

TORONTO TRANSIT COMMISSION REPORT NO. 31

MEETING DATE: June 20, 2001

SUBJECT: EXPANDING TRANSIT PRIORITIES IN TORONTO

RECOMMENDATIONS

It is recommended that the Commission:

1. Receive this report for information, noting that:
 - TTC staff are working with staff of Toronto Transportation Services and City Planning to identify priority measures which can be implemented in the near term to provide faster, more reliable service on busy routes so that they will be more competitive with the private auto;
 - the priority measures under review fall into four categories:
 - More Aggressive, Widespread Restrictions on Stopping and Turning – the central area streetcar routes would be designated as “Red Routes”, where congestion-related delays would be reduced by increasing the duration of the peak-periods. During these periods, vehicles would be strictly prohibited from stopping in the curb lanes and from making left turns from the streetcar tracks, and fines would be dramatically increased for motorists who do not comply with the turning or stopping restrictions;
 - Signal Priority - continued implementation of signal priority on transit routes with frequent service in order to reduce delays at traffic signals and, thereby, increase travel speeds for customers and reduce operating costs;
 - Physically-Separated Transit Lanes – reserved transit lanes are required on several high-frequency surface routes and, to work effectively, they must be physically separated from other traffic. Initial concepts focus on greater physical separation for the streetcars on King Street and St. Clair Avenue, and on a busway on Yonge Street, north of Finch Subway Station;
 - Transit Priority Applications for New, Innovative Service Concepts – examples are i) “Rapid Bus” services, with widely-spaced stops, aggressive signal priority, and significantly-higher speeds than typical bus routes; and ii) high-speed inter-regional bus services accomplished by establishing a physically-separated busway and using signal priority in corridors such as Yonge Street, north of Finch subway station, and Dufferin Street/Allen Road north of Downsview Station;
 - staff will bring forward more detailed design and implementation plans on these

concepts as they become finalized; and

2. Forward this report to Toronto Transportation Services and City Planning.

FUNDING

This report has no impact on the TTC's operating or capital budgets.

BACKGROUND

The Commission, has made a number of requests for staff to report on transit priority measures which could improve the speed, regularity, and efficiency of transit service in Toronto. These requests are summarized below:

<u>Commission Meeting Date</u>	<u>Report Subject</u>	<u>Requested Action</u>
• March 8, 2000	Operational Improvements on 504 KING Streetcar	Staff to report on the operational disruptions being experienced on Dundas Street West (and warranted actions).
• December 13, 2000	2001-2005 Capital Program and 10 Year Forecast	Staff to report back, in consultation with the relevant City of Toronto Transportation Officials, on transit priority measures that the TTC and the City could undertake to improve transit priority on key routes.
• February 16, 2001	2001 TTC Operating Budget	Staff to report to the Commission regarding significant transit priority measures for the surface system, in particular streetcars.
• February 27, 2001	Correspondence from Commissioner Moscoe Re: Exclusive Streetcar Service	Staff to report on the feasibility of establishing an exclusive streetcar lane, 24 hours per day, on Queen Street from Simcoe to Victoria.
• April 11, 2001	Procurement Authorization for 2001 Signal Priority Program	Staff to report back to the TTC's Budget Sub-Committee of the status and future plans for signal priority.
• April 11, 2000	504 King Street Route: Results of Police Enforcement Blitz and Next Steps.	Staff to report back to the Commission on future strategies to improve streetcar service on King Street.

This report responds to these requests, and describes a variety of measures being developed

by TTC and City staff to provide greater priority to transit service in Toronto.

DISCUSSION

TTC staff are working with staff of Transportation Services and City Planning to identify priority measures which can be implemented in the near-term to provide faster, more reliable and more efficient transit services and, ultimately, make them more competitive with the car. This report describes the status of this work.

Experience to Date: What Works, What Doesn't

Transit priority measures currently in place in Toronto generally fall into one of three categories, which have been found to have differing levels of effectiveness:

- 1) **Legislative measures such as left-turn prohibitions for general traffic:** these are generally ineffective because of the high number of motorists who disregard them;
- 2) **Signal priority, which gives transit vehicles a green light when they need it:** this is in place at over 200 intersections. It is effective in significantly reducing transit delay caused by red traffic signals; and
- 3) **Reserved lanes/dedicated rights-of-way for transit:** there are roughly 100 kilometres of "traffic" lanes reserved for transit vehicles, in one of two forms: (a) Part-time reserved lanes - for buses alone, or for all vehicles with at least three occupants. These are, in many cases, ineffective because of the high number of motorists who use the lanes illegally; and (b) dedicated rights-of-way, which are physically separated from other traffic, for example, the median right-of-way for streetcars on Queens Quay West or on Spadina Avenue. These are fully effective in protecting transit from the effects of traffic congestion and, thus, achieving faster and more efficient service.

