MOTOR VEHICLE SAFETY

Commercial Vehicles

Vulnerable Road User (VRU) Safety

February 23, 2017

Canada

Purpose

To inform stakeholders about Transport Canada's research project

Outline

- Issue
- Data
- Collision investigations
- Research plan

Issue

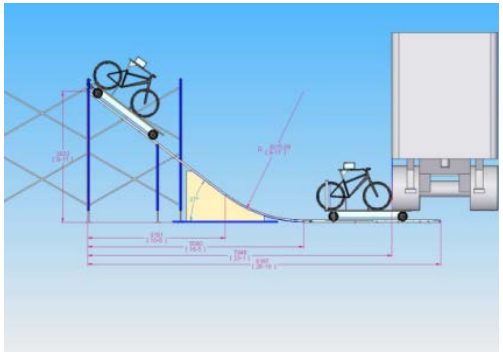
- Vulnerable road users (VRU) are at significant risk when they are involved in collisions with large commercial vehicles
- Pressures to mandate side guards

Minister Garneau establishes task force to improve safety for cyclists and pedestrians on Canada's roadways

- OTTAWA, Sept. 29, 2016 /CNW/ - The Government of Canada understands that cyclists and pedestrians expect their roads to be safe. They rely on them to commute to work, to explore their communities, and to get their families home safely.
- The Honourable Marc Garneau, Minister of Transport, announced that Transport Canada and the provinces and territories will establish 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.
- **To complement the work of the task force, Transport Canada will undertake a new study to examine the benefits of modern technologies to reduce collisions between vulnerable road users (cyclists and pedestrians) and heavy trucks.**

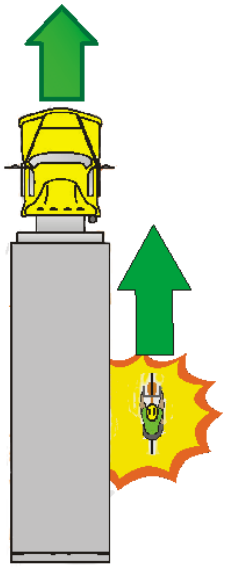
TC Review – Side Guards

- **TC commissioned 2 NCR studies**
  - **1st NRC Study - Side Guards for Trucks and Trailers** (2010)
    - Literature and statistical review
    - Not clear if side guards will reduce deaths and serious injury or if the guards will simply alter the mode of death and serious injury
  - **2nd NRC Study – Side Skirts** (2012)
    - Market ready trailer side skirts offer fuel savings potential of 4% - 7%
    - A side skirt would not fail when impacted at 90^0 by a bicycle*

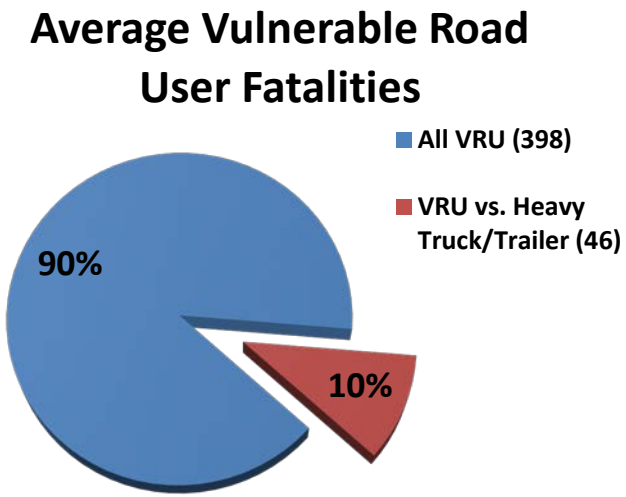


TC Review – Side Guard Effectiveness

- One study is commonly cited that shows **61%** side guard effectiveness
  - 2005 study by TRL investigating fatalities from 80's-90's
    - It found that side guards demonstrated effectiveness in 1 collision scenario
    - All other collision scenarios showed no reduction (or a slight increase) in fatalities



