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TORONTO

REPORT FOR ACTION

MoveTO 2021-25: Congestion Management Interim Action Plan and Non-Competitive Contract for Smart Signals

Date: October 22, 2020
To: Infrastructure and Environment Committee
From: General Manager, Transportation Services; and
Chief Procurement Officer, Purchasing and Materials Management Division
Wards: All

SUMMARY

MoveTO 2021-25 is an interim action plan to accelerate a portion of the broader Congestion Management Plan with specific focus to modernize and build resilience into the City of Toronto's transportation system through the response to the COVID-19 pandemic and into the recovery period. MoveTO involves using both piloted and proven techniques and technologies to manage the unpredictable patterns of motor vehicle, pedestrian, and cyclist traffic along key corridors and intersections. The measures proposed in MoveTO are to be accelerated for implementation over the next two years in particular.

In March of 2020, the City's transportation system experienced the largest drop in transportation demand since traffic volumes have been recorded. As the COVID-19 pandemic was declared and the City as well as the Province moved into states of emergency, demand for travel on the City's streets fell by more than half. Over the summer and through the various stages of the Provinces re-opening, traffic volumes have begun to increase again. These dramatic changes in demand disrupted decades-long patterns of growth and congestion, requiring a strategic review of operational capabilities to navigate the uncertainty and fluctuations in the number of vehicles on streets and the modal choices of travellers as demand recovers.

Building off of the foundation put in place through the City's Congestion Management Plan, and in alignment with Vision Zero and the Freight and Goods Movement Strategy, the MoveTO strategy proposes targeted actions to more effectively manage the transportation system. These initiatives can begin in 2021 at an estimated cost of $38.8 million over five years to be included in Transportation Services 2021-2030 Capital Budget and Plan and include the following:

- **"Smart" traffic signals**: These automatically adjust signal timing based on actual traffic demand and respond to varying volumes and unpredictable traffic patterns. Staff propose Smart Traffic Signals be installed at 500 locations over the next five

years, with a focus on major arterials parallel to expressways and other corridors with irregular traffic patterns.

- **"Intelligent" intersections**: A set of technologies that will allow the intersections to improve the safety of pedestrians and cyclists and form the backbone of a modern multi-modal data and analytics system. Staff propose that intelligent intersections be installed at 100 locations over the next two years, with a focus on urban environments in locations with high multi-modal activity.
- **Advanced Transit Signal Priority (ATSP)**: A system that detects buses running behind schedule and extends green times when necessary to accommodate. Staff propose that the first 100 priority locations be installed over the next two years and a strategy be developed to enable ATSP at all 2400 signals within the City.
- **Continuation of the Construction Hub Pilot Program**: A program to effectively manage access to the right-of-way with an emphasis on Vision Zero principles, while developing traffic management and communications plans to help mitigate the congestion-related impacts associated with unavoidable road closures. Staff propose the extension of the existing Yonge/Eglinton Hub and the addition of three new locations (Downtown Hub, Lakeshore Hub and East Harbour Hub) in 2021.
- **Transportation Demand Management Strategy**: A set of measures to encourage individuals to make specific transportation choices that serve to benefit the overall system. Staff propose to build on the existing Smart Commute program to provide additional supports to employers and to develop a strategy to improve the toolset available to the City of Toronto and boost the depth of engagement with major employers.

In 2017, Transportation Services issued a Request to Prequalify (RTP) to prequalify providers for a smart signal technology pilot to seek a new smart signal system where traffic signal timing changes based on actual traffic demand. Two suppliers were selected for the pilot deployment in 2018 and both smart signal technologies were evaluated in 2019. Sydney Coordinated Adaptive Traffic System (SCATS) deployed by TransCore was the only successful solution for future upgrades and expansion. TransCore is the only authorized sub-distributor for SCATS in North America. SCATS software ownership and intellectual property rights are retained by Transport for NSW.

Accordingly, this report seeks authority from City Council for the General Manager, Transportation Services to negotiate and enter into any non-competitive contracts with TransCore ITS, LLC (TransCore), that are necessary for the design, supply, delivery, implementation and support of a new traffic adaptive signal control system solution (smart signal system) for up to five years, for the total amount not to exceed $23,753,471.34 net of HST ($24,171,532.44 net of HST recoveries).

Collectively, these strategies within the multi-modal MoveTO Interim Action Plan will reduce travel times and improve travel reliability for vehicles, improve safety and optimise movement for pedestrians and cyclists at intersections, improve transit operations, coordinate construction activities to minimize impacts to the transportation network and improve safety, and support employers in their role to reduce travel demand and greenhouse gas emissions.

RECOMMENDATIONS

The General Manager of Transportation Services, and the Chief Procurement Officer of Purchasing and Materials Management, recommend that:

1. City Council request the General Manager, Transportation Services to include for consideration approximately $39 million dollars for the MoveTO interim pandemic congestion management plan initiatives in Transportation Services 2021-2030 Capital Budget and Plan.

2. Subject to the approval of the Transportation Services 2021-2030 Capital Budget and Plan and funding requirements for the MoveTO interim pandemic congestion management plan initiatives, City Council grant authority to the General Manager, Transportation Services to negotiate and execute any non-competitive agreements with TransCore ITS, LLC, as the sole supplier to meet the prequalification requirements of Request to Prequalify (RTP) No-1205-17-5043, that are necessary for the design, supply, delivery, implementation and support of a traffic adaptive signal control system solution in the amount not to exceed $23,753,471.34 net of HST ($24,171,532.44 net of HST recoveries) for up to five (5) years, on terms and conditions satisfactory to the General Manager, Transportation Services and in a form satisfactory to the City Solicitor.

3. City Council grant authority to the General Manager, Transportation Services to negotiate and execute a software end user licence agreement with Transport for NSW for which TransCore ITS, LLC is an authorized sub-distributor, and which provides central server software and field computer software, on terms and conditions satisfactory to the General Manager, Transportation Services and in a form satisfactory to the City Solicitor.

4. City Council request the General Manager, Transportation Services, in consultation with the Chief Planner and Executive Director, City Planning, and Director, Environment and Energy, to report on a proposed transportation demand management (TDM) strategy to the Infrastructure and Environment Committee by the second quarter of 2022.

FINANCIAL IMPACT

The total cost to implement MoveTO is estimated at approximately $111.2 million and will span five years from 2021 to 2025. Funding of approximately $38.8 million for system preparation and delivery for the next five years will be considered within the 2021-2030 Capital Budget and Plan of Transportation Services during the 2021 Budget Process. The remaining estimated $72.4 million will be included for consideration in the future budget processes. See Table 1 below for details.

