EARTH COUNCIL
Presents:

"GUIDE FOR ACCESS TO PHYSICAL SPACE IN PROTECTED AREAS"

OF THE PROJECT ON ACCESSIBILITY FOR PEOPLE WITH DISABILITIES IN PROTECTED AREAS

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FOREWORD

The Project of Accessibility to Protected Areas for People with Disabilities of the Earth Council, and the State of Costa Rica through the following institutions: National Council of Rehabilitation and Special Education, the Ministry of Environment and Energy, the Citizens Defense Council, and the Technological Institute of Costa Rica, have joined their efforts in order to design the first protocol in the world on accessibility for people with disabilities to protected areas.

Its objective is to provide a series of instruments for guiding, recommending and facilitating the access of people with disabilities to protected areas.

The protocol is divided into ten handbooks that may be used jointly or separately, according to the reader's interest. The subjects developed are the following:

1- GUIDE FOR MAKING AN ACCESSIBILITY DIAGNOSIS IN A PROTECTED AREA

2- GUIDE FOR CARRYING OUT AN ACCESSIBILITY PLAN IN A PROTECTED AREA

3- GUIDE FOR THE INTERPRETATION OF PROTECTED AREAS BY PEOPLE WITH DISABILITIES

4- GUIDE FOR THE ACCESS TO PHYSICAL SPACE IN PROTECTED AREAS

5- GUIDE FOR SIGNALING, INFORMATION AND COMMUNICATION FOR THE ACCESS OF PEOPLE WITH DISABILITIES TO PROTECTED AREAS

6- GUIDE FOR PREVENTION AND SAFETY FOR PEOPLE WITH DISABILITIES IN PROTECTED AREAS

7- GUIDE FOR CHILDREN AND ADOLESCENTS: ACCESS AND ENJOYMENT OF PROTECTED AREAS, A MULTI-SENSORY POINT OF VIEW OF OUR NATURAL SURROUNDINGS

8- OPENING THE DOORS TO PROTECTED AREAS

9- ACCESSORIES FOR TECHNICAL AIDS FOR THE ACCESS OF PEOPLE WITH DISABILITIES TO PROTECTED AREAS

10- SUSTAINABLE DEVELOPMENT AND HUMAN RIGHTS OF PEOPLE WITH DISABILITIES

We hope that this effort will help open the doors to protected areas.

Rodrigo Jiménez
Project Coordinator
Accessibility for People with Disabilities to Protected Areas

This **Guide for the Access to Physical Space in Protected Areas** is part of the Accessibility Protocol, and has the following objectives:

1 OBJECTIVES

1.1 GENERAL OBJECTIVE:

To provide –through a protocol for physical accessibility and universal design oriented towards all people– guidelines for the planning, design, construction, conservation and operation of infrastructure in national parks and other protected areas, for practical use related to issues of disability, sustainability, and natural and cultural environments.

1.2 SPECIFIC OBJECTIVES:

1. To establish universal design guidelines that help eliminate physical and spatial barriers which limit the insertion of people with disabilities in the field of ecotourism in national parks and other protected areas.

2. To develop a document that gathers and adapts published standards and basic criteria about accessibility for people with disabilities to the spatial, natural and cultural environment, and to apply this to national parks and other protected areas.

1.31.3 TECHNICAL OBJECTIVE:

To depict –in a document that is easy to read and interpret– guidelines that establish the minimum spatial conditions, in order to carry out universal design within the environment of national parks and other protected areas, through the principles of sustainable development and harmony with the environment.

I. INTRODUCTION

We are pleased to present this document oriented towards spatial accessibility for all people, and specifically focused on universal access to national parks and other protected areas. It is integrated with other texts, all of which conform the **PROTOCOL OF ACCESSIBILITY TO NATIONAL PARKS AND OTHER PROTECTED AREAS FOR PEOPLE WITH DISABILITIES**.

This work contemplates openness towards the access of all people to the natural and cultural environments of national parks and other protected areas. It is a guide for people or entities related to disabilities, sustainable development and spatial design.

The different chapters provide guidance for all those interested in the achievement of real accessibility within the space –both natural and built-in– that conforms a global structure in protected areas. Also, the planning, construction and operation processes in protected areas and their relationship with ecotourism, were furnished with general information, educational tools and the application of international accessibility standards, universal design and environmental harmony.

The development of this work and our participation through the different workshops and activities of the PROTOCOL have linked us once more to the constant search for a physical space that is accessible to all people, regardless of age, gender or ability. We trust that the use of this knowledge will help guide the path towards a real integration of humanity.

Dr. Arch. María de los Ángeles Barahona Israel

Arch. Shirley M. Campos Villalobos

A design oriented towards people with disabilities is not optional for designers and architects; it is the law of the earth.

Ruth May Lusher [1]

[1] Free translation, made by the authors, of Ruth May Lusher, Administrator of ADA Technical Assistance, US Department of Justice, in STRATEGIES FOR TEACHING UNIVERSAL DESIGN, Adaptive Environments Center, 1995, USA.

1 METHODOLOGY DEVELOPED

This section contains the methodological strategy used for the work, and its final result.

1.1 STAGES USED TO DEVELOP THE PROPOSAL

2.1.1 Preliminary studies (Stage 1)

This is the stage of preparation of the proposal for the selected subject. In this phase, the major issues were identified, the objectives of the project were defined, and an integral overview of the theoretical background applied was presented.

2.1.2 Gathering of information and background (Stage 2)

The purpose of this stage was to gather the bibliographical and field knowledge to determine spatial and informational needs, as well as to perform a diagnosis of the current physical conditions in protected areas, in order to ensure accessibility for all people, especially people with disabilities and senior citizens. In order to gather this information, the following steps were taken:

A. Context analysis:
   Physical-spatial evaluation of the main natural and cultural factors that determine, for the development of the project, the characteristics pertaining to national parks.

B. Analysis and gathering of criteria defined in the theoretical background of the documents, bylaws and codes that regulate the adequate physical and spatial conditions of the natural and built-in environments, in order to attain universal design.

C. Analysis of the spatial requirements peculiar to the different activities, establishing characteristics that provide comfort and safety to the visitors of national parks (for example, in circulation and rest areas, among others), and which define the parameters for universal design.

2.1.3 Document design process (Stage 3)

This stage contemplates the development of the specific objectives, that is the development of the protocol as of the definition of the anthropometric, architectonic, functional, technical, formal, spatial and programmatic needs that were analyzed.

2.1.4 Presentation (Stage 4)

It comprises the gathering of standards, adaptations and physical-spatial recommendations of universal design, anthropometric needs, and sustainable development, in harmony with the environment.

1.2 SOURCES OF INFORMATION

The main sources of information were provided by experts in the field of accessibility: the Citizens Defense Council, the National Council of Rehabilitation and Special Education, the Library of the School of Architecture of the University of Costa Rica, the Ministry of Environment and Energy, as well as the Internet, books and magazines indicated in the bibliography section.

1.3 DATA COLLECTION INSTRUMENTS

The following procedures were used to gather information:

- Bibliographical consultations
- Interviews in the MINAE
- Visits to national parks
- Mapping of the regions and areas studied (diagnosis)
- Photographs (diagnosis)
- Flow charts
- Sketches

II. GENERAL CONCEPTS

1 UNIVERSAL DESIGN

The term *universal design* is used in this document as a symbol of change (both conceptual and technical) in the needs of openness and access of people with disabilities to physical space, and thus to the general social environment. It is an example of the change in perspective regarding the perception of people with disabilities in everyday life.

The term is not recent; it has been used since 1980[2]. The architect Michael Vendar began the use of an extended more universal word. However, several publications use it more frequently since the end of last century (1995), to indicate that a design of physical spaces or products must be used by people of all ages and abilities. The specific definition of *universal design* is based on a holistic concept that creates environments and products oriented towards many people, regardless of age, gender or ability.

The concept goes beyond the idea of *accessibility.* The word *universal* establishes the kind of usefulness of the design. Its purpose of including all kinds of population in a space makes it more effective, so that it is also economically efficient. Given its holistic origin, it provides more versatile design solutions, instead of isolated solutions.

1.1 PRINCIPLES

The following principles of universal design[3] determine its function, be it in open spaces, built-in areas, objects, or products. In order to classify a design within a universal concept, it must fulfill the following requirements:

1.1.1 EQUITABLE USE
The design must be useful and marketable for people with different abilities.

1.1.2 FLEXIBILITY OF USE
The design must be useful for different functions and preferences, and it must also work in accordance to the different abilities of the users.

1.1.3 SIMPLE AND INTUITIVE USE
The design of the product or space must be easy to understand, devoid of complications.

1.1.4 PERCEPTIBLE INFORMATION
The design must be easy to understand, it must communicate effective information to the user, regardless of the spatial conditions and his or her sensory abilities.

1.1.5 CLARITY IN ITS USE
The design must be clear, safe, and it must also minimize accidents or unintentional actions.

[2] *Strategies for Teaching Universal Design*, edited by Polly Welch, Adaptive Environments Center, Boston, MA, USA, 1995.

[3] http://www.design.ncsu.edu/cud/univ_design/principles/udprinciples.htm

1.1.6 LOW PHYSICAL EFFORT

The design must be used comfortably and effectively, without requiring a great physical effort.

1.1.7 SIZE AND SPACE FOR ITS USE

The design must have an adequate size and space for its reach, manipulation and approach, regardless of the size, posture or mobility of the user.

Universal design must be useful for all ages. Leon Pastalan and Michel Philibert[4] call for a design oriented towards the human condition in which, for example, aging is defined as a pattern of changes throughout the whole cycle of life. Thus, design for children, senior citizens, and people with disabilities must not be oriented towards specific groups of people, but towards a wide scope of environments used by all humanity.

Universal design also recommends the use of several languages, for example, different languages in airports, including languages for visually impaired people.

In order for *universal design* to be accepted, it must involve high esthetic standards. The relationship between beauty and effectiveness or functionality is important. In the case of protected areas, it must also include simplicity and harmonic integration with the environment.

The design process in general must incorporate other important considerations, such as economic, construction, cultural, gender and environmental issues. This will imply higher demands that improve the design and fulfill the expectations and needs of a higher number of users.

[4] *Strategies for Teaching Universal Design*, edited by Polly Welch, Adaptive Environments Center, Boston, MA, USA, 1995.

2 ACCESSIBILITY IN PUBLIC SPACES

When speaking about accessibility, one refers to a quality possessed by a space, a place or, in our case, a protected area, that allows people with mobility or communication difficulties to "access all places and buildings they desire without extraordinary efforts, to access establishments that offer them touristic services and be able to leave these safely in case of emergency, and to comfortably use the facilities and services provided in these touristic establishments."[5]

2.1 Needs of visitors with mobility or communication difficulties

In order to design or adapt the space for its use by people with disabilities, one must know their accessibility needs.
In order to carry out an activity in a specific place, two variables must be analyzed:

- Displacement. This means moving to the ideal place to perform an action, that is being able to move freely throughout the environment, without any limitations or obstacles.

- Use. This means performing the action itself, that is being able to enjoy, use, and profit from what surrounds one.[6]

Both variables are necessary. It is no good to have a restroom adapted for its use by a person in a wheelchair, if the door is so narrow that it is impossible to enter.

"**Displacement** can also be:
Horizontal: Moving along streets, passages, hallways, wings of a building, etc.
Vertical: Going up or down stairs, ramps, etc., both outdoors and indoors.

While **use** has two stages:
Preparation: Approaching, locating oneself, and being able to make contact with the object that will be used.
Performance: Carrying out the activity desired, which is the final goal of the whole process."[7]

2.2 Difficulties generated by the activity

When moving throughout the surroundings one may run into maneuvering difficulties. –These are the ones that "limit the capacity to displace oneself, access spaces and move within them. During horizontal displacement, for example, we may face difficulties when maneuvering in a straight line, changing one's direction, going through a door, going through narrow spaces on the street, sliding on a slippery floor, tripping over poorly cemented floors, etc."[8]

[5] Barón Concha "Curso de turismo accesible" Spain: Royal office for prevention and attention for people with disabilities, 1999, page15.
[6] Ibid. page 16
[7] Id.
[8] Ibid. page 17

Another difficulty arises when one must change level: "during vertical displacement, problems arise when overcoming changes in level, be it continuous, abrupt, or greater level changes such as the ones present when going from one floor to another within a building."[9]

2.3 Difficulties that arise in the use of spaces

Distance: It may be a difficulty that hinders the possibility of reaching objects and perceiving sensations. It is any difficulty in approaching objects manually, visually or in an auditive form, for example reaching the faucet of a beach shower that is located 170 cm above the floor or reading informational brochures that have very small print.

Control: These are the "difficulties for performing activities that arise from problems with equilibrium control or manipulation of objects or mechanisms such as faucets, doorknobs, telephone dials, elevator buttons"[10], etc.

2.4 Functional criteria that facilitate human activity

One must foresee that the group of interrelated spaces, interior and exterior, in an activity, allow for free movement of all people. Thus, the following parameters for paths must be taken into account:

- "They must be flat with gentle slopes. Neither stairs nor steep ramps are apt for all people; if they cannot be completely flat, the ramp must have a gentle slope.
- They must be as short as possible, in order to avoid long journeys for people with the greatest moving difficulties. In cases where not all paths are accessible, they must be signaled in order to avoid errors, and subsequent unnecessary movements and efforts.
- They must be free of obstacles. Not only must they be wide enough for people who use wheelchairs or walk with crutches to walk along them, but they must also be free of projecting or mid-height obstacles, which are very dangerous for visually impaired people.
- There must be safe support and guidance elements, non-slippery pavements, handrails that serve as a means of support, and railings that prevent falls when there are holes or slopes."[11]

In order to perform any kind of intervention, construction or adaptation within national parks and other protected areas, one must take into account the following four aspects:

- It should be also accessible for a person in a sitting position. Thus it will be reachable by a person in a wheelchair or by a short person. An example of this would be controlling the height at which a telephone booth, a hand dryer in a restroom, a coat and hat rack, etc., are located, so that they can be used by any person.

[9] Id.
[10] Id.
[11] Id.

- That it can be used without moving from one's position. Most people with limited mobility use their upper limbs in order to move. Thus, they cannot move and act at the same time. An example of this would be that people who use crutches may gain support on a counter or sit down in order to free their hands and be able to use them.

- That it does not require fine motor skills for those people who have no strength and dexterity in their hands. For example, facilitating the use of faucets, switches, doorknobs, operation elements, etc., which must have a design that allows for their conformable and safe manipulation by all people.

- That it does not depend on one basic sense: sight or hearing. It will be necessary to have adequate means so that information which is normally perceived through the deteriorated sense to be also received through other senses. This basically means hearing and touch in visually impaired people, and sight and touch in deaf people.[12]

These details influence design and construction, due first to the choice of adequate materials and accessories that can be universally used, and due second to their strategic location so that any user can manipulate them.

Incorporating accessibility to the touristic sector in national parks and other protected areas provides quality standards that improve service facilities and contribute to the training and satisfaction of new users.

Any accessibility solution undertaken in tourism, regarding users, cultural activities, sports, recreational activities, etc., must be supported by the following five basic criteria:

Diversity: Users have a great diversity of personal situations and needs.

Autonomy: The maximum possible autonomy must be fostered for users of facilities and services, especially those who have limited mobility or communication difficulties, so that they do not have to depend on others.

Dignity: People's dignity and their right to privacy must never be impaired. Accessibility solutions must guarantee respect towards the person with a disability.

Safety: The facilities and services offered by protected areas must be safe for all users. Thus, any technical aid or accessibility solution must guard the integrity of those who use it, and that of those who do not need it.

Compatibility: Accessibility must be an integral characteristic of the services and facilities provided by protected areas, in order to guarantee the possibility of their use and enjoyment by all people, without ignoring of the essence and nature inherent to these areas.[13]

[12] Ibid. page 18

[13] Ibid. page 19

3 SUSTAINABLE DESIGN

PATH IN POAS VOLCANO, COSTA RICA

3.1 SUSTAINABLE DESIGN AND ENVIRONMENTAL HARMONY

An accessibility protocol oriented towards national parks, protected areas and other natural environments, must take into account sustainable design and harmony with the environment. Previously, the section on the Diagnosis of Access to Physical Space presented an introduction to this subject, which is elaborated on this chapter. Other chapters of this document develop more specific considerations about the natural environment. However, it is necessary to establish the general guidelines that must characterize the design of physical spaces, whether they are built-in or natural, in relation to sustainable development and harmony with the environment.

We must take into account that sustainable development involves both natural processes and resources, and cultural ones. We must also remember that the ultimate purpose of sustainable development is the conservation of this diversity of environmental resources, which are interdependent and must be perpetuated and appreciated. Thus, fostering accessibility in national parks and other areas of biological interest involves a commitment to promoting conservation, protection and sustainability of natural resources, striving to minimize the impact on them as much as possible.

Drawing up a protocol of accessibility for people with disabilities in national parks, forces us to establish general guidelines for the protection of these environments, and to interrelate them with the philosophy of universal design. This interrelation commitment between sustainability and accessibility is oriented towards the planning, design and administration processes of the site, with the main purpose of achieving harmony and respect towards natural and built resources, such as architectural or on-site heritage, and protecting the biodiversity of the environment.

These concepts are very important, and are oriented towards sustainability in sites where ecotourism is promoted and developed.[14] This point of view is valid both for the site's visitors, for the nearby community, and for the administrators of the park or protected area; in other words, for the population related to ecotourism.

The document **GUIDING PRINCIPLES OF SUSTAINABLE DESIGN** [15,] is very valuable for the development of this subject. This important bibliographical reference establishes nine subjects to consider and analyze when developing the relationship between sustainable design and ecotourism processes. These subjects are of interest from several professional perspectives, and we establish them here through general guidelines:

[14] GUIDING PRINCIPLES OF SUSTAINABLE DESIGN, United States Department of the Interior, National Park Service, Denver Service Center, 1993
[15] Idem

3.2 INTERPRETATION

This first subject refers to the human being's need for interpretation of the sites in the environment. Interpretation facilitates communication among people and natural and built resources of the parks, and it opens up a fascinating world of knowledge, new interests, and experiences. This world must be accessible according to the concept of universal design, as well as oriented towards its enjoyment and access by all people. This document's chapter on Interpretation develops these concepts in detail.

It is important to mention that the preparations for providing interpretation opportunities for all people must begin during the first stages of design and planning of the sites. We must take into account that interpretation processes must facilitate knowledge and learning, as well as sensibility and perception of the site's biological and built resources, to all people including those with disabilities.

How can we make sure that all visitors to these sites may know and enjoy the area's resources and elements of interest? How can we make sure that people with disabilities experience a wonderful view of a tropical rainforest, the sound of its fauna, the sensation of fresh water in a lake or blue sea, or that they may learn about sustainability of the natural environment? The answer is providing them with these opportunities, by developing standards of universal design, accessibility, and harmony with the environment.

3.3 NATURAL RESOURCES

The knowledge and enjoyment of natural resources in a park or protected area are an integral part of the ecotourism process and, as such, they must be governed by the parameters of the existing ecosystems.

Knowledge about the natural behavior of ecosystems and their links is fundamental when planning and designing the access to parks. One must also take into account the danger of fragmentation of natural habitats in these parks. Thus, this danger must be minimized and the biological diversity protected, especially if there are to be alterations, constructions or adaptations for the purpose of ecotourism activities. Also the introduction of external energy sources must be reduced to a minimum by using existing energy sources as much as possible.

The pressure exerted by human beings on an ecosystem must be scientifically determined, by evaluating the ecosystem's capacity for adaptation instead of the site's physical capacity, all this in order to determine the potential ecotouristic development.

Having in mind that the environment will be altered by the visits of human beings to the sites of interest, limits must be established for these environmental changes. However, experts recommend acceptable limited changes that, when added up to unpredictable events such as hurricanes, draught or others, do not exceed the capacity limits and cause a total collapse of the ecosystem.

Monitoring and assessment processes of the ecosystems and the works located near them are also recommended. This monitoring must ensure that the recommended limits of change are not exceeded, and it must provide information about the behavior of the different systems. In order to carry out this process, existing geographical information (GIS) is required regarding soils, hydrology, patterns for the use of soils, and existing flora and fauna. [16]

The impact of touristic development on natural resources must be prevented by means of surveys and analysis previous to the development of the projected works. Special attention must be given to negative impacts caused by the contamination stemming from several physical and biological processes, such as the increase in noise, the increase in erosion, the alteration of vegetation, the increase in sedimentation, the barriers that hinder the movement of animal species, and the pollution derived from means of transportation, among others.

3.4 CULTURAL RESOURCES

The cultural resources belonging to certain people or site constitute their symbols, their values, their identity and history. These resources are divided into tangible and intangible cultural resources.

Tangible cultural resources include built-in spaces, architecture, historical sites or places, bridges, roads, landscapes, objects and historical documents. In Costa Rica, aside from national parks, which in themselves possess a great natural heritage, we have valuable architectural heritage in monuments such as theaters, houses, schools, libraries, churches, railway stations, markets, haciendas, and others. [17]

Among tangible natural resources we also classify plants, animals and other elements such as food and craftsmanship. Some sites such as mountains, caverns, and clearings in woods and paths, are frequently defined as sacred sites or praying locations. Some examples in Costa Rica are the sacred stone of Our Lady of the Angels in Cartago, and the historical site of Guayabo, near Turrialba.

We define intangible resources as those cultural aspects related to myths and legends, songs, folkloric dances, and local and regional customs.

[16] Idem

[17] See document about REAL PROPERTY UNDER PATRIMONIAL STATEMENT, of the Ministry of Culture, Youth and Sports, Costa Rica.

Cultural resources are finite and unique, and thus policies and measures for their protection and conservation must be implemented. In Costa Rica, there are regulations that legally protect these resources. Act N° 7555 for the Protection of Historical Architectural Heritage, and Act No. 6703 on National Archaeological Heritage, are the legal documents that protect these cultural resources which, at the same time, conform the educational foundation for these heritage values.

The management of these invaluable resources must include their protection and conservation. At the same time, accessibility concepts must ensure that all people have the opportunity of enjoying these heritage resources, without their being deteriorated or devaluated.

So as to protect and preserve natural resources, and striving to cause the least impact possible on the environment, we recommend the use of adequate measures during the processes of planning, design construction and other operations. We recommend the development of culturally sensitive assets and sites, means of protection and conservation oriented towards the future, and the use of contextual architectural styles in new buildings that reflect the cultural heritage of the area or region. Also, education about the region's sustainable historical environmental methods is recommended whenever possible.

It is fundamental to possess knowledge about historical construction materials and systems, techniques and resources used in the site, and to develop a permanent identification with the conservation of these resources, whether they are local, regional, national or global. All this is linked to the philosophy of providing knowledge and appreciation opportunities for all human beings, regardless of their mental or physical ability.

3.5 DESIGN OF THE SITE

The design of the site, which is an activity that plans a possible intervention process, must be carried out integrally, under the premise of sustainable design. This intervention implies the planning of processes for circulation and construction of structures and services within natural and cultural environments.

We recommend an ecological design for the site, which protects the existing ecosystems and integrates the following guidelines[18] :

a. - Direct relationship with the existing context
b. - Interdependent and interconnected treatment of the landscape
c. - Integration of the original environment within the developed project
d. - Promotion of the diversity of flora and fauna

[18] GUIDING PRINCIPLES OF SUSTAINABLE DESIGN, United States Department of the Interior, National Park Service, Denver Service Center, 1993

e. - Reutilization, restoration or regeneration of deteriorated areas, especially urban landscapes
f. - Conservation and restoration of the original landscape

The visitor safety in a park is fundamental, whether the visitor has a disability or not. The park's design must integrate the visitor with nature in a safer and more direct way. The design must incorporate adventure and challenges to the visitor's experience, through ecological integrity and safety, always providing these experiences for everyone, including people with disabilities.

Considerations about design include safety aspects within recreational areas, and protection upon extreme weather conditions. Also, lighting must be as natural as possible; it must incorporate natural barriers and try to limit environmental impact, at the same time ensuring the visitors' safety. There must be alternate access emergency routes for obtaining water, food and medicine provisions, as well as a reliable communication system.

3.6 BUILDING DESIGN

Sustainable design applied to buildings is based on a balance and an ideal relationship between the human being and his environment. Specifically, sustainable design establishes that there must be a minimum of impact on local, regional, and global environments. Those people who plan, design and develop these elements have the opportunity and the responsibility to protect the place, its people, and their spirituality.

As to buildings, the philosophy of sustainable design orients us towards a balance between the needs of the human being and the touristic load capacity[19] of natural and cultural environments. The ideal situation for this to happen would be if the facilities are built with natural materials gathered at the site, if it has its own energy derived from renewable sources such as sun and wind, and if the project under construction is capable of adequately managing its own waste.

In order to apply this philosophy, ecotourism must be planned in a sustainable way, with design objectives for sustainable buildings. The objectives must have a long-term duration, minimize resource degradation and consumption, and promote environmental sensibility and the use of educational tools to show the importance of the environment in everyday life. The objectives must also be oriented towards the relationship of human beings with their natural environment and its benefits on spiritual, emotional and therapeutic health, and they must promote new human values in order to achieve a harmonic relationship with the resources and the environment.

[19] It refers to the quantity of touristic load that an area can bear without there being negative damages on its environmental, natural or cultural resources.

The following important premises are recommended in order to achieve a sustainable design for built-in spaces:

a. - The design must be dependent on the ecosystem and the cultural context, there must be a respect towards the cultural and natural resources of the site, and the impact of the construction must be fully minimized.
b. - The design must reinforce adequate environmental responses. It must educate the visitors and users on the services and adequate responses of their surroundings. It must establish how the physical surroundings can be integrated to the natural systems, in order to protect both resources and human comfort, and induce towards less superficial lifestyles.
c. - Motivate the appreciation of the natural environment, and establish behavior rules related to it.
d. - Create behaviors oriented towards the respect of natural and cultural resources, forsaking consumer-society values such as the use of cars.
e. - Use the simplest technology according to functional needs, and include passive energy strategies related to the local climate. Avoid intensive use of energy, environmental damages, waste production, and the use of hazardous materials.
f. - Use mainly renewable local materials.
h. - Promote equality as to the access of all people.
g. - Apply the philosophy that states that small is better, minimizing the size of the buildings, the resources needed, and their operation, and promote recycling of construction wastes.

Above all, sustainable design must seek the harmony with the environment. Thus, it is fundamental to consider the following elements related to climate, vegetation, topography, hydrology, geology, seismic activity, plagues, wildlife, human factors, and sensory experiences.

The design must adequately respond to the weather and use techniques that promote adequate comfort for the human being' necessities. After an analysis of weather conditions, the designer must professionally manage determining factors such as sun, wind, temperature and humidity, its variants and characteristics, for the benefit of human comfort.

The designer must also consider the physical conditions of vegetation, topography, bodies of water, hydrology, geology, and others, in order to achieve harmony and minimize the damage on natural resources. He must use the existing conditions, such as topography, in order to highlight landscapes, strategically locating facilities and services, and interfering as little as possible with the environment.

LOOKOUT POINT IN MONTEVERDE MOUNTAINS, PUNTARENAS, COSTA RICA

The designer must be responsible and make respectful use of all the vegetation, the hydrological geological ecosystems, and biodiversity, in order to protect them and minimize the impact. The designer must also preserve and protect anthropological, architectural, autochthonous, archaeological, historical and artistic cultural resources, for the enjoyment of present and future generations. [20]

This enjoyment may be motivated by sensory experiences, granting the visitor the opportunity to have access to information, contemplation and learning about the biodiversity of environmental factors. Using tools from spatial design, such as scale, rhythm, proportion, balance and composition, the built-in space can be harmonically integrated to the environmental context.

The characteristics of color, sound, touch, smell and flavor of the resources must also be used to improve the human being's experience in relation to nature. This experience must be facilitated through design, and all people offered the opportunity to enjoy it under the premises of universal design.

Recycling of construction materials and the use of recycled materials set another guideline to achieve sustainable design. We recommend that the conservation and integration of energy and water be ensured through construction processes and materials that are environmentally respectful and friendly.

The following subjects for analysis are also fundamental in order to achieve harmony with nature. They are described in more detail in the following paragraphs.

3.7 ENERGY MANAGEMENT

The usual way of using energy from hydrocarbons has led the world to the destruction of many of its natural and built resources. This is the reason why nowadays the priority is the use of alternate energy, first-rate renewable energy, such as the one derived for the sun, wind and biogas conversion.

Through a lifestyle less oriented towards a consumer society, and using sustainable energy alternatives, a sustainable development and a balance of energy management responsibilities can be achieved.

[20] See information on cultural resources in Section 3 of the former pages.

ESTUARY IN PLAYA LANGOSTA, GUANACASTE, COSTA RICA

In order to achieve an ecological energy management, we recommend the use of methods for the conservation of this energy. This can be done through the search for efficiency in devices and objects, the use of natural lighting, the use of sensors and controls such as photocells, and the use of efficient refrigeration systems. There is a tendency towards the conversion of devices with high-energy requirements by means of accessories that help save energy, such as energetically efficient clothes dryers, accessible to all people. The use of solar energy in water heating and cooking processes in households are examples of this beneficial practice.

Thus, it is essential to identify the existence, the potential, and the feasibility of the use of renewable energy sources such as solar energy, wind, biogas, and geothermic energy, in order to fulfill the energetic needs of sustainable development.

3.8 WATER SUPPLY

This item deals with the strategies for water protection and conservation, and the importance of its reutilization. Just like with all the other resources, educational programs for users on these strategies are essential to the sustainability of this valuable natural resource.

Some strategies for the conservation of this resource include the manufacture of sink faucets, flush toilets, urinals, and cooking and laundry devices, all modified for saving water.

It is also recommended to look for different water supply sources, such as rainwater, seawater, and water from vapor. If the water used comes from these alternate sources, its source, its treatment, and its interpretation must be accessible to all people. Its regulation must be precise and it must comply with preset standards. Above all, international health standards must be fulfilled.

3.9 WASTE PREVENTION

Conceptually, waste prevention is a fundamental part of the philosophy of sustainable development. It is due to the danger of contamination caused by wastes that we must think about decreasing its production. Also, the waste produced must be reused and recycled.

The different strategies to achieve this are based on three main principles:

- Using products that minimize waste production and which are not toxic.
- Using compost or aerobic procedures on biodegradable waste.
- Reusing materials on site, or collecting them for recycling processes.

SUSPENSION BRIDGE IN MONTEVERDE, PUNTARENAS, COSTA RICA

Most wastes in national parks and protected areas come from toilets, urinals, showers, sinks, kitchens, laundry services, and floor drains. We recommend the recycling, reutilization and responsible management of these wastes, as well as the use of latrines for compost processes, and aerobic or anaerobic septic tanks or systems. Regarding the access to these special latrines for people with disabilities, the same design characteristics established in accessibility standards are maintained.

The maintenance of facilities in a national park must be contemplated from the beginning of the site's planning and construction stages. The simplicity in construction and the use of adequate technology will facilitate the maintenance process. Safety and universal accessibility items must be taken into consideration as of the first stages of the site's design conception. The purpose of this is to prevent future changes or modifications that might damage the design and the facilities, cause high remodeling expenses or unnecessary material expenses, or deteriorate the natural environments. We recommend the use of tools such as GIS and CAD, in order to facilitate the inclusion of these considerations in the general design.

3.10 MAINTENANCE OF FACILITIES

The maintenance of facilities in these areas must take into consideration the following elements, among others:

- Carry out the process of maintenance as a continuous activity.
- Make an inventory of the elements that must be considered, such as the number of picnic tables, signs, posters, rooms, restrooms, chairs, kinds of places, and others.
- Measure the quantity of built-in square meters, and the length of paths or access routes.
- Give maintenance according to climatic factors. For example, vegetation must be frequently collected in areas where it shows an annual growth. Collected materials can be recycles or used as compost material.
- Perform daily cleaning tasks in tropical climates.
- Clean, polish, and lubricate vehicles and mechanical equipment frequently, in order to prevent rusting and malfunctioning due to saline climates or sandy places.
- Frequently repair signposts damaged by the wind, the rain, or the sun.

Compliance with the aforementioned guidelines may ensure the integration between accessibility and harmony with the environment in national parks and protected areas.

III. ANTHROPOMETRY

All the different variables involved in design must be taken into account, so that the data selected are those that best adapt to the user of the space and the objects designed. Thus the necessity of defining precisely the characteristics of the target population, regarding their age, gender, kind of work, and race. When a design is destined for an individual or a small group, and under certain special circumstances, one can develop anthropometric information from measurements taken, and it will have an adequate rate of reliability. If one is willing to grant the necessary time to the making of a suit or dress, one will also be willing to do this for an built-in interior or exterior environment, or for its components, especially when this involves a great financial investment.

1. SENIOR CITIZEN

Studies show two important facts:

1. Senior citizens of both genders tend to be shorter than young adults. This difference can be explained by the fact that older people belong to earlier generations. Recent studies confirm that the dimensions of the human body generally increase between generations as time goes by.
2. Elongation measurements taken in senior citizens are lower than those in young adults. The elongation capacity decreases due to arthritis or limited joint movement. This applies especially to vertical elongation, in order to reach or grab objects.

