



Yonge North Subway Extension Benefits Case Analysis – Context

Background

On November 28, 2008, the Metrolinx Board approved the Regional Transportation Plan entitled *The Big Move*, which included a subway extension from Finch Station to Richmond Hill Centre at Highway 7 as a Top 15 priority project. The Board required a Benefits Case Analysis (BCA) be completed for the Yonge North Corridor and other priority projects. In collaboration with the City of Toronto, The Regional Municipality of York (York Region) and the Toronto Transit Commission (TTC), Metrolinx developed a BCA.

The Yonge North Subway Extension is currently unfunded. The costs and timelines presented in the BCA report are to be considered for high-level project appraisal purposes only. Costs, phasing and timelines are subject to detailed future planning, design, and engineering project development phases.

Metrolinx Action and Next Steps

At the closed session of the Metrolinx Board of Directors meeting of July 13, 2009, the Board received for information the Yonge North BCA, presented as an interim high-level project appraisal.

This interim BCA appraisal of the project raised a number of key network related considerations. Considering this, Metrolinx, in close collaboration with the City of Toronto, TTC and York Region, will undertake additional analysis to more comprehensively understand these matters and how they impact the network and project scope. The analysis will include:

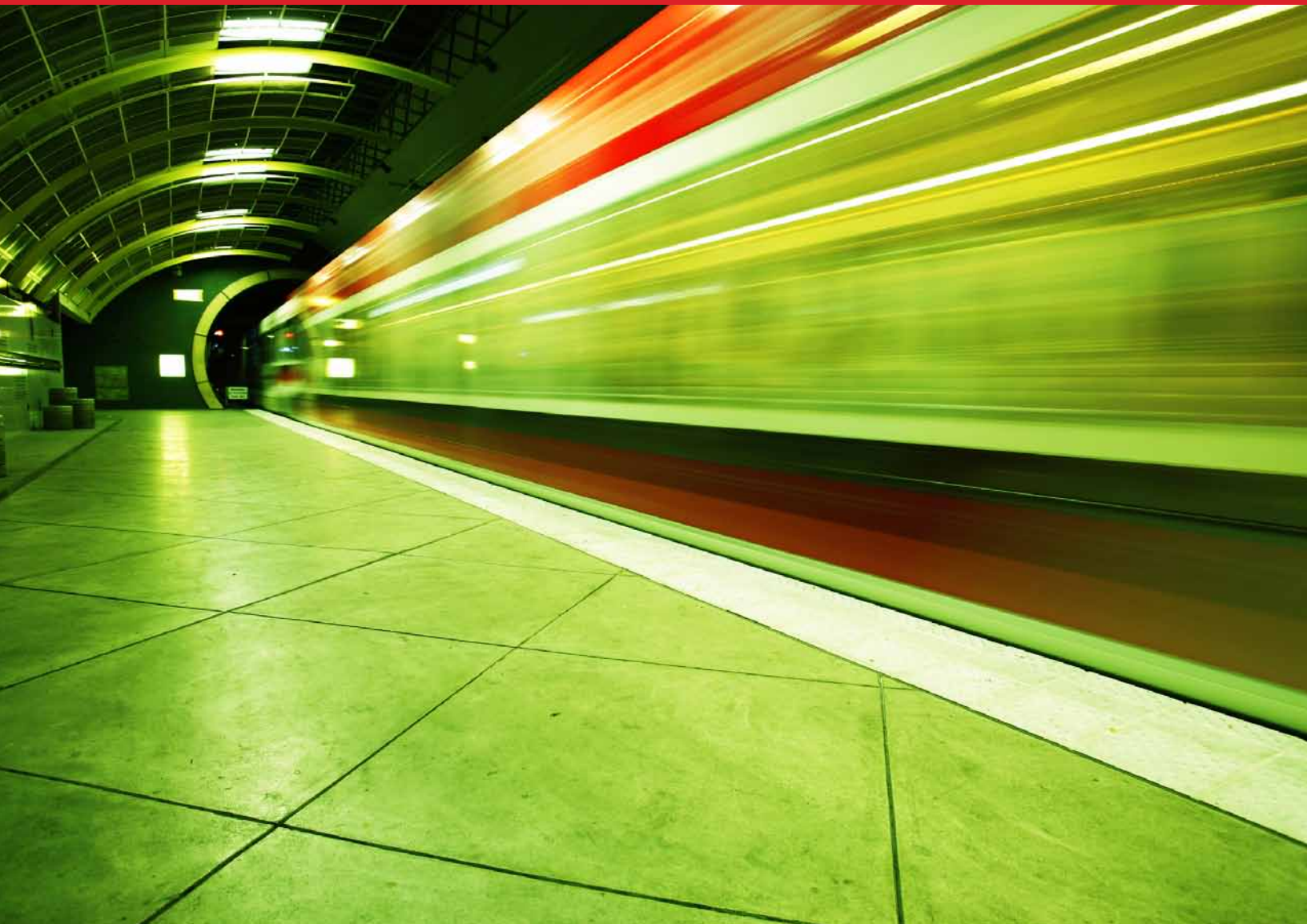
- Possible adjustments in project scope, timing or phasing;
- Consideration of the extent to which improved service levels on the parallel GO Richmond Hill rail corridor to off-load some of the demand on Yonge Subway corridor (existing and proposed extension); and
- The cost impacts of the various options on the subway yards strategy, Yonge-Bloor subway station improvements; and a future Downtown Relief Line to bypass the Yonge-Bloor congestion pinchpoint.

