URBAN DESIGN FOR DISABLED PEOPLE

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Defining outdoor space dimensions and standards in respect to disabled people’s requirements and redesign of selected outdoor space components in respect to these standards is the main subject of this research. It is important that just “outdoor open space” is the main concern of the research. For this reason at first, starting point of the research, “Universal Design” explained with its guidelines and principles in detail, then, importance of disabled people’s participation in social and economic life and reasons of increase in their population is emphasised. After, general terminology, definitions, and dimensions of outdoor space components and disabled people’s are given. Outdoor space components are defined and then, their design and maintenance guidelines, standards are given. At the end, Izmir City Centre is selected as a project area and absence and faults of existing outdoor built environment in respect to disabled people requirements defined. In project, selected outdoor space components that are not correspond standards are redesigned in accordance with design guidelines and standards.
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In short, the main subject of this research is “URBAN DESIGN FOR DISABLED PEOPLE”. Under this item it will be examined in Izmir City Centre, there is no arrangements;

- to increase disabled people’s ability of mobility and comfort,
- to ease their life especially in exterior space,

consequently, to get them in society in our surrounding environment that able bodied people achieve daily social, economic and cultural activities.

Even if there are arrangements, they do not correspond design and maintenance standards for people with disabilities. In order to constitute this research on strong basement or explain starting point of it, Design or Universal Design, explained with its principles and guidelines below, was selected as a key word at first. Because for all designers, main purpose of design of any product, it can be just a pencil, building flat, part of a city or whole city, is the same in all over the world even if people that live in different district have different social, cultural and economic characteristics and behaviours.

“UNIVERSAL DESIGN: The design of products and environment to be usable by all people, to the greatest extend possible, without the need for adaptation or specialized design.

- **Principle One: EQUITABLE USE**

  The design is useful and marketable to any group of users.

  **Guidelines:**
  - Provide the same means of use for all users
  - Avoid segregation or stigmatizing any users.
  - Provisions for privacy, security, and safety should be equally available to all users.

- **Principle Two: FLEXIBILITY IN USE**

  The design accommodates a wide range of individual preferences and abilities.

  **Guidelines:**
• Provide choice in methods of use.
• Accommodate right- or left-handed access and use.
• Facilitate the user’s accuracy and precision.
• Provide adaptability to the users pace.

• **Principle Three: SIMPLE AND INTUITIVE USE**

  Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.

  **Guidelines:**
  • Eliminate unnecessary complexity.
  • Be consistent with user expectations and intuition.
  • Accommodate a wide range of literacy and language skills.
  • Arrange information consistent with its importance.
  • Provide effective prompting for sequential actions.
  • Provide timely feedback during and after task completion.

• **Principle Four: PERCEPTIBLE INFORMATION**

  The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.

  **Guidelines:**
  • Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
  • Provide adequate contrast between essential information and its surroundings
  • Maximize “legibility” of essential information in all sensory modalities.
  • Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions)
  • Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

• **Principle Five: TOLERANCE FOR ERROR**

  The design minimises hazards and the adverse consequences of accidental or unintended actions.
Guidelines:
- Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- Provide warnings of hazards and errors.
- Provide fail safe features
- Discourage unconscious actions in tasks that require vigilance.

**Principles Six: LOW PHYSICAL EFFORT**

The design can be used efficiently and comfortably and with a minimum of fatigue.

*Guidelines:*
- Allow user to maintain a neutral body position
- Use reasonable operating forces.
- Minimize repetitive actions.
- Minimize sustained physical effort

**Principle Seven: SIZE AND SPACE FOR APPROACH AND USE**

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user’s body size, posture, mobility.

*Guidelines:*
- Provide a clear line of sight to important elements for any seated or standing user.
- Make reach to all component comfortable for any seated or standing user.
- Accommodate variations in hand and grip size.
- Provide adequate space for the use of assistive devices or personal assistance.

The principles of universal design in no way comprise all criteria for good design, only universally usable design. Certainly, other factors are important, such as, aesthetics, cost, safety, gender and cultural appropriateness, and these aspects should be taken into consideration as well when designing". (http://www.design.ncsu.edu 16.05.1998)

It is emphasised that design of environment to be useful by all people. This is the starting point and we can use **Accessibility** instead of it as a just one vocabulary item. The term accessibility is applied to element of the physical environment that can be
approach, entered and used by people with physical and mental disabilities. At last, we can state that accessible design is any design intended to make performance of basic activities (necessary, optional and social) easier and safer for as many people as possible. It can be corrected, because all of us are potential disabled people. We all might be disabled people at one time in our lifespan consequence of accidental or unintended actions. For this reason, accessible design should not be for as many people as possible but it should be for all.

After this starting point, type of activities that occur in public space is defined, and then, disabilities that use our surrounding exterior environment is categorised as an answer of “for whom design and maintenance will do?”

Then, exterior open spaces are categorised and the result of visual survey of existing urban environment is analysed to decide whether it corresponds disabled people’s requirements.

At the end of the visual survey, compared with foreign standards that adapted to our citizens (because Institute of Standards of Turkey has few standards for exterior space) “What kind of arrangement is done for people with disabilities and whether arranged elements are designed in accordance with design and maintenance standards and disabled people’s requirements are searched.

It was seen that all arrangement was completed with lack of knowledge, randomly and without harmony for all city. It is ascertained that all of them should be redesigned and they cost extra expenditure.

Ended up, all these examined visuals examples categorised and redesigned in accordance with design and maintenance guidelines and standards of outdoor space.
Chapter 2. ACTIVITIES AND SPACE

2.1. Type of Activities

People go outside from their home for a specific purpose in daily life. It can be working, shopping, sport, visiting or just walking around. If we categorised these purposes, people go outside to accomplish these activities:

- Necessary Activities
- Optional Activities
- Social Activities,

Necessary activities include those that are more or less compulsory - going to school or to work, shopping, waiting for a bus or a person, distributing mail - in other words all activities which those involved in are to a greater or lesser degree requiring participation. In general, everyday tasks and pastimes belong to this group include the great majority of those related to walking. These activities will take place throughout the year, under nearly all conditions, and are more or less independent of the exterior environment. The participants have no choice.

Optional activities includes such activities as taking a walk to get a breath of fresh air, standing around enjoying life, or sitting and sunbathing. These activities take place only when exterior conditions are optimal, when weather and place invite them.

Social activities are all activities that depend on presence of other in public space. Social activities children at play, greetings, and conversations, communal activities of various kind, and finally as the most widespread social activity passive contacts, that is simply seeing and hearing other people. Different kinds of social activities occur in many places: in dwellings, in private outdoor space, gardens and balconies: in public buildings at place of work and so on. Social activities occur spontaneously, as a direct consequence of people moving about and being in the same place. This implies that social activities are indirectly supported whenever necessary and optional activities are given better condition in public spaces. The character of social activities varies, depending on the context in which they occur. In the residential streets,
near schools, near place of work, where there are a limited number of people with common interests or background socials activities in public space quite comprehensive: greetings, conversation, discussion and play arising from common interests and people know each other.

When the quality of outdoor area is good, optional activities occur with increasing frequency. Furthermore, as levels of optional activities rise the number of social activities usually increases substantially. (Gehl, 1987, p.11,12)

It can be set up in order people's type of behaviour while accomplish these activities in public spaces;
• Walking and Running
• Standing
• Sitting
• Seeing, Hearing and Talking.

While using outdoor environment or accomplish these activities, outdoor space quality is not important for able-bodied people. Even if they get bother, they survive their daily life in anyway. Moreover, their most important problems that bother them is being functional, accessible or comfort of living environment that is traffic jam, air pollution or working condition. On the contrary, for another group of people that survive their life on wheelchair or with cane, walker, the most important problem is just being able to go their working place (if they have), to get building after two-three steps, cross the street, to get a phonecall which is not at convenient height.

Although they have the same rights in using living environment with others why outdoor spaces are arranged as if they do not live with others, they are not important or are not a part of population. According to Disabilities Committee of Prime Ministry 7.5 million people live in Turkey. It constitute %10 of total population. %1.4 have mobility impairments, %0.2 have visual impairments, %0.6 have audial impairments, %2.3 have mental impairment and %5.5 have other impairments.
We can see rarely few arrangement that is done in the name of disabled people, all of them are not correspond standards and their requirements. For this reason in chapter 7 living environment examined in respect to standards, their absences and faults found out, in chapter 8 all of them redesigned to show how should they be done?

2.2. Type of Space and its Components That Daily Activities Occur in

Urban Open public Space is the main topic of this research. In this concept we see urban open public space as the common ground where people carry out the functional and ritual activities that bind a community, whether in the normal routes of daily life or in periodic festivities. In other words we can say that public space is the stage on which the drama of communal life unfolds. (Carr, 1992, p.xi) And more general if we wish to clarify the concept of urban space without imposing aesthetic criteria, we are compelled to designate all type of space between buildings in towns and other location as urban space. (Krier, 1991, p.15)

These spaces can be categorised:

• Streets
• Squares and Plazas
• Public Parks
• Playgrounds
• Memorials
• Markets
• Greenways and Parkways
• Neighbourhood Space
• Community Open Spaces
• Waterfront,

but in this research these spaces are generalised, but all determined design and maintenance guidelines, of course, will be applied to them that mentioned above.

• Walks and Intersection Areas, include pedestrian crosswalks areas,
• Parking Areas,
• Waiting Areas and Drop-off zones,
- Playgrounds;

    main urban open spaces are categorised like that, in addition; site furniture, lighting, vegetation, signage consideration, ramp, stairs and handrails, walls, fence and railings are considered as complementary components of them.
3.1. Reasons of Increase in Disabled People Population

"Convenient access to the outdoor environment is frequently denied to many in our society because of the manner in which outdoor elements designed and constructed. Indeed, the urban environment is generally inaccessible for a range of people with disabilities characterised by interwar expansion of the suburb, which aligned to the postwar spatial divisions of city functions, generated cities which increasingly placed a premium of individual mobility. It can be said that the city is a vast desert containing few oases for people disabilities." (Imrie, 1992, p.2)

"The total number of permanent disabled people that include elderly, because of definition of disabilities, is growing dramatically. The primary reasons for this are better medical treatment and care and as a direct result of this increase longevity. With people living well into their seventies, eighties, and nineties, it may be expected that the opportunity for a traumatic injury or a debilitating disease during their lifetime is greatly increase." (Braille, 1984, p.4) Also the wars, that have occur our recent history, terrorism, increasing traffic accidents created a large number of disabled people additionally.

"For younger age groups, forecasting the affect of economic and social changes and medical progress on the incidence of handicap is hazardous; safer working conditions, for instance, may reduce industrial disabilities, but doctors may preserve the lives of patients who would have previously died as a result of accident." (Bossay Anne, 1982, p.173)

In addition to this, "worldwide elderly population is increasing at rapid rate, and elderly individuals currently comprise approximately 6 percent of the world population. In 1991, for example, nearly 332 million persons in the world were 65 or older. Projections for the year 2000 that are 426 million or more people will be elderly. In the United States 1990 Bureau of the Census reported 31.1 million elderly or 12.5 percent of the total population. Among to this group 18 million were 65 to 74, 10 million were 75 to 84 and 3 million were 85 or older. These figures reflect a 22 percent increase in
the number of elderly individuals since 1980 census. The elderly population is expected to grow 73 percent between 2010 and 2030 and at last one person in 12 could be 80 or older by 2050." (Scott, Marshall, Baker, 1998, p.3) “Two thirds of all disabled people are of retirement age. The elderly as a percentage of the total U.K. population increased from 4.7 percent in 1901 to 14.6 percent in 1978; and although the overall proportions is now stabilising, the segment of the population over 75 will still be growing in the year 2000.” (Bossay Anne, 1982, p.173)

“In Turkey, in 1990 one person for every 27 (3.9 %), in 1997 4.9%, in 2005 one person in 17 will be 65 or older.” (Institute of standards of Turkey, 1990) Although aging is a process that does not cause a person to become disabled, increase the likelihood of impairment to functional abilities such as, sight, hearing and mobility that require consideration beyond the needs of younger individuals who may be able-bodied.

3.2. Social and Economic Aspect of Using and Creating Built Environment

The urban areas provide great and varied number of built spaces which include residence work places, shelters, retail spaces and entertainment areas. And also urban spaces are costly consequently, requires efficient use.

In the past the basic attitude of the general population toward those with various disabilities was “out of sight- out of mind”. Current attitude place more emphasis upon encouraging disabled people to lead more productive lives and to avail themselves of educational and employment opportunities. Coincidentally with this, a national effort has been made to employ greater numbers of handicapped person in more diverse positions and locations. This of course requires that those with disabilities must be able to go easily to a place of education and employment.

“Currently there is an increased awareness of the needs of disabled people who are challenged by urban environment. The United States and Nordic countries (Iceland, Finland, Norway, Denmark and Sweden) are two region that have led in addressing those needs and both regions are in the vanguard in what they have accomplished for disabled persons with non-correctable impairments who lack ability, power or fitness to complete
a task and for individuals with special needs such as those pushing wheelchairs or infant strollers. The approach to accessibility by the U.S.A. and the Nordic countries differ because of the contrasting ideologies or systems of support provided in those places. Fundamental differences exist between the philosophies or the ideologies of the regions in terms of welfare, social and health services and the delivery of the goods and services within the urban environment.” (The Journal of Urban Technology, Scott et al., 1998, p.5,6) this is the economic and social aspect of using and creating urban environment.

“The U.S. is governed under “liberal welfare regime”, under this regime able-bodied individuals are expected to provide for themselves, but government assistance is available for those who are less able to provide for their individual welfare. Citizen’s welfare is based on available resources and operates from a position of providing for basic needs or providing the minimum necessary to meet the basic needs of the individual. In short, this regime is based on economics.” (The Journal of Urban Technology, Scott et al., 1998, p.5,6)

“On the other hand, the Nordic countries governed under “social-democratic” regime. Under this regime everyone in society should be integrated into all civic, social and public arenas. In this ideology collective provisioning recognises and provides for each citizen’s individual needs regardless of age or ability. An underlying assumption of this ideology is that each individuals has the right to move in, around and through all physical and social environment, even for only brief visits or encounters. A result of this ideology is that employment and access to goods and surfaces are made available to all individuals without special consideration or exception. The environment is accessible because, it has been designed or modified to accommodate the changing needs of individuals and the diversity of ages and abilities that are characteristic of society. It is a “society for all”. Nordic countries were based on principle of universalism. This approach promotes accessibility as the highest possible standard instead of a means to meet the minimum needs of the citizen’s. Universal accessibility or a society for all inherently includes each citizens regardless of age or ability. This approach contrasts with a society that has to make accommodation for individuals with disabilities or special needs. A Nordic ideology supports a high level of equality among its citizens across the lifespan as well as accessibility to goods and services. Abilities change across
time, so environmental changes may also be required that accommodate a changing range of abilities.” (The Journal of Urban Technology, Scott et al., 1998, p. 8, 9)

Compared to Social-democratic regime, “Liberal Welfare regime is based on economics, less costly and inclusive approach. In terms of equity Social-democratic approach appears to align more closely with the concept of Universal design that recognises the needs of all individuals regardless of age or ability. Universal design is an inclusive concept in which features of the environment support the activities of a range of individuals who may use or occupy the space. Ramps and curb cuts accommodate not only individuals who are using wheelchairs but also infant stroller, individuals with visual impairment other using canes and walkers, using bicycles, roller skates or skateboards and also all individuals have various abilities and special needs that develop and recede during the course of one’s life. For example, all individuals are short when they are young and majority of individuals will experience some decline in their sensory abilities with age. Parent pushing an infant or two young children in a stroller have needs that are similar to those of individuals using wheelchairs. The user of the wheelchair, however recognised as having disability that requires reserved parking close to the entrance of the building. The parent with the stroller who is not considered to have a special need does not receive special consideration such as, accessible parking. Thus, equity in the Liberal welfare system falls short in delivering urban technology. Other segments of the population are ignored or excluded.

