TPANACollector

INTRODUCTION

This document provides an overview of the TPANACollector software solution provided by TPA North America Inc.

The TPANACOLLECTOR accepts MAC Addresses collected by Bluetooth Traffic Monitors (BTM) deployed on the roadside. Outlier algorithms process this data into average travel time data and predicted travel time data in real-time. In addition, the data is archived for later extraction and analysis by other off-line software tools.

ARCHITECTURE

The TPANACollector software runs on the Microsoft Server 2012 Standard Edition or equivalent operating system and uses Microsoft's MSQL 2012 ore equivalent relational database system.

The TPANACollector browser-based interface works with industry standard browsers such as FireFox, Chrome, Safari and Edge.

TPANACOLLECTOR BROWSER INTERFACE

The User interface to the TPANACOLLECTOR software is through industry standard browsers. The features of TPANACollector include:

- 1) User Configuration: Up to 10 users can be defined with UserID / Password protection. Users can access the system simultaneously.
- 2) BTM configuration. This allows for the creation of the database of BTMs.
- 3) Link Configuration. This allows for the create of the database of Links
- 4) Data collection: TPANACollector polls Bluetooth Traffic Monitors (BTM) to collect Bluetooth MAC Addresses.
- 5) Data Display: TPANACollector provides a real-time display of the collected Bluetooth data. Depending on the configuration of the field equipment this can include the MAC Addresses, Voltage, Cell signal strength, Latitude and Longitude, Temperature, etc
- 6) Map: TPANACollector displays the locations of the field BTMs on a map. Red, Green and Yellow lines are configured to display the traffic conditions according to user defined speed intervals.
- 7) Graphs/Charts: TPANACollector can create charts and graphs of the collected data.
- 8) Data Output:
 - a. TPANACollector has a facility for outputting Bluetooth detection data, Bluetooth trip data, and travel time and speed data. The user can create reports according to their desired date and time collection intervals.

Oronge traffic+

- b. TPANACollector has the facility to output an XML file of the collected travel time data for use by other software systems
- 9) NTCIP Sign interface: Communicate and control NTCIP compatible Variable Message Signs.
- 10) Scheduler: schedule messages to NTCIP signs

CHANNEL MAP

The Channel Map provides an overview of the locations of the BTM units on Google Maps. The current real-time travel time for the defined links is displayed when hovering over a BTM. The contents of an NTCIP message sign are shown when hovering over the relevant icon.

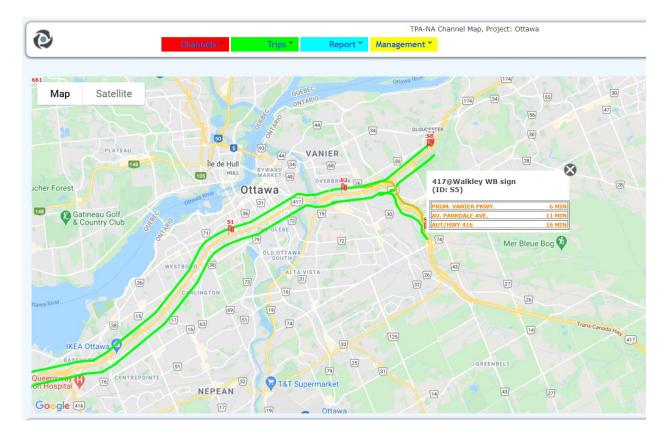


Figure 1 TPANACollector Map interface

Orongetraffict

LINK AND ROUTE CHART

The TPANACollector system can display graphs and charges of the collected data.