Table 1: MoveTO Estimated Costs

Move TO Estimated Costs Considered in the 2021 Budget Process ($M)	**Capital (2021-25)**	**Operating**
Smart Signals & Transit Signal Priority	$30.2	N/A
Intelligent Intersections	$3.7	N/A
Construction Hub Extension	N/A	$0.3
Transportation Demand Management	N/A	N/A
CMP Continuation	$5.0	N/A
Subtotal	**$38.8**	**$0.3**
Estimated Costs Not Considered in the 2021 Budget Process ($M)		
Smart Signals & Transit Signal Priority	$72.4	N/A
Total Estimated Cost of MoveTO	**$111.2**	**$0.3**

*Refer to Attachment 1 for capital cash flow breakdown

Subject to approval of the 2021-2030 Capital Budget and Plan, this report provides authority to engage TransCore ITS, LLC into a non-competitive contract at a value of $23,753,471.34 net of HST ($24,171,532.44 net of HST recoveries) for the design, supply, delivery, implementation and support of a combined smart signal and transit signal priority system.

Extension of the Construction Hub Pilot in 2021 will cost approximately $0.28 million and will be considered within the 2021 Operating Budget of Transportation Services during the 2021 Budget Process. Any program costs for expansion and permanency in 2022 and beyond would be fully recovered through a revision of transportation user fees. Additionally, Operating impacts of capital for sustainment of MoveTO beyond 2021, including funding and staff resources, will be included for consideration in future budget submissions.

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

DECISION HISTORY

City Council, at its meeting of October 27-28, 2020, considered the Freight and Goods Movement Strategy from the General Manager, Transportation Services.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE16.1

City Council, at its meeting of January 29, 2020, authorized the Director, Environment and Energy to continue the delivery of the Smart Commute program subject to available funding, and directed the Director, Environment and Energy to evaluate the feasibility of enhancing the Smart Commute program by engaging with navigation providers and to report back to the Infrastructure and Environment Committee in the fourth quarter of 2020.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE11.16

Infrastructure and Environment Committee, at its meeting of December 5, 2019, requested that the General Manager, Transportation Services include the reduction of congestion and movement of people safely and efficiently as the first principle of the Congestion Management Plan. The Committee further requested the following items be included in the report on the Congestion Management Plan:

a. A measure of the impact of commercial deliveries and ride share on congestion in the City of Toronto, and how to better measure impacts;

b. A review of the use of one way streets to address congestion and gridlock;

c. The results and implementation of the downtown operations study; and

d. Data and recommendations on the impact of increases from urban freight delivery vehicles associated with the growth of online shopping.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.IE10.4

City Council, at its meeting of November 26, 2019, referred to the General Manager, Transportation Services a request to undertake a detailed evaluation of delays in travelling, congestion and gridlock to determine whether congestion and gridlock is getting better or worse, to establish benchmarks for acceptable traffic delays, and to develop a public dashboard that quantifies and identifies the scope and scale of gridlock and congestion issues.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.MM12.28

North York Community Council, at its meeting of September 16, 2019, requested City Staff to report on the development of a comprehensive Construction Traffic Safety Management Plan for the Yonge-Eglinton area and to implement it immediately.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.NY8.50

Toronto and East York Community Council, at its meeting of September 16, 2019, requested City Staff to report on the development of a comprehensive Construction Traffic Management Plan for the Yonge-Eglinton area and to implement it immediately.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.TE8.88

City Council, at its meeting of July 16, 2019, directed the General Manager, Transportation Services to consider the results of the Transportation Impact Study from the Review of Municipal Code Chapter 546, Licensing of Vehicles-for-Hire, as part of the update on the Congestion Management Plan.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.GL6.31

The Bid Award Panel, at its meeting of October 11, 2017, granted authority to award the RTP Call Number 1205-17-5043 to TransCore ITS, LLC and Black and McDonald Limited for the Adaptive Traffic Signal Control System (Smart Signals) Pilot.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.BA45.2

City Council, at its meeting of November 3, 2015, endorsed an updated Congestion Management Plan to span 2016-2020.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.PW8.1

City Council, at its meeting of December 16, 2013, endorsed the Congestion Management Plan 2014-2018 to manage congestion across the City of Toronto, and the Downtown Transportation Operations Study implementation plan.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.PW27.12
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.PW27.13

COMMENTS

Traffic Impacts from the COVID-19 Pandemic

In the two months immediately after COVID-19 pandemic response measures were introduced, delays for motor vehicles were eliminated across the City's road network. Improvements in city-wide travel times were measured at 37% and 44% during the a.m. and p.m. peak hours, respectively. While travel time delays are still significantly lower relative to those prior to the pandemic, they have gradually increased in recent months as services have reopened and car traffic has partially returned.

By the second week of April, daily car and pedestrian traffic in the downtown core dropped precipitously to 40% and 20% of pre-pandemic volumes, respectively. Cyclist traffic, on the other hand, increased to 130% of pre-pandemic volumes during this same period, in part due to the warming weather, but also as residents turned to cycling as a safe and physically distant travel alternative. Volumes for all three modes of travel have since more than doubled at the time of this report, but car and pedestrian traffic both continue to be well below pre-pandemic levels. All modes of travel have also experienced drastic shifts in time-of-day patterns, including a substantial reduction in the traditional morning peak.

It should be noted that the City's permanent multimodal monitoring infrastructure, installed as part of the King Street Transit Pilot and used to monitor changes resulting from the response to the COVID-19 pandemic, is located in the downtown core; changes in travel patterns observed downtown are significantly different than those present in other parts of the City, where predominantly only anecdotal observations are available for comparison. The ability to use this data to track changes and tailor policy

responses such as the ActiveTO, CurbTO, and CafeTO programs are one of the driving forces behind the identified need to expand the scope of this type of data collection through the Intelligent Intersections program in MoveTO.

Pedestrians

Downtown pedestrian volumes decreased by an average of 80% by the second week of April, in large part due to the massive reduction of office employees working in the core. The largest percentage changes were observed at intersections within the Financial District (e.g. King and Bay), while those in close proximity to major residential areas (e.g. Richmond and Bathurst) were less affected. Volumes have since slowly recovered in recent months but continue to be significantly lower (an average decrease of 60% relative to pre-pandemic conditions) with large variances (decreases ranging from 40% to 80%) across intersections. It is expected that changes in pedestrian volumes elsewhere in the city are much less extreme given the unique concentration of dense service-based employment in the Financial District and surrounding areas. Reliable data on changes in pedestrian traffic outside of the downtown core is limited due the lack of multimodal monitoring infrastructure.

