



**STEPPING BACK TO MOVE FORWARD :**  
A POEM WRITTEN IN LIGHT AND BRICK

**Hyung Jo**

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

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Marcia Feuerstein

Matthew Dreher

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Alexandria Virginia

Keywords:

Senior Apartment, Brick, Light, Shadow, Mixed-Use, Community Space

# STEPPING BACK TO MOVE FORWARD :

## A POEM WRITTEN IN LIGHT AND BRICK

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### **Abstract**

Louis Kahn, the master of modern architecture, said, “Even a brick wants to be something ” the phrase explained how important it is to respect the properties and materials, each material has a structure or form that can be the most beautiful to express its essence.

The reason that he taught the essence of materials by using “brick” as an example among numerous materials the characteristics of bricks are very simple and clear. The essence of the brick lies in 'stacking'. The stone & metal panels which can be found as common as bricks, the surface forms are smooth, but it held by various types of material.

The surface materials require separate devices to overcome gravity instead of forming a large surface at a time. Architecture is the site where human technology overcomes the providence of nature. However, brick is not 'attached' material, its 'stacked' material. A piece of brick is placed and laid on, depending on gravity.

The nature of bricks goes hand in hand with the history of mankind and is loved a lot. “Architecture is a poem written in light and brick,” and brick can be a material that makes use of the essence of architecture: practicality and art.

In fact, that the most common building around us is a brick building is evidence that the brick is imprinted with familiar and reliable materials for everyone. Moreover, the bricks are an inexpensive and fast-producing material.

In this thesis, I 'd like to propose the housing for elderly residents on the Robinson North Terminal at the Potomac waterfront in Alexandria Virginia. Also I tried to understand and study the material properties of bricks, and to realize mix-used architecture that can conform to Alexandria's unique order and maximize the potential of only sites

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## **General Audience Abstract**

### **Aging and Elderly**

As medical technology develops and demography changes, the demand for more resources. In addition, as the elderly population grows, total support costs (infant and elderly population / productive population) continue to increase. In the past 30 years, the United States has grown at an age-old population five times faster than France and the United Kingdom, twice as many as Germany. Older people's participation in economic activities and their support are emerging as important topics. Older retirees can be good mentors for young adults based on their skills and business operations experience. Economic activity of older people can also reduce conflict among generations. In fact, startups / entrepreneurs accounted for more than 50s over 20-30s. As consumers, people in their 50s have a great presence. Not only do they account for more than 50% of the total US consumption, but consumer dispositions also vary. Likewise, the elderly can be a great help in revitalizing the economy if they are consumers with high demand and maximize their potential as producers.

### **Abandoned land of Alexandria waterfront (Robinson terminal North)**

Robinson Terminal North was built in the early 1730's west's point. It was an important marine settlement in the 18th century for marine ships. This site, which is now threadbare, has a lot of historical importance and has a great potential. Robinson Terminal North, which is owned by the Washington Post, is halved by Union Street and currently made up warehouses, a nearly 40,000 square foot pier, and the terminates of a rail line. Redevelopment of the site has been planned for scores of years. In keeping up with the goals of this Plan to encourage public access and delight of the waterfront, land uses in the renewal Robinson Terminal North should be active and productive place.

## ACKNOWLEDGMENTS

Paul Emmons (Thesis Commottee Chair)

Thank you for your kindness and thoughtfulness. Your encouragement has always given me a new perspective of Architecture. Also your passion for Architecture has been an example for me. I have learned so much things from you. With your help, I was able to step up to Architecture.

Marcia Feuerstein

Thanky you for your wide vision have challenging me to explore the Alexandria site with Architecture. I appreciate your patience and encouragement. With your suggestions has helped me to developpe the my thesis.

Matthew Dreher

Thank you for your positve attitude and for encouraging me. I appreciated sharing your knowledge and willingness to idea. With your advice I was able to solve many difficulies.

To my family

I am deeply greateful to my wife and parents. Jieun Lee as my wife and mother of a Ellie, I couldn't finished without your hard work and dedication. Mom and Dad, thank you for your support, prayers and encouragement.

I also want to thank you Clark Jun, Franklin, Prof. Jean Hur and Dukkyu-Ryang.

Thank you all very much!

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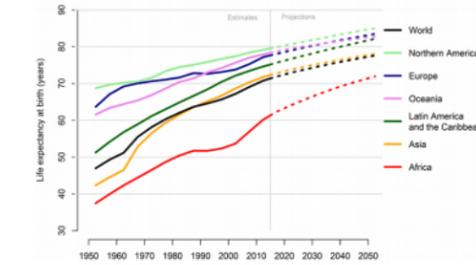
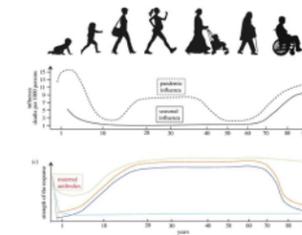
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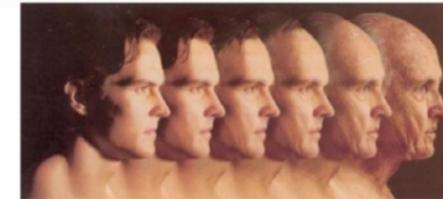
## First Approach : Elderly People and Aging

1. **Housing is the most essential and basic environment in human life It is the most important factor in determining the quality of life that affects a person's physical, psychological and social relationships. In particular, elderly people spend more time in residence than other age groups.**
2. **The increase in the elderly population has increased their interest in quality of life and they want to live in a place where they can spend their retirement where they lived.**
3. **As the body of the elderly changes over time, the physical condition is changed by the aging phenomenon, and accordingly the necessary facilities are also changed.**

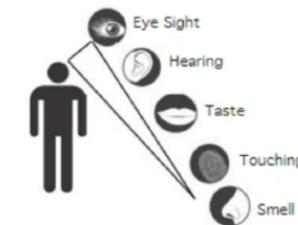


### Proposal

1. **Architectural approach to supplement the physical condition of the elderly people**
2. **Communicate with the generation by talking to the local community based on a self-reliant old community**
3. **Providing a place for unity between generations**
4. **Older people act as a net function in revitalizing local economies that function as business mentors for the younger generation.**



When people get old, they start to lose sensibilities. Generally, the process starts from age 40. The most common and very first sense is eye sight, hearing, taste, touch, and smell. However, we can keep the good sensory systems by practices and encounter with everyday.



## Second Approach : Global Warming & Sea level rise

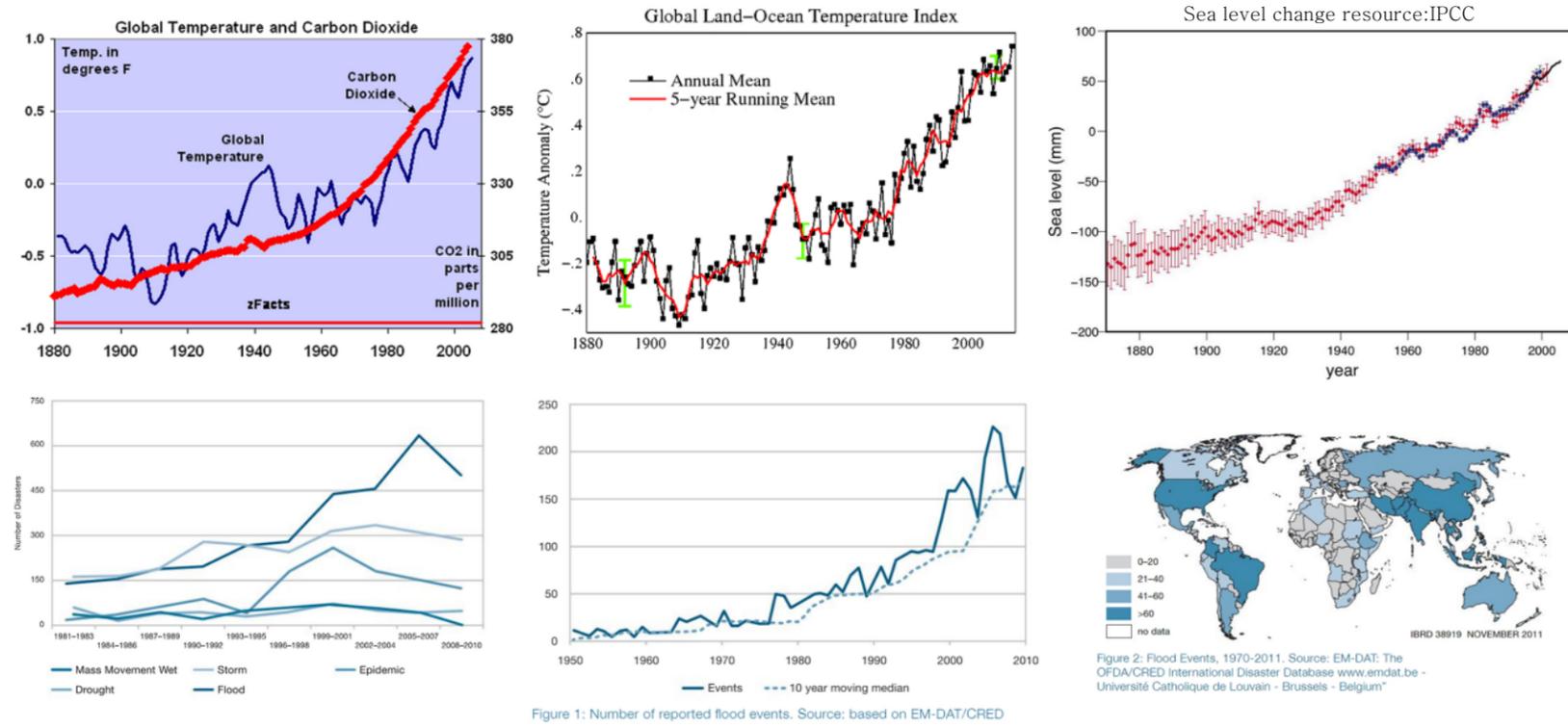


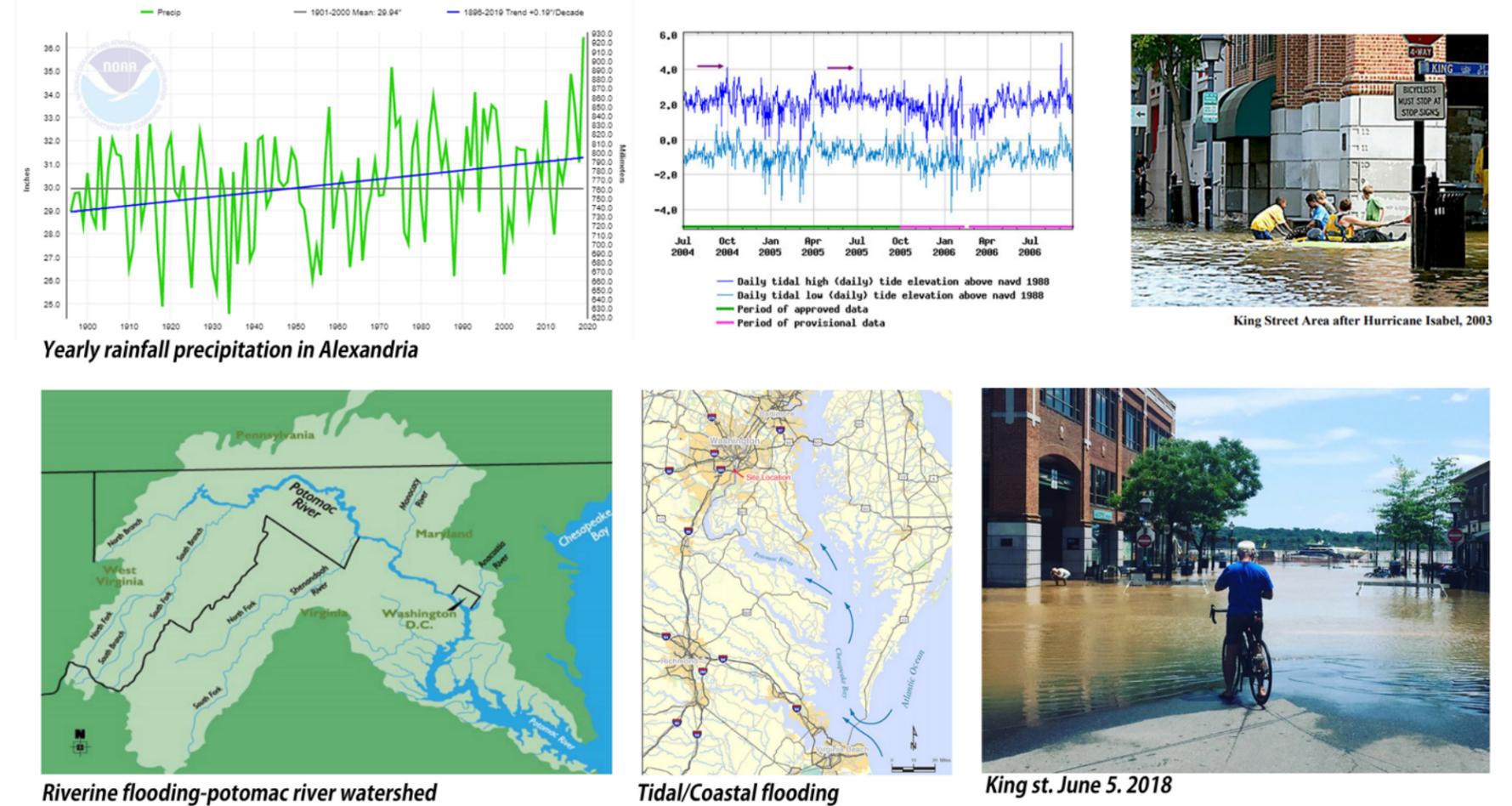
Figure 1: Number of reported flood events. Source: based on EM-DAT/CRED

Figure 2: Flood Events, 1970-2011. Source: EM-DAT: The OFDA/CRED International Disaster Database www.emdat.be - Université Catholique de Louvain - Brussels - Belgium

The global average sea level has risen to an average of 0.07 inch/year over the past 100 years, which is greater than the average change over the last several thousand years. Depending on the greenhouse gas increase scenario used (High or low) projected sea-level rise is projected to be everywhere from 7 inch to 24 inch for the greatest greenhouse gas increase scenario.

Global warming is partially responsible for these deluge events. Because warmer air can hold more moisture, heavier precipitation is expected in the years to come. In the Midwest and Northeast, big storms that have only historically been seen once every 20 years are expected to happen as much as every 4 to 6 years by the end of the 21st century. Simultaneously, shifts in snowfall patterns, the onset of spring, and river-ice melting may all make worse overflow risks. Now is the time to face up to the realities of global warming, as well as the increasing frequency and strength of heavy rainfall events across the country. We need to reduce the risks to riverfront communities. Important steps include discouraging development in flood-prone areas and protecting the natural systems, such as swamps, that help buffer it from the flood.

## Third Approach : Potomac River flooding source



Riverine flooding-potomac river watershed

Tidal/Coastal flooding

King st. June 5, 2018

The causes of flooding in Alexandria are increased water inflow upstream, sea level rise and minor drainage. The annual change in precipitation is gradually increasing and the frequency of flooding is gradually increasing due to the rise in sea level.

**Site :** Robinson Terminal North / 1 Oronoco Street, Alexandria, Virginia

Robinson terminal north which is 40,000 square foot pier is the most historically significant site in the Alexandria. Site connected with Oronoco Bay Park and Oronoco street of water's edge. From the 18th century the site was in use for trade and shipping, but abandoned now. Redevelopment has been envisioned several times since decades ago.

Currently, there has been a disconnect between the site flooding and the waterfront, and the huge mass obscures the view of visitors. Many of walker, runner and biker along the N. Union street, but Robinson terminal caused narrow passageway. I was wondering how to effectively return this historic and potential land to the citizens.



