

BLUETOOTH TRAVEL TIME MONITORING SYSTEM

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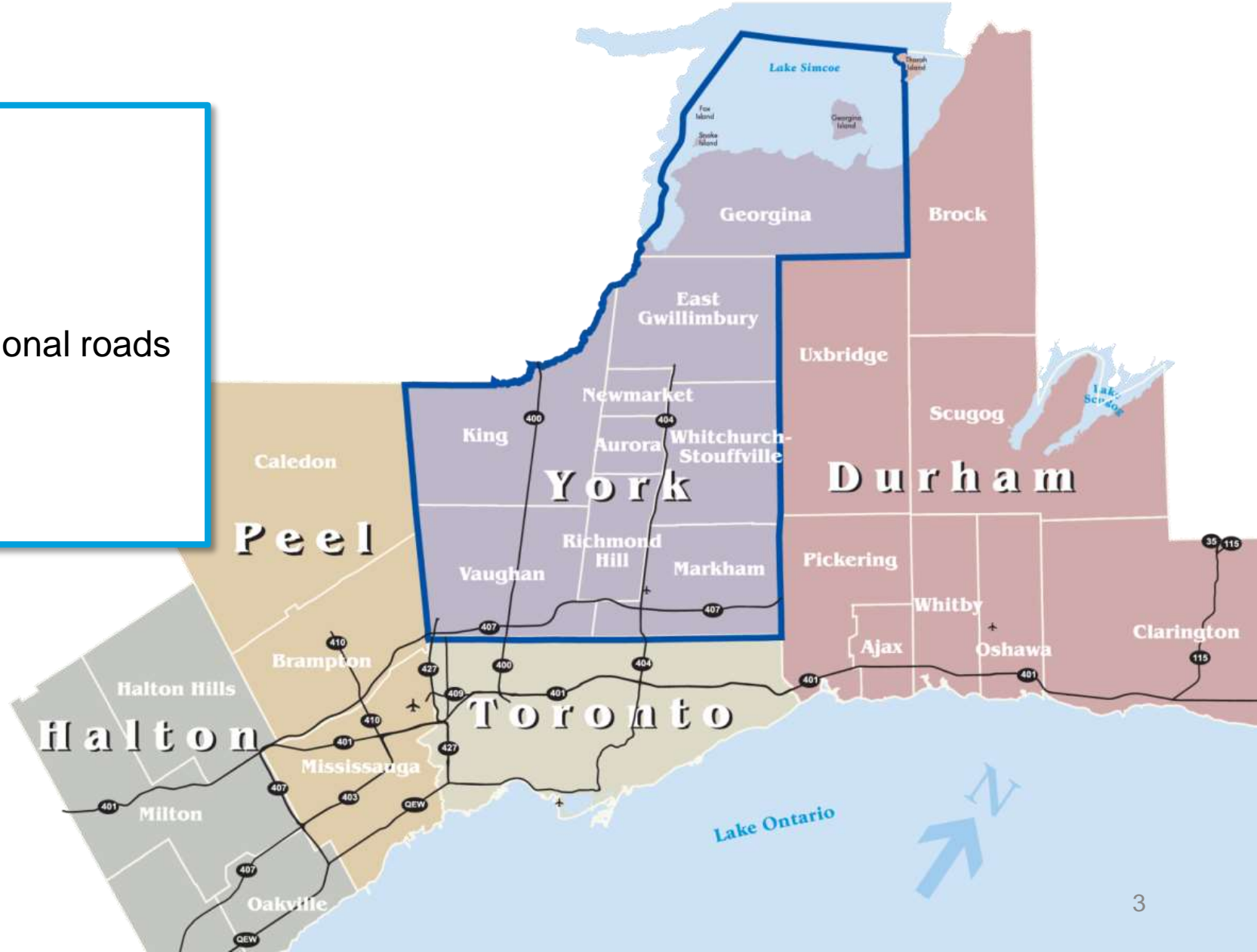


OUTLINE

- York Region Quick Facts
- Project Background
- Bluetooth Applications in York Region
- Next Steps

QUICK FACTS

- Area - 1776 km²
- Population
 - 2016 – 1.1 million
 - 2041 – 1.8 million
- ~4,200 lane kilometers of Regional roads
 - ~40% Urban
 - ~60% Rural
- ~890 traffic control signals



