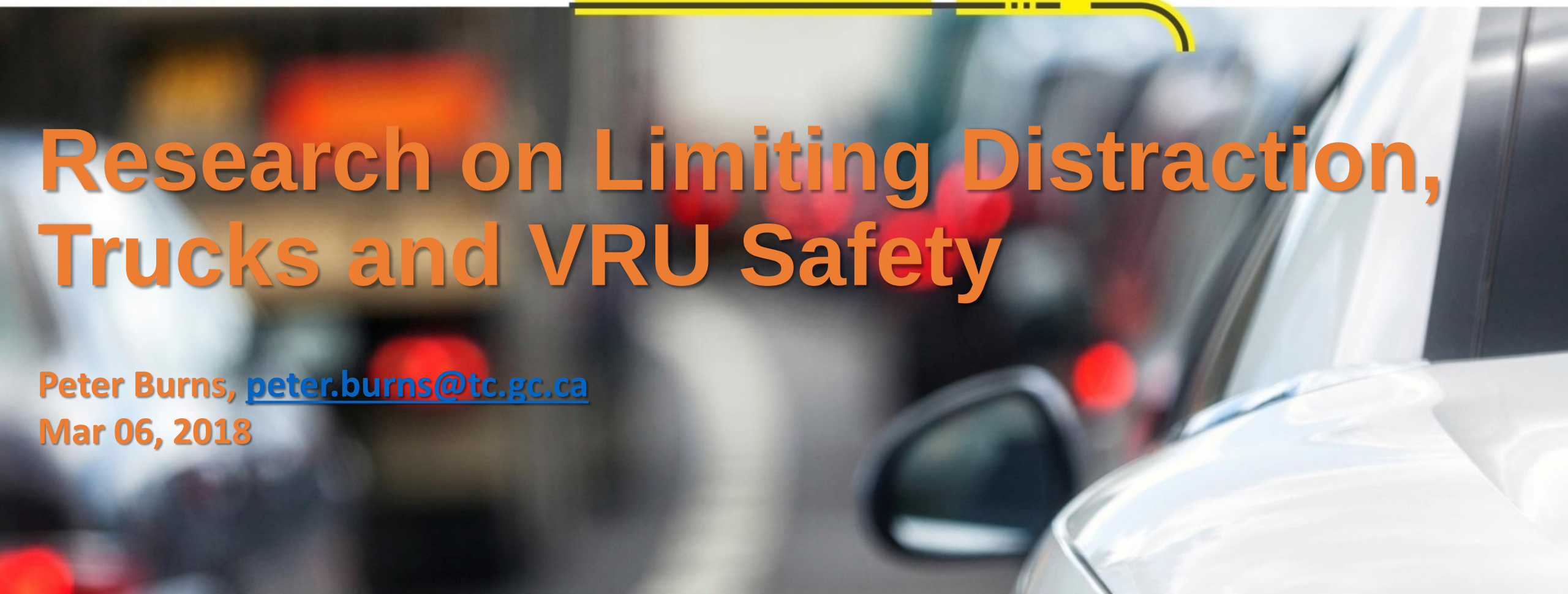
ROAD SAFETY AND MOTOR VEHICLE REGULATIONS



Research on Limiting Distraction, Trucks and VRU Safety

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Mar 06, 2018

Outline

- Limiting distraction from displays
- Vulnerable road user (VRU) heavy vehicle collision investigations
- Track testing of VRU warning systems
- Field operational test (FOT) of warning systems
- Automatic emergency braking (AEB) system testing

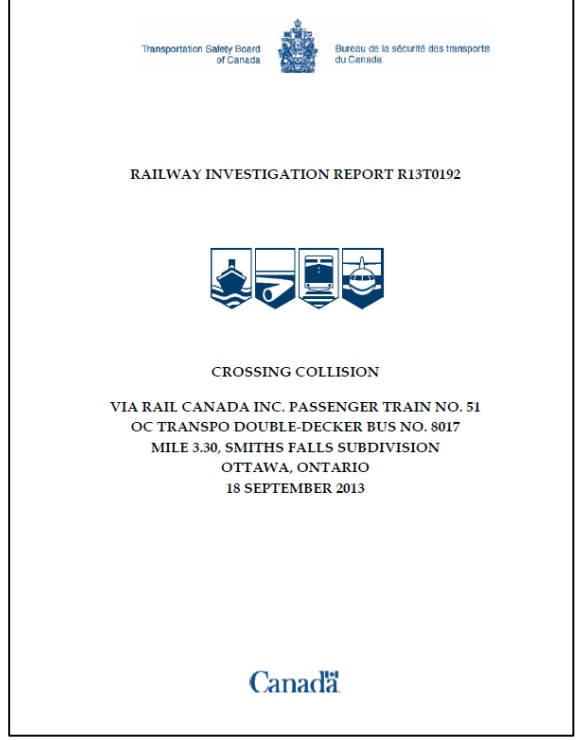
TSB Investigation: Via Rail / OC Transpo Crash

- Ottawa Sept 18th 2013, a bus collided with a train resulting in 6 fatalities and 9 serious injuries among the bus occupants.
- TSB investigation led to a number of recommendations, one of which addresses driver distraction (*R15-01):*

"The Department of Transport, in consultation with the provinces, to develop comprehensive guidelines for the installation and use of in-vehicle video monitor displays to reduce the risk of driver distraction."

