Designing for Cycle Traffic

Designing for Cycle Traffic

International principles and practice

John Parkin

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Foreword

It is just too dangerous!

This widespread justification among the general public for not riding a bicycle has become almost a mantra, a self-evident truth. Cycling looks dangerous and, quite often, probably feels dangerous. The argument is hard to gainsay. Its mixture of facts and feelings is not readily countered by a strictly logical appeal to the actual statistics of cycling casualties.

And yet the rationale that underpins the case for cycling as a mode of urban transport is irrefutable. Cycling really does 'make sense'. It is an efficient use of public space; it helps to address issues of congestion and pollution, and it can play a very positive role in the general physical and mental health of the nation.

We have to find ways to encourage and attract more people to take up cycling. To do this, first and foremost, cycling needs to look, and to be, safe for everyone. The claim of one city mayor that cycling was '98% safe' really is not reassuring! To be a plausible option for short everyday trips, cycling needs to be safe from pushchair to wheelchair, from eight to eighty.

But it is not like that at present, and the reason is not hard to find. Since the mid-1960s, cycling has effectively been designed out of our road infrastructure. Roads are being built with only cars in mind, and this has been the case for decades. Indeed, Buchanan (1963) even questioned whether there would be any transport cycling by the turn of the century. Road design has created a legacy of inappropriate infrastructure, an environment hostile for cyclists. It has contributed to divisive attitudes, leading to a level of aggressive behaviour between the 'tribes' of motorists and cyclists, which is not conducive to encouraging anyone to take up cycling.

So, what is to be done? This book by John Parkin addresses the critical components of the solution, namely 'designing for cycle traffic'. Where new infrastructure projects are being developed, designing for cycling costs little extra in the overall budget of the whole scheme. By contrast, retrofitting safe and convenient facilities for cyclists is costly and, if it entails any reallocation of road space, controversial and bitterly contested. Just as cycling has been, de facto, 'designed out', it is urgent that we now ensure all future road schemes build in safe cycling from the start.

Road design must address issues of traffic speed and the layout of give-way junctions, roundabouts, signals and crossings. All these factors contribute to safe roads; getting them wrong is frequently the indirect cause of road-user conflict, and of collisions, which when cyclists are involved, also usually means injury. They are all covered in detail in this book. Additionally, the routes themselves must have other qualities – of being convenient, easy and attractive – if they are to persuade people to change their habitual travel behaviour. Crucially, the routes that are built need to be 'from somewhere to somewhere' not, as has so often been the case, installed merely for convenience as a token 'green gesture'. 'Build it and they will come' is not an adage to which I subscribe – they may very well not come if what is

provided is not relevant to real travel needs. How often have cycle routes been constructed that end with the dispiriting road-sign advising that ‘cyclists dismount’? What sort of journey is that?

Building safe, high-quality infrastructure is not the only element necessary to make urban cycling more attractive. A whole range of measures – from secure, convenient cycling parking, to signing and way-finding, as well as professional cycle training – have a part to play. For cycling to become a normal everyday activity, significant societal and cultural change needs to take place.

Creating this change and turning the vision of efficient transport into reality is a major challenge, requiring determined leadership and strong political will. But this challenge needs to be inspired by, and based on, imaginative, functional, high-quality design. Design must deliver streets that are for us all, as people, and not simply for vehicles.

In this book, John Parkin draws attention to the importance of appropriate language in our speaking and writing (and hence our thinking) and planning for cycling. I wholeheartedly endorse this emphasis on the importance of how we frame the issues that confront city dwellers – illustrated by congestion, the speed and volume of traffic, and the sheer difficulty of crossing the road, even for the fleet of foot. But these are in reality the manifestations of deeper and more fundamental questions, namely ‘Who are our streets for?’ and ‘What sort of places do we want to live in, and our children to grow up in?’

Places that are attractive for our everyday lives will also be attractive to everyone for walking and cycling. In contrast with the antagonistic and sterile debate of ‘motorists versus cyclists’, the notion of creating places that are liveable for everyone is a unifying proposition. We all want to pass our time in safe, attractive and enjoyable surroundings.

