

APPENDIX 1

METROLINX GO TRANSIT REGIONAL EXPRESS RAIL OVERVIEW

1. GO REGIONAL EXPRESS RAIL OVERVIEW

Over the next ten years Metrolinx will be implementing Regional Express Rail (GO RER) service across the GO rail network, a part of the Government of Ontario's Moving Ontario Forward plan, announced on April 17, 2015. Through GO RER, the core segments of the GO network will be upgraded to feature:

- Frequent, all-day service
- Faster trip times
- Electric trains

New rail service will be provided throughout the weekday, evenings, and weekends, leading to substantial increases in ridership in the off-peak periods, and augmenting already significant ridership in the peak periods. This would be a 140% forecast increase in overall ridership over the next fifteen years. In order to speed travel, investments will be made in track speed improvements, electric trains and equipment, grade separations, and other improvements. The tracks, corridors, and trains themselves will be used more intensively and GO RER will improve the time it takes for commuters to complete their journeys in a host of ways.

In addition to reductions in journey times achieved by cutting wait times and increasing travel speeds through electrification, GO RER will increase transit system capacity. Investing in capital improvements to existing GO rail corridors would mean that additional service and capacity could be provided cost effectively in a built-up urban environment while generating important economic, social and environmental benefits. With the Greater Toronto and Hamilton Area (GTHA) region poised to grow to 9 million people by 2031, GO RER is a means to meet the region's transit needs.

1.1 Developing the GO RER Program

Metrolinx has been developing the GO RER concept since the Provincial commitment in June 2014 – building off the extensive work that was already underway. In conjunction with the Province, Metrolinx staff have been working to develop the GO RER program, comprised of four key elements:

1. **Service Concept:** made up of the frequency and extent of service, the type of service, and the service speed; provides the foundation to determine infrastructure needs and develop a phasing plan
2. **Infrastructure Needs:** in order to be clear on the infrastructure and equipment that will be needed to deliver on the Service Concept
3. **Phasing Plan:** to identify the optimal sequencing of infrastructure and service, considering factors like ridership growth, congestion benefits and effective infrastructure delivery
4. **Engagement Plan:** to identify the work necessary to engage stakeholders that include the public, municipalities, and elected officials.

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GO RER Service

A preliminary GO RER service concept has been developed and is currently undergoing refinement. GO RER service on the GO rail network will be more than a doubling of peak period service and a quadrupling of off-peak period service compared to today and a wider range of options to get around. It includes:

Weekday peak period, peak direction service:

- Every 15 minutes on the Lakeshore West line between Hamilton GO Centre and Union Station;
- Every 30 minutes on the Lakeshore West line between West Harbour and Union Station;
- Every 15 minutes on the Milton line;
- Every 30 minutes on the Kitchener line between Kitchener and Union Station;
- Every 15 minutes on the Kitchener line between Mount Pleasant and Union Station;
- Every 30 minutes on the Barrie line between Allandale Waterfront and Union Station;
- Every 15 minutes on the Richmond Hill line; and
- Every 20 minutes on the Stouffville line between Unionville and Union Station.

Two-way, all-day 15-minute service or better on weekdays, evenings and weekends:

- For the Lakeshore West line between Burlington and Union Station;
- For the Lakeshore East line between Oshawa and Union Station;
- For the Kitchener line between Bramalea and Union Station;
- For the Barrie line between Aurora and Union Station; and
- For the Stouffville line between Unionville and Union Station.

Two-way 60-minute service or better on weekdays, evenings and weekends:

- For the Lakeshore West line between Hamilton GO Centre and Union Station;
- For the Barrie line between Allandale-Waterfront and Union Station; and
- For the Stouffville line between Mount Joy and Union Station.