Status:

- VTTI prepared a review of relevant guidelines for TC.
- We are currently drafting new distraction guidelines and will develop these further in conjunction with the CCMTA and in consultation with stakeholders

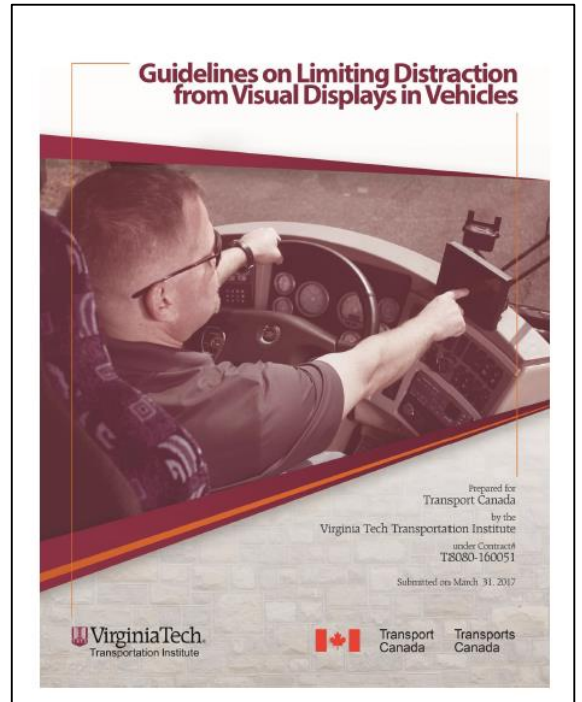

Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

RAILWAY INVESTIGATION REPORT R13T0192

CROSSING COLLISION

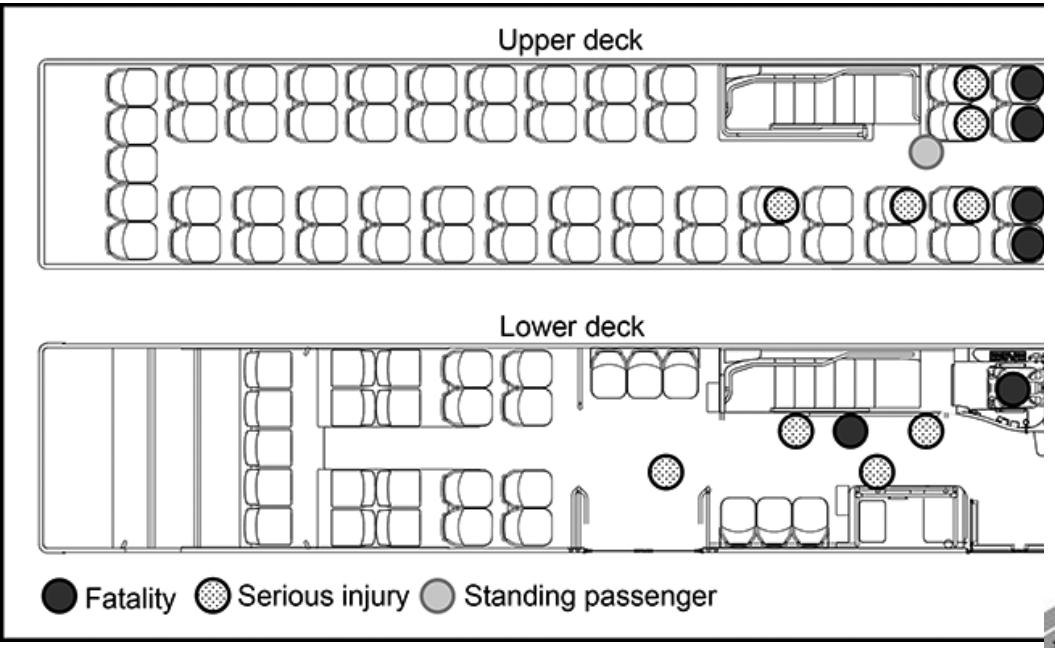
VIA RAIL CANADA INC. PASSENGER TRAIN NO. 51
OC TRANSPO DOUBLE-DECKER BUS NO. 8017
MILE 3.30, SMITHS FALLS SUBDIVISION
OTTAWA, ONTARIO
18 SEPTEMBER 2013

