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INITIATIVES TO MANAGE TRAFFIC CONGESTION

The Transportation Services Committee recommends:

- 1. Receipt of the presentation by Paul Nause, Manager, Traffic Engineering and Integrated Intelligent Transportation Systems and Gregg Loane, Program Manager, Integrated Intelligent Transportation Systems; and**
- 2. Adoption of the recommendation contained in the following report dated December 19, 2011, from the Commissioner of Transportation and Community Planning.**

1. RECOMMENDATION

It is recommended that this report be received for information.

2. PURPOSE

This report updates Council on the Transportation and Community Planning Department's approach to congestion management for York Region. The report explains the impacts and causes of traffic congestion and describes the tools being used to improve mobility in York Region.

3. BACKGROUND

Traffic congestion has been a concern in York Region for many years

In 1971, the newly established Regional Government recognized that "a sprawling, uncontrolled urban growth is not inevitable". At that time, the Region identified problems associated with "traffic congestion, pollution, urban sprawl, strip development and local finances" were challenges that would require financial resources, skills and tools to mount an effective attack on these problems.

More recently, a 2009 Organization for Economic Co-operation and Development (OECD) report estimated in 2006 alone, traffic congestion resulted in \$3.3 billion in lost productivity in the Greater Toronto Area.

A 2006 York Region Council report entitled "Managing Congestion – Update" summarized the efforts taken over the previous two years to identify the causes of

congestion, and identified solutions to be carried forward, including intersection improvements, transit initiatives, arterial corridor reviews, road expansions, and improvements in traffic management technology. This report was one of the catalysts for the Region to commission in 2007 the York Region Intelligent Transportation Systems Strategic Plan, which is currently being implemented.

In 2011, a York Region customer satisfaction survey revealed 75% of York Region residents polled identified traffic conditions as a very important factor in determining where they choose to live. Of those polled, 26% indicated their work commute very negatively impacted their quality of life, and the majority of these specifically identified bad traffic and the amount of time spent in their car as their concerns.

4. ANALYSIS AND OPTIONS

Congestion happens for a variety of reasons; sometimes because there is an incident, and sometimes because there is too much traffic volume (demand) for our road network to process

There are two basic types of congestion:

- Recurring congestion – the kind you will see everyday at rush-hour
- Non-recurring congestion – the kind that happens when something unusual occurs

There are many causes of non-recurring congestion. They include:

- Incidents – collisions, breakdowns
- Work zones – construction, maintenance, lack of a planned road disruption management process
- Weather – snow, ice, fog, heavy rain
- Special events – parades, parties, protests
- Emergencies – evacuations, disasters

Generally, these types of non-recurring congestion cannot be eliminated. However, the effects of this congestion may be reduced through effective road network management.

By contrast, the causes of recurring congestion are less obvious to the road user because they are not related to any physical blockage on the roadway. Common causes of recurring congestion include:

- *Insufficient capacity for the demand* – This occurs when the number of users exceeds the road's ability to process traffic. This manifests itself as rolling queues (due to traffic volume congestion), queues developing at bottlenecks (such as road narrowings, in basket-weave areas, and in areas with busy accesses) and at pinch-

points (such as at busy traffic signals with heavy competing demands for “green time”).

- *Unrestrained demand* – This occurs when land use management allows development to occur at a pace that exceeds improvements in capacity and transportation infrastructure (i.e. people moving capacity inclusive of roads and transit).
- *Need for improved management of congestion* - This occurs when the services and systems for managing congestion are not in place, or when they are not performed or managed efficiently. To this end, there is a continuing need to monitor and evaluate traffic conditions to ensure a proactive approach towards addressing changes in traffic volumes and patterns.

The ‘traditional’ approach to addressing capacity shortfall was to build new roads, or to widen existing roads, to meet this demand. Today, more sustainable approaches to meeting demand are preferred. These include the promotion of improvements in transit, cycling and pedestrian infrastructure to encourage a modal shift in the way people choose to travel.

