Unattended Aerial Vehicle Operations for Traffic Management

City of Toronto

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Congestion Management Plan (2016-2020)

CMP Objectives

Improve

- ➔ Traffic flow
- ➔ Safety
- ➔ Management of congestion

Focus

- ➔ Technology
- ➔ Policy
- ➔ Operations

Established 2014

- ➔ 8 person team to focus on related projects

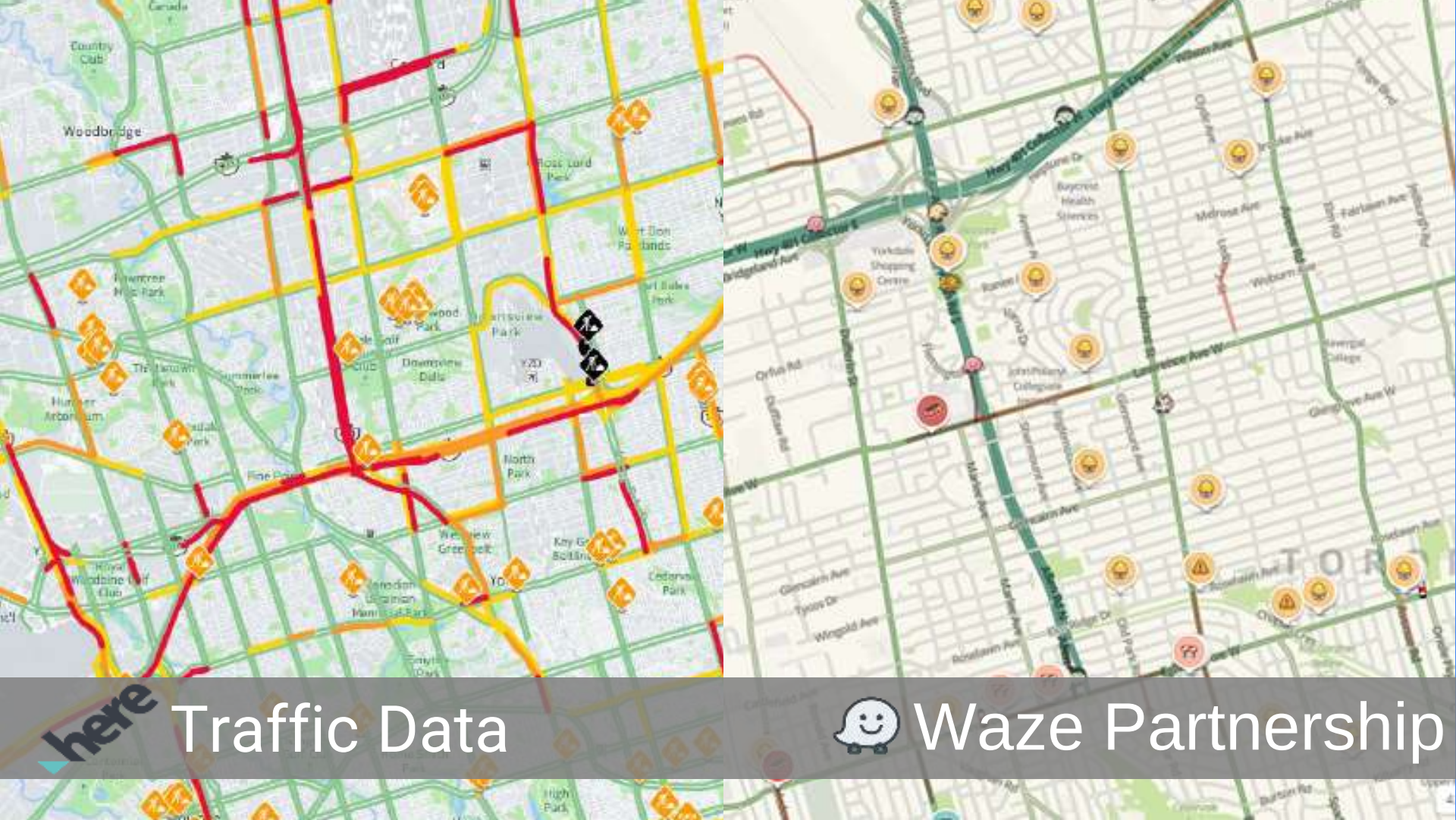
Transportation Operations Centre

Operations Centre Upgrade

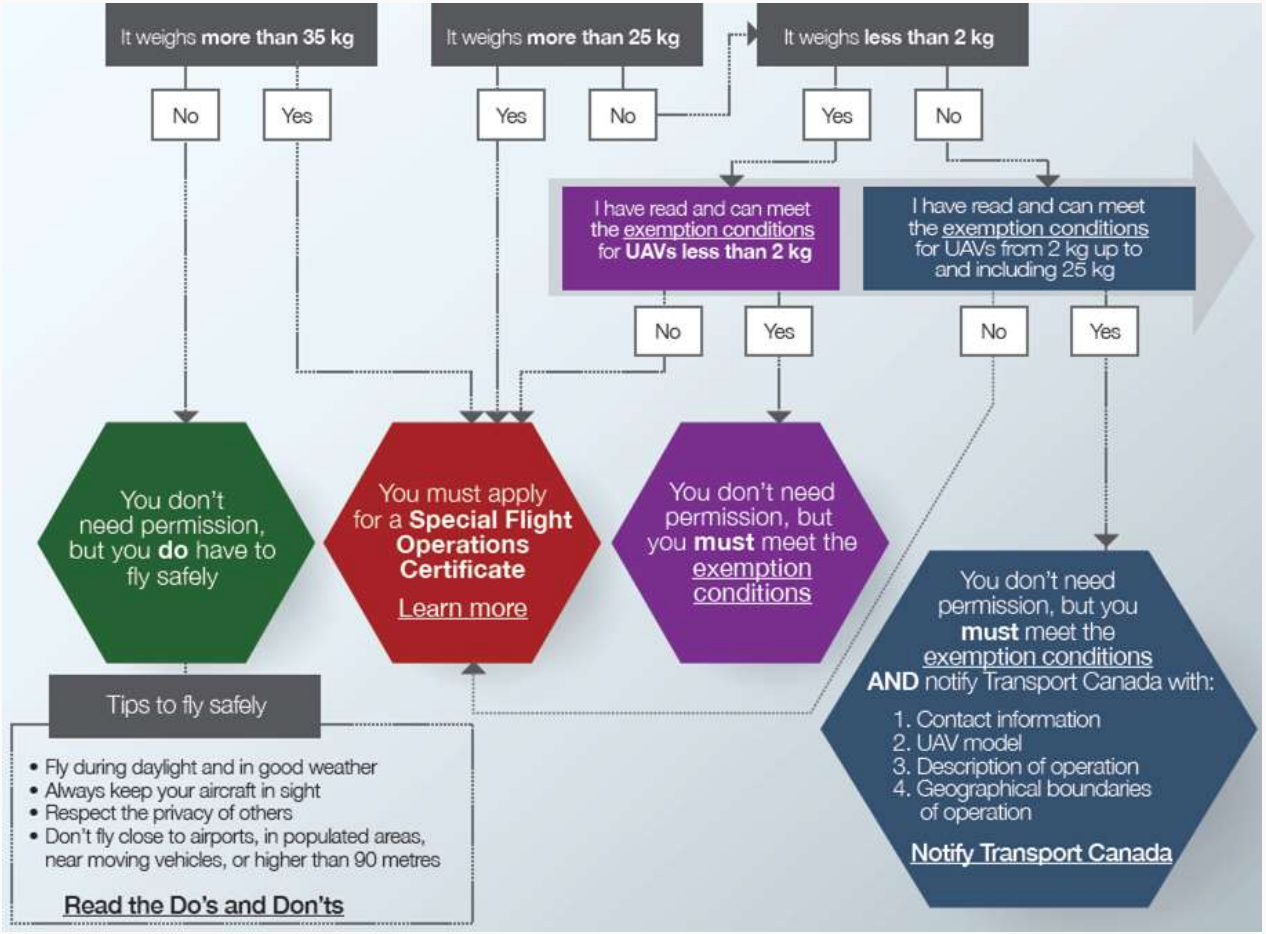
- New operational model
- Upgraded video wall and video management software
- New traveller information strategy
- Upgraded traffic management system
- Traffic data purchase and Waze partnership

Monitoring - CCTV Camera Network

Location	Number
Expressway	46
Arterial	210
Total	**256**


Traffic Data
Waze Partnership

UofT Partnership


It weighs more than 35 kg
No
Yes
It weighs more than 25 kg
Yes
No
It weighs less than 2 kg
Yes
No
I have read and can meet the exemption conditions for UAVs less than 2 kg
No
Yes
I have read and can meet the exemption conditions for UAVs from 2 kg up to and including 25 kg
No
Yes
You don't need permission, but you do have to fly safely
You must apply for a Special Flight Operations Certificate
Learn more
You don't need permission, but you must meet the exemption conditions
You don't need permission, but you must meet the exemption conditions AND notify Transport Canada with:
1. Contact information
2. UAV model
3. Description of operation
4. Geographical boundaries of operation
Notify Transport Canada
Tips to fly safely
• Fly during daylight and in good weather
• Always keep your aircraft in sight
• Respect the privacy of others
• Don't fly close to airports, in populated areas, near moving vehicles, or higher than 90 metres
Read the Do's and Don'ts