PROJECT BACKGROUND

BLUETOOTH COVERAGE



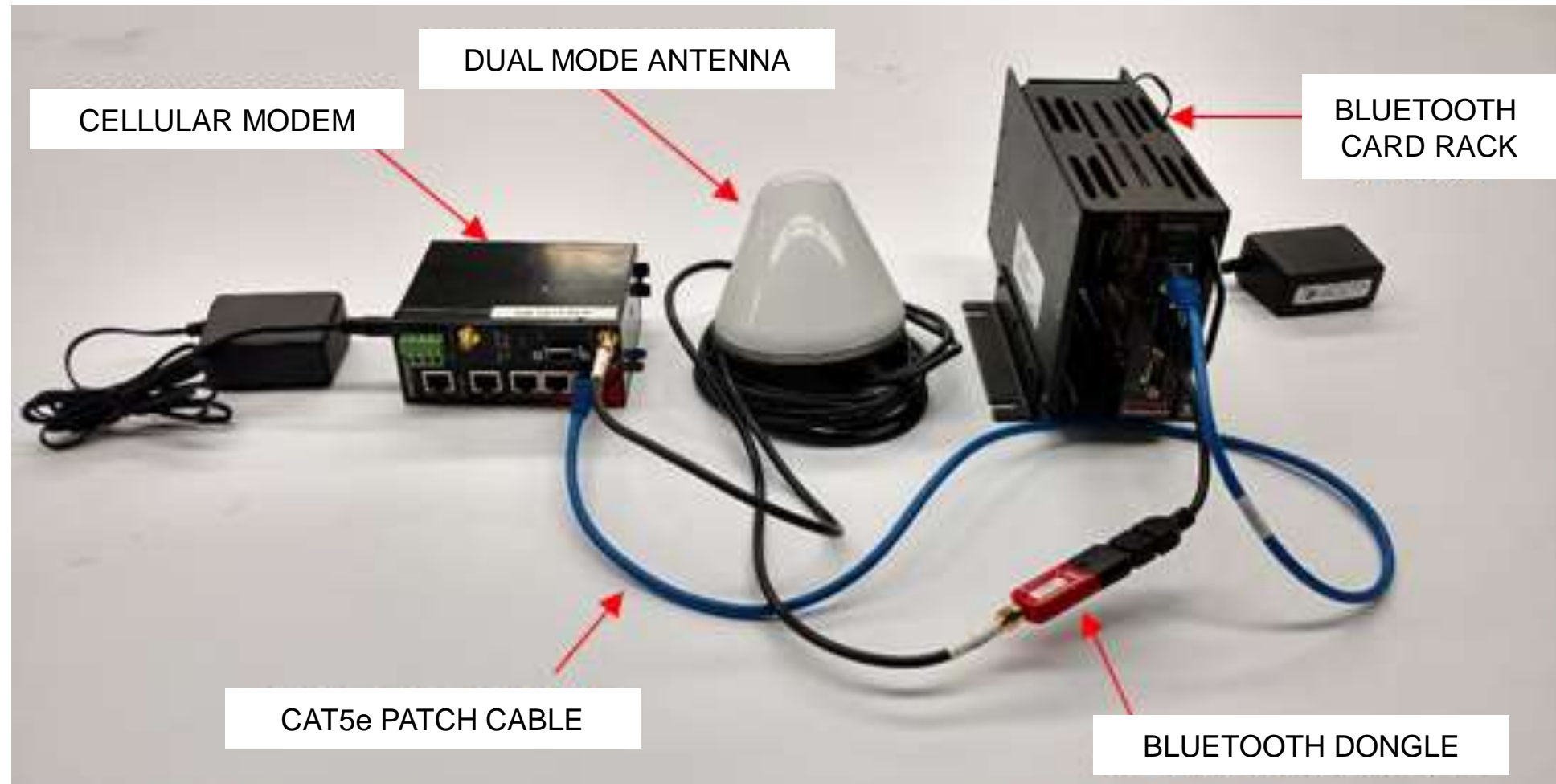
- June 2018: 270 Sensors
 - 600+ directional segments
 - 900+ km coverage
- 2019 - ~400 Sensors
 - 900+ directional segments
 - 1300+ km coverage

BLUETOOTH DEPLOYMENT

- Bluetooth sensors are installed inside the traffic cabinets
 - At all major signalized intersections
 - At selected midblock signalized intersections
- Data is encrypted in the field before transmitting to central software for processing



BLUETOOTH FIELD EQUIPMENT



TRAFFIC CONTROLLER CABINET INSTALLATION



BLUETOOTH
CARD RACK

CELLULAR
MODEM



DUAL MODE
ANTENNA

BLUETOOTH APPLICATIONS IN YORK REGION

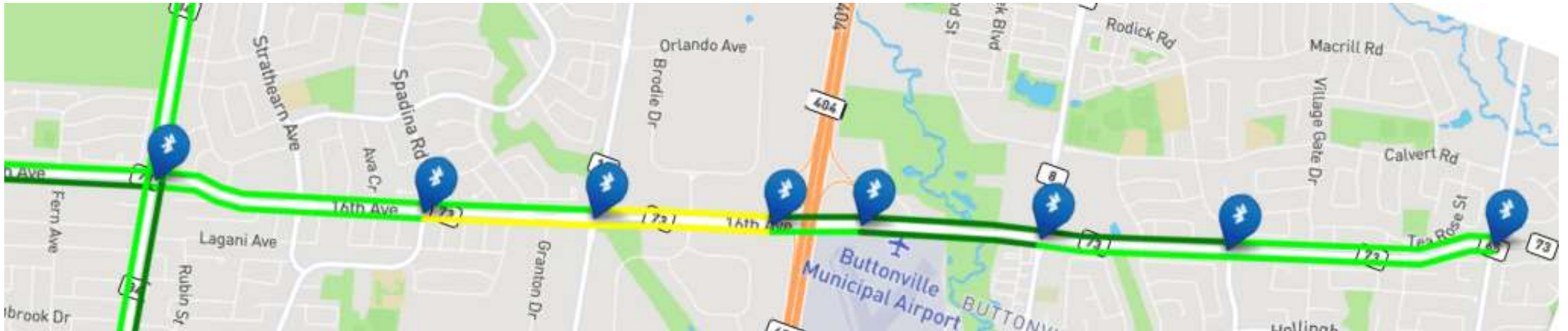
BLUETOOTH APPLICATIONS IN YORK REGION

- Signal Corridor Reviews
 - 16th Ave, Bayview Ave, etc.
- Traffic Impact Analysis
 - Aurora Left-Turn Restriction Pilot
 - Parallel routes for construction zone
 - Snow Plow operations
- Congestion mapping
 - Real-time and Historical
- Performance Measures
 - Region, Municipality and Corridors
- Travel Time in Work Zones



