Keeping motorcyclists (& cyclists) safer with low cost design

Practical engineering solutions for safer riders

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What is the issue?

This risk is predictable and systemic — yet every day during peak hours we place drivers in a high-cognitive-load, time-pressured task under fatigue, pressure, and constrained visibility, even though we know humans do not perform reliably in these conditions.

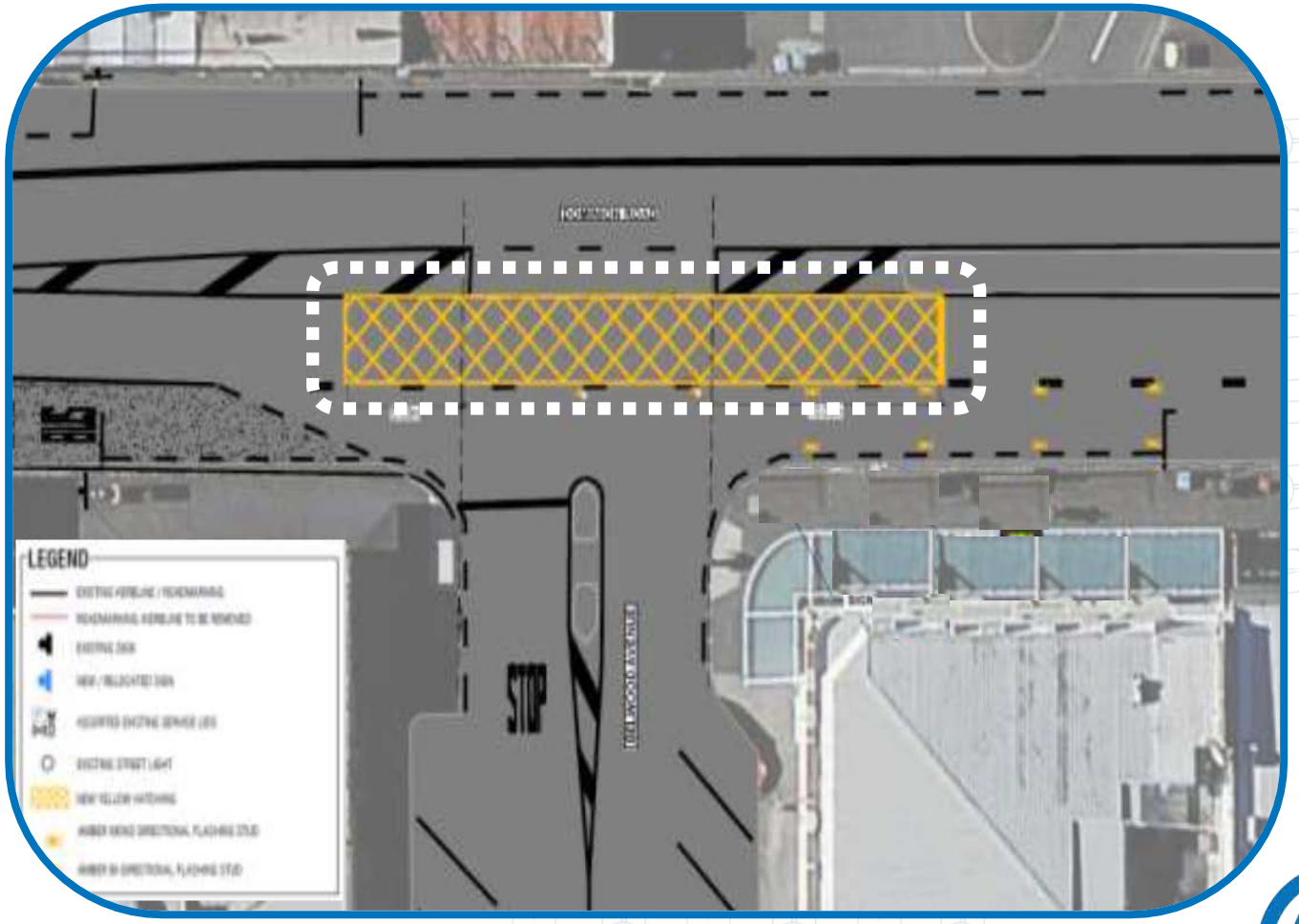
Stage 1 – The “yellow keep clear hatching” on general traffic lane

