# Improving Cycling Safety in Toronto

*A data-driven investigation into how Toronto can improve the safety of its cyclists*

## 2024 SAS Safe Roads Competition

Seneca POLYTECHNIC

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# Agenda

01 | Why study Cyclists?

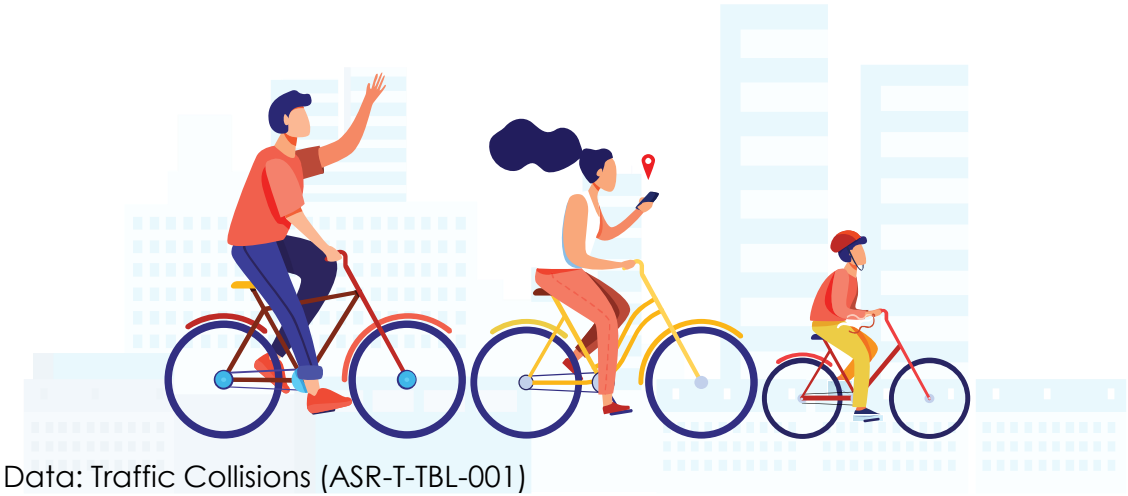
02 | Background on Cyclist Behaviour

03 | Why do collisions occur?

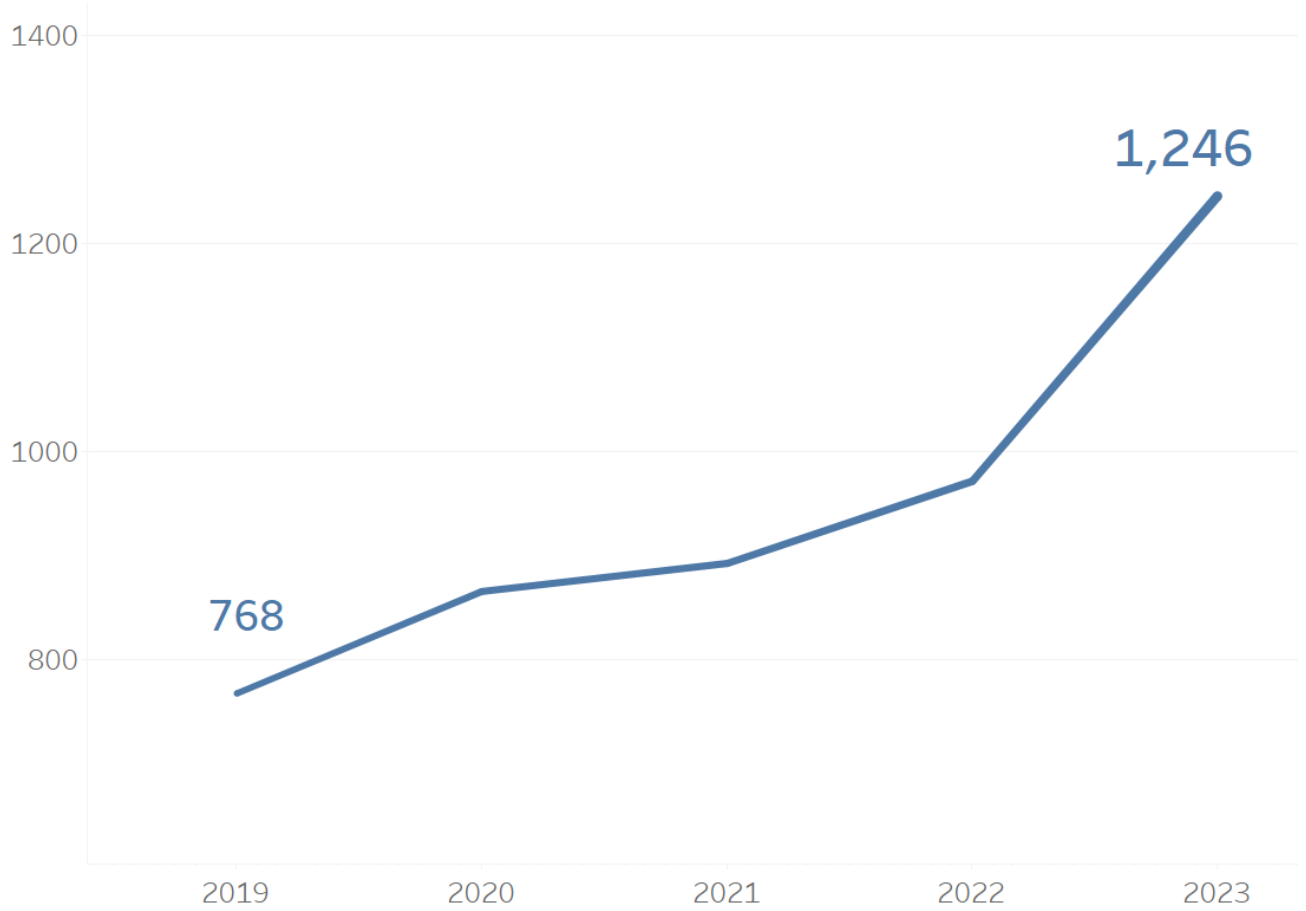
04 | Summary & Recommendations

# Why study Cyclists?

The number of collisions related to cyclists has steadily increased each year since the pandemic.



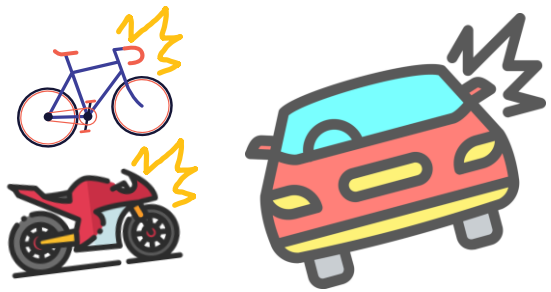
## Collisions of Cyclists



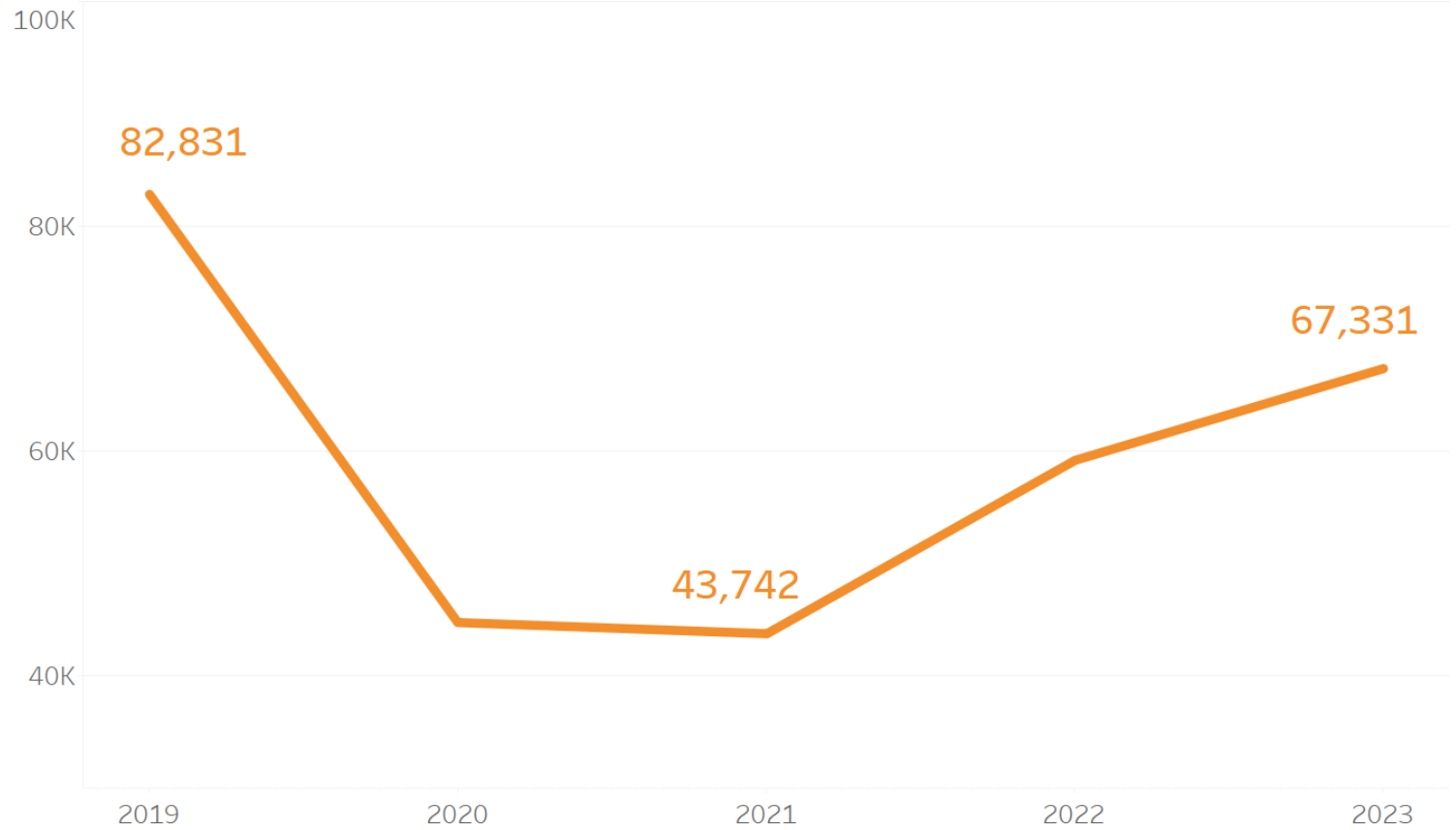

Data: Traffic Collisions (ASR-T-TBL-001)

