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TOWARDS INCLUSIVE URBAN DESIGN: PROMOTING DESIGN FOR ALL IN SYRIA

M.Sc. Thesis by

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TOWARDS INCLUSIVE URBAN DESIGN: PROMOTING DESIGN FOR ALL IN SYRIA

ABSTRACT

A comfortable environment is the basis for the quality of life, it is what makes a person satisfied and content in their society, in order to be happy, they desire the availability of access to public services easily without obstacles, and this is what is known as the concept of accessibility.

This study aims to highlight the importance of design for all in the urban environments, to provide accessible streets, and the advantages of applying its standards in the Syrian streets, as after the war and the effects it had on the city and citizens. Additionally, most of the streets are designed for vehicles without taking into account services for pedestrians regardless of their physical condition, especially people who require special services (the elderly, the blind, people with strollers and even people with reduced mobility).

In order to achieve this aim, three international standards were studied as a literature review (WDU, ADA, and ABNT) and their results were compared with one of the important streets of Aleppo city, which is Ibn Al-Bitar Street, known as Adonis Street, which has been chosen as a case study to implement the potential improvements in terms of design for all/accessibility. Accordingly, to reveal the obstacles that pedestrians in this street face in terms of accessibility, a survey was conducted. Therefore, by following the standards of the study, and the data collected from the survey, we produced solutions to the obstacles of accessibility. Accordingly, the study presents comprehensive recommendations and illustrative proposals for the rehabilitation of services specific to people with reduced mobility and visually impaired, which will encourage the revival of the city and the return of refugees. All of these efforts aim to promote equal opportunities for participation in the society and enhance accessibility in Syrian streets by improving and updating the current standards to be more comprehensive and designed for all.

Keywords: Accessible Street, Accessibility, Design for All, Streets Standards, Disability.

KAPSAYICI ŞEHIR TASARIMINA DOĞRU:

SURIYE'DE HERKES IÇIN TASARIM TEŞVIK ETMEK

ÖZ

Rahat bir ortam yaşam kalitesinin temeli olmakla birlikte bireyi toplumunda huzurlu ve mutlu eder. bunun için her şeye engelsiz olarak kolayca bir şekilde erişilebilmesi gerekir.

Bu çalışmanın amacı, tasarımın kentsel ortamlarda yaşayan herkes için önemini vurgulamak, erişilebilir sokaklar sağlamak, savaş sonrası kent ve insanlar üzerinde bıraktığı etkiler gibi Suriye sokaklarında yaşan standartlarını uygulamanın dezavantajlarını vurgulamaktadır. Ayrıca, sokak ve caddıların kahır eksereytı motorlu taşıtlar için tasarlandığından yeye geçetleri ve ingeli insanların günlük hayatlarını kolaylaştırmak hesaba katılmamıştır.

Bu kapsında üç uluslararası standart bir edebiyat incelemesi (WDU, ADA ve ABNT) olarak incelenip sonuçları Adonis Caddesi olarak bilinen Ibn Al-Bitar Caddesi olan Aleppo şehrinin önemli sokaklarından biriyle karşılaştırıldı. Bu tümü/erişilebilirlik için tasarım açısından olası iyileştirmeleri uygulamak üzere örnek olay incelemesi olarak seçilmiştir. Buna göre, bu sokaktaki insanların günlük yaşamlarında karşı karşıya oldukları engelleri ortaya çıkarmak için bir anket yaparak günlük yaşamlarında vurgulanmıştır. Ayrıca bu çalışma, vatandaşların görüşlerini ifade ettikleri bir anketin standartları ve yanıtlarına uyarak, sokaktaki erişilebilirlikle ilgili bu engellerin hafifletilmesi için gerekli engellerin ve gerekliliklerin bir listesini de içeriyor. Bu bağlamda çalışma, fiziksel çevrenin rehabilitasyonu için kapsamlı bir tavsiye ve teorik ve illüstrasyon önerileri sundu ve kentin yeniden canlanması ve mültecilerin bu duruma geri dönmesi yönünde cesaret verdi. Tüm bu çabalar, daha kapsamlı olmak üzere mevcut standartları geliştirerek ve güncelleyerek, topluma katılım için eşit fırsatları teşvik etmeyi ve Suriye sokaklarında erişilebilirliği artırmayı amaçlamaktadır

Anahtar Sözcükler: Erişilebilirlik Sokak, herkes İçin Tasarım, Sokaklar Standartları, Engellilik.

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LIST OF ABBREVIATIONS

ABNT	"Associação Brasileira De Normas Técnicas" Brazilian Association of Technical Standards.
ADA	Americans with Disabilities Act Standards.
HNAP	Humanitarian Needs Assessment Program.
IDP	someone forced to leave his home but remains within his country's borders.
OCHA	United Nations Office for the Coordination of Humanitarian Affairs.
PRM	Persons with Reduced Mobility.
UN	United Nations.
VI	Visually Impaired People.
WDU	The Universal Standards Guide For Persons With Disabilities.
WHO	World Health Organization.

CHAPTER 1

INTRODUCTION

1.1 Motivation and Background

The Syrian conflict has had a profound and wide-reaching impact on the lives of Syrians, affecting their culture and leaving a lasting impact on their memories. This has been particularly evident in the war-torn country, where the effects of the war have been devastating and far-reaching.

As the conflict in Syria progressed, it had a significant and devastating impact on the lives of Syrians, leaving deep marks on the country's culture and the memories of its inhabitants. The ongoing war has caused the destruction of partial or entire urban systems in many cities, including the destruction of homes and infrastructure related to public services such as roads, schools, and hospitals. This has led to an increase in disabilities, both physical and social, for both the old and young, highlighting the need for efforts to make the city livable, sustainable, and accessible for all.

Inclusive design, also known as design for all, aims to create accessible and user-friendly public spaces for all members of society, including children, women with children, the elderly, the sick, and people with disabilities. Accessibility, a crucial aspect of urban livability, can be improved by removing barriers and obstacles that make it difficult for individuals with various needs to navigate public spaces. By taking into consideration the needs of all members of society, we can create inclusive and livable urban environments that foster a sense of community and belonging [1].

The concept of "Universal Design" was coined in the United State America in the mid-1980s by architect Ronald L. Mace. It refers to designing environments so they can be easily accessible, understandable, and usable by all people regardless of age, size, ability, or disability. The goal is to create inclusive spaces where everyone can participate and

contribute. Universal Design has roots in architecture and focuses on removing obstacles for people with disabilities through retrofitting existing buildings and adopting a new approach to designing new ones. The objective is to make different environments and products usable for everyone in the most independent and natural way possible, without the need for special adaptations.

Reconstruction is becoming the new battleground in the Syrian conflict that increases the importance of Syrian integration for reconstruction and recovery in the country [2]. Tackling the legacy of the conflict and restoring a measure of stability by integrating all Syrians for reconstruction and recovery will attain some level of stability and sustainability in the country [3]. The integration of the Syrian people is crucial for achieving peace, economic stability, prosperity, and development within the country.

The rebuilding of infrastructure and housing is only one aspect of the significant challenges facing Syria. To fully recover, the country needs support in restarting its economy, stabilizing its currency, and restoring essential public services such as education, healthcare, electricity, and water, which can only be accomplished through the unification of its people [4].

While reconstruction efforts have already begun, they are not yet a comprehensive, nationwide initiative and they do not take into account the needs and wants of the population, which increases the fact that Syrian people need to integrate nationwide for the development of the country comprehensively. Promoting accessibility in urban spaces is crucial for the inclusion of individuals with disabilities and those with limited mobility in Syria. This includes not only those with permanent disabilities, but also those who temporarily have limited mobility such as children, the elderly, pregnant women, and obese individuals [5].

According to the United Nations UN, 10% of the world population, or approximately 650 million people, have a disability, with 80% of these individuals living in developing countries [6]. With the world currently experiencing a demographic shift due to

population aging and a decrease in fertility rates, Syrian cities must provide inclusive spaces for all users, particularly for those with disabilities or limited mobility.

For a long time, we built cities just for able people, closing our eyes on disabled people, without thinking about how they can live, how they can move, and how can make them not feelings of inferior, the goal of design and planning is to enhance the built environment and ensure it is tailored to the needs of its users. [7].

So, as architects, we have to consider more about sprawling cities and how to make them more livable in terms of inclusive design and accessibility, in the optimal time to proactively plan proactively for the city's future before it's too late.

1.2 Problem Definition

After years of war in Syria, 25% of houses and 57% of infrastructure have been demolished and displaced 12 million people away both internally and abroad, according to the United Nations Office for the Coordination of Humanitarian Affairs OCHA report 2023[8]. After the announcement of Damascus as the least livable city in the global livability index 2019, the first national and international demand is the voluntary return of refugees which requires better conditions and more accessible cities for them.

According to Humanitarian Needs Assessment Programme HNAP, 36% of Syrian people have a disability, all of them above 12 years [9]. Accessibility is necessary for promoting the use of pedestrian spaces and enhancing the quality of life for individuals. Convenient and easy access for pedestrians can bring numerous benefits to cities and their inhabitants such as reducing stress, improving mental health, increasing focus, and providing restorative experiences.

Furthermore, an accessible city should provide expansive space for efficient movement and social interactions [10], Syria, with its rich history and culture, has the potential to attract more tourists by providing accessibility for both the general population and Persons with Reduced Mobility PRM and Visually impaired persons VI [11].

However, the lack of comprehensive Syrian standards and urban furniture such as seating and shaded areas makes the streets less inviting for pedestrians and doesn't encourage walking.

Ultimately, providing accessibility in neighborhoods and streets is essential for promoting stability and development, particularly in the aftermath of war, to make the streets and neighborhoods accessible for all.

Rebuilding infrastructure in war-torn areas can be a complex and challenging process, requiring the coordination of multiple organizations and stakeholders. However, it is also an opportunity to improve accessibility and ensure that public spaces and essential services are accessible to all.

1.3 Aim of Research

In order to develop a livable life for all, it is necessary to achieve a perfect balance between livability and satisfaction of citizenship, upgrading residential streets and paying attention to the development of the dimensions of accessibility, and trying to implement them as much as possible according to international standards.

The research aims to examine the effectiveness of using accessibility as a means of creating more livable streets that are inclusive and user-friendly, with the ultimate goal of enhancing the quality of life for residents.

The study explores the quality of Syrian streets through the lens of accessibility, focusing on the public right-of-way in improvement projects for Syrian streets and to be prepared for recovery projects by identifying the main accessibility issues and providing recommendations for making streets more accessible.

This thesis will conduct a comparison between the current state of Syrian streets and accessible streets that offer opportunities for all, according to different standards. It also intends to identify solutions for overcoming obstacles and rebuilding Aleppo city post-war under accessible conditions, as well as assessing the level of satisfaction of citizens with residential streets. and to answer the main research questions:

1. What is the current situation of the streets in terms of accessibility?
2. What are the main obstacles people face in the streets from the point of design and the experience of users/inhabitants?
3. What are the design guidelines and recommendations for urban fabric (streets and walkways) to be inclusive and accessible for all in Syria?

1.4 Methodology

This study uses a deductive and comparative methodology, based on reviewed literature by comparing different global standards which are the most comprehensive (Brazilian Association of Technical Standards, The Universal Standards Guide for Persons with Disabilities, and the Americans with Disabilities Act Standards), to provide a wide range of accessibility factors and parameters.

The study applies this methodology to a case study of one of the most important streets in Aleppo city, where gaps and accessibility issues are identified according to the comparison of three international standards to the current situation of the street through observations, field notes, and mapping. Moreover, illustrative images have been represented to clarify the obstacles that people face.

Moreover, a survey has been conducted to tease out what makes qualified and livable urban environments with ease of use and accessibility for all users to live in and how people would like to move around their streets. Additionally, The results were used to create visual representations of an imagined scenario for the street after incorporating various accessibility features and tools. These images serve as a demonstration of the potential improvements that could be made to enhance the accessibility of the street for PRM and VI. Furthermore, the study improves recommendations in terms of planning accessible streets in Aleppo.

The study hopes to make public spaces more accessible and explorable and to give a base idea of accessible city streets, which shows how to include inclusive planning in the

regular design process, in order to design the streets without exceptions. Figure 1.1 Shows the method plan.

Figure 1.1 Methodology

CHAPTER 2

LITERATURE REVIEW

2.1 General description and definitions

In this chapter, a comprehensive overview of the key terms and concepts addressed in the thesis is provided.

2.1.1 Accessibility and Design for All

Accessibility is a crucial aspect that determines the usage of pedestrian spaces and enhances the quality of people's life [12]. Generally, accessibility is the measure of ease and convenience for a resident to access a particular destination [13]. Accessibility can be defined as the property of a location that allows for ease in overcoming spatially imposed barriers, such as distance and time [14]. to achieve this, the environment must be designed with the principles of "Design for All" in mind, which prioritizes inclusivity and equality by creating products, services, and environments that are accessible and usable by all individuals, regardless of their abilities or disabilities[15].

This approach ensures equal opportunities for participation in society by considering the diverse needs and abilities of all individuals. In summary, Design for All is the principle that everything created for human use must be accessible, convenient, and adaptable to the diverse needs of society, thus enhancing accessibility and overall quality of life.

In one sense, accessibility refers to the proximity between two points, while in another sense, it refers to the ability of transportation systems to provide low-cost and/or quick access between different locations. However, due to the complex and conceptual nature of accessibility, it can be difficult to provide a clear definition and measure it quantitatively.

Figure 2.1. shows the city elements as an Accessible City in two types, citizens, and buildings, and how we have to look around to design cities.

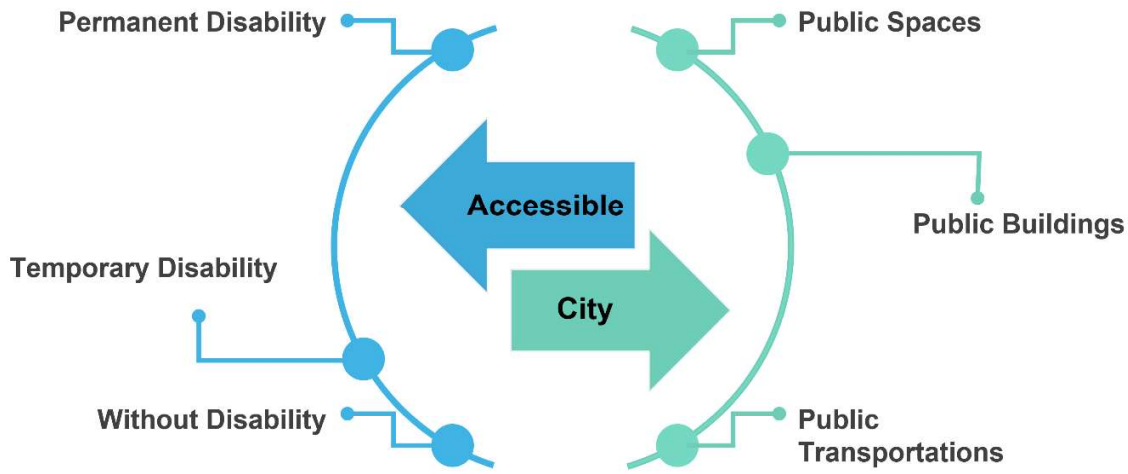

Figure 2.1. The Accessible city elements.

Accessibility in cities refers to the ease with which individuals can navigate and engage with the built environment, regardless of their abilities or disabilities. The concept of accessibility has undergone significant evolution throughout the 20th century, as attitudes toward disability, design, and urbanism have changed.

In the early part of the 20th century, accessibility was largely viewed as the absence of physical barriers, such as steps or narrow doorways. The focus was on removing these barriers in order to make buildings and spaces more accessible. However, by the mid-20th century, the disability rights movement had gained momentum and the concept of accessibility was broadened to include social and environmental factors.

One of the key milestones in the evolution of accessibility was the passage of the Americans with Disabilities Act (ADA) in 1990. This legislation prohibited discrimination against individuals with disabilities in employment, transportation, public accommodations, and services. The ADA had a significant impact on the design of buildings and public spaces, requiring designers to consider accessibility in all aspects of the built environment, including parking lots, sidewalks, elevators, and door handles.

Another important development was the publication of "The Design of Everyday Things" by Don Norman in 1988. In this book, Norman challenged traditional notions of

accessibility and argued that good design should be accessible to everyone, regardless of their abilities. Norman's work helped to popularize the idea that accessibility was not just a matter of removing physical barriers, but also of creating environments that were intuitive and user-friendly for all people.

Over the years, many architects, designers, and engineers have made important contributions to the field of accessibility. Some of the most notable figures include Christopher Alexander, who developed the pattern language movement in architecture, and Pritzker Prize-winning architect, Renzo Piano, who has designed many accessible buildings, including the Pompidou Center in Paris and the New York Times building in New York City.

The concept of accessibility in cities has evolved significantly throughout the 20th century, from a narrow focus on physical barriers to a broader consideration of social and environmental factors. Today, accessibility continues to be an important consideration in the design of cities, and designers are increasingly focused on creating environments that are accessible, inclusive, and user-friendly for all people.

2.1.1.1 Accessibility and Disability:

The concept of disability is not a characteristic of the individual, but rather the result of the interaction between the person and their environment. By addressing the barriers that prevent individuals with disabilities from participating fully in society [6].

Sometime through life, may we have a disability, it may be temporary or permanent. Disability takes away the abilities that the man had enjoyed, it means difficulties that prevent him from doing some activities.

In every community, there are many PRM and VI, according to World Health Organization WHO every 100 people there will be about 15 with disabilities. According to a new UNICEF report, an estimated 240 million children worldwide have disabilities. These children face greater challenges than their non-disabled peers in terms of overall well-being[16].

Ensuring the well-being of PRM, particularly in developed countries, is a significant challenge due to a lack of services tailored to their specific needs and abilities, which often hinders their ability to participate in various activities that require mobility, Therefore, disabled people become frustrated and handicapped only by the way in which their environment emphasize their disability, but we can give them a better life by giving them a chance with the facilities that make them accessible and comfortable in movement.

Must be considered, the presence of a large diversity in the degree of disability apparent between one category of disabilities, and the presence of people with multiple disabilities.

The accessibility of public spaces and buildings is typically geared towards individuals with physical disabilities, such as wheelchair users and those with visual or auditory impairments [17].

The disability rights movement calls for equal access to all aspects of life, including not only physical accessibility but also access to the same resources, services, organizations, and facilities as non-disabled individuals [18].

Cold Smith considers that the design criteria for personal movement largely determine the way people move from one place to another, while ordinary people walk on two legs with the possibility of movement at different levels up and down slopes and stairs, we find that the person who uses the wheelchair, no matter how much experience and strength you have Physically requires a lift to climb to the top or is carried by other people, and here lies the importance of ramps as an answer to a design problem related to the handicapped in addition to other technical aids [19]

It is widely recognized that individuals with disabilities possess a wide range of abilities and talents, but their potential can be hindered or facilitated by the environment [20].