Changes implemented in 2020

- Keep clear hatching applied to general traffic lanes only
- Hatching extended 5-10 m in advance on each approach to the intersection
- Hatching length tailored to achieve sight distance

Intended outcomes

- Improved intervisibility between road users
- Reduced intersection blocking



Stage 1a – Active Warning Device

Changes implemented in 2022

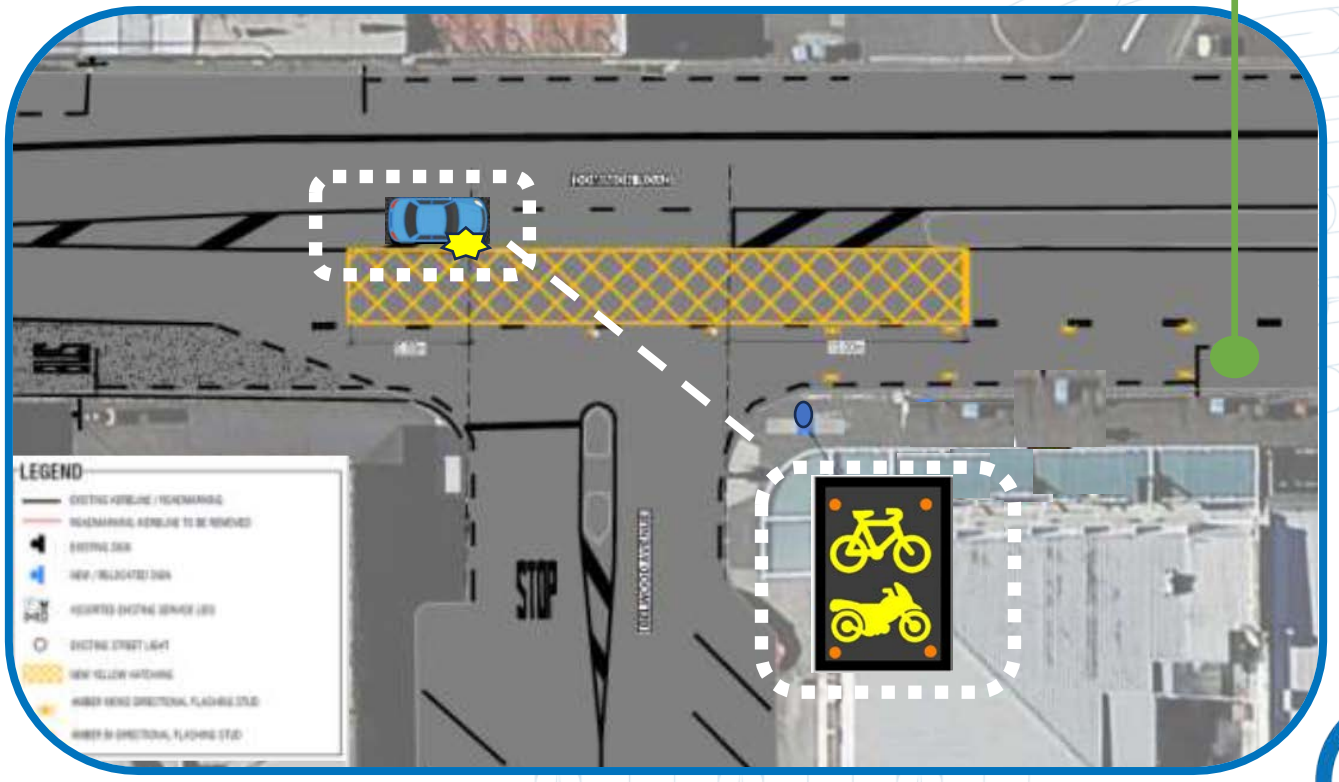
- Active Warning sign with Flir camera detects riders' presence in kerbside (bus lane) lane.
- Activates a flashing warning sign facing the right-turning traffic

