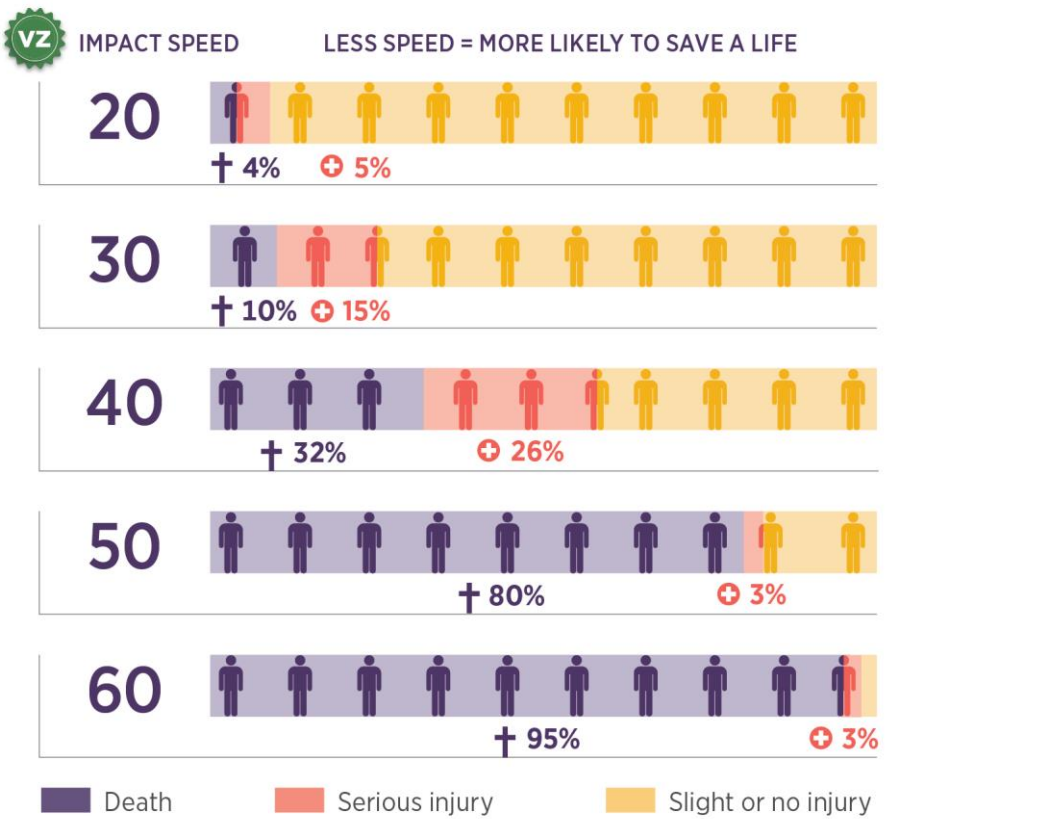
Rethinking road safety; an urban [street] design lens

Amir Kayal, Auckland Transport

Auckland Transport
An Auckland Council Organisation

Knowledge



† Source: Towards Safe System Infrastructure: A Compendium of Current Knowledge (2018) Austroads

