



## **Walkability: Suburban Plaza Revitalization**

A case study of Improving Walkability along Duke Street

Hoda Taheri 2023

# **Walkability: Suburban Plaza Revitalization**

A case study of Improving Walkability along Duke Street

Hoda Taheri 2023

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in  
partial fulfillment of the requirements for the degree of

Master of Science in Architecture  
Urban Design Concentration

Paul Kelsch  
Susan Piedmont-Palladino  
Paul Emmons

May 9, 2023  
Alexandria, VA

Keywords: Walkability, Connectivity, pedestrian-friendly, Alexandria, Suburban Areas

© 2023 by Hoda Taheri  
Thesis

# **Walkability: Suburban Plaza Revitalization**

A case study of Improving Walkability along Duke Street

Hoda Taheri 2023

## **ABSTRACT**

In recent years, there has been a growing recognition regarding the importance of walkability in urban design. Walking, as the most common form of physical activity, has gained recognition for its numerous benefits. While walkability has been extensively studied by urban designers, there is a gap in understanding how to promote and enhance walkability in suburban areas.

The United States has historically prioritized car-centric transportation systems, resulting in less developed infrastructure for walking and cycling. Although efforts have been made in recent years to improve conditions for pedestrians and cyclists, there is still much progress needed to elevate the country's standing. The City of Alexandria, Virginia, boasts a diverse population and is known for its unique neighborhood called Old Town. Old Town is widely recognized for its high level of walkability, characterized by streets that are designed to prioritize pedestrians, creating a welcoming environment that encourages social interaction and a strong sense of community. However, in the suburban areas surrounding Old Town, there is a notable lack of walkability.

This study look at challenges and opportunities in promoting walkability in a suburban area of Alexandria. By examining the specific context of Alexandria, This thesis aims to create a more walkable environment in an area that currently focuses on cars. The goal is to create more livable and pedestrian-friendly suburban environments that encourage walking and bicycling, and support the well-being of residents.

# **Walkability: Suburban Plaza Revitalization**

A case study of Improving Walkability along Duke Street

Hoda Taheri 2023

## **GENERAL AUDIENCE ABSTRACT**

In recent times, there has been a growing acknowledgment of the value in designing cities that prioritize walkability and placing pedestrians' needs. Walking, which is the most popular way to stay active, has been recognized for its numerous benefits for our health and well-being. However, when it comes to making suburban areas more walkable, there is still a lot we don't fully understand.

In the past, many urban designs in the United States have focused on cars, making it challenging for people to walk or cycle comfortably. While efforts have been made to improve conditions for pedestrians and cyclists, European countries are still ahead in terms of walking and cycling rates. The City of Alexandria, located in Virginia, is characterized by its diverse population and renowned for its distinctive neighborhood known as Old Town. Old Town is celebrated for its walkability, with streets that prioritize people over vehicles. IN contrast, the surrounding suburban areas don't enjoy the same level of walkability.

This study aims to explore the obstacles and opportunities in making suburban areas more walkable, focusing on Alexandria's context. By implementing design solutions, aim to transform suburban areas into vibrant, pedestrian-friendly communities that promote walking and biking, contributing to the overall well-being of residents.

*To my mother  
Thank you for supporting me unconditionally through  
every stage of my life*

*To Negin and Hadi  
Thank you for your endless support. I would never be  
here without you.*

# ACKNOWLEDGMENT

## **Paul Kelsch**

*I began this program with you as my first professor, and now I am completing it. You introduced me to urban design and motivated me in this way. Thank you for your support and patience throughout my journey in WAAC.*

## **Susan Piedmont-Palladino**

*You provided me with invaluable knowledge to complete my research. Thank you for the numerous opportunities you have given me in WAAC.*

## **Paul Emmons**

*I am grateful for your invaluable support and guidance during the completion of my thesis. Every conversation we had provided me with new insights and encouraged me in my academic pursuits.*

# TABLE OF CONTENTS

## **Chapter 01: Introduction**

Background	02
Problem Statement	03

## **Chapter 02: Research and Case Study**

Urban Design Parameters	04
Street mall vs strip mall	05
Jan Gehl thoery	06
Iranian Traditional Cities- Case Study	07

## **Chapter 03: Site Selection and Analysis**

Site Selection	10
Site Analysis	15

## **Chapter 04: Design Development**

Design Principles	21
Design Proposals	23

## **Chapter 05: Results and Conclusions**

Conclusions	40
Bibliography	41
Image Citations	42

## LIST OF FIGURE

• FIGURE 1	Cycling and walking share of daily trips in Europe, North America, and Australia, 1999–2009.	02	• FIGURE 24	Bicycle Network Analyze.	18
• FIGURE 2	Cars still dominate the American Commute.	03	• FIGURE 25	Pedestrian Network Analyze.	19
• FIGURE 3	Street connectivity.	05	• FIGURE 26	Existing Condition images.	21
• FIGURE 4	Street mall vs strip mall.	06	• FIGURE 27	Proposed urban design solutions.	21
• FIGURE 5	Behavior of city dwellers in the city space.	06	• FIGURE 28	Current Site Situation.	22
• FIGURE 6	Examples of human-scaled design in shaded narrow alleyways in old cities of Iran.	07	• FIGURE 29	Proposed design.	22
• FIGURE 7	Grand Bazaar Tehran and the Grand Bazaar of Tabriz Vibrant public spaces in traditional Iranian cities.	07	• FIGURE 30	Existing Condition.	23
• FIGURE 8	Plan of Naqsh-e Jahan square in Isfahan.	08	• FIGURE 31	Proposed design.	23
• FIGURE 9	Naqsh-e Jahan square in city of Isfahan.	08	• FIGURE 32	Howard Street Existing Condition.	24-25
• FIGURE 10	Bazaar Isfahan, Bazaar connects different urban design elements.	08	• FIGURE 33	Howard Street Proposed design.	24- 25- 26
• FIGURE 11	Timche Malek in Isfahan.	09	• FIGURE 34	Howard Street Proposed design Sections.	27
• FIGURE 12	Walking area map.	10	• FIGURE 35	Roundabout Design Existing Condition.	28
• FIGURE 13	Duke Street images indicate that it is a car-dominated place.	11	• FIGURE 36	Roundabout Design Proposed design.	28-29
• FIGURE 14	Old Town images indicate a Walkable area.	11	• FIGURE 37	New Street Proposed Design.	30- 37
• FIGURE 15	Walkability score map.	12	• FIGURE 38	New Street Proposed Design Sections.	30
• FIGURE 16	Duke in Motion	12	• FIGURE 39	Parking lot Existing Condition.	31
• FIGURE 17	Alexandria, Virginia Population 2023	13	• FIGURE 40	Plaza Proposed Design.	32- 33- 34- 35- 36
• FIGURE 18	Site location.	13	• FIGURE 41	Plaza Proposed Design Section.	34
• FIGURE 19	Land use map.	14	• FIGURE 42	Material Selection.	35- 36
• FIGURE 20	Population Diversity map.	14	• FIGURE 43	Phase 1 and Phase 2 of project.	38
• FIGURE 21	Walkability collage.	15	• FIGURE 44	Improving Continuity.	39
• FIGURE 22	Potential of the site.	15			
• FIGURE 23	Walkability challenges	16-17			

*The rhythm of walking generates a kind of rhythm of thinking, and the passage through a landscape echoes or stimulates the passage through a series of thoughts[1].*

-Rebecca Solnit

## **CHAPTER: ONE**

---

## **INTRODUCTION**



## Background

Walkability is defined as “the extent to which the built environment supports and encourages walking through providing safety, and high level of accessibility and connectivity to destinations, and visual interest within a reasonable span of time” [2]. Walking is the oldest form of human movement and Walking is the most common form of physical activities (U.S. Department of Health and Human Services, 1996).that significantly reduces the number of obesity rates in today’s highly consumable societies [3].

Walkability refers to the ease and comfort of walking as a mode of transportation and a way of life. It is a measure of how friendly and safe an area is for pedestrians, and how easy it is to get around. It is associated with numerous benefits, including improved health and fitness, social interaction, economic activity, and reduced environmental impact. In addition to the physical infrastructure and development pattern of a community, walkability also takes into account other factors that influence how conducive a place is to walking. These include street design, traffic calming measures, access to public transportation, proximity to key destinations such as schools, shops, parks, and employment centers, and the overall safety and perceived security of the area.

A walkable community is typically characterized by a high degree of accessibility and mobility, which means that people can easily and comfortably walk to where they need to go. This often requires a shift away from car-oriented planning and design, which tends to prioritize speed, efficiency, and convenience for motorists over the needs and desires of pedestrians. A walkable community, on the other hand, is designed with the pedestrian in mind, with a focus on creating a safe and enjoyable environment for walking.

In suburban areas, walkability can be more challenging to achieve than in urban areas due to the spread-out nature of suburban development, the lack of a traditional street grid, and the prevalence of car-oriented infrastructure such as highways and arterial roads. Despite these challenges, promoting walkability in suburban areas is important for a range of reasons, including reducing traffic congestion, promoting physical activity, and enhancing social connections within communities.

[1] Solnit, R. (2001). *Wanderlust: A History of Walking* (p. 11). Penguin.

[2] Forsyth, A. What is a walkable place? *The walkability debate in urban design*. *Urban Des. Int.* 2015, 20, 274–292.

[3] Saelens, B.E.; Sallis, J.F.; Frank, L.D. Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Ann. Behav. Med.* 2003, 25, 80–91.

I used to live in Tehran, a dense city with a population of about 10 million. When I moved to the US, I noticed that people’s approach to walkability is different in many cities. Looking at the available data on walkability in the US has proven to me that I am on the right track of study. The share of daily trips by walking and cycling varies greatly from country to country (Figure 1). At the low end, approximately one-tenth of daily trips are by foot or bike in car-oriented countries such as Australia, Canada, and the United States. At the high end, more than half of all daily trips in the Netherlands are by walking or cycling. Most European countries have levels in between, with active travel accounting for 25 percent to 35 percent of daily trips [4].

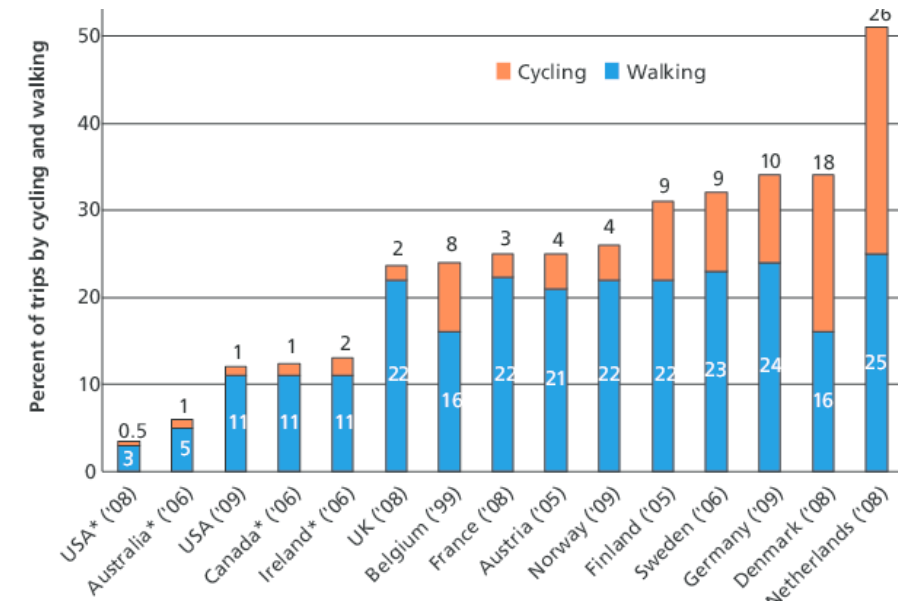


FIGURE 1- Cycling and walking share of daily trips in Europe, North America, and Australia, 1999–2009.

[4] Buehler, R., & Pucher, J. (2012). Walking and Cycling in Western Europe and the United States: Trends, Policies, and Lessons. *Transportation Quarterly*, 66(3), 249-266.

Cars still dominate the American Commute (Figure 2). There are several factors contributing to the low adoption of bicycles as a means of everyday transportation: for one, Americans are used to commuting longer distances than people in most European nations, automatically ruling out the bike for many [5]. Additionally, a significant number of major cities in the United States do not prioritize or facilitate bicycling as a convenient and safe mode of transportation.

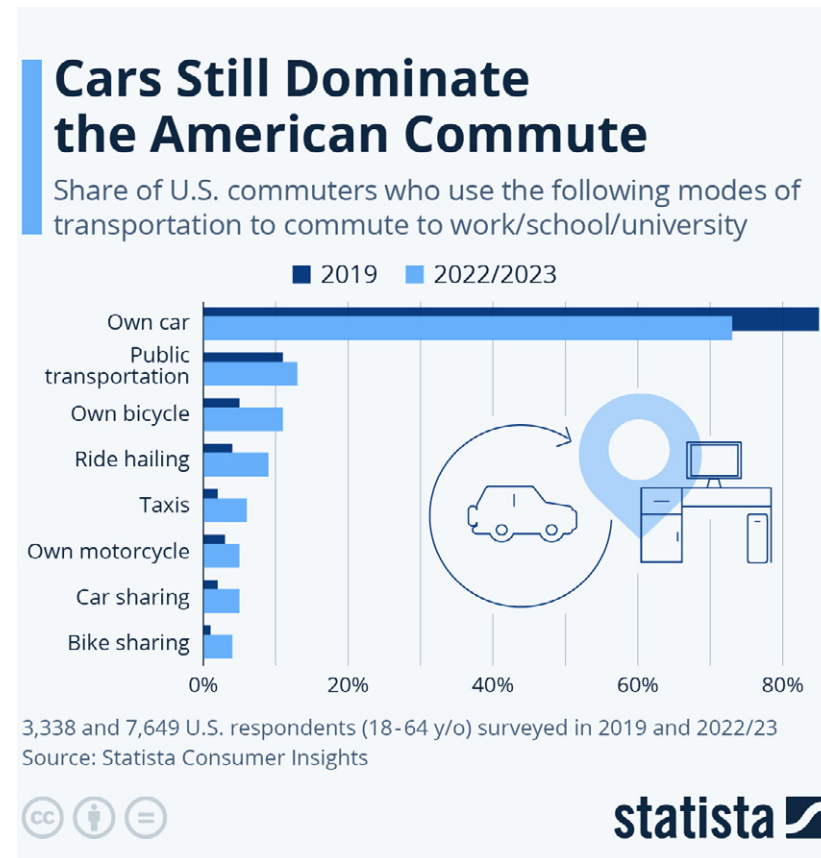


FIGURE 2

## Problem Statement

How can urban designers effectively promote walking in urban areas? The question becomes even more critical when considering suburban areas. Enhancing walkability in suburban areas poses a greater challenge due to their low-density development and limited connectivity between destinations. Cars visually and physically dominate in these places. These questions have motivated me to pursue this study.

