

Safety improvements with Cycleway CW9

An analysis of cyclist collisions resulting in casualties along a section of Chiswick High Road and King Street in London and safety improvements expected with Cycleway CW9.

Executive Summary

We analysed vehicle movements for 115 collisions between cyclists and motor vehicles that resulted in cyclist casualties on Chiswick High Road and King Street.

Our finding was Cycleway CW9¹ would reduce collisions by **75%** based upon collisions that would be prevented and mitigated by the Cycleway CW9 design.

Acknowledgements

We would like to acknowledge and thank the following experts who reviewed and provided comments on this document.

Dr J.P. Schepers, Ministry of Infrastructure and the Environment, Delft, The Netherlands

Dr Rachel Aldred, Reader in Transport, University of Westminster

Professor John Parkin, Professor of Transport Engineering, University of the West of England

“The analysis appropriately uses the best available evidence on the relative safety of two-way cycle tracks adjacent to a carriageway in order to assess the potential future level of risk relative to the current risk. The report provides a robust indication of the reduction in risk as a result of the two-way cycle track”

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¹ Formerly called Cycle Superhighway CS9

Research Approach

Summary

Our approach was:

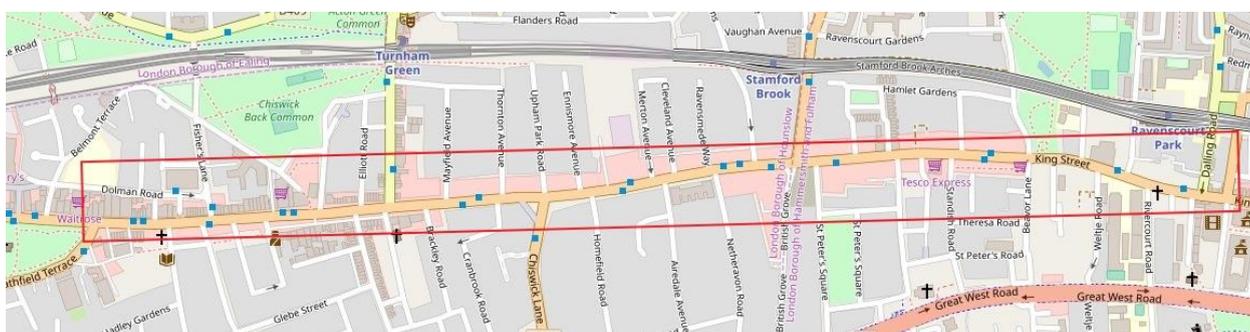
- Collect data on collision reports from a section of the A315 road along Chiswick High Road and King Street
- Analyse cyclist collisions and categorise them into:
 - Types of cyclist collisions which would be “designed out” by CW9
 - Types of cyclist collisions which could still occur with CW9
- Calculate overall impact of CW9 on cyclist collisions based upon collisions designed out and mitigation measures for collisions that could still occur

Data Collection.

Our research analysed cyclist collisions along the CW9 route based upon [STATS19 reports](#) completed by police following a road traffic collision with a casualty.

STATS19 reports are available from [data.gov.uk](#). Several websites (such as [TfL London Collision map](#)) provide a graphical user interface to obtain collision data from STATS19 reports; however, these websites only provide a summary of collision information. Our analysis used vehicle movements in source police collision reports, not summary data.

We collected reports on all collisions occurring on the A315 between the junction of Chiswick High Road and Heathfield Terrace and the junction of King Street and Studland Street, a distance of approximately 2 km. The western part of the A315 is in the London Borough of Hounslow and named Chiswick High Road. The eastern part of the A315 is in the London Borough of Hammersmith and Fulham and named King Street. The borough boundary and change of name is at the junction of Goldhawk Road (A402).



Cycleway CW9 will be protected bi-directional track along this section of the A315. The bi-directional track will be on the south side of the A315. CW9 will not be protected west of the junction of Chiswick High Road and Heathfield Terrace. CW9 will be protected east of the

junction of King Street and Studland Street; however, currently there is no through route for two way cycling east of this junction so collision data from here is not suitable for comparison.

