Berlin-Design for all

Accessible Public Buildings
(2nd Edition)

Table of contents

Welcome 5

SECTION I – GENERAL PRINCIPLES

1. General remarks 6

2. Anthropometric principles 8

2.1 Requirements and capabilities of users in public spaces 8
2.1.1 Mobility requirements 8
2.1.2 Sensory requirements 8
2.1.3 Intellectual/Cognitive requirements 12

3. Legal framework 14

3.1 Social-policy framework 14
3.1.1 UN Convention on the Rights of Persons with Disabilities (CRPD) 14
3.1.2 National Action Plan 15
3.1.3 Design for all 15
3.2 Building regulations 16
3.2.1 Circular SenStadt VI A No. 03/2010 16
3.2.2 Building Regulations for Berlin (BauOBln) 16
3.3 Specific legal codes and other frameworks 18

SECTION II – ACCESSIBLE PUBLIC BUILDINGS

1. General requirements for barrier-free access 20

1.1 Orientation and information 21
1.1.1 Information systems 21
1.2 Movement areas 28
1.3 Light and lighting 32
1.3.1 Quality of light 32
1.3.2 Functions of light 33
1.4 Acoustics and communication 34

2. Public access 35

2.1 Connection to local public transport 35
2.2 Connections to individual transport 35
2.3 Barrier-free design of premises 36

3. Functional areas in buildings 36

3.1 Entrances 36
3.2 Foyers and corridors 37
3.3 Escape routes 37
3.4 Places of public assembly 38
3.5 Office spaces in public administration buildings 38
3.6 Retail areas 39
3.7 Dining areas 39
3.8 Sanitary facilities 40
3.8.1 Toilets 40
3.8.2 Baths and showers 43
3.8.3 Changing areas 43
3.9 Therapy and treatment rooms 44

4. Functional elements of buildings 45

4.1 Pathways (on premises) 45
4.2 Parking spaces 46
4.3 Ramps 49
4.4 Stairways 52
4.5 Lifts 54
4.6 Doors 56
4.7 Windows 60
4.8 Surfaces 60
4.8.1 Floor covering 60
4.8.2 Walls and ceilings 61

5. Selected facilities for public use 62

5.1 Places of public assembly (sports venues, theatre, cinemas, concert halls) 62
5.2 Exhibition spaces 63
5.3 Hotels 66
5.4 Education and sport facilities 70
5.4.1 Childcare facilities 70
5.4.2 Schools 71
5.4.3 Sport centres 72
5.4.4 Public baths 75

Sources 78

DIN Standards 78

Implementing regulations 79
Additional regulations 80

Publications 81
Additional literature 81

Online resources 82

Acknowledgment 82

Imprint 84

Supplementary volume:
BERLIN-DESIGN FOR ALL: PUBLIC OUTDOOR SPACE (SECTION III)

In June 2007, the Berlin Senate Department for Urban Development published the manual **Barrier-Free Planning and Construction in Berlin - Public Buildings.** With that publication, a planning guide for construction in the private and public sectors was made available for the first time.
Since that time, we are happy to report, a great deal has changed. The 2007 manual has had to be revised to reflect these changes and is now available in an updated edition.

This second edition incorporates current international codes and legal regulations. The title, too, has been changed to **Berlin-Design for all: Accessible Public Buildings.** This is evidence of a paradigm shift. Earlier piecemeal solutions to barrier-free construction will hereafter be adapted to develop into a comprehensive *Design for all*. The Design for all approach integrates the needs of all people, and acknowledges people with disabilities as an integral part of our society. The 'deficit approach' has been replaced by a 'diversity approach'.

Social changes, not least among them demographic shifts, have made the need for barrier-free construction into a prevailing issue surrounding public space and building. Barrier-free access is a concept that is all too often understood as something that relates only to disabilities – and reduced mobility in particular. But the concept of a 'barrier' is one that must be understood more broadly. Some colours or fonts can be perceived more clearly than others; certain floor surfaces create better traction or better acoustic conditions that in turn facilitate orientation. Mobility and social interaction in public space is a social issue and nothing should 'stand in its way' – in the figurative and the literal sense of the words.

The context for the increasing attention to this theme is the ratification of the United Nations Convention on the Rights of Persons with Disabilities, or the UN Disability Convention. The UN Convention calls for greater self-determination and participation in public life for people with disabilities and establishes new benchmarks to that end. The Federal Republic of Germany has made a commitment to meeting these standards, for example, with the presentation of a National Action Plan in June 2011. The Berlin Senate Department for Urban Development and the Environment supports this broad-ranging social objective. Under the rubric of 'disability mainstreaming', the Design for all approach will become an integral part of administrative and planning processes right from the start.

Successful work needs an effective network. Since 2001, the Berlin Senate Department for Urban Development and the Environment has worked closely with disabilities organizations, field experts, state and borough commissioners for people with disabilities, the state advisory board for people with disabilities and other expert and professional bodies through the working group 'Barrier-Free Construction and Transportation'. Continuity and constructive collaboration have resulted in undeniable success.

The city in all its diversity should be accessible without impediments. That is a political demand. People should be able to move and interact freely without external impediments as far as their personal circumstances allow. As we move forward, the **Design for all** approach will shape the unique identity of the city. Our future task will consist of this: to modify public buildings and spaces so they can be used independently, simply, intuitively and comfortably by everyone. This publication makes a contribution to that end.

Michael Müller

Senator for Urban Development and the Environment

Berlin, August 2012

1. General remarks

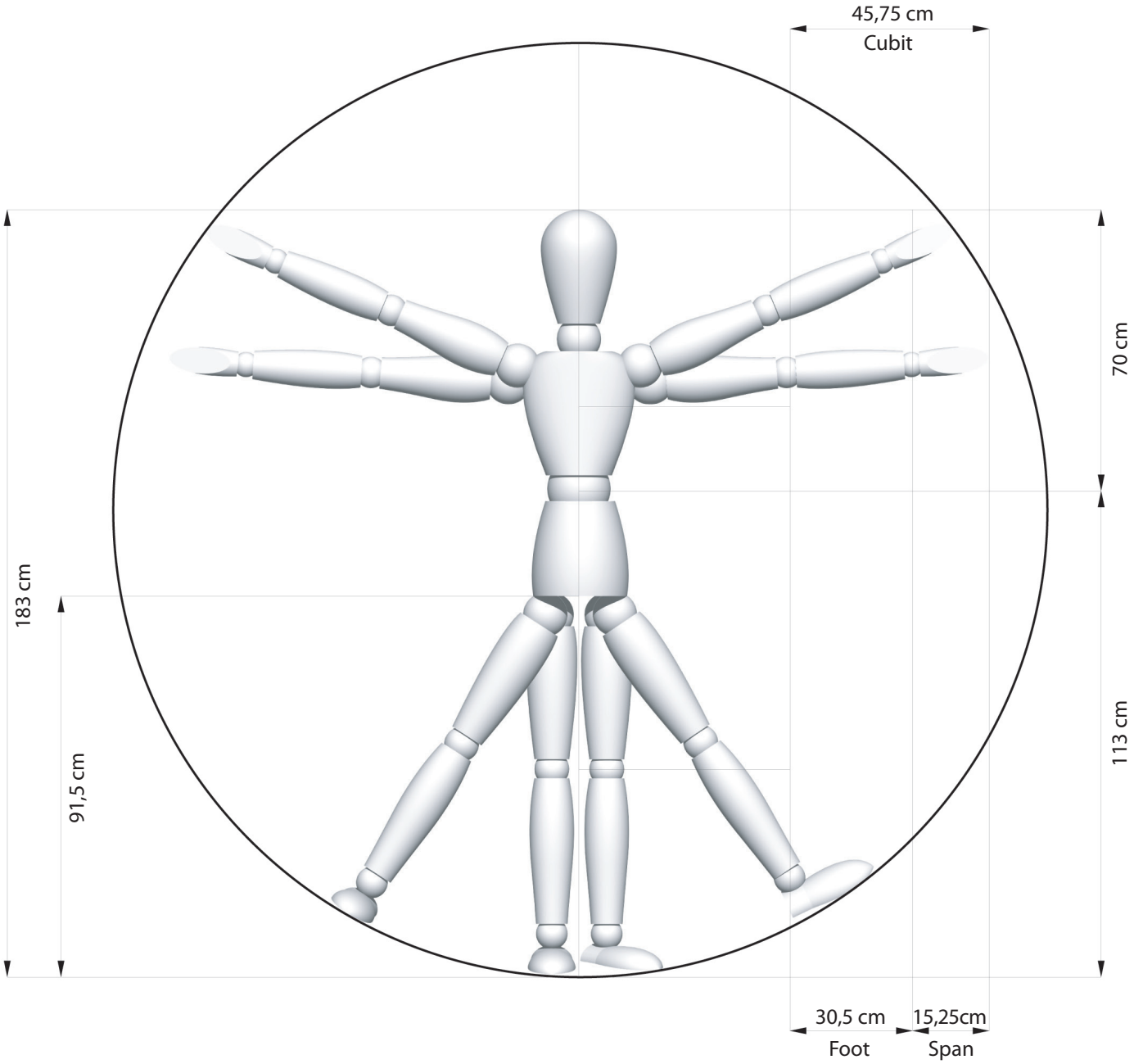
Barrier-free planning and construction means building for all people. Its objective is the design of public spaces and buildings that are safe and enjoyable for everyone, including people who have disabilities. In addition to the special requirements of people with reduced mobility, people who are blind or have a visual impairment, people who are deaf or hard of hearing, those of smaller stature or with intellectual disabilities, barrier-free construction takes into account the general needs that arise over life cycle – from childhood to old age. Today, the emphasis is no longer on just removing barriers but on a creating a *Design for all* (Section I, 3.1).
This approach requires a new awareness on the part of everyone involved in the planning and construction process. It is based on the following principles:

- **Respect for social diversity**
- **Easy and intuitive handling**
- **Simple detection and intelligibility**
- **High safety standards**

paired with high aesthetic standards in design and realisation. The legal guidelines alone cannot fulfil these criteria. Everyone who embarks on a construction endeavour must take on the challenge of this complex objective – to design a built environment that is usable by everyone.
The proportion of older people in the German population is growing. Since many diseases and disabilities are specifically linked to aging, the number of people with disabilities is expected to increase proportionally. This means that here too it is critical to create conditions that allow people to participate actively in society and to preserve their independence for as long as possible. It has become standard practice to design public buildings that provide barrier-free access. Where changes need to be made to existing structures, however, it is often difficult to reconcile different interests. This is a challenge that demands creativity and commitment.
The preservation of historic structures should not be neglected (Section I, 3.3). Historic preservation and barrier-free construction are not mutually exclusive. The solution is to bring the needs of the public and the demands of historical preservation into correspondence. This requires an individualised approach for each specific case.
The information and illustrations in this manual are user-friendly clarifications largely based on DIN standard 18040 Part 1(Section I, 3.3). Due to the complex perspectives and factors involved in the barrier-free design of public areas, practical recommendations for planning, construction and operation are indispensable.
This manual, **Berlin-Design for all–** Accessible Public Buildings together with the manual **Berlin-Design for all–** Public Outdoor Space (Section III) form a comprehensive foundation for planning and design. Therefore, in some places reference is made to, or specific passages cited from Section III.
Design for all is the new target for the design of our future living spaces. The standards for this objective are continually evolving.

The scenes, illustrations, and drawings in this manual are not intended as specific guidelines. They are meant to offer some basic orientation and inspiration for the planning process.

This is the sense in which this manual for public construction in Berlin should be understood. It is not a substitute for timely discussions with citizens and expert groups at an early stage of a building project, or for the participation of state and borough commissioners for people with disabilities and the working group 'Barrier-Free Construction and Transportation' of the 'Barrier-Free Construction' coordinating office at the Berlin Senate Department for Urban Development and the Environment. Experience has shown time and time again that this type of early collaboration is the best guarantee of a comprehensive barrier-free design that will function down to the last detail and avoid the added costs of retrospective improvements. This document also includes reference to specialist literature on the subject, a small selection of which is listed in the appendix.



Cubit = Distance from the elbow to the tip of the middle finger
Foot = Distance from the heel to the toe
Span = Distance of the outstretched hand between the tip of the thumb and the tip of the little finger

Scheme of human proportions based on Leonardo da Vinci, body measurements in metric system
Ideal measurements based on a presumed height of 183 cm

2. Anthropometric principles

2.1 Requirements and capabilities of users in public spaces

Planning in the public sector is subject to technical and financial parameters and is largely focused on creating rational solutions. With *Design for all* as a goal, the 'human measure' generally becomes a more important consideration. Public use of the built environment should be barrier-free and that means it should be equally available to all users. Yet, the 'human measure' is not just a set of proportions used to define a range of bodily movements; it must also bee seen as a measure of use and perception. Architecture should be self-explanatory and provide clear orientation and functionality. People using public spaces should not be subject to the goals of planners. Instead, planners should take their cues throughout the planning process from the needs and abilities of a diverse population of users. For this, there are three basic categories of requirements that can be distinguished:

- **Mobility** requirements
- **Sensory** requirements
- **Intellectual/cognitive** requirements

2.1.1 Mobility requirements

The design of rooms should be based on the human body – its potential for movement and its radius of action. Early units of measurement (foot, cubit, pace) were directly linked to the human body such as the canon of proportions by Leonardo da Vinci. Today, it is often possible to compensate quite effectively for restrictions on human mobility through the use of assistive technologies. As a result, we can depart to some extent from standard measurements (derived from on ideal images), e.g., lateral range, highest reach. Movement area should be calculated on the basis of individual circumstances, so that everyone can move freely and without obstruction. To ensure a fully functional design, the largest and smallest human dimensions must be taken into account (e.g., persons of smaller or larger stature) in addition to average human measurements.

2.1.2 Sensory requirements

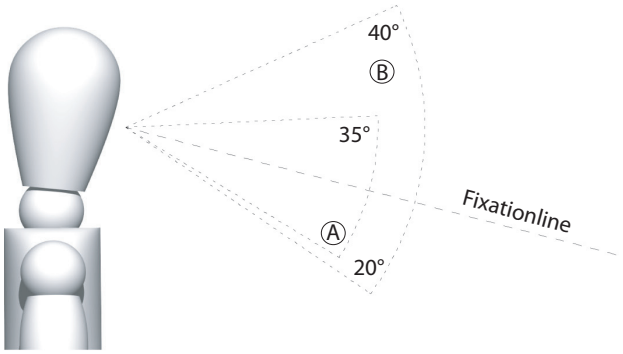
The environment is generally perceived through a combination of different senses. In order to compensate for sensory limitations or loss, it is necessary to simultaneously convey the same information to two more senses. This is known as the **principle of multi-sensory design**. For example, important visual information should also be presented acoustically.

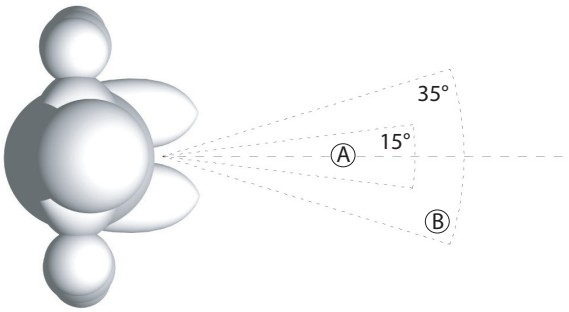
Sight
From a physiological perspective, needs profiles of users vary based on the type of impairment or disorder of the eye. The primary differences can be described as:
- Diminished visual acuity
- Impaired vision
- Early blindness
- Late blindness

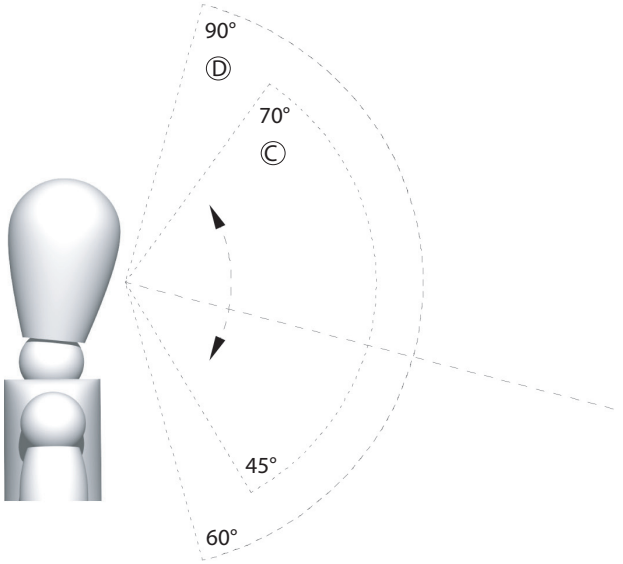
In addition to the organic abilities of the eye, visual perception of the environment also depends on external conditions, like conditions of natural light and shadow, artificial lighting, colour, and the form and structure of surfaces. The deliberate use of these elements in a design can contribute significantly to improved perception of the environment, facilitating or making it possible at all for individuals to freely navigate public spaces.
In-depth information on this subject can be found in DIN standards DIN 32975 and DIN 1450, as well as in the publication, *Improving Visual Information in Public Space: A Manual for Planners and Practitioners* published by the German Ministry of Health.
People with impaired vision require strong differences between light and dark to perceive visual information. Here, a distinction is drawn between **light density contrasts** and **colour contrasts.**

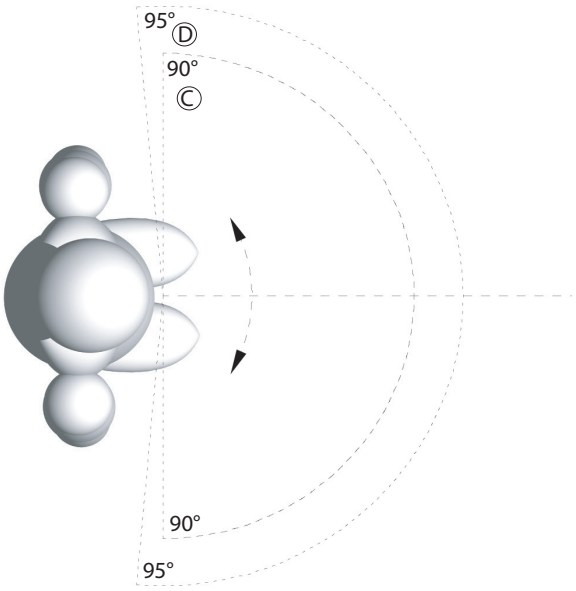
Light density contrast refers to the difference between the brightness of an object against its background.
A colour contrast uses colour in the design to differentiate the object from its background.

People with colour vision deficiencies acquire most of their important visual information from light density contrast. Reduced visual acuity requires special visual supports, whereas people who are blind require compensation for the absent sensory information through









Range of Vision
Ⓐ Optimal range of vision
Ⓑ Maximum range of vision

Field of fixation
Ⓒ Maximum field of fixation
Ⓓ Extended field of fixation

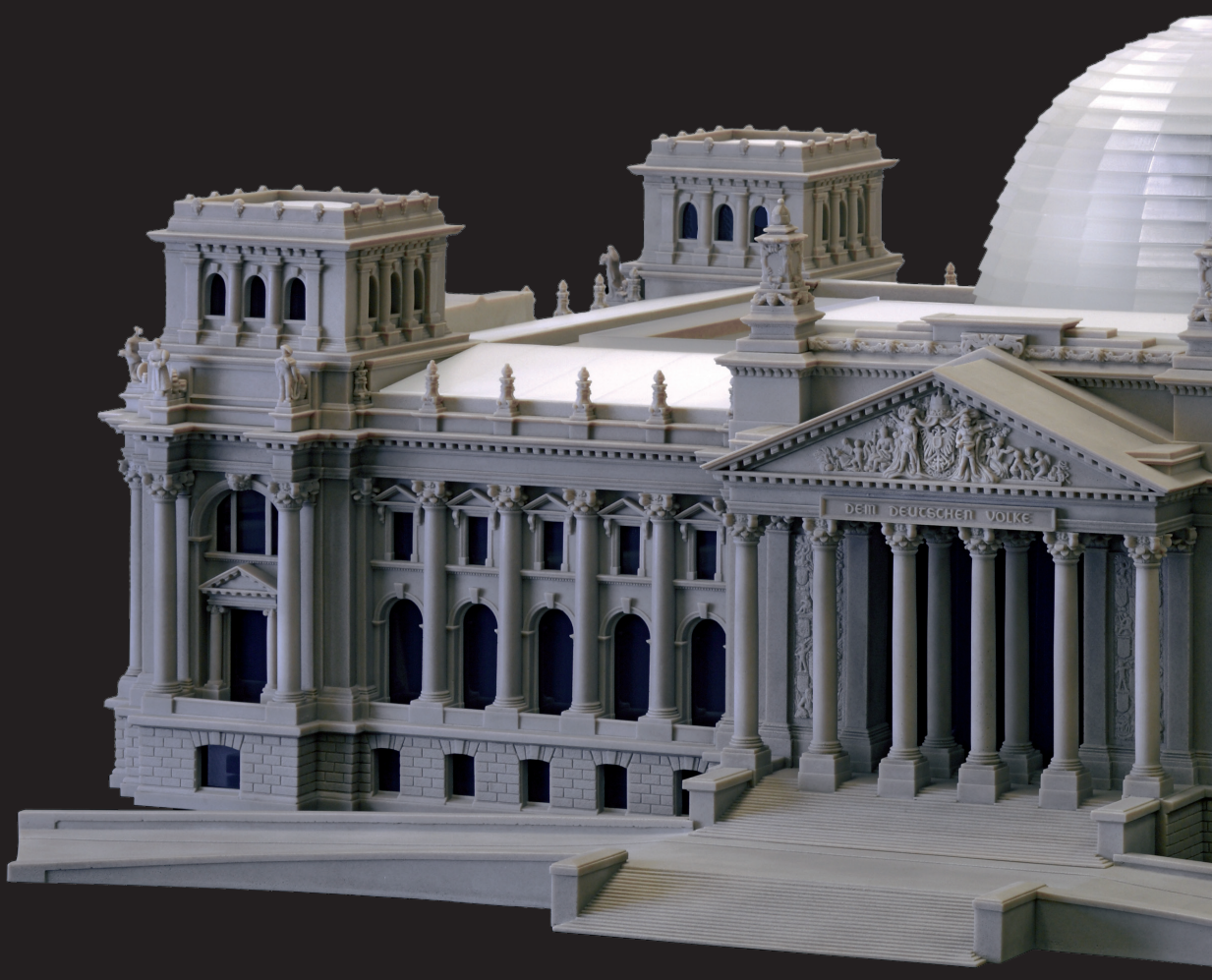
Hearing
In addition to the sense of sight, the perception of acoustic signals and verbal communication is an important part of orientation in public space. Acoustic requirements vary depending on:

- Hearing impairment,
- Age-related hearing loss
- Deafness

In addition to keeping background noises and echo effects to a minimum, cases of mild to moderate hearing loss require effective public address systems and high-quality presentation of acoustic information. In cases of severe hearing loss (people with implants or hearing aids), hearing enhancement systems, good lighting, and visualizations are also required. Individuals with age-related hearing loss primarily require information visualization. A person who is deaf not only requires exclusive visualizations but also translation into sign language. Hearing impairments often go unnoticed by others in the environment until there is closer contact and direct communication. This is an area, therefore, that needs to receive more attention in the future.

'Not seeing separates us from things, not hearing separates us from people'.
Immanuel Kant

Technical requirements will be explained in Section II, 1.4.



Touch
The sense of touch is often very well-developed in people who have a visual impairment or who are blind. They are able to make calculated use of tactile or haptic surface structures to facilitate orientation and information uptake. Different layers of information are created by the shape and surface of selected materials, their structure and temperature, as well as the contrasts between these parameters and contrasts to the surrounding environment. Specific elements include:

- tactile maps (ground plans, city plans, maps of public transportation routes)
- tactile letters (alphabetic script, raised letters, Braille, pictograms)
- figural representations (tactile models)
- floor structures with tactile information or floor indicators in the sense of DIN 32984 on guidance systems (e.g., plaster pavers and plates or ribbed plates).

Smell/Taste
These are elements that are not commonly exploited in project planning, yet they are very important to individuals. One example of the way they are consciously utilised is in a fragrance garden.

Tactile model of the Reichstag building (Scale 1:100)
Built by: Technical University Berlin, Modell + Design
On permanent exhibition in the plenary chamber of the German Bundestag

2.1.3 Intellectual/Cognitive requirements

Effective orientation in public space depends to a large extent on individual skills and knowledge. Therefore, the objective should be to design a built environment that is easily intelligible, intuitive and useful. Buildings are easier to use when their form and function work together. A simple ground plan and straightforward language on signs or in guidance systems, and in instructions for using computers or automated machines should be a priority. In addition to the mandatory use of simple figures and symbols, particularly in orientation systems, the barrier-free design of information technology is becoming an increasingly pressing issue for people with an intellectual or cognitive impairment (Section II, 1.1). Legal regulation of this area is in effect at the federal level with the Federal Ordinance on Barrier-Free Information Technology (BITV) and also at the state level with the Berlin Administrative Regulations for the Creation of Barrier-Free Information Technology (VVBIT, Section I, 3.3).

Plain Language
In today's society, we find ourselves increasingly confronted with a flood of information that we can only process with great difficulty or very superficially. Plain language makes it possible for people to understand content easily. This benefits everyone – not only people who have an intellectual or cognitive impairment.

Plain language seems easy.
But sometimes plain language can be very hard.

The important thing is that everyone understands.
For example: pamphlets, directions, information boards or websites.
That is why we use plain language.
Plain language is important for many people.

For example, for
- for many people who do not speak German very well,
- for many people who have a visual impairment,
- for many people who have a hearing impairment,
- for many people who have learning disabilities or an intellectual impairment.

Plain language has definite rules.
Here are some of them:

1. Rules for sentences
- Use short sentences.
  Express only one idea in each sentence.
- Use simple sentences.
- The sentences should not be convoluted.
  Wrong:
  Publicly accessible buildings are generally furnished with signs facilitating communication and orientation.
  Right:
  There are signs in many buildings
  The signs have information on them.
  You can find your way around buildings by using the signs.
- Write every new sentence on a new line.

2. Rules for word
- Use short, familiar words.
  Wrong: Omnibus
  Right: Bus

- Avoid using difficult words.
  Sometimes you need to use a difficult word.
  Then you have to explain that word.
- Always use the same words for the same things.
  For example:
  If you are writing a text about a lift.
  Use the word lift in the whole text.
  Do **not** alternate between elevator, hoist and lift.
- Avoid words like:
  Would, could, should, ought, might.
- Avoid abbreviations.
- Divide longer words if they are needed.
  Then the words are easier to read.
  Wrong:
  Leuchtdichtekontrast
  Right:
  Leucht-Dichte-Kontrast

3. Rules for design

- Use a clear font:
  Arial, Tahoma, Verdana or Myriad Pro.
- Use a large font.
  This text is a 14-point font size.
- Leave enough space between the lines.
  This text has a line spacing of 1.5
- Write with your text flush to the left.
- Make many paragraphs.

4. Other rules

- It is good if you can use examples.
- Do not write numbers out as words.
- Leave out special characters.
- Some examples of special characters are: §, &, %
- Have texts edited or reviewed.
- The reviewers should be people with learning or cognitive disabilities.
- There is an icon for plain language texts that have been reviewed.
  The icon looks like this:

These are some of the rules for plain language.
But there are even more rules.
The rules were made by the Network for Plain Language.
The rules can also be found on the Internet at:
http://leichtesprache.org

2. Legal framework

3.1 Social-policy framework

The 1994 amendment to the **Basic Law for the Federal Republic of Germany**, Article 3 para. 3 states: 'No person shall be disfavoured on account of his or her disability.' With this amendment, the German constitution clearly states that 'regulations that discriminate and alienate, as well as discriminatory conditions in the everyday lives of people with disabilities are not acceptable to society as a whole'. This constitutional law not only has a declaratory character, but also represents a binding obligation for legislators, government administrators and the judiciary. General clauses of this kind, however, can only be fulfilled through specific regulations. Berlin was the first federal state in Germany to act on the federal ban on discrimination by passing the **State Equal Rights Act (LGBG)** (Law on Article 11 of the Berlin Constitution 17 May 1999).
Federal legislation later followed suit with Article 1 - the **Equal Opportunity for People with Disabilities Act (BGG)** - of the law on disability equality and amendments to prior laws from 27 April 2002. The first guideline principles for a barrier-free city were summarised in the 1992 document 'Guidelines for Making Berlin a More Disabled-Friendly City', which were expanded in 1996.

The goal of the LGBG is the creation of equal living conditions for all people, whether they have a disability or not. The introduction of the extraordinary right of action under the Administrative Court's code of procedure granted through the LGBG (Article 15) is of particular importance in this context. According to this provision, non-profit associations with legal status that are represented on the state advisory board for people with disabilities have the right to enforce barrier-free access by means of appeal and judicial redress.

The BGG, which entered into force on 1 May 2002, gave concrete, nationwide expression to the paradigm shift in disability policy and defined the concept of barrier-free access for the first time. 'Facilitating self-determination instead of providing aid' became the new guiding principle.

BGG Article 4 Barrier-Free Access:
'Built environments and other installations, means of transport, everyday technical devices, information processing systems, acoustic and visual sources of information, and communication equipment and any other designed living spaces are barrier-free if they are accessible and usable by people with disabilities in the usual and customary way, without special difficulty and without outside assistance'.

3.1.1 UN Convention on the Rights of Persons with Disabilities (CRPD)

The UN Convention on the Rights of Persons with Disabilities (CRPD), ratified by Germany in 2009, is based on the Universal Declaration of Human Rights and core UN human rights treaties. The convention defines and specifies universal human rights from the perspective of persons with disabilities and in the context of their particular life circumstances.
The UN Convention thus represents an important step toward strengthening the rights of people with disabilities worldwide. It recognises disability as part of the diversity of human life, and in so doing overcomes the out-dated principle of providing aid, which is still prevalent in many countries.
(see 'Disability Report' 2009, Federal Ministry of Labour and Social Affairs)

Obligations of the States Parties
States Parties undertake to:
- Adopt all appropriate legislative, administrative and other measures for the implementation of the rights recognised in the present convention
- Take all appropriate measures, including legislation, to modify or abolish existing laws, regulations, customs and practices that constitute discrimination against persons with disabilities
- Article 9: Create measures to promote the accessibility and functionality needed for an independent life and full participation in all spheres of life in the physical environment, including:
  - transportation
  - information and communications
  - publicly accessible institutions and services, as well as
  - buildings, roads, indoor and outdoor facilities, including schools,

housing, medical facilities and work places;
- and to formulate minimum standards and guidelines for such accessibility.

This does not have to result in additional costs. Here, the principle of sustainability can prove effective. We need intelligent planning from the beginning.

3.1.2 National Action Plan

The aim of continuing efforts is described with the terms 'universal design' or 'design for all'. In the federal government's National Action Plan for the Implementation of the UN Convention on the Rights of Persons with Disabilities the term 'Design for all' is defined as:

With the National Action Plan, the federal government of Germany developed the means to systematically advance the implementation of the UN Convention over the next ten years. The National Action Plan points the way toward a society in which all people actively participate, whether they have a disability or not. As such, it relates to all aspects of life and all parts of society.

3.1.3 Design for all

Facts:
- 10% of the population depends un conditionally on barrier-free access
- 40% of the population needs barrier-free access as an essential support
- 100% of the population appreciates the greater comfort of barrier-free access

In all phases of the planning process the *Design for all* approach requires the participation of the people who will be using the spaces in the future – the people who will fill them with life. *Design for all* therefore represents an important step toward a self-sustainable future development that will improve the quality of life and promote user-friendly and cost-efficient design. The Design for all approach therefore has a key role to play in space-related research and planning practice. Future design characteristics will be oriented towards the requirements of barrier-free construction and will integrate additional factors.
These are:
- Adaptation to human scale and proportions
- Attention to human diversity (e.g., gender diversity)
- Respect for the needs of the target group (e.g., people with disabilities)
- A global perspective (e.g., international visitors, people with a migration background).

'Design for all is a term that refers to the planning and design of products and environments (e.g., objects, buildings, public pathways, streets and squares, public green spaces and technical installations) that allows all people to use these products and environments as far as possible without individual adjustments or special assistance'.

(from 'Toward an Inclusive Society: The Federal Government's National Action Plan for the Implementation of the UN Convention on the Rights of Persons with Disabilities', Federal Ministry of Labour and Social Affairs, August 2011)

3.2 Building regulations

3.2.1 Circular SenStadt VI A Nr. 03/2010

In addition to standard building codes, public building projects in Berlin are subject to the quality standards outlined in this manual. **These standards are legally binding for Berlin state building projects** as stipulated by the Circular SenStadt VI A No. 03/2010 – General Directive, Barrier-Free Construction (expanded in 2011 to include public outdoor space).
In the hiring of private contractors, compliance with the requirements of barrier-free construction must be safeguarded. In addition to the applicable legal frameworks (Building Regulations for Berlin, DIN 18040-1, Berlin Road Act, Implementing Regulations on Pedestrian and Bicycle Paths), contracts for all public or publicly funded building measures in the state of Berlin must include on the following:

- An agreement to adhere to the standards in the manuals *Berlin-Design for all: Accessible Public Buildings* and *Berlin-Design for all: Public Outdoor Space*
- The obligation to develop a comprehensive plan for barrier-free access to the physical structures, including a description of the elements of barrier-free construction that identifies specific barrier-free measures

To ensure the inclusion of the disabilities community, the standing disabilities commissioners (state and borough commissioners) should be kept informed about all major public building projects being carried out.

