Ira Verma  Johanna Hätönen  Päivi Aro

FUTURE PUBLIC TRANSPORT FOR ALL
Usability and accessibility in station areas
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Usability and accessibility in station areas
Abstract

Regardless of their age and functional capability, access for all user groups is improved by good rail traffic design and improved station accessibility. Safe, accessible public transport benefits all user groups, while helping to meet sustainable development goals and contributing to the creation of a socially sustainable urban environment.

The aim of the Future Public Transport for All Project was to create a comprehensive picture of the accessibility and usability of rail traffic terminals and of solutions impacting on the success of the entire journey. The user study was conducted in co-operation with the Finnish Association of People with Physical Disabilities, the Finnish Federation of Hard of Hearing, and the Finnish Federation of the Visually Impaired. Data was collected via interviews and online questionnaires, as well as observational tours of rail traffic stations with representatives of various user groups.

The entire journey was analysed, from the starting point to the final destination. Needs for further development were identified in terms of journey planning, the use of public transport and station accessibility. The study resulted in guidelines on the application of recognised best practices and new planning solutions in creating accessible rail traffic terminals.

The study reveals that rail traffic and public transport would be more widely used if they were safe and accessible. Potential users can be attracted to public transport through improvements in communication, the station area, guidance and feeder traffic.

This project formed part of the Tekes Sustainable community technology programme and of Helsinki's Innovative City Programme. The project's main development targets, and the main sources of funding, were the Western Metro and Ring Rail Line. Other participants included the Finnish Ministry of Transport and Communications, the Finnish Transport Agency, the Cities of Espoo and Vantaa, Finavia, Helsinki City Transport (HKL) and Helsinki Region Transport (HSL).

Keywords - keywords (and categories)
Rail traffic terminals, journey, accessibility, usability

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**INSTRUCTION CARDS**
'The Future Public Transport for All – Usability and accessibility in station areas‘ is a study mapping the accessibility and usability of public transport, particularly rail traffic, for different user groups. An extensive user study was conducted to map the factors either promoting or hindering travel. The aim of the project was to introduce user-oriented solutions to the design of rail traffic stops, stations and terminals, and their surroundings. Design objectives include facilitating mobility and orientation in rail traffic areas, while making changes from one means of transport to another as easy as possible.

The project focused on the entire journey, from its starting point to the final destination. Factors contributing to a successful experience were analysed. Implementing solutions that promote usability has an impact both on the overall accessibility of the environment and the degree of user satisfaction. Most people who participated in the user study said they would make greater use of public transport if their needs were better met. Solutions contributing to usability would enable the elderly population, people with small children (prams), persons with reduced mobility and people with disabilities to manage independently on public transport.

The study results can be applied in various ways to rail traffic projects launched in the near-future. During the project, the effects on usability and independent travel of design solutions implemented recently in some of Helsinki’s public transport terminals, and in a few European cities, were evaluated. Still in the project planning stages, the Western Metro Line and the Ring Rail Line have been the target of active development. In ongoing planning processes, the study results have been directly implemented through interaction with designers. Applied research and development promotes innovation and the direct application of new solutions in practice.

To persuade all potential user groups to opt for public transport, this mode of travel and its appeal must be developed. Land use requirements issued by Finland’s environmental administration, and the public transport targets set by the Ministry of Transport and Communications, can be met by developing public transport, particularly rail traffic. Furthermore, well-functioning rail traffic would contribute to the creation of a socially sustainable metropolitan area in the greater Helsinki area. Improving the accessibility and usability of terminal areas will help to create positive travel experiences, increasing the use of public transport in turn.
This project was a private project financed by Tekes, with Länsimetro Oy as the primary applicant. The Aalto University Department of Architecture’s Sotera Institute (The Research Institute for Health Care Facilities) was commissioned to perform the study. The project's steering group included representatives of the research group and the instances financing the project. Matti Kokkinen, Managing Director of Länsimetro Oy, was the chairman of the steering group and the project co-ordinator. Based on a prearranged schedule, the steering group met two to three times a year.

The project included a working group which comprised representatives from Sotera, the Finnish Federation of the Visually Impaired, the Finnish Association of People with Physical Disabilities, and the Finnish Federation of Hard of Hearing. The group invited specialists to make evaluations, give lectures or to engage in some other project work, as necessary.

STEERING GROUP

Matti Kokkinen, Managing Director, Länsimetro Oy
Arja Aalto, Chief Inspector, the Finnish Transport Agency
Sinikka Ahtiainen, Public Transportation Coordinator, City of Espoo
Timo Ernvall, Professor, Aalto University School of Science and Technology, Traffic and Transport Technology
Hannu Huttunen, Professor, Aalto University School of Science and Technology, Architecture
Nina Karasmaa, Project Manager, Helsinki Region Transport, HSL
Emmi Koskinen, Traffic and Transportation Engineer, City of Vantaa
Harri Leivo, Accessibility Representative, the Finnish Association of People with Physical Disabilities
Katarina Myllärniemi, Ministerial Adviser, the Finnish Ministry of Transport and Communications
Jari Pusa, Project Manager, Finavia
Hanna-Leena Rissanen, Accessibility Representative, the Finnish Federation of the Visually Impaired
Marko Vihervuori, Senior Researcher, Traffic and Transportation, Helsinki Region Transport, HSL
Ira Verma, Project Manager, Aalto University School of Science and Technology, Sotera

PROJECT GROUP

Ira Verma, Project Manager, Sotera
Päivi Aro, Industrial designer, Pinko Oy
Johanna Hätönen, Research Assistant, Sotera
Harri Leivo, the Finnish Association of People with Physical Disabilities
Jukka Rasa, the Finnish Federation of Hard of Hearing
Hanna-Leena Rissanen / Anna Ruskovaara, the Finnish Federation of the Visually Impaired
Erica Roselius, Laboratory of Transportation Technology, DI worker
Background

Rail traffic development in the greater Helsinki area

In August 2008, the Ministry of Transport and Communications, the cities of Helsinki, Espoo, Vantaa and Kauniainen and YTV signed the Helsinki Metropolitan Area Transport System Plan. Local operators proposed the Ring Rail Line as the first major construction project, with the Western Metro as the second. Construction began on the Ring Rail Line in spring 2009. The line will enter service in the second half of 2014. Excavations for the Western Metro were initiated in autumn 2009 and the line should be opened in 2015.

Planning of the current metro network began in 1955, when two proposals to build an underground railway in Helsinki were put to the city council. The city council’s positive decision on this was recorded on 7 May 1969. The metro line was first tested on 1 June 1982 and the official opening ceremony was held on 2 August in the same year.

In the 1910s, Eliel Saarinen and Bertel Jung had already added suburban railway tracks to their Helsinki city plans. These plans can be viewed as an early model of the Finnish metro system. A growing Helsinki needed new traffic connections. The aim was to connect new neighbourhoods to downtown Helsinki, while making it easy for residents to move from one suburb to another. During WWII, this issue of tunnels became topical. Tunnels running from the city centre towards Käpylä and North Haaga would double as air-raid shelters.

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1 Minister of Transport Anu Vehviläinen on 24 November 2009.
After the war, as large numbers of people moved to Helsinki, the public transport fleet could no longer cope with growing demand. A suggested solution included "fast tracks" to run underground in the city centre. But the time had not yet come for such projects and support for the metro was overwhelmed by opposition. Negative experiences with metro systems abroad had generated scepticism in Finland. "For the travelling public, journeys by vehicles in daylight were preferred and considered healthier than travelling in dark cars roaming through tunnels", comments Hans Sahlberg, Helsinki City Transport's (HKL) retired Managing Director, on experiences abroad.

When Helsinki’s Eastern suburbs were built in the 1950s, the subject of a metro system became topical again. Poor traffic connections to the new suburbs and the growing number of cars in Helsinki boosted support for a metro line. Finally, at the end of the 1960s, the main railway lines were finished. Commuter trains would run along the main lines to the West and North, while a metro would be built to serve the Eastern areas of Helsinki.

**Sustainability and user-friendliness**

In addition to providing a convenient method of travel, rail traffic offers a solution to many of the challenges posed by sustainability. Experts agree that, in terms of sustainable development, optimal land use in urban areas is supported by rail traffic. In the Helsinki region, national land use objectives are aimed at promoting urban structures relying on public transport, particularly rail traffic.²

In the greater Helsinki area, traffic is responsible for approximately one fifth of CO2 emissions, only 2% of which is due to rail traffic. CO2 emissions can be reduced by promoting public transport and limiting travel by private car. Public transport can also be rendered more attractive by improving the accessibility and usability of vehicles and stations. Additionally, station surroundings should provide a safe light traffic network for pedestrians and cyclists³.

In addition to energy-efficiency and reducing transport emissions, rail traffic plays a role in the development of a socially sustainable city. In terms of social equality, everyone should be able to satisfy their travel needs irrespective of their financial, physical or mental abilities. The quality of the living environment, the availability of functions and services and the accessibility of the transport system have been defined as the key factors in social equality.

Population ageing will increase the importance of accessible and usable transport in the future. It is estimated that, in 2030, over 25% of the total population will be over 65 years old ⁴. Participation possibilities can be improved by developing the transport system to better accommodate the elderly, persons with reduced mobility and people with sensory disturbances.

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² Government decision on reviewing national land use objectives, 2008.
³ Helsingin pyöräilyn kaksinkertaistamisohtelma, 2004. [A program to double the amount of cycling in Helsinki. 2004].
⁴ Statistics Finland, forecasts on demographic developments.
User information

User information is needed to support the development of terminal areas, and to determine passengers’ requirements and emerging problems. Users perceive their journey as a whole that should function as expected from the starting point to the final destination. They evaluate and compare existing solutions. Finding solutions that will meet the users' requirements is a task for experts. General information on passenger numbers, ages, gender, purpose of travel etc. is needed to support development solutions.