Understanding the specific challenges and identifying urban design solutions to enhance walkability in suburban areas is crucial for creating more sustainable, healthy, and livable communities. This study aims to investigate how urban design solutions can effectively enhance walkability in suburban areas. By identifying the key characteristics of a walkable community and examining the specific challenges associated with promoting walkability in suburban contexts. This research seeks to provide insights and recommendations for improving walkability in these areas. Ultimately, the goal is to contribute to the development of more livable and pedestrian-friendly suburban environments that encourage active transportation and support the well-being of residents.

[5] Richter, F. (2023, May 19). Cars still dominate the American commute. [statista] <https://www.statista.com/chart/18208/means-of-transportation-used-by-us-commuters/>.

## CHAPTER TWO

---

# RESEARCH AND CASE STUDY

### Urban Design Parameters Affecting Walkability

There are urban design factors which are affecting walkability. Studies show that land use, density, and connectivity are the main parameters that are affecting walkability.

#### Land use

Land use is one of the key elements of urban design that can have a significant impact on the walkability of a community. Land use refers to the types of activities that occur in a particular area, such as residential, commercial, industrial, or institutional uses.

In a study of four neighborhoods in San Francisco, Handy et al. (2002) found that land use mix was significantly correlated with higher levels of walking, indicating that a diverse mix of land uses, including residential, commercial, and public spaces, can increase the walkability of an area [6].

One of the most important aspects of land use for walkability is the mix and diversity of land uses in a particular area. When land uses are mixed together in a complementary way, it can create a more walkable and pedestrian-friendly environment. For example, having a mix of residential and commercial uses within the same area can provide people with access to essential services and amenities within walking distance, reducing the need for automobile travel.

#### Density

Gehl noted that higher densities in urban areas lead to revitalization and liveliness of communities, and increase the tendency towards choosing walking over other means of transportation means (car, bus, train, etc.) [7, 8]. Higher-density areas are more conducive to walking because there are more people and destinations within a compact area.

[6] Handy, S., Cao, X., & Mokhtarian, P. (2002). Correlation or causality between the built environment and travel behavior? Evidence from Northern California. *Transportation Research Part D: Transport and Environment*, 7(4), 237-266.

[7] Gehl, J. (2011). *Life Between Buildings: Using Public Space*. Island Press: Washington, DC, USA.

[8] Gehl, J., & Gemz, L. (2004). *Public Spaces-Public Life*. Arkitektens forlag: Aarhus, Denmark.

Density is one of the key factors that affect walkability in urban design. The density of a community refers to the number of people, homes, or jobs within a given area, usually measured in units per acre or square mile. High-density areas are generally more walkable than low-density areas because they have a greater mix of land uses, are more compact, and have a higher concentration of destinations and activities within walking distance.

Higher density areas also tend to have more complete street networks, with interconnected streets, sidewalks, and bike lanes. This allows for safe and efficient movement of pedestrians, cyclists, and vehicles, providing people with a greater range of transportation options.

In contrast, low-density areas, such as suburban communities with single-family homes, are often less walkable due to their sparse land use patterns and disconnected street networks. These areas are designed around the automobile and often lack sidewalks, bike lanes, and public transportation options. This makes it difficult for people to walk or bike to destinations and creates a reliance on cars for transportation. However, it is important to note that density alone does not guarantee walkability. The design and layout of the built environment are also important factors. For example, high-density areas with large blocks, wide streets, and few crosswalks can be less walkable than areas with lower density but a more connected street network.

## Connectivity

Connectivity is a key factor of urban design that affects walkability by providing people with safe and efficient routes to move around a community. A well-connected street network with multiple pathways, sidewalks, and bike lanes creates a pedestrian-friendly environment that encourages walking and cycling and reduces dependence on cars.

Neighborhoods that exhibit enhanced street connectivity, characterized by a higher quantity of intersections and more direct street layouts, tend to experience increased levels of walking. One way to improve connectivity is by creating a grid-like street pattern, where streets are interconnected and allow for easy navigation between different parts of the community. A grid-like street pattern also provides multiple routes to reach destinations, which helps to reduce traffic congestion and improve overall transportation efficiency [Figure 3].

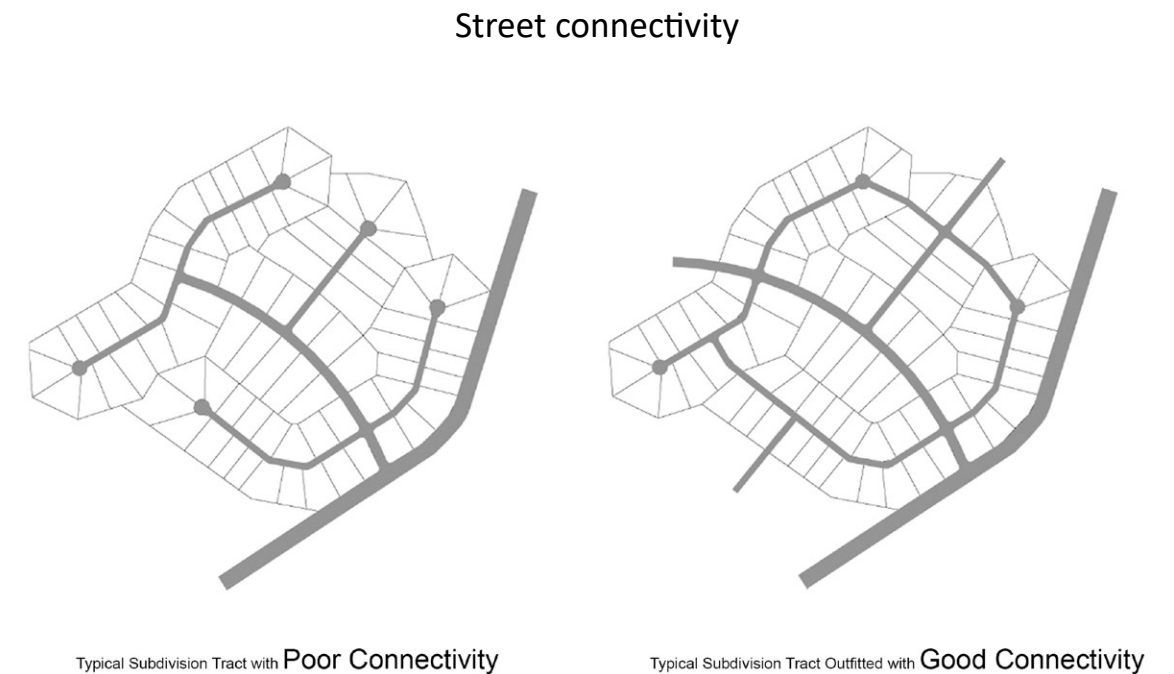


FIGURE 3

## Strip Malls in Suburban Areas

Strip malls are a common feature of suburban areas. Like any urban typology, the shopping center has a history of its own. The story begins with the traditional main street pattern in which retail activity is lined up along both sides of the street. The street is a place of intense interaction that accommodates vehicles of all types, as well as pedestrians. Retail activity is highly visible and accessible along the street. The ground floor is devoted to retail uses while the upper floors of typically two- to three-story buildings accommodate offices and apartments [9] (Figure 4).

[9] Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Annals of Behavioral Medicine*, 25(2), 80-91. doi: 10.1207/S15324796ABM2502\_03.

### Jan Gehl thoery

Jan Gehl is a Danish architect, urban designer, and urbanist who has dedicated his career to studying and advocating for people-centered urban planning and design. His extensive research and influential work have significantly shaped the understanding and practice of creating walkable cities.

As a concept, “life between buildings” includes all of the very different activates people engage in when they use common city space: purposeful walks from place to place, promenades, short stops, longer stays, window shopping, conversations and meetings, exercises, dancing, recreation, street trade, children’s play, begging and entertainment [7].

Graphic represents of the connection between outdoor quality and outdoor activities. An increase in outdoor quality gives a boost to optional activities in particular. The increase in activity level then invites a substantial increase in social activities [10].

Street mall vs strip mall

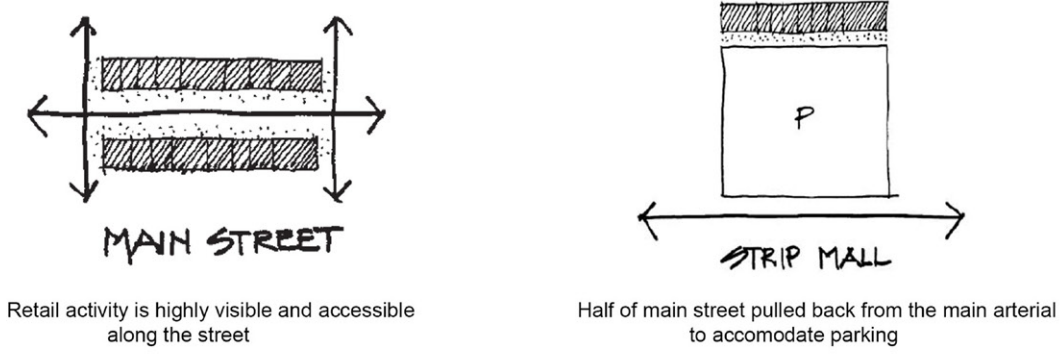


FIGURE 4: Street mall vs strip mall

Strip malls were designed to control the chaotic commercial development along main streets by concentrating and regulating it, and providing more parking space. The traditional main street could not handle the amount of parking required. Strip malls are essentially only half of a main street pulled back to create a large parking area in front of the stores. The focus of strip malls was on providing easy parking and high visibility of each shop, rather than creating a pleasant environment for pedestrians.

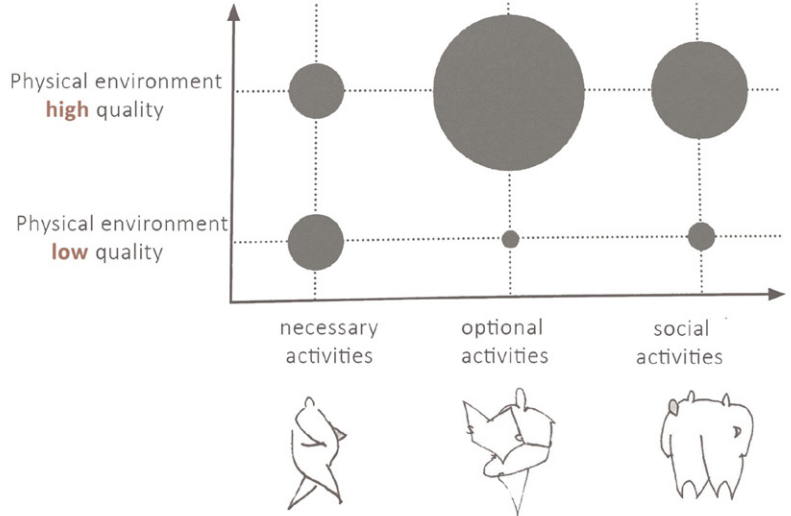


FIGURE 5: Behavior of city dwellers in the city space.

[7] Gehl, J. (2011). Life Between Buildings: Using Public Space. Island Press: Washington, DC, USA.

[10] Gehl, J. (2010). Cities for People (p. 21). Island Press.

## CASE STUDY: Iranian Traditional Cities

Iranian traditional cities were formed in response to climatic conditions. They show a deep-rooted understanding of sustainability; the importance of designing with nature rather than against it. These cities stand as remarkable examples of how human settlements can seamlessly blend with the natural environment, creating comfortable and livable spaces that are adapted to the specific climatic challenges of the region. In addition to their responsiveness to climatic conditions, the human-scaled nature of Iranian traditional cities fosters a strong sense of place and connectivity. Examples of such spaces are shaded alleyways in the old city of Iran (Figure 6).

Iranian traditional cities are known for their walkability. The layout of them embraces narrow and shaded alleyways, interconnected pathways, and vibrant public spaces, all contributing to a harmonious blend of functionality and aesthetic appeal. In traditional Iranian cities, urban life revolves around three main pillars: religion, represented by mosques; trade, embodied by bazaars; and family, centered on houses (Figure 7).

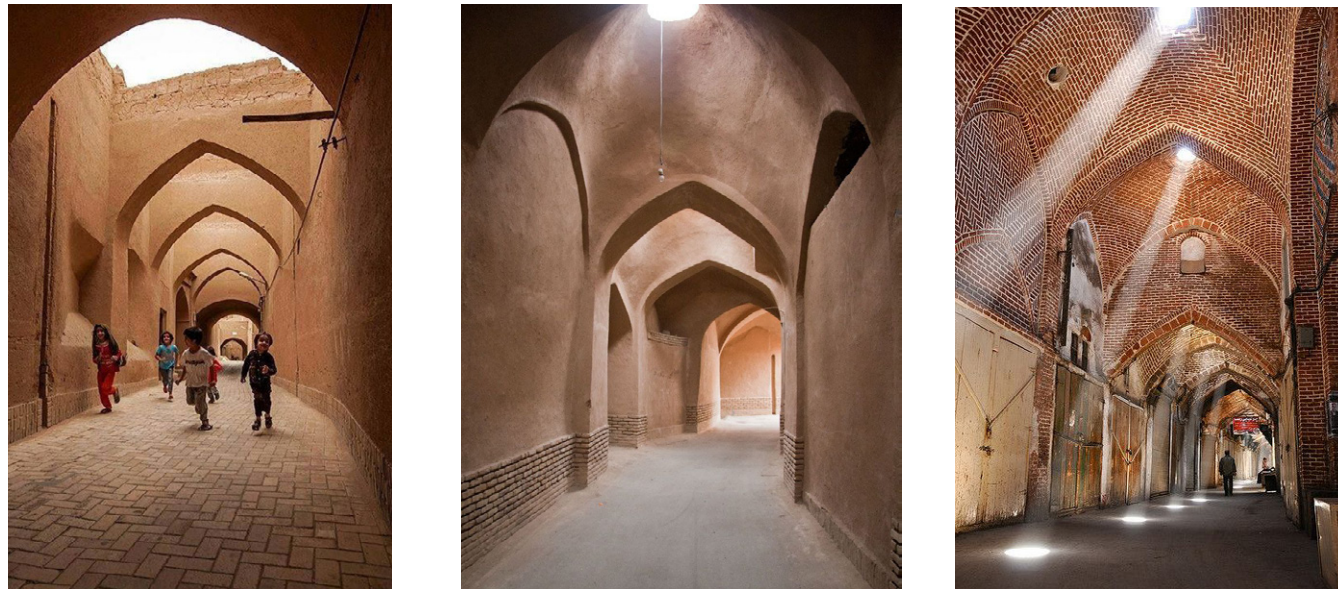


Figure 6- Examples of human-scaled design in shaded narrow alleyways in old cities of Iran



Figure 7- vibrant public spaces in traditional Iranian cities

## Bazaar

Bazaar is the heart of the city, and the nearby plaza transformed into a lively gathering spot for social and economic activities. The interconnected public spaces and narrow pathways established a city environment where walking became the preferred mode of transportation over other options. Traditional Iranian cities relied on bazaars as vital links that interconnected various urban design elements such as residential areas, public squares, schools, public baths, and mosques. Beyond their role in facilitating commercial transactions, bazaars served as vibrant social and cultural centers, bringing people together and fostering community interactions (Figure 8, 9).