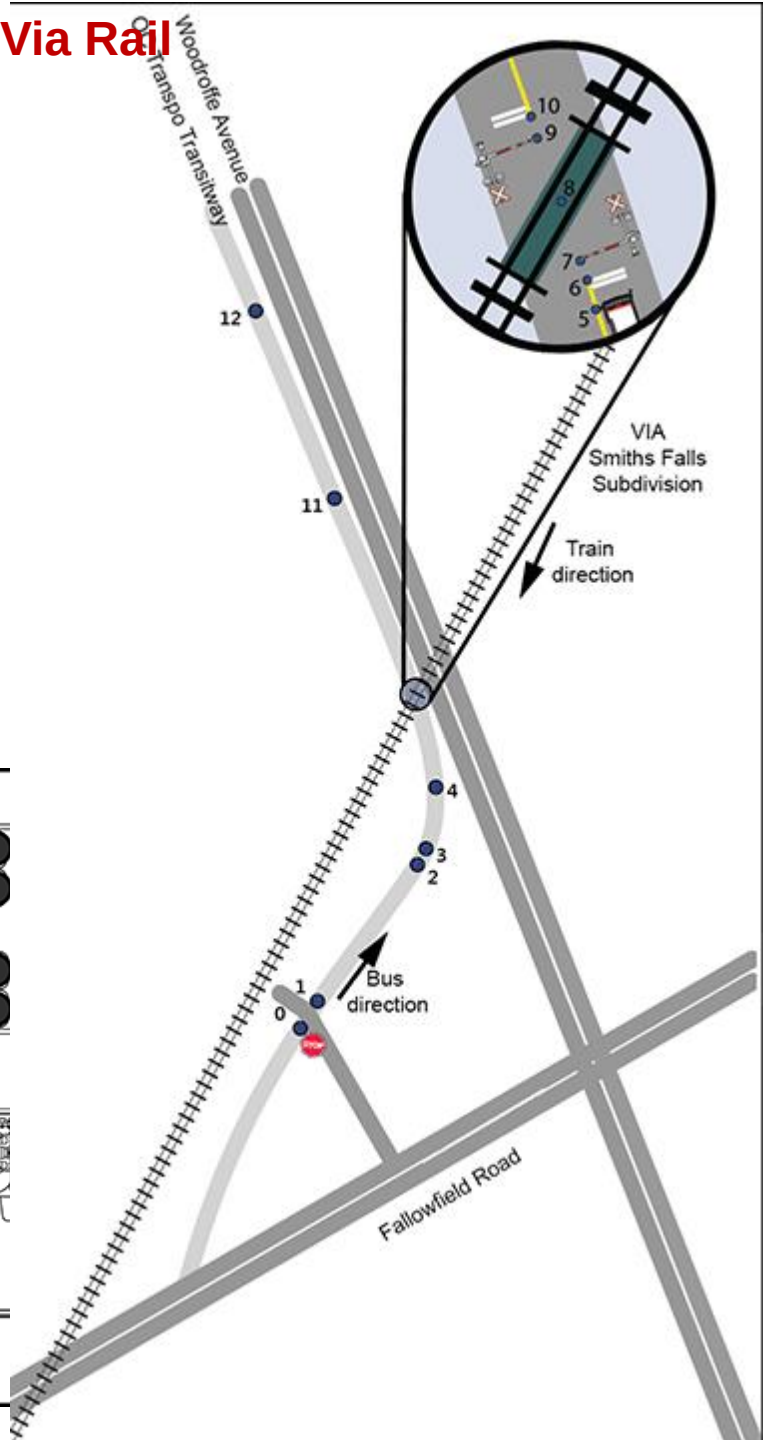
Canada



OC Transpo Crash/ Via Rail

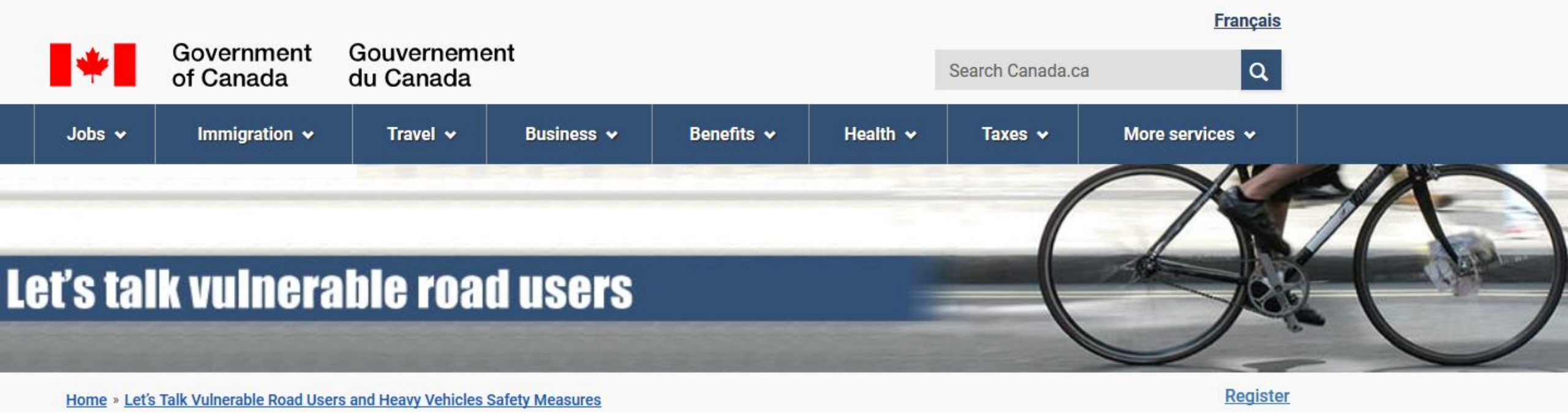
An OC Transpo bus sits where it collided with a Via Rail train during the morning commute. (THE CANADIAN PRESS/Adrian Wyld)





VRU Task Force

- VRUs are at significant risk when they are involved in collisions with large commercial vehicles.
- Pressures to mandate side guards.
- In Sept 2016, the Minister of Transport, announced a new task force to discuss safety measures to reduce injuries and fatalities involving cyclists, pedestrians and heavy trucks.
- The task force, established through the Canadian Council of Motor Transport Administrators, will explore cameras, sensor systems, side guards, as well as educational safety and awareness programs.
- Transport Canada would also examine the benefits of sensors to reduce collisions between VRU’s and heavy trucks.