Efficiency refers to the cost of and time expanded on, new construction or modification existing environment. In Liberal welfare system, approach to creating an environment for an individual with specials may be to modify a unit in an apartment complex, for example, to accommodate the specific need of a particular individual. This may be less costly initially than providing furnishing or appliances incorporating appropriate technology or building units in an urban setting that are designed to meet the needs of a range of individuals from the outset of the project”. (The Journal Of Urban Technology, Scott et al., 1998, p.10, 11)

“Because legislation like the ADA (Americans with Disabilities Act) identifies the number of units and parking spaces that will be handicapped accessible, these spaces may be vacant if no one with a special needs occupying the unit. This vacancy represents an inefficient use of resources. The Liberal welfare system is also less costly. Although
financial cost and rates of taxation is high in Social-democratic approach fewer social
problems occur than other systems. If a person become disabled person after his/her
50’s or 60’s and if she live for 30 years at the same place, the financial burden of
modification and technical aids shared among building owner, disabled person and state
in Social-democratic regime. On the other hand, the liberal welfare regime required that
disabled person move to the “handicapped accessible” unit that may or not in the same
building which have been their home for 30 years.

At the end, the Nordic approach to a accessibility and its underlying ideological
belief recognises contributions and special need of every individual, resulting in a
society with social and physical environment that are more inclusive than exclusive and
consequently more satisfying and enduring”. (The Journal Of Urban Technology, Scott et
al.,1998,p.12,13)

3.3. Importance of Creating Barrier-Free Exterior Space

Accessibility is base feature of the built environment. It implies that dwellings,
shops, theatres, parks, and working places should be accessible and useful. In addition, it
provide people to participate social and economic activities that basically purpose of the
built environment.

In the last decade access for the disabled to public buildings and facilities in the
cities has become an important part of the political agenda, and many public authorities
internationally are promoting strategies for “accessible built environment”. 19-20
june1963 in Stresa, 12-17 May 1967 in Oslo by FIMITIC. In 1987 in Utrecht and in
1990 in Holland (Hoensbrock) by Europe Commission, many congress was organised
on ACCESSIBILITY. It was stated by all congresses as a common result, using existing
environment equally and independently must be as a base principle while design process.
Moreover , architectural barriers seriously prevent handicapped people from success
chance of social and professional adaptation. At last, it was stated that social and
professional adaptation can not be separated between them.
In Turkey “Office of Prime Ministry Department of Disabilities”, “Ministry of Working and Social Security Protection of Disabled People National Coordination Committee”, and its subcommittee; “Removal of Physical Barriers” and “Disabled People Confederation of Turkey” working for disabled people officially. In respect to these organisations Ministers Committee declared in 30.05.1997 (published 19 June 1997,no:2301) -add to 3194 Construction Act- “It is obligatory to apply TSE’s concerning standards in all construction plan, urban, social and technic infrastructure area and buildings for creating accessible and livable urban environment for disabled people”. In addition; 3030 Metropolitan Municipality Act, 1580 Municipality Act was modified by this act.

Using built environment is very simple for a great number of people, but mental and physical handicapped people have a great difficulty in using it. However, making a relationship just for disabled people between accessibility is quite restricted because it interests elderly people, children, too high or short people, people that get injured in a sports events, a women pushing a baby-carriage, huge and fat people... As a result, one or whole of them have a great possibility to get effected from built environment. It is logically wrong the fact that people remain deprived from social relationship between them because of permanent or temporary handicap. Every body have an equal rights to live, work or entertain.

Everybody have an equal right to live, work or entertain. Moreover, they have same right to use facilities and give their own services without any prevention. In addition to this, if they are not being prevented from doing their work or using facilities, society would work better. In this case, Equality, Integration and Independence should be second starting point for us.

Whatever the reason, we go outdoors to enjoy ourselves in what we feel is our private world. The path from the back door to wherever we intend to go has many barriers that interfere with even the simple tasks mentioned above. We may not find the surface hard enough for the wheelchair, or we may discover that the ground is too soft for our crutches or canes or pavement may be too narrow for wheelchair. Although benches are useful, they may be difficult to use because they are at incorrect height. A table may be difficult for a chair to get close to. There is little protection from the sun or
rain. Where is that telephone if we need it? What kind of light have we provided for our safety and security? Or there is no enough clear space to move get into the car with wheelchair. Sudden ground differentiation is very danger for wheelchair use. Even if there is a just one step, it constitutes a hazard and obstacle for them.

"Architects, developers and public officials can make all buildings free of barriers in the design and construction. But, if people can't get from building to building or from cars or buses to the buildings, then the total environment is not barrier free. The freedom and lifestyle of some will be curtailed at sometime because of the way an area is conceived and constructed". (Braille, 1984, p. 4)

Nearly everyone, at some point in his life, will encounter an environmental barrier that prevents access or efficient use of an urban space or service. A young child's height, for example, is not a disabling condition until he/she encounters space designed to accommodate taller adults. Old adults frequently acquire infirmities of sight, hearing or walking that make cities less accessible to them. Even inability to read (because of language or literacy problems) limits accessibility. In other words, every person can expect to be physically handicapped either temporarily or permanently at some time during their lifetime. A mother pushing a baby carriage, a shopper whose arms are loaded down with packages, a child pulling a wagon, a pregnant woman may all find themselves unable to cope with a flight of stairs, a curb, or a door because of the design of these elements.
Chapter 4. DEFINITIONS

For the purpose of this study it has been necessary to give general terminology and to define particular handicaps, impairments and restricted devices so that they may be related to individual design elements. The terminology used below, with the exception of "temporary impairments", is generally accepted and used in literature dealing with the handicapped.

4.1. General Terminology

"Access Aisle": An accessible pedestrian space between elements, such as parking space, seating, and desks that provides clearances appropriate for use of the elements.

Accessible: Describes a site, building and facility, or portion thereof that complies with these guidelines.

Accessible Element: An element specified by these guidelines (for example, telephone, controls and the like)

Accessible Route: An continuous unobstructed path connecting all accessible elements and spaces for a building or facility. Exterior accessible route may include parking access aisles, curb ramps, crosswalks at vehicular ways, walks, ramps, and lifts.

Clear Floor Space: A minimum unobstructed floor or ground space required to accommodate a single stationary wheelchair and occupant.

Cross Slope: The slope that perpendicular to the directional of travel.

Curb Ramp: A short ramp cutting through a curb or built up to it.

Detectable Warning: A standardised surface feature built in or applied to walking surfaces or other elements to warn visually impaired people of hazards on a circulation path.

Marked Crossing: A crosswalk or other identified path intended for pedestrian use in crossing a vehicular way.

Ramp: A walking surface which has a running slope greater than 1:20

Running Slope: The slope that is parallel to the direction of the travel.

Signage: Displayed verbal, symbolic, tactile and pictorial information.

Tactile: Describes an object that can be perceived using the sense of touch.
Walk: An exterior pathway with a prepared surface intended for pedestrian use, including general pedestrian areas such as, plazas and courts.(http:\www.access-board.gov. 16.05.1998)

4.2. Definition of Disabilities

“In general Disability may be used to refer a considerable range of human differences—including those defined by age, health, physical and mental abilities and even family status—that have been associated some form of social restriction or material deprivation. Disability that used in the social science refers to the social experiences of people with some form of physical impairment to a limb, organ, or mechanism of the body.”(The Journal of Urban Technology, Gleeson, 1998, p. 89)

According to Council of Ministry of Turkey (30.05.1997)(Published in 6 June 1997) Disability or Disabled people;

“innate or later result of any accident or illnesses, a person that lose his/her physical, mental, physiological, emotional and social ability in various range, unfit to the normal daily necessity and in the need of protection, care, rehabilitation, adviser and support services”.

“disability, disabilities, “A disability is a permanent physical or mental injury or illness that restricts the way that some one can live their life”( Collins Cobuilt English Language Dictionary, p.396)

Disability used here encompasses impairments which have an organic basis, including those which shows plainly as physical and intellectual impairments. Therefore, the concept of this research will not directly consider mental illnesses, a specific set of health-related conditions which can be distinguished from physical disability.

4.3. Type of Disabilities

“Temporary Impairments: Temporary impairments refers to any and all situations in which people become temporarily restricted in their movements either through a disease or trauma that requires time to heal, or simply in performing the normal functions of everyday life. The pregnant woman, the shopper with his arms loaded with packages, the skier with a broken leg are “handicapped to a degree” in their movements but the duration of their impairment is relatively short-lived.
Activity Impairments: The term activity impairment generally refers to any sort of limitation which curtails the normal activities of a person. Most often disease of the heart, lungs, or forms arthritis and rheumatism are involved. Visually, audial or mobility curtailment are not included. In general, people with activity impairments can not play strenuous games or engage in unlimited physical activities.

Mobility Impairments: A mobility impairments curtails the ability of movement or ambulation. It may be caused by such things as partial paralysis which has not been compensated for by the use of ambulatory aids, or the absences of extremities have not been replaced by mechanical aids. Disabilities, deformities, or handicaps which curtail the movement of the person are included in this category.

Manual Impairments: A partial manual impairments entails the impairment of either both hands to a certain degree, or total disability of one hand. It may refer to the lack of a replacement of a missing hand or arm with a mechanical device. There is some use of hands or arms, and some manual dexterity in a partial manual impairment.

A total manual impairments means, in effect, that the person has no use of his hands or arms. Therefore, he is handicapped in those aspects of the exterior environment which require the use of these extremities. It may be the result of arthritis, rheumatism, amputation, or the replacement of a limb by artificial devices.

Visual Impairments: Partial visual impairments are usually caused by dysfunctions such as color blindness, cataracts, the loss of partial sight in one eye, a detached retina or congenital birth defects. A worsening of some of these problems may cause total visual impairments. A total visual impairment means that a person has total loss of vision.

Audial Impairments: Partial audial impairments include people with a limited ability to hear but who are still able to detect major sounds such as loud noises or audial warnings in the exterior environments. A person with total audial impairment can not hear any sounds at all.
Mental Retardation: Mental retardation is defined today as a subaverage intellectual functioning which originates during the developmental period and is associated with impairments in adaptive behaviour. In less mechanical terms the mentally retarded person is one who, from childhood, experiences unusual difficulties in learning and is relatively ineffective in applying whatever he has learned to the problems of ordinary living. Degrees of mental retardation (mild, moderate, severe, profound) are measured by considering both measured intelligence and impairment in adaptive behaviour.” (Braille, 1984, p.5-6)
Chapter 5. DIMENSIONS

After this point dimensions, that guide design standards constitution and design process, are important to create barrier-free exterior environment for all. In most instances designing a space that will accommodate wheelchair insures that it will also be large enough not to be restrictive for other people using it.

Accessibility is defined by body dimensions of human being and their physical capabilities. So far, in all design process, average body dimensions has been used. All built environment that built for average human body does not mean that they provide equal accessibility for all. Nobody can be average human being appearance and a good part of them are different from average one in terms of height, weight, power, pace...

While built environment is arranging, these differentials should be taken into consideration. Just in this case standards can be arranged for whole average or exceptional ones. But this can not be accomplished by provide different facilities neither for each person nor people in different category. Facilities can be used in case all of them contains all people’s requirements which shows great variety.

5.1. WHEELCHAIR DIMENSIONS

![Wheelchair Dimensions](image)

Figure 5.1. Wheelchair Dimensions (Goldsmith, 1976)
5.2. BASIC HUMAN DIMENSIONS

Figure 5.2. Able-Bodied Man and Woman & Man and Woman on Crutches (Goldsmith, 1976)

Figure 5.3. Man with a Walker and a Dog (Goldsmith, 1976)
5.3. WHEELCHAIR-BOUND PEOPLE DIMENSIONS

![Diagram of wheelchair dimensions](image)

**Typical dimensions.**

- Typical vertical reach/shelves, lifting aids
- Oblique reach, shelves, cabinets, windows
- Forward vertical reach, switches, shelves
- Head height/shower fixtures
- Eye level, windows, mirrors
- Shoulder level
- Push handle height
- Elbow level, counters, tables
- Knuckle level, shelves, electric outlets
- Foot height/toe recesses

**Typical dimensions.**

- Chair armrest level, counters, tables
- Thigh level, tables, sinks, lavatories, work area
- Chair seat level, toilets, showers, baths
- Downward reach, shelves, outlets
- Foot height, toe recesses

Figure 5.4. Lateral Reach (Width) and Forward Reach (Length) (Goldsmith, 1976)
5.4. CLEARANCES

Figure 5.5. Clear space for passage-two way and 180 degree turning (W. Harvis et al., 1988)

Figure 5.6. Clear ground space for forward and parallel approach (W. Harvis et al., 1988)

Figure 5.7. Clear Floor Space for Turning (W. Harvis et al., 1988)
5.5. DIMENSIONAL REQUIREMENTS FOR THE BLIND

Figure 5.8. Visually impaired person with long cane (W. Harvis et al., 1988)

5.6. HANDICAPPED ANTHROPOMETRICS FOR CONVENIENCE CONTROL

Figure 5.9. Convenience control (Goltsmith, 1976)
6.1. WALKS & INTERSECTIONS

6.1.1. WALKS

Sidewalks provide pedestrians with access to entrances from passenger loading zones and parking spaces and also serve to connect outdoor activity areas to secondary entrances. The arrangement of accessible elements and the overall walk system should provide the shortest and most convenient routes possible. Walks should be designed to allow the greatest diversity of people to move safely, independently, and unhindered through the exterior environment.

Figure 6.1. General Considerations of Walks (Robinette, 1985)

Rest areas allow handicapped person to move more easily through the city and are helpful to the general public as well.

Provide continuous cross slope to walkway surfaces for water run-off

Provide adequate width for walkway:
one-way traffic: 120 cm min.
two-way traffic: 165 cm min.

Provide non-slip ramp surface
max. gradient 17%

Items to consider in the design or modification of walk systems are:

**WALK WIDTH:** "Although walk must be 1.20 cm min. for one-way traffic, 1.65 m two-way traffic, wide overall, posts, fire hydrants, utility poles or similar objects may go..."
beyond the walk as long as 90 cm passage is maintained. The surface of curbs may not be included in the measurement of walk width.

**SURFACES:** The surface of walk should possess stability and firmness, be relatively smooth in texture, and have a non-slip surfaces. The use of expansion and contraction joints should be minimised, and their size should be as small as possible, preferably under 1.25 cm in width. A continuos surface must be provided. No steps of any kind are allowed on a walk.” (Robinette, 1985, p. 27)

**DETECTABLE WARNINGS:** “Flash transitions are a potential danger to guests who are blind and use curbs to detect the presence of streets or driveways. One way of solving this problem is to use detectable warning surfaces. A detectable warning surface is a series of strips, grooves in a tactile pattern at least 90 cm wide, that can be detected by blind guests who are using canes. Detectable warnings were required at flush transitions and where steps are located in the path of travel. Another method of assisting people with low vision is to use changes in the colour and patterns of paving materials to highlight crosswalks, ramped areas, flush transitions and interfaces with vehicular traffic.” (Davies, Beastley, 1994, p. 45)

**REST AREAS:** “Occasional rest areas off the travelled path are enjoyable and helpful for all pedestrians, and especially for those with handicap that make walking long distance exhausting. Location of rest areas should be at convenient intervals— not more than 60 m— (see fig. 6.2.)

**FURNITURE STRIPS:** Paved areas adjacent to walks are recommended to accommodate benches, drinking fountains, phones, trash receptacles and other site elements. Furniture strips provide access to these elements but maintain a clear path of travel along the walk. Because many guests with low vision travel without canes, the edge of furniture strips should be identified by both a change in materials or a texture and a contrasting colour.” (Davies, Beastley, 1994, p. 45)
CROSS SLOPE: “Cross slope makes walks hard to navigate for wheelchair users because the chair has a tendency to head down the cross slope rather than straight. Cross slope may not exceed 1:50.” (Golitsman et al., 1992, p. 27)

GRADIENTS: “Pedestrian paths with gradients under 5% are considered walks. Walks with gradients in excess of 5% are considered ramps and have special design requirements.” (Robinette, 1985, p. 27)

LANDINGS: “This item only applies to walks that have continuous slope but do not exceed 1:20. These walks must have a level resting area that is at least 1.50 m × 1.50m located a minimum of every 120cm.” (Golitsman et al., 1992, p. 27)
LIGHTING: “Light is important at walks, for both safety and security (min 1 footcandle recommended). Low lighting, particularly from fixtures mounted below eye level should be controlled and aimed to reduce glare. Low lighting provides better definition to ground surfaces and therefore is helpful for mobility. Steps or stairs in walks can be highlighted by low lighting on the surface of the treads, aimed from each side of the steps. This reduces glare, minimises shadows, and visually defines the planes of the treads and rises.” (Davies, Beasley, 1994, p. 44)

HEADROOM ALONG WALKS: “Vertical clearance of at least 2 m must be provided above walks at all times. Trees and other overhanging objects must be maintained so that adequate headroom is provided.” (Goldsman, et al., 1992, p. 27)

MAINTENANCE: “Proper maintenance of walk is imperative. Where they are deteriorating, repairs should be made to eliminate any conditions that may cause injury.

