Safety for Vulnerable Road Users

ITS Washington
November 6th, 2024
Farid Semmahi

MIOVISION

4 Steps for Safety Improvement

1. Selection
2. Collection
3. Reflection
4. Correction

MiVision

Selection

Where do I start?

Selection is about understanding where to begin analyzing the current safety risks at your intersections.

This can be done by considering key indicators including:

- Vehicle volumes
- Pedestrian or bicyclist traffic
- Red Light Runners
- Higher speed limits
- Crash rates
- Vulnerable areas like schools and nursing homes
- Complex Intersection Design
- Citizen complaints

Crash Data - Risk Indicator

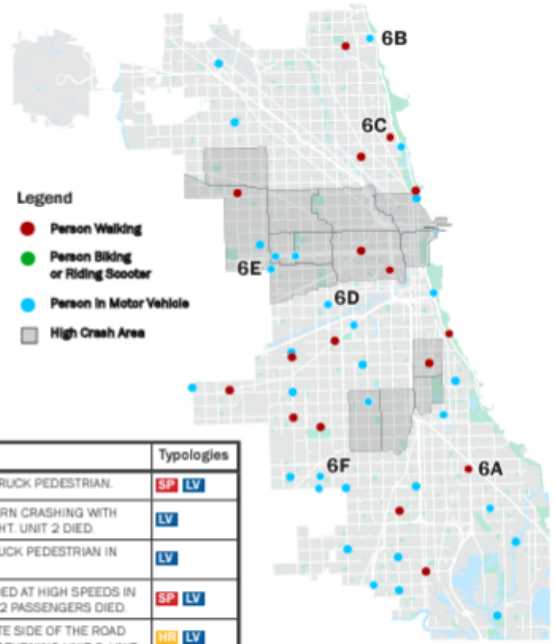
Traffic Fatalities in the City of Chicago

June 2024 Update

		People Walking	People Biking	People in Motor Vehicles*	All Modes
THIS MONTH	June 2024 (CPD Provisional)	2	0	5	7
THIS YEAR	Jan - June 2024 (CPD Provisional)	18	0	34	52
LAST YEAR	Jan - June 2023 (CPD Provisional)	21	3	35	59
5-YEAR AVERAGE	Jan - Jun 2018 - 2022 (IDOT)	21.4	3	39	63.4
10-YEAR AVERAGE	Jan - Jun 2013 - 2022 (IDOT)	20.8	2.3	36.6	59.7

Illinois Department of Transportation (IDOT); *does not include crashes on interstates, includes motorcycles and other vehicles

Fatal Traffic Crash Locations in 2024 through June



Fatal Traffic Crashes in June 2024 (PROVISIONAL) - PAGE 1/1:

Map Key	Crash Date	Crash Time	Crash Location	Victim	# Fatal	Crash Circumstance	Typologies
6A	6/2/2024	5:28 PM	8157 S HARPER AVE	PEDESTRIAN	1	RIGHT-TURNING UNIT 1 STRUCK PEDESTRIAN.	SP LV
6B	6/2/2024	10:34 PM	6602 N SHERIDAN RD	MOTORCYCLIST	1	UNIT 1 MADE ILLEGAL UTURN CRASHING WITH UNIT 2 TRAVELING STRAIGHT. UNIT 2 DIED.	LV
6C	6/5/2024	5:26 PM	630 W ROSCOE ST	PEDESTRIAN	1	LEFT-TURNING UNIT 1 STRUCK PEDESTRIAN IN CROSSWALK.	LV
6D	6/16/2024	5:00 AM	2600 S CALIFORNIA AVE	PASSENGERS	2	UNIT 1 AND UNIT 2 COLLIDED AT HIGH SPEEDS IN INTERSECTION. TWO UNIT 2 PASSENGERS DIED.	SP LV
6E	6/17/2024	1:45 AM	4535 W ROOSEVELT RD	DRIVER	1	UNIT 1 DROVE ON OPPOSITE SIDE OF THE ROAD ATTEMPTING TO PASS LEFT-TURNING UNIT 2. UNIT 1 DRIVER DIED.	HR LV
6F	6/20/2024	11:58 PM	8300 S KEDZIE AVE	DRIVER	1	UNIT 1 DISREGARDED TRAFFIC SIGNAL AND STRUCK UNIT 2 AT A HIGH RATE OF SPEED. UNIT 2 DRIVER DIED.	SP DT HR LV

About this Report

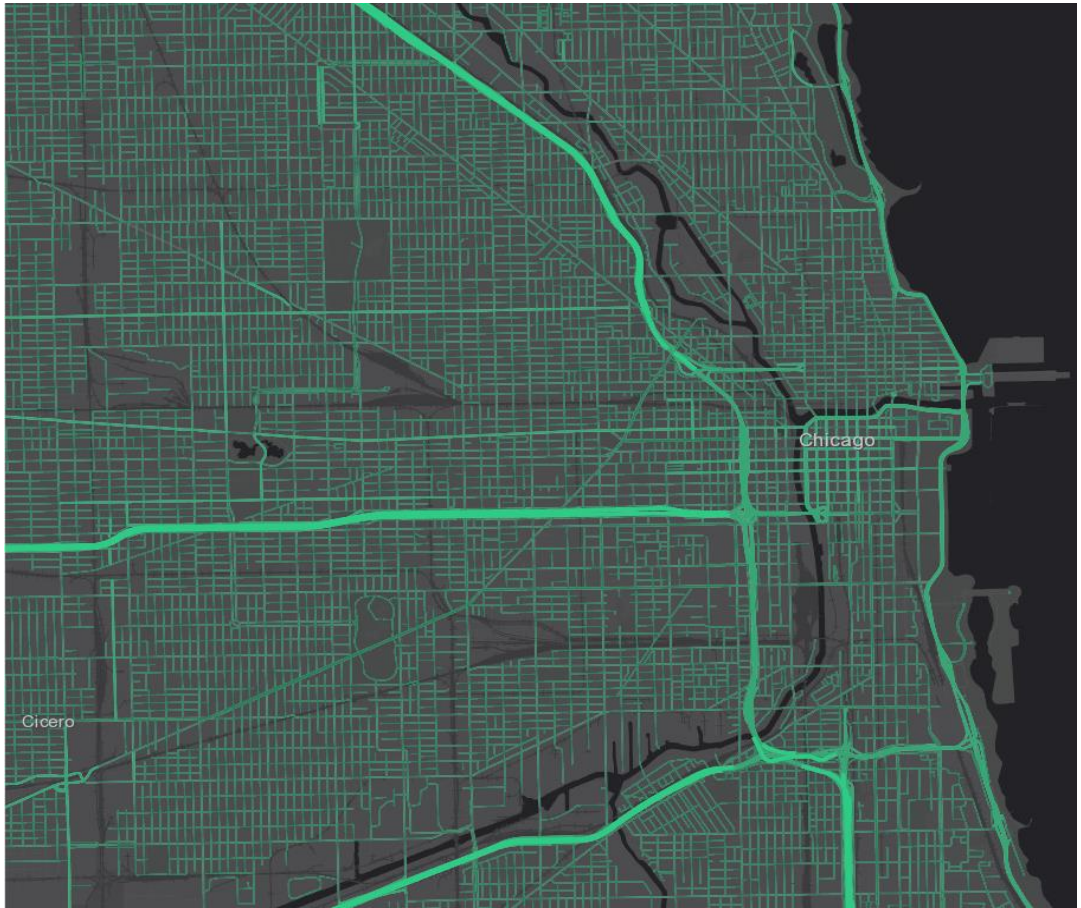
The Chicago Department of Transportation (CDOT) conducts a timely analysis of fatal traffic crash reports furnished by the Chicago Police Department (CPD) to understand the circumstances associated with such crashes. Based on these analyses, CDOT has identified trends, patterns, and correlations associated with each fatal traffic crash. These factors are then grouped into fatal crash typologies as listed to the right. Classifying crashes based on these typologies is among the preliminary outcomes of the analysis process and supports CDOT's efforts to develop relevant and data-informed actions to increase traffic safety. This report provides summary information related to fatal traffic crashes reviewed and analyzed by CDOT that occurred in the month specified.