The use of the guidelines outlined in these manuals is strongly encouraged for the planning and construction of all other publicly accessible buildings in **private ownership** in view of current social policy goals (State Equal Rights ActSection I, 3.1).

3.2.2 Building Regulations for Berlin (BauOBln)

The responsibility for realising barrier-free access to public spaces in practical terms lies primarily with the municipality. 'Barrier-free construction', Article 51 of the Building Regulations for Berlin (BauOBln) provides the legal framework for publicly accessible structures and their grounds. It sets the **minimum legal requirements** of the legal building code to ensure barrier-free access and proper and adequate usage.
The technical rules entered on the **List of Technical Building Regulations** should be applied in planning and construction. This will ensure that sensory and cognitive requirements are met, in addition to spatial parameters.
The specific regulations for barrier-free access in the Building Regulations for Berlin (BauOBln) are as follows:

Article 51 Barrier-Free Construction
'(2) Buildings that are accessible to the public must be constructed and maintained in such a way that they can be accessed without barriers by people with disabilities, the elderly and visitors with small children via the principal entrance and enjoyed in line with their designated use without outside assistance. In addition to the escape routes required by Article 33, structural measures that enable visitors who are using wheelchairs to independently evacuate the building in an emergency are required only if the structure or the relevant parts of it are used by a greater than average number of people with disabilities than the proportion that exists in the general population. Otherwise operational policies to ensure rescue using third-party assistance are sufficient.

(3) In accordance with para. 2, buildings must be accessible via a principal entrance without steps and with a clear passage of minimum 0.9 m. There must be sufficient area for movement in front of any door. Ramps must not have a slope of more than 6%; they must be at least 1.20 m wide and have solid and easy-to-grip handrails at both sides. There must be a landing at the beginning and end of each ramp and interim landings every 6 m. The landings must be at least 1.50 m long. Stairs must be equipped with handrails at both sides, which must continue across landings and window openings right to the end of the stairs. Stairs must have solid risers. Corridors must be at least 1.50 m wide. In the provision of toilets, at least one cubicle must be made so that it can also be used by people with disabilities, and must be accessible and usable without any barriers; this must be appropriately marked. Article 39 para. 4 also applies to buildings with fewer than five floors above ground, as far as floors must be accessible by wheelchairs, without steps.

(4) Where lawfully existing buildings are modified according to para. 2 in their use or essential structure, the requirements referred to in para. 2 apply accordingly; in cases where essential structural alterations are made, the conditions listed in Article 85 para. 3 apply to the remainder of the structure.

(5) Deviations from paras. 1 to 4 are permissible, according to Article 68 para. 1, in cases where the requirements can be fulfilled only by considerable additional effort and cost, due to 1) the adverse condition of the terrain, 2) the installation of a lift that would not otherwise be required or 3) the adverse conditions created by existing development'.

Note:
Under the provisions of Article 15 and its extraordinary right of action granted by the State Equal Rights Act (LGBG), any voting member of the state advisory board for people with disabilities representing a non-profit association may file an appeal and apply for judicial redress (legal challenge), if he or she provides evidence that the public administration has deviated from the regulations of Article 50 para. 1, sentence 1, from Article 51 of the Building Regulations for Berlin or Article 16 of the Operating Regulations (BetrVO).

Article 39 Lifts
'(4) Buildings with more than four above-ground floors must have a sufficient number of lifts. At least one of these lifts must be designed for the use of prams, wheelchairs, stretchers and goods and must have stops on all floors. This lift must be accessible without steps from main public traffic areas and from all floors that contain rooms for common use. The top floor may be disregarded if its use does not require a lift or if it has been converted into living quarters within an existing structure. Insofar as upper floors are required to be accessible without steps by wheelchair users, sentences 1 to 4 apply also to buildings with fewer than five above-ground floors.

(5) Lift cars designed to transport stretchers must have a useable floor space of minimum 1.10 x 2.10 m and those designed for wheelchairs minimum 1.10 x 1.40 m; doors must have a clear passage of minimum 0.90 m. In a lift designed to accommodate wheelchairs and stretchers, the area of the lift car not required for wheelchairs may be separated off by a lockable door. In front of the lifts there must be a movement area of minimum 1.50 x 1.50 m'.

Article 50 Parking Spaces, Spaces for Bicycles
'(1) When constructing buildings accessible to the public, sufficient parking spaces must be provided for those with severely restricted mobility and people in wheelchairs. These spaces must be close to public roads and safe from traffic. When constructing buildings or other structures expected to draw heavy traffic, sufficient bicycle storage must also be provided. If structures are altered in line with sentences 1 and 3 or if their use is changed, parking spaces for cars and bicycles according to sentences 1 and 3 must be created in such a number and size that they are able to absorb any additional vehicles that result from the modified use.

'(2) The parking spaces according to para. 1 sentence 1 may be created on the building lot itself or on a suitable lot within acceptable distance if its use for this purpose has been approved under public law. Storage areas for bicycles according to para. 1 sentence 3 must be created on the building lot or on publicly owned space in front of it or removed according to para. 3'. (Section II, 4.2)

To implement and clarify these provisions, the Senate Department for Urban Development and the Environment published the *'Implementing Regulations on Article 50 of the Building Regulations for Berlin (BauOBln) on providing parking spaces for vehicles of people who are severely mobility impaired or in wheelchairs, as well as for bicycles'* **(AV Stellplätze)** in December 2007.

3.3 Specific legal codes and other frameworks

DIN 18040 Part 1
The basic details on the requirements for accessible public buildings are contained in DIN 18040 Part 1 from October 2010. This standard replaced DIN 18024 Part 2 and was introduced into technical building regulations on 1 July 2012 (Implementing Regulations for List of Technical Building Regulations from 23 May 2012 – AV LTB). It thereby became legal building code and is legally binding. The opening section lists the buildings or parts of buildings that are required to provide barrier-free access according to BauOBln Article 51 para. 2. Also with respect to barrier-free construction, a list of the relevant DIN standards should be consulted in Section 7 of the AV LTB – Technical Regulations as Planning Criteria – in the second column of the appended table.

A summary of DIN standards and relevant guidelines for the public sector can be found in the appendix.

Historic Preservation Law (DSchG Bln)
All buildings are first and foremost subject to the legal building code. Depending on the planned construction measures, Article 51 of the Building Regulations for Berlin (BauOBln) may then apply. The extent to which those additional measures are carried out is weighed in accordance with their compatibility with historic or monument character.

Article 11 para. 1:
'Authorization (…) is to be granted if no opposing grounds exist with regard to historic property preservation or when predominant public interest so demands'.

Article 11 para. 6:
'In making decisions, the historic property authority will consider the concerns of mobility impaired persons'.

Where changes are made to existing structures, conflicts often arise between the different needs of users and historic preservation. To bring public needs and preservation concerns into correspondence is a challenge that requires creativity and commitment. Historic preservation and barrier-free access are not mutually exclusive. To find balanced solutions, however, requires a highly individualised approach for each unique case.

An important element in this context for public buildings in Berlin is **Circular SenStadt VI A No. 03/2010** and the legally binding obligation it contains for builders to submit a **comprehensive plan for barrier-free access**.
The instructions and recommendations outlined in the manuals *Berlin-Design for all : Accessible Public Buildings* and *Berlin-Design for all: Public Outdoor Space* should serve as a basis.

Regulations on the Use of Physical Structures (Operating Regulations – BetrVO)
Article 1 sets minimum requirements for the rescue of wheelchair users by means of regulated third-party assistance (operational measures). This is permitted in accessible public buildings that are not used by an above-average number of people in wheelchairs, or in cases where the building is only occasionally visited by an above-average proportion of wheelchair users. These measures require that the building owner develop fire safety arrangements in consultation with the Berlin Fire Department (Section II, 3.3).
Part 4 of Operating Regulations (BetrVO) regulations operational procedures for buildings that are used for commercial purposes and public assembly, hotels and accommodation buildings and car parks. There, for example, it is stipulated that **1 % of the seating** in places of public assembly, and a minimum of 2 visitor spaces must be designated for wheelchair users. Additional companion seats must be assigned to each of these.
Article 16 stipulates that a minimum of 10 % of guest rooms in hotels or other lodging must provide barrier-free access (Section II, 5.3).
Article 21 stipulates that designated parking bays for disabled users in car parks should be appropriately marked and located in easily accessible and secure areas (Section II, 4.2).

Administrative Regulations for the Creation of Barrier-Free Information Technology (VVBIT)
Pursuant to the provisions in Article 11 of the Constitution of Berlin (VvB) and Articles 1 and 2 of the State Equal Rights Act (LGBG), the state government of Berlin is required to provide information technology services that are equally usable to the public, whether they have

a disability or not, particularly in terms of internet presence and services. The Administrative Regulations for the Creation of Barrier-Free Information Technology (VVBIT) draws from the regulations and standards of the **Brandenburg Barrier-Free Information Technology Regulation (BbgBITV**) as the basis for the accessible design of IT services provided by the Berlin administration. The requirements and conditions are based on the 'Web Content Accessibility Guidelines 1.0' or the Federal Ordinance on Barrier-Free Information Technology (BITV 1.0). The enactment of the BITV 1.0 was an extension of Article 11 of the BGG (Section I, 3.1) and is applicable nationwide. It contains no guidelines about the underlying technologies used for providing electronic content and information or the software to be used. The requirements and conditions relate solely to electronic content and information itself that is offered there. In addition to considering the needs of users with sensory impairments, people with cognitive or intellectual disability are an important target group to consider, in addition to people who cannot read well, those who do not speak or understand the language fluently, children and older people.

The **basic principles** of barrier-free IT services are:
- Perceptibility (information, user interfaces, e.g., input fields)
- Ease of use (user interface, navigation)
- Ease of comprehension (information, control elements, user interface)
- Robustness (compatibility with current and future software, including assistive technologies; Section II, 1.1.1 Information terminals and automated machines.

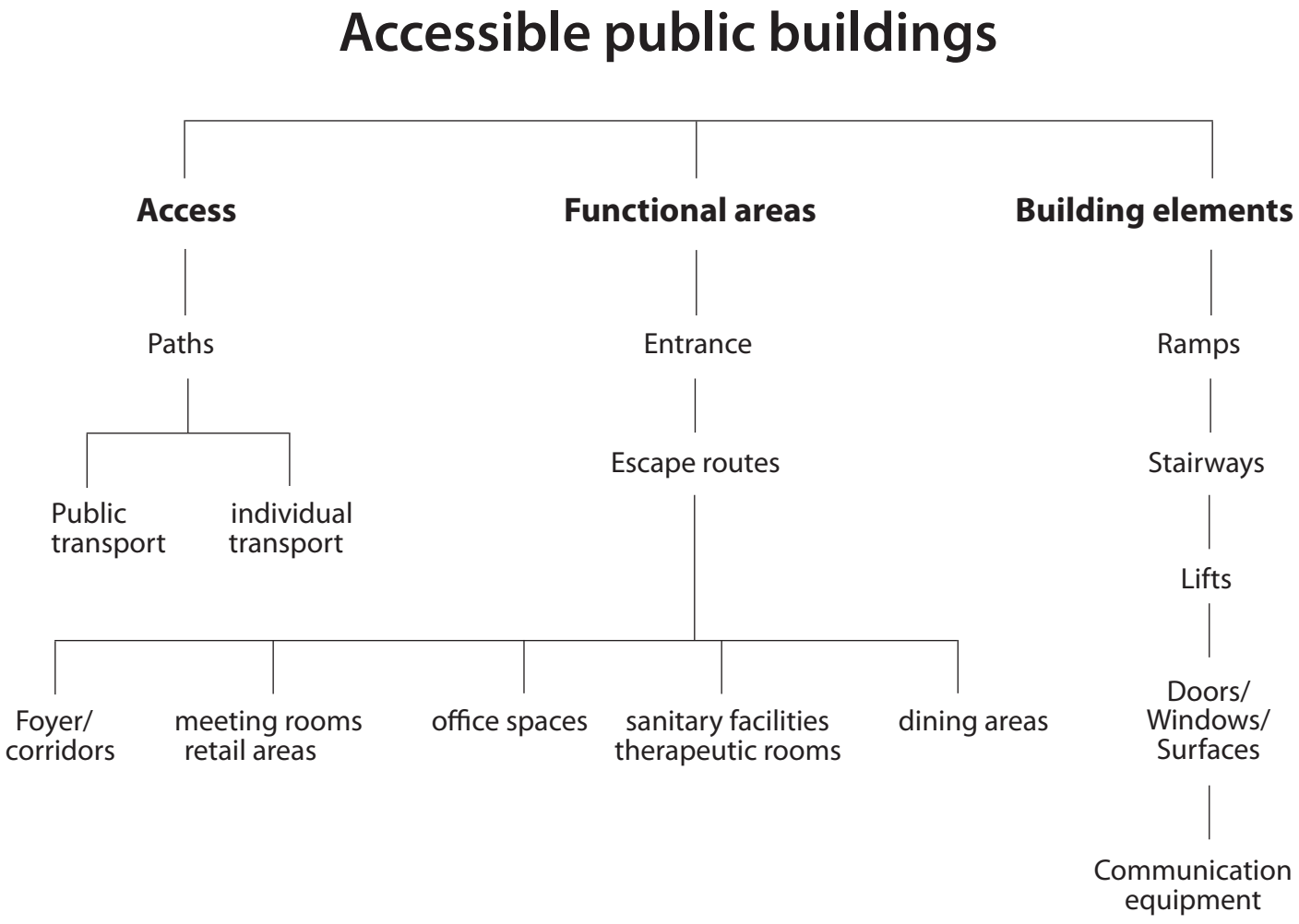
In September 2011, the **Federal Ordinance on Barrier-Free Information Technology – BITV 2.0** entered into force and replaced the BITV 1.0. It is anticipated that the state of Berlin will adopt assume these new guidelines sometime in 2012.

1. General requirements for barrier-free access

DIN standard 18040 Part 1 identifies its scope of its application to the barrier-free planning, construction and furnishing of accessible public buildings and associated outdoor installations that support access or serve building-related functions. Publicly accessible buildings include cultural and educational facilities; sport and recreational centres; medical facilities; offices, administration and court buildings; shops, hotels, car lots, garages and public toilets. Requirements for barrier-free access pertain to the parts of these structures and their grounds that are intended for public use. **This standard applies to new buildings. It should be adapted accordingly in the design of alterations or renovations to existing buildings**.

Office, administration and court buildings are also subject to the regulations of the Workplace Ordinance (ArbStätt, Section II, 3.5). Here, the needs of employees are the primary consideration.
Article 51 on 'Barrier-Free Construction' in the Building Regulations for Berlin (BauOBln), in contrast to DIN 18040 Part 1, applies to the entire built area with no restrictions.

This manual illustrates the principles of barrier-free planning and provides suggestions and inspiration thorough examples of important and frequently arising functional parts of buildings. This schematic diagram provides a visualization of the basic approach



1.1 Orientation and information

For participation in the highly structured built and technological environment of today requires clear, easily intelligible communication of information. Information and orientation systems must be designed in keeping with the principle of multisensory design. In other words, **visual** information should also be conveyed in a **tactile** or **acoustic** form (Section I, 2.1.2). This applies to physical structures as well as to the associated outdoor facilities (property boundaries). DIN 18040 Part 1 establishes specific requirements for the communication of information.

Visual information
The most important factors for seeing and recognising are:
- Light density contrast (light/dark)
- Size of the object viewed
- Shape (e.g., lettering, signs)
- Spatial arrangement of the object viewed (e.g., advertising should not overlap)
- Distance of the observer
- Light and lighting (Section II, 1.3)

Further suggestions can be found in DIN 32975.

Light density contrast refers to the difference in brightness between an object and its background (light/dark contrast).

Colour contrast uses elements of colour in design to distinguish object from their background and thereby provides additional information for orientation.

As a general rule of thumb: **the higher the light density contrast, the greater the visibility.**
Information that can be perceived only from a very short reading distance must be easily accessible so that it can be closely approached and examined from a wheelchair.
Visual information needs to be well-lit and free of surface glare. Reflections or strong shadows should be avoided.

For better orientation, the **lighting** of building elements such as stairways should be free of surface glare or strong shadows.

Tactile information
Tactile information is perceived by blind people in many different ways:
- With the finger tips
- With the hands
- With the feet
- With a white cane.

Tactile orientation aids must be clearly distinguishable from the surrounding environment, for instance, it must have a contrasting shape, material or surface texture.
Tactile inscriptions must be available in both raised letters (profile letters) as well as in Braille. Supplementation with pictograms or special characters should be kept to a minimum; simple symbols are important in order to avoid ambiguity.
Tactile signs should be mounted at a height of 1.45 to 1.60 m. Signs installed on a inclined, lectern-style surface may be installed lower.

Acoustic information
Acoustic information must be understandable even by people who have a hearing impairment. Sound should be accurately heard without interference from:
- The impact of noises from the outside and
- long reverberation times (poor room acoustics)

Tones or tone sequences used as alarms or warnings must be recognisable, easy to interpret and to distinguish.

For special requirements that apply to rooms used for oral communication, refer to DIN 18040 (Section II, 1.4).

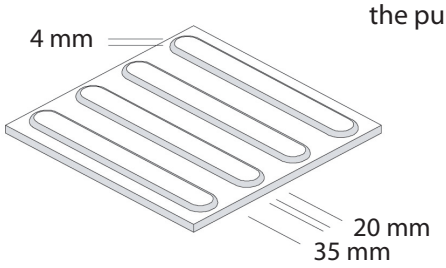
1.1.1 Information systems

Information can be communicated on different levels. On the structural level, information can be conveyed, for example, through floor guidance systems, signs or models. On the technological level, this role can be assumed by devices like information terminals, audio guides or navigation systems.
Among other things, DIN 18040 Part 1 requires that entry areas in accessible public buildings are easy to find and navigate. In the near future, the electronic communication of information will take on a more central role to make this possible, since the floor indicator methods currently in use have some limitations.

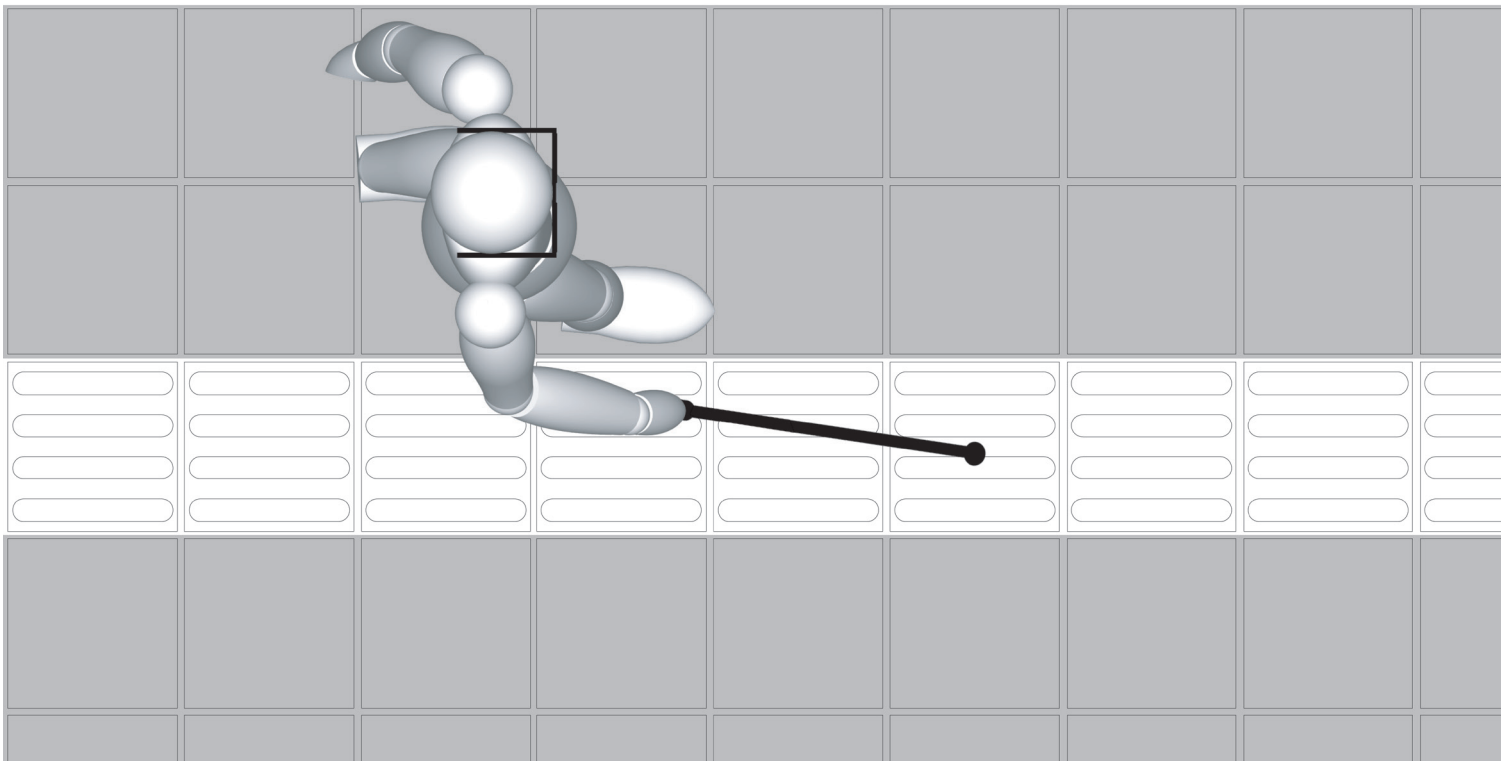
Floor indicators
Typical floor indicators use material combinations such as concrete pavers, gravel, small paving stones etc. to create conspicuous visual and tactile contrasts. These contrasts are useful for people who are blind, who sense them using a white cane, as well as for visually impaired people through foot contact. DIN 32984 contains special requirements for floor indicators. Floor indicators can fulfil different functions: **information, orientation, guidance, and warning.** Depending on how they are applied, one of these functions tends to predominate. This DIN standard stipulates the planning and configuration of specific floor indicators and other orientation aids for blind and visually impaired people in accessible public buildings, public transport facilities and road traffic areas. The structural complexity and more variable uses of accessible public buildings, together with a less hazardous situation overall, means that there are very different requirements for the design of guidance and orientation systems in buildings open to the public than for road traffic areas.

Guidance systems
- DIN 32984 (Point 6: Orientation in Buildings)
- DIN 32975
- DIN Technical Report 142

DIN 18040 Part 1 requires that all accessible public buildings should be equipped with guidance and orientation systems for the blind and visually impaired. These are features that benefit all users.
The foremost objective is to develop a design for a public area as a whole that facilitates orientation of its own accord, or requires only intermittent markers as a guide. For instance, the skilful use of alternating materials, the insertion of acoustic elements like chimes or running water, or even the addition of artistic components create accents in a space that help with orientation. Users who are blind, for example, often make use of the interface of the floor and walls, or fixtures such as baseboards. These areas need to be kept free of permanent or movable fixtures.
Requirements for guidance systems vary depending on the transparency of the building layout and the intensity of use.



Tactile floor indicators



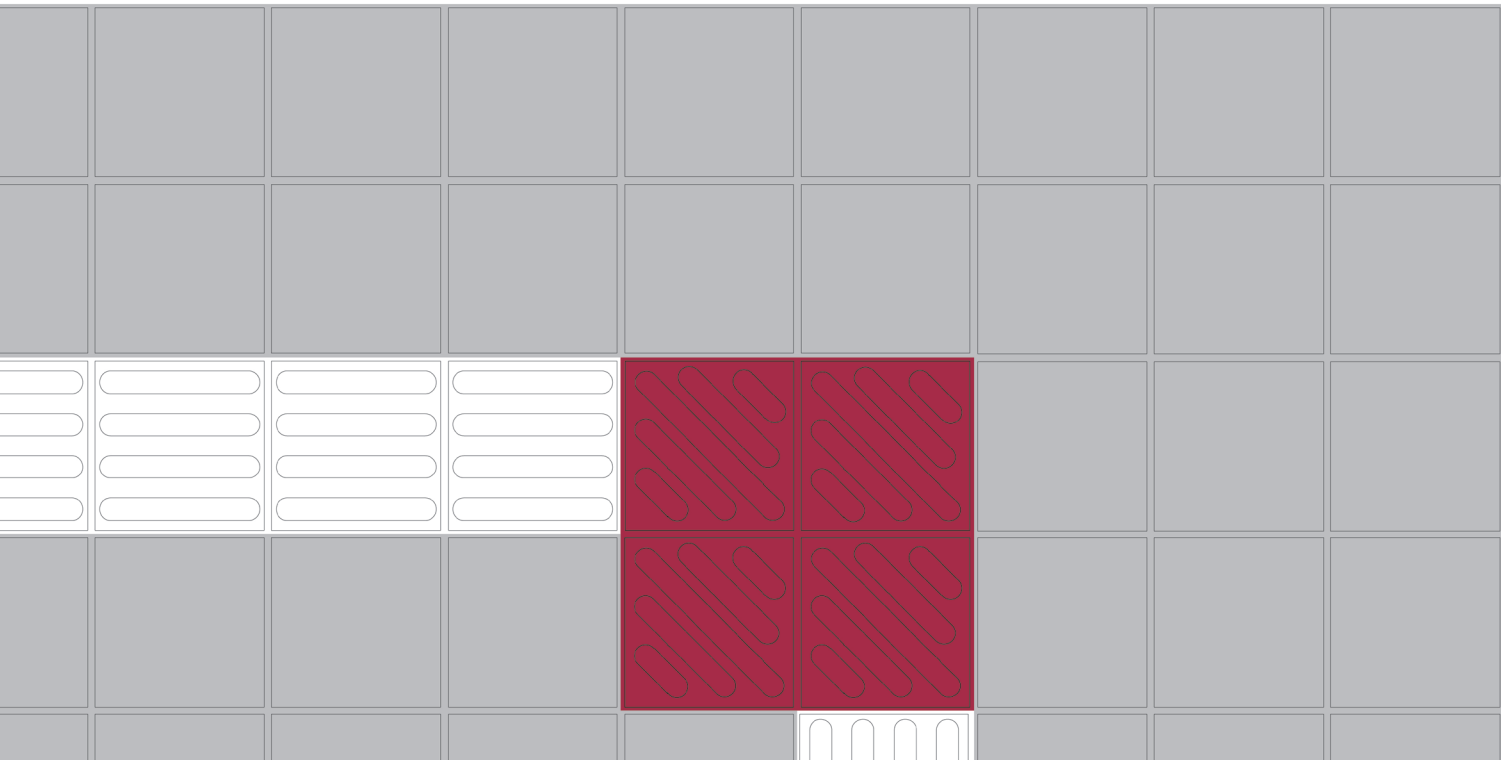
Minimum requirements:
- Routing strips leading from the entrance/exit to the relevant functional areas or rooms (e.g., main information points, cashier area, stairs, lifts)
- Tactile attention fields on each floor, at a minimum these should mark off the space in front of downward leading stairways (Section II, 4.4)
- Continuous tactile directional strips on the floor, e.g., leading to staircases, passenger lifts, floor information board, waiting rooms and sanitary facilities.

In public facilities with heavy traffic and many different functions (e.g., educational facility, public library) it is useful to integrate floor guidance systems into a comprehensive guidance plan, supplemented by tactile handrail inscriptions, tactile floor plans, and acoustic or electronic information systems.
The recommendations in DIN Technical Report 142 include specific requirements for orientation systems with regard to the design of information, lettering, colours and shapes, lighting, routing elements and special requirements for signage.
In an optimal situation there would be little need to have a separate guidance system for people with disabilities. Instead we should aim to design all the necessary information so that it is accessible and useful for everyone. This captures the spirit of a *Design for all*.

Signage
- DIN 32975
- DIN 1450
- DIN Technical Report 142

Buildings open to the public are usually equipped with signs that serve communication and orientation. These orientation aids should be clear and easy to understand. Signs should have a uniform and consistent design with respect to colour, shape, graphic characters (special characters, pictograms) and placement. The repetition of colours and shapes can, for example, reinforce the coherence of an entire information chain.
Signs should be visible from a distance and contain at least a symbol or label of the destination. These can be optimised by including visual and tactile contrasts in the design. In creating contrasts, the surface and background of the sign as well as its placement are key factors. Reflections and glare from surface should be avoided. The sign must contrast visually with the environment. A guidance system installed in the floor can reduce the demands on signage, for example, by directing visitors to tactile plans of the site.
Whether a sign is labelled with characters, arrows or pictograms depends on the kind of information the sign needs to communicate. The colour of the graphic characters should have a high light density (light/dark contrast) for the setting, to ensure that the information

Attention field (change in direction)



on the sign is visible under a range of light conditions. The design of graphic characters should comply with DIN 1450.
The form of all characters on signs should be determined by the angle of vision and reading distance of the viewer. A height of 1.40 m below the lower edge of the lettering or pictogram is appropriate for information that will be viewed at close range. At this height, graphic characters are clearly visible from a seated position and can be reached and touched by people in a standing position. The sign should be placed to allow visitors a close approach.

The first priority should always be a clear and well-ordered environment. Informational signs should only be used as a practical supplement.

Pictograms
are radically simplified symbols that are **understood internationally**. Pictograms alone are generally not sufficient as comprehensive information systems. In combination with additional information, however, they can effectively support very focused and complex visual orientation.
There is no national and European standard for pictograms at this time.

In general, the following applies:
International Standard ISO 7001 is a good source of standard pictograms. Minor deviations in the symbols are permitted to adjust for specific national and cultural contexts. Such modifications, however, may not compromise the key elements or the meaning of the pictogram. Visual consistency is particularly important for reliable and unambiguous recognition. Pictograms can be rendered in different sizes and colours; always consider the light density contrast and select a size that will allow for successful orientation.
The following sources for pictograms are recommended, based on the type of disability:
- Mobility impairment: ISO 7001
- Visual impairment: World Blind Union
- Hearing impairment: World Federation of the Deaf symbol

Recommended pictograms indicating barrier-free access

Blind Person (World Blind Union)

Barrier-free access or accessible toilets (ISO 7001)

Barrier-free lift (ISO 7001)

Equipment available for the deaf and hearing impaired (World Federation of the Deaf symbol); when accompanied by the letter 'T' below and the right, the pictogram indicates that the area is outfitted with an induction loop system

Graphic characters
- DIN 1450
- DIN 32975
- DIN Technical Report 142

Specific requirements :
- Select a sans serif typeface with upper and lower-case letters
- Select the size of characters based on the reading distance and height
- Use appropriate contrasts and colour combinations (e.g., black on white, white on blue/purple)
- For tactile characters, use Braille and raised letters in equal measure
- Make limited use of tactile writing and ensure that it is ergonomically accessible, for example, mounted on an inclined, lectern-style surface (angle of incline 15°)
- Choose a solid colour for the information field that contrasts with background

Braille and raised letters are types of lettering designed to be read by touch. Raised letters are characterised by embossed upper-case letters and special characters, whereas Braille is a system of raised bumps. Labels or pictograms (e.g., on doors) should be legible, high-contrast and tactile. They must be placed at an appropriate height (lower edge minimum 1.40 m).

