



**NEAR EAST UNIVERSITY  
INSTITUTE OF GRADUATE STUDIES  
DEPARTMENT OF ARCHITECTURE**

**DEVELOPING A FRAMEWORK OF UNIVERSAL  
DESIGN IN THE CONTEXT OF SUSTAINABLE  
URBAN PLANNING  
IN NORTHERN NICOSIA**

**PhD. THESIS**

**Ümran DUMAN**

**Nicosia**

**December, 2022**

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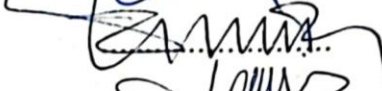

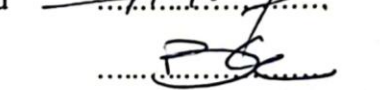

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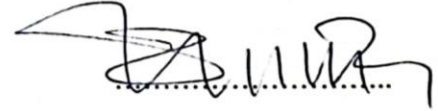
## Approval

We certify that we have read the thesis submitted by Ümran Duman titled **“Developing a Framework of Universal Design in the context of Sustainable Urban Planning in Northern Nicosia”** and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Doctor of Philosophy in Architecture.

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## Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.



Ümran Duman

05/12/2022

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**Ümran Duman**

## **Abstract**

### **Developing A Framework of Universal Design in the Context of Sustainable Urban Planning in Northern Nicosia**

**Assoc. Prof. Dr. Buket Asilsoy**

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Universal design can be defined among the most important catalysts of urban design parameters that are fundamental to social sustainability. Universal design is efficient in procuring solutions that satisfy the joint requirements of all users in built environments having an increasing variety of users. Northern Nicosia also urgently needs to incorporate universal design principles into its urban design parameters. In terms of the quality of urban settings, including public spaces like parks, squares, streets, and avenues, the city has considerable deficiencies. Based on this ground, the study aims to evaluate universal design within different dimensions in the context of sustainable urbanism in Northern Nicosia. Accordingly, a conceptual framework is developed using the relevant literature review to explain universal design as a concept. Later, in the methodology section of the study, a qualitative assessment based on the principles of universal design and a quantitative evaluation based on Turkish Standard Institute standards were used in three neighbourhoods. Besides, the perception, satisfaction and opinions of the users living in these neighbourhoods were investigated through a questionnaire conducted with 150 participants. In addition, various suggestions and recommendations for improving urban spaces are provided. Based on the theoretical evaluation and the findings of the qualitative and quantitative analysis at Taşkınıköy, Göçmenköy and Marmara, it can be concluded that urban spaces in northern Nicosia do not achieve a convenient environment for all individuals to the greatest extent possible. In sum, it is expected that this study will contribute to the existing knowledge on the terminology of universal design in the context of sustainable urbanism.

**Keywords:** universal design, sustainable urbanism, social sustainability, qualitative and quantitative analysis, Northern Nicosia

## Özet

### Kuzey Lefkoşa'da Sürdürülebilir Kentsel Planlama Bağlamında Evrensel Tasarım için Bir Çerçeve Geliştirilmesi

**Doç. Dr. Buket Asilsoy**

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**Aralık 2022, 205 Sayfa**

Evrensel tasarım (ET), sosyal sürdürülebilirlik (SS) için temel olan kentsel tasarım öğelerinin en önemli katalizörlerinden biri olarak tanımlanabilir. Evrensel tasarım, artan kullanıcı çeşitliliğine sahip yapıları çevrelerde tüm kullanıcıların ortak gereksinimlerini karşılayan çözümler sağlamada etkilidir. Kuzey Lefkoşa'nın da acilen evrensel tasarım ilkelerini kentsel tasarım parametrelerine dahil etmesi gerekmektedir. Parklar, meydanlar, sokaklar ve caddeler gibi kamusal alanlar da dahil olmak üzere kentsel alanların kalitesi açısından, şehrin önemli eksiklikleri vardır. Bu zeminden hareketle çalışma, evrensel tasarımın sürdürülebilir kentleşme bağlamında farklı boyutlarıyla Kuzey Lefkoşa'da değerlendirilmesini amaçlamaktadır. Buna göre, evrensel tasarımı bir kavram olarak açıklamak için ilgili literatür taraması kullanılarak kavramsal bir çerçeve geliştirilmiştir. Daha sonra çalışmanın metodoloji bölümünde üç mahallede evrensel tasarım ilkelerine dayalı nitel bir değerlendirme ve Türk Standartları Enstitüsü standartlarına dayalı nicel bir değerlendirme yapılmıştır. Ayrıca bu mahallelerde yaşayan kullanıcıların algı, memnuniyet ve görüşleri 150 katılımcı ile yapılan anket aracılığıyla araştırılmıştır. Ayrıca kentsel mekanların iyileştirilmesine yönelik çeşitli görüş ve önerilerde bulunulmuştur. Teorik değerlendirme ve Taşkinköy, Göçmenköy ve Marmara'daki nitel ve nicel analiz bulgularına dayanarak, Lefkoşa'nın kuzeyindeki kent mekanlarının tüm bireyler için mümkün olabilecek en uygun çevreyi sağlamadığı sonucuna varılmıştır. Özetle, bu çalışmanın sürdürülebilir kentleşme bağlamında evrensel tasarım terminolojisine ilişkin mevcut bilgilere katkı sağlaması beklenmektedir.

**Anahtar kelimeler:** evrensel tasarım, sürdürülebilir kentleşme, sosyal sürdürülebilirlik, nitel ve nicel analiz, kuzey Lefkoşa

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## **List of Abbreviations**

<b>B.C:</b>	Before Christ
<b>ET:</b>	Evrensel Tasarım
<b>KKTC:</b>	Kuzey Kıbrıs Türk Cumhuriyeti
<b>PWD:</b>	Person with Disability
<b>SPSS:</b>	Statistical Package for Social Sciences
<b>SS:</b>	Social Sustainability / Sosyal Sürdürülebilirlik
<b>TSE:</b>	Türk Standartları Enstitüsü
<b>TSI:</b>	Turkish Standarts Institute
<b>UD:</b>	Universal Design

## CHAPTER I

### Introduction

In cities, because of social, economic, and communal reasons, population growth is observed. The different individuals live together in these urban environments. Urban design is a detailed management method that determines the physical, socio-cultural, and socio-economic conditions in urban space and is multi-faceted, examining and analysing urban formation. The craft of creating, shaping cities and towns is acknowledged as urban design. It entails the planning and design of structures, public spaces, transportation networks, services, and amenities. It is the act of giving form, shape, and attributes to groups of buildings, entire neighbourhoods, and the city as a whole. It is a structure that organizes elements into a network of different types of urban spaces. Urban design consolidates architecture, landscape architecture, and city planning to do cities more useful and appealing. (European Urban Knowledge Network, 2019). Urban aesthetics and the availability of public spaces also have a significant impact on urban design

Urbanization is occurring globally (Yıldırım et al., 2020). In 2008, more than half of the world's population lived in cities for the first-time, and these figures are expected to rise (Montgomery, 2007). Up to 70% of individuals on Earth are expected to live in urban areas by 2050. (Debnath et al., 2014). As such, as cities grow in size, so does the diversity of individuals. The needs of the users of the target audience should be met in order to make them work, the structure, the environment, or the product use at the most efficient level. In urban designs, the users are all individuals who live in the city.

All four sustainability pillars have been recognised in this era of urbanization to offer resolutions to the problems emerging at a rapid ratio. Hence, beginning at the end 1950s, sustainable urban design arose as a recent discourse within the sustainability context and has been recognized as a concern for urban development and planning, primarily in developed countries (Asilsoy & Oktay, 2018).

A diverse range of concerns, beginning at the structure unit and progressing up to the urban scale, are involved in sustainable urbanization.

Building energy performance and perception of energy efficiency are two of the most important issues at the structure scale (Özarisoy & Altan, 2021). As the scale increases, these headlines may become more varied and address topics like urban design, transportation, and other topics related to sustainability, which include the four main elements of environmental, economic, cultural, and social sustainability.

SS, which has a broad and open definition, is one of these dimensions (Boström, 2012). Eizenberg and Jabareen (2017), for example, defend that SS as a notion seeks to improve the preservation of people, in any case of race, origination, culture, or socioeconomic situation, against threat by encouraging the adoption of just and equitable social, economic, and environmental policies. Additionally, it could be proposed SS has something to do with how the surroundings affects people's life quality from a humanitarian standpoint. Therefore, it could be discussed that a socially sustainable artificial environment must be designed to meet the needs of a wide range of users. In other words, there is a significant connection between social sustainability and the universal design concept. It is critical to consider the containment and improvement of individuals who have been excluded from interacting in community for a variety of causes (Vavik & Keitsch, 2010). In this context, adopting the idea of UD, that attempts to provide designs for general use, makes sense. This contains creating urban areas for various user groups, such as streets, squares, parks, and green areas.

The UD concept can be used to resolve the common needs of all persons who use urban spaces. Mace defined UD as “products and environments created to be usable by all individuals, to the greatest extent possible, without the need for adaptation or specialized design” in 1985 (Gosset et al., 2009). Universal design is emphasizing the significance of acknowledging and comprehending that human beings will progress through diverse stages of ability throughout their lifetime (Pinna et al., 2020). The aim of UD in the design and composition of an environment that is accessible, understandable, and usable to the highest degree achievable by all persons is to support equal rights and opportunities (Lid, 2014). It also helps to improve the quality of life in cities. It addresses obstacles faced by individuals with disabilities, old people, children, and other populations who are frequently overlooked during the design process. UD decreased stigma while also providing benefits to all users (Steinfeld & Maisel, 2012). The adoption of the

concept of universal design in urban design will allow various types of users to use the same urban space, thus enhancing communication, sharing, and relationships. Thus, in recent years, the contribution to the sustainable urban concept focused on the protection of the ecosystem and the prevention of the social, economic, and environmental problems arising in parallel with the economic and technological developments will be contributed.

In contemporary urban design, the quality of human life and social sustainability, which addresses the interpersonal communication dimension, will be provided by the common living spaces designed by assimilating the idea of universal design. The presence of public areas is critical in the context of urban planning and design. Urban areas are in a variety of shapes and sizes, including parks, green areas, streets, squares, boulevards, and avenues. They supply resting areas and opportunities for people to interact with others (Carmona et al., 2010; Lotfata & Ataöv, 2020). Hence, urban spaces must be designed to be usable by people of all ages and abilities. In another way, the close relationship between humans and the artificial environment is the causes why cities and settlements require high-quality city areas to improve the social direction of daily life. (Arengi, 2020). Urban areas have the capacity to bring individuals together and can serve as a hub for cultural, political, and economic actions (Carmona et al., 2010; Jacobs, 1961; Thompson, 2002).

In the largest sense, people as social beings create their own life, intelligence, and world. 'Nature' has been altered and, in a way, produced, as seen in social life by the sensation organs (Lefebvre, 1991). Individuals have composed an artificial environment by interfering with nature to meet their needs. In this situation, urban spaces are one of the main domains of the urban fabric that are crucially needed for serving all users to the maximum extent practicable.

In line with this research, the city of Northern Nicosia in Cyprus was chosen for this study. It appears that Northern Nicosia urgently needs to enhance the dynamics of its urban design and incorporate universal design concepts into its urban design initiatives. In terms of the quality of urban settings, including urban areas like parks, squares, streets, and avenues, it has considerable deficiencies as a city. Therefore, the purpose of this research is to conduct a quantitative and

qualitative assessment and thorough evaluations of selected neighbourhoods in Northern Nicosia in terms of the seven UD principles.

### **1.1 Statement of the Problem**

Universal design principles are among the efficient tools to increase the quality of urban environments within physical, environmental, social, and anthropometrical characteristics. Accessibility, walkability and safety among sustainable urban design parameters are common requirements of all users in urban spaces. Such that the transportation, circulation, and access to spaces within the city should be appropriate for everyone. As long as accessibility, walkability and safety are achieved, with the help of participation, communication, and interaction social, cultural, and physical relations in daily life will be maintained in urban spaces.

Principles of universal design might be an effective tool for making urban environments more user-friendly, sustainability-oriented, and for increasing the quality of urban life in cities. In addition, there are strong relationships between sustainable urban design parameters (such as accessibility, walkability and safety) and universal design concepts. Northern Nicosia appears to have an immediate requirement to develop its city design dynamics and to incorporate UD principles into urban design efforts. So, in terms of the quality of urban surroundings, including urban spaces like parks, squares, streets, and avenues, Northern Nicosia as a city has serious shortcomings.

Nicosia is the capital of Cyprus. This city houses the country's executive branches (the presidency, prime ministry, and other ministries). Furthermore, it is a city with a variety of intense activities and service facilities (such as industrial units, etc). Besides, Northern Nicosia has both private and public schools (from nursery to high school), as well as several university campuses. In other words, the city has a dense population; it is the most crowded city in North Cyprus. According to the 2011 census, the de jure population of Northern Nicosia is 94.824 individuals (DPÖ, 2011).

In addition, there is a trend of population increase in relation to the rise of the rapid urbanization process. Depending on the population density, the sort of users differentiates and varies. According to the census of the State Planning

Organization in 2011, the number of children and elderly individuals in the population cannot be underestimated. In addition, disabled individuals are among the user groups of Northern Nicosia (Figure 1).

Figure 1.

*An Activity Day in Northern Nicosia (by author)*



Even though there are many related grounds like regulations, master plans and standards to support universal design principles, it is impossible to argue that urban areas can achieve quality-of-life dynamics and accessibility for all. Such that several universal design principles have been recently adopted regarding standards for disabled individuals as a resource. There is a booklet prepared by the Chamber of Architects including some standards for disabled individuals. These standards are also ratified by the state as regulations. Despite all these improvements, the physical structure does not seem to be improved in urban spaces in Northern Nicosia. In this case, it can be argued that there are no common places where social communication can be established between various users in the city of Northern Nicosia. In other words, it can be argued that social sustainability, one of the sub-headings of the concept of sustainability, has been neglected in Northern Nicosia.

## **1.2 Purpose of the Study**

The main aim of the thesis is the evaluation of universal design scientifically, with different dimensions in the context of sustainable urbanism in Northern Nicosia. Individuals have different physical characteristics in diverse periods of life (like childhood, adulthood, old adult, pregnancy). They may be physically and/or mentally disabled and may be disabled within a certain period of time. Urban spaces are open to the use of everyone living in the city. All individuals need urban environments suitable for them in terms of accessibility, walkability and safety, which are sustainable urban design parameters.

The urban spaces in the common use of all, regardless of educational status, physical, mental characteristics, chronic discomfort status, social or economic status, should be appropriate for everyone's use. In this way, in the context of the sustainable urban concept taken into account in urban design, spaces will be designed that will strengthen the social connection between different users and communication, thus contributing to social sustainability. In the study, urban spaces in Northern Nicosia will be evaluated for all individuals with different characteristics living there.

In sum, it is important to consider the concept of UD in urban environmental design. Universal design is a concept that will contribute to the parameters of sustainable urban space. Thus, it aims to contribute to forming sustainable social environments with a close connection between criteria for sustainable urban area design and universal design.

## **1.3 Research Questions**

With the accomplishment of the research aim and objectives, it is targeted to provide suggestions for improving the urban environments in relation to the concept of universal design in Northern Nicosia. Thus, with the fulfilment of the research aim the urban environments including the urban spaces can be more useful in terms of sustainable urban design parameters for individuals having different characteristics in society, strengthening the social relations of all urban individuals and providing a positive impact with environmental, social, and economic dimensions. Within this framework in this thesis, the following main question is asked:



- Are the urban spaces in Northern Nicosia convenient regarding the universal design principles?

In addition, it is aimed to find answers to these sub-questions:

How can SS be defined in relation to sustainable urbanism?

- How can UD as a concept be defined?
- How is the link among universal design, urban design and social sustainability for the accomplishment of sustainable urban environments?
- Are urban spaces in Northern Nicosia appropriate for all users in terms of sustainable urban design parameters such as accessibility, walkability, and safety?
- Are the users satisfied with the existing urban spaces in Northern Nicosia with regard to universal design principles?
- What are the suggestions for making urban spaces more qualified in terms of UD principles in Northern Nicosia?

#### **1.4 Limitations**

The study is carried out in three neighbourhoods (Taşkınköy, Göçmenköy, Marmara) of Northern Nicosia that are neighbouring to each other. The study aimed to conduct a quantitative and qualitative evaluation and thorough analysis of selected avenues in each of the selected neighbourhoods in terms of the seven UD principles. As a research limitation, the type and number of urban spaces for evaluation could be expanded. In addition, the evaluation of users in terms of the UD concept and accessibility, walkability and safety among sustainable urban design parameters are also an important part of the study. This assessment was made by randomly selected users through a questionnaire in the same neighbourhoods. As a limitation of the research, user opinions of other sustainable urban design parameters can also be taken. The scientific study can also be carried out in various urban spaces throughout various districts of the city in order to more accurately assess the UD principles in Northern Nicosia. Furthermore, more theoretical patterns are required to examine the relationship between the concept of UD and sustainable urban environments.

### **1.5 Scope of the Research**

In the first part of the study, a general introduction was made and statement of the problem, purpose of the study, research questions, limitations, and scope of the research are explained.

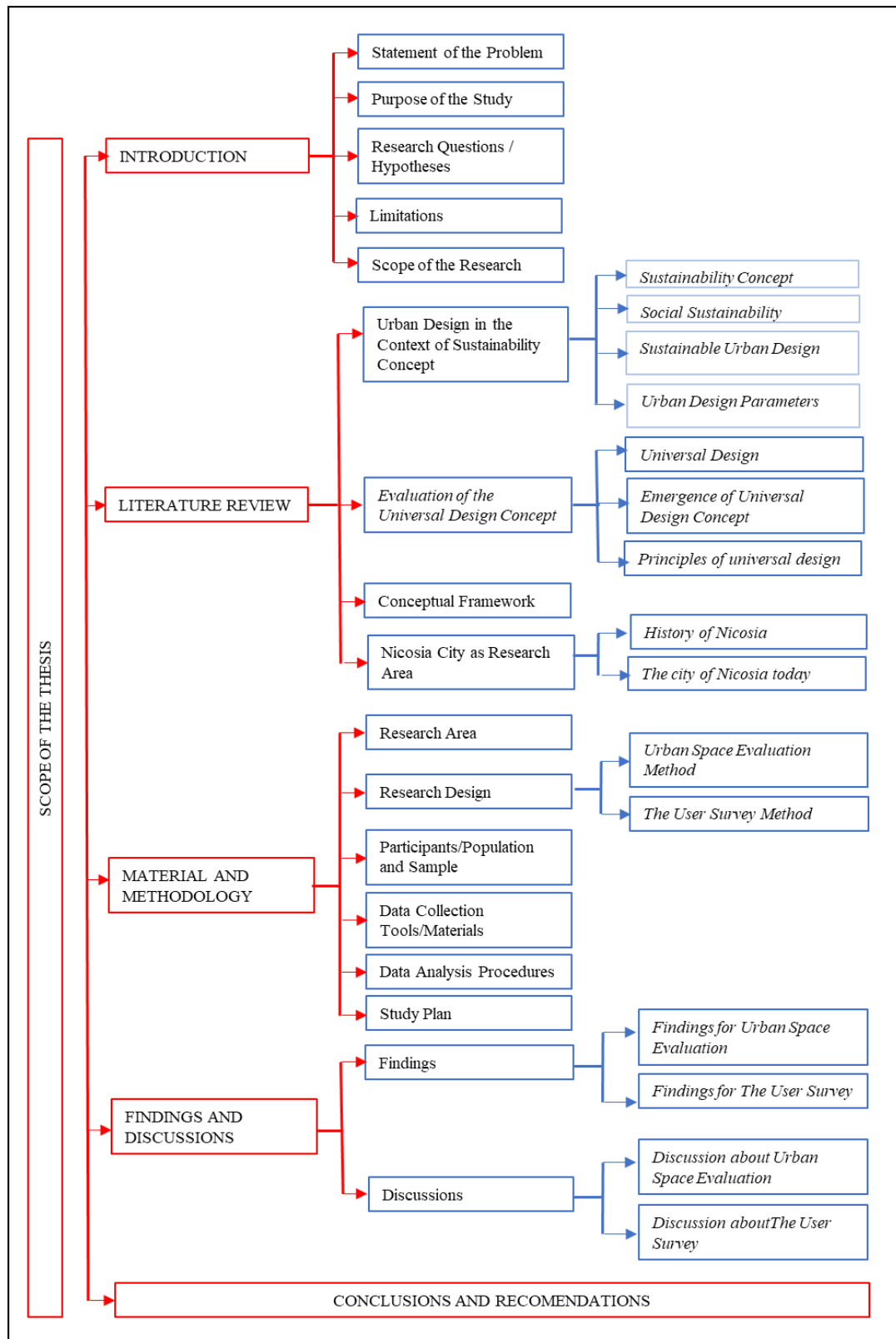
The second part is the literature review. The sustainability concept, SS, sustainable urban design, and sustainable urban design parameters have been examined in detail with a literature review under the title of urban design in the context of the sustainability concept. In addition, the emergence of the concept of UD, and its principles are explained in detail. The concept of UD, taken into account in many different scales, is discussed within the urban scale. Subsequently, the conceptual framework was created and explained in the last part of the literature review.

In the third part of the research, firstly, the city of Nicosia is evaluated under the title of 'The City of Nicosia as Research Area'. Later, the methodology is explained in detail under the titles of Research Design, Participants/Population and Sample, Data Collection Tools/Materials, Data Analysis Procedures, and Study Plan.

In the fourth section, the findings related to the research are presented. Discussions are made according to the findings.

In the last part, there are conclusion and recommendations based on the whole study. See Figure 2.

Figure 2.

*Scope of the Thesis (by author)*

## **CHAPTER II**

### **Literature Review**

In this part of the thesis, previous studies on the research subject were examined as the literature review. Accordingly, the concept of sustainability and its sub-titles were discussed under the title of 'Urban Design in the context of Sustainability Concept'. Moreover, urban design parameters impacting sustainable urban design are examined. In addition, the concept of universal design, which is the main subject of the thesis, is explained together with its principles. According to the literature review, the theoretical framework has been developed at the end of the chapter.

#### **2.1 Urban Design in the Context of Sustainability Concept**

As a result of the industrial revolution, the number of individuals living in urban areas has increased and urbanization has started to rise. The phenomenon of urbanization emerged as a solution to unplanned and uncontrolled overpopulation, migrations and destruction of historical, cultural and natural importance. In other words, the quality of life in cities has decreased gradually after the negative changes in the cities with the industrial revolution. After these problems, the concept of sustainable urban planning has become pivotal in 1800s. Approximately one century later, in the mid-1900s, sustainability emerged as a new definition for urban planning. In the meantime, urban design has also been an important discipline within urban planning as a tool for finding solutions to the built environment problems. The urban designer should consider all individuals living in the city as users. In addition, they should be aware that urban design made today will be passed on to future generations. Also, it should not be forgotten that the urban design made today will contribute to and influence the future development of the city.

One of the trends that make urban sustainability a critical issue today is that more and more people are living in urban areas. It is predicted that this will be the case in the foreseeable future. The density of population caused the variety of users (with different physical characteristics, mobility and educational level) to live together. In today's cities, problems caused by population density have been

noticed, the designer takes care of the importance of the design of urban spaces. The accessible city is accessible to all individuals, in any case of their physical and cognitive abilities, so it is not only people who have vision, hearing and speech, orthopaedic, mental disabilities or multiple obstacles, is a city that can serve individuals with different characteristics such as arms, legs, broken, very short or very long (Mamatoğlu, 2015). While approaching urban design with the concept of sustainability, this study mostly aims to contribute to social sustainability. Social sustainability is concerned with how the environment influences the human life quality (Kadir & Jamaludin, 2013). In order to ensure social sustainability in urban design, it is argued that it is necessary to give importance to making designs suitable for all individuals living in the city. In this section, first of all, the concept of sustainability will be discussed in all its aspects, and then social sustainability will be focused on. The common needs of users in urban design will be revealed. Accordingly, in order to meet these requirements, various conceptual approaches will be discussed and the most appropriate one will be decided.

### ***2.1.1 Sustainability Concept***

Sustainability is widely recognized as a significant theoretical framework for situating urban policy and development, procuring the context for substantial literature on planning, architecture, and urban design (Tangestanizadeh & Piri, 2018). The concept of sustainable development arose in response to an acute awareness that ecological destruction and the 1980s' "retreat from social concerns"-manifested as poverty, deprivation, and urban dereliction blighting a lot of parts of the earth are unsustainable (Dempsey et al., 2011)

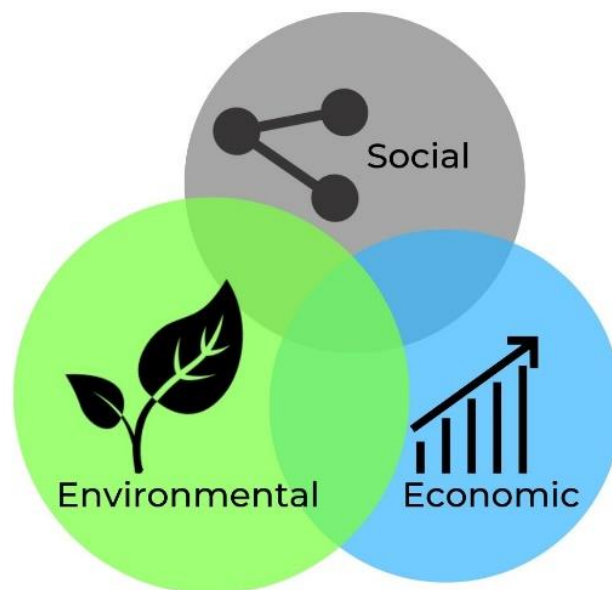
The concept of sustainability was first described in the Brundtland Report, published in 1987 by the World Commission on Environment and Development (WCED) under the name 'Our Common Future'. In the report, the criteria of sustainable development are developing environmental technologies, balancing the distribution of energy produced from natural resources, preventing poverty and controlling population growth (Karataş, 2004). Despite different governments defining the term differently, the basic concept posed in the World Commission on Environment and Development definition is generally upheld: "development

that meets the needs of the present without jeopardizing future generations' ability to meet their own needs." (World Commissions on Environment and Development, 1987).

The concept of sustainability was defined at the Rio Conference as economic development that does not consume natural capital, not failing to meet the requirements of future generations, protecting the equilibrium between economy and ecosystem and is sustainable as ecological (Aktuna, 2007). There were three main subtitles (environmental, economic and social sustainability) for explaining sustainable urban design at the beginning time (Figure 3).

Figure 3.

*Three Subtitles of Sustainable Design (ISSD, 2020)*



Accordingly, sustainability is the production of healthy habitable urban spaces by protecting the ecological resources, ensuring economic viability and improving the quality of life. (Barton & Grant, 2006; Ranhagen & Groth, 2012). Sustainable city/neighbourhood planning-design parameters, the structure of the settlement (suitable density, balanced mixed-use, open areas), the transportation system (roads for pedestrians and cyclists, public transport, efficient logistics

system), energy (solar architecture, renewable energy) focus on the determination of water supply, sewerage, waste disposal, use of resources/material flow, social structure (diversity, quality of life, participation), economic area (employment, public-private sector cooperation), implementation strategies. Sustainability, as the crucial concern of the 21st century, firstly were categorized into three main aspects; environmental, economic and social. The scope of these subtitles can be listed in Table 1.

Table 1.

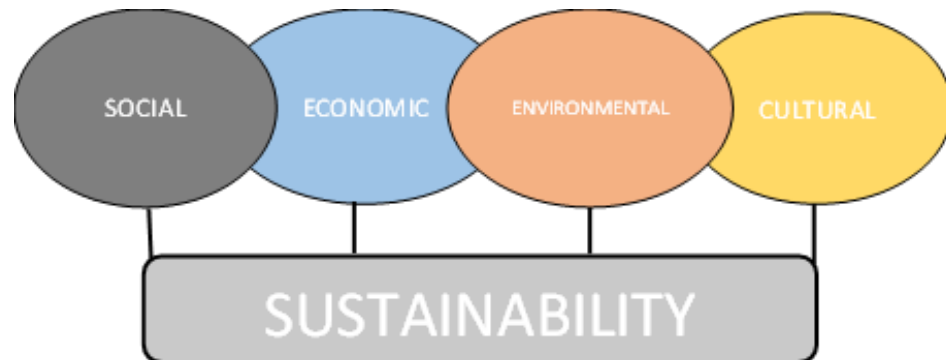
*Ensuring Ecological and Sustainable Settlement (Edwards, 2007)*

<b>SUSTAINABILITY</b>		
<b>Environmental Sustainability</b>	<b>Economic Sustainability</b>	<b>Social Sustainability</b>
<ul style="list-style-type: none"> <li>• Ecosystem integrity</li> <li>• Ecological artificial environment</li> <li>• Waste reduction and control</li> <li>• Elimination of products containing toxic raw materials</li> <li>• Use of recycled material</li> </ul>	<ul style="list-style-type: none"> <li>• Healthy growth and development</li> <li>• Less cost/high efficiency</li> <li>• Rational resource and energy use</li> <li>• Continuous loop</li> </ul>	<ul style="list-style-type: none"> <li>• Cultural identity</li> <li>• Quality of life</li> <li>• Human health and safety</li> <li>• Stability, justice and easy accessibility</li> <li>• Bringing disabled people to society</li> </ul>

However, in the meantime, it has been understood that cultural sustainability must be handled as another main pillar of the sustainability concept. Because of that, sustainability has been examined under 4 headings in recent years. This situation is shown in Figure 4.

Figure 4.

*Four Main Subjects of Sustainability (by author)*



Sustainability has become the prevalent target of urban design (Yung et al., 2011) during last few decades (Dempsey et al., 2011). The environment and economic sustainability have been prioritized among the main dimensions of sustainability, while SS has been generally ignored (Woodcraft et al., 2011, Manzi et al., 2010).

Environmental sustainability aims to balance housing, water, energy and food within the framework of respect for the nature cycle. This concept enhances the biodiversity and renewal of the ecosystem and ensures the integration between nature and human. Environmental sustainability includes objectives such as clean water and natural resources, renewable energy, organic culture, soil and food development, the development and diffusion of green building technology, and the utilization and utilization of waste as a valuable resource (waste management). In environmental sustainability, it is important to preserve the existing resource stock in the world and transfer it to future generations at least at today's level (Paçin, 2019).

Economic sustainability includes the sharing of resources, joint support and a strong local economy and the needs that serve people. Local units, sharing, social entrepreneurship, secular economy and co-ownership are central concepts of economic sustainability. Creating a healthy environment for economic justice aims to provide strengthening solutions to the local economy. The main factors that compel economic sustainability are the increase of world population and industrialization (Paçin, 2019).



Additionally, the idea of cultural sustainability is less well-developed than other ideas. Due to its social component, it is frequently categorized under social sustainability. Still, Hardoy et al. (1993) have succinctly highlighted two key views of cultural sustainability. The first speaks to how common values, viewpoints, and attitudes help to realize sustainable development. The second interpretation focuses on the long-term viability of culture, and in this instance, culture is seen as an essential element of growth. Thus, culture should develop alongside socioeconomic changes over time, and its development should be acknowledged by preserving cultural heritage (Chiu, 2004).

Cultural sustainability differs from social sustainability in the approach of transferring values, perceptions, attitudes from the past to future generations. However, this contributes to SS. Cultural sustainability could be accepted as a concept that contributes to SS. Since the year 2000, the importance of SS has been widely acknowledged as an integral component of sustainability that must be vigorously debated (Dempsey et al., 2011; McKenzie, 2004). Academics and practitioners are increasingly employing the concept in various ways to address issues concerning how society must be planned and developed in both developed and developing countries (Ghahramanpouri et al., 2015).

Although all sub-titles of sustainability are important for sustainable urban design, it can be argued that social sustainability has been neglected in previous studies. In this study, there is a search for a conceptual approach in order to ensure social sustainability, based on the item "increasing the quality of life", one of the sustainable urban planning-design parameters. For this reason, in the next parts of this chapter, the concept of SS will be explained and conceptual approaches to contribute to social sustainability in sustainable urban design will be mentioned.

### ***2.1.2 Social Sustainability (SS)***

In the discussion of mainstream sustainability, a lot of emphasis has been placed on the environmental and economic aspects; however, SS, which is equally significant, has frequently been overlooked. (Woodcraft et al., 2011). SS is concerned with how the environment affects the user life quality; therefore, a socially sustainable artificial environment must be created through careful planning and design. Aside from social development within a community, the life

cycle and growth of individuals within their private living spaces are significant underlying elements of SS. It is concerned with issues such as cultural identity, quality of life, human health and safety, stability, justice, equity, and accessibility, as well as topics such as social justice, poverty, human rights, and gender equity.

SS is based on the needs of individuals. It promotes trust, cooperation and openness among individuals. It also wants to create a sense of belonging in human relations and joint projects, social transactions. It draws attention to the importance of power and cohesion arising from the diversity of individuals. Social sustainability aims to promote communication and peace-based skills that resolve conflicts (Paçin, 2019). Increasing interaction between different generations can contribute to SS.

Researchers working on this concept attempt to theorize this multidimensional concept in relation to society, people, and the artificial environment. (Woodcraft, 2012). According to King(2008) and Littig and Griessler(2005), SS entails meeting basic human needs and ensuring their continuation for future posterity. So ‘Human’ is the major focus within the description of the SS concept (Dempsey et al., 2011). Diverse definitions of this concept have been provided in different frameworks in Table 2.

Table 2.

*Various Definitions of SS (Ghahramanpouri et al., 2015; Mehan & Soflaei, 2017)*

<b>Researchers</b>	<b>Urban SS Definitions</b>
Chiu, 2002	SS relates to social norms and conditions in that any environmental or economic decisions must not exceed the community’s tolerance for change.
Barron and Gauntlett, 2002	Socially sustainable communities are equitable, diverse, connected and democratic and provide a good quality of life.
Chiu, 2003	SS is the maintenance and improvement of well-being of current and future generations.
McKenzie 2004	SS is a life-enhancing condition within communities, and a process within communities that can achieve that condition.
Laguna, 2014	A condition where an extended set of basic needs are met for all residents regardless of their race/ethnicity, age, religion, gender, socioeconomic status and/or level of ability and the highest possible level of social inclusion and participation in community life is promoted.

Table 2 (Continued.)	
Magis and Shinn, 2009	SS concerns the ability of human beings of every generation to not merely survive, but to thrive.
Colantino, 2010	Traditional hard SS themes such as employment and poverty alleviation are increasingly being complemented or replaced by the emerging soft and less measurable concepts such as happiness, social mixing and sense of place.
Holden, 2012	A process of urban development, supported by policies and institutions that ensure harmonious social relations, enhance social integration and improve living conditions for all groups.
Bacon et al., 2012	It describes the extent to which a neighborhood supports individuals and collective well-being. SS combines design of the physical environment with a focus on how people live and use the spaces, relate to each other and function as a community. It is enhanced by development which provides the right infrastructure to support a strong social and cultural life, opportunities for individuals to get involved, and scope for the place and the community to evolve

Urban SS is defined as “the continuing ability of a city to act as a long term, the viable setting for peoples’ communication, interaction and cultural progress” (Yung et al., 2014). According to Littig and Grießler, SS approaches are based on the social consequences of environmental political aims rather than theory (Littig & Grießler, 2005).

Polese and Stren, on the other hand, provide a global definition of SS with a focus on urban environments. Without disregarding the importance of the physical setting (such as public spaces, homes, and design) within urban sustainability, they concentrated on the social (civil society, cultural variety, and social integration) and economic aspects of sustainability (Polese & Stren, 2000).

Furthermore, as a broad concept, social sustainability has both tangible and intangible measures; in other words, it has both physical and non-physical characteristics. Social sustainability can be addressed at the individual, relational, and institutional levels by utilizing a wide range of indicators (Hale et al., 2019). Equity, social justice, poverty, safety, human rights, gender equality, life quality, and subjects like the sense of place, identity and culture, social capital, and cohesion can be included as the top non-physical indicators (Eizenberg. & Jabareen, 2017; Dempsey, 2009; Hussein et al., 2020). Furthermore, amongst the

physical indicators of SS are sustainable urban design parameters such as accessibility, safety, and walkability, as well as sustainable urban forms that can be defined as features like compactness, density, sustainable transportation modes, mixed land uses, and ecological design (Eizenberg. & Jabareen, 2017; Barton, 2000; Dampsey et al., 2011). At this point, it can be argued that UD has a direct relationship with the parameters of sustainable urban design (which could be listed as physical indicators), and it could establish an indirect relationship with sustainable urban forms and eventually with non-physical social sustainability parameters. Seen in Table 3.

Table 3.