The impact of war on accessibility is a complex issue that affects a range of aspects, including design and society. can have a significant impact on the design of cities, both in terms of the destruction of buildings and infrastructure, as well as the development of new technologies and innovations that can improve accessibility. For example, the widespread bombing campaigns of World War II resulted in the destruction of many buildings and

infrastructure, making it more difficult for people with disabilities to navigate and engage with the built environment. On the other hand, the war also led to the development of the first mass-produced wheelchair, which dramatically improved accessibility for people with mobility impairments.

The war can also have a profound impact on society, both in terms of the trauma experienced by individuals and communities, as well as the changes to the social fabric of society. For example, the loss of life and injury sustained during the war can result in a significant reduction in the population, which can have a long-term impact on the social structure of a society. Additionally, the rebuilding of infrastructure and the design of new buildings can bring people together, creating new social opportunities and bonds.

In any case, Accessibility is a fundamental right, it aims to provide equal opportunities for individuals with disabilities to access services, employment, and various other aspects of life on the same level as non-disabled individuals.

We have to make our cities inclusive and make them livable and on the road to sustainability, also enabling access through and giving a chance for disabled people to live like others by accessibility.

2.1.2 Standards and Design for All

In order to make a fair judgment, evaluation, or selection, certain standards or principles must be established. These standards serve as the basis for determining the ideals or requirements that must be met [21]. It's based on needs, possibilities, and human rights.

Any action plan should include specific goals, strategies to achieve them, and methods for measuring and evaluating progress. These plans should also align with established standards and guidelines.

The criteria for human requirements and users of buildings and public facilities were defined by the International Center for Research and Building Studies as the level

and conditions necessary for a person to live and work comfortably and safely, by health standards, and by the required economic qualifications[22].

This leads us to say that an understanding of accessibility standards, in addition to the designer's experience in designing accessible facilities, will enable practitioners to develop a guide to lead engineers in creating streets suitable for all.

2.1.3 Accessible Streets

Complete streets, as defined by the National Complete Streets Coalition, are streets that are designed to be safe and accessible for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities[23].

The streets and sidewalks of a city are more than just a way for cars and other vehicles to move around, they are also important public spaces for residents and visitors and are often the most important public spaces where people experience the city. As Jane Jacobs famously said, "If a city's streets look interesting, the city looks interesting; if they look dull, the city looks dull." [24]. This highlights the importance of streets as the primary spaces where people experience and interact with a city.

In recent years, the concepts of "streets for people" and "streets as places" prioritize the needs of people in the design of streets.

Generally, traffic engineers have primarily focused on designing streets for vehicular traffic, but as motorized traffic has increased, streets have become increasingly hostile and unsafe for people.

In the context of the pandemic, streets have become even more important as public spaces, but for some people, lack of accessibility and amenities can make them difficult to navigate.

In Arab cities, streets make up a significant portion of urban space, between 28-32% and in some cases as much as 40%. Similarly, in American cities, streets make up between 30-50% of urban space, making them one of the most important public spaces in cities[25].

So as architects, we have to give priority to ensuring that people's facilities are accessible just as important as street design.

2.1.3.1 Streets Elements'

The elements of streets are changing between one street and another, and they are classified according to rank:

- Express streets
- Primary streets
- Secondary streets
- Tertiary streets

Generally, complete streets in figure 2.2. contain main elements, and these elements are, Walkways, roadways, parking, bike lane, Ramps, Crosswalk, and street furniture, in addition to stairs and stair lifts which do not exist in all street-type, each one of these elements has privet dimensions and features or in other words, it's standards. This research took this type of street as a reference to produce illustrations, figure 2.3. shows street elements in a section, which could be adopted as an example to follow in street design.

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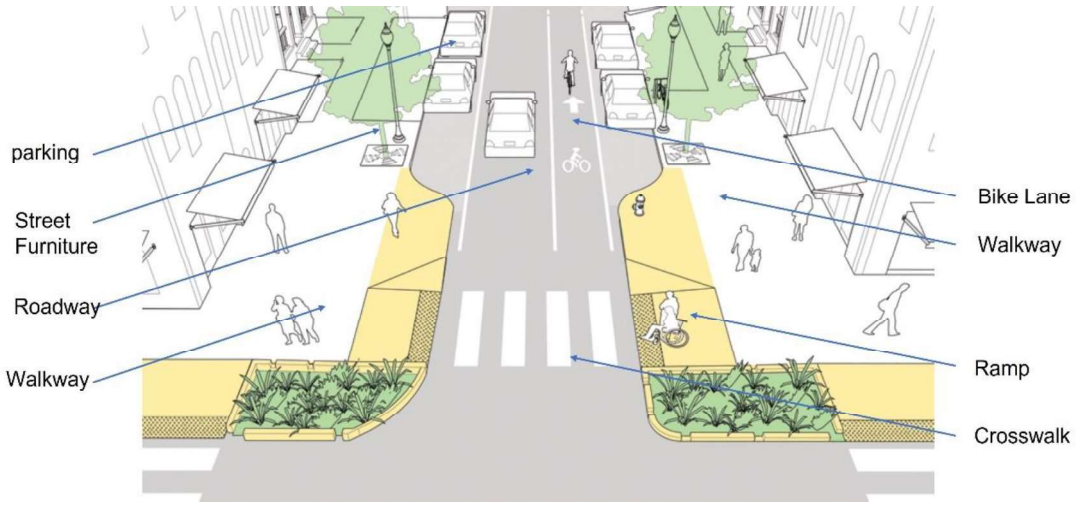

Figure 2.2. The Streets Elements. [26]

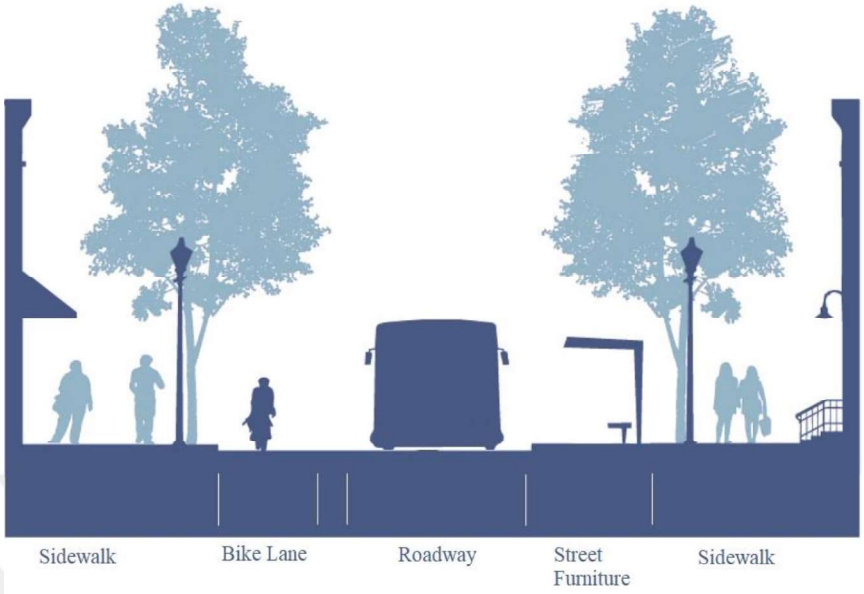

Figure 2.3. A Section in The Street. [26]

2.2 The Global Standards

In this study the comparison made between three types of standards, WDU: THE UNIVERSAL STANDARDS GUIDE FOR PERSONS WITH DISABILITIES made by the WORLD DISABILITY UNION, the other one is ADA: AMERICANS WITH DISABILITIES ACT Adopted by the U.S. Department of Justice and the U.S. Department of Transportation, and ABNT: ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS, Brazilian Association of Technical Standards, the National Forum for Standardization. And this comparison is based on measurement differences.

2.2.1 Walkways

the walkway is a continuous, unobstructed, and signposted path, which connects the build environments of spaces and buildings, and can be used autonomously and safely by all people, it's part of the road, normally segregated and at a different level, not intended for the vehicles, reserved for pedestrian traffic and, when possible, for the implementation of furniture, signage, vegetation, signposts and other.

This includes all path types (walkways, ramps, squares, and crosswalks) in open areas such as parks and recreation areas and sporting fields.

2.2.1.1 The Width of The Walkways

WDU says the width of walkways should be 1.5 to 2 meters but should be 3 meters minimum if there is a bus station and 3.5 meters at the storefront, also any mobility device requires a 1.5 meters minimum of turning ability.

ADA says the width of walkways should be 0.915 meters minimum, for turning ability at 180 degrees around an element that is less than 1.22 meters wide, the clear width should be 1,065 meters minimum, but if the width of the tune is 1.525 minimum compliance is not required.

ABNT says the width of walkways should be 0.9 to 1.8 meters minimum, for turning ability without element, in 90 degrees the clear width should be 1.2 meters, in 180 or 360 degrees the clear width should be 1.5 meters, for turning ability in 180 degrees around an element which is less than 1.20 meters wide, the clear width should be 1,05 meters minimum, if it is more than 1.20 meters wide, the clear width should be 0.9 meters minimum.in Table 2.1. the width of the walkway according to his type.

Table 2.1. The Width of The Walkways.

The Width of The WALKWAYS			
	WDU	ADA	ABNT
Straightway	1.5 m – 2 m min.	0.915 m min.	0.9 m – 1.8 m min.
Turning Way	1.5 m	0.915 m – 1.065 m min	0.9 m – 1.05 m min

All pedestrians can move freely and safely when the width of the walkway is comfortable and unobstructed.
It could be resized according to usage frequency, road class, and group. Figure 2.4. and figure 2.5. show the different widths of walkway types for people with wheelchairs.

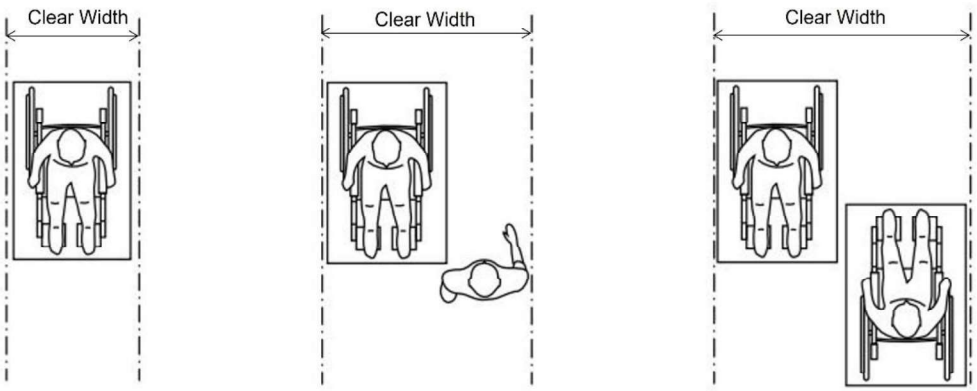

Figure 2.4. Types of Walkways in Straightresway.

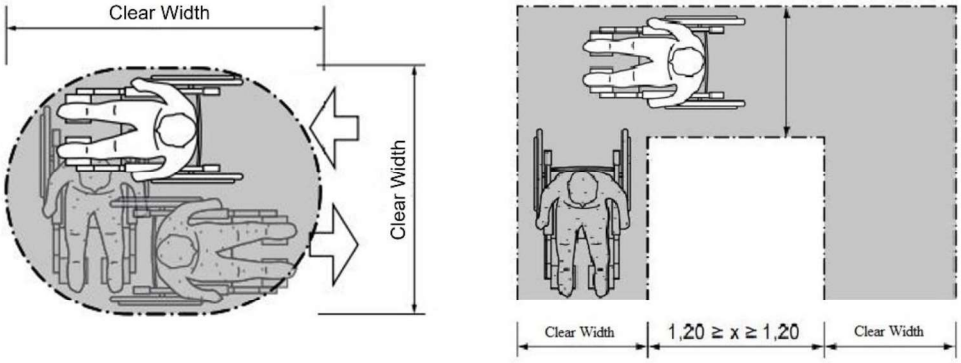

Figure 2.5. The Width of The Walkways in Turning Way.

2.2.1.2 The Slope of The Walkways

WDU: on the walkway, the slope should be between 2% and 6% to be safe for wheelchair users.

ADA: the walkway shall not be steeper than 5%.

ABNT: the slope of the walkway should be between 3% and 5%, and more than 5% considered as a ramp.

Table 2.2. shows the slope percentage, and figure 2.6. shows how the walkway should be tilted to the roadside.

Table 2.2. The Slope of The Walkways.

The Slope of The Walkways			
	WDU	ADA	ABNT
The Slope	2% <slop< 6%	slop < 5%	3% < slop < 5%

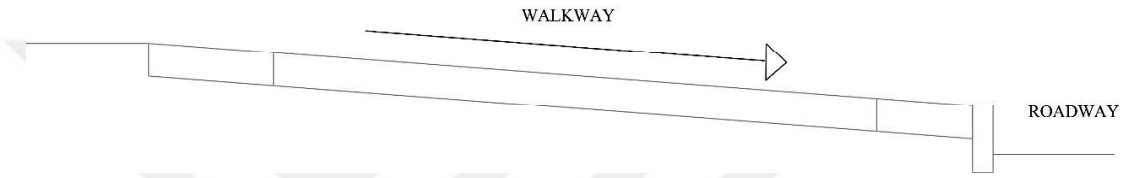

Figure 2.6. The Slope of Walkways.

2.2.1.3 Height of The Pavement

In Table 2.3. WDU mentioned that the pavement height should not be more than 15 cm.

ADA mentioned the height of pavement should not be more than 1.3 cm, but if it gets to be more, there should be a ramp.

ABNT did not mention if there is a private height for pavement.

Table 2.3. The Height of The Pavement.

The Height of The Pavement			
	WDU	ADA	ABNT
The Maximum Height	15 cm	1.3 cm	-

Figure 2.7. shows the section in the road and the maximum height of the pavement.

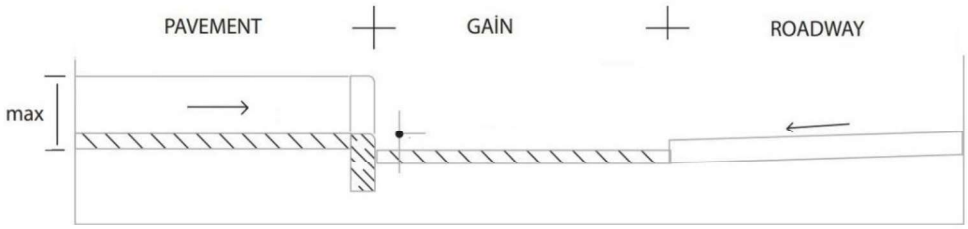

Figure 2.7. The Height of The Pavement.

2.2.1.4 Drainage on The Walkways

"Rain or any other moisture should be drained immediately to prevent discomfort and provide safety for all pedestrians Where the border stone on a walkway meets with the vehicle road, a necessary slope should be given on the longitudinal and transverse lines so that the surface water is provided with the necessary drainage at the manholes" [27]

At crossroads and crosswalks, water grooves should be designed safely so as not to become an obstacle for all pedestrians including disabled individuals. in figure 2.8. we could see how the pavement and the road tilt to the drainage side.

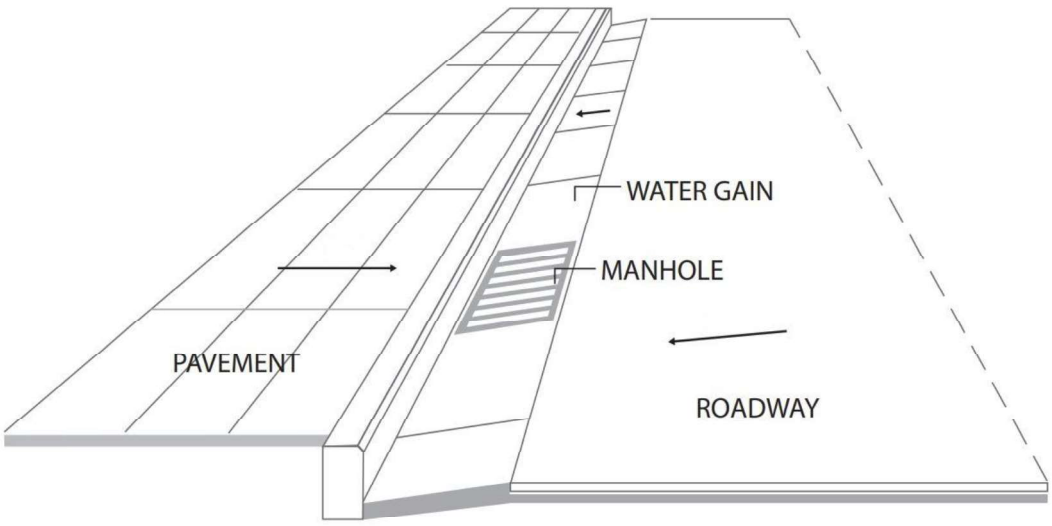

Figure 2.8. Drainage on Walkways[26].

2.2.1.5 Material of The Walkways

"The surface of the Walkway must be non-slippery, and the path surface should not be uneven such as a protruding manhole cover, or have sudden changes in level such as a step to remain level and continuous. It should be designed to allow for ease of transition with a hard, stable, and slip-resistant material to be safe to use for all people but, in particular, people who use wheelchairs and other mobility devices. The design would consider the surface texture as a necessary element of a barrier-free route" [28].

The route path should be easy to follow for visually impaired or blind individuals who use a cane to find and detect natural or constructed guidelines and feel and/or hear the different surfaces.

The warning tactile line should eliminate the uncertainty of the path or the direction of a path for people with visual disabilities when there are gaps, such as at an intersection. in figure 2.9. we can see the warning tactile line for visual disabilities on walkways.

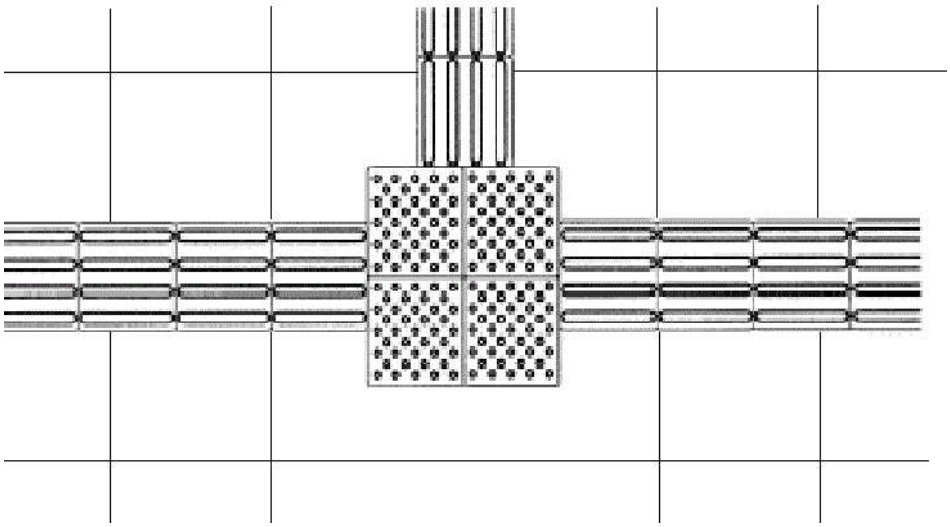

Figure 2.9. The Guidelines for Visual Disabilities on Walkways.

