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Access to the forests for disabled people

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List of Content

1. Introduction

Urban Woodlands have a key-role regarding peoples needs to exercise physically, practice their sports or to seek tranquillity. These needs are general for everyone, but too often are people with some form of disability locked out from the woodlands because of technical obstacles or due to lack of knowledge. This manual is giving advice on how such technical obstacles can be removed or altered in order to allow access to the forests also for people bound to a wheelchair or with some other disability. The manual also describes a number of sports practiced by disabled people, this in order to inform woodland owners or managers about these sports, since they are not always well known.

This manual is aimed at professional foresters and managers of woodlands, in particular of urban woodlands, and the ambition is to provide some good advice regarding increased accessability for people with some disability. It is also hoped that the manual can provide information and generate a more general understanding on what it means to live with a disability problem and yet wanting to live a normal and active life. Nature is for everyone.

This manual is produced by the National Board of Forestry in Sweden as part of the Swedish-French EU/LIFE project Urban Woods for People 2001 – 2005.

The text is written by Dr Ylva Lundell from the Swedish University of Agricultural Sciences, who is a scientist and professional forester and also has a good personal insight in what it means to live an active life as disabled. Many thanks to those who have contributed to this manual.

1.1. The manual

For people with a disability it is often impossible to get out into nature. Forestland generally means insurmountable hindrances with bulbous roots that lie entangled over narrow, stony and uneven paths. The forest, with all its sounds and smells, is something alien that is glimpsed through car windows.

This manual is designed to offer people with disabilities better opportunities for recreation in nearby forests and countryside. The majority of Sweden’s population live within 5 km of a central place. Urban forests are therefore of great importance, and particularly for people with disabilities who often find it difficult to travel longer distances.

The term disability covers a wide range. This manual foremost focuses on the needs of people with physical disability and impaired vision, but also to some extent on those with other disabilities such as retardation and allergy. The group of people with physical disability foremost includes those using wheelchairs, with walking difficulties, and short people with limited functions in arms and hands. People with hidden disabilities, such as asthma and cardiovascular diseases, may have physical disability in certain situations. Families with prams frequently encounter problems similar to those that face people with physical disability, as well as sometimes also pregnant women. Medical advances have led to increasing

numbers of people surviving serious accidents, and an increasingly elderly population results in an increase in the proportion of people with physical disability. Impaired vision may mean anything from slightly impaired vision to blindness.

The manual has been prepared foremost for municipal and other landowners of urban forests, as well as to non-profit making organisations and others working with athletics or recreational activities. Our ambition is to give disabled people, their relatives and organisations the inspiration and guidance to make an increased utilisation of the nature around us. The ideas and guidelines in the manual need not only be used in urban forests but also apply to recreational areas and smaller green belts, such as found in urban parks.

The ambition with this manual has been to cover as widely as possible all aspects of making nature accessible to people with disabilities. The manual provides examples of measures that can successively be accomplished.

The manual has been compiled as part of the EU-financed Swedish-French LIFE project “Urban Woods for People”. Other parts of the project deal with the preparation of manuals for the management of urban forests, measurements of forest recreational values, production of information material in subjects such as health effects of forest recreation, descriptions of the numerous different forest values, and establishment of pilot forests for recreation.

1.2. Objectives for forestry

For many years Swedish forestry had a high timber production as its main target. Since the introduction of the Forestry Law in 1993, environmental objectives have been given a magnitude that is just as important as production objectives. The social values of the forest are today receiving increasing attention. It is not just a matter of harvesting timber, berries, and mushrooms in the forest – today we can also harvest health and increased well-being. The social values of the forest are, naturally, of greatest value in and around towns and urban centres. The social values may, for example, be found in enjoyment of wind-whispering solitude and the smell of soil in a warm spruce forest, in looking for chanterells on a sunny autumn day, in jogging round the exercise track, in feeling your pulse take off during moose-hunting, or in deceiving that huge old pike in the reed-beds. Experiences such as these give us recreation, which gives us contentment, and improves the health and well-being of stressed modern people.

1.3. Importance of nature for quality of life

Research clearly shows that human health is positively affected by time spent in green recreational areas (this research has mainly been taken from Grahn, 1993 and Ottosson & Grahn, 1998). There are probably several factors that interact. Daylight prevents depression, has an influence on the vitamin status of the body and on bone growth. Fresh air affects one’s sense of contentment and air quality is better outdoors than indoors, even in heavily trafficked environments. Green vegetation has numerous positive effects – it reduces stress and increases one’s ability to concentrate.

During past millennia mankind has become adapted to live in nature. That environment has developed our spontaneous attention. We have learnt to react when we encounter dangerous objects such as spiders, snakes and heights. In an urban context, an environment constructed for humans, it is instead necessary for us to use large amounts of energy-requiring concentration. This is needed to process different problems, to exclude unnecessary information and sounds. It is needed, for example, when driving a car and when we are dealing with troublesome computers, situations that easily give rise to stress reactions and where we are unable to use our spontaneous reflexes. It is only in nature that we can rely on our spontaneous attention and where our directed, energy-requiring concentration can rest.

Time spent in forests and other green areas lead to clear health effects. People living in parts of cities with abundant green vegetation are healthier than those living far from green areas. This might be an effect of the stress-relieving effect of greenery and the clear relationship between stress and infections. “Wilderness” features are of great importance, particularly for children, who develop better mobility and become more harmonious. Time spent in a natural wilderness was found to be beneficial and restorative for persons suffering from “burn-out”. Other trials demonstrated that elderly, confused, persons who had been in parks and green areas become more lucid, have a better memory, and reduce their need for analgesics and sleeping tablets.

Visits outdoors were found in trials to give elderly persons increased concentration ability. But even the sight of a park or other green area has a clear effect on health. In one trial, people who could clearly see greenery during the day were much more alert and less irritable than those who could see no greenery.

People with a disability have similar needs for relaxation and recreation as found for others. In most cases, however, forest areas are completely inaccessible and a physically handicapped person or a person with impaired vision will never have the opportunity to find the calm and relaxation offered by nature. Abrupt differences in level, such as roots, stones and stumps are often in the way. There are also hindrances in surrounding attitudes, knowledge and imagination. Most hindrances can, namely, be removed if the right circumstances are created.

1.4. Handicap policy

In the spring of 2000 the Swedish parliament approved a national plan of action for handicap policy (Government Bill 1999/2000:79) where the citizenship perspective of handicap policy was established. It is our common responsibility to build a Swedish society where people with disabilities have similar rights and possibilities as other citizens. Handicap policy deals with the rights of everybody to be citizens – to participate. Persons with a disability must not be regarded as “objects for special measures” but must be regarded as citizens with similar rights and possibilities as others to determine over their lives and have their wishes respected.

Sweden has pledged to comply with the UN’s Standard Regulations for people with disability. The fundamental philosophy behind this is to create participation and equality for people with disabilities throughout all of society. Everyone in

society – the government, authorities, municipalities, companies, organisations, etc., – has a responsibility to ensure that the UN Standard Regulations are followed in reality.

§ 5 of the Standard Regulations deals with the physical environment, e.g., buildings, collective transportation, streets and other outdoor environments, that must be made accessible regardless of which, or how severe, the disability. Demands for accessibility must be placed at the start, when the external environment is being planned and built. The paragraph also requires that everybody (including persons with impaired vision, those with a hearing disability, and persons with other communication disabilities) must have access to information and possibilities for communication.

§ 11 of the Standard Regulations states that persons with disabilities shall have similar possibilities for recreation and athletics as others. Facilities for recreation and sports, for example, hotels, beaches, sports fields and sports arenas, must be available. People arranging recreational activities, for example, must offer their services to everybody, including persons with disabilities, and if they work with athletics and recreational activities they must consult handicap organisations when they plan their activities.

Disabilities have always been present and will always be present as a natural feature of mankind. About one-fifth of the people in professionally active ages have some kind of disability. People with disabilities are citizens in society with the same conditions as others, and have exactly the same rights and obligations as others. In accordance with the responsibility and financing principle, strongly emphasised in the government's plan of action, all activities shall be accessible to all citizens, including persons with disabilities. This means that expenses for essential adaptations will be financed within the framework of the normal budget.

2. Disabilities

2.1. Definitions

Injury, functional reduction, disability or handicap? Swedish authorities, in common with the handicap movement, usually rely on the WHO's definition of these words.

A disease or injury may give rise to a reduction in a bodily function. If the disease or injury is of a short-term nature, e.g., a broken leg, it is not considered to be a functional reduction. The term functional reduction includes a large number of different disabilities in populations throughout the world. A disability may, for example, be a mobility impairment or impaired vision. **A functional reduction or a disability is always related to an individual.**

A handicap, on the other hand, is not a personal characteristic, but occurs in relation to an environment where a person encounters a lack of understanding or a poor physical adaptation to the circumstances inherent in the person in question. A handicap describes the meeting between people with a functional reduction and the environment, and refers to loss of, or restriction of, possibilities to participate in society on the same conditions as others. **Because handicap is something that arises in relation to the environment it can be removed or redesigned**.

2.2. What does mobility impairment imply?

People with mobility impairment are largely those with wheelchairs, with walking difficulties, short people and people with limited functions in arms and legs. People with hidden disabilities such as asthma and cardiovascular disorders may in certain circumstances be considered to have a mobility impairment.

Users of wheelchairs include everything from well-trained youngsters with strong arms using light manually operated wheelchairs to people who have to use larger electrically powered wheelchairs on account of muscular disease, infirmity or other reasons. Some people who use wheelchairs are unable, for various reasons such as coordination problems, muscular weakness or impaired vision, to manipulate the chair and require assistance.

Manually-powered wheelchairs generally have large wheels at the rear and small castor wheels at the front. Castor wheels easily get stuck in uneven ground or on verges. Large electrically powered wheelchairs, particularly those intended for outdoor use, can better cope with uneven surfaces and steep slopes than manual wheelchairs, but require much more space for manoeuvring.

There may be many reasons for walking disabilities, e.g., poor balance, weak muscles, pain or respiration difficulties. People with walking difficulty often require, for reliable and safe access, level surfaces that are not slippery or slope too much either longitudinally or laterally. In addition, distances must be short, benches for resting must be available and also guide-rails to give support to those

with poor balance. Walking aids may take the form of a walking stick, a walking frame or another person's arm on which one can lean.

Limiting functions in arms and legs are also a form of mobility impairment that may lead to problems in driving a wheelchair, when manoeuvring and when stretching to reach a door handle, taps and buttons, etc. Those able to walk may find it difficult to carry things or to hold a walking stick. In order to keep one's balance it is necessary to swing one's arms when walking. In other respects, short people often experience problems in reaching buttons and other control equipment, as well as walking long distances.

Families with prams may recognise the problems encountered by users of wheelchairs on uneven surfaces and in narrow passages.

In this manual, the expression physical disability usually refers to mobility impairment.

2.3. What does impaired vision imply?

Persons with impaired vision generally include those with weak vision, with severely impaired vision and those that are completely blind.

Weak-sightedness or impaired vision may cause not only problems with focus but parts of the field of vision may also be diffuse or absent. Severely impaired vision may also result in only locomotor vision remaining.

Impaired vision can to some extent be corrected using optical aids. Large and clear texts are easier for people with impaired vision to read. Blind people and people with severely impaired vision may need Braille or acoustic information. Because not all blind people or those with severely impaired vision can read Braille, there must be other possibilities for them to receive information. Single words or figures on signposts can, for example, be written with normal letters or figures, or raised lettering.

The individual aids that a person with impaired vision can use when moving are a white cane and a guide-dog. Without vision it is difficult to orientate over large open areas and therefore people with impaired vision need access to guide tracks and markers. The guide tracks should be distinguishable from the surroundings by means of different surfacing or ground material, distinct borders or railings. Markers may be devices that emit signals of some kind that help in orientation, e.g., a water fountain. Unexpected obstacles may imply a danger for people with impaired vision. Incorrectly parked cycles, advertising boards, roots and unevenness in unexpected places, stairways that are not clearly marked at the top and bottom, and protruding objects, particularly at head height, are examples of real risks to a person with impaired vision.

Colours and diverging material can be used in a way that makes the surroundings more distinct. If, for example, floors and walls, or doors and doorframes, are painted in colours of different intensity, it will be easier to distinguish the borders between them.

2.4. What does retardation imply?

Retardation may be comprehensive, moderate or slight, and the different forms give rise to different difficulties for the retarded person. Many retarded persons also suffer from other disabilities, e.g., physical retardation and impaired vision. Retarded persons find difficulty in understanding, in orienting themselves, and in assessing directions and distances. In order to find one's way around, a person with slight retardation may require a logically designed environment where signboards are given distinct, uniform symbols.

2.5. Great need for everybody to experience nature

Experiences of nature and culture are what many foreign visitors are looking for when they visit Sweden. They are looking for nature, pure air and a feeling of wilderness. They want hiking tracks that are well sign-posted, and where there are possibilities to eat and to spend the night. There are also many Swedes who have got tired of sun-and-sand holidays and who are looking for activities based on experiences, such as angling, hiking and the "wilderness experience".

People without disabilities today have good possibilities to experience nature and culture, whereas those who are restricted to wheelchairs, and those with impaired vision, among many others, encounter major problems when they want to do the same things. A study completed in 1998 in a medium-sized Swedish town, Örebro, showed that 90 % of all disabled persons asked, requested possibilities to get out into the forest and countryside. A rough calculation shows that there are about 1.5 million people in Sweden with some kind of disability, and the corresponding figure in Europe is 40 million. Thus, groups that have largely been prevented from experiencing nature, and who now ask for possibilities to do so, are very large. Investment in adaptations of nature areas for persons with disabilities may generate new forms of tourism.

It is very difficult to decide how many people with different types of disabilities there are because it is often unknown how the calculations have been made. Sometimes, for example, it is not clear whether the estimates are based on level of disability or level of functional reduction – something regarded as a slight mobility impairment in one context may be moderate in another, and two people with the same medical diagnosis need not have the same experience of their limitations.

The table below gives approximate figures on the number of people with impaired vision and mobility impairment in Sweden. The figures, largely based on data from Statistics Sweden, have been taken from The Handicap Institute's homepage (www.hi.se). The number of people with impaired vision has been calculated from the total number of persons with impaired vision minus the number of blind and those with severely impaired vision.

	16-84 yrs	**Entire population**
Impaired vision	100 000	143 000
Blind and severely impaired vision	15 000	24 000
Slight mobility impairment	450 000	560 000
Severe mobility impairment	250 000	350 000

The principle must be that we can all enjoy nature, and thus the target must be to create “nature experiences for everybody” and that everybody has the opportunity to reach the forest and countryside on equal conditions. In this context, “everybody” means all people, regardless of whether they have disabilities or not, whether they are young or old, male or female. Words such as handicap tourism and handicap adapted hiking tracks give associations to special arrangements intended for a certain sector of the population. People with disabilities are citizens like all other people and should, of course, be offered the same opportunities as all the others to participate in different nature establishments and arrangements. This refers particularly to those that are funded entirely or partly with public funds. The standard for what is normal, e.g., planning of a recreational area, must be modified so that it can be done with consideration to all people.

There is still a lot to do to help people with disabilities to visit the forest, and nature herself places certain obstacles to accessibility, e.g., steep slopes. Accessibility should be clearly defined in the information on the area.

3. Planning and legislation

3.1. Building legislation

The legislation on planning and building (PBL) contains regulations controlling building. In, for example, Ch. 3 § 7 it is established that buildings to which the general public has access shall be accessible to, and can be used by, people with impaired physical and orientation ability. This applies both to new buildings and when modifying existing buildings.

However, building legislation is Sweden offers too much space for interpretations of how the physical environment shall be designed. Terms such as accessibility (e.g., entering a toilet) and usability (e.g., being able to reach a water tap) are not today defined by law. All accessibility to the physical environment must be based on physical measures in order to be able to function in practice for people with physical disabilities. Provision of measurements is not a method that can fulfil the accessibility requirements, it is a condition.

3.2. Measurements in this manual

Measurements that are essential for achieving accessibility and usability vary from person to person, and depend on, for example, muscle strength, possible stiffness in joints, skill in manoeuvring a wheelchair or walking frame, and how the wheelchair has been designed. In this manual, the user of a wheelchair is assumed to be able to use an outdoor wheelchair when in the countryside and when on forest tracks. Because he/she cannot change from one wheelchair to another when entering a building or a toilet, the measurements concerning widths and space for manoeuvring are based on what is required for an electrically powered wheelchair for outdoor use. The measurements refer to a chair of this kind in a standard construction and with a normal design, i.e., the back and leg supports have a normal angle and where the seat is of normal width *(cf. section 13)*. As regards slopes, edges, etc., consideration has been taken to people with weak hand and arm strength.

As a comparison, it can be mentioned that the wheelchair model used in the National Board of Housing, Building and Planning as standard for measurements in public places is an electrically powered wheelchair for restricted outdoor use. The Board’s building regulations do not pay regard to persons with reduced arm strength or lack of mobility in the upper part of the body.

3.3. The General Plan

All municipalities have a general plan that must be reviewed, and if necessary modified, at least once during each mandate period. The plan should include a plan of municipal land use in the municipality, i.e., largely stating where houses are to be built and where recreational areas should be established either now or in the future. The General Plan must also, in accordance with law, state how the planning promotes a socially good living environment, which includes access to

recreation, fresh air and the possibility to relax from everyday stresses, as well as accessibility and usability for the disabled.

The General Plan contains guidelines and goal formulations that are not legally binding. Individuals who are interested in developing opportunities for recreation in their municipality should, nonetheless, make use of the plan's possibilities for exerting influence. These individuals can participate in the open consultations that the municipality is obliged to arrange during the preparation of a new plan, and state their views when the proposal is demonstrated in an exhibition open to the general public.

