Country Report for Germany

Compiled by Olaf Czogalla and Juergen Gerlach in the framework of
COST Action 385 "Pedestrian Quality Needs"

1. Facts, figures and available statistics

Statistical data is comprehensively available from the Federal Statistical Office Germany who maintains a statistics portal for inquires over the Internet. Guidelines for Road Design are published by the Society for Highway and Traffic Research (Forschungsgesellschaft für Straßen- und Verkehrswesen) in coordination with the Federal Ministry for Transport (Bundesministerium für Verkehr, Bau und Stadtentwicklung) and the Federal Highway Research Institute (Bundesanstalt für Straßenwesen). Selected figures have been collected and are given in the accompanying spreadsheet.

2. Recent publications on pedestrian issues

2.1 Publications of the Society for Highway and Traffic Research (Forschungsgesellschaft für Straßen- und Verkehrswesen - FGSV)

The FGSV is the responsible organization for coordination of federal research activities in the area of traffic and highway research in Germany and works out technical regulations for design and construction of traffic facilities and also pedestrian facilities. Working group 2.5.2 deals with pedestrian affairs within the German road traffic regulations (StVO). In 2007 it is planned to compile a "Guideline for Inline-skating in public road space" and "Instructions for pedestrian guidance".

The guidelines and recommendations of the FGSV, which are relevant for pedestrian issues, are mentioned in Chapter 4. The following publications of the FGSV are dealing with pedestrian issues too:

Grundlagen der Straßenverkehrstechnik und der Verkehrsplanung - Band 2: Verkehrsplanung [FGSV-Nr. 031/2] (Principles of road traffic planning and transport planning – Volume 2: Transport planning) (1997)

Merkblatt über den Rutschwiderstand von Pflaster und Plattenbelägen für den Fußgängerverkehr (FGSV-Nr. 407) (Instructions about slide resistance of paving and pavement flags) (1993)

Merkblatt über Schutzmaßnahmen gegen das Parken auf Nebenflächen [FGSV-Nr. 942] (Instructions for precautions to avoid parking on pavement) (1993)

Straßenbeleuchtung – Teil 1: Auswahl der Beleuchtungsklassen [FGSV-Nr. DIN 13201-1] (Selection of illumination class) (2005)
substitute for FGSV 323 "Richtlinien für die Beleuchtung in Anlagen für Fußgängerverkehr", Ausgabe 1987 (Guidelines for illumination of pedestrian plants)

2.2 Publications of the Federal Highway Research Institute (Bundesanstalt für Straßenwesen - BASt)

Authors D. Alrutz, D. Gündel, H. Müller
Title Nutzung von Inline-Skates im Straßenverkehr (Use of inline-skates in traffic)
Kind of publication Report BASt, book no. M 135
Year of publication 2002
Availability BASt

Authors Kienbaum Management Consultants GmbH, Düsseldorf
Title Information and control systems for traffic safety for seniors
Kind of publication Report BASt-Info 14/02
Year of publication 2001
Availability BASt

Authors U. Carraro, M. Eckert, S. Jordanova
Title Neue Gütekriterien für die Beleuchtung von Straßen mit gemischtem Verkehr und hohem Fußgängeranteil (New quality-criterions for the illumination of roads with mixed traffic and a high pedetrian-share)
Kind of publication Report BASt, book-no. V 86
Year of publication 2001
Availability BASt

Authors W. Brög, E. Erl
Title Kenngrößen für Fußgänger- und Fahrradverkehr (Known measurements for pedestrians and bicycle-traffic)
Kind of publication Report BASt, book-no. M 109
Year of publication 1999
Availability BASt

Authors D. Alrutz, W. Bohle, S. Gugel
Title Flächenanprüche von Fußgängern (Area-requirements of pedestrians)
Kind of publication Report BASt, book-no. V 71
Year of publication 1999
Availability BASt

Authors F. Albrecht, E. Brühning, K.-H. Frenzel et. al.
Title Rechtsabbiegen bei Rot mit Grünpfeil (Right turn on red with green arrow)
Kind of publication Report BASt, book-no. V 72
Year of publication 1999
Availability BASt

Authors Universität Erlangen-Nürnberg, Institut für Psychologie
Title Ways of communicating road safety information to the elderly
Kind of publication Report BASt-Info 10/98
Year of publication 1998
Availability BASt

Authors D. Ellinghaus, K. Seidenstecher, J. Steinbrecher
Title Vergleich des Verkehrsordnungsrechts in Europa - Literaturübersicht unter Berücksichtigung der kommunalen Verkehrsüberwachung (Comparison of the traffic-

regulations-law in Europe – literature-overview in consideration of the local traffic-observation)
Kind of publication Report BASt, book-no. M 69
Year of publication 1997
Availability BASt

Authors K. Füsser, A. Jacobs, J. Steinbrecher
Title Sicherheitsbewertung von Querungshilfen für den Fußgängerverkehr (Security-evaluation of crossing-facilities for pedestrian-traffic)
Kind of publication Report BASt, book-no. V 4
Year of publication 1993
Availability BASt