Typologies

- SP Speeding
- DT Disregard Traffic Signal/Sign
- DS Distracted
- HR Hit & Run
- SU Single-Unit Crash
- LV Striking Driver in Large Vehicle

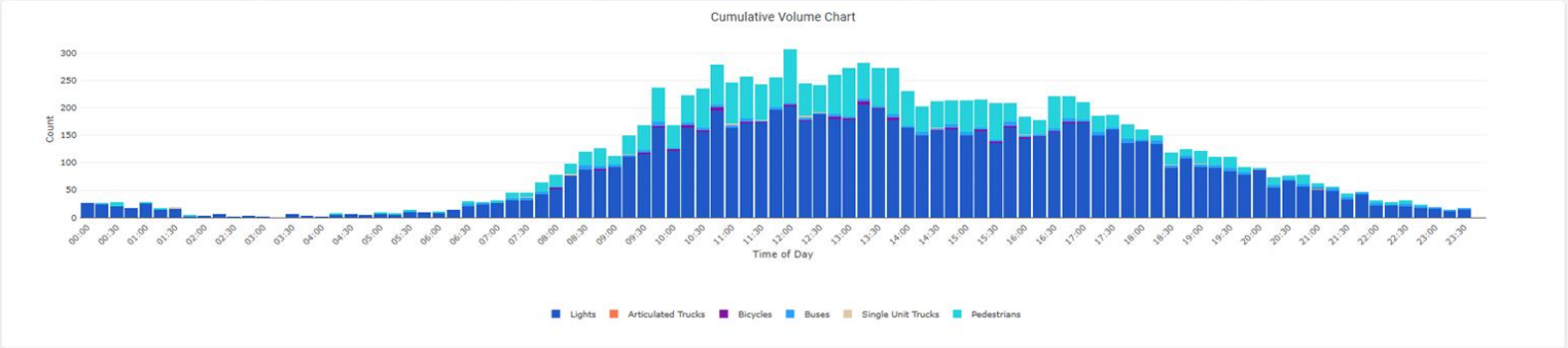
MIOVISION

Speed Limits - Risk Multiplier



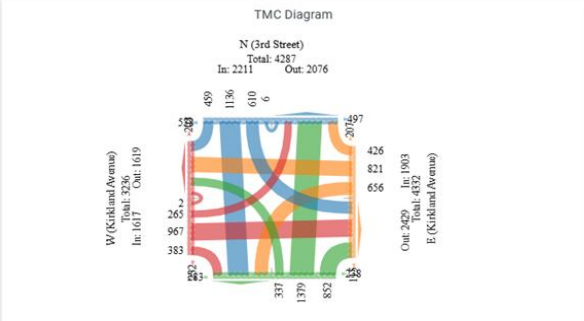
Count Data - Volume Context

8,220	0.21%	720	792	676
Total Vehicles	Total Truck %	AM Peak 10:30-11:30	Midday Peak 12:45-13:45	PM Peak 16:45-17:45



Total Counts by Class

Lights	Articulated Trucks	Bicycles	Buses	Other Motorized Vehicles	Single Unit Trucks	Pedestrians
7,912	1	79	291	Ø	16	2,313



TMC Vehicles Summary

Movement	SB-LT	SB-RT	SB-THRU	SB-U-TURN	WB-LT	WB-RT	WB-THRU	NB-LT	NB-RT	NB-THRU	EB-LT	EB-RT	EB-THRU	EB-U-TURN
Classification	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts
Lights	492	455	1,097	6	654	319	798	326	847	1,328	262	381	946	1
Bus	116	0	33	0	1	105	1	0	0	34	0	0	1	0
Bicycle	1	2	3	0	0	1	19	9	3	17	2	2	19	1
SingleUnitTruck	1	2	3	0	1	0	3	2	2	0	1	0	1	0
ArticulatedTruck	0	0	0	0	0	1	0	0	0	0	0	0	0	0

TMC Crosswalk Summary

Movement	S-CW	S-CCW	W-CW	W-CCW	N-CW	N-CCW	E-CW	E-CCW
Classification	Count	Count	Count	Count	Count	Count	Count	Count
Pedestrian	283	238	203	232	497	538	115	207

Light Vehicles | Buses | Heavy Vehicles | Bikes | Pedestrians

MIOVISION

Collection

What is the current state of the intersection?

Once you understand which intersections may be your most problematic you can begin evaluating that hypothesis.

Before you can make changes you need to understand the current state of your intersection. This can be done through several different forms of data collection.

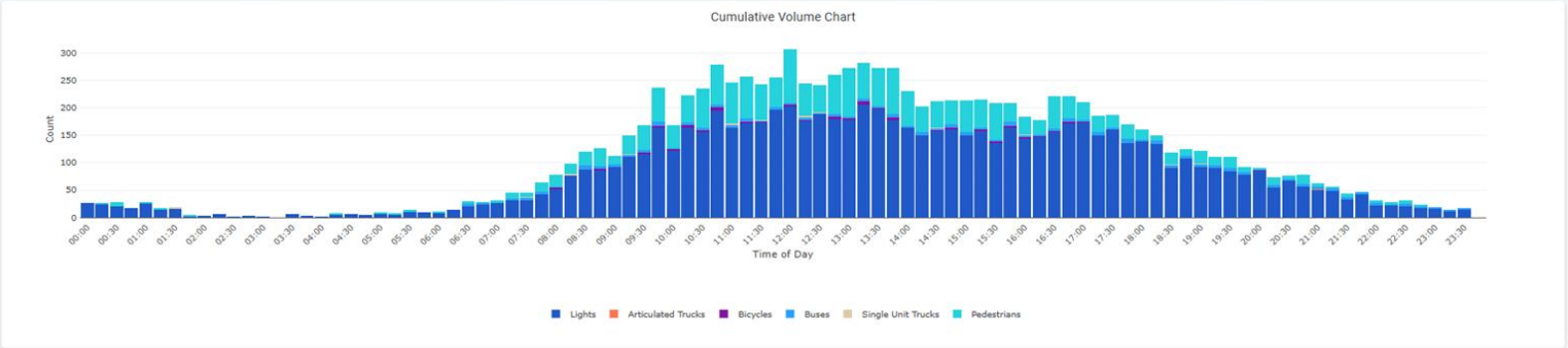
Multimodal Detection - Full Intersection