Intended outcomes

- Alerts right-turning vehicles to oncoming cyclists and motorcyclists in the kerbside lane

Motorcyclist / Cyclist detection

Flir camera detects or motorcyclist cyclist approaching



Crash statistics analysis (2.5 years)

Preliminary results (stage 1 and 2a combined):

	Control Pre		Control Post		Treatment Pre		Treatment Post		Control	Treatment
	Total (4 years)	Total Per year	Total (2.5 years)	Total Per year	Total (4 years)	Total Per year	Total (2.5 years)	Total Per year	% change per year	% change per year
Fatal	0	0	0	0	0	0	0	0	0.00%	0.00%
Serious	0	0	1	0.4	3	0.75	0	0	100.00%	-100.00%
Minor	2	0.5	0	0	3	0.75	1	0.4	-100.00%	-46.67%
	2	**0.5**	**1**	**0.4**	**6**	**1.5**	**1**	**0.4**	**-20.00%**	**-73.33%**

Injury crashes reduced by ~50%

Four of the eleven treated sites were evaluated with four control sites

Conflict study

Two week peak – period video – manually analysed to identify serious, high risk interactions (i.e. near misses, avoidance manoeuvres or collisions.

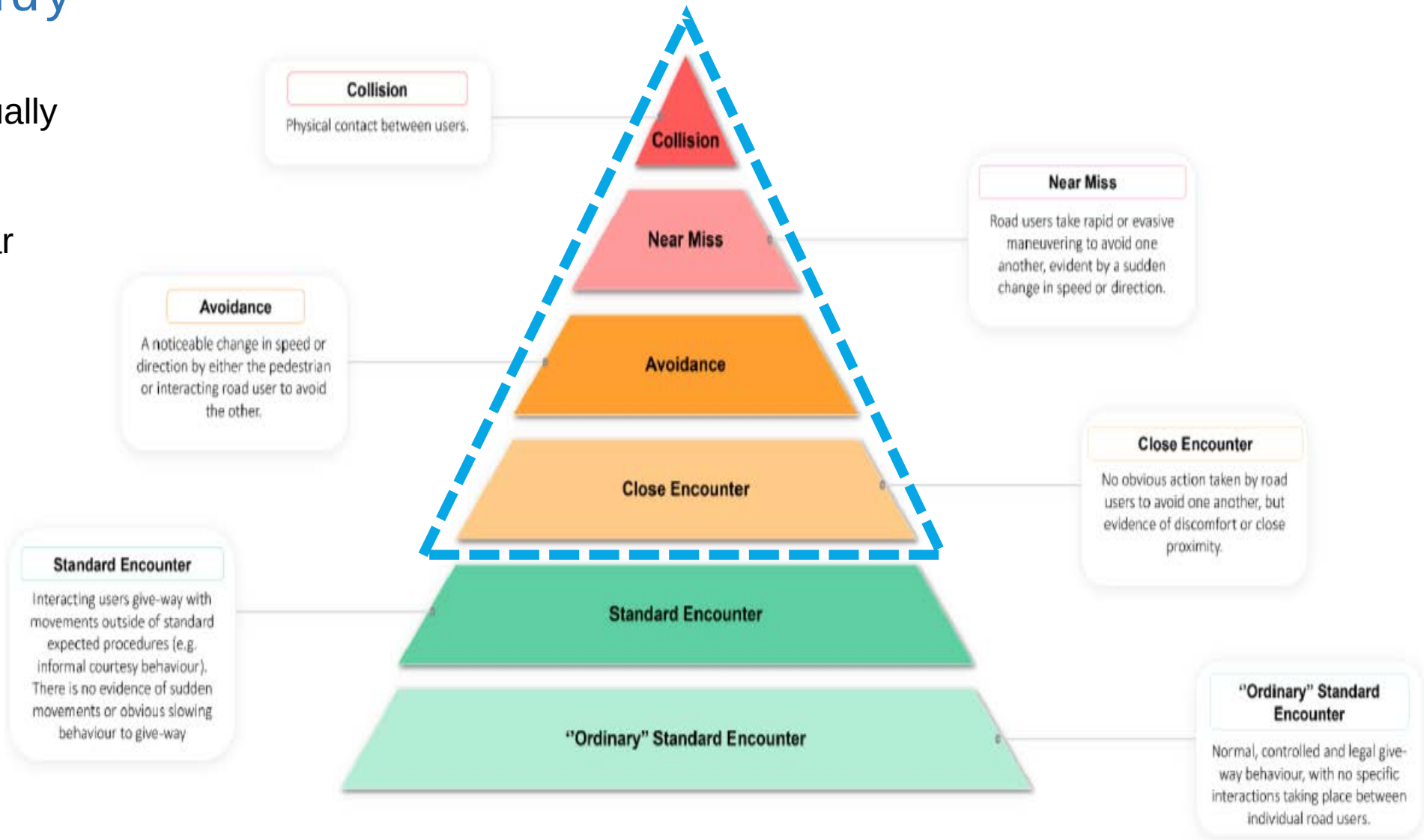
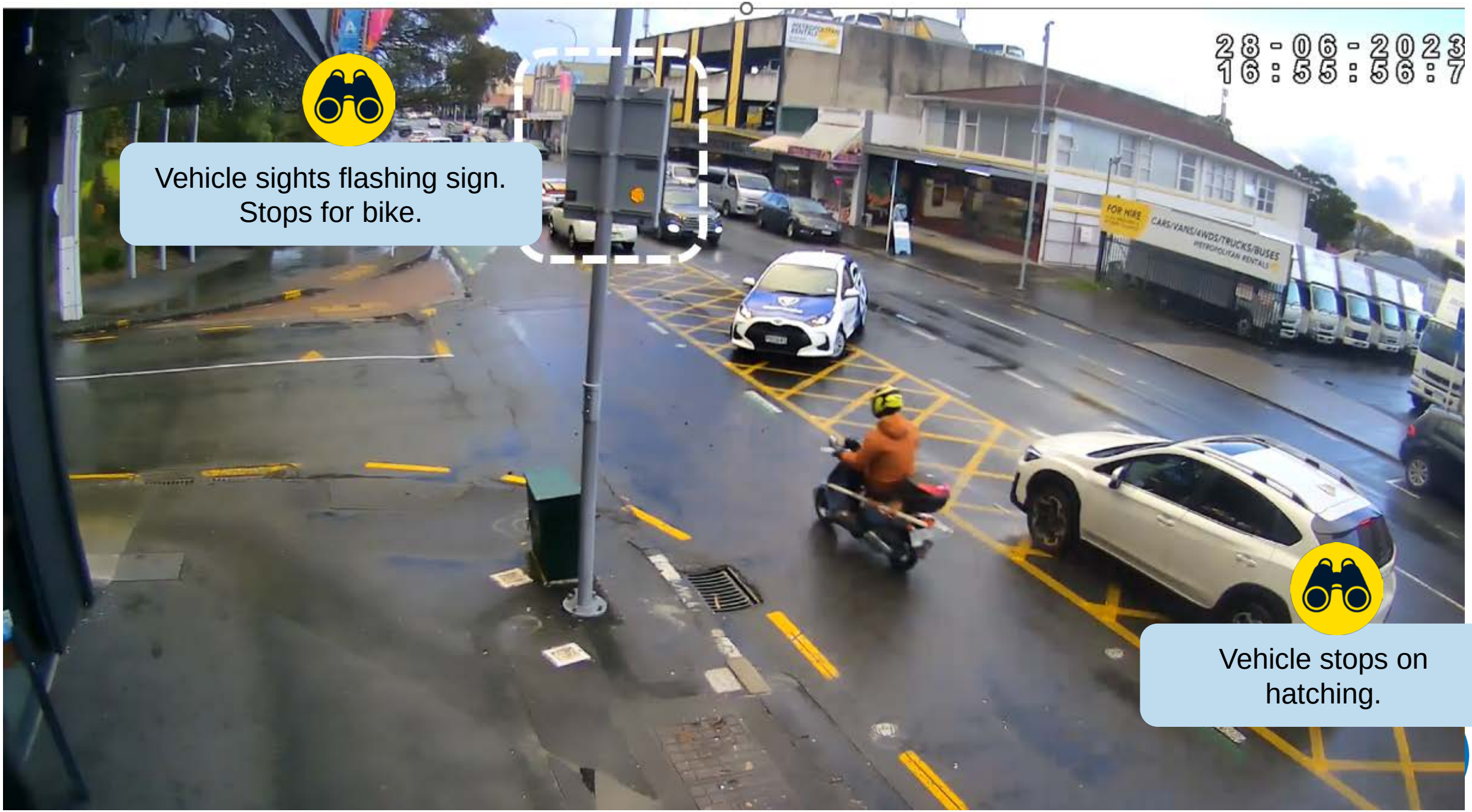


