Bicycle parking design guide

Attractive and user-focused from the design to implementation

Fig. 01: Exemplary cyclists / © ARGUS

ARGUS studio/

EHA ector hoogstad architects

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Additionally to this English version, we provide a German version.

Both digital versions can be accessed with the following QR codes:

English

German

Disclaimer

This document provides design recommendations and guidance for the planning and construction of bicycle parking facilities.

It is based on a variety of rules and regulations, but is not itself legally binding.

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Foreword

ARGUS studio/

ARGUS studio/ is an independent department of ARGUS Stadt und Verkehr, a well-established transport planning company that has been successfully carrying out transport and urban planning projects since 1983.

We are part of the mobility revolution - our goal is to find appropriate and innovative solutions for sustainable mobility. We combine many years of know-how in traffic planning and consulting with the experience of managing municipal traffic departments. We have practical knowledge from founding and running start-ups in the field of mobility services to research and teaching at universities.

We are united by our fascination for the mobility revolution and the design of livable urban spaces. To this end, we accompany transport transformation projects from conception to implementation and take on complex, cooperative planning processes with clients, other planners and citizens.

Fig. 02: Streetscape design on the east bank of the Alster / © ARGUS

Fig. 03: Redesign of the Osterstraße / © ARGUS

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Foreword

Ector Hoogstad Architects

Everything we do at Ector Hoogstad Architects is driven by our desire for progress. The firm's roots go all the way back to the post-war reconstruction of Rotterdam, and the spirit of that period shaped our no-nonsense approach to work and our preference for rational, practical solutions. Just as it did our love for the poetry of clarity, space, transparency and beautiful materials. It also led us to be optimists with a firm belief in progress, and this we shall forever remain.

It is through the above lens that we observe the challenges facing the world today. How do we limit climate change and learn to live with its already unavoidable consequences? What does the circular economy mean for our future daily lives? The development and sharing of knowledge is essential to our collective efforts to answer these pressing questions, for knowledge is the key to progress.

Fig. 06: Forecourt of the bicycle parking garage Stationsplein Utrecht / © EHA

Fig. 07: Hyperion Lyceum Amsterdam / © EHA

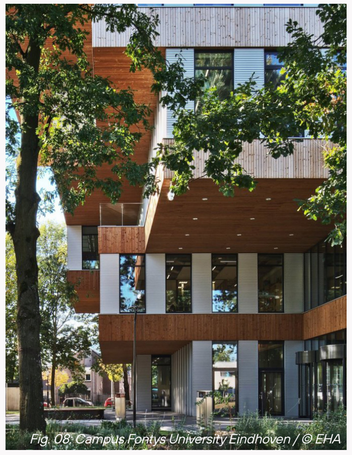


Fig. 08: Campus Fontys University Eindhoven / © EHA

Fig. 09: Bicycle parking garage Stationsplein Utrecht / © EHA

Foreword

Cooperation

Interdisciplinary work and networked thinking are essential for developing and implementing innovative solutions to the challenges of tomorrow's cities. The provision of an attractive infrastructure for the means of transport of the environmental alliance (buses, trains and active mobility) is a decisive component for the design of sustainable mobility. In this context, it is important to go beyond the technical functionality of bicycle parking facilities and design them in such a way that all cyclists are happy to use them at any time of the day or night. Through numerous projects, from small neighborhoods to urban master plans, ARGUS studio/ has gathered extensive knowledge about the concepts and everyday needs of cyclists, which is combined in this guide with specific experience in the architectural implementation of high quality bicycle parking facilities.

Based on existing regulations, this guide also provides concrete information, dimensioning approaches and implementation examples to support all parties involved on the way from conception to realization, always keeping the future users in mind.

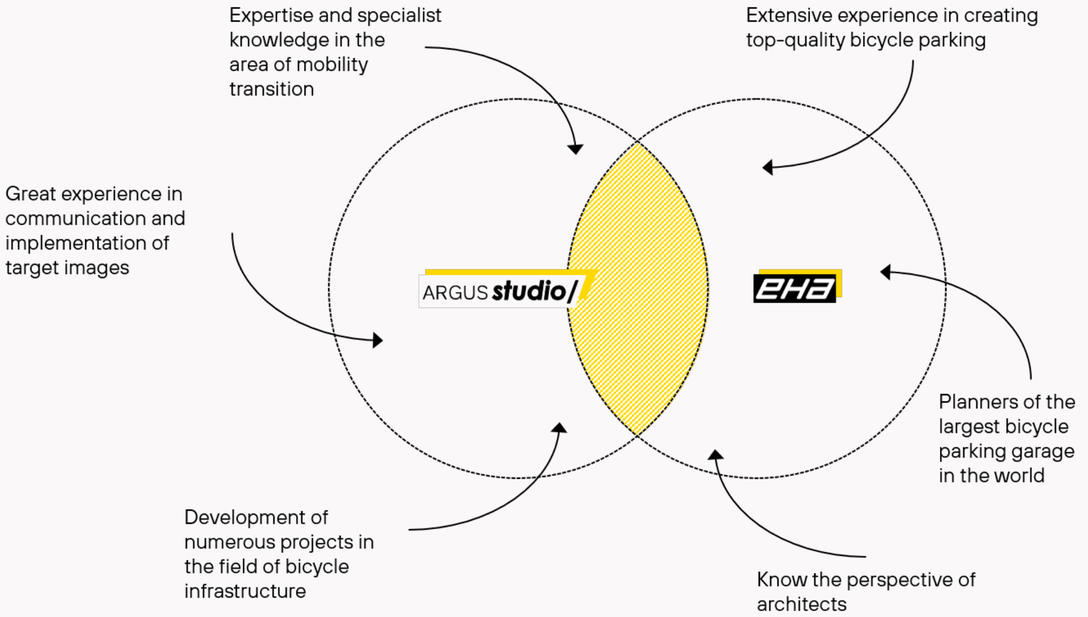


Fig. 10: Competencies and Interfaces / © ARGUS

Foreword

Rules & regulations

The underlying regulations regarding accessibility and dimensions of the parking systems apply in the context of the Free and Hanseatic City of Hamburg and may differ from regulations in other federal states or countries. The document does not claim to be complete. Specific requirements (e.g. fire protection) are not included in the Design Guide and must be met at the user's own responsibility.

In addition to the regulations and guidelines, common parking systems from various suppliers were also examined.

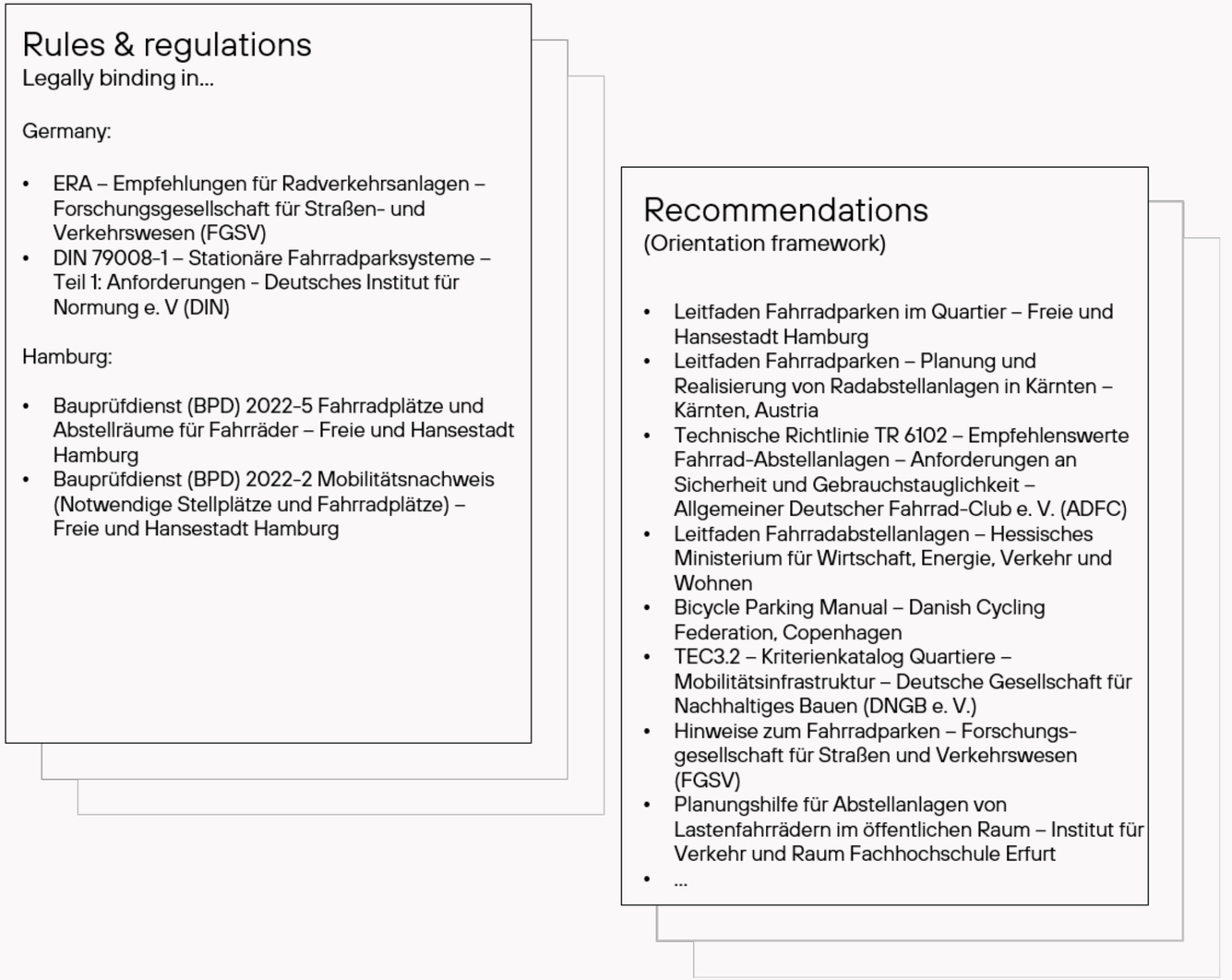


Fig. 11: Regulations and guidelines used / © ARGUS

02

Introduction

The following chapter provides an overview of current challenges and issues in bicycle parking. It also outlines the development process of the Design Guide and explains its intended use.

Introduction

Challenge: Implementation

The design of attractive bicycle parking facilities goes far beyond the placement of bicycle brackets in accordance with applicable rules and regulations. Even with architectural constraints such as statics or evacuation routes, and the demand for efficient use of space, it is important to focus on the actual needs of cyclists from planning to implementation, and thus provide an infrastructure that invites everyday use of the bicycle.