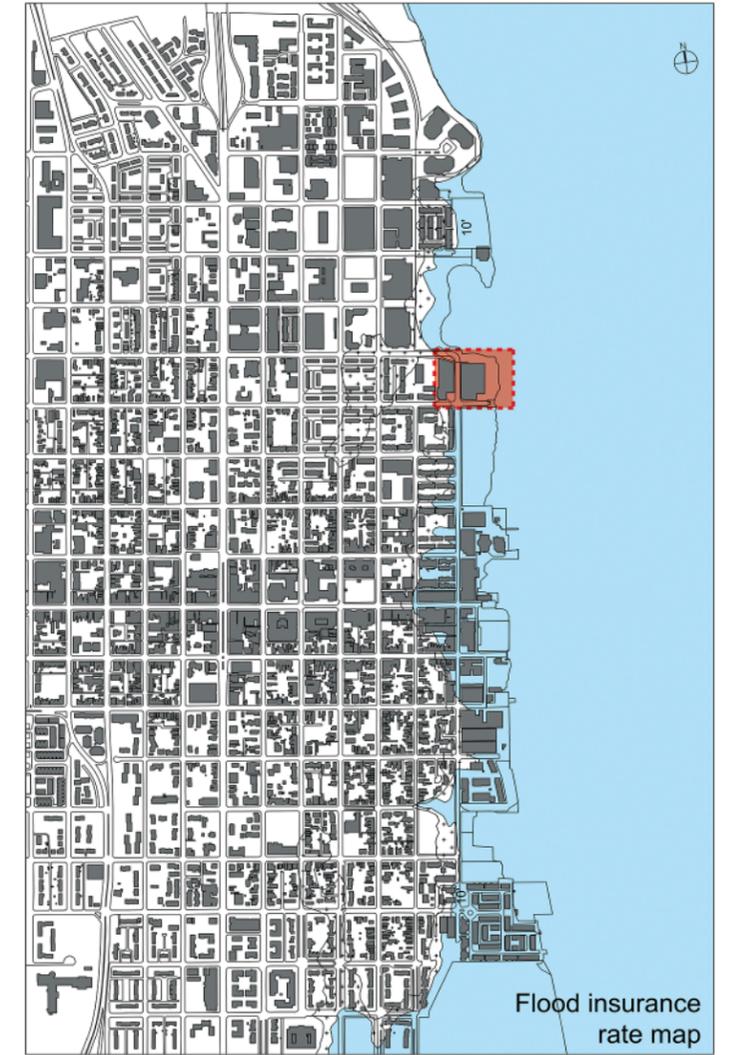
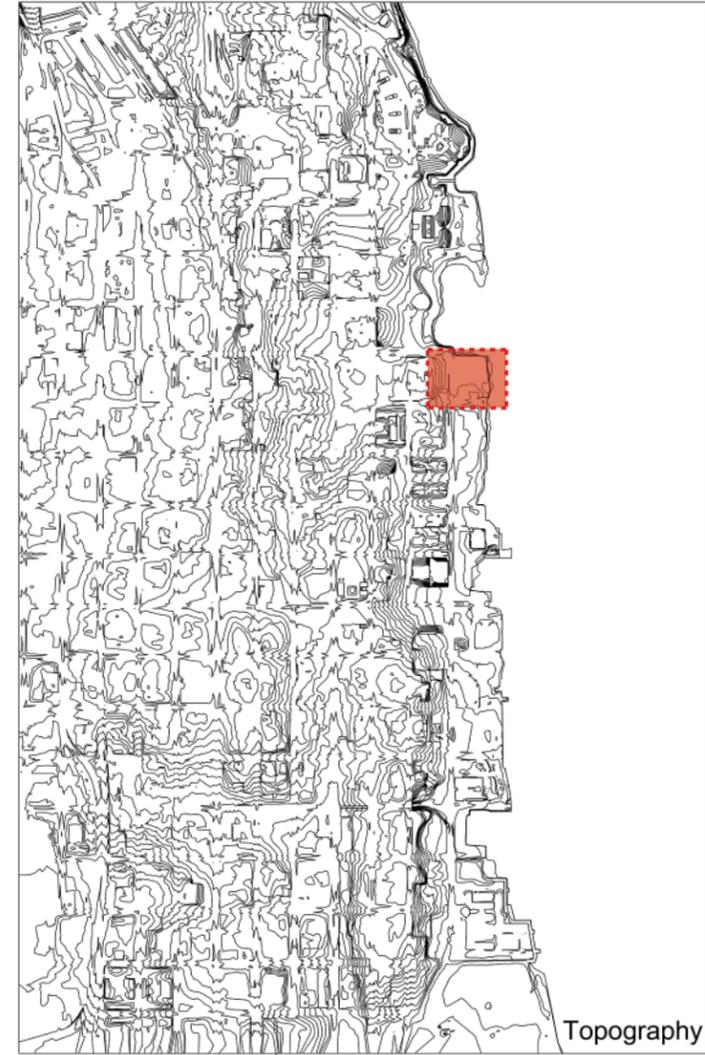
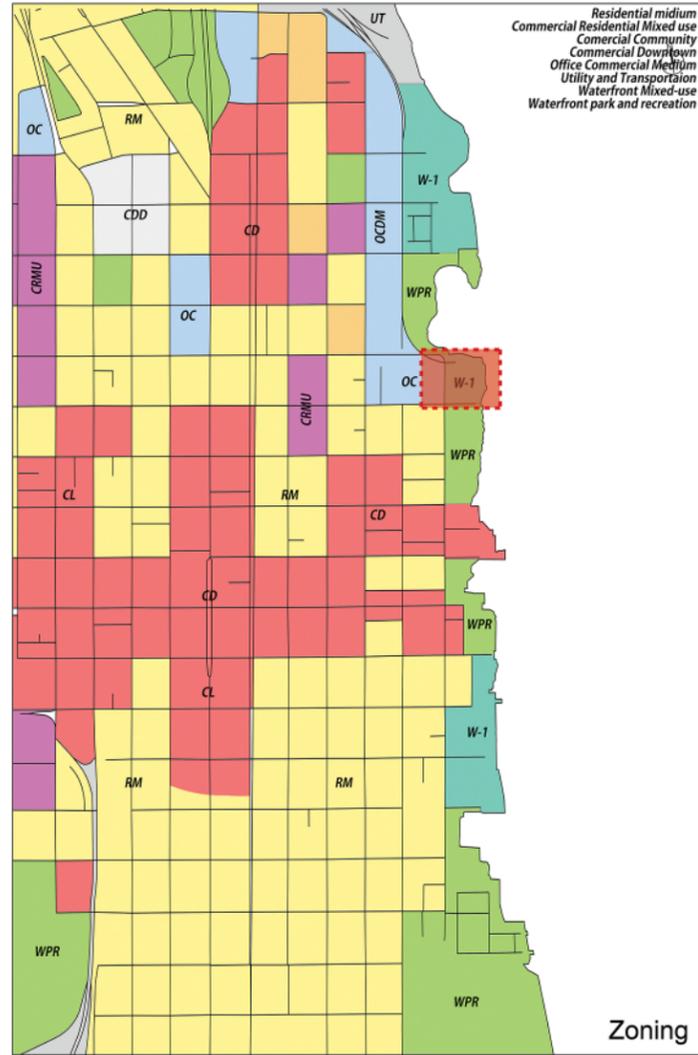
501 N Union St. Alexandria VA



Oronoco Bay Park



# Site Analysis



# Mapping & Change of Shorelines



1748



1862



1907



1921



1949



1957



1963



1970



1983



1994



2005

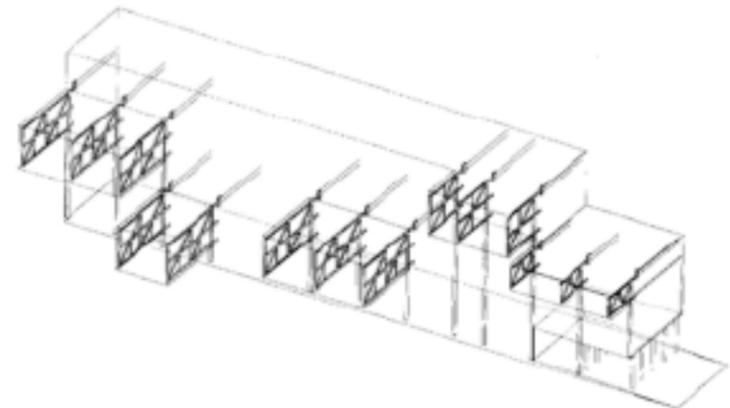


2018

## Precedent Studies



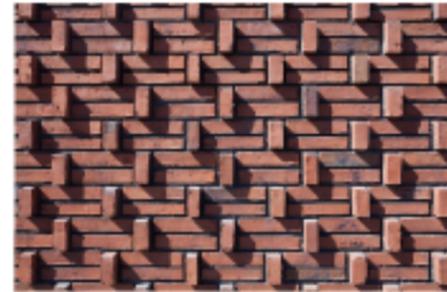
**WOZOCO SENIOR APARTMENTS**  
Location : Amsterdam-Osdorp, Netherlands  
Architect : MVRDV  
Owner : Het Oosten Housing Association  
Complete : 1997  
Total SF : 24,606 sq ft (7,500 m<sup>2</sup>)  
Total Cost : EUR 4.5 million  
100 total units, 13 cantilevered of north facade



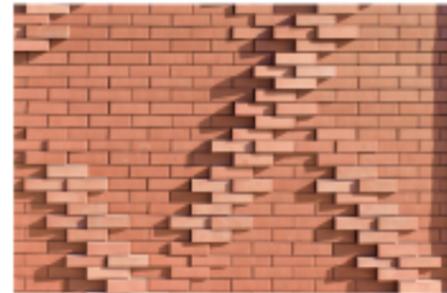
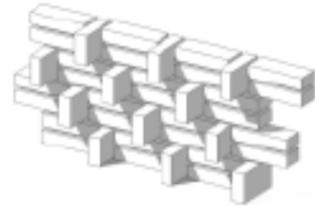
**HOUSES FOR ELDERLY PEOPLE**  
Location : Alcácer do Sal, Portugal  
Architect : Francisco Aires Mateus  
Owner : Santa Casa Da Misericordia  
Complete : 2010  
Total SF : 3,640 m<sup>2</sup>  
38 Units with charity facilities



## Brick Stacking Studies



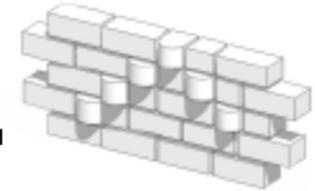
**AH Roden 2.0**  
 Location : German  
 Category : Commercial  
 Architect : Attika Architecs  
 Project Year: 2017  
 Type of bond : Block bond +  
 Dented Stock soldiers  
 Jointing : Raked



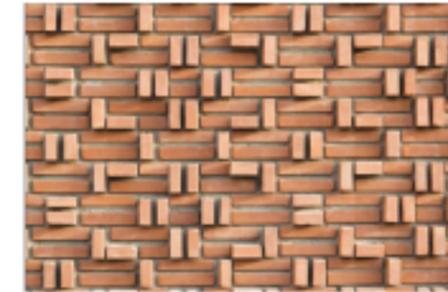
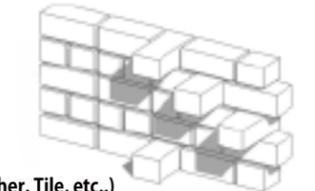
**Solidarity**  
 Location : Rue Jean, France  
 Category : Office  
 Architect : Ellenamehl  
 Project Year: 2015  
 Type of bond : Stracher bond  
 (Variant)  
 Jointing : Concave



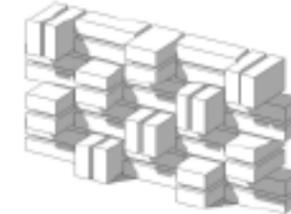
**Baker House**  
 Location : Cambridge USA  
 Category : Dorms  
 Architect : Alvar Aalto  
 Project Year: 1948  
 Type of bond : English+Dentil  
 (Variant)  
 Jointing : Concave



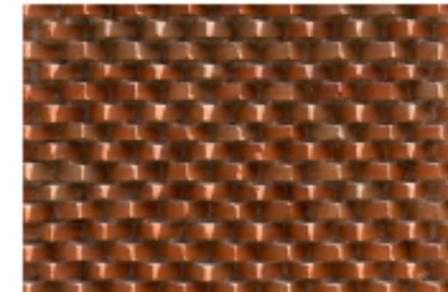
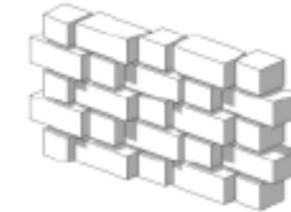
**Ballsbridge residential**  
 Location : Cambridge USA  
 Category : Residential  
 Architect : Peter Legge  
 Project Year: 2010  
 Type of bond : Various  
 (Brick on edge, Flemish stretcher, Tile, etc..)



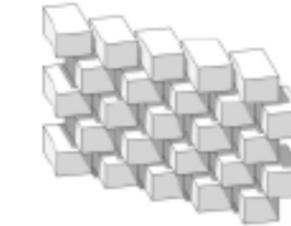
**Musee Yves Saubt Laurent**  
 Location : Marrake,Morocco  
 Category : Museum  
 Architect : Studio KO  
 Project Year: 2017  
 Type of bond :  
 Basket weave (Variant)  
 Jointing : Raked



**Woof Shadow**  
 Location : Tehran, Iran  
 Category : Apartment  
 Architect : Tachra Design  
 Project Year: 2016  
 Type of bond : Flemish  
 Jointing : Zero (Glue)

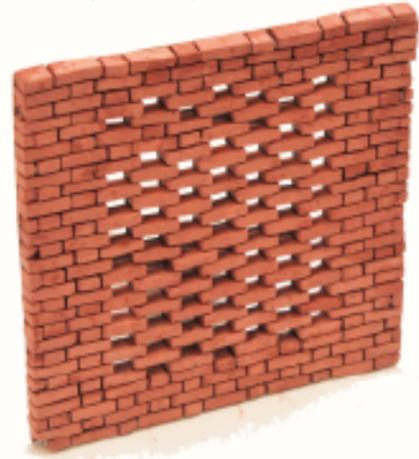


**Saint Peter House**  
 Location : San Pedro, Mexico  
 Category : Residential  
 Architect : Estudio Tecalli  
 Project Year: 2014  
 Type of bond : Dog-tooth  
 Jointing : Extruded

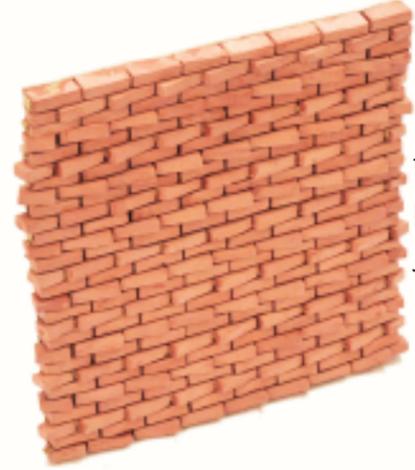


This pattern study shows how architects have approached bricks and how they have been represented. This study shows how bricks are stacked. in this case of Ballsbridge residential, the architect shows various experimental patterns, and bricks are stacked using various methods on one side. The case of Woof shadow, there was no jointing, because architect used glue instead of jointing.