2.2.2 Trees, Signs, and Urban Furniture

Urban furniture can act as a natural barrier to canalize the movement of pedestrians and as an obstacle to prevent vehicular and other unwanted traffic from the walkways. Urban furniture like kiosks/vendors, newspaper boxes, flower carts, seating benches, and so on, the placement of the urban furniture should be to the sides of the pedestrian pathways and shall be placed as one continuous line under the service strip line so that it does not impede the flow of pedestrian traffic, in figure 2.10. we can see the service lane site on the walkway.

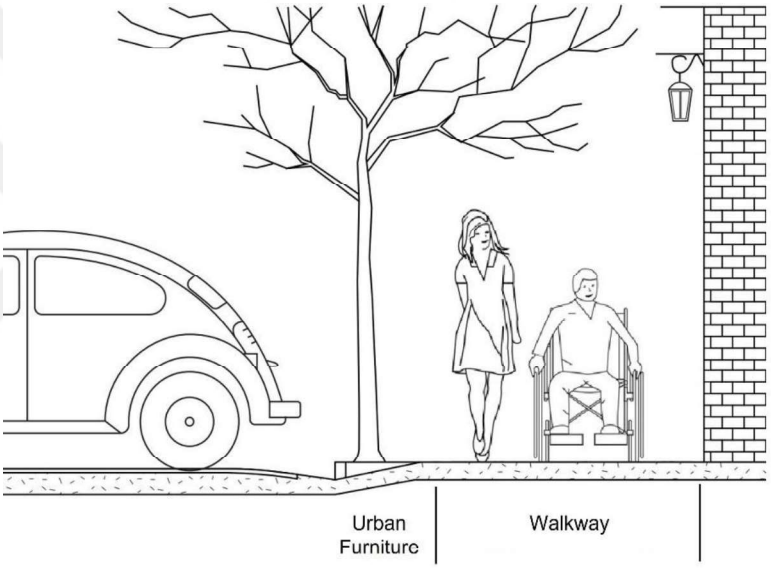

Figure 2.10. The Service Line on The Walkways.

"In addition to urban furniture, sidewalk cafés, and seating areas should be surrounded by fencing that can be detected with a cane or by a contrasting color to prevent people with a visual disability from tripping over the furniture and/or patrons".

"The umbrellas need to be within the barrier and be contrasting in color, other overhead hazards may be storefront awnings, overhead signs, lighting, and tree branches. All the possible overhead hazards should be a minimum of 220 cm measured from the finished surface to the underside of the object".

“A different texture may be used on the ground to surround the object as another method of detection. There is nothing with applying redundancy to ensure the independence and safety of people, including people with disabilities”.

“Urban furniture, if possible, should have rounded or chamfered edges and corners to prevent injury” [29].

Dumbaugh and Gattis (2005), Portella (2007), and J. Davis (2014) stated that commercial signage is classified as street clutter, and those physical details of streets affect the perception of users of community identity and sense of belonging.
The service strip or the urban furniture lane according to WDU, should not be less than 0.75 meters and not more than 1.2 meters in width that includes the border stone, and ABNT says it should be a minimum of 0.70 meters, But ADA didn’t mention the width.in table 2.4. the width of the urban furniture lane on the walkway.

Table 2.4. Width of Urban Furniture Lane.

Width of Urban Furniture Lane:			
	WDU	ADA	ABNT
The width	0.75 m – 1.2 m	–	0.7 m min

2.2.2.1 Resting Areas

Rest areas should be located alongside the pedestrian path and the area should be designed with a stable, hard, and slip-resistant surface. The area should accommodate the entire bench and adjacent to the bench to allow for a wheelchair or other mobility device to rest and enjoy with others. Figure 2.11. shows the rest areas with benches and areas for the mobility device.

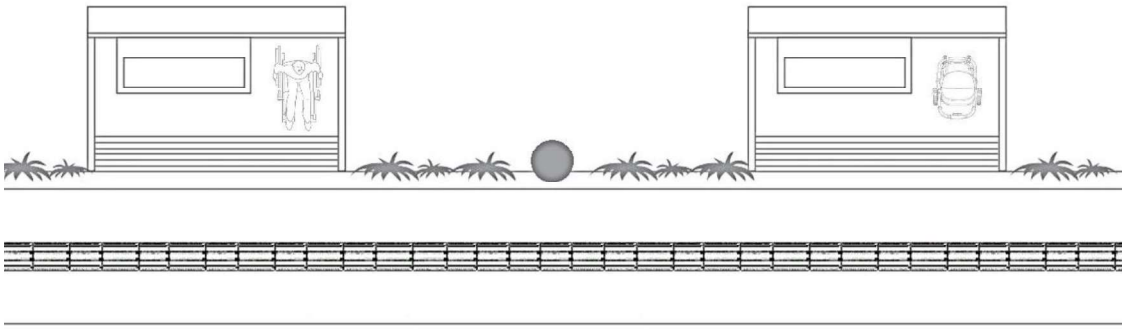

Figure 2.11. The Rest Area with The Mobility Devices.

2.2.2.2 Safety on the walkways

The width of the pedestrian walkway shall also include a safety band bordering both sides of pathways in open areas, such as a bicycle path, to warn of potential danger

The safety band or border shall be of a different texture and be contrasting in color to the main walkway to ensure that people who are visually impaired or blind will be able to move safely in pedestrian traffic.

The walkway surface should be even and free of obstacles like grates, floor mushrooms, and parking lot chains to ensure that all pedestrians can travel safely.

If grates must be located on pedestrian walkways, the bars on grates shall be perpendicular to the flow of pedestrian traffic to prevent the wheels from wheelchairs or the tip of canes and crutches from sliding through. Figure 2.12. shows how the bars on the grates are perpendicular to the road lane.

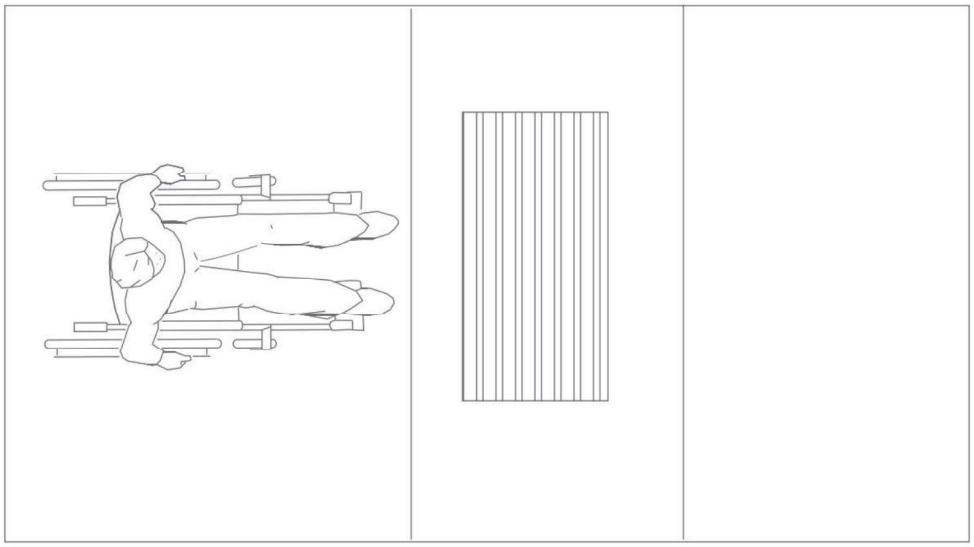

Figure 2.12. The Bars on Grates on Walkways.

Walkway renewal or repair sites can be problematic for people with visual disabilities. These work sites should be circled with barricades. The barricades shall also have barrier sticks or other cane-detectable barriers.

Audible and visual warning signals should be installed when it is necessary. A sufficient width should be allowed for wheelchairs to pass by the site and when temporary walkways that are required due to repairs or construction.

Scaffolds or other temporary structures should have signs that are surrounded by a band of contrasting colors and warning signals to alert sight-disabled individuals when they are placed on or adjacent to a walkway.

A scaffold is placed adjacent to the walkway to allow people to pass through easily and safely. Protective coverings should surround the corners of the scaffolds. Signage should be secured above the surface.

Vehicles should not occupy walkways. If a bicycle path is organized next to a walkway, trees and/or structural design features should block the passage of bicycles from accessing the walkway.in figure 2.13. shows the cones surrounding the construction site.

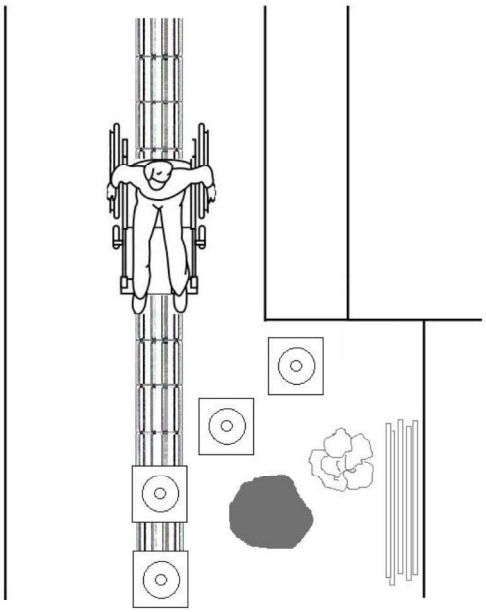

Figure 2.13. Warning Signals of Construction.

2.2.3 Ramps

"Ramps are incorporated into walkways, crosswalks, and building entrances to create an easier travel experience for all pedestrians, including people with disabilities, specifically by eliminating differences in height. Ramps should be ergonomic (gentle slopes) in design for the comfortable and safe passage of people with visual disabilities along with wheelchairs, strollers, handcarts, and other devices used for movement on walkways to compensate for differences in height" [29].

2.2.3.1 The Types of Ramps

There are three ways sloped ramps on a walking route; straight run, 90-degree turn, and 180-degree turn in addition to a curb ramp. Figure15. shows the types of ramps A is a straight ramp, B is a ramp with a 90-degree turn and C is a ramp with a 180-degree. figure 2.14. and figure 2.15. show the curb ramps.

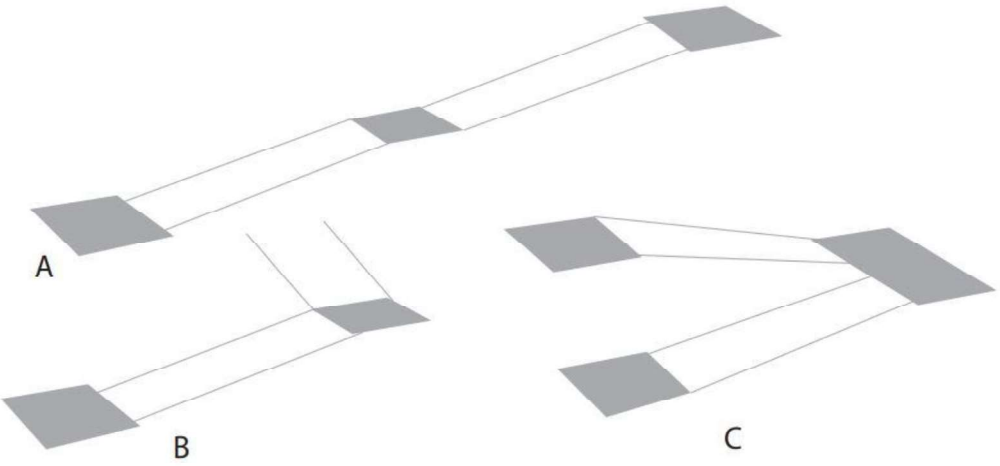

Figure 2.14. Straight Ramp and Ramp with a Degree.

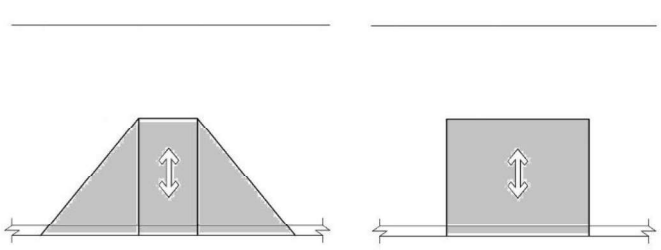

Figure 2.15. Curb ramps.

2.2.3.2 The Ramp Width

The width of ramps is changing according to the ramp types in Straight line condition, WDU and ABNT say the width should be a minimum of 0.9 meters, and ADA says the with should be a minimum of 0.915 meters. But in turning around with degree WDU say the with should be as a minimum between 0.9 meters and 1,4 meters according to the turning degrees, ADA says it should be more than 1.22 meters, and ABNT says it's the same with the straight line, it should be as a minimum 0.9 meters. Table 2.5. shows the difference between widths according to the ramp type, and Figure 2.16. shows where to calculate the ramps.

Table 2.5. The Width of the Ramps.

The Width of the Ramps			
	WDU	ADA	ABNT
Straight line	≥ 0.9 m	≥ 0.915 m	≥ 0.9 m
Turning around	≥ 0.9 m- 90º ≥ 1.4 m-180º	≥ 1.22 m	≥ 0.9 m

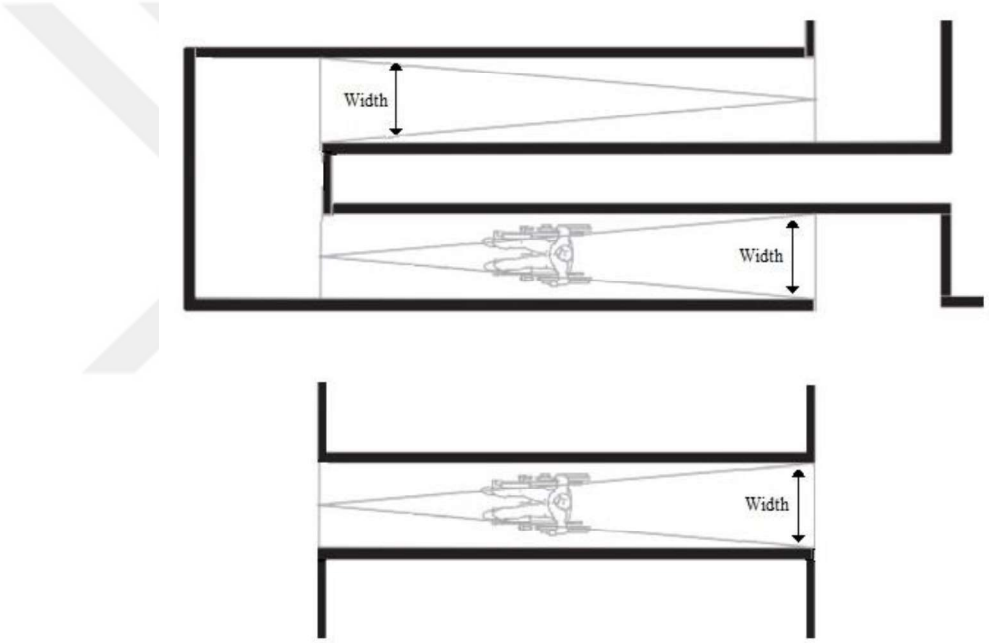

Figure 2.16. The width of The Ramp

2.2.3.3 The Slope of Ramps

The slope of the ramp will define the safety of pedestrians with disabilities. Ideally, a vertical obstacle measured from the finished floor shall have a slope no greater than 8% or 1:12 according to WDU with landing platforms, if appropriate, in ADA standards the slop shall have a slope no greater than 8.3%, and in ABNT standards the slop should be between 5%

and 8.3%. In addition, ABNT says the slop with landing has to be between 8.3% and 12.5%.

However, if an 8% slope is not possible due to alack of appropriate area, then the slope will change inappropriately with the raise and length of the ramp. Figure 2.17. and table 2.6. show the percentage of ramps slope.

Table 2.6. The Slope of The Ramps

The slope of The Ramps			
	WDU	ADA	ABNT
Straight line	< 8 %	< 8.3 %	< 5% – 8.3 %
With Landing	-	-	< 8.3% – 12.5 %

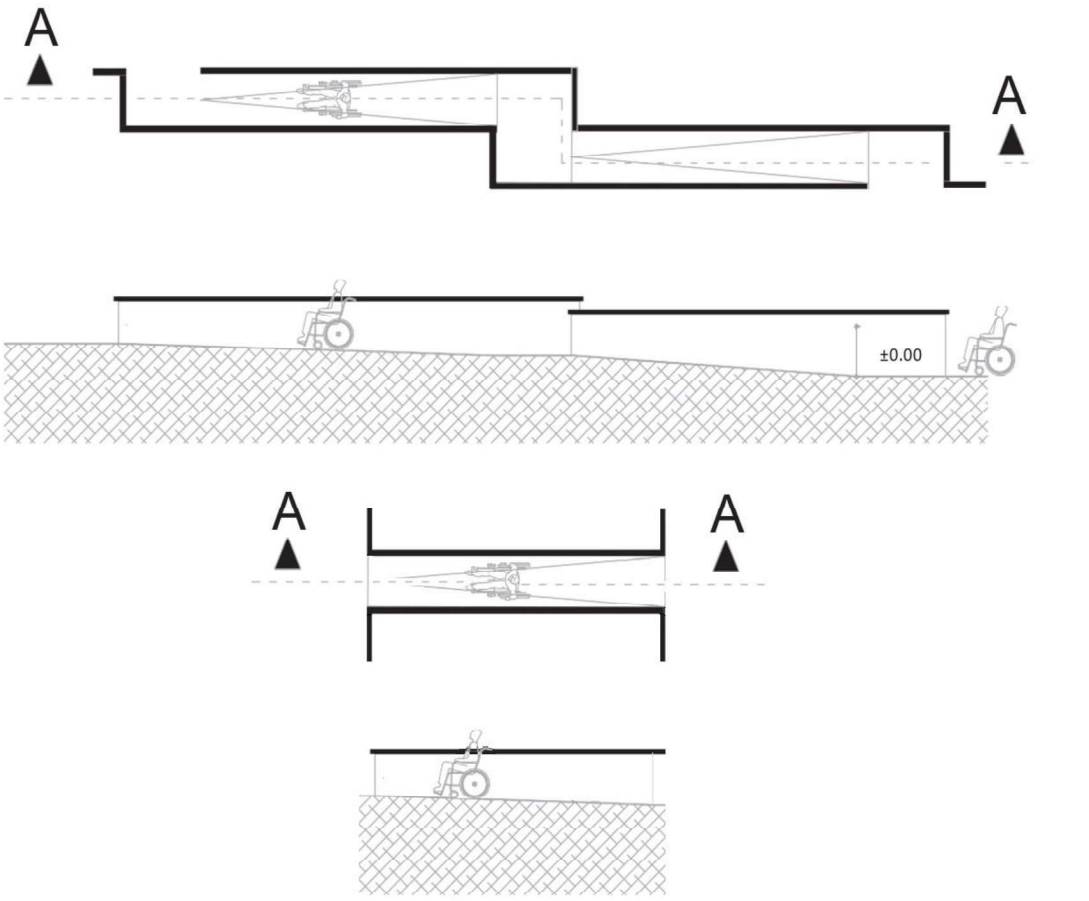

Figure 2.17. The Slop of Ramps in a Straight Line and with Landing.

