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Memorandum

Date: October 23, 2019

To: Caitlyn Prévost, City of Ottawa

From: Matt Pinder, Alta Planning + Design

Cc: Kalle Hakala, Alta Planning + Design

Re: **Cycling Safety Review of High-Volume Intersections: Countermeasure Menu**

Introduction

This memo contains a summary of the countermeasures to be considered for the Ottawa Cycling Safety Review of High-Volume Intersections project, to improve the safety and operations of the study intersections from a cycling perspective. This memo is intended to meet the requirements of Task 2-1: Countermeasure Menu (General).

Countermeasures are split into **short-term**, intended to be low-cost and easy to implement, and **long-term**, which are to be considered when improvement opportunities arise through reconstruction. Short-term countermeasures are numbered, to support with Task 2-2: Countermeasure Menu (per intersection), where the numerical identifiers will be used to indicate which interim countermeasures are recommended for consideration at each intersection. Long-term countermeasures will be considered during the development of conceptual designs for each intersection as part of Task 3.

Documents Used to Source Countermeasures

City of Ottawa Design Guidance:

- City of Ottawa Traffic Calming Design Guidelines (2019)
- *DRAFT* City of Ottawa Pedestrian and Cycling Design Toolkit (2019)
- City of Ottawa Mini-Roundabout Guidelines (2017)
- *DRAFT* Roundabouts for Complete Streets Design Guide (2018)

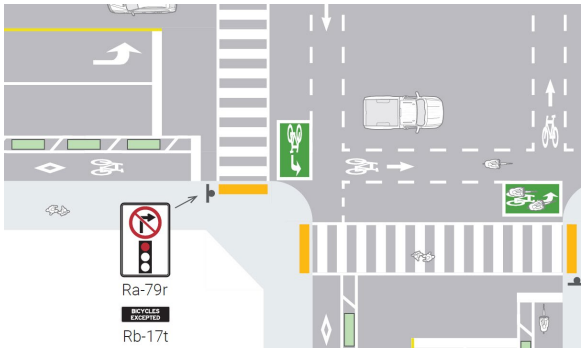
Other Guidance:

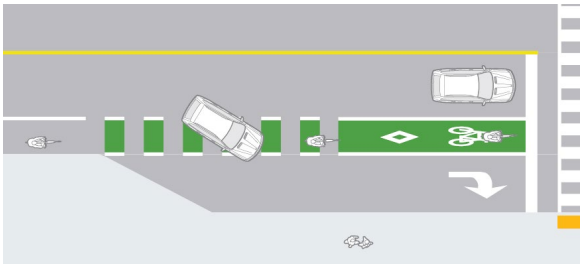
- NACTO Don't Give Up at the Intersection (2019)
- NACTO Designing for All Ages & Abilities (2017)
- *DRAFT* OTM Book 18 Update (2019)
- NACTO Urban Bikeway Design Guide (2012)

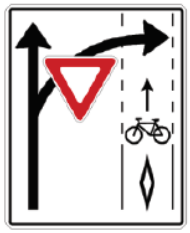
Short-term Countermeasures

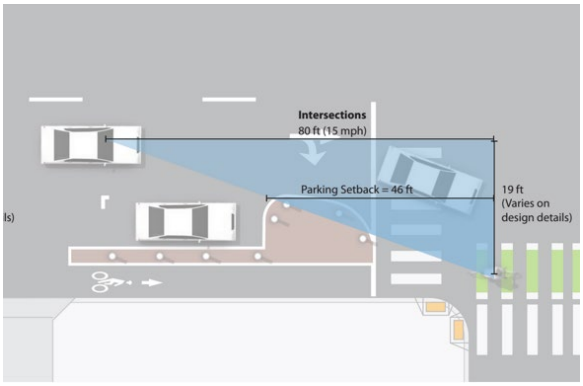
The following list of countermeasures can generally be implemented at a low cost and within a short timeline. They are often temporary measures and must either be maintained or replaced over time, or upgraded to a permanent (ultimate) configuration.

