

Post Preliminary Design Business Case Technical Memorandum March 2021

Executive Summary

With the GO Expansion program, Metrolinx is moving forward on a significant investment that will transform transit access across the Greater Toronto and Hamilton Area (GTHA). Beyond GO Expansion, as described in the GO Expansion Full Business Case from November 2018, Metrolinx is advancing additional rail programs including the GO rail extension to Bowmanville. This investment will add new rail service and connectivity to the Lakeshore East GO rail line.

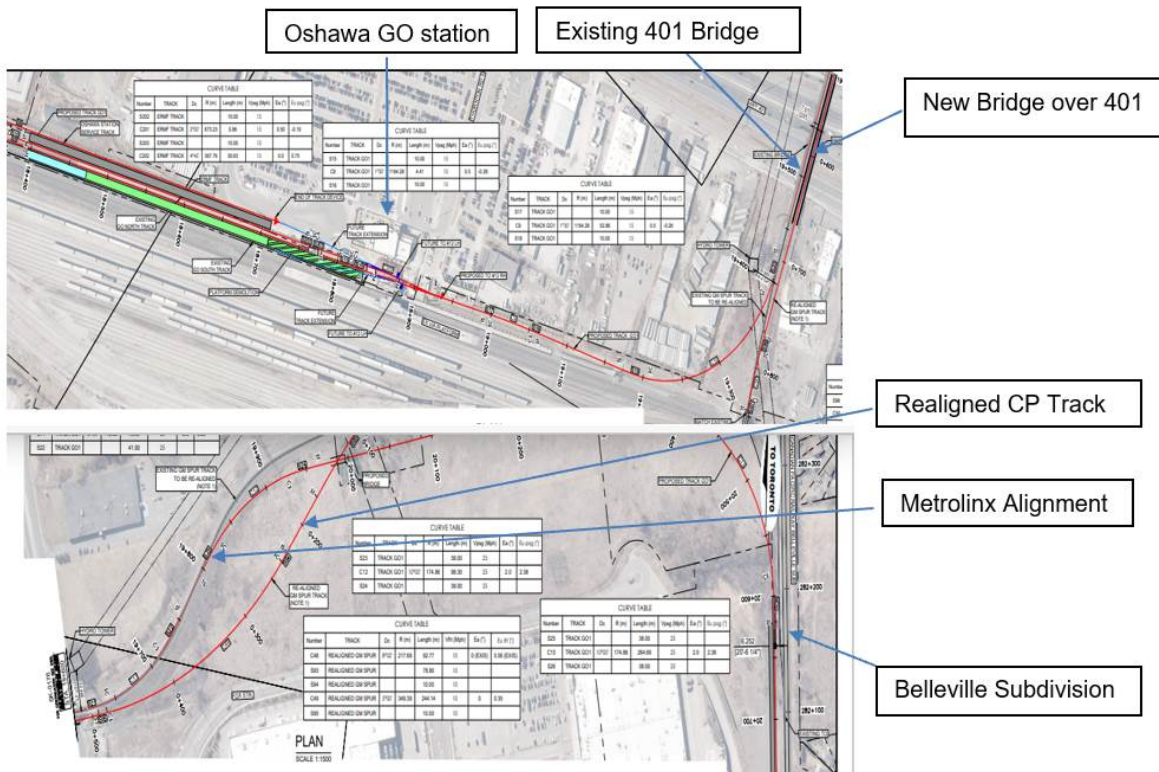
An updated Initial Business Case (IBC) was completed in February 2020 and examined the potential to expand GO rail service to Bowmanville through multiple options proposing a peak-only and all-day service pattern. Option 2 from the IBC was chosen as the preferred option, which would provide all-day service to Bowmanville by a new connection from the GO Subdivision and Oshawa GO station through the Canadian Pacific (CP) Railway's General Motors (GM) spur line to cross Highway 401 and connect to CP's Belleville Subdivision. This is currently a single track crossing that Metrolinx would like to operate on.

A Preliminary Design Business Case (PDBC) was approved in April 2020 and examined two potential service patterns to operate on this extension. The two options analyzed differ only in frequency of service on weekends. Option 1 provides bihourly weekend train service and Option 2 provides hourly weekend train service. Weekend service in Option 2 has higher annual boardings and revenue, but greater operating costs leading to a lower Benefit Cost Ratio (BCR).