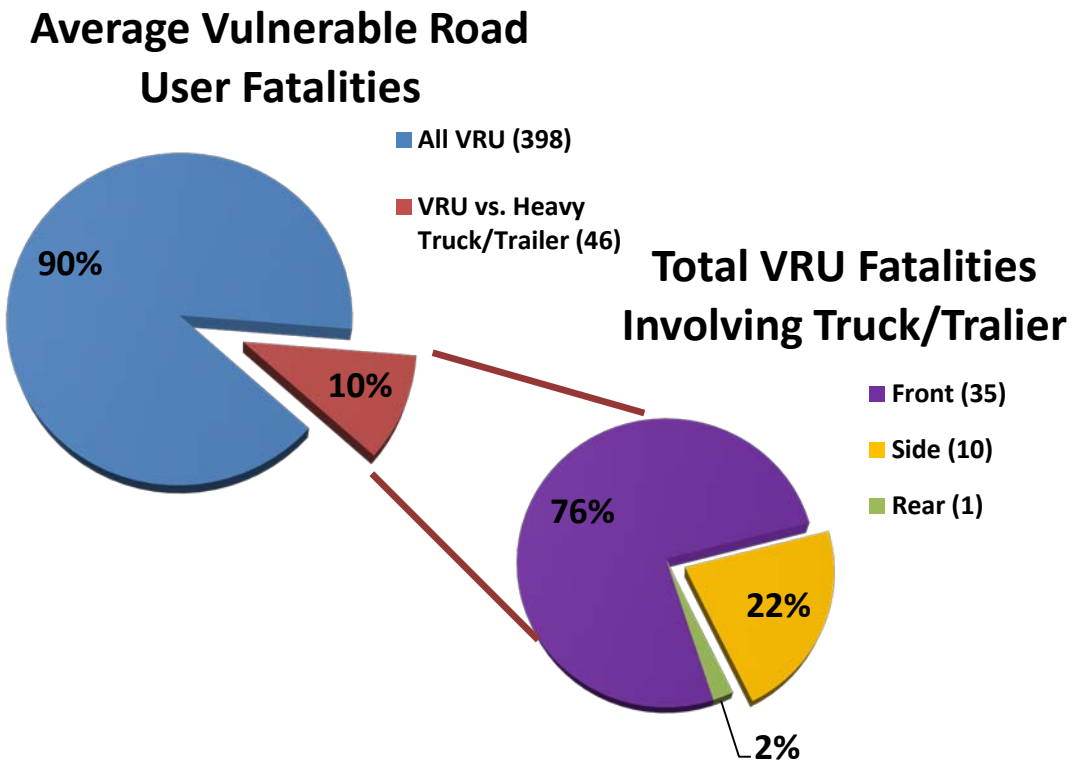
TC Review - NCDB Stats 2003-2012

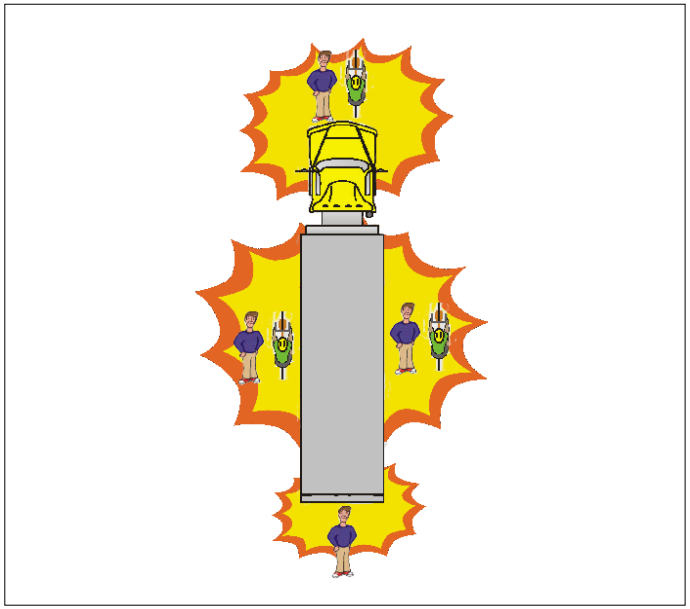


Pedestrians and Cyclists account for 15% of all road user fatalities

2009-2014 data under review will also include buses

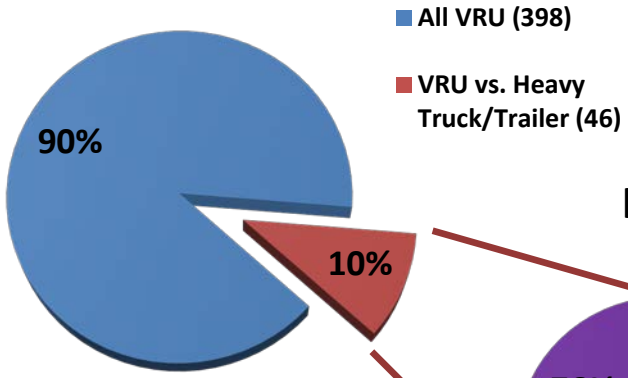
TC Review - NCDB Stats 2003-2012





TC Review - NCDB Stats 2003-2012

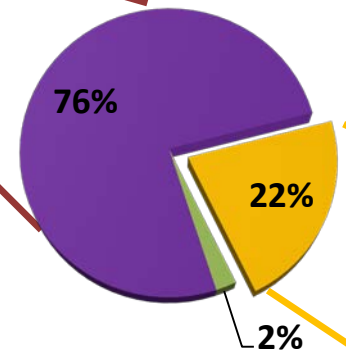
Average Vulnerable Road User Fatalities



All VRU (398)