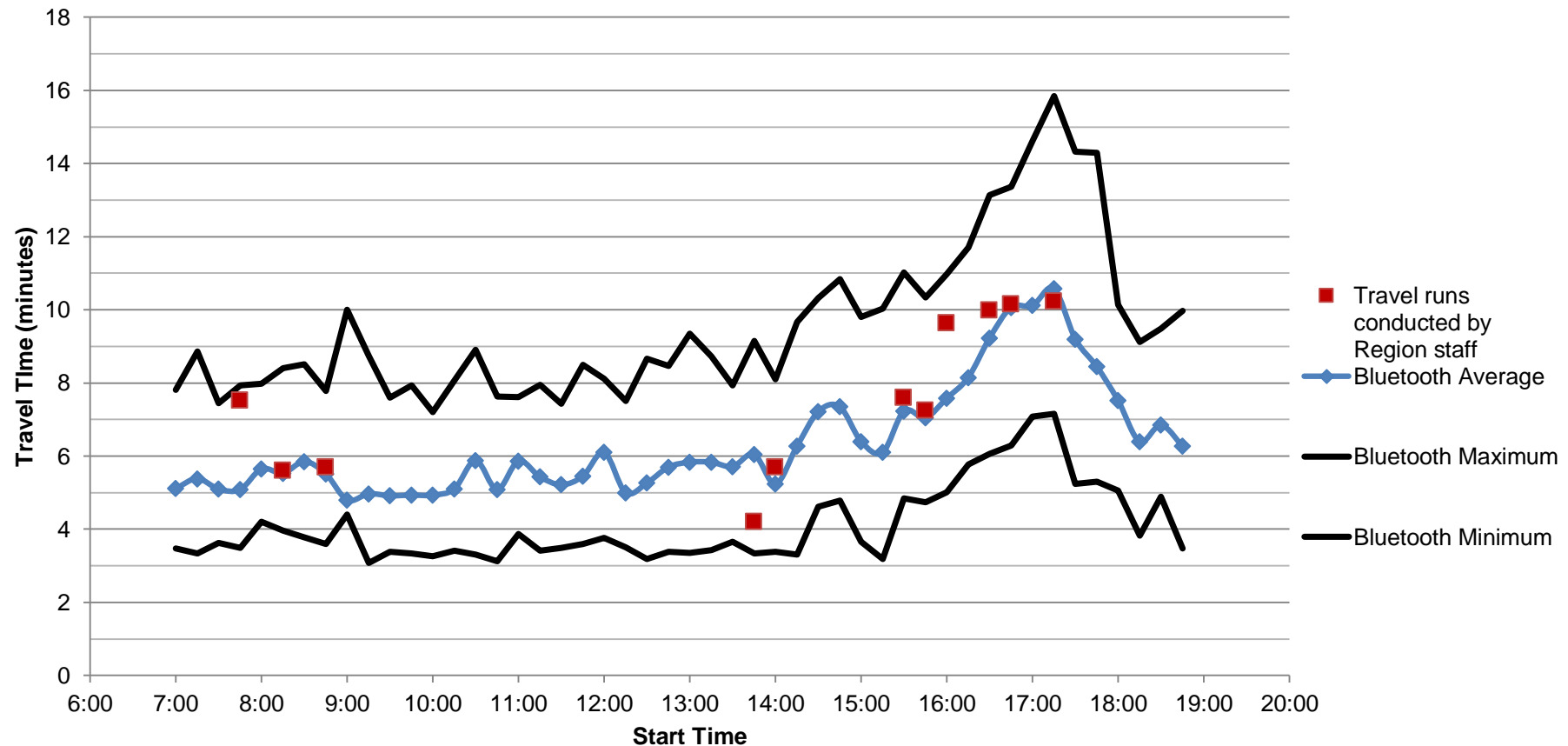
16TH AVENUE TRAFFIC SIGNAL CORRIDOR REVIEW