Links to detailed maps of CW9 are in section [References](#) and an example of one section is shown below.



We collected STATS19 reports meeting the following criteria:

- **(Local Authority (Highway) = Hounslow OR Hammersmith and Fulham)**
- **AND (1st Road Number OR 2nd Road Number = 315)**
- **AND (Location Easting OSGR² >= 520690 AND <= 522670)**
- **AND (Date >= 1-Jan-2005 AND <= 31-Dec-2017)**

This produced the following data:

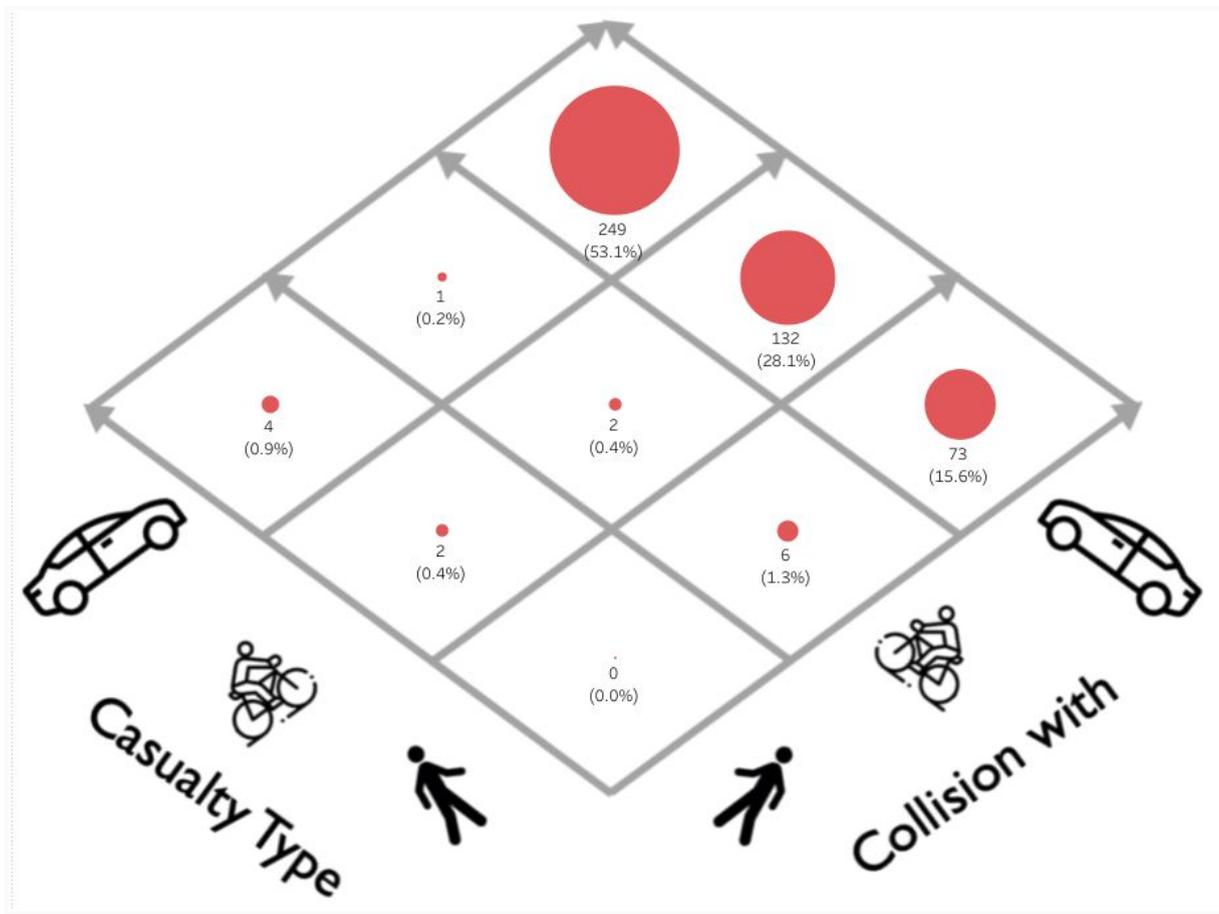
- 430 Collisions
- 469 Casualties