Report on VRU Safety Countermeasures and Public Consultations

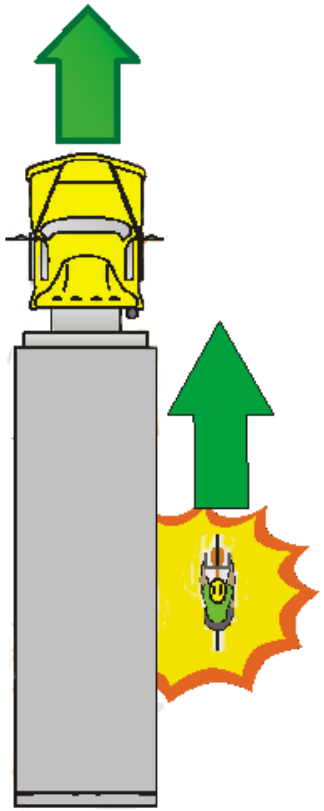
- A steering committee, co-chaired by Alberta and TC is conducting public consultations on a report that discusses countermeasures to keep pedestrians and cyclists safe around heavy vehicles.
- Interactive website where you can read the report, participate in a discussion forum and/or complete a survey.
- Open from March 2nd until April 2nd so please circulate the link to anyone who might be interested in providing comments.

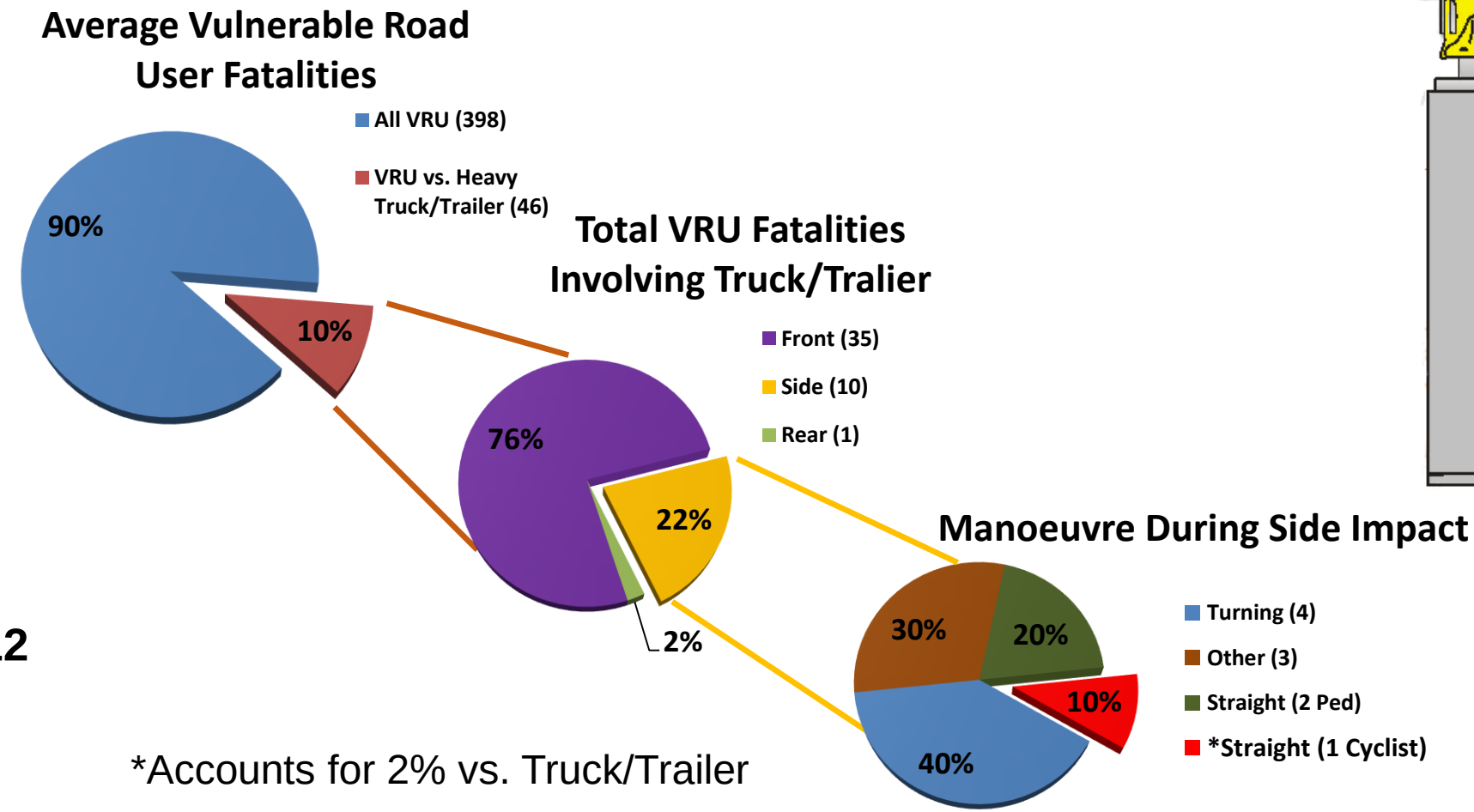
https://letstalktransportation.ca/VRU

TC Review – Side Guard Effectiveness

One study by TRL is commonly cited that showed 61% side guard effectiveness (2005), but

- Side guards demonstrated effectiveness in 1 collision scenario (lane change into cyclist)