- Leslie Street to Warden Avenue - length 4.2 km
- Before-and-After Analysis



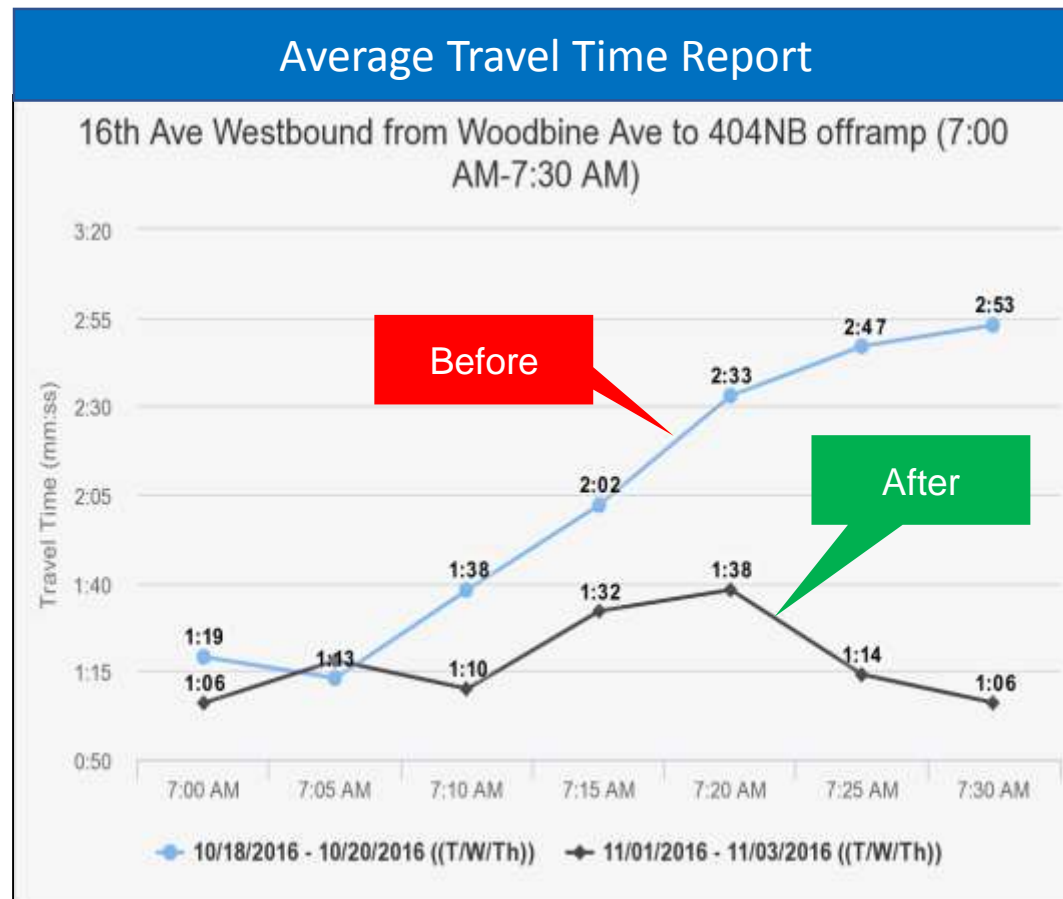
TRAVEL TIME - TRAVEL RUNS VS. BLUETOOTH

**10/13/2016 Eastbound Travel Time Comparison
Leslie St. to Warden Ave.**



DETAILED STATISTICS FOR ANALYSIS

16th Avenue Traffic Signal Coordination Improvements (Most congested segment)

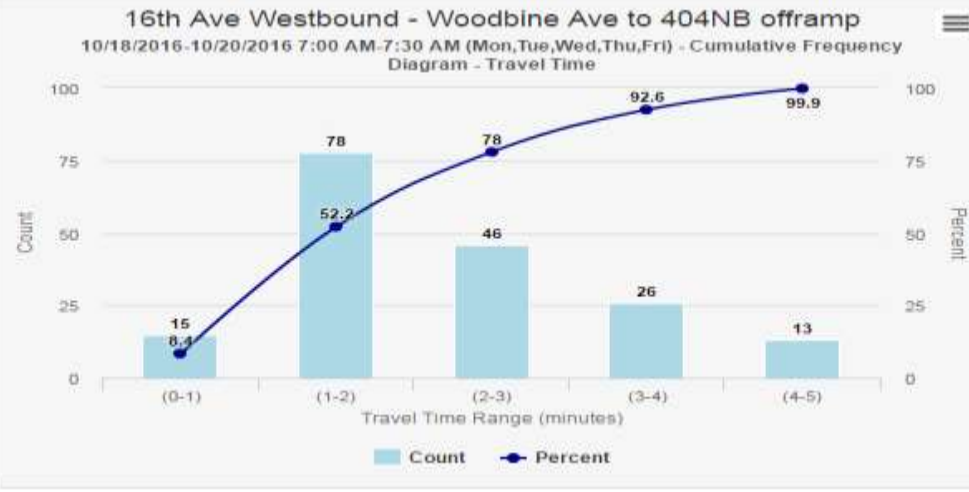


Detailed Statistics	Before	
	Before	After
Mean Travel Time	2:10	1:22
Mean Speed	28.1	39.7
Median Travel Time	1:55	1:14
Median Speed	25	39
85th Percentile Travel Time	3:38	1:55
85th Percentile Speed	42	54
95th Percentile Travel Time	4:12	2:17
95th Percentile Speed	53.3	60.6
Free Flow Travel Time	0:57	0:57
Travel Time Index ⓘ	2.28	1.43
Buffer Time Index ⓘ	0.94	0.67
Planning Time Index ⓘ	4.42	2.4

AVERAGE TRAVEL TIME AND DISTRIBUTION

BEFORE

Oct 18-20,
2016
7:00-7:30am



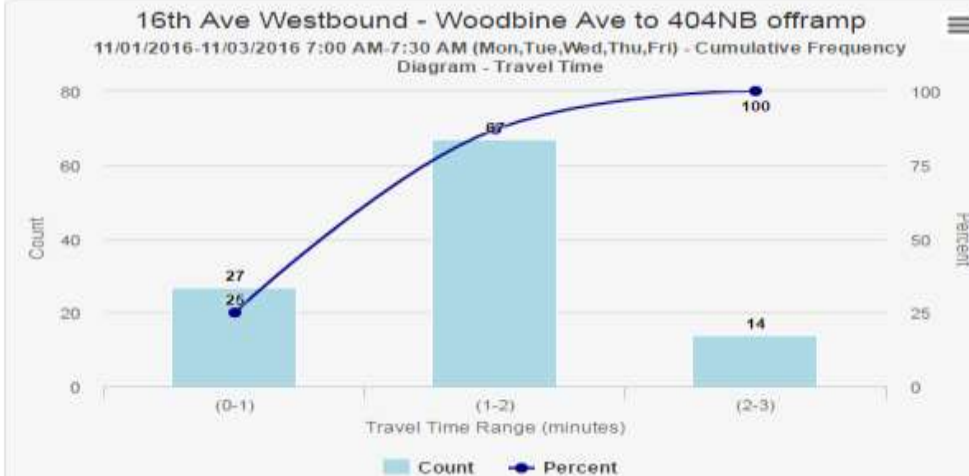
Travel Time Frequency Distribution

Travel Time Minutes	Count	Percentage
0-1	15	8.4%
1-2	78	43.8%
2-3	46	25.8%
3-4	26	14.6%
4-5	13	7.3%

