# An Evaluation of Universal Design Approach in Design Practice: The Case of Housing Design Practice in North Cyprus

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# ABSTRACT

Today, there is a growing appreciation of the extensive benefits of universal design (UD) in various design professions. To achieve these benefits, design professionals and especially architects must have the knowledge and skills to implement UD in practice, and housing is an important part of the building typologies that requires a new outlook as the demography of users also change. This research investigates UD in the context of recent architectural housing design practice in North Cyprus and questions the reasons behind why there is a scarce of integrated/human-centred housing design examples. It traces the reasons behind this fact, whether it is the changing attitudes in the culture of architectural education, or it is the lack of continuous professional development (CPD) or the user and/or client profile. For this purpose, an online survey has been organized to review the inclinations of the local architects from a wide range of ages, sex, and educational background.

**Keywords:** universal design; architecture; housing design, architectural education; continuing professional development; North Cyprus.

# ÖZ

Günümüzde, çeşitli tasarım mesleklerinde evrensel tasarımın (UD) kapsamlı faydaları giderek artan bir şekilde takdir edilmektedir. Bu faydaları elde etmek için tasarım profesyonelleri ve özellikle mimarlar, UD'yi uygulamada uygulamak için bilgi ve becerilere sahip olmalıdır ve konut, kullanıcıların demografisi de değiştiği için yeni bir görünüm gerektiren bina tipolojilerinin önemli bir parçasıdır. Bu araştırma, Kuzey Kıbrıs'taki son mimari konut tasarım uygulaması bağlamında UD'yi araştırmakta ve neden az sayıda entegre / insan merkezli konut tasarımı örneğinin olduğunu sorgulamaktadır. Araştırma ister mimarlık eğitimi kültüründe değişen tutumlar olsun, ister sürekli mesleki gelişim (CPD) eksikliği veya kullanıcı ve / veya müşteri profili olsun, bu gerçeğin arkasındaki nedenleri izlemektedir. Bu amaçla, yerel mimarların geniş bir yaş, cinsiyet ve eğitim geçmişine sahip eğilimlerini incelemek için çevrimiçi bir anket düzenlenmiştir.

**Anahtar Kelimeler:** evrensel tasarım; mimari; konut tasarımı, mimarlık eğitimi; sürekli mesleki gelişim; Kuzey Kıbrıs.

**I would like to dedicate this thesis to my family**

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# INTRODUCTION

The topic of universal design (UD) due to its concerns relating to design for all focuses specifically on the issue of usefulness. For any design, from the scale of city planning to the design of buildings or any product, theorists and design practitioners argue that usefulness is a decisive factor for any successful design. Thus, even the importance of usefulness is clear, during the history of design, this concept rarely has been highlighted and there is a lack of attention to it in the design professions.

Even during the modernism era, where the two concepts, “form follows function” and “truth to materials” were introduced and were the guiding principles of architecture of the time, the issue of usefulness received less attention than the function.

However, in the contemporary era, there is a constant demand that architects and designers think for a variety of users and therefore focus more on the user’s needs. One of the first movements which were putting nature and humans’ needs at the centre of the design, was after the 1970s energy crisis corresponding to the emergence of sustainable design. Together with this movement, the importance is given to the environment has increased, and the question arose:  Is protecting people not just as important as protecting the natural environment? Thus, the importance of useful design, protecting users, being aware of a variety of users received more and more attention in the contemporary era. And perhaps, if architects and designers, were

considering the protection of people from the origin of design principles we would have succeeded in saving the environment as well. Thus, the Universal Design is at the heart of design with its main principles and concepts if we are designing for this contemporary age.

The main concept of UD is coming through the disability rights movement. Later on, this concept has developed and expanded to include social sustainability and user-centred design. When the natural environment and all spaces designed with UD principles respond to the needs of the users from all categories, it can improve the quality of life. UD should be applied to a different range of principles from the design of the products, to the bigger scale such as architecture, urban planning, and also infrastructure.

This short introduction highlights the importance dedicated to UD especially in our contemporary era. Looking from the perspective of our age, this research builds on a literature review that unfolds what is universal design, how it is approached, and what its underlying principles are. After a review of the UD and its underlying principles, the study focuses on how these principles are interpreted in the case of housing where there is usually no such obligation to apply UD principles. Under this framework, the research focuses on the case of housing design practice in Northern Cyprus, of which the built environment has been suffering heavily from the after-effects of the housing explosion the island has been experiencing since the last decade in line with the announcement of the infamous Annan Plan upon the entry of Southern Cyprus to the EU.

Although many housing projects have been designed by the Turkish Cypriot Architects, in between 2004 and 2020, it is observed that many of them have not been designed according to the principles of universal design. Through a base-line survey, the research attempts to understand the cognizance of practicing architects on universal design principles and standards as well as how often it is demanded by their users.

The collected results will hopefully help shed light on a significant issue where in due course the awareness of professionals shall be raised. The research will conclude with proposals towards the betterment of this significant issue in the design practice. This study can highlight the existing weaknesses in the architectural housing design practice in North Cyprus from the perspective of UD principles. Consequently, the research aims to develop recommendations for the implementation of UD in the architectural housing design practice in Northern Cyprus so that better quality environments can be achieved.

## 1.1 Problem Statement

As mentioned earlier, Universal Design (U.D.) is one of the important concepts in today's world and is highly essential for having a successful design. There are a great number of disciplines that are affected by universal design and its implications, including planners and designers to facility managers and groups that utilize facilities, especially in the health field, rehabilitation, as well as groups dealing with all sorts of disabilities. Therapists and people studying human behavior are involved, and so are administrators/managers of communities and facilities that cater to seniors. Then there is the building industry, especially housing, which is beginning to take note of universal design by creating and building prototypes of universally designed houses. This process requires a collective and collaborative approach to design where the user

is integrated into the process. Legal standards are required to guarantee the rights of users in the social and physical environment, but on their own, they cannot alone contribute to building culture and to the development of a society of equal opportunities.

Unfortunately, acceptance of universal design concepts in the design and building professions is progressing slowly. There is a need to bridge the gap between universal design and the building professions by presenting built examples of new and remodel existing homes that integrate universal design features from the outset.

Under this framework, the research focuses on the case of housing in Northern Cyprus, of which the built environment has been suffering heavily from the after-effects of the housing explosion the island has been experiencing since the last decade in line with the announcement of the infamous Annan Plan upon the entry of Southern Cyprus to the EU in 2004.

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## 1.2 Research Question

Lack of UD design consideration in the housing projects in North Cyprus can be observed in the existing projects in different cities. From the building designed by targeting the students or low-income users to more contemporary and well designs buildings, the lack of UD is presivable. Apart from some ramps for public access to building (most of the time designed with a wrong degree) or inclusion of an elevator in apartment projects after 4 floors, not many more UD principles and standards can be seen. This everyday observation arises a hypothesis that there is a negligence of universal design principles in housing design in TRNC, thus this study tries to answer:

- What are the main reasons behind the negligence of universal design principles in the building profession and the implementation of housing in Northern Cyprus?

## 1.3 Aim and Objectives

To understand why practicing architects do not apply UD principles and standards in their housing projects?

- To investigate the background of professional architects based on their age group, gender and education and how responsive they are to U.D principles in their design process
- To highlight if clients/users demand the application of UD principles during the design process.
- To explore if and how architects, make their clients/users become part of an architectural design project.

## 1.4 Research Methodology

This study is based on descriptive methods including related literature from primary sources like books and scientific articles, and secondary sources such as internet sources where related architectural drawings and photographs are tracked for the completion of the case study analysis. Also, the exploratory method will be used for discovering the reasons behind the non-usage of U.D. principles in professional practice. In general, this study will be applied research, to respond to a practical question. In this manner, questionnaires with a selected number of architects will be carried out. The survey has been designed throughout the online website of Survey Monkey (Appendix A), it includes 34 different questions (multiple choice, open-end, scaled based) which collected data from 67 participants in total. Although there are different tools for carrying an online survey such as, SoGoSurvery, Typeform, Zoho Survey and etc., but for this study Survey Monekey has been selected since it is the most well-known name in the realm of online survey tools. This tool is well designed and easy to use. With this tool the survey data makes the research conclusions stronger and more compelling, providing direct evidence. This platform is popular among academic researchers since easily can transfer data to Excel and SPSS and make the analysis process easier.

## 1.5 Limitation of Study

This research is focusing on the concept of UD in architectural design. The aim of the research has been explained earlier, however for achieving this goal some limitations has been applied to the study in order to narrow down the research and find out the more specific answers. In this manner the first limitation has been added on the building types. For this study the main focus is on the housing design practice. In this manner the commercial, office buildings and ect., are not included in the study. For

the housing types there is not limitation for single housing, apartment blocks, mass housing or so on. Thus, following chapers discuss the principles of UD design which can be applied in one or more types of housing and not necessarily all types. The other limitation of study has been applied on the group for collecting the data. This study carring the data collection on practicionaris and architects. Thus, the research is questionaning understanding of architects in North Cyprus over the concept of UD, tried to understand the lack of usage of this concept in this country is from where. The study is not focusing on a specific period of design practice such as design, application etc., but tries to highlight the general understanding over the mentioned topic.

## 1.6 Structure of the Thesis

This thesis is structured in five chapters. The first chapter (Introduction) comprises the general introduction to the topic, formulating the research problem, aims, and methodology of the study. After that, the study continues through a comprehensive literature review on Universal Design, including all the information related to Universal Design, the definition, principles, demography, benefits and so on.Chapter three focuses on Universal Design particularly in housing, impacts of this method on user's health (psychologically and physiologically).

Chapter four investigates the case, the practice, in North Cyprus where interview and questioner results from the architects are interpreted to understand the awareness of Universal Design principles in architecture in this region. In chapter five the study will be concluded with presentation of the results, recommendations, and further research.

# Chapter 2

# UNIVERSAL DESIGN

From the 1950s there was a shift in the field of architecture towards Universal Design and the growing demand to design for “all”, people with different kinds of disabilities, started to get more attention. In different parts of the world, from Europe, East Asia, to United States, UD or designing without barriers improved to build an environment for all people with different physical disabilities. At the beginning of introducing UD into architecture, the main focus was considering physical disabilities, but nowadays, UD is thinking beyond responding to the physical disabilities needs but also taking into consideration factors such as air quality, the sound level since they can create barriers for some special group of people (Froyen, 2012). It has to be mentioned that in general the concept of disability can be defined and explained in various ways for different people, it means meaning that one will receive the support, services, and resources that are necessary for a reasonable quality of life. (Charlton, 2000). For having an accurate accessibility system, the combination of changes in parameters such as physical factors, social aspects, and also assistance should be considered (Froyen, 2012).

From all over the world, in different contexts, such as Australia, Brazil, Canada, France, Germany, India, Ireland, Israel, Italy, the Netherlands, Norway, Southeast Asia, and Switzerland thinking about UD can be perceived (Preiser and Ostroff,2001) even if there is a huge difference among the mentioned countries culture related to ow

the movement has evolved. Based on these differences' different terminologies and terms with diverse historical and cultural meanings have been developed, terms such as accessible design, barrier-free design, design for all, and so on (Iwarsson, 2005).

For example, in Japan, the UD concept stayed as a dominant terminology while in United State this concept has been used interchangeably with the concept of inclusive design. Meanwhile, in the UK, north and central Europe terminologies such ad design for all or inclusive design remained fundamental terms, it should be mentioned that still, Council of Europe uses UD as the main term in the resolutions (Council of Europe, 2007). Even though in the USA terminologies such as life-span design has been used, Mullick and Steinfeld (1997) explain that UD's focus on social inclusion is what separates it from these other terms. At the same time, Weisman in 2001 mentioned that there cannot be division among human health, social justice, and also environmental health. In addition to this in some contexts such as USA or Japan, sustainable design is including the terms such as UD and also inclusive design (Fletcher, 2015). And the same issue can be seen in Europe when Walsh in 2001 saying that the sustainable development concept needs to be integrated into the European disability agenda.

It was from 1985 by Mace in the United States that the concept of the design which can be communicated and utilized by a wide group of users were initially used and introduced. By 1997, UD has developed based on the seven principles by the Center for Universal Design. The seven principles of UD have been developed by a group including people from different disciplines which the principles can evaluate and define the usability level of the design. The seven principles of UD were designed in a way to bring the adaptation to the design and create awareness worldwide. In this

manner, these principles have been translated and been used in different countries (Fletcher, 2015).

It has to be mentioned that, based on some authors' opinion the seven principles developed for UD are not useful and applicable for some contexts around the world, for example, the countries in which they are in process of development.

Sadly, the usage of the concept of UD and accepting is a must for developing a design idea in the field of architecture is slowly progressing. To make this progress more rapid there is a need to introduce the design examples or the remodeled designs which UD concept has been considered from beginning in them to the practitioners in the field of architecture and by this method try to fill the existing gap between the UD principles and design profession (Preiser and Vischer 2006).

## 2.1 Definition of Universal Design

Universal Design has been mostly defined in literature as follows:

“The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” The title of Universal Design can be given to the product or the design environment which can be used by a wide group of people, of different ages and abilities, without the need for adaptation (Forrest and Gombas, 1995). Best UD examples are the designs which elements of Universal Design is not noticeable, and they are integrated into the design from the initial steps and not as an additional adaptation solution. A design can be successful from the UD point of view when the design solution is just easy for everyone to use and it is not taking all the attention to it. It should be a solution that is developed based on being suitable for a wide range of people of different ages, sex, or

any short-term or permanent disability and can work properly under different environmental circumstances (Imrie, 2006).

Being accessible[1] is the must factor for Universal Design, but since this factor has been part of the design from the initial design process it is integrated into the design and it is not noticeable as an additional element. There are times that UD engage adaptable[2] strategies as well to fulfill customization, but the best is when choices are presented equally. As an example of the adaptable strategies, the height-adjustable cooktops can be mentioned which can be a move for short or seated cooks. In addition to the two mentioned concepts, UD can be transgenerational[3], but this concept is covering more than the disabilities related to age groups (Jeschke, et al, 2008).

To sum up, it can be said the Universal Design, has to be always accessible, and sometimes it can be adaptable or transgenerational. Figure 1 displays the intersection and relation among the four types of design. The Figure shows that the main group is the label of “Accessible Design”. This main group includes three other design types that overlap each other as well. The three design groups are Adaptive, Transgenerational, and Universal Design. The presented figure shows all the mentioned three design types are subsets of the accessible design and based on the overlaps sometimes a design can consist of two or more of the design types (Jeschke, et al, 2008).