VRU vs. Heavy Truck/Trailer (46)

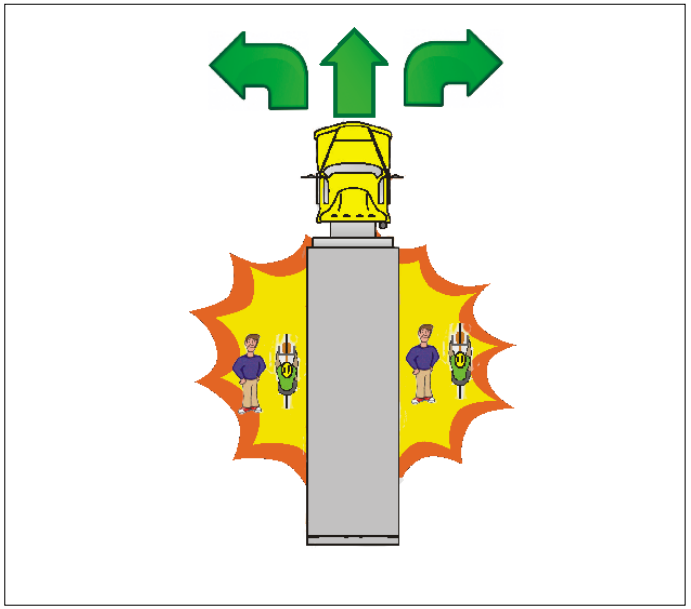
Total VRU Fatalities Involving Truck/Tralier



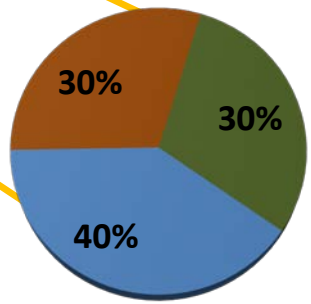
Front (35)

Side (10)

Rear (1)



Manoeuvre During Side Impact



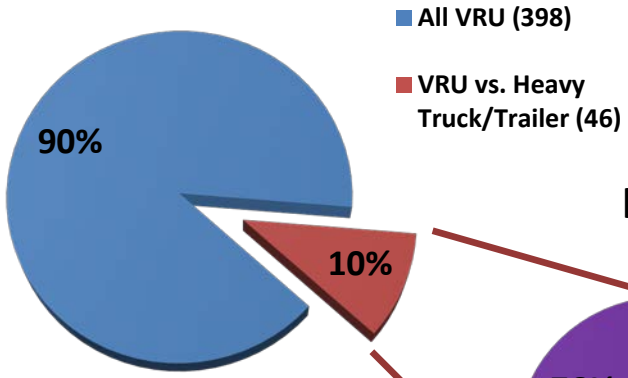
Turning (4)

Other (3)

Straight (3)

TC Review - NCDB Stats 2003-2012

Average Vulnerable Road User Fatalities



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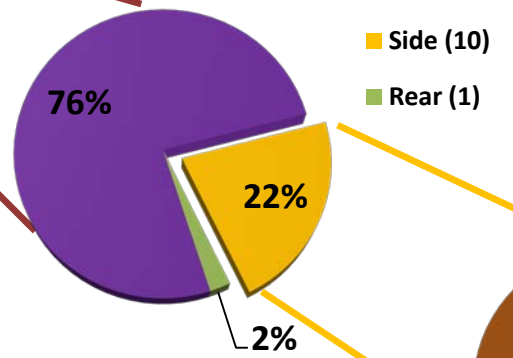