This is why John Parkin’s book places cycling in the wider context of urban design, and why the language of ‘what we talk about when we talk about cycling’ is so very important.

If the lessons and good practice that have so cogently and extensively been documented in this book are taken to heart, and realised by the new generation of traffic engineers, planners and designers, they will have achieved John Parkin’s noble purpose.

Phillip Darnton OBE
London
January 2018

Biography

Following his role as chairman and chief executive of Raleigh Industries Ltd., Phillip was appointed by the Secretary of State for Transport as chair of Cycling England from 2005 until its abolition in 2011. Since then he has undertaken a range of pro bono appointments for various public and private cycling-related groups. He is chair of the UK Department for Transport’s Cycle Rail Working Group, and executive director of the Bicycle Association. In 2010, he was awarded an OBE for services to cycling.

Reference

Buchanan C (1963) *Traffic in Towns: A Study of the Long Term Problems of Traffic in Urban Areas. Reports of the Steering Group and Working Group Appointed by the Minister of Transport.* Her Majesty’s Stationery Office, London, UK.

Preface

The fabric of communities should be designed principally for people. Streets are the arteries of a community that give it life. Sclerotic traffic conditions are created by the inefficient use of motor vehicles as a means of travel. Motor traffic also poses significant risk, as evidenced by the collision record. The cycle is not only more space-efficient than motor vehicles; it creates safer much more liveable cities as well.

Creating appropriate designs that encourage cycle use will sustain economic vibrancy, create social inclusivity and minimise environmental damage. As well as being an efficient mode for purposeful travel, cycling is a popular leisure activity.

The aim of this book is to provide a coherent summary and evaluation of the principles and practices for designing for cycle traffic. Creating attractive and comfortable infrastructure for cycle riders will also create an attractive and comfortable public realm for everyone.

Cities constantly develop, and so too do streets. In the Americas, renewed interest has been seen in the potential for cycle traffic from the east coast (New York) to the west coast (Portland), and in Bogotá and Buenos Aires. In Europe, Seville in Spain created a network of routes for cycle traffic very rapidly from a low starting point, and the Dutch have recently refreshed their policy on and investment in cycling.

The book is timely because there has recently been significant development in design guidance and design practice internationally. The US National Association of City Transportation Officials produced comprehensive guidance in 2012. The Danish collection of cycling concepts was updated in 2012. Transport for London has been at the forefront of the design development and implementation of

schemes for cycle traffic, and published a revised version of its guidance in 2016. Highways England also published a new standard in 2016. A wholly revised version on Dutch design guidance was introduced in 2017, with significant new emphasis on inter-urban cycle highways. Recently published Welsh guidance is being further updated in 2018.

The book focuses on design and operational appraisal of best international principles and practice for streets and their junctions, as well as separated cycleways. It also deals with civil engineering construction details. Planning processes are dealt with and issues for developing nations are covered. The final chapter discusses innovation.

The book draws on first principles and empirical evidence; to help develop thinking and behaviours, there is an emphasis on appropriate language throughout.

Designers may be drawn from many disciplines, including traffic and highway engineering, transport planning, spatial and town planning, architecture and urban design. The book is for these people, and students in these fields.

John Parkin

Frenchay

February 2018

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I would particularly like to thank Brian Deegan, a pioneer designer for cycle traffic, who reviewed the whole book. Also, special thanks to Rob Gallagher who provided valuable information to support the writing of Chapter 14. All the reviewers provided insightful comments about structure and content, and some reviewers did a splendid job of thoroughly subediting my text as well. The reviews were knowledgeable and perceptive, and the reviewers told me in no uncertain terms when I

was wrong. Of course any omissions and errors remain entirely my responsibility.

For help with photographs and plans, I would like to thank Isabelle Clement, Kevin Hickman and Alex Ingram at Wheels for Wellbeing, Mike Davies, Grant Weller and Vanessa Kelly at Cambridgeshire County Council, John Dales at Urban Movement, and John Bennett at the Park Centre.