2.2.3.4 The Rise of Ramp

The rise of the ramp has to be less than 0.5 meters in WDU, less than 0.3 meters in ADA, and less than 0.8 meters in ABNT to be an accessible ramp. Table 2.7. shows the rise of the ramp in meters, and how it is in figure 2.18.

Table 2.7. The Rise of Ramps

Rise of ramp			
	WDU	ADA	ABNT
The rise	< 0.5 m	< 0.3 m	< 0.8 m

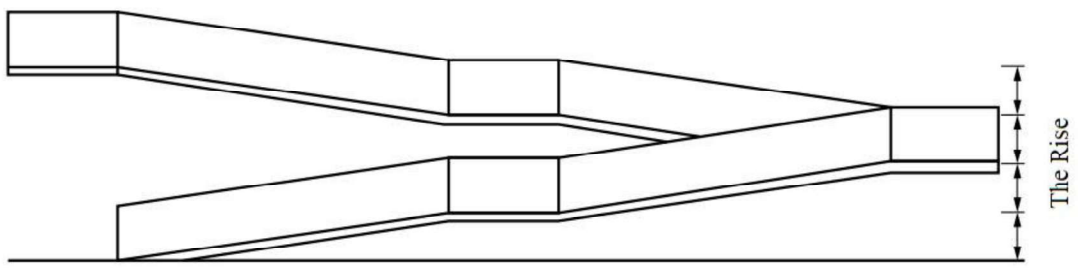

Figure 2.18. The Rise of ramps with landing

2.2.3.5 The Landings of Ramps

If the ramp didn't achieve less than the previous rise it should contain on landing with a long ramp run, Ramps shall have landings at the top and the bottom of each ramp run.

In WDU landing length shall be 2.5 meters or more, in ADA standards the length shall be 1.525 meters or more, in ABNT the length of the landing shall be 1.2 meters or more. Table 2.8. shows the landing lengths.

Table 2.8. The Landing Length of The Ramp.

The Landing Length of The Ramp			
	WDU	ADA	ABNT
The Landing Length	≥ 2.5 m	≥ 1.525 m	≥ 1.2 m

2.2.3.6 The Surface of Ramps

"Ramp surfaces should be covered with hard, stable, non-slip material or the surface may be lightly roughened, Ramps shall use a different material at the top of the ramp to signal a change of elevation for sight disabled individuals. The material shall be set 15 cm back from the edge and have a 150 cm surface area" [29].

Extended Floor or Ground Surface. The floor or ground surface of the ramp run or landing shall extend (30.5 cm) minimum beyond the inside face of a handrail [30].

ABNT the ramp surface should be smooth, stable, and non-shakable for devices with wheels and non-slip under any condition, dry or wet [31].

2.2.3.7 The Safety

Ramps shall be designed with railings and borders or guards on the unprotected sides of the ramp.

The railing should extend at the top and bottom of the ramp to signal one's approach to a change in elevation. The railing should continue toward the ground or curve into the wall to prevent articles of clothing and bags from catching.

The railing should be designed with horizontal or vertical slats to prevent people from accidentally falling through. A guard or border on the side of the ramp will prevent the wheels of wheelchairs, strollers, and other mobility devices from slipping off the ramp. For the handrail, WDU says that the height should be not less than 0.76 meters and not more than 0/865 meters, but ADA says the height should be not less than 0.865 meters

and not more than 0.965 meters, and ABNT says the height should be 0.7 meters minimum and 0.92 meters maximum. In figure 2.19. and table 2.9. we see the height of the handrail.

Table 2.9. The Handrail for Safety.

The Handrail Height			
	WDU	ADA	ABNT
The Handrail Height	0.76 m – 0.865 m	0.865 m – 0.965 m	0.7 m – 0.92 m

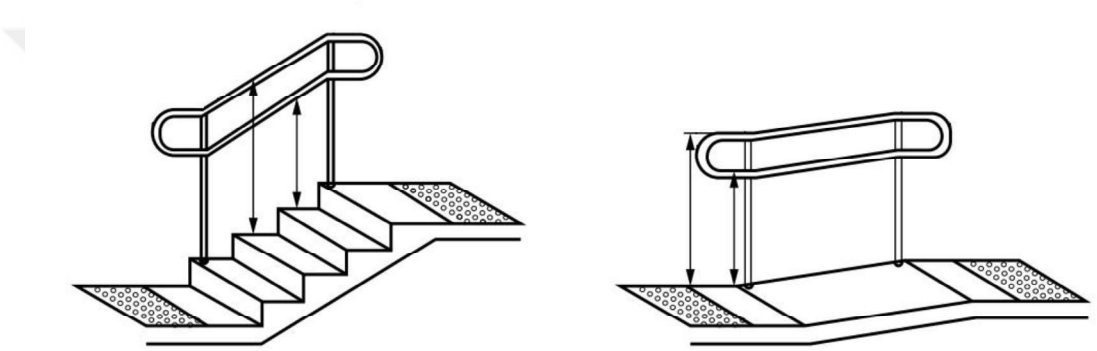

Figure 2.19. The Handrail height

2.2.4 Crosswalk

"Crosswalks are designed to move pedestrian traffic safely across vehicular roadways. A level surface will eliminate obstacles and a tactile surface will assist all pedestrians, including people with visual disabilities, to cross the road safely. This design should provide all of the users the sense, that it is the crosswalk beginning. This user can be people with visual disabilities, wheelchairs, strollers, and handcarts" [29].

On the crosswalks if the surface of the road and pavement are the same level, persons with wheelchairs do not need to pass that elevation difference, if the surface of the road and pavement are not the same level, there should be a curb ramp to pass that elevation.

2.2.4.1 General principles about crosswalks;

- Obstacles like flowerbeds and flowerpots, mushrooms, symbols, signposts, and poles (electric, light, traffic, etc.) should not be placed on the crosswalks. This may impede the movement of persons with disabilities.
- All posts or information boards on walkways and intersections should not be placed on the corner as they may obscure the person from the driver's line of sight.
- Surface markings such as clearly defined zebra lines are required to further demarcate the crosswalk as the proper place to cross in front of traffic.

2.2.4.2 Crosswalk Ramps

The surface of the road and pavement are not the same level, there should be a curb ramp to pass that elevation. The slope of this ramp is 2% according to WDU and ADA, and 3% according to ABNT, table 2.10.

Table 2.10. Slop Of Crosswalk Ramps.

The Slope of Crosswalk Ramp			
	WDU	ADA	ABNT
The slop	< 2%	< 2%	< 3%

For Crosswalk there are two types:

2.2.4.2.1 Uncontrolled crosswalk:

uncontrolled crosswalks are usually located in areas such as residential and in areas where traffic naturally slows or must yield such as a school zone.

Uncontrolled means no signaling devices or flashing lights.

Instead, signage is used to notify drivers of an existing crosswalk 20 m ahead and exercise caution when approaching.

Additional signage is placed 1 m from the crosswalk so that it will not obscure the pedestrian from the driver's view, and it will also notify pedestrians of its location.

The signage should be phosphorescent or “glow in the dark” to increase its visibility for drivers when there is minimal to no street lighting. Figure 2.20. shows the Uncontrolled crosswalk.

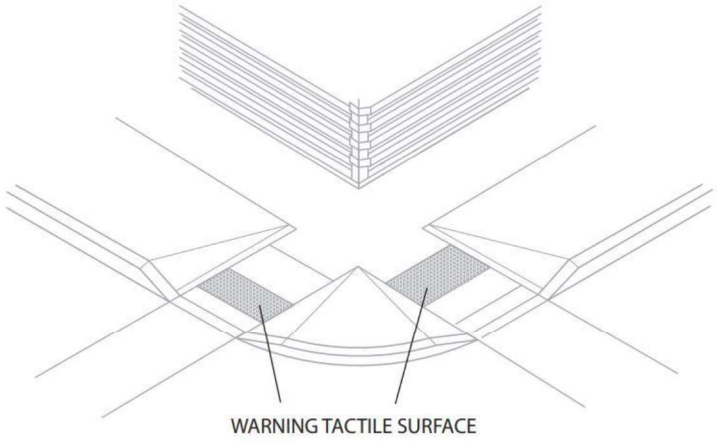

Figure 2.20.The Uncontrolled crosswalk.

2.2.4.2.2 Controlled Crosswalk

Controlled crosswalks are generally located in high-traffic areas, including intersections, to control pedestrian and vehicular traffic.

Controlled crosswalks mainly use electronic signaling devices such as traffic signals and flashing pedestrian crossing signals. Figure 2.21. shows the controlled crosswalk.

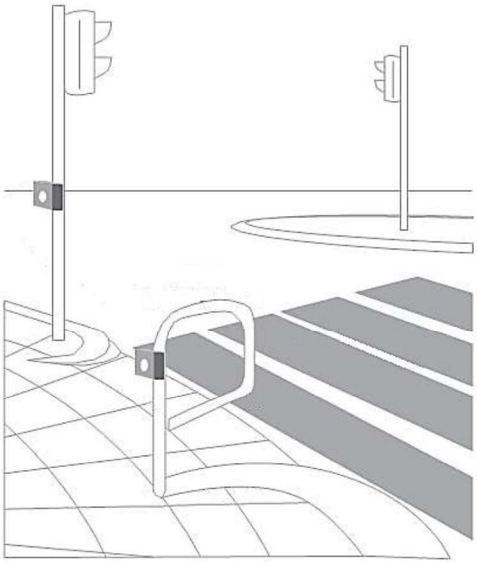

Figure 2.21. The controlled crosswalk.

2.2.4.3 The Refuge Area:

"Refuge or traffic island crosswalks are located where there are 3 or more lanes of traffic flow for each direction and are controlled with crossing signals. The crossing signal posts may be located on the protected traffic islands if the time required by a pedestrian to ensure that the symbols are easily seen and heard, with or without a disability, to cross 6 lanes or more of traffic is too great to achieve safely" [32]. Therefore, there are guidelines for designing these protective refuge areas:

The refuge area within the crosswalk is protected by traffic islands that should be in WDU 1.60 – 2.50 m in width and situated on the outer edge of the crosswalk which is 3 – 4 m in width and should be level with the road surface. If not, there should be a ramp of 90 cm in width with an 8% slope on both sides of the traffic island. in ADA and ABNT there is no privet dimension for islands, just for ADA in the raised island, there should be curb ramps with a level area of 1.22 meters long minimum by 0.915 meters wide minimum and not steeper than 5%.

The protected refuge area should have a different material or texture from the road surface as an indicator for persons with visual disabilities of the safe standing area when the audible signal ends.

To further aid with the safety of all pedestrians, protective islands should be equipped with visual and audible traffic signals or warning plates.

The refuge area should be level with the road surface. If not, there should be a ramp with a slope on both sides of the traffic island to allow for the safe passage of persons who use wheelchairs or other mobility devices. Figure 2.22. illustrates the site plan of a refuge area.

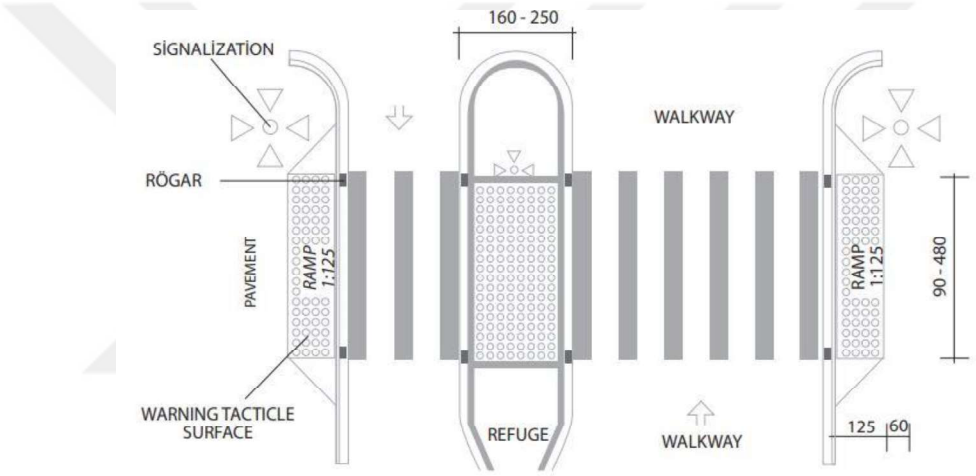

Figure 2.22. The Refuge Area.

2.2.5 Stairs

Since stairs can disturb disabled people's mobility, it is important for achieving accessibility. However, if stair-building is inevitable, then railing should be implemented on both sides. The stairs should be designed to prevent missteps, tripping, or slipping for all users, including people with visual disabilities.

On the walking surfaces of the stairs, the ragged and non-slippery coating should be used. If necessary, the surface of the stair should be covered to be protected from weather effects.

2.2.5.1 Size of the Stairs:

Flooring and stepping dimensions must be consistent across entire staircases or insulated steps. For dimensions, the following conditions must be met, in WDU whereas the height of the stair should be 0.15 meters and less the formula is $\{(2\,x\,e) + (1\,x\,p) = 63\,cm\}$, ADA says the rise of the stair should be more than 0.16 meters and less than 0.18 meters, and the deep of stair is 0.28 meters minimum without a formula, in ABNT the deep should be and less than 0.65 the and more than 0.63 meters, the rise less than 0.18 meters and more than 0.16 meters, and the formula will be $\{63\ cm \leq p + 2e \leq 65\ cm\}$. All steps on a flight of stairs shall have uniform riser heights and uniform depths. At the top of the stairs system, there should be a tactile and contrasting material to indicate that a person, including people with visual disabilities, is approaching a change in level**.** Table 2.11. shows the dimensions of the stairs and figure 2.23. shows the stairs elements.

Table 2.11. Stair's Size.

Stair's Size			
	WDU	ADA	ABNT
Dimensions e: rise p: height	$(2\,x\,e) + (1\,x\,p) = 63\,cm$ (e): $e \leq 15$ cm	$10\ cm \leq e \leq 18\ cm$ $28\ cm \leq p$	$63\ cm \leq p + 2e \leq 65\ cm$ (p): $28\ cm \leq p \leq 32\ cm$ (e): $16\ cm \leq e \leq 18\ cm$

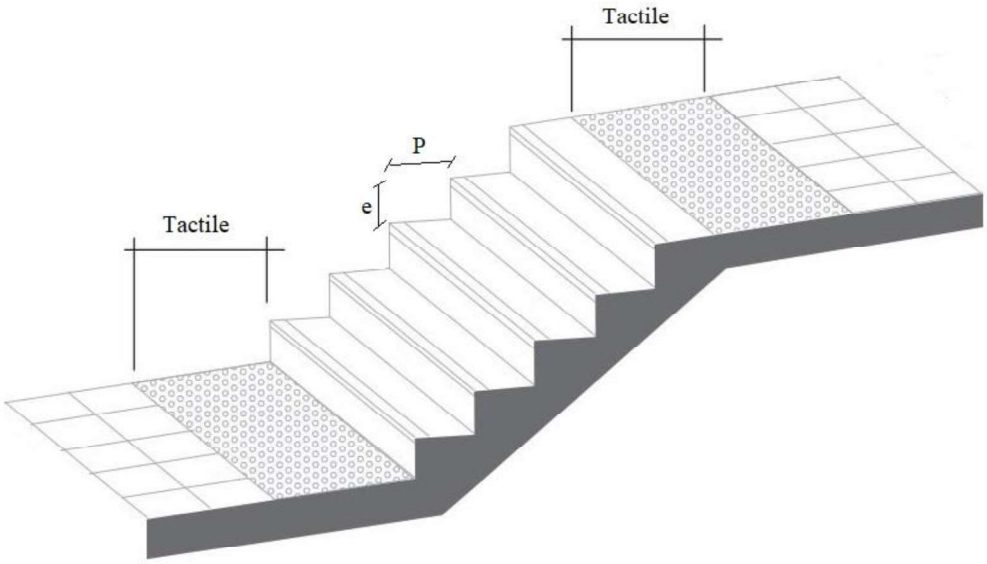

Figure 2.23. The Stairs Dimensions and The Tactile.

The width of the stairs should be determined according to the flow of people which is 1.2 meters according to ABNT, figure 2.24.

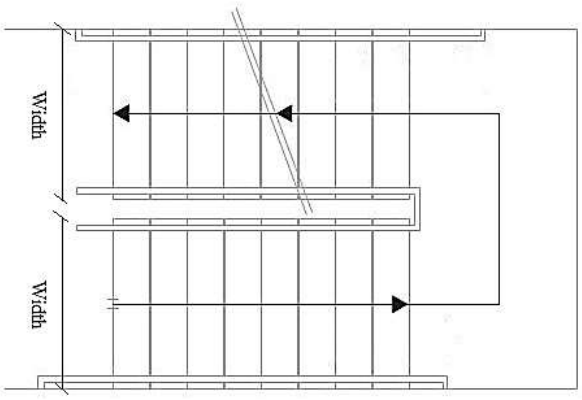

Figure 2.24. The Stairs' width.

2.2.5.2 Wheelchair platform stairlifts:

a platform lift system may be used to assist persons with mobility limitations to safely ascend or descend a shallow set of stairs, only if there is no other safe alternative like an elevator or ramp. A clear and flat landing area is required at the top and bottom of the stairs. Figure 2.25. displays the platform on the stairs.

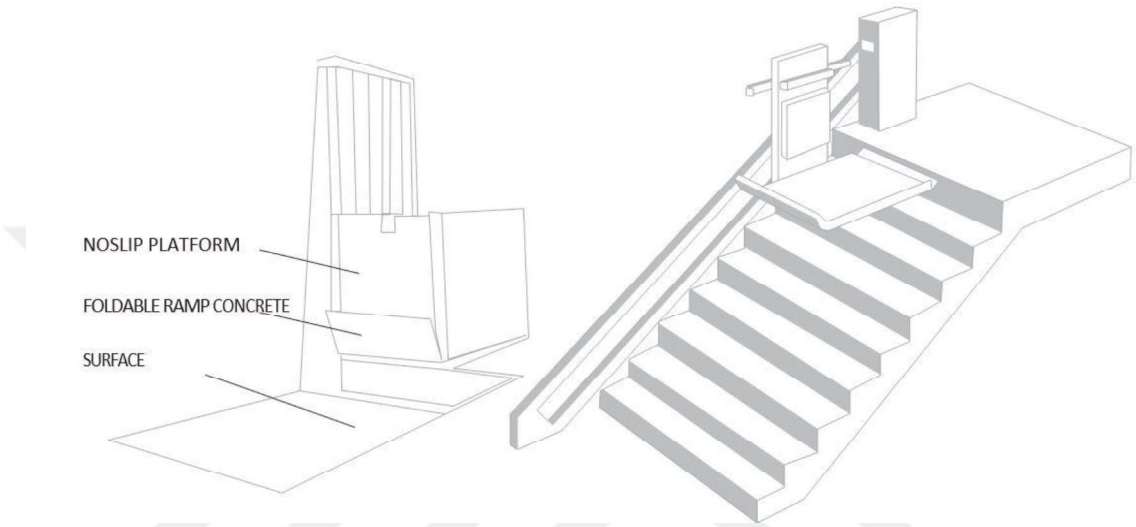

Figure 2.25.The Platform.

