

# HerWay, Her Journey

OP2; Team 028; ECE297



# FEELING UNSAFE AT NIGHT?

**15%**

**Men** [1]

**50%**

**Women** [2]

...disparity revealed by a study conducted in the  
United States and United Kingdom

# FEAR NEGATIVELY IMPACTS COMMUTE

A survey conducted in Southwest Ontario by researchers found that women's [3]...

Apprehension about potential attacks and harassment



Impacted use of transportation facilities and commute

Insecurity is greatest when...



1. Walking at night
2. Waiting for transport

# MORE LIGHTING = MORE SAFETY

Uniformity & High  
Brightness Lighting

Enhanced perceived  
**safety & security**

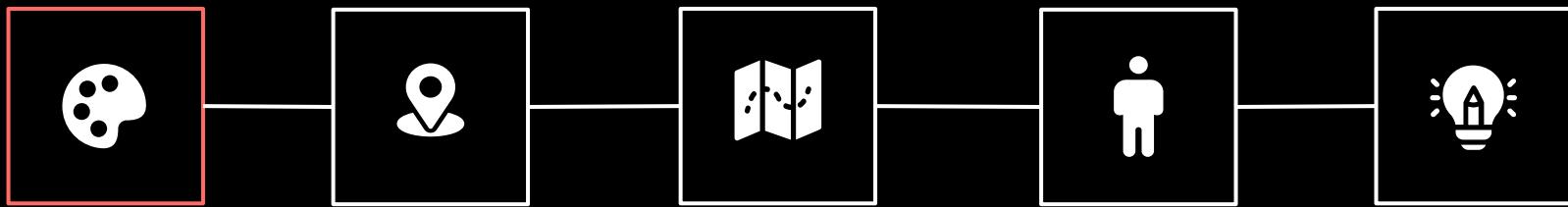
**94%** of women feel  
safer [4]!

# HerWay

A map for female nighttime  
commuters

More is coming up!

# WHAT'S TO COME:



COLOUR  
SCHEME

POIs

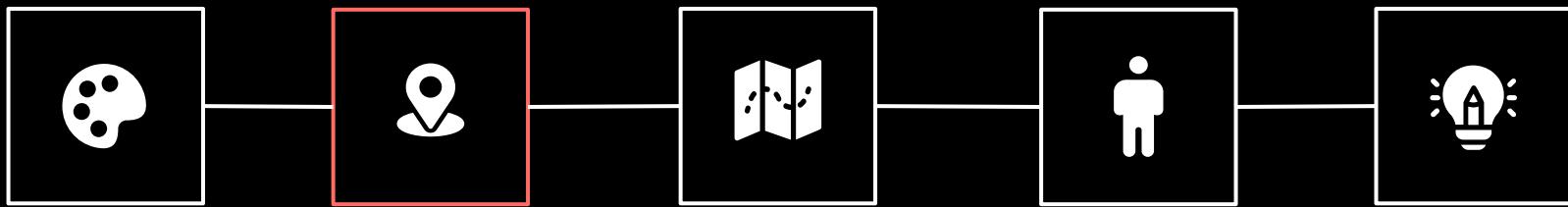
WAYFINDING  
FOR DIFFERENT  
CASES

TRAVELING  
COURIER

FUTURE  
PLANS



# WHAT'S TO COME:



COLOUR  
SCHEME

POIs

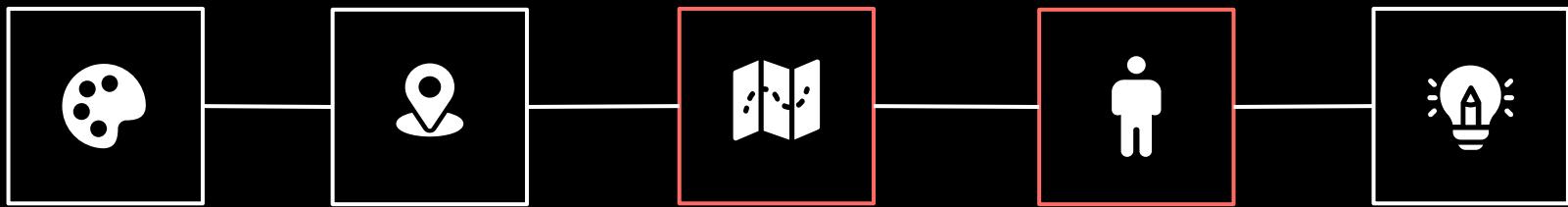
WAYFINDING  
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# WHAT'S TO COME:



COLOUR  
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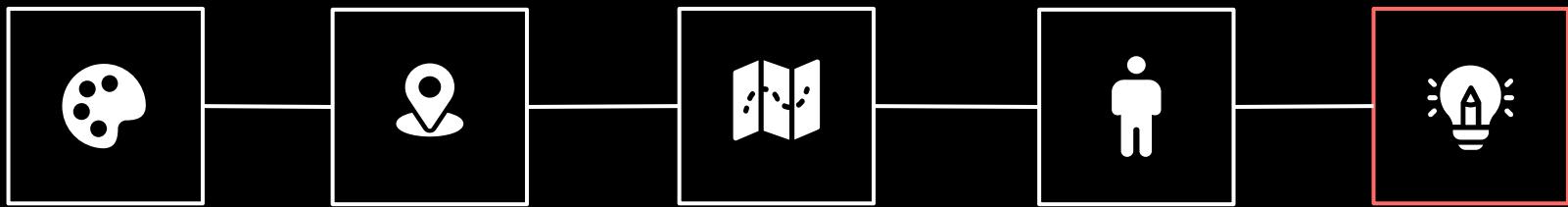
WAYFINDING  
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# WHAT'S TO COME:



COLOUR  
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WAYFINDING  
FOR DIFFERENT  
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# COLOUR SCHEME

HIGHLIGHTING SAFETY

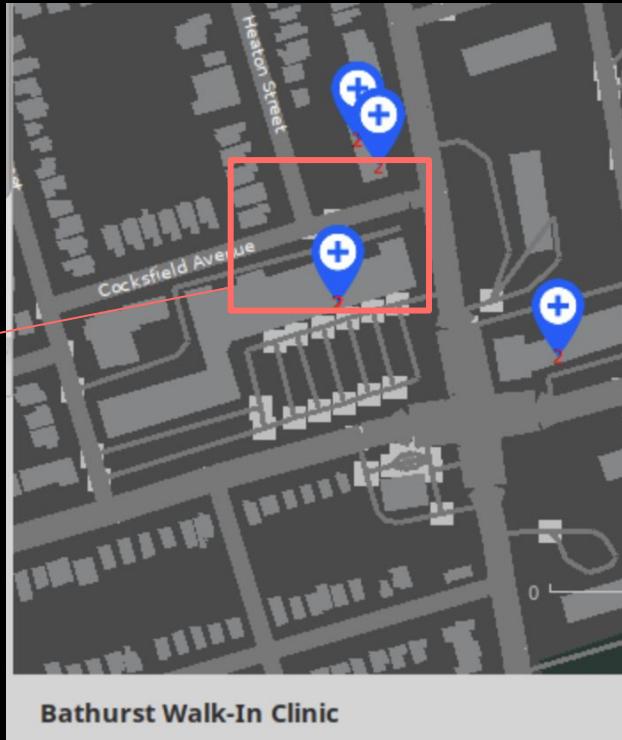
# DEFAULT DARK MODE: IMPROVING VISIBILITY AT NIGHT

[5]



# DARK MODE HIGHLIGHTS EMERGENCY SERVICES

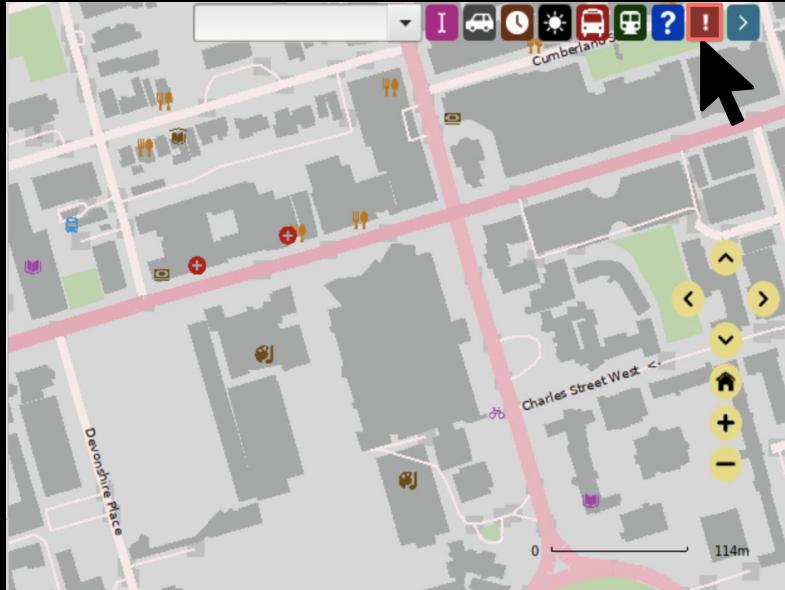
Easily identifiable  
using high contrast  
icons



# STAY SAFE ON WELL-LIT STREETS

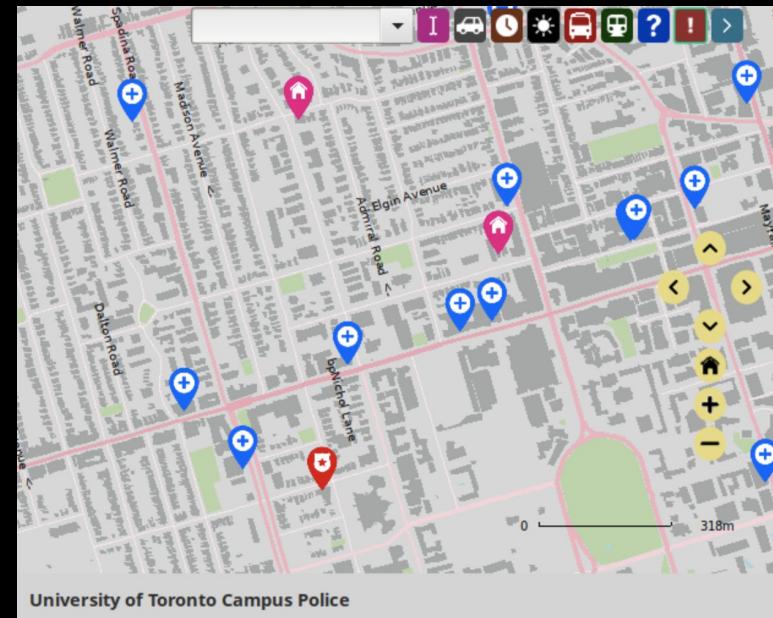


# POINTS OF INTEREST



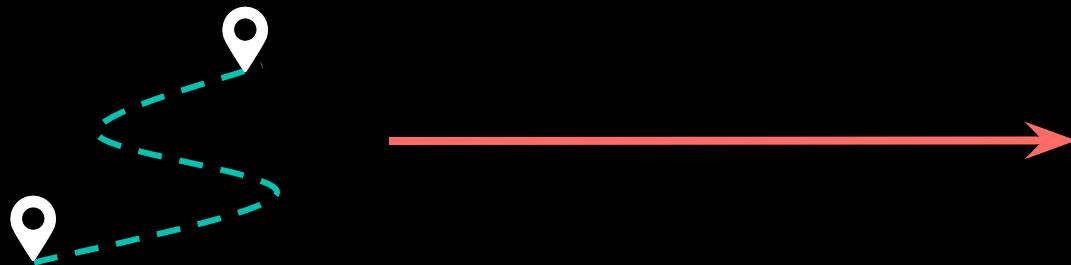
[6]

Points you to the support you need.