Dynamic information displays
Dynamic information should be readable by everyone. There are different display media (e.g., in public transport, administrative buildings) that can be equipped with dynamic information systems.
- LED (light-emitting diode)
- LCD (liquid crystal display)

Braille alphabet (named after Louis Braille)

Criteria for readability :
- cognisable from the distance
- Simple and uncluttered design
- Clear and clean appearance of display
- Free of glare and flicker
- Readable from the front and sides
- Suitable size of characters
- Light-density contrast (light/dark)
- Effective colour combinations (e.g., legible by those with red-green colour vision deficiencies)
- High resolution (readable characters), for example with LCD

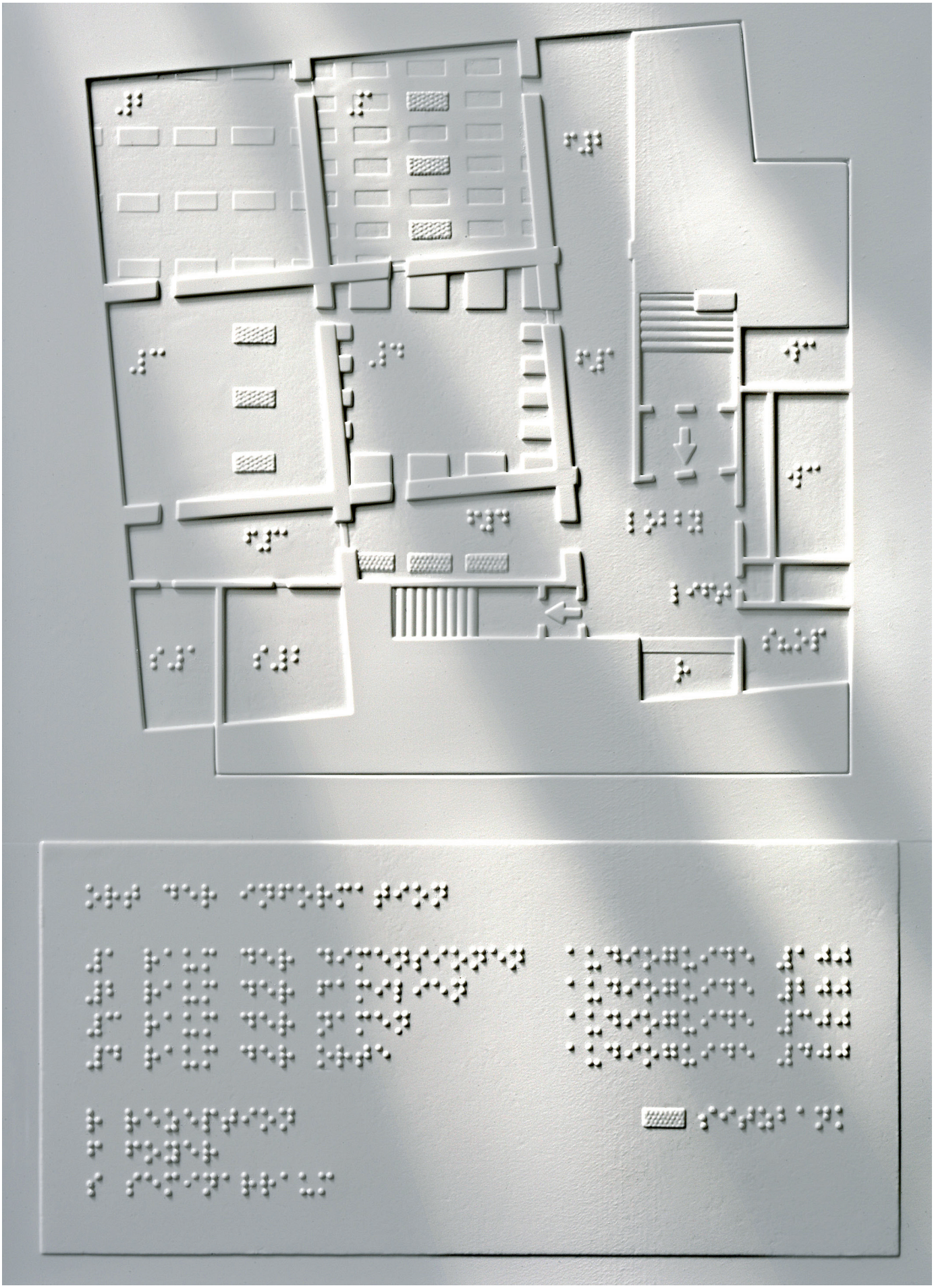
Readable text
There are special rules for making sure that text is easy to read. Different kinds of communication events and media (exhibition, newspaper, radio, television, Internet etc.) demand different kinds of presentation. For example, there are special requirements for reading while standing amid the background noise created by nearby installations or other visitors.
The way a text is formulated should always depend on the target group, the type of text and the communication event. The use of plain language (Section I, 2.1.3) should be an on-going consideration.

Tactile floor plans or tactile models
(Section III, 4.2)
Presenting tactile layouts or floor plans provide an overview of functional distribution and wayfinding in a building. These types of diagrams are particularly useful in buildings that have complex floor plans. Tactile plans (embossed plans, tactile models) simplify communication with people who are blind or who have a visual impairment.

Information terminals and automated machines
Information terminals and automated machines must be fully accessible and usable. They should be within reach for people in wheelchairs and at a height that either offers adequate knee clearance or is height adjustable. They should not be inset into walls or other structural elements and they should not have sharp edges. People who are blind or have a visual impairment must be able to locate them easily and operate them through highly tactile, high-contrast control elements. Automated machines should also be easy to operate by those who have limited grasping ability. Bell sounds or acoustic communication equipment (Section II, 1.4) enhance perceptibility for those who are hard of hearing.
There are currently no standards in place that apply to this area. In addition to the requirements of the Brandenburg Barrier-Free Information Technology Regulation (BbgBITV, Section I, 3.3), specifications on the future design of barrier free cash dispensers (ATMs) are outlined in Circular WiTechFrau II F No. 2/2008 issued by the Berlin Senate Department for Economics, Technology and Women's Issues.

Requirements and specifications for **structural integration**:
- Barrier-free access
- Guidance and orientation elements
- Movement areas in front of terminals

And for **usage**:
- visual, tactile and acoustic perceptibility (multisensory principle)
- A touchscreen that allows for use with prosthetics by offering alternative function keys; this also facilitates use from a wheelchair since the perspective from below can distort the image on the screen.
- Five-button control device (forward, enter, reverse, zoom, on/off) to allow accessible usage for people who have mobility problems or visual impairment.
- Adequate knee clearance for wheelchair users
- Screen (appropriate or adjustable height, good contrast, typeface, free of glare); user interface should be mounted on an incline from front to back (lectern-style)
- Software (simple, user-friendly operation, voice output)
- Audio jacks for headphones as well as speakers to supplement acoustic information.



Relief ground plan with Braille writing: Information Centre of the Memorial to the Murdered Jews of Europe, Berlin Built by: Technical University Berlin, Modell + Design

Screens and projectors present information visually. Audio speakers and Braille displays, on the other hand, make information available to the ears and to the touch.

Assistive technologies for information technology context include:
- Screen magnifier software (supports reading, also may be synchronised with screen reader)
- Screen reader (text output in speech or Braille)
- Text-to-speech or voice recognition software
- Alternative keyboards

Audio stations
- Technology compatible with hearing aids such as, e.g., devices using telecoil and cochlear implants, audio cable connections)
- Use of strong visual contrasts for control elements
- Offer text versions of audio information

Audio transcription equipment
Transcription (Lat. trans-scribere: rewrite) refers to the transfer of an audio or video recording into a written form.

Audio description
An audio description (video description, descriptive narrative) refers to an audio track added to visual media to provide extra information about actions, actors, texts and other types of visual content on the screen).

Audio guides
- Ease of use (e.g., one-button operation)
- Touchscreen and touch-sensitive buttons/keys used only in connection with visual, acoustic, and/or tactile (vibration) feedback on command delivery and acceptance. An acoustic signal should sound for each action made by the person entering commands, even if the command is accepted.
- Strong visual and tactile contrasts

Visual guides
- PDA – personal digital assistant
- Small portable screen with sign language and spoken language represented in text form

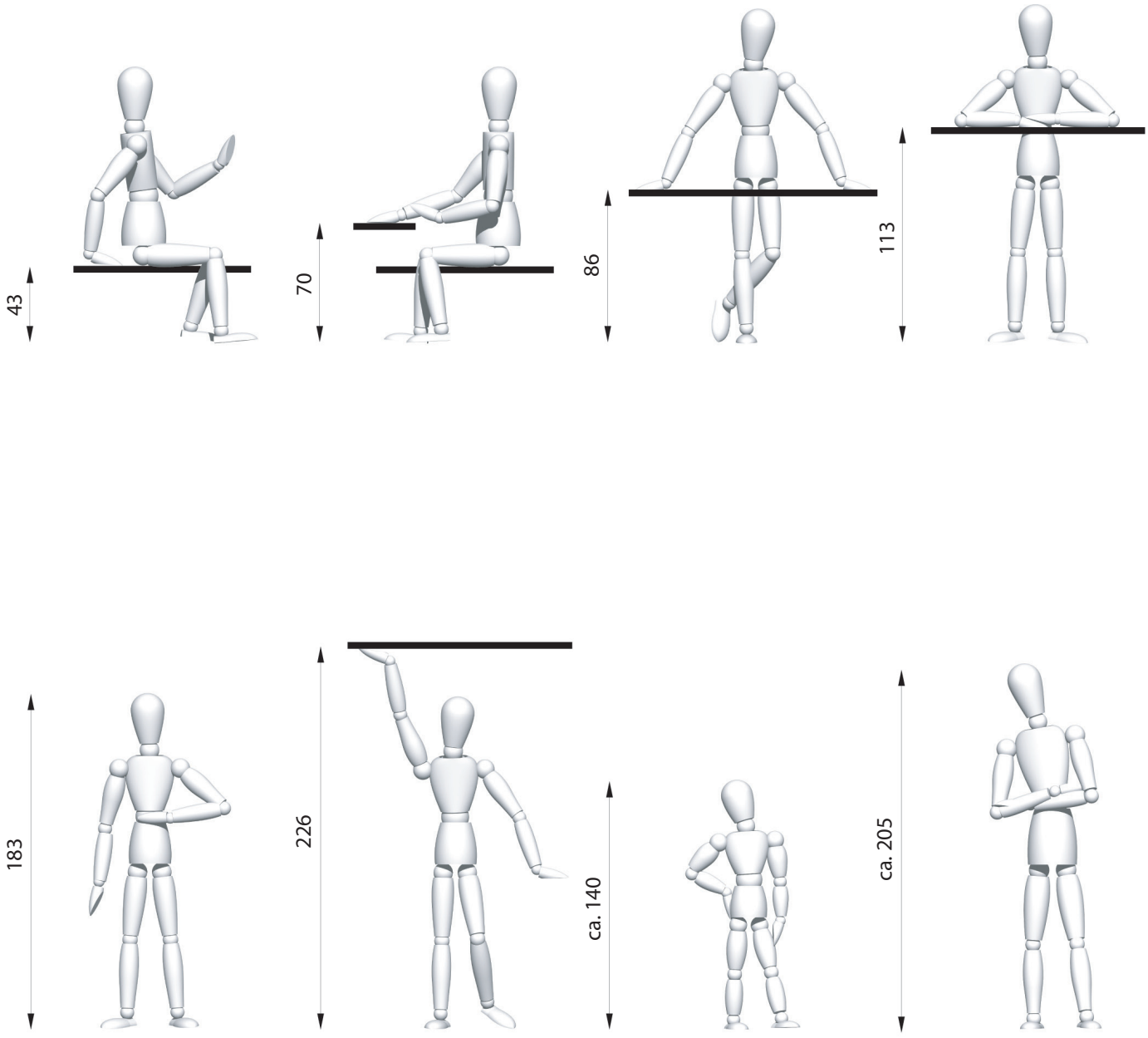
RFID systems (radio-frequency identification)
make it possible to identify and locate objects, or navigate buildings and the outdoors with the help of RFID chips installed in selected locations. They are well-suited therefore to function as a guide for people who are blind or visually impaired. Specially designed canes outfitted with an RFID reading system locate the RFID chips embedded in the area (e.g., the floor or ground) and communicate that data to a wireless device. A beep tone is then communicated via Bluetooth, letting the user know whether he or she is on the right path. Detailed information about the area, such as traffic signals or nearby services can also be communicated in the same way.

Navigation systems
In the near future, we anticipate that more effective mobility guides will be available that enhance free movement and safety for people who are blind and severely visually impaired. These will use pedestrian navigation systems that function via a mobile phone in the outdoors as well as inside public buildings. In combination with informational elements within the building (floor guidance systems,
signage, audible traffic signals), such navigation systems will enable independent and confident routing in public traffic areas as well as in public buildings. At present, however, none of the preliminary technologies meet the requirements for reliability and accuracy of location (e.g., bus stops).

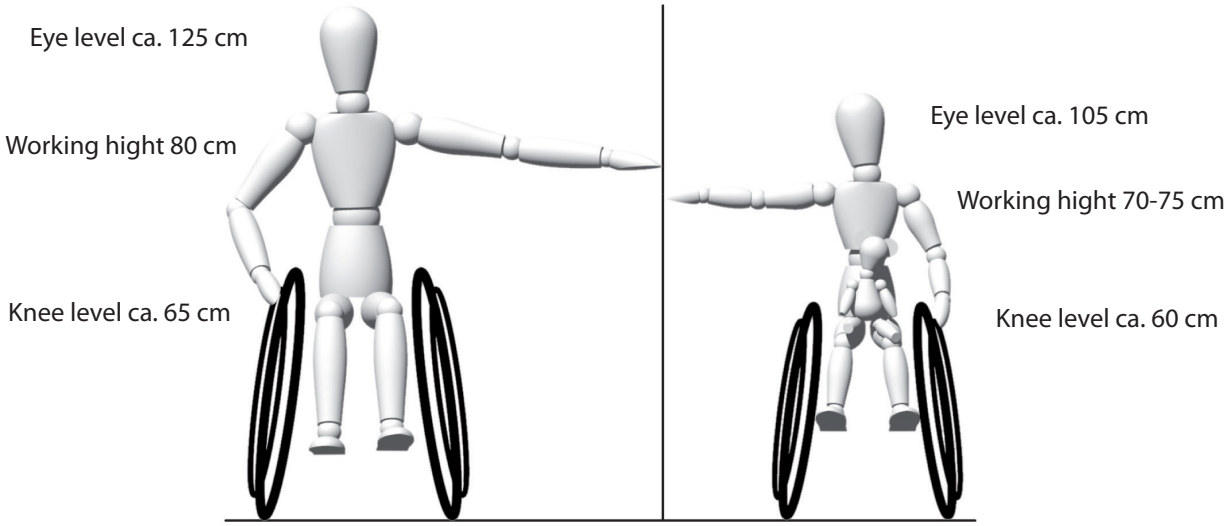
1.2 Movement areas

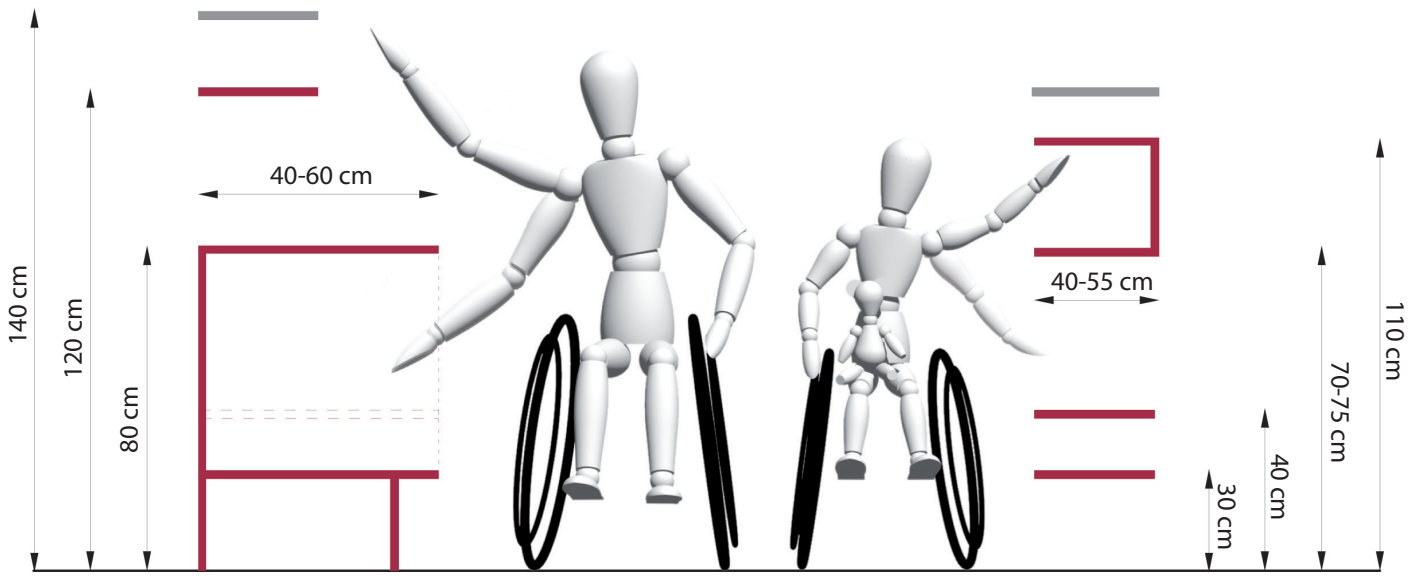
The dimensions of movement areas, rooms and furnishings are determined by body posture and physical measurements. The design should integrate the needs of as many users as possible. Different body sizes can limit transparency and orientation (e.g., different eye levels). Movement areas are not calculated solely on the basis of body measurements. They are also affected by the size of auxiliary equipment like walking aids or wheelchairs. People using wheelchairs require the largest movement areas.
As a basic principle, movement area and passing area should not be reduced or restricted. They may, however, overlap for functional and economic reasons.

The following recommendations should serve as a guide:



Ergonomic dimensions in centimetres


Eye level ca. 125 cm
Working hight 80 cm
Knee level ca. 65 cm
Eye level ca. 105 cm
Working hight 70-75 cm
Knee level ca. 60 cm


140 cm
120 cm
80 cm
40-60 cm
40-55 cm
110 cm
70-75 cm
40 cm
30 cm

Width
- General traffic areas (corridors): minimum width 1.50 m
- Secondary traffic areas: minimum width 1.20 m
- Passageways/door: minimum clear passage 0.90 m

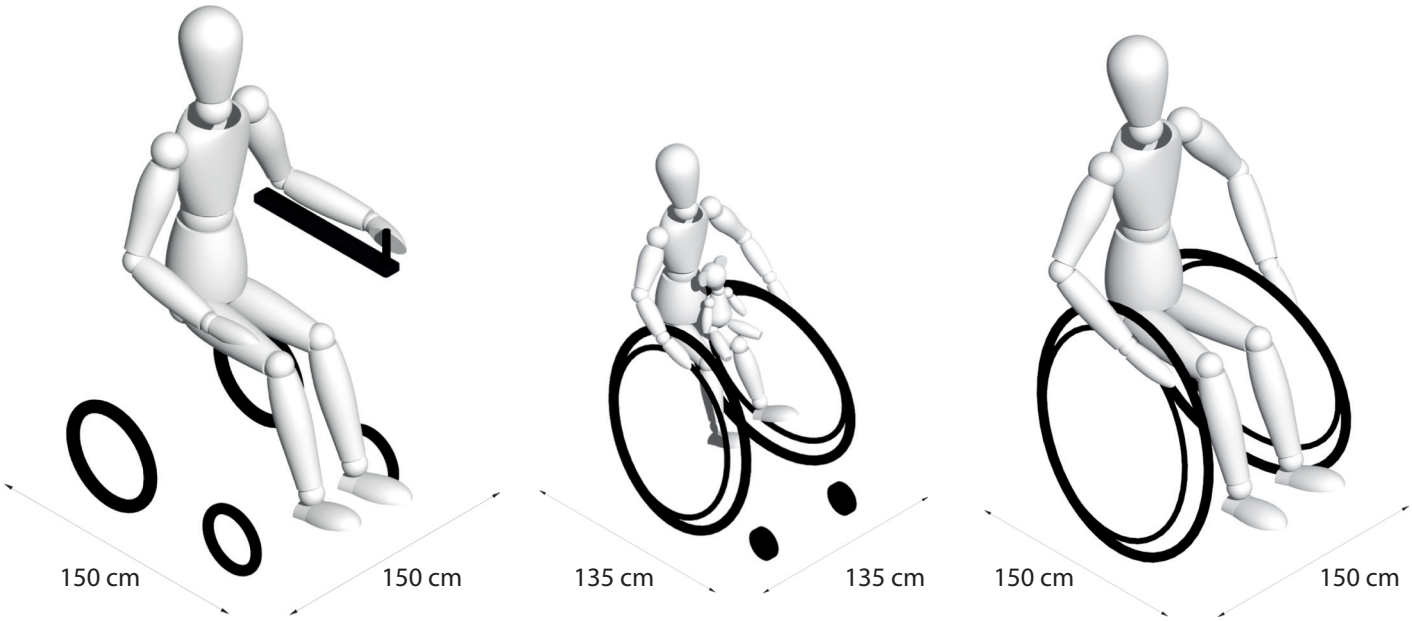
Movement areas
- Turning areas (e.g., wheelchairs): 1.50 x 1.50 m
- In front of side-hung doors: 1.50 x 1.50 m
- Passing space for wheelchairs or people with walking aids: minimum width 1.80 x 1.80 m

Operating height (seated position)
- From 0.85 m to maximum 1.05 m

Working height (seated position)
- Maximum 0,80 m

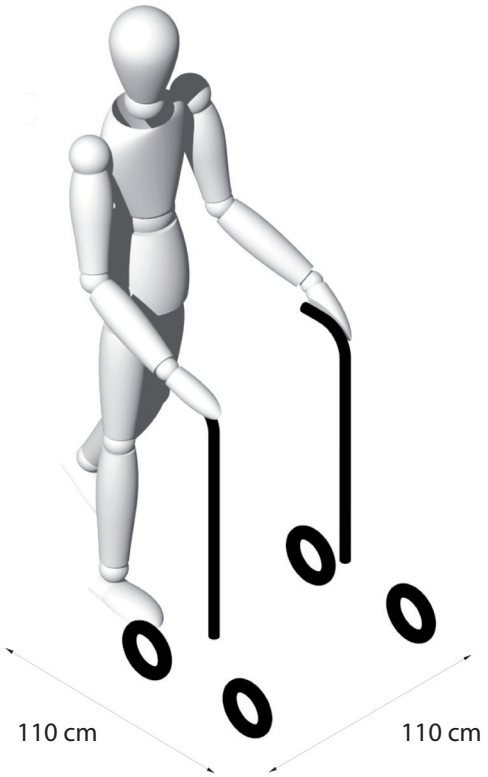
Highest reach (seated position)
- Minimum 0.30–0.40 m
- From 1.20 m to maximum 1.40 m

Knee clearance
- Height approx. 0.70 m
- Width minimum. 0.90 m
- Depth minimum. 0.55 m



Movement areas of different wheelchairs

Rollators
Rollators today have become indispensible tools for individuals with temporary or permanent mobility impairments and for those with less robust physical constitution. Especially in light of demographic shifts in the population, we expect to see a steadily increasing number of people using rollators in public spaces. For this reason, the needs of this group of users should be studied more carefully during the planning process, alongside those of wheelchair users. In general, people using rollators have the same needs for indoor and outdoor areas as those of for wheelchair use, such as sufficient movement area (minimum 1.10 x 1.10 m) and level, non-skid ground surfaces (Section II, 4.8; Section III, 3.1). The maximum allowable height difference in the outdoors of 3 cm already presents some difficulties for those using rollators. It is recommended that height differences not exceed 2 cm. Height differences in the ground surface should be chamfered, since even a 2 cm height difference can present a challenge.



Movement area for a Rollator

1.3 Light and lighting

All human beings require a minimum amount of light for effective orientation, work and well-being. People who are older or have a visual impairment, for example, require roughly ten times the intensity of light needed by young people. Optimal lighting conditions for the user are created by the interaction of different light sources – avoiding exclusively direct or indirect light. If reduced lighting is desired, for example in specific functional rooms, reflective markings or added accent lighting fixtures can be used to compensate, but should never result in glare. Sparkling or flashing light installations should be kept to a minimum and should not be installed in orientation areas. Artificial lighting for areas where significant activity takes place should adapt to the spectral colours of daylight, so that colours and contrasts are reproduced accurately. Strong shadows and surface glare should be avoided. The surface reflectivity of materials should not be overlooked (Section II, 4.8). This should be an essential component of a lighting concept.
In transitional areas leading from indoors and outdoors and vice versa, natural and artificial lighting can be effectively used as an integrating element, enhancing visual comfort and reducing the time needed for the eyes to adjust to new lighting conditions.

1.3.1 Quality of light

In assessing light quality, experts distinguish between ergonomic factors (ELI) like visual performance, visual comfort, vitality and individuality, as well as factors relating to energy efficiency (LENI). All factors should be considered to the greatest possible extent when developing a lighting scheme. In general, the general aim of lighting is to approximate daylight conditions by creating uniform illumination throughout a space (indirect lighting). The demand on light quality increases when concentration, efficiency or creativity are required, for example, in a workplace. It is important to identify the lighting needs of a given project during the planning stages and then to evaluate them again in the context of the finished solutions. Depending the function of a particular area, there will be different priorities and criteria used to evaluate the light quality.

Visual performance
Lighting that complies with current standards is crucial so that people are able to accurately perceive visual tasks and thus carry out activities effectively. The following criteria should be considered:
- Sufficient lighting
- Uniform lighting
- Colour rendering
- Contrast rendering
- Avoidance of strong shadows
- Avoidance of physiological glare (i.e., reduced visual performance)

Visual comfort
Visual perception in a room is more pleasant when lighting is uniformly bright and balanced. The decisive criteria in this context are:
- Balanced distribution of brightness
- Light density differences
- Modelling (three-dimensional form, texture)
- Uniform lighting in the surrounding area
- Artificial light supplemented with daylight
- Light that does not flicker
- Avoidance of psychological glare (i.e., discomfort)
- Feelings of security

Vitality
Light contributes to a sense of well-being and influences all human activities. Factors such as
- Lighting that approximates daylight
- Avoidance of heat radiation
- Avoidance of electromagnetic fields

contribute to the stimulating and energising influence of light.

Individuality
Different visual needs, visual activities and times of use require that individuals have some control over their lighting situation. Sensors and control systems help users adjust the lighting to their specific needs. Individuals can have control over lighting though:
- Switches and dimming controls
- Selection of lighting mood
- Presence detection
- Choice of lighting schemes
- Flexible options for building modifications

1.3.2 Functions of light

Light as a guide
Light is not only a tool for seeing. It can be used to emphasise important cultural objects and can assist orientation. Light fixtures can have very specific functions, for example, to guide people in one direction or mark a dangerous situation. It should be noted, however, that artificial lighting is rarely able to reproduce the same level of visual contrast as that perceived in daylight. Moreover, artificial light should not detract from the existing light density contrasts in the environment under daylight conditions.
Examples:
- Step markings (not as a replacement for the requisite physical markings of the step edges!)
- Path markings indoors and outdoors, e.g., with recessed floor-level lighting or at plinth height. Floor-level uplighters can easily cause glare and should be kept out of the immediate walking area.
- Specific placement of light elements (e.g., next to control elements, to support guidance)

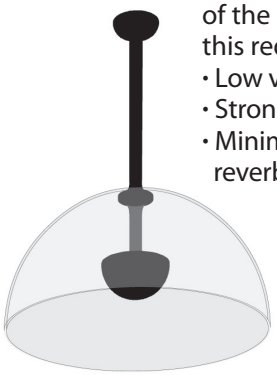
Light as a warning
For light to warn of a dangerous situation, it must not only have a high-contrast design and colours to indicate warning, but also include extra lighting effects (e.g., blinking or flashing lights to warn of a construction site barrier). It should always be directed downward to avoid glare.

Light to create emotion
Light also has an effect on the emotions. Brightness, colour, light distribution and light dynamics can shape the mood in a room. Depending on the desired outcomes, colour can nurture an atmosphere of dynamic energy or peaceful relaxation. Emotional factors like these can provide support for specific groups of people.
There is no one optimal solution that can simultaneously satisfy all the varied demands placed on lighting in equal measure – creating visual performance, a spatial impression, and wellbeing. Lighting must be customised during the planning phases to accommodate the unique needs and uses of a space. Effective technologies, an intelligent lighting concept and good lighting management will all contribute to the creation of an energy efficient and people-oriented lighting solution.

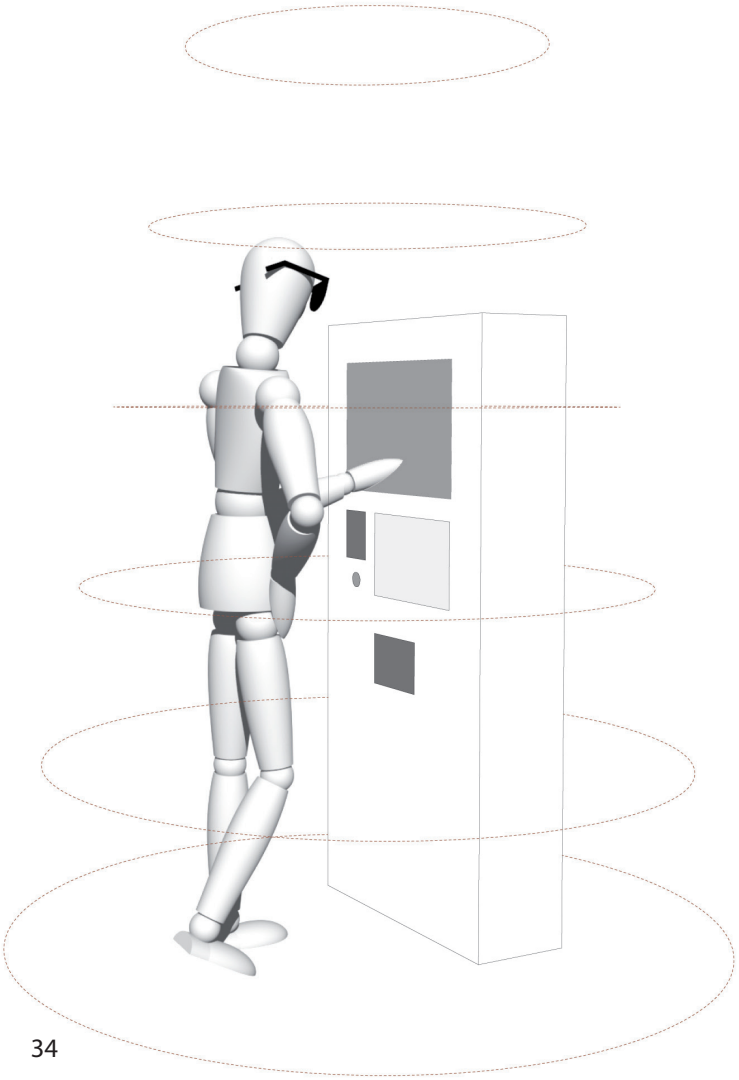
1.4 Acoustics and communication

The general needs of individuals with a hearing impairment are discussed in Section I, 2.1.2 and Section II, 1.1. Special technical parameters for acoustics are outlined in DIN 18041.
People who have a hearing impairment as well as individuals with a visual impairment depend on special equipment to perceive acoustic transmissions in large rooms, halls or in the open air (Section III 3.5.5). Favourable conditions for effective acoustic communication in enclosed areas can often be accomplished through the acoustic properties of the building itself. As a general rule, this requires:

- Low volume of background noise
- Strong and early sound reflection
- Minimal late room reflection, short reverberation time



Sound shower



Public address systems
Requirements:

- Intelligible speech
- Regular sound distribution
- Good sound quality
- Location (visual and acoustic source in one place)
- Buffered from disruptive external influences
- Suited to the environment (buildings, trees)

For sound amplification in very limited parts of rooms, for example, in museums, trade halls, businesses and different multimedia, video or audio terminals as well as in classrooms and offices, the use of audio delivery systems like **Sound Shower** can be very effective. These are highly concentrated and focused directional speakers. They make it possible to address a message or project sound to specific parts of a room as well as to small groups or individuals. Undesirable stray noises from the environment are greatly reduced due to minimal audio reflection.
As an alternative or to enhance hearing, sockets should be installed for visitors to use their own headphones.

Alarm systems
Audible alarm systems should be provided with a supplementary optical signalling device to enable a visual perception of alarm. This should be synchronised with the acoustic signal. Visual signalling devices should not be obstructed or masked by other sources of light. Nor must acoustic signals be affected by other sources of noise. Acoustic information conveyed as a tone or series of tones must be recognisable, easy to interpret and easy to distinguish.

Hearing systems
Hearing systems provide direct audio broadcasts without the interference of background noise through the use of :

- Headphones,
- Hearing aids,
- Ear Implants (cochlear implants)

These devices should be distinguished from:

- Inductive sound systems (induction loop system),
- Infrared transmission systems (IR)
- Radio transmission systems (FM). (see also Section III, 3.5.5)

Induction loop systems can be permanently installed in the floors, walls or ceilings to provide an economically feasible solution for hearing enhancement in larger facilities of public assembly as well as optimal audio reception for individuals wearing hearing aids. They should be installed according to a low-overspill principle (http://acs-akustik.at). This ensures that other hearing systems in the area – whether fixed or mobile – are not disturbed by the transmission. Auxiliary equipment like headphones or audio cables with Euro Plug connectors can improve the acoustic situation for people without hearing aids. Users are able to move about freely within the induction loops.

Infrared and radio transmission systems
In these systems, speech transmitted through a microphone is broadcast wirelessly via infrared light or radio waves to a small receiver carried by the listener.

Portable hearing systems
Portable systems can improve otherwise adverse acoustic situations. One advantage they have is that the induction field is limited to an individual loop worn or carried by the user. Multiple channel settings allow for different and simultaneous uses without mutual interference. With respect to the interior appearance and function of a space, however, there is a risk that such systems may impact the design or become an obstacle, for example, through extensive cable routing.

Portable radio transmission systems have the advantage that they are wireless, location-independent, lightweight, and can be used everywhere. The transmission is of optimal audio quality.
The installation of hearing systems should be carefully planned in consultation with professionals to create an optimal interaction of the intended use room acoustics, and electro-acoustics (computer simulations or taking room acoustic measurements before finalising the terms of construction is recommended). The installation of induction loops(e.g., simple loops for small areas, figure 8 loops in larger rooms) is a critical factor for the performance quality.
Visitors should preferably be informed about available hearing systems in advance, via flyers or the Internet.
The pictogram of the World Federation of the Deaf (Section II, 1.1) can be used.

2.1 Connection to local public transport

The paths leading from public transport stops to accessible public buildings must be evaluated for barrier-free access. Criteria to consider are:
- Surface materials (Section II, 4.8; Section III, 3.1)
- Visual and tactile ground indicators (Section II, 1.1)
- Kerb cuts (maximum height 3 cm)
- Level access
- Ramps (Section II, 4.3; Section III, 3.3)
- Guidance systems and signage (Section II, 1.1)
- Construction work in the area

Public transport companies can help by providing information in stations and at individual stops. This should include information about temporary restrictions and impediments due to construction activity as well as changed path networks.

2.2 Connections to individual transport

Barrier-free paths should be designed to create the most direct route possible between the parking area and the main entrance of a building. Controlled access gates at the entry must provide clear passage of minimum 0.90 m for wheelchair users. The area must be marked with visual and tactile ground surface indicators for people who are blind or who have a visual impairment.