Residential growth and the resulting commuting trips contribute to congestion in York Region

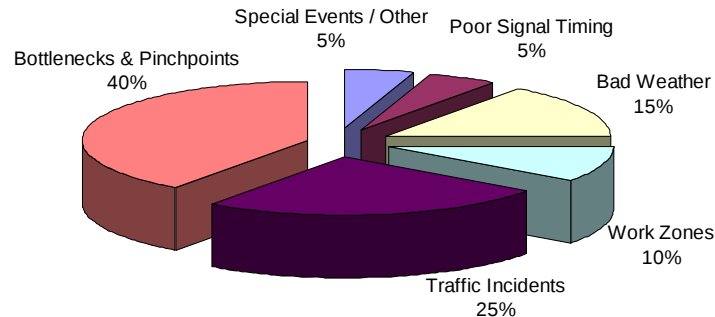
York Region’s economic development and population growth success story has been, and will continue to be a contributing factor to the growing congestion pressures within the Region. Table 1 illustrates the rate of growth, which has a direct relation to the growth of congestion over time.

Table 1
Growth of Congestion

Growth Trends in Congestion	Years	Years
	2001 – 2011	2011 – 2021
Population growth	41%	22%
Employment growth	34%	39%
Travel demand growth (across major screenlines)		
- To/From Toronto	18%	15%
- To/From Peel	10%	18%
- To/From Durham	40%	41%
- To/From Simcoe	16%	8%

These figures illustrate a healthy trend toward increasing the local employment base to service the growth in the number of York residents. A Regional planning objective will be to ensure this growth in employment remains focussed on high-paying local positions that mitigate the number of commuting trips.

The following exhibit outlines the relative impacts of recurring congestion (shown on this graph as ‘bottlenecks’) and non-recurring congestion types (shown as the remaining congestion types). Non-recurring congestion accounts for more than half of the total congestion experienced on the streets, and thus measures to manage and mitigate this congestion are the focus of this report.



Estimates for the Greater Toronto Area suggest congestion here results in as much as \$3.3 billion in lost productivity in 2006.

Our Congestion Management Toolkit is focussed on managing travel demand by reducing the number of trips, improving transit services and better managing the existing road network

In support of The Regional Municipality of York’s Official Plan (which speaks to managing urban growth and land use), the Region’s Transportation Master Plan identifies the reduction of travel demand as a cornerstone of the Plan. Reducing demand for single-occupant vehicle (SOV) travel reduces congestion and supports a greener, more sustainable environment. The Transportation Master Plan specifically identifies four key objectives to reduce single-occupant vehicle travel, and to achieve the greatest mobility possible:

- Develop initiatives and strategies that reduce the need to travel
- Provide more convenient and reliable alternative modes
- Enhance public transit by improving existing infrastructure and services
- Optimize roads to accommodate all modes of travel, and expand roadways only when necessary

The following report focuses on the latter part of these objectives, and describes the services provided by the Traffic Management and Intelligent Transportation Services Branch of the Department to manage travel demand and make the most effective use of the existing road capacity.

York Region's Congestion Management Toolkit

How to Reduce Recurring Traffic Congestion

Effective traffic management processes and systems are key to reducing recurring traffic congestion. York Region employs a number of traffic engineering tools and procedures to manage traffic on the Regional road network, as follows.

The Region operates a Centralized Traffic Signal Control System (CTCS) which allows us to set signal timings, operate signals in a coordinated fashion, manage signal timing plans by time of day, provide priority to transit and emergency vehicles, and through traffic detectors, monitor conditions on the roadway.

The Region uses computer simulations to model the effects of changing signal timing, so these changes can be optimized before they are installed on the street. These models consider the potential improvements to be gained for not only a specific traffic signal, but also how operations will improve for a group of synchronized signals.

As part of these on-going efforts to update signal timing and signal synchronization to best suit road-user needs, the Region also conducts pro-active 'arterial road reviews', which are comprehensive assessments of how a road is operating. They include evaluations of the signal timing efficiency that lead to improvements in traffic signal synchronization. Our ability to reduce congestion is determined by measuring the travel time through the study area before and after making the desired signal timing and other related adjustments.