Fig. 6.4. Headroom Along Walkway (Davies, 1994)

CURB RAMPS: Changes in grade from street to sidewalk and from sidewalk to building entrances create most problems for people with physical handicaps. To facilitate movement over low barriers, a curb ramp should be installed. (See fig. 6.5.) Surfaces should be non-slip but not corrugated as the grooves may fill with water, freeze, and cause the ramp to become slippery. A lack of indication of where the cut ends and the road pavement begins can also be dangerous. A textual change on the curb cut can provide a warning.

DRAINAGE STRUCTURES: Improperly designed, constructed or installed drainage structures may be hazardous to people who must move over them. When grating occur, they must have openings that are no more than 1.8 cm wide in one direction. There is no limit on the length of the opening. If openings are circular their diameter must not exceed 1.8 cm. Grating must be oriented so that the longest dimension of the openings is perpendicular to the predominant direction of travel along the walks. Grates should
likewise be kept clean so as not to lessen the efficiency of the overall storm system. Obviously, a surfaces build-up of water, especially in the winter may present a hazard. For this reason, drainage structures should not be located between a curb ramp and the corner of a street or immediately downgrade from a curb ramp.” (Robinette, 1985, p.27)

Figure 6.5. Type of Curb Ramp (Davies, 1994)

WHEEL STOP: “Wheel stops are necessary where wheeled vehicles may roll into a hazardous area. They should be 5 cm. to 7.5 cm. high, 15 cm. wide, and should have breaks in them every 1.50 m. to 3.00 m. to allow for water drainage off of the walk.

CURBING: Curbing is a commonly specified element on most sites, and is in turn one of the most neglected items in regard to the physical barriers it creates. The problem is twofold; stemming from the attitude of most designers that 15 cm. concrete curbs are simply an avoidable necessity, and from municipalities who further aggravate the problem by writing in curbing clauses to building ordinances for no other reason than that it has always been a past requirement.

When specifying the conventional curbing, the designer should be aware of the following items:

- Curbing should not create any unnecessary barriers to physically handicapped individuals. Where barriers have been created, previously laid curbs should either be removed or ramped.

- Curbing, if necessary, should never be higher than the max. Height of one step; 16.5 cm. This is particularly important where there is any pedestrian traffic crossing over, or vehicles parking adjacent to the curb.
Doubled or stepped curbs are difficult for the handicapped to negotiate, and in darkness are hazardous to all pedestrians. Their use should be limited, if not restricted.

There are six types of curbing:
- a: Vertical face curb:
- b: Sloped face curb:
- c: Pre-Made wheelstops:
- d: Posts and bollards:
- e: Guard rails
- f: Posts and chains.” (Robinette, 1985, p. 28)

FIGURE 6.6. TYPE OF CURB RAMP (ROBINETTE, 1985)

6.1.2. INTERSECTIONS

Any discussion on walkways would be incomplete without some mention of intersections and the potential hazards they can cause for handicapped people moving through the environment. Essentially, there are three items pertaining to intersections about which the designer should be concerned:

- Vehicular And Pedestrian Warning Systems.
- Pedestrian Crosswalks.
Directional And Informative Signage

Warning systems:

- Where there is great deal and pedestrian traffic at intersections, signal lights should be used to assist people in crossing the street.
- For safety reasons, traffic signals should be designed so that glare from the sun does not interfere with their ability to be seen, nor should they be placed where they are easily confused with the surrounding background.
- The configuration of the lights should always be arranged with the red to the top, amber in the center, and green at the bottom; this is the only way color blind people have of determining when it is safe to cross.
- In addition to the vehicular signal, pedestrian “walk”- “don’t walk” signals are helpful. Crossing signals should be placed where they are plainly visible, and if push-buttons are incorporated in to the system, they should be located no higher than 90cm.
- Plant materials or other obstacle should never be allowed to visually block pedestrian movements from motorists or vehicular movement from pedestrians.

Crosswalks:

Crosswalks are used to delineate an aisle for pedestrian traffic to use when travelling through an intersection against vehicular traffic.

- Crosswalk should be constructed so as to be easily seen by motorists.
- A variety of visual and textual materials can be used for crosswalk delineation.
- The interior width of a crosswalk should be as wide as the width of the approaching walk.
- The use of textured warning strips for the blind at crosswalks is not recommended.
- At busy crossing, a buzzer should sound so long as the pedestrian light is at “walk”.
- Push buttons to activate pedestrian crossing light should be at an accessible height 75-90 cm, both children and person in wheelchairs.
- Passage through pedestrian island should be 1.50 m min. width for two way traffic.
- Traffic island should be 1.20 m width to protect pedestrians from vehicular traffic.
• Curb cuts at 17% max. slope and 1.50m min width for two way traffic.
• Drainage grates should be located away from pedestrian paths.
• Contrasting paving material can be placed behind curb cuts to act as warning strips for the blind, paving should extend full width of walkway.

Figure 6.7. Pedestrian Crossing (Robinette, 1985)

Signage:

Most problems relating to signage at intersection can be attributed to either size or graphic layout. When considering signage to be posted at intersection the designer should:

• Make sure locations are easily visible to either motorists or pedestrians, depending on the who the sign is intended for.
• Choose sign size relative to specific design situations. This is particularly critical for motorists; when speeds increase visibility decreases.

• Whenever possible use signs that have dark colored background with light colored letters. Research has proven that this combination is easier to read than dark colored letters on light backgrounds. (Robinette, 1985, p. 31–43)
6.2. RAMPS, STAIRS & HANDRAILS

6.2.1. OUTDOOR RAMPS

Changes in level are often necessary or desirable, but should be limited as slopes demand skill in balance and greater physical exertion from handicapped persons. Any changes in level should be ramped. When stairs are used in conjunction with ramps, they should be properly designed for use by person with mobility limitation.

"Ramps are alternative routes for people who are not able to use stairs; however, they do not take the place of stairs since certain portions of the population find ramps more difficult to use. Any surfaces pitched above 5% is considered a ramp.

Plant materials should be located so that shadows do not prevent sun from melting snow and ice on ramp surface

Provide min. 5 footcandles light at all ramp and stair location

Ramps width vary according to design situations. Pref. min. are:
1 way: 120 cm. width
2 way: 180 cm. width

max. length 900 cm between landings

Materials should extend a min. 45 cm beyond top and bottom of ramp.

150 cm min. clear space at both top and bottom of ramp

Provide 5 cm high curbs at edge of ramp surface for use by wheelchairs as emergency wheelstop

Figure 6.8. Outdoor Ramp (Robinette, 1985)
**GRADIENT:** The max. gradient for a ramp of any extended length should not exceed 1:12 (8.33%) not including curb ramps. (Robinette, 1985, p.46)

**LENGTH:** “The allowable length for a single run of ramp depends on the slope of the ramp. Each run of ramp must not exceed 9 m if the slope is greater than 1:16, for ramps with slopes 1:12 to 1:16 run lengths may be up to 12 m.” (Goltsman et al., 1992, p.30)

**LANDINGS:** “In any case, a landing must be provided for each 75 cm of rise. Landings must be provided at the top and the bottom of each segment of a ramp as well as between segments of the ramp if there is more than one run.

- **Top Landing**
  Top landings must be at least 1.50 x 1.50m. If a door opens onto the landing, the length must be 1.05 m plus the door width to accommodate the doors swing.

- **Bottom Landings**
  Bottom landings must be at least 1.80 m long and as wide as the ramp surface.

- **Intermediate Landings**
  Intermediate landings must be at least 1.80 m long and as wide as the ramp.” (Goltsman et al., 1992, p.30)

**WIDTH:** “The min. clear width of any ramp is 90 cm. Where ramps are heavily used by pedestrians and services deliveries, there should be sufficient width to accommodate both, or provisions made for alternate routes.” (Robinette, 1985, p.46)

**SURFACE:** “The surface of the ramp should be brushed concrete or a similar surface to prevent slipping.” (Goltsman et al., 1992, p.29)
**CLEARANCE:** “The bottom and top approach to a ramp should be clear and level for a distances of at least 1.50 m., allowing for turning manoeuvres by strollers, dollies, wheelchairs etc.” (Robinette, 1985, p. 46)

**CROSS SLOPE:** “Cross slope makes ramp hard to navigate for wheelchair users because the chair has a tendency to head down the cross slope rather than the straight. Cross slope may not exceed 1:50.

**WHEELSTOP:** Low curbs along the sides of ramps and landings should be provided as surfaces against which wheeled vehicles can turn their wheels in order to stop. Ramps must include protection from drop-offs at the edge. This can be accomplished with walls, 5 cm min. curbs, or railing that provide a suitable barrier at the ramp surface, such as a continuous rail immediately above the ramp surface or vertical posts. Alternatively, the ramp surface may be widened to extended at least 30 cm past the handrails on each side. (Goltsman et al., 1992, p. 29)

**TEXTURE:** “A Textural signal prior to the ramp at both top and bottom, may be used to warn the pedestrian of the upcoming obstacle.

**LIGHTING:** Ramps should be illuminated to an average maintained light level which insures their safe use in darkness. It is important that the hill and toe of the ramp be particularly well illuminated.

**MAINTENANCE:** Ramps should be maintained properly to keep them from being hazardous. Debris, snow and ice should be kept off the surfaces. Handrails should, at all times, be properly secured.

**PLANTING:** Plant materials should be located so that shadow do not prevent sun from melting snow and ice on ramp surface.” (Robinette, 1985 p. 46)

### 6.2.2.2. OUTDOOR STAIRS

Stairs should be designed to provide for the min. amount of energy expenditure, a factor which is particularly important to elderly and semi-ambulant people. They should be wide enough for people to pass one another, be of safe design, and have proper appurtenances to ensure their safe use.

**CLEARANCE:** “The min. clear width for any stairway should be 90 cm. Where stairs are heavily used, width should be increased to handle traffic requirements.
LANDINGS: The max. rise between landings for external unprotected stairs is 1.20 m. Where the stairs are protected, a 1.80 m. rise is acceptable. Where total grade change exceeds 1.80m intermediate landings are necessary.

TREAD and RISE: All steps in a series should have uniform tread width and riser height. Stair treads should be deep enough to allow a man to place his whole foot on it. The preferred range is between 27.5 cm to 36 cm. Risers for exterior stairs should be between 10 cm. To 15.5 cm in height, with 14.3 cm preferred.

NOSING: Nosing should be rounded or chamfered. A 2.50 cm rounded nosing is most acceptable. It should be of a color contrasting that of the treads and risers to make identification easier. Abrupt, square nosing provide less frictional resistance and cause tripping.

LIGHTING: Stairways should have an average maintained light level which insures their safe use in darkness. Light should be cast down toward risers so that the treads will not be in shadow.” (Robinette, 85, p.51)
6.2.3. HANDRAILS FOR OUTDOOR USE

Handrails serve the primary function of providing support for people who are in the process of climbing or descending stairs or ramps; whereas railings are placed more for reason of preventing people from entering or falling into a dangerous area.

General:

• "Handrails and railings should preferably be round or oval 3.75 cm to 5.00 cm in diameter.

• There should be a min. 7.50 cm spacing between handrails and adjacent walls, and wall surfaces should preferably be nonabrasive.

• Where handrails or railing are fully recessed into walls, a space of 15 cm should be allowed between the top of the rail and the top of the recess, and a spaces of 7.50 cm should be allowed between the bottom of the rail and the bottom of the recess.

• The ends of handrails should be rounded off or turn into the wall so that they are not hazardous.

• Handrails, railings, and their appurtenances should be maintained free of slivers, sharp protrusions etc.

4.2.3.1. HANDRAILS FOR RAMPS

• Handrails should be provided on both sides or every ramps. They should extend past the heel and toe, 30 cm to 45 cm, except in places where the extension in itself presents a hazard.

• The vertical dimension from the ramp surface to the top of a single handrail should be between 80 cm 90 cm.
A second rail is advantageous to children and wheelchair dependent people. Where two rails are used the top rail should be placed 90 cm to 97.50 cm, and the lower rail should be placed at 70 cm.

Handrails should be continuous across the landings.

4.2.3.2. HANDRAILS FOR STAIRS

Handrails should be placed on each side of a stairway and should be 82.5 cm vertically from the nose of the treads to the top of the handrail; the distance from the landing surface to the top of the handrail should be 80 - 90 cm.

Handrails should extend past the tread at top and bottom, a length of 30-45 cm unless the extension in and of itself creates a hazard. The change of direction of the handrail provides a tactile clue to a person about to make the last step. Where the extension of the handrail is of itself a hazard, notches or knurling on the rail may be used to provide the clue.

Handrails should be continuous across landing where possible.

Handrails should be designed to support 250 lbs. And should be kept securely fastened at all time." (Robinette, 1985, p. 57)

Figure 6.13. Height of Handrails (Robinette, 1985)
When steps become exceptionally wide, intermediate handrails should be provided at 6m-9m intervals.

![Handrails for Extra-wide Stairways](image)

**Figure 6.14. Handrails for Extra-wide Stairways (Robinette, 1985)**

### 6.3. PARKING

The objectives is to provide parking as close to a main accessible entrance as possible, ensuring a safe route which will allow sufficient space to get in and out of the car.

**ACCESS-AISLE.** “Parking spaces of greater width than normal are necessary for people who are disabled and use mechanical aids such as, wheelchairs, crutches and walkers. For example a person who is chairbound must have a wider aisle in which to set up his wheelchair”. (Robinette, 1985, p. 73) The clear spaces required beside accessible parking space are called an ACCESS AISLE. It should be at the same level of the parking surfaces, and be the full length of the parking spaces. The 1.20 - 1.50 access aisle with provides spaces for lowering lift platforms, swinging car doors open, and manoeuvring wheelchair and walkers while boarding vehicles. Where multiple parking spaces are provided, one access aisle can serve two spaces.

![Parking Dimension](image)

**Figure 6.15. Parking Dimension (www.access-board.gov 16.05.1998)**
**NUMBER OF STALLS:** “A minimum of two spaces per parking lot should be designed for use by physically restricted people or at least one space per 25 cars. The required number of designated spaces is shown below.” *(Goltsman, 1992, p. 21)*

<table>
<thead>
<tr>
<th>Spaces</th>
<th>1 to 25</th>
<th>26 to 50</th>
<th>51 to 75</th>
<th>101 to 150</th>
<th>201 to 400</th>
<th>401 to 500</th>
<th>1001 to over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>7</td>
<td>9</td>
<td>#2 of total</td>
</tr>
</tbody>
</table>

**LOCATION:** “These spaces should be placed as close as possible to a major entrance of a building or function to minimise guest travel distance and exposure to inclement weather, preferably no more than 30 m away.” *(Robinette, 1985, p. 73)*

**CURB RAMP LOCATION:** “Allow direct connections to walks so that guests do not have to travel on drive ways or between parked cars to reach entrances. This route of travel is particularly dangerous for guests in wheelchairs, who may not be readily visible to other drivers. Curb ramps should be provided at each access aisle to connect parking spaces to walks.” *(Davies, Beasley, 1994, p. 40)*

**SURFACE:** “Ground surfaces for parking spaces access aisle and accessible routes are best if paved with hard surface materials such as, concrete, brick, or asphalt. Where paving is not possible, crushed stone, sand stone and other materials that compact into relatively smooth dense surfaces can also be used. Gravel, sand, earth and similar materials that are soft or loose must not be used, because many people who walk with difficulty or who use wheelchairs can not move across such surfaces.