*SS Indicators Including Urban Design Parameters (by author)*

Physical Indicators	Non-physical Indicators
<p><b>*Sustainable Urban Forms</b></p> <ul style="list-style-type: none"> <li>Compactness</li> <li>Density</li> <li>Sustainable transportation</li> <li>Mixed land uses</li> <li>Ecological design</li> </ul> <p><b>*Sustainable Urban Design Parameters</b></p> <ul style="list-style-type: none"> <li>Accessibility</li> <li>Connectivity</li> <li>Walkability</li> <li>Safety</li> <li>Adaptability</li> <li>Legibility</li> <li>Comfort</li> </ul>	<p><b>*Equity</b></p> <p><b>*Security</b></p> <p><b>*Poverty</b></p> <p><b>*Human Rights</b></p> <p><b>*Social Justice</b></p> <p><b>*Quality of Life</b></p> <ul style="list-style-type: none"> <li>Sense of place</li> <li>Identity and culture</li> <li>Social capital</li> <li>Social cohesion</li> </ul>

“\*” symbol defines main indicators of social sustainability

### ***2.1.3 Sustainable Urban Design***

Urban design, like architecture and planning represents a process, as well as a series of end products, and an ongoing process through time that begins long before a development is conceived and continues long after it is completed (Tangestanizadeh & Piri, 2018). In this ongoing process, the economic, social, cultural and technological contexts for choices change of individuals. In addition, urban design requires sensitivity to issues of cultural diversity (Carmona et al,

2010). The user diversity (different age groups, physical-mental characteristics, language, religion, race etc.) is also an important consideration during urban design. Because of these reasons, urban design and sustainability have a close relationship, which influenced the development of cities. By considering the concept of sustainability in urban design, despite changes and diversities, the designed environments are going to meet the needs of individuals. In recent times, there has been a rise in public support for sustainable urban design, and issues like liveability and clean energy are receiving a lot of attention.

Sustainability includes not only environmental but also economic and social sustainability. In addition to environmental impacts, urban designers must consider social impacts and long-term economic viability. (Carmona et al, 2010). In this thesis, taking into account the user diversity in the cities, it is argued that the use of urban areas by everyone will contribute to social sustainability. It is significant for urban design to have the quality that can be passed on to future generations and can be used by all individuals. For this reason, in the following sections of the thesis, conceptual approaches that will contribute to SS in the context of urban design will be discussed.

Urban design as a concept progressively developed throughout the second half of the 20th century as a result of the criticism towards the contemporary urban textures and of the established built environment professions' perceived inability to produce high-quality spaces. These professions include architecture, planning, civil engineering, landscape architecture, and property professionals. (Tangestanizadeh & Piri, 2018). In addition, the regulatory and financial procedures that work in tandem with design to create the civic environment must be incorporated into urban design. The urban design thus serves as a nexus for the disciplines and interests that build places, in service to citizens' desires for better locations to live their lives (Dobbins, 2011). From the early 1960s, a clutch of designers and writers - notably Jane Jacobs, Kevin Lynch, Gordon Cullen, Christopher Alexander, Aldo Rossi, Ian McHarg, Jan Gehl and others - became known as urban designers. Among these it can be cited a renovated appreciation for Jane Jacobs's (1961) insistence on the vigour and complication of street life; Lynch's (1960) research about the way cities could and should be able to be

subliminally read and understood; Cullen's (1971) concept of town spaces as a sequential continuity of experience instead of a collection of static structures and the spaces between; Alexander's (1977, 1979) opinions about the integral relationship of human functioning and its spatial context; Tibbalds's (1992) call for human-friendly cities; and other human-oriented approaches such as those of Oscar Newman, William Whyte, Allan Jacobs, Raquel Ramati, Peter Bosselmann, Clare Cooper-Marcus, and many others (Thwaites et al, 2007). Besides, Lynch identified 5 performance dimensions of urban design (Table 4) (Carmona et al, 2010).

Table 4.

*Five Performance Dimensions of Urban Design According to Lynch  
(Carmona et al, 2010)*

<b>Vitality</b>	The extent to which the form of places supports human functions, biological needs, and capabilities
<b>Sense</b>	The extent to which users can perceive and structure places in time and space early on.
<b>Fit</b>	The extent to which the shape and capacity of spaces correspond to the pattern of behaviors that individuals engage in or want to engage in
<b>Access</b>	The ability to reach other individuals, activities, resources, services, information, or locations, as well as the number and variety of elements that could be reached
<b>Control</b>	The ability of those who use, work in, or live in places to compose and manage access to places and activities.

Accordingly, it seems that the most important factor to consider when designing urban design is human. It can further be argued that the major purpose of urban design is to enable individuals to use the designed city in the most efficient way.

The craft of constructing and reshaping cities and communities is known as urban design. It involves the positioning and planning of structures, public areas, transportation networks, services, and amenities. It is the process of giving structures in groups, entire neighbourhoods, and the city a form, shape, and

personality. It serves as a foundation for organizing the components into a system of streets, squares, and blocks. To make urban environments useful and appealing, urban design combines architecture, landscape architecture, and city planning. (European Urban Knowledge Network, 2019).

Understanding the link between individuals (society) and environment around them (spaces) is an essential component of urban design (Carmona et al, 2010). Because of that, urban designers have to know human needs (Figure 5) The principle aim of urban design is to enhance the quality of the human spatial environment, and by so doing, to develop the life quality of human. Therefore, centre of the work of urban design are individuals, their values, aspirations and power or ability to achieve them (Oktay, 2006).

Figure 5.

*Pyramid of Human Needs from Maslow (Carmona et al, 2010)*



Urban spaces are among the main components of urban design. Urban spaces are all types of spaces between buildings and other elements of the city. Madanipour described the urban space as “a place that is physically accessible to all; places within the towns, cities and rural areas where foreigners and locals can enter with very few restrictions” (Madanipour, 1999). Buildings play a significant role in urban spaces. As they help the formation of urban spaces, they sometimes become symbols of those areas.

Urban space is that part of volume of a town that is formed by outer walls of the buildings, but not constrained by them; it is experienced in the context of streets and lanes, parks and squares and has a social function in the urban pattern (Oktay, 2006). Urban spaces have two main sorts as urban open areas and urban green areas. Urban open and green spaces have the ability to improve dwellers' urban life quality and to decrease negative effects of urban environments such as noise, pollution etc. (Jim & Chen, 2003). These spaces can be classified in different categories according to their size, location, function, usage etc. (Byrne & Sipe, 2010; Swanwick et al. 2003).

Urban spaces may be in a variety of shapes and sizes, including green areas, parks, streets, squares, boulevards, and avenues. They offer the places needed for recreation and foster opportunities for interpersonal contact. The terms streets, boulevards, avenues, etc., imply design elements lacking in the term road (Carmona et al, 2010).

The neighbourhoods are the city units that include many types of urban spaces (streets, square, avenue, park etc.) together. The units where social interaction is strong between individuals who live in or have working there. Social interaction is one of the urban space quality components. For this reason, all spatial quality parameters that are effective in the development of social relations must be evaluated within the scope of urban space design. The high quality of urban space will affect individuals' use of public space and develop social interaction areas. In other words, social sustainability will be contributed when urban space is designed by taking spatial quality parameters into consideration.

There are some approaches to measuring the quality of urban areas. Whyte (2000), suggesting four basic factors that make a public space successful; stated that it must be accessible, people must participate in various activities, the space must have a comfortable or positive image and support social activities, and it must be a friendly place where users could interact more. Gehl classified the relationship between urban space activities and physical space quality into three activities. These are essential activities, optional activities, and social activities. Gehl argues that each of these three types of urban space activity shows different



dependencies on the physical environment. Carr et al. a good public space according to the framework set out by Gehl and proposed by Gehl; It has five basic criteria: inclusiveness (accessible and open), important activities, safety, comfort, and convenience (Mehta, 2014). On the other hand, Kevin Lynch suggests that the image of the area in the mind should be readable, perceptible, and memorable in providing the social design of urban space.

#### ***2.1.4 Urban Design Parameters***

Urban designers should always consider that cities are for all individuals and that the human factor cannot be neglected in urban planning. Considering all these, urban design parameters were discussed in this thesis in order to create sensitive urban environments for all users.

According to Whyte (2000), successful urban environments should be accessible, open to the public, encourage a variety of activities, have a positive public image and support social activities, and be welcoming spaces where people could mingle. Urban design parameters can be specified using a variety of features as a broad topic. In other words, many academics highlight varying factors to explain these criteria. Hence, each of these parameters is broad within its own terminologies and related to the others. According to this study, accessibility, connectivity, walkability, safety, adaptability, readability, and comfort are the important ingredients of urban design parameters.

These urban design parameters for urban design are evaluated below. The following sections of this chapter will examine approaches that can provide these parameters in urban design for everyone. Among them, the most appropriate approach directly in relation to these parameters will be determined for all individuals. It could be defending that UD has a direct relationship with the parameters required to create sustainable urban spaces. In another way, it could be an effective tool for meeting the urban design parameters that address human needs in urban environments.

##### ***Accessibility***

Accessibility refers to the degree to which streets allow all persons, in any case of physical, sensory, or mental impairment, to reach, enter, use, and move

around locations they need or wish to visit (Figure 6). According to the Swedish National Encyclopaedia 'Possibility of participating in something desirable,' is the description of accessibility. Because accessibility is a relative concept, accessibility issues must be expressed as a human-environment relationship. In other words, accessibility is the meeting of a person's or group's functional capacity and the physical environment's design and demands (Du & Zhang, 2020).

Figure 6.

*An Accessible Design on Street (Global Designing Cities Initiative, 2022)*



A legible street plan is the same as one that is accessible. The streets are physically connected to one another, have unobstructed views, and feature straightforward intersections. Wherever possible, accessible streets steer clear of elevation changes. However, gradual slopes are simpler for everyone to recognize and navigate than little steps when they are inevitable.

Accessible cities are likely to have:

- A mix of area uses.
- Residence within 500 meters of regional basic services and facilities, like a general food shop, post office, bank, GP surgery/health centre, green space, common use toilets, common use seating items, and public transportation stops.

- Residence that is not more than 800 meters from neighborhood secondary services and amenities, such as public open areas (parks, allotments, recreation areas, and squares), a library, a dentist, an optometrist, houses of worship, community centers, and facilities for community and leisure activities, as well as public restrooms and seating.

- Visible and easily identified entrances to places and buildings.
- Ground-level entrances with flush thresholds whenever possible.
- Common-use seats every 100 m to 125 m.
- • Well-connected streets with unobstructed views and straightforward connections.
- 2 m wide, flat footways.
- Gently sloping terrain as opposed to 1 or 2 tiny stairs where minimal level fluctuations are inevitable.
- A selection of steps and a ramp with a maximum gradient of 1 in 20 where greater level changes are unavoidable.
- Level differences (where inevitable) that are clearly marked and well-lit with guards, handrails and non-slip, non-glare surfaces.
- Pedestrian crossings and common use toilets at ground level.
- Telephone boxes with level thresholds.
- Gates/doors with no more than 2 kg pressure to open and levers rather than knobs.

In brief, accessibility as a term could be considered within various scales of the urban environment, and a variety of approaches to assessing accessibility can be used. (Pratiwi, et al., 2015). Furthermore, several scholars argue that this term could be used as a sub-indicator of walkability. It is also associated with connectivity.

### ***Connectivity***

Connectivity is described as the directness and availability of alternative routes from one point to another within a street network (Figure 7). One way to measure this phrase is the number of intersections per square mile of the area and the ratio of a straight-line distance to network distance. (Handy, et al., 2019). Furthermore, connectivity is described by Moura et al. (2017) as the degree to

which the pedestrian network connects to important trip origins and destinations as well as the degree of linkages between various routes on the network.

Figure 7.

*Connectivity on A Street (Kareem, 2017)*



### ***Walkability***

Walkability is described as “the extent to which the built environment supports and encourages walking through providing safety, and high level of accessibility and connectivity to destinations, and visual interest within a reasonable span of time” (Forsyth, 2015).

Walkability is necessary for a sustainable city. A city is walkable if its entire network of public corridors is walkable and residents could live without relying on automobiles (Zakaria & Ujang, 2015). According to social equity principles and as supported by laws like the Americans with Disabilities Act (ADA) and the Australian Disability Discrimination Act (DDA), the definition of pedestrians could be further enlarged to include those who use wheelchairs or other assistive devices. Policy documents reinforce and implement this inclusive

definition of walkers, with Title 23 of the US Code (USC) defining a walker as “any person traveling by foot and any mobility-impaired person using a wheelchair” and the Wisconsin Pedestrian Policy Plan defining a pedestrian as “any person walking, standing or in a wheelchair” (Wisconsin Department of Transportation, 2002). Accordingly, it is an important issue that the pedestrian roads are suitable for all users in the city.

The walkability is described as the level of pedestrians' comfort and safety such as the existence of casual surveillance, spaces between pedestrians and vehicles as well as high quality connected pedestrian walkways (Zakaria & Ujang, 2015). The design and placement of the sidewalk and path seem to be essential for promoting pedestrian activities. (Brown et al., 2007).

Individuals should access the functions and activities in the neighborhood as a pedestrian. A walkable space allows people to enjoyably explore the city on foot. The environmental qualities that make walking easier determine a pedestrian's sense of comfort (Zakaria & Ujang, 2015). There is a symbiotic relationship between pedestrian mobility and economic, social, and cultural interaction and transactions, and pedestrian movement is compatible with the idea of streets as social spaces. (Carmona et al, 2010).

The UK Government states that 10 min is a comfortable walking time to reach services and facilities and calculates this is the time it takes to walk about 800 m (Department of Transport, Local Government and the Regions (DTLR), 2001). They also suggest that local shops, a bus stop, a health centre and a place of worship should be situated within 10 min (800 m) walking distance (American Institute of Architects (AIA), 1985; Carstens, 1985).

Direct pedestrian routes and access to the street network are features of a walkable area. (Figure 8). Park and Schofer (2006) proposed that street networks and sidewalks be properly constructed and designed to allow for easy walking. These contain the presence and continuity of pavements and pedestrian routes that connect pedestrians to frequent public transportation services with safe crossings. (Hutabarat Lo, 2009). Furthermore, the place must be able the facilitation of individuals with varying abilities in the way of accessibility. It could be provided using the universal design concept.

Figure 8.

*Streets with Walkability (Schoonbeek, 2020)*



Walking activity could be a pleasant mode of travel if the place ensures the quality of walking situation, safe, comfort and convenience (Litman, 2004). In brief, it will be possible to increase the number of walkers if the city offers a welcoming and secure environment for pedestrians. According to Litman (2011), "walkability" also refers to the comfort, safety, connection, and permeability of walking conditions in urban areas (inclusiveness of neighbourhood design). One of the real systems that make up the city is the flow of pedestrians (De Certeau, 1984). Additionally, Henri Lefebvre asserts that the neighbourhood is the location where the space/time relation is most appropriate for the users who leave their homes and travel on foot (De Certeau, et al., 1990). Furthermore, according to Owen et al. (2007), street connectivity, a diversity of land uses, proximity to destinations, and user density are the fundamental components of a neighbourhood's walkability.

### *Safety*

One of the factors of an accessible and walkable surrounding is safety. Individuals can live in a better, more comfortable, and the safer environment if street networks are well-structured and pedestrian districts are clearly defined. (Zakaria & Ujang, 2015). The degree to which urban spaces allow persons to utilize, like, and act about the outdoors without the worry of tripping or falling, being scrunched, or being attacked is referred to as safety. Buildings facing the street, distinct bike lanes, and large, well-lit, plain, smooth footways are all indicators of a safe roadway (Burton et al, 2006).

Southworth (2005) suggested crossing times for people of various mobility and disabled requirements as criteria for the safety of walkable surroundings. Placement and length of crosswalks also should be taken as an important issue in the safety of the street design. Besides that, traffic speeds, pedestrian and traffic signing, and traffic signal criteria are significant for providing a safe user environment. Walkway width and condition, path surveillance, and lighting are also equally significant for the safety of walkability and accessibility in urban design (Zakaria & Ujang, 2015).

Additionally, both those with and without dementia who did not get lost pending the escorted walks were much less aware of possible issues, impediments, and hazards like unstable pavement or broken urban furniture. This implies risks that could be hazardous to all users present themselves as a greater concern to those who are confused and/or have memory or orientation issues (Burton et al, 2006).

Urban design should be safe for all individuals. For this reason, designed elements in urban life have to have characteristic as possible as taking care all mental and physical situation of individuals. The safety of the users should be considered at every stage of urban elements design, from the material selection of them to the places where they are located (Figure 9).



Figure 9.

*Safety Street Design (Smith & Santos, 2019)*



### ***Adaptability***

Another parameter is adaptability, which refers to the ability to easily adapt to changing social, technological, and economic conditions, thereby creating development conditions that support a city's ability to respond to changing circumstances (Rauws & De Roo, 2016). The significance of adaptability and resilience of public spaces against pressures has grown in recent years (Zandieh, et al., 2020).

Urban spaces, like avenues and squares, are focal points for a variety of activities such as shopping, sitting, eating, walking, and resting (Figure 10). The ability of urban spaces to adapt to changes and withstand pressures is crucial to their success. (Carmona, 2019). As Schneider (2000) has conferred: “The long-term stability of public space as a system depends on the adaptability of its structure and on the ability to change its uses, its unspecific multi-functionality” (Schneider, 2000).



Figure 10.

*Adaptability on Public Space (Green Futures Research & Design Lab, 2022)*



### ***Legibility***

Another urban design parameter is legibility, which is described as the ability to portray a clear image that is simple to understand and perceive. Legibility is measured by recognizable routes, intersections, edges, and landmarks. A legible space is distinct and ordered to assist the resident in orienting himself, categorizing parts of the city, and acquiring a sense of security that he could relate to the surrounding urban world (Sternberg, 2000). Sometimes a new or old building, sometimes a symbol, sometimes a sculpture can contribute to the legibility of the urban space (Figure 11).

Figure 11.

*Old and New Buildings Defining the Legibility of The Urban Spaces (Ujang & Shamsudin, 2012)*



### *Comfort*

Another parameter to consider in the urban environment is comfort. It is critical to supply comfort conditions in urban spaces in order to maximize user experience. It contains physiological, psychological, and physical measures. Many aspects of well-loved and comfortable outdoor and urban environments are global. A lack of vehicles and a high likelihood of unintentional or planned encounters with other individuals are significant considerations for users (Figure 12). These outdoor areas must also be designed to be usable in a variety of weather and climate conditions. They should have, at the very least, sunlit and shaded areas, rain and wind preservation, and, if essential, well ventilation on hot days, as well as multi-purpose furniture made of inviting materials and finishes. The comfort of urban spaces could be developed by implementing passive and active strategies that are tailored to regional climatic conditions. A lot of environmental agents affect outdoor comfort, including solar radiation, infrared radiation from the surroundings and the sky, air temperature, humidity, and wind speed (Transsolar Energietechnik GmbH, 2022).

Figure 12.

*Example Visual for Comfort in Urban Space (Transsolar Energietechnik GmbH, 2022)*



## **2.2 Evaluation of the Universal Design (UD) Concept**

UD proposes to make designs that will enable individuals from various age groups with diverse physical and mental characteristics to use the same spaces. The contribution of this to sustainability as a conceptual approach is investigated. In the context of the concept of sustainability, SS is neglected while environmental and economic sustainability are taken into account more. In this thesis, it is among the aims to contribute to the neglected SS in urban design. Therefore, conceptual approaches to social sustainable in urban design are included in the research.

SS will be achieved by protecting cultural identity, improving the life quality in the community, contributing to human health and safety, providing fair and easy accessibility, and bringing people with disabilities into society. According to literature reviews, there are many conceptual approaches that can contribute to SS. Accessible design, adaptable design, usable design, inclusive design, design for all and UD are among them. In this part of the thesis, these approaches are going to be emphasized.

### ***Accessible Design***

Accessible design is the creation of entities that adhere to specific legal mandates, guidelines, or code needs in order to provide accessibility to individuals with disabilities (Erlandson, 2008). It is based on the principles of extending standard design principles to individuals who have some type of performance limitation in order to maximize the number of potential customers who can easily use a product, structure, or service (CEUD, 2003). Furthermore, Accessible design typically refers to products and environments that meet specified requirements for use by people with disabilities (Deardorff & Birdsong, 2003).

### ***Adaptable Design***

Adaptable design features are alterations made to the design in order to make a standard design useable for a specific person (Erlandson, 2008). Built-in Design features that allow for flexibility and adjustability, such as a height-adjustable sink and cooktop, or adequate framing in walls and additional electrical rough-in allowing for simple, economical, and structurally adequate modification, such as adding grab bars or visual alarms, adaptability accommodates the needs of all occupants and allows for more effective functioning (Alberta Municipal Affairs and Safety Codes Council, 2008).

### ***Usable Design***

Usable design is used to compose products that are simple to use and effective. The International Organization for Standardization describes usability as the "effectiveness, efficiency, and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular environment." (DO-IT, 2020)

Individuals with disabilities, unfortunately, are not usually contained in usability tests. Thus, a lot of products that perform well in usability tests are not accessible to them. Progressively, accessible and UD considerations are being addressed by usability professionals. Usability shares some key goals with accessibility and universal design. Designers seek to create product features that are easily discovered and operated by the user (DO-IT, 2020).

### ***Inclusive Design***

Inclusive design is neither a new design genre nor a distinct specialization. It is a common design approach in which designers provide that their products and

services address the requirements of the broadest possible audience, regardless of age or ability (Design Council, 2008).

Inclusive design is essentially the reverse of earlier approaches to designing for disabled and elderly individuals as a sub-set of the population, and an integral part of a more recent international trend towards the integration of older and disabled individuals in the mainstream of society (Clarkson & Coleman, 2013).

### ***Design for All***

Design for all is described in the Stockholm declaration of the international association “EIDD-Design for All Europe” as “design for human diversity, social inclusion and equality” (Aragall & Montana, 2012). The purpose is to enable all individuals to have equal opportunities to participate in every aspect of society. A product, an environment and a system, to attain the design for all labels, must acknowledge some principles and verify different users and needs of them. The principles are: to promote human variety; to support social inclusion and equality; the use of product is easy and pleasant for all possible users; the use of product does not discriminate neither physically nor psychologically, the aim is to improve the quality of life (Lagatta, et al, 2015).

#### ***2.2.1 Universal Design (UD)***

Universal design (UD) could be described as “the design of entities that can be used and experienced by people of all abilities, to the greatest extent possible, without adaptations” by the Center for Accessible Housing (Erlandson, 2008). UD concept with seven basic principles provides as design guidelines for diverse design disciplines including the artificial environment. UD is defined as “the design of products and environments to be usable by all individuals, to the greatest extent possible, without the need for adaptations or specialized design” (NCSU, 1997). The major aim of it is to ensure inclusivity and therefore, prohibit exclusivity. In addition, another subject of it is minimizing the public tendency toward social ostracism. With this aim, the UD concept should affect social sustainability positively in cities.

In cities where population growth has been observed in recent years, users who have different characteristics live together. Human beings have different

physical characteristics such as childhood, adulthood, pregnancy, and the elderly in different stages of their life. In addition, they can have physical or mental disabilities in part or all of their life. In society, all individuals have equal rights. Because of consideration of this situation, it can be suggested that the designers have to adopt the concept of UD. The UD concept is a design method which adopts the concept of making designs that will meet the requirements of different types of individuals in the same application. Everyone is considered a user in the universal design concept regardless of age, physical characteristics, personal development and skill (Figure 13).

Figure 13.

*Some of the User Types Considered in the UD (The Center For Universal Design, 1998)*



Aesthetics, engineering options, environmental issues, safety concerns, industry standards, and cost are all factors to consider when designing a product or environment. Designers typically consider the average user. According to the Center for Universal Design, universal design is the design of products and environments to be usable by all individuals to the greatest extent possible, without the requirement for adaptation or specialized design (Burgstahler, 2009).

In other words, universal design is the design and composition of an environment to allow all individuals, regardless of age, size, ability, or disability, to access, understand, and use it to the maximum extent probable. A setting (or any building, product, or service within that setting) must be designed to meet the needs of all individuals who wish to use it. Individuals with varying abilities should be able to use public spaces comfortably and safely, as much as possible

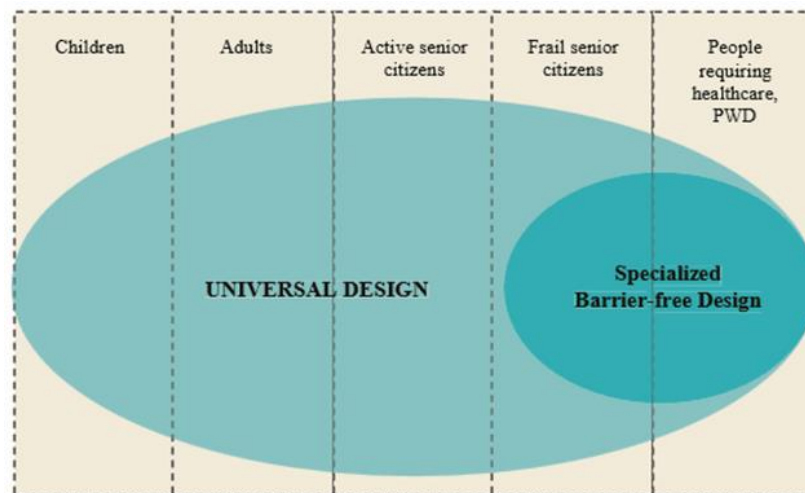


without requiring special assistance (The Center for Excellence in Universal Design, 2014).

An inclusive environment with UD properties is more cost-effective than a specialized barrier-free design because of UD's broader scope of accessibility and user-friendliness. Universal design provides services and accommodations for a wide range of individuals, from young children to frail older adults, including individuals in need of healthcare and PWD (person with disability). As provided in Figure 14, the specialized design only serves the last two groups of the population, whereas UD may serve the requirements of various users to the maximum extent probable (Harrison, 2011).

Figure 14.

*UD Providing a Broader Scope of Accessibility (Harrison, 2011)*



The concept of UD is a design method used by different disciplines such as graphic design, fashion design, industrial products design. Besides, the disciplines, designing for a great range of user types, the interior architecture, architecture, landscape architecture and urban design also use this design method.

The user population targeted by UD also includes individuals with disabilities. There are many standards and laws in the world for them. The designers who have adopted the UD use this standards and laws as sources. The

UD does not have any special standards or rules, but it has seven principles for explain the aim of it and make the concept understandable.

When the conceptual approaches that are thought to contribute to social sustainability, including the concept of universal design, are compared, Mullick and Steinfeld (1997) described that universal design's focus on social inclusion is what separates it from other terms (Ostroff, 2001). It seems that UD is the best way for contributing to social sustainability. Although all of them can give positive effects on social sustainability, the aim of UD is the most suitable concept.

### ***2.2.2 Emergence of UD Concept***

The twentieth century saw significant social changes in terms of civil and human rights. Medical advances during this time period increased the likelihood of surviving an injury or illness. Individuals were living longer lives, and the average life expectancy of people with severe disabilities was rising (The Center for Excellence in Universal Design, 2014).

After World War II, a large number of individuals, mostly young individuals, continued their lives as disabled individuals. The life span and the elderly population have increased with the help of medical developments. All these developments have contributed to the adoption of user diversity beyond standards. The presence of disabled individuals who have existed since ancient times has been adopted in this term.

The world is getting more urbanized by the day. The industrialized world's population is now much more diverse. Disadvantaged persons, who account for 15% of the global population, are regarded as the largest minority of the world (Montgomery, 2007; World Health Organization, 2011).

Nevertheless, in many scientific domains, the description of disability is described in terms of the "social" version rather than the "medical" version, and it is widely adopted that persons are specified to be handicapped by society (Montgomery, 2007; World Health Organization, 2011; Mace, 1985). Consequently, the concept of disability is an umbrella term for physical disabilities, activity limitations, and the negative interactions between personal



and contextual agents (environmental and individual agents) (World Health Organization, 2011). Since the 1980s, the concept has been regarded as a social rather than a medical issue. In this context, "disability" is the result of persons' interactions with their environment and is unrelated to persons' deficiencies (Sınmaz, 2018).

As the twentieth-century social movements gained traction, the design industry responded with targeted efforts. Concepts like barrier-free design, which aimed to remove barriers from the artificial environment for disabled persons, first appeared (The Center for Excellence in Universal Design, 2014). At the beginning, the barrier free design is accepted as a solution. Later it seems that because this solution is special only for disabled individuals, they were exposed to the discrimination. In this period, the aim in design is to reduce barriers for disabled users; handicapped toilet, disabled ramp, disabled elevator, etc. In brief, it has been noticed that the arrangements made for the disabled in the design with the view of "separate is not equal" marginalize this user group.

On the other side, the amount of elderly people has increased due to a rise in average life expectancy. As the population ages, so increases the amount of persons with functional challenges (Persson et al., 2015). Thus, several terms have thus been introduced in the past few decades to propose equal opportunities for all users living in urban environments. These terms include accessible design, barrier-free design, adaptable design, usable design, inclusive design, design for all, and UD. In what Iwarsson (2005) refers to as the enabler concept, these terms have somewhat disparate historical and cultural meanings. Among these concepts, UD is one of the most prominent. It is widely regarded as the most inclusive approach proposed as a solution to the problem of design discrimination. (Mace et al., 1991; Preiser & Korydon, 2011).

Mace introduced and promoted UD as a new nomenclature in the United States in 1985 to communicate a design approach that could be used by a broader range of users (Ostroff, 2001). In a conference presentation, Mace (1998) mentioned that he was frequently asked about UD, assistive technology, and barrier-free design. Then he argued that the universal design movement should concentrate on all individuals rather than just those with disabilities. This method

is a design philosophy that eliminates disparities between differing skills (Null, 2003).

### ***2.2.3 Principles of UD***

Many changes have started to be observed with the effects of socio-economic, cultural and technological developments in the world. The effects of these developments were also observed in the cities. The development of technology with the industrial revolution has created rapid urbanization. Thus, urban arrangements have begun to offer different opportunities to users.

At the Universal Design Center of the North Carolina State University. These design principles have changed several times from 1994 to 1997 until they are finalized by Mace and his colleagues. These changes were made to make the most understandable and most comprehensive of the principles. The team that prepared the principles included architects, engineers, product and environmental design experts. There are seven principles.

1. Equitable use
2. Flexible use
3. Simple and intuitive use
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use

In addition to these seven principles, the experts of universal design, the sustainers of Mace's mission, have added three more new principles to the new user requirements that have emerged due to the changing conditions of the world. These principles will increase in the future due to the impact of the UD on the current life. These new principles are as follows:

1. Adding to human delight
2. Functional and aesthetic integration
3. Social cohesion and participation (Evcil, 2014)

The designers should not forget that these principles are only for explaining the concept of UD, and they can be improved and/or added new things. They

don't set rules to the designers, and also, they are not for creating a checklist. In this part of the study, seven

The UD principles were created by architect Ronald L. Mace, who used this design idea for the first time in the mid-1980s in America and then continued with designers. Principles which is published on April 1st, 1997 will be examined. When the principles are explained, some examples will be given. The given examples can be used to describe a single principle as well as to multiple principles.

### *Equitable Use*

It seeks to identify solutions that are equitable for everyone and made available for everyone's usage. It should include the same meaning by all as possible. The design should be carried out without discrimination for any user type. The design is usable and marketable to individuals with a range of skills (European Urban Knowledge Network, 2019).

The entry doors of vehicles have to be suitable for all individuals (wheelchair users, parents with the stroller etc.) using public transport in cities (Figure 15).

Figure 15.

*The Entry Doors of Vehicles Are Suitable for All Individuals (National Disability Authoring, 2014)*



### ***Flexible Use***

This principle is about giving users the opportunity to choose the best option for them. Design should be suitable for the use of individuals with different abilities. The designed product should be equally useful for right and lefthanded users.

The railing design which has different levels fixed handle is an example for the flexible use principle (Figure 16).

Figure 16.

*The Railing Design with Different Levels Fixed Handle (National Disability Authoring, 2014)*



### ***Simple and Intuitive Use***

The goal of this principle of universal design is to make sure that everyone can easily grasp the design. This principle's objectives include eliminating needless complexity, delivering information in a consistent manner, and ensuring design simplicity. It targets to make designs that everyone can understand in the same way, regardless of user experience, literacy level, language abilities, and available concentration grade.

For example, if the qualities of the city can be understood and used by everyone, the tourists who do not know the language of the city can find their way there.

### ***Perceptible Information***

Regardless of the environment or the sensory of user capabilities, the design efficiently conveys the relevant information to the user. (National Disability Authoring, 2014). The main information of the design has to be noticed. For example, the information given in an information panel should be clear to individuals with different abilities or barriers (Figure 17).

Figure 17.

*An Information Panel for Individuals with Different Abilities or Barriers*  
(National Disability Authoring, 2014)

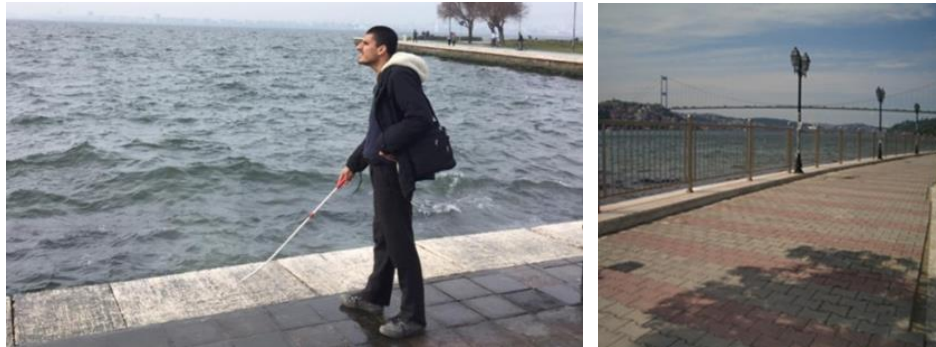


### ***Tolerance for Error***

The design reduces risks and the negative effects of mistakes or unplanned actions (Burgstahler, 2009). In other words, designs ought to be made to reduce mistakes and mishaps that might result from user behaviour. For example, a visually impaired person cannot perceive end of the walking path if there is no warning element to the seaside (Figure 18).

Figure 18.

*The Seaside Walking Paths*



***Low Physical Effort***

The design is efficient, comfortable, and requires little effort to use. This principle application is used in doors that open automatically for individuals with a diversity of physical traits. (Burgstahler, 2009).

In urban design, especially on sloping lands, the parks and promenade areas should be designed so that everyone can easily navigate. The ramps with suitable slope or steps with low level, have to be designed for passing level differences (Figure 19).

Figure 19.

*Example for Low Physical Effort Principle (Ergenoğlu, 2013)*



### *Size and Space for Approach and Use*

Appropriate size and space are provided for approach, reach, manipulation, and use regardless of the body size of individual, posture, or mobility (Burgstahler, 2009). The principle of leaving enough space for approach and use is aimed at increasing user accessibility especially urban designs and interior designs. For example, automatic ticket machine entrances have to be enough distance for using from wheelchair users (Figure 20).

Figure 20.

*The Example for Size and Space for Approach and Use Principles (National Disability Authoring, 2014)*



In sum, following the Mace approach, a multidisciplinary group of experts at North Carolina State University's Center for Universal Design wrote certain principles in 1997 to clarify the scope of universal design as it was perceived in the mid-1990s, and to ensure guidance in both design and evaluation activities (Steinfeld & Maisel, 2012). Accompanied by a set of guidelines for each principle, they were a valuable tool for clarifying UD for early adopters and are still widely used today (Maisel & Ranahan, 2017). The seven UD principles are designed to promote universal accessibility in the artificial environment (Yiing et al., 2013),

and they have been accepted in design practice in a lot of fields. These principles are summarized in Table 5 below.

Table 5.