2. PEOPLE WITH PHYSICAL DISABILITIES

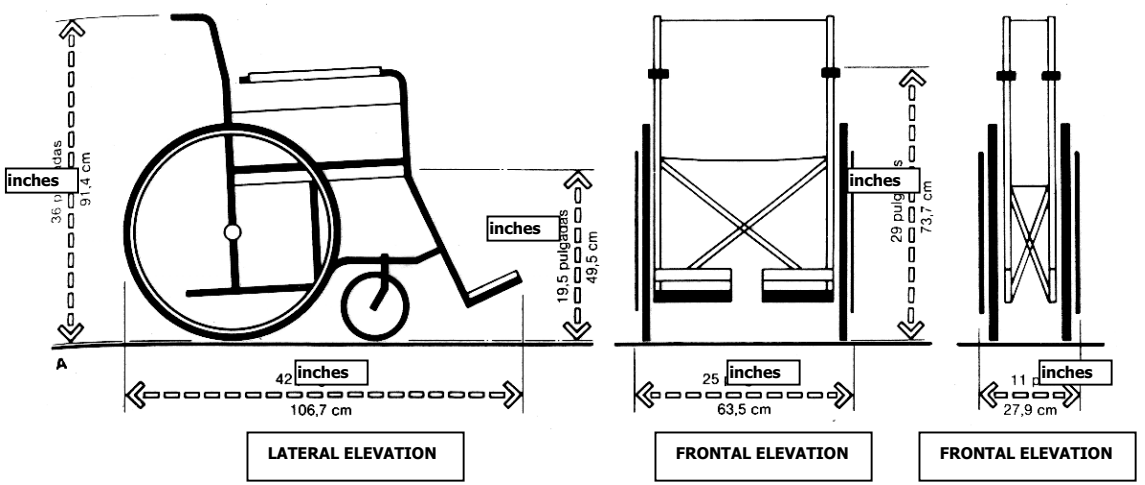
The problems of people with physical disabilities that face an environment built by man have a wide repercussion. "In 1970, the U.S. Department of Health, Education and Welfare estimated that there were around sixty-nine million people with physical limitations in the United States. The total population with disabilities throughout the world is estimated at four hundred million people, of whom 75% are abandoned to their own luck."[21]

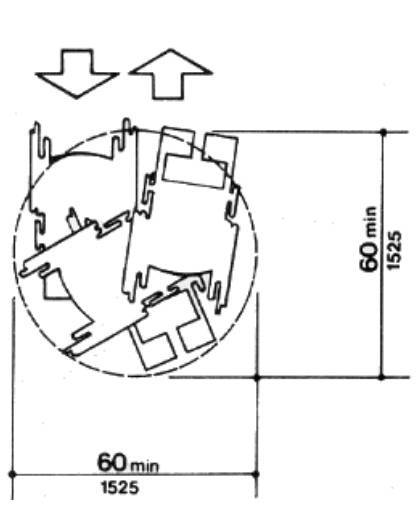
Seeking solutions to the problems that affect people with disabilities in their relationship with their spatial surroundings is an interdisciplinary task for all of us.

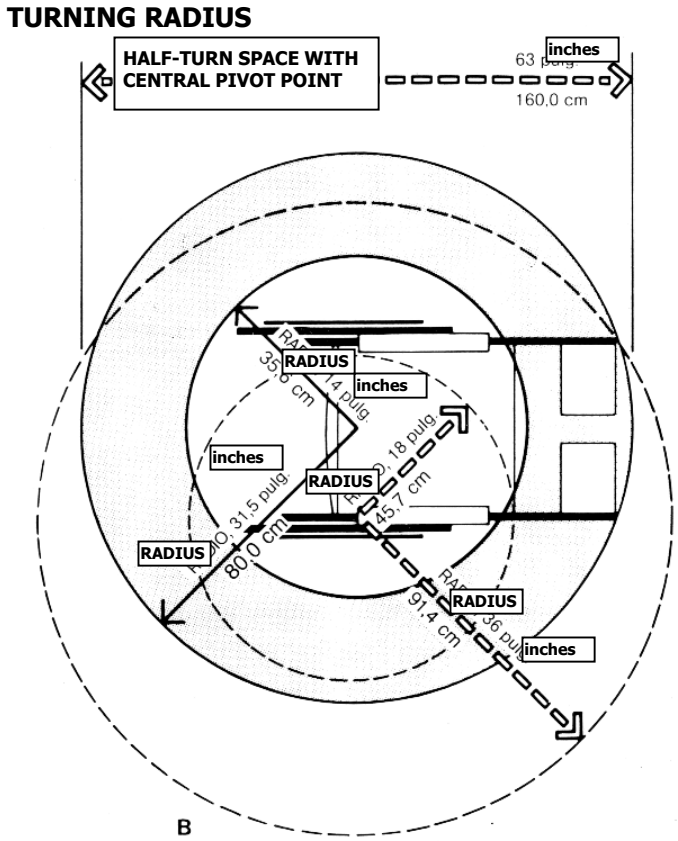
2.1 PEOPLE IN WHEELCHAIRS

Data collection about people in wheelchairs implies certain difficulties due to the quantity of variables that must be considered: kind of disability, affected parts of the body, scope of the paralysis, degree of muscular dysfunction, cumulative effect on general mobility of the limbs due to confinement in a wheelchair, etc.

It will be useful for the designer to have access to basic data and characteristics of the wheelchair. But one must always consider the global idea of the person-wheelchair ensemble, elongation, play, and other parameters needed to develop and carry out projects.







Taken from *Las dimensiones humanas en los espacios interiores*, Spain: Editorial Gustavo Gili, S.A, 1983, page 51

[21] Panero, Julius. *Las dimensiones humanas en los espacios* interiores, Spain: Editorial Gustavo Gili, S.A, 1983, page 50

As to this subject, there are many circulation diagrams showing the measures of men and women in wheelchairs. These data must be interpreted and applied wisely, since the elongation dimensions are qualified as medium dimensions. Reach is a very important factor in these design cases, and must be based in the body dimensions of the lower stature population, and not the medium stature one. Thus the data from 5% of the population will be used. A design based on medium reach would leave out one half of all wheelchair users.

"Figure 3-3, table 3-4, and figure 3-4 contemplate the anthropometry of individuals that depend on wheelchairs. It is important to notice that most of these chairs are not built in order to keep the body in an upright position, and thus some parts of it are not kept strictly vertical nor horizontal."[22]

When a wheelchair user is able to move his upper limbs and can maintain an upright position in spite of the inclination of the wheelchair's back, the medium anthropometric reach of the arms must be the adequate one. "This reach depends on the 15° inclination that the back has regarding the vertical line, and based on this, the anthropometric mean of this measure will be modified. Please notice that the measurement of the standard reach is made with the back in an upright position, and the individual seated on an horizontal plane."[23]

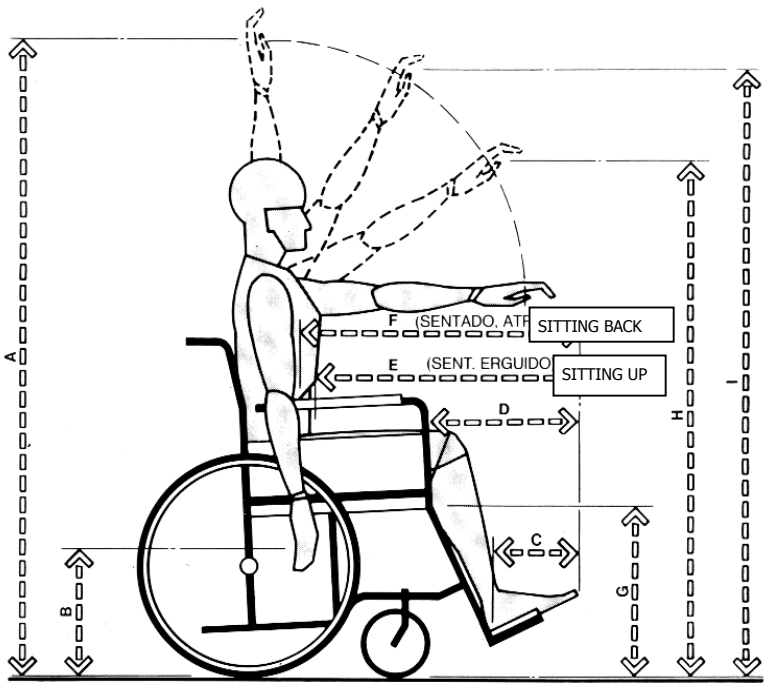


Fig. 3-3. Anthropometry of people in wheelchairs: In the lateral view, the user and the chair can be seen, along with the most important anthropometric measures for men and women. The total reach data correspond to 2.511 percent, so as to accommodate users with the smallest body size. Since women's bodies are smaller than men's, we recommend that the dimensions corresponding to women be used in any design where reach is involved. As to those problems where clearance is involved, the data of a 97.51 percent will be used, particularly masculine dimensions, since they have a greater body size. Figures and data adapted from *Designing for the Disabled*, Goldsmith, 1963, and according to measurements taken from British and North American studies.

	MAN		WOMAN	
	Inches	**Cm**	**Inches**	**Cm**
A	62.25	158,1	56.75	144,1
B	16.25	41,3	17.5	44,5
C	8.75	22,2	7.0	17,8
D	18.5	47,0	16.5	41,9
E	25.75	65,4	23.0	58,4
F	28.75	73,0	26.0	66,0
G	19.0	48,3	19.0	48,3
H	51.5	130,8	47.0	119,4
1	58.25	148,0	53.24	135,2

Table 3-4.

Taken from *Las dimensiones humanas en los espacios* Interiores, Spain, Editorial Gustavo Gili, S.A, 1983, page 52

[22] Id.

[23] Ibid, page 55

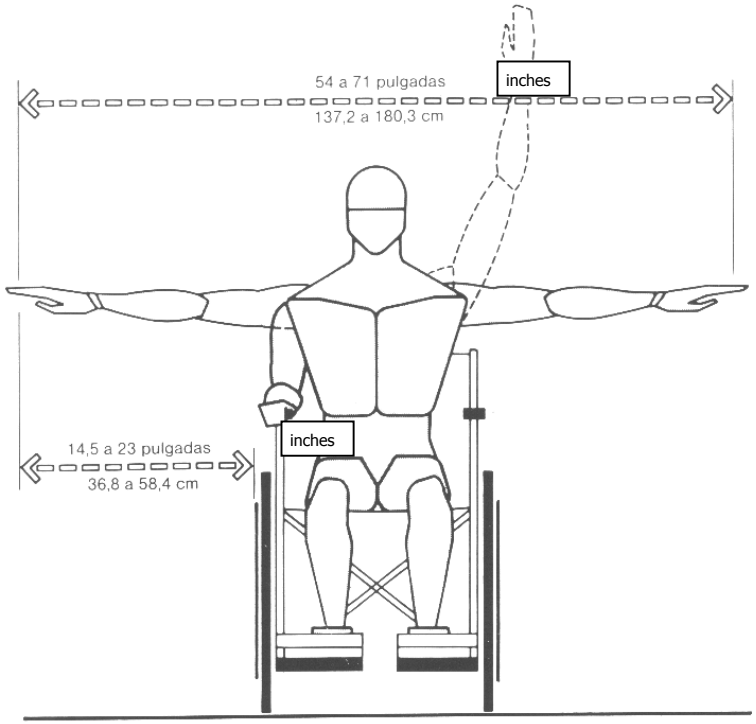
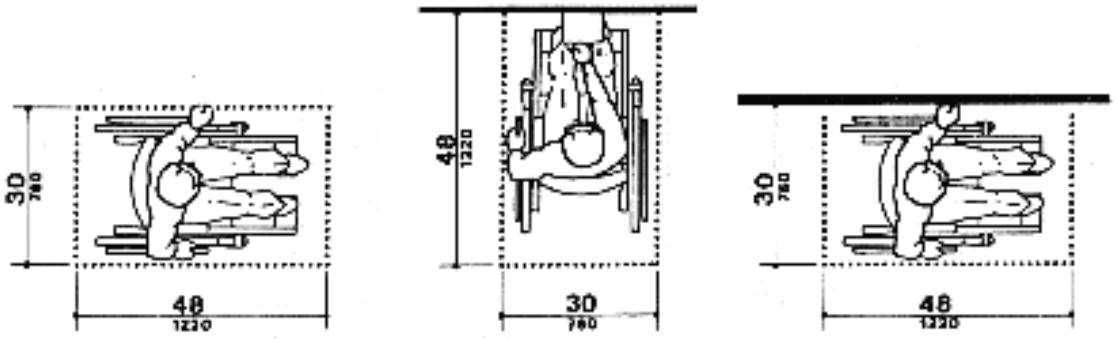


Fig. 3-4. Anthropometry of people in wheelchairs: In the frontal view, the user and the chair can be seen, along with the most important anthropometric measures. Bilateral arm reach measures, with arms extended to both sides and at the height of the shoulders, and the shoulder height, were extracted from the American National Standards Institute (ANSI Pub. A 1 1 7-1961, updated in 1971). Data about gender and percentage groups are missing.

Taken from *Las dimensiones humanas en los espacios Interiores*, Spain, Editorial Gustavo Gili, S.A, 1983, page 53

MINIMUM SPACES FOR WHEELCHAIR USE



Free ground plan space | Frontal approach | Lateral approach

Taken from www.access-board.gov/adaag/html/Adfig.html

2.2 PEOPLE WITH RESTRICTED MOBILITY

No analysis about the spatial needs for people with disabilities can overlook other elements inherent to them, such as crutches (Fig. 3-5), strollers (Fig. 3-6), canes (Fig. 3-7), and guide dogs (Fig. 3-8). These technical aids become functional parts of their user's bodies. The technical aid and the user must be considered as one single entity. It is important to remember that design not only involves the anthropometry of the user-technical aid unit, but also a series of spatial considerations corresponding to the environment in which the user moves.[24]

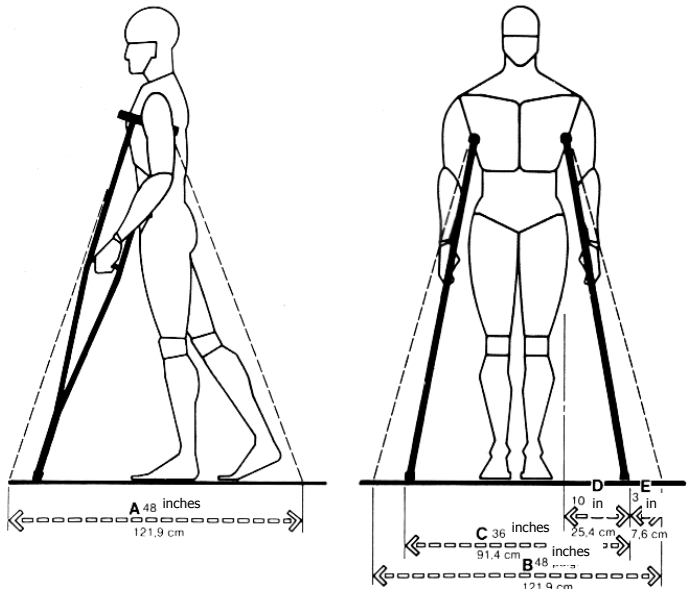


Fig. 3-5. Crutches. The use of crutches significantly alters the shape, step and speed of the user. Changes in level, and climbing and descending stairs become difficult and sometimes impossible. The limited use that the user can make of his inferior limbs noticeably reduces the performance level, especially when opening or closing doors, standing up and sitting down. The dimensions that have the most influence on clearance are: (A) oscillation of the crutches, (B) oscillation of the crutches when walking, (C) separation of the crutches when the user is standing up, (D) separation between the crutches and the body, and (E) crutch-body oscillation. For users with arthritis or severe cerebral palsy, the clearance measures indicated must be increased.

Taken from *Las dimensiones humanas en los espacios Interiors.* Spain: Editorial Gustavo Gili, S.A.. 1983, page 54

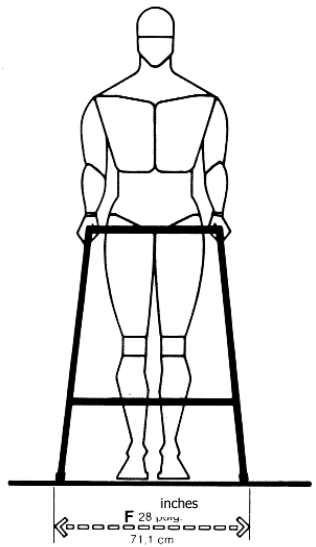


Fig. 3-6. Stroller: The clearance required by a stroller user is easily defined due to the very nature of the device and its method of use. The frontal view of the user indicates a minimum of 71.1 cm (28 inches) for (F).

[24] Adapted from *Las dimensiones humanas en los espacios* interiores, Spain: Editorial Gustavo Gili, S.A, 1983, page 51

significantly

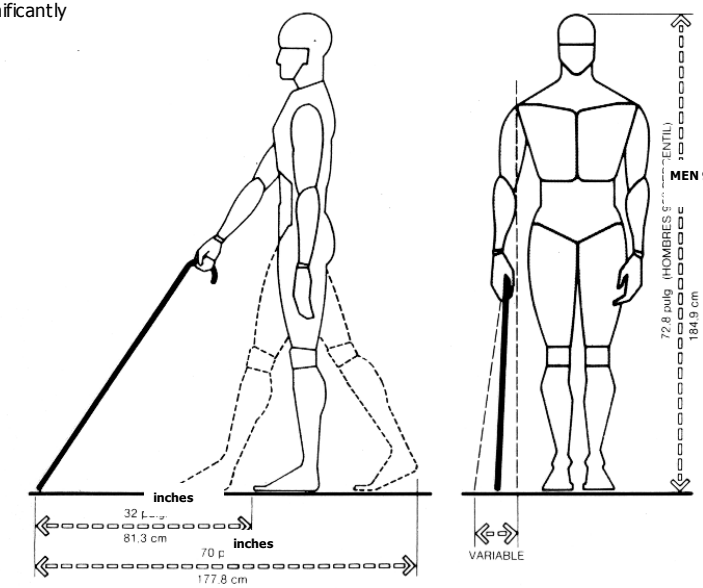


Fig. 3-7. Canes: They may be used by people who are blind, one of whose limbs are hurt, or those who have some kind of illness or condition such as advanced age, arthritis, cerebral palsy, diabetes, multiple sclerosis, etc. Blind people require the maximum clearance space, due to the characteristics of their disability. The frontal and lateral views indicate precise clearance tolerances.

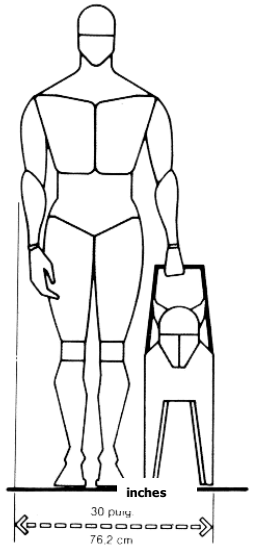


Fig. 3-8. Guide dog: The ideal combined clearance is hard to establish given the different variables involved in this case of a user and his dog. However, the minimum clearance is established at 76,2 cm (30 inches).

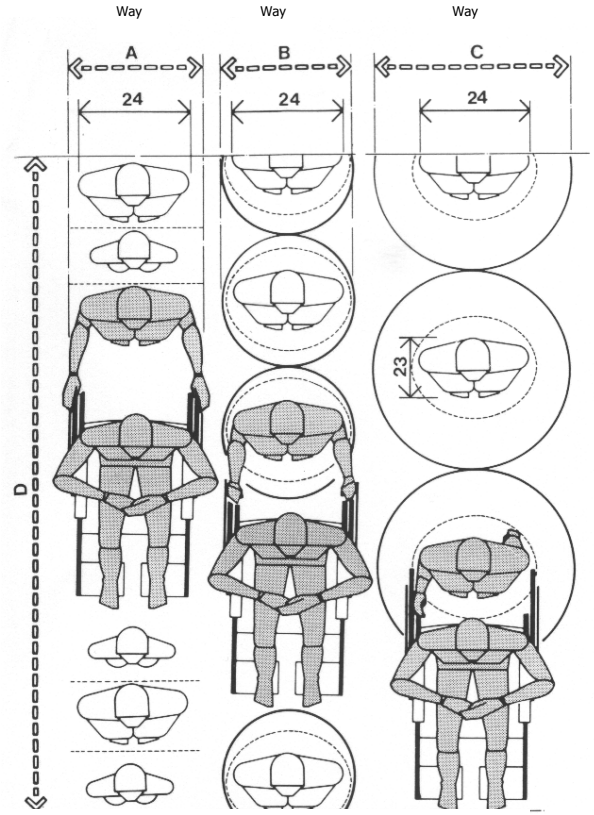
Taken from *Las dimensiones humanas en los espacios Interiores*, Spain, Editorial Gustavo Gili, S.A, 1983, page 51

IV. SPATIAL STANDARDS

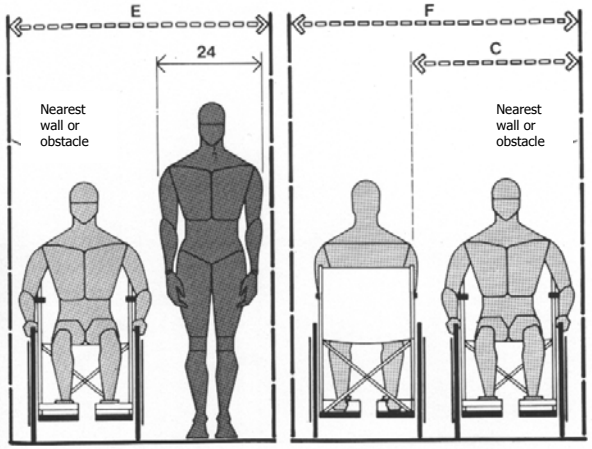
1. CIRCULATION SPACES

1.1 HORIZONTAL CIRCULATION

The upper right graphic shows a queue of people, introducing the variable of a person in a wheelchair. The lower right graphic indicates the clearance that must be applied to the hallway width in order to adapt it to the circulation of a wheelchair. The passing of two wheelchairs, one next to the other, requires a width of 152,4 cm (60 inches), while for a single one a width of 91,4 cm (36 inches) is enough. A hallway that is 137,2 cm (54 wide) allows for one person to circulate and pass people in wheelchairs. In the case of long hallways, it is convenient to locate rest areas in the shape of lateral relief spaces, halls or reception areas. The distance between rest areas could be 30,5 m (100 feet) for interior areas, and 100 m (300 feet) for outdoor areas. It is always necessary to locate rotation areas for wheelchairs. One complete turn can be made within a diameter of 152,4 cm (60 inches). As shown in the graphic on the following page, a person in crutches needs a clearance of 152,4 cm (60 inches) in order to move or pass another wheelchair user. So as not to block the way for a wheelchair, a person requires a clearance of 106,7 cm (42 inches). [25]



"QUEUES"/ COMPARATIVE DENSITIES INCLUDING PEOPLE IN WHEELCHAIRS



CIRCULATION IN WHEELCHAIR/HALLWAYS AND PASSAGES

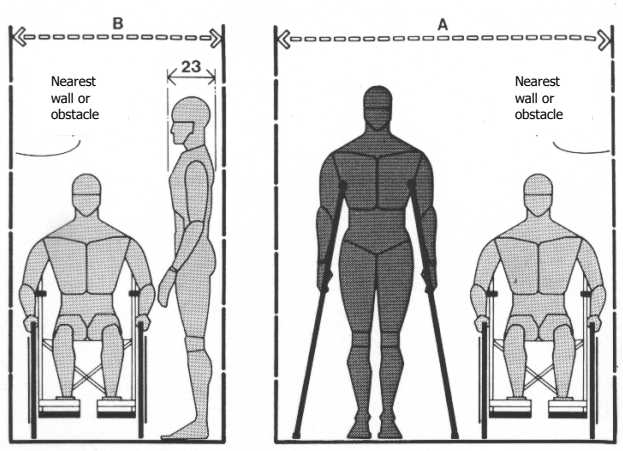
Taken from *Las dimensiones humanas en los espacios interiores*, Spain: Editorial Gustavo Gili, S.A, 1983, page 269

	In.	Cm.
A	30	76,2
B	24	61,0
C	36	91,4
D	120	304,8
E	54	137,2
F	60	152,4

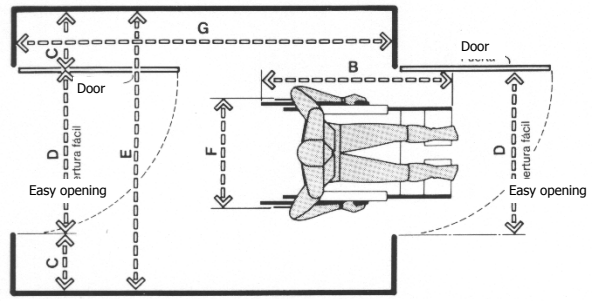
[25] Adapted from *Las dimensiones humanas en los espacios interiores*, Spain: Editorial Gustavo Gili, S.A, 1983, page 269

1.1.1 DOORS

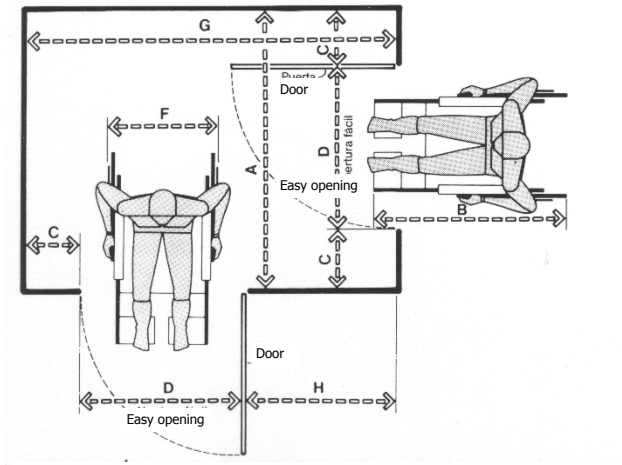
The two graphics below study the spatial demands for a wheelchair user to maneuver in a place with two doors. In the first case, both doors face each other, in the second they are perpendicular. In order to go through the door, the wheelchair needs a clearance of 213,4 cm (84 inches) for the closing door not to interfere. The length of these chairs is 106,7 cm (42 inches). The 213,4 cm mentioned comprise a door of 91,4 cm (36 inches) and an additional clearance of 15,2 cm (6 inches) divided between both sides. At either side of the door, a clearance of 30,5 cm (12 inches) is left to facilitate the approach of the wheelchair, while another person opens it and then steps back, which is especially important when a door opens inwards. When the doors are located on perpendicular planes, the essential thing is to establish dimensions so that no interference between them takes place.[26]



CIRCULATION IN WHEELCHAIR/HALLWAYS AND PASSAGES



CIRCULATION IN WHEELCHAIR/ALIGNED DOORS



CIRCULATION IN WHEELCHAIR/DOORS ON PERPENDICULAR PLANES

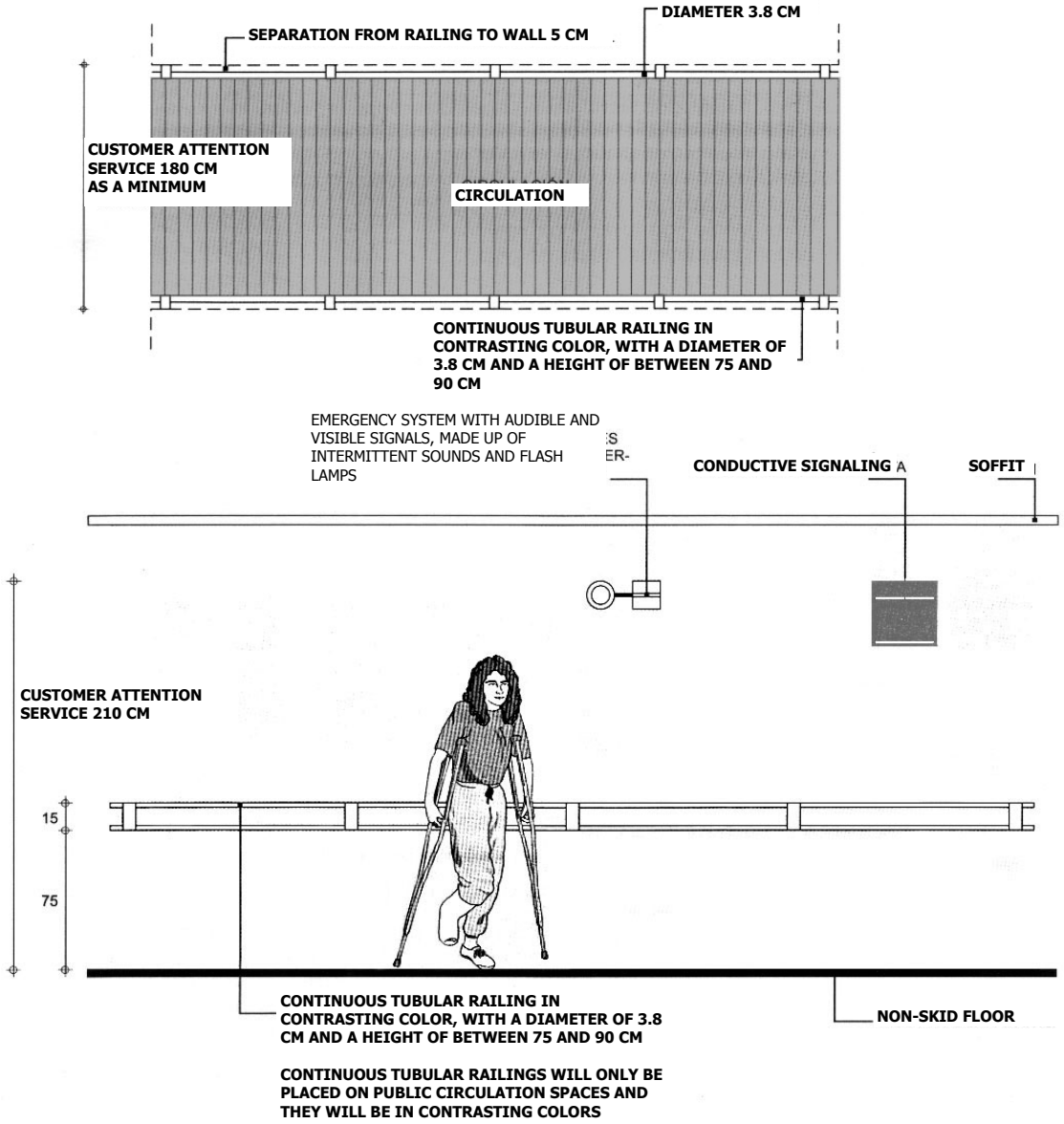
	In.	Cm.
A	60	152,4
B	42	106,7
C	12 min.	30,5 min.
D	32	81,3
E	56 min.	142,2 min.
F	25	63,5
G	84	213,4
H	36 min.	91,4 mi n.

Taken from *Las dimensiones humanas en los espacios* interiores, Spain: Editorial Gustavo Gili, S.A, 1983, page 269

[26] Adapted from *Las dimensiones humanas en los espacios* interiores, Spain: Editorial Gustavo Gili, S.A, 1983, page 270

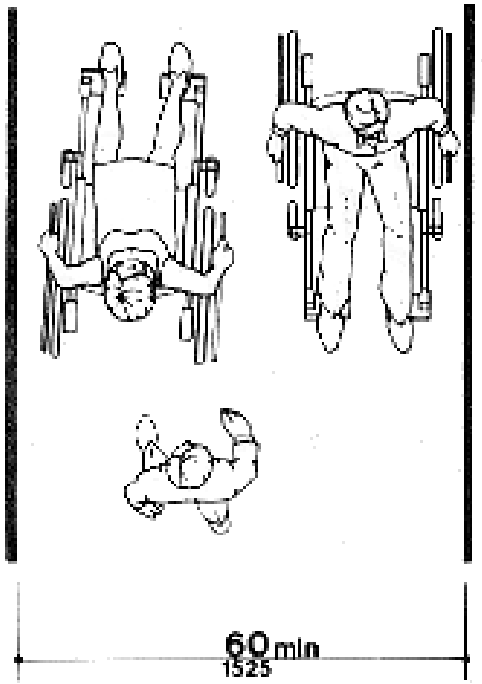
1.1.2 PASSAGES, HALLWAYS AND PATHS

Passages, hallways and paths must have a minimum width of 180 cm.
One must also have a railing located at a height of 90 cm from the floor, in a color that contrasts with the vertical delimitation.
There must be tactile strips with a width of 20 cm on both sides of the hallway.
There must be a non-skid floor, and an emergency signal with light and sound.
There must be conductive signs.
A curb or ramp preventing overturning must be built on both sides of the path, with a minimum height of 10 cm.