Authors A. Katz
Title Der Schutz von Fußgängern vor Kfz-bedingten Verletzungen: Forschungsvorschläge auf der Basis einer Literaturauswertung (The protection of pedestrians from road vehicle related injury: Suggested research based on a review of the literature)
Kind of publication Report BASt, book-no. H 247
Year of publication 1992
Availability BASt

Authors R. Wiebusch-Wothge
Title Kriterien für Gestaltung, Einsatz und Sicherheit von alternativen Fußgängerüberwegen (Criterions for the arrangement, application and security of alternative pedestrian crossings)
Kind of publication Report BASt, book-no. H 208
Year of publication 1989
Availability BASt

Authors L. Neumann
Title Einsatzkriterien für Anlagen des Fußgängerquerverkehrs – Ergänzungsuntersuchungen (Application-criterions for facilities of crossing pedestrian-traffic – continuative analysis
Kind of publication Report BASt, book-no. H 163
Year of publication 1987
Availability BASt

Authors S. Ahrens
Title Ein Beitrag zur Beschreibung des Sicherheitsempfindens von Fußgängern auf innerstädtischen Straßen (An article for the description of security-sensation of pedestrians on roads within city limits)
Kind of publication Report BASt, book-no. H 165
Year of publication 1987
Availability BASt

Authors R. Eger, H.-G. Retzko
Title Führung des Radverkehrs im Innerortsbereich, Teil 6: Gemeinsame Verkehrsflächen für Fußgänger und Radfahrer (Guidance of bicycle-traffic in areas within city limits, part 6: common traffic-areas for pedestrians and bicyclists)
Kind of publication Report BASt, book-no. H 138
Year of publication 1986
Availability BASt

Authors R.R. Hamann
Title Fußgängersicherheit an Haltestellen (Security of pedestrians at stops)
Kind of publication Report BASt, book-no. H 120
Year of publication 1985
Availability BASt

2.3 Publications of the Federal Ministry of Transport (Bundesministerium für Verkehr, Bau und Stadtentwicklung)

Authors K. Ackermann, G. Feller et. al.
Title Bürgerfreundliche und behindertengerechte Gestaltung des Straßenraums (2. Auflage) (Traffic facility design equipped for the disabled– 2nd issue)
Kind of publication Report BMVBS, book-no. 54
Year of publication 2000
Availability BMVBS

Title Fußgänger- und Radverkehrsführung an Kreisverkehrsplätzen (Guidance of pedestrian and bike-traffic at roundabouts)
Kind of publication Report BMVBS, road construction and road traffic-engineering research, book-no. 793
Year of publication 2000
Availability BMVBS

Authors W. Angenendt, M. Wilken
Title Gehwege mit Benutzungsmöglichkeiten für Radfahrer (Pavements with facilities for bicyclists)
Kind of publication Report BMVBS, road construction and road traffic-engineering research, book-no. 737
Year of publication 1997
Availability BMVBS

2.4 Publications of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety - Federal Environment Agency (Umweltbundesamt UBA)

Exploiting potentials – More support of bicycle and pedestrian traffic (Study 2001), Model project "More quality of life for cities and communities"

The first part of the study contains a manual on strategic approaches and measures. An attractive pedestrian path network must, for example, be close-meshed, show low interference from other road users (including bikers), and fulfill objective and subjective safety criteria. Clarity and pedestrian-friendly design with signposts are important as well as good connections to public transportation. In the second part, a deficit analysis indicates shortcomings in the legal and planning fields as well as the significance of political climate, administration's commitment, traffic safety and public relations work. To demonstrate exactly how pedestrian and bicycle traffic can be promoted, the Federal Environment Agency chose three model cities: Lingen on the Ems River, Lutherstadt Wittenberg, and Plauen in Saxony.

The most important goal is to create a pedestrian and bicycle-friendly environment in traffic policy and in the daily coexistence of all road users. The FEA is sponsoring the development of a comprehensive plan of action that in addition to infrastructure measures includes supporting public relations work, a broad range of services, and connections to public modes of transport. In this way, walking and cycling can again become a worthwhile and safe alternative to the automobile—bringing fun, relaxation, and health to the individual, and heightened quality of time spent in cities and climate protection for all.

The model project aims to show that it is possible to increase the amount of pedestrian and cyclist traffic considerably within a short time. This requires the intensive cooperation of the model cities, contractors and the Federal Environment Agency to find and apply cost-effective, innovative and unconventional solutions.

Authors J. Krause, E. Hildebrandt
Title Quality management in pedestrian and cycling traffic
Kind of publication Brochure
Year of publication 2001
Availability Federal Environment Agency TEXTE series as Nr. 28/2005 (in German)
Short Abstract

The Walking and cycling friendly city study has been published in the Federal Environment Agency TEXTE series as Nr. 28/2005 and may be downloaded from the Internet at http://www.umweltdaten.de/publikationen/fpdf-l/2989.pdf. The study includes chapters on the process of creating walking and cycling friendly cities as (German: Bausteine auf dem Weg zur fußgänger- und fahrradfreundlichen Stadt) and a brochure titled Qualitätsmanagement im Fuß- und Radverkehr [Quality management in pedestrian and cycling traffic]