3.4. Planning of recreational areas

The planning of recreational areas and other green areas often includes numerous different considerations, such as position in relation to buildings and roads, soil conditions, possible disturbances from industry, etc. It is important already in this early stage of the planning to include accessibility as a factor that must be considered.

There are different theories about suitable size of parks and green areas. If it is to attract frequent visits, the park must not be too far away from the home. The critical distance to an everyday park is a walk of 7-8 minutes, which means about 300 m without busy roads or other obstacles that must be negotiated. This means that it is better to have numerous small parks than fewer large parks. However, large parks are needed for people to find calm, secluded areas where the noise of traffic, etc. does not penetrate.

The process involved in planning land use and building is governed by requirements that apply to the entire country and that have been established by parliament (e.g., the Planning and building legislation) and in local plans that are established by each municipality.

In the practical planning in a municipality priority is often given to the building of houses and roads. Planning of recreation and leisure, and the reservation of undisturbed areas of nature, often comes in second place. It would be desirable if the building of homes and creation of leisure areas could be planned together. This would make the importance of forests and open-air activities clearer, as well as create increased conditions for outdoor recreation and lead to better public health.

3.5. Adaptation to nature and disability

During planning and the practical design of different measures it is important to keep in mind why they are being made. Measures should be designed to support the experience of nature and to promote the feeling of actually being in a wilderness. A person in a wheelchair or with a pram will move along paths and tracks. Nature is thus experienced from the track or path. Clearly, it is important to preserve as much as possible of the original environment along the path or track when it is built, otherwise one's experience of nature will be lost, and thus the whole meaning of the project.

If possible, the path should be laid out so that other senses than just sight are stimulated. The opportunity to touch large moss-covered rocks and old rugged trees will give a feeling of safety and security and can be experienced as exciting, particularly for retarded persons. Flowers and berries emit fragrances and flavours. Bird song and running water stimulate the sense of hearing.

For various practical reasons it will never be possible to make nature fully accessible to the disabled. However, it is better to do little than nothing at all. In very undulating terrain a compacted narrow track with a level surface will make it easier for persons with impaired vision, and also retarded persons, to find their way.

When making adaptations a balance must be reached between the need for handicap adaptation and the need to experience undisturbed nature. Different priorities perhaps need to be made in different areas.

A path that winds past massive ancient trees and large moss-covered rocks offers a greater nature experience than a path that goes as straight as an arrow through the forest. Normally, narrow paths are not built straight through uninteresting parts of the forest and the same applies to wider tracks for wheelchairs.

Paths intended for wheelchairs must not be too steep. Moderate slopes on paths can be achieved by building them along the slopes , which will also usually result in a meandering path that offers numerous opportunities “round the next corner” *(fig. 3.5:1).*

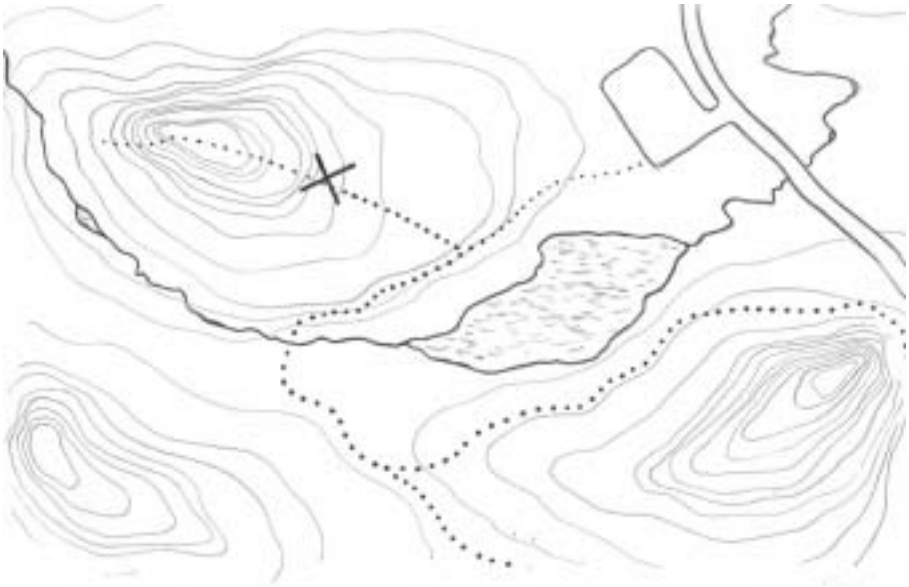


Fig. 3.5:1

Fig. 3.5:2 If possible, paths should be laid out in the proximity of lakes or other waterways where views give positive nature experiences and where the landscape is often less undulating.

In sectors of the forest with a rich fauna it is important to be cautious about where the paths are laid out in order to avoid frightening away the animals. If paths are placed along the edges of such areas there will be better chances to see the animals.

3.6. Aesthetic considerations

Buildings or other structures should be adapted to the natural surroundings but aesthetic considerations are just as important. This concerns not only the building itself but also the result of the building activities. When laying out a path, for example, the soil's top layer should be saved and then laid out again along the edges of the path, where the vegetation might have been damaged. If it is not possible to use the original ground vegetation for restoration, one should avoid using conventional grass seed as an alternative. Some form of mixed wild seeds should be used, or the planting of trees that grow naturally in the area.

Material that merges with the surroundings should be chosen. Wood and natural stone are therefore preferable when making constructions in recreational areas. Grill sites and wind-shelters could be covered with peat or wooden roofing instead of tiles or corrugated iron.

4. Information

4.1. Area information and maps

A condition for a recreational area being accessible to everybody is that there is well-designed, detailed and correct information on the area. All information to those with normal vision must also be available to those with impaired vision, e.g., in Braille. Information must be available in Tourist Offices and at the recreational branches of local municipal authorities.

There should be a map that clearly shows how one can reach a recreational area. Persons who have difficulty in moving over long distances should be able to see on the map how it is possible to reach, or approach, different parts of the area by car. The map should be included in all information material, e.g., brochures and advertisements.

4.2. Tactile maps for those with impaired vision

Tactile maps (maps with raised markings) may assist people with impaired vision to survey a recreational area. On maps of this kind they can use their fingers to feel what the terrain looks like, where the paths lead to, and where different buildings are located. Instead of locating the tactile map on a sign board, it is better if persons with impaired vision can take it home where they can study it at leisure, or take it with them on their walks in the recreational area.

The tactile map, as on all other information to those with impaired vision, should also clearly mark areas suitable for exercising guide dogs.

Audiotapes may also be used to assist people with impaired vision in finding their way round a recreational area. In such cases, the tape should successively describe where the path is leading to and what is in its neighbourhood. It should also provide information on where it is suitable to exercise guide dogs.

Tactile maps are easily made today on special swelling paper. When the map is ready in an original it is put in a coping machine that uses swelling paper instead of normal paper. The map is copied onto the swelling paper, which is then placed in a heating drum. The heat causes all black lines, dots and surfaces to swell, which makes it possible to read the map by using one’s fingers and feeling what the surroundings look like.

Swelling paper consists of two layers, the lower is of normal paper and the upper consists of millions of microscopic plastic spheres. When the swelling paper is run through the heating drum the black lines and black areas absorb more energy than shiny areas, which causes the plastic spheres to swell.

Tactile maps have been in use since the 18th century, when metal threads, string and wax illustrations were used to achieve the raised effect.

4.3. Information boards and signposts

In strategic places, such as entrances and in parking areas, there should be information boards showing how you can find your way around the area. Other information may be available in boxes with lids, explaining who owns and manages the area, where one can leave comments on, for example, adaptation measures, the area's bedrock, flora and fauna, and local history. These boxes should be located so that persons sitting in wheelchairs can reach them.

Signboards should be possible to read at close distances, both when standing and sitting, and therefore the centre of the board should not be positioned more than about 120 cm above the ground. The board should be located in a place with good light conditions and, in order to avoid reflexes from natural light it should be angled 5-10 degrees forwards at the top edge. The slope will make it easier for those in wheelchairs, as well as children, to read the entire signboard *(fig. 4.3:1)*. Readability will also increase if the surface of the board is matt and not glazed or covered by other material that gives reflexes. If the board requires lighting, the light source must not cause reflexes or dazzling. Additionally, it should not be placed in such a way that the reader casts a shadow on the text.

Information boards on roads should be located so that they can be read from the car, because a person in a wheelchair may find it difficult getting out of, and into, a car. If an information board is located on a trail or narrow path, there should be possibilities to stop and read it without hindrance to other people who wish to pass by. The space in front of an information board should be sufficient for a person in a wheelchair to sit directly looking at the board without causing an obstacle for passers-by.

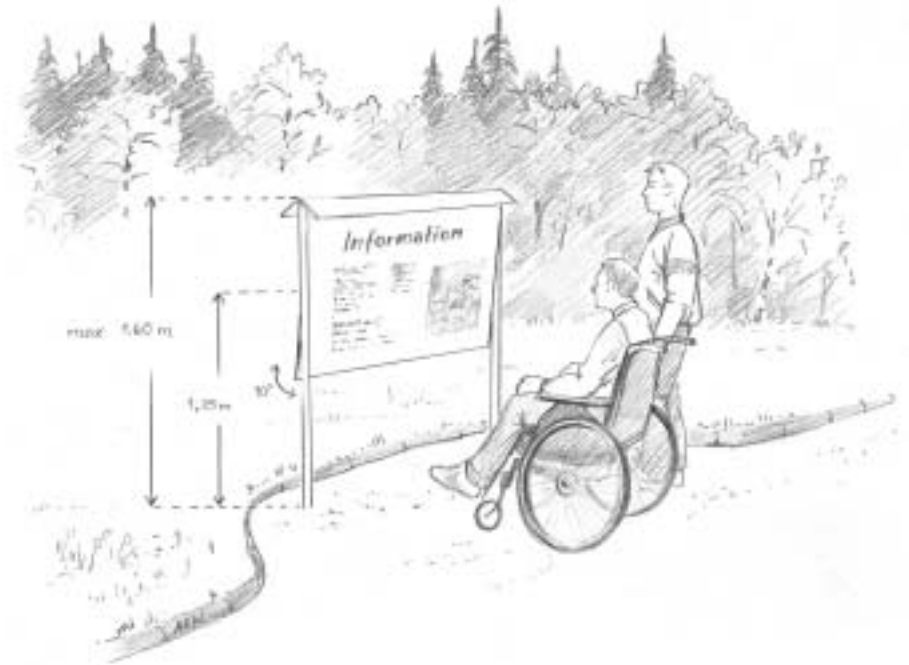


Fig. 4.3:1 Information board

Text on information boards should be concise, easily understandable and should not contain irrelevant information. It should contain information of importance to disabled persons. Available toilets and changing rooms, distances, and resting

places along the trails should be clearly marked. Steep slopes and other obstacles should also be marked so that a disabled person can, from the start, decide whether the trail is suitable or not. This type of information should be available at numerous places within the area so that persons with mobility problems can avoid going long distances to no avail. For those who are physically disabled or with impaired vision it is often the small details that are decisive for accessibility. A small, eroded, gully across a trail created by runoff water in the spring may result in the entire recreational area being inaccessible to wheelchairs, or perhaps that somebody with impaired vision stumbles, falls and becomes injured. Consequently, information boards should list telephone numbers that can be called when repairs or maintenance are required.

Apart from information boards, there should also be clear signposts in leisure or recreational areas. These signposts should include information on distances longer that 100 metres. New signposts should be placed at all junctions of paths or trails to avoid loss of orientation.

Signs drawing attention to interesting features of nature or historical details, such as ruins, former forest activities or ancient trees, should be placed at strategic sites along paths and trails. These signs should have an informative text (see below) and be placed at a level and with a slope that enables persons sitting in wheelchairs to read them. At a distance of about 2 metres from the sign (in both directions) there should be a marking of some kind (e.g., stumps at the side of the path, or a change in the verge) indicating to those with impaired vision that a sign is being approached *(fig. 4.3:2).*

Fig. 4.3:2 Shift of rails indicate an information board.

4.4. The text

The text on the signs should be designed with consideration to those reading it. Preferably, it should be possible to get close to the signboard, which helps those

with impaired vision. The following sizes are recommended for those with weakly impaired vision:

- 15 mm on a sign that can be approached closely, e.g., a sign on an office door.
- 25-40 mm on important location signs, etc. that can be read at a distance of some metres, but which can be closely approached, e.g., in stairwells, WC, and cloak-rooms.
- 70-100 mm on street signs that can be read at a distance of 1-3 metres
- For signs that are intended only to be read visually from a distance (*see fig.4.4:1)*

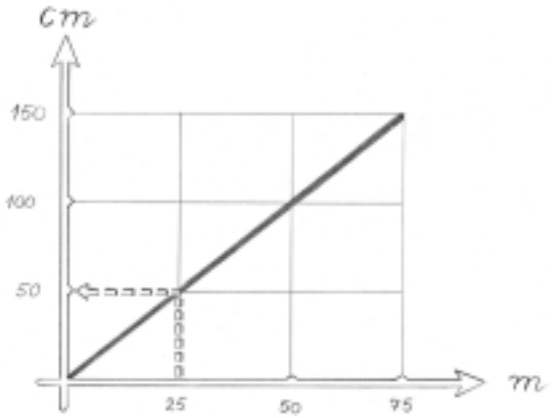


Fig. 4.4:1a Text height at different reading distances, recommended by The Swedish Association of the Visually Impaired

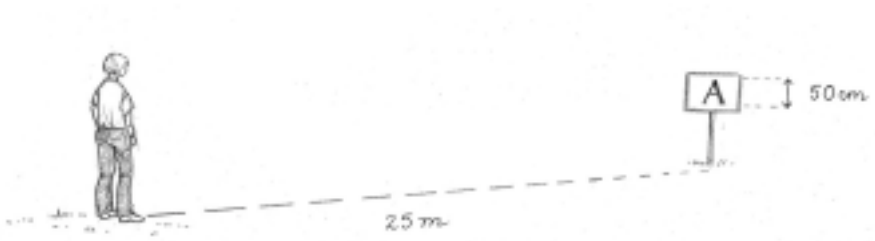


Fig. 4.4:1b At a reading distance of 25 m, the letters have to be 50 cm high. (According to national authorities 37 cm would be enough. At the distance of 75 m the letters should be 112 cm).

The lettering should be in a font that is easy to read, it should have lines of similar size, without ornamentation. It should not be in italics. Lower case letters are easier to read than upper case, and thus should be used for all text (except, of course, the first letter in each sentence, and in names, etc.). The colour of the text should diverge distinctly from the background colour. The combination black/white is the easiest to read. When colours are used together, colour-blind people find it difficult to distinguish between red and green, orange and brown, and between blue and green.

Persons with disability may have difficulty in reading and understanding normal text. An alternative may be to provide information in the form of a PICTOGRAM. This is a symbol language with a very large number of symbols that are understood by many disabled persons. More information on the symbols is given on www.sih.se/pictogram.

4.5. The handicap symbol

The international handicap symbol must not be used in information brochures, etc. in cases where only parts of the establishment are accessible to the disabled, e.g., a toilet. When an establishment is not fully accessible for all the functions it is intended to fulfil, this information must contain correct details on which parts are accessible to the disabled. *Within* the establishment, the handicap symbol can be used to identify accessible facilities.

5. Parking

The recreational area should be possible to reach by bus or by car. The following should be located as close as possible to the entrance to the area:

- A bus stop
- Parking with slots for the disabled
- Possibilities for taxis and vehicles used by social services, etc. to park.

5.1. Bus stops

Public transport must be able to reach the recreational area. According to the parliamentary plan of action for handicap policy, this must have been achieved by year 2010 at the latest. Consequently, close to the entrance of the recreational area or close to the start of a nature trail there should be a bus stop. There should be possibilities to wait for the bus in a rain- or wind shelter *(see section 8.4)*. In these shelters the floor must be on a level with the surrounding ground and there should be a 50 cm high bench on which to sit, with arm and back rests. Timetables and other information should be placed at a suitable height (about 120 cm) inside the shelter, and be written in large, distinct letters that can be read also by persons with impaired vision *(see section 4.4*).

5.2. Parking for cars

Parking areas in conjunction with recreational areas must have special slots for the disabled. The number of these slots should correspond to the anticipated number required, and guidelines are either 5 % of the total, or that there are two handicap slots regardless of the total number plus one extra handicap slot per one hundred normal slots.

The slots should measure 3.6-4.0 m wide and 5.0 m long. If the slots are placed one after the other along a verge, then they should be 7 metres long. Sometimes a wider width than 4.0 m is needed. About 5 m width is required if two persons, one on each side, are to be able to get out of a car if both use wheelchairs. Vans or people carriers with ramps or lifts on one side also require a slot that is at least 5 m wide. A good way of getting the extra space required by people carriers with ramps is to place one or more of the handicap slots along a path or other open area where other cars cannot park. However, the path must not be so narrow that it becomes completely blocked during the time it takes for the driver to get out of, or into, the vehicle *(fig. 5.2:1)*.