52.2% travelling less than 2 minutes

AFTER

Nov 1-3, 2016
7:00 -7:30am



Travel Time Frequency Distribution

Travel Time Minutes	Count	Percentage
0-1	27	25%
1-2	67	62%
2-3	14	13%

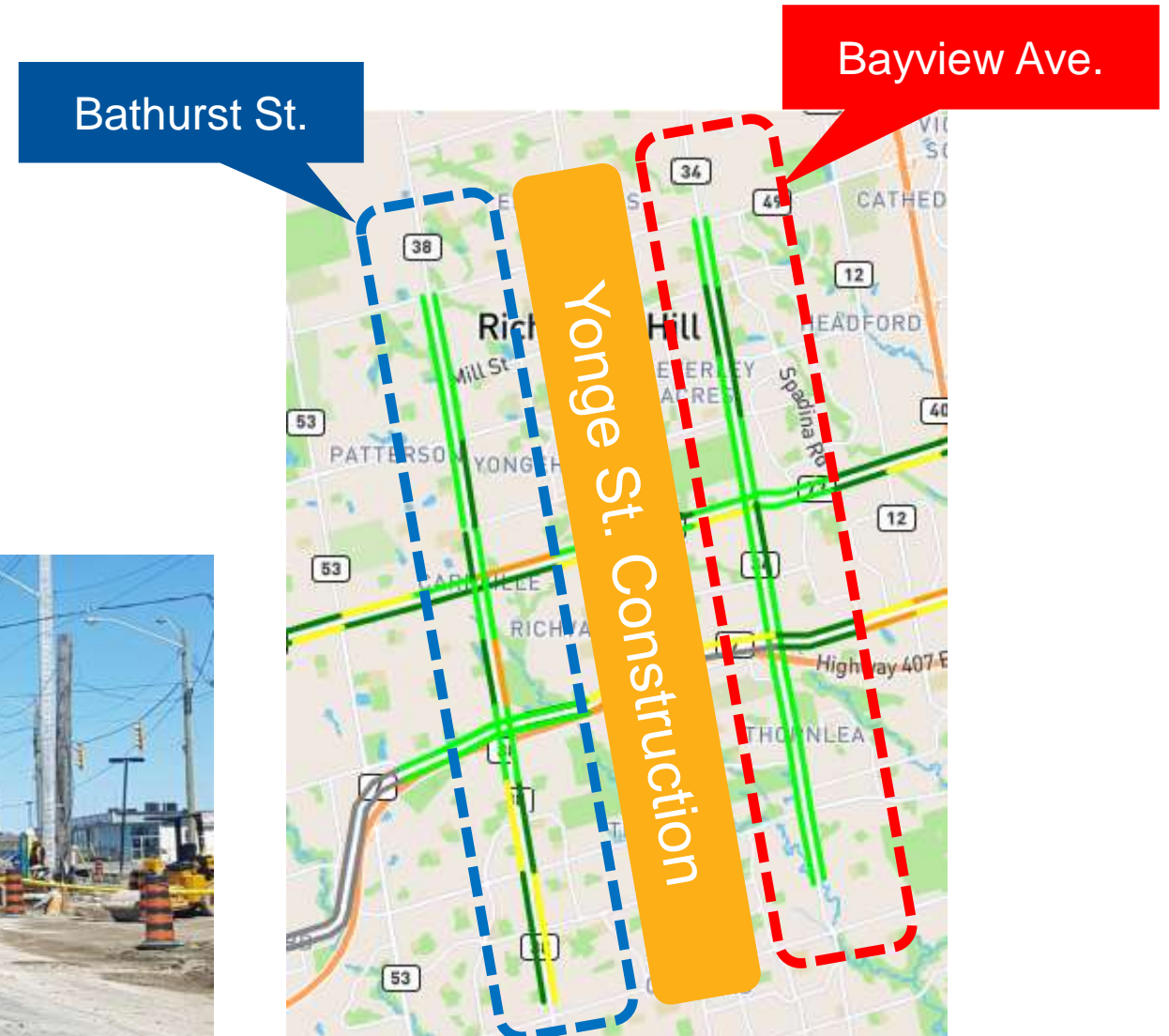
87% travelling less than 2 minutes

PARALLEL ROUTE TRAVEL TIME COMPARISONS

Bathurst Street vs. Bayview Avenue

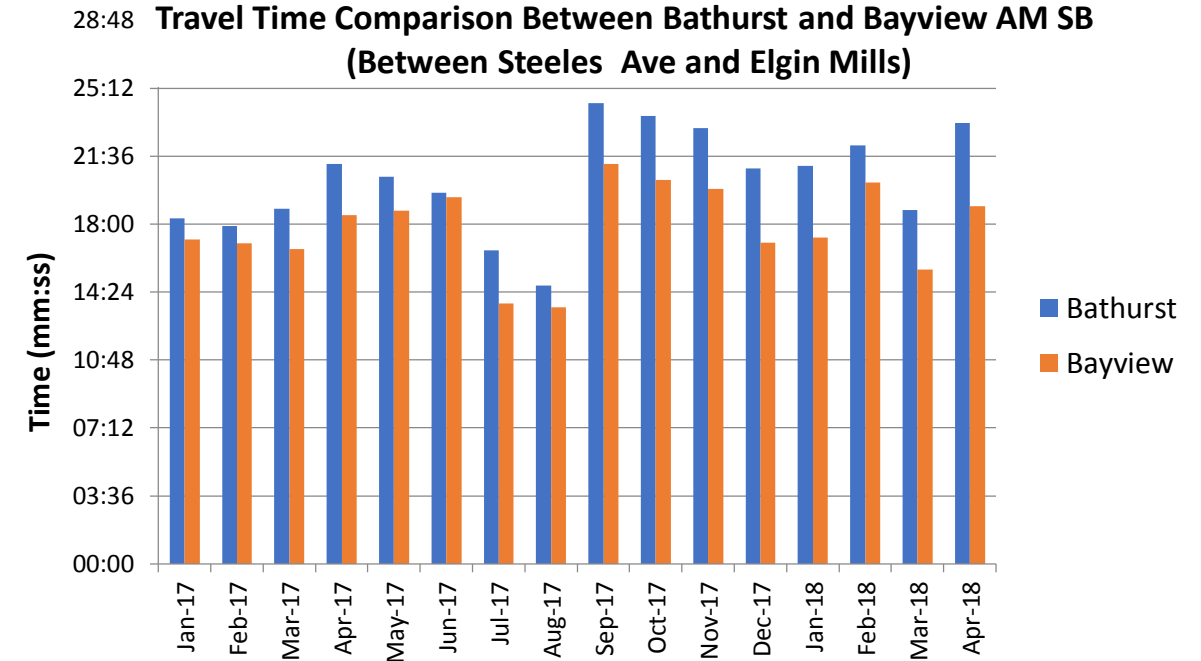
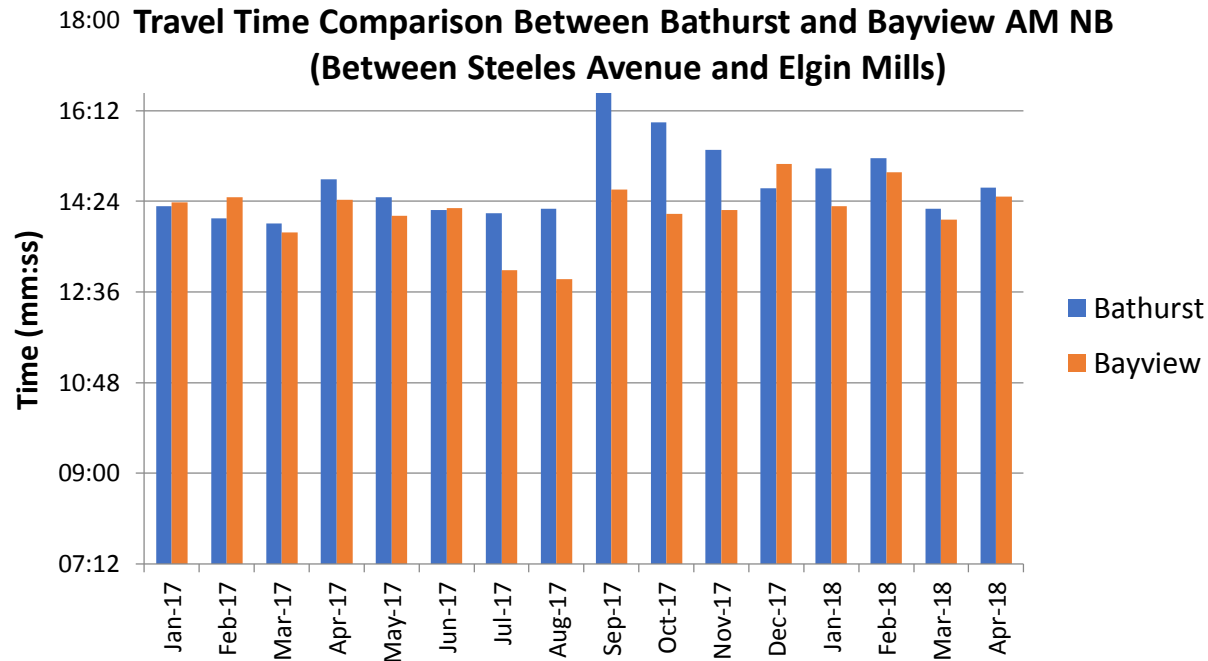
Compare