Figure 2 Encounter Types in Hierarchical Order


28-06-2023
16:55:56:7
FOR HIRE
CARS/VANS/4WDS/TRUCKS/BUSES
METROPOLITAN RENTALS
Vehicle sights flashing sign.
Stops for bike.
Vehicle stops on
hatching.

Next phase – Active warning device operation

Right turn vehicle detection

Flir camera detects the presence of right turning vehicle

The “watch out vehicle turning” sign warns cyclists / motorcyclists about right-turning vehicles so they can **slow down** (reduce both likelihood and severity should a crash happens) and stay alert.

Keeping Motorcyclists Safer *with* Low-cost Design

Dominion Road Trial

Stage 1 and 1b results

- Injury crashes **halved** in 2.5 years
- Remaining crashes were less severe
- Fewer close calls observed
- **60% reduction** in vehicles blocking intersections
- **Improved visibility** for both drivers and riders was key
- **Design insight:** hatching alone may not be enough for meaningful results

MACKIE RESEARCH

Safety always

Poster # 11

Thank you

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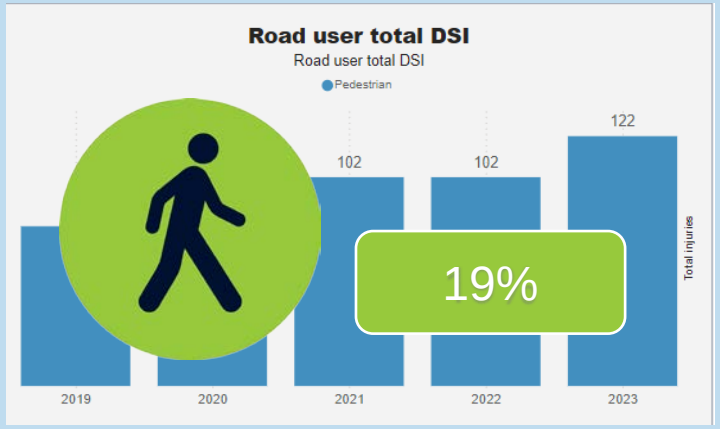
People travelling outside vehicle crash trends

(analysed period 2019 and 2023)

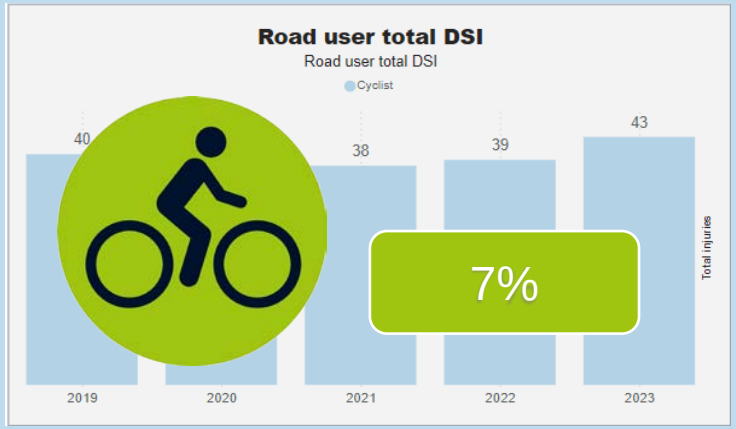
Pedestrian DSI trend – 487 DSI on AT network, 12 on state highways