The Finnish Ministry of Transport and Communications, the Rail Administration, Helsinki City Transport (HKL) and VR-Group (a Finnish transport company providing rail transport and supplementary road transport services) have each mapped their current status and issued guidelines on the accessibility of stations and public transport interchanges. Mapping tools have been created for internal use, while reports have been intended solely for developing internal processes. Due to the lack of a common tool, the results are not directly comparable. The Finnish Association of People with Physical Disabilities and Stakes (Technical Research Centre of Finland), for example, have developed tools for the detailed evaluation of public facilities and services. These tools can be applied to the evaluation of rail traffic environments and public transport terminals.

Each rail traffic station accommodates several operators, all with their own accessibility criteria and objectives. Because the different sections of a passenger terminal are administered by different organisations, uniform and holistic development is a challenge. However, successful travel requires uninhibited access throughout the journey. Therefore, general improvements to station services include clarifying the responsibilities and proprietary relationships between various operators and improving co-operation.

New regulations and EU directives

New European-wide regulations are being prepared which have implications for Finnish rail traffic. At the end of 2009, the European Commission issued a decision regarding persons with reduced mobility in regular and high-speed railway systems. This decision entered into force on 1 December 2009 and will remain valid until further notice.

The regulation primarily affects buildings and passenger platforms constructed in rail traffic areas, subsequent to its entry into force. Although the metro has been excluded, it is likely that accessibility regulations will soon affect underground stations too.

In addition to persons with sensory disturbances or disabilities, this regulation defines persons with reduced mobility as including people with small children (prams) or heavy luggage, children, and foreign tourists unfamiliar with the language. The regulation will therefore affect all rail traffic users at some point of their lives.

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User study

Overview

A comprehensive user study was conducted as part of the Future Public Transport for All study. The aim was to obtain a comprehensive understanding of how well rail traffic functions in the greater Helsinki area. In addition, key development targets were to be mapped, from the perspective of passengers with reduced mobility or sensory disturbances in particular. The user study was used as a tool for discovering solutions to factors preventing or hampering the use of public transport.

Problems and deficiencies experienced by different user groups were classified into dangerous, inhibitive and hampering factors. Factors were also mapped and analysed which cause uncertainty or fear during transport by rail and in station environments.

In this report, the results of the user study have been deployed in defining the best practices and design solutions set out in the 'Solutions and development suggestions' sections.

The analysis focused on the entire journey, from planning to the final destination. The journey was viewed from the perspectives of physical accessibility of the surroundings, availability of travel information and services, and implemented practices. A journey being a sum of its parts, the compatibility of different parts was analysed from the perspective of usability. A journey can only be considered accessible if all links in the chain are unbroken and function smoothly.

How the user study was conducted

In the user study, the usability of rail traffic was analysed together with passengers with reduced mobility, impaired vision or impaired hearing. Representatives of the Finnish Association of People with Physical Disabilities, the Finnish Federation of the Visually Impaired and the Finnish Federation of Hard of Hearing participated in the planning and implementation of the user study.

User information was collected via an extensive online questionnaire, in interviews and during observational tours. 151 persons with reduced mobility and sensory disturbances participated in the online questionnaire.

During the observational tours, a total of 22 people representing different user groups were interviewed. Most interviewees also participated in an observational tour. A total of 8 observational tours were conducted.

Observational tours were conducted in rail traffic stations located in the greater Helsinki area. During the tours, the stations, stops, feeder traffic areas, the availability of travel information and service functionality were assessed.

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Aro, P. 2009. Yhteenveto pääkaupunkiseudun raideliikenteen käyttäjätutkimuksesta. [A summary of the user study on the greater Helsinki area rail traffic.]
Results of the online questionnaire

Respondents to the questionnaire who have impaired vision or hearing were all active users of public transport. Of the respondents, persons with impaired vision and reduced mobility preferred the metro, while those with impaired hearing were avid users of the metro and commuter trains. Of all rail traffic modes, persons with reduced mobility use commuter trains the least. Persons with impaired vision or hearing use trams the least. Most respondents (80% of those with reduced mobility, 77% of those with impaired vision and 55% of those with impaired hearing), would travel by rail significantly or somewhat more, if travel was easier.

As well as the built environment, the obstacles encountered in various places can concern the availability of information or services. Announcements and the availability of information on service alterations and incidents have caused problems for many passengers with sensory disturbances.

Some 43 per cent of persons responding to the online questionnaire avoid rail traffic if the means of public transport needs to be changed en route. Rail travel was also avoided in difficult weather (e.g. freezing temperatures), when the ground was frozen, during rush hours and after dark.

According to the questionnaire responses, 40% of respondents with impaired vision, 36% of those with reduced mobility and 16% of those with impaired hearing use only familiar routes and rail connections they have already mastered. For some persons with impaired vision, orientation and mobility guidance is necessary in unfamiliar environments. Such persons are not confident of managing independently on a new route; new routes are learned with an assistant.

For persons with impaired hearing, unclear or missing announcements created most problems. Information on service alterations is typically delivered through announcements, and persons with low hearing do not receive this information. Of the respondents, 43% with impaired hearing and 40% with impaired vision feared missing an important message on service alterations. Furthermore, 53% of the respondents with impaired vision replied that they had disembarked at the wrong stop due to lack of information. Persons with impaired vision have experienced difficulties in locating the correct platform, stop, lift or vehicle. Persons with reduced mobility have experienced problems in locating a lift in the station area, and accessing the station or platform when the lift is out of order.

Factors causing uncertainty or fear which affect the reliability and image of rail traffic were also mapped. Uncertainty about arriving at the destination may prevent a journey. Some 39% of respondents with reduced mobility were uncertain about boarding a vehicle independently.

All respondent groups wanted more information on accessibility for journey planning. 23% of respondents were not satisfied with the availability of timetables and route information. In particular, more information was required on nearby feeder traffic areas (77%), any construction sites or roadwork affecting accessibility (77%) and service alterations (75%). Most respondents searched for timetable and route information online using YTV’s (HSL, Helsinki Regional Transport Authority, since 1 January 2010) Journey Planner, for example.
Have you ever encountered obstacles to travel in the following rail traffic or station environments or situations?

Answers in agreement (“yes”) Comparison by target groups (%)

- Stations and platforms and their immediate surroundings?
  - Persons with reduced mobility: 46%
  - Persons with impaired hearing: 33%
  - Persons with impaired vision: 31%

- Feeder and connective traffic stops near the station?
  - Persons with reduced mobility: 67%
  - Persons with impaired hearing: 37%
  - Persons with impaired vision: 32%

- Passageways in the station?
  - Persons with reduced mobility: 30%
  - Persons with impaired hearing: 24%
  - Persons with impaired vision: 22%

- Ticket sales or information desks in the station?
  - Persons with reduced mobility: 53%
  - Persons with impaired hearing: 47%
  - Persons with impaired vision: 44%

- Lifts or escalators in the station?
  - Persons with reduced mobility: 60%
  - Persons with impaired hearing: 45%
  - Persons with impaired vision: 29%

- Rest rooms?
  - Persons with reduced mobility: 50%
  - Persons with impaired hearing: 38%
  - Persons with impaired vision: 22%

- Other services at the station (cafés, stalls, restaurants, etc.)?
  - Persons with reduced mobility: 50%
  - Persons with impaired hearing: 30%
  - Persons with impaired vision: 22%

- Metro platforms?
  - Persons with reduced mobility: 40%
  - Persons with impaired hearing: 22%
  - Persons with impaired vision: 18%

- Commuter train platforms?
  - Persons with reduced mobility: 53%
  - Persons with impaired hearing: 31%
  - Persons with impaired vision: 22%

- Tram stops?
  - Persons with reduced mobility: 70%
  - Persons with impaired hearing: 44%
  - Persons with impaired vision: 22%

- When boarding or exiting a vehicle (metro, commuter train or tram)?
  - Persons with reduced mobility: 53%
  - Persons with impaired hearing: 22%
  - Persons with impaired vision: 35%

- While travelling on a vehicle (metro, commuter train or tram)?
  - Persons with reduced mobility: 50%
  - Persons with impaired hearing: 31%
  - Persons with impaired vision: 35%

Figure 3. Obstacles in rail traffic environments
### Issues causing anxiety and uncertainty when travelling by rail

Comparison by target groups (%)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Persons with reduced mobility</th>
<th>Persons with impaired hearing</th>
<th>Persons with impaired vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>I won't be able to cope independently</td>
<td>28</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>I'll get lost or end up in a wrong destination</td>
<td>8</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>I'll miss my appointment or other reason for travel, because of the obstacles in the built environment</td>
<td>4</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>I'll miss my appointment or other reason for travel, because I cannot access timetable or route information</td>
<td>4</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>I'll fall, trip or slip on the way</td>
<td>2</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td>I'll lose my balance or fall of the platform</td>
<td>12</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>I can't board or exit the vehicle independently</td>
<td>2</td>
<td>10</td>
<td>39</td>
</tr>
<tr>
<td>I'll be trapped between closing doors</td>
<td>2</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>I'd need help, but no-one will assist me during the journey</td>
<td>8</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>I will not receive important information about service alterations</td>
<td>12</td>
<td>20</td>
<td>43</td>
</tr>
<tr>
<td>I'll cause delays to other passengers</td>
<td>12</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>I'll not have enough strength to see the trip through</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Figure 4. Issues causing anxiety and uncertainty when travelling by rail**
Major user group-specific targets for improvement

Improvement needs in station areas were divided according to specific user groups. This was done to ensure that equal consideration is given to the specific needs of passengers with reduced mobility, impaired vision, and impaired hearing. The user information obtained can be applied to creating solutions which will ease travel for all passengers.

