Toronto Transit: BACK ON TRACK

Sheppard Subway Development and Financing Study

Interim Report

Toronto Transit Infrastructure Limited

Design:

Design Services, Information Production
City Clerk's Office
City of Toronto

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Your Worship
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January 27, 2012

Dear Mayor Ford,

You directed that TTIL [formerly TTCL] be revived for the specific purpose of preparing a business case analysis for a potential P3 procurement of the Sheppard Subway extension. I am pleased to submit our interim report — ***Public Transit: Back on Track***.

In this initial phase, we were mandated to examine the feasibility of the Sheppard Subway extension and more generally, to examine the feasibility of a future integrated transit network utilizing subway [heavy rail] technology wherever possible for Toronto and the Greater Toronto Area [GTA].

While contemporary families are diverse in socio-economic terms, we are all confronted by a common problem — congestion on our roads and the lack of an integrated, fast, reliable and safe transit network. This transit deficit has the most profound impact on our underserved [in some cases, unserved] priority neighbourhoods in which the residents are totally dependent on public transit — "transit-captives" would be a good descriptor! Many reside in social housing without access to an automobile or are members of the cohort known as the "working poor" with limited access to a car.

This phenomenon has plagued us, been discussed and examined countless times by countless recognized authorities *ad nauseam*. The frequently repeated phrase "integrated transit network" is in danger of becoming nothing more than a cliché if substantive and sustained action is not taken soon.

The growing transit deficit has, not unexpectedly, evoked anger, frustration and cynicism from residents as to the sincerity of our political leaders. Many could be forgiven for thinking that politicians are really only interested in their near-term electoral prospects and their legacies when they see them grasp at quick fixes which are often second-class rather than first-class plans.

Public Transit: Back on Track reflects discussions [both formal and informal] that took place over the last several months with planners, engineers, lawyers, financiers and experienced, open-minded transit operators. The historical development and socio-economic context of subways was also reviewed. The focus was kept on the impact of our transit deficit on contemporary families and employers. In other words, we reviewed past decisions, planning documents, and technical specifications and impact analysis for the Sheppard Subway before arriving at conclusions and recommendations. The health and well-being of the residents of Toronto and the GTA was/is paramount in our consideration of this pressing issue.

Public Transit: Back on Track is focused on the P3 procurement potential of subways and is mindful of municipal structural deficits and fiscal limitations. It calls for a bold transformation of our transit system, how it is governed, managed, funded, and partners with senior levels of government. It embodies a sustainable use of urban space together with innovative subway funding and financing approaches.

After the last 9 months of work is tabulated, there is only one inescapable conclusion:

The subway option is the most cost-effective and environmentally friendly technology for the Sheppard corridor. It is the only technology that will deliver real and measurable benefits for the residents and commuters of Toronto, and improve regional competitiveness. It is the only technology that will get Torontonians out of their cars and on to public transit.

Additionally, securing financing from the private sector is both feasible and desirable for the City. History illustrates inaction has a cost. Delays in construction simply transfer the burden of fixing our transit system onto the next generation; the cost of this burden escalates over time and is significantly greater the more we delay construction than employing innovative revenue and financing tools.

Social equity demands we provide the most vulnerable groups within our society and the underserved priority neighbourhoods with the same level of transit as found elsewhere in the City. It requires we provide reliable, convenient and rapid access to our cultural and sporting venues such as the ROM, AGO, Massey Hall, Rogers Centre and the Air Canada Centre. It requires us to search and employ the very best solutions that are on offer.

The Sheppard Subway remains an approved transit project for the City of Toronto. It was first included in the Official Plan in 1980, as part of the Major Centres policy. Thirty years of planning studies and detailed technical and functional specifications exist.

It's time to get public transit back on track.

Before concluding, I must express my deepest gratitude to Dr. Jo Kennelly who tirelessly went through TTC and Council minutes, examined international best practices, worked with Metrolinx and KPMG to ensure accuracy of data with respect to growth, development and cost calculations and met with countless transit experts and innovators who were eager to offer their expertise and experience to benefit the City the Toronto. The City of Toronto Finance and Planning staff and KPMG consultants must be thanked for working diligently and often overtime to support the development growth and capital financing analysis and options. Metrolinx staff and consultants were also of enormous assistance, as was staff from the federal agency PPP Canada. Two volunteers who care deeply for the city, Doug Turner and Steve Fry, provided many hours of valuable input. A City of Toronto engineer [working on weekends], who also lives in the eastern part of Scarborough, provided a well thought out alternative plan which should be given due consideration in the future.

We have delivered on our mandate within the timeframe and limited resources provided. We believe that our Interim Report – ***Public Transit: Back on Track*** – provides the sufficient rationale for the City to move forward with the Sheppard Subway extension. We have demonstrated that this can occur quickly and have articulated a clear work plan for action.

Recommendation

TTIL is recommending Council: 1) re-confirm completion of the Sheppard subway linking Downsview to Scarborough Centre; 2) commit to a two-phased approach for construction and completion of the Sheppard subway; and 3) approve TTIL proceeding with the second phase of the project, including establishing robust corporate governance and management structure for TTIL, updating design and environmental assessment work and examining in further detail delivery model and procurement options.

On behalf of TTIL [Co-chair Councillor Norm Kelly and Director Councillor Doug Ford].

Respectfully,

Gordon J. Chong
Co-chair & CEO

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Section 1.

INTRODUCTION & KEY FINDINGS

Section 1 introduces the traffic congestion and population growth problems facing Toronto. It outlines the opportunity the Sheppard Subway extension project presents for the City to adopt a cost-effective, financially viable, and socially responsible approach to fixing Toronto's transit deficit.

Comparisons between subway and LRT technology alternatives for the Sheppard corridor - previously examined in considerable detail and approved by Council - is introduced. This discussion is followed by key findings, recommendations for next steps, and the report outline.

••• 1.1. Problem: Subsidy Driven Transit Business Model •••

Toronto is at a critical juncture. The population of the GTA is forecast to double over the next 50 years. Traffic congestion is taking a physical and psychological toll on citizens and the economic health of the City. Congestion has been identified as the number one threat to Toronto's global competitiveness. Commuter traffic both in and out of the City is growing. Toronto ranks 19 out of 23 metros in terms of transit performance. Toronto spends less per capita on public transit than Calgary, Montreal, London, New York and Berlin (Board of Trade, 2011). In 2010, it took transit users about 20 minutes longer than cars, to get to work (Turcotte, 2011). Toronto lacks a comprehensive and cost-effective networked approach to rapid transit construction that offers real choice, convenience, minimizes social and environmental impacts and facilitates regional interactions and economic growth. An obvious and growing transit deficit exists.

Transit expansion and land use planning in the City of Toronto is distributed across City and provincial organizations. Transit expansion is at the mercy of the City of Toronto's current revenue streams, budgeting processes, and debt rules. The City has limited access to secure revenue streams available to other world class cities. Subway expansion is competing with ageing public facilities, decades of underinvestment in basic services, and growing labour contracts. Debt servicing costs (including principal and interest) is limited to 15% of property tax revenues in any given year. This policy protects the City's strong credit rating, but it also transfers the burden of necessary infrastructure projects onto the another generation's plate; a burden that for subways has increased over time, as construction, raw materials and labour costs have increased at a faster rate than building and borrowing costs.

The TTC is reliant on City, provincial and federal government subsidies for both operating and construction costs. It has, over time, moved away from the capital financing plan of the first subway build of the 1950s; whereby TTC and Metro Toronto took responsibility for funding new subway infrastructure from transit and other revenues, relying on the senior levels of government (i.e. a loan from the Province)for minimal assistance. Transportation plans and infrastructure monies available to the City from senior levels of government change every time there is a provincial or federal election, with a pattern of *review-delay-change in priorities-change in branding of plans-and stops put on past commitments* - repeated over and over again.

••• 1.2. Decision to be Taken •••

The City is faced with choosing between two significantly different approaches towards expanding rapid transit to solve Toronto's transit deficit.

> *The first is no further expansion of the subway network and expansion of the streetcar/ LRT network into the suburbs, and the second is expansion of the subway[2] network into the suburbs; as was approved by Metro Council in 1975.*

TTIL has illustrated that other global cities have been able to construct an impressive subway network at a fraction of the per kilometre construction price as compared to the TTC (e.g. Madrid, Vancouver), and/or invest in subway construction and make a return on that investment (e.g. Hong Kong).

[1] Other financing structures were introduced after this period, including cost sharing with Province.

TTIL has also demonstrated that:

- Higher order transit supports growth and increased revenues for municipalities;
- Numerous options exist to fund and finance the completion of the Sheppard Subway and further expand Toronto's subway network to other priority neighbourhoods; and
- Over the long run subways compared to street level LRTs have the potential to deliver **significant value for money** for Toronto, as well as achieve significant system and transportation efficiency, environmental, economic growth and cost benefits.

TTIL is strongly of the view that the City of Toronto **should not** purchase infrastructure vital to the long term competitiveness of the City because it is "on sale." Lower initial capital costs of street level LRTs and the value of this for the City, for example, is eroded over the long-term with higher operating, labour, maintenance, and replacement costs. Although initial capital costs are higher, the subway solution offers the best value for money transit solution for the suburbs, including:

- Greater carrying capacity along transit corridors;
- Greater platform capacity at stations;
- Greater ability to move people out of cars into transit because of the quality of the service;
- Faster commute times and improved inter-regional/rapid transit transfers;
- Fewer residential units displaced;
- Fewer driveways impacted;
- Fewer jobs displaced;
- Fewer heritage and archaeological resources affected;
- Lower noise levels;
- Less restrictions around intersection access and disruption during construction;
- Fewer negative visual impacts; and
- Lower long term operating costs and improved cost-effectiveness across a broad range of factors.

[2] This includes fully grade separated rapid transit that does not interfere with automobile traffic.

Movement on the Sheppard Subway can occur quickly.

The approvals for the Sheppard Subway are in place. An extensive capital financing plan was undertaken in 1991 and updated by KPMG this year. The Sheppard Subway project has the support of the Provincial government and the federal government agency PPP Canada. Thirty years of planning studies and detailed technical/functional specifications for the corridor exist.

In 1992 an Environmental Assessment was prepared by Delcan and Cole-Sherman, under the Provincial Let's Move Program and with the support and input of the TTC. The Environmental Assessment analysed a range of transit options for Sheppard Avenue – including "do nothing," Bus Rapid Transit, Light Rail Transit (LRT), Medium Rail Transit (MRT) and Subway/Heavy Rail Transit (HRT).

The more than 400 page 1992 Sheppard Subway Environmental Assessment report includes detailed analysis of the transit options against potential impacts, as required by legislation at the time, and technical drawings/specifications including:

- ***Subway alignment*** – horizontal and vertical alignments along the full 8.4km from North York to Scarborough Centre.
- ***Station design*** – station design and placement, including emergency exits, ventilation shafts and fans, and two "side" designs in addition to a centre platform to facilitate large volumes of riders between Sheppard and Yonge Street;
- ***Ancillary service placement*** – location and design of ancillary services, passenger pick-up/drop-off areas, commuter parking lots.

The 1992 Environmental Assessment stated that *"it was not anticipated that the tunnelling operation will conflict with any existing buried services or utilities."* A detailed construction risk mitigation strategy and monitoring plan was included in the Environmental Assessment.

Sheppard Subway Sunk Costs Run Into the 100s of Millions of Dollars

The **sunk costs** for the Sheppard Subway run in to the hundreds of millions of dollars (2011 dollars), including station and platform construction, lengthy tail tracks and track connections to support the westward extension, transit and planning studies over 30 years, changes to the Official Plan, environmental assessment and technical designs, financial analysis and other staff time and resources. Further, the development community has sunk costs related to the Sheppard Subway. Many developers entered the corridor with the active support of the TTC to increase densities around certain planned Sheppard subway stations, including towards the east end of the 1992 alignment.[3]

It is concerning to TTIL that - after 60 years of a subway-focused rapid transit plan for Toronto, and 30 years of technical, planning, financing and environmental studies and government approvals related to the Sheppard Subway - the Chair of the TTC, Adam Giambrone, announced March 16th 2007, via press release, an abrupt change in public policy to cancel the Sheppard subway and any future subway expansion projects. The light rail plan was reported to the Commission. However, given the significance of the public policy change proposed, and the fact it had **multi-year budget implications**, it is shocking that the 2007 Transit City proposal did not go to Council for full debate and approval. Prior Sheppard corridor environmental assessment, public consultation, analysis and approvals by Council were simply ignored.

[3] Letter from TTC Chief General Manager to Scarborough Community Council, September 17th 2003.

The basis given for this abrupt change in public policy was five-fold:

1. LRT expansion, albeit a poorer solution than subways, is less expensive;
2. LRT could extend the reach of public transit into more neighbourhoods;
3. LRT would reduce greenhouse gases and smog causing pollutants;
4. There was insufficient ridership to justify the cost of a subway; and
5. The then Mayor had a mandate to change the public policy (overturn Sheppard Subway approvals).

These arguments were promoted despite the fact that the most comprehensive study, *1992 Sheppard Subway Environmental Assessment*, that compared LRT and subway technology along the Sheppard corridor with transportation, land use, social, archaeological, environmental and cost elements concluded that:

1. From a cost perspective, a subway was more **cost-effective**. That is, over the long run the capital and operating costs of subways outweigh the cheaper up front capital costs of the LRT option. The LRT option requires more vehicles, increased storage, higher maintenance and operating costs than subways. Moreover, the TTC considered and rejected the LRT option no less than three times prior to 2007;

2. From a neighbourhood perspective, the LRT at street level compared with subway was deemed to increase noise and traffic congestion in the neighbourhoods. The widening of streets would not compensate for the increase in actual demand by road users (related to natural growth). Light rail in dedicated rights of way would split communities, restrict intersection access and add an elevated level of danger to streets, especially for children and persons with disabilities. A wheelchair user in Toronto stated to TTIL that they were "terrified of getting a wheel stuck in the tracks and tipping over … with no time to move out of the way of an oncoming streetcar/LRT."

Figure 1: Streetcar Death & Injury Ties Up Scarce Toronto Emergency Services

3. From an environmental perspective, a subway was deemed to have significantly fewer impacts than the LRT option, including noise levels, visual impacts, and affecting streams, woodlands, surface water flow. The 1992 Environmental Assessment raised concerns about additional gridlock along Sheppard Avenue associated with LRT option and increased natural growth that would contribute to auto-pollution and increased greenhouse gas emissions;

4. From a ridership perspective, a subway from North York to Scarborough City Centre was deemed to have significant carrying capacity to accommodate predicted ridership while the LRT option was deemed to have insufficient carrying capacity. It was concluded that an LRT option would *"provide capacity for only two-thirds of the projected 2011 peak period demand on opening day and would therefore operate at capacity very soon after commencing service."* And, the LRT option would *"not provide any reserve capacity to respond to future longer term growth in demand."*

   By adjusting the route so that it bypassed Scarborough City Centre (running along Sheppard Avenue to Meadowvale instead), as the 2007 Transit City Light Rail plan did, ridership volumes were obviously and significantly reduced. This alignment eliminated direct access to public transit for the largest population and employment district in the area. Of note, the 1992 Sheppard Subway Environment Assessment screened out an alignment similar to the 2007 Transit City plan based on the following:

   - Alignment travel time and number of transfers required to access Scarborough City Centre from other major centres, or vice versa, were greater than other options being considered;
   - Alignment convenience and access to other transit connections such as GO was less than other options being considered;
   - Alignment development and employment potential factors were less than other options being considered;
   - Cost of extending option, including extending SRT north, were greater than other options: and
   - Alignment did not meet the planning goals of the Official Plan.

   In 1992 the public overwhelmingly rejected (74%) routes that "did not serve the Scarborough City Centre directly."

Finally, in terms of the then Mayor's mandate, there was no mention in any of the 2003 or 2006 campaign literature or during the campaign itself that the Sheppard Subway extension would be scrapped, or importantly that the alignment changed to bypass Scarborough Centre and run contrary to the Official Plan. In 2003, David Miller campaigned on the following:

- *"We will invest in infrastructure improvements in the form of subways and the bus ways. System improvements and state-of-the-art technological applications will reduce cost per rider."*
- *"Align Transit Policy with the Official Plan."*
- *"Commit to continuous subway expansion to meet Toronto and the GTA's growth needs."*

In 2006, David Miller campaigned on the following:

- *"Rapid transit connection that links the Sheppard subway line to the Scarborough Town Centre."*

Transit guru Steve Munro, in his analysis of the Miller transit platform October 27, 2006, stated *"elsewhere in Miller's platform we find the … the Sheppard east subway."* [4]

In 2006, David Miller when questioned during the election campaign about his surface route plans, maintained his support for the Sheppard Subway extension to Scarborough Centre, albeit conditional on federal funds:

> *"Subways are great," Mr. Miller told reporters at the unveiling of his public transit platform. "They're fast and they're efficient. But we all know that new subway stations are only one piece of the puzzle... additional lines could be built if the federal government implements a national transit strategy," Mr. Miller said. "With federal funds, Toronto could extend the Scarborough RT line, connect the Sheppard subway to the Scarborough Town Centre and build a transit corridor along Finch Avenue," Mr. Miller said.*[5]
>
> *Mayor Miller said that in order to accommodate Toronto's expected population boom by 2021, transit must be expanded. Since building new subways is not in the current budget, he calls on other governments to contribute.*[6]

[4] A Look At Candidates' Transit Policies: David Miller. Posted on October 27, 2006 by Steve. http://stevemunro.ca/?p=245
[5] National Post, Wednesday, October 25, 2006.
[6] Toronto Observer, December 13 2006

••• 1.3. Key Findings •••

TTIL is recommending Council note:

Sheppard Subway Policy Findings

1. The Sheppard Subway is not a new idea. The Sheppard Subway, from Downsview to Scarborough Centre, was formally approved by Metro Council in 1986, proposed by Controller Trimmer and seconded by Councillor Layton, as part of the "major centres planning" initiative.

   Metro Council Minutes, June 24 1986 (Vote 36-2)
   Metro Toronto and Toronto Official Plan, 1980, 1986, 2002

2. The Sheppard Subway remains approved public policy of the City of Toronto, and has remained so through numerous changes in government (federal, provincial and municipal). It was a top transit priority for Toronto for more than 30 years.

   Metro Council and Council Minutes, 1980 to 2011
   Ministry of Environment and Energy Notice of Approval, 1994
   Metro, City & TTC Studies, Plans and Reports, 1980 – 2007
   TTC Minutes, April 16th 2006

3. Subway compared with LRT technology delivers the greatest value for money for the Sheppard corridor over the long term; i.e. the most cost-effective technology. This is associated with lower vehicle, storage, maintenance and operational costs. Indirect environmental, social, land use and transportation benefits associated with subway compared to LRT are equally superior for connecting North York to Scarborough Centre.

   Sheppard Subway Environmental Assessment 1992, approved by Metro Council 1993
   Sheppard Avenue Widening Environment Assessment, 1993
   Ministry of Environment and Energy Notice of Approval, 1994

4. LRT technology for the Sheppard corridor was repeatedly rejected by Toronto and the TTC between 1972 and 2007.

   Provincial Intermediate capacity Transit Programme, 1972
   Metro Council Meeting, June 24 1986 (Vote 29-8)
   Chief General Manager of the TTC (David Gunn), 1996
   Chief General Manager of the TTC (Rick Ducharme), 1999 & 2001
   Metro, City and TTC Studies, Plans and Reports, 1986-2007

5. Building a Transit City 2005 (which included the Sheppard Subway) identified that the top three reasons why Torontonians do not use transit were as follows: 1. "transit too slow/transit too long"; 2. "car faster"; 3. "poor connections/wait too long"

   Building a Transit City 2005

6. The $6 billion 2007 Transit City Light Rail plan was announced via press release March 16th 2007, prior to TTC review and endorsement. Though the light rail plan was eventually reported to the TTC and elements of it reported to Council through the budget process, it is shocking that this plan - with multi-year budget implications - simply ignored preferred alignment, public preferences, and transportation, environmental, social, land use, and cost analysis for the Sheppard corridor. Thirty years of transit studies, public consultation and approvals for the corridor were set aside without discussion or debate at Council.

   Sheppard Subway Environmental Assessment 1992, (approved by Metro Council, TTC, Ontario Government 1993)
   Ministry of Environment and Energy Notice of Approval, 1994
   Metro/Council Minutes, 1986- 2011

Table 1: 1992 Environmental Assessment versus 2008 Environmental Assessment: Comparison of Key Findings

Category	1992 Environmental Assessment Findings	2008 Environmental Assessment Findings
Overall Cost-effectiveness	Subway (with detailed summary)	LRT (no details provided)
Carrying Capacity	Subway (LRT insufficient capacity)	LRT (Insufficient demand for Subway)
Residential Units Displaced	Subway better	not addressed
Jobs Displaced	Subway better	not addressed
Heritage Resources	Subway better	not addressed
Archaeological Resources	Subway better	not addressed
Noise Levels	Subway better	not addressed
Driveways Affected	Subway better	not addressed
Intersections Restricted	Subway better	not addressed
Road Restrictions (construction)	Subway better	not addressed
Visual Impacts	Subway better	not addressed
Ridership	Subway better	not addressed
City Plan Objectives	Subway better	not addressed

7. In 1992 the public overwhelmingly rejected (74%) routes that "did not serve the Scarborough City Centre directly."

Cost Findings: Metrolinx Sheppard Subway Cost Estimates

8. The total cost of construction, design management, storage and vehicles for the four options considered by Metrolinx is as follows:

Table 2: Metrolinx Sheppard Subway Extension Construction Costs
(Order of magnitude (costs million of 2011 dollars)

Options	New Tunnel (Metres)	Total Length (Metres)	New Stations	Underground Platform length (Metres)	Station Length (Metres)	Cost 2011 $
Option 1 Downsview – SC	12,725	18,225	11	155	165	$3.7 billion
Option 2 Don Mills – SC	8,013	13,513	7	155	165	$2.4 billion
Option 3 Don Mills – SC	9,513	15,013	8	155	165	$2.8 billion
Option 4 Don Mills – Victoria Pk	2,313	7,813	2	155	165	$803 million

SC = Scarborough Centre

Metrolinx Sheppard subway Cost Analysis 2011

9. TTC's cost estimate for the Sheppard Subway extension (east and west) is more than one billion dollars higher than the Metrolinx estimate ($4.7b compared with $3.7b).

TTC Sheppard Subway Cost Estimates, 2011
Metrolinx Sheppard subway Cost Analysis 2011

10. TTC's Sheppard LRT costs approximate the same cost per kilometre as subway construction in Madrid and fully grade separated Vancouver's Canada Line ($87.4 million per kilometre compared with $90m/km and $105m/km respectively).

TTC Report, May 29 2009
Metrolinx Study Tour 2008
Canada Line Reports

11. TTC's subway costs per kilometre are close to three and a half times that of other global cities and three times higher than Vancouver.

    Metrolinx Study Tour 2008
    Metrolinx Sheppard subway Cost Analysis 2011
    Canada Line Governance and Construction Reports
    International Studies
    TTC Cost Data and Projections

Cost Findings: International and National Comparisions

Table 3: Madrid, Vancouver, and Toronto Construction Cost Comparison

Subway Elements	Madrid 2008	Vancouver Canada Line 2009[1]	Toronto Sheppard 2002[2]	Toronto Spadina 2011[3]	Metrolinx Sheppard Extension 2011[4]
Construction Dates	1995-2007	2005-2009	1994-2002	2009-2015	2012-2018
Construction Period	12 years	4 years	8 years	6 years	6 years
Subway Constructed	Nearly 150 km	19.2 km	5.5 km	8.6 km	6.7km
Stations	120 stations	16 stations	6 stations	6 stations	7 stations
Cost per km (CDN$)	**<$90M/km**	**$105M/km**	**$170M/km**	**$306M/km**	**$177/km**

1. Only about half of the Canada Line is tunnelled which would have influenced average construction cost.
2. Sheppard Subway Yonge to Don Mills, completed 2002. Final cost was $973 million (excluding vehicles)
3. Data provided by TTC. October 17th 2011. The "total budgeted cost of TYSSE= $2.634 billion"
4. Metrolinx cost estimates including vehicles for the east extension, Don Mills to Scarborough Centre.

Alternative Financing Opportunities & Key Success Factors for Transit Expansion

12. Key success factors in delivering large scale transit expansion plans include:

    Improved Funding & Policy Environment

    - Dedicated long-term and directed sources of revenue to support capital financing;
    - Integrated transit and planning development policies in support of sustainable transit system;

    Improved Governance/Project Structuring

    - Operating transit expansion authorities on commercial and financing principles independent from the potential for political interference;
    - Ability to capture the experience, expertise and discipline of the private sector during all phases of the project – design, build, maintenance, operations and financing – and allow the public sector to focus on its core business;
    - Ability to incorporate life-cycle costs, and/or defer capital cost repayment to operating period where revenue potential is increased;
    - Robust and transparent expenditure and procurement processes that provide private sector with confidence during the bid process.

13. International best practice demonstrates it is possible to leverage existing assets to fund major infrastructure and the potential exists to construct and operate a rapid transit network that is both profitable and improves the public realm. As such, new governance and revenue models offer Toronto an affordable opportunity to build new subways beyond completion of the Sheppard Subway.

    Metrolinx Madrid Tour 2008
    Hong Kong MTR (rail + property program)

KPMG Land Development Findings

14. KPMG/N. Barry Lyon Consulting (NBLC) estimate that over the forecast period (2012-2062):

    • The GTA population will double from 6 million to 12 million;

    • Sheppard (east and west) and Eglinton corridors will capture between 11% and 13% of the Toronto housing market, up from 4% in the baseline scenario;

    • An 800 m TIF zone with subway transit along Sheppard (east and west) and Eglinton corridors will capture upwards of 8.8 million sq metres of new residential, office, retail and industrial growth, with a current value assessment (CVA) value of $37.4 billion in 2012 rising to $159.5 billion in 2062.

KPMG Revenue Tool Findings

15. KPMG concluded that funding and financing for the Sheppard Subway extension is feasible. Policy/legislative support of Council and the Province would be required. The funding conclusion is identical to the findings of the Coopers and Lybrand Sheppard Subway Financing Study undertaken and reported on in 1992, summary attached as Section 10.12.

16. Detailed analysis by KPMG of three revenue tools – tax increment financing (TIF), development charges (DC) and city-owned property rights – illustrate that a large revenue pool is available to finance construction of the Sheppard Subway.

    KPMG estimate that for Phase 1 of the project (Sheppard east – Don Mills to Scarborough Centre):

    • Sheppard (east) and Eglinton corridors, with a subway built, will capture between **$5.3 billion** (reference) and **$6.0 billion** (high growth) in TIF revenues over the forecast period (2012-2062);

    • Development charges applied to all new development within City limits will capture between **$2.2 billion** (reference) and **$2.9 billion** (high growth) in revenues over the forecast period (2012-2062);

    • The land value of the City-owned properties in both the Sheppard and Eglinton corridors in 2011 dollars to be **$207 million**.

17. KPMG identified 10 other traditional revenues tools that could be used to finance the Sheppard Subway extension, ranging in size over the forecast period (2012-2062) from upwards of $700 million for passenger vehicles charges to upwards of $76.8 billion for vehicle kilometre travelled fees. Express tolls would capture upwards of $6 billion over the forecast period, and gas tax upwards of $27.8 billion.

18. The cost of the Sheppard Subway extension is a fraction of the size of the pool of alternative revenues tools that could be used to support the project.

    KPMG Sheppard Subway Capital Financing Plan, 2011
    Coopers and Lybrand Sheppard Subway Financing Study, 1991
    Sheppard Subway Development Charges By-Law, 1997 and 1999

Table 4: Revenue Tools Identified by KPMG (East)

Detailed Analysis

Revenue Tools	2011 Value	50 Year Period Revenue Estimates Conservative-Aggressive ($ billions)
Revenue Tools Examined (Detailed Analysis)		
Tax Increment Financing[2]		$5.3 - $6.0
Development Charges[2]		$2.2 - $2.9
Sale of Development Rights	$0.2	

Other Revenues Tools

Revenue Tools	Annual Revenue Estimates Conservative-Aggressive ($ millions)	50 Year Period Revenue Estimates Conservative-Aggressive ($ billions)
Revenue Tools Examined (High Level Analysis)		
Road Pricing		
• Zone Based Tolls	$95 - $136	$8.2 - $11.9
• Expressway Tolls	$70 - $556	$6.0 - $48.4
• High Occupancy Toll (HOT) Lanes	$23 - $185	$2.0 - $16.1
• Vehicle Kilometre Travelled Fees	$883 - $1,766	$76.8 - $153.6
Parking Pricing		
• Parking Sales Tax	$26 - $105	$2.3 - $9.2
• Parking Space Levy	$91 - $227	$7.9 - $19.7
Regional Sales Tax	$251 - $503	$21.9 - $43.7
Gas Tax	$321 - $641	$27.8 - $55.8
Passenger Vehicle Charge	$84 - $168	$0.7 - $1.5
Employer/Payroll Tax	$340 - $680	$29.6 - $59.1

[1] Net present values are included in the KPMG report. These figures do not consider bond securitization.
[2] TIF and DC analysis including Sheppard east only

KPMG Financing Findings

19. KPMG analyzed three potential delivery models for the Sheppard subway, namely traditional financing, P3 Availability Model and P3 Concession Model. The analysis demonstrates that partnering with the private sector will dramatically improve the City's ability to finance the project during the construction period. Financed through traditional means, the City will need to finance an additional $914 million during the construction phase (over and above TIF, DC, property rights revenues), compared with new zero dollars with P3 Availability model and $739 million with P3 Concession Model.

Table 5: Summary of Additional Monies Required During Construction Period

Financing Models	Additonal Up-Front Funding Required by City*	Annual Revenues Required at Start of Year 1	Annual Revenues Required at Start of Year 8
Traditional Financing	$914 million (1-7 years)	$123 million (1-7 years)	$0
P3 Availability Payment	**$0 billion**	**$0 million**	**$ 736 million ($77 million in year 8 down to $5 million in year 24)**
P3 Concession Model	$739 million (1-7 years)	$99 million (1-7 years)	$0

* Beyond federal and provincial contributions of $983 million, City-owned development rights of $221 million and Bonds of $629 million (TIF, DC supported starting in Year 5)

20. Alternative construction and procurement approaches offer the potential for the City to save the taxpayer hundreds of millions of dollars and accelerate Sheppard subway project completion.

Metrolinx Cost Analysis 2011
Metrolinx Study Tour 2008
KPMG Capital Financing Plan 2011
PPP Canada
International Best Practice

Sheppard Subway Completion

21. Progress on the Sheppard Subway can occur quickly. Thirty years of planning studies and detailed technical and functional specifications exist for the east bound alignment of the Sheppard Subway extension from Yonge to Scarborough Centre. Metrolinx estimates a seven year time frame to connect Don Mills to Scarborough Centre. TTIL has articulated a clear and robust governance framework and work plan for the project. It has the support in principle of PPP Canada.

    Sheppard Subway Environmental Assessment, 1992
    City and TTC Studies, Plans and Report, 1986-2011
    Metrolinx Cost Analysis 2011
    Metrolinx Study Tour 2008
    KPMG Capital Financing Plan 2011
    PPP Canada
    International Best Practice

22. Inaction has a cost. In addition to costs of congestion (estimated at $6 billion annually to the Toronto economy), delays in construction increase the direct financial burden on future generations. Historically, construction materials and labour costs have risen at a faster rate than inflation and/or debt financing.

    Toronto subway plans and costs per kilometre, 1911
    Network 2011 Report, 1985
    Chief General Manager of the TTC, 1998
    TTC Meeting Number 1749, April 9, 2003
    Spadina Subway Cost Projections, TTC October 2011
    *Consume*r Price Index

Sunk Costs

23. Sunk cost for the Sheppard Subway extension (Downsview to Yonge and Yonge to Scarborough Centre) run into the 100s of millions of dollars.

    Sheppard Subway Environmental Assessment, 1992
    TTC and Council Minutes, 1980-2011
    Sheppard Subway Design and Construction Specifications

Transparency and Accountability

24. A lack of public transparency exists with respect to expenditures by the TTC. It was impossible from publicly available data to accurately track money spent on project, tenders and awards. Website information is removed after only four weeks; this compares with senior levels of government where information is kept online for several years.

1.4. Back on Track: Recommendations & Next Steps

TTIL is recommending that Council:

Policy

1. Re-confirm completion of the Sheppard subway linking Downsview to Scarborough Centre, as was approved in 1986 as part of the Major Centres Plan, and continues to be approved City policy.

2. Commit to a two-phased approach for construction and completion of the Sheppard subway as outlined in previous policy directives.

   a. Phase I: Don Mills to Scarborough Centre
   b. Phase II: Yonge to Downsview

Next Steps: TTIL Governance & Activities

3. Approve TTIL proceeding with the second phase of the project including the following activities:

   a. Governance and Expertise: establish robust corporate governance and management structure for TTIL based on sound financial and commercial principles including:
      i. Determine roles, responsibilities, service procurement practices and accountability structures,
      ii. Hire executive, technical, financial and legal expertise;

   b. Design/Needs Update: finalize preliminary design, costs, and benefits including:
      i. Update geotechnical and design elements (1992 Environmental Assessment); and
      ii. Update cost-benefit analysis for the project (updated 1992 Environmental Assessment).

   c. Delivery Model Analysis: undertake further analysis – both quantitative and qualitative - on the delivery model for the project, including:
      i. Compare traditional/public sector procurement approach and P3 models;
      ii. Analyze across delivery models (e.g., Design, Build, Finance, Design Build Finance Maintain, Sale Leaseback, Build Own Operate etc.); and
      iii. Determine market realities of each approach;

   d. Value for Money Analysis: develop robust financial models for the project including:
      i. Determine value for money over the life-cycle of the project and optimal risk allocation plans for the City;

   e. Integrated (Delivery Model/ VfM) Analysis: determine value for money including:
      i. Review results of quantitative and qualitative delivery model analysis to determine if value for money analysis had any impact on options for the City;

   f. Procurement Strategy: determine Sheppard Subway procurement framework based on above analysis, including:
      i. Confirm design;
      ii. Contract structure
      iii. Construction schedule;
      iv. Risk allocation model;
      v. Payment schedule etc.

g. Funding/Capital Financing Plan Update: Develop final capital financing plan including (working with City and Province):

   i. Identify source of funds, timing, cash-flows, market realities, legislative program, etc.;
   ii. Develop funding proposal to Infrastructure Canada to unlock the $333 million federal commitment for Sheppard Subway project;

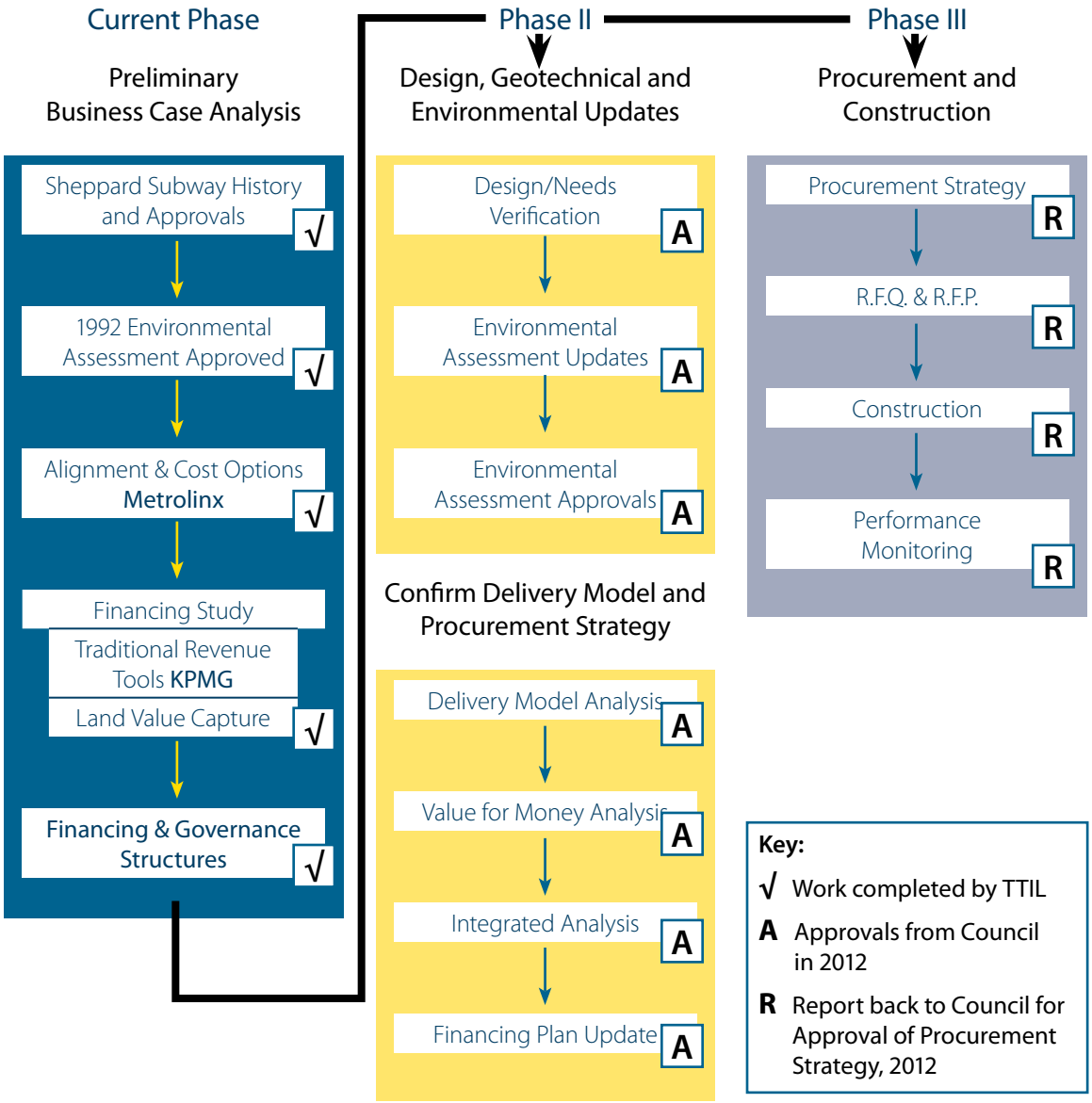
h. Other Activities/Subway Expansion: Explore innovative alternative financing options including:

   i. Continue investigation into optimal subway routes,
   ii. Continue investigation into alternative financing/value capture approaches, and
   iii. Development of integrated long term subway expansion plan for Toronto.

Budget

4. Approve a budget of $10 million to undertake activities in 3) above, agreed upon by PPP Canada and Ontario market experts as the necessary next steps for this project. TTIL has identified sources of matching funds that could be applied for at senior levels of government.

Figure 2: TTIL Sheppard Subway Work Plan



••• 1.5. About Toronto Transit Infrastructure Limited (TTIL) •••

At the Mayor's request, the Toronto Transit Commission (TTC) revived an existing subsidiary corporation of the TTC, Toronto Transit Consultants Limited (TTCL), and charged it with undertaking a preliminary analysis of the business case for the Sheppard Subway, using a P3 procurement model. The name Toronto Transit Consultants Limited (TTCL) was changed to Toronto Transit Infrastructure Limited (TTIL).

A three-person Board was appointed to TTIL, comprising Dr. Gordon Chong, Councillor Doug Ford and Councillor Norm Kelly. The corporation has two staff: Dr. Gordon Chong (CEO) and Dr. Jo Kennelly (VP, Program Management and Strategic Alignment). Dr. Chong began March 2011, and Dr. Kennelly joined May 2011.

Dr. Chong was City and Metro Councillor 1980-82, Commissioner of TTC 1984-88, Vice Chair of the TTC 1987-88, Metro Councillor 1994-1997, new amalgamated City of Toronto Councillor 1997-2000, Chair of Greater Toronto Services Board 2001, and Chair of GO Transit 2002-2007.

Dr. Kennelly has a Ph.D. in Geography from the University of Cambridge, England. She holds a first class honours degree - including urban planning and economics - from University of Otago, New Zealand. Dr. Kennelly served as a senior adviser in the Department of Prime Minister and Cabinet, NZ. She was Chair of an Officials' Cabinet Committee and her portfolio responsibilities included the building of a new national museum. Dr. Kennelly was Director of Scientific Advancement and Public Policy at the National Cancer Institute of Canada, 2003-2006, and served as Director of Policy for the Federal Minister of Health 2006 - 2007.

TTIL was given limited resources by the TTC to undertake this preliminary feasibility study; a modest budget of less than $100,000 for Board governance, staff, and technical expertise to examine a project valued upwards of $3.0 billion[7]. Provincial, national and international transit and market professionals provided TTIL with expert advice on an in-kind basis. The City funded and commissioned a study of land development potential and revenue tools options for the project as per the Memorandum of Understanding signed by the City and the Province; the results of which are outlined in Section 6.

Current Phase: Work Completed

Budget limitations notwithstanding, TTIL has made significant progress with the support of the City Planning and Finance Departments, expert technical and financial advisers, KPMG and Metrolinx. The following tasks have been completed:

1. *Sheppard Subway History and Approvals:* review of history and approvals for the Sheppard Subway;
2. *1992 Environmental Assessment:* examination of 1992 Environmental Assessment, needs assessment, technological comparisons, network screening, and technical specifications against current needs and network plans;
3. *Cost Estimates:* review of cost estimates for four alignment/construction options for the Sheppard Subway extension (Metrolinx);
4. *Development Potential:* examined development potential for the Sheppard-Eglinton corridor over a fifty year period (2012-2062)

5. *Financing Study/Feasibility Through P3 Procurement:* examined funding and financing options for the Sheppard Subway (KPMG) and explored alternative funding and financing mechanisms to support subway construction more widely in Toronto. This involved a comprehensive review of national and international experience. City staff provided an analysis of policy/legislative change that would be required to support KPMG funding tools identified; and
6. *Financing and Governance Structures:* developed financing and governance structure to TTIL's guide work plan.

[7] Legal work prior to the commencement of the project was paid for separately.

1.6. Outline of Report

TTIL undertook as its first step an investigation of the history of the subway construction in Toronto and in particular the Sheppard Subway. There was sufficient anecdotal evidence to suggest that approvals for the Sheppard Subway were still in place, hundreds of millions of dollars had already been spent on the proposed subway extension, and changes in public policy and negotiations with senior levels of government for an abrupt change in rapid transit policy along the Sheppard corridor occurred without Council approval, due consideration of the Official Plan and environmental and cost considerations.

The history of subway construction in Toronto is brought together in **Section 2 (History of Subway Construction in Toronto)**, including a detailed chronology of studies and decisions with respect to the Sheppard Subway and Subway extensions. Information provided in this section was gathered from multiple sources, including review of TTC and Council meeting minutes, transit historians, and Toronto archives. Numerous transit websites provided historical details that were validated with City staff and other experts.

In **Section 3 (1992 Environmental Assessment)** an overview of methodology and key results of the 1992 Sheppard Subway Environmental Assessment are presented.

In **Section 4 (Sheppard Subway Costs)** results of an examination by Metrolinx commissioned by TTIL of the costs related to four options for phase 1 of the Sheppard Subway extension are presented. This section also includes snap-shot of past TTC estimates for the Sheppard subway.

Two international and well-known transit experiences are outlined in **Section 5 (International Case Studies: Costs & Alternative Delivery Mechanisms)**, namely Madrid and Hong Kong. Madrid's costs of construction are much lower than Toronto, and Hong Kong is one of the few transit authorities in the world that has demonstrated that investments in rapid transit can actually generate profits.

In **Section 6 (Sheppard Subway Capital Financing Plan)** the conclusions of the KPMG Planning and Capital Financing Study, that was commissioned by the City and TTIL, for the Sheppard Subway are outlined. This work draws upon the efforts of City Planning and Financial Departments, planning experts N. Barry Lyon Consultants, and KPMG.

In **Sections 8 & 9 (Globally Competitive & Integrated Transit System For Toronto & Next Steps: Ttil Governance Structure And Work Plan)** TTIL's vision, mission, goals and objectives for a successful rapid transit construction plan for Toronto, akin to the Madrid model of 150 km of new subway at a more efficient cost structure, are detailed. Essential to the vision is the use of current and existing assets to generate value that can be used to build the rapid transit system in Toronto.

Additional information is contained in **Section 10 (Appendices)**.

Section 2.

HISTORY OF SUBWAY CONSTRUCTION IN TORONTO

This section provides an overview of subway construction in Toronto – from the first mayor to make subways a main plank of his campaign to become Toronto Mayor in 1910 to the purchasing of tunnelling equipment in 2010 for the Spadina extension.

A detailed examination of the history of the Sheppard Subway is also presented – from its inception in 1980 as part of the "Major Centres Plan" connecting North York and Scarborough Centre to its approval in full by Metropolitan Toronto Council in 1986 to construction and opening of the first segment of the line from Yonge street to Don Mills.

Planning, rapid transit, financial and environmental studies as well as changes to the Official Plan to accommodate the Sheppard Subway and Sheppard Subway extension undertaken by the Province and City/Metro since 1980 are outlined.

TTIL estimates that 100s of millions of dollars has been invested thus far in the Sheppard Subway extension.

Figure 3: Toronto Subway Expansion and Sheppard Subway Timeline, 1910 -2011

New Subway Construction and Extensions	Mayor of Toronto	Year	Premier Of Ontario	Sheppard Subway
Horatio C Hocken made the underground the main plank of his campaign for Mayor	George R. Geary	1910		
Subway Construction Call for Tender		1911		
Rapid Transit Department (TTC) established. Begun design work on subways (January)	Federick J. Conboy	1944		
Yonge Street Subway Approved	Robert Hood Saunders	1946	George Dew	
	Hiram E. McCallum	1948	Thomas Kennedy	
Yonge Street Subway Construction Begins		1949	Leslie Frost	
Yonge Street Subway (Union to Eglinton) Opened (March)	Allan A. Lamport	1954		
		1961	John Robarts	
University Line Opened (February)	Philip Givens	1963		
Bloor-Danforth Opened (February)	William Dennison	1966		
Bloor-Danforth line extended to Islington and Warden stations (May)		1968		
		1971	Bill Davis (March)	
Yonge line extended to York Mills (March)	David Crombie	1973		
Yonge line extended to Finch (March)		1974		
		1975		Decision to scrap Queen Street subway and support "surburban" subway development (Metro Council)
University line extended from St. George Station to Wilson Station, Spadina segment (January)	John Sewell	1978		
Bloor-Danforth line extended to Kipling and Kennedy stations (November)		1980		New Official Plan Adopted (Metro Council)
		1981		
	Art Eggleton	1982		Accelerated Rapid Transit Study (Metro Council/TTC)
		1983		Long Range Plan (TTC)
		1984		Sheppard Finch Rapid Transit Corridor Study (Metro Council/TTC)
				Systems Priority Study (TTC)
		1985	Frank Miller (February)	Network 2011 - A Rapid Transit Plan for Metropolitan Toronto (Metro Council/TTC)
				Scarborough Council request Metro Council establish Sheppard Subway as No. 1 Prrority
		1985	David Peterson (October)	
		1986		Network 2011 – Final Report (Metro Council/TTC)
Yonge line - North York Centre station was added between Sheppard and Finch Stations		1987		Future Transportation Needs in the GTA (Metro Council/TTC)
				Sheppard Subway Functional Planning Studies (TTC)
		1988		Provincial Transit Review: Transportations Directions
		1989		
		1990		Sheppard/Finch Short Term Transit Improvement Study (Metro Council/TTC)

New Subway Construction and Extensions	Mayor of Toronto	Year	Premier Of Ontario	Sheppard Subway
				Sheppard Subway Property Protection Study (Metro Council/TTC)
				Provincial Annoucement: Let's Move (April)
			Bob Rae (October)	Let's Do It – A Joint Response and Implementation Study (Metro Council/TTC)
	June Rowlands	1991		Sheppard Subway Financing Study (TTC)
		1992		Sheppard Subway Environmental Assessment (TTC Completed)
		1993		Provincial Annoucement: Rapid Transit Expansion Program
				Sheppard Subway Design/Construction Began (TTC)
		1994		Sheppard Subway Environmental Assessment (Province Approved)
				Official Plan Adopted (Council Approved)
	Barbara Hall	1995	Mike Harris (June)	
University, Spadina segment, extended to Downsview (March)		1996		Sheppard Subway - First Segment Funding Approval (Metro Council Re-Confirmed Commitement)
		1997		Sheppard Subway Construction Begins
				Sheppard Subway DC Bylaw Approved (Metro Council)
		1998		Sheppard Subway Station Design Released (Designed to Accommodate Extension)
	Mel Lastman	1999		City: Development Charges Bylaw Approved by City of Toronto
		2000		
		2001		Sheppard Subway Extension Study Approved (TTC)
		2002	Ernie Eves (April)	Sheppard Subway Line, Yonge to Don Mills Segement, Opened (November)
				Official Plan Approved 9protecting Sheppard for "hiher order transit" (Council Approval)
	David Miller	2003	Dalton McGuinty (October)	Ridership Growth Strategy (March) (TTC Adopted)
		2004		
		2005		TTC: Building a Transit City: Subways
		2006		TTC: Comprehensive Rapid Transit Plan for Scarborough (August)
		2007		TTC: Transit City Plan Promoting Ligth Rail Transit
				Provincial Annoucement: MoveOntario 2020 (April)
			Dalton McGuinty (October)	
		2008		
		2009		
Tunnel boring machines were purchased to extend the University line	Rob Ford	2010		
		2011		

••• 2.1. Toronto Subway History, 1910-2011 •••

1910 – 1946

It is 100 years since the first mayoral candidate for the City of Toronto, Horatio Clarence Hocken, made the underground issue the main plank of his campaign to become Toronto's mayor (1910). Although Hocken did not win the mayoral race in 1910 (it was won by George R. Geary who opposed subways) his idea of subways received overwhelming support from the citizens of Toronto. The result of a referendum held on subways together with the Mayoral ballot question was supported almost two to one (19,268 to 10,697). Yet, after numerous studies and reports, development of a subway plan and the issuing of a call for tenders for the construction of the first subway, the City backed away from its subway plans. It did not have the support of citizens who were weary of rising taxes.

