

# Sustainable Design Of A Residential- Mixed Use Mid-Rise In The Junction Triangle Neighbourhood

by

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A thesis

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### *Author's Declaration*

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.



## *Abstract*

The purpose of this thesis is to design and present building strategies for housing that demonstrate efficient well-integrated continuity between human, nature, and technology for a high – mid-density building in a populated urban environment on a main avenue in Toronto’s Bloor Street south and the West Toronto rail path. The building design incorporates sustainable strategies such as Passive cooling methods, energy generation, Rainwater harvesting, CO2 consumption, Vertical Integration of vegetation, Natural ventilation, Daylight penetration and constructed wasteland for rainwater treatment. The objective is to achieve a better state of mental and physical health for the occupants and their neighbourhood. The thesis proposes these design strategies without the constraint of financial viability in this day and age, so as to promote such methods and mentality in forthcoming constructions.

The thesis asks, how can Architects participate in reforming our society with today’s ever-changing needs? What are those most pressing issues? How can architecture tackle these issues from its own standpoint? The thesis takes the stand that Global warming and mental health are the primary contemporary issues in developed countries, subsequently, in developing countries, global warming will have the highest devastating effects on the most fragile and vulnerable settlements. In order to steer the planet away from an ecosystem collapse and to reconstruct that environment, we need to address humanity’s manipulation of the environment and change the makeup of the physical spaces we occupy. The purpose of this thesis is to research by design in the specific setting of Bloor St South meets West Toronto rail path so as to find the best possible solution regarding overall health and sustainability.

## *A*cknowledgements

I would like to thank my great professors Marie-Paule Macdonald, Val Rynnimeri and David Correa who helped me pursue this thesis and my external examiners Michael Piper, Georg Rafailidis, my very good friends Melika Mehdizadeh, Jennifer Jimenez, Sameerah Aumjaud, Raymond Fan and Snober Khan, and finally to my lovely supportive mother Alice Sabet who has always been the backbone of all my success.

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# 01. INTRODUCTION

## The Scenario

Reflecting on all the damage we as the human race have irreversibly inflicted on our planet in the Anthropocene era, it would seem we would have understood the urgent need to redefine the actions that led us to this position, but this has not been the case. As developed industrial nations have been most responsible for this damage, many traditional cultures still hold more sustainable living methods. Architects can have the capability to influence the masses towards better ideals with their architecture. Moving past Vitruvian architecture to a more versatile, efficient, habitat friendly, engaging and eco-friendly practice could help people understand and re-evaluate their practices.

This much-needed practice in architecture can lead to many questions. For how many different species do we design for? How responsive could the building be to its surroundings and users?<sup>1</sup> It seems that answering these questions generally fall into the theoretical topic of Posthumanism in the Anthropocene, but this topic has operated in a vastly hidden territory and not been explored well enough. From what is understood thus far posthumanism is the challenging of the long-standing conception of the built environment as an object autonomous from the environment and governed by disciplinary interiority. Lourie Harrison draws to the polarized comparison rival futurists Francis Fukuyama's *Our posthuman future* (2002) that describes the dehumanizing effects of biotechnological advancements, versus Ray Kurzweil's *The singularity is near* (2005) which promotes a positive merge of human intelligence with technology by 2050 lies a posthuman territory that reflects the entangled relation of human, technology and environment.<sup>2</sup>

## Climate Change

Human-made climate change is undeniable, ravenous, and occurring faster than scientists initially predicted. Causes are mechanistic and well understood. We have introduced immense quantities of greenhouse gasses into the air that are intensifying the mechanism through which solar heat is trapped by our atmosphere, thereby altering the processes responsible for creating the delicate temperature range that has engendered and supported life on earth for the last 3.5 billion years. The main culprit is carbon dioxide produced by the combustion of fossil fuels. The initial result is a general warming trend, the infamous global warming, which has already begun to trigger a domino effect of changes to other environmental variables such as global ocean and air currents, carbon sinks and precipitation patterns to name a few.<sup>3</sup>

The purpose of this design is to limit the use of energy and in consequence fossil fuels for heating and cooling and also contribute to the consumption of co2 gases, in turn creating a healthier microclimate.

## Climate Change Is The New Gravity

Buildings are a big part of the equation of global warming, with their operation alone making up 30 to 40 percent of industrial society's worldwide carbon footprint (Graham S Wright). This subject brings us into a familiar category, the complex intersection between the built and natural environments that generally falls under the broader mantle of sustainable and resilient design, but sustainability is a vague concept and can be defined as anything from a moral argument to an emotional plea to marketing strategies. In fact, sustainability can easily be described as the process of maintaining something at a specific level. If we agree that in this case, the thing is life on earth and the level is industrial human society, then, for now, sustainability becomes quantifiable, and the metric is carbon. Clarified by these simple definitions, sustainable and resilient design becomes a mandate and a projects success or failure is quantified through carbon emissions.

As designers we know the constraints generate beauty, Gravity has not mandated limits but created opportunities. Climate change must become the new gravity; We have to accept the fact that climate change is the new baseline design constraint for the built environment. Although gravity as a design constraint guides compliance through immediate feedback, climate change will not baby us. We have to define its parameters for design and create our own short-term feedback inputs. Carbon as the metric of that feedback will not limit our expression any more than gravity. The only thing that has really changed is the stakes.

As the realities of global warming become increasingly evident, attention has turned to direct mediation strategies focused on warming processes like the urban heat island effect, CO2 emissions, and Energy consumption. Increased urban density, heat production from cars, air conditioning, increased impermeable surfaces, vegetation removal and air pollution all contribute to the urban heat island effect. Guidelines for mediating the warming of cities encourage the construction of green infrastructure in the form of green roofs and green walls, increased vegetation and the adoption of reflective and light-coloured surfaces for roofs and paving. Emerging research suggests that such generalized recommendations may not achieve the desired outcome. Studies warn us against the application of a one-size-fits-all approach to climate change mediation.<sup>4</sup>

## Our Dependence On Energy

As aforementioned at the heart of what is not sustainable are the carbon dioxide (CO<sub>2</sub>) emissions resulting from fossil fuel dependence, albeit so simple and consequences so high, we have a severe problem finding a solution. The fact is over 80 percent of the energy we use today comes from fossil fuels (coal, oil and natural gas) and quitting fossil fuels at once would essentially be synonymous with the end of prosperity. Although technology or machine power of the industrial revolution is given credit for our advancement, it would not have had much of an economic impact without unlocking the vast stores of fossil fuels to run those machines. From the beginning of the industrial age in the 19th century through to today, economic activity has been closely related to energy use.

What can we as a collective species and more specifically architects do in order to minimize our dependence on fossil fuels?



## Other Pressing Issues Of Sustainability

Research warns us against a rote approach to sustainable design. As an example, in a 2015 article in the Nature journal highlights that in some cases rooftop plantings may, in fact, increase night-time temperatures, “cool” roofs can slow wind and limit rain precipitation, green infrastructure on buildings can have minimal impact on thermal comfort at street level, and extensive tree planting can actually increase humidity. Therefore, site-specific strategies need to be taken into consideration for a more viable outcome.

Furthermore, how can a building increase mental health and what are its guidelines?

An article in the Architects Journal conveys a series of instructions from a therapists point of view for psychiatric hospitals, but these guidelines need not be restrictive to one type of building.

1. High ceilings: Reduce the feeling of pressure or claustrophobia.
2. Adequately sized rooms: Rooms large enough to give a sense of space.
3. The Possibility of observation: Corridors should not twist in ways that people cannot be seen.
4. Relaxation Areas: Rooms designed to promote relaxation with quiet lighting (perhaps coloured and dimmable), soft surfaces and so on.
5. Creative spaces for group interaction and arts: often these rooms are not adequately designed into buildings. Suites may be extensive and an art room small. Group therapy rooms should be large enough to be multi-purpose.
6. Use of gardens: nature offers quiet healing to troubled souls.<sup>5</sup>

## Sustainable Development

From what can be deduced from the recent construction of buildings in Toronto, one can argue in the last two to three decades, only a handful of buildings can be named that have sustainability aspects towards the environment. Even though this sustainability aspect only aims to achieve a zero energy consuming status, ambition can be set higher to produce energy and mitigate climate change. Furthermore, these green buildings are mostly comprised of an institutional function such as George Brown Colledge Waterfront Campus, TD Centre, RBC Waterpark Place, Royal Bank Plaza.<sup>6</sup>

Therefore, one can argue this line of thought should be taken into the residential sector especially with the vast development of mid to high-rise residential buildings since 2003. At the moment, sustainability in this sector is mostly comprised of high-end single-family homes with sustainability consultants that have mainly retrofitted these homes for solar panels and more insulated walls.

On the other hand, Toronto's condominium prices have hit an all-time high, the cost of a typical condo has risen to \$523,000, a 12.35% increase compared to the previous year (2017). This rise is the 7th monthly increase for prices, and the 5th consecutive all-time high, meaning it is becoming harder and harder for the younger generation to own or rent a dwelling.<sup>7</sup>

Therefore the issue becomes what can architects and developers do to tackle this increase. As it would seem, the primary precaution to take is to increase density.