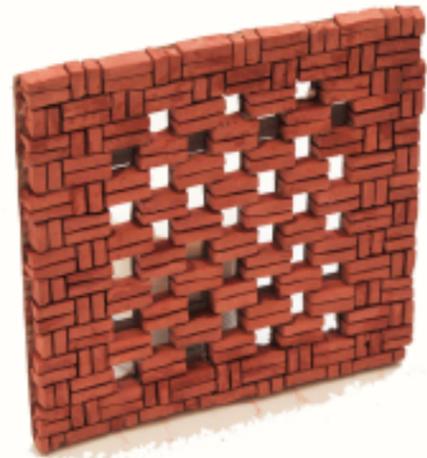
### Stacking Study Models



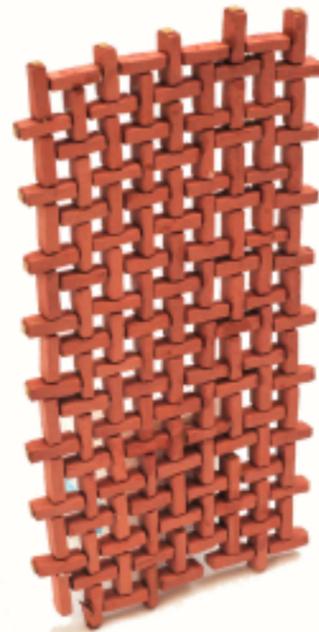
Type of bond :  
Basket Flemish (Variant)  
Jointing : Concave



Type of bond :  
Running (Variant)  
Jointing : Raked

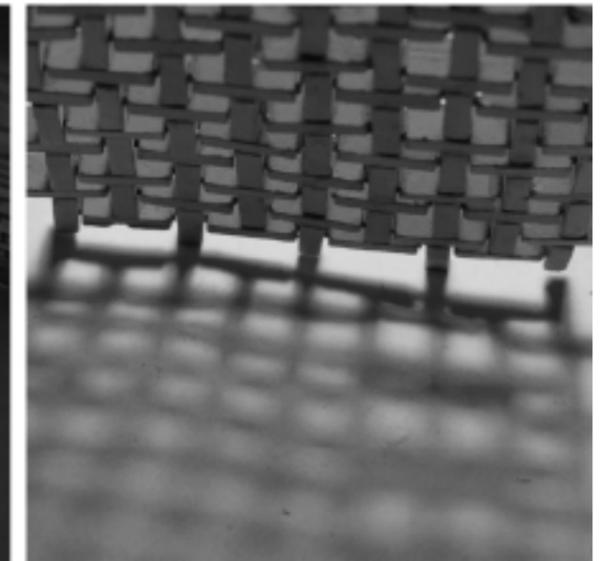
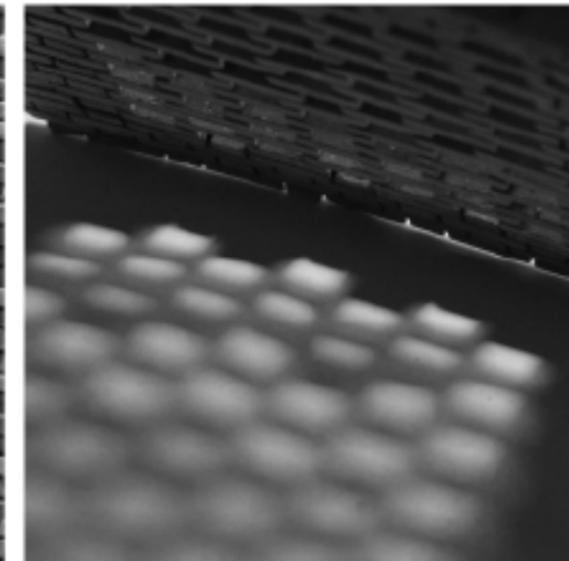
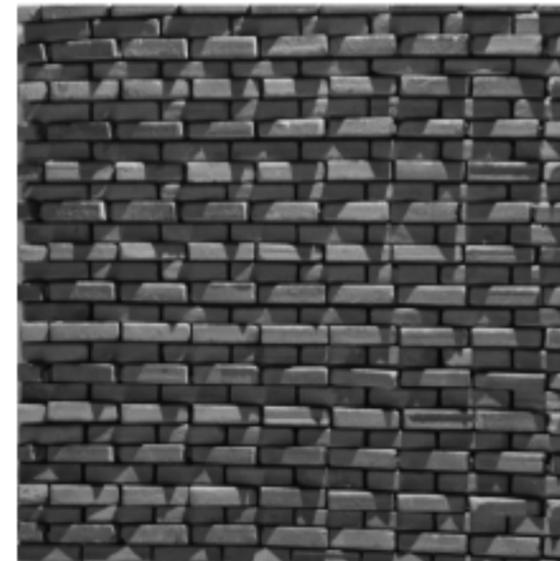
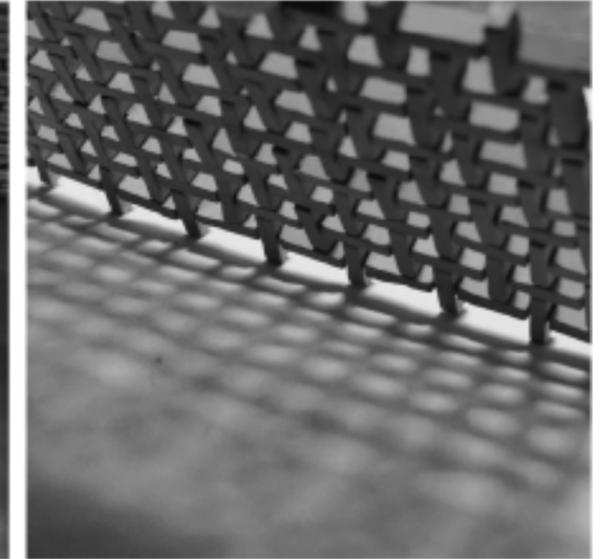
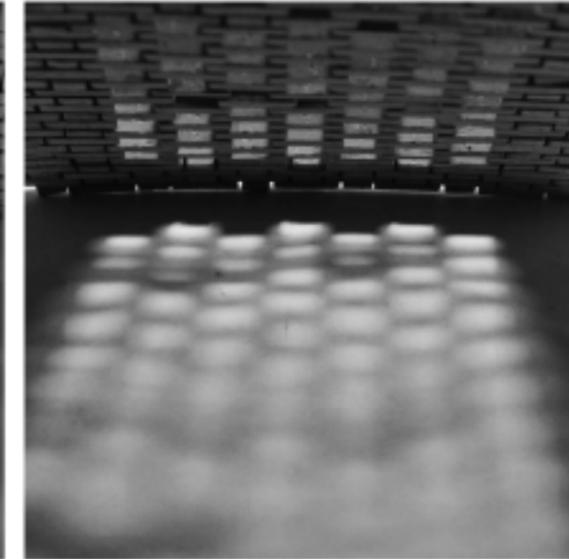
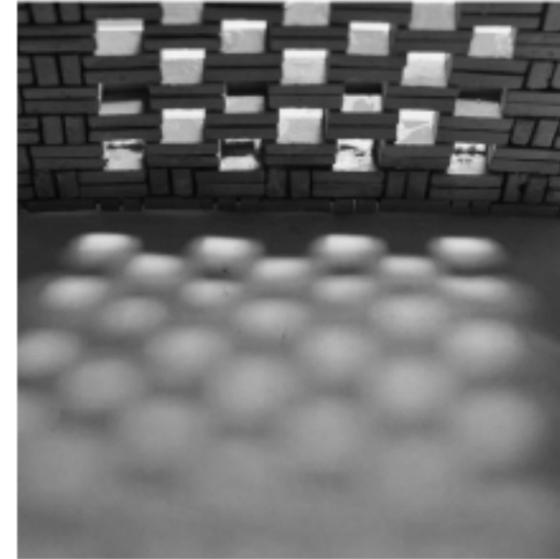


Type of bond :  
Basket Weave (Variant)  
Jointing : Raked

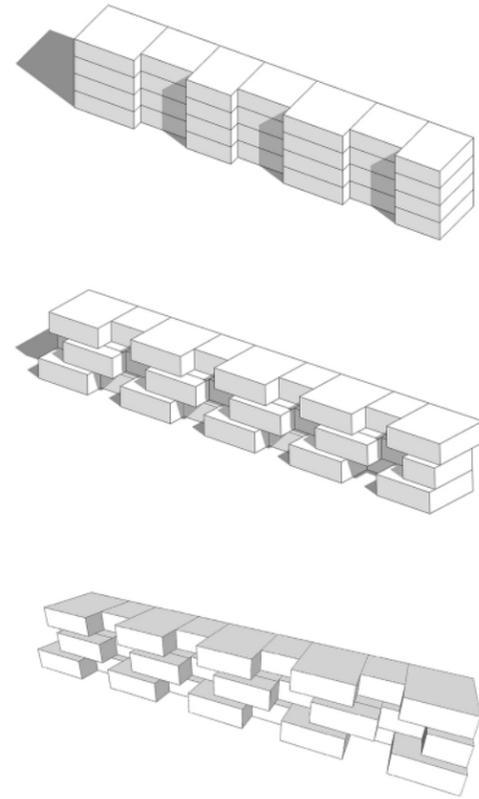
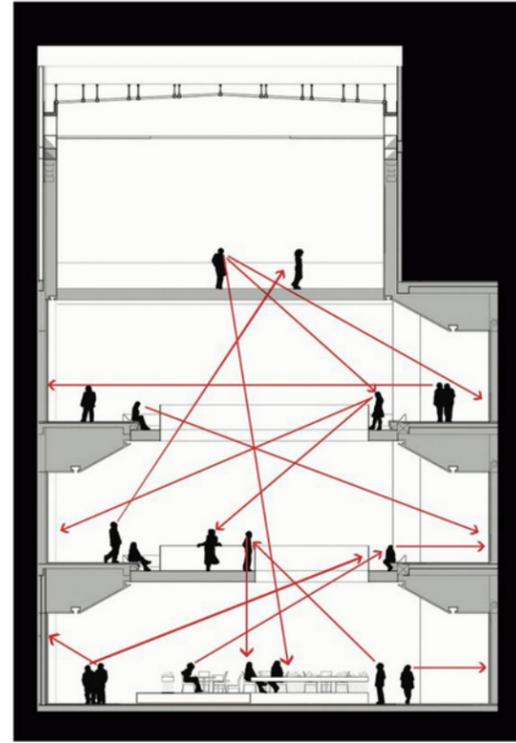


Type of bond :  
Chantilly (Variant)  
Jointing : Raked

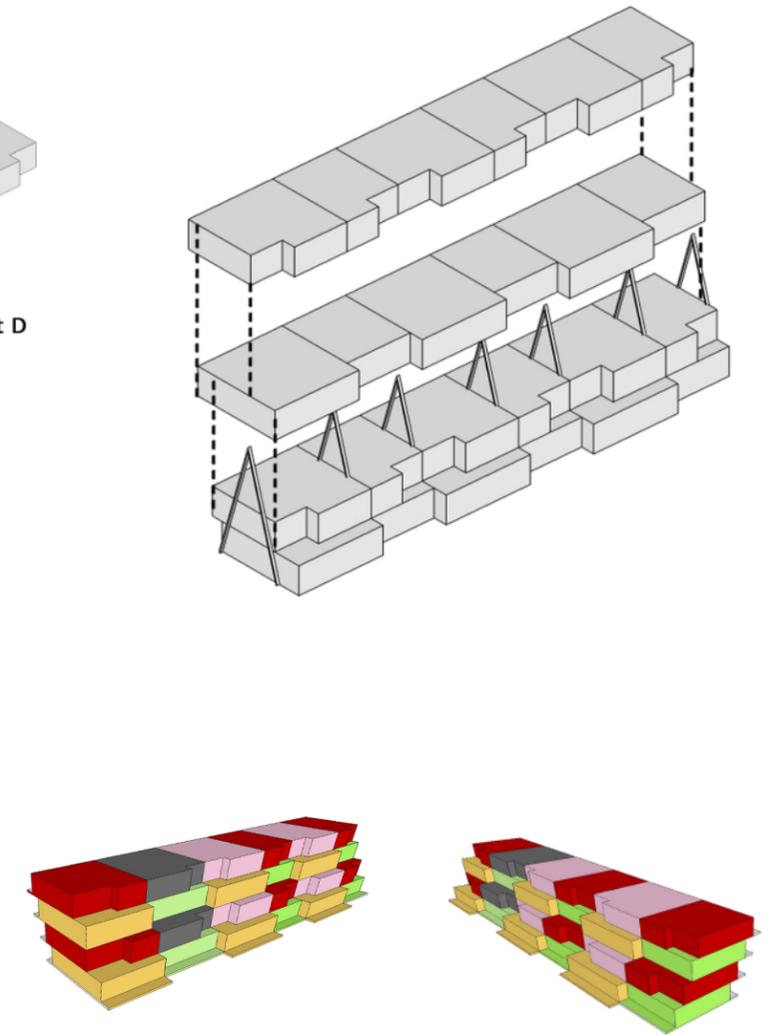
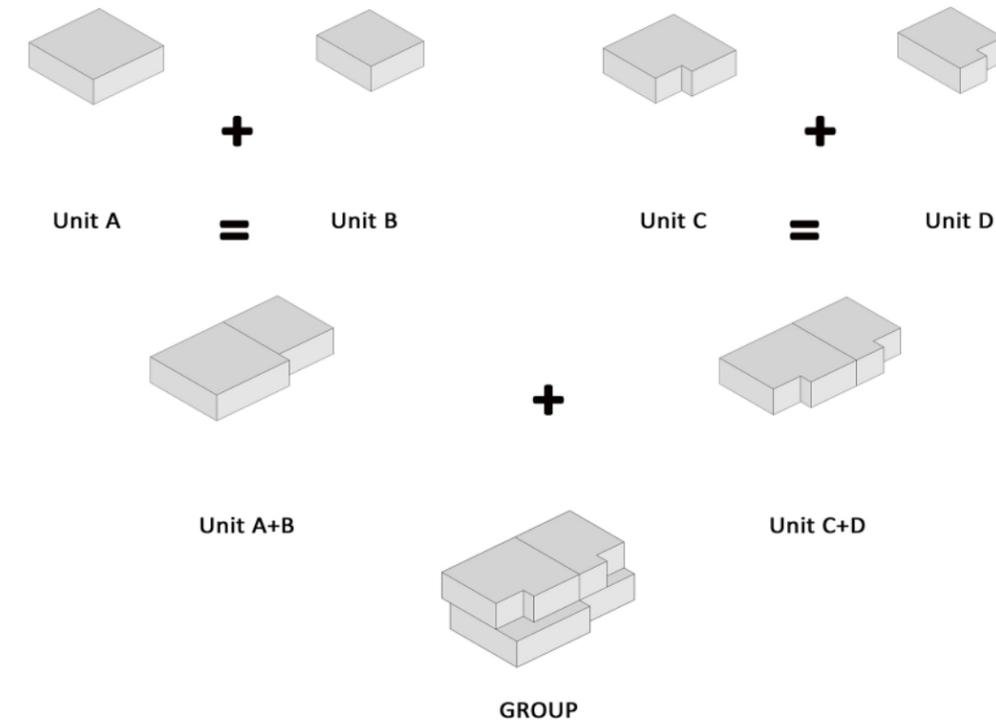
### Shadow Studies



# Social Interaction Through stepping of Housing Units



# Unit Fabrications



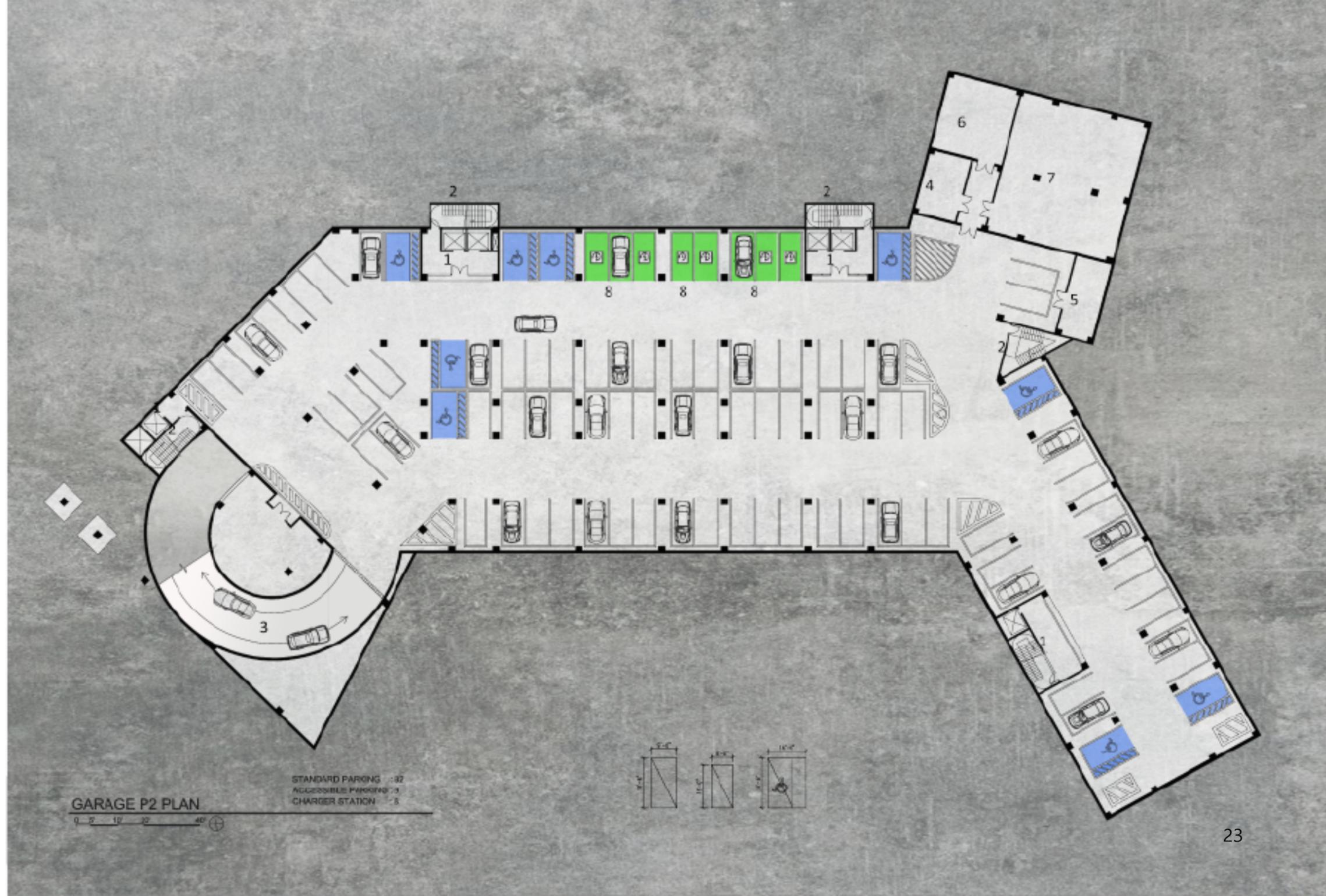
## Site Plan

In the north and east, the entire ground level was elevated to prevent flooding. By installing a board walk along the shoreline, more people can enjoy the waterfront. In addition, the boardwalk provides a function to smoothly connect with oronoco bay park and founders park. A large oval floating bay is set up on the east, where many people can enjoy kayaking. Due to the wet land along the coast, it is possible to prevent flooding and to clean the environment due to wetlands. The square is effective in preventing flooding as it not only generates many events, but also can play the role of a rain garden.