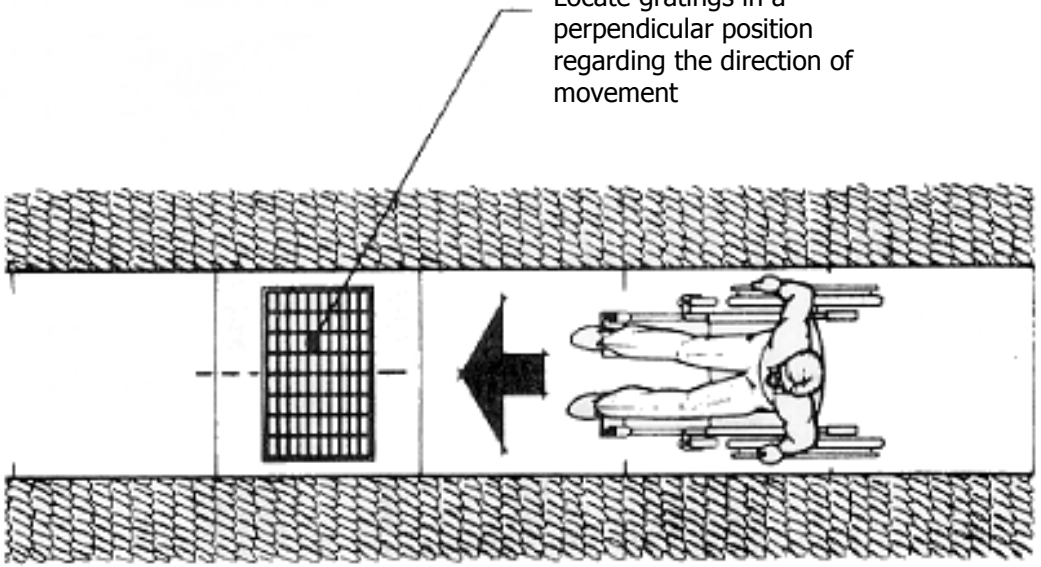


Taken from *Criterios normativos para el diseño, construcción y operación de espacios físicos*, Mexico: Convive, 2002, page 10

MINIMUM MEASURES IN A PUBLIC HALLWAY WITH REGULAR TRANSIT



LOCATE THE LENGTH OF THE DRAINAGE GRATINGS PERPENDICULARLY FROM THE DIRECTION OF MOVEMENT

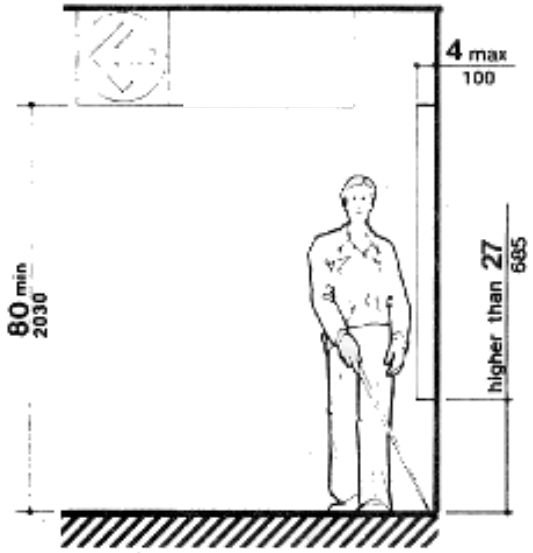


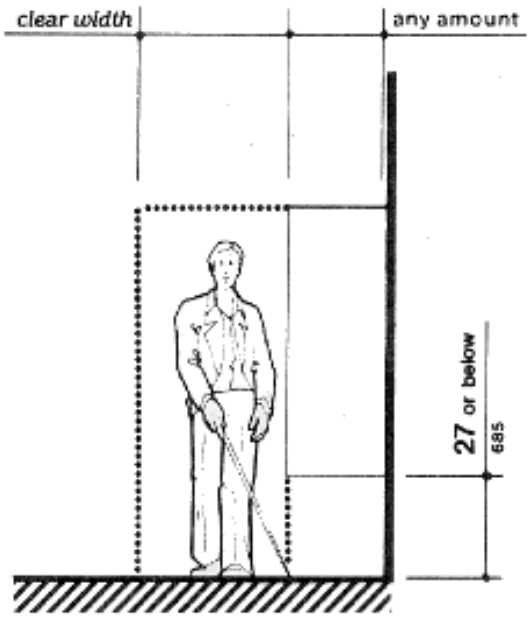
Taken from www.access-board.gov/adaag/html/Adfig.html

1.1.3 STANDARD GUIDE FOR VISUALLY IMPAIRED PEOPLE

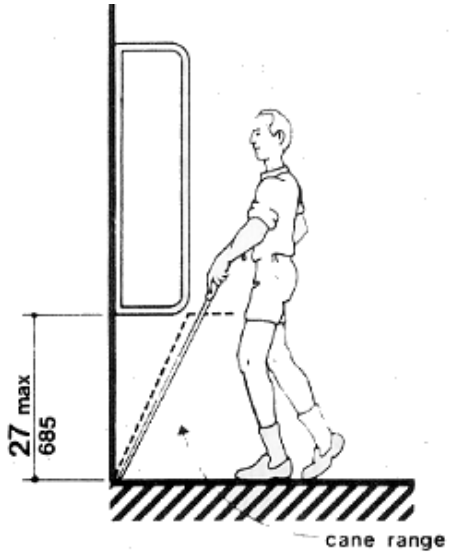
1.1.3.1 PROTRUDING OBJECTS

In case of protruding objects, when walking parallel to a wall or in open spaces –such as a forest with vegetation located on the sides of the path–, these may be indicated at the height of the socle. The presence of signaling or interpretation elements must be indicated by a change in texture or material on the vertical edge of the walls or paths. These object must possess a minimum length of 1.20 m, which allows, at least, contact with the person's cane.



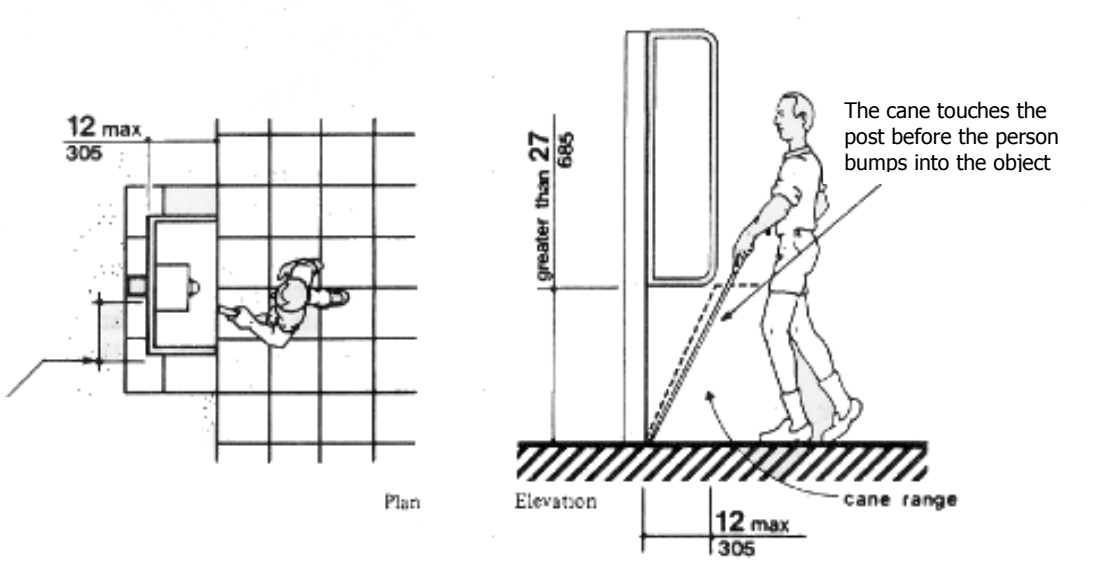


Protruding objects when walking perpendicularly to a wall: When approaching protruding objects, signaling on the wall or on the path, a change in floor texture and/or material must be used.

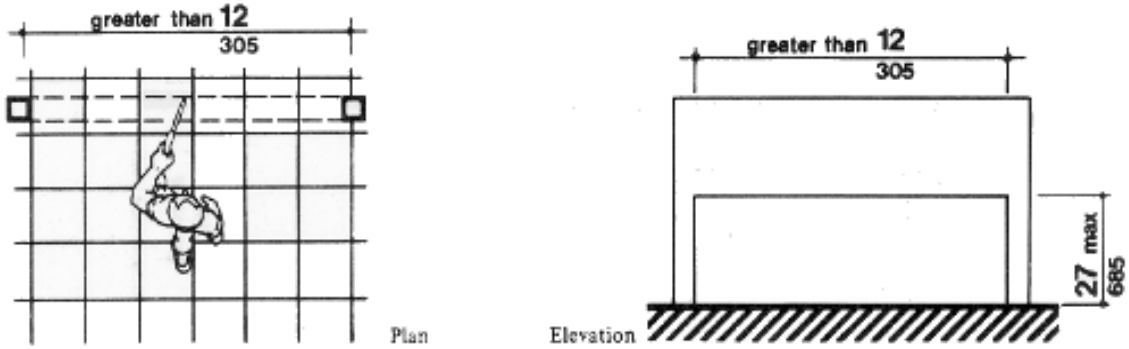


Taken from www.access-board.gov/adaag/html/Adfig.html

Objects mounted on posts or pylons:
The diagram illustrates an area in which a hanging or protruding object may be greater in size than 0.305 m. (12 inches).

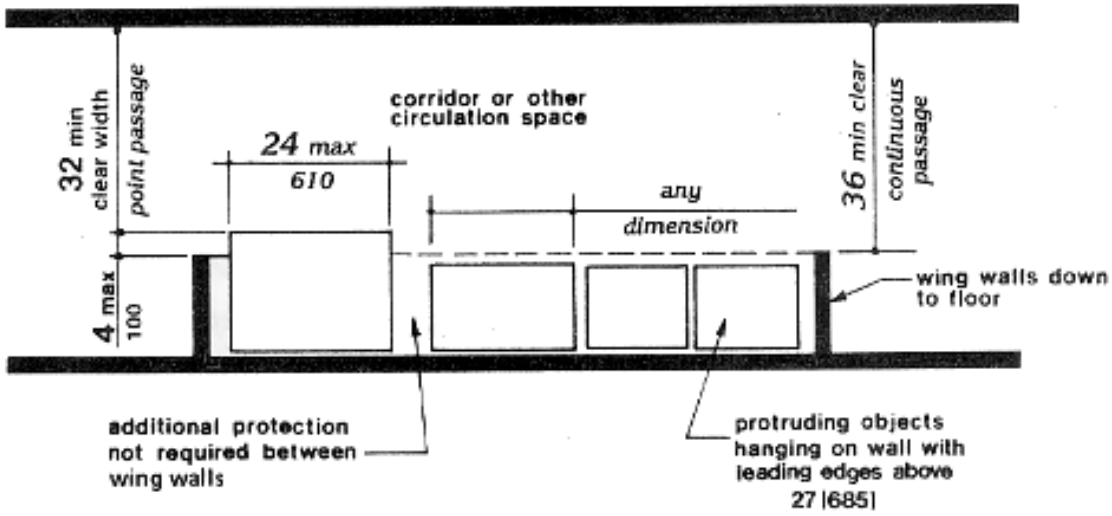


Information screens:
Dimensions that can be detected by the cane.

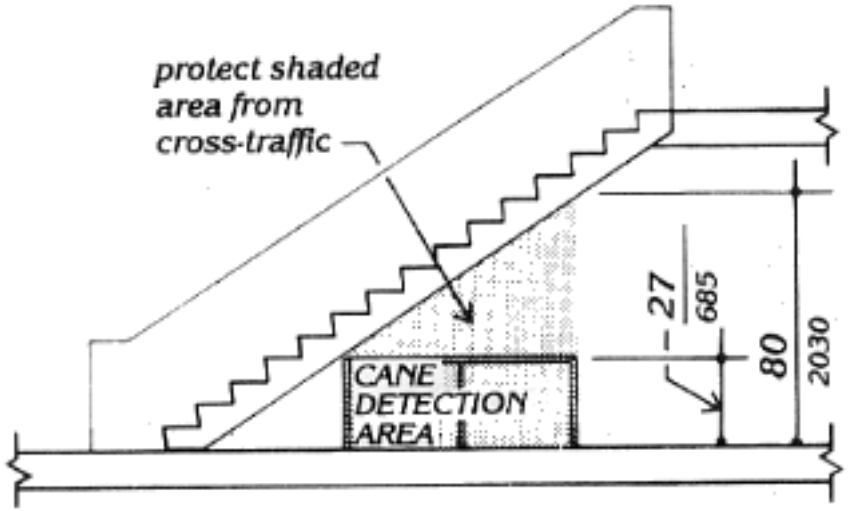


Taken from www.access-board.gov/adaag/html/Adfig.html

Protection around objects mounted or hanging from walls and measures for clearings or widths.
The minimum width of the hallway is 0.92 m.
The maximum dimension of the protruding object is 0.10 m. (4 inches).



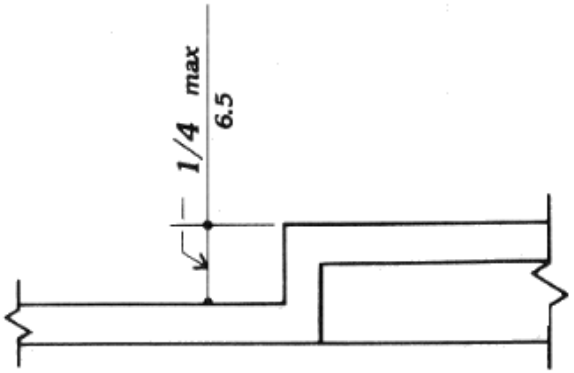
Protruding objects: hazards for the head
Example:
Protection under the stairs with a maximum height of 2.030 m. Hazard detection must be achieved by installing a railing no higher than 0.685 m.

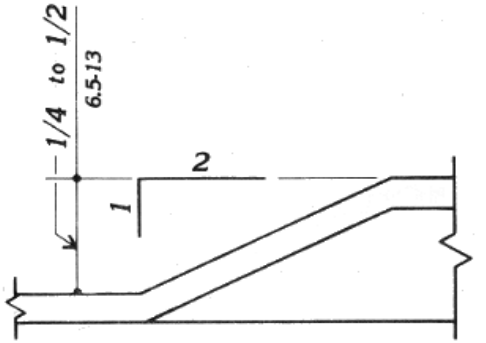


Taken from www.access-board.gov/adaag/html/Adfig.html

1.1.4 CHANGES IN LEVEL

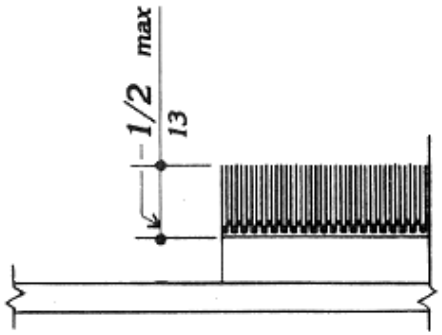
Accessible route

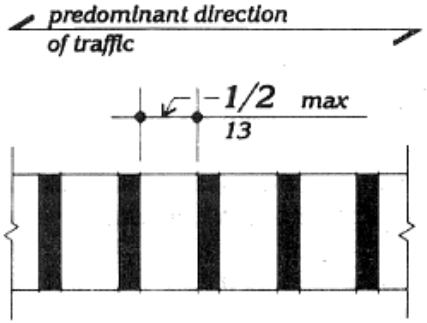




1.1.5 THICKNESS OF CARPETS

Fibers



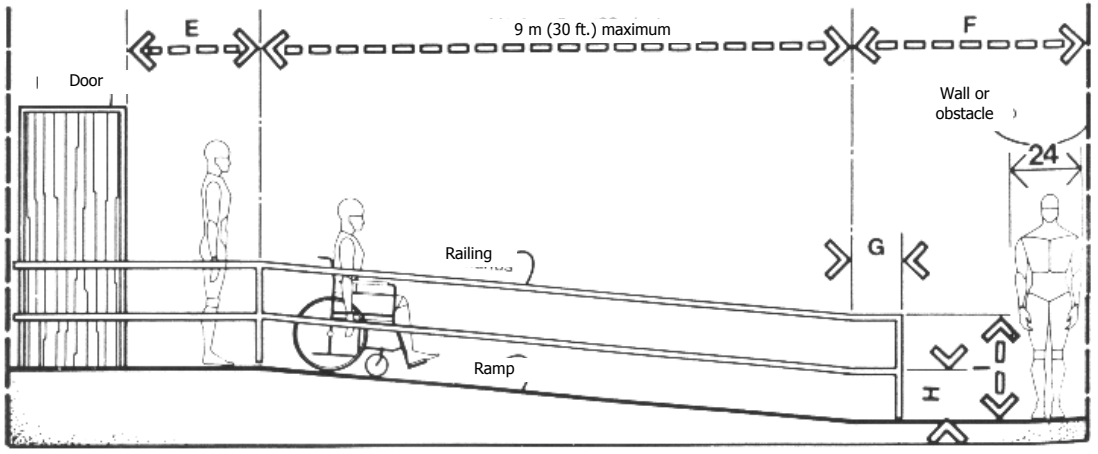


Taken from www.access-board.gov/adaag/html/Adfig.html

1.2 VERTICAL CIRCULATION

1.2.1 RAMPS

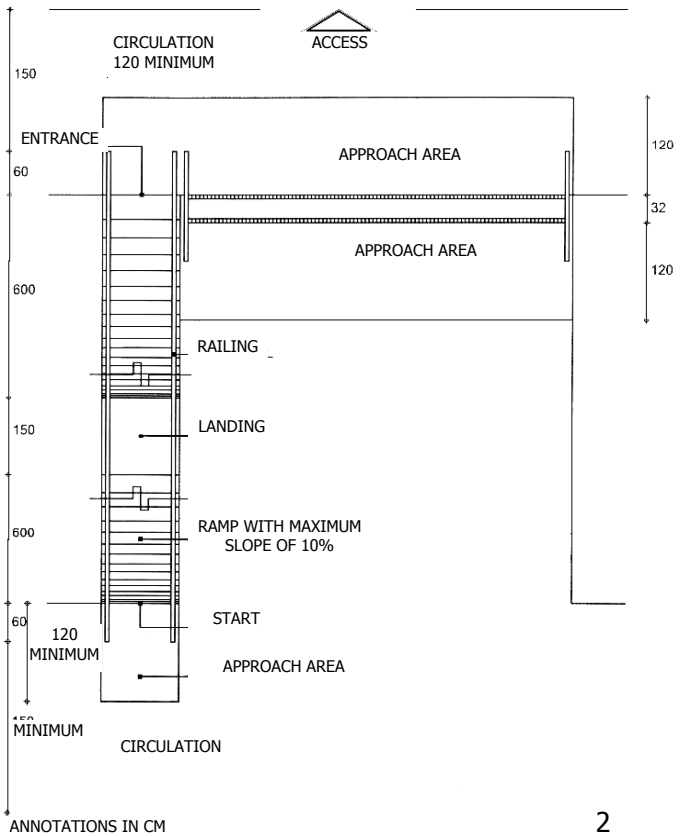
An option to avoid climbing stairs is a ramp, which satisfies the needs of any user, especially those of a visitor in a wheelchair.
In this specific case, in natural areas with sloping paths, we recommend the conventional standards requesting a maximum slope of one unit in height for every twelve in length, with a maximum extent of 9 m (30 feet) without a landing. Landings are assigned a minimum length of 106,7 cm (42 inches), and they must be located at every change in the direction of the ramp, and at entrances and exits. Horizontal planes with doors will have a clearance of 106,7 cm (42 inches) to permit door rotation, except in cases where they do not invade the ramp, where this measure can be reduced to 61 cm (24 inches) from the side with the latch. [27]
The following graphic is a diagram for the design of an ideal ramp.



Exterior ramp

1

	in	cm
A	18	45,7
B	48 min.	111,9 min.
C	54 max.	137,2 max.
D	30	76,2
E	42 min.	106,7 min.
F	72 min.	182,9 min.
G	12~18	30,5-45,7
H	18-20	45,7-50,8
L	33-34	83,8-86,4

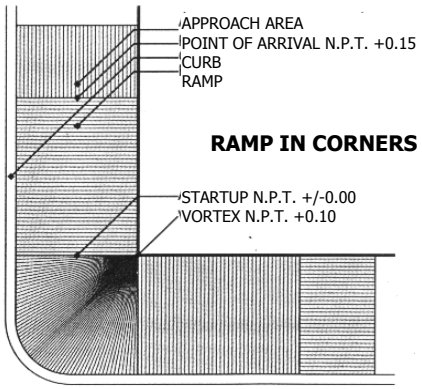


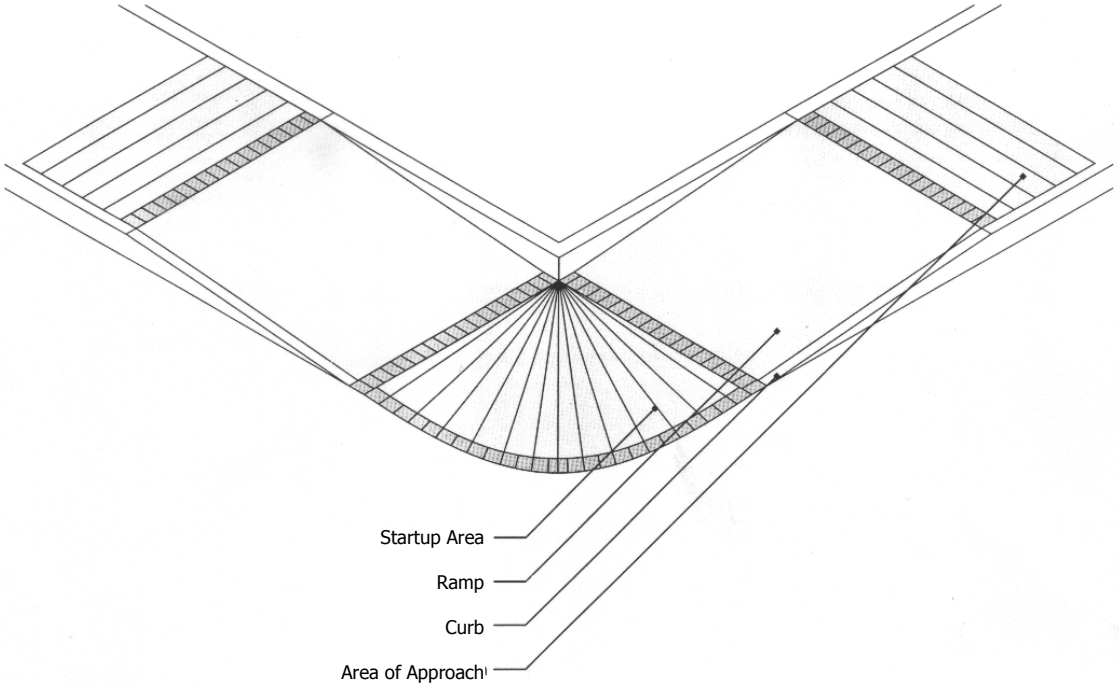
2

Taken from
1 *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page269

2 *Criterios normativos para el diseño, construcción y operación de espacios físicos...* Mexico: Convive, 2002, page 5, chap. 3.

[27] Adapted from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 274.





Specifications:

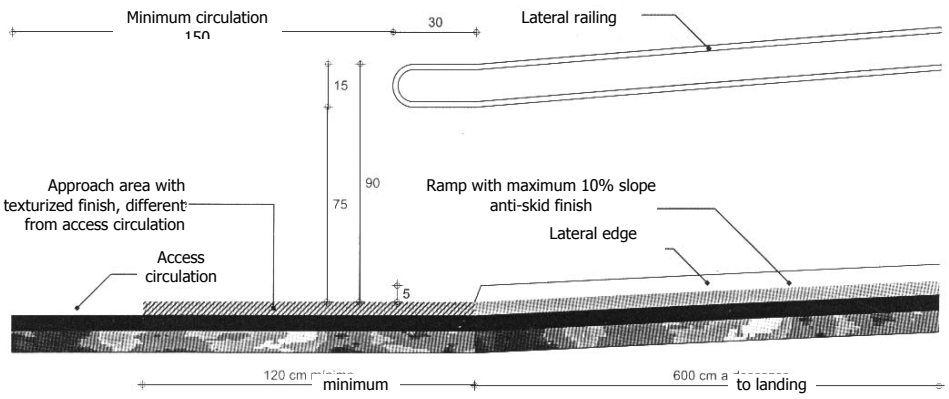
Startup Area and Approach Area:
Ceramic for high traffic, 10x20cm, in red
Dal Tile (Dal Monte) Dal-Jewelstone Ceramic, 2"x2", in yellow

Ramp: texturized concrete
Curb: epoxy traffic paint in yellow

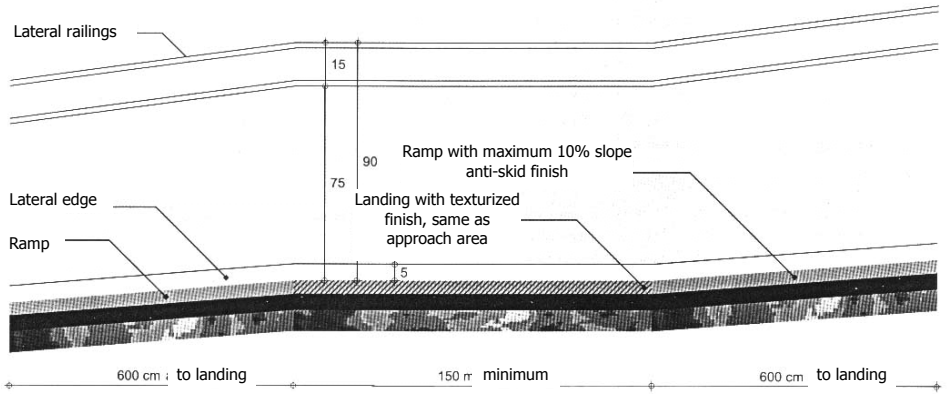
Isometric

Adapted from *Criterios normativos para el diseño, construcción y operación de espacios físicos...* Mexico: Convive, 2002, pages 5-6, chap. 3.

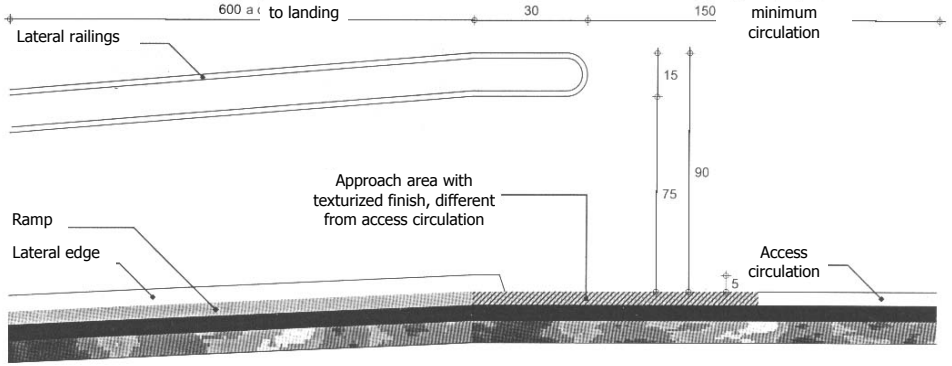
Cut on Startup



Cut on Landing
no scale



Cut on arriving



Annotations in cm

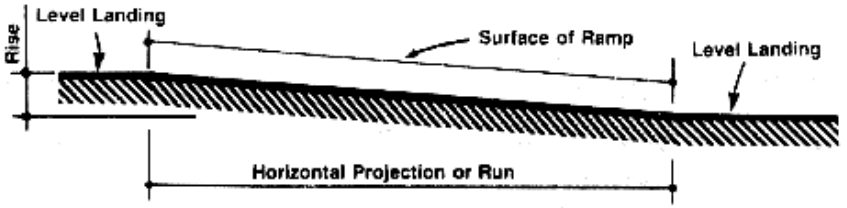
Adapted from *Criterios normativos para el diseño, construcción y operación de espacios físicos...*
Mexico: Convive, 2002, page 7-8, chap. 3.

1.2.1.1 RAMP COMPONENTS AND THEIR DIMENSIONS

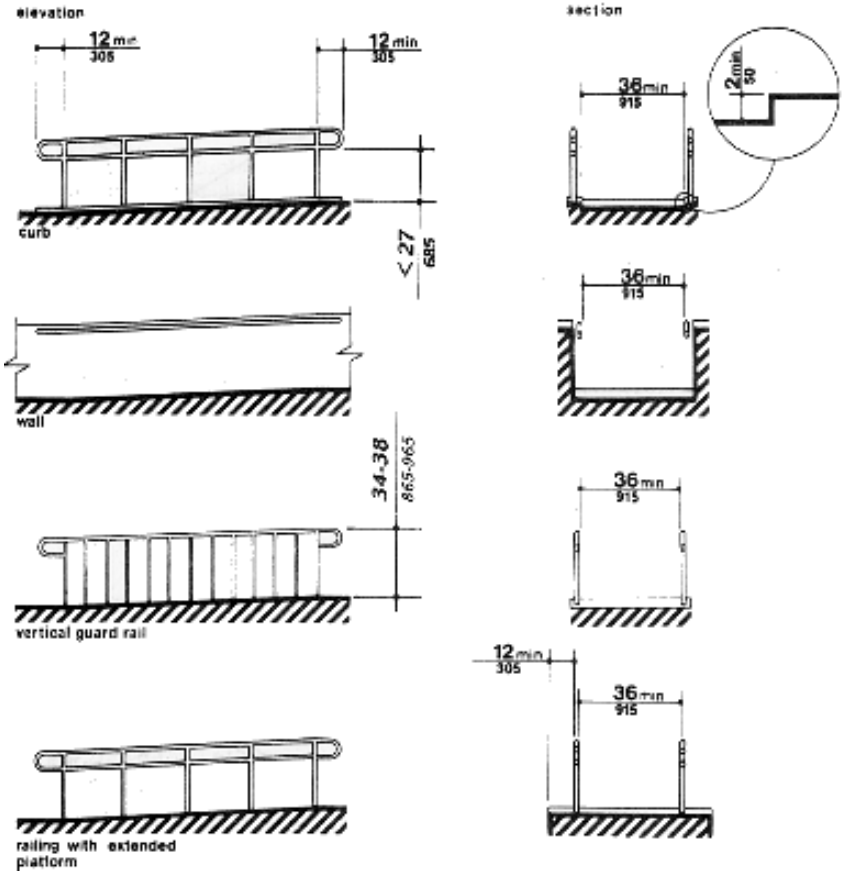
If the ramp slope is between 1:12 and 1:16, the maximum height will be 0.760 m (30 inches), and the maximum horizontal length will be 30 feet (9 m). If the slope of the ramp is between 1:16 and 1:20, the maximum height will be 0.760 m (30 inches), and the maximum horizontal length will be 40 feet (12 m).

Examples of protection in railings and extensions

LONGITUDINAL SECTION



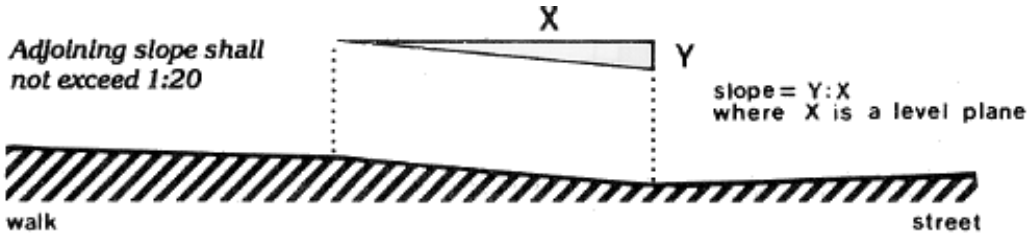
	Maximum Rise		Maximum Horizontal Projection	
Slope	in	mm	ft	m
1:12 to < 1:16	30	760	30	9
1:16 to < 1:20	30	760	40	12



Taken from www.access-board.gov/adaag/html/Adfig.html

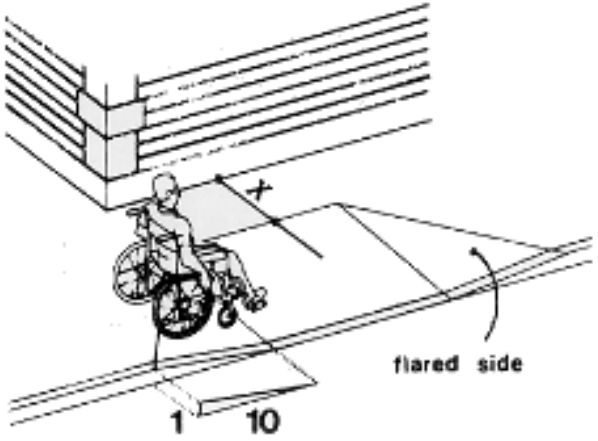
1.2.1.2 SLOPES IN RAMPS FROM THE STREET

The slope of the ramp is the result of the division of height into length of the ramp. On sidewalks, the ramp must not exceed a 1:20 ratio.