Cyclists

While traffic downtown across all other modes decreased substantially in the weeks and months following the initial response to the pandemic, cyclist volumes had more than doubled by the end of May this year; a combination of the warming weather as well as modal shifts due to safety concerns and City pandemic response policies. Relative to months of comparable weather in 2019, cyclist traffic in the downtown core remained at 70% to 90% of typical volumes despite significantly reduced commuting activity, buoyed by significant increases in weekend travel. Weekday cycling volumes are currently lower (-15%) than typical pre-pandemic conditions observed in September 2019, but are also now much higher (+50% to +80%) than those observed on similar weekends.

TTC Ridership

By the end of March this year, TTC ridership had dropped to 22% of normal ridership, as measured by vehicle boardings, with a further five percent decline in April (17%), and a sustained recovery in ridership as the pandemic recovery advanced. At the beginning of September, TTC system-wide ridership was about 40% of normal levels. Ridership declines had a differential impact on the various modes of public transit offered by the TTC, with subway ridership suffering the largest decline and bus ridership the least. The proportion of riders travelling to and from the downtown core also decreased to a greater extent, with a greater proportion of riders travelling by bus within and between Etobicoke, North York, and Scarborough.

Motor Vehicles

As of late September 2020, daily motor vehicle traffic at selected downtown intersections was between 15% and 40% lower than a September 2019 baseline, and between 5% and 25% lower on the City's major expressways. Traffic during the morning peak and late night periods, in particular, has been significantly reduced. Car traffic

downtown has rebounded in recent months with daily volumes having almost doubled compared to conditions earlier on in the pandemic. Private transportation company (PTC) trips such as Facedrive, Lyft and Uber continue to be down by approximately 65% (when comparing March to July 2020 to the same time period last year); however, at their lowest, they were down approximately 80% (April 2020 compared to April 2019). While the taxicab industry does not currently provide trip data to the City, the TTC Wheel-Trans has indicated that their taxicab contract was operating at 35% of normal capacity as well (July 2020). Truck traffic downtown has been less impacted overall, and has nearly returned to pre-pandemic levels. City staff are currently unable to isolate the impacts of delivery vehicles (including those in service for online ordering) and other local goods movement from overall light vehicle and truck volumes. As part of the Freight and Goods Movement Strategy, parallel work will be undertaken by the Smart Freight Centre, a centre of excellence for goods movement, to address these data gaps.

Construction Activities within the City

During the early weeks of the pandemic, the reduction in traffic and changes in allowable working hours regulated by the province created the opportunity for the City's Work Zone Coordinators to try to advance as much construction work as possible. This included work that was originally scheduled for 2021 and beyond. In doing so, this has alleviated some of the demands for construction closures that were anticipated to come in future years. To date, the City's Work Zone Coordinators have processed a record 4,279 Rush Hour Exemptions since the March pandemic shutdown.

Vehicular Congestion and Travel Time Index

In response to the rapid changes from the pandemic response, staff in the Data and Analytics unit of Transportation Services quickly established a monitoring program to track the decline and recovery in transportation demand across all modes. This included the creation and monitoring of a citywide Travel Time Index for motor vehicles. The Index tracks the ratio of travel time experienced over a specific hour compared to uncongested traffic conditions. For example, an index rating of 2.0 would mean that, on average, it takes twice as long to travel the same distance as compared to conditions if there were no motor vehicles on the network at all.

Between March 17, 2020 (when the Province of Ontario declared a state of emergency) and May 19, 2020 (Stage 1 of the Restart in the Province's COVID-19 Action Plan), the Index showed that even during the traditional peak periods the road network was operating at free flow conditions (rating of 1.0) nearly every day. Since then, travel times have gradually increased with continued reopening; however, they have not yet recovered to the pre-pandemic levels observed in mid-February. A graph illustrating the weekday evening peak hour (5:00 to 6:00 PM) Index ratings from February 3 to October 16, 2020 is included in Attachment 2. Given the recent resurgence in new cases of COVID-19 at the time of writing, it is not possible to reasonably predict traffic travel times and volumes.

MoveTO 2021-25 Interim Action Plan

Move TO 2021-25 is an interim action plan to build resilience into the City of Toronto's transportation system through the response to the COVID-19 pandemic and into the recovery period. The plan has been developed under the strategic framework for managing transportation, which includes the Vision Zero Road Safety Plan and Freight and Goods Movement Strategy. It involves using technologies already piloted by the City to manage the unpredictable and dynamic patterns of motor vehicle, pedestrian, and cyclist traffic along key corridors and at high-demand intersections. The interim plan is the set of proposed immediate actions for the next two years, with projected costs stretching out on a five-year horizon. Transportation Services staff will seek additional authorities in 2022 to implement the balance of the MoveTO plan. Additional congestion management tools, such as the increased use of managed lanes and one-way streets, will be investigated more thoroughly beyond 2021, as travel patterns stabilize.

MoveTO is a proposal to manage the City's transportation system in real-time by installing "smart" traffic signals that can adjust timing based on actual traffic demand, "intelligent" intersections that can better respond to the needs of pedestrians and cyclists, and "priority" signals for transit vehicles to reduce delays at intersections and improve adherence to schedules. Continuing and expanding the Construction Coordination Hub pilot program and measures to better manage transportation demand are also part of the Plan. A summary of the proposed activities, locations, and benefits are included in Attachment 3.

Building off of the foundation put in place through the City's Congestion Management Plan (CMP) 2016-2020 and earlier Downtown Transportation Operations Study (DTOS), each of these new initiatives could begin in 2021 if requested funding is allocated. A report on the final results of the CMP is forthcoming in 2021, and a summary of DTOS results is included in Attachment 4 of this report.

1. Smart Signals

Traffic signal timings are determined based on the traffic volumes of vehicles, cyclists and pedestrians that need to be managed. As a result, improperly timed traffic signals can lead to artificial delays in the transportation system for all road users. Throughout the pandemic the significant changes in motor vehicle traffic volumes and largely unpredictable traffic patterns have emphasized the need for traffic signals that can automatically detect and adapt to changing circumstances.

Transportation Services conducted a comprehensive review and needs assessment to replace the City's legacy Split Cycle Offset Optimization Technique/Urban Traffic Control (SCOOT) traffic adaptive control system in 2017. The investigation culminated in the release of a Request to Prequalify (RTP) tender that included an actual deployment and evaluation of systems as part of the procurement process. The evaluation ran over a few years as City staff wanted to ensure that the system was capable of meeting all of the City's needs and was able to perform under various weather and road conditions. The evaluation itself considered travel time and delay reductions at intersections while maintaining the stringent Vision Zero safety constraints of maintaining leading pedestrian intervals (LPI) and longer pedestrian crossing times

for seniors and small children. Other factors were considered related to maintenance, sustainability and life cycle costs.