1946 – 1962

It was another 36 years before the subway question was raised again in earnest (1946). This time the City approached the issue of financing first. It secured support from the federal government (up to 20% of the cost of the project) and developed a capital financing plan for transit revenues to fund the remainder, with the City taking responsibility for funding the moving and improvement of pipes and reinstalling of roads. This time, when the referendum was put to citizens with a well thought out financing plan, it was supported seven to one (69,935 to 8,630).

In 1946 (April) Toronto City Council approved construction of the Yonge Street subway line. Construction began on the Yonge Subway line on September 8, 1949 and it opened from Eglinton to Union in 1954; 44 years after Hocken ran on subways as the main plank of his campaign for Mayor.

In 1952 Allan Austin Lamport was elected Mayor of City of Toronto (he later resigned in 1953 to become head of the TTC).

In 1953, the Legislative Assembly of Ontario passed the Metropolitan Toronto Act creating Metro Toronto which came into effect in 1954 (Metropolitan Toronto Act, 1953). Fred Gardiner became the first Chairman of Metropolitan Toronto.

In 1954, Leslie Howard Saunders became Mayor of the City of Toronto [now the lower tier municipality] serving under Fred "Big Daddy" Gardiner.

1963 – 1980

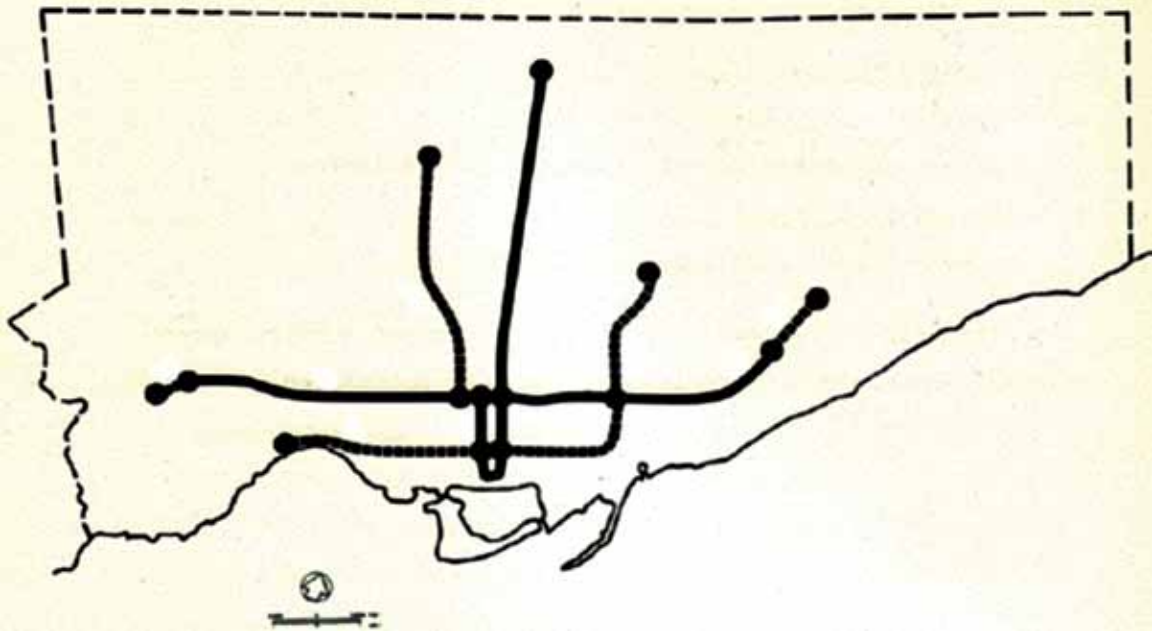
In 1963 the Yonge-University line was created by extending the Yonge line from Union Station to St George, creating a loop from Union station north to Bloor/St George.

In 1966 (February) the Bloor Danforth line (Keele to Woodbine) was opened.

The 1966 Metro Toronto Transportation Plan proposed the following subway plan/extensions:

1. Extending the Yonge-University line from York Mills to Finch, opened in March 1974;
2. Extending the Yonge-University line from St George to Wilson, opened in January 1978;
3. Extending the Bloor-Danforth line from Islington to Kipling, opened in November 1980;
4. Extending Bloor-Danforth from Warden to Kennedy, opened in November 1980;
5. Construction of a new Queen line from Humber to Eglinton and Don Mills, scrapped in 1975.

Figure 4: 1966 Metro Toronto Transportation Plan



All but the proposed Queen line have been built.

The Queen line was scrapped in 1975. It was believed that downtown was adequately served by subways, but the suburbs were not.

In 1972 (November) the Davis Provincial government announced an urban transportation policy for the Province of Ontario *"indicating a shift in emphasis from urban expressways to a variety of transportation facilities which put people first."* A subsidy programme subsidy of 75% to assist municipalities in the roll out of intermediate capacity transit technology (similar to the Scarborough rapid transit) was announced. A series of light rail transit expansions were proposed for the Toronto region (Intermediate Capacity Transit Plan) based on 1972 population capacities. This light rail plan and others rejected by the TTC are contained in Section 10.2.

In 1973 (February) the Yonge-University line was extended up Yonge Street to Lawrence and York Mills.

In 1974 Paul V. Godfrey became the Chairman of Metropolitan Toronto.

1981- 2011

In 1986 (June) Metro Toronto Council approved the building of the Sheppard Subway from Downsview to Scarborough Centre in a vote of 36-2.

In 1987 (June) a new station was added to the Yonge-University line - North York Centre station.

In 1996 (March) the Yonge-University line was extended one stop to Downsview.

In 1997 (August) construction of the first segment of the Sheppard Subway began.

In 1998 Melvin Douglas "Mel" Lastman became the first Mayor of the new amalgamated City of Toronto, serving until 2003.

In 2002 (November) the first segment of the Sheppard Subway opened, from Yonge to Don Mills. The original proposal approved in 1985 under Network 2011 was from Downsview to Scarborough Centre.

In 2003 David Miller became Mayor of Toronto, serving until 2010.

In 2010 tunnel boring machines were purchased to extend the University line north from Downsview to York University and the city of Vaughan.

In 2010 Rob Ford became Mayor of Toronto.

2.2. Sheppard Subway History, 1975-2011

The Sheppard Subway has been official public policy since 1986. It is not a new idea. Construction and subway extensions along the Sheppard corridor have consistently been deemed a top priority for rapid transit for Toronto by City/Metro Toronto Council and the Toronto Transit Commission.

2.2.1. 1975-1996: Studying, Designing, Approving and Funding for the Sheppard Subway

In 1975 Metro Council approved scrapping the proposed Queen Street line and replacing it with suburban subway development. It was believed the downtown was adequately served by subways, but the suburbs were not (*Toronto Transportation Plan Review: Choices for the Future*).

In 1980 a new official plan was adopted for Metropolitan Toronto, recommending the creation of transit hub centres in Etobicoke, North York and Scarborough. These "major centres" would be linked by new subways along the Sheppard and Eglinton Avenues. Approval of the plan resulted in proposed new expressways being deleted in favour of a focus on public transit, support of approval for suburban subway development, and development of subway **rapid transit from North York to Scarborough Centre along the Sheppard Avenue Corridor** *(Metropolitan Toronto: Official Plan)*. Following approval of the 1980 Official Plan, a number of rapid transit studies were undertaken between 1982 and 1985. The **Sheppard Subway** was deemed a priority project throughout this period, and the amendments made to the Official Plan to include Sheppard Subway.

In 1982 a study of rapid transit needs across Metropolitan Toronto was undertaken, including **Sheppard**/Finch Corridor, Downtown Relief Line and Eglinton Avenue corridor. The study recommended rapid transit subways were justified in each of these three transit corridors, and would support the "major centres" policy. Metro Toronto Council directed the Metro Toronto/TTC to undertake detailed rapid transit feasibility studies for specific transit corridors, including Sheppard/Finch corridor *(Metro Toronto/TTC: Accelerated Rapid Transit Study, ARTS)*.

In 1983 the Toronto Transit Commission included in its long range plan an **east-west rapid transit line north of the 401** *(Toronto Transit Commission's Long Range Plan)*.

In 1984 the detailed feasibility study for the Sheppard/Finch was reported on. The **Sheppard Subway** (underground) was recommended as the preferred option. *(Metro Toronto/TTC: Sheppard-Finch Rapid Transit Corridor Study, SFRT)*. This study was conducted, initially, as part of the a broader North Metro Rapid Transit Corridor Study, which was initiated as part of the Province's GO-ALRT program.

In 1984 a Systems Priority Study was initiated to examine results of three rapid transit studies, namely the **Sheppard**-Finch, Downtown Relief Line and Eglinton West and to establish priorities for implementation *(Systems Priority Study)*. The results of this study were reported in *Network 2011: A rapid Transit Plan for Metropolitan Toronto*.

In 1985 (February) Bill Davis retired. Frank Miller became Premier of Ontario.

In 1985 (May) the Economic Development and Planning and Transportation Committees received the *Network 2011: A Rapid Transit Plan for Metropolitan Toronto report and eight background reports directed that the reports be circulated to Area Municipalities and TTC.*

Network 2011 proposed a 28 year transit construction plan for Metropolitan Toronto. The **Sheppard Subway** (Yonge to Victoria Park) was deemed Metropolitan Toronto's/TTC Number 1 priority for rapid transit development. The stages of the programme proposed in 1985 were:

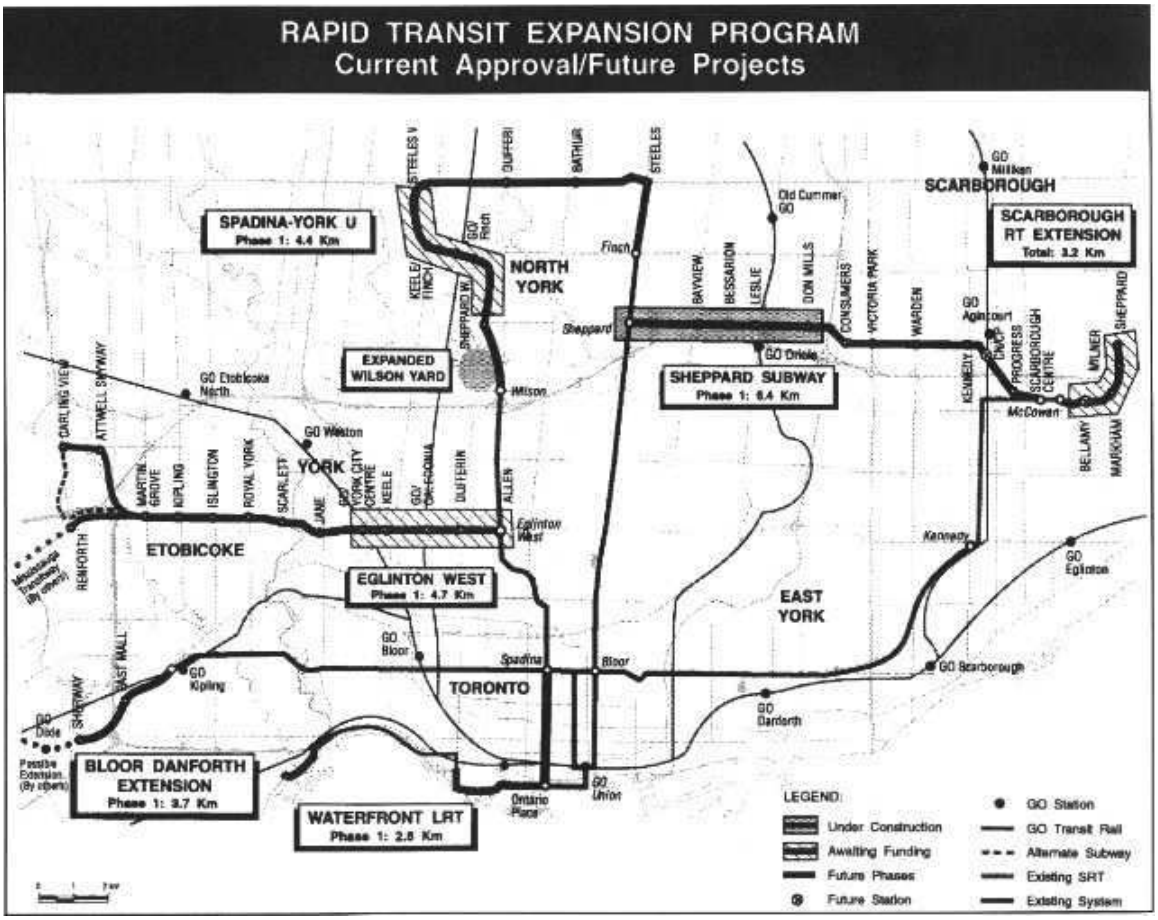
Stage 1	1989-1993	**Sheppard Subway** – Yonge to Victoria Park
Stage 2	1994-1998	Downtown Relief Line
Stage 3	1999-2003	Eglinton West express bus facility
Stage 4	2004-2009	**Sheppard Subway** – Victoria Park to Scarborough City Centre and Yonge to Downsview Spadina Subway extension to Sheppard Avenue
Stage 5	2010-2014	Eglinton West upgrading to subway

The estimated cost of Stage 1 **Sheppard Subway** – Yonge to Victoria Park was $500 million and Sheppard extension in Stage 4 from Victoria Park to Scarborough City Centre $740 million.

In 1985 the former City of Scarborough in its response to Network 2011, requested Metropolitan Council to establish as first priority construction of the entire **Sheppard Subway** line from Downsview to Scarborough City Centre.

In 1985 (June) the Miller provincial government was defeated by a non-confidence motion on the Speech From the Throne. David Peterson was sworn in as Premier of Ontario.

Figure 5: Network 2011 Subway Plans Approved By Council for Construction 1986



Network 2011: TTC Sheppard Subway Promotional Material, 1986

Promotional materials in support of Network 2011 demonstrate that the TTC boldly supported and sponsored subway development along the Sheppard corridor, and construction of the Downtown Relief Line to relieve Yonge/Bloor crowding.

TTC advertisement depicted a typical couple with a newborn baby, and then showed this family at various milestone years of the plan. The message being promoted was:

> **When a child born in 1985 is 13 years old, the first phase of the Sheppard Subway and the Downtown Relief line would be ready.**[8]

In 1986 (June) Metropolitan Toronto Council reviewed the final report of Network 2011 plan and approved the building of the **Sheppard Subway** from Downsview to Scarborough Centre and extension of Spadina Subway in a 36-2 vote.

[8] Transit Toronto. Found at www.transit.toronto.on.ca

The motion moved by Controller Joyce Trimmer and seconded by Councillor Jack Layton stated:

(i) The forgoing motion (e) by Mayor Tonks, seconded by Alderman Pinsloo, be amended by deleting from the Recommendation No. (2) (a) in the joint Report the words "the Sheppard Subway line described in this reported and shown on Schedule 'A' appended hereto" and substituting therefore the words:

"the extension of the Spadina Subway to Sheppard Avenue and the **Sheppard Subway** from the extended Spadina subway to the Scarborough City Centre"

On the same day a motion to construct the Sheppard line as Light Rail Transit was defeated by a vote of 29-8 *(Metro Council Meeting, June 24 1986)*.

In 1986 the Official Plan was amended (Amendment 8) to include the **Sheppard Subway**. The subway was shown as committed from Yonge to Victoria Park and "future" from Victoria Park to Scarborough Centre. The alignment included running along Sheppard to Brimley, and then south to Scarborough Centre.

Figure 6: 1986 Official Plan Amendment

In 1987 (September) a provincial election was held. David Peterson was elected Premier of Ontario.

In 1987 Metro Toronto and the TTC reconfirmed the need for the **Sheppard Subway** as part of the Major Centres Plan and supporting future growth of the City of Toronto. The TTC issued a call for tenders for design of the Sheppard subway. Preliminary designs were developed (TTC: Sheppard Subway Functional Planning Studies).

In 1988 the Provincial government signalled an intention to delay further support for the Network 2011 plan and the **Sheppard Subway**. It put the project under "review." Highway 407 was deemed the Province's highest priority (Province of Ontario: Transportation Directions).

In 1990 (April), after two years of study, the Peterson government announced it's "Let's Move" program. Let's Move was a ten year plan for transit spending across the GTA, with a budget of $6.2 billion. This plan maintained support for the **Sheppard Subway**.

In 1990 Metropolitan Toronto and the TTC undertook a review of short-term transit priorities for the Sheppard-Finch transit corridor. The study re-confirmed the need for the **Sheppard Subway** *(Metro Toronto/TTC: Sheppard/Finch Short Term Transit Improvement Study)*. Metro Toronto/TTC commissioned a study to protect property for future construction of the **Sheppard Subway** *(Metro Toronto/TTC: Sheppard Subway Property Protection Study)*.

In 1990 Metropolitan Toronto and the TTC provided a response to the Province's "Let's Move" Plan and started work on its subway expansion plan. The Environmental Assessment for the **Sheppard Subway** was initiated and the TTC established the "Let's Move Department" *(Metro Toronto/TTC: Let's Do It – A Joint Metropolitan Toronto/TTC Response and Implementation Study)*.

In 1990 (September) a provincial election was held. Bob Rae was elected Premier of Ontario.

In 1991 Metropolitan Toronto commissioned a study of alternative financing models for the **Sheppard Subway**. The study concluded significant revenue potential existed for the construction of the **Sheppard Subway**.

In 1992 (September 16th) the **Sheppard Subway** Environmental Assessment (EA) was completed. The EA re-confirmed the need for the **Sheppard Subway**. The 1992 Environmental Assessment for rapid transit connecting North York and Scarborough City Centres concluded that:

> *"the most efficient and environmentally acceptable method to improve transportation services and satisfy urban structure goals ... in the **Sheppard**/Finch corridor is ... to construct and operate the Sheppard Subway (underground) on Sheppard Avenue as far as Kennedy Road and then south-easterly into the Scarborough City Centre via Kennedy-Progress alignment."*

In 1993 the Rae provincial government released its own transit plan. The final plan included the **Sheppard Subway** and an Eglinton West Subway to York City Centre *(Rapid Transit Expansion Program)*.

In 1994 (April 12th) notice of approval to proceed on the **Sheppard Subway** from North York Centre to the Scarborough City Centre was received from the Ministry of Environment and Energy (MOEE). The EA's have no expiry date (TTC Commission's Report, April 9th 2003).

In 1994 (May) City staff reported at Planning and Transportation Committee that future station locations were being protected for as development applications are approved *(May 28 1994, Staff Report, Planning and Transportation Committee)*.

In 1994 the new Metro Toronto Official Plan was adopted by Council, including the proposed 1992 **Sheppard Subway** Environmental Assessment preferred alignment *(Metro Toronto Official Plan, 1994)*.

In 1994 Barbara Hall became Mayor of Toronto, serving until 1997.

In 1995 (June) a provincial election was held. Mike Harris was elected Premier of Ontario.

In 1995 (November) the Harris provincial government agreed to fund a complete **Sheppard Subway** from Downsview to Scarborough Centre. Construction on the first segment of the Sheppard from Yonge to Don Mills Sheppard continued.

In 1996 (February) Metro Council reaffirmed support for construction of first segment of the **Sheppard Subway** to Don Mills *(Metro Council Meeting, February 14th 1996)*.

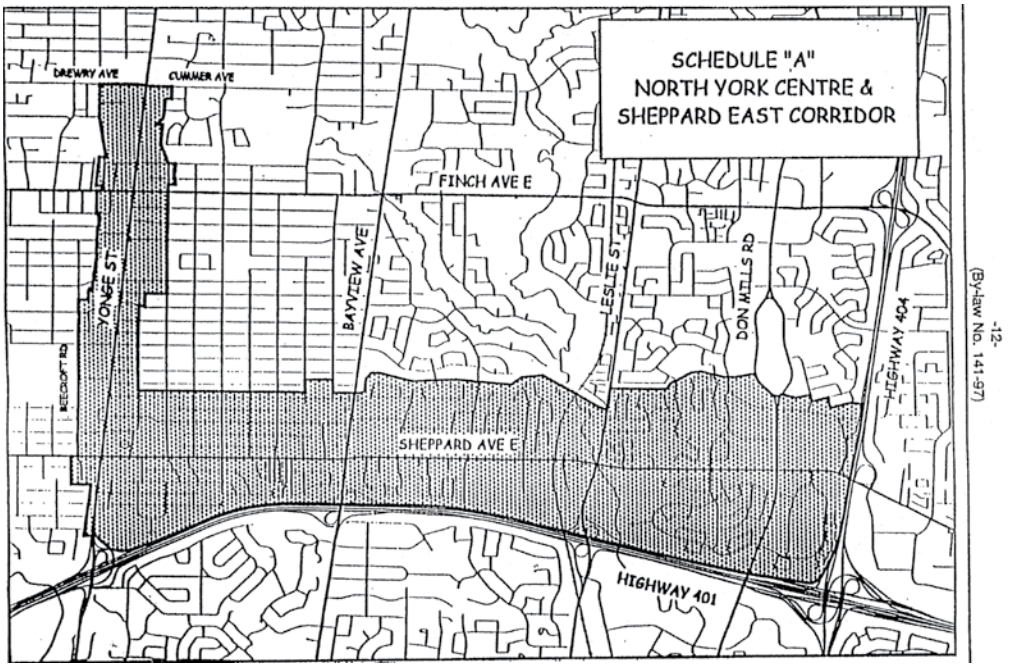
In 1996, a move was made by members of Council to convert the **Sheppard Subway** to LRT. LRT advocates argued that the LRT would cost less and the subway would be underutilized because it only went to Don Mills. **The LRT idea was dismissed by the TTC Chief General Manager (David Gunn) who maintained its commitment to subways, belief in its projections that use would vastly increase once it was connected to Scarborough Centre, and an LRT on the surface would interfere with vehicular traffic.**

2.2.2. 1997 – 2007: Building Subway Phase 1, Continued Planning for Phase 2

In 1997 (August) construction on the first segment of the **Sheppard Subway** began, with the lowering of the twin tunnel boring machines into the ground between Leslie Street and Provost Drive. The machines began tunnelling towards Yonge Street beneath Sheppard late Fall 1997.

In 1997 (October) an area-specific development charge bylaw was adopted by Metro Toronto. The new bylaw imposed a single service **Sheppard Subway** DC on new development in the Sheppard East Corridor and North York Centre. The **Sheppard Subway** DC rates ranged from $1,163 per 1 bedroom apt unit to $2,713 per single family dwelling unit for residential development and $1.36/sq. ft. for industrial uses to $2.58/sq. ft. per office/commercial uses (not including the annual indexing adjustment) *(1997 Development Charges Bylaw)*.

Figure 7: Sheppard Subway Development Charges Zone, 1997



In 1998 (August), the TTC released the architectural drawings for the station design associated with the **Sheppard Subway**. Chief General Manager David Gunn released cost figures for the **Sheppard Subway** extension, including $1.3 billion from Don Mills to Scarborough Centre (East extension) and $0.8 billion from Yonge to Downsview (west extension).

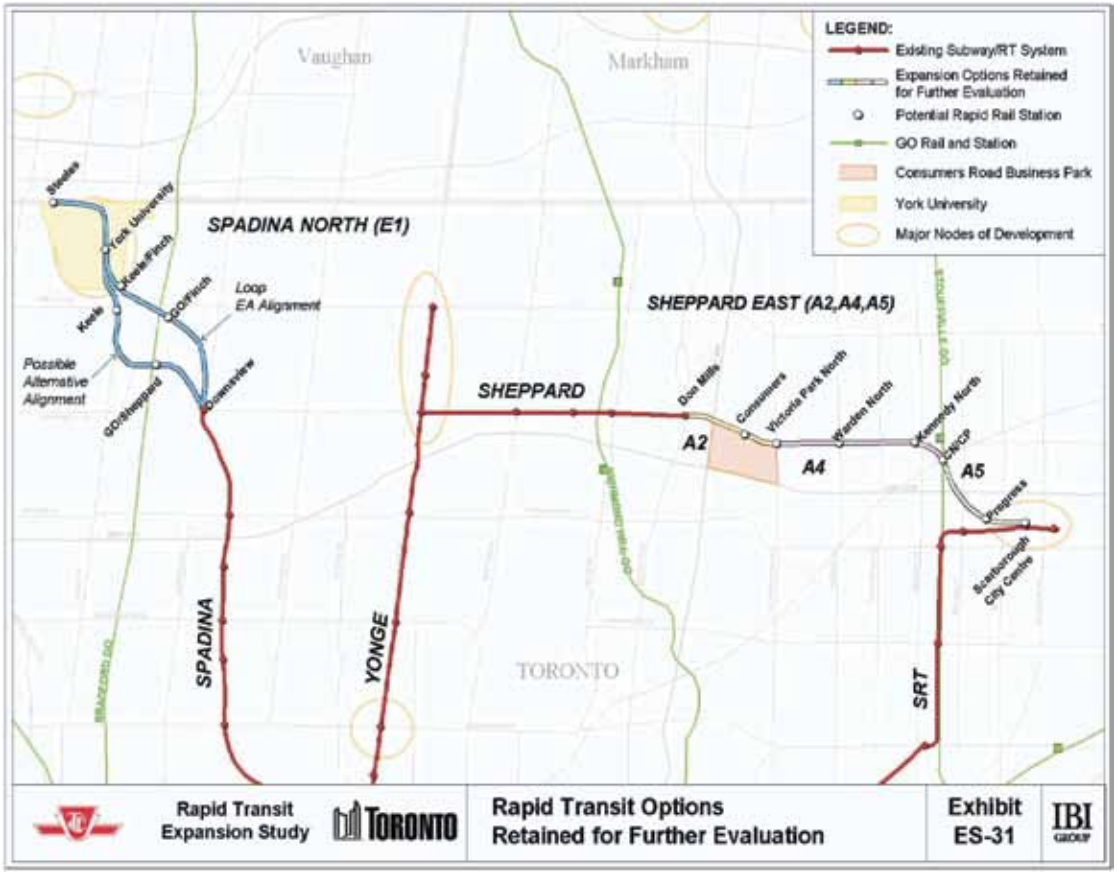
In 1998 (December) Melvin Douglas "Mel" Lastman became Mayor of Toronto, serving until 2003.

In 1999 (June) track installation on the **Sheppard Subway** began, which was completed by July 2000.

In 1999 (December) the TTC reviewed and rejected a proposal by D.S. Lee and Associates (with the support of Alan Tonks in his capacity as Chair and CEO of Greater Toronto Services Board) for the development of LRT along unused rail corridors. It was seen as a distraction from other TTC and GO priorities by TTC Chief General Manager Rick Ducharme *(December 4th 1999 Toronto Star, Tonks' Plan Aims to Put GTA on Right Track to Better Transit).*

In 2001 (August), the Commission considered the *Rapid Transit Expansion Study* and approved preparation of a detailed business case for the **Sheppard Subway** extension. The cost of the **Sheppard Subway** extension from Don Mills to Scarborough Centre was estimated to be $1.5 billion (2003), with completion by 2013 and annual ridership of 9.1 million.

Figure 8: Rapid Transit Expansion Study, 1991



In 2001 (August) the 1999 LRT plan was brought forward again. TTC again rejected this idea stating the transit proposals that stand out as having the highest probability for success and are cost effective in terms of capital and operating costs are the "northerly extension of the Spadina subway or an easterly extension of the **Sheppard Subway**" *(Other Rail Ideas Seen as Rivals in Struggle for Transit Funds, Toronto Star Aug. 24, 2001).*

In 2002 (April) Mike Harris resigned. Ernie Eves became Premier of Ontario.

In 2002 (November), the **Sheppard Subway** - Yonge to Don Mills segment - was opened, including five stations: Sheppard/Yonge, Bayview, Bessarion, Leslie, and Don Mills. A tail track of 835 meters extending west of Yonge Street was built, and two connecting Wye tracks (east and west) to the Yonge line. The south west connections were designed to support future westbound construction of the **Sheppard Subway**. Wye tracks and scope of work schematics are provided below[9].

Figure 9: Wye Tracks and Tail Tracks **Sheppard Subway**

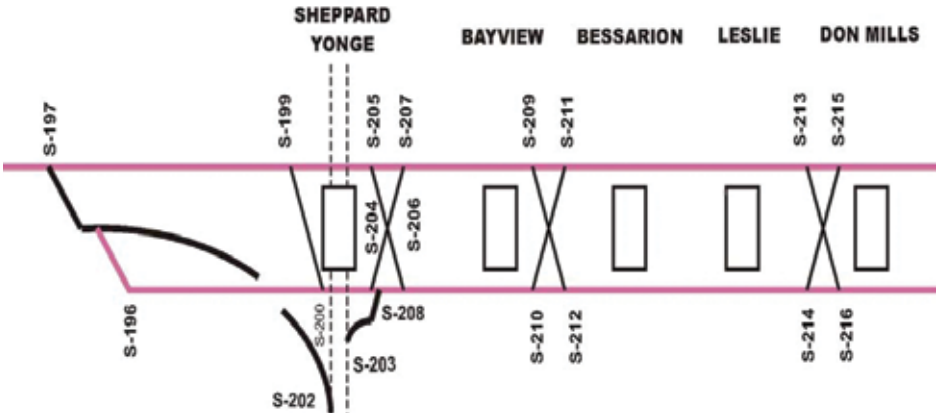
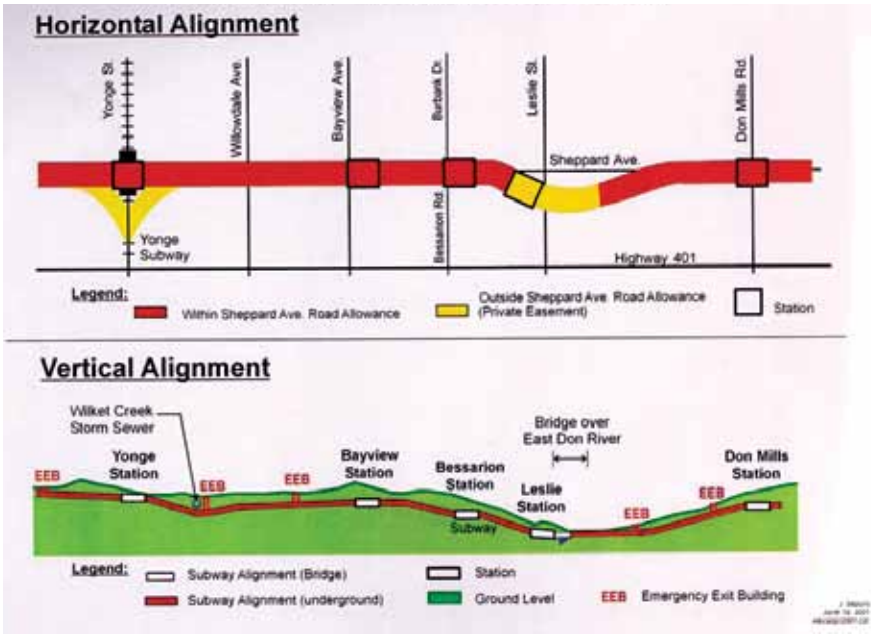


Figure 10: Alignment of **Sheppard Subway**



[9] Budd. T, Wayne, D., Tom, L. Track Installation on Toronto Transit Commission's Sheppard Subway Line. Papers for 2003 Arema Conference.

In 2002 (November), the City of Toronto approved its new Official Plan. The plan advocated targeted employment, population and transit development in support of Major Centres Plan. It presented the following vision for City Growth: *"the focus is on altering behaviour so as to reduce our dependence on the private automobile,"* and indicates that *"the plan must be supported by high quality transit services."* This vision included protecting existing and planned rapid transit networks (bus ways, streetcar/LRT and subways). The alignment for the **Sheppard Subway** in the 2002 Official Plan is shown in the map below, running along Sheppard and down to Scarborough Centre. It is designated as "higher order transit corridor."

Figure 11: Higher Order Transit Corridors, Official Plan Map 4, 2002

In 2003 (March) the Commission adopted *The Ridership Growth Strategy* (RGS) and approved that the **Sheppard Subway** become a First-Priority transit category, thus reaffirming the **Sheppard Subway** as a priority transit project for the City of Toronto *(TTC Meeting No. 1825 Wednesday, March 19, 2003)*. The Strategy stated the **Sheppard Subway**, from Don Mills to Scarborough Centre, would be completed by 2013.

In 2003 (April) the TTC referred cost data on the **Sheppard Subway** to the City Budget Advisory Committee. Total cost of the Sheppard extension from Don Mills to Scarborough Centre was estimated at $1.75 billion. The TTC anticipated minor modifications to the 1992 Environmental Assessment *(TTC Meeting No. 1749 Thursday, April 9, 2003)*.

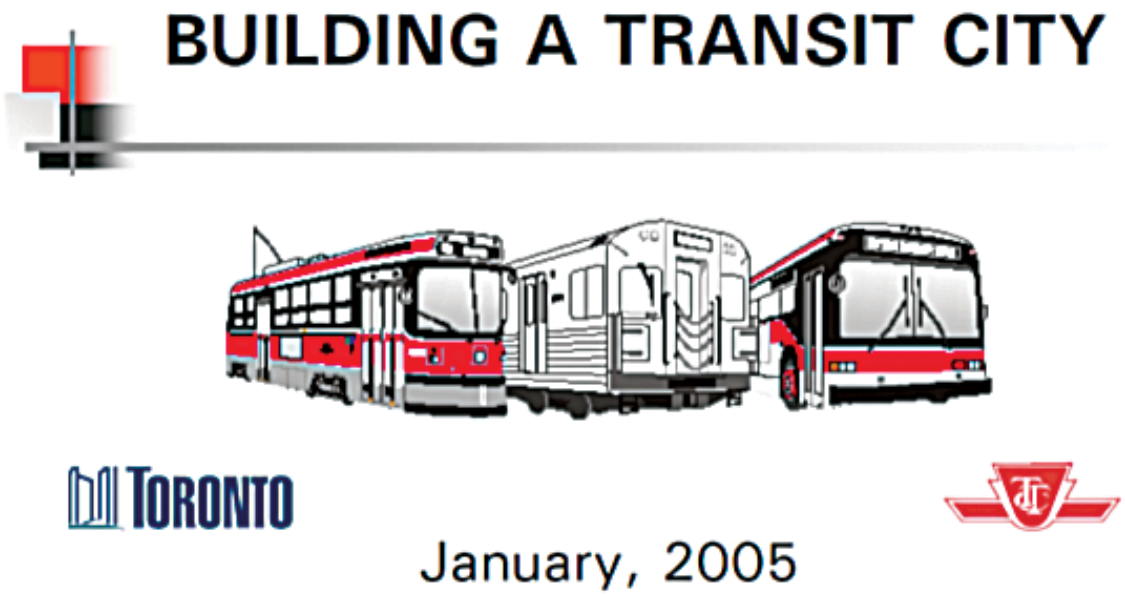
In 2003 (May) the TTC approved that one third of the costs for the environmental assessments of the Sheppard (and Spadina) extensions be sought from the federal and provincial governments respectively, with an application to the Canada Strategic Infrastructure Fund *(TTC Meeting No. 1827 Thursday, May 1, 2003)*.

In 2003 (October) a provincial election was held. Dalton McGuinty was elected Premier of Ontario.

In 2003 (December) David Miller became Mayor of Toronto, serving until 2010.

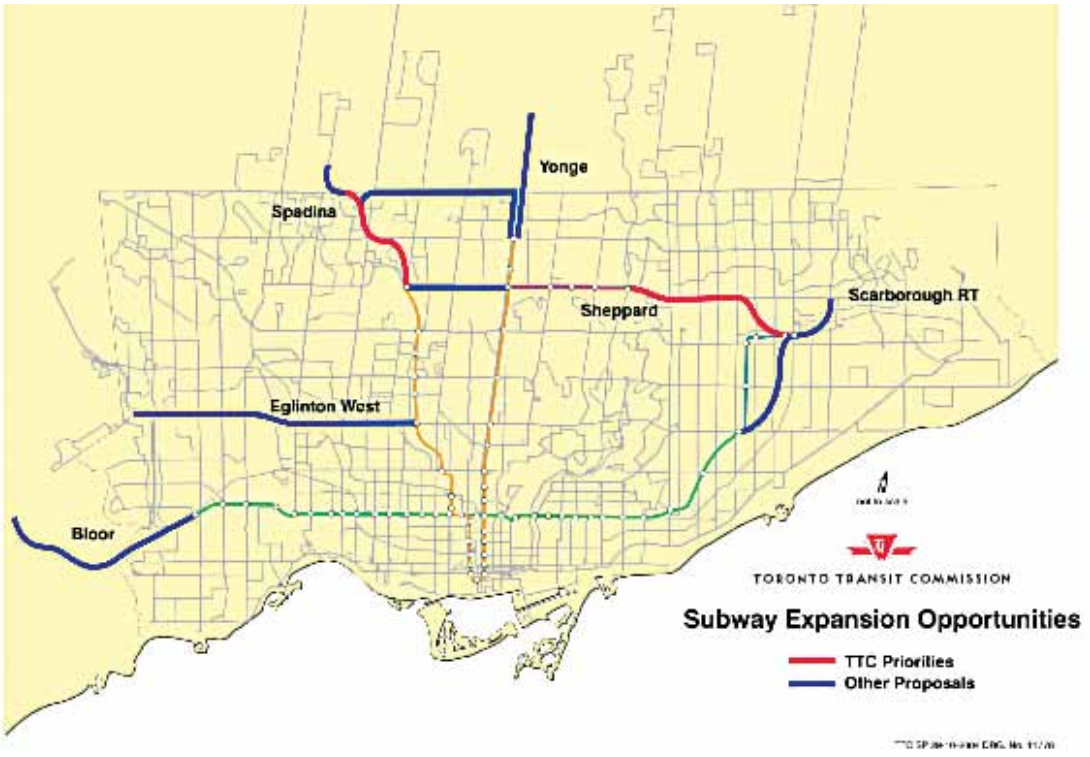
In 2005 (January) the Commission approved in principle the ***"Building a Transit City"*** plan identifying the **Sheppard Subway extension as a TTC priority project**. The Commission directed staff to closely examine each route for priorization *(Building a Transit City, Meeting Number 1851, Wednesday January 12, 2005)*.

Figure 12: Building a Transit City



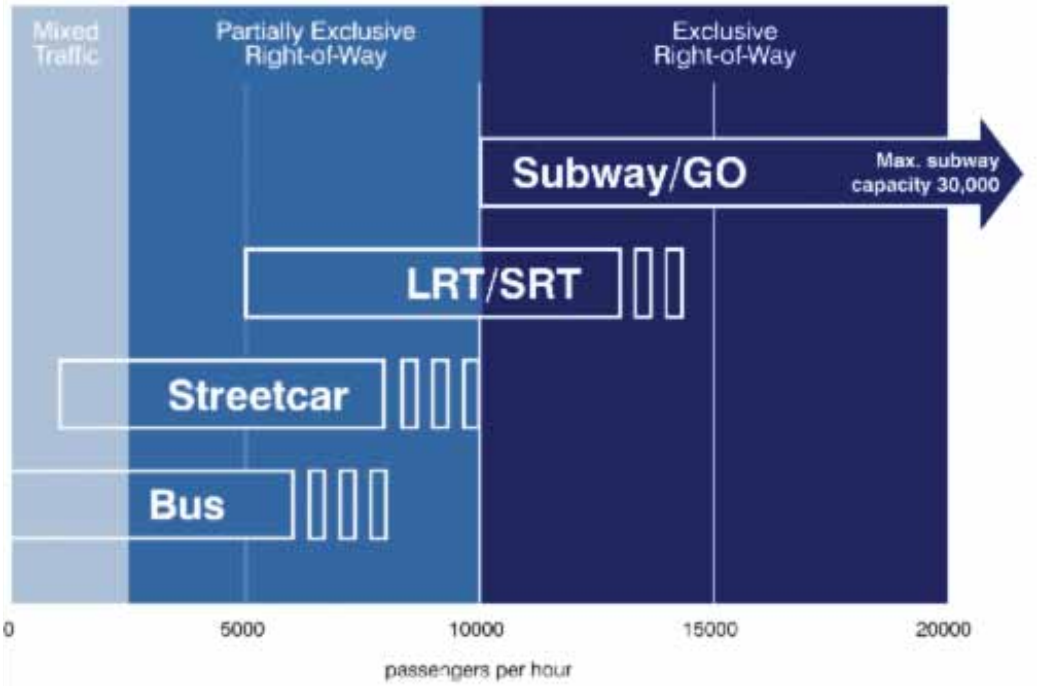
The TTC Building a Transit City plan also highlighted other Toronto subway priorities, namely University-Spadina extension, Eglinton West, Bloor West, Yonge extension and Scarborough.

Figure 13: TTC Subway Expansion Opportunities, 2005



The TTC *Building a Transit City* plan identified subways as the best mode of transit for lowering commute times and moving large numbers of people across Toronto.

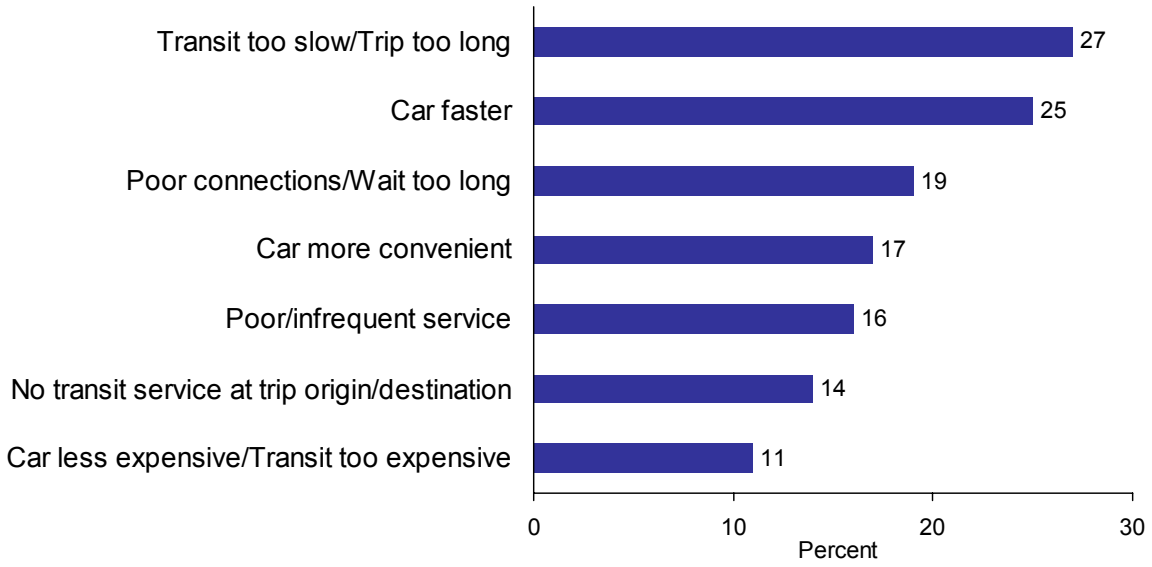
Figure 14: Ridership Capacity Comparisons: Bus, Streetcar, LRT, Subway



Further, *Building a Transit City* identified that the top three reasons why Torontonians do not use transit is because

1. "transit too slow/transit too long"
2. "car faster"
3. "poor connections/wait too long"

Figure 15: *Building a Transit City*: Top Reasons Why Torontonians Don't Use Transit



In 2005 (May) an article in the Globe and Mail, entitled "Rapid transit? Not on Spadina" stated:

> *Instead of living up to pre-construction reports that streetcars on dedicated lanes would cut travel time from Bloor Street to Queen's Quay by 5 minutes … the 510 appears to take longer than the buses that plied the route from 1948 to 1997. A TTC document obtained last month says the trip takes one minute longer in the afternoon rush hour than in 1990. Data on historical and current transfers indicate a 17-minute bus trip in 1993 now takes 19 minutes by streetcar.*

In 2005 (July) the TTC approved procurement for property acquisition to implement a future **Sheppard Subway**/GO Transit Station (Kennedy Road) *(Meeting No. 1858, Wednesday, July 13, 2005).*

In 2006 (April) the TTC noted and approved advising the provincial minister that cost of updating the 1992 Environmental Assessment for the **Sheppard Subway** was estimated at $2 million *(Meeting No. 1868 Wednesday, April 19, 2006).*

In 2006 (August) the TTC noted that construction for the **Sheppard Subway** would need to be staged *(Meeting No. 1873 Wednesday, August 30, 2006).*

In 2006 (October) David Miller was re-elected Mayor of Toronto. Campaign literature made no mention of rejecting the Sheppard Subway in favour of light rail, or promotion of a transit plan that ran contrary to the Official Plan.

In 2006 (December) Councillor Adam Giambrone was appointed Chair of the TTC.

In 2007 (January) the TTC noted that **Sheppard Subway** extension to Scarborough Centre would cost $948 million over the next ten years and was estimated to cost in the order of $2.4 billion in total. The TTC Base capital budget 2007 to 2016 included $2 million for an environmental assessment of the **Sheppard Subway**.

The TTC noted that no funding had been identified. At the same meeting the TTC approved $3 million in capital funding to enable the TTC to proceed with a series of environmental assessments on the rapid transit projects "highlighted in the mayor's mandate"* (Meeting No. 1878, January 31, 2007). This was confirmed by the Budget Committee at a Special meeting held early February (*Budget Committee Meeting No. 7 (Special), Friday February 16th 2007*).

* Scrapping the **Sheppard Subway** and replacing it with a street level LRT along Sheppard Avenues was never "highlighted," or even mentioned, in the then Mayor's 2006 campaign literature.

Though light rail was proposed for other areas of the City, it is shocking that this rationale was used as the public policy justification for allocating money towards a light rail environmental assessment for Sheppard - with an alignment that had previously been rejected by the public and ruled out on network, transportation, land use and cost grounds. Furthermore, that no funding could be identified for $2 million Sheppard Subway environmental assessment update noted in the report.

2.2.3. 2007 - 2011: 2007 Transit City Light Rail Plan

In 2007 (March 16) the newly-appointed Chair of the TTC Councillor Adam Giambrone launched a $6 billion Light Rail Plan via press release. This news release removed the **Sheppard Subway** extension from the Toronto's Transportation Plan, replacing it with light rail vehicles sharing the road with cars. It also proposed an entirely new route in the Sheppard corridor that had never been studied or proposed before. The new route ignored the Major Centres Plan that had been the cornerstone of Toronto's Official Plan since 1980, a 27 year period. It also ignored the findings of the 1992 Environmental Assessment and numerous TTC and Metro Toronto/Toronto population growth, planning and ridership studies. There was no public consultation or review, debate and approval by Council prior to the 2007 Transit City Light Rail press release announcement *(TTC: Toronto Transit City – Light Rail Plan)*.

In 2007 (March 21) five days following the press release the TTC endorsed the 2007 Transit City Light Rail Plan, and sent the plan out for "endorsement and support" to the following bodies: The City Of Toronto; The Greater Toronto Transportation Authority; The Canadian Urban Transit Association (CUTA); The Federation Of Canadian Municipalities (FCM); The Province Of Ontario; And The Government Of Canada Requesting Their Endorsement And Support" *(Meeting No. 1880 Wednesday, March 21, 2007)*.

In 2007 (June 13), three months after the press release, the TTC approved the 2007 Transit City plan and aggressive implementation schedule *(TTC Meeting No. 1883, Wednesday, June 13, 2007)*.

In 2007 (June 15) the Province unveiled its transit plan MoveOntario 2020. This plan included $11.5 billion for the 2007 Transit City LRT plan *(MoveOntario 2020)*.

In 2007 (July 16-19), the Council approved the preparation of a work plan with financials *(only)* by the year end related to environmental and engineering studies for the 2007 Transit City Light Rail plan. This was introduced as part of a broad policy focus on reducing greenhouse gases and smog causing polutates. It was buried within a 228 page Committee report *(Council Meeting Minutes, July 16-19, 2007)*. Council did not approve the Transit City plan, nor consider or rescind the approved Sheppard Subway plan.

In 2007 (October) a provincial election was held. Dalton McGuinty was re-elected the Premier of Ontario.

In 2007 (November 14) TTC received a staff report and approved expenditures in the amount of $22.9 million in 2008 and 2009 for environmental assessments ($5.8 million) and preliminary work on the 2007 Transit City Plan ($17.1 million) *(Meeting No. 1889 Wednesday, November 14, 2007)*.

In 2008 (January) Metrolinx issued a report on a study tour of the UK and Metropolitan Madrid, raising issues about TTC subway costs. Madrid, for example, built 150 kms over an eight-year period using a public-private model at a cost of $90 million per kilometre. The first segment of the **Sheppard Subway** by comparison was built at a cost of $170 million per kilometre. *(TTC subways twice as costly as Madrids, Toronto Star January 24, 2008)*.

In 2008 (July 15) Council approved the recommendations of the streamlined Sheppard East LRT Environmental Assessment study to allow staff to begin detailed design as soon as possible, and authorized staff to submit the final Environmental Assessment Study report for the 30-day public review period, as required to complete the EA process for this project *(Council Meeting Minutes, July 15-16, 2008)*. This 2008 Environmental Assessment:

- Erroneously claimed alignment with the Official Plan (which at the point of EA publication did not include high order transit along Sheppard Avenue east of McCowan);
- Did not undertake a full assessment of all the factors, including the transportation, social, natural environment, land use and costs factors as examined by the previously approved 1992 Environmental Assessment;
- Did not consider the long term operational, labour, storage, and vehicles costs associated with the LRT;
- Changed the route so as to bypass Scarborough Centre, thus significantly reducing ridership expectations for the line;
- Removed the **Sheppard Subway** option from all further consideration in a single paragraph, despite the Major Centres Plan and over 30 years of planning, ridership, development potential studies.

In 2008 (September) the Planning and Growth Management Committee approved amendment Number 57 of the Official Plan (Council approval July 15, 16, 17 and enacted September 25, 2008) to extend high order transit along Sheppard Avenue from McCowan to Meadowvale.

In 2008 (December) the TTC approved $50 million for transit consultants for the new Transit City Light Rail Plan - $25 million for Transit City Associates (a joint venture of AECOM Ltd., Parsons Brinckerhoff and Giffels Associates Ltd./IBI Group) and $25 million for Comtech International Design Group Inc *(TTC Meeting Minutes, December 17, 2008)*.