[3]

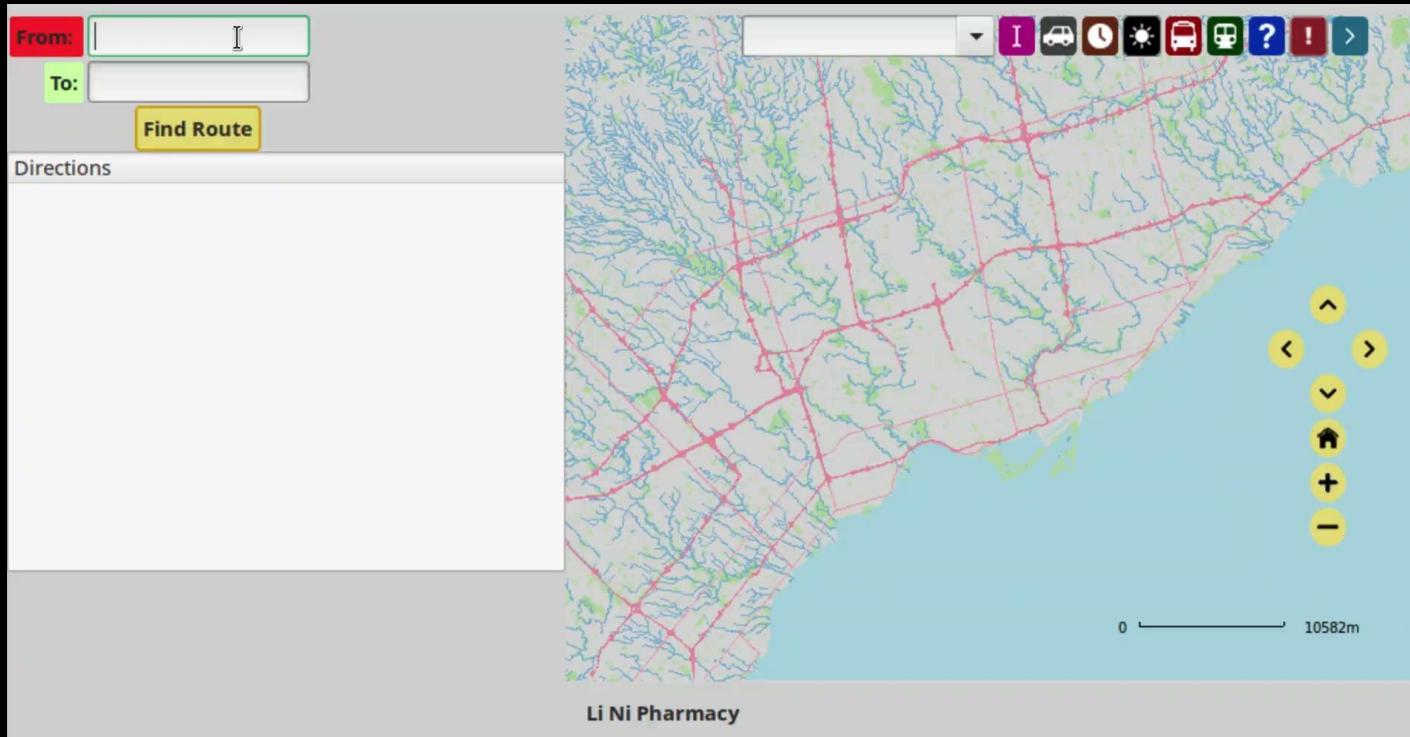
# WAY-FINDING



Safe, quick &  
accessible  
wayfinding.

# 1. Finding bus & subway routes has never been easier

## 2. Save time with autocomplete

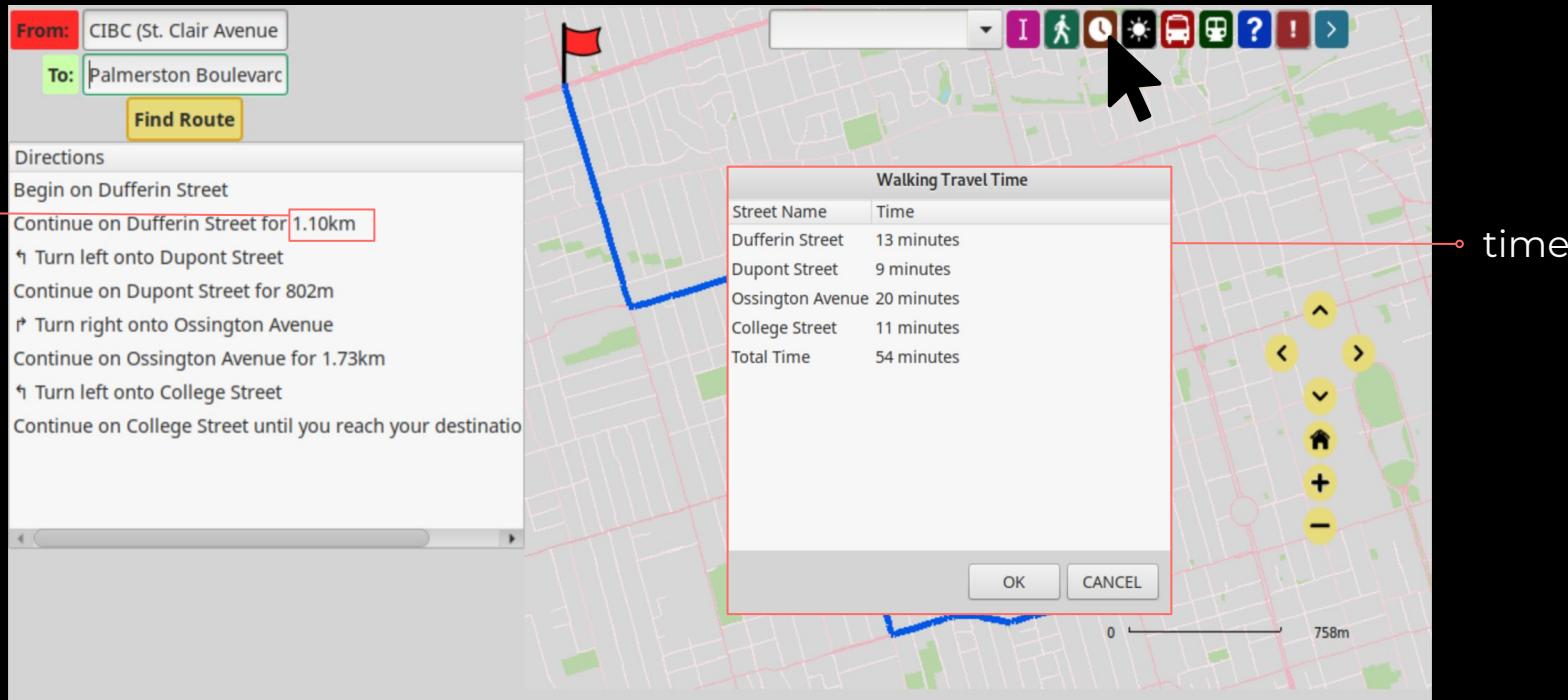


[10, 11]