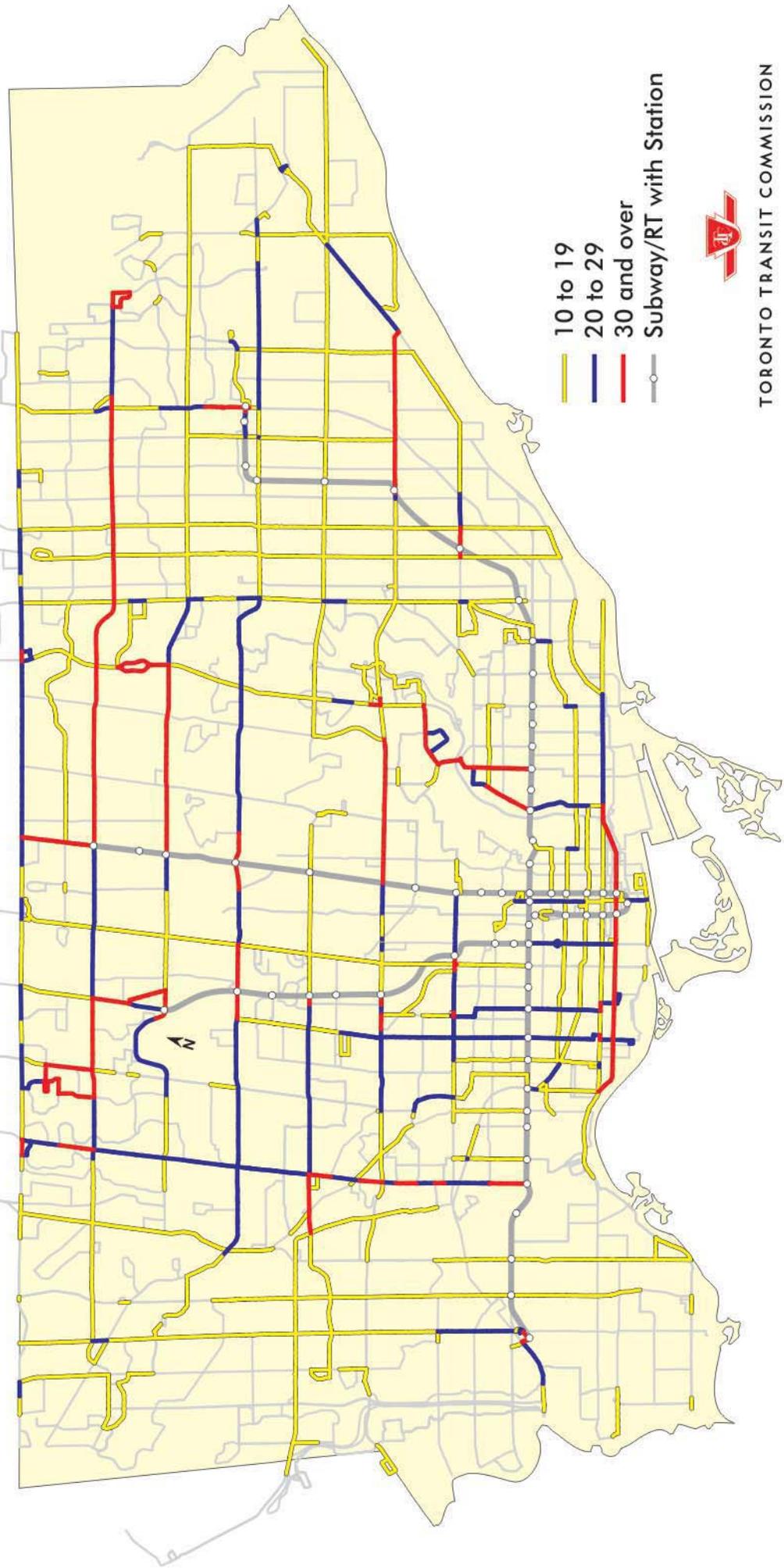
A Plan for Expanding and Improving Transit Priority in Toronto

TTC staff have reviewed operations throughout the surface system to identify those areas where transit priority measures would provide the greatest benefit in terms of the speed, reliability and efficiency of surface transit. Staff focused on those routes with the highest customer volumes, most-frequent service, and those which are subject to the greatest levels of delay and service disruption due to persistent traffic congestion.

Exhibit 1 shows those road sections with the most-frequent transit service. Exhibit 2, while not exhaustive, highlights "hot spots" where peak-period traffic congestion is severe and persistent and where transit operations, as a result, are subject to slow, stop-and-go, conditions almost every weekday.

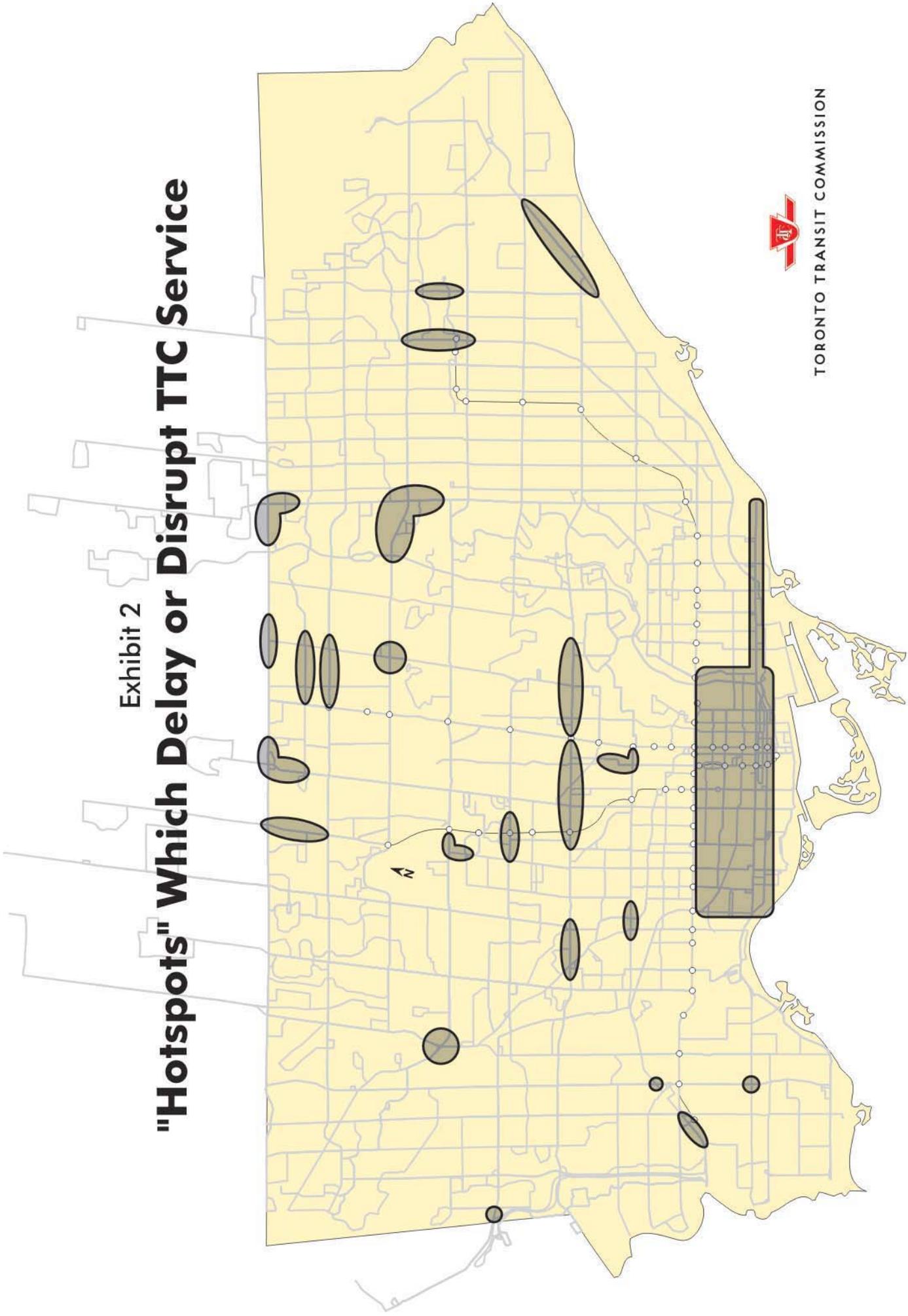
This information helped determine where to focus attention, and which transit priority measures should be considered.