A selection of questions that should be considered throughout the planning and implementation process:

- *Does the location of the bicycle parking facilities allow a smooth integration into the daily pathway system?*
- *Is it safe and comfortable for all user groups to be in and around the parking facilities?*
- *Are there adequate parking facilities for cargo and special bicycles?*
- *Can high-value bicycles be parked in a theft-proof manner?*
- *Can additional equipment, such as bicycle seats and trailers, be stored at the facility?*
- *Is there a place and equipment to do minor repairs yourself?*
- *Will the charging facilities be able to handle the expected sharp increase of e-bikes and pedelecs?*

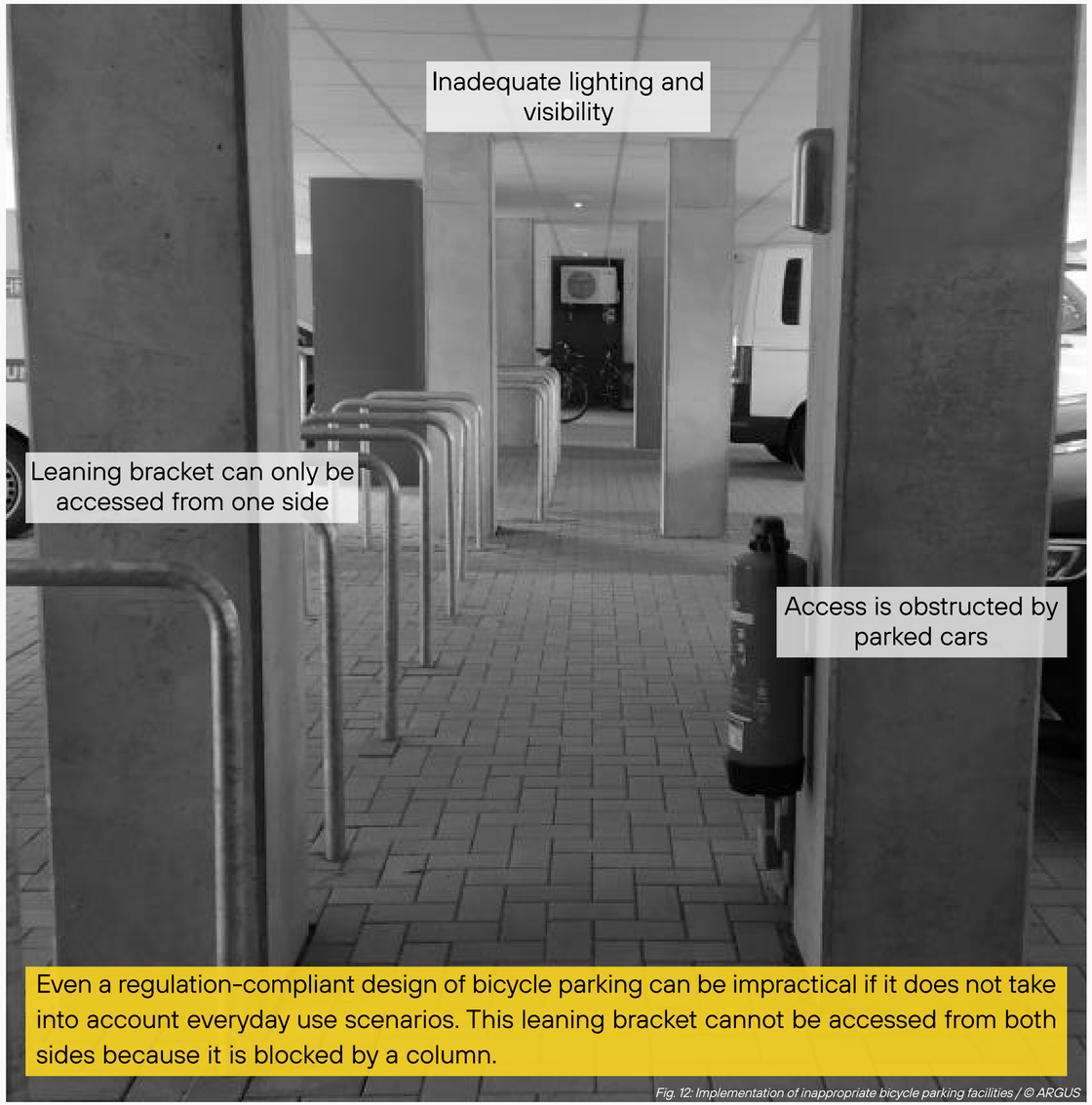


Fig. 12: Implementation of inappropriate bicycle parking facilities / © ARGUS

Introduction

Challenge: Diversification

The user groups and the types of bicycles they use are becoming more diverse, placing more complex demands on parking facilities. At the same time, it is important to provide a high level of comfort for all cyclists. Different parking elements with appropriately dimensioned movement areas take this diversity into account.

The location of the different parking elements can also take into account everyday use cases: Cargo bikes should be placed in close proximity to combi leaning brackets for children's bicycles. Mobility impaired people are particularly sensitive to detours and should be prioritized for dedicated bicycle parking along the route chain.

The growing number of e-bikes can be accommodated by providing ample battery charging facilities in bicycle parking facilities. Private micro-mobility vehicles, such as e-scooters, and the use of bicycle trailers are also becoming increasingly important and can be integrated into planning by providing parking.

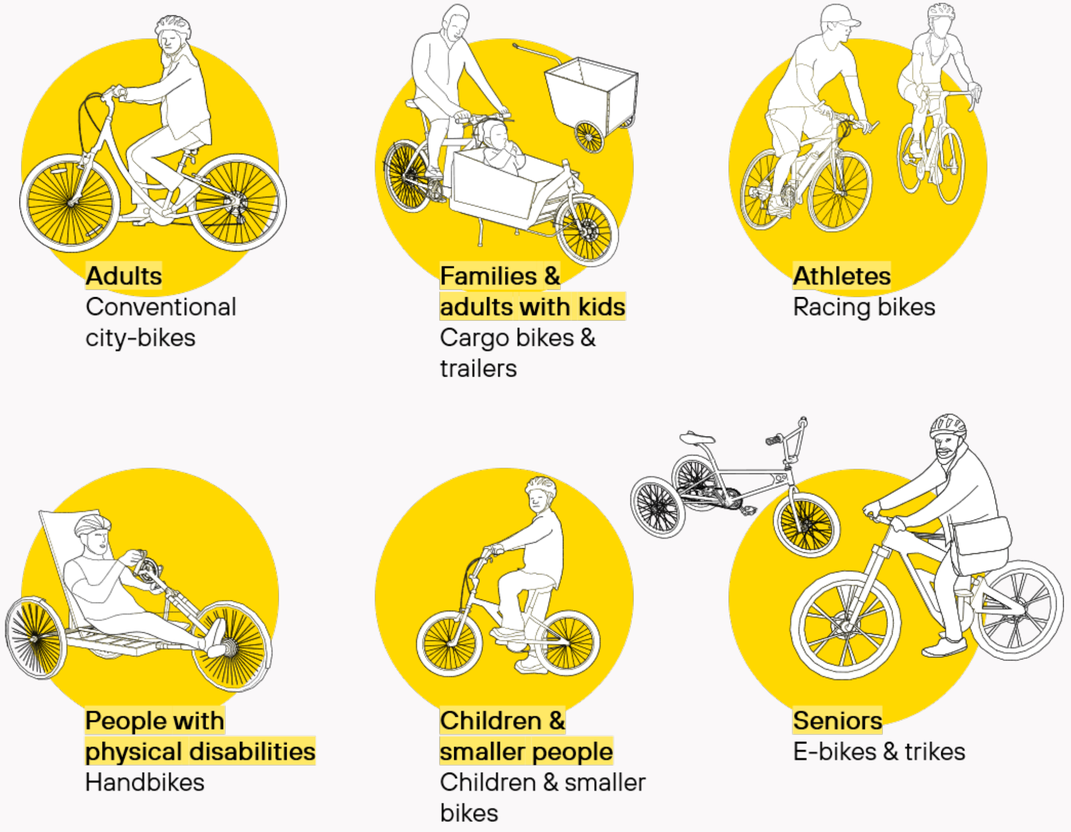


Fig. 13: Examples of user groups and bike types / © ARGUS

03

Current developments

The Corona pandemic induced a significant bicycle boom and reinforced the increase in bike sales. New types of bicycles are being used in greater numbers and the general range of models on offer is becoming increasingly differentiated.

In order to realize first-class bicycle parking, it is important to take into account current trends and developments on the bicycle market. The goal is to ensure that parking facilities also meet future requirements and needs. Therefore, the following chapter is dedicated to current developments on the bicycle market.

Current developments

Trends on the bicycle market

The number of bicycles in Germany has grown to 81 million bikes.

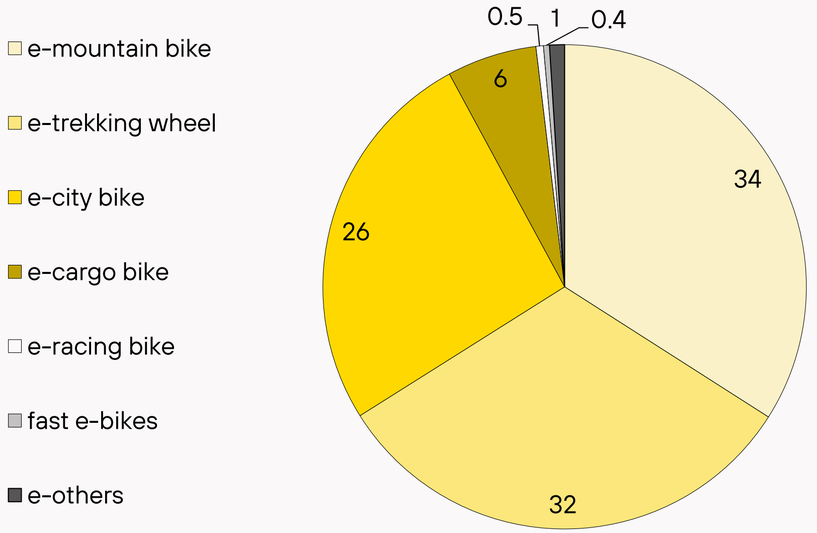
Statistically all inhabitants have a bicycle at their disposal.

Sales of cargo bikes increased by 62% from 2020 to 2021.

Similar to cargo bikes, sales of bike trailers and other bicycle-related transport options are on the rise.

Experts predict that e-bikes will account for more than half of the European bicycle market share in 2030.

Proportion of different models in sales in 2021



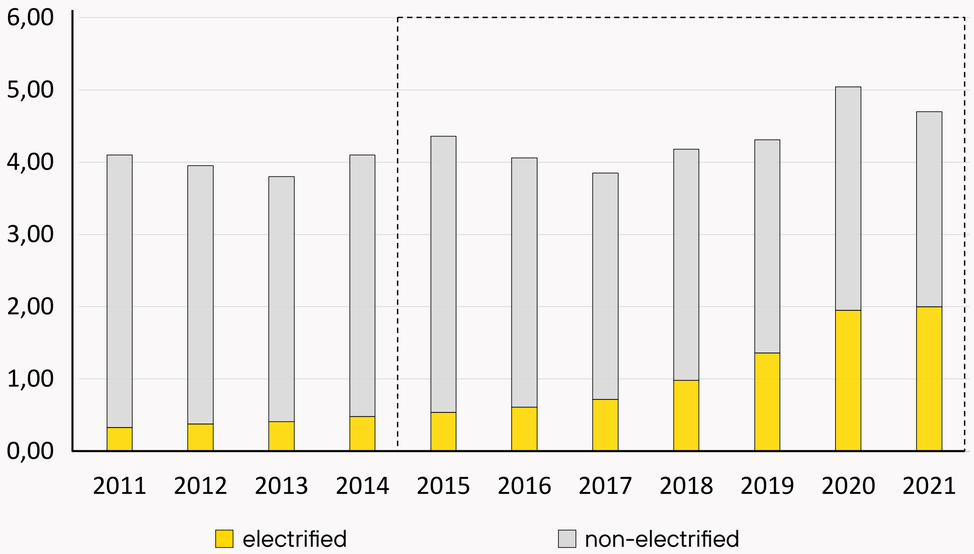
Data based on ziv-zweirad.de; elektrofahrrad24.de; cargobike.jetzt & de.statista.com.

