Report for Action

Managing Crowding on Line 1 Yonge-University

Date: January 18, 2018
To: TTC Board
From: Chief Operating Officer

Summary

This report is in response to a TTC Board motion to investigate opportunities to alleviate crowding on Line 1 Yonge-University, specifically the south Yonge portion of the line, as well as the over-burdened parts of Line 2 Bloor-Danforth from Coxwell Station to St. George Station. This report will address opportunities to improve crowding on Line 1, and address concerns of crowding levels on Line 2.

Line 1, from Finch to Union Station is the busiest section of any transit line on the TTC network, carrying 450,000 customer trips per day. Ridership on this portion of the line has grown consistently over the last 15 years and exceeds scheduled capacity south of Bloor Station during the morning rush hour. In addition to the segment downtown, the section south of Eglinton Station is increasingly busy and is approaching capacity as well. Some growth in passenger demand has been accommodated outside of the traditional rush hours, but this has resulted in trains being full for longer periods of time, presenting more challenges to deliver quality service.

The TTC has introduced operational efficiencies to help manage the crowding along Line 1. Staff has been working on immediate and long-term strategies and solutions to help alleviate pressure from the line.

Recommendations

It is recommended that the TTC Board:

1. Receive this report for information;

2. Direct staff to report back on service performance and capacity improvements on the south Yonge portion of Line 1 in Q2 2018.

Financial Summary

There are no financial implications beyond what is approved in the existing operating budget resulting from this report. Each of the short, medium and long term strategies and/or solutions referenced in this report have financial implications, and financial impacts arising from recommended service performance and capacity improvements on the south Yonge portion of Line 1 will be included in the Q2 2018 report.

The Chief Financial Officer has reviewed this report and agrees with the financial impact information.

Equity/Accessibility Matters

The TTC has made significant progress in moving towards providing barrier-free, accessible transit services to all customers. All TTC subway trains are accessible and the TTC's Easier Access Program will make all existing subway stations fully accessible by 2025.

Crowding during the morning and afternoon rush hours can present barriers for customers using mobility devices and families using strollers. It can also be a deterrent for customers, such as seniors and customers with other physical, cognitive and sensory abilities, to use Line 1 to complete their trips. Reduced crowding will make Line 1 more attractive to all potential customers. It will also support the objectives of the Wheel-Trans' Family of Services, the City's Poverty Reduction Strategy and the Seniors Strategy, of making conventional transit more accessible and attractive to everyone as a means of improving access to employment, educational and cultural opportunities.

Decision History

At its June 15, 2017 TTC Board meeting, the Board passed a motion moved by Commissioner Mihevc which was amended by Commissioner Fragedakis and was carried as amended to: Request staff to report on strategies to alleviate pressure on Line 1, and the over-burdened parts of Line 2 from Coxwell Station to St. George, and Yonge-Bloor Station itself, while the Downtown Relief Line is being planned and built.

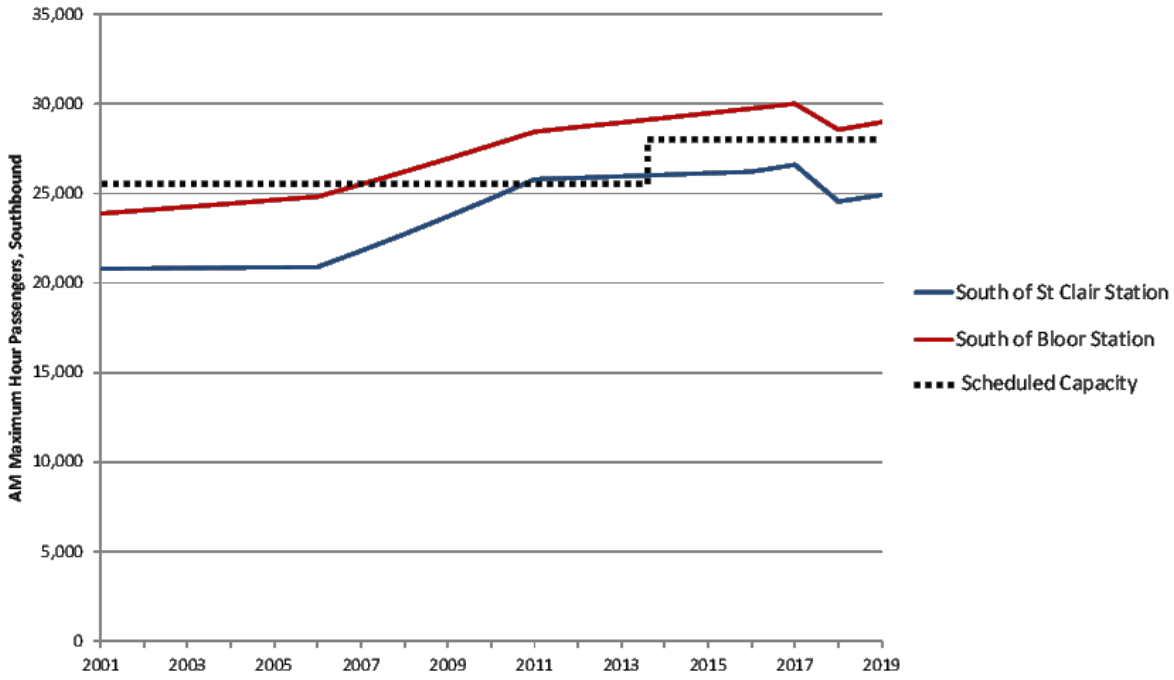
http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2017/June_15/Reports/20_New_Business_Strategies_to_Alleviate_Ridership_Pressure_o.pdf