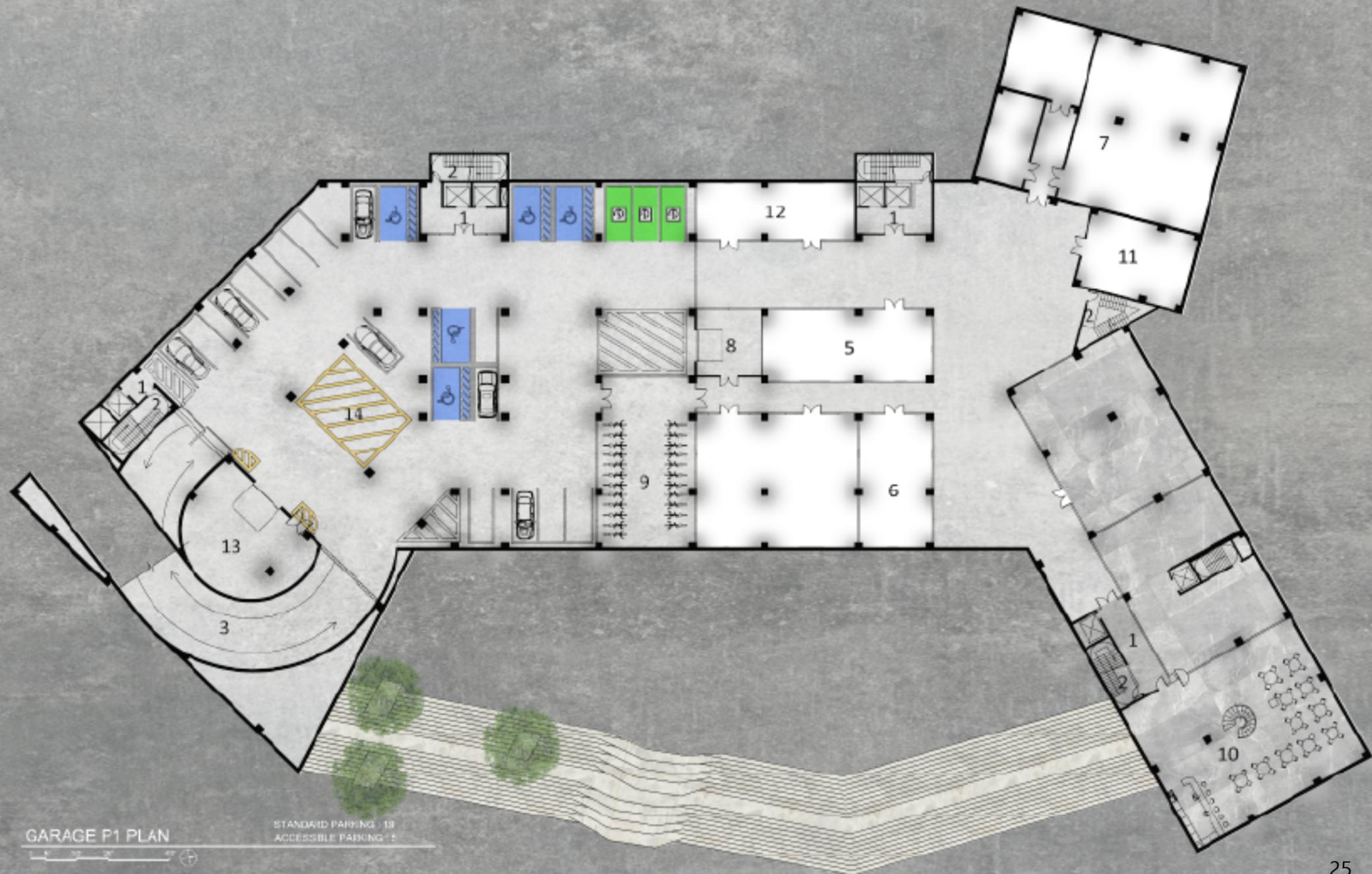
The most important thing is the organic connection between residential, commercial and park. Commercial and residential users are free to enter and exit from any direction.

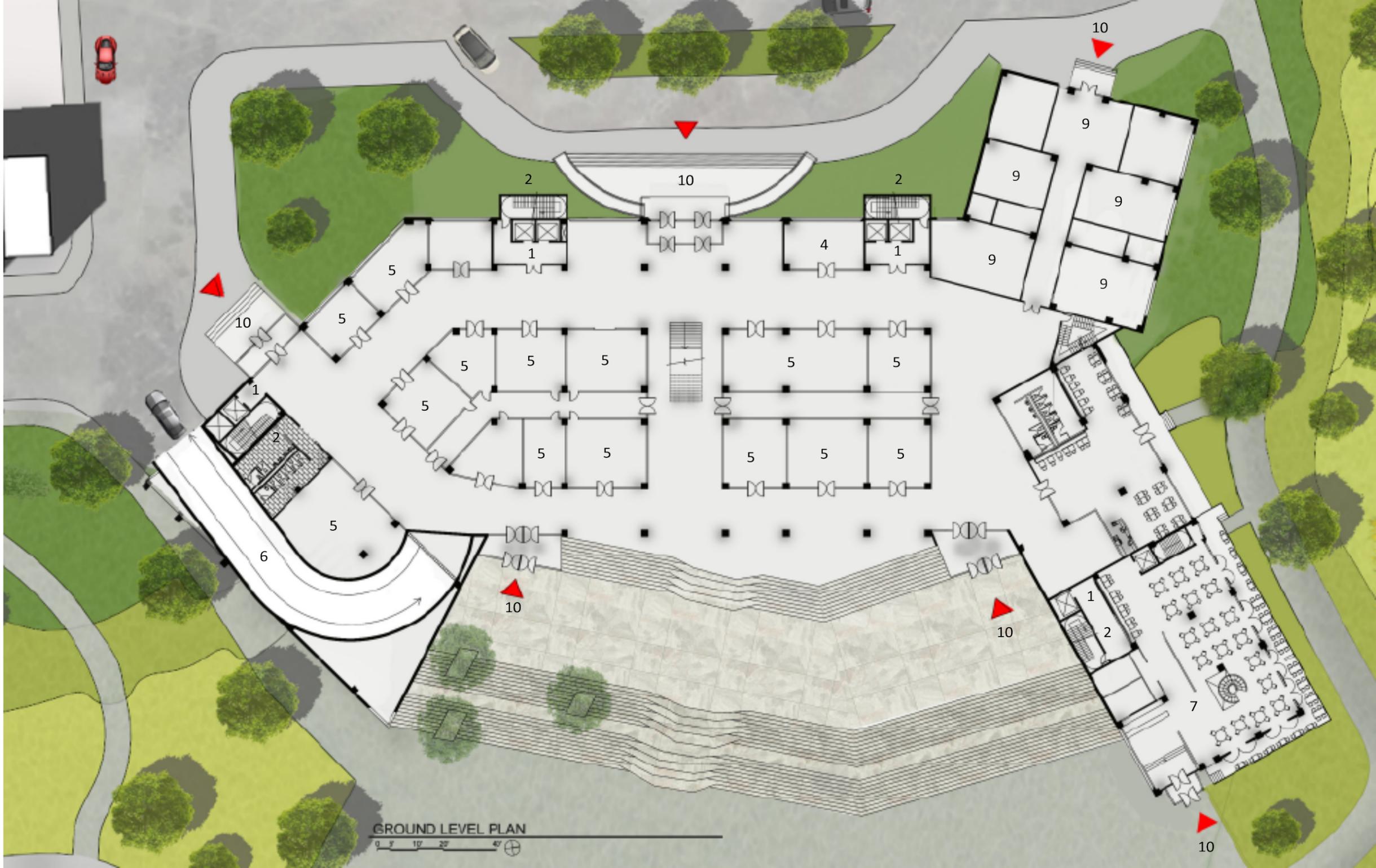


- 1 ELEV. LOBBY
- 2 FIRE RATED STAIR(2HR)
- 3 GARAGE ACCESS RAMP(13%)
- 4 MAINTENANCE OFFICE
- 5 STORAGE
- 6 WATER SERVICE
- 7 MECHANICAL ROOM
- 8 ELECTRICAL CHARGING STATION



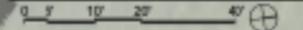
- 1 ELEV. LOBBY
- 2 FIRE RATED STAIR(2HR)
- 3 GARAGE ACCESS RAMP(12%)
- 4 RESIDENTIAL PARKING ACCESS
- 5 MAINTENANCE OFFICE
- 6 STORAGE
- 7 FITNESS
- 8 LOADING AREA
- 9 BIKE STORAGE
- 10 RESTAURANT
- 11 REST ROOM
- 12 MAIL SERVICE
- 13 TRASH AREA
- 14 TRASH LOADING

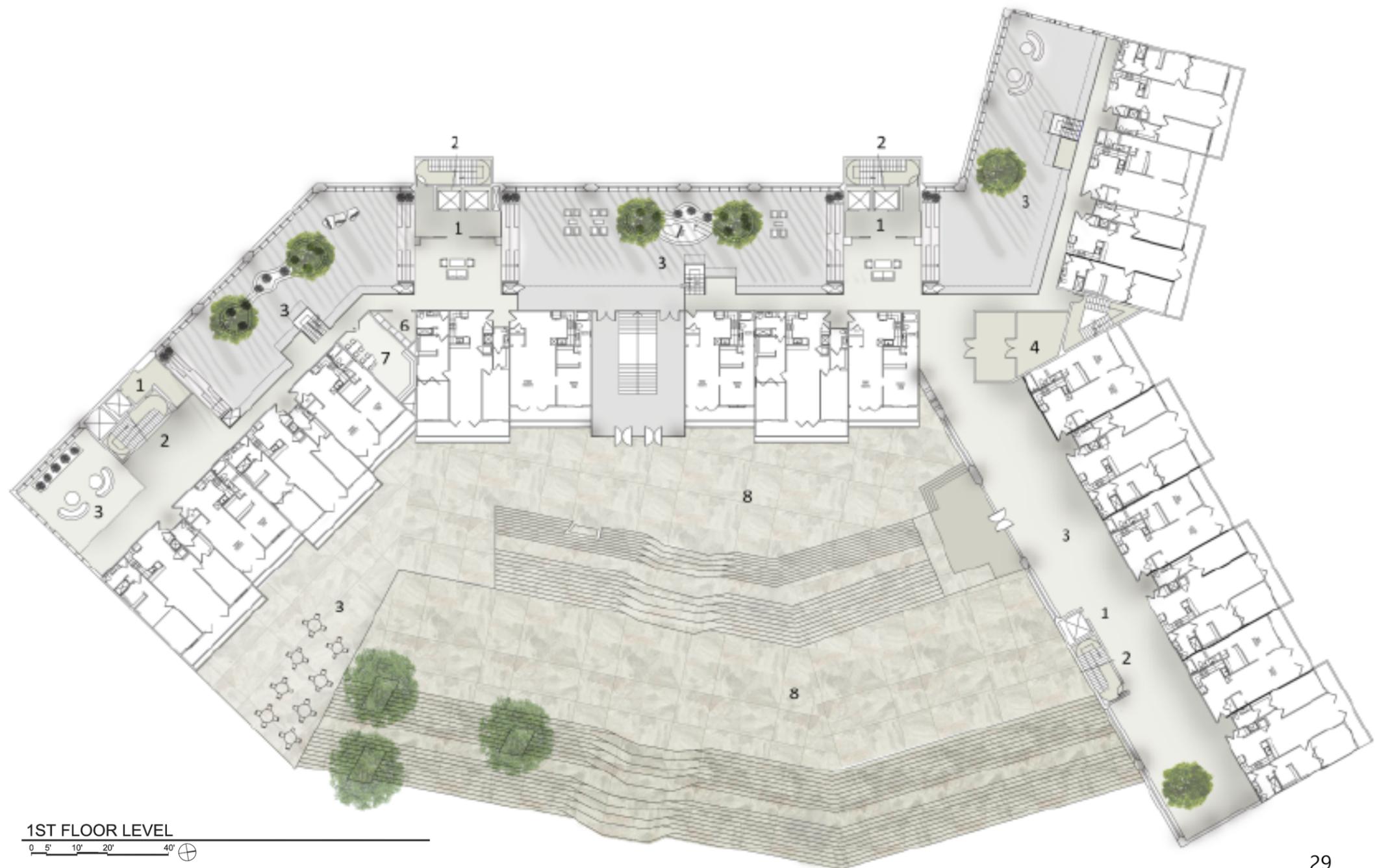




- 1 ELEV. LOBBY
- 2 FIRE RATED STAIR(2HR)
- 3 COMMUNITY SPACE
- 4 MAIN OFFICE
- 5 COMMERCIAL
- 6 PARKING ACCESS
- 7 RESTAURANT
- 8 SQUARE
- 9 DAYCARE CENTER
- 10 ENTRANCE