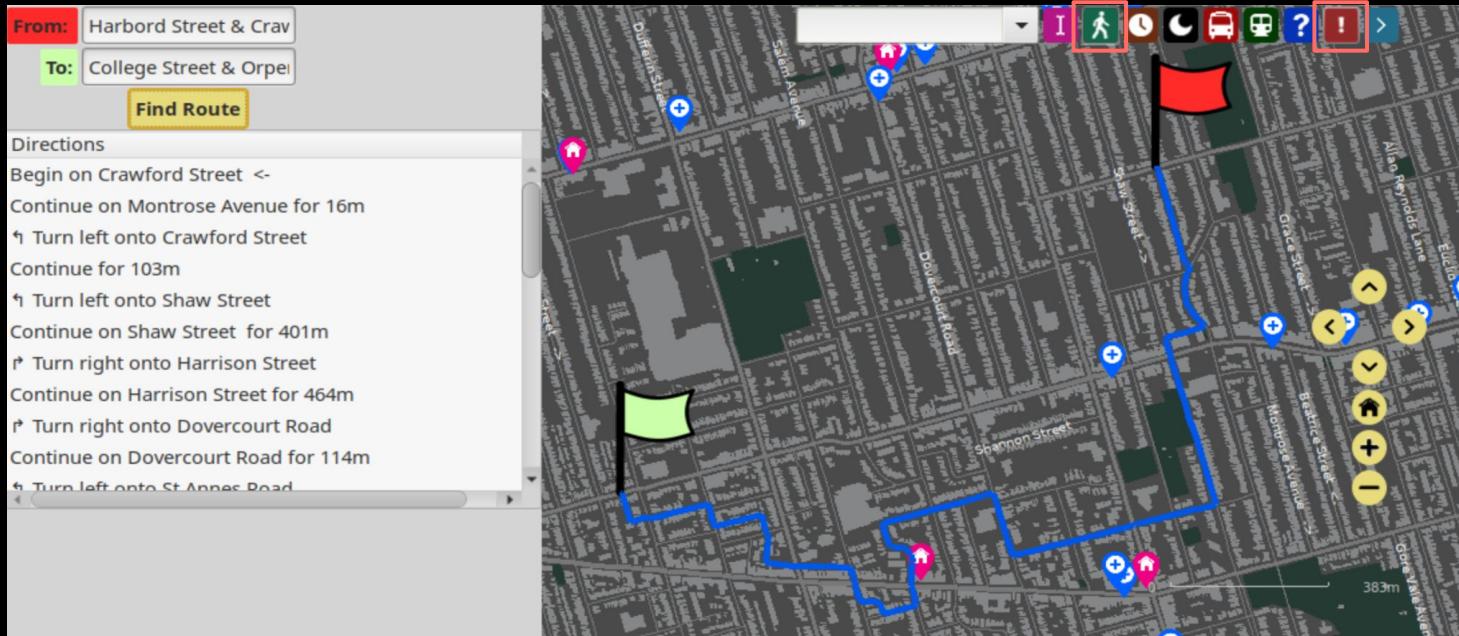
20

# 3. Eliminate guessing with direction estimates

distance



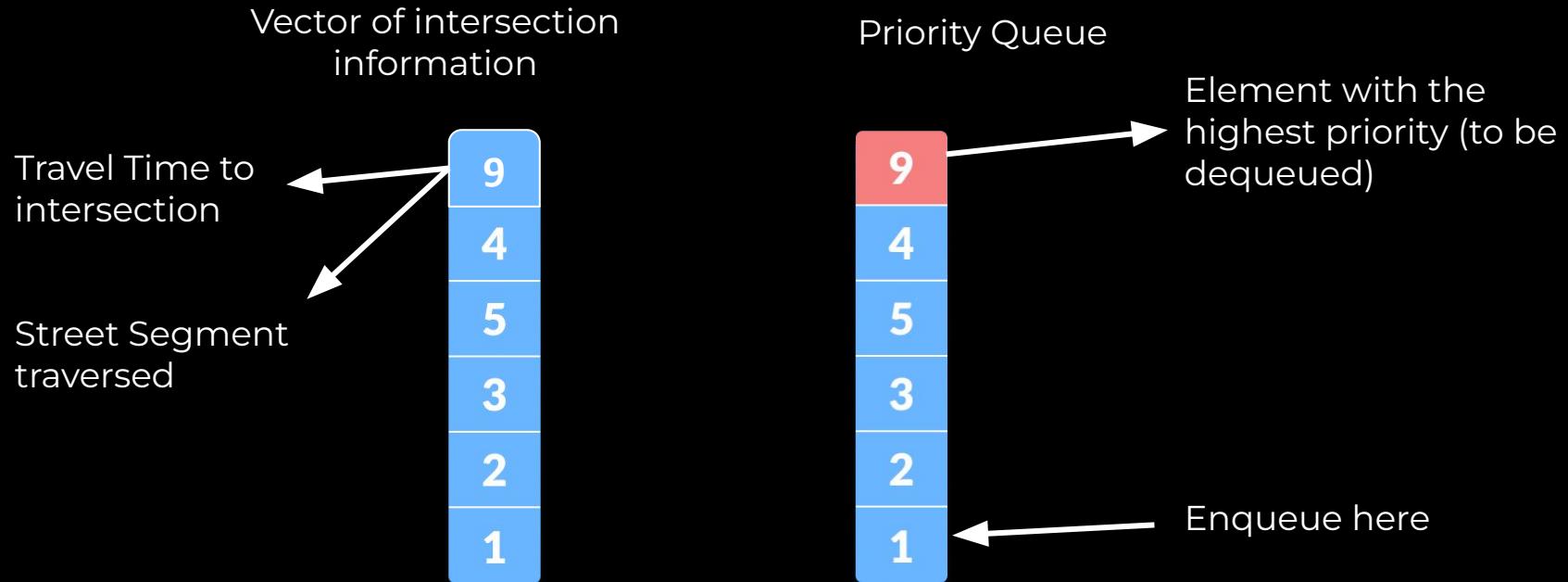
# 4. Reduce your risk: follow HerWay's recommended route



