of subways. Light-rail lines are currently being constructed or have recently been opened in over 100 cities world-wide. For example, Paris – with its' long and storied history of metros -- has implemented three LRT's and is presently building another seven lines. These cities chose LRT because it offers many advantages, including:

- Reliable, fast service (twice as fast as traditional streetcars) because it operates in its own right-of-way, protected from traffic and congestion, and people get on and off like subways
- High passenger-carrying capacity of up to 8,000 passengers per hour per direction (four times higher than the TTC's current busiest bus and streetcar routes) without the need for expensive tunnelling or above-grade elevated structures
- The quietness of electrically-powered vehicles, and the smoothness of rail service, resulting in comfortable and enjoyable travel
- Accessible to people with disabilities and people using wheelchairs, scooters, and mobility aids
- Convenient community access, because stops are closer together than subway stations, and are typically located at street level so that elevator or stair access is not required
- Environmentally- and community-friendly, with zero local emissions, smooth, quiet operation, while keeping travellers and activities on the street, not pushed underground
- Consistent and proven increases to property values, attracting private-sector investment and development
- Affordable, with per-kilometre costs approximately 60%-70% cheaper than subways.

Fig. 12 Strasbourg, France: Typical modern light rail in the centre of the road

Selecting the right transit technology depends on what land uses and densities you're trying to serve and, therefore, what capacity you need. Toronto's land-use, development, and economic outlook has changed significantly since the mid-1980's when plans called for concentrations of high-density employment nodes at urban centres which would be linked together by subways, and when Toronto's neighbouring municipalities were much less developed. Toronto's current Official Plan de-emphasizes the "centres" concept and, instead, calls for more-dispersed lower-density development spread out along the city's major arterial roads, referred to as "Avenues". At the same time, Toronto's neighbours are now all cities unto themselves, and they have competed fiercely, through taxation and economic incentives, to attract employment. This has resulted in the employment originally envisioned for Toronto's centres, not materializing as expected.

The two centres which were intended to anchor the Sheppard Avenue corridor – North York Centre and Scarborough Centre – today have a total employment of 44,000 compared to the 1980s projection of almost 160,000 by 2011. So, the travel demand which these centres now generate is much lower than was expected back when a Sheppard Subway was conceived. Moreover, Toronto's needs have changed in other ways. Today, there are thirteen "priority" neighbourhoods scattered throughout the city, which need improved access to employment and educational opportunities. Today, Toronto needs a city-wide network of high-quality transit to provide good access to every part of the city. The earlier arguments for one or two very-high capacity subways serving a limited part of the city no longer hold. And governments have repeatedly shown that they can't afford the huge capital funding required to build and maintain subways. This has never been truer than today. Any funding available for public transportation must now, more than ever, be used to deliver the best and most-affordable transit benefits to the

largest number of people and to the widest area of the city. The Expert Panel established by City Council has been asked to determine how to achieve this objective within the specific context of Sheppard Avenue.

There is already a subway on Sheppard Avenue between Yonge Street and Don Mills Road, so the matter of transit on that section of Sheppard Avenue is settled. The question is: what transit should be provided on Sheppard Avenue east of Don Mills, where the subway stops. Toronto's Official Plan projections of future population and employment in the areas which would be served by either a light-rail line or subway on Sheppard Avenue, result in a projected future travel demand on Sheppard Avenue, east of Don Mills Road of between 3,000 and 4,500 passengers per hour. Even with very optimistic assumptions about additional future growth and possible future transit expansion, that demand increases to only 6,000 passengers per hour. None of these projections can justify the expense or capacity of a subway east of Don Mills Road, which could carry up to 30,000 passengers per hour. The projected demand on Sheppard can be comfortably accommodated by LRT, whose capacity can be increased up to 8,000 passengers per hour, thus providing for future additional demand on Sheppard Avenue.