Light Vehicles | Buses | Heavy Vehicles | Bikes | Pedestrians

MIOVISION

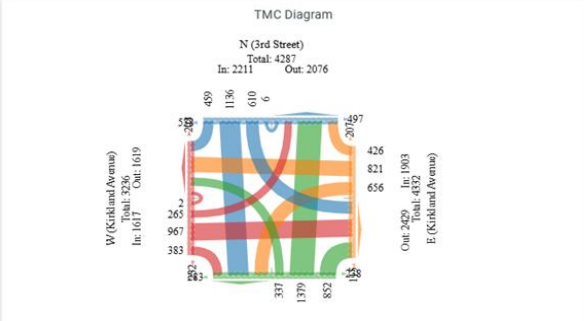
Count Data - Volume Context

8,220	0.21%	720	792	676
Total Vehicles	Total Truck %	AM Peak 10:30-11:30	Midday Peak 12:45-13:45	PM Peak 16:45-17:45



Total Counts by Class

Lights	Articulated Trucks	Bicycles	Buses	Other Motorized Vehicles	Single Unit Trucks	Pedestrians
7,912	1	79	291	Ø	16	2,313



TMC Vehicles Summary

Movement	SB-LT	SB-RT	SB-THRU	SB-U-TURN	WB-LT	WB-RT	WB-THRU	NB-LT	NB-RT	NB-THRU	EB-LT	EB-RT	EB-THRU	EB-U-TURN
Classification	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts	Counts
Lights	492	455	1,097	6	654	319	798	326	847	1,328	262	381	946	1
Bus	116	0	33	0	1	105	1	0	0	34	0	0	1	0
Bicycle	1	2	3	0	0	1	19	9	3	17	2	2	19	1
SingleUnitTruck	1	2	3	0	1	0	3	2	2	0	1	0	1	0
ArticulatedTruck	0	0	0	0	0	1	0	0	0	0	0	0	0	0

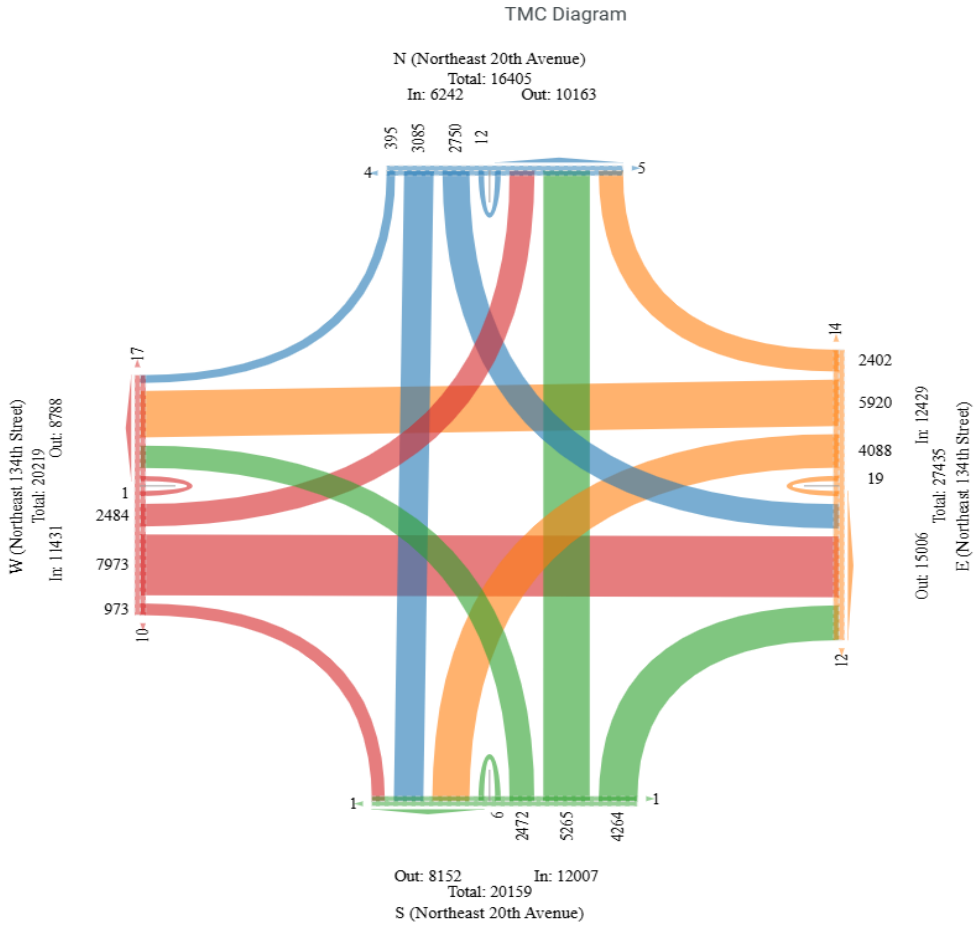
TMC Crosswalk Summary

Movement	S-CW	S-CCW	W-CW	W-CCW	N-CW	N-CCW	E-CW	E-CCW
Classification	Count	Count	Count	Count	Count	Count	Count	Count
Pedestrian	283	238	203	232	497	538	115	207

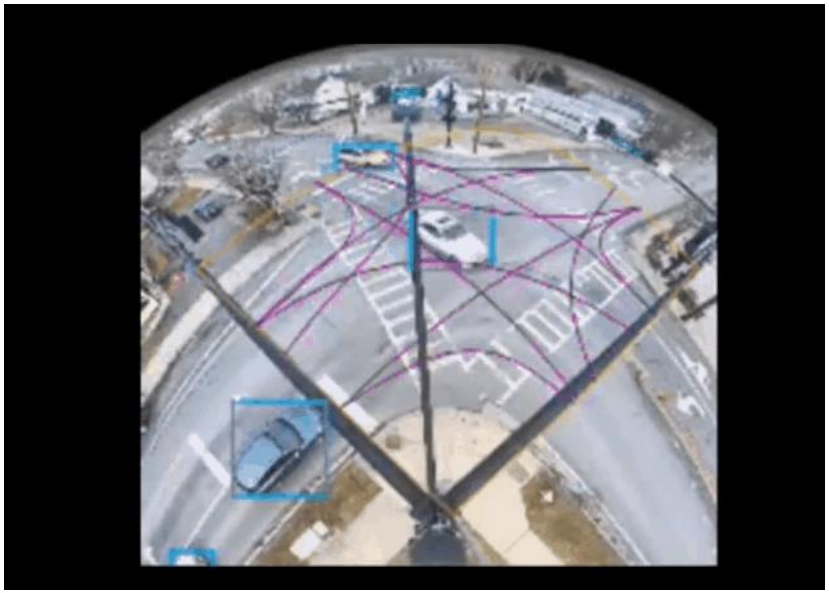
Light Vehicles | Buses | Heavy Vehicles | Bikes | Pedestrians

