

An Evaluation of Standards in Open Spaces for Mobility Impaired Users: The Example of Istanbul's Çirpici Community Gardens

Selçuk Akarsu¹, Gökçen Firdevs Yücel Caymaz^{2*}

¹Architecture Design Master's Program, Istanbul Aydin University, Turkey

²Architecture and Design Faculty, Istanbul Aydin University, Turkey

Abstract: A basic human need for recreation is met by making open green areas public spaces, and inasmuch as they are indispensable for healthy and abled individuals in a community, the disabled also have a right to use them. Because the disabled encounter difficulties in every area of life, parks and gardens are of great importance as they provide opportunities for them to participate in social life. Accessibility is limited in parks where the appropriate specifications for the disabled are not complied with. Under these conditions, disabled individuals are unable to benefit from recreation areas and are alienated from the social environment. The aim of this study was to assess the accessibility to the mobility impaired of park areas intended to serve all users, using the Çirpici Community Gardens as an example. Within the boundaries of the area under study, the profiles of individuals with physical impairments (the walking impaired, those confined to wheelchairs, those with arm and hand disabilities) and other disabilities were identified, including provisionally disabilities (affecting the elderly, pregnant women, people with temporarily illnesses, etc.). The procedure then conducted was to fill out observational and assessment forms, using the Turkish Standards Institute's specifications. Detailed observations were made and measurements taken so that the study area could be tested against the control list. The results indicated that in terms of the usage criteria for the disabled, there was not a large proportion of obstacles to accessibility within the sample area of study.

Keywords: Disability, Mobility impairment,

Accessibility, Recreation

Publication date: October, 2019

Publication online: 30 October 2019

***Corresponding author:** Gökçen Firdevs Yücel Caymaz, gokcenfyucel@gmail.com

1 Introduction

The aim of this study was to conduct field observations, measurements and assessments to determine the problems encountered by mobility impaired individuals in open spaces, taking the TSE standards as a baseline, with a view to proposing alternative solutions that could be applied to the area of study. Within the boundaries of this area, the profiles of individuals with physical impairments (the walking impaired, those confined to wheelchairs, those with arm and hand disabilities) and other disabilities were identified, including provisionally disabilities (affecting the elderly, pregnant women, people with temporarily illnesses, etc.).

Uslu and Shakouri (2012) stressed that every child, whether disabled or "normal", has the right to play, and that playgrounds have to be designed for children with different potentials and different physical or mental abilities^[1]. A great many studies done in Turkey have concluded that not enough is being done to facilitate use of the physical environment by the disabled. These, like the present study, have made heavy use of the Turkish Standards Institute's specifications. Eşkil (2011) showed, within the framework of TSE and United Nations (UN) criteria, that the city parks are unsuitable for use by the disabled^[2]. Aykal et al. (2016) investigated the compliance of parks with TSE

standards, and found that in the implementation stage projects intended for the disabled were considered to be unimportant^[3]. Pouya et al. (2016) showed that children's play activities in playgrounds organized around natural elements (topographical variations, animals, plants, water, earth, and sand) have a positive effect on their mental wellbeing^[4]. Olgun and Yilmaz (2014), from an ergonomic perspective, researched the suitability of use and problems that emerged with car parks, walking paths, vegetation, and street furniture elements for disabled users with different types of disabilities, and proposed various solutions^[5]. Bulut et al. (2008) evaluated the purposes and functions of lighting, paving, trash cans, seating areas, signs and information panels, boundary edges, bus stops and water features, the materials used in them, the locations chosen for them, and the use of furniture; they assessed their usability, and made recommendations for the future^[6]. Öztürk et al. (2015) showed through their study that pedestrian pavements, street furniture, paving, ramps, pedestrian crossings, signboards, etc. were inadequate for use by the physically mobility impaired; they proposed that the preferred material used in pedestrian pavements should be oriented towards the disabled, and therefore ergonomic and durable, and that signboards should be removed from points where they result in the pavement narrowing^[7]. And Sakıcı et al. (2013) studied the activities and usage of open green spaces in terms of the extent to which these parks can be easily accessed; whether or not ease of

movement within them is facilitated; whether they are secure, maintained and attractive; how suitably they are equipped for the physically disabled, as well as whether or not they provided opportunities for these users to come together in the same areas with other users; and they came to the conclusion that the freedom of movement they provide to the disabled is quite limited^[8].

Studies that have been done commonly conclude that there is a need to provide comfort for the disabled in urban spaces. The choice of Çırpıcı Community Gardens as the sample area for this study was determined by the fact that it is located in the heart of Istanbul where there is a high population density, it serves not only Zeytinburnu but also neighboring districts, and it features details of contemporary design. This is one of the largest parks in Istanbul, and it was opened to the public in three stages: the first in 2014, the second in 2016, and the third in 2018. The aim of the study was to determine what problems are encountered in it by physically disabled users, and how much care has been taken to ensure accessibility for mobility impaired users.

2 Subject and method

2.1 Subject

This research focused on Zeytinburnu's Çırpıcı Community Gardens in the Marmara province of Istanbul, within the provincial borders of the city (Figure 1).



Figure 1. Location and boundaries of the Çırpıcı Community Gardens on a map of the province of Istanbul (URL-1, 2019)

National and international books and articles, reports, publications and Internet resources were consulted to gather data related to the present condition of the Çırpıcı Community Gardens.

2.2 Method

In order for planning for the disabled to be suitable, the most important rule to be identified in universal design is that it must be suitable for all users. Application

without planning results in greater difficulties for mobility impaired users. Elements of external spaces such as main roads, pavements, ramps, street furniture, lighting, sports and play areas need to be designed appropriately so they can be used by mobility impaired users. In this study, evaluation and controls were carefully conducted on the lines of TSE standards, developed according to world standards. These standards were selected so that acceptable, defined standards would be complied with within the borders of Turkey.

The subjects covered in the literature research included definitions of disability, types of disability and the standards of measurement for mobility impaired users. Satellite images of the area and its location in Istanbul were examined (Figure 1), measurements and observations were conducted within the research area and photographs were taken. The compliance of all the areas within the gardens was determined using the observation form, prepared according to Standards TS 12576^[9], TS 9111^[10] and TS 12460^[11] of the Turkish standards. Evaluation was completed according to the fifteen benchmarks on the form in order to arrive at the conclusions.

The observation and evaluation forms regarding the area under study were included in the data analysis. The observational results within the area were supported by relevant measurements and photographs.

3 Research findings

3.1 Evaluation of standards for mobility impaired users of the Çırpıcı Community Gardens

The area studied is located in the Zeytinburnu district of the province of Istanbul. The borders of the area are the E-5 highway in the northern zone, Çobançeşme Koşuyolu Street in the western zone, and Fikret Yüzatlı Street in the southern zone. The total area of the gardens is approximately 465.000m², and was planned to be completed in six phases. However, to date only about three phases, comprising about 233.600m², have been completed. Transportation to and from the north of the gardens is via the Zeytinburnu city bus, metro and tram stops; at the south there are the İETT Turan Güneş Street stop, the İETT Veli Efendi Mahallesi stop and the Fikret Yüzatlı Street stop.