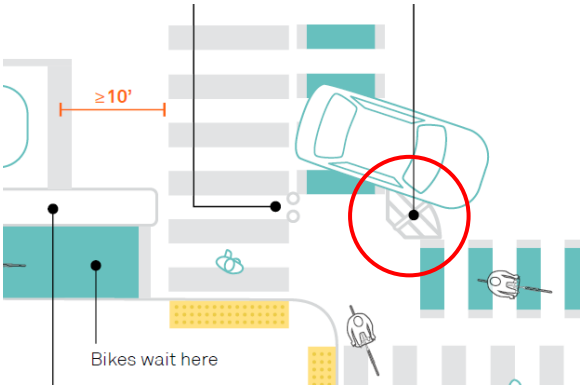
Table 1 – Short-term countermeasures and examples

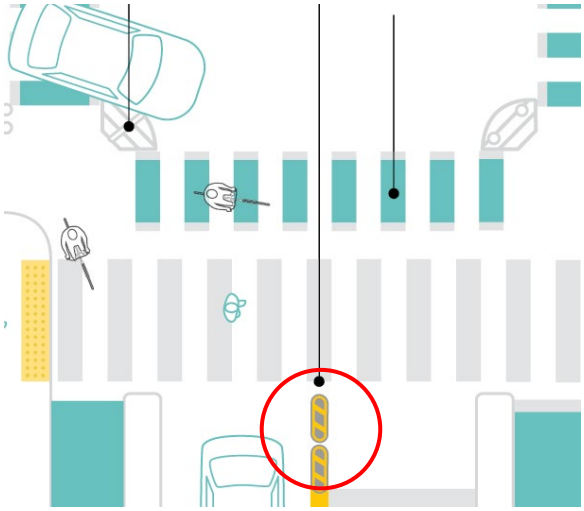
	Countermeasure	Example
1	**Green conflict zone treatment** *Image sources: Alta (Ottawa, ON)*	
2	**Bike box** *Image source: DRAFT City of Ottawa Pedestrian and Cycling Design Toolkit (2019)*	
3	**Two-stage left turn box** *Image source: DRAFT OTM Book 18 Update*	

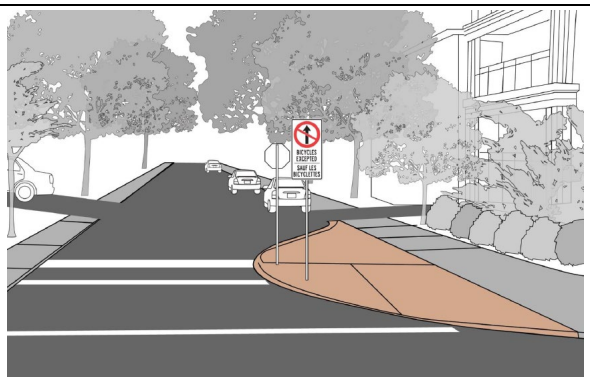
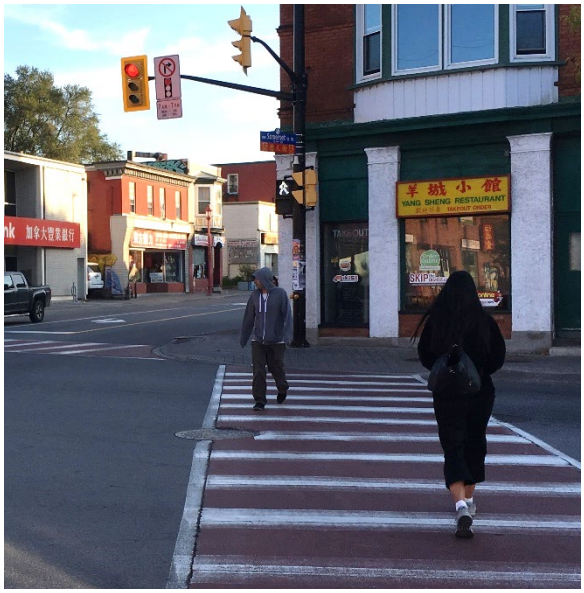
4	Advanced bicycle stop bar *Image source: Alta (Ottawa, ON)*	
5	Floating bicycle lane *Image source: DRAFT OTM Book 18 Update*	
6	Shared bicycle lane / turn lane (mixing zone) *Image source: Alta (Toronto, ON)*	
7	Strategically placed sharrows or "super sharrows" *Image source: Alta (Ottawa, ON)*	