Figure 1 : GO Existing Peak Service



Figure 2: GO RER Peak Period Service

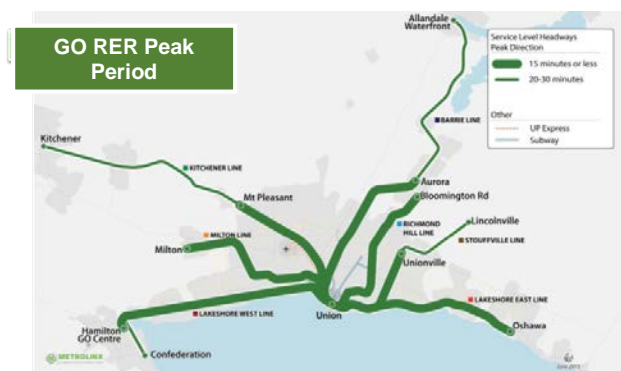


Figure 3: GO Existing All-Day Service

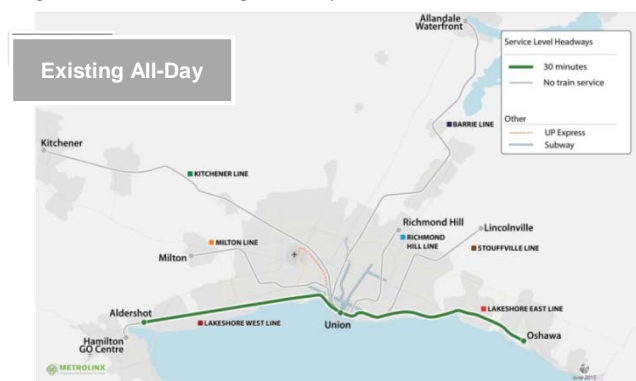
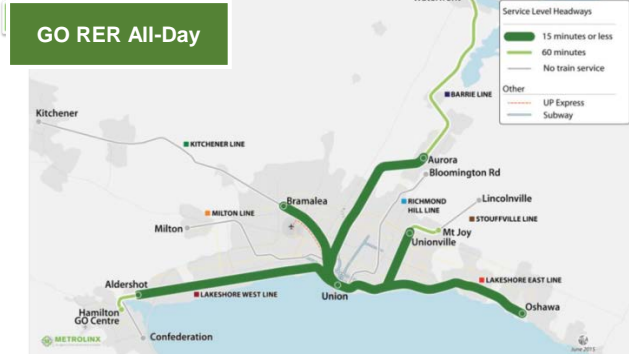


Figure 4: GO RER All-Day Service



1.2 GO RER Electrification Plan

Electrification of five of the GO corridors is a key component of the GO RER program. Currently, GO operates most rail services with 10- or 12-car trains powered by diesel locomotives. This is an efficient way to move large numbers of commuters during rush hour, but diesel locomotives are not able to accelerate as quickly as electric alternatives, limiting their ability to travel at top speeds for longer periods. GO RER service would use a mixed fleet that would include electric propelled trains. Journey times can be reduced by ten to twenty percent with electric traction, depending on route, stopping pattern and equipment, as well as technology and equipment improvements.

Through more electrified service, GO RER will lead to a reduction in greenhouse gas emissions, caused by the conversion of the trains from diesel to electric propulsion, the resulting higher ridership and mode shift from auto trips to transit trips. Electrification of a significant portion of the rail network would reduce the need for diesel fuel, and electric multiple unit trains can be run less expensively than heavy diesel locomotives, which will help make the system self-sustaining in the long term.

Electrified service will be implemented on the following Metrolinx-owned corridors with the highest service levels:

- The Lakeshore West line between Burlington and Union Station;
- The Lakeshore East line between Oshawa and Union Station;
- The Kitchener line between Bramalea and Union Station, including the Union Pearson Express service;
- The Barrie line between Allandale Waterfront and Union Station; and
- The Stouffville line between Lincolnville and Union Station.

Figure 5. GO RER Electrification Plan



1.2. Preliminary Capital Cost Estimates

The capital investment estimates draw on GO Transit's long-standing experience with laying track, construction of stations, bridges and other infrastructure, installing and upgrading signaling, purchasing diesel locomotives and unpowered bi-level cars, and acquiring property. Metrolinx also drew on information from systems around the world comparable to GO RER to prepare cost estimates for the new elements of the system: electrification, purchase of electric trains, and purchase and installation of advanced train control systems.