# Why study Cyclists?

Meanwhile, the number of total collisions fell by 15% in the period 2019 to 2023



## Total Number of Collisions



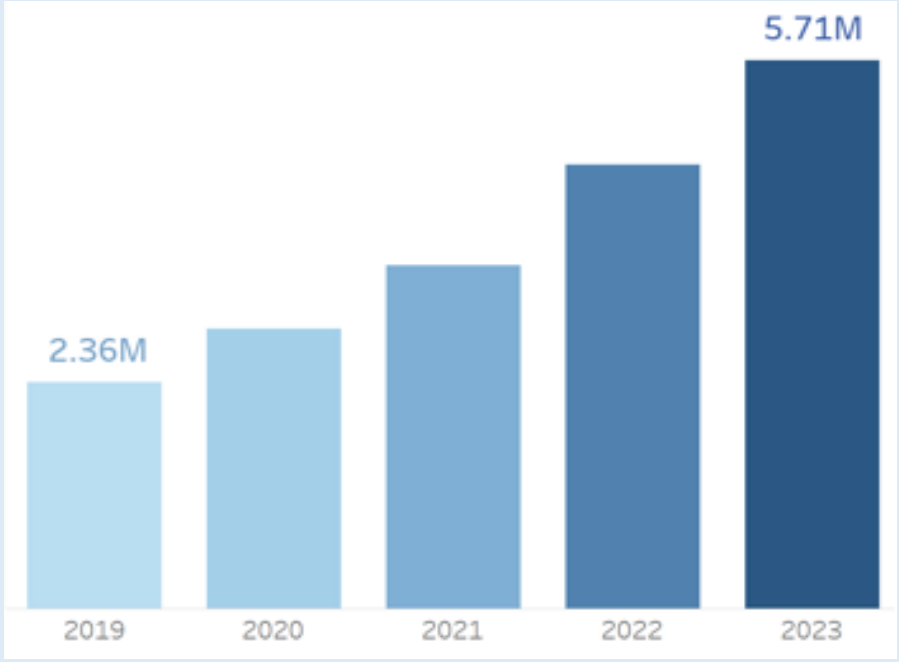

Data: Traffic Collisions (ASR-T-TBL-001)

# Why study Cyclists?

**Support Vision Zero and improve safety for most vulnerable road user types**

## Growing Demand

**Almost 6 million total rides** taken in 2023, just on the bike share platform




## Why it is alarming?

**68%** Cycling collision injury rate

**~12%** Automotive / Motorcycle collision injury rate

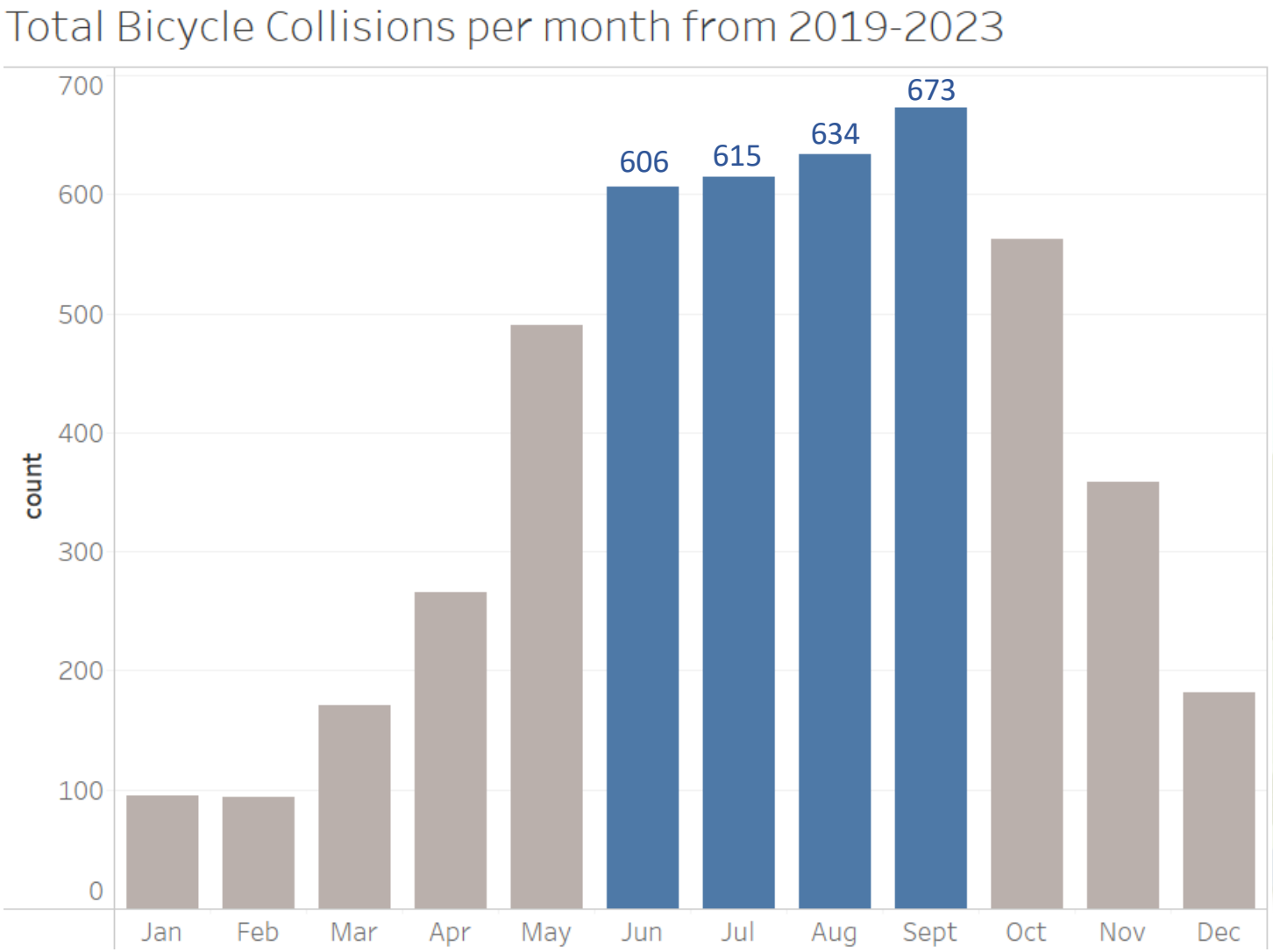
Cyclists do not have the protection that other modes of transport provide, increasing the risk of a serious injury.

