

Urban Commercial Vehicle Parking in Toronto

Illegal Parking Issues, Impacts, and Policy Interventions

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Civil Engineering
UNIVERSITY OF TORONTO

Outline for Today

- Commercial vehicle parking
- Illegal CV Parking, where and why?
- Impacts on congestion
- Policy opportunities
 - Public Sector solutions
 - Private Sector solutions



66%

Downtown

700,000

Tickets



\$23 Million



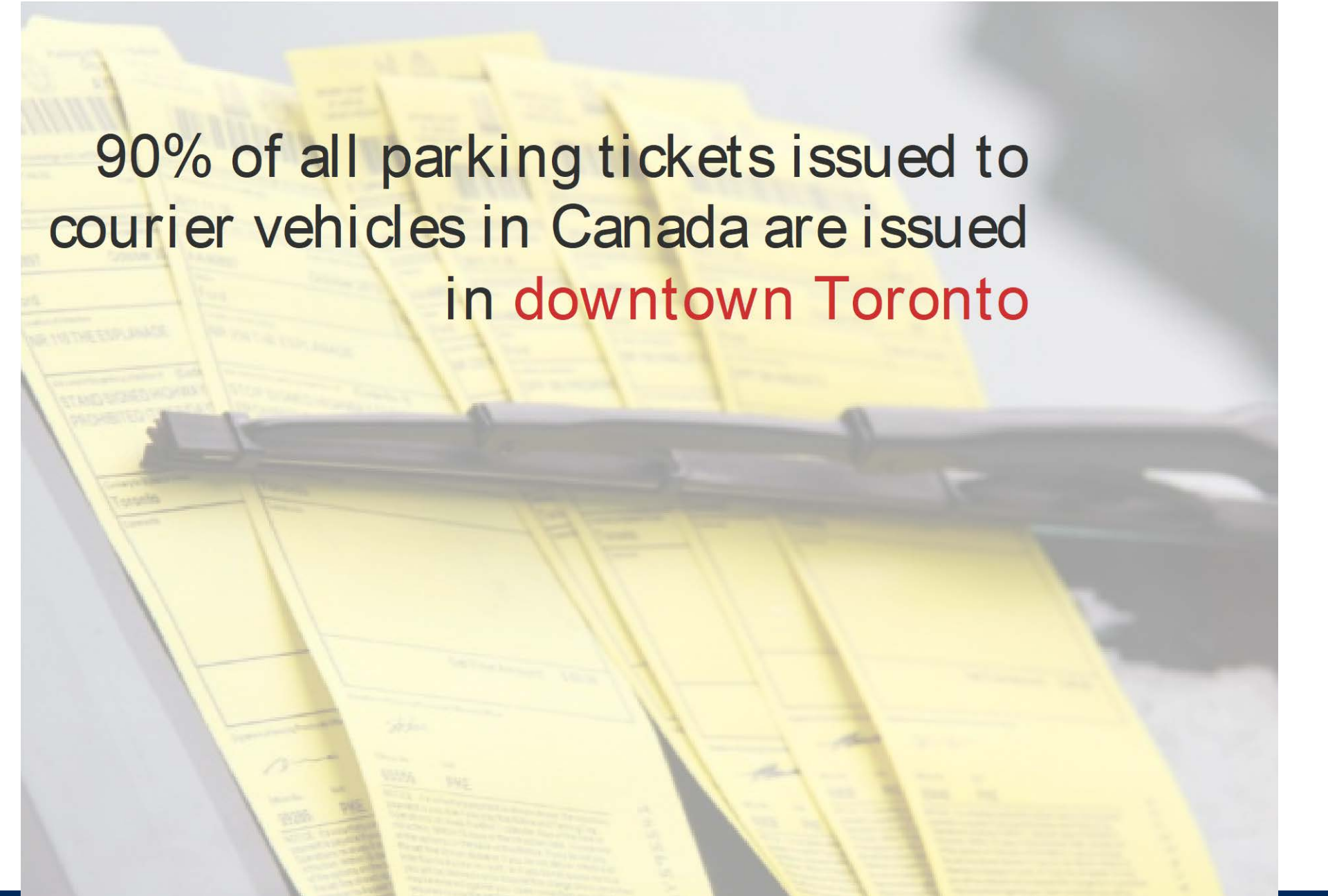
Congestion

500 Million vehicle-hours / year

Safety

**14% of illegal parking leads
to unsafe cyclist conflicts**



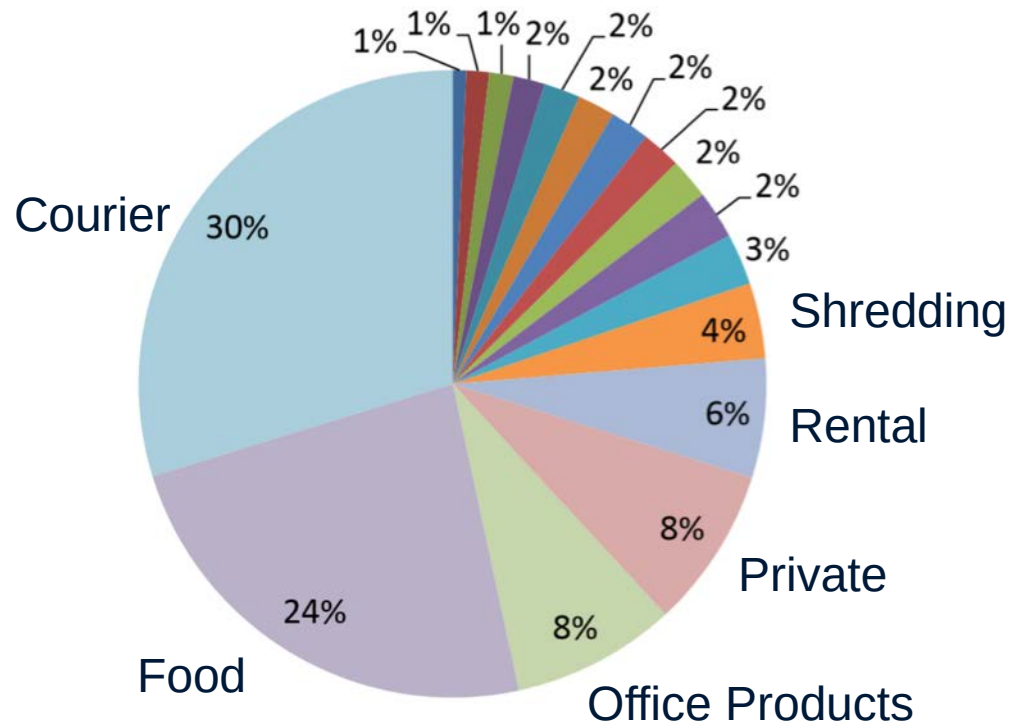


90% of all parking tickets issued to
courier vehicles in Canada are issued
in **downtown Toronto**