Fig. 14: Pie chart showing the share of bicycle models in sales in 2021 / © ARGUS. Data based on ziv-zweirad.de.

Current developments

Trends on the bicycle market

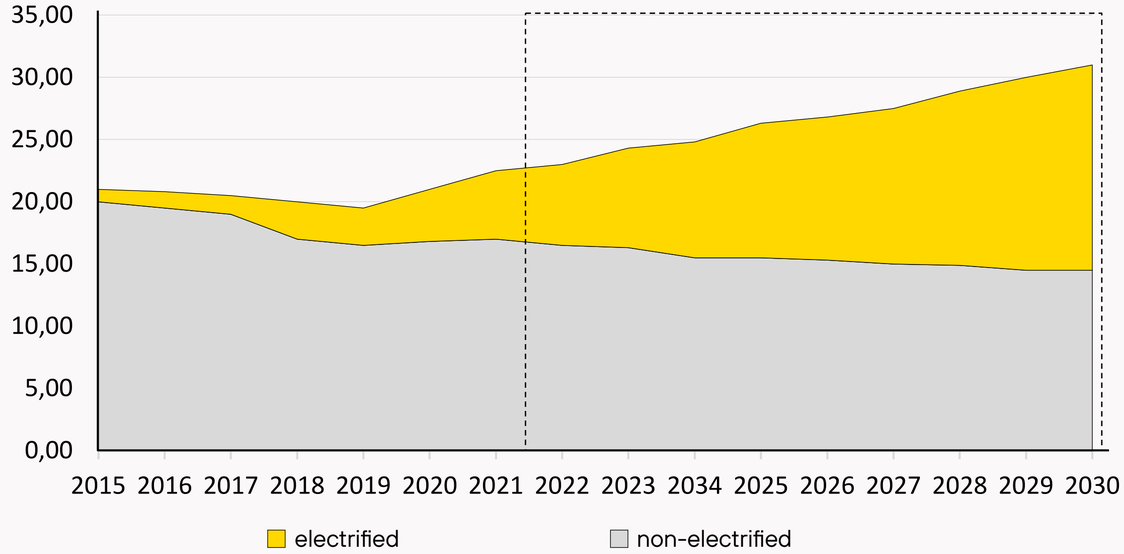
Bicycle sales in million units in Germany



The market shares of electricfied and non-electrified bicycles are converging.

Fig. 15: Stacked bar chart of bicycle sales in Germany / © ARGUS. Data based on elektrofahrrad24.de.

Forecast of bicycle sales in million units in Europe



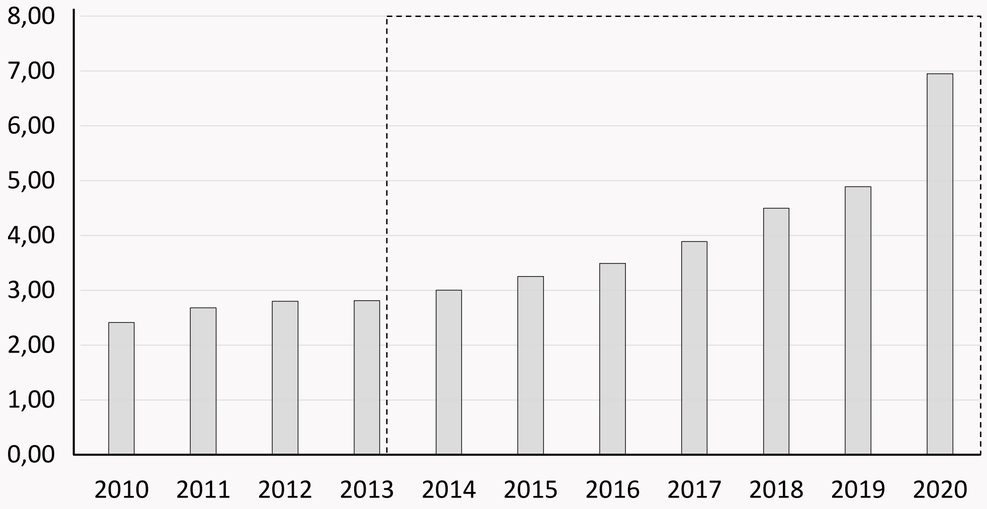
By 2030, at least one in two bicycles sold in Europe is expected to be electrified.

Fig. 16: Stacked area chart predicting bicycle sales in Europe / © ARGUS. Data based on cargobike.jetzt.

Current developments

Trends on the bicycle market

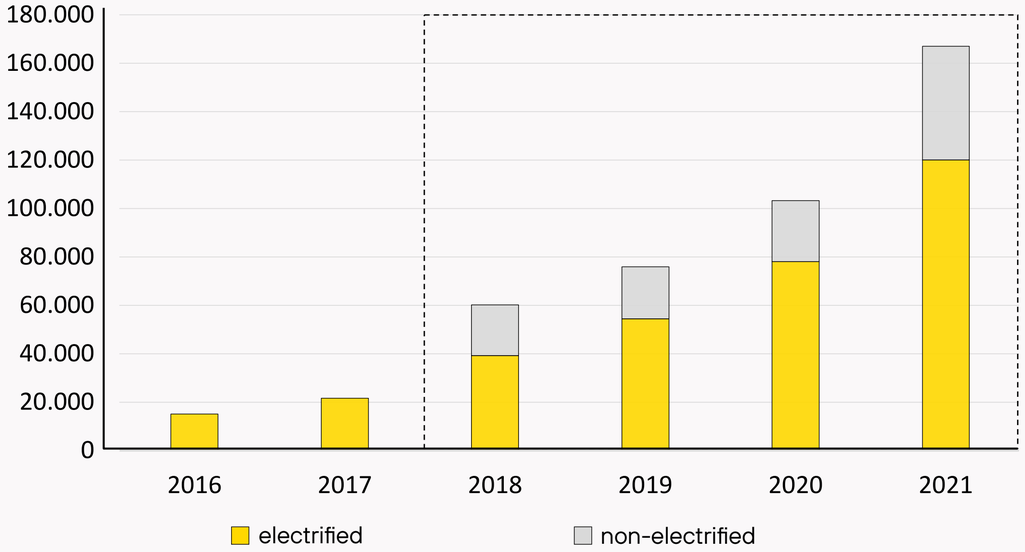
Retail sales of bicycles, bicycle parts and accessories in Germany in million euros



Retail sales of bicycles, parts and accessories have been steady in recent years and have recently increased significantly.

Fig. 17: Bar chart of retail sales of bicycles, bicycle parts and accessories in Germany / © ARGUS. Data based on de.statista.com.

Cargo bike sales in Germany



Cargo bikes are becoming increasingly important. Most are electrified.

Fig. 18: Stacked bar chart of cargo bike sales in Germany / © ARGUS. Data based on cargobike.jetzt.

Current developments

Trend radar

The bicycle market is undergoing several developments that are reflected in the sales statistics. Strong differentiation of bicycle types, increasing electrification, growing demand for cargo and specialty bikes are becoming more and more important.

Market studies predict that e-bikes will account for approximately 50% of the total European bicycle market by 2030. With the increase of higher priced bicycles on the roads, it is necessary to create parking facilities that provide protection against weather, theft and vandalism. Bicycle equipment should also be considered in the planning and design of bicycle parking facilities. For example, lockers can be used for temporary storage of equipment (helmets, lights, saddlebags, etc.).

In view of the increasing number of new bicycle purchases, the efficient handling of abondoned bicycles must also be considered in the subsequent operation of the parking facilities. In some Dutch parking facilities, a digital system is used to record the duration of bicycle parking.

Current trends on the bicycle market

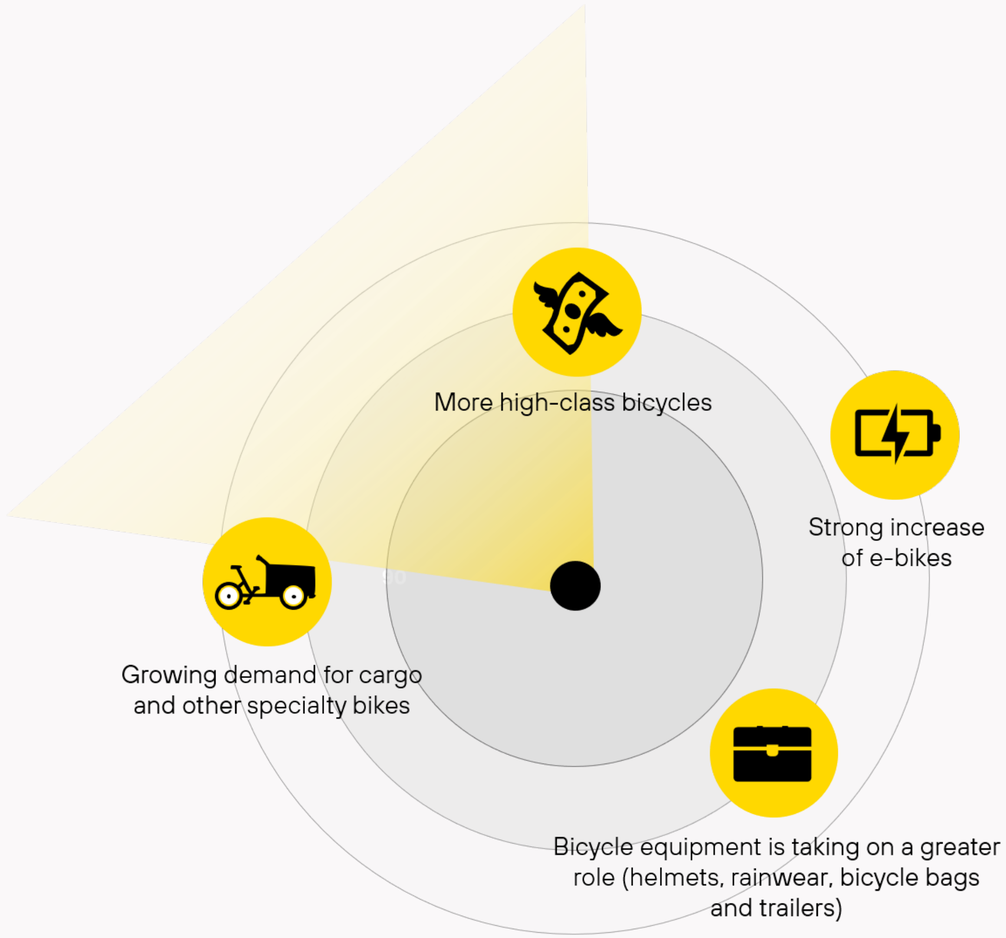


Fig. 19: Trend radar on current developments in the bicycle market / © ARGUS

04

Design parameters

In order to realize first-class bicycle parking, a number of standards must be met. The essential requirements are illustrated in the following chapter and apply to outdoor and indoor facilities.