The Region has recently signed an agreement to procure commercially-available traffic flow information (using cell phone location data) from Urban Informatics Corporation (UIC). One of the uses of this data will be to help us identify congestion hotspots, and these locations will be the subject of future arterial road reviews.

In addition, as part of the vivaNext deployment, a new traffic signal control system is currently being procured which will expand our ability to provide priority to transit vehicles on Regional roadways.

How to Reduce Non-Recurring Traffic Congestion

To effectively manage the impacts of incidents, planned road work, and special events, it is necessary to:

- Understand the operational procedures governing the roles of the various impacted agencies and personnel
- Monitor the on-going operations

- Respond to changing operational needs during the event using various tools and procedures
- Use “smart” programming/scheduling tools to minimize the impacts of capital construction and road maintenance projects

York Region Transportation and Community Planning Department has a Standard Operating Procedure (SOP) for managing non-recurring congestion that provides process direction in the event of a non-recurring incident. It describes roles and responsibilities for potential stakeholders, provides contact information for these stakeholders, and identifies system tools to be used in support of managing the incident so the time to resolution is reduced. The procedures also specify the communication escalation procedures to make sure senior staff, municipal staff, all other stakeholders, and the public are informed of the incident in a timely fashion. These Standard Operating Procedures are reviewed regularly to ensure they incorporate lessons learned, and that all related contacts are up-to-date.

The Region relies on various personnel and tools in detecting these non-recurring events causing the congestion, and in monitoring their progress towards resolution. These include:

- York Regional Police are often an early source of information concerning events causing congestion
- York Region Transit dispatch and their bus operators are also often a key source of information concerning events
- York Region’s roads patrollers
- Closed-circuit television (CCTV) cameras covering a limited portion of the Regional road network
- Urban Informatics Corporation (UIC) data – a commercial data feed providing network congestion data for the Regional road network
- Bluetooth detection technology used to measure travel time on Highway 7 through the vivaNext construction area

There are a variety of tools used to manage events causing non-recurring congestion. The Region modifies traffic signal control parameters to better manage traffic near events. The Region employs “smart” work zones to provide video and detection monitoring and signing support of work and event zone operations. The Region also provides active management of special events using barricades, signing, temporary by-law modifications, temporary signal timing adjustments, etc. Also, Roads operations personnel provide minor road repair and road salting services as needed.

In support of these activities, the Region employs Portable Variable Message Signs (PVMS) to warn road users of road and lane closures ahead on the roadway. These signs are trailer-mounted and normally deployed for major planned and emergency closures / reductions. They are placed in advance of these trouble spots at locations that give

motorists opportunities to divert before getting to the congested area. Occasionally, fixed (not variable) signs are used for this same purpose in advance of planned closures.

The Region also uses traveller information to reduce travel demand and effect route balancing. Specifically, the Transportation Services pages of the York Region public website provides live camera images of road conditions where cameras are available, planned road closure information (including location, anticipated start and end date, nature of the closure and advice for motorists), and longer-term construction information. Similarly, the York Region Transit website provides service alerts related to road closures, incidents and any other activities affecting transit service.

For major events, York Region Corporate Communications prepares media releases that are sent to broadcast media and posted to the York Region website. On an as-needed basis, these releases are disseminated via York Region's social networking channels, including Twitter and Facebook.

To assist in the management of non-recurring congestion, York Region is currently deploying a telephone-based traveller information system to complement the information provided on the Portable Variable Message Signs, and to make this information available to a significantly expanded audience. This deployment will be completed in early 2012.

Link to Key Council – approved Plans

York Region's approach to managing congestion directly supports York Region's Transportation Master Plan and Official Plan by:

- Developing initiatives and strategies that reduce the need for travel
- Optimizing roads to accommodate all modes of travel

The Traffic Management and Integrated Intelligent Transportation Services Branch's congestion management toolkit provides the means of reducing travel demand, and managing congestion, promote mobility and support a greener, more sustainable environment.