Finally, I would like to thank Kate Parkin, who has patiently tolerated my long hours at the computer during the writing of the book. She also sacrificed two holidays to photography field trips.

Thank you one and all.

John Parkin

About the author

John Parkin is a Chartered Civil Engineer and Professor of Transport Engineering at the University of the West of England, Bristol.

He began his career in highway and traffic engineering with consulting engineers, and has been involved in all stages of the promotion of transport schemes, including policy formulation, modelling and forecasting, operational analysis and economic appraisal, design and construction, and monitoring and evaluation. He has experience

across all land-based modes of transport and has a particular specialism in cycling. His research has included modelling, empirical traffic engineering research, and monitoring and evaluation. He has been involved in developing cycle traffic design guidance and in training highway and traffic engineers.

Glossary and abbreviations

AADT	Annual average daily traffic; the total estimated volume of two-way traffic carried in a year on a road, divided by 365. Sometimes called ADT (average daily traffic)
Absolute minimum	Design parameter that may be used where there is a physical constraint on existing roads where a cycle facility is proposed, or an existing cycle facility is to be improved within the highway boundary (see also <i>desirable minimum</i>)
Advanced stop line	A stop line at a signal-controlled junction that creates a space for cycle traffic to wait at a red aspect, and that is located some distance downstream of the stop line for general traffic (see also <i>bike box</i>)
Advisory cycle lane	A cycle lane bounded by a broken white line
Bicycle highway	Regional main cycle track with a high-quality finish that is separate from roads carrying motor traffic (Dutch definition; not to be confused with <i>cycle highway</i> or <i>cycle superhighway</i>)
Bicycle path or bike path	Cycleway (USA)
Bicycle	A cycle with two wheels
Bike box	See <i>advanced stop line</i> (USA)
Bike lane	See <i>cycle lane</i> (USA)
Bridleway	The UK legal definition is as follows: a highway over which the public have the following, but no other, rights of way, that is to say, a right of way on foot and a right of way on horseback or leading a horse, with or without a right to drive animals of any description along the highway, and the right to ride a pedal cycle, not being a motor vehicle, on any bridleway, but in exercising that right cyclists shall give way on bridleways
Buffer distance	Horizontal separation between the edge of a carriageway and a cycle lane or cycle track
Bus lane	A lane within a carriageway separated by a solid white line from the rest of the carriageway and reserved for buses, and also cycle traffic
Byway open to all traffic (BOAT)	The UK legal definition is as follows: a highway over which the public have a right of way for vehicular and all other kinds of traffic, but which is used by the public mainly for the purpose for which footpaths and bridleways are used
Carriageway	The UK legal definition is as follows: a way constituting or comprised in a highway, being a way (other than a cycle track) over which the public have a right of way for the passage of vehicles
Cycle highway	A cycle lane or track within a highway (see also <i>bicycle highway</i> and <i>cycle superhighway</i>)
Cycle hire scheme	A scheme that allows the general public to hire cycles, sometimes from docking stations, sometimes not