Issue Background

Growth on the Yonge Corridor and the Yonge Subway

After stagnating ridership during the 1990s, morning rush hour ridership on Line 1 has reached historical maximums of 28,000 to 30,000 passengers per hour southbound from Bloor Station. Since 2001, approximately 50,000 additional residents have moved within a 10 minute walk of Yonge subway stations north of Bloor Street, representing nearly 60% growth over the last 15 years, compared to city-wide population growth of about 10% during the same period. Over the same period, employment in the downtown core has grown by almost 40%, compared to city-wide employment growth of 15%. The additional population density and employment opportunities in the downtown core have contributed to more riders on Line 1, particularly during the morning rush hour.

Figure 1: Passenger Demand on Line 1 – Yonge Subway during Morning Rush Hour



Scheduled capacity increased in 2014 with the introduction of Toronto Rocket trains, which, due to the open-gangway design, have 10% more capacity vs. T1 trains.

Customers have adapted to the morning rush hour crowding conditions by changing their commute times earlier or later in the morning. Whereas morning peak hour ridership on Line 1 southbound from Bloor Station has increased by about 10% since 2001, the three-hour morning peak period ridership has increased by nearly 20%. In other words, much of the growth in demand generated along the Yonge corridor has been accommodated on the shoulders of the peak hour and the “peak within the AM peak period” has spread.

Figure 2 illustrates the evolving demand profile along the Yonge subway between 2001 and 2016 relative to the scheduled capacity provided along the line during the morning rush hour. Prior to 2006, the only section of Line 1 that was close to capacity was the section between Bloor Station and College Station. Between 2006 and 2011, this condition has extended northerly towards Eglinton Station, and then the 2016 column shows some improvement, as full roll-out of the Toronto Rocket fleet in 2014 provided a 10% improvement in capacity. Despite that improvement, Bloor Station to College Station remains at or above capacity.

Figure 2: Yonge Subway Demand vs Scheduled Capacity – Morning Rush Hour

	2001	2006	2011	2016
Finch	G	G	G	G
North York Centre	G	G	G	G
Sheppard-Yonge	G	G	G	G
York Mills	G	G	G	G
Lawrence	G	G	Y	G
Eglinton	G	G	Y	Y
Davisville	G	G	Y	Y
St Clair	G	G	R	Y
Summerhill	G	G	R	Y
Rosedale	G	G	R	Y
Bloor-Yonge	Y	R	R	R
Wellesley	Y	R	R	R
College	Y	Y	R	R
Dundas	G	G	G	G
Queen	G	G	G	G
King	G	G	G	G

G	Less than 85% full: Sufficient capacity to serve demand
Y	Between 85% and 100% full: Approaching capacity, crowded vehicles that slow down service and may not accommodate localized surges in demand
R	100% full: Capacity exceeded, trains bypass waiting passengers frequently

Improvements to Service

Ridership statistics reveal that sections of Line 1 are near or exceeding capacity for a 90 minute period during the morning rush hour. There are a number of initiatives the TTC has/or is in the process of implementing to manage the crowding and relieve capacity, which include the purchase of the Toronto Rocket trains, operational efficiencies, ATC, opening of TYSSE, work on the Relief Line, Smart Track and a capacity study of Bloor-Yonge Station.