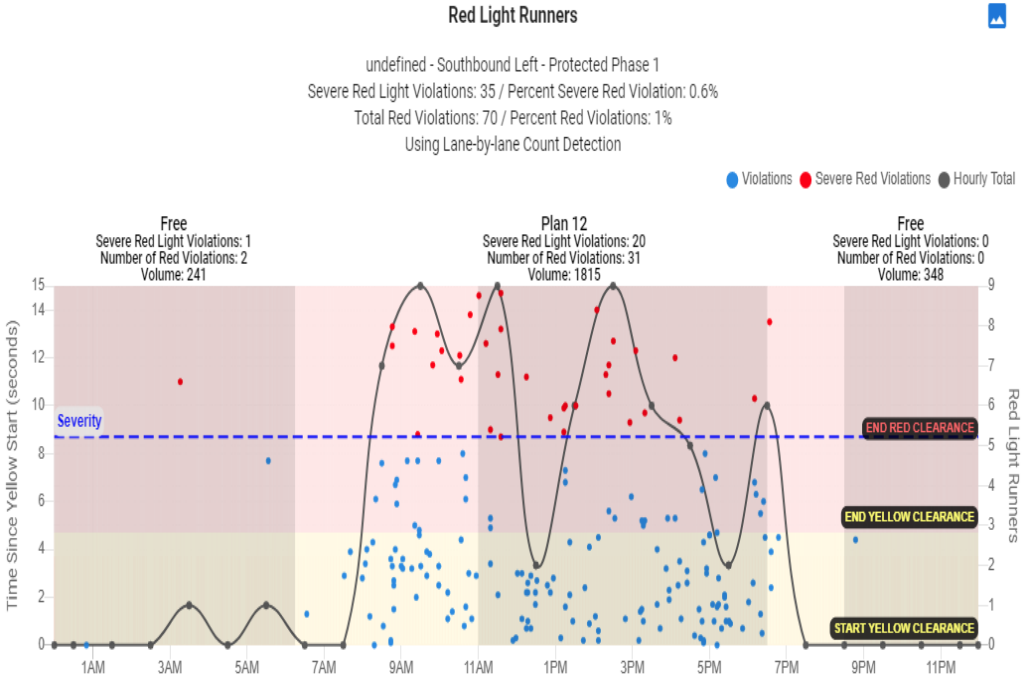
MIOVISION

Count Data - Volume Context



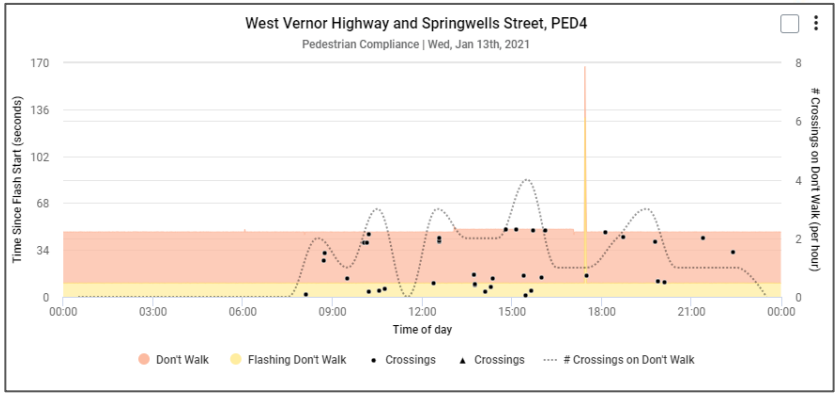
Red Light Running



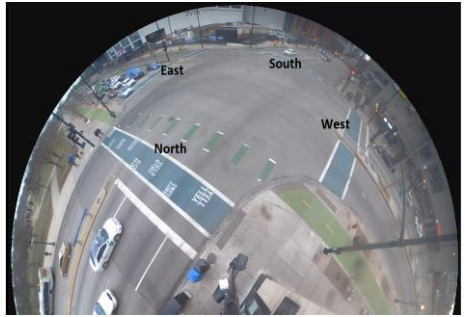


MIOVISION

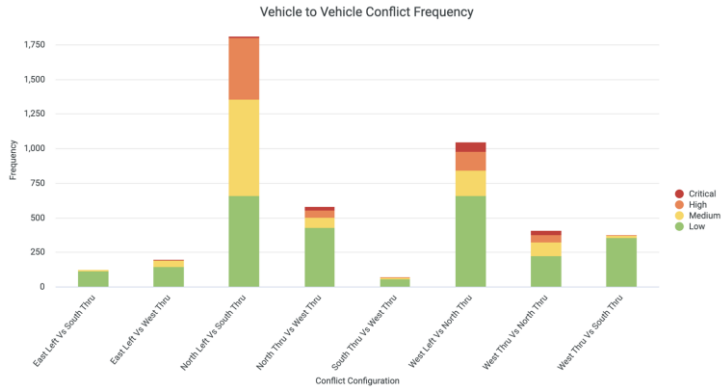
Pedestrian Compliance

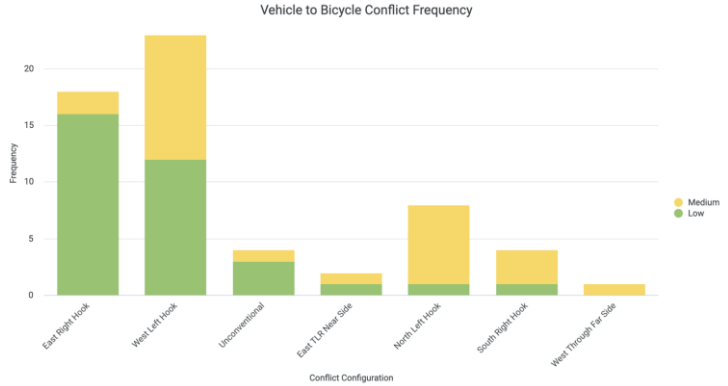


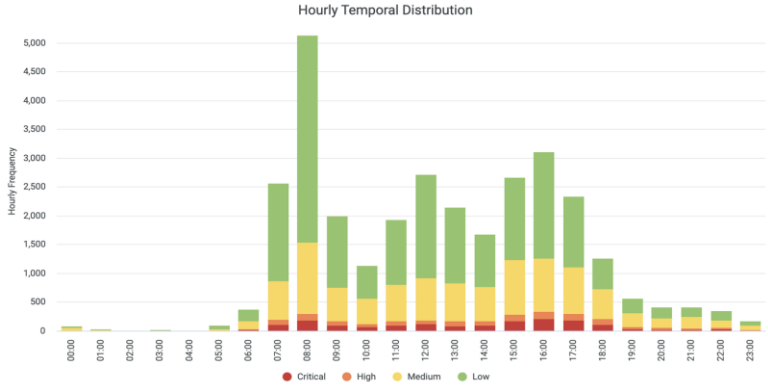
Pedestrian Signal Compliance	61.5%	
Total Pedestrian Counts	39,356	Over 1 week
East	60%	
West	59%	
North	63%	
South	62%	