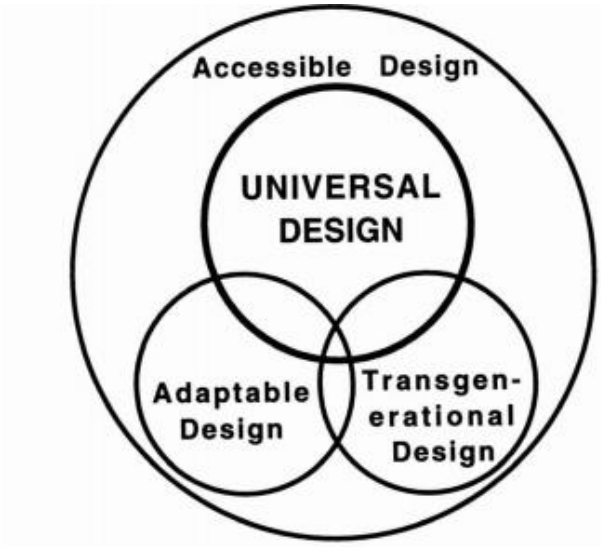



Figure 1: Relationship between U.D., adaptive and transgenerational design and with accessible design.

1. Accessible design can be defined as a design that meets prescribed code requirements for use by people with disabilities.
2. Adaptable design features are modifications made to a standard design to make the design usable for an individual.
3. Transgenerational design, sometimes called life span design, is the design that considers the changes that happen to people as they age.

## 2.2 Brief History of Universal Design

If we are to look at Universal Design from a historical perspective and put it in a historical context, the research needs to extend to the beginning of the design profession's history. It can start with the Roman architect, Vitruvius, in the 1st century, when he wrote a dissertation called the Ten Books on Architecture. It should be mentioned that this is the only survived book from the classical era in the field of architecture. In this book, Vitruvius is mentioning that a successful design needs to have three characteristics, “firmness, commodity, and delight.” If these three characters have been translated into contemporary vocabulary, they mean, strength, usefulness, and character. The usefulness which he had mentioned in his book in the basic principle of a concept we can associate with the Universal Design of our contemporary era. Thus, it is proof of recognition regarding how important usefulness is starting from the beginning of the design profession. However, the way that usefulness has been emphasized during different periods can be varied and they could

serve different purposes. It should be mentioned that the concept of usefulness can include different aspects ranging from comfort, benefits, construction easiness to pleasure. If the research goes forward on the historical context of UD, and proceeds the classical era, it is possible to study this concept in the vernacular architecture since vernacular architecture is a huge part of the design field even till this very moment (Story, et.al., 1998).

As it is known vernacular buildings are products of the people who are the users of the buildings. There are examples in history where the craftspeople did the construction work for others, but they are still part of the same society as their clients. In general, vernacular architecture is part of the tradition of one society and the changes in time relating to the design are very slow and not very recognizable. Even though in some context it can be perceived that the design stayed almost the same after thousands of years. The important note about vernacular architecture is that the concept of usefulness plays an important role (Case,2008). Over time and throughout the experiences, vernacular building design, the tools to be used, and the form of the buildings have been developed and changed to fit the needs of the occupants and match with the way of living. Environmental conditions, local materials available, and social values have been always taken into consideration (Rapoport 1969). There is a belief among some scholars that vernacular architecture due to being closer and being a better fit to the occupant's lives is better designed than professionals' works (Alexander 1964).

From the Renaissance period on, there is a neglect of vernacular architecture and most of the documented histories belong to western architecture which has been done by professionals. Most of the designs mastered by the professionals were created for

upper classes of the society or governmental or religious purposed building since the professionals had to be paid. Even during this era between Renaissance and Industrial Revolution the usefulness has stayed one of the factors in design, but it generally took a backseat to “character”, which is referring to the meaning of a place, in the professional ranks, but it should be mentioned that the stated term of character has not only to refer to aesthetics, therefore it is not focusing only on the ugliness or beauty. In most cases, professionals have been asked to design a place that boosts the positive meaning of the space to the client or the society. As an example, Gothic cathedrals can be mentioned, as they are designed in a way to give significant religious and cultural meaning to the society (Alexander 1964).

As a meaning, the aesthetic expression uses formal manipulations to elicit an emotional response. In the field of architecture and design, aesthetic is expressing the character, but that is not its only purpose, it also can have useful purposes. The aesthetic can be used to clarify the territories, personal territory from the neighbors, or as another example, it can be used as an attraction factor for a place or in contrast to repelling the people. In the famous book written by sociologist Thorstein Veblen in 1994 called Theory of the Leisure, he explains that identity behavior includes the consumption process. What he discusses is, the good taste, can be understood as to how people can communicate with superiors by showing the ability to spend large amounts of money on “useless” things. if you can afford to buy useless things, you demonstrate wealth by doing so. In other words, what he has explained is the term conspicuous consumption. As a result, people having a large home in scale compared to what they need, having a larger or faster car compared to their neighbors. Having a jewel with rare rocks.  All Velble’s examples are showing products with no intrinsic

value and it is just representing a monetary value, which only rich people can do. Even though any of these products do not have specific purposes, but since someone wishes to communicate superiority, then on the social scale they are getting useful labels. Thus, before a product or a design gets the label of usefulness, the meaning of this term must be defined clearly. Usually, the definition of usefulness can be changed and redefined over time based on cultures (Ostroff, 2011).

During the Industrial Revolution and World War II, the term usefulness in design and architecture starts to gain extra attention and become more important in the field of the architecture profession. Due to the advancement of technology, changes in social justice, and developments in science, within 100 years and in the 20$^{th}$ century it is observed that the function and functionality step forward in the field of design. It was by the beginning of the modern movement, while avant-garde designers found more space to work, that the usefulness in design has been emphasized. But it should be mentioned that there are many debates about whether they were successful or not in their design of products (Canton,2006).

It was from the 1960s that the problems of modernism in architecture started to show themselves. During that time, architects, designers, planners started to highlight human-centered design and focusing on usefulness. This change in showing attention to usefulness created a motivation with a sense of social responsibility.

Mentioned group of designers, architects, and planners, tried to dedicate their design and products by focusing more on the people from different groups especially the group which has been underserved by professionals in the earlier eras. And they usually needed technical support to make sure the design and community development

project can be of service to the end-users, their values, and priorities. These designers had the aim to change the practice of architecture in a way to involve end-users and their needs to their design by understanding social sciences, such as psychology, sociology, and so on. In other words, they tried to adopt the social priorities which have been transpired in the last 1960 and 1970s, which means considering affordable houses, a different group of people, with different age, education, and different health conditions. Many designs based on the concept of human-centered thinking can be seen throughout that period and even continues till today, which is all now under the umbrella of Universal Design. (Lebbon,2009).

## 2.3 Principles of Universal Design

By 1758 B.C. King Hammurabi declared the first building codes developed in Babylon. Based on the codes written on stone, whoever was designing or building for other people in society were responsible for the quality of their design. That initial code was not providing the guideline for how to design but it mentioned that if someone built or designed a building for others which due to being not strong enough collapsed and caused the death of the householder, the builder would be punished. That building code and penalties become a reason for innovations, and even the builders without a license, permit, or any specific building code in their hands were considered trustworthy. Yet, to be clear, this code had been applied to situations where someone was building a house for others, rather than for people building a house for themselves (Hammurabi's Code of Laws).

Later on, and in 1666 and 1871 with two great fires in London and Chicago, there was a change in building codes where it started addressing the risk that each building can create for the neighboring buildings and also to the public. The development of the

cities became denser, buildings were taller and had closer proximity. It was all these changes that led to the change in building regulations and building codes. Existing problems in constructed buildings led to the changes in building codes related to ventilation, water supply, fire, lighting, and so on (Raithby,1819).

By 1905, the National Board of Fire Underwriter, which is an insurance group in the United States, developed a building code which was based on that the risk for the occupants would be minimized. In 1940 and again in the United States three other national codes have been developed in different regions. The three mentioned codes have been unified and created by the International Code Council (ICC) and based on that in 2000 first international building codes were published. Even though these codes were developed internationally they were still not in use in all countries, and in many countries, they developed their national building codes. By 1997, and for the building code developed in 2000, the concept of Universal Design, was mentioned. For putting the UD concept into practice, some principles have been developed which helped the practice of UD significantly (Story, 2001). 7 principles were developed in 1997 for Universal Design by a group of people from different disciplines, such as architects, designers, engineers, and researchers.

1. Equitable Use – all designs should be usable for all people with any kind of disabilities;
2. Flexibility in Use - all designs should accommodate all group of people with different abilities and distinctions;
3. Simple and Intuitive – design should be easy to use and understand without considering the users' experience and level of knowledge;

4. Perceptible Information – all designs should give all the necessary information to the users;
5. Tolerance for Error - all designs minimize the danger of accidental actions;
6. Low Physical Effort – by considering all kinds of physical disabilities, all designs should be used comfortably in order to minimize the fatigue;
7. Size and Space for Approach and Use - Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility (Story, 2001).

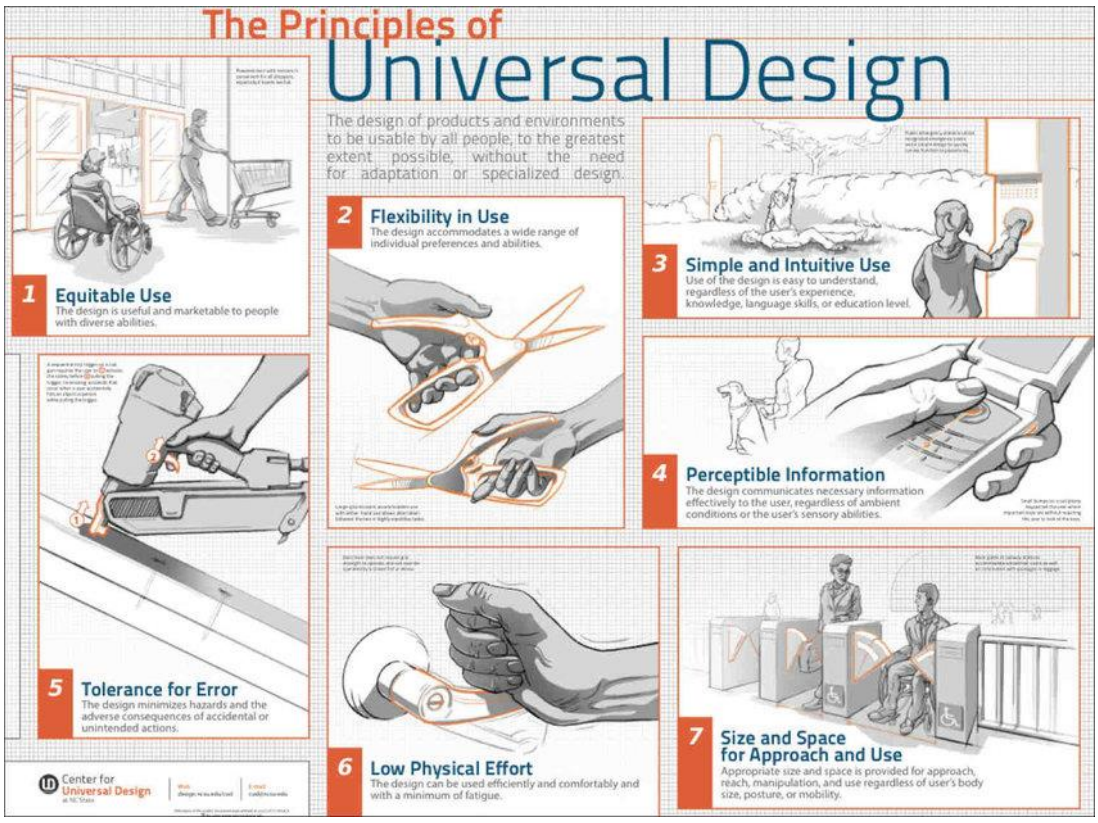


Figure 2: Universal design principles
(retrieved from https://www.interaction-design.org/)

Table 1: The principles of universal design (Connell et,al,. 1997)

| |
|---|
| Principle 1: Equitable Use |
| The design is useful and marketable to people with diverse abilities. |
| Guidelines: |
| 1a. Provide the same means of use for all users: identical whenever possible; equivalent when not. |
| 1b. Avoid segregating or stigmatizing any users. |
| 1c. Make provisions for privacy, security, and safety equally available to all users. |
| 1d. Make the design appealing to all users. |
| Principle 2: Flexibility in Use |
| The design accommodates a wide range of individual preferences and abilities. |
| Guidelines: |
| 2a. Provide choice in methods of use. |
| 2b. Accommodate right- or left-handed access and use. |
| 2c. Facilitate the user's accuracy and precision. |
| 2d. Provide adaptability to the user's pace. |
| Principle 3: Simple and Intuitive Use |
| Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. |
| Guidelines: |
| 3a. Eliminate unnecessary complexity. |
| 3b. Be consistent with user expectations and intuition. |
| 3c. Accommodate a wide range of literacy and language skills. |
| 3d. Arrange information consistent with its importance. |
| 3e. Provide effective prompting and feedback during and after task completion. |
| Principle 4: Perceptible Information |
| The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. |
| Guidelines: |
| 4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information. |
| 4b. Maximize "legibility" of essential information. |
| 4c. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions). |
| 4d. Provide compatibility with a variety of techniques or devices used by people with sensory limitations. |
| Principle 5: Tolerance for Error |
| The design minimizes hazards and the adverse consequences of accidental or unintended actions. |
| Guidelines: |
| 5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded. |
| 5b. Provide warnings of hazards and errors. |
| 5c. Provide fail-safe features. |
| 5d. Discourage unconscious action in tasks that require vigilance. |
| Principle 6: Low Physical Effort |
| The design can be used efficiently and comfortably and with a minimum of fatigue. |
| Guidelines: |
| 6a. Allow user to maintain a neutral body position. |
| 6b. Use reasonable operating forces. |
| Principle 6: Low Physical Effort |
| 6c. Minimize repetitive actions. |
| 6d. Minimize sustained physical effort. |
| Principle 7: Size and Space for Approach and Use |
| Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility. |
| Guidelines: |
| 7a. Provide a clear line of sight to important elements for any seated or standing user. |
| 7b. Make reach to all components comfortable for any seated or standing user. |
| 7c. Accommodate variations in hand and grip size. |
| 7d. Provide adequate space for the use of assistive devices or personal assistance. |

In addition to the mentioned seven principles, a guideline has been developed which gives extra recommendations about each principle. As an example, for principle number 2, Flexibility in Use, there is a guideline related to accommodating right or left-handed access and use (Story, 2001).

## 2.4 Demography of Universal Design

In the field of sociology, there is a field of study related to population statistics which is called Demography. Demography can give various data related to age, sex, income, living arrangement, education, and so on and also analyze the relationship between variables. These data usually display in the form of graphic (Mace, et, al. 1991).

In general, there are a few people in different disciplines, such as designers, planners, and so on which have been trained to understand the demographics. But it should be mentioned that they do not need to become experts in demography, but by better understanding the demographic trends, they can have a better understanding of the concept of UD and plan better design features and career. To sum up, a better understanding of demography can help the designers to learn more about the importance of UD and have a better understanding of what should be the priority in designs (Waldrop, Stern, 2000).

Ron Mace and his colleagues, which are founders of UD, explain their observations as follows;

> "Changing demographics, perceptions, and attitudes are fueling the demand for more sophisticated products, housing, and business environments that are accessible for people of all ages, sizes, and abilities. These changes signal a wide array of opportunities for designers to apply their creative energies to the solution of practical social and psychological problems" (Mace, et, al. 1991).

