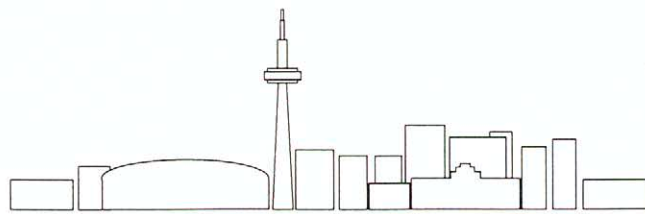




Toronto Transit
Commission



RAPID TRANSIT EXPANSION STUDY

RIES

August 2001

Executive Summary

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EXECUTIVE SUMMARY

1. Introduction

The TTC's rapid transit system has grown incrementally since the initial Yonge Subway line opened in 1954 (see Exhibit ES-1). The Sheppard Subway scheduled to open in 2002 will mark the end of the latest era of subway construction and will lead to inevitable questions concerning the need for future rapid transit expansion, affordability and what is the highest priority for continued expansion.

2. Purpose of the Study

The purpose of the Rapid Transit Expansion Study (RTES) is to examine the needs and priorities for expansion of the TTC's rapid transit system to support population and employment growth as envisioned in the new City of Toronto Official Plan and in recognition of GTA development trends.

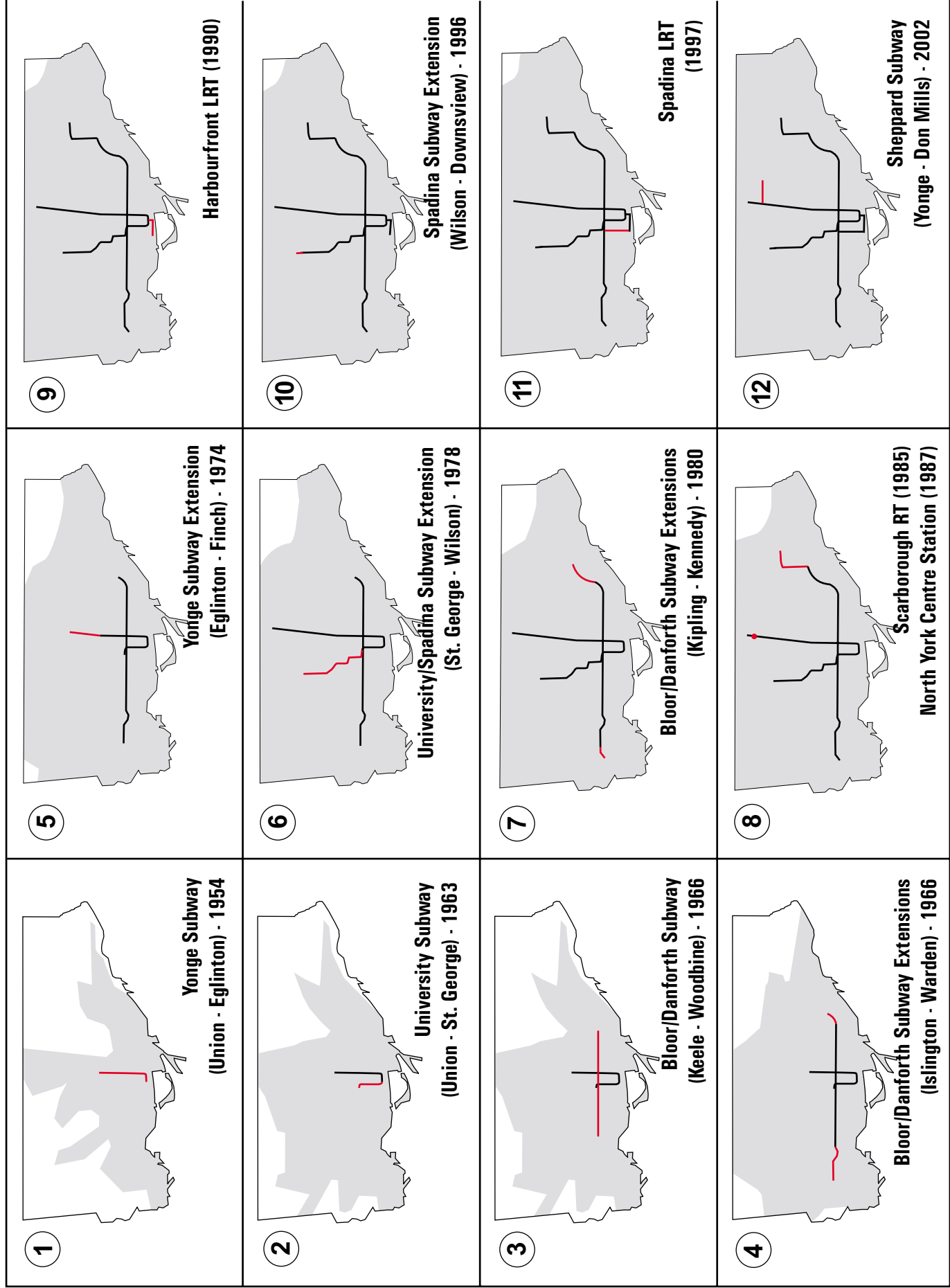
It is important for the TTC to have a clear vision on the need and feasibility for the development and expansion of the rapid transit system in the next 10-15 years and that the Commission be able to articulate a short-term strategy for expansion for discussion within the current term of Toronto City Council (2001-2003).

For the purposes of this study, rapid transit is defined as those types of transit which require a fully separate right-of-way (subway, RT). This study is not intended to deal with issues such as HOV lanes, reserved bus lanes, transit priorities, LRT in a reserved right-of-way or other similar transit initiatives. These issues are the subject of a separate TTC study. However, in corridors that are not recommended for rapid transit extensions, short term operational improvements are addressed including bus rapid transit concepts.

3. Context of the Study

While this report focuses on the need for future rapid transit expansion, the TTC faces a huge capital shortfall just to maintain the existing system in a state of good repair. The TTC's capital needs in the next decade, assuming no rapid transit expansion are \$3.8 billion, against which the City of Toronto has established a target of \$2.2 billion. With a \$1.6 billion shortfall in its base capital needs, the City of Toronto, and senior levels of government, must fund the TTC's basic capital needs before contemplating funding for rapid transit expansion. TTC's capital needs include the requirement to replace a large part of the bus and subway fleet and refurbishment of the streetcar fleet that was originally purchased with 75% funding from the Province of Ontario in the late 1970's.

Exhibit ES - 1: Growth of TTC Rapid Transit System (1954 - 2002)



The TTC has been consistent that the priority for capital funding is as follows:

<u>Priority</u>	<u>Capital Item</u>
1	State of Good Repair/Safety
2	Legislative
3	Ridership Growth Related
4	Transit Priorities/Improvement
5	Rapid Transit Expansion/System Enhancements

The conclusions of this study, with respect to future rapid transit should not be misinterpreted. While the short listed projects are important to the continued growth of the TTC and the City of Toronto, their implementation would be supportable only after the TTC's base capital needs have been met.

4. Related Studies and Projects

A number of studies are currently underway on future rapid transit expansion and a number of private sector initiatives for an LRT network have recently been proposed for the GTA. The intent of this study is not to critique these studies or to question the conclusions or priorities of other agencies. To the contrary, this study aims to examine the rationale for rapid transit from the TTC's perspective, to identify the criteria for successful implementation of rapid transit, and to evaluate which TTC expansion options have the highest probability for success based on those criteria. Only after a consistent evaluation method has been applied to all projects can a decision be made on the highest priority projects for expansion in the GTA.

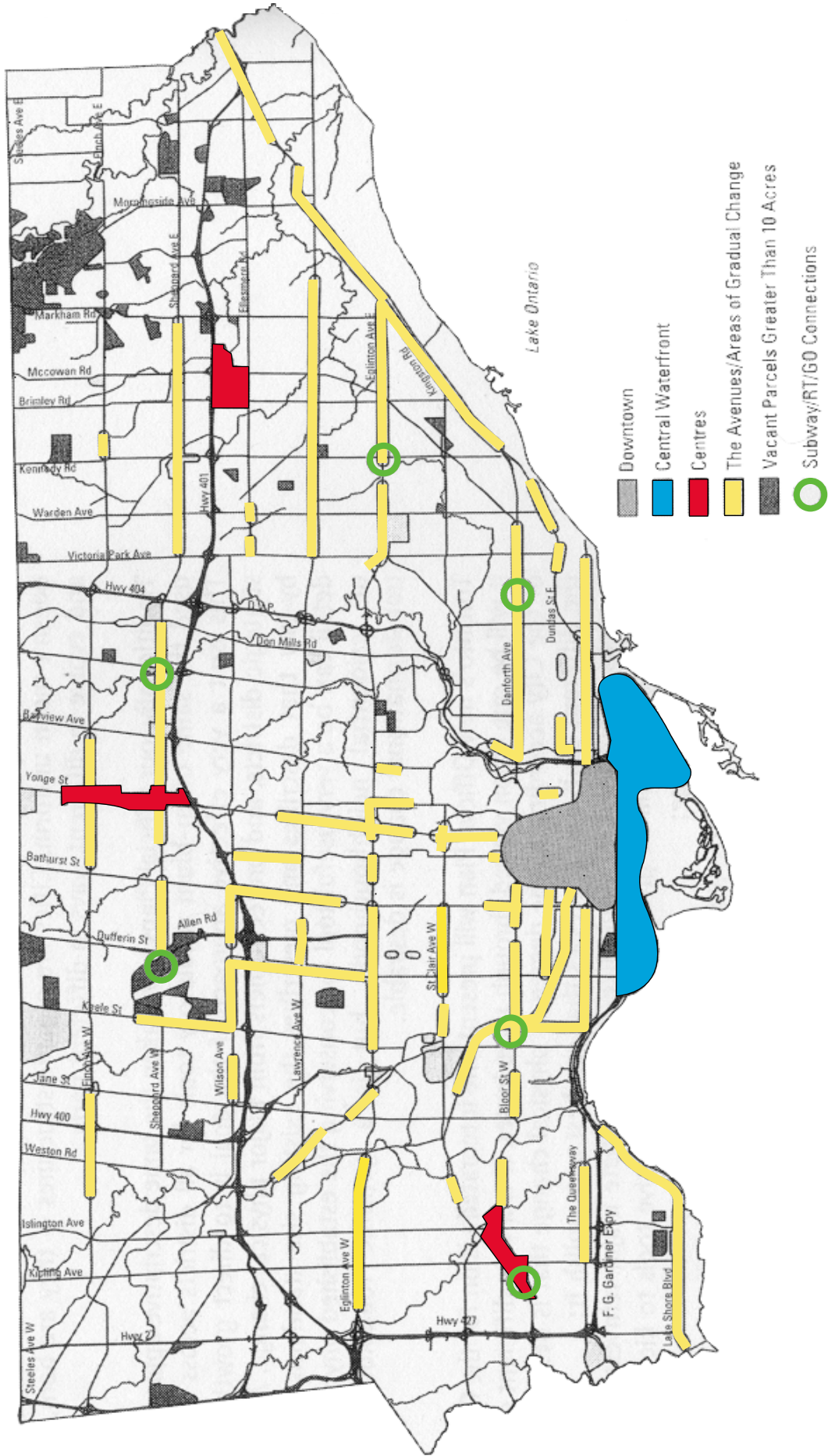
5. City of Toronto Official Plan

From a planning, operational and city building perspective, it is important that the TTC's priorities for rapid transit expansion be compatible with the City of Toronto's new Official Plan. With a target population of 3.0 million, a simplified planning process, and targeted growth areas (see Exhibit ES-2), the Official Plan can also be a powerful tool to stimulate the densities that are necessary for a rapid transit line to be an operating success.

This study attempts to answer the following key transit and land use questions:

- Given the critical relationship between transit and land use, how does the population and employment growth envisioned in the City of Toronto Official Plan differ from past planning studies and what impact does this have on short and long-term rapid transit planning?
- What is the current level of maturity of the various nodes of development within the GTA?
- If rapid transit systems are to be extended into new areas, at what densities can they be operationally successful?

Exhibit ES - 2 Potential Opportunities for Growth: New Approaches to Land Use



- How will the location and density of new development within the City of Toronto (and the GTA) affect transit usage and the need and justification for rapid transit service into new areas?
- In addition to zoning and Official Plans, what other factors need to be in place to achieve significant redevelopment in rapid transit corridors and/or around stations?

6. Density is the Key to Successful Rapid Transit

When examining the existing rapid transit system, the single biggest factor in determining whether a rapid transit initiative will be an operating success is the density that exists in the corridor today and the potential increased density that is possible in the future. As shown in Exhibit ES-3, transit modal splits in excess of 30% are only possible if the density in the vicinity of stations exceeds 100 jobs and/or residents per hectare. At densities below 100, the success of rapid transit cannot be assured and the operational performance of a line may not be financially affordable.

This study focuses on those corridors that are at or near the density threshold of 100 population/employment per hectare. Obviously, the risk of operational losses increases in the initial years of a line's operation if extensive redevelopment must take place to reach this threshold. The opposite is also true, i.e., lines that are at or near the threshold today are less risky from a financial perspective as redevelopment is not needed to ensure operational success.

As shown in Exhibit ES-4, the stations built since 1978 (with a few exceptions) have not achieved a 30% transit modal split and most do not meet the density threshold even 25 years after implementation. This reflects the reality that some corridors did not have the appropriate success factors for redevelopment prior to implementation and increased zoning alone was not sufficient in overcoming the barriers to redevelopment.

When some stations have extensive redevelopment and others have none 25 years after a line was constructed, it should come as no surprise that "if you zone developers will come" is not always the case. Zoning is one of many factors that must be in place for a line to be an operating success and this reality must be factored into rapid transit investment discussions.

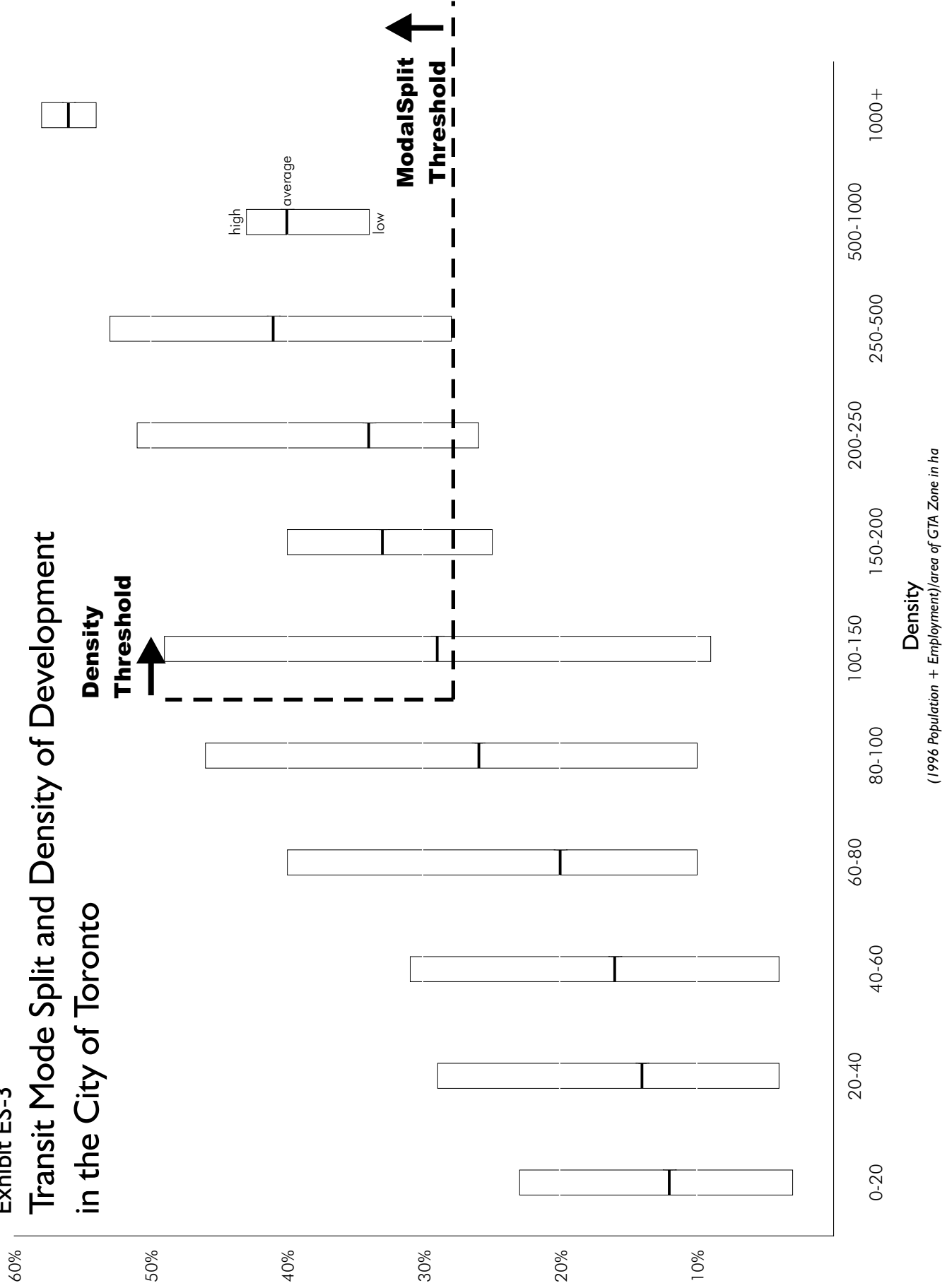
7. Identification of Possible Rapid Transit Options