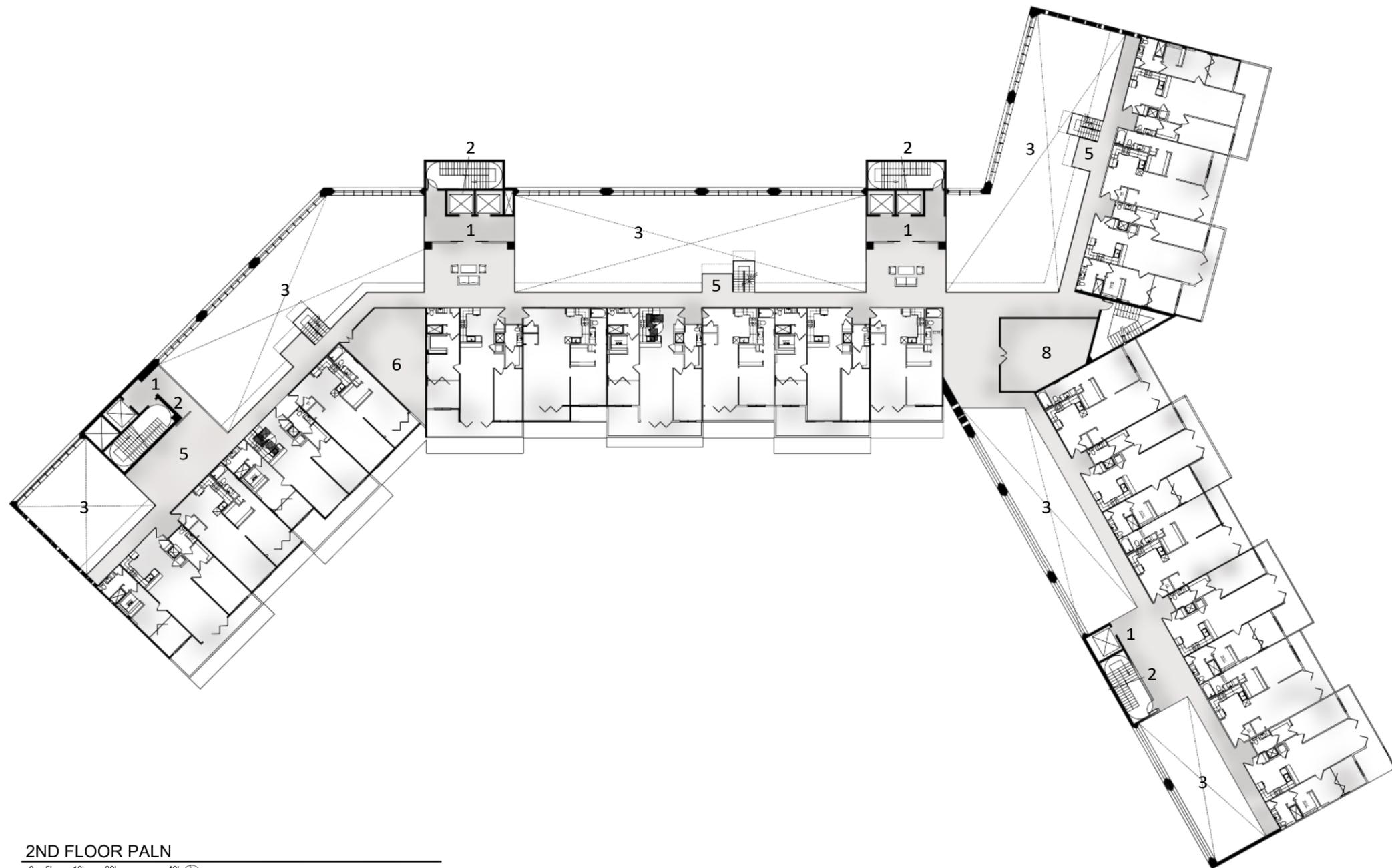
GROUND LEVEL PLAN

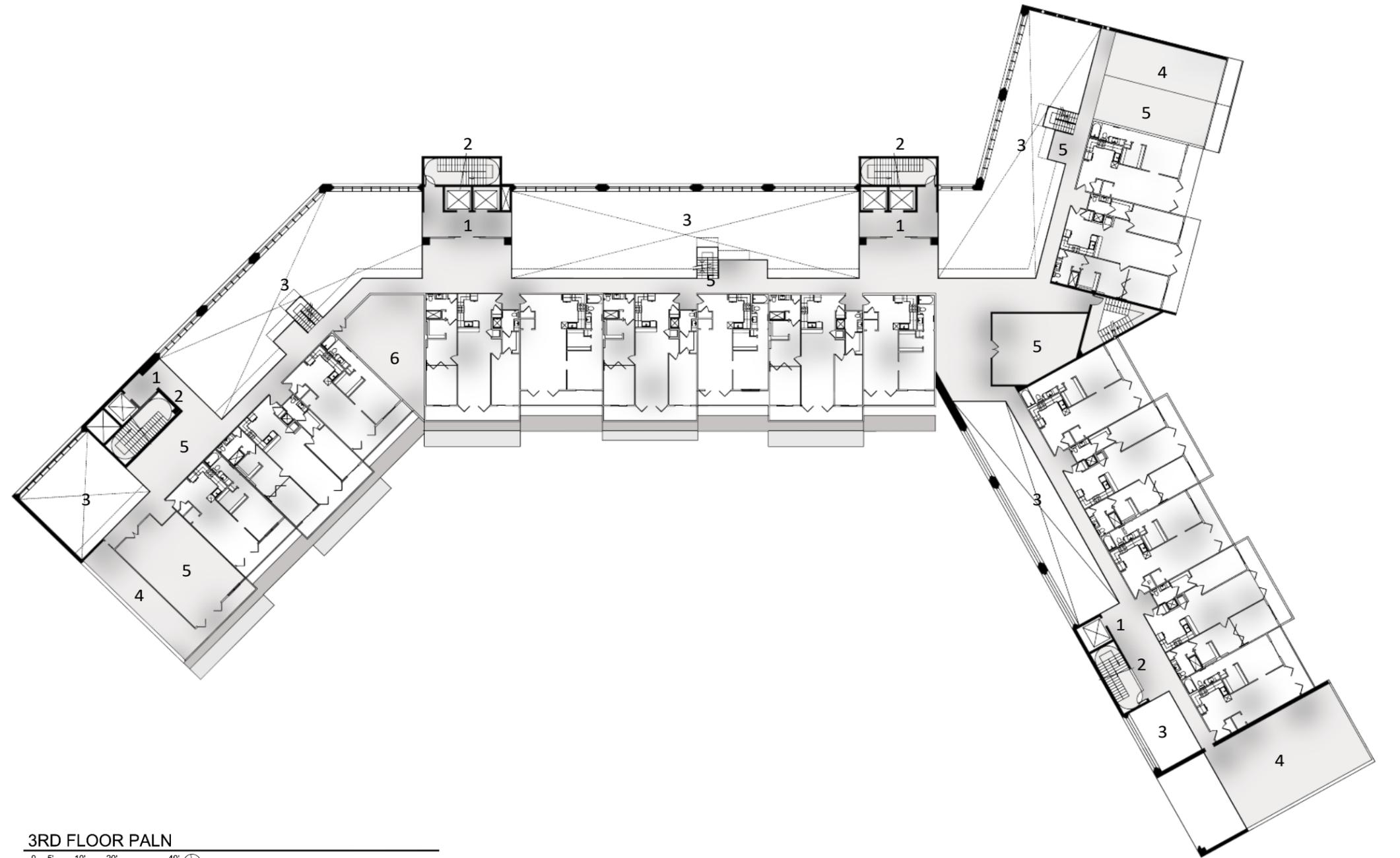




- 1 ELEV. LOBBY
- 2 FIRE RATED STAIR(2HR)
- 3 COMMUNITY SPACE
- 4 MAIN OFFICE
- 5 STORAGE
- 6 TRASH AREA
- 7 KITCHEN
- 8 SQUARE

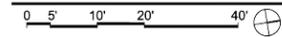
1ST FLOOR LEVEL  
 0 5' 10' 20' 40' ⊕

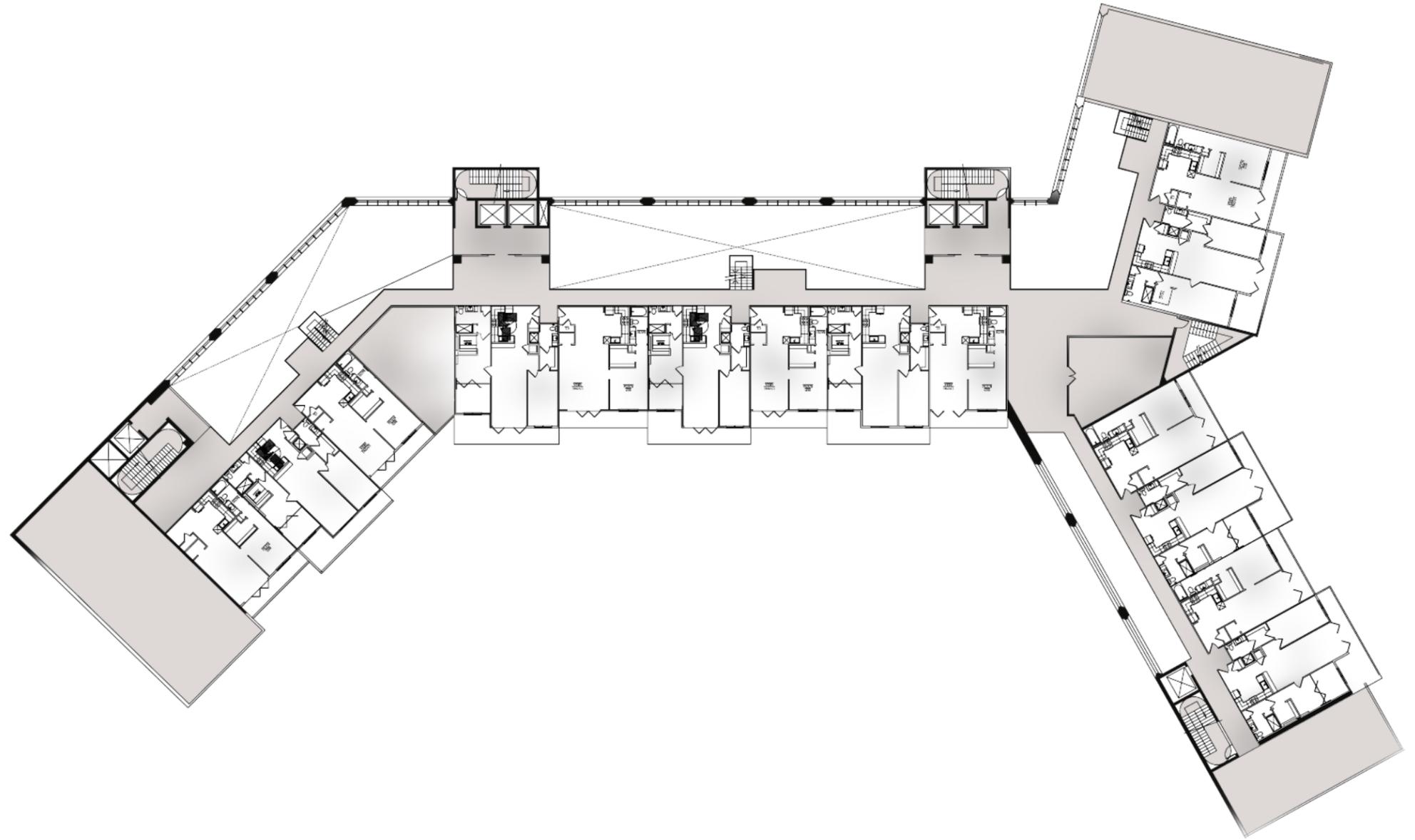




- 1 ELEV. LOBBY
- 2 FIRE RATED STAIR(2HR)
- 3 OPEN BELOW
- 4 ROOF TERRACE
- 5 COMMUNITY SPACE
- 6 TRASH AREA

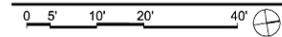
3RD FLOOR PLAN



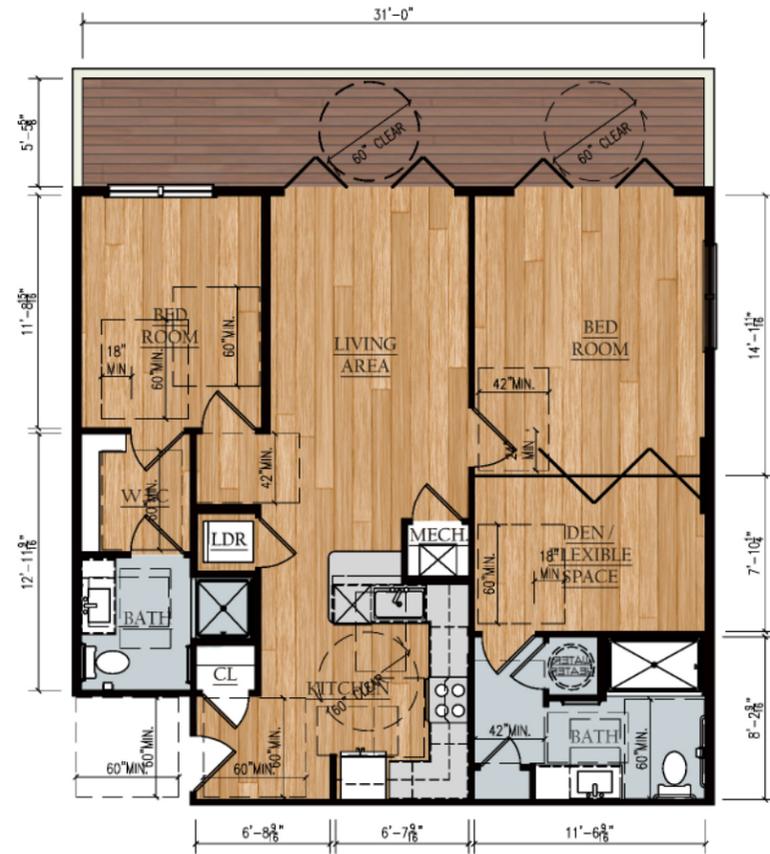


- 1 ELEV. LOBBY
- 2 FIRE RATED STAIR(2HR)
- 3 OPEN BELOW
- 4 ROOF TERRACE
- 5 COMMUNITY SPACE
- 6 TRASH AREA

4TH FLOOR PLAN



# Unit Floor Plans



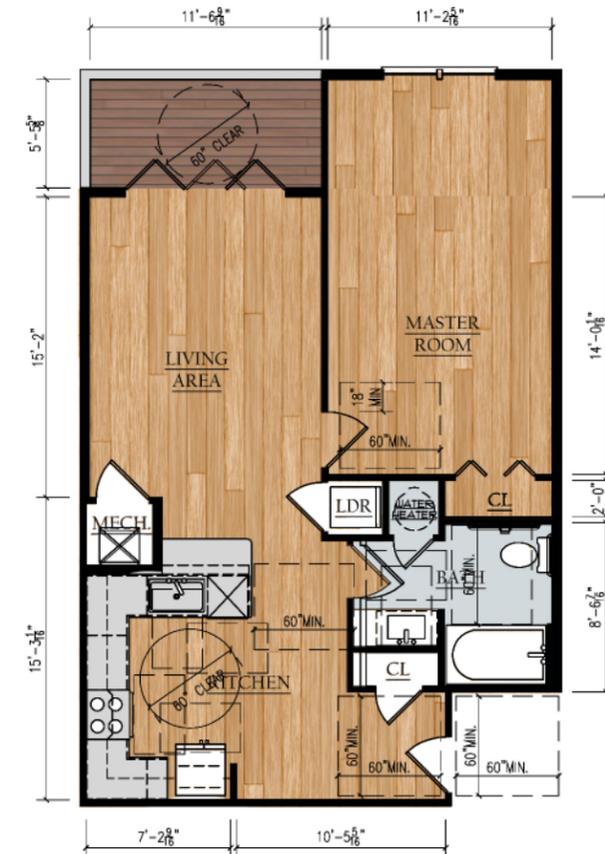
○ UNIT A FLOOR PLAN  
SCALE: 1/4" = 1'-0"



② UNIT 2 FLOOR PLAN  
SCALE: 1/4" = 1'-0"

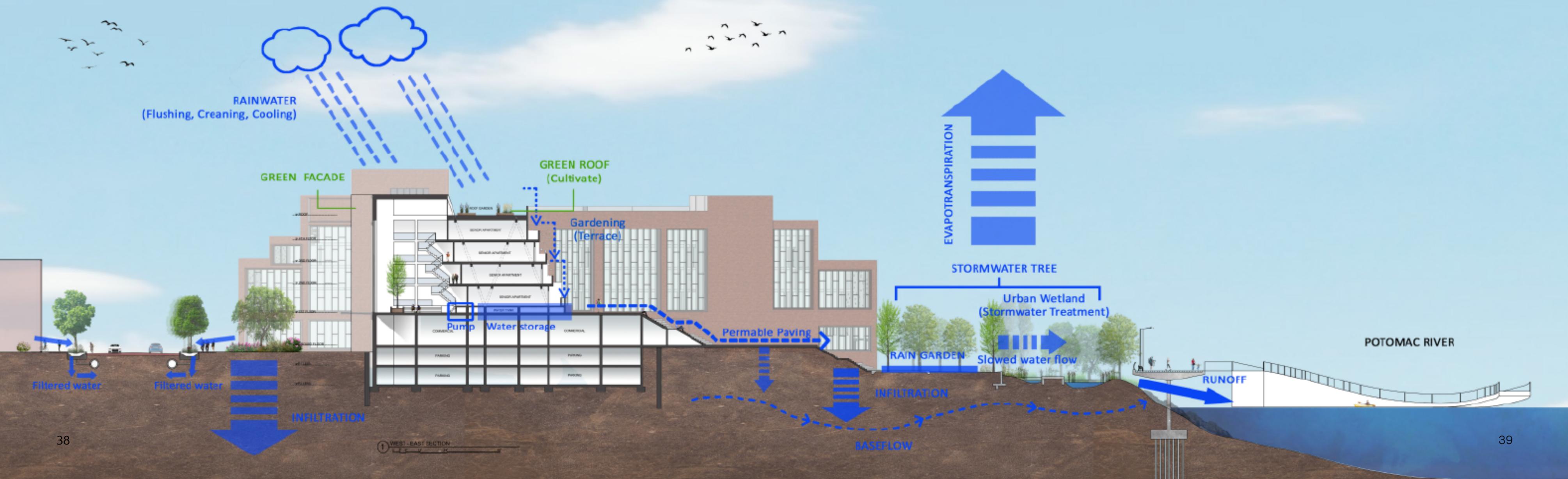


③ UNIT C FLOOR PLAN  
SCALE: 1/4" = 1'-0"