Persons with reduced mobility

In this report, a person with reduced mobility refers to someone who has difficulties getting around due to an illness or disability, and who may therefore use assistive devices such as a wheelchair. The disability may be temporary or permanent. Additionally, people whose mobility has been affected by old age, pregnancy, small children (prams) or luggage may be considered people with reduced mobility. Issues causing difficulties for a person with reduced mobility include differences in elevation, long distances and reach. Proper reach is often an issue for children, as well as persons of short stature. In the following, major targets are introduced for improvements easing travel for persons with reduced mobility, particularly by rail.

1. Accessible routes and signs

The most user-friendly solution would be to make main passages accessible to everyone. In many stations, the accessible route takes a different course to the main passage. A lift, ramp or accessible entrance, for example, may be located apart from the main passage. Accessible routes are often longer and more complicated than main passageways, and signage is poor. In particular, routes and signage for feeder traffic areas are problematic.

2. Improving compatibility between the transport vehicle and the edge of the platform

The level difference between the new, low-floored tram models and elevated platforms is still too large, or the gap is too wide, for easy access by wheelchair, electric wheelchair or scooter. Tram and platform compatibility must be further improved. Some tram stop canopies are located so close to the edge of the platform that it is impossible to pass under the canopy by wheelchair. In terms of usability, tram platforms are often too narrow.

Older, low-floored commuter trains have extensible ramps. Although these require the help of a conductor, during the observational tours it was noted that conductors either did not always have time to help a person with reduced mobility, or did not always notice that assistance was required.
3. Improving the availability of information on accessible travel

It is difficult, if not impossible, to find timetable information on low-floored connections at a commuter train station. Finding such information is also difficult on the most popular online timetable and route search services. In general, too little information is available on accessibility to enable advance journey planning.

Persons with impaired vision

A person with impaired vision may have low vision or be blind. Vision may be reduced due to illness or injury. Persons with low vision often suffer from night blindness and are sensitive to glare. Impaired vision affects orientation and makes it difficult to estimate distances and height differences. However, most persons with impaired vision are able to sense light, contrast and movement.

1. The effective use and development of standardised sign systems for persons with impaired vision

In station areas, there are too few signs facilitating the orientation and functioning of persons with impaired vision. Where such signage does exist, it is inconsistent.

In particular, standardisation is needed in sign surface materials, audible signals and the use of tactile signs and braille in stations and platforms.

2. Accessibility and management of travel information

Many independently travelling passengers with impaired vision have no access to important travel information in stations, such as timetables and platform details for the next departure. Furthermore, identifying the vehicle at the stop or platform is difficult, if not impossible, for many persons with impaired vision.

At stations equipped with queue number systems, queueing for a service is impossible for many persons with impaired vision.

3. Facilitating the perceptibility of rail traffic environments

In some stations, the environment cannot be easily perceived. A risk of collision or a fall is posed, due to the edges of stairs, glass doors and walls, columns and fixtures not being clearly perceptible. In some stations, the platform edges are not clearly marked using contrast marking and surface materials. The warning area should be uniformly marked on every platform.

Sharp contrasts in lighting, which cause glare or day blindness, should be avoided in station areas. Day-time lighting is often insufficient in underpasses, under platform canopies and in lobbies, for example.
Persons with impaired hearing

Persons with impaired hearing can be roughly divided into two groups: persons with a hearing impairment and deaf persons. Persons with a hearing impairment can communicate through speech and lip-reading, and with the help of a hearing aid. In the main, deaf persons communicate visually using sign language and writing.

A hearing impairment complicates communication and hinders access to information. Difficulties in distinguishing between words is typical of age-related hearing impairment: the person is likely to hear the sound of speech, but is unable to distinguish between words.

1. Information on service alterations at the station, platforms and on-board

If only audible announcements are given, a person with hearing impairment does not have access to details on service alterations. On platforms and onboard vehicles, details on service alterations are typically announced through speakers only.

2. Improving the communication environment of stations

Service desks often lack the proper communication environment necessary for persons with hearing impairments. Typical defects include the lack of an induction loop and unclear practices for communicating with passengers with impaired hearing.

3. Improved usability of devices and automated functions

In many stations, various technical devices and automated functions are becoming increasingly common. For persons with sensory impairments, it is essential that any information relayed by a device, such as the success or failure of an action, is given both audibly and visually.

Figure 5. The user study was conducted in co-operation with disability organisations. User experiences were recorded during observational tours, in photographs and videos.
Solutions and development suggestions

THE STATION AREA AND ITS IMMEDIATE SURROUNDINGS

In this report, in addition to the actual station building, the station area comprises any pick-up and drop-off traffic and feeder traffic areas, feeder traffic parking areas and near-by crossings. This definition corresponds to the Rail Administration’s definition in the technical railway track RATO instructions. However, the entire terminal area affecting people who work or live within one kilometre of the station building is considered part of the station area’s immediate surroundings. In public transport planning, an acceptable walking distance is typically 300 to 700 metres in urban areas. In the city planning of new neighbourhoods, the basic principle is to limit the distance to the nearest stop/station to 300 metres.

Special attention should be paid to pedestrian and cycle routes. Many elderly people and persons with reduced mobility are unable to walk long distances. They should therefore be offered supplementary public transport and resting places along pedestrian paths. These resting places should be within viewing distance of each other.

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9 Joukkoliikenteen suunnitteluohje Helsingissä (kh 18.6.2007).
[Instructions for public transportation planning in Helsinki. 2007]
Rail traffic users participating in the study detected several defects and problems within station areas and their surroundings. Several dangerous situations arose due to poorly marked elevation differences, slippery surfaces and dangerously steep ramps, for example.

To facilitate journey planning, more information is required on construction work in the vicinity of station areas. Many passengers viewed hindrances caused by construction work as negatively affecting the safety and duration of travel.

The major challenge in developing a terminal area, and its immediate surroundings, lies in securing a safe, accessible and short route from pick-up/drop-off and feeder traffic areas, to the service area and passenger platforms. To accommodate the needs of persons with reduced mobility, elderly passengers and people with little children (prams) and luggage, these routes must be short and appropriately signed. This will eliminate unnecessary detours.

In addition to concrete physical accessibility, clearly marked routes contribute to a positive travel experience. Unambiguous design of a station area and clearly marked routes, from near-by crossings and pick-up/drop-off and feeder traffic areas, to the service area and passenger platforms, help people find their way.

Appropriate marking and signs are critical in places where a route must be selected. An uninterrupted sequence of signs should be located along routes running through the terminal area, at intervals not exceeding 100 metres. If an accessible route splits off from the main passage and has not been properly marked, persons with reduced mobility and people with impaired vision are likely to follow the general flow of passengers, to the main passage way.

Figure 7. Poorly marked elevation differences had posed a hazard to 64 per cent of those with impaired vision and to 35 per cent of those with reduced mobility or impaired hearing, who participated in the study.

Figure 8. 30 per cent of those with impaired vision and 16 per cent of those with reduced mobility, who participated in the study, had lost their balance, and some had even fallen down, due to construction in the terminal area.

Near-by crossing

A dangerous, or difficult-to-negotiate near-by crossing should not prevent the independent travel of persons with limited mobility or impaired vision. It is recommended that crossings in the vicinity of stations be designed according to the SuRaKu - Accessibility Guidelines on outdoor areas 11.

With the help of these guidelines, pedestrian footpaths and intersections can be designed and constructed to allow persons with reduced mobility or impaired vision to function as independently as possible. The guidelines include information on measurements and materials that can be employed in the design and construction stages. In the design and construction of pedestrian crossings, special attention should be paid to differences in crossing elevation and footpath inclinations, for example.

An accessible route, leading from a near-by crossing to the station’s main entrance, should be as short as possible and equipped with appropriate signage. A short accessible route and appropriate signs serving all passengers contribute to fast and easy travel for all.

Accessible routes must be appropriately maintained, to ensure they remain safe in all weather conditions. A snow melting system should be installed in the terminal area and its surroundings. Such a system will ensure that surface materials providing guidance and crossing markings remain visible during the winter months.

Figure 9. Crossings around the station area should be distinctively marked.

11 Suraku_Kortti-1_060208.pdf. [SuRaKu Card 1]
A warning area, clearly defined by its surface texture and contrast, should lie adjacent to a pedestrian crossing, to give proper warning to persons with impaired vision. Clearly identifiable zebra crossing markings and contrasts help persons with reduced vision to detect a designated crossing. Furthermore, the crossing area should be adequately lit. It should also include uninterrupted guidance for persons with impaired vision, from the crossing to the station entrance.

- The minimum lighting requirement for pavements is 10 lux and a minimum of 30 lux for pedestrian crossings.\(^{12}\)

- An accessible pedestrian crossing should be equipped with a ramp kerbstone for assistive devices with wheels. The minimum width of a ramp should be 2,300 mm, to enable winter maintenance by machine.

- The push-button on a traffic-light pole should be distinctive and reachable from a wheelchair.

For the special level of accessibility as defined in the SuRaKu Accessibility Guidelines, crossings should always be equipped with traffic lights. A pedestrian crossing sign should be placed at the edge of the road. The push-button on a traffic-light pole should be easily reached and placed at a height suitable for those using wheelchairs.

For more information, please see:
Ulkotilojen esteettömyyden SuRaKu –kartoitus (Suunnittelu, Rakentaminen ja Kunnossapito) [Planning Guidelines for an Accessible Environment. The SuRaKu Report.]

Crossings and pavements:

\(^{12}\) Suraku_Kortti-1_060208.pdf. [SuRaKu Card 1]
Pick-up and drop-off traffic

The recommended distance between the station entrance and pick-up and drop-off area is no more than 100 metres. Pick-up and drop-off areas should be located next to an accessible entrance. The entrance to the terminal should either be visible from the pick-up and drop-off area, or be clearly marked. To accommodate safe transfer from car to wheelchair, sufficient space should be reserved for the pick-up and drop-off area. Footpaths should not be routed across traffic lanes. The passage to the station and terminal area should be as short as possible and not include steps. A sufficient number of resting places should be located along the path, within viewing distance of each other.