Within the gardens are cycle paths, two football fields, two basketball courts, five tennis courts, three picnic areas with 24 tables, three different

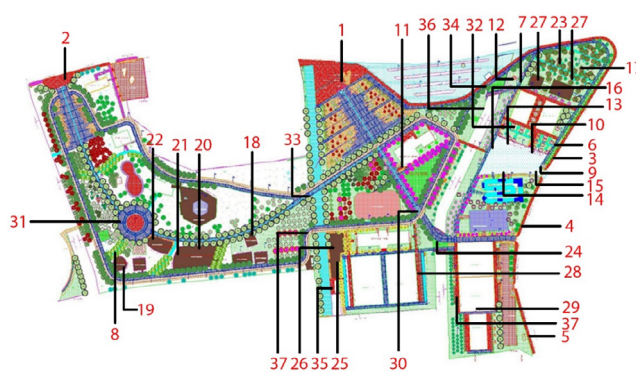
exercise areas, children's playgrounds, rest areas and walking areas, and a leisure center. There are currently three different entrances to the area (Figure 2).



Figure 2. The zones of the gardens and the project^[12]

Because the square area is large, it was divided into three zones for examination according to the specified criteria; these were studied and photographed separately, as indicated in the forms at the end of this essay.

3.1.1 Zone 1



*Numbers on the plan correspond to points where photographs were taken.

Figure 3. Çırpıcı Community Gardens, the existing part of Zone 1^[13]



Figure 4. Zone 1 Entrance 1 (Photo 1)



Figure 5. Zone 1, Entrance 2 (Photo 2)

There are two separate entrances to the area (Figures 4 and 5). It was observed that as there is no difference in the surface elevation, wheelchair users can enter with ease.

In Zone 1, as indicated in Figure 6, the pavement was measured and found to be 260 cm in width and 15 cm in height, with a cross slope of 1% and a longitudinal slope of 3%. The joint gap of the paving was 2mm. According to the standards, the width of the pavement must be at least 150cm, the paving height (from the road paving) at least 3cm and at most 15cm, the cross slope at most 2% and the longitudinal slope at most 5%; the paving joint gap should be at most 5mm. As such, the pavement was observed to be suitable for wheelchair users. In order that the paving material would not be slippery

for wheelchair users in wet weather, slip-resistant material was chosen. When the trees planted along the pavement were examined, they were found to be suitable at a pavement width of more than 200cm (Figure 6).



Figure 6. Zone 1, pavement around the gardens 1 (Photo 3)

It was observed that small moat rings were left in the ground around tree and plant stems, but that this was unsuitable and inadequate. The set-up lane of electrical wiring, lighting, and signboards used along the pavement was measured to be 80 cm, kerb included.

The trees and traffic signs on the pavement do not pose an obstacle to the passage of wheelchairs, as shown in Figure 7. It was observed that there was no protective barrier constructed at the kerb to prevent cars from parking on the edge of the pavement (Figure 7)



Figure 7. Zone 1, pavement around the gardens 2 (Photo 4)



Figure 8. Zone 1, pavement around the gardens 3 (Photo 5)

According to the standards, the height of any branches overhanging the edge of the pavement, thorny plants or signboards must be at least 220 cm. In the area under study, no thorny plants were used along pavements. Traffic signs at the edges of pavements were found to be at a height of 300 cm (Figure 8). As such, the pavements around Zone 1 of the gardens were found to comply with the standards and be suitable for wheelchair users (Figures 5-8).

3.1.1.1 Pedestrian roads



Figure 9. Zone 1, location of needed rest area on pedestrian road (Photo 6)

According to the standards, the width of passage for dual carriageways should be at least 150cm, and the slope of access roads should be at most 5%. Ramps with a length of more than 10m and a height of more than 50cm should have a 150cm x 150cm landing platform at the start and end and a rest area every 10m.

In the part of the study area shown in Figure 10, the width of passage on the pedestrian path was measured to be 330cm, and the slope of the pedestrian path a maximum of 3%. In this area the slope of the pedestrian road is suitable; however, because the length of the road is more than 10m, for every 10m there should be a 150 x 150 cm landing platform and rest area, and this is not present. As such, it is unsuitable for wheelchair users (Figure 9).



Figure 10. Pedestrian road in Zone 1 of the gardens (Photo 7)



Figure 11. Side road in Zone 1 of the gardens (Photo 8)

The road shown in Figure 10 has a passage width of 330cm, and its slope close to zero. The spacings of the drainage grating on the road were 13 mm, in line with standards. The joint gaps in the material are such that they do not pose a problem for wheelchair users passing over them. The protective kerb at the edges of the ramp was 5cm. According to the standards, it was observed to be suitable for wheelchair users.

The secondary pedestrian roads in the gardens, shown

in Figure 11, had a width of 120cm and a 3% slope. The paving material of the pedestrian road is unsuitable from the point of view of a wheelchair user. The road allows a wheelchair user and an unimpaired individual to pass one another easily; however, the paving was determined to be unsuitable according to the standards.

These observations indicate that the pedestrian roads in Zone 1 have a width and slope completely suitable for mobility impaired users. However, as regards the paving of pedestrian roads, while the choice of material and joint gaps are suitable for main roads, the paving material used for secondary roads is unsuitable for wheelchair users.

3.1.1.2 Ramps



Figure 12. Zone 1, pavement ramp within the gardens (Photo 9)



Figure 13. Zone 1, toilet ramp within the gardens (Photo 10)

Considering the general features of ramps, measurements were made of the ramp slope in three-directions at the edge of the pavement and at the meeting point with the carriageway. The ramp slopes were generally 5%, and the ramp slope suitable for

wheelchair users; ramp width was not less than 200 cm. There were no bumps or depressions at the points where the pavement connected to the roadway.



Figure 14. Zone 1, pavement ramp within the gardens (Photo 11)



Figure 15. Zone 1, entrance to children's playground without ramp (Photo 12)

3.1.1.3 Parking areas



Figure 16. Zone 1, disabled parking area 1 (Photo 13)



Figure 17. Zone 1, disabled parking area 2 (Photo 14)

Regarding the suitability of the parking areas for disabled users, the elevation level was +3.00 cm, the width of the parking space 390cm, and the gap between parking spaces 120cm to allow for wheelchairs. Disabled parking signs have been made on the ground. Considering the standards, these conditions are suitable for wheelchair users (Figure 16).



Figure 18. Zone 1, entrance to parking area (Photo 15)



Figure 19. Zone 1, disabled exit road from parking area (Photo 16)

The entrance to the parking area does not pose a problem for wheelchair users, and the space for getting tickets is also suitable (Figure 18). Within the parking area indications of direction are inadequate; are no existing signboards to guide disabled users. The 2% slope to get to the pavement from the parking area is suitable for wheelchairs. No special space has been set aside for disabled users to access the carriageway. It was observed that in the car park, there is an insufficient number of disabled parking spaces (Figure 19).