In November 2020, it was announced that the GM Oshawa plant would reopen which resulted in CP requiring Metrolinx to pursue an independent alignment instead of the sharing of the existing bridge on the GM Spur under the IBC Option 2.

The proposed additional infrastructure offers significant operational improvements, flexibility and exclusive control over the service patterns over the shared use option. It allows Metrolinx the opportunity to operate independently of CP on its own alignment from Oshawa to Bowmanville, crossing Highway 401 on a dedicated bridge with a grade separation over the GM Spur, while running parallel to the CP Belleville Subdivision on leased lands east of the GM Spur, as shown in Figure 1 below. As the exclusive user along the full length of the new corridor, Metrolinx will be undertaking the civil, signal and infrastructure works on the extension. The limited modifications to the CP alignment north of the 401 bridge resulting from the expansion, specifically related to laying of track and signal work, will be completed by CP through means of a construction agreement.

Figure 1: Metrolinx Amended Alignment to Belleville Subdivision



To facilitate service operations on the opening day of the extension, additional construction of enabling works along the Bowmanville extension corridor have been added to the plans. These enabling works will ensure the successful operation of trains on opening day of the extension.

This memorandum presents a high-level evaluation of this adjusted infrastructure version of the Bowmanville extension, highlighting changes under the four cases of the business case framework to supplement the information provided in the board-approved Bowmanville PDBC. What follows is an overview of the differences with the original Option 1 and the new infrastructure version in table form.

Figure 2: Business Case Overview

Strategic Case		
	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
Strong Connections	Annual boardings 4.9 million (2041)	Annual boardings 4.9 million (2041)
	19,000 people and 10,400 jobs within 800 metre of a station along the extension by 2041	19,000 people and 10,400 jobs within 800 metre of a station along the extension by 2041
Complete Travel Experience	New stations improve connections to the DRT network	New stations improve connections to the DRT network
	Average in-vehicle travel time from Bowmanville to Union Station reduced by 15 minutes; from Peterborough to Union Station reduced by 30 minutes	Average in-vehicle travel time from Bowmanville to Union Station reduced by 15 minutes; from Peterborough to Union Station reduced by 30 minutes
	New stations provide improved GO facility capacity with 3,980-4,950 total parking spaces	New stations provide improved GO facility capacity with 3,980-4,950 total parking spaces
Sustainable Development	Encourage Active Modes of Transportation with three of four proposed station locations located in residential areas	Encourage Active Modes of Transportation with three of four proposed station locations located in residential areas
Economic Case (2020\$ Present Value)*		
	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
Total Costs	\$1,436M to \$1,564M	\$1,340M to \$1,450M
Total Economic Impacts	\$1,073M	\$1,073M
Net Benefits (NPV)	-\$492M to -\$363M	\$(377M) to \$(267M)
Benefit Cost Ratio (BCR)	0.69 to 0.75	0.74 to 0.80
Financial Case (2020\$ Present Value)*		
	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
Total Revenue	\$295M	\$295M
Total Capital Costs	\$1,416M	\$1,335M
Total Operating and Maintenance Costs	\$582M	\$582M
Operating Cost Recovery Ratio	0.51	0.51
Deliverability and Operations Case		
	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
Constructability	New bridge to be constructed on the GM spur over Hwy 401 parallel to current bridge with grade separation between Metrolinx and CP tracks north of the 401	Uses existing (single track) CP rail spur including bridge over Hwy 401 (additional improvements may be required)
	GO trains will operate parallel to the mainline track, reaching it on an exclusive crossing of the 401.	Requires connection from mainline to GM Spur line
	Train service enabling works to be constructed on the Bowmanville corridor extension	
Operations	The operation of consist length between six and 12-car, as well as, two diesel locomotives are under consideration	The operation of consist length between six and 12-car, as well as, two diesel locomotives are under consideration
Environmental Approvals	Additional studies required for environmental approvals	Additional studies required for environmental approvals
Stakeholder Dependencies	Obtain consent and approval of CP, CN, Hydro One and VIA	Obtain consent and approval of CP, CN, Hydro One and VIA
Procurement	CMAR procurement for delivery of infrastructure	Design-Bid-Build procurement for delivery of infrastructure
Timeline	Assumed 70 months delivery timeline or longer	Assumed 70 months delivery timeline or longer