Design parameters

General requirements

The following pages present the basics of high-quality bicycle parking in eight essential steps. The foundation of the eight general requirements is a user-centered, attractive and functional design.

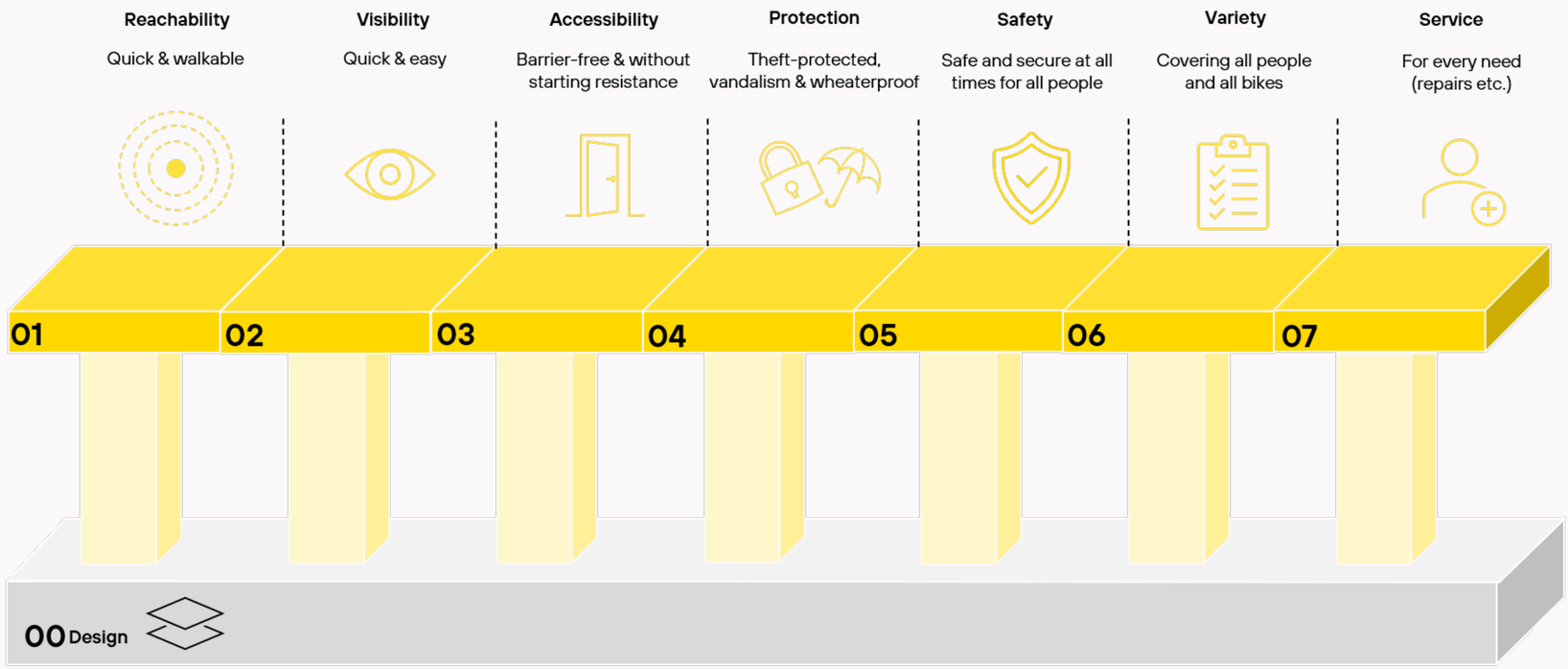
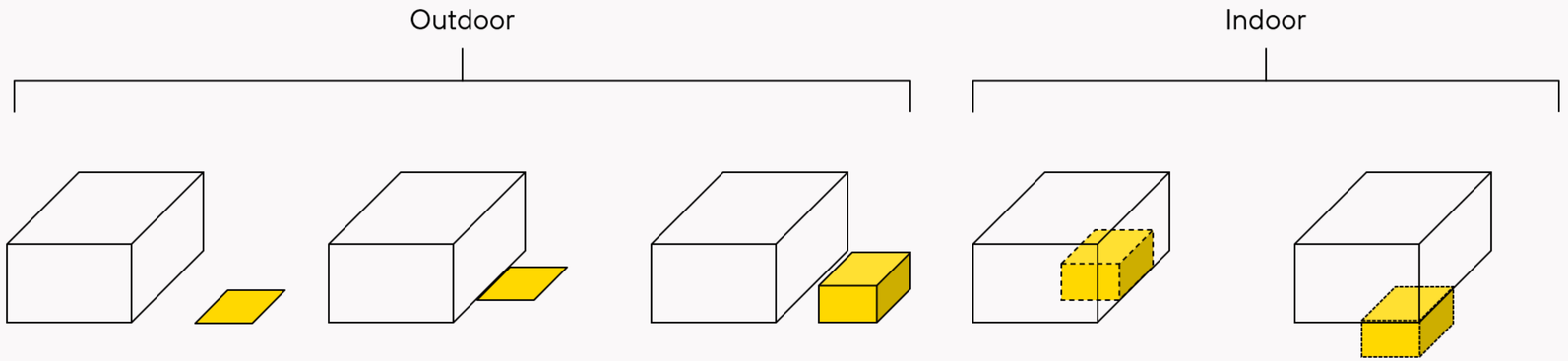


Fig. 20: General requirements for high-quality bicycle parking / © ARGUS

Design parameters

00 Design

This section highlights various framework conditions of bicycle parking as well as a number of general requirements to be considered during planning. A key aspect that influences planning is the issue of location. There are various location options, which entail different requirements for outdoor and indoor design. The appropriate choice must be made based on local conditions.



Located in open space

+ easy access
+ easy and quick to find
- no protection against theft or vandalism
- challenge for open space planning / landscape planning
- competition with other types of land use (playgrounds ...)

Located near entrance

+ easy access
+ subjective safety
- no protection against theft or vandalism

Separate facility

+ easy access
+ easy and quick to find
+ theft-protected, vandalism & weatherproof
- challenge for open space planning / landscape planning
- competition with other types of land use (playgrounds ...)

Integrated in the building

+ easy access
+ theft-protected, vandalism & weatherproof
- consumption of ground floor space (not economical)

In the underground garage

+ economic accommodation in the basement
+ theft-protected, vandalism & weatherproof
+ large facilities possible
- necessary bridging of height differences

Fig. 21: Advantages and disadvantages of different bike parking locations / © ARGUS

Design parameters

00 Design

A well thought-out design is the basis for an efficient and user-centered bicycle parking experience. Only a clever design ensures clear orientation within the facility. The larger the facility, the more sophisticated the design concept. Parking facilities should not feel claustrophobic, so it is recommended to incorporate as much natural light as possible and use an inviting and bright color scheme. In addition to adequate lighting, special attention must be paid to the use of high-quality materials. When choosing materials, it is also important to consider that the materials should be as durable as possible and contribute to a pleasant acoustic.

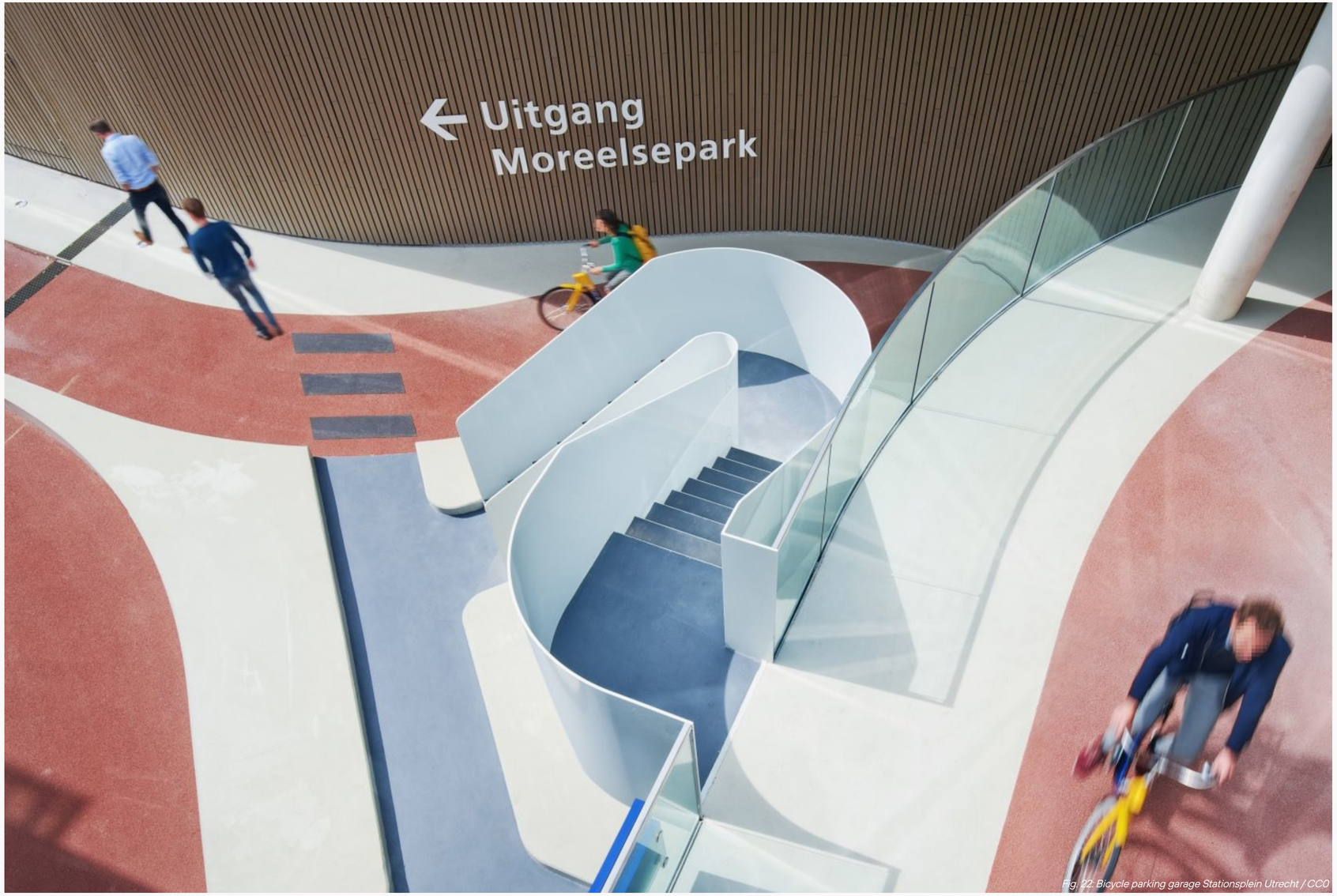


Fig. 22: Bicycle parking garage Stationsplein Utrecht / CC0

Design parameters

00 Design

Another important factor in the design of bicycle parking facilities is functionality. The facility should be designed so that bicycles can only be parked in designated parking spaces. To discourage parking outside of these designated spaces, elements to which users could attach their bicycle locks should be avoided. Sight lines between levels are recommended for larger, multi-level facilities. Bicycle and pedestrian paths should be clearly separated and intersections avoided where possible.