3.1.1.4 Playgrounds



Figure 20. Zone 1, children's playground 1 (Photo 17)



Figure 21. Zone 1, children's playground 2 (Photo 18)



Figure 22. Zone 1, children's playground 3 (Photo 19)



Figure 23. Zone 1, children's playground 4 (Photo 20)



Figure 24. Zone 1, children's car playground 5 (Photo 21)



Figure 25. Zone 1, children's playground with ramp 6 (Photo 22)

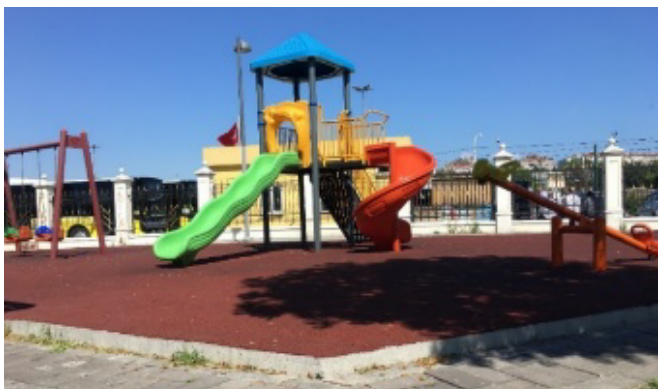


Figure 26. Entrance to children's playground, ramp not constructed (Photo 12)

In Zone 1, there is a total of six children's group play areas. Figures 20-22 show children's play equipment with slides and swings that is not oriented to the needs of physically disabled users.

The other children's group play areas include frames with swings and play areas with children's cars, as seen in Figures 23-24. In the swing areas, there are no specially designed swings for wheelchair users. For wheelchair users to use swings, the size must be suitable for wheelchairs, and secure swing equipment is needed. Because children's areas with cars must enable disabled users to use them with assistance from others, these areas were inadequate.

Figure 25 shows that the ramp for the children's group play area is suitable for wheelchair users. In this area, there is no common equipment or space that can be used equally and is appealing to all users.

Figure 26 shows that there are no ramps at all at the entrance to the children's play area, so it is unsuitable for wheelchair users.

3.1.1.5 Sports areas

In Zone 1, there is exercise equipment at three separate points. As seen in Figures 27-29, the equipment includes devices that can be used by both the abled and the disabled together. As there is no specialized exercise equipment here that is designed for disabled users, this area can be used by everyone. The space between devices is 100cm, and sufficient space has been left for wheelchair users to move in it.

Figure 30 shows exercise equipment and a sports space in which disabled users can challenge themselves, and benefit from working their hand and arm muscles to strengthen them.

Figures 31-33 show the paving material used in the sports areas, which is suitable for wheelchair users.



Figure 27. Zone 1, exercise area 1 (Photo 23)



Figure 28. Zone 1, exercise area 2 (Photo 24)



Figure 32. Zone 1, football field (Photo 28)



Figure 29. Zone 1, exercise area 3 (Photo 25)



Figure 33. Zone 1, tennis court (Photo 29)

3.1.1.6 Street furniture



Figure 30. Zone 1, exercise area 4 (Photo 26)



Figure 34. Zone 1, benches and trash cans (Photo 30)



Figure 31. Zone 1, basketball court (Photo 27)

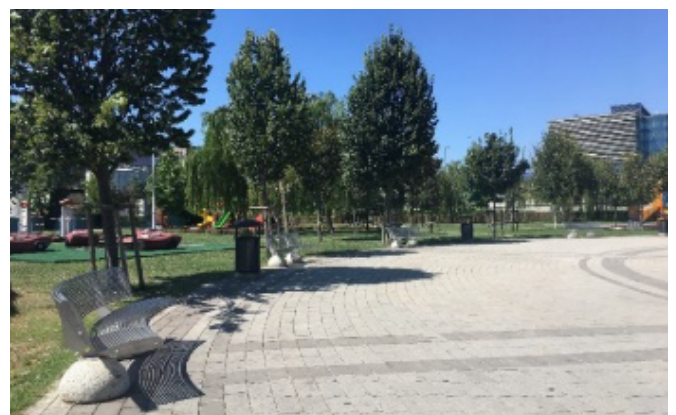


Figure 35. Zone 1, benches (Photo 31)



Figure 36. Zone 1, tables with benches (Photo 32)



Figure 40. Zone 1, overhead elements 1 (Photo 36)



Figure 37. Zone 1, trash cans (Photo 33)



Figure 41. Zone 1, overhead elements 2 (Photo 37)



Figure 38. Zone 1, lighting within the gardens (Photo 34)



Figure 42. Zone 1, stands (Photo 38)



Figure 39. Zone 1, toilets (Photo 35)

In this zone, as regards the street furniture, the seating area has a space of 1.20 x 1.20m which is suitable for accommodating wheelchair users. The height of the opening of the trash can from the ground is 100cm. The trash can is at the same level as the pedestrian road, and the location is accessible. The benches and trash cans are suitable for disabled users (Figure 34, 35).

The benches with picnic tables in this area are unsuitable for wheelchair users (Figure 36). The height of the openings of trash cans from the ground is within the standards, at 100cm. The trash cans are spaced correctly, but the distance from the edge of the

pavement is unsuitable (Figure 37).

As regards lighting elements, on the main road these are at a height of 3.5m and at a width within the standards. Within the gardens, the lighting is also at a height of 3.5m and at a suitable width (Figure 38).

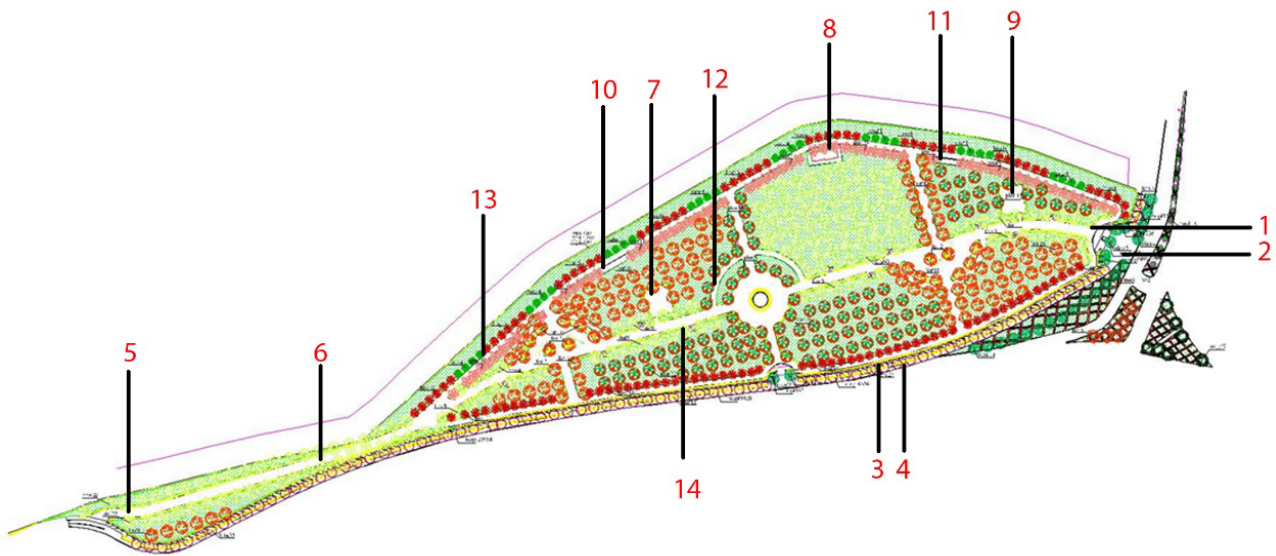
Figure 39 shows the men's and women's toilets, separately intended for disabled users. Regarding the measurements of the toilets, for wheelchair users to maneuver within them, they comprise a space of 1.5 x 1.5m in width, with holding rails at a height of 43cm from the bowl, and the highest point of the mirror at 190cm. Taking into consideration the presence of

collapsible railings, the features of elements within the toilets, and the proportions of the disabled toilet cubicles, the toilets are compliant with the standards

Figures 40 and 41 show that there is no space set aside under overhead protective covering elements for wheelchair users.

