# Bayers Rd and Joseph Howe Dr

MicroTraffic Video Diagnostic Findings and Recommendations

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# Contents

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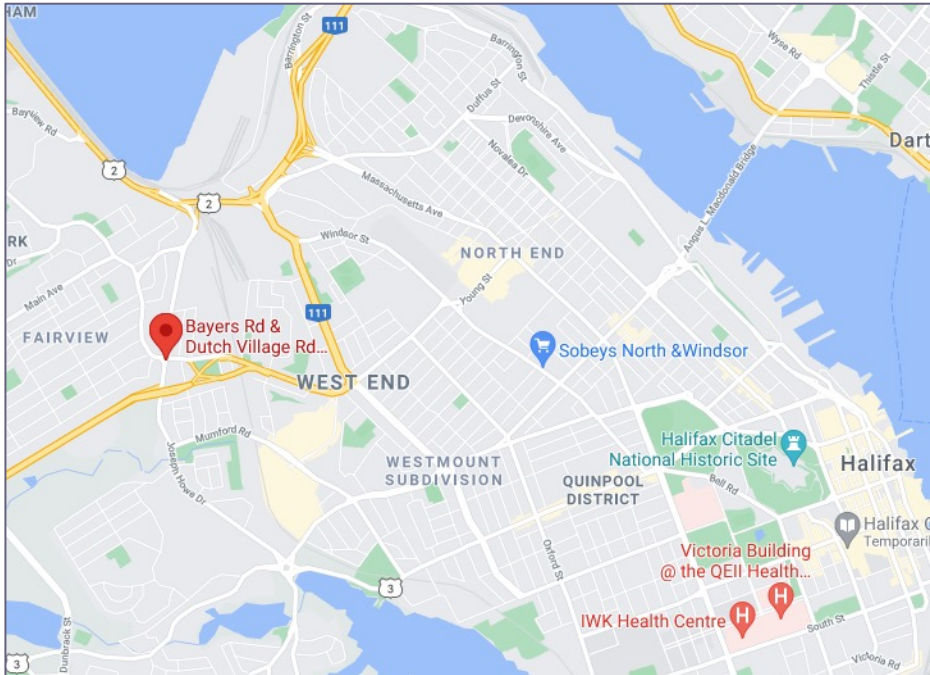
# Intersection Overview

- Bayers Rd and Joseph Howe Dr is located near Fairview, northwest of downtown Hamilton.
- Joseph Howe Dr connects the Armdale Roundabout in the south to Highway 2 in the north.
- Bayers Rd begins east of Joseph Howe Dr; the west approach is Dutch Village Rd.
- The land use surrounding the intersection is mixed with commercial establishments (NW quadrant), and single and multi-family residential homes.
- Video analytics indicates that the intersection is used by approximately 50 cyclists, 850 pedestrians, and 38,200 vehicles per day (from 5:00-24:00). Note that the counts were completed in November when VRU volumes may be depressed.



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Bayers Rd. Looking East

**Bayers Rd. Features:**

- One through lane, one left turn auxiliary lane and one right turn only lane.
- Right turn channelization island for EBR
- High turn radii for WBR (high speed)
- 50 km/h posted speed limit
- Three signal heads EB and WB (one nearside)
- Left turn signalization: permissive only
- No reflective back plates on signals
- Sidewalks on both sides of the intersection with boulevard separation
- Hydro poles located <0.5m away from the roadway (east of the intersection)