### 2.4.1 Uses of Demography

When the topic is about the demography the issue is not just some numbers, but the main aim is the understanding of what those numbers suggest about the users or population target which the project or the design is for, their needs, and their future developments. Developing and gathering information based on various demographic characteristics, such as age, sex, level of education, or different physical disabilities, and understanding the relationship between their variables can create an insight that can be very useful for any design. The designer who has an understanding of demography has a better insight about the clients and the product they are needed for so they can design a project which is suitable for a wider group of people (Waldrop, Stern, 2000). In various ways, demography can be helpful for designers, such as:

1. It can predict the needs and demands in the future for the design, building, or urban strategies. As an example, the rapid increase in the number of children born after World War II can be mentioned, such demography can show the need for educational building needs in the future. Which that event led to the increase of the construction of schools plus the community planning in suburban and so on;
2. Understanding the features and needs which are acceptable for different products or buildings. As an example, when the number of women joining the workplaces increased, workplaces that were designed for the male generation, had to be adjusted to address women's needs and present. As an example of the implications, having a restroom for women, allowances for pregnancy can be mentioned. From the other perspective by women joining the workplace, the number of housewives decreases so this creates a huge demand for childcare settings, kindergartens, etc.;

3. Career Development: the young professionals can establish their careers by understanding and responding to the needs of a wide group of people which has been usually neglected by the other professionals in the field, by this way, for example, architects by understanding that the population of the older generation is increasing they can start considering the age groups of people and their needs and become the leading designers before any other professionals even noticing this demand;
4. Knowledge translation: When something new is trending that can present the need for some new knowledge and development. As an example, when asthma and some other respiratory diseases increase, this requires the designers to be more sensitive towards indoor air quality. Therefore, by improving their knowledge about the issue, designers can apply methods that can affect respiratory diseases and, in this way, address the issue;
5. Networking: Having more experts in demographic analysis increases the connection between professionals, government agencies and so on which can lead to jobs and recommendations. Moreover, it helps build a constituency for a better project. The group of people who have special needs can know the necessity of promoting their needs and influence the public. As an example, representatives of support groups can help to encourage a project that has some community resistance (Steinfeld and Maisel, 2012).

It must be noted that, demography is not the only justification movement for the design process and decisions. In opposite sometimes data from demography can mislead as well and they are not always the accurate answer to designer's questions. The interpretation of demography data, additional judgments, and having additional data if needed should be taken into considerations. In this manner, a better understanding of beneficiaries of universal design is needed.

### 2.4.2 Beneficiaries of Universal Design

People with different kinds of disabilities are the main targets and initial beneficiaries of the Universal Design. One of the most important demographic trends which are affecting the need and necessity for UD is the aging of the population because it has a direct relation with creating for some kinds of disabilities. In other words, as much as one person lives the possibility of having disabilities and special needs is increasing. For example, in the 1970s, the usage of the ramp was introduced, and later it was used in designs and this became a must in the building codes. At the beginning, it seemed like an additional feature which small group can get benefits from it. But by time, the researchers showed that the whole population found it beneficial and easy to use. This was an example to show the leaders of design that may be the target of this field is wider, so the demographic study has been done and data showed the target of accessible design is not limited to people with disabilities and the target is the larger group of people (Friedland and Summer, 2005).

The first thing which had to be done was studying how disability can be defined, the studies show that there are many possibilities to define and give definition to disability. In most of the definitions for disability, it was identified as a big problem in public health, which required services from the government, changes in business, and policies

to create benefits for all groups of people with disabilities. So, carrying out the survey has been the way for estimating the outbreak of disability which would be limited to daily activities such as walking, toileting, eating, etc. the data coming from such surveys help the development of disability rights law which defines the population which gets benefits of it. Although still many policies in many contexts need more concentrated definition. As an example, a definition used to evaluate the ability to work is needed to establish eligibility for disability benefits. For developing the policy in places such as healthcare, governments collecting data on different factors such as chronic conditions (vision or hearing loss, heart problems) or data related to other diseases (Alzheimer or cancer) and the number of people in need of assistive devices (walker or wheelchair) and by gathering all these data the budget for a health program can be clarified and pay for all required special equipment. It should be taken into consideration that mentioned data, related to diseases, or special assistive equipment and so on will identify the group of people who are at risk of functional disability, but at the same time it will include the group of people which they do not necessarily have functional limitation at that moment, especially if they are in the initial stages of developing some diseases or their limitation doesn't necessarily require services but still this group (at-risk population) can get high benefits of accessibility features during lifetime (Friedland and Summer, 2005).

It can be said that in general, the literature related to Universal Design is concentrating on the same group of people which accessible design literature is focusing on. This group of population is people with movement, sensory and cognitive issues, which can include the aging group of people that are at risk of at least one kind of disability. The concentration on this group of the population has five reasons:

1. There is an assumption that only mentioned group of people having a temporary or permanent functional loss, even though, other groups might have functional limitations as well;
2. Many social or economic factors can reinforce the effects of barriers in daily routines by enforcing limitation of access to the resources, as an example, the insufficient public transportation;
3. Topography, limitation of service, and extreme climatic issues, or in general geographic location can cause barriers as well. as an example, living in an area with not enough access to the markets;
4. The group of people without disabilities or young people also can get benefits from universal design and defining the target group can give the wrong impression. This wrong impression can limit the usage of UD;
5. The other impression is that UD can be used in the practice of architecture just by fulfilling the accessibility code. And transfer the legal importance of it in the design profession to just a technical specialist who knows the codes (Steinfeld and Maisel, 2012).

Even though the main focus and roots of UD is on disability rights and designing for all groups, it is important to leave the traditional thinking towards disability and study the target group, especially if architects are designing for modern societies with the dynamic nature which people are having different experiences and there are fast changes technologically or economically. Designers must understand that the goal of UD should include a wide range of people with different needs and preferences. Every different demographic group has needs that are important and as serious as the needs of the people with mobility disability or limitations. It should be taken into

consideration that some of these groups can have more barriers in their everyday routines. Following eight groups of people can give the broader perspective towards the targets for UD, even, it is still not limited to only these main eight groups of population targets:

1. There are a group of people who are not categorized as having functional limitation even if they have permanent or temporary limitation because of their body types or conditions. For example, pregnant women, children, or people with special physical features (very short or tall, very heavy or light);
2. Caregivers, which are the people that others are dependent on them. This group is getting befits from the environment which supports their care activities. This group of people can be families with small children, families with a member with a disability, caregivers of older people. This group can be professional caregivers like nannies or informal ones;
3. Psychosocial conditions, this group can have issues such as Alzheimer's, autism, or depression which they are confronting different social barriers. Such conditions may cause the perception of movement or cognition limitation as well;
4. Behavioral limitations can include people which legally or illegally are dependent on alcohol or drugs. And also, a group of people who due to their medication they have perception limitation;
5. Different ethnic groups, or people from different cultural backgrounds, with different preferences, expectations, generally people which are different from the majority of the population. The visitor to a country that can be different from the host country such as different language, diet norms, and spatial behaviors;

6. Population with low or middle income, this group can usually face the access limitation to the services and resources;
7. People who had to change their living environment and live in temporary living situation, this can happen due to extreme events such as was or natural disaster. So, people finding themselves in a culturally different living environment;
8. Homeless people, children, or spouses from an abusive environment. This group of people needs protection and a protected environment. They require special services which sometimes can limit their freedom and their access to resources (Gyi, et, al. 2000).

Considering all the mentioned groups as the target group for UD can change the perspective towards UD significantly. Instead of looking to UD just for the target population with movement disabilities, all groups should be taken into consideration, and designs should respect everyone's rights. Thus, unnecessary barriers must be removed, and design should work equally for all. All mentioned issues related to UD highlights that for designers, the concept of UD should be important all the time and not only when the specific project needs certain care or just to meet some building codes and legal requirements.

## 2.5 Chapter Summary

In this chapter, the definition of universal design has been explained based on the literature review, and a brief history of universal design and the origin of it in the literature has been given. Later on, the seven established principles of universal design have been explained and lastly, the demography of universal design and its beneficiaries has been clarified. The following chapter is built upon chapter two. After

understanding the meaning of the universal design, the succeeding chapter will focus on this concept in the practice of architecture and housing.

# Chapter 3

# UNIVERAL DESIGN IN HOUSING PRACTICE

This section explores the emergence of universal design in the housing practice. This chapter is not focusing on one specific type of housing design, but instead studies the principles which can be applied in one or more types of housing designs for people with different disabilities. As mentioned in detail in the previous chapter, Universal Design is a concept that has been developed to have a new and innovative response to the problems of the built environment. Putting UD into practice in architecture needs lots of changes in the perceptions of architects on many different levels. Designers and architects must keep in mind to have more successful designs, it should be easier to use and is more friendly to people from a different group and with different disabilities. Designs based on the concept of UD not only should be usable by a different group of people but still, they should be durable and attractive.

To present UD in the practice there are three possible ways, marketing, product design, and integration. In the marketing method, the main concern is on how organizations display UD as one of their efforts for attracting users. The second method is focusing on how an organization company tried to improve and develop its products and designs based on the UD. And the third one is the method that has the main concentration on how UD can be integrated into designs and products and services.

## 3.1 Universal Design in Practice of Architecture

Regulations related to accessibility have to be applied to the building. This can be through the building code or because of complaints. The guideline for applying Universal Design codes and standards is a complex task. The standards are details and it is difficult to follow them. While this concept is applying to the practice it is a must to meet all the requirements for getting the project approved. So, based on this, all standards and requirements have the same level of value. As an example, some small details such as the placement of the toilet paper have the same importance compared to the percentage of the ramp slope or the dimension of the door. Thus, any false in any standards can be the cause for project rejection by the officials. Regulations for UD are creating a set of rules which all designers and architects will follow without any preconceptions related to the ability or disability of people to get benefit from the result. In any democratic system, regulations and standards need to be defined to present the minimum threshold. But when the topic is about Universal Design, the aim of the design project is not about getting a pass or fail, in contrast, it is about developing a mind-set (Preiser, 2008).

### 3.1.1 Universal Design from Architects' Perspective

As mentioned in the previous sections, there are many definitions for Universal Design. In general, UD meaning the design or a product that can be usable by the majority group of people without considering their age, sex, education level, or physical disabilities. UD concept in architecture is not only focusing on users with movement disabilities, but it does include a larger group of people. The implication of UD in architecture has not been always successful throughout history. As an example, Usonian House by Frank Lloyd Wright can be highlighted as an attempt for designing an environment which can be suitable for all group of people, which was an

unsuccessful endeavor in the 1950s. This project was supposed to be affordable housing for a large group of people but in contrast, it was not very affordable for users, and even though it had very small bedrooms and kitchens it was not easy to live in (Trachtman, et.al, 2000).

One of the challenges that can be mentioned which architects are facing regarding Universal Design is having one set of standards. As far as the topic is about design and production, communities and cultures with different expectations and norms should be taken into considerations. But in the contemporary world in which we are facing globalization, can we suggest that having one set of standards and criteria can universally answer the needs and expectations of everybody with different cultural backgrounds? This is a question that can arise in every designer's mind. Many issues will show themselves when established standards of universal design are dealing with different contexts and cultures. There are many different expectations for space design or lighting and other features for the same type of environment in different cultures and besides that, in different context architects will face different economic conditions, different technological developments and so on which all of this can make the application of universal design more complex for architects (Vavik, 2009).

The developed 7 principles of UD in 1997, are based on the ideal conditions, and when it comes to the practice of architecture, they need to be operationalized to be realistic based on the real world and everyday design struggles. Maybe that's why in the field of architecture still there are fewer examples that have accomplished these goals. Even though there are examples of universally designed projects available but still there is a resistance in the practice of architecture to adopt their designs based on the new paradigm. In the contemporary architecture practice, there is more hope that buildings

design based on UD concept will be seen more. Having more example of universally designed buildings in the future can be through the following three strategies:

- Short-term, evaluations on the existing buildings need to be carried out
- Medium-term, programming projects for the future buildings,

Long-term, educating the Universal Design (Vavik, 2009).

### 3.1.2 Universal Design Strategies in Housing Design Practice

Universal Design regulations and standards should be defined in a way to be understandable for everyone with different disabilities with a simple language. Regulations should also be responsive towards a variety of projects and for different contexts (different housing typologies). This section presents different strategies which might be required for some typologies in order to give a general understanding for what is needed for housing design. Each consideration should be applied on projects based on the needs for each specific housing typology. For example, the principles for how to design an entrance hall are more required for apartment blocks, mass housing and etc., and maybe not required for single housing design. the design principles have been developed for covering different disabilities. For instance, the texture use on the pathways or corridors in necessary for people with visual disability while usage of ramp with correct percentage is necessary for people with movement disability. Thus, all UD considerations must be applied in order to cover all range of permanent disabilities (blindness, movement disability etc.) and temporary disabilities (pregnancy, bone fractures and etc.).

- ***Site circulation***

For the site circulation, there is regulation based on UD which requires to have pedestrian pathways within the site to meet building codes related to accessibility the other design routs in the site don't have to fulfill the regulations:

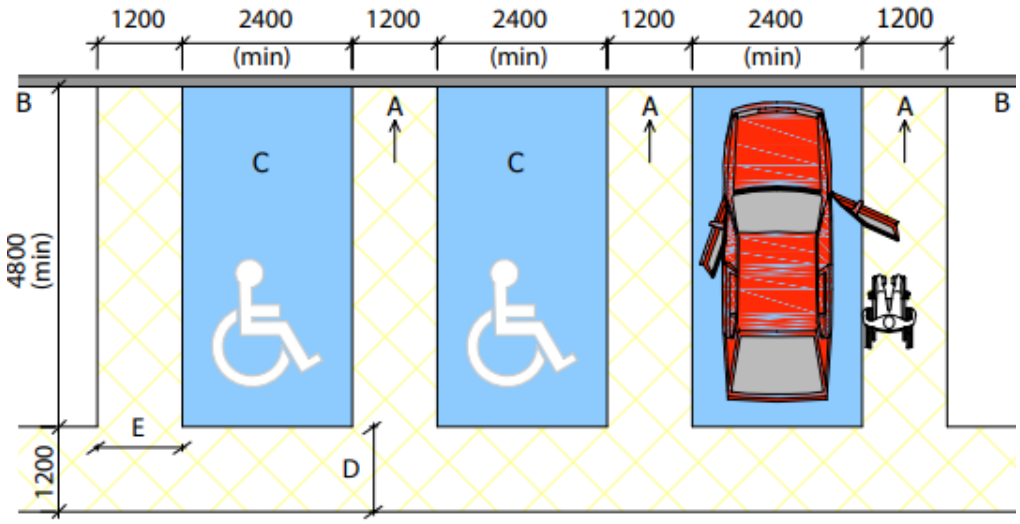
- There must be at least one path from an accessible parking area, and one from a public transportation stop to each building on the site;
- There must be at least one path connecting each building in the site. It should be mentioned that UD expands while explaining these standards and needs to address usability and safety, so security in each pedestrian path in the site needs to be provided;
- The access point to the site for pedestrians and bikes needs to be marked clearly;
- The information given by the paths should not be complex and the perception of the site entrance for pedestrians, bikes, and cars should be clear;
- The pedestrian pathway and bike lanes should be continuing network to protect the pedestrians;
- To protect pedestrians and bike lanes from extreme weather, paths must have protections and well lit;
- Paths should be design in a way to make the building entree more visible and clearer (Dong,2012).