According to the standards, the area set aside for seating elements should leave a 1.20 x 1.20m space. Figure 42 shows that such a space has not been left at the stands for wheelchair users. This area is unsuitable for wheelchair users.

3.1.2 Zone 2



*Numbers on the plan correspond to points where photographs were taken.

Figure 43. Çirpıcı Community Gardens, the existing part of Zone 2 (URL-2, 2019)

3.1.2.1 Pavements



Figure 44. Zone 2, entrance gate (Photo 1)



Figure 45. Zone 2, pavement in front of entrance gate (Photo 2)



Figure 46. Zone 2, bicycle path along pavement (Photo 3)

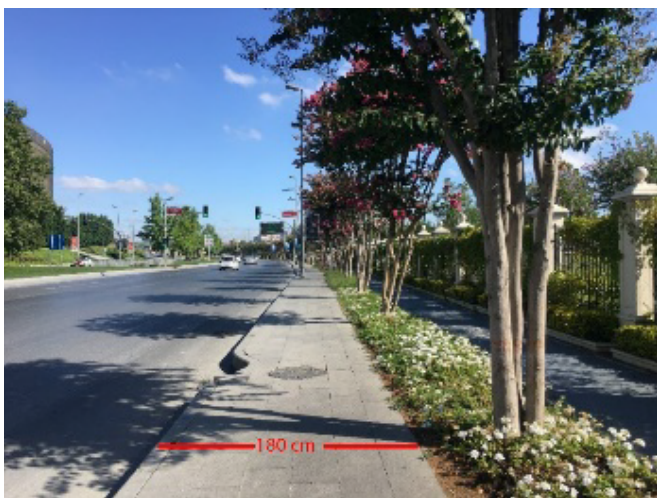


Figure 47. Zone 2, pavement around the gardens (Photo 4)

In Zone 2, there is one entrance gate. The ground in the front area past the entrance is made of compressed sand and this creates difficulties for wheelchair users (Figure 44).

According to the standards, the joint gap should be at most 5mm, and the paving material chosen should be slip-resistant. In the area studied, the joint gap is 3mm and slip-resistant material has been used. The parquet-style stone used for paving in front of the entrance is suitable for use by the physically disabled (Figure 45).

In Zone 2 of the gardens, the surrounding paving features pedestrian walking roads, bicycle paths and green areas, and serves three different functions. Each area has a width of 180cm. Because there is no difference in elevation on entering the gardens, wheelchair users can enter easily. The pavement has a cross slope of 1% and a longitudinal slope of 3%. The material covering the ground is suitable for physically disabled users. In Figure 47, the plants with branches

hanging over the pavement have kerbstone borders which are suitable and efficient. There is no protective kerb to prevent cars from parking on the edge of the pavement. The electricity poles, lighting and signage on the pavement are suitable. When evaluated according to the standards, the pavement is of a suitable size to be used by wheelchair users (Figure 46 and Figure 47).

3.1.2.2 Pedestrian roads



Figure 48. Zone 2, pedestrian road (Photo 5)



Figure 49. Zone 2, pedestrian road (Photo 6)

The pedestrian road shown in Figure 48 has a width of 500cm and is suitable for wheelchair passage in both directions. The pedestrian road has a slope of 2%. The drainage grate is perpendicular to the road and the grating spacings are 1.3mm. Because it is an earth road, it is affected by bad weather conditions and there is some unevenness. The protective kerb around the road is less than the standard 5cm. Because soil and sand materials have been used for the pedestrian road, this poses problems for disabled individuals walking and getting wheelchairs to move. For this reason, the

pedestrian road is unsuitable for wheelchair users.

3.1.2.3 Ramps



Figure 50. Zone 2, ramp (Photo 7)



Figure 51. Zone 2, ramp (Photo 8)

Figure 50 shows the entrance ramp to the children's play area. The ramp is 250 cm in width, with a cross slope of 2% and a longitudinal slope of 4%. The ramp is suitable for use by wheelchair users.

3.1.2.4 Playgrounds



Figure 52. Zone 2, children's playground (Photo 7)



Figure 53. Zone 2, children's playground (Photo 9)

The children's play area shown in Figure 52 features a slide unit, a climbing frame and swing equipment. For the disabled to be able to use wheelchairs without assistance, there must be safety precautions taken for special play elements (swings, etc.) designed specifically for disabled users. The play elements are not suitable for use by wheelchair users.

As Figure 53 shows, there are normal swings in the children's play areas of the gardens. Features like slides, seesaws and swings are found in every children's park. Play elements that can be used together by abled and disabled children are recommended. Because there is an elevation difference at the entrance to the area and a ramp has not been constructed, the area is unsuitable for wheelchair users.

3.1.2.5 Sports areas



Figure 54. Zone 2, exercise area 2 (Photo 10)



Figure 55. Zone 2, exercise area 2 (Photo 11)

In Zone 2, there is exercise equipment in two areas. Most of the exercise equipment is designed for children using their feet, which is a problem for disabled users, and there is no equipment for exercising the hands and arms; the space between devices is 120cm. It was determined that the exercise areas in this zone are not suitable for wheelchair users.

3.1.2.6 Street furniture



Figure 56. Zone 2, benches and trash cans (Photo 12)



Figure 57. Zone 2, lighting elements (Photo 13)



Figure 58. Zone 2, toilets (Photo 8)



Figure 59. Zone 2, overhead cover elements and seating area (Photo 14)

According to the standards, seating areas must include a space of 1.20 x 1.20m for wheelchairs. The openings of trash cans must be at a height of 90-120cm from the ground. And the distance from the kerb stone at the edge of the walking pavement must be at least 40cm.

In this zone, street furniture includes seating areas, with a space of 120 x 120cm left at the sides, which are suitable for disabled users. The trash cans were measured at a height of 100cm from the ground; and the space between the trash cans and the kerb stone comply with the standards, with a distance of 40cm (Figure 56). The benches and trash cans in this zone are generally suitable for use by mobility impaired individuals.

According to the standards, the roads within a park have to be lit, and the poles of lighting elements should be a height of 2.3m and a width of 90cm. As seen in Figure 57, the lighting elements here have a width of 90cm and a height of 350cm; they are suitable for use.