The estimated capital investment to deliver the recommended GO RER program by 2024 is \$13.5 billion (2014\$).

1.3. GO RER Project Benefits

GO RER is expected to provide substantial benefits to the region through improved service to additional rider demand and by attracting new riders. GO RER will provide these benefits by leveraging the full capacity of the integrated regional transit network.

Projected benefits of transit and transportation projects include:

- Time savings for existing and new transit users;
- Auto cost savings for drivers who switch to transit;
- Quality of life benefits, such as improved comfort, convenience and
- Reliability for transit users;
- Safety benefits, primarily through reductions in road accidents;
- Benefits to transit users through relief from crowding; and
- Cost and time savings to road users due to congestion relief.

2. EXISTING GO RAIL SERVICE WITHIN THE CITY OF TORONTO

All seven GO rail corridors provide service within Toronto, meeting at Union Station. The Lakeshore corridors run through service at Union Station, but most corridors terminate there. Out of a total of 64 GO rail stations, nearly one-third are within Toronto. The Lakeshore East and West corridors provide peak, midday, evening, and weekend service. In the off-peak periods, service is every 30 minutes in both directions and in the peak, it is more frequent. On the Milton, Kitchener, Barrie, Richmond Hill, and Stouffville corridors, service runs only in the peak periods, in the peak direction and ranges from every 12 to 30 minutes.

GO Rail currently has 197,000 average weekday boardings, 12% of which are from within the City of Toronto. 91% of passengers ride to and from Union Station making GO rail service a key enabler of employment growth in Toronto's downtown. Historically, ridership growth has been around 3% per year.

3. GO RER AND THE CITY OF TORONTO

3.2. GO RER Will Serve Toronto Passengers

It is projected that City of Toronto residents will benefit substantially from the improved travel choice and expanded capacity afforded by the introduction of improved GO service. Peak trips will increase in frequency, making commutes to downtown Toronto easier and more convenient. Residents will also see 15 minute midday, evening and weekend service on the Stouffville, Kitchener, Barrie, and Lakeshore East and West corridors, enabling flexible travel that will serve students and people with non-traditional work schedules, and people taking trips for a diversity of purposes from shopping to visiting friends or family, to cultural events. GO RER will also enable people from the surrounding region to more easily visit Toronto. Electrification will reduce noise impacts along rail corridors, and will also enable faster trips.

Figure 6. GO Corridors in Toronto



GO RER service will enhance and benefit from the growth of the TTC, feeding more riders to and from local buses, LRTs and subways as more people choose to combine them for more trips. The GTHA Fare Integration Strategy, currently under development and discussed below, will facilitate transfer between services. The 19 GO stations within the City of Toronto, for example, could see significantly more use given increased service and better integration with TTC. This mutual growth would make projects that are currently underway as part of the Regional Transportation Plan even more useful for people, including the Eglinton Crosstown LRT.

3.3. GO RER Infrastructure in the City of Toronto

The GO RER program entails substantial investment in rail infrastructure within the City of Toronto, building upon already existing infrastructure including tracks, grade separations, and other components. A number of Environmental Assessments (EA) are planned or in progress and additional EAs will be identified as the work progresses. In addition, Metrolinx will be conducting ongoing consultation with the City of Toronto, stakeholders and the public on construction impacts. The following table provides an overview of existing GO rail

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infrastructure within Toronto and also infrastructure expansion and improvement planned as part of GO RER.