Surfaces at parking spaces must not be sand, gravel or other loose materials

*Fig. 6.16. Surfaces at parking spaces (The accessible housing design file, p. 17)*
**SLOPE:** Accessible parking spaces and access aisle should be at the same level to make wheelchair manoeuvring easier. If a ground slope is unavoidable it should be parallel to either the length or width of the parking spaces. A diagonal or multiple cross slope is extremely difficult to manoeuvre and should be avoided. Slopes should be limited to a max. of 5 cm rise or drop for every 125 cm. Gentle slopes are required as parking spaces with steep slopes make it difficult for people to open or close their doors or position theirs lifts.

![Figure 6.17. Surfaces Slope of Parking](The accessible housing design file, p. 18)

**CURB RAMP:** When accessible routes such as sidewalk are placed at the same level as the parking spaces, wheelstops or bollards should be provided to prevent vehicles from reducing clear width of walk. If curbs or changes in level are unavoidable, curb ramps or sloping surfaces at access aisle should have a max. slope of 2.5 cm rise for every 30 cm. Curb ramps should be recessed into curbs rather than projecting out into traffic or parking lanes. Two types of recessed curb ramps are commonly used in a variety of applications, flared ramps, returned ramps. Extended curb ramps on access aisle interfere with van lifts and access to front door of cars should not be installed.
**Figure 6.18. Curb ramp at access aisle** *(The accessible housing design file, p. 20)*

**VAN PARKING:** Vans with side platform lifts cannot be accommodated in conventional accessible parking spaces. These vans require 2.40 m side clearance and access to operating controls to retract the platform and lock the vehicle. Controls are typically located on the passenger side of the van, above the tail light. This requires extra-wide parking spaces 4.88 m or a wide sidewalk 2.44 m parallel to the parking spaces. These spaces must also provide a vertical clearance of at least 2.85 m. Parking spaces for vans should be reserved, either on grade or within parking structures and designated as van accessible. One out of every eight reserved stalls (but at least one) must be designated as “van accessible” and must comply with “van accessibility requirements.”

*(Davies, Beasley, 1994, p. 41)*

**SIGN:** “Every reserved parking stall should be designated with a sign, displaying the international symbol of accessibility. The sign must be at least 450 cm² in size. Painted pavement markings must be provided in addition to require signs. Reserved stalls must
be painted solid blue with a white international symbol of accessibility. Sign must be provided that warn drivers of the possibility of towing if reserved spaces are used without authorisation. The sign must also provide information covering towed vehicles. (Goitsman et al., 1992, p. 21)

**OVERHANGING BUMPERS:** “Accessible routes adjacent to parking must allow for the possibility of parked cars overhanging into the walkway. A min. 90 cm width must be maintained at all times.

**Walk Width Must be Maintained**

Wheelstops or bollards to prevent vehicle from reducing clear width of walk

90 cm min. clear walk width

Flush joints preferred

Figure 6.19. Bumpers (The accessible housing design file, p. 19)

**GENERAL DIMENSIONS:** Designated stall must be at least 2.70 m wide and 5.40 cm. Every designated space requires an adjacent access aisle. This aisle must be on the passenger side of each spaces unless it is located between and is shared by two designated spaces. Access aisle must be at least 1.20 to 1.50 m wide. Van spaces must be provided with a wider aisle than normal designated spaces. Aisles adjacent to van accessible spaces must be 2.40 m in width. (see figure 6.15)

**PARALLEL PARKING:** Parallel parking spaces should be placed adjacent to walk system so that access from the car to the destination is over a hard surface. Such spaces should be made 4.20 m wide 6.60 m long and should either have a 1:6 ramp up to the walk, or should be separated from it by bollards or some other device if the road level is at the same elevation as the walk. These areas should be designated as special parking since they may otherwise appear to be a drop-off zone. (Robinette, 1985, p. 73) see fig. 6.20

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**LIGHTING:** “Outdoor lighting (1 footcandle) should be provided at accessible parking and along the route to the entrance for night time safety.

**TURN AROUND:** Turn around at the end of parking lots be easily converted into “access ramp” for the handicapped and eliminate the need for curb cuts.” (Robinette, 1985, p. 78) see fig. 6.21

![Parallel Parking Diagram](image)

**PARALLEL PARKING**

Curb ramps provided at 1/6 (17%) slope

Aisle allow pedestrian access between parked cars

Figure 6.20. Parallel Parking (Robinette, 1985)

![Ramped Turn Around Diagram](image)

**RAMPED TURN AROUND**

Signage designating handicapped parking

Curb ramp 17% max. slope

Figure 6.21. Cross section of parking (Robinette, 1985)

**6.4. WAITING AREAS & DROP-OFF ZONES**

Transportation mode change areas such as parking lots, bus stops, train stations, and terminals tend to be confusing and difficult to negotiate due to their size, the large amounts of traffic usually associated with them, and necessity to change grade levels. Generally, if access through these areas is made simple for wheelchair dependent people pushing strollers and dollies, then access is made easier for all people. The three major
site areas concerned with mode change are waiting areas, drop-off zones, and parking facilities.

6.4.1. WAITING AREAS

"Waiting areas for mass transit are perhaps the most common of all exterior waiting areas. Due to the large amount of time waiting for buses and trains, it is important that these areas be physically accommodating for all people.

When designing exterior waiting areas, the following items should be considered:

**WIDTH**: The waiting area should be large enough to comfortably accommodate the average number of people normally using it.

**SEATING**: Seating should be provided for the average number of daily users, with space also allotted to park wheelchairs, strollers, and other wheeled vehicles. Where possible, an overhead shelter or canopy should be used to minimise the effect of the weather. Care should be taken to locate vertical support posts out of the paths of pedestrian either using or passing near the shelter.

**LOCATION**: Make sure that waiting area designs allow passengers to see approaching vehicles before they arrive at the stop. This courtesy allows all passengers time to adequately prepare themselves for boarding and as a result, shorten loading times for vehicles and reduce embarrassing situations for handicapped individuals.

**CURB RAMP**: Loading areas should be design so that circulation from the waiting area is uncomplicated and over paved surfaces. The loading area itself should not have a curb that must be climbed. If a curb can not be avoided, a 1:6 ramp will be necessary.

**LIGHTING**: Lighting (5 footcandle) is also important for this area at night time for safety and comfort.

**CLEARANCE**: In front and back side of the shelter there should be provided for waiting passengers and pass through pedestrian traffic 1.50 m additional paving is recommended to eliminate congestion of through pedestrian on walk. *(Robinette, 1985, p.67)*
6.4.2. DROP OFF ZONES

"Drop off zones are beneficial for letting off and picking up people who are laden with packages, have children in strollers, or are physically restricted in some way. The objectives is to provide stopping as close to a main accessible entrances as possible, ensuring a safe route which will allow enough space to get in and out of the car.

The designer should consider the following items:

**WIDTH**: The width of the drop of zone should be a minimum of 3.60 m wide to allow the car doors to be fully opened for ease of access.

**LENGTH**: Length of the zone should accommodate at least two car, allowing 7.50 m for each, and should have gradual access to the main road.

Figure 6.23. Drop off Area (Robinette, 1985)
**CURB RAMP:** Where the zone is at the same grade as the adjacent walk, bollards or some other suitable device should be used separate the two functions. When a curb exists and can not be removed one small 1:6 ramp per car should be provided to make the grade change.

**SIGNAGE:** Signage should be provided to identify the drop of zone and limit its define use to a “pick-up – and drop-off” function.

![Diagram of passenger drop off area outside traffic lanes](image)

Figure 6.24. Drop Area with Curb Ramp (The accessible housing design file, p.21)

**BOLLARDS:**
- Bollard are useful as traffic control device as they allow for pedestrian access while halting vehicular access. They should be spaced a minimum of 90 cm apart to allow a wheelchair to pass.
- Bollards can be useful for seats. If they are at least 30 cm wide, and between 45 cm to 60 cm high.
- Bollards should be painted in a contrasting colour to the paving they rest on and should be well illuminated at night to minimise the risk of a person inadvertently walking into them. (Robinette, 1985, p.67)

6.5. WALLS, FENCES & RAILINGS

In addition to their common functions of retaining earth and separating site elements, walls can be designed to provide a number of secondary functions such as
seating, surfaces on which to rest packages, and support and guidance to physically restricted people.

When designing seat walls, retaining walls and free-standing walls, the designer should consider the following items:

6.5.1. WALLS

- Seat walls should be between 45 cm and 55 cm high in order to accommodate physically restricted people. Walls lower than this present a hazard as they are easily overlooked.
- A width of at least 30 cm is required for comfortable seating on the top of any wall.
- Retaining walls between 60 cm and 90 cm are useful in providing surfaces to lean against in a half-sitting position, or as a surface to sit upon. Wheelchair users can easily rest packages on the walls of this height.
- Walls between 90 cm and 120 cm in height are particularly good for package rests. They are difficult for most people to sit on.
- Where pedestrian or bicycle traffic occurs adjacent to the top of a wall, a barrier should be incorporated between the walk way and the edge to prevent people from inadvertently falling off. Barriers can be either a railing device or a natural hedge.
- Free standing walls are above 120 cm in height.
- Too high for seating, these walls are useful to the handicapped only with the addition of a handrail. Handrails should be located according to specifications in the ‘Handrail’ section.
- Where walls are located adjacent to walkways, weep holes should not be located so as to drain out onto the walking surface. Water drainage could from ice spots during winter months.
- Drain pipes should not project past the face of any wall. Likewise, walls should be free of any projections or appendages which might prove dangerous to people passing by.
- For inherent reasons of safety, all walls should be maintained in good condition.” (Robinete, 1985, p. 60)
A 7.5 cm drop behind seat walls is recommended to keep drainage from running onto seat surface. 20 cm recommended seat width 30 cm preferred. 45 recommended seat height 50 cm max.

A 30 cm setback is recommended.

60 cm to 75 cm high walls are useful as rest support.

Provide 60 cm min space in front of walls to keep legs off adjacent walkway. 90 cm for wheelchair.

Walls in the 90 cm to 100 cm range can be used as arm supporter.

Figure 6.25. Wall Types (Robinette, 1985)

6.5.2. FENCES

"Fencing is one element in the exterior environmental that has specially been used as a barrier. For this reason, the subject matter below will only deal with safety factors involved when fencing is used in public areas. When using fencing, the designer should be aware of the following conditions:

• Unless specifically designed for security purposes, fencing should not present any unnecessarily dangerous situations for children or other people who might be tempt to climb over or on it.

• Post should be sunk adequately into the ground so that the fence does not collapse during high winds or with the weight of a climber. The fence fabric should be well secured to all posts for similar reasons. Fencing should be free of any projections or appendages which might prove dangerous to people on an adjacent walkway, playing field etc. (Robinette, 1985, p. 63)
6.5.3. RAILINGS

- "Railings should be placed between 75 cm to 90 cm off the ground.
- Where safety is an important concern, there should be at least 2 parallel bars that occur below the top rail. These should be no further apart than 30 cm. Additional security may be had with the application of a structural screen to the railing.
- A 2.5 cm to 7.5 cm high curb placed 10 cm in front of a railing will prevent the footrest of a wheeled vehicle from striking the vertical supports of the railing as it moves adjacent to it." (Robinette, 1985, p. 63)

Figure 6.26. Railing (Robinette, 1985)

6.6. PLAYGROUNDS

Thousand of children are alone who handicapped by severe mental and emotional problems are only able to achieve satisfying play through the use of define apparatus. Likewise, an imaginative children may quickly lose interest in traditional play equipment whereas a creative apparatus may hold his attention. Therefore, the designer should strive to create a playground that will provide a rich and wide ranging set of both defined and creative experiences.

Just as designers have been designing the environment for the ‘normal’ man, so have playgrounds been designed for the ‘normal’ child. Unfortunately, the child who is physically handicapped usually has restricted motor development and as a consequences
of his limited movement, does not see the world and himself in the same way as a normal individual would.

By designing the play in which a disabled child can manipulate his environment as much as possible by himself, regardless of the extent of his disability, the child can have motor experiences comparable to those of normal children. These experiences give a child a broader range of perceptual sophistication and thus a fuller and more normal base for academic growth and self appreciation.

The following criteria are given for consideration in enhancing the use of play facilities both from the standpoint of serving more people and of making the facility safer.

ACCESS TO: A playground should be easily accessible from the adjacent community over hard surface paths, with ramps placed where necessary.

ACCESS WITHIN: Access within the playground should include a system of hard surface paths. Not only does this improve mobility for the handicapped, but can double as a tricycle path.

ORGANIZATION: The play area should be reasonably organised in order that a child who is blind may learn how to locate equipment as he enters and moves about the grounds.

APPARATUS LOCATION: Apparatus able to accommodate a greater diversity of children does not need to be drastically altered from those now in use. Rather, they must be placed and modified in such a way as to make them both more safe and accessible. Sharp edges, splinters, or poorly designed appurtenances should be eliminated.

DIVERSITY: Playgrounds that are accessible to handicapped children require a certain amount of adult supervision. The amount of supervision varies depending on the type of the handicap the child has, the type of equipment presents, and the number of the handicapped children using the facility. This may mean that in certain cases parents will have to accompany their child in order that they may supervise his play. In other cases, a single attendant may be sufficient. A series of small vignettes have been prepared to illustrated some of the many recreational devices that can be incorporated into play grounds and can be used by most handicapped children.”(Robinette, 1985, p.95)
6.6.6. ALL GAME AND SPORTS AREAS

ACCESS: "To be used by a person with a disability, game and sports areas must be adjacent to an accessible path of travel. This path must be smooth, level, stable and slip resistant.

SURFACE: The surface of the sports area must be accessible to people with disabilities. In general, this means that the area must be surfaced with a wheelchair-accessible materials (e.g. pavement, astroturf, rubber padding, etc.) However, in determining accessibility, it is important to take into account the ability level of potential users. While grass and dirt surfaces are not accessible to many people with disabilities, they can be accessible, when firm and relatively level, to the more athletically inclined.

GATES:
- Vertical clearance: There must be at least 2.0 m of vertical clearance at the gate or opening.
- Width: The clear width at the gate or opening must be at least 80 cm." (Goltsman et al., 1992, p.41)

Figure 6.27. Play Area Dimensions (Robinette, 1985)

6.6. LIGHTING CONSIDERATION

"The purpose of site lighting is basically twofold: (1) illuminate, and (2) to provide security. Lighting should be provided in areas that receive heavy pedestrian or vehicular use and in areas that are dangerous if unlit, such as stairs and ramps, intersections or abrupt changes in grade. Likewise, areas that have high crime rates should be well lit in order that people travelling at night may feel personally secure from attack."
The phrase “well lit” has a wider meaning than simply higher light levels. Unless light is placed where it is really the most useful, the expense of increasing footcandle levels is wasted. An area may need only the addition of a few more lights to correct its problems, not an increase in light levels from fixtures that are too few, or poorly located.

When considering the installation or renovation of lighting systems, the designer should be aware of the following considerations:

- Overhead lamps have the advantage over low lever fixtures of providing better economy and more even light distribution. Fixtures should be placed so that light patterns overlap at a height of 2.10 cm, which is sufficiently high to vertically illuminate a person’s body. This is particularly important consideration now that lighting fixture manufacturers are designing luminaries with highly controlled light patterns.

- At hazardous locations such as changes of grate, lower lever supplemental lighting or additional overhead unit should be used.

- Where low lever lighting is used fixtures should be placed in such a way that they do not produce glare. Most eye levels occur between 1.10 cm (for wheelchair users) and 1.80 for standing adults.

- Posts and standards along thoroughfares should be placed so that they do not present hazard to pedestrians or vehicles.

- A minor consideration is the use of shatterproof coverings on low-level lighting where there is the change of breakage from vandalism or mishaps from people playing
frisbee, football, etc. The absence of any resulting broken material will reduce otherwise potential hazards.

- When walkway lighting provided primarily by low fixtures, there should be sufficient peripheral lighting to illuminate the immediate surroundings. Peripheral lighting provides for a better feeling of security for an individual since he can see into his surroundings to determine whether or not passage through an area is safe. Such lighting should be approached from one of two ways:
  a: By lighting the area so that an object or person may be seen directly.
  b: By lighting the area to place an object or person in silhouette.

When deciding horizontal length between lighting fixtures and using with high efficiency, “cut off terminology” and Transverse Road Line, Longitudinal Road Line are important terminology.” (Robinette, 1985, p.8) see fig. 6.29.

