

7. Evaluation

7.1 Introduction

Not surprisingly, the previous chapter shows that both the RT and LRT alternatives for the Scarborough RT corridor require considerably less capital investment than construction of an entirely new subway between the Kennedy and Scarborough Centre stations with only one intermediate station.

Costs and cost effectiveness, of course, are not the only factors that generally influence the choice between the non-subway and subway alternatives. In the Scarborough corridor, other factors can probably be summarized in terms of two basic issues or questions, namely,

- What other benefits would a subway decision offer with respect to land use, consistency with and support for the City's Official Plan, and the elimination of what is now viewed as a troublesome transfer between the RT and Bloor-Danforth subway at Kennedy Station?
- Are there more cost effective means of achieving these benefits without the large cost premium involved in the subway solution?

In other words, given the large difference in capital investment between RT and subway (about \$860 million) or between LRT and subway (about \$730 million), can these differences be used to achieve land use benefits in other ways and reduce the inconvenience of the present transfer at Kennedy Station?

7.2 Land Use Considerations

The Scarborough City Centre has long been identified as a major location for land use intensification and redevelopment in ways that depend upon improved accessibility by public transit. In fact, as noted previously, the main justification for construction of the existing Scarborough RT was predicated upon the positive impact such a service would have on improving the desirability of the Scarborough City Centre as a "growth node".

In this regard, RT and LRT alternatives both offer increased capacity and improved reliability relative to the existing service. Thus both contribute to the City's land use objectives and support the general philosophy of the current Official Plan.

Providing a direct, continuous service across Toronto on the Bloor-Danforth subway to Scarborough City Centre undoubtedly increases opportunities for even greater intensification. However, the extent of such differences cannot be estimated at this time.

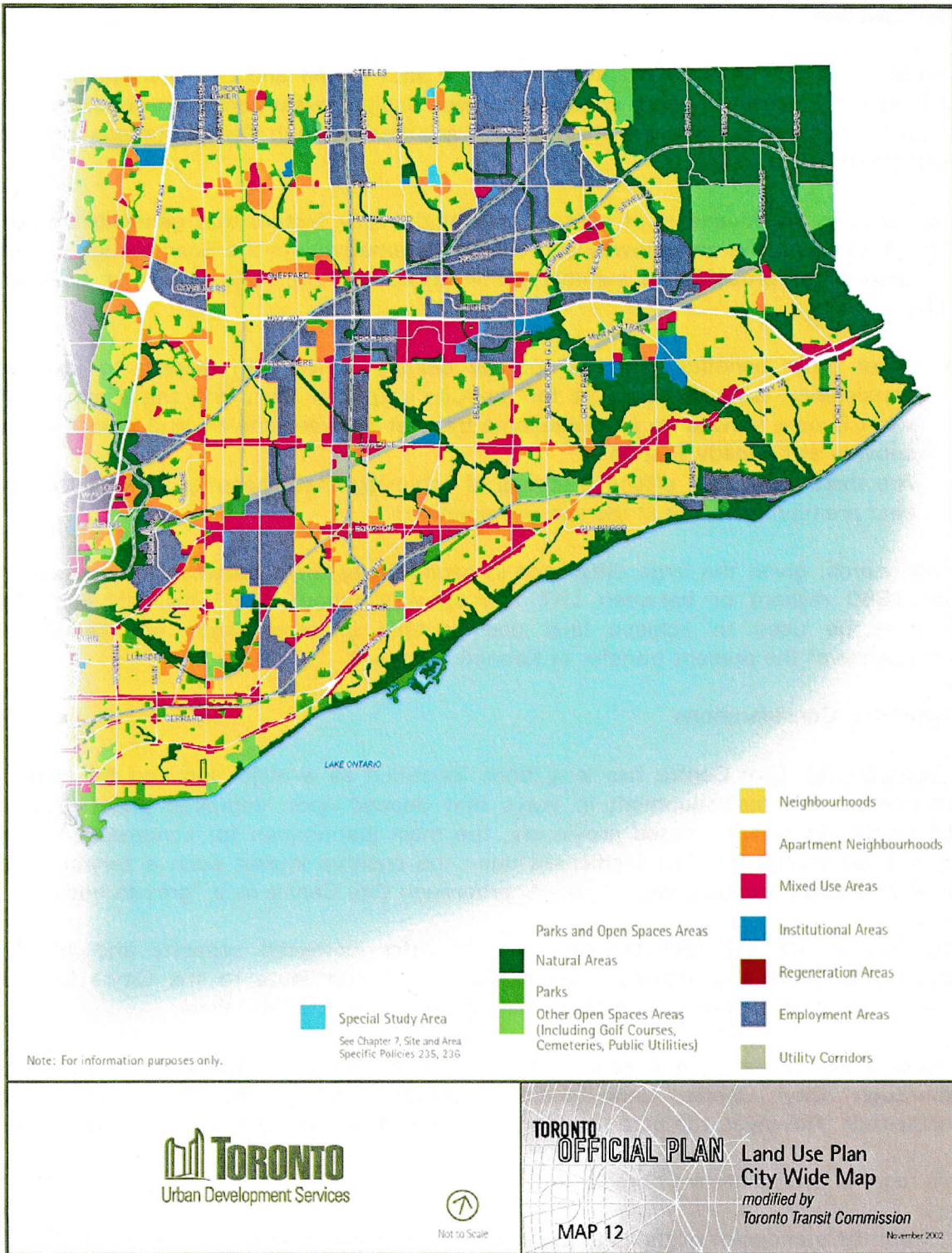
In this regard, two points are noteworthy.