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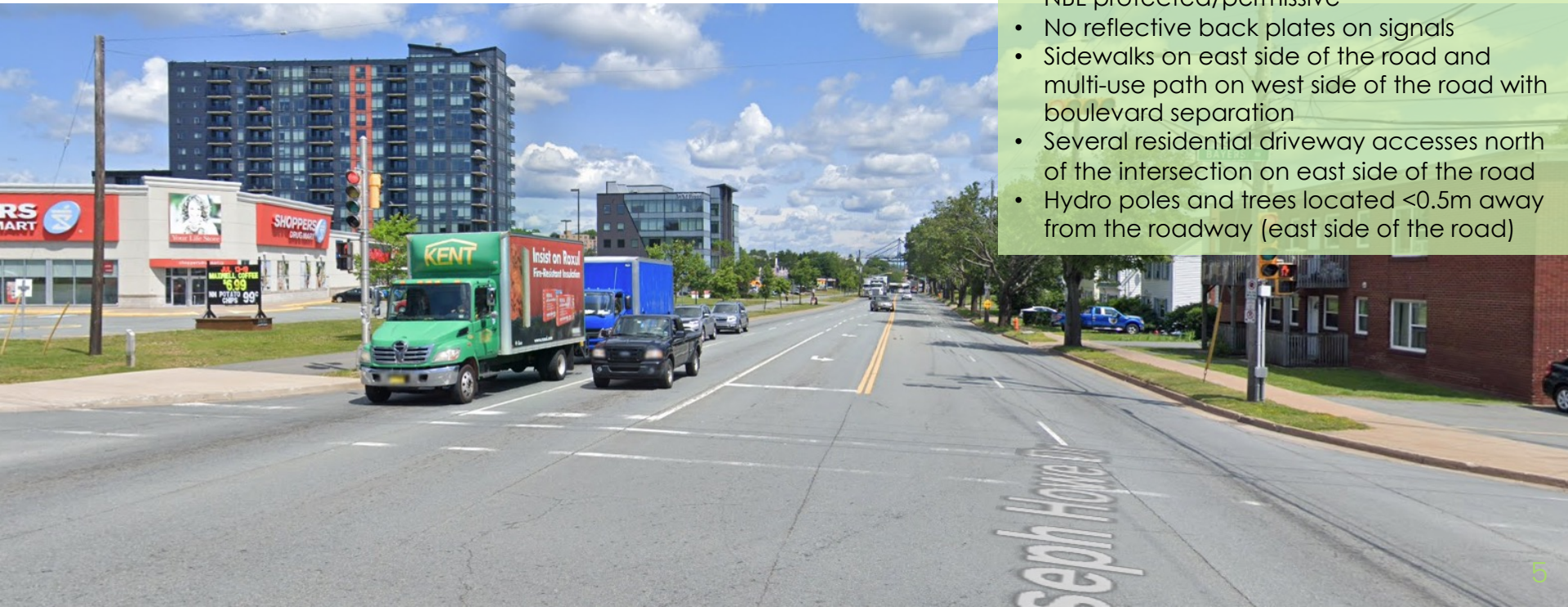
Joseph Howe Dr. Looking North




**Joseph Howe Dr. Features:**

- Two through lanes and one left turn auxiliary lane.
- High turn radii for SBR (high speed)
- 50 km/h posted speed limit
- Three signal heads SB and four signal heads NB (one nearside for both)
- Left turn signalization: SBL permissive only, NBL protected/permissive
- No reflective back plates on signals
- Sidewalks on east side of the road and multi-use path on west side of the road with boulevard separation
- Several residential driveway accesses north of the intersection on east side of the road
- Hydro poles and trees located <0.5m away from the roadway (east side of the road)

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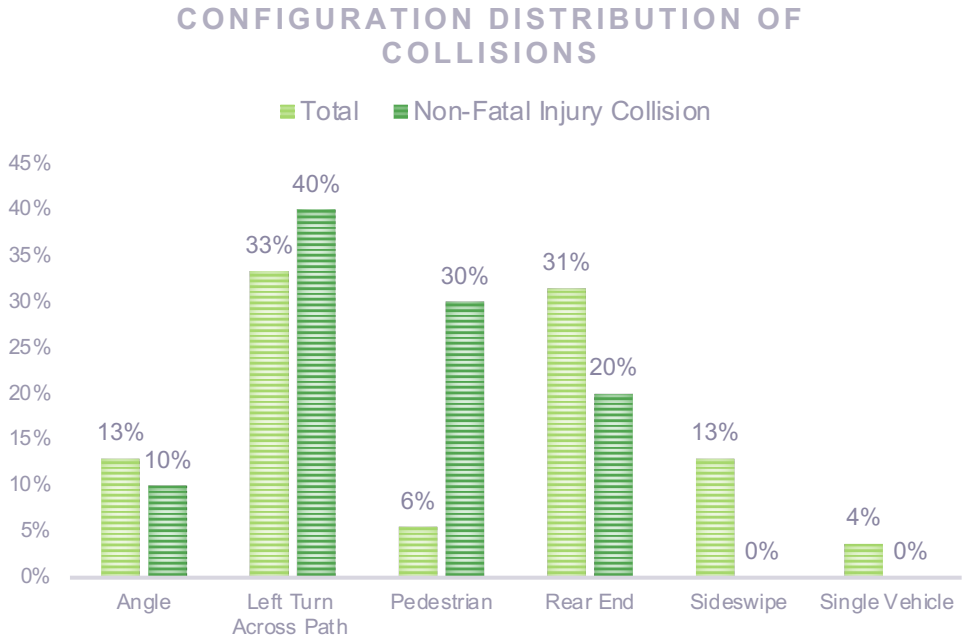
# Collision Analysis