Knowledge

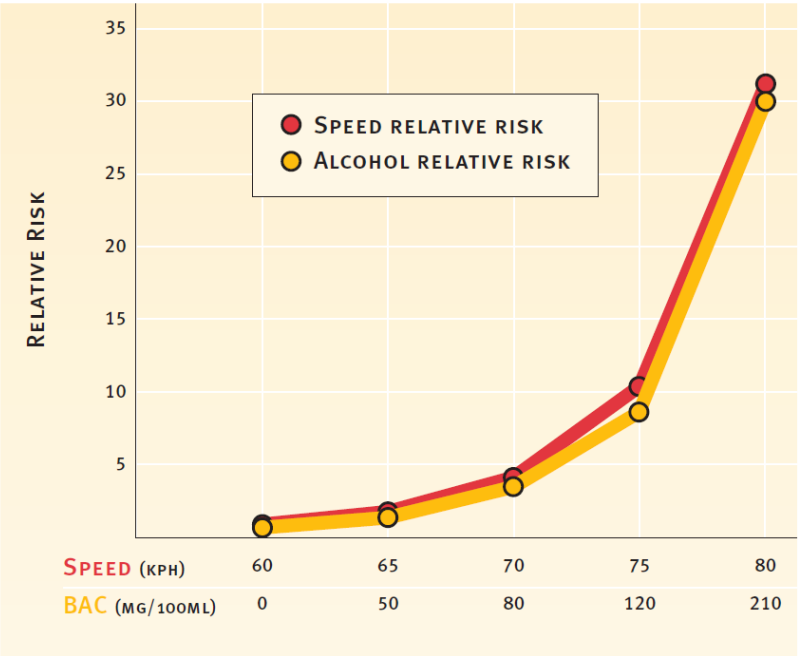


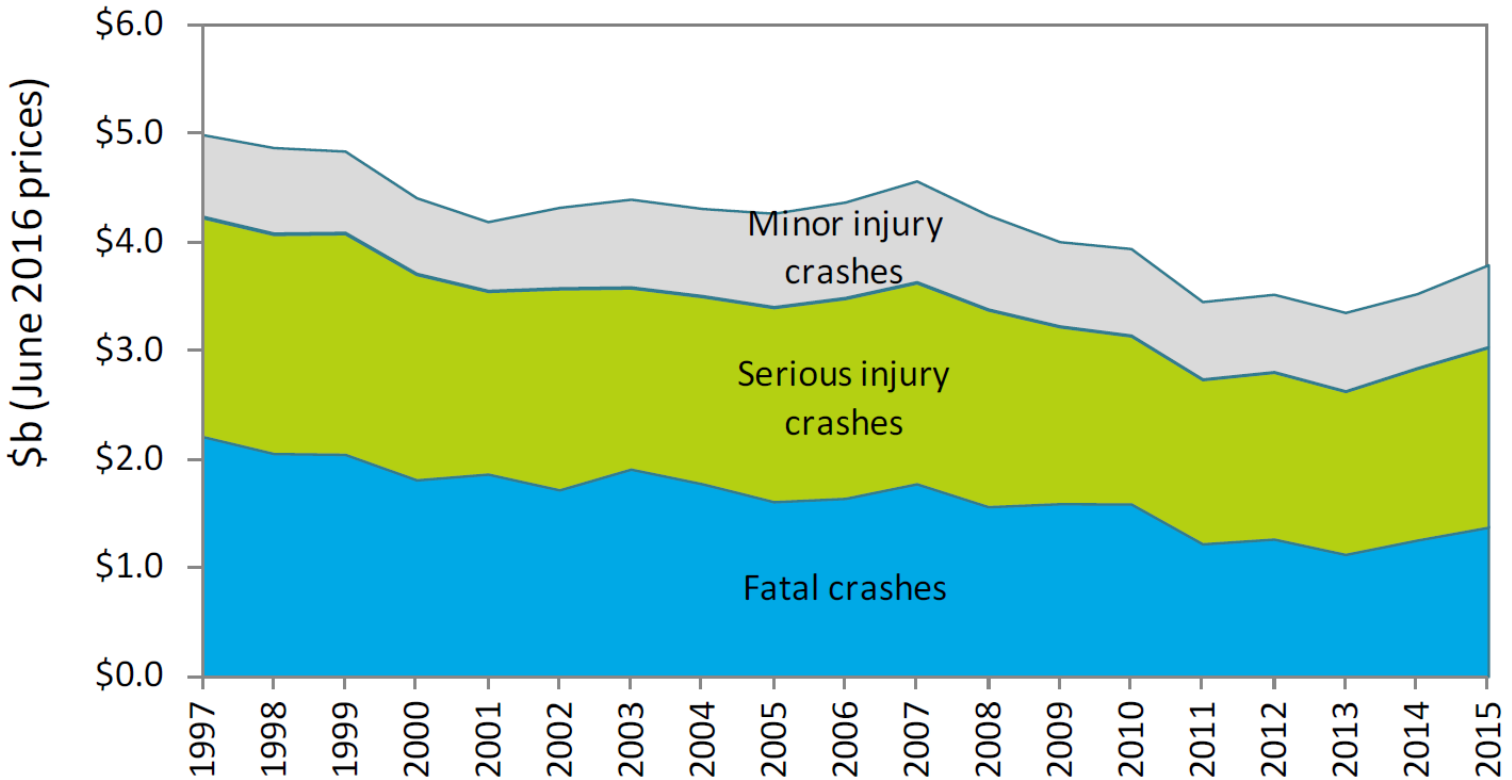
Figure A3 – Relative risks of involvement in a casualty crash for certain speeds and with certain levels of blood alcohol concentration (BAC)

	Base offence	Relative risk for offence	Penalty
Drink-driving	Exceeding 80 mg/ 100 mg blood alcohol concentration	3.2	maximum 3 months prison or $4,500 fine (maximum 6 months prison or $6,000 fine for third or subsequent offence) and • 6 months licence disqualification (12 months for third or subsequent offence), except in special circumstances
Speeding	Travelling 70 kph in a 60-kph zone (speed limit exceeded by not more than 10 kph)	4.2	• fine of $30 and • 10 demerit points (unless a speed camera offence) • 100 demerit points in 2 years results in 3 month licence suspension

Down with Speed: A Review of the Literature, and the Impact of Speed on New Zealanders. Accident Compensation Corporation and Land Transport Safety Authority, 2000.