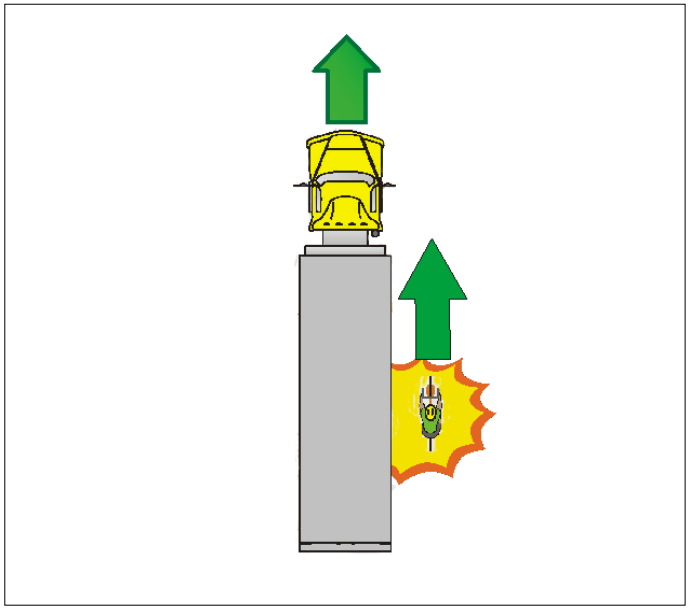

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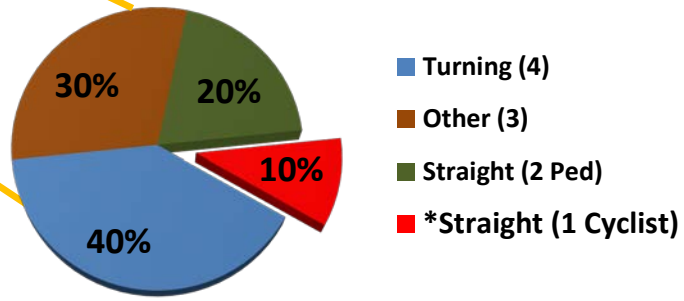
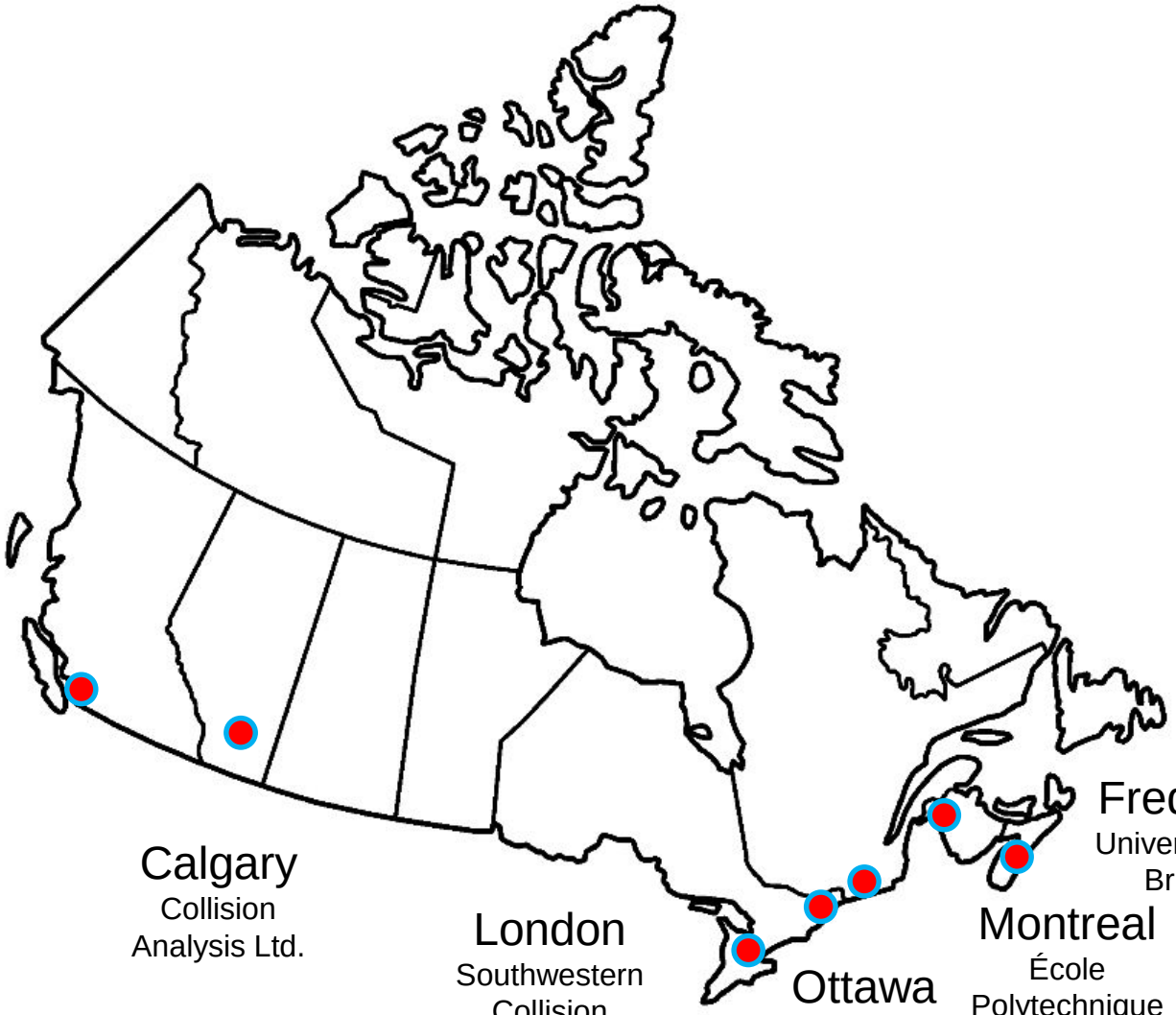