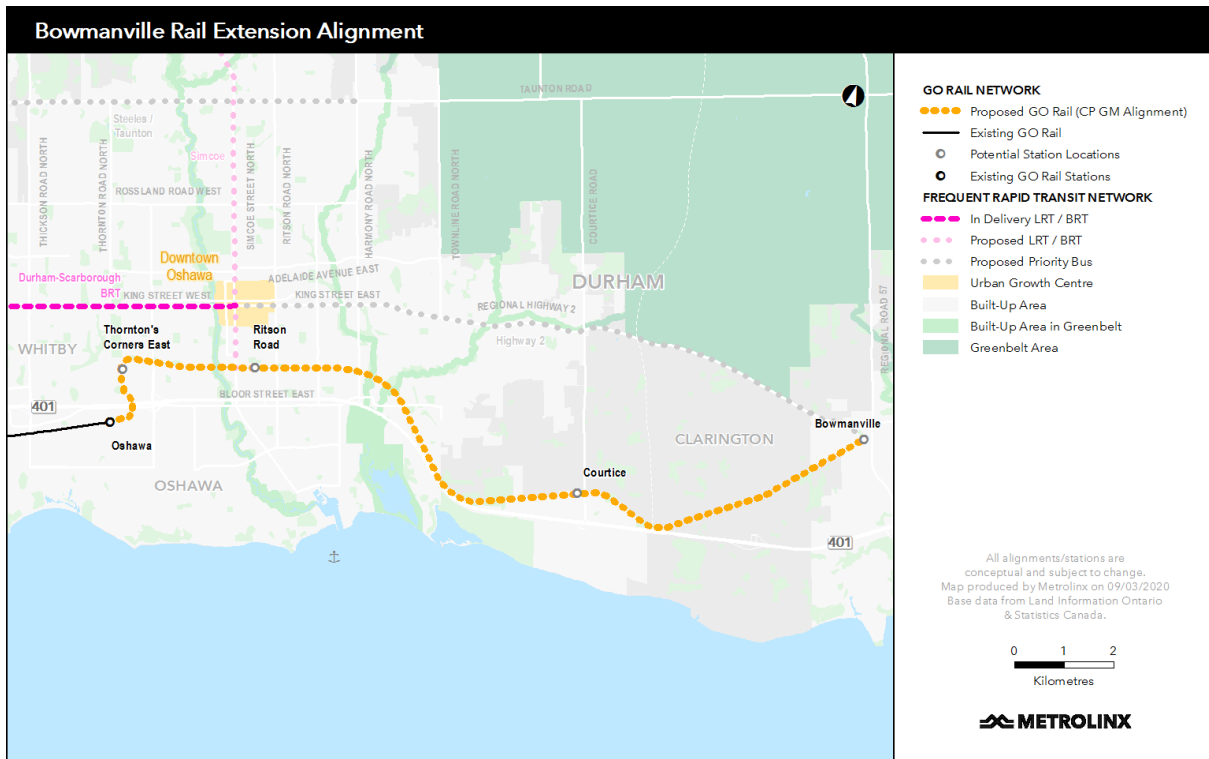
Strategic Case

The Strategic Case is unaffected based on the refined scope of the project. The station locations, service provided, travel times and potential ridership remain unchanged. The additional infrastructure ensures Metrolinx will be operating independently of CP on an exclusive alignment crossing Highway 401 with a rail to rail grade separation over CP trackage on the GM Spur while running parallel to the CP Belleville Subdivision on leased land.

Future increases to service will be easier with this configuration as it eliminates the need for CP approval of GO service levels. When it comes to day to day operations, having a fully independent rail corridor, including a separate Highway 401 crossing, will ensure more reliable service; should freight encounter a mechanical issue or delay, GO service would no longer be impacted until the issue could be resolved. The parallel bridge and tracks resolve these potential situations.

The map below shows the alignment, unchanged by the requirement for additional infrastructure.

Figure 3: Corridor Extension Alignment



Economic Case

The table below summarizes costs, benefits and overall performance through the BCR and the Net Present Value (NPV) calculation. The changes have led to the projected cost range increasing by between \$96 and \$114M. The BCR decreased by 0.05 with the addition of this new infrastructure and the net benefits decreased between \$96 and \$115M as costs have increased while benefits remain unchanged.