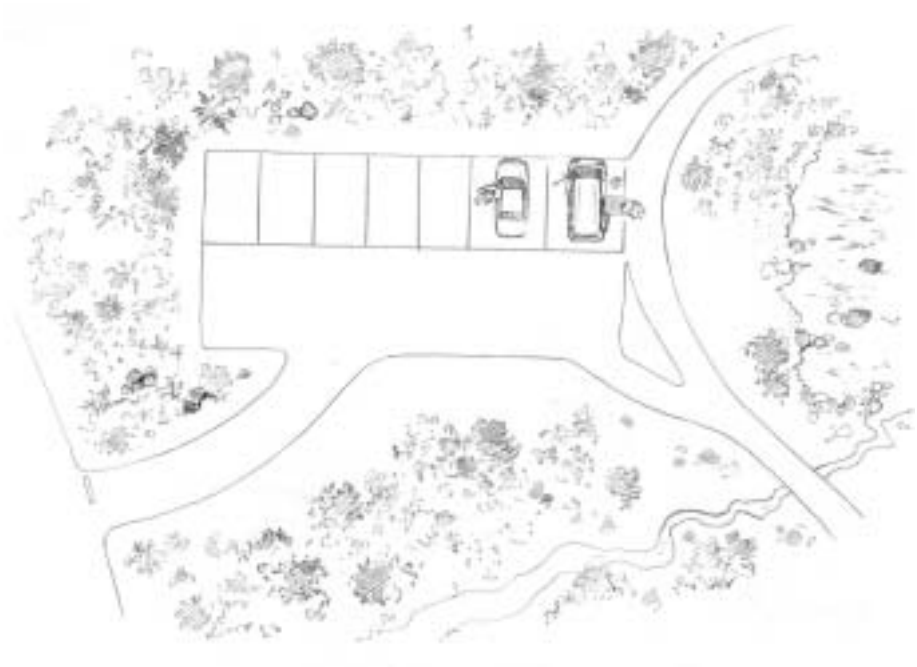


Fig. 5.2:1 Parking slot

A parking slot for handicapped must not slope in any direction, and must have a level, compacted, surface. It should be marked with a handicap symbol. There must not be pavement edges or other obstacles on the way from the parking slot to the nature area.

5.3. Delivery/collection areas for taxis and other services

It must be possible to reach the recreational area by means of taxi or vehicles provided by the social services. Consequently, in conjunction with a suitable entrance, there must be a place where taxis, etc., can wait without being in the way. This place must have a compacted, level surface and be easy to approach with a wheelchair. There should be access to a wind- or rain shelter for those waiting for their transportation *(see section 8.4)* and a ca. 50 cm high bench with arm- and back-rests on which to sit while waiting *(see section 6.9)*. If it is possible to go indoors in the neighbourhood of the recreational area's entrance, e.g., in a building with a reception and cafeteria, there should be possibilities to wait indoors and see when the taxi, etc., arrives *(see section 10.1)*. If some form of roofing is built over the entrance to the building, it should be sufficiently high to allow a people carrier to drive under.

6. Paths and tracks

6.1. General

Footpaths in nature areas close to urban centres should be designed in such a way that allows all people, both those seeking exercise, pensioners with walking frames, and users of wheelchairs, to use them. The paths should preferably be laid out to provide all users opportunities to enjoy variable terrain and to obtain an inspiring experience of nature *(see section 3.5)*.

If practically possible, the path could be taken close to lakes and waterways. Similarly, if the nature area or forest contains historical places, such as ancient tumuli or ruins, it may be of interest to lay out the path to pass them. Paths should be laid out in such a manner to avoid hazards. Places where rocks may fall from cliffs, and areas with erosion risks, should be avoided. In places where the path is close to a steep slope or precipice, railings should be erected, etc. The building of paths must not cause ugly damage to surrounding nature and should preferably be done without the assistance of heavy machinery.

When laying out a path on mineral soil with good drainage it may be sufficient to level out the ground and apply a surface material. The surface should slope a maximum of 1 % laterally in order for rainwater to run off. On wet mineral soils there may be a need for 30-40 cm deep ditches along the edge of the path. If the path is in terrain that slopes laterally it is sufficient to have a ditch only on the upper side. The ditches should be filled with coarse gravel that will allow the water to flow away and prevents the risk of somebody falling into them *(fig. 6.1:1)*. Material dug out of the ditches should be removed and not deposited along the side of the path.

Fig 6.1:1 Path with runoff drains

Runoff drains should be located close to paths and trails to avoid becoming obstacles to wheelchairs and people with impaired vision. Electricity cables and water piping should also be located along the side of the path. Excavations will

then not disturb the path and cause hazards to people with impaired vision who may fall into the holes. The fact that electric cables are placed to one side of the path is also an advantage for people who are sensitive to electricity.

With regard to people with impaired vision, no waste bins, signposts or other protruding objects should be present along passages or pathways.

In preventing unauthorised traffic, road booms are often erected on narrow roads that are designed only for maintenance traffic. It is important in such cases to arrange a gap of about 90 cm alongside the boom. The passage must have a level compacted surface. It is important that the foundations supporting the boom, generally a lump of cement, do not protrude and constitute an obstacle *(fig 6.1:2)*.

Paths and tracks for use during the evening must be well lighted *(see section 6.10)*.

Fig. 6.1:2 A too narrow passage left for a person using a wheelchair.

6.2. Slopes

Steep slopes complicate accessibility for persons with walking difficulties and for persons with limited function in arms and hands who use manual wheelchairs. Longer distances along paths and tracks should slope a maximum of 1:40-1:50. Short distances with steeper slopes can be accepted. Slopes steeper than 1:20 should be avoided, i.e., not more than one metre in height difference over a distance of 20 metres. On such slopes many users of wheelchairs can still manage without assistance. On slopes of 1:20, or perhaps steeper, the path should be built with 2-metre long resting levels without a slope every 5 metres. Preferably there should never be more than two consecutive slopes.

In areas considered to be accessible to the disabled, steep slopes can be accepted only under special circumstances and along very short distances. However, it is important to remember that if, for example, the start of a forest path consists of a steep slope this will mean that many people with mobility impairment will be excluded from the entire path. Slopes and ramps should be straight and not contain a turn or a curve.

Slopes laterally must not be more than required for water runoff. This means lateral slopes of max. 1 % on level paths and 0 % on paths that slope longitudinally.

6.3. Widths

A suitable width of a path is 1.6-1.8 m. The 1.6 m width allows a pedestrian and a wheelchair to pass each other on the path and also that two persons in manual or electrically powered wheelchairs can meet. The 1.8 m width is necessary if two electrically powered wheelchairs for outdoor use are to be able to pass each other, and that a person with impaired vision and personal guide can meet a pedestrian. It may be suggested that the path is given a width of 1.6 m since a narrower path melts into nature better than a wider one. The path could then be widened occasionally to allow meetings between larger wheelchairs. If the path is very busy is could be as wide as 2 m. An absolute minimum width of 1.2 m can be accepted at occasional places, e.g., when crossing bridges or passing smaller obstacles in the terrain. The width also allows a person with impaired vision to take exercise by jogging alongside a personal guide**.**

An electrically powered outdoor wheelchair requires a path width of 2 m if it is to be turned. A width of 2.5 m makes the turning easier and reduces the number of times the wheel chair has to be reversed. A wheelchair can also be turned at junctions of paths, etc. *(see section 13).*

6.4. Surfacing

The surfacing of a path should be with a material that merges with the surroundings. The surface should be compacted, smooth and not slippery. A layer of stone powder may be suitable. Stone powder, consisting of ground rock in the size 0-4 mm, is laid out in a 5 cm thick layer. When this layer is watered (the best way is to wet it by spreading out commercial road salt) and allowed to dry it becomes solid and hard. In order to make the surface even, a roller can be used. The use of stone powder as surfacing requires a good and solid base. A durable base may, for example, consist of a layer of sand at the bottom, covered by a layer of crushed rock and a layer of gravel. The layer of stone powder is then placed on top.

The surfacing can also consist of concrete or tarmac. When tarmac is used it is best to choose a light-coloured type. A light-coloured path diverges in colour from the surrounding green vegetation and is easier for persons with impaired vision to see and follow. The use of wood as surfacing involves the risk of it becoming slippery when wet, and if it is to be used then the wood should be un-planed and placed at right-angles to the direction of the path.

A meandering path, with large trees close to the track, gives an inviting impression. The disadvantage of having trees close to the path is that roots may disintegrate it, causing the surface to become bumpy and uneven. Consequently, it may be better to remove trees that are closest to the path.

6.5. Railings, handrails, wheelchair safety considerations

In all places where the path is higher than the ground on one or both sides, there should be some sort of edging. A person in a wheelchair will otherwise risk falling out of the chair if one of the wheels leaves the path. The edging could be a 20 cm high wooden edge fixed by pegs pushed into the soil. In order not to interfere with water runoff the edging should not go all the way down to the surface of the path *(fig. 6.5:1)*.

Fig. 6.5:1 Edging.

Railings should be positioned at all steep parts, along lakeshores and other "hazards" where there may be a risk of somebody falling and becoming injured. On slopes of 1:20 or more there should be railings where physically disabled persons can find support. The railings should be 90 cm high and be fitted with a handrail at the height of 75 cm *(fig. 6.5:2)*.

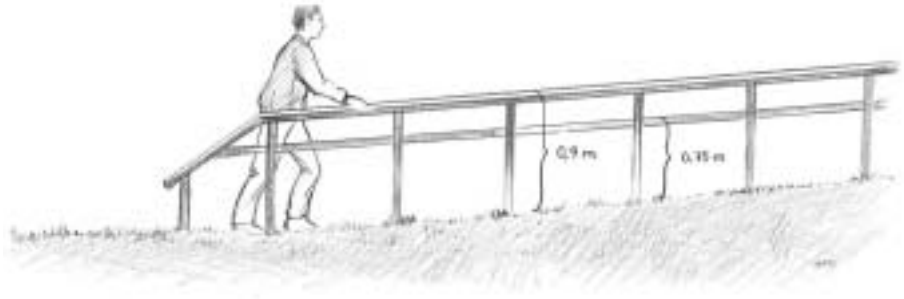


Fig. 6.5:2 At elevations of 1:20 – 1:12 handrail may be needed.

Persons with impaired vision require something to follow if they are to proceed alone along a path. A path that is lighter in colour than its surroundings is of great help for those with weak vision. Logs laid out along the side of a path, painted in a diverging colour, provide good assistance both to those with weak vision and to the completely blind, as the latter can use their stick to find the logs. The logs must be laid out in such a manner that they do not prevent water runoff from the path. An alternative to logs is to lay along the side of the path a ca. 5 cm strip of a material that diverges in colour and structure from the material in the path, e.g., light-coloured coarse gravel. The contrast between the compacted surface on the path and the soft ground at the side of the path may also be sufficient for a blind

person to feel his/her way forward, whereas a person with impaired vision is still dependent on contrasting colours between the path and the surrounding ground.

Railings, or a nylon rope placed at a suitable height, will assist persons with impaired vision to find their way over surfaces that lack natural orientation points. Railings of nylon rope are also of great assistance along paths that do not have a clear and distinct border with the surrounding nature, and also in places where it is difficult for a blind person to use a stick to find where the path is located. Nylon ropes are useful for those with severely impaired vision, whereas fixed railings can be of assistance to both them and persons with physical disability.

By modifying the edging a few metres before reaching the relevant site, information can be provided to those with impaired vision, e.g., that benches, information boards or facilities for barbecues are nearby. Instead of a log placed along the side of the path, the edge marking for a couple of metres could consist of another material, such as planks*(fig. 4.3:2)*. Another possibility would be to place stumps on both sides of the path, and on both sides of the object to be marked, to indicate that something of interest is nearby. Different surfacing on the path can also be used to indicate the same thing. However, the disadvantage of using a different surfacing is that sooner or later the different materials will cause undesirable edges and ridges on the path.

6.6. Bridges and links to solid ground

Bridges, by all means made out of wood, should be built over marshy areas and streams. The bridges should be designed to merge with the surroundings as much as possible. The surface boards should be placed at right angles to the walking direction, with a spacing of 5 mm. Because wood easily becomes slippery when wet it is important that the surface is smooth and level. If another material than wood is used the bridge can be built with a slight slope but not more than 1:20. The bridge should be at least 1.2 metres wide *(fig. 6.6:1)*. Bridges are often popular places on which to take a break, perhaps for fishing or just to look at the running water. In such cases the bridge should be wider than 1.2 m in order to provide space for people passing by. Both sides of the bridge must be fitted with railings that are sufficiently stable to allow them to be safely leant upon. When building bridges it may be suitable also to consider whether they should be dimensioned to carry maintenance vehicles.

Fig 6.6:1 A good bridge construction

At places where the path meets the edge of a bridge there may easily be erosion at the sides, which may gradually reduce the width of the path. This can be avoided if the bridge is built at a place where the terrain along the stream is level. The bridge should then be built longer than the actual width of the stream, thereby enabling the “abutments” to be placed some metres in on solid ground. A board protruding on both sides of the path may help to stop gravel and soil eroding into the water *(fig. 6.6:2b).*

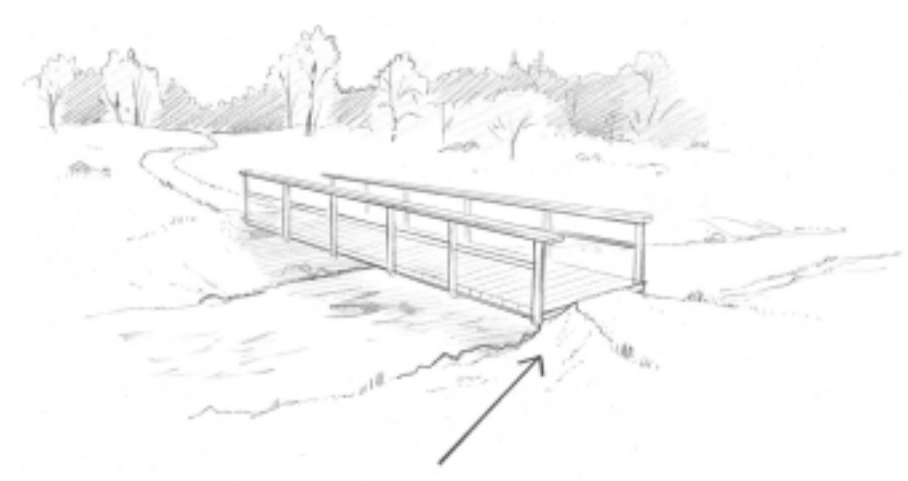


Fig. 6.6:2a

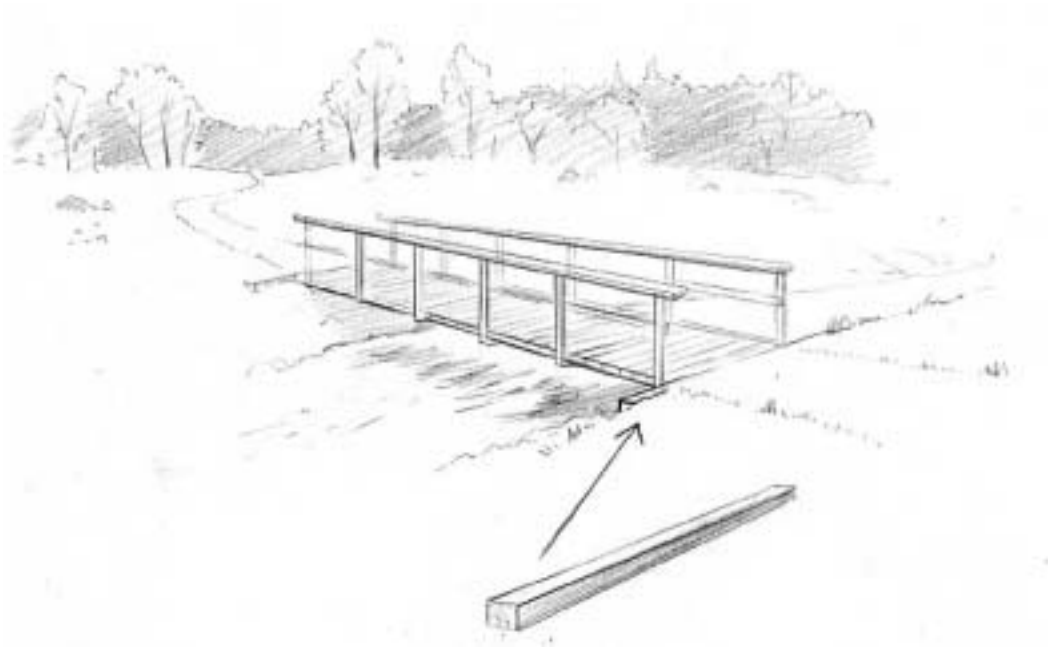


Fig 6.6:2b A protruding board can stop the erosion

Long-distance footpaths sometimes require negotiating a fence without giving grazing animals the possibility to pass through. At such places cattle/sheep grids should be built. These are usually in the shape of an inverted and somewhat flattened V, with lateral slats and handrails. It should also be possible for persons using wheelchairs to use these grids and consequently they must not be too narrow or too steep.

6.7. Board-walks

Board-walks are often laid over unstable ground, wetlands and other inaccessible areas. Boardwalks are generally built out of wood *(fig. 6.7:1, 6.7:2, 6.7:3)*. The surfacing should consist of boards placed at right angles to the walking direction. The gaps between the boards should be max. 5 mm. When boards are used to form paths they should have the same width as a normal footpath, and there should be meeting-places where persons using wheelchairs or families with prams can pass each other. Railings should be erected along the sides *(see section 6.5)*.

Fig. 6.7:1 Board-walk with edging.

Boardwalks of this kind must always be laid out in such a way that they clearly show the direction in which one should be walking. When a boardwalk comes to an end a person with impaired sight may assume that the path continues straight on. Thus, a boardwalk must never end on a curve, but should continue a bit until the path again becomes straight.