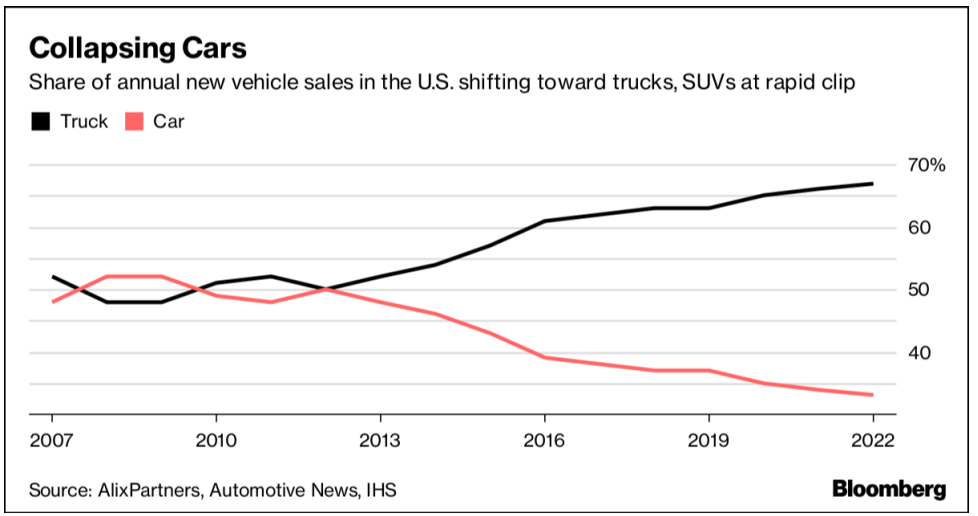
Value

Figure 2: Estimated annual total social cost of injury crashes, by crash severity ($ billion, at June 2016 prices)



Social cost of road crashes and injuries 2016 update, Ministry of Transport, March 2017

Changing climate?



"There's a good chance that in eight years, this segment of the market doesn't even exist."

Ford CEO

https://www.bloomberg.com/news/features/2018-01-16/why-the-american-sedan-is-marked-for-death

Double-cab ute nation vs carbon zero

https://www.newsroom.co.nz/2018/11/04/305983/double-cab-ute-nation-vs-carbon-zero

Newsroom Pro Managing Editor Bernard Hickey and Newsroom Business Editor Nikki Mandow sitting in Nikki's Toyota Hilux double cab ute. Photo by Dan Cook/RNZ

AUTO

Driver Safety

Refresh Your Driving Skills · Safe Driving Resources and Tips · Driving Assessment

SUVs Increasingly Deadly to Pedestrians

News report says size, design and popularity of SUVs are raising the body count

by Victoria Sackett, **AARP**, July 3, 2018 | Comments: 9

TRANSPORTATION

Better car design could prevent pedestrian deaths, says NTSB report

Americans buy SUVs because they're safe. But they're more likely to kill people who aren't in cars

By Alissa Walker | @awalkerinLA | Sep 27, 2018, 1:00pm EDT

SHARE

Aviation vs Land Transport

- Regula
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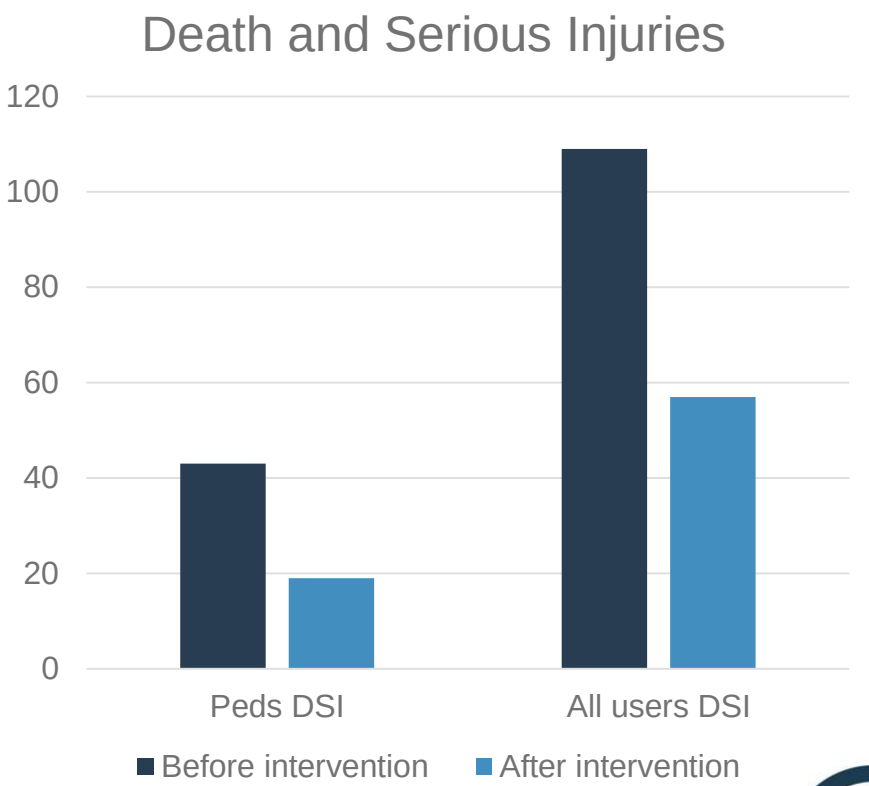
The car following the collision