In 2009 (April) the TTC approved a report recommending Bombardier Transportation Canada Inc. build 204 fully accessible Light Rail Vehicles (LRVs). The total cost of the contract was $1.2 billion. A contract award to Bombardier Transportation Canada Inc. was contingent upon funding. The contract stipulates a minimum 25-per-cent Canadian content requirement *(Meeting No. 1908, Monday, April 27, 2009)*.

2.2.4. 2007 Transit City Light Rail Plan Planning and Decision-Making

TTIL have been unable to find records or reports of:

- Council reviewing, debating and/or rescinding approvals for the **Sheppard Subway**;
- Council reviewing, debating and/or rescinding approvals for the **Sheppard Subway**, in favour of an alternate (light rail transit) plan for the corridor, before significant expenditures by the TTC on environmental assessments, design consultants and vehicles;
- The $6 billion Transit City Light Rail plan in the public domain, or presented to Council, prior to the March 16, 2007 press release by the Chair of the TTC;
- Planning studies confirming the importance, or extensive public consultation, leading up to the amendments to the Official Plan in 2008; which involved a significant change in the transit route and network/centre alignment for the Sheppard Avenue corridor.

2.2.5. Sheppard Subway Sunk Costs, 1980-2011

TTIL estimates that 100s of millions of dollars (in 2011 dollars) was invested by all three levels of government (City/Metro Toronto, TTC, Province and Federal) between 1980 and 2007 on the **Sheppard Subway** extensions (east and west), including:

- A lengthy tail track of 835 meters west of Yonge Street;
- Connecting Wye tracks on the south west side of Yonge Street to tail track to "accommodate future westbound extension";
- Stations and platform design, placement and construction (five stations) to support both east and west extensions, and higher commuter traffic and longer trains as predicted by ridership forecasts associated with extension of the line to Scarborough Centre;
- Rapid transit studies;
- Development of functional specifications/preliminary designs;
- Technology investigations, comparative studies;
- Environmental assessment and approvals;
- Financial analyses and plans, implementation of development charges and negotiations of funding agreements;
- Official plan studies and amendments; and
- Other staff/officials time devoted to the project.

The majority of these sunk costs can be recouped with the completion of the design and construction work for the **Sheppard Subway** extension.

Figure 16: Example: Sheppard-Yonge Station Sunk Costs Related to Extension of Line

Westbound platform - constructed (not in use)

Centre platform – built to accommodate increased ridership with extensions to Scarborough Centre and Downsview

Station length – portion of station walled off - but constructed to accommodate increased platform and vehicles with extensions east and west (& increased ridership)

Section 3.

SHEPPARD SUBWAY: 1992 ENVIRONMENTAL ASSESSMENT

In 1992, an Environmental Assessment Study was conducted by Metro Toronto and the TTC to determine the most appropriate options for improving transportation services in northeast Toronto. The study examined in detail transportation, social, environmental land use, and cost factors for the Sheppard corridor from Yonge Street to Scarborough Town Centre.

The study concluded that subway for the Sheppard corridor was the optimal transit option, including on cost grounds. Specifically, the 1992 Sheppard Subway Environmental Assessment concluded:

"While the initial capital costs for some options (e.g., busway, LRT) would be less expensive than a subway, they offer reduced quality of service, result in increased congestion on the road network, have negative environmental impacts on the local community, are unable to achieve future land use objectives, fail to respond to future ridership growth and carry increased operating costs. If Metropolitan Toronto is to fully achieve its urban structure, environmental and social goals, while at the same time choosing a technology with the most economical (capital and operating costs) performance in the long run, a subway along Sheppard Avenue is the preferred choice."

••• 3.1. Subway Recommended Over LRT on Efficiency, Environmental and Cost Grounds •••

3.1.1. 1992 Environmental Assessment Overview

There has only been one study that has undertaken a full assessment of transit options along Sheppard Avenue, the 1992 Sheppard Avenue Environmental Assessment prepared by Delcan and Cole Sherman. A Sheppard Subway had been identified as a priority project in the Ontario government's Let's Move strategy announced by Premier David Peterson in 1990 and subsequently endorsed by Premier Bob Rae. The Environmental Assessment was required to comply with government regulations at the time.

This study examined in detail a range of transit options for Sheppard Avenue - including "do nothing," Bus Rapid Transit, Light Rail Transit (LRT), Medium Rail Transit (MRT) and Subway/Heavy Rail Transit (HRT) options. The report included over 400 pages of detailed analysis of the various options against the following factors/potential impacts as required by legislation:

- Transportation
- Social Environment
- Natural Environment
- Land Use
- Capital and Operating Costs.

After an extremely thorough investigation the study recommended the Sheppard Subway as the preferred transit option for the corridor. Specifically when Subway was compared against an LRT approach, and summarized in Table 5.6 of the Environmental Assessment report (below), it was found that LRT would:

- Displace more residential units;
- Displace more jobs;
- Affect more heritage resources;
- Affect more archaeological resources;
- Result in higher ambient noise levels;
- Impact more driveways;
- Restrict access to more intersections;
- Restrict more kilometres of road during construction;
- Have insufficient carrying capacity to meet future demand;
- Have reduced platform size;
- Provide poorer quality inter-regional/rapid transit transfers;
- Result in negative visual impacts;
- Be less appealing to the target ridership due to lower quality of service (speed, capacity); and
- Be less cost effective over the long run.

Table 6: 1992 Environmental Assessment Report (Table 5.12)
Comparison of the Environmental Impacts of Sheppard LRT and Sheppard Subway

COMPARISON OF THE ENVIRONMENTAL IMPACTS OF SHEPPARD LRT AND SHEPPARD SUBWAY TABLE 5.12		
FACTOR	SHEPPARD LRT[1]	SHEPPARD SUBWAY
Capital Cost (Construction, Property, Yards, Vehicles)	$ 0.95 billion	$ 1.9 billion
Rapid Transit Vehicle Costs	$ 450 million	$ 165 million
Annual Rapid Transit Operating Cost (at 15,000 persons per hour)	$ 55 million	$ 26 million
Net Annualized Cost	$ 132 million	$ 134 million
Capacity to Respond to Ridership Growth	Very Limited	High
Driveways Affected by ROW	250	0
Number of Signalized Intersections Affected	32	0
Number of Intersections with Access Restricted	21	0
Suburban Road/Rapid Transit Grade Separations	12	0
Visual Intrusion	Moderate	None
Impact on Pedestrian Movements	High	None
Homes Experiencing Higher Noise Levels	402	0
Heritage/Archaeological Resources Affected	15	1
Full/Partial Residential Properties Required for ROW Acquisition	308/102	3/0
Full/Partial Commercial Properties Required for ROW Acquisition	23/66	1/4
Households Displaced for ROW Acquisition	502	3
Jobs Displaced for ROW Acquisition	300	0

[1] Includes grade separations of major north-south streets.

It is particularly noteworthy that the Sheppard Subway option was deemed preferable to an LRT option on the basis of ability to meet future ridership demand, and overall cost.

3.1.2. Ability of Subway to Meet Future Ridership Needs

The 1992 Environmental Assessment concluded that a Sheppard LRT option was deemed not capable of meeting projected demand. The base ridership estimate for the Sheppard Subway was estimated at 14,000 passengers in the Peak Hour per Direction, with conservative estimates of 23,000 passengers by 2031, a passenger volume that LRT could not accommodate.

It was concluded that an LRT option would be able to *"provide capacity for only two-thirds of the projected 2011 peak period demand on opening day and would therefore operate at capacity very soon after commencing service."* In addition it was noted that LRT would *"not provide any reserve capacity to respond to future longer term growth in demand"* in a region forecast to experience population growth of 6 million over the next 50 years.

Consistent with the Major Centres Plan and studies undertaken by North York and Scarborough, the Subway option was more effective at supporting intensification at nodes around proposed stations and was therefore a better fit with long-term transportation and land use objectives.

3.1.3. Ability of Subway to Reduce Future Gridlock on Sheppard

In line with the City of Toronto's Official Plan supporting intensification along major avenues, it is noted that absolute demand for road travel on Sheppard as a result of natural growth is expected to increase regardless of choice of transit option. The Subway option, when compared to street based LRT, is better able to address this concern and contribute to reducing greenhouse gases and future gridlock. The subway will operate in either underground or a completely grade-separated right-of-way not interfering with automobile traffic. It is also the better alternative for encouraging car users to instead use rapid transit.

3.1.4. Cost-Effectiveness of Subway versus LRT

The LRT alternative was also rejected by the 1992 Environmental Assessment based on overall cost-effectiveness. While the initial capital costs to construct an LRT option are less than comparable construction costs for a subway, the study noted that an LRT option had higher long-term operational and labour costs associated as well as higher vehicle, storage and property acquisition costs.

Based on the costs from the 1992 Environmental Assessment, the Sheppard Subway option was deemed the best transit route on a cost-effectiveness basis for the City of Toronto.

Annual operating costs of the LRT in 1992 were estimated to be more than double that of subway ($55 million versus $26 million), vehicle costs higher ($454 million versus $165 million), storage costs higher ($235 million versus $150 million), and property acquisition costs higher ($133 million versus $60 million).

Table 7: LRT vs Subway Costs 1992 Environmental Assessment

Category	LRT $millions	LRT < > Subway Costs	HRT/Subway $millions
Operating	55	>	26
Vehicles	454	>	165
Storage	235	>	150
Property Acquisition	133	>	60
Construction	610	<	1650

Assuming the 1992 costs and holding storage, vehicles and property acquisition constant, the higher capital costs of the subway ($593 million) would be recovered from operating savings in less than 21 years, after which there would be significant cost savings to the project.

3.1.5. Comparison of 1992 Findings to 2008 "STREAMLINED" Environmental Assessment

The 2008 "streamlined" Environment Assessment for the Sheppard LRT of the 2007 Transit City plan summarily rejected a subway option in one paragraph with no supporting documentation. Only one other option, Bus Rapid Transit (BRT), was considered by the 2008 Environmental Assessment. This was rejected in favour of LRT in less than one page with little detailed discussion.

There was no reference in the 2008 EA to the extremely detailed findings and strikingly different conclusions of the prior 1992 Environmental Assessment. Thirty years of planning for the Sheppard Subway and examination of a comprehensive set of transportation, social, environmental, land use and economic factors were simply ignored. A summary comparison of the findings of the two studies is provided in the table below.

Table 8: 1992 Environmental Assessment versus 2008 Environmental Assessment: Comparison of Key findings

Category	1992 Environmental Assessment Findings	2008 Environmental Assessment Findings
Overall Cost-effectiveness	Subway (with detailed summary)	LRT (no details provided)
Carrying Capacity	Subway (LRT insufficient capacity)	LRT (Insufficient demand for Subway)
Residential Units Displaced	Subway better	not addressed
Jobs Displaced	Subway better	not addressed
Heritage Resources	Subway better	not addressed
Archaeological Resources	Subway better	not addressed
Noise Levels	Subway better	not addressed
Driveways Affected	Subway better	not addressed
Intersections Restricted	Subway better	not addressed
Road Restrictions (construction)	Subway better	not addressed
Visual Impacts	Subway better	not addressed
Ridership	Subway better	not addressed
City Plan Objectives	Subway better	not addressed

••• 3.2. Route Alignment •••

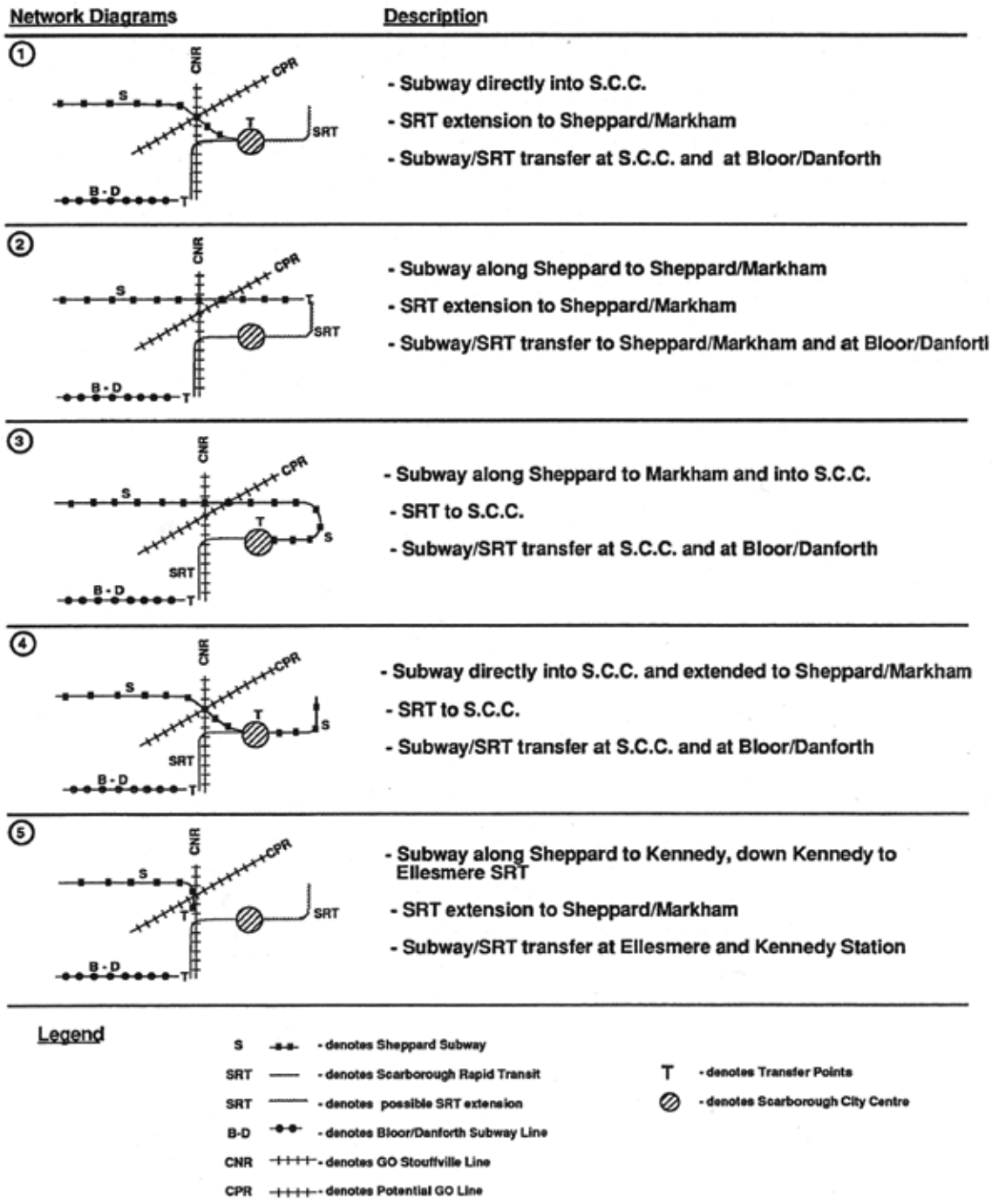
3.2.1. Network Screening

The 1992 Environmental Assessment assessed five route alignments for the Sheppard Subway. Each alignment was assessed against future anticipated expansion of the Scarborough Rapid Transit (SRT) line, planning policy with respect to use of employment areas, and TTC policies and directives at the time. Much was made of the intent at the time to extend the SRT to Markham/Sheppard (which is not part of the current Metrolinx plans).

Table 9: Sheppard East Network Options Analysed

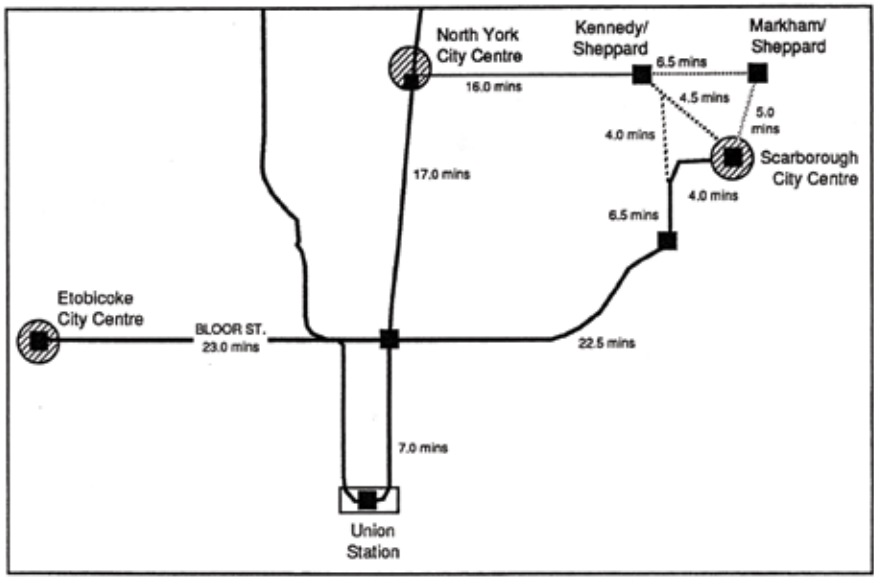
Route Alignment/Network Options	SRT Expansion With Each Option
1. Subway directly into Scarborough City Centre	SRT extension to Sheppard/Markham
2. Subway along Sheppard to Sheppard/Markham	SRT extension to Sheppard/Markham
3. Subway along Sheppard to Markham and into Scarborough City Centre	SRT to stop at Scarborough City Centre
4. Subway directly into Scarborough City Centre and extended to Sheppard/Markham	SRT to Scarborough City Centre
5. Subway along Sheppard to Kennedy, down Kennedy and to Ellesmere	Meeting SRT at Ellesmere SRT extension to Sheppard/Markham

Figure 17: Network Options Schematics (Exhibit 8.2.2., 1992 EA)



The routes were analyzed against a range of factors, including transportation, such as travel time between major centres - Etobicoke, North York and Scarborough - development/landuse and costs factors.

Figure 18: Travel Times Between Major Centres (Exhibit 8.2.3.)



Reference: T.T.C. Information on Distances and Operating Speed

0.0 mins *Travel Time Between Time Points Shown in Minutes*
All Transfers assumed to be 3 Minutes

Time Points (includes transfer locations)

Indicate the Approximate Location of the City Centres

Results of Screening

Options 1, 2, 3 and 5 were screened out at the first stage of 1992 analysis. These were seen as less effective in promoting and ensuring the:

- Prominence and pre-eminence of the Scarborough Centre;
- Accessibility across the entire City and between the major centres - Scarborough Centre, North York Centre , Yonge/Bloor, and Etobicoke Centre.

Option 2, similar to the *2007 Transit City Light Rail Plan extending to Markham Road*, was screened out based on:

- Travel time and number of transfers required to access Scarborough Centre from other major centres, or vice versa, including an additional 10 minutes travel time from Scarborough centre to North York compared with more direct routes;
- Directness of route;
- Convenience and access other transit;
- Service provided to areas of largest development and employment potential;
- Cost (including costs of extending SRT north)
- Did not meet the planning goals of the Official Plan (connecting the major centres).

The 2007 Transit City Light Rail plan was never considered, due to lack of population and employment in the area which has not changed considerably since 1992.

Option 4 of extending the subway/rapid transit east of Scarborough Centre was screened out as it was the subject of a separate environmental assessment.

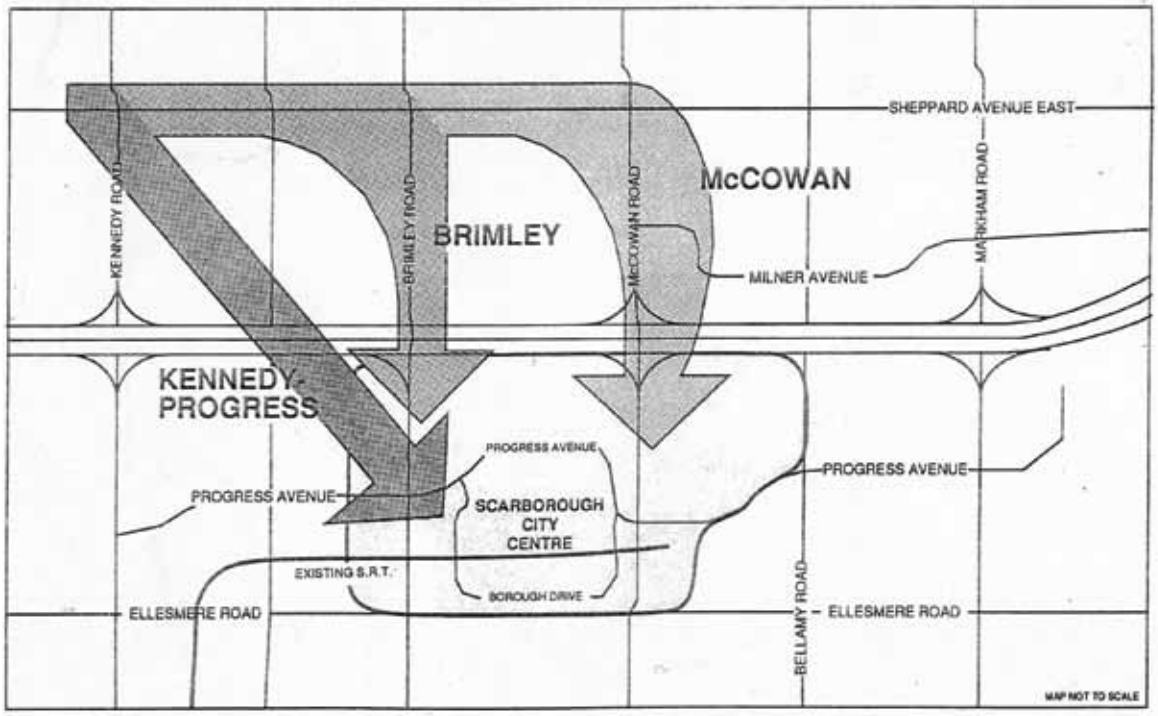
In 1992 the public overwhelmingly rejected (74%) routes that "did not serve the Scarborough City Centre directly."

3.2.2. Corridor Alternatives Analysis

A range of corridor alternatives were analyzed within Option 1. These included:

- Kennedy-Progress – from Sheppard/Kennedy direct to Scarborough City Centre through Agincourt and Progress west area;
- Brimley – along Sheppard to Brimley, south on Brimley and on to Scarborough City Centre ;
- McCowan – along Sheppard to McCowan, south on McCowan and on to Scarborough Town

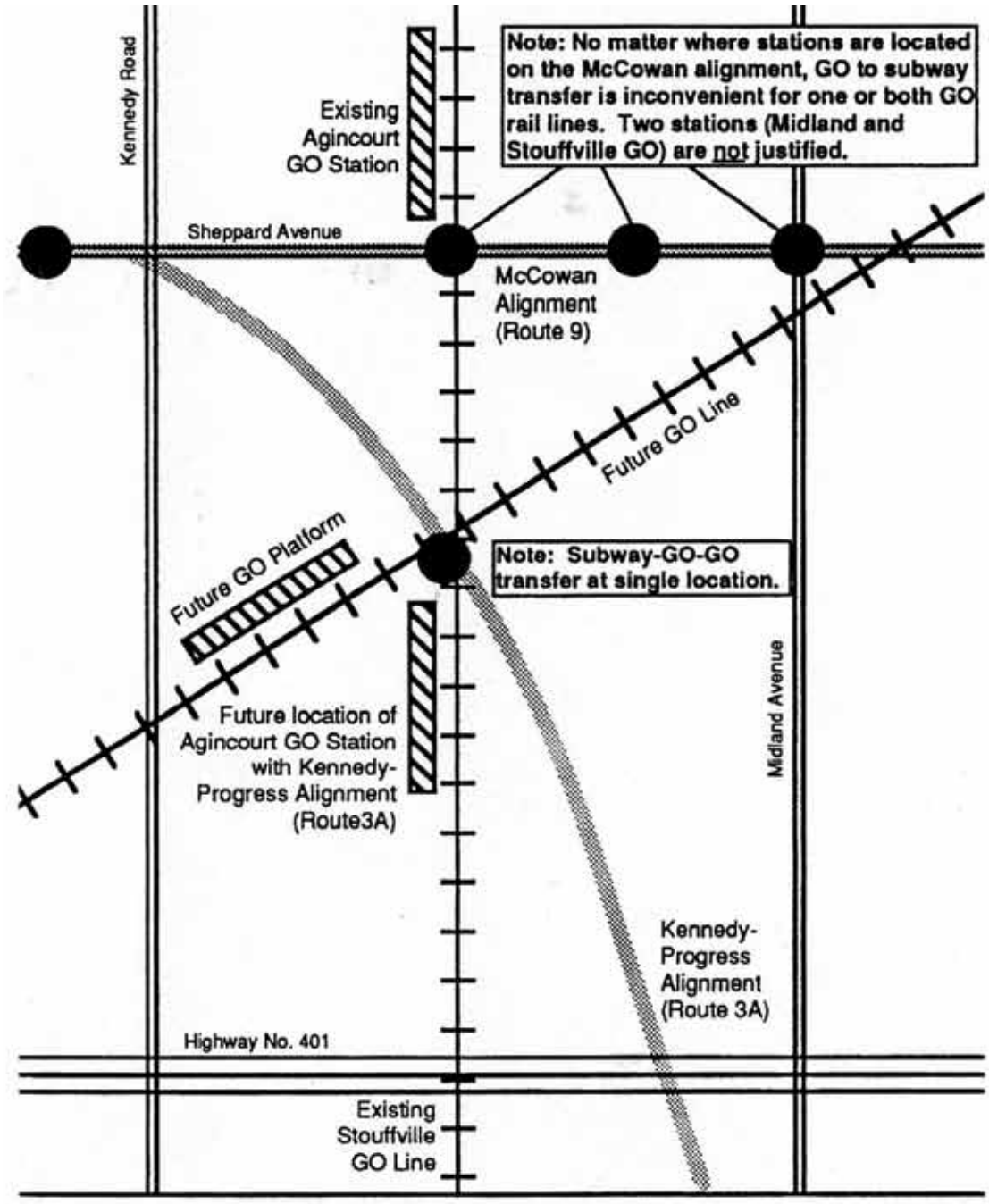
Figure 19: Sheppard Corridor Options (Exhibit 8.3.1)



Brimley was screened out during the first phase of analysis, with Kennedy-Progress and McCowan identified as the two preferred routes. Of these, Kennedy-Progress was deemed the most preferred route based on network and other transit connections, population and employment served and capital and operating costs.

The strategic interface of GO and a subway station was a major factor in the selection of the Kennedy-Progress route as the recommended alignment for the subway, together with the long term development potential of the CN/CP catchment area (area bounded by Highway 401, Kennedy Road, Sheppard Avenue and Midland Avenue). It was recognized at the time that transitional land use policies (pre- and post-subway) would be necessary to realize the long term potential of the area. TTC was of the view that this area offered a unique situation within the City to intensify without disrupting existing stable neighbourhoods and advocated strongly for mix use development.[10]

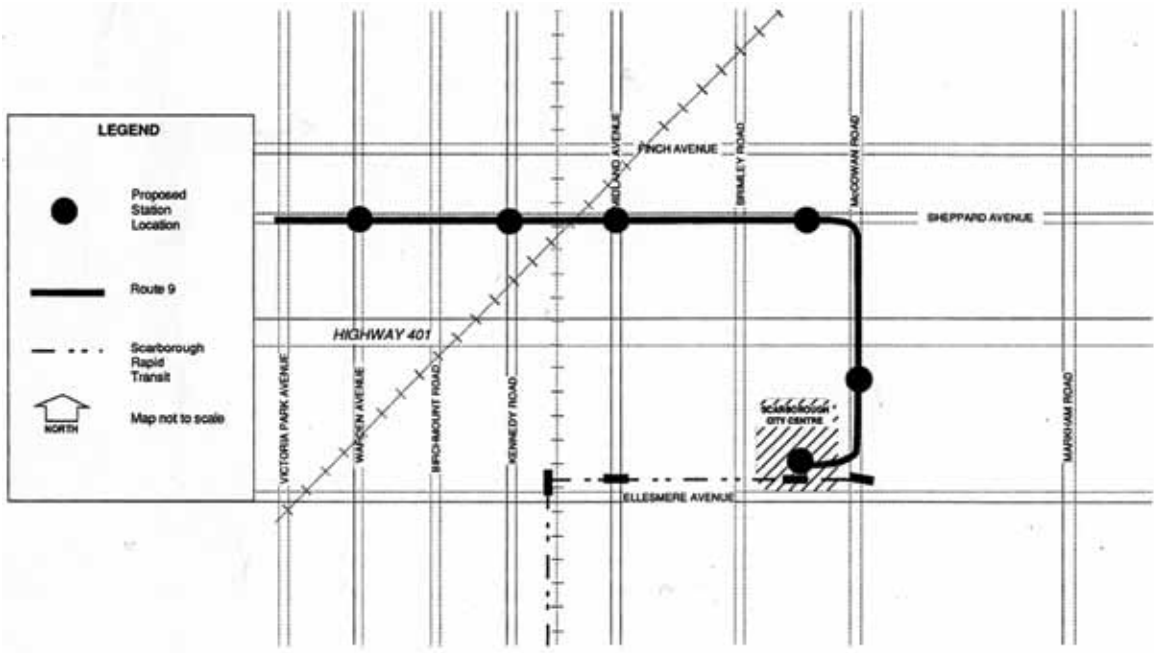
Figure 20: Network Interface of Kennedy-Progress Route (Exhibit 8.5.3)



[10] http://www.toronto.ca/legdocs/2002/agendas/committees/sc/sc021112/it006a.pdf)

The main advantage that the McCowan alignment had over the Kennedy-Progress alignment was that it maintained the potential for future subway expansion south using existing SRT alignment. It would support a "one seat ride" around the loop from Yonge/Sheppard to Scarborough Centre to Kennedy to Yonge/Bloor. To use the Kennedy-Progress alignment and extend the network south (along the SRT alignment) would require a loop east and then west beyond Scarborough Centre; an alignment not likely to be acceptable due to land use, operation, service and cost impacts.

Figure 21: McCowan Alignment (Exhibit 8.5.2)



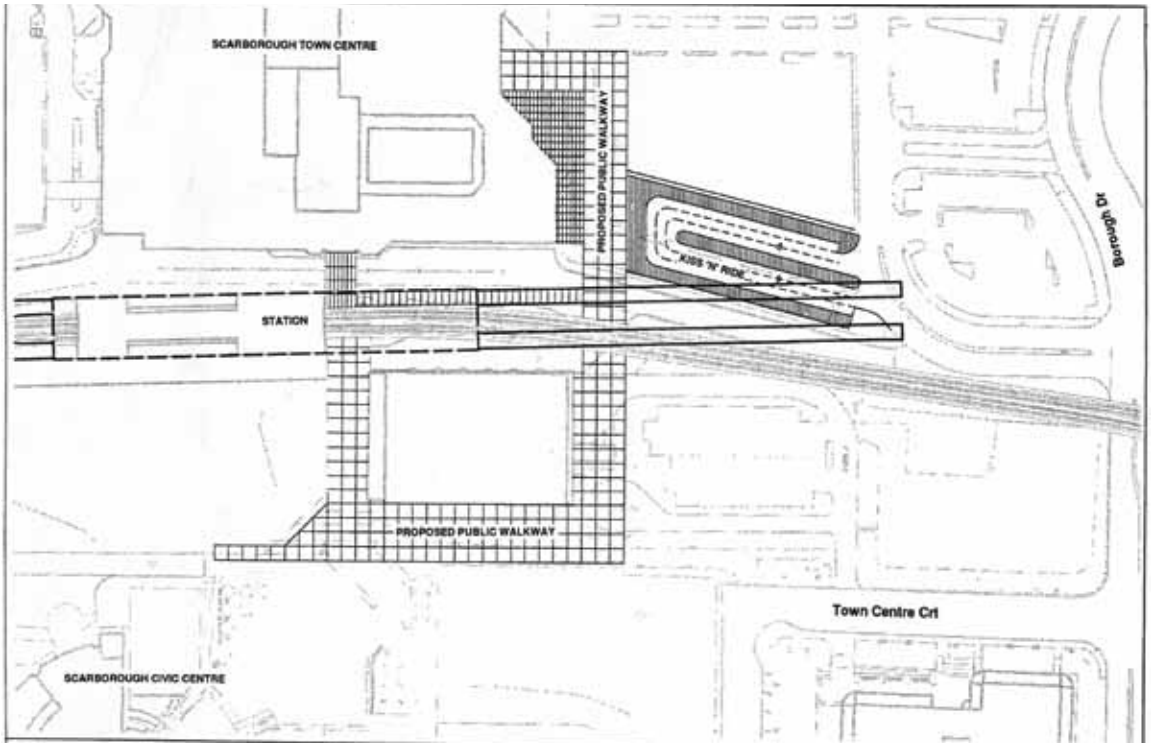
••• 3.3. Technical Drawings •••

Detailed technical drawings exist for 8.4 km extension east bound, include the following:

- Recommended horizontal and vertical alignments along the full 8.4km from North York to Scarborough City Centre.
- Station design and placement, including emergency exits, ventilation shafts and fans, and two "side" designs in addition to a centre platform to facilitate large volumes of riders between Sheppard and Yonge Street
- Location and design of ancillary services, passenger pick-up/drop-off areas, commuter parking lots.

An example of stations drawings is included below.

Figure 22: Scarborough City Centre Recommended Layout (Exhibit 8.6.2)



Horizontal and vertical alignment drawings for the entire route from Don Mills to Scarborough Centre are contained in Section 10.3.

Detailed ancillary services, construction risk mitigation and monitoring strategies were also developed as part of the 1992 Environmental Assessment.

Section 4.

SHEPPARD SUBWAY COSTS

Preliminary cost estimates for the Sheppard Subway were provided by Metrolinx. Metrolinx is an agency of the Government of Ontario created under the Metrolinx Act 2006 to "improve the coordination and integration of all modes of transportation in the greater Toronto and Hamilton Area."

Metrolinx – and its engineering consultants – provided cost estimates for four different staging options. The results of this analysis are presented in this section. As well, a history of TTC cost estimates for the Sheppard Subway is provided.

4.1. TTIL/Metrolinx Route Alignment/Corridor Options

TTIL with the assistance of Metrolinx, and its consultant Steer Davies Gleave ("SDG"), examined the costs for four different subway route alignment options for the Kennedy-Progress and McCowan corridors. These corridors were consistent with preferred corridors identified by the 1992 Environmental Assessment.

Kennedy-Progress – McCowan Corridor Options

Option 1: Sheppard West and East – consistent with the 1986 Council approval, and 1992 Environment Assessment Alignment for east side.

Option 2: Sheppard East – 1992 Environment Assessment Alignment

Option 3: Sheppard East - alternate alignment in the 1992 Environmental Assessment that provided for future conversion to subway around the entire route from Yonge/Sheppard to Scarborough to Kennedy, and deemed by the planning consultants to have the significant development potential for the City

Option 4: Two stop extension on the Eastern end that could be delivered quickly and on a limited budget for comparative purposes.

The route characteristics are summarised below:

- Subway technology (compatible with current Sheppard line);
- Run time of 25 minutes;
- Fleet storage facility to be provided at an expanded Wilson yard as part of the wider TTC maintenance strategy;
- Opening year 2020;
- Service headway of 5 minute with 4-car subways trains to match current Sheppard Line service patterns; and
- Platforms to be planned for the potential of 6-car subway trains in the future (as is the current Sheppard line).

Route alignments not carried forward in the analysis are detailed in Section 10.4.

4.1.1. Option 1 – East & West Sheppard Subway extension, with EA Alignment

Option 1 is consistent with the 1986 Council approval. It involves eastern and western extensions to the existing 5.5km tunnel between Sheppard-Yonge and Don Mills to provide a 16.7 km tunnelled subway. The result would be a continuous subway service between Downsview and Scarborough Centre Stations.

Figure 23: East and West Sheppard Subway Extension only with EA Alignment at Eastern End

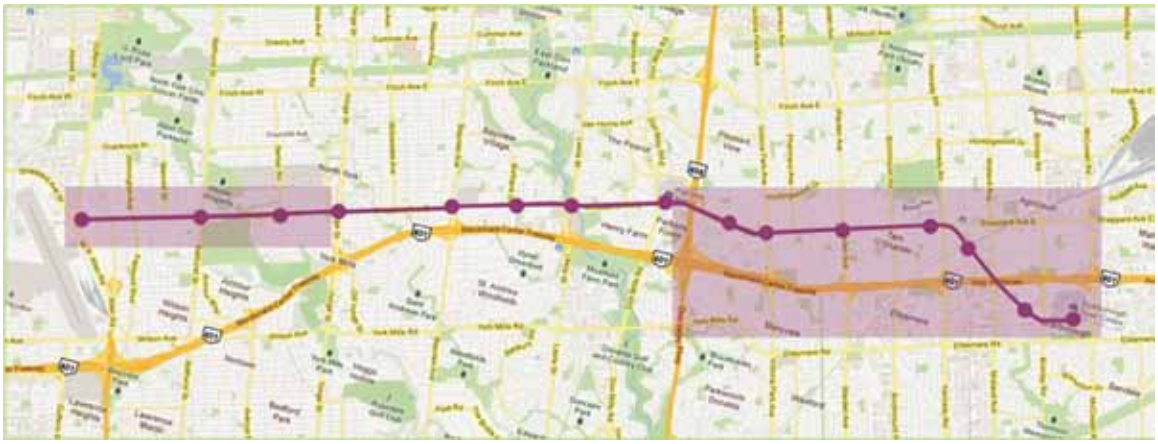


Table 10: Option 1 Travel Times and Speeds

Route Section	Stations (East to West)	Distance	Average Speed	Travel Time
Eastern Extension	Scarborough Progress Agincourt Kennedy Warden Victoria Park Consumers	6.7km	40 kph	10 min
Existing Sheppard Line	Don Mills Leslie Bessarion Bayview Sheppard-Yonge	5.5km	40 kph	8 min
Western Extension	Senlac Bathurst Wilson Heights Downsview	4.4km	40 kph	7 min
TOTAL ROUTE	**16 Stations**	**16.7km**	**40 kph**	**25 min**

4.1.2. Option 2 – East Sheppard Subway Extension only, with EA Alignment:

This option is essentially the same as Option 1, but without the western section between Downsview and Yonge which was not included in the original 1992 Environmental Assessment. With the same route characteristics as Option 1, except that it covers the east extension only, this option could potentially be delivered with reduced planning lead times compared to Option 1 (2018).

Figure 24: East Sheppard Subway Extension only with 1992 EA Alignment

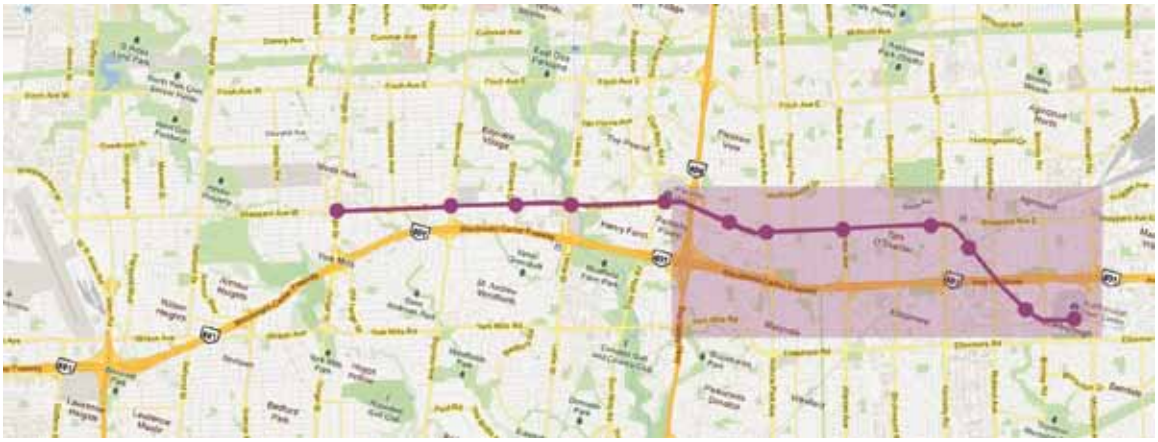


Table 11: Option 2 Travel Times and Speeds

Route Section	Stations (East to West)	Distance	Average Speed	Travel Time
Eastern Extension	Scarborough Progress Agincourt Kennedy Warden Victoria Park Consumers	6.7km	40 kph	10 min
Existing Sheppard Line	Don Mills Leslie Bessarion Bayview Sheppard-Yonge	5.5km	40 kph	8 min
TOTAL ROUTE	**12 Stations**	**12.2km**	**40 kph**	**18 min**

4.1.3. Option 3 – East Sheppard Subway Extension only, with Alternative Alignment

This option is similar to Option 2, but with a different alignment between Agincourt and Scarborough and with a new station to be provided at Brimley instead of Progress. The rationale for this option is that there is residential and commercial development potential adjacent to the proposed Brimley station given its current relatively low density. Area around Progress station on the other hand is fairly developed and its land use is primarily industrial. The alignment also preserves the option for consistent technology and "one seat ride" from Yonge to Scarborough Centre to Kennedy via SRT alignment.

Figure 25: Option 3 East Sheppard Subway Extension only with Alternative Alignment

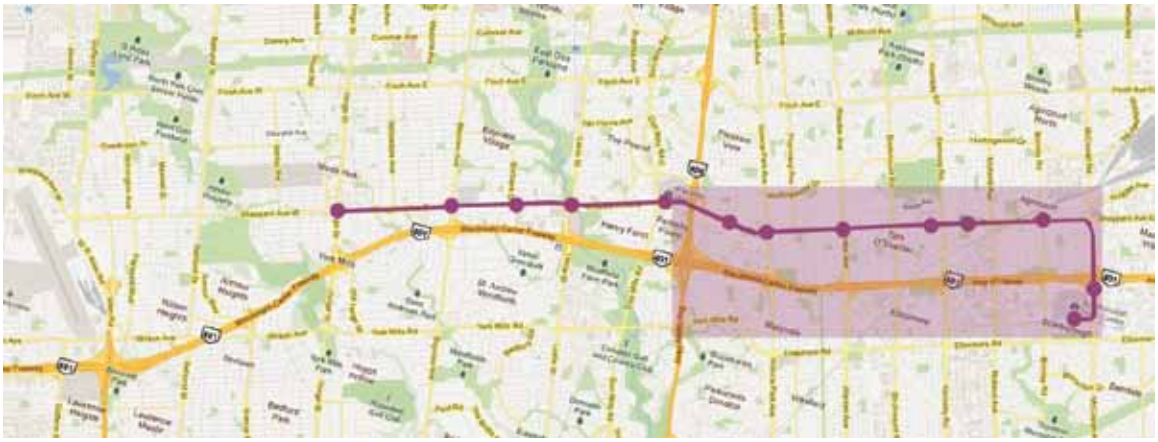


Table 12: Option 3 Travel Times and Speeds

Route Section	Stations (East to West)	Distance	Average Speed	Travel Time
Eastern Extension	Scarborough McCowan Brimley Agincourt Kennedy Warden Victoria Park Consumers	8.0km	40 kph	12 min
Existing Sheppard Line	Don Mills Leslie Bessarion Bayview Sheppard-Yonge	5.5km	40 kph	8 min
TOTAL ROUTE	**13 Stations**	**13.5km**	**40 kph**	**20 min**

4.1.4. Option 4 – Preliminary East Subway Extension, Don Mills to Victoria Park:

This option takes forward the Eastern focused options and pursues a preliminary extension of the subway from Don Mills to Victoria Park. This option could advance the project's in-service date as the shorter section could have shorter planning lead time compared to the other options. This option will connect a significant amount of residents and employment located at Victoria Park and Sheppard to the subway network. The bus network from the east would then feed into Victoria Park Station, which could offer significant benefits to passengers through by-passing the busy intersection of Hwy 404 and Sheppard Avenue. The assumed in-service date is 2016.

Figure 26: Option 4 Preliminary extension of Sheppard subway from Don Mills to Victoria Park

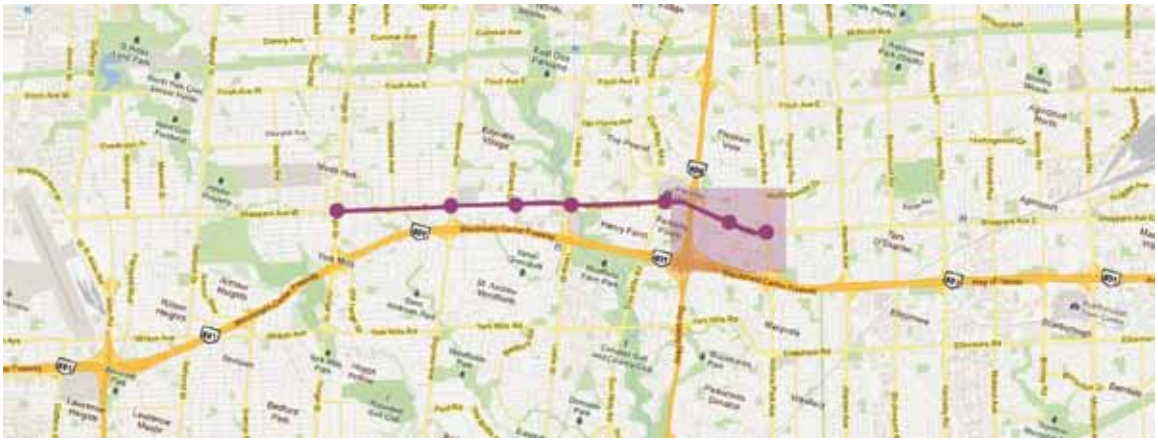


Table 13: Option 4 Travel Times and Speeds

Route section Stations (West to East) Distance Average Speed Travel Time

Route Section	Stations (West to East)	Distance	Average Speed	Travel Time
Existing Sheppard Line	Sheppard-Yonge Bayview Bessarion Leslie Don Mills	5.5km	40 kph	8 min
Eastern Extension	Consumers Victoria Park	2.0km	40 kph	3 min
Connection to Bus network at Victoria Park				
TOTAL ROUTE	**7 Stations**	**7.5km**	**40 kph**	**11 min**

4.1.5. Metrolinx Sheppard Subway Cost Estimates: Summary Results

The total cost of construction, design management, storage and vehicles is:

- $3.7 billion both east and west (with 1992 environmental assessment alignment)
- $2.4 billion East (Yonge to Scarborough Centre);
- $2.8 billion East (Yonge to Scarborough Centre, via McCowan);
- $803 million east (Yonge to Victoria Park).

Table 14: Metrolinx Sheppard Subway Extension Construction Costs [1, 2]

(Order of magnitude costs: million in 2011 dollars)

Options	New Tunnel (Metres)	Total Length (Metres)	New Stations	Underground Platform length (Metres)	Station Length (Metres)	Cost 2011 $
Option 1 Downsview – SC	12,725	18,225	11	155	165	$3.7 billion
Option 2 Don Mills – SC	8,013	13,513	7	155	165	$2.4 billion
Option 3 Don Mills – SC	9,513	15,013	8	155	165	$2.8 billion
Option 4 Don Mills – Victoria Pk	2,313	7,813	2	155	165	$803 million

SC = Scarborough Centre

[1] Costs include: 1) Construction: survey, utility relocations, road works, community relations projects, site preparation, environmental mitigation and investigation, guide way, landscaping and site restoration, power and systems structures, stations, bus loops, mainline track work, power supply and distribution, automatic train control, security and communications, revenue collection, maintenance facility; 2) Design/Management: design, management and administration, project insurance, operations preparation, security prior to opening, environmental permitting, system closure, property acquisition, contingencies of 25.83%, interest during construction; 3) Vehicles: vehicles, testing and commissioning.

[2] The alignment lengths set out above are the lengths from the centre of the end station platforms to the end of the station box, and a further 230 metres added to each new end of alignment to accommodate the tail track, which are not required for travel time estimates.

Further detail on the basis of the cost estimates is contained in Section 10.4. and a comparison of TTC and Metrolinx costs in Section 10.5.

The TTC costs estimate for Sheppard east and west extension ($4.7 billion) is a billion dollars more than Metrolinx ($3.7 billion) (see Section 10.6).

4.2. History of TTC Sheppard Subway Estimates

It is interesting to note that from a historical perspective, the costs associated with the Sheppard Subway have increased significantly since the project was first approved in 1986. At that time, the TTC estimated the cost of construction was $154 million per kilometre. In 1998 the TTC estimated the cost at $162 million per kilometre, in 2003 at $218 million per kilometre and more recently provided TTIL with costs exceeding $351 per kilometre.

Table 15: TTC Estimates for Sheppard Subway, 1985-2011

Year	Cost per Km
1985	$154 million[1]
1998	$162 million[2]
2003	$218 million[3]
2011	$351 million[4]

[1]Network 2011 Report.

[2]Chief General Manager, David Gunn, TTC design and architectural drawing release.

[3]TTC Meeting No. 1749 Thursday, April 9, 2003

[4]Cost estimates provided to TTIL, May 2011 (including storage)

Section 5.

INTERNATIONAL CASE STUDIES: COSTS & ALTERNATIVE DELIVERY MECHANISMS

There are many examples of transit authorities around the world that have been successful at expanding their transit network in a cost-effective way. Two well known examples are Madrid and Hong Kong.

This section reports on the findings of a tour by Metrolinx of the Madrid in 2008 and provides an outline of the Hong Kong experience.

Hong Kong is an example of a global transit authority that has demonstrated that investments in rapid transit can generate profits. It is also an example of successful integration between land use and rapid transit development. It embodies a sustainable use of urban space, and innovative subway funding approaches.

••• 5.1. Metrolinx Madrid Subway Study Tour 2008: Global Case Study •••

> "From 1995 to 2003 when we opened the Sheppard line, in this eight years we built six kilometres, six," he said. Madrid by coincidence, from 1995 to 2003, built 110"
>
> *Rick Ducharme, Chief General Manager of the TTC. Toronto Star, November 12, 2005*

In 2007 it was well known that Madrid had been successful at building a subway network, and in January 2008 senior representatives from Metrolinx traveled to Spain for in-depth meetings with a range of officials from both the public and private sectors. The meetings included tours of a number of major transportation infrastructure projects in the Madrid metropolitan region. Since Madrid has many parallels to Toronto – geographic scale, urban design, population size and distribution, and similar economic circumstances – there were a number of interesting comparisons to be drawn and lessons to be learned.