Fig. 23: Bicycle parking garage Stationsplein Utrecht / © EHA

Design parameters

01 Reachability

Consideration of the relationship between parking duration and distance is critical to the quality of bicycle parking. While short-term parking (guests, visitors, customers) should be located close to the destination, long-term bicycle parking can be located further away.

As a rule of thumb, the following can be said: Centralized facilities for long-term bicycle parking (e.g. overnight parking) should provide more services than decentralized facilities for short-term parking. Bicycle parking should be located no more than 50 meters from the entrance to the home/workplace. For short-term use: The closer to the entrance, the better. In order to provide convenient access to the parking facility, it is important to ensure that the access is barrier-free and, ideally, can be reached by bicycle. This requires a user-friendly access route with cycle-friendly surfacing. In addition, different height levels need to be bridged, for example by ramps or lifts.

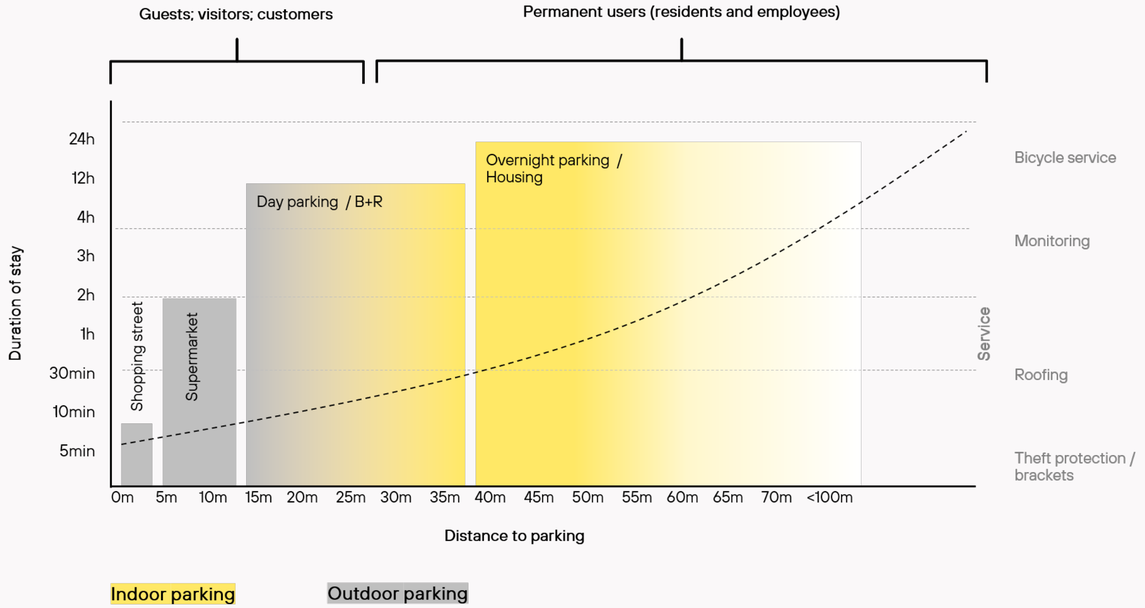


Fig. 24: Distance to bike parking based on use and length of stay /
© ARGUS. Data based on Celis, P., Bølling-Ladegaard, E. (2008): Bicycle Parking Manual. Ed. by the Danish Cycling Federation, Copenhagen.

Design parameters

02 Visibility

Attractive and usable bicycle parking facilities have a clear design and are easy to navigate. Bright and good general lighting are essential. Floor markings and signage schould be provided to enable easy orientation. Different colour sections and numbered parking spaces provide good orientation. Signs, information boards and path markings should be easy to see and understand. For very large parking structures, capacity displays are also recommended to avoid unnecessary rides while looking for free spaces.

Fig. 25: Bicycle parking garage Amsterdam Zuid / CC0

Design parameters

02 Visibility

A well-designed lighting scheme can prevent the creation of anxiety areas, as well as vandalism and theft. Good lighting increases personal safety and makes it easier to park bicycles. Dark, hidden corners should be avoided at all costs. Indoors, daylight can be used to enhance appeal through generous windows and skylight systems. Outdoor areas need to be well lit at all times of the day and year.

When positioning luminaires, care should be taken to ensure that parking systems are not obstructed by shadows, and that bicycle spaces are not obscured by users when in use. Good lighting ensures that faces can be seen from a distance, which increases the subjective feeling of safety. In Germany, the lighting of public parking facilities is mainly regulated by the DIN-Norm 67528 „Beleuchtung von öffentlichen Parkbauten und öffentlichen Parkplätzen".

The key criterion is that users feel safe both day and night, and that people unfamiliar with the location can easily find their way around. Lighting can be provided by daylight, artificial light or a combination of the two, with public parking garages requiring at least 75 lux throughout the area. Ideally, driveways should have 100 lux or more, while a minimum of 75 lux is recommended for bicycle parking. Entrances and exits require 300 lux during the day and 75 lux at night.

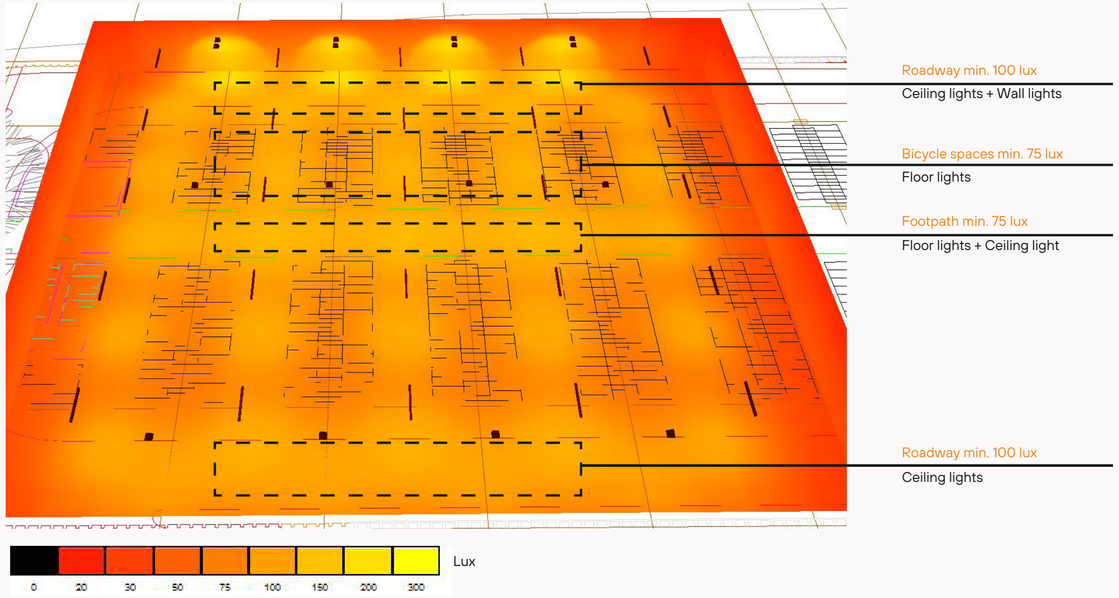


Fig. 26: Lighting concept bicycle parking garage Stationsplein Utrecht / © ARUP Netherlands (simone.collon@arup.com).

Design parameters

03 Accessibility

The accessibility and organisation of the areas within the facilities is particularly important for user-friendliness. The design must not only ensure the compatibility of different types of bicycles and user groups, but also take into account the daily arrival routines.

Depending on the size of the car park, a bicycle-accessible access route can significantly reduce the overall parking time. In particular, designated bicycle ramps should be designed with adequate width and visibility to allow two cargo bicycles to pass each other (recommendation: 3 m). Bicycle ramps should be designed with as low a gradient as possible (recommendation: max. 6 %). Depending on the size of the car park, mixed vehicle ramps with extra-high kerb separating pedestrian, bicycle traffic and car traffic, and spacious elevators can also be suitable for reaching bicycle parking spaces. Stairs with guide rails for bicycles are not suitable for many user groups and should not be used.

Within parking facilities, separation of bicycle lanes or one-way traffic may also be helpful. In any case, the design of lanes should avoid obstructions caused by improperly parked bicycles or double-decker elements protruding into the lanes. In addition, transfer areas can be provided so that the bicycle can be dismounted and, if necessary, unloaded without blocking the lanes. When parking bicycles in buildings, it is important to avoid barriers of any kind and a large number of doors. These should open automatically and be made of glass.

Fig. 27: Driving, transfer and parking areas bicycle parking garage Stationsplein Utrecht / © EHA

Design parameters

03 Accessibility

In addition, care should be taken to ensure that accesses and roadways are sized to allow two cyclists to meet, whether pushing or riding. There should also be a safe distance on both sides.

A person pushing a bicycle requires a space of 0.80 - 0.85 meters wide. When two people pushing a bicycle meet, an intermediate space of 0.1 meters is sufficient, so that together with the safety distances of at least 0.25 meters on both sides, the total space required is at least 2.5 meters. When two people on bicycles meet, the distance between the bicyclists is greater, and therefore more space is required, due to the speed. If a roadway cannot be fully utilized due to lack of space for the encounter, widening of the roadway should be allowed, especially at locations with poor visibility, to allow bicyclists to yield in the event of an encounter. The encounter of two cyclists should also be taken into account in the dimensioning of doors, so that they should be considered with a width of 2.5 meters.

Use Cases	Width of ramp	Ramp slope
ramps with one-way traffic	1.60 m (1)	6-10 % (2)
ramps with two-way traffic	min. 3.00 m	6-10 % (2)

Further accessibility options	Measurements	To be considered
Lifts	min. 2.10 m x 1.10 m	Lifts may only be used for bicycle parking and are not used for other access to the building.
Ramps with car traffic	min. 1.60 m (3) max. 10 % slope	It is imperative that cycle traffic is physically separated from car traffic, otherwise the access is not considered as user-friendly. Therefore the high kerb must be at least 0.80 metres wide in all cases.

(1) In the event of an encounter, possibilities to evade must be created (especially in places that are not easily visible) - e.g. widening of the carriageway.
(2) At 6 % slope, the maximum permissible length of the ramp is 65 metres until a platform is required. At 10 % the maximum length is 20 metres (data based on DIN 18040-1 Barrierefreies Bauen)
(3) According to ERA - Empfehlungen für Radverkehrsanlagen: the space requirement of a cyclist is at least 0.8 metres. The safety distance to building walls is 0.25 metres in minimum. The safety space to the roadway is 0.5 metres. This results in a total space requirement of 1.55 metres in minimum for one-way traffic.