Data: Bike Share Ridership, Killed or Seriously Injured (KSI) Collisions

# Background

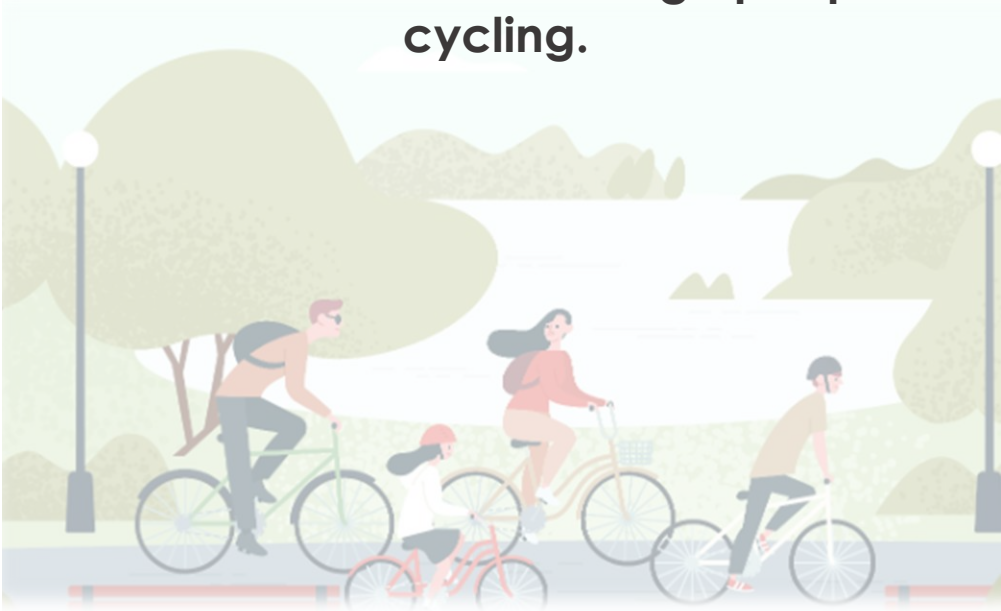
Tracking Cyclist Behavior

# Which months do most collisions happen?



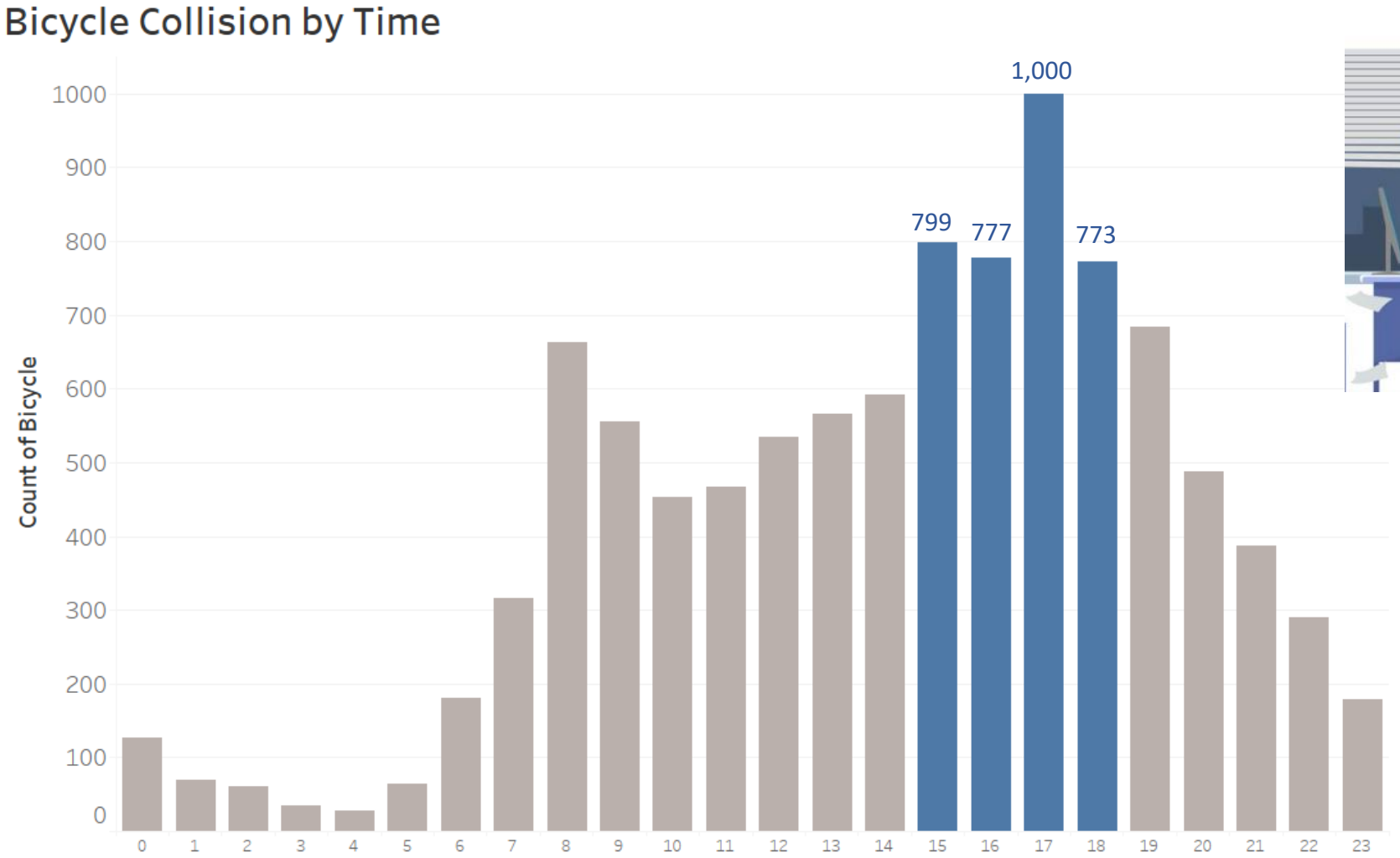

**June to September (Summer & Autumn)**

**Good weathers encourage people cycling.**



Data: Traffic Collisions (ASR-T-TBL-001)

# What time does most collisions take place?



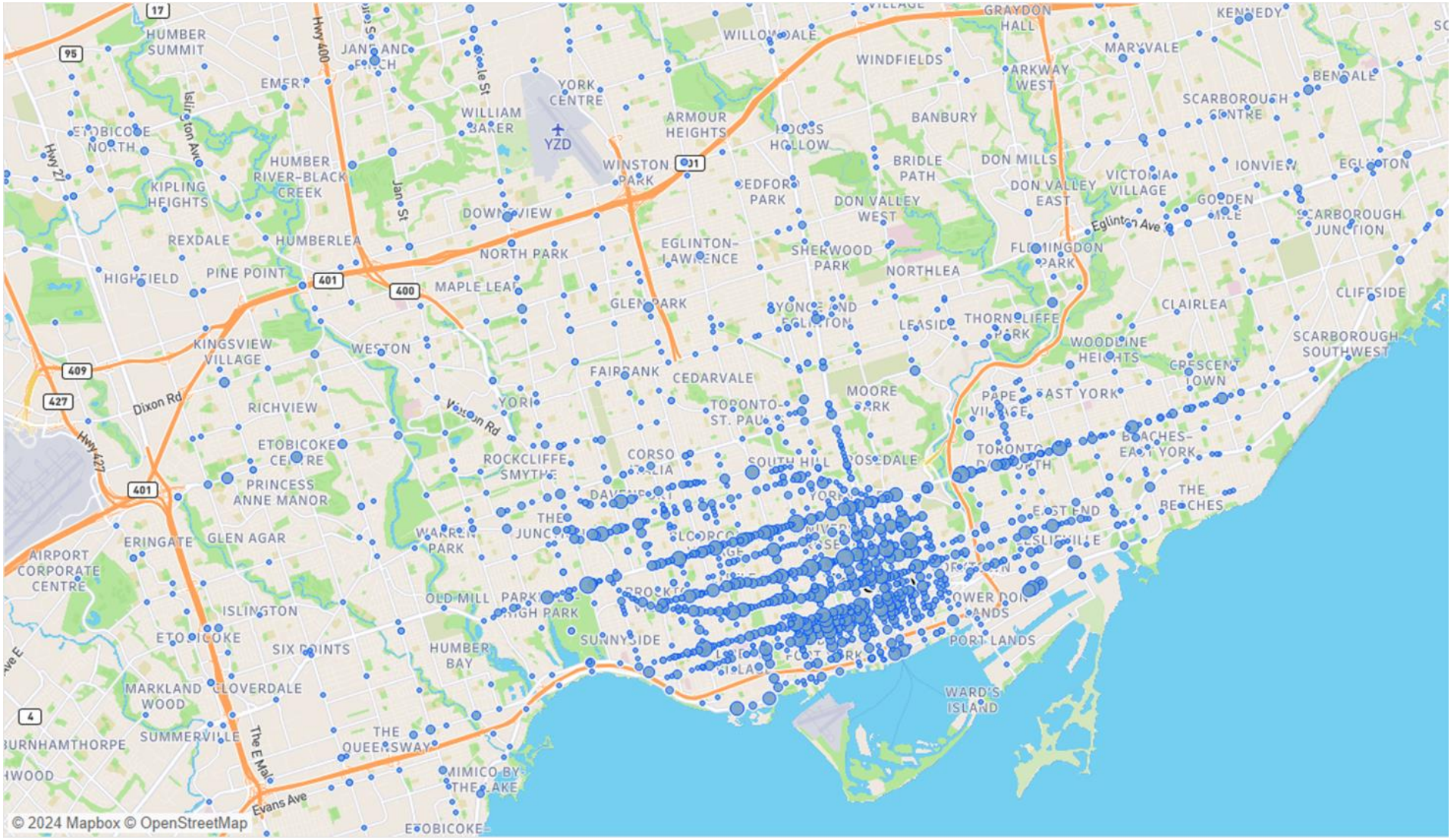


**3:00pm to 6:00pm**

Data from 2019-2023

Data: Traffic Collisions (ASR-T-TBL-001)

# Where do the accidents happen?

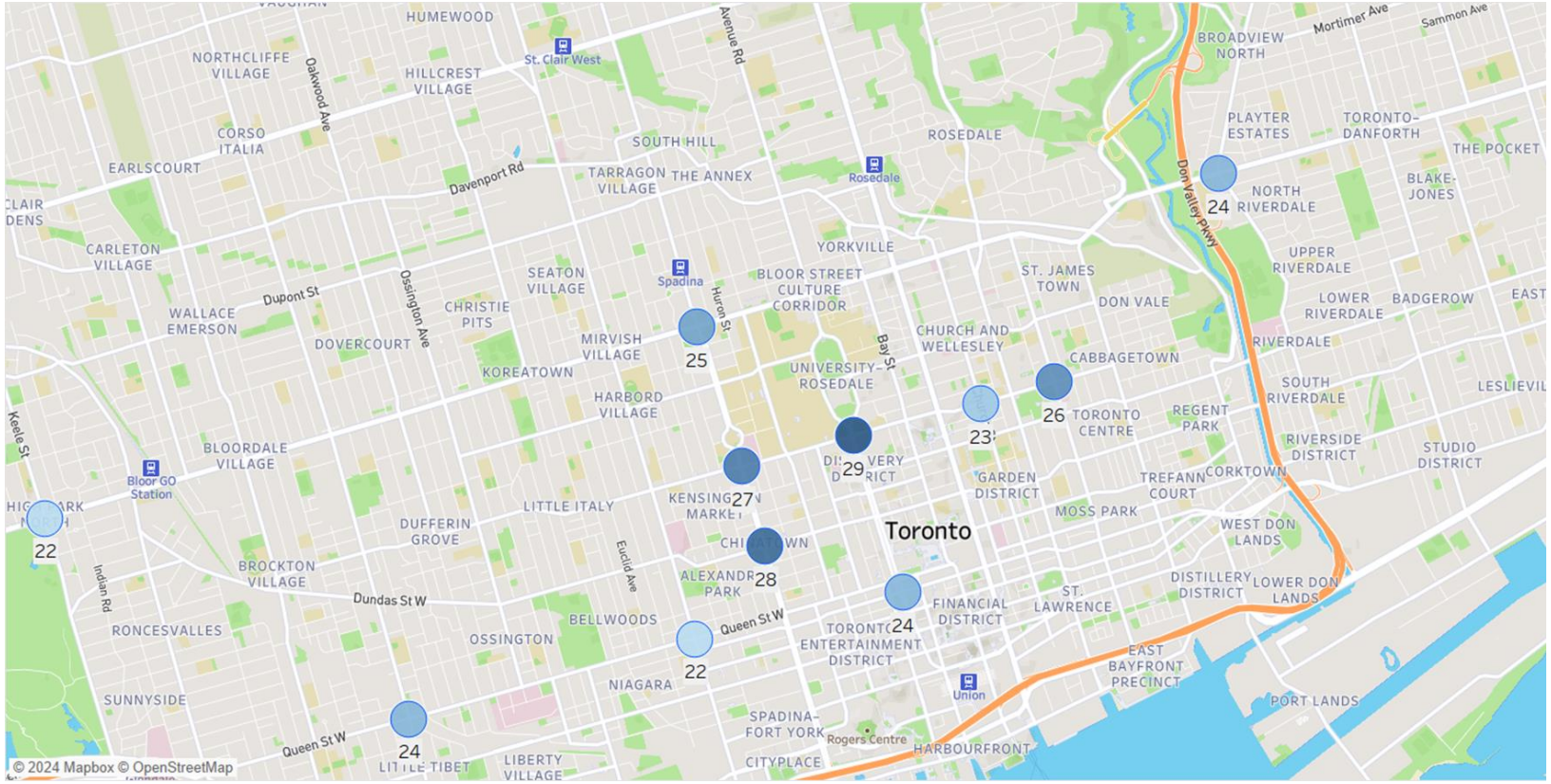



Data: Traffic Collisions (ASR-T-TBL-001)