*Principles of UD (Imrie, 2012; The Center for Universal Design, 2003)*

Principle	Description	Design Details
Equitable use	The design is useable and marketable to individuals of various skills. It purposes to find solutions that are fair to all users and available to everyone.	<ul style="list-style-type: none"> <li>• Supply the same means of use for all individuals: identical whenever possible; equivalent when not.</li> <li>• Avoid segregating or stigmatizing any users.</li> <li>• Make provisions for privacy, security, and safety equally suitable to all users.</li> <li>• Make the design appealing to all users.</li> </ul>
Flexibility in use	The design caters to a wide range of personal preferences and abilities. This principle entails allowing users to choose a suitable alternative for themselves.	<ul style="list-style-type: none"> <li>• Ensure selection in methods of use.</li> <li>• Accommodate right- or left-handed access and use.</li> <li>• Facilitate the user's accuracy and precision.</li> <li>• Ensure adaptability to the user's pace</li> </ul>
Simple and intuitive use	The design is simple to use, regardless of the user's previous experience, knowledge, language abilities, or current concentration level. It is to ensure that the designer makes the design simple for everyone to understand. This principle emphasizes design simplicity, reducing unnecessary complexity, and providing information in a consistent manner.	<ul style="list-style-type: none"> <li>• Eliminate unnecessary complexity.</li> <li>• Be consistent with user expectations and intuition.</li> <li>• Accommodate a wide range of literacy and language skills.</li> <li>• Arrange information consistent with its importance.</li> <li>• Supply effective prompting and feedback during and after task completion.</li> </ul>
Perceptible information	Regardless of ambient conditions or the user's sensory skills, the design effectively communicates essential information to the user	<ul style="list-style-type: none"> <li>• Use various modes (pictorial, verbal, tactile) for redundant presentation of necessary information.</li> <li>• Maximize "legibility" of necessary information.</li> <li>• Differentiate items in ways that could be defined (i.e., make it easy to give instructions or directions).</li> <li>• Ensure compatibility with a various of techniques or devices used by people with sensory limitations.</li> </ul>



Table 5 (Continued).		
Tolerance for error	The design reduces dangers and the negative consequences of unintentional or accidental actions. In other words, designs must be created to reduce errors and accidents caused by user behaviour.	<ul style="list-style-type: none"> <li>• Arrange items to minimize dangers and errors: most used components, most accessible; dangerous components eliminated, isolated, or shielded.</li> <li>• Supply warnings of hazards and errors.</li> <li>• Supply fail safe properties.</li> <li>• Discourage unconscious action in tasks that require vigilance</li> </ul>
Low physical effort	The design allows for efficient, comfortable, and fatigue-free use.	<ul style="list-style-type: none"> <li>• Allow user to maintain a neutral body situation.</li> <li>• Use reasonable operating forces.</li> <li>• Minimize repetitive actions.</li> <li>• Minimize sustained physical effort.</li> </ul>
Size and space for approach and use	Regardless of the user's body size, posture, or mobility, the principle of appropriate size and space is provided for approach, reach, manipulation, and use.	<ul style="list-style-type: none"> <li>• Supply a clear line of sight to significant components for any seated or standing user.</li> <li>• Make reach to all elements comfortable for any seated or standing user.</li> <li>• Accommodate variations in hand and grip size.</li> <li>• Supply adequate area for the use of assistive devices or personal assistance.</li> </ul>

### 2.3 Conceptual Framework

UD is a strategy with the overarching goal of making the design and combination of disparate environments and products used for all without the requirement for adaptation or specialized design solutions (Ahmed & Ergenolu, 2016). Furthermore, UD must be comprehensive from origin to destination to accommodate the broadest possible range of potential users (Harsritanto, 2018). As a result, it could be defended that if the UD is properly conceived and implemented, it is not noticeable because it simply works (Erlandson & Psenka, 2014).

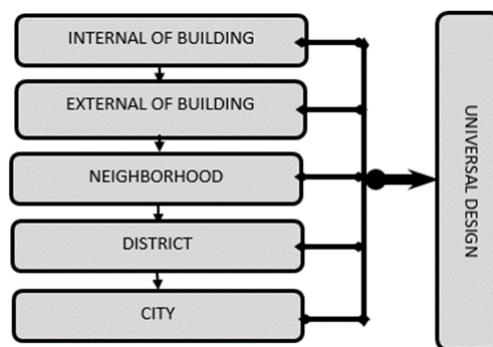
Aesthetics, engineering possibilities, environmental concerns, safety considerations, business standards, and cost are just a few of the numerous variables that need to be taken into account while designing any place or product. Designers typically take the standard user into account. On the other hand, according to the Center for Universal Design, universal design entails creating

places and products that are as usable by everyone as feasible without the need for adaptation or specialist design (Burgstahler, 2009).

UD, used by many design disciplines, can be considered at different scales as interior architectural design, architectural design, landscape design, urban design. In other words, UD can be considered from a product design to city design (Figure 21). All of these disciplines have interaction between them. Designing all of them with the point of view of the concept of UD will ensure that the elements of all spaces in cities are suitable for all users.

Figure 21.

*The UD in Different Scales*



Within all these scales, universal design has an important role in social sustainability. Dempsey et al. (2011) conducted a literature review on SS, identifying both non-physical and physical factors (Stevenson, 2020). Physical aspects include sustainable urban forms and sustainable urban design parameters. The universal design concept contributes to making these physical aspects suitable for everyone.

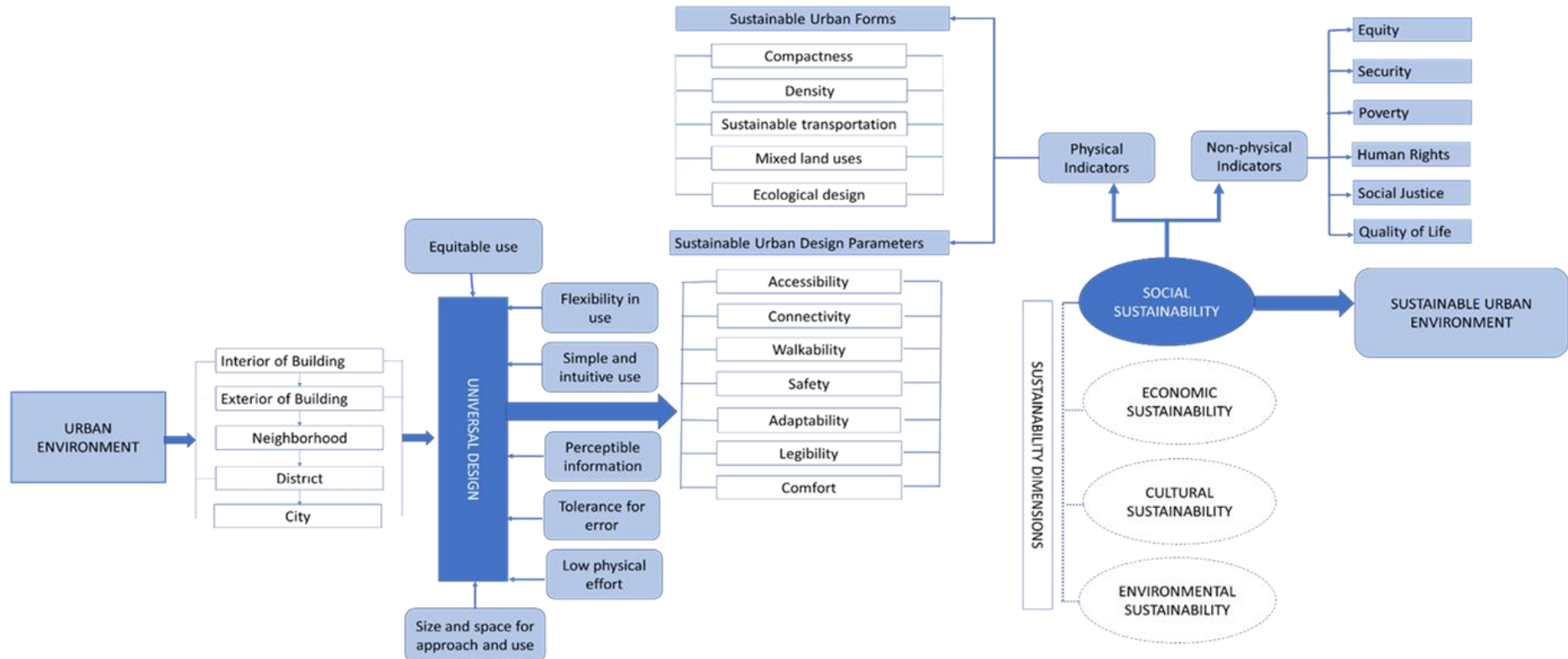
The canon of contemporary urban design, namely sustainability, can be studied in various dimensions. SS, as one of the four main dimensions, has frequently been overlooked or neglected. SS combines physical and social realm design—infrastructure to support social and cultural life, social amenities, systems

for citizen engagement, and space for individuals and spaces to evolve (Borowczyk, 2018).

The SS concept has links to concepts of social equity and inclusion, which include concepts such as empowerment, participation, and social justice (Dempsey et al., 2011; Manzi et al., 2010). The universal design concept is an inclusive design method that adopts the concept of making designs that will meet the requirements of various types of users in the same application. Everyone is considered as a user in universal design concept regardless of age, physical characteristics, personal development, and skill.

In sum, it can be briefly suggested that UD (applied in different scales of the built environment with the help of seven main principles) has a positive impact on urban design parameters. The urban design parameters are among the physical components of social sustainability. As a comprehensive concept, alongside tangible components, social sustainability involves non-physical components. With the help of these indicators within these two main classifications, SS is one of the four main pillars of sustainable urban environments. The conceptual model is shown in Figure 22 below.

Figure 22.  
*Conceptual Framework Representing the Link Between Universal Design and Sustainable Urban Environments*



## **CHAPTER III**

### **Material and Methodology**

In this chapter, the materials and methodology of the research are discussed. Firstly, Northern Nicosia with its neighbourhoods, which was chosen as the study area, is introduced. Later, research design, participants and sample, data collection tools, data analysis procedures and study plan are explained. A qualitative assessment based on the principles of UD and a quantitative evaluation based on Turkish Standard Institute standards were used in selected three neighbourhoods. Besides, the satisfaction and opinions of the users living in these neighbourhoods were investigated through a questionnaire.

#### **3.1 Research Area**

The third-largest island in the Mediterranean Sea is Cyprus. It is situated in a very strategic area of the world. Cyprus has been an important settlement throughout history, with factors such as its geographical feature and strategic location, its unique culture formed by the contributions of different civilizations, and the contributions of the Mediterranean climate to the formation of this culture. According to the macro climate classification of Northern Cyprus, it is among the climate zone called "semi-arid". At the same time, since it is located on a Mediterranean island, the summer season is hot and dry; the Mediterranean climate is seen, where the winter season is warm and less rainy (KKTC Meteoroloji, 2022).

Cyprus Island had come under the rule of many civilizations due to its geographical location. This has had a significant impact on the city of Nicosia, which is in the center of the island. Cyprus island was governed by Old Egypt (B.C. 1500-1450, B.C. 1200-1000), Hittite (B.C. 1320-1200), Phoenicians (B.C. 1000-710), Assyrians (B.C. 710-609), Egypt (B.C. 609-525), Iranian Persian (B.C. 525-333), Persian and Old Greek (B.C.411-333), Ptolemy (B.C. 294-58), Rome (B.C. 58- A.D. 395), Byzantium (395-1190), the Crusades (Richard I) (1190-1192), Lusignan (1192-1489), Venice (1489-1571), Ottoman (1571-1878), British (1878-1960) in chronological order (Altan, 2016). Each civilization

wanted to leave its mark on the region. The historical values that can survive to the present day can help to recognize the civilizations that reigned on the island of Cyprus.

The capital of Cyprus has been Nicosia for approximately 1200 years. The Lusignan era produced the most of the significant colossal surviving examples of the 13th century architecture that dominates the island. The city was surrounded by fortifications during this period, in addition to the construction of a palace, inns, houses, churches, and monasteries. Some of them are currently seen in Nicosia (Figure 23). As a result, the city has a plan with constraints. The current walls were rebuilt during the Venetian era in the fifteenth century (Enlart, 1987). These walls can still be seen today (Figure 24).

Figure 23.

*Some Building Examples (Great Inn and St. Nicolas Church) from Northern Nicosia (by Author)*



Figure 24.

*The Venetian Walls (Lonely Planet, 2022)*

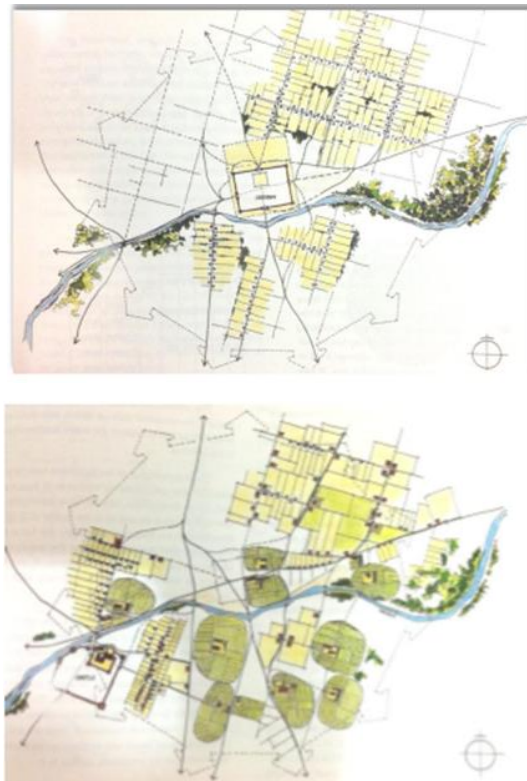


In addition to buildings, these civilizations also affected the development of the Nicosia city (Figure 25). The capital of Cyprus over the past ten centuries, Nicosia, has served as a tangible reminder of the island's rich history. In 1989, the Nicosia Master Plan designated it as a conservation area. The Walled City, Nicosia's oldest part, is one of the finest examples of medieval town planning, dating back to the Venetian period (1489-1571). The entity of the urban form was more important than the internal structure at this time: the city's Renaissance walls, with their 11 bastions and three gates, were built to consolidate the town, which had revealed a dispersed character. During the Ottoman period (1570-1878), the city was transformed into a modern capital, with improvements to both infrastructure and residential areas. Even though Nicosia was not physically divided during this period, the two main communities of the town, the Turks and the Greeks, were already living in separate residential places described by their religious centres: the Turkish districts were located around the mosques, while the Greek districts developed around the Greek Orthodox churches (Diaz-Berio, 1982). Urban density in Nicosia rose throughout the British colonial era (1878–1960) when vacant land was developed (Demi, 1990). Nevertheless, suburban growth outside the city walls and along the main roadways was also a result of the increased administrative, commercial, marketing, and service roles that came with

the British administration (Zetter, 1985). After the Second World War, Nicosia rapidly grew in population, reaching 100,000 by the early 1960s. (Oktay, 2007).

Figure 25.

*Nicosia City in Different Terms (Demi, 1990)*



The Greek and Turkish communities had lived together for many years in Cyprus. The city was split by the "Green Line" in 1963 as a result of political conflicts between the two communities; the Buffer Zone has been created in 1974. The Buffer Zone cuts through the Walled City's heart, creating a lifeless corridor and disrupting the city's cohesion. The Buffer Zone delineated the extent of territorial control by Turkish and Greek forces from the start, and it became one of the main determinants in the physical development of the city in the years that followed (Oktay, 2007).

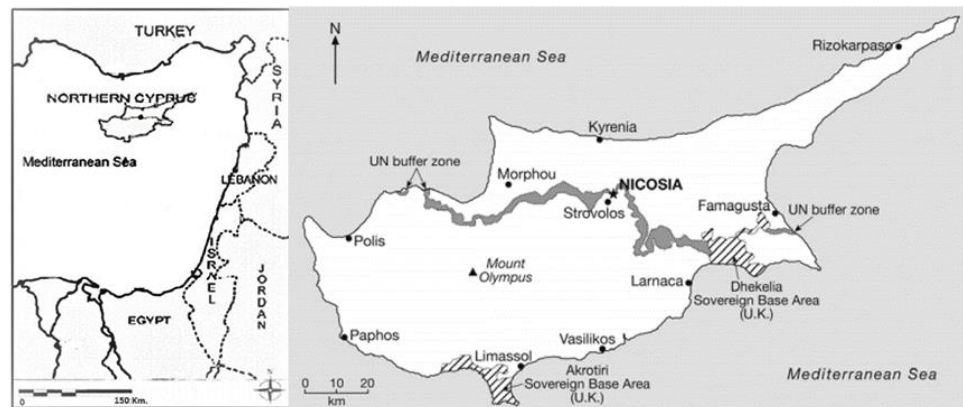
In brief, following intercommunal conflicts in the 1960s and the events of 1974, the island was divided into two parts: north Cyprus and south Cyprus



(Oktay, 2005). Nicosia, Famagusta, Kyrenia, Güzelyurt, İskele, and Lefke are the six districts of Northern Cyprus. Nicosia, divided by a buffer zone, serves as the capital of both northern and southern Cyprus (Figure 26). It is also the central district of Northern Cyprus, covering an area of 502.19 km<sup>2</sup>. The Nicosia district is bounded to the north by Kyrenia, to the south by the Greek Cypriot community, to the east by Famagusta, and to the west by the Morphou districts. (Erengin, 2018).

Figure 26.

*Location of the Island of Cyprus and Nicosia (Asilsoy & Oktay, 2016; Oktay, 2007)*



Northern Cyprus has experienced rapid, unsustainable urban growth (Asilsoy & Oktay, 2016). Urbanization began in the 1980s as a result of economic development, which created a demand in the mass-housing sector. As a result, apartment blocks, detached, semi-detached, and terraced houses were built at random across the country in both urban and suburban areas. Consequently, poorly built urban environments exist in the absence of any political agenda for controlling urban planning, infrastructure, and physical quality (Özarisoy & Altan, 2017). Despite having a master plan for more than 30 years, Northern Nicosia, the capital of Northern Cyprus, has suffered greatly from this undesirable tendency of urbanization.

Northern Nicosia includes the country's administrative units (presidency, prime ministry, and other ministries). Furthermore, it is a city with a variety of intense financial and social activities. In addition, Northern Nicosia has private and public schools (from nursery to high school) as well as various university campuses with a diverse user base. The population distribution according to the neighbourhoods of the city of Northern Nicosia, which has a large population, can be seen in Table 6 according to the last census of the state planning organization.

Table 6.

*The Population Distribution According to the Neighbourhoods of the City of Northern Nicosia (DPÖ, 2011)*

<b>Neighbourhood Name</b>	<b>Population</b>
ABDİ ÇAVUŞ	568
AKKAVUK	793
ARABAHMET	561
AYDEMET	2314
AYYILDIZ	489
ÇAĞLAYAN	1307
GÖÇMENKÖY	3003
HAYDARPAŞA	155
İBRAHİMPAŞA	566
İPLİKPAZARI	229
KAFESLİ	233
KARAMANZADE	351
KIZILAY	3535
KÖŞKLÜÇİFTLİK	2939
KUMSAL	1855
KÜÇÜK KAYMAKLI	10572
MAHMUTPAŞA	314
MARMARA	3081
ORTAKÖY	8868
SELİMİYE	878
TAŞKINKÖY	3847
YENİCAMİ	1663
YENİŞEHİR	3715
HAMİTKÖY	5338
HASPOLAT	4204

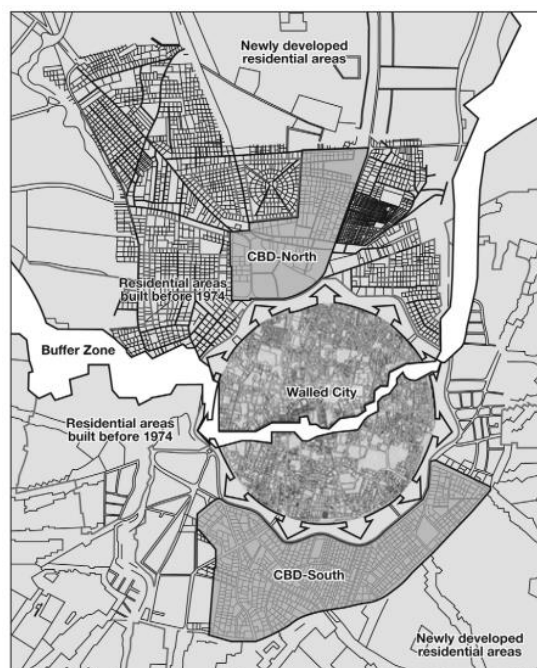
Cities are the backdrop to a large part of the social and economic activity of a country, representing hope for a better future and reminding individuals of its cultural heritage. Nicosia's urban structure remains unconsolidated, owing to the city's vast, haphazard spread, which may be explained by the unstable land market and a high stock of urbanized but underutilized land in the 1980s (Zetter, 1985).

Nicosia's ongoing division is central to many of the city's ongoing problems. The division limits development and imposes various problems for city planning within a general framework. The division has prompted a process of outward growth away from the old core of Nicosia on both sides, as well as increased marginalisation. Since the Buffer Zone was established in 1974 to reinforce the city's division, the city has grown significantly along the north-south axis (Figure 27) (Oktay, 2007).

The two halves of the city of Nicosia are currently governed by two separate municipalities: the Nicosia Turkish Municipality and the Nicosia Greek Municipality, according to the city's current political-administrative and planning institutions.

Figure 27.

*The Existing Urban Layout of Nicosia (Oktay, 2007)*



North part of Nicosia consists of 5 sub-districts (the central sub-district of Nicosia, Akıncılar, Alayköy, Gönyeli and Değirmenlik). Nicosia is the most populous city in Cyprus according to the latest census. In this thesis study, three bordering neighborhoods (from the central sub-district of Northern Nicosia) selected from the north of the city of Nicosia in Cyprus, which is the capital divided into two, are taken into.

All individuals who live in a city are users of urban spaces. These users include individuals over the age of 65, children, wheelchair users, hearing-visually impaired individuals etc. All individuals prefer to use urban spaces that are accessible, walkable, and safe for them. It is seen that there is a strong connection between these concepts, which are among the parameters of sustainable urban design, and universal design. For these reasons, it can be suggested that urban spaces should be designed by adopting the universal design concept. In this way, easily accessible areas are created where the health and safety of the users are taken seriously, and special needs users (disabled individuals) can participate in society. Accordingly, the quality of life in urban spaces increases. In short, urban spaces designed with the concept of universal design contribute to social sustainability. With this main idea, three bordering neighbourhoods in Northern Nicosia were chosen as the study area.

The reasons why the study is conducted on neighborhood scale can be listed as follows:

- According to Perry (1929), the neighborhood is a physical design tool that enables individuals living within its borders to interact socially. Neighborhoods are used as models to reflect neighborhood relationships. In addition, the development of social interaction at this scale will contribute to the integration of the society, as the neighborhoods are experienced in neighborhood relations between the individuals living there and reflect the identities and qualities of the inhabitants (Şahin Körmeçli, 2019).

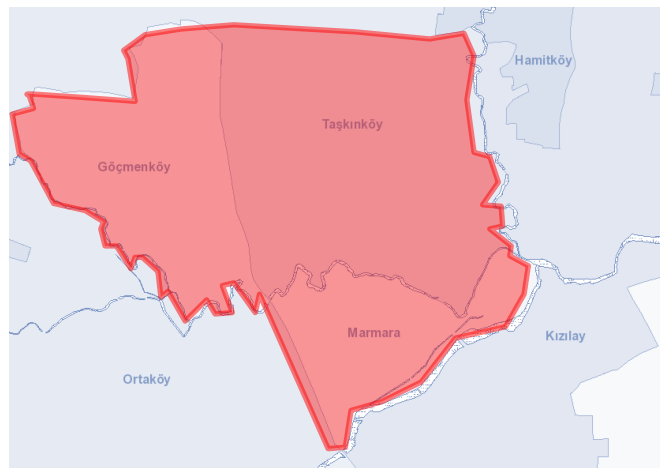
- According to Akın and Erkan (2012); in the definition of the neighborhood units, the social factors that provide the dimension of meeting and establishing face-to-face relationships within the population and area size of a particular population play a role. On the other hand, determining the areal size of the

neighborhoods, the population it has, and the distance this population can walk without difficulty are effective. In other words, the neighborhood can also be defined as a small residential unit where face-to-face and personal relationships are dominant, and members can benefit from the common city facilities such as primary school, playground, market within walking distance without difficulty (Şahin Körmeçli, 2019).

Three bordering neighborhoods in the north east of Northern Nicosia are selected as the study area (Figure 28). They are called Taşkinköy, Göçmenköy and Marmara neighborhoods. This region is an important region where trade, business centers, and residential areas are concentrated. There is Dr. Fazıl Küçük Boulevard to the north of the study area and there is the Kemal Aksay Street to the east.

Figure 28.

*Taşkinköy, Göçmenköy and Marmara Neighbourhoods (Kent Rehberi, 2020)*



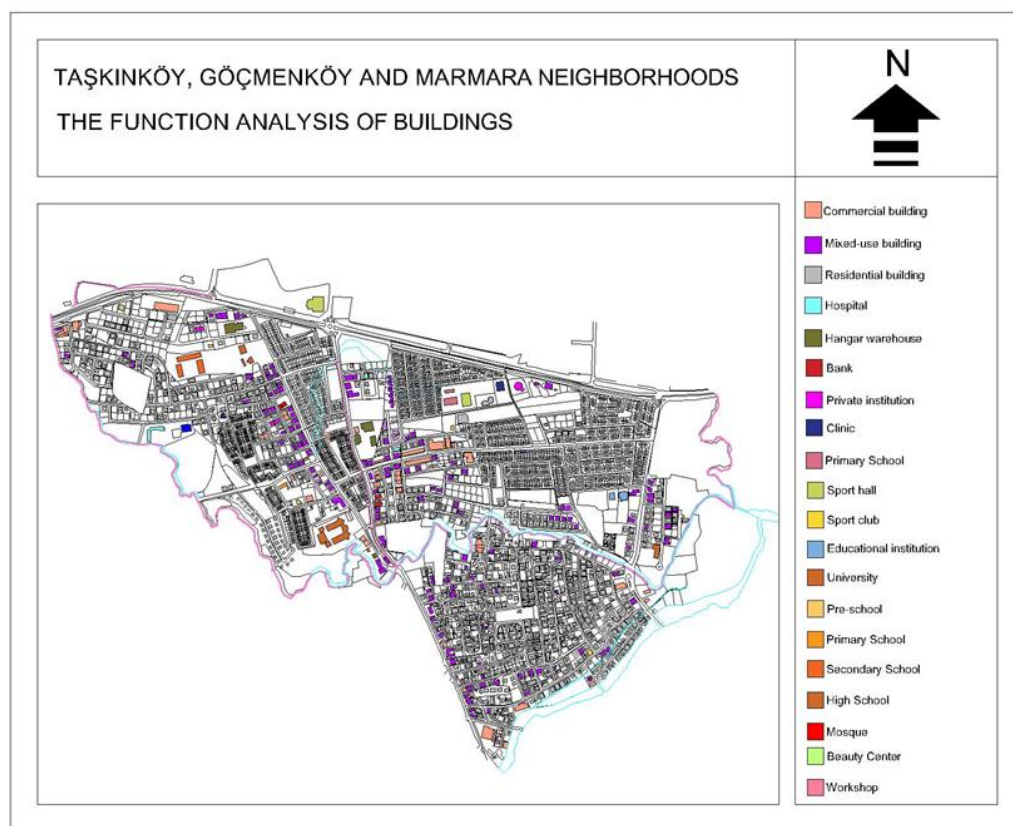
The reasons for choosing these three neighbourhoods as working areas can be listed as follows:

- The main arteries connecting the city centre are located in and around the region.

- They are mixed-use neighbourhoods, the individuals living here have the opportunity to access the functions that can meet their daily needs by walking (Figure 29).

Figure 29.

*Functional Analyses of the Buildings in Taşkinköy, Göçmenköy and Marmara Neighbourhoods (by author)*



- The neighbourhoods include urban public spaces in different typologies (parks, squares, streets, avenues, road axes, playgrounds). They are important areas for social interaction of all individuals in different characteristics (age, gender, education level, physical and mental characteristics etc.). Visuals of the urban spaces of the selected neighbourhoods can be seen in Table 7.

Table 7.

*Urban Spaces in Different Typologies in Selected Neighbourhoods (by author)*

	Taşkinköy	Göçmenköy	Marmara
Streets			
Avenues			
Parks			



According to these reasons, it can be argued that these neighbourhoods have the potential to evaluate with sustainable urban design parameters and universal design.

It has been determined that parks and green areas are neglected among these urban spaces that host different activities. Although parks and/or green spaces have an important place in the lives of individuals living in cities, the scarcity of these areas in selected neighborhoods is striking. Parks and green areas in the neighborhoods are shown in Figure 30. Some details about parks and green areas are given in Table 8, Table 9 and Table 10.

Figure 30.

*Parks and Green Areas in Neighbourhoods (by author)*

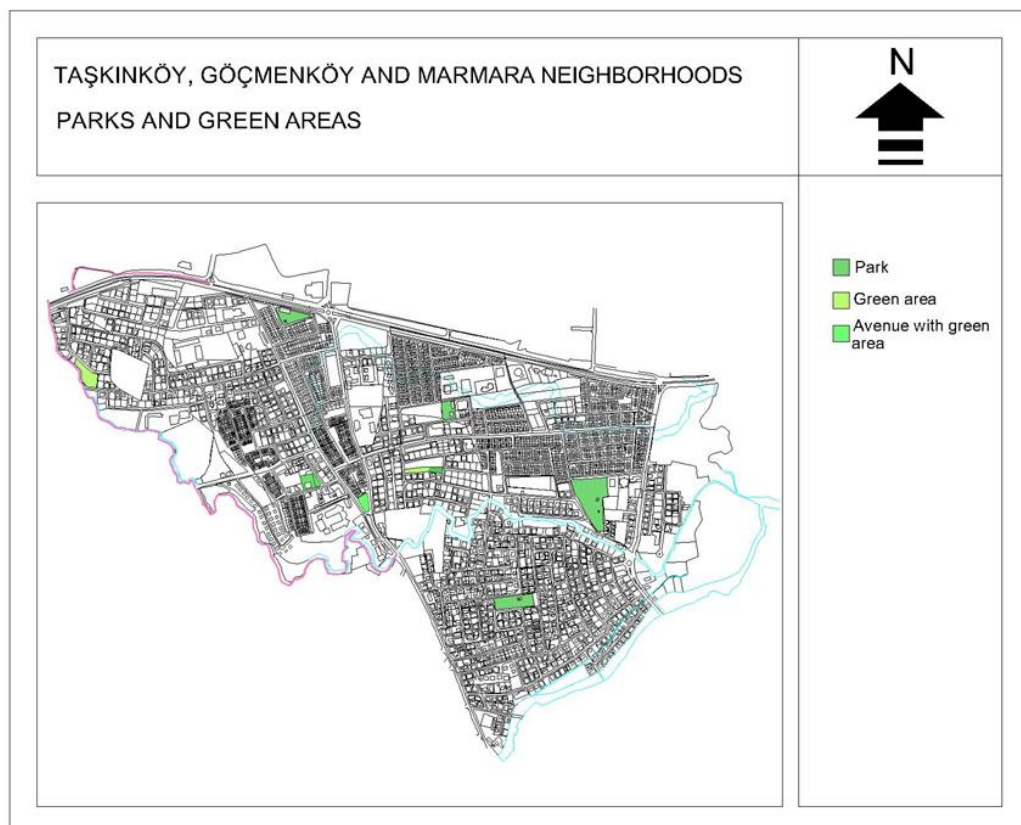




Table 8.  
*Details of the Parks in Taşkınköy Neighborhood (by author)*




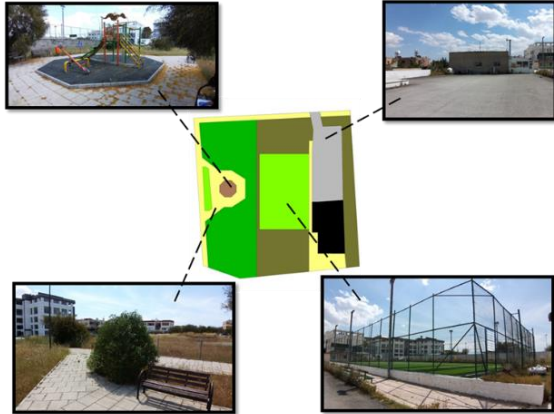
Taşkınköy Neighborhood			
Park Name	Location of The Park	Sketch and Visuals from Park	General Information about Park
Park in Yüksel Kanatlı Street			This is the smallest park of the neighborhood. It is nearly 2300 m <sup>2</sup> . Different covered materials can be seen in this park, caoutchouc material for playground areas and cobblestone for circulation paths. It consists of playground equipment, sports equipment, green areas and urban furniture (seating elements, lighting elements, trash cans).
Park between Taşkınköy 4.Street and Şht. Muharrem Çalay Street			The covered materials of the park are caoutchouc material for playground areas, cobblestone for circulation paths. It has nearly 4400 m <sup>2</sup> area. It is composed of playground equipment, playing field, green areas, car parking area, sports club building, urban furniture (seating elements, lighting elements, trash cans).

Table 8 (Continued).

Dr Fazıl  
Küçük Park



It is in intersection point of Park Street and Çetin Başar Street.



This is largest park of this neighborhood, nearly 14500 m<sup>2</sup> area. This park consists of playground equipments, sports playing equipments, playing field, green areas, car parking areas, water item, urban furniture (seating elements, lighting elements, trash cans, book sharing point, cat house, bicycle parking), cafe and buffet. One of the playground area in this park is designed by taking care disabled users and this part of park is called FOGEM Accessible Park. Different covered materials were used for designing the park, caoutchouc material for playground areas and walking paths and cobblestone for circulation paths.

Table 9.

*Details of the Parks and Green Areas in Göçmenköy Neighborhood (by author)*

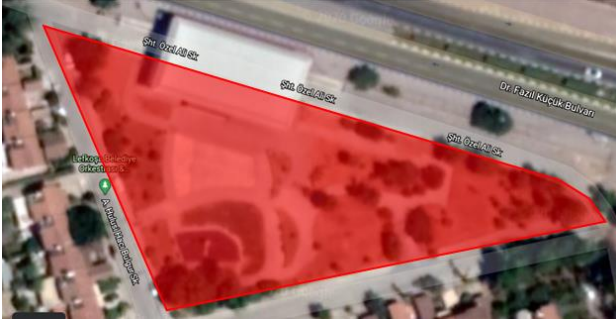

Göçmenköy Neighborhood			
Park Name	Location of The Park	Sketch and Visuals from Park	General Information about Park
Sanat Park	 <p>The park is between A. Hulusi Hacı Bulgur Street and Şht. Özel Ali Street.</p>		<p>It is called Sanat Park and has nearly 5336 m<sup>2</sup> area. This park consists of playground equipment, sports playing equipment, playing field, green areas, activity area and many types of urban furniture (seating elements, lighting elements, trash cans, book sharing point, bicycle parking). In addition, there is a tribune, some part of which is in the park. Also, different covered materials can be seen in this park, caoutchouc material for playground areas, cobblestone for circulation paths and concrete for activity area.</p>

Table 9 (Continued).

Göçmenköy  
Park



The park is intersection point of Şht. Aydın Veleddin Street and Şht. Behzat Hüseyin Street.



It is called Göçmenköy Park and has nearly 4132 m2 area. This park consists of playground equipment, sports playing equipment, green areas, activity area, restaurant and urban furniture (seating elements, lighting elements, trash cans). Also, different covered materials can be seen in this park, caoutchouc material for playground areas, cobblestone for circulation paths and concrete for activity area.



Table 9 (Continued).

Bülent Ecevit  
Square

The square is in intersection point of Rauf Denktaş Avenue and Şht. Mustafa Mehmet Street. It is opposite site of Bülent Ecevit Anatolia High School.



It is called Bülent Ecevit Square and has nearly 1970 m<sup>2</sup> area. This area consists of green areas, activity area, water item, sculpture of Bülent Ecevit, flags, buffet and urban furniture (seating elements, lighting elements, trash cans). Also, different covered materials can be seen in this park, cobblestone for circulation paths and marble for under the sculpture.

Natural Green  
Area



The green area is between Uludağ Street and Ürgüp Street



It is a natural green area. There are trees and natural plants in this area.

Table 10.

*Details of the Parks in Marmara Neighborhood (by author)*

<b>Marmara Neighborhood</b>			
<b>Park Name</b>	<b>Location of The Park</b>	<b>Sketch and Visuals from Park</b>	<b>General Information about Park</b>
Marmara Park	 <p>It is turned over with Dilek street, 23. Street and Ören street.</p>		<p>It is called Marmara Park and has nearly 7000 m<sup>2</sup> area. It is between residential buildings. This park consists of playground equipment, sports playing equipment, playing field, green areas, walking path, activity area and many types of urban furniture (seating elements, lighting elements, trash cans, bicycle parking etc.). In addition, there is a buffet which is not use when this analyze done. Also, different covered materials can be seen in this park, caoutchouc material for playground areas, cobblestone for circulation paths and concrete for activity area.</p>

There are different road types (double strip road, dead end road, on way road, two-way road) in selected neighborhoods. The double strip road, in Dr. Fazıl Küçük Boulevard, is one of the crowded traffic roads of the Northern Nicosia. This road is used for going from Northern Nicosia to Ercan Airport and Famagusta city. Also, this road is used by individuals who come to organized industrial zone of Northern Nicosia and Near East University. Additionally, this road has important role for connecting different neighborhoods of the city. In addition, there are many two way and one-way roads for connecting different urban spaces. Besides, there are dead end roads in these neighbourhoods.

In addition, there are four traffic lights for controlling intersection points of the roads. Besides, there are bus stops in eleven different points of this neighborhoods for public transportation. These bus stops have same characters (Figure 30).

Figure 30.

*The Bus Stops in Neighborhoods (by author)*



Besides, there are different types of car parking (parallel to road, perpendicular to road and designed as car parking area). They have different car capacity and physical character (dimensions, covered material etc.) (Figure 31).

Figure 31.

