Empowering Cities to Design and Manage Safer Streets

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Traffic Crashes

Traffic crashes are a global leading cause of death

This has placed higher priority and scrutiny on building and maintaining **safer transportation networks for all modes of travel.** This has surfaced as more adoption of Vision Zero and safety initiatives.

"Over 35,000 people die in traffic crashes across the U.S. every year, by far the highest rate of any industrialized country. An increasing percentage of these deaths are of people walking and biking in urban areas." - National Association of City Transportation Officials (NACTO)

4 Steps for Safety Improvement

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

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Selection

Where do I start?

Targeting 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
- Foot or cyclist traffic
- Red Light Runners
- Higher speed limits
- Crash rates
- Vulnerable areas like schools and nursing homes
- Complex Intersection Design
- Citizen complaints

As of now, the information available to manage your roads are in data ‘silos’.

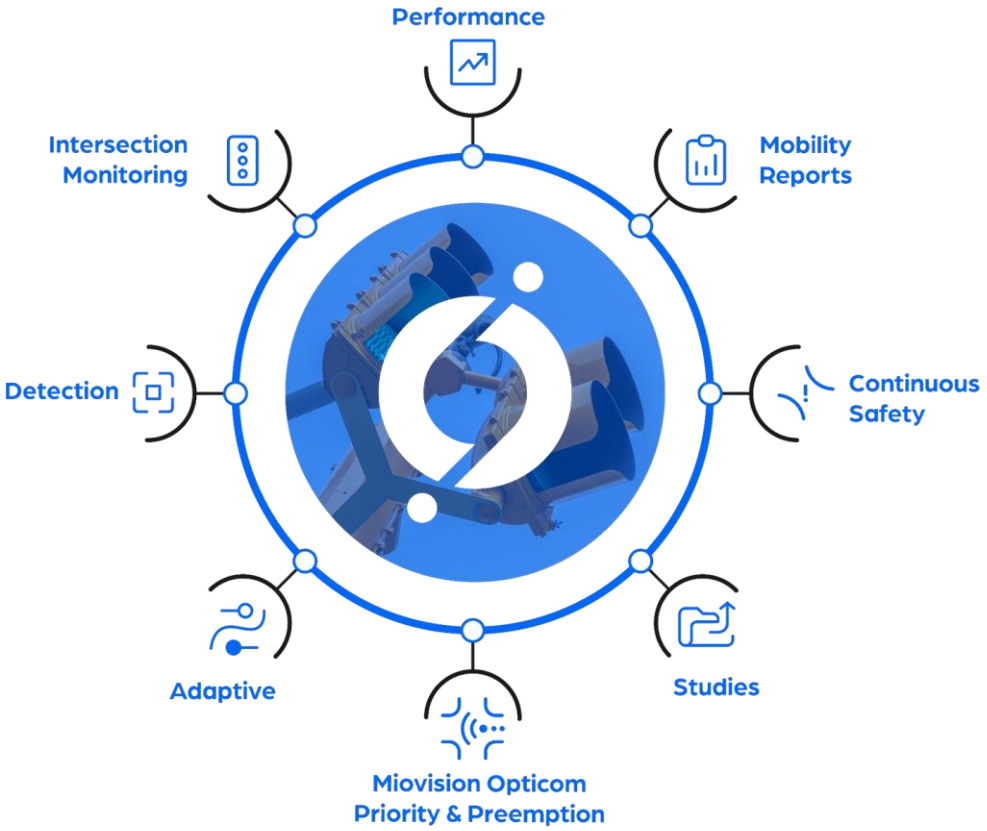
Different applications