# Where do the accidents happen?

Bicycle collisions frequently occurred on Spadina Ave, College St, University Ave

**Top 10 locations : Bicycle collisions**




| Rank | Street Name | Collisions |
|---|---|---|
| 1 | **College St/University Ave** | 29 |
| 2 | Dundas St W/**Spadina Ave** | 28 |
| 3 | **College St/Spadina Ave** | 27 |
| 4 | Carlton St/Sherbourne St | 26 |
| 5 | Bloor St W/**Spadina Ave** | 25 |
| 6 | Queen St/Dufferin St | 24 |
| 6 | Richmond St W/**University Ave** | 24 |
| 6 | Bloor St E/Broadview Ave | 24 |
| 9 | Carlton St/Church St | 23 |
| 10 | Queen St W/Bathurst St | 22 |
| 10 | Bloor St W/Keele St | 22 |

Data: Traffic Collisions (ASR-T-TBL-001)

# Why do collisions happen?

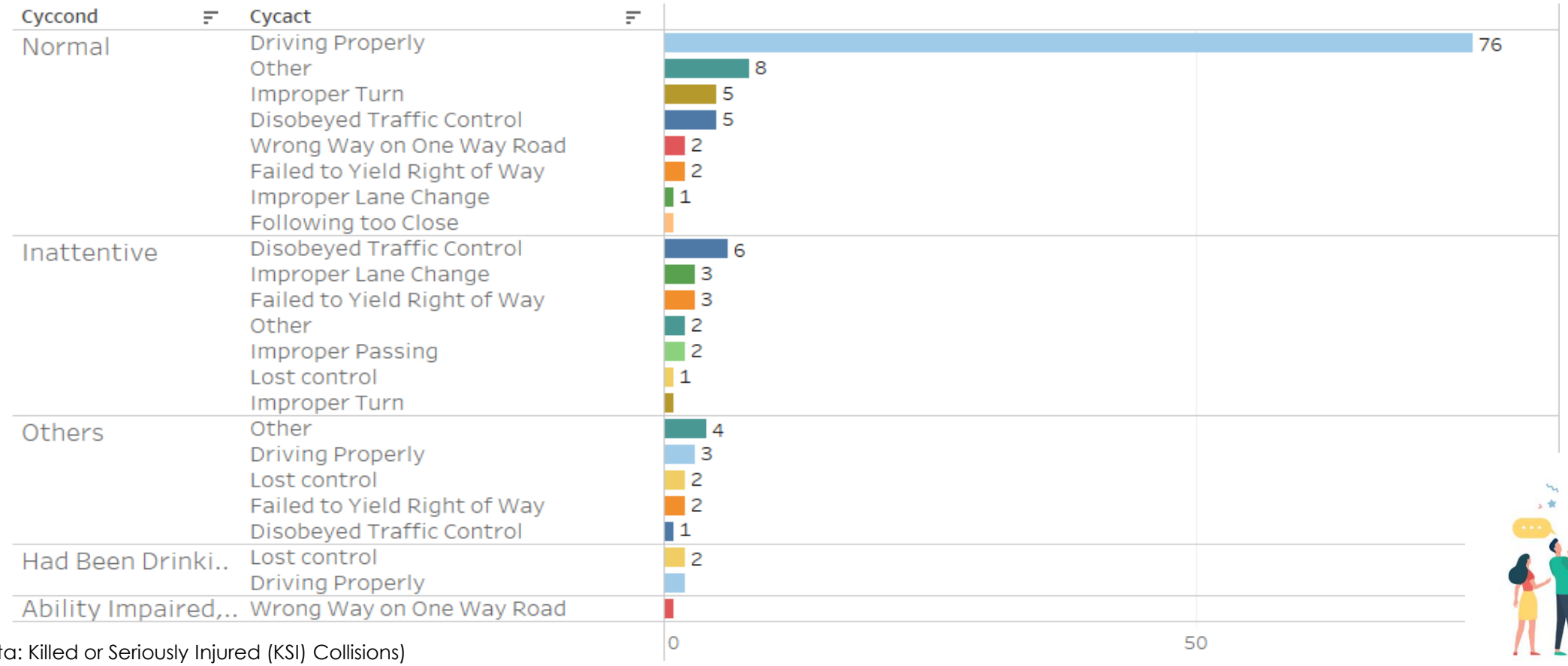
# Why do collisions happen?

**Lack of traffic control**

# Lack of traffic control on roads

**Most collisions happen when cyclists are in normal condition and driving properly. Why do collisions still take place?**

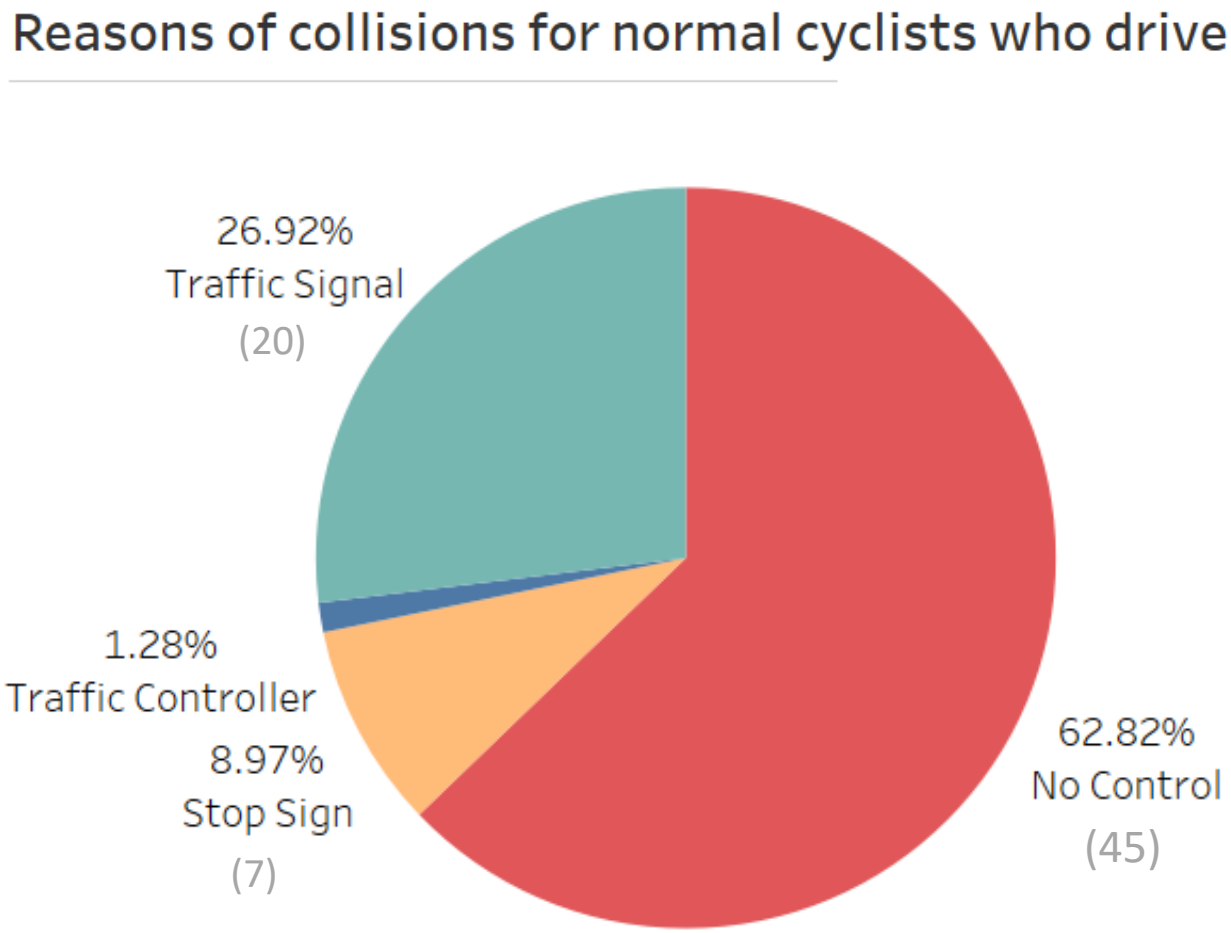
## Reasons for Collisions and Conditions of Cyclists




Normal: 100
Inattentive: 18

Data: Killed or Seriously Injured (KSI) Collisions)