Figure 6.29. Types of Distribution (Robinette, 1985)

6.7. SIGNAGE CONSIDERATION (Robinette, 1985)

“Essentially signs should perform three functions. They should: (1) Identify a place and indicate whether or not it is accessible to everyone; (2) Indicate warnings where necessary; (3) Give routing information.

The information given on size should always be clear and precise. Sign locations should never present unnecessary hazards for pedestrian or vehicular traffic.” (Robinette, 1985, p.89) In addition, “signage should be as consistent as possible in
terms of location, mounting height, color, typeface and terminology." (Davies, Beasley, 1994, p. 53)

"IDENTIFICATION AND ACCESSIBILITY:

Key site-related areas that should be identified by sign posting are:

- Traffic signs announcing public rest stops with accessible facilities. Public lavatories accessible to pedestrians.
- Special car parking.
- Directional signs for vehicles and pedestrians such as "one way" street signs.
- Signs identifying accessible entrances to building or facilities.
- Informative signs on buildings.

![Universal signs of Disabilities](www.access-board.gov.16.05.1998)

In order that signs be more useful to everyone, they should be designed to be readable by all people, including the visually handicapped. This can be accomplished in a number of different ways:

- Braille strips can be placed along sign edges.
- Raised or routed letters are readable by the blind or partially sighted.
- Graphic symbols are useful in transmitting messages quickly, but should be avoided as the sole means of imparting information because they can be confusing to the blind.
- Signage that will be used by the visually handicapped must be located in a manner that first allows the sign to be recognised and second, allows the sign surface to be touched by the reader’s hand.
- Signs along walkways or corridors should be set back a minimum of 45 cm and placed at a height of 1.20 m to 1.65 m.
WARNINGS: Textural paving may be used to warn of imminent hazards such as abrupt changes of grade, stairs, ramps, walk intersections, etc. and the locations of special information. The only effective use for such a system would be in a closed environment such as a school for the blind.

ROUTING INFORMATION: Where it is critical that people be able to travel quickly and unhindered to their destinations, routing information should be given. Hospitals, college campuses, institutions, etc. should have posted signs, lines, or allows painted on walk systems that are accessible to wheeled vehicles, particularly where such path systems are limited in number. Access to buildings with only one or two entrances that are accessible to wheeled vehicles should be clearly indicated by routing signs.

READABILITY: The readability of any sign is a function of many items. When designing or choosing the format of a sign, the following things should be considered.

- Information should be as concise and direct as possible. Lettering styles and graphic symbols should be as bold and simple as possible. Fancy styles become cluttered, are time consuming and confusing to read.
- Colour schemes of contrasting colours with light images on dark background make signs both easier to read and more readable from longer distances.

PLACEMENT: The placement of signs is important because wrongly located, they may present an obstacle or hazard. Unless intended to be read by the blind or the partially sighted, they should be set far enough off a travelled way and/or high enough off the ground so as not to be inadvertently walked into."(Robinette, 1985, p.88)
Keep signage above 240cm where pedestrians may inadvertently walk into "head height" objects.

Where bicycles are involved, signs should be kept above an 255cm ht.

Min seatback of 60cm are recommended at curb and walkway edge to keep pedestrians from accidently walking into sign or posts

Seatbacks are especially important where large vehicles with lateral overhang will be operating along narrow streets and loading docks

Figure 6.31. Sign Posting(Robinet, 1985)

6.8. VEGETATION CONSIDERATION

"There are some very basic considerations worth mentioning concerning placement, choice, and maintenance that should be observed by the designer.

- Potentially dangerous plants such as those having large thorns or those with poisonous fruit should not be placed immediately adjacent to major walks where they may present a hazard. This is not to say that such plant material should not be used near heavily travelled areas, but only that it should be used with discretion.

- Proper maintenance of plant material is necessary to assure that dangerous situations do not arise. Seed pods, berries or fruit that may produce a slipper surface should be removed.

- Branches that overhang walks should be pruned to a height 2.55 cm above the ground to prevent eye or face injuries.
• In areas where snow is a common winter occurrence careful consideration should be
given to the type and location of plants which will be placed along public
thoroughfares because:
• Species which have a tendency to break under ice and snow loads should be kept
away from heavily traffic areas.
• "Snow droop" can cause branches to bend below a safe level above walkways and
streets. It should be determined whether or not these branches present a hazard so
that they may be pruned accordingly.
• Plant material is useful for providing shelter from the sun, and to a extent, from the
wind.
• Plant materials is useful for providing shelter from the sun and to an extend from the
wind.
• Plant material can be used efficiently as barriers in controlling the movements of
people through public spaces or in keeping them away from hazardous areas.
• Avoid placement of planting materials where their shadows might prevent the
effective melting of ice and snow by the sun.
• Improper location or poor maintenance can quickly lead to a reduction of the
efficiency of lighting system.
• Creeping ground covers or invasive materials can be trouble. If not contained keep
them off buildings, walkways, steps, ramps, lighting and sign fixtures.
• They can be used as a noise prevention materials especially heavily traffic
area."(Robinette,1985,p.81)

6.9. SITE FURNITURE

In recent decades, then, the concept of urban design has developed notably and in
a close connection with urban or public furniture. All modern cities have an
administrative sector to deal with seating, signs, garbage bins and guardrails, lighting,
fountains and street cleaning. The street has been transformed into enlarged living room
for all citizens. For this reason, it has to be comfortably appointed and furnished.
Unfortunately, this statement is not valid our cities, therefore the following data
represents design recommendations to create accessible, livable and attractive cities in
regard to the most commonly used elements of site furniture. The criteria shown are intended to enhance the use of specific types of furniture by a greater diversity of people.

**SEATING**

"Seating should be provided adjacent to paved areas, along walks, near the tops and bottoms of major ramps and stairs and where otherwise deemed appropriate. It should not be located within a travelled way where it would create an obstruction. Seat height in a given area should be uniform and at a height from the ground of 45 - 50 cm. Seats should be designed with back support and arm rests. Aside from being desirable from a stand point of comfort, they also provide support for people rising up off the seat. A space of 1.20 m should be allowed between the front of a seat and the nearest obstacle. A space 75 cm wide between ends of benches, or at the end of one bench, allows room for strollers and wheelchairs." (Robinette, 85, p. 112)

![Figure 6.32. Seating Dimension(Robinette, 1985)](image1)

![Figure 6.33. Seating Dimension with Rest Areas(Goltsman, 1992)](image2)

**OUTDOOR TELEPHONES**

- "All installations of outdoor telephones should include at least one unit that is useable by people not able to use standard telephones. To this end, the following items should be considered:
• Access to the unit should be over a hard surface.

• The installation should be located either entirely out of doors or, if enclosed, should be spacious enough to permit access by a wheelchair. The top of the telephone should be no higher than 1.20 m above the floor.

Figure 6.34. Outdoor Telephone Dimensions (Robinette, 1985)

• Public telephone should be operable by push buttons.

• Telephone books should be located approximately 75 cm above the floor.

• A fold-up seat should be provided at a height between 45-50 cm.

• A volume control should be provided in an out-of-the-way place on the telephone to aid the hard-of-hearing.

• Receiver-handset cords should be at least 72.5 cm long, if directories are permanently attached.

• Lighting should be provided above the shelf to help guests read small print. (Braille, 1985, p.119)

• "To facilitate conversation and increase privacy phones should be located away from corridor traffic and other sources of noise." (Davies, Beasley, 1994, p.60)

SWITCHES, BUTTONS, SOCKETS AND WALL MOUNTED APPURTENANCES:

• "Switches for lights, buttons for elevators and street crossings, electrical sockets, fire extinguishers, alarm boxes, etc. should be placed no higher than 1.20 m from the
floor. Pull down levers or control knobs of any kind should not require more than 8 lbs. of force to operate them." (Braille, 1985, p.119)

**DRINKING FOUNTAINS:**

"In order that a greater diversity of people from small children to wheelchair dependent individuals may be accommodated by drinking fountains, the following items should be considered:

- In all areas, fountains should be placed on hard surface areas or immediately adjacent to hard surfaces in order to be accessible to wheelchair dependent people.
- It may be necessary to design a free standing ambulant adults, and a lower fountain for children and wheelchair dependent people.

![Diagram of a drinking fountain with accessible design considerations](image)

Figure 6.35. Drinking Fountain Dimension (Robinette, 1985)

- Fully recessed fountains should be avoided unless adequate space is allotted for wheelchair access.
- Controls for drinking fountains should be hand-operated levers rather than knobs. Spring-loaded return mechanism should not be used in conjunction with either levers or knobs since the force required to activate these devices is more than some people are able to exert. Both the lever and the bubbler should be located at the front of the fountain.
- Stepping blocks, often provided to enable children to reach the bubbler, should be located so as not to interfere with access to the fountain either by totally ambulant people or wheelchair dependent people." (Robinette, 1985, p.119)
**TRASH RECEPTACLES:**

- "Trash receptacles should be of a type that may be operated by a single hand movement.

- The opening of a trash receptacle should approximately 90 cm above the ground. Spring-loaded doors that are foot-operated should not be used.

- The receptacle should be strong enough to provide support for people who may require it in order to use the receptacle.

- Edges should be crimped, rounded or smoothed to prevent cuts or abrasions." (Braille, 85, p.119)

![Diagram of trash receptacle dimensions](image)

Figure 6.36. Trash Receptacle Dimensions (Robinette, 1985)
Chapter 7. ABSENCE and FAULTS OF EXISTING OUTDOOR BUILT ENVIRONMENT IN RESPECT TO DISABLED PEOPLE REQUIREMENTS

In this chapter design and maintenance guidelines and standards will be examined, in other words, outdoor space components:

- Walks and Intersection,
- Ramps, Stairs and Handrails,
- Parking,
- Waiting Areas,
- Playgrounds,
- Site Furniture will be evaluated in respect to standards and guidelines.

Walls, Fence and Railings, Lighting, Signage consideration evaluated under Walks and Intersection section as a subitem. For this reason, first, visual survey is completed under these items by taking photograph and measuring them in its actual place in Izmir city centre. Then, measured values compared to design and maintenance guidelines and standards. In this way their absence and faults is determined. At the end, few examples under these items are added to show successful solutions from abroad.

7.1. WALKS and INTERSECTION

Fig. 7.1. Organisation of Walking Surface(18 April 1999 by T. Gökgöz from Alsancak, front of 100.Yıl High School)

- There is no paving material to make walking area clear and stable. A manhole should be locate at the same level with walking surface because it constitute an obstacle for wheel-chair users even abled-bodied people.
- Along right-hand of walkway furniture can be located on the condition that furniture strips are provided for people with low-vision
• Cross slope of 2% should be provided for water run-off.

• Wall height is 30 cm. It should be 45 cm recommended 50 cm max. for seating. 60 cm leg space should be maintained.

Fig. 7.2. Curb ramp (18 April 1999 by T. Gökçen from Alsancak front of 100. Yil High School)

• Walk surface should be continuous. Although curb ramp provided (%17) parked car prevent people from walking steadily.

• Curb height should be 16 cm but here it is 30 cm. It constitute an hazard even able bodied people.

Fig. 7.3. Surface of Walkway (25 April 1999 by T. Gökçen on Fevzi Pasa Avenue)

• On both fig. 7.3. , 7.4. surface of walk should possess stability and firmness and should be smooth in texture. Here it is very difficult for wheelchair users to move because of walking surface.
Fig. 7.4. Surface of Walk (25 April 1999) by T. Gökçen - Fevzi Pasa Avenue

Fig. 7.5. Surface of Walkway (25 April 1999, by T. Gökçen, near Hilton)

- Clear space for two way pedestrian traffic is enough but the surface of the walk should be smooth in texture for wheelchair users.
- Textured warning strips is provided at pedestrian crossing point but there is no curb cut.
- Although walking route has enough space, location of vegetation lighting and site furniture especially ticket sale box with waiting area prevent continuous and clear walking routes from people. There is no order and harmony on walking route.

- In the name of providing continuous walk surface no steps of any kind are allowed on a walking route. Here 20 cm (meaningless curb) is great obstacle for wheelchair users.
Although total walk width 2.80 m, clear space is 1.20 m because of location of glass receptacle. It should be min. 1.65 m for two way traffic.

Although walk width 1.98 m vegetation elements occupy 110 cm of walk surface. Remained 88 cm is not enough even 1.20 m one way traffic. Left side of vegetation element, 80 cm space is convenient for providing 120 cm or 165 cm clear space.

Wall height 73 cm is convenient for rest support.
- A continuous and clear walk surface should be provided. Here 90 cm clear space is not enough for clear passage and there is no curb ramp. For two way traffic 2.00 x 1.65 m headroom should be provided.

- Improper location or poor maintenance lead to a reduction of the efficiency of lighting system.

- Tree-Grates make walking surface narrow. Whole walking surface width is 165 cm but clear space for two way traffic traffic. 165 cm should be maintained. Using vegetation element prevent 2.00 m headroom clear space.
40 cm clear space is not enough to pass. (Total width of walkway is 270 cm.)

- Location of sign 179 cm in height. It should be located 225 cm. Here this sign constitute a great hazard for pedestrian and min. 60 cm setback of sign from headroom is recommended.

- Because of vegetation elements headroom is 173 cm in height. It should be 200 cm min.

- Furniture strips can be provided to access to furniture for many guests with low vision and without canes. It can be identified both a changing materials and a texture and a contrasting color.
• Branches that overhang walking route should be pruned to a height 255 cm above the ground to prevent eye or face injury. Here it is 173 cm.
• Improper location can lead to a reduction of the efficiency of the lighting system.
• 70 cm wall height is convenience for rest support.
• Lighting and Planting location is successful in the name of clear and continuous walk surface, but surface of walk should be smooth in texture.

• Wall height 100 cm is convenient for arm supporter.

- Maintenance is very important after working on. Repairs should be made to eliminate any condition that may cause injury.

Fig. 7.16. Maintenance of Walkway (14 March 1999, by T. Gökçen, across the IYTE)

- Although there is a level differentiation successful solution provided without stairs with convenience slope.
- While crossing the street 120 cm clear space should be provided, but here it is 75 cm and no curb ramp.

Fig. 7.19. Pedestrian Crossing (25 April 1999, T. Gökçen, Çankaya Intersection)

Fig. 7.20. Pedestrian Crossing (25 April 1999, by T. Gökçen, Çankaya Intersec.)
For Çankaya Intersection (Fig. 7.19, 20, 21, 22) it can be stated:
- A variety of visual and textual material should be used for crosswalk delineation. Contrasting paving materials should be placed behind curb cut to act as warning strip for the blind, paving should extent full width of walkway.
- Passage through pedestrian island should be 120 cm min. width for two way traffic to protect pedestrians from vehicular.
- There is no curb cut. %17 max. slope and 150 cm min. width for two way traffic should be provided.
- Push buttons to activate pedestrian crossing light should be located at an accessible height 75 cm to 90 cm both children and person in wheelchairs.

Fig. 7.23. Pedestrian Crossing (18 April 1999, by T. Gökçen, front of Izmir Cinema at Alsancak)

- Here curb ramp gradient is %11, but textual changing should be provided between walking route and ramp surface.
For both Fig. 7.24,25 it can be said that

- While crossing, there is no curb ramp or 120 cm pedestrian island for pedestrian safety.

It can be summarised for walking areas of Izmir City Center that all pedestrian areas design with lack of knowledge, order and harmony. There are examples in the name of providing design standards, but they need redesign. It means additional cost for all.
7.2. RAMPS, STAIRS and HANDRAILS

Fig. 7.26. Ramp Consideration (18 April 1999, by T. Gökçen, front of Izmir Metropolitan Municipality)

- Handrails should be provided on both sides of a height of 90 cm and the lower rail should be placed at 70 cm.
- The surface of ramp should prevent slipping.
- Low curbs along the sides of ramp should be provided as surface which wheeled vehicle can turn their wheels in order to stop.