https://goo.gl/Txd9U1

Collisions Before and After the Removal of Pedestrian Railings at 70 Junctions and Crossings on the Transport for London Road Network

- **Summary**
  - Removal of railings at 70 sites, 90 staggered crossing
  - Collect crash data 3 years before & after
  - 56%



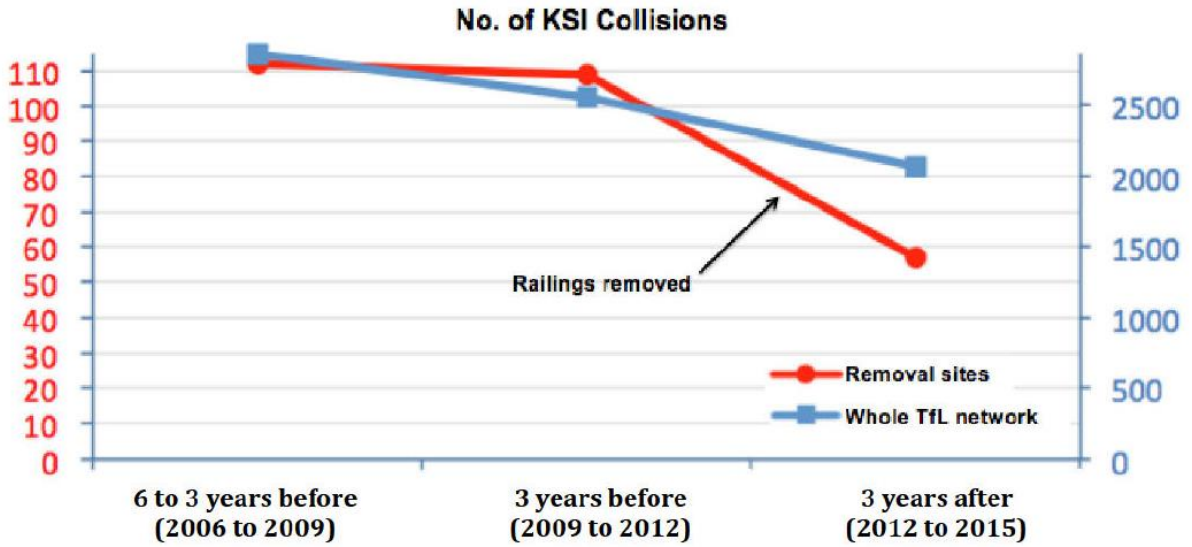
Transport for London

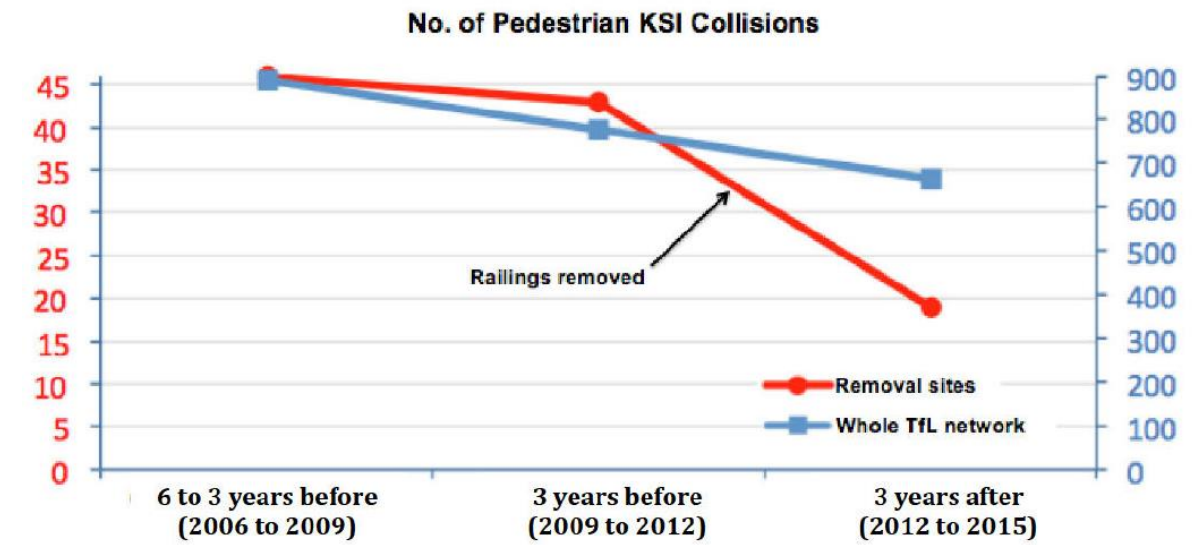
Ped Collisions in the Vicinity of Reverse Staggered Crossings