Exhibit 1
Buses/Streetcars per Hour
Morning Peak Period



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Exhibit 2 "Hotspots" Which Delay or Disrupt TTC Service



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A. "Red Routes": Strict Peak-Period Turning and Stopping Restrictions to Reduce Delays due to Traffic Congestion

As indicated in Exhibit 2, slow and congested traffic conditions plague streetcar operations in the central area and sections of a variety of bus routes throughout the city. "Red Routes" are a concept intended to improve peak-period traffic and transit operations on busy, congested traffic streets by implementing widespread peak-period stopping and left-turning restrictions, so that all traffic, including transit vehicles, flow faster and more smoothly. For this measure to be effective, two issues must be resolved:

i) Peak periods must cover more hours:

While congested traffic conditions are typically associated with the posted peak periods, transit service is often subject to the most-severe congestion just after the morning rush hours, and prior to, and just after, the afternoon rush hours. For example, on King Street, the posted PM peak period does not begin until 4:00 p.m. However, between 3:00 p.m. and 4:00 p.m., traffic and transit, whose volumes are substantial, can use only one lane because parking and stopping is permitted in the curb lane. Vehicles waiting to make a left turn, from this single lane, can grind everything else to a halt. These conditions typically result in a significant deterioration in the quality of service on the streetcar line well before the formal peak-period begins. Similarly, traffic and transit volumes continue to be high well after 6:00 p.m. when the peak period restrictions end. At that time, on-street parking is again allowed, traffic is again reduced to a single lane, and movement slows dramatically. There are many areas where bus operations, as well, are subject to this same problem; for example, on Eglinton Avenue West between Bathurst Street and Keele Street.

ii) Legislative measures must be effective:

If legislative measures, such as turning and stopping restrictions, are to be effective, the high violation rate by Toronto drivers must be addressed. TTC staff believe that the number of police dedicated to enforcement of traffic regulations is so limited that the chances of a motorist being caught, making a prohibited turn, for example, are extremely low. At the same time, the fine for being caught is far too affordable. To ensure motorist compliance, legislative measures must be supported by effective deterrents.

In light of the above, TTC staff have been working on a proposal to have high priority corridors, or "Red Routes", established, initially on congested roadways which have streetcar service, to reduce peak-period congestion and the associated delays to streetcar operations. Specifically, the following measures are proposed for roads which would be "Red Routes":

- expanded hours of coverage for peak-periods, to better reflect current traffic and transit conditions
- prohibition of all left turns during peak-periods
- prohibition of all stopping, on both sides of the street, during peak-periods

- significantly-increased fines for motorists who do not comply with the parking, stopping, or turning restrictions on these roadways
- continual and strict police enforcement on these routes.

The initial focus for “Red Routes” would be streetcar routes in the central area, starting with those sections where passenger volumes and traffic congestion are the greatest: south of Bloor Street, between Dufferin Street and Parliament Street, and on St. Clair Avenue, from Avenue Road to Yonge Street (see Exhibit 3). Detailed recommendations are being developed for a section of Dundas Street, which would be used as a demonstration project. Pending finalization of this work, TTC staff have begun addressing the delay problem on these route sections by requesting that left turns to all new developments from streetcar tracks be prohibited as part of the conditions of development approvals.

TTC staff are reviewing the feasibility of a further expansion of the “Red Route” concept to the remaining sections of the streetcar routes in the central area, and to busy, congested bus routes, as shown in Exhibit 3.

B. Signal Priority Expansion Plan

Signal priority reduces the amount of delay to streetcars and buses at red traffic signals. Wire loops, placed in the pavement in front of a signalized intersection, detect an electronic signal from a bus or streetcar, and the normal signal timings are altered in their favour – either “holding” the green light until the vehicle has travelled through the intersection or, if the vehicle is arriving on a red light, bringing up the green light quicker.

This ensures faster service for customers and reduces the costs required to provide that service. For example, on a route with 40 equipped intersections, the round-trip running time can, typically, be reduced by 8-to-10 minutes. Most transit riders use two bus or streetcar routes per trip, so the potential travel time savings could become significant when a large enough number of routes is equipped. The round-trip time reductions also allow the same service level to be provided with one-to-two fewer vehicles during most operating periods – important savings given that a bus costs about \$500,000, and a streetcar costs about \$3 million. Operating costs are also reduced by, on average, \$200,000 per route per year.