# Lack of traffic control on roads

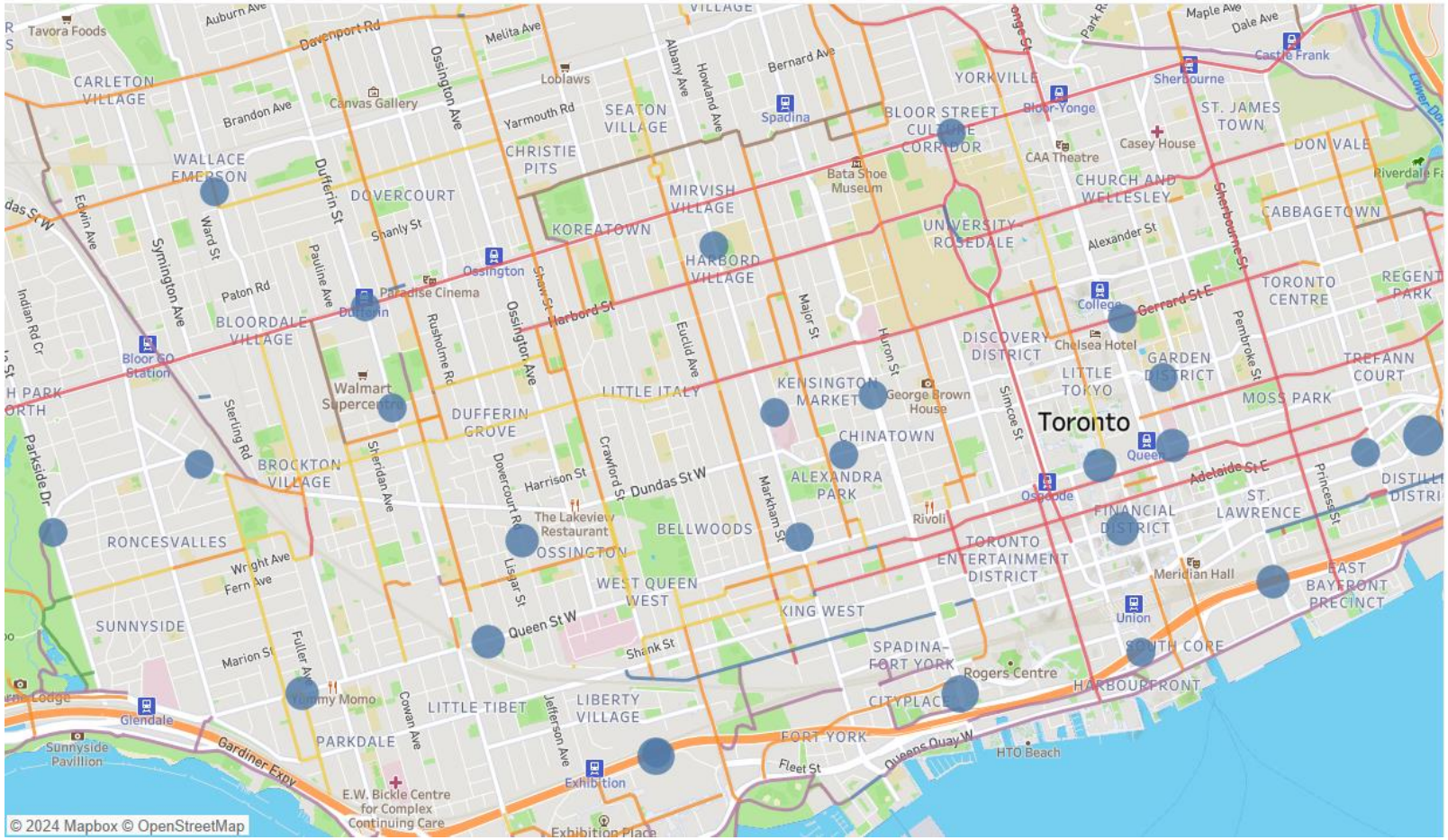



**Since 2019,**
**no traffic control is the core reason for cyclist collisions**

Data: Killed or Seriously Injured (KSI) Collisions

# Lack of traffic control on roads

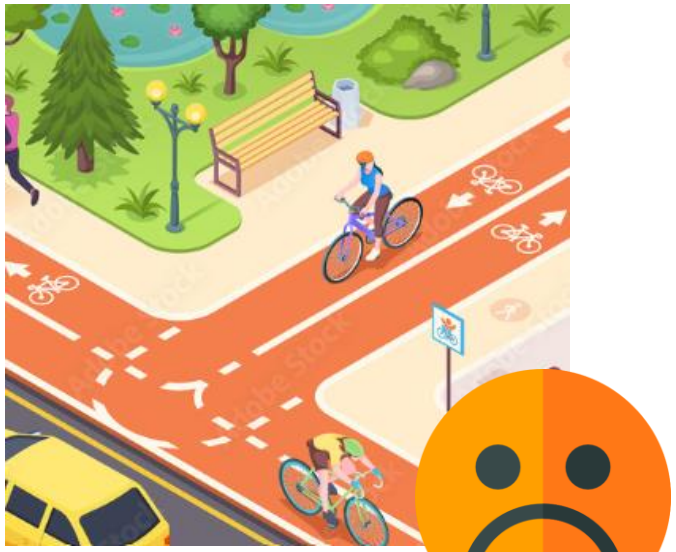
**Collisions Locations where there is no traffic control, map of (>3) collisions**




| No | Street1 | Street2 |
|---|---|---|
| 1 | Spadina Ave | Fort York BLVD |
| 2 | Eastern Ave | Gilead PL |
| 3 | DonValley Parkway N | Leaside BDGE |
| 4 | Yonge ST | Erskine Ave |
| 5 | Old weston Rd | Rogers Rd |
| 6 | Queen St E | Victoria Park Ave |
| 7 | DonValley Parkway S | York mills Ramp |
| 8 | Don Mills Rd | Kern Rd |
| 9 | Lawrence Ave E | Townley Ave |
| 10 | St Clair Ave E | No Bonnington Ave |
| | ... | ... |

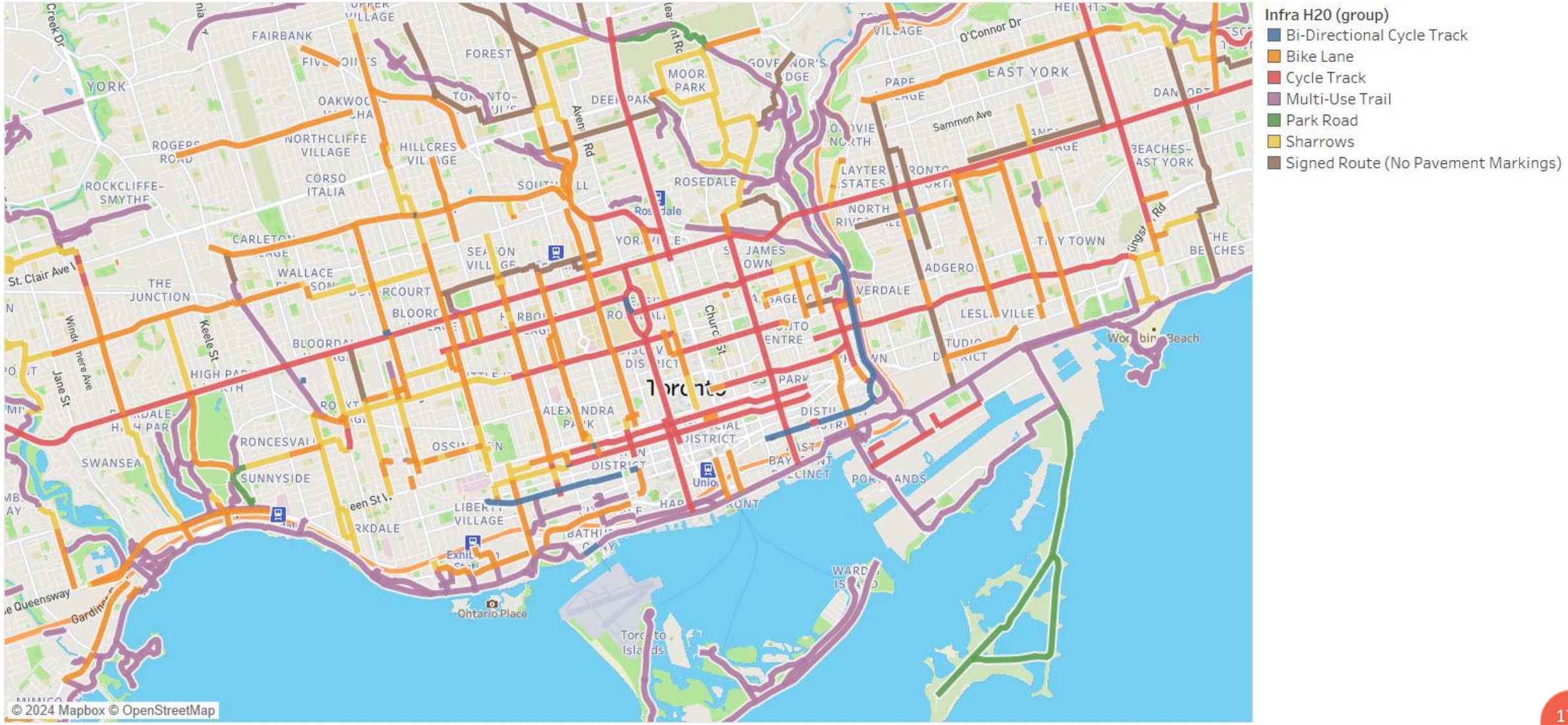
Data: Killed or Seriously Injured (KSI) Collisions