2.3 Barrier-free design of premises

Step-free access from the street-side property line to the building must be ensured (e.g., dropped kerbs, Section II, 4.1). Barrier-free access to the building should be considered along with the requirements that apply to the building itself (Section II, 3.1). Where there is a complex of buildings, this should include the path network between individual structures and functions.

3. Functional areas in buildings

3.1 Entrances

Entrances to buildings have great architectural value. They provide an interface between the world inside and outside and play a primary role in shaping the visitor's overall impression and acceptance of a building, its uses and the quality of use. Entrances must carry out two very different functions: they must be inviting on one side, and they must provide boundaries, protection, and control on the other.

The following elements are relevant for people **with restricted mobility**:

- Step-free options for entry
- Door or gate clearance of minimum 0.90 m
- Door opening options:
  - Manually controlled, easy to operate doors, requiring maximum force of 25 Newtons
  - Power-operated doors with push-button control
  - Doors automatically activated by sensors
  - Access control system through brief contact with staff. In this case, attention should be paid to the ease of location, accessibility and usability of bell and intercom. Visitors should make visual contact with the staff.

The following elements are important for people with **sensory-cognitive impairments:**

- The building of public facility should be easy to find and identify, for example, through signage, routing or design elements (Section II, 1.1).
- The principal entrance should be emphasised through the use of building proportion, colour, materials and high-contrast design
- Directional and informational signs (Section II, 1.1)

3.2 Foyers and corridors

There is often an entry vestibule located in front of the **foyer** in a building. The depth of the vestibule should not be less than 1.50 m when the door is open. There must be a minimum clear passage of 0.90 m in all passages. Users expect to find clear information about the building in the foyer.

- Designed with easy to intuit guidance elements, such as:
  - Clear design of floor plan
  - Colour scheme (light/dark contrasts)
  - Selected materials (e.g., tactile contrast in the floor)
  - Sufficient lighting (Section II, 1.3)
- Guidance and orientation systems (Section II, 1.1) with way-finding map or signs
- Tactile and easy-to-understand floor plans or tactile models
- Easy to operate information terminals, automated machines (Section II, 1.1) or other technical devices like audio recording media, telephones — acoustic measures for people with hearing impairments (Section II, 1.4)
- Personal service (door person or porter).

Information counters should be designed and furnished with acoustic, visual and tactile elements in equal measure, following the principle of multisensory design (Section I, 2.1.2). Service counters with glass separation panels in particular need to be equipped with an intercom and an induction hearing system.

Foyer areas **with connections to stairwells or lifts** are usually considered smoke or fire compartments, and separated from other corridors by means of heavy smoke and fire doors. It is imperative that these junctures be designed to provide full barrier-free functionality.

Elements in a barrier-free design might include:

- Open doors with smoke detectors
- Power-operated doors
- See Section II, 4.6

Corridors

- Clear passage of minimum 1.50 m
- Passing space of minimum 1.80 m x 1.80 m up to maximum of 15 m corridor length
- Possible clear passage of minimum 1.20 m if the corridor is less than 6 m long and there are not required changes of direction or if there are turning options before or after
- Clear ceiling height of minimum 2.10 m (note: this should be checked where signage may project into the corridor)
- Large glazed walls should be highlighted with safety markings (Section II, 4.6) unless the walls are can be clearly recognised through some other means

Corridors and other areas of internal circulation may not have a greater slope than 3% otherwise they must be equipped with ramps or lifts.

Intuitive, easy to follow routes through a building make orientation easier. Helpful elements include:

- Change in floor materials (e.g., accentuate important functions)
- Baseboard contrast between wall and floor
- Intermittent or linear use of lighting elements
- Art objects

Information boards or other (portable) furnishings should not be in or project into the immediate circulation area.

3.3 Escape routes

Two independent escape routes are required.
Managers of publicly accessible facilities or sections thereof that are used by an average number of wheelchair users (up to 1 % of the visitors) are required to create in-house procedures in consultation with the Berlin Fire Department for evacuation and rescue of wheelchair users with the help of third-party assistance. These procedures will be registered in a fire protection plan and publicly displayed in a central area. Staff must be trained regularly on what to do in the event of danger, especially with regard to providing help for wheelchair users. The legal basis for this is the Regulation on the Use of Physical Structures (Operating Regulations – BetrVO).

Additional structural measures for independent evacuation of people in wheelchairs is required in cases where the building or sections of a building are used by a greater than average number of wheelchair users relative to the average population of people with disabilities in general population

(the relevant legal principle is found in Article 51 para. 2, sentence 2 of the Building Regulations for Berlin, BauOBln). These fire safety measures are determined on a case-by-case basis and include:

- The construction of **fireproof waiting areas** or fire compartments where people can stay until rescued by third-party help
- **Visual information** communicated via light signals in and outside of rooms and corridors used by deaf and hearing impaired users; signal transmission systems (DIN 32974)
- **Acoustic information** for blind and visually impaired users, for example, acoustic signals in the direction of escape routes, voice alarms
- **Tactile information**, for instance, on information systems specifically designed for blind and visually impaired persons, including a corresponding representation of the escape route using a tactile model or high-contrast, relief maps of the escape plans (e.g., relief printing)

Safety can be further improved by:

- Marking escape routes with a high-contrast design even at ground level (e.g., contrasting baseboards, strip l ighting, directional lighting, additional signs at floor-level, floor markings) – Information in the ceiling area may be almost completely obscured by smoke.
- Security lighting
- Smoke alarms (acoustic and visual alarms).

3.4 Places of public assembly

In Berlin, the operation of places of public assembly is subject to the Regulation on the Use of Physical Structures (Operating Regulations - BetrVO). Detailed specifications can be found in Section II, 5. It is particularly important to note here that adequate barrier-free sanitary rooms must be provided for public assembly rooms and must be clearly designated, even in cases where rooms are of variable size through the use of movable partition walls.
For larger rooms (approx. 80 m2), the installation of an acoustic communication system for people with hearing impairments (Section II, 1.4, preferably induction systems) is useful (churches, auditoriums, multipurpose halls).

3.5 Office spaces in public administration buildings

The following are important criteria for administration buildings:

- Accessibility and usability of common-use rooms (seminar rooms, canteens, kitchenettes)
- Doors: (Section II, 4.6): minimum clear passage 0.90 m, labelling or marking of glass panels
- Movement area in room (Section II, 1.2)
- Furnishings: Height adjustable or wheelchair accessible tables and desks
- Control elements, e.g., for opening windows (Section II, 4.7) or sun protection at a height of 0.85-1.20 m, heating elements
- High-contrast design, colours
- Special individualised aids
- Allocations of sanitary facilities
- Lighting

Lighting
Light influences creativity, improves communication and decision-making abilities. Lighting should therefore meet all the quality criteria for visual tasks.
The leading factors are:

- High levels of daylight
- A mixture of direct and indirect luminescence for friendly, bright ceilings
- Concentrated light in areas for visual work
- Daylight dependent lighting control

The criteria listed here should also be applied to offices not located in public administration buildings. If an employer engages people with disabilities, he or she is charged with providing barrier-free access to all rooms and workplaces under the Workplace Ordinance (ArbStättV, Article 3a para. 2).
It is generally possible to adapt an office or workplace so that it is accessible for everyone.
Book 9 of the German Social Code (SGB IX) requires employers to create suitable workplaces and working environments so that workers with disabilities find lasting employment. This includes the provision of **barrier-free information and communication technologies** (Section I, 2.1.3; Section I, 3.3; VVBIT).
Moreover, Article 27 of the UN Disability Convention calls for the inclusive design of our working world. That means **working conditions should be adapted to people` s needs and not the reverse.**

3.6 Retail areas

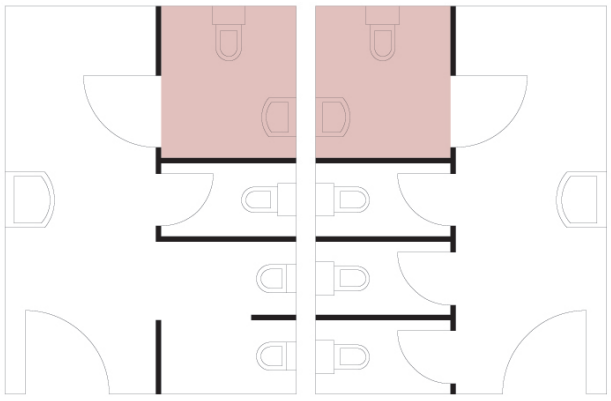
As a general rule, retail areas in the trade and service industry are required to meet barrier-free design standards. In addition to the basic building regulations that apply to all publicly accessible facilities, significant thought must go into appropriate furnishings and operational organisation in retail areas. Sufficient **movement areas** is required (1.50 x 1.50 m, where necessary 1.20 m), for example in front of shelving units and tables, displays, counters, cashier area or automated machines. Passage widths (minimum 0.90 m), as well as highest vertical reach and different levels of visual access as described in Section II, 1. must be considered. If necessary, specific areas may be appropriately retrofitted, for example, a portion of a high counter or bar may be lowered to 0.85 m high and approx. 1 m wide. Visually optimised information, sometimes with the addition of tactile elements, can facilitate self-sufficiency or play an even more fundamental role enabling affected persons to be independent in many retail and market areas. For example, a tactile, high-contrast floor plan or merchandise map in a supermarket not only enables a visually impaired customer to perform daily shopping chores, but also makes it possible for them to the experience 'shopping' itself independently and in the usual way.
Bell sounds or other acoustic **communication equipment** support perception for customers with a hearing impairment (Section II, 1.4).
Smaller businesses with a split-level floor plan should organise their merchandise along barrier-free lines, for example by making all goods available on one level. The important thing is to ensure that the basic functional whole and its different parts flow easily in an inclusive and accessible way.
It is useful to situate barrier-free **sanitary rooms** in a central location where several functional areas can make use of them. Fitting rooms should also be provided with a movement area measuring 1.50 x 1.50 m; where necessary, this can be accomplished by using an adjustable design, such as using moveable walls.

Designated parking spaces, for example in underground or multi-storey car parks should be located close to barrier-free entrances and exits (Section II, 4.2, Operating Regulations – BetrVO). Traffic routes should be kept free of advertising media. Large glass panels and doors should have safety markings. In lifts, it is helpful if the announcement stating the floor also includes details about the range of products on that floor.

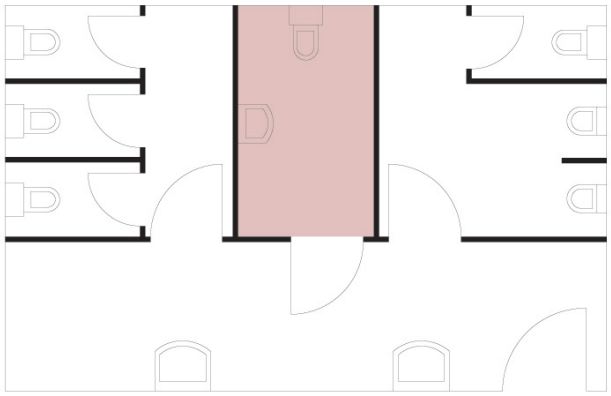
3.7 Dining areas

Restaurants and canteens are subject to the general requirements for accessible public buildings as outlined in Section II, 1 through 4:
- Avoid reflective and slick surfaces
- Ensure adequate movement area (Section II, 1.2)
- A clear passage of 0.90 m should be maintained in traffic areas in restaurants; suitable alternatives available for passages where foot traffic is directed in a compulsory one-way direction (e.g., turnstiles)
- Furnishings: high-contrast design of the environment
- Modifiable seating options
- Wheelchair accessible (approx. 0.70 m knee clearance)
- Where furnishing is limited to bar stools with high counters or tables, alternatives should be offered
- Lowered bar elements and glass covers at a height of 0.80 m
- Display cases with glass shelving for food and beverages should be at eye-level of people seated in a wheelchair
- Sufficient and glare-free lighting (e.g., for reading menus)
- Menus (food menus, wine list) should be printed in large, sans-serif fonts, Braille and/or provided with illustrations.
- Location of barrier-free washrooms c lose to the dining area
- Level access to outdoor terraces
- Solid, wheelchair accessible surface (e.g., no gravel)

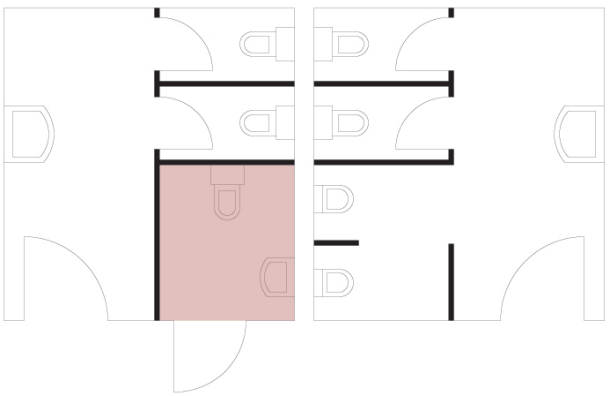
Self-service faculties:
- Control elements, e.g., of vending machines, at a height of approx. 0.85 m (maximum 1.05 m, in exceptional cases up to 1.20 m)
- Information and instructions provided with high-contrast design and in easily accessible locations
- Tray slide: height of 0.80 m, if necessary reached from the side
- Acoustic information systems (e.g., induction hearing system) (Section II, 1.4); particularly at service counters and cashier areas (e.g., in a canteen).



Variant a



Variant b1



Variant b2

3.8 Sanitary facilities

Detailed requirements for sanitary facilities can be found in DIN 18040 Part 1, point 5.3. Room layout, configuration, and the number of toilets will vary depending on the frequency of use and the space available.

3.8.1 Toilets

A publicly accessible area that serves a specific function is required to have at least one barrier-free WC assigned to it. This is especially important to ensure in places where there are variable separations of the building parts! In buildings with more than two storeys the number of accessible toilets should be increased accordingly, with at least one additional accessible toilet added.
The room layout can vary depending on to the floor plan and the conditions of use.
a) Layout where barrier-free WC cubicles are integrated into men's and women's washrooms respectively
b) Layout for a unisex barrier-free WC cubicle for both men and women to use.
Advantages: suited for use with assistants or during the busy breaks in sports or entertainment venues, optional installation of an infant changing table.
Note:
If there is no anteroom fronting the WC cubicle, care should be taken to protect privacy from direct views to the interior.

Toilet cubicles – Planning Scenario 1
Meets comprehensive requirements in compliance with DIN 18040 Part 1 including:
- Movement area of 1.50 x 1.50 m
- Two-sided transfer area next to WC.

Deviations from Planning Scenario 1 may be necessary in existing buildings and must be justified.

Toilet cubicles – Planning Scenario 2
Deviates from DIN 18040 Part 1. May be used in exceptional circumstances. It requires:
- Smaller but still functionally adequate space (2.20 x 1.60 m)
- Movement area of 1.50 x 1.50 m
- One-sided transfer area

Possible uses:
- Modifications to existing building
- Buildings classified as historic monuments
- Low frequency of use

In Planning Scenario 2, a possible solution can offered with power-operated,

height adjustable WC that enables a two-sided transfer despite limited space.

Toilet cubicles – Planning Scenario 3 this scenario should only be implemented for active athletes in publicly accessible sport facilities where there is very limited space – alternatives should be explored! Special regulations apply: The cubicle size can be smaller, by dispensing with the turning radius of the wheelchair, permitting space for only one-sided transfers to the WC (1.61 x 1.51). The toilet cubicle is assigned next to the wet rooms next to the changing area. Access to the cubicle **must** proceed through the wet area.

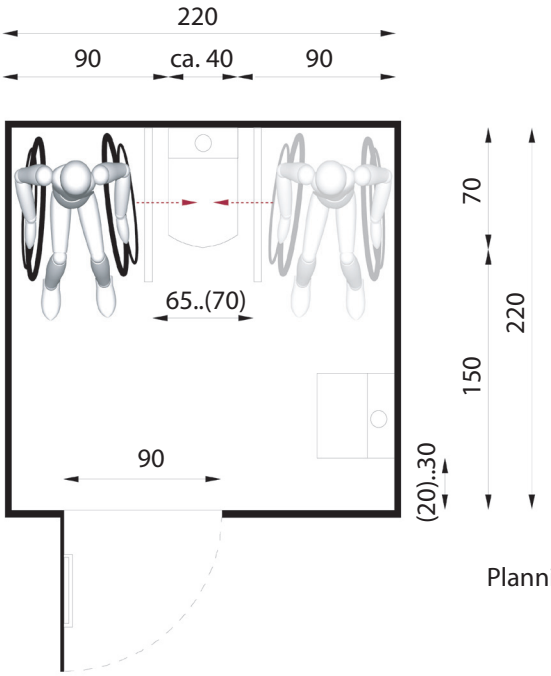
Equipment
Sanitary fixtures and control elements should be in visual and tactile contrast to the wall and flooring. Lighting should avoid excessive glare and reflectivity: light fixtures with anti-glare protection, indirect light.
For independent and self-directed use, a universal locking system (Eurokey) should be made available as long as the door to the WC is closed to other users.

Cubicle doors (see also Section II, 4.6)
- Minimum clear passage of 0.90 m
- Doors should generally open outward
- Manually operated doors should be equipped with a horizontal grabrail at a height of 0.85 m on the inside of the door
- It should be possible to release locks from outside
- Door (doorframes or panels) and handles should be designed to contrast with each other and to their surroundings
- Signage or labels should be placed at a height of approx. 1.40 m and designed with strong visual and tactile contrasts

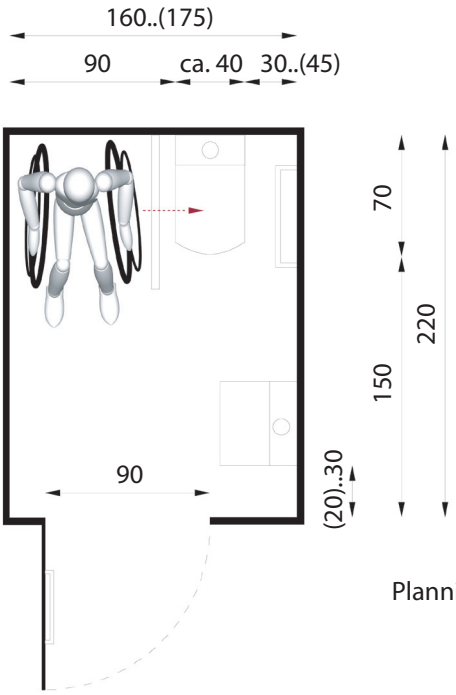
The installation of sliding doors requires a structural opening that is approx. 0.10 m wider than a side-hung door in order to supply the space required for clear passage. In variations of Planning Scenario 2 and 3, the clear passage width can be reduced to a minimum of 0.80 m.

The following dimensions are general dimensions for **WC pans**:
- Depth 0.70 m
- Height 0.46–0.48 m including seat
- Back support 0.55 m behind the front edge of the WC pan

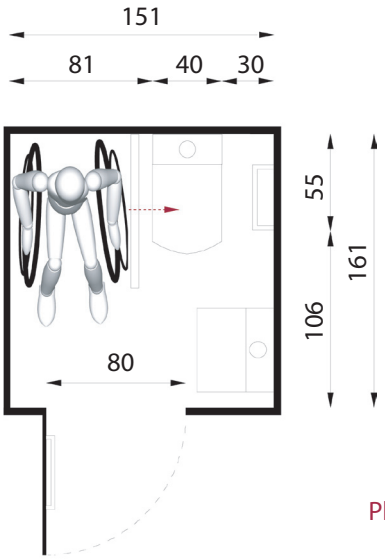
In Planning **Scenario 1**, this is mandatory.



Planning Scenario 1



Planning Scenario 2



Planning Scenario 3
WC for Athletes!

Grabrails
- Upper edge of the grabrail should be located 0.28 m above the seat
- Should extend 0.15 m beyond the front edge of the WC pan

In **Planning Scenario 1** (space for two-sided transfer) fold-down grabrails should be installed on either side
- Clear distance between grabrails 0.65–0.70 m

In **Planning Scenario 2** (space for one-sided transfers) a fold-down grabrail should be attached to the transfer side and a fixed grabrail attached to the wall side (e.g., forming an L-shape).
In **Planning Scenario 3** a fixed grabrail can be mounted on the wall side.
- Horizontal: approx. 0.40 m long, 0.70 m high above floor finish
- Vertical: approx. 0.80 m long aligned with the front edge of the WC pan

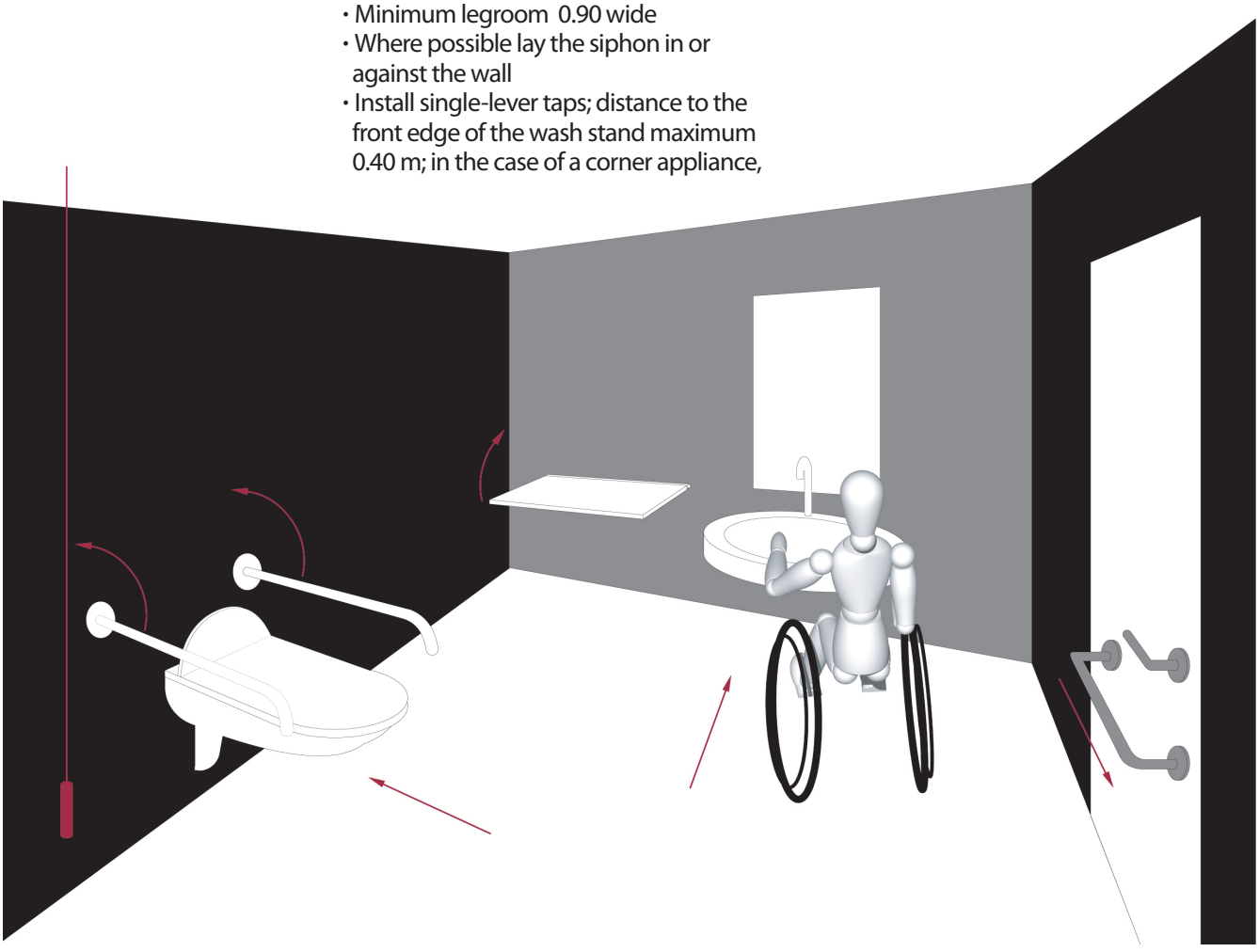
Flush controls should be simple to use (large pressure plate, wall-mounted push buttons to the side or integrated into the grabrail).

Barrier-free usage of **sinks** requires:
- Installed height of 0.80 above floor finish
- Knee clearance of 0.67–0.70 m (no water heaters below basin)
- Minimum legroom 0.90 wide
- Where possible lay the siphon in or against the wall
- Install single-lever taps; distance to the front edge of the wash stand maximum 0.40 m; in the case of a corner appliance, taps should be installed on the side.
- Height adjustable, if necessary

There are no special requirement for the design of washstands. Designs for top mounted washstands, however, do not meet the requirements.

Additional furnishings
- Soap or paper towel dispensers should be easy to use and installed at a height of maximum 0.85 m.
- Mirror flush with wall; lower edge height approx. 0.95m and upper edge approx. 1.95 m (adjustable mirrors are not required)
- Shelves at height of maximum 0.85 m
- Coat hooks at height of maximum 1.20 m (mounted at two heights for standing and sitting positions)
- Skid-resistant flooring (Section II, 4.8.1)
- Emergency pull-cord or switch at a height of maximum 0.20 m above floor finish in the transfer area near the WC
- Toilet seat riser

Larger WC-facilities should provide sanitary options for people of smaller stature and children. In these areas, WC pans should be installed at a height of 0.35 m (not including the seat) and urinal bowls at a height of 0.50 – 0.57 m.



Changing area
Where infant-changing facilities are permanently installed (changing table 0.70 x 0.70 m) the room must be adjusted with respect to the movement area. With a fold-down design, the retracted depth of the changing table must be factored in to the minimum width of the room.

3.8.2 Baths and showers

Planning Scenario 1
Fulfils comprehensive requirements in compliance with DIN 18040 Part1.
The requirements include:
- Shower area flush with floor, 1.50 x 1.50 m (lowered by no more than 20 mm, e.g., chamfered edges)
- Fold-down shower seat, shower stool, shower chair: seat area minimum 0.50 m deep
- Seat height of 0.46–0.48 m
- Grabrails: installed horizontally at a height of 0.85 m; vertically extending to height of 1.50 m
- Control elements (taps, shower house, soap dispenser) approx. 0.85 m high, placed within arm's reach
- Skid-resistant floor covering in shower (appropriately adapted from GUV-I 8527, at least for assessment group B)
- Shelf or portable shelving at a height of approx. 0.85 m

Planning Scenario 2
Fulfils limited requirements for people with reduced mobility (use of walking aids, rollator, wheelchair).
Requires that the shower area is flush with floor, minimum depth of 1.20 m and a width of 1.00 m.
This scenario results in multiple areas of functional overlap in the movement areas within the bathroom. The equipment is the same as in Planning Scenario 1.

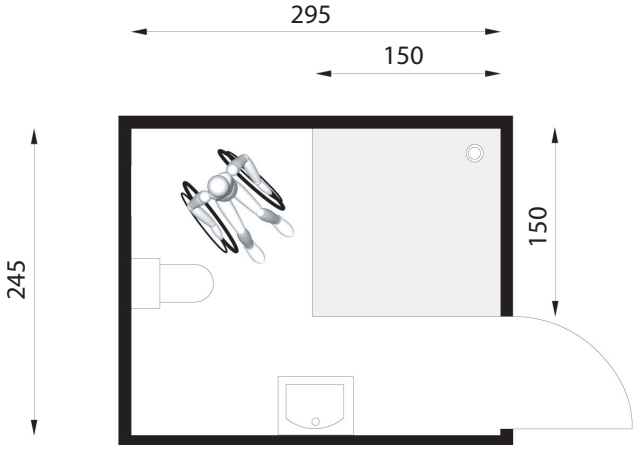
Planning Scenario 3
In sport facilities the shower area should be constructed without partitions between the individual showers in order to ensure the necessary movement area. Grabrails and support arms, an additional hand-held showerhead, and shower seat may be omitted here. The provision of a mobile shower chair is mandatory. Shower taps should be installed at a maximum height of 1.05 m above the floor finish.

Bathtubs
It is important to make sure that a movement area of 1.50 x 1.50 m is maintained in front of the bathtub. Horizontal and vertical grabrails should be installed lengthwise on the wall. The clearance on the underside of the tub (approx. 0.15 m) used for example by mobile lifting devices should not be obstructed by any panelling on the front side of the bathtub. The entry side of the bathtub should be restricted to 0.50–0.55 m high.

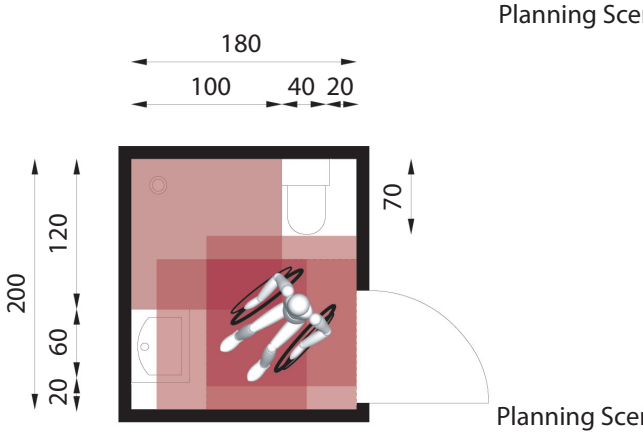
A high-contrast design is also important in bathrooms and bathing areas.

3.8.3 Changing areas

Changing areas, particularly in public baths and large medical or wellness establishments, must provide at least one cubicle that can accommodate a changing bed when it is fully assembled.
The following specifications apply:
- Stalls with movement areas of 1.50 x 1.50 m
- Height of changing bed 0.46–0.48 m
- Locker usage: height of lock assembly 0.85 m; lowest locker shelf 0.40 m, clothes rail or hooks at a height of maximum 1.20 m
- Bench with seat depth of minimum 0.50 m
- Where applicable, option of transfer to mobile shower chair
- Tactile and visual markings on lockers
- Accessible hairdryer
- Key tags with tactile markings



Planning Scenario 1

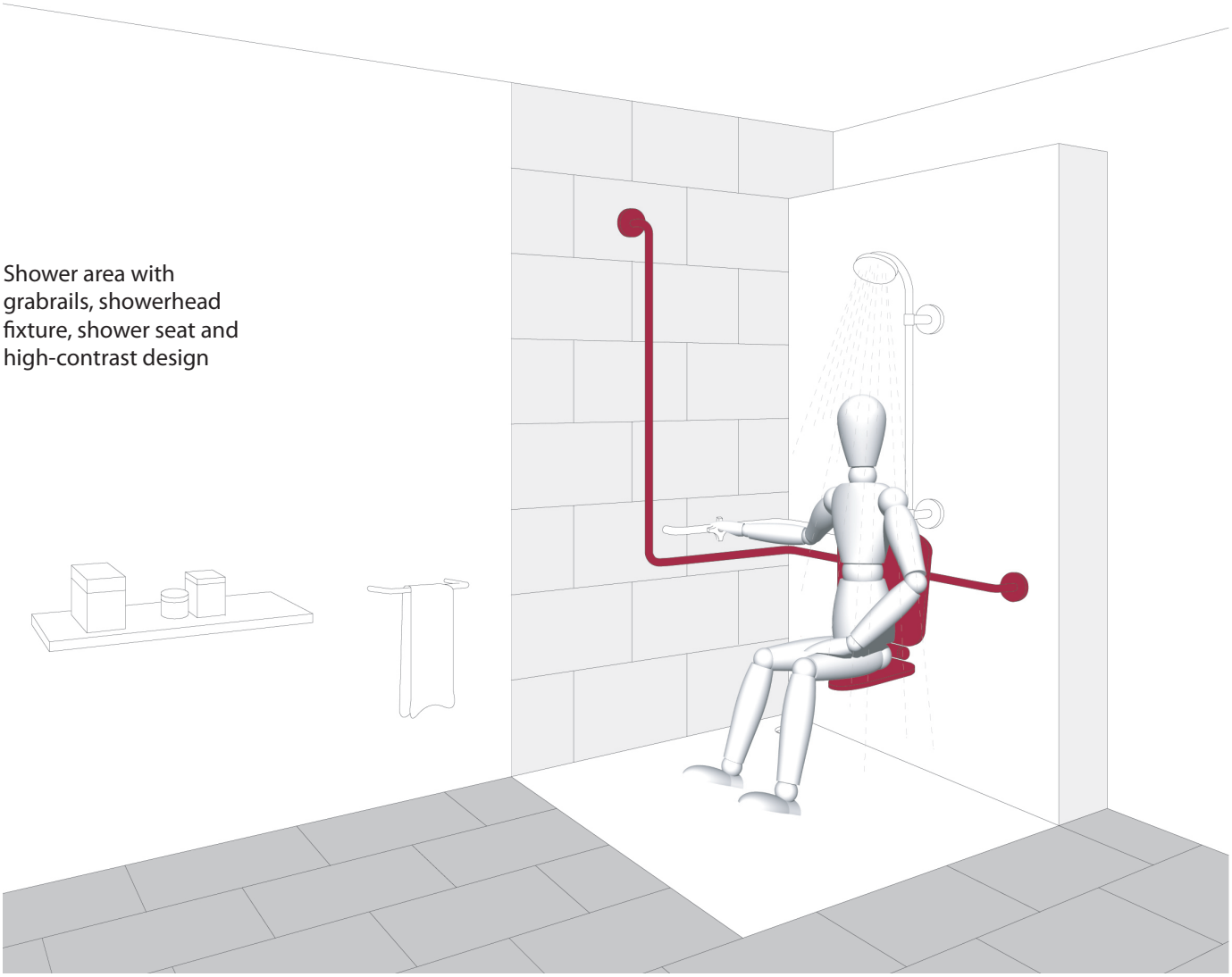


Planning Scenario 2

Fitness areas
There are no use-specific requirements regulating the furnishings for changing areas. A floor space of minimum 23 m^2, taking into account the necessary movement area of 1.50 x 1.50 m, allows unrestricted movement in a wheelchair.