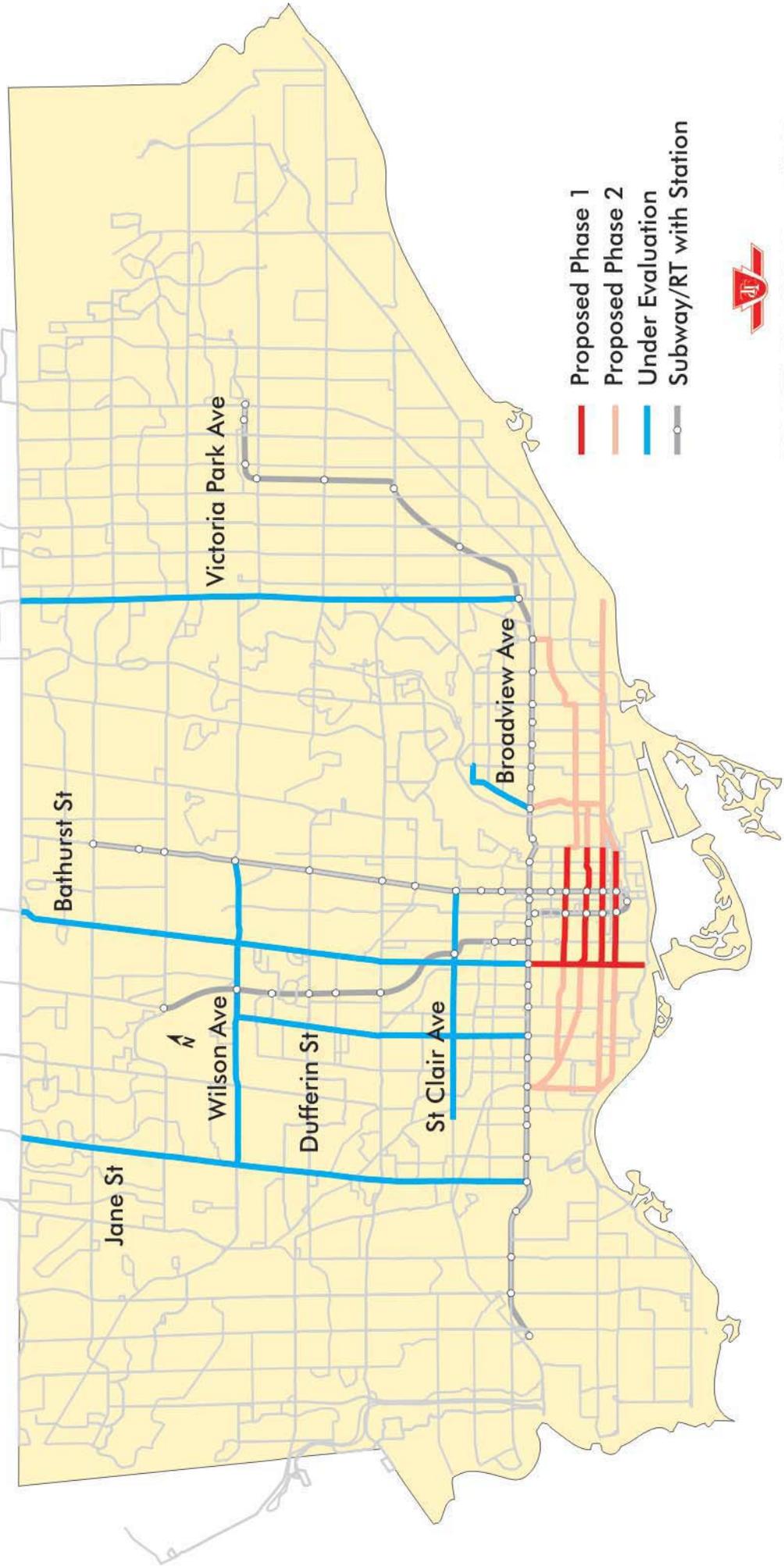
To date, 215 intersections have been equipped with signal priority on five streetcar routes and two bus routes. This has allowed savings of 10 streetcars and four buses, and a reduction of \$1.5 million in annual operating costs on the affected routes.

Staff plan to continue the installation of signal priority on busy transit routes to reduce delays caused by traffic signals. This technology costs approximately \$25,000 to purchase and install at each intersection but, given that it pays for itself in reduced operating costs and vehicle savings, there are obvious service and business rationales to continue with the program. At present, TTC and City staff are equipping one route per year. The current plan entails equipping the following routes, as illustrated on Exhibit 4.

Exhibit 3

Proposed "Red Routes"

Expanded Peak Period Stopping and Left Turning Prohibitions



- Proposed Phase 1
- Proposed Phase 2
- Under Evaluation
- Subway/RT with Station



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35 Jane	32 Eglinton
39 Finch East	25 Don Mills
36 Finch West	6 Bay
54 Lawrence East	510 Spadina
85 Sheppard East	24 Victoria
53 Steeles East	100 Flemingdon Pk
60 Steeles West	45 Kipling
95 York Mills	52 Lawrence West
34 Eglinton East	96 Wilson
165 West Road North	37 Islington
42 Cummer	110 Islington South
47 Lansdowne	86 Scarborough
86 Scarborough	68 Warden
102 Markham Road	58 Malton

When all of these are implemented, the total of 35 routes would generate an estimated \$48 million savings in vehicle-related capital costs and approximately \$5.7 million in annual operating costs.

C. Dedicated Transit Lanes – Physically Separating Transit from Traffic Congestion

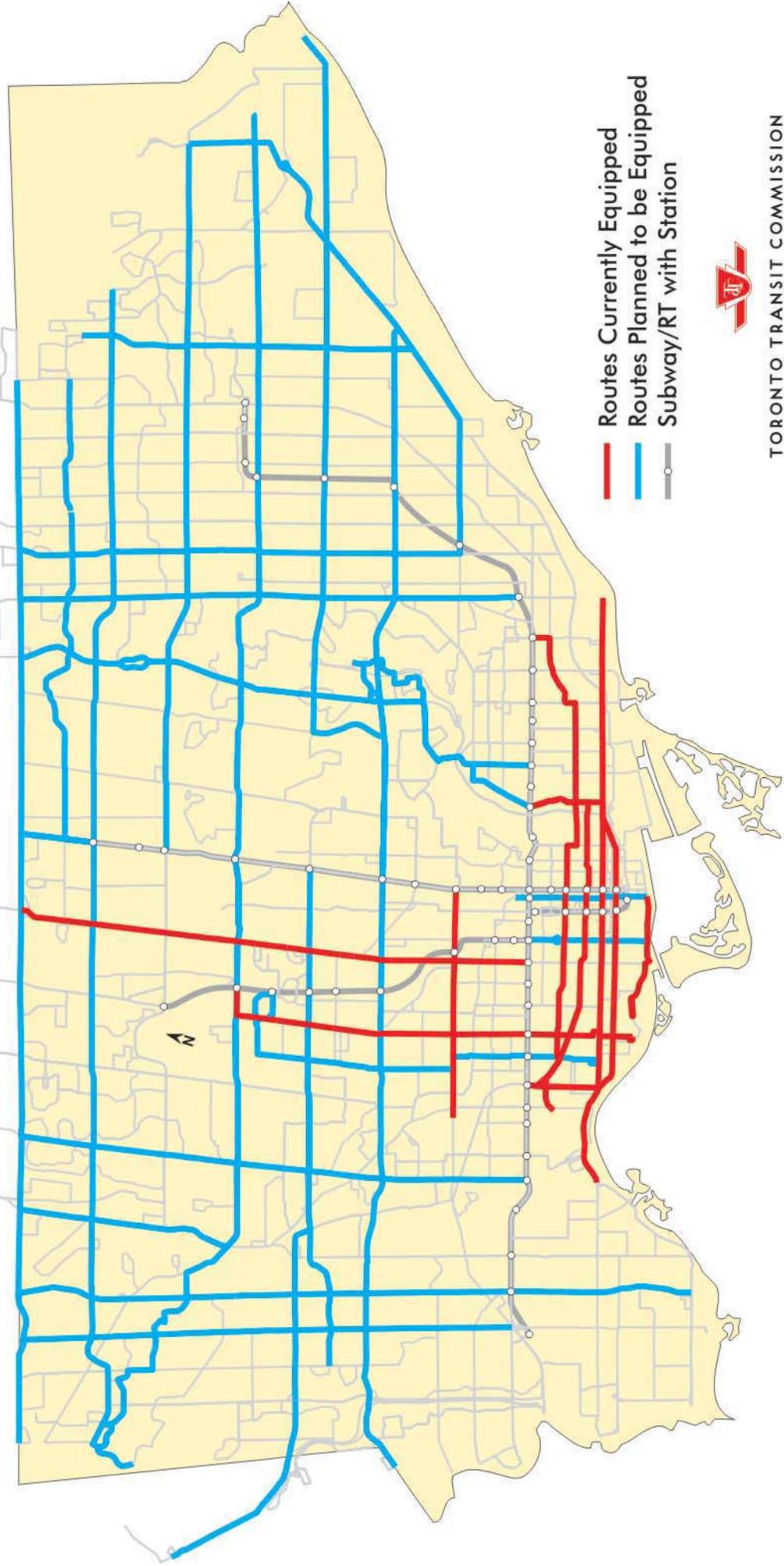
While signal priority alleviates delays at traffic signals, which speeds up service and reduces the cost of operating a route, it also reduces delays to other traffic on the roadway. Similarly, “Red Routes” would increase the capacity and improve operating speeds for all traffic on the designated roadway, not just transit. While these measures improve the speed and reliability of public transit, which is a definite benefit to customers, they do not significantly improve the competitiveness of transit relative to the car. Moreover, their effectiveness will likely diminish over time: as traffic congestion continues to increase in the city, the travel time savings of signal priority will be offset by slower speed on roads in general. Similarly, as traffic volumes increase on “Red Routes”, transit will again be stuck in slow, congested conditions, as transit, along with all other road users, slowly grind to lower and lower travel speeds.