2.2.6 The Standards Comparison

Table 2.12. displays the comparison of the three global standards (Brazilian Association of Technical Standards, The Universal Standards Guide for Persons with Disabilities, and the Americans with Disabilities Act Standards) in terms of accessibility factors and parameters. This comparison provides a clear understanding of the differences between the standards and the areas where they may overlap or differ, provides a clear understanding of the variations in dimensions and specifications for walkways, ramps and stairs standards, and highlights the areas where gaps in accessibility may exist. This understanding is crucial for the analysis and evaluation of the case study in Aleppo city, as it will inform the identification of barriers to accessibility and the development of recommendations for improvement.

Table 2.12. The Global Standards Comparison.

Main Factor	Factor Detail	Factor Dimension	Global Standards Dimensions		
			WDU	ADA	ABNT
Walkways	Width Of WALKWAYS	Straight line	1.5 m – 2 m min.	0.915 m min.	0.9 m – 1.8 m min.
		Turning Way	1.5 m	0.915 m – 1.065 m min	0.9 m – 1.05 m min
	Width of Urban Furniture Lane	The width	0.75 m – 1.2 m	–	0.7 m min
	The Walkways Width Totally in Straight line		2.25 m – 3.2 m min.	0.915 m min.	1.6 m – 2.5 m min
	Height of the pavement	The maximum height	15 cm	1.3 cm	-
	The Slope of Walkways	The slop	2% <slope< 6%	slope < 5%	3% < slope < 5%
Ramps	Width of Ramps	Straight line	≥ 0.9 m	≥ 0.915 m	≥ 0.9 m
		Turning around	≥ 0.9 m- 90º ≥ 1.4 m-180º	≥ 1.22 m	≥ 0.9 m
	The Slope of Ramps	Straight line	< 8 %	< 8.3 %	5% < slope < 8.3 %
		With Landing	-	-	8.3% < slope < 12.5 %
	Rise of ramp	The rise	< 0.5 m	< 0.3 m	< 0.8 m
	Landing of Ramp	The landing Length	≥ 2.5 m	≥ 1.525 m	≥ 1.2 m
		The handrail height	0.76 m – 0.865 m	0.865 m – 0.965 m	0.7 m – 0.92 m
	The Slope Of Crosswalk Ramp	The slop	< 2%	< 2%	< 3%
Stairs	Stair's Size	Dimensions e: rise p: height	(2 x e) + (1 x p) = 63 cm (e): e ≤ 15 cm	10 cm ≤ e ≤ 18 cm 28 cm ≤ p	63 cm ≤ p + 2e ≤ 65 cm (p): 28 cm ≤ p ≤ 32 cm (e): 16 cm ≤ e ≤ 18 cm

According to the previous comparison, the three standards - ABNT, ADA, and WDU - provide comprehensive measurements for ensuring the accessibility of street elements. However, ABNT has the most extensive range of dimensions, in addition, the Brazilian streets are similar to the Syrian ones and that makes them more suitable for rehabilitation projects. Meanwhile, ADA and WDU have more specific and stringent standards that are more appropriate for new street construction projects.

CHAPTER 3

THE CASE STUDY

An important street in Aleppo, Syria, has been chosen as a case study, to be studied and evaluated its gaps and missing features that determine its accessibility and features, which can be adapted and implemented.

Ibn Al-Bitar Street is one of the streets that has not been inflicting a lot of material damage as a result of the war, yet it has been highlighted as a very important street whose analysis can be used to determine the standards adopted in the city in general and to avoid the negatives and obstacles because all streets did not meet the standards before the war, and this is a chance to make our streets better when carrying out the reconstruction and rehabilitation the city.

The street before the war was used just for transit it didn't contain many stores or shops, people used it to go to the university or to the other parts of the city, but after the war and the huge immigration from eastern Aleppo, many of them lived in Ibn Al-Bitar street, it got a lot of new services and transformed from a transit street to this important street now. Many of the immigrants have an injury, a disability, or even a phobia, and for that this street should get our attention to make it comfortable and accessible for all.

3.1 Overview of Aleppo City

Aleppo city is located in the north of Syria and is known as Syria's industrial and economic capital. Before the start of the conflict in 2011, "it was the city with the highest population with 4.2 million inhabitants… the UN estimates that as of 2019, there are currently 1.6 million people living in Aleppo city, only 200,000 people reportedly live in the eastern parts of the city, which endured the greatest amount of damage, As of 2019, conditions in Aleppo city remain alarming with high levels of poverty, lack of basic services, and extremely damaged buildings with reconstruction efforts estimated at hundreds of millions of dollars. Many residents are still threatened by unexploded

remnants of war and are still in need of continued lifesaving humanitarian assistance" [33].

Many of the infrastructures in the city were damaged, and the main vessel that supplies the city with life is the street, which had huge damage through the war, "Primary roads and trunk roads have received the most damage within cities….Aleppo is the most impacted city, accounting for the majority of the damages in the 10 cities, in absolute and relative terms….With the latest escalation of the conflict, damage to Aleppo's road transportation sector doubled from September 2016, reaching 44 percent damage in February 2017."[34] Figure 3.1.

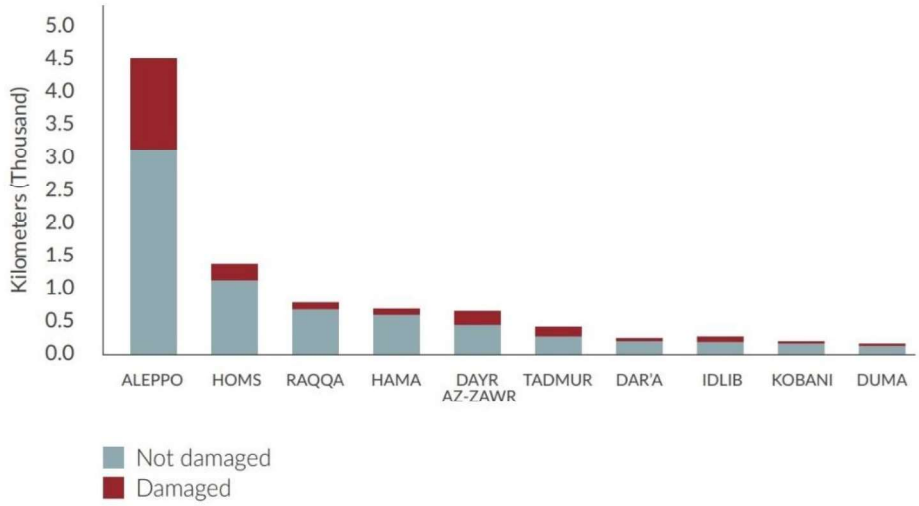

Figure 3.1. The Damages of Intra-City Roads [35].

In a report prepared by WHO on disabilities, he said "Explosive remnants of war will continue to be a threat to individuals, especially children, and strain the health system in Syria for years to come. A national household survey carried out in June 2019 found that over half of all households surveyed had a member who was living with a disability and almost half of the households surveyed had two or more members who were living with a disability" [36].

And in a report prepared by HNAP in 2020, about disabilities in Syrian people, 6.5 million are displaced across Syria, and over a third of those displaced people have a disability (36 percent). The figure 3.2 and figure 3.3 show the internally displaced people with disabilities around Syria. According to a report prepared by the organization Yadn bi Yad in Hanano in Aleppo city, from 2018 until 2021, they registered 10 400 people with disabilities [37].

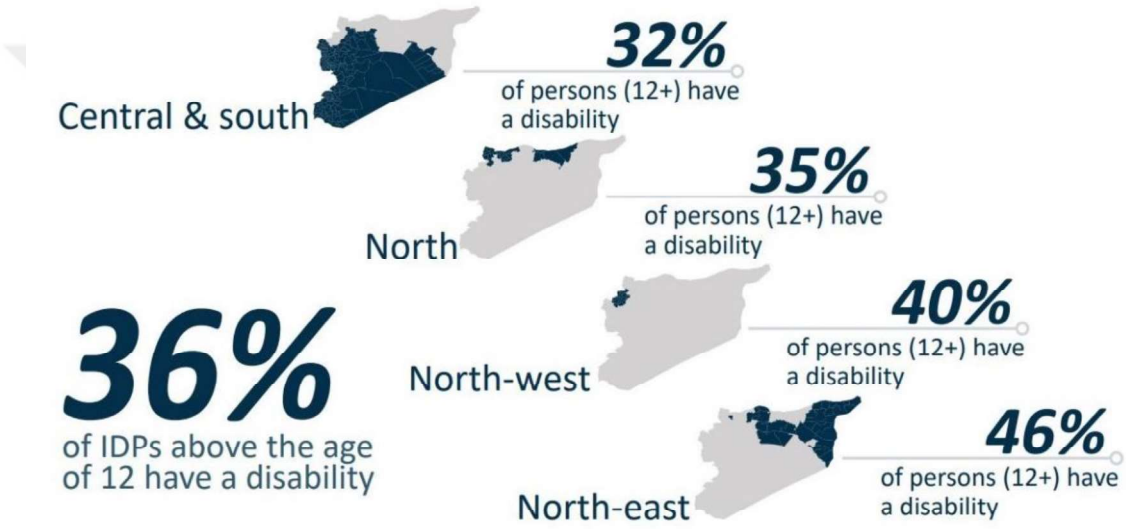

Figure 3.2. The IDPs with Disabilities Around Syria [38].

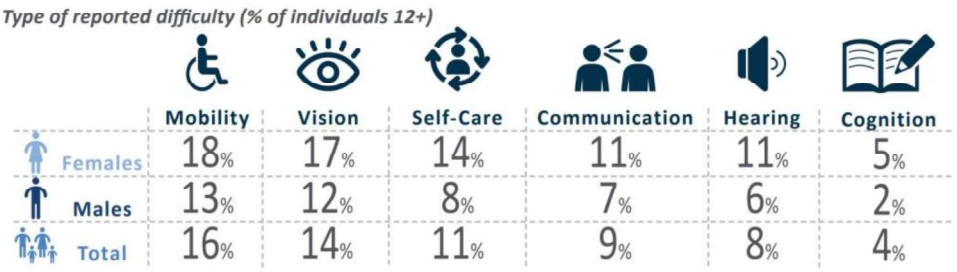

Figure 3.3. The Percentage of Disability Types.

Generally, Today's and future victims will require comprehensive care and facilitation of life services, to make their life easy, and integrate again with society, and to help the move into the city, the street had chosen to evaluate it with the standards that have been studied and try to find problems and solutions.

3.2 Analyze of Ibn AL-Bitar Street Context

Ibn AL-Bitar Street or Nazlet-Adonis as it is known, it's an important street, it is one of the oldest streets in the west of Aleppo city, and it is 2.3 km away from the Citadel of Aleppo (in a horizontal path). It is important because it connects the city center and many important destinations, it is the main link between the main entrance of Aleppo University which is a special point and the City Center, and it has three important streets intersecting with it, and ends with the railway bridge. Figure 3.4. shows the street location in Aleppo city.

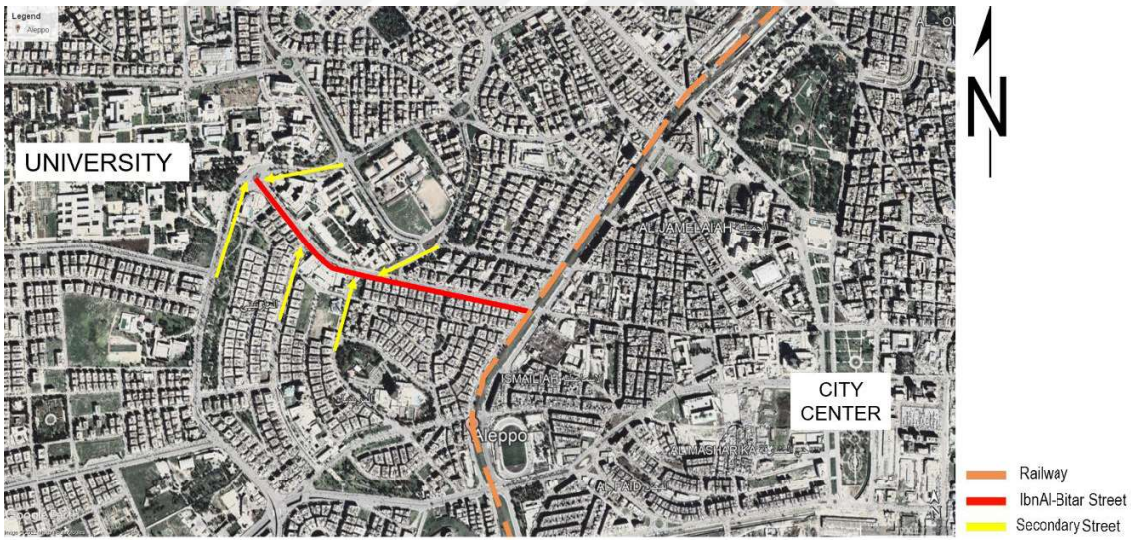

Figure 3.4. The Street Location in Aleppo.

The land of Ibn AL-Bitar Street has light inclinations, the lowest point of the street is in the east with a height of 379 m above sea level, and the highest point of the street is in the west from the University side at a height of 409 m above sea level. Figure 3.5. shows the street in the neighborhood.

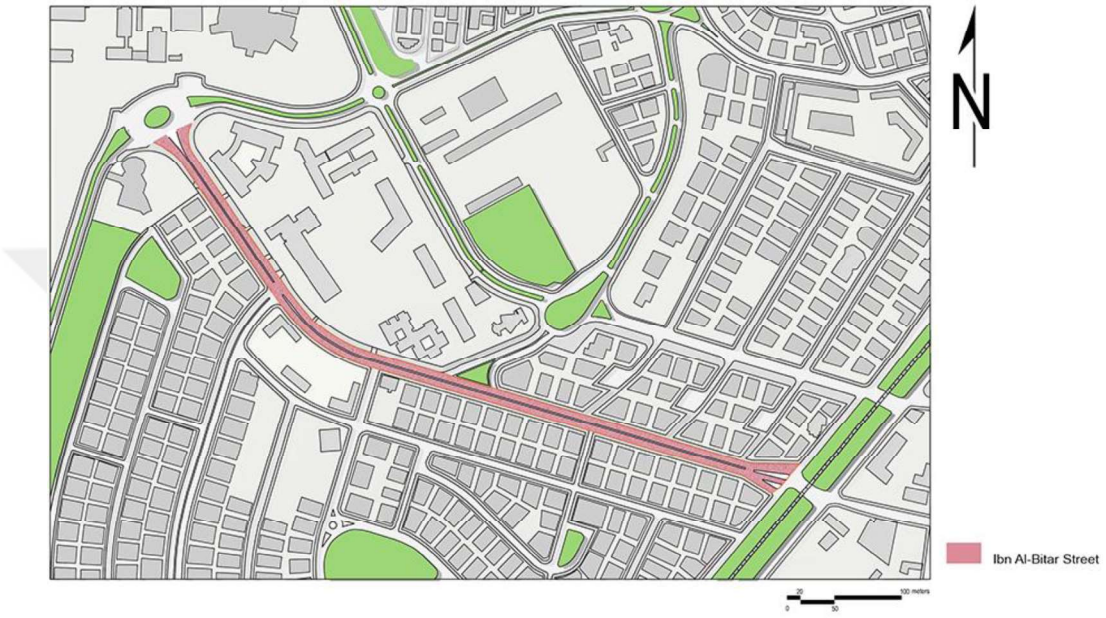

Figure 3.5. Ibn Al-Bitar Street.

AA section in figure 3.6 crosses the street and shows the resident from the right side until the university on the left side and shows the stores and the electricity generators, also the difference between the street height.

Figure 3.6. AA Cross-Section.

figure 3.7 is the BB section, It crosses the street in the university from the right side and the resident from the left side and shows the street measures and the stores' furniture on the walkway.

Figure 3.7. BB Cross-Section.

CC section crosses the street in the residence from the right and left sides and shows the street measures and the stores' furniture on the walkway in figure 3.8.

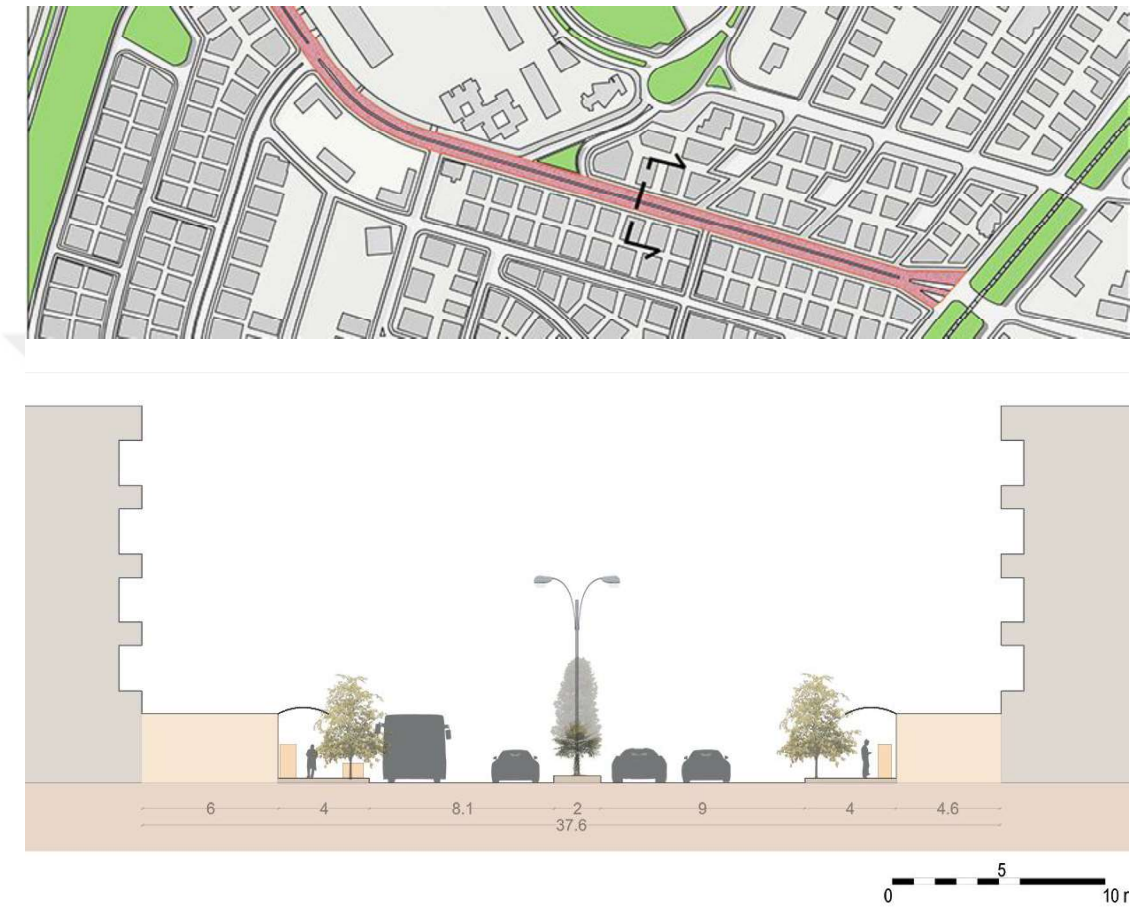

Figure 3.8. CC Cross-Section.