Pedestrians made up 16.4% of DSI casualties on AT local road

- 32% at intersections (158 DSI).
- 53% of pedestrian intersection crashes were at priority controlled (GW & STOP) intersections.
- 42% of pedestrian intersection crashes were at signalised intersections

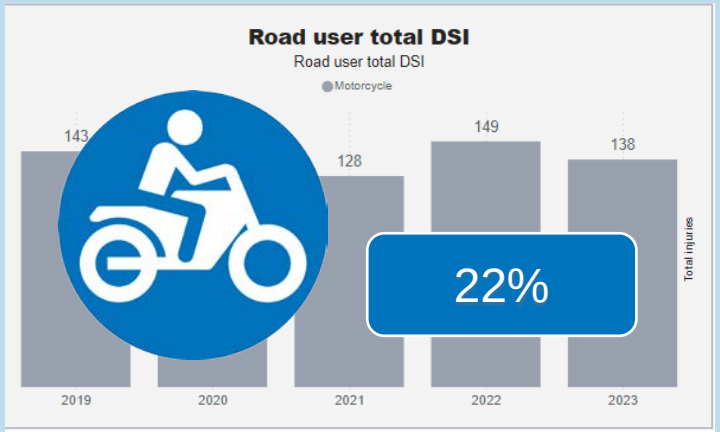
Cyclist DSI trend – 196 DSI on AT network, 5 on state highways



Cyclists made up 7.4% of DSI casualties on AT local road network.

- 52% occurred at intersections 101 DSI).
- 73% of cyclist intersection crashes were at priority controlled (GW & STOP) intersections.

Motorcyclist DSI trend – 569 DSI on AT network, 98 on state highways



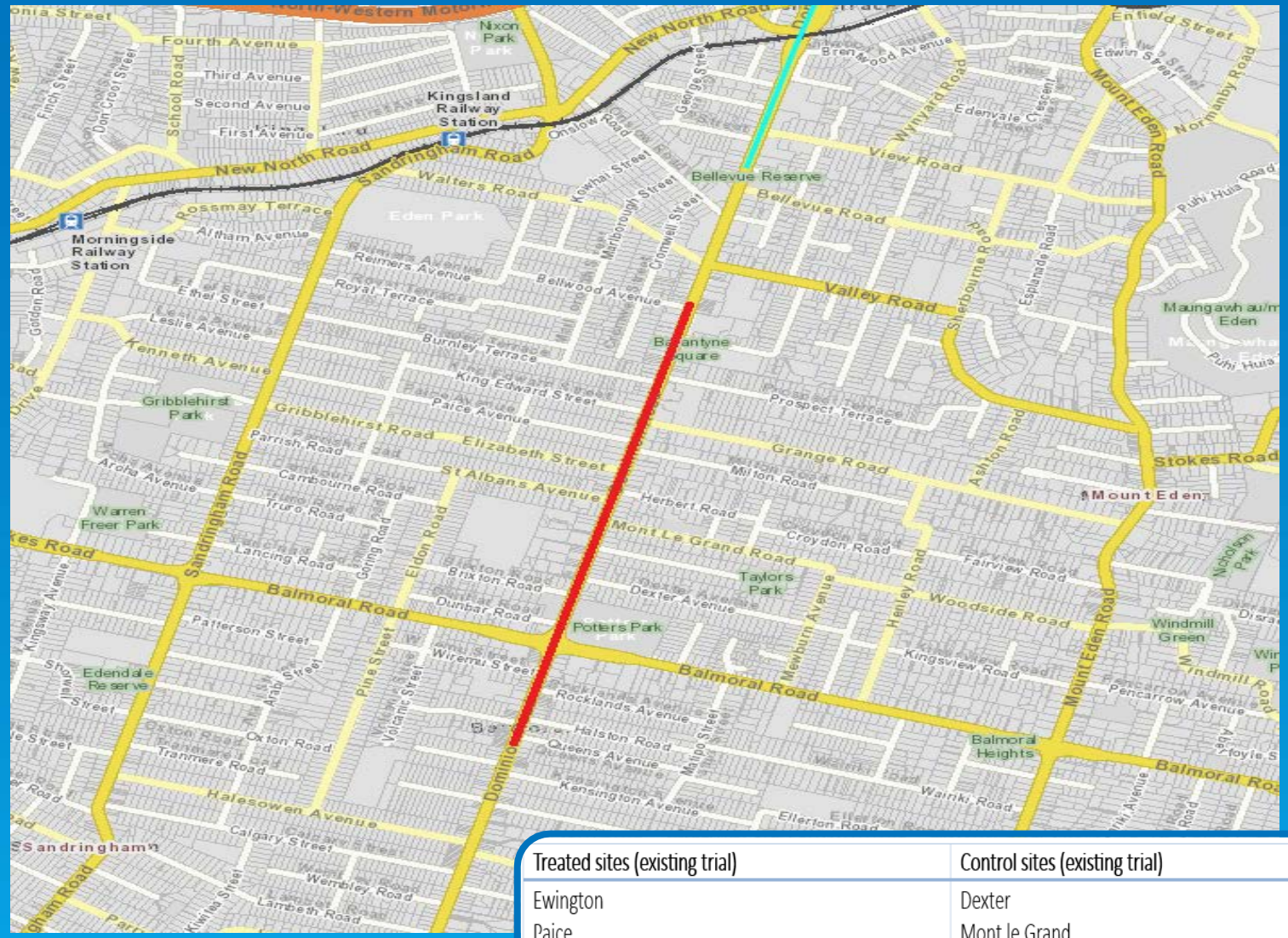
Motorcycle and Moped riders made up 19.5% and 2.1% of DSI casualties respectively on AT local network.