Data Collection

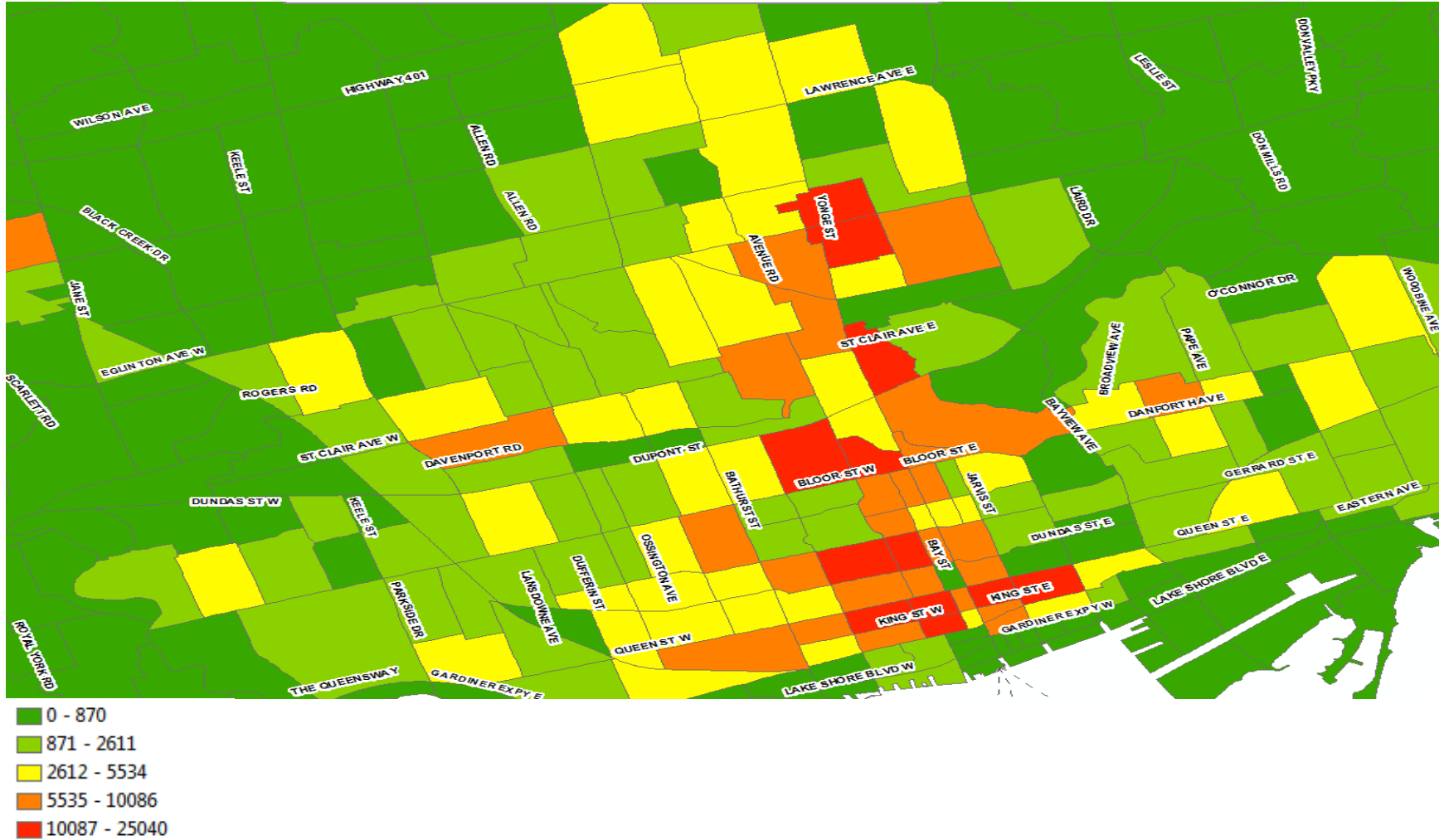
What Commercial Vehicles are parking?



Data Collection by Justin Kwok, University of Toronto



Locations of Illegal On-Street Parking



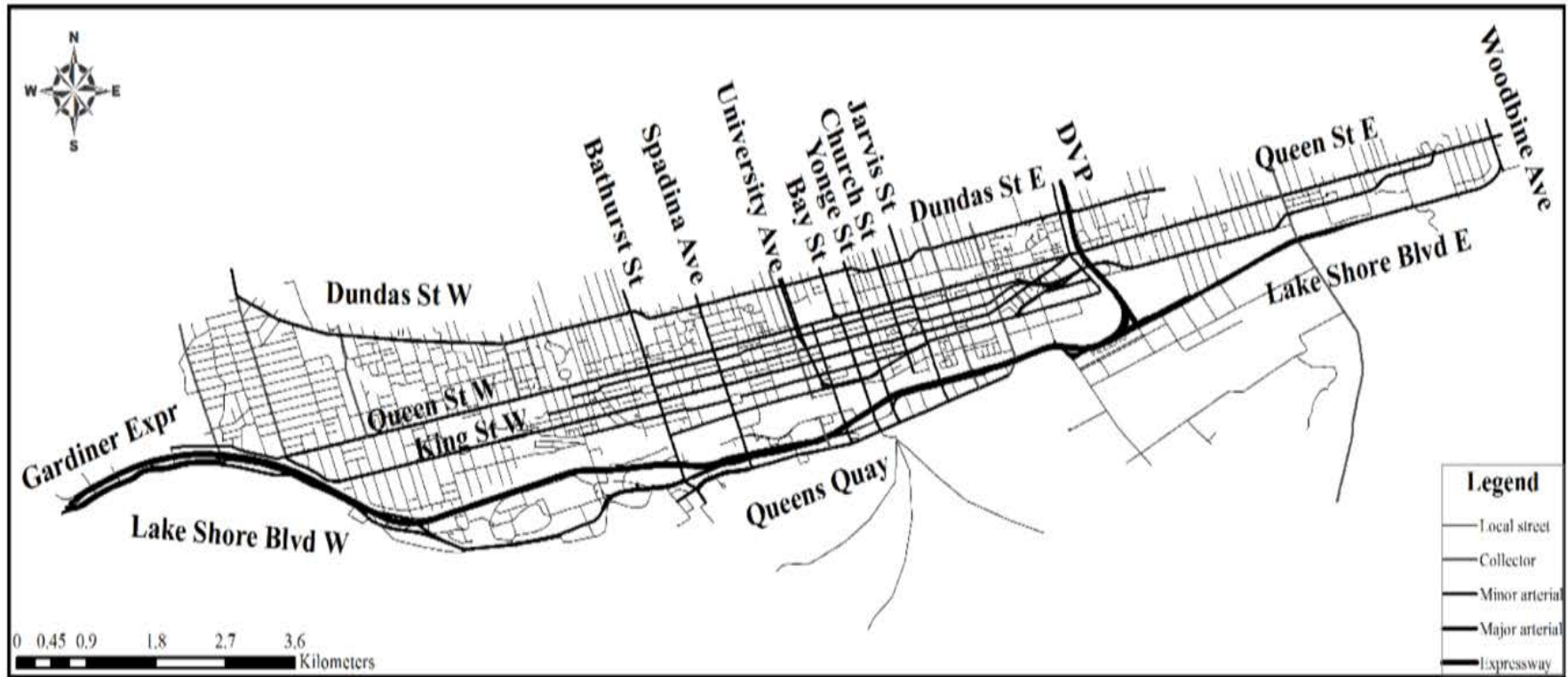
Quantifying Impacts

What is the impact of illegal parking on traffic congestion?

Research by Ahmed Ramadan, MAsC, University of Toronto



Traffic Microsimulation



Toronto Waterfront Network, Amirjamshidi (2013)

Data

- Microsimulation Model with Existing Travel Demand
- Parking Citations from Toronto Open Data (2011)
 - Date
 - Time
 - Type
 - Location
 - Fine