*Car Parkings from Neighborhoods (by author)*

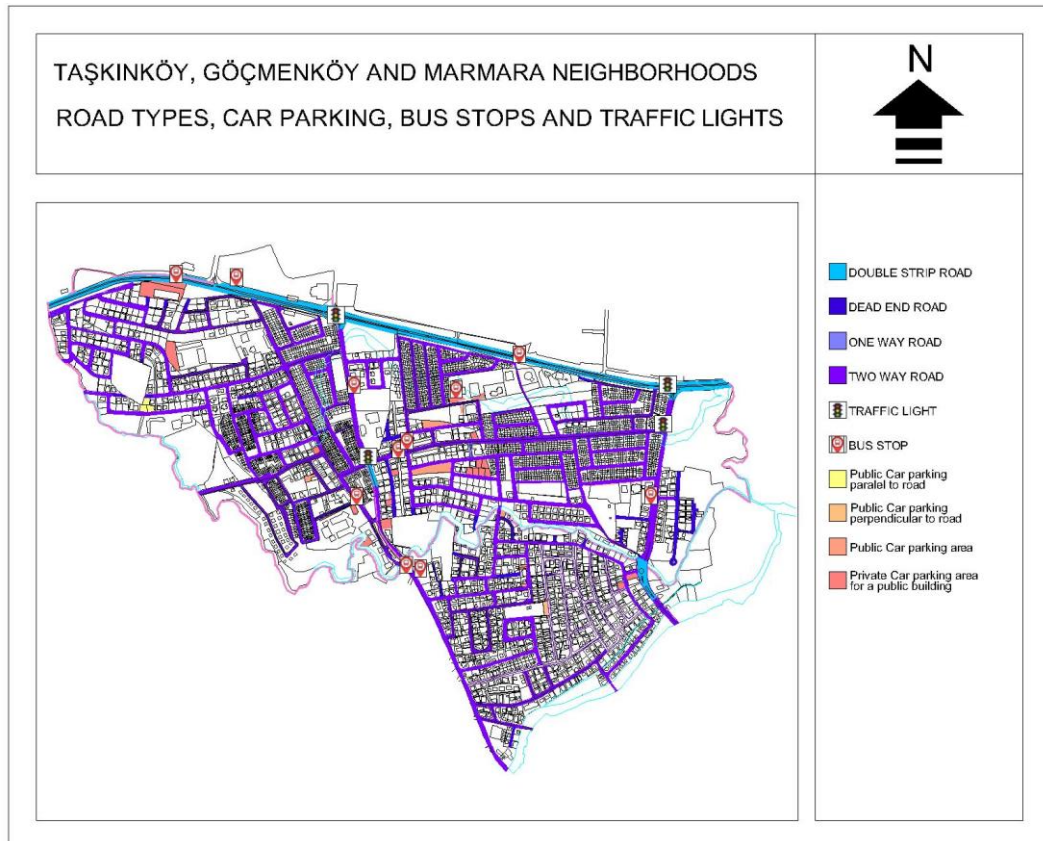


Details about road types, car parking, bus stops and traffic lights can be seen from Figure 32.



Figure 32.

*The Neighborhoods Road Types, Car Parking, Bus Stops and Traffic Lights (by author)*



### 3.2 Research Design

For the accomplishment of the study's aim and objectives, both qualitative and quantitative research techniques are used. Data was collected in three neighbourhoods (Taşkinköy, Göçmenköy and Marmara) located of Northern Nicosia using two main methods.

*Urban Space Evaluation Method:* On-site inspections were carried out in selected neighborhoods. Firstly, connections between urban spaces and types of urban spaces were discussed throughout the neighborhood. Afterwards, the heavily used axis of the neighborhood was determined and the elements found here were evaluated with the universal design perspective and urban design parameters. In addition, as the quantitative part of the research, the chosen urban space items were assessed in terms of size properties according to the Turkish

Standards Institution (TSI) standards, prepared by taking into account international standards, including the European directives/regulations.

*The User Survey Method:* A questionnaire was prepared to evaluate the opinions of the users. After receiving general information about the participants, the questions about some of the parameters of sustainable urban space (accessibility, walkability and safety) are asked and submitted for user evaluation. These parameters were accepted as general user requirements in urban spaces. In addition, users are able to evaluate urban spaces in neighbourhoods from universal design perspective.

### 3.3 Participants/Population and Sample

*Urban Space Evaluation Method:* In this study, Taşkınıköy, Göçmenköy and Marmara, which are the developing neighborhoods of Northern Nicosia, were chosen as the sample. This part of the city is an important region where trade, business centres, and residential areas are concentrated. In addition, the neighborhoods within this region contain the crowded population of the city. According to the last census, their populations are given in Table 11 (DPÖ, 2011).

Table 11.

*According to the Last Census, the Population of Taşkınıköy, Göçmenköy, Marmara (DPÖ, 2011)*

Neighbourhood name	Population
Taşkınıköy	3847
Göçmenköy	3003
Marmara	3081

Parks and green areas, road types and parking lots were determined primarily in these three neighborhoods that border each other. In addition, the urban space elements on an intensively used axis of each neighborhood were analysed in detail in terms of material, location and size. These analyses were

made with qualitative and quantitative methods, taking into account universal design principles, sustainable urban space parameters and Turkish standards.

*The User Survey Method:* A random sample of 150 residents between 18 and 65 years old was chosen for the user survey in three neighborhoods (Taşkınıköy, Göçmenköy, Marmara) of Northern Nicosia. As their population densities are nearly equal, the number of participants from each neighborhood is the same. The respondents were selected randomly in each sample area and they were asked to fill out a questionnaire form.

### **3.4 Data Collection Tools/Materials**

*Urban Space Evaluation Method:* The urban spaces in these neighbourhoods were evaluated with the on-site examination method. This evaluation was supported by photography and measurement. In addition, maps obtained from Google Earth and the online City Guide file prepared by the Nicosia Turkish Municipality were used. The map obtained was saved in the Autocad file with the extension dxf. Then, this map has been imported into the Depthmap X 0.35 program. The program creates an axis map according to the roads drawn in the Autocad file. In this way, the streets and avenues used extensively were determined (Figure 33). In this map, red or dark orange-coloured axes are used extensively. Thus, urban items in the avenues with intensive use from each neighbourhood were examined in more detail from sustainable urban design parameters, the UD point of view and TSI standards.

Two disparate tables were created separately for qualitative and quantitative evaluation. In one of the tables, a qualitative evaluation of urban space elements in terms of UD principles has been made. In addition to this evaluation, the effect on sustainable urban design parameters is also investigated according to a score of positive (✓), negative (x) or non (o) (Table 12).

In addition, as the quantitative part of the research, the chosen urban space items were assessed in terms of size properties according to the Turkish Standards Institution-(TSI) standards, prepared by taking into account international standards, including the European directives/regulations. Although there are no checklist or concrete standards for UD, there are several merits that designers use

as a reference. In this research, alongside the qualitative evaluation, the Turkish Standards Institution- (TSI) is referenced and an assessment in terms of size is completed for the evaluated urban space items (TSI, 2021). The items were assessed and displayed as appropriate (A) or inappropriate (I). These tables can be used to evaluate urban elements in all urban spaces (Table 13).

Figure 33.

*Axis Maps the Streets and Avenues Used Extensively (by author)*

Taşkinköy



Göçmenköy



Marmara





Table 13.

*Assessment of the Urban Space Items According to TSI Standards  
[Appropriate (A)/ inappropriate (I)] (by author)*

Urban Space Items	Existing Dimension	TSI Standards	A/I
<i>Type of Urban Space Item</i>	<i>Available dimensions of evaluated item in cm. (height, length, width)</i>	<i>Given dimensions in TSI Standarts of evaluated item (height, length, width)</i>	<i>Displayed 'A' or 'I'</i>

*The User Survey Method:* A questionnaire consisting of five sections with an aim of investigating user perceptions and views about some of the sustainable urban design parameters and the UD principles of the urban spaces in Northern Nicosia is applied.

In this study, the first part consists of demographic data. In the second, third and fourth sections of the questionnaire, there are questions about accessibility, walkability and safety, selected as general user requirements in urban space among the sustainable urban design parameters. In the last part of the questionnaire, there were seven items related to universal design principles.

For the items of the questionnaire investigating user views, Likert-type five-point scale (strongly disagree to strongly agree) was used to record the participants' responses. The answers were coded as 5= strongly agree, 4= agree, 3= unsure, 2= disagree, or 1= strongly disagree. So, the measures of this study are as follows.

***Part 1: Demographic Data:*** Socio-demographic data about gender, age etc are measured with 6 items.

***Part 2: User Views about Accessibility:*** Data investigating user views about accessibility are collected with the help of 10 items. While one of the items is a multiple-choice question, three of them are answered with Yes/No options. The remaining 6 items were presented using a Likert-type five-point scale.

***Part 3: User Views about Walkability:*** Data investigating user views about walkability are collected with the help of four items. All items were presented using a Likert-type five-point scale.

***Part 4: User Views about Safety:*** Data investigating user views about safety are collected with the help of four items. While 1 of the items was answered with Yes/No options, the remaining four items were given using a Likert-type five-point scale.

***Part 5: User Views about Universal Design Principles:*** Data investigating user views about universal design principles are collected with the help of seven items. Each item represents one of the principles.

The relevant questionnaire is given in Appendix A. NEU Scientific Research Ethics Committee gave an ethics report for that questionnaire. This report can be seen in Appendix B.

### **3.5 Data Analysis Procedures**

*Urban Space Evaluation Method:* With the help of google earth and city guide maps, on-site investigations were made and data were collected on the type of road, car parking areas, bus stops, traffic lights, parks and green areas. The collected data were analysed on maps prepared by the AutoCAD program. In addition, the Depthmap X 0.35 program determined intensive use axes from each neighbourhood. The location of the urban elements in these areas was shown on maps using Autocad and Paint programs and analyzed in the urban space evaluation form in the light of the data collected by photographing, on-site inspection and measurement.

*The User Survey Method:* After the data was collected, the research results were analysed with the help of SPSS (statistical package for social sciences). In addition, the reliability test of the questionnaire was carried out using the SPSS program. All findings are displayed in tables and graphics.

### **3.6 Study Plan**

*Urban Space Evaluation Method:* The on-site examinations were made within one week in May 2020 for Taşkınköy, one week in June 2020 for Göçmenköy, and one week in August 2020 for Marmara.

*The User Survey Method:* The user survey was applied to participants in the first two weeks of September 2020. Later, the collected data were processed into the SPSS program and displayed with tables and graphs.



Discussions are going to be revealed by overlapping the findings obtained from the urban space evaluation method and the user survey method. In addition, the analysis and researches are going to shed light on the conclusions and recommendations of this thesis.

### 3.7 Conceptual Design of the Methodology

The details explained in other parts of the material and method section of the thesis are gathered here as a flowchart (Table 14).

Table 14.

#### *Conceptual Design of the Methodology*

Basic Components	Indicators	Used Material(s)	Used Method(s)
Physical Analysis of Research Area	Function of the buildings in the neighbourhoods	<ul style="list-style-type: none"> <li>• Google Earth map</li> <li>• City Guide map</li> <li>• Autocad drawing programe</li> <li>• Photo capture feature of Android phone</li> <li>• Meter</li> </ul>	Qualitative method <ul style="list-style-type: none"> <li>• On-site inspections</li> </ul>
	Parks and green areas in the neighbourhoods		
	Road types, car parking bus stops and traffic lights in neighbourhoods		
Urban Space Evaluation	Urban items at main axis are evaluated according to material, location and dimension	<ul style="list-style-type: none"> <li>• Depthmap X 35 Program is used for determining main axis</li> <li>• Urban Space Evaluation Table prepared with UD perspective and urban design parameters (Table 12)</li> <li>• Assessment of the urban space items according to TSI standarts (Table 13)</li> <li>• Photo capture feature of android phone</li> <li>• Meter</li> </ul>	Qualitative and quantitative methods <ul style="list-style-type: none"> <li>• On-site inspections</li> </ul>
User Survey	Part 1: Demographic Data Part 2: User Views about Accessibility Part 3: User Views about Walkability Part 4: User Views about Safety Part 5: User Views about Universal Design Principles	<ul style="list-style-type: none"> <li>• User survey questions about demographic data, accessibility, walkability, safety and UD principles</li> <li>• SPSS program</li> </ul>	Qualitative and quantitative methods <ul style="list-style-type: none"> <li>• Applied user survey to randomly selected 150 citizens between 18 and 65 years old</li> </ul>

## CHAPTER IV

### Findings and Discussion

In this chapter, all the findings are presented and discussions are made. Tables 12 and 13 explained in the material and method part of the study were filled in for the main axes determined in each neighbourhood. The findings obtained from the questionnaire applied afterwards are presented in tables and bar charts. Accordingly, various recommendations for improving urban areas are provided in the study's discussion section, taking the UD principles and TSI standards into consideration.

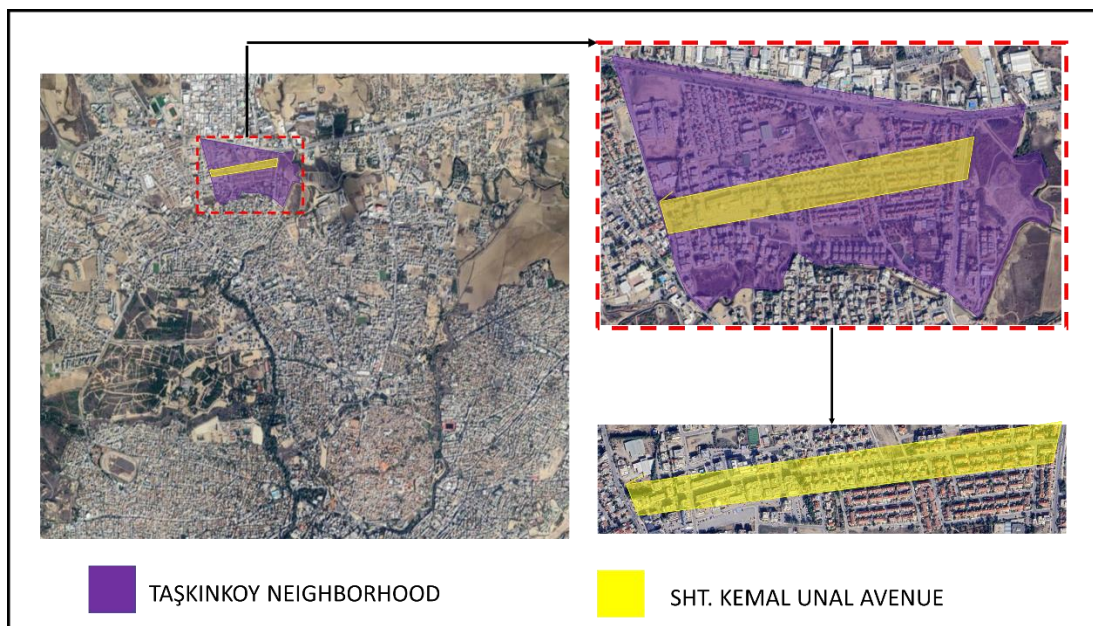
#### 4.1 Findings for Urban Space Evaluation

##### 4.1.1 Taşkinköy Neighborhood

There are various urban areas in the Taşkinköy neighbourhood. In this work, Şht. Kemal Ünal Avenue, as an intensively used urban areas of the neighbourhood, was investigated and analysed. Seen in Figure 34. According to the data of the Depthmap X 0.35 program, it is seen that this street is used intensively.

Figure 34.

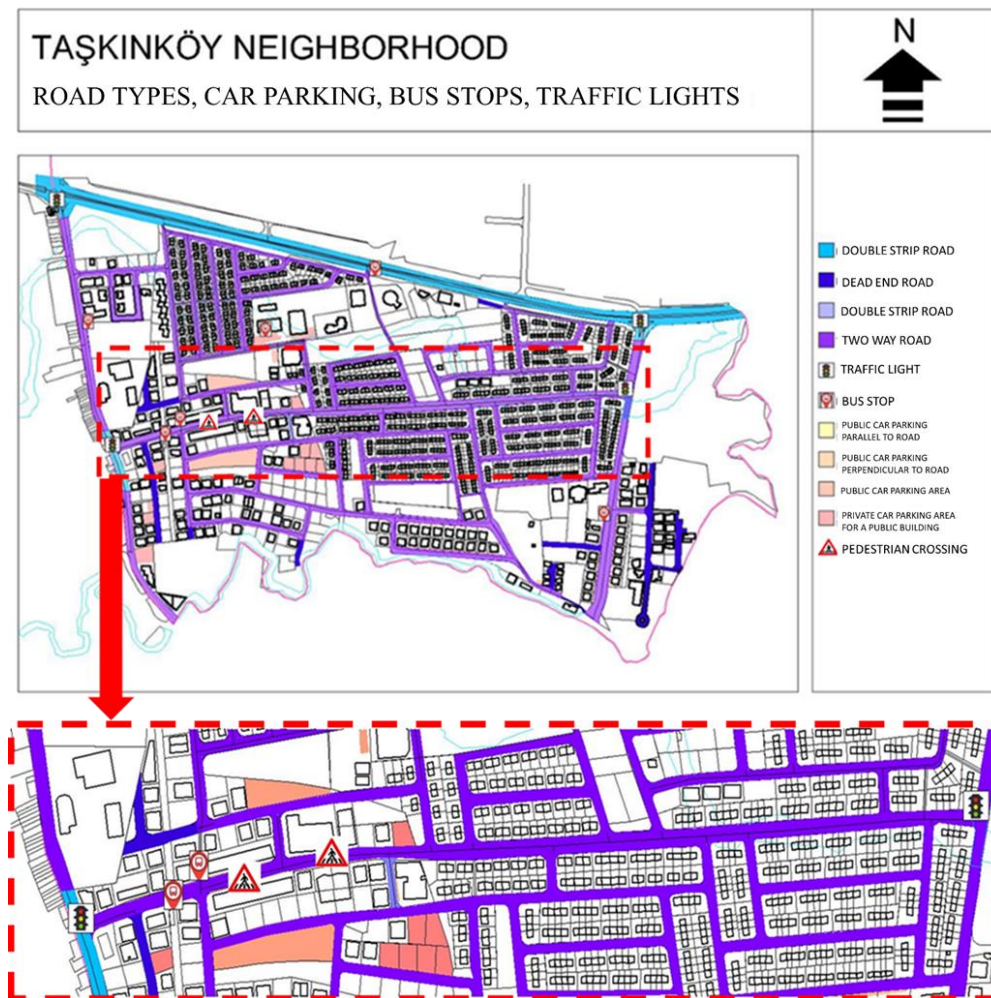
*Şht. Kemal Ünal Avenue in Taşkinköy Neighborhood (by author)*



On-site inspections were conducted on Şht. Kemal Ünal Avenue, a two-lane road that was selected as the study area. There are two bus stations on this avenue as well as public parking lots parallel to the street. In addition, the avenue has 2 traffic signals, each of which is situated at 2 opposite places. Furthermore, various urban furniture objects, such as lighting fixtures, trash cans, signage, money machines, flower pots, etc., are also placed at many points along the avenue. Additionally, there are two locations with pedestrian crossings. Ramps with speed limits are placed for the pedestrian crossings. The details of this mapping can be seen in Figure 35.

Figure 35.

*The Details of The Şht. Kemal Ünal Avenue Analysis in Terms of Road Type, Car Parking, Bus Stops, Pedestrian Crossings, and Traffic Lights (by author)*



At the beginning of the evaluation, the current condition of the randomly selected nine items in the selected urban area was evaluated in terms of material, size, and location in accordance with the 7 principles of UD. Evaluated items were photographed and measurements were taken. Selected urban space items were investigated qualitatively for each of the seven UD principles. The impact of these evaluated items on the parameters of sustainable urban design is investigated further in this section of the study.

Furthermore, as part of the quantitative component of the study, the selected urban area items were evaluated in terms of size properties using TSI standards. Two disparate tables, which are explained in the Data Collection Tools/Materials part of the thesis, were created separately for qualitative and quantitative evaluation. Although there are no checklists or concrete standards for universal design, there are various merits that designers use as a guide. In this research, alongside the qualitative evaluation, the Turkish Standards Institution (TSI) is referenced and a size evaluation has been done for the analysed urban space elements. The evaluated items were (Figure 36):

1. Garbage cans
2. Signs
3. Bus stops
4. Parking lots
5. Sidewalks/walking paths
6. Pedestrian crossing
7. Traffic lights
8. Flowerbox
9. Cash dispenser

These items evaluation is done with urban space evaluation table (Table 15) and evaluation of the urban space items in accordance with the Turkish Standards Institution standards (Table 16) for Şht. Kemal Ünal Avenue in Taşkinköy Neighbourhood.

Figure 36.

*The Determined Urban Area Items on Şht. Kemal Ünal Avenue (by author)*

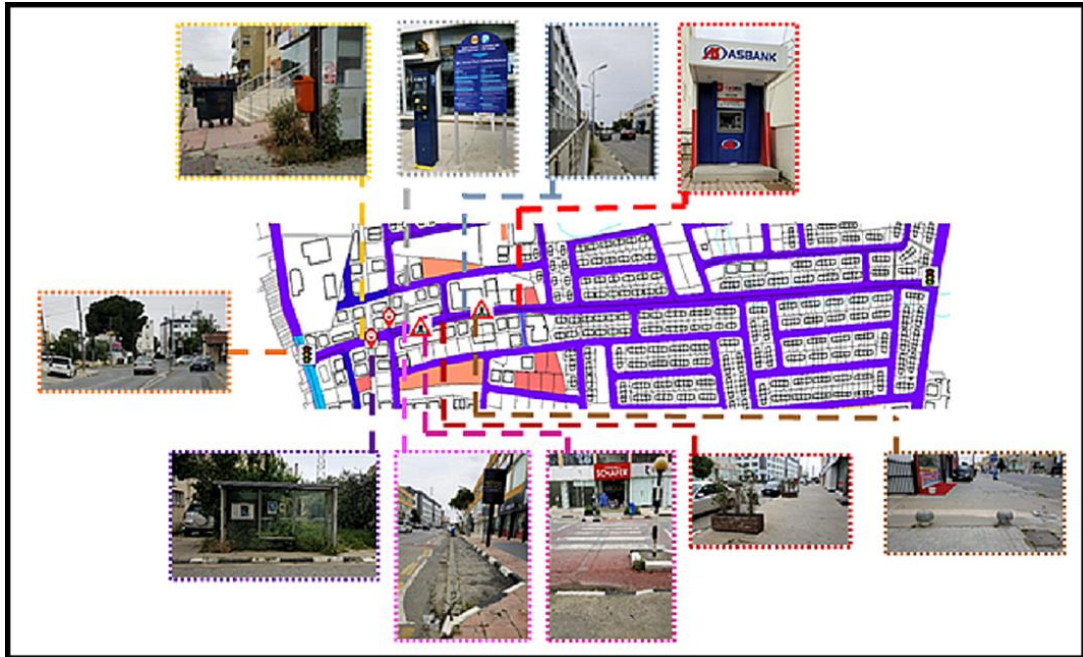




Table 15

*Urban Space Evaluation for Şht. Kemal Ünal Avenue in Taşkinköy Neighbourhood**(by author)*

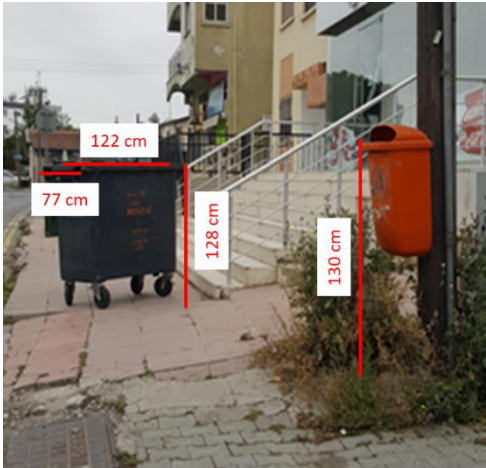
Urban Space Evaluation Form																																										
Neighborhood Name: TAŞKINKÖY			Urban Spaces Name And Type: Şht. Kemal Ünal Avenue																																							
Evaluated Item	Visual (S)	UD Principles	Evaluation				Sufficient (S)/ Insufficient (I) /Non(N)																																			
Garbage Cans		Equitable use	Garbage cans can be used by different profiles of users, including disabled ones.				S																																			
		Flexibility in use	Their location, size, and composition vary. As a result, It provides users with opportunities for various demands.				S																																			
		Simple and intuitive use	Everyone can understand the function of it.				S																																			
		Perceptible information	It is made of material that contrasts with its surroundings, increasing its visibility.				S																																			
		Tolerance for error	Users may have instant accidents because of the place.				I																																			
		Low physical effort	Short individuals or Children cannot easily access.				I																																			
		Size and space for approach and use	They are not appropriate for the approach and use of children, short people, or wheelchair users.				I																																			
		<table border="1"> <thead> <tr> <th colspan="2">Sustainable Urban Design Parameters</th> <th>Accessibility</th> <th>Connectivity</th> <th>Walkability</th> <th>Safety</th> <th>Adaptability</th> <th>Legibility</th> <th>Comfort</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Score</td> <td>✓ Positive</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>× Negative</td> <td>×</td> <td>○</td> <td>×</td> <td>×</td> <td>○</td> <td>○</td> <td>○</td> </tr> <tr> <td>○ None</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>									Sustainable Urban Design Parameters		Accessibility	Connectivity	Walkability	Safety	Adaptability	Legibility	Comfort	Score	✓ Positive								× Negative	×	○	×	×	○	○	○	○ None					
Sustainable Urban Design Parameters		Accessibility	Connectivity	Walkability	Safety	Adaptability	Legibility	Comfort																																		
Score	✓ Positive																																									
	× Negative	×	○	×	×	○	○	○																																		
	○ None																																									

Table 15 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Signs		Equitable use	They are not usable for illiterate and visually impaired persons.	I				
		Flexibility in use	Individuals can choose the language that best suits them because the information board is written in two (Turkish and English). The explanation, however, is incomprehensible to the visually impaired and illiterate.	I				
		Simple and intuitive use	The device's symbols and controls are self-explanatory. on the other hand, there is no explanation tool available for those who are blind.	I				
		Perceptible information	Individuals do not perceive information in the same way.	I				
		Tolerance for error	It is dangerous for persons who walk distractedly or have poor eyesight because of its location on the walking path.	I				
		Low physical effort	It is enough to push the keys for use with ease.	S				
		Size and space for approach and use.	It is appropriate for different users' approaches and uses.	S				
		<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	✓	○	×	×	✓	○	✓

Table 15 (Continued).

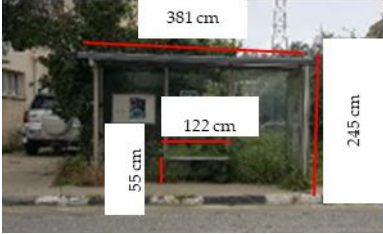
Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient(S)/Insufficient (I) /Non(N)				
Bus Stop		Equitable use	The seating component is in just one variety. (h:50cm. w: 122cm. d: 40 cm.)	I				
		Flexibility in use	The level difference is not been passed with a pavement ramp to get to the bus stops.	I				
		Simple and intuitive use	The stops cannot be observed from a distance because no necessary markers or guidance have been made.	I				
		Perceptible information	There is no information board at the bus stops.	I				
		Tolerance for error	Because transparent material is used, visually impaired persons are endangered.	I				
		Low physical effort	Wheelchair users cannot reach bus stops without exerting physical effort. There isn't a ramp or textured surface.	I				
		Size and space for approach and use	There is enough area for wheelchair users or parents with strollers to stand.	S				
	<b>Sustainable Urban Design Parameters</b> ✓ Positive × Negative ○ None	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score		✓	×	×	×	×	✓	×





Table 15 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Sidewalk/Walkway		Equitable use	Diverse user groups have been ignored. Both textured surfaces and sidewalk ramps have not been developed. Pavement surfaces have suffered partial destruction.	I				
		Flexibility in use	The material size of the sidewalks along the street varies. Different users have not been considered, and designs, such as the pavement, have not been made with user needs in mind.	I				
		Simple and intuitive use	Sidewalk areas are identified.	S				
		Perceptible information	It has not been possible to identify the property area, pedestrian area, and safety lane individually.	I				
		Tolerance for error	Various components, including lighting embedded in the pavement, cover the walking area and may contribute to accidents.	I				
		Low physical effort	There aren't any ramps on the walkways to help maintain their continuity.	I				
		Size and space for approach and use	Despite having the same user density, the sidewalk widths vary along the street.	I				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	✓ Positive × Negative ○ None	×	×	×	×	×	○	×

Table 15 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Pedestrian Crossing		Equitable use	Due to deficiencies and errors in physical arrangements, it cannot be used equally by all individuals.	I				
		Flexibility in use	User diversity is not taken into account.	I				
		Simple and intuitive use	The caution lines painted on the ground make it visible from a certain distance. Additionally, there are ramps with speed limiters for cars that are close to the pedestrian crossing. Despite being inside the pedestrian crossing, flashing warning lights have been considered in order to be seen at night.	S				
		Perceptible information	There are no guide way available for those who are blind.	I				
		Tolerance for error	Due to its degraded terrain, it may result in accidents. Accidents could also happen because of where the flashing warning lights are placed. Thankfully, there are ramps on both sides of the crossing to slow down drivers.	I				
		Low physical effort	The intersection of the sidewalk and the pedestrian crossing is not on the same level, and no ramp is planned.	I				
		Size and space for approach and use	In terms of size, it is appropriate for all individuals. (w = 400 cm)	S				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	×	✓	✓	×	×	○	○

Table 15 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Traffic Lights		Equitable use	Its purpose is to direct vehicle traffic. Pedestrians crossing the street are not taken into account.	I				
		Flexibility in use	There are no warning systems that can accommodate different user types.	I				
		Simple and intuitive use	The lights colors are recognized internationally. It is equally comprehended by all individuals.	S				
		Perceptible information	There isn't a sign warning drivers that a traffic light is nearby when they approach the intersection.	I				
		Tolerance for error	The length of the red light is set up to prevent vehicles traveling in opposite directions from colliding.	S				
		Low physical effort	It doesn't require any physical power because it is automated.	S				
		Size and space for approach and use	Users inside the car can see the dimensions of light heights from a given distance. (h = 346 cm.)	S				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	✓	✓	○	✓	○	○	○

Table 15 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Flowerbox		Equitable use	It is not appropriate for groups of people to stroll side by side on sidewalks since flowerboxes cover that space. It can cause dangerous for those who are blind.	I				
		Flexibility in use	Flowerboxes can be employed as a barrier and decorative element by placing their long side parallel to the road.	I				
		Simple and intuitive use	The intersections of the vehicle road and the sidewalks are controlled and distinct due to the locations of the flowerbeds.	S				
		Perceptible information	It is not made in a hue that stands out from the surroundings. This makes it difficult to identify.	I				
		Tolerance for error	The flowerboxes' placement on the pavement covers the walking area and may result in an accident.	I				
		Low physical effort	It causes changes in direction when walking because it covers the walking space. In terms of minimal physical exertion, it is inappropriate.	I				
		Size and space for approach and use	Its height is insufficient for people to perceive it. (h: 42 cm)	I				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	✓ Positive × Negative ○ None	○	✓	×	×	○	○	○

Table 15 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Cash Dispenser		Equitable use	It cannot be argued to be of equal use due to its size and the variation in pavement levels.	I				
		Flexibility in use	In terms of machine dimensions, the user is not given an option. The flexible usage principle has been disregarded.	I				
		Simple and intuitive use	Illiterate people and/or those who are visually impaired cannot use it, even if the operating screen and keys are ideal for simple and intuitive use by users with varied user profiles.	I				
		Perceptible information	Information that is intended for use is not visible to people who are blind or illiterate.	I				
		Tolerance for error	Accidents may occur due to the uneven surface between the pavement and the device's access platform.	I				
		Low physical effort	The level of difficulty for using the equipment suggests that it is incompatible with the idea of low physical effort.	I				
		Size and space for approach and use	It is not accessible to everyone due to its size and access platform, making it unsuitable for use.	I				
		<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>
Score	✓ Positive × Negative ○ None	×	○	○	×	×	○	○

Table 16.

*Assessment of the Urban Space Items According to the TSI Standards*

<b>Urban Space Items</b>	<b>Existing Dimension</b>	<b>TSI Standards</b>	<b>A/I</b>
<b>Garbage Cans</b>	height: 130 cm	height: 90–120 cm	I
<b>Signs</b>	height: 200 cm	starting point height: 105 cm end point height: 195 cm	I
<b>Bus Stops</b>	sitting element height: 50 cm	sitting element height: 41–46 cm	I
	thick, non-matte, colored, reflective strips: not available	thick, non-matte, colored, reflective strips height: 100– 140 cm	I
<b>Parking Lots</b>	width: 202 cm length: 472 cm	width: 250 cm length: 500 cm	I
<b>Sidewalks/Walkway</b>	width: 145–856 cm (variable)	width: at least 150 cm	I
<b>Pedestrian Crossing</b>	width: 400 cm	width: min. 300 cm	A
<b>Traffic Lights</b>	Height: 346 cm	height: 450 cm	I
<b>Flowerbox</b>	height: 42 cm	height: 70 cm	I
<b>Cash Dispenser</b>	card point height: 121 cm cash point height: 100 cm	max. card point height: 110 cm max. cash point height: 80 cm	I

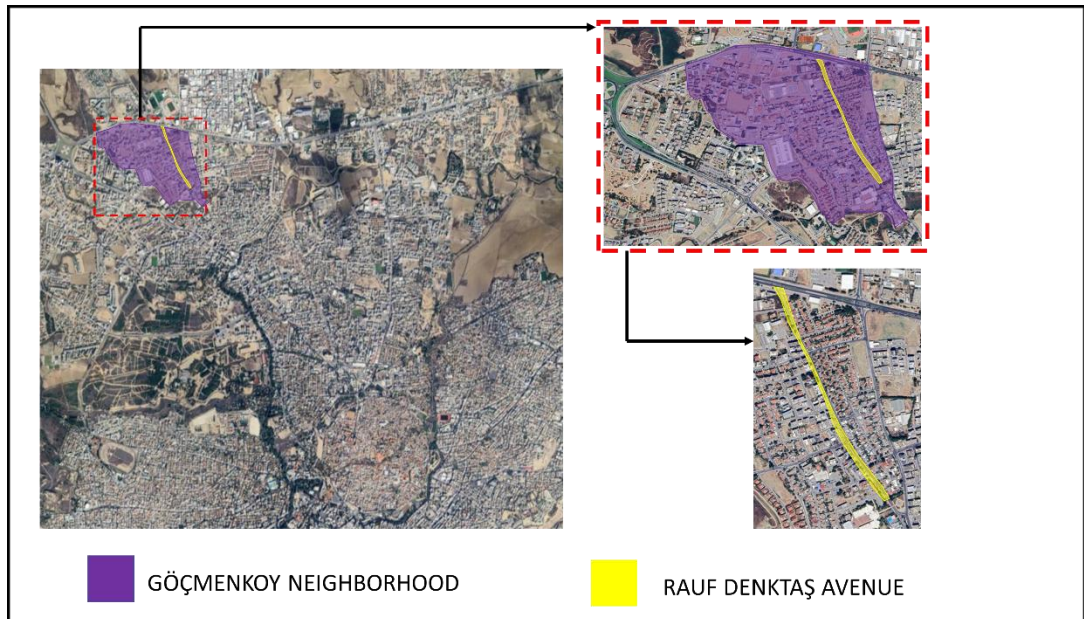
**4.1.2 Göçmenköy Neighborhood**

There are many urban areas in the Göçmenköy neighbourhood. In this study, Rauf Denktaş Avenue, as one of the urban areas with a high use density of the neighbourhood, was investigated and analysed. See Figure 37. According to the data of the Depthmap X 0.35 program, it is seen that this street is used intensively.



Figure 37.