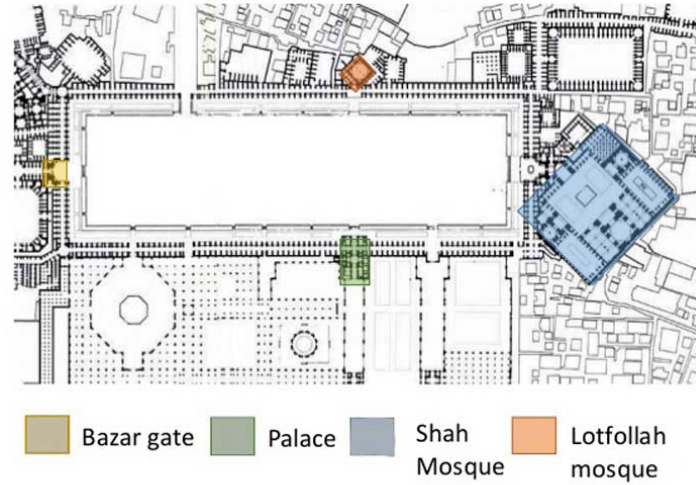
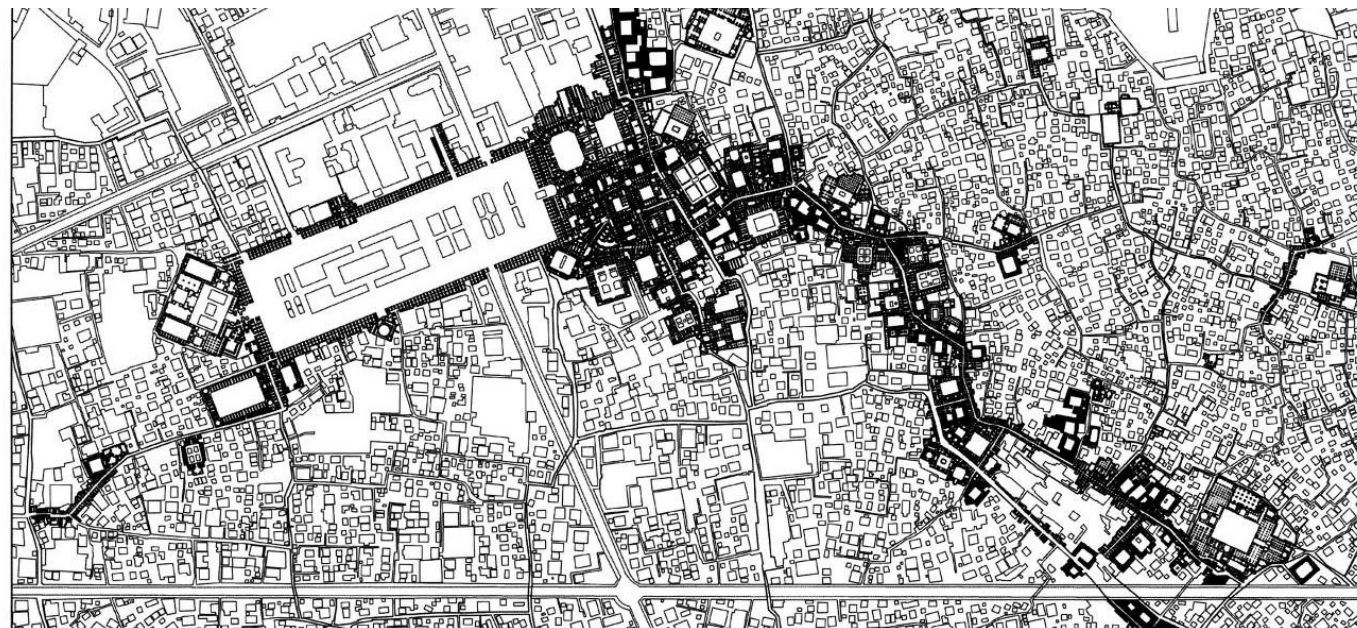


Figure 8: Plan of Naqsh-e Jahan square in Esfahan

Figure 9: Naqsh-e Jahan square in city of Esfahan



Bazaar in Iranian cities, including Isfahan, is characterized by its linear structure. This can be observed in the map of Isfahan, where the bazaar is represented as a long, straight path or street that runs through the city (Figure 10).

Figure 10: Bazaar Isfahan- Bazaar connects different urban design elements



## Timcheh (Arcade)

The intersection of two passageways in a bazaar creates an opportunity for a Timche to be built. A masterpiece of Persian architecture. Timcheh typically has a rectangular or square plan with an open central courtyard that is surrounded by small shops. Timche facilitates pedestrian movement and circulation within the bazaar. The interconnected nature of these arcades creates a network of pathways, guiding visitors through different sections of the market. This layout promotes a natural flow of foot traffic, making it easier for people to navigate the bazaar and discover various shops and stalls along the way (Figure11).

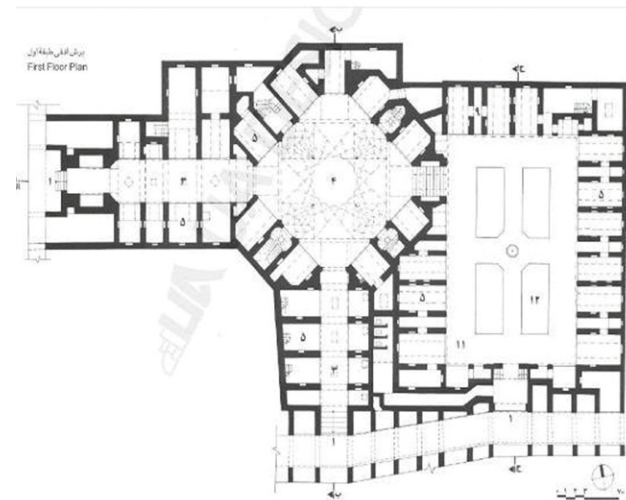


Figure 11- Timche Malek in Isfahan

## Case Study Findings

The bazaars in Iranian cities, such as Isfahan, exhibit a fascinating linear structure that has deeply influenced my approach to designing walkable suburban areas, with a particular emphasis on connectivity. When studying the map of Isfahan, it becomes apparent that the bazaar functions as a long, straight pathway that extends throughout the city, connecting various elements. This observation led me to explore the significance of connectivity in urban design, including the relationship between houses, shops, and other elements within the fabric of a city.

Timche is a remarkable architectural creation that fosters a sense of community and social interaction through its thoughtful design. With its strategic layout and inviting spaces, Timche provides a place for people to pause, gather, and connect while going about their day. Whether it's a covered passageway, an open courtyard, or a shaded alcove, every element of Timche is carefully designed to encourage pedestrians to stop, take a breath, and engage with their surroundings.

Timche facilitates pedestrian movement and circulation within the bazaar. The interconnected nature of these arcades creates a network of pathways, guiding visitors through different sections of the market. This layout promotes a natural flow of foot traffic. By study of bazaar and Timche, I understand the value of creating a well-connected network of pathways that guide visitors through different areas.

The inspiration from Timche has prompted me to consider the importance of creating designated spaces within my design where people can pause, relax, and engage in social interactions. These spaces would resemble the inviting atmosphere and sense of place found within Timche.

## CHAPTER THREE

---

### SITE SELECTION AND ANALYSIS

### Site Selection

When I visited old town of Alexandria for the first time, I noticed that it was easy and enjoyable to walk around. However, when I went to another place just three miles away on Duke Street, I realized that few people were walking there. This difference surprised me and made me wonder why two locations in the same city, could have such contrasting situations when it comes to walking.(Figure 12) compares the walking area maps of the Old Town and the western section of Duke Street. As depicted, the Old Town has a grid-like pattern of pedestrian pathways, While Duke Street boasts sidewalks that are characteristic of suburban areas, it is frequently accompanied by the presence of dead-end streets. (Figure 13,14).



Figure 12- Walking area map

West on Duke Street, Alexandria, VA



Figure 13: Car-dominated place

Old Town, Alexandria,



Figure 14: Walkable area

## Smart Location Calculator

The map below indicates the walkability scores of three points along Duke Street. The first point is located in Old town, while the other two points are situated to the west Duke Street. It was evident old town has a good walk score, but it was surprising to discover that the two points to the west also scored 72 and 82 in terms of walkability. This finding indicates that the area has the potential to become more walkable.

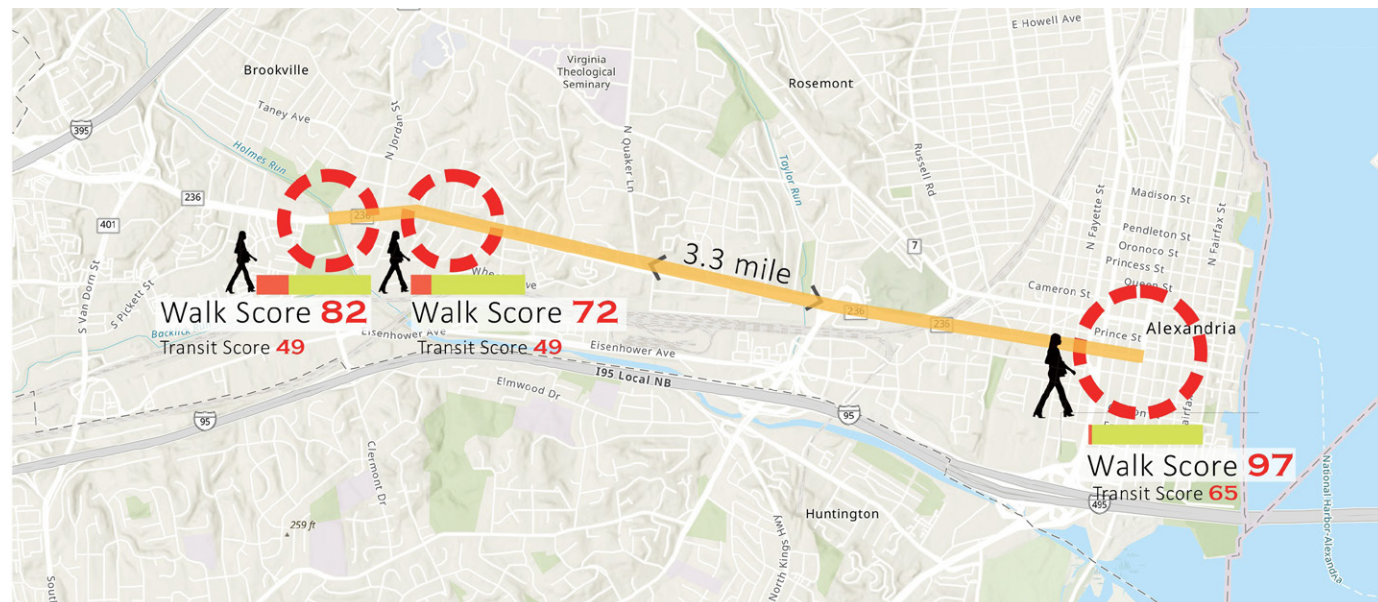


Figure 15

## Duke Street in Motion

Duke Street in Motion is a project will provide an efficient and desirable bus rapid transit (BRT) option along Duke Street by improving the transit experience for current and potential riders [11]. With multimodal enhancements to the corridor, Duke Street will become a safe, efficient, and desirable community connector for people riding the bus, walking, biking, and driving.

The Duke Street in Motion project presents an opportunity for this site, as it will greatly facilitate the smooth connection of pedestrians and cyclists in this area to public transportation. Enhance accessibility and encourage sustainable transportation choices. Sustainable transport systems operate most efficiently when integrated with other modes of transportation.

The walkability of the built environment is enhanced if the pedestrian network is connected to public transportation modes. This facilitates people to take public transport, reduces car dependency and increases the pedestrian flow. Moreover, if destinations within walking distance are well connected, then people will be encouraged to walk rather than drive. Jacobs and Pafka used the phrase “pools of use” to refer to the zone accessible by walking at a particular urban location measured by distance or time [12].

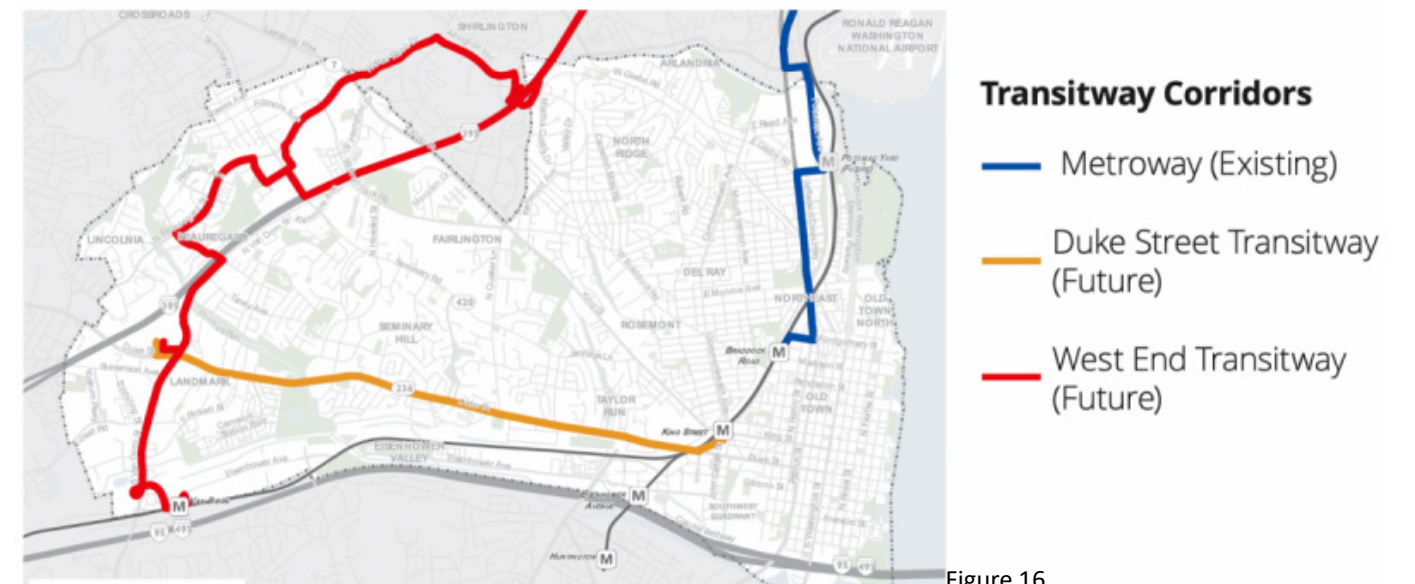


Figure 16

[11] (Duke)Alexandria City Government. (n.d.). Duke in Motion. Retrieved May 15, 2023,

[12] Row, A.T.; Jacobs, J. The Death and Life of Great American Cities. Yale Law J. 1962, 71, 1597.