Site No.	Location	Type	No. R/S crossings	No. F/S crossings	Pedestrian collisions														
					Before					After					Difference				
					Slight	Serious	Fatal	Total	KSI total	Slight	Serious	Fatal	Total	KSI total	Slight	Serious	Fatal	Total	KSI total
1	Archway Rd / Archway Gyratory – north arm of gyratory	J	1	0	1	0	0	1	0	0	0	0	0	0	-1	0	0	-1	0
2	Bassborough Gardens / Grosvenor Rd	J	4	0	1	1	0	2	1	3	1	0	4	1	2	0	0	2	0
4	Blackfriars Rd / Southwark St	J	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Borough High St / Marshalsea Rd	J	1	2	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0
12	Brompton Rd / Hans Crescent	SAC	1	0	2	1	0	3	1	0	0	0	0	0	-2	-1	0	-3	-1
15	Burdett Rd / Bow Common Lane	J	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Burdett Rd / St Pauls Way	J	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Burdett Rd / Thomas Rd	SAC	1	0	1	1	0	2	1	1	0	0	1	0	0	-1	0	-1	-1
21	Cromwell Rd / Collingham Rd	J	1	0	0	1	0	1	1	0	0	0	0	0	0	-1	0	-1	-1
23	Cromwell Rd / Knaresborough Place	J	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Cromwell Rd / Marloes Rd	J	1	0	2	1	0	3	1	0	1	0	1	1	-2	0	0	-2	0
25	Cromwell Rd / Queens Gate	J	4	0	3	0	0	3	0	1	0	0	1	0	-2	0	0	-2	0
27	Euston Rd / Pancras Rd	J	1	0	1	2	0	3	2	0	0	0	0	0	-1	-2	0	-3	-2
28	Hampstead Rd o/s BP station - ped refuge	SAC	1	0	1	0	0	1	0	0	0	0	0	0	-1	0	0	-1	0
31	Holloway Rd / Loraine Rd	SAC	1	0	3	0	0	3	0	0	0	0	0	0	-3	0	0	-3	0
32	Holloway Rd / Sandridge St	J	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Holloway Rd / Tufnell Park Rd - traffic island	J	1	0	2	0	0	2	0	0	0	0	0	0	-2	0	0	-2	0
34	Jamaica Rd / Abbey St	J	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Jamaica Rd / Bevington St / St James's Rd	J	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	Jamaica Rd / Tooley St / Shad Thames	J	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	Jamaica Rd / West Ln / Southwark Pk Rd	J	1	0	1	0	0	1	0	0	0	0	0	0	-1	0	0	-1	0
42	London Bridge / Duke St Hill	J	2	0	4	0	1	5	1	4	0	0	4	0	0	0	-1	-1	-1
44	Ludgate Circus	J	2	0	1	0	0	1	0	5	0	0	5	0	4	0	0	4	0
46	Marlybone Rd / Baker St	J	2	0	4	1	0	5	1	6	0	0	6	0	2	-1	0	1	-1
49	Nine Elms Lane / Kirtling St	J	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	Old Kent Rd / Dunton Rd	J	1	0	1	2	0	3	2	1	0	0	1	0	0	-2	0	-2	-2
53	Old Kent Rd / Humphrey Str / Albany Rd	J	2	2	0	1	0	1	1	2	0	0	2	0	2	-1	0	1	-1
54	Old Kent Rd / Ilderton Rd	J	2	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0
55	Old Kent Rd / Malt St	J	2	0	2	0	0	2	0	0	0	0	0	0	-2	0	0	-2	0
56	Old Kent Rd / Olmar St	J	2	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0
57	Old Kent Rd / Peckham Park Rd	J	1	0	0	0	0	0	0	2	0	0	2	0	2	0	0	2	0
58	Old Kent Rd / St James Rd	J	2	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0
59	Old Str / Vince Str	SAC	1	0	2	2	0	4	2	1	1	0	2	1	-1	-1	0	-2	-1
62	Seven Sisters Rd / Green Lanes Rd	J	2	2	0	2	0	2	2	3	0	0	3	0	3	-2	0	1	-2
63	Seven Sisters Rd / Isledon Rd	J	1	0	3	1	0	4	1	1	0	0	1	0	-2	-1	0	-3	-1
64	Shoreditch High St / Great Eastern St	J	4	0	3	0	0	3	0	4	1	0	5	1	1	1	0	2	1
67	Stamford Hill / Clapton Common	J	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	Stamford Hill to the north of Windus Rd - o/s Morrisons	SAC	1	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
		Totals	58	13	39	16	1	56	17	39	4	0	43	4	0	-12	-1	-13	-13
															0%	-75%		-23%	-76%