Different hardware

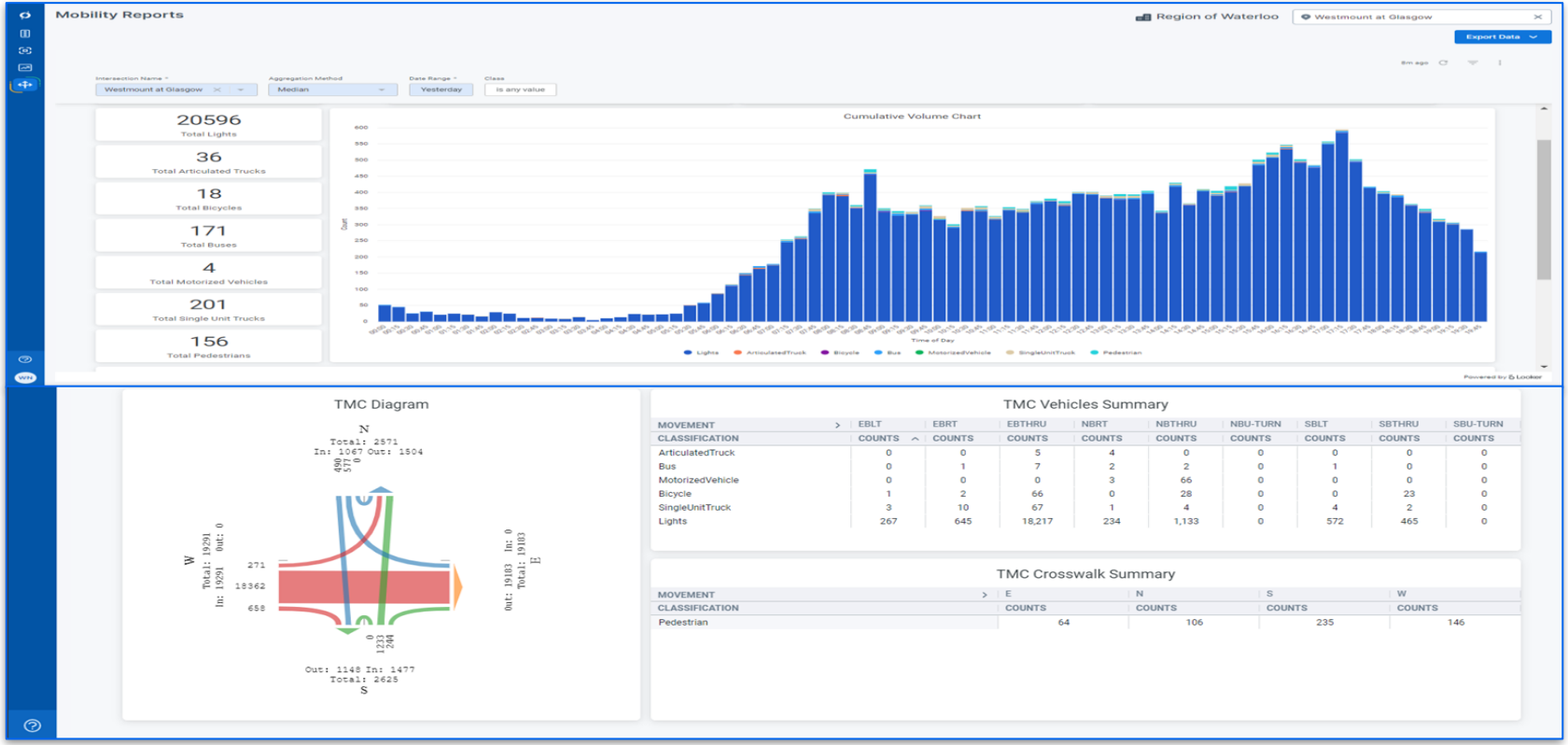
Different interfaces

Separate contracts

A more efficient method is one platform that integrates the data in all of the applications you need to better manage traffic...and make improvements less time consuming — and less costly.



Count Data - Volume Context



MOVEMENT	EBLT	EBRT	EBTHRU	NBRT	NBTHRU	NBU-TURN	SBLT	SBTHRU	SBU-TURN
CLASSIFICATION	COUNTS	COUNTS	COUNTS	COUNTS	COUNTS	COUNTS	COUNTS	COUNTS	COUNTS
ArticulatedTruck	0	0	5	4	0	0	0	0	0
Bus	0	1	7	2	2	0	1	0	0
MotorizedVehicle	0	0	0	3	66	0	0	0	0
Bicycle	1	2	66	0	28	0	0	23	0
SingleUnitTruck	3	10	67	1	4	0	4	2	0
Lights	267	645	18,217	234	1,133	0	572	465	0

MOVEMENT	E	N	S	W
CLASSIFICATION	COUNTS	COUNTS	COUNTS	COUNTS
Pedestrian	64	106	235	146

Light Vehicles | Buses | Heavy Vehicles | Bikes | Pedestrians

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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

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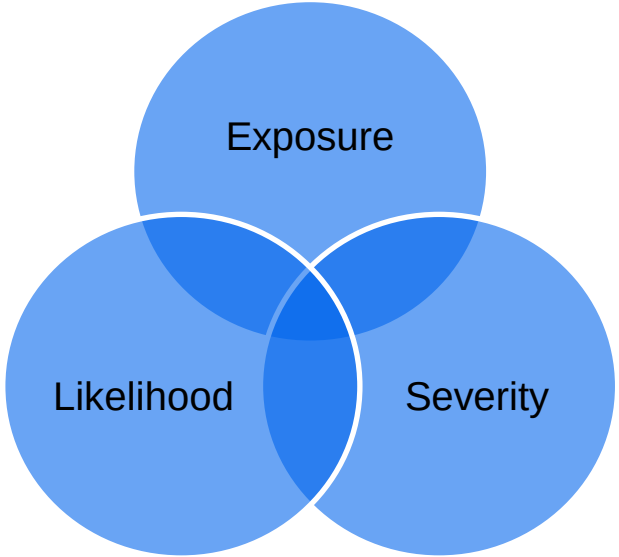
Transportation Safety

Near-miss analysis provides a method of using sensor technology to measure the frequency and severity of near-misses and is proven to be a very reliable predictor of severe crashes.