2.5 Publications of the Institute f. Automation and Kommunikation (ifak)

Authors Hoyer, Robert; Schönrock, Rene
Title VESUV – Video based driver assistance system for improved safety of vulnerable road users
Kind of publication Research report
Year of publication 2001
Availability Directly from the author
Short Abstract

Poor visibility conditions may lead to the increase of accident rates with vulnerable traffic participants, e. g. cyclists and pedestrians. Future driver assistance systems shall improve this situation. For this purpose vulnerable traffic participants have to be reliably identified and their positions have to be investigated. One problem for this task is the differentiation between people and mounted objects in the vehicle environment. The project VESUV (Videobasiertes Assistenzsystem zur Erhöhung der Sicherheit ungeschützter Verkehrsteilnehmer) dealt with the development of a video based assistance system for increasing road safety. In the foreground of this project is the reliable identification of vulnerable traffic participants. The developed solution can be deployed with moderate costs and is characterised by a high robustness. While testing the system all traffic participants independent of the actual degree of danger have been reported to the driver.

Authors Czogalla, Olaf; Herrmann, Andreas
Title Personalized Hazard Warning System for Safety Improvement of Vulnerable Road Users
Kind of publication Reviewed article for ICTCT Workshop 2007
Year of publication 2007
Availability Directly from the author
Short Abstract

The combination of selected Intelligent Transport Systems (ITS) technologies allow for individualisation of traffic information to improve traffic safety of vulnerable road users. The proposed method and prototypic technical solution described in the paper is based on the concept of keeping the motorized traffic up-to-date with location based and individual information about accident risk spots and hazards in an urban or inter-urban street network. For traffic participants who are not familiar with a local urban traffic system it is more difficult to concentrate on additional warning signs. Especially if traffic signs are overlooked or accident hazard spots are not recognized by the driver, additional advice could be helpful. For a delimited region like a city relevant hazards warning messages are stored in a geo-referenced database that is broadcasted by Digital Audio Broadcasting (DAB) to be received by digital car radios. For display and announcement of hazard warning messages a standard PDA with positioning capability and wireless connection to the digital radio was used.

2.6 Publications of Non Governmental Organizations

All Publications are in German (some abstracts available in English).

- Safeguarding mobility of elderly people within road traffic: Research documentation - Mobilitätssicherung älterer Menschen im Straßenverkehr: Forschungsdokumentation, TÜV-Media GmbH, Köln, 2007

- Chancen und Optimierungspotentiale des nichtmotorisierten Verkehrs (Policy and measures to promote walking) Planungsgemeinschaft Verkehr, Forschungsprojekt im Auftrag des BMVBW, Hannover 2005 (abstract in english available at http://edoc.difu.de/edoc.php?id=F1PVGO2I)

- FE77.452/2000: Bemessungsgrundlagen für Fußgängerverkehrsanlagen (Principles for dimensioning of pedestrian areas), 2003. in: Straßenverkehrstechnik, Heft 11/2004

- Pedestrian Guidance Systems - Wegweisungssysteme für den Fußverkehr. Arbeitsgruppe Fußverkehr von SRL und FUSS e.V. (Hrsg.), Kassel, 2004

- Barrier-free public transport in Germany - Barrierefreier ÖPNV in Deutschland, Verband Deutscher Verkehrsunternehmen (VDV), VDV-Förderkreis (Hrsg.), Düsseldorf, 2003

- Cyclists and Pedestrians- Radfahrer und Fußgänger. Arbeitsgruppe Fußverkehr von SRL und FUSS e.V. (Hrsg.), Kassel, 2003

- Steps towards a pedestrian city - Westphal, Ekkehard und Bernd Herzog-Schlagk: Zebrastreifen - Schritte zur Fußgängerstadt. FUSS e.V. Fachverband Fußverkehr

Deutschland (Hrsg.), Berlin, 2002; fußnote 4: Renaissance der Zebrastreifen. Arbeitsgruppe Fußverkehr von SRL und FUSS e.V. (Hrsg.), Kassel, 2002

- Sidewalks without barriers - Gehwege ohne Hindernisse. Arbeitsgruppe Fußverkehr von SRL und FUSS e.V. (Hrsg.), Kassel, 2001

- Walking – A planning tool for practical use (Fußverkehr – Planungshilfe für die Praxis). Institute for research of urban and country development and building NRW (ILS NRW). Modules for planning practice, book no. 24, Dortmund, 2001

- What is the best width for sidewalks? Wie breit müssen Gehwege sein? Arbeitsgruppe Fußverkehr von SRL und FUSS e.V. (Hrsg.), Kassel, 2000

- Walking to the bus stop - Zu Fuß zur Haltestelle. Arbeitsgruppe Fußverkehr von SRL und FUSS e.V. (Hrsg.), Kassel, 2000

- Zu fuß mobil: Praktisches, Förderliches und Forderndes zum Fußverkehr: Borgmann, W.; Bräuer, D., Brög, W. Institute for research of urban and country development and building NRW (ILS NRW), book H 158, Dortmund, 2000

- Criteria for application and safety of pedestrian crosswalks - Menniken, Carola: Sicherheits- und Einsatzkriterien für Fußgängerüberwege. Heft 24 der Schriftenreihe des Instituts für Verkehrswissenschaft, Straßenwesen und Städtebau, Hannover, 1999