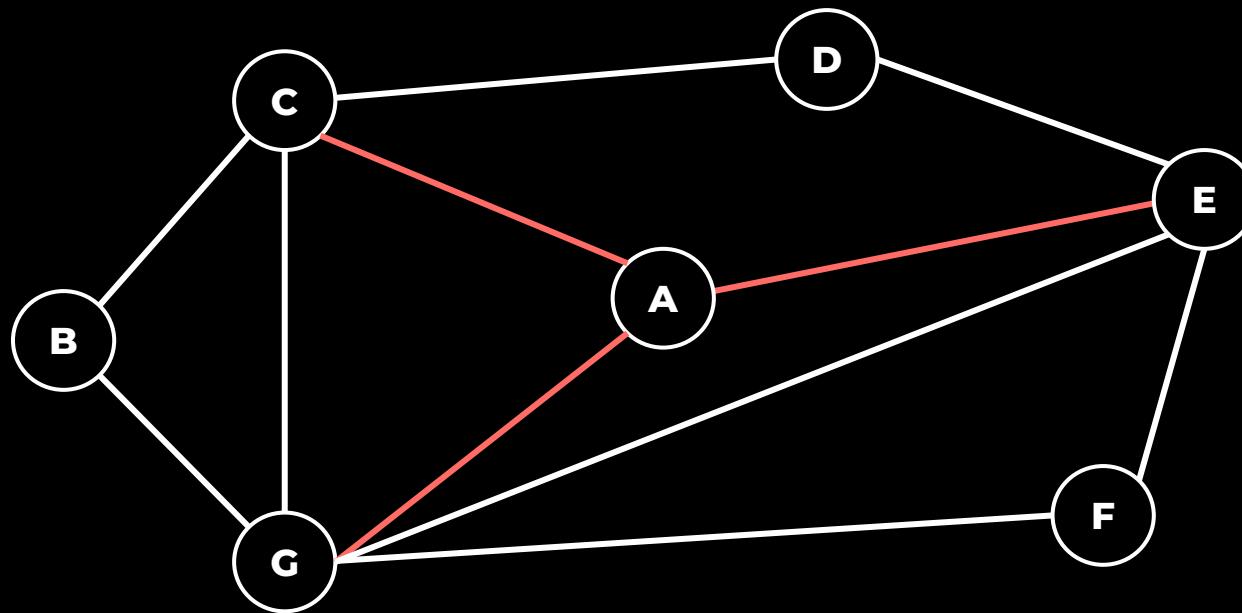
# ALGORITHM

UTILIZING DIJKSTRA'S

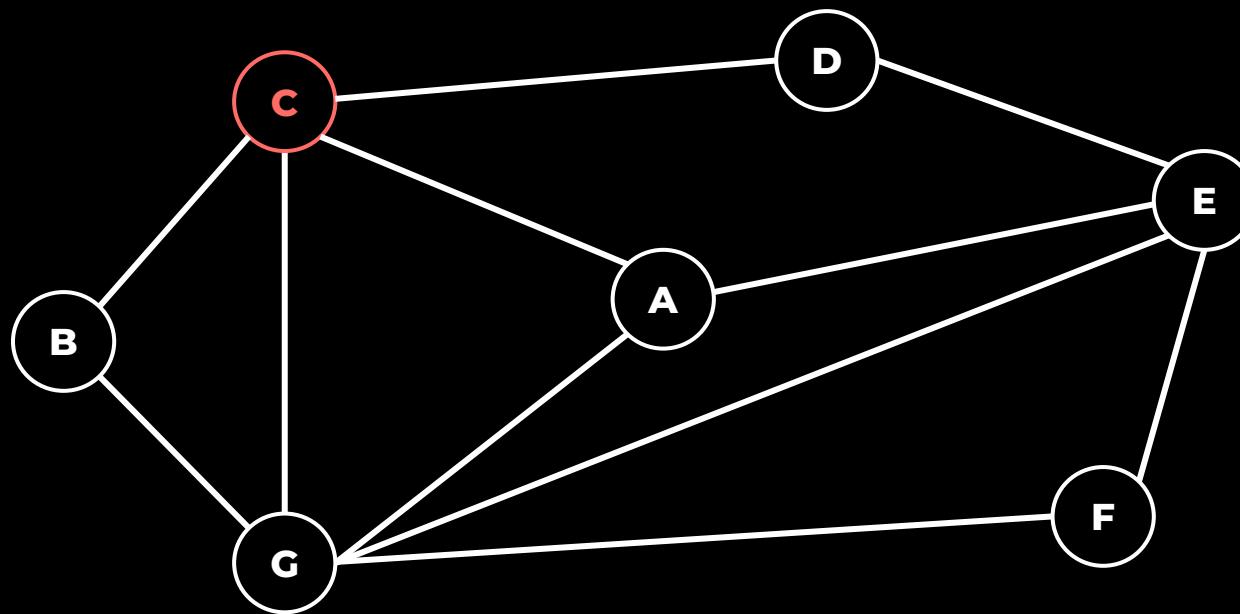
# How Dijkstra's works



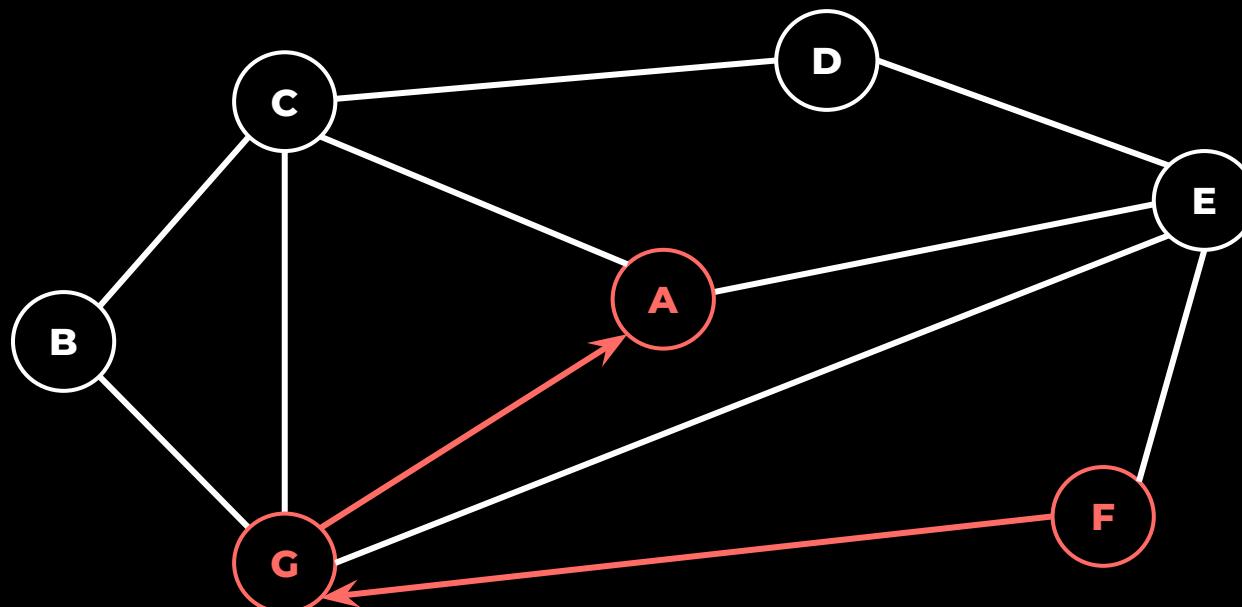
# EXPLORE ALL CONNECTING STREETS



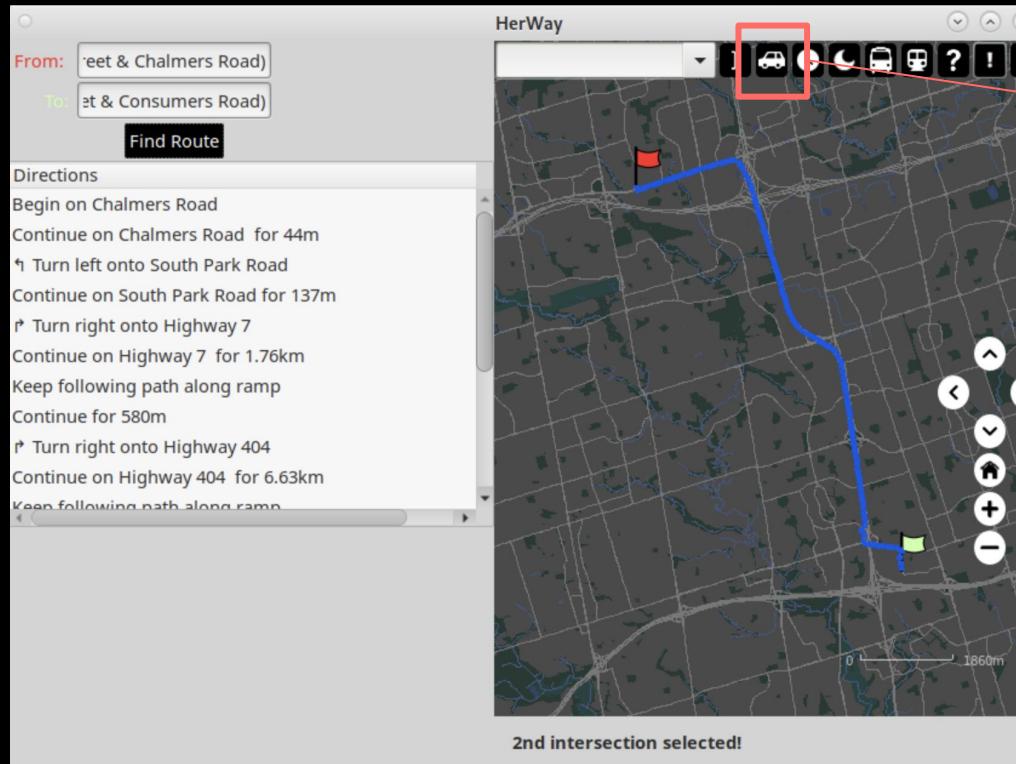
# NEXT INTERSECTION WITH SHORTEST TRAVEL TIME



# TRACE-BACK THE PATH

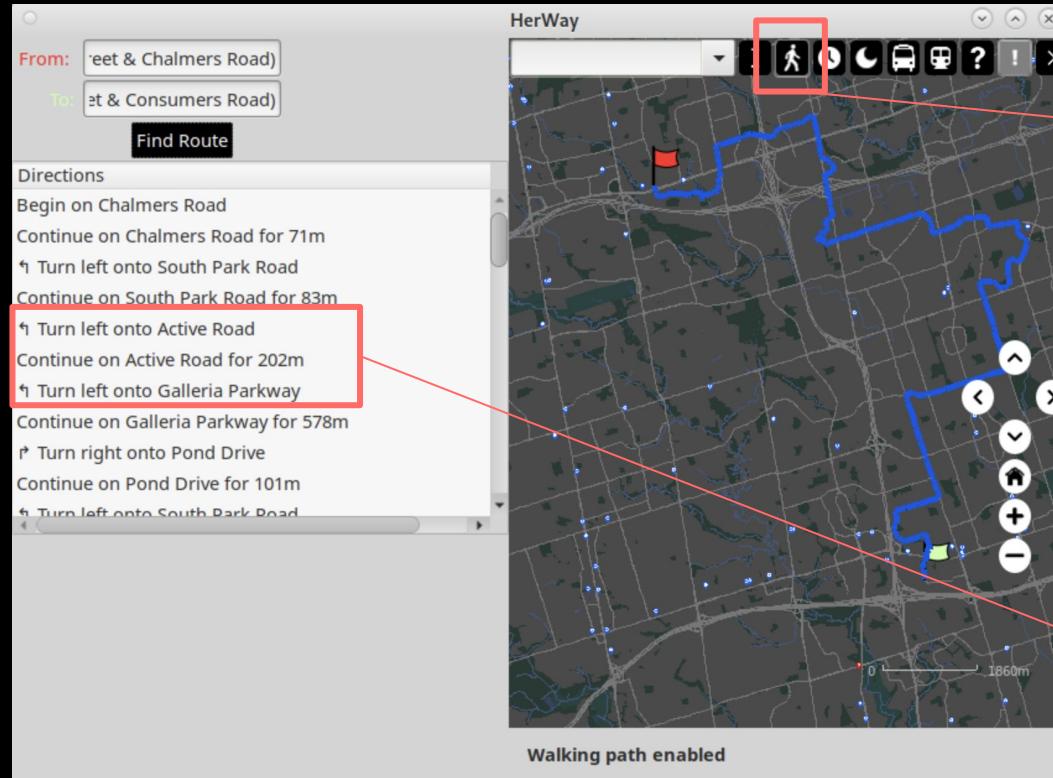


# Finding the shortest driving route

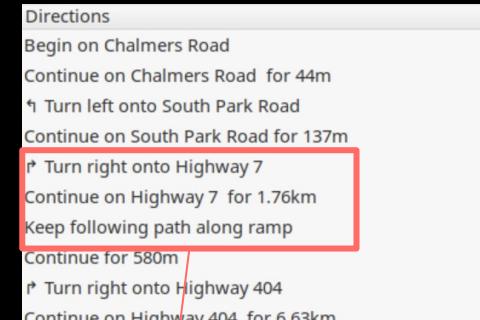


Toggle between  
driving and walking

# Avoid highways, find a walking path

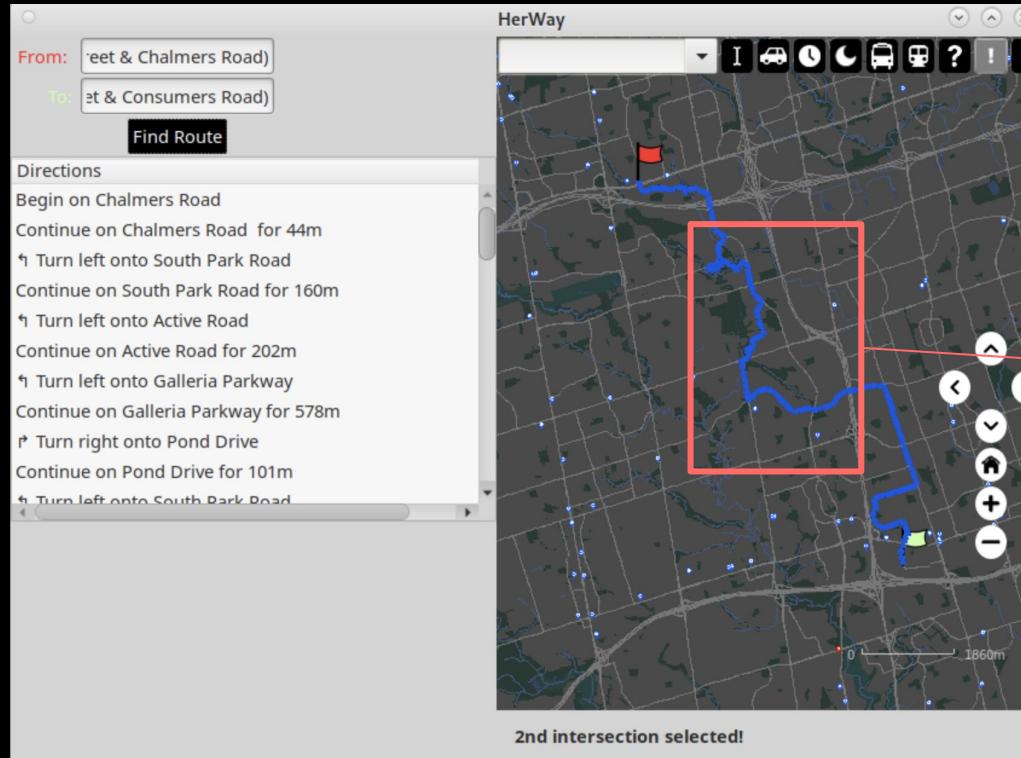


Walking mode selected



No highways compared to previous directions

# Prioritize well-lit streets for a safer route



Toggle to select  
“safety” mode

Path prioritizing  
well-lit roads

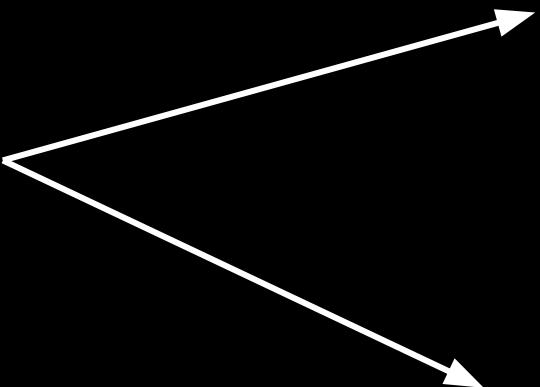
# Need to make a pit stop?