3.9 Therapy and treatment rooms

Therapy and treatment rooms in medical facilities such as doctors' offices and physiotherapy clinics, as well as those in wellness or general fitness facilities must be designed for barrier-free access, as part of the general requirements for accessible public buildings. Pathways and functional areas, such as reception areas, waiting rooms and examination rooms (reception counters, X-ray areas) must be fully accessible and functional. Information counters should be equipped with acoustic communication equipment for hearing impaired people. (Section II, 1.4, e.g., portable induction loop pads).
Restrooms, changing areas and other facilities should also be constructed to provide barrier-free access.
In smaller medical facilities alternative solutions may be possible. For example, in individual cases, highly adjustable and portable examination equipment might be used, or changing rooms could be designed without special equipment, deviating from Section II, 3.8.3, or provided in alternative forms (e.g., movable walls).



Shower area with grabrails, showerhead fixture, shower seat and high-contrast design

4.1 Pathways (on premises)

The following section offers very general guidelines and should be read in tandem with the manual *Berlin-Design for all: Public Outdoor Space* (Section III).

Width of pathways
Pathways must be wide enough for people who are using a wheelchairs or walking aids, including the space needed for passing. A width of 1.50 m is generally sufficient. A minimum width of 1.20 m is acceptable on pathways if they are not longer than 6.0 m. For longer pathways, wider passing points must be provided.

Longitudinal slope
The maximum longitudinal slope of a pathway may not exceed 3%. That gradient is manageable for wheelchair users and people with reduced mobility and does not create any particular impediment.. The slope may reach up to 6% if there are intermediate landings laid out at regular intervals no more than 10 m apart with a slope of no greater than 3%.
If topographical conditions of the site make it impossible to avoid a more extreme slope alternative routes, bypasses or ramps (Section II, 4.3) should be considered. A warning directing attention to the upcoming slope of the pathway and information about available bypass routes are highly recommended.

Cross slope
For drainage reasons, a cross slope of up to 2% must be maintained depending on surface structure and traction of a path. A higher gradient is problematic for wheelchair users because they have to steer against it.

Changes of direction
(see Section III, 5.2.1)
Experience has shown that unclear or confusing terrain detracts from a feeling of safety and should be avoided. When laying out paths, sharp corners should be softened by rounding or curving the route. Where there is a change in direction, minimum width of the path increases to 1.50 m.

Surface design
(see Section III, 3.1)
Pathway surfaces must provide good traction and a smooth ride; they must be level, skid resistant, with minimal joints or gaps, and non-reflective. We say a surface has good traction when the soles of shoes, walking aids and the wheels of a wheelchair are able to maintain a secure grip, even when the surface is dirty, wet or snowy.
The following materials have proven to have good traction:
- Concrete pavers/concrete slabs/concrete paving
- Natural stone surfaces
- Fired, flat-laid clinker brick
- Rolled concrete with crushed gravel aggregate
- Washed concrete slabs with gravel aggregate .

A surface texture that is excessively coarse, however, increases the rolling resistance of wheels and so is likewise unsuitable.

Path edges
(see Section III, 5.2.1)
The structural boundaries of a path should be designed to establish a clear route, particularly for people who are blind or visually impaired. Adjacent lawns, lawn edging stones or pavers, for example, create strong tactile accents that give people who are blind additional tactile guidance and orientation.

Gutters
Gutters or drainage channels running in the direction of a path can offer complementary guidance to people who are blind or visually impaired. Gutters that cut across the path or even along the side, however, may pose problems for wheelchair users and people using walking aids. Therefore, they should not be deeper than 1/30th of their width. Within these parameters, the sides should taper to the floor of the gutter at a minimum angle of 45 degrees. Another option is to install a covering over the gutter that is flush with the ground, for example, a metal grate.

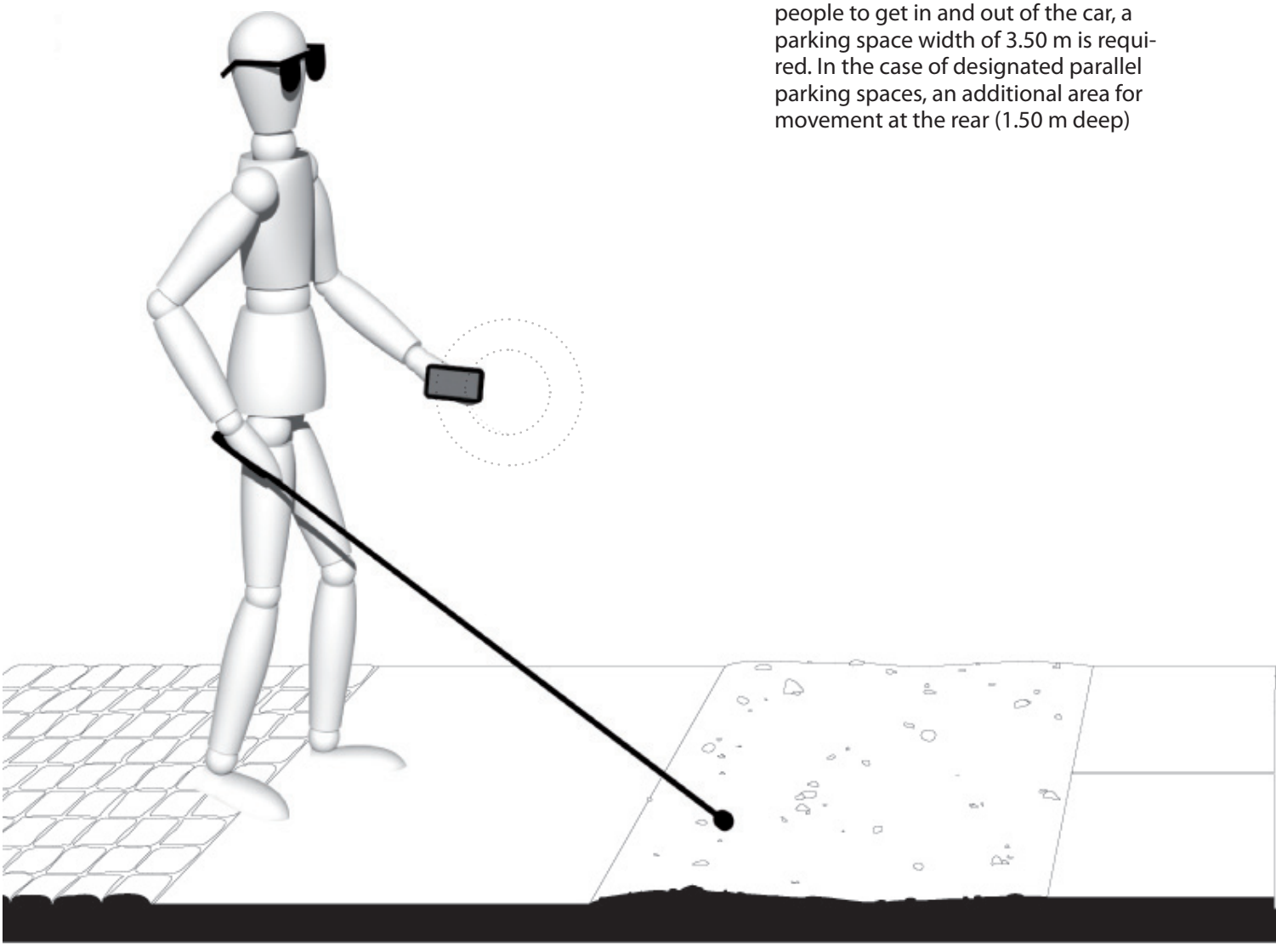
Orientation aids
(Section II, 1.1)
Extra information, for example, for people who are blind or visually impaired, can be communicated through markings on surface of the pathway. More specific information can be conveyed via tactile lettering on a handrail. Signs and other visual information should be designed so that they are easily accessible but not in the direct pathway. The closest possible reading distance should be ensured for people who have a visual impairment. Glare and reflection should be avoided through the choice of appropriate materials.

Lighting
(see Section III, 4.4)
Lighting should be evenly distributed and free of glare. Optimally, cones of light should overlap to avoid areas of shadow. Lighting fixtures should be installed at a height of at least 2.10 m. Ground-level lighting along a path, or lights integrated into railings are popular, but can compromise safe walking or driving unsafe if they are not installed correctly. Spotlights or accent lights should always be directed downwards

Street furniture
The clear passage of a pathway should never be adversely affected by objects such as poles, benches or informational signs. Furniture in public areas should have a high-contrast design and preferably be placed to the side in an area bordering the pathway. Benches should be positioned with a space to one side, for example, where wheelchairs or prams can be parked. (Section III, 4.3)

4.2 Parking spaces

Article 50 of the Building Regulations for Berlin (BauOBln) and the Implementing Regulation on Article 50 (AV Stellplätze, Appendix 1) regulate vehicle parking spaces for people with severe disabilities or people using wheelchairs. According to these regulations, 3% of the total parking spaces in self-parking facilities and at least 1 parking place per facility must be designated for people with people with mobility restrictions and wheelchair users. If a disproportionate number of parking spaces results from the calculations stipulated by the Implementing Regulation on parking spaces, a mutually agreeable and reasonable alternative can be developed on an individual basis in consultation with owners, operators as and users. Designated parking spaces should be maintained in practical locations and as close as possible to the destination – not further than 100 m to the property or building entrance.
In order to provide enough space for people to get in and out of the car, a parking space width of 3.50 m is required. In the case of designated parallel parking spaces, an additional area for movement at the rear (1.50 m deep)



should be provided for special transport services and private cars to load and unload.
Attention to the special parking space rights can be drawn through the use of signs and surface markings, which, optimally fill the entire surface area.

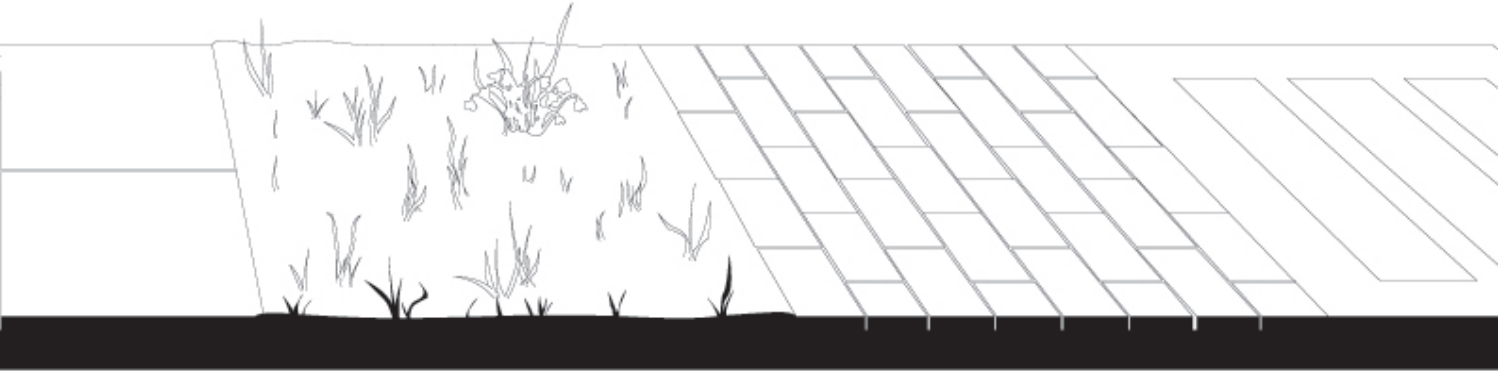
Large parking facilities in general require conspicuous, clear and easily intelligible design arrangements that facilitate and enable orientation and usage for all people. (Section II, 1.1)

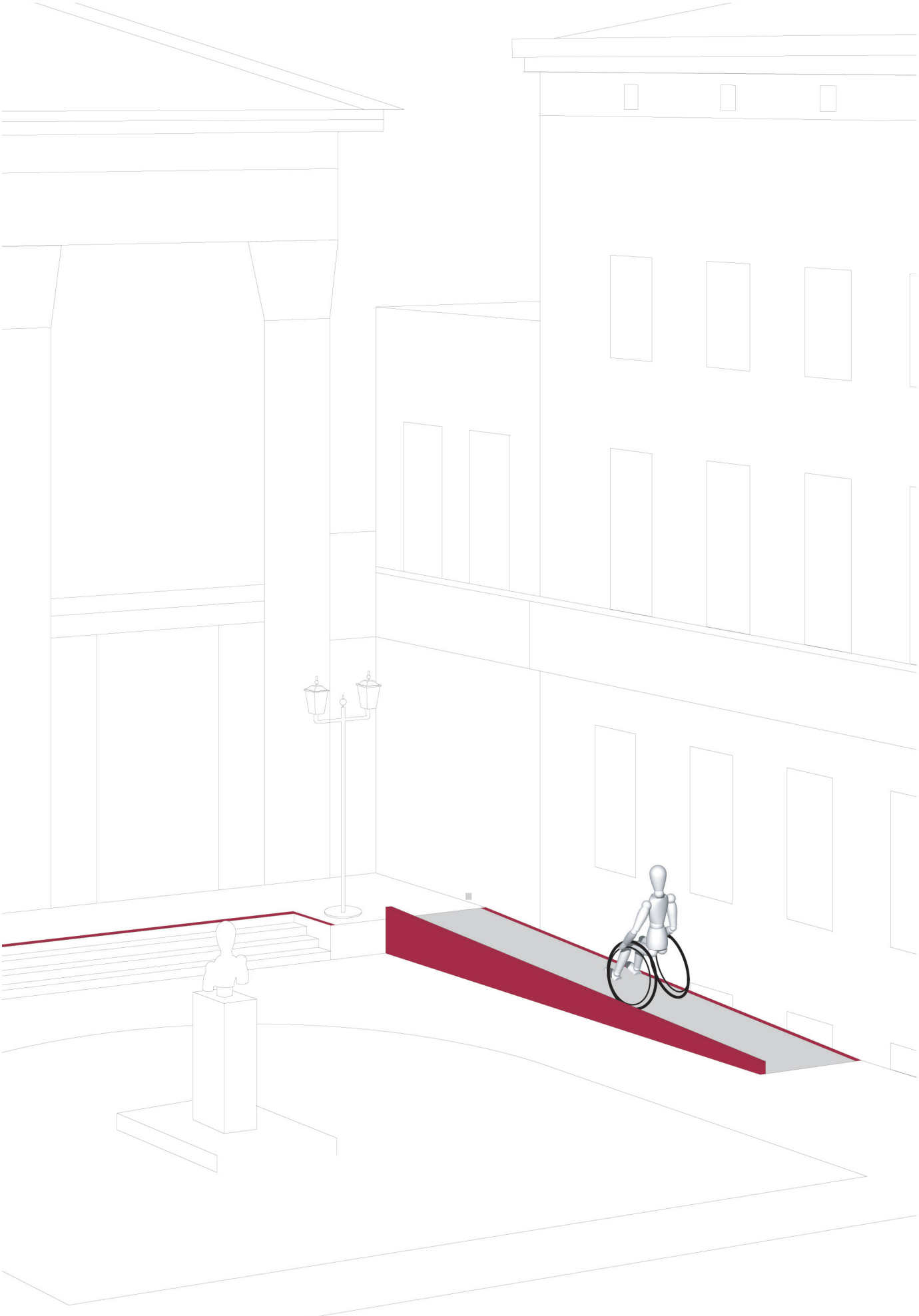
Uncovered parking spaces present a disadvantage for people with restricted mobility in inclement weather conditions. Due to the generally longer time needed to get in and out of the car, these disadvantages should not underestimated.

Multi-storey and underground car parks
Where possible, designated parking spaces in car parks should be situated on the ground level to allow direct egress to the outdoors in case of an emergency. Otherwise they should placed close to the lift to avoid traveling excessive distances, and also linked to public streets or to the building levels overhead.

Direct and adequate lighting in car parks must be provided. If lighting is controlled by a timer, it should be set so as to allow additional time needed to get in and out of the car.
Where designated parking spaces are positioned side by side, the adjacent movement area can be shared with the space next to it for a more economical use of the space overall.
There must be sufficient depth (minimum 1.50 m) within the safety zone between open doors, including the automatic opening of adjacent doors, which are largely installed for fire protection.

Car parking systems
The main purpose of car parking systems is to optimise available parking space. Parking systems are only suitable for wheelchair users when the car is automatically guided to the designated parking area and can be ordered from there. Parking systems in which cars must be directly driven to the mobile platform are not suitable for wheelchair users due to the necessary substructure at a height of up to approx. 0.10 m. If this type of system is used, additional fixed parking spaces need to be provided.





4.3 Ramps

The design of a ramp requires special attention. Compared to a flight of stairs a ramp needs to be six or seven times as long to overcome the same incline of 6 %. Since many ramps are installed retrospectively as added fixtures to overcome height differences, the extent to which they are viewed as acceptable and convenient depends largely on the type of construction and the design elements used.
Aesthetic features in ramp design can minimise psychological barriers that may arise from facing a very long or steep ramp. Confronting a large area that spans a significant height difference in the form of a sloping plane can present problems that should not be underestimated, especially given the general insecurity that many people experienced who have impaired mobility or who are using manual wheelchairs. Creative solutions to this can be found through the use of special markings and the incorporation of intermittent landings.
At a building entrance, ramps should be used to bridge a height difference of maximum 0.80 to 1.00 m. With a greater difference in height, otherwise technical lifting systems are the preferred option. This also applies to building interiors.

Ramp width
Berlin's building regulations require ramp dimensions with a minimum width of 1.20 m. This is an optimal width for use at a building entrance. If space is limited, a short, clear ramp that is installed in addition to stairs can have a minimum width of 1.00 m and still be functionally acceptable. Ramps that incorporate a change in direction or that experience heavy traffic must be widened to 1.50 – 1.80 m since their route is unclear.

Ramp slope
Slope of up to 4%
A ramp of up to 4% slope is considered a sloped path, but it does not necessarily have to conform to the standard construction details stipulated by the BauOBln such as lateral upstands or handrails. Nonetheless, it is important to ensure surface traction, good lighting and accents on the side to demarcate the ramp from its surroundings.

Slope of 4 to 6%
Ramps with this slope can be easily used by both pedestrians wheelchair users.

Slopes > 6%
Ramps with greater than this slope are generally reserved for exceptional cases (e.g., existing building stock)!
The specific gradient should be indicated on signs.

Slope of up to 8%
Ramps with this slope place greater demands on the user. Subjective physical and psychological factors present limits as do certain types of wheelchair and weather conditions in outdoor areas.

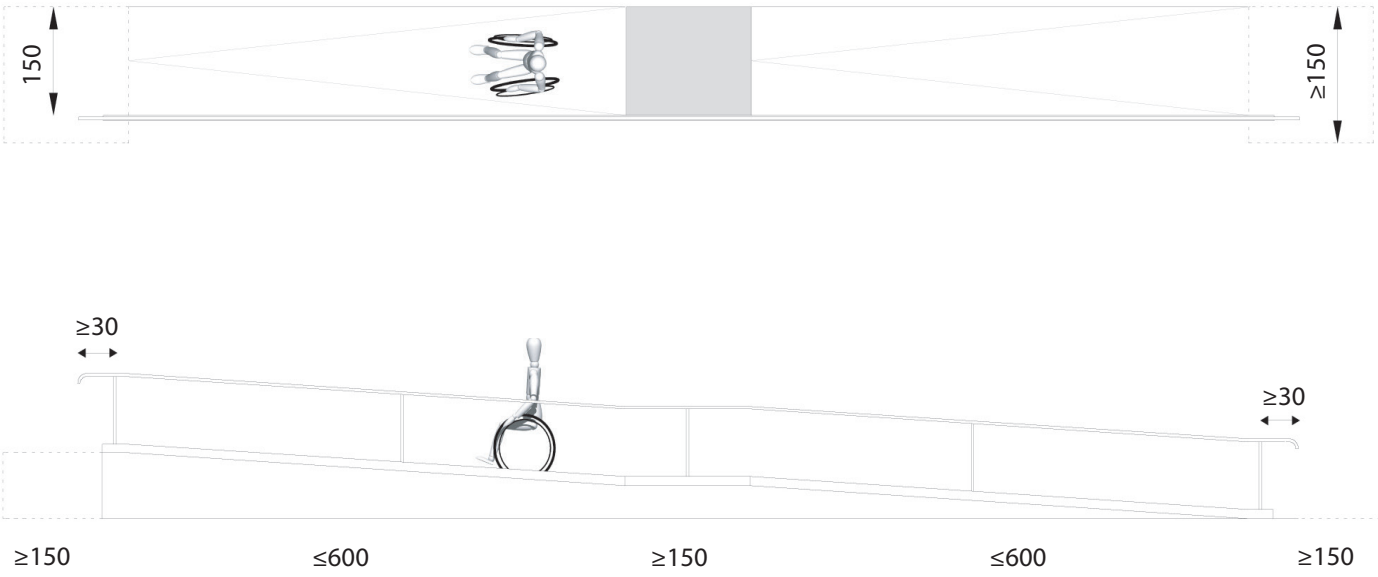
Slope of up to a maximum of 10%
Ramps with this slope are allowed **only allowed to bridge very short spans (e.g., to bridge a single step)** and must be accompanied with the offer or personal assistance.

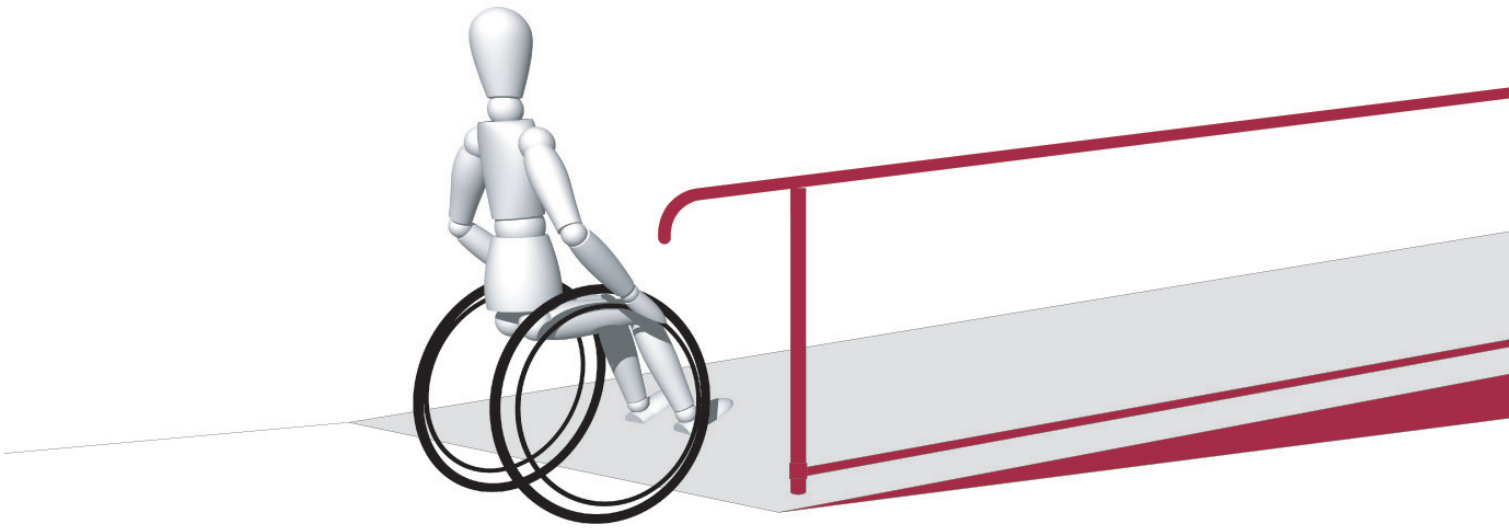
Cross slopes on ramps
Cross slopes on ramps are prohibited.

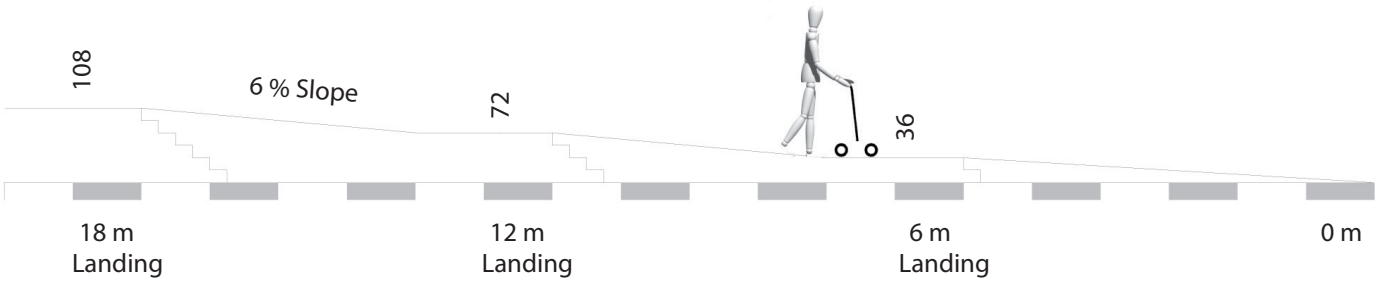
Ramp surfaces
The surface of a ramp should not be too smooth nor have major irregularities or produce reflections. The choice of materials affects both appearance and functionality. Very long ramps can be made much more attractive through the use of different materials. Well-placed accents in the design can convey a sense of psychological security. Beginning, ends or changes in the slope should be signalled with changes in materials, contrasts, colours or ground surface indicators.
(Section II, 1.1.1, Section III, 4.1.2).
Ramps that are exposed to the weather and or very steep present an increased danger of slipping. Transverse grooves (perhaps made of grooved rubber insets) or a stone surface laid in a fish-scale pattern can improve the situation. Clinker brick and concrete pavers have proven to be effective surfaces. Natural stone should only be used with cut surfaces. Metal structures and surfaces can often adapt well to site conditions but will become slippery when wet. They should therefore have an appropriate surface profiling (maximum mesh width of 12 x 12 mm). Where necessary, mats should be kept ready for use during the cold weather
(see Materials, Section III, 3.1).

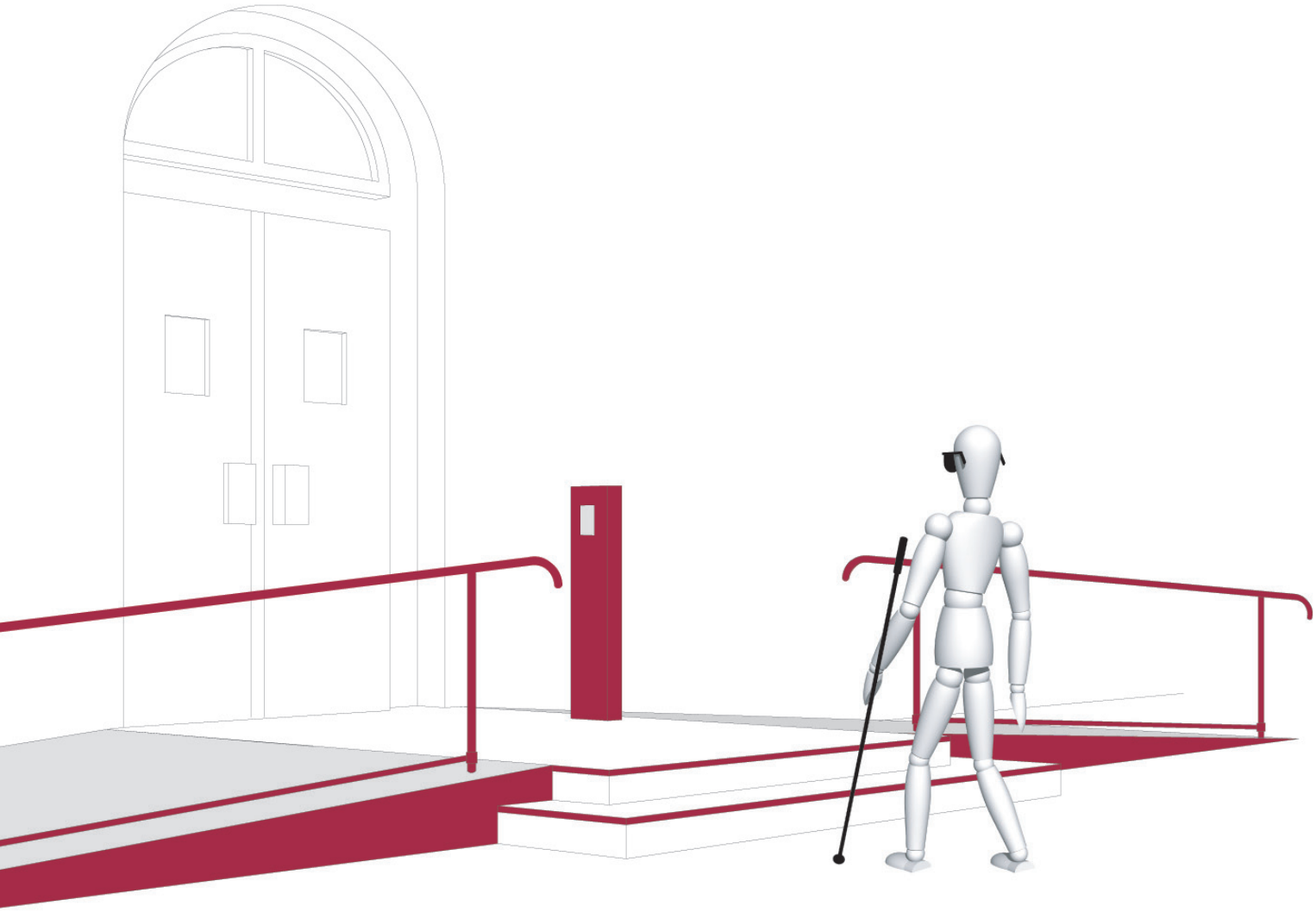
Handrails, balustrades, wheel deflectors, landings
Handrails are an important element for ramps designed without accompanying stairs, particularly when they are outdoors. Handrails should have a non-slip surface (e.g., wood or stainless steel in a rounded shape) and extend continuously to 0.30 m into the level area. See Section II, 4.4. for details on installation height. Wheel deflectors as kerbed upstands should be 0.10 cm high. Landings should be integrated into the plan for ramps longer than 6 m and have a depth of 1.50 m. The distance between them should be determined by the topography and structural situation. Movement areas of 1.50 x 1.50 m should be placed at the beginning and the endings of the ramp. A downward leading staircase may situated on the same axis as the extended path of a ramp only after a minimum distance of 3.00 m.

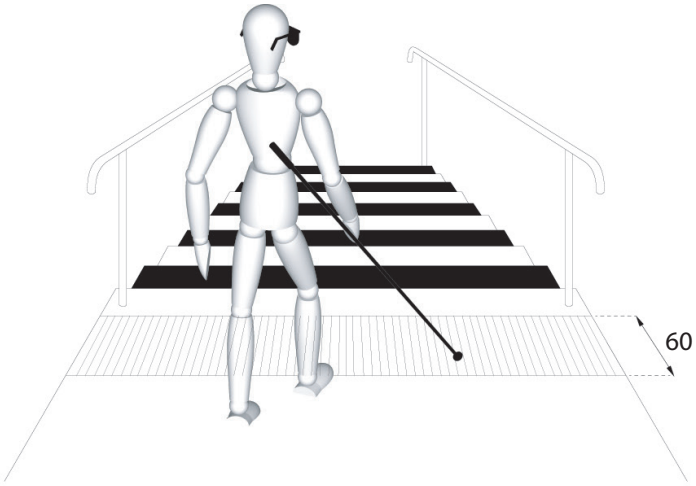
Lighting
Ramps should well illuminated and free of glare, particularly at the beginning and end of the slope, where special accent lights may also be placed.