Of a number of vendors that were considered and subsequently evaluated, the Sydney Coordinated Adaptive Traffic System (SCATS) submitted by TransCore was the only successful solution for future upgrade and expansion. During the evaluation phase of the procurement, the SCATS system was deployed at 12 traffic signals along Sheppard Avenue through Morningside Avenue. The SCATS Smart Signal system exhibited a 2.6% decrease in travel time above and beyond that was already achieved by signal coordination during peak hours.

As part of MoveTO, Transportation Services aims to expand the pilot SCATS solution and to install Smart Traffic Signals at 500 locations over the next five years. The locations would focus primarily along major arterials parallel to the expressways. Other corridors have also been identified that have varying volumes and unpredictable traffic patterns. Attachment 4 provides the corridors currently being considered for Smart Traffic Signal deployment. In order to optimize the delivery process prior and ramp up capacity, 34 smart signals will be implemented over the first two years of the program and would expand to 155 locations per year in order to install 500 signals by 2025.

Smart Signal System Selection Process

In 2017, the City issued a Request to Prequalify (RTP) No-1205-17-5043 seeking to prequalify up to three (3) smart signal solutions for pilot deployment and evaluation. The pilot deployment included the design, supply, delivery, implementation and support of the shortlisted smart signal technologies. The main objective of the pilot deployment was to create a real-life testing environment which the City could use to assess and evaluate the performance of the shortlisted solutions.

The intent was that if more than one solution was deemed as prequalified upon the pilot deployment, these prequalified solutions would be invited to a subsequent Request for Proposal (RFP) competition. According to the RTP 1205-17-5043 Section 2.1.3, the City reserves the right to negotiate a sole source agreement instead of issuing an RFP in the event that only one Solution passes the prequalification criteria.

Seven (7) proposals were received for the aforementioned RTP in 2017 and two different traffic smart signal system solutions were shortlisted to participate the pilot deployment. In 2018, the following two new smart signal systems were implemented in two (2) pilot areas in Toronto (that consisted of a total of 22 intersections):

a. Black and McDonald Limited deployed InSync Adaptive Traffic Control System (InSync) along Yonge Street between Yonge Boulevard and Castlefield Avenue (north-south major arterial road perpendicular to Highway 401); and

b. TransCore ITS, LLC deployed SCATS along Sheppard Avenue between Nelson Road and Meadowvale Road (east-west arterial road parallel to Highway 401).

The pilot deployments and evaluations were carried out in 2018 and 2019 respectively. To ensure the efficiency and reliability of the new system, the pilot evaluation included:

- Customer Service
- Functionality of the Proposed Solution
- Network Travel Time Reduction during Peak Hours (AM and PM)
- Network Travel Time Reduction during Weekend
- Network Travel Time Reduction during Weekday
- Other Traffic Operational Aspects

To ensure the performance analysis was reasonable, an independent analysis was performed by a third-party engineering consultant. To ensure the evaluation process was fair, the entire scoring process from the 2017 proposal evaluation to the 2019 pilot evaluation was monitored by a fairness monitor consultant. See Attachment 6 for the fairness monitor attestation report.

SCATS deployed by TransCore ITS, LLC (Purchase Order 6046718), was the only successful solution for future upgrade and expansion. The benefits of the selected SCATS system had been proven in the pilot evaluation. SCATS demonstrated its cost effectiveness, and improved the network travel times in (i) Weekday Peak Hours, (ii) Weekday, and (iii) Weekend by detecting and responding the continuous changing traffic patterns in real time.

Per the RTP 1205-17-5043 Section 2.1.3, the City reserved the right to negotiate a sole source agreement instead of issuing a request for proposals in the event that only one Solution passes the prequalification criteria. As such, Transportation Services is seeking the authority to negotiate and enter into any non-competitive contracts with TransCore ITS, LLC (TransCore), necessary for the design, supply, delivery, implementation and support of a new traffic adaptive signal control system solution (smart signal system) for up to five (5) years, for the total amount not to exceed $23,753,471.34 net of HST ($24,171,532.44 net of HST recoveries).

City Council approval is required in accordance with Municipal Code Chapter 195-Purchasing, where the current request exceed the Chief Purchasing Official's authority of the cumulative five (5) year commitment limit for each vendor under Article 7, Section 195-7.3 (D) of the Purchasing By-Law or exceeds the threshold of $500,000 net of HST allowed under staff authority as per the Toronto Municipal Code, Chapter 71- Financial Control, Section 71-11A.

2. Intelligent Intersections

Intelligent intersections are a strategy designed to address some of the key learnings from the COVID pandemic, namely the need to prioritize the movement and safety of cyclists and pedestrians and the need to monitor and adjust based on continuous multi-modal data. While Smart Signals focus largely on the efficient and safe movement of vehicles, Intelligent Intersections refers to a set of technologies that will allow the intersections to be more efficient, have lower delay for all road users, improve the safety of pedestrians and cyclists, as well as form the backbone of a modern multi-modal data and analytics system. The data gathered from these intersections will allow the City to

understand how travel patterns are shifting as well as to adapt intersection operations expeditiously to design, support and monitor programs such as ActiveTO.

Intelligent intersection technologies were first piloted by Transportation Services to monitor the King Street Transit Pilot in 2017. This technology consisted of video-based machine vision counting devices that were able to monitor the number of pedestrians, cyclists, and vehicles passing through downtown intersections to provide critical insights into the performance of the pilot. The system was also able to provide real-time data to support regular optimization of the signals along the corridor, ensuring that transit vehicles travelled unimpeded.

The legacy left by this project has acted as the backbone of a monitoring and analytics program which has allowed Transportation Services to monitor changing multi-modal travel volumes through the COVID-19 pandemic and provide insights to guide the creation of pandemic-response programs. Without this technology, the City would have had a limited ability to understand the impact of the pandemic and measure the resilience of cycling volumes, the impact on pedestrians, and the drops in vehicular volumes that were observed throughout the downtown core. While the insights have been extremely valuable, the limited scope of the current system has meant that staff are unable to monitor these trends outside of the downtown core.