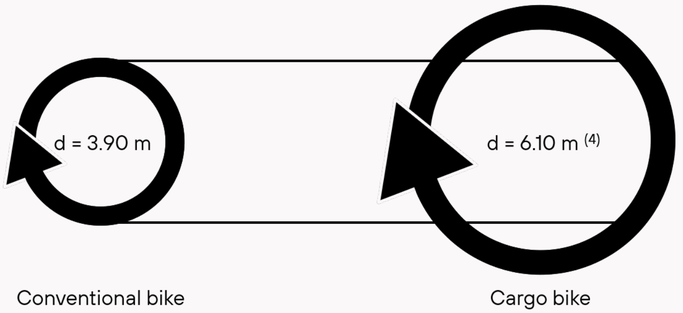


Fig. 28: Turning radii of different types of bicycles / © ARGUS. Data based on e-lastenrad.de.

(4) For turning radii on ramps, the guide values for the turning circles of conventional bicycles apply as a minimum. It is better to use the turning circles of larger cargo bikes as a guide to ensure that larger bicycles can also use the ramp without restrictions.

All measurements are recommended by ARGUS and are based on the rules and regulations listed on page 8.

Design parameters

04 Protection

An essential component of an attractive bicycle parking facility is adequate protection against theft and weather. Especially with the increase in higher priced bicycles (e.g. e-bikes or cargo bikes), protection against vandalism must also be considered, especially for long-term parking. Especially in larger facilities, additional security measures such as security guards should be considered. In staffed facilities, it is important that guards are clearly visible at entrances and exits and have a good overview of the parking area. It is also possible to provide additional security in exchange for a parking fee. In this case, a ticket gate system at the entrances and exits is a good option.

It is also important that bicycles can be locked at all times. Because of the increased space requirements for cargo bikes and other specialized bicycles, parking areas without leaning brackets or ground anchors are often offered, but these do not provide the ability to lean or lock and should be avoided at all costs.

Another way to protect your equipment is to provide lockers so that bags, helmets, and other accessories can be securely locked and not carried around. This service is particularly useful in conjunction with larger parking facilities or bicycle parking at the workplace.

Fig. 29: Bikesharing Box Rotterdam / CC0

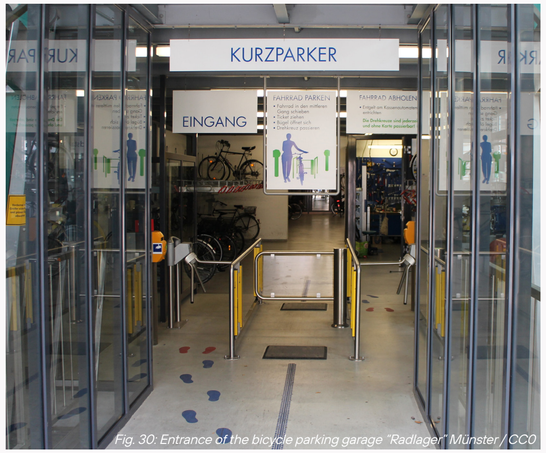


Fig. 30: Entrance of the bicycle parking garage "Radlager" Münster / CC0

Design parameters

05 Safety

In addition to objective security measures, subjective security measures must also be considered. Well-lit spaces and a visible video surveillance system can help increase users' sense of safety.

When designing covered bicycle parking, it is important to ensure that paths and roadways do not lead to dead ends. In addition, clear lines of sight are essential for good visibility and a high sense of security. Entrances and exits should always be clearly marked and easy to find.

Fig. 31: Bicycle parking garage Stationsplein Utrecht / ©

Design parameters

06 Variety

Not every parking system is suitable for every user. In order to meet the needs of as many users as possible, it is important to offer a variation of parking systems. Double-deck parking systems can accommodate many bicycles in a space-efficient manner, while bollards and stands are only suitable for larger types of bicycles (tricycles, cargo bikes, etc.). Leaning brackets with an additional middle bar (knee rail) can be used by both children and adults, but children or people with limited mobility cannot use double-deck parking systems without assistance.

Therefore parking systems should be carefully selected, and provided in sufficient numbers, taking into account the different bicycle types.

Fig. 32: Bicycle parking garage Antwerpen / CC0


Fig. 33: Double deck parking B+R station / CC0


Fig. 34: Covered bicycle spaces / CC0

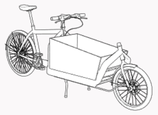

Fig. 35: Bicycle parking garage Malmö Centralstation / CC0

Design parameters

06 Variety

For the selection and organization of the parking systems, it must be taken into account that different parking systems vary in terms of space efficiency. In addition sufficient parking and maneuvering space must be available, especially for larger bicycle types. In light of the increase in cargo bikes and e-bikes, an adequate charging infrastructure must also be planned. The central decision criteria in the selection of parking systems should always be user centricity. The table on the right gives an overview of the dimensions of different bicycle types.

Dimensions of different types of bicycles

Bicycle type	Length	Width (widest part)	Height
Conventional bike 	1.90 m	0.60-0.70 m	1.0 m
Children / smaller bikes 	1.0-1.80 m	0.30-0.60 m	0.60-0.90 m
Tricycle 	1.80 m	0.75-0.80 m	1.10 m
Cargo bike 	2.10-2.70 m (some types now > 2.70 m)	0.80-1.20 m	1.15 m
Trailer 	1.60 m	1.0 m	1.1 m

All measurements are recommended by ARGUS and are based on the rules and regulations listed on page 8.

Design parameters

06 Variety

The following pages outline dimensions for a variety of parking systems. The figures shown are based on a number of regulations or were calculated on the basis of Ector Hoogstad Architects' plans for the largest bicycle parking garage in the world. Therefore, the presented dimensions are rather generous and are designed for parking facilities with a comparatively high frequency. Accordingly, in small-scale contexts, the dimensions can be slightly reduced for efficiency reasons.

The most suitable parking systems for conventional bicycles are leaning brackets and double-deck parking systems. Leaning brackets and ground anchors are also suitable for parking cargo bikes and other special types. Parking systems such as rim holders, hanging systems and bicycle boxes should be avoided. Bicycle boxes in particular require a lot of space and are not barrier-free for all user groups. When choosing the parking system and dimensioning the aisles, the proportion of short-term and long-term parkers should also be taken into account. A high proportion of short-term parkers, especially in larger parking structures, means a high fluctuation and a lot of traffic. Sufficiently wide drive aisles are therefore a precondition.

Leaning bracket | 90 degree line-up

Parking system	Installation space depth one-sided installation	Installation space depth double-sided installation (overlapping front wheels)	Parking space width – distance between two brackets/bike racks	Wall distance - distance of last parking space to outer wall	Traffic space width for parking spaces on both sides	Clear height
Leaning bracket	2.0 m	3.50 m	1.0 m	0.80 m	2.0 m when pushing; 2.50 m when driving	min. 2.20 m
Double-deck parker	3.20 m with completely extended slide rail	6.40 m with completely extended slide rail	0.50 m	0.50 m	2.50 m driving aisle - this does not include the area needed to pull out the rail (which is already included in the installation space depth)	min. 2.75 m
Cargo bikes and special types (e.g. trailer)	2.70-3.0 m	not possible due to transport bracket on cargo bikes	1.20 m	1.80 m	2.50 m when pushing (encounter event 2 x 1.20 m); 3.0 m when driving	min. 2.20 m

It is advisable to plan a ceiling height of 2.75 metres directly so that the parking system can be converted to double-deck parking at a later date if the need arises.

All measurements are recommended by ARGUS and are based on the rules and regulations listed on page 8.

Design parameters

06 Variety

For the parking of children's bikes and smaller bicycles, it is recommended not to design extra parking spaces, but to provide leaning brackets with an additional middle bar (knee rail) at half height at about 35 to 40 centimetres, so that children's bikes and smaller bicycles can be leaned against.

Leaning bracket | 45 degree line-up

Parking system	Installation space depth one-sided installation	Installation space depth double-sided installation (overlapping front wheels)	Parking space width – distance between two brackets/bike racks	Wall distance - distance of last parking space to outer wall	Traffic space width for parking spaces on both sides	Clear height
Leaning bracket	1.50 m	2.50 m	1.0 m	0.80 m	2.0 m when pushing; 2.50 m when driving	min. 2.20 m
Cargo bikes and special types (e.g. trailer)	2.0 m	not possible due to the transport bracket on cargo bikes	1.40 m	1.70 m	2.50 m when pushing (encounter event 2 x 1.20 m); 3.0 m when driving	min. 2.20 m

Ground anchor | 90 degree line-up

Parking system	Installation space depth one-sided installation	Installation space depth double-sided installation (overlapping front wheels)	Parking space width – distance between two brackets/bike racks	Wall distance - distance of last parking space to outer wall	Traffic space width for parking spaces on both sides	Clear height
Cargo bikes and special types (e.g. trailer)	2.70-3.0 m	not possible due to the transport bracket on cargo bikes	1.20 m	1.80 m	2.50 m when pushing (encounter event 2 x 1.20 m); 3.0 m when driving	min. 2.20 m