- Pedestrian-friendly traffic lights in urban and rural areas - Herzog-Schlagk, Bernd und Klaus Schlabbach: Fußgängerfreundliche Ampeln in Städten und Dörfern. FUSS e.V. Fachverband Fußverkehr Deutschland (Hrsg.), Berlin, 1991

- Mobility-handicapped people within traffic: Research results and planning recommendations – Mobilitätsbehinderte Menschen im Verkehr: Forschungsergebnisse und Planungsempfehlungen, Verkehrsclub Deutschland (VCD) und Universität Kaiserslautern, Fachgebiet Verkehrswesen (Grüne Reihe Nr. 39), 1997

- R. Suhre: Sicherheit des Fuß- und Radverkehrs auf kleinen Kreisverkehrsplätzen (Safety of pedestrians and cyclists at small roundabouts). Universität Dortmund, Fachbereich Raumplanung

- Vergleich der Fussgängerbehandlung in der Schweiz, in Deutschland und in Frankreich, Diplomarbeit Gilles Renck, Hochschule Technik und Wissenschaft Karlsruhe 2006

- Leitfaden - Unbehinderte Mobilität, Hessische Straßen- und Verkehrsverwaltung, Wiesbaden 2007

- Walking is moving the town (Gehen bewegt die Stadt), Angelika Schlansky, Roland Hasenstab, Bernd Herzog-Schlagk, FUSS e.V. (Hrsg.) 2. Auflage, Berlin, Februar 2006

3. Current research projects

TU Dresden

Prof Helbing, funded by DFG (German Research Foundation): *Perspectives of present pedestrian and "panics"* research project

D. Helbing, I. J. Farkás, P. Molnár, and T. Vicsek (2002) *Simulation of pedestrian crowds in normal and evacuation situations.* Pages 21-58 in: M. Schreckenberg and S. D. Sharma (eds.) Pedestrian and Evacuation Dynamics (Springer, Berlin).

D. Helbing, P. Molnár, I. Farkas, and K. Bolay (2001) *Self-organizing pedestrian movement*. Environment and Planning B 28, 361-383.

D. Helbing, L. Buzna, A. Johansson, and T. Werner (*2005) Self*-organized pedestrian crowd dynamics: Experiments, simulations, and design solutions. Transportation Science 39(1), 1-24.

Uni Duisburg-Essen

Prof. Schreckenberg: Projects PESOS – Analysis of people streams and on-board training BYPASS – Evaluation and analysis of evacuation processes aboard vessels using microscopic simulation technology

TU Hannover Institute of cartography and geoinformatics

Birgit Elias: *Landmark based navigation for pedestrians using geographic data of various representation*" Funded by DFG

BASt

BSV Büro für Stadt- und Verkehrsplanung, Reinhold Baier GmbH, Aachen, Projekt Nr.: 82.276, 2007, Potenziale zur Verringerung des Unfallgeschehens an Haltestellen des ÖPNV-Öffentlicher Personennahverkehr/ÖPSV - Potentials of reducing accident rates at stops forming part of the local public road and rail network

Projekt Nr.: 77.490 Stand: März 2006, Integration von Geh- und Radwegen in innerstädtischen Straßentunneln und Einhausungen – Integration of pavements and bicycle lanes into inner-city road tunnels and overhead noise barriers

4. Policy statements

Technical recommendations for pedestrian traffic facilities are:

1. Design Recommendations for Pedestrian Traffic Facilities
German reference:

EFA 2002: Empfehlungen für Fußgängerverkehrsanlagen.
Forschungsgesellschaft für Straßen- und Verkehrswesen FGSV (Hrsg.), Köln, 2002

2. Design Recommendations for Urban Roads

RASt 2006: Richtlinien für die Anlage von Stadtstraßen.
Forschungsgesellschaft für Straßen- und Verkehrswesen FGSV (Hrsg.), Köln, 2007

3. Guideline for design and equipment of pedestrian crosswalks
German reference:

R-FGÜ 2001: Richtlinien für die Anlage und Ausstattung von Fußgängerüberwegen
Bundesministerium für Verkehr, Bau- und Wohnungswesen BMVBW (Hrsg.), Berlin, 2001

4. German Highway Capacity Manual

Handbuch für die Bemessung von Straßenverkehrsanlagen (HBS 2001),
Forschungsgesellschaft für Straßen und Verkehrswesen - FGSV, Köln 2002.

5. Guideline for Traffic Light Control

Richtlinien für Lichtsignalanlagen (RiLSA), Forschungsgesellschaft für Straßen- und Verkehrswesen – FGSV, Köln 1992, Teilfortschreibung 2003, Köln 2003.

6. Instructions for lay out of roundabouts

Merkblatt für die Anlage von Kreisverkehren, Forschungsgesellschaft für Straßen- und Verkehrswesen – FGSV, Köln 2006.

5. Legal position of pedestrians

Regulations regarding pedestrians in Germany are defined in §25 of Road Traffic Regulations (StVO).