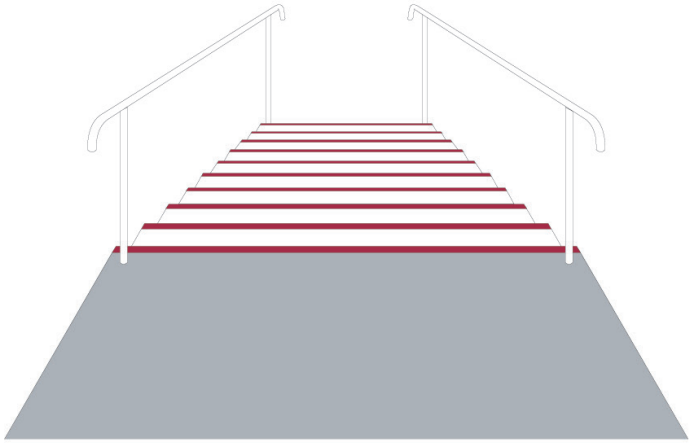


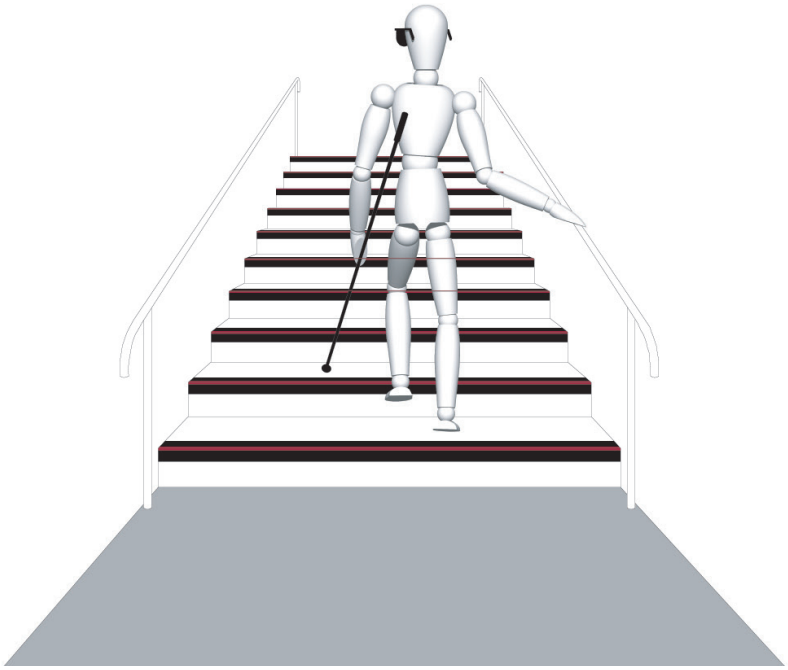



108
6 % Slope
72
36
18 m
Landing
12 m
Landing
6 m
Landing
0 m









4.4 Stairways

Stairways are structural elements for overcoming vertical distances. For those who use them, they not only fulfil functional and technical needs but also have significant social, communicative, space-creating and aesthetic qualities. Stairways are often designed along very functional and austere lines and serve as an escape route for emergencies. However, given a creative form, they are able to break down psychological barriers, and in doing so facilitate their physical use. The legally binding technical principles are stipulated are in DIN 18065.

Geometry and measurements
Flights of stairs should be designed with a straight run. Spiral staircases should be avoided. Stairways that are not necessary for the building's function (Article 34 BauOBln) may deviate from this in individual cases as circumstances justify.
This is particularly true for grand or historic stairways. A stairway requires an optimal gradient. This should not exceed the maximum slope set out by DIN 18065 and tread depths should not fall below the minimum. On an open staircase, upstands on the lateral edge of steps may be helpful. Stairways may not be installed with less than 2.1 m overhead clearance.

Orientation
Disruptions in the body's rhythm of movement on a stairway are usually the result of a step that is seen too late, a sudden change in step height, indistinct edges of steps or inappropriate platform dimensions. Depending on the construction of the stairway, step edges should be marked as follows:
- Up to 3 risers – Each step
- In stairwells – First and last step of the run; preferably all steps
- Depth of the marking: tread 40–50 mm, risers 10–20 mm (measured from the step edge respectively)

In the case of open stairway structures that are not integrated with walls or whose position is not obvious from the physical context, tactile floor indicators should be used in the design to draw attention to it, especially for the upper entrance stairway via an attention field 0.60 m deep directly after the uppermost step. In doing so, however, avoid creating the illusion of steps.
It is important to note that visual contrasts can arise in situations where there are only tactile differences (in the same material), thereby creating the illusion of steps!

It is therefore recommended that the attention field be placed at a distance of approx. 0.60 m behind the uppermost step-edge marking.

Risers
Risers provide greater safety, especially when their design contrasts with step treads. They are legally required by Article 51 para. 3, BauOBln.

Step nosings
should be avoided or used minimally to create an additional profile. Step nosings of up to 20 mm are permitted for risers set at an angle.

Stairways that are not necessary for the building's function (Article 34 BauOBln) may deviate from this in individual cases as circumstances justify.

Treads
Treads should be non-skid and designed with high-contrast markings along the lead edge. Additional skid resistant profiling on the step edges increases safety.
Translucent step materials should rarely be used in places with a high frequency of new visitors.

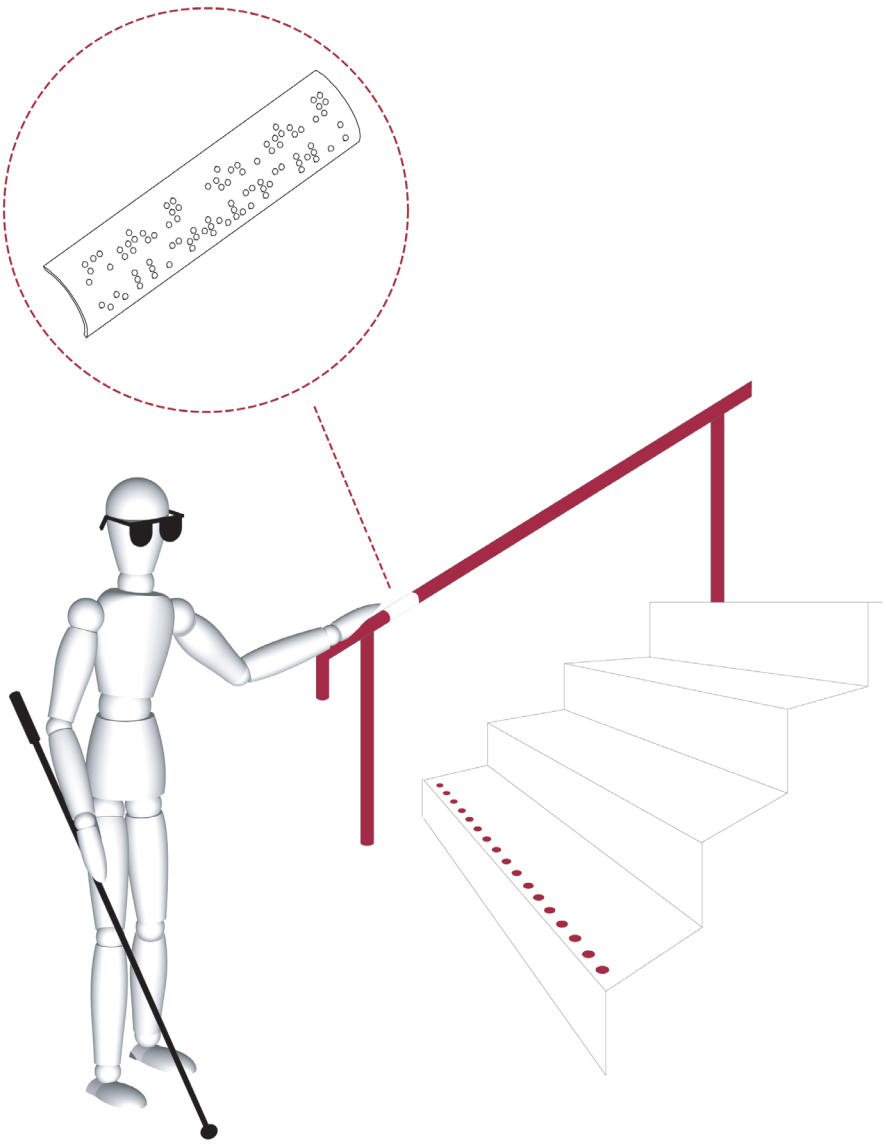
If steps to compensate for height differences cannot be avoided they must be clearly marked.

Landings
Stairway landings allow the user to take a break in the climbing motion by providing a few steps of even ground. This reduces the physical exertion of climbing the stairs. It is important to ensure an undisturbed walking rhythm by adjusting the depth of the landing. The depth of the landing must allow for a certain number of standard steps. Differences in materials, colour and contrasts between landings and steps can be helpful to users. Tactile ground indicators should be integrated in areas with heavy traffic. It is important to avoid creating the illusion of steps.

Stringboards and wall surfaces
These can enhance orientation or visual perception of the staircase through the use of high-contrast design.

Handrails and balustrades
Handrails run continuously on both sides of the stairway. They should extend 0.30 m into the level area at the top and bottom of the stairway as well as continuously around landings and stairwells. The required height is stipulated in DIN 18065, with a preferred height of 0.85–0.90 m at the upper edge of handrail. Additional handrails (height of 0.60–0.75 m) for people of smaller statue and children may also be provided. Handrails should be ergonomically designed, including:

- Round and elliptical profiles with a diameter of 30–45 mm, made of material that is pleasant and easy to grasp, e.g., wood
- Brackets installed on the underside
- Lateral distance to the wall, minimum 50 mm
- Rounded ends if the handrails where they continue into the room, e.g., curving down or pointing toward the wall.
- Light density contrast to the wall or surrounding space - increases usability
- Tactile information can also be communicated in Braille or raised letters on the handrail (orientation points)



Barriers in the sense of **balustrades** are required on the open sides of staircases and landings for safety reasons. The height is regulated by BauOBln Article 38 para. 4. Decorative bannisters or balustrades should be supplemented for safety reasons with high-contrast handrails.

A handrail provides stability, support and guidance.

Lighting
Lighting with natural light is the preferred option. Artificial lighting should illuminate steps from the above in order to avoid creating shadows. Lighting from the side or step-lighting can cause glare and should only be used at a low level of luminance and with the light directed downward. Among other effects, tightly bundled accent lights can produce harsh shadows that disrupt orientation.

Escalators (and moving walkway)
Escalators are a useful addition to structural stairways and ramps, for example, in cases where pedestrians must cross significant height differences. The following general criteria should be noted:

For escalators:
- Maximum angle of climb 30°
- Maximum escalator speed 0.5 per sec.
- Minimum 3 flat steps to lead
- Step width approx. 1.00 m; minimum 0.80 m
- Step edges and sides marked with high visual contrast
- Audible signal warning provided at entry

For horizontal travelators (moving walkways):
- Maximum angle of climb approx. 7° (comfortable use)
- Maximum nominal speed of 0.50 m per second
- Minimum width 0.90 m
- High-contrast marking along sides
- Audible signal warning at entry

These guidelines also ensure that travelators can be comfortably used by people with wheelchairs or prams. It is important to ensure that wheelchairs can be brought safely to a stop once they are on the moving walkway.

Escalators and travelators cannot be used by all people with reduced mobility and therefore are only suitable as the sole alternative to stairways and lifts in exceptional situations. The additional integration of a elevator is essential!

4.5 Lifts

In order to ensure unrestricted vertical circulation in buildings, barrier-free lifts must meet the needs of all users. The principle requirements that apply to this element are found in Article 39 of BauOBln in connection with DIN 18040, Part 1. The essential parameters can be found in DIN EN 81-70. This standard includes very detailed information and descriptions on the use of lifts by people who have visual impairments or who are blind (Appendix E).
The following is a summary of the essential requirements.

Measurements
- Movement area in front of lift: 1.50 x 1.50 m
- Usable area of the lift car, minimum 1.10 x 1.40 m
- Usable area of a lift car with two doors double-sided to one corner, minimum 1.40 x 1.60 m
- Clear passage through door of 0.90 m

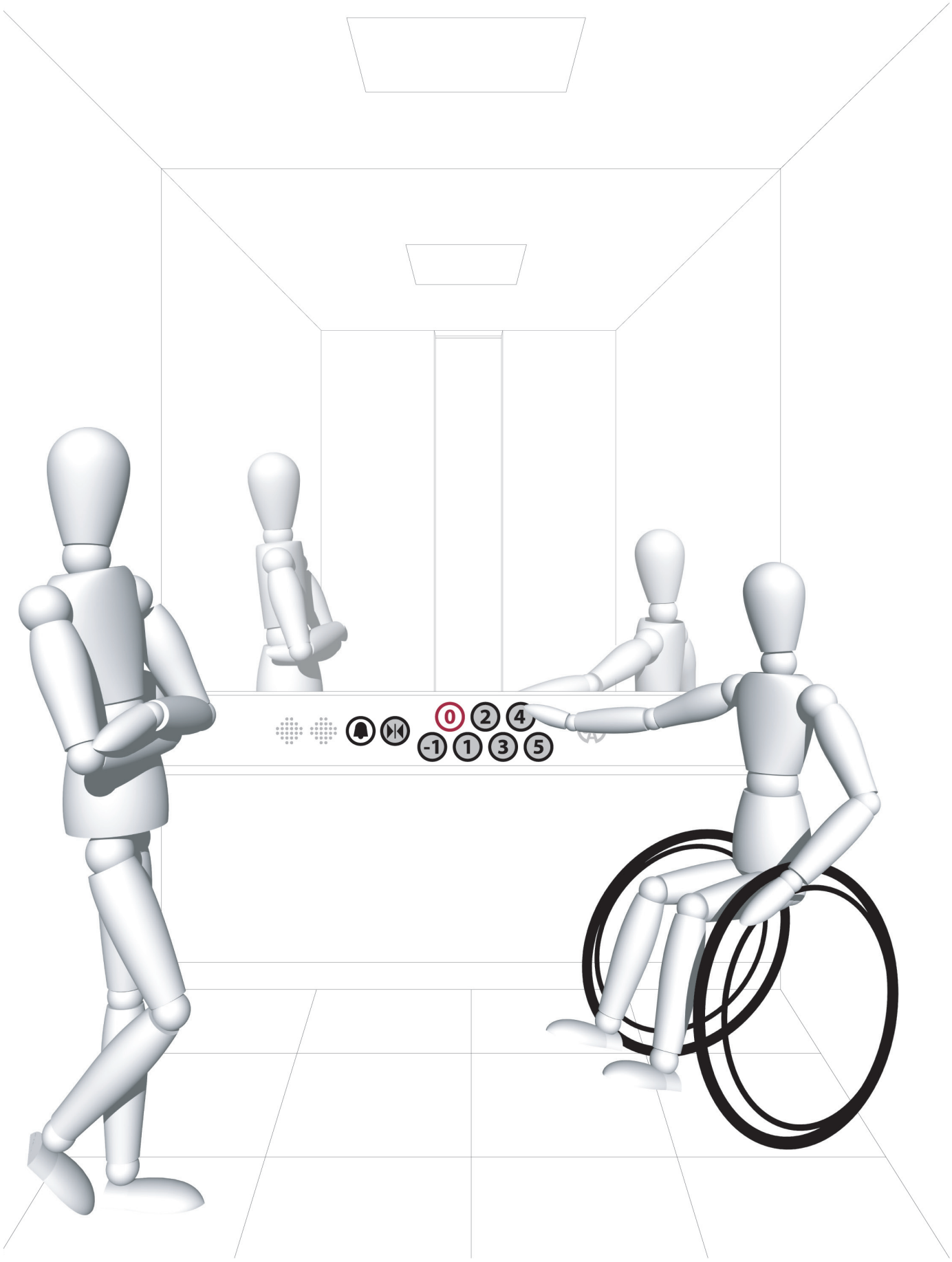
Design
- DIN 32975
- Lift doors or frames, call buttons and call panels should contrast visually (light/dark) with the respective underlying surface
- Use non-reflective wall finish with a strong colour contrast to the floor

Control elements
- Minimum distance to any corner 0.50m
- High contrast design of call buttons as well as letters, numbers, and symbols (embossed, e.g., tactile lettering, Braille)

Call buttons on individual floors:
- Located on the right side at a height of 0.85 m
- Minimum size 50 x 50 mm (size of characters 30–40 mm)
- Confirmation of button operation through a visible and audible signal

Call panels in the lift car:
- Approx. height 0.85 m (lower edge) to 1.05 m (upper edge), up 1.20 m height possible in exceptional situations
- Mounted to the right side or on the side toward which the door closes
- Central arrangement on the side wall (recommended in larger lift cabins)
- Letters, numbers and symbols approx. 30–40 mm tall with a obvious purpose

A horizontal panel with an inclined surface (lectern-style) is preferred to the vertical installation of controls. It is not


0
2
4
-1
1
3
5

necessary, however, to install both types of call panel.
Information that is communicated visually, for example in a lighted display (Section II, 1.1), must be reinforced by an acoustic signal and vice versa (multisensory principle).

Other fittings
- Mirror mounted across from the entrance door; alternative (e.g., polished stainless steel)
- Handrail on at least one side wall at an approx. height of 0.85 m
- Voice announcements
- Glare-free, even lighting
- Optional fold-down seating

Lifts may also be equipped with an induction hearing system (Section II, 1.4) to inform passengers who have a hearing impairment in case of an emergency.

Other types of lifts and lifting systems can be employed, most frequently for use in existing building stock. These can include lifting devices, platform lifts, portable elevator platforms and stairlifts. They should be installed according to EU Machinery Directive 2006/42/EC and can be operated without a lift shaft and with a loading ramp. Apart from the specific structural conditions, the choice of apparatus depends largely on the building's function. The load capacity for public use should be a minimum of 300–500 kg. The specific manner of operation can also be chosen based on the conditions of its use. Moreover, there are many other options, including service through buttons, keys (Eurokey), numeric codes, chips or operational remote controllers.
The following criteria can be used to help decide on the appropriate mechanical lifting device:
- Height difference
- Authorised group of users
- Intensity of use
- Service personnel
- Load carrying capacity

Lifting devices without a lift shaft
Carrying capacity of 300–350 kg
Maximum lifting height approx. 4.0 m

Platform lifts
Should only be used as an exception.
Clear platform dimensions: minimum 0.90 x 1.30 m
Maximum lifting height approx. 1.80 m

Portable elevator platforms
Suitable for temporary use (limited usage)
Carrying capacity 230 kg
Usable platform dimension 0.95 x 0.75 m
Maximum lifting height approx. 1.00 m.

Stairlift
These are especially suited for historic buildings (protected under preservation law) because they leave the overall impression of the building intact. Use of stairlifts generally requires:
- Sufficient platform size
- Sufficient width of stairway
- Sufficient space for approach

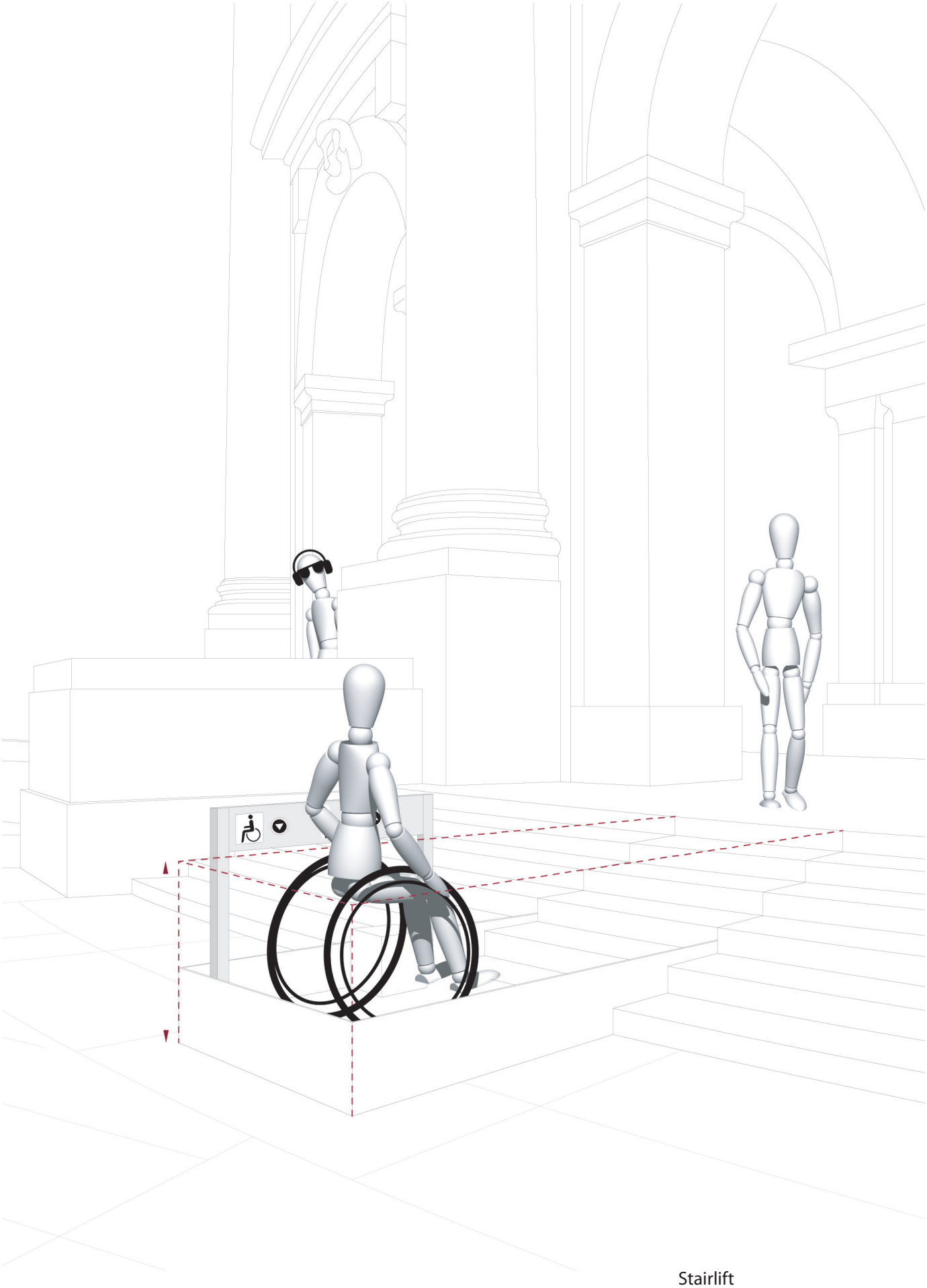
4.6 Doors

Doors are an important and frequently used building element for gaining independent access to functional rooms. In addition to ensuring adequate space for movement around doors, attention must be given to visual and functional features.

Doors vary based on their **intended functions:**

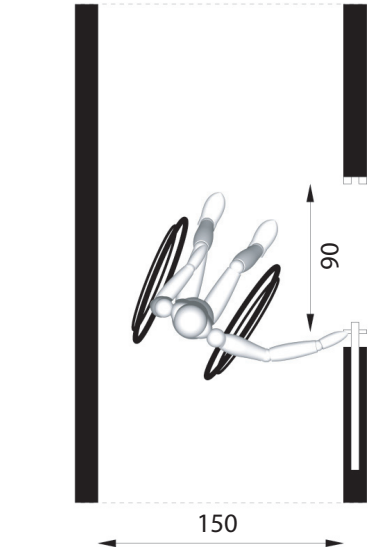
Gates (car parks, property lines) usually only open with power operation.
Entrance doors lead into buildings; usually require power operation.
Fire doors usually require power operation (Chapter II, 3.3.).
Smoke doors can be designed to stay open and passable through the use of a locking device.
Sanitary room doors should usually open outwards.
Sound-insulated doors – It is important to bear in mind that the thickness of the door will have an impact on the width of clear passage.

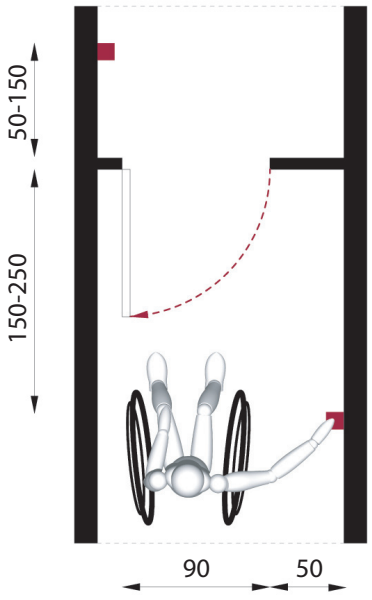
Doors vary based on their **style of construction:**
Side-hung doors require special attention to ensure the required movement areas.
Balanced doors can provide effective operation in restricted spaces.
Revolving doors must be accompanied by side-hung doors. A tactile guidance system in the ground should lead toward the side-hung door.
Sliding doors are suitable.
Swinging doors are not sufficient as the only option for access. For barrier-free usage they must be fitted with hold-open devices to prevent them from swinging through.



Stairlift
Illustration based on the Bode Museum, Museum Island, Berlin

Folding doors and **space-saving doors** should not be used in public buildings. The integration of finger protection door profiles in the design limits the risk of trapping fingers in the door.





Door width
The mandatory clear passage of 0.90 m must not be reduced, for example, by the intrusion of the door leaf into the space. This is particularly important in the case of sliding doors! In existing buildings, there may be cases where door widths are adequately functional with a minimum width of 0.80 m (for internal doors). This does not apply however to entrance doors of buildings and institutions.

Orientation and movement areas
The swing area of automatic side-hung doors should be accentuated with visual and tactile contrasts. It is usually sufficient to incorporate a movement area of 1.50 x 1.50 m in front of doors. This also applies to the area in front of the a side-hung door where the door opens. Here, on the closing side of the door, there must be a minimum distance of 0.50 m between the door handle and the side wall. If there is insufficient movement area, automatic controls must be used to compensate.

Door locks and door handles / Opening and closing systems
All opening and closing systems must be easily operated with minimal force (approx. 25 Newtons), otherwise automatic door systems are required.

Automatic doors must open promptly and have a delayed closing movement, so that people with reduced mobility have sufficient time to pass through the door. Sensors must also detect movement in the door area.
All opening and closing systems must be installed at the manual operating height of 0.85 m to 1.05 high. In public institutions, or for example barrier-free restrooms or accommodations, the operating height should be maintained at 0.85 m. Manual and power-operated door opening systems should have a high-contrast design.
Any input devices, such as buttons used to open a door automatically must be appropriately placed:

- For a side approach, at a minimum distance of 0.50 m in front of the swinging of door (measured from the opening side)
- For a front approach, minimum distance of 1.50 m to 2.50 m in the opening direction (width of door leaf approx. 0.95–1.00 m) and minimum distance of 0.50 m to 1.50 m in the closing direction.

Door handle fixtures should have a design that is easy to grip, for example curved or U-shaped pulls or vertical brackets. It is much easier for individuals in wheelchairs to pull the door shut if the handle is installed horizontally on the door at a height of 0.85 m. The recessed, pocket-type handles ("olive") commonly found on sliding doors, should be excluded and replaced by pull handles. Turning handles like door knobs are likewise unsuitable.
Door jambs deeper than 0.26 m should be avoided.

Design
Doors should contrast clearly from the wall surface either as a surface (door leaf) or as an opening (door frame). Contrasts should be light-dark or colour, with a high light density contrast. Floor stoppers and thresholds should be avoided or limited to a maximum height of 20 mm (e.g., chamfered). Metal grates in front of doors should not exceed a mesh width of 12 x 12 mm.

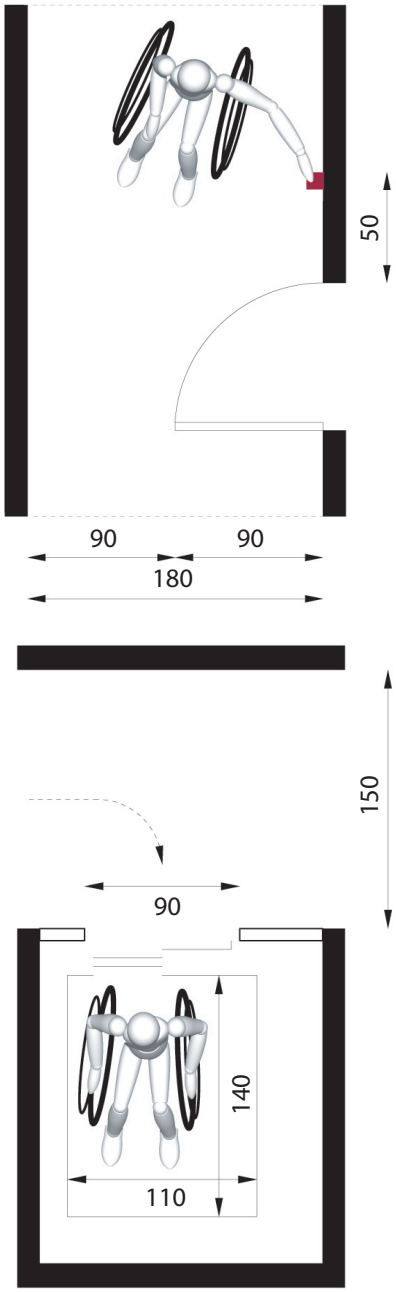
Glass doors or **large glass panel**s must be clearly visible through the addition of safety markings (DIN 32975). These markings should:
- Extend over the entire surface of the glass
- Create a good visual contrast (alternating light/dark contrast) and should be
- Applied at a height of 0.40–0.70 m and 1.20–1.60 m.

Note: a hem of up to approx. 0.35 m reinforces the visual impact.

Lettering
Lettering should be placed at a height of approx. 1.40 m. The type and size of lettering should comply with DIN 1450 and DIN 32975 (Section II, 1.1).
The characters contrast visually to the background.
For fixed information like room numbers, tactile labelling is useful. Some figures, such as numbers made from higher grade of adhesive film, are already sufficiently tactile to be detected when they are mounted at the appropriate size.

Communication fixtures
Addresses and nameplates, mailboxes, bells and intercom systems must all be positioned bearing in mind the speaking height and eye level of a person in a wheelchair. Control elements should be placed at a height of 0.85 and should contrast to the surroundings.

Acoustic signals (confirmation) should also be conveyed visually and vice versa, so that as often as possible two senses are addressed at the same time.



4.7 Windows

Windows are required to be barrier-free only in specific functional areas. Such areas includes barrier-free office spaces or barrier-free rooms in hotels. In these cases, windows must meet the following criteria:

- Movement area in front of the window, minimum 1.50 x 1.50 m. Important factors here include the type of controls and the opening direction of window casements.
- Control elements for opening, closing and adjusting (e.g., blinds) must be within reach of person sitting in a wheelchair – height of 0.85–1.05 m above floor finish
  - Some flexibility up to a maximum height of 1.20 m may be justified (due to construction specifications)
  - Otherwise, install appropriate auxiliaries (e.g., levers, longer handles)
- High-contrast design of control elements
- Sill height: non-obscured view above approx. 0.60 m (e.g., hotel room)

Side-hung windows offer wheelchair users and people of smaller stature optimal usage insofar as the window opener is within range. The operation of tilt-and-turn fittings for side-hung windows is restricted for people seated in a wheelchair.

Centre-hung or pivot windows have the advantage of easy handling because the handle is fitted to the lower cross beam. The disadvantage is the window may swing through.

Vertical-pivot windows can be effectively used by people using a wheelchair. In an open position, however, they may project into the space and restrict movement area.

Sash windows are particularly suitable for independent use by people who are in a wheelchair. Does not affect movement area.
Independent operation of a **skylight window** is possible for a person sitting in a wheelchair if additional means are provided like a rod or a crank for operating the skylight controls. The control portion of the device should be placed between 0.85–1.05 m.

Additional Fittings

- External and internal fixtures screening for sun protection and privacy, easy to use manual or power operation

4.8 Surfaces

4.8.1 Floor covering

Outdoors (Section III, 3.1)
The surface structure of ground coverings must be level and offer smooth passage by foot or wheelchair. It must have good traction under wet conditions. In addition, surfaces should have:

- Bevelled joint edges
- Minimal joints; joints ≥ 8 mm should be flush with the surrounding area
- Minimise longitudinal and transverse slopes

If surfaces integrate elements for orientation, these should be produced with tactile and visual contrasts. For example, mosaic block paving with open joints.
Possible materials:

- Natural stone: has excellent qualities when the surface is cut
- Concrete and clinker brick pavers have good surface structure, are skid-proof

under wet conditions, and are available in many colours and shapes
- Porous surfaces like grass pavers and water-bound surfaces require some additional measures for wheelchair access, for example, the design of even, drivable trails.

A mix of materials offers good options for designing with visual and tactile contrasts.

Indoors
Indoors, the floor surface structure should be level, non-reflective and skid resistant (minimum 9R in compliance with BGR/GUV-R 181).
Floor coverings in wet rooms must be skid-proof, in compliance with GUV-I 8527
High-pile coverings should be avoided (high rolling resistance) .
Thresholds kept to a maximum height of 20 mm.
In interior rooms, different materials or material structures should be used to facilitate orientation. In some cases, they may have specific guidance function. Tactile and visual contrasts can be complemented by the different sound produced by different textures (wood-stone-carpet-metal).

4.8.2 Walls and ceilings

Different surface structures (including differentiated treatment of the same material) can support to orientation in a room. The use of alternating materials like concrete, natural stone, textile surfaces, metal and wallpaper provides extra information especially for people with a visual impairment.
A variety of approaches to light and lighting to natural light such as the use of automatic controls, should be considered during the design stage. Colour contrasts with high light density factor (light-dark contrast) improve or facilitate overall orientation.