We've got you  
covered



# Traveling Salesman Problem

No  
guaranteed  
solution  
that...

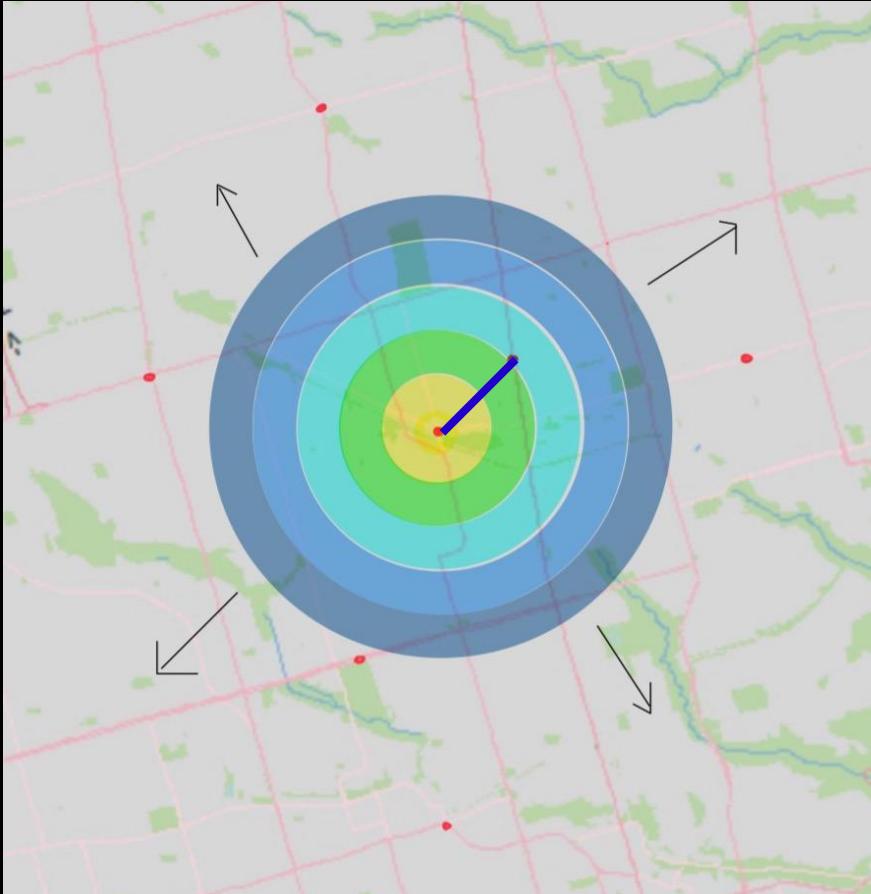


Optimal  
Result

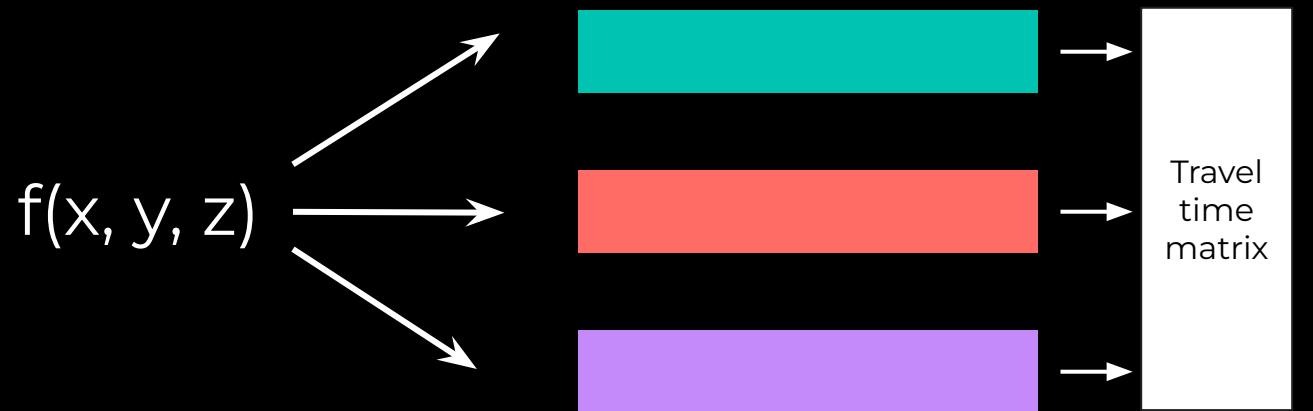
Low  
Computational  
Complexity

# Multi-Target Dijkstra's

REA AHUJA



# Improve performance with multithreading



**Parallel processes**

# Multithreading reduces computation time by ~38%

```
Extreme Hard London took: 57898ms
QoR extreme_multi_london_england: 127882
FAILURE: 1 out of 1 tests failed (1 failures).
Test time: 57.90 seconds.
```

```
Analyzing M4_Public_Extreme_Multi_London
Testing (including setup) took: 72.09 sec
```

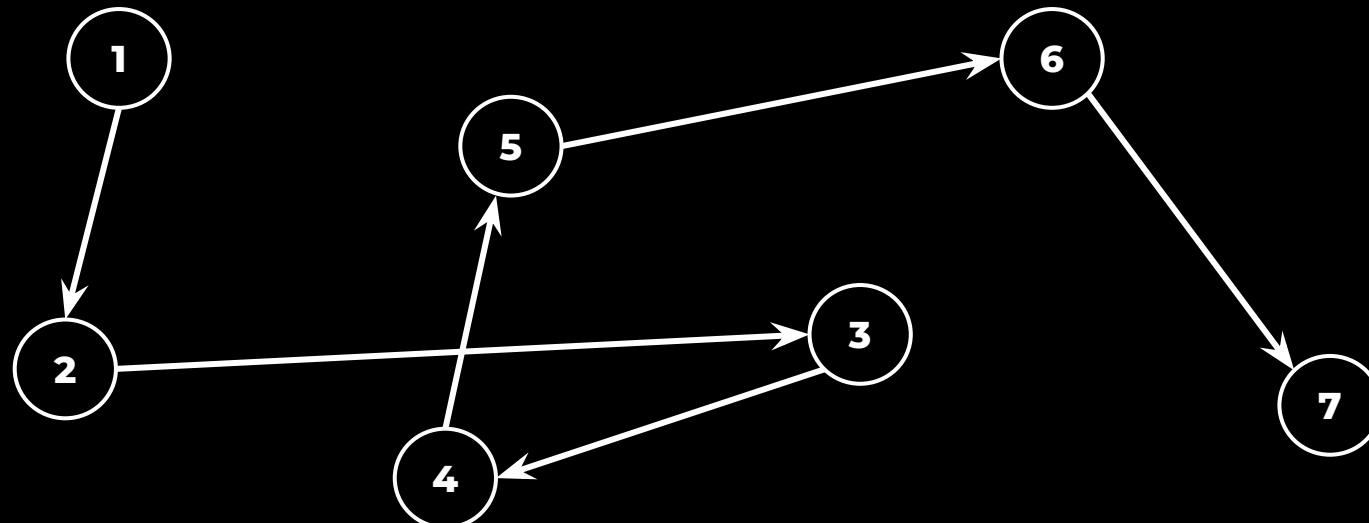
Test Summary: FAIL ( 1 of 1 failed)

```
Extreme Hard London took: 35636ms
QoR extreme_multi_london_england: 127882
Success: 1 tests passed.
Test time: 35.64 seconds.
```

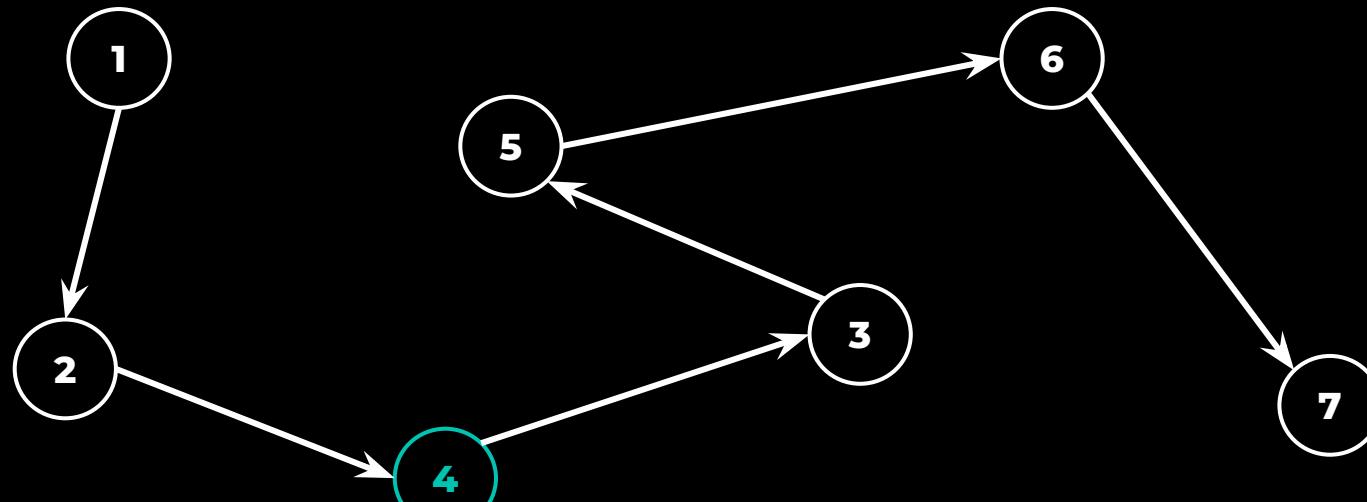
```
Analyzing M4_Public_Extreme_Multi_London
Testing (including setup) took: 49.81 sec
```