Ped Collisions in the Vicinity of Forward Staggered Crossings

Site No.	Location	Type	No. R/S crossings	No. F/S crossings	Pedestrian collisions														
					Before					After					Difference				
					Slight	Serious	Fatal	Total	KSI total	Slight	Serious	Fatal	Total	KSI total	Slight	Serious	Fatal	Total	KSI total
4	Blackfriars Rd / Southwark St	J	1	2	0	1	0	1	1	1	0	0	1	0	1	-1	0	0	-1
5	Borough High St / Marshalsea Rd	J	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Bow Rd / Alfred St – to the east of the junction	SAC	0	1	2	3	0	5	3	1	0	0	1	0	-1	-3	0	-4	-3
7	Bow Rd / Fairfield Rd	J	0	1	4	1	0	5	1	2	0	0	2	0	-2	-1	0	-3	-1
8	Bromley Rd / Catford Rd	J	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0
9	Bromley Rd / Sangley Rd	J	0	1	0	0	0	0	0	2	0	0	2	0	2	0	0	2	0
10	Brompton Rd / Beauchamp Place	J	0	1	1	0	0	1	0	0	0	0	0	0	-1	0	0	-1	0
11	Brompton Rd / Brompton Place	SAC	0	1	4	0	0	4	0	2	1	0	3	1	-2	1	0	-1	1
13	Brompton Rd to the west of Lancelot Place	SAC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Burdett Rd / Ackroyd Drive	SAC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Burdett Rd / St Pauls Way	J	1	1	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0
19	Clapton Common bet Braydon Rd & Portland Ave	SAC	0	1	1	0	0	1	0	0	0	0	0	0	-1	0	0	-1	0
20	Clapton Common bet Osbaldeston Rd & Oldhill St	SAC	0	1	3	0	0	3	0	0	0	0	0	0	-3	0	0	-3	0
34	Jamaica Rd / Abbey St	J	1	1	0	0	0	0	0	2	0	0	2	0	2	0	0	2	0
35	Jamaica Rd / Bermondsey LU Station	SAC	0	1	1	0	0	1	0	0	0	0	0	0	-1	0	0	-1	0
36	Jamaica Rd / Bevington St / St James's Rd	J	1	2	0	0	0	0	0	0	1	0	1	1	0	1	0	1	1
37	Jamaica Rd / Rotherhithe Tunnel Rdbt - traffic island west	J	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	Lower Clapton Rd / Urswick Rd	J	0	1	0	0	1	1	1	0	0	0	0	0	0	0	-1	-1	-1
47	New Kent Rd to the middle east of Balfour St	SAC	0	1	2	1	0	3	1	1	0	0	1	0	-1	-1	0	-2	-1
48	Nine Elms Lane southwest of Cringle St	SAC	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	1	1
49	Nine Elms Lane / Kirtling St	J	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	Nine Elms Lane / Wandsworth Rd	J	0	1	2	0	0	2	0	0	0	0	0	0	-2	0	0	-2	0
52	Old Kent Rd / Hendre Rd	J	0	1	3	0	0	3	0	1	0	0	1	0	-2	0	0	-2	0
53	Old Kent Rd / Humphrey Str / Albany Rd	J	2	2	4	0	0	4	0	0	0	0	0	0	-4	0	0	-4	0
61	Seven Sisters Rd / Blackstock Rd	J	0	1	1	2	0	3	2	2	0	0	2	0	1	-2	0	-1	-2
62	Seven Sisters Rd / Green Lanes Rd	J	2	2	4	0	0	4	0	4	0	0	4	0	0	0	0	0	0
70	Wick Rd/ Cadogan Terrace	J	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Totals	10	32	32	8	1	41	9	20	3	0	23	3	-12	-5	-1	-18	-6
															-38%	-63%		-44%	-67%


No. of KSI Collisions
110
100
90
80
70
60
50
40
30
20
10
0
2500
2000
1500
1000
500
0
Railings removed
Removal sites
Whole TfL network
6 to 3 years before
(2006 to 2009)
3 years before
(2009 to 2012)
3 years after
(2012 to 2015)