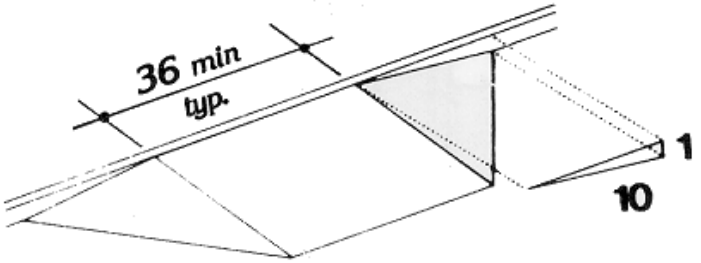
1.2.1.3 SIDES OF THE RAMPS ON SIDEWALKS

If the space or depth at the end of the ramp is less than 1.20 m (48 inches), the inclination of the lateral ramps or inclined sides must not exceed a 1:12 ratio.



1.2.1.4 RAMP WITH INCLINED SIDES

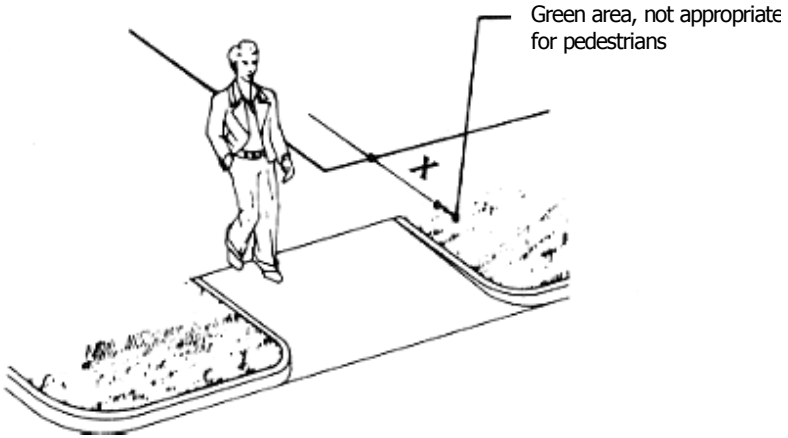
(0.92m minimum width)



Taken from www.access-board.gov/adaag/html/Adfig.html

1.2.1.5 SIDES OF RAMPS

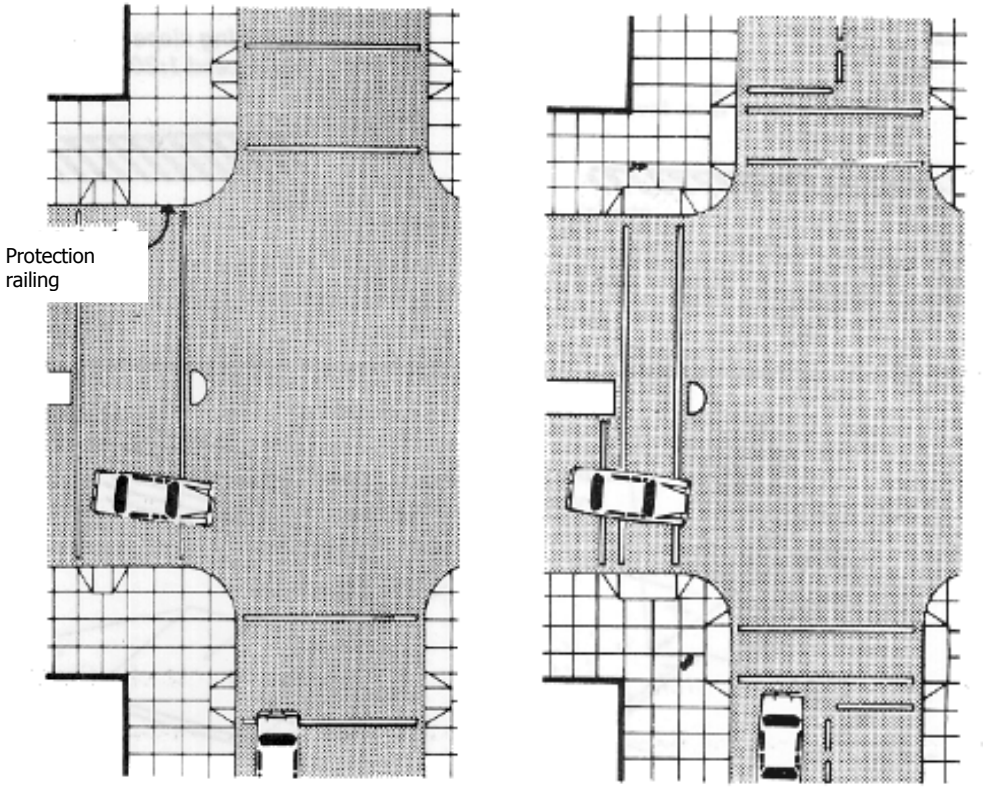
They can be built next to green areas on sidewalks.



1.2.1.6 STREETS:

1. RAMPS AT INTERSECTIONS

2. RAMP AT INTERSECTIONS ON SIGNALED STREETS



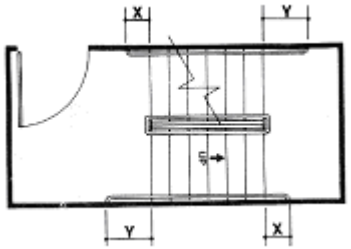
1. 2.

Taken from www.access-board.gov/adaag/html/Adfig.html

1.2.2 STAIRS

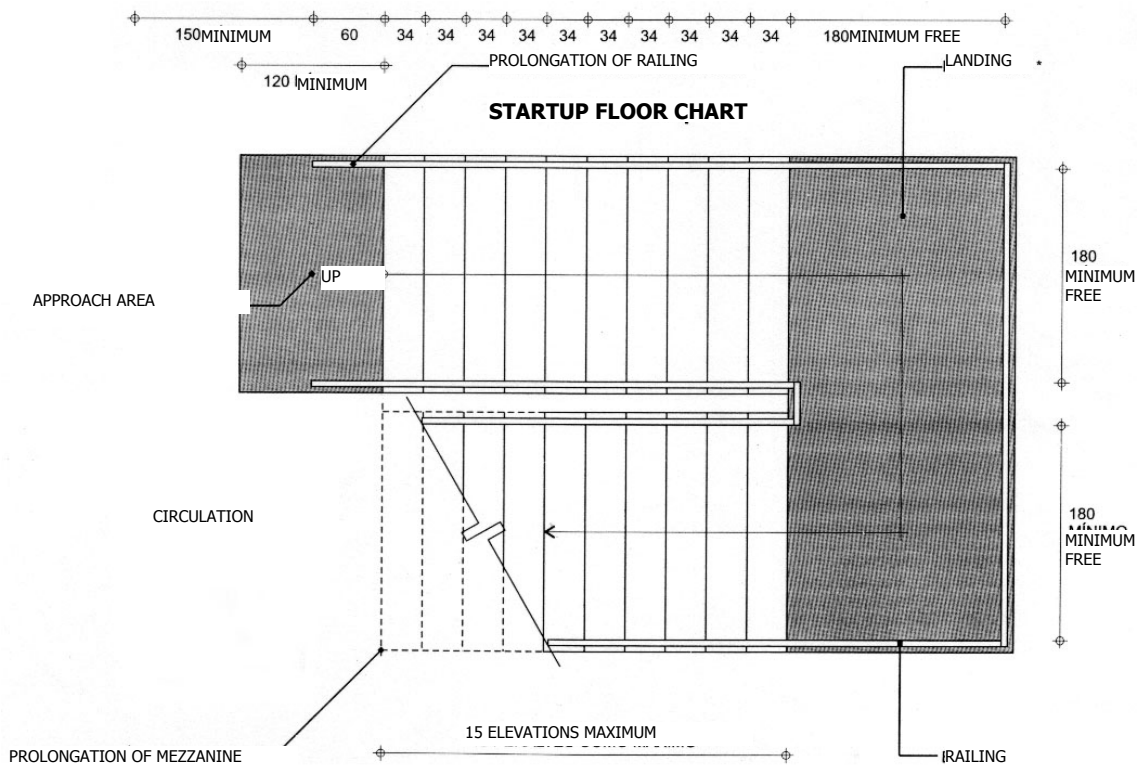
1.2.2.1 CHARACTERISTICS

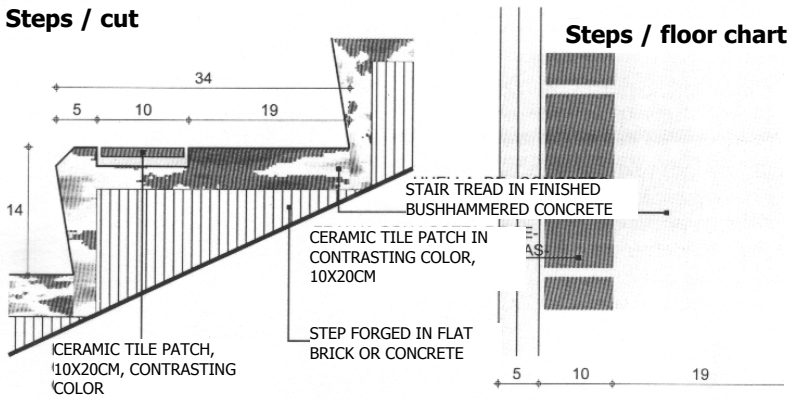
-Minimum width, 180 cm
-Anti-skid surface
-Railing on both sides
-Approach area to stairs, 120 cm wide
-Emergency signaling with sound and intermittent red and yellow lights, 210 cm from the floor



1.2.2.2 STAIR FLOOR CHART, RAILING

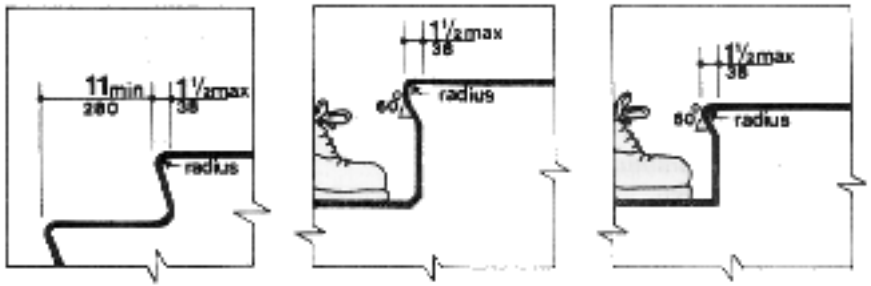
NOTE:
X is the extension of the railing required at the top of the stairs, and it must be at least 0.30m (12 inches) long.
Y is the railing's minimum extension of 0.30m (12 inches), plus the adjoining space when one enters or turns around at the stairs.



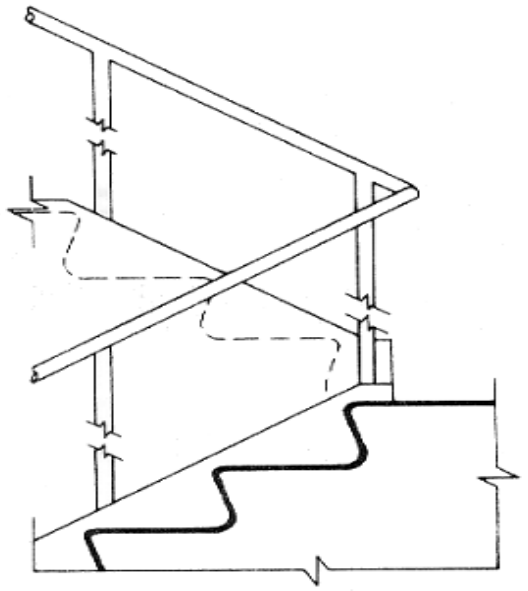


Taken from *Criterios normativos para el diseño, construcción y operación de espacios físicos...*
Mexico: Convive, 2002, page 9, chap. 3.

1.2.2.3 RUNG DETAILS ON STAIRS



INCLINED ANGULAR ROUNDED



2

1.2.2.4 RAILING

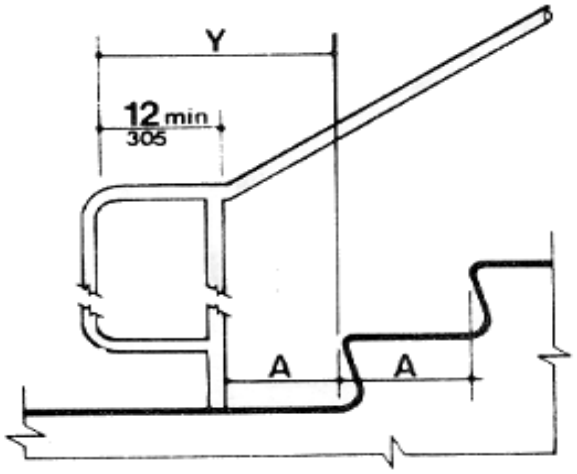
1. Railing on stairs with extensions at the end

X, 0.30m (12 inches), is the minimum length required at the top. Y, 0.30m, is the space required at the base of the stairs, plus the space of access to them.

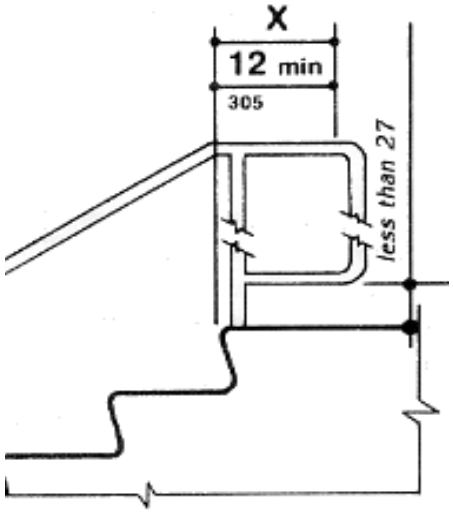
2. Railing on stairs with elevation of the central railing

3. Railing on stairs with extensions at the end

X = 12 inches minimum, for the length required
Y = 12 inches + the width of one rung, as a minimum.



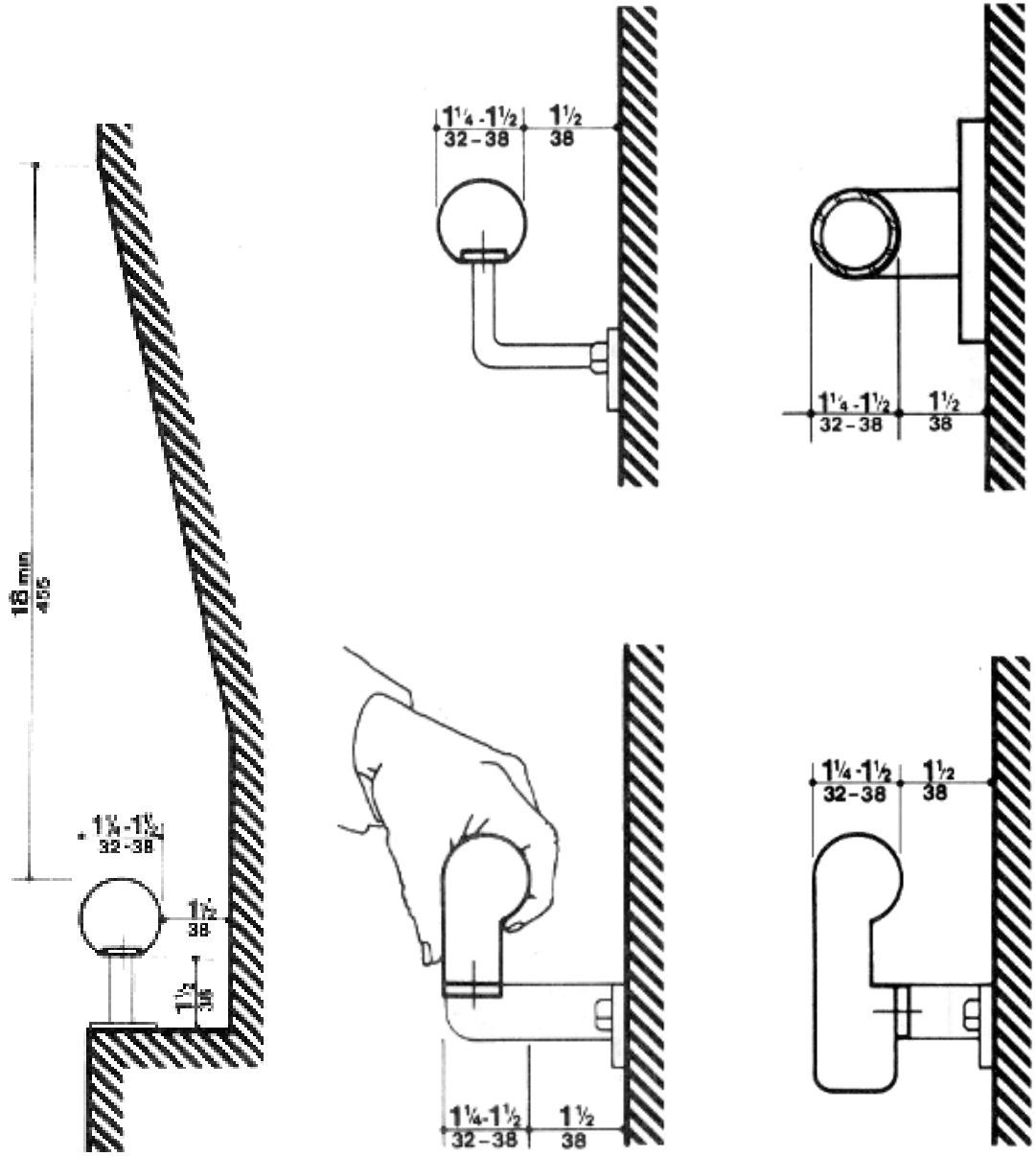
1



3

Taken from www.access-board.gov/adaag/html/Adfig.html

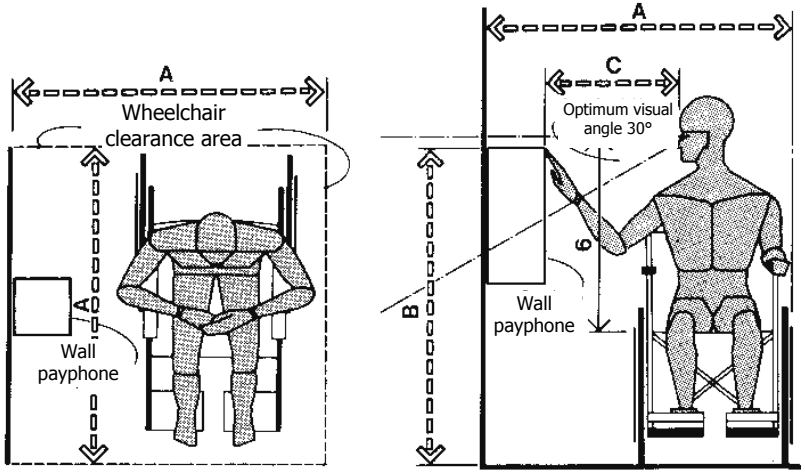
The clearance between railing and wall must be adapted to the greater hand thickness, and its dimensions will depend on the interior grip diameter corresponding to the shortest user. A railing clearance of 5,1 (2 inches) and a diameter of 3,8 cm (1,5 inches) will adapt to most users.



Taken from www.access-board.gov/adaag/html/Adfig.html

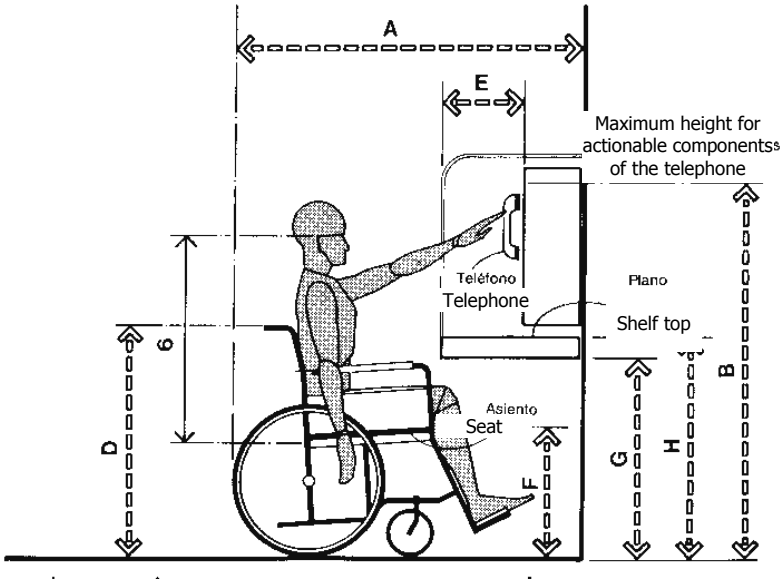
2. PUBLIC PAYPHONES

The access to public payphones for people in wheelchairs depends on the earpiece, dial and coin slot being at no more than 121,9 cm (48 inches) from the floor. It is also convenient for the earpiece to have a volume regulator, so that it can be used by those people with hearing impairments. Instructions for use must be presented in a tactile and visual manner, for those people with visual impairment. Wall phones must have an adequate space in order to facilitate parallel access to the frontal side of the telephone, for people in wheelchairs. If the telephone also has a shelf, it will be located at 73,7 cm (29 inches) from the floor, height measured from the lower side of the shelf. The phone booths will have a minimum width of 106,7 cm (42 inches); the device will be installed on the wall or lateral surface, and a space of 81,3 cm (32 inches) will be left for the door opening.[28]



	in	cm
A	48	121,9
B	48 max	121,9 max
C	13-20	33,0-50,8
D	36	91,4
E	8-12	20,3-30,5
F	19	48,3
G	29 min.	73,7 min.
H	32 max.	81,3 max.

PAYPHONE / DISABLED USER



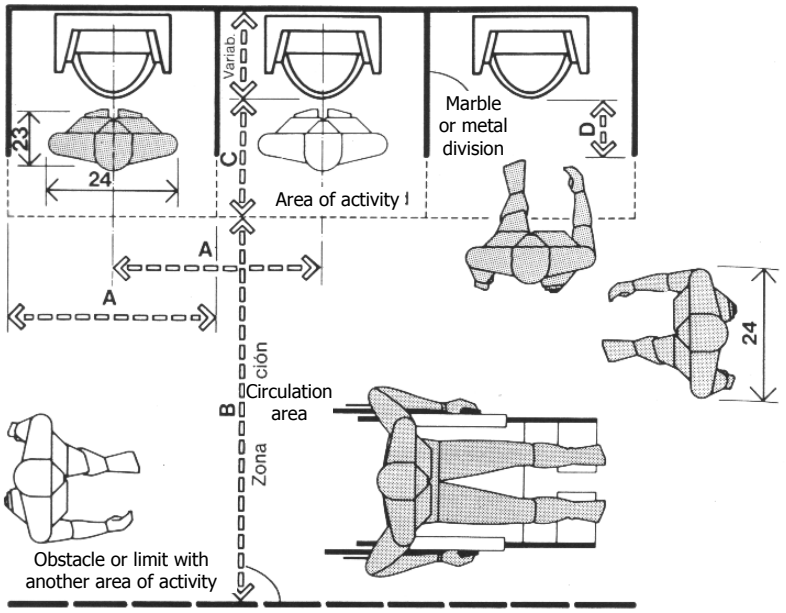
[28] Adapted from *Las dimensiones humanas en los espacios interiores* Spain: Editorial Gustavo Gili, S.A., 1983, page 280.

Taken from
Las dimensiones humanas en los espacios interiores Spain: Editorial Gustavo Gili, S.A., 1983, page 280

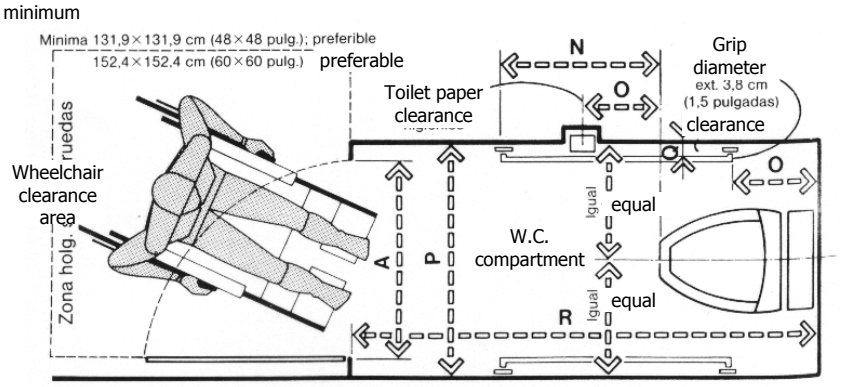
3. RESTROOMS

Urinals can be placed in groups, with a separation among them of 81,3 cm (32 inches). The division between elements must have an extension of 20,3 to 25,4 cm (8 a 10 inches) from the frontal side of the urinal, with an activity area in front of the device with a width of 137,2 cm (54 inches).
Urinals for people in wheelchairs must have a minimum access width of 91,4 cm (36 inches). In case of toilets, the frontal access for these same individuals requires an area of 106,7xl82,9 cm (42x72 inches). It is essential to have a clearance area for wheelchairs in front of these facilities.[29]

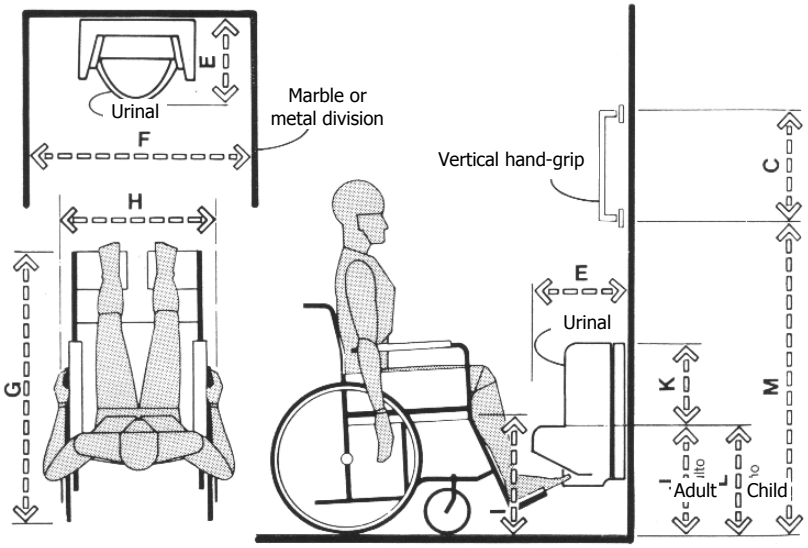
	in	cm
A	32	81,3
B	54	137,2
C	18	45,7
D	8-10	20,3-25,4
E	14 min.	35,6 min.
F	36 min.	91,4 min.
G	42	106,7
H	25	63,5
I	19	48,3
J	17 max.	43,2 max.
K	12 min.	30,5 min.
L	14 max.	35,6 max.
M	48	121,9
N	18 min.	45,7 min.
O	*12*	30,5
P	42 min.	106,7 min.
Q	1.5 min.	3,8 min.
R	72 min.	182,9 min.



DISTRIBUTION OF URINALS



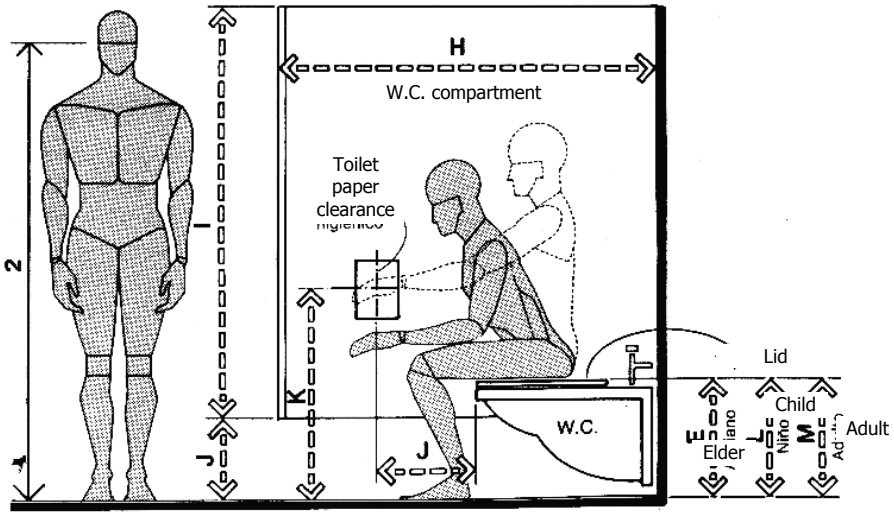
TOILET COMPARTMENT / FRONTAL TRANSFER ACCESS



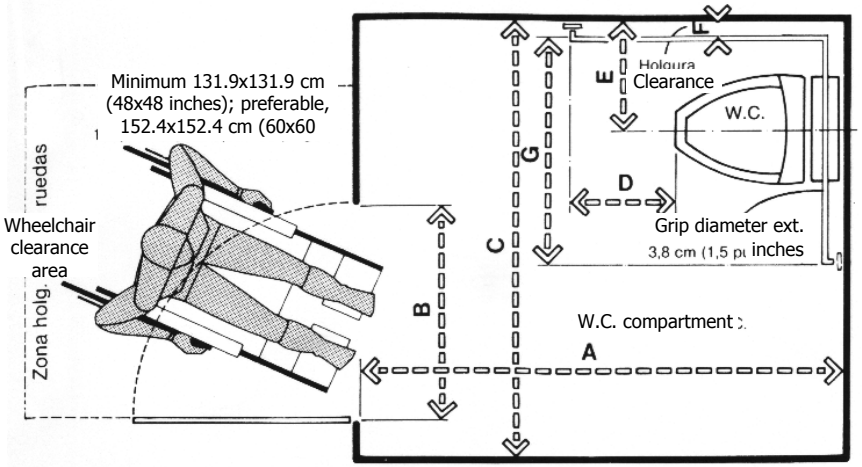
DISTRIBUTION OF URINALS / USER IN WHEELCHAIR

[29] Adapted from *Las dimensiones humanas en los espacios interiores* Spain: Editorial Gustavo Gili, S.A., 1983, page 276.

Taken from
Las dimensiones humanas en los espacios interiores Spain: Editorial Gustavo Gili, S.A., 1983, page 276



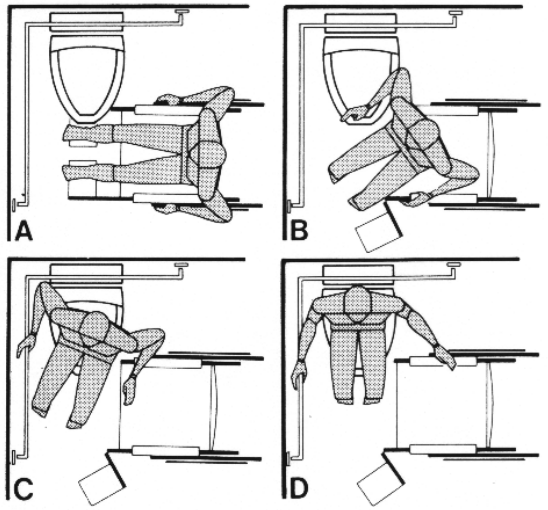
TOILET



TOILET COMPARTMENT / LATERAL TRANSFER ACCESS

For wheelchair users, a mode allowing lateral transfer is more comfortable than the one with frontal transfer shown on the previous page. This mode implies a minimum space of 167,6xl 82,9 cm (66x72 inches), with a movement that can be appreciated on the right-side graphic. Even if the technique varies with the different users, the phases are mainly those represented in the graphic. The upper right graphic shows the heights and clearances needed in a conventional toilet, specifying that the heights respond to the needs of children and elderly people.[30]

	in	cm
A	72 min.	182,9 min.
B	32	81,3
C	66 min.	167,6 min.
D	18 min.	45,7 min.
E	18	45,7
F	1.5 min.	3,8 min.
G	36	91,4
H	54 min.	137,2 min.
I	58	147,3
J	12	30,5
K	30 max.	76,2 max.
L	10	25,4
M	14-15	35,6-38,1



A The user approaches the W.C. laterally.

B He distances himself from the armrest and the footrest is moved to gain free space; in order to stand without falling, on hand rests on the W.C., seat or grip, and the other one on the chair; the transfer is carried out.

