

Road & Transport Research



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Illustration referred to in
Alan Parkers article.

- **Accidents at roundabouts in NSW**
- Geometric design consistency based on speed change on horizontal curves
- The work of the PIARC Technical Committee C1 Surface Characteristics
- Expediting pavement improvements in heavy traffic areas
- OECD Cooperative international research into vehicle-road interaction

Opinion

In keeping with the theme of several contributions to this issue of 'Road and Transport Research', Alan Parker offers some typically robust and thought-provoking opinions about the hostility of the road system to cyclists - particularly at roundabouts. While these, of course, are Alan's views, we publish the following as a contribution to the gradual improvement of Australia's technical guides and resources. Your responses are welcome.

ROUNDAABOUTS ON MAIN ROADS: A NON-MOTORISED USERS PERSPECTIVE.

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The first time I was clipped by a car on a roundabout was 40 years ago in the UK, commuting to my office by bicycle. Even so, it did not bother me much in those days, being young, very fit and able keep up with what we would now regard as vintage cars with poor acceleration and limited by a 30 mph speed limit. How could I possibly feel insecure? In those days, most roundabouts were single lane and like most young males my confidence was boosted by an overdose of testosterone. Fortunately there were a few older and wiser people to learn from and one veteran cyclist said to me 'the last roundup for cyclists is going to be the roundabout' - a very perceptive prediction.

In the late sixties, living in the New Town of East Kilbride in Scotland, I rode under bicycle friendly roundabouts and learnt that some road designers and planners also anticipated the safety problem that 'at grade' roundabouts pose for all non-motorised users. Grade separated roundabouts were starting to be used in all the New Towns.

The chief engineer/designer of the 'Mark 1' New Town of Stevenage, which had the most comprehensive bikeway system in Britain at that time, published his bicycle planning guidelines including how to grade separate cyclists and pedestrians at roundabouts (Claxton 1968).

ROUNDAABOUTS IN THE UK AND SWEDEN

By 1970, many roundabout designs had been trialed in Stevenage and their publication 'Roundabouts' written for motorists shows illustrations of grade separated installations and advises motorists to 'select a low gear and adjust speed to 20 mph. (32 km/h)' which is good indicator of appropriate roundabout speeds. The comment is also made about UK roundabouts generally 'that it is rare in towns that a speed of over 25 mph. (40 km/h) can be attained'. I am arguing here that 40 km/h should still be the maximum design speed and with the benefit of hindsight we now know that this is one of the reasons why the road death rate per 100,000 population in Stevenage and other New Towns is now one third to one half of the national average.

In 1975 the Swedes produced a national bikeway design manual (Report 33 1975) which shows a separate two way bicycle path around the perimeter of a two lane roundabout. The text neatly defines the problem of ordinary cyclist:

'Roundabouts are built on the principle that the vehicles will weave with each other at approximately the same speed. This presents a problem for the cycle traffic which should not be mixed with the car traffic without being assigned to a cycle track and a cycle pavement crossing'.

In May 1980, when on a study tour of several English New Towns, I rode my bicycle over and under grade separated roundabouts with shared footways or separate foot paths and bicycle paths. There are also some good examples of grade separation of bicycle paths in Canberra. The post World War 2 decision to boost Canberra was initially the result of Menzies' commitment to the ideas of the English new towns movement, which happily coincided with the National Capital Development Commission recruiting many of its planners from the UK (many of whom had experience with the New Town development corporations), so it should come as no surprise that there are good examples of roundabouts with bicycle paths bypassing them.

The road death rate per 100,000 people in the ACT has been half the national average most years since 1975 and it is the only Australian City with a separate bikeway network. Comment about the fatal accident rate in Canberra compared with other cities is problematic because cyclist exposure data on bicycle kilometres ridden is not available in Australia like it is in the Netherlands, UK and Sweden. Based on data from the Netherlands, my 'back of the envelope calculation' is that in 1997 the bicyclist death rate per 100 million km would be around 2.5 in Canberra (similar to that in Dutch cities) and around 5.5 in the state capital cities. (F.O.R.S. 1988)

Sadly for UK and Australian cyclists, since 1965 the New Town grade-separated roundabouts have been the exception and not the rule. The Planning Advisor to the Cycle Touring Club (CTC), a national organisation with 60,000 members, warned of the need for even experienced cyclists to avoid using roundabouts. Up until this time the CTC had jealously guarded cyclists' right to use the road, but by 1983 cars were much faster and traffic was much heavier and the need for some separate bicycle facilities was now urgent. Too many CTC members had been killed and injured and the warning was very specific:

'Roundabouts can extremely dangerous for cyclists; at roundabouts the balance of safety may lie in the shared use of grade separated facilities.' (Watkins 1983)

Transport and Road Research Laboratory (TRRL) researchers worked closely with members of the Cycle Touring Club (Layfield and Maycock 1986) and their published report confirmed cyclists' worst fears. By 1984 there were 2,230 roundabouts on main roads in the UK and many of them were multi lane roundabouts; the risk of an accident on a multi lane roundabout is much higher for cyclists, partly because of the higher vehicle speeds. The errant motorist can cut across the motor lanes and speed through a roundabout (see Fig. 1).