§25 Pedestrians

(1) Pedestrians have to use sidewalks. Pedestrians may walk on the road surface if neither a sidewalk nor a side-strip is present. If pedestrians use the road surface they must walk on the left or right side-strip in built-up areas. Outside of built-up areas they have to walk on the left side facing the oncoming traffic it this is reasonable. In darkness, poor visibility or if traffic conditions require they have to walk in a row.

Sign 239 Pedestrian

(2) Pedestrians carrying along vehicles or bulky items have to use the road surface if they would gravely impede other pedestrians on the sidewalk or side-strip. In case pedestrians carry along vehicles the must walk on the right edge of the road. Before they turn left they are not allowed to use another lane.

(3) Pedestrians must cross a road in attention to car traffic speedy and in the shortest way across the direction of car traffic namely, if traffic condition requires, only at intersections or T-junctions, at traffic lights within surface markings or at pedestrian crosswalks.

(4) Pedestrian must not climb over barriers like bars or chains. Gate barriers prohibit to enter barred road surface.

(5) Railtrack facilities that are not used also for public traffic may only be trodden at therefore prescribed positions.

§26 Pedestrian Crosswalks

(1) At pedestrian crosswalks all vehicles except track bound vehicles have to give way to pedestrians as well as drivers of wheelchairs who intend to cross the road. Vehicles may approach the crosswalk only with moderate speed, if necessary they have to stop.

(2) In a traffic congestion vehicles must not block pedestrian crosswalks.

(3) Overtaking is not allowed at pedestrian crosswalks

(4) If the surface marking leads over a bikeway or another part of the road these provisions apply likewise.

Pedestrian Crosswalk

$ 42 Traffic calmed zone

The traffic calmed zone is an inner-city road reserved for use by pedestrians, child's play is allowed everywhere in the zone. Vehicles passing through the traffic calmed zone must not hinder or jeopardize pedestrians; vehicles have to wait if necessary. Pedestrians must not hinder vehicle traffic without need. The maximum speed for vehicles is walking speed. Pedestrians have right of way. Parking is only allowed at designated and marked spaces, except for the purpose of boarding, de-boarding, loading or unloading the vehicle.

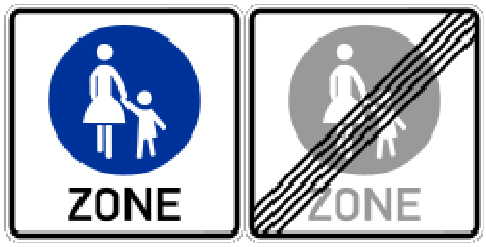
Sign 325 and 326 Begin and end of traffic calmed zones

Sign 240 Shared ways for pedestrian and bicycle

Sign 241 Separate ways for pedestrian and bicycle

Pedestrian zone

The pedestrian zone is an inner-city road reserved for use by pedestrians. Vehicles are only allowed for delivery reasons. The maximum speed for vehicles is walking speed. Pedestrians have right of way.



Sign 242 and 243 Begin and end of pedestrian zones

§ 37 Traffic lights and Green arrow

(Text abridged)
… At a traffic light turn on red is allowed after a full stop if on the right side of the traffic light a sign is attached displaying a greed arrow on black background. Only the driver on the right lane is allowed to turn. The driver must not hinder other road users especially pedestrians and traffic having a green signal.

Sign 720 Green arrow (for right turn on red light)

6. Best Practises

In the past 20 years the equality of pedestrians with respect to traffic mode was constituted in technical recommendations. The use and partitioning of road space with appropriate regulations in support of the pedestrians fall into the responsibility of municipal authorities.

Sidewalk width's do not only result from the remainder of the amount of street space but depend on the expected traffic volume just like for other traffic modes. At an available side width of 2.50 m the usable and acceptable sidewalk width must be at least 1,80 m plus safety distance of 0,50 m to the lane. On urban roads in high-density areas a sidewalk width of up to 6,00 m has to be aspired (EFA, 3.2).

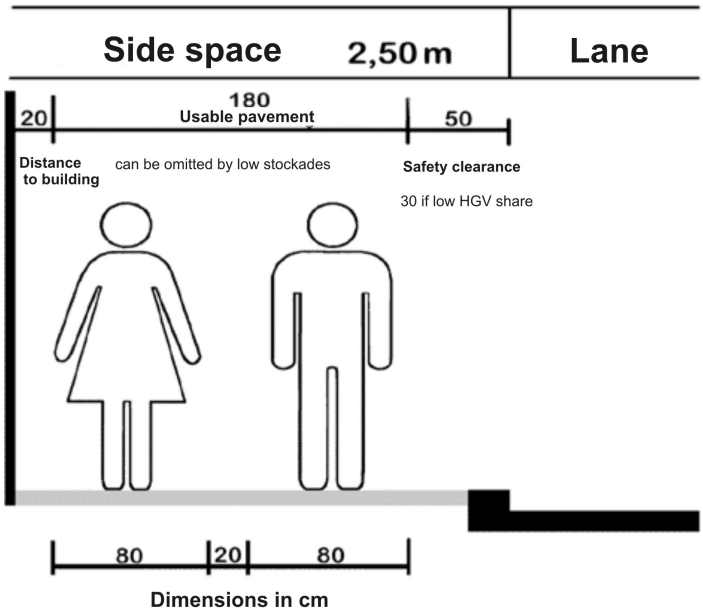


Figure: Sectioning of side space for roads within residential areas (normal case) (Source: EFA 2002)

