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To: ["Direct to Mayor and Council - DL"](#)
Date: 11/6/2023 3:15:52 PM
Subject: Council Memo - Advocating for the Requirement of Side Guards of Heavy Trucks in Urban Areas
Attachments: ENG - Council Memo - Advocating for the Requirement of Side Guards of Heavy Trucks in Urban Areas - 15350.pdf

Dear Mayor and Council,

Please see the attached memo from Lon LaClaire on **Advocating for the Requirement of Side Guards of Heavy Trucks in Urban Areas – Part B**. A short summary of the memo is as follows:

- This memorandum responds to the July 19th, 2022, Council motion directing staff to review where right-hand turns intercept with bike lanes at intersections to ensure that hazards and dangerous interactions between vehicles and cyclists are mitigated
- For two years, staff worked with a road safety consulting firm, on a Canada-wide study to get better insight on the right hook conflicts.
- The study took baseline observations at 22 intersections in Vancouver and 90 intersections in nine other Canadian cities. Additionally, safety interventions were implemented at ten out of the initial 22 intersections in Vancouver and a follow-up analysis was undertaken.
- The study recommended key design principles to alleviate right turn hook conflicts.
- Next steps include implementation of intersection improvements, as part of newly delivered infrastructure; and continue to monitor existing right turn hook conflict areas, to identify and implement safety interventions on the existing network.

If you have any questions, please feel free to contact Lon LaClaire at 604-873-7336 or lon.laclaire@vancouver.ca.

Best,
Paul

Paul Mochrie (he/him)
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The City of Vancouver acknowledges that it is situated on the unceded traditional territories of the x^wməθk^wəyəm (Musqueam), Skwxwú7mesh (Squamish), and səlilwətał (Tsleil-Waututh) Nations.

MEMORANDUM

November 3, 2023

TO: Mayor and Council

CC: Paul Mochrie, City Manager
Armin Amrolia, Deputy City Manager
Karen Levitt, Deputy City Manager
Sandra Singh, Deputy City Manager
Katrina Leckovic, City Clerk
Maria Pontikis, Chief Communications Officer, CEC
Teresa Jong, Administration Services Manager, City Manager's Office
Mellisa Morphy, Director of Policy, Mayor's Office
Trevor Ford, Interim Chief of Staff, Mayor's Office

FROM: Lon LaClaire
General Manager, Engineering Services

SUBJECT: Advocating for the Requirement of Side Guards of Heavy Trucks in Urban Areas
– Part B

RTS #: 15350

This memorandum responds to the July 19^h, 2022 Council motion directing staff to review where right-hand turns intercept with bike lanes at intersections to ensure that hazards and dangerous interactions between vehicles and cyclists are mitigated.

Background

Right-turning vehicles continue to be a safety concern for cyclists at intersections in the City. According to the ICBC collision data for the past 5 years, right-turn or right hook collisions with cyclists represent approximately 12% of the all incidents.

The City's goal is to have zero traffic related fatalities and serious injuries. The number of fatalities each year on the City's roadways have been trending downward for the past 30 years. Regrettably, there were 14 traffic related fatalities in 2022 including the June 29th incident involving a cyclist on Pacific Blvd at Hornby St that was killed as a result of a collision with a right-turning semi-truck. In July 2023, protected-only signal phases were installed at this intersection to reduce potential conflicts between turning vehicles and cyclists. Staff will monitor the intersection to confirm effectiveness of these changes.

Bicycle Right Hook Conflict Study

In 2021, recognizing the ongoing conflicts between right-turning vehicles and cyclists, staff started working with Canadian road safety consulting firm, MicroTraffic, on a Canada-wide study focused on right turn hook conflicts. Using leading technology in video analytics to analyze and predict collisions, the first phase of this study took baseline observations at 22 intersections in Vancouver and 90 intersections in nine other Canadian cities. For the second phase of this study, various safety interventions, ranging from the installation of right turn phases, detectable flashing LEDs, and paint markings were implemented at ten out of the initial 22 intersections in Vancouver and a follow-up analysis was undertaken. A complete list of Vancouver intersections involved in the study can be found in Appendix A.

The study recommended several key design principles to alleviate right turn hook conflicts, including:

- Carefully consider adding protected signal phasing when peak hour right turn volumes are above 140 or other factors indicate one is needed;
- Implement right-turn bays, where space permits, to reduce turning vehicle speeds and provide cyclists clarity on driver intentions;
- When feasible, implement protected intersection designs; and
- When cyclists have a downhill approach to an intersection, consider more robust safety interventions.

Next Steps

In general, the City's design and implementation of cycling facilities at intersections are consistent with the design principles identified in the study and as part of the Vision Zero goals, staff will:

- Continue to implement intersection improvements, such as protected intersections and protected only turn signals as part of newly delivered infrastructure;
- Monitor existing right turn hook conflict areas, through the traffic count program and resident feedback, to identify and implement safety interventions on the existing network;
- Continue to test automated warning systems such as flashing LED technologies and other emerging technologies to warn motorists of cyclist conflicts;
- Seek the delivery and/or space to implement safety interventions at intersections through the development process; and,
- Identify gaps in the BC Motor Vehicle Act with respect to the regulations that govern cyclist and vehicle interactions at intersections, as an interim step, staff will explore the feasibility of enacting Street and Traffic bylaw changes.

I trust this memo responds to Council's motion around mitigating bicycle right hook collisions.
Please contact me directly if you have any questions.

A handwritten signature in blue ink, appearing to read 'Lon LaClaire', with a horizontal line extending to the right.