With the change in the context of the Junction Triangle to its new cultural/residential functionality, increasing prices are prevalent. These new cultural institutions have drastically escalated the land values, in consequence, residential property prices have skyrocketed to an all-time high. Therefore, to create a cost-effective, viable option, the design will have to account for residents with lower income (such as upcoming Artisans) with modest condominiums and also increase density to prevent overall costs from soaring higher, in effect building less costly units for the users.

Leading questions that need to be addressed for the purpose of this design thesis are as follows.

1. How can a single building help reverse climate change?
2. What makes a building sustainable and resilient to its environment?
3. What makes a building more relatable to its users and in consequence improve overall health both physical and mental?

## Precedent Walkthrough

In order to better answer such questions, one can look to the past. Old civilizations had overcome these obstacles without the need for consuming tremendous amounts of fossil fuels, creating pleasant spaces in harsh climates. Furthermore more contemporary designs can also be drawn upon. The most influential precedents are stated as follows.





Fig 1. West Toronto RailPath- Bloor St Bridge

### The Green corridor connection

The purpose of this design is to extend the green corridor (west Toronto railway path) into the building to create a more extensive and sustainable biome as an example of all other buildings in the vicinity of the corridor.





Fig 2. Boroujerdiha House

### Solar chimneys of Kashan

In the harsh desert climate of Kashan, Isfahan Province, mansions such as the Boroujerdi house were fitted with numerous passive strategies to withstand the heat. The central system taken into consideration for the purpose of this design is the solar chimney.<sup>8</sup>



Fig 3. Port of Laft Overview, Qeshm Island

### Wind towers of the port of Laft

Perfected to an almost science, the masons and architects of such cities as the port of Laft on the Persian Gulf used wind towers to create mild temperatures of around 25-26 degrees in the 35 to 40 degree hot and humid climate predating the invention of electricity.<sup>9</sup>





Fig 4. Michahil Village, Persian Gulf

### Ice pits of ancient Persia

The ancient Persians used ice pits to create and store ice at night throughout the country.<sup>10</sup> This method is made a reality through the concept of thermal radiation and the fact that the atmosphere does not absorb wavelengths of heat between 8 and 13 microns known as the transmission window.<sup>11</sup> This system is comprised of a tall southern wall overshadowing a sunken body of water.<sup>12</sup>



Fig 5. Ford Foundation headquarters Atrium

### The Ford Foundation headquarters

KRJDA has been practicing synergistic and environmentally responsible design well before “green” building was in demand. Over their fifty year history, they have strived to maximize energy efficiency, minimize environmental impacts, and take advantage of smart and responsible building design strategies.<sup>13</sup>





Fig 6. Casa Ruta Del Sol's Front View

### Casa Ruta Del Sol's Sun Louvres

The three-story house designed by Christian Wassmann in 2015 in Miami Beach, is a concrete structure that dialogues with a 1930's bungalow and uses the sun as the central figure to promote the vitality and health of the inhabitants.<sup>14</sup>

## Thesis Structure

The set goals of this design are to achieve a sustainable and resilient building that correlates with its surroundings. In order to accomplish this task, the building is approached as an ecosystem and measures were taken to ensure the sustainability and resilience of such a system.

Firstly the primary goals of the system are set, taking into consideration the already present attributes of the natural and human-made neighbourhood, then build upon those attributes.

Secondly, draw upon already proven technologies and design apparatuses to minimize energy consumption, in turn, reducing carbon emissions and also create healthier and more productive environments. Such design details have established themselves over periods of hundreds of years to develop sustainable structures.

Lastly, define the design by its architectural drawings and further establish its encompassing attributes.

## Notes

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## 02. GENERAL PRINCIPLES

### Ecosystem Narrative

In order to design this thesis, the building was approached as an ecosystem, numerous series of different systems working together to achieve set goals. The ABC&E analysis is used to better understand the workings of such a system.

ABIOTICS      BIOTICS      CULTURAL      ENERGETICS

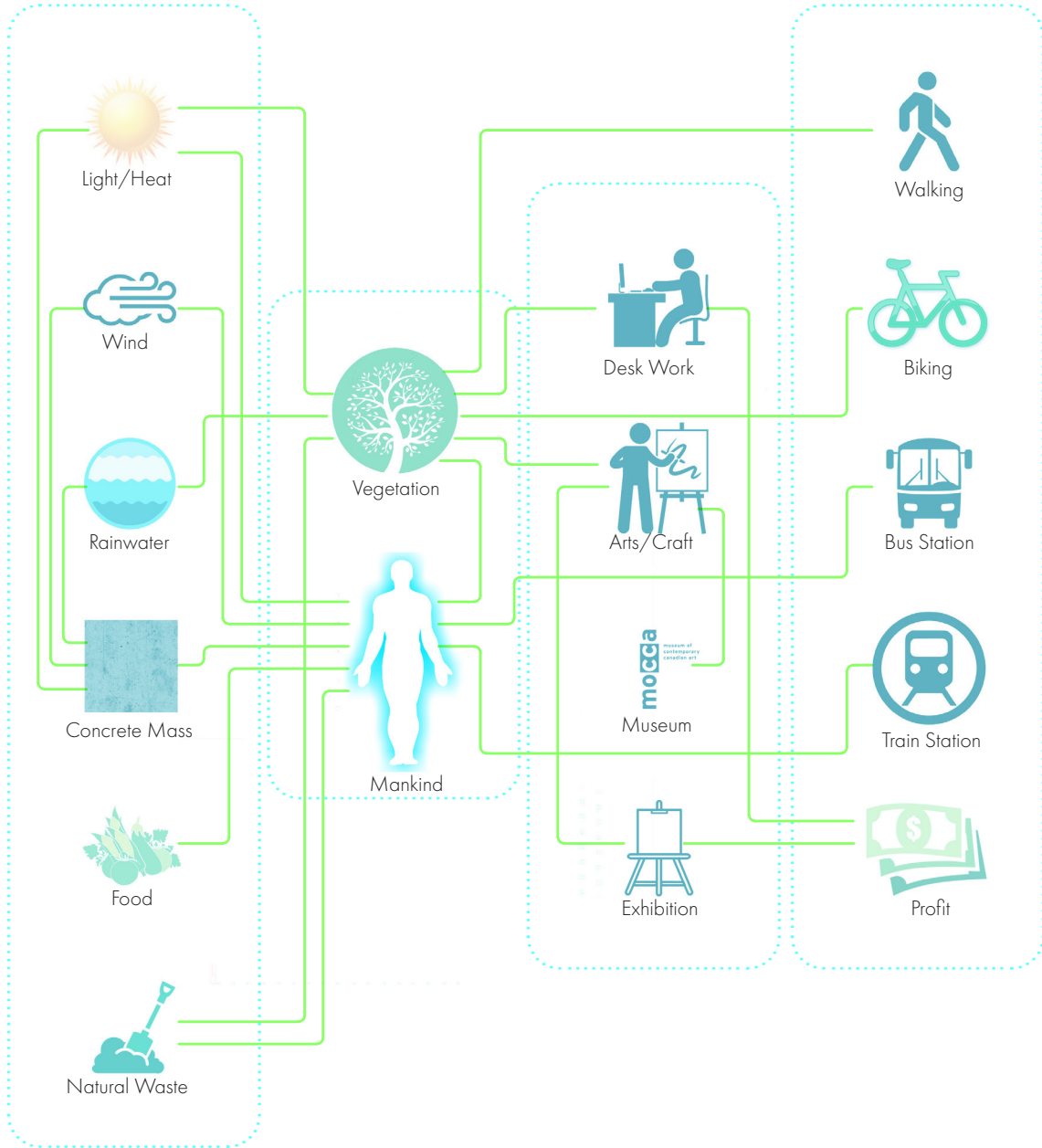


Fig 7. Ecosystem Narrative



### Abiotics

The Proper utilization of Light and heat, air flows, rainwater management, large mass and compost production are in effect.

### Biotics

The main actors in this system are comprised of vegetation and mankind, but one can argue wildlife such as birds and bees can also be considered.

### Cultural

Working spaces, workshops and the ability to showcase the craft.

### Energetics

Emphasis on walking, biking and public transport by means of buses and trains are utilized. Turning a profit from the art pieces produced is also a main attractor.

## Analysis Of The ABC&E's



Fig 8. Infilled Riverbeds

**Disappearing Rivers**

Coloured by year last seen on map

- 1802
- 1827; 1830; 1834; 1842; 1848
- 1851; 1852; 1853; 1857; 1858; 1862; 1863; 1868
- 1872; 1875; 1876; 1882; 1884; 1885; 1888; 1889
- 1890; 1892; 1893; 1894
- 1901; 1902; 1903; 1909; 1910
- 1913; 1915; 1918
- 1921
- 1927
- 1931; 1932
- 1937; 1942
- 1949
- 2017

River Beds

The railway path, once a riverbed, was a ravine infilled in 1942 to make way for Toronto's growth. This fact would imply that the soil underneath the infill should be extremely fertile due to the river carrying minerals and nutrients downwards from the hills surrounding the city.