The BCA process for this project has identified a range of development and congestion pressures along the Yonge Subway corridor. In partnership with York Region, TTC and the City of Toronto, Metrolinx will be carrying out the work above and report back to the Metrolinx Board on the resolution of key project issues in late 2009.



YONGE NORTH SUBWAY EXTENSION BENEFITS CASE

June 2009





Yonge North Subway Extension

Benefits Case

Executive Summary

June 1st 2009

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Executive Summary

In 2006 the Province of Ontario created the Greater Toronto Transportation Authority, later renamed to Metrolinx in December 2007. The primary responsibility of the new organisation is to provide leadership in the planning, financing and development of the Greater Toronto and Hamilton Area's (GTHA) multi-modal transportation network and to conform to the objectives and vision set out in the *Places to Grow Act*, 2005.

Part of Metrolinx' mandate and one of its first deliverables was the development of the Regional Transportation Plan, known as *The Big Move*, a 25-year plan for the implementation of the Province's *MoveOntario 2020* vision of 52 new rapid transit projects in the GTHA by 2020.

As the rapid transit projects contemplated in *The Big Move* move closer to implementation, a Benefits Case will be prepared for each project. The purpose of the Benefits Case is to undertake a comparative analysis of feasible options for a specific rapid transit project and present the results in such a way that it will assist decision makers to select a preferred option for implementation.

This report is about the Yonge North Subway Extension (Yonge) project which is one of the rapid transit projects announced by the Premier as part of *MoveOntario 2020* initiative and identified in the RTP. The project involves a 6.8 kilometre north - south extension on the current Yonge-University-Spadina subway line.

In consultation with Metrolinx and the Toronto Transit Commission (TTC) and York Region three options were identified for study in this analysis.

- | Option 1: Subway Extension with 6 stations
- | Option 2: Subway Extension with 5 stations
- | Option 3: Bus Rapid Transit Extension with Richmond Hill GO Line service improvements

The three options were compared to the Base Case, which is defined as the existing transit network along the Yonge corridor growing over time to accommodate increased demand. The table below summarizes the key characteristics of each of the options.

Note that extension of the subway north to Richmond Hill will have an effect on the southern section of the Yonge line, which operates near capacity south of Bloor Station. This report includes a proportion of the costs for relieving these capacity constraints, based on the extension's impact on ridership. It should be noted however that in order for the Yonge Subway extension project to proceed, the necessary improvements to relieve capacity constraints at Bloor-Yonge Station may need to be funded.

Summary of Options

	Option 1	Option 2	Option 3
Year in Service	2017	2017	2013
Total Capital Costs (\$m)	\$2,379	\$2,254	\$220
Additional Bloor-Yonge capacity costs required beyond Total Capital Costs	\$360	\$360	--
Number of stations	6	5	7
Maximum loading point demand in 2021 ^{1,2} (between Finch Station and Richmond Hill)	13,400 corridor of which 8,900 on the subway	12,300 corridor of which 9,600 on the subway	11,100 corridor of which 5,000 on the BRT
Passenger Capacity Per Hour Per Direction in 2021	15,000	15,000	3,000
Unmet demand in 2021, passengers per hour, peak direction	-	-	2,000
Meets Long-Term Capacity Needs	Yes	Yes	No ³
Frequency of Service in 2021	6 min ⁴	6 min	3 min
Frequency of GO Rail Service, peak direction	30 min	30 min	20 min
Number of subway vehicles	36	30	--
Number of BRT vehicles	--	--	24
Travel Time	14 min	12 min	17 min

¹ Subway demand is lower than RTP. RTP assumed headways of 1 minute.