- 41% occurred at intersections (236 DSI).
- 64% of motorcyclist intersection crashes were at priority controlled (GW & STOP) intersections.

Dominion Road – treated sites and control

Total of 11 treated sites:

1. Bellwood Ave
2. Ewington Ave
3. Prospect Terrace
4. Burnley Terrace
5. Paice Avenue
6. King Edward St
7. Grange Rd
8. Milton Rd
9. Wiremu St
10. Rocklands Ave
11. Tennyson St



Treated sites (existing trial)	Control sites (existing trial)
Ewington	Dexter
Paice	Mont le Grand
Wiremu	Telford
Rocklands	Carmen

What are we trying to solve and how?

Purpose / Safety outcomes

- Removes the masking effect of queued general traffic
- Improves awareness between right-turning vehicles and oncoming cyclists and motorcyclists in the kerbside lane
- Encourages lower speeds for riders in the kerbside lane, reducing injury severity if a crash occurs.

A range of options were considered with motorcycle & cycling advocacy groups, through two focus groups and member of public to test the proposed solutions

#	Option	Purpose/Design Philosophies
1	Speed table on SVL	Speed
2	Set back limit lines	Visibility
3	Plastic base and safe hit posts	Operational issue – cutting corners
4	Sharrow with colour treatment	Visibility - warning
5	Yellow hatching	Visibility
6	24/7 bus lanes	Visibility
7	Chicanes	Speed
8	Tactile surfacing	Speed
9	Cobbled surfacing in RT bay	Speed
10	Parking restrictions	Visibility
11	Smartstuds /Active TGSIs	Visibility - warning
12	Active warning signs	Visibility - warning
13	Part time RT ban	Eliminate problem movement
14	Full time RT ban	Eliminate problem movement
15	Variable speed limit	Speed
16	Zebra crossings on side road	VRU
17	Friction grip	Speed, and visual warning