Miovision defines near-miss events by:

- Speed
- Impact Angle
- Temporal Separation
- User Type/ Vulnerability
- Order of Interaction

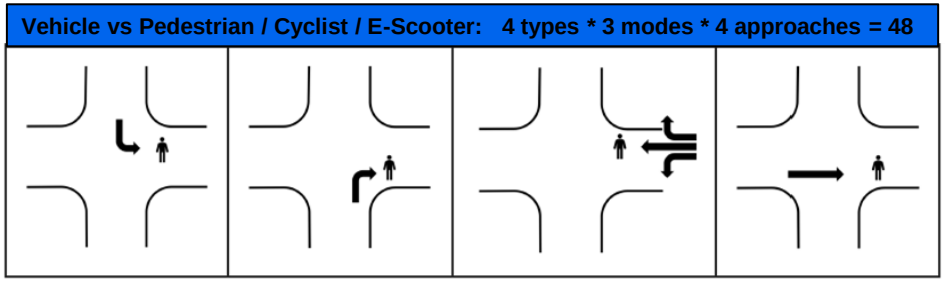


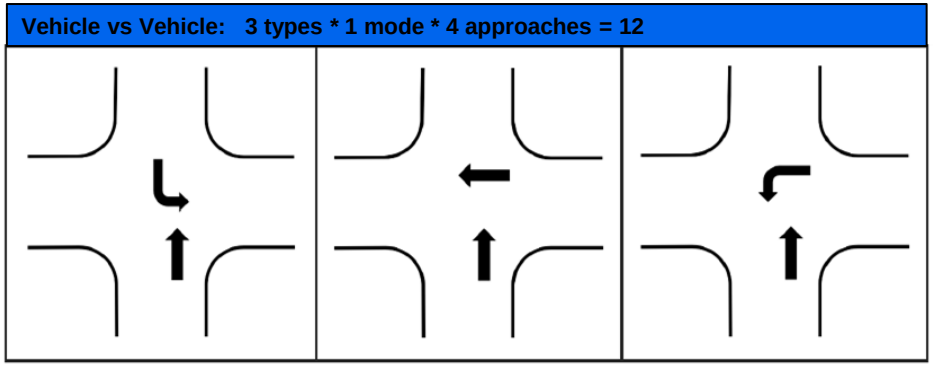
By measuring near-misses, we **proactively** and **precisely** diagnose risks to empower effective road safety improvement planning

Scenario Types

Miovision Safety Studies accurately measures 60 risk configurations for standard intersections, representing all crash configurations with significant potential to produce fatalities and serious injuries at 94% accuracy

Vehicle vs Pedestrian/Cyclist

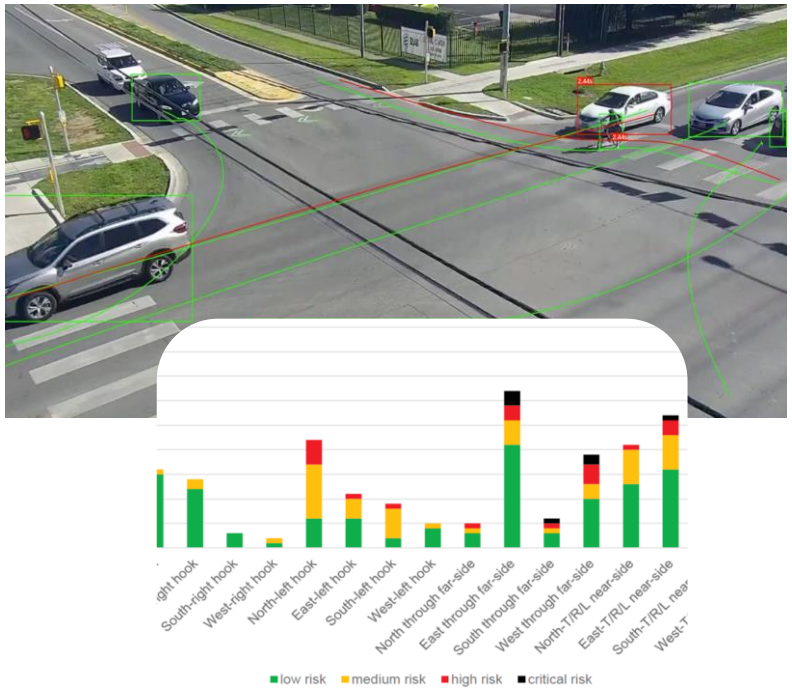




Continuous Safety Monitoring

Access Recent and Historical Near Miss Data

- Leverages a Miovision 360 camera and a Core DCM
- Tracks Individual Conflicts and Near Misses
- Categorizes based on severity and object categories (bike, ped, veh)
- Groups Near Misses by exact movements
- Stores data for up to 5 years at a time for easy before and after review



94% Validated accuracy of Miovision Safety Studies risk indicators for predicting injury collisions*

80% Typical risk reduction achieved when responding to diagnostics

36X Faster measurement of safety improvement compared to crash data

*Anarkooli, Persaud, Milligan, et. Al (2021). Transportation Research Record.