² OSGR = Ordnance Survey Grid Reference

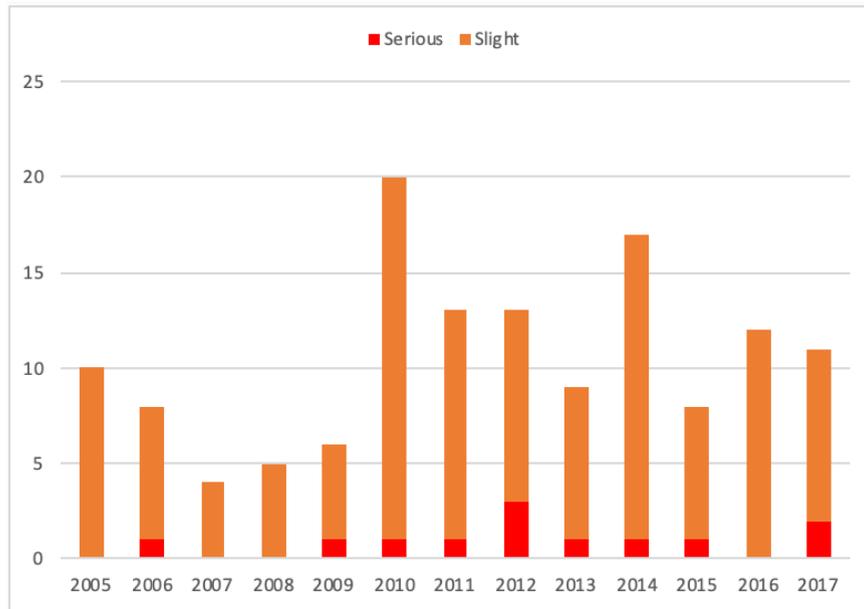
Summary of Casualties



A315 Casualties



A315 Casualty Type



A315 Cyclist Casualties

Analysis of Collision Types

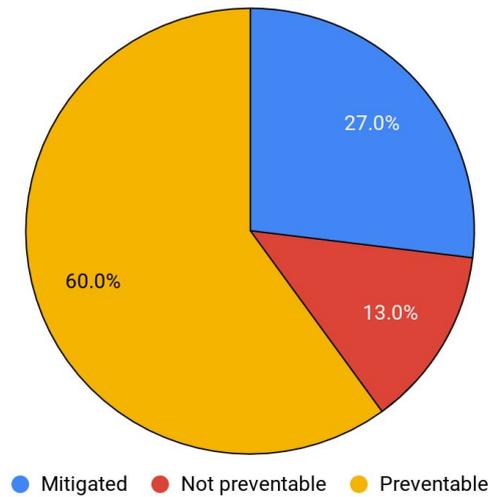
Summary of Analysis

Police STATS19 reports contain **Vehicle Manoeuvre** fields for each vehicle involved in a collision.

We analysed the **Vehicle Manoeuvre** fields for collisions involving a pedal cycle and another motor vehicle (there were two collisions involving a pedal cycle and two motor vehicles)