According to the standards, in toilets the holding rail should be 25-35cm higher than the bowl, the mirror

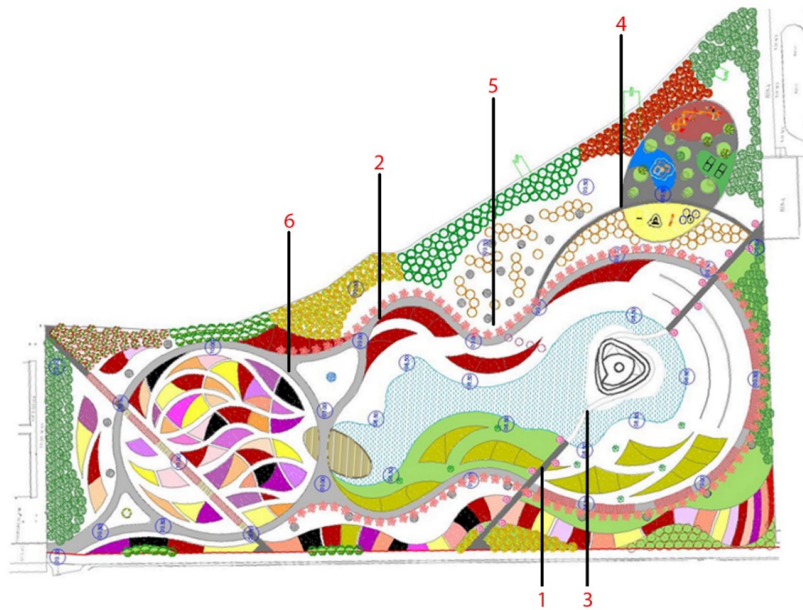
located at a height from the ground of at most 90cm, the height of the upper point of the mirror at most 1.9m, liquid soap and paper towels located at a height from the floor of between 80cm and 1.1m, and toilet paper at a height from the floor of 43-48cm. The toilet cubicle should have a width of at least 1.5m, and for a standard toilet cubicle the net depth where the bowl is mounted on the wall should be at least 1.42m, or if mounted on the floor, at least 1.5m.

The sand and soil material used for the road to access the toilets makes this road unsuitable for use by wheelchair users. The toilets are suitable for use by

mobility impaired users in terms of their allocation of separate space for disabled individuals, (Figure 58).

The overhead covering elements shown in Figure 59 may be used as sun shades, but are inadequate for bad weather. Under these covering elements, the separately added seating elements have a 150 x 150cm space left on one side where wheelchair users can wait comfortably. In this zone, the overhead covering elements do not provide obstacles to mobility impaired users; however, the physical structure that should provide the expected function is inadequate.

3.1.3 Zone 3



*Numbers on the plan correspond to points where photographs were taken.

Figure 60. Çırpıcı Community Gardens, the existing part of Zone 3 (URL-2, 2019)

3.1.3.1 Pedestrian roads



Figure 61. Zone 3, sloping pedestrian road (Photo 1)



Figure 62. Zone 3, sloping pedestrian road (Photo 2)



Figure 63. Zone 3, causeway over a lake (Photo 3)

The sloping pedestrian road shown in Figure 61 has a width of 300cm, and is suitable for two wheelchair users to pass one other. The ramp slope is 2%; and it is suitable for use by everyone. Between the planted area and the pedestrian walkway there is no separating element. Soil has been used as the ground surfacing material. While this may appear suitable from an aesthetic perspective, in the course of time, bumps and depressions will develop, creating potential danger for mobility impaired individuals.

The slope of the pedestrian roads shown in Figure 62 is 3%. While it may appear suitable for two-way passage, the materials used similarly leave open the possibility of dangers.

According to the standards, the width of passage for dual carriageways should be a minimum of 150cm, and the slope of access roads at most 5%. There must be a 150 x 150cm landing platform at each end of ramps longer than 10m and higher than 50cm, and also a rest area every 10m.

The transit road shown in Figure 63 has a slope and width that comply with the standards. In this zone, the absence of any seating elements, trash cans or lighting elements along the length of the sloping pedestrian road make it unfavorable for both comfort and security reasons. On the pedestrian road and the ramps, the specified rest area every 10m has to be added.

3.1.3.2 Playground



Figure 64. Zone 3, children's playground (Photo 4)

There is a children's play area in only one place in this region. As in the other zones, slides and swings are in use; but the children's play elements are only intended for use by abled children. Here there needs to be play equipment designed for everyone to be able to use and play with. For disabled users to use these kinds of play elements they would require help from outside, and if they were to use them on their own, they would be vulnerable, as there are no safety precautions in effect, and accidents can happen.

3.1.3.3 Street furniture



Figure 65. Zone 3, overhead protective elements (Photo 5)



Figure 66. Zone 3, trash container (Photo 6)

The overhead protective elements used here were observed to provide suitable protection from poor weather conditions and the sun. They are easy to use and provide opportunities for rest to mobility impaired users (Figure 65). According to the standards, the height of openings of trash containers from the ground must be 90-120cm. As Figure 66 shows, in Zone 3 trash dumpsters are used in place of trash cans, and these are unsuitable according to disability standards. In terms of measurements, they are suitable for wheelchair users, but from the point of view of usage and ergonomics they are unsuitable.

3.2 Evaluation of the observation and assessment forms for the area studied

This section details the observation and assessment forms prepared in accordance with the standards of TS 12576, with the aim of evaluating the suitability of access of the study area for the disabled. Evaluations were not made for functions, materials or applications that were not found in the area.

Table 1 shows the pavement observation form; pavement criteria of dimensions, surface covering, infrastructure and security components have been considered and the existing conditions examined in detail. Table 2 shows the pedestrian road observation form, which examined pedestrian road width, elevation, long-distance slope elevation, rest areas and landing platforms, drainage gratings, ground covering and their level differences at crossings, and the appropriateness of protective kerbs. Table 3, the disabled ramps and car parks form, examines ramp slopes in three directions, perceivable surfaces, ramp

elevation on narrow pavements, car park locations and sizes, areas between parking spaces, the numbers of car parks, directional signs within car parks, car park ticket machines, parking meters, etc. Table 4 shows the assessment of children's play elements, sports areas, exercise devices and trash cans in the light of the criteria; the trash can dimensions and their heights from the ground were suitable, and they were located in such a way as not to obstruct pedestrian traffic. Children's play elements were examined to determine their suitability for disabled users. Sports areas and exercise equipment were evaluated according to the standards for their suitability; the sports fields have slip-resistant ground covering, are made of rugged material, and are suitable. The exercise devices were partly intended for disabled users, and were suitable. Table 5 assesses the observations of dimensions and suitability for use by disabled users of seating elements, lighting, public toilets and overhead protective elements.

