

State of the Art Design for Cycling Facilities

Reasons for publishing the new ERA 2010

In summer 2010, the German Road and Transport Research Association (FGSV) will publish the new Guidelines for Cycling Facilities (Empfehlungen für Radverkehrsanlagen, ERA 2010). Since the last ERA in 1995, transport safety research was able to clarify essential questions which had been left open regarding adequate cycling facilities and potential effects on road safety. Many municipalities created innovative examples of how to encourage cycling in their street networks. Multiple best practices from cycle schemes all over Germany and Europe are published on the German Bicycle Portal www.nrvp.de. This platform was established for collaboration and dissemination of the National Cycling Plan 2002–2012 (see Cycling Expertise No. O-1).

In September 2009, a revised Highway Code for Germany (StVO) defined new regulations determining the rights of cyclists in traffic. The administrative instructions of the Highway Code (StVO-VwV) shaped the implementation of cycling facilities in the municipalities, in order to enable an improved cycling experience in the networks. Since 1995, a vivid professional discussion has developed – also jurisdiction – regarding the viability of making the usage of minor quality cycle paths compulsory. In many such cases, additional risk factors (e.g. at junctions) were found. Cyclists chose the carriageway for improved comfort and reduced travel time, contrary to traffic regulations. The revised Highway Code instructions precisely define the cases in which usage is mandatory, asks for better quality facilities and introduces a more comprehensive series of bicycle user rights.

New generation of technical guidelines on street design

The new state of the art road design is not limited to the cycling issue. The new FGSV Guidelines for Design of Urban Streets (RASt 06) recommend a new methodological approach to structural design (see Cycling Expertise No. I-2). This requires renewed effort on the part of the planners in working towards the integration and balance of all modes. In cases of doubt, and where the street lacks space, the new guidelines recommend full and planned integration of the modes within the same space in order to provide a top quality infrastructure to all forms of transport. The layout of

Cover image: Advisory "safety lane" in the carriageway – recommended in the ERA 2010 on cycling facilities

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a road alone must be sufficient for users to understand the local system in place, so that road-users can rely on their intuition rather than a series of traffic signs cluttering the urban space.

ERA 2010 – New manual on cycling facilities

The ERA 2010 specifies the RASt's new street design philosophy with images showing actual cross-section examples and figures relating to the design and programmes to encourage cycling. Core content of the ERA is a catalogue directing cyclists within the street's profile:

- Cycling on the carriageway amongst mixed traffic;
- Cycling on the advised "safety lane", part of the carriageway and only used by motorized traffic in specific instances, e.g. by heavy goods vehicles (marked with a dashed white line);
- Using the cycle lane, which is for the exclusive use of cyclists (separated from the rest of the carriageway and marked by a continuous white line);
- Using the cycle path, which is separated from car traffic by means of a kerb, parking lane or green area.

The ERA points out that in doubt no cycle path is better than a cycle path of poor quality. According to the guidelines the requirements on the design follow the main objectives of cycling policy:

- objective safety: avoiding road traffic accidents;
- subjective safety: making cycling appear safer, thereby dismantling one psychological barrier to bicycle use;
- taking into account different cycling speeds;
- minimizing effort and physical energy expenditure while cycling;
- minimizing travel time.

More ERA recommendations focus on the following issues, for example (more Cycling Expertise editions in progress):

- cycle schemes and network planning procedure;
- PR work, public involvement and collaborative action with partners;



Basic types of cycling facilities:

top: advisory cycle safety lane (to be used by motorized traffic in specific instances only, marked by a dashed white line)

middle: cycle lane for exclusive use by cyclists (marked by a continuous white line)

bottom: cycle path (separated from car traffic by means of a kerb and green areas)

The new generation of guidelines on urban street design: see Cycling Expertise No. 1-2 "Cycling in Urban Main Streets"

- detailed parameters of cycling facilities (width, gradients and slopes, visibility of users etc.);
- route-design in pedestrian spaces, in narrow areas and bottlenecks, on uphill/downhill gradients, on bus lanes, at bus and tram stops;
- cycle traffic at junctions, traffic lights, and roundabouts;
- cycling on country roads;
- construction techniques and maintenance of cycle paths;
- bicycle parking facilities and organisation of bicycle stations;
- evaluation of effectiveness and performance, quality assurance.

Research on road traffic safety - different ways to direct the cyclists

Since the 1980s the safety of cycling has been a major focal point of research programmes in Germany, mostly conducted by the Federal Highway Research Institute (BAST). New elements of cycling facilities were reviewed for their specific safety effects. The advised "safety lanes" were a particular focus point; the presumption from the older ERA 1995 that they might be only appropriate at minor car frequencies was disproved. They also work well in roads with a higher volume of traffic, but only where motorists have sufficient space to overtake cyclists.