Fig. 6.7:2 A good boardwalk provides access also for children. Photo Torleif Nilsson

Fig. 6.7:3 Meeting passages are important. Photo Torleif Nilsson.

6.8. Distances

A suitable length of a nature trail is between 300 and 1 500 metres. A suitable length for weak people and the elderly is a few hundred metres, whereas those with impaired vision, those in wheelchairs with strong arms, and persons using electric wheelchairs, can manage longer distances. There should be possibilities along the path to take a short cut on the way home.

6.9. Resting places/benches

Resting places in the shape of benches should be placed at regular intervals along paths to be used by disabled persons. Especially along shorter trails there should be benches at intervals of 50-100 metres. The benches should be located in places that encourage the visitor to take a rest, both in sunny and in shaded positions. They should be on a level, compacted surface alongside the path so that they do not cause hindrance to passers-by. Next to the benches there should be a similar area, level and compacted, large enough for outdoor wheelchairs, i.e., about 1 metre wide.

The benches should be 50 cm high and fitted with backrests, and with arm supports at both ends. The arm supports should be placed 0.2 m above the surface of the bench and should extend over the entire width of the seat.

People are different and have different needs of somewhere to sit. There should also be benches that are lower in height, enabling also short people to sit comfortably.

In addition to locations along paths and trails, there is also a need for rest-places around service buildings and kiosks.

6.10. Lighting

Good lighting must be available in establishments that are used during evenings. Lamp-posts should be placed slightly away from the path so that they will not imply a risk to people with impaired vision, and so close to each other that there are no dark patches between them. Lamp fittings should be placed so that hazardous passages, junctions, hindrances, etc. will be well illuminated. Low-pressure sodium lamps with yellow light should not be used on paths and trails, and bulbs that irradiate in all directions should be avoided on account of dazzling, etc. The best result is if the lamps give a downward directed light. The lighting should provide sufficient illumination for normal vision, i.e., 3-5 lux on pathways. Signs, colour marking, etc., should be illuminated with 5-10 lux. The illumination should be directed so that the reader is neither dazzled nor is shading what is to be read. This is best achieved by light coming diagonally from above.

6.11. Dustbins/litterbins

Dustbins, litterbins and other rubbish containers must be accessible for the disabled and those with impaired vision. It must be possible to reach such facilities from a wheelchair, which means that an empty space of 2.5x2.5 metres is required in front of the bin. The lid/opening should be max. 80 cm above ground level and easy to manoeuvre with one hand. If there are different containers for different types of waste, then the bins must be marked clearly with text complemented with symbols in contrasting colours illustrating the types of waste to be put into the different bins. The marking should also be made in Braille.

In recreational areas with numerous visitors it is of particular importance to be able to dispose of one’s rubbish easily. The litterbins should be closely spaced, by all means with messages reminding the visitors of the importance of not throwing rubbish into nature. Conscientious use of litterbins will increase the pleasure the place gives, as well as increasing the safety of both humans and animals. It may be noted that broken bottles are a danger not only to animals but also to pneumatic wheelchair wheels.

In parts of the recreational area that are visited less often there may be reason to replace litterbins with signs such as “If you carried it here, you can carry it home”.

7. Stairs

The building of stairs, either indoors or outdoors, should be avoided as far as possible. If this is unavoidable, the following considerations should be made.

A staircase that goes down should not be located opposite a door. This particularly refers to an elevator door because a person in a wheelchair may reverse out of the elevator and then might not notice the staircase in time.

A handrail should be placed 30 cm outside both the uppermost and lowermost step. Handrails should be placed at a height of 90 cm on both sides of the staircase on account of some people being able to support themselves only with one arm .

Staircases should be straight. Curved staircases are more difficult to climb, to carry a stretcher on, or to negotiate with a wheelchair in emergency situations. If the staircase is long, there should be resting areas that are at least 1.3 m long.

All stairs in a staircase should have the same depth. The stairs may be, for example, 15 cm high (the rise) and 30 cm deep (the tread), which makes the staircase easy to use.

A person with impaired vision must be able to see clearly where the staircase starts and finishes. This can be achieved by painting the uppermost and lowermost steps in contrasting colours. If this is not feasible, the marking can be done with durable tape in contrasting colours. A blind person unable to see contrasting colours can be warned about a nearby staircase by placing some form of marking in the flooring or ground. This is particularly important when the staircase goes down. Outdoors, this can be done by changing the surfacing of the path just before the flight of steps is reached.

8. Facilities

8.1. Furniture in resting/picnic areas

Normally the furniture at a resting place or picnic area consists of a fixed table and benches. They should be placed on level and compacted ground. The design of the furniture is entirely decisive for how they can be used by people with physical disabilities.

Tables at resting areas, etc. should have 0.75 m free space under the top of the table in order for a person in a wheelchair to come close to the table. The tabletop should protrude 0.60 m outside the legs of the table. A person in a wheelchair can then come close to the table without their feet or knees coming into contact somewhere. The protruding part of the tabletop also makes it easier for a person with difficulty in lifting his/her legs to sit down. Wheelchairs are constructed in different ways and it is useful to also have a free space of 0.80 m between the table-legs on the short side of the table, provided that the legs are straight, which would enable a large wheelchair to get close to the table.

Fig. 8.1:1 shows an example of a well-designed picnic table. The tabletop has 0.75 free height above the ground. It extends well out over the table-legs, which are rounded and thereby enable somebody to come close to the table by putting one leg on each side. The horizontal space between the tabletop and the bench is 20 cm, which allows a person to come sufficiently close to the table. The bench is fitted to the table at foot height in the centre of the bench, which gives the whole table stability. The total weight of 350 kg allows persons with walking difficulties to lean on the table without risk of it falling over. The benches are on only half the circumference of the table, which enables persons with walking difficulties to sit at the end of the bench without having to lift their legs over the seat. The free space provides plenty of room at the table for people using wheelchairs, or for a pram requiring supervision.

Fig. 8.1:1a. A good and accessible table

Fig. 8.1:1b

The type of table illustrated below is different and is more or less impossible for physically disabled persons to use. It is difficult to get between the table and the bench because of the need to lift one's legs over the diagonal plank in order to sit

down. People using wheelchairs are unable to approach the table closely on any of the sides because the tabletop does not protrude at all. In addition, the table is placed on sand, which makes it impossible for people in wheelchairs to use.

Fig. 8.1:2 Not just the table, but also the bedding of it, must be accessible for a person using a wheelchair. This is not the case here.

8.2. Outlook points

Outlook places on high locations that cannot be reached by car are usually inaccessible to persons using wheelchairs. In places with steep slopes the accessibility for persons with walking difficulties can be improved if the path is made level and compacted, and also fitted with handrails.

At outlook points there should be benches to sit on and rest. The benches should be placed with regard to the view and to the possibility to have access both to sun and shade as well as protection from the wind. The benches should be 50 cm high and fitted with back and arm supports. Arm supports should be 0.20 m above the surface of the bench and extend over the whole width of the seat.

A sitting person should be able to enjoy the view to the same extent as somebody who is standing. Consequently, there should be no fences, bushes, etc. that break the view from sitting height.

8.3. Grill hearths and grill cabins

The footpath to a grill hearth or grill cabin should be level, compacted and smooth *(see section 6)*. Wear-and-tear on the surface, leading to emergence of roots and stones, will lead to obstacles not only to physically disabled persons but also those

with impaired vision on their way to and around the barbecue site. This wear-and-tear damage must be continuously dealt with.

The design of the actual hearth should be such that a person in a wheelchair or a person using a walking frame can use it. With a design that provides space for the foot support of a wheelchair, the hearth should be placed at a height of about 0.70 m *(fig. 8.3:1).* If a more compact design is required, where access for a wheelchair is only from the side, the grill grid should be placed lower, at about 0.50 m above the ground.

Fig. 8.3:1 A good and accessible grill hearth.

If benches or other fixed seats are placed around the hearth, there should be an opening of at least 0.90 m for a wheelchair. At least one of the benches should have a sitting height of 0.50 m.

Fig. 8.3:2 Persons using wheelchairs cannot approach the fire and the benches are to low.

Fig. 8.3:3 Example of a grill hearth where the benches are higher, perhaps one of them could be even a bit higher. The accessibility would be better if the stone in the foreground was removed.

Grill cabins should have a door opening of at least 0.90 m, preferably more. Inside the cabin there should be benches, preferably fixed to the walls, with a sitting height of 0.50 m above the floor. It should be possible for a person in a large outdoor wheelchair to sit close to the hearth on the same conditions as others without blocking the entrance or having to be placed in front of the benches. This can be solved by leaving a gap in the benches on one side of the door, thereby enabling a wheelchair to be reversed into the space provided.

Grill cabins are generally built out of logs and, for the sake of stability, the lowermost log is often left in the door-opening. This forms a high threshold that is impossible to negotiate for a person using a wheelchair. In order to retain stability and to promote accessibility, an iron plate can be placed at ground level and attached to the logs on each side of the opening. The plate will ensure the stability of the cabin and will not be an obstacle for wheelchairs to pass.

8.4. Protection from rain and wind

Open-air establishments, etc. must offer visitors the possibility to shelter from rain and wind, e.g., during a heavy rain shower, or while waiting to be collected by car. Buildings intended to function as cafeterias or with changing rooms may also function as giving satisfactory shelter from rain but in other respects special shelters must be arranged.

In open-air establishments with long-distance walks, shelters must also be available in outer parts of the area, especially at resting places and in places where angling is popular.

At bus stops, or on quays while waiting for a boat there should always be somewhere to shelter from the wind and rain.

The path to the wind- and rain-shelter must be easily accessible by wheelchair and there should be no differences in level (*see section 6*). The shelter should be at least 2 metres deep and be fully level with the ground outside. A bench should be provided inside the shelter *(see section 6.9)*.

The wind- and rain-shelter should be built in such a way that it merges with the surrounding nature, and should preferably be built using local material. Natural building materials such as rock, wood and peat are best. Artificial material such as plastic should only be used in places where it is not visible. The shelter's floor should preferably be made of compacted stone powder (*cf. section 6.4*) or impregnated wood. It should be easier to prevent the occurrence of undesirable edges and unevenness if the same material, e.g., stone powder, was used both on the access path and on the floor of the shelter.

In places where there is already protection from the wind, a simple roof may be sufficient as a shelter.

8.5. Bird-watching towers and hides

Bird-watching towers and hides should be constructed so that people in wheelchairs can also use them. The tower or hide should then be approached from a nearby parking area along a path suitable for persons using wheelchairs.

When building a bird-watching tower the following could be remembered:

- There should be a ramp up to the tower. The slope should preferably be less than 1:20 but a slope of 1:12 could be accepted
- The ramp should be built separately from the tower's construction in order to avoid vibrations that may disturb the bird-watching
- There should be space for several persons using wheelchairs on the platform. There might also be possibilities to use a ladder to reach a higher observation point
- The tower should be designed to provide protection from wind and rain
- The colouring of the tower, and the material used, should merge with the surrounding nature
- No entrances or other passages should be narrower than 84 cm
- The railing/wall around the edge of the platform should be designed to allow a person sitting in a wheelchair to see out.

When building a hide the following could be remembered:

- The hide must be at ground level in order to allow access to persons using wheelchairs
- The hide should have an entrance from the side or rear, and could be accessible from a level or only gently sloping path
- The entrance door must have a width of at least 84 cm.

Fig. 8.5:1 Bird watching tower suitable for persons with mobility impairments.

Fig. 8.5:2 A good bird watching tower in Haninge, Sweden.

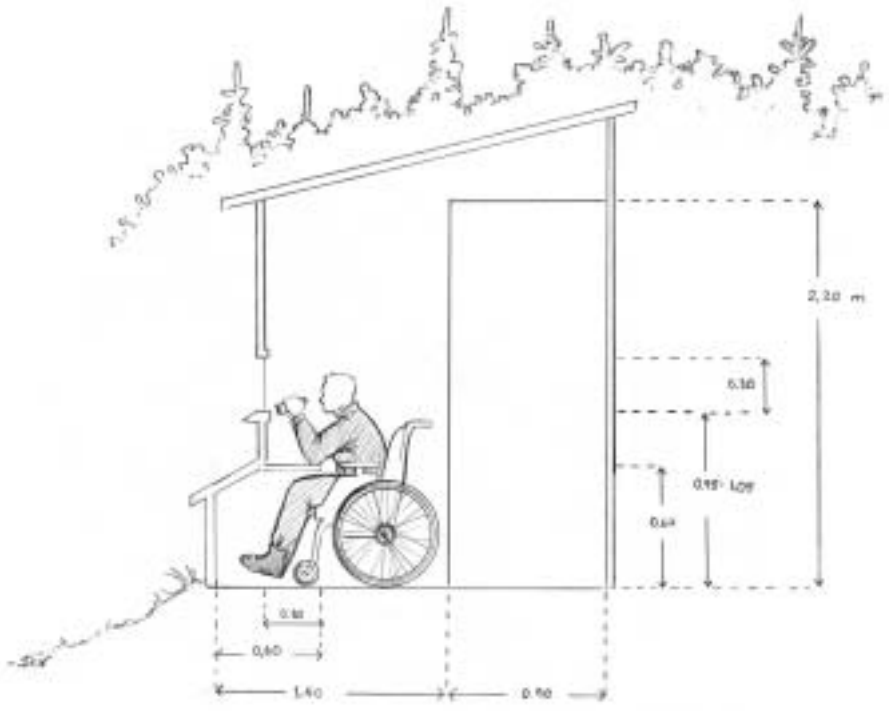


Fig. 8.5:3 Observation hide suitable for persons using wheelchairs.

8.6. Horse-riding facilities

If a person with a mobility impairment is to be able to ride a horse a mounting block with a ramp is required. The mounting block must be sufficiently large to accommodate both the person in the wheelchair and two assistants. It must be solidly build to cope with the weight of three people and the wheelchair, and have strong railings around the sides. The railings should be comfortable to grip and designed to enable the disabled person, if possible, to use them to assist in mounting the horse.

When building a mounting block of this kind in an existing riding establishment it can be done by:

- Making an opening in the edging around the riding-school
- Make a movable mounting block that is rolled out when needed
- Build a mounting block outdoors, close to the riding-school (this alternative may lead to problems with rain, snow or ice).

The height of the mounting block must be adapted to the sizes of the horses and the riders. The floor of the block should be slightly below stirrup height, i.e., 70 cm or max 80 cm for a large horse. There should be a possibility on the outer side of the horse for an assistant to stand in order to assist with the mounting.

It is better for the mounting block to be too low than too high. It is easier to scramble up into the saddle than to carefully lower oneself down without a bump. Additionally, the assistants will have more difficult working postures if the mounting block is too high.

Fig. 8.6:1 To mount a horse.

A mounting block built separately from other installations should be built in two parts. One part is reached up a ramp, and the other up a ladder or stairway. Both are made 140 cm wide, which gives good stability and plenty of space. The horse is led in between the two parts of the block, and the assistants can stand on both sides of the horse to help the disabled person to mount.

For riders who have impaired vision it would be of benefit if the riding-school had edging of contrasting colour. When required, sound signals could be used to help the disabled person to orientate in the riding-school. There should also be a suitable place for a guide dog to wait.

8.7. Kiosks and cafeterias

Paths to kiosks and cafeterias should be level, smooth and compacted *(see section 6).* A discussion on design of doors, ramps, etc. is given in section 10.

The ground in front of a kiosk should be level and compacted. This also applies to temporarily erected kiosks at bathing beaches, etc. The serving hatch should be reached without having to climb steps, and should be max. 1.10 m above ground level in order to be conveniently accessible to short persons and for persons using wheelchairs.

It should be possible for persons in wheelchairs to enter cafés and restaurants, as well as being able to have access to the terraces that are often part of these establishments without being hindered by a narrow door-opening, a high threshold or edge. The same applies to out-door cafeterias, etc. If the establishment is on two floors there should be possibility to reach the upper floor by lift.

Café tables should be accessible to persons using a wheelchair, which implies that there should be 0.75 m free height under the tabletop and that there should be space for knees, legs and feet under the table. There should be access to chairs with armrests.

In establishments with a bar, the height of the bar should be 0.80 above floor level.

8.8. Bathing beaches

A parking area for handicap cars should be available close to the bathing beach, and a compacted path, etc. should lead from the parking area to the beach (*see section 6*)

Sand is very difficult to move on for a person using a wheelchair and all sandy beaches should have compacted paths. These paths should not be narrower than 1.2 m (*see also section 6.3*). They could be made out of concrete or planed planks laid at right-angles to the walking direction. However, in the case of planks there is a risk that they will become slippery when wet. The hard-surface paths must enable persons using them to fully enter the water, which means that they should continue until the water is deep enough for swimming (*see below*). Such paths should preferably be made of concrete. If wood is used the planks must be secured to the bottom to prevent them floating up.

The hard-surface paths should also enable general movement around the beach, to reach kiosks, toilets, etc., as well as to leave the beach. In areas with shifting sand it may be necessary to find alternative solutions to get hard-surface paths on which to move around.

A bathing beach is generally visited for swimming during sunny weather and thus it is also important that there are places with trees to provide shade. There should also be places with benches, in both sunny and shady spots, where people can sit comfortably (*see section 6.9*)

Changing-rooms should also enable access to people in wheelchairs. Doors must be at least 90 cm wide, with no thresholds or other obstacles. Benches should be 50 cm high with a depth of 60 cm, and there should be possibilities to wash oneself. Changing rooms are usually divided into male and female sides, and thus there should be a changing room available to a person in a wheelchair who has an assistant of the opposite gender (*see section 10.3*).