Basic requirements for facilities of pedestrian traffic within city limits (Source: EFA 2002)

	brief description or utilisation	**AADT [1)] (vehicles/24h)**	**Width of side space [1)]**	**Arrangements for crossing traffic [2)]**
1	lane unattached guided ways	-	3,00 m	(if roads are crossed, potentially necessary there)
2	trafficable ways in residential areas	< 500	minimum width of road space 4,50 m	no crossing facilities necessary
3	lane in residential area, sparsely built-up stockades ≤ 0,50 m stockades > 0,50 m	< 5.000	 2,10 m 2,30 m	normally no crossing facilities necessary,

				potentially advanced side spaces
4	closed building development, high-density, maximum 3 floors	< 5.000	2,50 m	advanced side spaces
5	closed building development, medium-density: 3 to 5 floors	< 5.000	3,00 m	pedestrian refuge islands, advanced side spaces
6	mixed utilisation of habitation and trade, medium-density: 3 to 5 floors	< 5.000	3,30 m	pedestrian refuge islands, advanced side spaces, raised sett pavings, pelican crossings
7	mixed utilisation of habitation and trade with frequent public transport, high-density	< 5.000	4,00 m	pedestrian refuge islands, pelican crossing, if necessary light-signal systems
		< 10.000	5,00 m	light-signal systems
8	cross-town link, low-density, agrarian utilisation	< 15.000	3,30 m	pedestrian refuge islands, pelican crossing, if necessary light-signal systems
		≥ 15.000	4,00 m	light-signal systems
9	shopping street with shelves, high frequented public transport	< 15.000	5,00 m	line-like crossing: central reserve, pelican crossing
		≥ 15.000	6,00 m	light-signal systems
1) If given traffic volume is extravagated about more than 5.000 vehicles/24h, width of side space must be increased by 1,0 m. If there are any punctiform or line-like local anomalies to consider, there can be surcharges in the side spaces according to table 3 possible. 2) The advices for equipment with arrangements for the pedestrian traffic apply for average measures. To choose the applicable type of crossing facilities cp. chapter 3.3				

Bottlenecks have to be particularly considered (EFA, 3.2.4). At a high pedestrian frequency the required space has to be exactly calculated (EFA, 3.2.3; HBS, 11). These usage demands have to be regarded during planning of the road profile or can require a planning change (EAE, 4.2; EAHV, 4.2.1.1).

Sidewalks

Sidewalks are an important part of the living space. The surface should be smoothed, clean and quite presentable. Parking of cars at sidewalks should be prevented (EFA, 3.1.3). Sidewalks have to be adequately lit and be cleared of obstacles.

Driveways to parcel lots

The driveway to a parcel lot over a sidewalk has to be constructed to signal optically the pedestrian right of way at the sidewalk and must not have a steep slope because of disabled persons relying to a wheelchair (EFA, 3.1.2.6).

Shared ways for pedestrians and bicycles

Shared facilities for pedestrians and bicycles should be build only exceptionally (EFA, 3.1.2.5), if the volume of pedestrian and bicycle traffic is low enough and mutual endangerments are not likely to happen (EAHV, 4.2.4.5).

Maximal compatible load of pedestrians and bicyclists during the peak hour

Usable pavement width	∑ bicyclists + pedestrians	Thereof pedestrians
> 2,50 – 3,00 m	70	≥ 40
> 3,00 – 4,00 m	100	≥ 60
> 4,00 m	150	≥ 100

In combination with comparable comments in administrative instructions related to Road traffic regulations (Sign 240 StVO) exist at the moment no univocal, even instead contradictory regulations. The velocity difference between pedestrian (4 km/h) and bicycle (15 km/h) lead to conflicts and frequently to serious accidents. Therefore the concern for pedestrians have to be primarily taken into account if bikeways are placed into the side space of roads.

Roadworks construction sites

Construction sites that reach into the space of sidewalks have to be designed and marked so that concerns of disabled persons are met (EFA, 4.1.3).

Sidewalk networks

A sidewalk network is an important precondition for a safe and comfortable pedestrian traffic. For that reason exist planning guidelines and supportive instructions (EFA, 2.3) to allow for present and possible connecting ways like greenways, embankment ways, passages through buildings, arcades, pedestrian overpasses and so forth.

Resting places

Resting places are required to extend the walking range of pedestrians considerably.

Sanitary facilities

Sanitary facilities should be erected in regular intervals in central areas of cities (EFA, 4.3).

Guidance

An well designed pedestrian guidance can be realised by clearly arranged layouts, visual lines of sight or through unified types of pavement to provide orientation for guests and locals. (EFA, 4.4).

Pedestrian Crossings

For Pedestrian Crossings are different solutions available. The kind of crossing facility depends on the permitted speed on the road, the traffic volume and the number of pedestrians.