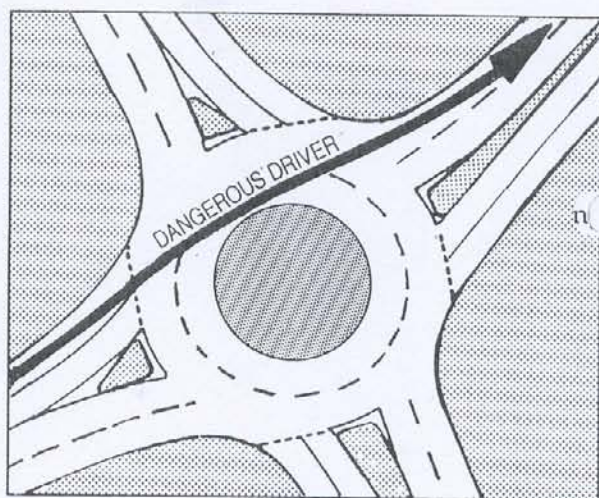


Figure 1
The path of a dangerous car driver speeding through an Australian two-lane roundabout

Most of this information was submitted to the State Bicycle Committee of Victoria at the time but was ignored by the road fraternity. Meanwhile the message was getting through to government in the UK. In 1986 the Department of Transport (D[†]) (1986) stated the following which still applies today to multilane roundabouts in the UK and in Australia:

'Roundabouts appear to be a particular hazard for pedal cyclists: the main conflicts are between cyclists already on the roundabout and motor vehicles either entering or leaving the roundabout. No satisfactory method has been found for reducing the risk to cyclists once they have entered the circulatory system'.

In 1996 little had been done outside of the UK New Towns, and multi-lane roundabouts are still a major deterrent to cycling because they are dangerous and perceived as being so by most cyclists (Allott and Lomax 1991). In the UK, roundabouts provide the worst examples of discrimination against cyclists in the traffic system.

ROUNDBABOUTS IN THE NETHERLANDS

Fortunately for cyclists there is the example of the Netherlands, where the urban population is nearly the same as the Australian urban population and 85% of the Dutch still ride bicycles. After cycling in ten Dutch cities in 1997 and experiencing for myself what has been done, I do not need to be convinced that it is the home of world best practice in bicycle planning and provision. Not only that, they have made great progress with developing bicycle and pedestrian friendly roundabouts. In the nineties the Dutch have been building around 50 single lane roundabouts on main roads a year. According to the English language version of the Dutch national bicycle design manual they are safer for all road users including cyclists:

'As result of relatively tight dimensioning the speed of motorised traffic on and in the vicinity of roundabouts is reduced to 30 to 35 km/h. Hereby not only the total number of accidents but also the number of injury-related accidents is substantially lower than at junctions. Research has shown that 16% of accidents at roundabouts had serious consequences. In 25 % of all accidents cyclists and/or moped riders were involved. Although victims at roundabouts are also mainly cyclists and moped riders, on balance road safety is strongly improved for them too.' (C.R.O.W. 1993a, p.183)

In the Netherlands, multilane roundabouts are clearly recognised as being dangerous for cyclists and, as a general rule, have grade separated bicycle paths. In practice the Dutch have developed some interesting single lane roundabout designs which are much safer for cyclists but they oppose in principle even having a narrow second lane for bicycles because it allows errant motorists to travel at higher speeds. The English language summary of the Dutch language publication 'Rotondes' (C.R.O.W. 1993b) states:-

'In principle, it is not advisable to construct roundabouts with a cycle lane. Due to the application of a cycle lane, the road surface is widened to such an extent that the speed of motorised traffic increases. If it is not possible to construct a roundabout with a separate lying track [see cover photo], then a roundabout with cycle-lane separated from the carriageway by a physical barrier is a good alternative [see Fig. 2]. In principal, roundabouts with separate lying tracks are preferable for situations outside built up areas.'

Since 1990, as part of the Dutch national environment plan and their National Bicycle Master Plan, there has been some positive discrimination in favour of cyclists. Why else would they spend A\$1.2 billion on bicycle facilities since 1990? Whatever the reason for the production of their high quality English language bicycle planning guides (C.R.O.W. 1993a), Australian cyclists have a reason to be grateful because Dutch road engineers know what should and should not be done to make cycling safe.



Figure 2
Roundabout with a protected bikelane west of Tilburg,
The Netherlands (photograph by Alan A. Parker)

AN EXPERIENCED BICYCLE RIDER'S PERSPECTIVE 1997

Having ridden a bicycle recently around Dutch, British and Australian roundabouts that are not grade separated it seems to me that the extremes of what is safe or unsafe for cyclists is a spectrum of many alternative designs in different road speed and traffic volume environments. For example, the Dutch do use single lane roundabouts with an unprotected bike on the outside but mostly at sub arterial intersections where traffic volumes are low. However, the cycle lane surface stands out in red (see Fig. 3) and my observations at several of them was that Dutch motorists were slow and courteous road users.