Fig. 7.27. Ramp Consideration (18 April 1999, by T. Gökçen, Konak)

- Ramp slope is %42, it should be %8.33.
- Height of handrail is 94 cm, it should be 90 cm and they should extend a min.45 cm beyond top and bottom of ramp.
- Width is 90 cm, it should be 120 cm.
Gradient of ramp should be 8.33, but it is 25%

Height of handrail is 90 cm, but lower level handrail should be placed at a height of 70 cm. Handrail should extend a minimum of 45 cm beyond top and bottom of ramp.

5 cm high curbs should be provided at the edge of ramp surface for use by wheelchairs as emergency wheelstops.

5% cross slope should be provided.

Max. riser height should be 16 cm, here it is 18 cm, max. tread should be 27.5 cm, but it is 30 cm.

Ramp gradient is 32%

Height of handrail is 80 cm, lower level is 55 cm. They should be 90 cm and 70 cm.

150 cm landings should be provided.
Here it is 130 cm.

- 5 cm curb at edge of ramp surface should be provided as emergency wheelstops and handrails should extend 45 cm beyond top and bottom.

Fig.7.30. Ramp Consideration(25 April 1999, by T. Gökçen, at Mithatpasa Küşükyali)

- Gradient of ramp is %11. It should be %8.33. Width of ramp is 147 cm.
- Handrail should be provided at a height of 90 cm and 70 cm(lower level)
- Width of Tread should be max.27.5 cm but here it is 30 cm.

Fig.7.31. Ramp Consideration(18 April 1999, by T. Gökçen, M. Kemal perimeter road)

- Although ramp is provided just 3 cm in height obstacle make access difficult for wheelchair users to building.
Fig. 7.32. Curb Ramp Consideration (25 April 1999, by T. Gökçen, front of McDonald’s at Çankaya)

- It is impossible to access for wheelchair users with %113 ramp slope. It should be just %17 and textual changing should be provided behind curb cut for blind people.
- Curb height is 34 cm. It should be max. 16 cm.
- Flared ramp should be provided. Slope of side of flared ramp should be %10.

Fig. 7.33. Curb Ramp Consideration (25 April 1999, by T. Gökçen, Fevzipasa Avenue)

- %34 curb cut gradient is so excessive. It should be %17. Flared ramp should be provided.
- Textual changing can be provided in different way.
• Width of ramp is 60 cm. It should be min. 120 cm. Height of curb is 26 cm, it should be 16 cm max.

Fig. 7.34. Curb Ramp Consideration (14 March 1999, by T. Gökçen, behind the Efes Otel)

• Gradient of curb cut is %17. It is convenient but it can be ordered in more perfect way.

• A textual changing can be provided in different way. It should be non-slip but not corrugated as the grooves may feel with water, freeze and cause the ramps to become slippery.
Although ramp gradient is 12%, solution can be more attractive and carefully designed.

- Flared ramp should be provided.
- Height of curb is 24 cm, it should be 16 cm max.
- Width of ramp is 125 cm, it is convenient for one way traffic.

Fig. 7.35. Curb Ramp Consideration (14 March 1999, by T. Gökcen, front of 100. Yil High school)

Fig. 7.36. Stairs Consideration (14 March 1999, by T. Gökcen, public buildings at Konak)
• It is impossible for wheelchair users to access to public building. Even if there is only one stair, it has the same mean with it for handicapped people.

![Image of a person using a wheelchair on a ramp](image)

**Fig.7.37. Handrail Consideration( 14 March 1999, by T. Gökçen, at Konak)**

• Partially successful solution without stairs gradients should be more smooth
• Handrails should be provided at a height of 90 cm and 70 cm for lower lever.

In summarise, recent ordered especially curb cuts, has not convenient gradient. Curb cuts should be designed with 17% slope, ramps with stairs should be 8.33%. All designed curb ramps, ramps and stairs should be redesigned. In this situation they are not usefull for wheelchair users. It means again reconstruction of them is extra cost for all or inefficient usage of national source. At last it can be state that all level differentiation should be solved with ramp. If level differentiation is too high it should be solved on the condition that providing landing for each 75 cm of rising.
7.3. PARKING

- Location of parking is convenient for handicapped because it located near entrance of Love Road.
- There is no curb for handicapped people with max. slope of 17%
- Dimension of parking area should be 240 cm x 540 cm with 150 cm access aisle for manoeuvring wheelchair.
- Painted pavement marking must be provided in addition to sign. Reserved stall must be painted solid blue with a white international symbol of accessibility. Sign must be that warn drivers of the possibility of towing if reserved space are used without authorisation.
- Lighting should be provided for night time safety.
Fig. 7.39. Parking for Handicapped people (25 April 1999, by T. Gökçen, front of central post office Alsancak)

- There is no curb ramp for wheelchair users with a ramp of %17.

Fig. 7.40. Parking for Handicapped (18 April 1999, by T. Gökçen, Narlidere Migros)

- Dimension of parking area is 400 cm x 210 cm. It should be 390 cm x 540 cm with a access aisle.
- It can be provided different solutions with green area. It can be organised as a access aisle instead of it.

Fig. 7.41. Parking for Handicapped People (18 April 1999, by T. Gökçen, EGS Shopping Center Bornova)

- Although dimensions of parking area 360 cm x 480 cm successfully designed parking stall. It should be 540 cm x 390 cm.

- It should be provided painted pavement marking in addition to sign.

- Wheel stops and lighting provided.

- Handicapped people's requirements considered while designing this space.

7.4. WAITING AREAS and DROP OFF ZONE

Fig. 7.42. Waiting area Consideration (18 April 1999, by T. Gökçen, Konak)
For fig. 7.42, 43 it can be stated that:

- Shelter, seating and enough space for wheelchair users is provided
- Design of waiting area allows passengers to see approaching vehicles
- Lighting provided for night time safety and comfort
- 17% curb ramp should be provided
- 150 cm additional paving is recommended in front and back side of waiting area.

Location of ticket sale box prevent clearance of back side.
Fig. 7.44. Waiting area
Consideration 18 April 1999, by T. Gökçen, Pasaport
- There is no shelter and pull-off lane for buses. Busses occupy one lane of full width of the road
- No seating area
- Lighting provided
- %17 Curb ramp should be provided.

Fig. 7.45. Waiting Area
Consideration 18 April 1999, by T. Gökçen, M. Kemal perimeter Road
- There is no clearance in front and back side of waiting area. Here 45 cm front clearance and no back clear space for "pass thro" traffic.
- There is no curb ramp with slope of %17
A width and length of drop off zone should be 360 cm x 750 cm for each car.

- Signage should be provided to identify the drop off zone.
- Flared ramp or solution with slope for all drop off area from the curb to road level can be provided.
- Directional information that closely related to drop off area should be provided.
- Bollard should be provided a min. of 90 cm apart to allow wheelchair to pass if road and pavement are at the same level. They can be used for seating if they are at least 30 cm wide to 45 cm and 60 cm high.
Fig. 7.47. Drop off Consideration (14 March 1999, by T. Gökçen, front of Konak Tansas)

- Dimension of Drop off zone is 285 cm x 650 cm. It should be 360 cm x 750 cm for each car.
- There is no signage that identify drop off zone
- There is no curb ramp %17 for wheelchair users
- When using curb bollard are not necessary.
- Directional information that related to drop off zone should be provided.

7.5. PLAYGROUNDS

Fig. 7.47. Playground Consideration (18 April 1999, by T. Gökçen, M. Kemal perimeter road Küçükyali)
• Access to a playground should be easily accessible with ramp of 17%.

• Access within the playground should include a system of hard surface which smooth, level, stable and slip resistant.

• Elevated area that containing sand or water may be provided access for wheelchair users.

• Apparatus must be placed and modified in such a way as to make them both safe and accessible. Sharp edge, splinters or poorly designed apparatus should be eliminated because they constitute an hazard for blind children.

• Seating elements should be located near playground so that children’s adults watch closely while they playing.

• 30 m in height lighting element located for night time safety and comfort.

• Trash receptacle and drinking fountain should be provided at convenient height 90 cm and 83 cm respectively.

7.6. SITE FURNITURE

For fig. 7.48. it can be stated:

• The top of the telephone should be no higher than 120 cm, but here it is 158 cm.

• Telephone book is located at a height of 135 cm but it should be 75 cm above the floor.

• Receiver hand set cord should be at least 72.5 cm long

• Sign should be solid blue with a white international symbol of accessibility.
Fig. 7.48. Outdoor Telephone Consideration (25 April 1999, by T. Gökçen, front of central post office Çankaya)

- One of them should be designed for disabled people.
- Access to telephone is impossible for disabled people because of 4 cm curb.
- It should be located at a height of 120 cm from the ground.

Fig. 7.49. Outdoor Telephone Consideration (180 April 1999, by T. Gökçen, Fevzipasa Avenue)
Fig. 7.50. Seating Consideration (14 March 1999, by T. Gökçen, Konak)

- Along walkway rest areas (120 cm depth) should be provided. A space of 75 cm wide between ends of bench and ends of rest area should be provided for strollers and wheelchair users.

Fig. 7.51. Seating Consideration (25 April 1999, by T. Gökçen, M. Kemal perimeter road Küçükyali)

- Successful solution for seating along walkway.
- A space for wheelchair 100 cm (min. 75 cm)
- Depth and Width of rest area 200 cm (min. 120), 360 cm (min. 200 cm) respectively.
Fig. 7.52. Drinking Fountain Consideration (14 March 1999, by T. Gökçen, Konak)

- It is not an accessible drinking fountain for wheelchair users. Curb ramp 17% should be provided or should be level drinking fountain.
- Recessed fountain can be provided on the condition that adequate space is allotted for wheelchair people access.

Fig. 7.53. Lighting Consideration (18 April 1999, by T. Gökçen, front of Sevinc Patisserie Alsancak)

- Lighting apparatuses located randomly. A space between them should be determined according to type of distribution and height of lighting apparatus.
• Access to trash receptacle is difficult for wheelchair users. Distance from walkway is 54 cm. It should be located at convenient distance from walkway.
• The opening of a trash receptacle is located convenient height, 90 cm.

At last, it can be said for all constructed exterior space design:
• There is no order and harmony for all outdoor space design.
• There is no maintenance.

For all city, design and maintenance standard and guidelines should be determined in respect to design elements and materials that will be used while construction process. They should be same for all city, at least design principle can be determined by Izmir Metropolitan Municipality, then local municipalities can order exterior space in respect to these principles.

By this way, harmony and variety can be provided for all city in the name of creating barrier-free or accessible exterior environment and attractive city for all.

7.8. SUCCESSFUL EXAMPLES FROM ABROAD

In this section few examples that are successful in respect to design and maintenance guidelines will be shown from USA, JAPAN, FRANCE and HOLLAND.
Fig. 7.55. Walking Consideration (Eckbo, 1992, Japan)

- General concept and order is the first impression of this walking area. Location and type of vegetation and seating elements, walking surface do not create any obstacle for pedestrians.

Fig. 7.56. Walking Consideration (Mukoda, 1990, USA)
• There is any obstacle on walking route and clear headroom space is provided by using convenient vegetation element. Location of signs, lighting and vegetation elements help to create clear walking route.

![Fig. 7.57. Walking Consideration (Mukoda, 1990, USA)](image)

• Another clear walking area. Using tree grates make it safe especially for wheelchair users.

![Fig. 7.58. Walking Consideration (Eckbo, 1992, Japan)](image)
• Textual changing and bollard are used instead of curb in the name of creating barrier-free exterior space.

Fig. 7.59. Walking Consideration (Mukoda, 1990, Germany)

• Using texture separate bicycle and walking route. Location of sign, lighting and vegetation elements provides clear walking path.

Fig. 7.60. Walking Consideration (Mukoda, 1990, USA)
• Textual changing is used for blind people to indicate pedestrian crossing point.
• Using tree grate provide wider clear walking space especially for wheelchair user.
• Although telephone box is not accessible for wheelchair users, location of it is convenient for creating clear walking space.

![Image: Ramp with Stairs](Eckbo, 1992, Japan)

- Excellent ramp solution with stairs. For providing convenient gradient two landings are used.
• Texture of ramp is different from stairs.
• Another ramp is constructed in green area for providing smooth slope.

Fig. 7.62. Pedestrian Crossing (Eckbo, 1992, Japan)

• There is no curb at crossing point of the road.
• Using bollard, location of signs and walking surface is constructed with a high consideration and in order.

Fig. 7.63. Waiting Area Consideration (Mukoda, 1990, France)
- Main characteristic of waiting area is clear waiting and passing space in front and back side of it respectively. In addition, there is a space for wheelchair near seating element but, it has not curb ramp for wheelchair users.

Fig. 7.64. Parking Consideration (Domus, Nov. 1998, p. 55)

- Two space reserved for disabled people with access aisle

Fig. 7.65. Handrail Consideration (Domus, March 1998)

- Handrails extend past the tread at top and bottom.
- Lower level handrail is provided for children and elderly people.
Chapter 8. REDESIGN of SELECTED COMPONENTS of BUILT ENVIRONMENT in RESPECT TO DESIGN GUIDELINES & STANDARDS

In this chapter all previously mentioned design and maintenance guidelines and standards are applied to selected six parts of Izmir City Center. These are:

- Front area of 100. Yıl High school-Alsancak,
- Çankaya Junction,
- Front Area of Üçkuyular Tansaş
- Cumhuriyet Square,
- M. Kemal Paşa Perimeter Road-Küçükçaylı
- Front Area of Sevinç Patisserie.

For all case study area, different design and maintenance guidelines and standards are applied to existing situation of them. In order, front area of 100. Yıl High school-Alsancak considered as a walking area that include, site furniture, vegetation and lighting consideration, Çankaya Junction considered as intersection point, pedestrian crossing standards and guidelines are applied to it in order, for front area of Üçkuyular Tansaş ramps, stairs and handrails standards are applied, for front area of Central Post Office-Cumhuriyet Square parking and outdoor telephone box consideration are studied, playground and waiting area consideration are dealt with in M. Kemal Paşa perimeter road-Küçükçaylı, at last, in front area of Sevinç Patisserie drop off standards and guidelines applied to existing situation of it.

At first, for each selected component of built environment, existing situation plans are plotted, existing usages and problems are indicated. Then, related design and maintenance guidelines and standards are applied, all of them are redesigned in respect to disabled people’s requirements. By this way it is indicated “how our living environment should be designed, ordered and furnished” in the name of creating “Barrier-Free exterior space” for all.

8.1. WALKS AREA (Front area of 100. Yıl High school-Alsancak)

Most of people, even able-bodied people, find this area the most uncomfortable walking route, that’s why many people use roadway instead of it.
8.1.1. PROBLEM DEFINITION

- Surface of walking route is the most important problem. It does not possess stability and firmness and has not non-slip surface. Location of manhole has 5 cm height and it is an obstacle for both wheelchair users and able-bodied people.
- Walking route is not continuous.
- Although provided curb ramps have convenient gradient, in front of them parked cars prevent wheelchair users from access to them.
- It has not cross slope 1:50 for water run-off.
- Curb height is too high; 30 cm.
- It has not clear headroom space for especially blind people.
- Location of sign, vegetation elements and site furniture prevent people from comfortable walking.
- Distance between lighting apparatus is not efficient in the name of light distribution. Many of them are located in the middle of walking route. It constitute a great hazard for blind people.
- Walking route has not seating elements in rest areas and have few trash receptacle.
- Walls height is not convenient for seating and arm supporter. Its height are 0.50m and 0.85m respectively.
- There is no detectable warning for blind people at curb ramp location.

8.1.2. PROPOSED SOLUTIONS

- For creating clear walking surface all obstacles eliminated, slip resistant, stable and smooth textured walking walking surface is provided.
- For curb ramp, brushed or washed concrete are used non-slip surface material.
- 2% cross slope is provided for water run-off.
- Min.2.00m vertical clearance is provided.
- Plants are located not to reduce the efficiency of lighting system.
- Branches that overhang walk surface pruned to a 2.55m above the ground to create clear headroom space.
- Fruited plants are not located to prevent slipping on ramp surface. Potentially dangerous plants such as having large thorns or those with poisonous are not located.
• Short type of light distribution is used and cut off lighting apparatus are located. Distance between them is determined as a 13.5m. Height of lighting apparatus is 3.00m.