First, from the standpoint of the land use component of the Official Plan, a section of which is shown in Figure 7.1, most of the planned concentration is indicated to occur

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adjacent to the Scarborough City Centre itself and in the north-south corridor from Lawrence Avenue to Sheppard Avenue between Kennedy and Midland.

Figure 7.1 – Scarborough Portion of the Toronto Official Plan Land Use Map



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The segment within this corridor between Lawrence and Ellesmere is, and would continue to be served by either RT or LRT along the present Scarborough RT route, in addition, of course, to the Scarborough Centre itself.

Even better transit access would be provided to the City Centre by the subway alternative. However, the subway route essentially bypasses the Kennedy-Midland corridor and passes through areas largely designated as “neighbourhoods” in the land use plan. Thus opportunities for development and intensification between the Kennedy Station and Scarborough City Centre are more limited than in the case of either RT or LRT service in the existing Scarborough RT corridor. Moreover, the proposed subway route offers less service to the mixed use proposed for the Ellesmere/McCowan area (McCowan station).

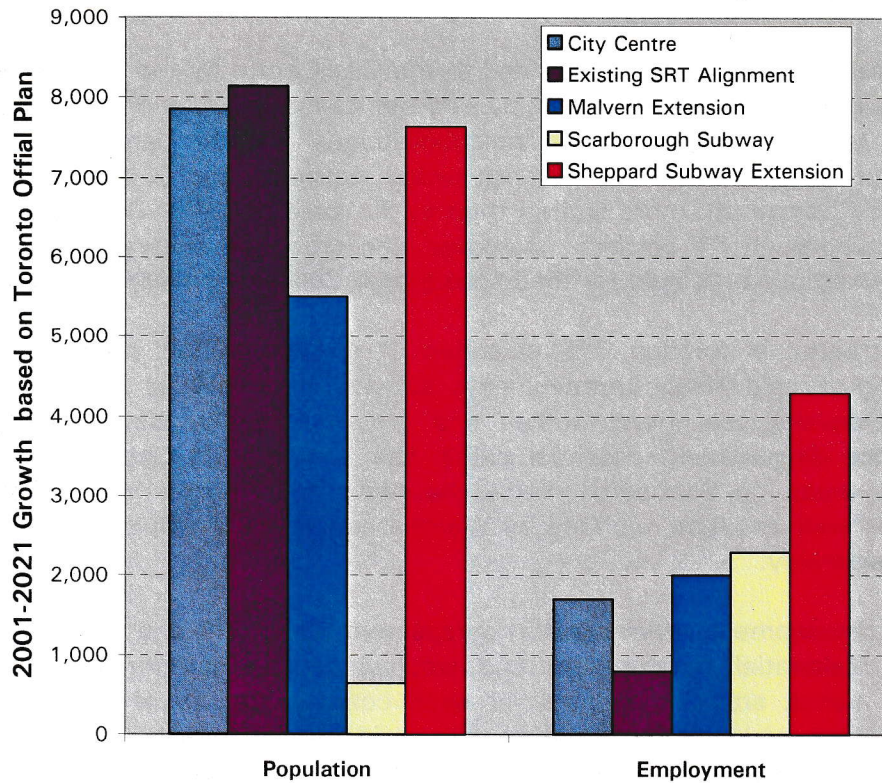
Second, if as treated in Section 7.5, selection of a Scarborough subway significantly delays the timing of rapid transit improvements (subway or otherwise) within the Sheppard corridor, some development opportunities and growth may be lost or delayed. Both corridors enhance development potential within the Scarborough City Centre. However, development in areas on Sheppard Avenue bounded by the Don Valley Parkway and Victoria Park, as well as areas bounded by Warden and Midland would, at the very least, be delayed considerably.

