Roundabouts – Swiss Experiences

Oskar Balsiger, Bern Switzerland

Cyclists accept single-lane roundabouts as a useful and safe form of junction provided the dimensions, geometry and organisation of same correspond to the lines along which they drive and provided nothing prevents cyclist-specific behaviour.

The majority of cyclists cycle in the middle of the roundabout lane and thus demand the respect of motorists to treat them as road users with equal rights. In order to protect this safe behaviour, the Swiss government has introduced a totally new rule of the road whereby cyclists have the right to "obstruct" motor vehicles in this exceptional case. "On roundabouts without special cycles lanes, cyclists are no longer bound by the rule to cycle on the right."

The talk is based on experience gathered in the Canton of Bern as well as the Swiss norm to be published this year "junction elements of bicycle traffic". Here, norms will be published not regarding the roundabout itself but regarding traffic patterns and elements to be considered in the interests of cyclist safety when designing roundabouts.

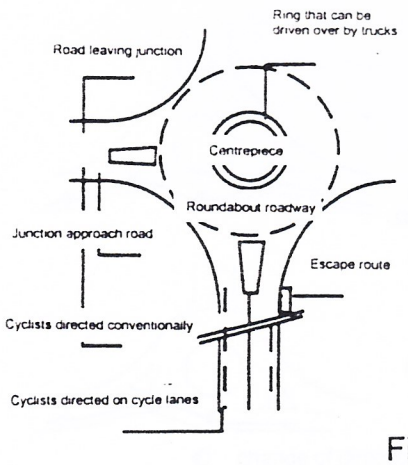

Fig. 1 Terms

1. Initial situation

In 1986, when "roundabouts with cyclist priority" were first introduced in Switzerland, neither politicians nor public authorities nor engineers and traffic experts knew whether this form of junction would pass the test in the area of cyclist traffic. This type of roundabout broke with the Swiss cycle-on-the-right traffic regulation valid at the time, and could only be introduced at specially designated junctions with a special permit from the competent federal office. Junctions in need of redevelopment - either because they were no longer able to cope with the volume of traffic or because they were no longer safe - were selected as pilot objects. For all parties involved – planners, engineers, public authorities and users – the roundabout experiment meant breaking new ground. They suddenly all found themselves part of a learning process, taking part in a development with an uncertain outcome.

2. The Thesis

The thesis put forward at the beginning of the experiment was as follows:
If we succeed in building and organising roundabouts in such a way that cyclists can participate in traffic without any difficulty, cyclists will not regard roundabouts as an obstacle.

In order to test the truth of this, road boards in the Canton of Bern carried out experiments on suitable junctions. The conversion to a roundabout took place overnight: old junction structures (traffic islands, verges) were removed, levelled using asphalt, and replaced by new, setdown, easily correctable verges. During the subsequent period of getting used to and observing the new form of junction, the project officials met with public authorities, associations (e.g. the Velo interest group, the association of driving instructors) and interested parties, evaluated their observations and made corrections to the verges. The question that provided the most fuel for discussion was whether cyclists should be integrated into the traffic, assigned to a cycle path circumventing the roundabout or to a cycle lane at the outer edge of the roundabout roadway.

3. The Cyclist Compatibility Test

On the basis of experience gathered to date, every new junction is tested for suitability for cyclist traffic. In order to do this, the advantages and disadvantages of a traffic-light-controlled junction are weighed up against those of a junction involving a roundabout. The prerequisites that must be met for cyclists to regard a roundabout as a welcome form of junction are as follows:

3.1 Outer Dimension:
Diameter min. 24m, max. 34m; ideal: 28 – 29m.

3.2 Roundabout Roadway:
No subdivision into lanes, no special cycle lanes. Width 8m or less
(Fig. 1)

3.3 Centrepiece:
The centrepiece of the roundabout prevents vehicles, including cyclists, from driving in a straight line across the junction. If deflection is not possible on account of the tractrix of larger vehicles, this function is performed by a ring that can be driven over by the rear wheels of busses and trucks (Fig. 1 + 7).

3.4 Geometry/Traffic Dynamics:
When setting the verges, it must be ensured that all vehicles must not change direction more than three times when crossing the junction
(Fig. 2 + 7).

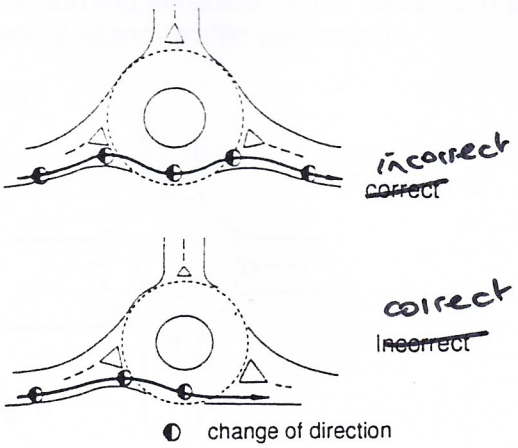

Fig. 2

3.5 Junction Approach:
Case a. Cyclists approach the roundabout conventionally on the road: one-lane entrance to the roundabout roadway. In the case of roundabouts with a higher volume of traffic, a "bypass" is used instead of a two-lane entrance.

Case b. Cyclists approach the roundabout in cycle lanes: one-lane entrance to the roundabout roadway, cycle lanes commencing 18-25m ahead of the roundabout roadway (Fig 1 + 7). Special case "bypass" for higher volumes of traffic: cycle lanes for cyclists going straight are used continuously right to the verge of the roundabout roadway (junction element).

Case c. Cyclists approach the roundabout on a parallel cycle path: applying the principle of lane addition (junction element) the cycle path is allowed to run into cycle lanes 60m in front of the roundabout roadway - in exceptional cases 30m – then analogous to Case b, "cycle lanes" (Fig. 3).

