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Memorandum

DATE: June 29, 2010

TO: Metrolinx Board of Directors

FROM: *John Howe, Vice-President, Investment Strategy and Project Evaluation (ISPE)*

RE: **Dundas, Durham-Scarborough, Hurontario-Main and GO Stouffville Benefits Cases Analyses (BCAs)**

Executive Summary

On November 28, 2008, the former Metrolinx Board approved the Regional Transportation Plan, entitled *The Big Move*. To help inform the project funding decision-making process, the Board directed ISPE staff to undertake Benefits Case Analyses (BCAs) for all Top 15 priority projects, beyond those with pre-Metrolinx funding commitments (e.g., Spadina Subway extension, Georgetown South/Air Rail Link, Mississauga and Brampton BRT projects).

The purpose of the BCA process is to identify, at a high level, the best-performing project scope options for each project. The Metrolinx BCA extends beyond traditional transportation cost-benefit analysis. In addition to measuring the transportation user and financial impacts of each option, the BCA also addresses long-term economic, environmental and social impacts – consistent with the three foundation pillars of *The Big Move*.

This Board report addresses the BCA results for the four outstanding Top 15 Priority Projects, including the Dundas, Durham-Scarborough and Hurontario-Main rapid transit projects, as well as two-way, all-day rail service on the GO Stouffville Corridor.

Recommendation

BE IT RESOLVED:

THAT the Metrolinx Board receive and approve for public release the BCA reports for the Dundas, Durham-Scarborough and Hurontario-Main and the GO Stouffville rapid transit projects;

AND THAT the Board direct staff to:

- Input the BCA findings for all four projects into the Metrolinx Project Prioritization Framework and 10-Year Provincial Infrastructure Plan currently under development;

- Input BCA findings for the GO Stouffville Corridor into the Metrolinx Electrification Study of the GO Transit rail system;

- Work with municipal partners to advance the Dundas, Durham-Scarborough and Hurontario-Main projects to meet planning, design and engineering (PDE) and environmental assessment (EA) requirements, and to strengthen the cost confidence process and maintain these projects in a high state of implementation readiness;

- Focus the PDE workplans on Bus Rapid Transit (BRT) options for the Dundas and Durham-Scarborough projects, allowing for a future transition to Light Rail Transit (LRT) in the long term; and on Light Rail Transit (LRT) options for the Hurontario-Main project;

- Work in partnership with Halton, Burlington, Oakville, Mississauga and Toronto to develop a "service strategy" for the Dundas rapid transit corridor;

- Work in partnership with the City of Brampton to implement a BCA evaluation of the Queen Street Zum Corridor, a key network complement to the Hurontario-Main Corridor; and

- Report back on PDE progress for the Dundas, Durham-Scarborough and Hurontario-Main projects in early 2011.

Background

Over the past two years, ISPE staff have reported back to the Board on a number of occasions with BCA results for Top 15 projects in real time as the various reports were completed. This final Top 15 BCA report back addresses the results for the last four outstanding BCAs, which examined costs and benefits associated with project alternatives for the Dundas, Durham Scarborough and Hurontario-Main rapid transit projects as well as the case for two-way, all-day service on the GO Stouffville Corridor.

Following a competitive process, ISPE retained experienced consulting teams led by Steer Davies Gleave (SDG) for the three municipal rapid transit project BCAs, and Halcrow, along with Hatch Mott MacDonald and Delcan, to carry out the GO Rail BCA. Throughout the BCA process, ISPE staff worked closely with our municipal partners, and in the case of the GO Stouffville BCA our internal colleagues from Corporate Infrastructure, Policy and Planning and Operations, in developing the project options, developing operating and capital cost estimates, and reviewing the BCA results for each project.

The costs presented in each BCA are expressed in 2009 dollars as order-of- magnitude estimates for high-level project appraisal purposes only. Refined cost estimates, implementation phasing strategies and timelines would need to be developed through further detailed planning, design, and engineering (PDE) work by Metrolinx and/or its municipal partners for each corridor.