- All other collision scenarios showed no reduction (or a slight increase) in fatalities





NCDB Stats 2003-2012

*Accounts for 2% vs. Truck/Trailer

Investigations of Heavy Vehicle Collisions with VRU since 2005

The data from the in-depth collision investigations highlight a number of common characteristics and issues:

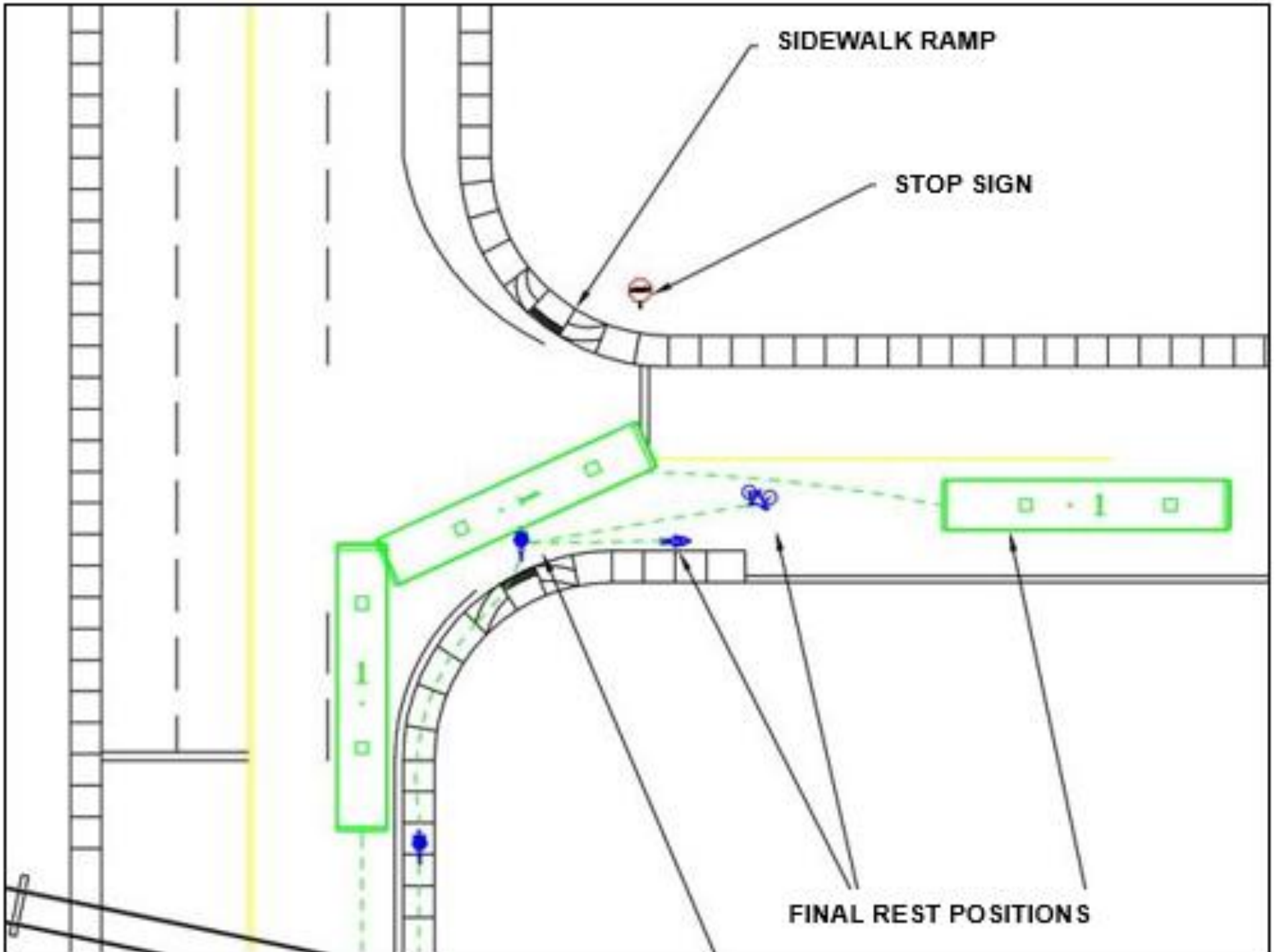
- A wide variety of vehicle-types, with both cab-forward and conventional cab designs, were involved;
- Every vehicle, with few exceptions, had mirrors systems that exceeded those required by CMVSS 111, however blind spots still exist;
- The incidents typically involved a low speed turning manoeuvre;
- The majority of collisions occurred in daylight at urban intersections during clear weather conditions;
- The VRU was frequently located in, or near, a crosswalk, or was at an unmarked crosswalk.