Special “transit-only” lanes, which separate transit from the effects of traffic congestion, are the most-effective means of making transit more competitive with the car. Transit-only lanes are most justifiable when the number of people being carried on transit is equivalent to the carrying capacity of a typical traffic lane. This threshold is reached when the service headway, or the time between vehicles, is approximately three minutes on a bus route, or four minutes on a route with standard-length streetcars.

TTC staff have reviewed the levels of peak-period congestion on every route with these high service frequencies, and have selected the route sections shown in Exhibit 5 as the most-appropriate locations for dedicated transit lanes in the near term.

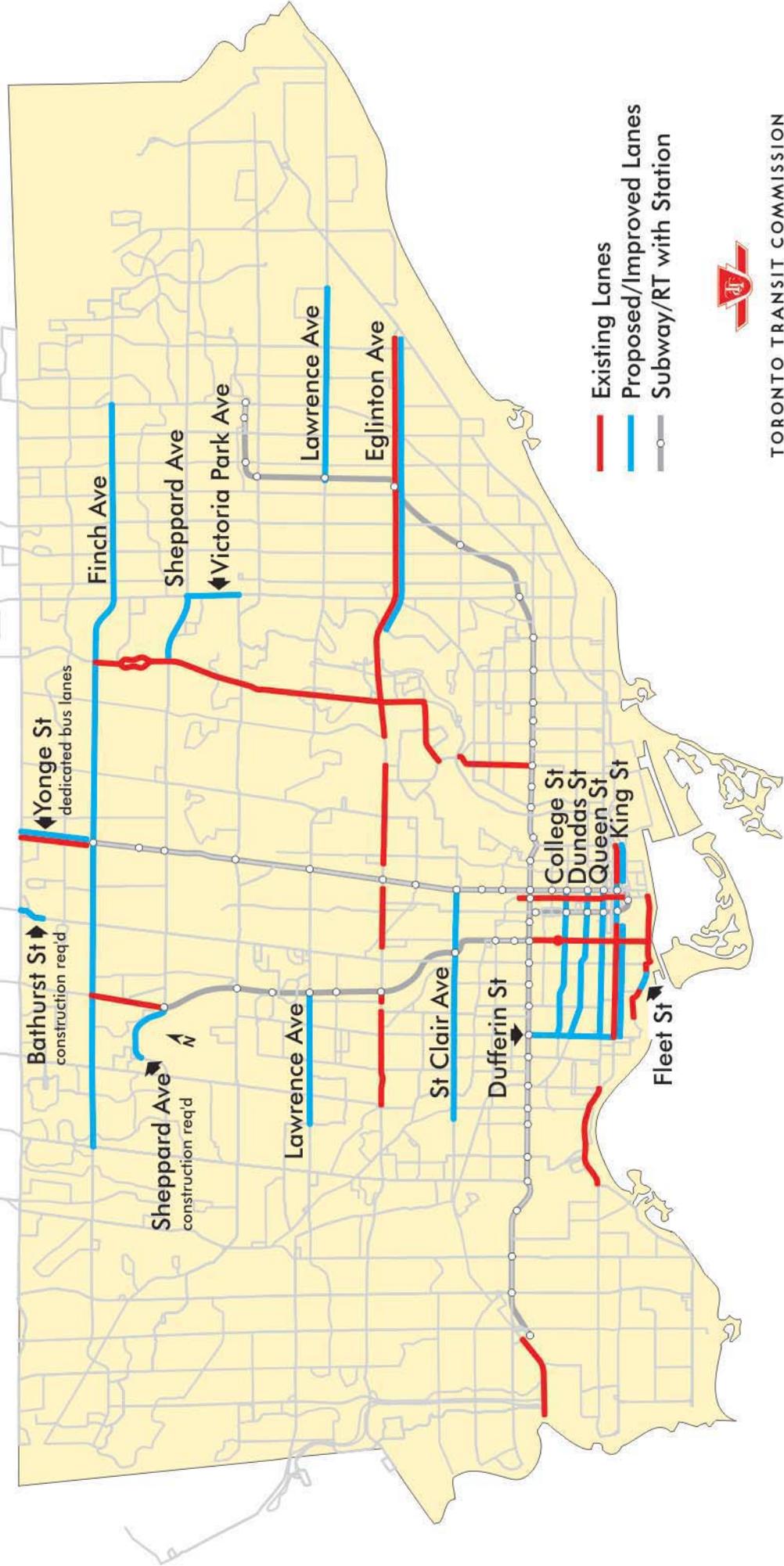
TTC staff are preparing design concepts to effectively separate transit operations from mixed traffic and the effects of traffic congestion, beginning with the following three road sections:

Exhibit 4 The TTC's Signal Priority Program



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Exhibit 5 Reserved Transit and HOV Lanes in Toronto



- Existing Lanes
- Proposed/Improved Lanes
- Subway/RT with Station



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i) King Street – Dufferin Street to Parliament Street

In the report entitled, *Dedicated Streetcar Lanes on the 504 KING Route*, considered by the Commission at its meeting on April 11, 2001, TTC staff advised that they are working on ways to separate streetcars from the congestion of mixed traffic on this section of King Street. Operating conditions on King Street are governed by a relatively narrow, four-lane road with traffic congestion affecting streetcar service through much of the day. One of the concepts put forward by staff, which has gathered much public attention, is to protect streetcars from the delays and disruption of mixed traffic by changing the physical configuration of King Street, between Dufferin and Parliament Streets, so as to restrict through traffic to streetcars and emergency vehicles. The concept, illustrated in Exhibit 6, is intended to also ensure that all normal commercial activities on King Street, except on-street parking, can continue without disruption.

A working group, consisting of staff from TTC, Transportation Services, and City Planning, has been established to examine this concept and any other concept which would accomplish the objective of extricating streetcars from the mixed-traffic congestion and gridlock which is so detrimental to quality transit service. The group will draw on the expertise of City Economic Development, the Toronto Police, and the Toronto Parking Authority, as required. There is also a high-level review team, overseen by Councillor Joe Panatalone (Chair of Planning and Transportation Committee) and Councillor Brian Ashton (Chair of the Toronto Transit Commission) whose mandate it is to consider the conclusions and recommendations of the working group, in the broader context of the city's business community, and the need to improve the overall speed and reliability of transit in Toronto.

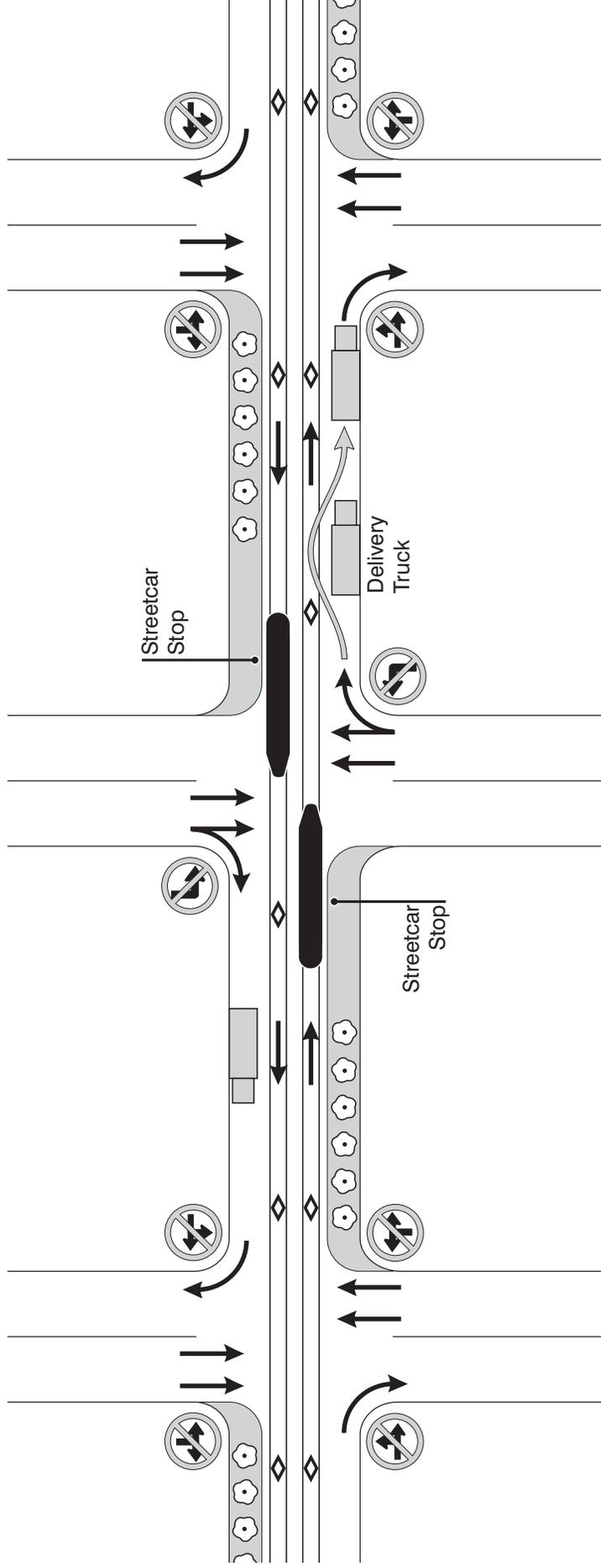
TTC staff expect to ultimately use King Street as a test case and to use the findings from this work to identify acceptable means of establishing dedicated lanes on other streetcar routes in the downtown area.

ii) Yonge Street – Finch Subway Station to Steeles Avenue

This section of Yonge Street carries more bus traffic than any other roadway in Toronto. In the a.m. peak hour, south of Drewry Avenue, there are 110 southbound TTC, GO, York Region, and Brampton Transit buses destined for Finch subway station. While there are HOV lanes in the curb traffic lanes, many buses do not use them because of the delays, which result from other vehicles which turn right, drop-off or pick-up people, or illegally stop or stand. As a result, these "priority lanes" are often slower for buses than the general traffic lanes. TTC staff are currently reviewing how to use the various transit priority measures described in this report to create fully-dedicated bus lanes to allow this huge volume of buses to move faster and more reliably to and from Finch Station. One example of such a concept would be a physically-separated busway. This type of treatment would significantly improve bus travel speeds and reliability. Coincidentally, the Region of York has also started work on developing a busway concept for Yonge Street, north of Steeles Avenue, in recognition of the need to move buses faster and more reliably. TTC staff, City Transportation staff, and City Planning staff are currently working with the Region of York to co-ordinate and collaborate on these complementary initiatives.