At public bathing beaches there should be possibilities to borrow wheelchairs to be used when getting into the water. There could also be need for storage possibilities of the private wheelchair, maybe in some kind of cabin close to the water line or close to where the jetty reaches land.

At public bathing beaches there must be at least one handicap toilet *(see section 10.2*), preferably close to the changing-rooms.

At public bathing beaches there should be possibilities for physically disabled persons to enter the water, this can be achieved in several ways:

- A person with walking difficulty can manage to enter the water without an assistant if there is a gently sloping ramp equipped with double hand-rails spaced at 0.60 m. The bottom, below the water surface, can be a hard sand bottom or artificially hardened. The hand-rails should be easy to grip and placed at a height of 0.90 m. They should continue out into the water until it is possible to swim.
- A person using a wheelchair or a transport chair that is not damaged by water can enter the water to a distance where swimming is possible.
- There should be possibilities to enter the water from a jetty by means of a crane *(see section 8.12.8*).
- A stairway that enters the water and located where the water depth is max. 1 m. On the bottom at the foot of the stairway there should be a hardened

surface that is level and at least 1.3 m long. Below water level there should be protective measures to prevent swimmers coming accidentally under the jetty or stairway.

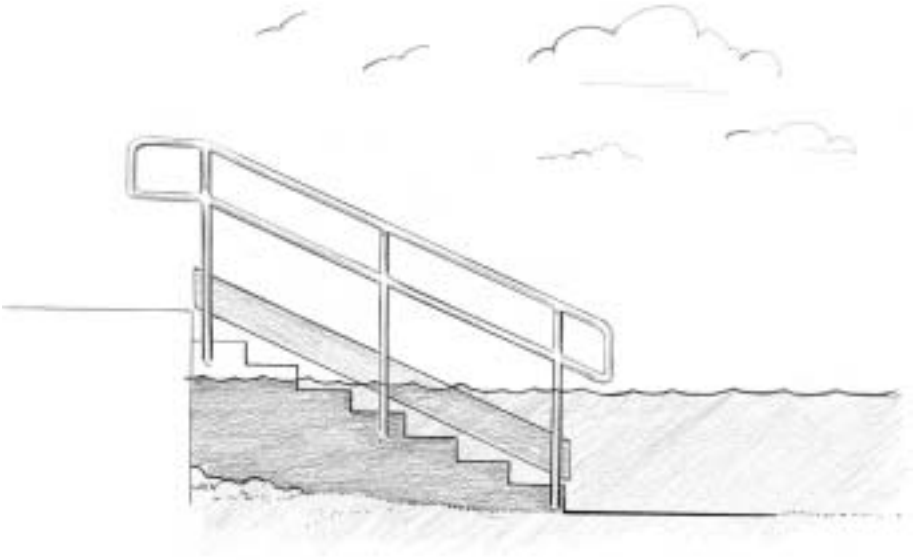


Fig. 8.8:1 A stairway may be helpful for a physically disabled person to enter the water.

- A slide can be used to enter the water. It should be low, with a slope as gentle as possible. The slide should be possible to detach if required. To enable people in wheelchairs to be easily lifted onto the slide, it should be at the same height as the wheelchair's seat, i.e., 0.5 m above the surface of the jetty with the horizontal part parallel with the seat of the wheelchair.

Fig. 8.8:2 A slide into the water

- At the end of the jetty one of the sections can be submerged one or two steps below the water surface. A person can sit in the water and use his/her arms to get up and down, possibly with some assistance.

8.9. Bathing jetties/pontoons

Getting into and out of the water is much easier if the surface of the pontoon or jetty is close to the water surface. A small constant difference in height between a

jetty and the surface of the water is thus an advantage, which means that in this respect pontoons are better than fixed jetties.

In section 8.12 an account is given of requirements to place on the construction of jetties, e.g., stability, surface material, railings and space for activities.

People with mobility impairment and those with severely impaired vision may need railings on a jetty, whereas persons without disability may consider the railings to be obstacles. Placing railings only on one side of the jetty might solve this. A crane of some kind makes it easier for physically handicapped people to enter the water from a bathing jetty (*see section 8.12.8 on cranes, etc*.).

8.10. Fishing jetties

The intention with fishing jetties is that you can use them for fishing, which requires that they should be located in places where there are good opportunities to catch fish. Fishing jetties should be constructed so that they merge with the surroundings, and should not be located in places of particular beauty but by all means where the anglers can look at such places. There should be an area of 8-10 metres around the jetty that is free from reeds and other vegetation to avoid hooks and line becoming entangled.

It should be possible to reach a fishing jetty by car. With regard to the need to carry fishing gear from the car, the handicap-adapted parking area should be not more than 25 metres from the jetty. The path should be level, smooth and hardened *(see section 6*). No uneven edges should be present between the shoreline and the jetty.

Handicap toilets *(see section 10.2*) and rain- and wind shelters (*see section 8.4*) should be located close to the jetty. The toilet building should be placed closest the jetty, preferably in a discrete location.

The jetty should be large enough to provide space for at least two people fishing from electrically powered wheelchairs. There should be possibilities to fish while standing, sitting in a wheelchair, or from a bench. Angling should not be mixed with other activities on the jetty.

The jetty should be built so that the distance to the water is as short as possible. If the jetty is fixed, it may be suitable to build it so that the flooring is about 30-40 cm above the mean water level during the summer. The jetty will be used most during the summer and it matters less if it is under water during other times of the year.

A fishing jetty should have an edging around the sides to prevent a wheelchair or walking sticks slipping over the edge (*see section 8.12.6*). There should also be a handrail, at least on one side of the jetty. If a pontoon is used then there should be a handrail around the entire surface. The lower part of the railing should avoid breaking the view of the water surface as much as possible. In order to satisfy the needs of both sitting and standing anglers, the railings should be of different heights, e.g., 0.8 and 1.1 m. Narrow gaps in the railings will allow the catch to be brought up more easily *(fig. 8.10:1).*

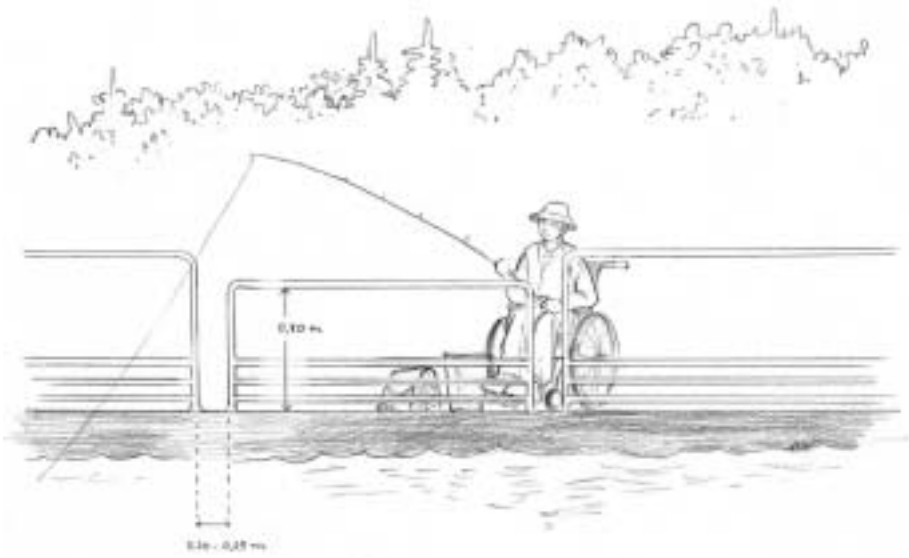


Fig. 8.10:1 Fishing site.

Pontoons fitted with an outboard motor, enabling a trip further out in the lake, offer greatly improved opportunities for experiencing nature. A ramp can be used to assist boarding from the shore. It should be possible to hire mobile angling pontoons in smaller lakes with sheltered conditions.

8.11. Boat jetties/landing stages

Parking facilities *(see section 5*) and toilets *(see section 10.2*) for handicapped should be located close to boat jetties.

Moorings and landing stages should be built with the following considerations in mind:

- Sufficient water depth for the boat to be used
- Protection from currents, waves and wind
- That they are well separated from other activities such as angling and swimming.

Landing stages could be located at a jetty sited centrally in the harbour area. Moorings can be located at the same place.

Boats must be moored in a stable manner so that they can cope with an uneven loading without excessively large movement. The boat must be able to be moored either along the jetty or at right angles to the jetty with the stern closest to the jetty.

The sides of the jetty should be covered in order to prevent the gunwale of the boat going under the jetty. This is particularly important in the case of light-weight landing stages because the boat can easily come under the pontoon if the landing stage is loaded on the opposite side. When the landing stage then levels out, the boat may be pressed down under the surface of the water.

Simple devices to hold on to when entering or leaving the boat (knotted rope, railings, round metal poles etc.) are useful aids. Protruding details must be colour-marked with consideration to those with impaired vision.

An important factor when moving between a jetty and a boat is the height relationship between the surface of the jetty and the boat's gunwale or deck. The foremost ambition should be that a person in a wheelchair could remain seated while entering the boat. In most cases this is not possible. The height relationship that then gives the best conditions in such a situation is when the boat's gunwale is at about the same height as the seat of the wheelchair, i.e., about 0.5 m above the surface of the jetty. This height offers good possibilities also for people with walking difficulties to climb aboard.

Aids when entering or leaving boats may be as follows (N.B., always with handrails):

- Movable steps.
- Fixed steps along the side of the jetty – up or down depending on the height of the jetty above the water *(fig. 8.11:1).*
- A ramp along the side of the jetty – up or down depending on the height of the jetty above the water. *(fig. 8.11:2).*
- Part of the jetty could be built on a sloping pontoon. This probably can only be achieved when the entire jetty is a landing stage/pontoon that is independent of water level. This will enable the boarding of small boats from different heights above the water level depending on where the boat is positioned along the sloping part of the jetty *(fig. 8.11:3).*
- A movable gangway with handrails. *(fig. 8.12:1a).*
- A gangway that can be raised or lowered *(fig. 8.12:1b).*
- Some form of crane (*see section 8.12.8*).

Fig. 8.11:1 Fixed steps along the side of the jetty

Fig. 8.11:2 A ramp along the side of the jetty.

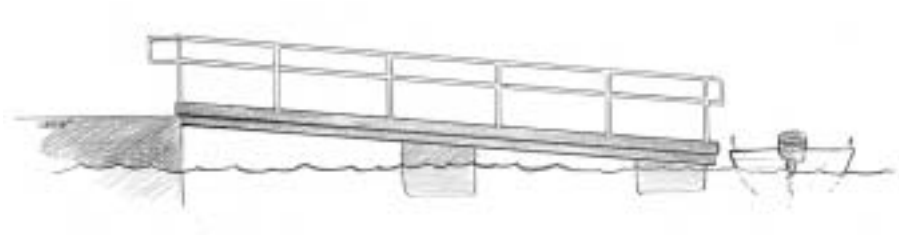


Fig. 8.11:3 Floating bridge

8.12. Construction of jetties

8.12.1. General

It should be possible to reach the jetty along a compacted path or track (*see section 6*). There should also be access to handicap parking areas close to the jetty (*see section 5*). The area must be sufficiently illuminated if jetties are to be used during the evenings (*see section 6.10*).

8.12.2. Stability

The jetty must fully stable with no swinging in any direction. A swinging or rocking surface is a difficult environment for many people with disabilities, particularly those with walking difficulty and poor balance.

The problem with stability applies especially to pontoons. Pontoons, on the other hand, have a constant height above the surface of the water, which may sometimes be a better solution than fixed jetties. If a pontoon is chosen attempts should be made to avoid or reduce the instability by choosing a site that is protected from the wind, currents, waves, etc. and by choosing a design that offers good stability through its size, weight, design and anchoring.

A pontoon should never be less than 2.4 m wide and 5.0 m long, and its carrying capacity should not be less than about 0.5 tons per length-metre. Even a pontoon with these technical characteristics is very mobile and places considerable demands on balance when exposed to waves or loading, and should only be used in sheltered locations.

At places that are more difficult to protect from waves and where the pontoon remains in the water throughout the winter, stronger and heavier designs should be chosen. In difficult locations it is recommended that the minimum

measurements are 3x10 m and with a loading capacity of 1 ton per length-metre. A pontoon extending in different directions, e.g., in an “L” or “T” shape will be less sensitive to wave movements and loading, etc.

All sorts of pontoons can be given considerably improved stability if they are anchored correctly, using e.g., chains and concrete anchors or piles. They are also experienced as being more stable if the height of the floating blocks is reduced and if the blocks are spread out more evenly under the flooring of the pontoon, particularly around the outer edges.

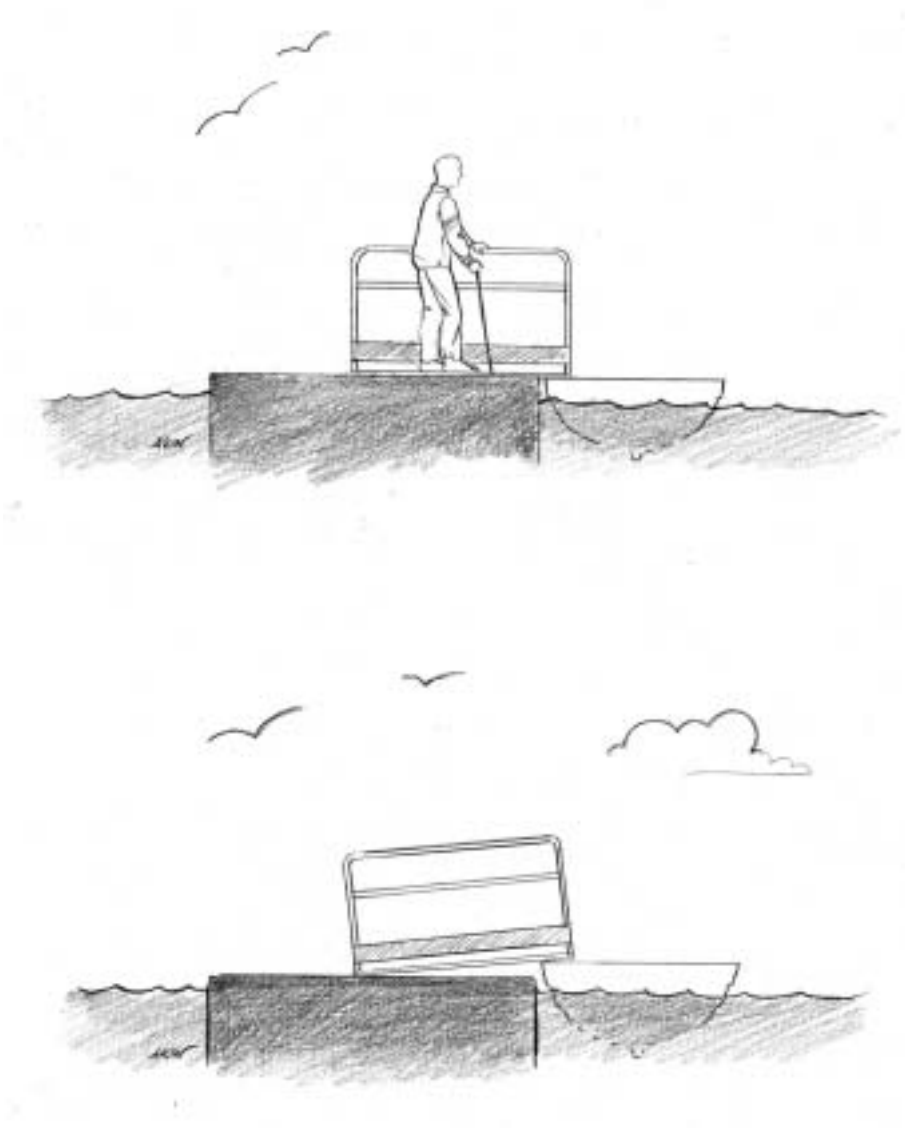


Fig. 8.12:1a A movable gangway with handrails.

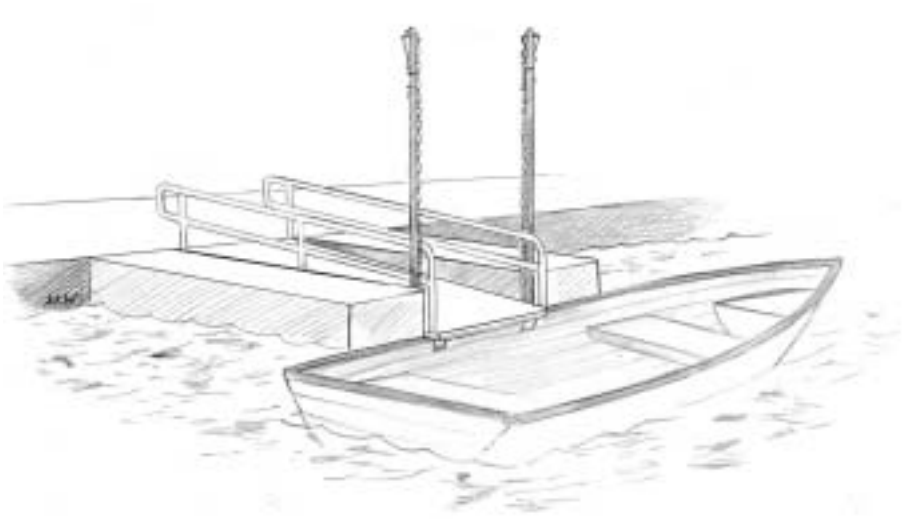


Fig. 8.12:1b A gangway can be raised or lowered.

A jetty as well as a pontoon should be both secure and stable, as well as giving impressions of security and stability. Consequently, complete and reliable information on access to and use of the jetty or pontoon should be available – a visit should not result in unwelcome surprises.