Table 1: Existing and Planned GO RER Infrastructure by Corridor

Corridor	Current Infrastructure	Planned Infrastructure
Lakeshore East	<ul style="list-style-type: none"> 3 tracks from the Union Station Rail Corridor to Guildwood 	<ul style="list-style-type: none"> Corridor expansion between Guildwood and Pickering GO stations: Environmental Assessment (EA) is ongoing with community and provincial government engagement commenced in September 2015 and approval anticipated in Summer 2016 Corridor expansion between Union and Scarborough GO stations: EA will commence in Fall 2015 with approval anticipated in Summer 2017 Highland Creek and Rouge River bridge widening designs underway Property impacts and requirements for the grade separations at Morningside Avenue, Scarborough Golf Club Road and Galloway Road have been identified. Community engagement and realty negotiations are commencing in September 2015
Stouffville	<ul style="list-style-type: none"> Single track from Scarborough Junction to Lincolnville. 	<ul style="list-style-type: none"> EA approved for 2nd track from Scarborough Junction to Unionville GO station. Double track (5 km) between Agincourt and Milliken GO Stations: <ul style="list-style-type: none"> Mobilization and preparatory work has started and construction planned to complete Fall 2016; includes noise walls and preparation for future electrification Community relations consultation with affected residents in progress EA and design assignment for southern grade separations (up to 6) underway GO station modifications at Agincourt, Milliken, and Unionville: Design at 10% for new 2nd track, new and modified rail platforms with elevators, tunnels, canopies, and customer service amenities
Kitchener	<ul style="list-style-type: none"> Single track from the Union Station Rail corridor to Etobicoke North Passing track at Malton Station Georgetown South project nearing completion 	<ul style="list-style-type: none"> EA approved for 4th track required for GO RER. Design of the Highway 401 structure and Etobicoke North GO Station underway with construction expected to commence in 2017 Remaining Georgetown South works include minor road work, completion of the John Street (Weston) pedestrian bridge, Bloor, Weston and Etobicoke North station improvements

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Corridor	Current Infrastructure	Planned Infrastructure
	<ul style="list-style-type: none"> Rail to rail grade separation at West Toronto with the CP North Toronto Subdivision Rail to road grade separation at the Hwy 401 crossing 	
Barrie	<ul style="list-style-type: none"> Single track Davenport Diamond at junction with CP North Toronto Subdivision Passing track at York University 	<ul style="list-style-type: none"> EA for double tracking underway New Caledonia GO station (intersecting with the Eglinton Crosstown) EA and design is underway with the first public meeting scheduled in November 2015. Davenport Grade Separation - Residents Panel recommendations are being reviewed
Lakeshore West	<ul style="list-style-type: none"> 4 tracks from the Union Station Rail Corridor to Long Branch Station Willowbrook Maintenance Facility located just beyond Mimico Station 	<ul style="list-style-type: none"> Exhibition GO station improvements
Richmond Hill	<ul style="list-style-type: none"> Single track from the Union Station Rail Corridor to the Doncaster Diamond Rail to rail grade separations at the crossing with the CP Belleville Subdivision 	<ul style="list-style-type: none"> Gormley Station under construction Bloomington Station design underway
Milton	<ul style="list-style-type: none"> 2 tracks from Bloor Station to Milton with several additional passing tracks 	<ul style="list-style-type: none"> Kipling GO station – New bus terminal and station improvements design underway
Union Station and the Union Station Rail Corridor	<ul style="list-style-type: none"> There are currently 14 tracks at Union Station, 8 of which are used by GO service, 4 of which are used by VIA, and 2 of which are under construction. York Concourse opened in June 2015 Glass atrium complete 	<ul style="list-style-type: none"> Downtown Bus Terminal: Excavation is expected to start in Spring 2016. Union Station: Bay Concourse construction is underway.

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Corridor	Current Infrastructure	Planned Infrastructure
Network Signals		<ul style="list-style-type: none"> • Preliminary Design for the USRC Signaling System is scheduled to be completed in the Fall 2015. • Enhanced Train Control (ETC) Strategy under development • Work has commenced with Electrification consultant to identify the scope to ready the signaling infrastructure for electrification.
Electrification	<ul style="list-style-type: none"> • Grounding and Bonding incorporated into a number of station redevelopment projects in anticipation of electrification 	<ul style="list-style-type: none"> • Electrification EA for the UP Express corridor is complete. • System wide Electrification EA is in progress with targeted completion of December 2016. • Technical evaluation & agreement is underway with Hydro One for power requirements. • Enabling Works for electrification infrastructure is being evaluated and coordinated with corridor teams.