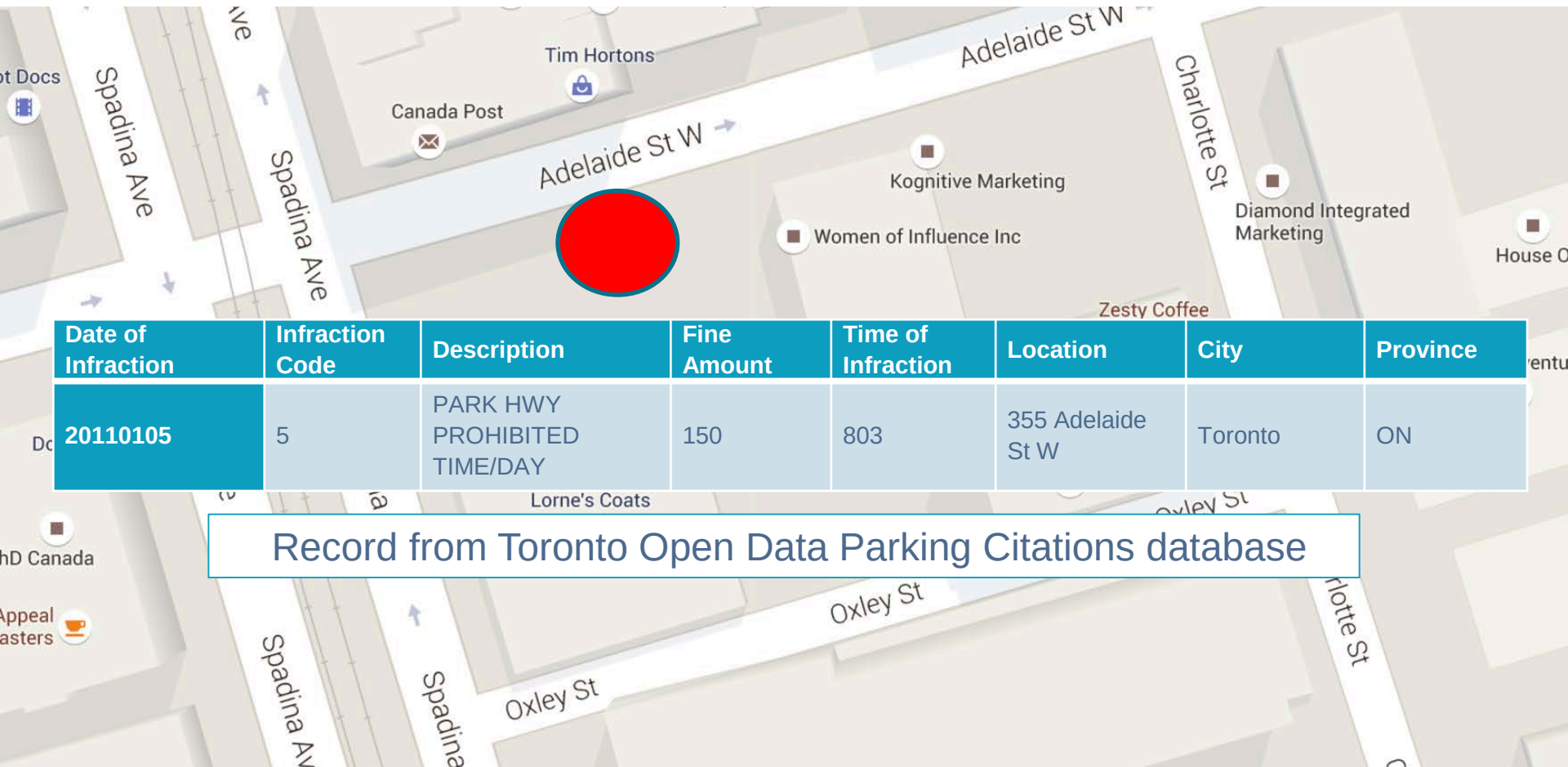
Research Methodology – Scenario Design

Scenario 1 – Base Case, No Illegal Parking

Scenario 2 – Illegal Parking Added



Example Simulation – 355 Adelaide St W



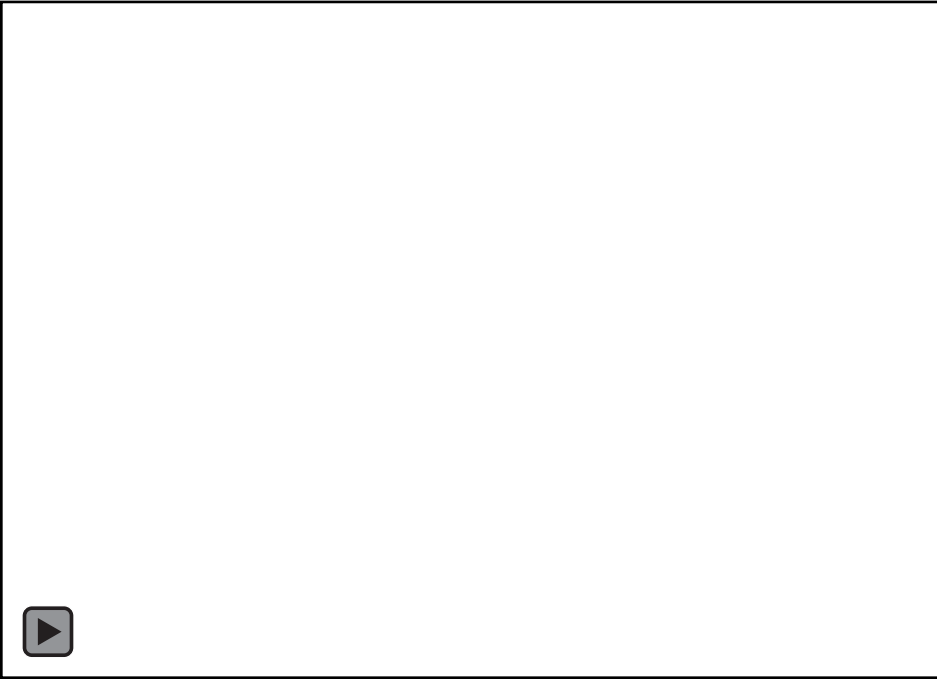
Date of Infraction	Infraction Code	Description	Fine Amount	Time of Infraction	Location	City	Province
20110105	5	PARK HWY PROHIBITED TIME/DAY	150	803	355 Adelaide St W	Toronto	ON

Record from Toronto Open Data Parking Citations database

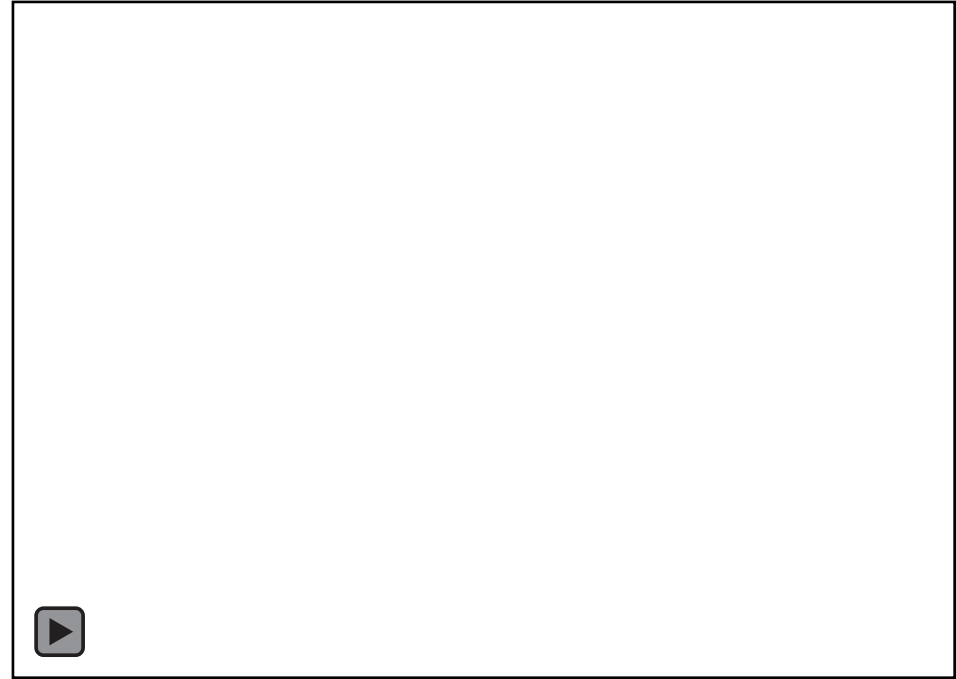
Retrieved from Google maps on 24/02/2016