8.12.3. Obstacles

It is important to ensure than no parts of the construction such as fenders, sign boards, poles for railings, mooring equipment, litterbins, etc, reduce the necessary free space on jetties and gangways. This applies up to a height of 80 cm above the surface of the jetty or gangway. Protruding parts above this height should also be avoided with regard to persons with impaired vision. On the other hand, longitudinal railings, etc., may intrude on the free space above a height of 80 cm.

The free space measurements required with regard to accessibility for wheelchairs are described in section 8.12.7.

8.12.4. Surfacing and materials

The two surfaces that are usually used on jetties, floated concrete and unplanned wood with the fibres at right angles to the walking direction, generally give satisfactory protection against slipping. If wood is used, the gaps between the planks should be maximally 5 mm.

All types of surface will become slippery as a result of snow, ice, fish entrails or growth of algae or lichens, but a surface with a deeper pattern generally gives better walking conditions. A layer of expanded metal may retain good walking conditions because it allows water to drain away together with any slippery additions.

If different surfaces, in wet and dry conditions without any slippery additives, are compared with properties of floated cement and unplanned wood, the following may be noted:

- Carborundum strips give the best friction properties
- Asphalted roofing paper with a sanded surface has very good friction properties
- That mats of material such as sisal, coconut fibre and punched felt, as well as “wall-to-wall” carpeting (tufted), industrial flooring with quartz sand in the surface, plastic grass with or without a permeable backing, and rubber mats, do not provide better non-slip characteristics, either when walking bare-foot or in shoes with soles of leather or rubber
- That planed wood is slippery.

On surfaces that are not frequently used and where there is a risk that slippery conditions may occur, particularly on planed wood and on rocky outcrops exposed to water, asphalted roof paper with a sanded surface can be applied and fixed sufficiently to remain in place when exposed to wind and water. It can then easily be replaced when the fiction characteristics deteriorate. Asphalted roofing paper becomes rather sticky in hot sunshine and in very warm conditions it may be difficult to walk barefoot on the paper. An alternative is to use footboard paint or varnish mixed with sand.

Strips with carborundum surfaces can also be attached in places where there are slippery conditions. These strips should be placed at right angles to the walking direction, with not more than 10-15 cm between them.

People with impaired vision are assisted if the surface layer, or the colour, is changed just before alterations in the path leading to the jetty, e.g., before a change in direction or to identify where the path meets the abutments of the jetty.

Materials used in jetties and their different fixtures are generally risk-free for people with allergies. However, chrome should be avoided, e.g., in galvanised steel that has been chromed. Tar products and certain chemicals in impregnated wood and painted material may imply a risk if allergic persons come into contact with them before they have properly dried. Skin exposed to sunlight is particularly sensitive when it has been in contact with tar products, etc. Impregnated timber for use in jetties should, thus, be allowed to dry before being used.

Impregnated wood should be used when building pontoons or when building a retaining frame around a buoyancy block, in order to make them more aesthetically attractive.

8.12.5. Gangways, stairways

Surfaces should be of floated concrete or unplanned timber placed with the fibres at right-angles to the walking direction. Gaps should not be wider than 5 mm.

Gangways should be straight and preferably they should not slope. If sloping is unavoidable then the slope should be less than 1:20. Slopes steeper than 1:12 cannot be accepted (*see also section 10.8*). Changes in the walking direction should be marked with lines in contrasting colours.

Steps with horizontal treads are better than sloping treads for some people with walking aids. A stairway cannot be used between a land-based surface and a pontoon that changes its vertical position depending on the water level as the steps may then slope at a steep angle. Handrails or steps are unsuitable for most people with physical disabilities.

Stairways can be used from land to a pontoon or from a jetty down into the water. The steps should have a height (rise) of 14-15 cm and a width (tread) of 30-34 cm. Both level and sloping treads should be smooth so that a dragged foot does not fasten. The steps on the whole stairway should have the same measurements – there should not be more than 8 steps without a resting level. The resting level should be 1.3 m long. A person with impaired vision must be able to clearly see where the stairway starts and finishes. Paining the uppermost and the lowermost step in a contrasting colour can achieve this.

A gangway should normally have handrails on both sides. A gangway should preferably be build with a width of 1.8 m, with handrails on both sides and, in addition, a handrail placed 0.6 m from one side. This gives a wide passage for wheelchairs and a narrower passage for people walking who need to support themselves with both arms. The rails should preferably continue unbroken until they reach new rails on the jetty or on land. The gangway should preferably be placed at right angles to the jetty or land so that persons with impaired vision can clearly identify their positions. Rounded corners should always be on crossings. If it is not possible to align the gangway at right angles to the jetty then the handrails should be extended 0.3 m past the start and end of the gangway and rounded at the ends (cf. how handrails on stairways should extend 0.3 m outside the stairway at both ends).

8.12.6. Safety railings and handrails

All jetties should be fitted with edging to prevent wheelchairs slipping over the edge and to prevent canes and crutches from gliding over in the same way. In order to permit water runoff the edging should not extend all the way down to the surface but should suitably be 5 cm high with the lower edge 3 cm above the surface of the jetty. The edging can be of wood or metal piping and should be strong enough to withstand being run into by an electrically-powered wheelchair weighing about 300 kg, not including the person driving it.

Handrails should be present to assist pedestrians and those needing support, particularly on pontoons where it may be difficult to keep one’s balance. Railings should be at heights of 0.8 m and 1.1 m in order to suit people of different height. If the railing ends at the end of the jetty, there should be some kind of marking that indicated to blind people that the end of the handrail and the end of the jetty is nearby.

If there are not handrails then a contrasting marking can be placed along the edge of the jetty to help persons with impaired vision to see where the jetty comes to an end. Blind people, unable to see the contrasting colours must use their cane to find their way to the end of the jetty, e.g., by using the edging along the jetty as described above.

8.12.7. Space for manoeuvring

Paths and gangways should be at least 1.6 m wide. If two electrically-powered wheelchairs are to be able to pass one another, a width of 1.8 m is required. A width of 1.3 m is acceptable for shorter and less frequently used paths. Gates, etc. should be at least 0.9 m wide. These measurements are also suitable for persons with impaired vision who feel their way with a swinging cane.

In places where a person with impaired vision must go without an assistant, double handrails may be useful. The handrails should be easy to grip and be placed at a height of 0.90 m.

Free spaces (3x3 m) are required for turning electrically-powered wheelchairs and other wheelchairs where assistants are required. On narrow jetties (down to about 2.4 m wide) the turning areas should be 3.5-4.0 m long because the turning requires that the wheelchair has to reverse one or more times, which requires space.

The extra large measurements are justified by the need to avoid coming too close to the edge of a jetty. Corresponding areas for manoeuvring on a surface without hazards in the neighbourhood can be reduced to 2.5x2.5 m.

8.12.8. Lifting devices, cranes

To make a public jetty accessible to everybody generally requires a crane or other lifting device that will enable a person with physical impairment to get from the jetty either into a boat or into the water. Karlskrona Sailing Club has developed a simple, reliable, boat-crane enabling a person to board a boat with dignity assisted by only one person (*see section 15*).

A crane used on public jetties must be approved for use in such situations. Approval depends on how the designer/manufacturer wishes to classify the device. However, there is a grey zone in the classes.

- If the crane is expressly designed to compensate for a physical impairment it is regarded as a medical technical product and is classified under EU’s medical technical directive. The risk analyses that the manufacturer must perform are relatively expensive.
- If the device is to lift people in a purely general manner, it is inspected and classified in accordance with EU’s machinery directive. In this category the inspections are much cheaper.

9. Parks

9.1. Design

Different surfacing on large paths and smaller branch paths make it easier for persons with impaired vision to find their way around parks. Similarly, the pathways should either have distinct borders of stone or cement that can be felt when using a cane, or nylon roping at a suitable height that can be followed by hand (*see also section 6*).

Persons with impaired vision also orientate themselves by ear. Fountains are good orientation points, at the same time as they are interesting features in a park. If the fountain is below ground level it should be given some form of railings to prevent persons falling into it.

There should be numerous benches in a park and there should be possibilities to rest in both sunny and shaded positions. The benches should be 50 cm high and be fitted with both back-rests and arm-rests, as well as painted in a colour that diverges from the surroundings. The benches should not take space from the footpaths, but should be placed to one side of the path. Alongside the benches should be a compacted, level area for an out-door wheelchair, i.e., about 1 m wide. A person in a wheelchair can then sit alongside a person sitting on the bench.

9.2. Choice of plants

In parks and other smaller areas of nature to be found in urban environments there are possibilities to influence the vegetation. Particularly in places where people are present, such as benches, playgrounds, etc., it is important to consider allergic persons and avoid plants that are known to cause problems. Examples of plants that may give rise to allergy, or cause problems for allergic persons, are:

- Grass, birch, sallow, hazel, alder, etc., during the pollen period (grass and birch are the worst)
- Strongly smelling plants such as lilac, broom, jasmine, hyacinth, spiraea, bird-cherry, lily of the valley
- Plants belonging the compositae such as ox-eye daisy, marigold, chrysanthemum, cowslip
- Weeds such as common mugwort and dandelion.

Plants that are insect-pollinated are preferable to those that are wind-pollinated. On grassed areas the choice of seed mixture should preferably contain grasses forming tufts in as large a proportion as possible, with features of grasses that spread with rhizomes as these form fewer spikes and panicles. It is also important that the grass is mowed regularly and that the grass is collected and removed. Instead of grass, it is also possible to choose other soil-covering plants.

Plants that generally do not cause problems for allergic persons are, e.g., conifers, fruit trees and berry bushes, white beam, mountain ash, roses, clematis, dog-rose, campanulae, most of the ranunculae, rock-garden plants, vegetables such as lettuce, dill, parsley and chives.

Some plants, such as poplar and willow, have shallow roots or roots that lie on the surface. These roots may make it difficult for persons in wheelchairs to use a path and may cause pedestrians to stumble. Consequently, such plants should not be planted close to pathways.

10. Buildings

10.1. Entrances

Porches in entrances should be built so that it is not necessary to change direction when passing through. The easiest way is to use automatic sliding doors. If there are two doors placed after each other and the outer one opens automatically then the inner door should also open in the same manner. Both doors should open in the same direction.

If automatic sliding doors are not available there should be, instead, an automatic door-opener that the visitor can activate. Placement of the door-opener is described in section 10.7.1 (Doors with automatic opening/closing).

An entry hall should be large enough for a wheelchair to turn *(see section 13)*. There should also be space for a person with a large outdoor wheelchair to wait without being in the way. From that place it should be possible to see when the taxi, etc. arrives or when a rain shower has passed over. This “waiting room” should also provide space for other persons to sit, as well as space for a walking frame without it being in the way. The bench should be placed at a height of 50 cm and fitted with back- and armrests.

It is important that the floor is covered with a non-slip material because large quantities of water and dirt will be brought in when the weather is foul. Mats and scrapers should be sunk into the floor to avoid the risk of tripping over them.

It is useful to have a telephone in the entrance hall that can be used to phone for a taxi or handicap bus.

10.2. Toilets

Toilets should be clearly marked on maps of the area, preferably also with information on distances. If they are placed in secluded positioned away from the path, then clearly visible signs must be placed on the side of the track.

Everybody can use a large, well-designed handicap toilet. It is better to build one large toilet than to locate a handicap toilet with minimum dimensions and a standard toilet on the same space.

At large-scale recreational establishments it is useful to have a handicap toilet equipped with a vertically adjustable nursing table. The nursing table can be folded up against the wall when not in use, and the latch on the locking mechanism must be located in a position possible for a sitting person to reach. When the nursing table is in the position for use it should not be an obstacle for a person in a wheelchair.

Disabled people use different types of wheelchairs and different techniques when moving from the wheelchair to the toilet. The type and magnitude of the disablement will be decisive for how the move is achieved, and from which side it is done. If everybody is to have the possibility to use a public toilet there must be

space for a wheelchair on three sides of the toilet. There should also be space for an assistant.

Note that the measurements given below for the toilet also apply to dry toilets/privies. The actual toilet bowl must be stable, securely attached, and possible to come close to. In many dry toilets the actual seat is placed far in on a box-like arrangement that makes it difficult to reach from a wheelchair if someone wishes to empty their stoma bag, etc. Even a dry toilet needs a handle on the inside so that the door can be pulled shut**.** The dry toilet can be given light through a window in the roof. Certain types of plastic allow light to pass through, apart from UV-radiation and are as durable as metal sheeting.

Toilets should be left unlocked when not in use. Thus, it should not be necessary to go somewhere else to get a key.

Toilets should be clearly marked in signs with raised lettering so that people with impaired vision can identify where the door leads. The sign should be placed on the wall alongside the door just above the height of the door-handle.

There are a number of minimum requirements that should be placed on a public toilet:

- The free space in a door opening should be 84 cm. On the inside the door should have a handle placed at a height of 80 cm above the floor and extending across the entire width of the door.
- No hard threshold or edge should be present at the door.
- The size should be at least 2.5x2.5 m. The size generally given, 2.2x2.2 m, is insufficient for large outdoor wheelchairs that require more space to turn and swing.
- The toilet bowl should be placed 10 cm from the sidewall to enable an assistant to stand behind it.
- The sitting height of the toilet bowl, including the seat, should be 48 cm. An alternative would be to have a vertically adjustable toilet.
- Folding armrests should be at 80 cm above the floor, spaced at 60 cm.
- The armrest should be fitted with an alarm device, with a sign explaining where the alarm is heard. There should also be an alarm that can be reached from the floor. This alarm should be placed on the wall, 0.2 m above the floor on the same side as the door’s handle. In an outdoor privy the alarm could be of a mechanical type.
- Toilet paper should be placed on the armrest. Extra rolls should be within reach from sitting height.
- The washbasin should be 50x45 cm, with the edge 80 cm above the floor. If the washbasin is smaller it is particularly important that it is not placed too close to the wall, and is not placed in the corner of the room.
- The water-seal, drain and piping should be placed to one side or in the wall.

- The water tap should be of the one-hand type
- The mirror should be 90 cm high with its lower edge 1 m above the floor.
- Towels, soap, etc. should be within reach at 80 cm above the floor close to the washbasin. The soap dish should be placed so that wet soap drips into the basin and not onto the floor. The container for paper towels should have a wide opening so that the towels can be easily pulled out.
- The litterbin should not be fixed, but should be capable of being moved in order to provide more space and avoid becoming an obstacle.
- The floor should be covered with non-slip material.
- Walls and ceiling should be of a strong design in order to enable a hoist to be fitted, if required.
- Hooks for clothing and hand towels should be placed about 1.0-1.2 m above the floor.

10.3. Changing rooms

Requirements placed on changing rooms:

- The free space in the door opening should be 84 cm. On the inside the door should have a handle placed at a height of 80 cm above the floor and extending across the entire width of the door.
- No hard threshold or edge should be present at the door.
- There should be a bench on which to sit, height 50 cm and depth 60 cm. With consideration to persons needing to take off and put on orthotic leg devices, the bench should be at least 1.2 m long.
- Access to a handicap toilet.
- Washing possibilities
- Clothes hooks at a height of 1.2 m, and some hooks also at 1.6 m.
- An electric plug for a hair-drier placed at 0.7-1.0 m above the floor.
- A non-slip floor.

In addition to public changing rooms, there should also be a separate changing room for persons in wheelchairs. This room should be equipped with a bunk that enables clothing to be changed while lying prostrate.. The room can also be used when the assistant is of the opposite sex, or when there are persons who wish to change clothes in privacy (e.g., those with a stoma operation). A mirror, size 0.3 to 1.8 m above the floor, will make dressing easier and also when changing stoma bandages.

Changing rooms for men and women should be clearly marked with signs with raised lettering, e.g., M and F, which will enable persons with impaired vision to feel their way to the correct door. The sign should be placed on the wall to the side of the door, just above the height of the door handle.

10.4. Space for showering

Shower cubicles adjoining the changing rooms or wash-room should be equipped with the following:

- The size should be 1.5x1.0 m, with a curtain. Note: shower cubicles are generally more or less impossible to use for persons in wheelchairs.
- No hard thresholds or edges must be present at the entrance.
- There should be a loose stool, 50 cm high and with a seat area of 50x50 cm.
- There should be a shelf or basket for soap and shampoo, 80 cm above the floor and close to the shower bracket.
- There should be a flexible, portable, hand-shower with lever controls.
- The hand-shower should be capable of being attached to a vertical bar, 80-130 cm above the floor.
- The lever-regulated thermostat should be placed 80 cm above the floor.
- The wall of the shower should be fitted with a handle or bracket on which the disabled person can hold to achieve stability, 80 cm above the floor.
- The floor should be of non-slip material.

10.5. Sauna

If a person in a wheelchair is to be able to enter and use a sauna, the following are necessary:

- A free floor space of 1.3x1.3 m is required to be able to enter with a wheelchair.
- The lowest bench level should be 50 cm above floor level
- There should be an alarm device.
- The wheelchair/trolley should not cause burns.
- The door should have a free entry of 84 cm and have a window. The door should open outwards and be without a lock.
- Floor gaps must not be wider than 5 mm.
- The sauna heater must be well protected for people with impaired vision and to ensure that those in wheelchairs cannot come too close with their feet.

10.6. Regulating equipment

The possibility to use regulators, buttons, handles, light-switches, etc., depends on how they are designed and placed. An environment that is fully accessible in other respects can be made unusable if the regulating equipment is at the wrong height or requires full mobility of the user’s hands and arms. The size, differences in level, spacing and height of buttons may be decisive for the chances for disabled persons to manage by themselves or not. A large spacious lift, for example, will be impossible for a disabled person to use if the control panel is placed too high.