The primary purpose of the visit was to better understand how Madrid had been able to build a vast subway system so quickly and on a comparatively much lower cost structure than had been undertaken in Toronto (by the TTC). In conjunction with the trip to Madrid meetings were also held in the UK with representatives of transportation agencies and transportation experts in Edinburgh, Leeds/ West Yorkshire, Manchester and London. Following these meetings Metrolinx published a study that detailed their findings. Full copy of this report is provided in Section 10.7.

The report identified that, between 1995 and 2007, Madrid constructed nearly 150 km of new subway including 120 new stations at an average cost of just $90 million per kilometre. 150 km is approximately double the size of the TTC's entire subway network and constructed in a mere 12-year period.

The report noted that while direct comparisons are often difficult, the delivery method (replacing traditional procurement with innovative approaches to construction, financing and relationships with the private sector) was a key contributor to lower costs.

Illustrative of this point is a comparison of Madrid's costs against the TTC's recent experience on Sheppard, estimates provided to TTIL for the Spadina line extension to York University and Vaughan, and the cost of completed Canada Line in Vancouver (partnered with private sector). The costs differences are striking.

Table 16: Madrid, Vancouver, and Toronto Construction Cost Comparisons

Subway Elements	Madrid 2008	Vancouver Canada Line 2009[1]	Toronto Sheppard 2002[2]	Toronto Spadina 2011[3]	Metrolinx Sheppard Extension 2011[4]
Construction Dates	1995-2007	2005-2009	1994-2002	2009-2015	2012-2018
Construction Period	12 years	4 years	8 years	6 years	6 years
Subway Constructed	Nearly 150 km	19.2 km	5.5 km	8.6 km	6.7km
Stations	120 stations	16 stations	6 stations	6 stations	7 stations
Cost per km (CDN$)	**<$90M/km**	**$105M/km**	**$170M/km**	**$306M/km**	**$177/km**

1. Only about half of the Canada Line is tunnelled which would have influenced average construction cost.
2. Sheppard Subway Yonge to Don Mills, completed 2002. Final cost was $973 million (excluding vehicles)
3. Data provided by TTC. October 17th 2011. The "total budgeted cost of TYSSE= $2.634 billion"
4. Metrolinx cost estimates including vehicles for the east extension, Don Mills to Scarborough Centre.

NB: May 2009 estimates by TTC for light rail plan along Sheppard corridor was $1.2 billion, or $87.4 million/kilometre.[1]

[1] TTC/Commission Report May 28, 2009

In both Madrid and Vancouver there was a greater emphasis on engaging with the private sector and to explore alternative approaches to financing. The Metrolinx report stated that in Europe there are often conditions to ensure that government funding is supplemented by private investment wherever possible.

> *The response of the public sector has been creative, notably in jurisdictions that are not ideologically predisposed to favour P3s. They have created joint-ventures for specific projects and other such devices to attract private equity capital and purpose-based revenue streams, without relinquishing public ownership or requiring a guarantee of public policy direction. (Metrolinx 2008, pg. 19)*

One of the other findings of the Metrolinx report was that a key success factor in delivering bold transit initiatives was through "enabling" the transportation authority with long-term dedicated sources of revenue. Ensuring the authority had an independent capacity to fund a project both facilitated private sector investment and helped by reducing risk of inaction due to policy shifts due to government changes.

> *Successful regional transportation authorities commonly had independent, transportation-dedicated sources of revenues upon which to rely in developing their long-term plans and in enlisting private-sector and pension-fund investors … dedicated revenues were seen as a more effective measure to stabilize investor confidence, by insulating longer-term or risk-affected investments from periodic subsequent governmental policy shifts. (Metrolinx 2008, pg. 15)*

The table below provides further details of the Madrid experience and the reasons reported by Metrolinx as to why Madrid was able to build a subway network twice the expanse of the TTC's entire subway system in just 12 years and at substantially lower average costs per kilometre are listed.

Table 17: Madrid Subway Experience, Key Success Factors

Innovative approach to construction costs	Major technological investments in tunnel-building were amortized early and over large projects resulting in more efficient use of major capital equipment (e.g. expensive tunnel boring machines)
Approach to construction management	A culture and practice of practical on-site, non-hierarchical construction issue-resolution seemed to reduce Spain's costs of pre-engineering and client's engineering oversight. Being able to rely on these practices on an on-going basis seemed to contribute to better bid prices and more efficient resolution of disagreements that would otherwise produce project delays and additional costs
Innovative approach to financing	Alternative financing techniques figured prominently in the rapid and extensive construction of regional and interurban expressways, often using a toll-road format or joint-investment / joint-benefits model for "hubs" and transit lines
Consistent on-time delivery schedules	Linking of construction "promises" to specific municipal terms. Each major program of construction was organized in a fashion that allowed municipal leaders to specify the intended cost and completion targets for their projects, and to be held accountable for that implementation performance at the end of the term of each council
Role of private sector	If the private sector knows its financial contribution is a pre-condition to advancing a crucial or potentially attractive transportation project, they will participate financially.
Role of innovation	Measures that included the use of innovative technology (automatic train control, fully automated operation), efficient design features (parallel platform-side doors) or enhanced value-capture often contributed to the general success of these ventures.
Integrated fare systems	Iinitial, dramatic upswing in ridership across the metropolitan area came about as a result of the new regional authority introducing a low-cost, universal zoned-fare system, employing an integrated fare card.
Transit oriented gateway development	The "gateway" approach taken in Madrid suggests that interchange points can have a primarily transportation role. Moreover, they help to create an environment where parallel urban intensification can occur and transportation-supportive revenues can be derived from those collateral benefits.

Information provided by TTC shows that Madrid was able to achieve efficiencies in terms of governance, management, construction, approvals, station design and the development of a continuous loop around the network. In addition, construction was undertaken 24 hours seven days a week which optimized the use of expensive tunnel boring machines.

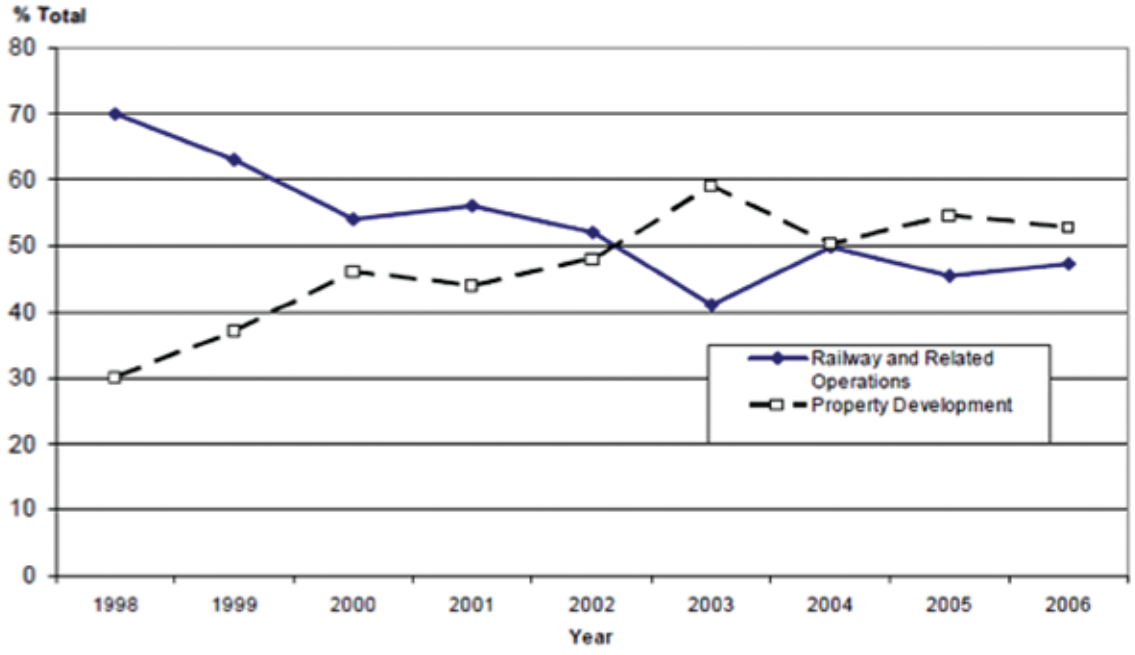
••• 5.2. Hong Kong: Global Case Study II •••

5.2.1. Hong Kong Transit Authority: Overview

Hong Kong is one of the few places in the world where public transportation makes a profit. This is in a large part due to the local transit authority, MTR's "rail+property" ("R+P") program. With Toronto set to see unprecedented expansion in rapid transit infrastructure it is a good opportunity to consider Hong Kong's development model.

MTR operates on commercial principles, financing and operating railway services that are not only self-supporting but that also yield a net return on investment. The fully-loaded costs of public transportation investment, including operations and maintenance, are covered by supplementing fares with income from real estate development including sale of development rights, joint venturing with private real-estate developers, and running retail outlets in and around subway stations. Property development and investment have made significant financial contributions to MTRC's profits. The company has established itself as a prominent player in the local property market.

Figure 27: Contributions of railway and property to MTRC's operating profits[11]



MTR does not receive any cash subsidies from the Hong Kong government to build transit infrastructure. Instead the government, the majority shareholder, seeds the process by granting exclusive development rights based on the "before rail" value for land above and adjacent to subway stations. These grants relieve the transit authority from purchasing land on the open market. These rights are then sold to developers at an "after rail" price. The difference between land values is substantial and is able to fund transit construction. MTR also negotiates a share of future property development profits. In this way MTR receives a "front end" payment for development rights and a "back end" share of property revenues.

[11] Source: Bo-sin Tang (MTRC annual report, various issues)

Such a development approach to some extent necessitates intensification in land use around subway stations. However MTR through its experience in Hong Kong has discovered that profits can be maximized by following a transit-oriented development (TOD) approach where station environments also include high-quality pedestrian spaces. By developing the station as the central focus of the local community, farebox income and purchases of goods and services at MTR-owned shops in and around pedestrian-friendly spaces at railway stations are maximized.

Throughout the 1980s and 1990s, the Hong Kong government was the sole owner of MTR. Corporate decisions are weighed in favour of the broader public good, as highlighted in the company's 2010 financial report:

> *We see a railway system not merely as a physical infrastructure, but an asset with social, environmental and economic implications. Properly designed and integrated with property development, a railway enables more effective utilisation of land, contributing towards sustainable urban development and benefiting the environment. As such, a successful rail line must nurture local communities and consider local aspirations during design, construction and in operation.*

MTR's track record has been impressive. Since 2000 the company has been profitable, has paid regular dividends to the government, and has seen its value more than double. Total financial return to the Hong Kong government through MTR over the past 30 years has been estimated at well over HK$140 billion. MTR is now providing consulting and management services to international public transportation systems, and is involved in transportation development using a similar approach in mainland China.

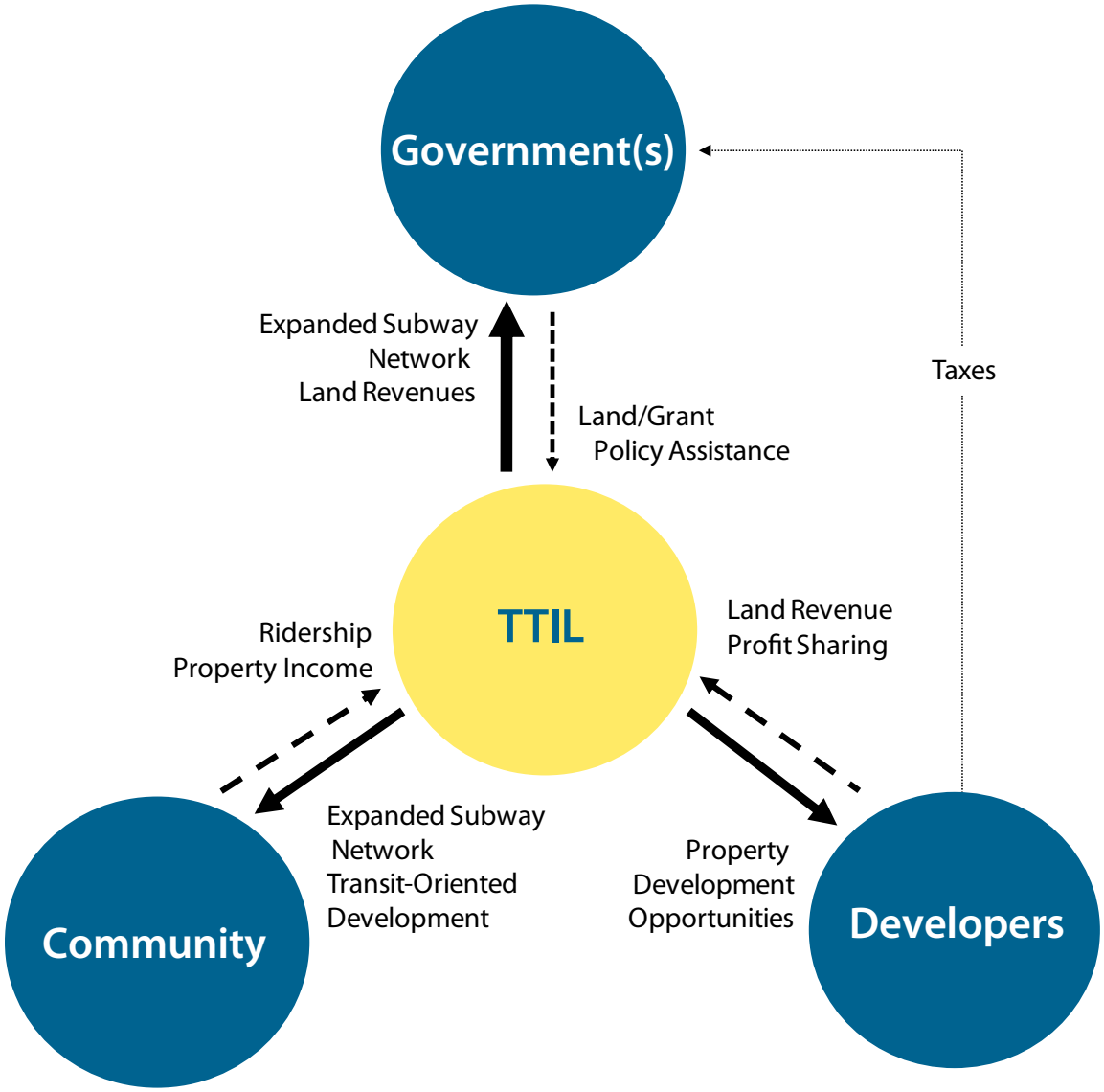
Toronto could follow a similar approach and right now, as the city is moving forward with plans for new rapid transit construction, it is an ideal time to consider the Hong Kong model. Before final decisions on subway and LRT alignments and station locations are made it is critical to consider the opportunities for value capture. It is also important to enable the agency developing new infrastructure to make decisions on sound commercial principles. Business considerations must not be entirely ignored in favour of local transit considerations. Value capture through intensification cannot simply be left to private landowners and property speculators. The TTC's traditional approach of having standalone subway stations that act as little more than access to rail transportation (often from adjacent ground level parking lots) is not a transit-oriented development approach that will create community centres and maximize revenue opportunities from future retail services.

Hong Kong MTR Application for Toronto

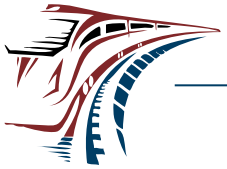
The existing TTC system, which was not developed with such considerations, is unlikely to be in a position in the near future to establish partnerships as in Hong Kong. As such it would be worth consideration to create a new entity with a clean slate to lead development of new infrastructure.

As an option a new transit development agency could be initially capitalized with elements of the current TTC system or with City owned property most suitable as part of a transit-oriented development approach moving forward. Some assets that may be suitable from this perspective might include the TTC rail yards, City owned properties along the proposed rapid transit routes and potential alternate alignments, other City owned properties that could see significant value capture through improved transportation infrastructure (e.g. the Portlands area), highway infrastructure adjacent to existing or proposed transit infrastructure, and the Scarborough RT infrastructure and corridor as it undergoes redevelopment.

Figure 28: Application of MTR Model for Toronto[12]



[12] Based on Bo-sin Tang figures.



Section 6.

SHEPPARD SUBWAY CAPITAL FINANCING PLAN

KPMG LAND DEVELOPMENT, REVENUE TOOLS, AND FINANCING ANALYSIS

The City of Toronto funded a preliminary study of the land development, revenue tools, and financing options for the Sheppard Subway extension. An open competition was held. This was won by KPMG.

KPMG concluded there are a number of feasible revenue tools available, and to choose from, to fund the construction of the Sheppard Subway extensions. This conclusion is similar to the findings of the Coopers and Lybrand Sheppard Subway Financing Study undertaken in 1992. KPMG also concluded that partnering with the private sector to finance the project provides the City with the opportunity to capture the benefits of private sector capital, management and innovation, as well as delay costs of construction to the operating period. Financing analysis was undertaken on the basis that the project would be completed in stages, starting with the East extension from Don Mills to Scarborough Centre first. That is financing analysis was based on a cost estimate of $2.4 billion. A summary of the KPMG study is provided in this section.

Comment and recommendations on the use of one revenue tool - Tax Increment Financing - is also provided in this section for Council by urban and regional planning expert and economist Dr. David Amborski of Ryerson University.

6.1. KPMG Mandate and Methodology

KPMG was engaged by TTIL and the City to examine how to finance the cost of Sheppard Subway extensions. KPMG managed a team of experts including internal KPMG infrastructure and P3 procurement experts, N. Barry Lyon Consultants (NBLC) expert in urban development feasibility, and Turner and Townsend Cm2r, construction and procurement experts.

The study involved a detailed examination of potential revenue tools as well as a preliminary assessment of potential financing options and structures related to the cost of subway construction.

Revenue tool analysis included examination of:

1. Residential, office and commercial development potential and market realities around subway stations and determination of property values, municipal tax revenues and uplift associated with subway construction along Sheppard and Eglinton corridors;
2. Land development potential and market realities across the city, including an analysis of revenue generated by raising development charges City-wide;
3. City-owned properties along transit corridors and the identification of 18 properties with significant redevelopment potential and the calculation of the estimated value of these lands (600 properties were reviewed); and
4. Other financial tools used to fund subways and other major infrastructure development by municipalities/regions across North America and around the globe.

In terms of financing options and structure, KPMG investigated three options:

1. Traditional public sector financing;
2. P3 availability payment model; and
3. P3 concession model.

A two stage process of financing the project was analysed, starting with the East following quickly by the West; that is, procurement and construction on the West extension would start before the end of East construction.

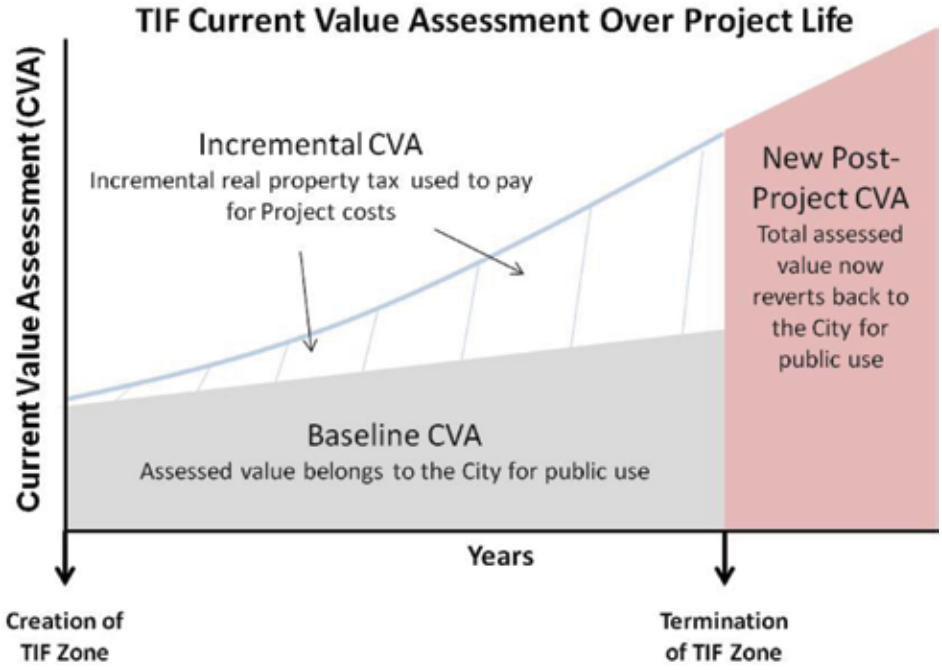
••• 6.2. Key Financing Terms •••

Tax Increment Financing

Tax increment financing is a public finance technique used by local government jurisdictions to fund infrastructure initiatives and stimulate economic development in designated geographic areas. TIFs work by leveraging future tax revenue increases to finance current infrastructure projects through the dedication of the incremental tax revenue between the assessed value of designated areas ("TIF zones") prior to the development and its assessed value after the developments are completed. By doing this, future tax gains are leveraged to finance the present costs of eligible improvements in designated areas.

As indicated by the graph below, the increment value available for funding the Project is determined by the difference between the baseline CVA and any increase in assessed valuations in the TIF zone solely attributable to the construction of the Eglinton-Scarborough Crosstown and Sheppard Extension lines. The incremental CVA is made up of two components, each of which is highlighted in the estimate of potential TIF revenues:

- the tax increment uplift in existing property values; and
- the tax increment from new development in the TIF zones that has been accelerated and presumed to be incremental.



Source: KPMG

Further details on tax increment financing from KPMG are contained in Section 10.9.

Development Charges

Development charges are one-time, upfront fees levied on land development projects by the City in an effort to help fund the costs of capital infrastructure (e.g., roads, transit, sewers, emergency medical services, etc.) required to service growth. These charges are applied to all new developments within City limits and the revenues flow directly to the City. The City has already implemented a similar arrangement to help fund the Spadina line and it has been assumed that the Project will benefit from the same special treatment afforded by the Province with respect to the *Development Charges Act* as the TYSSE in terms of being exempted from the historical service cap and the 10% statutory reduction for transit projects.

Traditional Public Sector Financing

Under the traditional delivery method, the design, governance, operations and management remains with the public sector.. The City would be responsible for procurement of build/construction firms and implementing revenue tools to pay for the costs of construction during the construction period.

P3 Procurement & Financing

P3s are a long-term performance-based approach for procuring public infrastructure where the private sector assumes a major share of the responsibility in terms of risk and financing for the delivery and the performance of the infrastructure, from design and structural planning, to long-term maintenance. The two models examined by KPMG were the availability payment model and concession model.

P3 Availability Payment Model

Public owns facilities and maintains governance and enters into lease agreement with a private partner, which the P3 industry refers to as "concession agreements." The private partner accepts the responsibilities and risks of the design, construction, financing and maintenance aspects of the Project. In return, the private partner will receive periodic lease payments, based on performance. Lease payment to private partner would be lower than if project were partially financed/operated by the agency. This model is neither a sale of assets, nor a privatization. City retains ownership of all assets.

P3 Concession Model

Public owns facilities and maintains governance, enters into lease agreement with a private entity that is responsible for operations, maintenance, financing, and construction. TIF, DC and other revenue tools are "assigned" to the private partner over a defined period for use in raising private financing; i.e. revenues tools are assumed to be transferred to the private sector. Private sector accepts the responsibilities and risks of the design, construction, financing and maintenance aspects of the Project. As with P3 availability payment model, this model is neither a sale of assets, nor a privatization. City retains ownership of all assets.

Further features of the three models summarized by KPMG are attached in Section 10.9.

6.3. Why Governments Choose P3 Financing Options

The policy reasons and benefits associated with why governments choose P3 financing structures are outlined below.

Table 18: Federal Position on P3s (PPP Canada)[13]

Why do Government's Choose P3s?

Public-private partnerships address the following challenges faced by governments in managing large, complex capital infrastructure projects:

- Lack of pricing of capital and risk: capital budgeting and execution is generally done with no reference to cost of capital.
- Lack of capacity: there is an inability to develop and retain internal expertise to manage large projects.
- Inadequate consideration of whole life-cycle costs: governments tend to manage the design, construction, operation and maintenance as separate processes, without considering the interactions between them.
- Inadequate incentives and contractual discipline: contracts often do not include sufficient incentives for scope and cost discipline; cost-based contracts can, in fact, create perverse incentives for contractors to encourage change orders and cost increases.

Why Do P3s Work?

P3s work because they engage the expertise and innovation of the private sector and the discipline and incentives of capital markets to deliver public infrastructure projects.

- **P3 projects involve greater consideration of whole life cycle:** P3s put into an integrated contract the entire life-cycle -- design, build and operate and maintain; this ensures that overall cost and risk is considered; for example, design takes into account of cost to build, maintain and operate and avoid white elephants.
- **P3 projects engage the expertise of the private sector:** The private sector has the experience and expertise to deliver large projects. They bring innovation and learnings from other projects. Many Canadian and international firms have developed significant expertise developing and executing P3s, which can be employed for the benefit of taxpayers.
- **P3 projects ensure private sector capital is at risk, bringing capital market discipline and incentives:** Most importantly, P3 projects require private sector capital to be at risk. The public sector pays only when the infrastructure is available and performs. This generally means that no payments are made until the infrastructure is built and a substantial portion is paid over the life of the asset, if it is properly maintained and performs. This "skin in the game" means that taxpayers are not on the financial hook for cost overruns, delays or any performance issues over the assets life. It also means that the profit motive is harnessed to ensure effective results. Finally, this requires the private sector to raise both equity and debt capital, meaning that there is substantial oversight by lenders and investors in both the upfront due diligence and project execution. This is a discipline that the public sector cannot match.
- **P3 projects allow the public sector to focus on its core business:** The public sector's core focus should be on the defining the output it wants (i.e., x litres of clean water, y traffic capacity). Leave it to the private sector to provide the most effective solution to deliver on those outputs.

When Do P3s Work?

In general, P3s produce value for larger public infrastructure projects (they warrant the transaction costs and attract sufficient private sector interest) and for complex projects (the value of the risk transferred is higher than the incremental financing costs). However, P3s are not the solution in every case. P3s provide benefits but they also involve costs. The cost of private sector finance is higher than government borrowing, as it reflects risk adjusted returns. In addition, P3s involve transaction costs to structure (legal, financial). As a result, in order to ensure the best possible value for the taxpayer, a detailed value for money analysis is required to assess whether the costs exceed the benefits.

The central policy message from PPP Canada material is that in order to ensure the best possible value for the taxpayer associated with the Sheppard corridor, a detailed value for money analysis comparing traditional financing with P3 options is required. The activity requirements to support this are outlined in Section 9 (Next Steps: TTIL Work Plan). The KPMG study was limited to the identification and analysis of potential revenue tools (funding) and high level procurement (financing) options only.

[13] Available at www.p3canada.ca

••• 6.4. KPMG/NBLC Land Development Findings •••

6.4.1 Factors Influencing Growth in the GTA

In preparing the forecast for development growth as a result of improved transit, the following factors were deemed to have an impact on market and nature of development patterns in Toronto and the GTA as whole.

Affordability

Affordability is by far the most significant determinant when buying a home, impacting on both the location and housing type chosen. The principal reason driving the strength of the GTA condominium industry is affordability. With only a few exceptions, the cost of condominium apartments in the GTA are significantly lower than other comparable housing forms. As of July 2011, the average cost of a resale single detached home in the GTA was $568,530 (and $691,175 in the City of Toronto), while the average price of a resale condominium in the GTA was $332,354 ($353,190, in the City of Toronto).

For single persons, young couples or empty nesters, a condominium apartment allows them to purchase only the amount of home they actually require.

As the land supply for lower density housing becomes increasingly limited, pricing for these homes will continue to rise. In comparison, the opportunities for higher density housing are much greater and can offer improved affordability, in communities that offer a greater level of services and amenities.

Transportation

After affordability, transit that is part of an extensive network and offers frequent, continuous and low cost service is likely the most significant driver of intensification. Transit of this nature has far reaching influences on how people work and live. In the simplest terms, it relieves the requirement for many people to either own or use automobiles, representing significant personal financial and social benefits, as well as broader societal savings in terms of congestion, pollution, road maintenance, safety, and other issues.

Proximity to High Quality Neighbourhoods

A large part of the attraction of urban living within compact communities is that it allows for people to live in neighbourhoods that they might not otherwise be able to access, due to affordability issues or the suitability of available homes. These neighbourhoods are highly attractive to many, as they offer easy (walkable) access, not only to various transportation options as already discussed, but to a variety of other services and amenities, including:

- Cultural and social attractions;
- Major institutions (ex. hospitals, colleges & libraries);
- Sporting venues;
- Bars and restaurants;
- Employment districts;
- Parks and public open space;
- Recreational areas (ex. waterfronts and boardwalks); and,
- A variety of commercial/retail services and conveniences.

Design & Amenities

The design and amenities offered by intensification developments themselves are also attractive to various buyer groups. Such things as; building architecture, security, concierge services, exercise and entertainment facilities, and unit finishes, all provide for greater convenience and a sense of exclusivity and prestige, not available in similarly priced lower density housing.

Buyer Groups

Demand by individual buyers and renters is driving the market for intensified residential development forms. There are four general buyer groups. Understanding their needs as buyers or renters provides some insight into what areas will successfully intensify.

1. *Empty nesters (55-75) and Retirees (75+)* no longer in need of a large family home typically seek apartment living for its low maintenance, access to neighbourhood amenities and services, security and building facilities. Due to the wealth accrued over time and through previous ownership of real estate, these two buyer groups are able to afford more expensive units and prefer to live in neighbourhoods surrounding their homes, rather than downtown locations. These buyers prefer lower buildings in familiar neighbourhoods that offer a sense of prestige and community.
2. *First time buyers (25-35)* are typically attracted to apartments due to the prospect of affordable homeownership. In many markets, condominium units are the only affordable housing choice for this buyer group. This buyer group typically purchases smaller units, located in downtowns and other vibrant urban communities, with emphasis on transit and walkability. Within this buyer group there are several sub groups, including singles, professional couples and divorced persons. Single women are a new and growing market segment.
3. *Move-up buyers (35-55)* generally make up the smallest proportion of households living in apartments. This is generally due to their ability to afford other housing types and, because of families, greater indoor and outdoor space requirements, safety concerns and the need to live close to community facilities, such as schools, parks and community centres. There is some evidence that this buyer-group will grow as high density urban living becomes more accepted and as the product offerings adapt. These buyers are typically second generation condo buyers and largely found in downtown Toronto.
4. *The final buyer group,* which is almost exclusive to condominiums, is Investors. These are individuals or groups that purchase units and then rent them out, seeking to capitalize on the lack of rental units in the marketplace and the desire to live in favoured areas. Investors are typically interested in purchasing smaller units that have lower purchase prices and can be rented out less expensively (and are more marketable). The demand from all of these buyer groups is projected to increase over time, as the cost of low density residential choices increases with limitations in supply, as the population ages and as condominium living becomes more accepted.

Employment Intensification

There are a variety of factors that create market demand for high-density employment developments, i.e., offices (government and private sector) and research & development facilities, some of which are similar to those that create residential demand. Some of the factors include:

- Access to public transit for employees;
- Access to highways, major road corridors and other major transportation facilities (airports, rail, etc.);
- Parking;
- Proximity to support services, similar businesses and basic commercial services;
- Proximity to related institutions (hospitals and colleges); and,
- Highly visible and exclusive/prestigious locations.

6.4.2. Impact of High Order Transit on Property Value Uplift

In preparing the forecast for property development value, transit was deemed to have the following impact on residential, office, retail and industrial property values:

Residential

NBLC's research and the literature reviewed in the preparation of this study, attached as Section 10.11. **support significant increases in value for development within close proximity to high order transit**. However, the extent of the price gains directly attributable to improved transit is difficult to accurately assess, as a broad range of neighbourhood characteristics also come into play. In general, however, NBLC saw greatest value up-lift occurring in higher density developments, where owners/tenants are more likely to make use of and benefit from transit services on a day-to-day basis.

Office

Office developments are found to appreciate for a variety of factors, including increased employee catchment area, local area amenities, and as a result of good transit and/or highway connections. Once located along transit, an employer may have difficulty leaving the corridor without losing employees as they have altered their lifestyle, commuting patterns and housing to match the existing location. Studies by Weinstein, Clower and Cervaro indicate office rents as much as 15% above base rate appreciation, based on existing vacancies and rental rates for office within TIF zones adjacent to existing mass transit (Yonge-Sheppard) versus those without (Don Mills – Eglinton).

Retail

Retail studies of higher order fully graded separated transit systems in Santa Clara and Dallas have shown premiums exceeding 30% compared to identical properties without access to high order transit services. As residential density and ridership increases along a corridor, retail develops a captive consumer base, which creates the setting for an agglomeration of retail, further drawing in new retailers and consumers. Retailers will either pay a premium for a location along the transit corridor, or lose transit riding consumers to competitors who do locate along the corridor.

Industrial Appreciation

Case studies in Santa Clara and Dallas revealed mixed results with respect to industrial price appreciation. According to one study, it was calculated that values had actually dropped by 8.5% as a result of proximity to mass transit, and in another study values increased by only 2.8%. The positive impact of the subway on industrial land value is largely mitigated by the low employment density and automotive/shipping intensive nature of industrial land uses. The development of new high density residential structures stemming from a new subway line creates additional logistical complexity (noise, traffic) for nearby industrial users and often results in relocation.

6.4.3. Development Forecast Results

GTA and Toronto Population and Development Forecast

The forecast suggests that the GTA population will double from 6.0M to 12.0 M by 2062. By 2062 NBLC expect that, based on current trends, about 65% of all residential development will be in the form of higher density typologies. While the 905 will capture a large share of high density development, Toronto will remain the location of choice for most buyers.

Based on NBLC's analysis of population growth, economic trends and regional development, NBLC forecast that by 2062 the demand for higher density housing units in the GTA will reach roughly 30,000 units per year. NBLC also project that Toronto will capture 57% of these sales by 2062, declining from its current 75% share of annual GTA high-rise sales. Based on the development of both transit corridors, Sheppard and Eglinton are expected to capture between 11% and 13% of the Toronto Market, up from 4% in the baseline scenario.

This translates into a projected average annual market demand of 1,666 to 1,868 units per year over the forecast period. This estimate anticipates economic cycles where little or no growth may occur followed by relatively strong periods. This demand is consistent with the market experience along the existing subway corridors of the North York Centre Corridor and Sheppard Corridor between 2005 and 2010.

6.4.4. Sheppard and Eglinton Corridor Analysis – Development Activity and Tax Increment Financing Potential

The following tables summarize the results of NBLC forecasts for baseline (no transit), reference (average growth) and high growth scenarios. In the baseline scenario, it is assumed that the existing development continues to appreciate in value, but at a relatively modest rate. Growth also occurs but, without any significant upgrade in transit service, it continues at a modest pace. In the reference and high growth scenarios, it is expected consistent with the research that the introduction of subway transit will make many of the areas within the future alignments significantly more attractive to development. NBLC has assumed that with subway transit along the Eglinton and Sheppard corridors, the TIF zones will capture roughly 50,000 to 60,000 units of high-rise growth that would have otherwise occurred elsewhere in the GTA. As a result of the new transit and increased residential development along the corridors, it is assumed that office space within the TIF zones will increase its present 6.4% share of the Toronto office market by 20% over 50 years.

Table 19: Total Forecasted Development Activity within TIF Zones by 2062

(GFA) –per sq metres (Millions)

Residential			Multi-Residential			Office			Retail			Industrial		
No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth
2.8m²	7.3m²	8.2m²	0	0	0	0.6m²	1.2m²	1.3m²	0.1m²	0.3m²	0.3m²	0	0	0

Table 20: Current Value Assessment within TIF Zones (2012)

Based on Estimated Inflation (1.5%) (Billions)

Residential	Multi-Residential	Office	Retail	Industrial
No Transit	No Transit	No Transit	No Transit	No Transit
$23.4b	$4.7b	$3.4b	$5.2b	$0.6b

Table 21: Projected Municipal Tax Base (2062) within TIF Zones

Based on Inflation and Projected Growth (1.5%) (Billions)

Residential			Multi-Residential			Office			Retail			Industrial		
No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth	No Transit	With Transit Average Growth	With Transit High Growth
$72.4	$117.7	$127.8	$9.9b	$10.7b	$10.9b	$10.3b	$15.1b	$16.1b	$11.6b	$14.7b	$57.1b	$1.3b	$1.3b	$1.3b

NBLC has assumed that with subway transit along the Eglinton and Sheppard corridors, the TIF zones will capture approximately 8,761,207 – 9,736,668 sq meters new growth, with a current value assessment (CVA) value of $37.4 billion in 2012 rising to $159.5 billion by 2062 (reference scenario) and $171.3 billion (high growth scenario), based on estimated inflation (1.5%).

A summary table of the above is presented below:

Table 22: Summary Growth Forecast Table (No Transit, Reference Scenario, High Scenario)

Total (Eglinton, SRT, And Sheppard East)				
Scenario	**50 Year Development Potential Total GFA by Use (sq. m.)**		**CVA (2012)**	**CVA (2062)**
Base Case No Transit Expansion	Residential	2,819,698	$23,435,030,139	$72,418,883,066
	Multi-Residential	0	$4,720,049,170	$9,936,847,741
	Office	609,682	$3,389,599,590	$10,365,365,421
	Retail	107,420	$5,237,895,466	$11,647,761,669
	Industrial	0	$616,880,293	$1,298,682,560
	TOTAL	**3,536,800**	**$37,399,454,658**	**$105,667,540,456**
Reference Scenario with Transit	Residential	7,285,065	$23,435,030,139	$117,690,889,316
	Multi-Residential	0	$4,720,049,170	$10,731,795,560
	Office	1,195,985	$3,389,599,590	$15,087,481,742
	Retail	280,156	$5,237,895,466	$14,669,256,866
	Industrial	0	$616,880,293	$1,325,605,048
	TOTAL	**8,761,207**	**$37,399,454,658**	**$159,505,028,532**
High Scenario Added Density	Residential	8,164,751	$23,435,030,139	$127,791,715,454
	Multi-Residential	0	$4,720,049,170	$10,930,532,515
	Office	1,288,660	$3,389,599,590	$16,056,136,552
	Retail	283,256	$5,237,895,466	$15,196,589,173
	Industrial	0	$616,880,293	$1,337,643,037
	TOTAL	**9,736,668**	**$37,399,454,658**	**$171,312,616,731**

Source: N. Barry Lyon Consultants

NB: KPMG report which focuses on Sheppard east (phase 1) financing provide east side only growth projections.

6.5. KPMG Revenue Tool Findings

6.5.1. Tax Increment Financing Results

The following table summarises the results of KPMG Tax Incremental Financing (TIF) revenues analysis over a 50-year period, from 2012 to 2061, in the Sheppard and Eglinton corridors for Phase 1 of the project (Don Mills to Scarborough Centre).

The right hand column provided the total results for reference and high growth development scenarios along the Sheppard-Scarborough-Eglinton transit routes. The total TIF revenues between 2012 and 2062 are estimated by KPMG to be $5.3 billion (reference) and $6.0 billion (high growth). Additional revenues would be expected if the Sheppard west extension was included in this analysis.

Table 23: TIF Zone Revenue Over 50 Years (2012-2061)[1, 2]

Scenarios	Tax increment from Uplift $ million	Tax Incremental from New Development $ million	Total $ million
Reference Scenario Total Value	$736	$4,582	$5,318
High Growth Scenario Total value	$739	$5,306	$6,045

[1] This excludes the education portion of property taxes.
[2] TIF analysis including Sheppard east only

6.5.2. Development Charges Results

The following table summarises the results of KPMG Development Charges analysis applied to all new developments within the City limits for reference and high growth development scenarios:

- **Scenario 1** – The City will continue its current policy of exempting industrial development from development charges and only charging non-residential development for the ground floor GFA; and
- **Scenario 2** – The City will change its current policy and apply development charges to all non-residential development:

The total development charge revenues between 2012 and 2061 are estimated by KPMG to be $2.19 to $2.85 billion (reference) and $2.20 to $2.87 billion (high growth).

Table 24: City-Wide Development Revenues Over 50 Years (2012-2061)[1]

Scenarios	Scenario 1 Current Policy	Scenario 2 Charge all non-residential
Reference Scenario Total Value	$2,190	$2,850
High Growth Scenario Total Value	$2,203	$2,878

[1] TIF analysis including Sheppard east only

6.5.3. City-Owned Development Revenues Results

The following table outlines the estimated minimum and maximum land value projections of the City-owned properties in both the Sheppard and Eglinton corridors in 2011 dollars. The average estimate is $207 million.

Table 25: Estimated Land Value of City-Owned Sites in Corridors ($2011)

Corridor	Minimum	Maximum	Average
Sheppard Corridor	$25,189,976	$30,974,988	$28,082,482
Eglinton Corridor	$158,607,811	$199,893,109	$179,250,460
Total (18 properties out of 6,00)	**$183,797,787**	**$230,868,097**	**$207,332,942**

The values projected represent an order of magnitude view of potential land values; for the purposes of our analysis, KPMG assumed the average. It was also been assumed that no extraordinary servicing, environmental remediation or other unforeseen costs or physical limitation might restrict a site's value or ability to accommodate redevelopment.

6.5.4. Other Potential Revenue Tool Results

Through a study of national and international infrastructure projects, KPMG identified ten other revenues tools in implementation by municipalities, regions and countries around the globe to support transportation infrastructure expansion. These include road pricing, parking pricing, regional sales tax, passenger vehicle charges and employer/payroll taxes. KPMG estimated that these revenue tool options range in size over the forecast period (2012-2062) from upwards of $700 million for passenger vehicles charges to upwards of $76.8 billion for vehicle kilometre travelled fees. Express tolls would capture upwards of $6 billion over the forecast period, and gas tax upwards of $27.8 billion.

Table 26: Other Revenue Tools Identified by KPMG[1, 2]

Revenue Tool	Annual Revenue Estimates Conservative-Aggressive ($ millions)	50 Year Period Revenue Estimates Conservative-Aggressive ($ billions)
Revenue Tools Examined (High Level Analysis)		
Road Pricing		
Zone Based Tolls	$95 - $136	$8.2 - $11.9
Expressway Tolls	$70 - $556	$6.0 - $48.4
High Occupancy Toll (HOT) Lanes	$23 - $185	$2.0 - $16.1
Vehicle Kilometre Travelled Fees	$883 - $1,766	$76.8 - $153.6
Parking Pricing		
Parking Sales tax	$26 - $105	$2.3 - $9.2
Parking Space Levy	$91 - $227	$7.9 - $19.7
Regional Sales Tax	$251 - $503	$21.9 - $43.7
Gas Tax	$321 - $641	$27.8 - $55.8
Passenger Vehicle Charge	$84 - $168	$0.7 - $1.5
Employer/Payroll Tax	$340 - $680	$29.6 - $59.1
High Growth Scenario Total Value	$2,203	$2,878

[1] Net present values are included in the KPMG report. These figures do not consider bond securitization.

In other words, KPMG concluded there are a number of feasible revenue tools available for use by the City to fund the construction of the Sheppard Subway extensions. This conclusion is almost identical to the findings of the Coopers and Lybrand Sheppard Subway Financing Study undertaken and reported on in 1992, attached as Section 10.12.

Recognizing it is highly unlikely the City will implement all of the identified revenue tools and the calculations are based on current car usage rates etc., and isolated analysis of each instrument, the table above illustrates that the magnitude of the pool of revenue tools is tens of billions over the 50-year period. **The cost of the Sheppard Subway is a fraction of the size of the pool of available revenues tools.** Some of the above tools will only be tolerated by the general public or the development community if revenues are used to support subways. LRT is not viewed by many in either camp as being a sufficiently significant improvement in transit infrastructure to warrant these additional revenue tools.

6.6. KPMG Financing Findings

6.6.1. Financing Under TIF, Bonds and City-Owned Development Rights

The amount of money available to the City/TTIL for the Sheppard Subway extension associated with the issuing of bonds will be less than projected revenue estimates, in some cases by a wide margin. Risk profile, growth patterns of revenue streams, debt service coverage, availability of senior level of government guarantee as well as project delivery models (e.g. traditional financing, P3 availability payment model or P3 concession model) will impact the quantum of proceeds available to the City.

The following table outlines the estimated proceeds by KPMG that could be raised from the TIF revenues and DC revenues. For ease of reference, the proceeds for the sale of City-owned development rights are also included. The table also indicates the assumed timing of the proceeds becoming available.

Table 27: Proceeds Available Under TIF Bonds, DC Bonds and Development Rights

Type	Amount Millions	Timing
TIF Bonds Proceeds	$156	End of Year 5 (2016)
DC Bonds Proceeds	$292	End of Year 5 (2016)
City-Owned Development Rights Proceeds	$221*	End of Year 3 (2014)
Total	$669	

*value includes inflation at 2.1%

6.6.2. Preliminary Comparison of Traditional and P3 Procurement/Delivery Models

The following table outlines the estimates of additional monies that would be required to fund the East Extension of the Sheppard Subway during the construction period beyond identified government contributions and proceeds from the TIF, DCs and development-rights under three different financing options.

Table 28: Summary of Additional Monies Required for Each Model

Financing Models	Additional Up-Front Funding Required by City*	Annual Revenues Required at Start of Year 1	Annual Revenues Required at Start of Year 8
Traditional Financing	$914 million (1-7 years)	$123 million (1-7 years)	$0
P3 Availability Payment	$0 billion	$0 million	$ 736 million ($77 million in year 8 down to $5 million in year 24)
P3 Concession Model	$739 million (1-7 years)	$99 million (1-7 years)	$0

* Beyond federal and provincial contributions of $983 million, City-owned development rights of $221 million and Bonds of $629 million (TIF, DC supported starting in Year 5)

The KPMG analysis demonstrates that under a traditional delivery model, the City will need finance all of the cost of the Sheppard Subway extension during the construction period in order to make monthly progress payments to the contractor for work completed. This amounts to financing needs of an additional $914 million during the construction phase over and above TIF, DC, property rights revenues. Of note, the traditional model is not eligible for additional funding from the federal government through PPP Canada. As is the case with typical traditional procurements, risks associated with construction activities and timing and budgetary over-runs are assumed by the City.

The P3 availability payment model provides the City with an opportunity to delay costs of construction to the operating period (year 8). This amounts to zero financing needs during the construction phase over and above TIF, DC, property rights revenues. By deferring additional funding requirement to the operating period, it provides the City with more time to capture revenue from development related revenue tools and/or determine other revenues tools.

The P3 Concession model requires additional funding during the construction period in the form of a $729 million; however, the additional funding requirement is less than the traditional model due to the private sector's ability to include equity in their financing structure (backed by the excess TIF and DC revenues).

6.6.3. Canadian P3 Market

A number of private sector partners have shown an interest in partnering with the City on the Sheppard subway extension. According to PPP Canada P3 projects are on the rise in Canada as a means of delivering better value to taxpayers, including better services, lower costs and faster delivery times. The funding and capital financing environment in Canada is different from that which existed in 2007. Canadian leadership, P3 expertise and procurement capacity has grown significantly over the past five years, extending to municipal markets. A key contributor to this change has been establishment of PPP Canada Inc. by the federal government in Budget 2008, with a mandate to expand the role of the private sector in the provision of infrastructure across Canada through the use of 'public-private partnerships'. Provincial policy leadership by British Columbia, Quebec, Alberta and Ontario, including an acceleration of projects considered as P3s, has added to the change in financing environment. The net result is that there now exists a robust institutionally framework and access to local expertise within which to examine further the costs and benefits of alternative delivery options and procurement structures for the Sheppard Subway extension.

6.7. Recommendations on Tax Increment Financing by Dr. David Amborski, Ryerson University

"In applying Tax Increment Financing in Ontario, it is first important for the staff, council and the public to understand the tools. The Province has permitted TIEG's, the use of Tax Increment Equivalent Grants for some time. This tool which is only permitted where there is a Community Improvement Plan in place provides financial benefits to the owner of the developing property. In 2006 the Province passed TIF legislation which is more in keeping with the TIF tools that have been applied for a considerable length time in US jurisdictions (48 States). Under most of these programs TIF funds some broader based infrastructure in order to provide some community benefits.

However, in the Ontario case, despite several TIF pilot studies, the tool has yet to be formally applied. This reflects in part that the "Regulations' for the Act have not yet been provided. This provides both a problem and an opportunity. A problem is that it makes the current Act difficult to apply: an opportunity in that those governments who are considering applying the TIF tool may have an opportunity to help shape the regulations so that they can make maximum use of the tool for their specific application.

The "But For" Test

In examining the TIF policies and regulations across North America, a number of jurisdictions employ the "but for" test. This refers to the fact that but for some type of public investment (usually in infrastructure) the proposed development would not be built or would not be built at the proposed density or form. These jurisdictions that apply this test generally only permit TIF funds to be used to help finance this infrastructure, typically by repaying for the TIF bonds used to fund the infrastructure. An example could be that without putting storm water attenuation infrastructure in the West Donlands development could not take place due to potential flooding. The advantage of this test is it helps to keep the funds focused on infrastructure that supports the new development. However, the "but for "test is not currently part of the Ontario legislation. If it was, or some how embodied in the regulation, it could ensure that TIF revenues/funds are well targeted. When the legislation was being developed no rationale was given for not including the "but for "test.

Use only for specific benefits (not to be watered down)

As the amount of money that can be raised via TIF's is limited, it is best to ensure that it be targeted to public benefits that are tightly tied to new development as anticipated in the "but for " test. If TIF and expected or made to attempt to fund too may broad public benefits, the TIF funds will be watered down and not be as effective as they could be. There may be pressure from some policy analysts and interest groups to fund broader based public benefits such as social housing. These pressures should be avoided.

Make the TIF catchment area as broad as possible.

In applying TIF, it is necessary to define the TIF district. In defining the district, it is best to define the district as broad/large as geographically possible. It is important to include all land in the area that is undeveloped, underdeveloped, or has the potential for redevelopment/intensification. This is important due to the fact that once the TIF district is defined, it is not possible to go back and alter the district. Consequently, it is important to define the district to include as much uplift in property values and hence property taxes to support the repayment of the TIF bond.