• Site furnitures located in green area that provided both road side of walking area. For seating element 80cm space is provided in rest area for wheelchair users. For each seating element a trash receptacle and 1.00m height lighting element are provided. Length and width of rest area are 2.50m, 1.20m respectively. Trash receptacle openings are located at a height of .90m. Drinking fountain is located at a height of 83cm for wheelchair users.

• Furniture strips are provided for site furniture in rest areas for blind people.

• For curb ramps, textual changing of walking surface is provided for indicating curb ramp location for blind people.

• 1.00m height wall is provided for arm supporter.

Existing situation and proposed plan for front area of 100. Yıl High school are shown in fig.8.1., 8.2.respectively)

8.2. PEDESTRIAN CROSSING (Çankaya Junction)

Çankaya Junction is the most crowded intersection point of İzmir, so it has important and vital problems especially for wheelchair users. Immediate and urgent ordering should be provided for that area even able-bodied people.

8.2.1. PROBLEM DEFINITION

• Pedestrian Island has not a 1.50m passage for wheelchair users.

• At crossing point there is no curb ramp with convenient gradient.113% and 34% ramp slope is too steep for wheelchair users.

• Textured warning strips is not located behind the curb ramp location on sidewalk for blind people.

• The interior width of crosswalk should have been a colored strip on road surface.

• At busy crossing, a buzzer does not sound when the light is at “walk”.

• Traffic island should be 1.20m width to protect pedestrian from vehicular traffic.

• Vegetation element and retail units on sidewalk prevent clear walking surface.

• Walking surface on sidewalk is not stable and firm.
URBAN DESIGN PROJECT FOR DISABLED PEOPLE

Figure 8.1. EXISTING SITUATION OF FRONT AREA OF 100. YIL HIGH SCHOOL-ALSANÇAK
walking area including vegetation, site furniture, lighting consideration

There is no access aisle for wheelchair users at the parked cars

Curb height is too high 30 cm.
Walking route has not seating element in rest area and have few trash receptacle.

Walking surface is not continuous and have many obstacle even able-bodied people.

Distance between lighting apparatus is not efficient in the name of light distribution.

Surface of walking does not possess.
Location of sign vegetation elements and site furniture prevent people from comfortable walking.

Walking route has not a clear headroom space for especially blind people.

Surface of walking does not possess stability and firmness.

Surface of walking does not possess stability and firmness.

Distance between lighting apparatus is not efficient in the name of light distribution.

HEIGT OF WALL: 0.5 m

HEIGT OF WALL: 0.5 m

SURFACE OF WALKING / CONTINUOUS RAMP ARE PROVIDED WITH STEPS AND FIRMNESS.
Plants are located not to reduce the efficiency of lighting system

Branches that overhang walk surface should be pruned to a 2.55 m above the ground to create clear headroom space

Fruited plants will not be located to prevent slipping on ramp surface

Potentially dangerous plants such as those having large thorns or those with poisonous should not be located

DETAILS OF VEGETATION CONSIDERATION

by tankut gokcen
00. YIL HIGH SCHOOL

**DETAIL OF LIGHTING CONSIDERATION**

- **SCALE 1/50**

**Ramp surface should be non-slip**
- Washed or Brushed concrete can be usable.

- **%2 Cross slope should be provided.**

- **2 m Vertical clearance should be provided.**

- **Opening of a trash receptacle should be located 90 cm above the ground.**

- **Min. 60 cm seatback for sign and plant location should be provided from the walk surface.**

- **For length of seating element min. 60 cm space per person should be provided.**

- **Height of a seat surface should be at least 45 cm from the ground.**

- **Width of seating should be 45 cm max.**

- **Drinking fountain should be located 90 cm from the ground but lower level should be 83 cm at a height for disabled people.**

- **Controls of drinking fountain should be hand-operated levers rather than knobs.**

- **Fully recessed fountain should be avoided, unless adequate space is allocated for wheelchair access.**
Clear Headroom Space

Arm Supporter Wall
Height 1.00 m

2.55 m x 2.20 m
• In front of Mc Donald’s curb height is 0.34 cm. It is so high even able-bodied people.

8.2.2. PROPOSED SOLUTIONS

• At crossing point 17% curb ramp gradient is provided. Flared ramp type is used and side of ramp is 10%. For the front area of Mc Donald’s curb height is not changed, curb ramp solution is provided for existing curb height.
• Contrasting paving material is placed behind the curb cuts to act as warning strip for the blind and paving is extended full width of walkway.
• Colored warning strip is provided for crosswalk delineation.
• Interior width of of a crosswalk is provided as wide as the width of the approaching walk.
• A buzzer is provided to sound so long as the pedestrian light is at “walk”.
• 1.20m pedestrian island is provided on ikiçeşmelik direction of junction.
• 2.50m passage through pedestrian island is provided for two way traffic.

Existing and proposal plans of Çankaya Junction is shown in fig.8.3., 8.4.respectively)

8.3. RAMPS, STAIRS AND HANDRAILS(Front area of Üçkuyular Tansaş)

Rare ramps, stairs and handrails solutions are provided in İzmir. Provided ramps in front of Üçkuyular Tansaş is partially successful solution in İzmir.

8.3.1. PROBLEM DEFINITION

• Provided ramp gradient is 25%. It is so steep for wheelchair users even people with strollers.
• Height of handrail is 90 cm, but lower level handrail should placed at a height of 70 cm. Handrail should extend a min. 45cm beyond top and bottom of ramp.
• 5 cm high curb should be provided at edge of ramp surface for use by wheelchair as emergency wheelstops.
• 2% cross slope should be provided.
• Riser height and width of tread is 18 cm,30 cm respectively.
• Width of ramp should be min.165 cm for twoway traffic, but here it is 120 cm.
• Diameter of handrail is 7.5 cm. It should be 5 cm.
At crossing point there is no curb ramp with convenient slope. %113 and %34 ramp slope is too steep for wheelchair users.

Textured warning strips is not located behind the curb ramp location on sidewalk for blind people.

Pedestrian Island has not a 1.50 m passage for wheelchair users.

At busy crossing, a buzzer does not sound when the light is at walk.

Vegetation elements, retail units and manholes on sidewalk prevent people from clear walking route.

Traffic island should be located with 1.20 m width to protect pedestrian from vehicular traffic.
Vegetation elements, retail units and manholes on sidewalk prevent people from clear walking route.

Traffic island should be located with 1.20 m width to protect pedestrian from vehicular traffic.
URBAN DESIGN PROJECT FOR DISABLED PEOPLE

Figure 8.4. PROPOSAL FOR CANKAYA JUNCTION pedestrian crossing

- Textured Warning Strip for Blind People
- Colored Warning Strip for Pedestrian Crossing
- Pedestrian Island
- Billboard

- Gradient of ramp is 8.3%
- Width of ramp is 1.80 m
- For stairs and ramps, white painted surfacing is provided
- 1.5 cm high contrast paint provided on ramp surfaces
- 2% grade on grade
- Heel and toe of ramp 150 cm. Space between two ramps 200 cm
- At crossing point, sidewalk with paint provides 20% contrast
- Parking space 45 cm. Near the parking area (150 cm.
- Space is provided for pedestrian
- Drainage is provided perpendicular to dominant direction
- 120 cm minimum width provided for pedestrian
- Color is provided in pedestrian
Textured Warning Strip for Blind People

Colored Warning Strip for Pedestrian Crossing

Pedestrian Island

Surface of Curb Cut is non-slip but not corrugated; Brushed Concrete Used

Textual Changes on the Curb Cut Provide a Warning to Indicate Where the Cut Ends and Road Pavement Begins

Push Button on Traffic Light Located at a height: 90 m

A Buzzer Should Sound So Long as the Pedestrian Light is at "Walk".

TRAFFIC LIGHT

MANHOLE

RETAIL UNIT

ELECTR. APPAR.

LIGHTING APPAR.

VEGETATION

SIGN
• There is no textual changing behind the ramp location for blind people.
• Width of pedestrian island is 80 cm. It is too narrow for pedestrians safety.
• Passage through pedestrian island is not provided on crosswalks.
• Drainage structure openings are not located perpendicular to dominant direction of travel.

8.3.2. PROPOSED SOLUTIONS

• Gradient of ramp is 8.33%.
• Width of ramp is 180 cm for two way traffic.
• For stairs and ramps the top rail is located at a height of 90 cm, lower rail is located at a height of 70 cm.
• Bottom landing is 180 cm x 180 cm.
• Top landing is 150 cm x 180 cm.
• 5 cm high curb is provided at edge of ramp surface as emergency wheel stops.
• For providing non-slip ramp surface washed or brushed concrete are used.
• 2% cross slope is provided on ramp surface.
• Diameter of handrail is 5 cm.
• Height of bollard is 60 cm. Space between bollard is 100 cm. Diameter of bollard is 35 cm for seating.
• At crosswalk point 17% curb ramp provided. Behind the curb ramp textual paving material is used for blind people.
• Parking space is 240 cm in width. Near the parking area 150 cm in width access aisle space is provided for wheelchair users.
• Drainage structure openings are located perpendicular to dominant direction of travel.
• 120 cm pedestrian island is provided for pedestrian safety. 300 cm a passage is provided in pedestrian island.
• Colored crossing strip is provided on crosswalk.
• Rise height and tread width is provided 16 cm and 33 cm respectively.
Existing and proposal plan are shown in fig. 8.5., 8.6. respectively.
AN URBAN DESIGN PROJECT FOR DISABLED PEOPLE

Figure 8.5. EXISTING SITUATION OF THE FRONT AREA IN UCKUYULAR TANSAS
ramps, stairs and handrails

by tankut gokcen
PROJECT FOR DISABLED PEOPLE

TUATION OF THE FRONT AREA IN UCKUYULAR TANSAŞ

and handrails

AREA

PARKING AREA

UCYOL

TRAFFIC LIGHT

DRAINAGE

LIGHTING APPAR.

VEGETATION ELE.
Figure 8.6. PROPOSAL PLAN FOR THE FRONT AREA IN UCKUYULAR TANSAŞ

Width of the Ramp: 1.80 m (Two-Way Traffic)
Bottom Landings: 1.80 x Ramp Width
Top Landings: 1.50 m x Ramp Width
5 cm high Curbs provided at edge of Ramp Surface as Emergency Wheelstop.
For providing non-slip ramp surface, Washed or Brushed Concrete are used.
2% Cross slope is provided on ramp surface
Diameter of Handrail: .05 cm
Handrails are extended past the heel and toe: 45 cm
The top rail is located at a height: .90 cm
Lower rail is located at a height: .70 cm

by tankut gokcen
Width of the Ramp: 1.80 m (Two-Way Traffic)
Bottom Landings: 1.80 x Ramp Width
Top Landings: 1.50 m x Ramp Width
5 cm high Curbs Provided at Edge of Ramp Surface as Emergency Wheelstop
For Providing Non-Slip Ramp Surface
Washed or Brushed Concrete are Used
2% Cross Slope is provided on Ramp Surface
Diameter of Handrail: .05 cm
Handrails are Extended Past the heel and Toe. 45 cm
The top rail is located at a height .90 cm
Lower Rail is located at a height .70 cm
8.4. PARKING AREA and OUTDOOR TELEPHONE BOX (Cumhuriyet Square)

In front area of Central Post office a parking space and outdoor telephone box are provided for disabled people, but both of them are not convenient for them.

8.4.1. PROBLEM DEFINITION

- Provided parking space has not an access aisle for wheelchair users.
- From the parking space to sidewalk there is no curb ramp with convenient gradient.
- Painted pavement markings should be provided in addition to require sign.
- Although a sign that designating disabled parking, there is no warning for drivers of the possibility of towing if reserved space are used without authorisation.
- Width of parallel parking area is not enough for maneuvering wheelchair.
- Access to telephone box is impossible for wheelchair users.
- Drainage structure openings are not located perpendicular to dominant direction of travel.
- The top of the telephone is 158 cm in height. Telephone book is located at a height of 135 cm it is too high for wheelchair user.

8.4.2. PROPOSED SOLUTION

- Parking dimensions are 240 cm x 540 cm for normal parking. Additional 150 cm is provided as a access aisle for wheelchair users.
- 8.33% curb ramp is provided from parking space to sidewalk. 17% curb ramp is provided to access telephone box.
- Behind the curb cuts textual changing is provided as warning strip for blind people.
- For parallel parking area 660 cm x 420 cm parking space is provided.
- Reserved parking stall is designated with a sign that display the international symbol of accessibility. Reserved parking area should be painted solid blue with a white international symbol of accessibility. Warning is provided for drivers of the possibility of towing if reserved space is used without authorisation.
- The top of a telephone box is located at a height of 120 cm
- Telephone book is located at a height of 75 cm.
- Fold-up seating at a height of 45 cm.
• Drainage structure openings are located perpendicular to dominant direction of travel. Existing and proposed plan are shown in fig.8.7, 8.8 respectively

8.5. WAITING AREA AND PLAYGROUND(M.Kemal Paşa Perimeter Road-Küçükçalı)

Selected this project area contains both playground and waiting area. For disabled people both of them has many problem.

8.5.1. PROBLEM DEFINITION

• There is no clearance in front and back side of waiting area. Here 45 cm front clearance and no back clear space for “pass throu” pedestrian traffic.
• There is no pull-off lane for waiting area.
• Playground is not easily accessible for wheelchair user.
• Access within the playground does not include a system of hard surface.
• The playground is not reasonably organised. It should be included playing apparatus for wheelchair users.
• Playground is not properly furnished. There is no seating element, drinking fountain, trash receptacle.

8.5.2. PROPOSED SOLUTIONS

• For waiting area 360 cm pull-off lane is provided with 30 degree angle from the road.
• In front and back side of the waiting area 150 cm clear space is provided for pedestrian waiting and “pass throu” traffic.
• For waiting area no curb is provided. Full width of pull-off lane is solved with slope.
• Different shelter is not used, because it include seating, lighting facilities and 85 cm clear space for wheelchair users in it. And also allow passengers to see approaching vehicular.
• For playground 80 cm height sand and water pool are provided for wheelchair users.
• Within playground hard surface is provided for wheelchair users.
• Access to playground is provided with curb ramp with 17% gradient. Behind the curb ramp textual paving changing is provided for blind.
Figure 8.7. EXISTING SITUATION OF THE CUMHURIYET SQUARE
parking area, outdoor telephone

The top of the telephone is 150 cm in height. Telephone box is located at a height of 135 cm.
Access to telephone box is impossible for wheelchair users.

Reserved parking space has not an access aisle for wheelchair user.
From the parking space to sidewalk there is no curb ramp with convenient gradient.
There is no posted permanent markings in addition to required sign.
Although a sign that designating disabled parking, there is no warning for drivers of the possibility of towing if reserved space are used without authorization.
The top of the telephone is 150 cm in height. Telephone box is located at a height of 135 cm.
Access to telephone box is impossible for wheelchair users.

PARALLEL PARKING AREA

Width of parallel parking area is not enough for maneuvering wheelchair.

Reserved parking space has not an access exit for wheelchair user.
From this parking space to sidewalk there is no curbing with convenient gradient.
There is no pointed permanent markings in addition to required sign.
Although a sign that designating disability parking, there is no warning for drivers of the possibility of towing if reserved space are used without authorization.
Figure 8. PROPOSAL FOR THE CUMHURIYET SQUARE
parking area, outdoor telephone

- Telephone box for disabled people
  - Top of the telephone
  - Located at a height: 2.20 m
  - Telephone base located at a height: 75 m
  - Paved area provided at a height: 45 m

- Color-coded warning strip
  - For blind people

- Colored crossing strip
  - Used externally of textured area

- Reserved parking for disabled people

- Access area
  - 1.20 m
  - Parallel parking area for the disabled

- Access aisle
  - 2.40 m
  - 2.40 m
  - 2.40 m
  - 2.40 m
  - 1.50 m

- Reserved van parking

- Sign Designating Disabled Parking

- Access lane
  - 5.40 m
  - 4.20 m
  - 6.60 m

- Access area
  - 0.10 m

- Reserved parking for disabled people

- Warning strip for blind people

- Central post office

- KONAK

- Alsancak
for telephone
With in the playground seating elements are provided in rest areas. 80 cm space is provided for wheelchair users near the seating elements.

Additional lighting apparatus are not provided, because 30 m height lighting apparatus is enough for lighting distribution.

At a height of 83 cm drinking fountain is provided for wheelchair users.