1. Dundas Street BCA

The rapid transit options assessed for this study are primarily bus-based as the density characteristics of the corridor make rail-based technologies expensive to implement and operate.

- Option 1 – BRT Light: Kipling to Highway 407;
- Option 2 – Full BRT: Kipling to Hurontario and BRT Light: Hurontario to Highway 407;
- Option 3 – LRT: Kipling to Hurontario and BRT Light: Hurontario to Highway 407; and
- Option 4 – Full BRT: Kipling to Highway 407.

BRT Light refers to **mixed traffic** operation of branded buses. Full BRT refers to branded buses operating within an **exclusive right-of-way**. Both BRT forms include ticket machines in bus stops for purchase and validation of tickets before boarding (similar to York VIVA).

Dundas BCA Results

	Option 1: BRT Light	Option 2: BRT West to Hurontario	Option 3: LRT West to Hurontario	Option 4: Full BRT
Total Capital Cost (Current $)	**$225 M**	**$291 M**	**$648 M**	**$505 M**
Total Capital & Incremental Operating Cost (PV)	**$222 M**	**$273 M**	**$554 M**	**$466 M**
Transportation User Benefit (PV)	**$373 M**	**$432 M**	**$499 M**	**$772 M**
Benefit : Cost Ratio	**1.7**	**1.6**	**0.9**	**1.7**
Emissions reduction (PV)	**$2.8 M**	**$3.3 M**	**$3.9 M**	**$5.2 M**
Development Potential (PV)	**$47 – 99 M**	**$292 – 610 M**	**$422 – 837 M**	**$472 – 989 M**
Jobs during Construction (person years)	**914**	**1,812**	**4,271**	**3,819**
Jobs long-term (person years)	**42**	**100**	**55**	**144**

All options studied generate good traditional cost-benefit ratios along with other positive qualitative benefits. Options 1, 2 and 4 all generate greater costs than benefits.

Current and future road widening planned for Dundas Street provides and opportunity to simultaneously build rapid transit infrastructure. In 2008, the Province of Ontario awarded approximately $57 million in Quick Win funding to Halton Region to introduce BRT on the Halton section of the Dundas corridor. A supporting regional rapid transit study developed by Halton identified a series as integral components to the east-west Dundas spine.

Uncertainty surrounding governance, service delivery and fare policy integration across the four transit jurisdictions that straddle the Dundas corridor should be addressed as the project moves forward. Concerns over who will be responsible for paying the increased operating costs are echoed across all municipalities.

2. Durham-Scarborough BCA

The Big Move identified a new 36-kilomtre long bus rapid transit line (Durham-Scarborough BRT) extending westward from the Downtown Oshawa Urban Growth Centre (UGC) along the Highway 2 – Ellesmere Corridor through the Downtown Pickering UGC to the Scarborough Centre UGC, providing connections with the TTC rapid transit network.

Working together with Durham and City of Toronto/TTC staff, the following three options were developed for assessment as part of the BCA for this corridor:

- Option 1 – Full BRT along median bus lanes over the length of the corridor with the exception of physically constrained portions of the route through the downtown areas of Oshawa, Whitby and Ajax;

- Option 2 – Partial BRT using median bus lanes along approximately 50 per cent of the corridor length, with mixed traffic operations in the remaining 50 per cent; and

- Option 3 – Partial BRT using median bus lanes along approximately 50 per cent of the corridor length within Durham Region, with mixed traffic operations along the Scarborough portion of the route.

In March 2008, the Province of Ontario committed a total of $82.3 million to Durham Region through the Quick Wins initiative to support the implementation of Phase 1 BRT in the Highway 2 corridor. The Phase 1 improvements (bus fleet expansion, intersection upgrades, Intelligent Transportation System components and maintenance centre expansions) are integral components of the larger Durham-Scarborough BRT project and have therefore been included within the scope of each of the three project options.