Ground anchor | 45 degree line-up

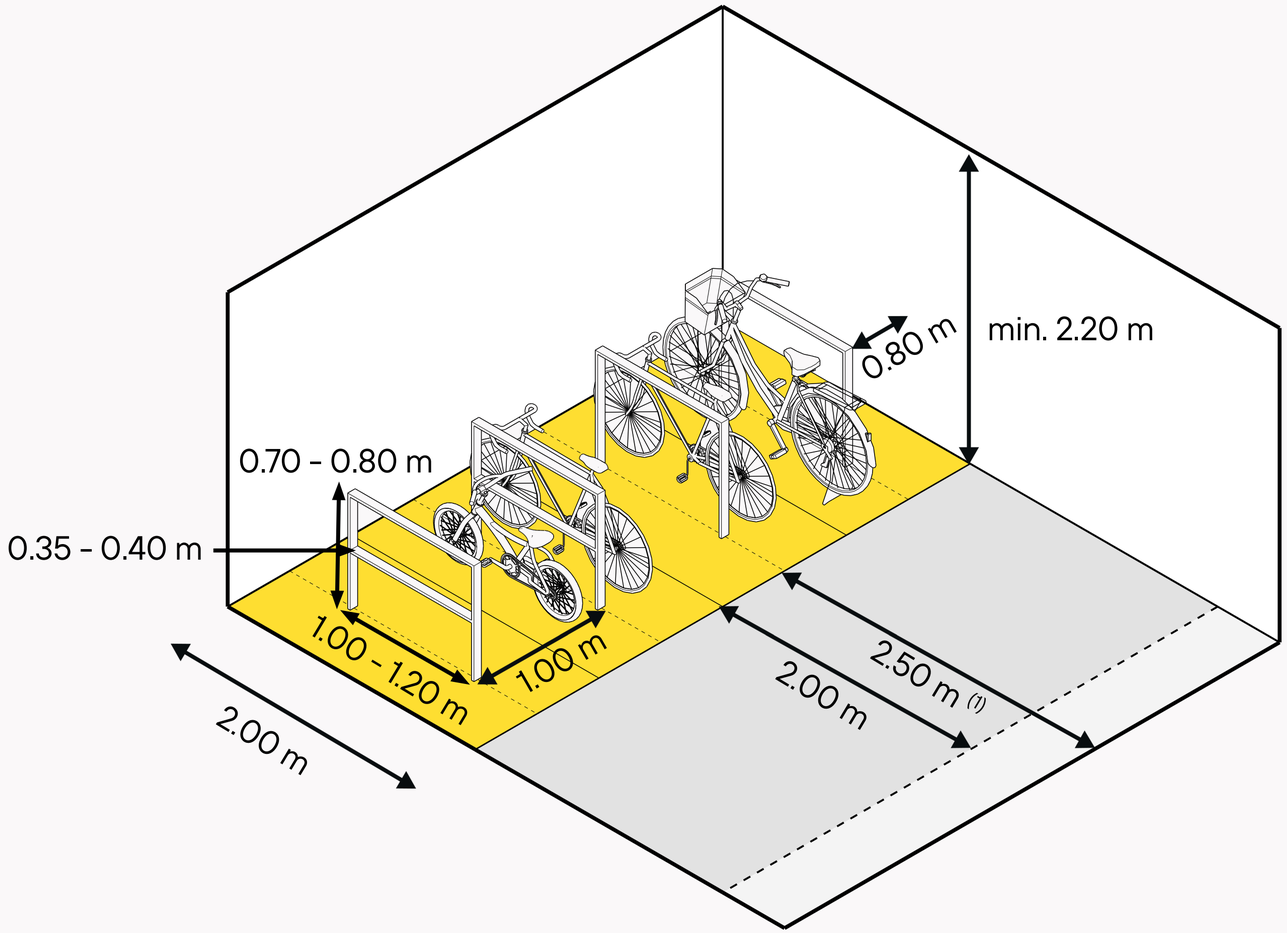
Parking system	Installation space depth one-sided installation	Installation space depth double-sided installation (overlapping front wheels)	Parking space width – distance between two brackets/bike racks	Wall distance - distance of last parking space to outer wall	Traffic space width for parking spaces on both sides	Clear height
Cargo bikes and special types (e.g. trailer)	2.0 m	not possible due to the transport bracket on cargo bikes	1.40 m	1.70 m	2.50 m when pushing (encounter event 2 x 1.20 m); 3.0 m when driving	min. 2.20 m

All measurements are recommended by ARGUS and are based on the rules and regulations listed on page 8.

Design parameters

06 Variety

Leaning brackets are suitable for indoor and outdoor parking. They are easy to use and, with the exception of cargo bikes and trailers, accessible for almost all types of bicycles. It is essential to ensure that there is sufficient space between two brackets so that the parking spaces remain clear and easy to use. In addition sufficient space for maneuvering (parking in and out) must be provided.



(1) If there is a high fluctutation and a large number of users parking and unparking at the same time, a wider drive aisle of 2.50 m is recommended so that newly arriving users do not have to wait for those already parking or unparking.

Fig. 36: Isometric drawing for a bicycle parking with a leaning bar / © ARGUS

Design parameters

06 Variety

Double-deck parkers are particularly useful when a high number of bicycle parking spaces are required and space availability is limited, as they are very efficient compared to other parking systems. Nevertheless, care must be taken that sufficient space is available for parking and unparking, as extended rails can otherwise obstruct other people while using the double-deck parkers or driving down the aisle. Furthermore, it must be considered that double-deck parkers cannot be used by weaker target groups such as children without additional assistance.

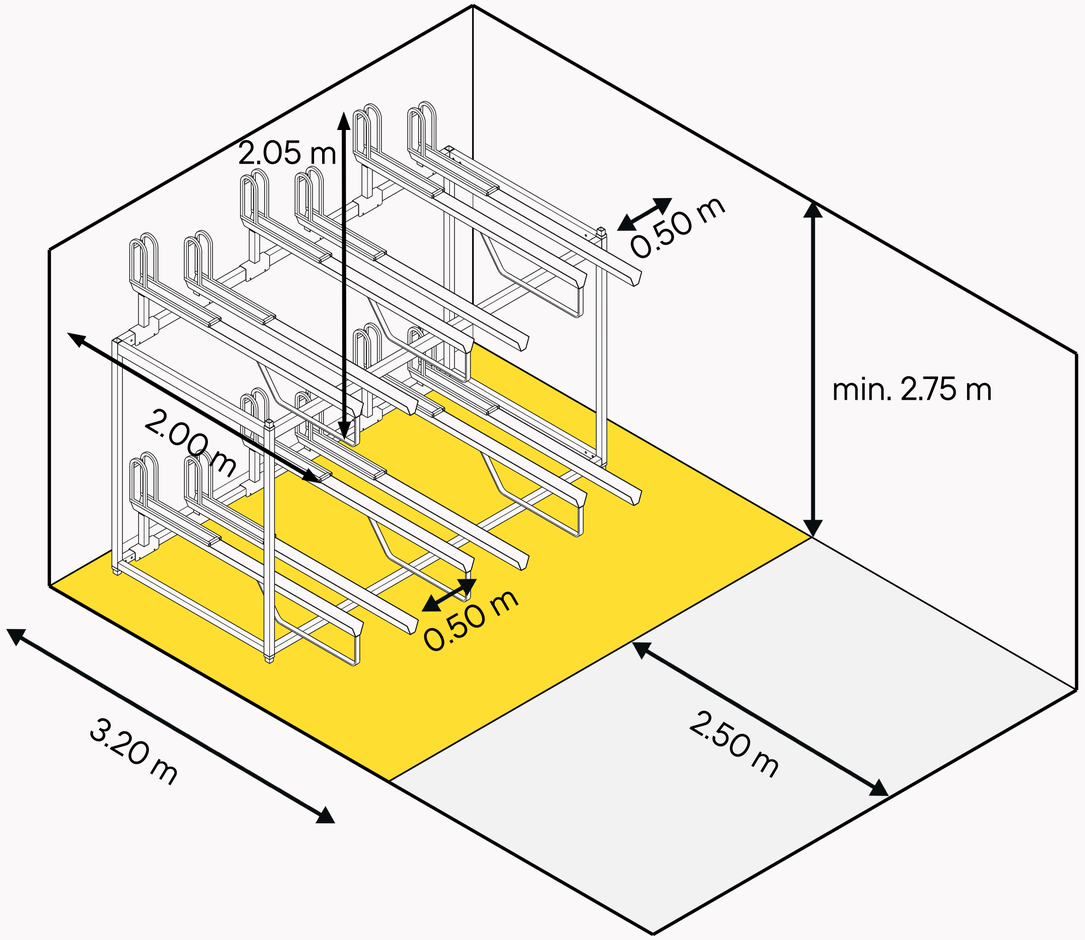


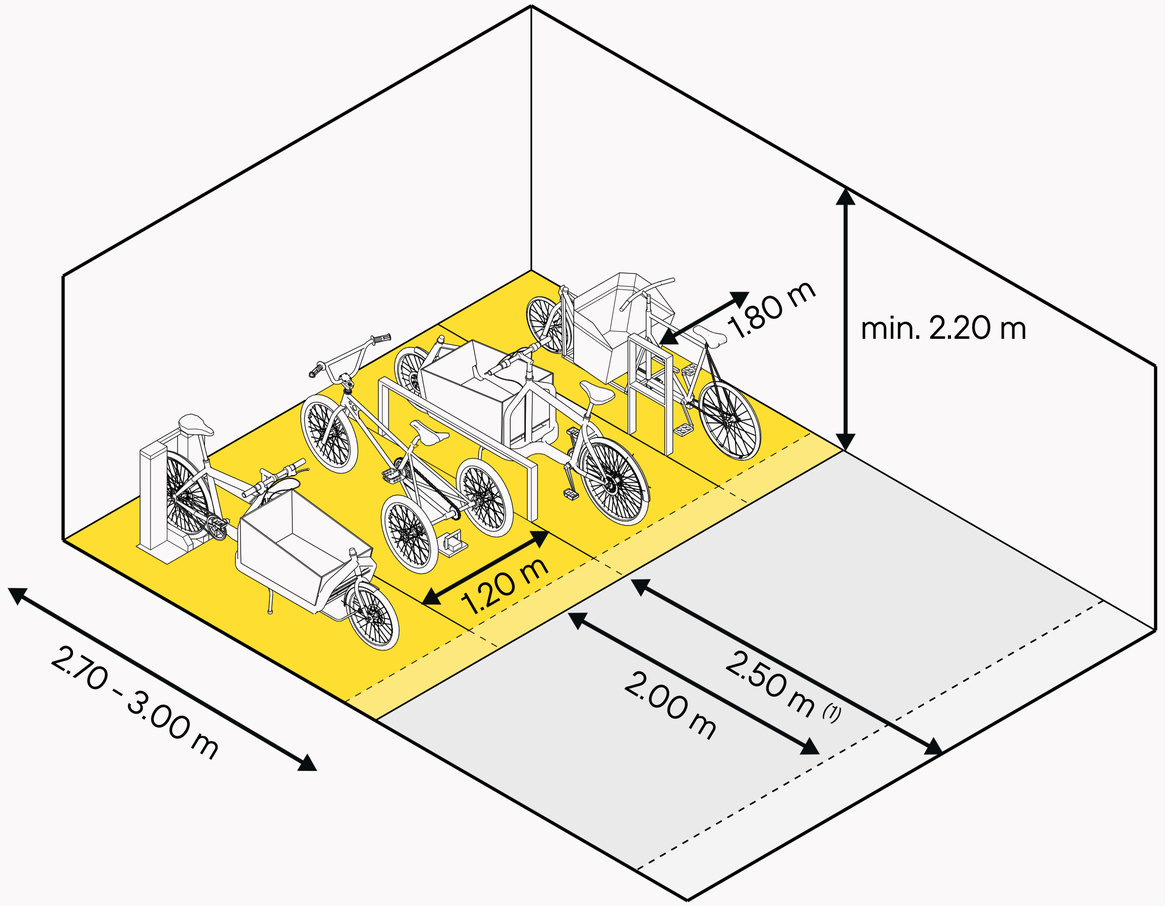
Fig. 37: Isometric drawing for bicycle parking with a double-deck parking system / © ARGUS

Design parameters

06 Variety

Parking spaces for cargo bikes must be dimensioned in such a way that different types of cargo bikes can use the space. A leaning bracket does not appear to be optimal for every cargo bike. The same applies to the ground anchor variant. In order to serve as many use-cases as possible, a variety of parking systems should therefore be offered.

The dimensions shown here can be adjusted if necessary. The minimum length of a parking space is 2.70 meters. Since some cargo bikes already exceed these dimensions, it is advisable to adjust the depth of the parking spaces to 3.00 meters if sufficient space is available.



(1) If there is a high fluctutation and a large number of users parking and unparking at the same time, a wider drive aisle of 2.50 m is recommended so that newly arriving users do not have to wait for those already parking or unparking.