e e e e e e e e e e e e e e e e e e e	TPA-NA Trakker Monitor, Project: P#19_MTO-CR Channels * Report * Management *							
Link Filter: ExpoFilter	▼ Route Filter: AdaptiveRouteFilter ▼							
Link ID	Link Name	Average TT	Average (km/h)	Number of Detections				
L1E_08-M3	401_E1:Yonge-Bayview	00:01:10	105	44				
L1E_M3-05	401_E1:Bayview-404	00:02:16	97	8				
L1E_M2-M3	401_E2:Avenue-Bayview	00:02:22	102	34				
L1E_M3-06	401_E2:Bayview-VicPark	00:03:04	106	18				
L1E_04-M3	401_E3:Keele-Bayview	00:05:15	110	23				
L1E_M3-M4	401_E3:Bayview-McCowan	00:06:10	109	26				
L1W_05-M3	401_W1:404-Bayview	00:02:19	95	14				
L1W_D1-M3	401_W1:404 SE@401-Bayview	00:02:58	79	20				
L1W_M3-08	401_W1:Bayview-Yonge	00:01:13	100	76				
L1W_06-M3	401_W2:VicPark-Bayview	00:03:21	97	25				
L1W_M3-M2	401_W2:Bayview-Avenue	00:02:25	99	24				
L1W_M3-04	401_W3: Bayview-Keele	00:05:52	98	20				
L1W_DD-M3	401_W2:404@Sheppard-Bayview	00:04:15	70	20				
LDN_DF-M3	DVP_N:Brookbanks-Bayview	00:04:46	72	13				
L1E_M3-DF	401 E2:Bayview-DVP@Brookbanks	00:05:36	56	10				