		Motor Vehicle Movement													Grand Total		
		Reversing	Parked	Waiting to go - held up	Slowing or stopping	Moving off	U-turn	Turning left	Turning right	Waiting to turn right	Changing lane to left	Changing lane to right	Overtaking moving vehicle - offside	Overtaking static vehicle - offside		Overtaking - nearside	Going ahead other
Cycle Movement	Waiting to go - held up				0.8%				0.8%								1.5%
	Slowing or stopping			0.8%													0.8%
	Moving off					0.8%			0.8%								1.5%
	Turning left					0.8%											1.5%
	Turning right								1.5%							5.3%	6.8%
	Waiting to turn right						0.8%							0.8%			1.5%
	Changing lane to right												0.8%			1.5%	1.5%
	Overtaking moving vehicle - offside											0.8%					0.8%
	Overtaking static vehicle - offside		1.5%							2.3%				0.8%			4.5%
	Overtaking - nearside		0.8%		0.8%				3.0%	1.5%							6.0%
	Going ahead other	0.8%	11.3%		0.8%	0.8%	1.5%	12.0%	26.3%	0.8%	2.3%	1.5%	2.3%	0.8%	0.8%	12.0%	73.7%
	Grand Total	0.8%	13.5%	0.8%	2.3%	2.3%	2.3%	15.8%	33.1%	0.8%	2.3%	2.3%	2.3%	2.3%	0.8%	18.8%	100.0%

We then analysed the vehicle directions in the detailed Police STATS19 reports to assess if the collision could have been prevented if the cyclist was using CW9 or could still have occurred with CW9. The detailed analysis is in section [Appendix 1: STATS19 Analysis](#).



Analysis of Collision Types

Collisions Preventable by CW9

Some types of collisions have been designed out by CW9 as they cannot occur with cycles separated from vehicles by a protected cycle track.

Examples of these types of collisions are cyclists being “doored” by parked motor vehicles and cyclists being hit by motor vehicles when both cyclist and motor vehicle are travelling in the same direction along the carriageway.

Other collisions have been designed out as CW9 is a bi-directional track along the south side of the A315. Collisions cannot occur between cycles travelling along CW9 and vehicles entering or exiting roads on the north side of the A315.

Our analysis shows that CW9 design could have prevented **60%** of collisions occurring along the A315.³

Collisions Mitigated by CW9

Collisions can still occur between cyclists on CW9 and vehicles crossing the cycle track when entering or exiting side roads on the south side of the A315.

³ 22% involving motor vehicle turning movements on north side of A315, 25% involving motor vehicle and cycle travelling in the same direction along A315, 12% involving cycles hit by open vehicle doors, 1% involving turn that will be banned from Dukes Avenue.

The design of CW9 will mitigate the risk of collisions compared to no cycle track as the cycle track will be more apparent to drivers than cyclists mixed in with general traffic.

Our analysis shows that CW9 design could have mitigated **28%** of collisions occurring along the A315.

The reduction of risk by mitigation measures is discussed in section [Safety Impact of CW9](#).

Collisions Not Preventable by CW9

12% collisions could not have been prevented or mitigated by CW9. For example, a collision involving a cyclist entering or exiting a side road off the A315.

Unable to Classify

We were unable to classify 19 collisions. Detailed STATS19 reports were not available for 6 collisions and 13 STATS19 reports stated it was not known how the collision occurred.

Safety Impact of CW9

Research on cycle track safety

There is no dispute that segregated bi-directional cycle tracks are very safe if there are no intersecting roads as they remove the risk of any collision between the cycle and motor vehicles.

The point at issue is whether the such cycle tracks elevate the risk at intersections where there are no traffic lights to control the priority. There are a number of such intersections on CW9 and while cyclists have priority, that of course does not prevent collisions. In addition these intersections are set back 2 m to 5 m from the A315 and are raised above the road surface to indicate cycle priority and reduce the speed of vehicles at the intersection (allowing drivers more time to scan for cyclists and reducing impact speed if a collision occurs).

The most comprehensive study on this particular topic was by [Schepers in 2011](#), cited by more than 100 subsequent publications. This study looked at 339 collisions with a range of junctions. The goal of the study was to quantify the independent risk factors for several characteristics of the junctions. These risk factors can be expressed as a simple multiplier of the underlying risk: a number greater than one indicates increased risk of collision.