Data Summary: Observations

- The first point of contact with the VRU was commonly the front or right side of the vehicle;
- The VRU was almost always run over and fatally injured;
- Low side ground clearance and closed-in sides does not guarantee the safety of VRUs, especially in the common, right-turn collision configurations;
- Drivers were not aware that their vehicle had struck a VRU until after the incident when drivers noticed something unusual or were alerted by other motorists or VRUs;
- A number of VRUs displayed a lack of situational awareness and/or inattention.

The above suggests that commercial vehicle drivers need assistance in detecting VRUs in close proximity to the vehicle. Countermeasures should be examined to improve both direct and indirect visibility in combination with detection systems that alert drivers to VRUs.

Case



- Bus had a side height of only 280 mm (ECE Reg. No. 73 minimum height is 550 mm)
- For comparison, a Toyota Sienna minivan has a rocker panel height of 260 mm

Summary

- Effectiveness of side guards has not been sufficiently demonstrated in the Canadian environment
- A regulation mandating side guards would be neither cost effective nor address the majority of the cases
- Collision investigations suggest that drivers need assistance in detecting VRUs in close proximity to the vehicle

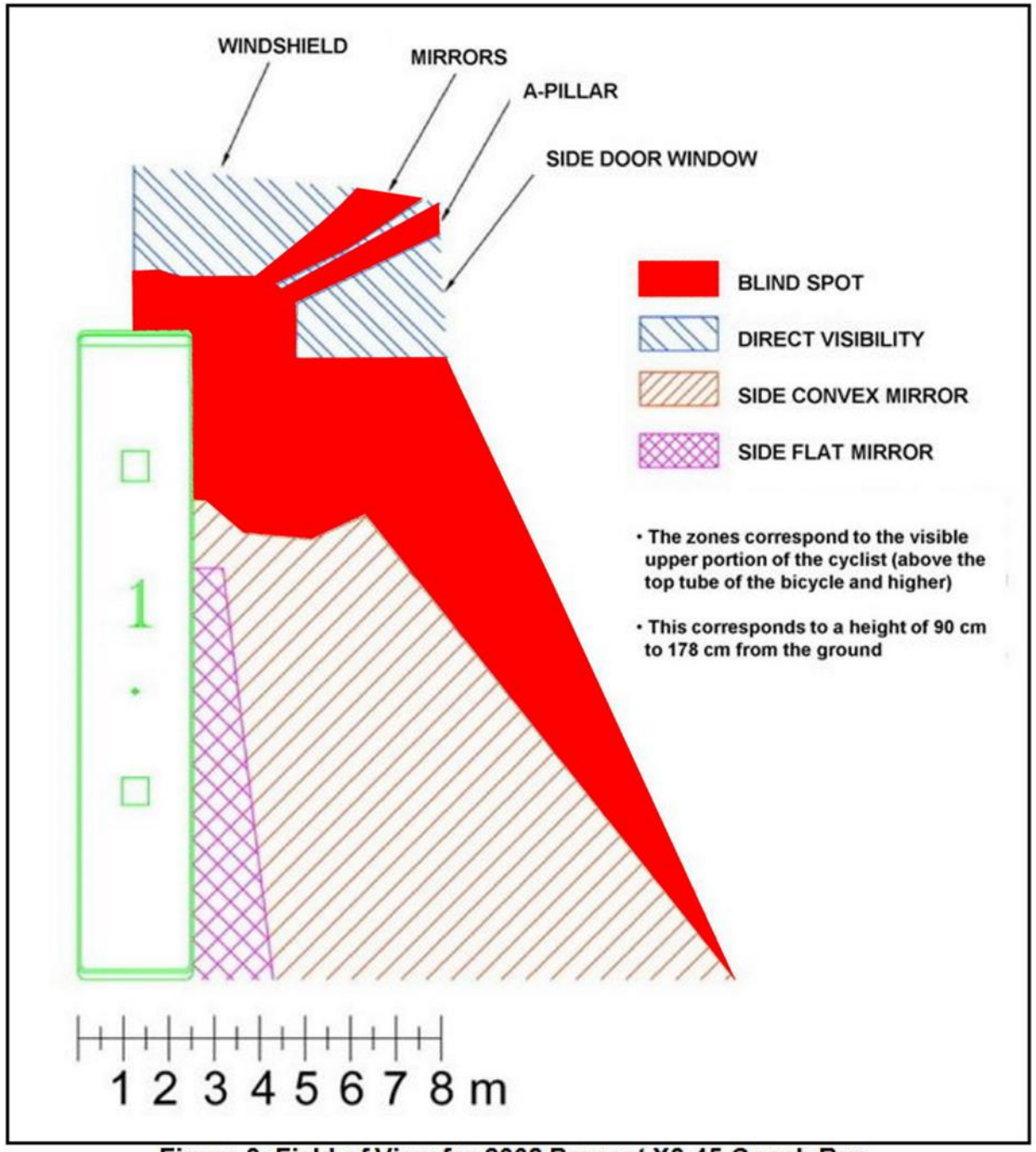


Figure 3: Field of View for 2008 Prevost X3-45 Coach Bus

Part 1: Track Testing

- Evaluated available sensor technologies to address blind spot risks on heavy vehicles (10 scenarios with 350 total tests).
- 3D scan of test truck to measure and visualize blind spots