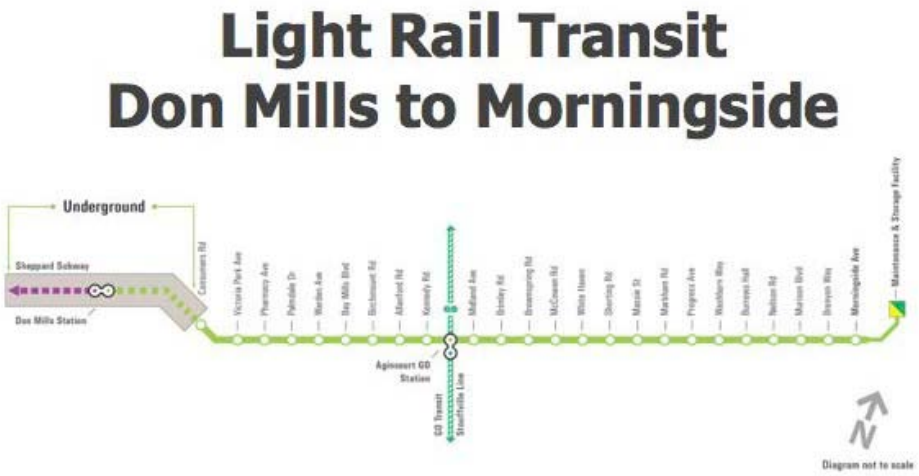
The Expert Panel has considered two primary transit options for Sheppard Avenue, east of Don Mills:

1. A continuation of the existing subway, east along Sheppard Avenue, and south to Scarborough Civic Centre

This first option – the subway extension – would provide eight kilometres of rapid transit, with seven stations, serving an adjacent population of 34,000 people, and carrying 27 million passengers per year. It would not serve any of Scarborough east of McCowan Avenue. It would cost between $3.25 billion and $4.73 billion (2010 $), depending on whether it were also extended west to Allen Road from Yonge Street.

2. A light-rail transit line, connecting with the subway at Don Mills, and proceeding east along Sheppard Avenue to Morningside/Conlins Road in its own right-of-way except at signalized intersections.

This second option – a light-rail line – would provide thirteen kilometres of rapid transit, with 25 stations, serving an adjacent population of 58,000 people, and carrying 17 million passengers per year. It would serve the entirety of Scarborough east to the Rouge River. It would cost $1 billion (2010 $), thus freeing-up funding which could be used to provide rapid transit service elsewhere in Toronto.



Toronto's development and economic outlook, and its resulting changing travel needs and demands, call for the establishment of high-quality light-rail transit throughout the city. Sheppard Avenue, in particular, would be well and adequately served by light-rail transit, with capacity available for future growth, and at a much-lower cost than a subway. Light-rail transit on Sheppard Avenue would meet the corridor's needs while making the most effective use of taxpayers' dollars.

Appendix B: Option B, Subway from Don Mills to Scarborough Centre

The following is a summary prepared by City staff of key information contained in Toronto Transit Infrastructure Limited's presentation and documents submitted to the Panel.

The panel received a presentation from Toronto Tranit Infrastructure Limited (TTIL), a subsidiary company of the TTC which was created to examine public-private partnership procurement options for the extension of the Sheppard Subway.

The TTIL presentation focused primarily on the following:

- A review of the 1992 Environmental Assessment ("EA") carried out for the original Sheppard Subway project
- TTIL's assessment of the TTC's project procurement record
- Recommended Next Steps

1992 Environmental Assessment

According to TTIL, the 1992 EA made a strong case for the subway option being more cost-effective over the long-run than an LRT built at grade in the middle of the road. TTIL summarized the EA's findings with respect to cost efficiency as follows:

- LRT less competitive per passenger carried
- LRT vehicles cost more than subway and storage costs greater than subway
- LRT annual operating costs higher than subway
- LRT requires more property acquisition and has a greater impact on municipal taxes
- LRT capital costs only 15% less than subway at 15,000 pphpd
- LRT other costs greater than subway – e.g. congestion, environment, social, land use, economic cost

In addition, the EA also concluded that the subway option would be more favourable with respect to factors such as carrying capacity, ridership, noise levels and construction period impacts.