# Why do collisions happen?



**Connectivity between cycling networks**

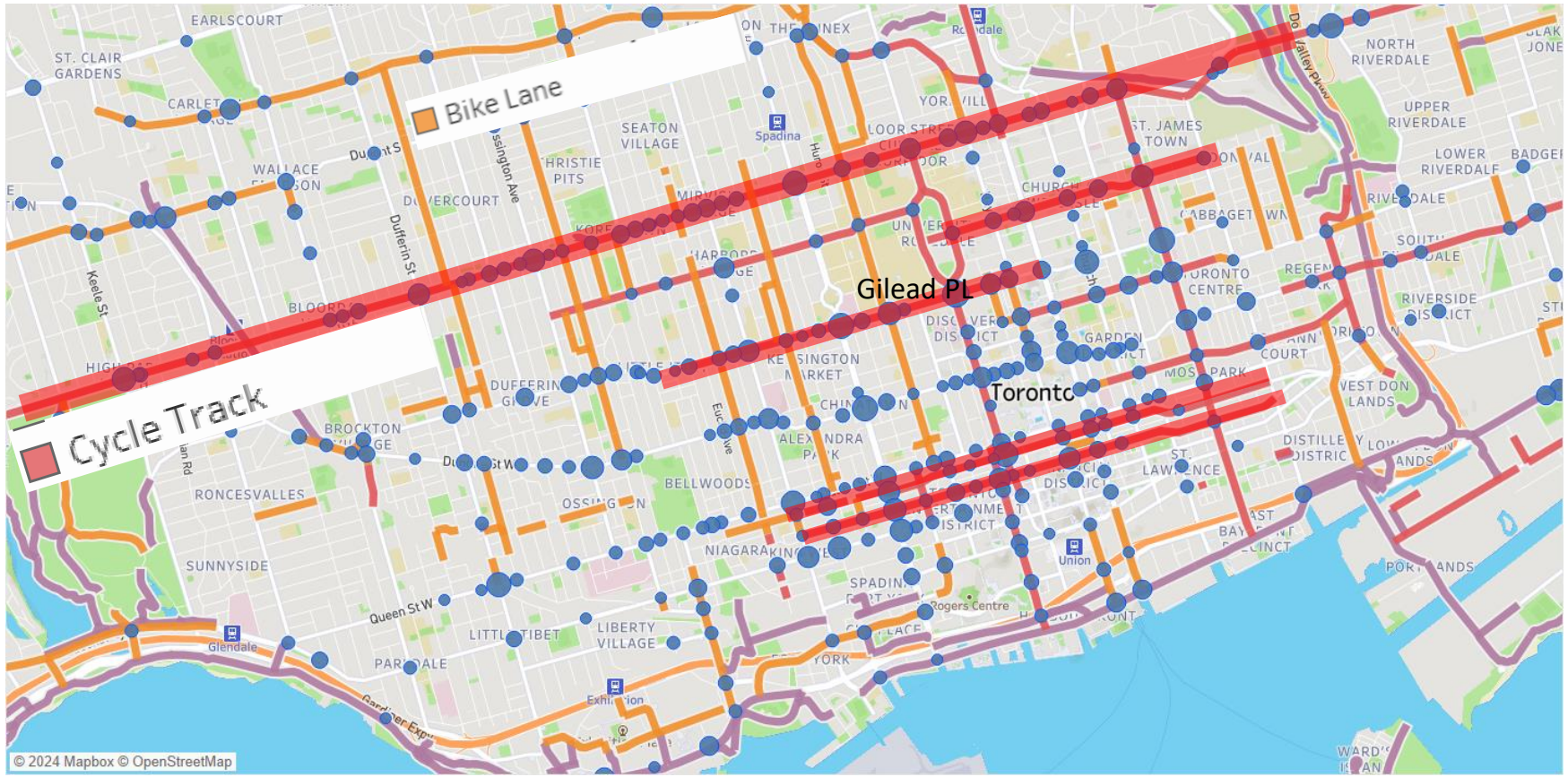
# Types of Cycling Network




Data: cycling-network

# Most cycling collisions happen on the Cycle Track

**Cycling Networks and Bicycle collisions**



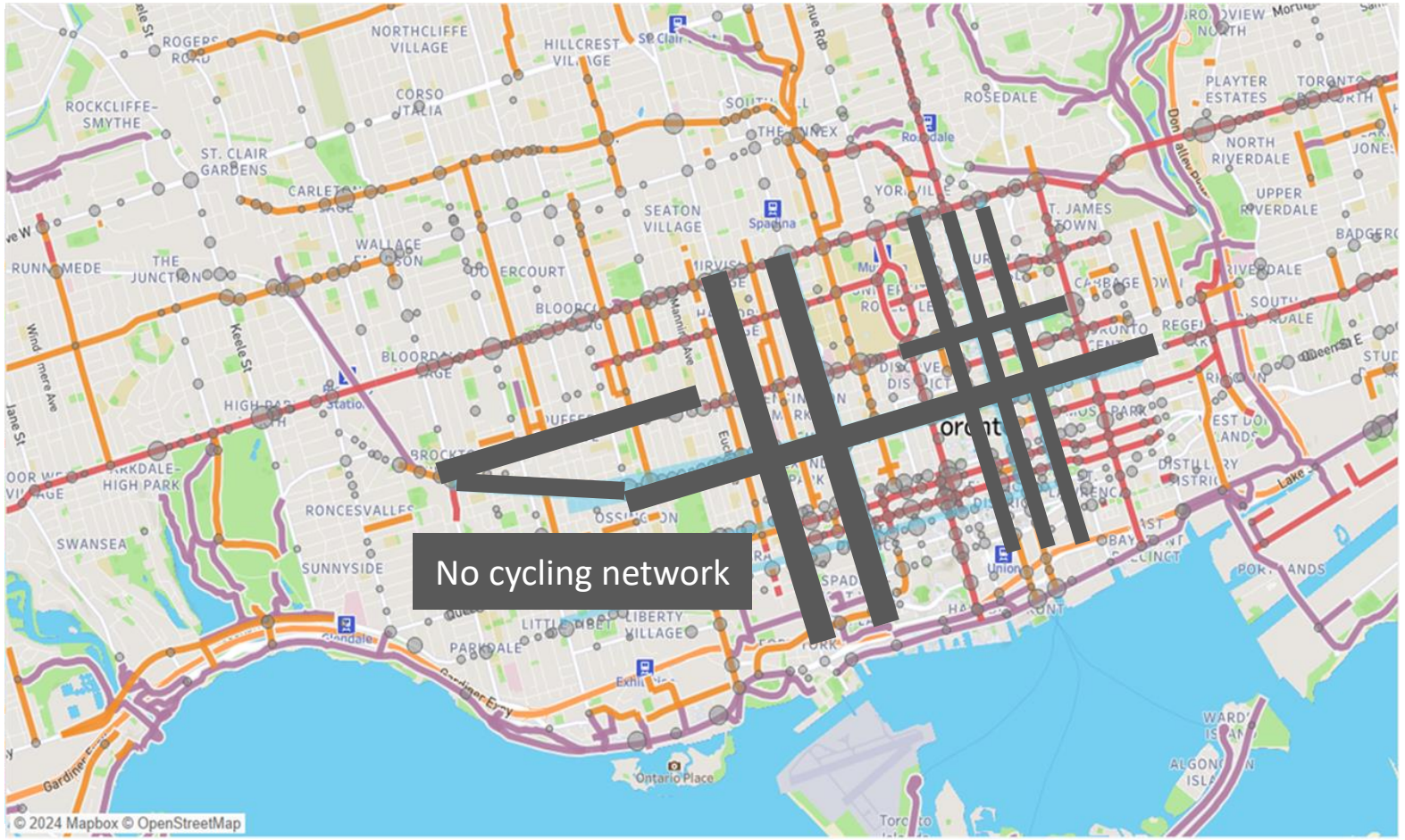

Bicycle collisions mainly occurred horizontally in a series aligned with **Cycle Track, and Streetcar Networks**



Data: cycling-network, Traffic Collisions (ASR-T-TBL-001)

# Lack of an integrated cycling network

- Cycling networks shows a lack of connection




| Vertical Tracks | |
|---|---|
| Bloor St W - King St W | Spadina Ave |
| Bloor St W - King St W | Bathurst St |
| Cumberland St-College St | Bay St |
| Hayden St-Adeleide St E | Yonge St |
| Bloor St W-Adeleide St E | Church St |

| Horizontal Tracks | |
|---|---|
| Lansdowne Ave-Manning Ave | College St |
| Lansdowne Ave-Shabourne St | Dundas St W |
| Dufferine St-University Ave | Queen St W |
| Dufferine St-John St | King St W |

Data: cycling-network, Traffic Collisions (ASR-T-TBL-001)

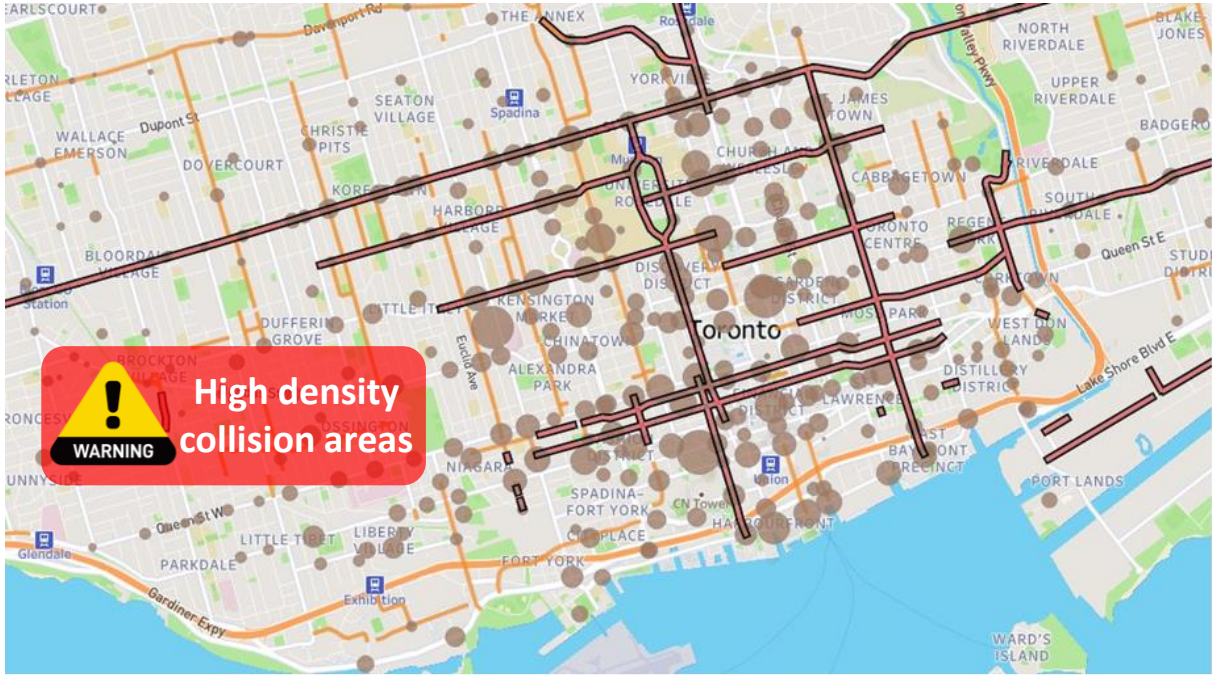
# Why do collisions happen?