Table 1. Pavement observation form

Park unit	Issues	Present situation			TSE standard
		Zone 1	Zone 2	Zone 3	
	Pavement (P)				
Measurements	P.1. Pavement width	more than 150cm	180cm	absent	Min. 150cm
	P.2. Height of pavement (from carriageway covering)	15cm	15cm	absent	Min. 3cm Max. 15cm
	P.3. Cross slope	1%	1%	absent	Max. 2%
	P.4. Longitudinal slope	3%	3%	absent	Max. 5%
Surface paving	P.5. Joint gaps in paving for wheelchairs	2mm joint gap left	3mm joint gap left	absent	Max. 5mm
	P.6. Paving material	acceptable	acceptable	absent	Non-slip material
Security	P.7. Height of hanging branches, thorny plants and signboards at pavement edge	Height more than 220cm Thorny plants were not used	Plants at a height of more than 220cm were not used	absent	Min. 220cm
	P.8. Protective barrier on kerb to prevent cars from parking on low pavements	No protective barrier. Kerb height does not permit cars to park	No protective barrier. Kerb height does not permit cars to park	absent	Max. height 70 cm Max. height 90 cm
Infrastructure arrangements on pavements	P.9. Plantings	acceptable	acceptable	absent	Pavement not narrower than 200cm
	P.10. Thorny and fruit-bearing plants	unused	unused	absent	unusable
	P.11. Bases of trees in pavements	acceptable	acceptable	absent	Grating or gravel in color opposite to that of surroundings
	P.12. Different elevations and textures outside moat ring around trees and plants	acceptable	acceptable	absent	Width: 60 cm. Height: 10 cm Texture: Perceivable surface
	P.13. Set-up lane for electricity, lighting, traffic signs, decorative plants and pedestrian railings	80cm implemented	100cm implemented.	absent	Kerbstone included Min. 75 cm Max. 120 cm
	P.14. Space between drainage grating bars	no grating	no grating	absent	Perpendicular to walking path, Max. 13 mm

Table 2. Pedestrian road observation form

Park unit	Issues	Present situation			TSE standard
		Zone 1	Zone 2	Zone 3	
Pedestrian roads (PR)					
Pedestrian road	PR.1. Two-way passage width	More than 90cm	More than 90cm	More than 90cm	Min. 90cm
	PR.2. Two-way passage width	More than 200cm	500 cm	300cm	Min. 150cm
	PR.3. Access roads	3% Slope	2% Slope	3% Slope	Max. slope 5%
	PR.4. Resting area before passing to second ramp from ramp which is longer than 10m and higher than 50cm	Rest area not constructed	absent	Rest area not constructed	250cm
	PR.5. Landing platform at both ends of ramp which is longer than 10m and higher than 50cm	acceptable	absent	acceptable	150x150cm
	PR.6. Drainage grating	acceptable	acceptable	absent	Must be perpendicular to the walking path, with grating spacing max. 123mm
	PR.7. Road and surrounding level differences	acceptable	unacceptable	unacceptable	Must be between 6 and 13 mm
Pedestrian road ramps	PR.8. Ramp slope if more than 5%	3% slope	absent	absent	Max. length 800cm and max. height 50 cm; Max. slope 6%
		3% slope	absent	absent	Max. length 500cm and max. height 35 cm; Max. slope 7%
		5% slope	absent	absent	Max. length 200cm and max. height 16 cm; Max. slope 8%
	PR.9. Ramp surfaces	acceptable	absent	absent	Hard, stable, non-slip material with little unevenness
		acceptable	absent	absent	Landing platform, 150x150cm at each end of the ramp
	PR.10. Protective kerb	acceptable	acceptable	unacceptable	Min. 5cm
	PR.11. if there is an elevation difference of more than 20cm	absent	absent	absent	Railing on both sides
PR.12. ramps wider than 300cm	absent	absent	absent	Railing in the middle	

Table 3. Ramp and car park observation form

Park unit	Issues	Present situation			TSE standard
		Zone 1	Zone 2	Zone 3	
Ramps (R)					
	R.1. 3-way slope at pavement edge	5% slope	4% slope	absent	Middle ramp max. 8% Side ramps max. 10% On one-way sloping ramps, max. 8%
	R.2. Width	Starts at 200 cm	250 cm	absent	Ramps at pavement edge, min. 120 cm. On the pavement path, min. 180 cm
	R.3. Plantings at the pavement edge	5% slope	4% slope	absent	One-way sloping ramp, max.: 8%
	R.4. Ramp on narrow pavements	3% slope	4% slope	absent	Perpendicular to the road, min. 2% Parallel to the road, max. 8%
	R.5. Junction of ramp and carriageway	No dips or unevenness	acceptable	absent	There should be no bumps and depressions
	R.6. Perceptible surface	Not implemented	acceptable	absent	Opposite color to the ground cover, 60cm

Parking areas (PA)					
Location	PA.1. Pavement elevation	acceptable	absent	absent	0.00, + 3.00 cm and ramp
Parking space size	PA.2. Parking space width	390 cm (250 + 140 cm)	absent	absent	Min. 360cm Desirable 390cm
	PA.3. Space for wheelchairs between two parking spaces	acceptable	absent	absent	Must be 120cm
	PA.4. At the edge of the carriageway	acceptable	absent	absent	At least one disabled sign required
	PA.5. Number of parking spaces	inadequate	absent	absent	One disabled parking space for every 50 cars
	PA.6. Directions within the parking area	Different colored disabled sign present on signboard and on ground	absent	absent	Disabled sign showing directions, disabled signboard, disabled sign on ground
	PA.7. Parking area ticket machine and parking meters	acceptable	absent	absent	90-120cm height
	PA.8. Ramp	acceptable with 2% slope	absent	absent	Ramp at edge of pavement

Table 4. Children's playgrounds, sports areas, exercise equipment and trash can observation form

Park unit	Issues	Present situation			TSE standard
Children's play elements (CPE)		Zone 1	Zone 2	Zone 3	
	CPE.1. Suitability of elements for disabled users	No play elements for disabled children found in the space, which is therefore unsuitable.	No play elements for disabled children found in the space, which is therefore unsuitable.	No play elements for disabled children found in the space, which is therefore unsuitable..	There has to be children's play equipment aimed at shared use by both abled and disabled children
Sports areas (SA)					
	SA.1. Tennis court material must be non-slip	acceptable	absent	absent	Ground paving material
	SA.2. Basketball court material must be non-slip	acceptable	absent	absent	Ground paving material
Exercise equipment (EE)					
	EE.1. Adequacy of exercise devices aimed at mobility impaired users	acceptable	unacceptable	absent	Inclined barbell device-Arm and leg workout device-Hand cycle -Vertical barbell device-Hand and foot pedal-Combined arm and leg workout device-Shoulder and arm workout device-Pull-up device
	EE.2. Space required between devices	acceptable	acceptable	absent	Min.: 100 cm
Trash can (TC)					
	TC.1. Height of opening of trash can from ground	100 cm	100 cm	unacceptable	90-120 cm
	TC.2. At the sides of pedestrian walkways	acceptable	acceptable	unacceptable	Kerb stone distance Min: 40 cm

Table 5. Seating elements, lighting, public toilets, and overhead covering elements observation form