7.1 Introduction

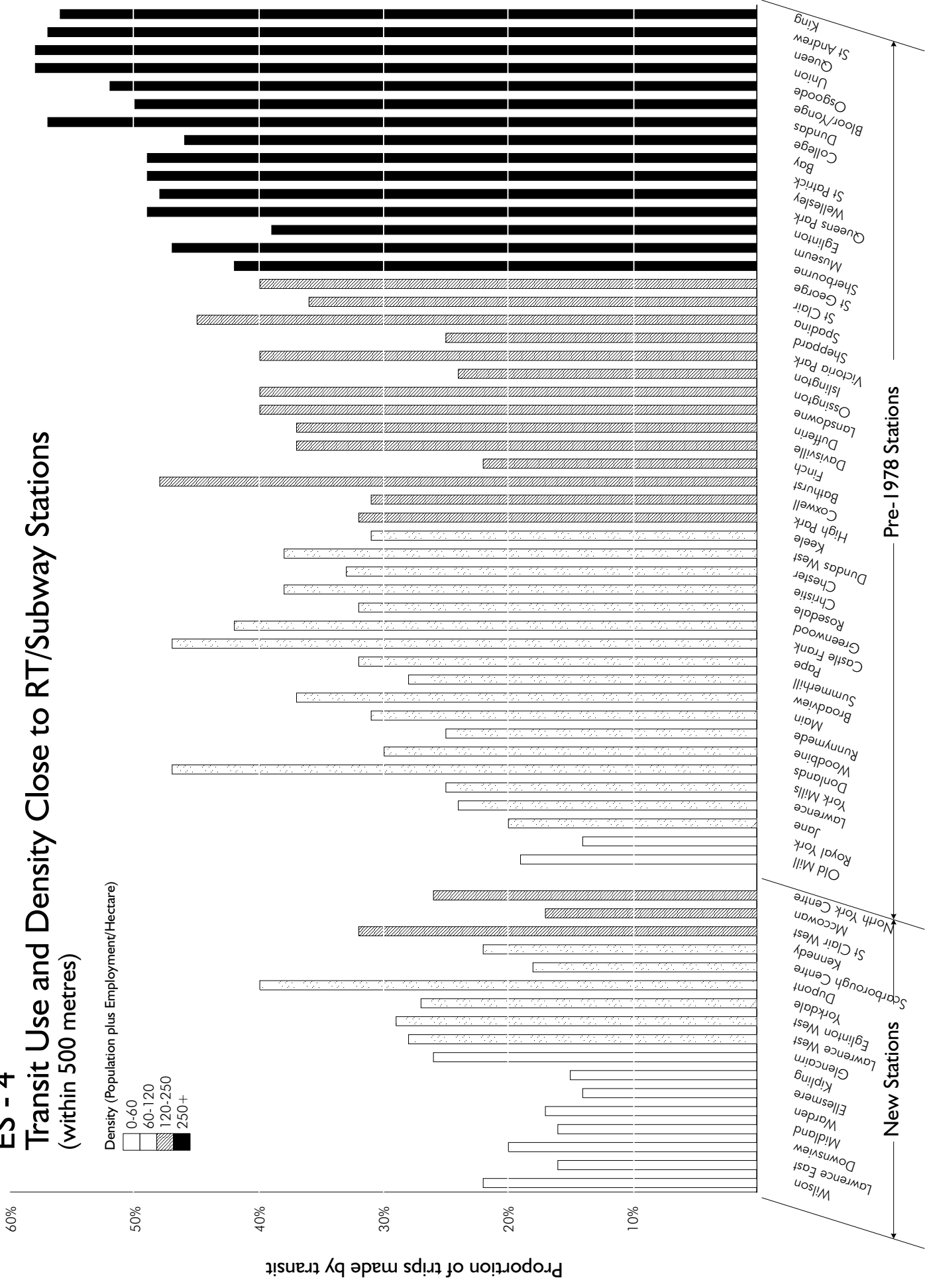
As an initial stage of the RTES, a list of possible rapid transit initiatives was identified that could be implemented in the short to medium (10-15 years). This includes projects that would support and promote redevelopment in the City of Toronto (particularly the designated City and intermediate centres), address the growing congestion problems in suburban areas, ensure the

Exhibit ES-3

Transit Mode Split and Density of Development in the City of Toronto



ES - 4 Transit Use and Density Close to RT/Subway Stations (within 500 metres)



anticipated growth in the downtown core could be accommodated and begin to address the low transit modal split in the 905 regions.

The identification of options was based on a 2.7 million population/1.8 million employment scenario (distributed by GTA traffic zone) for the City of Toronto. Exhibits ES-5 and ES-6 outline the densities in 1996 and the projected densities by zone based on a City population of 2.7 million.

In 1996, only the downtown core and the Yonge-Eglinton area had population and employment densities above 250 per hectare. Moderate densities (100-250 per hectare) are found in close proximity to the Bloor-Danforth Subway line, existing nodes (Consumers Road, the North York and Scarborough City Centres, Kipling/Islington), portions of the Eglinton Corridor, and isolated pockets in the northwest part of the city.

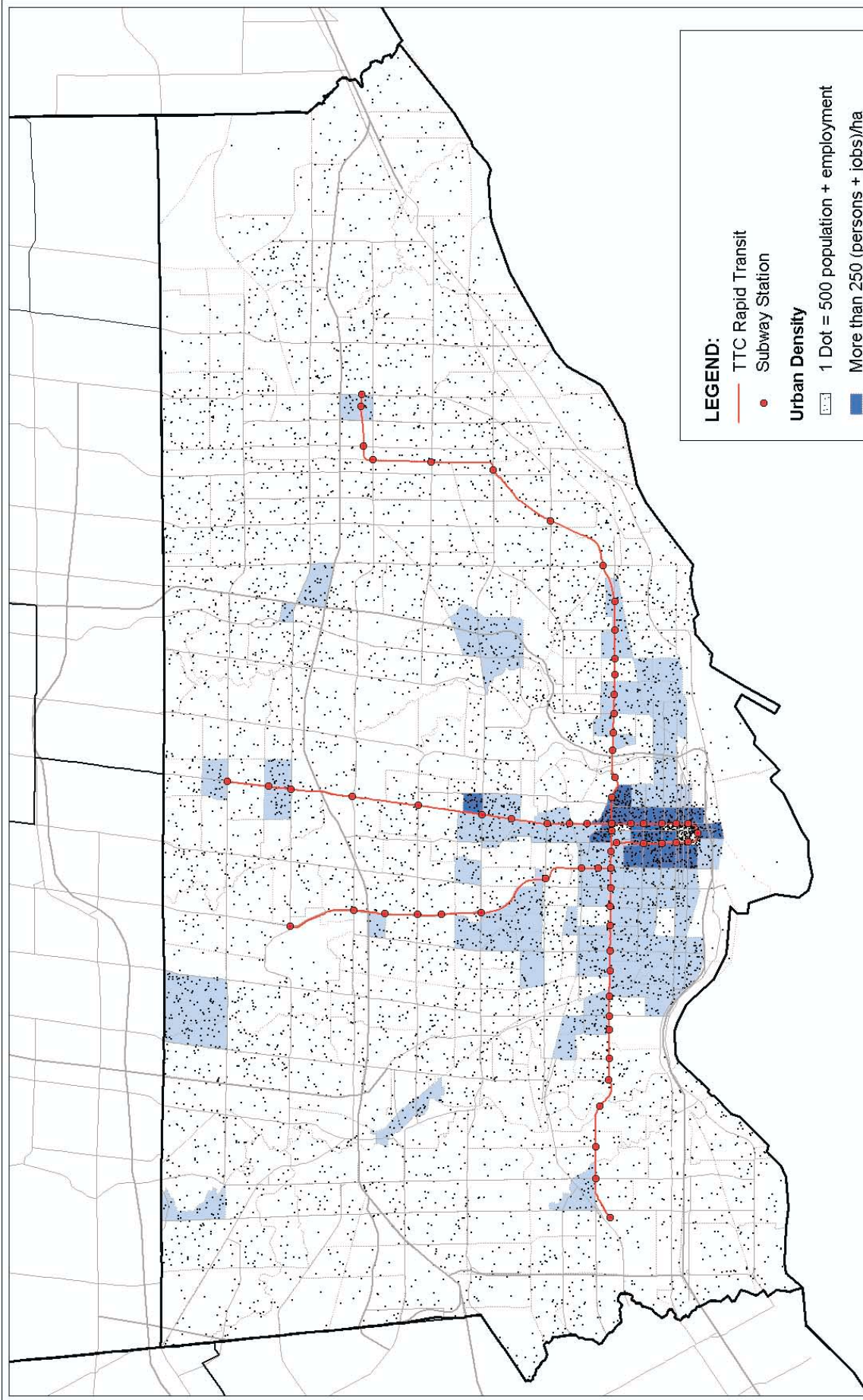
It is projected that when the City's population reaches 2.7 million, three new areas will have densities in excess of 250 population and employment per hectare; namely, Summerhill/St. Clair, Davisville/Eglinton and North York City Centre. Increases in density to moderate levels (100-250 population and employment per hectare) are anticipated in the Sheppard Subway corridor, the remaining part of the North York City Centre, Scarborough City Centre, Downsview Station, York University, York City Centre area, Etobicoke motel strip and the Spadina and Bloor-Danforth Subway lines north and west of St. George Station.

7.2 Rapid Transit Options Not Considered for Short Term Implementation

A number of rapid transit initiatives proposed in the GTA have not been evaluated as they are considered to be beyond the scope of this study. The following projects were not considered in the RTES study:

- The GTSB proposal to investigate bus rapid transit concepts.
- GO Transit rail expansion options.
- The private sector proposal to operate LRT type services in certain GO rail corridors and the Finch Hydro right-of-way.
- A Waterfront LRT East Extension to the Portlands.
- A commuter rail operation from Union Station to Pearson International Airport.

Of particular note is the fact that while the Waterfront LRT East Extension is considered an important long term initiative to support the redevelopment of the Portlands, it is not considered by the TTC to be a priority for implementation until significant development takes place in the area. The Portlands represents a significant policy thrust in the new City of Toronto Official Plan and the TTC supports the long term vision for the area.

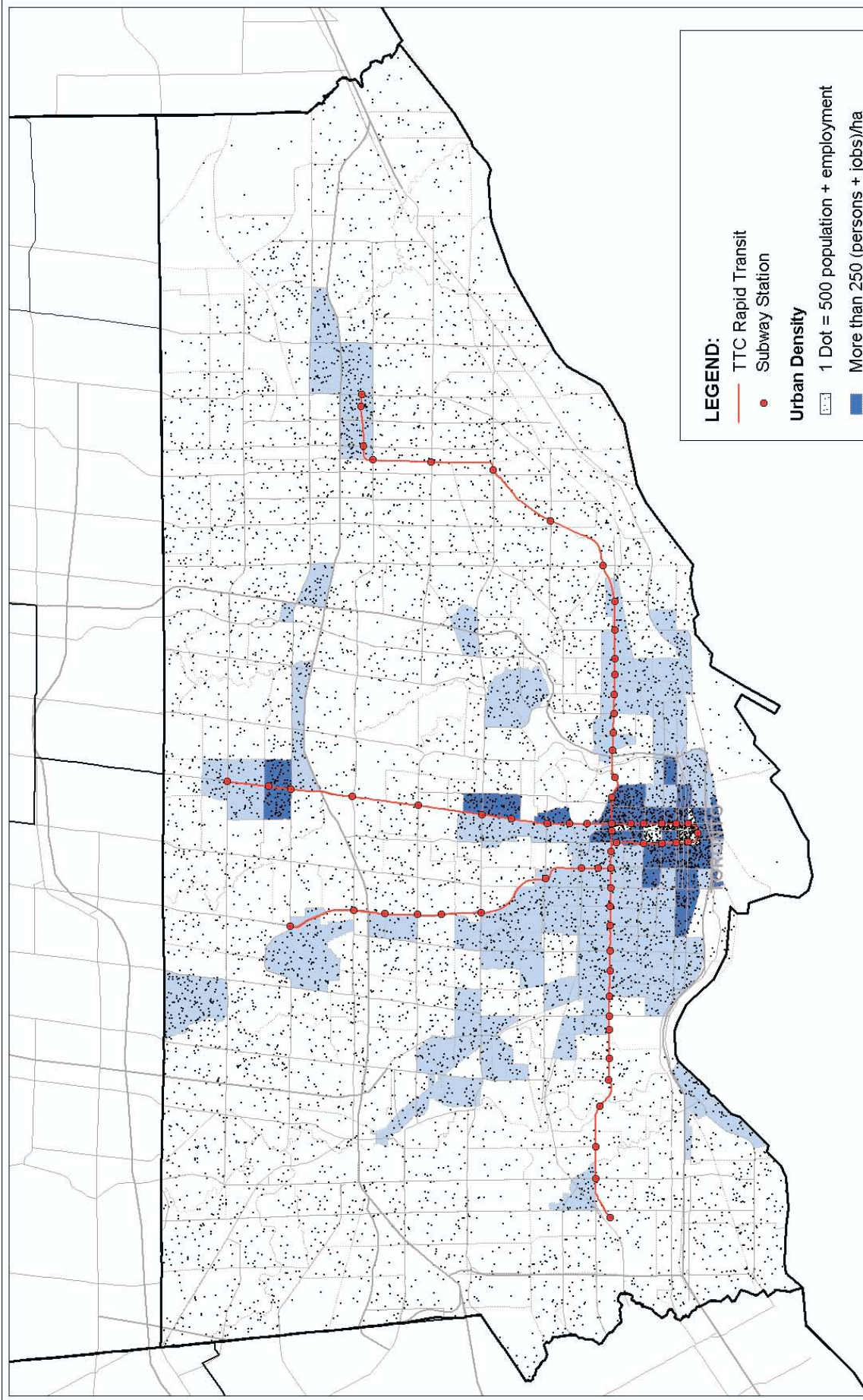


LEGEND:

- TTC Rapid Transit
- Subway Station

Urban Density

- 1 Dot = 500 population + employment
- More than 250 (persons + jobs)/ha
- 100 to 250 (persons + jobs)/ha
- Less than 100 (persons + jobs)/ha



LEGEND:

- TTC Rapid Transit
- Subway Station

Urban Density

- 1 Dot = 500 population + employment
- More than 250 (persons + jobs)/ha
- 100 to 250 (persons + jobs)/ha
- Less than 100 (persons + jobs)/ha

However, the policies for the Portlands must bear fruit in terms of density before an LRT to the area can be an operating success.

7.3 Capacity of the Yonge Subway and the Need for the YUS Loop

A critical issue that affects the identification of rapid transit options in the next 10-15 years is whether or not the Yonge Subway line has sufficient capacity to cope with projected growth. A related issue is whether the concept of connecting the Yonge and Spadina Subway lines to increase the capacity of the lines is required to alleviate congestion on the Yonge Subway line south of Bloor.

For reasons that are more fully explained in the main report, the TTC believes that the looping of the two lines is not required in the foreseeable future. Specifically, the following outlines the rationale for this conclusion:

- At the time of the YUS Loop Environmental Assessment (EA) in 1992 ridership had peaked at 32,000 per hour or the practical capacity of the Yonge line. Since that time ridership on the Yonge line has declined significantly to a low of 20,400 in 1996-1997. While ridership has recovered to 27,000 in 2001 there is still spare capacity for the short to medium term.
- Other initiatives (capital and operating) can be implemented in the short term to respond to congestion on the Yonge line at a lower cost than looping the two lines.
- A large portion of future growth to the Central Area can be more effectively served by GO Transit.
- It is expected that, in future, there will be better balance between residential and employment growth in the downtown and Waterfront areas than there has been in the past. This will moderate the need for increased subway capacity into the downtown area.

In short, the situation which prompted the YUS Loop EA in 1992 has changed significantly and consequently looping is not required in the foreseeable future. This opens the following possibilities for future rapid transit expansion:

- Looping of the Yonge and Spadina Subway lines on Steeles Avenue could be pushed further north (e.g. Highway 7) if required in the future.
- Radial extensions of the line beyond York/University could be considered if Steeles Avenue is no longer a constraint on the location of the top of the loop.
- Alignments which penetrate further west into the York University campus could be considered. Alignments further west into the University were rejected in the YUS Loop EA in 1992 as a more westerly alignment into

the University increased the capital costs for an easterly extension of the Spadina Subway line to join the Yonge Subway line.

The above conclusions were a key factor in the identification of future rapid transit initiatives as outlined below.

7.4 Rapid Transit Options

7.4.1 Introduction

Given the above conclusions and based on the 2.7 million population growth scenario, a total of six rapid transit initiatives were identified for potential implementation in the next 10-15 years (representing a total of 15 staging options) as outlined below (see Exhibit ES-7 and ES-8).

- Sheppard Subway (6 options)
- Scarborough RT (1 option)
- Eglinton Subway (1 option)
- Bloor-Danforth West (3 options)
- Spadina Subway Radial (2 options)
- Yonge Subway Radial (2 options)

The following briefly describes each option and the rationale for screening out certain options from further consideration.