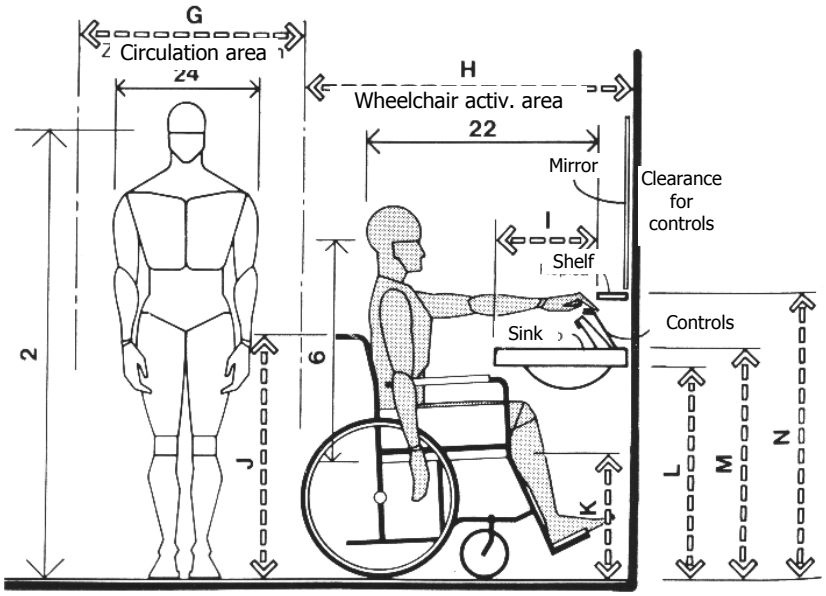
C The user rises, slides and turns until he is located over the W.C.

D The transfer concludes; the user maintains equilibrium

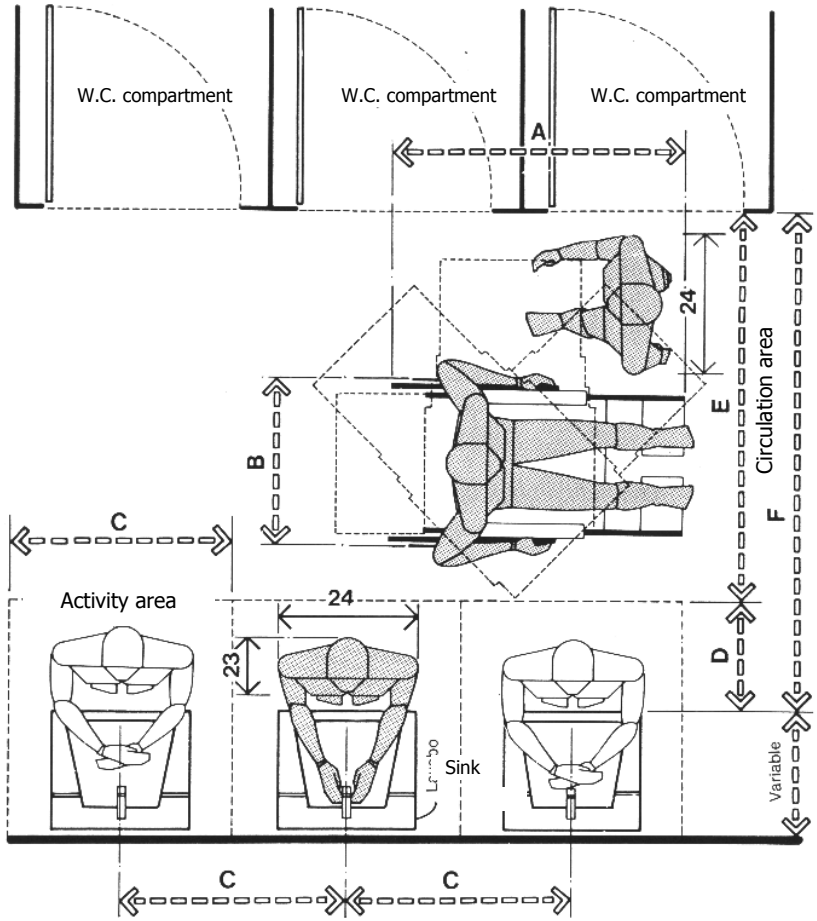
ACCESS TECHNIQUE WITH LATERAL TRANSFER

[30] Taken from *Las dimensiones humanas en los espacios interiores* Spain: Editorial Gustavo Gili, S.A., 1983, page 277.

Taken from
Las dimensiones humanas en los espacios interiores Spain: Editorial Gustavo Gili, S.A., 1983, page 277



SINK / USER IN WHEELCHAIR



SINK DISTRIBUTION

The maximum width of a dressed body is 66 cm (26 inches), but we suggest a separation of 81,3 cm (32 inches) as a minimum. In front of the group of elements, an activity area of 45,7 cm (18 inches) will be created, and also a circulation area with a minimum dimension of 137,2 cm (54 inches), apt for pedestrians and people in wheelchairs. The graphic above establishes the heights and clearances needed for the sinks to be accessible to users in wheelchairs.[31]

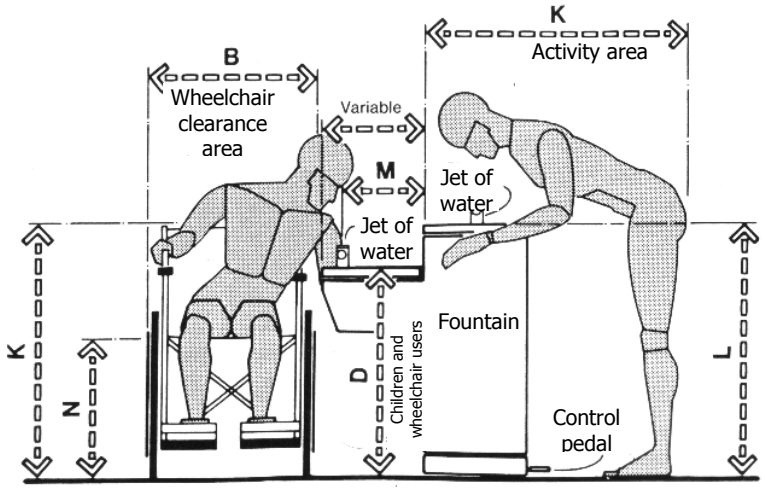
	in	cm
A	42	10627
B	25	63,5
C	32	81,3
D	18	45,7
E	54	137,2
F	72	182,9
G	30 min.	76,2 min.
H	48	121,9
I	18 max.	45,7 max.
J	36	91,4
K	19	48,3
L	30 min.	76,2 min.
M	34 max.	86,4 max.
N	40 max.	101,6 max.

[31]Adapted from *Las dimensiones humanas en los espacios interiores* Spain: Editorial Gustavo Gili, S.A., 1983, page 278.

Taken from
Las dimensiones humanas en los espacios interiores Spain: Editorial Gustavo Gili, S.A., 1983, page 278

4. WATER FOUNTAINS

The right hand graphic specifies the correct measures for a public fountain to be accessible to all people, whether they have a disability or not. This is why the height from the edge to the floor must be 76,2 cm (30 inches), although some standards increase this measure to 91,4 cm (36 inches). However, we prefer the first measure, except in extreme cases, where a maximum height of 86,4 cm (34 inches) will be applied. We recommend the use of manual operating controls, or else a combination of hand and foot controls.[32]



HEIGHT OF WATER FOUNTAIN

	in	cm
B	25	63,5
D	30	76,2
K	36	91,4
L	36 max.	91,4 max.
M	8 min.	20,3 min.
N	19	48,3

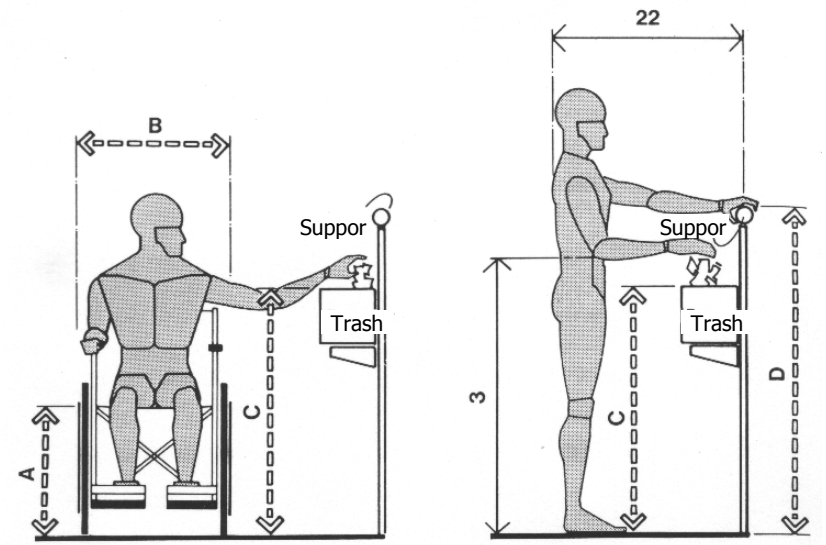
[32] Adapted from *Las dimensiones humanas en los espacios interiores* Spain: Editorial Gustavo Gili, S.A., 1983, page 281.

Taken from
Las dimensiones humanas en los espacios interiores Spain: Editorial Gustavo Gili, S.A., 1983, page 281

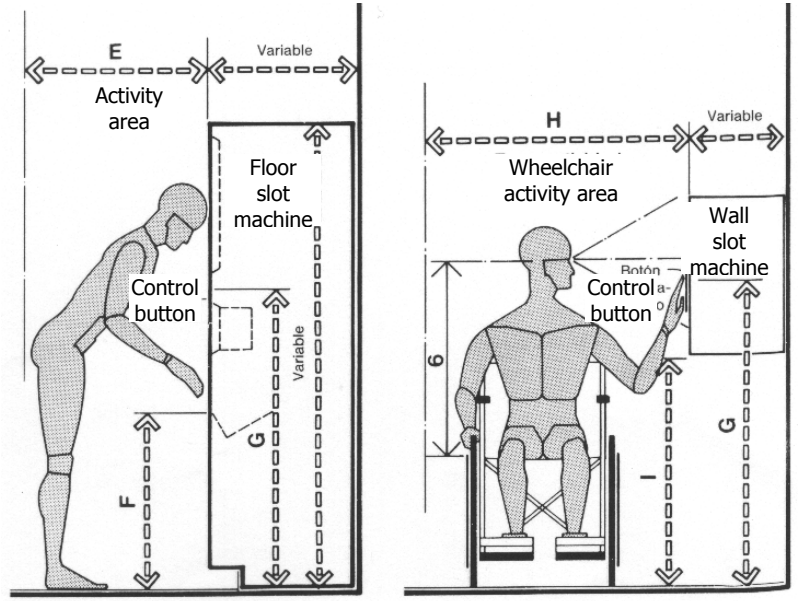
5. TRASHCANS AND SLOT MACHINES

The graphic above shows the heights recommended for the trashcans to be accessible to people with partial or total disability. This possibility of use requires the existence of a point of support.
The following graphic shows two examples of floor and wall slot machines. If the control mechanisms and the coin slots are well located, they may be used by all people. Thus, a height of between 61 and 121,9 cm (24 y 48 inches) is suggested. The user in a wheelchair requires a frontal activity area of 106,7 cm (42 inches). If these machines are operated by pulling on a control device, the required effort will be minimized.[33]

	in	cm
A	19	48,3
B	25	63,5
C	40	101,6
D	48-54	121,9-137,2
E	30	76,2
F	24 min.	61,0 min.
G	48 max.	121,9 max.
H	48	121,9
I	36 max.	91,4 max.



TRASHCANS



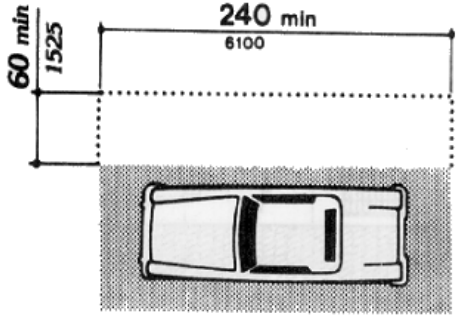
SLOT MACHINES

[33] Adapted from *Las dimensiones humanas en los espacios interiores* Spain: Editorial Gustavo Gili, S.A., 1983, page 282.

Taken from
Las dimensiones humanas en los espacios interiores Spain: Editorial Gustavo Gili, S.A., 1983, page 281

6. PARKING LOTS

Boarding area for people with disabilities in parking lots.
The boarding area must have an access area of at least 6100 mm (240 inches) measured parallel to the vehicle's entrance, by 1525 mm (60 inches) measured perpendicularly to the vehicle. This boarding area must be free of obstacles and at the same level as the vehicle area.

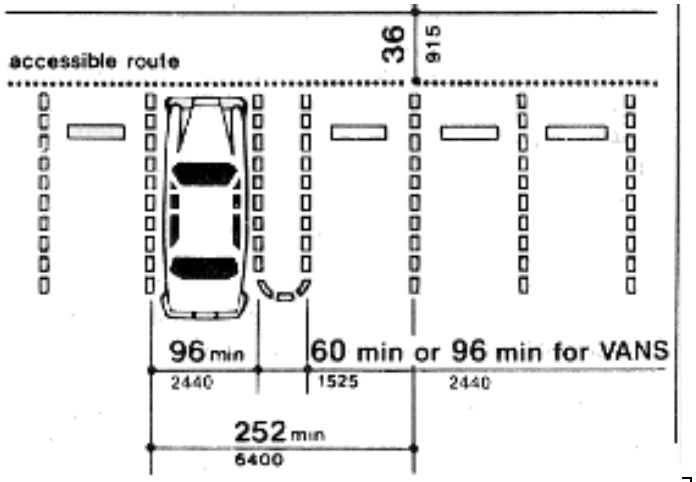


DIMENSIONS OF PARKING SPACES

1. The access must have a width of at least 1.525 m (60 inches) for cars, or at least 2.440m (96 inches) for microbuses or similar vehicles. It must also have an accessible space or route of 0.915 m (36 inches) in front of the parking lot.

2. Universal parking lot dimensions.

3. Wider boarding area for microbuses with a greater number of passengers.



1

2

3

Taken from www.access-board.gov/adaag/html/Adfig.html

For a person with reduced mobility or communication to access any touristic establishment, some accessibility criteria which firstly affect the site's parking lots must be taken into account.

The establishment may have its own parking lot, but this may not be sufficient. It must comply with certain requirements for it to be accessible:

Spaces for adapted vehicles must be adequately signaled, both on the pavement and with the corresponding vertical sign.

- They must be located on those parts of the parking lot that are closest to its exit.

- If the parking lot is roofless, the spaces must be covered by a light structure to protect them from the weather. Some people take their time boarding and leaving the vehicle.

- Each space will have a dimension of 3,70 m in order to facilitate loading and unloading a wheelchair. Three standard-width spaces may become two accessible spaces, or two 2,40 m spaces may share the passage area so that they have adequate dimensions for maneuvering a wheelchair.

- Curbs and stairs must be avoided, so that the person an reach the sidewalk or elevator.

- The parking lot exits must be adequately signaled. It is hard for some people to become oriented in underground parking lots.

- Adequate lighting is also important, both in an underground parking lot and during the night in an outdoor parking lot.

- Pedestrian passages must not go behind vehicles, since some driver might fail to see a pedestrian behind him when backing up, and there might be an accident.

- Pavements with loose gravel or sand must be avoided, and they must be given maintenance during the winter. This way, people using canes or wheelchairs will have less difficulties when moving along.[34]

[34] Taken from Barón Concha "Curso de turismo accesible" Spain: Royal Office for welfare and attention for people with disabilities, 1999, page 46.

7. MAIN ENTRANCE TO BUILDINGS IN PROTECTED AREAS

It would be ideal if the entrance to buildings were at the same level as the street, although occasionally, due to multiple factors, this cannot be so. In these cases one must look for alternatives that allow any customer to enter the building. This implies combining the use of a ramp to give access to people in wheelchairs or who cannot climb stairs, and of stairs, which can be more comfortable for other people who have difficulties using a ramp.

A ramp with the adequate dimensions and slope may solve the problem of the access to a building with stairs.

Wherever the entrance is, even if it does not coincide with the main entrance used by the rest of the customers, it must be both accessible and dignified. It must have the same "category", and not cause the customer to feel that he is being treated inadequately. For example, entrance to a building through the parking-lot ramp or through the cargo area, would imply discrimination towards the person receiving the service provided.

Good will is not enough either. The well-meant alternative of carrying a customer up the stairs is not the adequate solution. Aside from the danger of falling, nobody would feel comfortable if, for example, they had to be carried in front of everyone in order to enter a movie theater.

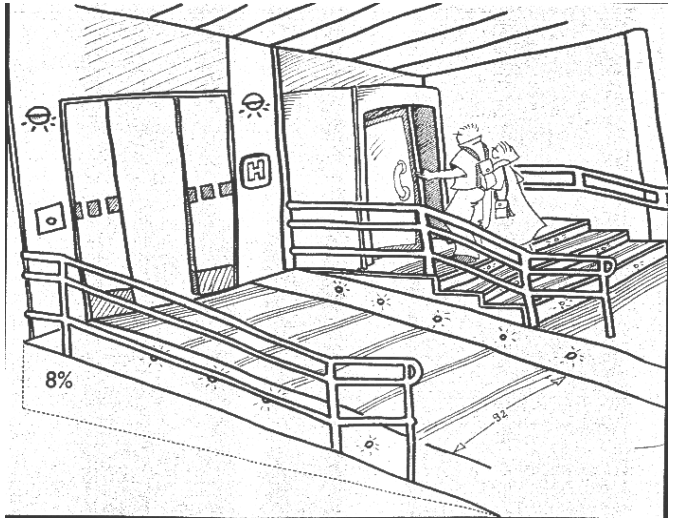
As mentioned earlier, any accessibility solution adopted must not threaten the safety or dignity of a person.

It is always important for any existing access different from the main one to be well signaled from the main entrance.

One can enter through a low ramp beside the stairs, or through an entrance at another point of the building that permits access to the ground floor. Also, one could use an elevator or an elevating platform, such as the ones described in a later chapter on technical aids.

The conditions for a ramp must have are the following:

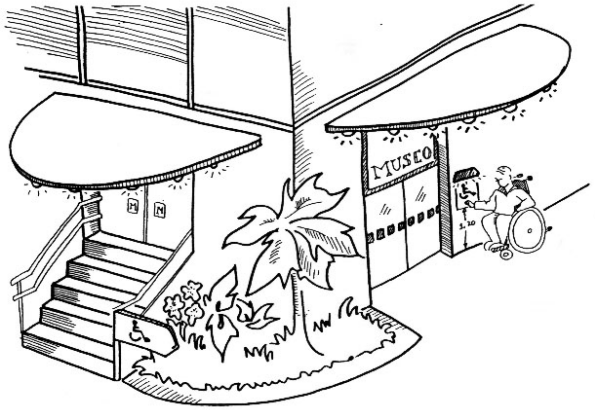
- Its slope must be less than 8% (if it is only one step, a small ramp will be enough to overcome it).
- It must have a railing, a curb on each side to avoid the diversion of wheels on a wheelchair, and landings if the ramp is long.
- The floor must be non-skid, in order to avoid slipping and falling.
- It is also necessary to give good maintenance to the pavement, the railings, etc., in order to avoid possible falls, sprains or slips.



In case it is impossible to build a ramp, and no other modifications can be made, a buzzer must be placed at the right height, so that a person can request help from his or her wheelchair.

Access through the stairs must fulfill the following requirements:

- It must have a safe railing (the circular ones are better, since they can be gripped easily), which must have continuity along the landing.
- A length of pavement with a different texture must be placed right before reaching the stairs, so that people with visual impairments can detect this obstacle.
- If the staircase has more than ten steps, landings must be placed intermittently, and make several lengths.



As to the entrance doors to the building, the following are several possibilities:

Revolving doors: The traditional ones are uncomfortable because they might cause somebody who does not feel too safe to trip, especially if he or she is loaded with suitcases, and usually a person in a wheelchair does not fit through them. However, there are accessible revolving doors already in the market, which stop if the customer stops and which have enough space for a wheelchair between the blades. It is an interesting solution for establishments such as hotels.

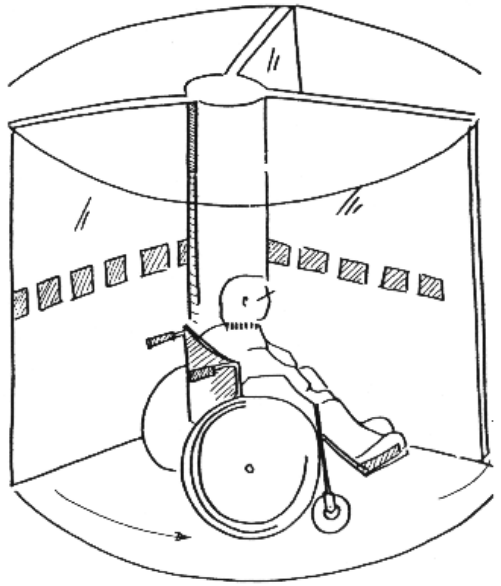
Regular doors that open outwards or inwards: If the door is located at the end of a ramp and it opens outwards, enough space for a person in a wheelchair to easily operate it must be provided. Also, in order for them to be accessible, the doors must fulfill a number of requirements listed below:

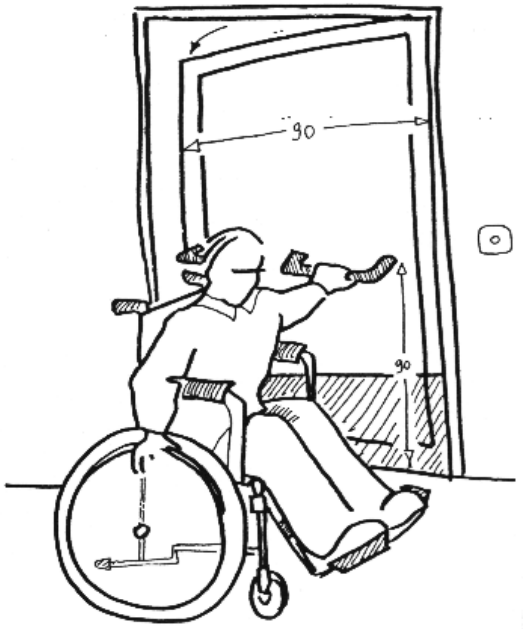
- They must not be very heavy, since it would take great physical strength to open them.
- Handles must be placed some 90 cm above the floor, and they must be easy to grip for people that have difficulties with their hands.
- They must be 90 or 80 cm wide, if hinges are placed at an angle and the necessary space is saved.
- In order to open them, go through, close them, and continue advancing, a free space of 150 cm in diameter is required at both sides of the door.
- The lower part must be protected, so that people in wheelchairs can gain support on the footrest when pushing the door to pass through.

If it is a glass door, it must be signaled by means of a sticker or colored stripe, in order to prevent people with visual impairment, or merely unwatchful people, from hitting themselves. If the door has an interior rail to prevent water from entering, it will be an insurmountable obstacle for a person in a wheelchair since, when they try to bring the back wheels over it, they have a great chance of falling. In order to prevent this, it will be enough to place a provisional or fixed metallic plate that performs the same function as a small ramp.

Automatic doors: They may be the ideal solution for any person with reduced mobility, but care must be taken that their opening rhythm is adequate, not too fast nor too slow, in order to avoid accidents. If it is necessary to push a button to operate them, it must be placed at an adequate height, so that a person in a wheelchair or a short individual can reach it.

Once the establishment has been entered, and in order to prevent a person with visual impairment who does not know the place from becoming disoriented, it would be good to place directing strips with different textures and colors on the floor, showing the way and allowing people to distinguish when they go from one place to another. It is also convenient that the floor not be too polished or wet, in order to avoid slipping, and that the signaling of the different services, departments, etc., be clear and correct.[35]





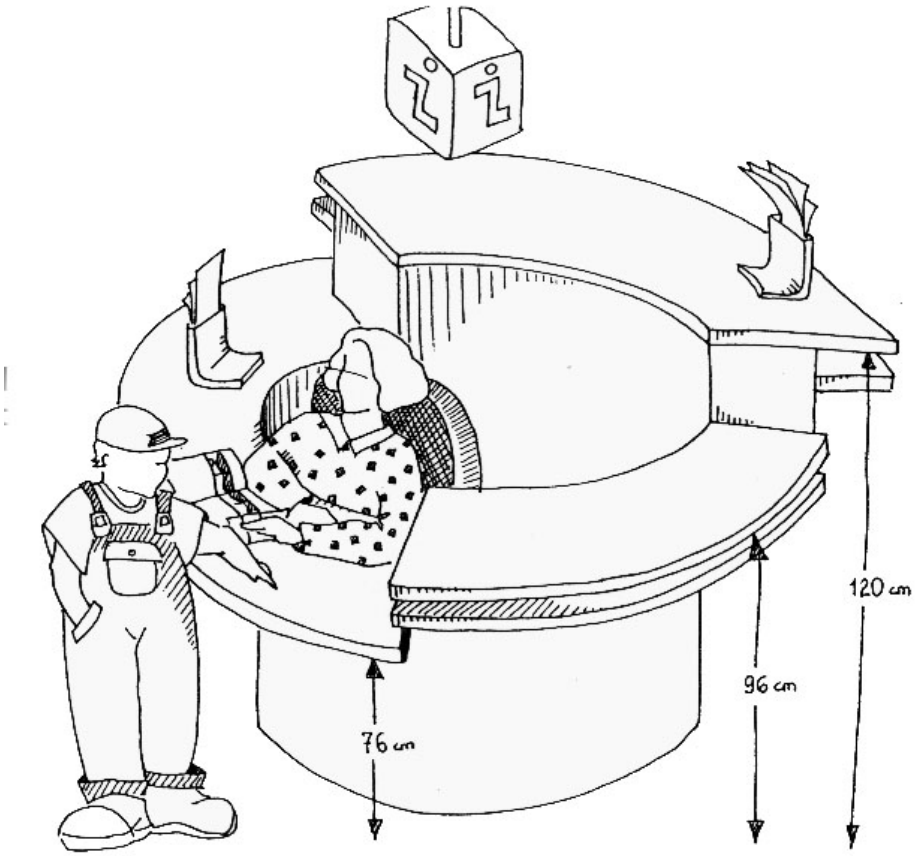
[35] Taken from Barón Concha, "Curso de turismo accesible" Spain: Royal Office for Prevention and Welfare for People with Disabilities, 1999, page 47.

8. RECEPTION DESKS, COUNTERS AND TICKET OFFICES

The space and furniture dedicated to attending clients –such as the counter in a tourist information center, the office of a travel agency, the box offices in a train station, or a hotel reception desk– must respond to certain specific characteristics so that they can be accessible for everyone.

Counters or box offices must have the following characteristics in order to guarantee accessibility:

- The customer attention area must be clearly signaled so that any person can easily locate it.
- A counter cannot have one only height; it must combine at least two possibilities: first, a higher section with a height of 1,20 m in order to attend customers while standing up; second, a lower part with a height of 76 cm and free space under the counter, in order to attend children, short people or wheelchair users while sitting down.
- Counters or box offices must be firm and stable, so that a person walking on crutches can gain support on them and have the equilibrium need in order to free his or her hands and fill out a hotel slip, pay a bill, grab a flight schedule, etc.

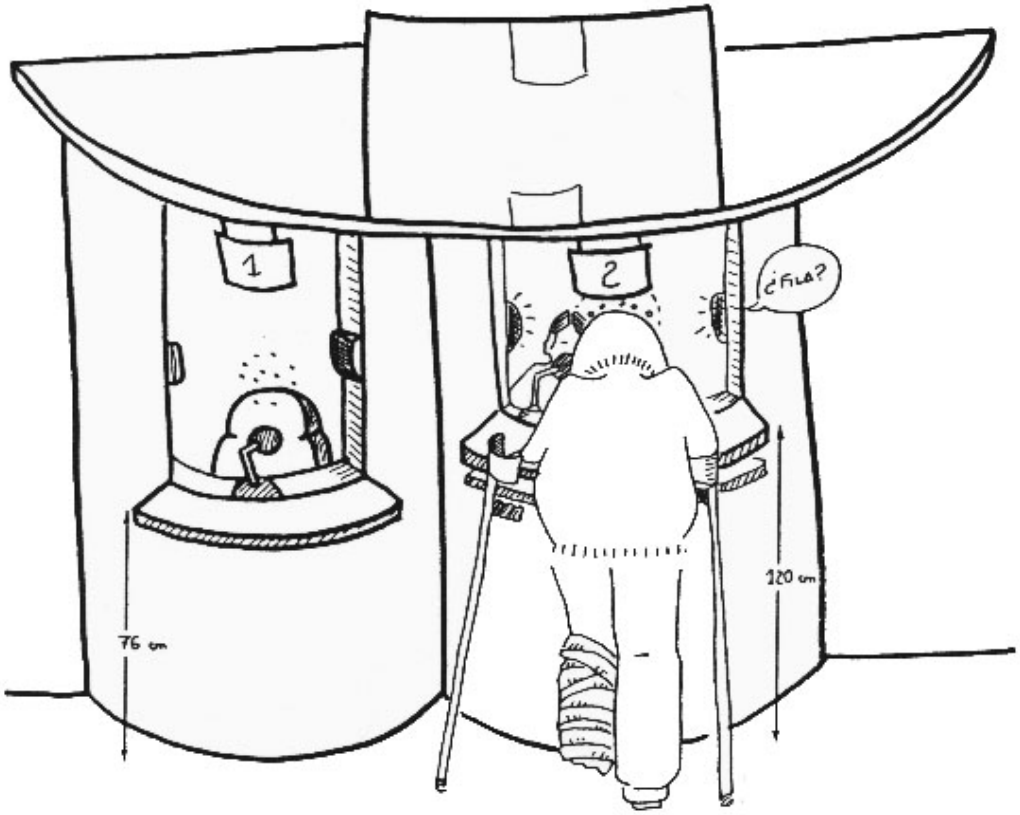


Taken from Barón Concha, *Curso de turismo accesible*. Spain:
Royal office for welfare and attention to people with disabilities, 1999, page 51.

- Counters can incorporate a shelf to place an elderly person's cane, a purse, or any other object that hinders the use of customers' hands.
- Ticket windows frequently have a crystal separating the person who attends from the customer, and thus an amplification system must be provided so as to facilitate communication in case customers with hearing disabilities arrive.
- The information placed on counters or provided in a ticket window must have letters big enough to be read by people with visual impairment.
- Posters or shelves with information available to the users must be located at a height that allows any person to see what is on them and take whatever he or she needs. People that present the most difficulties for reaching objects must be taken into account, that is people in wheelchairs and short people.

There must be a counter with several heights in order to comfortably attend to any customer.

Windows or box offices must also combine different heights and audiovisual means in order to give attention to all kinds of customers.[36]



Taken from Barón Concha, *Curso de turismo accesible*. Spain: Royal office for welfare and attention to people with disabilities, 1999, page 51.

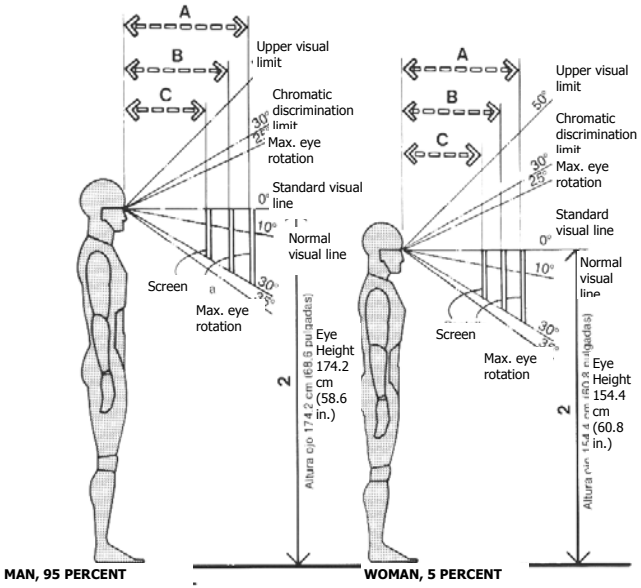
[36] Taken from Barón Concha, *Curso de turismo accesible*. Spain: Royal office for welfare and attention to people with disabilities, 1999, page 50.

9. AUDIOVISUAL SPACES

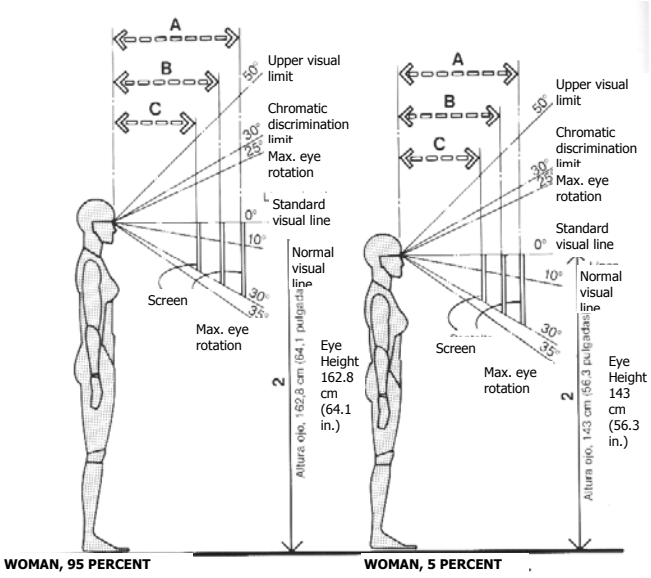
As a rule, a visual communication component presents the organization of a computer. Regardless of the kind of screen, the main item is the distance separating it from the eye, and the angle they form. Modules, aside from accommodating different body sizes, will also serve for performing activities while sitting or standing. Some basic visual concepts and anthropometric factors are analyzed in graphics in this page and the next.