- ***Parking***

Based on the laws in the U.S, the parking areas are the main source of complaints related to accessibility (U.S. Access Board, personal communication, 2005). Codes and standards related to accessibility are not addressing the paid parking areas in all

terms needed for design. On the other hand, UD guidelines are covering the wide group of users' issues related to the parking areas and also defining the term "priority parking" as well. following are some examples of what has been included in the Universal Design guideline related to the parking:

- The priority of parking area should be for people with physical disabilities, older users, pregnant women or parents with small children,
- The payment method should be simple, with help of methods such as smart tags or using of a credit card.
- There should be information available by the entry of the parking area which can display where there is available parking
- Parking spots close to the entrance should be free for disabled people, and there can be used by others in case they wish to pay for them (Pillay and Seedat, 2007).

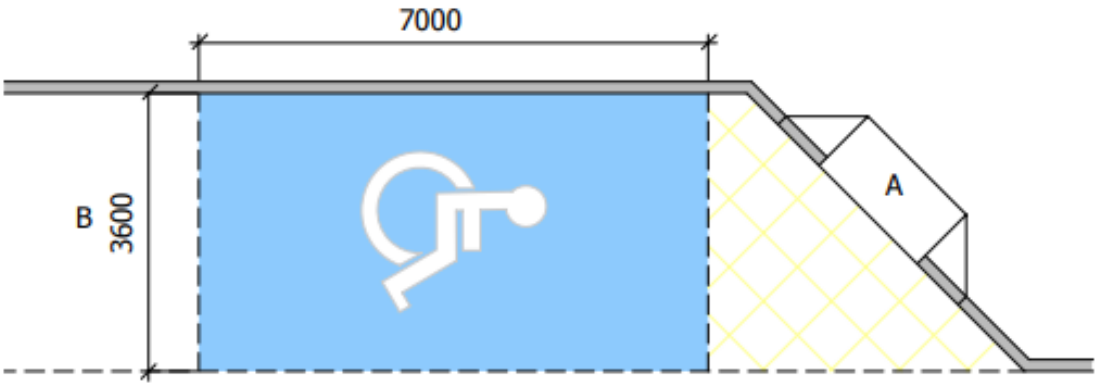



Key

A. Preferred access route with dropped kerb or level access avoiding travel behind parked cars
B. Dropped kerb or level access
C. Standard 2400 (min) x 4800 (min) designated parking space
D. 1200mm wide safety zone for boot access and cars with rear hoists, outside the trafic zone
E. 1200mm wide marked access zone between designated parking spaces

Note: All dimensions in millimetres

Figure 3: Designated parking spaces (retrieved from http://universaldesign.ie).




Key

A. Dropped kerb (with blister tactile paving)
B. Allows safety zone on kerb or street side

Note: All dimensions in millimetres

Figure 4: On-street designated accessible parking space and parent and child parking spaces (retrieved from http://universaldesign.ie)

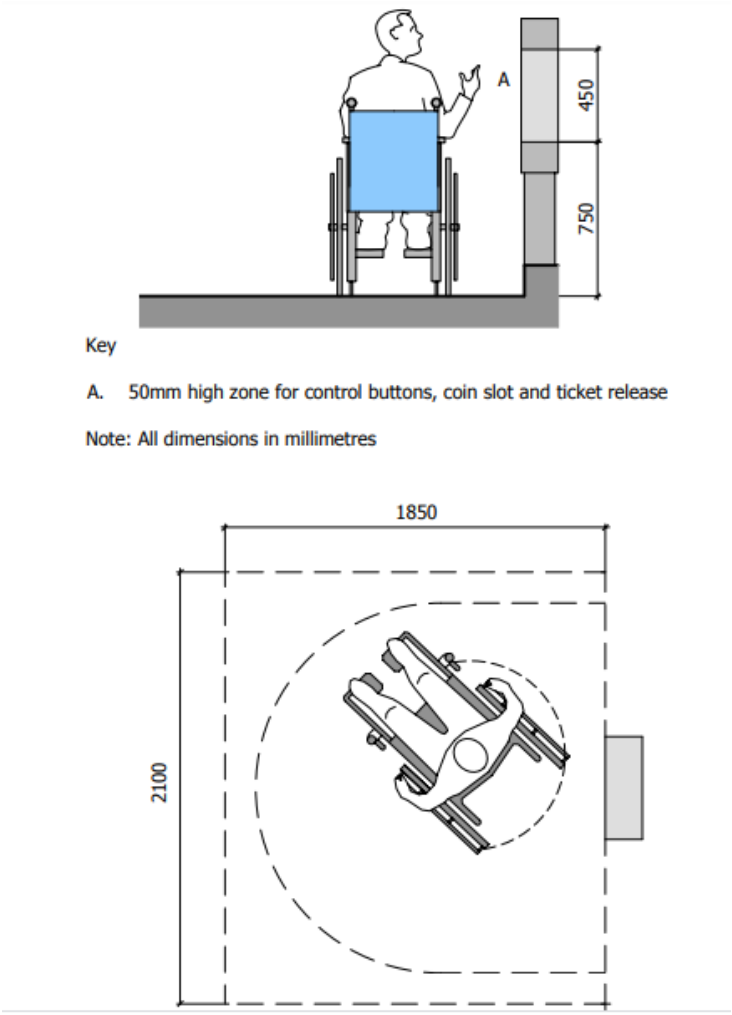



Figure 5: Ticket machine (retrieved from http://universaldesign.ie)

- ***Entrances***

Based on the UD concept, entries to the building, public or employee entrances, should be accessible as much as possible. Features which has been mentioned by UD can be as following:

- There should be landmarks such as lighting or other features by every main entrance of the building;
- Entrances should be with the shortest and direct path to the destination in the building;
- Entry and exit to the buildings should be protected by weather protection, waiting for area, and foyers;

- Signs should identify the entrance and exit of the building;
- With help of color codes or numbers the different class of entrée or exit must be identified (Canadian Human Rights Commission, 2007).

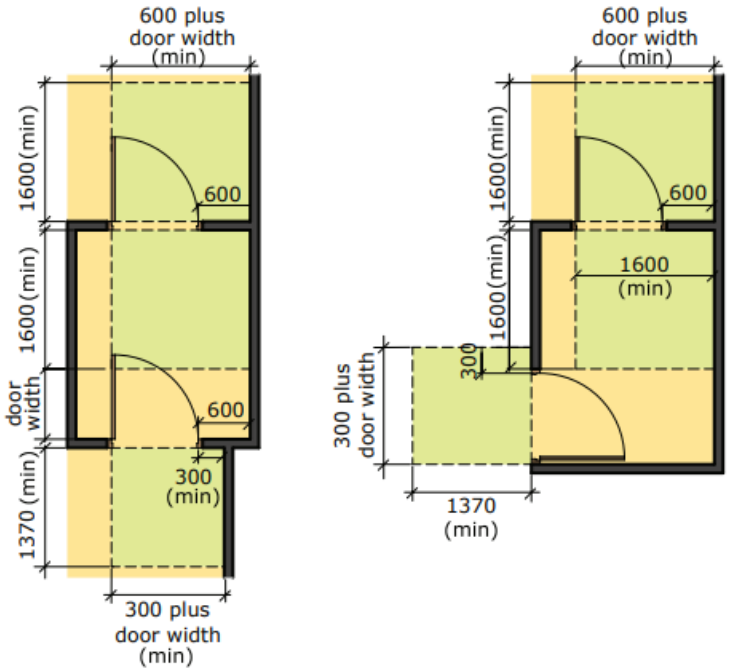



Figure 6: Clear space requirements for lobbies
(retrieved from http://universaldesign.ie)

Figure 7: leveled entrance to lobby (retrieved from http://universaldesign.ie)

- ***Planning***

Based on UD accessibility codes and standards, there few issues which has to be taken into concentration related to interior circulation. These standards are as following:

- The corridors widths need to be minimized;
- Corridors need to be suitable for users with mobility problem (usage of wheelchairs);
- Door movement needs to be clear;
- All the overhangs in the interior circulations must be removed in order to not cause the accident for people with vison problem. Circulations designed based on UD should be clear to address all the needs for people using wheelchairs;
- Interior circulations should have direct access the main spaces;
- Rooms with similar activities needs to be design close distance to each other;
- Outdoor activities related to interior spaces should be close to each other;
- Related service should be close to each other;
- Strategic locations should be given to informal social interaction spaces (Carr, et, al,. 2013).

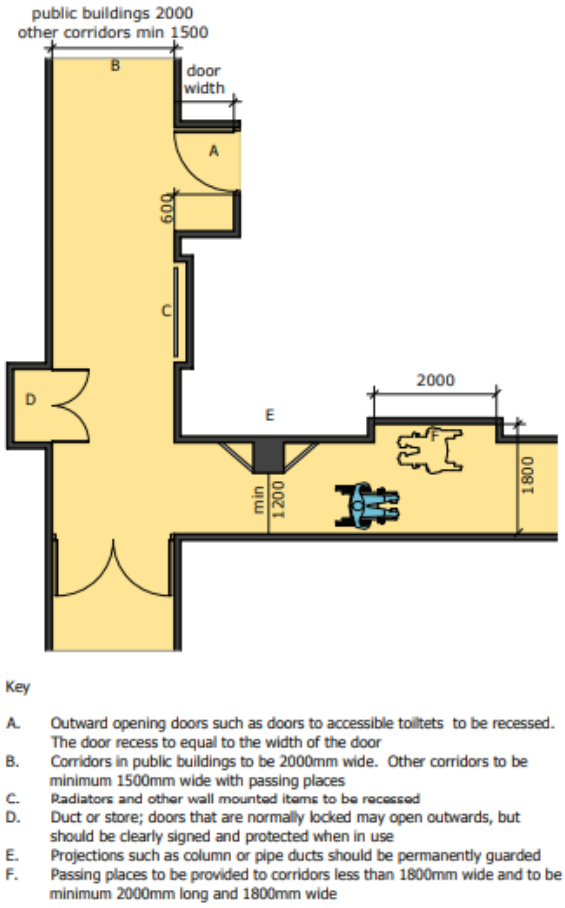



Figure 8: Clear space requirements for corridors.
(retrieved from http://universaldesign.ie)

- ***Ramps and staircases***

In the field of architecture, ramps are giving an alternative for accessibility which they usually located next to stairs which give the non-direct path. Also, these ramps are designed with the slope which gives maximum usability to people (Steinfeld, et, al, 1979) Minimum landing for wheelchair users should be provided as well. UD should give more creative and detailed strategies to improve safely and also usability of ramps, such as:

- Ramps should be designed and planned as the main path of accessibility and designed in a way that everybody can be able to use them;

- Ramps should be designed in a direction to decrease the effort of use for people;
- Ramp slope should be kept below the maximum allowance;
- The landing should be designed to be able to be used by wheelchairs;
- Sitting areas should be designed alongside the ramp or in the landings;
- Inclined pathways people (Steinfeld, et, al, 1979).

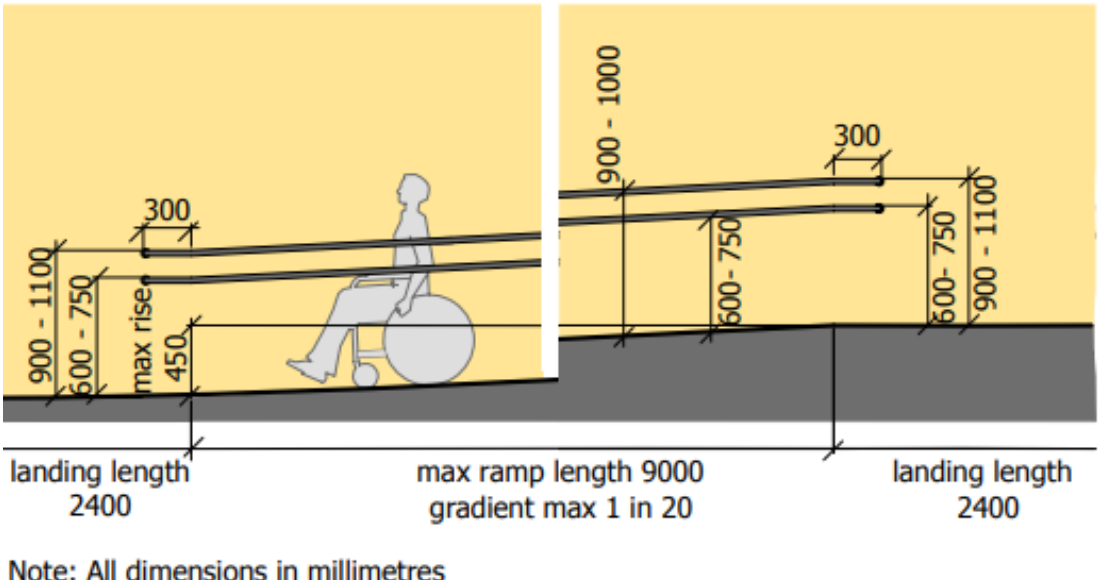



Figure 9: Internal ramp (retrieved from http://universaldesign.ie)

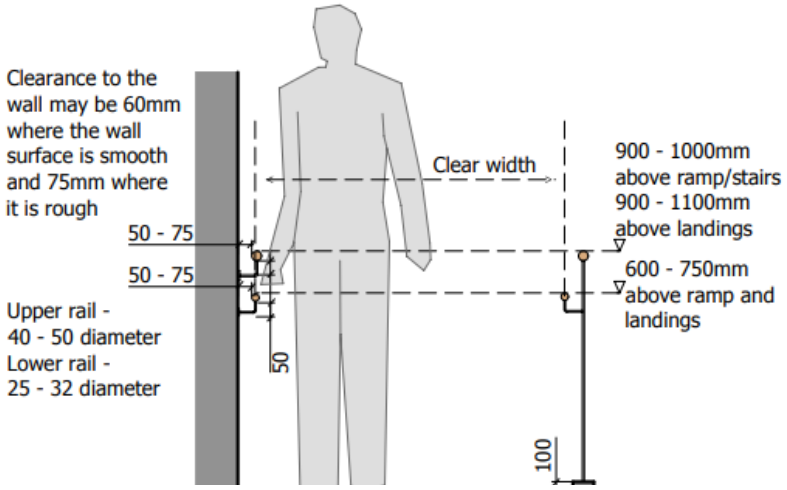



Figure 10: Handrail detail for internal ramps (retrieved from http://universaldesign.ie)

Based on UD characteristics every staircase needs to have safety features and be suitable especially for people with sensory impairment. Following are some of the strategies which need to be taken into consideration:

- A surface with a sensible texture needs to be added at the end of the stair run;
- The dimensions and proportion of staircase risers need to be designed to reduce the risk of falling;
- In the landing area, a space for resting needs to be designed;
- Any changes in the direction of the staircase need to be indicated by different texture or visual features;
- Covering material of surfaces needs to be glare-free;
- Steps edges need to have the contrast with the rest;
- Handrails, ramps, and stairs surfaces need to visually visible;
- Staircase lighting should be in a way to prevent ant shadow creation (Steinfeld, et, al, 1979).