Test Summary: PASS ( 0 of 1 failed)

# Quicker route possible? Yes!

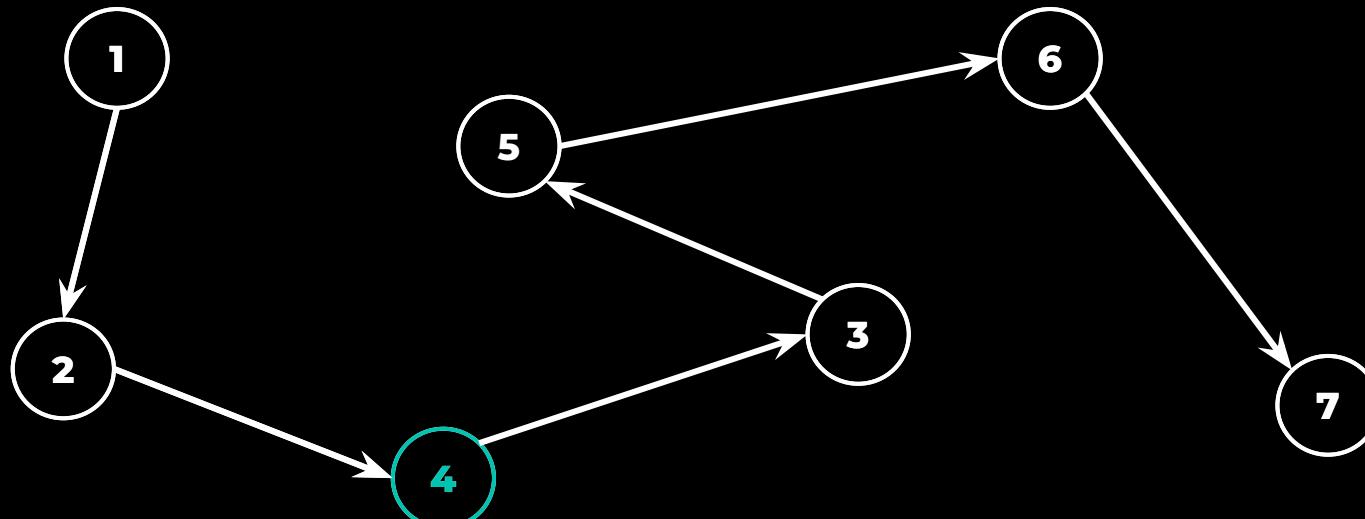


# Introduce randomness with a greedy algorithm

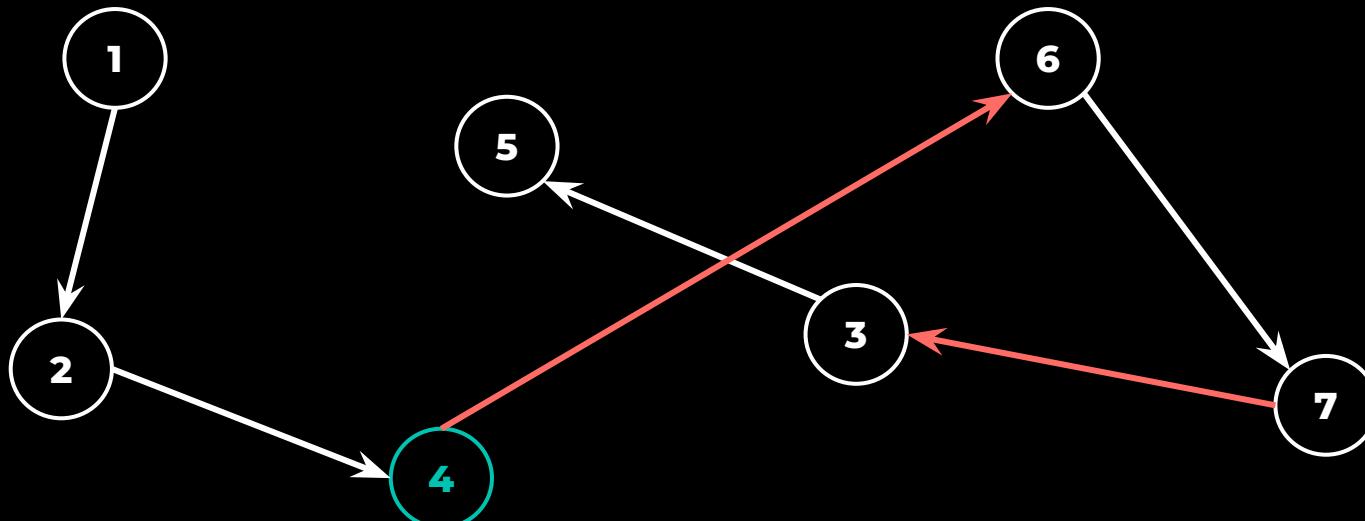


Greedy algorithm: selects the 2nd closest node, anywhere from 0-5% of the time and generates a new route

# Perform 2 opt to improve the result



# Perform 2 opt to improve the result

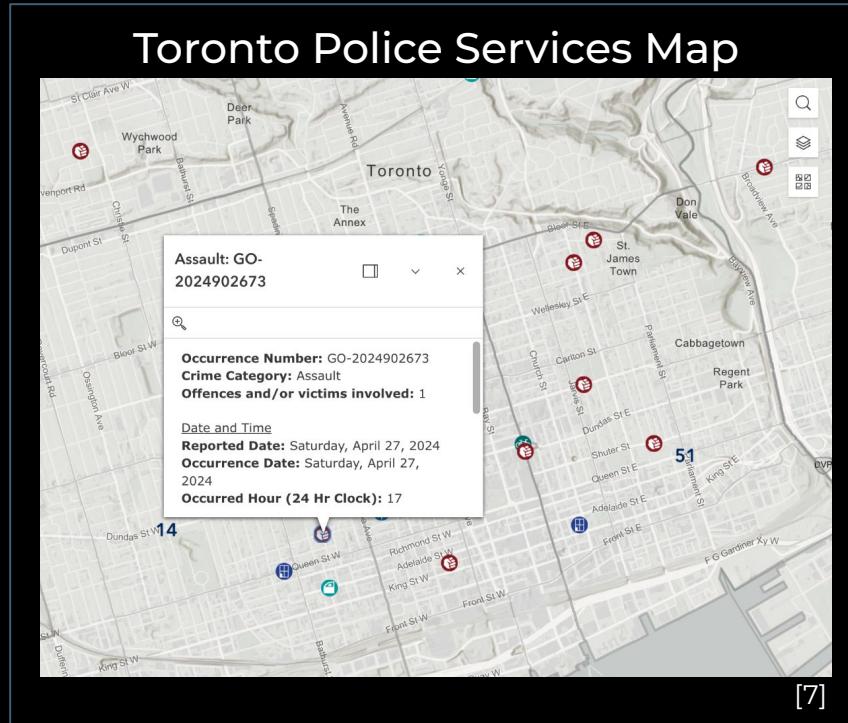


# Perturbations & 2-opt perform significantly better



# FUTURE PITCH

# It's time consuming...

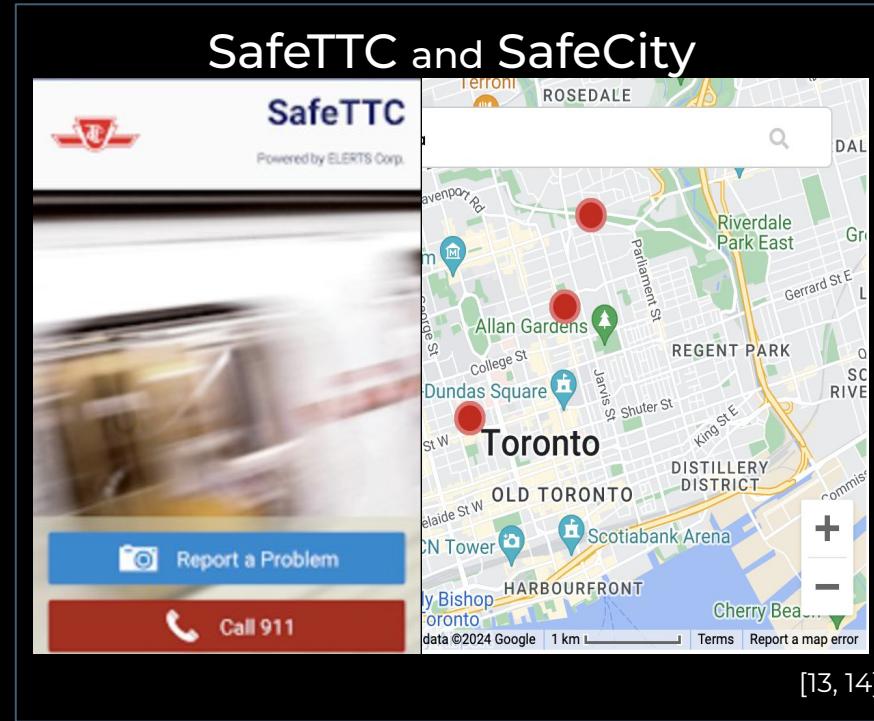


Shows recent crime activity

Requires active searching and interpretations of crime data

Time consuming and not user-friendly

# Reactive not Proactive



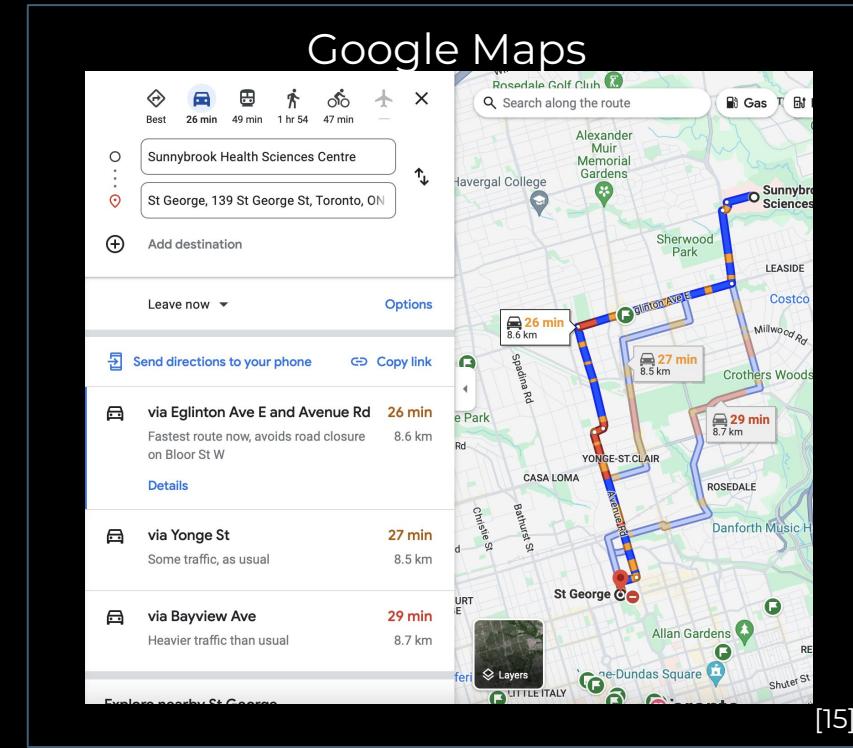
Can report harassment and safety concerns