Exhibit 6

Dedicated Streetcar Lanes on King Street



- Dedicated Streetcar Lanes (shown by ◇)
- No through traffic, no left turns on King
- No on-street parking
- Widen sidewalk replaces curb traffic lane on one side of road
- 4 lanes reduced to 3 lanes
- Delivery trucks/couriers allowed to stop on one side of every block

TTC staff believe that the concept of a busway would also be an improvement over the curb HOV lanes on Don Mills Road, on the six-lane sections of Eglinton Avenue and, potentially, on the wider sections of Lawrence Avenue East.

iii) St. Clair Avenue – Weston Road/Keele Street to Yonge Street

On this section of St. Clair Avenue, high-frequency streetcar service, with peak headways of 3-4 minutes, is operated in mixed traffic. This frequency of service is comparable to that provided on the streetcar routes in downtown Toronto. What distinguishes this section of roadway from those in the downtown is that this road section is wide, and has a six-lane cross-section. This is wide enough that it would be physically possible to create a fully-protected and separated right-of-way for streetcars, and still have four lanes available for other traffic.

As discussed earlier in this report, the only truly-effective means of providing priority to make transit quick, reliable, and efficient, is to physically separate transit from all other traffic. This section of St. Clair Avenue provides the opportunity to do that for an established, heavily-patronized, high-frequency streetcar service.

TTC staff are developing preliminary concepts for such a priority treatment, and will be presenting these for discussion to City Transportation and Planning staff.

D. Using Transit Priority to Create New, Innovative Service Concepts

The transit priority measures described in this report – signal priority, reserved lanes, turn prohibitions, physically-separated rights-of-way – can be combined and/or selectively applied to create new, innovative service concepts which would be fast, reliable, and attractive. Here are two examples:

- l) “Rapid Bus” Express Service: The concept here is to provide reliable, high-speed service for long-distance travellers through the use of longer, transfer-free routings, wide stop spacings of one kilometre or greater, and priority measures to ensure that these services do not get bogged down in traffic congestion. The services would not stop at all regular stops on the roads on which they operate, nor even at every intersecting bus or streetcar route; stops would be limited to those where major transfer volumes would be expected to occur. The TTC already operates three services, which capture the essence of this service concept: the 191 HIGHWAY 27 ROCKET, the 192 AIRPORT ROCKET, and the 196 YORK UNIVERSITY ROCKET. While these services do provide higher-speed services for people travelling longer distances, even these services could be faster and more attractive if they were complemented by priority measures which would, for example, exempt them from time-consuming left turns queues.

This type of high-speed long-distance bus service is successfully operated in other cities. Examples include the B-Line in Vancouver, Montreal’s R-Bus, and the Metrobus in Quebec City.

TTC staff believe that, based on observed travel patterns and roadway connectivity, there are other corridors which would lend themselves to a "rapid bus" type of service. They are: Albion Road/Weston Road, Eglinton Avenue, Finch Avenue, Kingston Road, Jane Street, and Don Mills Road. A possible network of rapid bus routes, including the TTC's existing "Rocket" series of high-speed services, is shown in Exhibit 7.

- ii) High-Speed Inter-Regional Bus Services: Working collaboratively with Toronto's neighbouring municipalities, and selectively applying transit priority measures, it may be possible to develop inter-regional services which are sufficiently fast and reliable as to attract people in this commuter market. Such services could be a supplement to the excellent services already provided by GO Transit.

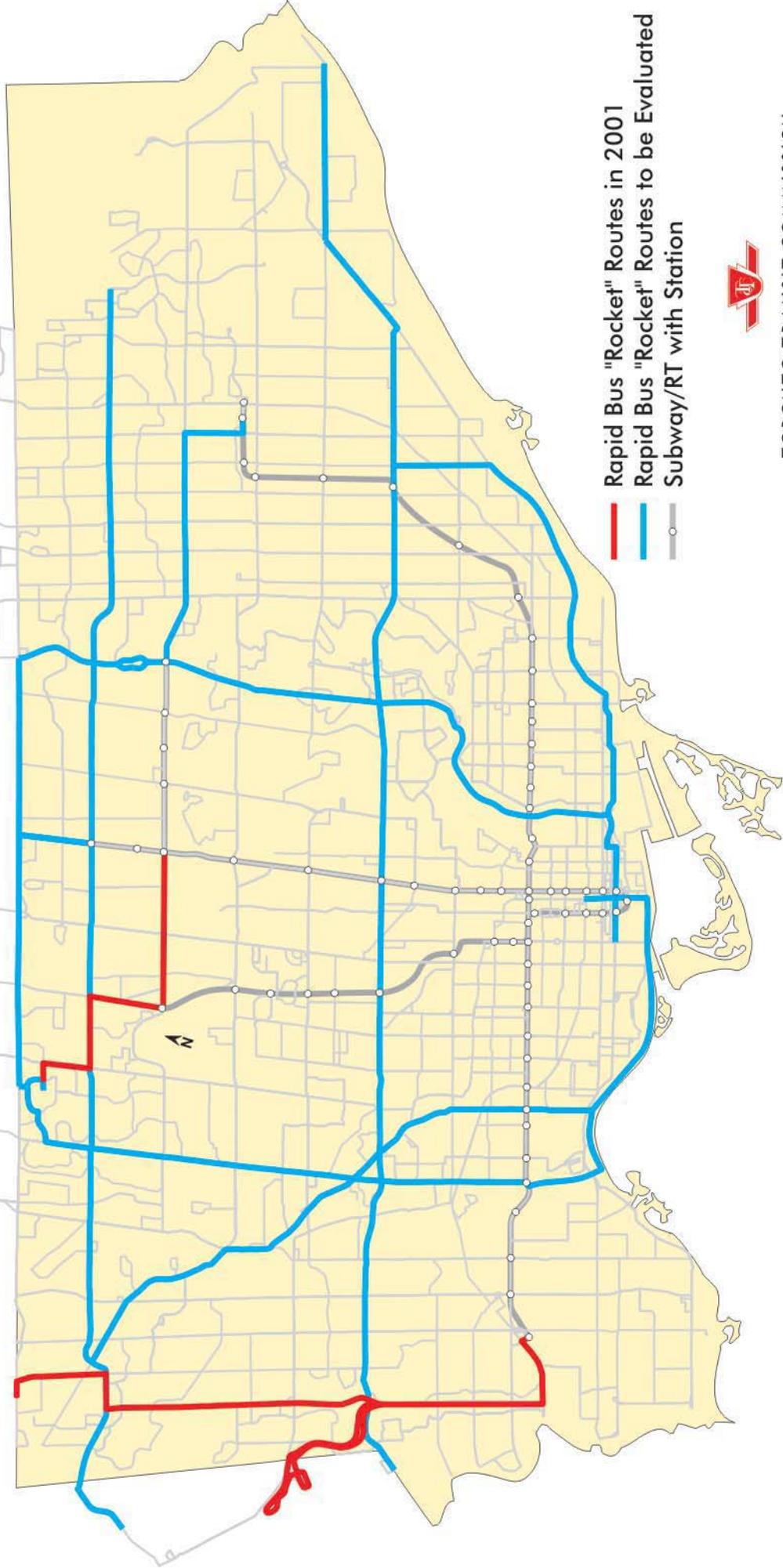
The percentage of people taking transit between Toronto and York is considerably lower than the percentage between Toronto and Peel or Durham. Given this fact, and the fact that both the Yonge and Spadina subway lines extend close to the Toronto-York boundary, staff have developed two inter-regional service concepts which would exploit the priority measure of dedicated bus lanes to provide high-speed bus connections with these subways. One would feature service between Finch Station and a commuter parking facility in the Langstaff area, operating in dedicated bus lanes on Yonge Street. This would be consistent with the conceptual work now being done by both TTC/City staff and York Region staff, and discussed earlier in this report. The other would have service between Downsview Station and a commuter parking facility in the area of the proposed Vaughan Corporate Centre. This routing would rely on dedicated bus lanes on Dufferin Street and Allen Road to achieve fast, obstruction-free service. Both of these service concepts are illustrated in Exhibit 8.