Figure 3: Bluetooth detections



TPA North America Inc **TPANACollector**



Figure 4 Bluetooth detection chart

Y22:XML 401VW00:	2020-11-04 13:35	west of 400	Y33:XML 401VW001	2020-11-04 13:35	OLL at Weston	Y09:XML 401VW00	10VWE:401 Westbound Ex 2020-11-04 13:35	p at weston
Voltage	Message Owner	Priority	Voltage	Message Owner	Priority	Voltage	Message Owner	Priority
0.01			0.01			0.01		
TO BAYVIEW			5 MIN TO AIRPORT VIA 409			3 MIN TO DIXON RD		
IN TO 404/DVP			8 MIN TO FINCH VIA 409/427			6 MIN TO RENFORTH DR		
IN TO MCCOWAN			16 MIN TO 401 / MAVIS RD			16 MIN TO MAVIS RD		
Y58:XML 401VW0	2020VES: 401 Eastbound Ea	st of Dixon	Y24:XML 401VW0020	VSF:400 Southbound Sou 2020-11-04 13:35	uth of Sheppard	Y07:XML 401VW00	020VWC:401 Westbound CC Renforth	OLL West of
Voltage	Message Owner	Priority	Voltage	Message Owner	Priority		2020-11-04 13:35	
0.01			0.01			Voltage	Message Owner	Priority
IIN TO HWY 400				12 MIN TO 404 VIA 401 E		0.01		
IN TO ALLEN RD				6 MIN TO 427 VIA 401 W		8 MIN TO 410 / STEELES		
MIN TO YONGE				12 MIN TO QEW VIA 401/427		15 MIN TO 403 / DUNDAS		
						21 MIN TO 401/TRAFALGAR		
Y10:XML 401VW0020VWS:401 Westbound West of Dixon 2020-11-04 13:35			Y03:XML 401VW003	OVEC 401 Eastbound COL 2020-11-04 13:35	L East of Dixie	Y57:XML 401VW00	2020-11-04 13:35	East of Dixie
Voltage	Message Owner	Priority	Voltage	Message Owner	Priority	Voltage	Message Owner	Priority
0.01			0.01			0.01		
IN TO 410 / 403			10 MIN TO 400 VIA 401 E.			10 MIN TO 400 VIA 401 E.		
IN TO DEW VIA 427 S			5 MIN TO 409 VIA 427 N.			5 MIN TO 409 VIA 427 N.		
) VWC:401 Westbound Coll	West of HWY	8 MIN TO QEW VIA 427 S.	030VWE:401 Westbound	Exp West of	8 MIN TO QEW VIA 427 S. Y04:XML 401VW00	31VEE:401 Eastbound West	of Renforth
	410	West of HWY	8 MIN TO QEW VIA 427 S.	Renforth	Exp West of	Y04:XML 401VW00	2020-11-04 13:35	
35:XML 401VW0030	410 2020-11-04 13:35		B MIN TO QEW VIA 427 S. Y21:XML 401VW0	Renforth 2020-11-04 13:35		Y04:XML 401VW00		of Renforth
35:XML 401VW0030	410	West of HWY Priority	B MIN TO QEW VIA 427 S. Y21:XML 401VWO Voltage	Renforth	Exp West of Priority	V04:XML 401VW00	2020-11-04 13:35	
35:XML 401VW0030 Voltage 0.01	410 2020-11-04 13:35		B MIN TO QEW VIA 427 S. Y21:XML 401VW0 Voltage 0.01	Renforth 2020-11-04 13:35		Y04:XML 401VW00 Voltage 0.01 8 MIN TO HWY 400	2020-11-04 13:35	
35:XML 401VW003(Voltage 0.01 MIN TO GUELPH LINE	410 2020-11-04 13:35		B MIN TO QEW VIA 427 S. Y21:XML 401VWO Voltage 0.01 21 MIN TO TRAFALGAR	Renforth 2020-11-04 13:35		V04:XML 401VW00 Voltage 6.01 8 MIN TO HWY 400 13 MIN TO AVENUE RD	2020-11-04 13:35	
35:XML 401VW003(410 2020-11-04 13:35		B MIN TO QEW VIA 427 S. Y21:XML 401VWO Votage 0.01 21 MIN TO TRAFALGAR 27 MIN TO HWY 25	Renforth 2020-11-04 13:35		Y04:XML 401VW00 Voltage 0.01 8 MIN TO HWY 400	2020-11-04 13:35	
35:XML 401VW003(Voltage 0.01 MIN TO GUELPH LINE MIN TO HWY 8 KITCHENER MIN TO HWY 8 KITCHENER	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of	Priority	B MIN TO QEW VIA 427 S. Y21:XML 401VWO Woltage 6.01 21 MIN TO TRAFALGAR 22 MIN TO TRAFALGAR 19 MIN TO GEW/TRAFALGAR	Renforth 2020-11-04 13:35 Message Owner 040VEF:409 Eastbound at	Priority	Y04:XML 401VW00 Voltage 0.01 B MIN TO HWY 400 I3 MIN TO AVENUE RD IS MIN TO AVENUE RD	2020-11-04 13:35 Message Owner OVWE:401 Westbound Exp	Priority