*Göçmenköy neighborhood and Rauf Denktaş Avenue (by author)*

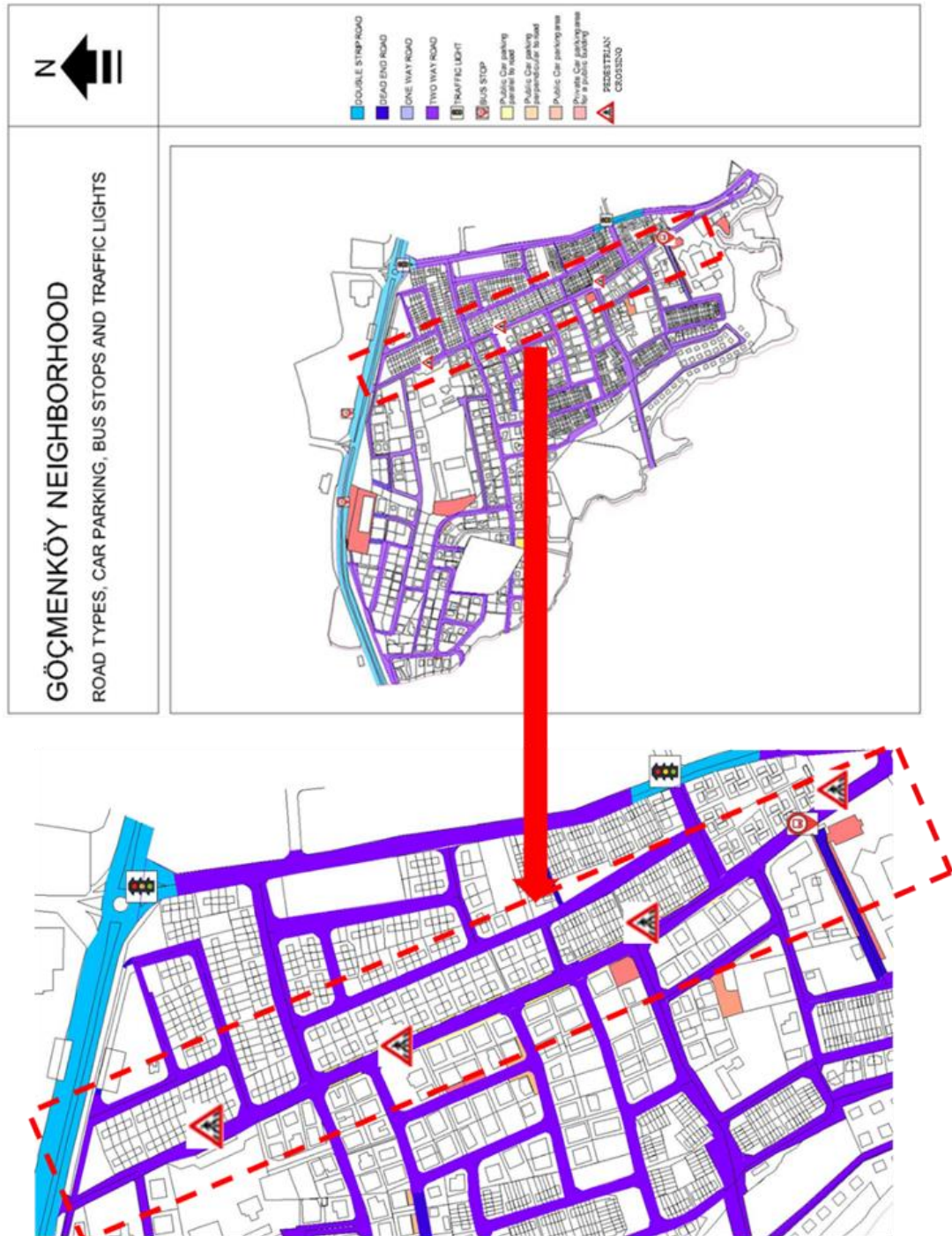


On-site inspections were conducted on Rauf Denktaş Avenue, a two-lane road that was selected as the research location. Along the highway are spaces for public parking parallel to road and 2 bus stops side by side in the same position on this avenue. Besides, there are diverse pieces of urban furniture (lighting elements, garbage cans, signs, etc.) items located at different points along the avenue. There are also pedestrian crossings at 4 different points. The details of this mapping can be seen in Figure 38.



Figure 38.

*The Details of the Rauf Denktaş Avenue Analysis in terms of Road Type, Car Parking, Bus Stops, Pedestrian Crossings, and Traffic Lights*



At the beginning of the evaluation, the current condition of the randomly selected 7 items in the selected urban space was evaluated in terms of material, size,

and location in accordance with the seven principles of universal design. Evaluated items were photographed and measurements were taken. Chosen urban space items were evaluated qualitatively for each of the 7 UD principles. The impact of these evaluated items on sustainable urban design parameters is further analysed within this part of the research.

Besides, as the quantitative part of the research, the chosen urban area items were assessed in terms of size properties according to the Turkish Standards Institution standards. Two disparate tables, which are explained in the Data Collection Tools/Materials part of the thesis, were created separately for qualitative and quantitative evaluation. The assessed items were (Figure 39):

1. Garbage cans
2. Signs
3. Bus stops
4. Parking lots
5. Sidewalks/walking paths
6. Pedestrian crossing
7. Clothes, shoes, textile box

These items evaluation is done with urban space evaluation table (Table 17) and evaluation of the urban space items according to the Turkish Standard Institute standards (Table 18) for Rauf Denktaş Avenue in Göçmenköy Neighbourhood.

Figure 39.

*The Determined Urban Area Items on Rauf Denktaş Avenue (by author)*

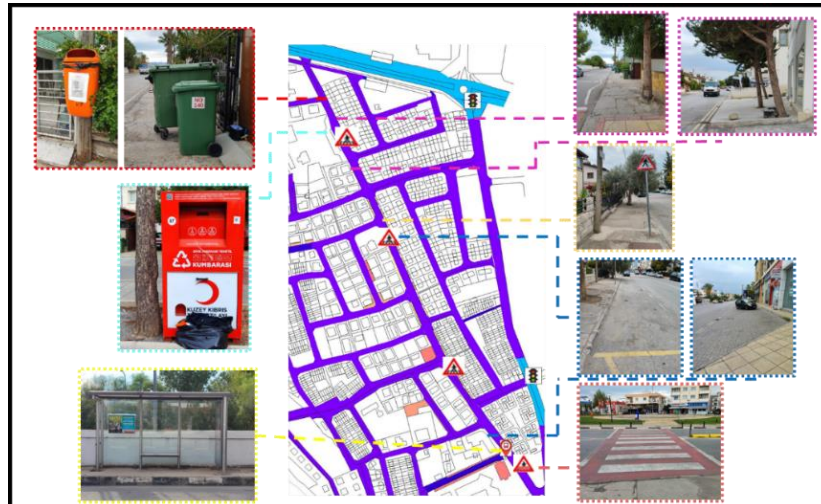


Table 17.

*Urban Space Evaluation for Rauf Denktaş Avenue in Göçmenköy Neighbourhood (by author)*


Urban Space Evaluation Form									
Neighborhood Name: GÖÇMENKÖY		Urban Spaces Name And Type: Rauf Denktaş Avenue							
Evaluated Item	Visual (S)	UD Principles	Evaluation				Sufficient (S)/ Insufficient (I) /Non(N)		
Garbage Cans		Equitable use	Garbage cans can be used by different profiles of users.				S		
		Flexibility in use	They vary in material, size, and location. For this reason, it offers users opportunities for different needs.				S		
		Simple and intuitive use	Its function is easily understood by everyone.				S		
		Perceptible information	It is made of material with a contrasting color to its surroundings, increasing its perceptibility.				S		
		Tolerance for error	Users may have instant accidents because of the location.				I		
		Low physical effort	Short individuals or children cannot reach easily.				I		
		Size and space for approach and use	They are not convenient for the approach and use of children, short individuals, or wheelchair users.				I		
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>	
Score	✓ Positive x Negative o None	x	o	x	x	o	o	o	

Table 17 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Signs		Equitable use	It has no effect on the principle of equitable use.	N				
		Flexibility in use	Visually impaired individuals could not understand the symbol.	I				
		Simple and intuitive use	It can be understood by everyone without visually impaired individuals as the international symbol is used.	S				
		Perceptible information	Although the international symbol is used, it is not possible for the visually impaired to understand.	I				
		Tolerance for error	Due to its location on the pavement, it is dangerous for people who walk distractedly or have poor eyesight.	I				
		Low physical effort	It has no effect on the principle of low physical effort.	N				
		Size and space for approach and use.	Its height is suitable for head recovery distance.	S				
		<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	✓	○	×	×	✓	○	✓

Table 17 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient(S)/Insufficient (I) /Non(N)				
Bus Stop		Equitable use	The seating component is in just one variety. (h:50cm. w: 122cm. d: 40 cm.)	I				
		Flexibility in use	The level difference is not been passed with a pavement ramp to get to the bus stops.	I				
		Simple and intuitive use	The stops cannot be observed from a distance because no necessary markers or guidance have been made.	I				
		Perceptible information	There is no info board at the bus stops.	I				
		Tolerance for error	Because transparent material is used, visually impaired persons are endangered.	I				
		Low physical effort	Wheelchair users cannot reach bus stops without exerting physical effort. There isn't a ramp or textured surface.	I				
		Size and space for approach and use	There is enough area for wheelchair users or parents with strollers to stand.	S				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	✓ Positive × Negative ○ None	✓	×	×	×	×	✓	×



Table 17 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I)/Non(N)				
Parking Areas		Equitable use	Not all individuals can use the parking spots next to the road equally. No parking space is available for those with disabilities.	I				
		Flexibility in use	The arrangement of disabled parking spaces has not taken into account the various user kinds.	I				
		Simple and intuitive use	The materials and designs used to construct the parking lots along the street make them difficult to recognize and comprehend.	I				
		Perceptible information	On the street, there are not signs with information regarding parking times.	I				
		Tolerance for error	The parking space's width makes car landings unsafe.	I				
		Low physical effort	A curb ramp is not taken into consideration for access from the parking area to the sidewalk.	I				
		Size and space for approach and use	It does not adhere to the parking dimensions (250/500 cm) established for the vehicle, with the exception of the manoeuvring area.	I				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	✓	○	○	×	×	○	○

Table 17 (Continued).



Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I)/Non(N)				
Sidewalk/Walkway		Equitable use	Diverse user groups have been ignored. Both textured surfaces and sidewalk ramps have not been developed. Pavement surfaces have suffered partial destruction.	I				
		Flexibility in use	The material size of the sidewalks along the street varies. Different users have not been considered, and designs, such as the pavement, have not been made with user needs in mind.	I				
	Simple and intuitive use	Sidewalk areas are identified.	S					
		Perceptible information	It has not been possible to identify the property area, pedestrian area, and safety lane individually.	I				
		Tolerance for error	Various components, including lighting embedded in the pavement, cover the walking area and may contribute to accidents.	I				
		Low physical effort	There aren't any ramps on the walkways to help maintain their continuity.	I				
		Size and space for approach and use	Despite having the same user density, the sidewalk widths vary along the street.	I				
		<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>
Score	✓ Positive × Negative ○ None	×	×	×	×	×	○	×

Table 17 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I)/Non(N)				
Pedestrian Crossing		Equitable use	Due to deficiencies and errors in physical arrangements, it cannot be used equally by all individuals.	I				
		Flexibility in use	User diversity is not taken into account.	I				
		Simple and intuitive use	The caution lines painted on the ground make it visible from a certain distance. Additionally, there are ramps with speed limiters for cars that are close to the pedestrian crossing.	S				
		Perceptible information	There are no guide way available for those who are blind.	I				
		Tolerance for error	Due to its degraded terrain, it may result in accidents. Thankfully, there are ramps on both sides of the crossing to slow down drivers.	I				
		Low physical effort	The intersection of the sidewalk and the pedestrian crossing is not on the same level, and no ramp is planned.	I				
		Size and space for approach and use	In terms of size, it is appropriate for all individuals. (w = 400 cm)	S				
		<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>
Score	✓ Positive × Negative ○ None	×	✓	✓	×	×	○	○



Table 17 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I)/Non(N)				
Clothes, shoes, textile box		Equitable use	It cannot be stated to be of equal usage due to its size and the variation in pavement levels.	I				
		Flexibility in use	There is no option for the user to select the box's dimensions. The principle of flexible use has been neglected.	I				
		Simple and intuitive use	Since the purpose and method of use are understood from the symbols and explanations on it, although it is suitable for simple and intuitive use for different user profiles, it cannot be used by illiterate and/or visually impaired people.	I				
		Perceptible information	Information that is intended for use is not visible to those who are blind or illiterate.	I				
		Tolerance for error	Accidents may occur due to the elevation difference between the access level to the box and the pavement.	I				
		Low physical effort	Due to the heavy weight of the material from which the box is produced, opening the chamber of the products to be thrown into it requires high physical effort.	I				
		Size and space for approach and use	It is not appropriate for all users to approach or use because of its high access point.	I				
<b>Sustainable Urban Design Parameters</b>		<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	✓ Positive × Negative ○ None	×	○	○	×	×	○	○

Table 18.

*Assessment of the Urban Space Items According to the TSI Standards (by author)*

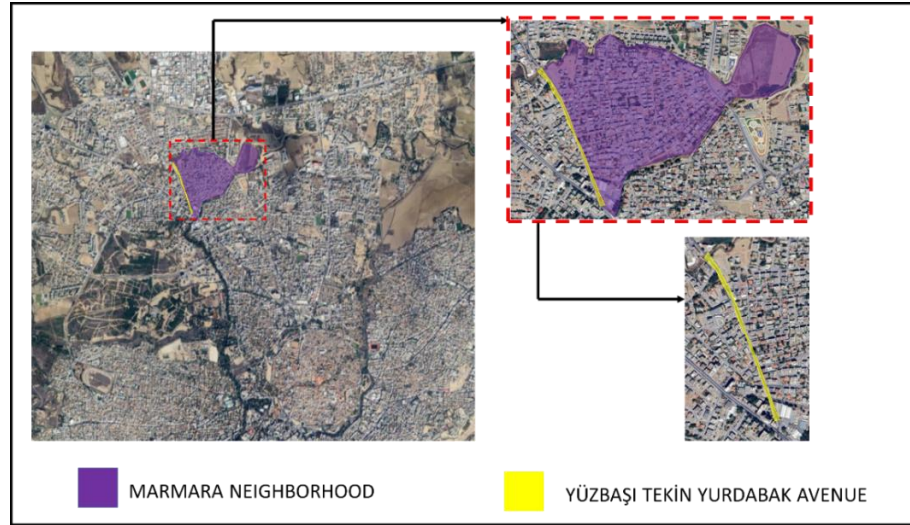
<b>Urban Space Items</b>	<b>Existing Dimension</b>	<b>TSI Standards</b>	<b>A/I</b>
<b>Garbage Cans</b>	height: 130 cm	height: 90–120 cm	I
<b>Signs</b>	starting point height: 215 cm end point height: 278 cm	starting point height: 105 cm end point height: 195 cm	I
<b>Bus Stops</b>	sitting element height: 55 cm thick, non-matte, colored, reflective strips: not available	sitting element height: 41–46 cm thick, non-matte, colored, reflective strips height: 100–140 cm	I
<b>Parking Lots</b>	width: 216 cm length: not limited	width: 250 cm length: 500 cm	I
<b>Sidewalks/Walkway</b>	width: 105–320 cm (variable)	width: at least 150 cm	I
<b>Pedestrian Crossing</b>	width: 400 cm	width: min. 300 cm	A
<b>Clothes, shoes, textile box</b>	height: 165 cm	height: max. 110 cm	I

#### ***4.1.3 Marmara Neighborhood***

There are many urban areas in the Marmara neighbourhood. In this study, Yüzbaşı Tekin Yurdabak Avenue, as one of the densely used urban spaces of the neighbourhood, was investigated and analysed. See Figure 40. According to the data of the Depthmap X 0.35 program, it is seen that this street is used intensively.

Figure 40.

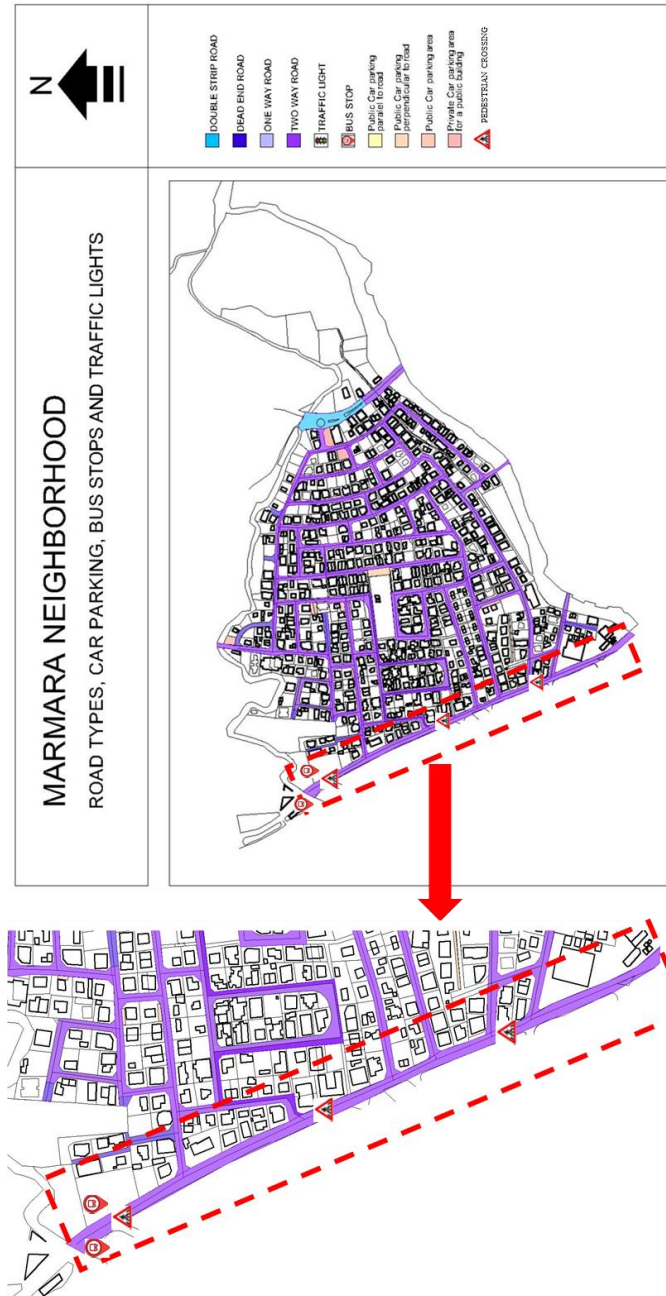
*Marmara neighborhood and Yüzbaşı Tekin Yurdabak Avenue (by author)*



Yüzbaşı Tekin Yurdabak Avenue, a 2-lane road that was chosen as the research area, was inspected onsite. This avenue has two bus stops and public parking lots parallel to the road. Besides, there are various pieces of urban furniture (lighting elements, garbage cans, signs, etc.) items located at various locations along the avenue. There are also pedestrian crossings at 3 different points. The details of this mapping can be seen in Figure 41.

Figure 41.

*The Details of the Yüzbaşı Tekin Yurdabak Avenue Analysis in Terms of Road Type, Car Parking, Bus Stops, Pedestrian Crossings, and Traffic Lights (by author)*



At the beginning of the evaluation, the current condition of the randomly selected 6 items in the selected urban space was evaluated in terms of material, size, and location in accordance with the seven principles of universal design. Evaluated

items were photographed and measurements were taken. Selected urban space items were evaluated qualitatively for each of the 7 UD principles. The impact of these evaluated items on sustainable urban design parameters is further analysed within this part of the research.

Furthermore, as the quantitative part of the research, the elected urban space items were assessed in terms of size properties according to the Turkish Standards Institution standards. Two disparate tables, which are explained in the Data Collection Tools/Materials part of the thesis, were created separately for qualitative and quantitative evaluation. The assessed items were (Figure 42):

1. Garbage cans
2. Signs
3. Bus stops
4. Parking lots
5. Sidewalks/walking paths
6. Pedestrian crossing

These items evaluation is done with urban space evaluation table (Table 19) and assessment of the urban space items according to the Turkish Standards Institution standards (Table 20) for Yüzbaşı Tekin Yurdabak Avenue in Marmara Neighbourhood.

Figure 42.

*The assessed urban space items on Yüzbaşı Tekin Yurdabak Avenue (by author)*



Table 19.

*Urban Space Evaluation for Yüzbaşı Tekin Yurdabak Avenue in Marmara Neighbourhood (by author)*


Urban Space Evaluation Form																										
Neighborhood Name: MARMARA			Urban Spaces Name And Type: Yüzbaşı Tekin Yurdabak Avenue																							
Evaluated Item	Visual (S)	UD Principles	Evaluation				Sufficient (S)/ Insufficient (I) /Non(N)																			
Garbage Cans		Equitable use	Garbage cans can be used by different profiles of users.				S																			
		Flexibility in use	They vary in material, size, and location. For this reason, it offers users opportunities for different needs.				S																			
		Simple and intuitive use	Everyone can understand the function of it.				S																			
		Perceptible information	It is made of material with a contrasting color to its surroundings, increasing its perceptibility.				S																			
		Tolerance for error	Users may have instant accidents because of the location.				I																			
		Low physical effort	Short individuals or children cannot reach easily.				I																			
		Size and space for approach and use	They are not suitable for the approach and use of children, short individuals, or wheelchair users.				I																			
		<table border="1"> <thead> <tr> <th colspan="2">Sustainable Urban Design Parameters</th> <th>Accessibility</th> <th>Connectivity</th> <th>Walkability</th> <th>Safety</th> <th>Adaptability</th> <th>Legibility</th> <th>Comfort</th> </tr> </thead> <tbody> <tr> <td>Score</td> <td> <ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul> </td> <td>×</td> <td>○</td> <td>×</td> <td>×</td> <td>○</td> <td>○</td> <td>○</td> </tr> </tbody> </table>									Sustainable Urban Design Parameters		Accessibility	Connectivity	Walkability	Safety	Adaptability	Legibility	Comfort	Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	×	○	×	×	○
Sustainable Urban Design Parameters		Accessibility	Connectivity	Walkability	Safety	Adaptability	Legibility	Comfort																		
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	×	○	×	×	○	○	○																		

Table 19 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I)/Non (N)				
Signs		Equitable use	It has no effect on the principle of equitable use.	N				
		Flexibility in use	Visually impaired people could not understand the symbol.	I				
		Simple and intuitive use	It can be understood by everyone without visually impaired individuals as the international symbol is used.	S				
		Perceptible information	Although the international symbol is used, it is not possible for the visually impaired to understand.	I				
		Tolerance for error	It is hazardous for persons who walk distractedly or have poor vision due to its position on the sidewalk.	I				
		Low physical effort	It has no effect on the principle of low physical effort.	N				
		Size and space for approach and use.	Its height is suitable for head recovery distance.	S				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	✓ Positive × Negative ○ None	○	○	×	×	○	○	×



Table 19 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient(S)/Insufficient (I) /Non(N)				
Bus Stop		Equitable use	The seating component is in just one variety. (h:50cm. w: 122cm. d: 40 cm.)	I				
		Flexibility in use	The level difference is not been passed with a pavement ramp to get to the bus stops.	I				
		Simple and intuitive use	The stops cannot be observed from a distance because no necessary markers or guidance have been made.	I				
		Perceptible information	There is no info board at the bus stops.	I				
		Tolerance for error	Because transparent material is used, visually impaired persons are endangered.	I				
		Low physical effort	Wheelchair users cannot reach bus stops without exerting physical effort. There isn't a ramp or textured surface.	I				
		Size and space for approach and use	There is enough area for wheelchair users or parents with strollers to stand.	S				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	✓	×	×	×	×	✓	×



Table 19 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Parking Areas		Equitable use	Not all individuals can use the parking spots next to the road equally. No parking space is available for those with disabilities.	I				
		Flexibility in use	The arrangement of disabled parking spaces has not taken into account the various user kinds.	I				
		Simple and intuitive use	The materials and designs used to construct the parking lots along the street make them difficult to recognize and comprehend.	I				
		Perceptible information	On the street, there are not signs with information regarding parking times.	I				
		Tolerance for error	The width of the parking space is not safe for vehicle landings.	I				
		Low physical effort	A curb ramp is not taken into consideration for access from the parking area to the sidewalk.	I				
		Size and space for approach and use	It does not adhere to the parking dimensions (250/500 cm) established for the vehicle, with the exception of the manoeuvring area.	I				
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	<ul style="list-style-type: none"> <li>✓ Positive</li> <li>× Negative</li> <li>○ None</li> </ul>	✓	○	○	×	×	○	○

Table 19 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Sidewalk/Walkway		Equitable use	Diverse user groups have been ignored. Both textured surfaces and sidewalk ramps have not been developed. Pavement surfaces have suffered partial destruction.	I				
		Flexibility in use	The material size of the sidewalks along the street varies. Different users have not been considered, and designs, such as the pavement, have not been made with user needs in mind.	I				
	Simple and intuitive use	Sidewalk areas are identified.	S					
	Perceptible information	It has not been possible to identify the property area, pedestrian area, and safety lane individually.	I					
	Tolerance for error	Various components, including lighting embedded in the pavement, cover the walking area and may contribute to accidents.	I					
	Low physical effort	There aren't any ramps on the walkways to help maintain their continuity.	I					
	Size and space for approach and use	Despite having the same user density, the sidewalk widths vary along the street.	I					
	<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>	<b>Comfort</b>
Score	✓ Positive × Negative ○ None	×	×	×	×	×	○	×

Table 19 (Continued).


Evaluated Item	Visual (S)	UD Principles	Evaluation	Sufficient (S)/Insufficient (I) /Non(N)				
Pedestrian Crossing		Equitable use	Due to deficiencies and errors in physical arrangements, it cannot be used equally by all individuals.	I				
		Flexibility in use	User diversity is not taken into account.	I				
		Simple and intuitive use	The caution lines painted on the ground make it visible from a certain distance. Additionally, there are ramps with speed limiters for cars that are close to the pedestrian crossing.	S				
		Perceptible information	There are no guide way available for those who are blind.	I				
		Tolerance for error	Due to its degraded terrain, it may result in accidents. Thankfully, there are ramps on both sides of the crossing to slow down drivers.	I				
		Low physical effort	The intersection of the sidewalk and the pedestrian crossing is not on the same level, and no ramp is planned.	I				
		Size and space for approach and use	In terms of size, it is appropriate for all individuals. (w = 400 cm)	S				
		<b>Sustainable Urban Design Parameters</b>	<b>Accessibility</b>	<b>Connectivity</b>	<b>Walkability</b>	<b>Safety</b>	<b>Adaptability</b>	<b>Legibility</b>
Score	✓ Positive × Negative ○ None	×	✓	✓	×	×	○	○

Table 20.

*Assessment of the Urban Space Items According to the TSI Standards  
(by author)*

Urban Space Items	Existing Dimension	TSI Standards	A/I
<b>Garbage Cans</b>	height: 86 cm width: 48 cm	height: 86 cm width: 48 cm	A
	height: 128 cm width: 122 cm	height: 128 cm width: 122 cm	
<b>Signs</b>	starting point height: 215 cm end point height: 278 cm	starting point height: 105 cm end point height: 195 cm	I
<b>Bus Stops</b>	sitting element height: 55 cm	sitting element height: 41–46 cm	I
	thick, non-matte, colored, reflective strips: not available	thick, non-matte, colored, reflective strips height: 100–140 cm	I
<b>Parking Lots</b>	width: 215 cm length: not limited	width: 250 cm length: 500 cm	I
<b>Sidewalks/Walkway</b>	width: 105–640 cm (variable)	width: at least 150 cm	I
<b>Pedestrian Crossing</b>	width: 400 cm	width: min. 300 cm	A

#### 4.2 Findings for the User Survey

The user survey, the study's measurement was examined to test its reliability, and Table 21 presents the alpha-reliability findings for the 25-item scale. The scale had a Cronbach's alpha value of 0.76, which indicated good reliability, according to the data.

Table 21.

*Reliability Value of Survey (by author)*

Cronbach's Alpha	N of Items
0,760	25

#### 4.2.1 Section 1: Demographic data

*Gender:* 56,0% of the 150 participants were female and 44,0% were male (Table 22 and Figure 43).

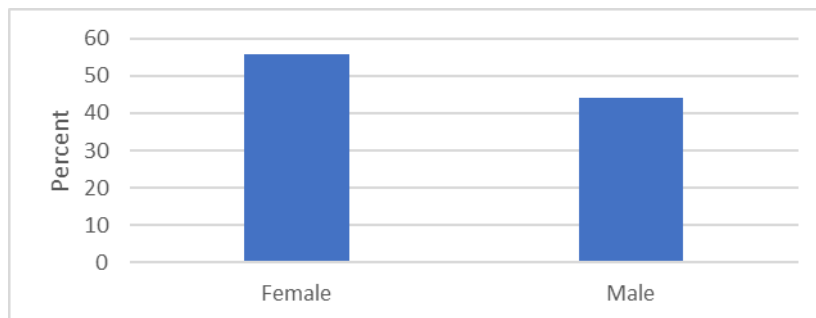
Table 22.

*Participants' Gender Profile (by author)*

Gender	Frequency	Percent
Female	84	56,0
Male	66	44,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 43.

*Participants' Gender Profile (%) (by author)*



*Marital status:* 72,7% of the 150 participants were married and 27,3% were single (Table 23 and Figure 44).

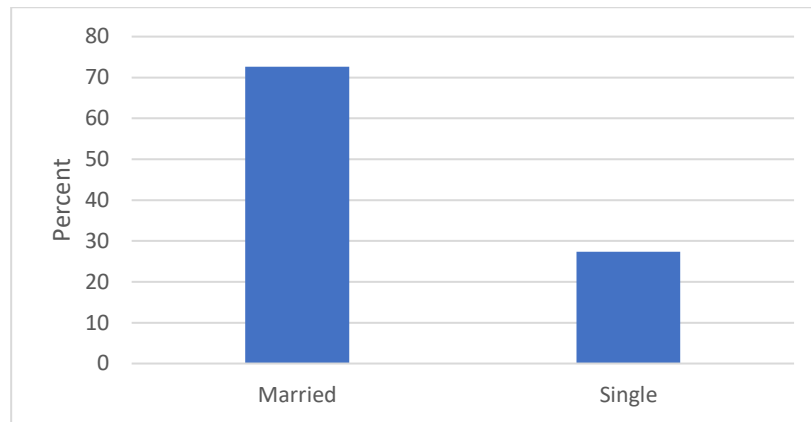
Table 23.

*Participants' Marital Status Profile (by author)*

Martial Status	Frequency	Percent
Married	109	72,7
Single	41	27,3
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 44.

*Participants' Martial Status Profile (%) (by author)*



*Age:* 24,6% of the participants in the study were between the ages of 35-44. 22,0% were between 65+ and 16,7% were between 45-54 years old. 14,7% were between 25-34 and 13,3% were between 55-64 years old. The rest 8,7% were between 18-24 years old (Table 24 and Figure 45).

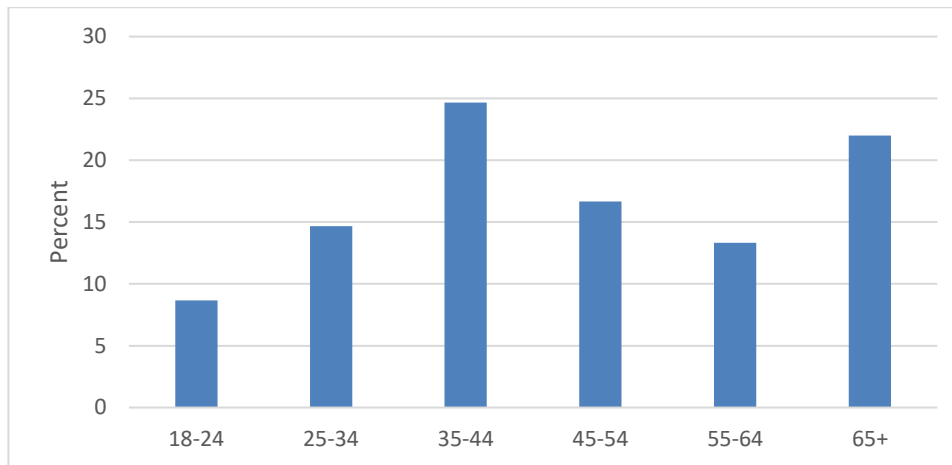
Table 24.

*Participants' Age Profile (by author)*

Age	Frequency	Percent
18-24	13	8,7
25-34	22	14,7
35-44	37	24,6
45-54	25	16,7
55-64	20	13,3
65+	33	22,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 45.

*Participants' Age Profile (%) (by author)*



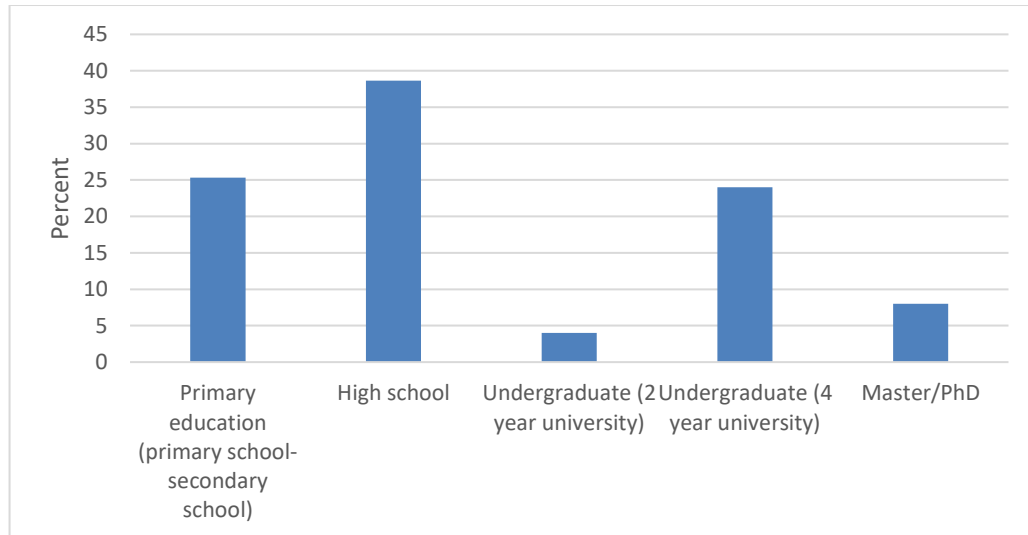
*Education:* The majority (38,7%) of the participants were high school graduates. 25,3% of them were the primary education level. 24,0% were undergraduate (4 year) and 8,0% were Master/PhD. The rest 4,0% were undergraduate (2 year). Details can be seen from Table 25 and Figure 46.

Table 25.

*Participants' Education Profile (by author)*

Education	Frequency	Percent
Primary education (primary school-secondary school)	38	25,3
High school	58	38,7
Undergraduate (2 year)	6	4,0
Undergraduate (4 year)	36	24,0
Master/PhD	12	8,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 46.

*Participants' Education Profile (%) (by author)*

*Occupation:* The majority (42,0%) of the participants were private sector. 26,0% of them were retired. 12,7% were housewife, 10,7% were officer and 4,6% of them were student. The rest 4,0% were unemployed. Details can be seen from table 26 and figure 47.

Table 26.

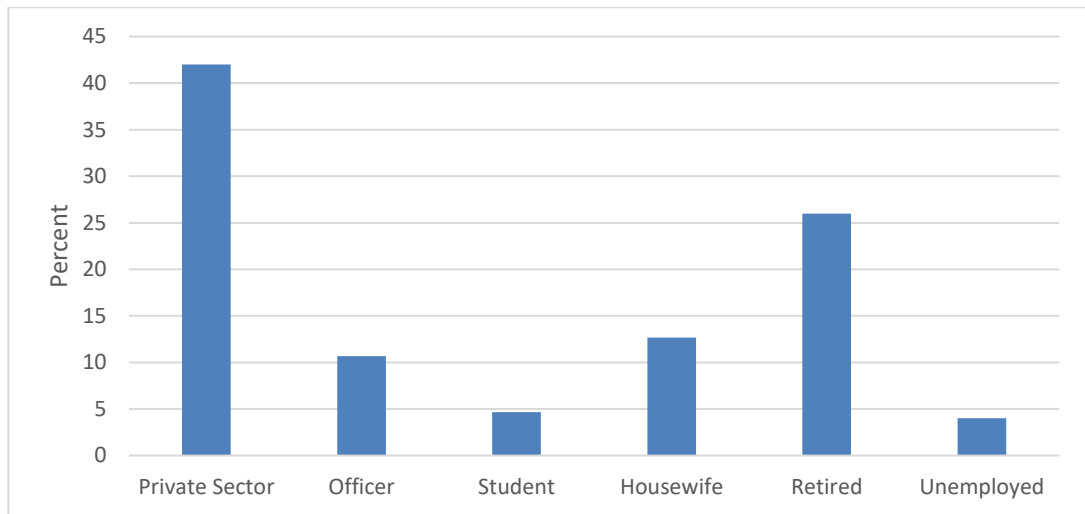
*Participants' Occupation Profile (by author)*

Occupation	Frequency	Percent
Private Sector	63	42,0
Officer	16	10,7
Student	7	4,6
Housewife	19	12,7
Retired	39	26,0
Unemployed	6	4,0
<b>Total</b>	<b>150</b>	<b>100,0</b>



Figure 47.

*Participants' occupation profile (%) (by author)*



*Special circumstance:* 83,4% of the participants in the study selected 'other' option for the question of "Do you have any special circumstance?". 13,3% selected 'chronic illness' and 2,0% selected 'senile' option. The rest 1,3% elected 'physical disability'. Details about the selections of participants can be seen from Table 27 and Figure 48. Most of participants who selected 'other' option argued they don't have any special circumstance.

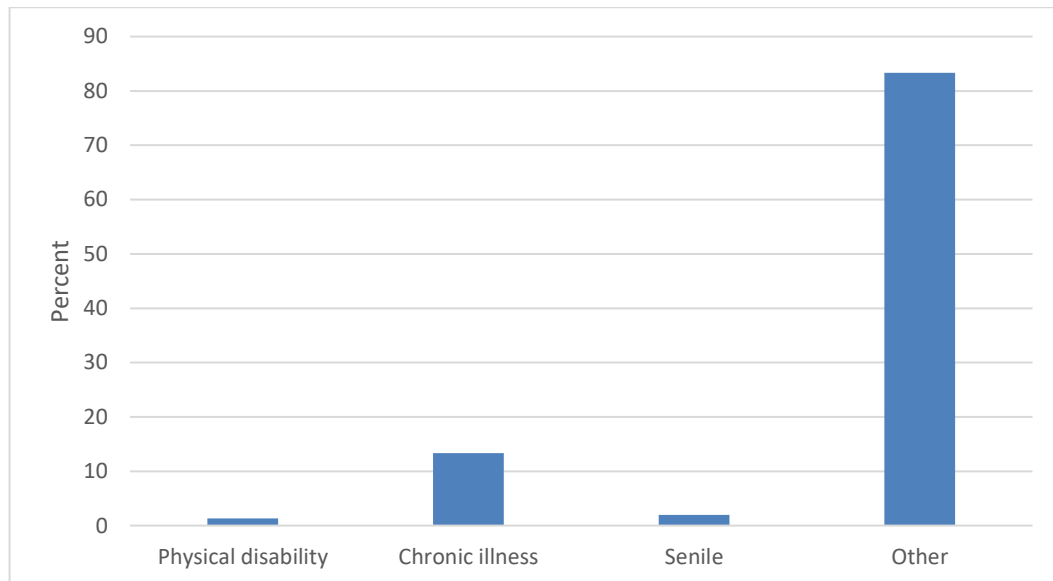
Table 27.