- It is recommended that resting places are no more than 50 metres apart.
- Pick-up and drop-off traffic areas, and accessible taxi spaces for persons with a disability, should be located near an accessible entrance.
- Parking spaces for persons with a disability should be clearly indicated with ISA symbols. (ISA, the International Symbol of Access)

Feeder traffic parking

Feeder traffic parking should be located near the entrance to a railway or metro station. Access from feeder traffic parking to the terminal area and platforms should be short and safe. The recommended walking distance from long-term parking to a station is less than 300 metres; it should not exceed 400 metres. This route should be free of steps, while signs and markings should be designed to account for passengers with impaired vision.

Safe and flexible feeder traffic parking contributes to the popularity of public transport as a means of commuting. A five-minute walk from the feeder traffic parking area to the terminal is considered too long, and has resulted in parking areas being under-used.

Parking spaces for persons with a disability should be located closest to accessible entrances and lifts. The dimensions of accessible parking spaces are given in the National Building Code issued by Finland’s environmental administration. By the side of the car, there must be enough space to accommodate transfer from car to wheelchair. Sufficient space must be left behind for emptying the car boot.

- The width of parking spaces for persons with a disability is a minimum of 3,600 mm and the length at least 5,000 mm.
- The minimum height required by accessible taxi vans is 2,800 mm.
- The minimum path width is 1,800 mm, sufficient to accommodate two prams or wheelchairs passing each other.

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13, 14 LVM, Esteetön matkakeskus. [Ministry of Transport and Communications. Accessible Public Transport Interchange]
Bicycle parking

Terminal accessibility is also enhanced by careful planning of pedestrian and cycle routes in the vicinity of a station terminal. Promoting cycling within cities is in line with general sustainability goals. Well-organised and safe bicycle parking promotes cycling. Furthermore, if bicycles can be carried onto public transport, the number of journeys by bike increases in city areas. The citybike system should be improved to promote cycling.

Effective bicycle parking should be located on the same level as the station entrance. Bicycle parking should be located in the immediate vicinity of the station entrance, while ensuring that bicycles do not block accessible routes and thereby cause a danger of collision or falling. It is recommended that short-term parking for people visiting the station is located 10 metres from the entrance, while long-term parking can be located further away. If the distance between the station entrance and bicycle parking is over 50 metres, parking racks tend to be underutilised. Bicycle racks should be located along the main directions of arrival by bike.

Seasonal variation in the number of cyclists is large. In the station area, the bicycling season can be prolonged and safe parking enhanced by ensuring that the parking area is safe and well lit. Racks should allow the locking of bicycle frames to them. Bicycle parking should be covered so that at least half of the available parking spaces are protected from rain. During winter, the number of cyclists falls and some racks can be removed, to allow for winter maintenance. Lockers provide the best protection against vandalism and weather.

Pedestrian footpaths and cycle paths should be separate and clearly marked. Cycle paths should be marked and paved with distinct materials and should not cross footpaths or traffic lanes. In addition, they should be routed behind, not in front of, the canopies of public transport stops.

It is expected that the number and size if bikes will increase in the near future. The number of tricycles, or "trikes", is likely to increase slightly, as a means of carrying luggage and assisting persons with balance disorders.

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19 Helsingin pyöräilyn kaksinkertaistamishjelma, 2004. [A program to double the amount of cycling in Helsinki. 2004].
Feeder traffic

According to the user study, changing from one vehicle to the next during a journey is the single-most significant hindrance or obstacle to travel. Feeder traffic poses problems, due to waiting periods caused by sparse connections and the need to change platforms.

In the future, new rail traffic projects in the greater Helsinki area will increasingly transfer passengers from buses to the metro and trains. It has been estimated that once the Western Metro line is completed, up to 60,000 journeys will be transferred from buses to the metro every day, while the total number of daily metro journeys will rise to around 100,000. Special attention should be paid to ensuring an easy changeover from one vehicle to the next, appropriate locations for feeder traffic, and clear and distinct signs. Easily accessible feeder traffic timetables and platforms, together with well organised maps indicating departure platforms, are the essential ingredients of a successful trip.

CHANGING FROM ONE VEHICLE TO THE NEXT

Changing from one vehicle to the next should be as safe and easy as possible. Departure platforms must be clearly marked and connective traffic should have fixed departure platforms. Changes in departure platforms should be avoided, because they increase the need for information, complicate advance planning and contribute to passengers’ feeling of insecurity.

When planning the route to the feeder traffic stop area, avoid crossings if possible. In metro terminals, the optimal solution is a lift that descends to the platforms directly from the entrance floor.

20 Minister of Transport Anu Vehviläinen on 24 November 2009 at the launch of the Western Metro line.
The waiting area must be sheltered and close to the connecting traffic area, with a view of the departure platform. Waiting for connecting traffic can also be done indoors, if real time audio-visual timetable information is available. This ensures that passengers do not need to remain outside in bad weather.

**TRAVEL INFORMATION**

Any travel information, such as timetables and departure platforms, should be announced on screens installed at eye level. Visual maps and display panels should be available for viewing at close range. Large touch panels displaying a map of the area are common in shopping centres and a perfect example of visual guidance. In the design of touch panel maps, special attention should be paid to differences in contrast.

A tactile map is a raised or embossed map for the visually impaired, displaying the location of platforms and platform numbers. In stations, tactile maps should be located inside or under a canopy. In addition, they should be located along passage ways and easily accessible. Tactile maps outdoors are less optimally fit for purpose, because fingers become numb in the cold and some sense of touch is lost.

**FEEDER TRAFFIC STOP AREA**

Feeder traffic stops are isolated from other traffic by greenery lanes, safety lanes and railings. The minimum distance between the stop's canopy and platform edge is 1,200 mm, measured from the foremost column in the bus's direction of travel. To ensure access by pram or wheelchair, the distance to the next column towards the rear should be at least 1,500 mm. A person leaving or entering a bus using the middle door may require additional space, due to a ramp being extended from the bus. This could be a person with a pram or in a wheelchair, for example. As a supplement to the SuRaKu Accessibility Guidelines, the Public Works Department of the City of Helsinki has issued a type draft for an accessible indented bus bay.

Bus stops without a bus bay are located on the outer edge of traffic lanes. Additional instructions complementing the type drafts for accessible stops include standardising the parking zone and marking the point to be aligned with the entrance door using blister tiles. The platform edge should be equipped with the appropriate safety markings and a warning area, for the benefit of persons with impaired vision.

Due to limited space, the terminals for feeder traffic often have head-in and reverse out bus bays. However, such bus bays should be avoided whenever possible, because reversing buses increase the risk of hazards.

It is recommended that tactile maps for checking the correct platform number be located at feeder traffic platforms and stops. For example, in the public transport interchange in Kamppi, tactile platform markings have functioned well. Free-standing signposts should be placed where they do not obstruct passages. A sign can also be placed on a canopy column, for example.

Timetables should be shown on screens in real time. Various mobile applications are being developed for persons with impaired vision, for receiving the latest timetables by phone.

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21, 22 Helsinki kaikille, Tyypipirustukset. Erikoistason pysäkkisyvennys. [Helsinki for all Project. Type drafts. Bus bay for special level of accessibility.]

23 Helsinki kaikille, Tyypipirustukset. Ajoratapysäkki. [Helsinki for all Project. Type drafts. Bus stop on traffic lane.]
It is recommended that feeder traffic platforms are covered. They should have a minimum width of 3,500 to 4,000 mm.

To enable maintenance by machine, the distance between the canopy's column closest to the platform edge and the edge of the carriage way should be a minimum of 2,250 mm.

Prams require a minimum distance of 2,000 mm.
To act as a distinct landmark, an entrance should be clearly distinguished from the building’s facade. If the station building is large and can be entered by foot from a variety of directions, a sufficient number of accessible entrances should be ensured. Preferably, all entrances should be accessible, at least the main entrance. If the main entrance is not accessible, the route to an accessible entrance should be clearly marked. The route from the main entrance to an accessible entrance should be as short and simple as possible.

A canopy offers shelter from the weather when waiting for pick-up and drop-off traffic. It also helps to keep the entrance clear during winter. Furthermore, an entrance with a roof or canopy is easier to distinguish when approached from the side.

Increasing the lighting level will further assist in accentuating the entrance, but will also contribute to diminishing any glare when stepping out into sunshine or entering from broad daylight. An excessive contrast between indoor and outdoor lighting may cause glare and prevent persons with impaired vision from seeing anything. A well-lit and clearly visible sign or symbol at the station entrance functions as a landmark guiding passengers, especially those with impaired vision.
A covered landing in front of an entrance allows people with prams or in wheelchairs to wait safely for the door to open. An embedded grating in front of the entrance acts as a warning area for persons with impaired vision. Ensure that heels, white canes, or the wheels of prams or wheelchairs cannot become caught in the grating. The sound of opening doors and flow of air will guide persons with impaired vision. Additionally, to guide persons with impaired vision to the door, an entrance should be equipped with an audible beacon. The audible signal should be clearly distinguishable from background noise.

Transparent glass doors and walls should have a warning stripe, to avoid the risk of collision. Warning stripes should be placed at eye level, measuring 900 to 1,500 mm from the floor surface. A warning stripe on a glass door or wall should comprise a minimum of two horizontally attached, 100 mm wide stripes 25.

Accessible routes should not include elevation differences. Thresholds can be avoided by using vestibules. Vestibules may also be beneficial in balancing the station’s indoor temperature, stabilising air currents and balancing changes in lighting. The recommended minimum width of a vestibule passage is 1,800 mm, which allows two wheelchairs or prams to pass each other and accommodates an accompanying assistant or guide dog. The recommended length of a vestibule is also 1,800 mm, to ensure sufficient space for turning around with an assistive device with wheels, if necessary. The dimensions of an accessible vestibule are published in the Building Information Foundation’s guidelines 26.