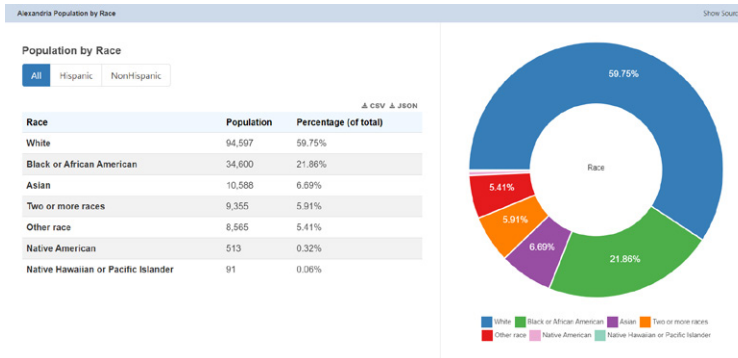
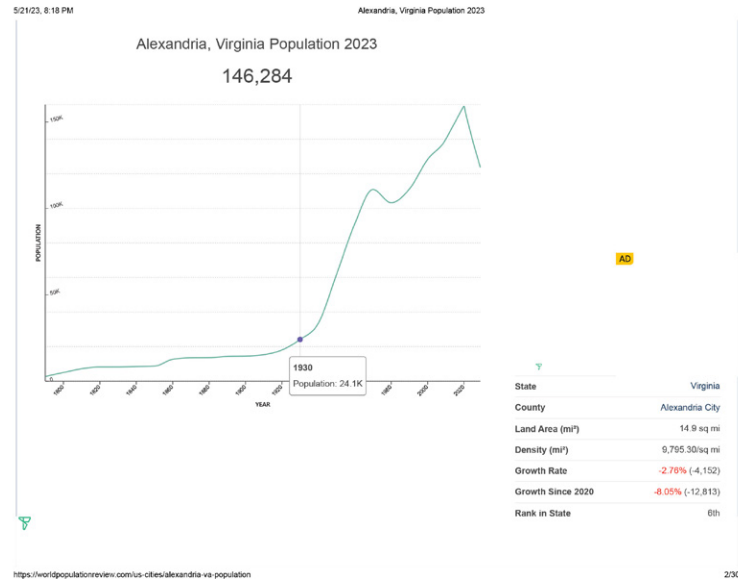


Figure 17- Alexandria, Virginia Population 2023



Figure 18- site location. Map created based on data from Open Street Map in QGIS

## Zoning map

The Zoning map of this area in Alexandria reveals that it is a mixed land-use area. It has residential high and commercial zoning. Mixed land use is a key factor in promoting walkability. Residential high density zoning implies the presence of apartment buildings or multi-story residences, accommodating a larger number of residents in a smaller area. This concentration of people contributes to the viability of local businesses and the availability of goods and services within a convenient walking distance. Commercial zoning designates areas for business activities, such as shops, restaurants, offices, and entertainment venues. Having commercial establishments interspersed with residential areas creates opportunities for residents to meet their daily needs without relying heavily on motorized transportation. This proximity of commercial and residential areas encourages pedestrian movement, as people can easily walk to nearby businesses for their shopping, dining, and entertainment needs.

### Zoning Map-2020

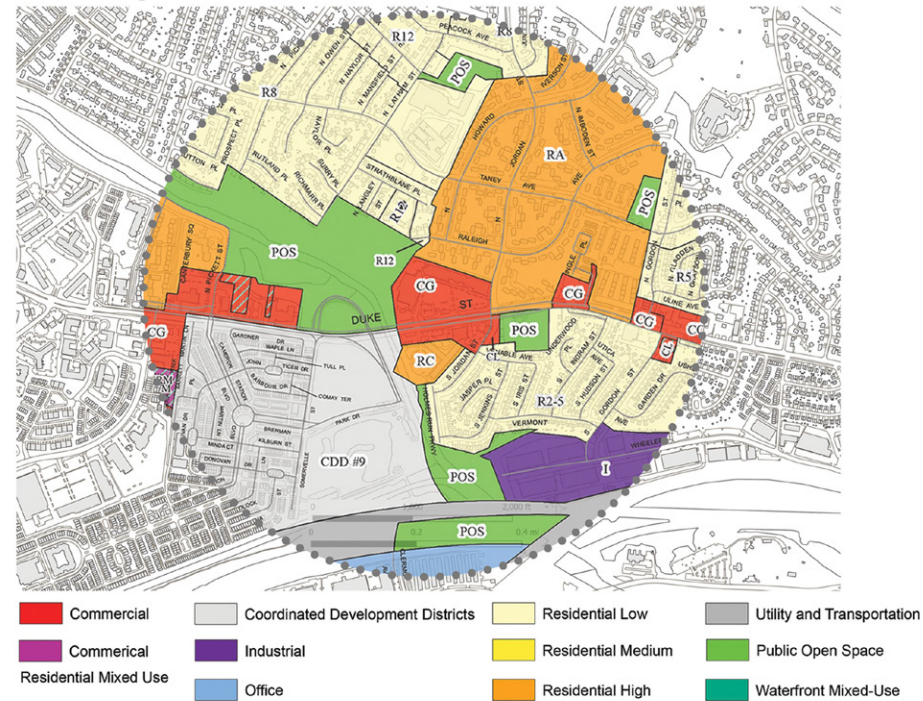


Figure 19

## Diversity map

With a diversity score of 99 out of 100, Alexandria City is much more diverse than other US counties [6]. This area is a more diverse area in the city of Alexandria. Diverse areas often have residents from various socioeconomic backgrounds, including individuals with different income levels and mobility capabilities. By promoting walkability, we ensure that all residents, regardless of their socioeconomic status or physical abilities, have equal access to transportation options and amenities. Walking is a universally accessible mode of transportation that can provide equitable mobility options for diverse populations. The map below shows the majority race by area in Alexandria, as self-identified on the US census. Darker shades indicate a larger racial majority in that neighborhood.

### Diversity Map

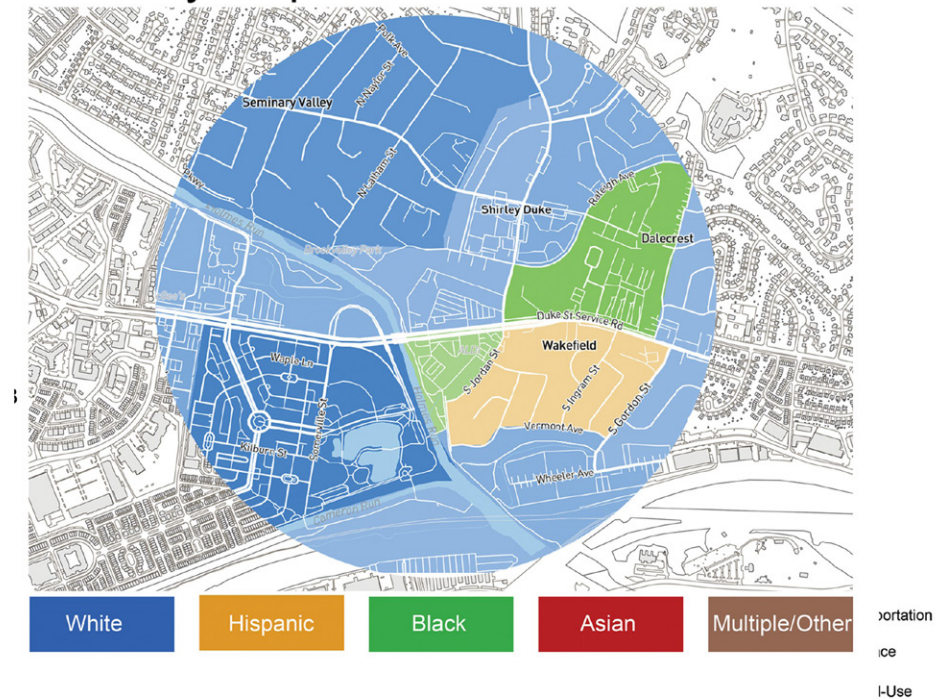


Figure 20

## Site Selection Result

Based on its unique characteristics and potential for creating a highly walkable area this site has been chosen for my project. Located just three miles away from the historic Old Town, it presents an opportunity to develop a different walkability experience. The site's mixed land use and diverse area make it an exciting prospect for creating a vibrant community. Additionally, the planned bus rapid transit along Duke Street greatly enhances the site's potential. This infrastructure improvement will provide efficient and reliable public transportation, further enhancing accessibility and connectivity for residents and visitors. In addition the site also benefits from its proximity to a nearby nature area.



Figure 21

## Site Analysis



Figure 22

# Challenges

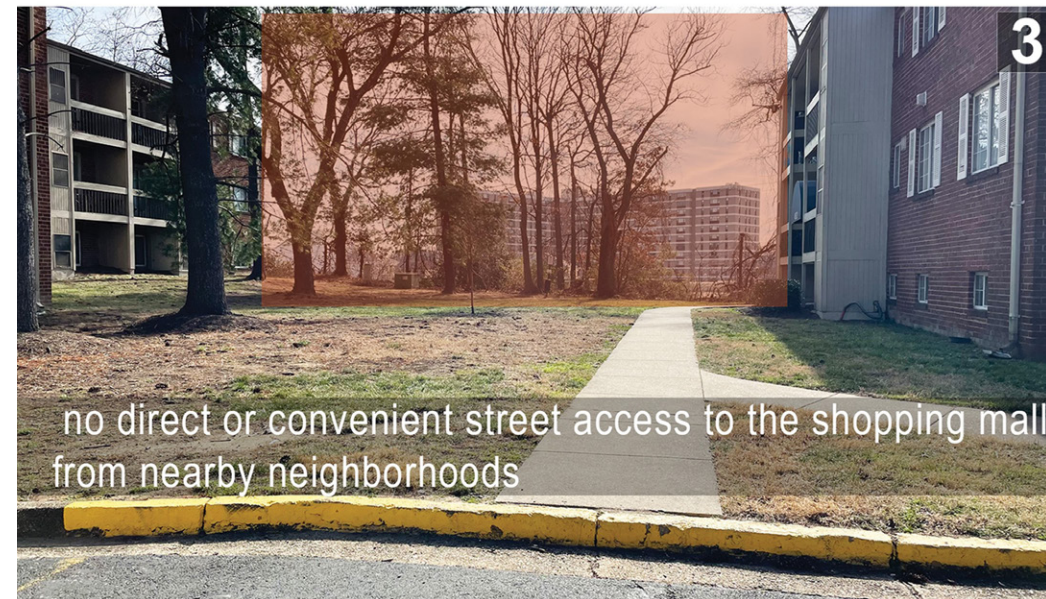
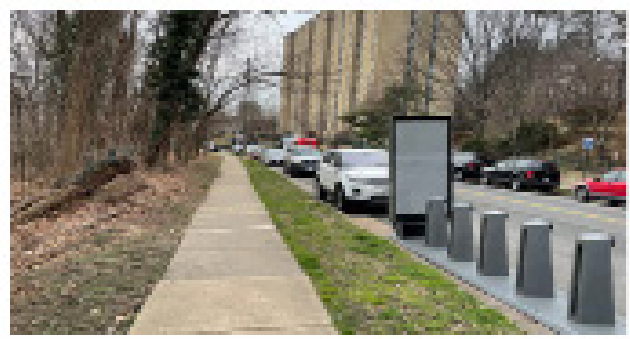
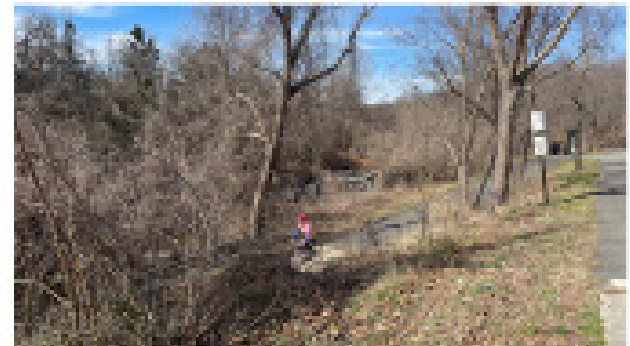
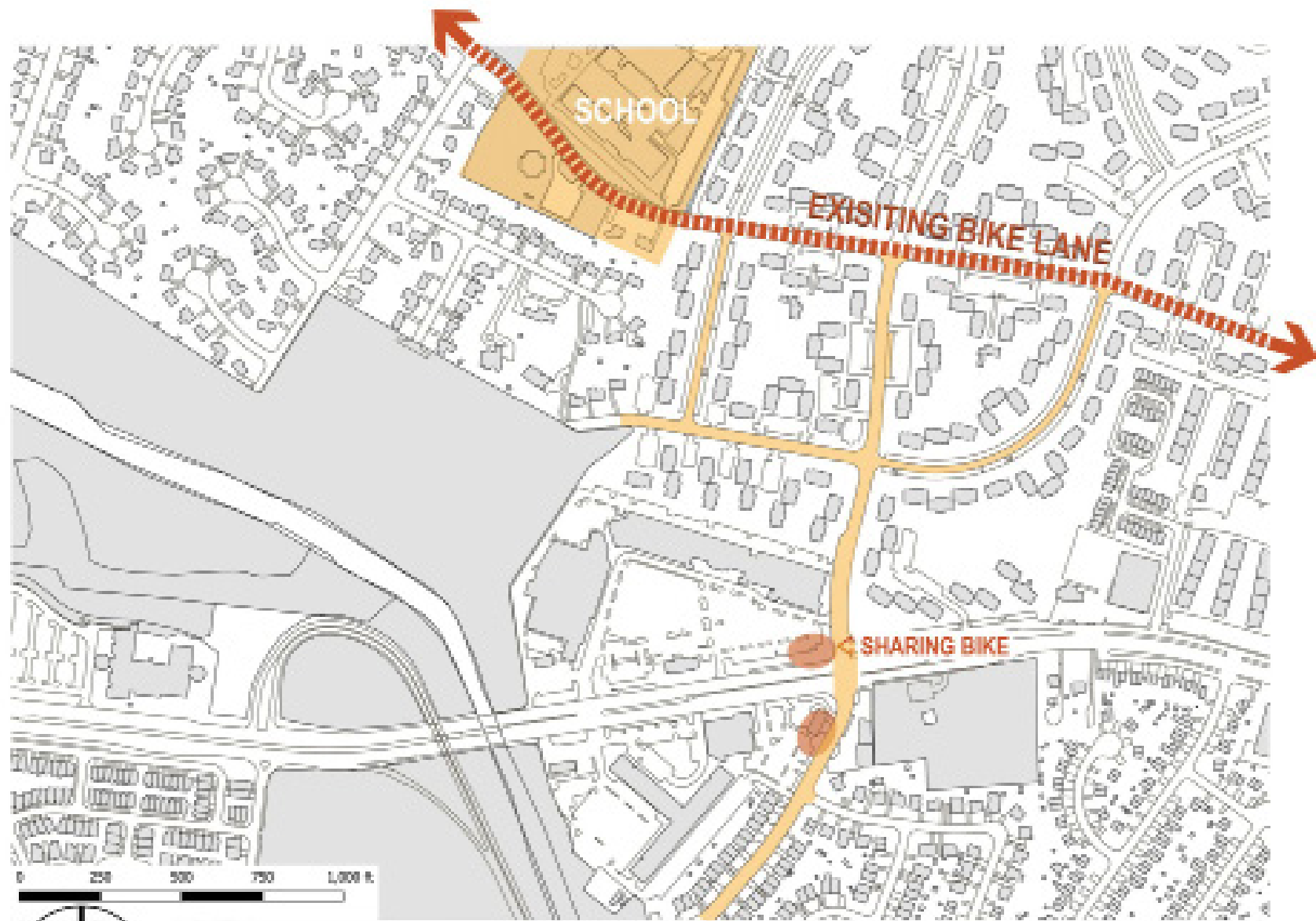