7.4.2 Sheppard Subway (Options A1 to A6)

Option A1 – This option (see Exhibit ES-9) involves a 1.4 kilometre single station extension of the Sheppard Subway line to Consumers Road. While this option would represent a low cost extension to an area with high ridership and re-development potential it has been not been retained as a stand alone extension option for the following reasons:

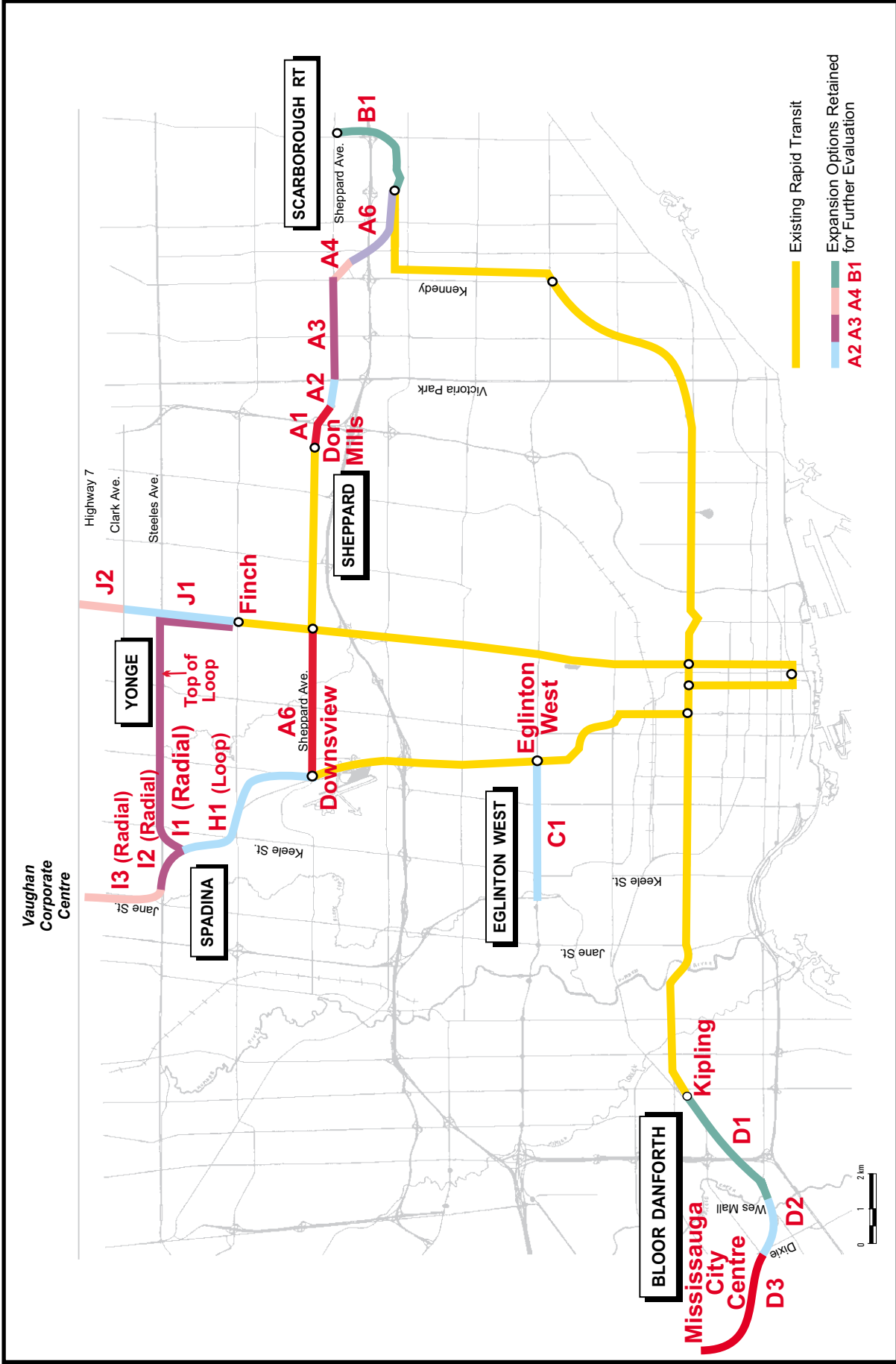
- Site constraints in the area of Consumers Road station.
- A bus terminal would be a throwaway cost following a further extension to Victoria Park.
- Alignment constraints with respect to the location of a crossover.
- The lack of space for commuter parking and passenger pick up and drop off facilities.


This is consistent with the Sheppard Subway EA which recommended that Victoria Park be the next stage beyond Don Mills Station. Consequently, Option A1 was screened from further consideration as a stand alone staging option.

EXHIBIT ES-7 – SUMMARY OF RAPID TRANSIT OPTIONS AND RESULTS OF INITIAL SCREENING

Rapid Transit Initiative	Number of Stations		Length (km)	Capital Cost ¹			Results of Initial Screening
	Initially	Future		Fixed Facility	Vehicles	Total	
<i>Sheppard Subway</i>							
A1 – Don Mills – Consumers Road	1	--	1.4	No Costs Developed	No Costs Developed	No Costs Developed	Eliminated
A2 – Don Mills – Victoria Park	2	--	2.1	\$390 M	\$27 M	\$417 M	
A3 – Don Mills – Kennedy	4	--	4.9	\$843 M	\$49 M	\$892 M	
A4 – Don Mills – CN/CP	5	--	5.5	\$1,002 M	\$49 M	\$1,051 M	
A5 – Don Mills – Scarborough City Centre	7	--	8.0	\$1,383 M	\$76 M	\$1,535 M	
A6 – Yonge – Downsview	2	--	4.5	No Costs Developed	No Costs Developed	No Costs Developed	Eliminated
B1 – SRT (McCowan – Sheppard)	3	1	3.1	\$286 M	\$88 M	\$374 M	
C1 – Eglinton Subway (Allan–York City Centre)	4	1	4.8	\$870 M	\$38 M	\$908 M	
<i>Bloor-Danforth Subway</i>							
D1 – Kipling – West Mall	1	1	3.8	\$455 M	\$113 M	\$568 M	
D2 – Kipling – Dixie	2	1	5.3	\$706 M	\$167 M	\$873 M	
D3 – Kipling – Mississauga City Centre	5	1	10.5	No Costs Developed	No Costs Developed	No Costs Developed	Eliminated
<i>Spadina Subway (Radial)</i>							
E1 – Downsview to Steeles	4	--	6.1	\$880 M	\$92 M	\$972 M	
E2 – Downsview to Vaughan Corporate Centre	5	1	8.6	\$1,218 M	\$130 M	\$1,348 M	
<i>Yonge Subway</i>							
F1 – Finch to Clark	2	--	3.7	\$573 M	\$113 M	\$686 M	
F2 – Finch to Langstaff	3	--	7.2	\$437 M	\$221 M	\$1,158 M	

¹ Excludes yard costs, property costs and escalation (all costs in 2000 dollars)



 <p>Rapid Transit Expansion Study (RTES)</p> <p>Toronto Transit Commission</p>	<h2 style="text-align: center;">Long List Of Rapid Transit Options</h2>	<h1 style="text-align: center;">Exhibit ES - 8</h1>
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Option A2 – This option (see Exhibit ES-9)) involves a 2 kilometre extension (2 stations) to Victoria Park with traditional bus, drop off and commuter parking facilities at the terminal station.

Option A3 – This 4.8 kilometre extension to Kennedy Road (see Exhibit ES-9) provides two additional stations beyond Victoria Park (Warden, Kennedy). This option has additional feeder bus, ridership and re-development potential and provides some opportunity for GO/TTC transfers to the Stouffville GO line.

Option A4 – This option (see Exhibit ES-10) extends beyond Kennedy Road to make a direct connection with the Stouffville GO line and provides a station in an area ripe for re-development (area bounded by Sheppard, Midland, Highway 401 and Kennedy Road).

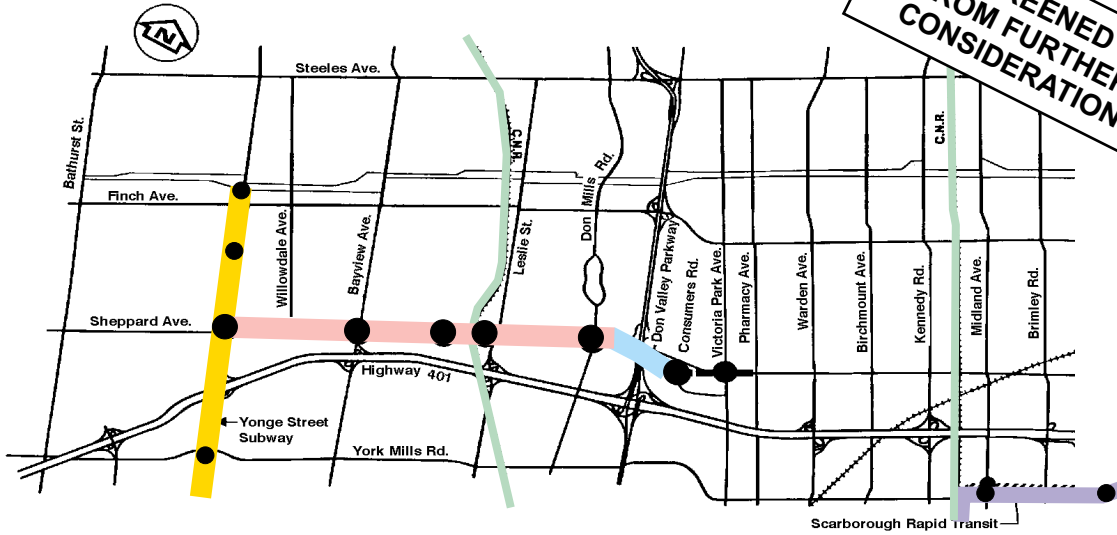
Option A5 – An 8.0 kilometre extension to complete the Sheppard Subway to the Scarborough City Centre (see Exhibit ES-10). This option would link the two City Centres and includes a new station in the Progress West industrial district, providing a further stimulus to the City Centre and the creation of further reverse direction traffic on the Sheppard Subway.

Option A6 – A 4.5 kilometre westerly extension from Yonge Street to Allen Road (with stations at Bathurst and Downsview) was identified initially but was screened from further consideration for the following reasons (see Exhibit ES-11):

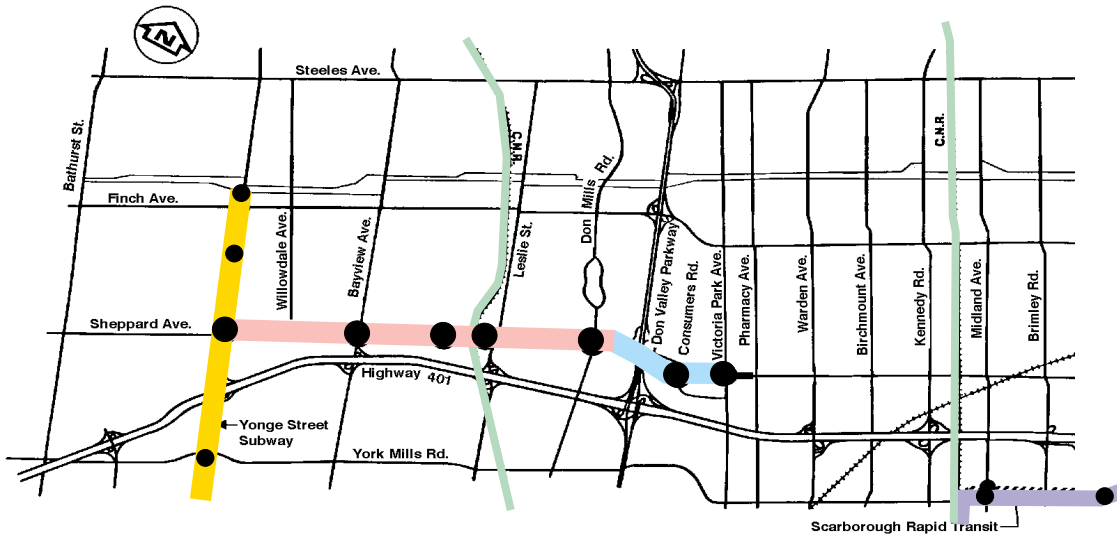
- As Downsview Station is already served by the Spadina Subway line, only one additional station is possible (Bathurst) and this station has only limited development potential.
- Demand for rapid transit is considerably higher east of Yonge Street in comparison to west of Yonge Street. The growth of the North York City Centre does not depend on a westerly extension of the Sheppard Subway line and consequently a westerly extension is considered lower priority in comparison to further easterly extensions.
- The high capital cost of such an extension is not matched by high ridership or re-development potential.
- Population and employment growth in the corridor is projected to be low.
- Densities in the area are projected to be below the threshold for implementation of rapid transit.
- The opportunities for feeder bus savings and commuter parking potential are considered to be low.

While there would be some strategic benefit in terms of encouraging Sheppard Subway riders to utilize the Spadina Subway line (rather the Yonge Subway line) to access the downtown core and in providing additional

Option A1



Option A2



Option A3

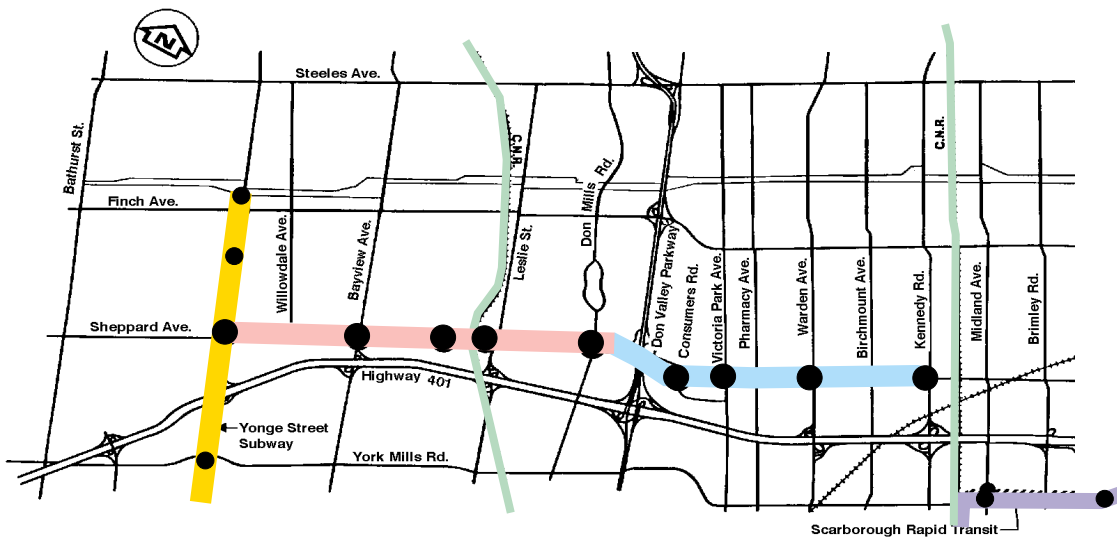


Exhibit
ES - 9

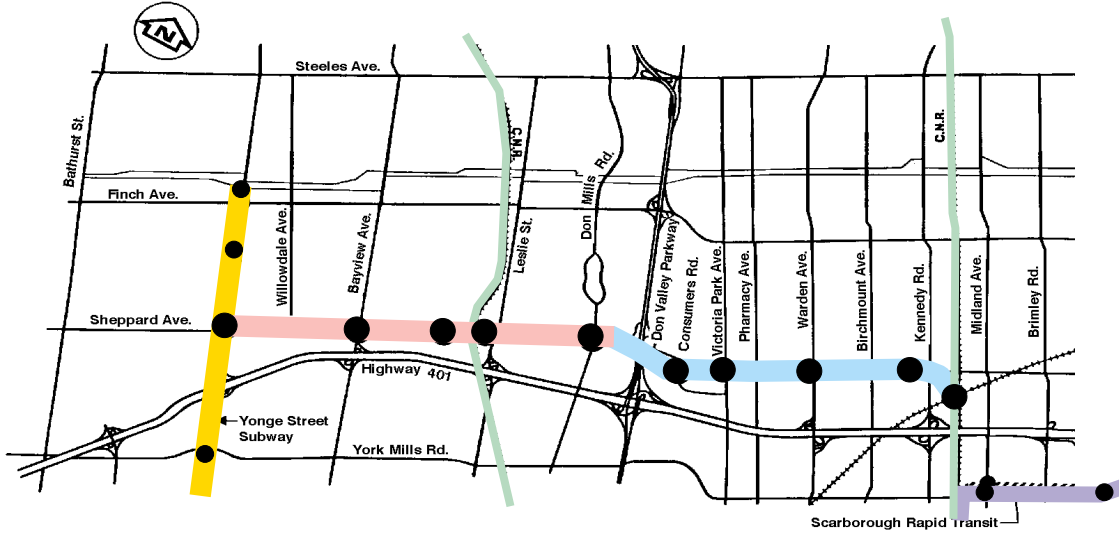
Sheppard Subway Options (A1, A2 and A3)



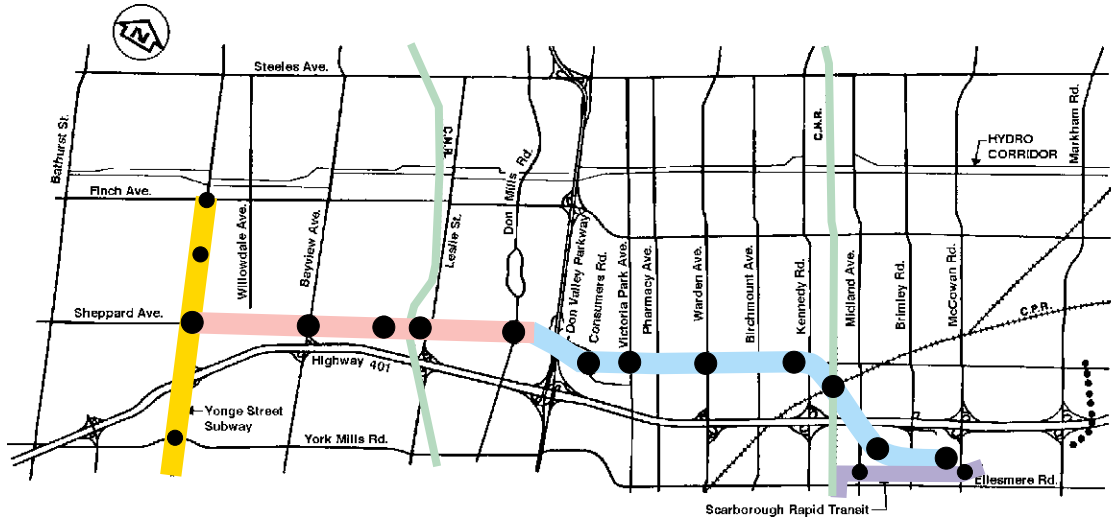
Rapid Transit
Expansion Study
(RTES)



Option A4



Option A5



- Existing SRT
- Existing Yonge Subway
- Existing Sheppard Subway
- Sheppard Subway Extension
- GO Rail Lines