5. FINANCIAL IMPLICATIONS

The Capital expenditure tools associated with Congestion Management are funded out of the ITS Strategic Plan approved by Council in December 2007. This 10-year strategy included approximately \$27 million in capital investments for roads and traffic initiatives aimed explicitly at managing congestion.

An additional \$1.8 billion in capital investment is also planned to significantly expand York Region's transit infrastructure (including the viva, vivaNext, and subway expansion

initiatives). This funding includes significant investment in transit-oriented technologies that combat congestion.

Although these large investments are planned over many years, actual commitments are reviewed and approved annually during the budget process.

6. LOCAL MUNICIPAL IMPACT

Congestion adversely affects all our local municipalities. York Region's approach to managing congestion directly benefits residents in each of the local municipalities by improving their mobility throughout York Region. Further, the related Standard Operating Procedures in place provide a framework for a cooperative work environment amongst York Region and local municipal staff during the management of events causing non-recurring congestion. Management of events, as well as our capital programs, is routinely completed in cooperation with our local municipal staff and councils. Staff will continue to work closely with the nine local municipalities to refine our congestion management strategies and to implement programs that reduce congestion on our road network.

7. CONCLUSION

There continues to be significant progress towards making the Regional transportation system as 'intelligent' as possible to reduce the impact of both recurring and non-recurring congestion. While congestion may never be eliminated, York Region services will increasingly provide our constituents with:

- Effective signal control and other systems to assist them on their way
- Timely information concerning current conditions and alternative travel choices
- Effective public transit alternatives to get them to their destination

For more information on this report, please contact Steven Kemp, Director, Traffic Management and Intelligent Transportation Systems at Ext. 5226.

The Senior Management Group has reviewed this report.



INITIATIVES TO MANAGE TRAFFIC CONGESTION

Presentation to
Transportation Services Committee

Paul Nause and Gregg Loane
January 11, 2012

Purpose of This Presentation

1. To explain the impacts and causes of traffic congestion.
2. To describe the tools being used to relieve congestion for road users.



Outline

- ❑ Background
- ❑ Why Does Congestion Occur?
- ❑ The Growth of Congestion In York Region
- ❑ Strategies for Managing Congestion
- ❑ Congestion Management Process
- ❑ Opportunities for Improvement

Background

- ❑ 1971 – Regional Chair identified congestion as a growing issue for York Region residents
- ❑ 2006 – Council Report on “Managing Congestion”
- ❑ 2009 – Results in \$3.3 billion in lost productivity annually in the GTHA
- ❑ York Region customer satisfaction surveys have identified traffic congestion as a significant concern.

Why Does Congestion Occur?

There are two basic types of congestion:

- ❑ Recurring congestion
 - the kind you will see everyday at rush-hour



- ❑ Non-recurring congestion
 - the kind that happens when something unusual occurs

Why Does Congestion Occur?

Causes of recurring congestion:

- ❑ Unrestrained demand
- ❑ Bottlenecks & pinch points



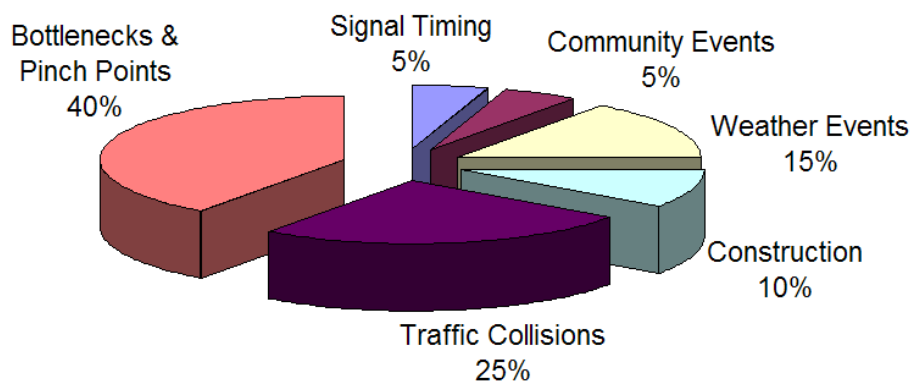
Why Does Congestion Occur?