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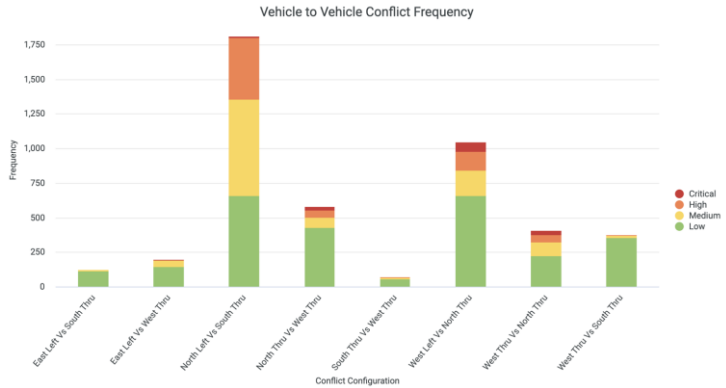
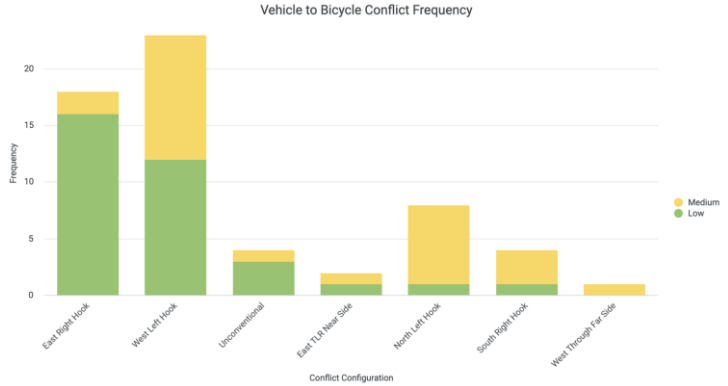
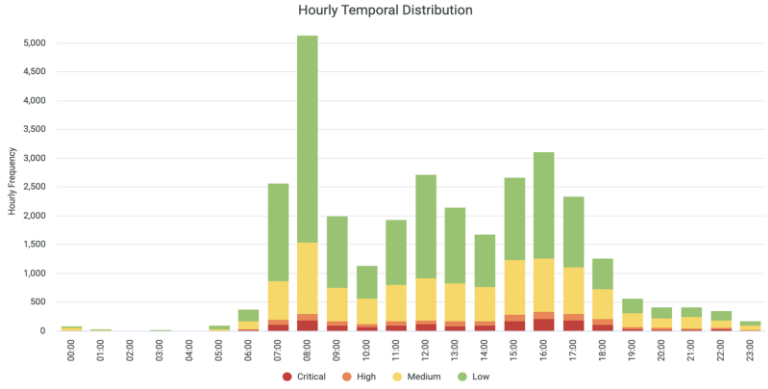
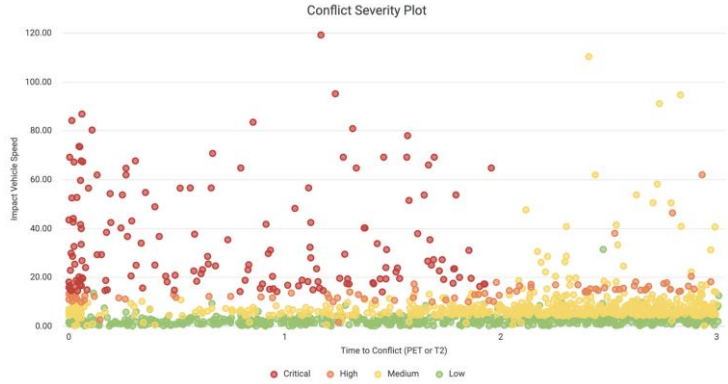
Software: Continuous Safety Monitoring









Reflection

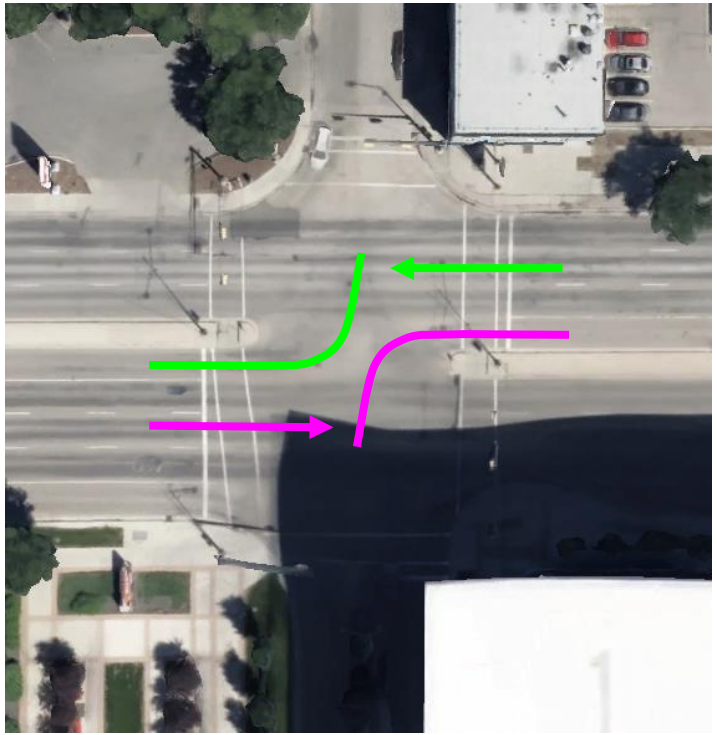
What did we learn?