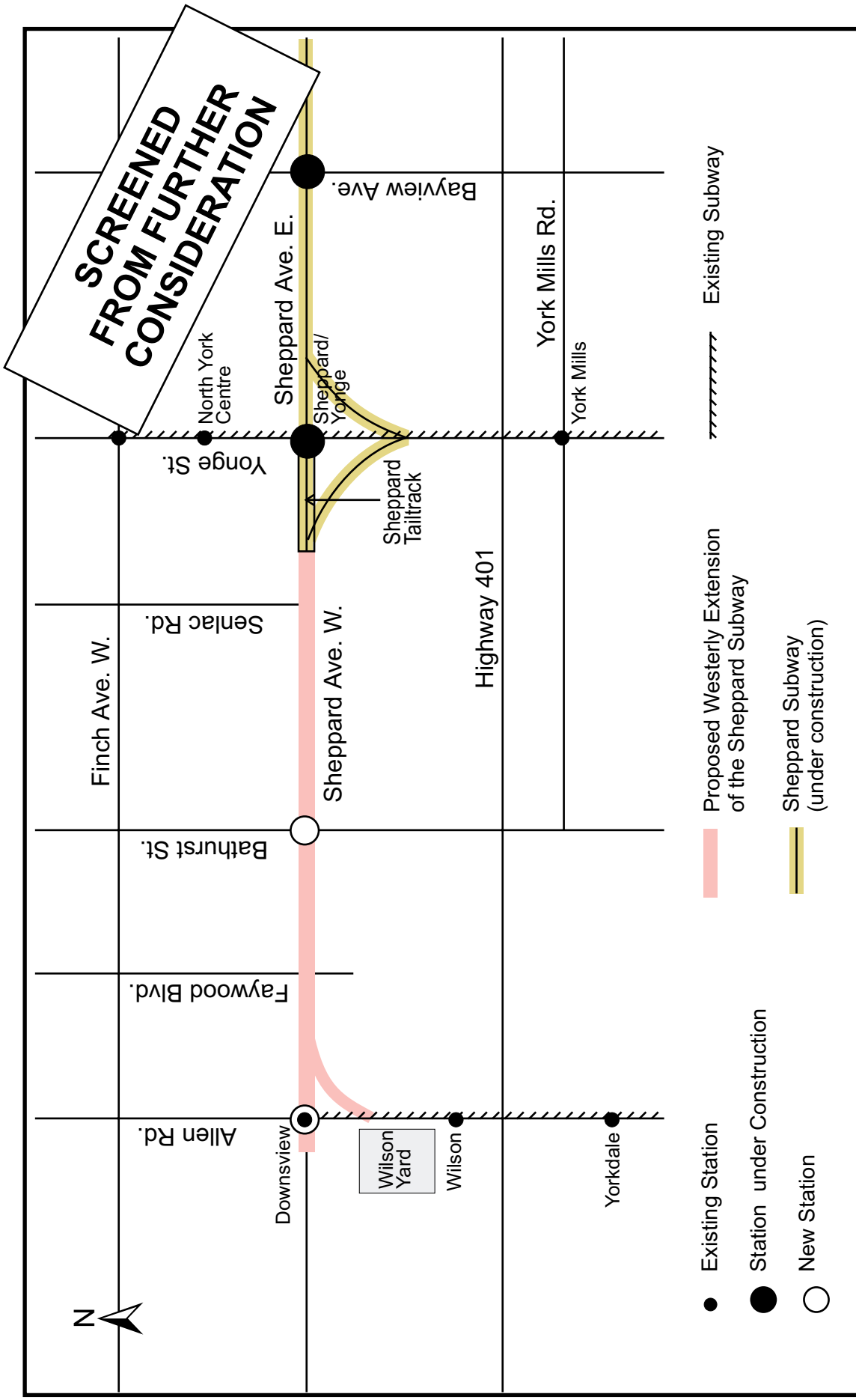
Exhibit
ES - 10

Sheppard Subway Options (A4 and A5)





Rapid Transit
Expansion Study
(RTES)





- Existing Station
- Station under Construction
- New Station
- Proposed Westerly Extension of the Sheppard Subway
- Existing Subway
- Sheppard Subway (under construction)

 <p>Rapid Transit Expansion Study (RTES)</p>	 <p>A6 - Sheppard Subway Extension (Yonge to Downsview)</p>	<p>Exhibit ES - 11</p>
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network connectivity for a variety of trip origins and destinations, a westerly extension of the Sheppard Subway is not considered a high priority in the short to medium term. Consequently, Option A6 was screened from further consideration.

7.4.3 SRT Extension to Sheppard Avenue (Option B1)

This involves a 3.55 kilometre extension of the SRT to Sheppard Avenue (see Exhibit ES-12) with stations at Markham Road, Milner and Sheppard Avenue including a station in the vicinity of Centennial College.

7.4.4 Eglinton West (Option C1)

A 4.7 kilometre westerly extension of the subway from Allen Road to York City Centre (see Exhibit ES-13) includes Caledonia Station as a future station.

7.4.5 Bloor-Danforth Westerly Extension (Options D1, D2 and D3)

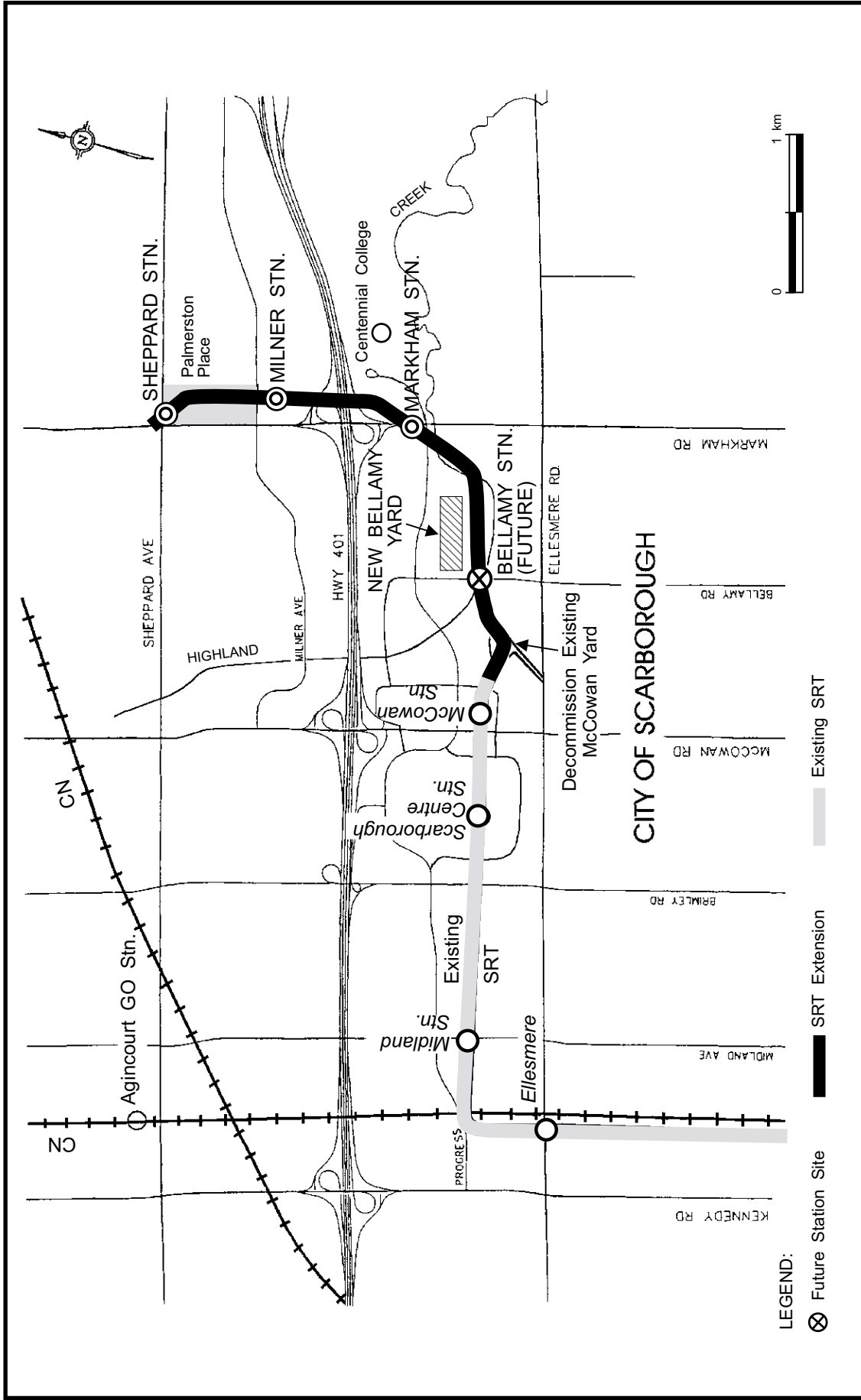
Three options for a westerly extension of the Bloor-Danforth Subway line were identified as follows:



Option D1 – Due to the potential redevelopment of the Sherway Gardens Centre this 3.2 kilometre extension (one station) includes the East Mall Station as a future station (see Exhibit ES-14).

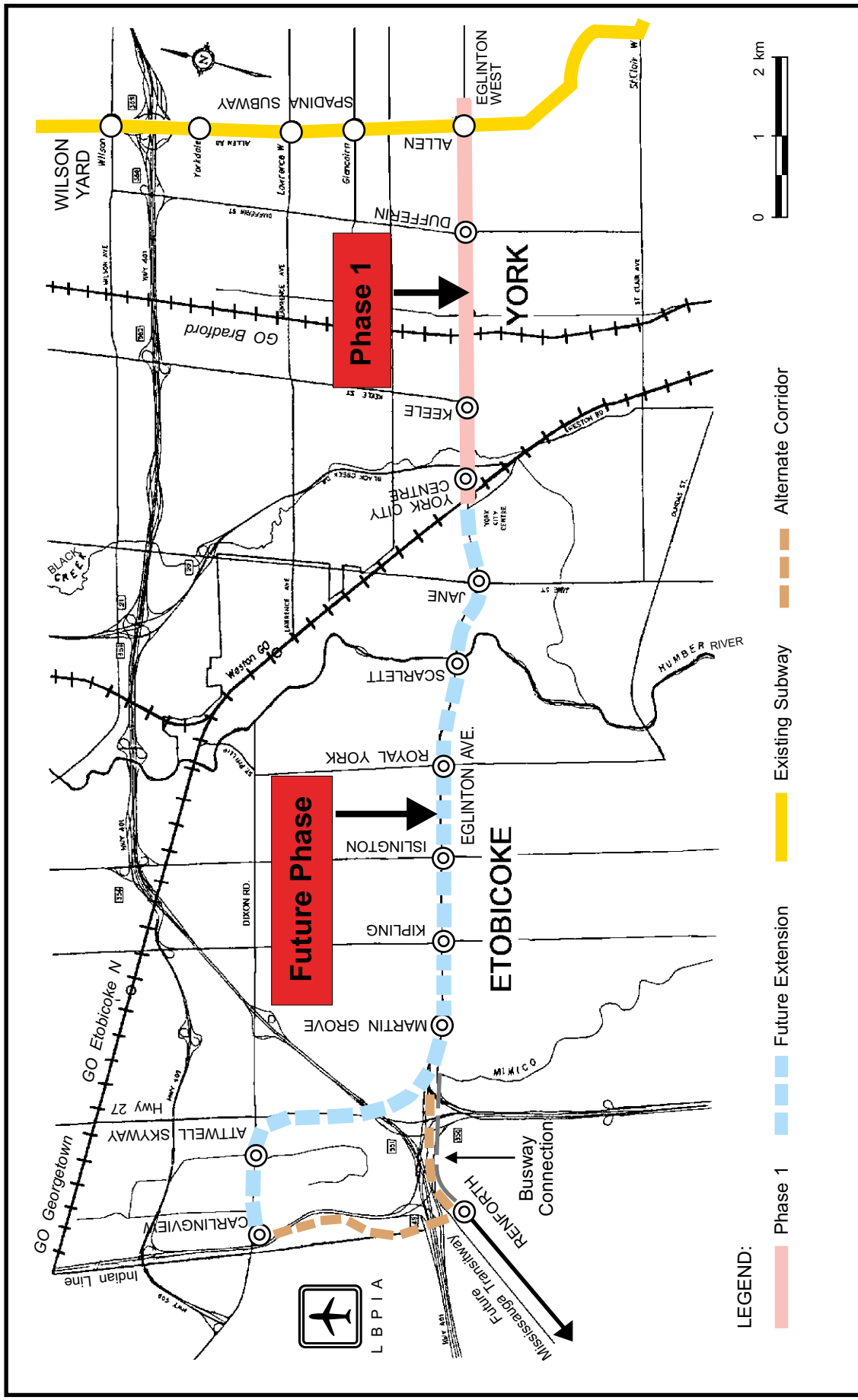
Option D2 – This option (see Exhibit ES-14) provides a further 1.4 kilometre extension from Sherway Gardens to Dixie Road. This extension would cross the City/Mississauga boundary and while this raises a number of operational, cost sharing and jurisdictional issues, this option has a number of advantages from a transportation perspective which warrants retention of this option for further consideration:



- It penetrates the west side of Highway 427 and the Etobicoke Creek which are significant transportation constraints to cross boundary travel.
- It provides an opportunity to integrate the Bloor-Danforth Subway and Milton GO lines in terms of transfers and shared commuter parking.
- It would result in significant feeder bus savings for Mississauga Transit and would free up land for re-development at Kipling and Islington Stations which is currently utilized for terminal facilities (particularly bus terminals).

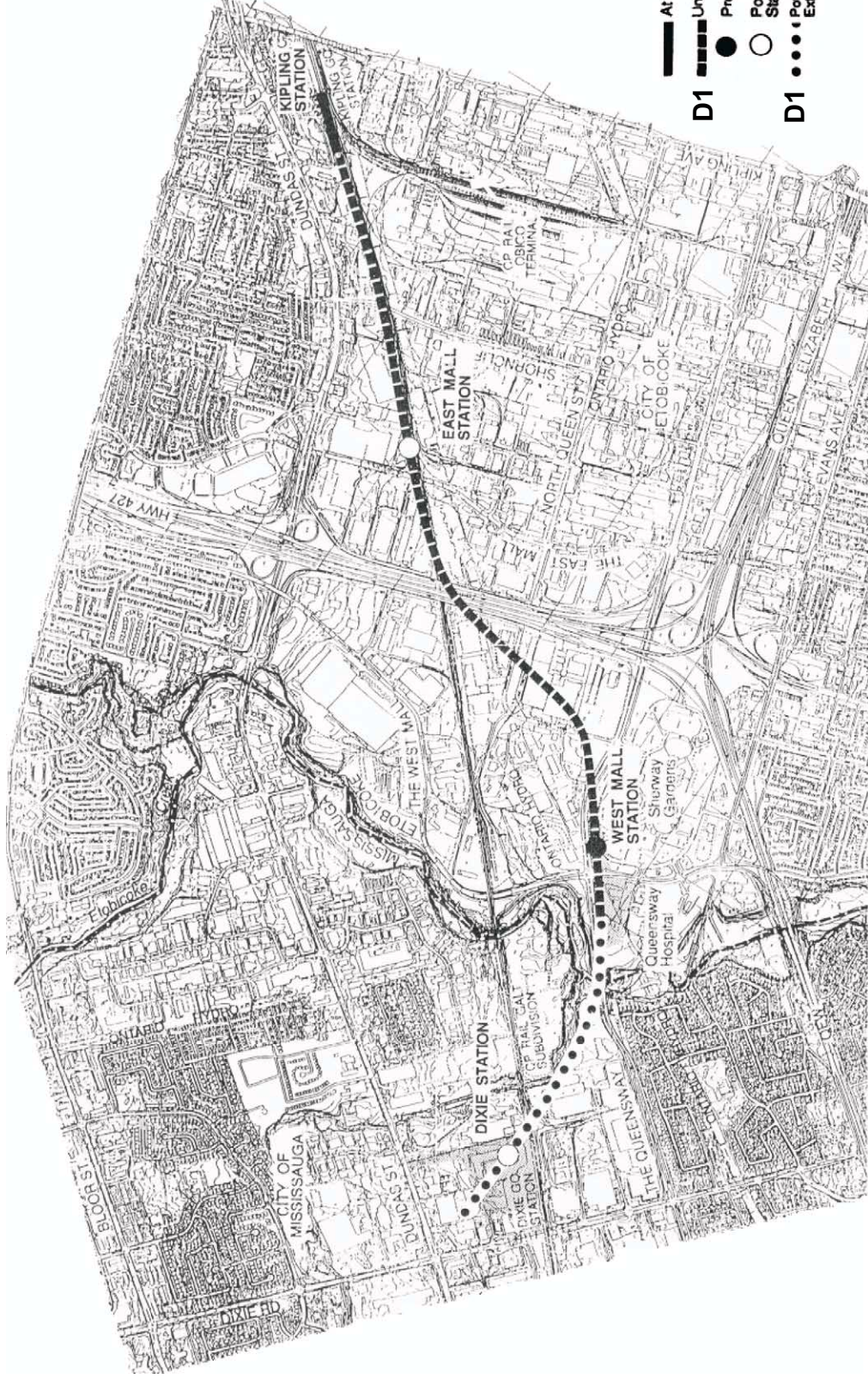
Option D3 – Option D3 (see Exhibit ES-15) would extend the Bloor-Danforth Subway line to the Mississauga City Centre including five new stations. For the following reasons, this option was screened from further consideration:



 <p>Rapid Transit Expansion Study (RTES)</p> 	<p>B1 - Scarborough RT Extension (McCowan - Sheppard)</p>	<p>Exhibit ES - 12</p>
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 <p>Rapid Transit Expansion Study (RTES)</p>  <p>Toronto Transit Commission</p>	<h2>C1 - Eglinton Subway (Allen - York City Centre)</h2>	<p>Exhibit ES - 13</p>
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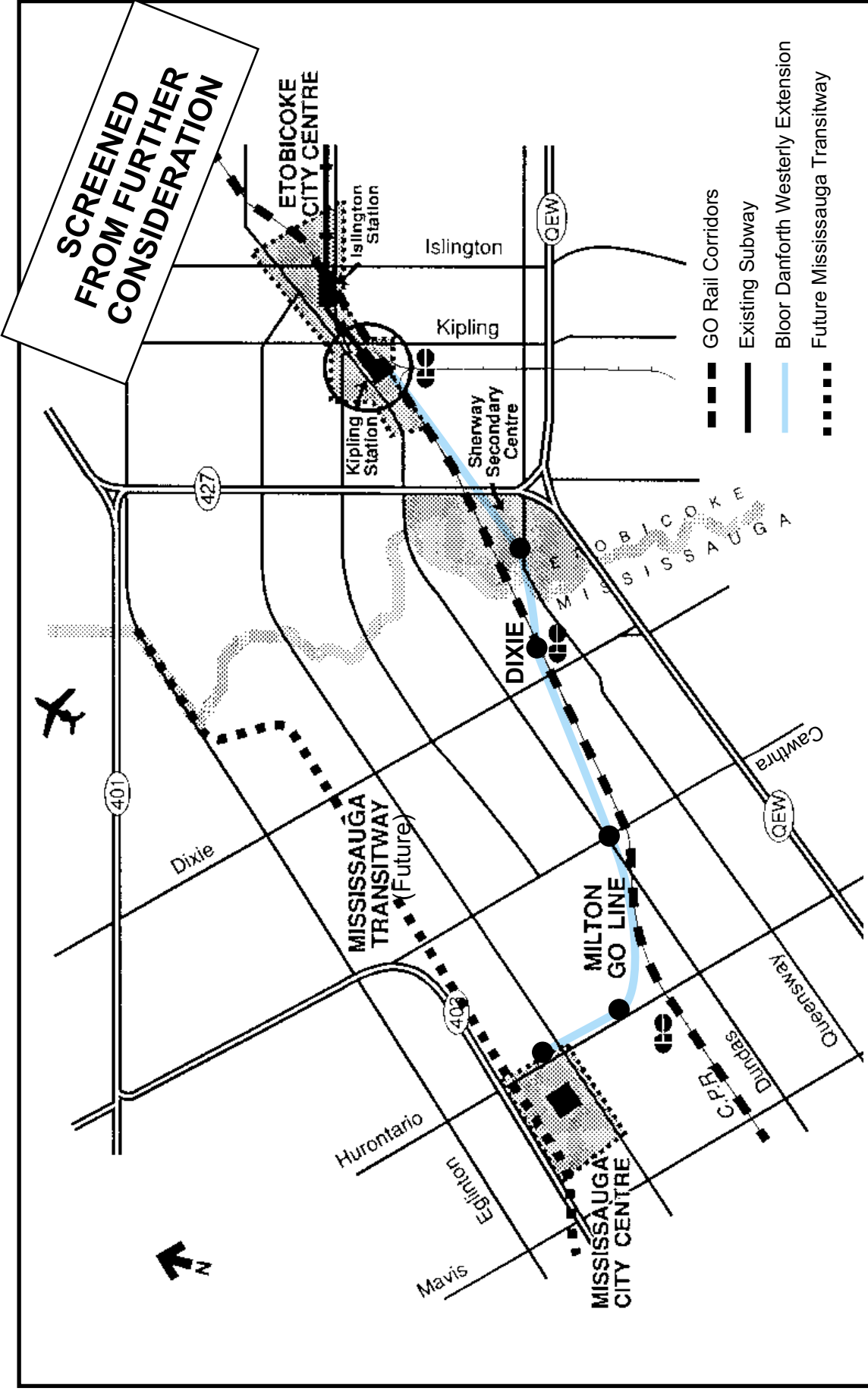


**Rapid Transit
Expansion Study
(RTES)**





**D1/D2 - Bloor Danforth Westerly
Extension (Kipling - Dixie)**

**Exhibit
ES - 14**



- GO Rail Corridors
- Existing Subway
- Bloor Danforth Westery Extension
- Future Mississauga Transitway

 <p>TORONTO</p>	<p>Exhibit ES - 15</p>
<p>Rapid Transit Expansion Study (RTES)</p>	<p>D3 - Bloor-Danforth Westery Extension (Kipling - Mississauga City Centre)</p>
 <p>Toronto Transit Commission</p>	<p>New Development/Kipling-Miss.cdr</p>

- The Region of Peel Official Plan does not support an extension of the Bloor-Danforth Subway line to the City Centre. Instead, the plan prioritizes the need for the Mississauga Transitway and in the longer term an extension of the Eglinton Subway line to meet the long term growth potential of the City Centre.
- The length and cost of such an extension precludes its consideration as a short to medium term staging option.

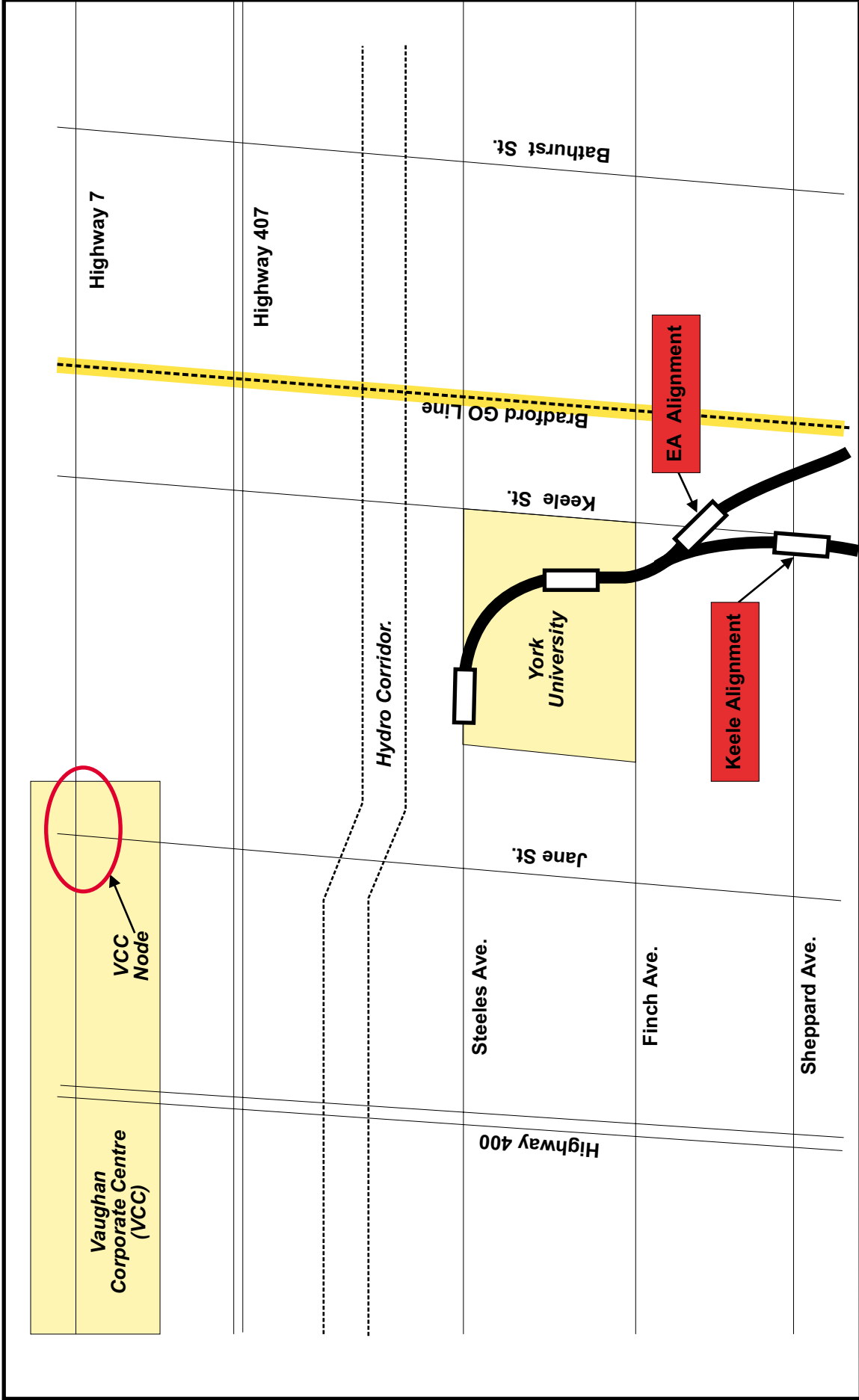
7.4.6 Spadina Subway Options (Options E1 and E2)



Option E1 – This option extends the Spadina Subway line in a radial fashion 6.0 kilometres from Downsview Station to Steeles Avenue (See Exhibit ES-16). This option provides York University with two stations, results in an inter-regional bus terminal for TTC, GO Transit and York Region on Steeles Avenue and permits 3,500 parking spaces to be constructed in the Hydro right-of-way north of Steeles Avenue.

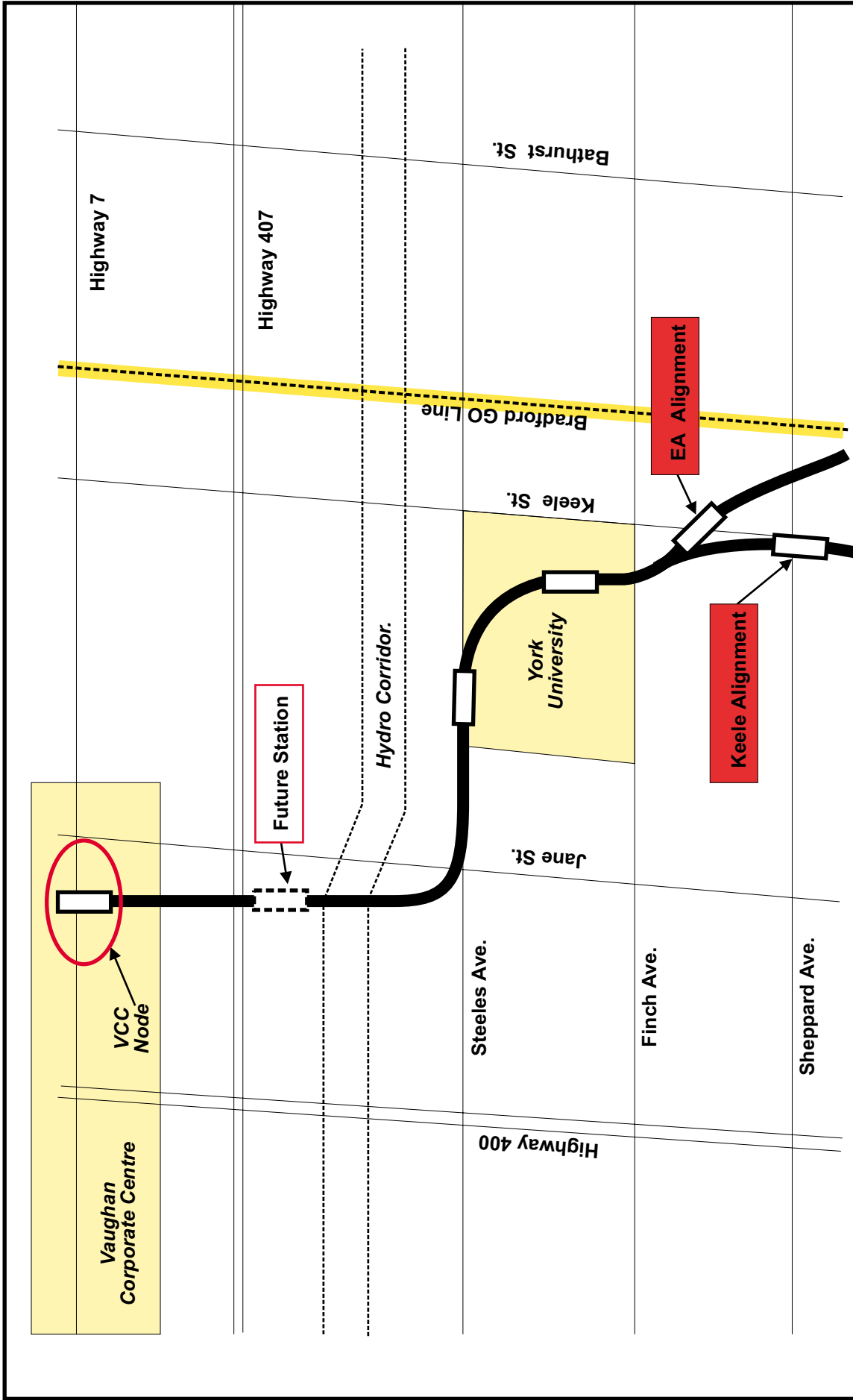
Option E2 – A further possible staging option for a northerly extension of the Spadina Subway line would involve extending the Spadina Subway line in a single stage to the Vaughan Corporate Centre (see Exhibit ES-17). This would involve an extension from Downsview Station of 8.6 kilometres and the implementation of one further station at Jane Street/Highway 7 in the Vaughan Corporate Centre. With this option, it has been assumed that a station at Highway 407 would be deferred pending the completion of the Highway 407 Transitway.



It should be noted that the City of Vaughan has initiated a Corridor Protection Study to identify a preferred alignment for a radial extension of the Spadina Subway line to the Vaughan Corporate Centre at Jane Street and Highway 7. The TTC has participated in this study and a wide range of alignment options have been investigated to protect for such an extension in the future. The Steeles Avenue alignment has emerged as the preferred option to connect to a north-south alignment, west of Jane Street, to the Vaughan Corporate Centre. As a result, Option E2 is consistent with the conclusion of the Vaughan Corridor Protection Study and is fully compatible with the City of Vaughan's long term objective for rapid transit to the Corporate Centre.

It should also be noted that a revised alignment between Downsview Station and Keele/Finch Station has been identified which would result in the GO/Finch Station being located at Sheppard Avenue and the shifting of the Keele/Finch Station approximately 200 metres to the south. This alignment can be implemented in either Option E1 or E2 and will be the subject of further analysis following the screening of the options to a short list.



 <p>Rapid Transit Expansion Study (RTES)</p>	 <p>TORONTO</p>	<p>E1 - Spadina Subway (Radial) Northernly Extension - (Downsview - Steeles)</p>	<p>Exhibit ES - 16</p>
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 <p>Rapid Transit Expansion Study (RTES)</p>	 <p>TORONTO</p>	<p>E2 - Spadina Subway (Radial) Northerly Extension - (Downsview - Vaughan Corporate Centre)</p>	<p>Exhibit ES - 17</p>
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7.4.7 Yonge Subway (Options F1 and F2)

Option F1 – This involves extending the Yonge Subway line 3.3 kilometres north to Clark Avenue with stations at Steeles Avenue and Clark Avenue (see Exhibit ES-18).

Option F2 – Option F2 (see Exhibit ES-19) would extend the Yonge Subway line in a single stage 6.7 kilometres to Highway 7/Highway 407/Langstaff with stations at Steeles Avenue, Clark Street and Highway 7/407.

7.4.8 Summary of Initial Screening Process

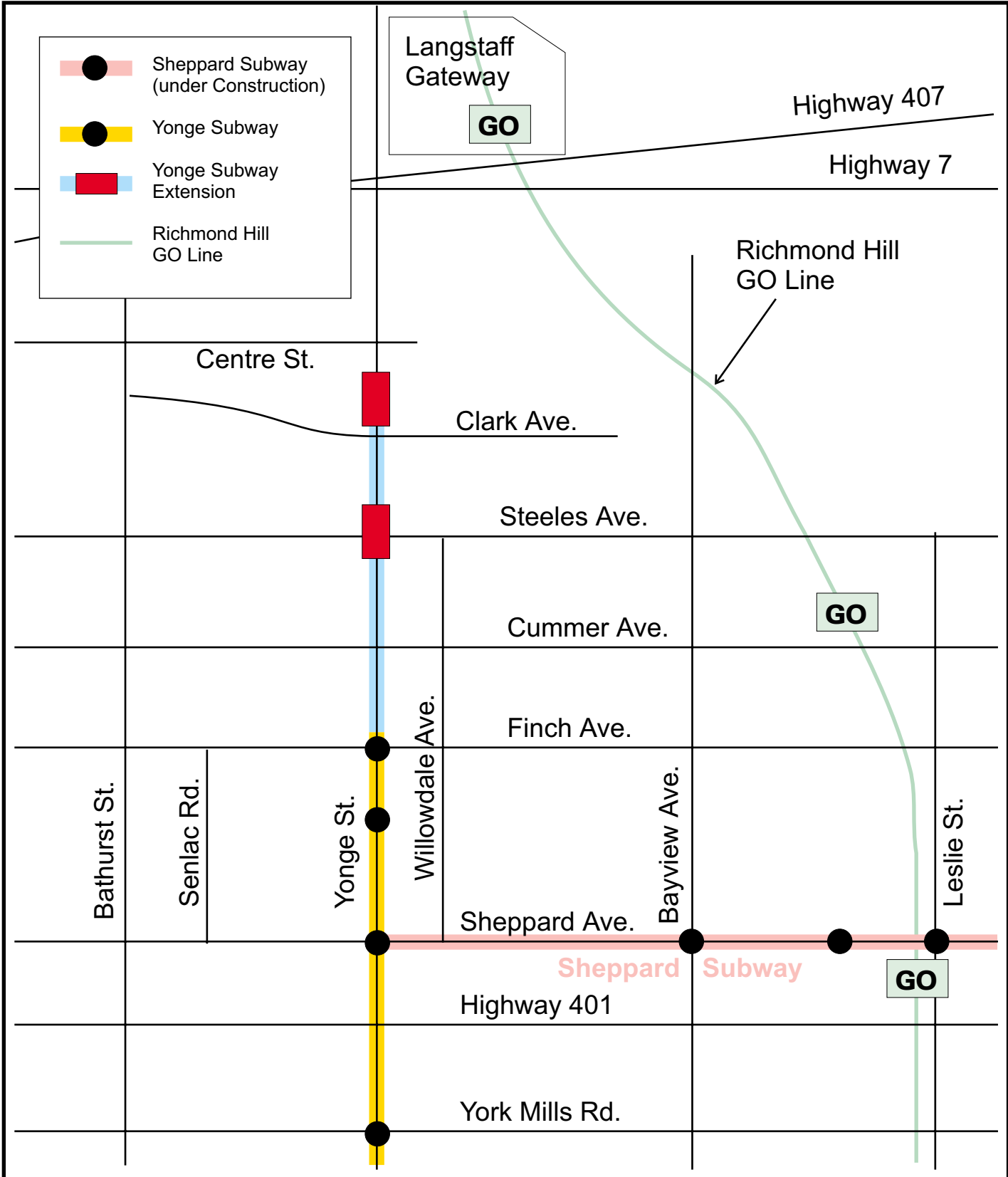
The initial review has screened the following options from further consideration (see also Exhibit ES-20):

Option	Project	Stage
A1	Sheppard Subway	Don Mills – Consumers Road
A6	Sheppard Subway	Yonge – Downsview
D3	Bloor-Danforth	Kipling – Mississauga City Centre

The screening out of these initiatives does not mean that rapid transit expansion to these areas will not be necessary in the long term. It simply means that their implementation cannot be justified in the short to medium term, is not practical as a stand alone incremental staging option, or does not have the necessary density in the foreseeable future to support an investment in rapid transit.