Reactive rather than proactive

Lacks anonymity, too complicated & powerless

[13, 14]

# No Safety Features



Route planning and real-time traffic conditions

Lacks integrated safety features

# They're Tedious and Limited...

Individually Valuable

Operate in Isolation

Tedious process to retrieve  
information about:

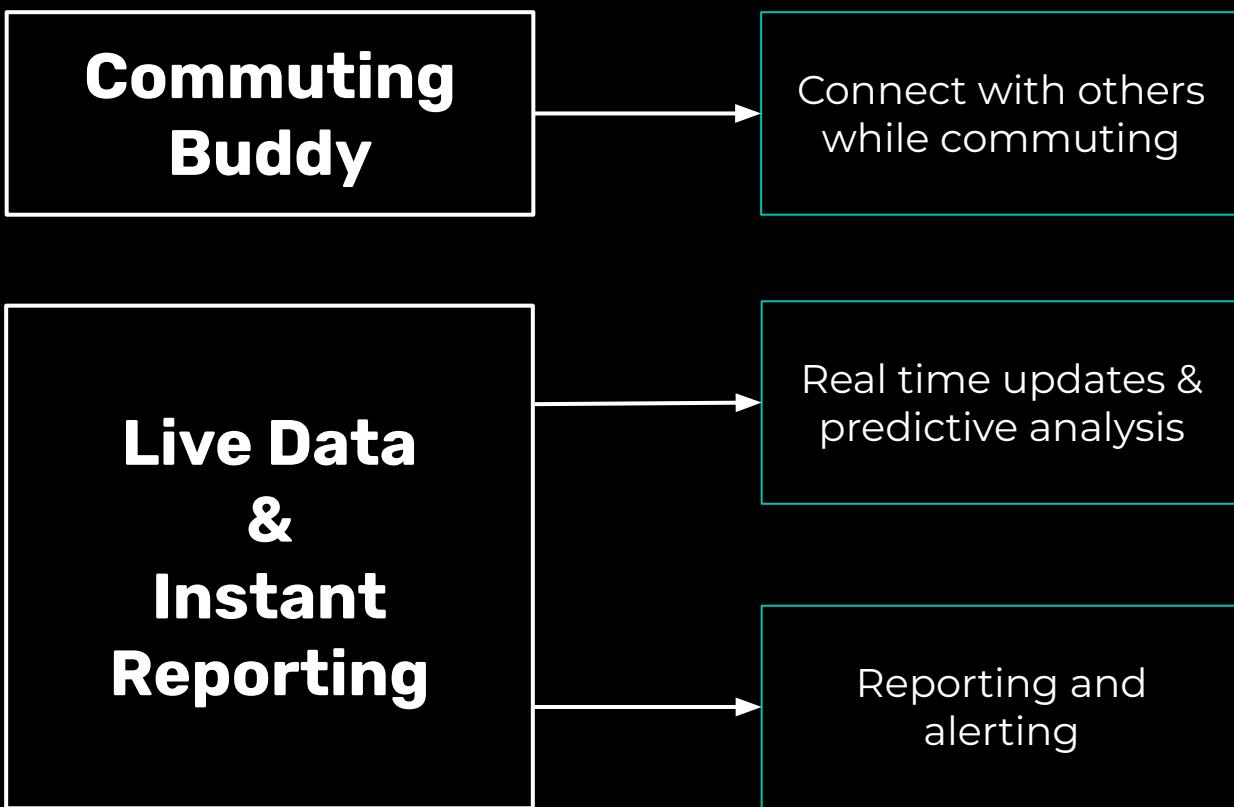
- Safety
- Travel



# What's the Solution?

HerWay

# Adding...



# #1: COMMUTER BUDDY

# USING THE TRAVELING COURIER PROBLEM TO HELP WOMEN CONNECT

Sally  
10 commutes

Hannah  
7 commutes

...

...

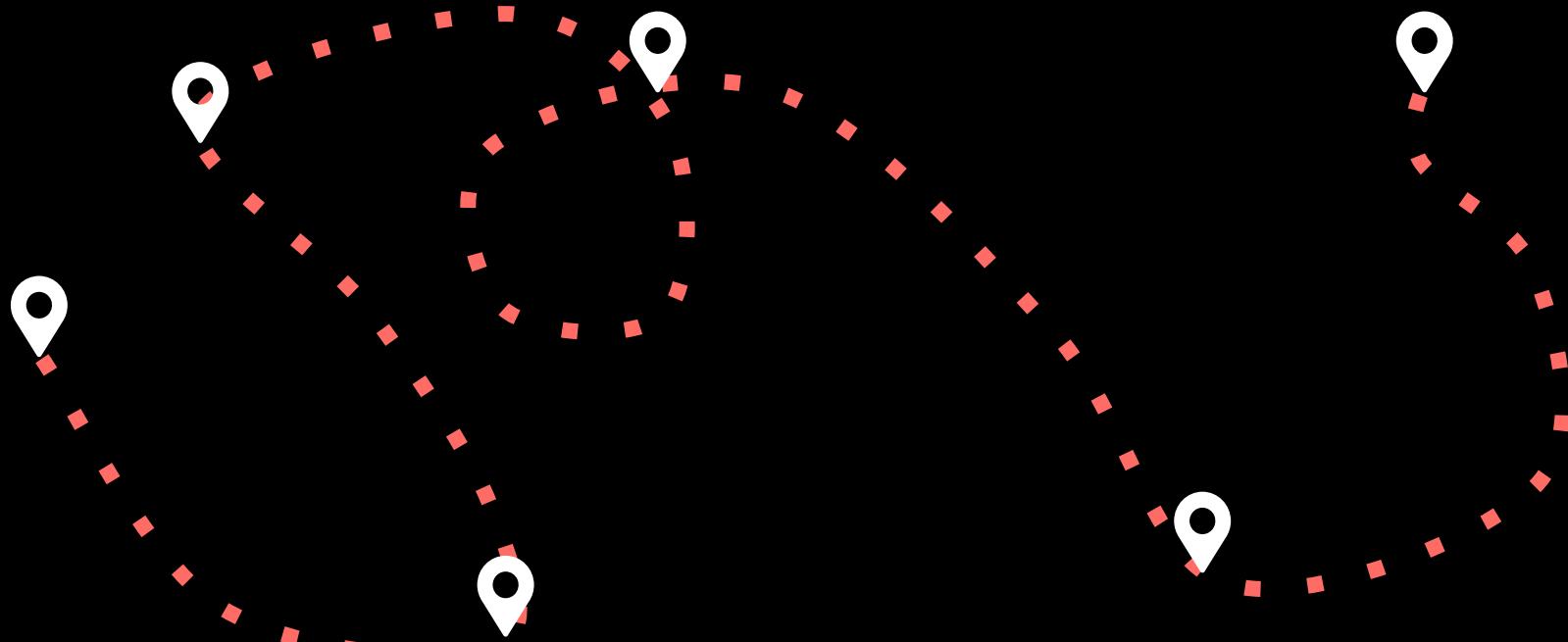
Mayfair Mews

College Street

Cage Lane

628m

# INCLUDING MULTIPLE STOPS ALONG THE WAY



# #2: LIVE DATA

ACQUISITION & VISUALIZATION

# Reporting has never been easier.

[16]

**Report any errors with HerWay or incidents while using here:**

Select problem:

- Poorly lit area (request maintenance)
- Discrepancies in displayed data
- Incident (option to report to local law enforcement)
- Felt unsafe
- Other