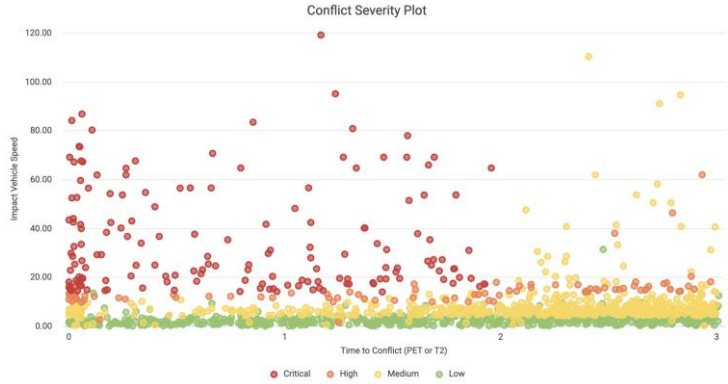


Continuous Safety Monitoring









Reflection

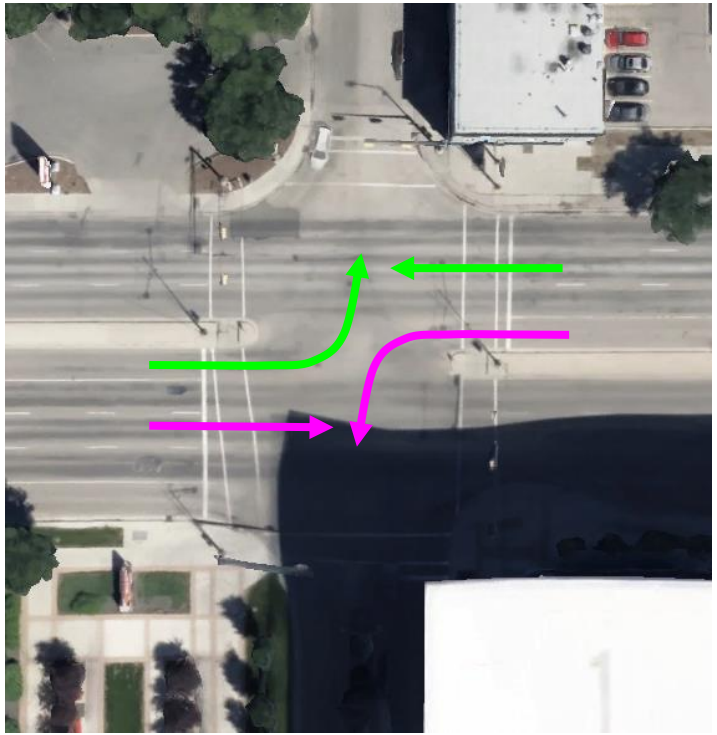
What did you learn?

Now that you have data that gives you an understanding of what the current intersection state is you can begin to discern the underlying causes and how they might be solved.

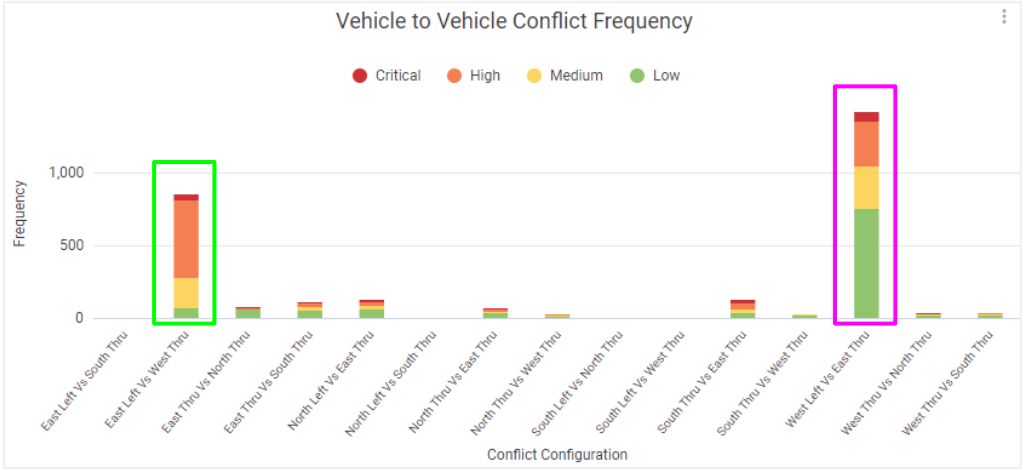
This means:

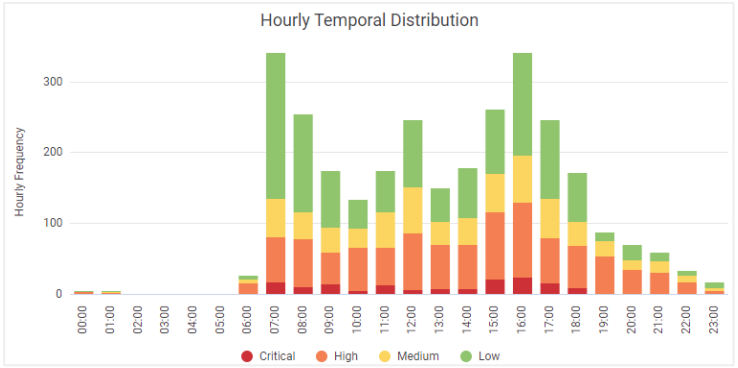
- Understanding your problematic movements
- Weighing severity and frequency of events
- Tracking statistics against time of day
- Sorting concern by road user types (ped, vehicle, bike)
- Leveraging any additional contextual information