- The provided collision data included 54 collision records from January 1, 2018 to April 12, 2021. Of the 54 records, 19% were classified as non-fatal injury collisions and 81% as property damage only collisions.
- Collisions with pedestrians that were listed as property damage only were modified to non-fatal injury collisions.
- The collisions were classified into the general descriptions shown in the adjacent figure based on the initial impact type and provided directional information.



The collision data revealed the following key points:

- Pedestrian collisions represent 30% (3 events) of the non-fatal injury collisions. The pedestrian collisions included a northbound-through vehicle (pedestrian did not have the right-of-way), a southbound-left vehicle and a westbound-left vehicle.
- Left turn across path collisions represent 33% of total collisions and 40% of the non-fatal injury collisions. The directional distribution was 11%, 17%, 17% and 56% for Eastbound-left, Westbound-left, Southbound-left and Northbound-left respectively.
- Angle collisions represent 13% (7) of total collisions and 10% of the non-fatal injury collisions. Of the angle events that include two through vehicles (4), red light running was listed in the description of 75% of the events.
- Rear End collisions represent 31% of total collisions and 20% of the non-fatal injury collisions. 24% of the collision events included right turning vehicles.

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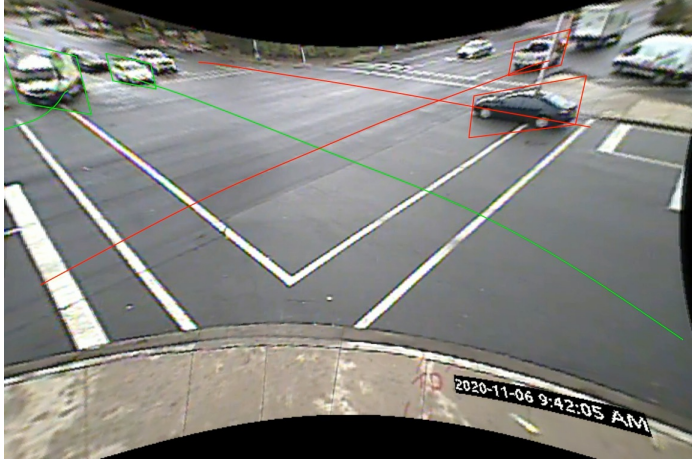
# Video Conflict Analysis – VEH-VEH

- 4 through vs through conflicts were detected during the 56-hour analysis period (east-through vs south-through).
- 10 Left-Turning vs Through Vehicle from Left conflicts were detected (north-left vs east-through).
- These conflict types require a signal violation, which are typically infrequent events, or occur at the signal phase change at relatively low vehicle speeds.




Signal Phase Change: south-through vs east-through


Signal Phase Change: north-left vs east-through

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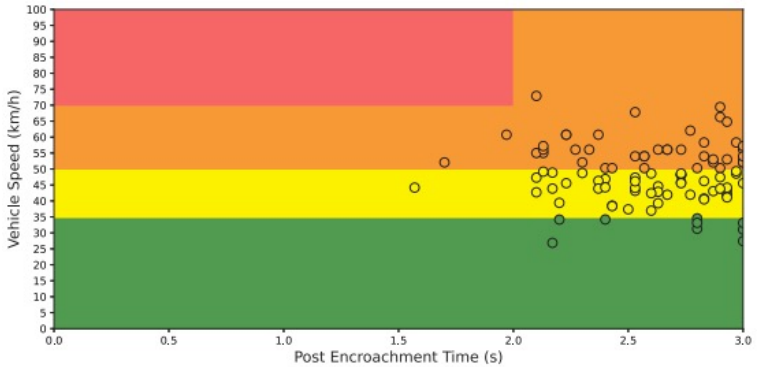
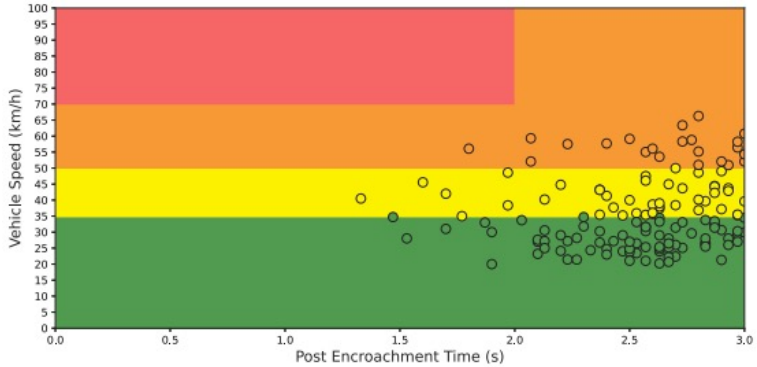
# Video Conflict Analysis – VEH-VEH