*Participants' Special Circumstance Profile (by author)*

Do you have any special circumstance?	Frequency	Percent
Physical disability	2	1,3
Chronic illness	20	13,3
Senile	3	2,0
Other	125	83,4
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 48.

*Participants' Special Circumstance Profile (%) (by author)*



#### **4.2.2 Section 2: User views about accessibility**

When the results of the item 'How did you get access to this neighborhood?' evaluated, 82,0% of them replied 'private car', 12,7% replied 'walking' and 4,7% replied 'public transport/taxi' to this item. The least agreement (0,6%) was about 'bike/motorbike'. Details can be seen from Table 28 and Figure 50.

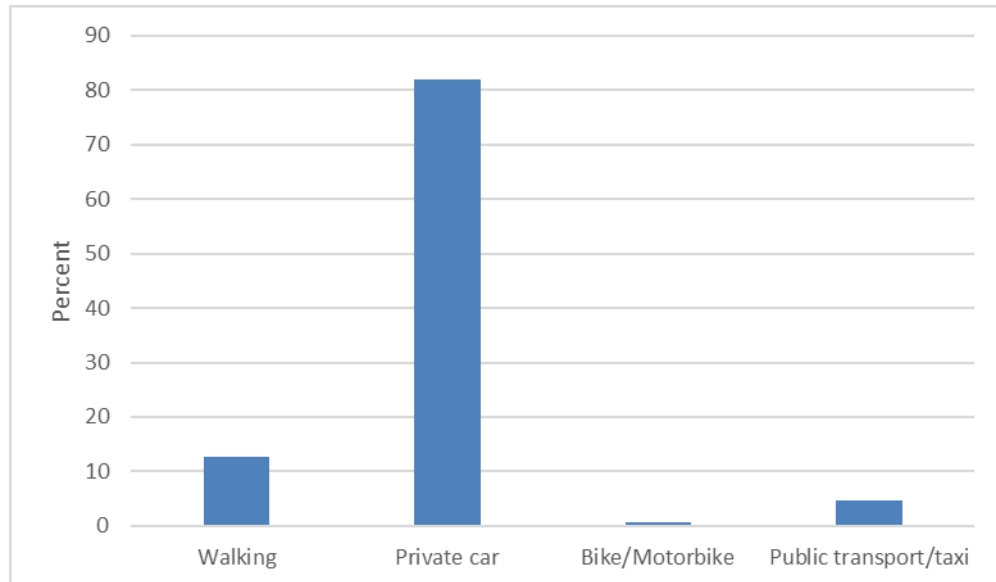
Table 28.

*Participants' Answers About the Item 'How did you get access to this neighborhood?' (by author)*

<b>How did you get access to this neighborhood?</b>	<b>Frequency</b>	<b>Percent</b>
Walking	19	12,7
Private car	123	82,0
Bike/Motorbike	1	0,6
Public transport/taxi	7	4,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 49.

*Participants' Answers About the Item 'How did you get access to this neighborhood? (%) (by author)*



When the results of the item 'Are there any green areas in this neighborhood that you can easily access?' evaluated, 74,0% of participants replied 'yes', 26,0% replied 'no'. Details can be seen from Table 29 and Figure 50.

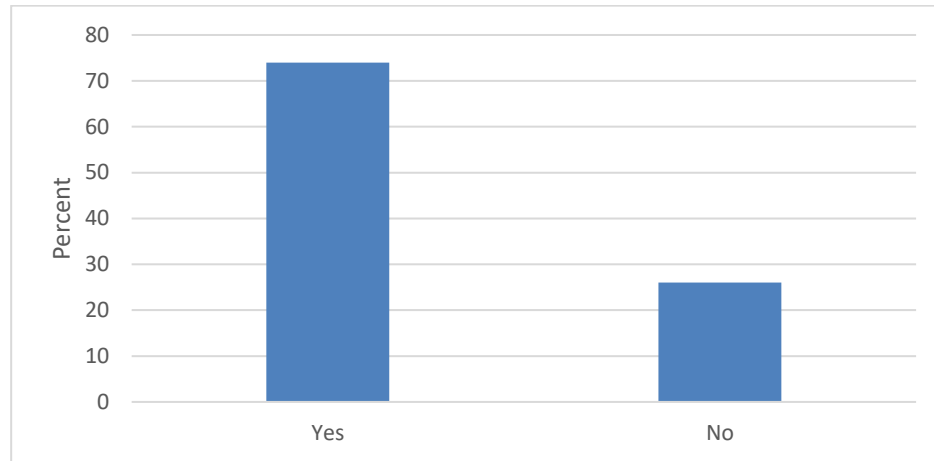
Table 29.

*Participants' Answers About the Item 'Are there any green areas in this neighborhood that you can easily access? (by author)*

Are there any green areas in this neighborhood that you can easily access?	Frequency	Percent
Yes	111	74,0
No	39	26,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 50.

*Participants' Answers About the Item 'Are there any green areas in this neighborhood that you can easily access?' (%) (by author)*



When the results of the item 'Do you think the green areas in this neighborhood are suitable for everyone?' evaluated, 50,0% of participants replied 'yes' and 50,0% replied 'no'. Details can be seen from Table 30 and Figure 51.

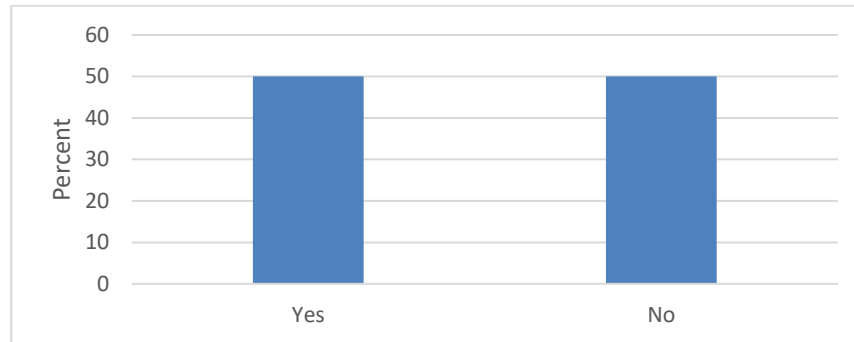
Table 30.

*Participants' Answers About the Item 'Do you think the green areas in this neighborhood are suitable for everyone?' (by author)*

Do you think the green areas in this neighborhood are suitable for everyone?	Frequency	Percent
Yes	75	50,0
No	75	50,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 51.

*Participants' answers about the item 'Do you think the green areas in this neighborhood are suitable for everyone?' (%) (by author)*



When the results of the item 'Do you think the squares and / or meeting areas in this neighborhood are suitable for everyone?' evaluated, 51,3% of participants replied 'yes' and 48,7% replied 'no'. Details can be seen from Table 31 and Figure 52.

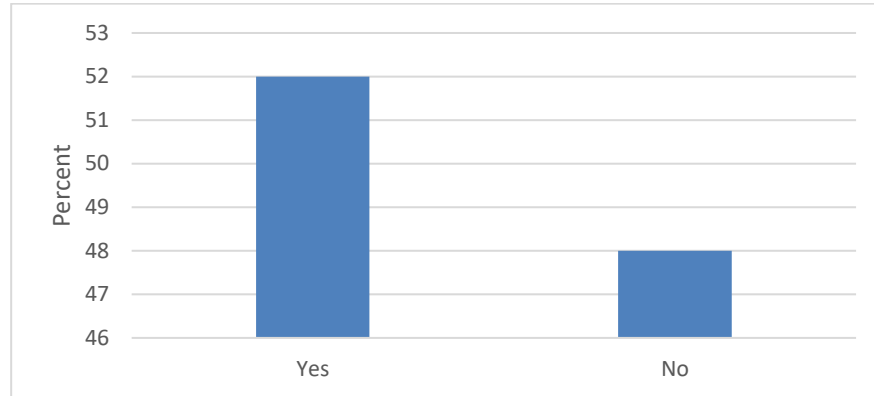
Table 31.

*Participants' answers about the item 'Do you think the squares and / or meeting areas in this neighborhood are suitable for everyone?' (by author)*

Do you think the squares and / or meeting areas in this neighborhood are suitable for everyone?	Frequency	Percent
Yes	78	52,0
No	72	48,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 52.

*Participants' Answers About the Item 'Do you think the squares and / or meeting areas in this neighborhood are suitable for everyone?' (%) (by author)*



When the results of the item 'The sidewalks in the neighborhood (in terms of material, size and continuity) are suitable for everyone.' evaluated, 40,7% of participants replied 'strongly disagree', 20,0% replied 'disagree', 17,3% selected 'unsure' option and 11,3% replied 'agree'. The rest 10,7% elected 'strongly agree'. Details can be seen from Table 32 and Figure 53.

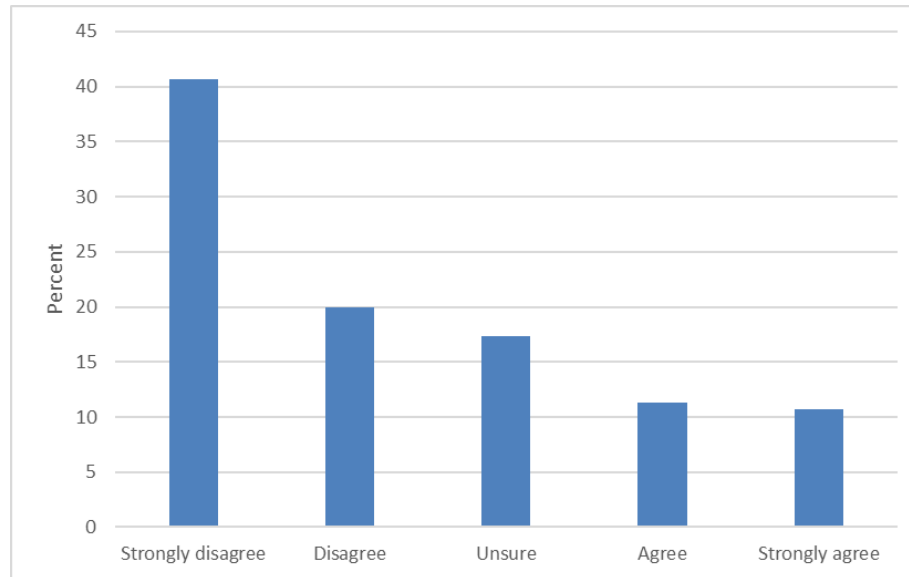
Table 32.

*Participants' answers about the item 'The sidewalks in the neighborhood (in terms of material, size and continuity) are suitable for everyone.' (by author)*

<b>The sidewalks in the neighborhood (in terms of material, size and continuity) are suitable for everyone.</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	61	40,7
Disagree	30	20,0
Unsure	26	17,3
Agree	17	11,3
Strongly agree	16	10,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 53.

*Participants' Answers About the Item 'The sidewalks in the neighborhood (in terms of material, size and continuity) are suitable for everyone' (%) (by author)*



When the results of the item 'The stops in the neighborhood are sufficient and suitable for everyone.' evaluated, 42,0% of participants replied 'strongly disagree', 18,7% replied 'agree', 15,3% selected 'unsure' option and 15,3% replied 'disagree'. The rest 8,7% elected 'strongly agree'. Details can be seen from Table 33 and Figure 54.

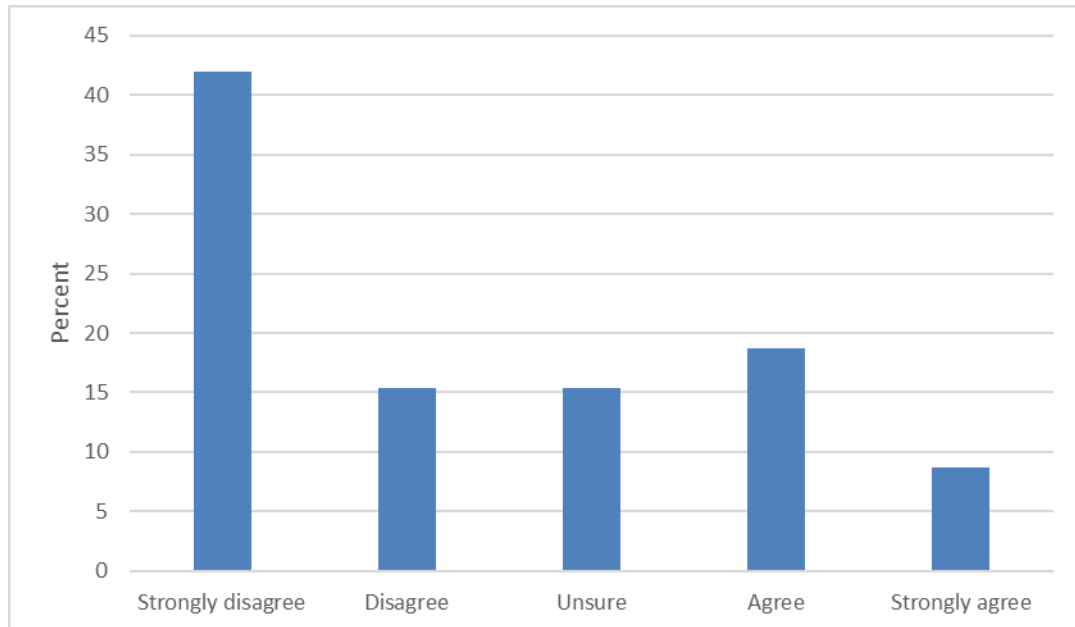
Table 33.

*Participants' Answers About the Item 'The stops in the neighborhood are sufficient and suitable for everyone.' (by author)*

<b>The stops in the neighborhood are sufficient and suitable for everyone</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	63	42,0
Disagree	23	15,3
Unsure	23	15,3
Agree	28	18,7
Strongly agree	13	8,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 54.

*Participants' Answers About the Item 'The stops in the neighborhood are sufficient and suitable for everyone' (%) (by author)*



When the results of the item 'Information signs located in the neighborhood are understandable and sufficient by everyone (including illiterate individuals and visually impaired)' evaluated, 58,0% of participants replied 'strongly disagree', 12,7% replied 'disagree', 10,0% selected 'agree' option and 10,0% replied 'strongly agree'. The rest 9,3% elected 'unsure'. Details can be seen from Table 34 and Figure 55.



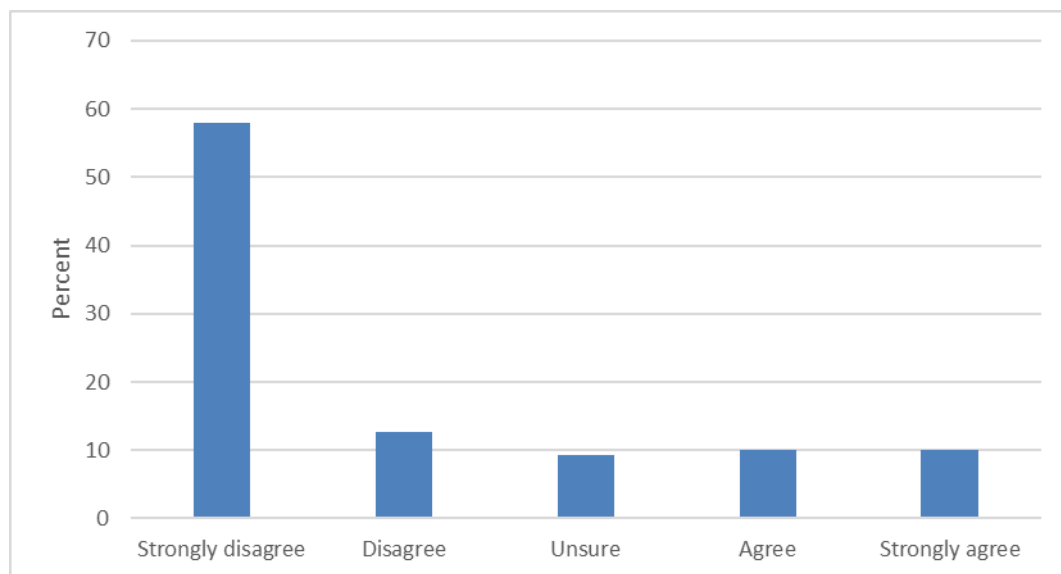
Table 34.

*Participants' Answers About the Item 'Information signs located in the neighborhood are understandable and sufficient by everyone (including illiterate individuals and visually impaired)' (by author)*

Information signs located in the neighborhood are understandable and sufficient by everyone (including illiterate individuals and visually impaired).	Frequency	Percent
Strongly disagree	87	58,0
Disagree	19	12,7
Unsure	14	9,3
Agree	15	10,0
Strongly agree	15	10,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 55.

*Participants' Answers About the Item 'Information signs located in the neighborhood are understandable and sufficient by everyone (including illiterate individuals and visually impaired)' (%) (by author)*



When the results of the item 'Urban furniture (benches, garbage bins, flower beds, etc.) in the neighborhood is sufficient and suitable for everyone (in terms of size, material and positioning)' evaluated, 50,0% of participants replied 'strongly

disagree', 18,0% replied 'strongly agree', 14,7% selected 'agree' option and 13,3% replied 'disagree'. The rest 4,0% elected 'unsure'. Details can be seen from Table 35 and Figure 56.

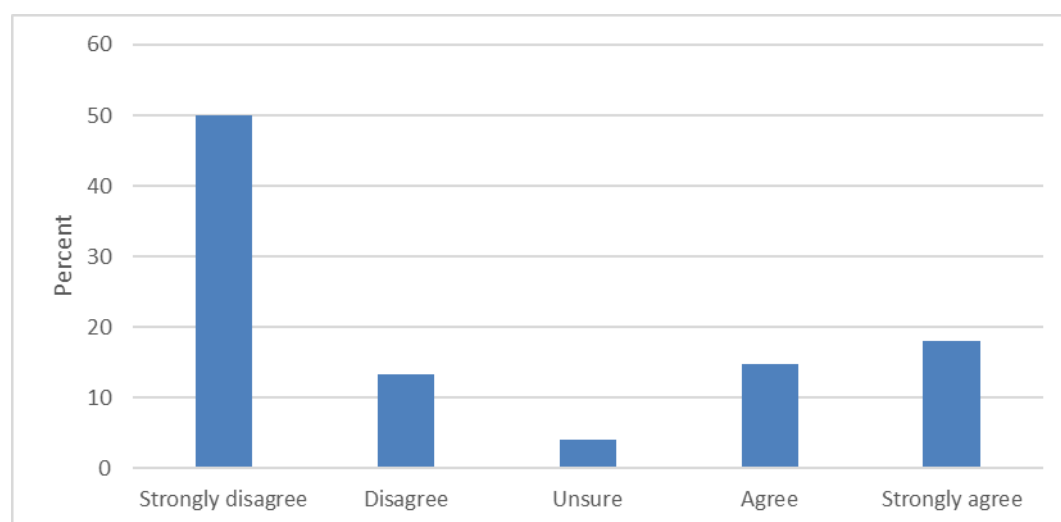
Table 35.

*Participants' Answers About the Item 'Urban furniture (benches, garbage bins, flower beds, etc.) in the neighborhood is sufficient and suitable for everyone (in terms of size, material and positioning)' (by author)*

<b>Urban furniture (benches, garbage bins, flower beds, etc.) in the neighborhood is sufficient and suitable for everyone (in terms of size, material and positioning)</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	75	50,0
Disagree	20	13,3
Unsure	6	4,0
Agree	22	14,7
Strongly agree	27	18,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 56.

*Participants' answers about the item 'Urban furniture (benches, garbage bins, flower beds, etc.) in the neighborhood is sufficient and suitable for everyone (in terms of size, material and positioning)' (%) (by author)*



When the results of the item ‘When you come to the neighborhood with a private car, you can easily find a parking space’ evaluated, 38,7% of participants replied ‘strongly disagree’, 19,3% replied ‘agree’, 16,7% selected ‘strongly agree’ option and 14,7% replied ‘disagree’. The rest 10,6% elected ‘unsure’. Details can be seen from Table 36 and Figure 57.

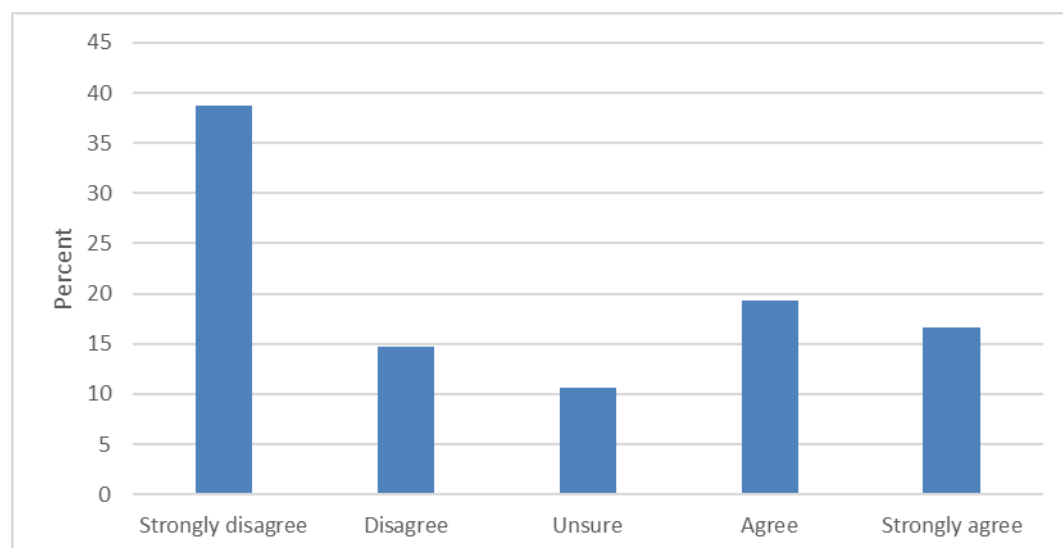
Table 36.

*Participants’ Answers About the Item ‘When you come to the neighborhood with a private car, you can easily find a parking space’ (by author)*

<b>When you come to the neighborhood with a private car, you can easily find a parking space</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	58	38,7
Disagree	22	14,7
Unsure	16	10,6
Agree	29	19,3
Strongly agree	25	16,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 57.

*Participants’ answers about the item ‘When you come to the neighborhood with a private car, you can easily find a parking space’ (%) (by author)*



When the results of the item ‘Parking areas (in terms of material, size, location) are suitable for everyone’ evaluated, 42,0% of participants replied ‘strongly disagree’, 25,3% replied ‘agree’ and 16,7% selected ‘strongly agree’ option. 8,0% replied ‘disagree’ and 8,0% elected ‘unsure’ option. Details can be seen from Table 37 and Figure 58.

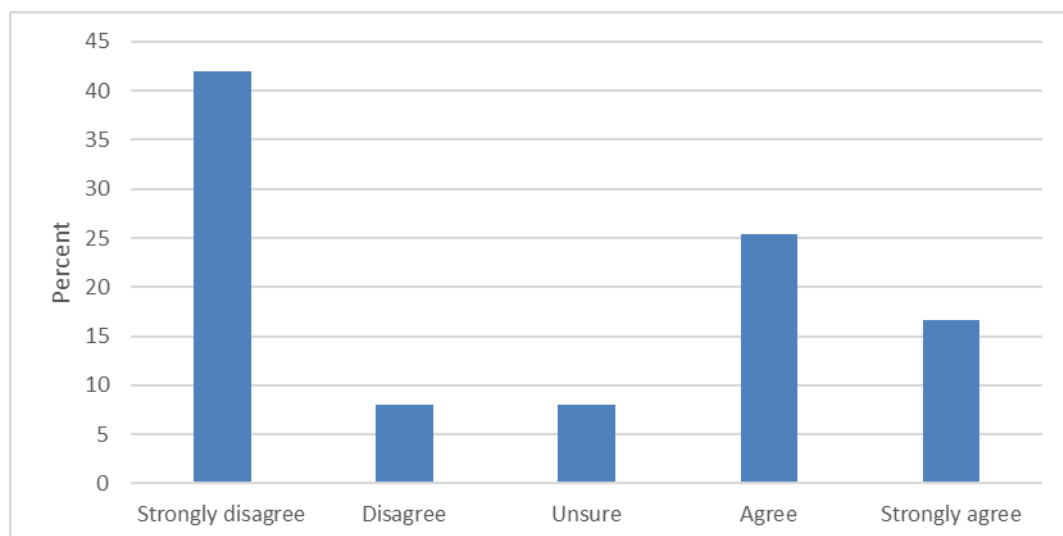
Table 37.

*Participants’ Answers About the Item ‘Parking areas (in terms of material, size, location) are suitable for everyone’ (by author)*

<b>Parking areas (in terms of material, size, location) are suitable for everyone</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	63	42,0
Disagree	12	8,0
Unsure	12	8,0
Agree	38	25,3
Strongly agree	25	16,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 58.

*Participants’ Answers About the Item ‘Parking areas (in terms of material, size, location) are suitable for everyone’ (%) (by author)*



#### 4.2.3 Section 3: User views about walkability

When the results of the item 'I can easily reach this neighborhood on foot' evaluated, 40,0% of participants replied 'agree', 38,0% replied 'strongly agree', 8,0% of participants selected 'unsure' option and 7,3% of them replied 'strongly disagree'. The rest 6,7% elected 'disagree'. Details can be seen from Table 38 and Figure 59.

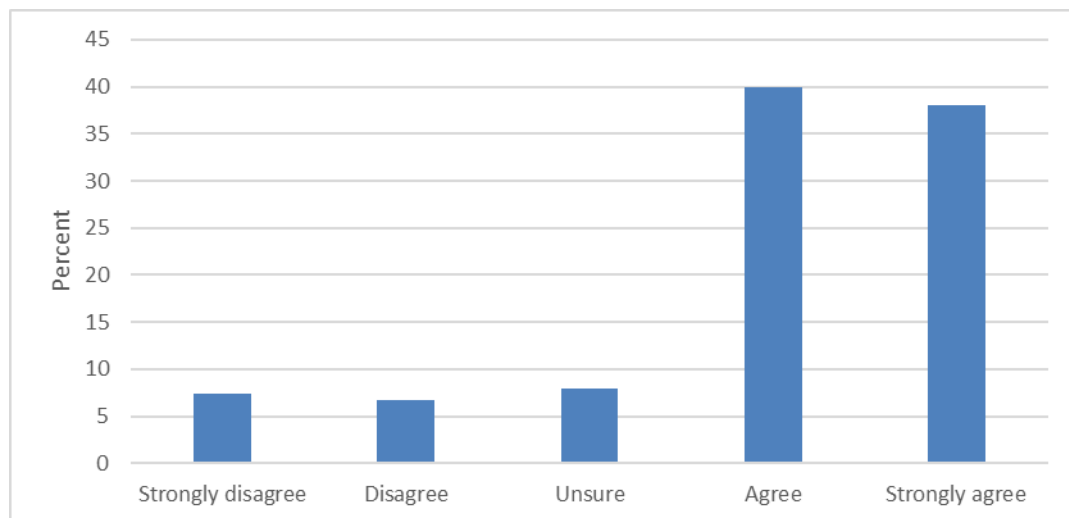
Table 38.

*Participants' Answers About the Item 'I can easily reach this neighborhood on foot' (by author)*

<b>I can easily reach this neighborhood on foot</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	11	7,3
Disagree	10	6,7
Unsure	12	8,0
Agree	60	40,0
Strongly agree	57	38,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 59.

*Participants' Answers About the Item 'I can easily reach this neighborhood on foot' (%) (by author)*



When the results of the item *'Pedestrian crossings in the quarter are positioned in necessary places and are suitable for everyone'* evaluated, 44,7% of participants replied 'strongly disagree', 16,0% replied 'unsure', 14,0% selected 'agree' option and 13,3% replied 'strongly agree'. The rest 12,0% elected 'disagree'. Details can be seen from Table 39 and Figure 60.

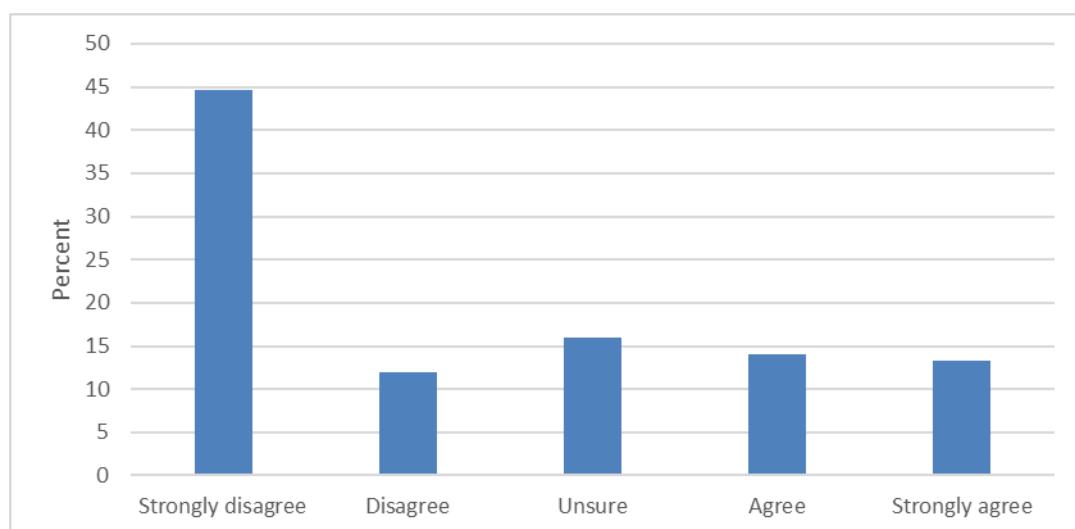
Table 39.

*Participants' Answers About the Item 'Pedestrian crossings in the quarter are positioned in necessary places and are suitable for everyone' (by author)*

<b>Pedestrian crossings in the quarter are positioned in necessary places and are suitable for everyone</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	67	44,7
Disagree	18	12,0
Unsure	24	16,0
Agree	21	14,0
Strongly agree	20	13,3
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 60.

*Participants' Answers About the Item 'Pedestrian crossings in the quarter are positioned in necessary places and are suitable for everyone' (%) (by author)*



When the results of the item ‘The traffic lights in the quarter are positioned in places necessary to protect the pedestrian traffic and are suitable for everyone’ evaluated, 54,0% of participants replied ‘strongly disagree’, 13,3% replied ‘unsure’, 12,0% selected ‘disagree’ option and 10,7% replied ‘agree’. The rest 10,0% elected ‘strongly agree’. Details can be seen from Table 40 and Figure 61.

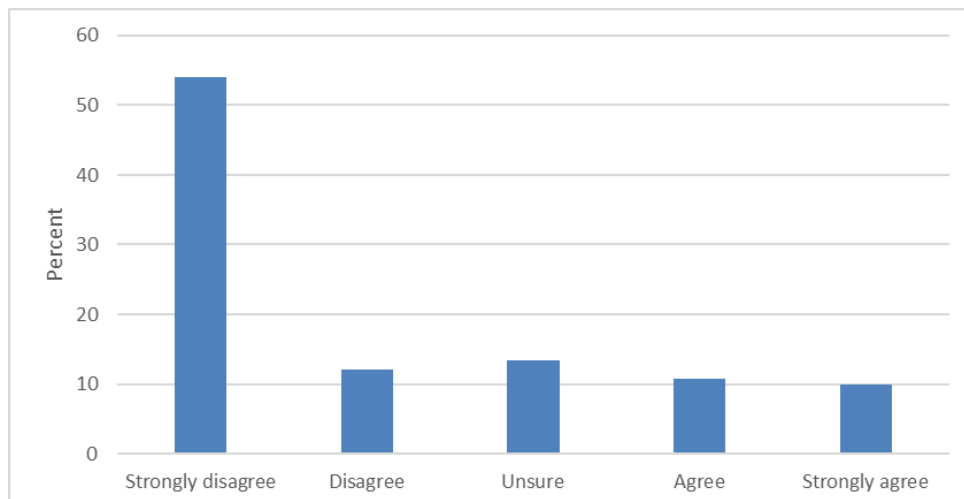
Table 40.

*Participants’ Answers About the Item ‘The traffic lights in the quarter are positioned in places necessary to protect the pedestrian traffic and are suitable for everyone’ (by author)*

<b>The traffic lights in the quarter are positioned in places necessary to protect the pedestrian traffic and are suitable for everyone</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	81	54,0
Disagree	18	12,0
Unsure	20	13,3
Agree	16	10,7
Strongly agree	15	10,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 61.

*Participants’ Answers About the Item ‘The traffic lights in the quarter are positioned in places necessary to protect the pedestrian traffic and are suitable for everyone’ (%) (by author)*



When the results of the item ‘In overcoming the level differences in the neighborhood, solutions have been made by taking into account the variety of users (such as positioning the ramps as well as the steps)’ evaluated, 49,3% of participants replied ‘strongly disagree’, 16,7 replied ‘disagree’, 14,7% selected ‘unsure’ option and 10,0% replied ‘strongly agree’. The rest 9,3% elected ‘agree’. Details can be seen from Table 41 and Figure 62.

Table 41.

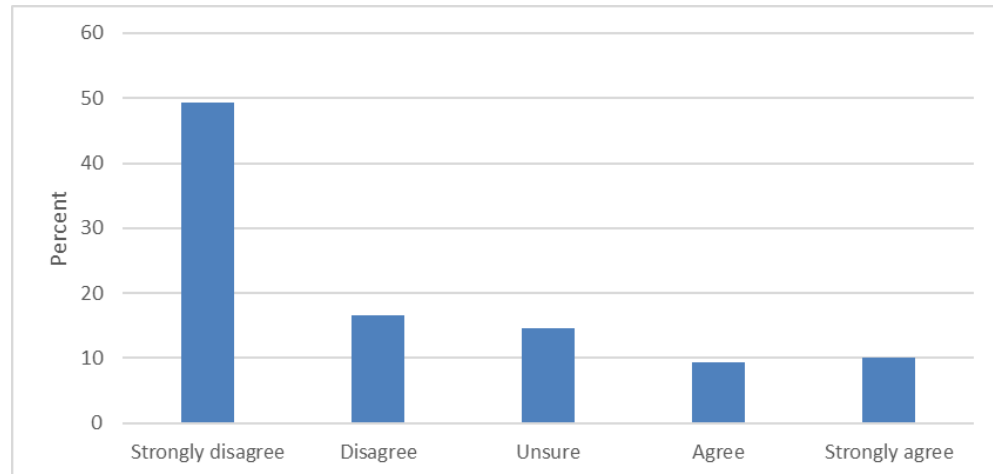
*Participants’ Answers About the Item ‘In overcoming the level differences in the neighborhood, solutions have been made by taking into account the variety of users (such as positioning the ramps as well as the steps)’ (by author)*

<b>In overcoming the level differences in the neighborhood, solutions have been made by taking into account the variety of users (such as positioning the ramps as well as the steps)</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	74	49,3
Disagree	25	16,7
Unsure	22	14,7
Agree	14	9,3
Strongly agree	15	10,0
<b>Total</b>	<b>150</b>	<b>100,0</b>



Figure 62.

*Participants' Answers About the Item 'In overcoming the level differences in the neighborhood, solutions have been made by taking into account the variety of users (such as positioning the ramps as well as the steps) (%) (by author)*



#### **4.2.4 Section 4: User views about safety**

When the results of the item 'Do you think your neighborhood is safe?' evaluated, 71,3% of participants replied 'yes' and 28,7% replied 'no'. Details can be seen from Table 42 and Figure 63. Most of the participants who selected 'no' option argued that the neighborhood is not safety because of not suitable physical conditions of them for users and increasing in crime rate.