The results from Schepers for the relevant characteristics of CW9, where cyclists should have priority at un-signalised crossings are as follows:

Cycle Track Attributes	Risk Factor for through cyclists
One-way	1.0 (control)
Two-way	1.75
2-5m offset from road	0.55
Raised crossing	0.49

Hence a two-way intersection alone will increase risk by a factor of 1.75. However combining with an offset and raised crossing reduces the overall risk by $1.75 \times 0.55 \times 0.49 = 0.47$. Hence CW9 can be expected to reduce the risk of collisions at such intersections by just over a factor of two according to this study. This improvement at intersections for through cyclists is in addition to the unquestioned improvements in safety from segregation from traffic between intersections.

Although this study was conducted in the Netherlands, a more recent study confirmed the results in London ([Li et al. 2017](#)). This study concludes:

"Compared to other CS routes, it is relatively safer to cycle on CS3, since most segments of CS3 are raised from the road and separated from the motor lanes. There would be a safer environment for cycling if such designs can be applied consistently on all other routes."

Application of Research on A315 Collision Data

We applied the following risk factors to the collisions analysed along the A315.

Collision Type	Number	Percentage of total	Risk Factor	Risk
Preventable	69	60%	0.00	0.00
Mitigated (referred to as Type 1 by Schepers)	32	28%	0.47	0.13
Not preventable	14	12%	1.00	0.12
Total collisions with known types	115	100%		0.25

Therefore compared to the control, CW9 should reduce the risk of collision by **75%**.

Other Collision Risk

CW9 will introduce a collision risk for cyclists turning left from un-signalled side roads on the north side of the A315 because the cyclist must cross both carriageways of the A315 to access CW9 on the south side of the A315.

However, CW9 removes a collision risk for cyclists turning right from un-signalled junctions on the south side of the A315 because the cyclist does not have to cross any carriageways of the A315 to access CW9.

For the section of the A315 under consideration, there are 16 un-signalled junctions on the north side and 19 un-signalled junctions on the south side with a legal exit onto the A315.

We have assumed that increased risk of collision taking a left turn from side roads on the north side of the A315 will be cancelled out by the removed risk of collision taking a right turn from side roads on the south side of the A315.

References

[TfL Consultation Report](#)

[King Street West Plans](#)

[Chiswick High Road Plans](#)

[Updated Plans for Dukes Road section of Chiswick High Road](#)

Road factors and bicycle–motor vehicle crashes at unsignalized priority intersections
J.P. Schepers, P.A. Kroeze, W. Sweers, J.C. Wüst
Accident Analysis and Prevention 43 (2011) 853–861

Safety effects of the London cycle superhighways on cycle collisions
Haojie Li, Daniel J. Graham, Pan Liua
Accident Analysis and Prevention 99 (2017) 90–101

Appendix 1: STATS19 Analysis

Detailed analysis provided upon request.