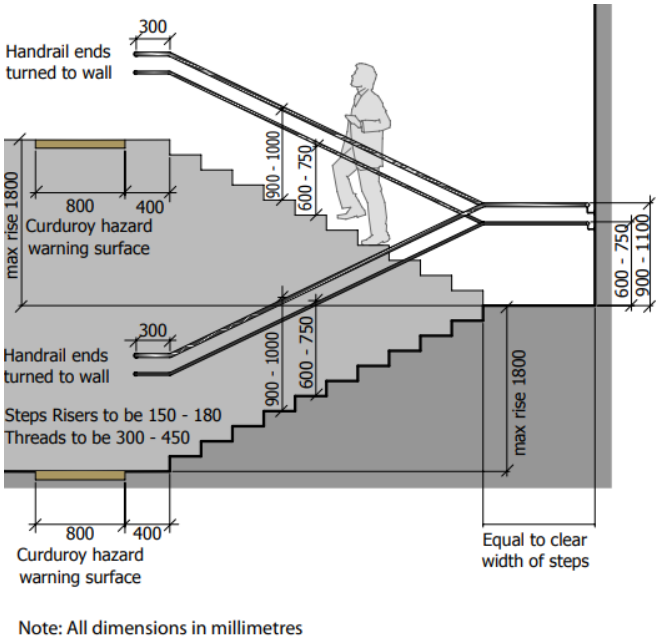



Figure 11: International staircase (retrieved from http://universaldesign.ie)

Figure 12: Examples of staircase with non-slip applied nosing and tactile surface at top and bottom of steps (retrieved from http://universaldesign.ie)

- ***Restrooms***

Universal design strategies for restrooms include:

- All bathrooms should be accessible,
- The entrance of the bathrooms should be large so people with assistive equipment can enter,
- It is preferable to use the maze plan design instead of using doors,
- One restroom needs to be designed in a way to be large enough to accommodate a person with the assistant and also having a place for a wheelchair,
- Grab bars need to be provided and they should be adjustable,
- Space should be defined for placement of luggage or packages in the bathrooms,
- Storages need to be designed to accommodate the personal stuff temporarily,
- Equipment needs to be touchless control,

- Special disposal for the medical waste,
- All facilities should be understandable for all users in this manner some signs can be helpful (Mullick,1999).

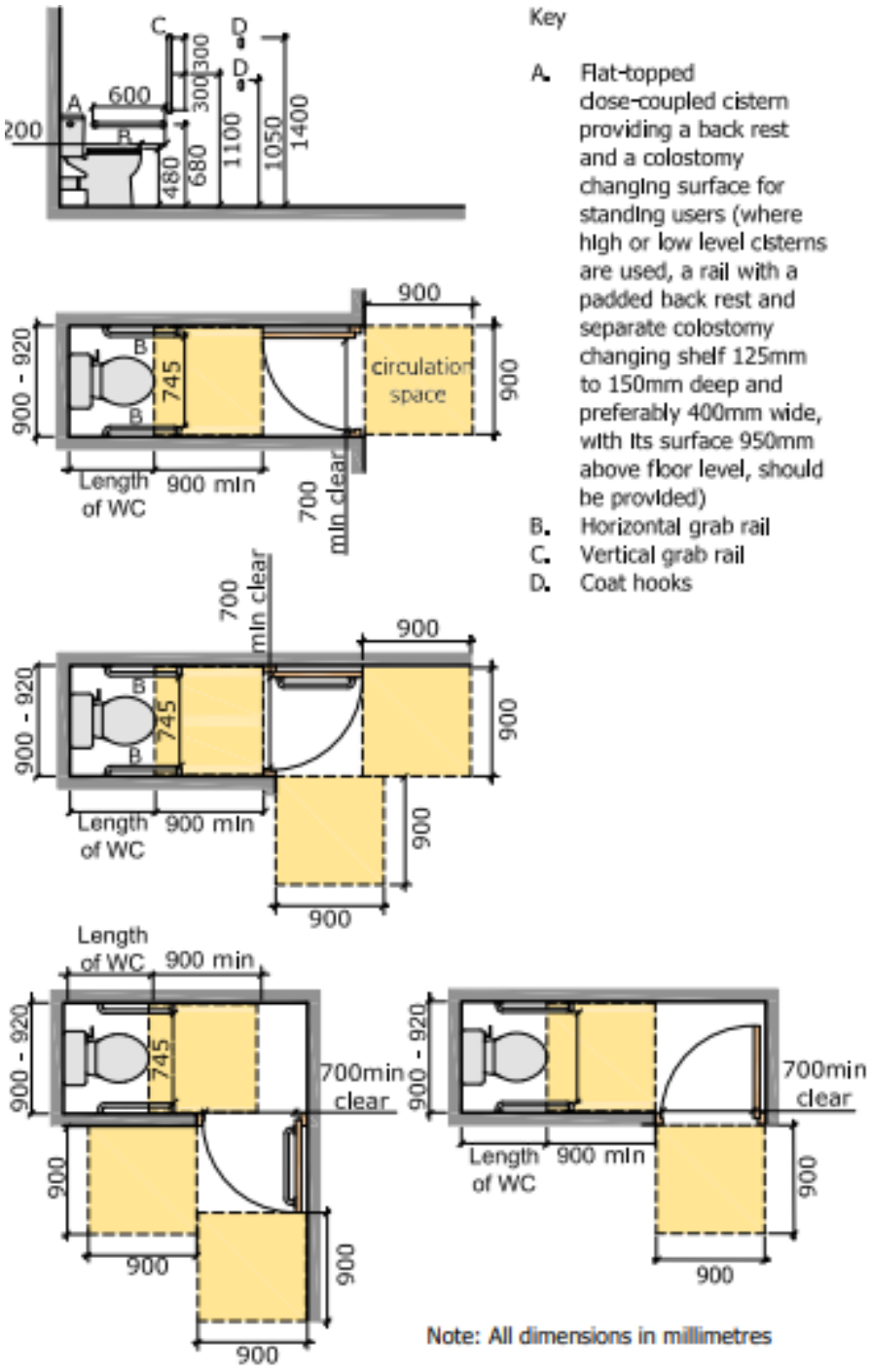
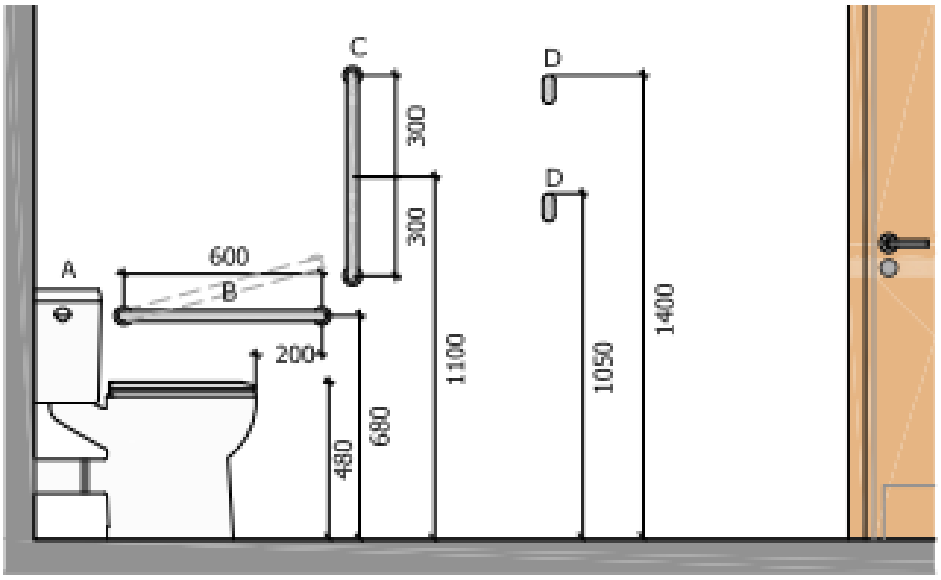



Figure 13: Layout of cubicles suitable for people with mobility difficulties (retrieved from http://universaldesign.ie)




Key

A. Flat-topped close-coupled cistern providing a back rest and a colostomy changing surface for standing users (where high or low level cisterns are used, a rail with a padded back rest and separate colostomy changing shelf 125mm to 150mm deep and preferably 400mm wide, with its surface 950mm above floor level, should be provided)

B. Horizontal (or 15 degree angle) grab rail 600mm

C. Vertical grab rail 600mm

D. Coat hooks

Note: All dimensions in millimetres

Figure 14: Position of grab rails (retrieved from http://universaldesign.ie)

Figure 15: Example of a bathroom designed with future-proofing in mind. (retrieved from http://universaldesign.ie)

## 3.2 Universal Design Housing

For a living place to be sustainable and suitable, it should respond to the different needs of all groups of users without limitation in age, sex, education level, physical disabilities, and so on. The Universal Design approach in housing aims to make the daily life activities in the living environment, possible and safe for all group of people (National Council on Disability, 2004).

Universal homes are the next generation of housing, which must be based on the Universal Design principles. These houses are examples of future housing and how it will be developed to be responsive towards the demography and also future trends. These houses are developed based on innovative technologies and ideas to create an interactive atmosphere for all groups of users. The innovations are less based on high-tech and more based on the better knowledge of people's behavior and needs while being responsive to the lifetime needs of one person. They include features that can support individuals for self-care and stay in touch with family and friends.

### 3.2.1 Demography and Housing Trends

During the lifetime, as people aging, changes in their different abilities can appear due to accidents or illnesses. All around the world, a big group of people getting into the mentioned category as the world’s population is growing older, the demand for a universally designed living environment is increasing.

Based on the research which has been done the U.S. in 2008 on residential units, among 129 million units plus 1.1 million added new units in 2008, very few of the residential units’ design based on UD or have UD features in them. It is while more than 6.8 million community resident Americans require using assistive equipment

(U.S. Census Bureau, 2005–2007). It should be mentioned that the number of people in need of special care is increasing while there is very little available housing that can be accessible for them. In other words, it can be said that over half of the people using a wheelchair have to use staircases in their houses (Kelly 2001).

Research done on public policy shows that governments try to implement policies for supporting UD, to decrease the expenses, spend on the hospitals and nursing home care system. In general, people do not prefer institutional living, and this fact adds extra pressure on home services. If the house is designed universally, many of these services are required less.

### 3.2.2 Key features in Universal Design Housing

In one of the last projects in which Ronals Mace has participated, the Universal Home has been generated with specific features related to the UD concept and also some features which can be applied and combine is the family houses or single living houses, following figure is displaying the which has been designed in a way to be responsive to all the needs of the users and be adapted to the changing market.

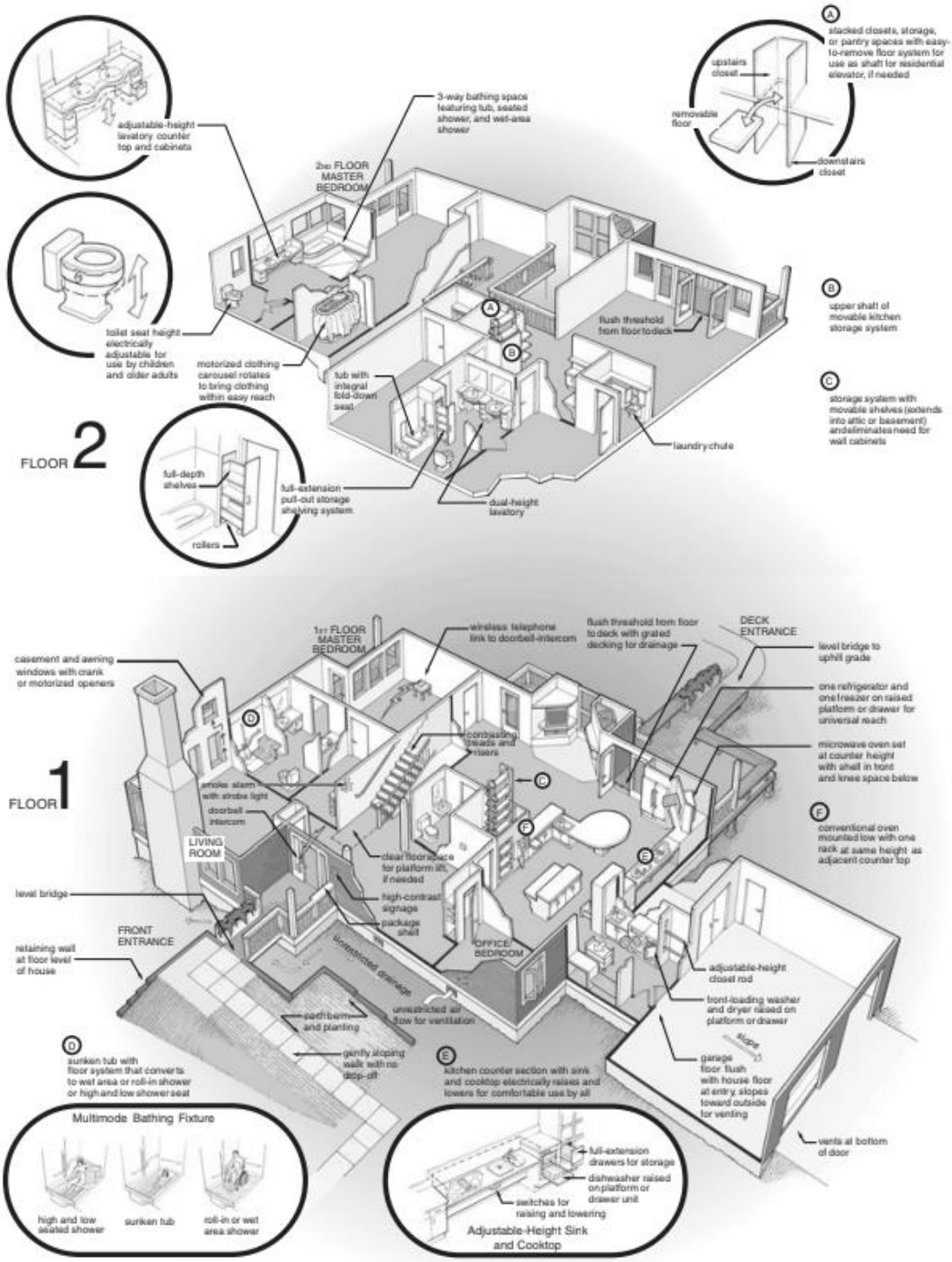



Figure 16: The next-generation universal home (Bringolf, 2011).

In this alternative universal house, not all the features have been considered, and there can many more features which will be improved during the time. But, the main key features of the universal house design are as following:

- Entrances to the buildings need to be leveled and without any stairs;
- In the one floor houses, the future possibility for accessing the second floor must be provided;
- Traditional norms might be different than current decision for some elements and features;
- Features in the building should be adjustable based on each individual's need
- Fixtures in the bathroom for bathing should provide multiple bathing options;
- Signs for showing the warnings or indicating the orientation should be included (Bringolf, 2011).