TIF should be used in conjunction with other funding tools

It is important to recognize that TIF revenues cannot be used to fund all transit investments, rather the revenue can be used to contribute to the financing of transit facilities. Consequently, TIF needs to be used in conjunction with other financing tools such as land leases, leasing air rights, special assessments, and public private partnerships. All of these tools need to be explored in terms of how they may be used in conjunction with TIF's in different locations depending on land use, ownership, stage of development/redevelopment of lands in the TIF area, etc.

Collective Municipal Input in the TIF Legislation Regulations

As the regulations for TIF legislation have not been provided to date. It would be useful to lobby the government in conjunction with other interested governments and parties to ensure that the regulations are most supportive of the TIF needs for this project and other similar projects. This will require some joint analysis to assess the impacts of different contexts of potential regulations that could be created. This could be done in conjunction with other jurisdictions who have an interest in making use if TIF funding for similar applications. This could include York Region, Ottawa, and the Region of Waterloo. There may well be additional jurisdictions that also have an interest."

David Amborski
School of Urban & Regional Planning
Ryerson University

Section 7.

GLOBALLY COMPETITIVE & INTEGRATED TRANSIT SYSTEM FOR TORONTO

TTIL's VISION, MISSION AND GOALS

The government cash subsidy approach of the TTC to funding and financing transit expansion is not sustainable. Since 1995 Madrid, using innovative delivery and financing methodologies, has constructed nearly 150 kilometres of subway at an efficient cost structure. Toronto has built 6 kilometres over the same period.

An alternative delivery approach that captures the market and cost discipline of the private sector (that the public sector cannot match) is urgently required to support subway expansion across the City.

This section provides TTIL's vision, mission, goals and objectives to guide a successful rapid transit construction plan for Toronto. Essential to TTIL's vision is adoption of a brand new approach to funding and financing transit expansion, including replacing traditional procurement with innovative approaches to construction, financing and relationships with the private sector and the structuring of operations so as to capture the value that is created through investments in public infrastructure.

••• 7.1. TTIL's Vision for System Transformation •••

TTIL views completion of the Sheppard Subway as originally approved by Council in 1986 to be a first step in re-inventing how we plan, build and operate public transit in Toronto. It is an opportunity to demonstrate that a more efficient cost structure is possible. Applying international best practices, TTIL will put Toronto on a path towards having a globally competitive first-class transportation network that is financially sustainable, fast and convenient.

Incremental change will not get Toronto where it needs to be.

The Province of Ontario's recent Regional Transportation Plan (2008) called for a bold transformation of the transportation system; recognizing that the current system is no longer meeting end users needs.

To date no bold plan has been developed that meets the needs of the end users. While the TTC has produced plan after plan, over the last 30 years, it has failed to deliver anything other than small incremental change. Short extensions to Toronto's existing subway network have not solved the transit deficit problem. Second-rate solutions such as LRT or streetcars on suburban streets do little to get people where they need to be faster than existing bus networks. Political considerations, whereby transit priorities change after almost every federal, provincial and municipal election, in large part have contributed to this. The reality, however, is that fixing how transit is structured is a lot easier, and markedly more practical, than trying to fix the political prioritization processes of multiple levels of government.

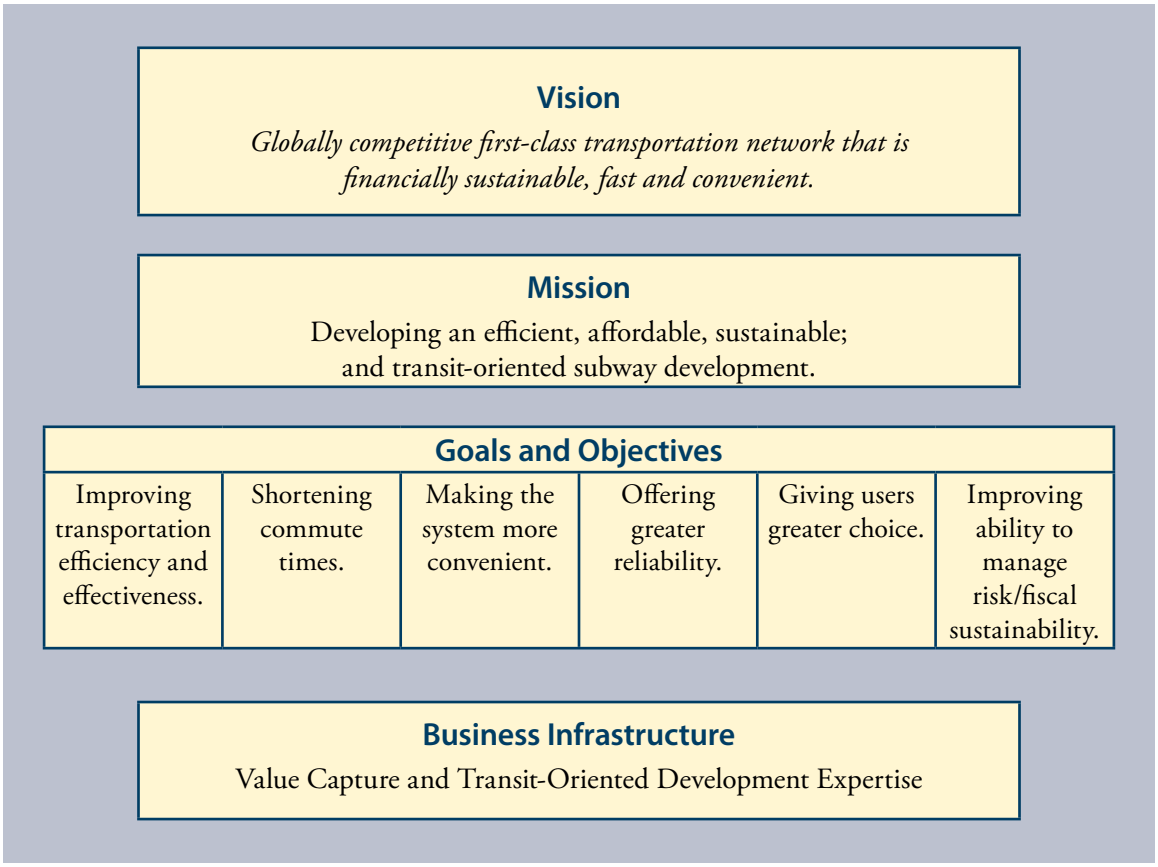
In other parts of the world it has been shown that if short-term political considerations can be removed from transit planning, and if transportation authorities are provided incentives to make decisions based on sound business principles, bold, innovative and long-term sustainable change is possible. What is required is **a first-class solution that addresses the needs of a growing urban population by focusing on the critical factors that determine long-term success of a public transit initiative**.

••• 7.2. TTIL's Mission •••

TTIL views the mission of a successful transit system for Toronto to be:

- Efficient;
- Affordable;
- Sustainable; and
- Support Transit-Oriented Development

Figure 29: TTIL Strategic Framework



Efficient

First and foremost, the goal of public transportation must be to get people where they need to go quickly and efficiently. An inefficient system of multiple changes and rapid transit sharing roads with cars, pedestrians, and cyclists will add both commuting time and stress to the less well off citizens that have no option other than to use public transportation. For the financially advantaged citizens choosing public transportation over cars is heavily dependent upon convenience and travel times. For the transit system, choosing LRT/streetcars and spending hundreds of millions of dollars to shave a few minutes off someone's commute is neither efficient nor affordable.

Building an integrated subway network at affordable prices that significantly reduces commute times and stress (not adds to it) must be a priority for Toronto. Other cities have shown that the latter approach is possible in an affordable and sustainable way.

Affordable

Transit expansion must be affordable. In Toronto capital costs tend to be viewed as expensive sunk costs, not as potential assets for current and future citizens to support social and economic wellbeing. The focus on transit as a "public good" has resulted in multiple levels of government arguing over who is responsible and a culture of "buck passing."

Other cities have solved the problem of affordability by treating the capital costs spent on transit expansion as an investment that can be used to generate a significant return on capital (across a wide portfolio of interests).

MTR, Hong Kong's transit authority, for example operates on commercial principles, financing and operating railway services that are not only self-supporting but that also yield a net return. The fully-loaded costs of public transportation investment including operations and maintenance are covered by supplementing fares with income from real estate development including sale of development rights, joint venturing with private real-estate developers, and running retail outlets in and around subway stations. Revenue from property holdings and commercial activities accounts for more than 60% of MTR's total revenue. Total financial return to the Hong Kong government through MTR over the past 30 years has been estimated at well over $100 billion. Based on Hong Kong's example it becomes clear that it is misleading to compare affordability based simply on the capital requirements for construction. Rather affordability must be compared based on all expenses and revenues over the life of a project with the goal of implementing an expansion approach that can create an overall financial return.

Sustainable

Transit expansion must be sustainable. If a transportation authority is beholden to government subsidies and short-term government budget cycles then short-term political considerations will always dictate priorities. In Toronto this is clearly the case.

Other cities have solved the problem of sustainability, by empowering transportation bodies to deliver bold transformation through the assignment of clearly defined long-term revenue streams outside of the direct control of political interference. Political responsibility is maintained through various oversight mechanisms.

Transportation authorities do not receive any cash subsidies from the government to build transit infrastructure, though the granting of exclusive development rights based on before "transit development" value is common.

Establishing a new entity, based on sound commercial principles, with a solid governance structure and seeded with assets that can be used to generate revenues to pay for the costs of construction and ongoing maintenance, is a long-term sustainable approach that has worked elsewhere and that should be considered for Toronto.

Support Transit-Oriented Development

Transit expansion must support development and vice versa. The KPMG/NBLC forecast suggests that the GTA population will double from 6.0M to 12.0 M by 2062. By 2062, NBLC expects that, based on current trends, about 65% of all residential development will be in the form of higher density typologies. While the 905 will capture a share of high density development, Toronto will remain the location of choice for most buyers.

The TTC's traditional approach of having stand alone subway stations that act as little more than access to rail transportation (often from adjacent ground level parking lots) is not a transit-oriented development approach that will create community centres and maximize the revenue opportunities that can be used to fund an expansion program.

Other cities have developed an approach to transit development, whereby transportation developers and city planners work in a co-ordinated fashion to ensure that development along a transit corridor and in particular around station locations is done in a way that maximizes the utility of the transit infrastructure to the local community. In doing so not only is farebox income increased due to a greater propensity of the local community to use the available public transit, revenue from retail shops in the station vicinity is also maximized.

7.3. Goals and Objectives

The choices that we make on how best to expand our public transportation network need to be carefully judged against the outcomes that we seek to achieve.

TTIL views the goals of a successful transit system for Toronto to be:

- Reducing gridlock;
- Shortening commute times to enhance quality of life;
- Making the system more convenient;
- Offering greater reliability;
- Giving users greater choice;
- Contributing to economic development;
- Improving air quality and impacts on human health;
- Improving transportation efficiency and effectiveness;
- Improving ability to manage risk.

Reducing Gridlock

Roads will always remain an important element of the regional infrastructure. The goal of an integrated transportation solution must be to reduce gridlock by building a first-class, highly efficient transit network that encourages a shift from automobile commuting to public transit.

Toronto has been found to be one of the worst cities in North America for gridlock. The **Toronto Board of Trade believes that "gridlock is now the greatest threat to economic prosperity in the region" and is costing the region $6 billion annually**. This is an enormous cost even when compared to the expenses involved in expanding public transit. With this magnitude of economic loss at risk we can't afford not to do things right.

Thus, potential transit solutions should be evaluated on how they contribute to alleviating gridlock. Approaches that further restrict traffic flow should be avoided.

Table 29: Reducing Gridlock: Indicators for Consideration

Traffic flow and bottlenecks
Peak-period congestion by area across the City
Economic loss estimates due to gridlock
Pollution and greenhouse gas emissions due to stopped traffic

Shortening Commute Times

Individuals view commute times as one of the most important considerations in determining mode of travel to work. In 2005, a survey done as part of the **TTC's Building a Transit City report determined that the top 3 reasons for not choosing public transit all related to time.** Thus, potential transit solutions should be evaluated against how much they can shorten average commute times in order to get more people to work faster and achieve the highest possible shift towards a public transit choice.

Table 30: Commute Times: Indicators for Consideration

Travel time across the City, between residential areas and major centres
Average commute times (auto and public transit)
Automobile versus public transit modal split
Public attitudes through market research

Making the System More Convenient

Convenience is one of the key determinants in mode of travel to work. **Public transit usage drops considerably for each additional transfer required during a commute.** Surface routes that require waiting or transferring outdoors in cold climates like Toronto influence individual's perception of convenience. Thus, potential transit solutions should be evaluated against how much they contribute to convenience in order to achieve the highest possible shift towards a public transit choice.

Table 31: Convenience: Indicators for Consideration

Number of transfers required between residential areas and major centres
Ratio of outdoor versus weather-protected transfers
Time spent at transfer locations
Ease of transfer (time between platforms, crowding etc)
Route information availability and meets needs

Offering Greater Reliability

Reliability, consistently running on time, is another attribute of successful transit systems that customers value. **Individuals want to know that transit will get them to work as planned and on time.** Building redundancy into the network that enables commuters to avoid areas of disruption influences use of transit. Developing subway loops is an approach used in many cities to improving reliability (e.g., District Line, London). Greater integration between municipal and regional transit systems may also contribute to increased reliability.

Table 32: Reliability: Indicators for Consideration

Number of system disruptions
Amount of time inconvenience due to disruptions
Route redundancies particularly along high volume corridors and routes
Effectiveness of updating users on disruptions

Giving Users Greater Choice

Real choice is one of the most important factors in developing a successful broader transportation network; i.e. making the public transit option available. The strategy for expanding the public transit network in Toronto should **balance the needs of automobile commuters and the needs of public transit users;** i.e. avoiding the approach where one side suffers from the other's gain. Active transportation options including bicycling and walking should also be encouraged wherever possible.

Table 33: Choice: Indicators for Consideration

Modal split (car, public transit, active transportation)
Availability for each transportation mode by neighbourhood
Commute times
Length of bike trails

Contribution to Economic Development

In an increasingly globalized world, businesses have many options on where to locate. A well planned regional transportation network will encourage both business investment in Toronto and the ability of Toronto to attract the best and brightest global talent. Thus, potential transit solutions should be evaluated against economic development potential. For example, **the cost differential between streetcars/LRT solutions and fully grade-separated subway solutions must be compared against the potential billions of dollars in lost/gained economic opportunity**.

Table 34: Economic Development: Indicators for Consideration

Capital Investment in Toronto
Labour Attractiveness of Toronto
Regional GDP Growth
Regional immigration and population growth
Cluster development
Tourism and international visitors

Improving air quality and impacts on human health (environment)

Transportation options to a varying degree have an impact on the environment of our local communities. **In building a network comprising all modes of transportation we should strive as much as possible towards green solutions.** Effort should be taken to audit and evaluate the choices we make in order to minimize negative environmental impacts.

Table 35: Air Quality and Human Health: Indicators for Consideration

Air pollution and greenhouse gas emissions
Noise pollution
Land consumption for transportation activities
Respiratory illnesses and asthma
Indicators of human stress

Improving transportation efficiency and effectiveness

The public transit network in Toronto consists of three subway lines, the Scarborough RT, hundreds of kilometres of streetcar and bus routes, and a large number of station and system access locations. Moving forward we must strive to increase this network. Hand in hand with an expansion of public transportation, **we must continuously be re-evaluate efficiency and effectiveness factors to ensure that our limited resources are being applied towards the most efficient solutions**. The city is constantly evolving and our approaches and solutions must also evolve.

Table 36: Efficiency and Effectiveness: Indicators for Consideration

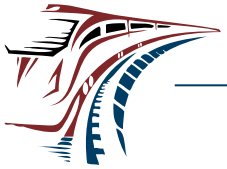
Integration of land-use and transportation planning
Proximity of rapid transit access by area of the city
Usage statistics of bus, streetcar and subway routes
Energy efficiency
Cost of operations and maintenance

Improving Ability to Manage Risk

The Toronto subway network is vulnerable. The Yonge line between Finch and downtown operates at maximum capacity and the risk of disruption is a serious issue. There are very few interconnection points in the subway network when compared to the criss-crossing routes of other comparable world cities. The financial core of the city is effectively served by a single subway line. Bloor/Yonge and St. George stations are particularly vulnerable given the volumes of passengers that pass through these stations each day. Failure to mitigate the risks associated with these vulnerabilities could lead to significant financial costs in the future.

Table 37: Manage Risk: Indicators for Consideration

Documentation and analysis of risk factors
Extent of risk mitigation strategies
Disaster recovery plans in place
Fiscal Sustainability



Section 8.

NEXT STEPS: GOVERNANCE STRUCTURE AND WORK PLAN

There is ample public policy evidence to support the continuation of the TTIL project. TTIL/Metrolinx costs estimate for East and West line extension is one billion dollars less than TTC estimates. The investment community has expressed substantial interest in participating in the Sheppard Subway extension project.

Moving forward robust governance and management based on commercial principles and innovative procurement approaches to construction and financing is required to capture transit efficiencies achieved by other first class world cities.

TTIL's proposed governance structure and 2012 work plan is outlined in this section. The plan proposes two phases involving Council participation: Phase 1 completion of design, geotechnical, and if required updating the 1992 Environmental Assessment, as well as confirmation of delivery model and development of procurement strategy; and Phase II procurement and construction execution.

8.1. Transparent and Robust Governance

In conclusion, TTIL has shown that:

- The Sheppard Subway remains approved public policy, that has remained so through numerous changes in governments (federal, provincial and municipal). It has been a top transit priority for Toronto for more than 30 years;
- Subway compared with LRT delivers the greatest value for money for the Sheppard Corridor over the long run;
- A tremendous amount of investment in planning studies and technical specifications (design and construction plans) has been undertaken to support immediate action;
- Funding of the Sheppard Subway is feasible. Numerous innovative funding approaches are available to support Sheppard Subway construction. The magnitude of these tools is significantly greater than the cost of the Sheppard Subway and many such tools may not be available to support LRT;
- International and national best practices demonstrate that alternate funding and delivery of construction models have the potential to reduce the burden of the cost of construction on taxpayers and accelerate project completion. This is supported by KPMG analysis.
- Research into the cost of procurement for the Sheppard Subway suggest that TTC cost estimates are higher than in other jurisdictions, up to more than three and half times that of other places in one case..

This is ample evidence to support the continuation of the TTIL project. Moving forward, robust governance, management, expertise, specification of priorities and funding is required to support the success of this initiative.

8.2. TTIL Governance Structure

TTIL undertook a thorough examination of different governance models for managing transit/subway expansion, as the model of governance and principles of business management will ultimately determine the effectiveness and success of any of action taken. The following governance structure is proposed for the expanded TTIL:

1. Establish TTIL as an independently governed company, with clear lines of governance and accountability between funding and operational partners;
2. Up to twelve Board members, with project and financing expertise;
3. Responsible for execution of capital financing/value capture plan and P3 procurement of subway design, build, maintain, finance that operates on sound commercial principles.

A stand alone entity would insulate the organization from short-term political change at all three levels of government, and is necessary to demonstrate that Toronto is serious about a new approach to public transit expansion, including attracting the type and level of investment required from the private sector. Transit projects, as outlined above, typically take a long time to deliver. The traditional TTC approach is to beg for money from senior levels of government, undertake design work in-house, and contract out construction.

The TTC is an operating agent of the City. Much work and focus is required by the TTC to improve the safety, efficiency and effectiveness of the transit system it operates. Its ability to expand the subway network using innovative financing and funding tools, as increasingly required by the federal government, is severely limited.

8.3. TTIL Board Roles and Responsibilities

The roles and responsibilities of the Board will include:

Network Growth

- Expanding Toronto's subway network using a mix of traditional and alternate financing structures, starting with the completion of the Sheppard Subway from Downsview to Scarborough Centre;
- Working collaboratively and constructively with Metrolinx to achieve greater efficiencies for the taxpayer in respect of subway expansion plans;

Improving Quality of Life & Maximizing Public Benefit

- Transit-oriented development is undertaken with the input and interests of local communities so as to enhance the quality of life and maximize public benefit of investments;

Financial Sustainability

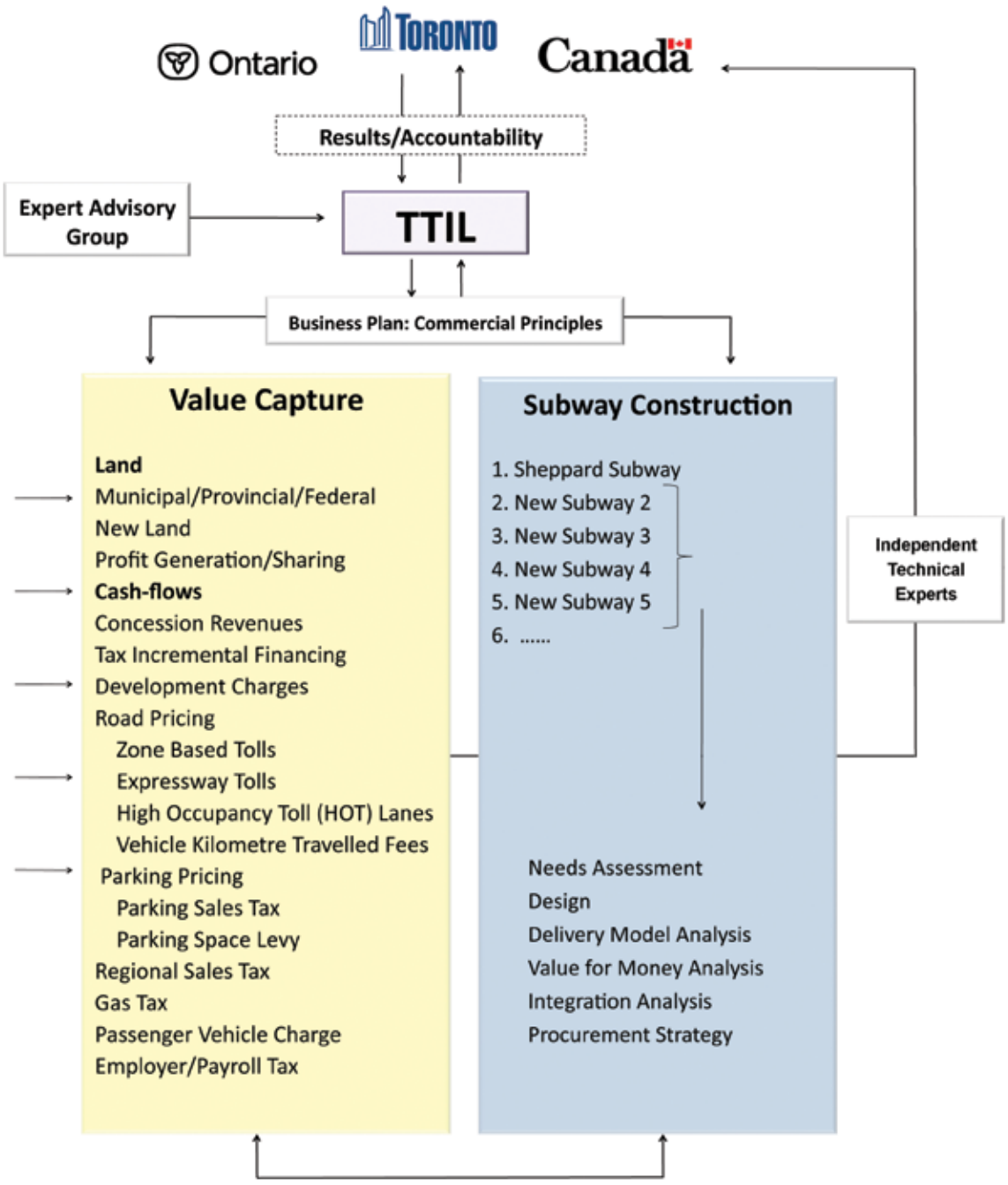
- Establishing priorities and outcomes goals/performance indices, in respect of TTIL's capital financing/property portfolio and subway construction plan;
- Ensuring balance between commercial and subway projects and sound risk management;

Transparency and Accountability

- Monitoring and reporting on the performance of TTIL;
- Reporting to the City, Province and Federal Government on performance;
- Ensuring financial, legal and auditing reporting requirements are met according to City, Provincial and Federal government guidelines.

For openness and transparency, an Advisory Committee of international and national planning, transit, and P3 procurement experts will be established to provide the Board with international best practices. A Working Group consisting of City and Provincial officials will also be established to support free flow of information across governments.

Figure 30: TTIL Governance Structure & Roles and Responsibilities



Potential Partners & Market Agents: Build Toronto, Waterfront Toronto, Toronto Lands Corporation, Infrastructure Ontario, Metrolinx, Toronto Regional Conservation Authority

8.4. TTIL Management Role and Responsibilities

The core responsibilities of the TTIL management will include:

- Experts and skills recruitment;
- Build and manage the property and transportation assets;
- Work with the City to identify revenue tool strategy implementation plan, including development of financial models;
- Undertake detailed delivery model and value for money analysis for the Sheppard Subway
- Initiate and manage research and strategy development towards subway network expansion
- Initiate and manage relevant procurement strategies and implementation plans

8.5. TTIL Transparency and Accountability

TTIL will work with City, TTC, provincial agencies and private sector advisors to develop robust and transparent procurement practices, including:

- Service specification
- Procurement specification
- Proponent/supplier terms and selection
- Contract management
- Performance evaluation
- Budget and risk management

TTIL will publish procurement practices on its website

The investment community has expressed substantial interest in participating in the project, since the announcement of the City's interest in building the Sheppard subway via a P3 procurement model.

8.6. TTIL Year I Strategic Priorities

The Year 1 strategic priorities for TTIL include:

Sheppard Subway Extension

Building on current work (including a history of the Sheppard Subway, development of preliminary cost estimates together with Metrolinx experts, which demonstrate enormous potential for cost savings compared to TTC managed project, even under a traditional procurement model, identifying a number of feasible funding options and financing and governance structures), the next steps for TTIL include the following:

a. *Governance and Expertise:* establish robust corporate governance and management structure for TTIL based on sound financial and commercial principles including:
   i. Determine roles, responsibilities, service procurement practices and accountability structures,
   ii. Hire executive, technical, financial and legal expertise;

b. *Design/Needs Update:* finalize preliminary design, costs, and benefits including:
   i. Update geotechnical and design elements (1992 Environmental Assessment); and
   ii. Update cost-benefit analysis for the project (updated 1992 Environmental Assessment).

c. *Delivery Model Analysis:* undertake further analysis – both quantitative and qualitative - on the delivery model for the project, including:
   i. Compare traditional/public sector procurement approach and P3 models;
   ii. Analyze across delivery models (e.g., Design, Build, Finance, Design Build Finance Maintain, Sale Leaseback, Build Own Operate etc); and
   iii. determine market realities of each approach;

d. *Value for Money Analysis:* develop robust financial models for the project including:
   i. Determine value for money over the life-cycle of the project and optimal risk allocation plans for the City;

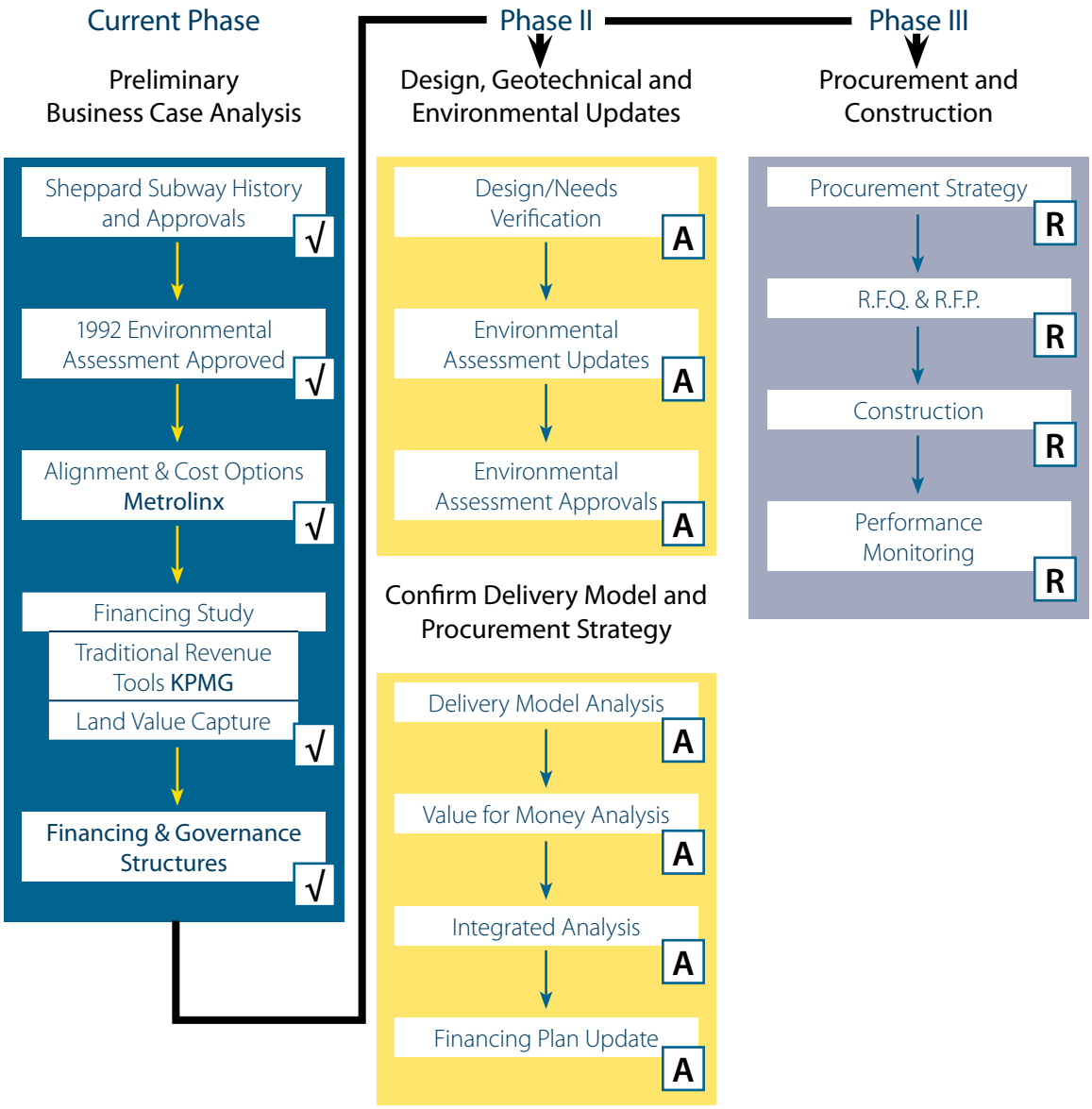
e. *Integrated (Delivery Model/ VfM) Analysis:* determine value for money including:
   i. review results of quantitative and qualitative delivery model analysis to determine if value for money analysis had any impact on options for the City;

f. *Procurement Strategy:* determine Sheppard Subway procurement framework based on above analysis, including:
   i. Confirm design;
   ii. Contract structure
   iii. Construction schedule;
   iv. Risk allocation
   v. Payment schedule etc.

g. *Funding/Capital Financing Plan Update*: Develop final capital financing plan including (working with City and Province):
   i. Identify source of funds, timing, cash-flows, market realities, legislative program etc,;
   ii. Develop funding proposal to Infrastructure Canada to unlock the $333 million federal commitment for Sheppard Subway project;

h. *Other Activities/Subway Expansion:* Explore innovative alternative financing options including:
   i. Continue investigation into optimal subway routes,
   ii. Continue investigation into alternative financing/value capture approaches, and
   iii. Development of integrated long term subway expansion plan for Toronto.

Figure 31: TTIL Sheppard Subway Work Plan

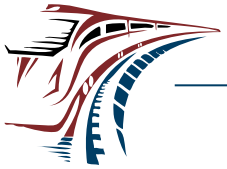


Key:

√ Work completed by TTIL

A Approvals from Council in 2012

R Report back to Council for Approval of Procurement Strategy, 2012

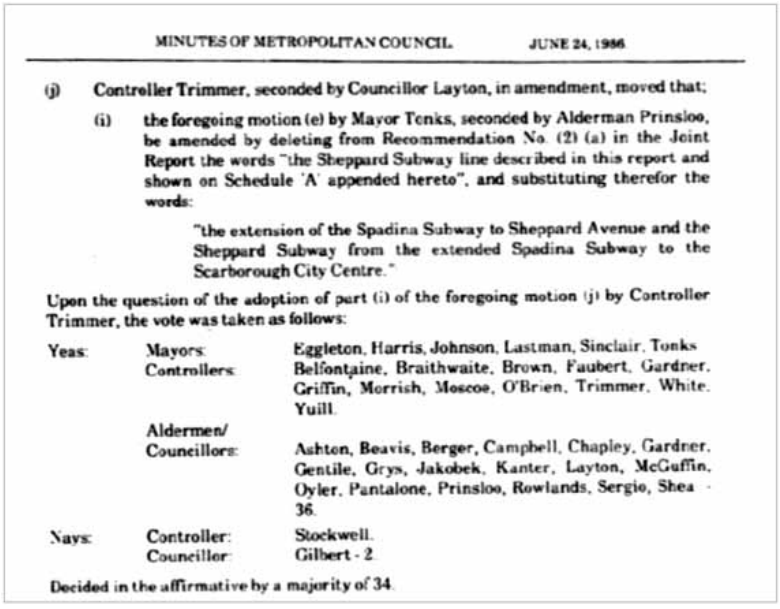


Section 9.

APPENDICES

••• 9.1. 1986 Approvals of Sheppard Subway (Council Minutes June 24, 1986) •••

The motion moved by Controller Joyce Trimmer and seconded by Councillor Jack Layton to approve Sheppard Subway.



MINUTES OF METROPOLITAN COUNCIL JUNE 24, 1986

(j) Controller Trimmer, seconded by Councillor Layton, in amendment, moved that;

(i) the foregoing motion (e) by Mayor Tonks, seconded by Alderman Prinsloo, be amended by deleting from Recommendation No. (2) (a) in the Joint Report the words "the Sheppard Subway line described in this report and shown on Schedule 'A' appended hereto", and substituting therefor the words:

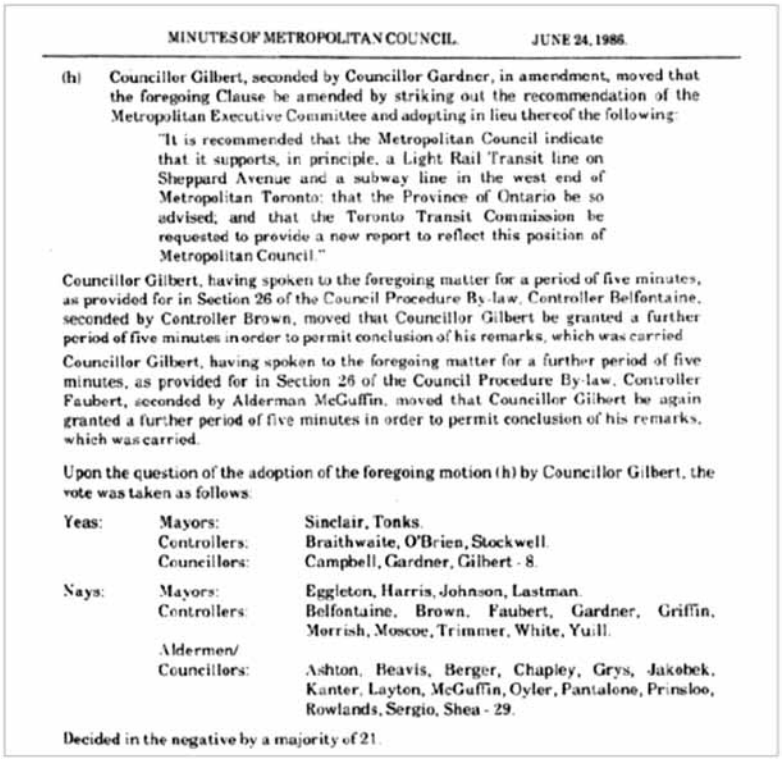
"the extension of the Spadina Subway to Sheppard Avenue and the Sheppard Subway from the extended Spadina Subway to the Scarborough City Centre."

Upon the question of the adoption of part (i) of the foregoing motion (j) by Controller Trimmer, the vote was taken as follows:

Yeas:	Mayors:	Eggleton, Harris, Johnson, Lastman, Sinclair, Tonks
	Controllers:	Belfontaine, Braithwaite, Brown, Faubert, Gardner, Griffin, Morrish, Moscoe, O'Brien, Trimmer, White, Yuill.
	Aldermen/ Councillors:	Ashton, Beavis, Berger, Campbell, Chapley, Gardner, Gentile, Grys, Jakobek, Kanter, Layton, McGuffin, Oyler, Pantalone, Prinsloo, Rowlands, Sergio, Shea - 36.
Nays:	Controller:	Stockwell.
	Councillor:	Gilbert - 2

Decided in the affirmative by a majority of 34.

On the same day a motion to construct the Sheppard line as Light Rail Transit was defeated by a vote of 29-8.



MINUTES OF METROPOLITAN COUNCIL JUNE 24, 1986

(h) Councillor Gilbert, seconded by Councillor Gardner, in amendment, moved that the foregoing Clause be amended by striking out the recommendation of the Metropolitan Executive Committee and adopting in lieu thereof the following:

"It is recommended that the Metropolitan Council indicate that it supports, in principle, a Light Rail Transit line on Sheppard Avenue and a subway line in the west end of Metropolitan Toronto; that the Province of Ontario be so advised; and that the Toronto Transit Commission be requested to provide a new report to reflect this position of Metropolitan Council."

Councillor Gilbert, having spoken to the foregoing matter for a period of five minutes, as provided for in Section 26 of the Council Procedure By-law, Controller Belfontaine, seconded by Controller Brown, moved that Councillor Gilbert be granted a further period of five minutes in order to permit conclusion of his remarks, which was carried

Councillor Gilbert, having spoken to the foregoing matter for a further period of five minutes, as provided for in Section 26 of the Council Procedure By-law, Controller Faubert, seconded by Alderman McGuffin, moved that Councillor Gilbert be again granted a further period of five minutes in order to permit conclusion of his remarks, which was carried.

Upon the question of the adoption of the foregoing motion (h) by Councillor Gilbert, the vote was taken as follows:

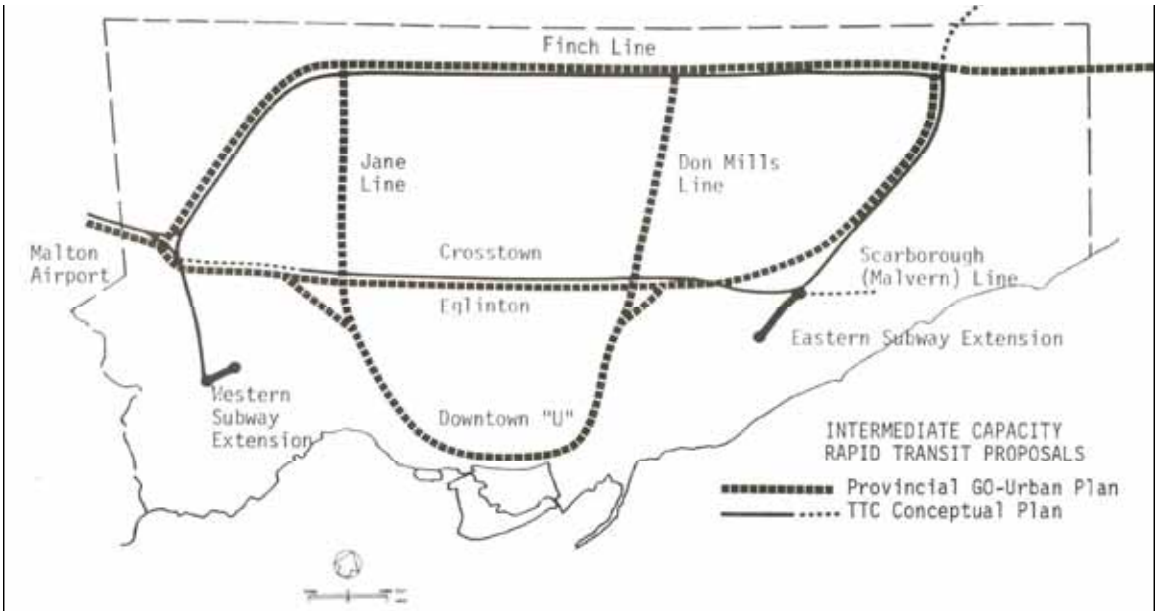
Yeas:	Mayors:	Sinclair, Tonks.
	Controllers:	Braithwaite, O'Brien, Stockwell.
	Councillors:	Campbell, Gardner, Gilbert - 8.
Nays:	Mayors:	Eggleton, Harris, Johnson, Lastman.
	Controllers:	Belfontaine, Brown, Faubert, Gardner, Griffin, Morrish, Moscoe, Trimmer, White, Yuill.
	Aldermen/ Councillors:	Ashton, Beavis, Berger, Chapley, Grys, Jakobek, Kanter, Layton, McGuffin, Oyler, Pantalone, Prinsloo, Rowlands, Sergio, Shea - 29.

Decided in the negative by a majority of 21.

••• 9.2. LRT Proposals Rejected by TTC •••

In 1972 (November) the Davis Provincial government announced an urban transportation policy for the Province of Ontario "indicating a shift in emphasis from urban expressways to a variety of transportation facilities which put people first." A subsidy programme subsidy of 75% to assist municipalities in the roll out of intermediate capacity transit technology (similar to the Scarborough rapid transit) was announced. A series of light rail transit expansions were proposed for the Toronto region (Intermediate Capacity Transit Plan) based on 1972 population capacities.

Figure 32: Provincial Intermediate Capacity Transit Programme, 1972



The Toronto Transit Commission later rejected this plan in favour of full-scale subways due to increasing population in the region and development potential along the corridor. The plan rejected was similar to the 2007 Transit City – Light Rail Plan.

In 1986 (June) Metropolitan Toronto reviewed the final report of Network 2011 plan and approved the building of the Sheppard Subway from Downsview to Scarborough City Centre and extension of Spadina Subway in a 36-2 vote.

The motion moved by Controller trimmer and seconded by Counsellor Jack Layton stated:

(ii) The forgoing motion (e) by Mayor Tonks, seconded by Alderman Pinsloo, be amended by deleting from the Recommendation No. (2) (a) in the joint Report the words "the Sheppard Subway line described in this reported and shown on Schedule 'A' appended hereto" and substituting therefore the words:

"the extension of the Spadina Subway to Sheppard Avenue and the Sheppard Subway from the extended Spadina subway to the Scarborough City Centre"

On the same day a motion to construct the Sheppard line as Light Rail Transit was defeated by a vote of 29-8 ***(Metro Council Meeting, June 24 1986)***

In 1996, a move was made by members of Council to convert the Sheppard Subway to LRT. LRT advocates argued that the LRT would cost less and the subway would be underutilized because it only went to Don Mills. The LRT idea was dismissed by the TTC Chief General Manager (David Gunn) who maintained its commitment to subways, belief in its projections that use would vastly increase once it was connected to Scarborough Centre, and an LRT on the surface would interfere with vehicular traffic.

In 1999 (December) the TTC reviewed and rejected a proposal by Lee Associates (with the support of Alan Tonks) for the development of light rail transit along unused rail corridors. It was seen as a distraction from other TTC and GO priorities by TTC general manager Rick Ducharme *(December 4th 1999 Toronto Star, Tonks' Plan Aims to Put GTA on Right Track to Better Transit)*.

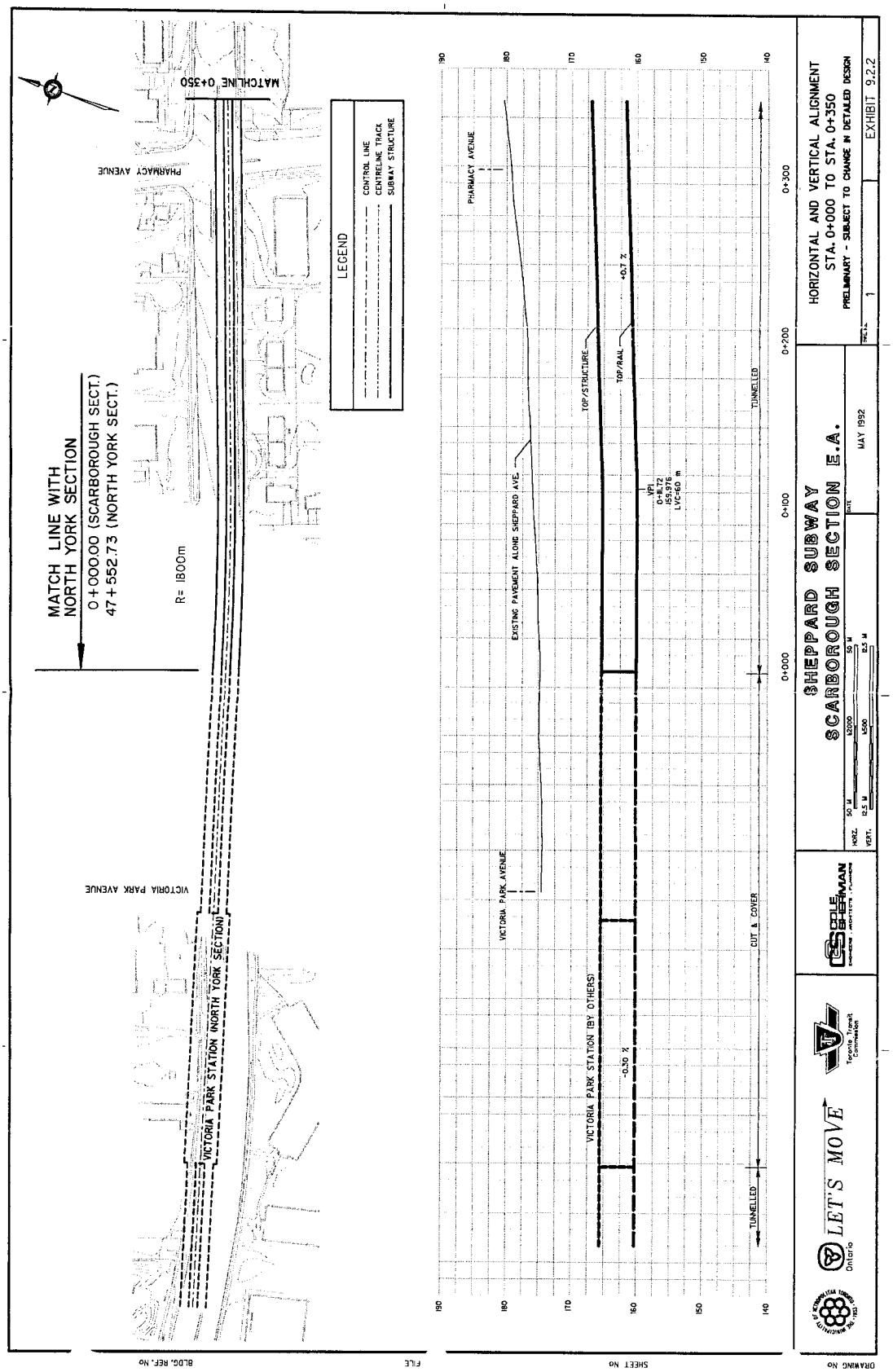
In 2001 (August) the 1999 LRT plan was brought forward again. TTC again rejected this idea stating the transit proposals that stand out as having the highest probability of for success and are cost effective in terms of capital and operating costs are the "northerly extension of the Spadina subway or an easterly extension of the Sheppard subway" *(Other Rail Ideas Seen as Rivals in Struggle for Transit Funds, Toronto Star Aug. 24, 2001)*.

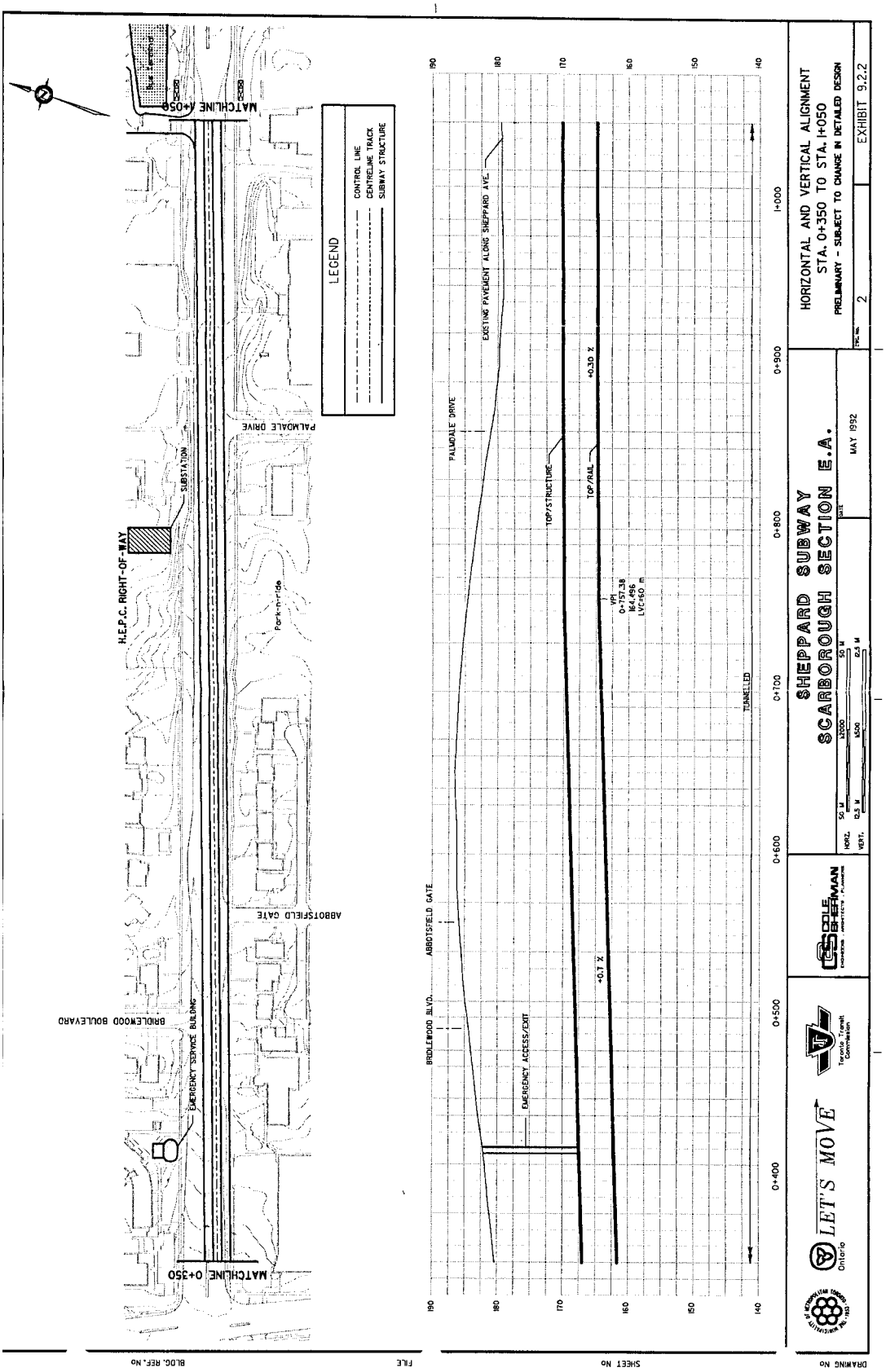
9.3. Vertical and Horizontal Alignment Drawings from Don Mills to Scarborough Centre

Preliminary alignment drawings from 1992 Sheppard Subway Environmental Assessment (subject to detailed design)

Exhibit 9.2.2.