Appendix 2: Example STATS19 Report

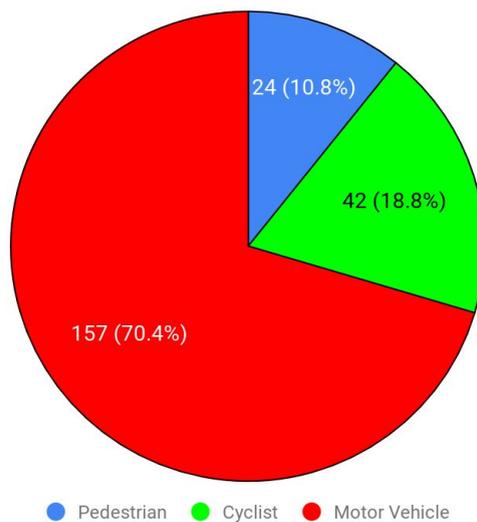
SEVERITY	District	Hourslow	Chiswick High Road - 12 year to May 2018		Grid Reference	520870 / 178490		
SERIOUS	Ref.No	15TX20568	Accident Date BETWEEN '01-Jun-2006' AND '31-May-2018'		Police Officer Attend:	Yes		
Date	23/07/2015	Day	Thursday		Road	A315 Location Chiswick High Road J/W Duke Road.		
Time	19:16	Weather	Fine without high winds		Description of Accident	Driver of V1 Opened Car Door in Path of V2 Causing Collision.		
Road Surface	Dry	Street Lighting	Daylight					
Speed Limit	30 MPH		SPECIAL SITE CONDITIONS	CONTRIBUTORY FACTORS		PARTICIPANT	PROBABILITY	
Carriageway	Single carriageway		None	405 Failed to look properly (Driver/Rider - Error)		Vehicle 001	A	
Junction Detail	T or staggered junction		CARRIAGEWAY HAZARDS	904 Vehicle door opened or closed negligently (Special Codes)		Vehicle 001	A	
Junction Control	Give way or uncontrolled							
2nd Road Number	U							
Pedestrian Facilities	None within 50 metres							
	Zebra crossing							
VEHICLES INVOLVED				2				
CASUALTIES INVOLVED				1				
Veh.No.	1	Vehicle type	Car	Make	Model	Cas No	1	
Manoeuvre	Parked	Severity	SERIOUS	Driver or Rider	Age	59 yrs	Sex	Male
Veh. direction from	Parked to Parked	Towing?	No tow or articulation	Post code	TW3			
Skidded	No skidding, jack-knifing or overturning		Car Passenger?	Not a passenger		PSV Passenger?	Not a passenger	
Veh location at impact (restricted lane)	On main carriageway not in restricted lane		Seat Belt	8		Cycle Helmet		
Junct. location of veh. at 1st impact	Approaching junction or waiting		Ped Movement	Not applicable				
Veh left carriageway?	Did not leave carriageway		Ped Location	Not applicable				
Hit object in c'way?	None		Ped Direction to	Not applicable				
Hit object off c'way?	None		School Pupil	Other				
First point of impact	Offside		Roadworker injured		Other Details			
Veh registration no.		Other veh.hit (ref.no)	2	Hit and run	Not hit and run			
Drivers age	25 yrs	Sex	Male	Breath test	Negative		Driving Lic	
Left Hand Drive	Unknown	Foreign veh.	Not foreign registered vehicle					
Journey purpose	Other		Post code		TW5			
Veh.No.	2	Vehicle type	Pedal Cycle	Make	Model			
Manoeuvre	Going ahead other							
Veh. direction from	West to East		Towing?	No tow or articulation				
Skidded	No skidding, jack-knifing or overturning							
Veh location at impact (restricted lane)	On main carriageway not in restricted lane							
Junct. location of veh. at 1st impact	Approaching junction or waiting							
Veh left carriageway?	Did not leave carriageway							
Hit object in c'way?	Open door of vehicle							
Hit object off c'way?	None							
First point of impact	Front							
Veh registration no.		Other veh.hit (ref.no)	1	Hit and run	Not hit and run			
Drivers age	59 yrs	Sex	Male	Breath test	Not Applicable		Driving Lic	
Left Hand Drive	Unknown	Foreign veh.	Not foreign registered vehicle					
Journey purpose	Commuting to/from work		Post code		TW3			

Appendix 3: Casualties on Brentford Section of CW9

We also analysed casualties on the Brentford section of the CW9 route, on the South Circular (A205) from the junction with Wellesley Road to Brentford High Street (A315) junction with Alexandra Road.



This section of the route had the following breakdown in casualties.



Traffic Casualties A205-A315 Brentford 2005-2017

To enable comparison between different lengths of roads with different numbers of cyclists, we calculated the casualties per km per year and divided this by the Department for Transport counts for Average Daily Number of Cyclists.

The resulting figures were

Section of Route	Casualties per km per year per 1000 cyclists
Chiswick High Road - King Street	3.7
South Circular - Brentford High Street	2.6

This indicates that Chiswick High Road and King Street is more dangerous for cyclists than the Brentford section of the route.