To place these development alternatives in perspective, Table 7.1 and Figure 7.2 compare the growth in residential development and employment by corridor within 500 m of proposed rapid transit stations. Figures for each corridor are *net* of growth within the Scarborough Centre which is common to all corridors. As shown, viewed on a total corridor basis, the Sheppard subway extension serves a considerably higher potential growth in both population and employment than the Scarborough subway. Moreover, if some portion of the difference in capital costs between the subway and the RT or LRT options is used to expand the network of higher order transit services in Scarborough, there are likely to be additional land use advantages.

Table 7.1 – Official Plan Population and Growth Estimates

Location or Corridor	2001-2021 Growth	
	Population	Employment
City Centre	7,860	1,700
Corridor (net of City Centre)		
Existing SRT Alignment	8,140	800
Malvern Extension	5,500	2,000
Scarborough Subway	640	2,300
Sheppard Subway Extension	7,640	4,300

Figure 7.2 – Comparison of 2001 to 2021 Official Plan Corridor Growth



7.3 Kennedy Station Transfer

Clearly, the subway alternative minimizes transfers at Kennedy Station, one of the most frequently criticized features of the present Scarborough RT. However, as noted previously, some passengers would be required to either change trains or wait for a Scarborough “through” subway, at least during peak periods.

For the RT alternative, the preferred alternative for meeting required capacity and providing greater operational flexibility involves construction of a new, replacement Kennedy RT Station on the surface of the existing parking lot. Although walking distances are increased by approximately one half of a train length, passengers will be required to negotiate only one instead of two levels. The transfer can be further eased by the use of moving walkways within the pedestrian connection to the mezzanine of the subway station.

Other alternatives that have yet to be evaluated involve bringing RT trains directly into the platform level of the Bloor-Danforth subway. For these designs, some of the additional capital costs for tunnelling and subway signalling would be offset against the costs of building the new RT station at Kennedy. The existing Kennedy subway station would serve both the subway and the Scarborough RT.

These Kennedy Station concepts can also be applied to the LRT alternative.

7.4 Service Disruption and Timing

Service disruption attributable to new construction is estimated at about eight months for the preferred RT solution. The RT alternative offers an opportunity to address current overcrowding by advancing the start of construction and the acquisition of additional vehicles.

For the LRT alternative, the service life of existing Scarborough RT vehicles is likely to be maximized to the point when reliability becomes a major issue. Thus service is likely to be disrupted for about three years during the period 2015 to 2018. With this scenario, there is no opportunity for an early increase in service capacity to address the current and forecast overcrowding on the line before 2018.

Because the subway alternative involves a completely new alignment, any disruption to service would be dictated by the final design of the Scarborough Centre subway station and implications for service on the existing Scarborough RT. However, the major timing factors relate to decision making, completion of an environmental assessment, detailed engineering and design, actual construction, and final testing. Best estimates are that this entire process would require about nine years from final approval.

Given recent announcements by the Ontario Minister of Transport regarding extension of the Spadina subway to the Vaughan Corporate Centre, as well as previous decisions of the TTC regarding the extension of the Sheppard Subway, a review of political priorities would be required in the very near future in order to avoid a lengthy period of service disruption in the Scarborough RT corridor.

From the perspective of capital budgeting, for the RT alternative, there is considerable latitude to spread infrastructure costs over four or five years involving *an average annual expenditure* of \$70 to \$90 million, un-escalated 2006\$ (depending upon the vehicle procurement schedule of payments) before closing the service to allow for connection of the existing track to the new station, at which point new Mark II cars can be introduced.