Voltage 0.01 MIN TO GUELPH LINE MIN TO HWY 6 NORTH MIN TO HWY 6 NORTH MIN TO HWY 6 NORTH MIN TO HWY 6 KITCHENER 737:XML 401VW004	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35	Prionty	B MIN TO QEW VIA 427 S. Y21:XML 401VWO Voltage 0.01 21 MIN TO TRAFACAR 27 MIN TO HTAFACAR 27 MIN TO HTAFACAR 19 MIN TO QEW/TRAFACAR Y25:XML 401VWOR	Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35	Priority	Y04:XML 401VW00 Voltage 0.01 B MIN TO HWY 400 I3 MIN TO AVENUE RD IS MIN TO AVENUE RD	2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410	Priority
35:XML 401VW003(Voltage 0.01 MIN TO GUELPH LINE MIN TO HWY 6 NORTH MIN TO HWY 6 KITCHENER	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of	Priority	B MIN TO QEW VIA 427 S. Y21:XML 401VWO Woltage 6.01 21 MIN TO TRAFALGAR 22 MIN TO TRAFALGAR 19 MIN TO GEW/TRAFALGAR	Renforth 2020-11-04 13:35 Message Owner 040VEF:409 Eastbound at	Priority	Y04:XML 401VW00 Voltage 0.01 B MIN TO HWY 400 IS MIN TO HWY 404 IS MIN TO HWY 404 Y36:XML 401VW004	2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410 2020-11-04 13:35	Priority West of HWY
35:XML 401VW003(Witage 0.01 MIN TO CHEPH LINE MIN TO HAY & NOTH MIN TO HAY & NITCHENER 437:XML 401VW004 Voltage 0.01	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35	Prionty	E MIN TO QEW VIA 427 S. V21:XML 401VW0 Viltage 0.01 21 MIN TO NRA4LGAR 27 MIN TO NWY 25 19 MIN TO NWY 25 19 MIN TO NWY 25 0.01	Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35	Priority	Y04:XML 401VW00 Voltage 0.01 B MIN TO HWY 400 I3 MIN TO AVENUE RD IS MIN TO AVENUE RD	2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410	Priority
335:XML 401VW003(410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35	Prionty	E MIN TO DEW VIA 427 5. V21:XML 401VW0 Voltage 2. MIN TO RAV 25 2. MIN TO MAY 25 2. MIN TO MAY 26 V25:XML 401VW0 V45ape 0.01 6 MIN TO HWY 400	Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35	Priority	V04:XML 401VW00 V08age 0.01 5 MN TO HWY 400 13 MIN TO AVERAGE RD 13 MIN TO AVERAGE RD 14 MIN TO HWY 404 V36:XML 401VW004 V08age 0.02	2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410 2020-11-04 13:35	Priority West of HWY
35:XML 401VW003(Witage .0.0 .0.1 MIN TO CUELPH LINE MIN TO HWY 6 NORTH MIN TO HWY 6 NORTH MIN TO HWY 6 NORTH Vitage .0.1 .0.2 .0.1 .0.2 .0.3 .0.4 .0.5 .0.6 .0.7 .0.7 .0.8 .0.9 .0.10 .0.11 <t< td=""><td>410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35</td><td>Prionty</td><td>B MIN TO QEW VIA 427 S. Y21:XML 401VW0 V8tage 0.01 12: MIN TO NEW/LAGAR 13: MIN TO NEW/LAGAR 15: MIN TO NEW/LAGAR 15: MIN TO NEW/LAGAR Y25:XML 401VW00 V8tage 0.01 6 16 MIN TO NEW 400 0 17 MIN TO HWY 400</td><td>Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35</td><td>Priority</td><td>V04:XML 401VW00 V07:20 E MIN TO AVERUE RD E MIN TO AVERUE RD E MIN TO AVERUE RD E MIN TO AVERUE RD E MIN TO AUENCE AND V07:20 V07:20 COLUMN L 401VW004 V07:20 COLUMN L 401VW004 COLUMN L 401VW004 COLU</td><td>2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410 2020-11-04 13:35</td><td>Priority West of HWY</td></t<>	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35	Prionty	B MIN TO QEW VIA 427 S. Y21:XML 401VW0 V8tage 0.01 12: MIN TO NEW/LAGAR 13: MIN TO NEW/LAGAR 15: MIN TO NEW/LAGAR 15: MIN TO NEW/LAGAR Y25:XML 401VW00 V8tage 0.01 6 16 MIN TO NEW 400 0 17 MIN TO HWY 400	Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35	Priority	V04:XML 401VW00 V07:20 E MIN TO AVERUE RD E MIN TO AVERUE RD E MIN TO AVERUE RD E MIN TO AVERUE RD E MIN TO AUENCE AND V07:20 V07:20 COLUMN L 401VW004 V07:20 COLUMN L 401VW004 COLUMN L 401VW004 COLU	2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410 2020-11-04 13:35	Priority West of HWY