No. of Pedestrian KSI Collisions
45
40
35
30
25
20
15
10
5
0
900
800
700
600
500
400
300
200
100
0
Railings removed
Removal sites
Whole TfL network
6 to 3 years before
(2006 to 2009)
3 years before
(2009 to 2012)
3 years after
(2012 to 2015)

Paradigm shift

Key questions	Traditional approach	Vision Zero Approach
What is the problem?	Crashes	Fatalities and serious injuries
What causes the problem?	Humans should know better, be infallible, and defer to machines	Humans make mistakes, humans are fragile
What is the appropriate goal?	Optimise the number of fatalities and serious injuries	Eliminate fatalities and serious injuries
Who is responsible?	Individual road users	System designers have ultimate responsibility for the systems, design, maintenance and use, and are ultimately liable for the level of safety in the entire system

Desired speeds

ROADS AND STREETS FAMILY

CONVENTIONAL HIGHWAY DESIGN

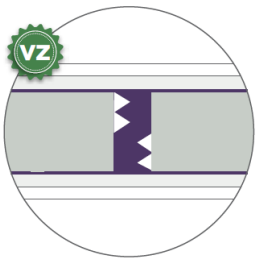
Operating speed > Design speed > Posted speed

PROACTIVE URBAN STREET DESIGN

Desired speed > Design speed > Posted speed

PLACE

Urban Street Design Controls



SPEED HUMPS

Speed humps or tables can be added to a street to vertically deflect traffic.

CHICANES/LANE SHIFTS

Chicanes require drivers to shift laterally by alternating either parking or kerb extensions along the street.

KERB EXTENSIONS

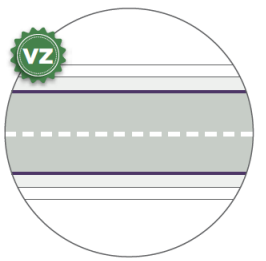
Kerb extensions narrow down the carriageway and increase awareness of drivers, while shortening crossing distance for pedestrians.

MINI ROUNDABOUTS

Mini roundabouts slow speeds by requiring additional attention from drivers at conflict points.

PINCHPOINTS

Also known as chokers, pinchpoints narrow the street, restricting drivers from operating at high speeds.

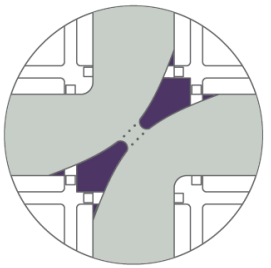


LANE WIDTHS

Narrower lanes correlate with slower speeds. Lane widths should be determined based on the Design and Control Vehicle for any given street.

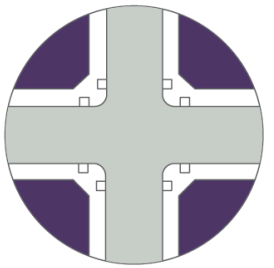
BLOCK LENGTHS

In addition to improved pedestrian connectivity, shorter block lengths limit the time cars can accelerate between stops.



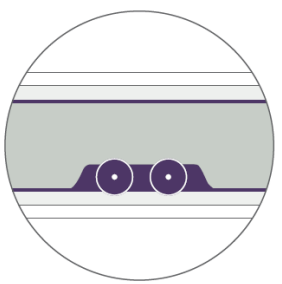
DIVERTERS

Diverters break up traffic and limit access to cars, while maintaining permeability for pedestrians and cyclists.



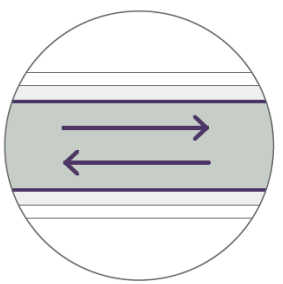
ACTIVE STREET EDGES

Active shop frontage with no significant setbacks not only limits sight lines, but alerts drivers to a change in environment and the likelihood of pedestrians crossing the street.



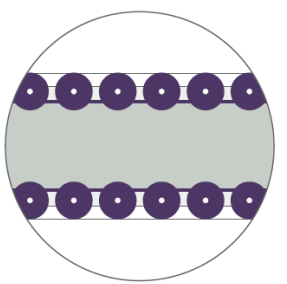
FORWARD VISIBILITY

Reducing forward visibility is an effective way to slow speeds and increase driver attention. Forward visibility can be reduced with plantings and street alignments.



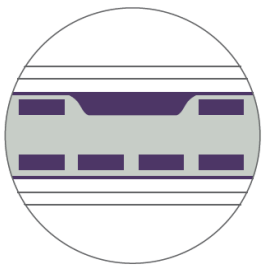
TWO-WAY STREETS

With the added risk of conflicting traffic flow, drivers tend to slow down.