Automatic sliding or outward opening swing doors are a practical solution – revolving doors are not recommended. Semi-automatic doors are opened with a push-button located on a control unit. The button should be clearly visible and stand out from its background. It should be located at such a height that it can be easily reached from a wheelchair, in a place where the person pushing the button is in no danger of being hit by the opening door. The radius of outward opening doors should be marked with a distinct surface material, to caution persons with impaired vision.

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25 RTV. Esteettömyys rautatieliikenteessä. [RTV. Accessibility and the railways.]
26 RT 09-10692. Esteetön liikkumis- ja toimimisympäristö. [Building regulation card RT 09-10692. Accessible environments.]
• The minimum width of the passage is 2,300 mm to ensure maintenance by machine.

• The minimum clear height of a passage is 2,200 mm and the recommended minimum underpass height of a building or part of a building is 3,000 mm. (SuRaKu Accessibility Guidelines)

• If possible, thresholds are avoided in entrances and the recommended maximal threshold height is 20 mm.

• In gratings, the maximum gap width is 5 mm and length 30 mm.

• The minimum dimensions of a vestibule are 1,800 mm in width and 1,800 mm in length to ensure sufficient space for prams and wheelchairs to pass each other safely and for turning around in the vestibule.

• Warning stripes attached to transparent glass doors and walls should be placed 850 to 1,050 mm and 1,500 to 2,000 mm from the floor surface.

• The push-button opening a semi-automatic door should be placed at a height of 800 to 1,200 mm.

• The force needed to open a door manually should not exceed 10 N.

Figure 20. A metro station can be a landmark. Munich, St. Quirin Platz.

29 VYP. Estetön asuinrakennus. [VYP Community Planning Service of the Disabled. Accessible residential buildings.]
Accessible routes

The main passage should be accessible. An accessible main passage should be logical, as short as possible and equipped with appropriate signage. When an accessible route departs from the main passage, the junction must be equipped with adequate signs for the selection of the correct passage. Since such junction points are very important, it is essential that they are clearly marked. Additionally, junction points must be equipped with a warning area on the floor surface, to draw the attention of persons with impaired vision.

Open floor plans, where functions and services are separated from the passage-way by furniture alone, are extremely difficult to navigate for persons with impaired vision. Navigating an open-plan terminal is a challenge for people accompanied by a guide dog.

In a metro station, since most passengers choose the escalator to move between levels, the main flow of pedestrians moves along a route towards the escalator. This route must be sufficiently wide to allow persons to move at different paces without colliding.

In an ideally designed pedestrian environment, crowding is avoided by allowing people to proceed at their own pace. An adequate number of resting places are located along the route for persons with reduced mobility.

Figure 21. Examples of various solutions to improve accessibility and usability inside a station building.
The route leading to the escalator should be marked on the floor, with a clearly visible contrasting stripe and a metal strip guiding persons using a white cane. A series of lamps running parallel to the passageway provides an additional guiding element. Many persons with impaired vision are able to find their way by going with the flow.

- The minimum lighting in accessible pedestrian routes in rail traffic areas is 100 lux, measured from floor level 30, while the recommended lighting is 300 lux 31.

- The minimum passageway width is 1,800 mm to allow two prams or wheelchairs to pass each other safely. However, the recommended minimum width is 2,500 mm.

- The maximum distance between resting places is 150 metres, the recommended distance is 50 metres 32.

Ticket sales and travelcard stamping

The same, easily identifiable ticket and stamping machines should be installed in every station. Such machines should be simple and easy to use. Persons with impaired vision, for example, have difficulty in locating and using a ticket stamping machine. Ticket and stamping machines must be within reach for wheelchair users. Facing the front, wheelchair users can reach a device placed 700 to 1,200 mm above floor level, provided that an adequate knee-recess has been left under the device. The keyboard, payment system and printer must all be placed at the same height 33. Ticket machines and other devices must give a recognisable sound, to indicate the success or failure of a transaction. New machines should never be installed before their usability has been thoroughly tested on different user groups.

It is recommended that machines are placed parallel to the passageway, so that any queues forming in front of them do not block or crowd the passage. Installing ticket and stamping machines at a distance from the escalators ensures free access to escalators, even during rush hours.

Figure 22. Nanakuma Line, Fukuoka, Japan

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30 RTV. Esteettömyys rautatiejärjestelmässä. [RTV. Accessibility and the railways.]
32 Roselius, E. 2009.
33 RTV. Esteettömyys raitiiliikenteessä. [RTV. Accessibility in rail traffic.]
Queues forming in front of ticket machines can also be reduced by providing a sufficient number of ticket machines and offering alternative methods of purchasing tickets, including etickets by mobile phone.

Background noise disturbs hearing. If the station has a separate area where tickets are sold, it should be placed somewhere where the noise conditions can be adjusted to accommodate persons with a hearing impairment. Hearing loss affects communicating with others and prevents access to information. It thus complicates managing independently. An induction loop for the hearing impaired must be available in at least one service point. Use of portable short-range induction loops is recommended. As the person behind the counter speaks into the microphone, the sound travels directly into the hearing aid via an induction loop installed in the counter. Customers must also be given the opportunity to communicate in writing.

The dimensions of customer care counters should accommodate passengers in wheelchairs. A handrail along the edge of a service counter provides support for persons with limited mobility.

Modern queueing systems are ideal for persons with impaired hearing. When the number changes, the system gives a sound signal and the displayed number often blinks on the screen. However, persons with impaired vision cannot use a queueing system based on eyesight and are unable to see the numbers changing on displays. An alternative method should be provided for them.

Some people with a hearing impairment prefer buying their tickets from a machine to purchasing tickets at a desk lacking an induction loop or sensitive service personnel.

It should be possible to locate the equipment and use it without additional guidance. The area around a ticket machine should be sufficiently large to provide some privacy. Around ticket machines, there should be an area with a radius of 1,500 mm. No other furniture should be placed within the area, which can be marked using different floor materials.

The possibility to use an induction loop can be combined with any vending machines and devices. An attached symbol should show where an induction loop is available. A connection can be made from ticket machines and information counters to a service centre located further away. This centre should provide advice on how to use the machine or supply other information regarding travel, for example. Button functions should be clearly identifiable, and the device must give an audible and visual signal to indicate the success or failure of an action.

Figure 23. Copenhagen Airport Information

LVM. Esteetön Matkakeskus.
[Ministry of Transport and Communications. Accessible Public Transport Interchange.]
A ticket validation gate installed at metro or railway stations should be sufficiently wide to allow pedestrians to pass through without needing to reduce their walking speed. At least one of the gates should be spacious, with a minimum width of 800 mm. The recommended minimum width of a ticket inspection gate is the standard width of doorways (850 mm), which ensures easy access for wheelchair users. An alternative passage must be provided for persons with reduced mobility, if the station is equipped with turnstile gates.

- Appropriate desk height for wheelchair users is 750 to 800 mm.
- Under the service desk, there should be a knee-recess of at least 670 mm measured from floor level and 600 mm deep.
- The minimum knee-recess width is 800 mm.

Furniture in ticket halls

Furniture should be placed clear of the passageway, to avoid the risk of tripping. Uniform furniture placement in different terminals helps persons with impaired vision to navigate at different stations. The furniture used must be robust and safe. Items of furniture should be immobilised, by fixing them to the ground. The colour or tone of the furniture must stand out from the background. Reflecting materials susceptible to glare should be avoided.

Ideally, seat materials should be durable and easy to clean. Seats should be clearly distinguished from their background. It is suggested that their location is marked on the floor, with a warning area with a clearly distinguishable contrast and material. Seats must have backrests, and arm rests are recommended. The recommended minimum distance between seating areas is 50 metres. In addition to the traditional seating height (450 mm), some seats should rise higher, to a seating height of 500 to 550 mm. Higher seats are suitable for passengers suffering from knee or hip problems. Seats and other furniture should be designed to take account of floor cleaning.

Figure 24. Nanakuma Line, Fukuoka, Japan

Figure 25. Seats at the Helsinki metro station were designed by Yrjö Kukkapuro. Special attention was paid to their ergonomics, durability and easy maintenance.

36 See above
37 LVM. Esteetön matkakeskus. [Ministry of Transport and Communications. Accessible Public Transport Interchange.]
38 SuRaKu Accessibility Guidelines.
Ticket hall – Signs

Signs in the ticket hall should guide passengers from the entrance to the service counters and then to the platforms, using their preferred method of moving to other levels. Signs are particularly important when the main route leading to the escalators deviates from the accessible route. Junction points and areas where tickets are bought and stamped should be marked on the floor with a warning area. In addition to visual signs, a tactile map should be located indoors and close to the entrance, to enable persons with impaired vision to check and learn the route.

The sound of the escalators leads persons with impaired vision to them. The route to the escalator should be marked with a contrasting stripe and a metal strip, for the benefit of those using a white cane. It is recommended that an audible beacon is used to guide persons with impaired vision to lifts. A sound signal should be given when a lift is called and when its doors open.

Figure 26. Signs at the feeder traffic terminal of Kamppi.

Ticket hall – Lighting

To avoid glare, information and ticket machines should be located away from direct sunlight. If artificial lighting is required for reading detailed information, the lighting intensity must be 15 lux above that of the environment 39.

- Service areas must be adequately lit, minimum lighting 300 lux 40.
- The recommended lighting at a service desk is 750 lux 41. This ensures that the employee's face is clearly visible, without a risk of glare.
- The recommended lighting at the checkout desk is 1,000 lux 42.
- Avoid direct sunlight and large glass surfaces likely to cause glare.
Moving to a different level

In terminals, passengers should be able to change level using the device they wish. Ideally, the stairs, escalators and lift should have equal prominence in the passageway. Choosing whether to take the lift or use the stairs is made on the spot. To promote healthier choices, it is recommended that any stairs be positioned on the passageway. If the stairs are located somewhere out of sight, people tend to choose the escalator or lift. Lifts must always be an available alternative for persons with reduced mobility.