*Accounts for 2% vs. Truck/Trailer

Collision Investigations



Vancouver
RONA Kinetics & Associates

Calgary
Collision Analysis Ltd.

London
Southwestern Collision Analysis

Ottawa
Transport Canada

Montreal
École Polytechnique

Fredericton
University of New Brunswick

Halifax
KSD Collision Investigation & Analysis

Data Summary: Background

- Investigations began in 2004 under the Special Collision Investigation programme as a result of a BC Coroner's Judgement of Inquiry which contained a recommendation directed at Transport Canada to require mirrors to extend the field of view at the front of large trucks.

- In 2005, sampling of collisions was initiated for a pilot study into the causal factors of fatal collisions. Fatal crashes were documented at various sites across Canada and a number of fatal crashes involving vulnerable road users (VRUs) and commercial vehicles were sampled, as part of this study between 2005-2009. At the conclusion of this study, specific cases of commercial vehicle/VRU collisions continued to be sampled under the Special Collision Investigation Programme.

- ASFCA currently has a database comprised of 81 cases that contain a total of 87 VRUs. Of the 87 VRUs, 80 were fatally injured (92%). These cases were sampled during the 10-year period from 2004-2014.

Data Summary: Vehicle Types

Data Summary: Vehicle Mirrors

- All vehicles were equipped with exterior rear view planar mirrors on each side of the vehicle, as specified in CMVSS 111 for vehicles, other than school buses, with a GVWR over 4536 kg (section 27).

- Additional mirrors were nearly always installed by the truck operators, or owners, to improve the driver's field of view.

- 91% of the vehicles had additional mirrors installed.

- Note that external mirrors often block a driver's direct field of view and create blind spots.