A cyclist preferring the carriageway over the cycle path

A recent BAST study (published in 2009) on accident risk and acceptance of traffic rules by cyclists illustrates the connection between cycling facilities and user behaviour. The issue of compulsory usage of cycle paths is also focused on. The survey included 39,000 cyclists' choice of the cycle facility type in road space. This choice was linked to the road accidents which occurred. Moreover, the traffic flow was studied and cyclists were interviewed. Irrespective of legal duty of usage, about 90 % of the cyclists riding in the right direction chose to use cycle paths or cycle lanes. At roads with cycle paths, about 20 % of all cyclists rode on the left, against cycling regulations. At roads with cycle lanes, the portion of cyclists riding on the left against regulations was about 10 %.

In conclusion, no single type of cycle facilities is always preferable to others. Neither the road space in which cyclists ride nor the risk of accident they face is influenced by mandatory cycle paths. The risk of accident cyclist face does, however, decrease with each type of cycle facility, providing the facilities are of a reasonable standard. Evidence allowed the following particular conclusions to be drawn:

- The accident density and the accident rate vary widely from facility to facility. The average accident rate on roads with cycle paths exceeds that of roads with cycle lanes only so slightly that it cannot be considered significant. On the other hand, for each type of cycle facility road sections with high accident rates were identifiable.
- Where the stipulated duty to use cycle paths was retracted, the accident density on affected roads and on roads with continuing mandatory cycle paths decreased.
- The average accident rate amongst cyclists riding in the right direction is lower on good quality cycle paths than it is on poor quality cycle paths, but comparable to the average accident rate on good quality cycle lanes.
- Cyclists' safety is significantly influenced by the existence of a sufficiently wide field of vision between the cycle facility and vehicle lanes as well as sufficient dividing verges between the cycle facility and car parking space.
- Compared to cycle lanes, cycle paths present cyclists with less interference from other cyclists, motorists and pedestrians.

Sources

FGSV: RAST 06 – Richtlinien für die Anlage von Stadtstraßen. Ausgabe 2006

FGSV: ERA – Empfehlungen für Radverkehrsanlagen. Ausgabe 2010

BAST – Bundesanstalt für das Straßenwesen (ed.): Unfallrisiko und Regelakzeptanz von Fahrradfahrern. Berichte der BAST, V 184 (2009), elaborated by Planungsgemeinschaft Verkehr (PGV), Hannover, and Institut Wohnen und Umwelt GmbH (IWU), Darmstadt http://www.bast.de/nn_75110/DE/Publikationen/Berichte/unterreihe-v2010-2009/v184.html

ERA Methodology in choosing the appropriate cycling facility

When selecting the appropriate type of the cycling facility, the ERA recommends following a detailed set of procedures adapted to conditions specific for Germany. Picking up on the types of cycling facilities introduced above, the main options are the following four:

- I mixed with car traffic
- II "soft separation", e. g. by advised "safety lane"
- III separation advisable (cycle lane or cycle path)
- IV separation essential (cycle lane or cycle path)

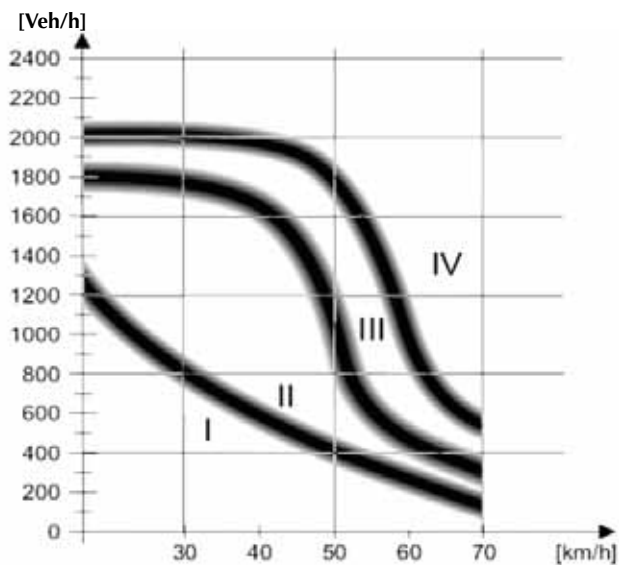


Fig. 1: Choice of cycling facility type (integration/separation) by car traffic volumes and speed (ERA 2010)

The main criteria on the axes in the selection diagram below are:

- The motorized vehicle frequency per day
- Motor vehicle speed (indicator V85 – 85 % of drivers under the speed threshold)

The diagram is not appropriate for dual carriageways, as other conditions determining cycling while being overtaken by cars play a role here.

Urban main roads in particular show all four kinds of facilities, as the diagram illustrates. After using the diagram to make a pre-selection, the next step is to check the specific conditions for implementing the selected type of facility. A detailed comparison of the options likely to be followed also takes other factors into account before a final decision is made (parking, heavy goods vehicles, junctions and property access roads, longitudinal inclination, specific requirements of the traffic laws, etc.).

Conclusion

The new state of the art for cycling facilities offers a wide range of facility types. The ERA guidelines recommend to implementing the separation or integration approach, depending from specific conditions in the concrete urban space. In doubt, no cycle path (integration) is better and safer than a poor quality cycle path (separation).



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Figures/Images

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