DISTANCE BETWEEN THE SCREEN AND THE EYE

Through an adaptation process, the human eye focuses on the screen according to the distance at which it is located. Many studies establish a minimum separation of between 33 and 40,6 cm (13 and 16 inches), an optimum one between 45,7 and 55,9 cm (18 and 22 inches), and a maximum one between 71,7 and 73,7 cm (28 and 29 inches). The former measures are mere approximations, and they vary according to the dimensions and brightness of the screen. On the other hand, as age advances, the eye's nearest focus point moves further away; for example, at age 6 this point is located at less than 10,2 cm (4 inches), while at age 40 this distance has doubled. On the other hand, the distance of the furthest focus point barely experiences any modifications. Thus, the maximum oscillation of 71,7 to 73,7 cm (28 to 29 inches) depends mainly on the size of characters and the stretching limitations of the module or the controls. The usual reading distance for printed material is approximately 45,8 cm (18 inches).



STANDING OBSERVER, MAN / VISUAL COMMUNICATION MODULE



STANDING OBSERVER, WOMAN / VISUAL COMMUNICATION MODULE

	inches	cm
A	28–29	71,1–73,7
B	18–22	45,7–55,9
C	13–16	33,0–40,6

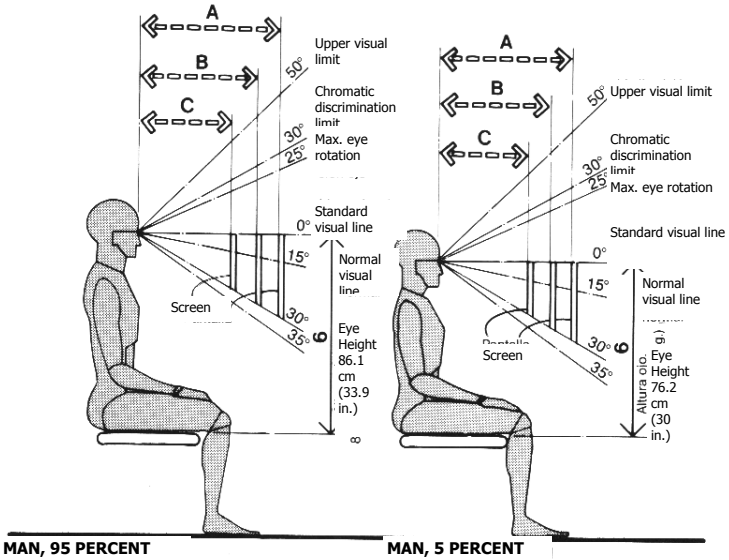
Taken from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 290

VISUAL ANGLE

In order to enjoy perfect vision, the visual line from the eye to the lower part of the screen must forma an angle with the mean horizontal visual line. In those cases where the observer is in a seated position and the period of work is long, it is inevitable for the person to adopt a more relaxed position where his or her head can rotate slightly downwards some degrees, which is why the 30° indicated must be increased to 33°.

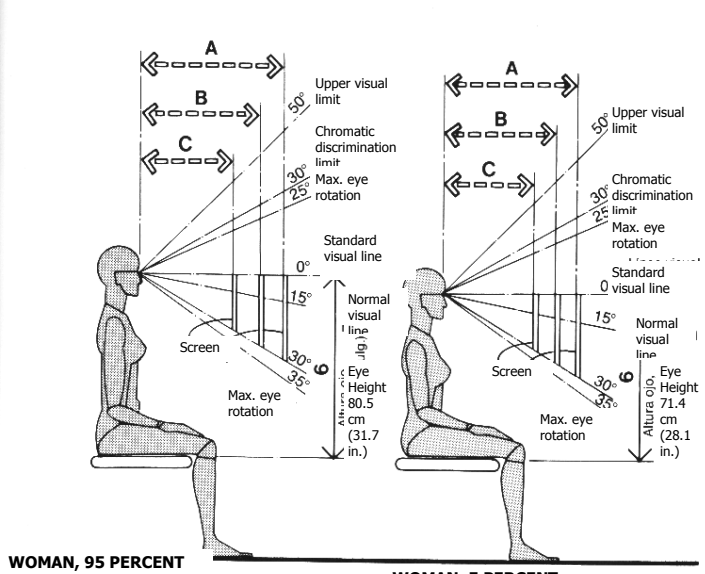
SCREEN HEIGHT

Theoretically, the height of the upper part of the screen must be placed in relation to the height of the observer's eye. The variation of this measure and, occasionally, the size of some screens will hinder its application. One solution for placing the screen within the reach and field of vision of a small observer might be to increase the height of the eye through and adjustable elevation platform. However, safety measures would have to be incorporated in order to avoid any accidents. This movable platform could be used even by taller people. Another more costly solution would be to create a screen with adaptable height. The problem is simplified when involving modules in which the observer is in a seated position, since in this position the height of people's eyes –regardless of their size– does not show such a remarkable difference as when standing up. In this last position, the difference is 30,5 cm (12 inches), while when seating, it is merely 15,2 cm (6 inches). Thus, in this case, the problem would be solved by a seat with adjustable height.



MAN, 95 PERCENT — MAN, 5 PERCENT

SITTING OBSERVER, MAN / VISUAL COMMUNICATION MODULE



WOMAN, 95 PERCENT — WOMAN, 5 PERCENT

SITTING OBSERVER, WOMAN / VISUAL COMMUNICATION MODULE

	inches	cm
A	28–29	71,1–73,7
B	18–22	45,7–55,9
C	13–16	33,0–40,6

Taken from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 291

SCREEN ANGLE

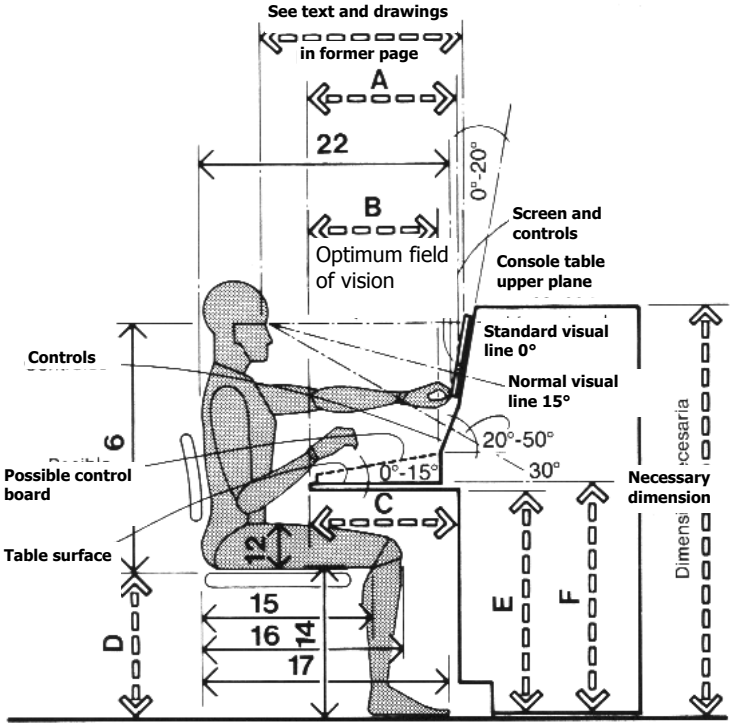
Whenever possible, the screen must be positioned perpendicularly to the mean visual line.

Controls

The command controls will be located within reach of the small observer, so that the body movements needed to use them do not hinder vision.

The upper drawing contains some directions for establishing the preliminary design hypotheses of the table with screen for visual communication modules. Certain basic factors must be confirmed. The use of an adjustable chair allows also to adjust the height of the eye according to the observer's anthropometric characteristics. A regulation range of 38,1 to 45,7 cm (15 to 18 inches) will adjust the eye height of 90% of the observers. However, this adjustment will be absolutely useless if the distance between the inferior surface of the table and the floor is not sufficient to lodge knees and thighs, once the seat is in the correct position. Most observers will be provided for if the distance is 67,3 cm (26,5 inches).

The optimum conditions for vision are created if the upper part of the screen is aligned to the mean visual line. When there is no other solution, it may be placed below the line, trusting the rotation of eyes and head, that is, the increase of the area explored with these movements. The greater the perpendicularity between screen and visual line, the more comfortable vision becomes. Thus, the first is inclined at 150 below the last.[37]



DESIGN DIRECTIONS / VISUAL COMMUNICATION MODULE

Adaptation from *Human Engineering Guide to Equipment Design*, p. 393

	inches	cm
A	16–18	40,6–45,7
B	16 min.	40,6 min.
C	18 min.	45,7 min.
D	15–18 adjust.	38,1–45,7
E	26.5 min.	67,3 min.
F	30	76,2

Taken from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 292

[37] Adapted from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 290

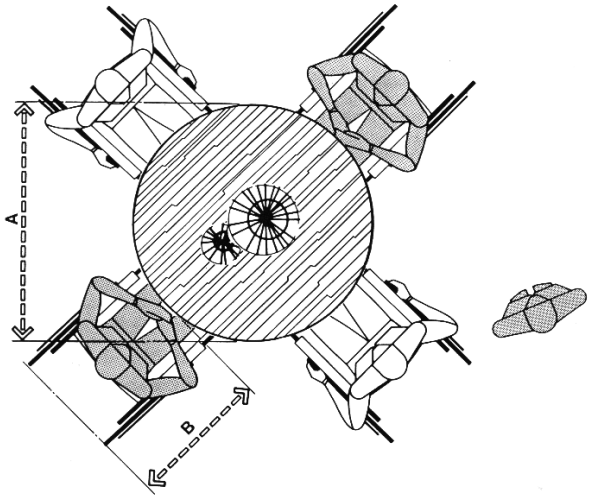
10. RESTAURANTS

Bars in salons and cafeterias must have at least two heights: one between 1,07 and 1, 14 m, and another one between 76 and 86 cm. The stools for the highest part will also have a height between 76 and 86 cm, while the ones in the lower part will be at the height of a normal chair. It is better to use stools that can be moved, and which have at least two widths, thus taking into account obese people.

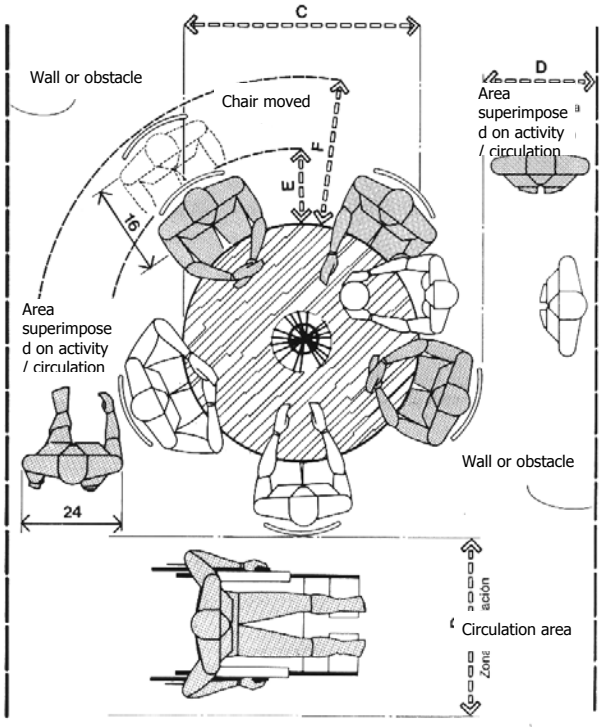
The tables must not have any obstacles at less than 68 cm from the ground. The legs must be placed on the corners, so that the legs of a person in a wheelchair may fit. Round tables with one single central leg may also be used. Round bar tables will have a minimum diameter of 61 cm. If they are used to serve meals, this measure must be increased to a minimum of 122 cm in diameter, although this is not recommended due to their instability. Rectangular tables will have a minimum surface of 76 cm per person.

If these are self-service restaurants or mess halls, the dimensions that require special care are the ones of the hallway through which clients circulate, the height of the surface on which the tray is placed, the inferior space left, the depth of the counters, the height of the shelves, all this in order to facilitate their use by people in wheelchairs.

Information about services offered in these facilities must also consider some basic accessibility criteria, so that any client can use them.[38]



TABLES / WHEELCHAIRS



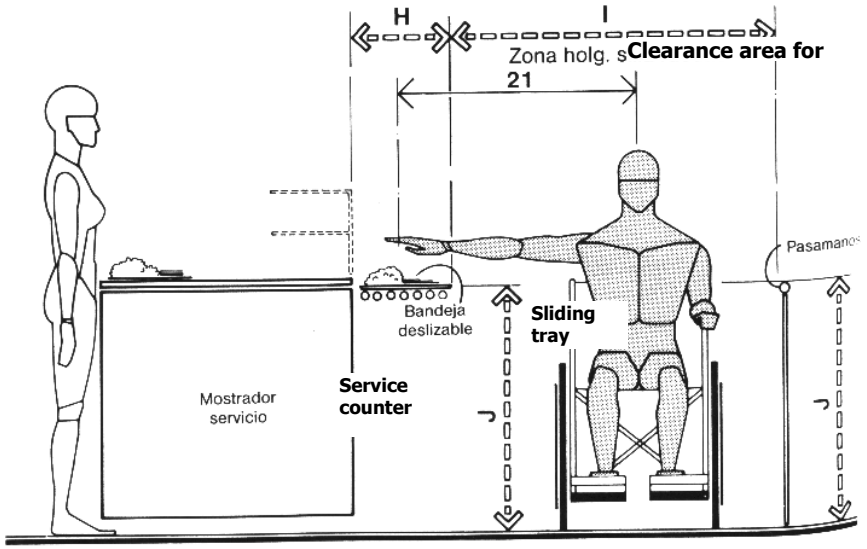
	inches	cm
A	48–54	121,9–137,2
B	24–30	61,0–76,2
C	48	121,9
D	36	91,4
E	18–24	45,7–61,0
F	30–36	76,2–91,4

Taken from
Las dimensiones humanas en los espacios interiores. Spain: Editorial Gustavo Gili, S.A., 1983, page 228

[38] Adapted from *Las dimensiones humanas en los espacios interiores.* Spain: Editorial Gustavo Gili, S.A., 1983, page 228

Environmental noise in a bar or restaurant may be controlled if its interior design takes into account sound absorption. There are simple solutions such as placing carpeting cloth piles or plants, but also room separations may create corners and comfortable places where it is easier to listen to the waiter or hold a conversation.

The former works regarding oral information. However, it is usual for bars and restaurants to have written information that they want to transmit to their clients. Thus, the price list or daily menu affixed to the wall must be located at a convenient height for people in wheelchairs or who are short. Other things to ensure are good lighting on them, that there are no obstacles that prevent people from approaching them, and that clear typography be used in contrasting colors to facilitate reading them. The menu handed out to the clients must also be easy to read. In this sense, special attention might involve offering blind customers a menu in Braille.[39]



SELF-SERVICE COUNTERS / ACCESS FOR WHEELCHAIRS

	inches	cm
A	41–43	104,1–109,2
B	30–36	76,2–91,4
C	10	25,4
D	42	106,7
E	31–32	78,7–81,3
F	12–13	30,5–33,0
G	9	22,9
H	20 max.	50,8 max.
I	34 min.	86,4 min.
J	34 max.	86,4 max.

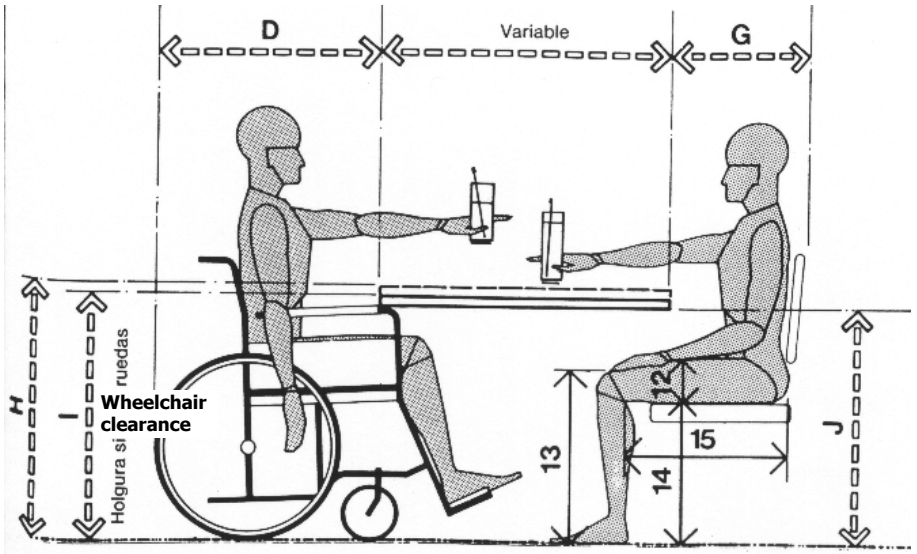
Taken from
Las dimensiones humanas en los espacios interiores. Spain: Editorial Gustavo Gili, S.A., 1983, page 222

[39] Taken from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 222

The graphic on the right examines the access of a wheelchair to a table, case ruled by the clearance from the floor to the inferior surface of the table. This space must accommodate the aforementioned elements. Unfortunately, the dimension assigned to this clearance varies according to the different sources and requirements. However, this measure is fixed between 73,5 and 76 cm (29 y 30 inches).

The American National Standards Institute (ANSI) places the armrest at 73,5 cm (29 inches) from the floor. Other current standards establish a height of 76 cm (30 inches) up to the inferior surface of the table, that is, lower than 78 cm (31 inches), which makes it impossible for short people without any disability to adapt themselves. In this case, the solution of raising the seat would cause these people's feet to remain hanging in the air without a place to rest, and it would make the existence of the footrest useless.

Since many wheelchairs have armrests at heights lower than 73,5 cm (29 inches), and others have adjustable ones, the authors recommend an adequate clearance of de 73,5 cm (29 inches) instead of 76 cm (30 inches), to serve people in wheelchairs or any other person.[40]



TABLES / WHEELCHAIR CLEARANCE

	inches	cm
A	76–88	193,0–223,5
B	66–78	167,6–198,1
C	40	101,6
D	30	76,2
E	16–17	40,6–43,2
F	29–30	73,7–76,2
G	18–24	45,7–61,0
H	31	78,7
I	30 min.	76,2 min.
J	29 min.	73,7 min.

Taken from
Las dimensiones humanas en los espacios interiores. Spain: Editorial Gustavo Gili, S.A., 1983, page 222

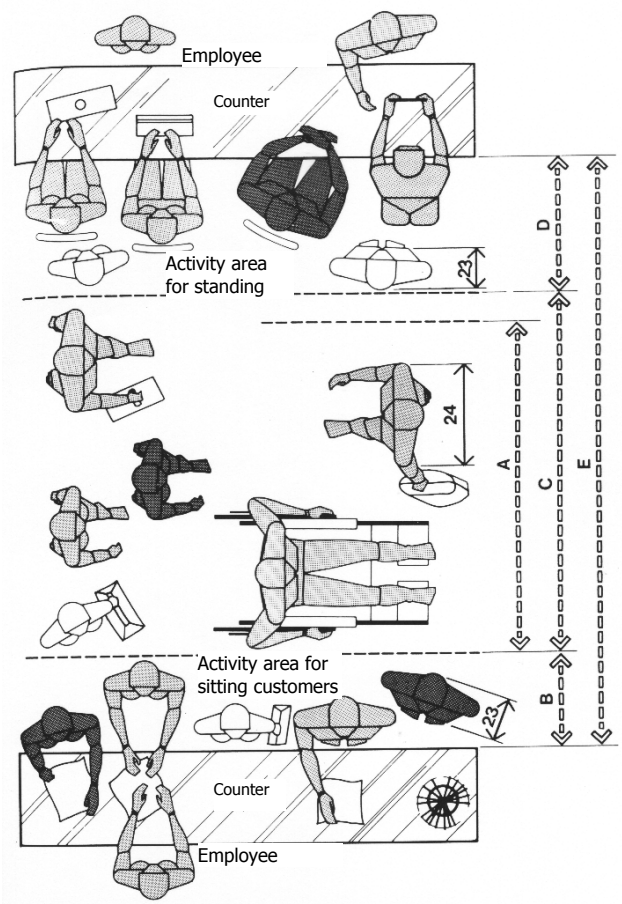
[40] Adapted from *Las dimensiones humanas en los espacios interiores.* Spain: Editorial Gustavo Gili, S.A., 1983, page 225

11. GIFT SHOP

The graphic on the right gives the necessary clearances in a secondary hallway separating two showcase counters.

The showcase located on the left has a frontal clearance that foresees the possibility of placing a person who has to kneel down in order to perform his or her tasks on the shelves. The minimum frontal clearance for the right showcase of 45,7 cm (18 inches) is fine for a person standing up and parallel to the one looking at or manipulating the articles exhibited under the showcase.

The maximum clearance between showcases can be 228,6 cm (90 inches). However, it is admissible to opt for a minimum clearance of 129,5 cm (51 inches), as long as one accepts the inevitable physical contact or having to step aside in order for a third person to pass between the two people carrying out their activities.[41]



WIDTH OF MAIN PUBLIC HALLWAYS S

	inches	cm
A	66 min.	167,6 min.
B	18	45,7
C	72	182,9
D	26–30	66,0–76,2
E	116–120	294,6–304,8
F	30–36	76,2–91,4
G	18–36	45,7–91,4
H	18 min.	45,7 min.
I	51 min.	129,5 min.
J	66–90	167,6–228,6

Taken from
Las dimensiones humanas en los espacios interiores. Spain: Editorial Gustavo Gili, S.A., 1983, page 199

[41] Adapted from *Las dimensiones humanas en los espacios interiores*. Spain: Editorial Gustavo Gili, S.A., 1983, page 199

12. PATHS

1. CLEARING THE PATH

In order to maximize the use of labor force, groups of five persons can be created in order to clear the paths. A worker can remove low, light vegetation with a machete, while another two carry the waste towards the site where it will be piled and buried. Burning of wastes must be avoided. There must also be a person with a saw cutting small trees and hanging branches that cannot be cut with the aid of a machete.

The team will be completed by a fifth person in charge of clearing any protruding tree stumps or branches, and performing one last cleaning. Several groups of five people can be used simultaneously in different sections of the path.

A problem that arises when removing vegetation is that of how to dispose of cut-off materials. All non-wooden materials such as grasses decompose rapidly, and may be scattered under the bushes.

Wooden materials will probably have to be taken away. For this, the work must be divided: some workers will clear the path while others remove vegetable waste. Wooden residues may be used for blocking shortcuts, covering naked areas, or providing a supplementary habitat for wildlife. Another recommendation would be taking that material to the part of the forest that has not been felled, so that it can be naturally recycled. If it is placed well inside the forest, it will not distract the attention from the beauty of the path.

In the cases in which vegetable remainders must be burnt, the place must be carefully chosen and the fire safely ignited. We do not recommend the burning of materials unless strictly necessary.

The fire must be kept away from fragile habitats or places with endangered species of plants and animals. Places with hanging vegetation must be avoided. Fires must not be lit on the path, since the heat and trampling might destruct the ground's structure, and the area might become prone to flooding. Light the fire on a convenient spot, so as to shorten the distance through which the materials removed must be carried.

Always have a bucket of water or sand handy. End the fire by putting out all live coals before abandoning the spot.

The use of herbicides on the path is not recommended, since they are dangerous: they damage the environment, they are hazardous for bodies of water, and their use is probably banned in the area.

This phase of the preliminary works will make the path accessible, ready to walk on and be capped (see Step 4). The capping work must begin only after completing the following steps.

2. CONSTRUCTION OF FOOTBRIDGES, BRIDGES, RAMPS, AND OTHER INFRASTRUCTURE OF THE PATH

Use the blue construction formats provided on this manual, and the following complementary information. These formats are based on real examples, but their dimensions will have to be adapted to the respective needs.

a. Footbridges

Footbridges are used to traverse difficult spots, such as muddy or swampy areas, and to protect unstable grounds. They must be properly attached to the ground.

Most footbridges have a cover or platform made of sawed boards or split logs. These must be placed transversally, with uniform spaces of 10 to 25 mm. Covering boards end at the same level as the last board, or overlapping several logs.

A smooth finish provides a more attractive appearance, but is not structurally as strong as an overlap. Constructive overlap has the additional advantage of being less susceptible to breaking during assembly, and provides a longer useful life before the edges rot and they collapse. The overlap must not be greater than 5 cm. Annular nails will reduce the possibility of the board splitting.

One of the problems with footbridges is that they can become slippery. The greater the space between the transversal boards, the faster water will be drained, but care must be taken that they are not too separated and thus hinder passage. Split logs provide more traction than planed wood. Another alternate measure to increase traction would be to nail metallic strips along the surface, or cover it with wire mesh.

Railings serve as a safety measure, or to prevent visitors from leaving the footbridges. They must always be resistant enough to support the weight of people that lean against them.

b. Bridges

Organizing the work:

1. Perform a mapping of the site.

2. Choose the most convenient kind of bridge (see the blue construction formats number 3 and 4).

3. Build a base or footing and secure it against erosion. Give enough time for the concrete to set.

4. Place a waterproofing membrane on the base or footing.

5. Place the main piles, place wedges, and secure the struts or beams.

6. Place waterproofing fiber on the piles.

7. Attach the cover boards, except for those between the railing beams.

8. Attach the railing beams and tighten the wire ties.

9. Attach the remaining cover boards.

10. Attach the railings to the beams.

After completing all construction works, cap the path according to the indications given in step 4.

Selection and mapping of the site

Always seek:

- The place with the shortest bay
- Solid edges providing for strong foundations and which do not flood
- A site that can be adjusted to the desired route of the path, and preferably with easy access for materials

In order to perform the site mapping, you will require topography tape, wire, hand level, and three alignment poles or straight poles. You will also need a way of maintaining the line horizontal, such as a clinometer, or you can make your own level using a length of clean and flexible plastic hose. Cut a 60 cm long section, fill it partially with water and join both ends with insulating tape.

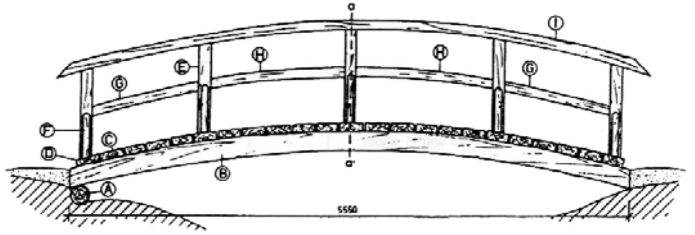
Bury an alignment pole firmly in the ground, on each side of the spot where the bridge will be placed. With the hand level, verify that the poles are straight. Then one person uses the clinometer or the leveling instrument, and places it beside the marking of the nearest pole, while the other person moves a marker beside the other pole, according to the instructions given by the first person. When an observation ring is used instead of a level, make sure that the water level in the measuring tool is level with both markings. Mark the level and then measure the same distance downwards (x) on both poles, and pull the tape or the line traced between them.

Replace both alignment poles on the edge with marking poles, so that you can find the exact line.

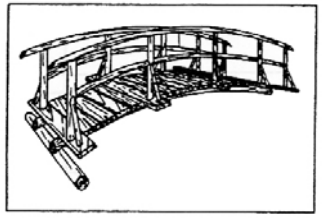
Make a sketch or photograph the elevation of the river's banks.

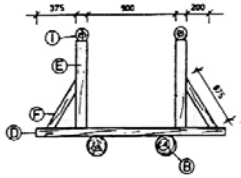
Make a sketch that shows the details of the riverbed, such as the erosion spots and the obstacles on the banks. Look for evidence of flooding, such as detritus o gravel deposits from the river. Mark the height of the deposits on the marking poles.

Simple bridge

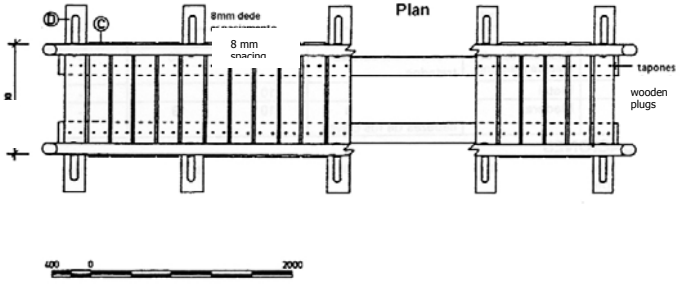


lateral view





a-a' cut



Construction of the bases
The bases keep the ends of the main piles dry, and provide anchor points for the bridge.

For shallow brooks and ditches, the piles may be carried and placed in position. The remaining piles may be slid over the one that is already placed. Alternately pull the pile from the opposite bank using a rope attached to it. In order to move heavier pieces, you may use a pulley.

Be very careful when you build a bridge, since it components are generally heavy and you may be crossing unstable areas or riverbanks prone to collapse.

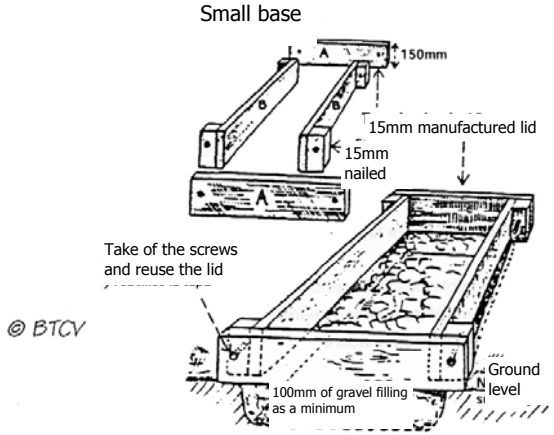


Figure 23: Bridge base: wood

Cover
The cover or platform of the bridge may be made of boards or logs cut on their upper side, in order to have a horizontal surface that is free of irregularities, and must be thick enough to resist many years of use. The space between boards or transversal logs must be approximately 2.5 cm.

Railings
A long bridge, or any bridge over a deep gap, must include a railing that is well attached to the main beam.

The following are two kinds of bases:

Wooden screens: They may be made of seasoned wood or logs. If you use logs or unseasoned wood, you must treat them with three layers of wood seasoning. Be extremely careful when using the seasoning liquid. Avoid spills and don't let the seasoning containers be washed in the creeks. The screen is filled with rocks to allow the draining of water, and at the same time providing a safe anchor for the bridge. The piles are nailed or screwed to the wood over the screen.

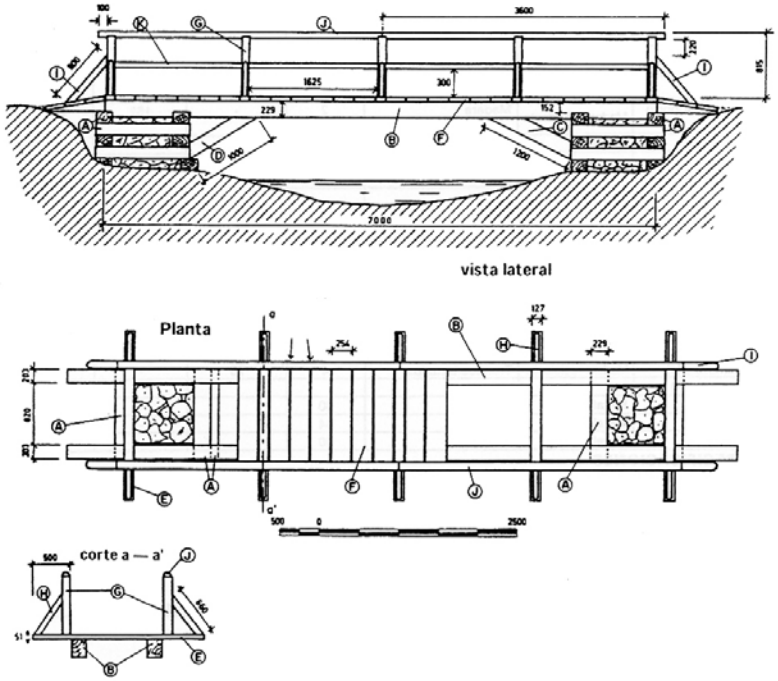
Concrete: A simple base or footing can be built by digging a ditch and filling it with a mixture of concrete in a 1:4 proportion.

Protection against erosion
In order to protect the base of the bridge against erosion, pile rocks on both sides of the base. This will reduce the effects of stagnant water and the subsequent erosion.

Selection of materials for building the bridge
Use local materials whenever possible. You may use logs without a bark. If you use at least three layers of wood seasoning, the main piles will last approximately 10 years under varying conditions.