At the safe end of the spectrum of roundabout designs we have the Dutch single lane 'tight' roundabouts with a low design speed and protected bikepaths around them within 50 kph default limits on the approach roads (see item under Bulletin Board - Editor). At the unsafe end of the spectrum there are the British and Australian multi-lane roundabouts which have high design speeds, no separate facility for cyclists and at best a 60 kph default limit on the approach roads.



Figure 3
Unprotected bikelane on Roundabout near Tilburg
University. (Photograph by Alan A. Parker)

Even with law abiding and courteous motorists operating within existing speed limits at Australian multilane roundabouts, the injuries rates for cyclists are likely to be high (Robinson 1998). With dangerous drivers for whom it is physically possible to drive very fast across the lane marking (see Fig. 1), roundabouts are potentially lethal for cyclists and pedestrians. In this sense, the Australian roundabout design guide (Austroads 1993a) is more than being merely obsolete; it represents dangerous advice. Given the undisciplined nature of so many Australian motorists (compared to Dutch drivers who are very courteous to cyclists because most of them ride bicycles), Austroads would be well advised to go back to the drawing board with their roundabout designs. I am not suggesting that a lot of cyclists will be killed by roundabouts, but that as roundabouts are perceived as being dangerous many cyclists will not cycle if they cannot avoid using them. Considering the health and other benefits of using bicycles instead of cars for short trips, it is inequitable to continue building multilane roundabouts without providing separately for cyclists.

WHAT NEEDS TO BE DONE

A 40 km/h residential speed limit was supported by the Bicycle Federation of Australia and there have been moves (so far unsuccessful) to introduce a national urban speed limit of 50 km/h, although there are increasing examples of both at the individual precinct level (see letter from Michael Yeates in this issue - Editor). Given the speed limits we are going to have in the foreseeable future, cyclists would be better off with signal-controlled intersections. However, there are ways of making the existing multi lane roundabouts safer for all non motorised users (Allott and Lomax 1993) and there is no reason

why new roundabouts that are as dangerous as they are now should be built. Some of the options for future action, including better detail design, at existing roundabouts are as follows:

- Safety audit procedure to be developed for all roundabouts that takes into account the present and future safety requirements of non-motorised users.
- 40 km/h maximum speed limit applied to all shared roundabouts and any roadway within a 50 metre radius of the roundabout.
- Regular surveillance of motorist behaviour with speed cameras and enforcement of a 40 km/h default speed limit (just as there is on signal-controlled intersections for the 60 km/h default limit.).
- Speed reducing bumps on the approach lane to the roundabout (not speed humps but the regularly spaced series of bumps they use to slow cars on freeway exit lanes in the UK).
- Converting low volume two lane roundabouts into one lane roundabouts and providing a protected shared footway in what was previously the outer lane.
- Building shared footways connected to pedestrian actuated crossings with a zig zag offset refuge (Strathclyde Roads 1995) so that the pedestrian crossing markings are near the entrance to the roundabout and set back an additional 10 metres at the exit lane.
- Putting in under or overpasses at higher-volume roundabouts.

Some of the options that need considering at new roundabouts are as follows:

- Mandatory provision of tunnels under all new multilane roundabouts in urban areas or in locations that will at some future date be an urban area so the option of providing fully finished grade separated shared footways at reasonable cost always exists.
- Mandatory provision of protected shared footways on all multilane roundabouts in rural areas.

- Tight design of lane widths and islands on multilane lane roundabouts so that most motorists (85th percentile) choose to enter or exit the circulatory at no more than 40 to 45 km/h
- Tight design of lane widths and the centre island on single lane roundabouts so that motorists cannot safely enter or exit the circulatory at more than 30 to 35 km/h with the provision of protected shared footways.

The Australian bicycle planning and design manual - Part 14 of the Guide to Traffic Engineering (Austroads 1993b) - has a section on roundabouts that is very misleading and gives the impression that multi-lane roundabouts are safe for cyclists. Even figure 4.19 showing a shared footway going through a two lane roundabout fails to incorporate the zigzag offset referred to in point six which is now recommended in the UK (Strathclyde Roads 1995). Indeed, a related problem with Part 14 is that it is meant to be an integral part of an Australian Guide to Traffic Engineering Practice but in practice is used as an optional add-on that is not binding on practitioners.

The commitment to write Part 14 came in 1987. Since that time the Dutch have spent A\$1.2 billion on bicycle facilities and have produced excellent planning and design guides. We need to revise Part 14 to make it more relevant in this area.

(Editor's note: Austroads currently has a working group preparing a revision of *Part 14: Bicycles* under the chairmanship of Terry Ryan of Bikesouth (DoT SA). The issue raised by Alan Parker is reportedly being considered. Submissions are welcomed by the group through your State Road Authority representative.)

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