- Several left turn across path conflicts were detected during the 56-hour analysis period, as follows:
  - 141 North-Left vs South-Through conflicts
  - 99 South-Left vs North-Through conflicts
  - 53 East-Left vs West-Through conflicts
  - 98 West-Left vs East-Through conflicts
- The signalization is protected/permissive for NBL and permissive only for all other turn movements.
- 42 High-Risk and 48 Medium-Risk events were detected for South-left vs North-through. When comparing the conflict rate of SBL vs NBT events to benchmark values for similar sites across North America, drivers at Bayers and Joseph Howe are 2.2x more likely to be involved in a medium or high-risk conflict event.




The LTAP conflict data, for example South-left vs North-through (above) and North-Left vs South-through (below), shows several conflicts occurring with through vehicle speeds exceeding the posted speed limit of 50 km/h (up to ~75 km/h).

At impact speeds above 50 km/h, opposing drivers have a >40% chance of a severe injury (MAIS 3+), which increases to >90% at 75 km/h.



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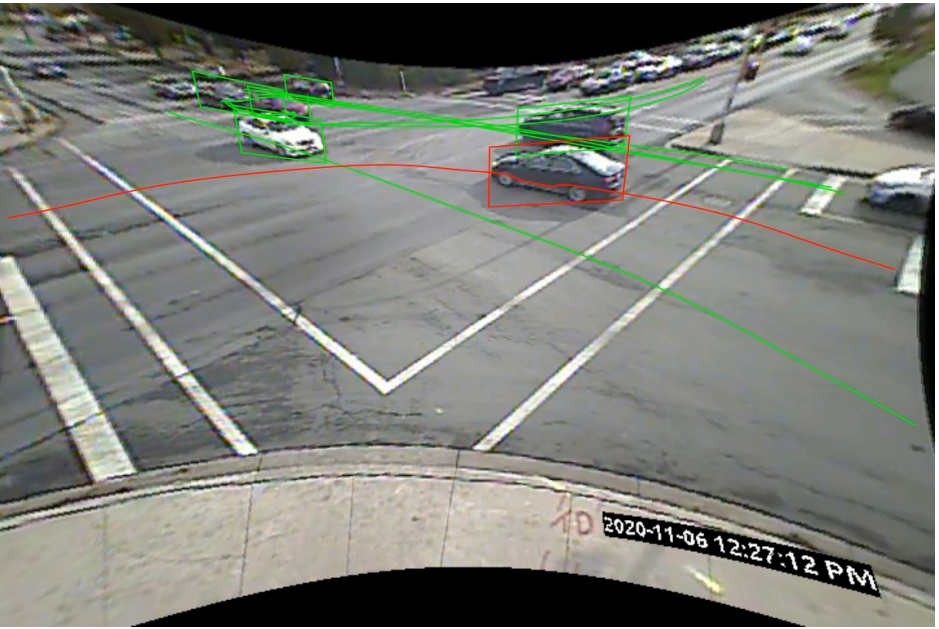
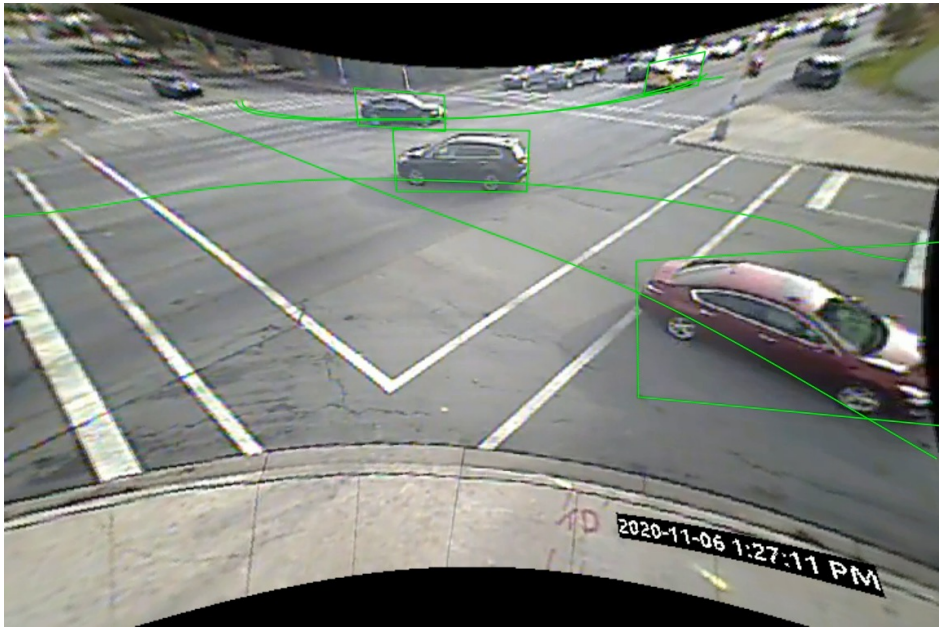