A LIFT

Lifts must always be available for persons with reduced mobility and those travelling with little children (prams). It is recommended that a lift is installed whenever the level height difference is more than 1 metre, as ramps then become inconveniently long. The recommended lift capacity is 10 people, and the minimum capacity is 8 persons. People with bicycles, prams and wheelchairs should be considered when designing the lift dimensions. Lifts should be designed according to the accessibility guidelines issued by the Building Information Group 43.

Persons with impaired vision should be guided to lifts by a metal strip running along the floor and an audible beacon. Lifts should

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be located at the ends of passageways or perpendicularly along the passageway. To avoid crowding while people are awaiting the lift, sufficient free space should be left in front of the lift doors. The floor number or symbol should be clearly marked next to the lift doors. A logical place for a directory is next to the lift, where the location of different services can be checked while waiting on it.

A lift can be called automatically using a motion detector, or traditionally by pressing a button. The button should be clearly distinguishable from the background and located at such a height that it can be easily reached from a wheelchair. Obstacles to pressing a button include reduced mobility or function of the upper limb. Different sounds should signal the call for a lift, its arrival, and opening doors. It is recommended that inside the lift, an audible voice announces the current floor and the selected floor number.

Floor buttons should be vertically arranged in logical order. The alarm button should be located apart from the floor buttons. To avoid false alarms caused by unintentionally pressing an alarm button, alarm buttons should be protected by a fixed ring. Avoid sensor buttons. The floor should be indicated next to the button, either in Braille or using tactile signs.

- The minimum depth of a lift car is 1,400 mm and the minimum width 1,100 mm. The recommended minimum dimensions of a lift car are 1,600 mm (depth) x 1,400 mm (width).
- The clear width at the door is 900 mm.
- The minimum radius of the turning circle in front of the lift is 1,500 mm.
- Lift buttons are located 850 to 1,000 mm above floor level and a minimum of 400 mm from any corner.
- The buttons should be sufficiently large (Ø 25 mm) and placed sufficiently far from each other (centre-to-centre distance 35 mm).
- Recommended lighting intensity in lifts is 300 lux.
- Floor directories should also be placed outside the lift.

Figure 28. Lifts should be accessible to all user groups.
ESCALATORS

Escalators form the main passage to the platforms in a metro station. For most user groups, escalators are a suitable means of descending to the platform. However, this is not the case for persons travelling with prams, bicycles or in wheelchairs. When three escalators are placed side by side, maintenance can be carried out without disturbing the flow of pedestrians. Persons with impaired vision who are accompanied by a guide dog tend to avoid escalators, in order to prevent paw injuries. The sound of an escalator functions as an audible sign for persons with low vision. A rubber mat or grating preceding the escalator will alert persons walking with a white cane.

ESCALATORS

Escalators should be located parallel or perpendicular to the route. Escalator dimensions depend on the flow of pedestrians. When the escalator width is 1,000 mm, it is possible for two passengers to stand side by side and there is room to pass other passengers. A clearance wider than the escalator and at least 6 metres long should be left at the upper end of an escalator, and kept free of ticket and stamping machines.

- A warning surface should begin 1200 mm prior to a descending escalator 49.
- It is recommended that a 6,000 mm clearance is left at the upper end of escalators 50.

STAIRS

Descending stairs should be located to the side and perpendicular to the passage, to prevent persons with impaired vision from accidentally entering the stairs. Sufficient clearance at the bottom of stairs will prevent persons descending them from blocking the passage. To avoid injuries, the space beneath the stairs should be enclosed or its entrance blocked. It should, nevertheless, be easy to keep clean. A warning area marked with distinct floor surface material should be located where the stairs begin.

The width of the stairs has an impact on the pace and flow of passengers. In the case of sufficiently wide stairs, it is easier to pass others and the going is generally more pleasant. In busy areas, the recommended stair width is equal to the width of the footpath leading to them. The minimum width of outdoor stairs leading to train platforms is 3,000 mm 51.

Stairs and ramps should be designed following the instructions on accessible build-

50 Roselius, E. 2009.
• Stairs are marked with a warning area 1,200 mm before the first descending step.
• The minimum width of stairs in an accessible public transport interchange is 2,000 mm.
• The minimum width of outdoor stairs is 3,000 mm.
• The minimum dimension of the tread length in easily accessible stairs is 300 mm and the maximum riser dimension is 160 mm 52.
• It is recommended that handrails also be positioned along the centre of very wide stairs at 2,400 mm intervals 53.
• The recommended diameter of handrails is between 25 mm and 45 mm.

RAMPS

The maximum inclinations and length of ramps have been defined in the SuRaKu Accessibility Guideline Cards 54 and in the building regulation’s section F1 55. Ramps are not recommended when the level height difference is more than 1 metre, as they then become inconveniently long. The minimum width of ramps leading to passenger platforms is 3,000 mm, and their maximum length is 6,000 mm, not including landings. Ramps run from one landing to the next; no lateral inclination is allowed in ramps.

• The recommended maximum inclination of a ramp is 5%.
• A handrail should run along both sides of a ramp.
Signs and marks for differences in elevation

Handrails on stairs may also be used as a guide. On the route to the passenger platform of a railway station, short instructions in Braille and in tactile markings should be located on the handrail, or attached to the wall at a height of 800 mm to 1,000 mm. Instructions on how to mark accessible routes are specified in the Finnish Rail Agency Regulations. It is recommended that the same instructions are also followed in metro stations.

Figure 30. A floor directory on a handrail (Photo by Finnish Association of People with Physical Disabilities).

Lighting and differences in elevation

The minimum lighting intensity in staircases is 100 lux, measured from floor level. In the case of artificial lighting, the lighting intensity should be 40 lux above the lighting intensity in the surrounding area. Minimum lighting requirements for persons with low vision is 300 lux. The recommended lighting intensity at the top and bottom of an escalator is 200 lux. Traffic lights should be included, to indicate the direction of the escalator. In addition to the light and its colour, there should be a distinct symbol for the benefit of persons with low vision.

Figure 31. An example of a lighting solution in a metro station in Copenhagen.

Platforms

Routes to platforms should be accessible. Passages should not have level differences and must be sufficiently wide to ensure safe passage. Guidance for persons with impaired vision should continue uninterrupted on the platform. Structural elements, such as gutters in outdoor platform areas, may also play a role as guiding elements. However, they should not present a risk of stumbling or slipping. Platform edge markings must be logical and uniformly used in all stations.

Platform and vehicle compatibility needs further improvement. According to the user study, in terms of accessibility, the metro is the best means of public transport for persons with reduced mobility. Cars can be designed to match the platforms, leaving only a narrow gap (approximately 50 mm) which does not prevent boarding. Automatically run metro trains always stop at the same point, which enables the entrance sections to be marked on the platforms using distinct materials, to guide persons with impaired vision. Platform walls add to safety.

In the design of the latest metro car models, better account has been taken of accessibility than in older cars. New car models improve the usability of regional and express trains. However, in addition to improved cars, onboard and station services should be developed to enable accessible travel for all user groups. Personnel must be trained in how to provide assistance, and assistive devices should be safe and easy to use.

Independent travel should be as uncomplicated as possible, without requiring advance contact with station services.

Figure 32. Examples of various solutions to improve accessibility and usability on a platform.
Only then will rail traffic be a truly accessible means of transport for all user groups. The more complicated the advance preparations required by a journey, the more likely it is that passengers will decide to travel by some other means.

Much room for improvement remains in the accessibility of tram stops and trams, before independent travel is a feasible option for all users of public transport. Accessing tram stops is a challenge, due to raised platforms which are typically too narrow for prams and wheelchairs. The minimum platform width required by prams is 2,000 mm\(^{59}\). One-sided platform islands located in the middle of a street, on which pedestrians cross traffic lanes, are unsafe. Platforms should be marked with signs and surface materials assisting persons with impaired vision. Winter maintenance of platforms poses additional challenges to year-round accessibility.

Low-floor vehicles have been developed to promote tram accessibility. Further improvements are needed in platform accessibility and ensuring the compatibility of platforms with low-floor cars. Typically, the gap between the car and platform is too wide. During the experimental part of our user study, wheelchair and electric wheelchair users could not independently access low-floor trams.

A platform needs to be wide enough to allow passengers to pass each other safely. Detailed instructions are given in the Finnish Rail Agency Regulations\(^{60}\). The edges of platforms should be marked with clearly visible warning signs in an alternate surface material, as well as with a warning area. The platform edge must contrast with the dark rails. Materials used should not be slippery when wet.

The places where the doors of a halted metro train will be should be marked on the platform using a distinct colour and surface material. Regional trains and other public transport should be developed to include fixed halting points which can be permanently marked on the platform or stop. This will facilitate locating the correct vehicle and its entrance.

- The minimum width of a regional train platform island is 3,300 mm\(^{61}\). If the platform is to include a canopy, the minimum required width is 3,500 mm.
- The minimum width of the platform warning area is 500 mm, which increases in relation to the speed of by-passing trains\(^{62}\).
- A warning stripe of 300 mm minimum is recommended for installation at feeder traffic stops\(^{63}\).

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Platform furniture

The width of a passage between the platform edge and an obstacle such as a sign, fixed furniture or structural obstacles, is 800 mm. Seats must be fixed and easily distinguished from the background by their contrast or colour. Furniture should not pose a risk of collision or stumbling. They should be durable and easy to maintain. Shiny and reflecting materials should be avoided.

Platform signs and markings

Platforms should have multisensory guidance. Signs and markings should be perceived through auditory, vision and tactile senses. Adequately lit display panels should be available for viewing at close range. The train cars’ direction of travel and platform numbers are displayed visually and using tactile signs. All information is available at one, clearly distinguishable place on the platform. Audible announcements benefit persons with impaired vision and induction loops help the persons with hearing impairments.