④ UNIT D FLOOR PLAN  
SCALE: 1/4" = 1'-0"

# Building Section & Water circulation

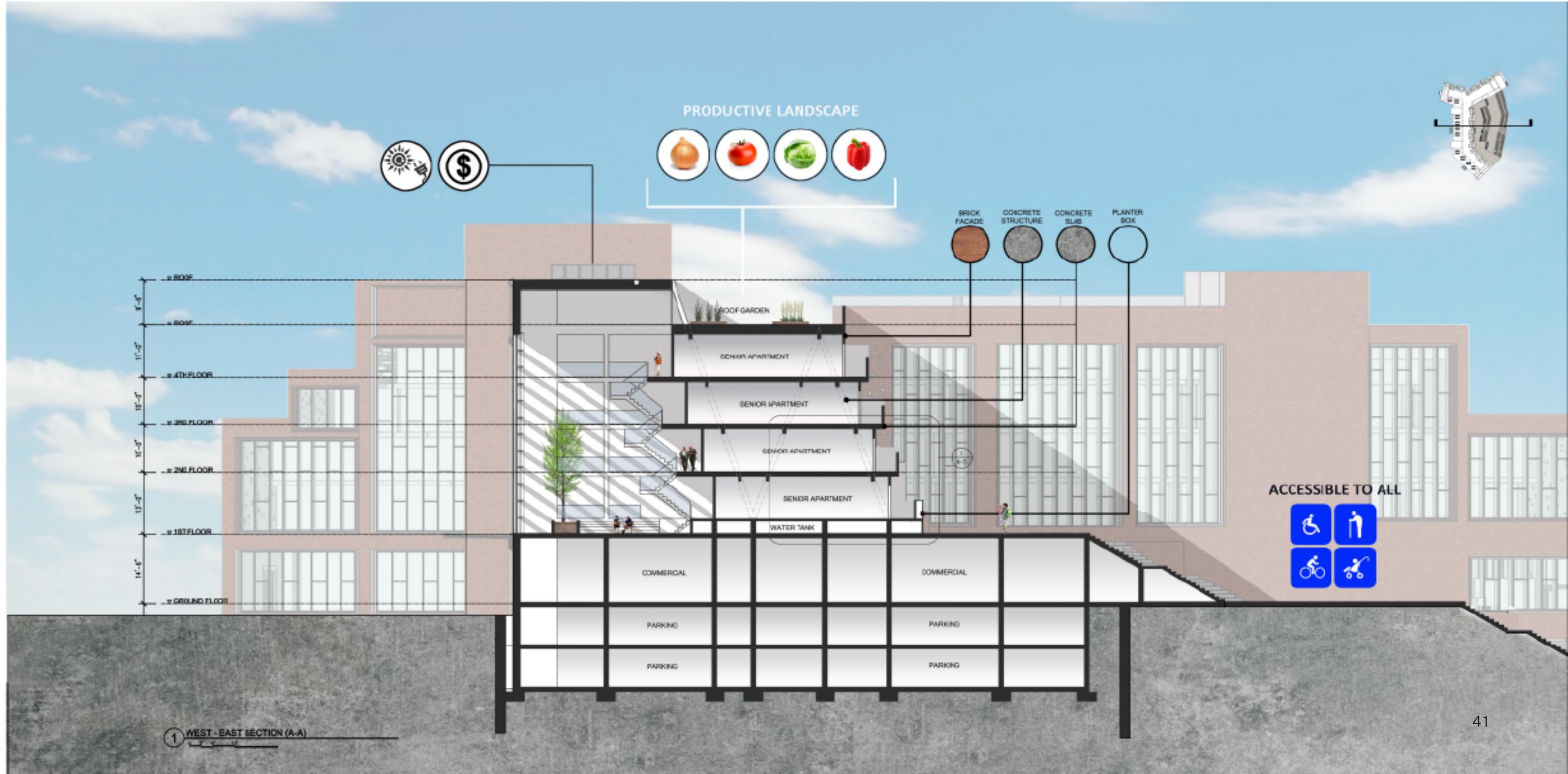


## West-East Section

In this section could see how to stepping back the residential units and how to connect with open community space and sturcture. Building has base podium structure. After the columns rise between the car parking spaces, diagonal columns support the walls of each unit, and digonal beams support each terrace. Between commercial and residential, a huge water tank is located, allowing water to be reused.

Community space which is located west side, there are many of sunlight, huge vertical and horizontal louver control the sunlight. Various activities are guaranteed by providing shelter for the elderly who are not affected by climatic conditions.

At the roof garden, we can learn about nature with gardening and cooking vegeta- bles themself, they can practice environmetal protection

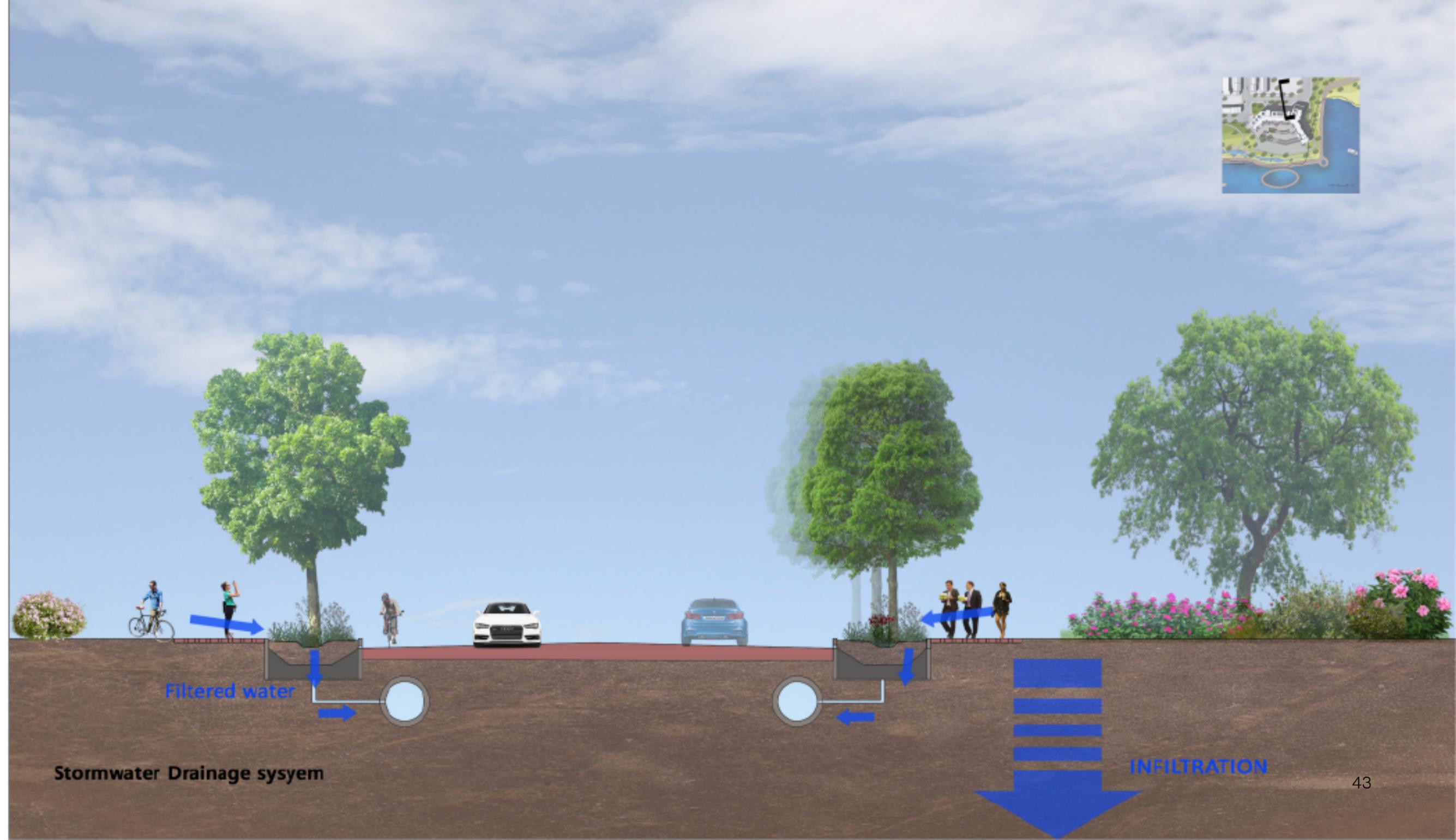


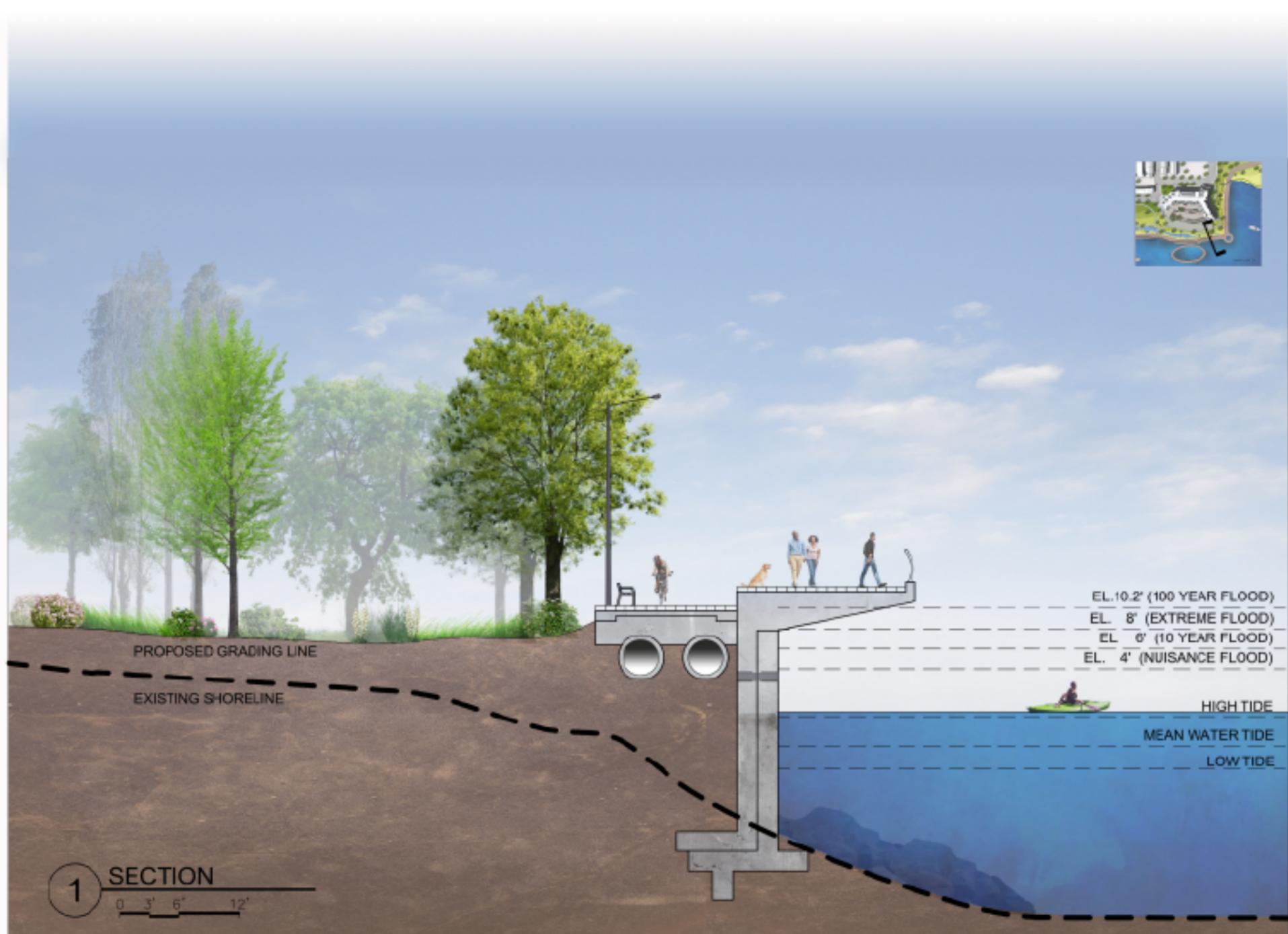
## Flood mitigation componets of Sections

To improve the capacity and functionality of strom water drainage, applied many kind of mitigation elements. The local storm driainage system between N union St. and water front direct stormwater flow into building pump station.

Extension of the promenade to Founders park. That makes new shoreline. Structural bulkhead raised the shoreline elevation to 8ft. It will reduce the frequency and inpcat of flooding. Also it will provide flood risk reduction up to 100 year return period storm events.

Boardwalk bridge extended from Oronoco Bay Park. Boardwalk provides additional circulation along the waterfront. It allows to access to the Oronoco St.'s edge and views over the Potomac river.







East Elevation

0 5' 10' 20' 40'



West Elevation

0 5' 10' 20' 40'



South Elevation

0 5' 10' 20' 40'