Comparison of TTC's Procurement Practices with Other Jurisdictions

The second principal component of TTIL's presentation was directed at building the case that the TTC's procurement model is not delivering the best value for money. TTIL provided the following comparison below in support of this position:

Table 20. Rapid Transit Project Delivery Comparison					
	Madrid	Vancouver Canada Line	Toronto Sheppard Line	Toronto Spadina Line	Metrolinx Sheppard Extension 2011
Construction Dates	1995-2007	2005-2009	1994-2002	2009-2015	2012-2018
Construction Period	12 years	4 years	8 years	6 years	6 years
Length Constructed	Nearly 50km	19.2km	5.5km	8.6km	6.7km
# of Stations	120	16	6	6	7
Cost per km	<$90M/km	$105M/km	$170M/km	$305M/km	$177M/km

Recommended Next Steps

TTIL recommended the following steps for moving forward with rapid transit improvements on Sheppard Ave.:

1. Clarify funding sources, timing, conditions, overall funding gap, market realities
2. Analyze capital and operating costs over 10 year, 20 year, 30 year and 40 year period for the Sheppard corridor
3. Undertake delivery model, value for money and integrated analysis required to determine optimal delivery model and value for money for governments
4. Update 1992 Environmental Assessment (comprehensive assessment of alignment and technology alternatives etc.)
5. Undertake market and opportunity assessment with development community
6. Clarification and public awareness on LRT proposal before public consultation

Appendix C: Supplementary Background Documents

Presentations and Background Information

- Comments by Professor Eric Miller, February 25, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_1.pdf

Metrolinx

- Presentation to the Expert Advisory Panel, February 17, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_2.pdf

- Achieving 5 in 10: A Revised Plan for the Big 5 Transit Projects (May 19, 2010)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_3.pdf

- The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area (November 2008)
  http://www.metrolinx.com/thebigmove/Docs/big_move/TheBigMove_020109.pdf

- Management Report, UK / Madrid Study Tour (January 25, 2008)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_5.pdf

TTC

- Presentation to the Expert Advisory Panel, February 17, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_6.pdf

- Presentation to the Expert Advisory Panel, February 24, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_7.pdf

- Rapid Transit For Toronto, February 8, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_8.pdf

TTIL

- Summary of Subway Option, March 12, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_9.pdf

- Presentation to the Expert Advisory Panel, February 16, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_10.pdf

- Toronto Transit: Back on Track – Presentation to Toronto Executive Committee (TTIL: February 13, 2012)
  http://www.toronto.ca/legdocs/mmis/2012/ex/bgrd/backgroundfile-45195.pdf)

- Sheppard Subway Extensions: Analysis of Funding Options for Toronto Transit Infrastructure Limited and the City of Toronto (KPMG: November 7, 2011)
  http://www.toronto.ca/legdocs/mmis/2012/ex/bgrd/backgroundfile-45062.pdf

- Sheppard Subway Extensions: Presentation to Toronto Executive Committee (KPMG: February 13, 2012)
  http://www.toronto.ca/legdocs/mmis/2012/ex/bgrd/backgroundfile-45207.pdf)

City

- City Planning presentation to the Expert Advisory Panel, March 2, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_14.pdf

- City Planning presentation to the Expert Advisory Panel, February 24, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_15.pdf

- City Finance presentation to the Expert Advisory Panel, February 15, 2012
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_16.pdf

- PG13.7, Sheppard Corridor Study - Final Report
  http://www.toronto.ca/legdocs/mmis/2008/pg/bgrd/backgroundfile-10465.pdf

- PG17.1, Official Plan Amendment for Sheppard East Light Rail Transit (LRT) – Final Report
  http://www.toronto.ca/legdocs/mmis/2008/pg/bgrd/backgroundfile-13885.pdf

- PG17.8, Request for Approval of the Sheppard East LRT Environmental Assessment Study
  http://www.toronto.ca/legdocs/mmis/2008/pg/bgrd/backgroundfile-14148.pdf
  http://www.toronto.ca/legdocs/mmis/2008/pg/bgrd/backgroundfile-14149.pdf

Third Party Documents

- Presentation by the Sustainable Urban Development Association (February 2012)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_20.pdf

- Making Tracks to Torontonians (Pembina Institute, February 2012)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_21.pdf

- Understanding the travel needs of London's diverse communities (Transport for London, 2011)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_22.pdf

- Gender Auditing: an Overview, (Stafford Pettersson Neath, 2004)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_23.pdf

- Gender and Sustainable Urban Mobility (Deike Peter, 2011)
  http://www.toronto.ca/legdocs/mmis/2012/cc/bgrd/CC20_1_app3_24.pdf