The vision for the Intelligent Intersections program is to expand the use of these technologies to increase coverage across the city to better understand the movement of all road users. Video-based technology will also allow Transportation Services to provide more time at lights to pedestrians and cyclists in real time and as demand warrants, as well as to be able to measure safety conflicts not currently captured such as near misses red light running and intersection blocking. In addition, Intelligent Intersections will provide continuous and real time data and analytics to retime signals to optimize performance in the face of rapidly changing traffic conditions, such as during extreme weather or from a change in construction projects. A final piece of the vision for Intelligent Intersections will be to generate real time open data from the detections and phasing at these intersections.

While Smart Signals will be deployed primarily along high-volume arterials parallel to the freeway network, Intelligent Intersections will be deployed in a mix of settings largely focused on urban environments in locations with high multi-modal activity. Intelligent Intersections will be targeted at three different types of locations within the city:

- Along key gateway corridors (for example in and out of the downtown core or crossing Midtown). This will allow the City to be able to monitor and measure the influx of people heading into and out of the downtown core and the inner city around the clock, measuring changes in mode share and providing a real time estimate of the multi-modal heartbeat of the city when combined with transit ridership and highway sensor data;

- Along multimodal corridors that include major cycling routes and trails in order to track and monitor changes in cycling volumes including seasonal changes in activity and the overall growth in cycling as more of the network plan is built out. The technology will also be able to monitor the impact of road transformations on all road

users and will look to monitor the impacts on the safety pedestrians and cyclists on key cycling and pedestrian heavy intersections; and

- Along some of the corridors with higher crash volumes (In coordination with the Vision Zero program) so that these intersections can be optimized and tailored for the safety of vulnerable road users first, as well as to be able to track and monitor the progress of Vision Zero initiatives targeted at making these intersections safer.

Transportation Services is proposing to implement Intelligent Intersections at 100 locations over the next two years.

3. Advanced Transit Signal Priority

The reliable operation of transit on city surface streets transit has always been important; however, given the changes in ridership and bus ridership levels, it is even more crucial during the pandemic. Although there has been a reduction in transit ridership during the pandemic, the TTC has shifted its operational focus towards a flexible approach to providing sufficient service on each route, the need to ensure partial capacity on the bus to maintain social distancing and to minimize pedestrian queues waiting to board the bus at particular stops. This transit management strategy is especially complex through the pandemic due to the increasing volumes of traffic and the unpredictable nature of queues and congestion forming along the routes.

Transit Signal Priority (TSP) is an Intelligent Transportation Systems solution whereby a bus or streetcar is detected approaching an intersection and the traffic signal adjusts the signal timing to improve the operation of the buses or streetcars. TSP has been implemented at approximately 400 intersections in Toronto since 1990, with the City of Toronto and TTC collaborating over the years to develop highly advanced TSP green extension and other features to provide significant benefits to transit vehicles, while allowing impacts to other road users to be mitigated. Based on past surveys in Toronto the typical travel time saving for transit vehicles is up to 16 seconds round-trip per TSP-equipped intersection, which equates to a 10-minute round trip savings on a typical route with 40 TSP-equipped intersections. TSP is generally designed such that the priority would only be given if it was reasonably expected that the transit vehicle would require between 16 and 20 seconds of extension which could increase to a maximum of 30 seconds to account for variability in passenger service time and travel time.

The new MoveTO Advanced Transit Signal Priority (ATSP) strategy proposes installation at additional intersections. This innovation will leverage the TTC's new vehicle detection system known as computer-aided dispatch/automated vehicle location (CAD/AVL) to provide more service reliability and vehicle spacing. At the same time, ATSP will mitigate impacts on other traffic by providing priority to TTC vehicles on a conditional basis.

The strategy will be implemented on the City’s new SCATS system and its existing central traffic signal control system, working with vendors to implement the necessary upgrades to accommodate the existing TSP-related functionality and level of priority. With the new approach, the transit location data from the TTC will be provided in real-time to the City's central traffic signal control system and/or directly to the traffic signal

controller. This will allow buses and streetcars to be given longer green-times when necessary. This new strategy will facilitate the rapid roll-out of Advanced Transit Signal Priority to the majority of traffic signal locations across the City with a reduced need for planning, design and implementation of location-specific field electronics infrastructure.

The MoveTO plan includes the rapid roll-out of Advanced Transit Signal Priority at 100 locations over the next two years at locations with high transit ridership and along routes identified in the City's Surface Transit Network Implementation Strategy, which is forthcoming in November 2020.

4. Construction Hub Pilot Program

In November 2019, Transportation Services initiated the Construction Hub Coordination pilot program for the Yonge and Eglinton area. In parallel, Mayor Tory initiated what became the Construction Hub Coordination Industry Outreach Working Group, a bi-weekly meeting consisting of representatives from a number of Toronto's major construction and builder membership forum leaders such as Residential Construction Council of Ontario (RESCON), Building and Land Development Association (BILD), Toronto Area Builders Association (TARBA), Concrete Ontario, Ontario Sewer and Watermain Construction Association (OSWCA), Heavy Construction Association of Toronto (HCAT), Ontario Road Builders' Association (ORBA). In addition to the logistical planning of the right of way in the Yonge and Eglinton area, the regular meetings have assisted in further strengthening the relationship between the City and industry in navigating the implications of COVID-19.

The significantly increased construction activity across the City requires increased logistical planning of access and use of the right-of-way. This exercise has to be done in a manner to minimize the impacts on traffic as well as maintaining safe access through and around construction sites for local residents and businesses, especially vulnerable road users. The pandemic has introduced even more complexity on construction planning as restrictions get modified based on public health directives and new programs are introduced that impact the use of the right of way.

Since the high levels of construction activity in the Yonge and Eglinton area and other areas are expected to continue into 2021, Transportation Services is now proposing to extend the Construction Hub pilot program in time and locations. Three additional Construction Hubs are proposed to be initiated next year as follows and as shown in Attachment 7:

- The Downtown Hub - bounded by College and Carlton Streets, Jarvis Street, Bay Street and Queen Street East;
- The Lakeshore Corridor - bounded by King Street, Cherry Street, Bathurst Street, and Queens Quay; and
- The East Harbour Hub - bounded by Lake Shore Boulevard East, Booth Avenue, Eastern Avenue, and the Don Valley Parkway.

In all four of these Construction Hubs, it is proposed that Transportation Services would continue to effectively manage access to the right-of-way placing emphasis on the Vision Zero principles of ensuring safe access for vulnerable road users while

developing traffic management and communications plans to help in mitigating the congestion-related impacts associated with unavoidable road closures.

Transportation Services is able to continue to fund and support the pilot for this program through 2021. Program expansion and permanency will be considered based on the results of the pilot and with consideration of other City priorities through future budget processes.