- Travel times
- Travel time reliability
- Seasonal variance



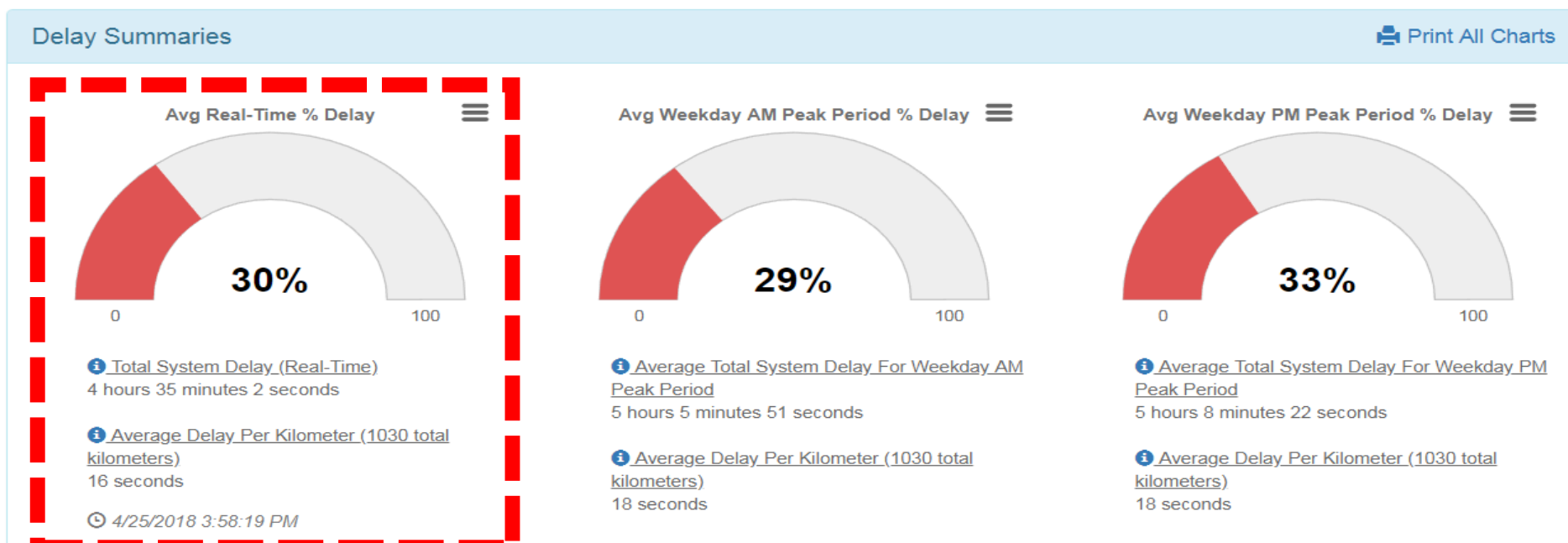
TRAVEL TIME COMPARISON: AM PEAK

Bathurst Street vs. Bayview Avenue



Bayview Ave. was generally faster, especially in the SB direction during AM peak.