Early Results - Vehicle to Vehicle

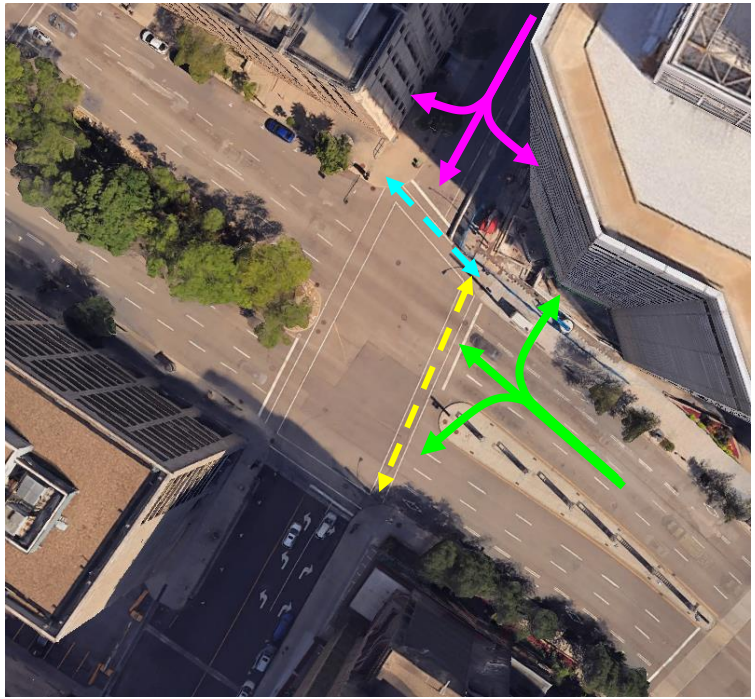


*One month of data

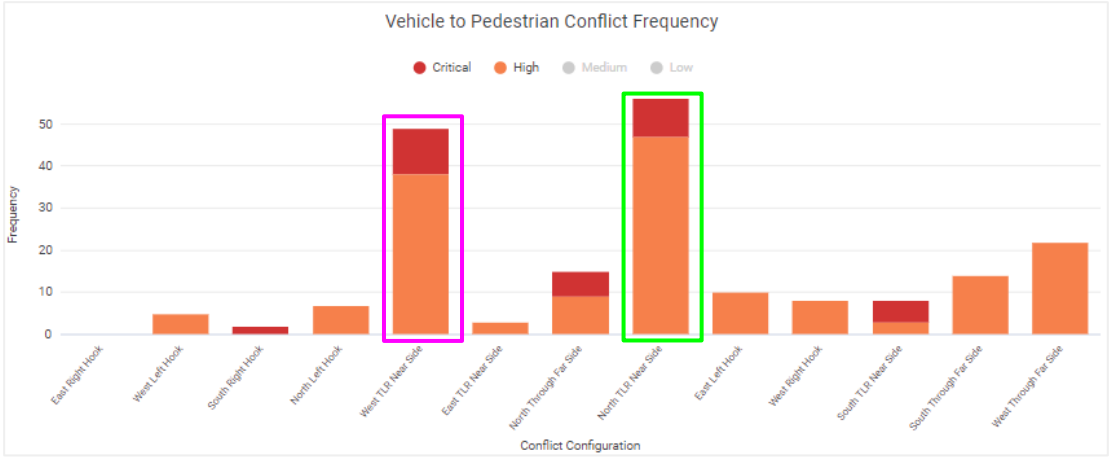


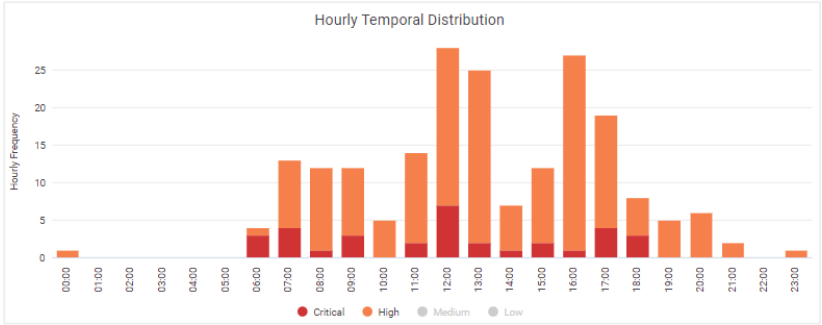


Early Results - Vehicle to Pedestrian



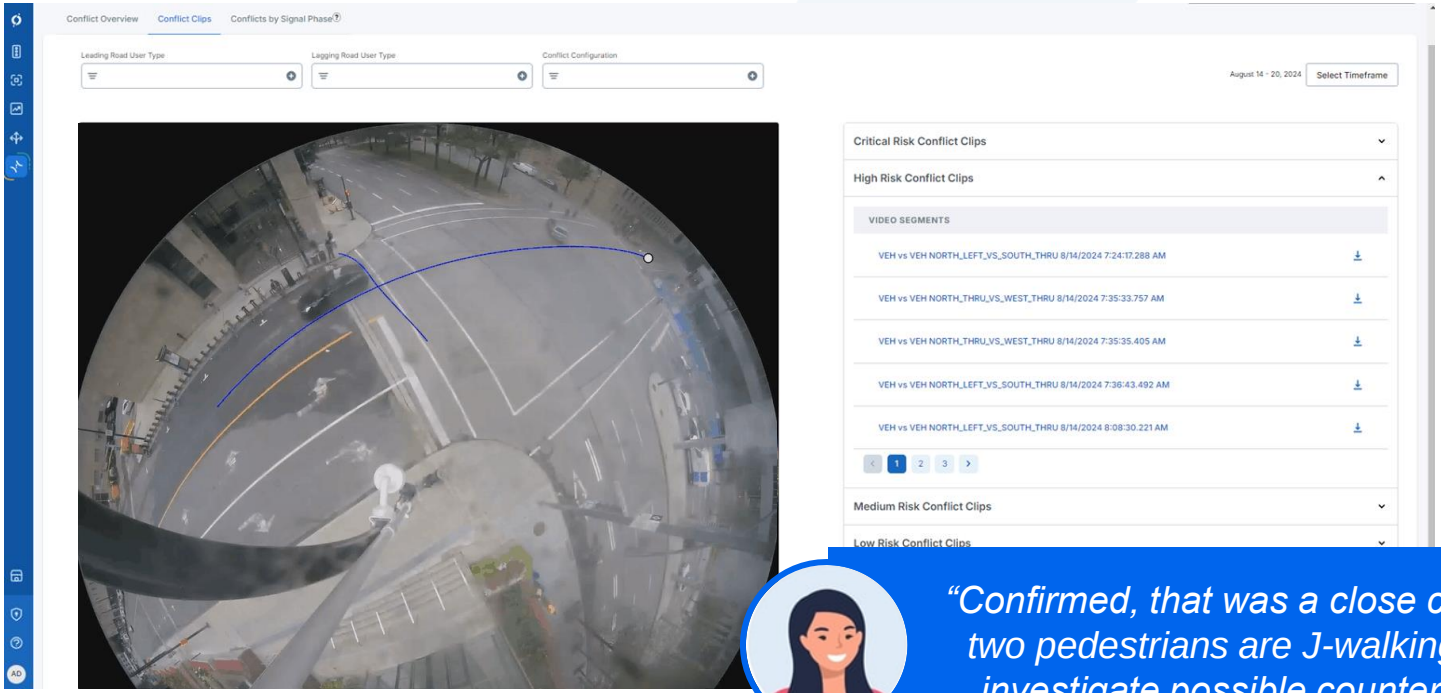
*One month of data

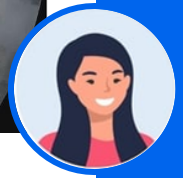




Conflict Clips

Use the filters to zero-in on the near-miss events you are interested in. View the video clips to see the near-miss in action, and do root-cause analysis.





"Confirmed, that was a close call! It looks like two pedestrians are J-walking. Now let me investigate possible countermeasures…."

Correction

What can we change?

Once you have a full understanding of the safety risks of your intersection you can then start taking action through existing intersection functions and intervention mechanisms.

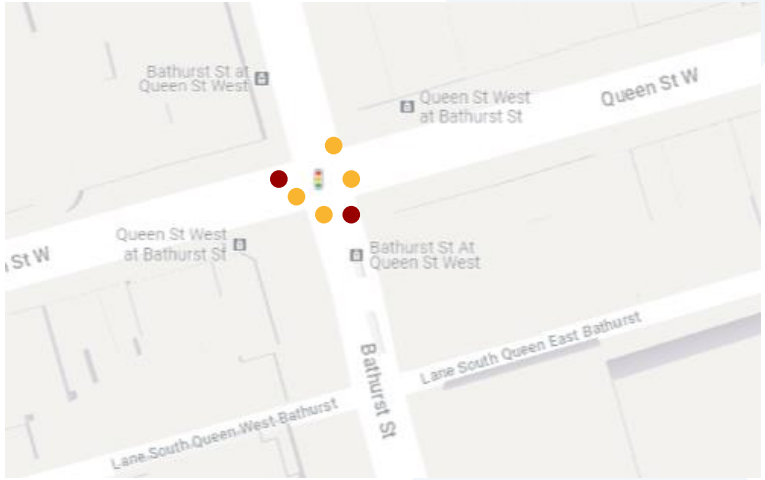
There are many ways to improve safety based on risks that have been identified and having the right systems in place means that you can measure that impact and make iterative changes to continually improve.