Cycle lane	A lane within a carriageway for use by cycle traffic (see also <i>advisory cycle lane</i> and <i>mandatory cycle lane</i>)
Cycle network	A set of connected cycle routes
Cycle route	Any route that can be used by cycles, including cycleways, cycle tracks, bicycle highways, cycle highways, cycle superhighways, stepped cycle tracks, light segregated cycle lanes, cycle lanes and carriageways
Cycle superhighway	A cycle lane or track within a highway (see also <i>bicycle highway</i> and <i>cycle highway</i>)
Cycle track	The UK legal definition is as follows: a way constituting or comprised in a highway, being a way over which the public have the following, but no other, rights of way, that is to say, a right of way on pedal cycles (other than pedal cycles which are motor vehicles within the meaning of the Road Traffic Act 1988) with or without a right of way on foot
Cycle traffic	A type of traffic where the vehicles meet the definition of a cycle
Cycle	A vehicle propelled by foot- or handcranks and usually having two or more wheels, including: bicycles, solo tricycles, handcranked cycles, tandem cycles, recumbent cycles, trailer cycles (tandems with a hinge, usually with a rear seat to carry a child), cycles towing trailers, cargo cycles and cargo tricycles
Cyclepath	A term that should not be used in connection with design for cycle traffic (see <i>cycleway</i>)
Cycleway	A route for cycle traffic, with a meaning that conveys a useful equivalence to carriageway
Design speed	The speed used to determine the geometric features of transport infrastructure
Desirable minimum	Design parameter that applies where the conditions for use of absolute minimum criteria are not applicable (see also <i>absolute minimum</i>)
Footpath	The UK legal definition is as follows: a highway over which the public have a right of way on foot only, not being a footway
Footway	The UK legal definition is as follows: a way comprised in a highway which also comprises a carriageway, being a way over which the public have a right of way on foot only (often erroneously called a footpath; see also <i>sidewalk</i>)
Grade separation	The vertical separation created where two routes cross each other at a junction (see also <i>separation</i>)
Greenway	A route that is used by cyclists and pedestrians, usually for recreational purposes
HGV	Heavy goods vehicle
Highway	The UK common law definition is as follows: a way over which the public has the right to pass and repass; this may be any way, court, alley, footpath or bridleway
Light segregated cycle lane	A mandatory cycle lane that is separated from the carriageway by intermittent physical objects
Link	That part of a network that connects junctions; hence, another word for a road, street, cycle track or cycleway
Mandatory cycle lane	A cycle lane bounded by a solid white line

Motor traffic	A type of traffic where the vehicles meet the definition of a motor vehicle
Motor vehicle	A mechanically propelled vehicle, intended or adapted for use on roads
MOVA	Microprocessor-optimised vehicle actuation (at signal-controlled junctions)
Nearside	The location relative to a road user or road feature of another road user or road feature; for the left-hand rule of the road, nearside is to the left-hand side (see also <i>offside</i>)
Offside	The location relative to a road user or road feature of another road user or road feature; for the left-hand rule of the road, offside is to the right-hand side (see also <i>nearside</i>)
Path	A way or track made for walking, with the meaning being derived from the fact that it was created by treading action (see also <i>footpath</i>)
Pavement	An engineering term used to describe the material comprising the surface and supporting structure of a carriageway, footway or cycle track
PCU	Passenger car unit, a traffic engineering term used to describe the effect in a stream of traffic of a vehicle relative to the effect of one car
Raised cycle track	Cycle track that is not at the same level as the carriageway (USA)
Restricted byway	The UK legal definition is as follows: a highway over which the public have restricted byway rights, with or without a right to drive animals of any description along the highway, but no other rights of way; restricted byway rights means: (a) a right of way on foot, (b) a right of way on horseback or leading a horse and (c) a right of way for vehicles other than mechanically propelled vehicles
Road	Any highway to which the public have access
SCOOT	Split-cycle offset optimisation technique (at signal-controlled junctions)
Segregation	The state where cycle traffic does not mix with other motor traffic or pedestrians; usually, though not exclusively, used in the context where they are kept apart in the horizontal plane (often used interchangeably with <i>separation</i>)
Separation	The state where cycle traffic does not mix with other motor traffic or pedestrians; usually, though not exclusively, used in the context where they are kept apart in the vertical plane (for example, <i>grade separation</i> ; often used interchangeably with <i>segregation</i>)
Sidewalk	Footway (USA)
Stepped cycle track	A cycle track that is adjacent to the carriageway and is constructed at an intermediate height between the carriageway and either the verge or the footway
Street	A road, typically in a built-up area
Traffic	Moving vehicles
Trail	A cycle and pedestrian route used for recreational purposes
UTC	Urban traffic control; centralised management of traffic flow using linked sets of traffic signals
Vehicle actuation	The triggering of demand in a signal controller because of the presence of traffic