Figure 1: Passenger Side Mirrors on a Tractor

Figure 2: Mirror Installation on a Recycling Truck

Data Summary: Field of View

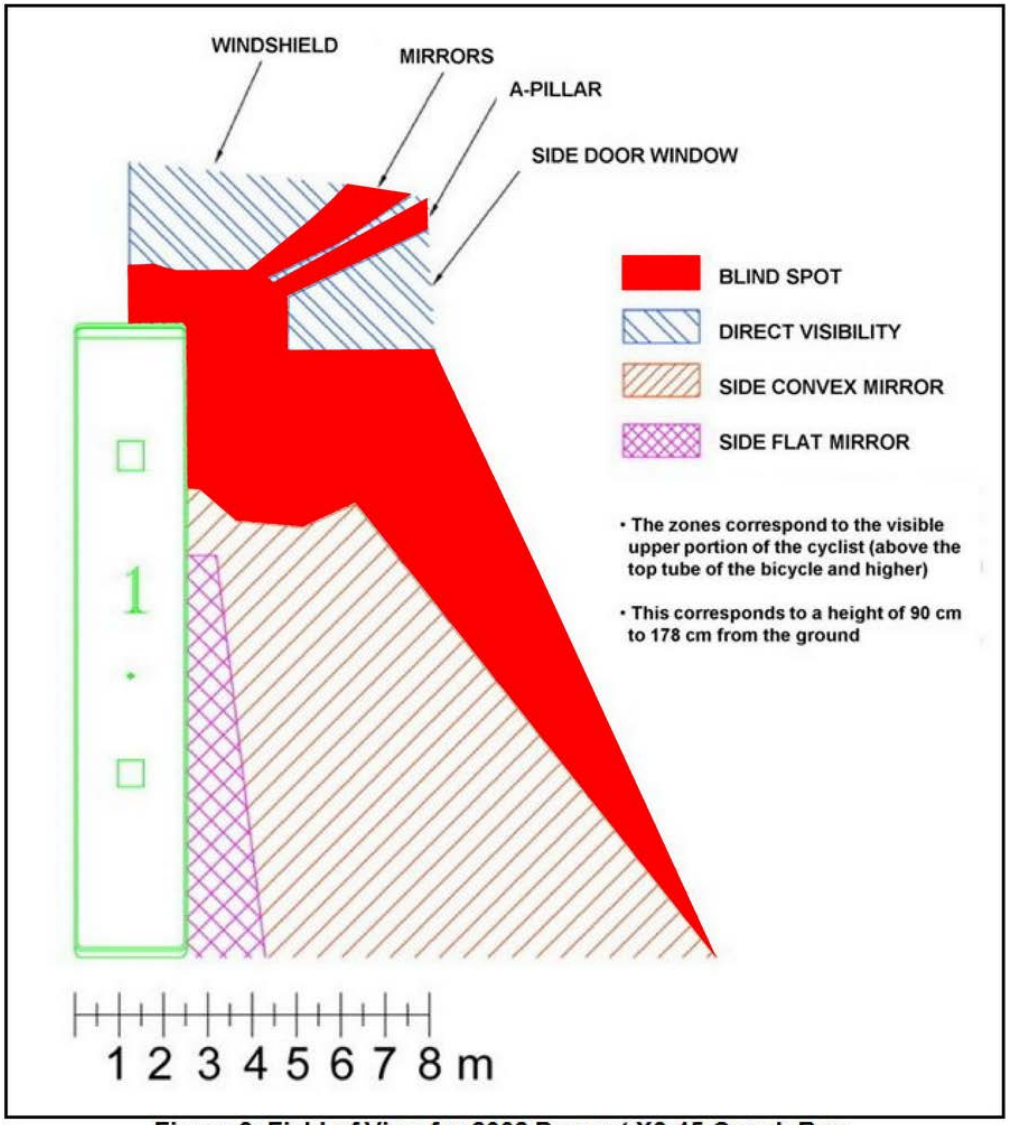


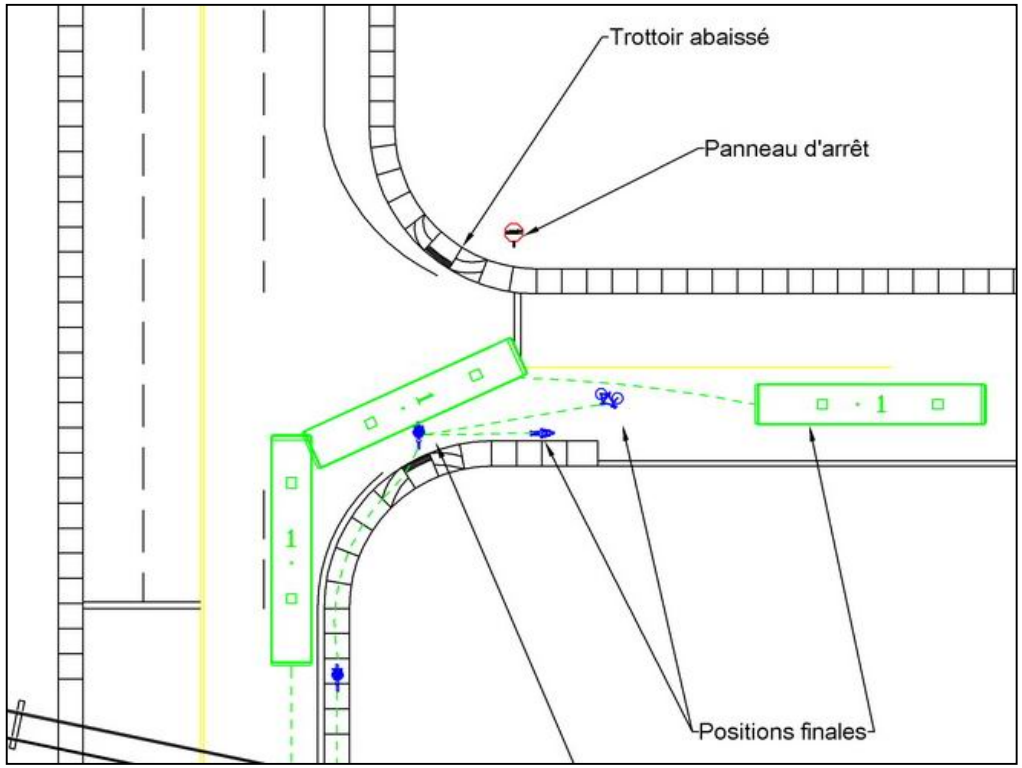
Figure 3: Field of View for 2008 Prevost X3-45 Coach Bus

Data Summary: Side Guards

- No commercial vehicle in the sample was equipped with side guards, however, observations can be made regarding the potential effectiveness of side guards from sampled cases.

Case File: ASF6-1335

- ASF6-1335 involved a coach bus and a 14-year-old cyclist.
- Cyclist was on sidewalk and fell while trying to avoid turning bus.
- Cyclist went under bus and was run over by RR wheels.