Select intersection(s) and/or streets

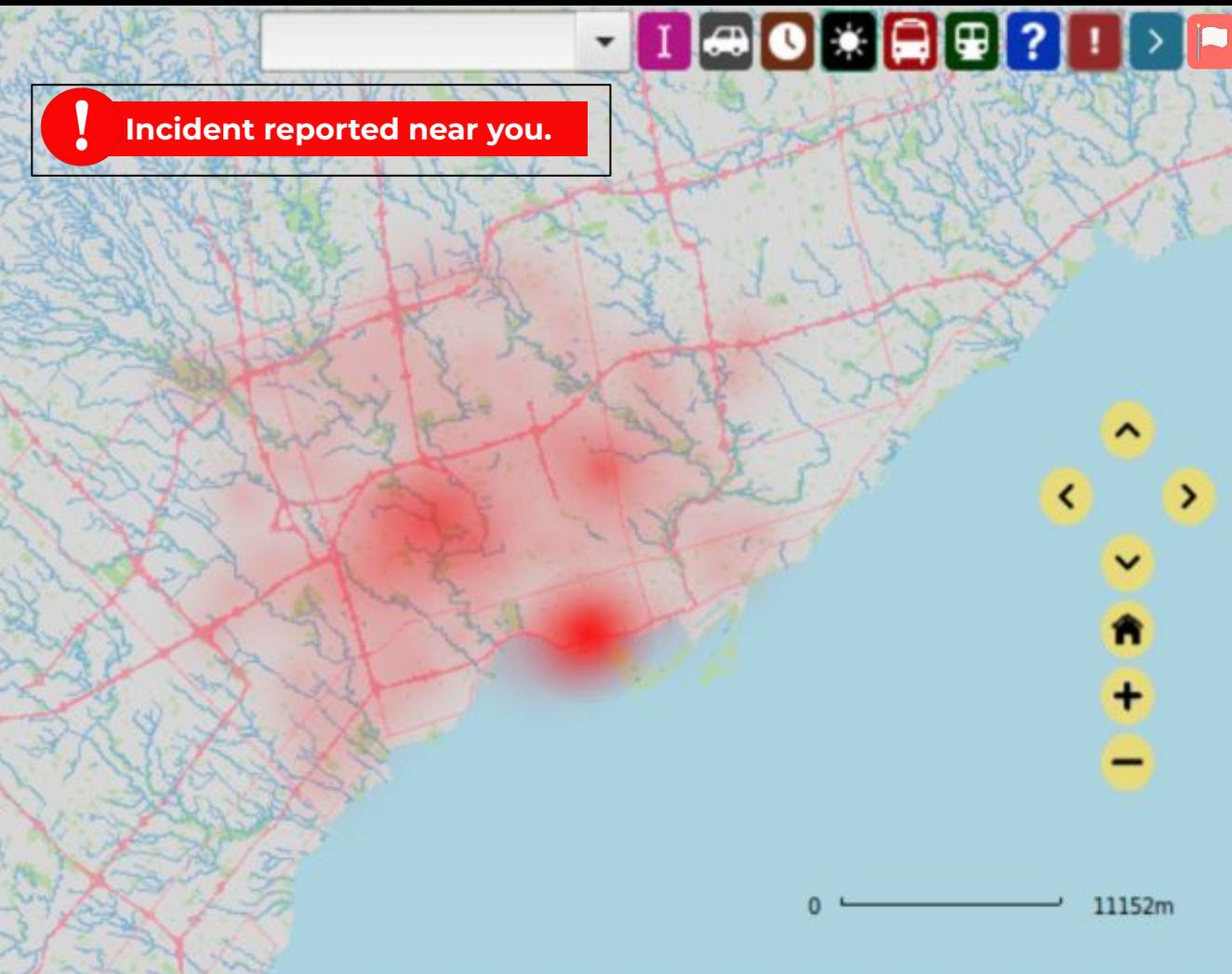


Attach photos or videos

Anonymous

11152m

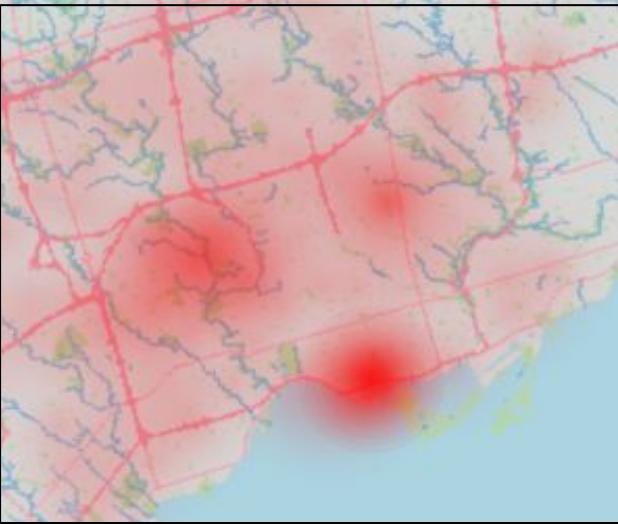




See the  
impact of  
your  
reports  
live.



Incident reported near you.

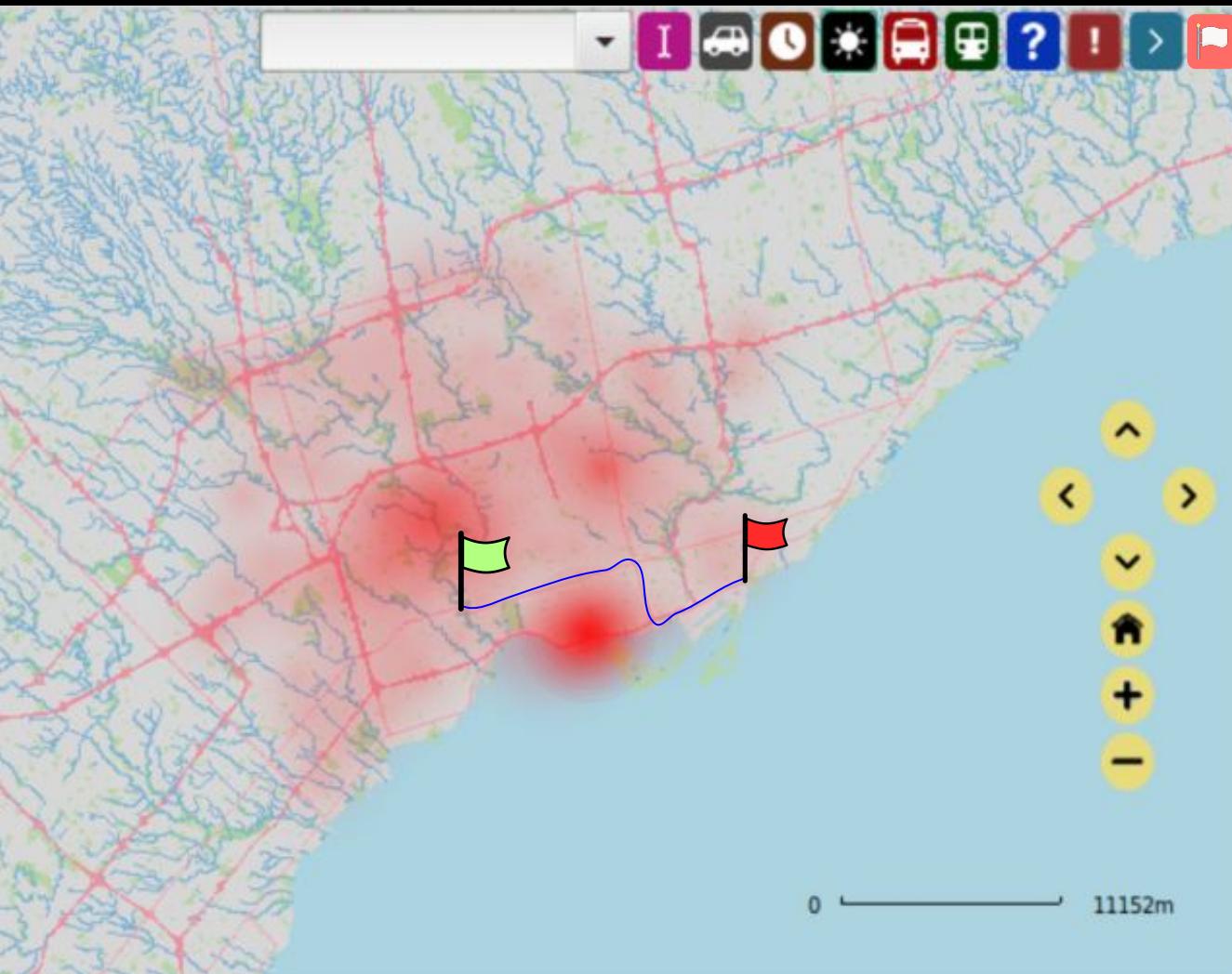


Heat map from HerWay user reports + historical  
crime stats

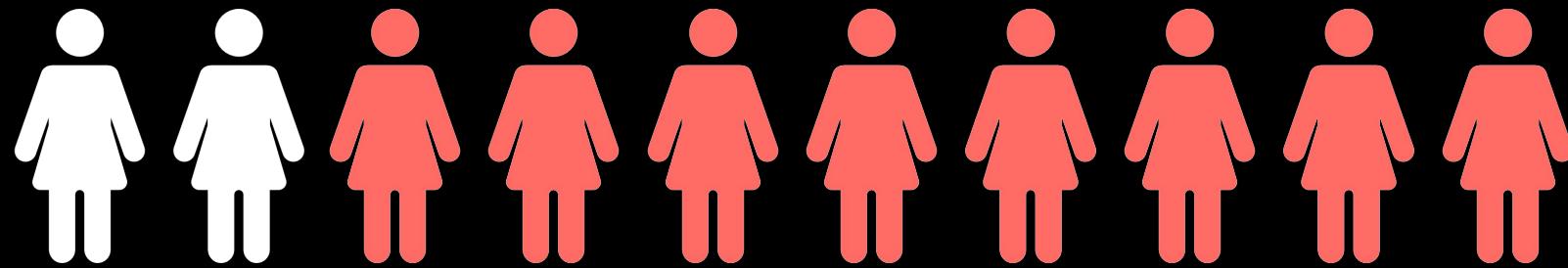
0 11152m

See the  
impact of  
your  
reports  
live.

Data  
collected  
will make  
future  
routes  
safer.

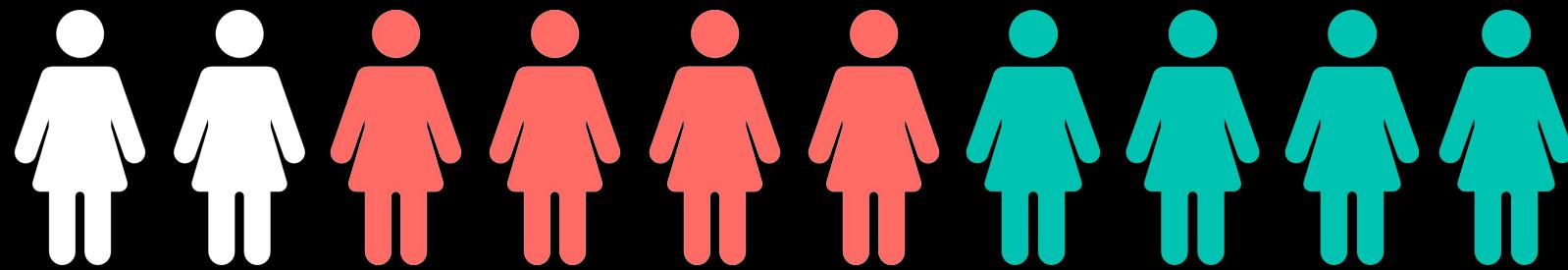


>80% of women have reported travelling alone at night.



[2, 16, 17]

1 in 2 of these women have felt unsafe while traveling in their own city.



[17, 18]

High-contrast colours &  
dark mode

+

POI crisis button

+

Wayfinding modifications  
for well-lit streets, transit,  
saving time

+

Future potential:  
commuter buddy + live  
data

# **HerWay:** Helping women get home safely.

Because every  
journey matters.

# Citations

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