Causes of non-recurring congestion:

- ❑ Incidents – collisions, breakdowns
- ❑ Special events – community events, parades, protests
- ❑ Emergencies – evacuations, disasters
- ❑ Work zones – construction, maintenance
- ❑ Weather – snow, fog, heavy rain



What Contributes to Congestion?



Source: FHWA (2003)

Growth of Congestion in York Region

Factors Influencing Congestion:

- ❑ Population & employment will both continue to increase through 2021
- ❑ Transit ridership is expected to increase
- ❑ However, growth in ridership will not offset increased demand in travel

Result:

- ❑ Congestion will continue to be a challenge



Current Congestion Management Approach



Advocated reducing demand by:

- ❑ Managing growth and land use
- ❑ Encouraging use of alternative modes of travel
- ❑ Improved public transit
- ❑ Optimized road network for all road users

Objective:

Achieve the greatest mobility possible

How We Manage Recurring Delay

- ❑ Traffic Management
 - ❑ Traffic signal systems
 - ❑ Traffic modelling
 - ❑ On-street reviews
 - ❑ Respond to requests



How We Manage Recurring Delay

- ❑ Reduce travel demand using traveller information:
 - ❑ Message Signs
 - ❑ Website
 - ❑ *Coming Soon:*
 - ❑ by phone
 - ❑ by updated website
 - ❑ Export open data



Congestion Management Process





Event Begins

Traffic Response Meeting to identify:

- resources ✓
- tools ✓
- process / plans ✓





Road Closures

This page lists planned road closures only.

Any unplanned road closures will be posted on our [media releases web page](#).

Langstaff Road (Y.R. 72)
City of Vaughan, between Huntingdon Road and Highway 27
Effective Date: Monday July 4, 2011 to Monday August 8, 2011

Langstaff Road will be temporarily closed to all but local traffic from Huntingdon Road to Highway 27 to facilitate the safe and efficient works associated with the Rainbow Creek watercourse crossing and significant earthworks and roadway re-grading in the adjacent area for Road Construction Contract No. 09-100. Throughout this road closure, access for local traffic will be maintained.





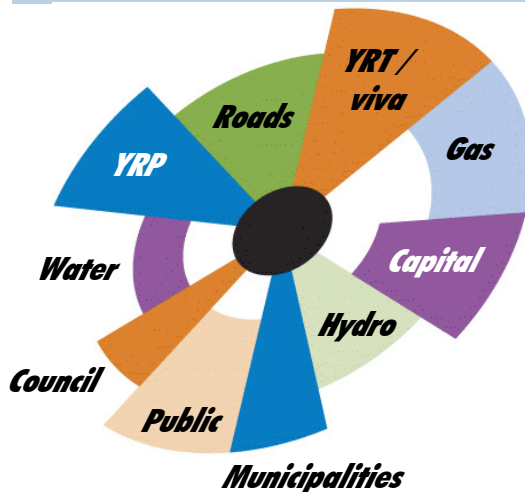
Traveller Information About the Event

Message Signs 

Website 

Phone information

3rd Party Delivery



Coordination with
Stakeholders
(as needed)