Case File: ASF6-1335

- 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**

Typical Collision Sequence with a Right-Turning Vehicle:

- The vehicle is either turning at speed or from a stop at relatively low speeds in the urban environment;
- First contact is near the front side of the vehicle which knocks down the VRU to the prone position;
- As the vehicle progresses through the turn, the rear wheels of the vehicle track inside the path of the front wheels and the prone VRU passes under the side and is run over by the rear wheels;
- The collision almost always results in a fatality.

Data Summary: Observations

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.

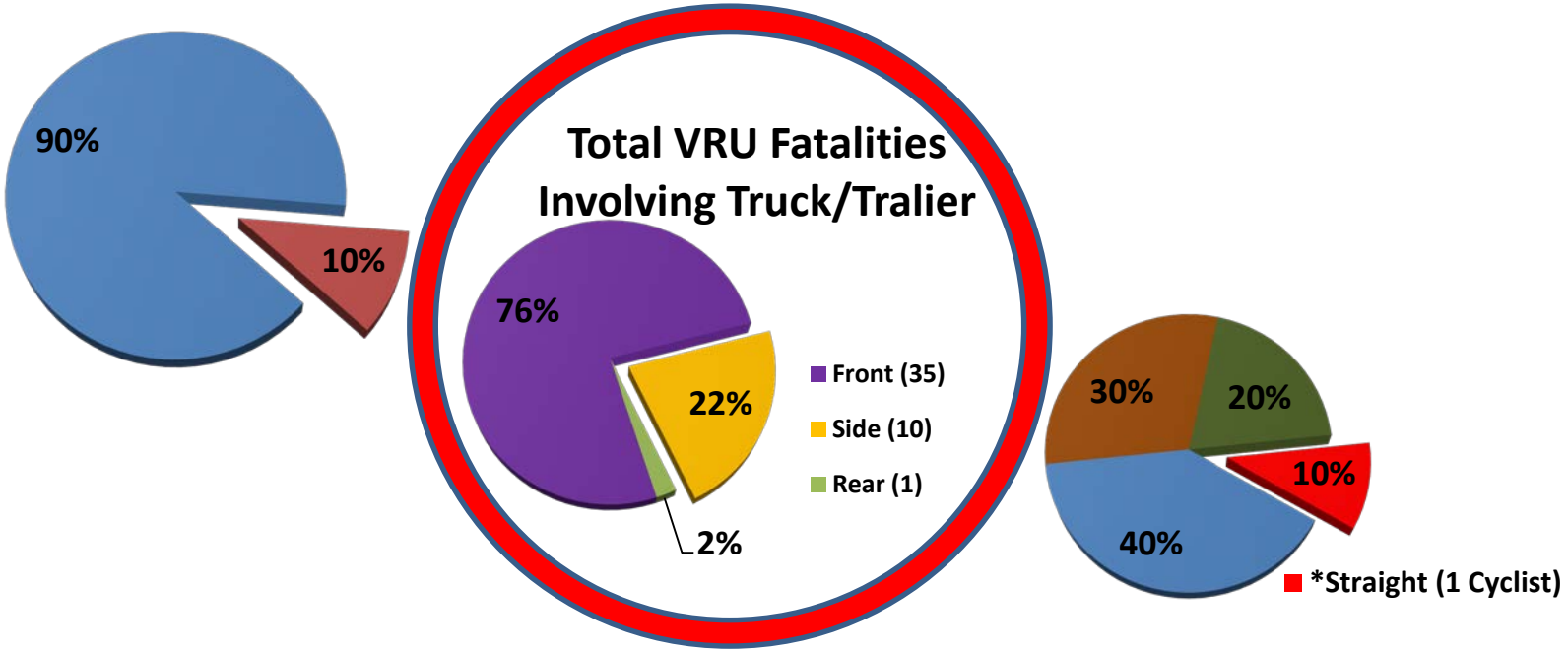
The above suggests that commercial vehicle drivers need assistance in detecting VRUs in close proximity to the vehicle. Countermeasures should be examined to improve both direct and indirect visibility in combination with detection systems that alert drivers to VRUs.