The projects outlined in Exhibit ES-21 were evaluated based on the following key criteria:

Criteria	Measure
Ridership	<ul style="list-style-type: none"> ▪ Peak point ridership ▪ Annual riders ▪ Annual new riders ▪ Daily boardings ▪ Boardings per kilometer
Population and Employment	<ul style="list-style-type: none"> ▪ Population and employment within 500 metres of station ▪ Population and employment within 2 kilometers ▪ Population/employment density
Capital Cost Effectiveness	<ul style="list-style-type: none"> ▪ Ratio of capital costs to new riders
Operating Cost Effectiveness	<ul style="list-style-type: none"> ▪ Ratio of operating costs to new riders
Network Connectivity	<ul style="list-style-type: none"> ▪ Connection to nodes, feeder buses, GO lines, inter-regional transit
Development Potential	<ul style="list-style-type: none"> ▪ Success factors for development
Official Plan Support	<ul style="list-style-type: none"> ▪ Compliance with Official Plan policies and growth areas
Staging Flexibility/Risk	<ul style="list-style-type: none"> ▪ Time to implement and risk that forecasts may not materialize
Inter-Regional Impacts	<ul style="list-style-type: none"> ▪ Ability to increase cross boundary ridership

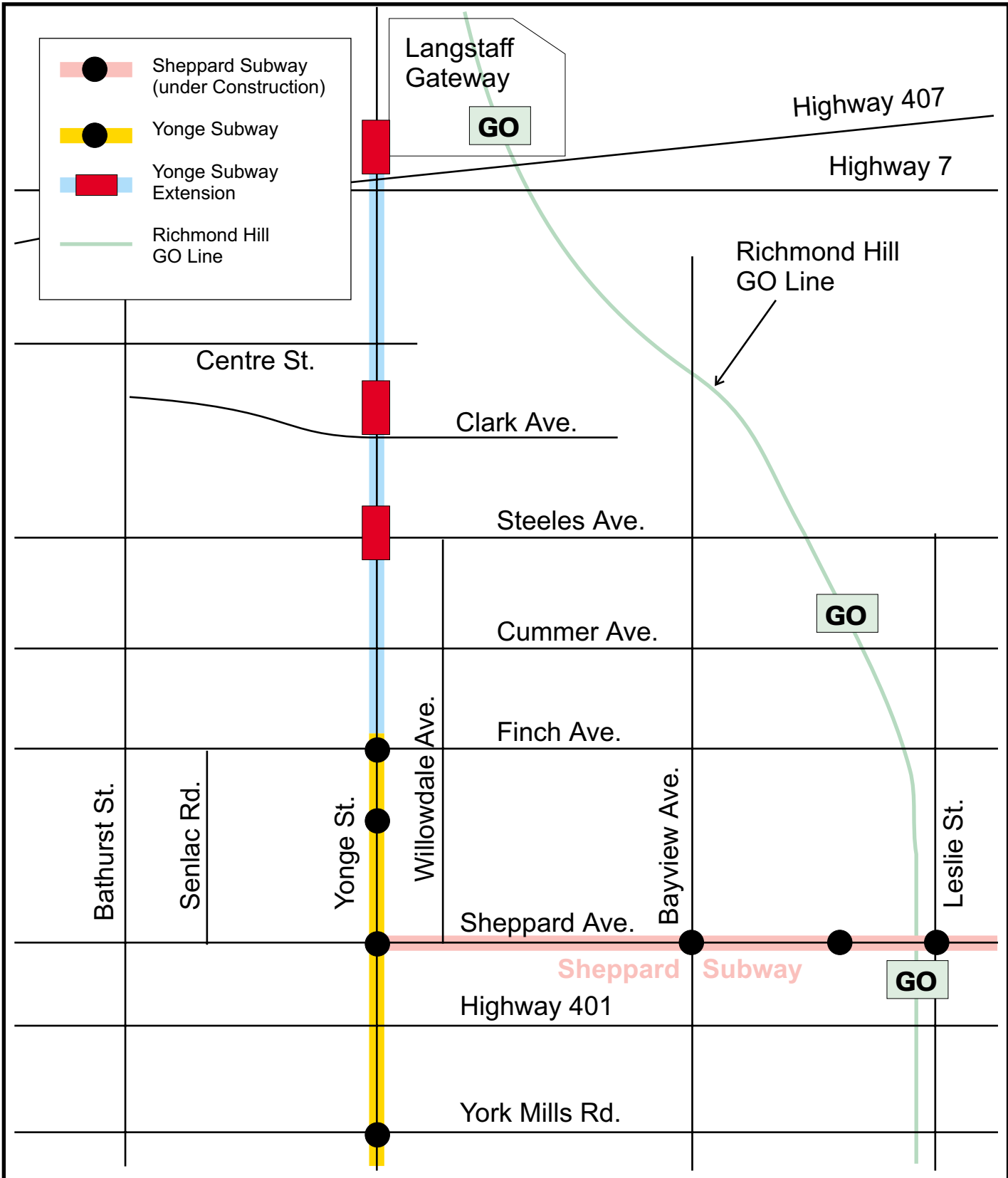


Rapid Transit
Expansion Study
(RTES)



F1 - Yonge Subway Northernly Extension (Finch - Clark Ave.)

Exhibit
ES - 18

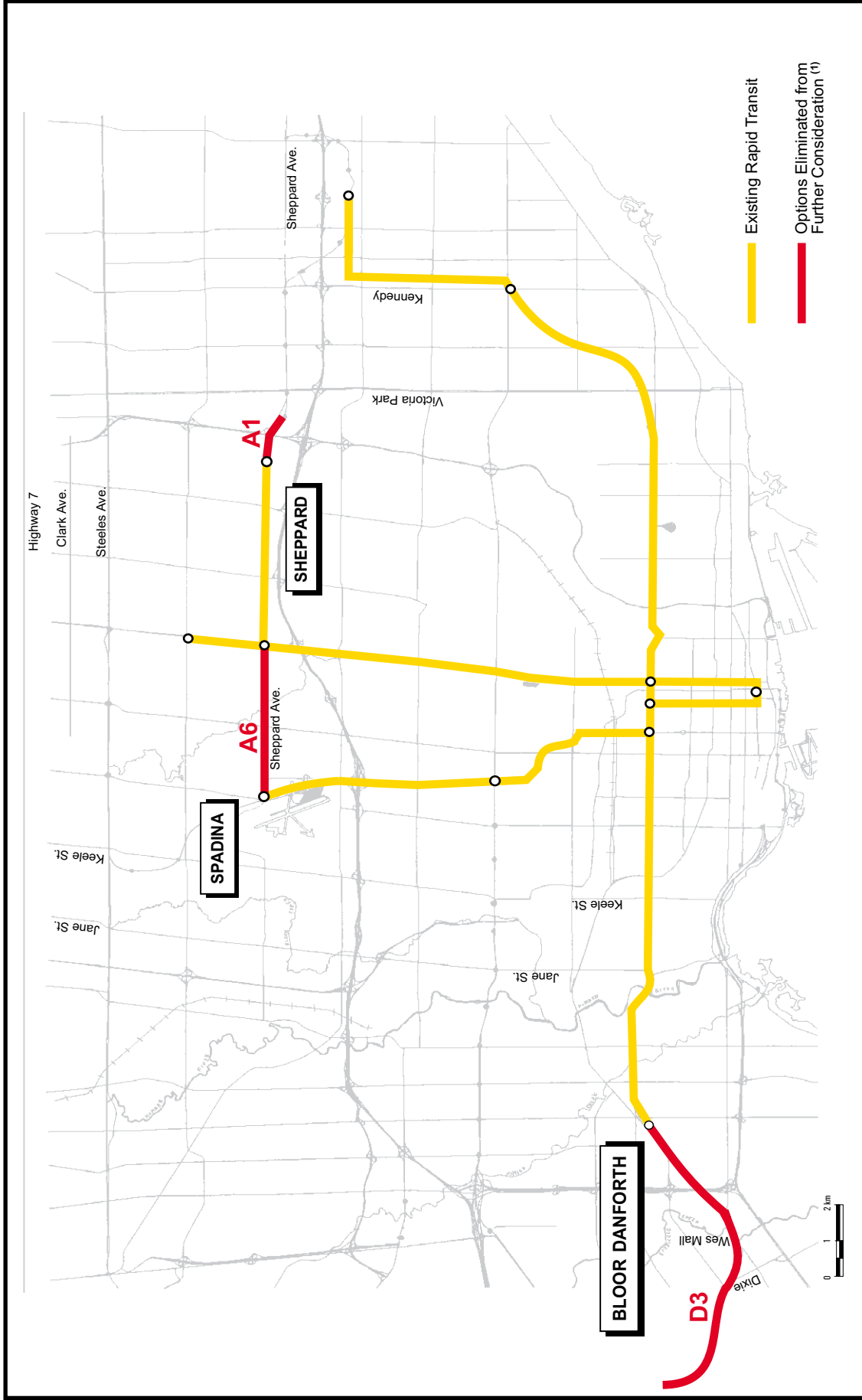



Rapid Transit
Expansion Study
(RTES)



**F2 - Yonge Subway (Radial)
Northerly Extension
(Finch - Langstaff)**

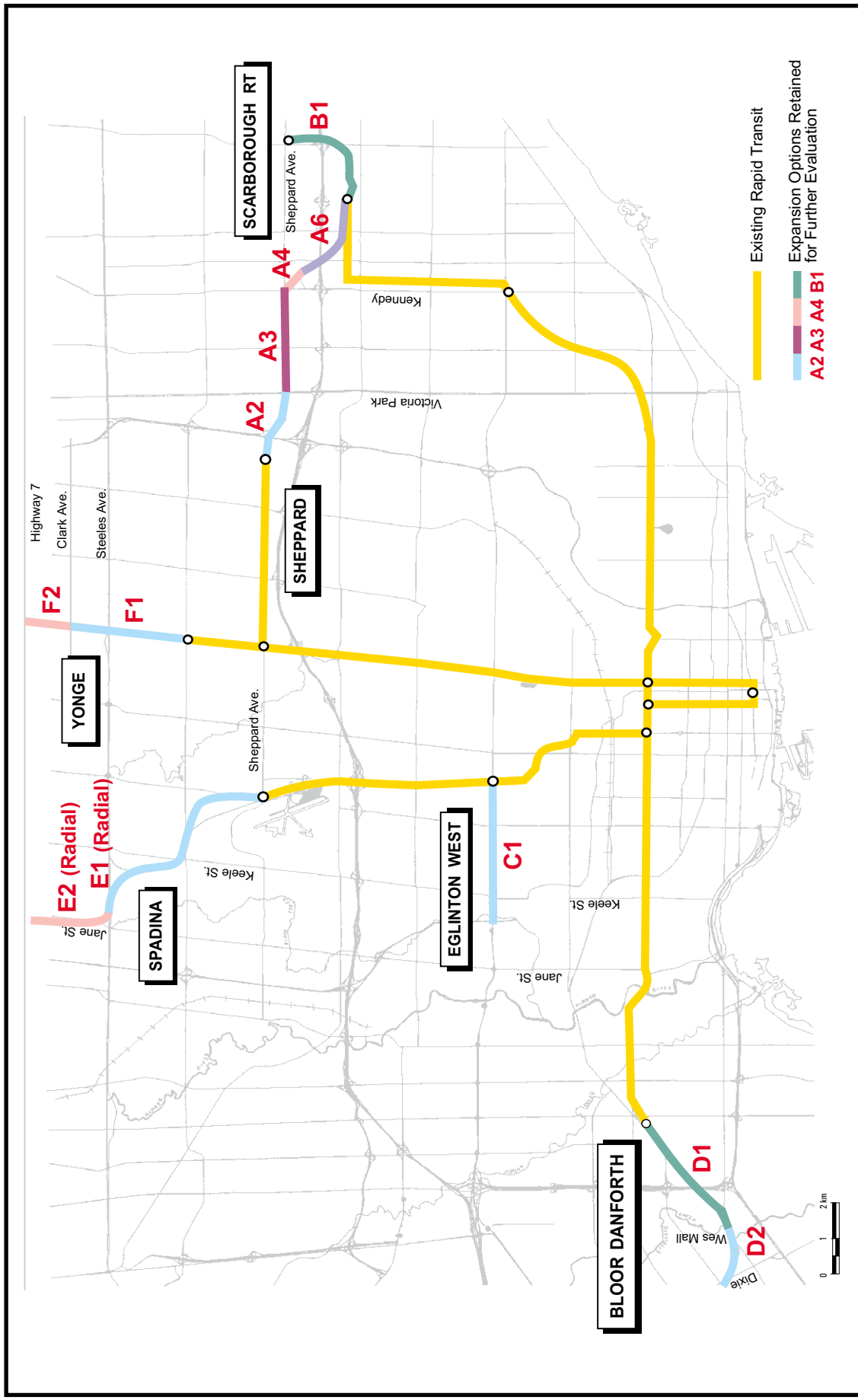
**Exhibit
ES - 19**



 <p>Rapid Transit Expansion Study (RTES)</p>	<p>Rapid Transit Options Eliminated from Further Consideration</p>	<p>Exhibit ES - 20</p>
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(1) LRT in GO Rail Corridors and Commuter Rail to Lester B Pearson Airport were not considered as options in this study.

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8. Detailed Evaluation of Rapid Transit Options

8.1 Introduction

In evaluating the rapid transit expansion options identified above, two approaches have been utilized reflecting the above key factors to successful station development. The first step was to compare the extension options in 2021 to the existing suburban sections of the subway and RT system in 2001. If new lines can approach or exceed in the future, the performance of the existing system today, then there is a high probability for operating success and vice versa. The second step was to evaluate the new rapid transit lines on a comparative basis to each other.

8.2 Comparison of Existing and New Rapid Transit Lines

When suburban sections of existing lines are compared to proposed extensions, it is clear that, based on modest city growth in population (to 2.7 million) very few corridors have the immediate potential to be successful. As shown in Exhibit ES-22, only the Sheppard Subway corridor has densities that are comparable to suburban sections of the existing network. This is due in large part to the large high density node of development in the Consumers Road Business Park and existing high density development at Birchmount Road and Kennedy Road.

Extensions of the Spadina, Yonge and Bloor-Danforth lines are less attractive in terms of existing and future densities whereas the Eglinton corridor and an extension of the Scarborough RT have modest existing and future densities.

When sections of existing and potential new lines are compared in terms of future density, daily usage, development within 500 metres of stations and development within 2 kilometres, a similar evaluation results. Easterly extensions of the Sheppard Subway consistently rank higher in many cases than existing lines while Bloor-Danforth extensions, the Spadina Subway extension to the Vaughan Corporate Centre and a Yonge Subway extension to Highway 7 rank among the lowest options. The other extension options (Eglinton, SRT, Spadina north to Steeles Avenue, Yonge Subway north to Clark Avenue) have modest densities and could be successful with redevelopment. Overall, only the Sheppard Subway and SRT extension options exceed the threshold of 100 workers/residents per hectare that is necessary for successful rapid transit.