Fig 9. Toronto Vegetation Map

### Green Areas

Due to the industrialization of the Junction Triangle neighbourhood in the past century, vegetation and ravines that once existed adjacent to the site had been landfilled and utilized as industrial land. These lands are currently being revitalized for the purpose of the Railway Path with trees and plants.



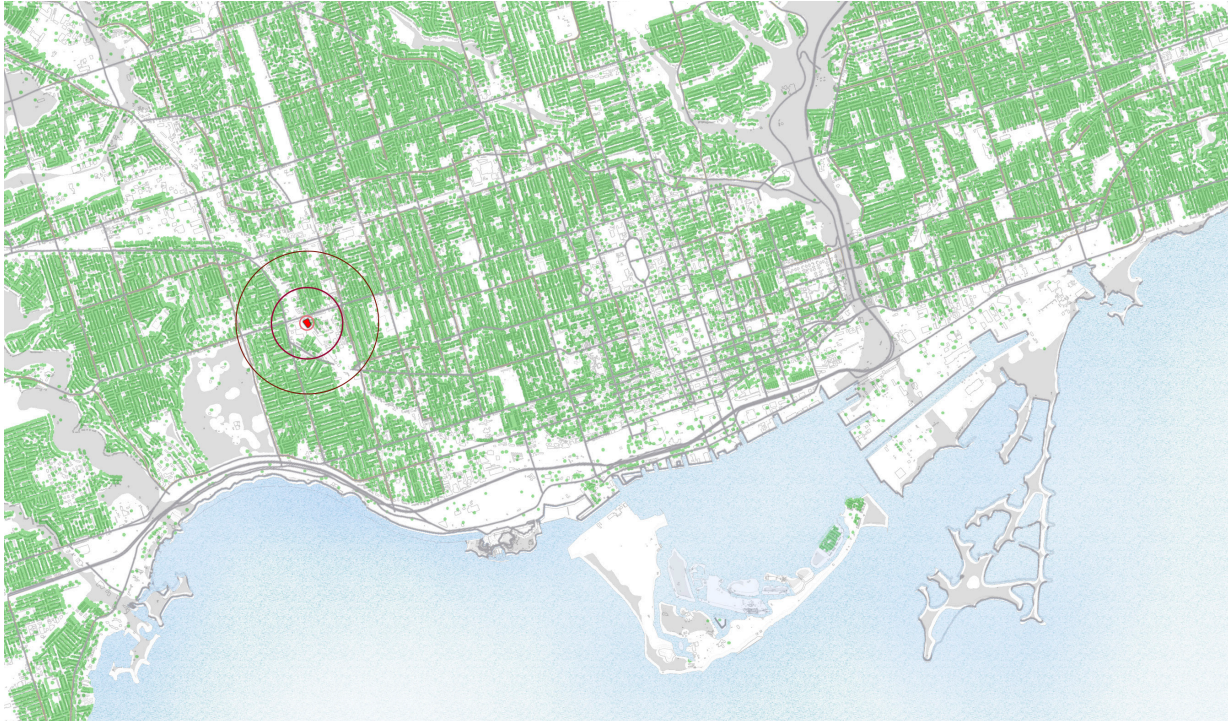


Fig 10. Toronto Tree Canopy Map

### Tree Canopy

The existing tree canopy adjacent to the site, mainly the linear West Toronto Railpath is meant to serve as the first component of a natural cooling system to the proposed building.

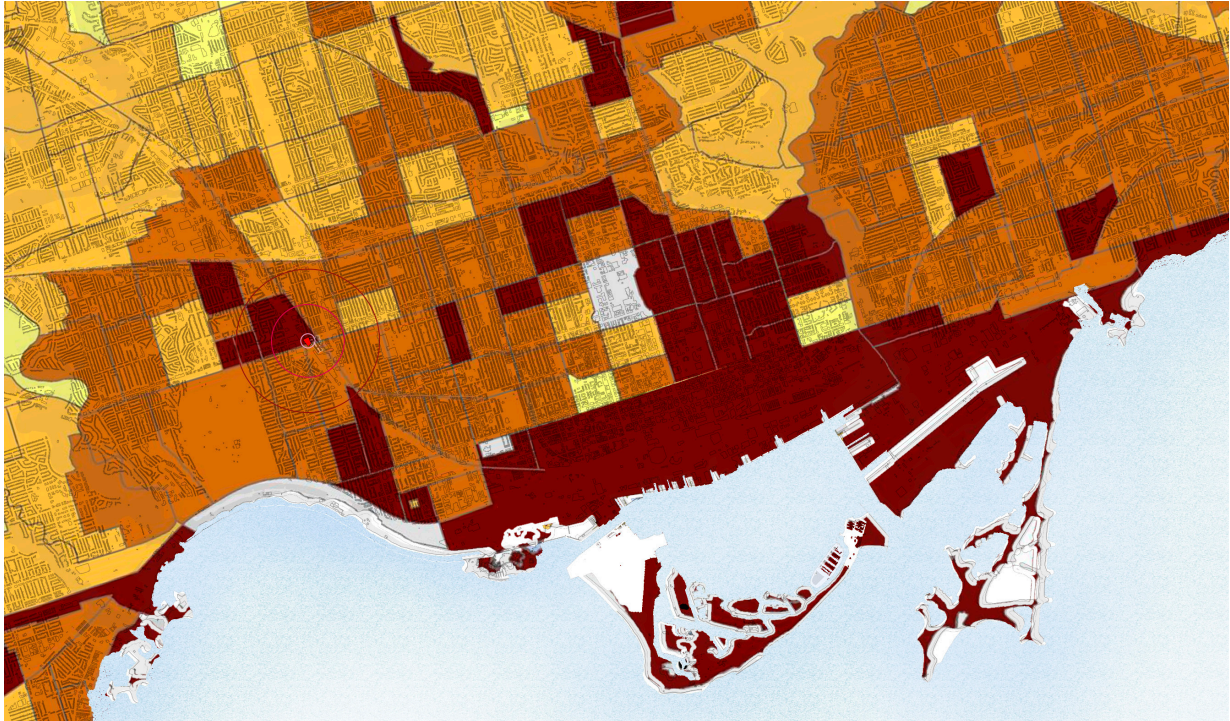


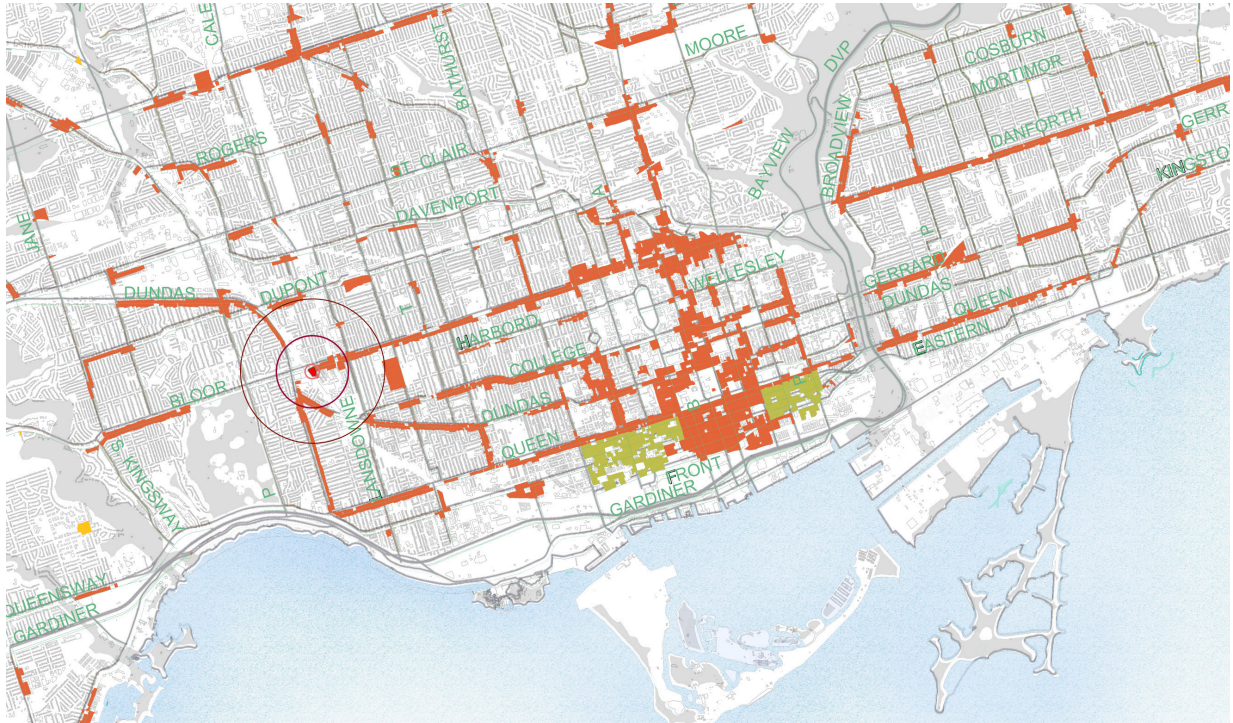
Fig 11. Toronto Adult placement Map



### Working Adult Population

This age range would suggest the need for buildings in this neighbourhood to incorporate the lifestyle and practices of such a young community.