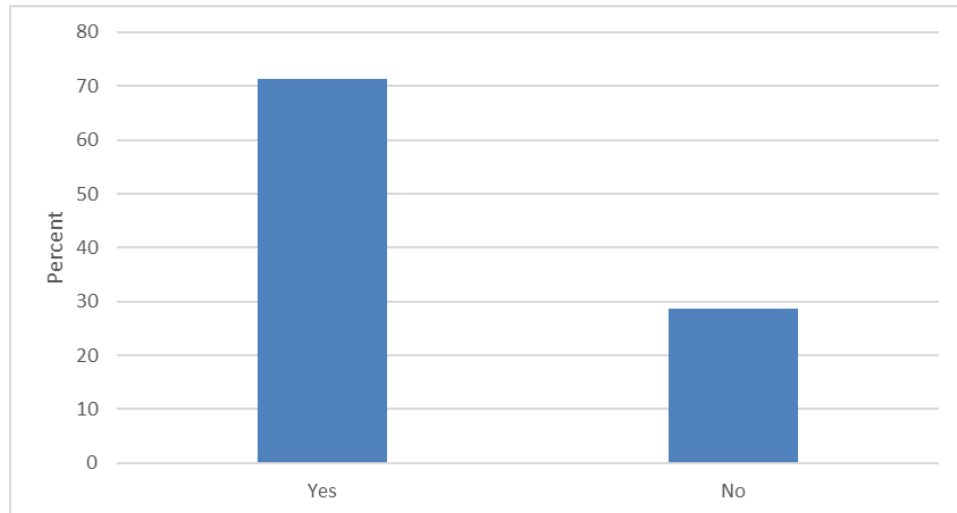
Table 42.

*Participants' Answers About the Item 'Do you think your neighborhood is safe?' (by author)*

<b>Do you think your neighborhood is safe?</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	107	71,3
<b>No</b>	43	28,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 63.

*Participants' Answers About the Item 'Do you think your neighborhood is safe?' (%) (by author)*



When the results of the item 'The street and / or avenue where the shopping, entertainment and consumption part of the quarter is concentrated should be reserved for pedestrians only' evaluated, 36,6% of participants replied 'strongly disagree', 24,7 replied 'strongly agree', 14,0% selected 'agree' option and 12,7% replied 'disagree'. The rest 12,0% elected 'unsure'. Details can be seen from Table 43 and Figure 64.

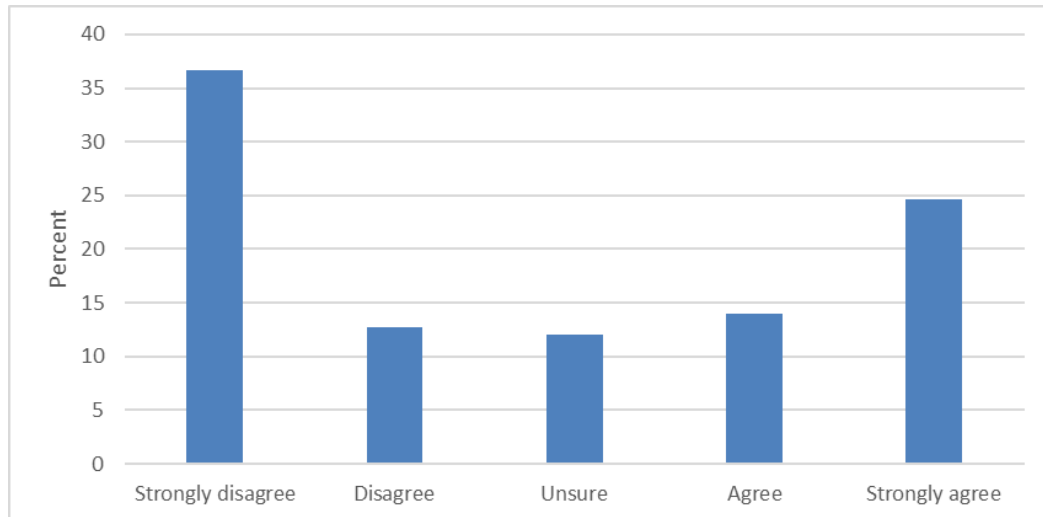
Table 43.

*Participants' Answers About the Item 'The street and / or avenue where the shopping, entertainment and consumption part of the quarter is concentrated should be reserved for pedestrians only' (by author)*

<b>The street and / or avenue where the shopping, entertainment and consumption part of the quarter is concentrated should be reserved for pedestrians only</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	55	36,6
Disagree	19	12,7
Unsure	18	12,0
Agree	21	14,0
Strongly agree	37	24,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 64.

*Participants' Answers About the Item 'The street and / or avenue where the shopping, entertainment and consumption part of the quarter is concentrated should be reserved for pedestrians only' (%) (by author)*



When the results of the item 'Elements such as information signs and billboards (in terms of material, size and location) in the neighborhood have a low risk of causing accidents in case of carelessness of the users.' evaluated, 28,7% of participants replied 'agree', 28,0 replied 'strongly disagree', 19,3% selected 'unsure' option and 13,3% replied 'disagree'. The rest 10,7% replied 'strongly agree'. Details can be seen from Table 44 and Figure 65.

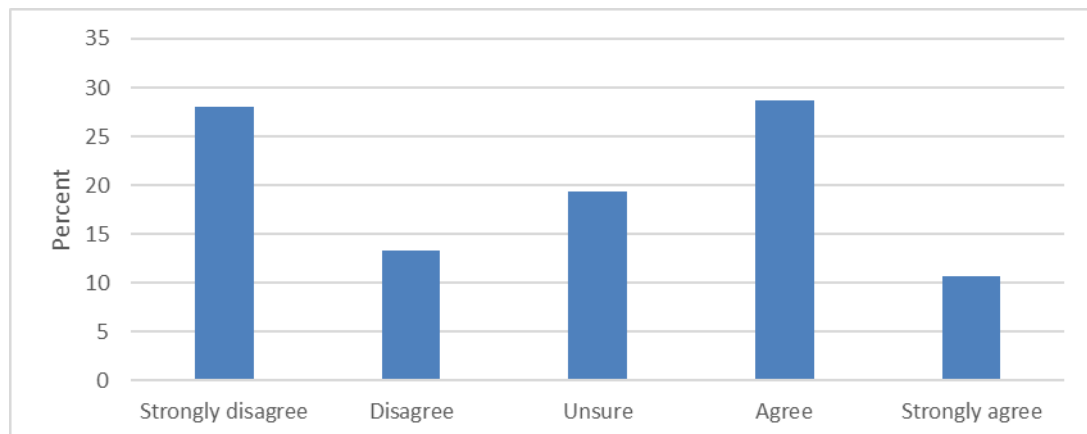
Table 44.

*Participants' Answers About the Item 'Elements such as information signs and billboards (in terms of material, size and location) in the neighborhood have a low risk of causing accidents in case of carelessness of the users' (by author)*

<b>Elements such as information signs and billboards (in terms of material, size and location) in the neighborhood have a low risk of causing accidents in case of carelessness of the users</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	42	28,0
Disagree	20	13,3
Unsure	29	19,3
Agree	43	28,7
Strongly agree	16	10,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 65.

*Participants' Answers About the Item 'Elements such as information signs and billboards (in terms of material, size and location) in the neighborhood have a low risk of causing accidents in case of carelessness of the users' (%) (by author)*



When the results of the item 'Lighting elements in the neighborhood are sufficient for night use of this place' evaluated, 26,0% of participants replied 'strongly disagree', 20,0 replied 'disagree', 20,0% selected 'unsure' option and

18,0% replied ‘strongly agree’. The rest 16,0% replied ‘disagree’. Details can be seen from Table 45 and Figure 66.

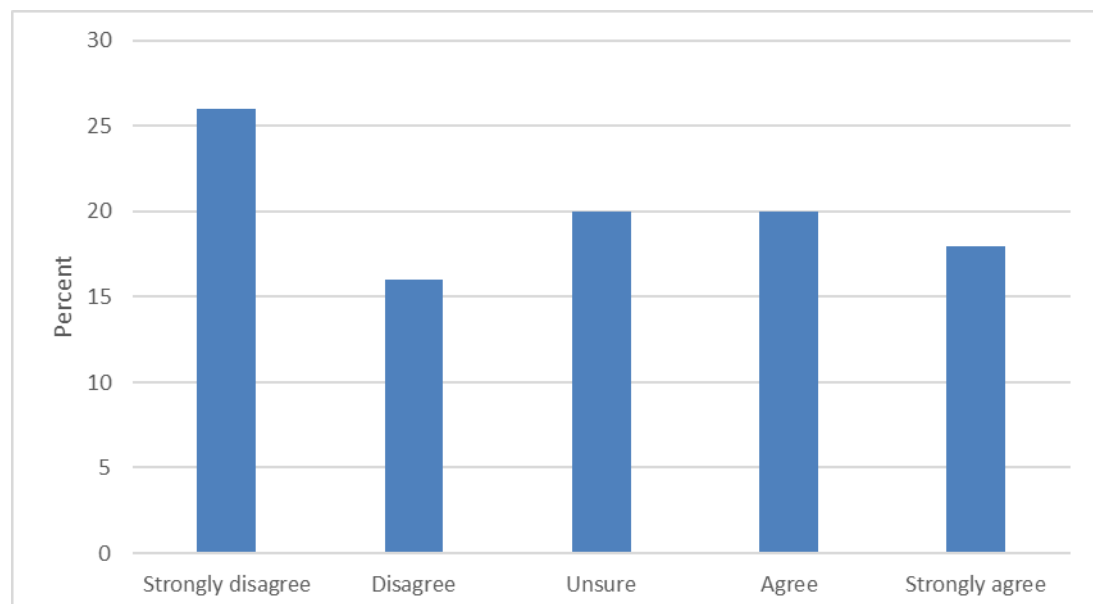
Table 45.

*Participants’ Answers About the Item ‘Lighting elements in the neighborhood are sufficient for night use of this place’(by author)*

<b>Lighting elements in the neighborhood are sufficient for night use of this place</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	39	26,0
Disagree	24	16,0
Unsure	30	20,0
Agree	30	20,0
Strongly agree	27	18,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 66.

*Participants’ Answers About the Item ‘Lighting elements in the neighborhood are sufficient for night use of this place’ (%) (by author)*



#### 4.2.5 Section 5: User views about UD principles

When the results of the item ‘In the urban areas (streets, avenues, parks, squares, etc.) of the neighbourhood, everyone has the opportunity to move around under the same conditions’ evaluated, 34,0% of participants replied ‘strongly disagree’, 18,7% replied ‘agree’, 18,0% of participants selected ‘unsure’ option and 17,3% of them replied ‘disagree’. The rest 12,0% elected ‘strongly agree’ option. Details can be seen from Table 46 and Figure 67.

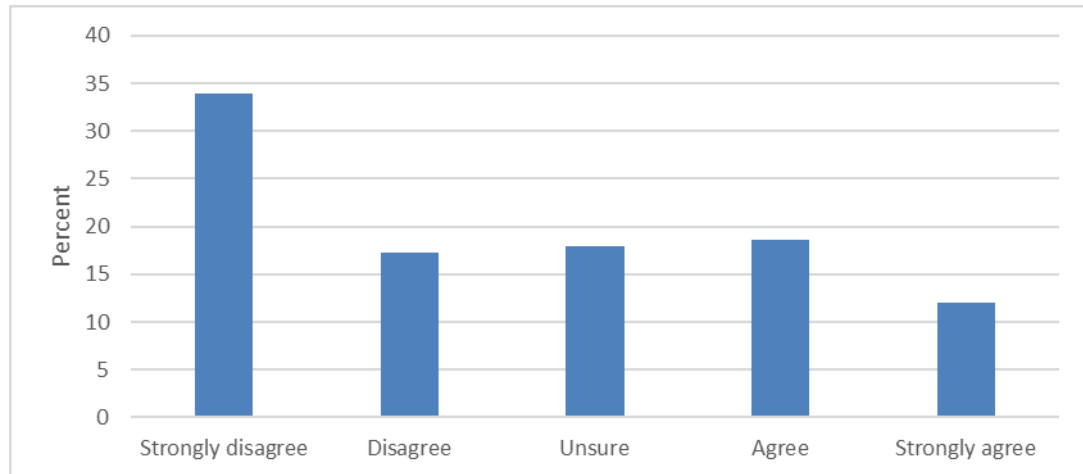
Table 46.

*Participants’ Answers About the Item ‘In the urban areas (streets, avenues, parks, squares, etc.) of the neighborhood, everyone has the opportunity to move around under the same conditions’ (by author)*

<b>In the urban areas (streets, avenues, parks, squares, etc.) of the neighborhood, everyone has the opportunity to move around under the same conditions</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	51	34,0
Disagree	26	17,3
Unsure	27	18,0
Agree	28	18,7
Strongly agree	18	12,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 67.

*Participants' Answers About the Item 'In the urban areas (streets, avenues, parks, squares, etc.) of the neighborhood, everyone has the opportunity to move around under the same conditions' (%) (by author)*



When the results of the item 'Considering the diversity of users in the neighborhood, there are elements with the same function designed with different features in urban spaces like street, avenue, park, square, etc.) (such as garbage bins, book sharing points located at different heights)' evaluated, 62,0% of participants replied 'strongly disagree', 17,3% replied 'disagree', 8,0% of participants selected 'agree' option and 7,3% of them replied 'unsure'. The rest 5,4% elected 'strongly agree' option. Details can be seen from Table 47 and Figure 68.

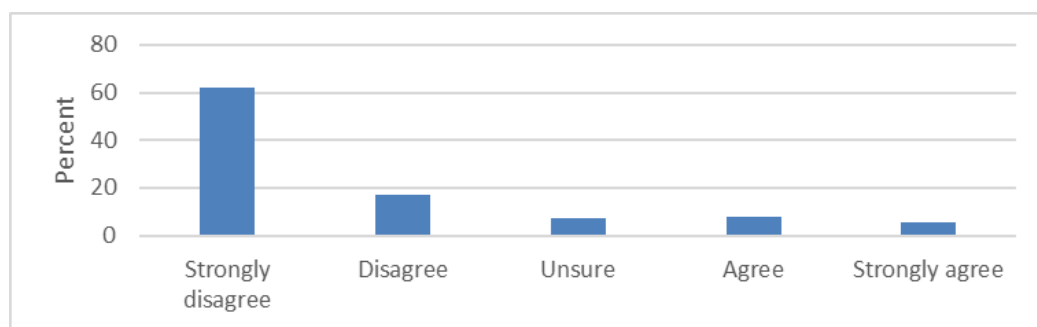
Table 47.

*Participants' Answers About the Item 'Considering the diversity of users in the neighborhood, there are elements with the same function designed with different features in urban spaces like street, avenue, park, square, etc.) (such as garbage bins, book sharing points located at different heights)' (by author)*

<b>Considering the diversity of users in the neighborhood, there are elements with the same function designed with different features in urban spaces like street, avenue, park, square, etc.) (such as garbage bins, book sharing points located at different heights)</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	93	62,0
Disagree	26	17,3
Unsure	11	7,3
Agree	12	8,0
Strongly agree	8	5,4
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 68.

*Participants' Answers About the Item 'Considering the diversity of users in the neighborhood, there are elements with the same function designed with different features in urban spaces like street, avenue, park, square, etc.) (such as garbage bins, book sharing points located at different heights)' (%) (by author)*



When the results of the item 'Urban spaces (streets, avenues, parks, squares etc.) in the neighborhood can be easily found and used by everyone with the help of perceptible information' evaluated, 42,0% of participants replied 'strongly disagree', 25,3% replied 'agree', 16,7% of participants selected 'disagree' option and 10,7% of



them replied ‘strongly agree’. The rest 5,3% elected ‘unsure’ option. Details can be seen from Table 48 and Figure 69.

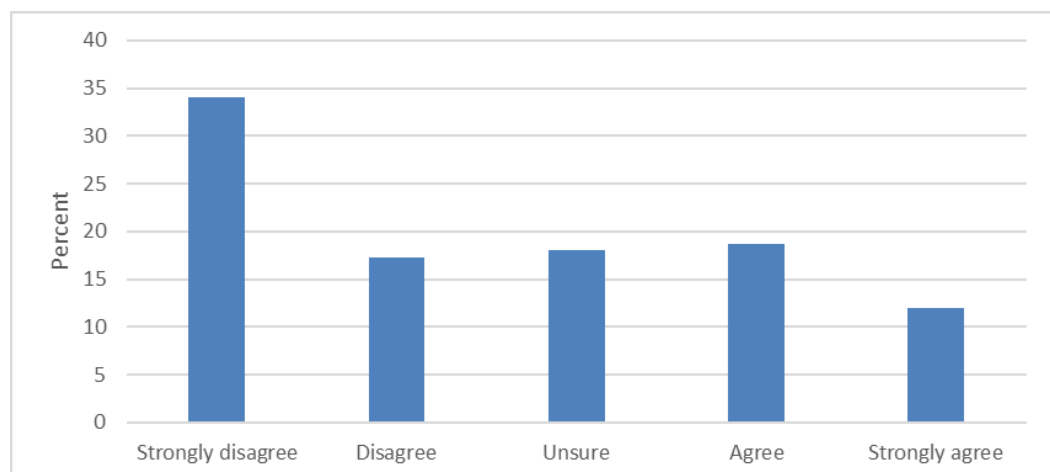
Table 48.

*Participants’ Answers About the Item ‘Urban spaces (streets, avenues, parks, squares etc.) in the neighborhood can be easily found and used by everyone with the help of perceptible information’(by author)*

<b>Urban spaces (streets, avenues, parks, squares etc.) in the neighborhood can be easily found and used by everyone with the help of perceptible information</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	63	42,0
Disagree	25	16,7
Unsure	8	5,3
Agree	38	25,3
Strongly agree	16	10,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 69.

*Participants’ Answers About the Item ‘Urban spaces (streets, avenues, parks, squares etc.) in the neighborhood can be easily found and used by everyone with the help of perceptible information’ (%) (by author)*



When the results of the item ‘Information signs in urban areas of the neighborhood (streets, avenues, parks, squares, etc.) can be understood by everyone’ evaluated, 28,0% of participants replied ‘strongly disagree’, 28,0% replied ‘agree’, 18,0% of participants selected ‘disagree’ option and 15,3% of them replied ‘unsure’. The rest 10,7% elected ‘strongly agree’ option. Details can be seen from Table 49 and Figure 70.

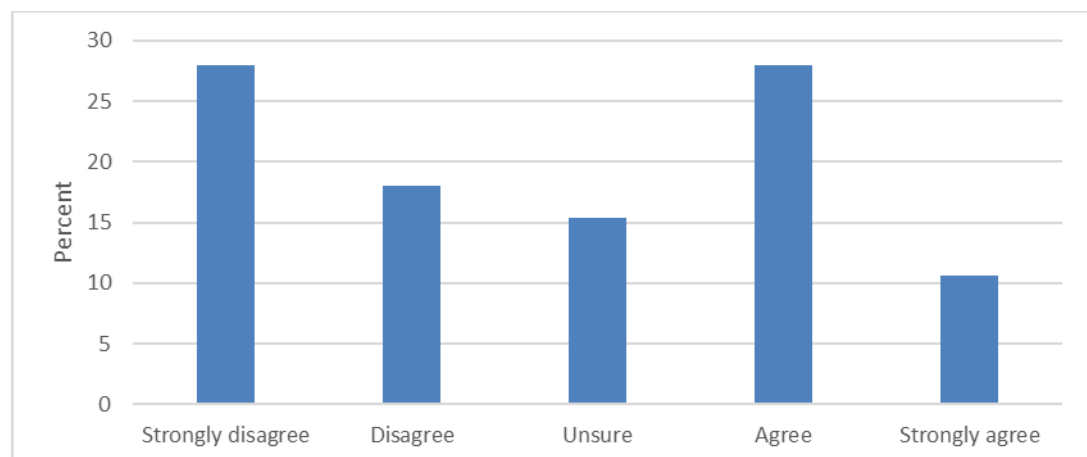
Table 49.

*Participants’ Answers About the Item ‘Information signs in urban areas of the neighborhood (streets, avenues, parks, squares, etc.) can be understood by everyone’(by author)*

<b>Information signs in urban areas of the neighborhood (streets, avenues, parks, squares, etc.) can be understood by everyone</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	42	28,0
Disagree	27	18,0
Unsure	23	15,3
Agree	42	28,0
Strongly agree	16	10,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 70.

*Participants’ Answers About the Item ‘Information signs in urban areas of the neighborhood (streets, avenues, parks, squares, etc.) can be understood by everyone’ (%) (by author)*



When the results of the item ‘Features (water items, urban furniture, etc.) found in urban areas of the neighborhood (street, avenues, park, square, etc.) is designed to minimize the likelihood of accidents that may occur due to the carelessness and / or physical / mental abilities of the users (such as avoiding proximity by planting flowers around the water element.)’, 37,3% replied ‘strongly disagree’, 20,7% of participants selected ‘unsure’, 18,7% replied ‘disagree’ option and 18,0% of them replied ‘agree’. The rest 5,3% elected ‘strongly agree’ option. Details can be seen from Table 50 and Figure 71.

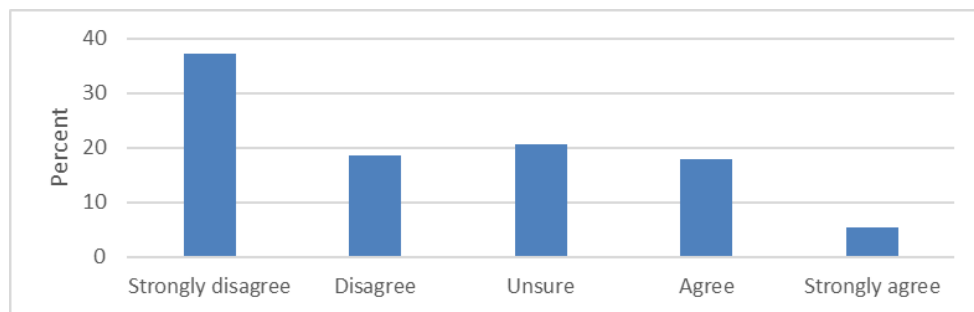
Table 50.

*Participants’ answers about the item ‘Features (water items, urban furniture, etc.) found in urban areas of the neighborhood (street, avenues, park, square, etc.) is designed to minimize the likelihood of accidents that may occur due to the carelessness and / or physical / mental abilities of the users (such as avoiding proximity by planting flowers around the water element.)’ (by author)*

<b>Features (water items, urban furniture, etc.) found in urban areas of the neighborhood (street, avenues, park, square, etc.) is designed to minimize the likelihood of accidents that may occur due to the carelessness and / or physical / mental abilities of the users (such as avoiding proximity by planting flowers around the water element.)</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	56	37,3
Disagree	28	18,7
Unsure	31	20,7
Agree	27	18,0
Strongly agree	8	5,3
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 71.

*Participants' Answers About the Item 'Features (water items, urban furniture, etc.) found in urban areas of the neighborhood (street, avenues, park, square, etc.) are designed to minimize the likelihood of accidents that may occur due to the carelessness and / or physical / mental abilities of the users (such as avoiding proximity by planting flowers around the water element.)' (%) (by author)*



When the results of the item 'Level differences in urban spaces (streets, avenues, parks, squares, etc.) of the neighbourhood can be overcome without exerting much physical effort by ramps achieving appropriate slopes', 40,0% of participants selected 'strongly disagree' option, 'unsure', 20,7% replied 'agree', 15,3% replied 'unsure' and 14,0% of them replied 'disagree'. The rest 10,0% elected 'strongly agree' option. Details can be seen from Table 51 and Figure 72.

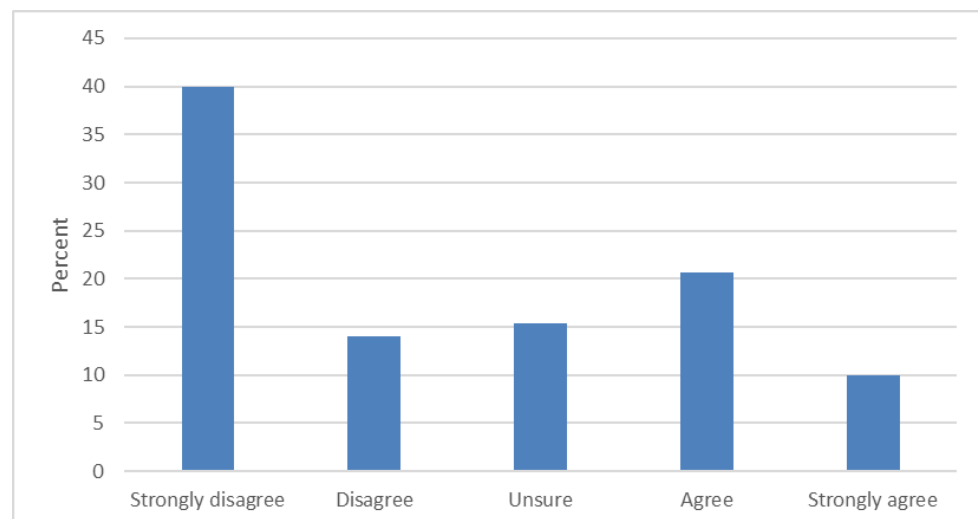
Table 51.

*Participants' Answers About the Item 'Level differences in urban spaces (streets, avenues, parks, squares, etc.) of the neighborhood can be overcome without exerting much physical effort by ramps achieving appropriate slopes' (by author)*

<b>Level differences in urban spaces (streets, avenues, parks, squares, etc.) of the neighborhood can be overcome without exerting much physical effort by ramps achieving appropriate slopes</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	60	40,0
Disagree	21	14,0
Unsure	23	15,3
Agree	31	20,7
Strongly agree	15	10,0
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 72.

*Participants' Answers About the Item 'Level differences in urban spaces (streets, avenues, parks, squares, etc.) of the neighborhood can be overcome without exerting much physical effort by ramps achieving appropriate slopes' (%) (by author)*



When the results of the item 'Equipment (children's playgrounds, sports fields, benches, etc.) in urban areas (streets, avenues, parks, squares, etc.) in the

neighborhood is suitable for everyone's approach and use (they offer different sizes of options and / or adjustable features)', 26,7% of participants selected 'unsure' option, 22,7% replied 'strongly disagree', 19,3% replied 'agree', 22,7% selected 'strongly disagree' option, 19,3% replied 'agree' and 16,7% of them replied 'strongly agree'. The rest 14,6% elected 'disagree' option. Details can be seen from Table 52 and Figure 73.

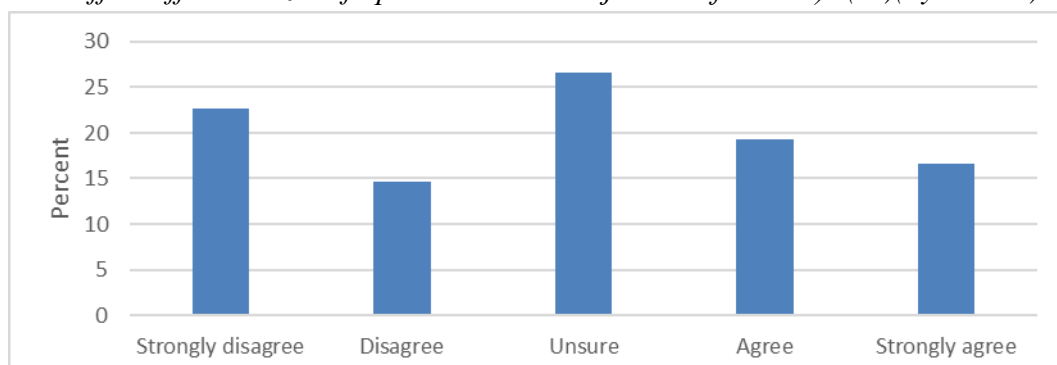
Table 52.

*Participants' Answers About the Item 'Equipment (children's playgrounds, sports fields, benches, etc.) in urban areas (streets, avenues, parks, squares, etc.) in the neighborhood are suitable for everyone's approach and use (they offer different sizes of options and / or adjustable features)' (by author)*

<b>Equipment (children's playgrounds, sports fields, benches, etc.) in urban areas (streets, avenues, parks, squares, etc.) in the neighborhood is suitable for everyone's approach and use (they offer different sizes of options and / or adjustable features)</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	34	22,7
Disagree	22	14,6
Unsure	40	26,7
Agree	29	19,3
Strongly agree	25	16,7
<b>Total</b>	<b>150</b>	<b>100,0</b>

Figure 73.

*Participants' Answers About the Item 'Equipment (children's playgrounds, sports fields, benches, etc.) in urban areas (streets, avenues, parks, squares, etc.) in the neighborhood are suitable for everyone's approach and use (they offer different sizes of options and / or adjustable features)' (%) (by author)*



## 4.3 Discussion

### 4.3.1 Discussion about Urban Space Evaluation

The studies and assessments lead to the conclusion that the tested approaches do not support the creation of a qualified environment for all people. These approaches were reviewed within seven dimensions and TSI requirements. As a result, a number of recommendations for improving the streets while taking into account universal design principles are offered below. These recommendations pertain to the bus stops, walkways, pedestrian crossings, urban furniture and equipment.

All individuals have equal rights in society with regard to the regulations and legislation of numerous countries. Urban spaces should exhibit this equality as well. There are some criteria or principles that the designer follows when creating designs for all users, even though there are no explicit checklists. Although these regulations and standards may vary from nation to nation, they all generally serve the same purpose of directing architects to make environments and areas that are suitable for all users, including the disabled. For instance, the United Nations has published *Accessibility for the Disabled—A Design Manual for a Barrier-Free Environment*. In addition, Turkey and Northern Cyprus also have laws. In Northern Cyprus, it is titled "Chapter 96 (Fasl 96)" and in Turkey it is called as "TS 12576 Urban Roads-Structural Preventive and Sign Design Criteria on Accessibility in Sidewalks and Pedestrian Crossings". They contain information on methods and application measures for cities. When these three standards are reviewed, it becomes clear that they have comparable application methods and contain measurements that are similar to one another. Consequently, some recommendations for the streets of Northern Nicosia are given below, along with illustrations to back them up.

#### **The Bus Stops**

The stops are locations created to allow vehicles to halt while transporting passengers with various skills and characteristic valueation (tall, short, young, elderly, etc.). There are public transportation vehicles in the urban circulation network in Northern Cyprus, despite the fact that they are not frequently used. At some locations along the selected avenues, there are bus stops. Below are some ideas for how to improve the usability of these stops.

- Directions and marks should be made so they are simple to find and visible from a distance.
- The bus stops are situated inside the pavement at the moment. They must be placed away from the pedestrian space and outside the pavement's width.
- Due to the usage of transparent material, two non-mattes, colored, reflective strips that are 15 cm thick should be connected 100–140 cm above the surface to prevent people with visual issues from being in danger.
- There shall be a readable and illuminated information sign at each stop indicating which public transportation vehicle the stop belongs to, the vehicle's route number, the route, and the stop's name.
- This plate must be at least 220 cm high off the ground. A maximum height of 110-130 cm should be used for informational boards at the stops. The route maps of the public transportation vehicles that will pass by that stop, the locations of the nearest taxi stand, and crucial phone numbers, such as emergency medical services, should all be included on these boards. An arrow on the route plan should point to the stop's location, and any transferable stops and other public transportation routes should also be highlighted. There should be a city map with colored zones denoting significant public structures and major thoroughfares. By employing letters with large buttons, embossed city maps, and route plans, the information on the board should be created with the visually handicapped in mind. If necessary, audio notification devices should also be used.
- Markings and guidance should be added as needed to make the stops simple to locate and
- Two 15 cm thick glossy, colorful, reflective strips should be placed 100–140 cm above the ground on these surfaces to ensure that visually impaired pedestrians are not put in danger if transparent material is used at the stops.
- The seating item of bus stop should be between 41 and 46 cm high.

### **Sidewalks/Walkway**

- Along the elected avenues, there are sidewalks on both sides of them. These sidewalks do not adhere to the safety strip, sidewalk walking space, and property area requirements specified in the laws and regulations under consideration because their widths do not match up along the avenue. Additionally, the pavements

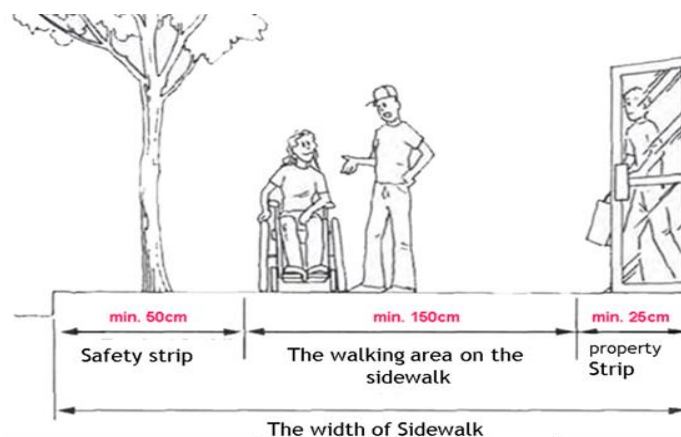


frequently lack paving materials. It is deformed where it is placed. Below are some ideas for making these walkways more practical for users.

- They must be created in accordance with the requirements for the property area, sidewalk walking area, and safety (Figure 74).
- The urban furniture, such as signage, flowerpots, trash cans, lighting fixtures, etc., should be placed inside the safety strip region depicted in Figure 74.
- Damage to the walkway surface should be rectified, and it must be completely covered with flooring materials that prevent slipping.

Figure 74.

*Sidewalk Section (Turkish Standards, 2012)*



- Tactile surfaces should be created in the walking area of the sidewalk shown in Figure 74 so that those who are blind can advance safely. These surfaces need to stand out from their environments and have a distinct tone.
- On the sidewalk area, there shouldn't be any elements, such as overhanging branches, prickly plants, or signboards, that are below the head recovery distance (less than 220 cm height).
- Ramps must be constructed to guarantee continuity of pavement. Ramps should be at a good slope and wide enough to ensure safety and continuity for all pedestrians, especially those with limited mobility.

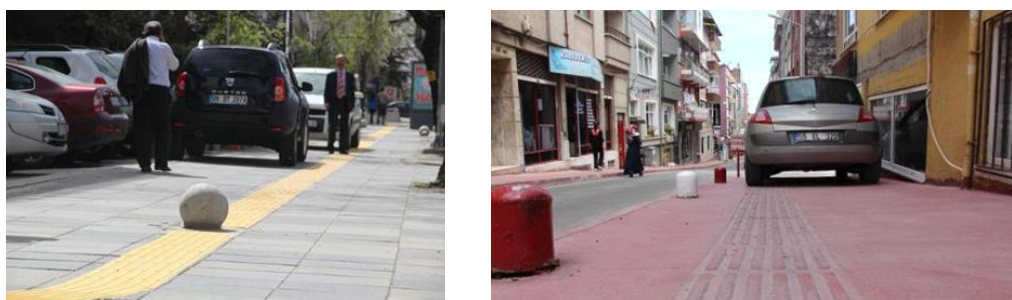
- There shouldn't be any obstructions on the sidewalk so that everyone who wants to walk on it can, including people with disabilities. The pedestrian safety strip on the pavement should contain all reinforcements that could result in horizontal and vertical obstructions.

- The walking space of sidewalk needs to be at least 150 cm wide to allow for the freedom of movement of all walkers, including those with reduced mobility. The sidewalk's minimum safety strip, walking area, and property strip widths change depending on the density of pedestrians.

Non-slip materials should be preferred for pavement surface coating and this material should be applied adjacent and without gaps. Care should be taken to ensure that infrastructure elements such as grill, manhole cover on the pavement are at the same level with the pavement surface perceptible surfaces should be created in the sidewalk to allow the visual impaired users to move on it safely. For the protection of those who are blind, there must be no stationary or moving items that obstruct movement, like pedestal billboards, lighting poles, trees, or parked cars. These sensitive surfaces should give continuity (Figure 75).

Figure 75.

*Situations Where the Continuity of Sensible Surfaces Is Impaired*

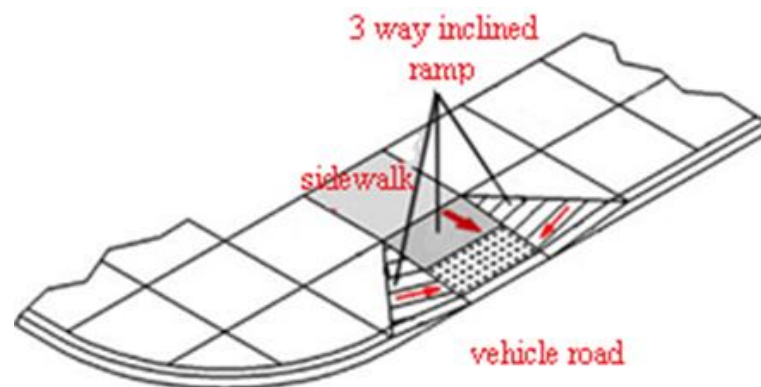


The ramp must be built to ensure continuity and transition between pavements. In order for all pedestrians, especially those with reduced mobility, to travel smoothly, the ramps must be at an appropriate slope and wide enough to assure safety and continuity. The ramps to be built on the sidewalks must be inclined to

three sides (Figure 76). In these ramps, the slope of the ramps on the sides must be maximum 10%, and the slope of the ramp in the middle where the stimulating surface is located should be maximum 8%. The width of this ramp should be at least 90 cm.

Figure 76.

*Three-way Inclined Pavement Ramp in TS 12576 (Gültaşlı, 2017)*



### **Parking Areas**

- On the streets that run parallel to the road, there are parking lots. These parking lots don't have any spaces designated for disabled people. Additionally, in spite of the level difference at the location where the sidewalk connects to one of the available vehicle parks, there is no ramp to facilitate impaired individuals. There are some recommendations below for building these car park lots more suitable for users.