Toronto Rocket Trains

The full roll-out of the open-gangway Toronto Rocket subway cars (see **Figure 3**) was completed in 2014 and this provided 10% additional scheduled capacity (over T-1 trains) without increasing the number of trains on the line.

Figure 3: Open-gangway Toronto Rocket train

Operational Efficiencies

In addition to the full fleet roll-out of the Toronto Rocket trains, the TTC was able to implement a number of service improvements along Line 1 in the past three years, as outlined below.

Implementation Date	Improvement	Annual Cost Implications
October 2014	The schedule was adjusted and additional run time was added which required two additional trains during the morning peak. Double step-backs, which allow the train to leave promptly while the crew is provided a few minutes at the terminal, were introduced at Finch and Sheppard West Stations in the peak periods to improve train turnaround time and service reliability. This ensures that a crew is always readily available when a train is scheduled to depart.	$1.0M in operating costs

Implementation Date	Improvement	Annual Cost Implications
March 2015	The schedule was adjusted again, and additional run time was added during most operating periods. Two of the four trains that were used as 'gap' or 'run as directed' trains were incorporated into the regular schedule to improve service along the entire line.	$2.2M in operating costs
March 2016	Additional run time was added during the midday and early evening operating periods Monday to Friday.	$1.6M in operating costs
September 2016	The schedule was adjusted again, and additional run time was added in the morning peak. Two additional trains were put into operation, which was partially offset by removing one of the two remaining 'gap' or 'run as directed' trains and placing them into regular service. During the morning peak, the scheduled turn-back on Line 1 was changed from St Clair West Station to Glencairn Station. This increased service for customers between the two stations and better distributed passenger loads southbound approaching St George Station.	$1.8M in operating costs
November 2017	The schedule was adjusted, and two additional trains were put into operation, which was partially offset by removing the last 'gap' or 'run as directed' train and placing it into regular service.	$3.2M in operating costs

Long-Term Strategies

Benefits Realization of AutomaticTrain Control

The main constraint on capacity is train throughput, which is controlled by an aging signalling system. In 2009, the TTC began replacing Line 1's aging signal infrastructure as it was due for replacement after more than 50 years in service. The new state-of-the-art signal system will use ATC, which means that train speed and train separation will be controlled automatically.

When ATC is fully implemented along the entire line in late 2019, the signalling system will deliver an improvement in scheduled capacity, as we can then run more trains on the line, closer and safely. There are constraints to capacity, including fleet size, traction power supply and emergency tunnel ventilation capability. Each are in the process of being assessed.

In 2020, it is planned that the scheduled service interval on Line 1 will be improved from its current 2 minutes and 21 seconds to 2 minutes which will provide an additional hourly capacity of about 33,000 passengers per hour.

Changes to Crowding Post-Opening of TYSSE

The opening of the Line 1 extension to Vaughan at the end of 2017 is expected to divert up to 5% of Yonge subway riders to the University side of Line 1. This estimate is based on the TTC's ridership forecasting, using inputs and parameters provided by City Planning, for the Line 1 extension. Existing travel demands were re-allocated to the TTC network with the extension and associated surface network changes. Trips starting in York Region or in the northwest part of Toronto make up most of the diversion.

The TTC will monitor the impacts to crowding on both sides of the line through 2018.

Bloor-Yonge Capacity Study

Staff are reviewing design options to help manage crowding at Bloor-Yonge.

Line 2 Bloor-Danforth Line

Figure 5 below illustrates the demand profile along Line 2 Bloor-Danforth relative to the scheduled capacity provided along the line during the morning rush hour from 2001 to 2016.

In the eastbound direction, rush hour demand greatly increased between 2001 and 2006 and has since stabilized. Approximately 22,500 passengers travel eastbound into St George Station in the morning rush hour. The section between Ossington and St George Stations are approaching capacity.

In the westbound direction, peak hour ridership also increased significantly between 2001 and 2006 and stabilized by 2016, with the section between Broadview and Yonge Stations approaching capacity. Morning rush hour demand westbound into Yonge Station is about 22,200 per hour. There are currently no sections of Line 2 where demand exceeds scheduled capacity.