1. Victoria Park Station Section
2. Victoria Park to Warden Stations Section
3. Warden Station Section
4. Warden to Kennedy Stations Section
5. Kennedy Station Section
6. Connection with CN/CP Station Section
7. Crossing 401 Section
8. Progress Station Section
9. Scarborough Centre Station Section
10. Limits of Alignment Section
11. Consumers Station Section
12. Settlers Curve Section
13. Victoria Park Station
14. [Missing]
15. [Missing]
16. Consumers Station
17. Victoria Park Station (alternative alignment)


MATCH LINE WITH
NORTH YORK SECTION
0+000.00 (SCARBOROUGH SECT.)
47+552.73 (NORTH YORK SECT.)
MATCHLINE 0+350
PHARMACY AVENUE
VICTORIA PARK AVENUE
VICTORIA PARK STATION (NORTH YORK SECTION)
R= 1800m
LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
PHARMACY AVENUE
EXISTING PAVEMENT ALONG SHEPPARD AVE.
VICTORIA PARK AVENUE
TOP/STRUCTURE
TOP/RAIL
+0.7 %
VPI
0+ML72
ELEV. 175.15
LVC=60 m
-0.30 %
VICTORIA PARK STATION (BY OTHERS)
TUNNELLED
CUT & COVER
TUNNELLED
190
180
170
160
150
140
0+000
0+100
0+200
0+300
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORIZONTAL AND VERTICAL ALIGNMENT
STA. 0+000 TO STA. 0+350
PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
MAY 1992
EXHIBIT 9.2.2
LET'S MOVE
Ontario
Toronto Transit Commission
DRAWING No.
SHEET No.
FILE
BLDG. REF. No.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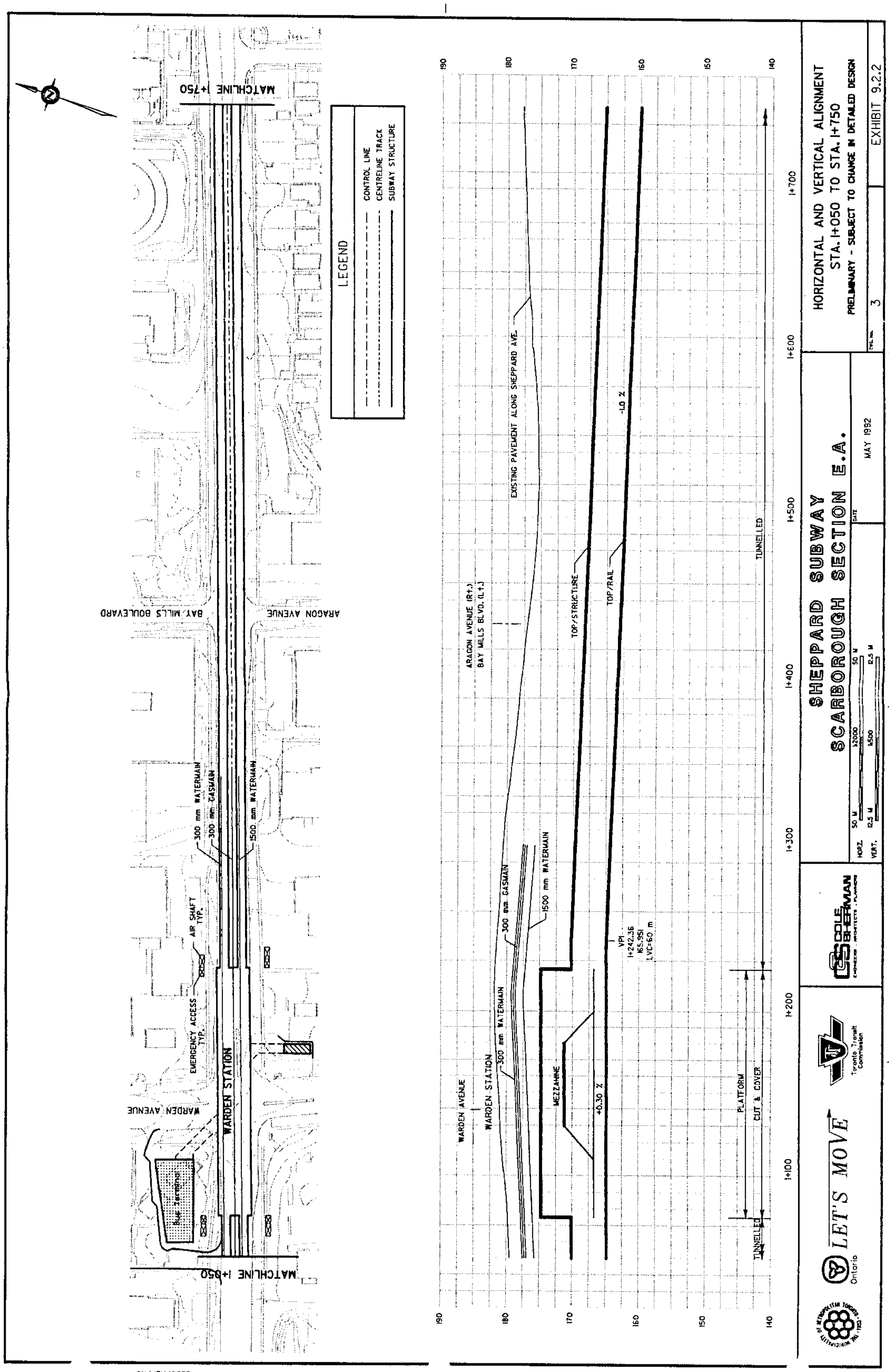
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
MATCHLINE 0+350
MATCHLINE 1+050
H.E.P.C. RIGHT-OF-WAY
SUBSTATION
PALMDALE DRIVE
Park-n-ride
BRIDLEWOOD BOULEVARD
EMERGENCY SERVICE BUILDING
ABBOTSFIELD GATE
BRIDLEWOOD BLVD.
ABBOTSFIELD GATE
PALMDALE DRIVE
EXISTING PAVEMENT ALONG SHEPPARD AVE.
TOP/STRUCTURE
TOP/RAIL
+0.30 %
-0.7 %
VPI
0+737.38
164.496
LVC=160 m
EMERGENCY ACCESS/EXIT
TUNNELED
0+400
0+500
0+600
0+700
0+800
0+900
1+000
190
180
170
160
150
140
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
MAY 1992
HORIZONTAL AND VERTICAL ALIGNMENT
STA. 0+350 TO STA. 1+050
PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
EXHIBIT 9.2.2
LET'S MOVE
Ontario
Toronto Transit Commission
COLE SHERMAN
DRAWING No
SHEET No
FILE
BLOC. REF. No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PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
EXHIBIT 9.2.2
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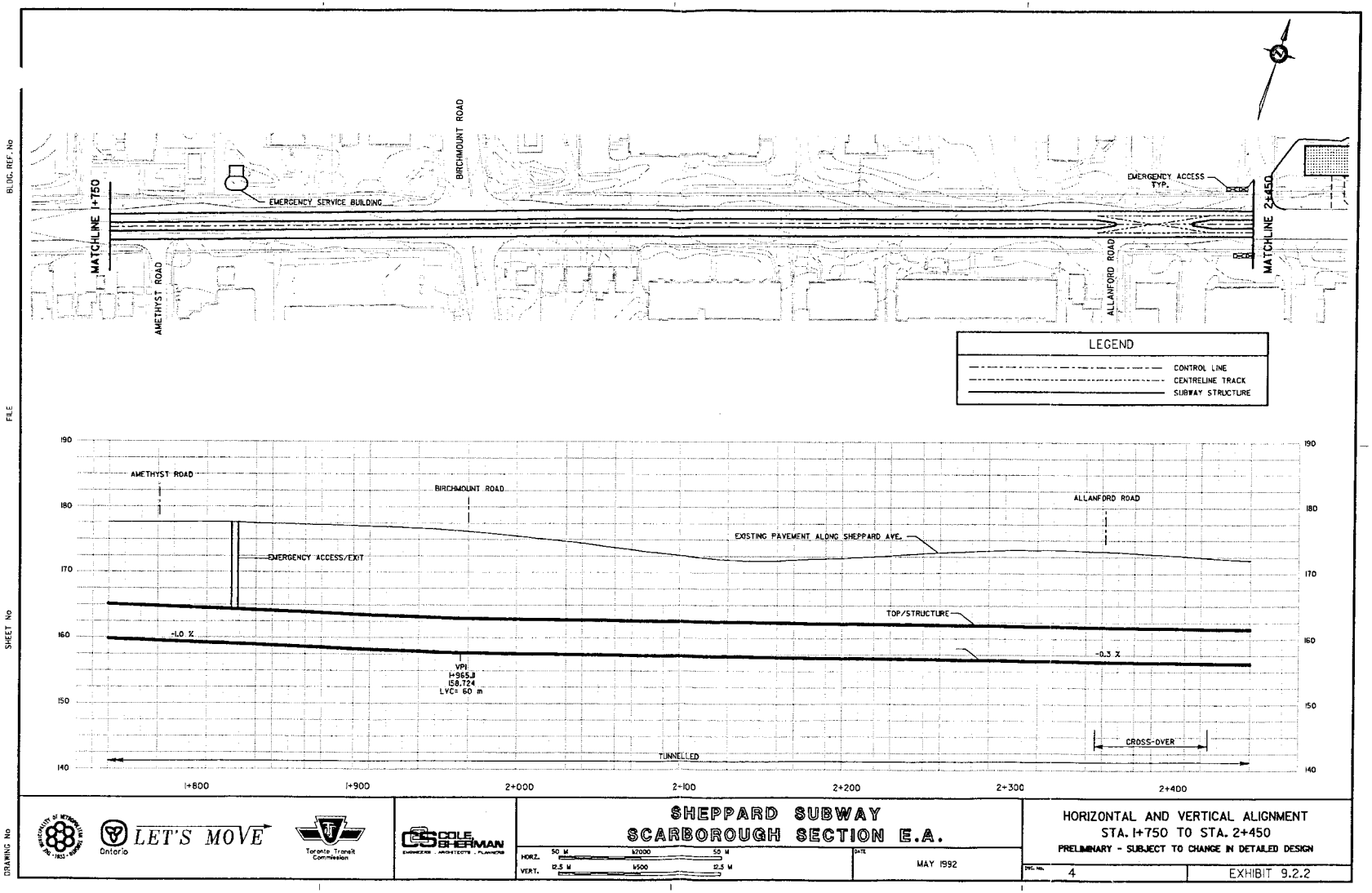
SCARBOROUGH SECTION E.A.
MAY 1992
LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
MATCHLINE 1+050
MATCHLINE 1+750
WARDEN AVENUE
WARDEN STATION
BAY MILLS BOULEVARD
ARAGON AVENUE
EMERGENCY ACCESS TYP.
AIR SHAFT TYP.
300 mm WATERMAIN
300 mm GASMAIN
1500 mm WATERMAIN
EXISTING PAVEMENT ALONG SHEPPARD AVE.
TOP/STRUCTURE
TOP/RAIL
MEZZANINE
PLATFORM
CUT & COVER
TUNNELLED
LET'S MOVE
Ontario
Toronto Transit Commission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SHEET No
DRAWING No
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EMERGENCY SERVICE BUILDING
MATCHLINE 1+750
AMETHYST ROAD
EMERGENCY ACCESS TYP.
MATCHLINE 2+450
ALLANFORD ROAD
LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
AMETHYST ROAD
BIRCHMOUNT ROAD
ALLANFORD ROAD
EXISTING PAVEMENT ALONG SHEPPARD AVE.
EMERGENCY ACCESS/EXIT
TOP/STRUCTURE
-1.0 %
-0.3 %
VPI
1+965.0
158.724
LVC= 60 m
CROSS-OVER
TUNNELLED
190
180
170
160
150
140
1+800
1+900
2+000
2+100
2+200
2+300
2+400
LET'S MOVE
Ontario
Toronto Transit Commission
COLE SHERMAN
ENGINEERS · ARCHITECTS · PLANNERS
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORZ. 50 M 1:1000 50 M
VERT. 12.5 M 1:500 12.5 M
DATE
MAY 1992
HORIZONTAL AND VERTICAL ALIGNMENT
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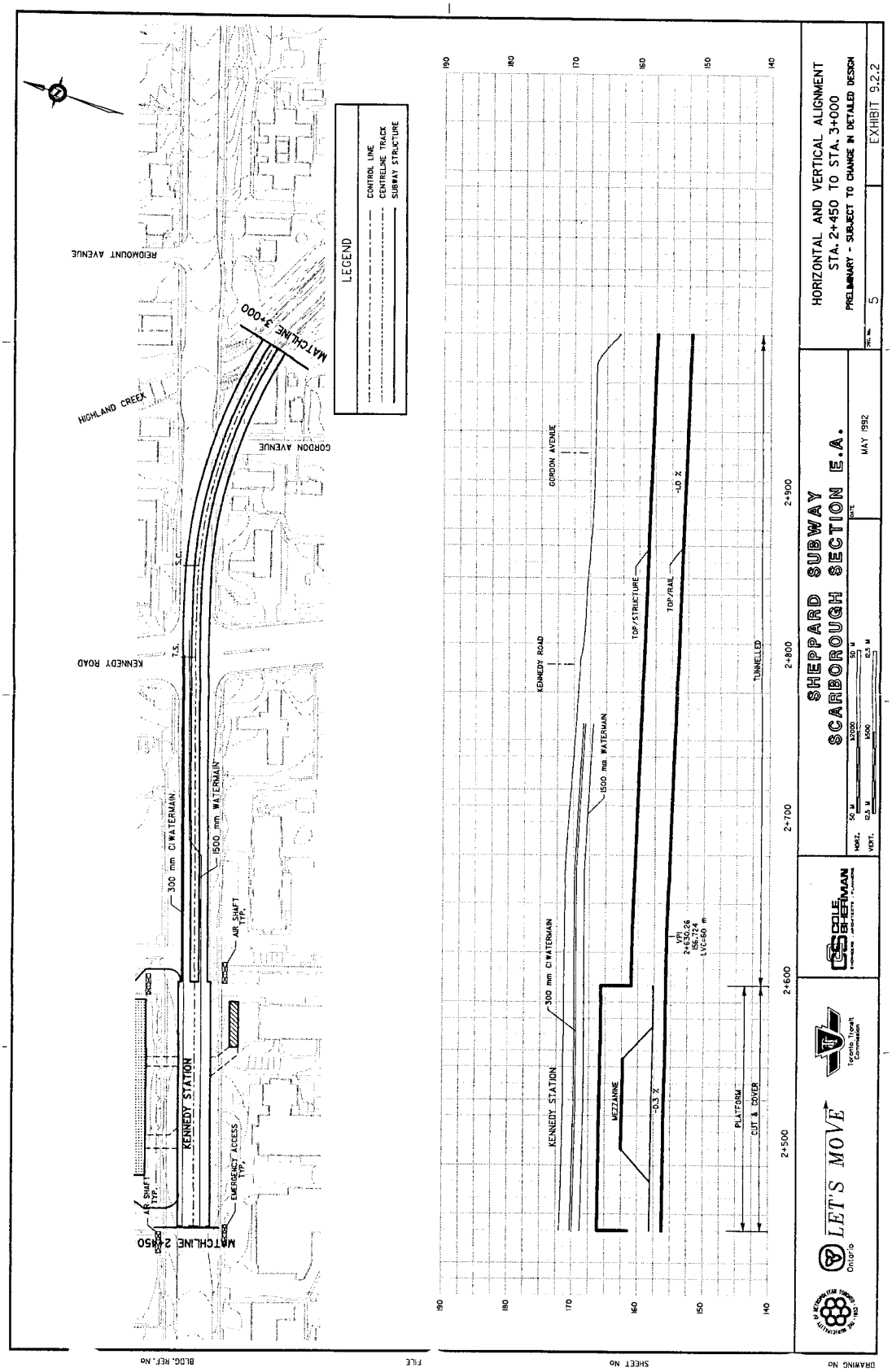
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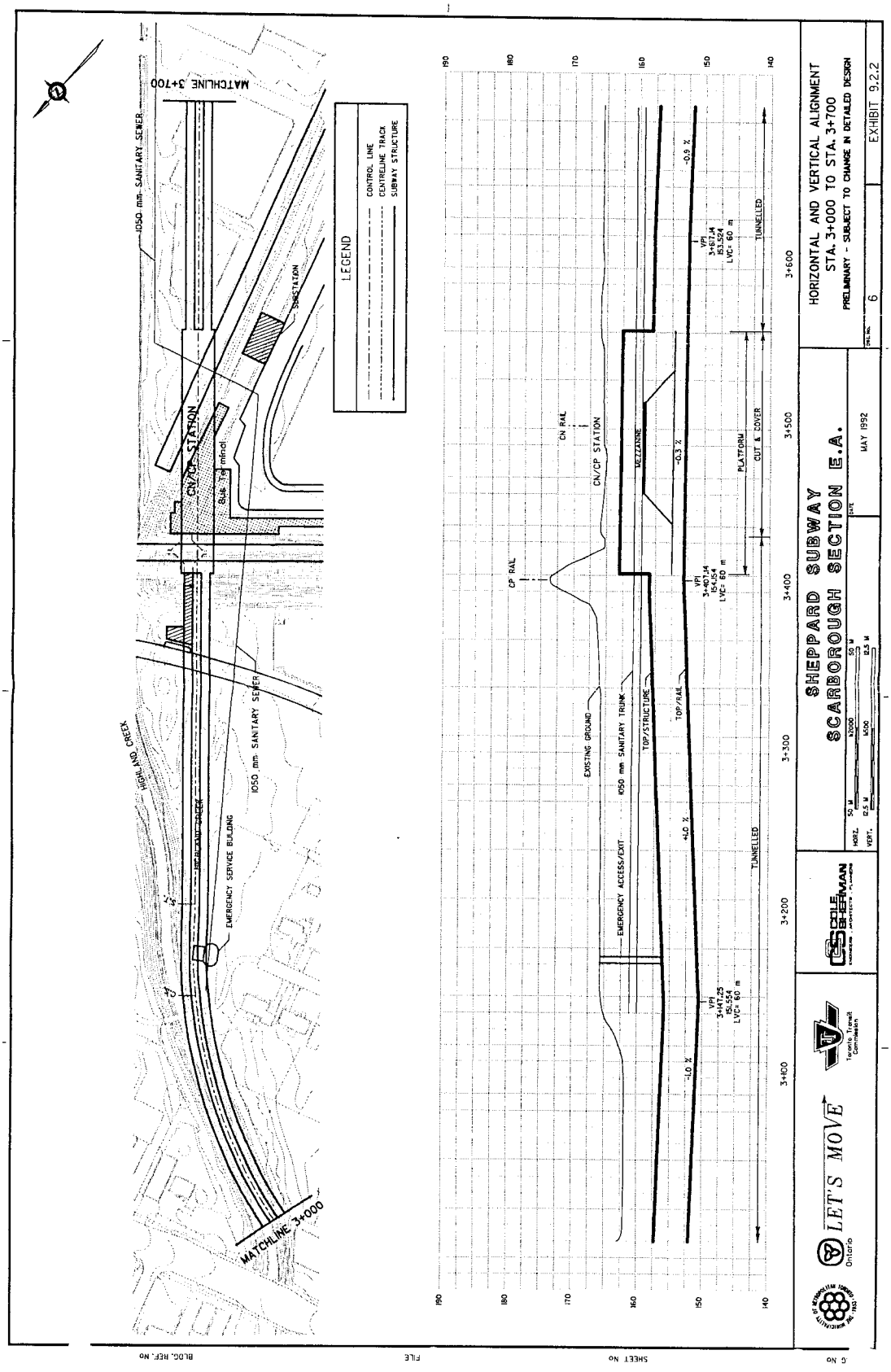
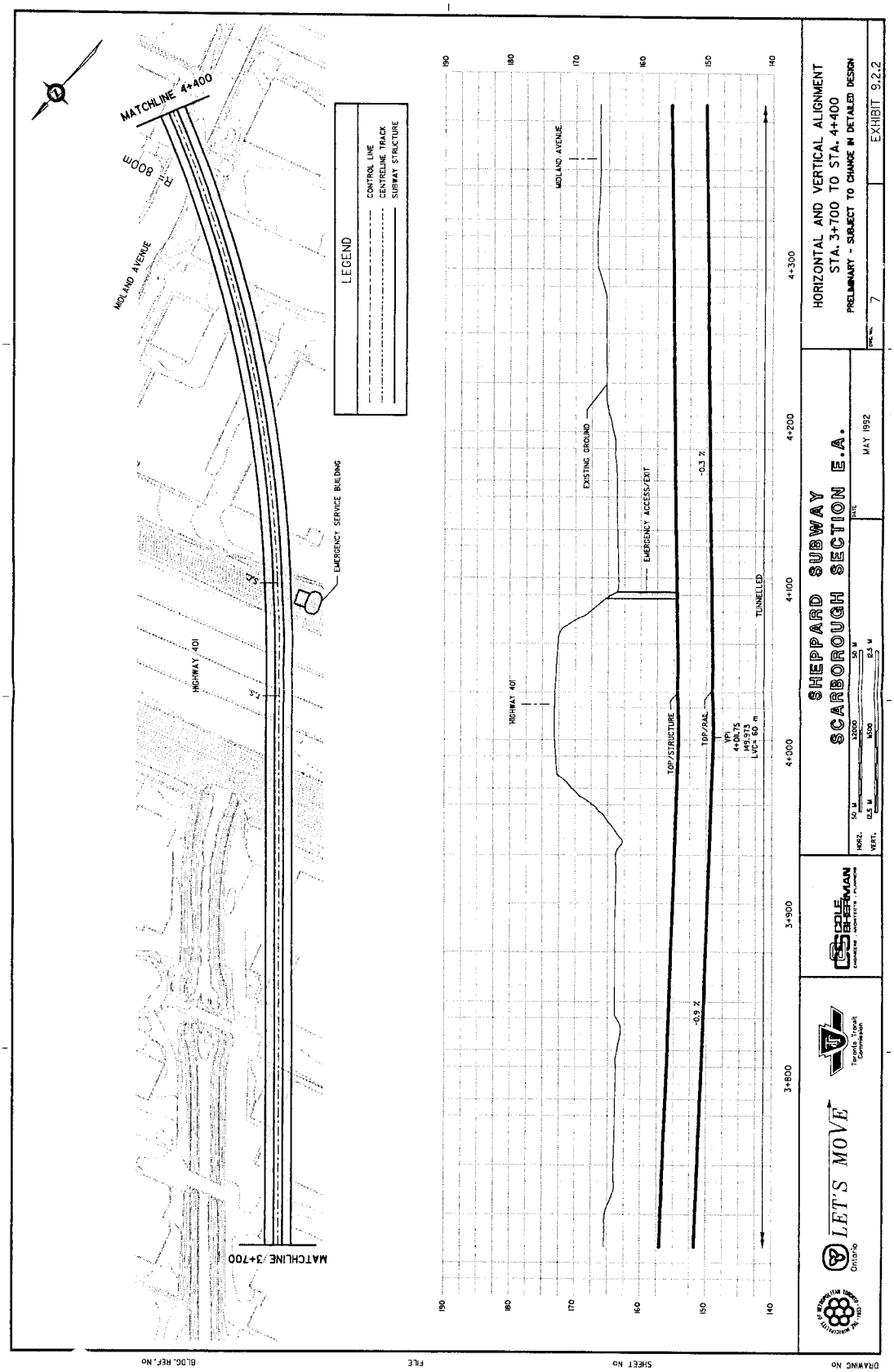
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
REDMOUNT AVENUE
HIGHLAND CREEK
MATCHLINE 3+000
GORDON AVENUE
KENNEDY ROAD
T.S.
S.C.
300 mm CI WATERMAIN
1500 mm WATERMAIN
AIR SHAFT TYP.
KENNEDY STATION
EMERGENCY ACCESS TYP.
AIR SHAFT TYP.
MATCHLINE 2+450
KENNEDY ROAD
GORDON AVENUE
1500 mm WATERMAIN
300 mm CI WATERMAIN
KENNEDY STATION
MEZZANINE
PLATFORM
CUT & COVER
TUNNELLED
TOP/STRUCTURE
TOP/RAIL
-0.3 %
-1.0 %
VPI
2+630.26
156.724
LVC=180 m
2+500
2+600
2+700
2+800
2+900
190
180
170
160
150
140
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORIZONTAL AND VERTICAL ALIGNMENT
STA. 2+450 TO STA. 3+000
PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
MAY 1992
EXHIBIT 9.2.2
LET'S MOVE
Ontario
DRAWING No
SHEET No
FILE
BLDG. REF. No


LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
MATCHLINE 3+700
1050 mm SANITARY SEWER
CN/CP STATION
SUBSTATION
HIGHLAND CREEK
EMERGENCY SERVICE BUILDING
MATCHLINE 3+000
CP RAIL
CN RAIL
CN/CP STATION
EXISTING GROUND
TOP/STRUCTURE
TOP/RAIL
TUNNELLED
CUT & COVER
PLATFORM
-1.0 %
+4.0 %
-0.3 %
-0.9 %
3+100
3+200
3+300
3+400
3+500
3+600
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORIZONTAL AND VERTICAL ALIGNMENT
STA. 3+000 TO STA. 3+700
PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
MAY 1992
EXHIBIT 9.2.2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R 800m
MIDLAND AVENUE
HIGHWAY 401
EMERGENCY SERVICE BUILDING
MATCHLINE 3+700
LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
MIDLAND AVENUE
EXISTING GROUND
EMERGENCY ACCESS/EXIT
HIGHWAY 401
TOP/STRUCTURE
TOP/RAIL
-0.3 %
-0.9 %
TUNNELLED
190
180
170
160
150
140
3+800
3+900
4+000
4+100
4+200
4+300
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORIZONTAL AND VERTICAL ALIGNMENT
STA. 3+700 TO STA. 4+400
PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
MAY 1992
EXHIBIT 9.2.2
LET'S MOVE
Ontario
DRAWING No
SHEET No
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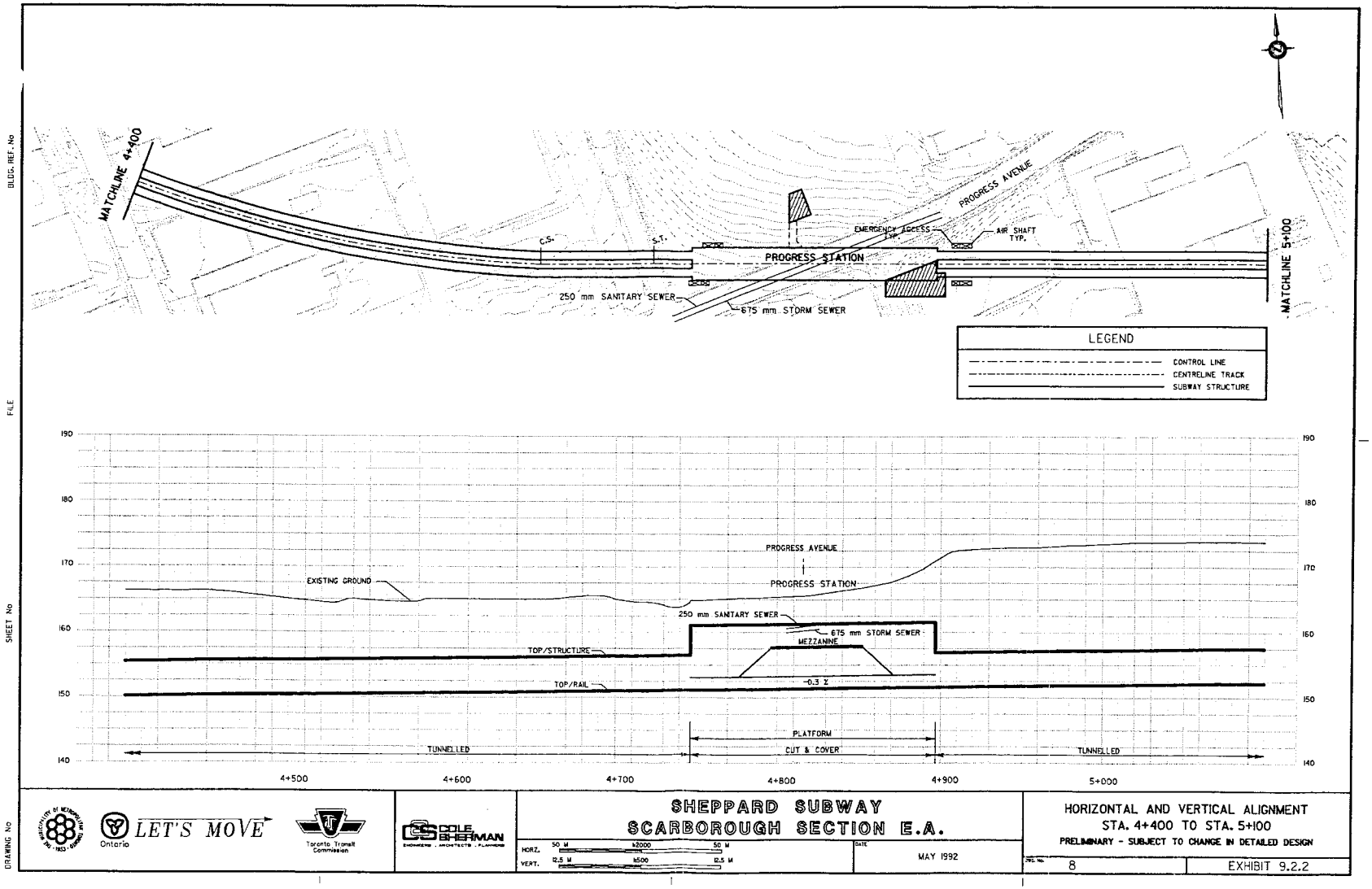
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AIR SHAFT TYP.
C.S.
S.T.
PROGRESS STATION
250 mm SANITARY SEWER
675 mm STORM SEWER
LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
190
180
170
160
150
140
EXISTING GROUND
PROGRESS AVENUE
PROGRESS STATION
250 mm SANITARY SEWER
675 mm STORM SEWER
MEZZANINE
TOP/STRUCTURE
TOP/RAIL
-0.3 %
PLATFORM
CUT & COVER
TUNNELLED
TUNNELLED
4+500
4+600
4+700
4+800
4+900
5+000
LET'S MOVE
Ontario
Toronto Transit Commission
DOLE SHERMAN
ENGINEERS · ARCHITECTS · PLANNERS
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORZ. 50 M k2000 50 M
VERT. 12.5 M k500 12.5 M
DATE
MAY 1992
HORIZONTAL AND VERTICAL ALIGNMENT
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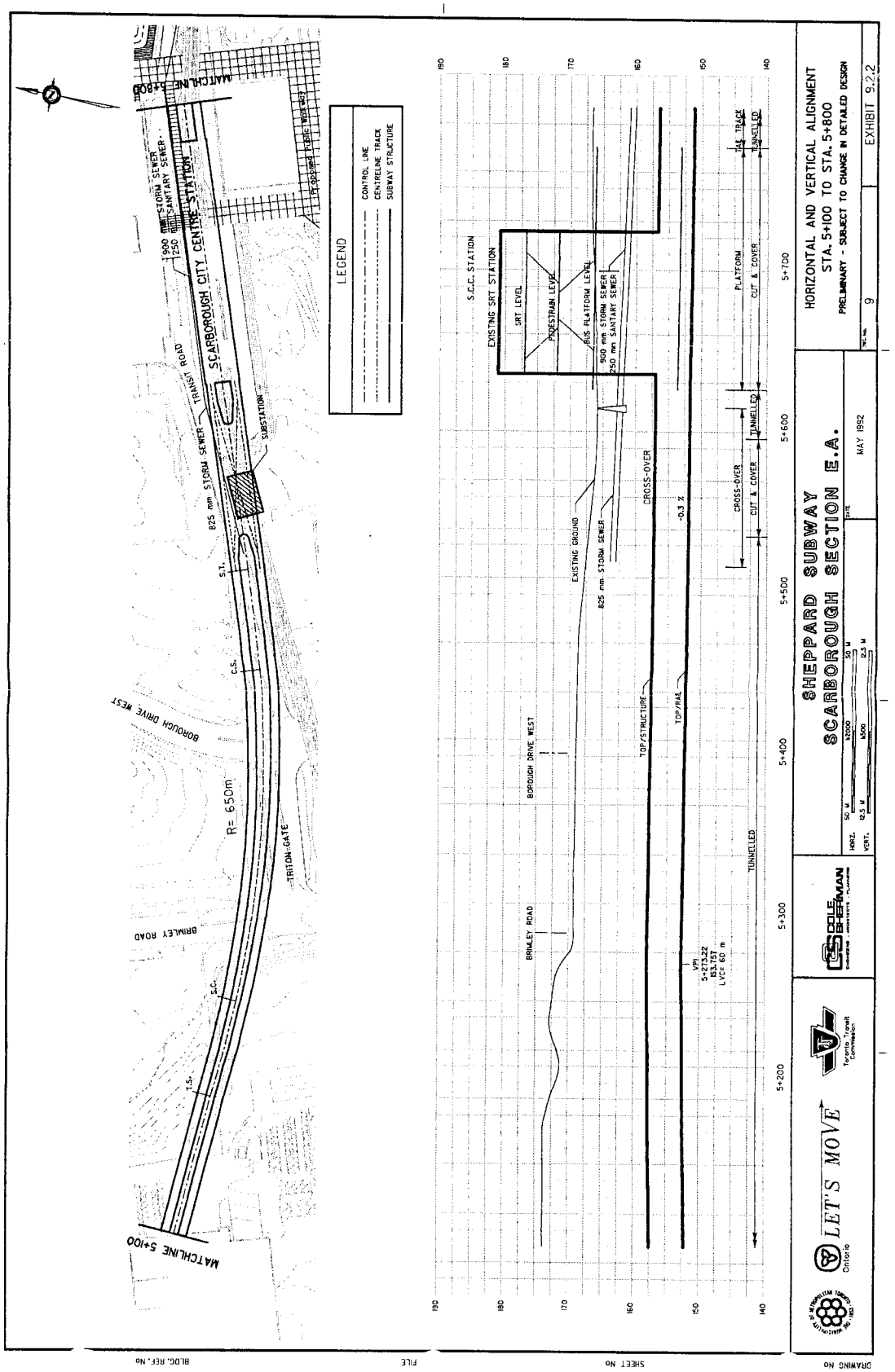
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BRIMLEY ROAD
TRITON GATE
SUBSTATION
825 mm STORM SEWER
1900 mm STORM SEWER
250 mm SANITARY SEWER
R= 650m
S.C.
C.S.
S.T.
T.S.
S.C.C. STATION
EXISTING SRT STATION
SRT LEVEL
PEDESTRIAN LEVEL
BUS PLATFORM LEVEL
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250 mm SANITARY SEWER
EXISTING GROUND
CROSS-OVER
TOP/STRUCTURE
TOP/RAIL
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CUT & COVER
TUNNELLED
PLATFORM
TRACK
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5+727.22
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LVC= 60 m
5+100
5+200
5+300
5+400
5+500
5+600
5+700
190
180
170
160
150
140
SHEPPARD SUBWAY
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HORIZONTAL AND VERTICAL ALIGNMENT
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PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
DATE MAY 1982
SCALES HORZ. 50 M 12.5 M VERT. 2.5 M
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LET'S MOVE
Ontario
Toronto Transit Commission
GENIVAR
GEILE SHEERMAN
SHEET No
FILE
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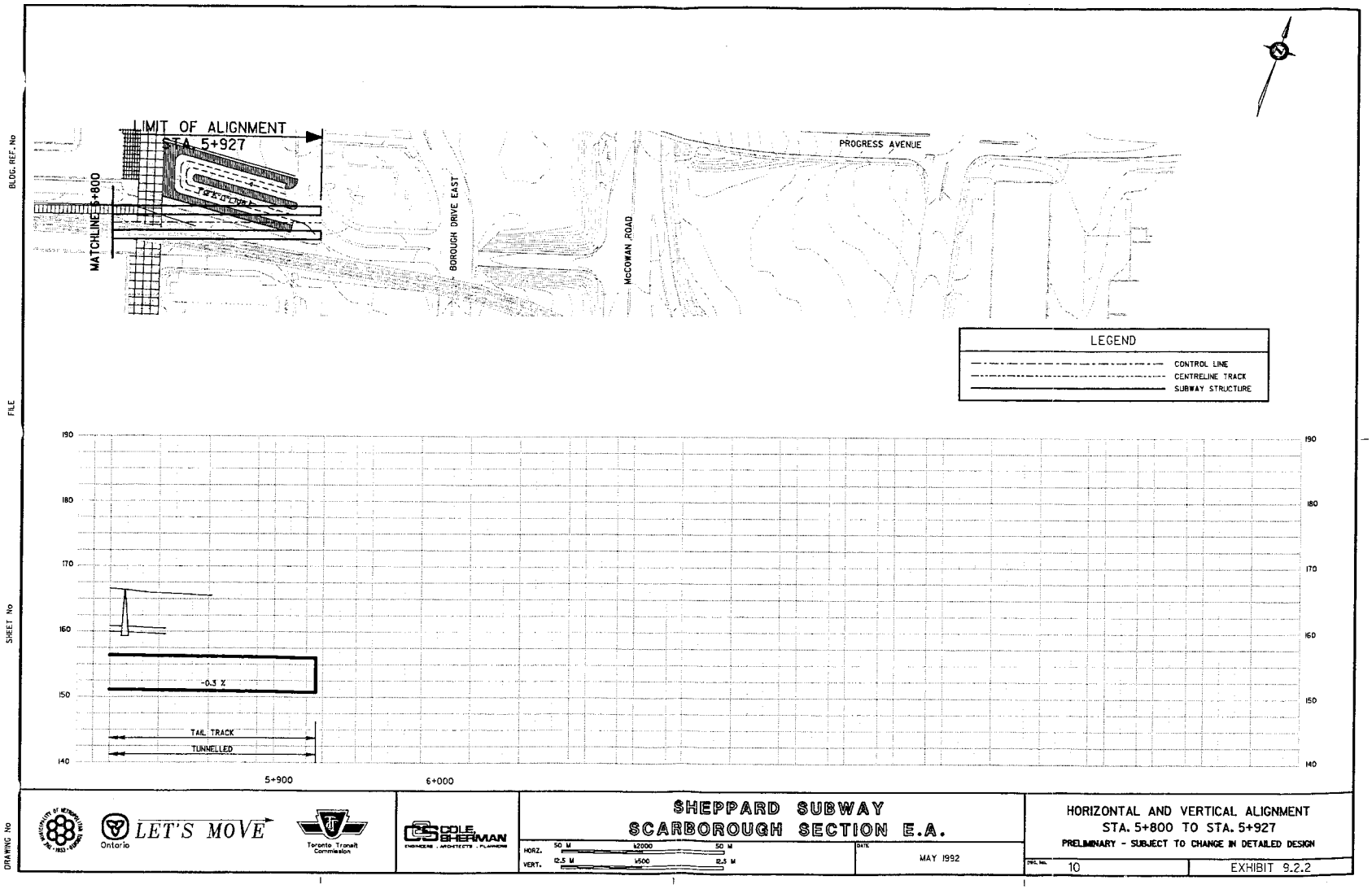
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LEGEND
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SUBWAY STRUCTURE
190
180
170
160
150
140
-0.3 %
TAIL TRACK
TUNNELLED
5+900
6+000
BLDG. REF. No
FILE
SHEET No
DRAWING No
LET'S MOVE
Ontario
Toronto Transit Commission
DOLE BEHERMAN
ENGINEERS . ARCHITECTS . PLANNERS
SHEPPARD SUBWAY
SCARBOROUGH SECTION E.A.
HORZ. 50 M 2000 50 M
VERT. 12.5 M 500 12.5 M
DATE
MAY 1992
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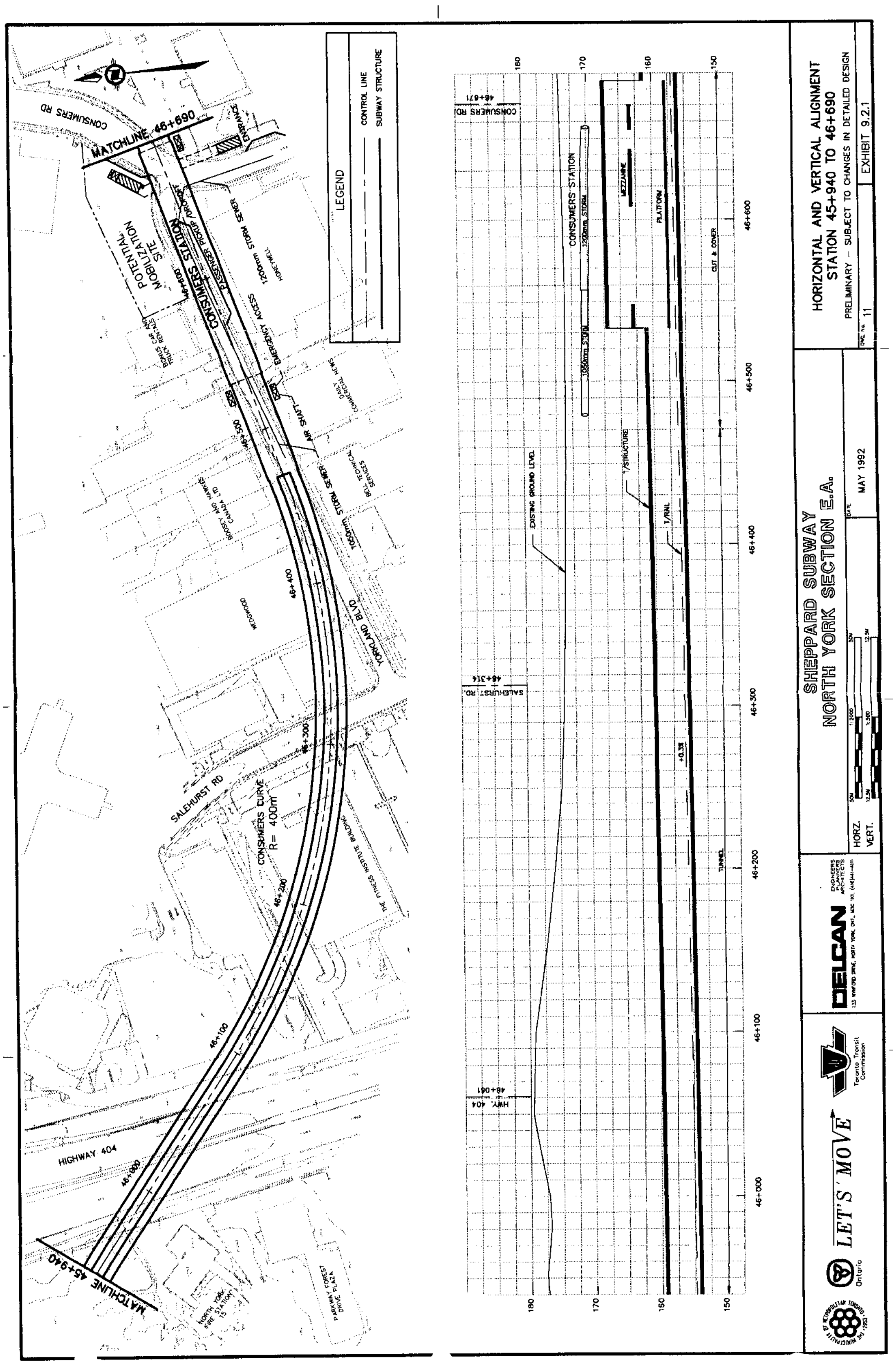
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STATION 45+940 TO 46+690
PRELIMINARY – SUBJECT TO CHANGES IN DETAILED DESIGN
EXHIBIT 9.2.1
MAY 1992
DELCAN
LET'S MOVE
LEGEND
CONTROL LINE
SUBWAY STRUCTURE
MATCHLINE 45+940
MATCHLINE 46+690
CONSUMERS RD
CONSUMERS STATION
POTENTIAL MOBILIZATION SITE
EMERGENCY ACCESS
AIR SHAFT
SALEHURST RD
CONSUMERS CURVE
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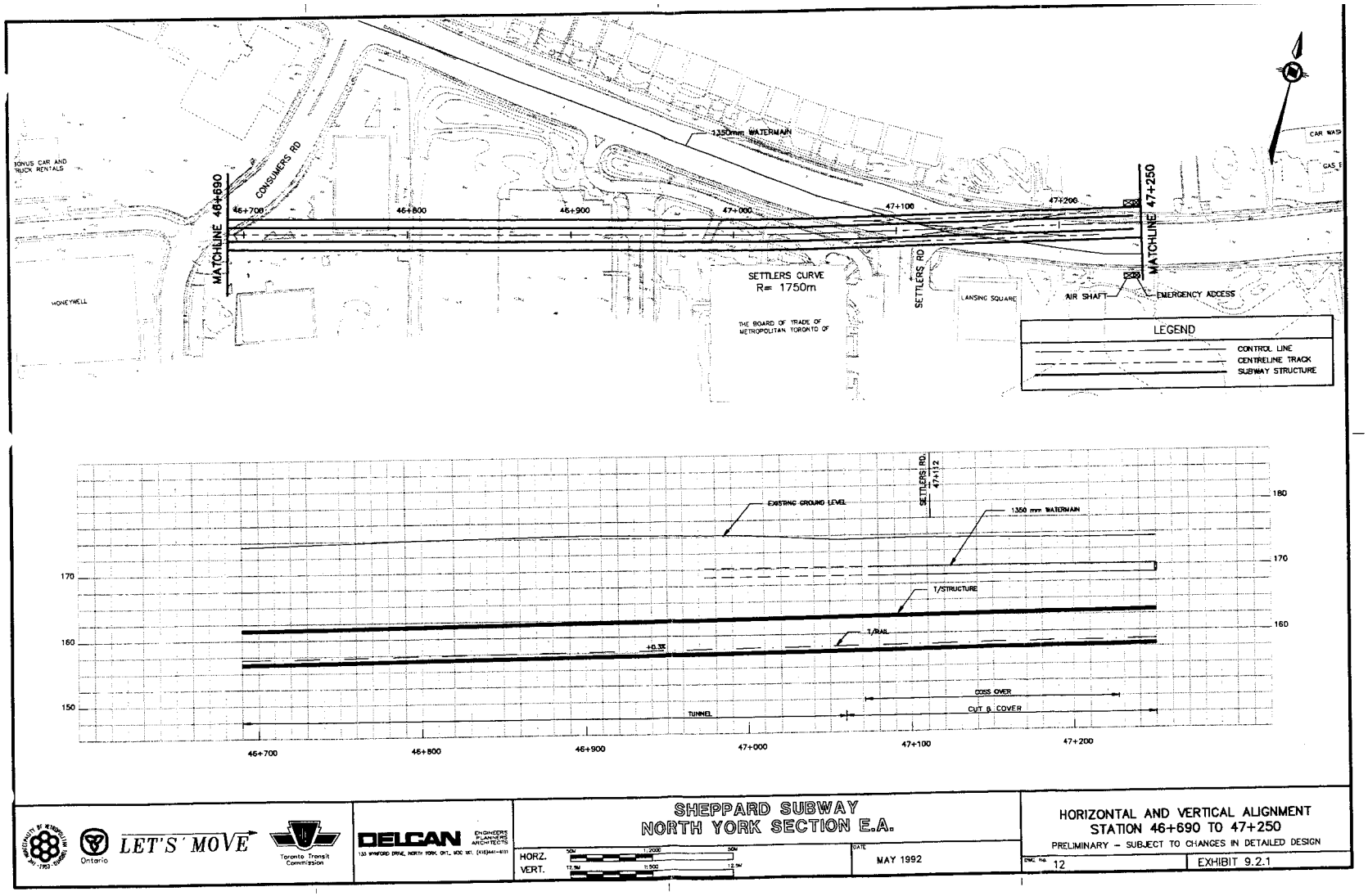
YORKLAND BLVD
HIGHWAY 404
EXISTING GROUND LEVEL
TUNNEL
CUT & COVER
PLATFORM
MEZZANINE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BONUS CAR AND TRUCK RENTALS
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46+700
46+800
46+900
47+000
47+100
47+200
MATCHLINE 47+250
SETTLERS CURVE
R= 1750m
SETTLERS RD
HONEYWELL
THE BOARD OF TRADE OF METROPOLITAN TORONTO OF
LANSING SQUARE
AIR SHAFT
EMERGENCY ACCESS
CAR WASH
GAS
LEGEND
CONTROL LINE
CENTRELINE TRACK
SUBWAY STRUCTURE
SETTLERS RD 47+112
EXISTING GROUND LEVEL
1350 mm WATERMAIN
T/STRUCTURE
T/RAIL
+0.33
TUNNEL
OPEN CUT
CUT & COVER
170
160
150
180
SHEPPARD SUBWAY
NORTH YORK SECTION E.A.
HORZ.
VERT.
MAY 1992
HORIZONTAL AND VERTICAL ALIGNMENT
STATION 46+690 TO 47+250
PRELIMINARY – SUBJECT TO CHANGES IN DETAILED DESIGN
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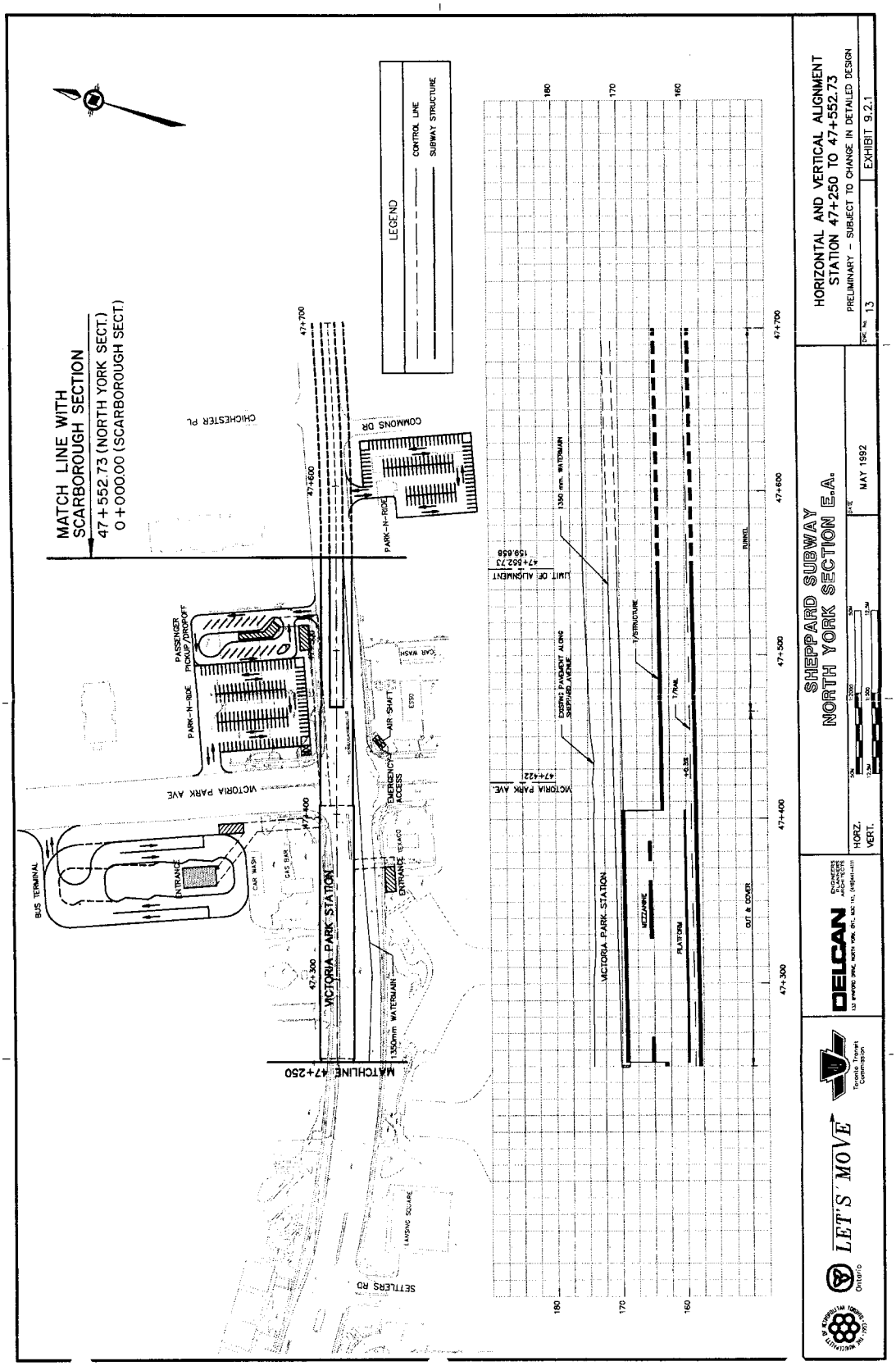
EXHIBIT 9.2.1
LET'S MOVE
Ontario
Toronto Transit Commission
DELCAN
ENGINEERS PLANNERS ARCHITECTS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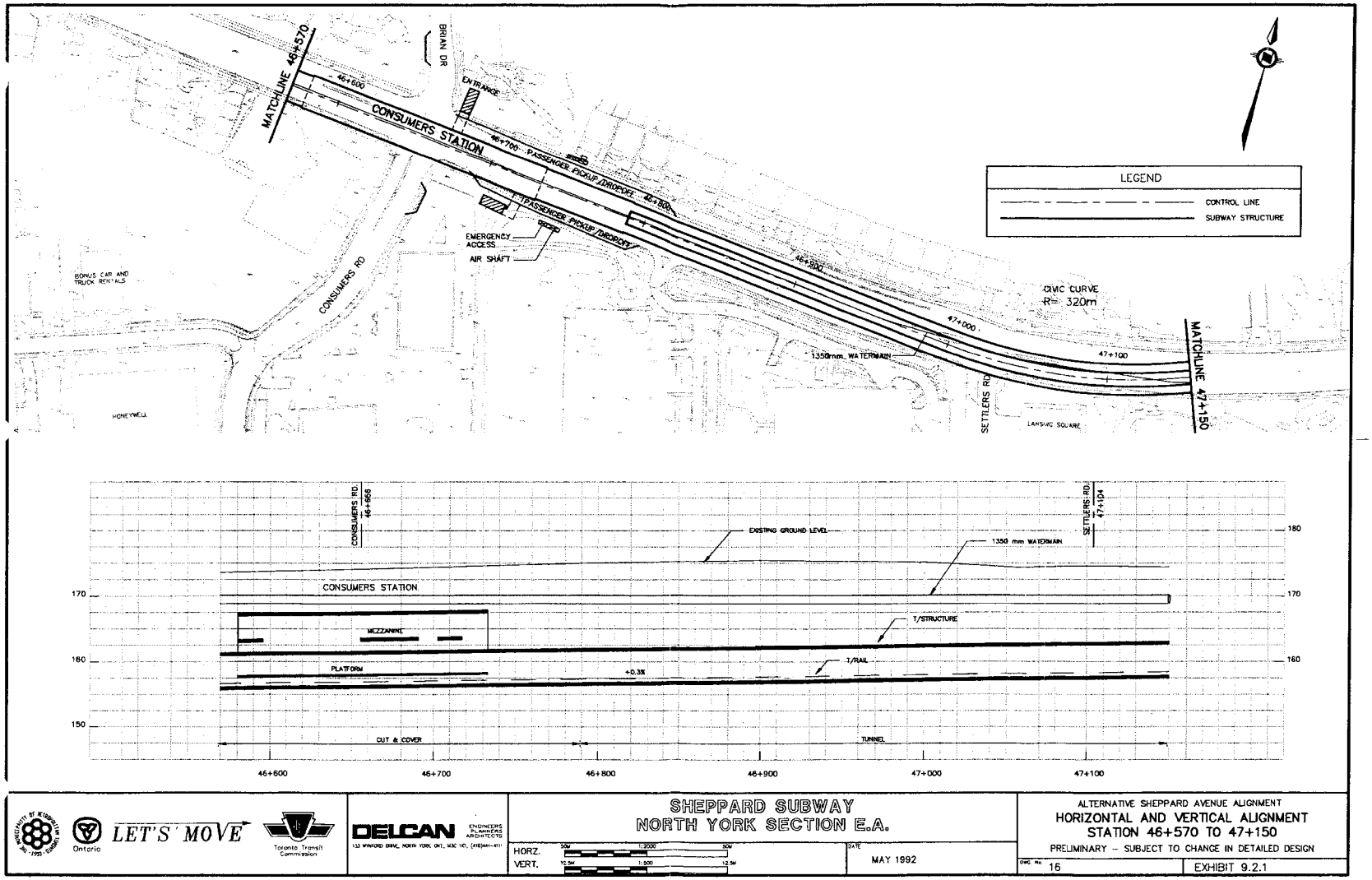
0+000.00 (SCARBOROUGH SECT.)
LEGEND
CONTROL LINE
SUBWAY STRUCTURE
CHICHESTER PL
COMMONS DR
PARK-N-RIDE
PASSENGER PICKUP/DROPOFF
VICTORIA PARK AVE
BUS TERMINAL
ENTRANCE
CAR WASH
GAS BAR
VICTORIA PARK STATION
EMERGENCY ACCESS
AIR SHAFT
ESSO
TEXACO
ENTRANCE
MATCHLINE 47+250
1350mm WATERMAIN
LANSING SQUARE
SETTLERS RD
LIMIT OF ALIGNMENT
47+552.73
158.658
1350 mm. WATERMAIN
EXISTING PAVEMENT ALONG VICTORIA PARK AVENUE
T/STRUCTURE
T/RAIL
-4.35
MEZZANINE
PLATFORM
CUT & COVER
TUNNEL
47+422
47+700
47+600
47+500
47+400
47+300
180
170
160
SHEPPARD SUBWAY
NORTH YORK SECTION E.A.
HORIZONTAL AND VERTICAL ALIGNMENT
STATION 47+250 TO 47+552.73
PRELIMINARY – SUBJECT TO CHANGE IN DETAILED DESIGN
DATE MAY 1992
DWG. No. 13
EXHIBIT 9.2.1
HORZ. 1:300
VERT. 1:300
DELCAN
LET'S MOVE
Ontario
Toronto Transit Commission