- CL - Commercial Local
- CR - Commercial Residential
- CRE - Commercial Residential Employment

Fig 12. Toronto Commercial Zone Map

## Commercial Zones

Situated on a main commercial street and also as a gateway to the museum of contemporary art Canada (commonly known as the Mocca), the site is ripe for commercial and cultural use.



1. AC Repair Co.
2. p | m Gallery (Dupont)
3. Angell Gallery (Dupont)
4. Erin Stump Projects
5. Autumn Gallery
6. Arsenal Toronto
7. Analogue Gallery
8. Gallery TPW



1



5



2



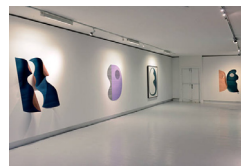
6



3



7



4



8

Fig 13. Junction Triangle Gallery placement

## Galleries

Situated in an upcoming neighbourhood with eight small to mid-size galleries, and also adding the placement of the new Mokka, the proposed building will be defined by its cultural aspects.



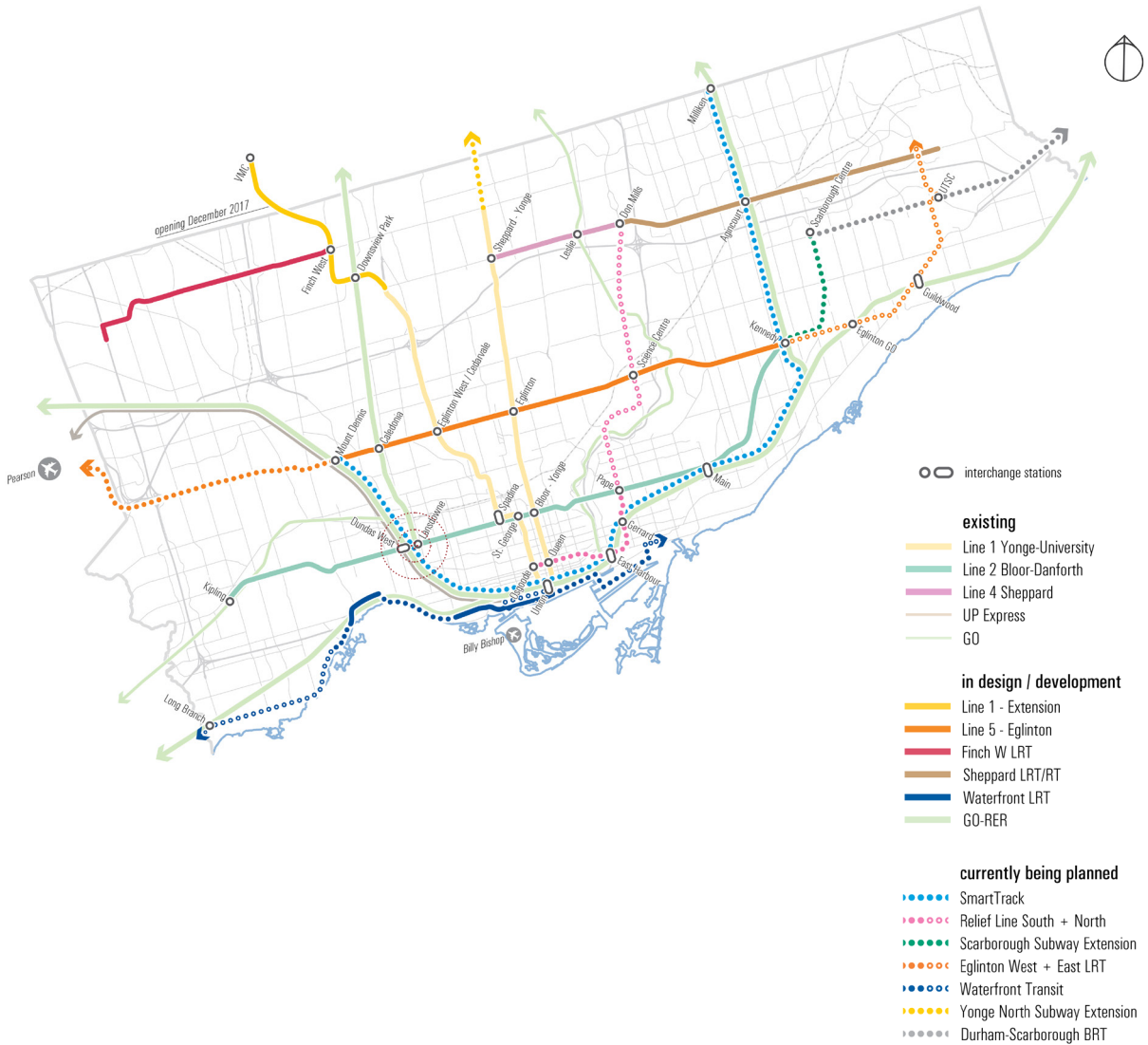


Fig 14. Toronto Present & forthcoming Public Transit Map

## Public Transit

Located on three different public transit lines, substantially minimizing the need for the use of personal vehicles and in turn reducing the carbon impact of tenants and visitors alike.

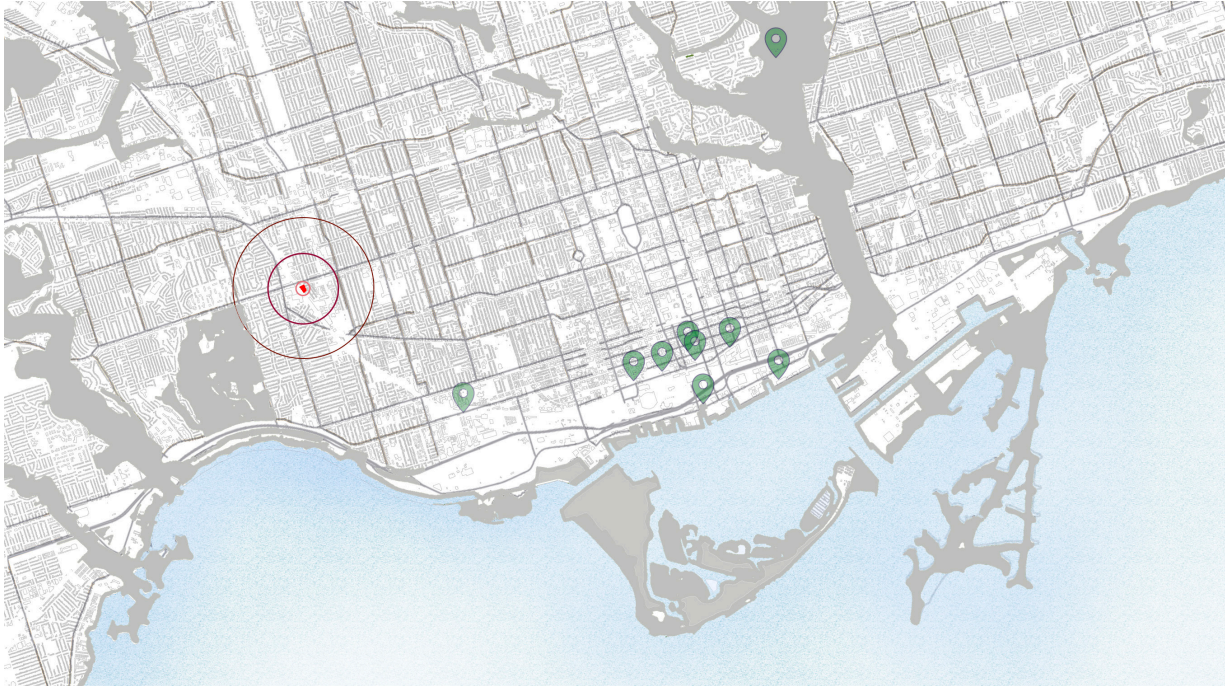
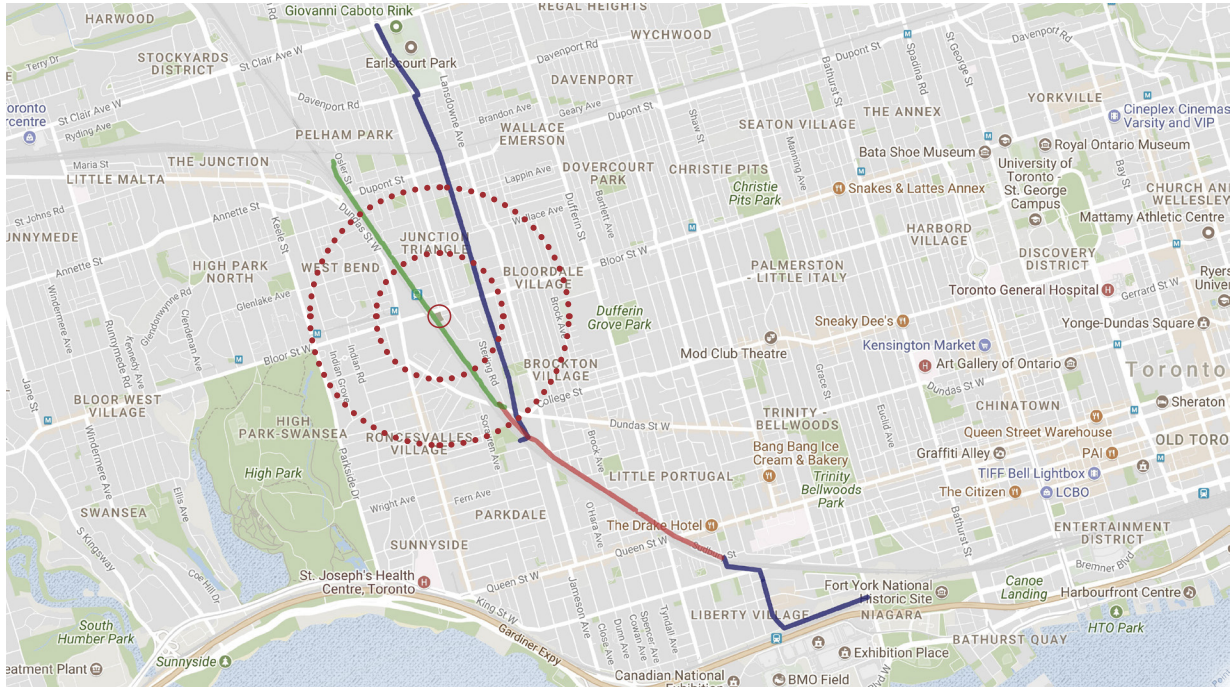