For the LRT alternative, the infrastructure costs spread over three years amount to about \$160 million annually. For the subway alternative, a five-year construction program would involve annual expenditures of approximately \$240 million.

7.5 Early Capacity Increase

Current capacity limitations of the existing RT service, clearly, are not conducive to increasing transit ridership within Scarborough. Flexibility for beginning construction of the RT alternative provides an opportunity for dealing with the existing Scarborough RT capacity shortfall earlier than in the case of either the LRT or subway alternatives. Once construction has been completed, new cars can be acquired to increase capacity while continuing to operate the existing fleet of vehicles (as is presently the case in Vancouver).

7.6 Public Consultation

Public consultation has been an integral component of the evaluation process, involving meetings with:

- the Scarborough Community Council (18 October 2005)
- the general public early in the study (10 November 2005),
- the Toronto Transit Commission (16 November 2005),
- representatives of Centennial College and the University of Toronto Scarborough Campus (4 January 2006),
- representatives of the Scarborough business community (20 January 2006), and
- the general public following completion of the technical analyses (24 April 2005).

A number of meetings were also held with individual City Councillors as well as with members of the Scarborough Provincial Liberal Caucus.

By and large, these consultations stimulated considerable public and political interest in replacing the Scarborough RT by an extension of the Bloor-Danforth subway. Excluding representations made by elected officials, the majority of sentiments expressed by the general public favoured the subway alternative (even before the technical analyses were completed). Major objections to the RT relate to the need to transfer at the Kennedy Station.

Nevertheless, a few of the verbal presentations and a higher percent of the written submissions stressed the importance of making decisions with respect to the Scarborough RT on the basis of an overall plan for a more extensive transit system.

7.7 Network Opportunities

This section briefly addresses potential opportunities presented by accepting the RT or LRT alternatives for service in the Scarborough RT corridor as compared to the subway alternative.

In view of the large difference in capital investment between RT and subway or between LRT and subway, the basic question is what menu of other significant transit improvements which, if combined with the lower capital cost RT or LRT alternatives:

- would provide greater benefits for a larger number of TTC riders, particularly in Scarborough, and
- better support the objectives of the City's Official Plan.

Various menus can be developed on the basis of the previously referenced TTC *Ridership Growth Strategy*, the Official Plan's designation of a surface transit priority network, and the joint TTC/City *Building a Transit City* plan.

Drawing on the proposed surface rapid transit proposals extracted from the *Ridership Growth Strategy* and *Building a Transit City* plans, shown in Figure 7.3, schematic representations of general network opportunities are presented in Figure 7.4.