East-left vs West-through: PET = 1.6s, vehicle speed: 56 km/h




West-left vs East-through: PET = 2s, vehicle speed: 43 km/h

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# Video Conflict Analysis – VEH-VRU

- East-Right hook conflicts in the right turn channelization island were not measured due to camera placement.
- 3 cyclist conflicts were detected during the 56-hour analysis period: one North-left hook and two East-left hooks.
- Several pedestrian conflicts were also detected, as follows:
  - 2 North-Left Hook conflicts
  - 2 South-Right Hook conflicts
  - 1 East-Left Hook conflict
  - 1 West-Left Hook conflict
  - 1 North-through far-side conflict (pedestrian violated the signal)

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# Video Conflict Analysis – VEH-CYC

- The cyclist volumes were relatively low, with less than 20 cyclists per crossing from 5:00 – 24:00.
- Although only a limited number of cyclist conflicts were detected, 2.6% of all cyclists that used the West Crossing were involved in a north-left hook medium-risk conflict and 3% of all cyclists that used the North Crossing were involved in an east-left hook medium-risk conflict.
- Cyclists on the Chain of Lakes multi-use path may travel at high speeds (refer to conflict clip) and arrive faster than expected for left-turning vehicles. Because this path is bidirectional, it presents human factors issues for NBL and SBR vehicles.
- The mixing area between cyclists and pedestrians where the MUP meets the intersection may pose risks to pedestrians.


Cyclist North Left-Hook:
T2 = 2.5s, vehicle speed: 21 km/h, cyclist speed: 25 km/h


Cyclist East Left-Hook:
T2 = 2.5s, vehicle speed: 20 km/h, cyclist speed: 18 km/h

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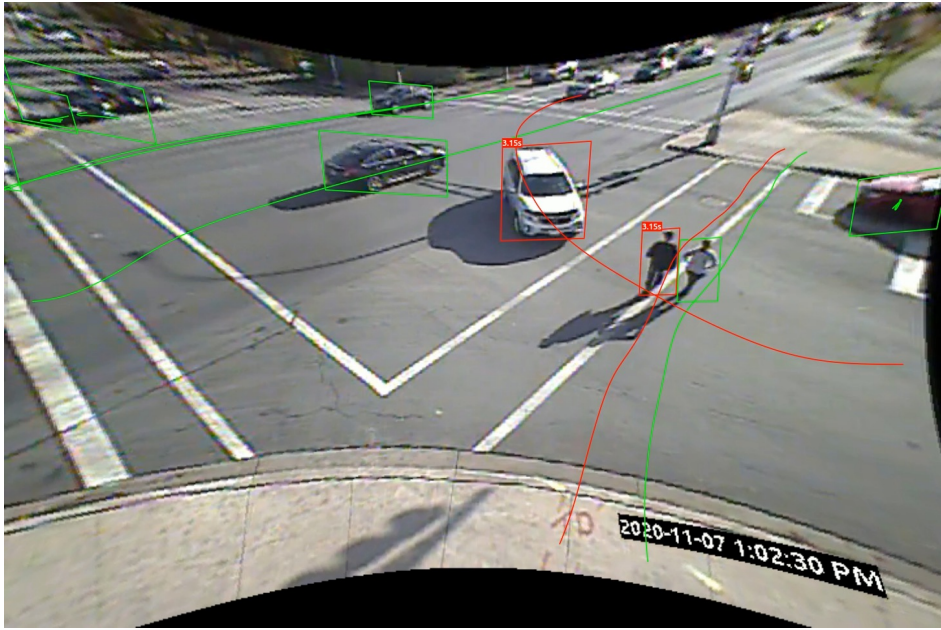
- On multiple occasions, the left turning driver did not notice the crossing pedestrian until they initiated their left turn movement. As vehicles yield to the right-of-way pedestrian, they become exposed to a potential conflict with oncoming through vehicles.