Transportation Services has included provisions to continue to fund and support the pilot for this program in their 2021 Operating Budget submission. Program expansion and permanency for 2022 and beyond would move to a model of full cost recovery for any program costs through a revision of transportation user fees. Further analysis and industry consultation is proposed to occur in 2021 to be ready for the 2022 budget process.

5. Transportation Demand Management

Transportation demand management (TDM) is the active use of measures to encourage individuals to make specific transportation choices that serve to benefit the overall management of the system. Common measures include the provision of carpool matching services, employer-subsidized transit passes, parking pricing, and education. The City of Toronto has been implementing employer-based TDM for at least two decades through the Smart Commute program delivered by the Environment and Energy division.

TDM measures such as flexible work arrangements and telework have played a critical role in the response to the COVID-19 pandemic across the world, including to provide business continuity at the City of Toronto. As part of the MoveTO interim action plan, staff are proposing to build on the existing Smart Commute program to provide additional supports to employers in Toronto, such as tools to coordinate the use of workplace pinch points such as elevators, increased alternative work arrangement options, and trip-end facilities for cyclists. This would include coordination of employee arrival and departure times with public transit schedules to manage demand and facilitate physical distancing in TTC and GO Transit vehicles.

Beyond immediate actions, staff are recommending that a TDM strategy be developed to improve the toolset available to the City of Toronto in managing demand, boost the depth of engagement with major employers, and develop programs that address transportation system capacity challenges outside of the typical commuting times and routes. The strategy would investigate needs and opportunities in residential-based TDM, development requirements, incentive programs, and school-based trips. Staff are proposing to report back to the Infrastructure and Environment Committee in the second quarter of 2022 on the outcome of the strategy, including any requested authorities, budget implications, and recommendations for removing barriers and providing incentives under the jurisdiction of other orders of government.

Congestion Management Plan Continuation and State of Good Repair

A small number of projects that were initiated in the original Congestion Management Plan require additional funding over the next two years to bring them to completion. In some cases, projects were deferred in order to fund other higher priority initiatives within the plan. The most significant portion of this costing is associated with the need to replace the City's five legacy variable message signs (VMS) on the Don Valley Parkway. These signs have met their life expectancy however, staff have found innovative ways to sustain them over the past couple of years. In two years' time, it will no longer be possible to maintain these signs. In other cases, projects that were initiated and completed require additional funding to extend their support such as the Advanced Transportation Management System (ATMS) project that improved the City's ability to remotely connect and change traffic signal operations in response to major incidents. The total cost to complete and maintain these important services is $4.98M over the next five years.

Equity Impacts of MoveTO

Implementation of the plan will result in reduced transit travel times and increased schedule adherence for transit riders, reducing the length of time riding public transit (and subsequent length of time riders spend in an enclosed space), as well as improving the ability to transfer and connect. This is especially important for essential workers who must continue to travel to work by transit through the pandemic. MoveTO will also facilitate shorter wait times for pedestrians at some intersections, reducing the frequency of pedestrians clustering at corners.

In addition, traffic delays and congestion generate excess pollutants from stop-and-go traffic ultimately impacting air quality in nearby communities. Due to the economic impacts of congestion, the communities that experience poorer air quality from transportation emissions tend to be lower-income areas, including some Neighbourhood Improvement Areas. The proposed MoveTO plan facilitates increased responsiveness of traffic signals for vulnerable road users, reducing exposure at intersections and negating the need to cross against traffic lights due to excessive wait times.

Conclusion

MoveTO 2021-22 is an interim action plan to modernize and build resilience into the City of Toronto's transportation system through the response to the COVID-19 pandemic and into the recovery period. MoveTO involves using both piloted and proven techniques and technologies as follows:

- Installation of smart and adaptive traffic signals to reduce travel times and improve the reliability of travel time for travel by vehicle;
- Implementation of intelligent intersections to improve safety and optimize movement for pedestrians and cyclists;
- Enhancement of transit signal priority to improve the TTC's on-time performance and spacing of vehicles, which will also reduce crowding at transit stops;

- Expansion of the hubs approach to coordination of construction activity that will minimize impacts and increase safety for the surrounding community; and
- Supporting employers in continuing to adjust to changing circumstances in employee commuting, while also developing a strategy to address other types of congestion.

Overall, MoveTO will modernize, improve operations, and build resilience into the City of Toronto's transportation system with substantial benefits through the pandemic and far beyond. With approval from City Council for the MoveTO Interim Action Plan, including to negotiate and execute any non-competitive agreements for the design, supply, delivery, implementation and support of a traffic adaptive signal control system solution, the benefits of MoveTO will be realized in select locations within 12 months.

The Fair Wage Office has reported that TransCore ITS, LLC has indicated that it has reviewed and understands the Fair Wage Policy and Labor Trade requirements and has agreed to comply fully. Background on the potential terms of the Smart Signal licence agreement with Transport for NSW (New South Wales) are included in Attachment 8.

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ATTACHMENTS

Attachment 1: MoveTO Capital Budget Forecast
Attachment 2: Travel Time Index
Attachment 3: MoveTO Program Summary
Attachment 4: Downtown Transportation Operations Study Results Summary
Attachment 5: MoveTO Planned Smart Signal Corridors
Attachment 6: Fairness Monitor Attestation Report for RTP 1205-17-5043
Attachment 7: Proposed Construction Hubs
Attachment 8: Potential Terms of Smart Signal Licence Agreement