Park unit	Issues	Present situation			TSE standard
		Zone 1	Zone 2	Zone 3	
Seating elements (SE)					
	SE.1. Seating areas	acceptable	acceptable	unacceptable	Space for wheelchair: 1.20 x 1.20 m
	SE.2. Benches with tables	unacceptable	absent	absent	Tables with benches have to be 75-90cm high and min. 60cm deep to accommodate a wheelchair
Lighting (L)					
	L.1. Main road lighting pole height and width	H:350 cm Width suitable	acceptable	absent	Height 2.3 m Width 1.5 m
	L.2. Lighting pole height and width within the gardens	H:350 cm Width suitable	acceptable	absent	Height 2.3 m Width 90 cm
Public toilets (PT)					
	PT.1. Existence of collapsible holding rails	Present	Present	absent	Collapsible rails should be brought in
	PT.2. Height of holding rails from bowl	acceptable	acceptable	absent	Needs to be 25-35cm higher
	PT.3. Mirror location	acceptable	acceptable	absent	Height from ground: Max. 90 cm Height of upper point of mirror: Max. 1.9 m
	PT.4. Liquid soap and paper towel location	acceptable	acceptable	absent	Height from ground: 80cm - 1.1m
	PT.5. Toilet paper location	acceptable	acceptable	absent	Height from ground: 43cm - 48cm
	PT.6. Width of toilet cubicle	acceptable	acceptable	absent	The standard toilet cubicle should have a width of at least 1.5m, and the net depth where the bowl is mounted on the wall should be at least 1.42m, or if mounted on the floor, at least 1.5m.
	PT.7. Device for emergency calls	Present	Present	absent	An emergency button should be available
Overhead covering element (OCE)					
	OCE.1. Adequacy of overhead covered area for protection in poor weather conditions	Present, acceptable	unacceptable	Present, acceptable	Overhead covered area for protection in poor weather conditions

General assessment of the conclusions of the observation form analysis

Table 6. Evaluation form

Zone 1		Zone 2		Zone 3	
Benchmarks	Degree of compliance	Benchmarks	Degree of compliance	Benchmarks	Degree of compliance
P.1	1	P.1	1	P.1	X
P.2	1	P.2	1	P.2	X
P.3	1	P.3	1	P.3	X
P.4	1	P.4	1	P.4	X
P.5	1	P.5	1	P.5	X
P.6	1	P.6	1	P.6	X
P.7	1	P.7	1	P.7	X
P.8	1	P.8	1	P.8	X
P.9	1	P.9	1	P.9	X

P.10	1	P.10	1	P.10	X
P.11	1	P.11	1	P.11	X
P.12	1	P.12	1	P.12	X
P.13	1	P.13	1	P.13	X
P.14	X	P.14	X	P.14	X
PR.1	1	PR.1	1	PR.1	1
PR.2	1	PR.2	1	PR.2	1
PR.3	0	PR.3	X	PR.3	0
PR.4	1	PR.4	X	PR.4	1
PR.5	1	PR.5	1	PR.5	X
PR.6	1	PR.6	0	PR.6	0
PR.7	1	PR.7	X	PR.7	X
PR.8	1	PR.8	X	PR.8	X
PR.9	1	PR.9	0	PR.9	0
PR.10	X	PR.10	X	PR.10	X
PR.11	X	PR.11	X	PR.11	X
R.1	1	R.1	1	R.1	X
R.2	1	R.2	1	R.2	X
R.3	1	R.3	1	R.3	X
R.4	1	R.4	1	R.4	X
R.5	1	R.5	1	R.5	X
R.6	0	R.6	1	R.6	X
CP.1	1	CP.1	X	CP.1	X
CP.2	1	CP.2	X	CP.2	X
CP.3	1	CP.3	X	CP.3	X
CP.4	1	CP.4	X	CP.4	X
CP.5	0	CP.5	X	CP.5	X
CP.6	1	CP.6	X	CP.6	X
CP.7	1	CP.7	X	CP.7	X
CP.8	1	CP.8	X	CP.8	X
CPE.1	0	CPE.1	0	CPE.1	0
ED.1.	1	ED.1.	X	ED.1.	X
ED.2.	1	ED.2.	X	ED.2.	X
FA.1.	1	FA.1.	0	FA.1.	X
FA.2.	1	FA.2.	1	FA.2.	X
TC.1	1	TC.1	1	TC.1	0
TC.2	1	TC.2	1	TC.2	0
SE.1	1	SE.1	1	SE.1	0
SE.2	0	SE.2	X	SE.2	X
LE.1.	1	LE.1.	1	LE.1.	X
LE.2.	1	LE.2.	1	LE.2.	X
PT.1.	1	PT.1.	1	PT.1.	X
PT.2.	1	PT.2.	1	PT.2.	X
PT.3.	1	PT.3.	1	PT.3.	X
PT.4.	1	PT.4.	1	PT.4.	X
PT.5.	1	PT.5.	1	PT.5.	X
PT.6.	1	PT.6.	1	PT.6.	X

PT.7.	1	PT.7.	1	PT.7.	X
OCE.1.	1	OCE.1.	0	OCE.1.	1
1: Complies with standards					
0: Does not comply with standards					
X: If no benchmark in the area					
<i>P.</i>	<i>Pavements</i>	<i>ED.</i>	<i>Exercise devices</i>		
<i>PR.</i>	<i>Pedestrian Road</i>	<i>TC.</i>	<i>Trash can</i>		
<i>R.</i>	<i>Ramp</i>	<i>SE.</i>	<i>Seating Element</i>		
<i>CP.</i>	<i>Car park</i>	<i>LE.</i>	<i>Lighting Element</i>		
<i>CPE.</i>	<i>Children's Play Element</i>	<i>PT.</i>	<i>Public Toilet</i>		
<i>SA.</i>	<i>Sports Area</i>	<i>OCE.</i>	<i>Overhead Covering Element</i>		

Table 7. Assessment form, statistical proportion table

	Unit	ZONE 1	ZONE 2	ZONE 3
(1) Benchmark values	Number	50	35	4
(0) Benchmark values	Number	5	5	7
(X) Benchmarks not present in area	Number	3	18	47
Total benchmarks	Number	58	58	58
Proportion of standards complied with		91%	88%	36%

As can be understood from the proportional Table 7, evaluations were made according to the existing functions at the Çırpıcı Community Gardens, in view of TSE standards. Zone 1 ensures the best standards at a ratio of 91%, Zone 2 at 88%, and Zone 3 at 36%. When evaluated in terms of quantity, activity and functions, it can be seen that Zones 1 and 2 are the most intensely and efficiently used, whereas Zone 3 is the least active area. Within these evaluations, in view of the fact that there are very few elevation differences in the area of the gardens, it can be concluded that the park area is easily accessible.

4 Conclusion and proposals

For disabled individuals to participate in daily life without support depends on a civilized collective and accessible environment and buildings (Sirel A. & Sirel O. Ü., 2018). Recreation areas, especially within city centers, play an important role for disabled individuals in terms of their social integration into the society, and accessibility. Within these recreation areas there are city parks, district parks, neighbourhood parks, excursion spots, wooded areas and green areas. As it is in many areas of life, the difficulties that disabled people face in these areas, cause alienation from

the community, loss of trust and withdrawal from society. The bases of these problems are people's lack of awareness or forgetting that any individual has the potential to become disabled, and the fact that the designers of such projects are not being versatile in their designs and taking universal principles into account. Accessibility affects every individual's quality of life, and therefore the design process should take into account accessibility and usability for all users as the basis for designs and produce solutions accordingly^[14]. Furthermore, in all public institutions and establishments, non governmental organizations and education establishments, understanding should be inculcated that every individual is a potential candidate to be disabled, and that all disabled persons are a part of the society.