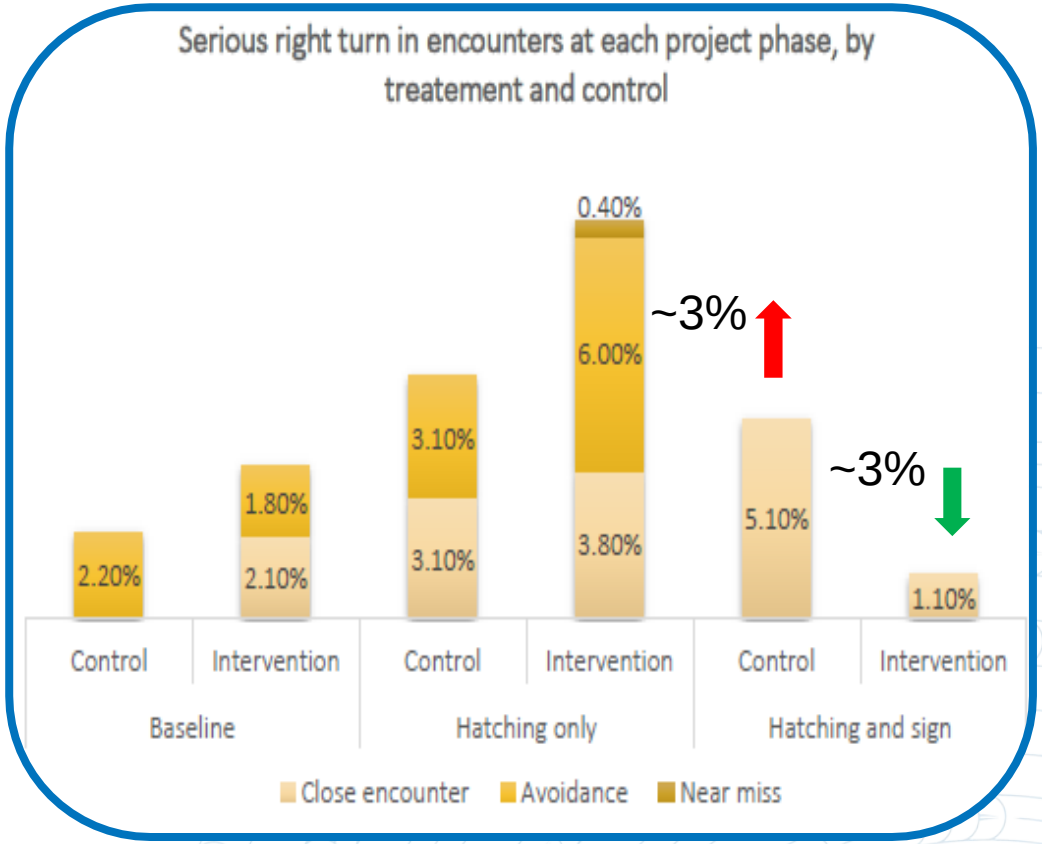
Conflict study

Preliminary results

- Conflicts reduced by ~3% following hatching and sign treatments, while control sites experienced a ~3% increase
- High severity conflicts – reduced (no near misses or avoidance type events observed).

Table 3: Right turn in encounters with VRU in the SVL and GVL

	Baseline		Hatching only		Hatching + signs	
	Control	Intervention	Control	Intervention	Control	Intervention
"Ordinary" standard encounter	126 (91%)	220 (78%)	80 (83%)	192 (82%)	54 (69%)	144 (77%)
Standard encounter	10 (7%)	50 (18%)	10 (10%)	18 (8%)	20 (26%)	41 (22%)
Close encounter	0 (0%)	6 (2.1%)	3 (3.1%)	9 (3.8%)	4 (5.1%)	2 (1.1%)
Avoidance	3 (2.2%)	5 (1.8%)	3 (3.1%)	14 (6.0%)	0 (0%)	0 (0%)
Near miss	0 (0%)	0 (0%)	0 (0%)	1 (0.4%)	0 (0%)	0 (0%)
Total encounters	139 (100%)	281 (100%)	96 (100%)	234 (100%)	78 (100%)	187 (100%)



Vehicle volumes and speed

Table 8:Vehicle volumes and speeds at peak times on weekdays at the 8 sites measured

		Baseline	Hatching only	Hatching + signs
GVL (bikes and motorbikes excluded)	Total count	77269	81478	78713
	85th percentile speed	45.5	45.1	45.0
	Mean speed	32.7	32.1	33.1
SVL (only bikes and motorbikes)	Total count	4195	3757	3050
	85th percentile speed	46.7	44.6	43.8
	Mean speed	34.0	32.5	32.2

Riders' speed on kerbside lane are still exceeding safe system range of 30 km/h – remain at high risk of serious injury or death