Special Flight Operations Certificate

- Visual line-of-sight
- Max height = 400 feet (120m)
- Maintain 100 feet (30m) lateral clearance from any person, building or vehicle not involved in the operation
- Can not operate UAV over built-up area over open-air assembly of persons
- Issue notice to airmen (NOTAM)

City's Objectives

- ➔ Evaluate UAVs for real-time traffic management of planned events and unplanned incidents
- ➔ Assess the TOC's ability to make operational changes in real-time using UAV
- ➔ Provide guidelines for future UAV operations

UofT's Objectives

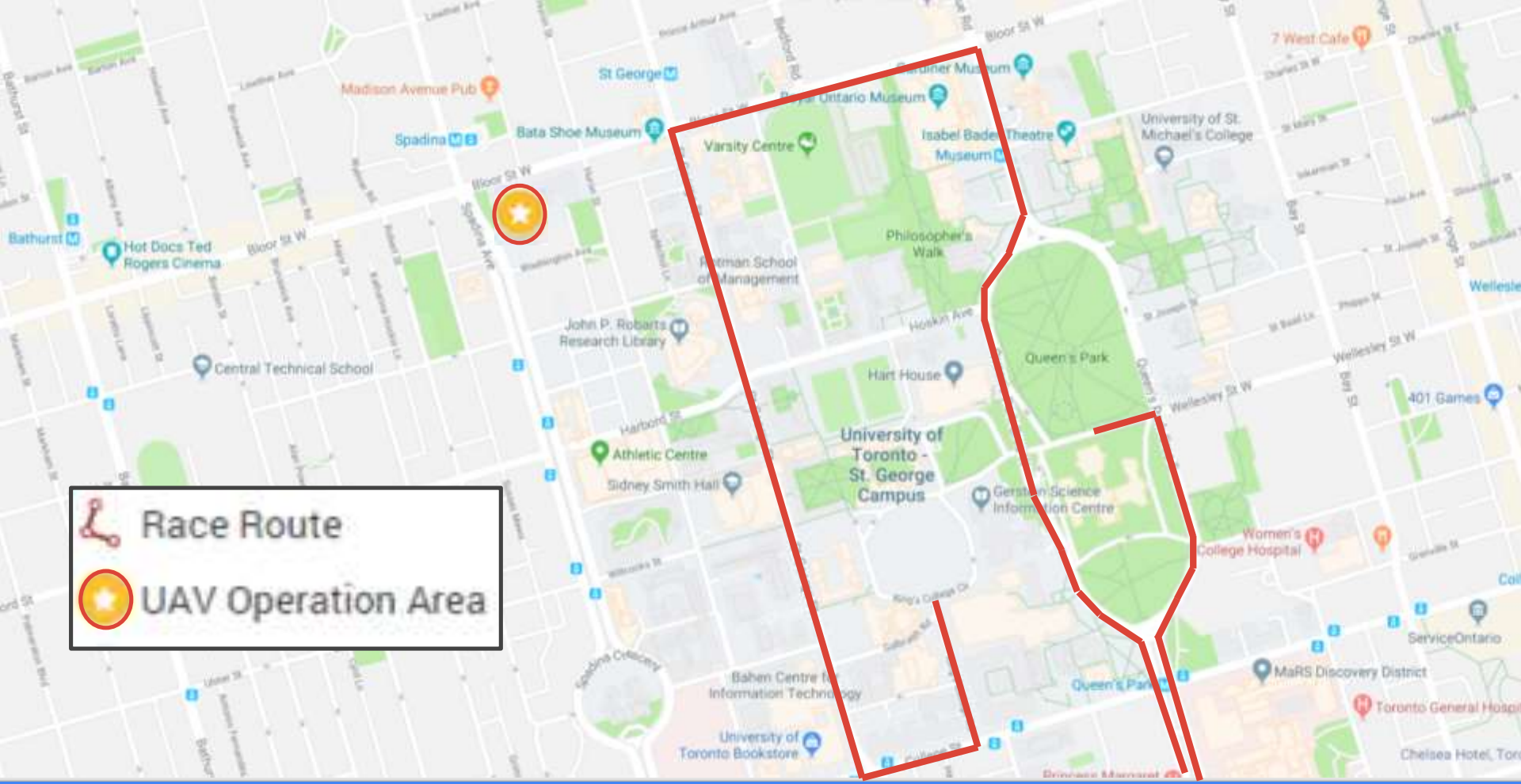
- ➔ Gain additional flight experience
- ➔ Observe a new practical application of UAV technology
- ➔ Demonstrate range capabilities of UAV