It is recommended that a metal strip and a contrasting stripe are installed on the platform to guide persons with impaired vision from the escalator to the car doors. In automatically running metro trains, the place where the train stops can be accurately determined and a platform screen door can be used as an entrance for persons with impaired vision. The objective is that at every platform, persons with impaired vision are guided to the same door. The route to the lift is marked by a metal strip only. A warning area of distinct contrast is installed in front of platform screen doors and lifts.

Furthermore, it is recommended that a tactile sign is placed at the platform screen door displaying the train’s direction of travel. At metro stations, in particular, knowing the direction of travel is important. At train stations, platform numbers can be installed in the same place with timetables and other information.

Platform lighting

The minimum lighting intensity at canopied platforms and in passenger tunnels is 50 lux. In the tunnel stations of Copenhagen, for example, the lighting intensity at the metro platforms is 200 lux which is inadequate for persons with low vision. The recommended lighting intensity in tunnels is approximately 300 lux.

Indirect overall lighting should be preferred. Direct lighting is only used to highlight platform screen doors, lifts and stairs.

The need for lighting decreases when the ground material of the platform is light and uniform. Patterned floor surfaces obstruct perception of the space.

Canopies made of glass should be avoided in outdoor stations, because they cause glare. Direct sunlight will also create sharp shadows which pattern the platform surface and disturb perception.

64 SFS-EN 12464-1 Lighting intensities.
65 Laitinen, S. 2008.
Figures 33 and 34. Availability of travel information at the platform. The current situation, and the suggested improvement.

Figures 35 and 36. An example of a platform lighting solution in a metro station at Copenhagen. The current situation, and the suggested improvement.
Solutions and development suggestions 2

This section includes suggested improvements regarding signs and service alterations.

SIGNS

Travel information

A majority of those who responded to the user questionnaire use an online journey planner or a printed timetable to plan their trip. Travel information should be made more accessible, to ensure streamlined travel plans in the future. Online timetable information and other relevant data should be made available in audible format, or suitable for downloading to a mobile device. Real time announcements should also be improved.

The public transport information system and incident information system have been studied as part of the Ministry of Transport and Communications' Research and Development Programme for Accessibility "ELSA". Adequate information on public transport promotes its use and makes it accessible for all user groups. Clear and logical information on public transport improves the safety of the actual journey. It also affects the personal choice of individuals, in using what they view as an effective and comfortable means of travel 66.
Audible signs

In terminal areas, audible signs should include announcements, audible beacons and various signalling devices. In the design of signs, attention should be paid to the intended environment, and background noises and sounds in the station area. Acoustics and reduced echo make announcements and speech easier to understand. Other sounds and background noise can mask audible signs.

High-quality sound reproduction devices should be used and announcements should be clear. Low-pitched sounds are more audible than high-pitched ones. To draw people’s attention, announcements should be repeated 67. In Copenhagen, to avoid disturbing the surrounding environment, announcements on outdoor metro platforms are quiet (45 dB). Announcements transmitting travel information are audible in a specific area of the platform. However, quiet announcements are inaudible to persons with impaired hearing. For their benefit, an induction loop installed at a fixed information desk in the station building, or on the platform, should be made available. Induction loops should only be installed by persons who understand the principles behind their operation. The function and field intensity of an induction loop must be tested prior to final installation 68. An induction loop location should be marked with a T symbol and installed in the same location as other information.

Sound signals help people to orientate themselves and estimate distances. The location of a lift, whether it has been called and the opening of lift doors can all be signalled using a different sound. Buttons and keys should give an audible signal, to denote the successful performance of an action. Announcements declaring the next stop are essential to the independent travel of persons with impaired vision.

Visual signs and markings

A clear floor plan, easily recognised landmarks along the routes and guide lighting help people to orientate themselves in the station area. Differences in contrast and colour, or lighting intensity, can be used to contribute to improved perception of an area. Transparent glass doors and walls should be clearly marked at eye level. With age, sharpness of vision and ability to adjust to changes in lighting become weak, and susceptibility to glare increases. The risk of collision is greatest for persons who have low vision, but still rely on their eyesight. Indirect lighting provides an even, overall light while spotlights can be employed to highlight differences in elevation and platform screen doors, for example.

Contrasting stripes and warning areas, marked on the floor surface of a route, provide guidance to persons with low vision. A dark stripe across a lightly coloured floor is a clearly distinguishable guidance element, similar to a series of lamps. Floor surfaces should be neutral in colour, without large patterns which disturb perception. Additionally, floor surfaces should not be reflective. The warning area of a platform should be light in colour, to ensure that the dark tracks are easily distinguished in contrast. Contrasting stripes on stairs must run along the entire length of the step, to ensure that persons with a reduced field of vision can identify the steps.

Humans can process a limited amount of information at a time. In station areas, the flow of information should be controllable, to ensure that informative messages are clearly distinguishable from advertisements. Terminals should issue instructions on the proper use of terminal space, which help to manage the number and position of signs, billboards, stands, panels and other forms of advertisement. To avoid the risk of tripping, advertisements, loose furniture and stands should be kept clear of routes accessible to persons with impaired vision.

Signs should be located throughout the entire terminal and be positioned so as not to cause the risk of collision. They should be easily perceived, bearing information which is legible in all lighting conditions.

**Tactile signs**

In addition to light and contrast differences, alternating surface materials can be used advantageously in the design of accessible routes. We can feel the surface material of a floor as we walk on it, and notice when it changes. Different surface materials can be used to complement guidance and to separate some functions from others. However, to avoid slipping and stumbling, the friction in adjacent materials should remain approximately the same. All surface materials should be non-slippery, even when wet.

Other surface materials must be easily distinguishable from the guiding and warning materials. To make interpreting signs easier, it is recommended that a uniform system of guiding stripes be applied in all stations.

Outdoor signs must function properly, including during the winter. It is recommended that a snow melting system be installed in entrance and feeder traffic areas. Uniform metal strips provide adequate guidance for persons with impaired vision. When a white cane makes contact with the strip, the impact is felt in the hand. This also creates a sound which provides additional guidance to a person with impaired vision.

Signs for lifts, restrooms and other services should also be in Braille or be tactile. Not all persons with impaired vision can read Braille. They benefit from clear symbols and tactile letters and numbers. Messages in Braille should be located 1,300 to 1,400 mm above the floor surface.
INCIDENTS AND SERVICE ALTERATIONS

If possible, information on incidents and service alterations be available during journey planning. Such information should be disseminated online and in station and platform areas. Accessing information on service alterations is problematic for persons with low hearing or vision, in particular. In addition to audible announcements, information should also be shown visually on e.g. displays and information panels. Visual information on service alterations should be emphasised, by combining text with movement and colour.

Information on temporary traffic arrangements and construction work in the station area should be available, for instance in online journey planners. Guidance for pedestrians should function properly during service alterations too, taking all user groups into consideration and never allowing pedestrians to enter traffic lanes. Road barriers, guidance along an abnormal route, and ramps and handrails satisfying accessibility criteria, must be installed at the site prior to any construction work. They should also be in good condition along the entire length of the affected area.

To enable advance route planning, lift maintenance and repairs should be announced online and at terminals. While maintenance or repair work is being performed on a lift or escalator, or when a lift or escalator is out of order, alternative means of moving to a different level must be offered to people with reduced mobility. Lifts should be installed in pairs, to ensure that one is functional whenever the other is under maintenance.

Three escalators should be installed side by side, to ensure that pedestrian traffic continues to move in both directions when one escalator is under maintenance. When pedestrian traffic is exceptionally busy, carrying bicycles and prams on an escalator should be forbidden. During the busiest rush hours, it must be possible to limit passenger access to the station and platform area. To reduce the risk of hazards, it should be possible to control passenger flow to the platforms by adjusting the escalator speed.

In the future, more attention should be paid to emergency exits in tunnels. All passengers should be able to exit a metro car during an emergency, including persons with reduced mobility. In an emergency, no-one should need to stay behind and await help in situations where other passengers are able to exit the metro car.

Emergency exit platforms located in the tunnels should be on the same level as normal platforms, to enable easy exit using assistive devices with wheels. The width of emergency exit platforms should be sufficient to accommodate wheelchair users, without blocking the way for other passengers.

Exit areas should be equipped with lifts, or some other exit route without stairs, that can be used even when there is a fire. Exit areas must be equipped with a direct voice connection to an exchange people can contact for help, in case of emergencies.

Emergency exits should also be installed and appropriately maintained in those parts of the network that run above ground.
Future targets for improvement

This report primarily focuses on the improvement of built environments, perception and guidance. A positive travel experience is, however, the sum of many factors. In the Future Public Transport for All Project, we decided not to include services and new technology for aiding guidance and providing access to information. Access to travel information in real time is technically possible and many applications are currently being tested and actively developed. Within station environments, implementing technology that supports the different senses, and new technological applications that facilitate orientation and access to travel information, enables persons with sensory disturbances to function independently.

Tampere University of Technology has developed a mobile application, Matkakumpanni, which is currently being test run. This application suggests alternative routes and provides door-to-door instructions for users of public transport. It also gives instructions during the journey. The Matkakumpanni application is controlled using mobile phone keys or through speech, and features speech recognition and spoken instructions 69.

The Technical Research Centre of Finland, VTT, has developed a mobile application to provide guidance to city travellers. This application is called KAMO, and part of the research was financed by Helsinki City Transport (HKL). While at a stop, the user receives real-time information by mobile phone, about bus and tram connections arriving at the stop. Users can also monitor the progress of their selected vehicle, stop-by-stop, on a mobile phone screen. In the future, this service will be available with a profile customised only to receive information on certain connections, routes or added services selected by the user 70.