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.

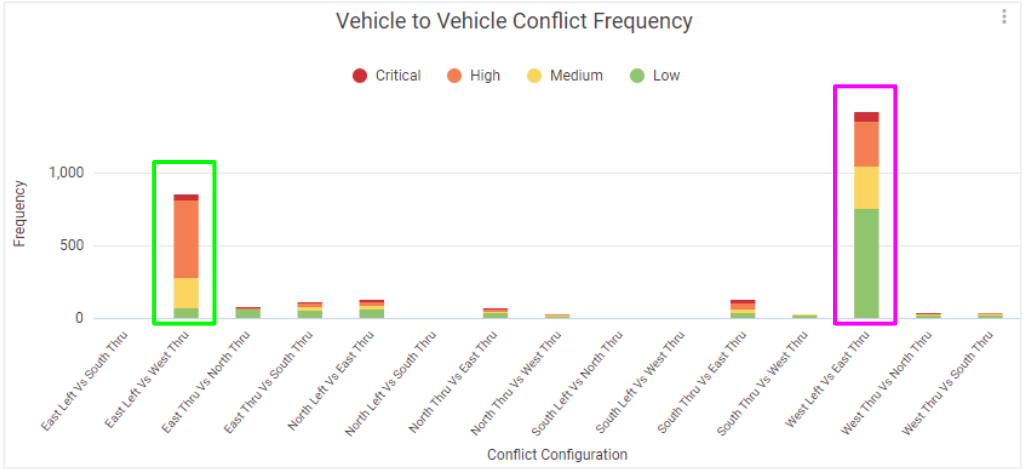
This means:

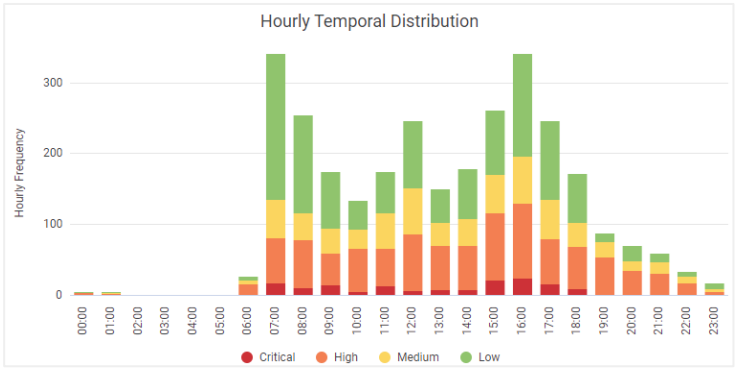
- Understanding your problematic movements
- Weighing severity and frequency of events
- Tracking statistics against time of day
- Sorting concern by road user types (ped, vehicle, bike)
- Leveraging any additional contextual information