In spite of Law 5378 which was enforced in 2005 - "all existing official structures belonging to public institutions and establishments, all existing roads, pavements, crossings, open and green spaces, playgrounds, etc., social and cultural areas, and areas or structures open to the public which are established by individuals or private organizations, have to be properly adapted for accessibility for the disabled within 7 years of this law coming into effect" - and

which has since then been extended for another three years, necessary changes have not been made in open and green areas for their use by disabled and elderly individuals. For this reason, for open and green spaces to be within the TS 12576 standards and appropriate for disabled individuals, newly designed projects should be examined carefully before being given approval and permits, and inspected more often while being built.

The area studied has been examined paying special attention to criteria of accessibility, usage, activity and comfort for the disabled.

As the area is mostly flat, there are not many ramps, and the few that exist meet the standards. Pavements and pedestrian road dimensions, surface covering, security, infrastructure designs and elevation angles have been studied and it has been observed that all are suitable according to TSE standards. At one location, it was observed that a pedestrian road, although it has appropriate elevation, has no landing platform or rest area appropriate for the length. This area must be redesigned in order to enable landings and rest areas to be set up along the slope.

Although in the entire area there are eight children's playgrounds at eight different locations, only in one of those playgrounds is there is a partial play element for disabled children. These areas have standard play elements, all with appropriate spacing and correct elevations, yet they are not appropriate for use by disabled children on their own. The play elements used, should be intended for all children using them, and be helpful for their mental and physical development. Although the types of exercise equipment available are not specifically for the disabled, they serve a wide range of other users. An appropriate amount of space between the exercise devices has also been left for wheelchair users.

The park has an adequate number of parking spaces for vehicles; however, within the car park, considering the potential of the gardens, an insufficient number of parking spaces has been set aside for the disabled.

In the park, directional signs, signboards, and signage are not sufficient and there are no auditory directional signs or raised map information boards for the disabled; these are imperative for large parks. This highlights the difficulty of access in a park or open space, and the likely inability of a disabled individual to reach a desired location without help from others.

Within the area there are street furnishings for seating, lighting and trash. Necessary and adequate

spaces for wheelchair users have been left among the benches; however, because the picnic tables are not the right height or depth for wheelchairs, these are not appropriate for use by disabled individuals. Trash cans are within the standard sizes and are also distributed appropriately in terms of spacing and usage. Lighting poles are larger than the minimum size and used appropriately.

Within the area, toilets and baby care units are found in three different spots. Each toilet includes four different functions, serving women, men, the disabled and infant care.

There are no appropriate spaces left for the disabled under the covered areas such as alcoves and pergolas.

No obstacles were found in the access points to sports areas of the gardens, including the basketball courts, football fields and tennis courts, and the materials used in these sports areas were found to be acceptable for use by disabled individuals and wheelchair users.

The results of the observations of this research, bearing in mind the TS 12576 standards, are as follows: Zone 1 according to the disabled suitability, shows high standards of adequacy; Zone 2 is partially adequate for the disabled; Zone 3 is not fully adequate for the disabled, and with all its deficiencies, it has very low accessibility. When the area studied is considered generally from the point of view of disabled standards, it can be said that accessibility needs are being met at a high level.

In conclusion, within the sample examined area, a large number of inadequacies have not been observed as regards accessibility for mobility impaired individuals. Although deficiencies have been detected in terms of activities and comfort criteria, it also has been observed that none of these deficiencies obstruct the general accessibility of the gardens.

References

- [1] Aysel, U. S. L. U., Nasim SHAKOURI. Engelli Çocuklara Dost Oyun Alanı Ve Dış Mekan Tasarımı. Erciyes Üniversitesi Fen Bilimleri Enstitüsü Fen Bilimleri Dergisi 28.5, 2012:367–75. Retrieved from <http://dergipark.org.tr/erciyesfen/issue/25563/269654>
- [2] Eşkil, Özlem Yüce. Engelliler için dış mekan tasarım özellikleri bağlamında Ankara kent parklarının irdelenmesi. MS thesis. Bartın Üniversitesi Fen Bilimleri Enstitüsü, 2011.
- [3] Aykal, Fatma Demet, Aysel YILMAZ, Selda Çelik. Kent Parklarının Erişilebilirliği Üzerine Bir Araştırma: Van Dilek Doğan Kent Parkı Örneği. Mühendislik Bilimleri ve Tasarım Dergisi 5, 2017:29–40.

- [4] Pouya, Sima, Elif Bayramoğlu, Öner Demirel. Doğa ile Uyumlu Fiziksel Engelli Çocuk Oyun Alanları. Mimarlık Bilimleri ve Uygulamaları Dergisi (MBUD) 1.1, 2016:51–60.
- [5] Olgun, Rifat, Tahsin Yılmaz. A Study on The Accessibility of Parks: The Case Study of the Kızılelma Park, Nigde. Artvin Çoruh Üniversitesi Orman Fakültesi Dergisi 15.1, 2014:48–63.
- [6] Bulut, Yahya, Ö. Atabeyoğlu, P. Yeşil. A study on the evaluation of ergonomic situations of the equipment elements in the centre of Erzurum city. Journal of Agricultural Sciences (Turkey), 2008.
- [7] Öztürk, Sevgi, Turkan Yaşar İsmail. Kastamonu Kent Merkezinde Fiziksel Engelli Hareketliliği. Mühendislik Bilimleri ve Tasarım Dergisi 3.3, 2015:511–6.
- [8] Sakıcı, Çiğdem, et al. Kastamonu Kentindeki Açık Yeşil Alanların Farklı Kullanıcılar Tarafından Kullanılabilirliğinin İrdelenmesi. Kastamonu Üniversitesi Orman Fakültesi Dergisi 13.1, 2013:129–43.
- [9] Enstitüsü, Türk Standartları. Şehir İçi Yollar - Özürlü ve Yaşlılar İçin Sokak, Cadde, Meydan ve Yollarda Yapısal Önlemler ve İşaretlemelerin Tasarım Kuralları. Hazırlık Grubu: Şehir İçi Yollar Özel Daimi Komitesi, Kabul Tarihi 8, 1999, TS No:12576.
- [10] Enstitüsü, Türk Standartları. Özürlüler ve Hareket Kısıtlılığı Bulunan Kişiler İçin Binalarda Ulaşılabilirlik Gereklere. Hazırlık Grubu: İnşaat İhtisas Grubu, Kabul Tarihi 22, 2011, TS No:9111.
- [11] No, T. S. "12460, Kabul Tarihi: 20.04. 1998." Türk Standartları Enstitüsü (TSE). Şehir İçi Yollar-Raylı Taşıma Sistemleri, TS No:12460.
- [12] URL-1. (2019). <https://earth.google.com/web/@40.99844839,28.89248167>
- [13] URL-2. (2019). İBB Park Bahçe ve Yeşil Alanlar Daire Başkanlığı, Çırpıcı Millet Bahçesi Son Hal Projesi.
- [14] Sirel, Ayşe, Osman Ümit Sirel. "Universal Design" Approach for the Participation of the Disabled in Urban Life. Journal of Civil Engineering and Architecture 12, 2018:11–21.
- *All photographs related to the park in this article were taken by the authors.