The plan of the building should be design based on the open-plan layout, which can create a proper sightline for occupants which can be very useful for people with hearing disabilities. Houses need to be constructed based on an engineering consultant to minimize the number of load-bearing interior walls and with this method have a more flexible interior space.

The first-floor master bedroom should be convertible to suit by having the bathroom inside to be suitable for older parents. Instead of having fixed features in the house as in traditional houses, in contrast, pieces should be adjustable and multifunctional (Maisel,2006).

The example given in this section is single family housing while the topic of this study is exploring the general term of housing. It should be mentioned that, the examples of apartment blocks (units) designed based on UD is rare. Usually design of units should be adapt for people with disability based on their request. Thus, the mass housing based

on UD is not common. In this manner, the principles given in the explained examples should be adapted and applied on apartments unit design based on occupants needs.

However, one of the well designed and adapted apartment units based on the UD but with focus of wheelchair users is Bright Harlem Apartment. The open plan of the unit gives the access to all areas to the wheelchair user of the family. The redesign features clever architectural detailing that gives each room the ability to blend or be separate and surfaces that can act as figures or enclosures. It also introduced a system of walls and ceilings that cut through the existing structure to expose new depths. The open floor plan of the living and dining rooms can be extended to the kitchen through a sliding door made from a frosted glass panel, to the music room through the neon yellow door, and to the den through a wood door cleverly concealed to match the walls. The bathroom is easily accessed by any user and features an iridescent tile wall and stainless-steel drawers. Aside from being beautiful, the usability of this all-access home proves why design is such a versatile field.

Figure 17: Bright Harlem interior design adapted based on UD.
(Retrived from https://www.6sqft.com/bright-harlem-apartment-features-transformative-rooms-and-is-wheelchair-accessible/)

For single family housing, apartment units or any type of the housing, the areas accessible to public such as entrances, parkings must address all principles of UD. The single housing designs or apartments based on the user's specific needs must be adapted. Following is the general checklist for designing a Universal Design housing which has been developed based on the general UD principles for different housing typologies which can be beneficial for housing design practice;

Table 2: Check-list for universal design housing (Dong, 2012)

| Check list for universal housing design | |
|---|---|
| **Parking:** | Ensure car parking space for an individual house is 3600mm wide x 7000mm long. |
| | Incorporate at least one designated accessible car parking bay for each lift core in communal car parks to blocks of flats. |
| | Provide at least one designated accessible car parking bay in each car parking area where more than one car parking area is provided |
| | Provide at least one designated accessible car parking bay adjacent to each lift core in an underground car park. |
| **Setting down point** | Provide a setting-down point close to the entrance of a block of flats or communal entrance to a group of dwellings. |
| | Ensure setting-down points are on level ground, with a section of dropped kerb and a kerbed section. |
| **External approach** | Provide level access to main entrance doors wherever possible. |
| | Provide level access between facilities on communal sites. |
| | Where level access is not possible, ensure access routes are gently sloping or ramped and incorporate landings at regular intervals. |
| | ensure paths to individual houses are at least 900mm wide |
| | Install gates that provide the clear opening width set out in the table above. |
| **Entrances** | Ensure entrances are easy to identify and easy to access. |
| | Ensure all entrances have an external light. |
| | Ensure entrances have some form of weather protection. |
| | provide a clear landing at least 1500mm x 1500mm in front of the entrance to individual houses. |
| | Provide a clear landing at least 2400mm x 2400mm in front of communal entrances. |
| | Ensure the entrance hall in an individual house incorporates an area at least 1500mm x 1500mm. |
| | Install doorbells no higher than 1200mm above ground level. |
| | Ensure every entrance and all other external doors have a level threshold. |

| Check list for universal housing design | |
|---|---|
| **Entrances** | Ensure entrance doors to individual houses have a clear width of 800mm and 300mm clear space adjacent to the leading edge. |
| **Horizontal circulation** | Ensure all houses and flats are arranged to provide convenient access throughout. |
| | Provide sufficient space to enable wheelchair users , those using scooters, parents with strollers, people using walking aids, and guide dog users to move through doorways and turn through 360 degrees |
| | Ensure corridors within flats and houses are at least 900mm wide |
| | Ensure corridors in communal areas are at least 1200mm wide. |
| | Ensure the width of doors and corridors are as set out in the table. |
| | Make sure all doors within houses and flats have a clear space of at least 300mm adjacent to the leading edge of the door. |
| | Ensure doors that open into rooms have their hinges adjacent to a return wall. |
| | Design bathroom and toilet doors so that they can be opened outwards in an emergency. |
| | Consider wet-room type showers in new houses. |
| | Consider reinforced or solid walls in bathroom/bedroom to take grab bars. |
| | Consider reinforced ceiling to provide for future hoist. |
| **Vertical circulation** | Provide one or more passenger lifts (preferably evacuation lifts) in the communal areas of blocks of flats of three or more storeys. |
| | Ensure lifts serve all floors, including underground carparks and other facilities. |
| | Provide an enclosed vertical rise platform lift in blocks of flats of two or three storeys. |
| | Where a platform lift is not installed at the outset, provide space, services, and structural support to facilitate easy installation in the future. |
| | Design individual houses to facilitate the future installation of a platform lift, home lift or stair lift. |
| **Rooms** | Provide a range of rooms and facilities in houses and flats. |
| | Wherever possible, locate the main living room, kitchen, and an accessible toilet at the entrance level. |
| | Provide an area within the living room that can be used in the future as a temporary sleeping area. |
| | Provide a toilet or bathroom that can be easily converted to incorporate a level access shower. |
| | Ensure the kitchen, main living area, and at least one bedroom incorporate an unobstructed turning area for wheelchair users, scooter users and people who use walking aids. |

## 3.3 Chapter Summary

After a review of UD in history and its underlying principles and their meaning in architecture, this chapter focused on UD strategies applicable to housing to create a checklist for architects. The chapter clarified how these aforementioned seven principles should be interpreted in the case of housing and become applicable in daily

life in terms of standards that can be applied in various contexts regardless of diverse cultural backgrounds.

The next chapter will focus on the case study, North Cyprus where the professional context will be explained and the details regarding how data was collected to measure the inclination towards the understanding and application of UD principles in architectural practice and housing applications in North Cyprus would be explained.

# Chapter 4

# CASE STUDY

## 4.1 Introduction

Being established in the early 1960s together with the arrival of the first Turkish Cypriot architects to the island, the Chamber of Turkish Cypriot Architects is one of the oldest professional institutions to be established within the Turkish Cypriot Community. Today, this professional body has grown to a large body of professionals with more than 1300 members of whom close to 1000 are graduates of North Cyprus Universities.

Before the establishment of the Turkish and Greek Cypriot Chamber of Architects, the architectural practice was largely managed by the Department of Public Works which was established in 1878. After the declaration of independence of the Republic of Cyprus this body operated under the Ministry of Transport, Communications, and Works. However, after the independence of Cyprus from the British Colonial Administration, the Republic of Cyprus remained under the administration of two communities only for a short time until the seizure of the Turkish Cypriot Community. This marked the establishment of many Turkish Cypriot Institutions.

Established with the initiations of the first Turkish Cypriot architects such as Ahmet Vural Behaeddin, Izzet Ezel Reşat, Abdullah Onar, Ayer Kaşif, Ahmed Behzat Aziz Beyli, and Hakki Atun, firstly the Union of Chamber of Architects and Engineers were

established and then came the organization of the architects' association which created the code of ethics, working fees and administrative structure of the system existing today. This was a huge step towards the professionalization of architecture in Cyprus where the legal responsibilities of preparing projects formally passed from the advocate clerks to professionals.

Starting from the mid-1950s, we start seeing professionally designed houses especially in cities such as Nicosia which today form the landscapes of modern Nicosia.

Apart from a few rules such as the inclusion of an elevator in apartment projects after 4 floors, we do not come across any universal design standards relating to houses. Together with the housing explosion following the announcement of Annan plan, many houses, groups of houses, medium to high rise apartments were constructed without the consideration of user demography. Today, the variety of people in terms of culture, professional status, age, marital status, choice of life has tremendously changed, making these standard applications remain unresponsive to the needs of the growing society.

North Cyprus has received a lot of temporary residents especially in the last three decades due to having a university-oriented economy. Additionally, the lack of Master Plans in many of the cities led to the strengthening of the construction sector where housing construction continued and houses were sold to people abroad, mainly former Russian states, Iran, and other middle east countries.

Building codes being dependant on the British Colonial period, there is not much trace of new standards apart from the Handbook published for architects in the first decade of 2000.

For this matter, the research is built on collecting information from the existing professionals, trying to understand how they approach universal design specifically in terms of housing design, what they think of their clients and their needs, how much they incorporate them to design as the end-user.

## 4.2 Survey Sample

For this research one main group of people has been selected as the primary target of the survey, the Turkish Cypriot architects who are members of the Chamber of Turkish Cypriot architects and have the license to practice the profession in the Northern part of the island. However, a limitation to data collection has been introduced excluding occupants or users of the buildings from the survey. This research focuses on discovering the professional architects' level of understanding about the concept of universal design and also, highlights the current situation for applying this concept to their housing designs in North Cyprus. Thus, this research is documenting the architects' perspective and level of understanding towards Universal Design through an online survey.

## 4.3 Survey Instrument

The questionnaire has been designed digitally through the online website of surveymonkey.com to provide both qualitative and quantitative data related to the topic of the study. The questionnaire contains 34 questions, designed based on different typologies such as multiple answers and open-ended questions, and scaled answers. The estimated time for filling the 6 digital pages' questionnaire is seven-

minute, which has been available online from September 2020 till November 2020. Figure 17 is presenting the responses' volumes to this online survey.

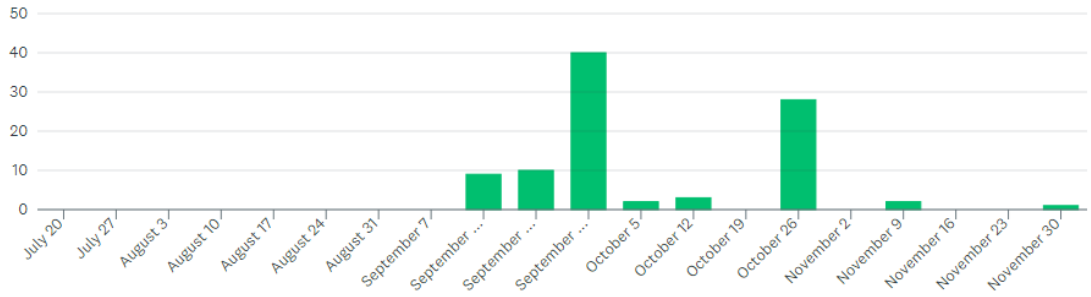



Figure 18: Responses Volumes

There are a different group of questions in the survey, group one is related to the personal information of the participants such as gender, age, education level, year of graduation, and profession. The second type of question is related to their understanding of the concept of Universal Design, how much they are aware of this concept and knowledgable about the 7 principles, if they had education related to this topic during their undergraduate/graduate education, the second sets of questions tried to highlight the existing level of knowledge related to universal design and understanding of this concept in the architecture profession in North Cyprus. And lastly, the third set of the question was designed to understand the level of application of Universal Design in the practice of architecture in North Cyprus.

In the following section, all the three mentioned groups have been looked at in terms of "survey responses and their analysis" studied in detail and documented through charts and tables to give a better understanding of the outcome of the survey.

## 4.4 Data Collection

As mentioned briefly earlier, for data collection a questionnaire has been designed. Then the questionnaire was opened to participants through the online cloud-based

company named SurveyMonkey. The survey is presented in Appendix A of this thesis both in English and the original language of the survey “Turkish”. After collecting the data through this system, all data has been analyzed based on descriptive, comparative, and correlational methodologies to answer the main research question of this study.

## 4.5 Survey Responses and Analysis

In total 67 architects responded to the survey. Following this section, the analysis of all three main groups of questions (mentioned earlier) has been presented. To start with, the demographic information of the participants (gender, education level, etc.) has been analyzed.

Out of 67 architects participating, 56.72% are male and 43.28% are female architects. In terms of age, 44.78% are in the age range of 28-37 and the lowest number of participants were from the age 58 and above. Regarding the education level of participants, slightly more than 50%, has an undergraduate degree, and the majority of graduates are from universities in Northern Cyprus (Eastern Mediterranean University, Near East University, Girne American University, Lefke European University) and graduated in between 2005 and 2018. The last question (number 6) included in the demography information of participants is related to the professional experience of architects in the field. The majority of responses are included into two categories of project architect and field architect. Participants could choose more than one criteria in question 6 to explain their professionalism in the field. The following table and group of charts is the summary of data analysis related to demographic information of 67 participants in this study.

Table 3: Demographic information of participants

| **Demographic information of participants** | | | | |
|---|---|---|---|---|
| # | Question | criteria | Percentages | Out of 67 |
| **1** | Gender of participants | Male (Erkek) | 56.72% | 38 |
| | | Female (Kadin) | 43.28% | 29 |
| **2** | Age groups | 22-27 | 10.45% | 7 |
| | | 28-37 | 44.78% | 30 |
| | | 38-47 | 28.36% | 19 |
| | | 48-57 | 11.94% | 8 |
| | | 58-67 | 1.49% | 1 |
| | | 68 and above | 2.99% | 2 |
| **3** | Education level | Bachelor (Lisans) | 50.75% | 34 |
| | | Master (Yüksek Lisans) | 38.81% | 26 |
| | | PhD (Doktora) | 10.45% | 7 |
| **4** | Professionalism in the field | Project architect (Proje Mimarı) | 73.21% | 47 |
| | | Field architect (Uygulamacı Mimar) | 58.93% | 33 |
| | | Drawing technician (Tekniker) | 8.93% | 5 |
| | | Educator full time (Eğitimci (Tam zamanlı öğretim üyesi) | 8.93% | 5 |
| | | Educator part time (Eğitimci (Yarı zamanlı öğretim görevlisi) | 10.71% | 6 |
| | | Public services (Kamu Görevlisi) | 7.14% | 4 |
| | | Others (Diğer) | 14.29% | 8 |

Following are the groups of charts documenting the explanation of demographic information of the participants (explained in the text and Table 3) with the visual figures.