8.3 Comparison of New Rapid Transit Options to Each Other

A description of the differences between the various options for key evaluation criteria is outlined below:

Exhibit ES-22
Characteristics of Subway End Sections
Existing Sections (2000) vs. Proposed Extensions (2021)

Segment	Length (km)	No. of St's	Pk Pt Vol (pphpd)	Daily Boardings	Boardings per km	Dev't within 500m			Dev't within 2 km			Comm Parking	Rank		Potential for Success			
						Pop	Emp	Density	Pop	Emp	Density		Ons/km	Dev't < 500m	Dev't < 2km	Yes	Maybe	No
Existing Lines (2000)																		
Yonge - York Mills to Finch	4.4	4	10,300	97,534	22,167	15,585	25,516	131	85,845	42,224	47	2,894	3	3	15			
Spadina - Yorkdale to Downsview	3.4	3	3,300	40,021	11,771	3,795	4,716	36	58,204	41,525	42	No	13	18	17			
Bloor-Danforth - Royal York to Kipling	2.7	3	8,100	59,031	21,863	8,339	8,639	72	50,548	32,613	40	1,282	4	12	18			
Scar-Danforth - Vic Park to Kennedy	5.0	3	8,500	56,741	11,348	18,066	3,386	91	133,135	32,331	57	2,610	14	8	10			
Scar RT - Midland to McCowan	1.8	3	2,500	29,266	16,259	1,101	19,554	88	47,455	43,030	49	No	5	9	13			
Proposed Extensions (2021)																		
A2 Sheppard to Victoria Park	2.1	2	5,100	49,716	23,674	10,839	14,477	189	75,097	33,694	75	250	2	1	8	X		
A3 Sheppard to Kennedy	4.9	4	7,200	73,948	15,091	16,951	17,168	120	144,720	66,974	84	1,050	6	4	6	X		
A4 Sheppard to CN/CP	5.5	5	7,200	73,948	13,445	17,574	20,153	112	199,700	92,837	106	1,450	8	6	3	X		
A5 Sheppard to Scarborough CC	8.0	6	8,400	102,840	12,855	39,498	37,615	187	275,090	114,615	117	1,450+	10	2	2	X		
B1 Scarborough RT	3.1	4	1,900	23,908	7,712	15,005	19,610	134	198,095	66,618	131	1,380	16	5	1	X		
C1 Eglinton West RT	4.8	4	4,100	45,448	9,468	20,027	9,820	95	174,574	46,085	95	400	15	7	4	X		
D1 Bloor Danforth to Sherway	3.8	1	700	7,144	1,880	69	4,885	63	22,658	36,030	49	800	18	14	13			X
D2 Bloor Danforth to Dixie	5.3	2	3,300	34,408	6,492	352	6,643	45	45,840	48,941	53	2,300	17	17	12			X
E1 Spadina Radial to Steeles	6.1	4	3,800	81,762	13,404	9,082	33,860	137	127,822	107,987	95	2,500	9	11	6	X		
E2 Spadina Radial to Vaughan CC	8.6	5	4,400	106,878	12,428	9,083	36,658	117	128,301	133,228	81	2,300	12	13	8			X
F1 Yonge to Clark	3.7	2	10,000	88,409	23,894	6,429	2,561	57	63,952	21,985	54	1,000	1	15	11	X		
F2 Yonge to Langstaff	7.2	3	11,900	104,924	14,573	9,388	3,156	53	97,144	27,735	46	1,000	7	16	16			X

NOTES:
Peak point volume, daily boardings from TTC Subway Counts
No. of commuter parking spaces from TTC Service Planning
Existing population and employment within 500m and 2 km based on City of Toronto block face data
Future population and employment based on 1993 OGTGA Forecasts, allocated to traffic zones by City of Toronto

(a) Boardings Per Kilometre

Two projects, namely the Sheppard Subway extension to Victoria Park and the Yonge Subway extension to Clark Avenue are superior to all options (see Exhibit ES-23) and even exceed the performance of the existing Yonge Subway line (York Mills - Finch). The remaining Sheppard and Yonge options as well as both Spadina options perform moderately well while the Scarborough RT, Eglinton and Bloor-Danforth options rank lowest in terms of boardings per kilometre.

(b) Population and Employment Density

As outlined in Exhibit ES-24, two Sheppard Subway options (to Victoria Park and to the Scarborough City Centre) dominate all other options and both of these options exceed both the density threshold and the existing performance of the Yonge line (York Mills – Finch).

Density within two kilometres is highest on the Scarborough RT extension followed by the Sheppard Subway (to CN/CP and to Scarborough City Centre) while the Yonge and Bloor-Danforth options are significantly below all other options (see Exhibit ES-25).

(c) Overall Cost Effectiveness

The Sheppard Subway extension from Don Mills to Victoria Park and all of the Spadina and Yonge Subway options have the lowest ratio of capital costs to new riders by a wide margin (see Exhibit ES-26). The Scarborough RT and the extension of the Sheppard Subway to Kennedy/CN/CP or the Scarborough City Centre are moderately successful when comparing capital costs and the ability to generate new riders. The Bloor-Danforth options are the least cost effective from a capital cost effectiveness perspective followed by the Eglinton Subway.

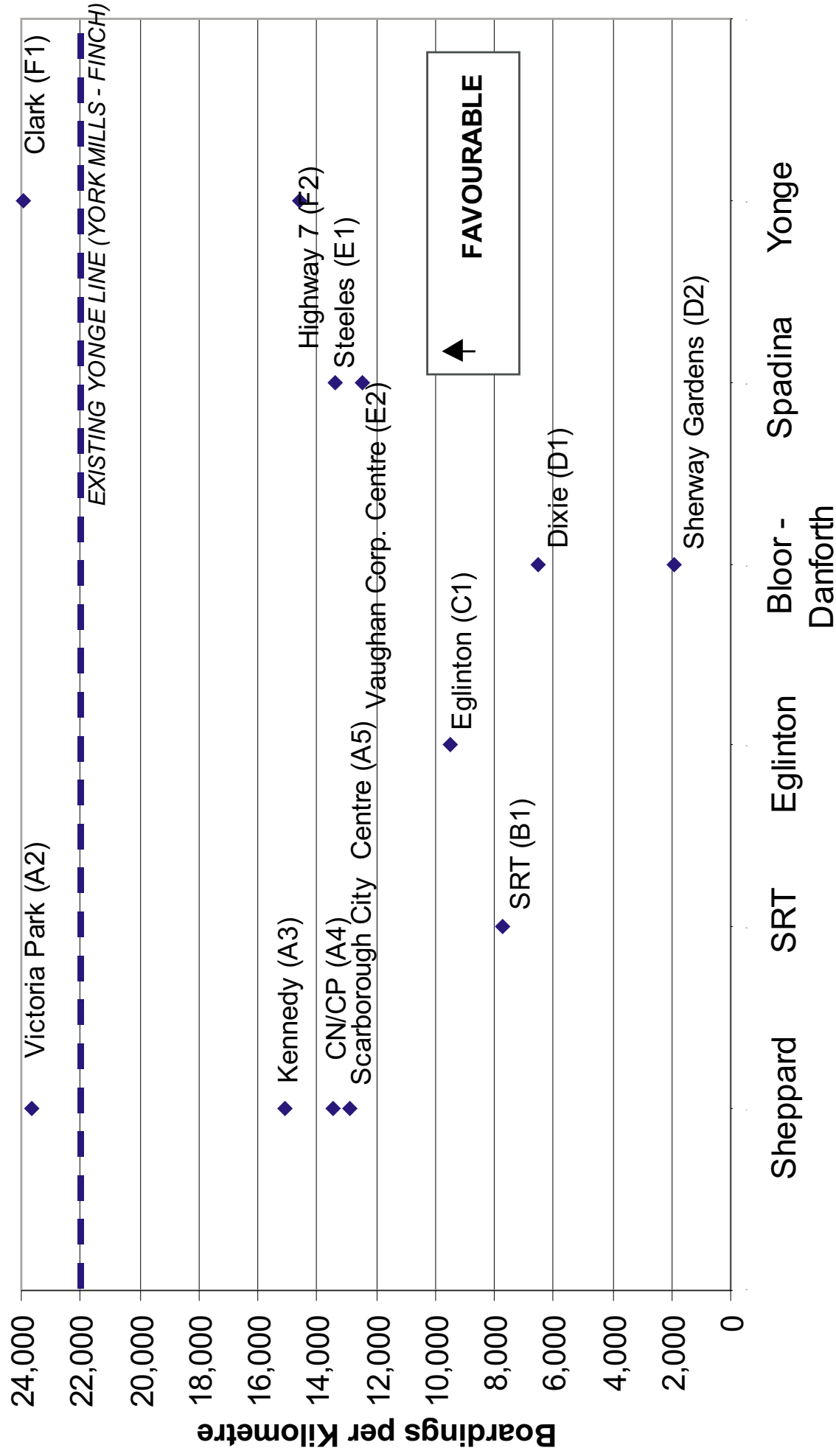
The ratio of operating costs to new riders is an indicator of the potential for a new line to recover its costs from the farebox (see Exhibit ES-27). The Sheppard Subway extension to Victoria Park Avenue is the highest ranked extension option based on this criteria followed closely by the Spadina Subway extensions options and the Yonge Subway extension to Clark Avenue.

The remaining Sheppard Subway options, SRT, Eglinton Subway and Yonge Subway extension to Highway 7 perform moderately well while the Bloor-Danforth extension options are the lowest ranked options based on operating cost effectiveness.

(d) Network Connectivity

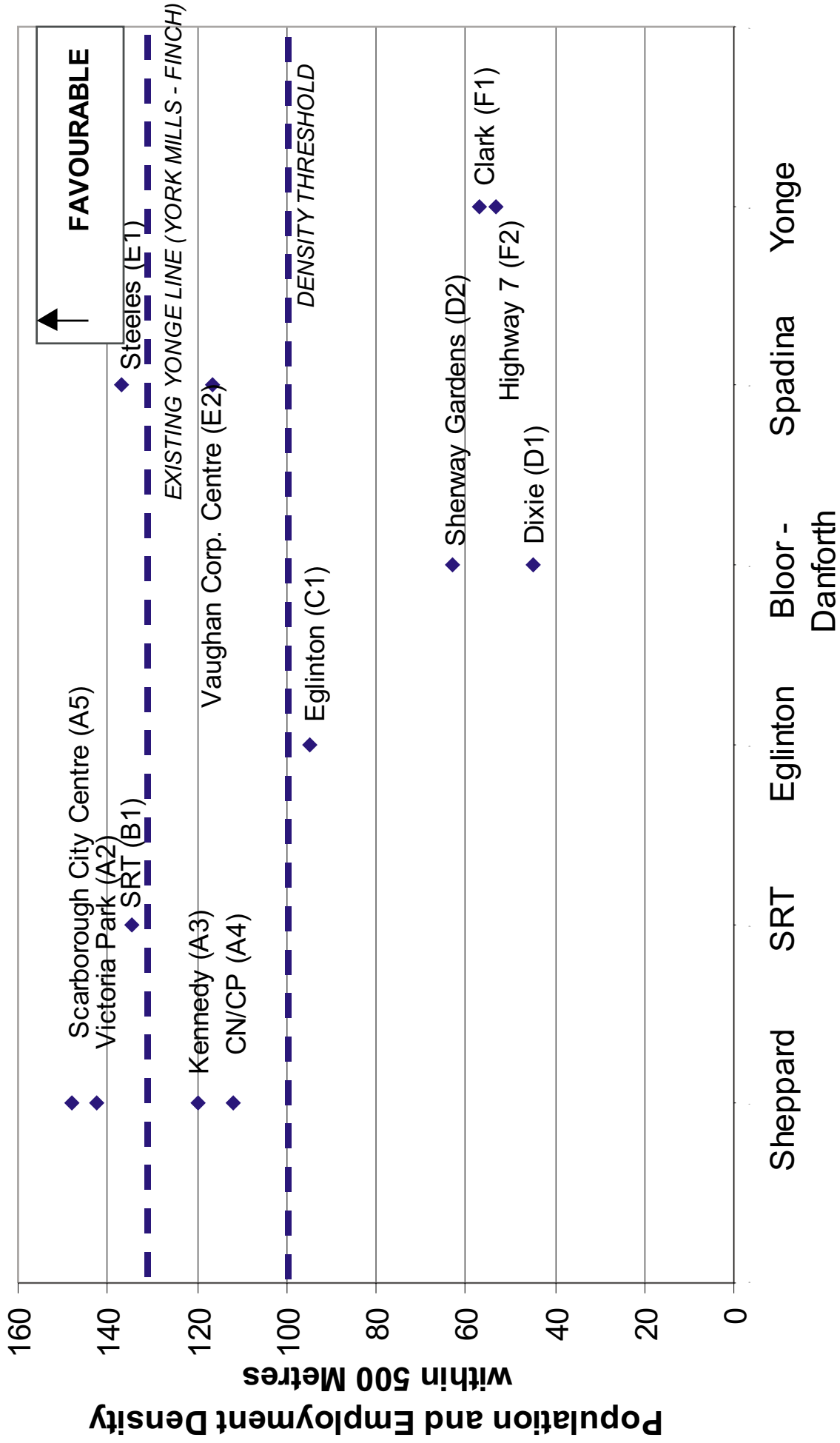
From a network connectivity and integration perspective, Sheppard Subway, Spadina Subway and Yonge Subway options are more highly rated (see Exhibit ES-28). The Sheppard Subway options have the ability to link the North City Centre, the Richmond Hill GO line,

Exhibit ES-23: Comparison of Boardings per Kilometre



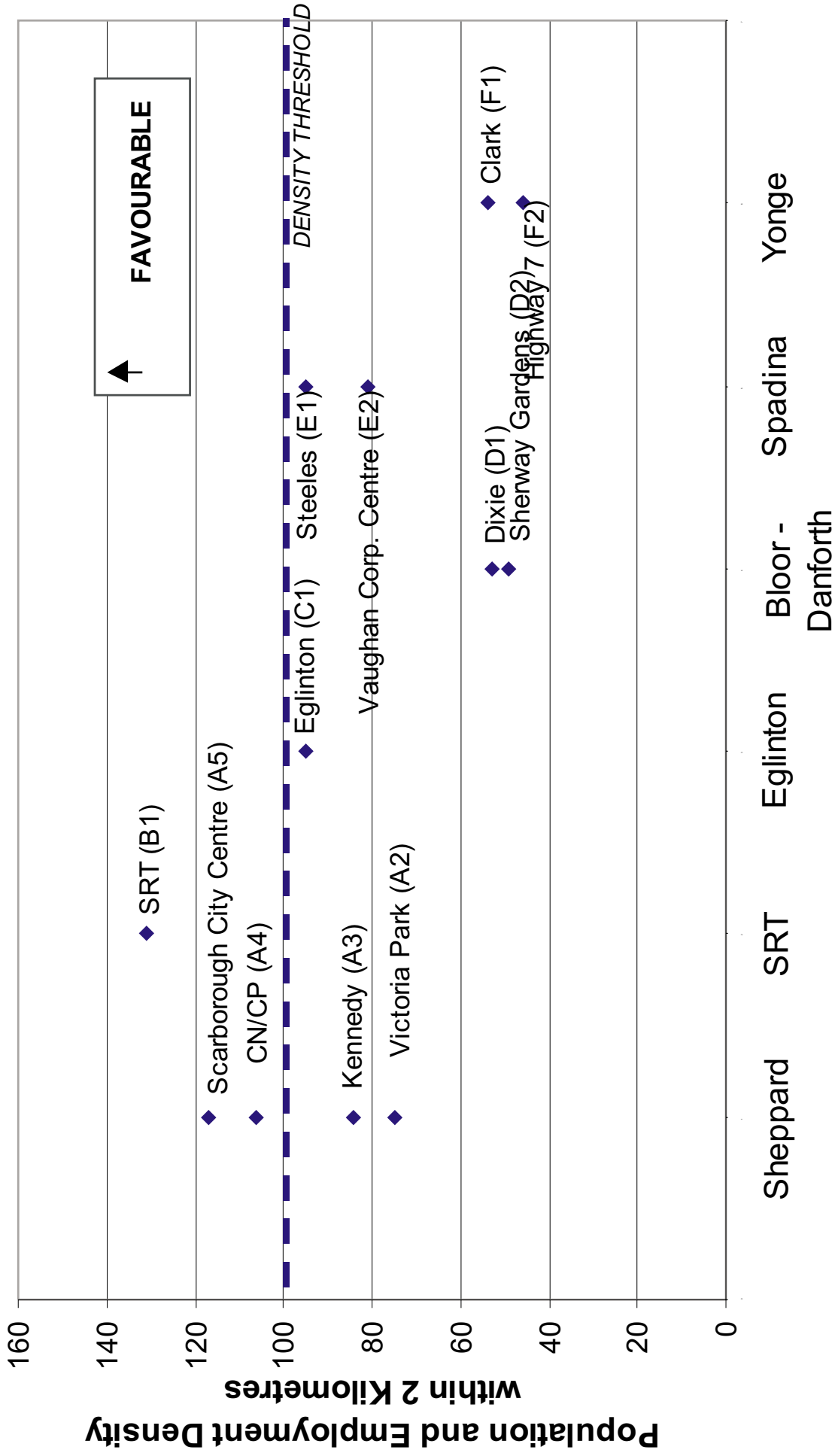
Sheppard SRT Eglinton Bloor - Danforth Spadina Yonge

Exhibit ES-24: Comparison of Density within 500 Metres



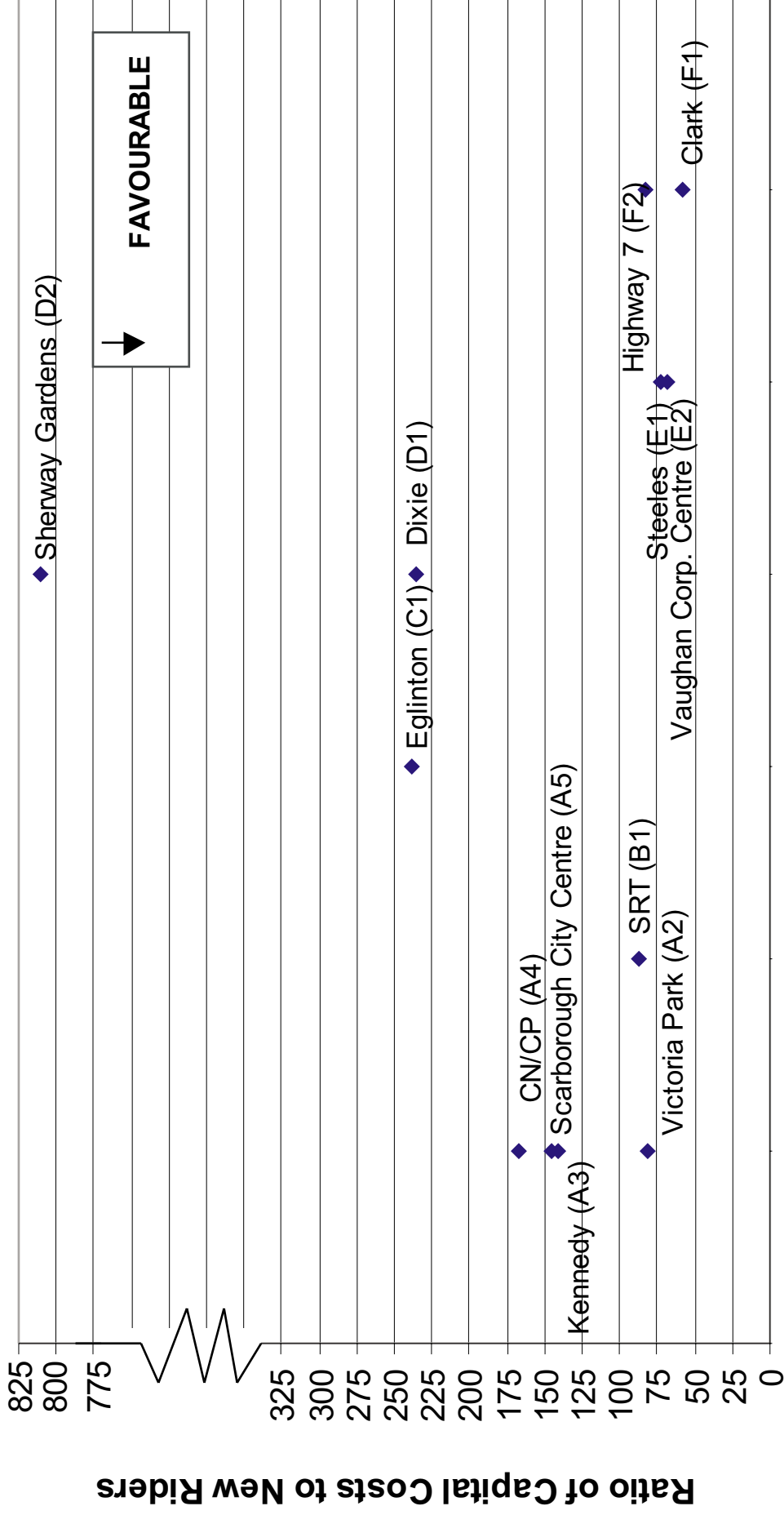
Sheppard SRT Eglinton Bloor - Danforth Spadina Yonge