The routing assumed in the BCA from the Pickering-Toronto border to Scarborough Centre, and the identified station locations, are conceptual at this early stage. Alternative routing options and stop locations along the Scarborough portion of the corridor could be examined in further detail should the project proceed to more advanced project development phases (e.g., preliminary design/engineering and environmental assessment stages) – to address community and neighbourhood impact issues particularly along the Ellesmere segment east of the University of Toronto Scarborough Campus (USTC).

Durham-Scarborough BCA Results

	Option 1: Full BRT	Option 2: Partial BRT	Option 3: Partial BRT in Durham (mixed traffic in Scarborough)
Total Capital Cost (Current $)	**$498 M**	**$392 M**	**$277 M**
Total Capital Cost & Incremental Operating Cost (PV)	**$444 M**	**$307 M**	**$246 M**
Transportation User Benefit (PV)	**$525 M**	**$327 M**	**$216 M**
Benefit : Cost Ratio	**1.2**	**1.1**	**0.9**
Emissions reduction (PV)	**$3.8 M**	**$2.2 M**	**$1.1 M**
Development Potential (PV)	**$57 - 59 M**	**$51 - 53 M**	**$51 – 53 M**
Jobs during Construction (person years)	**1,903**	**1,187**	**992**
Jobs long-term (person years)	**39**	**30**	**26**

The BCA results indicate that Option 1 (Full BRT) has highest benefit-to-cost ratio (BCR) at 1.2. This is primarily due to the faster travel time along dedicated median BRT lanes, which attracts the highest ridership and generates significant travel time savings benefits. However, Option 1 also has the highest capital costs at approximately $500 million.

Option 2 (Partial BRT) also has positive BCR at 1.1. The reduced speeds along mixed traffic segments results in lower ridership and travel time savings compared with Option 1. However, this is offset by significantly lower capital costs at approximately $342 million.

Costs outweigh the benefits for Option 3 (partial BRT in Durham/mixed traffic operations in Scarborough), with BCR at 0.9. The longer travel time through the Scarborough section due to mixed traffic operations reduces the overall attractiveness of service.

All options would support land use and economic development objectives along the Ellesmere-Highway 2 Corridor. The Durham-Scarborough BRT would enhance regional connectivity, including enhanced linkages between the three UGCs along the corridor.

3. Hurontario-Main BCA

Three options have been identified for this corridor.

- Option 1 – LRT: Port Credit to Downtown Brampton, via Mississauga City Centre;
- Option 2 – BRT: Port Credit to Downtown Brampton, via Mississauga City Centre; and

- Option 3 – LRT: Port Credit to Mississauga City Centre and BRT: Mississauga City Centre to Downtown Brampton

Note that Option 3 was developed to provide an indication on how BRT and LRT would interact and the effect of a transfer on the corridor. Potential implementation phasing will need to be examined through more detailed design work.

Hurontario-Main BCA Results

	Option 1: Full LRT	Option 2: Full BRT	Option 3: South LRT, North BRT
Total Capital Cost (Current $)	**$1,345 M**	**$359 M**	**$755 M**
Total Capital & Incremental Operating Cost (PV)	**$1,206 M**	**$330 M**	**$679 M**
Transportation User Benefit (PV)	**$1,779 M**	**$538 M***	**$692 M**
Benefit : Cost Ratio	**1.5**	**-**	**1.0**
Emissions reduction (PV)	**$8.0 M**	**$4.7 M**	**$5.9 M**
Development Potential (PV)	**$208 - 417 M**	**$98 - 157 M**	**$158 - 317 M**
Jobs during Construction (person years)	**7,000**	**1,309**	**3,671**
Jobs long-term (person years)	**575**	**16**	**260**

Full BRT option cannot meet projected 2021 capacity requirements and therefore the Benefit-Cost Ratio is not provided

Results show that all options generate higher benefits than costs, but the full BRT option cannot meet projected 2021 capacity requirements. All options support land use and economic development objectives for both the Mississauga and Brampton Urban Growth Centres. LRT demonstrates a greater ability to attract investment and redevelopment than BRT and LRT also supports the greatest reduction in greenhouse gas emissions. All options will enhance regional connectivity along the corridor.