**Distribution of bike share stations**

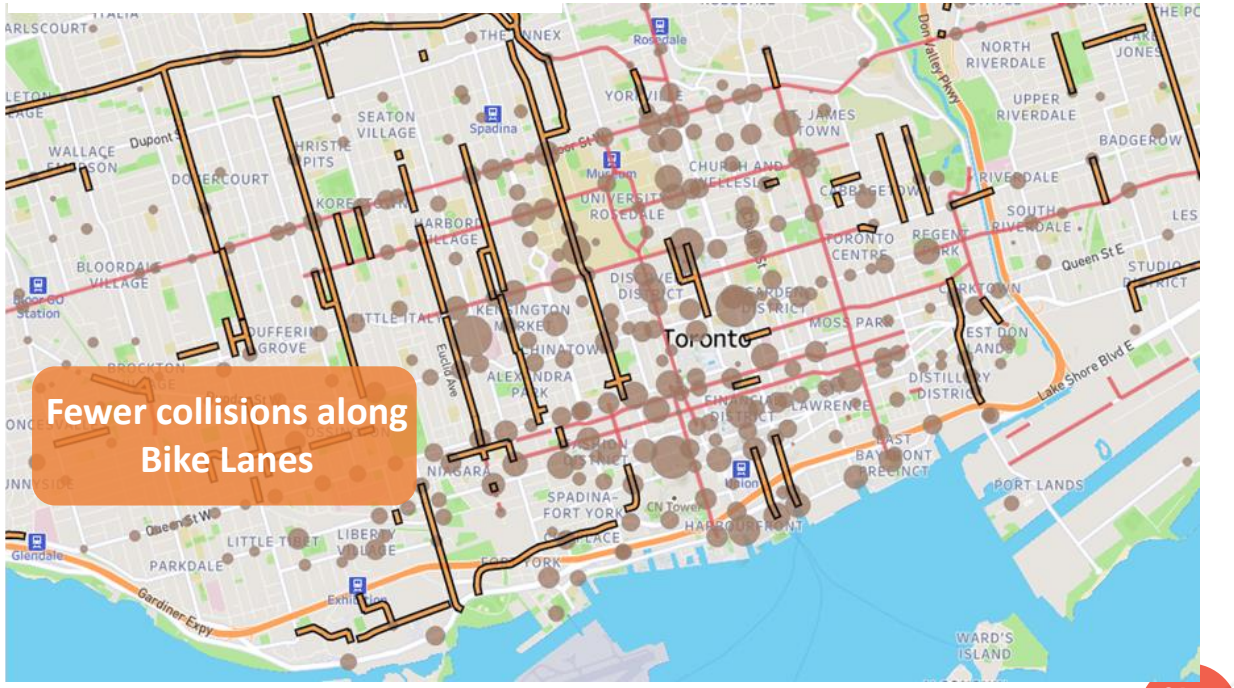
# Bike share stations in high density collision areas

- Most bike stations are on the cycling track – where many collisions occur.
- Lower density collision cycling track types such as the Bike lane have little start and end stations.
- Difficult for users to conveniently start or end their journey in safe areas.

Cycle Track




Bike Lane






Data: cycling-network, bike share ridership

# Key Findings

**Downtown** are the busiest area where bicycle collisions usually take place

**3 reasons of bicycle collisions in downtown**

**1) Traffic control**

- The primary reason for bicycle collisions is lack of control

**2) Connectivity between cycling networks**

- Bicycle collisions mainly occurred horizontally aligned with Cycle Track
- The vertical and horizontal tracks are not well intersected and interrupted
- The Lack of integrated bicycle infrastructures

**3) Distribution of bike share stations**

- Bike stations where users use the most are located in high density collision areas

# Recommendations

**Vision Zero Road Safety Plan**

- Our recommendations build on existing safety initiatives:
  - Cycling network implementation, cycling safety and education, and traffic control

1. Improve cycling infrastructure

2. Cooperate with bike-sharing companies

3. Improve Information Sharing

# Recommendations

## 1a. Improve cycling infrastructure - Integration

Improve cyclist safety with seamless integration between cycling lanes

| Missing Vertical Tracks | |
|---|---|
| Bloor St W - King St W | Spadina Ave |
| Bloor St W - King St W | Bathurst St |
| Cumberland St-College St | Bay St |
| Hayden St-Adeleide St E | Yonge St |
| Bloor St W-Adeleide St E | Church St |

| Missing Horizontal Tracks | |
|---|---|
| Lansdowne Ave-Manning Ave | College St |
| Lansdowne Ave-Shabourne St | Dundas St W |
| Dufferine St-University Ave | Queen St W |
| Dufferine St-John St | King St W |


Data: cycling-network, Traffic Collisions (ASR-T-TBL-001)

# Recommendations

## 1a. Improve cycling infrastructure - Integration

Improve cyclist safety with seamless integration between cycling lanes

| Missing Vertical Tracks | |
|---|---|
| Bloor St W - King St W | Spadina Ave |
| Bloor St W - King St W | Bathurst St |
| Cumberland St-College St | Bay St |
| Hayden St-Adeleide St E | Yonge St |
| Bloor St W-Adeleide St E | Church St |

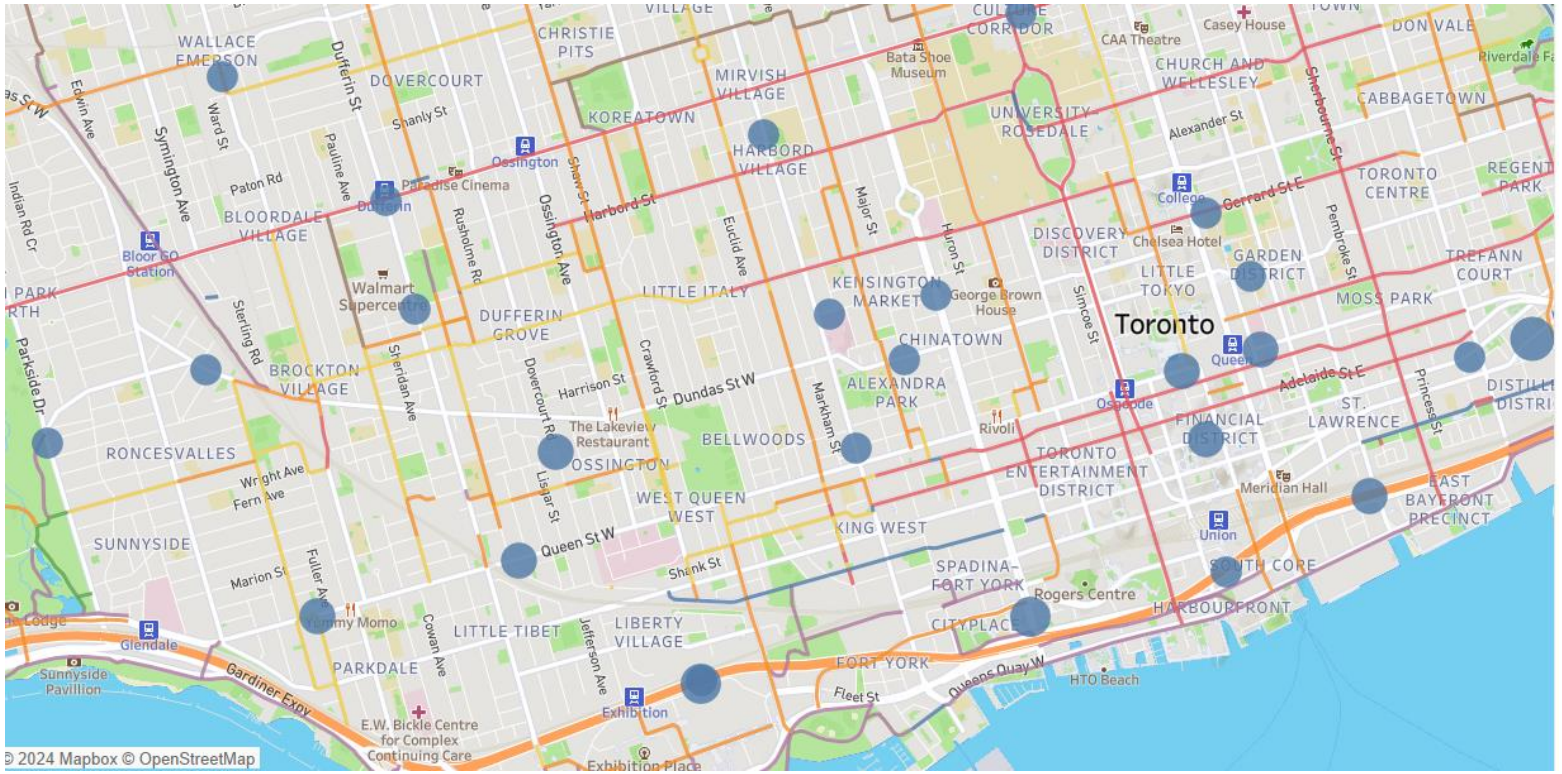
| Missing Horizontal Tracks | |
|---|---|
| Lansdowne Ave-Manning Ave | College St |
| Lansdowne Ave-Shabourne St | Dundas St W |
| Dufferine St-University Ave | Queen St W |
| Dufferine St-John St | King St W |