Early Results - Vehicle to Vehicle

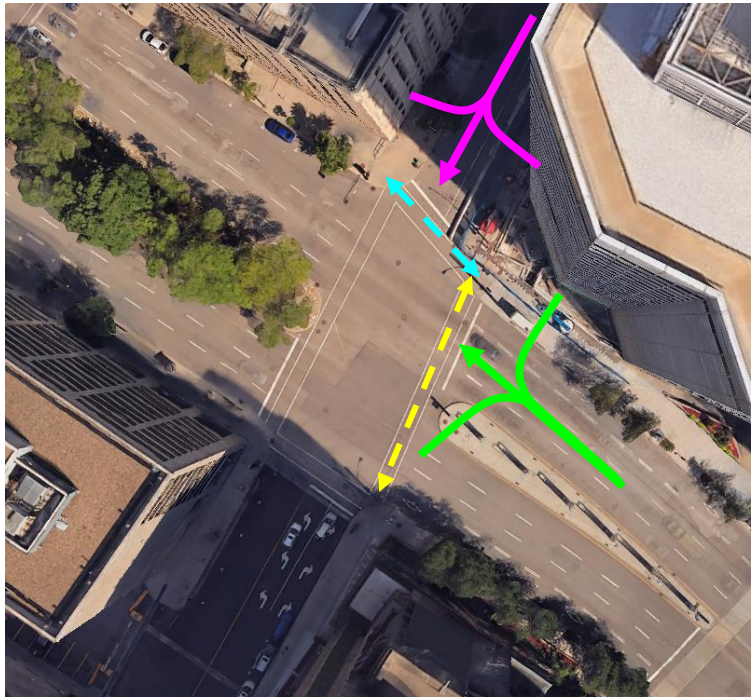


*One month of data





Early Results - Vehicle to Pedestrian



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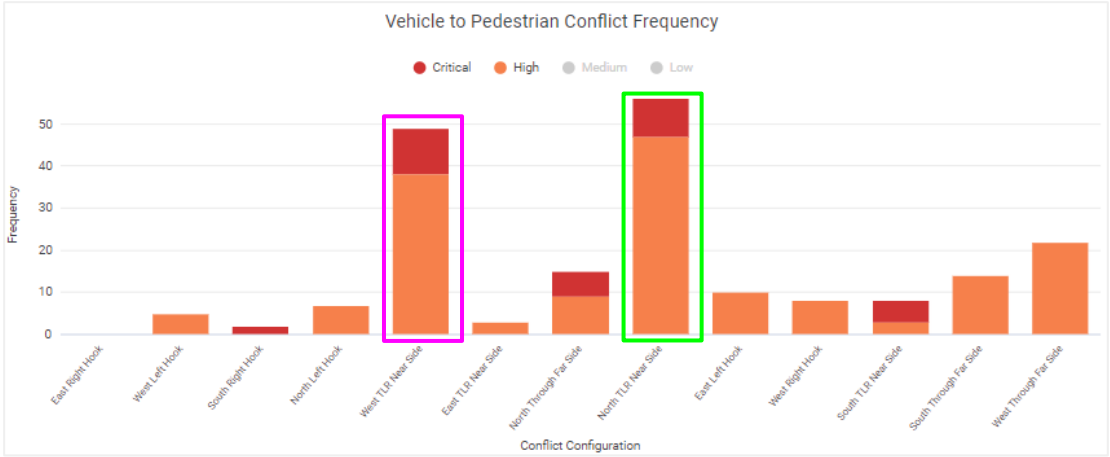
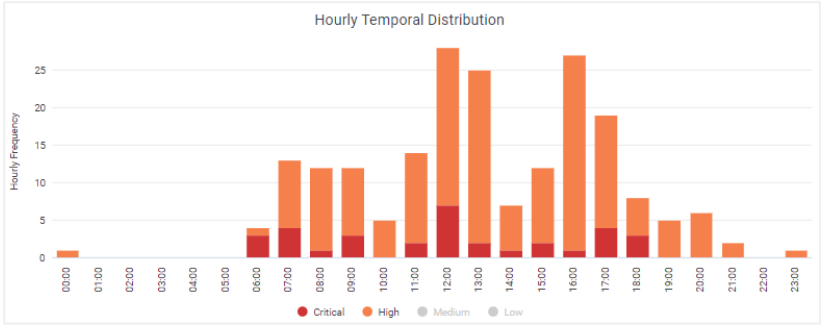
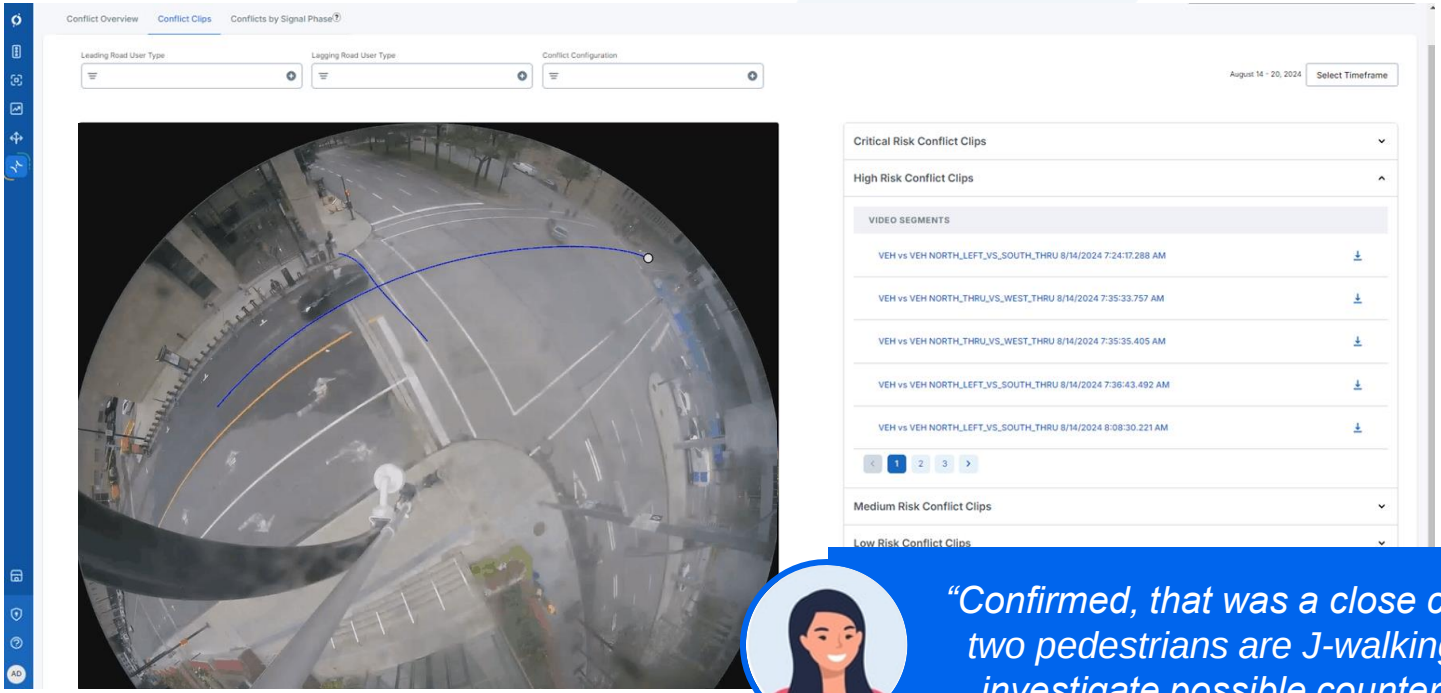
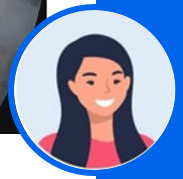