Figure 7.3 – Ridership Growth Strategy Surface Rapid Transit Corridors

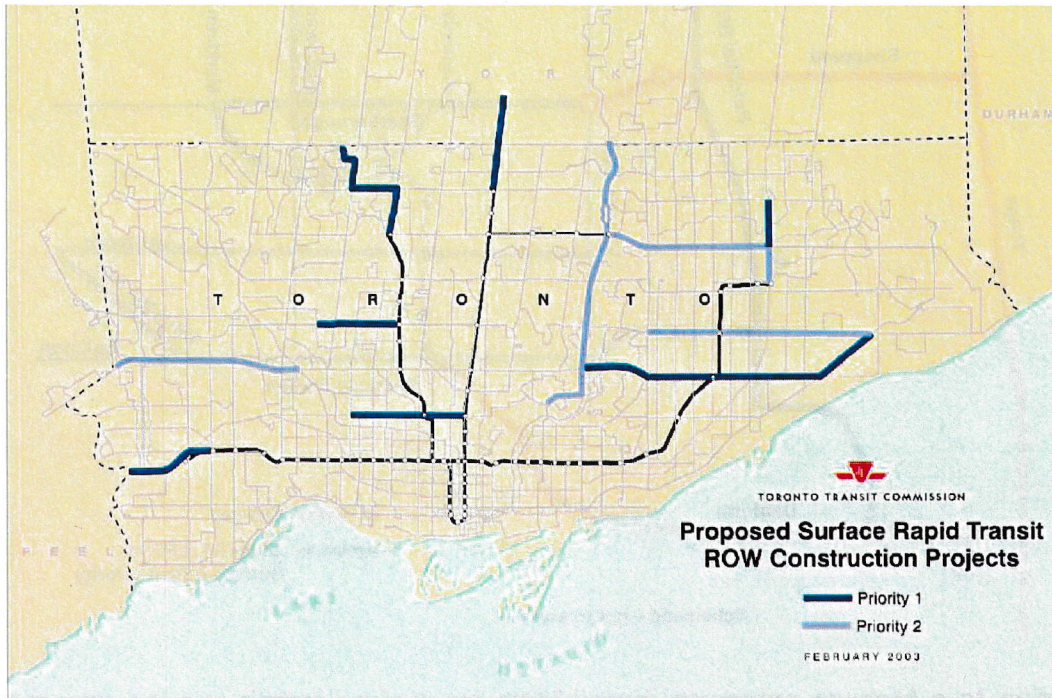
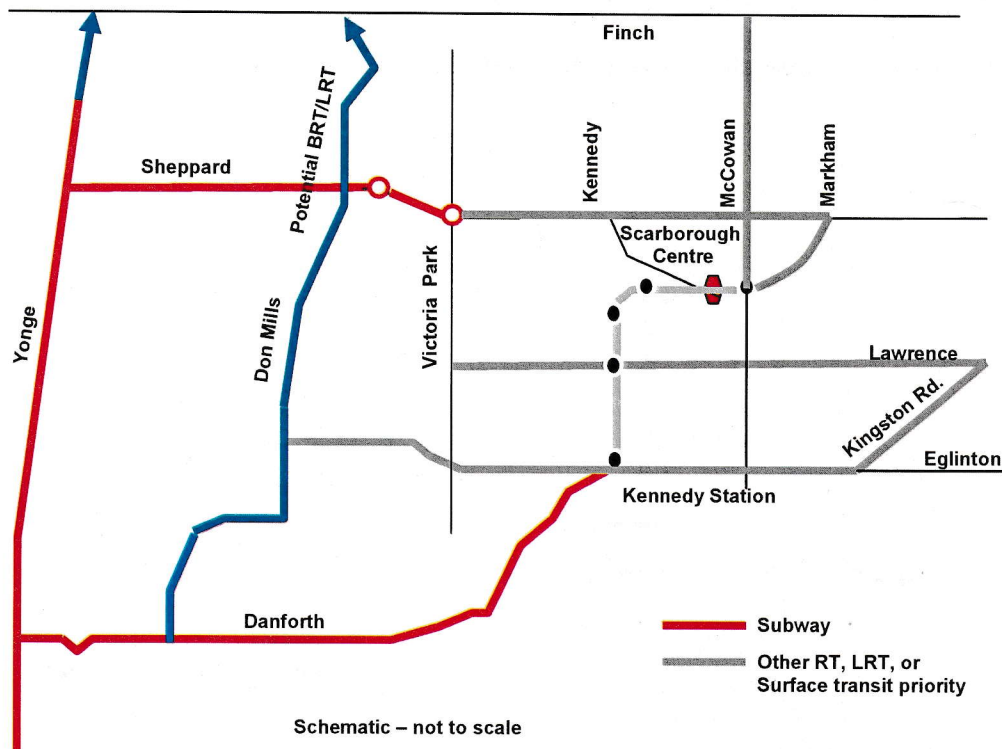


Figure 7.4 – Potential Network Elements for RT, LRT, or Surface Transit Priority
(Assuming Extension of the Sheppard Subway to Victoria Park)



In addition to a Malvern extension, possibilities for surface transit priority extracted from *Building a Transit City* include BRT or LRT on:

- McCowan (to connect with GO Transit’s proposed north-south BRT),
- Eglinton Avenue east and west of the present Kennedy Station,
- Lawrence Avenue east and west of Lawrence East Station,
- Kingston Road south of Lawrence,
- Sheppard Avenue east of McCowan, and
- within the Finch hydro corridor.

In other words, there are two basic approaches to comparing the large capital cost differences between the subway and non-subway alternatives for the Scarborough RT.

The first considers a Scarborough RT non-subway alternative as the first stage of an extensive network of higher order surface transit priority elsewhere in Scarborough. The second considers a Scarborough RT non-subway alternative (either RT or LRT) as the first stage of an investment package that includes a connection to the terminal of the Sheppard subway (either existing or extended, perhaps to Victoria Park).

For example, selecting RT technology for the Scarborough RT and building an additional 20 km of higher order transit identified in the *Ridership Growth Strategy* would involve

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considerably less capital investment than replacing the Scarborough RT with a Scarborough Subway.