Example Simulation

355 Adelaide Street W



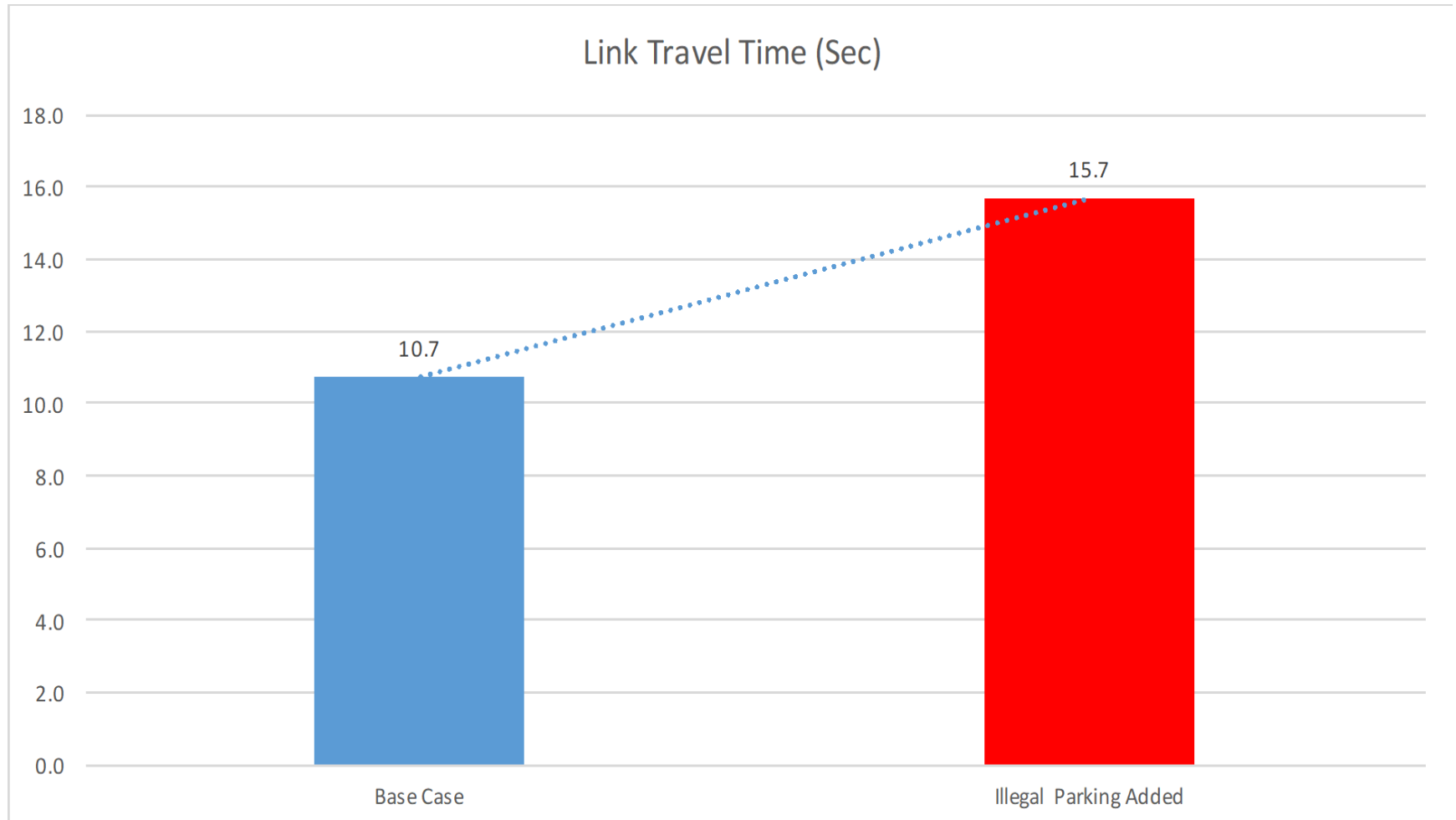
Scenario 1 – Base Case



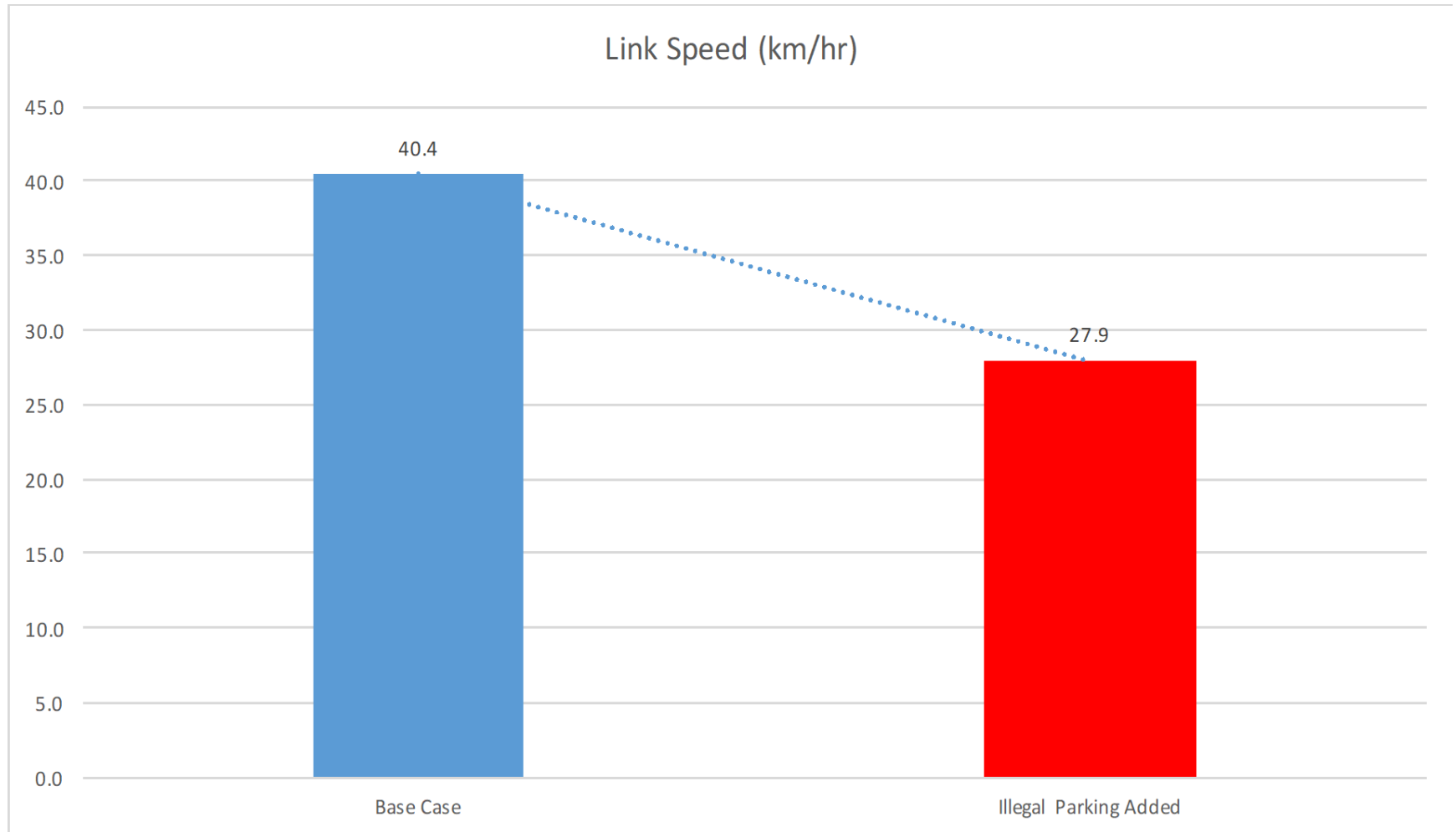
Scenario 2 – Illegal Parking Added



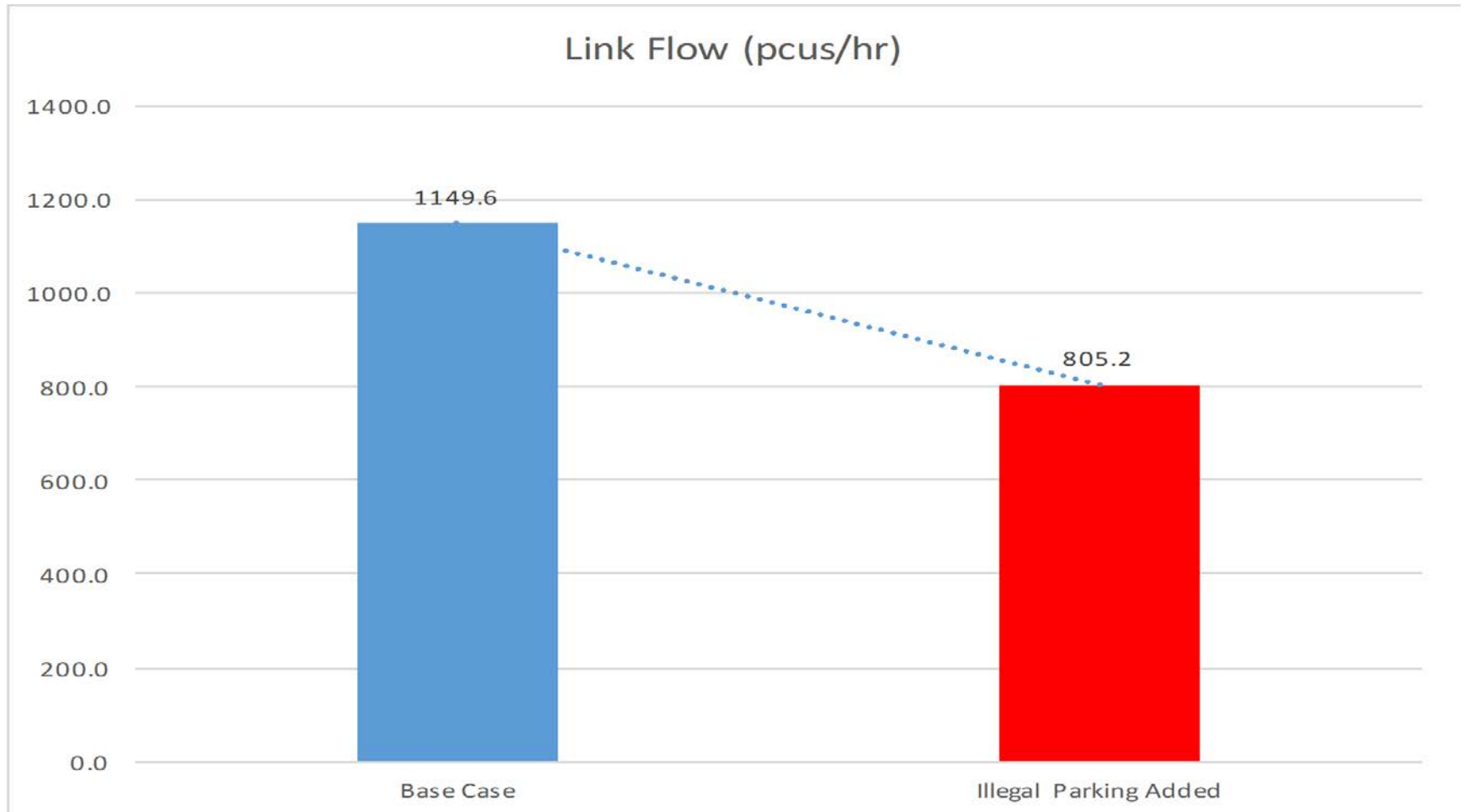
Example Simulation - Results



Example Simulation - Results



Example Simulation - Results



Summary Results

Road Segments on which Illegal Parking Incidents Occur

Scenario	Vehicle Delay (sec/veh)	Travel Time (sec/veh)	Speed (km/hr)	Flow (veh/hr)
Base Case	7	16.5	31	660
Illegal Parking Added	10.5	20.5	27	610