Case c

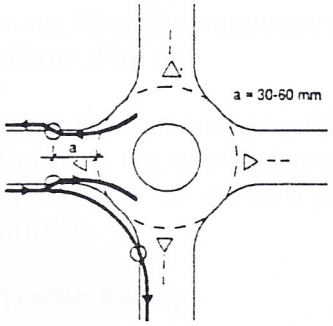

Fig. 3

Case d. Cyclists approach the roundabout on a dual-direction cycle path on the left hand side of the road: the cycle path is joined to a parallel junction branch 60 – 30m ahead of the roundabout roadway and the cyclist traffic approaching the roundabout is integrated into the traffic using crossing aids protected by islands (junction element). In addition, the cycle path is joined to the junction branch from the left (Fig. 4).

Case d

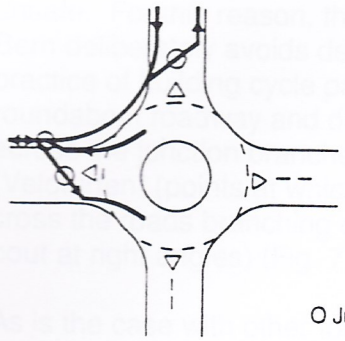

Fig. 4

Case e. Cyclists approach the roundabout on a dual-direction cycle path on the right hand side of the road: cycle path is directed into the adjacent street 60 – 30m ahead of the roundabout roadway in accordance with the principle of lane addition. In addition, it is joined to the junction branch from the right.

Case e

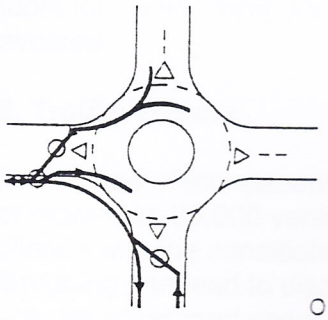

Fig. 5

Case f. Cyclists approach the roundabout on a cycle path that is not attached to the road: the cycle path is joined to the roundabout roadway like a road with a generous turning in radius (6m or more) and a central island (traffic separator).

Case f

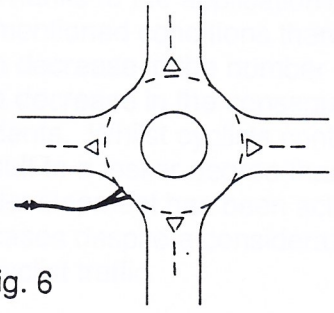

Fig. 6

3.6 Leaving the Junction

Case a. Cyclists leave the roundabout in a conventional manner on a single-lane roadway. Multilane drive-off should be avoided (Fig. 1).

Case b. Cyclists leaving the roundabout are directed onto cycle lanes: the cycle lane commences directly after leaving the roundabout roadway. Special case "bypass on the right": bypass is joined to the junction branch leading off the roundabout. This bypass has priority.

Cases c+d. Cyclists are directed onto an adjacent cycle path (cyclists travel in the same direction or opposite direction to traffic): cyclists are channelled into the cycle path 10 to 60m after leaving the roundabout roadway. The opening between the cycle path and the road must be a minimum of 10m long (Fig. 3 + 4).

Case e. Cyclists are directed onto a dual-direction cycle path on the opposite side of the road: cyclists are channelled onto the cycle path on the opposite side of the road via a centre area protected by islands (crossing aid junction element) measuring 1.5 to 2.5m in width and 30m in length, beginning 10m after leaving the roundabout roadway (Fig. 5).

Case f. Cyclists are directed onto a cycle path that is not attached to the road: turning in radius 6m or more similar to the approach.

4. Traffic Safety

The safest and quickest way for cyclists to navigate a roundabout is to cycle around the middle. Specially marked cycle lanes as part of the roundabout roadway run

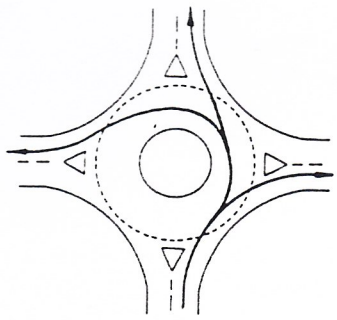

Fig. 7

counter to this behaviour and are deemed unsafe. For this reason, the Canton of Bern deliberately avoids developing a practice of building cycle paths around the roundabout roadway and directing cyclists across the junction branches via "Velofurten" (points at which cyclists can cross the roads branching off the roundabout at right angles) (Fig. 7).

As is the case with other forms of junctions, cyclists also regard busses and trucks as adversaries on roundabouts. Thus, there is no difference in height between the roadway and footpath near schools over a distance of ca. 10m. This means that cyclists (children) can leave the road (escape route) and cross the junction on foot (Fig. 1).

Problems are created by roundabouts with multilane approaches or diameters of less than 24m. Such roundabouts are unsuitable for cyclist traffic and should thus be avoided.

5. Traffic Volume

In the case of roundabouts with a volume of more than 30,000 vehicles a day, compliance with the conditions specified in the foregoing can lead to disadvantages (backups) for other road users. If this results in a demand for the introduction of multilane junction branches, planners should revert to traffic-light-controlled forms of junctions.

6. Final Remarks

Over 50 roundabouts are currently in use in the Canton of Bern (6,000 km2, 1 million inhabitants, 500,000 bicycles). The experiences with roundabouts are very positive. Thanks to the application of the above-mentioned conditions **there has been both a decrease in the number of accidents and a decrease in the consequences of accidents.** Whilst cyclists contribute to this result to a lesser degree than motorists, this development has been achieved in most cases despite a considerable increase in cyclist traffic.