LET'S MOVE — Ontario — Toronto Transit Commission

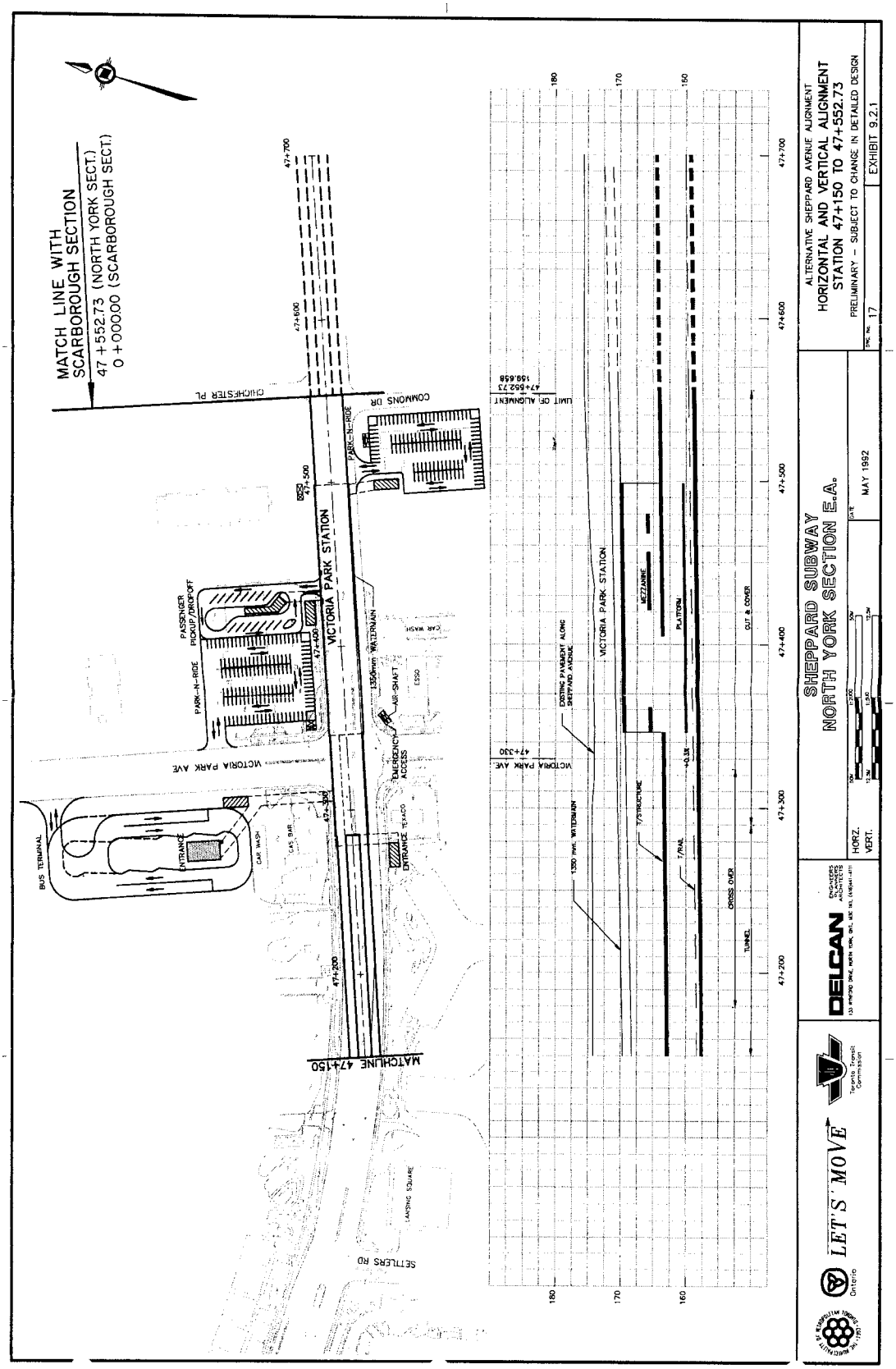
DELCAN ENGINEERS PLANNERS ARCHITECTS
133 WYNFORD DRIVE, NORTH YORK, ONT., M3C 1K1, (416)441-4111

SHEPPARD SUBWAY
NORTH YORK SECTION E.A.

HORZ. 50M 1:2000 50M
VERT. 10.5M 1:500 12.5M
DATE: MAY 1992

ALTERNATIVE SHEPPARD AVENUE ALIGNMENT
HORIZONTAL AND VERTICAL ALIGNMENT
STATION 46+570 TO 47+150
PRELIMINARY – SUBJECT TO CHANGE IN DETAILED DESIGN

DWG. No. 16 | EXHIBIT 9.2.1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CHICHESTER PL
COMMONS DR
PARK-N-RIDE
VICTORIA PARK STATION
PASSENGER PICKUP/DROPOFF
PARK-N-RIDE
MCTORIA PARK AVE
BUS TERMINAL
ENTRANCE
CAR WASH
GAS BAR
EMERGENCY ACCESS
AIR SHAFT
ESSO
TEXACO
1350mm WATERMAIN
MATCHLINE 47+150
SETTLERS RD
LANSING SQUARE
47+700
47+600
47+500
47+400
47+300
47+200
47+330
LIMIT OF ALIGNMENT
47+552.73
158.658
EXISTING PAVEMENT ALONG SHEPPARD AVENUE
1350 mm WATERMAIN
VICTORIA PARK STATION
MEZZANINE
PLATFORM
T/STRUCTURE
T/RAIL
CROSS OVER
TUNNEL
OUT & COVER
180
170
160
150
SHEPPARD SUBWAY
NORTH YORK SECTION E.A.
DELCAN
ENGINEERS ARCHITECTS
HORZ.
VERT.
DATE
MAY 1992
ALTERNATIVE SHEPPARD AVENUE ALIGNMENT
HORIZONTAL AND VERTICAL ALIGNMENT
STATION 47+150 TO 47+552.73
PRELIMINARY - SUBJECT TO CHANGE IN DETAILED DESIGN
DWG. No. 17
EXHIBIT 9.2.1
LET'S MOVE
Ontario
Toronto Transit Commission

9.4. Route Alignment Options Not Carried Forward for Evaluation

LRT or ALRT

The option of running LRT or ALRT technology rather than subway was considered. However given that the existing Sheppard line was designed for subway trains it was not deemed practical to convert it to an alternative technology and was already examined in the previous Sheppard-

Finch BCA. Western Only Extension

One of the potential options was to only construct the western extension between Downsview and Sheppard-Yonge. However, the development potential of this section was considered weaker than the eastern extension given that the western areas are more developed, albeit to a relatively low density. As the Sheppard extension is likely funded in part by capital raised through development along the corridor, the eastern extension was considered the priority. Furthermore based on the evaluation results of Options 1 and 2, it is also possible to estimate the incremental benefits of the western extension.

Elevated Alignment

There are sections of lower density development, particularly towards the eastern end of the alignment. However there are significant changes in elevation resulting in some engineering challenges if an elevated alignment were to be pursued. In addition it would likely result in a reduction in road capacity as well as creating negative visual impacts along the urban setting.

Finch West BRT

Finch West BRT analysis is not included in this BCA as it is the merits (benefits and costs) of the Sheppard Subway extension that are being assessed.

9.5. Metrolinx Sheppard Subway Costs: Basis of Estimates and Alignment

Basis of Estimates

1. Alignment information gathered from maps, previous environmental reports and studies, together with the Sheppard options memo prepared for the Business Case Analysis, meetings and a site visit carried out in August 2011.

2. The procurement structure anticipated within the estimates is that a dedicated project management organization would be formed to deliver the project; this organization would manage the project, award design and construction contracts, and manage the work over the construction stage of the project. The work of this organization would be complete on commencement of revenue service.

3. The construction prices assume the use of pricing obtained from competitive tenders, with minimal restrictions on construction methodology and without contractual conditions that would create onerous contractual situations that would be reflected in a contract price.

4. A procurement and construction schedules as follows:
   - Option 1 – 108 months
   - Option 2 – 84 months
   - Option 3 – 84 months
   - Option 4 – 60 months

5. The costs in the estimate are set out as present day 2011 dollars that are escalated over the construction period at an average rate of 3% per annum, assuming a construction start around the middle of 2012.

6. No engineering work has been carried out. All estimates are conceptual in nature and reflect an opinion to be verified or revised once design is commenced and completed. The vertical alignment follows that set out in the tunnel drawings.

7. There are previous estimates with spread sheets setting out the details which have been made available to assist the carrying out of this assignment. This estimate is prepared independently of the these estimates; however figures included for utilities, maintenance facility, and property have been adopted as there is, no information available that can allow for a detailed estimate to be prepared for these elements of cost.

8. The estimate overall scope of the estimate commences with the management and design of the project, procurement, construction, and preparing the system to be ready for operations at the commencement of revenue service.

9. The estimate excludes the following costs:

a) Any additional escalation that may be incurred if the construction start or completion dates are delayed.

b) Re-routing of existing transit services, either temporarily or permanently

c) Financing beyond the construction period

d) Any costs associated with changes to the existing line between Don Mills and Sheppard-Yonge, except for work to the end stations

e) Street works outside the transit routes

f) Operating costs

g) HST

Scope of the Works

Route Survey

General condition survey of the existing transit line

Survey of the new line

Utility Relocations

Permanent removal, protection and relocation of utilities along the route, the rate used for the allowance is an assessment of anticipated relocations based on the guideway type and the surrounding development, based on the existing budget.

Permanent Roadworks

Repaving and grading adjacent to the in new stations, and replacing roads disturbed by cut and cover guideway construction

Community Relations Projects

Funds for new community relations projects associated with the transit project, such as plazas or seating areas

Site Preparation

An allowance for demolition of existing structures as may be required for the construction of stations and emergency exit buildings Preparation of the site for all surface work including the cut and cover tunnel, stations, and at grade guideway.

Environmental Investigation and Mitigation

Environmental investigation

Allowance for environmental mitigation projects.

Guideway

Cut and cover tunnels for the end stations and tail tracks

5400mm Internal diameter bored tunnel, based upon the use of four tunnel boring machines for options 1, 2, and 3; and one tunnel boring machine for option 4. Progress rates for all options is assumed to average 10 metres per day per machine

Emergency exit buildings are included, and each shaft is assumed to be 6 x 24 metres on plan and contains a staircase from the cross-passage to street level. The numbers included are as follows:

- Option 1 – 9 shafts
- Option 2 – 4 shafts
- Option 3 – 5 shafts
- Option 4 – 2 shafts

Landscaping and Site Restoration

General landscaping along the guideway route

Power and Systems Structures

Sub-station buildings or rooms in stations as appropriate at approximately two kilometre centres, providing the following number of sub-stations:

- Option 1 – 8 sub-stations
- Option 2 – 6 sub-stations
- Option 3 – 6 sub-stations
- Option 4 – 3 sub-stations

Stations

Below grade stations of cut and cover construction with a platform length of 155 metres. The station structures are 10 metres longer than the platforms. The finish and service standards would be comparable with the existing TTC below grade stations. It is anticipated the station would include a single level mezzanine with two entries. The stations are shown on the alignment drawings to be between 20 and 30 metres below grade, averaging approximately 25 metres deep.

The station estimates are net of, and therefore exclude, the tunnel costs that would have been required to be constructed if no stations were required in any particular location. In locations where the stations are not constructed within a cut and cover section, it is assumed that the tunnel or bored through the station site, and thereafter once the station structure is constructed the tunnel lining is removed.

Trackwork

Direct fixation trackwork

Cross-over and storage tracks as required to the complete alignment

Power Supply and Distribution

Power supply and distribution sub-stations to the numbers shown above

Power rail with high voltage power feed

Blue light stations and general cabling

Automatic Train Control

Switch machines and cabling

VOBC units to the sub-way vehicles

Automatic train control and signalling system allowing for operation by drivers

Security and Communications

New communication cables

Operations and maintenance radios to the vehicles

Radiax cables to the tunnels

S.C.A.D.A. to the sub-stations

Revenue Collection

Four ticket vending machines per station

Two validators to each new station

Maintenance Facility

There are no details of the maintenance facility, and at this stage an allowance of $2.66 million per vehicle has been used as the basis of the estimate cost. This figure will be subject to adjustment as the detail of the facility becomes clearer.

Vehicles

Sub-way vehicles similar to the TTC "Rocket," at an estimated cost of $2,880,000 per vehicle based on 2021 operation requirements as follows:

- Option 1 – 55 vehicles
- Option 2 – 35 vehicles
- Option 3 – 41 vehicles
- Option 4 – 14 vehicles

Maintenance spares for the vehicles

Vehicle engineering and set up

Testing and Commissioning

Testing and commissioning the new systems and vehicles to operate the new line, including all necessary systems acceptance tests.

Design

The design and engineering of the project; including monitoring and management during construction.

Management and Administration

Project and construction management, covering the overall management by project staff and consultants for the duration of the project. This will include management, planning, cost and schedule control, estimating, procurement, quality assurance, contract management, safety monitoring, environmental monitoring, general administration, and offices for site based project staff.

Project Insurance

Project wide construction coverage including contractor's all risk

Wrap up liability

Professional errors and omissions

Pollution liability

Vehicle and third party liability

Operations Preparation

General preparation for operations

Security Prior to Opening

Maintenance and security to facilities between completion of construction and service commencement

Environmental Permitting

General environmental permitting costs

Property

An allowance included in the overall estimate for additional property purchase based on estimates prepared by others. This allowance has been added to recognize property costs, and has not been verified by a review of properties to be purchased or verification by a property professional. The cost included is to be reviewed and either confirmed or amended based on actual requirements

Contingencies

An allowance included to cover design development, unforeseen conditions, procurement risk and contract reserve during construction. The allowances used depend on the uncertainty related to work being carried out and the percentages vary between 10 and 35% dependent upon the element of work and perceived risk.

Interest During Construction

Interest cost of financing the project between commencement of design to the revenue service date. A borrowing rate of 3% has been assumed, with capitalization on service commencement.

••• 9.6. Comparison of TTC and Metrolinx/SDG Cost Estimates •••

Table 38: Comparison of TTC and Metrolinx/SDG Cost Estimates

KPMG's Comparison of TTC and SDG Cost Estimates					
TTC Estimate (East + West + Subway Yard) ($ millions, 2010$)			**SDG Estimate - Option 1 ($ millions, 2011$)**		
			Stations		$885
			Site Preparation		$1
			Permanent Roadworks		$13
			Community Relations Projects		$0
			Landscaping and Site Restoration		$1
Stations and Area Facilities		***$1,107***		***Sub-Total***	***$900***
			Guideway		$887
			Mainline Trackwork		$38
Running Structures and Special Structures		***$1,173***		***Sub-Total***	***$925***
			Utility Relocations		$9
			Power Supply and Distribution		$41
Utilities		***$53***		***Sub-Total***	***$49***
			Automatic Train Control		$32
			Security and Communications		$15
			Revenue Collection		$6
			Power and System Structures		$5
			Operations Preparation		$11
			Security Prior to Opening		$3
Operating Systems		***$329***	***Sub-Total***		***$73***
Subway Yard		***$500***		***Maintenance Facility***	***$138***
			Design		$172
			Management and Administration		$334
			Project Insurance		$42
			Testing and Commissioning		$6
Engineering and Management		***$666***		***Sub-Total***	***$554***
Contingency		***$998***		***Contingency***	***$737***
			Property		$214
			Route Survey		$2
			Environmental Mitigation and Investigation		$3
			Environmental Permitting		$2
Property / Easements		***$197***		***Sub-Total***	***$221***
Revenue Vehicles		***$109***		***Vehicles***	***$149***
HST Rebate		***($400)***		***n/a***	***$0***
TOTAL		**$4,732**	**TOTAL**		**$3,744**

* The TTC cost estimate for the maintenance facility was for a bigger facility than required for the additional vehicles related to the Sheppard Subway Extensions. The SDG estimate for the maintenance facility was based on a unit rate approach which was agreed upon with Metrolinx.

9.7. Report to Metrolinx, 2008: Report Number: CEO 08-003 Management

AGENDA ITEM NO.: 13
REPORT NUMBER: CEO 08-003

MANAGEMENT REPORT TO METROLINX

Report Title:	UK / Madrid Study Tour				
Report Number:	**CEO 08-003**	***Date to Board:***	**Jan 25, 2008**	***Date to Committee:***	N/A
Report To:	☒ **BOARD**		☐ **ADVISORY COMMITTEE** ☐ **AUDIT COMMITTEE** ☐ **GOVERNANCE COMMITTEE** ☐ **HUMAN RESOURCES COMMITTEE** ☐ **TECHNICAL ADVISORY GROUP** ☐ **OTHER:**		
Report Referred From:	**N/A**				
Author(s):	W. Michael Fenn		***Telephone:***	416-874-5906	
			E-mail:	Michael.Fenn@metrolinx.com	
Item Class:	IN CAMERA ☐		DECISION ☐	INFORMATION ☒	

1.0 RECOMMENDATION:

RESOLVED:

THAT the findings outlined in Report CEO 08-003 be referred to appropriate Metrolinx staff and consultants for consideration in connection with the Regional Transportation Plan and the Metrolinx Investment Strategy.

2.0 PURPOSE & EXECUTIVE SUMMARY:

In November 2007, Metrolinx officials visited the UK and Madrid, to examine the experiences of English, Scottish and Spanish transportation authorities with a variety of issues. Topics included:

- Methodologies for selecting and assigning transportation project priorities;
- Developing and implementing metropolitan transportation plans and policies;
- Implementing transit capital construction programs quickly and economically;
- Customer-service improvement initiatives, including the use of new technologies;
- Promoting active transportation and cycling;
- Measures to eliminate transportation barriers for those with disabilities and seniors;

- Application of alternative financing and procurement methodologies;
- The role of congestion charges, “value capture” and tolling in financing transportation systems and achieving environmental and transportation policy objectives;
- Implementing integrated fare cards and common fare media in regional transit systems;
- Design, creation and financing of mobility hubs and inter-modal terminals; and,
- The role of regulation and de-regulation in promoting efficient and customer-responsive transportation systems.

3.0 BACKGROUND:

The attached document outlines the findings, conclusions and recommendations arising from a Study Tour of the UK and metropolitan Madrid.

4.0 DISCUSSION:

See Appendix A: Summary of Findings and Areas for Further Examination Arising from a Study Tour of the UK and Metropolitan Madrid.

5.0 FINANCIAL MATTERS:

N/A

6.0 HUMAN RESOURCES MATTERS:

N/A

7.0 ENVIRONMENTAL MATTERS:

N/A

8.0 COMMUNICATION MATTERS:

N/A

9.0 LEGAL MATTERS:

N/A

10.0 CONCLUSION:

The CEO recommends the findings and examples cited in Report CEO 08-003 be referred to appropriate Metrolinx staff and consultants.

Respectfully submitted to the Board,

W. Michael Fenn, Chief Executive Officer

On behalf of Metrolinx Chair Rob MacIsaac and Director of the Board, Bill Fisch

CONTACT INFORMATION

W. Michael Fenn, CEO
416-874-5906 or Michael.Fenn@metrolinx.com

Appendices:

Appendix A: Summary of Findings and Areas for Further Examination Arising from a Study Tour of the UK and Metropolitan Madrid
Appendix B: Summary of Study Tour Itinerary
Appendix C: Madrid Metro Ridership Growth and System Expansion

Staff & Others Consulted:

Name	Telephone
Rob MacIsaac, Chair	416 874 5900
Bill Fisch, Board Director Region Of York	905 830 4444
Michael Sutherland Senior Planning & Policy Advisor	416 874 5922
Paul Chetcuti, Analyst	416 874 5914

Notifications:

Name	Mailing or E-mail Address
N/A	

Special Instructions:

N/A

Appendix A:

Summary of Findings and Areas for Further Examination Arising from a Study Tour of the UK and Metropolitan Madrid

A. UK / METROPOLITAN MADRID STUDY TOUR

A.1 In early November, Metrolinx's Chair Rob MacIsaac, Metrolinx Board Director York Region Chair Bill Fisch and Metrolinx CEO Michael Fenn accepted an invitation from British Consul General in Toronto, Nicholas Armour, to participate in an Ontario / Quebec Study Team touring the UK. The program's focus was on British metropolitan areas with experience in the financing and construction of public infrastructure and the delivery of public services. The Consulate's program included several days focusing on both infrastructure and technological systems in the field of public transportation and other areas of public service, such as education facilities and health-care delivery. Metrolinx officials decided to modify the Consulate's proposed program with two substitute days in northern England and Scotland, focusing on UK experience in areas such as transportation priority-setting and with two additional business days examining the metropolitan Madrid public transportation system - the putative inspiration for the MoveOntario 2020 initiative.

A.2 Over the course of five business days in the UK, the Study Team met with representatives of transportation agencies and transportation experts in Edinburgh (including a delegation from metropolitan Glasgow / Strathclyde), Leeds / West Yorkshire, Manchester and London. Members of the Study Team also took part in an Infrastructure Ontario presentation at Canada House, aimed at attracting interest in Ontario's extensive program of infrastructure construction, refurbishment and finance, from an array of European professional firms and investment houses. At the same time, the Study Team met with some of those same officials and others, concerning the UK experience in developing and financing transportation infrastructure using alternative financing and procurement models (AFP).

A.3 Following a week of UK meetings, the Metrolinx Study Team met with a range of Spanish officials from both the public and private sectors. The meetings included tours of a number of major transportation infrastructure projects in the Madrid metropolitan region, over the course of two days. Since metropolitan Madrid has many parallels to the Greater Toronto and Hamilton Area (GTHA) – geographic scale, modern urban infrastructure and well-established communities and neighbourhoods, its metropolitan population size and distribution, and similar economic circumstances – there were a number of interesting comparisons to be drawn and lessons to be learned. Madrid's achievements are well known: as much new subway construction in a decade as Canadian cities have produced in a generation; and, costs of subway construction that are less than 40% of those in Canada and the US, within far shorter timeframes.

This report summarizes a number of findings and conclusions from that Study Tour, as well as listing potentially productive areas for further examination, verification and future meetings.

B. INTRODUCTION

B.1 Much was learned in the UK about both positive and cautionary aspects of several "generations" of transportation planning and policy, by a succession of national governments, from Margaret Thatcher to new Labour Party Prime Minister Gordon Brown. The experience of metropolitan Madrid proved to have much to recommend it to Metrolinx, not only in the field of public transit, but also in other transportation fields, as Metrolinx embarks upon a fundamental re-thinking and recommending large-scale investment in regional transportation services and infrastructure.

B.2 Uppermost in the Study Team's considerations were five principal questions:

1. How was it possible to advance public transit systems – infrastructure, fleet, technology, and service offerings (more service, often at modest cost to the traveler) – so quickly and, apparently, so economically, especially in Madrid?

2. What are "best practices" in key areas of transportation policy – multi-modal terminals and transportation "hubs"; integrated fare regimes, fare media and technology; promotion of "active transportation"; approaches to road-based transportation, including road-pricing, infrastructure redesign and goods movement?

3. What "alternative approaches" and innovation were brought to the organization, procurement, financing, ownership, regulation, licensing, commissioning and delivery of transportation systems, and in expanding transportation infrastructure and services? Are there lessons on measures to avoid? Does some level of de-regulation or "provider competition" need to be part of the mix?

4. What processes have proved the most successful in allocating scarce resources among competing transportation initiatives, and other public priorities (economic development, sustainability, fiscal constraints, social progress and social equity, energy policy, etc.)? Are there proven, reliable, sustainable priority-setting models?

5. To what extent has experience with the various manifestations of alternative financing and procurement (AFP) contributed to:
   (a) Reducing costs of designing, construction, operation or maintenance of transportation projects, or component elements thereof, such as technology, refurbishment or rolling-stock?
   (b) Increasing the scale, number or extent of transportation initiatives and services beyond those that would have been produced using conventional approaches and a fixed amount of public financial resources?

(c) Producing more projects in the same time frame, or the same range of projects sooner?

(d) Demonstrating financial and program results that fully off-set the added cost of the private sector's higher cost of capital and its need to earn a reasonable level of profit for its investors; and / or,

(e) Developing projects on a timely basis and delivering them consistently on time?

C. THE ABILITY TO REDUCE COSTS AND DELIVER QUICKLY

C.1 While UK costs of construction for public transit infrastructure seemed to roughly parallel those in Canada, there appeared to be a more active program of construction and more private-sector and quasi-public investment in the UK. This new equilibrium followed a somewhat tumultuous three-decade period of widespread system restructuring and refurbishing, some of which was quite successful and some of which was not – or least resulted commercial failures, cost-overruns and/or transitional disruption.

C.2 Madrid was found to be roughly equivalent to other European capitals and major North American metropolises, in terms of standard of living, civil engineering practices, transparent public procurement and public finance. Despite those parallels, however, it appeared that the capital cost of major transportation infrastructure was considerably lower than in Canada and project-delivery quicker and more consistently on time. (In addition and perhaps not unrelated, the overall scale of civil engineering projects appeared to be more extensive. See "multi-modal" hubs). These lower capital costs reflected themselves both in lower "hard" costs of capital construction and in lower "soft" costs of pre-engineering, public tendering, contracting, process delays, and in resolving environmental, financing and legal issues.

C.3 Interestingly, the Madrid public transportation (subway) infrastructure achievements (1995-2007) were financed by a level of investment (C$10.7B) similar to the value of the Ontario Government's own-share commitment to Move Ontario 2020 (C$11.5B). In just twelve years, that level of investment in Madrid produced nearly 150 kms. of subway lines and 120 subway stations, at a per kilometre cost of less than C$90M/km.

C.4 While direct comparisons between jurisdictions can be somewhat unfair, the order of magnitude differences between Madrid and Canada are nonetheless notable, as the two tables below demonstrate:

Higher Order Transit Costs – Madrid , Toronto, Vancouver					
Project	**Period**	**Length**	**Stations**	**Cost/km (CAD)**	**Total Cost* (CAD)**
Madrid 1995-1999	**4 years**	**37.9 km**	38	$52.15 M	**$2.0 B**
Madrid 1999-2003	**4 years**	**54.7 km**	36	$71.52 M	**$3.9 B**
Madrid 2003-2007 (Metro Tube)	**3 years**	**53.6 km**	46	$89.40 M	**$4.8 B**
Madrid 2003-2007 (Metro-Tram)	3 years	27.8 km	34	$37.25 M	$1.0 B
Madrid 2007-2011 (Metro Tube)	**4 years**	**11.2 km**	7	$98.34 M	**$1.1 B**
Madrid 2007-2011 (Metro Tram)	4 years	10.0 km	20	$67.05 M	$0.7 B
Toronto Sheppard Subway	**8 years**	**5.5 km**	6	$181.81 M	**$1.0 B**
Toronto Spadina Subway Ext.	**8 years**	**8.6 km**	6	$244.18 M	**$2.1 B**
Vancouver Canada Line	**4 years**	**19km****	16	$105.26 M	**$2.0 B*****

* total costs are rounded
** total length includes 9km for underground portion
*** total cost is a combination of tunnelled and above ground portions

Madrid Mayor's Term of Office	Transportation Budget (C$)
1995-1999	$2.4 B
1999-2003	$5.0 B
2003-2007	$7.3 B
2007-2011	$8.4 B ($3.2 B Transit + $5.2 B Roads)
Total	**$23.2 B**

C.5 While the specific comparisons above are with the TTC and Vancouver's new Canada Line, it should be noted that the TTC's construction-cost experience parallels that of much of North America over the past decade, in the range of $225-250M per km. for conventional subway construction. In addition to the obvious advantage to the taxpayer and lower public debt obligations, Madrid's ability to reduce costs allowed it to favour subways over LRT and BRT in urban settings, and to build subways (and LRT / BRT) at an accelerated rate, over the course of two decades. This capacity for producing a great deal of higher-order transit at a reasonable cost in record time was combined with an integrated, low-cost fare regime and fare media. This combination had the effect of producing a level of transit ridership that far exceeds equivalent metropolitan areas in Europe – performing on a level with megacities like Paris, Moscow and London – and of course, vastly out-performing anything in North America, except for New York City.

C.6 How was this performance achieved? The answer appeared to a combination of favourable factors, some of which were natural advantages (e.g., soil conditions) but many due to sound, efficient decision-making and following a comprehensive, priority-based strategy. By setting out very ambitious multi-year financing and construction plans, major technological investments in tunnel-building were amortized early and over large projects.

This appeared to have allowed major capital equipment (such as expensive tunnel boring machinery) to be used more economically over time and over other projects. In the specific case of tunnel-boring equipment, additional machinery was then acquired due to the savings, for a compounding effect as it, too, was amortized. At the time of the Study Tour's visit, Madrid had an estimated 41 boring machines in operation, including some 30 that were used at one point in subway construction.

C.7 Subway construction was done on an uninterrupted, continuous-bore basis, year-in, year-out. Since the boring equipment technology used by Madrid can be operated with very few workers, once the equipment itself was amortized, there was little reason to discontinue its use, even if labour costs involved shift-work and overtime. To avoid adverse impacts on neighbourhoods and commercial enterprises, as well as to avoid buried utilities and structural foundations, tunnel-boring was done at a very deep level. Among the issues to be examined would be the degree to which Madrid's evidently favourable sub-surface conditions made this level of achievement easier than would be possible in (say) Toronto, Mississauga or Hamilton (although it was noted that much the same form of technology was employed with the Chunnel project, with its broad range of geo-technical challenges).

C.8 The subway and highway tunnelling technology involved an ability to contain and "seal" water infiltration immediately, without either pumping or diversion, so the presence of water tables and underground streams was less of an obstacle to continuous digging than would generally be assumed. Deep tunnels also permitted the subway system (Metro) to intersect more easily with established lines above and below the new tunnel alignment, including both subterranean urban regional rail lines (GO equivalent) and other subway lines. Deeper alignments seemed, as well, to facilitate construction of terminal facilities that incorporated underground parking facilities, taxi-marshalling areas, airline ticket counters on the airport line, PATH-type walkways and retail concourses, and large-scale below-grade bus terminal facilities. In the case of the Avenida de America project (as well as the Moncloa project and the Nuevos Ministerios station, both of which Study Team representatives visited in their final phases of construction), the engineering approach to subterranean construction minimized disruption to commercial and office activity and automobile traffic during an extended construction program. (Details were provided by Madrid authorities).

C.9 Deep tunnels did, however, require a considerable investment in transit passenger access, including the use of unique devices (e.g., large-capacity passenger elevators, in place of escalators). The safety and handicapped-access implications of deep-tunnel evacuation might also deserve attention, based on our observations of the depth of the buried highway tunnels on the Calle 30 (Road 30) "buried expressway" ring-road project and the evidently limited means of emergency egress.

C.10 Another interesting feature of Madrid's strategy was the unapologetic linking of subway, terminal and light-rail construction "promises" to specific terms of municipal councils in the Madrid region. Each major program of subway, light-rail and station construction was organized in a fashion that allowed municipal leaders to specify the

intended cost and completion targets for their projects, and to be held accountable for that implementation performance at the end of the term of council.

This approach appeared to have moved public transportation projects away from the recognized North American pattern of individual project announcements and a focus on *beginning* projects. In Madrid, while individual projects received considerable public attention, the focus of public discussion was evidently more directly upon on-time, on-budget completion and on steady progress with an on-going, wide-ranging but phased construction program.

Although political and managerial credit for the success and popularity of Madrid's transit plan was shared by the Mayor of Madrid and political leadership of the regional transportation authority, the intellectual credit for the initial scheme and its overall delivery was universally attributed to an internationally renowned Madrid engineering professor, Dr. Manuel (Manolo) J. Melis (Maynar), who is Professor of Railways at the Madrid Politechnical University (and Professor of Soil Mechanics at Coruna University) and who also now serves as the President of the Madrid Metro (subway system).

Conclusions:

C.11 Both Madrid and London took a comprehensive, multi-phased, priority-ranked approach that avoided isolated and piece-meal approaches both to new lines and to individual projects. System-performance, potential ridership increases and catchment-area extension were placed ahead of other considerations. Their approach to construction and environmental impacts avoided many of the commercially and socially disruptive aspects of conventional engineering practices. These measures combined to create an atmosphere of sustained, predictable investment in public infrastructure, especially in the field of transportation, and competitive, economies-of-scale practices in the construction industry and in project financing.

C.12 In the case of high-cost underground construction (subways, heavy rail, and their terminals), Madrid's costs were reduced by employing a typical commercial productivity approach: the one-time capital cost of technology was used to reduce the overall and on-going cost of construction.

C.13 A very active, long-term, predictable infrastructure investment environment in both the UK and Spain seemed to promote growth in the construction sector, both in terms of commercial capacity and levels of employment, as well as attracting international investment and technical expertise. It appears to have created a more competitive environment for bidding on public construction projects. It also seems to have reduced the level of job-protection or trade-restriction features in public tendering, in the construction trades and in the construction industry generally. Finally, the accumulated expertise developed by engineers and workers, often associated with repetition of processes and familiar technology, seemed to have the effect of driving down costs, especially in Madrid.

C.14 In Spain and elsewhere in continental Europe, it was suggested that predictable, codified construction industry practices – dealing with issues such as liability, dispute resolution, performance assurance, on-site decision-making and the like – allowed both bidders and clients to reduce their overhead and collateral costs. Special mention was made of things such as sureties, non-standard construction contracts and legal drafting, insurance levels and scope, tendering complexity, and so on, as contributing to bid-price add-ons in other ("common law") jurisdictions, including North America.

C.15 A culture and practice of practical on-site, non-hierarchical construction issue-resolution also seemed to reduce Spain's costs of pre-engineering and client's engineering oversight. The number and levels of engineering design and construction oversight appeared to be much lower than in other contexts. Being able to rely on these practices on an on-going basis seemed to contribute to better bid prices and more efficient resolution of disagreements that would otherwise produce project delays and additional costs.

D. IMPACT OF DE-REGULATION, TRANSPORTATION POLICY AND SENIOR-GOVERNMENT FINANCES

D.1 Since 1979 in the UK, there were several discrete rounds of de-regulation and, in some instances, outright privatization – e.g., regional and inter-urban trains, local transit buses, etc. During the Thatcher regime, virtually all local bus transit services were moved from the public sector to the private sector. Until recently, municipalities apparently did not even play a significant market-regulator role, such as restricting the number and quality of services offered on transit routes, or awarding non-subsidized route franchises. Initially, any bus firm wanting to offer a service could essentially do so. Predictably, this generated a chaotic pattern of bus services, with unprofitable routes being abandoned or service degraded. Of course, it also led to a spirited competition among providers, competing for customers on the basis of price, service, convenience, and comfort – including widespread introduction of newer bus fleets and a variety of consumer-oriented vehicles and services. Over time, market forces yielded larger, better-financed bus operators and a rationalization of routes and service, both through supply (commercial consolidation) and demand (market preferences of customers).

D.2 Professor George Hazel, a recognized international expert in transportation planning and priority-setting models, has recently been appointed to the IBI and MRC International Experts panel for the Metrolinx Regional Transportation Plan (RTP). While the Study Team was in Edinburgh, he convened a meeting of experts to discuss a range of issues. He also hosted a meeting of the metropolitan Glasgow regional transit authority (Strathclyde) which manages a subway, bus and regional rail systems. These discussions proved helpful in securing a range of views, across the political spectrum, on the experience of the UK with public transportation restructuring and infrastructure investment, including the role of the private sector.

D.2.1 The political and managerial leadership of the Strathclyde Partnership for Transportation (SPT), which is equivalent to Metrolinx or Vancouver's TransLink, outlined

their current regional transportation planning process. They expressed a desire to visit the GTHA and to meet with Metrolinx Board members and our municipal, provincial and transit partners, as they develop a transportation plan addressing similar issues to those being addressed by the Metrolinx RTP. Metrolinx Chair Rob MacIsaac indicated that GTHA officials would be pleased to exchange experience and information with Glasgow officials, and that an invitation to visit Ontario would be issued to them upon our return.

D.3 Among other issues discussed in Edinburgh were the AFP experience of London's highly successful Heathrow express, the London Jubilee Line, the Docklands Light Railway (DLR) and the London Underground's "Tube Lines" P3 contract. These were contrasted with the AFP "failures" of the London Underground's "Metronet" consortium and the initial privatization of British Rail. Among other factors, it was noted that the differences often related to inappropriate risk-transfer assumptions between the public and private sectors, and interestingly, among private sector partners. In a number of instances, failure was attributed to ignoring the fact that public acceptance and commercial success would be related to the quality of the services provided: "valued" services, customer focus and seamless delivery.

D.4 The Edinburgh discussions also addressed transportation project prioritization experience in the UK, and particularly in northern England (see "Northern Way" below).

D.5 In addition, the Study Team inquired about Professor Hazel's recent GlobeScan / MRC McLean Hazel research project, "Megacity Challenges", which examined the issues facing major metropolitan regions, focusing on 25 "megacities" around the world. The study produced several enlightening findings, particularly in relation to infrastructure needs and strategies, and their impact on issues ranging from health-care to civic finances. Two especially interesting aspects of the study were the crucial role of transportation infrastructure and a confirmation that the success of a "city region" depends on its political and managerial leadership building on the "three pillars" established by the Metrolinx Board for the Regional Transportation Plan. In the words of the study report: "….City managers must strike the balance between three overriding concerns: Economic competitiveness, environment and quality of life for urban residents."

While the Megacities study only included New York, Chicago, Los Angeles and Mexico City in the North American portion of its sample, there appeared to be lessons here for the Toronto / Hamilton metropolitan region. It was suggested that a seminar on the study and its findings, as they might apply to the Greater Toronto and Hamilton metropolitan region might be worthwhile and could be hosted by Metrolinx.

<u>Conclusions:</u>

D.6 Despite its somewhat chaotic launch, public transport de-regulation produced a long over-due reform and client-focused modernization in the way in which bus services were offered in the UK. Of more particular interest, it evidently reduced the direct-cost of public subsidy to public transit system operations. Governmental financial support, especially at the local and municipal level, came to be focused on sustaining otherwise unprofitable

routes or providing service to areas or clienteles requiring special consideration, rather seeing the budget diffused by subsidizing the entire public transit system's overall operating losses.

D.7 Hidden from view in the outline of UK service operations was the fact that the public sector, through the National Government in the UK, played a large role over time in providing financial support for fleet expansion and railway system infrastructure.

D.8 Although far more modest in scale than in North America, the public sector in UK provides school busing and some "yellow buses" through the public transportation and public transit systems, not through the school boards. This appeared to help to rationalize the delivery of student transit services, make marginal public transit routes more sustainable, and allowed public transportation expenditure choices to be made more equitably.

D.9 In both UK and Spain, the National Government essentially played the same role as a Canadian Provincial Government in the fields of transit and transportation, with the European Community (EU) having the same range of jurisdiction as the Federal Government in Canada and the US. As in the US, but unlike in Canada, the EU provided and continues to provide sustained funding for public infrastructure and transportation pilot projects under its mandates for the environmental, commercial competitiveness and promotion of open-markets. In the Madrid metropolitan region, a regional transportation authority (Consorcio de Transportes) plays the role of Metrolinx. In West Yorkshire (Leeds) and Greater Manchester, the regional authority also had other community planning, infrastructure planning, and economic development responsibilities.

D.10 Metrolinx may wish to consider hosting a workshop for a local and international audience, to examine the lessons that might potentially be applied to the GTHA, based on the finding of the GlobeScan / MRC McLean Hazel research project entitled "Megacity Challenges", perhaps with third-party sponsorship.

E. PROJECT PRIORITIZATION, ALTERNATIVE REVENUE SOURCES AND DEVELOPMENT VALUE "UPLIFT"

E.1 In Scotland and Yorkshire, there was discussion of the transportation investment prioritization process used in North England, entitled "Northern Way". A brief recap of this project was presented to the Metrolinx Board in April 2007 by MRC staff. While in Leeds, the Study Team met with representatives of West Yorkshire "Metro" and with officials of the Yorkshire Forward Regional Development Agency, which led the development of the "Northern Way" transportation project prioritization model.