50 %



22 %



14 %



7 %

Policy Implications of Simulation Model

- Ignoring illegal parking in traffic models for policy evaluation is unrealistic
- Impacts of illegal parking warrant policy action
 - Increase enforcement
 - Supply for parking should resemble demand, for users with little choice
 - Induce a mode shift for users with a choice

Public Sector Solutions

- Increased Enforcement?
- Courier Delivery Zones?
- Parking Permit System?



Addressing Parking Needs of Commercial Vehicles

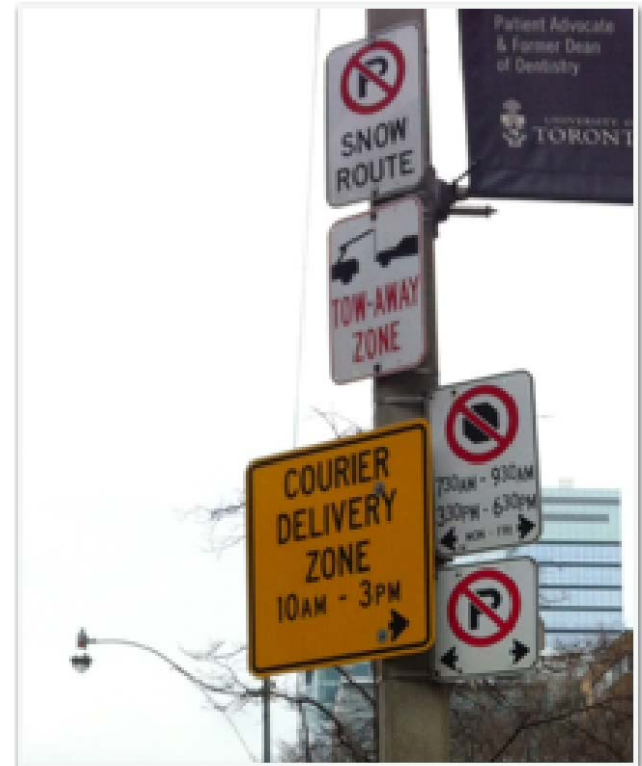
Challenges

- Deliveries often occur in dense, congested downtowns
- On-street parking is generally occupied for much of the day
- Off-street parking is more expensive, not conducive to delivery operations (usually very short delivery times)
- Insufficient loading docks in old buildings
- Some companies are legally required to park on site (shredding).
- Night time deliveries not practical for the current courier industry model



Toronto's Approach

- Introduction of **courier delivery zones (CDZs)** across downtown
- Exploration of **parking permit** program to exempt commercial vehicles from certain parking offenses