Illustration based on the Hanns Eisler Academy of Music, Berlin

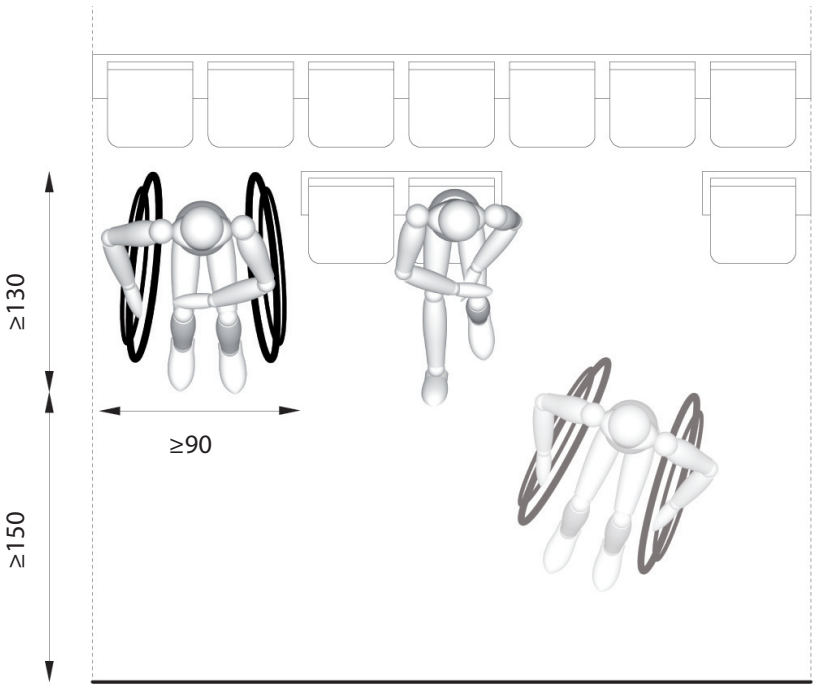
5. Selected facilities for public use

5.1 Places of public assembly (sports venues, theatre, cinemas, concert halls)

'Public assembly places are built area or parts of these areas designed for the concurrent presence of many people at events of various types, in particular educational, economic, social, cultural, political, sports, or entertainment events, as well as places for eating and drinking'. (Model Ordinance on Places of Assembly – MVStättV).
Places of public assembly must comply with the general requirements for accessible public buildings as listed in Section II,1 – 4. In meeting places with fixed seats or tiered seating, a minimum of 1% of visitors' seats must be designated for wheelchair users with at least 1 space located on even ground, consistent with the requirements of DIN 18040 Part 1 and regardless of the total number of visitor places. The required number of seats should be calculated based on the required seating stipulated by Article 26 para. 4 BetrVO (at least 1% of the total seating and a minimum of 2 spaces) (Note: the BetrVO applies for public assembly rooms that accommodate at least 200 visitors). In compliance with DIN 18040 Part 1, seating with greater legroom should be available for people who have reduced mobility or those of larger stature. In the case of new buildings, this standard can be implemented early in the design phase so that the necessary requirements can be qualitatively met. In existing buildings there may be structural or other constraints that require workaround solutions. Limited seating leads to criticism that is quite justified. Thus, adverse situations frequently give rise to public discussion. The following criteria must be considered when providing wheelchair accessible seating:

- Seating should not be located exclusively in the first or last rows
- Designated seats should be available at varying levels of visual and acoustic quality as well as in different price ranges; where there is tiered seating, seats should be available that border on entry and exit aisles
- Companion seating must be provided next to specially marked seats
- Railings in front of designated seating should have a transparent design above a height of 0.60 m to enable a clear view (sight lines from a wheelchair, DIN EN 13200 Part 1)
- Seat numbers should make good visual and tactile contrast
- Provide flexible seating options – folding chairs with easy handling
- Paths to seats should be indicated with visual and tactile contrasts; minimum clear passage 0.90 m
- In venues with raked seating, step markings are very important and must be clearly marked, whether they are designated for wheelchair use or not
- Additional handrails (e.g., for steep or very wide steps) improve safety (Section II, 4.4).)
- Pedestrian barriers like turnstiles must be opened when necessary (e.g., for people using wheelchairs)
- Minimum of 1 barrier-free WC for every 10 designated spaces for wheelchairs (Article 12 MVStättV)

Seating in the first row



Stage access
Access to the stage must be step-free. If necessary, this can be managed with the use of portable ramps or lifting systems.

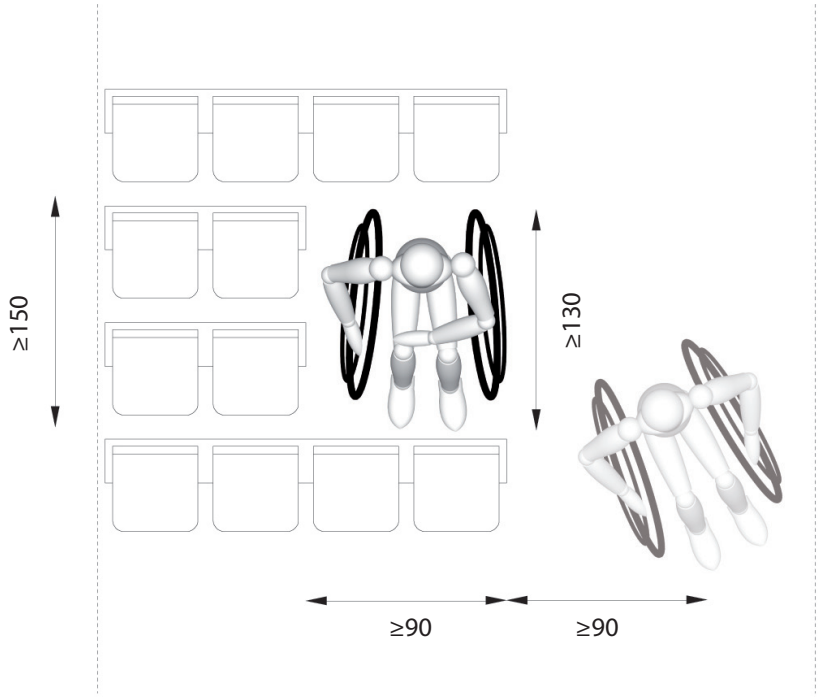
Furnishings:
In this area, the important elements are:
- Wheelchair accessible tables with sufficient knee clearance: height of approx. 0.70 m and width of minimum 0.90 m
- Room acoustics, amplifying equipment and sound absorption measures as well as induction hearing systems (Section II, 1.4)
- Preferably, all public seating (minimum of 20%) would be located within the reception range of an induction transmission. If only a portion of the seats are in the reception range, this area should be close to the lecture podium and positioned to allow eye contact.
- The speaker platform should have
  - Bright lighting and a microphone
  - Well-lit space for sign-language interpreter
  - Audio transcription equipment (Section II, 1.1).

5.2 Exhibition spaces

The term 'exhibition spaces' in this manual refers to museums, memorial sites and monuments, or archives and other collections that are accessible to the public. The Berlin State Association of Museums (LMB) has created a checklist of requirements for accessible exhibition design *'Design for all: A Checklist for Planning and Designing Barrier-Free Exhibitions'* (currently available in German at *http://lmb.museum/barrierefreiheit*). This checklist was made to offer a list of criteria for funding sources, but also to evaluate barrier-free access to exhibitions. The specifications on the checklist establish basic requirements for barrier-free access. When these minimum standards cannot be maintained, proposals for alternatives to compensate should be submitted.
For temporary or rotating exhibitions, one-time solutions may be found to suit specific situation, such as alternative staffing services (to direct visitors to seating, open doors)
In general, there are four main areas to consider:
- Building access
- Functionality in exhibitions and museums
- Tours/educational programs
- Operational policies

The LMB Checklist assumes that people have an adequate understanding and background knowledge of the Design for all approach. An awareness of current literature, continued training and an creative engagement with new developments in the field will be necessary in order to make future art and culture accessible to all people.

Building access
In addition to the requirements for barrier-free exhibitions, the accessibility of the exhibition within the urban fabric and the large building must also be evaluated. This perspective highlights

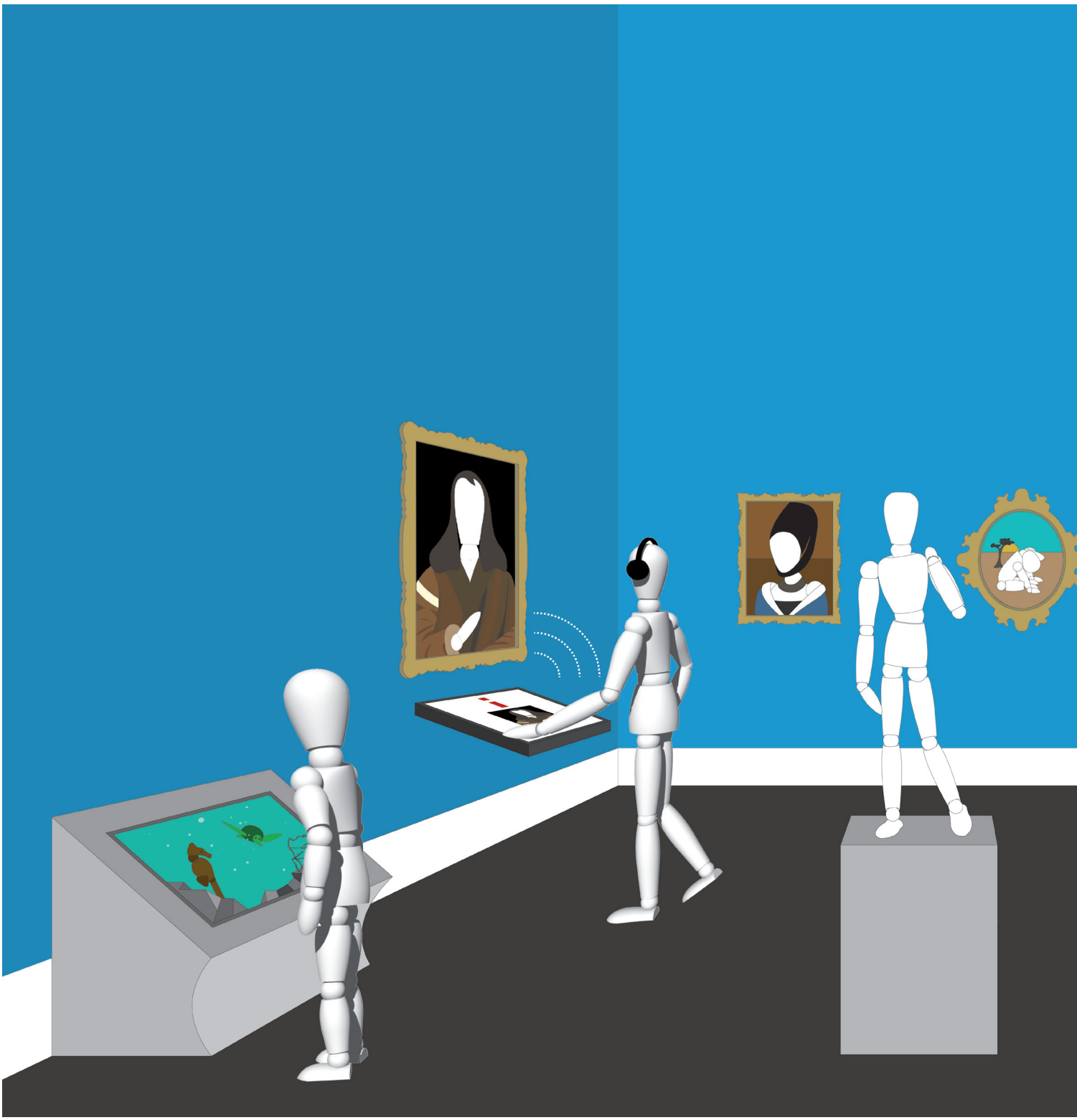


Seating on the aisle

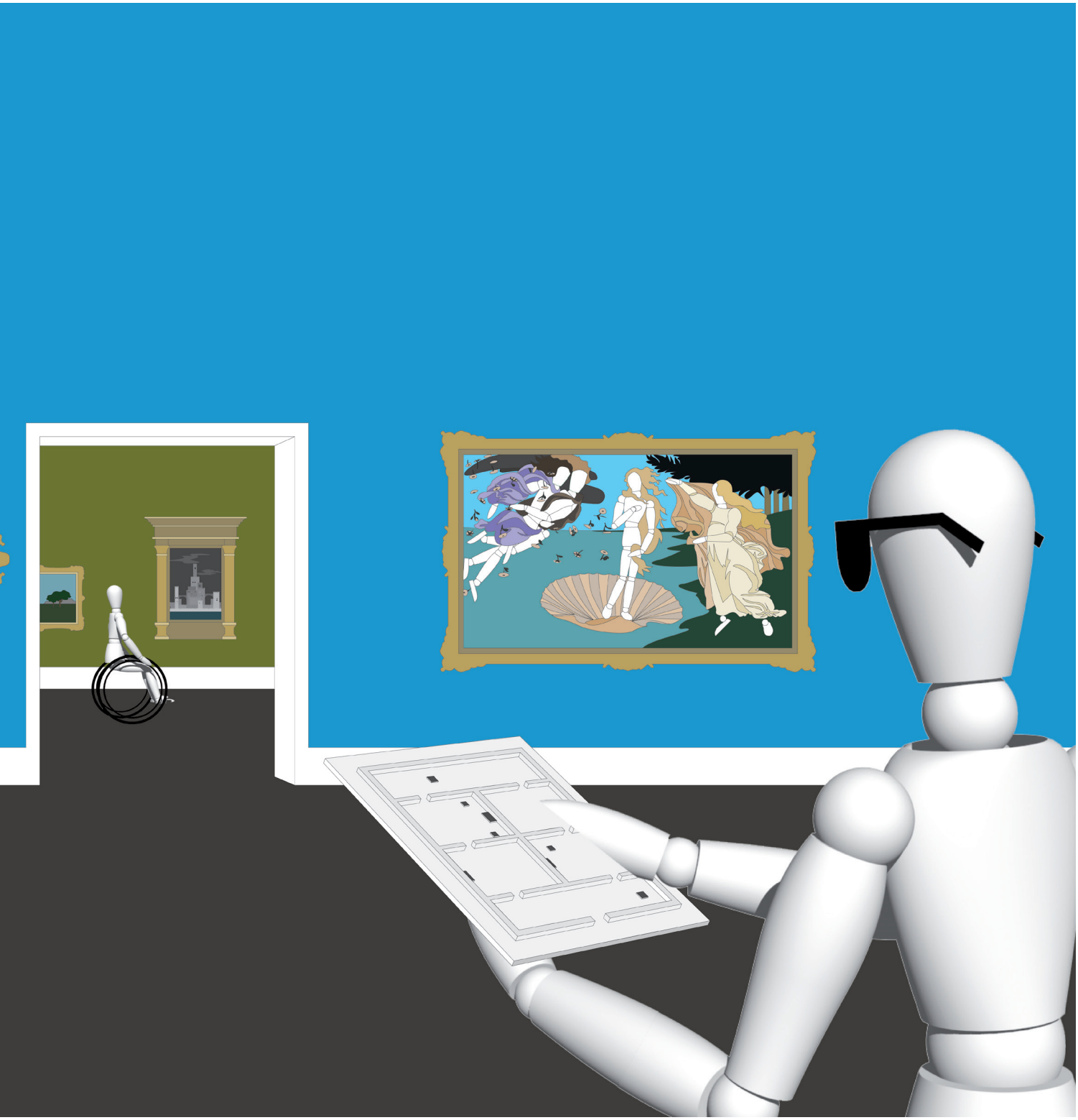
the interrelationship between public space, architecture, and exhibitions. The following points should be considered

For **outdoor areas**:
- Connection to public and individual transport (Parking spaces, Section II, 4.2)
- Wayfinding, design of grounds and public area (Surface design, Section III, 3.1)
- Coherent and unified guidance and information systems (Oriented to the building: signage, routing strips, Section II, 1.1)
- Access to the building: Entrances (Section II, 3.1); Stairways (Section II, 4.4); Ramps (Section II, 4.3); Lifting systems (Section II, 4.5); Doors (Section II, 4.6); Communication technology (Section II, 1.4)

For **buildings**:
- Access: Stairways (Section II, 4.4); Ramps (Section II, 4.3); Lifts/Lifting systems (Section II, 4.5)
- Foyer/Corridors/Reception (Section II, 3.2): Museum shop



(Section II, 3.6); Ticketing area; Cloakroom (Section II, 3.8.3); Communication devices (e.g., Induction loop, Section II, 1.4)
- Unified guidance and information system leading to functional areas (Section II, 1.1): e.g., layout of each floor produced with visual and tactile contrasts; pictograms; updatable information boards
- Circulation: Doors/Door opening systems (Section II, 4.6)
- Film and lecture rooms (Section II, 5.1): designated spaces; acoustic measures (Section II, 1.4)
- Dining areas (Section II, 3.7): seating; self-service areas
- Sanitary facility (Section II, 3.8): Eurokey
- Lighting (Section II, 1.3): light used as a modulating or accentuating element to create experience, lighting of specific objects, indirect light for rooms with minimal or no exposure to natural light; wayfinding through intermittent light fixtures



Functionality in exhibitions and museums
Visitors perceive exhibited work by means of motor and sensory-cognitive abilities. All levels and installations should be fully accessible. Restrictions in one sensory area can often be compensated for effectively through the use of other senses. Therefore, exhibitions should be designed to appeal to multiple senses. The criteria on the LMB Checklist on **Orientation and paths, Exhibition elements and Tours** should be consulted to put this principle into practice.
Operational measures, such as staff who have received training to raise awareness of the needs and required measures for people with disabilities, can provide additional support.
Barrier-free websites
(VVBIT, Section I, 3.3) offer information in advance of the visit.

5.3 Hotels

A minimum of **10%** of guest rooms in a hotel must be fully accessible and barrier-free (Operating Regulations – BetrVO, Part IV Article 16). In **30%** of the required barrier-free rooms, there must be sufficient movement area to guarantee the **unrestricted use of a wheelchair** (in compliance with DIN 18040 Part 2 para. 5, Designation 'R': movement area minimum 1.50 x 1.50 m). A hotel should be designed to meet the needs of all its guests. In doing so, the goal of integration should be given a high priority, for no guest wants to stand out or seem particularly afflicted. The barrier-free rooms at a hotel should have as unexceptional an appearance as possible and should be appropriate for everyone. It should be relatively feasible for new buildings to install

Memorial to the Murdered Jews of Europe, Berlin

the basic structural preconditions for barrier-free accommodation. However, corresponding customers services are also essential and must be appropriately considered by the manager. From a market standpoint of a growing and active clientele who are in the second half of life, it makes good economic sense for a hotel to have a well-thought-out design that includes appropriate accessibility features.

Recommended measures:
All functional areas of a hotel complex designed for guest use must be barrier-free. They should be arranged to serve the needs of users with reduced mobility as well as those with particular sensory or cognitive needs. The basic requirements for functional areas and elements are the same as those in other publicly accessible structures. This applies to:
- Access
- Parking
- Entrance, reception area
- Lobby
- Conference and dining areas, self-service areas
- Public sanitary facilities
- Wellness and fitness areas
- Grounds
- Horizontal/vertical access
- Orientation
- Lighting

Further criteria: Barrier-free and accessible guest rooms
Complex project conditions in terms of the site plan or number of floors – or even in terms of the developers and their vision – can require that modifications be made to the plan. Different requirements may necessitate variations between the rooms. These might include different movement areas or shower spaces, or the different placement of control elements or other furnishings. High-contrast room design is an important factor for guests who have a visual impairment or who are blind. Doors and control elements in particular should be given appropriate emphasis in the design. Sanitary facilities also need special attention. Where it is unavoidable for furnishings to intrude into the movement area, these should be marked with visual and tactile contrasts. Floor plans that allow for interconnecting rooms are useful for families or guests traveling with assistants.
The needs of people with allergies should also be taken into account in room design. This applies largely to the materials used in the facility (carpets, linens).
For guests with a hearing impairment, a fax machine or computer with a web-cam might be made available in lieu of a room telephone, or, for example, a special telephone attachment could be offered. Television sets with Teletext or similar functions make it possible for the management to provide information to guests visually as well as acoustically (events calendar, menus, special offers, emergency instructions, etc.). Television broadcast systems for hearing-impaired guests should be made available (e.g., IR transmission systems, Section II, 1.4).

Access to guest rooms
Control elements for opening the door such as key cards or other entry systems should be placed at a height of 0.85–1.05 m. They should be designed with high visual and tactile contrasts.
If door viewers are to be installed, they should also be provided for people using wheelchairs, people of smaller stature, as well as children (at an approx. height of 1.20 m). For opening side-hung doors, there should be a minimum gap of 0.50 m maintained between the door leaf (handle side) and the wall or any furnishings (Section II, 4.6). Doors to guest rooms must open to the outside for safety reasons .
Audible warnings for emergencies should be visually communicated for guests with a hearing impairment.

Movement area
The design of rooms in compliance with designation "R" is based on a movement area of 1.50 x 1.50 m. This movement space must be provided in the entry area, next to any bed, in front of any windows and wardrobes, as well as in the sanitary facilities. To optimise the floor layout, individual movement areas may overlap. The rooms offered at a hotel may vary such that the arrangement of space in some of the barrier-free rooms might be reduced to a functionally necessary minimum. The basis for this, however, remains the standard footprint of a wheelchair and its necessary action area of 1.20 x 1.20 m.

Furnishings: Clothes cupboards:
- No space-restricting furnishings
- Additional clothes hooks or rails at an operating height and reach of a person in a wheelchair, possibly movable pieces of furniture
- Storage at height of 0.85 m; minimum 0.50 m distance from the corner

Control elements:
- simple and intuitive operation at a height of 0.85 m
- clearly recognisable; attention-drawing, high-contrast tactile and visual features
- remote control (high-contrast, tactile) e.g., for the air conditioning

Wardrobes:
- sufficient toe clearance with a wheelchair, including footrests (height 0.30 m) or accessible from the side
- pull-out functional parts (alternatively: open shelving, mobile bedside tables)
- clearance beneath storage shelves, minimum 0.40 m high

Electrical sockets:
- height of minimum 0.40 m from floor finish to maximum 0.85 m

Hotel beds:
- optimal height 0.50 m, adjustable heights offer greater advantages

Working spaces, kitchenettes:
- Adequate knee clearance in the immediate cleaning and cooking area (height 0.70 m; width 0.90 m; depth 0.55 m)

Windows (Section II, 4.7)

Emergencies:
Emergency call devices are required in the washroom and in near the bed (maximum height 0.20 m above floor finish) and should of course stand out visually. A mobile emergency call device is also a possibility.

Washroom (Section II, 3.8)
The general ambiance of the hotel should be preserved despite specific equipment requirements. Special attention is needed to ensure the high-contrast design for the washroom and its fittings (door, fittings, taps, control elements). While it is conventional for washroom doors to open outward into the entry area (corridor),

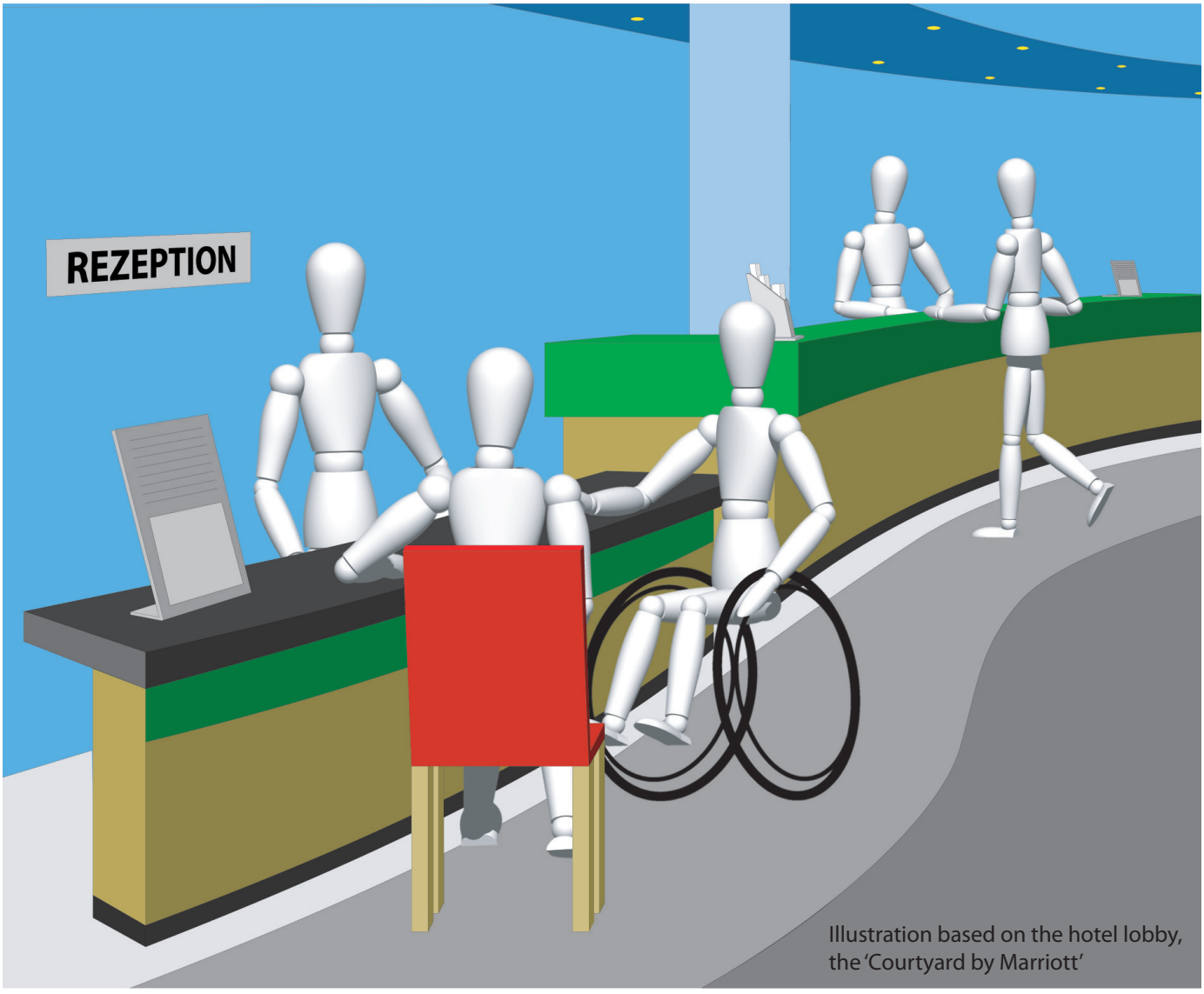


Illustration based on the hotel lobby, the 'Courtyard by Marriott'

for functional reasons the door should rather open into the room area with the room entry door behind it.

Shower/Bathtub (Section II, 3.8.2)

WC pans (Section II, 3.8.1)

Washstands: (Section II, 3.8.1)
The installation of top-mounted washstands does not fulfil barrier-free requirements. Corner washstands may require the taps to be installed to one side. Height-adjustable washstands are practical for families with children or guests of smaller stature.

Taps:
Should be single-level mixer taps. Temperature controls are strongly recommended.

Support arms and grabrails:
When installed with the appropriate mounting brackets, these can be adjusted as needed.

Escape routes (Section II, 3.3)
Emergency information on rescue must be made available in visual, tactile and audio format in guest rooms and at the reception (e.g., smoke alarms with strobe, tactile plan of escape routes, individual instructions). If the barrier-free rooms are exclusively occupied by guests who are using wheelchairs, special rescue measures are required. The distribution of rooms for guests using wheel-chairs in a vertical arrangement (above one another) can help ensure that guests are able to independently escape into protected areas (waiting areas).
Adequate space must also be provided in protected areas or for moving into another fire compartment or other functionally comparable solutions. Markings, signals and lighting should be used to make the escape route clear, easy to understand and to follow.

Services
To make guest room furnishings as individualised as possible, both the structural requirements of a building and customer services are important. Some types of onsite portable equipment provide a number of benefits and should be offered accordingly.
These include:
- Shower stool/shower chair
- Detachable grabrails
- Toilet seat risers
- Transfer aids (e.g., lifting device for bed and bath)
- Telephone with visual display or with a central orientation point on the number '5' button. The telephone receiver should be equipped with a telecoil to allow people wearing hearing aids to use the telephone through the induction coil built into their hearing device.
- Acoustic communication equipment for guests with a hearing impairment (Section II, 1.4)
- Fax machine
- Remote controls with appropriate keypads (strong colour and light/dark contrasts, sufficient size, tactile qualities)
- Storage place for extra wheelchairs with the option to charge wheelchair batteries.

Any admission information or explanations should also be provided in written form (also in Braille) or sound recording.
For example:
- Explanations about functional areas or room layout
- Operating systems (technical equipment, devices, climate control system, safe, telephone, emergency call systems, etc.)
- Escape routes
- Dining options

Note:
In addition technical assistance, there are many different rules of conduct that pertain to how hotel staff can deal easily and unobtrusively with guests who have impaired or different motor, sensory or cognitive abilities. A number of relevant non-profit organizations provide useful tips or training on barrier-free communication and handling for a pleasant hotel stay. The following areas merit special attention:
- Travel planning
- Barrier-free websites and booking options (Section I, 2.1.3 and Section I, 3.3; BITV; VVBIT)
- Barrier-free electronic check-ins
- Information on the local infrastructure
- Information on barrier-free paths in the area (trails, footpaths) that lead to:
  - Public transport, digitised city map with GPS
  - Designated parking spaces
  - Barrier-free cultural attractions
  - Medical facilities

5.4 Education and sport facilities

Barrier-free access and use are essential preconditions for playing and learning together.
As publicly accessible buildings, education and sport facilities are subject to the structural and functional requirements discussed in this manual.
The framework for designing outdoor areas is the manual, *Berlin-Design for all: Public Outdoor Space*.
Deriving from the UN Disability Rights Convention and the Plan of Action and Policy Measures for the state of Berlin (2011) of the Berlin Senate Department for Integration, Labour and Social Affairs, an educational mandate has been created asserting that children with and without disabilities should be educated together.

5.4.1 Childcare facilities

According to the Law for the Support of Childcare Facilities and Family Day Care (KitaFöG) no child may be refused admittance to a childcare facility due to the type or severity of a disability or because of special needs. In the paragraph 3 of Article 1, 'Tasks and Objectives of Support' it is stated that the communal life of children, lived side-by-side with and without disabilities, should be promoted as part of the fundamental right to equal participation.
In establishing a childcare facility, the building, furnishings and green spaces must be constructed in such a way so as to fulfil one of the Tasks and Objectives for supporting children identified in KitaFöG, Article 1 for providing childcare facilities that are accessible and usable without barriers.

The following recommended dimensions for **the movement space of children** using wheelchairs can serve as a guide, particularly for the construction of new buildings:
- Eye level: 0.65–1.15 m
- Highest reach: 0.30–0.85-1.20 m
- Arm length: 0.35–0.65 m
- Working height: 0.70 m
- Seat height: 0.32–0.44 m
- Knee clearance: 0.60 m
- Movement area: 1.35 x 1.35 m

The barrier-free design of childcare facilities requires basic compliance with building codes for all accessible public buildings discussed in this manual. The following areas are particularly important:

Public access:
- Barrier-free access via public and individual transport (Section II, 2.1 and 2.2)

Parking spaces:
(Section II, 4.2, AV Stellplätze)

Entry to the building/Internal circulation:
- Orientation, pathways, surface characteristics, lighting, grounds (Section III, Public Outdoor Space)
- Principal entrance (Section II, 3.1)
- Accessibility concept: Optimisation of interior functional program
- Ramps (Section II, 4.3)
- Stairways (Section II, 4.4): In waiting areas for children, single-step height transitions should be avoided. Where necessary, they must be clearly demarcated from the surrounding areas. Leading edges of steps should be chamfered or rounded.
- Handrails (Section II, 4.4): approx. 0.80 cm high, for infants and toddlers an additional handrail at a height of 0.60 cm
- Lifts (Section II, 4.5)
- Corridors (Section II, 3.2)
- At least one barrier-free WC (Section II, 3.8)
- Doors (Section II, 4.6): finger protection profile
- Windows (Section II, 4.7): installed with appropriate safety features. Window sills, for example, should not protrude in rooms for physical education. Adequate shading of sunlight and solar radiation.
- Maintain clear height of 2.00 m
- Minimum clear height for example, on elevated play area, 1.35 m
- Sufficient movement area/movement spaces (corridor, group rooms)
- Located on one level: group rooms, sanitary facilities

Orientation and information:
(Section II, 1.1)
- Clear, easy to remember building organization (intuitive orientation, visual connections, functional sequences)
- Easy to understand labelling of group rooms and other areas of public use
- High-contrast design (corridors, doors, handrails, furnishings, sanitary areas)
- Strong visual and tactile demarcation between different areas of public use
- Large-scale glass walls should be marked at children's eye level (0.65–1.15 m)

Floor coverings: (Section II, 4.8.1)
- Soft and resilient floor covering, e.g., in rooms for physical movement
- Avoid or clearly mark obstacles in paths and traffic areas, e.g., upstands, uneven areas or door stops

Acoustic measures: (Section II, 1.4)
- Overall reduction in noise level
- Good speech intelligibility
- Integrate hearing systems where appropriate

Light and lighting: (Section II, 1.3)
- Maximal of natural daylight
- Avoid creating reflections and glare

Furnishings:
- Rounded/chamfered corners and edges (radius of 10 mm)
- Design with rich visual and tactile contrasts (light density contrasts, surface materials)

Cloakroom: (Section II, 3.8.3)
- Coat hooks should be installed outside main traffic routes (e.g., not on the walls of corridors)

Sanitary facilities (washrooms and WC cubicles):
- Observe physically appropriate installation heights for sanitary fixtures, e.g., sinks, WC pans, mirrors, shelving (follow guideline VDI 6000 Blatt 6)
- Sinks: installation height of 0.55–0.65 cm
- WC pans: installation height 0.35 cm (without toilet seat)

For children using wheelchairs:
- Minimum of 1 sink mounted at a height of 0.70 m or adjustable height sink
- WC pans: have a toilet seat riser available

Outdoor play areas:
- Playgrounds: Section III, 5.4
- Suitable ground covering for hard surfaces around the building: asphalt, paving without sharp-edged aggregate, natural stone slabs, granular surface course (Section III, 3.1 Surface Design)

5.4.2 Schools

A 1990 amendment to the Education Act of the State of Berlin established the legal framework for introducing the integration of children with disabilities into Berlin primary schools as a regular practice. In 1996 and 2002 (with the amendment of the State Equal Rights Act) there was an expansion of the inclusive instruction policy to include upper and lower secondary schools. With the enactment of the new Education Act of the State of Berlin (January 2004, as last amended December 2010) inclusive education was enshrined in law. An outline of the necessary prerequisites for making inclusive education in Berlin a reality, and a plan for how these could be attained in the future was put forward in a **comprehensive plan for 'inclusive schools'** in January 2011. This far-reaching concept is based on the implementation of the UN Convention on the Rights of Persons with Disabilities (Article 24).