The street is one of the crowded streets, surrounded by many residential buildings that were inhabited by their owners, and some of these houses are rented by university students. It has many libraries, clothes stores, cafeterias, food shops, and schools. After the war, and some people started to move there, many food shops and clothes stores opened, which constituted an additional incentive for attracting more internally displaced people. Figure 3.9. shows photos of some buildings along Ibn-Albitar street taken at different times.

Figure 3.9. Photos along Ibn-Albitar street.

Figure 3.10. visually represents the hierarchy of the city streets and the central role that Ibn Al-Bitar street plays. It shows how many streets converge on this particular street and leads to the city center. The centrality of Ibn Al-Bitar street makes it an important hub for transportation and commerce, and social, which is an important aspect of urban development.

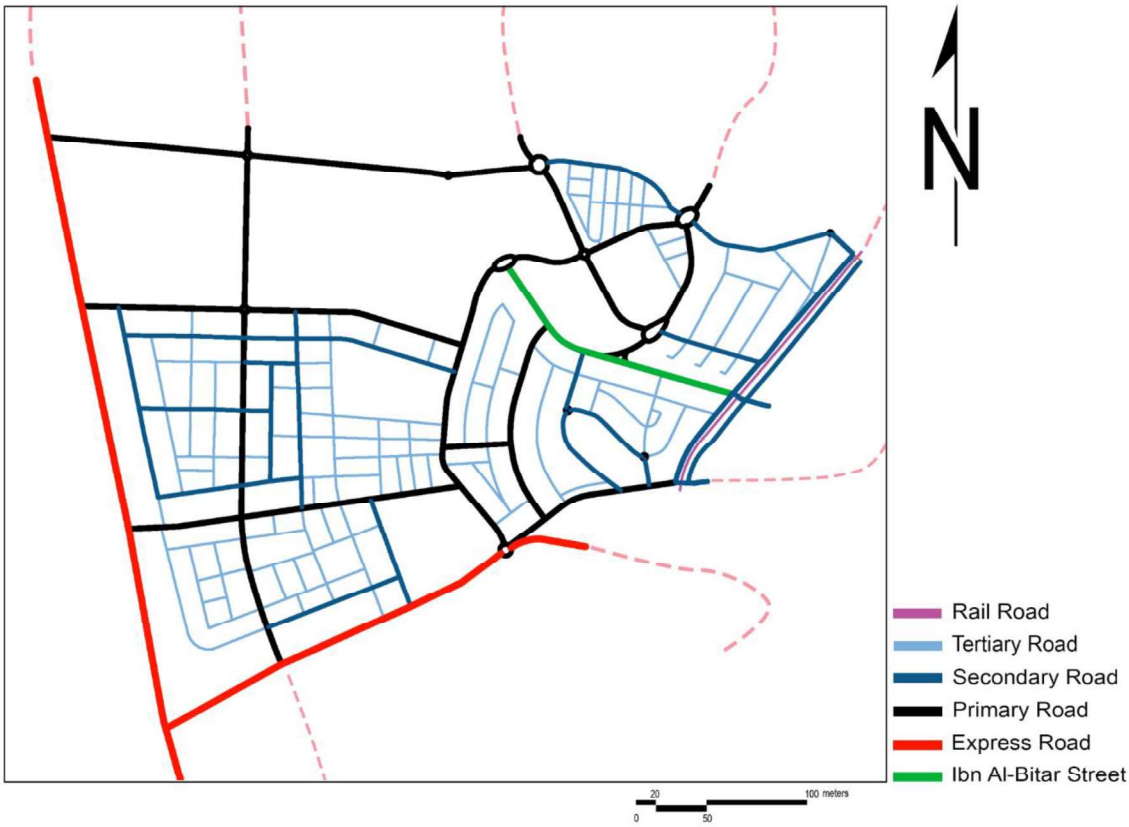

Figure 3.10. Streets Hierarchy.

Figure 3.11. presents a space and mass analysis of the street structure, examining the relationship between solid and void areas. it shows how the street service others to emphasize how much it is crowded and important.

Figure 3.11. Mass and Vacuum.

Figure 3.12. illustrates the land use of the street, which is a mixed-use area comprising both commercial and residential properties. These properties are located along the main street. It also shows the distribution of educational and healthcare facilities, including a governmental hospital, university buildings, and schools. Additionally, the figure depicts the proximity of mosques in the area and two restaurants one of them with wedding halls and electronic games. also, it indicates the presence of government buildings throughout the area, in addition to showing the streets and pavements around the neighborhood.

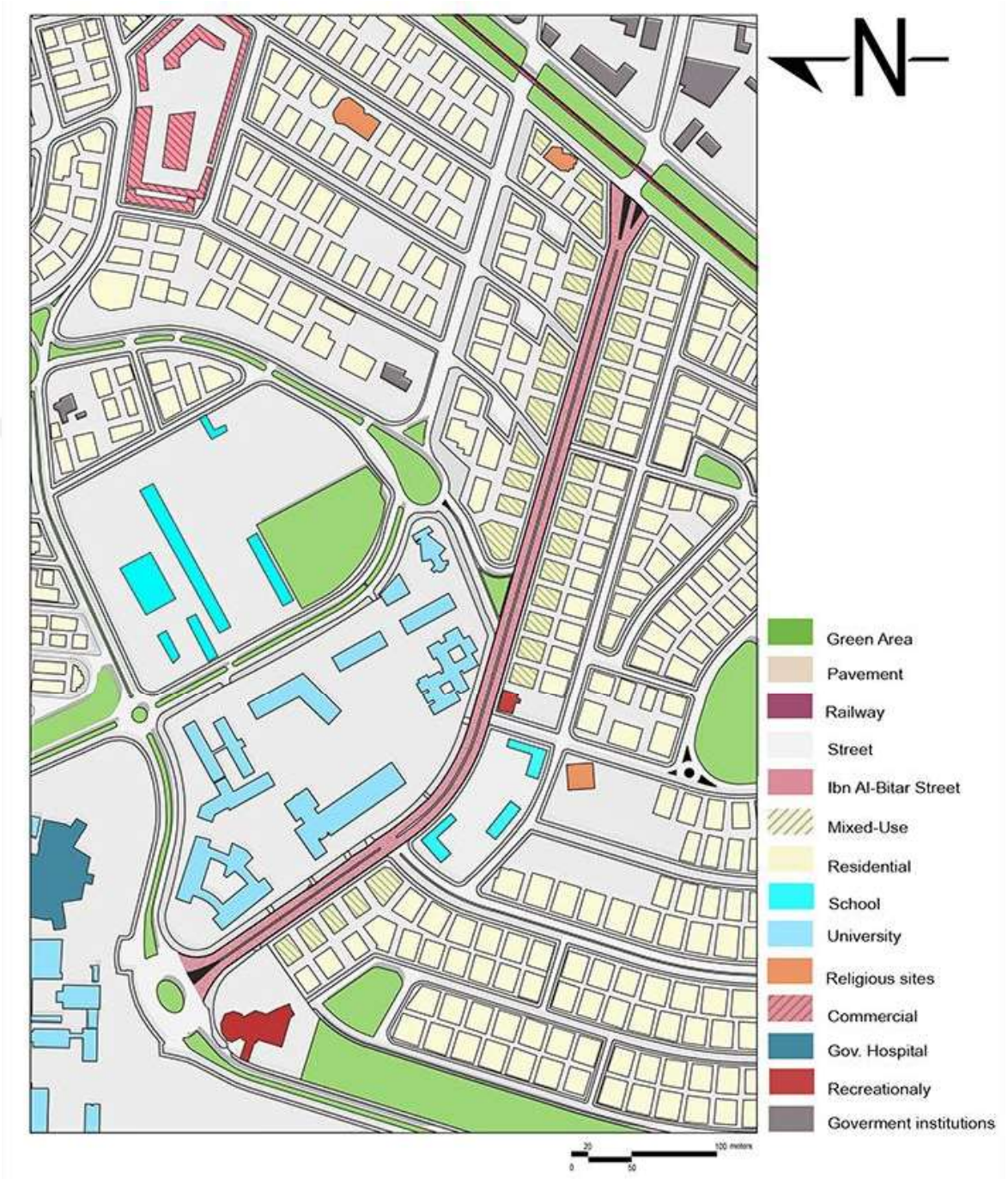

Figure 3.12. Land Use.

3.2.1 Finding and Analyzing the Weaknesses of Ibn Al-Bitar Street

In every street, there are many obstacles and problems which form gaps that need to be improved to provide ease of use in the movement and to encourage the walkability of the users.

In this part, the weaknesses and strengths of the street have been identified through illustrations on visuals of several parts of the street, and improvements have been presented in these illustrations in order to demonstrate the solutions concretely. Figure 3.13. and Figure 3.14. present a general view of the problematic situations which will be explained in detail in the following

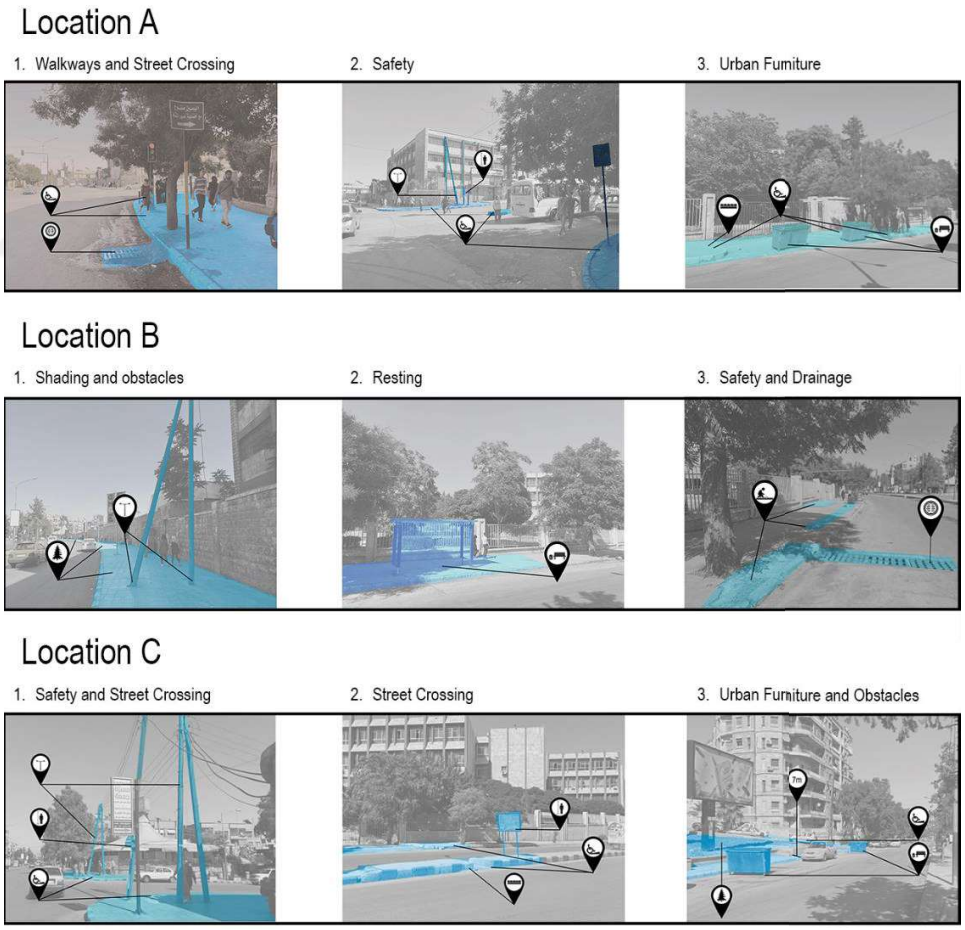

Figure 3.13. Street Gaps 1.

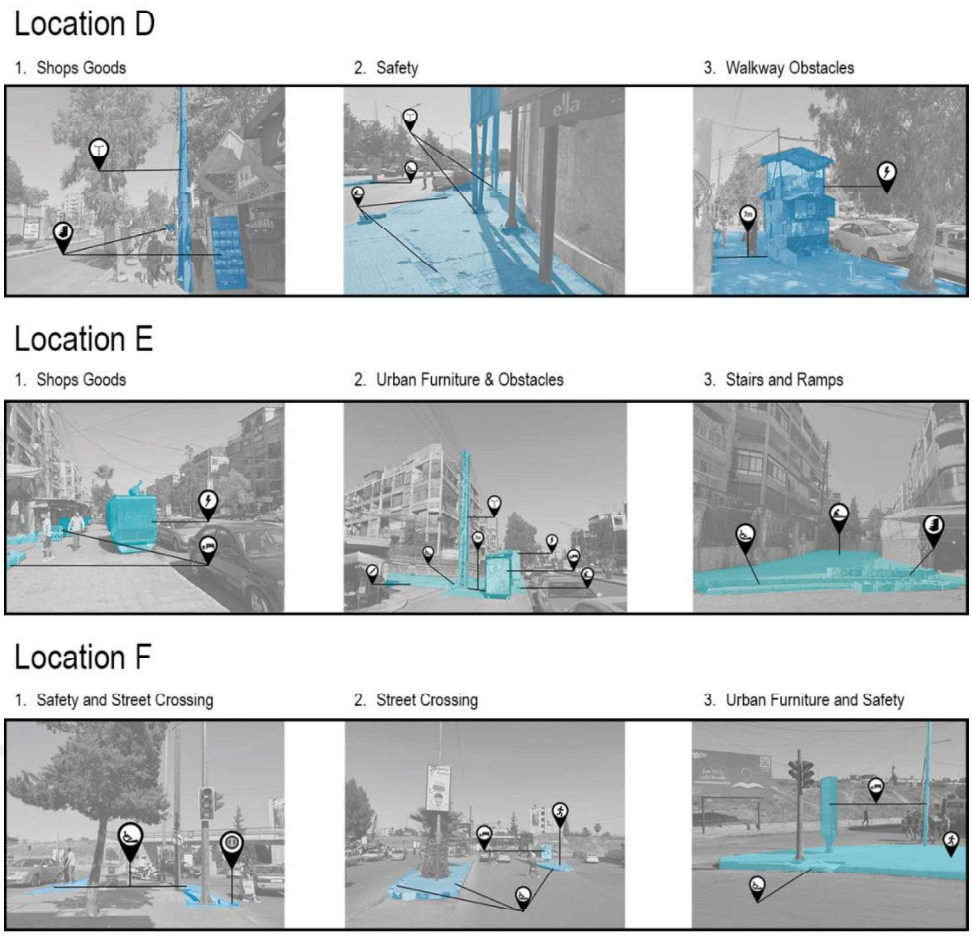

Figure 3.14. Street Gaps 2.

The following figures highlight the problematic situations that exist at Location A in figure 3.18. an area surrounded by residents, a school, and a university. Figure 3.15, figure 3.16 and figure 3.17, shows The analysis reveals that the crosswalk lacks ramps for PRM, the street signs are not at an accessible height, and the columns are placed in the middle of the walkway, hindering movement. Additionally, the traffic sign side lacks ramps and the drainage is not properly maintained, causing water to accumulate. On the opposite side of the street, there are obstacles such as trash containers and a lack of ramps and level surfaces for pedestrians to safely cross the street.

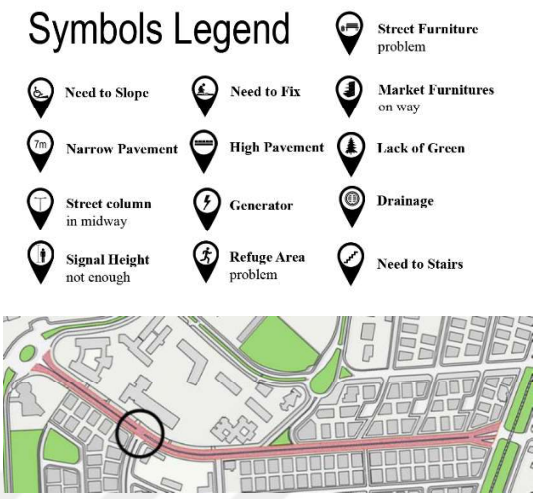

Figure 3.18 A location

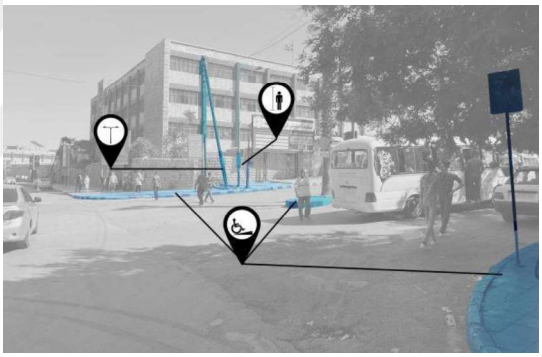

Figure 3.17 Problematic of 1. situation of A

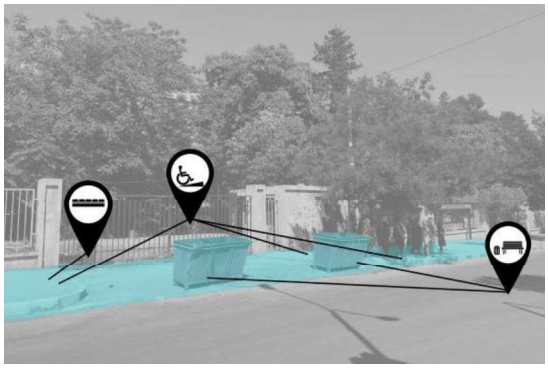

Figure 3.15 Problematic of 3. situation of A

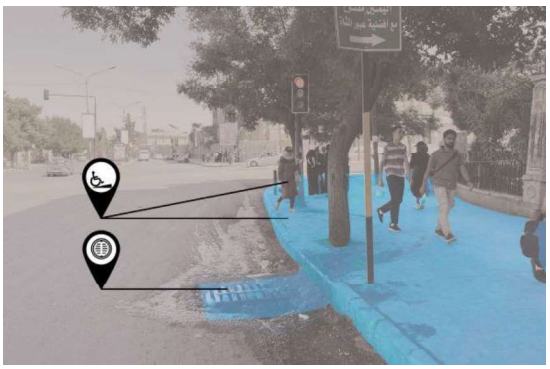

Figure 3.16. Problematic of 2. Situation of A

The following figures highlight the issues at Location B in figure 3.19, an area located in front of a high school and across from a university. Figure 3.20, figure 3.21 and figure 3.22, shows the walkway is wide, but lacks from trees shade . On the university side, there is a bus station without seating or ramps for easy movement. Additionally, the pavement at this location is in need of repair, with areas that are uneven and make the walkway narrow in certain spots. The drainage system is also impeded by a tree whose roots have damaged the pavement and blocked the flow of water.