In October 2014, two peak trains were added to increase capacity and service resilience on the line, and the results of this change were very favourable.

Figure 5: Line 2 Subway Demand vs Scheduled Capacity – Morning Rush Hour, Inbound

Eastbound	2001	2006	2011	2016
Kipling	G	G	G	G
Islington	G	G	G	G
Royal York	G	G	G	G
Old Mill	G	G	G	G
Jane	G	G	G	G
Runnymede	G	G	G	G
High Park	G	G	G	G
Keele	G	G	G	G
Dundas West	G	G	G	G
Lansdowne	G	G	G	G
Dufferin	G	G	G	G
Eastbound	2001	2006	2011	2016
Ossington	G	Y	Y	Y
Christie	G	Y	Y	Y
Bathurst	G	Y	Y	Y
Spadina	G	Y	Y	Y
St George	G	G	G	G

Westbound	2001	2006	2011	2016
Kennedy	G	G	G	G
Warden	G	G	G	G
Victoria Park	G	G	G	G
Main Street	G	G	G	G
Woodbine	G	G	G	G
Coxwell	G	G	G	G
Greenwood	G	G	G	G
Donlands	G	G	G	G
Pape	G	G	G	G
Chester	G	G	G	G
Broadview	G	Y	Y	Y
Castle Frank	G	Y	Y	Y
Sherbourne	G	Y	Y	Y
Yonge	G	G	G	G

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Immediate-Term Strategies – Line 1

Staff will be proceeding with the following opportunities to improve the crowding situation on Line 1 in the immediate-term:

Customer Awareness Campaign

In 2015, the TTC ran a successful customer awareness campaign that reduced the incidents of emergency alarms, and the resultant delays to service**.** False alarms on Line 1 (accounting for approximately 80% of all false alarms in the subway) were reduced by 33% in the six months following the launch of the campaign compared to the six months leading up to it.

Improved Station Management

The TTC has trained personnel in many stations and contracted Toronto EMS paramedics located at Eglinton, Bloor-Yonge and St Patrick Stations during the morning peaks and at Bloor-Yonge during the afternoon peak to quickly deal with emergency alarms. Paramedics are located at these stations because they represent where the most emergency alarm incidents occur during those time periods.

Additional passenger information displays and enhanced wayfinding will be implemented to encourage customers to use the entire length of station platforms which will help reduce passenger service times at stations. Enhancements to customer information and wayfinding will not divert customers away from Line 1, however it may allow customers to more efficiently use the capacity provided, and may provide some improvement to train dwell times.

Reinstate Use of Gap or Run-as-Directed Trains

Gap trains are empty trains that are introduced into service from time to time when there is a disruption to service. These trains can alleviate overcrowding conditions on the southbound platform at Bloor-Yonge, especially during delay incidents on the north Yonge portion of the line.

Medium-Long Term Strategy – Line 1

Other options have been investigated, but these options are not reasonable options in the immediate term. The options are either not feasible because of operational challenges or require additional study and financial investment:

1. Fare Strategies (Medium-Long term)

   Differential pricing to encourage demand away from the peak hours has been approved by the TTC Board, and a policy needs to be developed. With PRESTO at every station, and soon at every entrance of every station, this strategy is plausible. Some fare policies may also reduce demands during the critical time periods and are recommended for further study.

2. Short-Turning Trains on North Yonge (Not Recommended)

   Ridership data at stations north of Lawrence Station indicate that implementing this option would result in overcrowding on the trains and platforms north of Lawrence Station. In addition, many customers would have to wait longer for a southbound train at stations south of Lawrence as we would be doubling the potential wait time for southbound customers north of Lawrence. Equally important is the additional time required to short-turn a train during peak periods, which would negatively impact service levels northbound on Line 1, slowing service on the portion of the line we are trying to improve.

3. Adding buses on Yonge Street (Not Recommended)

   To be truly effective, dedicated lanes along Yonge Street and a much larger fleet of articulated buses would be required. Unfortunately, this is still an unattractive option as the trip times would be considerably longer than we can achieve on the subway already.

In conclusion, staff will initiate the immediate term strategies as noted, including the Emergency Alarm Customer Awareness Campaign, Improved Station Management, and Reinstating Run-as-Directed Trains, and continue to assess the medium-to-long term strategies noted. Staff will then report back to the Board on the effectiveness of these initiatives in Q2 2018.

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Signature

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