In the construction of schools, the building, furnishings and green spaces must be constructed in such a way so as to fulfil one of the Tasks and Objectives for the corresponding support of students as outlined in Article 4 para. 3 of the Education Act – that schools should be freely accessible and usable without barriers. Barrier-free access and functionality of the location must also extend to teachers, visitors and other users with a disability. The following areas require special attention:

Public access (to buildings/outdoor areas):
(Section III, Public outdoor space)
- Barrier-free access via public and individual transport (Section II, 2.1 und 2.2)
- Barrier-free access to green spaces, school buildings and sports facilities
- For complicated campus layouts: clear and unambiguous path networks to individual buildings
- Onsite parking spaces (AV Stellplätze, Section II, 4.2), where applicable, driveway for minibuses.
- Schoolyard, school gardens (e.g., raised beds), playgrounds (Section III, 5.4)

Access to building / Internal circulation:
- Orientation, pathways, surface characteristics, lighting, grounds (Section III, Public Outdoor Space)
- Main entrance (Section II, 3.1)
- Ramps (Section II, 4.3)
- Stairways (Section II, 4.4)
- Lifts (Section II, 4.5)
- Corridors (Section II, 3.2)
- Doors (Section II, 4.6)
- Windows (Section II, 4.7)
- Movement area (1.50 x 1.50 m) e.g., in front of lifts, corridors, classrooms

Orientation and information:
(Section II, 1.1)
- Clear, easy to remember building structure

- Colour scheme to facilitate orientation (e.g., design of corridors and classrooms with high light density contrasts)
- Rich visual and tactile contrasts demarcation of functional areas (e.g., in floor coverings)

Floor coverings (Section II, 4.8.1)

Acoustic measures: (Section II, 1.4)
- Good speech intelligibility
- Acoustic hearing systems in classrooms and meeting rooms

Light and lighting: (Section II, 1.3)
- Maximal use of natural daylight
- Avoid glare (sunshades and glare protection)
- High light-density contrasts

Furnishings:
- Classrooms: flexible chairs, wheelchair accessible desks, ensure clear passage between desk rows, step-free access to the front boards, boards should be at an appropriate usage height
- Rounded/chamfered corners and edges
- Design with strong visual and tactile contrasts (high light density)

Cloakroom: (Section II, 3.8.3)
- Hanging rails and hooks at a height of 1.00–1.30 m

Sanitary facilities: (Section II, 3.8)
- Minimum of 1 barrier-free toilet cubicle on each floor (preferably gender specific)
- Attention to ergonomic installation of sanitary fixtures where appropriate (sinks, WC pans, mirror, shelves) (follow guideline VDI 6000 Blatt 6)
- Installation height of sinks 0.65–0.75 cm (in primary school), users in a wheelchair require a height of minimum 0.70 m
- Installation height of WC pans 0.35 cm (without toilet seat) (for primary school), if necessary, have toilet seat riser available

Barrier-free internet services/computer use (Section I, 2.1.3; Section I, 3.3)

Schoolyard:
- Playground (Section III, 5.4)
- Suitable ground covering for paved surfaces: asphalt, paving without sharp-edged aggregate, natural stone slabs, granular surface course (Section III, 3.1)

5.4.3 Sport centres

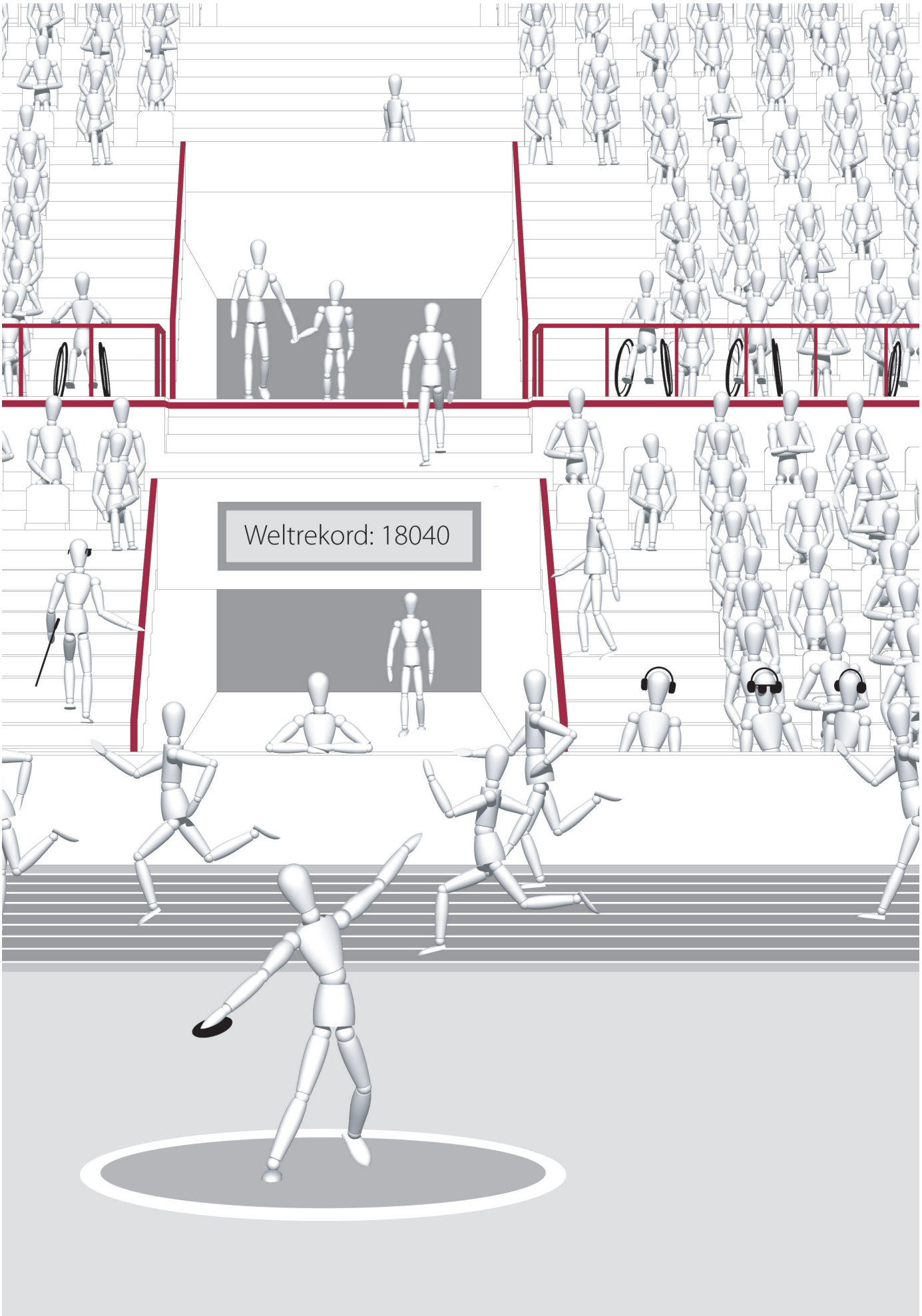
'New sports facilities **must** be suitable for disability sports'. (Act on the Promotion of Sports, SportFG Article 10, para. 2) According to Article 10 of the Act on the Promotion of Sports (SportFG) a sufficient number of publicly accessible sports facilities must be usable by people with disabilities. Areas for active as well as passive participation in sports must be barrier-free. The design and construction of sports fields and sports centres are subject to building standards DIN 18035 and DIN 18032; for ice rinks and ice-sport facilities DIN 18036 applies. Model layouts for gymnasia and buildings on athletic fields and also for their related furnishings and equipment are provided by the Berlin Senate Department for the Interior and Sport (SenInnSport). Special requirements apply to centres for high performance disability sports, for example, there are special dimensions for movement and waiting areas, minimum clear passage widths (1.17–1.25 m) and for lift cars (minimum area 2.00 x 1.40 m, door width of 1.25 m for the use of special sports wheelchairs).

The requirements outlined in this manual govern general-use publicly accessible sport centres.
The following areas require special attention:

Public access:
- Barrier-free access via public and individual transport (Section II, 2.1 und 2.2)

Parking spaces:
(Section II, 4.2, AV Stellplätze)
- Minimum of 2 designated parking spaces for athletes as well as for visitors
- Parking spaces should be clearly designated through signage or markings (on the street), optional: temporary designation as needed during special events

Access to the building:
- Orientation, pathways, surface finish, lighting, grounds (Section III, Public Outdoor Space)
- Main entrance (Section II, 3.1): where there are separate entrances for athletes and visitors/spectators, ensure that both have barrier-free access
- Ramps (Section II, 4.3)
- Stairways (Section II, 4.4)
- Lifts (Section II, 4.5): if applicable, con sider dimensions of sports wheelchairs


Weltrekord: 18040

Interior building accessibility:
- Accessibility concept: optimisation of internal functional program
- Ramps (Section II, 4.3): To bridge minor height differenced, ramps are preferred to the provision of a lift or other lifting device.
- Corridors (Section II, 3.2)
- Doors (Section II, 4.6)
- **All functional areas on one level** (gymnasiums, sanitary facilities for athletes as well as spectators, showers and changing areas)
- In the case of multiple or 'stacked' gymnasium structures, barrier-free access can be omitted in the upper rooms.

Orientation and information:
(Section II, 1.1)
- **In the spectator areas:** Information via hearing systems (Section II, 1.4); audio description equipment (useful in gymnasiums seating more than 500 spectators, Section II, 1.1.1); scoreboards: easily visible, high-contrast design
- Barrier-free website and internet services (Section I, 2.1.3 and Section I, 3.3; BITV; VVBIT)

Design:
Specific information can be found in the discussion in Section II, 1.1.
- Uniform and coherent colour system: e.g., high-contrast design of corridors, doors, handrails, furnishings and sanitary areas as well as good visual and tactile demarcation of functional areas to support orientation

Floor coverings:(Section II, 4.8.1)
- Sports Halls: non-skid, minimal rolling resistance, area elastic sport floors are optimal for wheelchair sports; point elastic sport floors are not suitable (see also Section III, 3.1 Table 1)

Spectator stands:
(Section II, 5.1)
- Minimum of 2 places for wheelchairs at floor level or in upper stands or gallery level (calculating a footprint of minimum 1.30 x 0.90 m plus the required movement area)
- for retractable (telescopic) seating systems, the designated seating places should be located in the area of the uppermost access route (e.g., in a sunken sports arena, with upper access at ground level)
- flexible seating options: rows of folding chairs can be used for companion seating as well as a space for wheelchairs

Acoustic measures:
(Section II, 1.4)
- Sound-reducing materials (reverberating times: DIN 18032 Part 1)
- In multiple sports halls, use of directed sound-absorbing measures (e.g., double-skinned divider curtain)
- Acoustic hearing systems: speaker and amplification system (PA system) is a component of the model equipment plans developed by the Berlin Senate Department for the Interior and Sport; this must be couples, for example, with an induction loop transmitter for speakers (for outdoor spaces, see Section III, 3.5.5)

Light and lighting:
(Section II, 1.3)
- Planning framework: DIN EN 12193
- Good uniform illumination
- Avoid creating reflections and glare

Lighting in sports venues not only promotes safety, but should also focus on creating good visibility for the athletes and spectators. In settings with special light installations and fixtures with directed light control, it is important to provide optimal glare control.

Sanitary facilities are subject to special regulations:

Spectator WC:
(Section II, 3.8.1, as in Planning Scenario 1)
- Minimum 1 barrier-free WC near the entrance and in the gymnasium area.
- Option: use Planning Scenario 2, e.g., in sport centres without spectator facilities.

Athlete WC:
(Section II, 3.8.1, as in Planning Scenario 3)
- Located near the wet rooms directly next to changing area

Shower area:
(Section II, 3.8.2, see Planning Scenario 3)
- Furnishings as in in Planning Scenario 1
- Wash troughs: height 0.80 m above floor finish, where applicable, knee clearance of 0.67–0.70 m

Changing area:
(Section II, 3.8.3)
- Barrier-free position to gymnasium

5.4.4 Public baths

In addition to the measures discussed in Section II, 3. and 4. the following are points of particular importance in the design of barrier-free bathhouses.

Public access:
- Barrier-free access via public and individual transport (Section II, 2.1 und 2.2)

Parking spaces:
(Section II, 4.2, AV Stellplätze)

Access to building / Interior circulation:
- Orientation, pathways, surface characteristics, lighting, grounds (Section III, Public Outdoor Space)
- Main entrance (Section II, 3.1): communication equipment installed at a height of 0.85 m
- Ramps (Section II, 4.3)
- Stairways (Section II, 4.4)
- Lifts (Section II, 4.5)
- Corridors (Section II, 3.2)
- Doors (Section II, 4.6)

Orientation and information:
(Section II, 1.1)
- Path guidance system designed with visual and tactile contrasts running from the entrance to the different functional areas as well as between them (entrance, cashier area, dressing room, sanitary facilities, swimming hall, fitness and sauna, dining area or other functions)

Cashier area:
- Visual/tactile guidance system in the floor (Section 1.1.1)
- Provide alternatives to forced one-way passages that have minimum clearance of 0.90 m (in exceptional cases 0.80 m)
- Counter service provided at height of 0.80 m
- Acoustic communication equipment (Section II, 1.4), e.g., portable induction loop pad
- where necessary, a wheelchair ready for on-site use in bathing areas and wet rooms

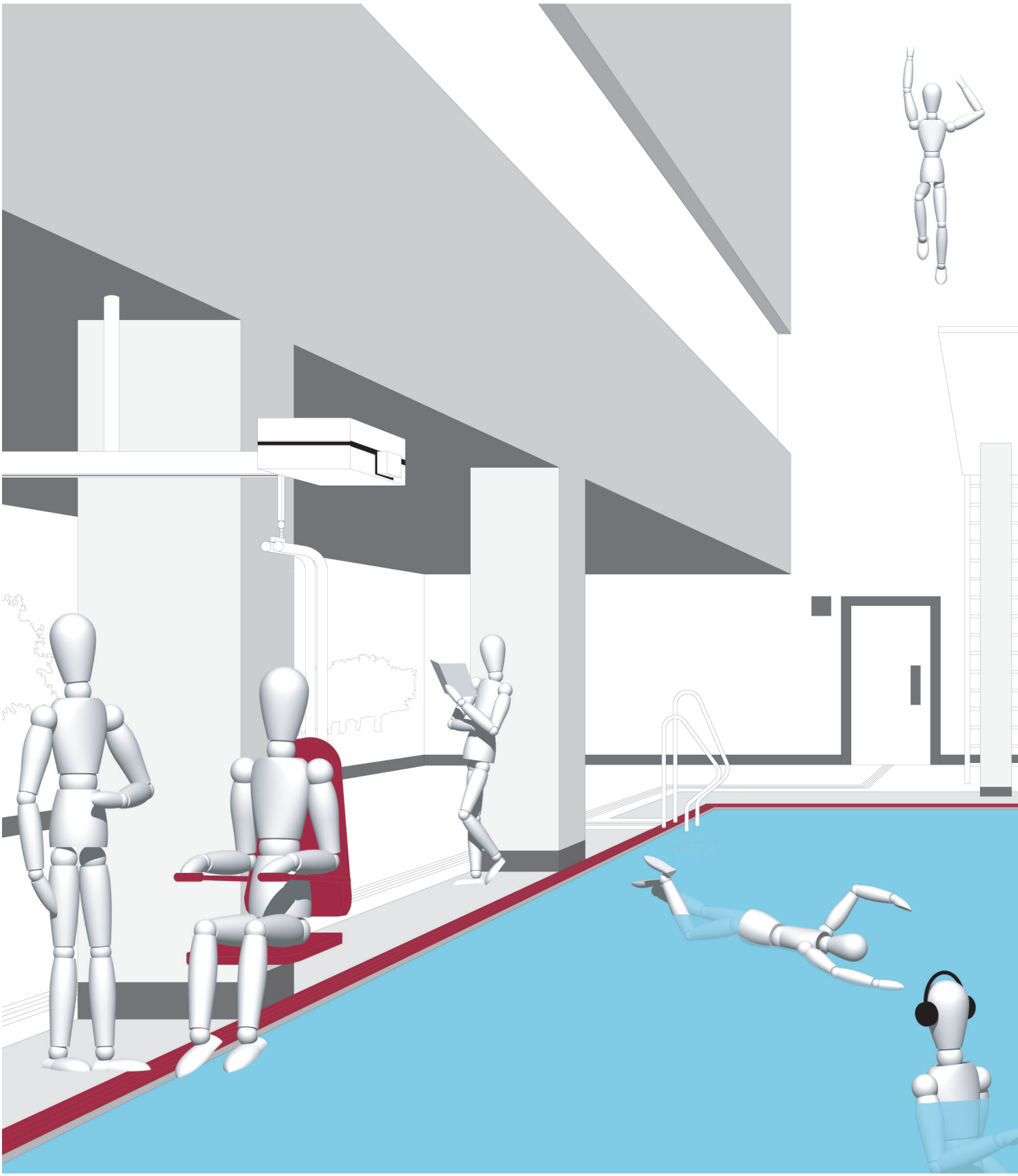
Floor coverings: (Section II, 4.8.1)

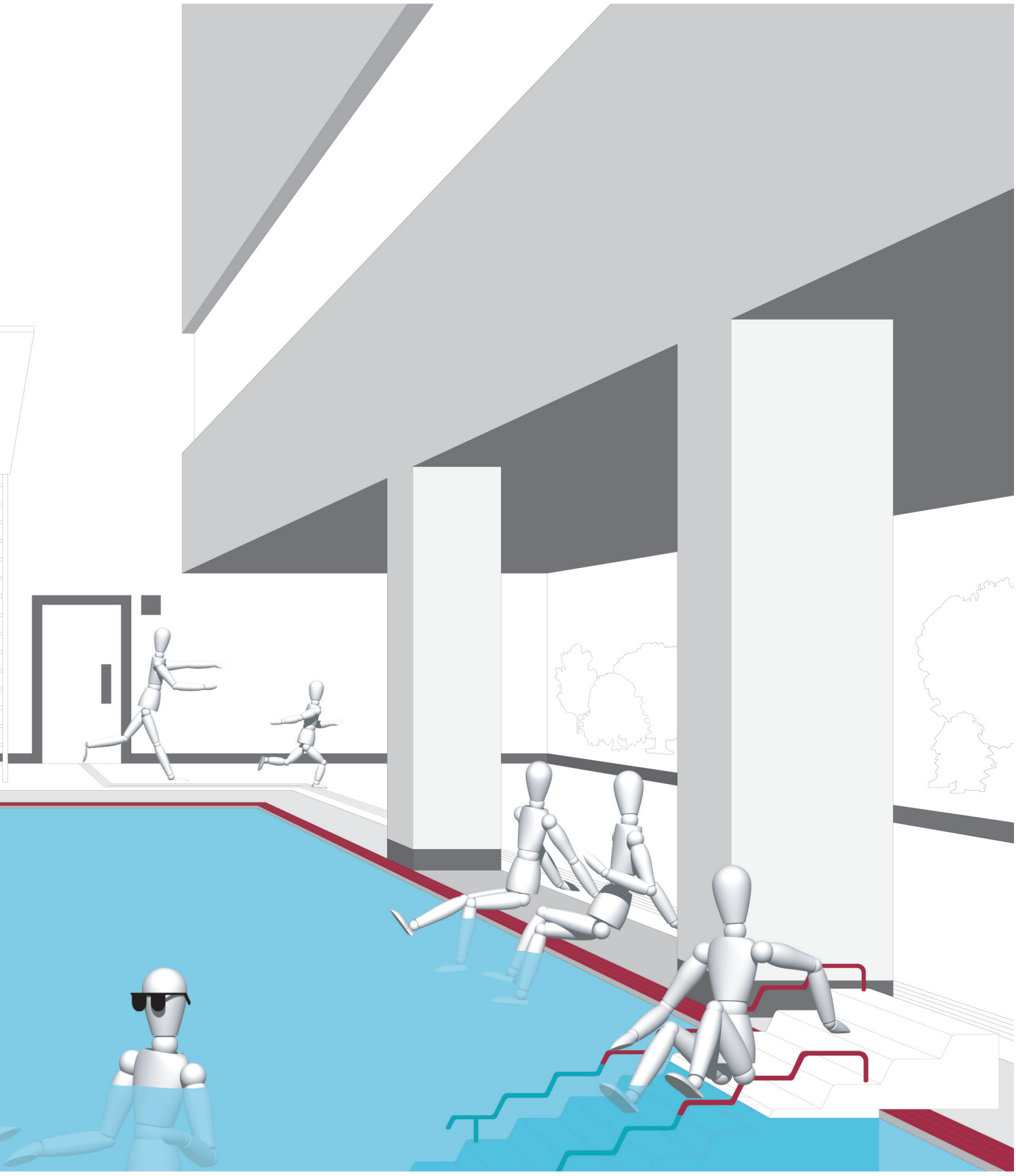
Light and lighting:
(Section II, 1.3, as in Gymnasiums)

Changing area: (Section II, 3.8.3)

Sanitary facilities: (Section II, 3.8)
- Depending on the layout, a minimum of one barrier-free toilet facility assigned to the changing areas
- Step-free showers, movement area minimum 1.50 x 1.50 m
- Shower seat, shower wheelchair

Swimming hall:
It should be ensured that:
- The walkway around the pool has sufficient width: approx. 3.25 m between pool edge and the surrounding sunbathing and relaxation areas.
- A path guidance system with strong visual and tactile contrasts directs the user to functional areas (e.g., to pool access)
- Visual and tactile contrasts mark the boundary of the swimming pool (e.g., easy to detect tactile edge, wide strips in the floor like a metal overflow channel around the circumference, coloured and/or tactile tiles)
- Appropriate assistance is available for pool entry and exit, including:
  - Pool access over elevated pool edge with grab bars as needed – for exiting the pool, upright support rails in the pool or suspended rope ladder are helpful
  - Lowered section of the walkway around pool (maximum ramp slope 6%) to ease transfer to the pool edge
  - seating steps/shallow stairs that facilitate transfer from wheelchair and sliding in and out from a seated position, handrail
  - portable entry stairs (complex handling, storage area)
  - even, sloped surface
  - pool lift equipped with a sling or seat, electric or hydraulic power operated - enable independent operation (variants are not preferred, since they tend to be conspicuous)
  - diving platform (assistance required)
  - acoustic signals
- where applicable, clearly marked area for wheelchair storage at the edge of the pool (out of consideration for people who are blind or have a visual impairment): e.g., visual and tactile contrasts in the floor covering or routing trips that do not lead into this area





Sources

DIN Standards

DIN 18040
Barrier-free construction – Design principles
Part 1: Accessible public buildings; October 2010
(replaces DIN 18024 Part 2, 1996)
Part 2: Residential buildings; September 2011
(replaces DIN 18025 Parts 1 and 2, 1992)

DIN 18065
Stairs in buildings – Terminology, measuring rules, main dimensions; June 2011

DIN 32975
Designing visual information in public space for barrier-free use; November 2009

DIN 32976
Braille – Requirements and dimensions; August 2007

DIN 32984
Ground surface indicators in public areas; October 2011

DIN EN 81-70
Safety rules for the construction and installation of lifts - Particular applications for lifts for passenger and goods passenger lifts - Part 70: Accessibility to lifts for persons including persons with disability; September 2005

DIN 1450
Lettering – Legibility; July1993

ISO 7001
Graphical symbols: Public Information symbols; November 2007 (English version)

DIN Fachbericht 142
Orientation systems – Requirements for orientation systems in public buildings; May 2005

DIN Fachbericht 124
The design of barrier-free products; 2002

DIN EN 13200
Spectator facilities
Part 1: Criteria for the layout of spectator viewing areas – Specifications; May 2004 (German version)
(Draft standard for Part 1: General characteristics of spectator areas; April 2011 (German version))

DIN 18041
Acoustic quality in small to medium-sized rooms; Issued May 2004

DIN 32974
Acoustic signals in public traffic areas – Requirements; February 2000

DIN EN 12665
Light and lighting – Basic terms and criteria for specifying lighting requirements; September 2011 (German version)

DIN EN 12464
Light and lighting – Lighting of work places
Part 1: Indoor work places; August 2011 (German version)
Part 2: Outdoor work places; October 2007 (German version)

DIN 5035
Artificial lighting
Part 3: Lighting of health care premises; July 2006
Part 6: Measurement and evaluation; November 2006

DIN EN 12193
Light and lighting – Sports lighting; April 2008 (German version)

VDI 6000 Blatt 6
Provision and installation of sanitary facilities
Blatt 6: Kindergarten, day-care centres, schools; November 2006

DIN EN 1154
Building hardware – Controlled door closing devices – Requirements and test methods (includes amendment A1:2002); April 2003 (German version)
(Corrigenda 1: June 2006)

DIN EN 1155
Building hardware – Electrically powered hold-open devices for sing doors – Requirements and test methods; April 2003 (German version)
(Corrigenda 1: June 2006)

DIN EN 12217
Doors – Operating forces – Requirements and classification; May 2004 (German version)
(Draft standard: November 2010)

DIN EN 13115
Windows – Classification of mechanical properties – Racking, torsion, and operating forces; November 2001 (German version)

DIN 33402
Ergonomics – Body dimensions of people
Part 1: Terms and definitions, measuring procedures; March 2008
Part 2: Values; December 2005 (Corrigendum 1: May 2007)
Part 3: Movement room at different normal positions and movements; October 1984

DIN EN: German version of European standards

ISO: International standards

VDI: Association of German Engineers

Implementing regulations

Implementing Regulations – List of Technical Building Regulations (AV LTB); May 2012

Implementing Regulation on Parking Spaces (AV Stellplätze)
Implementing Regulation on Article 50 of the Building Regulations for Berlin (Bau-OBln) on providing parking spaces for motor vehicles for people who are severely mobility impaired or in wheelchairs as well as for bicycles; December 2007

Additional regulations

Circular SenStadt VI A Nr. 03/2010
General directive for planning and realisation of construction work in Berlin – Construction directive (Abau); Barrier-free construction

Circular SenStadt VI A Nr. 03/2011
General directive for planning and realisation of construction work in Berlin – Construction directive (Abau); Barrier-free construction – Public outdoor space (Supplement to Circular SenStadt VI A Nr. 03/2010)

Circular WiTechFrau II F Nr. 2/2008
Public procurement – Barrier-free cash dispensers (ATMs) and other service machines

Design for all – A Checklist for Planning and Designing Barrier-Free Exhibitions
Editor.: Berlin State Association of Museums (LMB); November 2011

BGR/GUV-R 181
Floors in work rooms and working areas with a high risk of slipping; October 1993 – updated version October 2003
Editor: Federal Ministry of Health

GUV-I 8527
Floor coverings for wet barefoot areas; July 1999 – updated version October 2010
Editor: German Statutory Accident Insurance (DGUV)

GUV-SR S2
Child day care facilities; April 2009
Editor: German Statutory Accident Insurance (DGUV)

GUV-SI 8011
Correct seating posture in schools – Minimum requirements for desks and chairs in general education schools; April 1999 updated version October 2008
Editor: German Statutory Accident Insurance (DGUV)

Model layouts for structures on sport fields/gymnasiums/auxiliary rooms
Berlin Senate Department for the Interior and Sport

VVBIT
Administrative regulations for the creation of barrier-free information technology; August 2005

BbgBITV
Brandenburg barrier-free information technology regulation
(Ordinance for the creation of barrier-free information technology according to the Brandenburg Equal Opportunity for People with Disabilities Act); May 2004

BITV 2.0
Federal Ordinance on Barrier-Free Information Technology
(Ordinance for the creation of barrier-free information technology according to the Equal Opportunity for People with Disabilities Act); September 2011

Guidelines for tactile writing – Mounting of braille and raised profile letters and pictograms
German Association for the Blind and Visually Impaired (DBSV); May 2007

Publications

Berlin-Design for all: Public Outdoor Space
Senate Department for Urban Development Berlin; November 2011

Improving Visual Information in Public Space – A Manual for Planners and Practitioners
German Ministry of Health; Bonn, 1996

Guidelines for Making Berlin a More Disabled-Friendly City
1992 with continuation in 1996

Integrative Guidance and Information Systems (I.L.I.S.)
I.L.I.S./ Association for Promoting the Education of the Blind (VzFB); Hannover, 3rd Edition, 2007

Additional literature

Toward an Inclusive Society
The National Action Plan (NAP) of the Federal Government for the Implementation of the UN Convention on the Rights of Persons with Disabilities
Federal Ministry of Labour and Social Affairs; Berlin, Cabinet Decision: 15 June 2011

Comprehensive Plan for Inclusive Schools – Implementation of the UN Convention on the Rights of Persons with Disabilities
Berlin Senate Department for Education, Science and Research, January 2011

Barrier-Free: Building for the Future, 2nd Edition
Ulrike Rau (Ed.), Berlin, 2010

Universal Design
Oliver Herwig, Birkhäuser Verlag; 2008

ECA – European Concept for Accessibility – Manual (German version)
European Institute Design for all in Germany (Europäisches Institut Design für Alle in Deutschland - EDAD e.V., Fürst Donnersmarck-Stiftung zu Berlin; May 2005

Barrier-Free Planning and Design – Guidelines for Exhibitions in the German Museum of Technology Berlin
German Museum of Technology Foundation Berlin (DTMB); Berlin, 2008

The New Dictionary of Plain Language (excerpt)
Editor: Mensch zuerst – Person First Network of Germany

Simply Leipzig – A Cultural Guide to Plain Language
Editor: Life Counselling Leipzig for People with Intellectual Impairments

Collections:
German Association for the Blind and Visually Impaired (DBSV)

German Social Welfare Association

Online resources

http://www.stadtentwicklung.berlin.de/bauen/barrierefreies_bauen/

http://www.baufachinformation.de/

http://nullbarriere.de

http://pro-retina.de/beratung/mobilitaet/literatur

http://acs-akustik.at

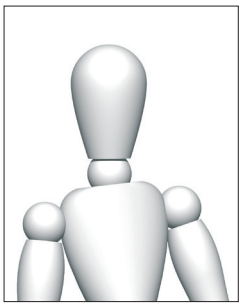
http://bik-online.info/

http://www.people1.de/

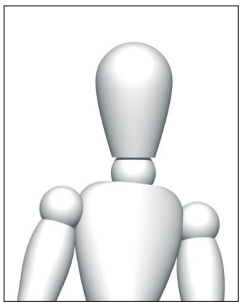
http://leichtesprache.org

Acknowledgment

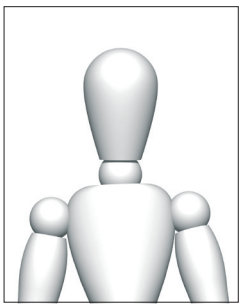
Thank you to the members of the working group 'Barrier-Free Construction and Transportation'
Berlin Senate Department for Urban Development and the Environment



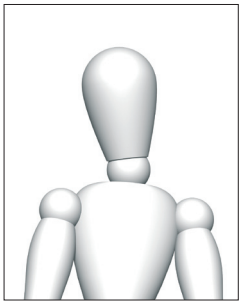
Ingeborg Stude



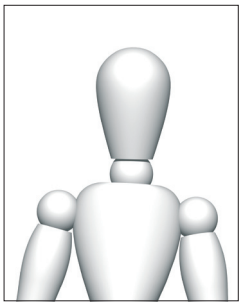
Ellen Müller



Burkhard Lüdtke



Robert Niemann



Annette Müller

Imprint

Editor second edition
Berlin Senate Department for Urban Development and the Environment
Communication
Am Köllnischen Park 3, 10179 Berlin
http://stadtentwicklung.berlin.de

Concept and specialist revision
Berlin Senate Department for Urban Development and the Environment
Directorate VI – Ministerial Issues in Construction
Coordinating Office for Barrier-Free Construction
Württembergische Str. 6
10707 Berlin

Ingeborg Stude: ingeborg.stude@senstadtum.berlin.de

Sabine Menger: sabine.menger@senstadtum.berlin.de

Coordinated with the working group 'Barrier-free Construction and Transportation'

Text and image editing
Ellen Susan Müller: e.mueller@ardeku.com

Plain Language (Section II, 2.1.3)
Lebenshilfe Main-Taunus, Annette Flegel
Plain language section edited by Ruth Eckhardt und Maren Klie

Design and Layout
1ART: info@1art-design.de
and Technische Universität Berlin: info@modellunddesign.de
Burkhard Lüdtke
Robert Niemann
Annette Müller

Photo
Gunter Lepkowski

Production and Distribution
Kulturbuch-Verlag GmbH, Berlin
Sprosserweg 3, 12351 Berlin

Internet version
http://stadtentwicklung.berlin.de/bauen/barrierefreies_bauen/de/handbuch.shtml

Print
mb druckservice, Berlin

ISBN 978-3-88961-104-8

Nominal fee 5.00 €

Berlin, March 2013