8	**On-road messaging** *Image source: City of Ottawa Traffic Calming Design Guidelines (2019)*	
9	**Regulatory or warning signage (examples include):** • Turning Vehicles Yield to Bicycles (TAC RB-37) • Shared Lane Single File (OTM Wc-24) • Bicycle Crossing Ahead (OTM Wc-14) *Image sources: Ontario Traffic Manual*	 RB-37 (TAC) (600 x 750 mm) Wc-24 (OTM) (60 cm x 60 cm) Wc-24t (OTM) (30 cm x 60 cm)
10	**Speed display devices** *Image source: City of Ottawa Traffic Calming Design Guidelines (2019)*	

11	**Parking setbacks** *Image source: Denver Moves Design Guideline (2015)*	
12	**Education (to target a specific behavioural issue)**	
13	**Enforcement (to target a specific behavioural issue)**	
14	**Vertical centerline treatments** *Image source: City of Ottawa Traffic Calming Design Guidelines (2019)*	
15	**Speed cushions and speed humps** *Image source: City of Ottawa Traffic Calming Design Guidelines (2019)*	

16	Visual lane narrowing *Image source: City of Ottawa Traffic Calming Design Guidelines (2019)*	
17	Corner radii reductions and curb extensions (using temporary materials such as paint and/or flex posts) *Image source: Alta (Portland, OR)*	
18	Protected bike lanes on approach to intersection (using temporary physical measures such as flex posts or concrete curbs) *Image source: Alta (Ottawa, ON)*	
19	Corner wedge & speed bump *Image source: NACTO Don't Give Up at the Intersection (2019)*	

20	Centreline hardening (using flex posts or curbs) *Image source: NACTO Don't Give Up at the Intersection (2019)*	
21	Setback crossing or protected intersection (using temporary materials) *Image source: Alta (Oakland, CA)*	
22	Vehicular directional restrictions (fully or by time-of-day) *Image source: Alta (Ottawa, ON)*	

23	Right-turn-on-red restriction (fully or by time-of-day) *Image source: Ontario Traffic Manual*	 Rb-79R (OTM) (600 x 900 mm)
24	Traffic diversion and intersection channelizations (using temporary materials) *Image source: City of Ottawa Traffic Calming Design Guidelines (2019)*	
25	Leading pedestrian / bicycle interval *Image source: Alta (Ottawa, ON)*	

26	**Signal phasing and timing adjustments** *Image source: Alta (Ottawa, ON)*	
27	**Floating transit island (using temporary materials)** *Image source: People for Bikes*	

Long-term Countermeasures

The following list of countermeasures will be considered as options when completing conceptual designs for each intersection.

- Overall intersection control
  - Full signalization
  - All-way stop-control
  - Minor leg stop-control
  - Pedestrian crossover (PXO)
  - Intersection pedestrian signal or midblock pedestrian signal (with bicycle signal)
  - Vehicle priority roundabout
  - Bicycle and pedestrian priority roundabout
  - Mini-roundabout
  - Neighbourhood traffic circle
  - Grade separated crossing
- Signal measures
  - Protected left/right turns
  - Advanced detection
  - Bicycle-friendly signal coordination
  - Bicycle-pedestrian scramble
  - Two-stage crossings
- Configuration
  - Vehicle lane reductions / reconfigurations
  - Crossride at one or multiple legs
  - Alternate routing for bicycles
- Horizontal / vertical alignment
  - Setback crossings / protected intersection
  - Relocate floating bicycle lane as setback cycle track crossing
  - Corner radii reductions
  - Truck aprons
  - Curb extensions
  - Centre medians
  - Traffic diversion and channelization
  - Remove right-turn channels or convert to Smart Channels
  - Raised crossings
  - Raised intersection
  - Transit boarding islands / bulb-outs
- Other
  - Streetscaping (to add visual friction and slow travel speeds)