35:XML 401VW003(Witage .0.0 .0.1 MIN TO CUELPH LINE MIN TO HWY 6 NORTH MIN TO HWY 6 NORTH MIN TO HWY 6 NORTH Vitage .0.1 .0.2 .0.1 .0.2 .0.3 .0.4 .0.5 .0.6 .0.7 .0.7 .0.8 .0.9 .0.10 .0.11 <t< td=""><td>410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35</td><td>Prionty</td><td>E MIN TO DEW VIA 427 5. V21:XML 401VW0 Voltage 2. MIN TO RAV 25 2. MIN TO MAY 25 2. MIN TO MAY 26 V25:XML 401VW0 V45ape 0.01 6 MIN TO HWY 400</td><td>Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35</td><td>Priority</td><td>V04:XML 401VW00 V08age 0.01 5 MN TO HWY 400 13 MIN TO AVERAGE RD 13 MIN TO AVERAGE RD 13 MIN TO AVERAGE RD 14 MIN TO HWY 404 V08age 0.01 26 MIN TO GOLLPH LINE 26 MIN TO MIN TO MIN TO GOLLPH LINE 26 MIN TO MI</td><td>2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410 2020-11-04 13:35</td><td>Priority West of HWY</td></t<>	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35	Prionty	E MIN TO DEW VIA 427 5. V21:XML 401VW0 Voltage 2. MIN TO RAV 25 2. MIN TO MAY 25 2. MIN TO MAY 26 V25:XML 401VW0 V45ape 0.01 6 MIN TO HWY 400	Renforth 2020-11-04 13:35 Message Owner 2020-12-04 13:35 2020-12-04 13:35	Priority	V04:XML 401VW00 V08age 0.01 5 MN TO HWY 400 13 MIN TO AVERAGE RD 13 MIN TO AVERAGE RD 13 MIN TO AVERAGE RD 14 MIN TO HWY 404 V08age 0.01 26 MIN TO GOLLPH LINE 26 MIN TO MIN TO MIN TO GOLLPH LINE 26 MIN TO MI	2020-11-04 13:35 Message Owner 0VWE:401 Westbound Exp 410 2020-11-04 13:35	Priority West of HWY
35:XML 401VW0030 Voltage .0.0 MIN TO CULLH LINE MIN TO HWY & NORTH MIN TO HWY & NORTH WITO HWY & STOCHMER. (37:XML 401VW004 Voltage .0.0 IN TO 410 / STELES MIN TO 400 / 401	410 200-11-04 13:35 Message Owner 0VEC:401Eastbound East of 2020-11-04 13:35 Message Owner	Priority of Hurontario Priority	E MIN TO QEW VIA 427 5. V21:XML 401VW0 Veltage 0.01 21 MIN TO TRAALGAR 27 MIN TO HWY 25 15 MIN TO HWY 25 15 MIN TO GUYTHANALGAR V25:XML 401VW00 Veltage 0.01 4 MIN TO HWY 400 14 MIN TO HWY 404	Renforth 2020-11-04 13:15 Message Owner 2020-11-04 13:15 Message Owner Message Owner	Priority 409/Kipling Priority	Y04:XML 401YW00 Witage 0.01 E MIN TO AVERAIR RD E3 MIN TO AVERAIR RD E4 MIN TO AVERAIR RD Y36:XML 401YW004 Witage 0.02 F6 MIN TO AVERAIR RD E4 MIN TO HARY 64 NOTOHING SIGN TO HARY 64 NOTOHING E5 MIN TO HARY 64 NOTOHING E6 MIN TO HARY 64 NOTOHING	2020-11-04 13:35 Message Owner 00WE:401 Westbound Exp 410 2020-11-04 13:35 Message Owner	Priority West of HWY Priority
35:XML 401VW0030 Voltage 0.01 MIN TO CULLH LINE MIN TO HWY & NORTH MIN TO HWY & NORTH MIN TO HWY & NORTH WItage 0.01 NI TO 410 / STELES 0.01 NI TO 400 / 402 MIN TO 400 / 401 19:XML 403VN0010	410 200-11-04 13:35 Message Owner 2000-11-04 13:35 Message Owner WEF:78 - 403 Toronto bour 2000-11-04 13:35	Priority of Hurontario Priority nd at King Rd	E MIN TO QEW VIA 427 S. V21:XML 401VW0 V0Rage 0.01 21 MIN TO NAVALGAR 27 MIN TO NW7 25 15 MIN TO NW7 25 15 MIN TO NW7 25 0.01 4 MIN TO HWY 400 B MIN TO AVENE RD 14 MIN TO HWY 404 Y08:XML	Renforth 2020-11-04 13:35 Message Owner 040VEF:409 Eastbound at 2020-11-04 13:35 404H0V1:404 HOV Tunn 2020-11-04 13:35	Priority 409/Kipling Priority nel	Y04:XML 401YW00 Witage 0.01 B MIN TO HWY 400 I B MIN TO AVENUE RD I B MIN TO AVENUE RD I B MIN TO AVENUE RD Y36:XML 401YW004 Witage 0.01 S MIN TO HWY 68 OCTORETH I S MIN TO HWY 68 NORTH	2000-11-04 13:35 Message Owner 00WE:401 Westbound Exp 410 2000-11-01 12:335 Message Conter 90V00310VSS:CourtneyPark 2020-11-04 13:35	Priority West of HWY Priority