These examples, of course, require further analysis, the main point being that for either the RT or LRT alternatives, significant lengths of additional, higher order transit could be provided at or below the capital cost of the Scarborough subway alternative alone.

7.8 Summary Evaluation

The main points of the preceding discussion are summarized in Table 7.3

Table 7.3 – Summary Evaluation of Scarborough RT Corridor Alternatives

Measure	RT	LRT	Subway
Stations	No change	No change	Eliminates: McCowan, Midland and Ellesmere
Support for Scarborough Centre	Good	Good	Superior (depending upon impact on Sheppard Corridor)
Capital Cost (2006\$)	\$360M	\$490M	\$1,220M
Resources available for other transit initiatives	Significant	Significant	None
Service Disruption	8 months	36 months	Uncertain
Early Capacity Increase	Yes	No	No
Implementation Risk	Low	High	Very high
Long Term Capacity	Meets needs	Meets needs	Exceeds needs
Transfer at Kennedy Station	Can be improved	Can be improved	Not required
Expansion Potential	Limited	Most Opportunities	Constrained by Resources
Stated Public Preferences	Low	Low	High

8. Conclusions and Recommendations

8.1 Conclusions

The main findings of this study are summarized in the brief analysis of strengths, weaknesses, opportunities, and threats provided in Table 8.1. The key conclusions are as follows:

1. Treated in isolation of system wide implications, infrastructure modification in combination with the acquisition of an expanded fleet of new, longer, more modern RT vehicles similar to those used in Vancouver, represents the most cost effective solution for meeting transit needs within the existing Scarborough RT corridor, with minimum service disruption and with the greatest flexibility to provide near term capacity increases.
2. For RT technology, minimum total cost and minimum disruption to service due to construction can be achieved by the acquisition of these Mark II vehicles and construction of a new Kennedy Station in a location that eliminates the present curvature problem.
3. The RT technology still leaves the TTC with a unique technology that, due to widely held perceptions in Toronto regarding the desirability of the technology itself (despite successful applications throughout Vancouver and elsewhere), probably has less potential for network expansion (other than to Malvern in the protected right-of-way) than a network of LRT and surface, streetcar based, transit priority services on arterial roads.
4. With higher capital investment and a considerably longer disruption of service due to construction, conversion of the existing Scarborough RT to a multiple unit LRT technology offers greater potential for overall system expansion, consistent with the transit priority goals reflected in the City of Toronto's *Official Plan*, the TTC's *Ridership Growth Strategy* and the joint TTC/City *Building a Transit City* plan
5. There is considerable risk, however, that a decision to proceed with the higher cost LRT alternative will not be accompanied by a serious commitment to build on this technology to expand the surface network of right-of-ways.
6. For either the RT or LRT technologies, the inconvenient multi-level transfer between the subway and the Scarborough RT can likely be improved through relocation of the elevated Kennedy Station to a new surface location. There are other alternatives that may provide direct access to the subway platform, but they have not been analyzed in this study.
7. There is a need for further analysis of the specific network opportunities and their capital requirements that could be combined with either an RT or LRT technology in the Scarborough RT corridor as a single integrated project

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8. As compared to the subway alternative, which would require almost an immediate decision to proceed if unacceptable disruption to service is to be avoided, there is a window of opportunity, over the next year or so, to further refine the RT and LRT technology alternatives within an analysis of realistic integrated packages of system expansion that would be possible at considerably less total capital investment than required for a Scarborough subway.
9. On the basis of ridership forecasts and preliminary cost estimates, replacement of the existing Scarborough RT by a new subway is not a cost effective solution that can be justified on technical grounds.
10. In the event City Council adopts the subway alternative, if the disruption of rapid transit service within the Scarborough RT corridor is to be kept within reasonable limits, there are serious timing issues that would undoubtedly affect implementation of the Sheppard subway and possibly a number of other transit right-of-way and other initiatives. If the subway alternative is selected, there is an immediate need to undertake an assessment of both the likelihood of funding, as well as realistic timing relative to other subway priorities previously identified by the TTC and reflected in the Minister of Transport's recent announcements pertaining to the Spadina subway extension to the Vaughan Corporate Centre.
11. In specific terms, allowing approximately nine years for an environmental assessment, detailed engineering, contracting, construction, testing and acceptance, approval and funding for the subway alternative would have to be guaranteed no later than early in 2007 to enable opening of a new subway between 2016 and 2018.