Try to use all the wood from the trees that you had to cut to clear the path. Choose the trees that you will fell carefully, avoiding any severe impact or damage to unique specimens. Limit the felling of trees only to that which is strictly necessary, and do not remove those that may be useful for interpretation purposes.

Bridge on foundations



Always remove sumps. They look bad; they are traces of human activity and may be dangerous.

Determine the position of the main pile

Choose the width of your bridge, that is, the distance between the railings.

You may choose a width of 75 to 90 cm when a low usage rate is foreseen. This width allows one-way transit. For two-way transit you must choose bridges of 120 cm.

3. START OF THE DRAINAGE WORKS

A bad drainage is the cause for most problems in the management of paths. Drainage problems must be examined during the phase prior to construction, and one must decide when it is preferable to choose a different route for the path so as to avoid areas prone to swamping, where the use of footbridges and bigger drains would be necessary.

In mountain areas rain can be strong and fast, and the path may become flooded and prone to erosion. Trampling compacts the humid ground, thus hindering its drainage, which causes the path to become muddy when it rains again. When it is dry, the ground becomes uncomfortable to walk on. When this happens, people walking avoid muddy areas or puddles, leaving the path and trampling on the adjacent vegetation, thus spreading damage and destruction.

On slopes, bad drainage not only affects the surface of the path and its beauty, but also the ground's stability. When the vegetation on slopes is eliminated by trampling, the ground is exposed to fast erosion due to the water that runs down the path.

The following is a description of four kinds of drains that may help you solve these problems. Before selecting the kind of drainage system you will use, observe the site in order to determine how the water reaches the path, and if the flow is superficial or subterranean. You must inspect your path under different climate conditions, and mark the places where the creeks formed by the rain cross the path.

Rainwater that falls on the path must run off down a drop.

The underground flow may cause persistent pooling throughout the year. Pools generally extend along a wide area, and are thus difficult to treat. Be careful with places where water springs to the surface, and where the flow of water may be intercepted and directed out of the path, generally at the foot of a steep slope or where the country rock is exposed.

The fact that something is out of sight does not mean it can be out of your mind. Take into account where the water goes once it leaves the path. You will need to build a sump.

General indications for building a ditch:

1) On most grounds, ditches need inclined sides in order to be stable. One useful rule is that a ditch must have a base width at least equal to half the width of the upper part.

2) The ditch slope will depend on the ground surface. However, it is important to maintain the inclination of the ditch bed as level as possible, in order not to hinder the flow. The erosion of steep ditches may be reduced by building a stone or wooden ditch, but these also require periodical cleaning as sediment accumulates.

3) Keep the ditch line as straight as possible. When a smaller ditch joins a bigger one, make sure they join at an angle as close to 90° as possible, so as to avoid erosion of the junction. The base of the smaller ditch must be slightly higher than the base of the main ditch.

4) Always work upwards, beginning at the lowest point, so that the workers do not have to work in the water flow.

5) Use the material removed from the ditch in order to fill up holes or build the surface of the paths. Make calculations so that the material has to be moved as little as possible.

6) Make sure that your workers work in teams. For example, one person eliminates lumps, a second one loosens and removes the surface layer, while a third one clears the lowest part of the ditch.

Four kinds of drains are described in this section.

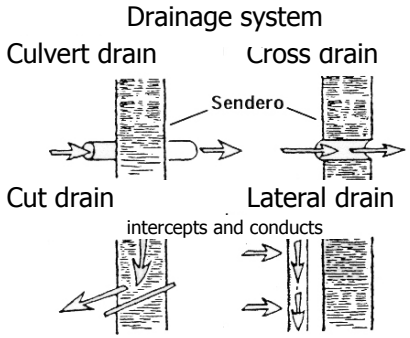


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Figure 32: Kinds of drainage

Type1: Cut drains

They are barriers or ditches on the slopes along the path. They divert the water to the sides so that it will not flow over the path.

Location: Look carefully along the edge of the path for loose pebbles or clay that may indicate in what direction the water flows during heavy rainfalls. The route taken by the water may show sings of erosion in the places where material has been removed. You will need to install a cut drain at the point where the water flows, and others at intervals of 3 a 5 m, up to the point where erosion starts.

Choose a place where there is already a small depression, rock or tree root on which a barrier can be placed. Cut drains must also be installed right above the angle on any pronounced curve. Make sure that there are no obstructions at the edge of the path that hinder the flow of water.

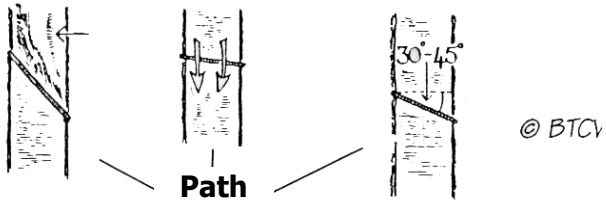

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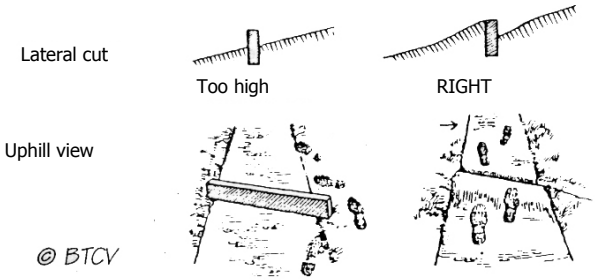
Figure 32: Cut drains

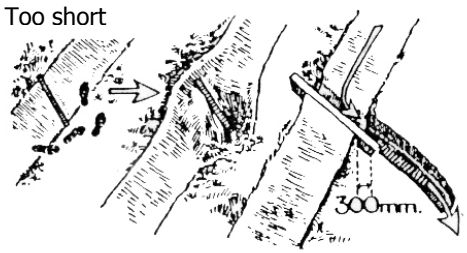
Angle: An angle of 30 to 45 degrees in relation to the direction of the path is adequate for most situations (Figure 34).



© BTCV

Figure 32: Cut drain

Height and length: If a barrier is built, it must be high enough to divert the flow of water, but not so high that people walking perceive it as an obstacle. Cut drains must extend at least 30 cm on each side of the path, in order to prevent people from going around them. The lower part must extend towards a ditch in order to make the water flow fast towards the slope. The ditch must



Bird's-eye view

Figure 35: Cut drain

be approximately 30 cm deep, and at least 90 cm wide, and its sides must be as inclined as possible (Figure 35).

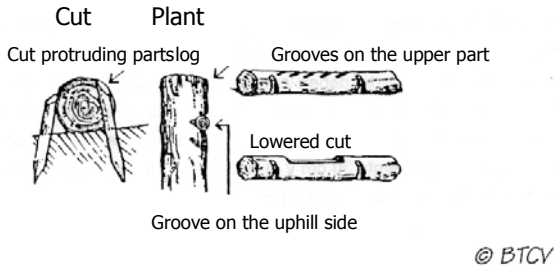
Construction: Cut and prepare your materials. Use logs without bark as illustrated on figure 36, and wooden stakes of approximately 7.5 cm in diameter and 45 cm in length.

Dig a ditch at a depth equal to half the diameter of the log, and a width equal two times its diameter.

Make a groove on the log at the upper side of the slope, so that stakes can enter and the drainage function is not hindered.

Settle the log firmly in the ditch until it is well lodged, and place the stakes at an angle so that they stop the log. Cut off the parts of the stakes that cannot be buried.

Make small grooves on the upper part of the log to create a corrugated surface and avoid people from slipping.



© BTCV

Figure 36: Cut drain

Compact the floor and the stones extracted from the ditch, on the inferior side of the log. Place big stones at both ends of the log to increase resistance and prevent people from walking around it.

Type 2: Cross drains

Cross drains carry the water flow through the path, and are only adequate for handling small and intermittent water flows. Any permanent flow will probably be unmanageable for a cross drain. You must use pipes or cross it by means of a bridge.

Location: Walk along the path during the rainy season and mark the places where the water crosses or runs along the path.

Construction: Dig a ditch following the natural flow of the water along the path. The drain must be at least 20 cm wide, and as deep as the lateral stones allow. In order to protect it from erosion, big slabs or stones can be lined along it and kept in place by means of lateral stones, as shown in figure 38.

Type 3: Lateral drains

Lateral drains are built along paths with many curves, and in areas of strong rain. They intercept superficial and underground water, and direct it downhill.

The ditch must be dug as close as possible from the edge of the path. In order to avoid the sides of the path to collapse towards the ditch, place stones along the drain.

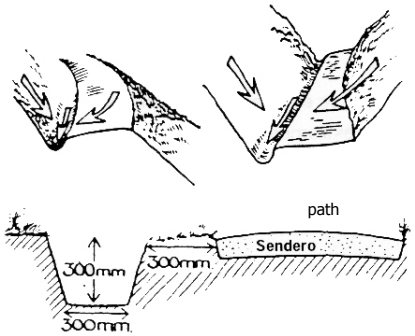


Figure 39: Lateral drains

Type 4: Culvert drains

Culvert drains take the water under the path. They must be installed when the flow of water is too great to manage it with a cross drain.

The construction of culverts is costly and requires regular maintenance. It is possible that it would be cheaper to build a simple bridge.

Construction: Dig a ditch at least 35 cm under the surface planned for the drain. Cover the base of the ditch with a 1 to 1.5 cm layer of aggregate. Place the pipe, which may be concrete or metal, and build a retaining wall with stone or bricks on both ends of the path. The walls will protect the drain and stop any erosive flow in the filling around the pipe. The height of each must be equal to the diameter of the pipe plus 30 cm, to reach the level of the path's surface. The diameter required for the pipe will depend on the probable flow, but it must have a diameter of at least 22.5 cm.

The Talbot formula may help estimate the size of the pipe required for the culvert:

Area of the waterbed versus diameter of the culvert pipe

(Square feet)	Inches	(MM)
0.9	12	300
1.23	15	375
1.77	18	450
2.40	21	525
3.14	24	600
4.91	30	750
7.07	36	900
9.62	42	1,050

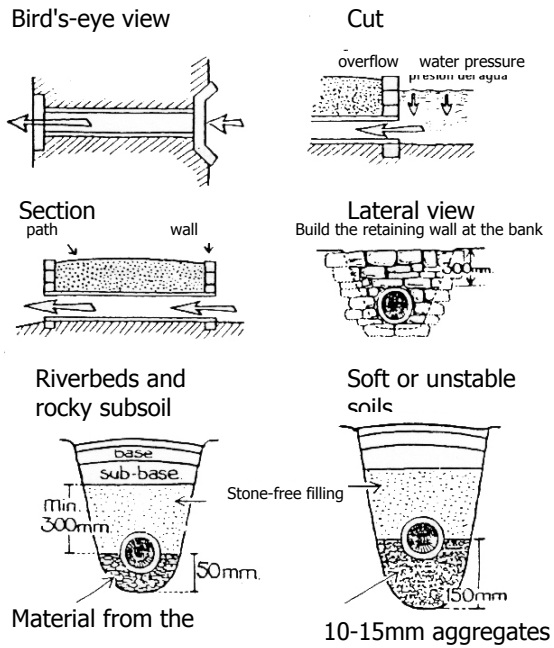


Figure 40: Culverts

Cover and surround the pipe with stones, and fill at least 30 cm above the pipe.

In order to drain small areas, use PVC pipes of 10 cm. Cover it with at least 10 cm of gravel to prevent users to break it. This pipe is not expensive and is easy to install, it helps drain the path but cannot manage great flows of water.

Note: In order to maintain their effectiveness, the pipes and drains must be cleaned regularly of soil and vegetation. A clogged drain is a useless drain.

Now the path may be continued according to Step 4, using a sub-base, a base, and capping material.

Use the construction formats provided at the end of this chapter for constructing benches, tables and other infrastructure for the path.

For very long paths, it may be necessary to foresee facilities for drinking water and restrooms. You must be very careful when choosing the kind of restroom, in order to avoid runoffs and outflows that can cause contamination of the surrounding soil and, especially, bodies of water.

Traditional restrooms are the best option, if one has an adequate drainage system to manage outflows, and if all the precautions are taken to avoid contamination of creeks and springs. Latrines are another option, but they must receive an adequate maintenance and sewage treatment. Another way to provide this service is using portable restrooms. These facilities may solve the problem, if they area adequately adapted so that they do not contrast with the landscape. These units demand strict maintenance, and can turn out to be very expensive.

4. CAPPING OF THE PATH

Once the path has been cleared and the bridges, benches, footbridges and drains have been built, the path is ready to be capped. In this section, the term capping is used to refer to the process of placing a layer of material on the path.

In most cases only one layer of material is required. In humid and unstable conditions, the path must be scraped and a base layer of aggregates be applied, on which the capping material can be placed. This will improve the drain and increase the life of the path.

Make sure that the path is ready before capping it.

Walk along the path. Make sure that the footbridges and bridges have been built, and the drains and culverts placed to avoid flooding and pooling on the path. Make sure that protruding roots, stumps and fallen logs have been removed.

Location and carrying of materials towards the site

Try to use materials available in the area. Deposits of stones and eroded materials from nearby creeks are not only free, but they are also close to the work site. Using them, you will avoid the complication of transporting materials from outside. When extracting materials from local creeks, take all the precautions needed to decrease the sedimentation of the water flow, using natural barriers or other adequate measures.

Quoins and cobbles may be gathered from the riverbanks and may be transported to the site in buckets. Old buckets with holes are useful for this purpose, since they prevent workers from carrying water unnecessarily. Do not take too much material from one single place on the creek, since its course may be altered.

Gravel must for the path's sub-base, and it must have a depth of 4 cm. It is possible that you do not need a sub-base for paths on well-drained or light-use paths.

Floodable areas are a good source of fine materials. These are generally found conveniently separated since, when the river floods, it deposits the heavier materials before the lighter ones.

Materials that are relatively finer must be placed in layers on the sub-base, with the finest layer on top. If the materials are not separated, the surface will be uneven and structurally unstable.

Other capping materials such as wood chips and shell powder may be used. Wood chips are adequate for protecting paths on forests prone to become muddy with use. On layer of chips avoids soil compacting and elevates the path above poorly drained grounds.

If there are no local materials available, you will need to buy commercial aggregates. You may use construction pebbles or ballast for the sub-base. Construction pebbles are strong and drain freely.

You can also use ballast and/or mining debris for capping the path. They must be placed in graded layers, 6 cm of ballast per each 4 cm of sub-base material will be sufficient to achieve a lasting path.

Your provider must take the material as close to the site as possible, but still you will need to transport it to the site of the works. If the material is transported by hand, use carts with rubber tires and/or plastic buckets or sacks.

The path must have a central curvature to make rainwater floods flow towards the lateral drains. You may elevate the center of your path with wastes collected during construction. The path must curve towards the center from the sub-base layer, and from there upward. If it is only given curvature with the capping material, it will quickly be flattened by use.

An alternative for the curvature of the path is to incline it slightly towards the side of the drain. This will cause the water to flow towards the drainage system.

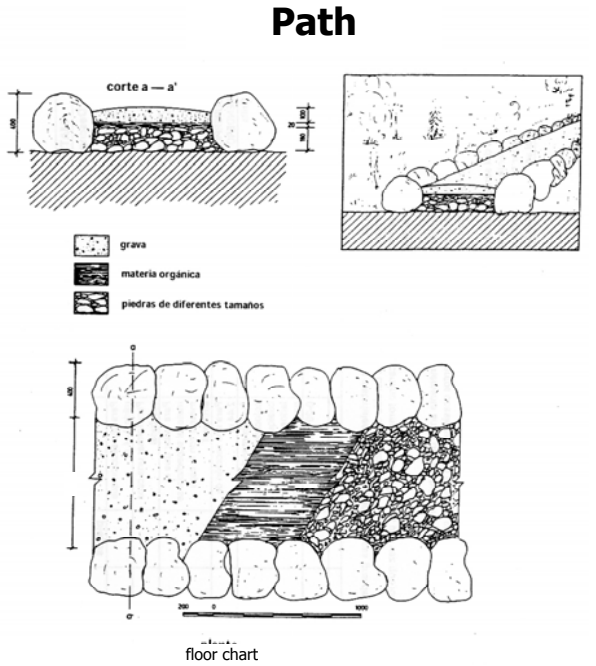
Finish of the path's edges

Decide if you will give any finish to the path's edges. The finish protects the margins of the path from erosion by runoff, and tends to keep visitors inside the path, but it may be expensive and not very pretty.

Stones are not recommended unless they can be hidden in the vegetation. Even if they are initially well covered by the base and the capping material, they tend to be exposed as the path is compacted.

Log edges look more natural and may be kept in place by stakes. They have the additional advantage of being easily removable when the path is compacted and they have served their purpose.

Most paths do not need to be capped or sealed with asphalt or concrete. These materials are expensive and don't look natural.[42]



Highlands.
Porous soils; superficial runoffs correspond to creeks. Only the path's flow is eliminated

Lowlands.
Impermeable soils; superficial runoffs are not in creeks. The flow is taken outside of the slope route

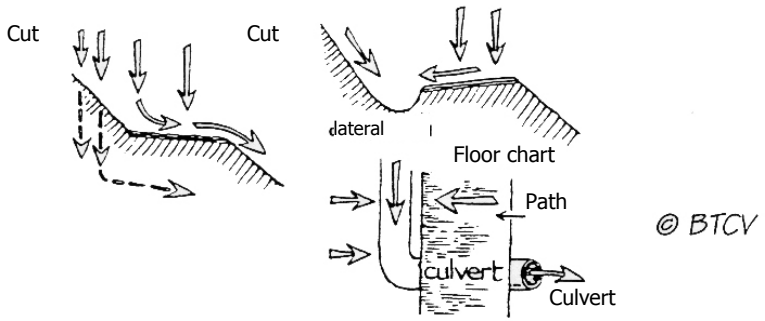
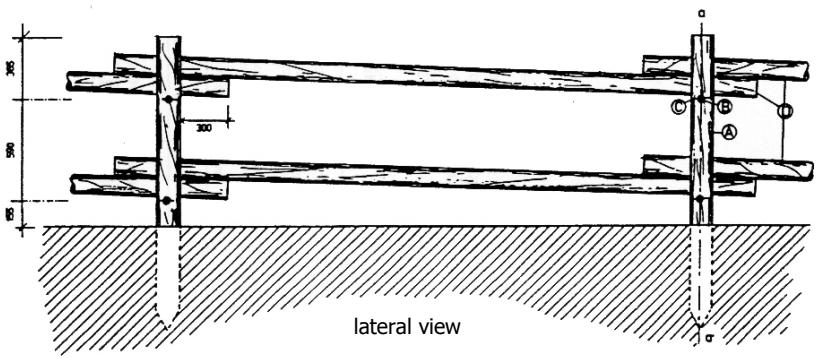
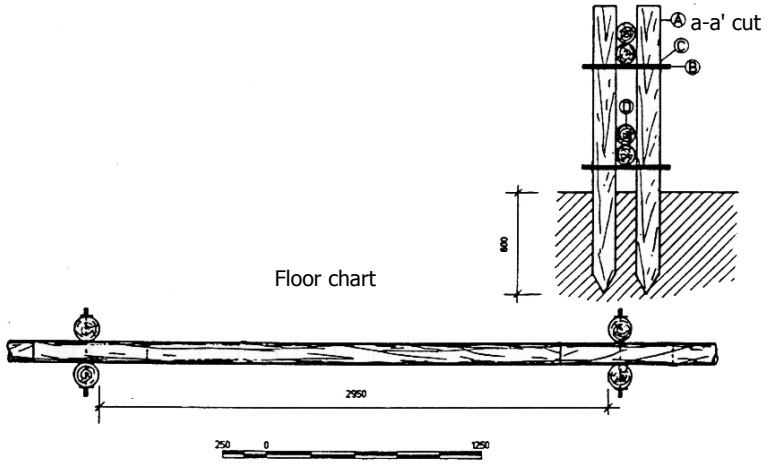


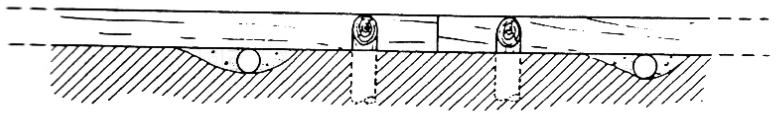
Figure 44: Giving the path its angle

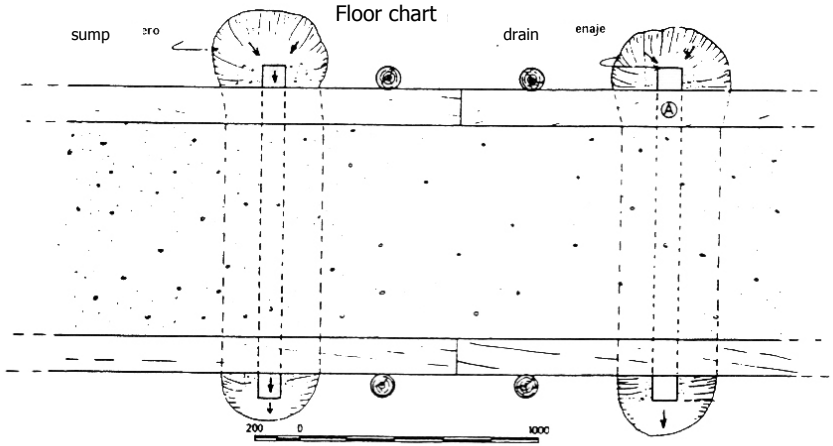
Fence with beams



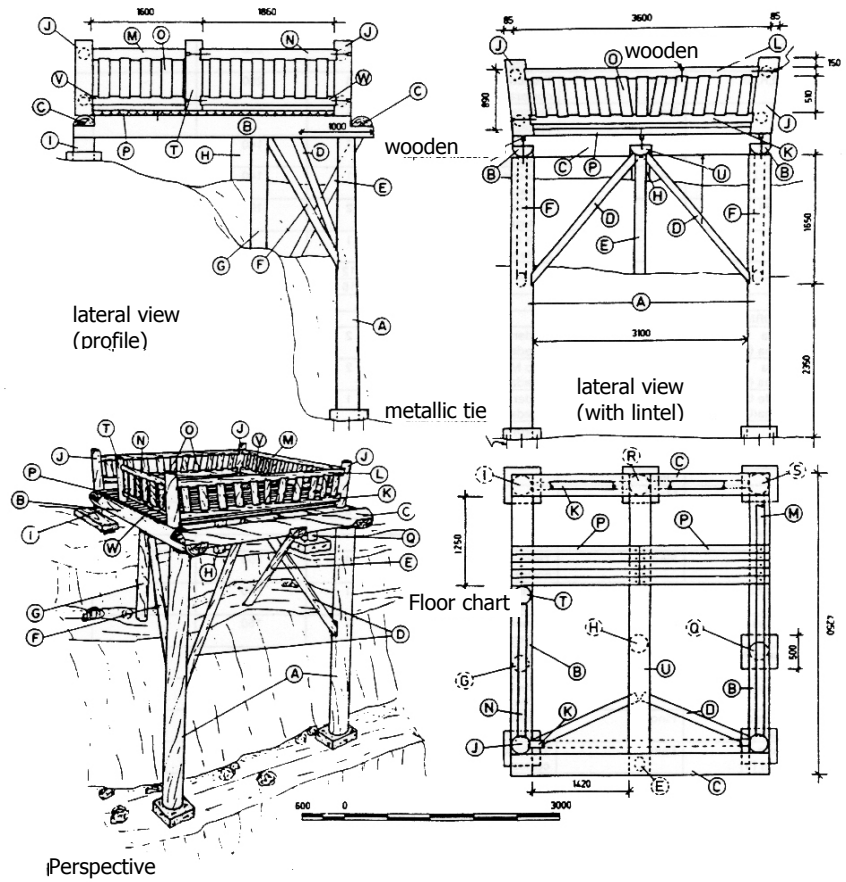


Culvert

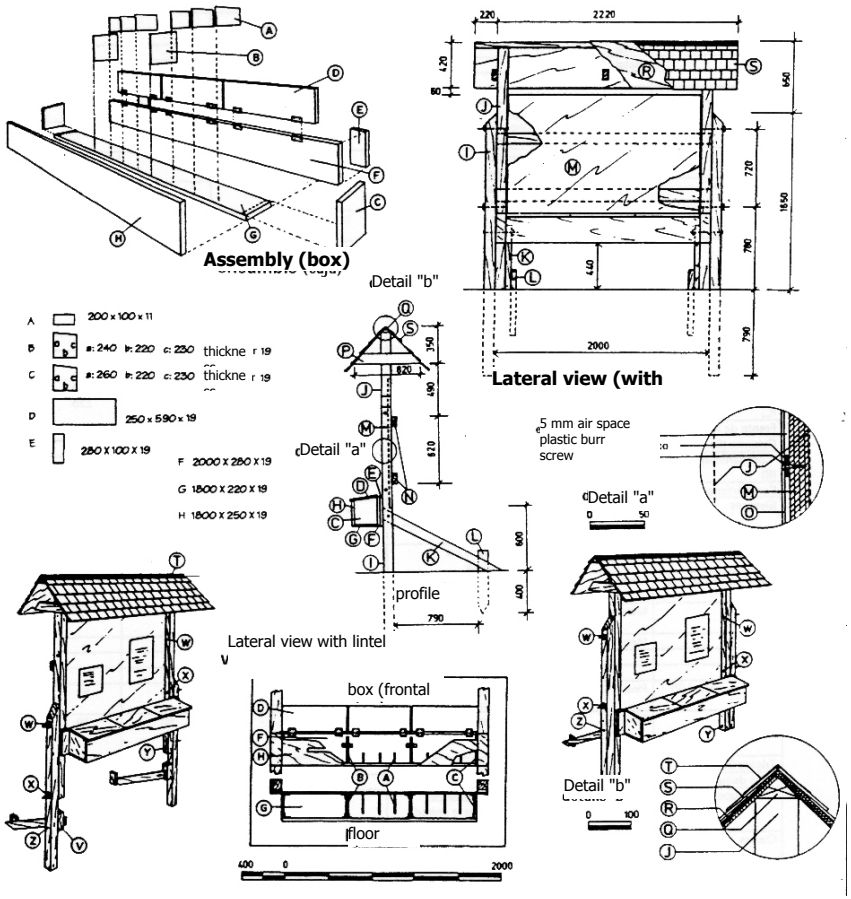




Lookout



Information screen

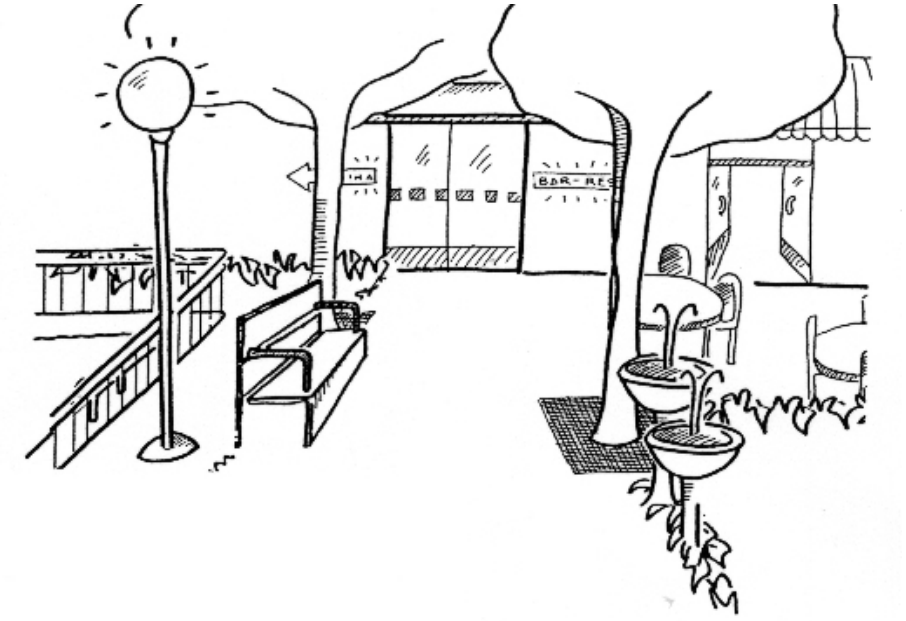


[42] Taken from Paul J. Butler, Director, *Path to money and conservation: Manual for creating low-impact paths that generate profits and foster consciousness-raising*, RARE Center for Tropical Conservation, 2000.

13. REST AND ENJOYMENT AREAS

Some establishments have open spaces, sports areas, gardens and beaches, among others. Naturally, those sites must ensure the use of their facilities by any of their visitors. Thus, the following are some ideas that may contribute to the improvement of accessibility also in these spaces:

- Define at least one accessible and well-signaled route to reach the garden, pool, terrace, etc.
- Eliminate obstacles posed by crosspieces on doors leading outside
- Delimit, in outdoor areas, a path adapted for people in wheelchairs.
- Light the place adequately.
- Place comfortable stools in order to rest or enjoy outdoor tranquility
- Place trashcans along the route
- Place fountains at an adequate height for children or customers in wheelchairs, according to climate, size of the garden, etc
- Choose aromatic plants and trees that provide shadow.
- Make sure that terrace awnings are high enough not to bump into them.
- Have a small space with children's games that are safe, ample, made of resistant materials and, above all, fun.
- Place protection on irrigation holes at the base of trees, so that they do not become a hazard for visually impaired people.
- Cover drains with gratings that have an adequate lay to avoid a stuck heel, cane, or simply tripping on them.
- Prune the trees so that they do not invade passage areas, and avoid anyone from bumping into their branches.



Taken from Barón Concha. *Curso de turismo accesible.* Spain: Royal office for welfare and attention for people with disabilities, 1999, page 65.

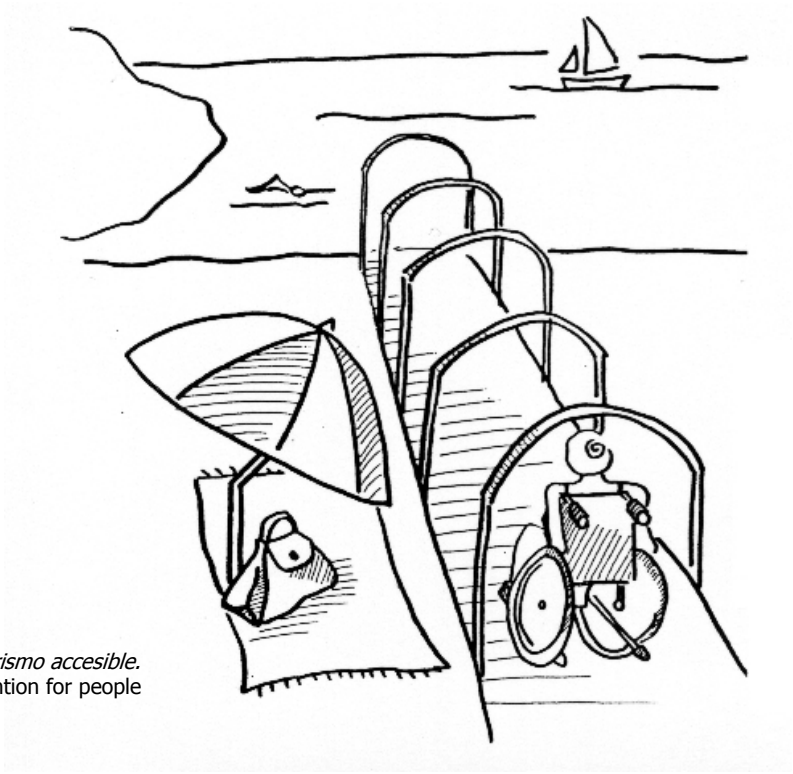
These are other particular recommendations in order to improve the use of areas with access to the beach:

Since sand presents many difficulties for circulating with canes, crutches and especially wheelchairs, wooden platforms may be installed. One must take into account that the width of these platforms must be sufficient for a wheelchair to circulate, and there must be no gaps that may cause tripping.

Umbrellas, showers, restrooms, and other services that make the customers' stay more comfortable can also be installed.

There are many details that must be taken into account depending on the kind of outdoor area involved, so that they can become safe, comfortable and cozy spaces, that is, spaces accessible to all customers.

Finally, this chapter gives some practical recommendations that may be useful in order to undertake a progressive accessibility plan in any touristic establishment. Although there are situations in which it is complicated to incorporate accessibility to an establishment or building that did not involve this characteristic from the moment of its design, there are many simple, cheap and easy solutions that contribute to improve accessibility. Others will only have to be kept in mind, and advantage be taken of reforms, repairs and replacement of broken items, in order to slowly incorporate these accessible elements or to eliminate barriers.[43]



Taken from Barón Concha. *Curso de turismo accesible.* Spain: Royal office for welfare and attention for people with disabilities, 1999, page 66.

[43] Taken from Barón Concha. *Curso de turismo accesible.* Spain: Royal office for welfare and attention for people with disabilities, 1999, page 50.