Fig 15. Toronto Present Green Building Map

- George Brown College
- Toronto-Dominion Centre
- RBC WaterPark Place
- Royal Bank Plaza
- The Berczy
- 320 Front St W
- Simcoe Place
- Barrymore Building
- Evergreen Brick Works

### Green Buildings

The best green buildings in Toronto are LEED certified. (Leadership in Energy and Environmental Design) furthermore, many of Toronto’s massive office towers are retrofitting to be more environmentally friendly.<sup>1</sup>









-  RailPath Stage 1 Completed
-  Stage 2 Passed EA
-  Wabash Crossover
-  Bridge to Liberty Village
-  Future Road
-  Railpath East/Barrie Line

Fig 16. Present & forthcoming West Toronto Railpath route

Map shows the existing Railpath GREEN and the expansion RED. The expansion is currently under feasibility study so it is a guideline. It is still not clear how far south it will go or how it will tie into other cycling routes. BLUE represents potential routes that are difficult to execute but being considered.

## West Toronto Railpath

The west Toronto Railpath is a 6.5-kilometre linear park from Toronto’s Junction Triangle Neighbourhood into the heart of the city.

Phase one of the project was officially opened in October 2009, including landscaping and a hard-surfaced path from Cariboo Ave to Dundas Street West.

Phase Two will extend the Railpath south and east towards downtown Toronto. Once completed, the Railpath will gift more than 250,000 Toronto residents a sustainable transportation linkage with the downtown core.<sup>2</sup>



## Ecosystem & Passive Design Narratives



Fig 17. Hanging Gardens of Babylon

### The Ziggurats Of Mesopotamia & The Green Corridor

These ancient stepped buildings were created to be home to the patron god or goddess of the city, usually comprise of seven levels of lush gardens to worship each day of the week. The impact of these green stepped pyramids were so high that the known world referred to them as “the hanging gardens of Babylon”. As to recreate the romanticism and nostalgia of these structures, the atrium and pockets in the structure are also created in the seven-level surmounting format. In conjunction with these hanging gardens, the base floor oasis is arranged to extend to the green corridor (west Toronto railway path) to create a larger and more sustainable biome as an example of other ensuing buildings in the corridor.

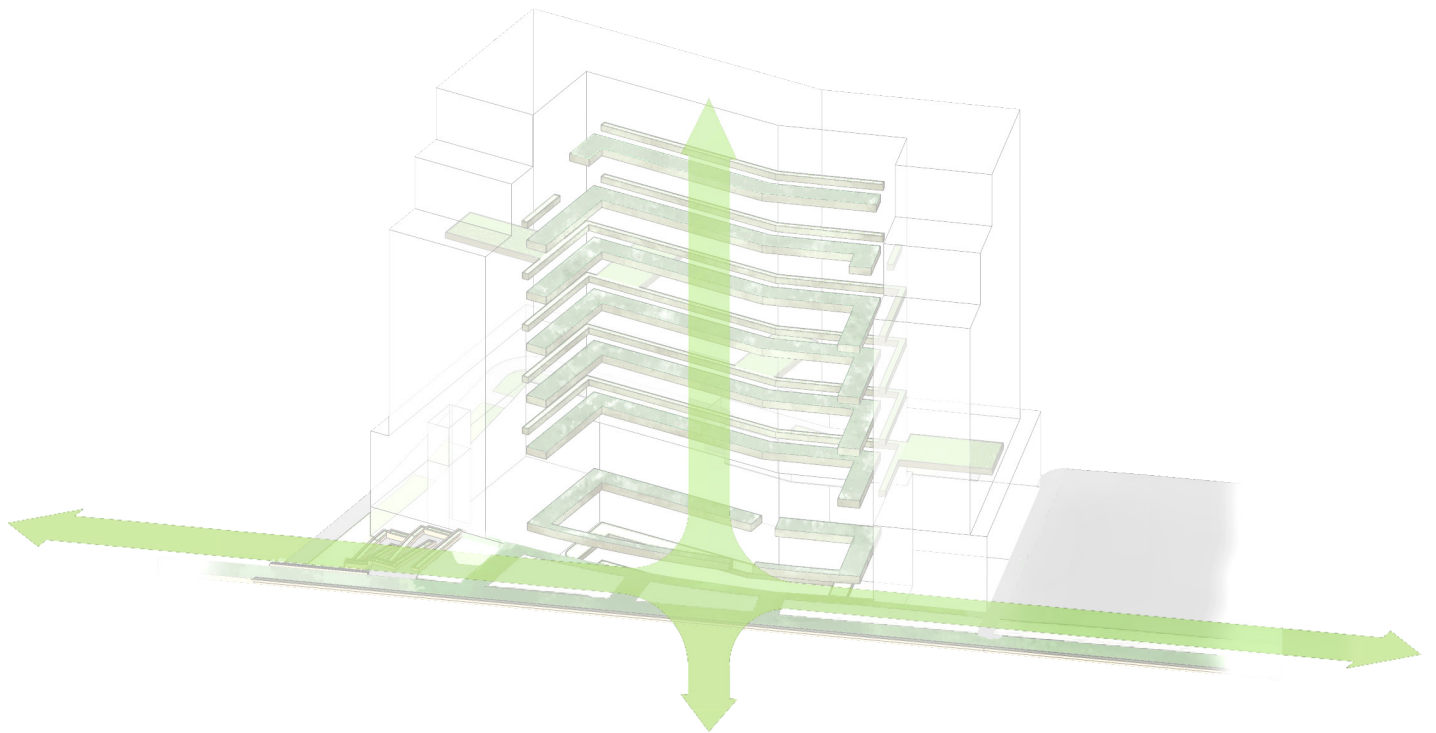


Fig 18. Vertical Gardens & Green Corridor Connection

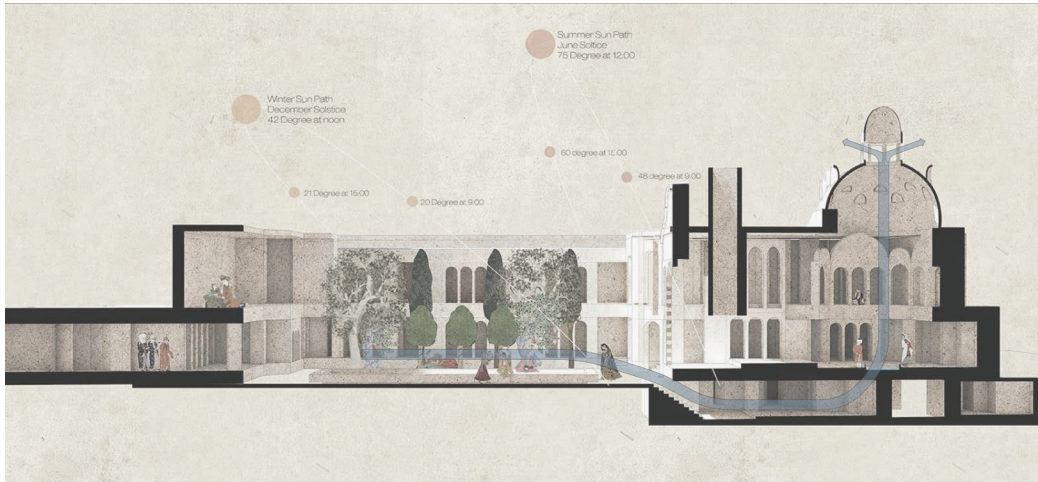


Fig 19. Boroujerdiha House Section & Solar Chimney

## Solar Chimney

The structure of a solar chimney is comprised of a cold wind intake (high pressure mainly from the south-western wind) and a small heated low-pressure exhaust that creates a vacuum to create an air draft.<sup>3</sup> The best examples of such systems that are well preserved today can be seen in the Bourujerdi house.<sup>4</sup> The House consists of a "Biruni" (exterior, public space) and the "Andaruni" (interior, the private quarters) features of Iran's traditional residential architecture, connected by an internal courtyard with a fountain pool and a two-story "Eyvan" (balcony). The main hall is topped by a "Khishkhan", a type of central dome, acting as the solar chimney of the summer house. To increase the passive performance of the mansion three forty meter tall wind catchers, two feeding the main hall and one on top of the entrance area, are also erected.<sup>5</sup>