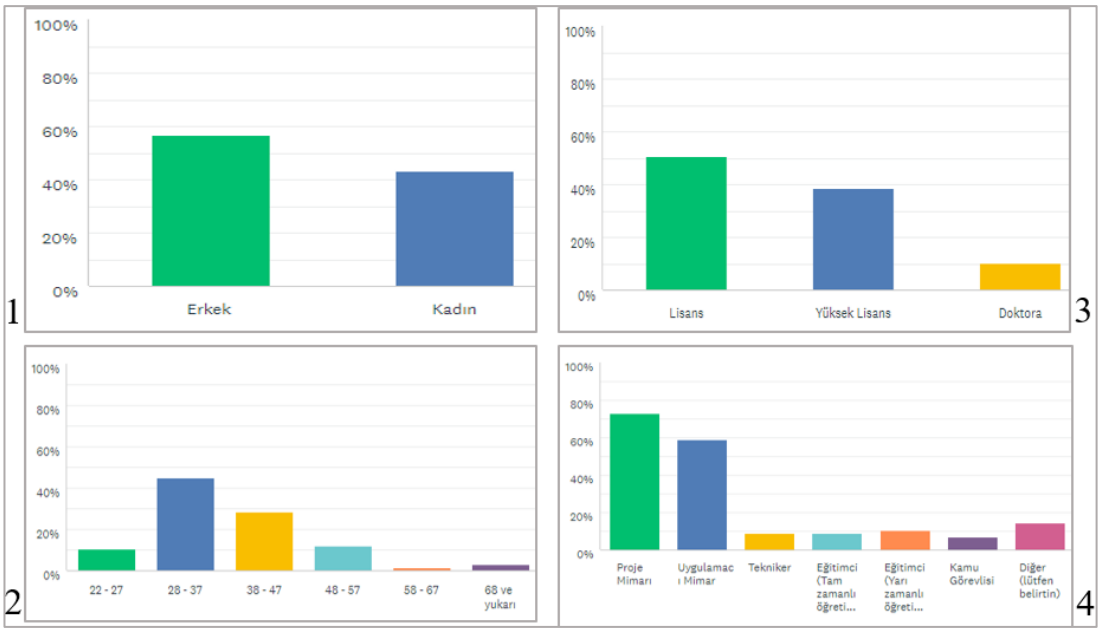



Figure 19: Demographic information of participants
(1. gender,2. ages, 3. education level, 4. Profession)

After the general demographic information of the participants, the second set of questions dealt with the familiarity of participants towards the concept of Universal Design. Question 7 asked the participants if they ever heard about Universal Design, if the participants answer to this question is no, the survey was automatically finalized here. The one who answered yes continued the survey. For this question, 18 participants answered no which automatically removed them from the survey.

Following question seven, participants were asked if they had any courses related to universal design in their architectural education, as must or elective course to understand if this subject has been covered in the education curriculums or not. The majority of responses, 80% claimed that they did not have any courses related to Universal Design in their undergraduate studies, which shows the necessity for integrating this topic in the education curriculum of the undergraduate program in universities. Besides asking if architects had courses related to this topic in their university education, they have been asked if they participated in courses (CPD)

related to this matter personally, which again majority, 76% responded as no. This lack of participation might bring the question, maybe architects are not interested in knowing more about this topic or integrating it into their work. When they were asked if they think it is necessary to have courses related to UD for continuous professional development, the majority (97.96%). Lastly from this set of questions, there was an effort to perceive what architects understand from the concept of UD. In this manner, they were asked what criteria/strategy were more related to the Universal Design (for these questions they had the chance to select for more than one criterion). Most participants chose "Size and Space for Approach and Use" as at least of the most related criteria (78%) and with a slight decrease in number in second and third place, "Flexibility in Use" (70%) and "Simple and Intuitive" (64%) can be seen. Based on participants' responses the "Tolerance for Error" has the lowest relation with UD, as it was only chosen by 32% of participants.

This set of questions, in general, can firstly clarify that there is a large percentage of architects who either never heard of universal design or they never had any courses (during their university period or after) which may be interpreted as alarming. However, their response to having these courses in CPD shows that they have expectations from their professional associations to include UD in their CPD program. And the last question of this set of data clearly shows that flexibility and accessibility (approachable by size and space) are the most important and relevant criteria related to Universal Design from the architects' perspective. The following tables are documenting the summary of the data analysis gathered from this set of questions.

Table 4: Familiarity of participants towards the concept of universal design

| familiarity of participants towards the concept of Universal Design | | | | |
|---|---|---|---|---|
| **#** | **question** | **Answer\criteria** | **%** | **number** |
| **1** | Have you ever heard of UD? | Yes (evet) | 67.27% | 37 |
| | | No (Hayir) | 32.73% | 18 |
| **2** | Have you had related courses in university? | Yes (evet) | 20% | 10 |
| | | No (Hayir) | 80% | 40 |
| **3** | Type of the course | Must (Zorunlu ders) | 70% | 7 |
| | | Elective (Seçmeli ders) | 30% | 3 |
| **4** | should Universal Design be part of continuous professional development | Yes (evet) | 97.96% | 48 |
| | | No (Hayir) | 2.04% | 1 |
| **5** | principle/s relates to Universal Design | Low Physical Effort (Düşük Fiziksel Çaba) | 50% | 25 |
| | | Size and Space for Approach and Use (Yaklaşmaya ve Kullanıma Uygun Ölçüler ve Mekân) | 78% | 39 |
| | | Tolerance for Error (Hata Toleransı) | 32% | 16 |
| | | Flexibility in Use (Kullanım Esnekliği) | 70% | 35 |
| | | Simple and Intuitive (Basit ve Sezgisel Kullanım) | 64% | 32 |
| | | Perceptible Information (Algılanabilir Bilgi) | 56% | 23 |
| | | Equitable Use (Adil Kullanım) | 58% | 29 |

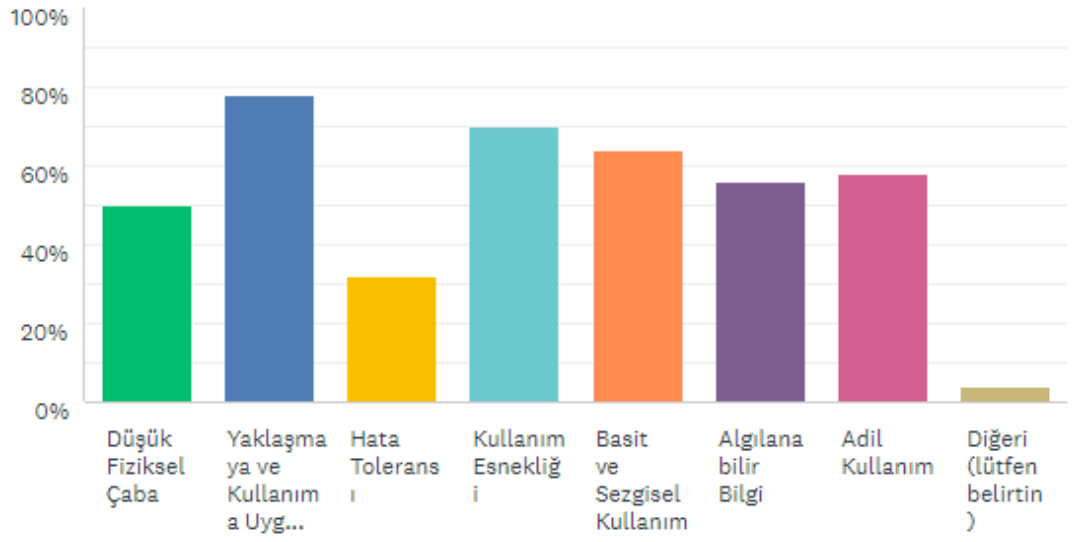



Figure 20: Principle/s relates to Universal Design

The last set of questions concentrated on the application of Universal Design in North Cyprus building practice and perspectives and observations of architects. This set of questions starts with asking the participants if they are applying this concept in their residential designs, if yes from which perspective, and if not what is the reason. The majority of participants claimed that they use UD principles in their design and according to them, “Size and Space for Approach and Use”, “Flexibility in Use” and “Simple and Intuitive” are the priority principles to be applied in the design. Following table presents their responses.

Table 5: Priority of application UD principles

| **If you apply any of the principle/s to residential design, which ones do you prefer as a priority?** | | | |
|---|---|---|---|
| **1** | Low Physical Effort (Düşük Fiziksel Çaba) | 48,98% | 24 |
| | Size and Space for Approach and Use(Yaklaşmaya ve Kullanıma Uygun Ölçüler ve Mekân) | 71,43% | 35 |
| | Tolerance for Error (Hata Toleransı) | 18,37% | 9 |
| | Flexibility in Use (Kullanım Esnekliği) | 67,35% | 33 |
| | Simple and Intuitive (Basit ve Sezgisel Kullanım) | 61,22% | 30 |
| | Perceptible Information (Algılanabilir Bilgi) | 30,61% | 15 |
| | Equitable Use (Adil Kullanım) | 40,82% | 20 |

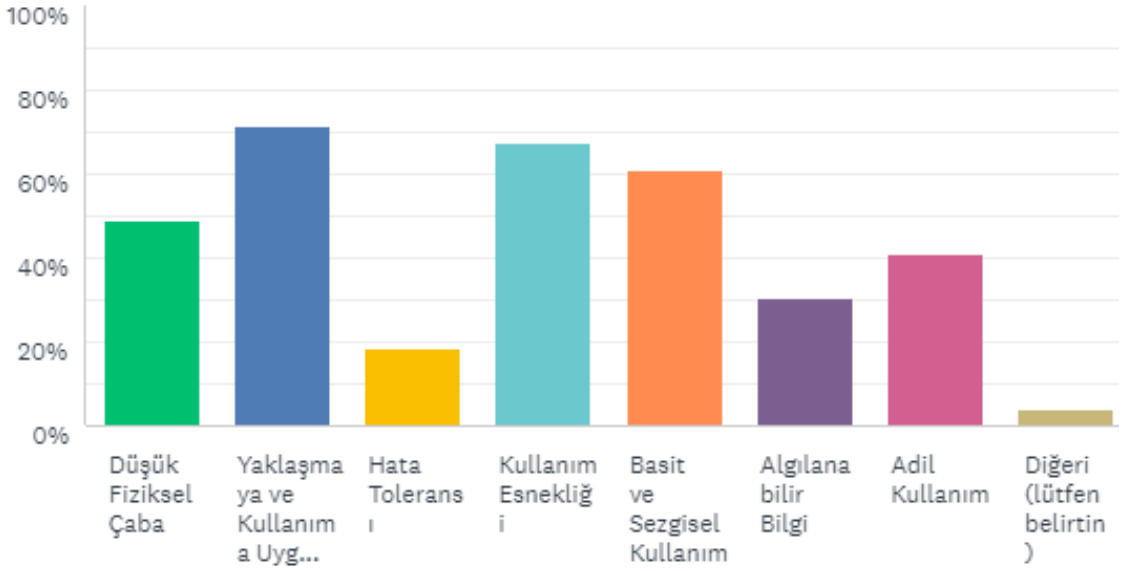



Figure 21: Priority of application UD principles

Among the answers, only one participant claimed that he/she is not applying the UD principles in the design, and the reason was, “not being able to convince the client”.

Based on the participants' answers to questions it became clear that in their opinion universal design principles implementation is more important and must be applied in the public spaces and public facilities, and a few participants selected the implementation of universal design in the housing units (only 26%).

Table 6: The implementation of universal design principles

| **Which of the options take precedence in the implementation of universal design principles?** | | | |
|---|---|---|---|
| **1** | Government agencies and surroundings (Devlet kurumları ve çevreleri) | 82% | 41 |
| | Public spaces (Kamusal alanlar) | 92% | 46 |
| | Individual housing and surroundings (Tekil konut ve çevresi) | 26% | 13 |
| | Public housing and surroundings (Toplu konut ve çevresi) | 34% | 17 |
| | Commercial buildings and surroundings (Ticari binalar ve çevreleri) | 66% | 33 |

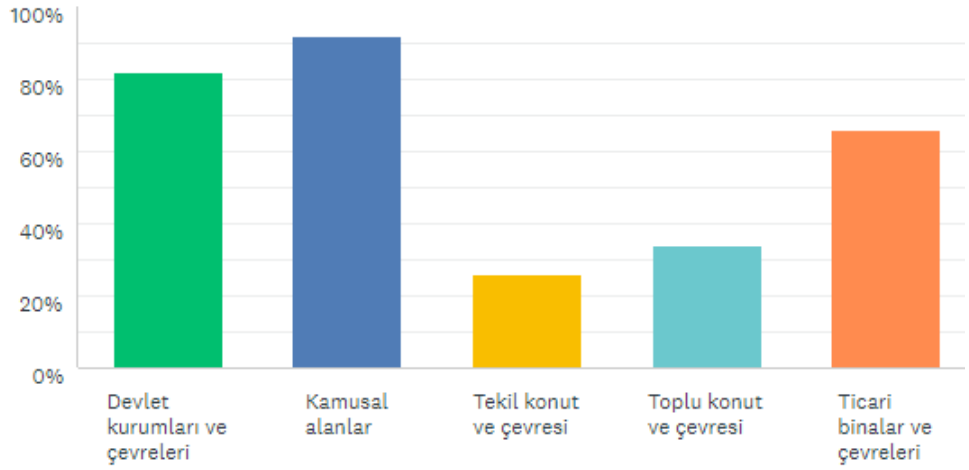



Figure 22: The implementation of universal design principles

Towards the end of the questionnaire before the scaled based questions, information was collected relating to the application phase of Universal design in practice and its problems and also awareness of clients about Universal Design, and if architects try to explain the concept to them to apply it in their project. One of the most important factors which needed to be clarified with this survey was the reason for not applying universal design in the projects by architects. This survey clarified that one of the main reasons behind the non-application of Universal Design was due to the high cost for the clients. Then follows problems such as lack of supervision and control of the authorities and lack of technologies for applying these principles in the local market. Even though based on the architects' answers, one of the main reasons for not applying UD is the client's negative approach due to high costs, the majority of architects claimed that they attempted to explain the UD concept and principles to their clients especially about the "Size and Space for Approach and Use", "Flexibility in Use" and "Simple and Intuitive". The majority of architects stated that they believe clients should be integrated into the design process, especially in the "Creation of the architectural program" and "Drafting the Preliminary project" phases. The following table is documenting and visualizing the summary of this part of the survey.