4. GO RER LAYS THE FOUNDATION FOR SMARTTRACK

The GO RER program provides the foundation for the SmartTrack concept. For example, the GO RER service concept of 15 minutes or better frequencies on the Kitchener and Stouffville corridors (from Bramalea and Unionville, respectively) are consistent with SmartTrack objectives. In other areas, such as new stations and the western heavy rail segment, the SmartTrack proposal may not be compatible with the GO RER service concept.

Many of the components planned for GO RER (listed in the Table 1) could provide a foundation for the SmartTrack concept. In particular, corridor upgrades along the Stouffville, Lakeshore East, and Kitchener corridors which enable the frequent two-way, all-day service that is a cornerstone of both GO RER and SmartTrack are critical (see Figures 7 to 10). Other SmartTrack components that are included in GO RER include new fleet, system elements like new signals, and electrification, and are discussed in more detail in Table 2. There are other aspects of the SmartTrack proposal that may not be compatible with GO RER aims; some of those challenges are discussed in Section 4.2.

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Table 2: SmartTrack Components Included in GO RER Program

SmartTrack Components included in GO RER	
Alignment	Upgrades to the entire Stouffville and Lakeshore East corridors and to the Kitchener corridor to Bramalea as well as track and platform upgrades to the Union Station Rail Corridor
Infrastructure	<ul style="list-style-type: none"> • Additional track to support bidirectional service • Grade separations to support increased frequency • Station upgrades • Railway bridges • Signals • Retaining walls • Utilities • Grading • Environmental mitigation measures (noise walls and vibration mitigation) • Catenary system for electrification • Electrification substations
Service Frequency	15 minute or better frequencies between Unionville and Union Station and Bramalea and Union Station (see Figures 7 to 10 for GO RER preliminary service concepts on SmartTrack corridors).
Service Span	Two-way, all-day service including peak, midday, evening and counter-peak
Service Pattern	The GO RER Base Case assumes that all branch line trains terminate at Union Station. Ongoing work is exploring the possibility of running through service on the Kitchener and Stouffville corridors
Electrification	Electrification of the entire Stouffville corridor, the Kitchener corridor to Bramalea and the Union Station Rail Corridor
Fleet	New vehicles
Fares	The GO RER Base Case assumes the existing fare structure. Metrolinx is undertaking a comprehensive fare integration analysis which includes integration with local fare options.
Stations	Stouffville: Unionville, Milliken, Agincourt, Kennedy, Danforth Kitchener: Bloor, Weston, Mt. Dennis (planned) Union Station