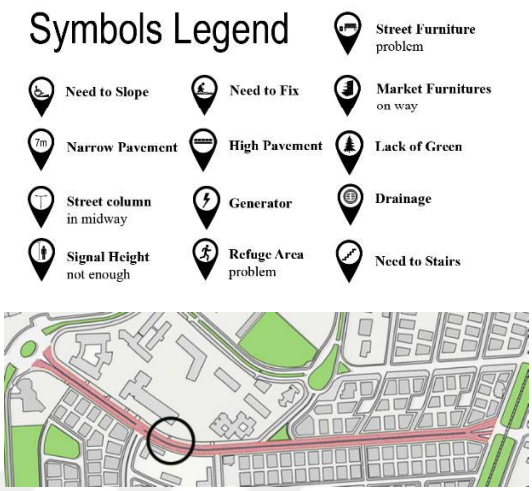

Figure 3.19. B Location

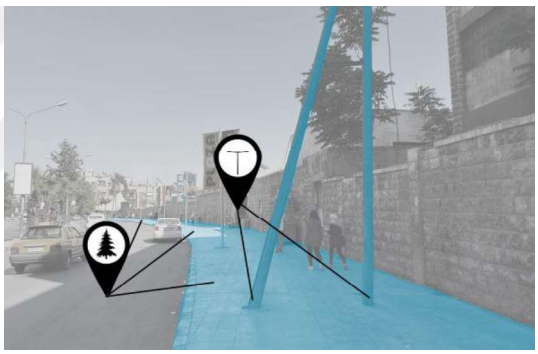

Figure 3.20 problematic of 1. Situation of B

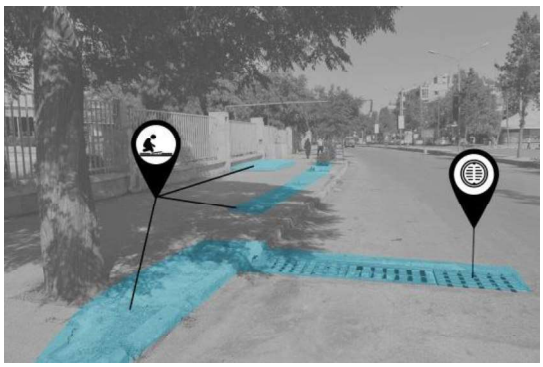

Figure 3.22 Problematic of 3. Situation of B

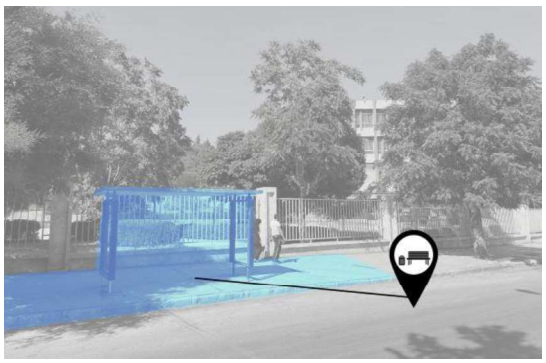

Figure 3.21 problematic of 2. Situation of B

The following figures highlight the problematic situations at Location C in figure 3.26, which is located at a street intersection near a cafeteria, a school, and a university. Figure 3.23, figure 3.24 and figure 3.25, presents several accessibility challenges, including electrical columns and market stands placed in the middle of the pavement, and a lack of ramps for PRM. The street crossing is also too narrow, and the pavement height is uneven, making it difficult to navigate. Additionally, the street sign at this location is inadequate, as it is not placed in an optimal location.

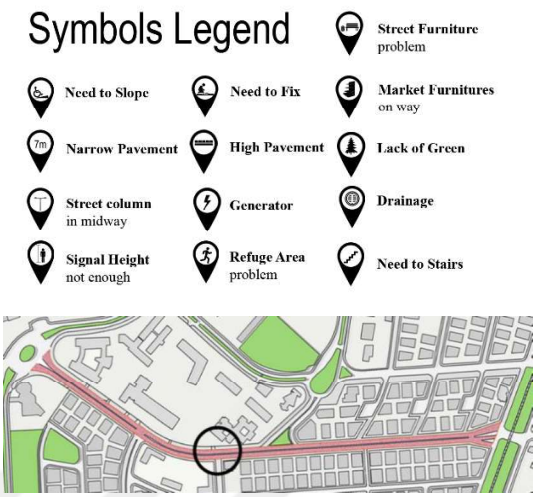

Figure 3.26 C Location

Figure 3.25 Problematic of 1. Situation of C

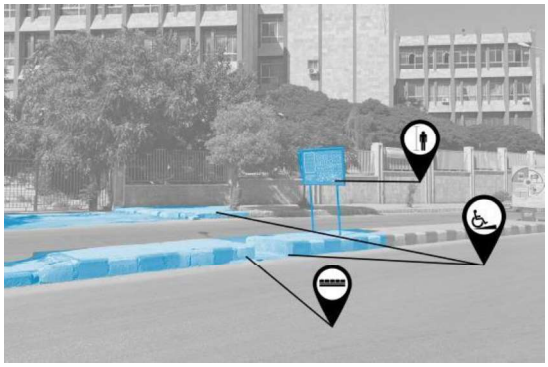

Figure 3.23 Problematic of 3. Situation of C

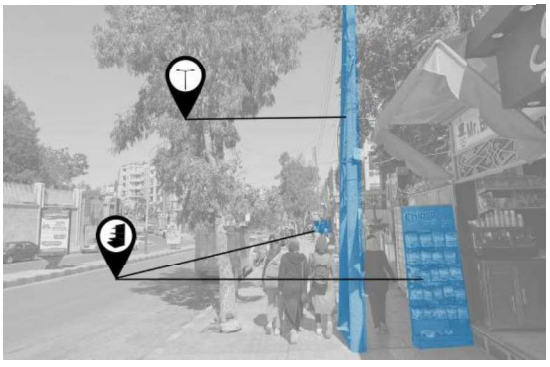

Figure 3.24 Problematic of 2. Situation of C

The following figures highlight the problematic situations at Location D in figure 3.30, The area located on a street crossroad which leads to Duwar Al-Ukhuwa and is surrounded by residential areas and a university. Figure 3.27, figure 3.28 and figure 3.29, displays the area characterized by a difference in elevation levels, which requires the installation of ramps to allow for easy pedestrian access. The presence of trash containers obstructs movement, and the pavement width is too narrow to accommodate PRM. Additionally, the area needs trees to provide shade and cover the empty space. The placement of billboards in the middle of the pavement, as well as the presence of chipped surface layers and stones, further contribute to the difficulty of navigating the area.

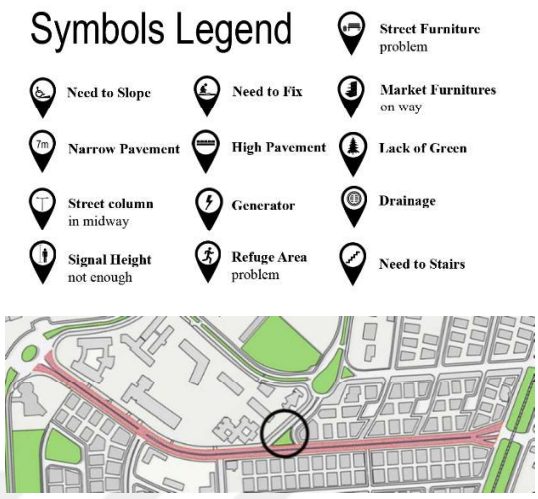

Figure 3.30 D Location

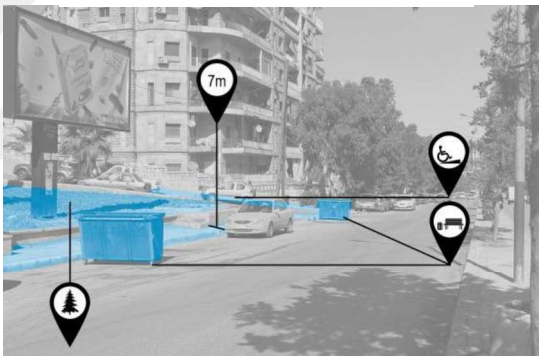

Figure 3.29 Problematic of 1. Situation of D

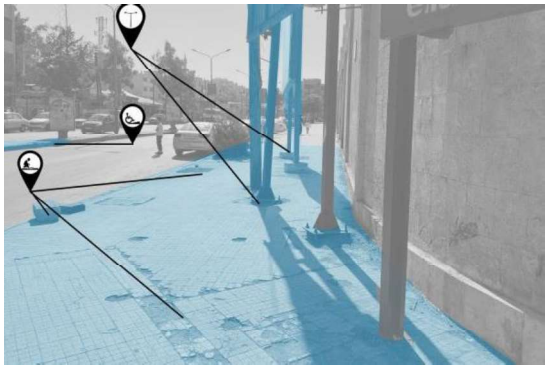

Figure 3.27 Problematic of 3. Situation of D

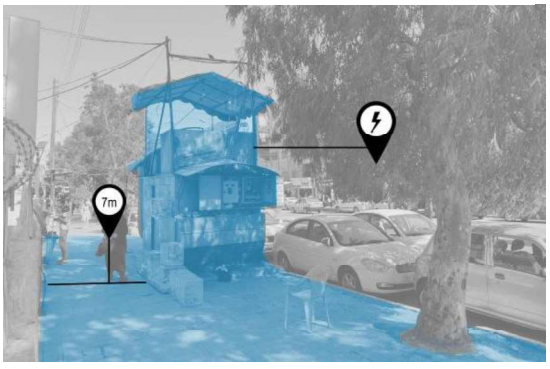

Figure 3.28 Problematic of 2. Situation of D

The following figures highlight the problematic situations at Location E in figure 3.32. Figure 3.31, figure 3.33 and figure 3.34 display the corridor has stairs but with no ramps, making it difficult for PRM to access. Additionally, the area is cluttered with market goods, blocking the path and creating obstacles for pedestrians. The surface of the pavement is uneven and cracked, and there is a lack of seating or shading options for those waiting at the bus station. Furthermore, the presence of electrical generators in the area adds to the congestion and lack of accessibility for all individuals. Overall, these corridors present a number of challenges for PRM.

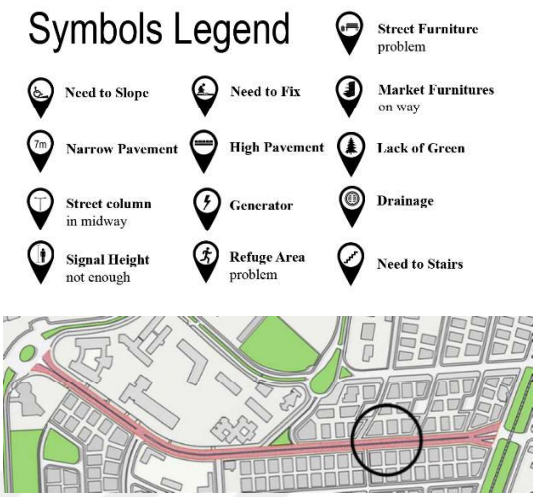

Figure 3.32 E Location

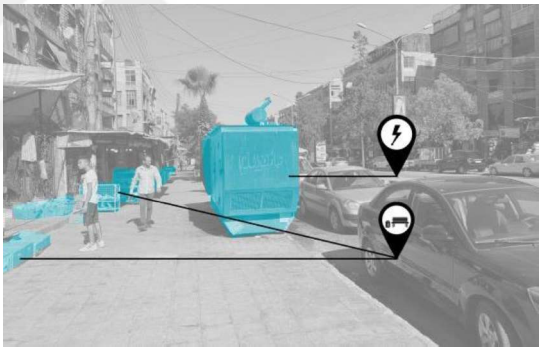

Figure 3.31 Problematic of 1. Situation of E

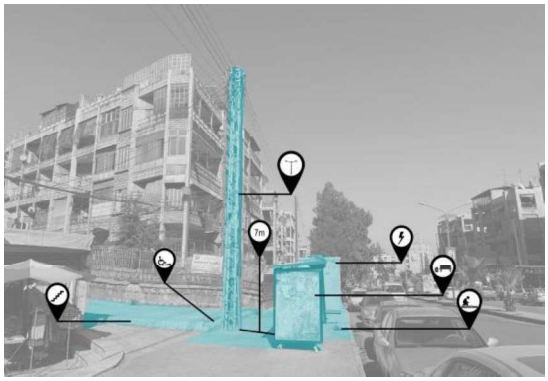

Figure 3.34 Problematic of 3. Situation of E

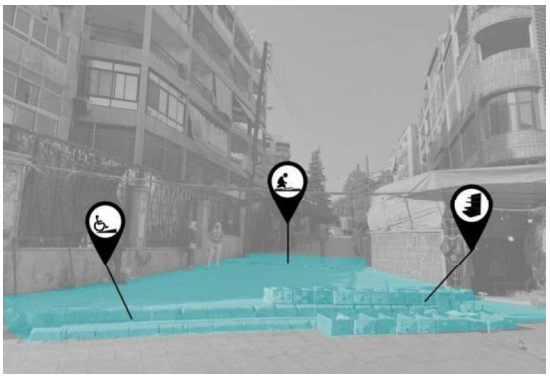

Figure 3.33 Problematic of 2. Situation of E

The following figures highlight the problematic situations at Location F in figure 3.35, The area located in the end of Ibn Al-Bitar Street. Figure 3.36, figure 3.37 and figure 3.38, shows the pavement in this area also in poor condition with chipped and cracked surfaces, making it difficult for PRM to navigate.

Additionally, there is a lack of proper street signage and traffic signals, making it difficult to safely cross the street. The area also lacks proper drainage, which can cause water to pool on the pavement and further impede accessibility.

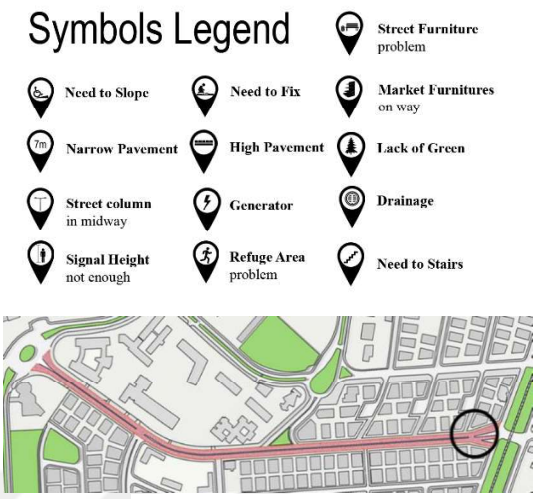

Figure 3.35 F Location

Figure 3.38 Problematic of 1. Situation of F

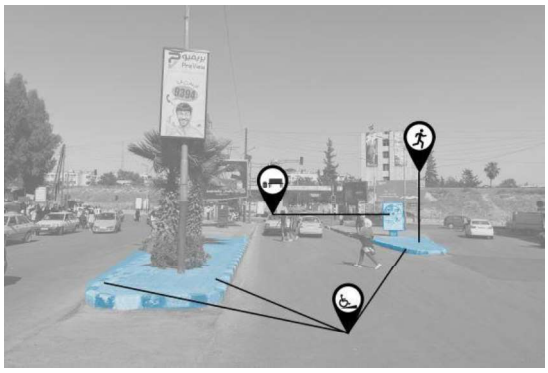

Figure 3.36 Problematic of 3. Situation of F

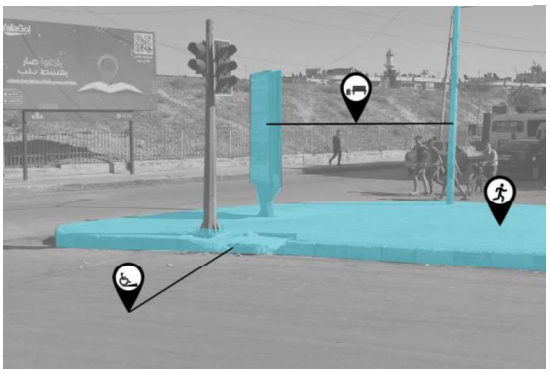

Figure 3.37 Problematic of 2. Situation of F

3.2.2 Dimensions of Ibn Al Bitar Street

The dimensions of Ibn Al-Bittar street have been analyzed to identify any accessibility issues for people with limited mobility, by comparing the measurements of the street elements to the global standards which have been searched in the literature review, the comparison aimed to uncover any gaps in accessibility. The results of these measurements are presented in Table 3.1, which illustrates the current state of the street's accessibility.

Table 3.1. Dimensions of Ibn Al Bitar Street elements.

Main Factor	Factor Detail	Factor Dimension	Ibn Al-Bitar Dimensions
Walkways	Width Of WALKWAYS	Straight line	1.2 m – 2.4 m
		Turning Way	1.2 m – 2.4 m
	Width of Urban Furniture Lane	The width	1 m -1.6 m
	The Walkways Width Totally		4 m – 5 m
	Height of the pavement	The maximum height	15 cm -30 cm
	The Slope of Walkways	The slope	-
Ramps	Width of Ramps	Straight line	-
		Turning around	-
	The Slope of Ramps	Straight line	-
		With Landing	-
	Rise of ramp	The rise	-
	Landing of Ramp	The landing Length	-
		The handrail height	-
	The Slope Of Crosswalk Ramp	The slope	-
Stairs	Stair's Size	Dimensions e: rise p: height	e: 28-32 p: 15-30

The walkways dimensions are variable along the street in total width of 4m – 5m. the street doesn't have any ramps or an element to make the stroller or PRM move easily, and that ensures the importance of improving the street and making it accessible.

3.3 The Survey

This study included a survey as a means of gathering the perspectives and experiences of the inhabitants of the area surrounding Ibn Al-Bitar Street. The survey was conducted after the initial analysis of the street in terms of planning according to international standards for accessibility. The participation of inhabitants in the survey was crucial as it provides insight into their needs and experiences, which are essential for creating an inclusive street for all users. This survey data will be used to supplement the analysis of the street and provide a comprehensive understanding of the barriers and challenges faced by residents and pedestrians on Ibn Al-Bitar street.

One of the most important points that people need when rehabilitating their country is to fulfill their desires. In order to know what the most important points are, the Survey shows us what they are. The final form of the Survey was prepared by using Microsoft forms with eleven questions in Arabic (the local's mother language). It was an open invitation and took a week to collect 62 answers. All the questions used are multi-choices except the last two questions where open-ended questions have been used.

The first two questions are about demographics: age, and gender. The next two questions are about mobility habits and mobility limitations. Then how often do you pass the street and why? After that we arrive at the main part of the survey which is, to mark what do notice in the street and mark the obstacles that you face in the street, the answers choices were selected upon the literature review and the elements of the global standards.