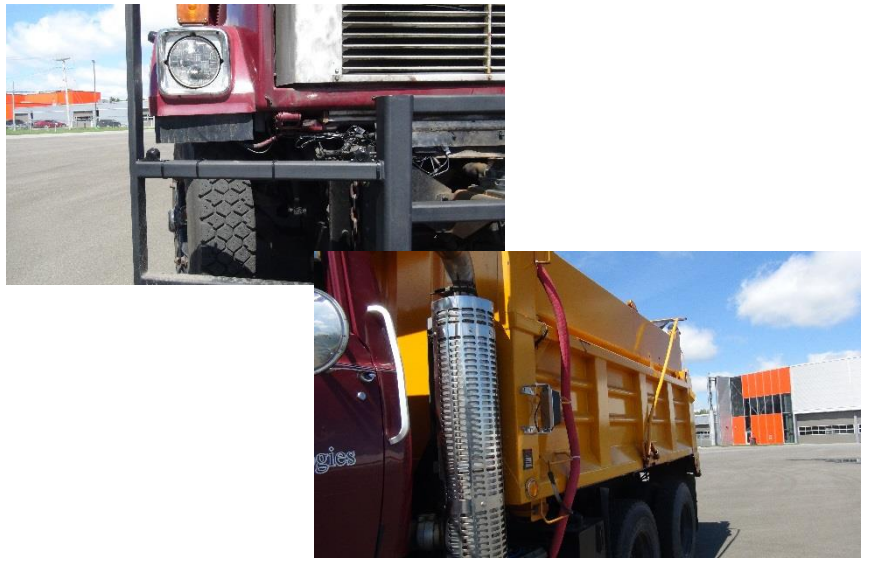
Part 2: Field Operational Testing

- FOT starting in 5 cities across Canada collecting data for 1- year (Hamilton, Toronto, Ottawa, Montreal and Edmonton)
- Different common urban heavy vehicles (14 in total)
- Measuring system performance under real world operation (weather, maintenance)
- Evaluation of driver acceptance (usage, workload, annoyance, false alarms, etc).