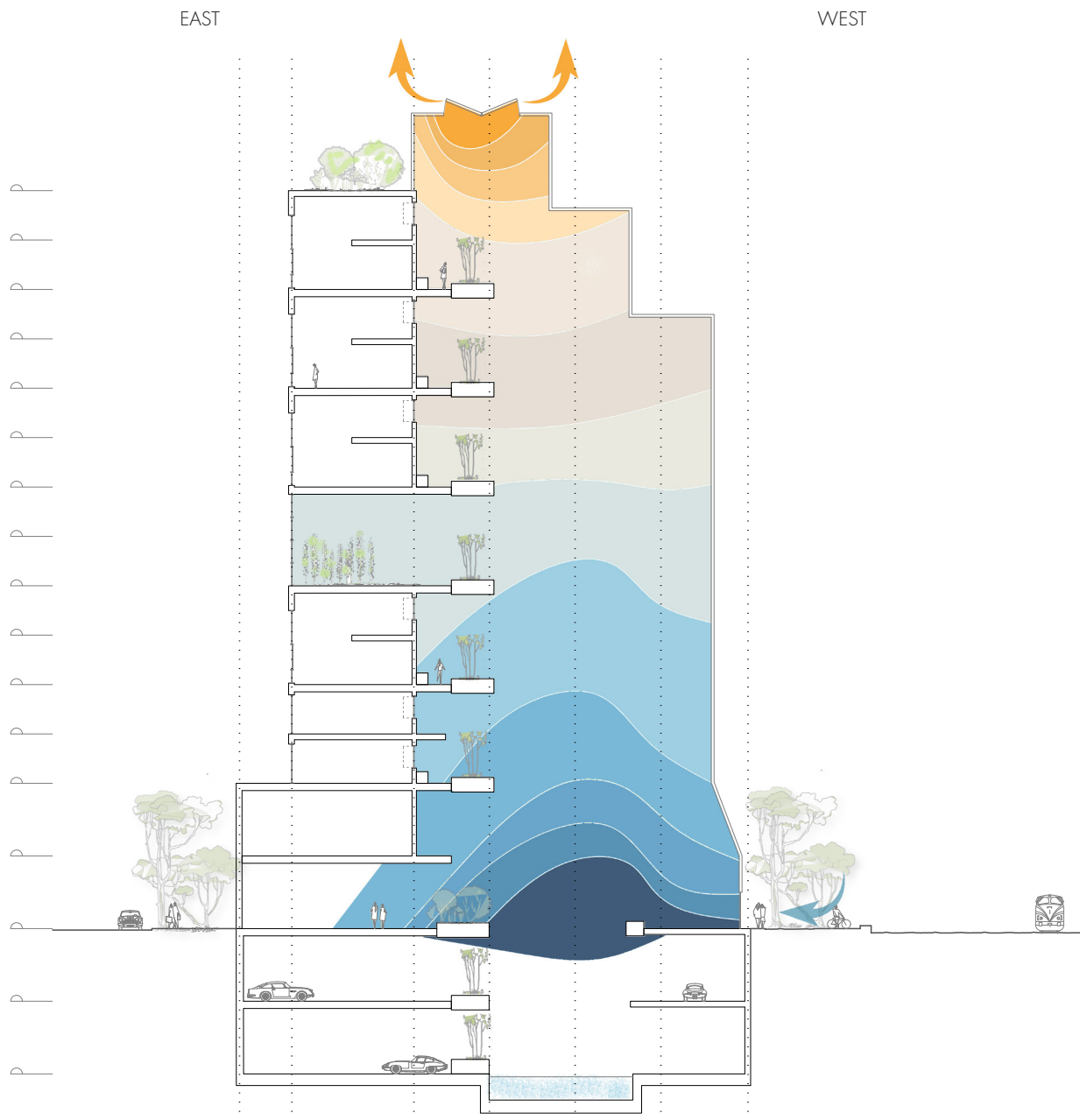


Fig 20. Proposed Building Solar Chimney Diagram

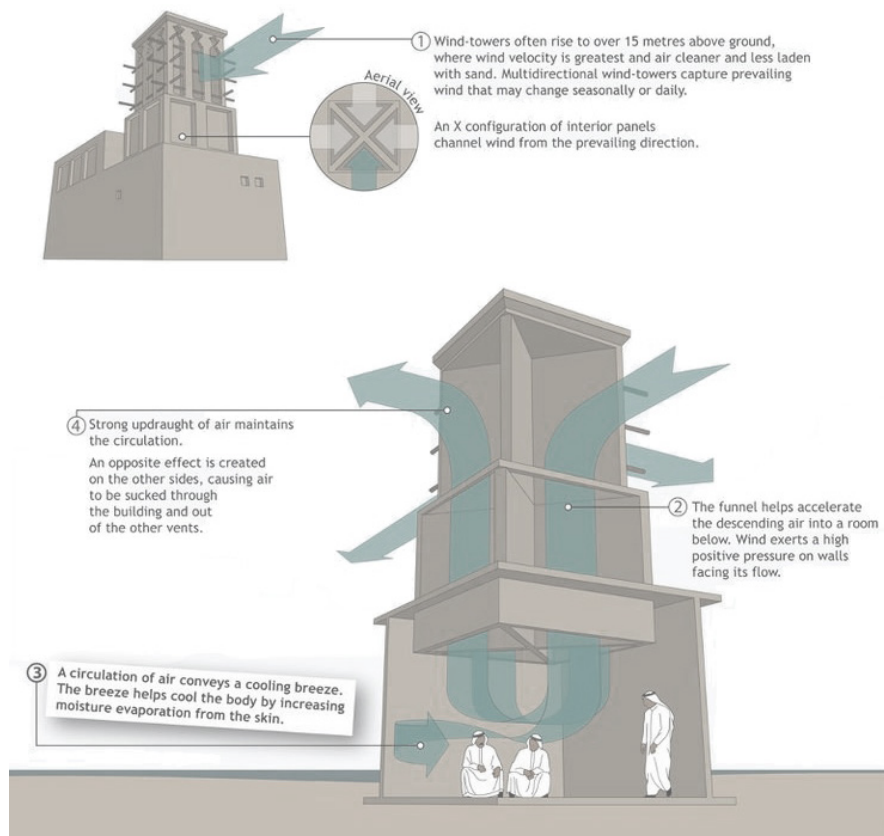


Fig 21. Wind Tower Function

## Wind Tower

Perfected to an almost science, the masons and architects of such cities as the port of Laft used wind towers to create mild temperatures of around 25-26 degrees in the 35 to 40 degree hot and humid climate of the Persian gulf predating the invention of electricity.<sup>6</sup> These wind towers (also known as Windcatchers) maximized the efficiency of wind drafts in the interior of houses by use of higher prevailing winds.