Conflict Clips

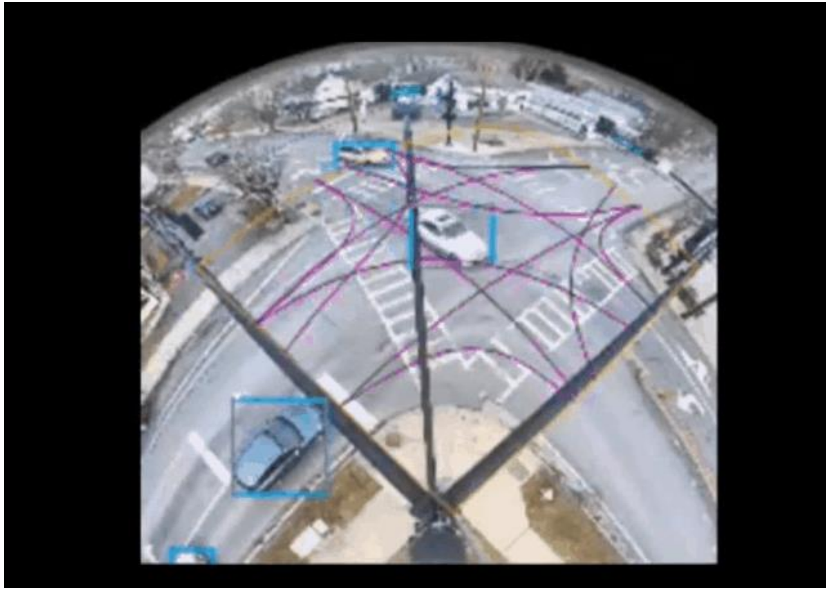
Use the filters to zero-in on the near-miss events you are interested in. View the video clips to see the near-miss in action, and do root-cause analysis.

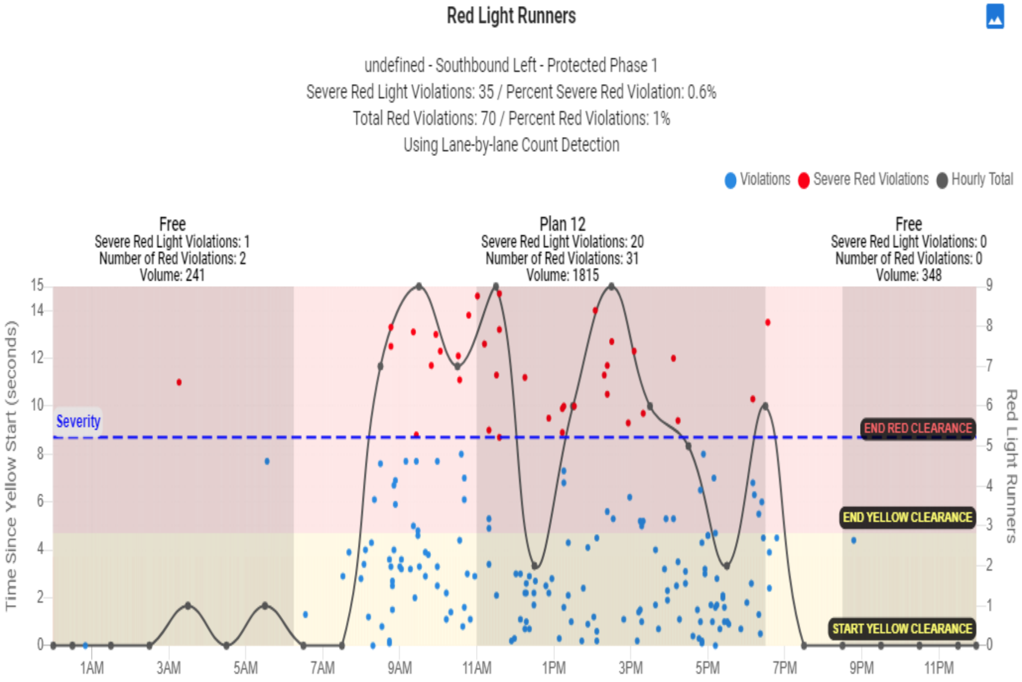




"Confirmed, that was a close call! It looks like two pedestrians are J-walking. Now let me investigate possible countermeasures…."