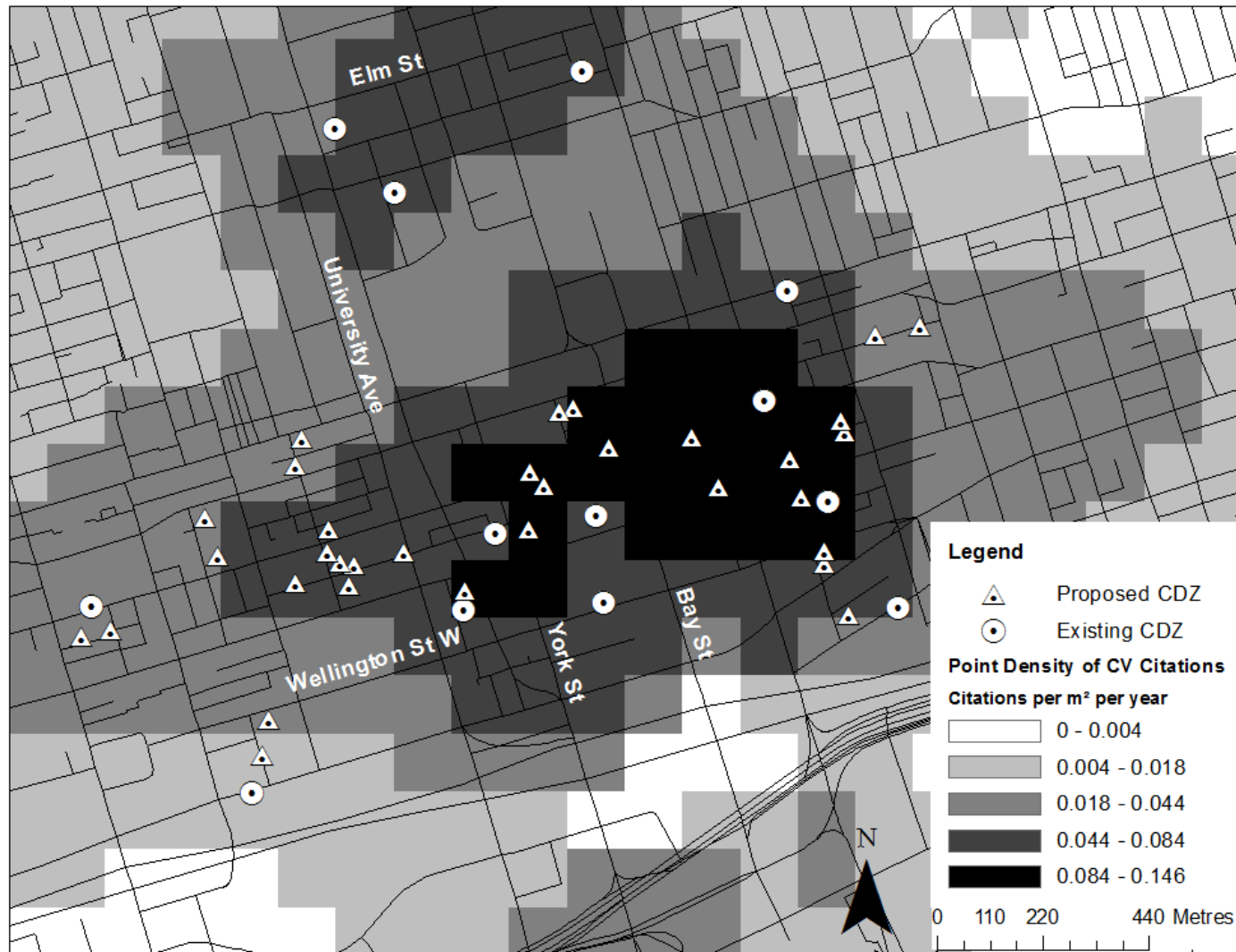
Research Objectives

Research by Adam Rosenfield, James Lamers, and Mehdi Nourinejad

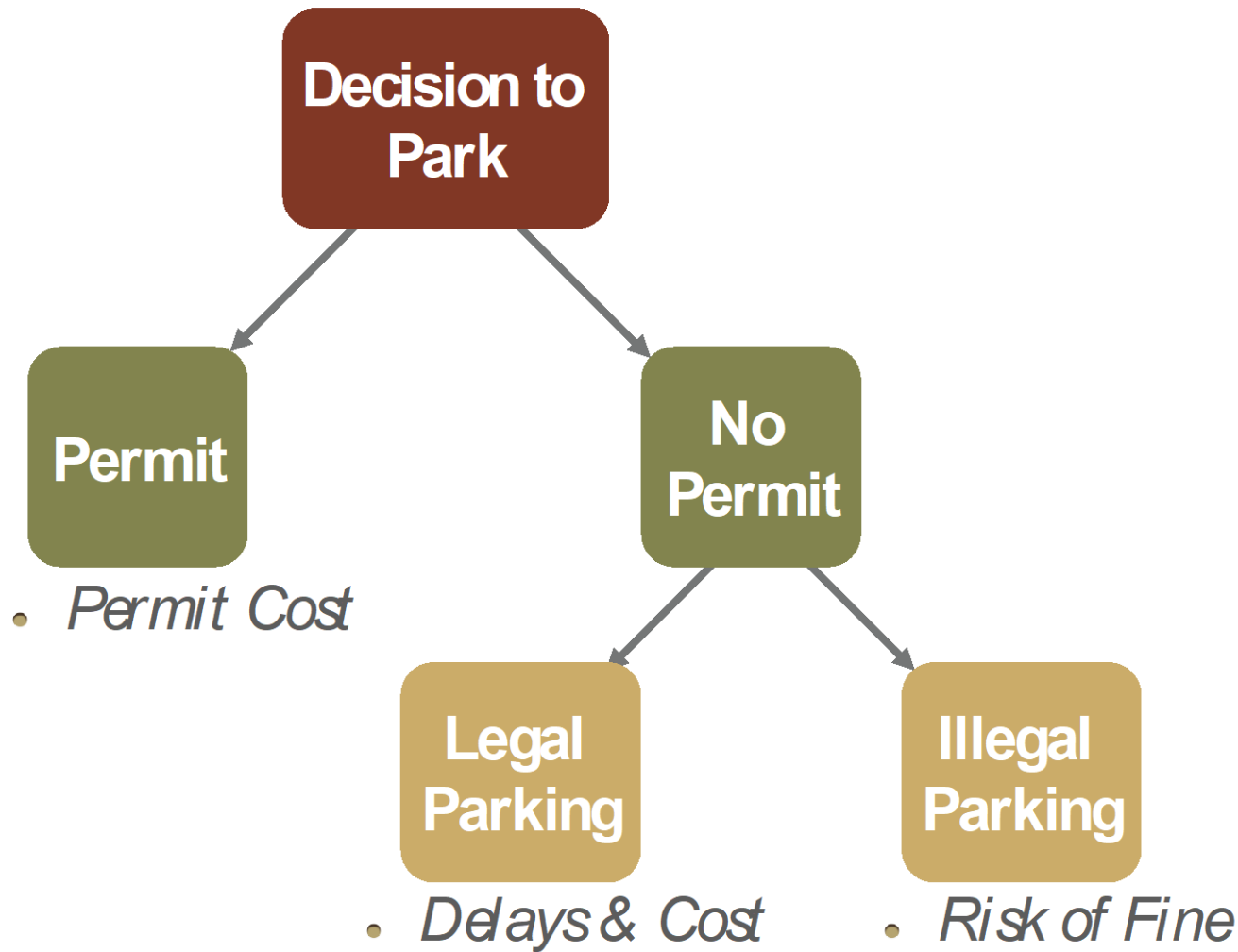
- Evaluate feasibility of courier delivery zones (CDZs) and parking permit policies
- Assess municipal fiscal impacts of parking permits under various pricing schemes
- Develop strategies to facilitate legal curbside activity for commercial vehicles in Toronto



Courier Delivery Zones / 2012 CV tickets



Modeling Parking Behavior



Key Findings

- Permit program can legitimize what is currently common illegal behaviour
- Permit program can likely be revenue-neutral below \$500/yr per truck
- Permit should be voluntary, but a high adoption rate is important for program success
- Expansion of Courier Delivery Zone (CDZ) pilot project has good potential but a permit program would need a large number of permitted parking locations to be effective



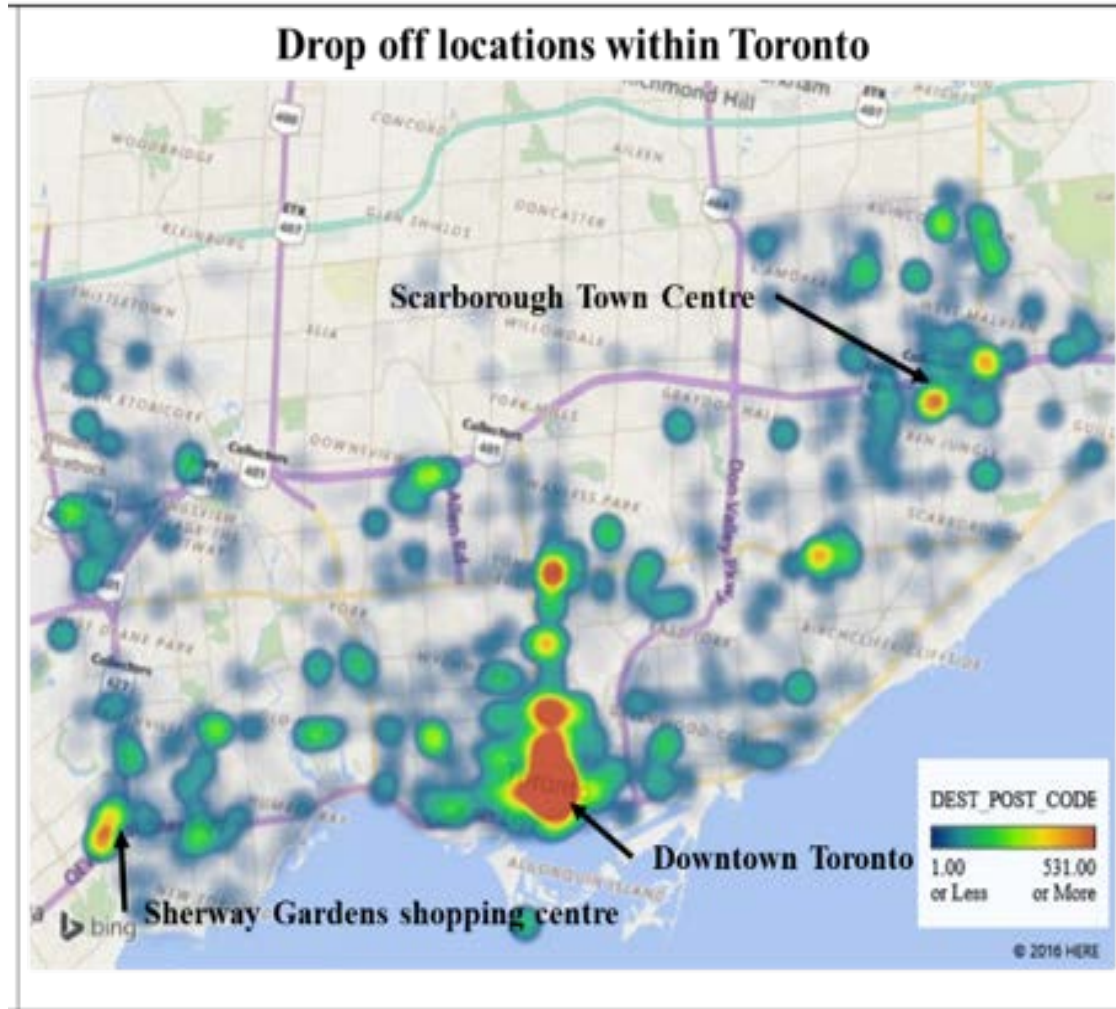
Courier Industry Response

Research by Mehdi Nourinejad, Paul Deng and Mahyar Jahangiriesmaili

- PATH system in downtown Toronto is currently used by a major courier in Canada
- Potential to expand that system