Fig. 38: Isometric drawing for the parking of cargo bikes with different parking options / © ARGUS

Design parameters

07 Service

Given the recent increase in the number of e-bikes, charging infrastructure should be provided for 100% of cargo bikes sized for the parking facility and 50% of other bikes. Due to a recent EU regulation, it is expected that only removable batteries will be allowed in the future. To prevent theft of bicycle batteries, it is recommended to provide lockable charging cabinets instead of integrating the charging infrastructure directly into the parking systems. An advantage of charging cabinets over integrated charging infrastructure is that e-bikes can be parked in any bicycle parking space, not just those specifically designated for e-bikes. When providing charging lockers, it is again important that the lockers are adequately protected against theft and ideally placed in highly visible locations. Typically, a battery charge will last approximately seven days. A charging cycle is estimated to take one day/night. Therefore, a single charging compartment can be used approximately seven times in a week. Surveillance cameras should be considered as an additional security measure. Another benefit of providing charging lockers is that they provide additional storage space for bicycle equipment or luggage.

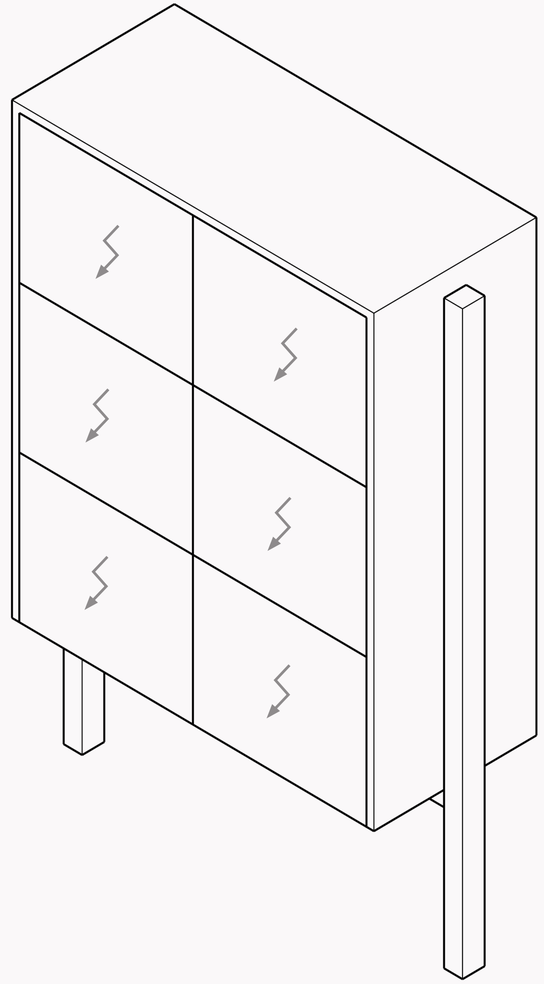


Fig. 39: Isometric drawing of a charging cabinet / © ARGUS

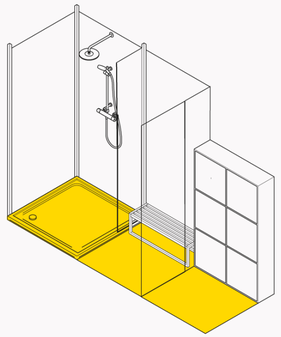
Design parameters

07 Service

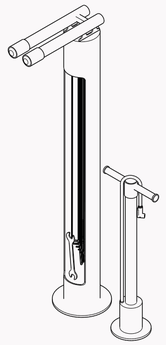
As an additional service, it is becoming increasingly important to provide repair stations with air pumps, vending machines and bicycle washing stations to increase convenience and comfort.

Showers, changing rooms and lockers are recommended as additional services in parking facilities used by a large number of employees. Location and design are particularly important for high acceptance.

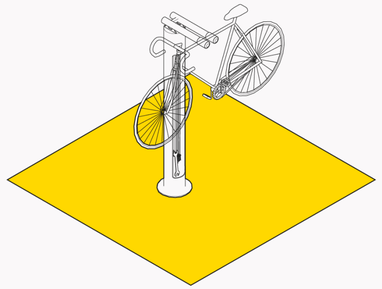
Showers and changing rooms



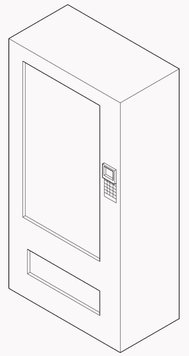
Air pump



Repair station



Vending machine for spare parts



Washing system

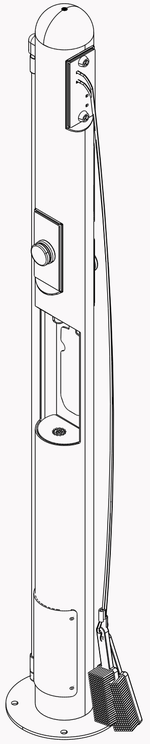


Fig. 40: Isometric drawing of various service offerings / © ARGUS

Design parameters

Checklist

A checklist has been developed as a further aid to checking whether the qualitative and quantitative characteristics of high quality bicycle parking presented in the guideline are met in the implementation of bicycle parking facilities. The checklist describes in a few points what is central to each step. For specific measurements, parking systems and other dimensioning, please refer to the individual chapters of the guide.

An example of the checklist is shown at right. The full version is available by scanning the QR code.

Checklist ☑

This document is a supplement to the Bicycle Parking Design Guide and serves as an additional aid in the design and construction of bicycle parking facilities. The list of design parameters is exemplary and not exhaustive. Further details can be found in the guide.

00 Design
General requirements ☐

Space and atmosphere
- *Friendly, bright, using natural light sources where suitable*
- *Inviting color scheme*
- *Sightlines between levels for multi-level facilities*

Materials
- *High quality*
- *Durable*
- *Promotes pleasant acoustics*

Functions
- *Clear distinction between parking, manoeuvring and driving areas*
- *No elements where bicycles can be improperly parked/locked*
- *Clear distinction between bicycle and pedestrian lanes*
- *Minimization of pedestrian and bicycle intersections*

01 Reachability ☐

Location according to parking time
- *Parking facilities are located in appropriate distances, differentiated by short- and long-term parking → p. 22*

Quality of access
- *Parking facilities are accessible by bicycle and are barrier-free*
- *Pleasant accessibility of the access road (flooring)*
- *Height differences are being bridged (ramps, elevators)*

02 Visibility ☐

Wayfinding
- *Wayfinding system (color coding, numbered bicycle parking spaces)*
- *High and unobstructed visibility of signs*
- *Digital parking guidance system for larger parking garages*

Lighting
- *If possible: daylight through windows or skylights*
- *Bright general lighting, at least 75 lux and 100 lux above driving aisles*
- *Adequate lighting of the leaning brackets/parking systems (avoidance of obstructed view due to own shadows)*
- *Avoidance of dark, poorly visible corners and spaces*

Fig. 41: Excerpt from the checklist / © ARGUS

Sources

[ADFC] Allgemeiner Deutscher Fahrrad Club e.V. (2011): Technische Richtlinie TR 6102. Empfehlenswerte Fahrrad-Abstellanlagen. Anforderungen an Sicherheit und Gebrauchstauglichkeit.

Amt der Kärtner Landesregierung (2015): Leitfaden Fahrradparken – Planung und Realisierung von Radabstellanlagen in Kärnten.

ARUP (2013): Utrecht Stationsplein Oost Lichtontwerp. Definitief Ontwerp.

cargobike.jetzt (2022): ZIV-Marktdaten: Rekordwachstum von 62 Prozent bei Lastenrädern. URL: https://www.cargobike.jetzt/ziv-marktdaten-rekordwachstum-von-62-prozent-bei-lastenraedern/.

Celis, P., Bølling-Ladegaard, E. (2008): Bicycle Parking Manual. Ed. by the Danish Cycling Federation, Copenhagen.

[DIN] Deutsches Institut für Normung e. V (2016): DIN 79008-1. Stationäre Fahrradparksysteme - Teil 1: Anforderungen.

[DNGB e. V.] Deutsche Gesellschaft für Nachhaltiges Bauen (2020): TEC3.2 - Kriterienkatalog Quartiere. Mobilitätsinfrastruktur.

E. Heinen, R. Buehler (2019): Bicycle parking: a systematic review of scientific literature on parking behaviour, parking preferences, and their influence on cycling and travel behaviour. Published in Taylor & Francis online.

Sources

e-lastenrad.de (2018): Lastenfahrrad Vergleich: Wendekreis der Transportfahrräder. URL: http://www.e-lastenrad.de/blog/e-lastenrad-neuigkeiten/lastenfahrrad-vergleich-babboe-nihola-yuba-test.html/attachment/lastenrad-vergleich-wendekreis.

Elektrofahrrad24 (2020): Ein E-Bike in den Warenkorb. Oder zwei. Oder drei. URL: https://www.elektrofahrrad24.de/blog/fahrradverkauf-prognose-2030%C2%A0%E2%80%8B.

Fachhochschule Erfurt, Insitut Verkehr und Raum (2022): Planungshilfe für Abstellanlagen von Lastenfahrrädern im öffentlichen Raum. Empfehlungen aus dem Projekt Aladin - Abstellanlagen für Lastenfahrräder in Nachbarschaften.

[FGSV] Forschungsgesellschaft für Straßen- und Verkehrswesen (2012): Hinweise zum Fahrradparken. FGSV – Verlag, Köln.

[FGSV] Forschungsgesellschaft für Straßen- und Verkehrswesen (2010): ERA - Empfehlungen für Radverkehrsanlagen. FGSV – Verlag, Köln.

Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Wohnen, Amt für Bauordnung und Hochbau (2022): Bauprüfdienst (BPD) 2022-2. Mobilitätsnachweis (Notwendige Stellplätze und Fahrradplätze).

Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Wohnen, Amt für Bauordnung und Hochbau (2022): Bauprüfdienst (BPD) 2022-5. Fahrradplätze und Abstellräume für Fahrräder.

Sources

Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Wohnen (2020): Leitfaden Fahrradparken im Quartier. Empfehlungen für die Planung von Fahrradabstellanlagen auf privaten Flächen.

Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Wohnen (2020): Leitfaden Fahrradabstellanlagen.

R. Egan, C.M. Dowling, B. Caulfield (2022): Exploring the elements of effectice public cycle parking: A literature review. Published in Journal of Urban Mobility.

Statista (2023): Umsatz im Einzelhandel mit Fahrrädern, Fahrradteilen und -zubehör in Deutschland von 2010 bis 2020. URL: https://de.statista.com/statistik/daten/studie/6330/umfrage/umsatzentwicklung-im-fahrradhandel-in-deutschland/.

This design guide is intended as a handbook for architects to ensure a user-centered orientation in the planning and implementation of bicycle parking. It was developed in collaboration with Ector Hoogstad Architects, the designers of the world's largest bicycle parking garage in Utrecht, the Netherlands. The key findings and lessons learned from the success story of the Utrecht Bicycle Parking Project were incorporated. The goal was to combine the expertise of the Dutch architect's office and the skills of ARGUS studio/ in communicating target images, measures and standards to strengthen the realization of first-class bicycle parking. Contents were collected that can be applied in different spatial contexts and are highly transferable.

We thank Ector Hoogstad Architects for the productive collaboration.

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