Many disabled persons find it difficult to use buttons that need to be pressed by a straight finger, whereas a button that protrudes, thereby enabling it to be pressed by the hand, is easier to use.

Remember that….

- Sets of buttons, single buttons and regulating equipment should be placed with their lower edges maximally 80 cm above the floor
- Buttons are placed so that a person in a wheelchair can come close to them, i.e., at least 1 m from corners and preferably so that there is knee-free space below them.
- Buttons that can be reached by a person sitting in a car should be placed about 1 m above the ground.

10.7. Doors

The design of doors is important for disabled persons to be able to move freely. Doors that are heavy to open (those with closing devices), automatic openers that close too quickly, and revolving doors that lack (or have a locked) supplementary conventional door, may be insurmountable obstacles.

Door apertures should not have a hard threshold or edge that is difficult to pass over. If, for example, it is necessary to have a threshold because of the climate, it should not be higher than 2.5 cm and should be rounded. Good alternatives for prevention of draughts are a soft threshold that is pressed down by the wheels of the wheelchair, a strip that is attached to the door, or a threshold that automatically withdraws into a recess in the floor when the door opens.

Signs providing information on what is behind the door should be attached to one side of the door, not on it. The reason is that persons with impaired vision need to stand close to the sign in order to be able to read it, and would otherwise risk being injured if the door were to be opened unexpectedly. The sign should preferably be made with raised lettering and placed alongside the door just above door-handle height so that the information can also be felt by using the fingers.

10.7.1. With automatic opening/closing

Doors with a closing device should be fitted with automatic opening and closing in order to become accessible to persons with physical disabilities. If the door-opening mechanism is to be accessible it must be placed correctly, which implies:

- That a person in a wheelchair can come close to the opening switch. This must always be placed at least 1 m away from an inward corner.
- That the switch must not be placed so that the door collides with the wheelchair when opening
- That persons with restricted mobility in their arms must also be able to reach the switch – thus it should not be placed too high. The lower edge of the switch should not be more than 80 cm above the floor/ground.

10.7.2. Without automatic opening/closing

Conventional doors without automatic opening or closing should be fitted with a hand bracket on the side of the door that is pulled when closing it. The hand bracket should be placed 80 cm above the floor and extend horizontally across the entire width of the door.

10.7.3. Door measurements

The open space provided by a door should be measured between the frame on the handle side and the face of the door when it is opened at a 90^{o} angle. A door opened to 180^{o} will give a wider opening but people in wheelchairs cannot close these doors. The smallest door size should thus be with a width of 100 cm, including the frame.

10.8. Ramps

When building new establishments it is important to avoid differences in levels because many disabled persons have limited strength and/or durability in their arms and hands. If ramps nonetheless must be built they should be adapted to the surrounding environment as regards material, placement and design.

The following should be considered when building a ramp:

- A maximum of two ramps in succession with lengths of five metres with a resting level in between
- A maximum slope of 1:20 (on the sloping part)
- The resting level between the ramps should be at least two metres long and with no slope
- A horizontal resting level in front of a door should have a size of at least 2.5x2.5 m
- There should be handrails on both sides of the ramp
- There should be edging along the side of the ramp to prevent persons using wheelchairs from falling over the side
- A ramp along a wall should have low edging along the wall to prevent hands from being scraped when the ramp is used by a person in a wheelchair
- The surface should be smooth and hard
- A ramp must be straight.

10.9. Choice of colours

Indoor environments, e.g., in service buildings, should make use of contrasting colours to enable persons with impaired vision more easily to orientate themselves. Painting the door in a darker colour than the surrounding walls, for example, could mark its location. If the doorframe also contrasts with the wall colour then it is also easier to see where the exit is when the door is open.

The term contrasting colours foremost refers to differences in the brightness of the paint. Persons with impaired vision can easiest see differences in brightness, whereas differences in colour may be more difficult to see. Thus, it is easier to see the difference between a light green and a dark green surface, than between a green and a blue surface with the same brightness.

It is important to mark the border between the floor and the wall. The easiest way to do this is to make the floor darker than the walls. It is also important to mark obstacles or places where there may be a risk of accidents, e.g., staircases and pillars.

Semi-matt colours should be used to avoid reflexes.

10.10. Lighting

Persons with impaired vision, the elderly and those with impaired hearing are dependent on good light conditions. It is particularly important to have good lighting in stairwells, at notice boards/signs and at orientation points, as well as when obstacles are present.

In a stairwell the steps must be clearly visible and shadows formed by the person walking in the stairwell must not fall on the steps. There must be no risk of being dazzled.

A person with impaired hearing reads the lips of persons talking and thus it is important that the face of, for example, a person working in a reception, is well illuminated.

Extra lighting may be required for objects or surfaces that require close inspection.

Elderly persons and some persons with impaired sight are very sensitive to dazzling by, e.g., reflexes in shiny material or when going from a dark to a light room. It is therefore important to consider the design and placement of lamp fittings.

11. Details and maintenance

People with disabilities often have fairly small margins in their lives and consequently it is important that details are correctly designed, thereby making the recreational establishments accessible. A person with weak arms might be able to get a wheelchair over a threshold of 1 cm, but not over 2 cm.

It is also important the have continuous maintenance to avoid obstacles occurring. If, for example, the ground subsides immediately in front of a ramp it may result in a sharp, difficultly negotiated difference in height. Water drainage pipes under pathways, etc. may cause difficultly passed unevenness in the path as a result of frost action in the spring. Branches (below the 2.2 m level) of trees and bushes growing close to pathways may imply obstacles or risk of injury to persons with impaired vision unless they are kept well trimmed.

The person responsible for management and maintenance must be aware of the importance of small details. A good idea at the start may, after a while, develop into a disaster.

In many cases it is possible to avoid maintenance by making the right investment from the start. Choice of correct material and construction technique, where “correct” does not necessarily mean the most expensive, will assist in reducing the maintenance costs. If, for example, the foundations of pathways are carefully laid then they will have a long life and need not be in need of continuous and expensive minor repairs.

At suitable places, e.g., on notice boards, there should be information on where visitors can phone to report the need of repairs.

12. Activities

12.1. Trail-O

Trail-O, previously known as handicap orienteering, is a competition open to everybody but is done on conditions suited to people in wheelchairs. The competing is based on problem solutions and not on getting through the forest as fast as possible. Assistance is permitted in the form of, e.g., pushing the wheelchair or registration at control points. The actual problem solution must be done entirely by the individual competitor.

Trail-O requires completion of a course of 2-3 km suitable for wheelchairs within a maximum time of generally 2 hours. A number of control stations are located around the course. At each control station a number (2-4) of orienteering screens are placed in the terrain. By using a map, and a control description obtained together with the map, the competitor must decide which screen is the correct one. In the elite class there may be controls where none of the screens have been correctly placed. The competitor must never leave the path and enter the terrain, even if he/she is walking, where a wheelchair cannot go. Choice of correct screen gives a point and the person with the most points wins.

12.2. Orienteering for persons with impaired vision

Maps with raised features (possibly together with a vibration compass) can fill a large need to persons with impaired vision when orienteering in the forest environment. They can also provide an overall picture of a recreational area (or housing estate). See further discussion in section 4.2.

A compass for blind persons could be, for example, a vibrating compass that is fastened on a belt around the waist. There are buttons on the front for the different points of the compass. For example, if the user wants to find north, the north button is pressed. The compass then vibrates when the person is turned towards, or walking in, all directions except north. When orienteering, the user adjusts the compass in the desired direction, adjusts and reads off the map using the fingers, and then easily finds the way to the finishing post.

12.3. Riding

Riding is an excellent way of getting out into the countryside for disabled persons. In addition to experiencing nature, handicap riding has numerous positive effects such as improved balance, coordination, trunk strength, increased pelvic mobility and the psychologically important experience of, at last, not having to look up when talking to others *(see also section 8.6).*

12.4. Hunting

Many of the considerations that apply to hunting in general also apply when the hunter is disabled. The hunting area should be at least a couple of hundred

hectares if a dog is to be used. If necessary, a local hunting club can be contacted to arrange a dog-handler.

Landowners or game management officers should be able to recommend suitable hunting areas for persons with physical disability. Possibility to approach the area by car is important. A forest trucking road or other road should lead to a parking area, from which it should be possible to proceed to the hunting area, e.g., with the help of a terrain vehicle, Permobile, etc. The landowner should be able to recommend suitable access tracks in the area and state, preferably in a contract, whether compensation for driving in the terrain is required.

Battue, i.e., hunting with beaters, is well suited to a physically disabled person. The hunter can sit still on a beat and the beaters or dogs can drive the wildlife towards the beat. A mobile hunter can individually look for a suitable beat, whereas a physically disabled hunter should have access to lines of fire from a fixed position on a beat *(fig. 12.4:1).*

The beats should be placed along a track that is accessible to a person using a wheelchair, etc., with lines of fire out to the sides. Somewhere centrally along the track there should be a wind shelter with a handicap toilet. If the toilet alternative is too expensive, then a privy could be built in accordance with the suggestions in sections 10.2 and 8.4.

Somewhere close to the hunting ground there should be possibilities to spend the night in a handicap-adapted cottage (*see section 10*). The cottage should be equipped with drying and cooking facilities. The bedroom should be sufficiently large to provide space for a wheelchair of outdoor type *(see section 13).* At least one bed should be of conventional type, i.e., not a two-level bunk type, which is difficult or impossible for a physically disabled person to use.

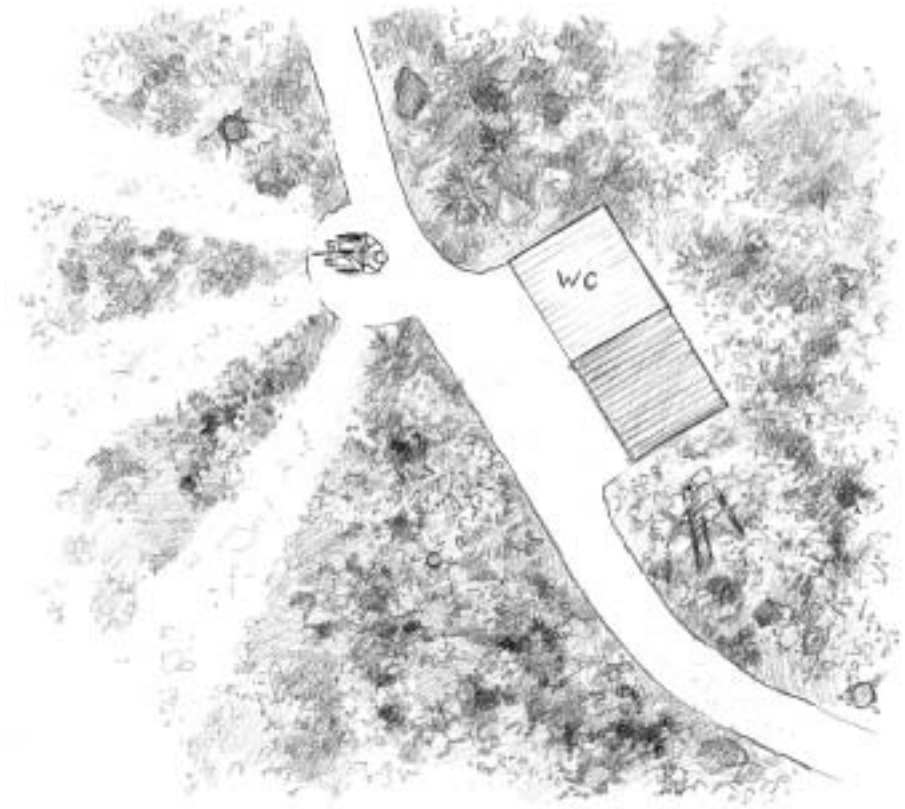


Fig. 12.4.1 A system for hunters with mobility impairments.

12.5. Sailing

Everybody should be given the opportunity on some occasion to feel the wind in one's hair, to hear the rustling of the sails and to feel water splashing on one's skin. Through knowledge and adaptation it is now possible for persons with severe physical disabilities or impaired vision to experience sailing. There are a number of fundamental practical conditions that make it easier for physically disabled persons when sailing, particularly those in wheelchairs.

There should be a pontoon or other jetty low in the water enabling easy movement into or out of the boat (*see section 8.11)*. If the boat has a centreboard then this is not a problem as getting into or out of the boat can be done from the shore. There should be plenty of space in the well, and well-organised lines and ropes. An attachment at the stern should restrict the movement of the boom and the sheet. Boat designs that are low and flat are good for both safety and comfort.

People with poor balance and those who find it difficult to sit upright can use specially designed bowl-shaped chairs that can be fastened in the boat. A soft cushion will make the chair more comfortable. The rigging must be adapted to the wind because if the boat heels strongly it may feel unpleasant, particularly for a person who is strapped in. Proper life jackets are a self-evident requirement on all boat trips.

Certain organisations (in Sweden: Stiftelsen Skota Hem) work to give physically disabled persons the opportunity to discover the delights of sailing. They train instructors and assist in selecting material and aids in tuition. In Sweden, there is also a manual for handicap sailing. Cooperation is established with clubs

throughout the country for disabled persons. Some of the types of boat used in handicap sailing are:

- The Mini-Twelve (2.4R) is a four metre keelboat for one person. This type of boat enables everybody, regardless of gender, age or physical disability, to compete on similar conditions all the way up to World Championship level
- Samba is a reliable and safe five metre keelboat capable of coping with strong wind conditions
- The Monark 606 (very similar to the Yngling) is a fast keelboat sailed by three people and today is being used increasingly in competitions.
- Sonar is a crewed boat for sailing with children and youngsters.

12.6. Water-skiing

Water-skiing can be done either standing or sitting. By means of a knee-board, a disabled person can kneel on a type of small floating board, and sit back on his/her feet. A strap is fastened over the skier's thighs and attached in such a way that it is released if the skier falls into the water. The skier then holds onto the same type of handle as in conventional water-skiing, which requires good balance and good arm and hand strength.

Another alternative is to water-ski in the sitting position on a wide ski where the skier sits in a seat that looks like a small hammock. The legs are attached to the front of the board. Once again, this requires good balance and full strength in the arms and hands.

Persons with more advanced physical disabilities and poor balance could ride behind a motorboat in some type of rubber dinghy. One type is in a triangular shape with three hollows in the bottom. The physically disabled person and an assistant each sit in one of the hollows with their feet in the third. The physically disabled person will be sitting firmly and will also have the extra confidence of having another person there too.

12.7. Paddling

A canoe can move quietly and smoothly through undisturbed nature and any mobility impairment in the legs is of no importance for the opportunity to enjoy such experiences on the same conditions as others. Because paddling a canoe only requires arm strength it is suitable for physically disabled persons with full strength in the upper body. Even if the physically disabled person can cope with the paddling, it is necessary for a non-handicapped person to be present to assist with all the other aspects of a trip in a canoe.

Adaptations should be made in waters that are flowing gently and have no waterfalls or strong currents. When entering or leaving the canoe it is useful to have jetties or pontoons with their surfaces at water level. There should also be toilets available for persons in wheelchairs, as well as wind shelters and barbecue sites. Hardened or compacted surfaces at resting areas make it easier to move around in wheelchairs.

The degree of adaptations made is always a question of priorities. It is important that not everything is adapted to the handicapped, as the feeling of being in undisturbed nature then will be destroyed.

In order to assist balance, a canoe can be fitted with outriggers that can be obtained from canoe manufacturers. Instead of sitting directly on the seat in a canoe one can use a normal form-moulded plastic seat such as those on certain chairs. This seat can be fixed to the canoe's seat or mounted on the floor of the canoe, providing support for the back. If it is placed in the bottom of the canoe the centre of gravity will be lowered and the canoe will become more stable but, on the other hand, it will be more difficult to paddle.

12.8. Angling

Many people, irrespective of any physical disability, experience that angling is an excellent way of getting out into the countryside, finding tranquillity and relaxation. Angling is a major recreational activity in Sweden, with more than 2 million (out of about 9 million) people reporting that they more or less regularly go angling. Every second male and every fifth female consider angling to be a good recreational activity. Angling has no use-before date, and interest in angling can remain throughout a person's life. The little boy sitting on the jetty with his rod and line, together with his grandfather, can keep on fishing until he himself is a grandfather, possibly finding it difficult to walk and take exercise. Many men who have become physically disabled after accidents or illness have sorrowfully realised that they have to abandon their interest in angling because of the lack of accessible waters. There is thus a massive need for adaptations that would allow physically disabled persons to enjoy angling. See also section 8.10.

Angling does not require great physical mobility and thus is a recreational activity that can be enjoyed by many disabled persons. Equipment for angling can easily be adapted to people with different degrees of disability in arms and hands. A few simple aids are listed below:

- Angling with a hand-held line is the simplest and least expensive method. The line can be wound up on something round, e.g., around a bottle.
- Angling with a long rod. The rod is usually 3-7 m without a reel and the line is a little shorter than the rod. The float can be drawn up or down the line but does not slip. This is a relaxing angling method, the equipment weighs little and throwing out some food can attract fish.
- Angling with a free line and a slipknot. This requires a reel rod of about 1.5-3 m, a line, weighted floats, sinkers, hooks and a slipknot. This offers possibilities to fish at different depths and at different distances. It is suitable for persons with different types of disability but at least one hand must have a good function.
- Fishing with a reel requires not only a reel but also a rod and line but in other respects can be varied in many different ways. Casting and reeling-in is required. This method is suitable for persons with full mobility in hands and fingers.