Courier Deliveries

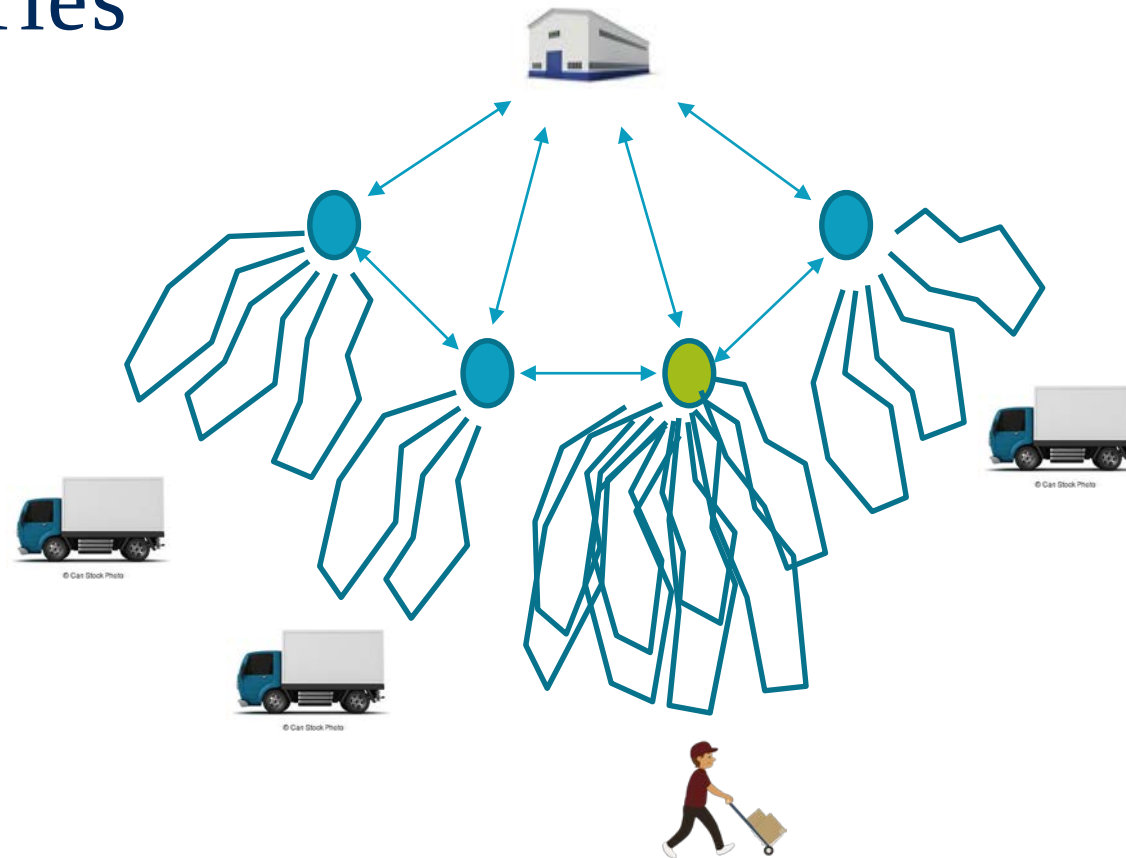


Downtown Toronto PATH Network

- Underground walkway spanning about 30 km
- Connects
 - 6 subway stations
 - Union station
 - Over 50 buildings/office towers
 - 20 parking garages
 - 8 major hotels



Expanding courier operations on foot in the PATH network to replace truck deliveries



Existing Facility at Adelaide and Potential Facility at Eaton Centre

- Adelaide Centre (Existing Facility)
 - 1000 deliveries/day within 700 meters
 - 400 pickups/day within 800 meters
- Eaton Centre (Potential Facility)
 - 1000 deliveries/day within 740 meters
 - 750 pickups/day within 650 meters

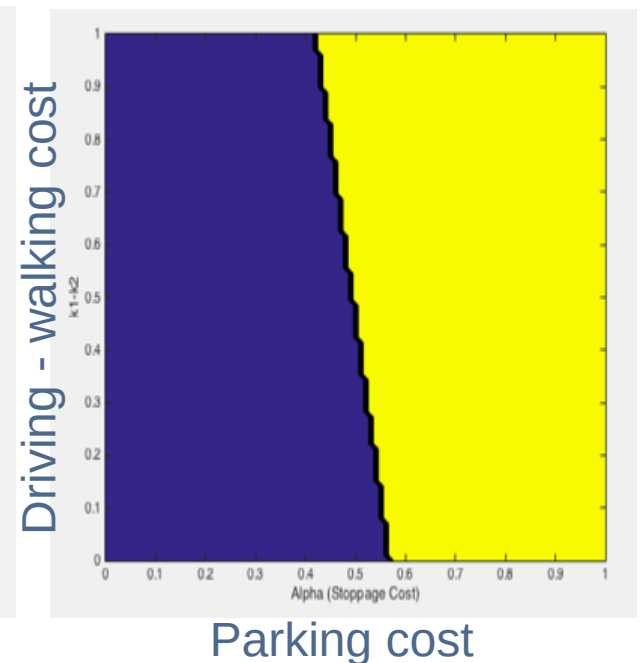
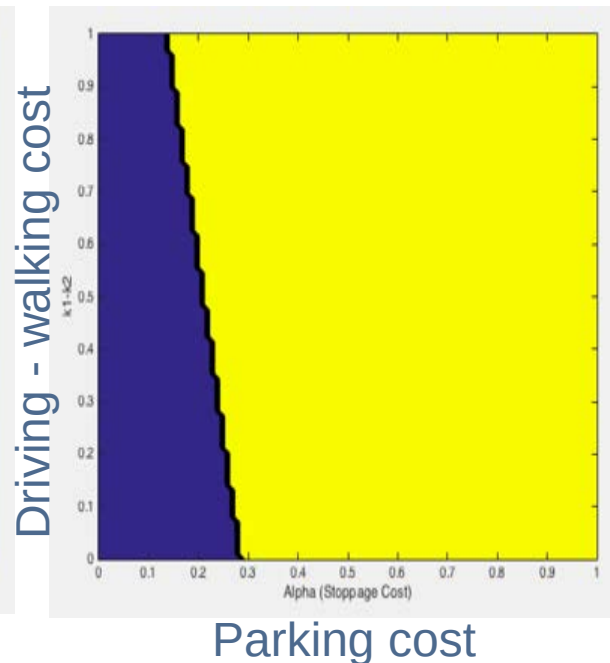
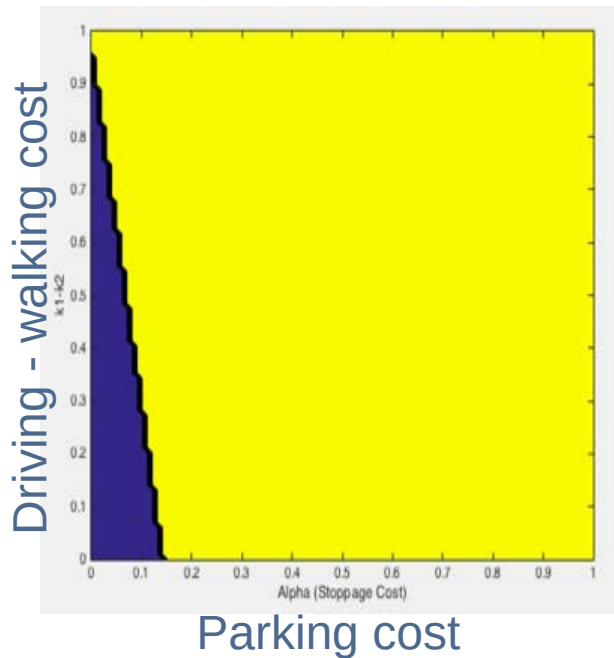