Figure 7: Kitchener GO RER Service: Weekday Peak Period

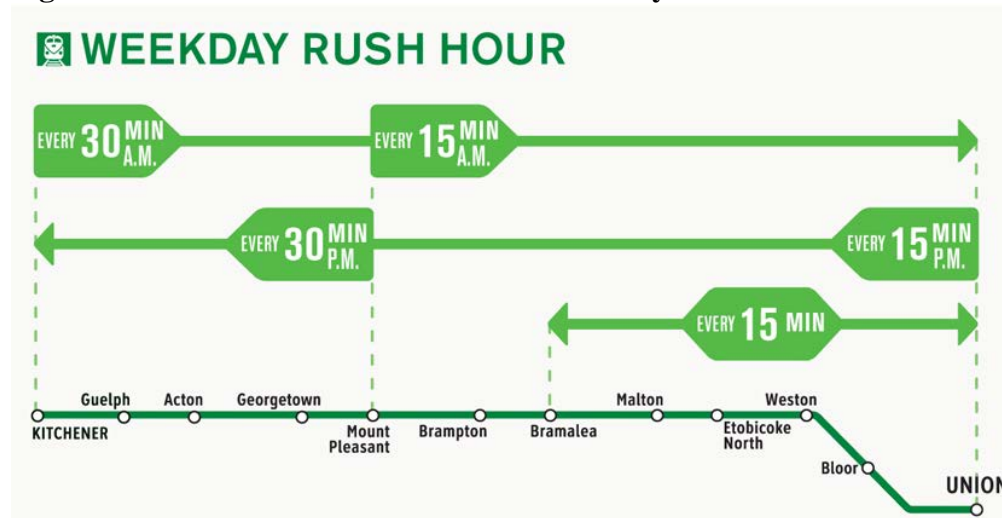


Figure 8 Kitchener GO Corridor Service: Off Peak

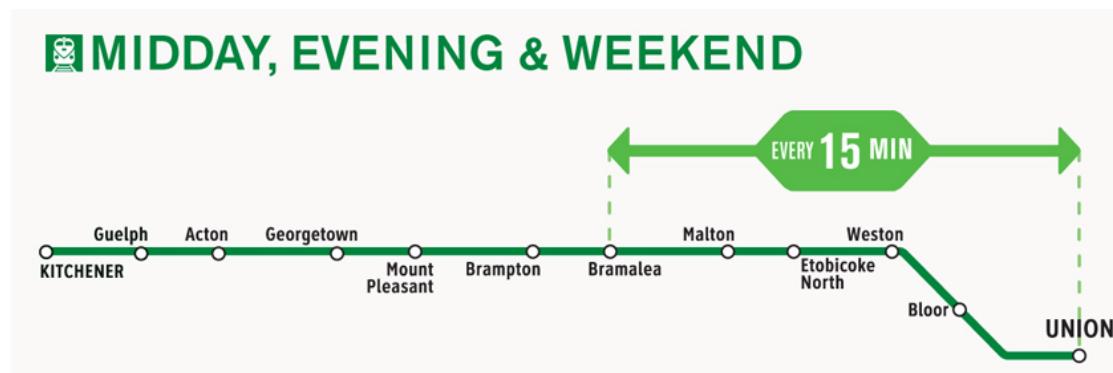


Figure 9. Stouffville GO Corridor Service: Weekday Peak Hour

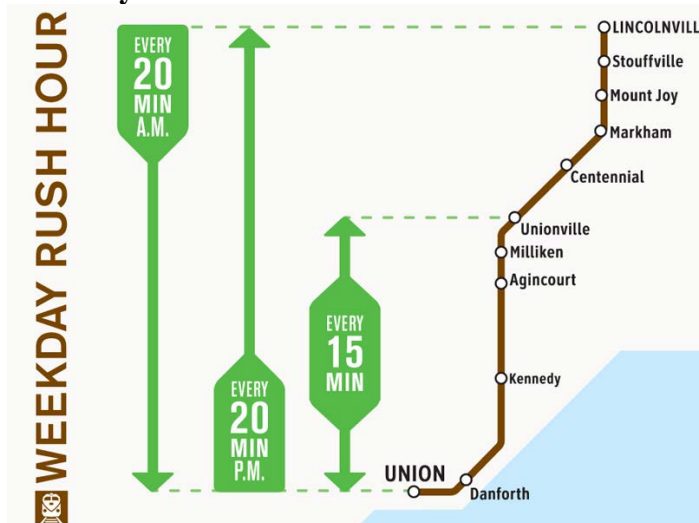
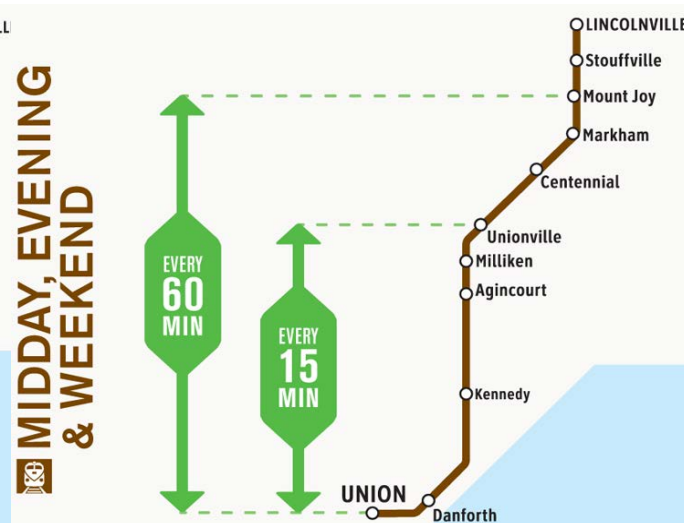