Correction Through Traffic Engineering

Traffic Engineers have many tools to mitigate safety risks once they have been identified and understood. This includes:

- Optimizing pedestrian cycles based on clearance times
- Increasing all-red times
- Implementing a pedestrian scramble
- Creating a protected left turn phase
- Shortening cycle lengths
- Restricting right turns on red
- Adjusting timing to be in line with demand

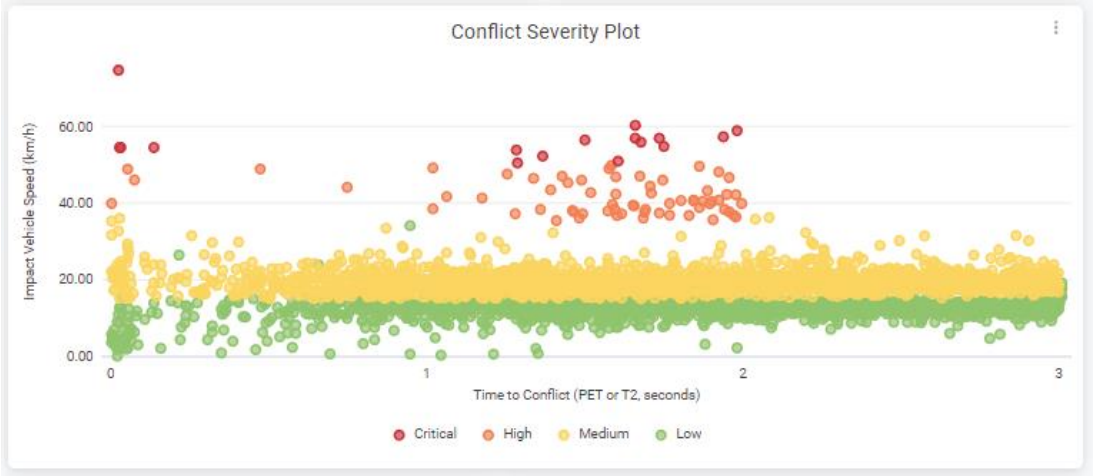
Solving Safety issues with Crash Data



Periodically assess crash data → Look at trends over ~3 years in limited data → Choose a counter measure → Wait 3 years to see if crash data changes

Reactive and very slow (~6 year cycle)

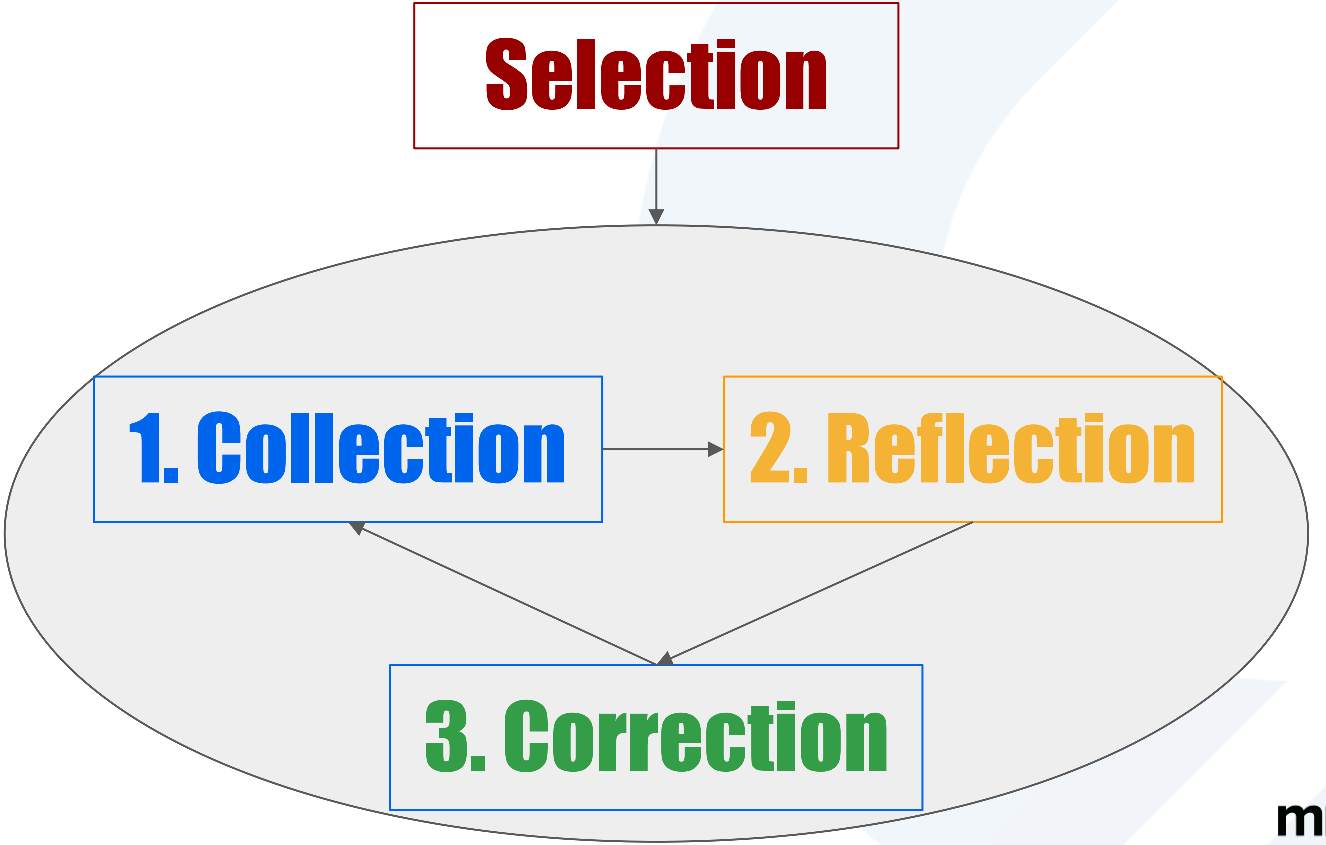
Solving Safety issues with Near-miss Data