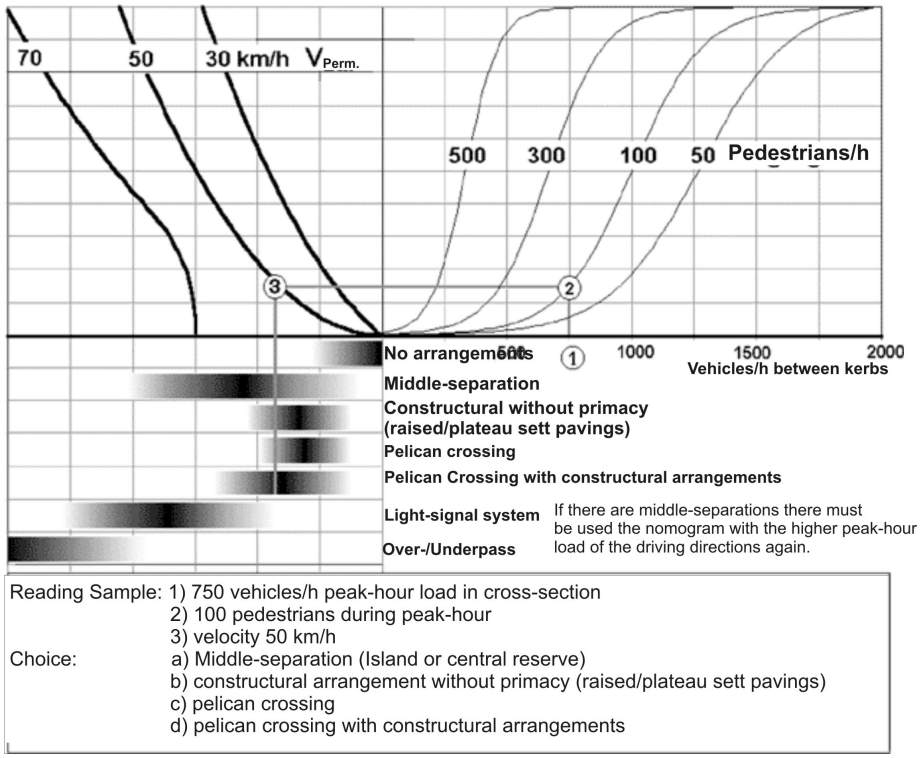


Figure: Application area of crossing-facilities on the route of 2-laned roads within city limits < 8,50 m lane-width (Source: EFA 2002)

Crosswalks

Pedestrian crosswalks are required in distances not exceeding 100 to 150 m. They should be constructed along the main direction of pedestrian connections to avoid indirections of more than 50 m (EAE, 5.2.1.10).

Pedestrian Protection Crosswalks (Zebra crossing)

The safer Zebra crossing with white strips on black pavement give the pedestrian the clear right of way and shortest waiting times. They are proved to gain the highest acceptance and

improve traffic safety. In technical guidelines issued by the Federal Ministry of Transport and Urban Affairs Pedestrian Protection Crosswalks are recommended for extended application in the range from 200 to 750 vehicles per hour in the peak hour of pedestrian traffic. In addition they can also be applied with respective reasons at important pedestrian connections, dedicated ways to nurseries and schools or high-frequented public institutions (R-FGÜ, 2.3).

Pedestrian Traffic Lights

Pedestrian traffic lights allow for more safety for pedestrians at streets with higher traffic volume and speeds if they are properly planned and constructed. Waiting times for pedestrians of more than 40 seconds should be avoided, at pedestrian actuated traffic lights the green time should be given 7 seconds after actuation (EFA, 3.3.5.1). It is recommended to design a conflict-free traffic light control in which pedestrians during their green time do not have to reckon with turning vehicles (RiLSA, 7.3.4). Since traffic lights in general do not provide the highest level of safety and moreover are very expensive investments they should only be installed if no other crossing aid can be considered (RiLSA, 7.4.1).

Center Refuge Islands or Center Refuge Strips

The pedestrian refuge islands lower the accident risk and alleviate the crossing of a road as only one direction of traffic has to be watched. The width should be 2,50 to 3,00 m whereof 1,50 must not be driveable for vehicles (EFA, 3.3.3.1). In a simpler form as markings at the pavements they represent the most cost effective crossing aid.

Bus and Tram stops

Public traffic stops should be efficiently embedded into the sidewalk network. Their layout and design influence considerably the attractiveness of public transportation and likewise that of pedestrian traffic. Sufficient waiting areas allow 2 persons per square meter whereas the basic condition is a minimum width of 1,50 m. The accessibility of the public transport vehicle on equal level should be strived to achieve (EFA 3.4). A dense network of stops and a high frequency of tram or buses mean the highest comfort for the public transport user. Public transport should be pre-empted to car traffic.

7. Innovations

Pedestrian safety and vehicles

- Protection of pedestrians and other vulnerable road users

Directive 2003/102/EC of the European Parliament and of the Council of 17 November 2003 relating to the protection of pedestrians and other vulnerable road users before and in the event of a collision with a motor vehicle and amending Council Directive 70/156/EEC.

The directive applies to the frontal surfaces of vehicles, which mainly means the bonnet and the bumper. It applies to passenger cars (category M1 vehicles) not exceeding 2.5 tonnes and commercial vehicles (category N1 vehicles) not exceeding 2.5 tonnes and derived from M1 vehicles. There is provision for the Commission to examine the possibility of extending the scope of the directive to vehicles not exceeding 3.5 tonnes.