Cost Analysis of Eaton Centre Walk Network

*Terminal Operating
Cost = \$500/day*

\$1000/day

\$2000/day



Yellow = Yes, develop the facility

Blue = No, facility will be more expensive



Legend



walkdrop_Proj

PATHnetwork

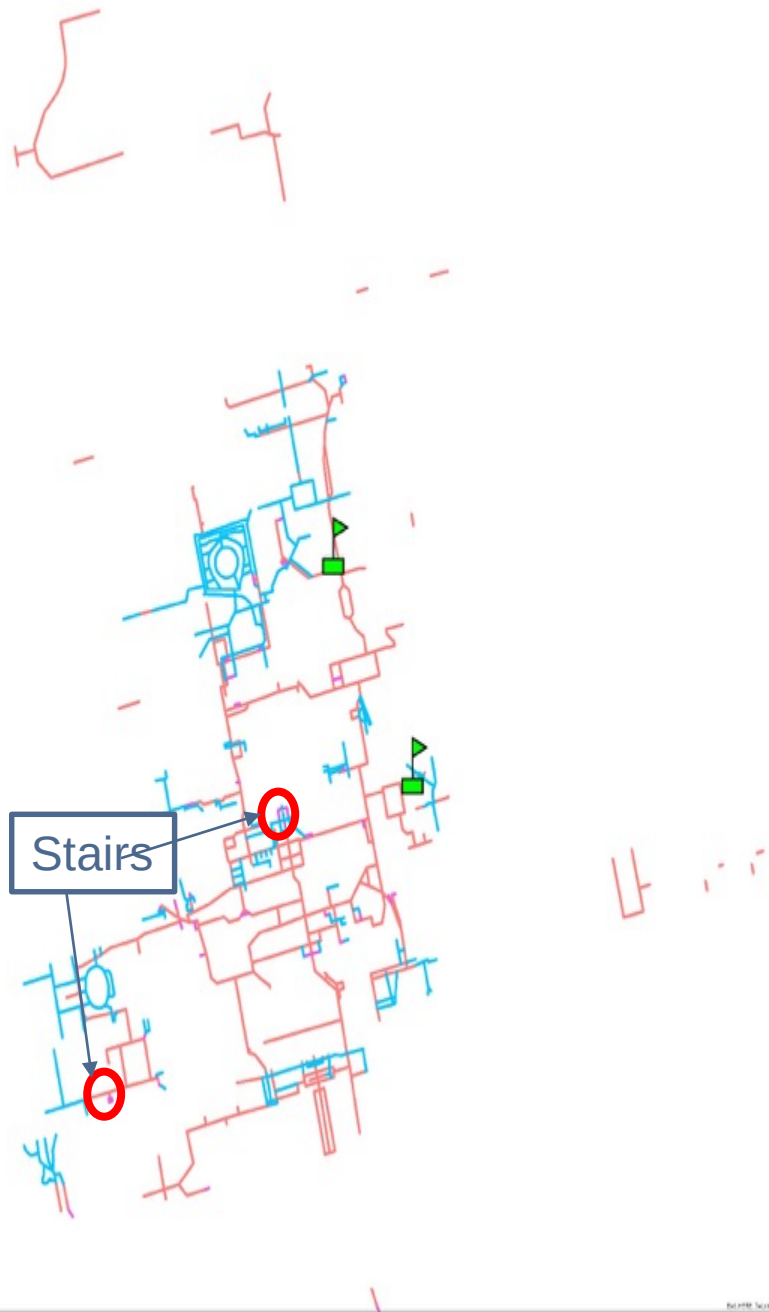
<all other values>

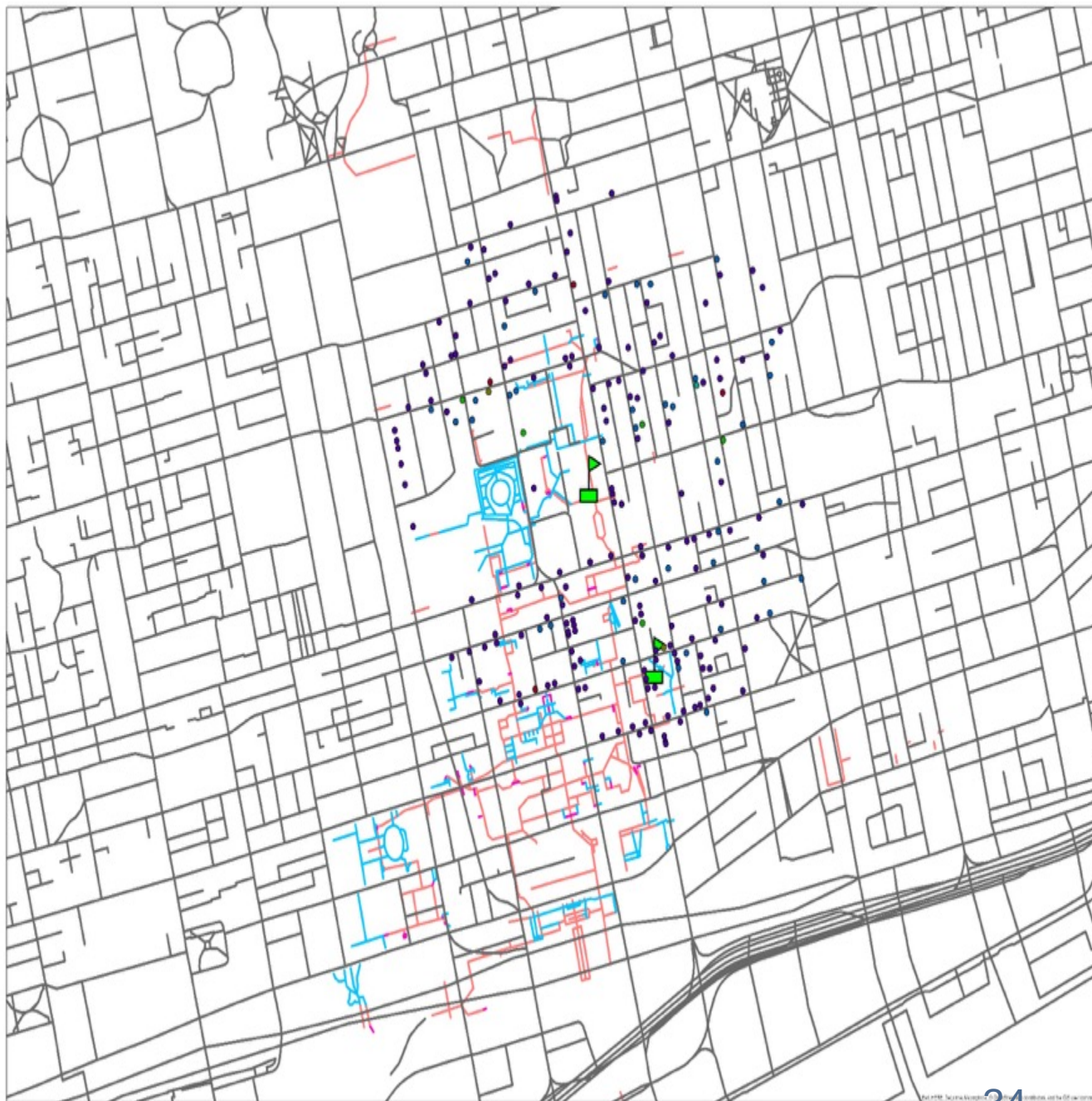
type

above grade walkway

enclosed walkway

stairs





Legend

- FMR_Delivery_Aug31_Eaton
- FMR_Delivery_Sept1_Eaton
- FMR_Delivery_Sept2_Eaton
- FMR_Pickup_Aug31_Eaton
- FMR_Pickup_Sept1_Eaton
- FMR_Pickup_Sept2_Eaton



<all other values>

type

- above grade walkway
- enclosed walkway
- sidewalk
- stairs



Length of Delivery Routes – Aug 31



Key findings

- Walk-networks are beneficial when
 - parking and driving costs are high,
 - walk movements are efficient,
 - facility costs are low.
- Seems practical, now in the process of refinement.



Overall Summary

- Commercial vehicle parking is an ongoing challenge
- Demonstrated congestion impacts of parking
- Few options exist for couriers to operate legally
- Viable parking management options exist in Toronto
 - Increased enforcement is probably not sufficient
 - Commercial loading zones show promise
 - Parking permit options could be revenue neutral
- Greater use of walking deliveries in downtown core of Toronto seems to be feasible



Current Research in Parking

- Using a video game approach to assess influences on parking decision making
- Night-time delivery pilot in the Region of Peel
- Optimal parking lot design for automated vehicles
- Logistics of robot deliveries



Student Geniuses

- Mehdi Nourinejad, PhD
- Adam Wenneman, MASc
- Ahmed Ramadan, MASc
- Mahyar Jahangiriesmaili, MASc
- Paul Deng, MASc
- Adam Rosenfield, BASc
- James Lamers, MASc
- Justin Kwok, BASc
- Bo Wang, MASc
- Sina Bahrami, PhD



Relevant Journal Articles

- **Nourinejad, M.** and Roorda, M.J. (2017). Parking Enforcement Policies for Commercial Vehicles. *Transportation Research Part A: Policy and Practice* 102: 33-50.
- **Rosenfield, A., Lamers, J., Nourinejad, M.,** and Roorda M.J. (2016). Investigation of Commercial Vehicle Parking Permits in Toronto. *Transportation Research Record: Journal of the Transportation Research Board* 2547:11-18.
- **Wenneman, A.,** Nurul Habib, K.M., and Roorda, M.J. (2015). A Disaggregate Analysis of the Relationships between Commercial Vehicle Parking Citations, Parking Supply, and Parking Demand. *Transportation Research Record: Journal of the Transportation Research Board* 2478: 28-34
- **Nourinejad, M. , Wenneman, A. ,** Nurul Habib, K. and M.J. Roorda (2014) Truck Parking In Urban Areas: Application of Choice Modelling Within Traffic Microsimulation. Poster presented at the *93rd Annual Meeting of the Transportation Research Board*. Washington DC, January 12-16.
- **Ramadan, A.,** and Roorda, M.J. (2017). An Integrated Traffic Microsimulation Model of Illegal On-street Parking in Downtown Toronto. Paper presented at the *96th Annual Meeting of the Transportation Research Board*. January 8-12, 2017.
- **Nourinejad, M.** and Roorda, M.J. (2017). Impact of Hourly Parking Pricing on Travel Demand. *Transportation Research Part A: Policy and Practice*. 98: 28-45.



Thank You!