² 2021 statistics are used because RTP results show that peak demand on route is within 15 years, with lower loads later with the implementation of Richmond Hill Express Rail. Corridor demand refers to the combined load of the proposed Yonge St. service, GO Richmond Hill service and local buses operating on Yonge St.

³ Demand is considerably higher than BRT capacity, as modelled in this analysis, in 2021 and 2031. Comparative tables throughout this report have the Option 3 column in grey to indicate that long-term capacity needs are unmet.

⁴ The assumed service frequency is derived from matching supply of service with ridership demand and does not reflect, nor propose, what TTC's ultimate operational plan and service level will be.

The results from the Multiple Account Evaluation are summarized in the table below.

Overall there is very little difference between the two subway options. The benefit-cost ratio for both options is 0.7. Option 1 has a \$7 million better overall net present value at a discount rate of 5%.

The subway options provide higher service quality and reliability than the BRT. Analysis suggests BRT would most likely experience substantial crowding in peak periods and would not provide a long term solution in addition to not being as reliable as the subway.

The subway options have much larger positive environmental, economic, land development and community impacts than the BRT. As shown in the table below the value of the GHG emissions is about half for the BRT compared to the subway options.

The economic impacts of the subway options are considerable, especially during construction. Some 21,800 person-years of employment are expected to be generated by Option 1 (this includes both direct and indirect impacts). For Option 2 the estimate is 20,700 person-years of employment while for Option 3 the estimate is 800 person-years of employment.

Subways have shown to be the most effective technology in stimulating land development around stations and the analysis shows substantial increase in development and land value provided municipal planning and zoning support the development. The incremental value of land development is estimated at between \$500 million to \$1.2 billion for Option 1 with slightly lower values for Option 2. Under Option 3 not much land uplift is expected - between \$32 and \$65 million.

The results from the Greater Golden Horseshoe Model indicate that the demand for the BRT in 2021 greatly exceeds the maximum capacity of the technology as contemplated in this report. The BRT assumes a dedicated busway with at-grade stops, articulated vehicles and the buses would run segregated from traffic. While the capacity of the BRT could be expanded slightly, the analysis suggests that technology may not have sufficient capacity for the long-term needs of the corridor.

This report is part of an ongoing study and planning effort by York Region, the City of Toronto, TTC, and Metrolinx regarding the complex and integrated Yonge Subway corridor. Other studies currently underway include:

- | TTC Subway Rail Yards Needs Study (underway)
- | Rapid Transit Options for Downtown Toronto (underway)
- | Metrolinx Richmond Hill GO rail improvements Benefits Case (underway), for Milton, Barrie, Richmond Hill and Stouffville corridors

MAE Summary

	Option 1	Option 2	Option 3
Transportation User Account			
Transportation User Benefits (PV \$m)	1,344	1,228	541
Qualitative User Benefits	✓✓✓	✓✓✓	✓
Financial Account			
Costs (PV \$m)	(1,886) ⁵	(1,776) ⁵	(196)
Benefits Less Costs (PV \$m)	(541)	(548)	345
Benefit-Cost Ratio	0.7	0.7	-. ⁶
Environmental Account			
GHG Emissions (PV \$m)	11.1	10.1	5.1
Qualitative Environmental Impacts	✓✓	✓✓	✓
Economic Development Account			
Economic Impacts During Construction	✓✓✓	✓✓	✓
Long-term Economic Impacts	✓✓✓	✓✓✓	✓
Development Potential (\$m)	482 - 1,205	394 - 984	32 - 65
Social Community Account			
Land Use Shaping	✓✓✓	✓✓✓	✓
Health	✓✓✓	✓✓✓	✓✓
Accessibility	✓✓✓	✓✓✓	✓✓✓

⁵ Excludes Bloor-Yonge capacity improvements not attributable to the Yonge extension

⁶ Benefit-Cost ratio is not provided as the full cost of the GO Rail improvements and the disbenefits of un-served demand have not been included.