Figure 10. Stouffville GO Corridor Service: Off Peak



4.1 Other Metrolinx Initiatives will also Support GO RER and SmartTrack

Beyond the SmartTrack elements that are already planned within GO RER, there are opportunities for enhancement of the GO RER program, which would further support SmartTrack.

4.1.1. GTHA Fare Integration

One such opportunity is GTHA fare integration, a key component of the regional transportation plan, *The Big Move*, which would move the region closer to operating as one seamless transit network. Metrolinx is currently leading work to define potential fare structures and assess their applicability. The vision of the GTHA Fare Integration Strategy is to increase customer mobility and transit ridership while maintaining the financial sustainability of GTHA's transit services. This strategy will remove barriers and enable transit to be perceived and experienced as one network composed of multiple systems/service providers.

The TTC and other transit operators have been working closely with Metrolinx on a technical advisory committee to advance this work. As the study progresses, Metrolinx will be working more closely with TTC and City staff on the applicability of the fare structures to Toronto. This work will consider fare structures to accommodate future transit network developments, such as SmartTrack. A recommended fare structure will be presented to the Metrolinx Board in February 2016 laying the groundwork for a multi-phase approach to fare integration in the region.

4.1.2. New Stations

Metrolinx is currently reviewing potential new station locations across the GTHA. New stations need to balance service frequency, expansion, and cost. They can:

- Expand service area, schedule and destinations
- Attract new customers
- Improve access for customers
- Improve integration with other transportation modes
- Be a potential catalyst for development
- Increase travel time on corridor
- Cause delay to, and contribute to the potential loss of upstream riders
- Increase capital costs
- Increase operating, maintenance and energy costs
- Facilitate urban sprawl in remote locations

Municipal engagement on methodology and information gathering is ongoing throughout the GTHA, including in Toronto. As well, public engagement on new station locations is planned for fall 2015. As they were not included in the Initial Business Case, new stations are also subject to additional funding.

Because new stations lengthen travel time for existing, longer distance passengers, incorporating a large number of new stations may pose a challenge to maintaining the service frequency and

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overall trip time objectives. While there are possible infrastructure options to address this issue, more work is required to determine if this direction is feasible. All eleven new SmartTrack stations are included in Metrolinx's new stations analysis.

4.2. Advancing the SmartTrack Proposal

In addition to the opportunities presented above, SmartTrack presents challenges as well.

4.2.1. Union Station Capacity

Metrolinx is currently undertaking a comprehensive study of Union Station to ensure that sufficient capacity exists on the tracks, on the platforms, and also on the approach tracks throughout the Union Station Rail Corridor, to accommodate the planned GO RER service levels to 2031. Adding service beyond what is already planned for GO RER will be challenging within Union Station.

4.2.2. Track Capacity

On the Kitchener corridor, the GO RER service concept calls for diesel and electrified GO service with express and local stops; VIA and UP Express trips add further pressure to corridor capacity. Running continuous service from Eglinton through to the Kitchener corridor, as proposed in the SmartTrack service concept, would put pressure on track capacity because it introduces a different type of service with a different speed and stopping pattern into an already complex environment. On the Stouffville corridor, the current GO RER service concept calls for seven trains in the peak hour, including three trains from Lincolnville and an additional four trains from Unionville.

Adding service beyond what is planned for GO RER may require additional tracks on the Kitchener and Stouffville corridors.

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