REAL-TIME DELAY DASHBOARDS

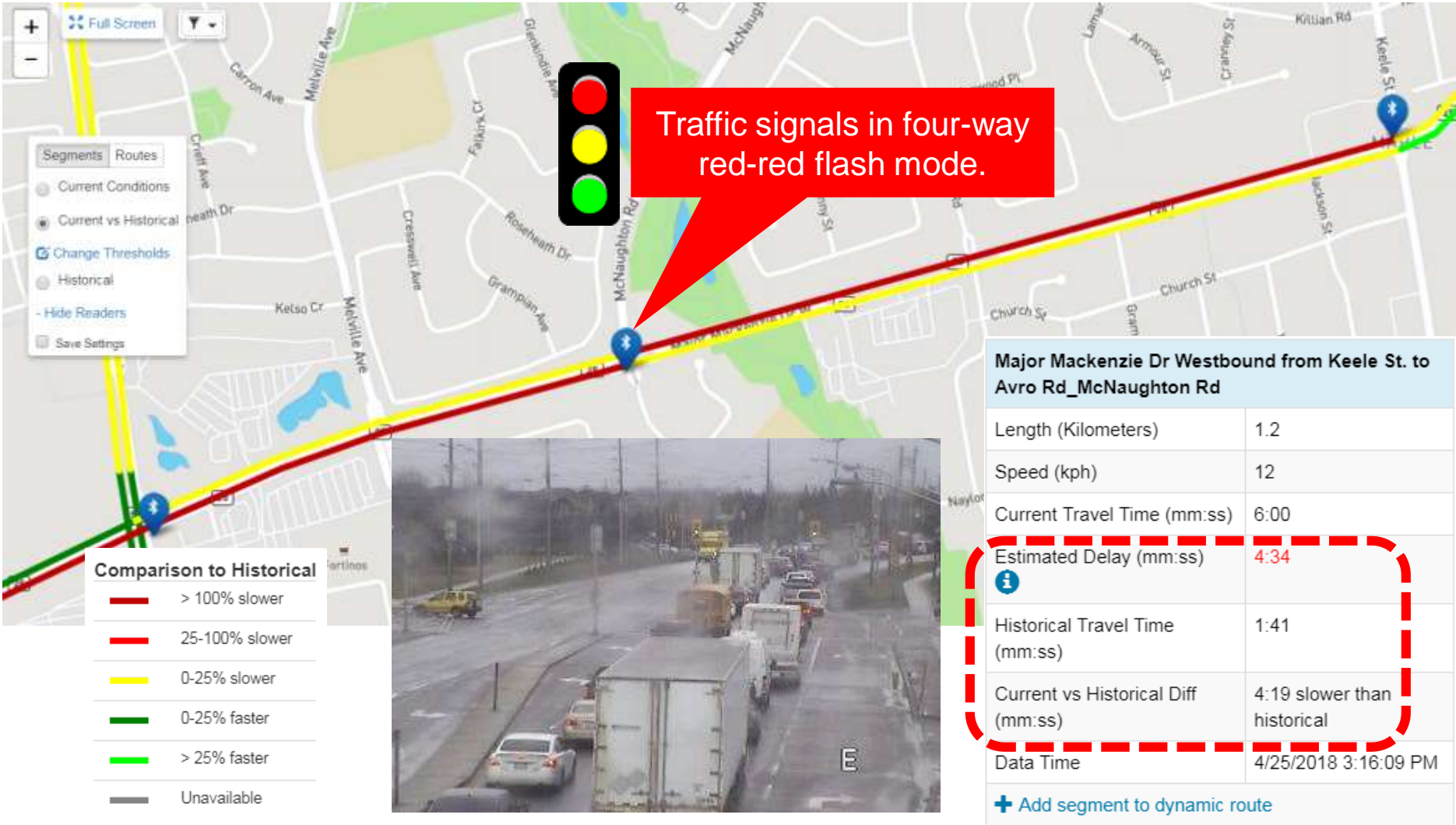


Detailed Real-Time Delay

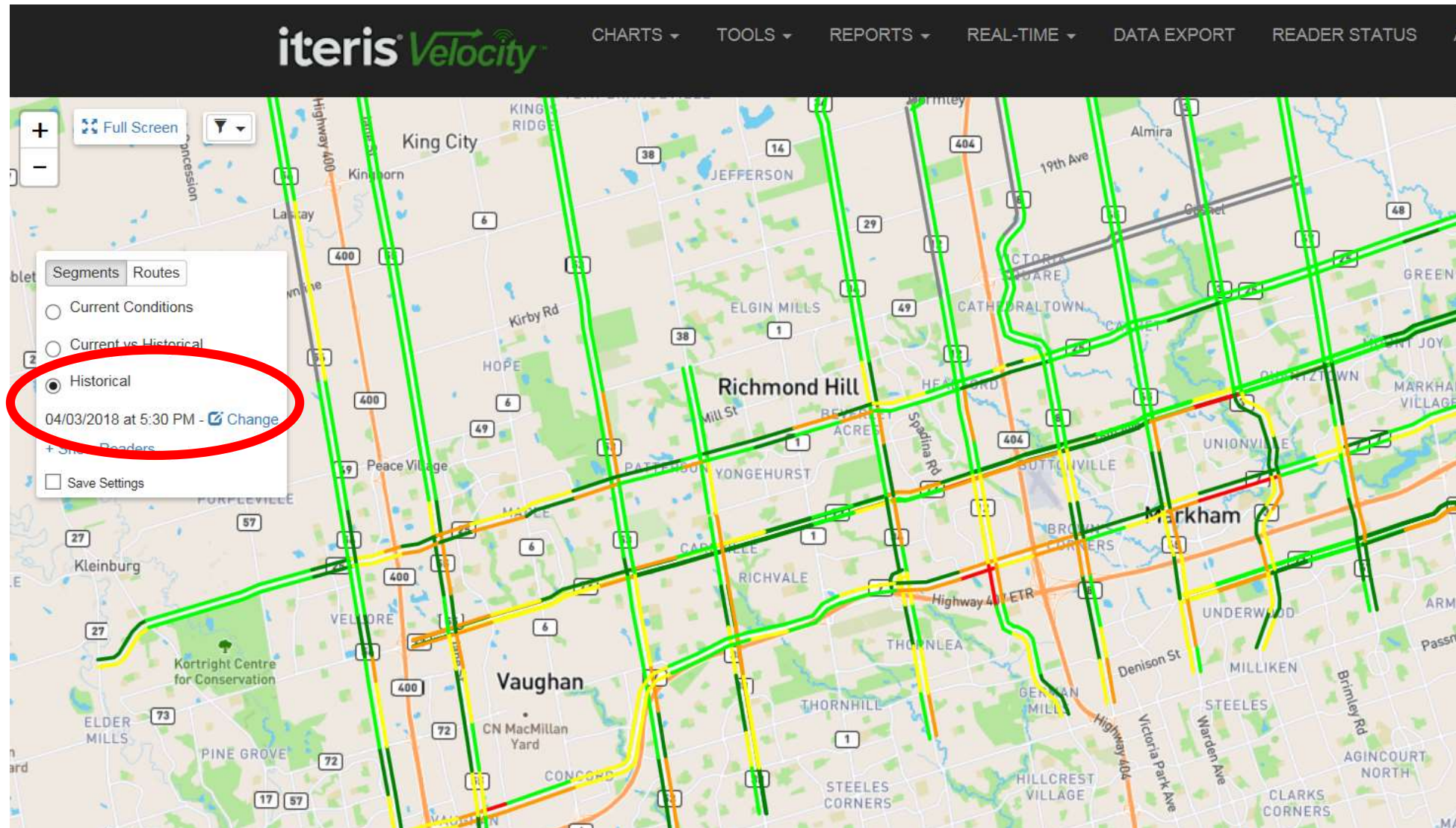
Show real-time delay greater than %

Location	Distance (Kilometers)	Normal Flow Travel Time (mm:ss)	Current Travel Time (mm:ss)	Normal Flow Speed (KPH)	Current Speed (KPH)	Delay %	Delay Time (mm:ss)
Major Mackenzie Dr Westbound from Keele St. to Avro Rd_McNaughton Rd	1.2	1:26	6:48	50	11	374.4	5:22
Davis Dr Westbound from Lundys Lane_Prospect St to Main St	0.6	0:51	3:28	42	10	307.8	2:37
Weston Rd Northbound from 407 WB Onramp to Highway 7	0.9	0:55	3:26	59	16	274.5	2:31
Major Mackenzie Dr Eastbound from Highway 400 NB Offramp to Jane St	0.8	0:51	3:06	56	15	264.7	2:15
Dufferin St Northbound from Clark Ave to Centre St	0.95	1:27	4:31	39	13	211.5	3:04
Major Mackenzie Dr Eastbound from Jane St to Avro Rd_McNaughton Rd	0.8	1:15	3:52	38	12	209.3	2:37

REAL-TIME CONGESTION MAP



HISTORICAL CONGESTION MAP



TRAVEL TIMES AND SNOW PLOW OPERATIONS

Highway 7 – from Bayview Avenue to Leslie Street



The background is a solid blue color with several large, overlapping, semi-transparent geometric shapes. These shapes include a large circle on the left, a large triangle on the right, and a large circle at the bottom center. The overlapping areas create darker shades of blue, adding depth to the design.

NEXT STEPS

NEXT STEPS

- Further data integration
- Open Data
- Snow plow operations
- Transit
- Travel Time Dissemination
- Performance Measures
- MTO Travel Time Studies



THANK YOU

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