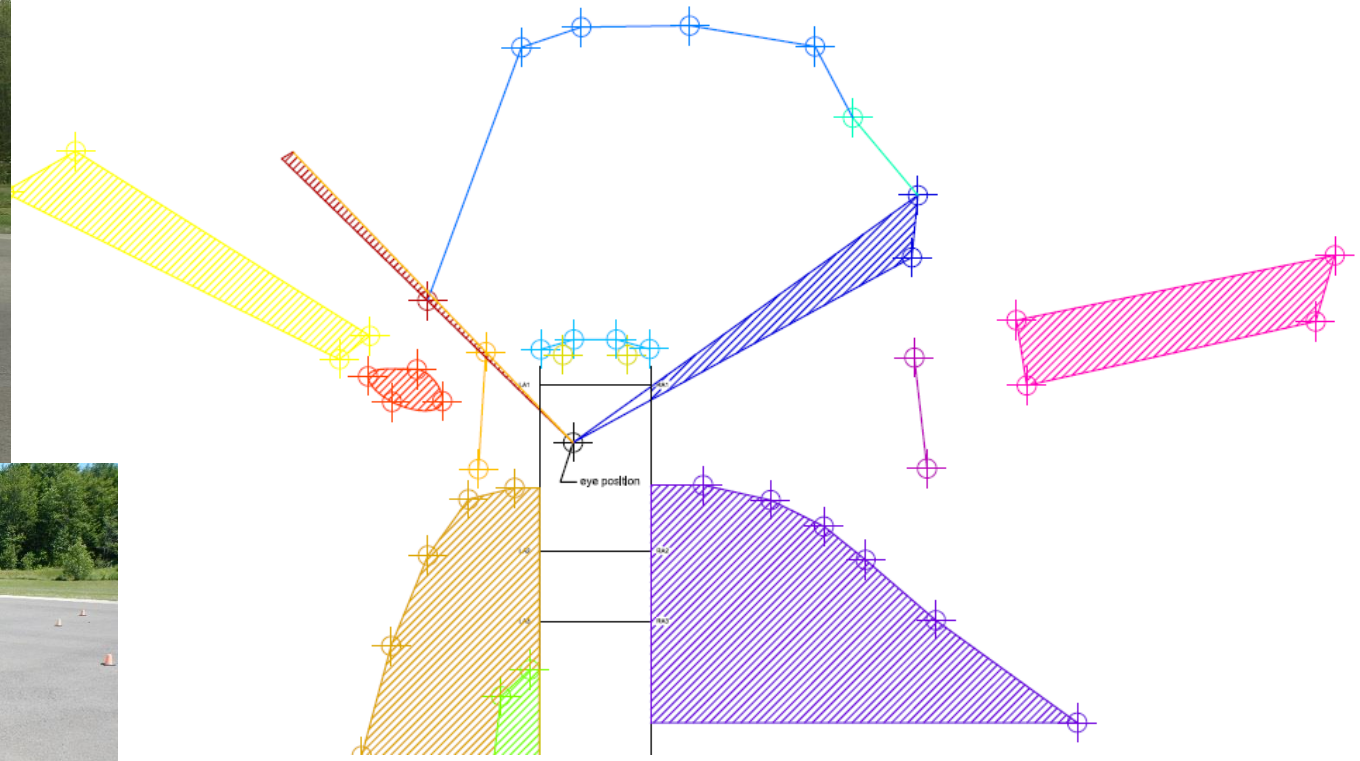
Track testing of VRU detection systems

Systems tested

- Mobileye Shield Plus
- Brigade camera 360
- Brigade Radar & Camera (activated by turn signal)
- Brigade Ultrasound proximity sensors
- Cycle Eye (cyclist detection only)



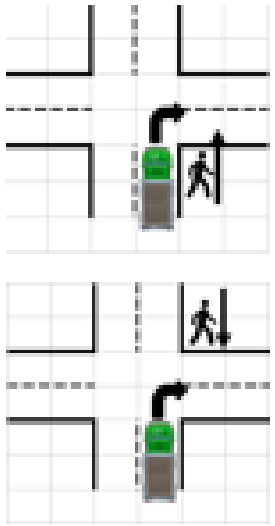
Test Targets



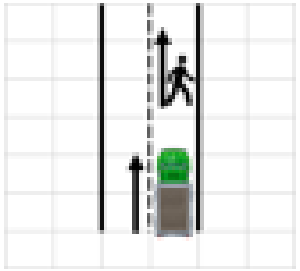
Collision Scenarios

Impact Zone Testing Scenarios / VRU in critical position

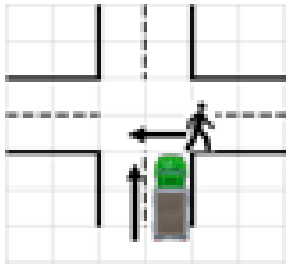
Right Turn



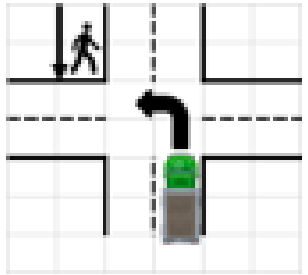
Run over



Cross in front



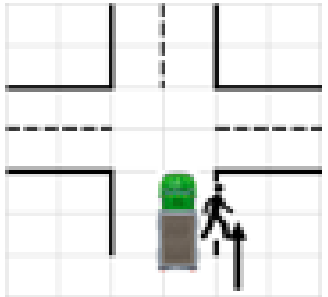
Left Turn



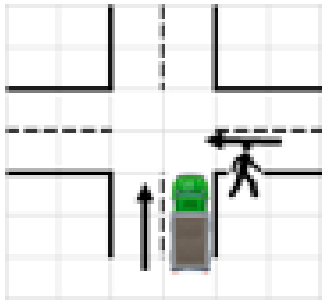
▶ **Test Videos**

Detection Scenarios / Warning to the driver of VRU's presence

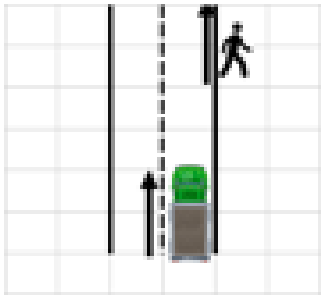
Show up in Blind Spot



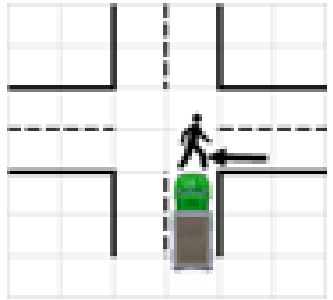
Short Stop



Sidewalk/ curb side



Walk in front



Crash Avoidance Systems for Trucks

- Electronic stability control (ESC)
- Roll stability control (RSC)
- Blind spot warning
- Lane departure warning
- Road departure prevention
- Collision warning
- Automatic Emergency Braking (AEB)
  - Vehicles
  - Pedestrians
  - Cyclists
  - Nighttime

Crash Avoidance: Automatic Emergency Braking

- Ongoing testing program to collect accurate and reliable data on the performance of AEB for different scenarios.
  - Vehicles are tested using the NHTSA procedure for Car AEB, European procedures for Car AEB and Pedestrian.
  - Over 2000-2500 tests are conducted each year from spring to the first snow fall.
  - This work is to:
    - Monitor new vehicle technologies
    - Assess foundational systems for higher levels of vehicle automation
    - Identify risks and limitations of available systems on the market to the Canadian public
    - Support the development of test targets and procedures
    - Guide future safety regulations.
  - A subsample of tests have also been conducted on various winter surfaces.