Existing and proposed plan are shown in fig.8.9, 8.10.

8.6. DROP-OFF AREA (Front area of Sevinç Patisserie)

Because of its location and containing functions, this drop-off area is used frequently. While dropping off and picking up many problems occur especially traffic flow. Because of being the most important drop-off area, front area of Sevinç Patisserie is selected for case study.

8.6.1. PROBLEM DEFINITION

- There is no pull-off lane for dropping off people.
- It is impossible to access from across the road to drop-off area. Curb ramp should be provided with convenient gradient.
- While crossing the street min. 150 cm passage through pedestrian island is not provided
- Signage should be provided to identify drop-off zone. And also directional information related to drop off should be provided.

8.6.2. PROPOSED SOLUTIONS

- Drop-off area is designed 360 cm in width and 750 cm in length per car with 30 degree angle with road.
- Whole width of pull-off lane is solved as a ramp so there is no curb.
- Informational sign related to drop-off area is provided.
- Height of bollard is 60 cm for seating. Space between bollards are 100 cm. Diameter of bollards are 35 cm. Three bollards near lighting apparatus are removable for vehicular passing.
- Non cut-off lighting apparatus is used. Height of it 300 cm and short lighting distribution is used.
URBAN DESIGN PROJECT FOR DISABLED PEOPLE

Figure 8.9. EXISTING SITUATION OF M. KEMAL PERIMETER ROAD-KUCUKYALI
waiting area and playground

There is no clearance in front of waiting area. Here 45 cm and no back clear space for pedestrian traffic.

There is no pull-off lane for tricycle.

There is no curb ramp for wheelchairs.

Access within the playground does not include a system of hard surface.

Playground is not properly furnished. There is no seating elements, drinking fountain and trash receptacle.

The playground is not reasonably organised.
It should be included playing apparatus for wheelchair users.

Views from the project area

Playground is not safe especially for wheelchair users. There is no curb ramp.

Beach is not included a system of hard surface.

Playground is not furnished. There is no seating elements, drinking fountain and trash receptacle.

The playground is not reasonably organised.
It should be included playing apparatus for wheelchair users.
Access within the playground does not include a system of hard surface.

Playground is not properly furnished. There is no seating elements, drinking fountain and trash receptacle.

The playground is not reasonably organised. It should be included playing apparatus for wheelchair users.

There is no clearance in front and back side of waiting area. Here 45 cm front clearance and no back clear space for pass through pedestrian traffic.

There is no pull-off lane for waiting area. There is no curb ramp for wheelchair users.
URBAN DESIGN PROJECT FOR DISABLED PEOPLE

Figure 8.10. PROPOSAL FOR MUSTAFA KEMAL PERIMETER ROAD, KUCUKYALI
waiting area, playgrounds
- 300 cm in width passage through pedestrian island is provided. Colored warning strips are used as a warning strip.
- 17% curb ramp is provided. Contrasting paving material placed behind curb cut as warning strip for the blind.
- Push button on traffic light located at a height of 90 cm from the ground.

Existing and proposed plans are shown in fig. 8.11., 8.12.
FIGURE 8.11. EXISTING SITUATION OF FRONT AREA OF SEVINC PÂTISSERIE

drop off area

There is no proper pull-off lane for
dropping off people.

It is impossible to access from access
the road to drop off area. Curb ramp
should be provided with convenient
gradient.

While crossing the street min. 150 cm
passage throw pedestrian island is
not provided.

Signage should be provided to identify
drop-off zone. Directional information
related to drop-off area should be provided.

by tankut gokcen
Signage should be provided to identify drop-off zone. Directional information related to drop-off area should be provided.

There is no proper pull-off lane for dropping off people.

It is impossible to access from across the road to drop off area. Curb ramp should be provided with convenient gradient.

While crossing the street near 150 cm passage thru- pedestrian island is not provided.
URBAN DESIGN PROJECT FOR DISABLED PEOPLE

Figure 8.12. PROPOSAL FOR THE FRONT AREA OF SEVINC PATISSERIE IN GUNDOGU drop-off area

by tankut gokcen
**URBAN DESIGN PROJECT FOR DISABLED PEOPLE**

<table>
<thead>
<tr>
<th>Figure 8.15. 3D View from Cumhuriyet Square</th>
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A mix model of liberal politics and social-democratic approach to accessibility may be formed. This model may integrate the best of the social-democratic approach, perhaps its inclusive view of individuals of all ages and abilities, with standards and guidelines for design (e.g., ANSI standards) and legislation (e.g., ADA) of a more approach that assure citizens of their rights to an accessible environment (e.g., Duro et al., 1998, p. 13).

At last, the need is clear that accessible environments are very important for economic success, but access is a potential for disabled people. First, there is an all-worthy people consequence of residential or commercial areas. In the case of accessible environment, centres, parks, and working places should be accessible for people to participate social and economic activities that benefit the community. For this reason, our living environment should be designed for persons who are disabled and people with special needs.

At this point, two kinds of solutions are needed for creating an accessible environment:

- Providing entirely separated area for handicapped population or;
- Redesign of existing built environment in accordance with their standards and guidelines.

Even though one can be cheaper than second one, but just second solution
Chapter 9. CONCLUSION

A common concern in industrialised nations is how to provide access to urban environments to individuals with diverse needs and whose abilities change over the course of their lives. The United States and the Nordic countries have been leaders in accommodating citizens with special needs by integrating technology into the fabric of the urban setting, although their approaches to accessibility and their underlying ideologies are different.

"A mix model of liberal-welfare and social-democratic approach to accessibility may be formed. This model may integrate the best of the social-democratic approach, perhaps its inclusive view of individuals of all ages and abilities, with standards and guidelines for design (e.g., ANSI standards) and legislation (e.g., ADA) of the liberal-welfare approach that assure citizens of their rights to an accessible environment."

(Scott, et al., 1998, p. 13)

At last, we can state that accessible environment is very crucial for social and economic success, because all of us are a potential disabled people. During our lifespan we all might be disabled people consequence of accidental or unintended actions. Accessibility is the base feature of the built environment. It implies that dwellings, shops, theatres, parks, and working places should be accessible and useful. In addition, it provide people to participate social and economic activities that basically purpose of the built environment. For this reason, our living environment should be designed and ordered for providing disabled people independence with social integration.

At this point two kinds of solutions can be recommended for creating barrier-free environment;

• Providing entirely separated site for handicapped population or;
• Redesign of existing built environment in accordance with their standards and guidelines.

First solutions can be cheaper than second one, but just second solution correspond both independence and integration together. For providing disabled people's
independence in social context isolated space—just for disabled people—should not be created for any purposes. Modifying the existing urban environment to suit the handicapped and the elderly is too costly. But no serious comparison has ever been made with the cost of keeping a growing number of people confined to their homes or institutions and enforced idleness. In particular, the numbers of those seriously handicapped in the prime of life because of car and sports accident is growing alarmingly in the industrialised countries.

Impairment in old age is closely tied to advancing years and the chronic diseases which cause incapacity in later life are surrendering very slowly to medical research. We can therefore be confident that by the end of the century there will be further increase in the number of handicapped people in the community. If they are enjoy opportunities equal to those of the able-bodied, the design of transport and the built environment can no longer dismiss their needs. Environmental modifications that include ramps to buildings and kerbs, safety zones in road center for those unable to sprint across during green light calibrated for the smooth flow of vehicular traffic, audible traffic light, parking zones for the handicapped conveniently sited and policed against fit trespassers would be also of use to mother pushing a baby carriage, a shopper whose arms are loaded with packages, a child pulling a wagon and even pregnant woman. These people may expect to be relieved of their handicaps within a fairly short length of time. Unfortunately, there are also those who, through a permanent handicap, will always be inhibited in their movements. Therefore all these arrangements have great importance for them. For any development plan instead of “Public Profit”, “Pedestrian Profit” should be the main concern of them.

Some observers argue that in the post industrial city “mobility” will be achieved through “telecommuting,” or “virtual communication,” rather than through physical travel. On the other hand, some observers argue that new work technologies often disadvantage disabled people by requiring high level of education, technical skills, self-confidence and in many cases, physical dexterity. Disabled people certainly desire and have struggled for “a place on earth”, material welfare, cultural acceptance and socio-spatial inclusion, not assimilation.
In Turkey, approximately 7.5 million people are disabled and about 30 million people are related people to them. This figure constitute a half of the total population. Just these figures makes this research more crucial. It is never be forgotten that every person can be expected to be physically impaired during their lifespan. Therefore, every person should approach this topic sensitively.

“If the components and part of our outdoor environment are carefully and sensitively enough designed, no one is “locked out” or inhibited in their physical access to any area or activity and, then, in effect ANYONE CAN GO ANYWHERE” ... (Braille, 1984, p.4)
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TÜRK STANDARDLARI

ÖZÜRLÜ INSANLARIN İKAMET EDECEĞİ BİNLARIN DÜZENLEHNESI KURALLARI

SPECIFICATIONS FOR DESIGNING RESIDENTIAL BUILDINGS FOR THE DISABLED

TÜRK STANDARDLARI ENSTİTÜSÜ
Necatibey Caddesi 112 Bakanlığı
ANKARA
TEKERLEKLİ SANDALYE GECİŞ GENİŞLİKLERİ

A.1 - TEKERLEKLİ SANDALYE İÇİN GEREKLİ ALAN
Tekerlekli sandalye kullanılanların çoğunun bahçe kapısı ve benzeri yerlere önden gireceklerse, 760 mm'lik net genişlik gerekli olur. Tekerlekli sandalye kullanan kişi binaya yabancıya, trafik çoksa, ani ve seri hareketler gerekirorsa, daha fazla genişlik gerekli olur.

Bu durumda en az genişlik 815 mm olmalıdır. Bununla birlikte geçilecek yerin derinliği 60 mm'den fazla ise genişlik en az 915 mm olmalıdır (Şekil-A1).

A.2 - YÜRÜMEDE KULLANILAN CIHAZLAR İÇİN GEREKLİ ALAN
Yürüme öTürülürler için en az 815 mm'lik net genişlik yeterli ise de rahat bir yürüyüş için, bu, en az 915 mm olmalıdır.

A.3 - GEÇİŞ İÇİN GEREKLİ ALAN
Vücuta sağlam kişiler kıyılara ağırlık giysileri içindeyken 815 mm'lik bir genişlik gereklidir. 815 mm'ye hem her iki taraftan kolun sallanma ajıcılığı olan 51 mm hem de objelerle (engel ve/veya çıkıntı) veya diğer yürüyenlerle uygun ajıcılık mesafesi olan 25 mm (her iki taraftan) dahildir. Tekerlekli sandalye kullanılanlarla yürüme cihazları kullanılan için kısa mesafelerde 815 mm'lik genişlik yeterlidir.

Eğer iki yönlü geçiş varsası rahat bir trafik için 1625 mm gereklidir. Böyle yerlerde genişlik en az 1525 mm olmalıdır. 1525 mm'den daha dar olan yerlerde iki tekerlekli sandalye yanyana geçebilir (Şekil A2).

1220 mm'lik bir genişlik, normal yürüyebilen bir kişinin yürüyemeyen veya kısmen yürüyebilen bir kişi ile yanyana geçebilmesi için gereklidir (Şekil A3).

A.4 - TEKERLEKLİ SANDALYE DÖNÜŞ ALANI
Tekerlekli sandalyenin 180° dönüşü için gerekli genişlik en az 1525 mm'dir.

Şekil-A6, kullanıcısı yetişkin bir erkek ile tekerlekli sandalye için tipik boyutları göstermektedir.

A.5 - TEKERLEKLİ SANDALYE İÇİN NET ZEMİN VEYA DÖŞEME ALANI
A.5.1 - Boyut ve Yaklaşım Mesafesi
Duran veya hareket eden bir tekerlekli sandalye için gerekli net zemin veya döşeme alanı 760x1220 mm dır (Şekil A 7a). Bu alan paralel veya önden yaklaşılm mesafesi içinde geçerlidir. (Şekil A7b, Şekil A7c) Tekerlekli sandalye kullanılanlar için net döşeme veya zemin alanı bazı nesneler altında gerekli olan diz-alanının bir kısımını da kapsayabilir.
A.6 - Tekerlekli Sandalye Alani ile Net Manevra Alani İlişkisi

Bir tekerlekli sandalye için net doçeme veya zemin alanının tamamen engelsiz bir kenar kullanıma rotasyon veya diğer tekerlekli sandalyenin net doçeme alanı ile bitişik olabilir.

Eğer net doçeme alanı (kullanım alanı) bir nığ içinde sınırlanmışsa veya diğer bir değişle tekerlekli sandalyeyi tamamen veya kısmen içine alacak şekilde üç taraftan sınırlanmışsa manevra açıklığına yapılacak ilave Şekil A8'de gösterildiği gibi olmalıdır.

A.7 - Önden Yaklaşım

Net doçeme mesafesi nesnelere sadece önden yaklaştığında düşünülebilen en yükseklik en fazla 1220 mm, en az 380 mm olmalıdır (Şekil A9a).

Önden yaklaşım için müsaade edilen en fazla yükseklik bir engelin üstünde olduğunda açıklıklar Şekil A9b'de gösterildiği gibi olmalıdır.

4.2.6 - Yandan Yaklaşım

Net doçeme mesafesi tekerlekli sandalye kullanılan kişiye paralel yaklaştığında müsaade ettiği, yandan yaklaşım yüksekliği yerden en fazla 1370 mm, en az 230 mm olmalıdır (Şekil A10a, Şekil A10b).

Yandan yaklaşımında bir engel söz konusu ise açıklıklar Şekil A10c'de gösterildiği gibi olmalıdır.
**SEKİL A 1 - Bir Tekerlekli Sandalye İçin Minimum Net Geçiş Genişliği**

**SEKİL A 2 - İki Tekerlekli Sandalye İçin Minimum Net Geçiş Genişliği**

**SEKİL A 3 - Bir Tekerlekli Sandalye ve Bir Yürüyen Özürlü İçin Minimum Geçiş Genişliği**

**SEKİL A 4 - Tekerlekli Sandalyenin Düzgün U Dönüşü Yapabilmesi İçin Gereklı Alan**
ŞEKİL A 5 a - Tekerlekli Sandalye Dönüş Alanları
NOT:垂直 boyutlar X<1220 mm olduğunda uygundur.

Bir engel strafında dönüş için gerekli genişlik

ŞEKİL A 5 b – Dönüş İçin Gerekli Genişlikler
ŞEKİL A.7 - Tekerlekli Sandalye Net Zemin Veya Düşeme Alanı
ŞEKİL A 8  - Niş İle Sınırlı Dönüş (Manevra) Açıklıkları
Önden yaklaşım mesafeleri (engelsiz)

Maksimum Önden Yaklaşım Mesafeleri (Bir engel üzerinden)

ŞEKİL A 9 – Önden Yaklaşım Mesafeleri
Ölçüler mm dir

Net döşeme alanı

En üst ve en alt yaklaşım mesafeleri

Bir engel üzerinden maksimum yaklaşım mesafeleri

ŞEKİL A 10 - Yandan (Paralel) Yakaşim Mesafeleri
Ölcüler mm'dir.

Geçiş yolu

Ara yol

iki taraflı kullanım

Tek taraflı kullanım

ŞEKİL - 1 Otopark
Ölcüler mm dir

ŞEKİL - 2 Bahçe Yolları Kaplama Malzemesi
Ölçüler mm dir

ŞEKİL 3 – Giriş Rampası

ŞEKİL 4 – Korunma Bordürü
ŞEKİL 5 - Trabzon Örnekleri
Ölcüler mm'dir

ŞEKİL 13 - Merdiven Trabzanları
Kötû durum

Kaçınmalı

Olabilir çözüm

Ideal çözüm

ŞEKİL 10 - Basamak Şekilleri

Ölcüler mm'dir.

max 38

300

max 38

60°

max 38

Eğimli çıkıntı

Kâseli çıkıntı

Yuvarlatılmış çıkıntı

ŞEKİL 11 - Kabul Edilebilir Çıkıntı Örnekleri ve Uygun Basamak Genişlikleri

Kat

Dinlenmek için sahanlık

ŞEKİL 12 - Sahanelkla Kesilen Dik Merdiven