Red Light Running





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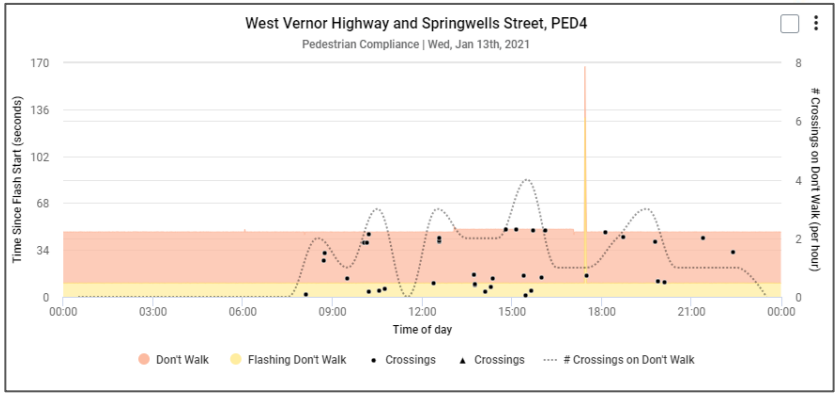
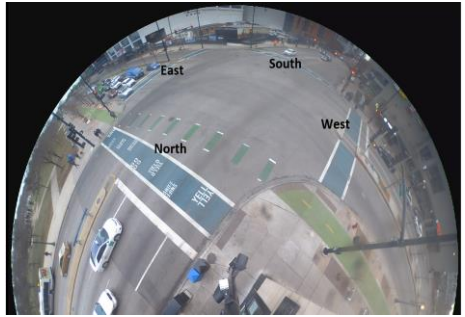
Pedestrian Compliance



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



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.

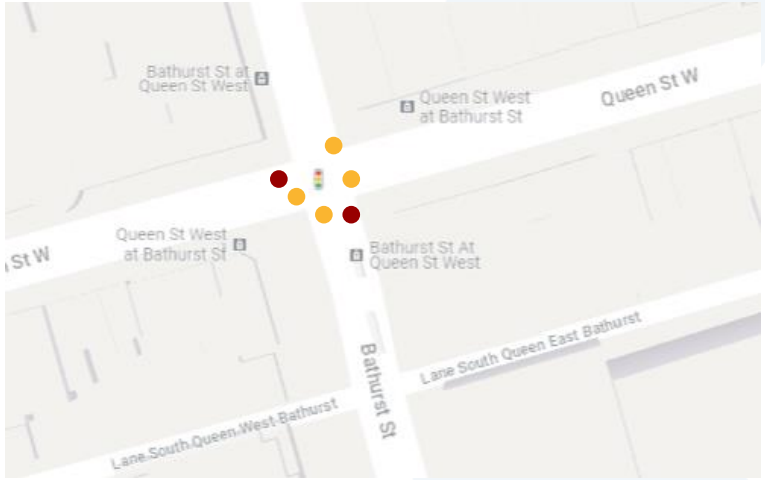
There are many ways to improve safety based on risks that have been identified and having the right systems in place means that you can measure that impact and make iterative changes to continually improve.

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 dedicated left turn phase
- Shortening cycle lengths
- Restricting right turns on red
- Adjusting timing to be in line with demand

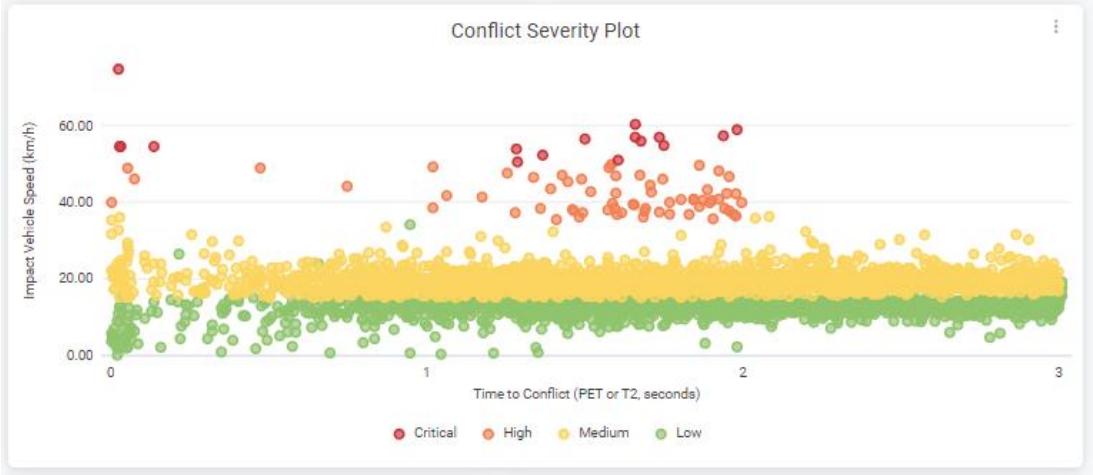
Solving Safety issues with Crash Data



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)

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

The Future of Pedestrian Safety - V2X

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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.

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Learn more about how our data is being used in other cities:

Examples include:

- Quincy MA: Empowering Cities to Protect their Most Vulnerable Road Users
- Chicago, IL: Becoming the best cycling city in America
- MassDOT: Measuring Arterial Operations and Performance with Miovision Hardware

Thank You!

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