Monitoring Conditions



Monitoring Conditions

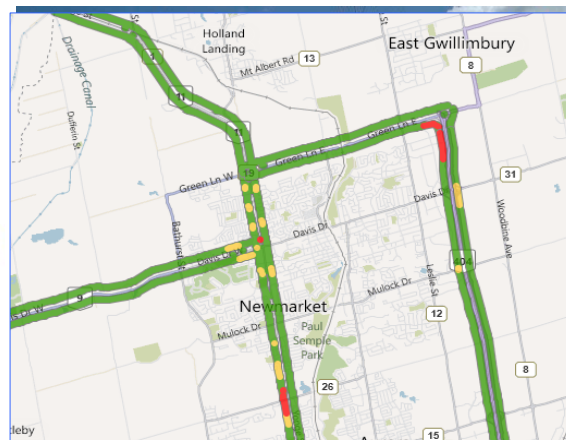
Road patrols

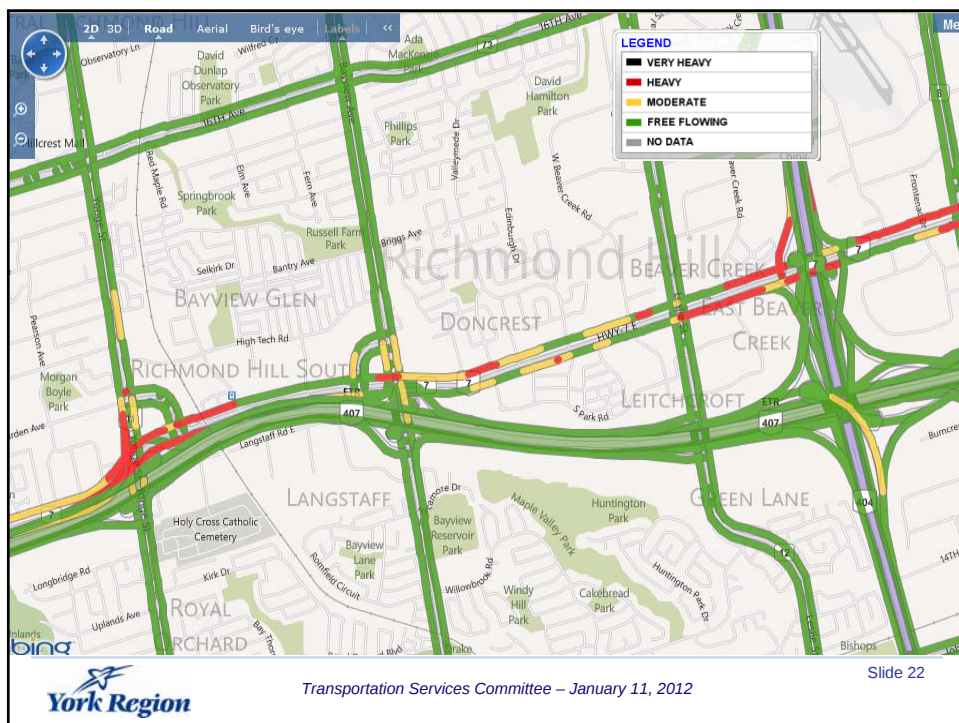
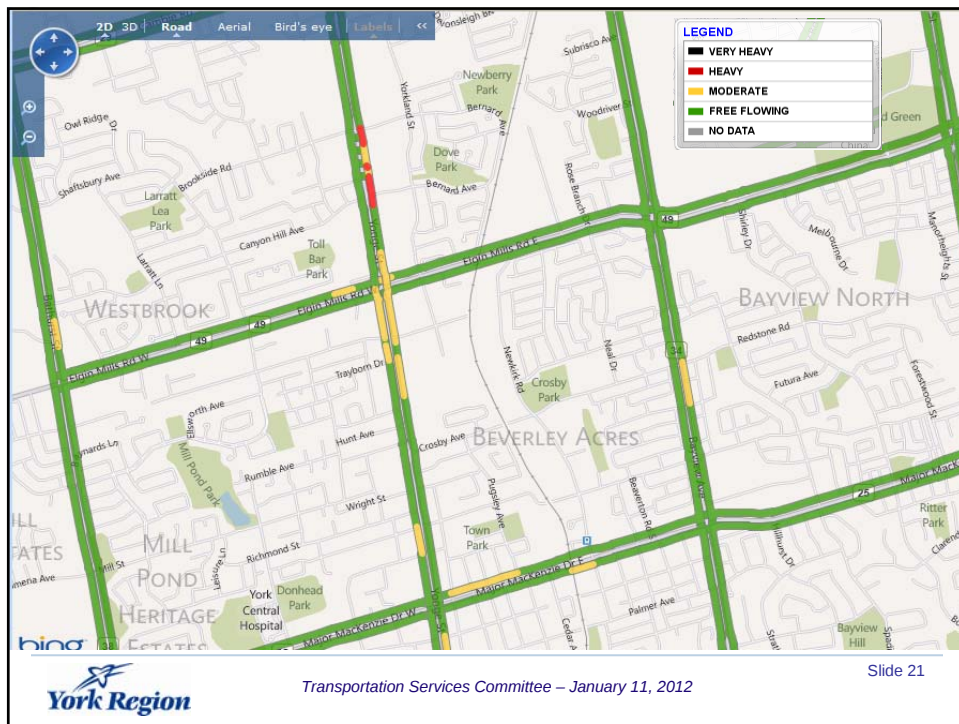