- Parking lots for disabled users should be set aside in parking lots at a rate of 5% of all parking lots. (Turkish Standards, 2012).

- In parking places designated for disabled users, markings should be applied on the ground and on the vertically positioned plate.

- Because the parking lot needs to be set up parallel to the road, the space needed for movement and maneuvering should be left on the side and back of

the parking spot designated for disabled users. Parking spaces intended for disabled people should be 700 cm by 400 cm, including these distances.

- A ramp must be used to make the transition from the parking lot to the pavement.
- Additional parking places should be set up with adequate vehicle widths (250/500 cm). On the floor, draw lines to separate them.
- Disabled parking spaces dimensions (parallel to the road): width: 400 cm, length: 700 cm
- The typical parking space has the following measurements: width: 250 cm, and length: 500 cm. (Turkish Standards, 2012)

While designing car parking area that seem appropriate to be positioned in the immediate vicinity of the buildings; vehicle dimensions, types of users and number of vehicles should be considered. Car parks can be open or closed car parks. In both types of parking lots, the floor should be covered with non-slip material, and directive and informative markings should be made to the necessary places in the parking lot (Turkish Standard, 2012).

In parking lot arrangements, a parking area of 250 cm in width and 500 cm in length should be designed for a passenger vehicle, excluding the manoeuvre area. The safety of everyone in the car parks should be considered, and it should be designed so that all users can safely reach the building from the car park. Night lighting of the car parks must be made at sufficient levels. In addition, parking lots should be protected from weather conditions such as snow and ice during the winter season, and from sunlight in summer, or should have regulations that have been taken into consideration and precautions (Turkish Standard, 2012).

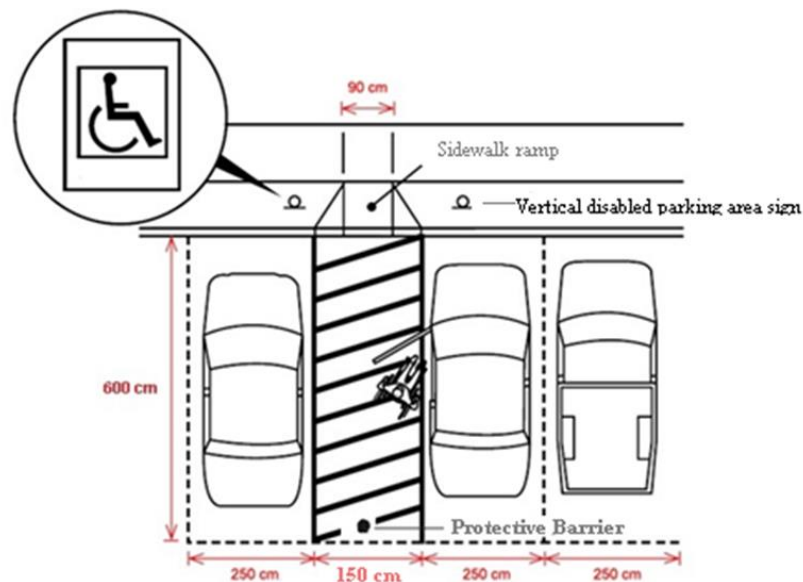
There should also be parking areas designed for the disabled among the users in the parking lot arrangements. According to Istanbul parking regulations; It is mandatory to have at least one parking lot with the disabled sign for every 20 vehicles in the parking lot. These parking areas should be located at the closest distance to the entrances / exits of the buildings or elevators. This distance should not be more than 30 m and should be connected by a safe path to building access. Car park areas arranged for the disabled should be preferred to have a net height of at

least 260 cm in order to enable them to park in van type vehicles if they are covered (Turkish Standard, 2012).

If there is a parking lot arranged for the disabled, the width should be 400 cm and the length 600 cm. If multiple disabled parking areas are planned, the width should be minimum 250 cm, and the length should be minimum 600 cm in order to move easily around the vehicle. A 150 cm wide and 600 cm long parallel access corridor to the vehicle should be reserved for easy access from wheelchair to vehicle between two disabled parking spaces. If the access corridor and the pavement are not at the same level, this area should be connected to the pavement with a ramp (Figure 77). Horizontal and vertical markings should be made so that the purpose of arranging parking areas designed for the disabled can be understood by everyone (Turkish Standard, 2012).

Figure 77.

*Parking Spaces Arranged for the Disabled (Turkish Standard, 2012)*



### **Pedestrian Crossings**

There On the avenues, there are several places where people can cross the street. Below are some ideas for improving the usability of these pedestrian crossings.

- There is damage at the intersection of the pavement and the pedestrian crossing. It is necessary to fix this damage. A ramp is necessary to bridge the gap in level between them. This ramp's construction material should be non-slip. The width of the ramp must match that of the pedestrian crossing.

- A warning surface should be installed at the beginning and conclusion of the pedestrian crossing to guarantee the safety of those who are blind or visually impaired. Additionally, the ground along the pedestrian crossing should have a guide mark.

- In the current situation, the flashing warning lamps located inside the pedestrian crossing should be moved before and after the pedestrian crossing in order to be seen at night. As a result, when approaching, drivers can be aware of the pedestrian crossing. Furthermore, the risk of users hitting this element in moments of carelessness within the pedestrian crossing's net usable area will be eliminated.

- At pedestrian crossings without light controls, a sign indicating a pedestrian crossing must be shown at least 20 meters in advance.

- Pedestrian crossings should have good overhead lighting that is distinct from and brighter than the illumination on the roads.

- Landmarks should be used to clearly indicate pedestrian crossings.

- Curbstones should not be used to cut pedestrian crossings on vehicle roads or intersections. To the pedestrian path, three-way inclined ramps as wide as the pedestrian crossing should be built up to the vehicle road level. The ramp (8% slope) should not spill into the carriageway.

- The surface texture of the level pedestrian crossings should be modified to include guide tracks and warning surfaces to ensure the safety of pedestrians who are blind or visually impaired. The pedestrian crossing must be 300 cm wide at a minimum.

Pedestrian crossings are of two types, with or without traffic light control. Traffic sign lamps should have colored lights for the hearing impaired, moving / stationary human symbols and sensible surfaces and audible warnings for the visually impaired at light-controlled pedestrian crossings. Traffic sign buttons should be positioned 90-120 cm high so that they can be used by wheelchair users. In addition, the buttons should be illuminated, audible and vibrating in order to be used

by visually and hearing-impaired users; there should be tactile raised arrows showing the intersection direction on the buttons (Figure 78). Passing opposite sidewalk times should be programmed to allow pedestrians with limited mobility to pass through (Turkish Standard, 2012).

Figure 78.

*Buttons Suitable for Use of All Individuals in Light-Controlled Pedestrian Crossings (Gültaşlı, 2017)*

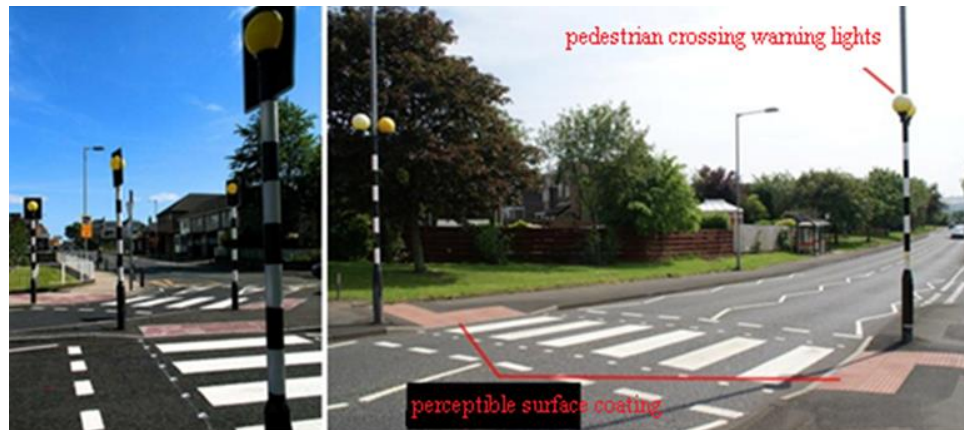


Traffic light uncontrolled pedestrian crossings may be preferred in places with low traffic density. For safety at such pedestrian crossings, drivers should be warned with a pedestrian crossing sign at least 20 m before the pedestrian crossing. It should be visible from a sufficient distance and be well lit. Uncontrolled pedestrian crossings must be equipped with a flashing yellow light for illumination, which will also be a warning to both vehicles and pedestrians. In addition, perceptible surfaces should be created at the beginning and end of the pedestrian crossing for the visually impaired (Figure 79) (Turkish Standard, 2012).



Figure 79.

*Traffic Light Uncontrolled Pedestrian Crossing (Turkish Standard, 2012)*



Sometimes for passing opposite side underpasses or overpasses can be designed in urban planning. In underpasses and overpasses, if it is appropriate for the environment, ramps with a slope not exceeding 6% should be preferred instead of stairs. In the event that a ramp cannot be made; vertical elevators, escalators or inclined elevators moving on the slope of the stairs should be made in order to ensure that the under and overpasses can be used by everyone (Figure 80).

Figure 80.

*Inclined Elevator in TS 12576, Which Can Be Preferred in Case the Ramp Cannot Be Made (Turkish Standard, 2012)*





## Urban Furniture and Equipment

Urban furniture and equipment have to be taking care in urban design and transportation network. Urban furniture covers benches, lighting poles, telephone boxes, trash cans, planting pots, ticket, newspaper, flower sales kiosks, public toilets, bus stops and sign / information boards, cash dispenser. Urban furniture and equipment must be positioned in appropriate points and designed in a way that does not prevent the movement of users with limited movement and suitable for everyone with sufficient markings. Considering the accident situations, care should be taken to ensure that urban furniture is free from sharp and protruding edges. When choosing the colors of urban furniture, colors that create contrast with its surroundings should be preferred in order to be easily perceived (Turkish Standard, 2012).

Along the avenues, there are many types of urban furniture and equipment. Garbage cans, signage, lighting fixtures, flower pots, and traffic lights are a few of them. There are some recommendations for these things to improve their usability.

- Urban furniture must be placed inside the property or safety strip that is marked on the sidewalk. They shouldn't be placed in the path of walking.
- They must be built in a variety of sizes and/or features to give the user options, including sizes that are ideal for wheelchair users, short individuals, and youngsters.
- Taking into mind those who are blind or illiterate, informational signs and/or digital devices (such parking lot payment points) should be supported by the Braille alphabet, auditory warning systems, and/or visual material.
- Lighting items should have capabilities to illuminate both the road for vehicles and the pavement.

In urban space evaluation tables, trash cans are rated. They must to be made of non-injurious materials, painted a striking color, have a lid that can be opened with one hand, and be positioned on the pedestrian safety strip.

Tables for evaluating urban spaces include signs. Information signs are letters and symbols that can be read, heard, and touched to communicate information. The information on the signs should be placed at a height from the ground that allows people of different heights and those in between to see it clearly. (Starting height:

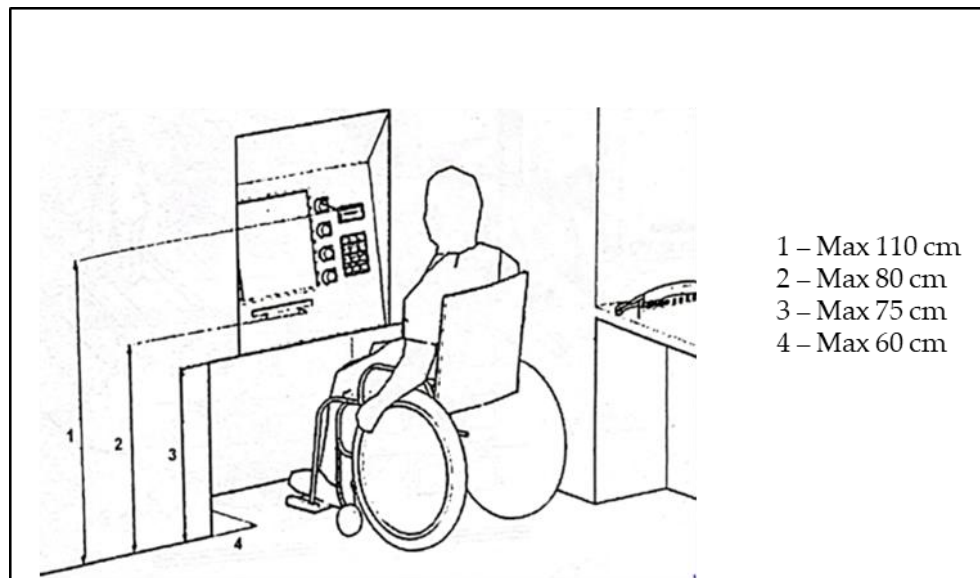
approximately 105 cm; finished height: approximately 195 cm.) (Turkish Standards, 2012).

Urban space evaluation tables provide an interpretation of traffic signals. Traffic sign buttons at intersections with pedestrian control should be positioned between 90 and 120 cm in height to make them accessible to people with disabilities. These buttons ought to be visible, audible, and vibrating so that pedestrians with vision and hearing impairments could operate them. The direction of the intersection should be indicated by embossed arrows on the buttons. At least 4.5 meters must separate the bottom of the traffic lights from the ground.

Additionally, the cash dispenser needs to have features wheelchair users can utilize and approach (Figure 81). With its proportions, auditory warning systems, and tactile keys, it ought to be suited for a range of users.

Figure 81.

*Cash Dispenser Example (Turkish Standards, 2011)*



### 4.3.2 Discussion about Findings of User Survey

#### Section 1: Demographic data

According to the findings of first part of the survey, demographic information of the participants such as age, gender, education level shows the diversity of the participants. Most of the participants select “*other*” option for “*Do you have any special circumstance?*” item. In explanation part of the survey for “*other*” option they argued they don’t have any special circumstance. Nevertheless, it is seen that 1.3% of the participants have a physical disability. In addition, 13,3% of participants have chronic illnesses. All of these participants are users of urban spaces in research area.

#### Section 2: User views about accessibility

When looking at the findings of the second part of the questionnaire, it seems that most of participants (82%) get access to these neighborhoods by private car. This situation shows the importance of car parking areas in the neighborhoods. It is interesting result that Participants’ answers about the item ‘*Do you think the green areas in this neighborhood are suitable for everyone?*’ are equally ‘*yes*’ (50%) and ‘*no*’ (50%). According to this data, it can be argued that green areas not suitable for half of the participants. There is an important finding about ‘*The sidewalks in the neighborhood (in terms of material, size and continuity) are suitable for everyone*’ item. Most of participants selected ‘*Strongly disagree*’ option for it. This show that sidewalks are not suitable for everyone. It can affect accessibility as a pedestrian. Most of the participants’ answer about the item ‘*When you come to the neighbourhood with a private car, you can easily find a parking space*’ is ‘*Strongly disagree*’. It showed that although most of them access by private car to there, they can not find a parking space easily. In addition, most of participants select ‘*Strongly disagree*’ option for ‘*Parking areas (in terms of material, size, location) are suitable for everyone*’ item.

#### Section 3: User views about walkability

The findings of the third part of the questionnaire are about walkability. When the results of the item ‘*I can easily reach this neighborhood on foot*’ evaluated, most of the participants replied ‘*agree*’. Although this data, most of the participants didn’t select ‘*walking*’ option for accessing in the neighborhoods. A significant portion of

the participants select '*strongly disagree*' elective for '*Pedestrian crossings in the quarter are positioned in necessary places and are suitable for everyone*' item. It showed that pedestrian crossings are ignored in the research area. The '*strongly disagree*' option is selected by most of participants for '*In overcoming the level differences in the neighbourhood, solutions have been made by taking into account the variety of users (such as positioning the ramps as well as the steps)*' item. This situation shows that user diversity is not taken into account.

#### **Section 4: User views about safety**

The questions in fourth part of the questionnaire are about safety. When the results of the item '*Do you think your neighbourhood is safe?*' evaluated, 71,3% of participants replied '*yes*'. This result showed that the research area is safe in terms of crime rate. When the results of the item '*Elements such as information signs and billboards (in terms of material, size and location) in the neighbourhood have a low risk of causing accidents in case of carelessness of the users.*' evaluated, 28,7% of participants replied '*agree*'.

#### **Section 5: User views about UD principles**

When the results of the item '*Considering the diversity of users in the neighbourhood, there are elements with the same function designed with different features in urban spaces like street, avenue, park, square, etc.) (such as garbage bins, book sharing points located at different heights)*' evaluated, 62,0% of participants replied '*strongly disagree*'. It shows that the flexible use one of the principles of UD is neglected in selected neighbourhoods. When the results of the item '*Urban spaces (streets, avenues, parks, squares etc.) in the neighbourhood can be easily found and used by everyone with the help of perceptible information*' evaluated, 42,0% of participants replied '*strongly disagree*' It can be argued that Simple and intuitive use, one of the universal design principles, is ignored in these neighbourhoods. It is interesting that the results of the item '*Information signs in urban areas of the neighbourhood (streets, avenues, parks, squares, etc.) can be understood by everyone*' showed 28,0% of participants replied '*strongly disagree*', 28.0% replied '*agree*'. This equality prevented a clear comment on whether the perceivable information principle was heeded or not. This equality prevented a clear comment on whether the perceivable information principle was heeded or not.

However, when looking at the rest of the findings it is seen that 18,0% of participants selected '*disagree*' option and 15,3% of them replied '*unsure*', 10,7% elected '*strongly agree*' option. Accordingly, it can be argued that this principle is also neglected.

In brief, when looking at the details of the collected data from the questionnaire, it can be argued that the accessibility, walkability and concept of universal design are ignored substantially in the urban spaces at the study area (Taşkinköy, Göçmenköy, and Marmara neighborhoods). Nevertheless, safety item is considered in these neighborhoods.

## CHAPTER V

### Conclusion and Recommendations

#### 5.1 Conclusion

As the world becomes more urbanized, the importance of universal design increases in both developed and developing countries. Recently, there has been a growing emphasis on providing equal opportunities for all individuals, including those with disabilities, to attend in social and communal life. Since the terminology of UD was first suggested, there has been remarkable progress, and the emergence of UD thinking can be seen in nations and regions all over the world. In addition, the place of the sustainability concept in urban design is also important. Each sub-branch of the sustainability concept should be considered in urban design. Social sustainability has been the most overlooked concept among these in the literature.

The city of Northern Nicosia, which has hosted various civilizations throughout history still carries various cultural traces. The city which is the capital of Northern Cyprus also urgently needs to incorporate universal design principles into its urban design parameters. In terms of the quality of urban settings, including public spaces like parks, squares, streets, and avenues, the city has considerable deficiencies. Based on this ground, the study aimed to evaluate universal design within different dimensions in the context of sustainable urbanism in Northern Nicosia.

Within this framework, this thesis consists of five chapters. In the first part, a general introduction was made and the purpose, research questions, limits and scope of the study were determined. Accordingly, in the second part, a literature review on the subject was made and the conceptual framework representing the link between universal design and sustainable urban environments was revealed.

According to the conceptual framework, UD (applied in different scales of the built environment with the help of seven main principles) has a positive impact on urban design parameters. The urban design parameters are among the physical components of social sustainability. As a comprehensive concept, alongside tangible components, social sustainability involves non-physical components. With the help

of these indicators within these two main classifications, SS is one of the four main pillars of sustainable urban environments.

In the third chapter, the material and method of the study were explained. A qualitative assessment based on the seven principles of UD and a quantitative evaluation based on Turkish Standard Institute standards, with the inclusion of European directives/regulations, were applied to the selected avenues of three (Taşkinköy, Göçmenköy and Marmara) neighborhoods. In the next section, the findings of the collected data were presented and discussions were held. Finally, conclusions are drawn based on the findings obtained through theoretical evaluation, research and analysis and suggestions are made accordingly. Based on the findings, it can be concluded that Northern Nicosia urban areas do not provide a convenient environment for all users.

In sum, the researcher targets that alongside theoretical evaluation, fieldwork involving qualitative and quantitative analysis and survey research can expand the existing scientific knowledge of UD. Briefly, this study has focused on the importance of considering the concept of universal design for urban spaces. The qualitative and quantitative analyses performed, as well as the review of literature, which included a theoretical framework, are expected to add to the existing knowledge of UD terminology in the context of SS.

## **5.2 Recommendations**

In an era dominated by intense urbanization activities, public spaces as streets, squares, parks etc are gaining more and more importance all around the world both in developed and developing countries. Urban spaces have a huge potential to improve the life quality and SS in modern cities by providing chances for equal involvement regardless of gender, age, country, or social-economic position (Rogers, 2003; Lotfata & Ataöv, 2020). Thus, it is eligible to adopt the concept of UD in order to contribute to SS while designing urban spaces.

The concept of UD is important to ensure usability for everyone in urban spaces. UD is described as “a process that enables and empowers a diverse population by improving human performance, health and wellness, and social

participation” (Steinfeld & Maisel, 2012). The seven UD principles are defined in the built environment to support universal accessibility (Yiing et al., 2013).

In order to provide sustainable urban space parameters such as accessibility, walkability and safety in the city of Northern Nicosia, the physical structure in all urban spaces should be improved. It is further recommended to increase the diversity and amount of the urban furniture items in urban spaces, and to rearrange the existing ones in terms of material size and location, as explained in the discussion section of this research.

This improvement should be by adopting UD principles. At this point, when applying UD principles, the Article 19 regulation under Chapter (Fasil) 96 applied in Northern Cyprus and the relevant TSI standards can be used as references. This Article 19 in Chapter 96 is prepared for the design of roads and buildings to be convenient for the use of disabled individuals; it was published in the official gazette and became efficient in 2016.

Despite the existence of a master plan, and the existence of many regulations and standards for the arrangement of urban spaces, there is a further requirement of preparing subscale plans for the urban spaces of the city. In addition fiscal budgets for the planning, design and implementations of these projects must be increased. Further, it must be ensured that the necessary control mechanisms are effective both in the design and construction phases.

Further, the improvement of urban spaces in Northern Cyprus is under the control of local governments. And urban design and planning are successful when technical experts from different disciplines work together as a team. It is therefore needed to strengthen the technical units of the municipalities with new architects, urban designers and landscape architects.

Beside local and central government, non-governmental organizations (NGOs) should have an improved focus on the subject of UD in relation to the issues of urban design parameters achieving sustainable environments. At this point it can be argued that related bodies like Chamber of Architects, Chamber of Urban Planners and Union of the Chambers of Cyprus Turkish Engineers and Architects need to have a crucial concern for developing professional knowledge among their members. For this reason, technical courses and seminars can be increased and campaigns for



the awareness can be created. Related governmental and non-governmental institutions can also collaborate with international experts for the education and awareness activities.

In this context, it is required for the architects, urban planners, urban designers and landscape architects in Northern Cyprus to clearly acknowledge that urban design should start from the building level up to the urban scale. Accordingly, it is important for them to be conscious of the relationship between universal design, urban design and sustainability. At this point, it is also important for the higher education units like faculties of architecture to improve their curriculum with related lectures for increasing the awareness and knowledge on related subjects at universities.

Last but not least, public awareness and concern needs to be improved and strengthened about the significance of urban spaces in built environments. Raising awareness can be efficient for the residents to more actively interact in public spaces. Such a lifestyle can improve the attention of the users on the subjects of UD, universal design and sustainable urban environments and can increase the demand for the planning, design, implementation and management of these spaces.

However, not only in Northern Nicosia but in all urban environments in the world, the requirements of UD must be noticed in order to increase comfort, adaptability, and flexibility that can help to improve social sustainability in cities (Kadir & Jamaludin, 2013). In other words, the strong relationship between universal design and urban design parameters is significant for socially sustainable urban spaces.

As concluding remarks, cities are for all individuals and the human factor cannot be neglected in urban planning. It is urgent to apply universal design-based guidance to local regulations so that problems can be resolved. Furthermore, UD should be exhaustive from origin to destination in order to accommodate the broadest possible range of potential users (Harsritanto, 2018).

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## Appendices

### Appendix A

#### Questionnaire

With this user survey, data will be collected for the doctoral dissertation titled "ANALYSIS OF URBAN PLANNING IN TERMS OF UNIVERSAL DESIGN: A STUDY IN NICOSIA, N. CYPRUS" conducted in the Department of Architecture of the Graduate School of Applied Sciences at Near East University. The current situation of urban spaces and user satisfaction and opinions regarding the suggestions for urban spaces suitable for all individual's use will be examined through the applied questionnaire. The questionnaire consists of five (5) sections. The word "everyone" in the questions in the questionnaire includes all individuals (elderly, sick, young, children, wheelchair users, stroller parents, visually / hearing impaired individuals, etc.) using the neighborhood with different age groups and / or different characteristics. Some of the replies will be made by rating. Rating meanings are explained below.

**1:** Strongly disagree, **2:** Disagree, **3:** Unsure, **4:** Agree, **5:** Strongly agree

#### Part 1: Demographic data

- Gender:

Female  Male

- Age range:

18-24  25-34  35-44  45-54  55-64  65+

- Marital status:

Married  Single

- Education:

Primary education (primary school-secondary school)

High school

Undergraduate (2 year university)

Undergraduate (4 year university)

Master/PhD

Others .....

- Occupation:

Private sector  Officer  Student  Housewife  Retired  Unemployed

- Do you have any special circumstances?

Physical disability  Pregnant  Chronic illness  Senile  Other:.....

## Part 2: Accessibility

- How did you get access to this neighborhood?  
 Walking     Special car     Bike/Motorbike     Public transport / taxi
- Are there any green areas in this neighborhood that you can easily access?  
 Yes     No
- Do you think the green areas in this neighborhood are suitable for everyone?  
 Yes     No
- Do you think the squares and / or meeting areas in this neighborhood are suitable for everyone?  
 Yes     No
- The sidewalks in the neighborhood (in terms of material, size and continuity) are suitable for everyone.  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*
- The stops in the neighborhood are sufficient and suitable for everyone.  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*
- Information signs (including illiterate individuals and visually impaired) located in the neighborhood are understandable and sufficient by everyone.  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*
- Urban furniture (benches, garbage bins, flower beds, etc.) in the neighborhood is sufficient and suitable for everyone (in terms of size, material and positioning).  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*
- When you come to the neighborhood with a private car, you can easily find a parking space.  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*
- Parking areas (in terms of material, size, location) are suitable for everyone.  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*

## Part 3: Walkability

- I can easily reach this neighborhood on foot.  
*Strongly Disagree*     1     2     3     4     5    *Strongly Agree*

- Pedestrian crossings in the quarter are positioned in necessary places and are suitable for everyone.

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*

- The traffic lights in the quarter are positioned in places necessary to protect the pedestrian traffic and are suitable for everyone.

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*

- In overcoming the level differences in the neighborhood, solutions have been made by taking into account the variety of users (such as positioning the ramps as well as the steps).

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*

#### **Part 4: Safety**

- Do you think your neighborhood safe?

Yes     No    (If no why?.....)

- The street and / or avenue where the shopping, entertainment and consumption part of the quarter is concentrated should be reserved for pedestrians only.

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*

- Elements such as information signs and billboards (in terms of material, size and positioning) in the neighborhood have a low risk of causing accidents in case of carelessness of the users.

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*

- Lighting elements in the neighborhood are sufficient for night use of this place.

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*

#### **Part 5: Universal Design Principles**

- In the urban areas (streets, avenues, parks, squares, etc.) in the neighborhood, everyone has the opportunity to move around under the same conditions. (Equatable use )

*Strongly Disagree*     1    2    3    4    5    *Strongly Agree*



- Considering the diversity of users in the neighborhood, there are elements with the same function designed with different features in urban spaces (street, street, park, square, etc.) (such as garbage bins positioned at different heights, book sharing points). (Flexible use)

*Strongly Disagree*    1   2   3   4   5    *Strongly Agree*

- Urban spaces (streets, avenues, parks, squares, etc.) in the neighborhood can be easily found and used by everyone via the perceptible information. (Simple and intuitive use)

*Strongly Disagree*    1   2   3   4   5    *Strongly Agree*

- Information signs in urban areas in the neighborhood (streets, avenues, parks, squares, etc.) can be understood by everyone. (Perceptible information)

*Strongly Disagree*    1   2   3   4   5    *Strongly Agree*

- Equipment (water items, urban furniture, etc.) found in urban areas in the neighborhood (street, avenue, park, square, etc.) is designed to minimize the likelihood of accidents that may occur due to the carelessness and / or physical / mental abilities of the users (by planting flowers around the water element. such as avoiding getting too close). (Tolerance for error)

*Strongly Disagree*    1   2   3   4   5    *Strongly Agree*

- Level differences in urban spaces (streets, streets, parks, squares, etc.) in the neighborhood can be overcome by ramps with appropriate slopes without exerting much physical effort. (Low physical effort)

*Strongly Disagree*    1   2   3   4   5    *Strongly Agree*

- Equipment (children's playgrounds, sports fields, benches, etc.) in urban areas (streets, streets, parks, squares, etc.) in the neighborhood is suitable for everyone's approach and use (they offer different sizes of options and / or adjustable features). (Size and space for approach and use)

*Strongly Disagree*    1   2   3   4   5    *Strongly Agree*

**Appendix B**  
**NEU Scientific Research Ethics Committee Report**



YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

26.08.2020

Dear Ömran Duman

Your application titled "**Analysis Of Urban Planning In Terms Of Universal Design: A study In Nicosia, N. Cyprus**" with the application number YDÜ/FB/2020/100 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

**Note:** If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

















## Appendix C

### Turnitin Similarity Report

#### Ümran PhD Thesis

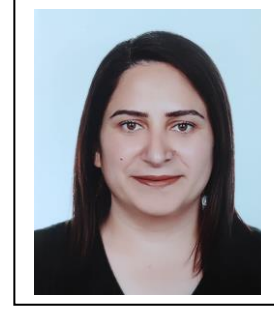
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<input type="checkbox"/>	Ümran Duman	Özet	0% 	--	--		2000419158	27-Jan-2023	
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<input type="checkbox"/>	Ümran Duman	Chapter II	15% 	--	--		2000418574	27-Jan-2023	

## CV

1. **Name Surname** : Ümran Duman
2. **Date of Birth** : 11.09.1991
3. **Title** : M. Sc.
4. **Education Status:**Master
5. **Institution** :Near East University



Degree	Department	University	Year
U.G.	Architecture	Near East University	2014
Master	Architecture	Near East University	2017
Doctoral	Architecture	Near East University	Continuing

5. **Academic Titles**

- Assitant Prof Doctor Date : -  
 Associate Prof Doctor Date :-  
 Proffesor Doctor Date :-

6. **Administered Master's and Doctoral Theses**

- 6.1. Master Theses-  
 6.2. Doctoral Theses-

7. **Publications**

7.1. **Articles published in international peer-reviewed journals (SCI, SSCI, Arts and Humanities, Scopus)**

Duman, Ü., & Uzunoğlu, K. (2021). The importance of universal design for the disabled in public buildings: a public building in Northern Cyprus as a case study. *Civil engineering and architecture*, 9(3), 690-707.

Duman, Ü., & Asilsoy, B. (2022). Developing an Evidence-Based Framework of Universal Design in the Context of Sustainable Urban Planning in Northern Nicosia. *Sustainability*, 14(20), 13377.

7.2. **Articles published in other international peer-reviewed journals**

Duman, Ü. & Asilsoy, B. (2019). Kent Mekanının Sürdürülebilirliğinde Evrensel Tasarımın Etkisi: Barış Manço Parkı. *YDÜ Mimarlık Fakültesi Dergisi*. Cilt 1, Sayı 1. Lefkoşa.

7.3. **Papers presented at international scientific meetings and published in the proceedings book**

Duman, Ü., Laleci, S., Yıldırım, S. & Gücel, S. (2017). Yöresel Yaşam Parkı: Kalavaç - Görneç Örneği. 2. *Uluslararası Mühendislik, Mimarlık ve Tasarım Kongresi*. Kocaeli.

Duman, Ü., Köksaldı, E., Tarboush, R., Atak, M. & Asilsoy, B. (2018). Examining The User Satisfaction In Relation To Urban Furniture: A Study In Kyrenia, Barış Park. *II. International Urban Environment Health Congress*. Cappadocia.

Duman, Ü. & Akansu, V. (2019). Evrensel Tasarım Kavramı Bakış Açısı ile Yat Limanları Kullanıcı Memnuniyetinin Araştırılması: Girne Antik Yat Limanı Örneği. *Çukurova 3. Uluslararası Yenilikçi Bilimsel Araştırmalar Kongresi*. Adana.

Akansu, V. & Duman, Ü. (2019). Kent Mekanlarına Getirilecek Yeni Düzenleme Kriterlerinin Belirlenmesinde Portekiz Örneğinin Kıbrıs Kapalı Maraş Bölgesine Uyarlanması. *Çukurova 3. Uluslararası Yenilikçi Bilimsel Araştırmalar Kongresi*. Adana.

Duman, Ü. & Akansu, V. (2021). The Effect of Covid 19 Pandemic on Public Green Space Use: Alsancak National Park Example - Alsancak Recreation Park Example. *4. International Conferance on Covid-19 Studies*. İstanbul.

Duman, Ü. (2021). Mekânda Erişilebilirlik. *Covid-19 Pandemi Sürecinde Eğitimde Engelli Hakları*. YDÜ – EHİK. Lefkoşa.

Duman, Ü. (2022). Mimarlık Alanında Farkındalık Eğitimi. *Engelli Hakları İzleme Çalışmayı*. YDÜ – EHİK. Lefkoşa.

#### 7.4. International books or chapters in books written

#### 7.5. Articles published in national peer-reviewed journals

#### 7.6. Papers presented at national scientific meetings and published in the proceedings book

Öksüz, E., Uluğ, E., Karaca, A., Kaya, S., Arcan, E. F. ve Duman, Ü. (2017). Profesyonel Hayatta Mimarlık Mesleği ve Mesleki Eğitim Politikaları. *V. Mimarlık ve Eğitim Kurultayı*. Lefkoşa.

Duman Ü. (2019). Engelli Standartları. *KKTC Başbakanlık Engelli Hizmetleri Koordinasyon Kurulu Semineri*. Sayıştaylık/Lefkoşa.

Duman, Ü., Yüzüak Duymaz, T., Oktay, M. & Akansu, V. (2021). Uzaktan Eğitim Yöntemi Olarak Çevrimiçi Eğitimin Asgari Koşulları, Gereklilikleri, Sorunları Ve Olanakları: Kuzey Kıbrıs Örneği. *6. Mimarlık ve Eğitim Kurultayı*. Lefkoşa

Duman, Ü. (2022). Kamusal Alanlarda Evrensel Tasarım. *KKTC Cumhurbaşkanlığı Erişilebilirlik Semineri*. Lefkoşa.

#### 7.7. Other publications

Duman, Ü. (2018). Kamusal Yapılarda Evrensel Tasarımın Önemi: Girne Kaymakamlık Binası ve Yakın Çevresinin İncelenmesi. *Mimarca*, 51-57. Lefkoşa.

### 8. Projects

#### 9. Administrative Missions

2019-Continuing \_\_\_ NEU Disability Rights Monitoring Committee, Faculty of Architecture Coordinator  
2020 – Continuing \_\_\_ NEU Faculty of Architecture Courses Coordinator

#### 10. Memberships to Scientific Organizations

UCTCEA Chamber of Architects

#### 11. Awards

2022, YDÜ Genç Araştırmacı Ödülü

#### 12. Please fill in the table below for the undergraduate and graduate level courses you have given in the last two years.

Academic Year	Term	Course Name	Weekly Hour		Student Number
			Teoric	Pratic	
2020-2021	Fall	MİM402	2	6	28
		Mezuniyet Projesi			
		MİM301 Mimari Tasarım III	2	6	19
		MİM307	3	-	58
		Çevre Kontrol Sistemleri II			
		ARC307	3	-	42
		Environmental			

		Control Systems II FAE481 Large Scale Urban Projects	3	-	24
	<b>Spring</b>	ARC 401 Architectural Design V	2	6	20
		ARC302 Architectural Design IV	2	6	27
		ARC206 Construction and Material II	2	2	37
		ARC106 Construction and Material I	2	2	30
		ICM/IAR306 Universal Design: Special Use and Users	3	-	24
	<b>Summer</b>	MİM307 Çevre Kontrol Sistemleri II	3	-	1
		ARC307 Environmental Control Systems II	3	-	10
		TMF479 Kentsel Projeler	3	-	1
2021-2022	<b>Fall</b>	ARC302 Architectural Design IV	2	6	16
		ARC202 Architectural Design II	2	6	8
		MİM307 Çevre Kontrol Sistemleri II	3	-	23
		ARC307 Environmental Control Systems II	3	-	33
		FAE481 Large Scale Urban Projects	3	-	25
	<b>Spring</b>	MİM302 Mimari Proje IV	2	6	21
		ARC202 Architectural Design II	2	6	8
			2	2	25

		ARC106 Construction and Material I	2	2	23
		MİM106 Yapı ve Malzeme I	3	-	31
		ICM/IAR306 Universal Design: Special Use and Users			
	<b>Summer</b>	MİM307 Çevre Kontrol Sistemleri II	3	-	8
		INAR342 Building Performance Special Use and Users	2	1	1