Table 7: Application phase and users' role

| Application phase and users role | | | | |
|---|---|---|---|---|
| **#** | **question** | **Answer\criteria** | **%** | **number** |
| **1** | What are the problems application phase? | Application found expensive by customers (Uygulama müşteriler tarafından pahalı bulunması) | 59.09% | 26 |
| | | Lack of legislation which obliges the application (Uygulamayı mecbur kılan mevzuatın yürürlükte olmaması) | 27.27% | 12 |
| | | Lack of adequate application control by the authorities (Yetkililer tarafından yeterli uygulama denetiminin olmaması) | 50% | 22 |
| | | Lack of suitable technology in the local market (Yerel pazarda uygun teknolojinin olmaması) | 36.36% | 16 |
| **2** | Do you inform the customer about Universal Design principles? | Yes (evet) | 80% | 40 |
| | | No (hayir) | 20% | 10 |
| **3** | What universal design principle/s are you discussing with your client? | Low Physical Effort (Düşük Fiziksel Çaba) | 56.41% | 22 |
| | | Size and Space for Approach and Use(Yaklaşmaya ve Kullanıma Uygun Ölçüler ve Mekân) | 79.49% | 31 |
| | | Tolerance for Error (Hata Toleransı) | 15.38% | 6 |
| | | Flexibility in Use (Kullanım Esnekliği) | 71.79% | 28 |
| | | Simple and Intuitive (Basit ve Sezgisel Kullanım) | 46.15% | 18 |
| | | Perceptible Information (Algılanabilir Bilgi) | 33.33% | 13 |
| | | Equitable Use (Adil Kullanım) | 38.46% | 15 |
| **4** | Do you think that each client can be included in the design process? | Yes (evet) | 58% | 29 |
| | | No (hayir) | 42% | 21 |
| **5** | In which stage/s do you think the customer should be involved with residential design and its implementation? | Creation of the architectural program (Programın oluşturulması) | 84% | 42 |
| | | Conceptual design (Kavramsal tasarım) | 48% | 24 |
| | | Drafting the Preliminary project (Avam projenin hazırlanması ) | 54% | 27 |
| | | Technical Design (Teknik Tasarım) | 4% | 2 |
| | | Construction/application (İnşaat/uygulama) | 20% | 10 |

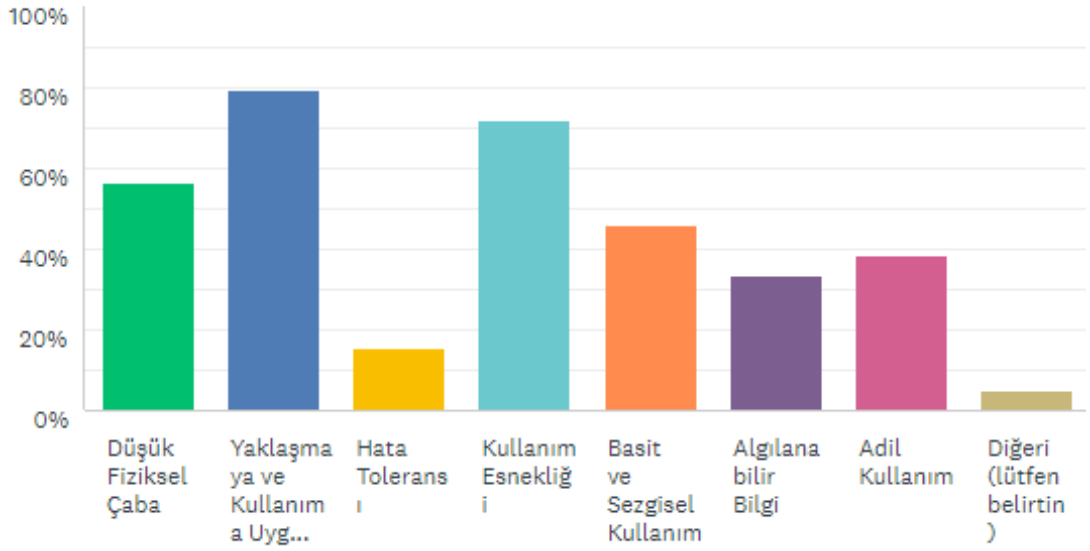



Figure 23: What universal design principle/s are you discussing with your client.

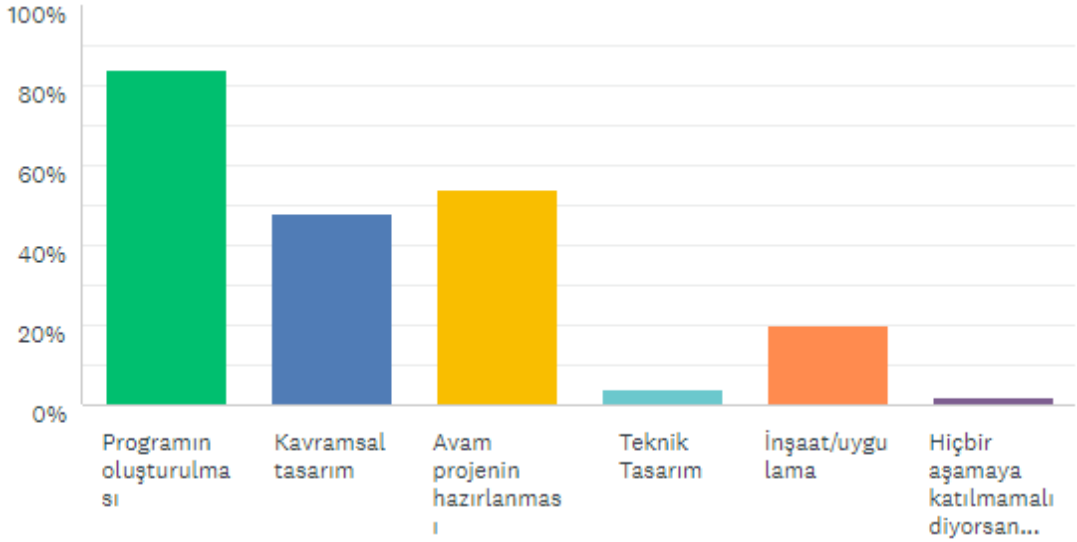



Figure 24: In which stage/s do you think the customer should be involved with residential design and its implementation

The last section of the questionnaire contains 10 scaled based questions to examine the level of importance that architects give to different criteria such as users' needs, physical environment, social environment, and so on. The following table is documenting the final results of the survey.

Table 8: Results of the scaled based questions

| # | question | Scales | | | | |
|---|---|---|---|---|---|---|
| | | Extremely important | Very important | Somewhat important | Not so important | Not at all important |
| 1 | What level of importance do you give to the user needs when designing residential? | 78% | 20% | - | 2% | - |
| 2 | What level of importance do you give to the physical environment when designing residential? | 59.16 % | 34.69% | 6.12% | - | - |
| 3 | What level of importance do you give to the social environment when designing residential? | 48.98 % | 42.86% | 8.16% | - | - |
| 4 | What level of importance do you give to the empathy with the user when designing residential? | 64% | 34% | 2% | - | - |
| 5 | What level of importance do you give to the physiological comfort of the user when designing residential? | 64% | 28% | 8% | - | - |
| 6 | What level of importance do you give to the psychological comfort of the user when designing houses? | 58% | 40% | 2% | - | - |
| 7 | What level of importance do you give to the climate when designing residential? | 67.35 % | 26.53% | 6.12% | - | - |
| 8 | What level of importance do you give to the aesthetics when designing residential? | 42% | 54% | 2% | 2% | - |
| # | Question | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
| 9 | The customers I designed residential have universal design principles knowledge and make such a request in the design process. | 4% | 8% | 40% | 42% | 6% |
| 10 | I believe that the client should have knowledge about universal design principles in the design process**.** | 16% | 58% | 10% | 6% | - |

## 4.6 Discussion

This survey aimed to clarify the current level of understanding relating to Universal Design among practitioners in North Cyprus which highlights the reasons behind the negligence of the usage of the Universal Design concept in residential housing design in North Cyprus. This survey can clearly show that there are still professionals who do not have a complete understanding of the UD principles and this can be due to the lack of given courses in universities or later on educational courses for architects to improve their profession. But based on the answers of participants there is a clear demand for having these courses in CPD. Thus, providing such platforms for professionals can improve the current situation related to the application of UD principles in North Cyprus.

On the other hand, most architects believe UD principles should mostly apply to the public buildings and public spaces, but they try to integrate UD principles in their design based on the client preference. Even though architects try to involve clients in decision-making related to the UD, by explaining the concept and its benefits, there is still a large number of customers who refuse the application of UD due to the extra cost. This is partially due to the lack of appropriate technologies and materials existing on the island. This fact affects the client's decision (from the economic aspect) and affects the architect from the design side since lack of sources can make the design and construction process more difficult.

Lastly, it should be mentioned that besides all the issues that architects and clients face there is no strict rule related to the application of UD in residential buildings and there is no proper supervision on the application of UD in the housing units in North Cyprus.

The developed rules and regulations related to UD are mainly focusing on the public, commercial buildings and not on housing. Accordingly, CPD education should become obligatory for architects to include a complete understanding of UD from all perspectives, local resources and technologies should be improved (which can decrease the cost) and proper rules and regulation for the application of UD in housing may help improve the quality of housing design and application in realtion to UD in North Cyprus.

# Chapter 5

# CONCLUSION

Sensitivity to people of all ages and disabilities is essential for not making them ignored from being a potential user group of the specific design. The concept of UD is there to stop the discrimination of people with disabilities but is also responsible for including all without any disabilities. In this context, the implementation of UD principles to everyday products, buildings, and outdoor environments to improve various individual particularly disabled individuals' capabilities increase their adaptation to built environments and create a better quality of life for them as well as their associates.

Therefore, design professions, principally architecture, interior architecture, landscape design, and industrial product design have to attribute importance to create environments and products that create an accessible, inclusive, and useful design for all user groups. Although Universal Design (UD) is a highly significant topic for design practices as an approach to designing buildings, interiors, outdoor environments, the university curriculums do not advocate the same importance to it in architectural education. In many architectural institutions around the world, UD is not treated as a must course but is part of other must courses which can only save a limited amount of time for its coverage. In some cases, it is an elective course. Therefore graduation from architecture schools is mostly formulated as having no inclusion of UD. Although countries with a long historical background in architectural education

have well-established building codes putting accessible design to the heart of the architectural practice, nonetheless an extensive understanding of the topic by the design professionals is not observed.

The research realized amongst the Turkish Cypriot professionals proves that awareness of UD as a term and its context in the light of its principles were not clearly understood by the practicing architects due to not covering the topic during architectural education, having a lack of continuing professional development and the lack of interest coming from their clients. Moreover, due to the changing profile of clients, architects experience problems in suggesting innovative solutions in housing design which is a cultural phenomenon that reflects the everyday life of users.

Therefore, to increase the awareness of the students on UD, and later graduates, it is fundamental to teach UD at universities as must courses and demand it in the studio education. Beside the academic education in universities, relate courses to update architects about the UD principles, progresses and changes is needed. Seminars, workshops and additional courses must be organized by authorities to increase the awareness of this concept and provide a better understanding for already graduates and who is working as architect today. Becoming aware of changing demographics is another piece of knowledge that architects should become aware of. And finally, it should be the responsibility of the Chamber of Turkish Cypriot Architects to make Universal Design a must course in continuing professional development and demand it from their members. Another responsibility of this institution is to initiate the release of necessary building codes and coordinate their application in practice. There should be more strict measures and controls over design process and application related to

UD principles. It is only then that a true transformation in the application of UD will start in Northern Cyprus.

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# APPENDIX

**Sample of the survey in English, followed by the original sample in Turkish**

**Dear Participant,**
This survey, compiled within the framework of the thesis study 'Universal Design Approach in Terms of Professional Practice and Housing Applications' carried out within the scope of The Master of Architecture Program, was prepared with the aim of taking your opinions and opinions. Your contribution to this survey will give important tips on how the Universal Design Approach is handled in terms of vocational practice and housing practices in our country, as well as the development of forward-looking education and training activities; it will play an important role in the development of constructive proposals for the future in the fields of education and implementation. We would like to thank you for your support and contribution by filling out this survey work in advance.
Sincerely

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**1. Gender?**
Male
Female
**2. What is your age group?**
22-27
28-37
38-47
48-57
58-67
68 and above
**3. What is your education level?**
Undergraduate
Post graduate
PhD
**4. What university did you graduate from?**
Undergraduate: ……
Post graduate: …….
PhD: ……
**5. What year did you complete your undergraduate training?**
Graduation year: …….
**6. In a professional sense, which of the following/s identifies you?**
Project architect
Field architect
Drawing technician
Full time educator
Part time educator
Public servant
Others: ……
**7. Have you heard the term Universal Design before?**
Yes

No

**8. Did you have a Universal Design course in your undergraduate education?**

Yes

No

**9. Is Universal Design a must-choose or compulsory course?**

Elective course

Compulsory course

**10. Have you participated in any class /course related to Universal Design as part of your continuous professional development?**

Yes

No

**11. In your opinion, should Universal Design be part of continuous professional development?**

Yes

No

**12. Can you define 3 keywords that express the importance of Universal Design to you?**

1. …….

2. ……....

3. …….

**13. According to you which of the following principle/s relates to Universal Design?**

Low Physical Effort

Size and Space for Approach and Use

Tolerance for Error

Flexibility in Use

Simple and Intuitive

Perceptible Information

Equitable Use

Others: …….

**14. Do you apply any of the above principles when designing residential?**

Yes

No

**15. If you apply any of the principle/s to residential design, which ones do you prefer as a priority?**

Low Physical Effort

Size and Space for Approach and Use

Tolerance for Error

Flexibility in Use

Simple and Intuitive

Perceptible Information

Equitable Use

Others: …….

**16. If you are <u>not</u> using which of the following/s will explain this situation?**

I find it unnecessary

Application is expensive

I cannot convince the client

Extends the design process

Most land sizes do not provide enough space for application

The lack of force of legislation that obliges the application

The lack of suitable technologies available in the local market
Others: ……..

**17. Do you believe in the importance of Universal Design in architectural design?**

Yes
No
If yes, please specify why: ……

**18. Which three of the following options take precedence in the implementation of universal design principles?**

Government agencies and surroundings
Public spaces
Individual housing and surroundings
Public housing and surroundings
Commercial buildings and surroundings

**19. Have you ever designed for a disabled user?**

Yes
No
If yes, can you briefly explain how this experience benefits you as an architect:
…….

**20. If you are considering universal design principles in your designs but having problems with the application phase, can you please mark the relevant reason/s?**

Application found expensive by customers
Lack of legislation which obliges the application
Lack of adequate application control by the authorities
Lack of suitable technology in the local market
Others: ……

**21. Do you inform the customer about Universal Design principles when designing residential?**

Yes
No

**22. What universal design principle/s are you discussing with your client?**

Low Physical Effort
Size and Space for Approach and Use
Tolerance for Error
Flexibility in Use
Simple and Intuitive
Perceptible Information
Equitable Use
Others: …….

**23. What level of importance do you give to the <u>user needs</u> when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**24. What level of importance do you give to the <u>physical environment</u> when designing residential?**

Extremely important
Very important
Somewhat important

Not so important
Not at all important

**25. What level of importance do you give to the social environment when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**26. What level of importance do you give to the empathy with the user when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**27. What level of importance do you give to the physiological comfort of the user when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**28. What level of importance do you give to the psychological comfort of the user when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**29. What level of importance do you give to the climate when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**30. What level of importance do you give to the aesthetics when designing residential?**

Extremely important
Very important
Somewhat important
Not so important
Not at all important

**31. The customers I designed residential have universal design principles knowledge and make such a request in the design process.**

Strongly agree
Agree
Neither agree nor disagree
Disagree

Strongly disagree

**32. I believe that the client should have knowledge about universal design principles in the design process.**

Strongly agree
Agree
Neither agree nor disagree
Disagree
Strongly disagree

**33. Do you think that each client can be included in the design process?**

Yes
No

**34. In which stage/s do you think the customer should be involved with residential design and its implementation?**

Creation of the architectural program
Conceptual design
Drafting the Preliminary project
Technical Design
Construction/application
None of the stages (please specify): …….

**Thank you very much for your valuable cooperation. Please click the DONE button below to complete your survey.**

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**Turkish version of the survey (Original):**