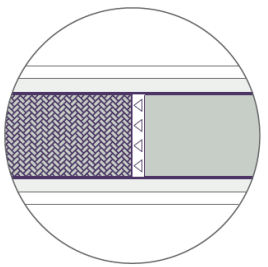
STREET TREES

Among many other benefits, street trees narrow the driver's line of sight and provide rhythm to a street.



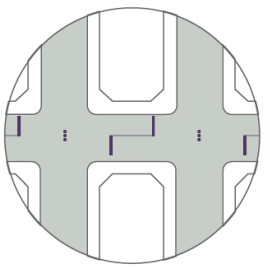
ON-STREET PARKING

On-street parking provides side friction and narrows the carriageway, resulting in slower vehicle speeds. This only works where parking is consistently occupied.



MATERIALS

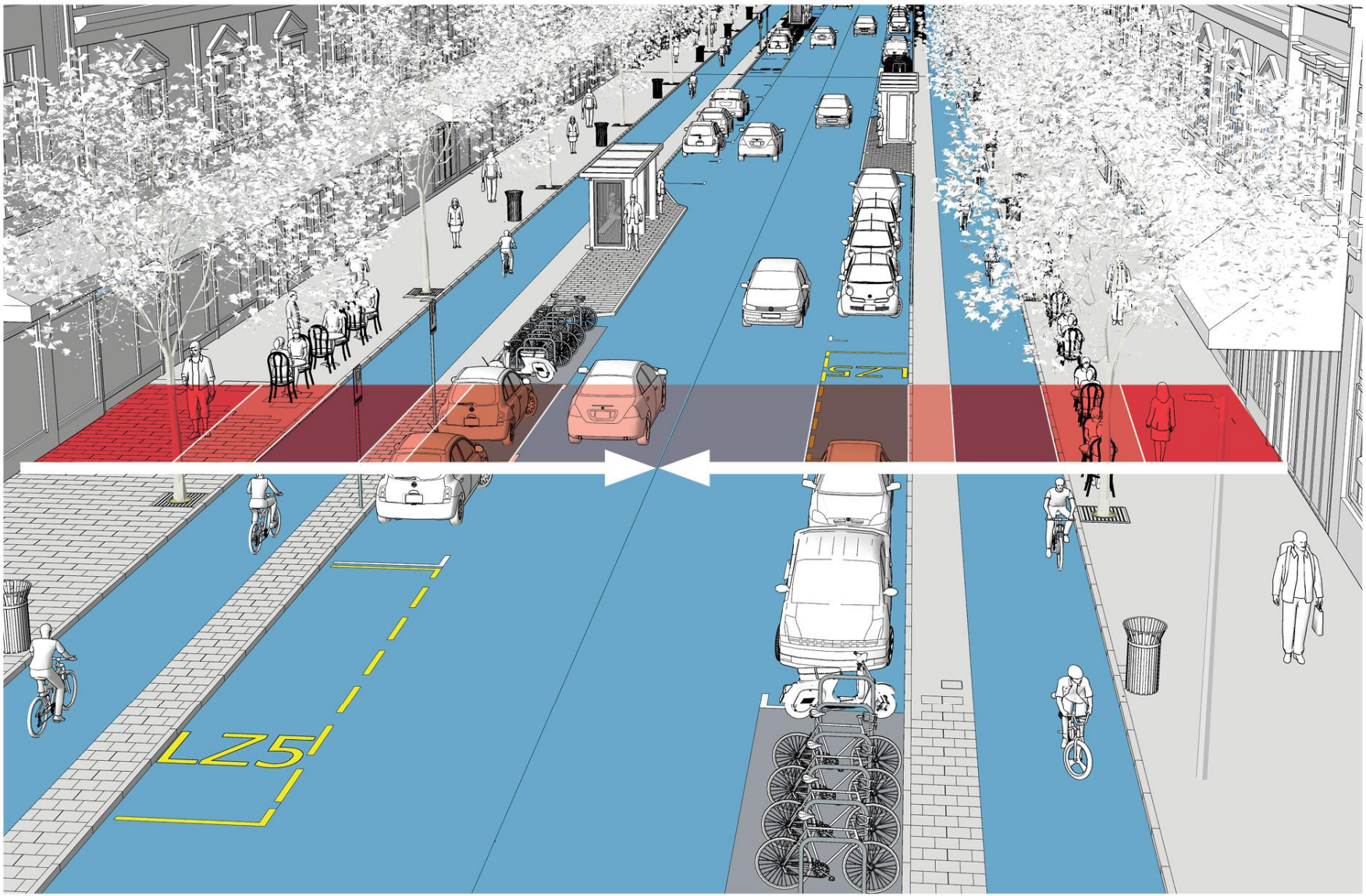
The visual perception and the physical characteristics of different materials can denote a slower or guest environment for cars.



SIGNAL PROGRESSION

Signals can be timed to achieve the street's target speed.

The centreline


SZ1
LZ5