Data: cycling-network, Traffic Collisions (ASR-T-TBL-001)

# Recommendations

## 1b. Improve cycling infrastructure – Traffic Control

Increase traffic control in areas with high numbers of "no traffic control" collisions




No traffic control areas with >3 collisions (2019-2023)

Data: Traffic Collisions (ASR-T-TBL-001)

### 1. Add current bike signages

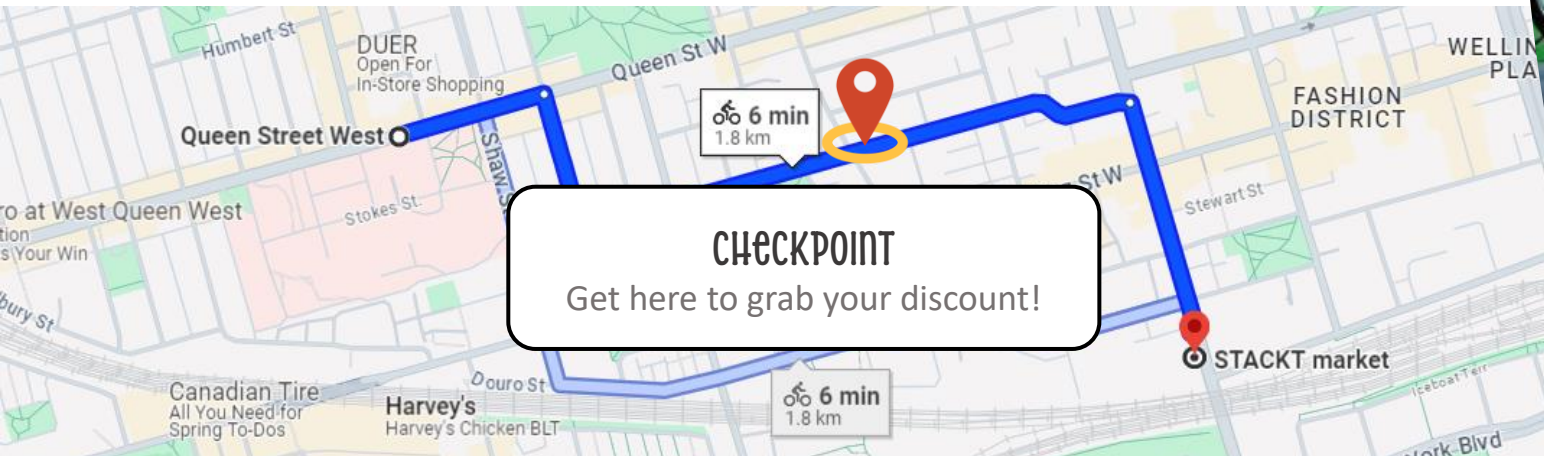

### 2. Design and add new signage



# Recommendations

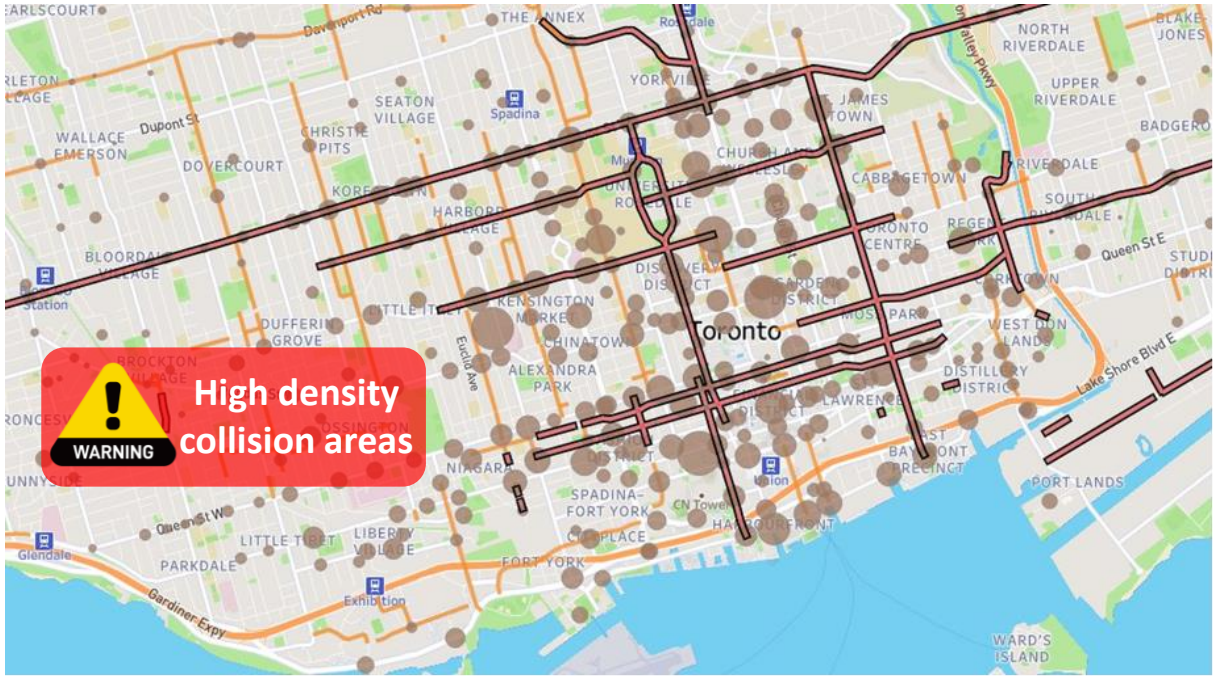
## 2. Cooperate with bike-sharing companies

- Place bike share stations in lower density collision areas to divert cyclists from busy areas
- Provide incentives for people to cycle on different tracks (detour on safer lanes)




# Bike share stations in high density collision areas

Cycle Track




Bike Lane


Data: cycling-network, bike share ridership

# Recommendations

## 3. Improve Information Sharing

- Instead of route efficiency, apps should **recommend the safest routes** based on traffic collision data and cycling track type

- Cycling apps should also **advise cyclists to bike or not** based on factors like weather, temperature and humidity.

### Cycling Conditions

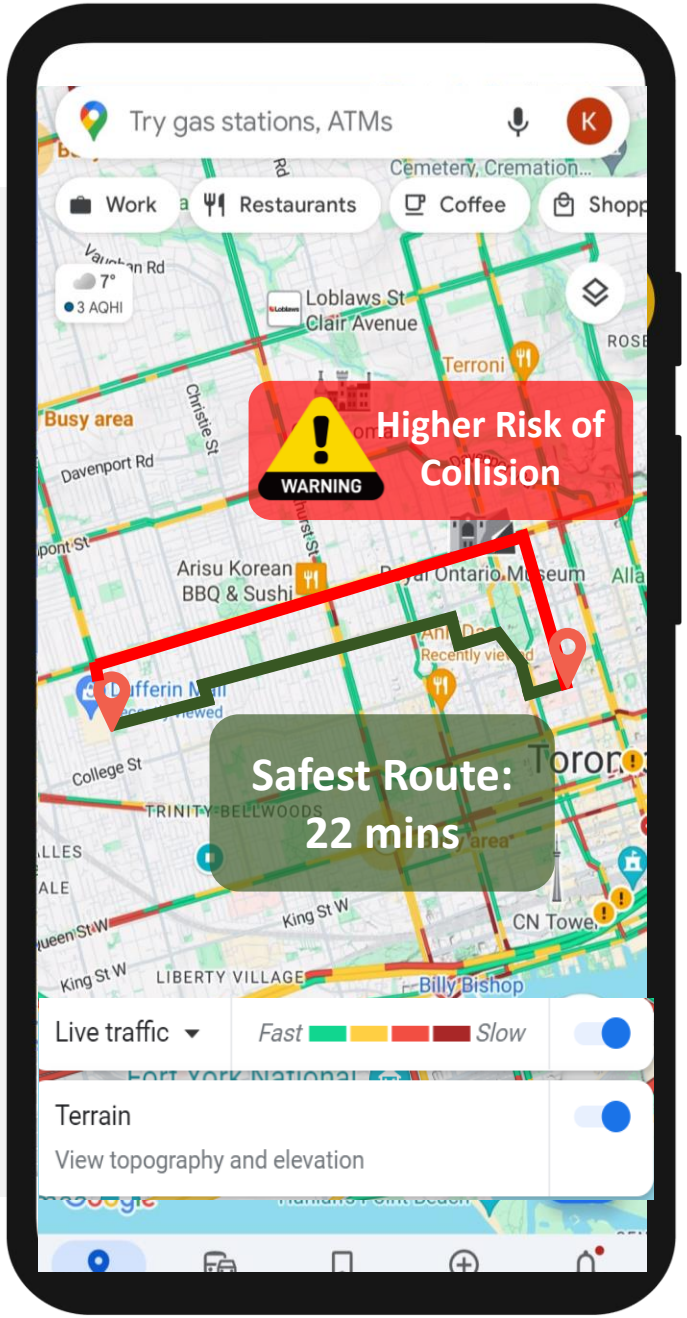
Not Optimal

**Weather**
Cloudy

**Temperature**
Freezing -13C

**Humidity**
High, slippery road

**Road Visibility**
Extremely Low




THANK
YOU