E.2 Discussions with Professor Hazel and his team in Edinburgh also included highlighting UK domestic and international experience, noting some practical examples of tools used in other jurisdictions:

(a) The privately financed Jubilee Line in central London, with 12 stations, saw a UK £ 3B investment produce UK £ 13B in commercial development-related revenues;

(b) Cardiff City Council (Wales) experience was cited as interesting example of coordinating the use of a range of transport assets, including private bus companies, parking revenues, and road-pricing revenues;

(c) Although not entirely transferable due to the differences in population density and land-values, the Hong Kong transportation authority's sale of "air rights" over and near terminals was cited as an example of a large proportion of transit operating costs being off-set by capturing value created by public infrastructure investment in transportation;

(d) An examination of the concept of the "voluntary contribution agreement", which was a device used successfully in Copenhagen's Orestad project, yielding UK £980M in revenues;

(e) Interest by at least one major international insurance company in distance-based, point-of-service, time-of-driving pricing, as a way to promote lower automobile use by rewarding lower mileage drivers with lower insurance rates;

(f) The potential for alternatives to road-pricing was explored, using surrogates such as parking. In Perth, Western Australia, increased parking levies were "paired" with new tramway routes. This allowed a clear correlation between new fees and new services, which is widely seen as a necessary *sine qua non* for any new levy or charge in the transportation field. Rather than impose a levy, the transportation authority required "licensing" of all parking spaces, which were granted upon application and payment of a fee. Politically sensitive issues were addressed by ensuring that the levy regime was responsive to the needs of existing communities and businesses: five commercial spaces or fewer, no parking levy; no householder parking levy; each business applies for a parking "license". Interestingly, the number of business parking spots was significantly reduced by business choice, once a license fee was imposed;

(g) In France, a payroll tax of 1% is imposed on employers with more than 10 employees, with the proceeds being used for public transit services; the amount increases on a time-limited basis when transportation infrastructure is improved in the vicinity;

(h) Although not metropolitan in scale, the experience of the Nottingham and Croydon public transit systems (tramways) were cited by a number of officials as models for achieving significant transportation "modal shifts" through the

(i) The potential for privately-led infrastructure renewal project: The Boston Post Office parking garage was an unsafe, underused and unsightly 60s-era parking garage that was converted into a dynamic retail hub.

E.3 In the UK and Spain, telephony and other electronic technology were being routinely incorporated into transportation systems. In Edinburgh and elsewhere in the UK, motorists can access on-street paid-parking using cell phones and others were using cell-phones to provide up-to-the-minute traveller information on transit routes.

Conclusions:

E.4 If the private sector knows its financial contribution is a pre-condition to advancing a crucial or potentially attractive transportation project, they will participate financially; if the project will likely proceed irrespective of a private-sector financial contribution, the private sector will use their resources to enhance the development opportunities arising from the project. In Greater London, it was suggested that the value of privately owned residential properties had grown by 10-20% as a direct result of new rapid-transit infrastructure. One practical caution was the experience that voluntary contribution agreements were said to work best for fixed infrastructure (e.g., stations, rail lines, BRT fixed infrastructure, ferry docks), but not for discretionary services subject to policy changes.

E.5 Successful regional transportation authorities commonly had independent, transportation-dedicated sources of revenues upon which to rely in developing their long-term plans and in enlisting private-sector and pension-fund investors. As with the voluntary contribution agreements referenced above, dedicated revenues were seen as a more effective measure to stabilize investor confidence, by insulating longer-term or risk-affected investments from periodic subsequent governmental policy shifts.

F. MOBILITY HUBS AND TERMINALS AND ROADWAY ACCESS

F.1 In the course of the Study Tour, the Study Team had occasion to visit a number of rail and bus terminals, both as formal guided tours by facility operators, and as users. They included Edinburgh, York, Leeds (Leeds bus terminal and Waverley rail terminal), Manchester (Piccadilly), London (Euston and Paddington, and those stations associated with specific rapid transit lines, including the new Jubilee Underground line, lines serving redeveloped east London and the Heathrow express line). Much has been made of the steady refurbishing of UK transit terminals (most recently, St. Pancras “Chunnel” high-speed train terminal) and several, such as Edinburgh and Manchester Piccadilly, were a crucial contributing ingredient to downtown revitalization programs.

F.2 Of potentially more interest to the GTHA communities, however, was the "mobility hubs" experience of metropolitan Madrid. These terminals are a key feature of the Madrid Transport Authority’s (Corsorcio de Transportes) grand design for promoting greater transit ridership and reducing urban congestion. The facilities, known in Spanish as

"intercambiadores" (exchanges / interchanges), were an interesting alternative to the "central terminal" model common to North American and British cities.

F.3 As part of its transportation planning and construction programs, metropolitan Madrid identified major transportation corridors, reflecting inter-regional and intra-regional passenger and commercial traffic patterns. Road network accesses to Madrid span the points of the compass, but are then linked by ring-roads at intervals. To reduce congestion and enhance transportation system performance, road concessions were granted to build toll-expressways to "parallel" no-charge highways and arterial roads following the same corridors and rings.

F.4 One such regional "inner-ring road" – Calle 30 (Road 30) – intercepts auto, bus and delivery-truck traffic otherwise destined to cross downtown Madrid using local streets. Although a key transportation artery, this ring road represented a major inner city visual barrier and was a source of significant congestion and air pollution. As part of the most recent generation of transportation infrastructure projects, Calle 30 is being buried in an extensive tunnelling program, using the construction technology pioneered in the building of the Madrid metro system. The cost of the Calle 30 project, undertaken by one of Spain's global-scale construction firms as a public-private joint-venture, is estimated to be C$5B – at a cost of €100M per km of tunnelled expressway. The surface area created by burying the expressway has been earmarked for a corridor of urban parks and public amenities. The Study Team had an opportunity to inspect the construction program in a near-completed section deep under Madrid.

F.5 In Madrid, the challenges arising from rapid suburban growth and improved transportation corridors had been a tendency to have large volumes of passenger and commercial traffic move toward the centre of the urban area, despite the presence of "ring" roads. The metropolitan authorities determined that a key ingredient in reducing congestion was to reduce single-passenger vehicle and bus traffic traveling to the centre of the urban area that did not have the city core as their final destination. As in the GTHA, the patterns of commuting have evolved from a hub-and-spoke, morning-in, evening-out pattern, to one of increasing all-day, cross-network commuting and commercial traffic.

F.6 As a result, the Madrid authorities designated a series of "gateway" facilities at the end of the transportation corridors in the near-suburbs or at the edge of the city core, for up-grading to a full multi-modal transportation hub. Typically built around pre-existing railway or bus terminals or major subway stations, these multi-modal hubs were designed to afford passenger traffic with an opportunity to transfer to other modes of transportation conveniently and generally using the same fare-media. This had the effect of siphoning-off the absolute volume of passenger-traffic vehicles competing for road-space with commercial vehicles, as well distributing passenger traffic in a way that ensured a quicker elapsed trip time, a key ingredient in influencing the choice between using transit and a car.

F.7 These "gateway" facilities ("intercambiadores") are being built in a multi-year capital program, complementing the expansion of subway and regional train lines, and

intercepting inter-urban and local buses, otherwise destined for downtown destinations or transfer points.

F.8 The "gateways" each have some or all of these features:

(i) Some "gateway" facilities were built by single-purpose joint-venture companies established by the transportation authority or the municipality, including private-sector investment in the facility and its adjacent commercial precinct (retail, commercial and residential parking garages, office commercial, high-density residential, etc.); the governance and investment structure of the "intercambiadores" companies reflects this investment and management partnership. (Av. de America Terminal was one such example).

(ii) The "gateway" facility is typically built around a rail terminal, but it is largely subterranean. In many cases, the facility was excavated to as many as four levels below street level, using techniques that allow uninterrupted street-level activity after the initial first-level excavation phase. Each level of the facility is devoted to one or more modes of transportation or related uses (public and residential parking, one or two levels of subway stations, with up to four distinct subway lines, one or more regional rail lines, a full-service local and inter-regional bus terminal, taxi marshalling area, PATH-type retail uses, airline departure processing facilities, et cetera). The levels devoted to buses and trains are large and airy, reflecting high ceilings, extensive change-of-air facilities, large bright, well-lit, well-ventilated, secure and technologically contemporary passenger waiting and client service areas. (For example, Principe Pio Terminal, a tour of which was provided by Madrid engineering staff).

(iii) The gateway facilities are typically located near major road arteries, allowing public and commercial inter-urban buses to off-load and to return-loop by underground expressway access to suburban bus-staging and service areas. This significantly reduces the volume of an otherwise extensive use of inter-urban coaches and local buses in the metropolitan area. These connections are also often underground and do not materially affect street-level traffic flows, nor do they present the aesthetic issues associated with monumental above-ground concrete works.

(iv) The scale of the "gateways" is physically quite large, although largely hidden from public view at street level. With the exception of street-median bus entrance tunnels, street-level aspects of the gateways are sensitively devoted to such things as heritage building preservation (e.g., vintage railway station architectural facades incorporated into commercial or transportation uses), for public spaces or even very modest "hidden" entrance points designed not to detract from surrounding architecture (e.g., historic squares, modern commercial centres, public plazas, etc.). Below ground, however, the facilities and the access tunnels are vast and multi-levelled. The location of these subterranean facilities allows them to be expanded over time, as demand rises. (A tour of the inter-urban bus

marshalling facilities at Moncloa Terminal, for example, revealed an extensive construction program aimed at doubling passenger handling capacity, along with extensive new, multi-level road-way access tunnels, all with little impact on existing busy bus and subway terminal operations, or on public activities at street level).

F.9 In North America, discussion of transportation hubs has a tendency to emphasize the land-use planning aspects and impacts of such facilities -- and the positive aspects of those effects were evident in Madrid. The "gateway" approach taken in Madrid suggests, however, that interchange points can have a primarily transportation role. This type of transportation terminal can materially improve the transportation system's performance. In doing so, moreover, they help to create an environment where parallel urban intensification can occur and transportation-supportive revenues can be derived from those collateral benefits.

G. ALTERNATIVE FINANCING AND PROCUREMENT (AFP)

G.1 The basis of the UK Consul-General's Study Tour program was to introduce Canadian officials from government, law and project-development fields to the British experience with public/private partnerships in the full range of AFP modes (project design, construction finance, on-going project finance, project management, system operation, system maintenance, public concession and franchise awards, etc.). As in Ontario, the UK experience in AFP prominently features hospitals, airports, bridges and highways, but the UK has also been actively engaged in public-private partnerships (P3) work in the area of public transportation, ranging from railways and subway systems to terminal redevelopment and inter-urban motor-coaches and local / regional public and private passenger bus systems.

G.2 The Study Team met with a variety of UK entities, from public authorities to private providers, and covered the range of experience from disappointing to excellent. The Governments of Canada and Ontario also hosted a presentation at Canada House in London at which Infrastructure Ontario, with support from Metrolinx representatives, outlined the MoveOntario 2020 initiative to a range of European firms and agencies with experience and expertise in transit and transportation projects. The presentation provided this audience with the opportunity to learn about the potential for introducing international best practices and investment into the range of construction and technology projects that will come to be associated with the MoveOntario 2020 initiative over the next decade.

G.3 While in the UK, very frank and productive meetings were held with public transportation officials about the mixed experience of AFP in the public transportation sector. These included the now evidently very successful Jubilee Line of the London Underground, where an investment in a newly refurbished, privately operated subway line generated substantial new development-related revenues for the system builder / operator. A similar experience was reported for the Docklands Light Railway line, which benefited from and contributed to the renaissance of the financially troubled east London Canary Wharf project. Measures that included the use of innovative technology (automatic train

control, fully automated operation), efficient design features (like parallel platform-side doors) or enhanced value-capture (through voluntary contribution agreements) often contributed to the general success of these ventures. (In Madrid, it was suggested that automated train technology aimed to achieve a remarkable 1.5 minute head-way for subway trains on its busiest line, Line 10).

G.4 An interesting set of "P3" lessons were drawn from the contrast between the two private consortia undertaking the refurbishing of the old and over-crowded London Underground (subway system). One consortium has been quite successful and economical ("Tube Lines"), while the other (Metronet) has had widely-reported financial, legal and performance difficulties.

G.5 In the UK and Europe, Spanish firms play a surprisingly prominent role in financing, construction and operation of public infrastructure, ranging from Heathrow Airport to tolled expressways in a number of countries. The European Union, which provides funding for transportation and infrastructure in a manner equivalent to the practices of the US Federal Government under the Clinton Administration, imposes conditions that endeavour to ensure that public finances are supplemented by private investment wherever possible. This stipulation is not based on an ideological predisposition in favour of the private sector, but rather apparently aims to achieve greater levels of infrastructure repair and expansion than would be possible relying on public funds and public debt alone.

The response of the public sector has been creative, notably in jurisdictions that are not ideologically predisposed to favour P3s. They have created joint-ventures for specific projects and other such devices to attract private equity capital and purpose-based revenue streams, without relinquishing public ownership or requiring a guarantee of public policy direction. In Spain, the Study Team observed that AFP techniques figured prominently in the rapid and extensive construction of regional and interurban expressways, often using a toll-road format or joint-investment / joint-benefits model for "hubs" and transit lines.

G.6 In Britain and the UK, AFP projects involving major new construction or structured-financing often received the greatest interest from major commercial construction and investment interests. Less popular were AFP projects involving long-term operation and maintenance, or revenue-guarantees, which also typically generated the greatest level of public and media debate. However, the Study Tour found that some public-private partnerships in the fields of technology and transportation services were projects of considerable interest and success: the area of integrated Fare Cards (Oyster Card – City of London / EDS partnership); universal urban cycling programs (e.g., cyclocity and Velib programs); congestion-charge implementation (City of London / Siemens); and terminal redevelopments (both UK and Madrid).

H. CONGESTION CHARGES

H.1 While in London, the Study Team met with those responsible for London's congestion-charge regime, both those responsible for policy ("Transport for London" (TfL)

agency) and those dealing with technical aspects (TfL and Siemens). The regime has recently doubled its catchment area westward and will soon see modifications / increases to its fee-charging regime – targeting types of vehicles (SUVs) and times of use, in order to achieve air-quality and other non-fiscal objectives.

H.2 Of particular note in the discussion on the London "congestion charges" experiment were the following facts: the fee-charging regime can be imposed by the London Mayor and the TfL authority without requiring the endorsement of either the London City Council or the National Government; and, that the current regime reports revenues of £125M from those presently paying £8/day to enter the "zone", while the cost of administering the program is reported as £90M. Although there are miscellaneous and enforcement revenues that yield a further £88M, it does seem to suggest that the catchment area could only be as small as it is and still be economically viable by imposing a relatively substantial daily charge (£8 or C$15 per daily trip). An extensive review of the London congestion charge and the application of its net proceeds was completed in 2007 and was the basis of the discussion. In the case of the TfL charge, £123M net "profit" was realized from the existing London congestion charge collected in 2006/07, with £101M going to public (bus) transit, £14M for bridges, £5M for road safety measures and £3M for cycling programs.

H.3 In discussing Greater Manchester's proposed application for Transportation Investment Fund (UK TIF) funding, it was noted that Manchester is one of several UK cities considering a wider "ring" for a congestion charge zone, but with a lower charge, in order to reduce congestion and to tie road costs more closely to road use and new infrastructure. There was general agreement that congestion charges could only be justified to the public if the proceeds achieved some obvious and tangible public transportation benefit. It was also agreed that any public evaluation or referendum on such proposals should only be undertaken after the public has had a reasonable period of time to experience them and to identify the collateral benefits. Failing to take this approach was cited in the negative public reaction experienced in Stockholm and Edinburgh.

I. ACTIVE TRANSPORTATION / ACCOMMODATING THE PHYSICALLY IMPAIRED

I.1 During the course of the Study Tour, there was an opportunity to observe the wide variety of relatively new measures being taken in the UK and Spain to promote walking, cycling and mobility of the physically challenged (particularly those in wheeled devices, like scooters). Chair MacIsaac arranged to meet with the representatives of the Transportation for London office that is promoting active transportation in London, funded in part by proceeds from the congestion charge. (As noted above, 2-3% of the net revenues of the London congestion charge were earmarked for cycling programs in 2007 totalling an incredible £36 million).

At its inception, the cycling program in London was met with scepticism. However, after building and extending the cycling network throughout the city and by improving greenways and providing extensive bicycle parking on the street, at railway and underground stations, in schools and in workplaces across London, cycling has seen an

80% increase since the year 2000. TfL has made similar commitments to improving the lot of pedestrians throughout the city with an impressive capital program.

I.2 Much has been made of the City of Paris' new universal, no-charge, publicly funded bicycle program for its urban core (Velib). It should be noted, however, that commercially-sponsored regimes using the same custom-designed bicycles and touch-less card technology are in use across Europe. The "cyclocity" systems are operated on contract by a pan-European bus-shelter outdoor advertising firm, JC Decaux. The systems typically provide low-cost, short-term bicycle rentals and use commercial sponsorship to reduce the cost of the program. However, in the observing bicycle stations at busy intersections in one major urban centre in Spain, the rate of utilization appeared low (a typical rental station seemed to have a large volume of its bicycles available for use).

I.3 In addition to technology, however, some of the more interesting aspects of measures to promote a safe and efficient transportation system for cycling and vehicles for the handicapped were more related to street and intersection design and traffic regulations. In the UK and Spain, "advanced greens" for turning motor vehicles allowed busy intersections with long queues of turning vehicles to be cleared more quickly without mixing of through traffic (including buses), off-loading buses, cyclists and pedestrians. This phasing appeared to reduce the tendency to have cycles, pedestrians and motor vehicles involved in an unequal and occasionally unsafe competition for priority at busy intersections. It also greatly shortened the length of the idling queues of turning traffic, which would otherwise delay through traffic and pedestrian crossings.

I.4 In Spain, the simple expedient of relocating the marked intersection crossings for pedestrian, cycles and handicapped vehicles / baby carriages, by setting them back 2-3 meters from the intersection itself, seemed to reduce dramatically the conflicts between turning auto traffic, through auto traffic and pedestrian / cyclist cross-walk traffic. In part, this effect was achieved by "stacking" and stopping turning traffic on the destination street, but behind the cross-walk -- rather than the North American practice of stacking turning traffic on the originating street and then turning through crossing pedestrians, scooters and cycles within the intersection.

I.5 In Madrid and elsewhere in Spain, cycle paths were frequently located on a widened sidewalk right-of-way, rather than on marked pavement on the roadway itself. These pathways for cycles and handicapped vehicles were typically on two-directional, green-tinted asphalt, immediately behind the curb. As a result, there was far less prospect for car / cyclist accidents, as the both the pedestrian and auto traffic were clearly segregated from cyclists – space permitting, by small boulevard trees. By using two-directional cycling paths on the sidewalk right-of-way, cyclists and automobile passengers were always facing one another, so the risk of opening-door and turning-vehicle collisions was dramatically reduced. Given the growing problem of cyclist fatalities and serious injuries, and the widespread but largely under-reported rate of minor collisions, these measures have much to recommend them, where street geometrics would permit them.

I.6 Audio signalling at intersections for the hearing impaired was widespread, as were pavement pebbling for the visually impaired, in subways and at street intersections. There did appear to be less attention to extensive and expensive retrofitting rapid transit vehicles and train carriages for wheelchairs and bicycles. An interesting practice emerging in the UK was to encourage seniors, many of whom eventually face physical mobility issues, to use public transit (including rail) after the morning peak, at no charge to them. Some argue that blanket subsidies for demographic groups such as seniors, are not sound transportation economics. In this case, however, the policy appeared to be to use economic incentives to encourage mobility among seniors (a health-policy objective), which would achieve the additional transportation policy objective of transferring largely discretionary travel from peak congestion periods to periods where public transit service was underutilized.

I.7 This last objective – promoting a more even distribution of transit demand and motor-vehicle road-use – appeared to produce significant, supply-side cost reductions in both Spain and the UK. It seems to have had the effect of reducing the tendency that persists in the transportation infrastructure field to 'build churches for Easter'.

J. ADVANCED TECHNOLOGY AND TRANSIT FARE INTEGRATION

J.1 Pursuing the Metrolinx Board's direction to engage the public through the most contemporary means of communications, the Study Team met with the principals of the Limehouse software firm, at its London headquarters. Limehouse is delivering an important component of the Regional Transportation Plan's on-line public engagement program and Metrolinx officials were pleased to establish personal contacts with both senior management and technical staff.

J.2 While in London, the Study Team met with the regional management of the firm (EDS) that delivered London Mayor Ken Livingstone's universal, integrated touch-less transit fare card – Oyster. The firm's local management claimed that the Oyster card had been moved from proof-of-concept stage, to full implementation with scores of transit operators, within eighteen months, achieving an enrolment of some ten million card holders. (This rapid progress may also be due to the firm's involvement with the equally successful Hong Kong "Octopus" integrated fare card). It has also been suggested by others involved that the full implementation period should more properly be described as taking 24 – 30 months.

In addition to this remarkable achievement, the Study Team noted that the extensive use of the Oyster fare card as a "purse" was being exploited to public advantage by TfL. Prepaid cash deposits made to TfL/Oyster by users were helping to reduce the system's operating costs. Coincident with the Study Tour's arrival, the Oyster card operators were also rolling-out a commercial relationship with the large Barclay's Bank chain. Under this widely promoted arrangement, an extensive use of embedded-chip credit card technology allowed touch-less access to all Greater London's public transportation systems, as well as enabling card/pass-holders to make routine debit or credit purchases.

J.3 Madrid regional transportation officials outlined the remarkable growth of transit ridership in the past two decades. However, the sudden resurgence of transit ridership in the late 80s and early 90s was queried by a Study Team member, as it coincided with the creation of the regional transportation authority but it predated the opening of the first generation of new subway lines. The response from Madrid officials was that the initial, dramatic upswing in ridership across the metropolitan area came about as a result of the new regional authority introducing a low-cost, universal zoned-fare system, employing an integrated fare card. Although not using the most contemporary "touchless" radio-frequency identification or RFID technology at the time, simply making an integrated fare card available to all transit users across the metropolitan area produced a level of new ridership that equalled the increases achieved by introducing new subway lines in subsequent years. Appendix C illustrates the relationship in Madrid between the implementation of a regional fare system, metro expansion and ridership.

For more information on the Study Tour Itinerary, see Appendix B.

Appendix B: Summary of Study Tour Itinerary, November 3 – 13, 2007

Date / Time	Morning	Mid-day	Early afternoon	Late afternoon
Sun		Arrive Edinburgh	Daniel Haufschild, MRC	
Mon	"Northern Way" and prioritization frameworks; George Hazel, Managing Director; John Saunders, Associate; Daniel Haufschild, Associate; MRC McLean Hazel	Public Transportation Authority - Strathclyde Partnership for Transportation (SPT), Glasgow: John Halliday, Assistant Chief Executive, Transport & Strategy; Alistair Watson, Chair, SPT Glasgow	Edinburgh terminal; Great North Eastern train to York; First Train (First Bus) to Leeds	Edinburgh Terminal; York Terminal; Leeds Waverley Terminal
Tue	Metro Leeds; Leeds Metro Bus Terminal	West Yorkshire "Yorkshire Forward" agency/"Northern Way"; John Jarvis; Jason Cooper (MRC)	Leeds Waverley Terminal, Virgin Rail train to Manchester	Manchester Piccadilly Terminal
Wed	Manchester Metrolink / Greater Manchester Passenger Transport Authority (GMPTE)	Manchester terminal, Virgin Rail train to London; Euston Terminal, London	International Financial Services (IFSL), Tube: Bank / Monument P3 experience in the UK and around the world, Stephen Harris, IFSL	
Thu	Partnerships UK, Edward Farquharson, Project Director www.partnershipsuk.org.uk	Round Table Discussion with private sector firms and (IFSL)	Case Study/stakeholder roundtable: the Oyster Card and Transport for London; EDS, Stephen Chandler, VP, London Oyster Card Project	Limehouse Software Ltd. Giles Welsh, CEO
Fri	Infrastructure Ontario information session to UK industry, Canada House	TfL: London cycling program	Graeme Craig (Director, Congestion Charging, TfL) – presentation and discussion on London's Congestion Charging scheme; Siemens IS & Infrastructure Industrial Solutions & Services	
Sat/Sun			London Heathrow Airport Express train, London Paddington terminal	
Mon	Breakfast meeting with Enrique Diaz-Rato and other CINTRA directors	Field visit to above-ground and underground segments of Calle 30; burying trans-urban expressway	Metro de Madrid, tour new Downtown-Airport Rapid Transit Line; security measures at airport post-bombing	Tour Terminal 4 Barajas Airport, incl. control centre and automated handling facilities (SATE)
Mon		Fernando Moral Medina, Head of 1st zone of Railways in Infrastructure Ministry (MINTRA); tour Nuevos Ministerios multi-modal transportation terminal and new regional rail tunnels	Ferrovial-Agromán Managers at new Barajas airport Terminal-4 Aena (Spanish Airports) Authorities (Crisis Centre)	Officials at Cintra's Headquarters, downtown Madrid
Tue	Fare integration in Madrid region public transport; introduction to administrative integration (the objectives of CTM, PT Authority)	Consorcio Regional de Transportes de Madrid: inter-modality "projects and reality".	Tour Moncloa (under construction) and Príncipe Pío (completed) multi-modal terminals and interchanges	Atocha Terminal (refit post-terrorist bombings), AVE train

Appendix C: Madrid Metro Ridership Growth and System Expansion

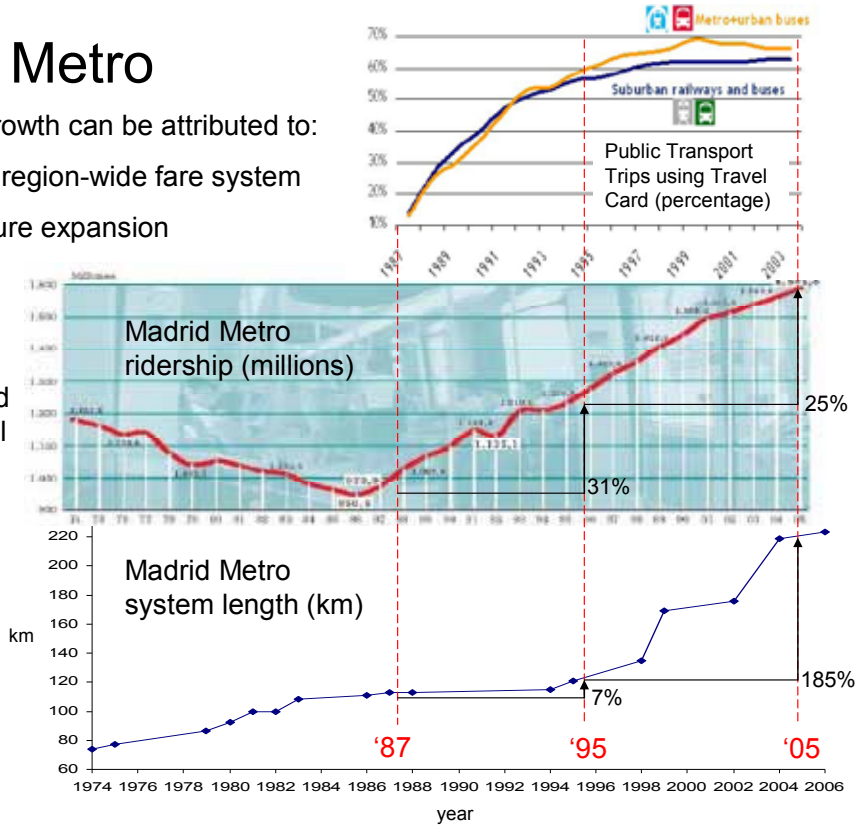
Madrid Metro

Ridership growth can be attributed to:

- Integrated region-wide fare system
- Infrastructure expansion

Two distinct phases:

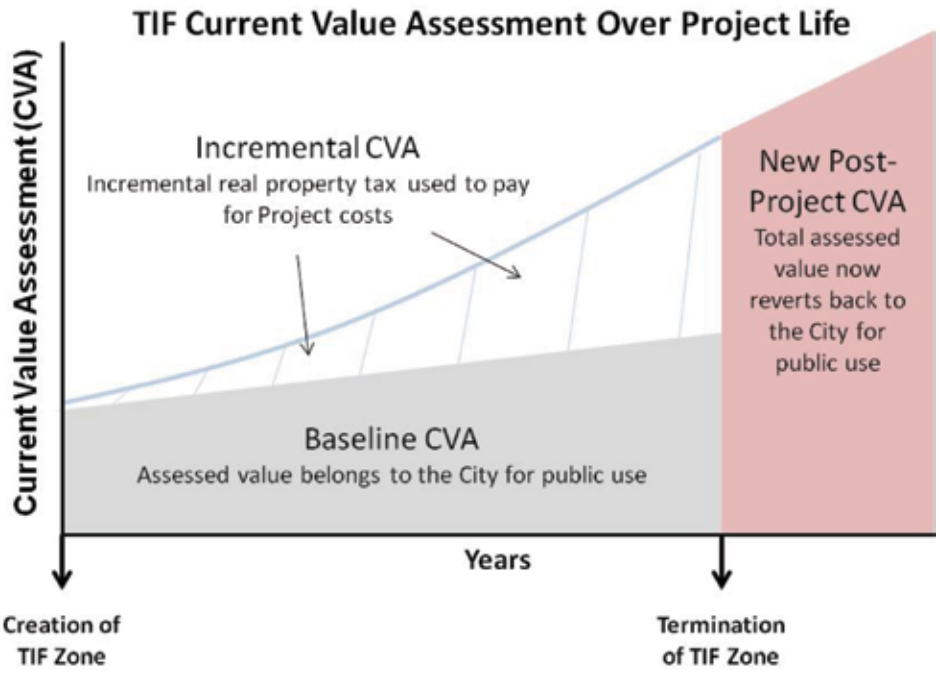
- '87 - '95; rapid uptake of travel card (region-wide fare system) by public
- '95 – '05; rapid infrastructure expansion



9.8. Tax Incrementing Financing Further Detail (from KPMG Report)

Tax increment financing is a public finance technique used by local government jurisdictions to fund infrastructure initiatives and stimulate economic development in designated geographic areas. This financing technique was originally used in California as a way to stimulate development in blighted areas and have since been authorized in 49 of the 50 US states. TIFs are much less prevalent in Canada, particularly in Ontario, with the Province only recently introducing them on a pilot basis for the Toronto-York Spadina Subway Extension ("TYSSE") and the West Don Lands redevelopment. TIFs work by leveraging future tax revenue increases to finance current infrastructure projects through the dedication of the incremental tax revenue between the assessed value of designated areas ("TIF zones") prior to the development and its assessed value after the developments are completed. By doing this, future tax gains are leveraged to finance the present costs of eligible improvements in designated areas.

For TIFs in the US, once a development plan has been identified tax values in the designated area are typically frozen at their current, "pre-developed" assessed valuation. Then, the local government jurisdiction (or a conduit issuer) will issue bonds backed by the security of repayment from future tax revenues within that same designated area. The proceeds from the sale of those bonds are then used to help pay for the infrastructure improvements specified in the approved plan. Upon completion of these infrastructure improvements, tax values in the designated area are expected to rise due to increases in the current value assessments of the properties within the area. Any increase in revenues, above the "predevelopment" assessed values, is dedicated to paying down the debt service on the TIF bonds that helped finance the initial development. Upon repayment of the bonds, the incremental revenues revert back to the traditional taxing entity. The City has developed a potential TIF scheme that may be used for the Sheppard Subway Extension project that is similar to that being used for the TYSSE. Under the City's scheme, it is assumed that the TIF zones will extend 800 metres (in all directions) from each of the proposed stations on both the Sheppard and Eglinton lines, whereby all incremental tax revenues collected in these corridors will be dedicated to funding the Project. A diagrammatic presentation of the proposed TIF zones can be found below.



Source: KPMG

As indicated by the graph above, the increment value available for funding the Project is determined by the difference between the baseline CVA and any increase in assessed valuations in the TIF zone solely attributable to the construction of the Eglinton-Scarborough Crosstown and Sheppard Extension lines. The incremental CVA is made up of two components, each of which is highlighted in the estimate of potential TIF revenues:

- the tax increment uplift in existing property values; and
- the tax increment from new development in the TIF zones that has been accelerated and presumed to be incremental.

It is worth noting that the TIF scheme currently considered by the City is subtly, but importantly, different than that of the typical TIF that has been applied in the US. Unlike typical US TIFs in which the baseline CVA is frozen at the "predevelopment" level (which would be represented by a flat line in the graphic above rather than an upward sloping line), the City's scheme uses the expected increase in real estate values that would have occurred without transit infrastructure asthe baseline. In typical US TIFs, revenues are generated from all growth above an established fixed, non-increasing, baseline whereas under the City's scheme, the TIF revenues would depend on the excess growth beyond natural growth.

9.9. Summary of Delivery Models Considered by KPMG

Table 39: Summary of Delivery Models Considered by KPMG

Summary of Delivery Models Contemplated in the Analysis			
	Traditional Model	**P3 Availability Payment Model**	**P3 Concession Model**
Project Design and Construction	City/TTIL responsibility.	City/TTIL to define project requirements. Private sector responsible for design and construction.	City/TTIL to define project requirements. Private sector responsible for design and construction.
How to pay for capital costs	Provincial and Federal funding already identified and sale of City-owned development rights used to fund a portion of capital expenditures. City/TTIL to issue TIF and DC bonds and use proceeds to fund another portion of capital expenditures. City/TTIL to secure further funding from government contributions and/or other revenue tools to fund the remaining portion of capital expenditures.	Provincial and Federal funding already identified and sale of City-owned development rights used to fund a portion of capital expenditures. City/TTIL to issue TIF and DC bonds and use proceeds to fund another portion of capital expenditures. Private sector partner to raise financing for the remaining capital costs.	Provincial and Federal funding already identified and sale of City-owned development rights used to fund a portion of capital expenditures. Private sector partner to issue TIF and DC bonds and TIF and DC equity and use proceeds to fund another portion of capital expenditures. City/TTIL to secure further funding from government contributions and/or other revenue tools to fund the remaining portion of capital expenditures.*
Ownership of TIF and DC revenues	Used as security for TIF and DC bonds issued by the City/TTIL. Revenues in excess of the TIF and DC bond debt service return to the City.	Used as security for TIF and DC bonds issued by the City/TTIL. Revenues in excess of the TIF and DC bond debt service return to the City.	"Assigned" to private sector for use in raising private financing. All TIF and DC revenues in excess of the debt service obligations are retained by the private sector partner.
Financial obligation to private sector related to private financing	None	Availability payments made to private partner for 30 years following construction. City/TTIL to secure further funding from government contributions and/or other revenue tools to fund availability payments (if excess TIF and DC revenues are not sufficient to cover payments)	None beyond allowing private sector to keep excess TIF and DC revenues.
Asset Maintenance and Rehabilitation After Completion	City/TTIL responsibility.	City/TTIL to define performance requirements. Private sector partner responsible for asset maintenance and rehabilitation.	City/TTIL to define performance requirements. Private sector partner responsible for asset maintenance and rehabilitation.

* This further funding from City/TTIL is required to achieve a commercially viable Concession Model and will be dependent upon the amount of financing that can be raised by the private sector partner using the TIF and DC revenues.

If a typical US-style TIF scheme is used instead of the scheme currently considered by the City, the amount of TIF revenues that can be generated could be significantly higher. .

Quantification of potential TIF revenues requires forecasts of real estate growth over the long term. The ability to forecast real estate growth in Toronto requires a specialized skill-set. N. Barry Lyon Consultants Limited ("NBLC"), a multidisciplinary real estate consulting firm that focuses on market research, urban planning, financial analysis and development management, was tasked with generating estimates for City-wide and corridor specific real estate growth.

9.10. Property Values Near Higher Order Transit (from N. Barry Lyon)

Table 40: Property Values Near Higher Order Transit

Property Value Appreciation Matrix			
Author	**City**	**Use**	**Price Premium**
Hess, Daniel Baldwin and Tangerina Maria Almedia (2007)	Buffalo	Residential	4.0% - 11.0%
Cervero., (2004)	San Diego	Residential	17.0%
Cervero., (2004)	Philadelphia	Residential	6.4%
Cervero., (2004)	Atlanta	Commercial	0.0%
Cervero., (2004)	Dallas	Retail	37.0%
Cervero., (2004)	Dallas	Office	14.0%
Garrett, T (2004)	St. Louis	Residential - Single Family	32.0%
Weinstein., Clower., (2003)	Dallas	Residential	12.6%
Weinstein., Clower., (2003)	Dallas	Office	13.2%
Weinstein., Clower., (2003)	Dallas	Retail	-2.1%
Weinstein., Clower., (2003)	Dallas	Industrial	-8.5%
Cevero, R. et al. (2002)	Santa Clara	Residential - Rental Apartment	45.0%
Parsons., Brinkerhoff., (2001)	Philadelphia & Boston	Residential	6.7% - 8.0%
Cervero., Duncan., (2001)	Santa Clara	Commercial	23.0%
Cervero., Duncan., (2001)	Santa Clara	Retail: not in shopping centre	40.1%
Cervero., Duncan., (2001)	Santa Clara	Offices, Banks, Clinics	41.5%
Cervero., Duncan., (2001)	Santa Clara	Community Shopping Centre	1.1%
Cervero., Duncan., (2001)	Santa Clara	Neighbourhood Shopping Centre	5.6%
Cervero., Duncan., (2001)	Santa Clara	Industrial	2.8%
Cevero, R. et al. (2001)	San Diego	Residential - Rental Apartment	0.0% - 4.0%
Weinberger, R. (2001)	Santa Clara	Office	15.0%
Weinberger, R. (2001)	Santa Clara	Commercial	15.0%
Weinstein., Clower., (1999)	Dallas	Retail	36.8%
Weinstein., Clower., (1999)	Dallas	Office	13.9%
Weinstein, B. et al. (1999)	Dallas	Office	10.0%
Weinstein, B. et al. (1999)	Dallas	Retail	30.0%
Sedway Group (1999)	San Francisco	Residential - Rental Apartment	15.0% - 26.0%
Chen, Hong, Anthony Rufolo, and Kenneth Dueker (1998)	Washington, D.C.	Residential - Single Family	10.50%
Diaz., et al., (1997)	San Francisco	Residential	13.0%
Gruen, A. (1997)	Chicago	Residential - Single Family	20.0%
Cervero., (1996)	San Francisco	Residential	15.0%
Benjamin, John D., and G. Stacy Sirmin (1996)	Washington, D.C.	Residential - Rental Apartment	7.50%
Landis, J. et al. (1995)	Sacramento	Residential - Single Family	6.2%

Property Value Appreciation Matrix			
Author	**City**	**Use**	**Price Premium**
Landis, J. et al. (1995)	Santa Clara	Residential - Single Family	-10.8%
Landis, J. et al. (1995)	San Francisco	Retail	0.0%
Armstrong, Robert J. (1994)	Boston	Residential - Single Family	6.70%
Al-Mosaind, M, et al. (1993)	Portland	Residential - Single Family	10.6%
Cevero, R. et al. (1993)	Washington, D.C.	Office	12.3% - 19.6%
Cevero, R. et al. (1993)	Atlanta	Office	11.0% - 15.1%
Bernick, M et al. (1991)	San Francisco	Residential - Rental Apartment	5.0%

Source: Aggregated Research performed by NBLC

••• 9.11. Coopers and Lybrand 1991 Sheppard Subway Financing Study (Summary) •••

EXECUTIVE SUMMARY

Metropolitan Toronto has reached a stage where the need for capital to construct infrastructure exceeds its ability to finance such expenditures in the traditional way. This study examines alternative funding sources for such infrastructure improvements with the Sheppard Subway being used as the basis for developing the concepts and as the basis for the analysis.

NON-TRADITIONAL REVENUE SOURCES WERE EXAMINED

The need for new sources of revenue was identified in a report by the Chief Administrative Officer on February 25, 1991. That report projected that an average of $125 million per annum is required over the next ten years from new sources of revenue. Subsequent analysis has indicated this annual shortfall could increase to $150 million.
This report examines a number of new tax revenue sources but emphasis is placed on the concept of "Value Charges", as a major municipal financing instrument.

The analysis which is the basis for this report lead to the conclusion that three taxing options should be considered, separately and together, as an alternative to increasing property taxes.

1. Value Charges which are based on taxing a portion of the increase in real estate value attributable to infrastructure creation. These charges fall into two groups:

   (a) Charges that apply to the areas adjacent to the proposed Sheppard Subway, and

   (b) Charges that apply to the areas adjacent to the existing transit lines.

2. An Auto Licensing Charge which is a charge based on the benefit enjoyed by road users in Metro when traffic is diverted from the roads onto the transit system.

3. Development Charges which apply Metro wide to new development and which are designed to finance the required general upgrading of infrastructure that is required as Metro continues to develop.

It is recognized that all taxes are unpopular, however, these options are put forward as an alternative to property tax increases because it is felt that taxes which more closely link the costs and benefits may be more acceptable.

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C&L

A DETAILED ANALYSIS WAS UNDERTAKEN

This study was conducted in three phases. During the first phase, research was undertaken to identify the variety of instruments that had been used by municipalities in other jurisdictions to finance infrastructure expansion. A long list of such instruments with the potential for application in Metro was examined and evaluated. A short list of approaches was developed for further testing. During this phase, the concept of Value Based Charges was identified as an approach which had distinct advantages. Another important concept developed at that stage was that automobile users in Metro would be major beneficiaries of an expansion of the transit system and should, if practical, make a financial contribution toward such transit expansion.

During the second phase, a multi-year financial planning model was developed, this was followed by a detailed analysis of the potential benefits to land owners. The impact of the construction of stations on the existing subway was also examined in detail.

This analysis led to the conclusion that there should be three benefit zones around each station:

Zone A - land immediately adjacent to the station with the potential to make direct connections into the station.

Zone B - land where significant impact would be enjoyed by land owners.

Zone C - land where the lowest level of impact would be enjoyed.

Estimated increases in value were made for different types of land use and development in each zone.

Tax schedules were developed by land use by zone based on the concept of taxing up to fifty percent of the increase in the value. These schedules were applied to projections of development activity to develop revenue projections.

Then, a parcel by parcel analysis was undertaken along a possible route of the new Sheppard Subway. The land use, Official Plan designation and zoning for every parcel was examined within the area the new subway would most likely effect in order to determine the potential for new development along the route. At the same time, an analysis was undertaken of the demand for various types of development. This detailed analysis provided a basis for applying charges.

VALUE CHARGES OFFER A NEW APPROACH TO REVENUE GENERATION

The concept of Value Charges has been developed to tax major beneficiaries of the subway through the taxation of increases in real estate value related to the subway. There are three different types of value charge, applied at different rates within three zones of benefit and at a different rate to five types of development. The three zones of benefit are centred on proposed subway stations

with the zone closest to the station paying the highest rate.

There are three types of charges:

1. The **Annual Value Charge** is an annual levy applied to all development, both existing and new, within the defined benefit zone. The charge is designed to recoup approximately 25 percent of the benefit that accrues to the landowner as a result of the construction of the subway. The charges range up to $1.20 per square foot depending on type of land use and proximity to a subway station.

2. The **Capital Value Charge** is applied on a one-time-only charge on new development, collected when the development commences. The charge is designed to recoup approximately 25 percent of the benefit that accrues to the land owners within defined benefit zones as a result of the construction of the subway. The charges range up to $10.00 per square foot depending on the proximity of the subway and the type of development.

3. The **Density Bonus Value Charge** is applied as a one-time charge on new development, collected when development commences. The charge is designed to recoup for Metro approximately 50 percent of the benefit that accrues to the land owners within defined benefit zones as a result of the additional density which is made possible as a result of the expanded capacity of the transit system. The current Official Plans establish limits on density. Additional density resulting from amendments to these plans within the defined benefit zones will be subject to Density Bonus Value Charge. The charges range up to $12.50 per square foot depending on proximity to a subway station and the type of development.

A detailed schedule for each land use, charge and zone is provided in the body of the report.

Consideration was given as to whether the application of the annual charge to existing residential properties was acceptable. There are arguments for including and for excluding residential from this charge and therefore, the analysis examines both options.

APPLICATION OF VALUE CHARGES TO AREAS ADJACENT TO EXISTING LINES WAS CONSIDERED

Examination of the Value Charge concept for the Sheppard Subway provoked consideration of similar charges for the areas around the existing subway and light rail transit line stations.

The reasons for examining the extension of this concept to existing lines are as follows:

- The costs associated with building a new subway line are similar in nature to the costs associated with the capital expenditures necessary to replace parts of and upgrade the existing system.

- If no charges are applied to the areas adjacent to existing lines, there is a

risk that those seeking new locations for development may, in some cases, prefer to seek sites adjacent to existing lines, especially sites on existing lines that are close to the junctions with the new line.

- The construction of the new line is an expansion of the system and confers some benefit on land owners adjacent to the existing lines.

The extension of the value charge concept would appear to work best when applied as a Capital Value Charge and Density Bonus Value Charge to new development with an appropriate allowance for these charges being introduced after appropriate notice and by being phased in gradually over a number of years. This approach will allow the market place to adjust smoothly. Harmonization of charges on real estate adjacent to new transit lines and charges on real estate adjacent to existing lines is important.

AUTOMOBILE CHARGES FIT WITH THE VALUE CHARGE CONCEPT

Pursuing the concept of seeking to raise revenue from those groups who enjoyed the benefit of the facilities to which the revenue will be applied quickly leads to the identification of automobile users as a major benefitting group. Automobile users benefit, when travellers use transit rather than roads, because the reduced congestion on the roads reduces trip time.

A number of options where examined and the one with the most merit is the introduction of an additional license fee on all vehicles registered in Metro. This concept involves asking the Province to give Metro the power to levy such a tax or ideally to collect such a tax on behalf of Metro. There are approximately one million vehicles licensed in Metro and the number is growing steadily. A charge of $30 which approximates the cost of one tank of gas appears reasonable and would generate a revenue of $30 million per annum today. The revenue would increase with vehicle ownership and the charge could be adjusted as necessary to stay in line with inflation.

A refinement of the concept is a mechanism which would allow those who pay an additional auto license fee to purchase TTC passes at a discount. This mechanism should be designed to have a minimal impact on TTC revenues.

A beneficial policy dimension to this tax is that it may marginally discourage car ownership and, therefore, road use within Metro. This is especially desirable from an environmental perspective.

DEVELOPMENT CHARGES COMPLEMENT THE VALUE CHARGES

Transit is only one service amongst many and examination of the problem of how to finance this infrastructure improvement raised related questions about the need for charges on new development as a mechanism to assist with the funding of other infrastructure improvements. Such a development charge would have to be coordinated with, "value charges", to ensure a consistent Metro-wide approach which avoids double taxation.

The fact that Metro is faced with extensive financial demands for infrastructure replacement and upgrades which are difficult to relate specifically to new development suggests that current legislation is not the appropriate basis for such charges. However, this matter cannot be effectively addressed until there is agreement in principal on the introduction of the concept of value charges as there is a need to harmonize all the charges of this type across Metro.

FINANCIAL PROJECTIONS

A number of alternative scenarios were analyzed and the result of what was titled the "Benchmark Case", provides a guide to the revenue potential of alternative taxes or charges.

The present value of each of the instruments is listed so that their significance can be compared to the present value of the capital costs of the Sheppard Subway of $1.480 billion.

VALUE CHARGE REVENUE

Present Value

Annual	$300 million
Capital	$185 million
Density Bonus	$ 75 million
Total	$560 million

It was also forecast that with policy changes, the revenue earned from advertising and retail leasing activities at subway stations could be increased by the present value amount of $26 million.

The potential revenue from other instruments expressed in annual amounts was estimated, on the basis of a less detailed analysis. The projections follow. An estimate of the revenue generated by the introduction of a Capital Value Charge on new non-residential development adjacent to existing transit lines is based on the average rates that apply in zone B along the Sheppard Line. The revenue is projected to be $5.5 million per annum. The extension of such a charge to residential, in a similar way to that proposed along Sheppard, would increase this amount significantly.

An automobile charge of $30 per vehicle would yield $30 million per annum and increase with growing vehicle ownership.

The application of a General Development charge applied Metro-wide could yield approximately $28 million per annum over the next decade.

It is important to consider three factors when reviewing the potential of the new revenue sources noted above. First, these projections change significantly if the projected rate at which new development occurs is different from the projections, therefore, there is significant risk which must be accounted for.

Secondly, these revenue sources do not match the pattern of expenditure for subway construction so that there will be a need to borrow to finance construction. Finally, no allowance is made in the projections for the cost of collecting the tax.

Value Charges will provide Metro with little help to directly finance its $125 million to $150 million annual shortfall in the next 10 years. This occurs because the vast majority of Value Charges collection occurs only after the first phase of Sheppard Subway begins operations about 1999. However, Value Charges substantially expands the revenue base, providing Metro with a substantial new revenue source to help pay down this shortfall over subsequent decades. The other financing instruments are likely to yield more immediate cash flows, depending on when they are initiated.

The following table shows the approximate annual equivalents of the funds collected during the forty year planning period. These equivalents are approximations as behind each of these numbers are detailed assumptions.

	Average Annual Revenue Potential Over 40-Year Period 1991-2031 (Nominal dollars including projected inflation)
Sheppard Subway Specific	**$ millions**
Annual Value Charges	93
Capital Value Charges	34
Density Bonusing Value Charges	16
Incremental Station Revenues	7
	150
Other	
Capital Value Charges applied near existing lines	5
Automobile Charges	30
Metro-Wide Development Charges	28
	63

The proposed financing instruments have the potential to make substantial headway in reducing Metro's shorter-term (1992-2001) capital planning shortfall, but their greater revenue potential occurs over the longer term as the tax base is permanently expanded.

CONCLUSION

This study has concluded that there is a number of feasible options for raising the required additional revenue other than the traditional property tax. The analysis also indicates that these options have significant revenue potential.

If it is decided to proceed with these proposals, those which are easiest to implement should proceed most quickly. Given the agreement of the Provincial Government to implement a modified approach to development charges that suits Metro's special needs, this proposal should proceed immediately together with the Auto Charge initiative.

The Value Charge proposals not only require consultation with the Provincial and other stakeholders, but also further work on the details of implementation with respect to such matters as appeals procedures, exemptions and collection timing.

The construction of new infrastructure for Metro clearly requires additional revenue. This analysis indicates that options other than property taxes exist and thus provides the basis for deciding between the options.

The team appreciated the opportunity of working with Metropolitan Toronto on developing these innovative ideas. We would also like to thank Metro staff for their assistance and cooperation in completing this work within a short time frame.

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