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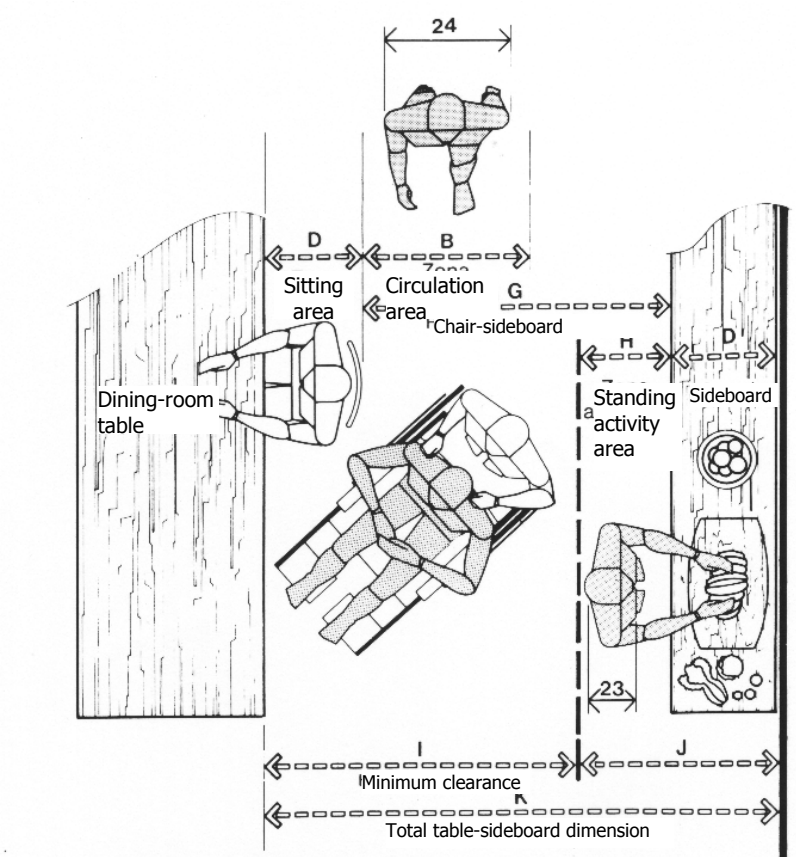

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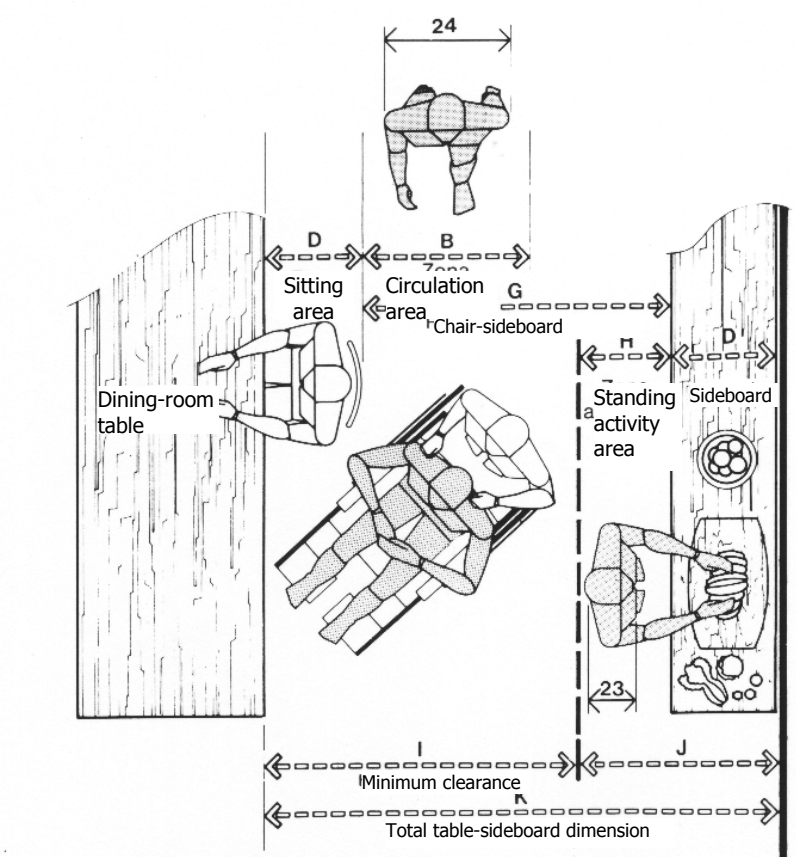

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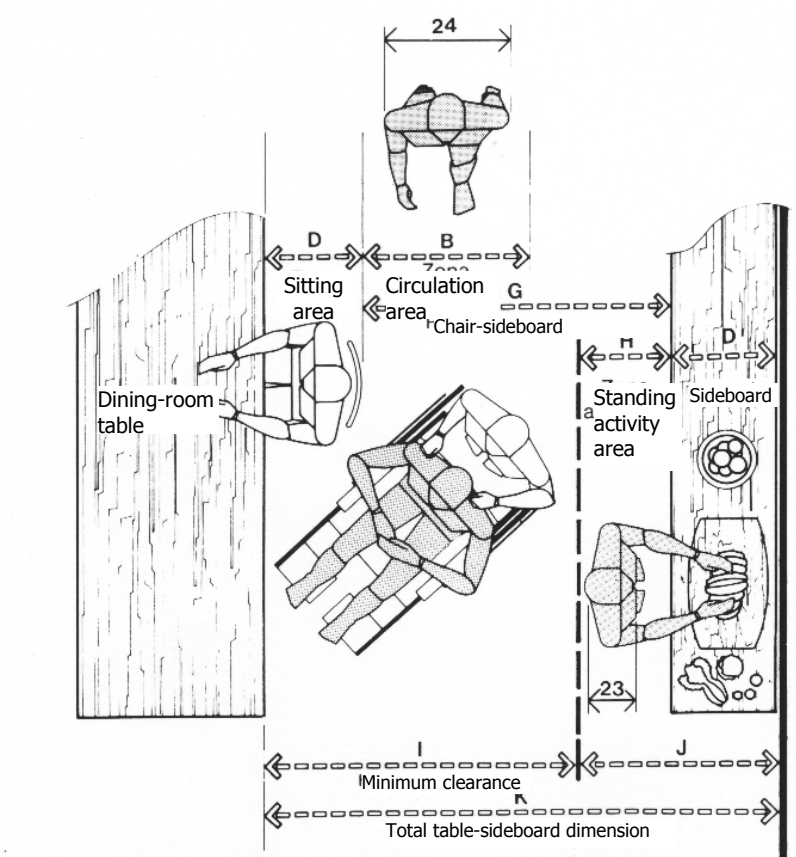

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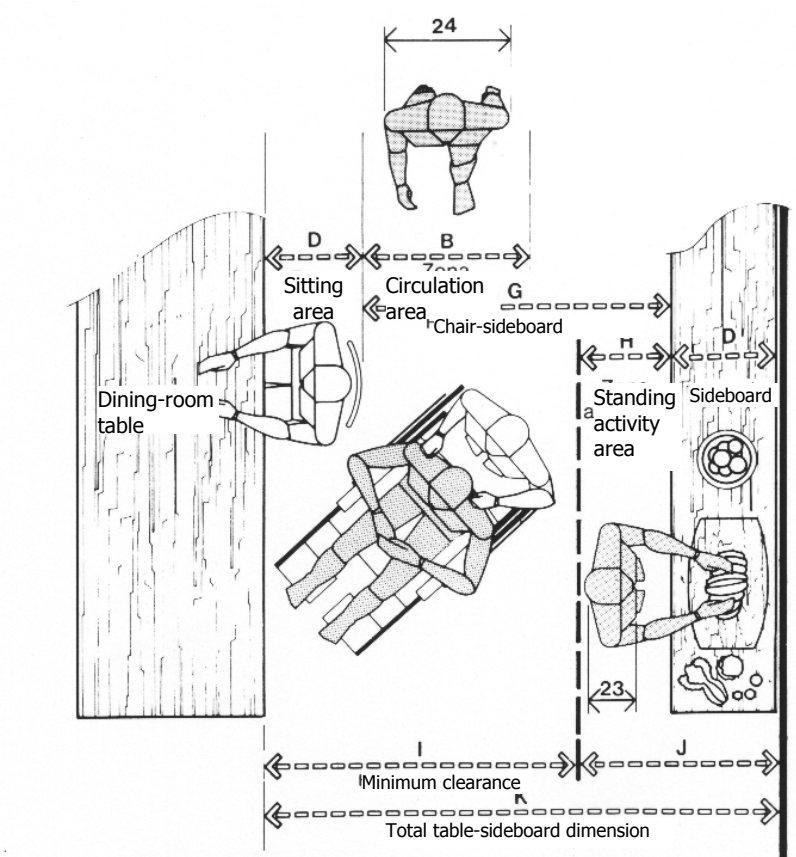

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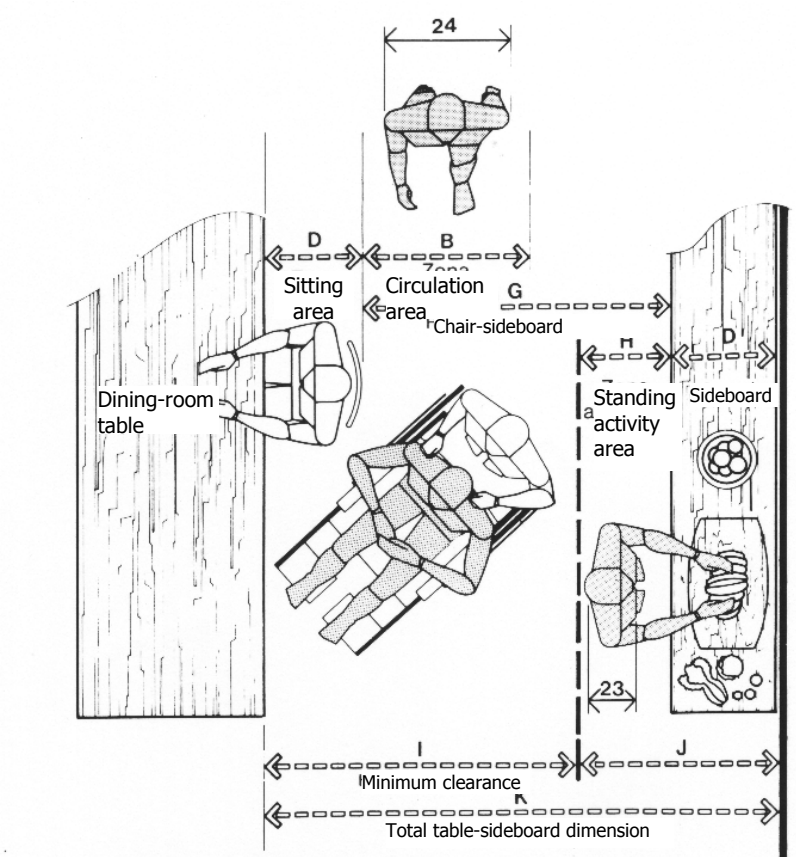

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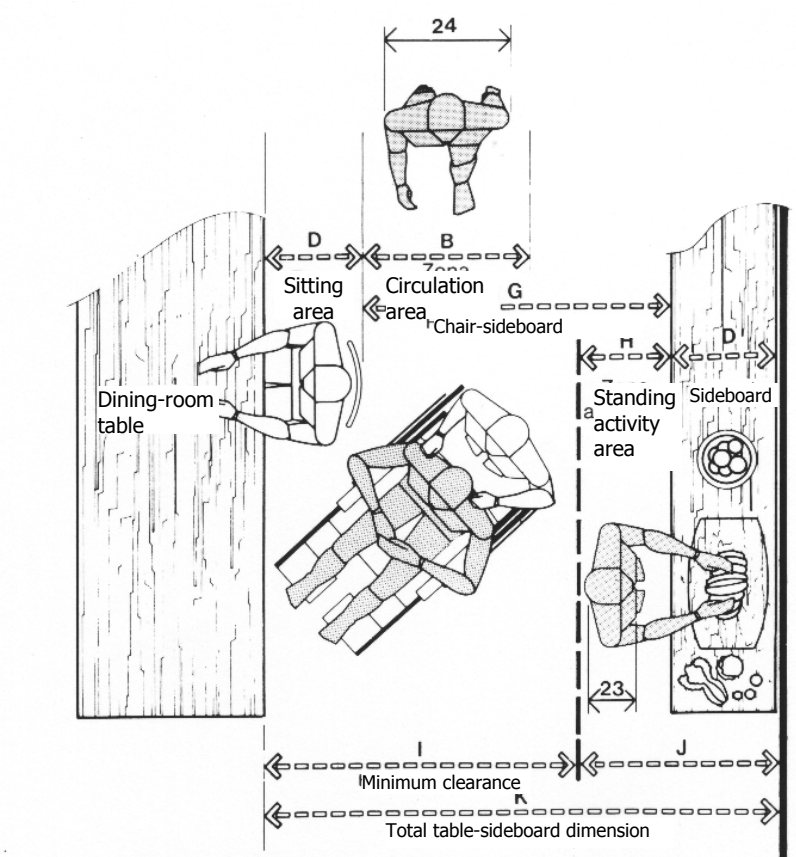

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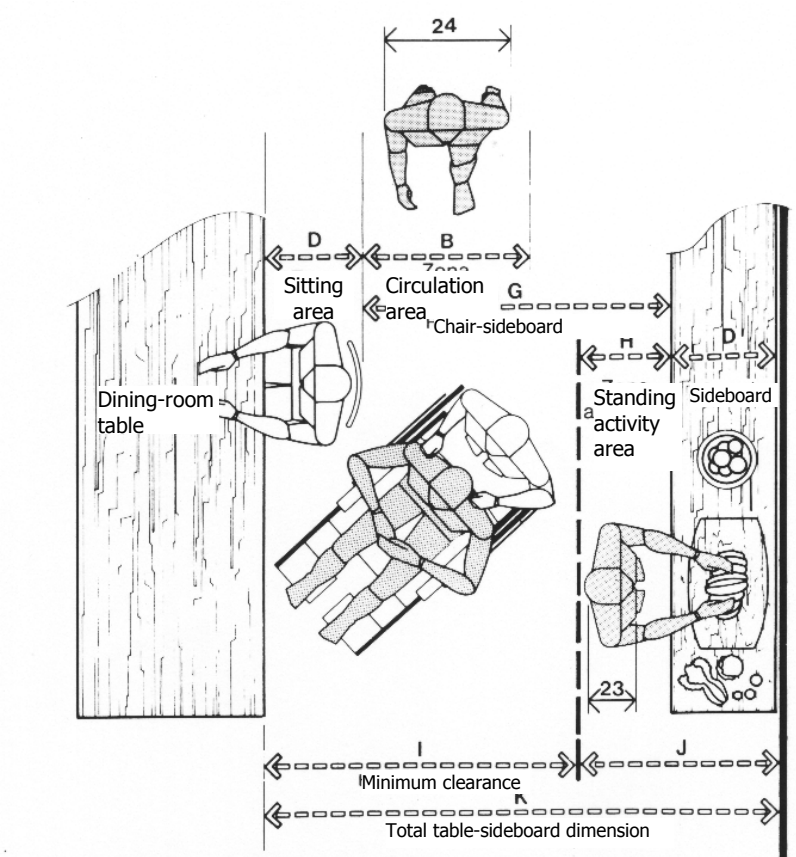

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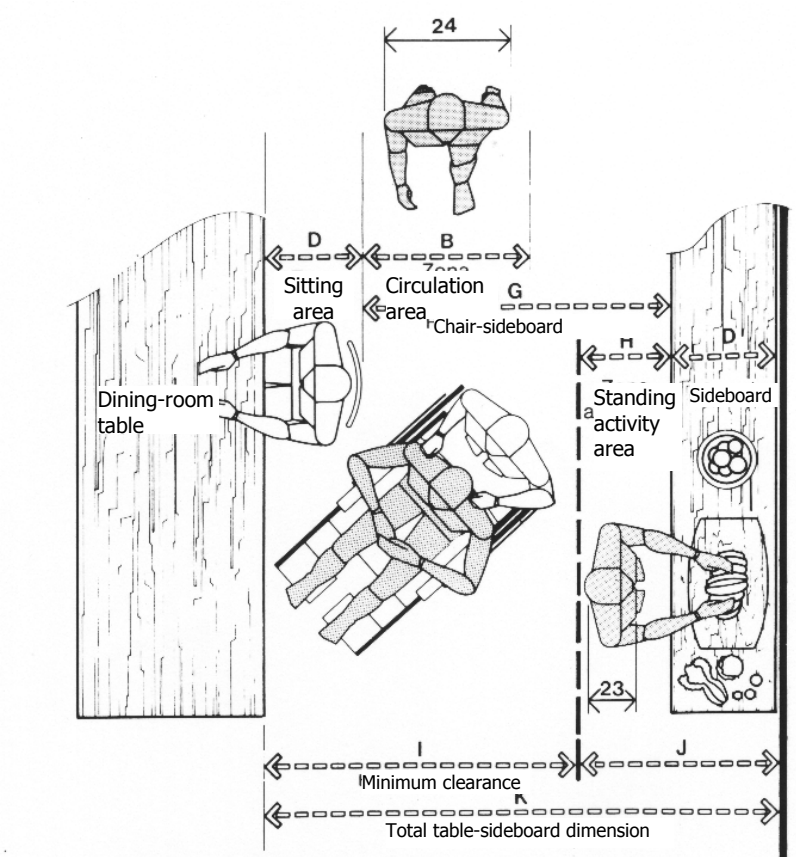

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B	30–36	76,2–91,4
C	72	182,9
D	18–24	45,7–61,0
E	12	30,5
F	24	61,0
G	50–54	127,0–137,2
H	50–60	127,0–152,4
I	54	137,2
J	86–102	218,4–259,1
K	90–96	228,6–243,8

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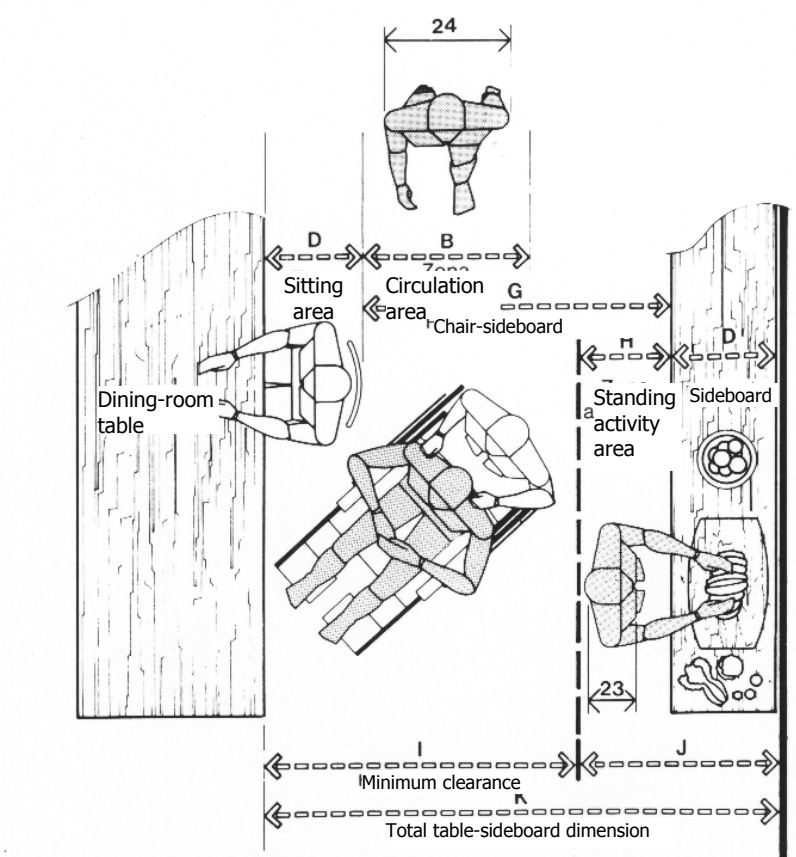

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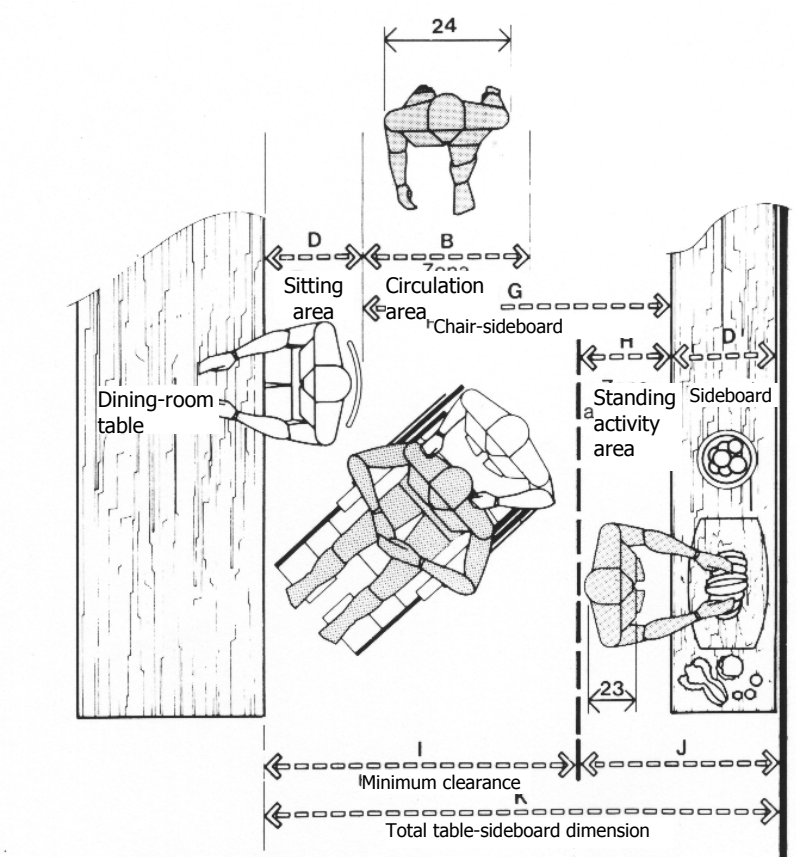

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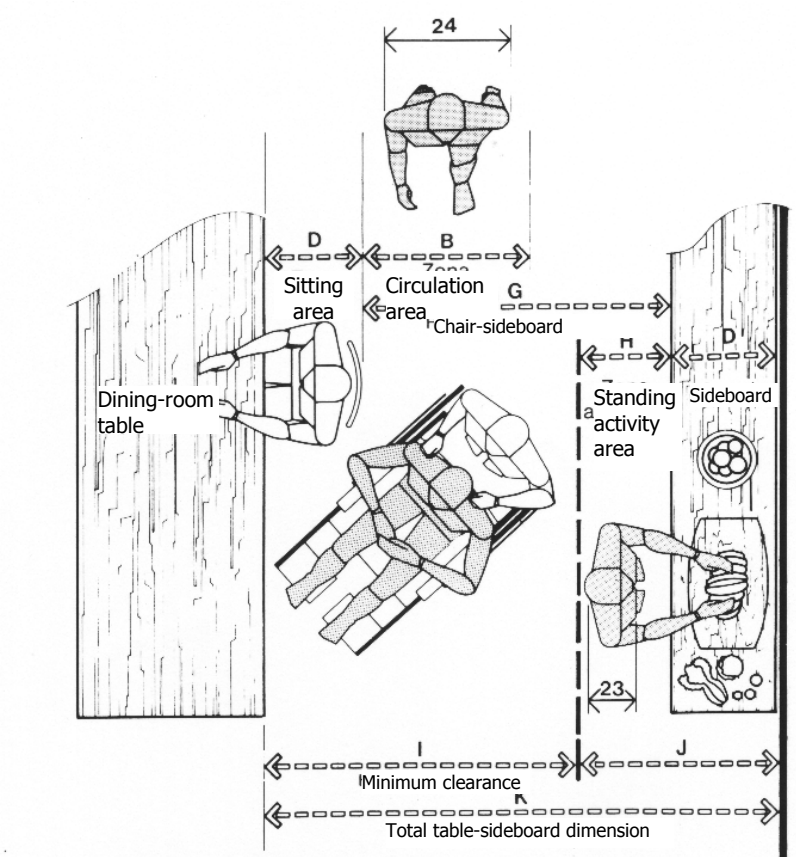

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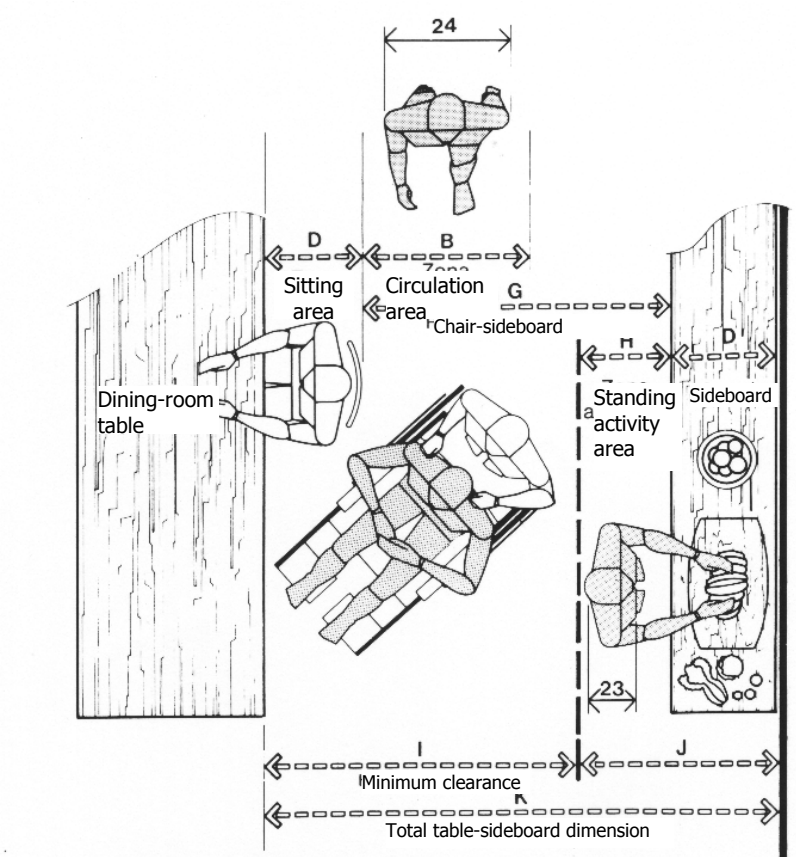

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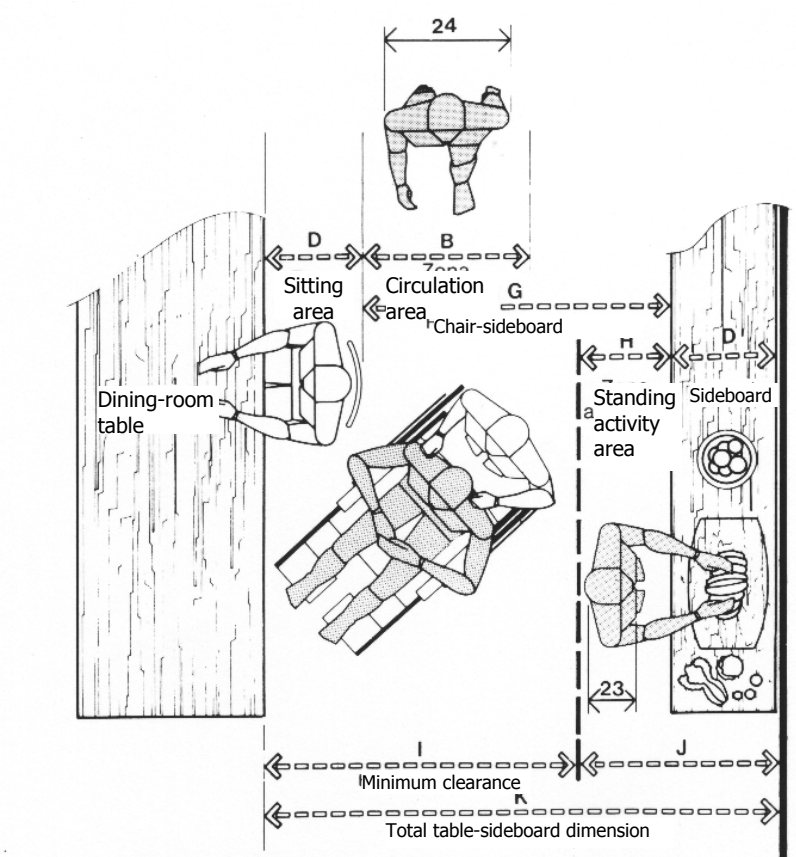

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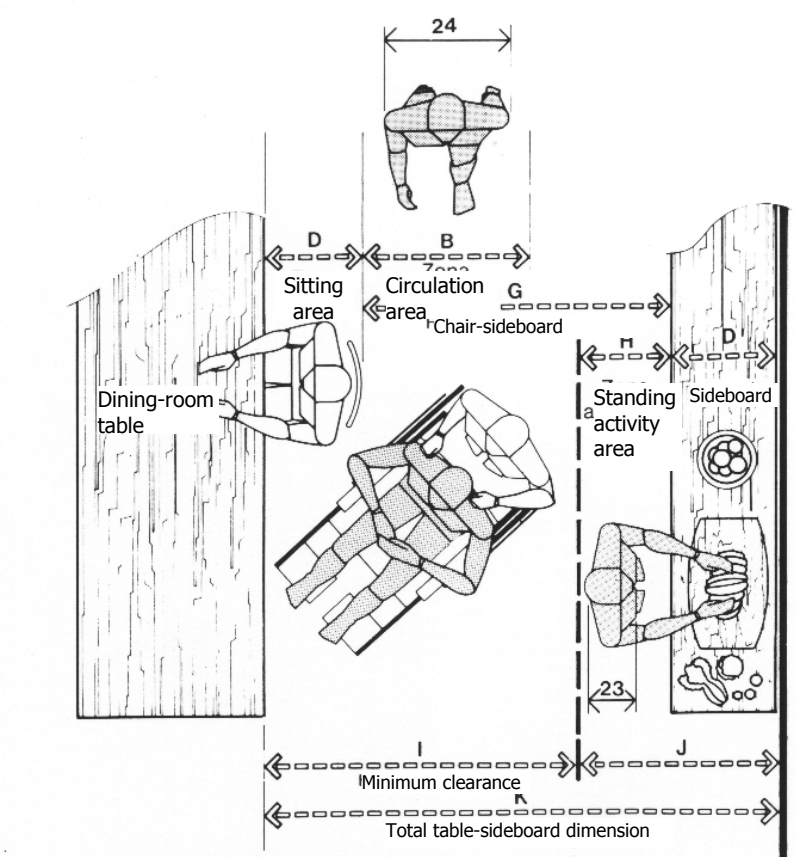

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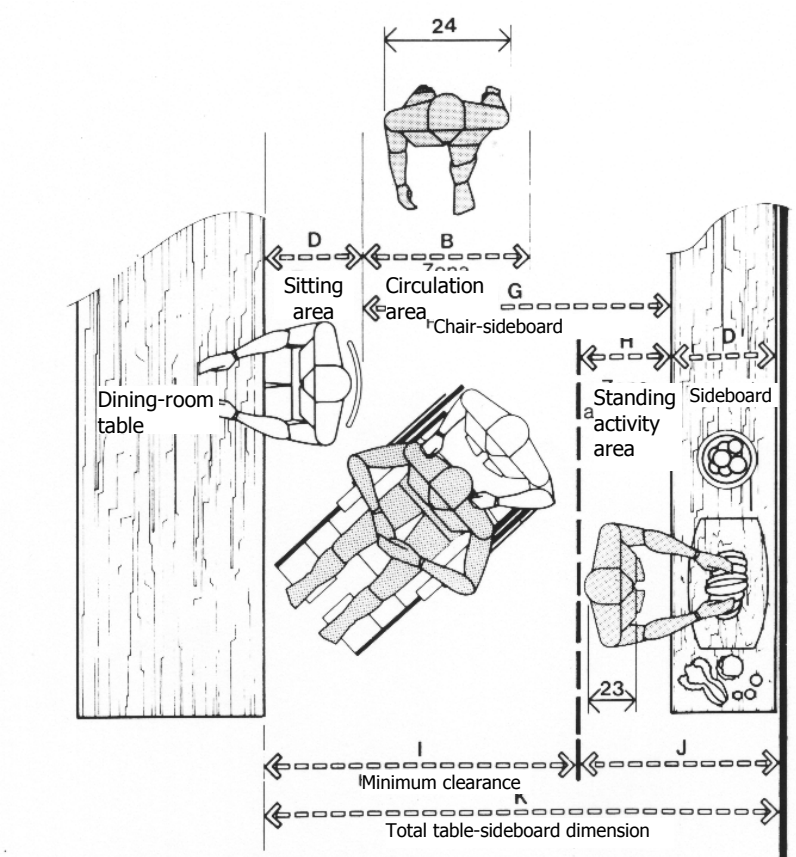

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