TC Review – 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

Alternative Solutions

- Goal: Target solutions that could have an impact on **all** VRU fatalities involving large commercial vehicles



100%

Research Plan

- To investigate vehicle technologies that will aid drivers in detecting vulnerable road users around heavy vehicles
- Focus is on Trucks, but application can also be used on buses

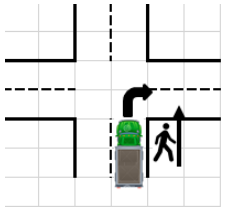
Research Plan

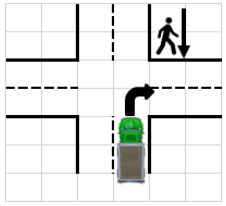
- Preparation – until March 31, 2017
- Laboratory Testing – March to May 2017
  - Report – July 31, 2017
- Field Testing – August 2017 to March 2018
  - Analysis – April – June 2018
  - Final Report – July 31, 2018

Collision Scenarios

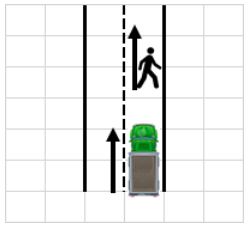
Impact Zone Testing Scenarios / VRU in critical position

Right Turn

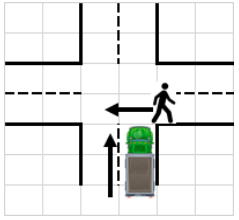




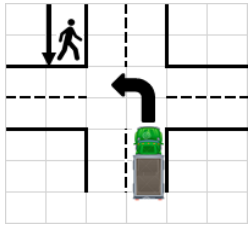
Run over



Cross in front

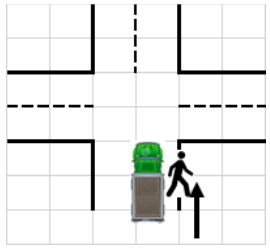


Left Turn

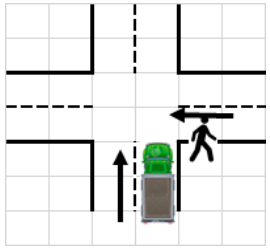


Detection Scenarios / Warning to the driver of VRU's presence

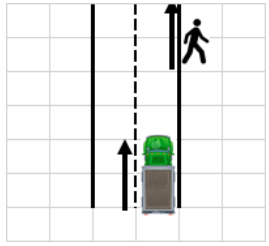
Show up in Blind Spot



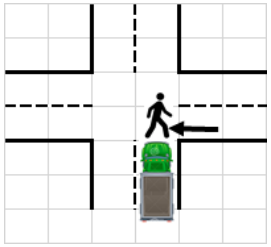
Short Stop



Sidewalk/ curb side

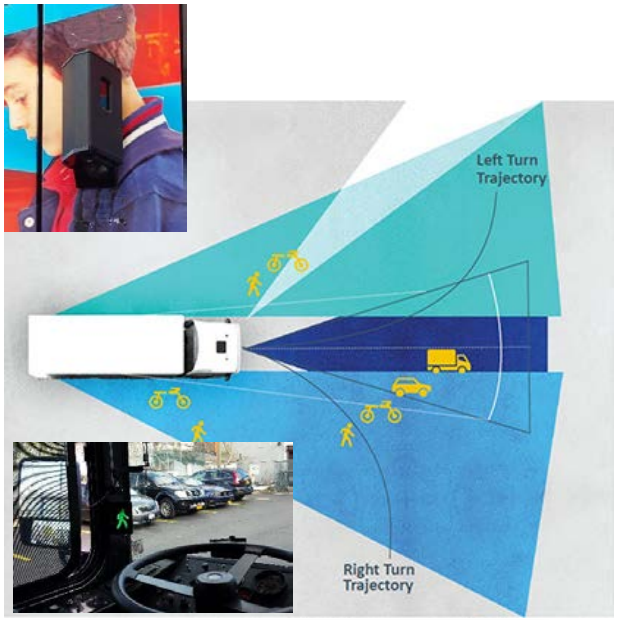


Walk in front



Technologies to be tested

Camera & Radar



Intelligent Detection Systems Camera based

Surrounding view Camera

Ultrasonic

Radar

Field Testing (August 2017- March 2018)

- Partner with 4 sites in Canada
- Evaluation of driver acceptance (usage, workload, annoyance, false alarms, etc)
- Analyse near misses
- Environmental impact (rain, snow, salt, etc)
- Reliability, maintenance

Then what?

- In the future something may lead to a vehicle regulation for new vehicles, however these take many years

Responsibilities

Federal

- New vehicle requirements – such as seat belts on vehicles
- At the time of manufacture

Provinces/Territories

- Vehicle use – such as requirement to wear seatbelts
- Aftermarket parts and modifications
- Retrofitting existing vehicles

Project 2: Limiting Distraction

- Transport Canada is developing guidelines for video displays in vehicles
- In response to Transportation Safety Board (TSB) recommendations
- Preliminary guidelines under development followed by consultations (2017-18)
- Looking for details on current fleets policies concerning driver distraction.

Contacts

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Thank you