- Extra crumple zone to protect pedestrians (Source BASF)

Pedestrians are always at a disadvantage in collisions with vehicles, because they don't have a built-in "crumple zone". So the more impact energy the car can absorb, the better protected the pedestrian is. Car makers are therefore starting to use Neopolen foam in many vehicle parts that affect safety. They are equipping bumpers, for example, with a core made of Neopolen. If the car hits a pedestrian, the bumper depresses and thus absorbs impact energy. This can reduce the incidence of severe injury.

Plastic solutions for bumpers from BASF help to improve crash protection for pedestrians. In case of a collision, Neopolen® foam absorbs impact energy, and an innovative component made of Ultramid® reduces the risk of severe knee injury.

- Components for Driver Assistance Systems (Source SIEMENS)

  - CMOS Cameras for detection of road edge markings
  - LIDAR Sensor for detection of headway space by 5 integrated infrared laser

- Innovative Headlights (Hella)

New headlights system have been developed to adapt better to different road and environment conditions that can even follow the road curvature. In curves the lights turn more to the center of the curvature towards the curb. So pedestrian and bicycles can be seen better.

- Infrared night vision driver assistance (BMW and other car manufacturers)

New forms of transport

- Called shared taxi
- Mobility services like car-sharing

Outdoor gadgets

- Inline skates
- SegWays (not approved)
- Pedestrian navigation devices

Intelligent technical innovations

- Modern buses have been introduced that can lean towards the entrance to lower and level the entrance with the kerb.
- The Kassel-kerb: special kerbstone to complete system with kneeling buses
- Kasseler Querungsbord: special lowered kerb with tactile surface for blind and visually impaired people (detailed information see: www.profilbeton.de)
- Easycross: special lowered kerb with tactile surface for blind and visually impaired people (detailed information see: http://www.klostermann-beton.de/output/frameset.aspx?rid=1&spr_id=1)

8. General Atmosphere

The general atmosphere towards pedestrians can only be described from a personal viewpoint. The attitude of car drivers towards pedestrians can be assessed to be respectful as well as in return. For instance, it may be said that car driver would slow down and stop if a pedestrian is on the road, even if the pedestrian is not allowed to stay there. Vice versa, normally a pedestrian would not voluntarily try to impede the traffic on a busy street. Unlike more conflicts arise between bicycles and pedestrians as bicyclists often use sidewalks instead of bikeways and pedestrians may stand on marked bikeways especially at tram/bus stops.

The behaviour of pedestrians towards pedestrians in comparison to other countries can depend on the size of the city and its traffic volume and may be also different from city to city. The situation on a crowded sidewalk can be described as not impolite but also not as specifically polite, meaning that an excuse when collisions accidentally happen is not the norm everywhere in Germany, in contrast to some countries in the world where excuses are already normally when two people happen to come too near before taking evasive manoeuvre.

In public discussions, also in parliamentary debates at the municipal level, the pedestrian issues are respected but do not play the most important role. Car traffic seems to be dominating decisions being made for instance in the field of traffic control, although acceptance in necessary concessions towards pedestrian issues exist.

In the last years the discussions about the demands and adjustment of an ageing society have grown up all over Germany. Against this background a barrier free infrastructure and a Design for All became more important as in the 90s.

The most identified conflicts of all pedestrians – including elderly people - with other uses of sidewalks are

- Cycling at sidewalks
- Shared ways for pedestrians and bicycles
- Sidewalk and Parking of vehicles allowed
- Trash bins, light poles, bicycle stands at sidewalks
- Electrical distribution boxes and other facilities at sidewalks
- Trading at sidewalks

Non Governmental Organizations

FUSS e.V. Association for pedestrian traffic in Germany

FUSS e.V.
Fachverband Fußverkehr Deutschland
Exerzierstraße 20, 13 357 Berlin
Tel. 030 / 492 74 73 - Fax 030 / 492 79 72
info@fuss-ev.de - www.fuss-ev.de

Periodical Publication: "mobilogisch!"
Contact: redaktion@mobilogisch.de, www.mobilogisch.de

Topics:

- Walking and Health
- Roundabouts – preferred crosswalks for pedestrians
- Berlin on its way towards a walking friendly city (Exhibit http://www.stadtentwicklung.berlin.de/verkehr/fussgaenger/)
- Cycling on the sidewalk
- Walking to school
- Improving safety and amenity on the way to school

Vereinigung für Stadt-, Regional- und Landesplanung e.V. - SRL
Yorckstraße 82
D-10965 Berlin
Tel. 030 / 27 87 468-0
Fax. 030 / 27 87 468-13
http://www.srl.de

Arbeitsgruppe Fußverkehr von SRL und FUSS e.V.
E-Mail: kontakt@fussverkehr.de
Internet: www.fussverkehr.de

Contact
Andreas Schmitz
Dörnbergstr. 12
34119 Kassel
Telefon: 0561 / 80758-0
Telefax: 0561 / 80758-58
E-Mail: schmitz@fussverkehr.de