Figure 23- Walkability challenges

# Challenges



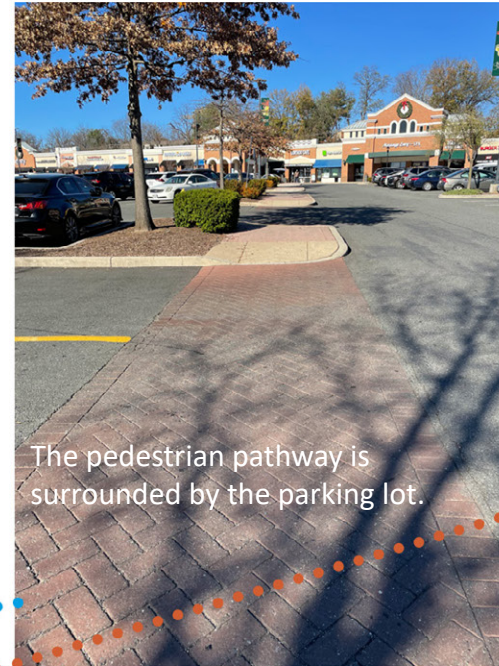
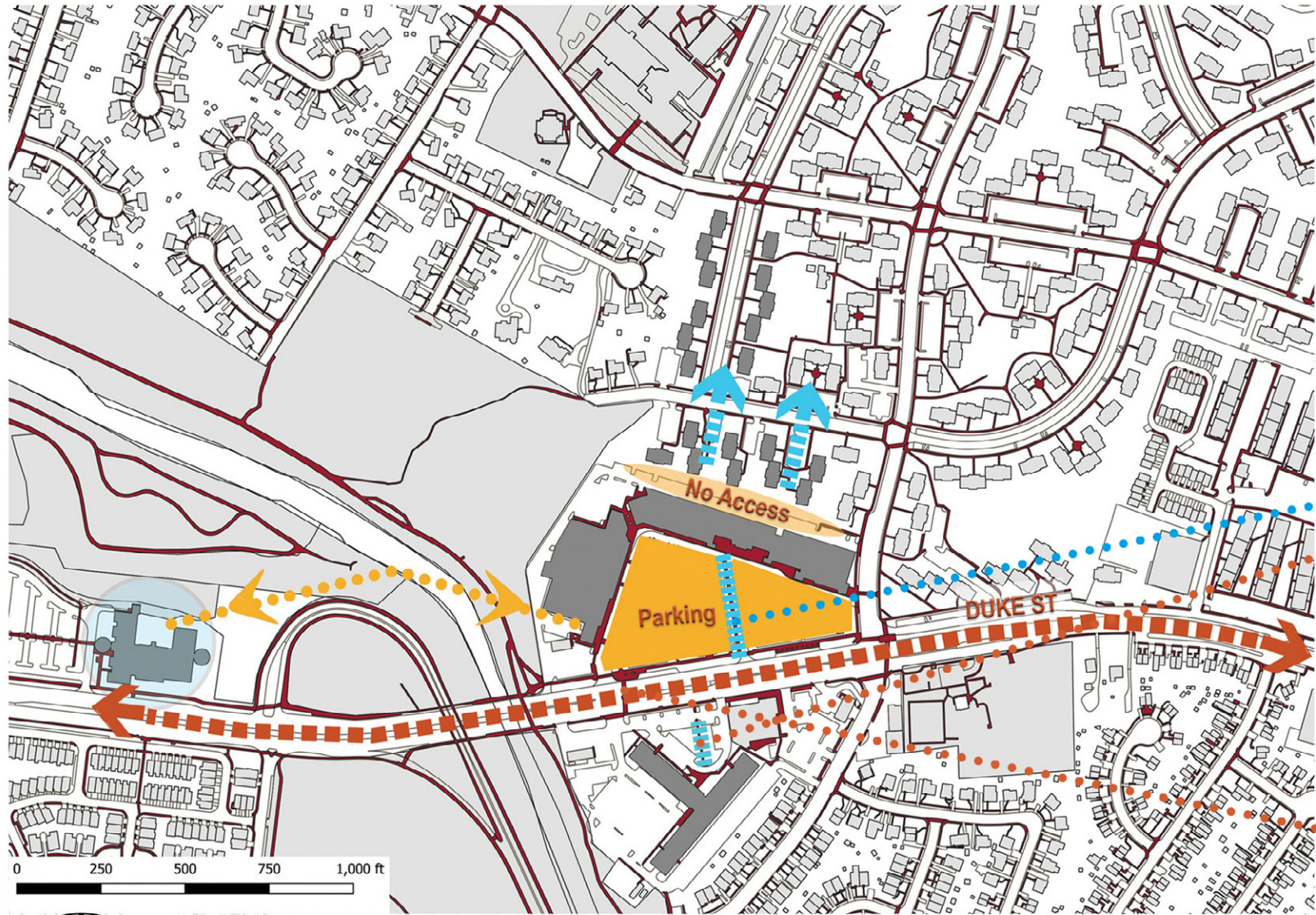
Figure 23- Walkability challenges



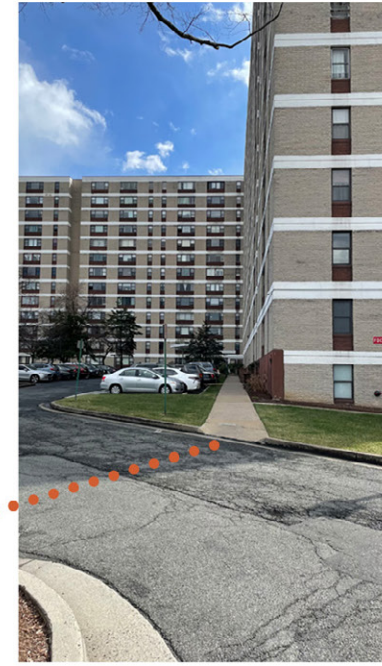
There is no bike lane connected to shared bikes.

**BICYCLE NETWORK ANALYZE**

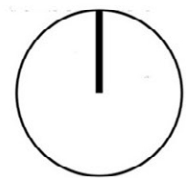
Figure 24- Bicycle Network Analyze



The pedestrian pathway is surrounded by the parking lot.



Duke Street



## PEDESTRIAN NETWORK ANALYSIS

Figure 25- Pedestrain Network Analyze

**CHAPTER FOUR**

---

**DESIGN DEVELOPMENT**

# Design Principles



Existing Condition

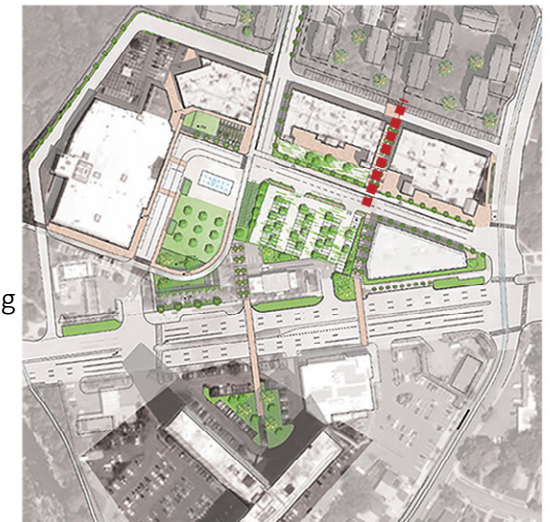
Figure 26



Figure 27

## Proposed urban design solutions

The existing layout of the strip mall presents a barrier to the northern residential neighborhood. To improve connectivity in the area, a creative decision was made to open up the existing strip mall and providing access from two different points to the northern neighborhood. This change not only facilitates movement between the two areas but also transforms the previously dead-end streets in the northern neighborhood into two connecting streets, where pedestrians are prioritized.



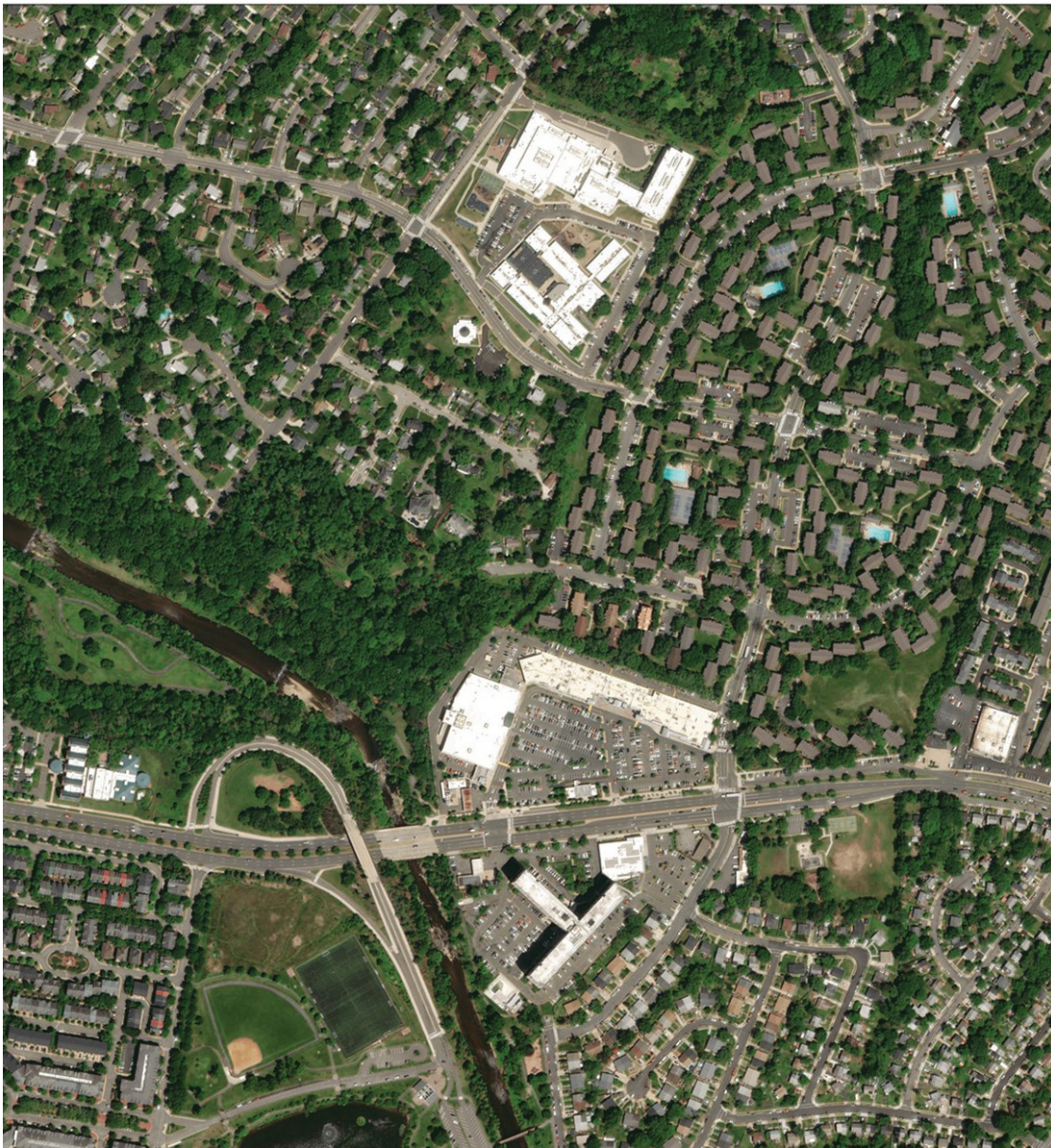


Figure 28

Existing Condition

The main concept incorporates a network of interconnected bicycle and pedestrian pathways that link the library, shopping mall, school, and residential building.



Figure 29

Primary Concept

Bicycle & Pedestrian Network   
New Pedestrian Way 

# Design Proposals

## Existing Condition



Figure 30

## Proposed Design



Figure 31

# Howard Street



Figure 32

Existing Condition



Figure 33

Proposed Design

# Howard Street



Figure 32

Existing Condition



Figure 33

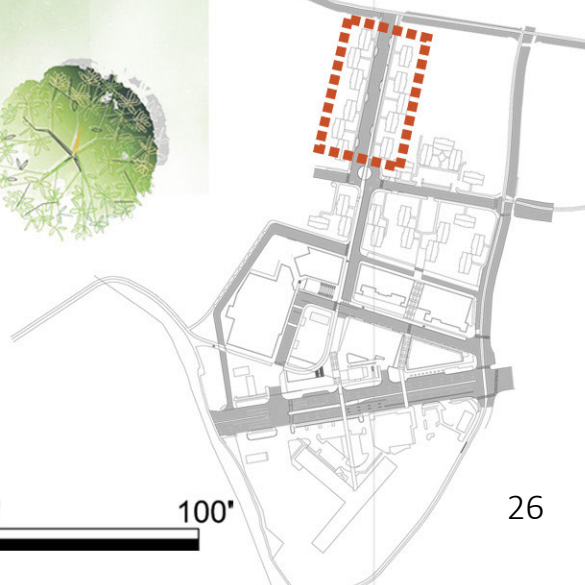
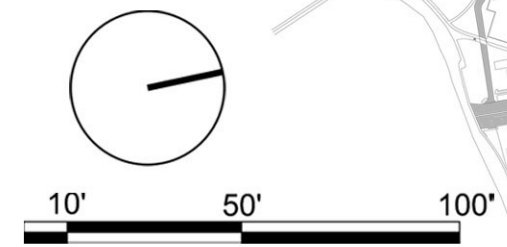
Proposed Design

The existing situation in the area indicates a prioritization of cars. A separated bike lane has been designed to ensure a safe space for cyclists, while designated seating areas have been strategically placed along existing pathways. These seating areas not only provides a place for pedestrians to rest but also serve as social spaces for people who living in the neighborhood to interact and socialize. The previous perpendicular parking arrangement has been replaced with a diagonal parking area. This change allows for more efficient use of space and improves the overall flow of traffic in the area.