The City's Role

- ➔ Get related permits
- ➔ Staff in TOC
- ➔ Identify alternate routes
- ➔ Monitor / Identify Needs
- ➔ Update timing as needed
- ➔ Restore

UofT's Role

- ➔ Acquire flight certificate
- ➔ Notify airports
- ➔ Pilot, observer and UAV
- ➔ Coordinate with TOC



CIBC Run for the Cure

Unattended Aerial Vehicle (UAV)

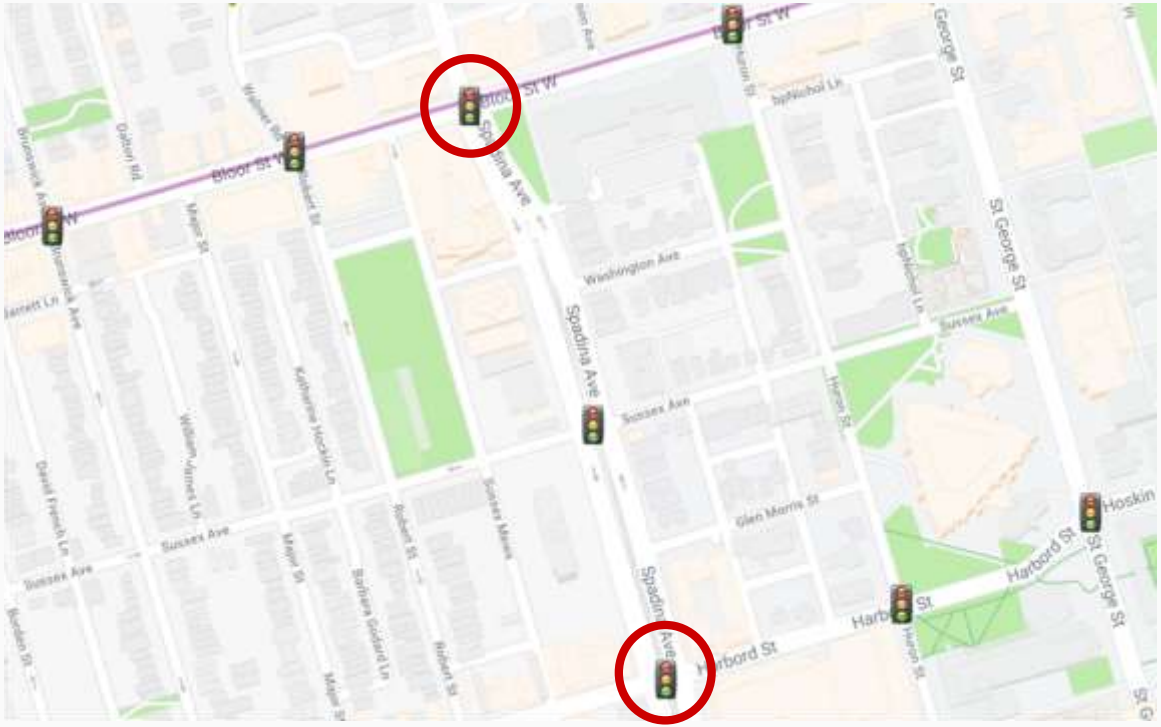
DJI Mavic Pro (740g)


GPS
95%
MAX ALT
75%
VISION
0EV
SD
CLEARANCE
HEIGHT
DISTANCE
RPM
In Flight (GPS)
Position
HD
Live · FPS 31.4
53:54
26:29
Auto
1080P/24 04:38.00
0.1
119
H.S 0.0 km/h
V.S 0.0 m/s
N/A

UAV Coverage

CCTV Coverage

Signal Timing Changes



Unplanned Events

Not feasible

- ➔ Unable to deliver blanket coverage
- ➔ Unpredictable in nature
- ➔ Battery life
- ➔ Current flight regulations

Planned Events

Feasible

- ➔ Able to deploy at carefully selected site
- ➔ Able to identify alternative routes and assess conditions
- ➔ Ability to change traffic signal timing
- ➔ Battery life and flight regulations
- ➔ Varying levels of occlusions

Future Potential

Federal regulations governing UAV flight capabilities

- ➔ Probable loosening of regulations
- ➔ Transport Canada may be willing to accept lateral movement over built-up areas

Battery life

- ➔ Strong expectations for battery life improvements

Privacy Impact Analysis (PIA)

- ➔ New PIA to include video from non-fixed locations

Conclusions

1. Currently not feasible to use UAVs to manage unplanned traffic incident
2. There is potential to utilize UAVs to manage traffic caused by planned events

Questions?

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