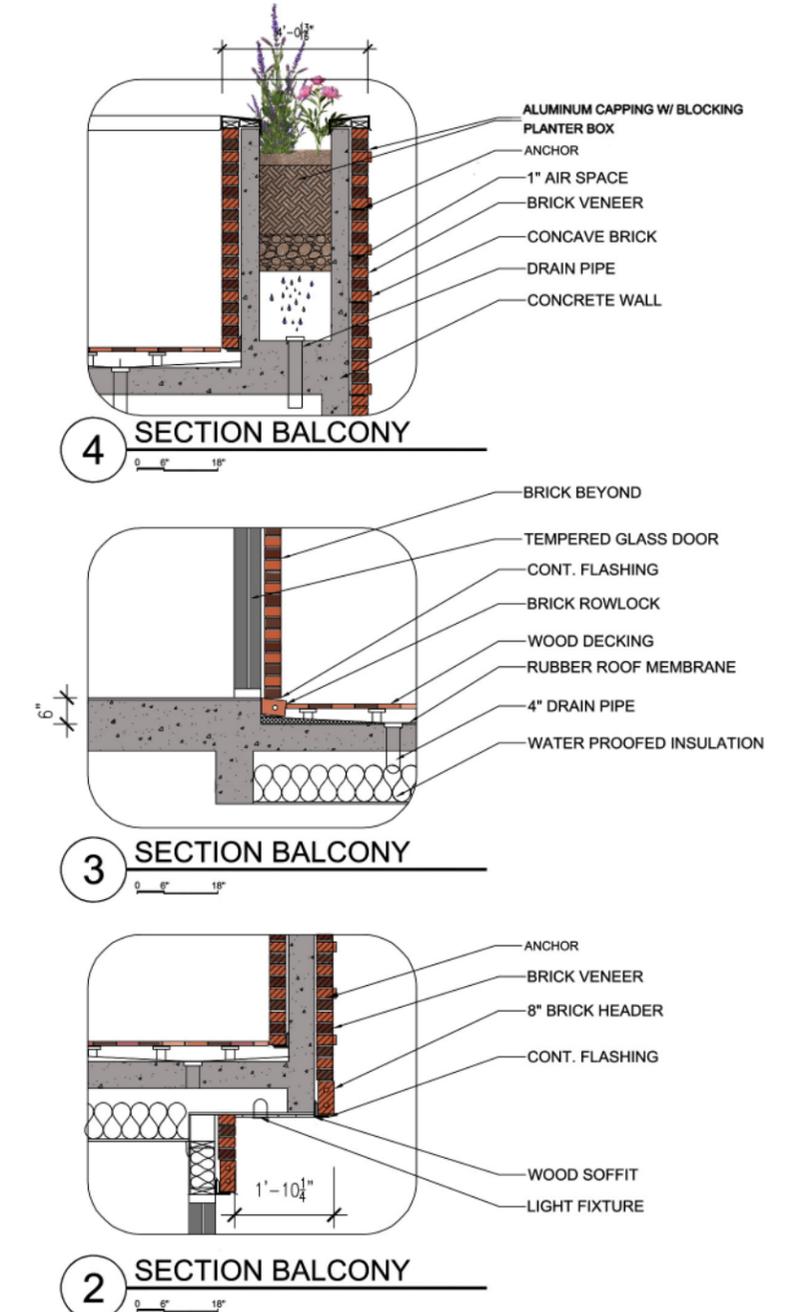
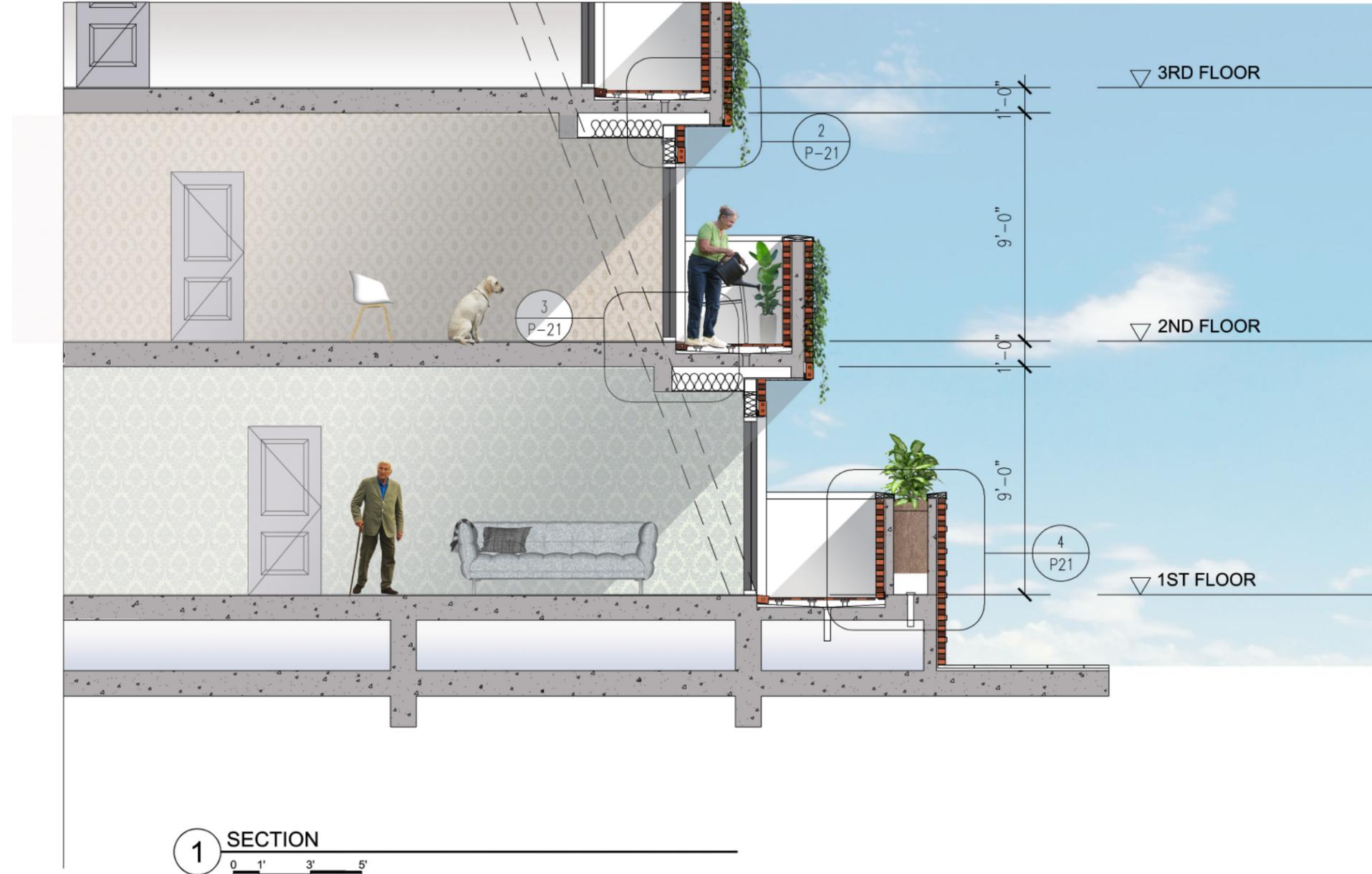
North Elevation

0 5' 10' 20' 40'

## Residential Section & Detail

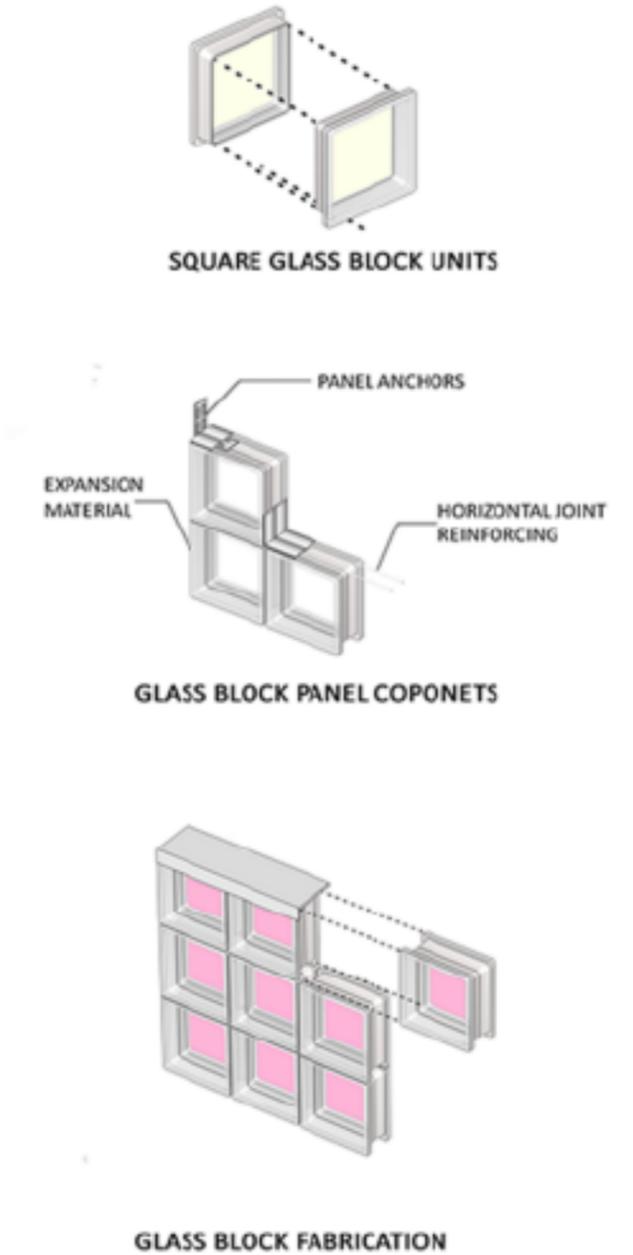
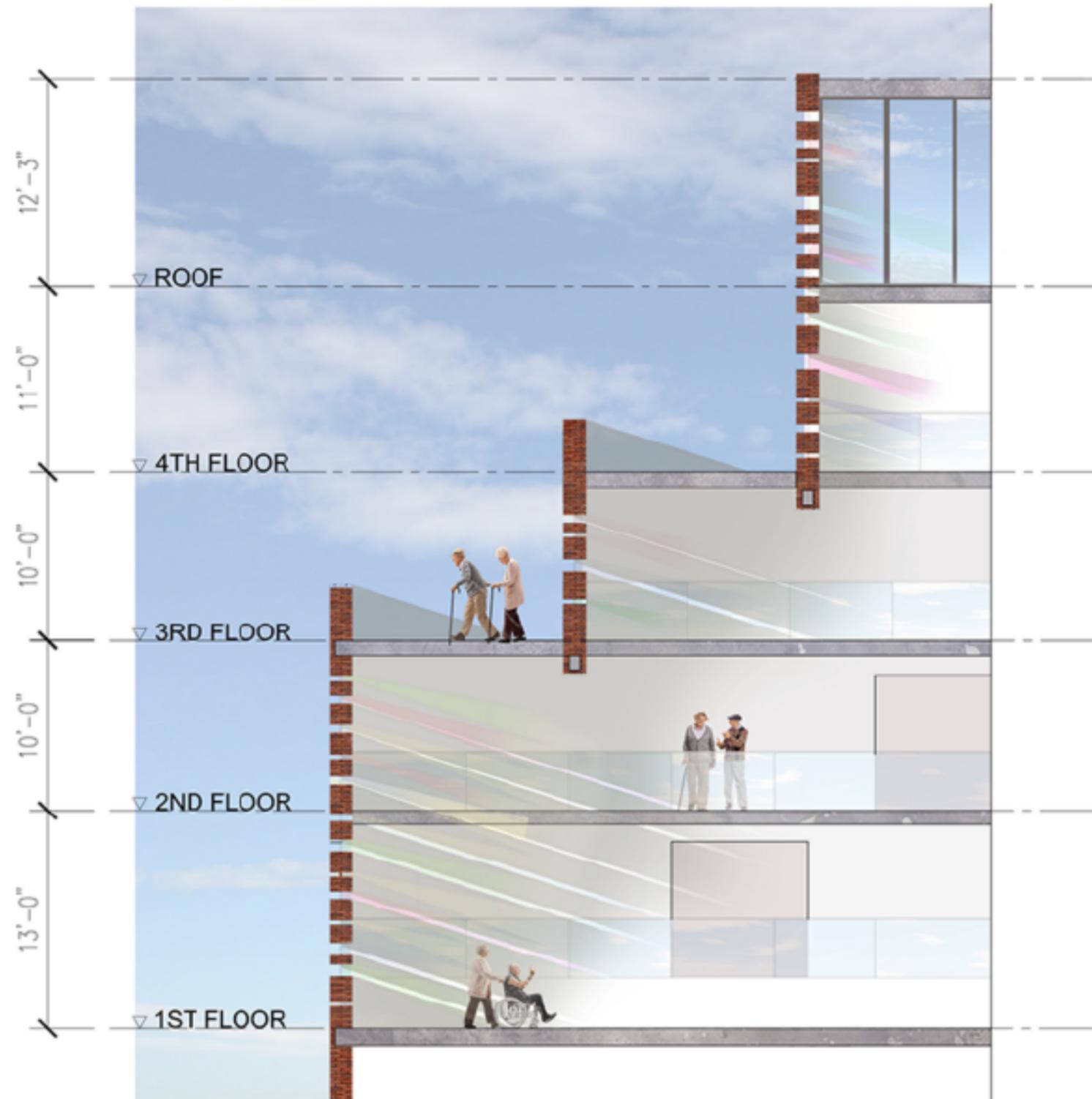
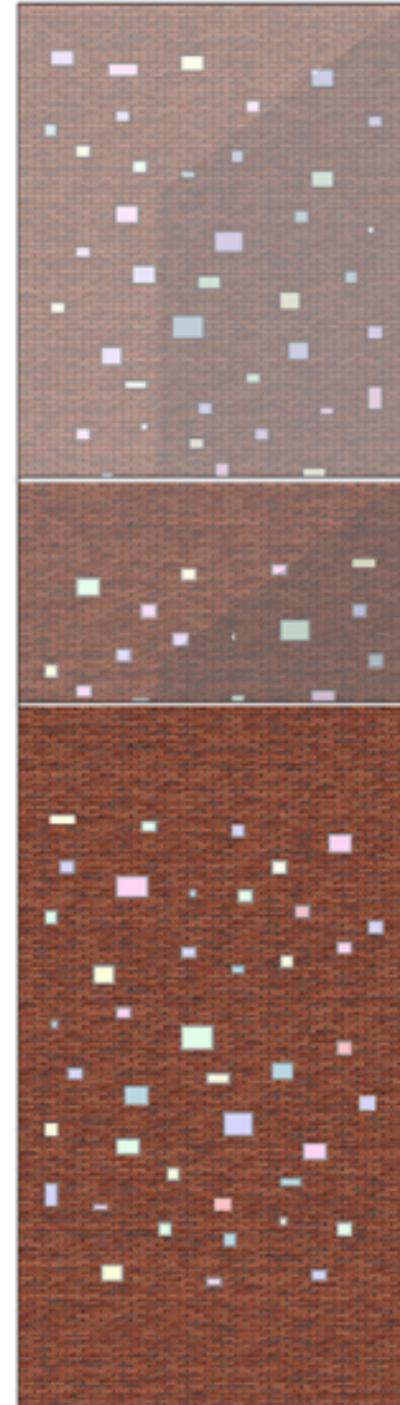
The first factor to consider in residential for the elderly people that is the physical condition changed with aging. The time and distance experienced by the elderly who cannot move easily. So I designed to feel the emotional change in every element encountered while moving. It is designed to ensure that personal space has provided, while elderly people can interact with other people. The space where the elderly can rest with each other. The environment space and community space can be connected naturally.

Stepping back terrace is good place to communicate each others and control their amount of sunlight. In addition, throughout gardening, they have a good influence emotionally.

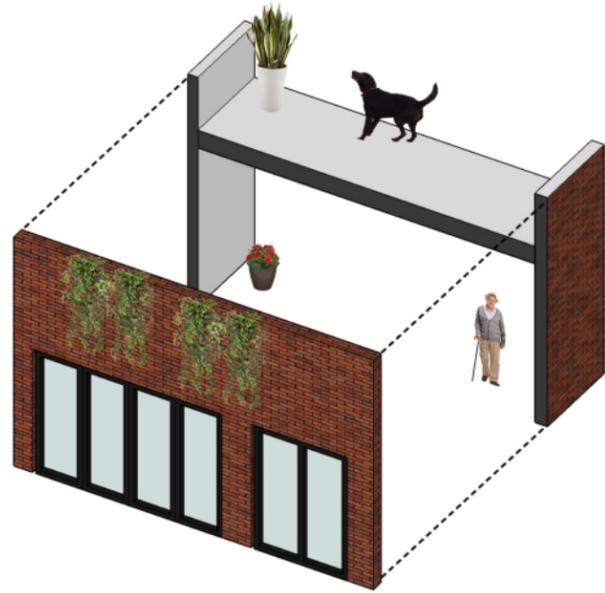


## Boundary and Crack

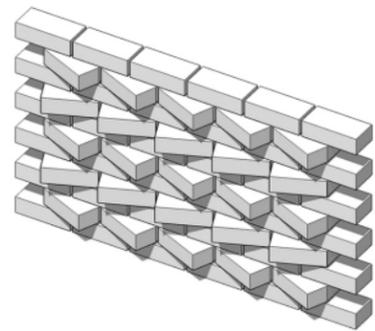
The crack is a space that exists on the boundary. The crack is a passage through a boundary. The crack is a passageway that borders inside and outside. The boundary forms an area of space distinction between one territory and another. It can see the sky and it can be also see the waterfront through the crack. Colorful lights and shadows that pour through red bricks can create a space that varies from moment to moment. The changes that light and shadow produce can notice changes in time and also have extended continuity of spatial depth. Due to visible waterfront through the crack, Architecture and humans will be able to communicate.