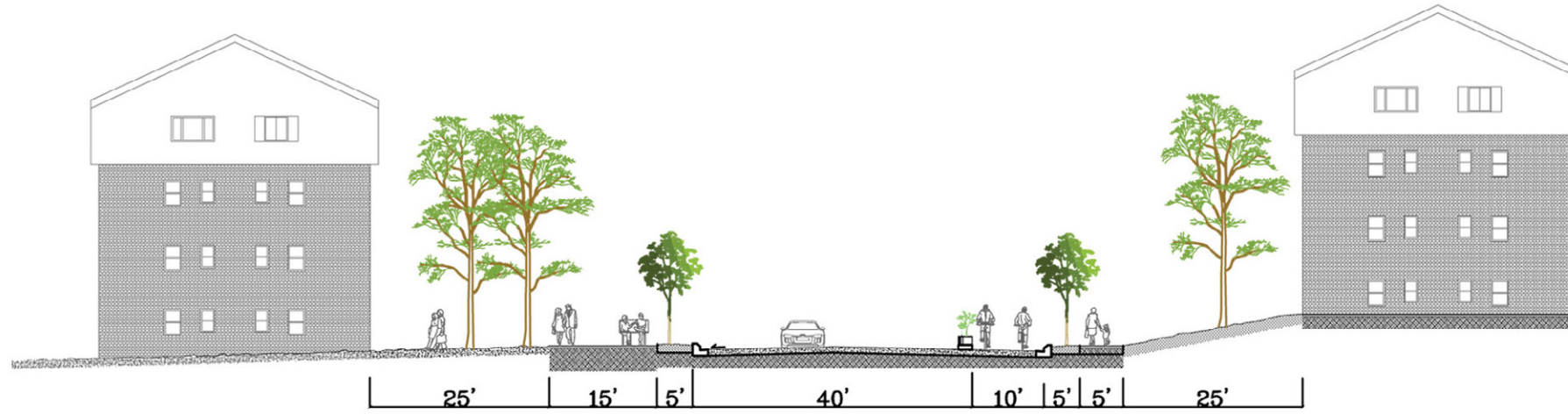
# Howard Street



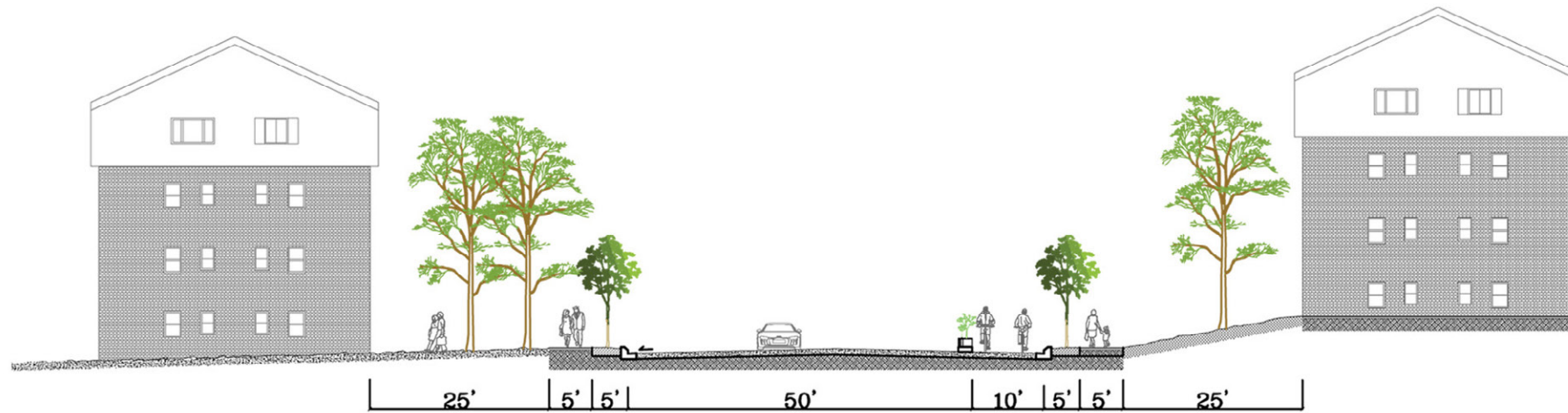
Figure 33



# Howard Street

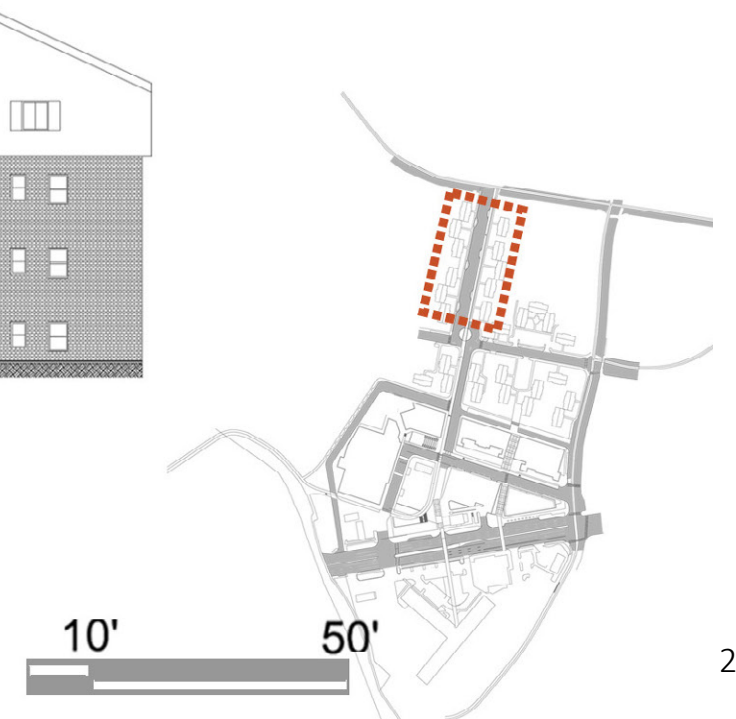


Section A



Section B

Figure 34



# Roundabout Design



Figure 35 Existing Condition



Proposed Design Figure 36

# Roundabout Design

In order to enhance connectivity in the area, a roundabout was designed to connect two non-aligned streets. It helps to manage traffic flow in this area. Additionally, the roundabout will provide a smooth transition for cyclists from the separate bike lane.



Figure 36

# New Street Design



Figure 37

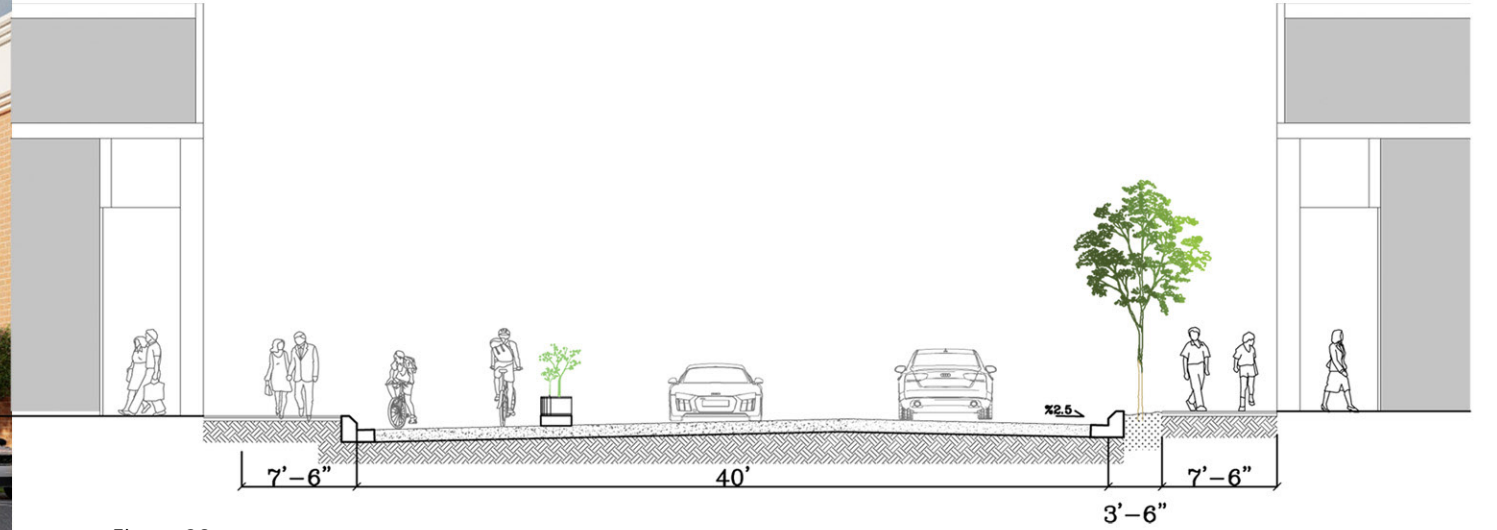
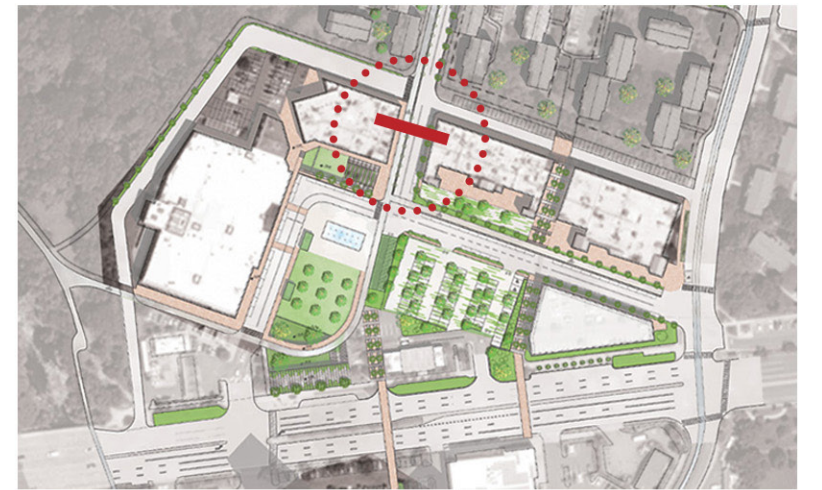


Figure 38

New street has been designed to accommodate pedestrians, bicycles, and a narrow lane for vehicles.



# Plaza Design



Figure 39

Existing Condition

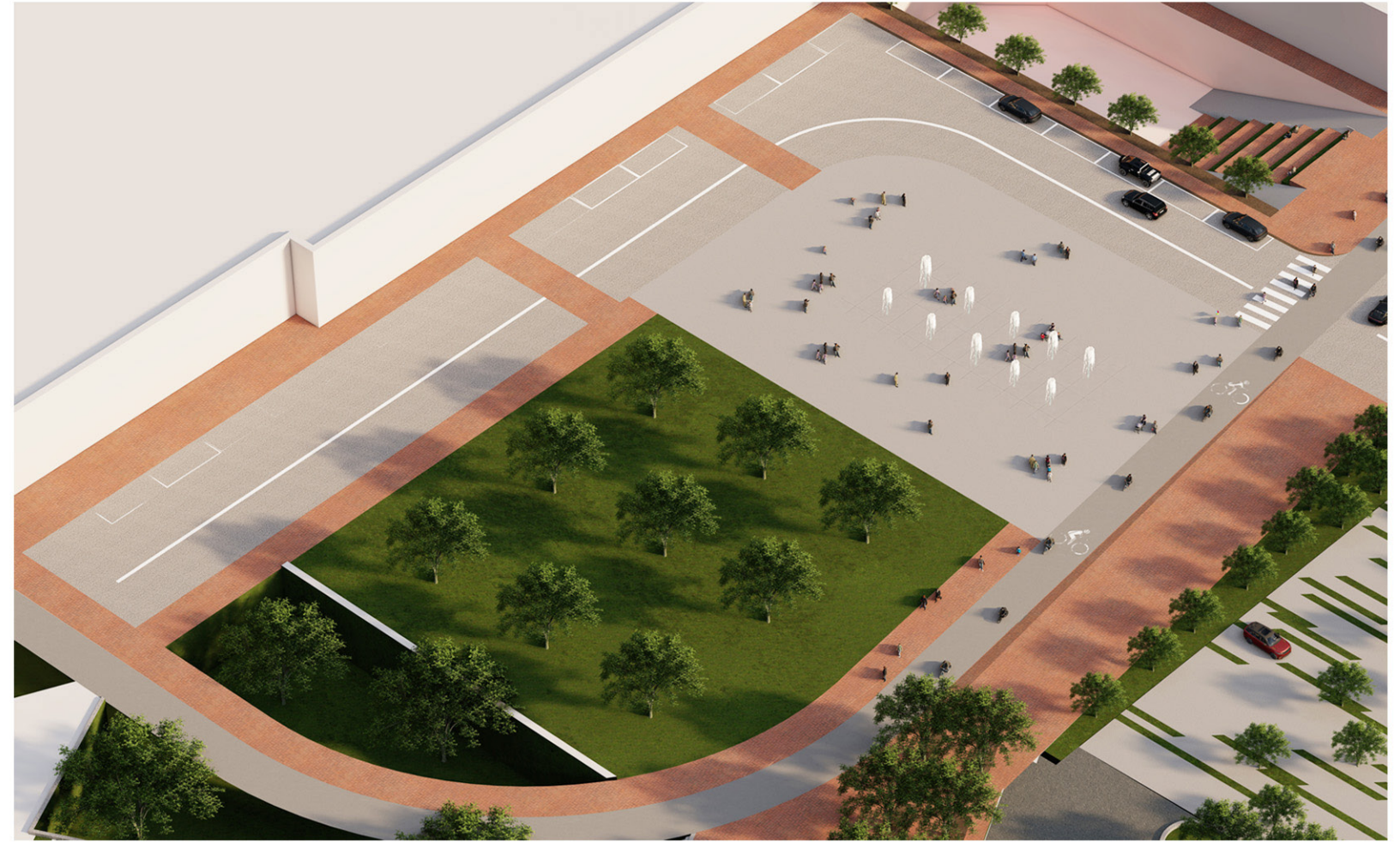


Figure 40

Proposed Design

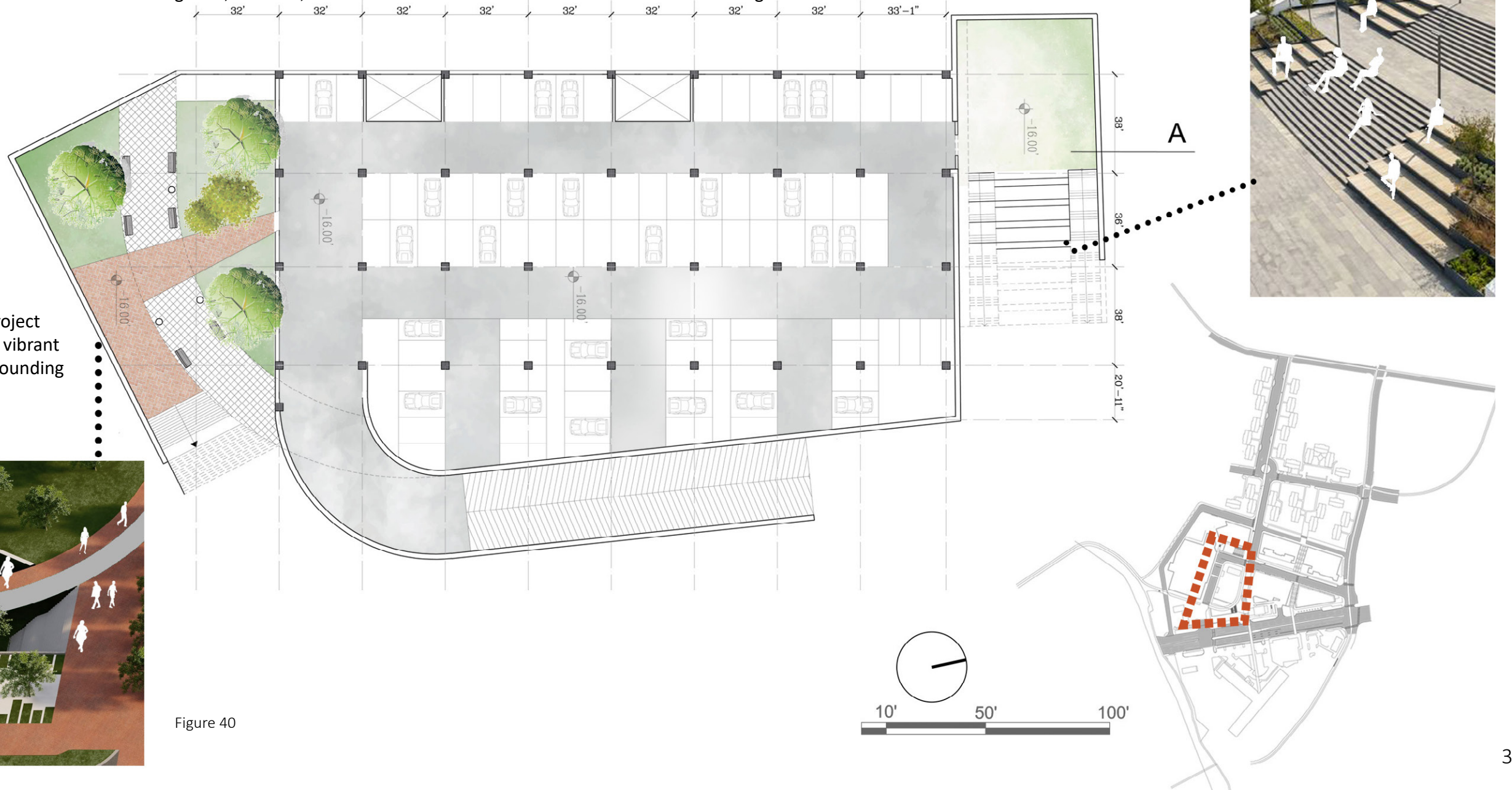
# Plaza Design



Figure 40

# Plaza Design

The urban stairs are thoughtfully integrated into the overall design. With seating areas along the stairs, people have the opportunity to gather, socialize, and immerse themselves in the outdoor movie screenings.