SUMMARY

Transit priority offers the opportunity to significantly improve the quality, reliability, and cost-effectiveness of transit in Toronto, often without any significant capital expenditures, but with some degree of inconvenience to other road users. This is the trade-off which is required if transit is to be made more attractive, so that it is used by more people, and pollution and congestion can be reduced.

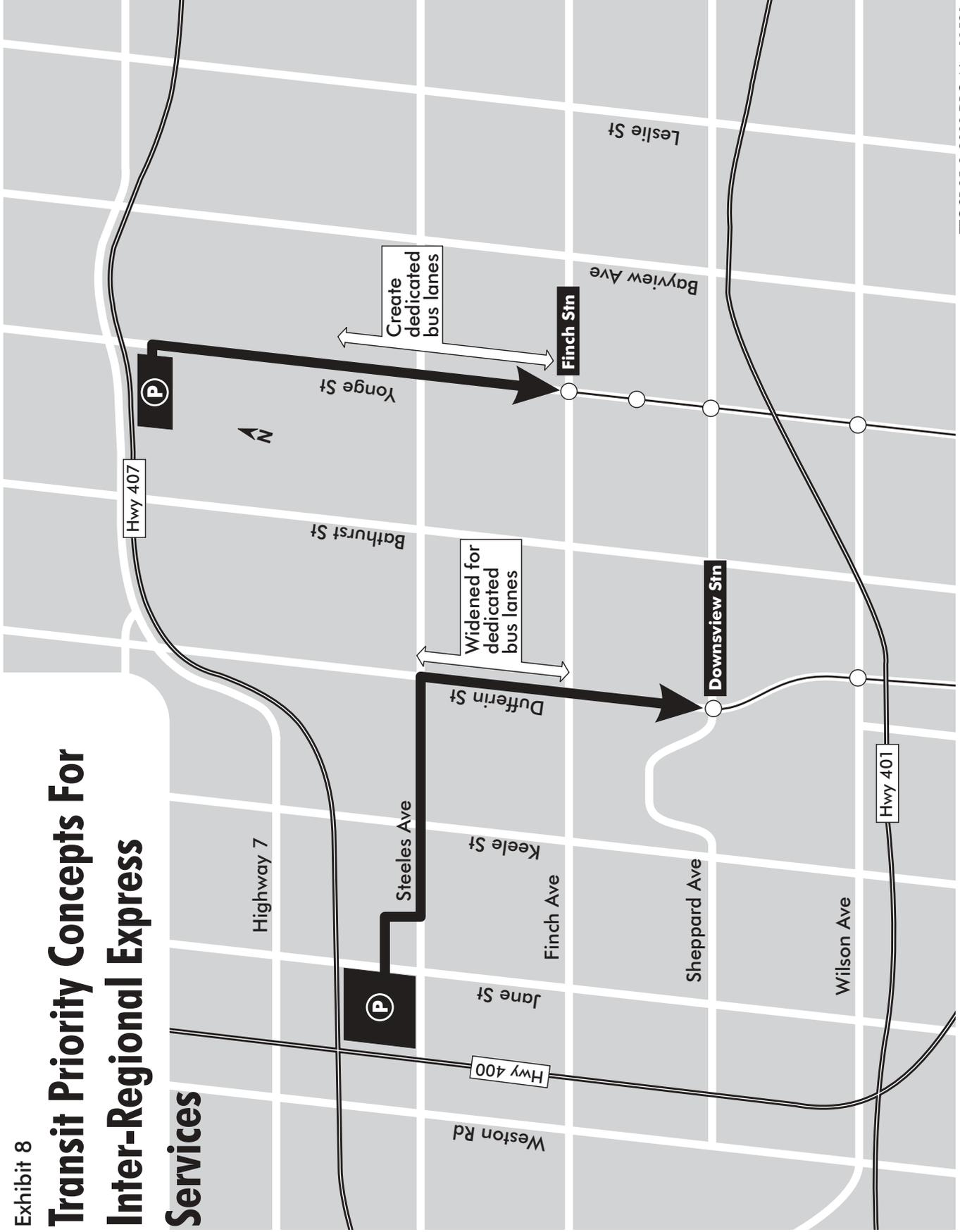
Transit priority measures currently in place vary considerably in their effectiveness. Signal priority and dedicated transit rights-of-way are very effective in speeding up and improving the quality of transit, while part-time reserved bus lanes or HOV lanes, and legislative measures such as turn prohibitions are much less effective because of the large number of motorists who do not obey them.

Exhibit 7 Possible Rapid Bus Network



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Transit Priority Concepts For Inter-Regional Express Services



This report describes four categories of priority measures which would work well in many locations throughout Toronto: (1) "Red Routes", entailing more aggressive and widespread restrictions on stopping and turning on busy transit roadways, during expanded peak periods; (2) continued expansion of the signal priority program, in order to reduce red-light delays; (3) physically-separated transit lanes, such as have been created on Spadina Avenue, in order to separate transit from the congestion and delay of mixed traffic; and (4) creating new and innovative service concepts, such as "rapid bus" services, through the selective application of various priority measures.

TTC and City Transportation and Planning staff are working together to identify how the various transit priority measures described in this report can be combined and applied to make transit perceptibly more attractive and more competitive with the car in Toronto.

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