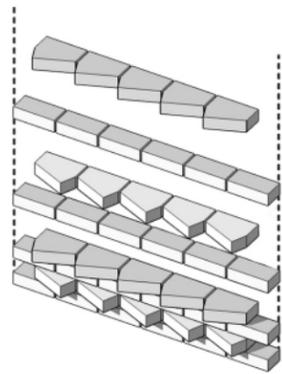
FACADE ELEMENTS



3D Axono view



Assembling drawing



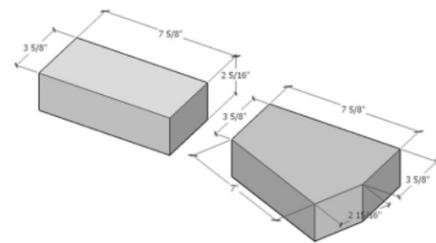
Odd-row top view



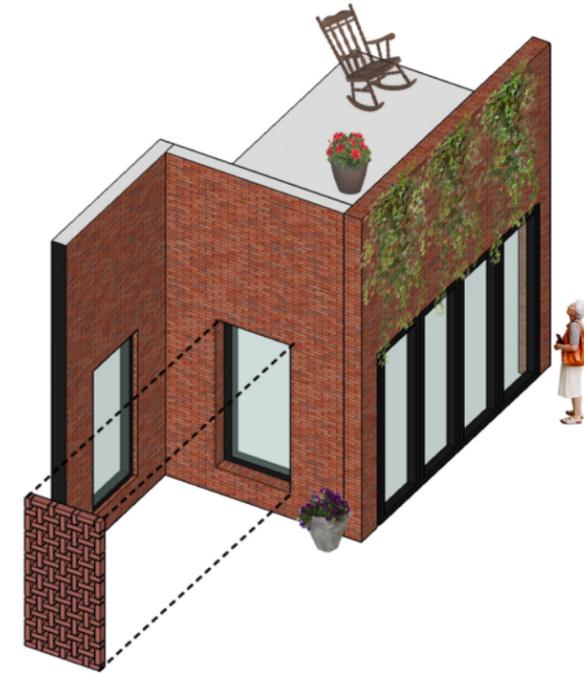
Even-row top view



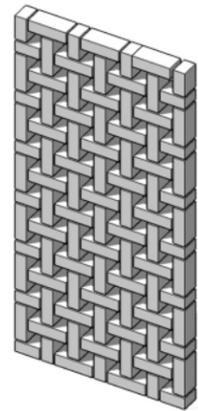
Brick detail



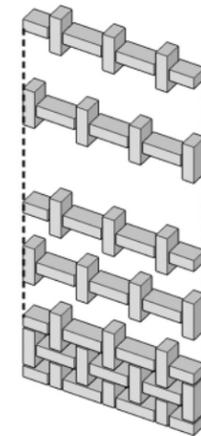
FACADE ELEMENTS



3D Axono view



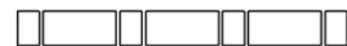
Assembling drawing



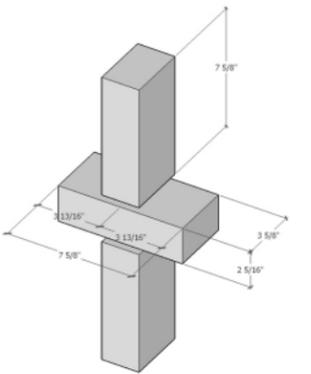
Odd-row top view



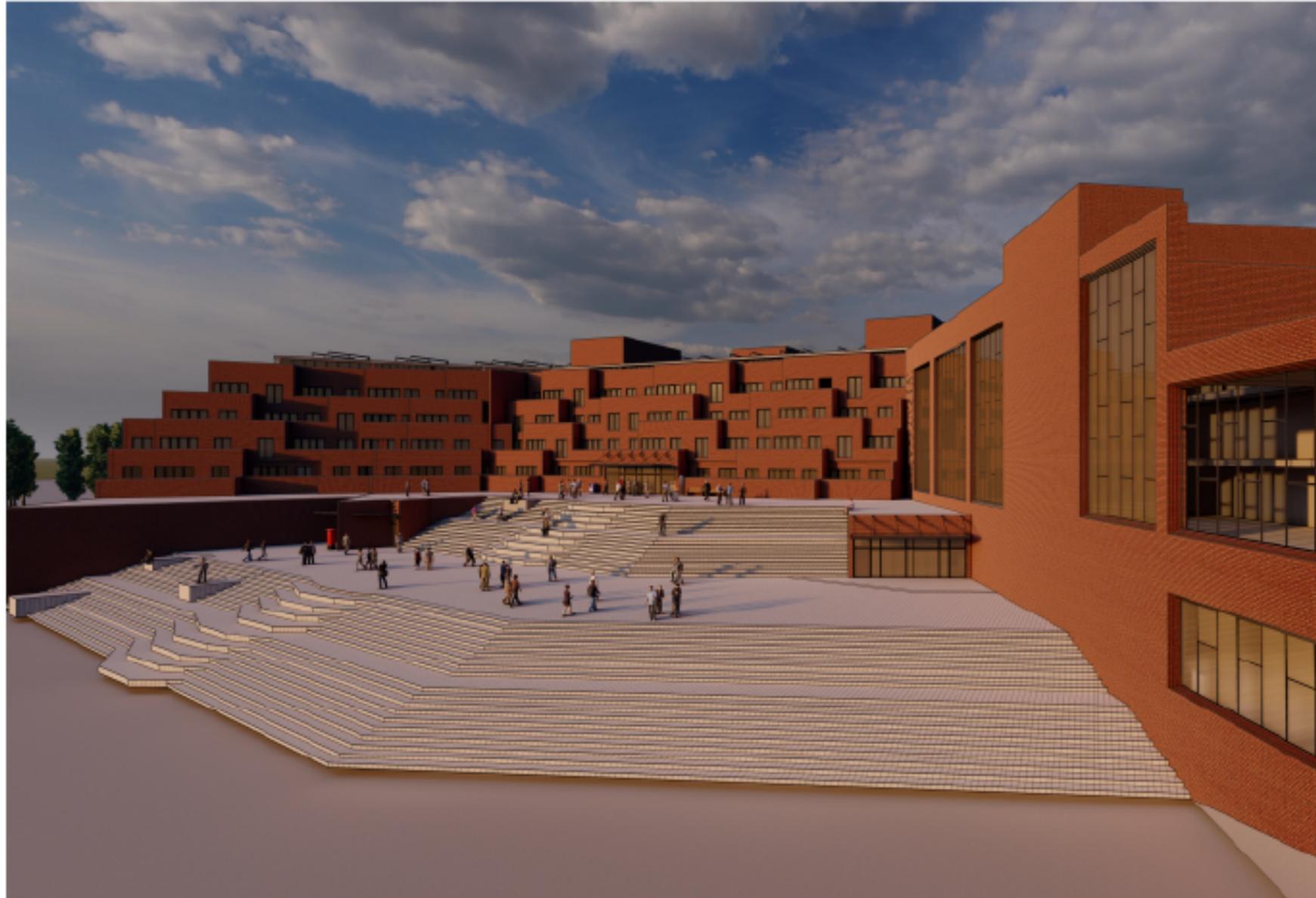
Even-row top view



Brick detail



East side of Perspective



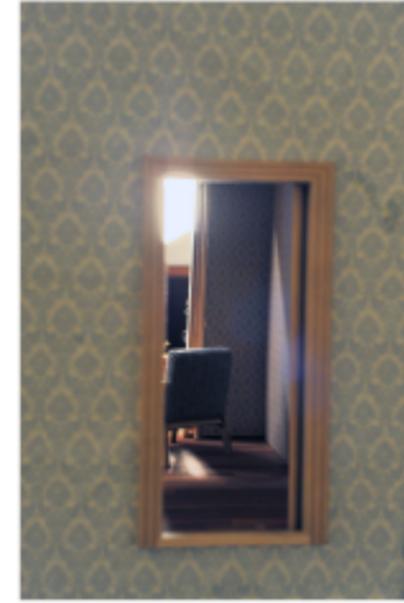
West side of Perspective



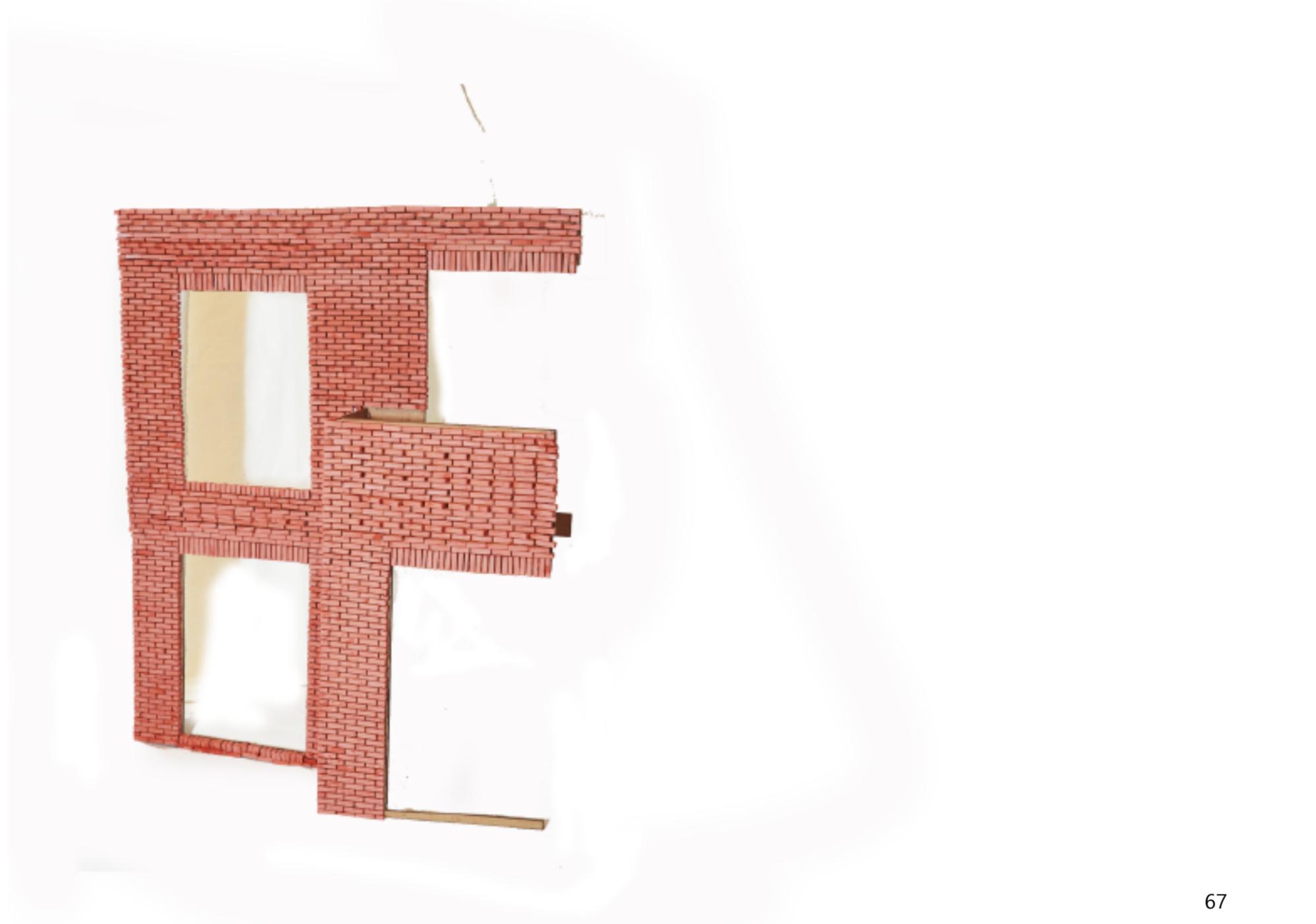
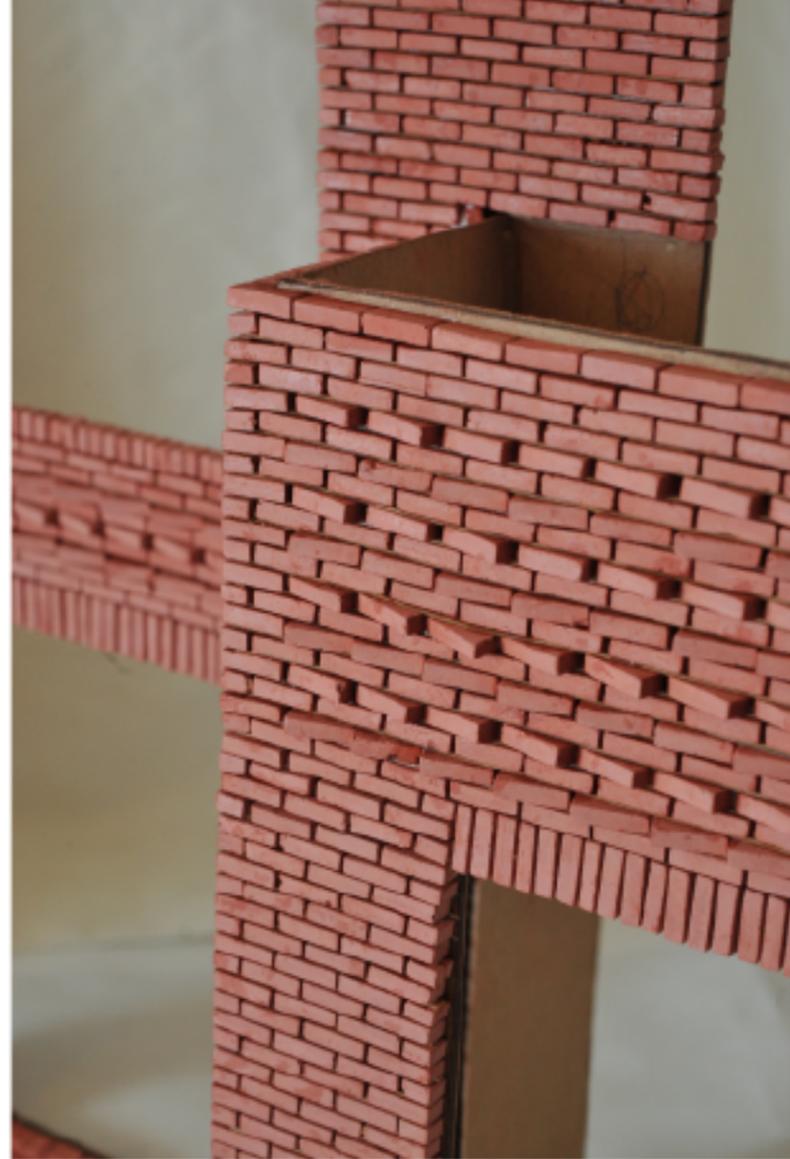
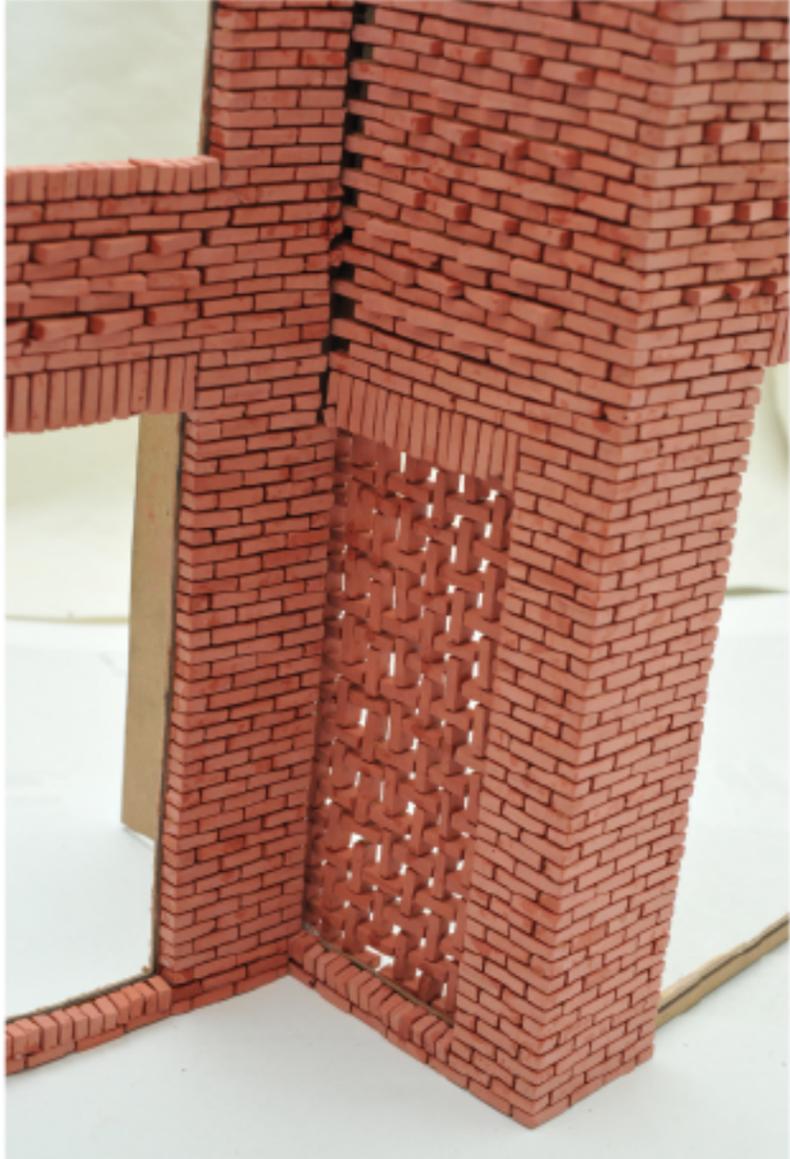
## Interior Perspective



Shadowbox Model Scenario



Detail Facade Model



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- Yearly Rainfall Precipitation in Alexandria (Evaluation and recommendation of Mitigation Measures. URS Corporation 2010)  
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