Valage 0.01	410 200-11-04 13:35 Message Owner 0VEC:401Eastbound East of 2020-11-04 13:35 Message Owner	Priority of Hurontario Priority	E MIN TO QEW VIA 427 5. V21:XML 401VW0 Village 0.01 21 MIN TO INV 25 15 MIN TO INV 25 16 MIN TO INV 25 16 MIN TO INV 25 V25:XML 401VW0 V88age 0.01 14 MIN TO AVENUE 80 14 MIN TO HWY 409 14 MIN TO HWY 409 V88age	Renforth 2020-11-04 13:15 Message Owner 2020-11-04 13:15 Message Owner Message Owner	Priority 409/Kipling Priority	V04:XML 401VW00 Witage 0.01 5 MIN TO HWY 400 13 MIN TO AVERUE RD 13 MIN TO AVERUE RD 13 MIN TO AVERUE RD 14 MIN TO AUERAL Witage 0.01 25 MIN TO AUERAL LINE 35 MIN TO AVERUE AUERA 45 MIN TO AUERAL 410 V07age	2020-11-04 13:35 Message Owner 00WE:401 Westbound Exp 410 2020-11-04 13:35 Message Owner	Priority West of HWY Priority
35:XML 401VW0030 Voltage 0/1 0/2 0/1 <td>410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35 Message Owner VEEF:7E - 403 Toronto bour 2020-11-04 13:35 Message Owner</td> <td>Priority of Hurontario Priority nd at King Rd</td> <td>E MIN TO QEW VIA 427 S. V21:XML 401VW0 V0Rage 0.01 21 MIN TO NAVALGAR 27 MIN TO NW7 25 15 MIN TO NW7 25 15 MIN TO NW7 25 0.01 4 MIN TO HWY 400 B MIN TO AVENE RD 14 MIN TO HWY 404 Y08:XML</td> <td>Renforth 2020-11-04 13:15 Message Owner 2020-11-04 13:15 Message Owner 404HOV1:404 HOV Tunn 2020-11-04 13:15 Message Owner</td> <td>Priority 409/Kipling Priority nel</td> <td>Y04:XML 401YW00 Witage 0.01 B MIN TO HWY 400 I B MIN TO AVENUE RD I B MIN TO AVENUE RD I B MIN TO AVENUE RD Y36:XML 401YW004 Witage 0.01 S MIN TO HWY 68 OCTORETH I S MIN TO HWY 68 NORTH I S MIN TO HWY 68 NORTH</td> <td>2000-11-04 13:35 Message Owner 410 2000-11-04 13:35 Message Denter 2000-11-04 13:35 Message Denter 2000-11-04 13:35 Message Owner</td> <td>Priority West of HWY Priority</td>	410 2020-11-04 13:35 Message Owner OVEC:401Eastbound East of 2020-11-04 13:35 Message Owner VEEF:7E - 403 Toronto bour 2020-11-04 13:35 Message Owner	Priority of Hurontario Priority nd at King Rd	E MIN TO QEW VIA 427 S. V21:XML 401VW0 V0Rage 0.01 21 MIN TO NAVALGAR 27 MIN TO NW7 25 15 MIN TO NW7 25 15 MIN TO NW7 25 0.01 4 MIN TO HWY 400 B MIN TO AVENE RD 14 MIN TO HWY 404 Y08:XML	Renforth 2020-11-04 13:15 Message Owner 2020-11-04 13:15 Message Owner 404HOV1:404 HOV Tunn 2020-11-04 13:15 Message Owner	Priority 409/Kipling Priority nel	Y04:XML 401YW00 Witage 0.01 B MIN TO HWY 400 I B MIN TO AVENUE RD I B MIN TO AVENUE RD I B MIN TO AVENUE RD Y36:XML 401YW004 Witage 0.01 S MIN TO HWY 68 OCTORETH I S MIN TO HWY 68 NORTH	2000-11-04 13:35 Message Owner 410 2000-11-04 13:35 Message Denter 2000-11-04 13:35 Message Denter 2000-11-04 13:35 Message Owner	Priority West of HWY Priority
witage	410 200-11-04 13:35 Message Owner 2000-11-04 13:35 Message Owner WEF:78 - 403 Toronto bour 2000-11-04 13:35	Priority of Hurontario Priority nd at King Rd	E MIN TO QEW VIA 427 5. V21:XML 401VW0 Village 0.01 21 MIN TO INV 25 15 MIN TO INV 25 16 MIN TO INV 25 16 MIN TO INV 25 V25:XML 401VW0 V88age 0.01 14 MIN TO AVENUE 80 14 MIN TO HWY 409 14 MIN TO HWY 409 V88age	Renforth 2020-11-04 13:35 Message Owner 040VEF:409 Eastbound at 2020-11-04 13:35 404H0V1:404 HOV Tunn 2020-11-04 13:35	Priority 409/Kipling Priority nel	V04:XML 401VW00 Witage 0.01 5 MIN TO HWY 400 13 MIN TO AVERUE RD 13 MIN TO AVERUE RD 13 MIN TO AVERUE RD 14 MIN TO AUERAL Witage 0.01 25 MIN TO AUERAL LINE 35 MIN TO AVERUE AUERA 45 MIN TO AUERAL 410 V07age	2000-11-04 13:35 Message Owner 00WE:401 Westbound Exp 410 2000-11-01 12:335 Message Conter 90V00310VSS:CourtneyPark 2020-11-04 13:35	Priority West of HWY Priority