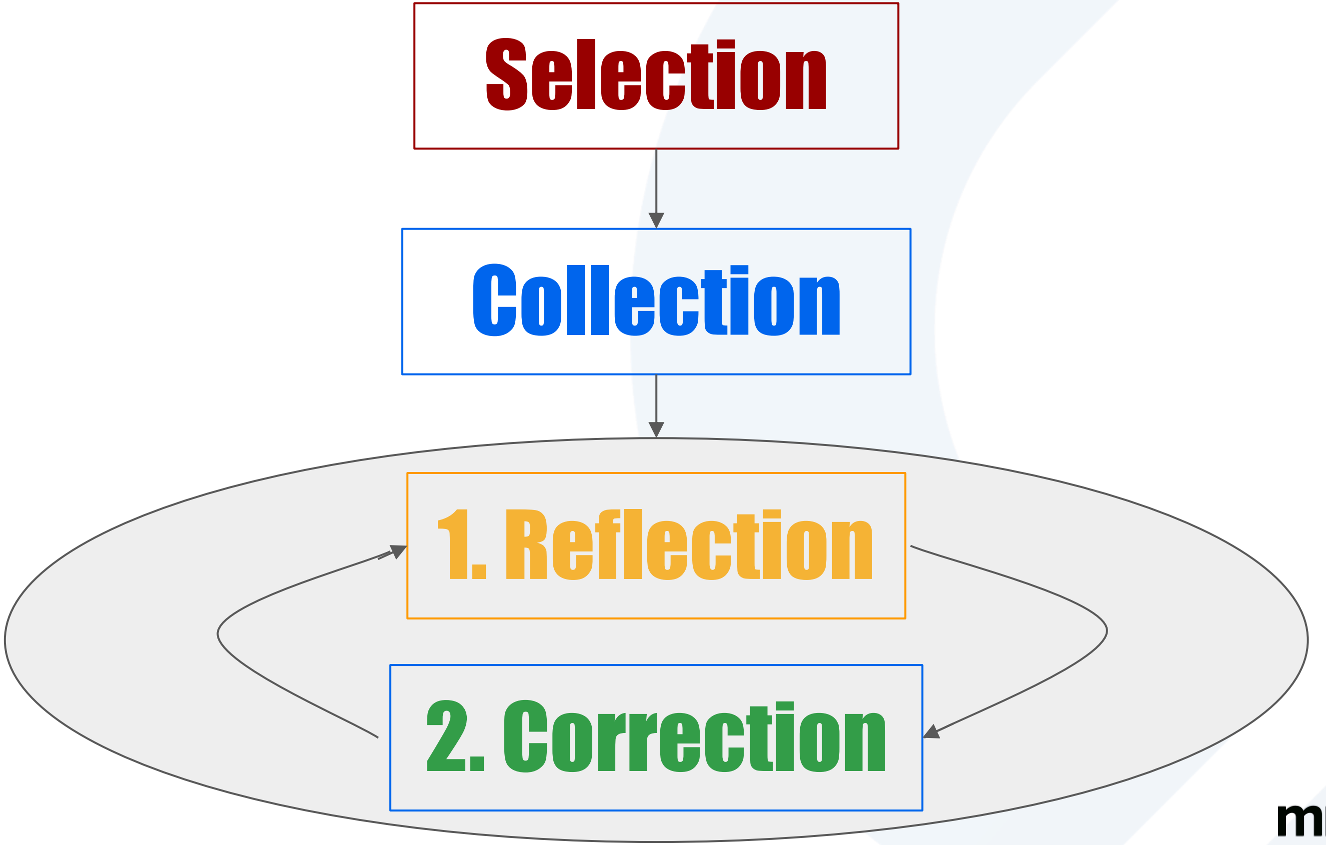
Regularly monitor trends → Flexible duration of analysis, rich context → Choose a counter measure → Immediately evaluate impact

Proactive and immediate (~4 weeks)

The Safety Monitoring Cycle



The Continuous Safety Monitoring Cycle



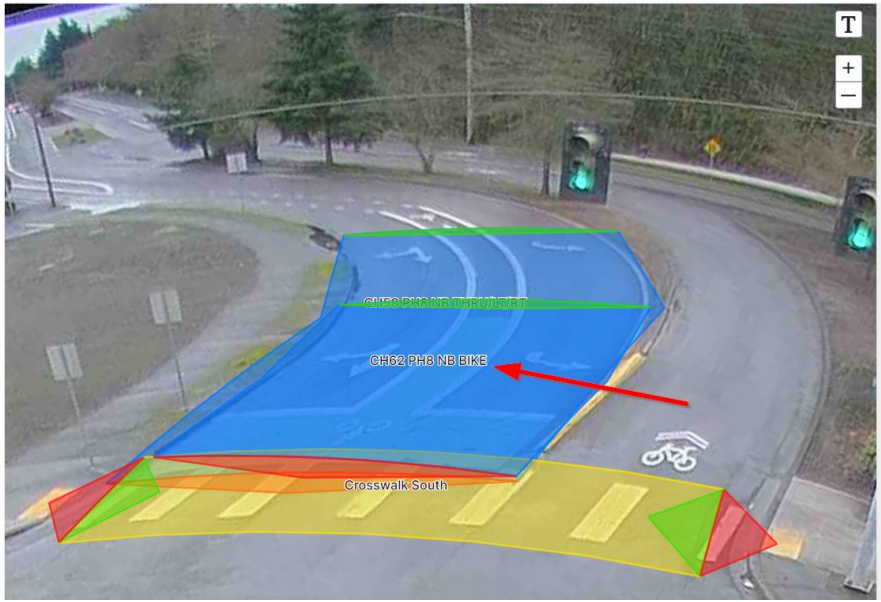
miovision

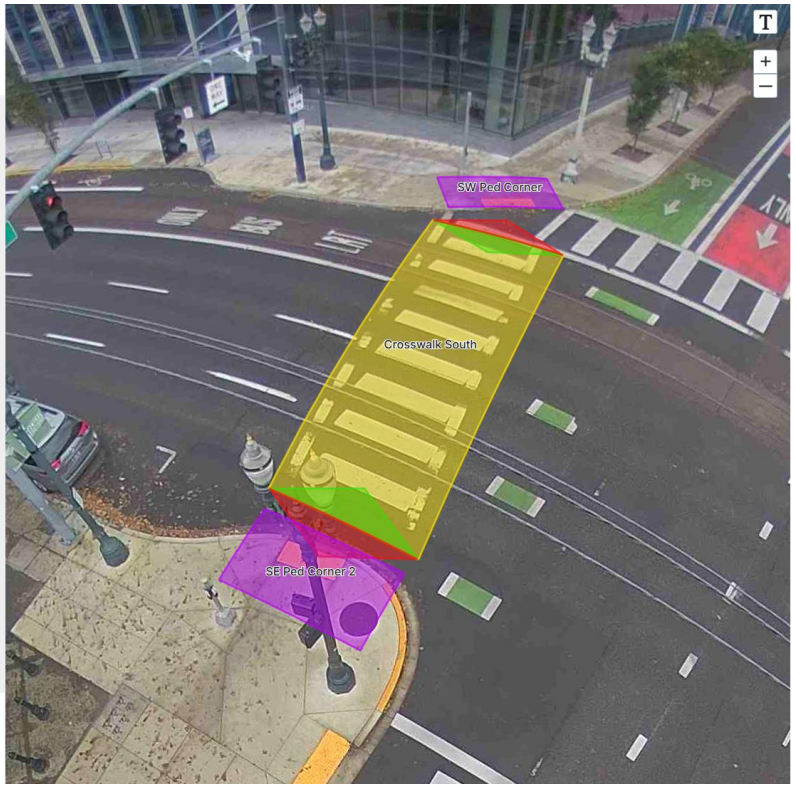
Correction Through Intervention

In addition to what can be done through the controller there are several alternative ways to improve safety. This includes:

- Leveraging pedestrian detection to supplement pedestrian buttons
- Implementing Pedestrian Extension to hold a phase if a pedestrian is crossing
- Utilizing bike specific actuation for bike lanes
- Adding a median in the middle of large intersections to act as a refuge
- Working alongside police to mitigate red light runners
- Adjusting signage to warn for problematic movements
- Lowering speed limits
- Enabling V2X applications for warning sensors or controller input

Detection for Vulnerable Road Users





MIOVISION

The Future of Pedestrian Safety - V2X

miovision

Questions to Consider:

- What data do I currently collect?
- What information am I missing?
- Are there safety grants I could be better leveraging?
- Does my current detection provide a full intersection narrative?
- How am I detecting for vulnerable road users?
- What am I using to gauge safety?
- Is my data collection continuous or study based?

Traffic Fatalities represent the most common cause of death among people under 44 in America. Leveraging the best technology and techniques is our best way to address the underlying causes to minimize injuries and deaths.

MIOVISION

Thank You for Listening

For any questions, please contact me at:

farid.semmahi@miovision.com