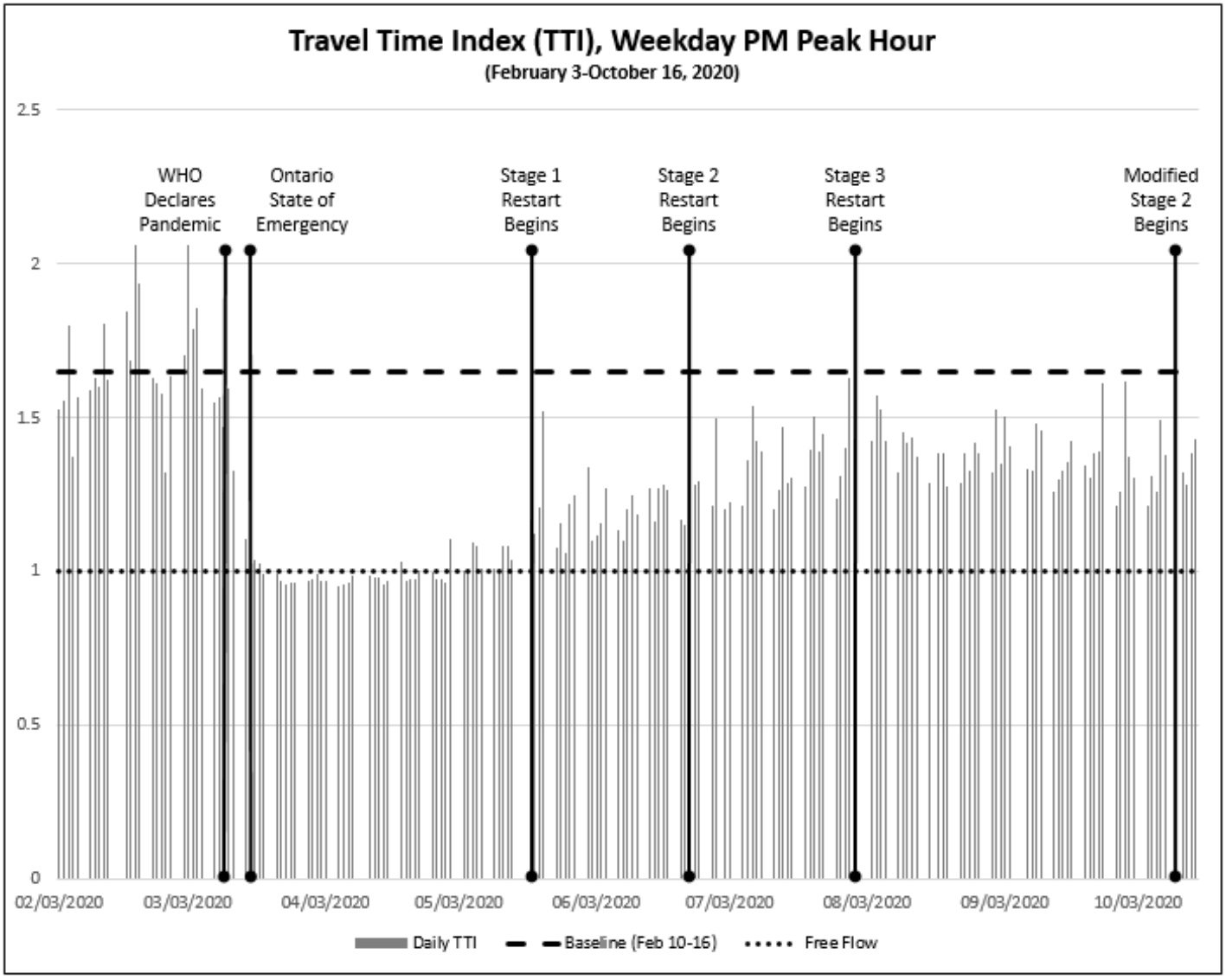
Attachment 1: MoveTO Capital Budget Forecast

Funding request to be considered as part of the 2021 Capital budget submission (2021 to 2025) **$ in millions**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Smart Signals and Transit Signal Priority	$3.54	$3.39	$6.50	$6.68	$10.04	$30.15
Intelligent Intersections Program	$0.92	$2.29	$0.48	$ -	$ -	$3.69
CMP 1.-0 on-going initiatives	$ -	$1.50	$2.27	$0.77	$0.45	$4.98
Total	**$4.45**	**$7.18**	**$9.25**	**$7.45**	**$10.49**	**$38.82**

Funding to be considered in future years **$ in millions**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Smart Signals and Transit Signal Priority	$ -	$ -	$21.07	$20.93	$30.37	$72.37
Total			**$21.07**	**$20.93**	**$30.37**	**$72.37**

Total Combined Program Cost: $38.82 + 72.37 = $111.3M

Attachment 2: Travel Time Index



Attachment 3: MoveTO Program Summary

Program	Description	Locations	Benefits
1. Smart Signals	Implementation of Smart Signals that will automatically adapt their operation to meet the demands of traffic in real-time	500 Locations to be implemented over the next 5 years	Benefit to Cost of 3:1 Travel Time Reductions (%): Peak Hours - 2.6% Weekday - 2.5% Weekend - 1.0%
2. Intelligent Intersections	Implementation of Intelligent Intersections to bring multi-modal intelligence to intersections including automatic detection of pedestrians and cyclists for improved safety via extended green times and reduced delays.	100 Locations to be implemented over the next two years	Will provide more time at lights to pedestrians and cyclists in real time and as demand warrants Ability to monitor the volumes and movements of all road users to support congestion management and safety analytics Ability to measure safety conflicts such as near misses as well as red light running and intersection blocking Will post continuous and real time data on open data from the detections and phasing at these intersections

Program	Description	Locations	Benefits
3. Advanced Transit Signal Priority	Implementation of a system that detects buses running behind schedule and extends green times when necessary to accommodate.	Strategy would enable TSP at all 2400 signals within the City however, the first 100 priority locations would be configured over the next two years	~10 minute round trip savings on typical route with 40 TSP equipped intersections
4. Continuation of the Construction Hub Pilot Program	Extending and Expanding the Construction Coordination Hub Pilot	4 Construction Hub Pilot Locations proposed for 2021 - Yonge/Eglinton Hub - Downtown Hub - Lakeshore Hub - East Harbour Hub	Better management and coordination of City right of way. Improved safety around construction work zones. Improved Traffic Management and Communications within Hubs
5. Transportation Demand Management Strategy	Supporting Employers in Providing Commuting Choices	Citywide	Improved resiliency of the transportation system. Reduced transportation demand for roads; potential for deferred expansion costs. Reduced greenhouse gas emissions.