Then an overall rating (out of ten) for the ease of movement and touring attraction. Finally, an open question for suggestions to enhance the accessibility and encourage walking around.

3.1.1. The Survey Results

The survey is presented in Arabic, as seen in Figure 3.39. collected responses from 62 participants with a majority of females (68%) outnumbering males (19%). The majority of the participants were between the ages of 26-50 (58%), followed by those between 18-25 (27%) and those above 50 (13%). This demographic breakdown may be attributed to the new population dynamics in Aleppo after the war.).

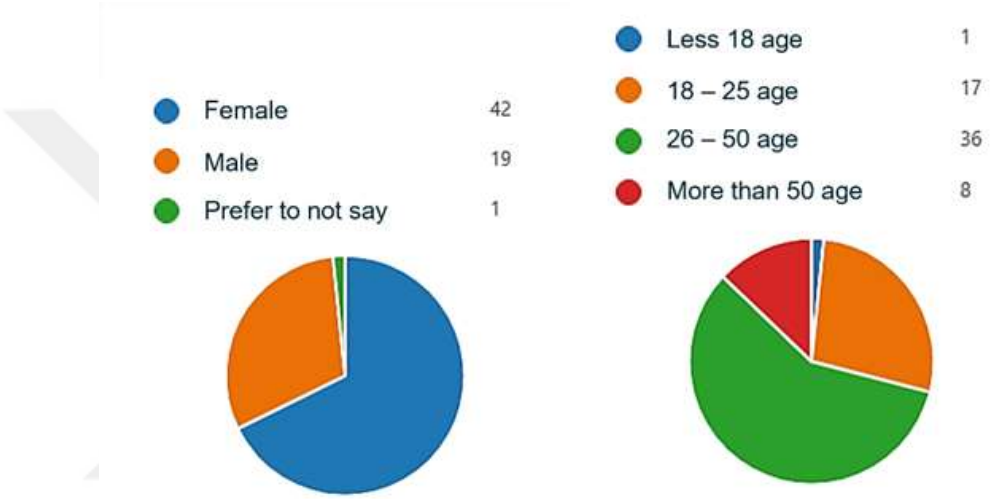

Figure 3.39. Respondents' Information.

Figure 3.40. illustrates the preferred mode of transportation for participants, with half of the respondents indicating that walking is their preferred mode, 40% using private cars and public transportation, 10% using taxis, none using bicycles, and 4% using baby strollers. This data suggests that cycling is not a common activity in the area. Additionally, half of the participants walk in street 1-5 times a month, and 16% walk in the street every day. And the purpose of the participant's use of the street, with 60% using it as a passage to the city center, 18% for shopping, 11% for leisurely walking, and 12% for living in the area. This indicates that the street attracts non-residents for passing through or shopping.

Figure 3.40. Street Usage Reasons.

Figure 3.41. shows Only 2% of participants noticed slopes, less than 7% noticed seating or crossing lines, and less than 12% noticed covered bus stops. 31% agreed that there is sufficient lighting in the street.

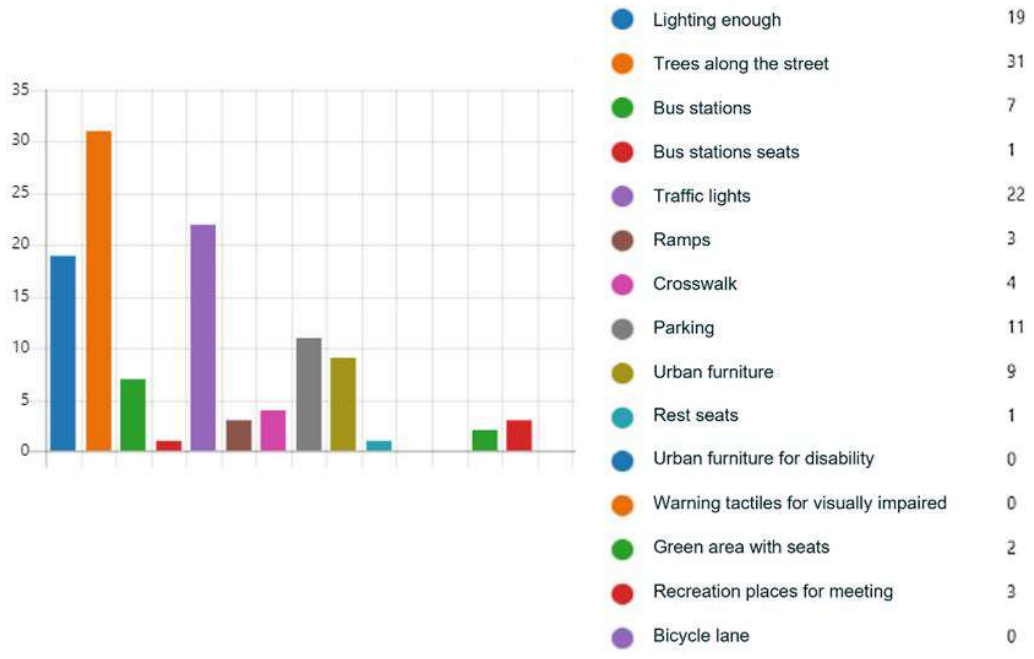

Figure 3.41. Items They Had Noticed on The Street.

Figure 3.42. illustrates the participants' perceptions of the street's accessibility, with 68% agreeing that goods in front of shops impede movement on the street and 65% agreeing that resting or shaded places are scarce.

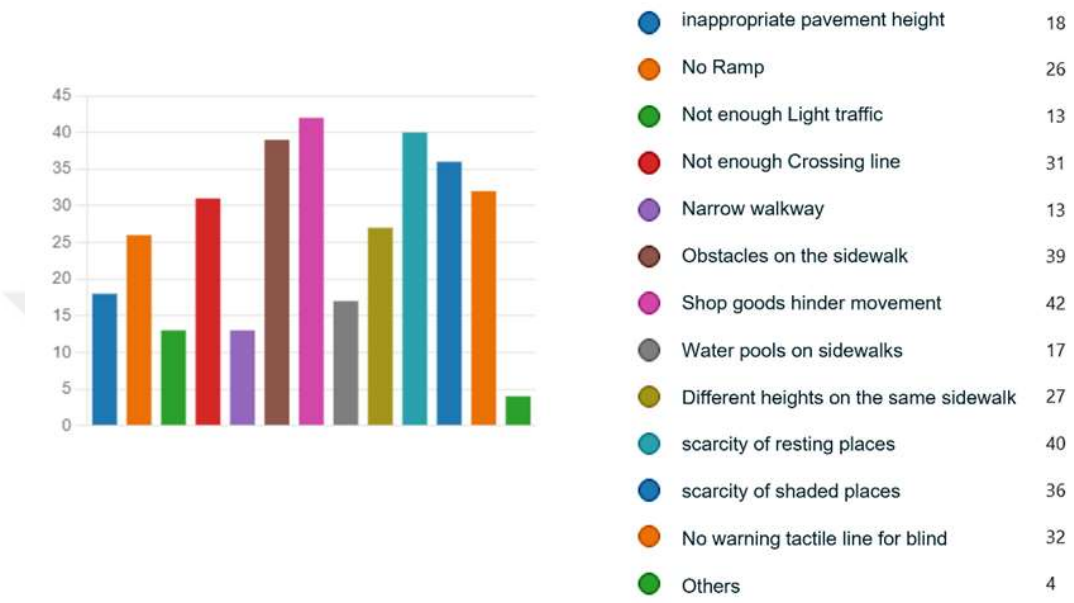

Figure 3.42. Obstacles They Face on The Street.

Figure 3.43. presents the overall street evaluation average rating for ease of movement and walking attraction, with a score of 3.27 out of 10. This suggests that overall, the street is not perceived as easily navigable or attractive for walking.

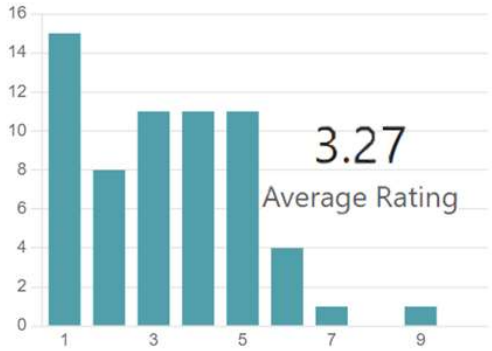

Figure 3.43. Street Evaluation.

Finally, the survey concluded with a list of suggestions from participants, as displayed in Table 3.2. And shows the category of the functions they talked about and their answers in English and Arabic language. These suggestions provide valuable insight into the areas that need improvement in terms of accessibility and livability on the street.

Table 3.2. People suggestions for improving the street.

Category	Spatial Requirements in English.	Spatial Requirements in Arabic
Furniture	Shaded places especially near the bus station	اماكن مظللة / اماكن مظللة مع مقاعد لمواقف الباصات والنقل العام / وضع كراسي او اماكن للاستراحة اثناء الصعود / وجود أماكن مظللة / مظلات للمواقف / وجود أماكن مظلله لانتظار المواصلات
Furniture	Places to set and rest	خاص المشاة اماكن استراحة / مقاعد للاستراحة / إضافة موقف استراحة مقعدين وذوي احتياجات خاصة
Aesthetic	Enhance cleanliness and more trash containers	النظافة/ حاويات قمامة ملونة حتى نراها بسهولة
Aesthetic	paints	ارصفة مدهنة / دهان للشوارع لنستمتع اكتر لمى نمشي /
Furniture	More trees and trim trees	أشجار ثم اشجار ثم اشجار / وضع اشجار على طول الطريق / وزراعة الأشجار / أشجار اكثر / زرع أشجار / تقليم الاشجار ومنعها من تجاوز منطقة المشاة
Street Design	Special area for bus station	اماكن للباصات / مواقف الباصات /
Maintain	Sidewalk slops	منحدرات للأرصفة / منحدرات للعربات / منحنيات للرصيف / منحدرات المرور العربات / منحدرات الرصيف لعربات الأطفال ومرور كبار السن عبرها /
Redesign	Remove goods on sidewalks	نشيل البسطات / وضبط مشكلة البسطات أمام المحلات/ وابعاد بضائع المحلات التجارية عن الرصيف / الغاء البضائع المعروضة على طول الطريق / منع اصحاب المحلات وضع اغراض في طريق المشاة / بسطات المحلات / ازالة البسطات / تأمين اماكن اخرى للبسطات / المحلات التجارية على الرصيف ما تكون موجودة / عدم وجود البضائع على جانبي / تحديد مساحة التجاوز المسموحة لبضائع رصيف / ازالة بسطات المحلات على الارصفة/

Transportation	More Public transportation vehicles	تنظيم حركة المرور تسهيل وساءل نقل / اكثار عدد السرافيس والباصات / اكثار من المطبات و اجبار السائقين على القيادة ببطء / تحديد حركة المرور
Street design	Increase the width of the sidewalk	توسيع الرصيف*2 / تعريض الأرصفة / زيادة عرض الرصيف
Furniture	Lightings based on renewable energy	انارة الشارع بشكل كاف / انارة دائمة / الإضاءة / إنارة الطرقات / إضاءة كافية " إنارة ليلية في الشوارع للسيارات على طول الطريق" /
Aesthetic	Beautification of sidewalks and shop fronts	الترتيب / والاهتمام بتجميل الارصفة والمناطقة الخالية وواجهات المحلات
Maintain	Fix tiling	اصلاح حجارة الرصيف / اصلاح بلاط الرصيف لتسهيل حركة عربات الاطفال والمكفوفين / اعادة الترصيف / عرض رصيف / الأرصفة المستوية / تخفيض ارتفاع الأرصفة / إعادة رصف الارصفة ودهنها / اعادة .وتهيئتها لذوي العربات والدراجات والمكفوفين واصحاب الاعاقة رصف المنطقة /
Furniture	More traffic lights	اشارة مرور للمشاة
Transportation	Needs for more qualified public transportation	تأمين مواصلات في كل حلب / توفير مواصلات / يفضل توفر أعداد كافية من الباصات منع المواصلات من تعليق الأشخاص خارج الباصات والسرافيس توجيه السائقين لاحترام حياة الأشخاص الذين يعبرون الشارع / ان يتم تحديد حد أعلى للركاب في كل وسيلة نقل
Redesign	Areas such as car parks	مواقف السيارات / مواقف السيارات

Redesign	New lines for bikes	اضافة ممر خاص لأصحاب الدراجات الهوائية
Furniture	Zebra crossing line with blacklight paint	ممرات للمشاة / ممرات مشات مخطوطة / ممرات مشاة / تخطيط أماكن مشي المشاة بلون واضح يرى بليل لشوارع خاصة في أثناء قطع شارع
Redesign	Entertainment areas	اماكن ترفيه
Redesign	Bridges for pedestrians	وجسور المشاة
Furniture	acoustic signs	وضع شاخصات صوتية سواء المشاة المكفوفين أو عاديين أو للسائقين
Redesign	New local marketplace for stalls	نقل الباعة الجوالين للمنطقة الخضراء الفارغة بعد صالات وردة الشهباء ومدينة الالعاب والمتواجدة باتجاه سيف الدولة من خلال انشاء سوق مغطى لهم على نمط سوق الخالدية حيث يتكمن الباعة الجوالين من الاستفادة من المكان بأجور رمزية وبعيدا عن الضرائب الباهظة
Redesign	Only pedestrian area/can public transportation move slowly	منع السيارات من العبور وتحويله لمنطقة مشاة بالكامل على غرار منطقة العبارة / عدا النقل العام
Furniture	Yellow lines	خطوط للمكفوفين
Furniture	Free Wi-Fi	واشارة نت مفتوح
Furniture	Directional signs and street names	لافتات مساعدة للمارة
Redesign	Area for local generators with extra observation	تهيئة أماكن خاصة للمولدات بحماية عالية

CHAPTER 4

RESULTS

Many of the studies and topics at the global and national levels today focus on how to improve human living conditions in terms of accessibility. In this study, the barriers and obstacles that reduce the ease of pedestrian movement and discourage movement on Ibn Al-Bitar street have been identified through an analysis and a comparison with three international standards, Additionally, a survey was conducted to gather insights on the citizen experiences and perceptions of the street accessibility.

The results of this study evaluating the current state of Ibn Al-Bitar street, several issues were identified that negatively impact the accessibility of the street for people with reduced mobility. These include:

- Variations in the width of the walkway,
- High and uneven pavement,
- Lack of proper urban furniture, such as seating and shady areas in addition
- The presence of signs that are either too low or placed in the middle of the walkway
- Additionally, the safety standards are not fully implemented, whereas the refuge area is not processed according to the studied international standards, and there are lake traffic signs,
- slippery and uneven walkway materials, as well as a lack of ramps and landing areas for mobility despite the stairs' existence.
- Also, there are no crosswalks or ramps present to allow for comfortable movement and no provision for visually impaired pedestrians.

The survey results indicate that the accessibility of Ibn Al-Bitar street for people remains a major concern, as the majority of respondents reported facing various challenges such as obstacles, whereas the ease of movement and touring on the street in question was evaluated through a survey given to applicants, with a score of 3.27 out of 10.

- most people use modes of transportation usually to cross the street
- Although 50% agreed that there are trees along the road, 65% said that there are rarely shaded places, and 31% said that there are sufficient lights, but most of them do not work because there is no electricity.
- Despite the fact that individuals with disabilities and their companions were not specifically surveyed, 68% indicated that the primary issues faced by pedestrians on the street include the presence of obstacles and furniture from shops obstructing traffic.
- Notably absent from the street were sloped sidewalks and building entrances, and warning tactile lines to assist the blind, everyone agreed that they do not exist.
- As for the other elements, such as crosswalks, and urban furniture (bus stops, rest areas, and shaded paths), most of those who submitted the survey agreed that they do not exist
- The majority of the respondents expressed a desire for wider sidewalks and the inclusion of urban furniture that encourages movement and strolls and 11% requested the presence of ramps for the sidewalks.

The various responses received confirm that the street in question is not adequately equipped for ease of movement, access, and comfort.

Finally, Ibn Al-Bitar Street was evaluated based on the pictures and plans and the three international standards that were identified as essential for accessibility. These criteria included the dimensions and elements that must be present in the street to ensure ease of movement and mobility for people with reduced mobility, The results are shown in Table 4.1.

Table 4.1. The Global Standards and Ibn Al-Bitar Street Measures Evaluation.

Main Factor	Factor Detail	Factor Dimension	Global Standards Dimensions			Ibn Al-Bitar Dimensions		
			WDU	ADA	ABNT	Fulfilled	Partially	Don't
Walkways	Width Of WALKWAYS	Straight line	1.5 m – 2 m min.	0.915 m min.	0.9 m – 1.8 m min.	1.2 m – 2.4 m		
		Turning Way	1.5 m	0.915 m – 1.065 m min	0.9 m – 1.05 m min	1.2 m – 2.4 m		
	Width of Urban Furniture Lane	The width	0.75 m – 1.2 m	–	0.7 m min	1 m -1.6 m		
	The Walkway Width Totally		2.25 m – 3.2 m min.	–	1.6 m – 2.5 m min	4 m – 5 m		
	Height of the pavement	The maximum height	15 cm	1.3 cm	-	15 cm -30 cm		
	The Slope of Walkways	The slop	2% <slop< 6%	slop < 5%	3% < slop < 5%	-		
Ramps	Width of Ramps	Straight line	≥ 0.9 m	≥ 0.915 m	≥ 0.9 m	-		
		Turning around	≥ 0.9 m – 1.4 m	≥ 1.22 m	≥ 0.9 m	-		
	The Slope of Ramps	Straight line	< 8 %	< 8.3 %	< 5% – 8.3 %	-		
		With Landing	-	-	< 8.3% – 12.5 %	-		
	Rise of ramp	The rise	< 0.5 m	< 0.3 m	< 0.8 m	-		
	Landing of Ramp	The landing Length	≥ 2.5 m	≥ 1.525 m	≥ 1.2 m	-		
		The handrail height	0.76 m – 0.865 m	0.865 m – 0.965 m	0.7 m – 0.92 m	-		
	The Slope Of Crosswalk Ramp	The slop	< 2%	< 2%	< 3%	-		
Stairs	Stair's Size	Dimensions e: rise p: height	(2 x e) + (1 x p) = 63 cm (e): e ≤ 15 cm	10 cm ≤ e ≤ 18 cm 28 cm ≤ p	63 cm ≤ p + 2e ≤ 65 cm (p): 28 cm ≤ p ≤ 32 cm (e): 16 cm ≤ e ≤ 18 cm	e: 28-32 p: 15-30		

the previous comparison between Ibn Al-Bitar street and the Global standards reveals a significant lack of compliance and a pressing need for improvement.

The street is currently not designed to accommodate the needs of all users, particularly those with limited mobility.

The absence of accessible elements such as ramps and the inadequate dimensions of sidewalks, crosswalks, and traffic signs make it difficult for individuals with disabilities or limited mobility to navigate the area safely and comfortably.

It is evident that a comprehensive redesign of the street is necessary to ensure accessibility and inclusivity for all users.