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Table 8.1 – Summary Conclusions on the Scarborough RT Alternatives

Alternative	Strengths	Weaknesses	Opportunities	Threats
RT	<p>Lowest total capital investment</p> <p>Greatest flexibility with respect to cash flows</p> <p>Minimum disruption of service due to construction</p> <p>Capacity increase can be advanced and expanded incrementally through joint operation of existing and new cars</p>	<p>Highest cost cars per passenger</p> <p>Least potential for network integration</p> <p>Retains need for special purpose maintenance of unique technology</p> <p>Still requires transfer at Kennedy</p> <p>Low public acceptance</p>	<p>EA for extension already approved</p> <p>Could be extended to the terminal of the Sheppard subway at lower cost than subway construction.</p> <p>Improved transfer at Kennedy Station</p> <p>Final decision can be delayed for 1 to 2 years while integrated networks are assessed.</p>	<p>Same vehicle procurement problem may arise in 25 years</p> <p>Little or no perceived improvement in service</p> <p>No guaranteed network expansion</p>
Conversion to LRT	<p>Similar to replacement streetcars</p> <p>Eliminates need for specialized vehicle maintenance</p> <p>Greatest potential for expansion as a surface priority network</p>	<p>Lengthy service disruption</p> <p>High construction costs (partly offset by lower vehicle costs)</p> <p>Capacity increase delayed</p> <p>Still requires transfer at Kennedy</p> <p>Low public acceptance</p>	<p>Could be extended to the terminal of the Sheppard subway at lower cost than subway construction</p> <p>Improved transfer at Kennedy Station</p> <p>Final decision can be delayed for 1 to 2 years while integrated networks are assessed.</p>	<p>Little or no perceived service improvement</p> <p>No guaranteed network expansion</p>
Subway	<p>Widest range of capacity potential</p> <p>No service disruption if decisions are made soon</p> <p>Eliminates transfers</p> <p>Greater localized land use Impacts at terminal stations</p> <p>Generally highest public acceptance</p>	<p>Very high construction costs and highest total cost</p> <p>Capacity increase delayed</p> <p>Eliminates 3 stations</p> <ul style="list-style-type: none"> • Ellesmere • Midland • McCowan <p>Probably delays greater land use benefits in the Sheppard corridor</p> <p>A final decision is required almost immediately to avoid unacceptable periods of service disruption</p>	<p>Integration with Sheppard subway</p>	<p>Under-utilized capacity</p> <p>Potential longest period of service disruption</p> <p>Likely to defer other subway investments (ie completion of the Sheppard Subway)</p>

8.2 Recommendations

1. Approve, in principle, the upgrading of the Scarborough RT as soon as possible to accommodate larger, new-generation vehicles, and to provide increased service capacity, noting that:
 - Upgrading of the line is estimated to cost \$190M and will require that service be disrupted for up to eight months,
 - The purchase of new-generation RT vehicles to replace the existing fleet and accommodate forecast future demand is estimated to cost \$120M by 2015, and
 - An additional \$50M is required to accommodate additional forecast growth between 2015 and 2031.
2. Include funding for upgrading the Scarborough RT, as well as for the purchase of larger, new-generation RT vehicles in the 2007-2011 TTC Capital Budget.
3. Prepare an implementation and staging plan for upgrading of the Scarborough RT line to accommodate new-generation vehicles.
4. Undertake a study of potential expanded networks based on routes identified in the *Building a Transit City* plan in order to develop an *Integrated Rapid Transit Plan for Scarborough* that specifically addresses:
 - Extension of the Scarborough RT line to Sheppard Avenue and other possible corridors,
 - Surface Bus Rapid Transit or streetcar-based LRT lines on Kingston Road, Danforth Avenue, Eglinton Avenue, Sheppard Avenue, Markham Road, and the Finch Hydro Corridor, consistent with the City's Official Plan, and
 - Staged construction of the Sheppard Subway east from Don Mills Station.
5. Based on cost and risk considerations related to the likelihood of funding, as well as realistic timing relative to other subway priorities, eliminate replacement of the existing Scarborough RT service with a Scarborough subway as a viable or cost effective solution.