Dependent on a real-time information system, a system for changing platforms has been under development for Helsinki Airport, under the Ministry of Transport and Communications’ AINO project. The idea was to enable the driver to communicate with the information system so that data on the driver’s route/connection could be linked to the monitored vehicle. However, no viable technical solution could be identified.

The Helsinki Region Transport (HSL) is currently testing an online solution which enables users to monitor the movements of buses and trams in the Helsinki region, via online maps and accurate to the nearest second. The objective is to extend the application to cover the movements of 1,500 public transport vehicles. Using a wireless LAN, passengers can connect to the Internet and receive real-time information on the arrival of public transport, progress of

69 http://matkakumppani.cs.uta.fi/
travel and vehicle change alternatives at forthcoming stops 71.

In the Norwegian AKTA project, a service has been developed for ordering and downloading timetable information by mobile phone, mainly intended for persons with impaired vision. Using this service, a passenger can contact the bus driver, who receives information on the passenger waiting at the stop and any assistance he or she may need. The passenger can also enter his or her destination, enabling the driver to prepare to provide assistance at the correct stop. Part of the project involved testing new technology to identify a vehicle as it approaches a stop. However, the technical applications need further improvement before the service can become fully operational 72.

The accessibility of stops and stations, both by bicycle and on foot, must be improved in co-operation with urban planners. Car-free neighbourhoods are being planned in Helsinki’s Kalasatama and Jätkäsaari, enabled by good rail traffic connections and proximity to a metro station. In the Marja-Vantaa Centre, car parks are clustered around the Ring Rail Line station, to promote rail traffic Clear, safe and well maintained pedestrian and cycle routes to the station contribute to increased use of rail traffic. When designed on pedestrians’ terms, urban environments become safer, and of higher quality.

In addition to citybikes, the plans include increasing the number of shared cars at traffic stations. Providing shared electric cars may significantly reduce the need for private cars. Charging stations for electric cars and buses must be taken into account in station environment planning.

71 http://transport.wspgroup.fi/hhkarkta/
Summary

For successful travel, each link of the journey must succeed. If any elements along the way prevent further progress, the journey will be broken. If insufficient advance information is available for journey planning, travel may even be completely prevented. A complete journey includes planning the journey, reaching the public transport station or terminal from the point of departure, buying a ticket, going to the platform, boarding the vehicle and travelling to the destination. Changing from one vehicle to another is sometimes required.

Vehicle accessibility has been improved by developing low-floor buses, trams and trains. SM5 trains will improve the usability of commuter trains in regional traffic and on the Ring Rail Line. Tram models with low floors are easier to board and exit. The compatibility of the platform and the vehicle is an important aspect. Stops should be arranged safely, ensuring short walking distances when changing vehicles.

According to our user study, the metro is the best option in terms of usability. Safety in the platform area can be improved by installing screen doors and providing guidance to persons with impaired vision. The need for feeder traffic and vehicle changes reduces the attraction of metro traffic. Changing from one vehicle to the next should be flexible and take as little time as possible. Intervals between metro connections must be sufficiently short. However, total travel times may become unreason-ably protracted as connection intervals for feeder traffic grow. Feeder traffic operations therefore require further improvement.

Station areas and the related services continuously develop and change. Unless they are understood as part of a whole, previously sound solutions and practices become dysfunctional. This should be taken into consideration when carrying out modifications.

Excellent guidelines and solutions exist for planning urban environments which accommodate persons with reduced mobility. These guidelines should be applied when new public buildings are designed and old ones renovated or modernised. The results of the user study show that, when using public transport, persons with sensory disorders, and with impaired vision in particular, continue to face a multitude of as yet unidentified obstacles. Accessibility criteria should cover all user groups. Guidelines must be supplemented with instructions concerning persons with sensory disorders, to ensure the usability and accessibility of public transport.
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Instruction Cards
THE STATION AREA AND ITS IMMEDIATE SURROUNDINGS, FEEDER TRAFFIC TERMINAL

An uncomplicated and accessible route from the terminal to the feeder traffic area:
– Feeder traffic area located close to the terminal
– The route to the feeder traffic area does not include elevation differences or crossings
– Route includes contrasting stripes and warning areas to assist persons with impaired vision
– Walking surfaces are smooth and non-slippery, even when wet
– The footpath and traffic lanes are separated from each other by a kerb
– The footpath edge bordering a traffic lane is marked using contrast differences and diverse materials

Clear maps and travel information in a multisensory format:
– An easy-to-read map depicting the feeder traffic area
– A tactile map of the feeder traffic area
– Travel information displayed in an easily spotted, prominent place
– Audible and visual travel information

Lighting, daylight management, furniture:
– Sufficient general lighting at all times of the day
– Glass surfaces marked with contrasting colours
– No shadows cast by glass ceilings onto the platform surface
– Waiting areas equipped with a sufficient number of seats
– Furniture and structures not made from reflective materials
– Areas with furniture marked with contrast differences
THE STATION AREA AND ITS IMMEDIATE SURROUNDINGS, FEEDER TRAFFIC STOP

Accessibility of feeder traffic stops:
– A short and easily accessible route leads to feeder traffic stops from the rail traffic terminals and platforms
– The route does not include elevation differences or crossings
– The route includes contrasting stripes and warning areas for the benefit of persons with impaired vision
– Walking surfaces are smooth and non-slippery, even when wet
– The footpath and traffic lanes are separated from each other by a kerb
– The footpath edge bordering a traffic lane is marked using contrast differences and diverse materials

Travel information:
– The numbers of departure platforms can be checked at the platform using the tactile sense
– Stops display timetable information in real-time and information on possible service alterations.
– In addition to visible travel information, audible information must also be available, e.g. a screen reader via an induction loop

Lighting and contrast:
– Sufficient general lighting at all times of the day
– Glass surfaces marked with contrasting colours
– The stop is marked with diverse materials and contrast differences
– The stop is equipped with a warning area, aligned with the door of the arriving vehicle
Crossings in the vicinity of stations should be planned according to the SuRaKu Accessibility Guidelines, regarding a special level of accessibility:

- Pedestrians and cyclists have separate lanes
- Sufficient lighting at crossings
- Markings are in good condition and the colour contrast of stripes is sufficient
- The crossing is preceded by a warning area, which can be identified by its contrast differences and distinctive material
- There is a ramp-kerbstone at the crossing
- Crossings are equipped with audible and visual signals
- The push-button on a traffic-light pole is reachable from a wheelchair
- Walking surfaces are smooth and non-slippery, even when wet
- The route from the crossing to the nearest entrance is marked with a contrasting stripe, for the benefit of persons with impaired vision
ENTRANCE

Accessible main entrance:
– The main entrance is equipped with automatic doors
– There are no elevation differences at the entrance
– The entrance is equipped with audible and visual signals

The entrance is easy to identify and clearly distinguishable from the building's facade:
– The entrance has a canopy or roof
– Increased lighting intensity at the entrance provides a guiding element and prevents glare when the lighting intensity changes
– A warning area is located in front of the entrance
– There should be no danger of assistive devices with wheels, or guide dogs' paws, being caught in gratings etc.
THE STATION BUILDING, THE TICKET HALL

An accessible route leading from the entrance to the means of moving to a different level and to service counters:
– The route is sufficiently wide to accommodate all user groups
– The route to the escalator is marked with a contrasting stripe and metal strip
– The route to the lifts is marked with a metal strip and sign plates, if necessary
– A tactile and clear map of the station building
– Lighting that facilitates perception and orientation

Machines, service counters and furniture:
– Ticket machines and devices are uniform and easily identified in all stations
– Machines and devices are easy to use by all user groups
– Machines and devices are positioned in a way that prevents queueing people from blocking the passage
– Hearing conditions are optimal around service counters
– Queueing systems can be used through multiple senses
– Service counters accommodate all user groups
– Furniture is uniformly located in all stations
– Furniture does not pose a risk of collision or stumbling
– Furniture is easy to perceive and stands out from the background and floor surface due to contrast differences
THE STATION BUILDING, MOVING TO A DIFFERENT LEVEL

Escalators:
– The main passage leads to the escalator
– A warning area precedes the escalator
– The direction of the escalator is marked using coloured lights and symbols
– At the top and bottom of escalators, there is a sufficiently large clearing
– A metal strip and a contrasting stripe lead to the escalator

Lifts:
– Lifts are equipped with audible beacons
– The lift is called by a motion detector
– An audible signal announces that the lift has arrived at the floor
– The buttons in the lift are in logical order and easily identified using the tactile sense alone
– A metal strip leads to the lift
– There is sufficient space in front of the lift

Stairs:
– The edges of stairs are marked with contrasting stripes and steps are easy to tread
– A handrail runs uninterrupted along the entire length of the stairs, guidance markings in Braille are attached to the handrail
THE STATION BUILDING, GUIDANCE ON PLATFORMS ABOVE GROUND

Travel information and timetables:
– Travel information can be easily located
– Timetable displays are shielded from reflections
– Display characters are large and clear, with a sufficient contrast between the character and its background
– Timetables show information on low-floor connections
– An induction loop is installed onto the frame of the timetable
– The platform includes a sound jet area, where audible travel information has a 45 dB intensity

Signs on platforms:
– Technical solutions are part of the guidance system of a platform. For example, a gutter running along the edge of the platform can function as a section of the warning area, while a gutter running through the middle of the platform can double as a stripe assisting persons with impaired vision
THE STATION BUILDING, GUIDANCE ON PLATFORMS IN TUNNELS

**Signs and travel information:**
- Signal lights at the top and bottom of escalators; signal includes both colour and a symbol
- A warning area is located at the top and bottom of escalators and in front of the platform screen doors
- A guiding stripe leads from the escalator to the nearest platform screen door
- Warning areas are located in intersections
- Platform screen doors can be clearly distinguished from the platform walls
- In the metro, tactile information on the direction of travel is located next to the platform screen door
- Travel information can be found next to the platform screen doors, at eyelevel