Traffic cameras



Data services







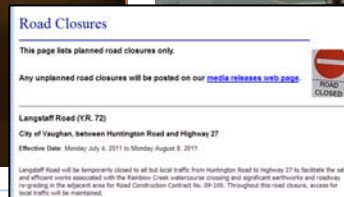
Make Operational Adjustments

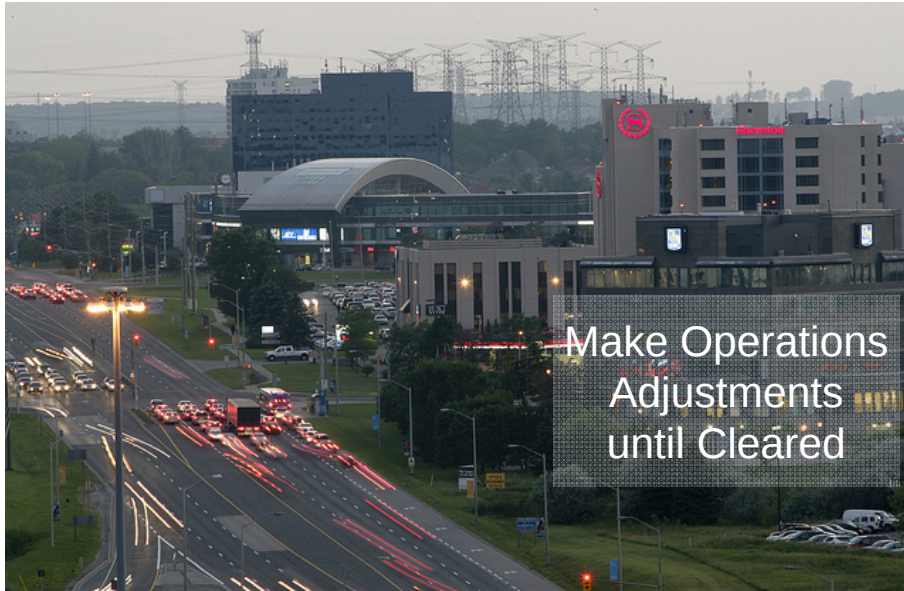
Make Operations Adjustments

Traffic Signals 

Barriers & signs 

Traveller Information 





Make Operations
Adjustments
until Cleared

Recent Accomplishments

- | | |
|---------------------------------------|--------------|
| □ Traffic camera deployments | 2007-Present |
| □ Broadened our systems expertise | 2008-2011 |
| □ 'Smart' work zones | 2010 |
| □ Website updated to include cameras | 2010 |
| □ Social media | 2011 |
| □ Road disruption management process | 2010-2011 |
| □ GPS probe monitoring | 2011 |
| □ Data service for network monitoring | 2011 |

Scheduled Improvements

- | | |
|--------------------------------------|-------------|
| □ Traveller information phone system | Spring 2012 |
| □ Traffic management system | Summer 2012 |
| □ Signal control system (vivaNext) | Autumn 2012 |
| □ Integration with MTO data | 2013 |
| □ Arterial reviews | On-going |



Discussion/Questions?