Lon LaClaire, M.Eng., P.Eng.
General Manager, Engineering Services

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Appendix A – Bicycle Right Hook Conflict Study Locations and Results

Staff with the support of MicroTraffic have completed a detailed safety conflict study, which included field investigations and video analysis to gain a better understanding of the vehicle right turn and cyclist conflict in a Vancouver context. The study encompassed various intersections featuring different bike lane designs, roadway configurations, and signal phasing. The study was completed in two phases:

- **Baseline analysis (Phase 1):** video footage was analyzed at 22 intersections in Vancouver (see Table 1). MicroTraffic engaged nine other Canadian cities to participate in the study, bringing in conflict data from an additional 90 intersections, allowing for a more representative sample of data.
- **Post-intervention assessment (Phase 2):** ten out of the 22 initial intersections for the Vancouver case were selected for safety improvements. Following the implementation of these improvements, a subsequent round of video footage was analyzed to measure the effectiveness of interventions (see Table 2).

The lessons learned from the study are as follows:

- **Vancouver:**
 - The implementation of a protected only right turn phase at one intersection (Quebec St & E 2nd Ave) led to a significant conflict reduction. Although a slight increase in vehicle right turning speeds was observed in the after period.
 - Trialing a detectable flashing LED yield to bicycles sign at one intersection (Pacific Blvd & Howe St) resulted in a decline in low risk conflicts. However, detection of cyclists requires improvement and further investigation.
 - Road paint/pavement markings such as Slow turn wedges and Reflective Pavement Markings (RPMs) at three intersections did not appear to have a clear impact on reducing vehicle turning speed or conflict rates.
 - Modest safety benefits were observed when installing signage and paint alone.
- **Canadian cities:** based on the conflict data from the 10 participating cities, key design principles were formulated to alleviate cyclist right hook conflicts.
 - Careful review of protected phasing trade-offs. This is crucial for intersections with right turn volumes above 140 vehicles per hour in the peak period. Initial results, showed decreased conflicts at intersections where the protected turn phase came after the bicycle and pedestrian phase (aka lagging turn phase).
 - Implementation of right-turn bays, where space permits, helps reduce turning vehicle speeds and provide cyclists clarity on driver's intentions.
 - Where permissive right-turns are allowed, yielding requirements need to be visible to drivers. The use of green paint and yield-on-turn signage is recommended.
 - Minimizing cyclist exposure to right-turning vehicles by reducing the crossing distance is essential where right turns are permissive.
 - Intersections with tighter corner radii can help reduce right-turning vehicle speeds.

- Incorporating physical protection between cyclists and motor vehicles on intersection approaches enhances safety.
- When feasible, adopting designs consistent with prototypical protected intersection designs.
- The introduction of horizontal deflection in bike lane approaches can reduce conflicts.
- Special attention should be given to intersection designs in areas with low pedestrian and cyclist volumes, as right turn speeds tend to be higher.
- Careful design considerations are essential for downhill approaches with grades above 2%.

Table 1: Intersections analyzed in Phase 1 (Baseline analysis)

Geometric Design		Right Turn Signal Phasing			
		Protected Only	Permissive	Protected Permissive	Unsignalized
Uni-Directional Bike Lane	Right Turn Bay		Burrard & 1st (SB)	Burrard & 4th (SB)	Burrard & 3rd (SB)
			Cambie & Nelson (EB)	Quebec & 2nd (SB)	Burrard & 5th (SB)
			Pacific & Howe (EB)	Clark & 6th (EB)	
			Quebec & 1st (SB)		
	No Right Turn bay		Cornwall & Cypress (NB)		Burrard & 2nd (SB)
			Ash & 10th (WB)		
			Burrard & 6th (SB)		
	No Right Turn Bay, Bend Out		Burrard & 7th (SB)		
			Ontario & 1st (NB)		
			Quebec & 1st (WB)		
Bi-Directional Bike Lane	Right Turn Bay	Hornby & Georgia (NB)	GNW and Carolina No data		
			Dunsmuir & Homer (WB)		
	No Right Turn Bay				
	No Right Turn Bay, Bend Out		Hornby & Pacific (NB, WB)		
Painted Bike Lane	Through Bike lane		Pacific & Richards (SB)		
			Burrard & Dunsmuir (WB)		
	Traditional Skip Dash				
	Combined Lane				
	Mixing zone				
Top 10 intersections selected for safety improvements (Phase 2)					

Table 2: Safety improvements analyzed in Phase 2 (Post- intervention assessment)

Intersection Approach	Safety Improvements
Burrard and 1st SB RT	<ul style="list-style-type: none"> - Yield to bikes sign relocation - Stop bar setback - Median extension
Burrard and 2 nd SB RT	<ul style="list-style-type: none"> - Secondary yield to bikes sign - Marked crosswalk - White RPMs
Burrard and 3 rd SB RT	<ul style="list-style-type: none"> - Secondary yield to bikes sign - Marked crosswalk
Burrard and 4 th SB RT	<ul style="list-style-type: none"> - Yield to bikes sign relocation
Cambie and Nelson EB RT	<ul style="list-style-type: none"> - Secondary yield to bikes sign - Stop bar setback
Clark and 6 th EB RT	<ul style="list-style-type: none"> - New yield to bike signs - Slow turn wedge
Dunsmuir and Homer WB RT	<ul style="list-style-type: none"> - Secondary yield to bikes sign - Repaint gaps on green paint
Howe and Pacific EB RT	<ul style="list-style-type: none"> - Detectable flashing LED yield to bikes sign
Quebec and 2 nd SB RT	<ul style="list-style-type: none"> - Protected only right turn phase
Pacific and Hornby WB RT	<ul style="list-style-type: none"> - Protected only right turn phase