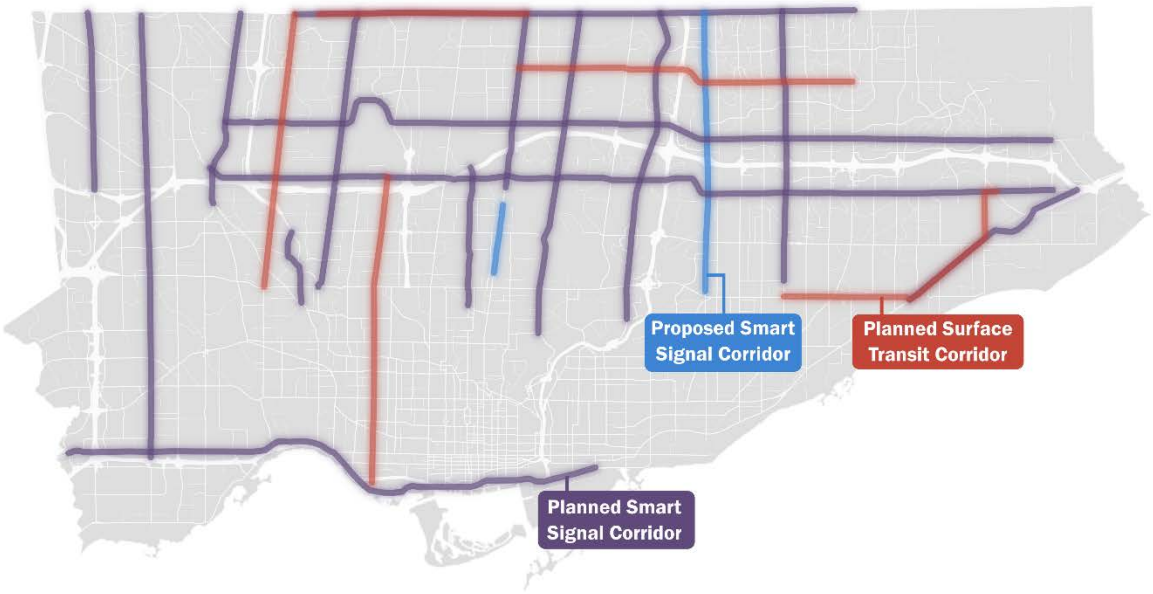
Attachment 4: Downtown Transportation Operations Study Results Summary

Project	Results
1 - Downtown Transportation Operations Project Implementation Team	In 2015, the General Manager, Transportation Services began chairing the Road Closures Coordination Working Group with senior representatives from Toronto Police, Toronto Parking Authority, TTC, and other stakeholders to prioritize efforts among City agencies that affect transportation operations across the City, including the downtown core. The Working Group still meets on an ongoing basis each month.
2 - Road User Behaviour Education Campaigns	The City has released materials to educate road users on safety and appropriate behaviour through the Art of Distraction, Please Slow Down Lawn Signs, Bicycle Safety, School Safety and End of Daylight Savings campaigns. These campaigns are now part of the City's Vision Zero Road Safety Plan.
3 - Traffic Assistance Personnel (TAP) Program	A contract for the TAP Pilot was awarded in Q1 of 2015, with pilot roll-out in Q3 of 2016. For the pilot, Toronto Police Service personnel were employed to enforce traffic by-laws, provide traffic control, and break gridlock conditions to reduce congestion and improve pedestrian safety. The success of the pilot led to the Traffic Wardens Program that was deployed in Q2 of 2018 and is currently ongoing.
4 - Adjusted Hours of Peak Period Parking and Turning Restrictions	In 2014, adjusted hours of peak period parking and turn restrictions were implemented on King St and Queen St. The hours when "No Stopping" is permitted on these roads were amended to reflect extended rush hours of 7:00 AM to 10:00 AM and 3:00 PM to 7:00 PM. In 2015, similar changes were made along Queen St, Dundas St, and Carlton/College St.
5 - Intensified On Street Stopping, Standing, and Parking Enforcement	Increased enforcement of the existing parking, standing and stopping regulations during peak periods in the downtown core was implemented in 2015. The increased enforcement improved road network operations and is currently ongoing.
6 - Enhanced Parking Infractions Management	Enhanced parking infraction management was implemented in 2015 by increasing fines from $60 to $150 for illegally stopped vehicles on key rush hour routes. City Council approved the governance and administrative requirements to establish an Administrative Penalty System (APS) for parking violations in 2016, with implementation taking effect in 2017.
7 - Courier Management	28 Courier delivery zones were implemented in 2014 and were successful at reducing courier operations in downtown routes, namely King St.

Project	Results
8 - Enhanced Disruption Management	In 2015, Transportation Services revised the Street Occupation Permit Fee to an area-based fee, and that permit fee rates be based on the market rate for space on public roadways as informed by on-street metered parking rates. These revisions were proposed to better manage the impacts of street occupancy in the surrounding area of road/ lane closures.
9 - Special Events Transportation Management	Continuous improvements implemented, including through the management of traffic and transportation during the 2015 Pan Am Games.
10 - Yonge & Dundas Area Traffic Operations Improvements	See above regarding courier delivery zones.
11 - Bay Street Clearway Transit Operations Improvements	Three new north-south right-turn restrictions on the Bay Street Urban Clearway were implemented in 2014 to facilitate transit through movements and reduce delays for passengers. As a result, northbound and southbound left and right turns are generally prohibited throughout this area on weekdays from 7:00 AM to 7:00 PM.
12 - Wellington Street and Simcoe Street Redesign and Two-way Conversion	In development.
13 - Gardiner Expressway Lane Modifications	In late July 2016, the City of Toronto prepared for the construction of a new off-ramp from the eastbound Gardiner Expressway to Lower Simcoe Street. This project included the removal of the York-Bay-Yonge off-ramp, the construction of a new ramp ending at Lower Simcoe Street, and improvements to Harbour Street. The new York-Bay-Yonge Ramp opened on January 29, 2018 to continue to accommodate high volumes of traffic flow from the Gardiner Expressway.
14 - Downtown Arterial Roads Traffic Cameras	A total of 144 traffic cameras were installed on arterials overall between 2014-2017, with 43 cameras installed primarily along PanAm Games Route in 2015.

Project	Results
15 - Transit Priority Strategy	A best practices review including a scan of industry technology options was completed in Q4 2016, with a TTC agreement started in Q2 2018, and anticipated implementation for Q1 2021.
16 - Richmond Street Congestion Management Traffic Signal Strategy	Optimized timings for the corridor were implemented in December 2012. The optimization significantly reduced delays and stops on Richmond Street for all three time periods.
17 - Entertainment District Area Operations Traffic Signal Strategy	A number of other traffic operations studies have covered off the original intention of this study.

Attachment 5: MoveTO Planned Smart Signal Corridors



Attachment 6: Fairness Monitor Attestation Report for RTP 1205-17-5043

Attachment 7: Proposed Construction Hubs

Attachment 8: Potential Terms of Smart Signal Licence Agreement

The City has engaged in communications with TransCore, who is also facilitating discussions on behalf of Transport for NSW, and the City notes that the negotiations may require that the software end user licence agreement with Transport for NSW be governed under the law of New South Wales, Australia. Transport for NSW has requested an indemnity from the City for damages arising out of the City's breach of the licence or use of the software, and also seeks to limit its liability to the total amount paid for the software.

The software end user licence agreement with Transport for NSW will be related to any executed agreements with TransCore, as the authorized sub-distributor for Transport for NSW. All software licence supply, installation, support and maintenance payments will be paid to TransCore, the SCATS authorized sub-distributor in North America. No additional payment will be given directly from the City to Transport for NSW.