Exhibit ES-25: Comparison of Density within 2 Kilometres



Sheppard SRT Eglinton Bloor - Danforth Spadina Yonge

Exhibit ES-26: Comparison of Capital Cost per New Rider Ratio



Sheppard SRT Eglinton Bloor - Danforth Spadina Yonge

Exhibit ES-27: Comparison of Operating Costs per New Rider Ratio

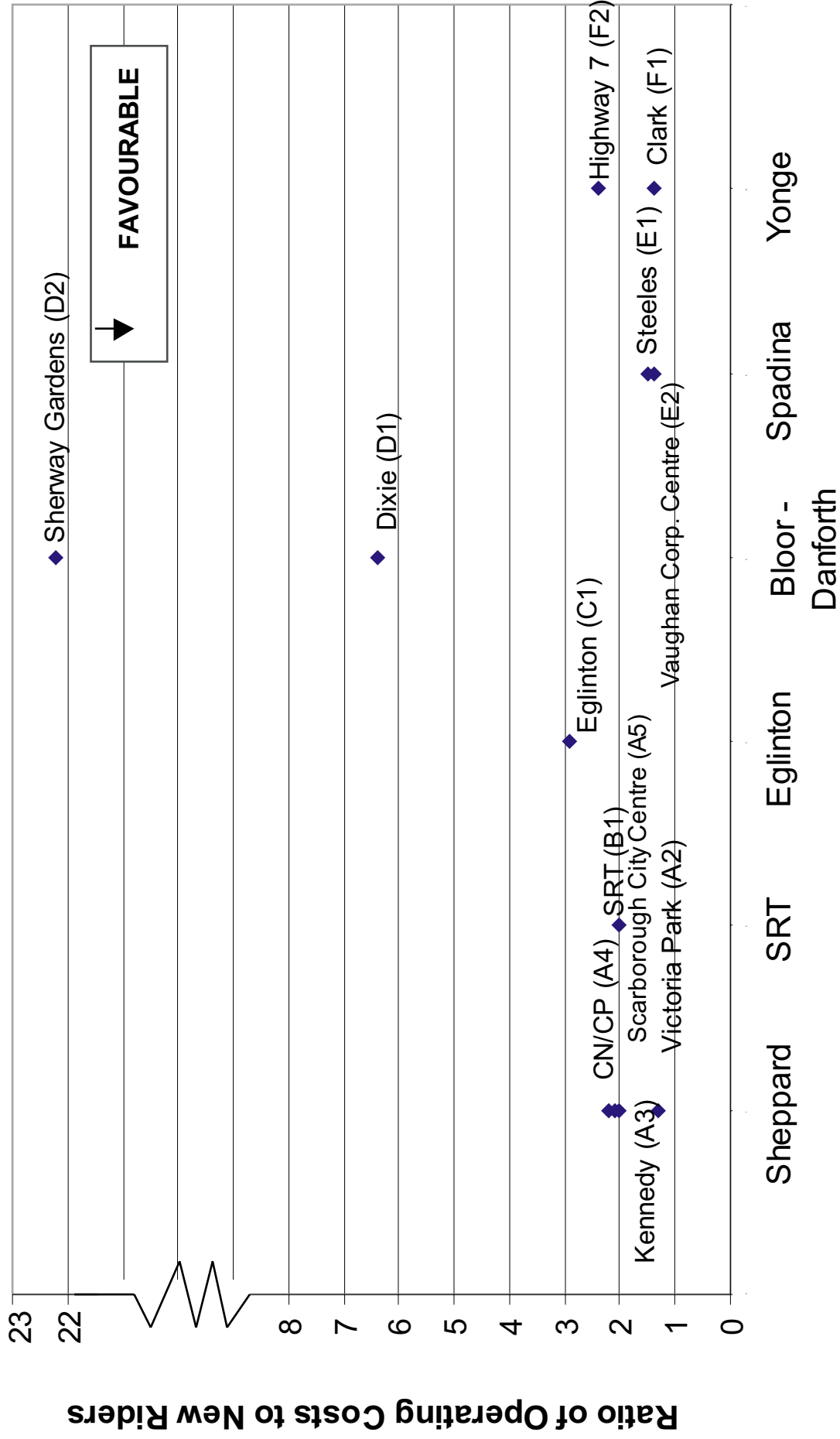


Exhibit ES-28
Comparison of Development Potential, Inter-Regional Benefits,
Flexibility / Risk and Network Connectivity

Rapid Transit Option	Network Connectivity	Flexibility/ Risk	Development Potential	Inter-Regional Benefits
Sheppard				
Victoria Park (A2)	◐	●	=	◐
Kennedy (A3)	◐	◐	◐	◐
CN/CP (A4)	●	◐	=	◐
Scarborough City Centre (A5)	●	◐	●	◐
SRT (B1)				
	○	●	=	◐
Eglinton (C1)				
	◐	○	;	◐
Bloor-Danforth				
Sherway Gardens (D2)	○	◐	=	○
Dixie (D1)	◐	◐	;	●
Spadina				
Steeles (E1)	◐	◐	=	●
Vaughan Corporate Centre (E2)	●	○	=	●
Yonge				
Clark (F1)	◐	◐	◐	●
Highway 7 (F2)	●	◐	=	●

Legend

- High Rating
- = High - Medium Rating
- ◐ Medium Rating
- ; Medium - Low Rating
- Low Rating

Highway 404, the Consumers Road Business Park, the Stouffville GO line, a future cross-town GO line, the Scarborough City Centre and the SRT into an integrated network.

Similarly, an extension of the Spadina Subway line to York University has the ability to link York University, the Bradford GO line, the Vaughan Corporate Centre, the future Highway 407 Transitway and improved Highway 7 transit service into an integrated network.

A Yonge Subway extension has the potential to link the North York City Centre, the future Highway 407 Transitway, the Richmond Hill GO line and regional bus service into an integrated transit network.

(e) Staging Flexibility/Risk

From a staging perspective (see Exhibit ES-28), there is increased risk of forecasts not materializing the longer it takes to implement a particular line. In this context, the options with the least risk from a staging perspective are the Sheppard Subway extension to Victoria Park, the Bloor-Danforth extension to Sherway Gardens and the SRT extension, all of which could be implemented within a 5 year time horizon. All of the remaining options take considerably longer to implement, have higher capital requirements and consume capital funding for longer periods of time.

(f) Development Potential

While future densities based on long term projections of City wide growth policies are an important criteria in evaluating future rapid transit options, past experience is that policy objectives alone are not sufficient to ensure that redevelopment occurs. As noted earlier, there are numerous examples of stations where little or no redevelopment has taken place 25 years after the opening of a station despite supportive land use policies.

The options with the highest potential (see Exhibit ES-28) for redevelopment based on the success factors observed at existing stations are the following options:

Sheppard Subway

- Don Mills to Victoria Park
- Don Mills to CN/CP
- Don Mills to Scarborough City Centre

SRT

- McCowan to Sheppard

Bloor-Danforth

- Kipling to Sherway

Yonge Subway

- Finch to Langstaff

Spadina Subway

- Downsview to Steeles (short term)
- Downsview to Vaughan Corporate Centre (long term)

The Bloor-Danforth extension to Dixie, the Yonge Subway extension to Clark Avenue and the Sheppard Subway extension to Kennedy have moderate appeal for redevelopment. The Eglinton Subway ranks the lowest in terms of redevelopment potential due to the fragmented land ownership pattern surrounding most stations, the slow pace of redevelopment in the York City Centre, and the fact that the current City of Toronto Official Plan does not recognize the York City Centre as a major growth node for the future.

(g) Inter-Regional Impacts

The project with the most significant inter-regional benefits are obviously those projects which extend into the 905 region (Spadina, Yonge and to a lesser extent the Bloor-Danforth extension). Due to the large potential for commuter parking at Steeles Avenue, the Spadina Subway extension to Steeles Avenue is particularly attractive despite the fact that the line ends at the City of Toronto/York Region boundary (see Exhibit ES-28).

Apart from connecting to the Stouffville GO line, the Sheppard Subway has only marginal benefits from an inter-regional perspective as does an extension of the SRT. While the Eglinton Subway line has long term inter-regional potential, the initial phase of the line has only moderate inter-regional potential.

8.4 Short Listed Projects

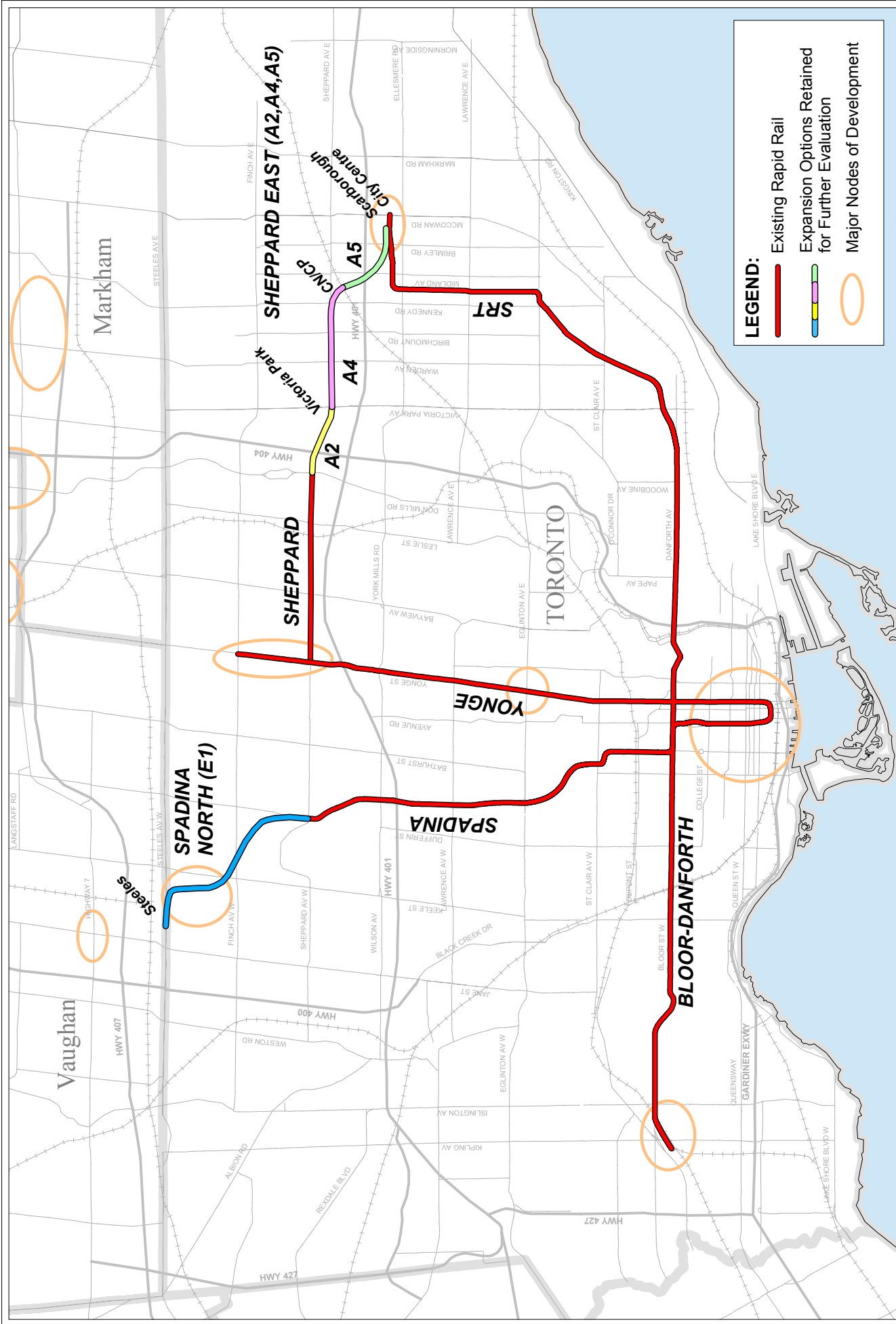
As outlined in Exhibit ES-29 and ES-30 and based on the key evaluation criteria, two projects, namely the Sheppard Subway and the Spadina Subway consistently rank higher than other options and have the highest potential for success. The potential staging options and station locations for these projects are as follows (see Exhibit ES-31):

Rapid Transit Option	Length (km)	Number of Stations	Capital Cost ¹ (\$2000)
<u>Spadina Subway</u> E1 Downsview to Steeles	6.1	4	\$975 M
<u>Sheppard Subway</u> A2 Don Mills to Victoria Park	2.1	2	\$420 M
A4 Don Mills to CN/CP	5.5	5	\$1,050 M
A5 Don Mills to Scarborough City Centre	8.0	7	\$1,535 M

¹ Excluding property, yard and escalation costs.

EXHIBIT ES-29 - FINAL SCREENING OF EXPANSION OPTIONS

Rapid Transit Option	Daily Boardings	Boardings per Km	Development		Density		Cost Effectiveness		Network Connectivity	Development Potential	Short Listed Project
			Within 500 m	Within 2 kms	Within 500 m	Within 2 kms	Capital	Operating			
Sheppard Subway A2 - Victoria Park A3 - Kennedy A4 - CN/CP A5 - Scarborough City Centre	Medium High High High	High Medium Medium Medium	High High High High	Medium High High High	Superior High High Superior	Medium Medium High High	Superior High High High	Medium Medium High High	High Medium High High	Yes No Yes Yes	
B1 - Scarborough RT	Low	Low	High	High	High	High	High	Low	Medium	No	
C1 - Eglinton Subway	Medium	Low	High	High	High	Medium	High	Low	Low	No	
Bloor-Danforth D1 - Sherway D2 - Dixie	Low Low	Low Low	Low Low	Low Medium	Medium Medium	Low Low	Poor Low	Low Low	High Medium	No No	
Spadina Subway E1 - Radial to Steeles E2 - Radial to VCC	High High	Medium Medium	Medium Medium	High High	Medium Medium	Medium Medium	Superior Superior	High High	High High	Yes No	
Yonge Subway F1 - Clark F2 - Highway 7	High High	High Medium	Low Low	Medium Medium	Medium Medium	Medium Medium	Superior High	Low High	Medium High	No No	



While the Yonge Subway options rank higher than most options, a northerly extension of the Yonge Subway line has the potential to overload the Yonge line. From an operational perspective, it would be more prudent to better balance ridership on the Yonge and Spadina Subway lines by first extending the Spadina Subway north of the current Yonge Subway terminus at Finch Avenue. By extending the Spadina Subway first, approximately 2,000-2,500 AM peak period (6-9 a.m.) riders on the Yonge Subway can be off loaded to the Spadina Subway line thereby providing significant relief to the Yonge line in the medium term.

9. Short Term Operational Improvements

With the recommendation that the Spadina and Sheppard Subway lines be considered for implementation in the next 10-15 years, there is an opportunity to enhance the prospects for rapid transit in other corridors in the short term. Based on existing bus volumes, two corridors should be considered for priority attention for interim improvements including transit priority measures. The two corridors recommended for priority attention are the:

- Yonge Subway corridor from Finch Avenue to Highway 7, and
- Bloor-Danforth Subway corridor from Kipling to Sherway Gardens.

10. Next Steps

Based on the results and conclusions of this phase of the work, there are a number of steps necessary to further evaluate rapid transit expansion options as follows:

- In conjunction with City staff, undertake detailed forecasts of ridership for the options based on the recently completed City forecasts of population and employment for a 3.1 million population scenario.
- Undertake alignment and station analysis to reach conclusions concerning the feasibility and desirability of the Keele Street alignment (Spadina Subway) and the Consumers Road alignment (Sheppard Subway).
- Undertake a detailed study of future downtown development scenarios and the resulting long-term GO and rapid transit capacity needs into the core area.
- Prepare a detailed business case analysis for each of the preferred options based on an assessment of vehicle, yard and property requirements, operating cost and forecast revenues.

Following the completion of the above analyses, a specific recommendation can be made concerning the highest priority project that should be implemented from the TTC's perspective.

In addition, staff will:

- Work with City staff to ensure property protection and land use support for the proposed station locations and alignment requirements of the preferred options.
- Identify opportunities to implement surface transit priority strategies and Bus Rapid Transit (BRT) services in potential future rapid transit corridors as a precursor to future rapid transit services. These corridors to include Yonge Street north of Finch Avenue, Downsview Station to York University and Vaughan, the Bloor Street Corridor west of Kipling Station, and Eglinton Avenue west of Eglinton West Station.