The sunken yard feature in the project serves as a focal point, creating a vibrant and lively atmosphere in the surrounding area.

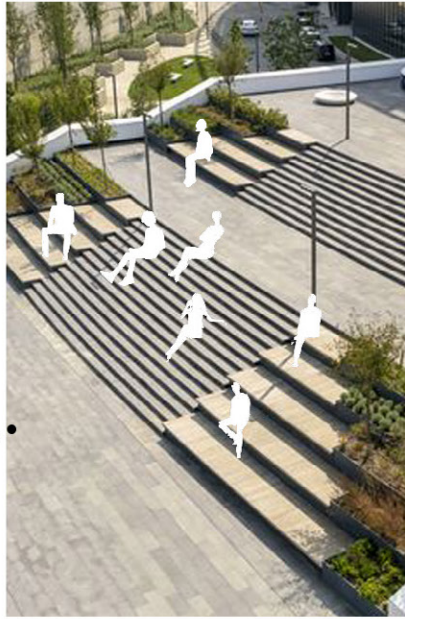
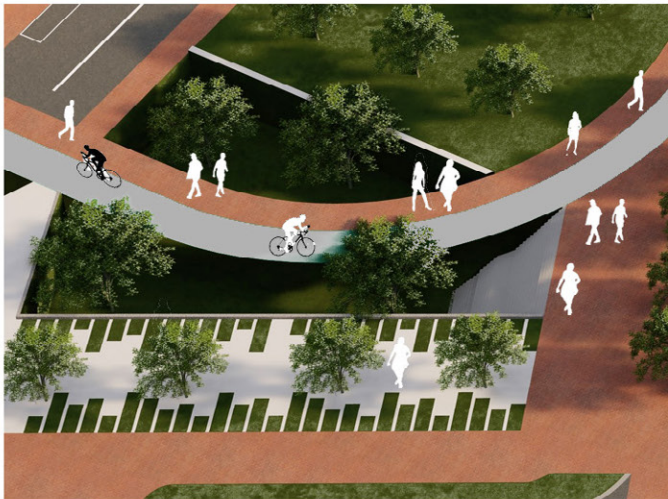


Figure 40

# Plaza Design



**An interactive water feature** is incorporated into the design, serving as a fun and engaging play area for children. The space provides a refreshing escape for kids, allowing them to cool off and play in a safe environment. Parents who come to do their grocery shopping can let their children enjoy the water feature before or after their shopping trip.



Figure 40

Figure 41



# Material Selection

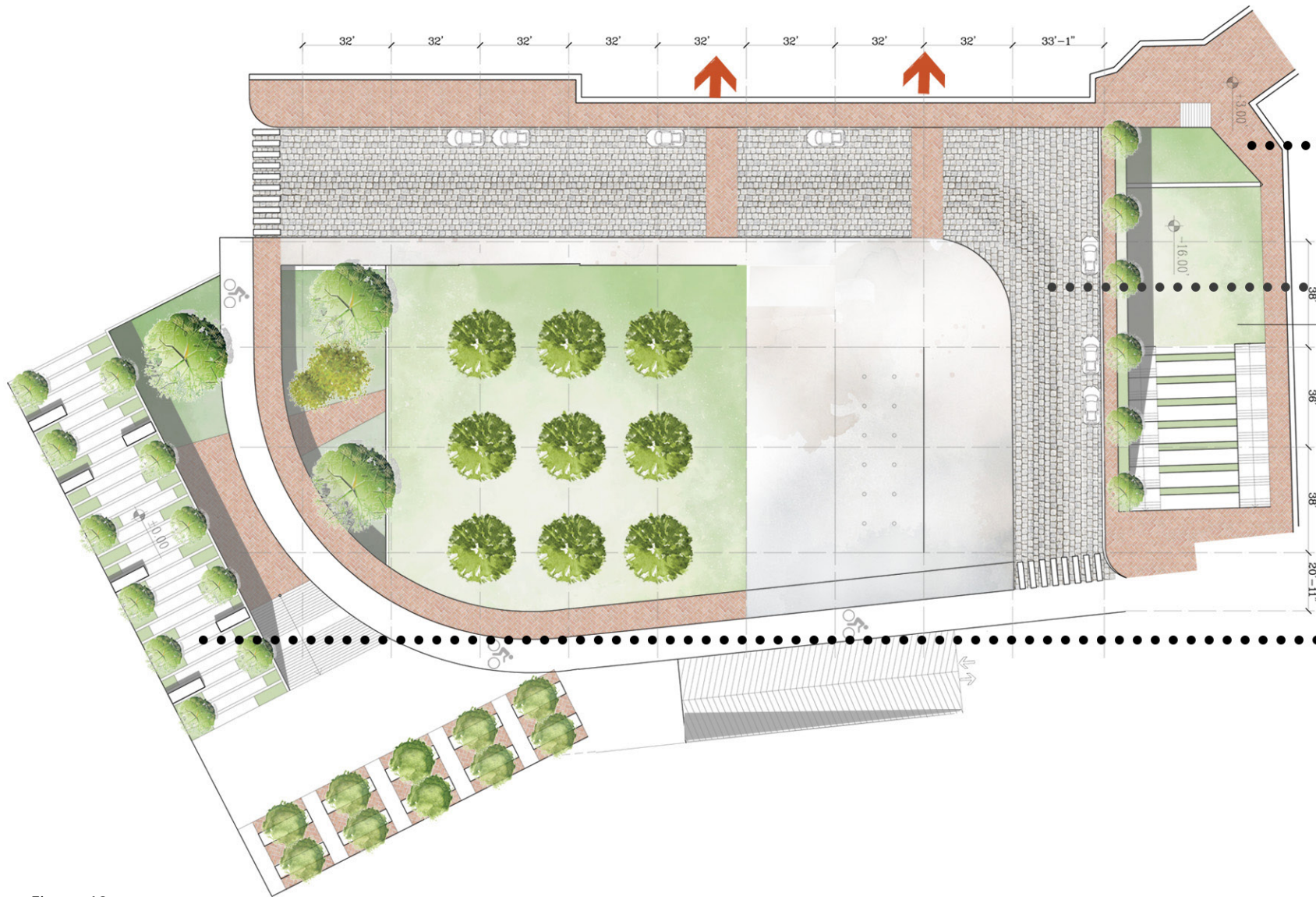


Figure 40



Figure 42

# Material Selection



Garden parking pavement



Figure 42

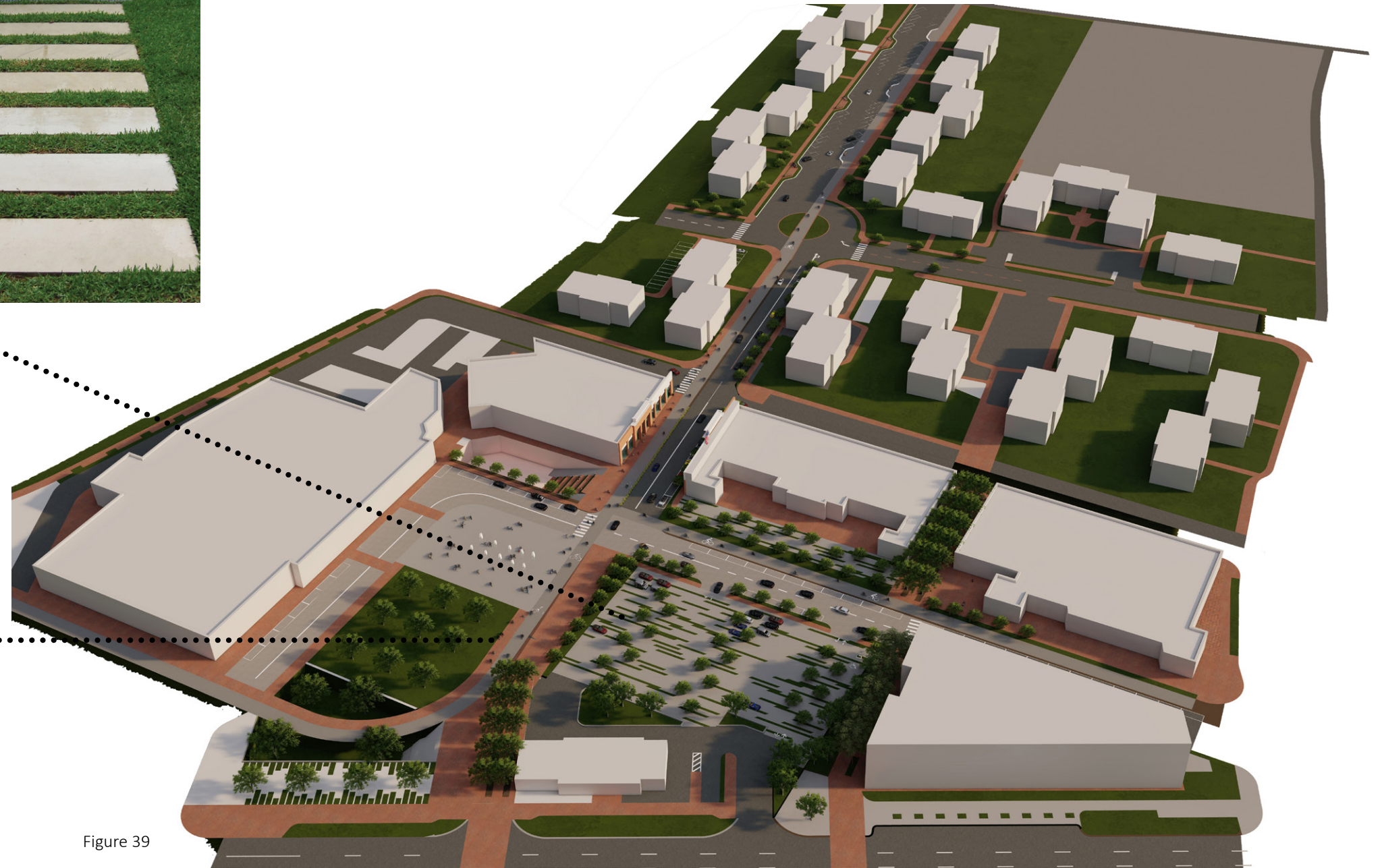
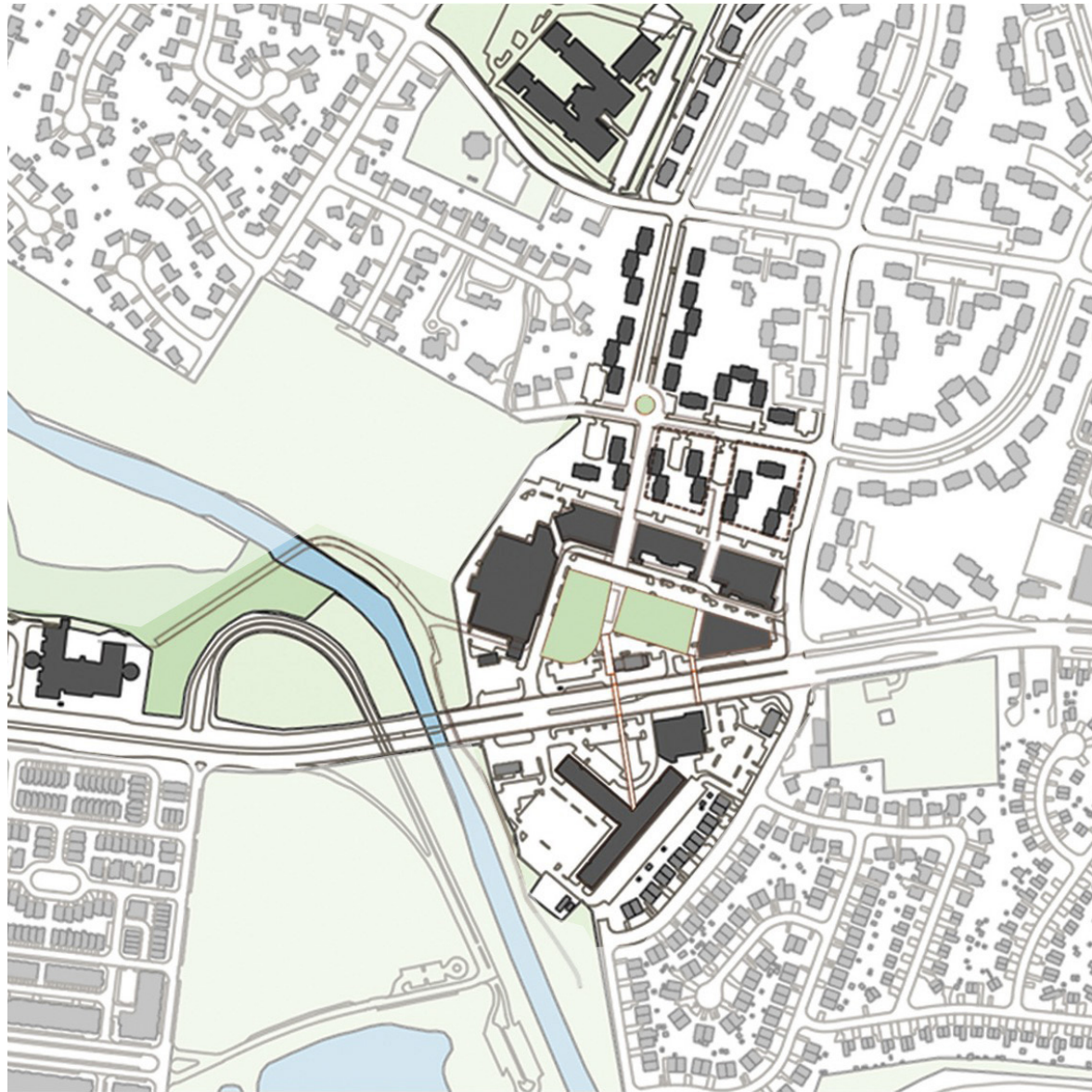