Figure 4: Economic Case Summary

Impact Type	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
	Weekend Service Every Two Hours	Weekend Service Every Two Hours
Total Costs	\$1,436M to \$1,564M	\$1,340M to \$1,450M
Infrastructure, Fleet, Rehabilitation and Replacement Costs	\$854M to \$980M	\$766M to \$878M
Terminal Value	\$(12M) to (\$14M)	\$(11M) to (\$13M)
Bus Fleet Costs	\$12M	\$12M
Operating and Maintenance Costs	\$585M	\$585M
Total Economic Impacts	\$1,073M	\$1,073M
User Impacts	\$756M	\$756M
External Impacts	\$27M	\$27M
Incremental Fare Revenue Adjustment	\$290M	\$290M
Benefit-Cost Ratio	0.69 to 0.75	0.74 to 0.80
Net Benefits (NPV)	-\$492M to -\$363M	-\$377M to -\$267M

Financial Case

The table below summarizes financial measures incremental to the Business As Usual case (BAU). The net revenue decreases by an additional \$82M as the costs have increased and revenue remains unchanged. The return on investment remains steady at 0.15, the same as the original configuration.

Figure 5: Financial Case Summary

Financial Case Metric (Incremental to BAU)	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
	Weekend Service Every Two Hours	Weekend Service Every Two Hours
Total Revenue	\$295M	\$295M
Total Capital Costs **	\$1,416M	\$1,335M
Total Operating and Maintenance Cost	\$582M	\$582M
Net Operating Cash Flow	\$(288M)	\$(288M)
Net Revenue (NPV)	\$(1,704M)	\$(1,622M)
Operating Cost Recovery Ratio	0.51	0.51
Return on Investment (ROI)	0.15	0.15

As shown in Figure 6 below, the new construction increases the infrastructure, rehabilitation and replacement costs by \$82M when compared to the original Option 1 in the PDBC. This represents the entire lifecycle costs of the new infrastructure.

Figure 6: Financial Case Capital Cost Breakdown

Line Item	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
	Weekend Service Every Two Hours	Weekend Service Every Two Hours
Infrastructure, Rehabilitation and Replacement Costs	\$947M	\$865M
GO Rail Fleet	\$469M	\$469M
DRT Fleet	\$12M	\$12M
Terminal Value	\$(12M)	\$(11M)
Total Capital Costs	\$1,416M	\$1,335M

Deliverability and Operations Case

This refined infrastructure affects Operations positively. The new rail bridge will effectively separate GO train operations from CP Rail operations making it easier for Metrolinx to service and maintain the corridor, as well as, increase service in the future. There will be no change to how we operate on the leased Belleville Subdivision lands; the benefits are tied to not interfacing with CP operations.

Deliverability changes are in the form of the new bridge to be constructed east of the current bridge, as well as tracks used by GO and CP to connect to their respective Highway 401 bridges. Metrolinx will be undertaking the civil, signal and infrastructure works on the extension which will be exclusively used by Metrolinx. Minor modifications to CP infrastructure as a result of the expansion, specifically related to laying of track and signal work, will be completed by CP through means of a construction agreement. Metrolinx will be the owner of the infrastructure during the period of lease we are seeking.

Along with the new infrastructure and upgrades for crossing the 401, enabling works supporting rail operations are to be constructed along the Bowmanville corridor extension.

All other elements of the Deliverability and Operations case remain the same as with the PDBC from 2020.

Figure 6: Deliverability and Operations Overview

Deliverability and Operations Case		
	Option 1- NEW INFRASTRUCTURE	Option 1- ORIGINAL
Constructability	<p>New bridge to be constructed on the GM spur over Hwy 401 parallel to current bridge with grade separation between Metrolinx and CP tracks north of the 401</p> <p>GO trains will operate parallel to the mainline track, reaching it on an exclusive crossing of the 401.</p> <p>Train service enabling works to be constructed on the Bowmanville corridor extension</p>	<p>Uses existing (single track) CP rail spur including bridge over Hwy 401 (additional improvements may be required)</p> <p>Requires connection from mainline to GM Spur line</p>
Operations	The operation of consist length between six and 12-car, as well as, two diesel locomotives are under consideration	The operation of consist length between six and 12-car, as well as, two diesel locomotives are under consideration
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