Detailed design and engineering work is needed to determine where the maintenance and storage facility should be located, what type of service will best serve Mississauga City Centre and how to build within the narrow rights-of-way in Downtown Brampton and south of the QEW to Port Credit.

4. GO Stouffville Corridor BCA

As part of the Stouffville Corridor BCA, two options were assessed for moving to two-way, all-day service:

- Option 1 – Two-way, all-day service to Unionville: Unionville GO Station selected as a logical potential end point for all-day rail service as it serves the Markham Centre Urban Growth Centre and would provide direct connections with future Viva BRT services along Highway 7/Enterprise Drive.

- Option 2 – Two-way, all-day service to the current line terminus at Lincolnville: Provides enhanced service over the length of the Stouffville Corridor, consistent with the assumptions for the four other corridors evaluated in the GO Rail BCA.

The two-way, all-day service levels assumed for the Stouffville Corridor were based on phased approach based on 2021 (Scenario A) and 2031 (Scenario B) time horizons for both the Unionville and Lincolnville options.

- Scenario A (2021): Half-hourly service in off-peak periods and half-hourly service in counter-peak direction during peak periods (e.g., outbound from Union Station in the AM peak period and inbound to Union Station during the PM peak period). Assumes the replacement of existing off-peak/counter-peak Train-Bus services.

- Scenario B (2031): Peak period service is expanded to 10-minute headways to either Unionville or Lincolnville in 2031. The BCA report acknowledges Union Station capacity issues and makes reference to Union Station Capacity and Downtown Access studies currently underway by Metrolinx.

As the key objective of the GO Rail BCA was to evaluate the case for the service-level improvements and corridor extensions envisioned in The Big Move, for the purposes of costing and analysis (e.g., estimating travel times), the continued use of diesel technology was assumed in each corridor. The report makes clear reference to the Electrification Study as the appropriate venue for evaluating future technology options on all corridors. As well, the final report will reference GO's plan to move to Tier-4 compliant diesel operations in the near future as the technology becomes commercially available.

GO Stouffville BCA Results

	Unionville (Option 1)	Lincolnville (Option 2)
Total Capital Cost (Current $) Scenario A 2021 Scenario B 2031*	$377 M +$64 M	$694 M +$128 M
Total Capital & Incremental Operating Costs (PV)	$521 M	$896 M
Transportation User Benefits (PV)	$508 M	$579 M
Benefit-Cost Ratio	**1.0**	**0.6**
Emissions Reduction (PV)	$2.7 M	$3.1 M
Jobs During Construction	3,990 person-years	7,440 person-years
2031 GDP Impact (PV)	$19 M	$22 M
Social Community Impacts	Additional services will contribute to: - reduced auto dependency, - increased walking & cycling activity, and - will stimulate residential development around accessible services	

*Capital costs between Scenario A (2021) and B (2031) are for additional train sets required for proposed peak period service enhancements.

Dundas, Durham-Scarborough, Hurontario-Main and GO Stouffville BCAs

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The results indicate that the Unionville option is the superior alternative, achieving equal benefits and costs. Extending two-way, all-day service to the current line terminus at Lincolnville generates a relatively modest increase benefits at a significantly higher cost than the Unionville Option. The results reflect the fact that the portion of the corridor north of Markham is located in the Greenbelt, which places restrictions on future growth and development potential.

Terminating two-way all-day service at Unionville would also avoid significant infrastructure requirements through the constrained portion of the corridor through central Markham. These include approximately 20 km of additional new second track between Unionville and Lincolnville, grade separating four additional road/rail crossings, building new platforms and pedestrian tunnels at four stations, and additional retaining/sound walls through central Markham.

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