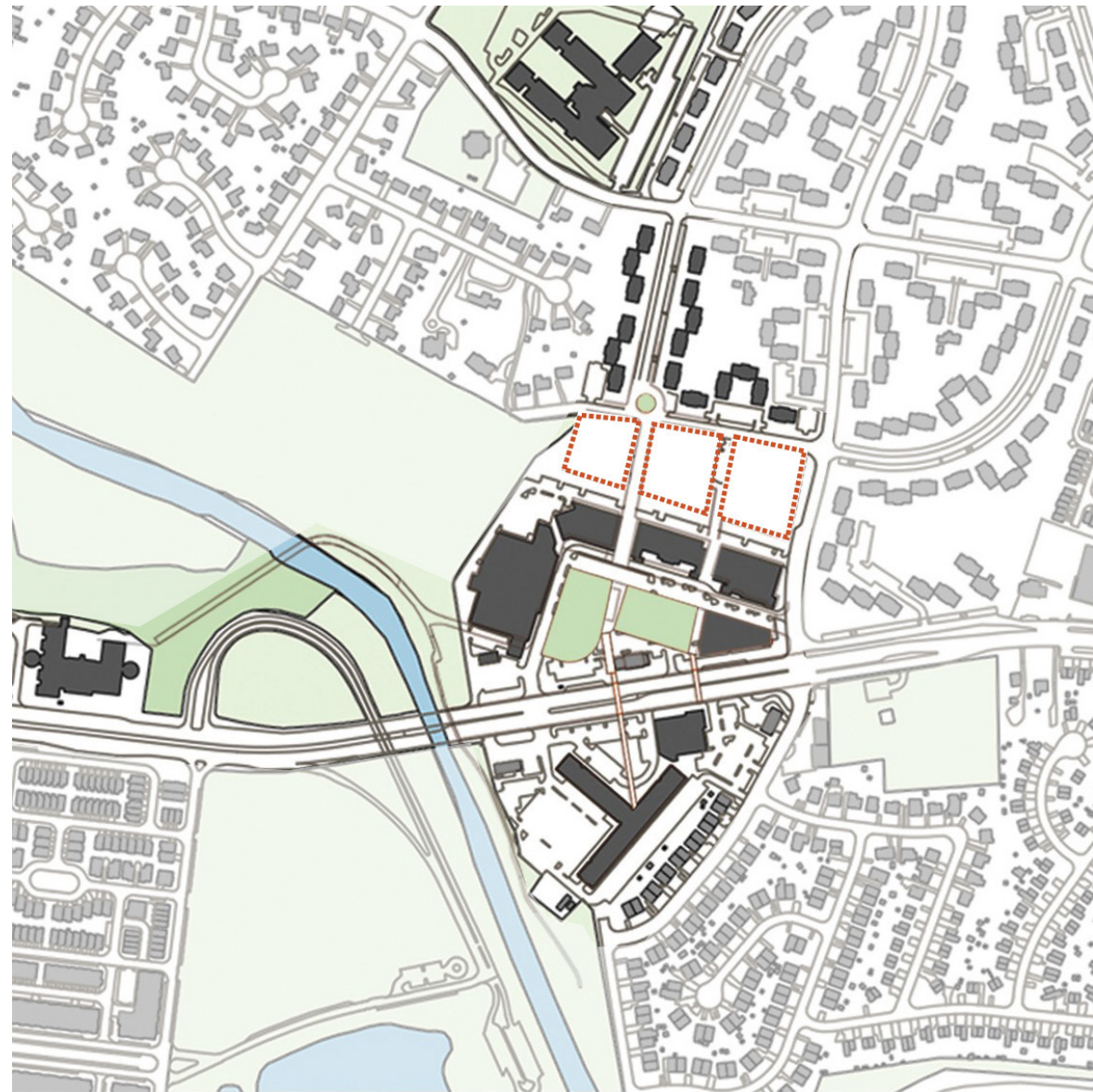
Figure 39



Figure 37



PHASE-1

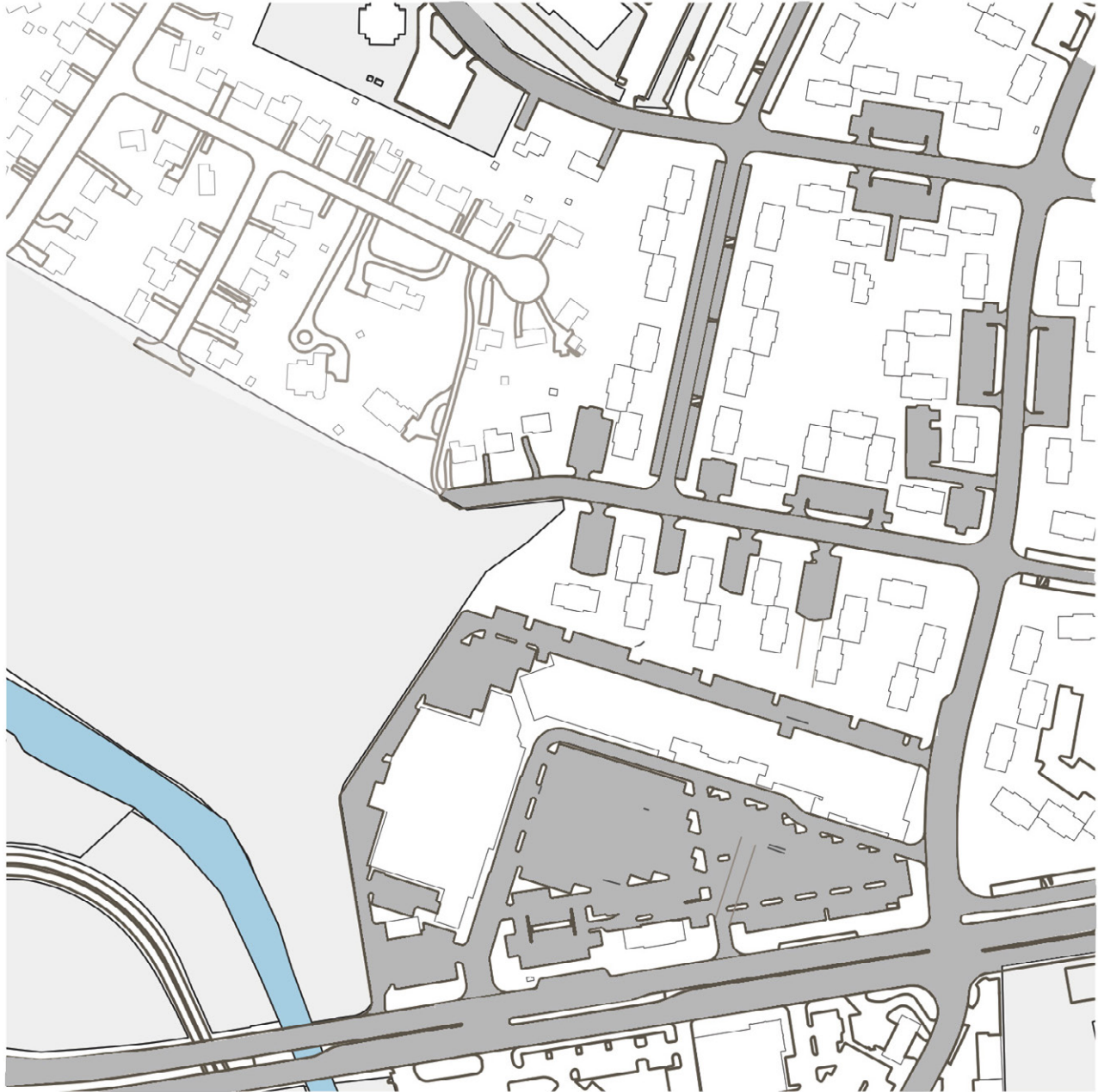


PHASE-2

The project is designed to be implemented in two phases. Phase two of the project involves a change in the land use of the northern area adjacent to the strip mall. The planned transformation encompasses a mixed land use concept, with an emphasis on high density development, aimed at providing services to the neighborhood.

The new land use plan includes the incorporation of office, cultural areas, and residential. This diverse range of land uses aims to create a vibrant and dynamic community and encourage walkability

Improving Continuity



Existing Condition



Proposed Design

## CHAPTER FIVE

---

## CONCLUSION

*You don't meet other people while driving in a private car, nor often in a bus or trolley. It's on foot that you see people's faces and statures and that you meet and experience them. That is how public socializing and community enjoyment in daily life can most easily occur. And it's on foot that one can be most intimately involve with the urban environment; with stores, houses, the natural environment, and with people.*

*-Allan B Jacobs "Great Streets"*

The lack of walkability in suburban areas has been a significant concern. Walkable areas not only provide health benefits to residents but also foster social interaction and a strong sense of community. Walkability plays a crucial role in sustainable transportation as it encourages active and healthy lifestyles and contributes to environmental sustainability.

This thesis addresses the challenge of creating a more walkable suburban area and promoting walking and cycling as sustainable modes of transportation. One key element in enhancing walkability is ensuring continuity in street design, creating a connected network that allows for seamless pedestrian movement. It is an important responsibility of urban designers to design for people and incorporate walkability as a key element in their designs.

# BIBLIOGRAPHY

Buehler, R., & Pucher, J. (2012). Walking and Cycling in Western Europe and the United States: Trends, Policies, and Lessons. *Transportation Quarterly*, 66(3), 249-266.

Forsyth, A. What is a walkable place? The walkability debate in urban design. *Urban Des. Int.* 2015, 20, 274–292.

Gehl, J. (2010). *Cities for People* (p. 21). Island Press.

Gehl, J. (2011). *Life Between Buildings: Using Public Space*. Island Press: Washington, DC, USA.

Gehl, J., & Gemz, L. (2004). *Public Spaces-Public Life*. Arkitektens forlag: Aarhus, Denmark.

Handy, S., Cao, X., & Mokhtarian, P. (2002). Correlation or causality between the built environment and travel behavior? Evidence from Northern California. *Transportation Research Part D: Transport and Environment*, 7(4), 237-266.

Jacobs, A. B. (1993). *Great Streets*. Cambridge, MA: The MIT Press.

Jacobs, J. *The Death and Life of Great American Cities*. Yale Law J. 1962, 71, 1597.

Jamei, E., Ahmadi, A., & Chau, H.-W. (2021). Urban Design and Walkability: Lessons Learnt from Iranian Traditional Cities. *Sustainability*, 13(10), 5553. <https://doi.org/10.3390/su13105553>

Kashef, M. Sense of Community and Residential Space: Contextualizing New Urbanism within a Broader Theoretical Framework. *ArchNet-IJAR* 2009, 3.

Khaghani, S. *Islamic Architecture in Iran: Poststructural Theory and the Architectural History of Iranian Mosques*; Bloomsbury Publishing: London, UK, 2012.

Rapoport, A. The nature of the courtyard house: A conceptual analysis. *Tradit. Dwell. Settl. Rev.* 2007, 57–72.

Row, A.T.; Jacobs, J. *The Death and Life of Great American Cities*. Yale Law J. 1962, 71, 1597.

Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Annals of Behavioral Medicine*, 25(2), 80-91. doi: 10.1207/S15324796ABM2502\_03.

Saelens, B.E.; Sallis, J.F.; Frank, L.D. Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Ann. Behav. Med.* 2003, 25, 80–91. [Google Scholar]

Solnit, R. (2001). *Wanderlust: A History of Walking* (p. 11). Penguin.

Southworth, M. (1997). *Reinventing Main Street: From Mall to Townscape Mall*. University of California Press.

Speck, J. (2012). *Walkable city: How downtown can save America, one step at a time*. North Point Press

# IMAGE CITATIONS

- **FIGURE 1** Buehler, R., & Pucher, J. (2012). Walking and Cycling in Western Europe and the United States: Trends, Policies, and Lessons. *Transportation Quarterly*, 66(3), 249-266..
- **FIGURE 2** Richter, F. (2023, May 19). Cars still dominate the American commute. [statista][ <https://www.statista.com/chart/18208/means-of-transportation-used-by-us-commuters/>].
- **FIGURE 3** Kashef, M. 2011. a Planning Design and Historical preservation, East Carolina University.
- **FIGURE 4** Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Annals of Behavioral Medicine*, 25(2), 80-91. doi: 10.1207/S15324796ABM2502\_03.
- **FIGURE 5** Gehl, J. (2010). *Cities for People* (p. 21). Island Press.
- **FIGURE 6** Images downloaded from Pinterest, ResearchGate, Uploaded by Heba O. Tannous
- **FIGURE 7** <https://www.irandestination.com/tag/iranian-historical-buildings/>
- **FIGURE 8** Plan of Naqsh-e Jahan square in Isfahan <https://mosqpedia.org/en/mosque/337>
- **FIGURE 9** photos downloaded from ResearchGate, uploaded by Heba O. Tannous.
- **FIGURE 10** <http://historicaliran.blogspot.com/2009/11/naghshe-jahan-square.html>.
- **FIGURE 11** <https://www.iranroute.com/sights/16/malek-timcheh-timcheh-malek>.
- **FIGURE 12** Image by Author. Data from Open street map.
- **FIGURE 13-14** Image by Author.
- **FIGURE 15** Image by Author. Data from Smart Location Calculator.
- **FIGURE 16** Duke in Motion <https://www.alexandriava.gov/DukeInMotion>.
- **FIGURE 17** Alexandria, Virginia Population 2023 <https://worldpopulationreview.com/us-cities/alexandria-va-population>
- **FIGURE 18** Image by author. Data from Open street map.
- **FIGURE 19** City of Alexandria 2022 Zoning Map [https://www.alexandriava.gov/sites/default/files/2022-12/2022%20Zoning%20Map\\_OCT.pdf](https://www.alexandriava.gov/sites/default/files/2022-12/2022%20Zoning%20Map_OCT.pdf)
- **FIGURE 20** Race, Diversity, and Ethnicity in Alexandria City, VA <https://bestneighborhood.org/race-in-alexandria-city-area-va/>
- **FIGURE 21** Image by Athor.

- **FIGURE 22** Image by Author. Data from Open street map.
- **FIGURE 23** Image by Author.
- **FIGURE 24- 25** Image by author. Data from Open street map.
- **FIGURE 26- 27** Image by Author.
- **FIGURE 28** City of Alexandria, Virginia Google map.
- **FIGURES from 29 to 41** Image by Author.
- **FIGURE 42** Images downloaded from Pinterest.
- **FIGURE 43- 44** Image by Author.