Pedestrian West Left-Hook: T2 = 2.6s, vehicle speed 14 km/h




Pedestrian North Left-Hook: T2 = 1.6s, vehicle speed 20 km/h

# Key Issues and Recommendations

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| Key Issue | Recommendation |
|---|---|
| **Left Turn Across Path (LTAP):**<br>• LTAP collisions make up 33% of all collisions and 40% of injury collisions.<br>• 391 LTAP conflicts were detected during the 56-hour analysis period, with several occurring at vehicle speeds exceeding posted speed limits<br>• Left turn signalization is permissive/protected (NBL) and permissive only for other directions<br>• NBL has the highest left turn volumes; several conflicts were observed at the end of the signal phase (in conflict with eastbound through)<br>• Many of the conflicts have higher severity due to speeding | • Convert to protected only, especially the NBL which interacts with the bidirectional cycle traffic on the MUP.<br>• For any left turns that cannot be converted to protected, consider protected-permissive.<br>• Use urban arterial speed management strategies such as centerline hardening with vertical delineators. |
| **Pedestrian Safety:**<br>• Approximately 850 pedestrians crossed the intersection in a day (in November). The north crossing is most commonly used and has a long crossing length (~27m).<br>• The 3 pedestrian collision events and 7 conflict events occurred for a variety of right and left-hook configurations. Several conflict clips indicate that permissive left turning drivers did not initially observe pedestrians crossing with the right-of-way.<br>• General improvements to pedestrian visibility at the crossing would be valuable, especially considering potential desire lines between residential areas, commercial establishments and the multi-use path. | • Reduce turn radii on NE and NW quadrants. If possible, provide directional vs diagonal curb ramps.<br>• Provide left turn traffic calming through vertical post centerline extensions.<br>• Provide bike vs ped travel path delineation on NW and SW quadrants.<br>• LPIs or the above-mentioned protected lefts will reduce turning conflicts with peds. |

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| Key Issue | Recommendation |
|---|---|
| **Angle Vehicle events:**<br>• 13% of collisions were Angle collisions, several of which listed red light running as a contributing factor.<br>• 4 conflict events were detected in the 56-hour analysis period for through vs through vehicles- these events were typically at a signal phase change and at relatively low speeds.<br>• Signal perception improvements would be valuable at improving safety at the intersection. | • Add reflective back plates to all signal heads to improve visibility of signals.<br>• Upgrade any signals < 300mm to 300 mm.<br>• Check all-red phase for possible extensions; ensure technical guidance is followed at a minimum. |
| **Cyclist Safety:**<br>• Only 3 conflicts were measured, but risk potential is higher. Exposure was low due to November study period and the MUP presents human factors issues with SBR geometry and permissive portion of NBL phase. | • Previously mentioned reduction of NW quadrant radius will reduce vehicle speed for SBR hook vs MUP cyclist conflicts.<br>• Previously mentioned protected NBL will reduce NBL conflict risk. |
| **High Speeds:**<br>• 82 high-risk conflicts (impact vehicle speed >50 km/h) were detected during the 56-hour analysis period<br>• Speed moderation techniques should be considered along this corridor. | • Intersection level speed management includes vertical delineators on centreline approaches. Corridor-level strategies should also be considered. |

**Note that the intersection recommendations have been looked at in isolation and will require further analysis by the municipality to determine complete network impacts.**