Figure 5 NTCIP Sign Interface



TPANACOLLECTOR TRAVEL TIME CALCULATION ENGINE

The TPANACollector travel time calculation engine performs the following functions:

- 1) Collects Bluetooth data
- 2) Creates Link travel times and stores the data
- 3) Creates Route travel times and stores the data
- 4) Monitors BTMs for the purpose of capturing Detections in real-time.
- 5) Monitors BTMs for the purpose of identifying problems with power and communications and reporting these in real-time.
- 6) Isolation of valid Detections by grouping multiple Detections of the same Device.
- 7) Recognition of Trips made by a Device by identifying valid pairs of Detections over a pre-defined Link, consisting of an Upstream (Source) BTM and a Downstream (Destination) BTM.
- 8) Filters recognized trips in order to identify and isolate potential "outliers".
- 9) Filters groups of trips to provide Trip Statistics (such as Average Travel Time) in real-time for all Links.
- 10) Filters groups of recognized Trips in order to provide Trip Statistics in real-time for pre-defined sequences on Links known as Routes.
- 11) Monitors system performance and generates and/or clears alarms as appropriate
- 12) Outputs an XML file with real-time travel time information
- 13) Filters data into travel times such as General Purpose Lanes and HOV lanes.
- 14) Detect queue formation and distance to the end of a queue.

SUPPLIER

The supplier of the software system is:

TPA North America Inc. 3335 Yonge Street Suite 405 Toronto, ON M4N 2M1 Telephone : 416-486-8457

Distributed by Orange Traffic:

18195 J.A. Bombardier Mirabel, QC J7J 0E7 Telephone: 1-800-363-5913