- Angling with a multi-reel, where the reel itself rotates, requires some practice. Stronger lines can be used than in reel angling, and thus the method is suitable for heavier fish.

12.9. Ice-sledging and cross-country skiing

Ice-sledging is a means of moving across frozen lakes, or to play sledge hockey. When sitting on the sledge, the rider uses sharp-pointed poles, e.g., ski-poles, to move forward.

A physically disabled person can use this method in cross-country skiing. He or she sits on a sledge fitted with skis and somewhere to attach the feet and uses ski-poles to move along a prepared track. The track should not be too steep, as it will prove heavy work to move uphill by only using one's arms.

12.10. Alpine skiing

12.10.1. Slalom

Persons with impaired vision, retarded persons and persons with mobility impairment but with supporting legs, and those with or without the need of leg-braces can ski slalom with certain adaptations. This also applies to persons with different types of disability in the arms and hands. It is possible to ski downhill using only one pole and skis and bindings can be adapted to the individual. Crutch poles, i.e., a crutch with a small ski attached to the bottom, may be of assistance to some people wanting to ski downhill.

The Totalskidskolan (*see section 15*), and other organisers arrange courses in alpine skiing for children and adults with different types of disability.

12.10.1. Ski-cart and Sit-ski

Snow need not be a cold and wet obstacle to a person with physical disability. You can also have fun in the snow. By means of a ski-cart or a sit-ski it is possible to ski down slopes on the same conditions as other skiers.

The ski-cart is foremost designed for persons with mobility impairment due to high neck injuries, which cause poor balance and hand function. The skier sits fastened in a moulded seat with a high back support. The ski-cart is fitted with four short skis; the two at the front can be steered or angled by means of two arm-controlled levers. The ski-cart can also be fitted with pedals or that an assistant steers the cart by means of shafts.

Fig. 12.1:1 Ski-cart

The sit-ski is designed for physically disabled persons with good truck balance and arm strength. The skier sits in a moulded seat fitted with a pliable ski mounted under the centre with short crutch-poles (with skis at the bottom) in his/her hands. The sit-ski is steered with the help of the crutch-poles and by leaning the body.

In Sweden sit-skis and ski-carts can be hired at some ski resorts and at these places it is possible to use the normal ski lifts. The hook on the ski lift is fastened to a hook on the front of the ski-cart and when the top is reached the skier releases the hook. If public ski slopes are to be used it is necessary that the skier qualifies for a licence at, for example, Totalskidskolan (*see section 15*).

12.11. Archery

Archery is a sport that can be enjoyed by young and old, physically disabled and not physically disabled, as a result of, for example, the bow strength being adapted to the individual. Different classes (age, gender) and types of bows contribute to a wide range of opportunities and enable competitions to be held on similar conditions regardless of the individual's situation. The compound bow is a popular alternative among those with reduced function or strength. The special

design of the bow allows the bow strength to be lessened at the same time as the power is retained. The result is increased precision and easier aiming.

Archery does not require continuous movement between different positions, particularly if an assistant collects the arrows, and thus is relatively easy for a person in a wheelchair to enjoy. The target should be placed in a position where no damage or injury can be caused by poorly aimed arrows. Persons with mobility impairment in the arms and hands may require personally adapted aids to assist in balance, and in holding and drawing the bow, etc.

12.12. Bird-watching

Bird-watching is easy for a physically disabled person to enjoy. One way to observe birds is through binoculars from a car. In areas with a rich bird life it is therefore an advantage if parking areas can be located in places that enable birds to be watched.

Another way is to use special towers or observation platforms (*see also section 8.5*).

Completely blind persons are able to go “bird-watching” along a forest path by listening for the different types of bird song.

12.13. Botany, culture, journeys of discovery, etc.

Forest walks provide access to fresh air, beautiful vistas and exercise, but the paths in a forest area also offer opportunities for other experiences and activities. Depending on the configuration of the area and how it is used, it may be possible to study and learn more about flowers and other plants, insects, butterflies, local history, etc. Beautiful places near lakes or in tranquil forest glades may be perfect subjects for a watercolour or oil painting. Lichens and mushrooms may be used as vegetable dyes. Improved access to the forest and nature enables a person with disability to increasingly choose activities according to interest and not just be forced to do what might possibly be available.

Available forest areas offer parents with disability several new opportunities to take their healthy children out on adventures of discovery in the forest. These children are otherwise often restricted to uninspiring bricks and mortar because their parents are unable to go elsewhere. Better access to nature allows a person who has recently become disabled and has to use a wheelchair to avoid having to stay at home when the rest of the family goes out into the forest on berry and mushroom expeditions.

12.14. Motor-powered

12.14.1. Permits

There are different ways for a person to get out into nature, despite having a comprehensive disability. When there is insufficient muscle strength, one can get out into nature with the assistance of a motorised vehicle. The legislation relating to driving in the terrain establishes the rights and obligations that have to be

observed when driving on another person's land, for example, avoiding newly planted areas. If there are established snow-scooter tracks then these should be used. The legal department of the local county administration issues permits for driving with terrain vehicles on public highways and on bare ground (without snow cover). Permission from the landowner is also required.

12.14.2. Snow-scooters

During the winter a snow-scooter is a good way of getting into the mountains or out onto a lake. People who are unable to drive a scooter for one reason or another can ride as a passenger sitting behind the driver or in a sledge drawn behind the snow-scooter.

12.14.3. Terrain vehicles

Four-wheel motorcycles, terrain vehicles, can be used to get out into nature both during snow-free periods as well as during winter conditions with snow and ice. These vehicles can be adapted to different types of mobility impairment but generally require relatively good strength and balance in the upper part of the body.

For people with paralysis of the arms and hands, e.g., following an injury to the spinal cord, a Woodstar ATC is suitable. An ATC (All Terrain Cart) can be driven both on surfaced roads and in uneven terrain. The largest difference between an ATC and other terrain vehicles is that the driver sits in and not on the machine. The centre of gravity is low and there is no need to use the body as a balance point. The vehicle can be individually adapted and can be driven by people with different types of physical disability, e.g., those with injury to the spinal cord, severe muscular disorders, CP-injuries and acquired brain damage. An ATC can even be driven by a person with such a severe neck injury that only the neck muscles function.

12.14.4. Boats

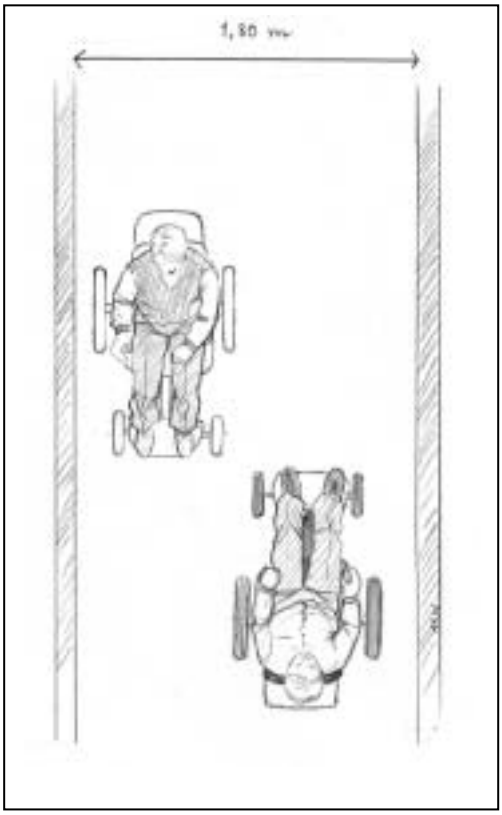
Persons with severe mobility impairment may find it difficult to use a canoe or a sailing boat. Pain, stiffness or other reasons may also cause difficulties in entering boats. A motorboat with a hatch in the side will then offer a possibility to get aboard a boat without having to move out of a wheelchair.

Pontoons fitted with an engine provide vastly improved opportunities to experience nature for people who find it difficult to board conventional boats. A mobile pontoon of this kind can easily be constructed as a raft with buoyancy blocks underneath a deck and with an engine and rudder. A ramp can be used to get onto the raft from land. Mobile pontoons should be available for hire in small calm lakes.

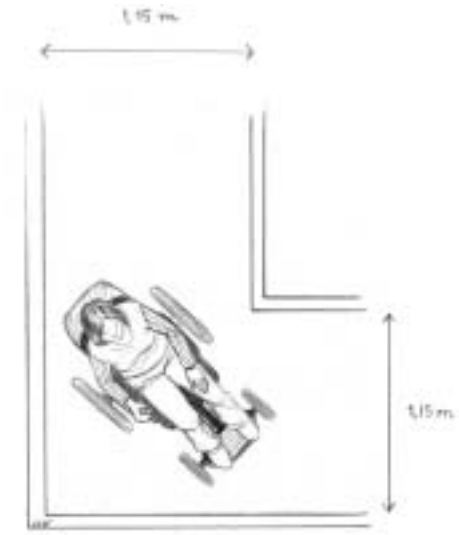
13. Space for manoeuvring with outdoor wheelchairs

Very short straight passage ex. through a door. As a rule add 10 cm to the width of the wheelchair.

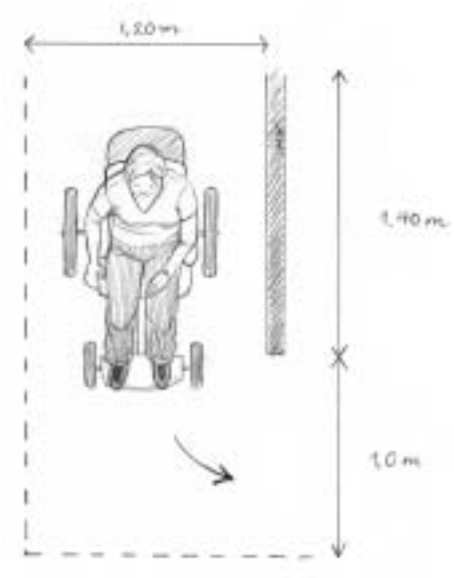
Short straight passage. Longer passages should be at least 1.3 m, preferably 1.5 m wide.



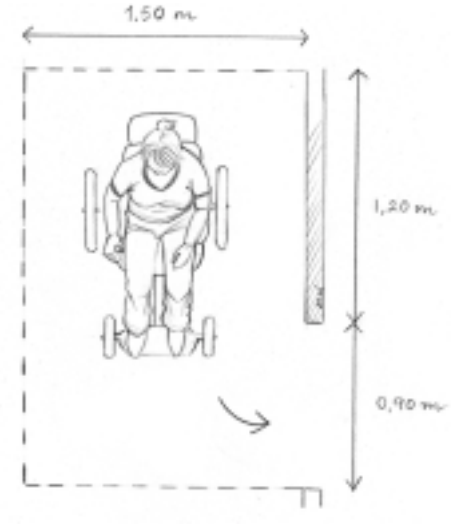
Meeting between 2 outdoor wheelchairs.



Passage 90°.

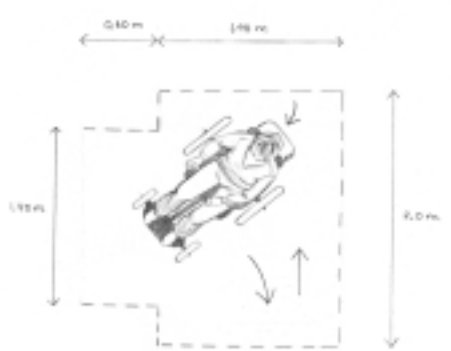


Space for turning in 90°
ex. through a door.

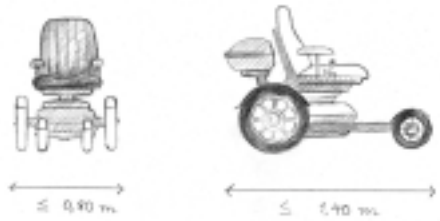


Space for turning in 90° but through a more narrow door.

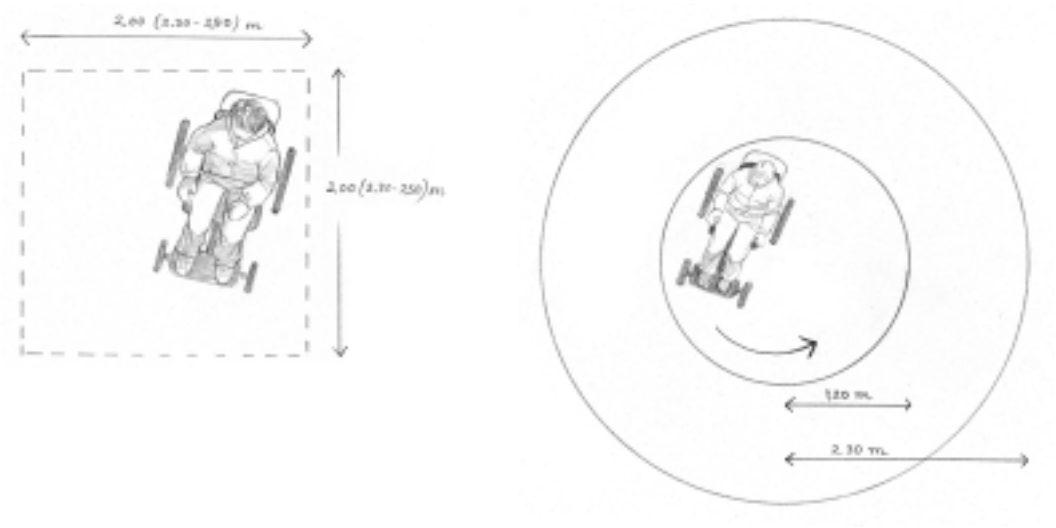
Wheelchairs must be able to turn within 2.5 m and should be able to do so within 1.8 m.



Turning through reversing on a T-shaped space.



Measurements according recommendations in the EN-standard 12184. Measures regards a wheelchair for normal use. Most wheelchairs are max. 0.75 m wide.



Space for turning through reversing 2.3-2.5 m will facilitate the turning.

A wheelchair must be able to turn within a radius of 2.3 m and should be able to do so within a radius of 1.2 m.

Fig. 13 Electric wheelchair for outdoor use. Measurements partly from EN-standard 12184, partly from testing of wheelchairs.

Modified from Bygg Ikapp Handikapp, 2001

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15. Contacts

De Handikappades Riksförbund (DHR) Box 47305, SE-10074.Stockholm, tel. +46 8 685 80 00, fax +46 8 645 65 41, www.dhr.se DHR is an organisation for people with mobility impairments

Göteborg-Grötö segelsällskap, www.ghif.se/ggss Arranges courses in handicap sailing

Hjälpmedelsinstitutet, Box 510, SE-162 15 Vällingby, tel. +46 8 620 17 00, texttel. +46 8 759 66 30, fax +46 8 739 21 52, www.hi.se. On the homepage www.hi.se/fritid there are suggestions on different types of recreational aids (jetties, fishing-rod holders, cycles, four-wheelers, etc.).
On the homepage www.hi.se/HIDA there is a database listing different types of aids

Karlskrona Segelsällskap, tel. +46 455 172 72. Loans of blueprints illustrating boat-lifts

The Swedish Environmental Protection Agency, SE-106 48 Stockholm, tel. +46 8698 10 00, fax +46 8 20 29 25, www.naturvardsverket.se

The Norwegian Association of the disabled, Postboks 9217 Grönland, NO-0134 Oslo, tel. +47 22 17 02 55, fax +47 22 17 61 77, www.nhf.no

The Swedish Association of Survivors of Traffic Accidents and Polio (RTP), Box 2031, SE-169 02 Solna, tel. +47 8 629 27 80, fax +46 8 28 15 60, www.rtp.se Offers camps and open-days with emphasis on nature-based leisure

Svensk Byggtjänst, SE-113 87 Stockholm, tel. +46 8 457 10 00, fax +46 8 457 11 99, www.byggtjanst.se, e-mail: kundtjanst@byggtjanst.se Bookshop www.byggbokhandeln.com

The Swedish Association of the Visually Impaired (SRF), SE-122 88 Enskede, tel. +46 8 39 90 00, texttel. +46 8 648 86 62, fax +46 8 39 93 22, www.srfriks.org

Stiftelsen Skota Hem, Box 136, SE-133 22 Saltsjöbaden, tel. +46 8 717 39 59, fax +46 8 717 87 96, www.skotahem.com Works to offer persons with mobility impairment the opportunity to discover sailing

The Finnish Association of Sports for the Disabled, Kumpulantie 1A, FI-00520 Helsinki, Finland, tel. +358-0-613 191, fax +358-0-146 2404, www.siu.fi

Totalskidskolan, tel. +46 60 13 23 95 or +46 152 122 66, www.totalskidskolan.z.se Totalskidskolan (The Total Ski School) arranges courses in alpine skiing for children and adults with different types of functional disability. International exchanges can be arranged with several countries, as well as instructor education in English. Totalskidskolan publishes a ski-guide that describes about 50 Swedish ski resorts. It can be ordered by e-mail, info@totalskidskolan.z.se

Recruitment Group – For Active Rehabilitation, Vanadisvägen 21, SE-113 46 Stockholm, tel. + 46 8 545 472 00, fax +46 8 545 472 10. RG works with the physical and mental training of physically disabled individuals, mainly

those with spinal cord injuries. Arranges also outdoor activities for disabled persons, www.rekryteringsgruppen.se

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Access to forests for recreation, sports or contemplation is a right that belongs to everybody. Too often , however, are people with some disabilities looked out from the forests because of some technical obstacles. This handbook presents practical advice to managers of urban or peri urban woodlands, to forest owners and to all others concerned on how to facilitate access to forests for everybody. Sooner or later in life, most of us will benefit from such measures when we are heading for the woods.

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