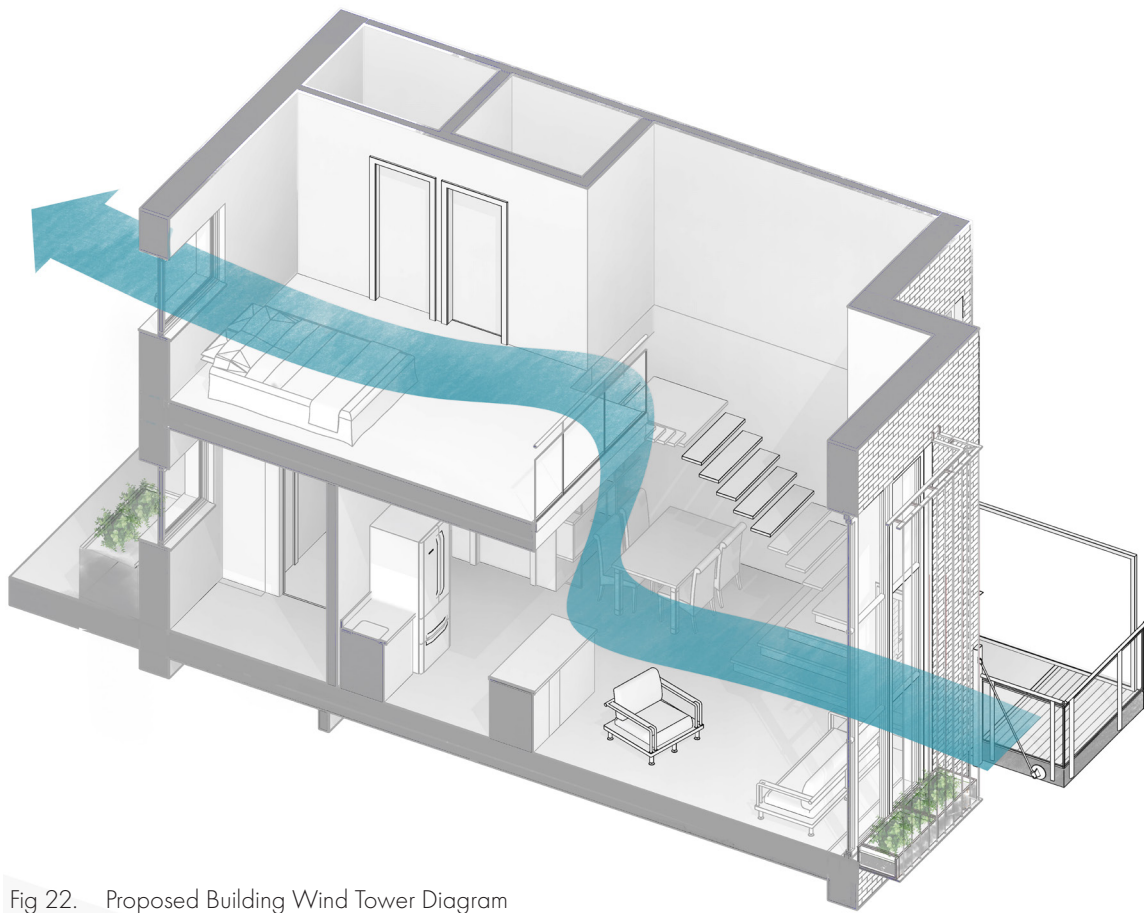


Fig 22. Proposed Building Wind Tower Diagram

## Precipitation Management

This system Structures the atrium to direct Precipitation from it, and the roof to the green roof filtration system, water the Ecocell<sup>7</sup> and eventually land in the pond in the basement in a closed loop.

The Eco-cell is a term mainly popularised by the ecological architect and eco master planner Ken Yeang. This system is comprised of five main attributes:

- 1- Vertical Integration of vegetation
- 2- Rainwater harvesting
- 3- Natural ventilation
- 4- Daylight penetration
- 5- Provide a living machine or constructed wasteland for sewage treatment

A fully integrated example of this system in a building can be seen in the Solaris, a 15 story office building located in the Fusionopolis hub in central Singapore's one-north business park.

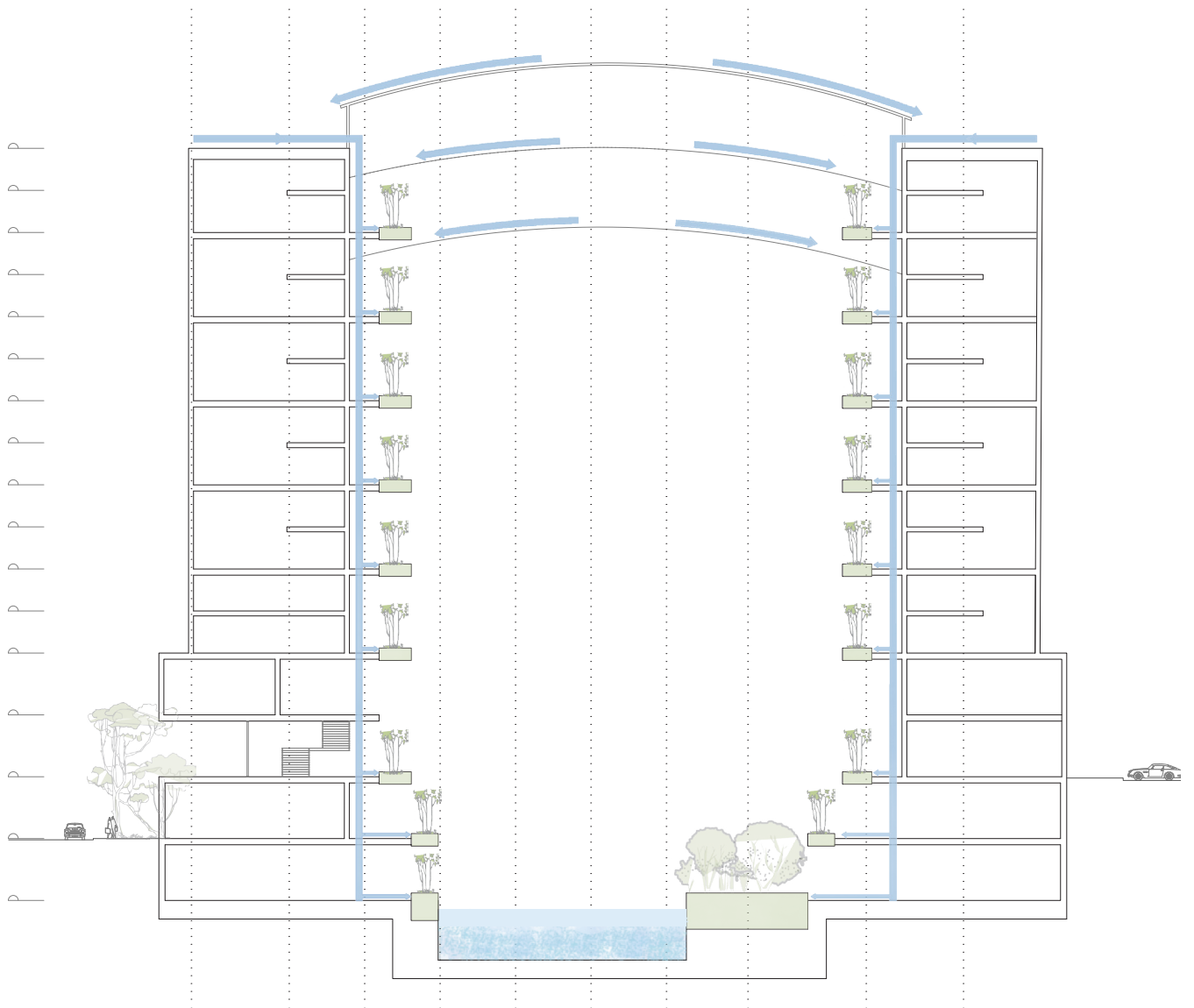


Fig 23. Proposed Building Precipitation Recycling Diagram



Fig 24. Sirjan Icepit, Kerman

### The Ice Pit Effect

The ancient Persians used ice pits to create and store ice at night throughout the country. This method is made a reality through the concept of thermal radiation and the fact that the atmosphere does not absorb wavelengths of heat between 8 and 13 microns known as the transmission window.<sup>8</sup> Numerous techniques are used to execute ice making, and the preserving process, a typical layout found in the Central and North-Eastern regions of Iran are comprised of three main components; a shade wall, pool, and domed roof reservoir. The wall is constructed to project a northward facing shadow, stretching in length both east and west. The size of the wall depends on the capacity of the reservoir.<sup>9</sup>

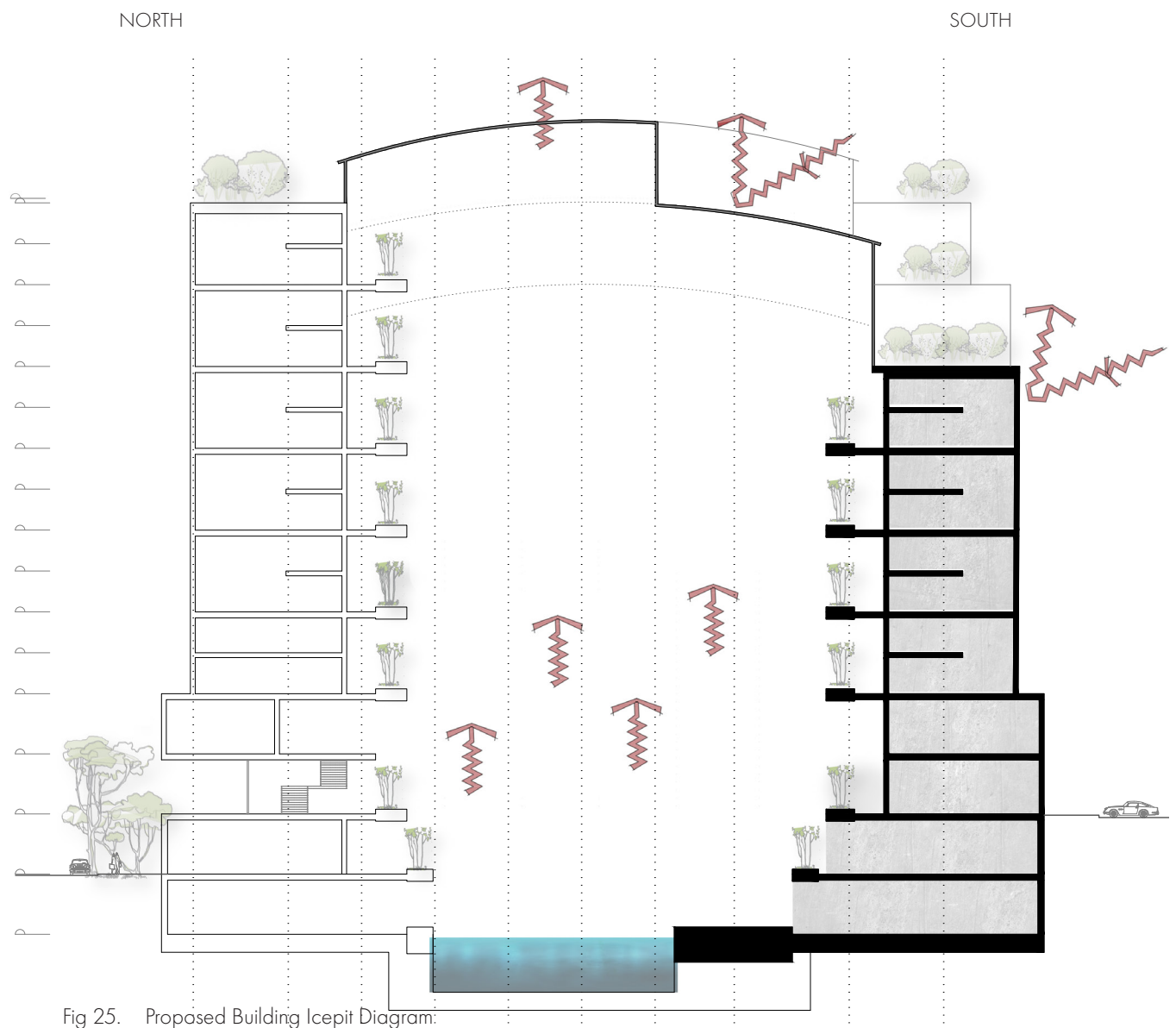


Fig 25. Proposed Building Icept Diagram:



Fig 26. Casa Ruta del Sol, Miami

## Shading Systems

Inspired by the Casa Ruta del Sol by Christian Wassmann in Miami Beach, Florida, the house uses the sun as the central figure to promote the vitality and health of its inhabitants<sup>10</sup>, on the eastern and western portholes of the building, vertical cables house vines to minimize the amount of direct sunlight penetrating the spaces in the summertime and due to the cold of winter, these dry vines let all the much-needed sunlight penetrate the building.

Southern windows have been calculated to account for two sets of louvres to let no direct sunlight in the summer and be completely permeable in winters, maximizing radiant heat use.

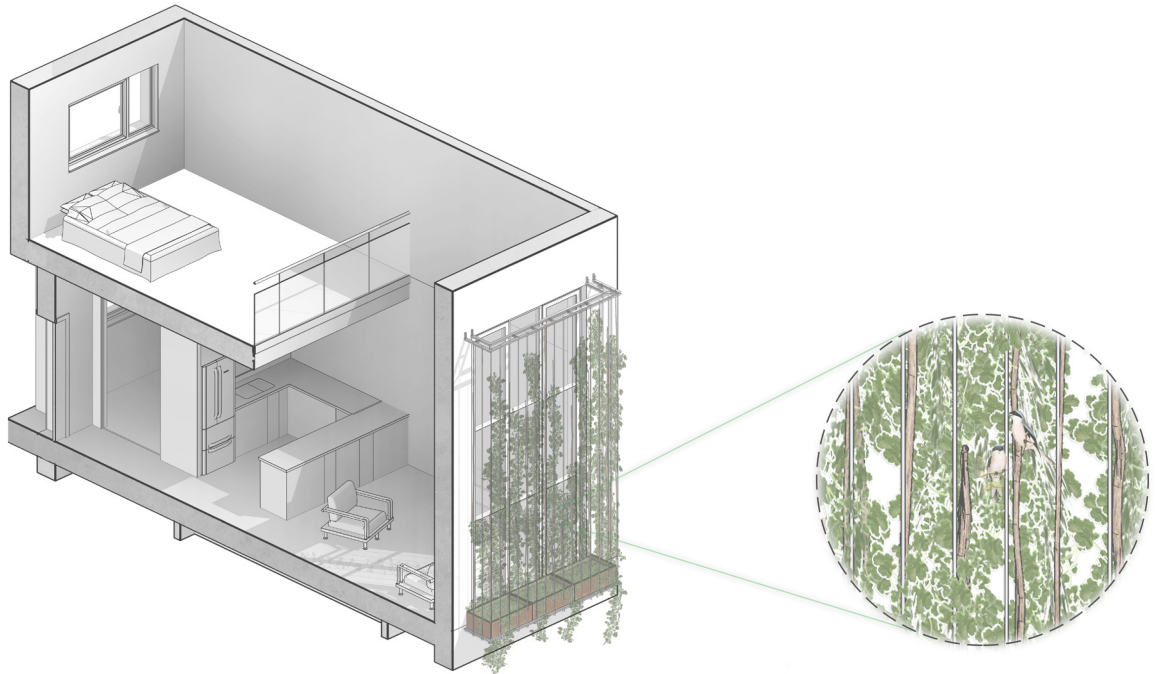


Fig 27. East & West Facade

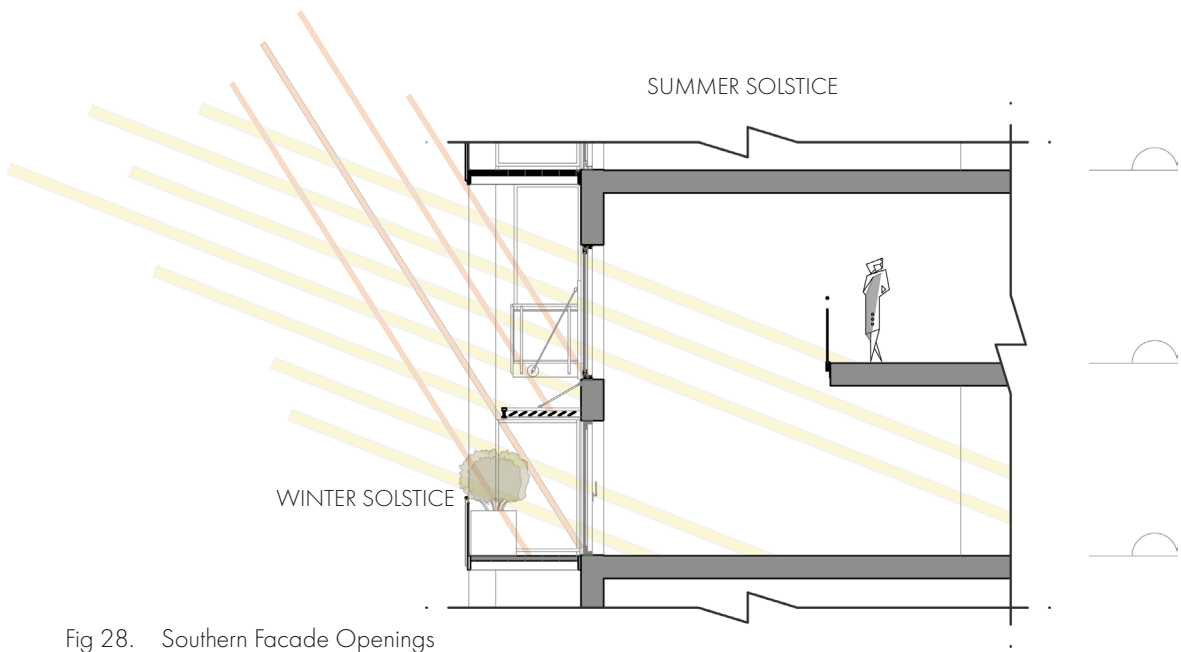


Fig 28. Southern Facade Openings





## Notes

- 1 Amy Grief, "The Best Green Buildings in Toronto," [https://www.blogto.com/toronto/the\\_best\\_green\\_buildings\\_in\\_toronto/](https://www.blogto.com/toronto/the_best_green_buildings_in_toronto/) (accessed July 5, 2018).
- 2 FRIENDS OF WEST TORONTO RAILPATH, "ABOUT FRIENDS OF WEST TORONTO RAILPATH," <https://railpath.ca/about/> (ACCESSED JUNE 6, 2018).
- 3 N. K. Bansal, R. Mathur and M. S. Bhandari, "Building and Environment," *Sciencedirect.Com*, no. Volume 29, Issue 4 (Oct, 1994).
- 4 *Encyclopedia of the Vernacular Architecture of the World* (England: , 1997). <http://catalog.hathitrust.org/Record/003941917>.
- 5 Hassan Radoine, *Architecture in Context: Designing in the Middle East* John Wiley & Sons, 2017).
- 6 Mohammed Karim Pirnia, *Introduction to Islamic Architecture (Ashnai-Ba-Memari-Eslami)* Soroush Danesh, 2005).
- 7 Ken Yeang et al., *Constructed Ecosystems : Ideas and Subsystems in the Work of Ken Yeang*, eds. Shireen Jahnkassim, Humaedah Rosly and Robert Powell, First edition. ed. (Novato, California: Applied Research And Design Publishing, 2016).
- 8 AAswath Raman, "How we can Turn the Cold of Outer Space into a Renewable Resource" TED talks, Apr 2018).
- 9 100 Mile house and Merritt College's Natural Building Class, "Yakhchal - Persian Ice Pit," <http://hundredmilehouse.blogspot.com/2014/07/vaulted-yakhchall-in-arbakooch-yazd-iran.html> (accessed July 5, 2018).
- 10 Michelle Traités Hites, "Casa Ruta Del Sol / Christian Wassmann," <https://www.plataformaarquitectura.cl/cl/780859/casa-ruta-del-sol-christian-wassmann> (accessed July 16, 2018).



## 03. DESIGN



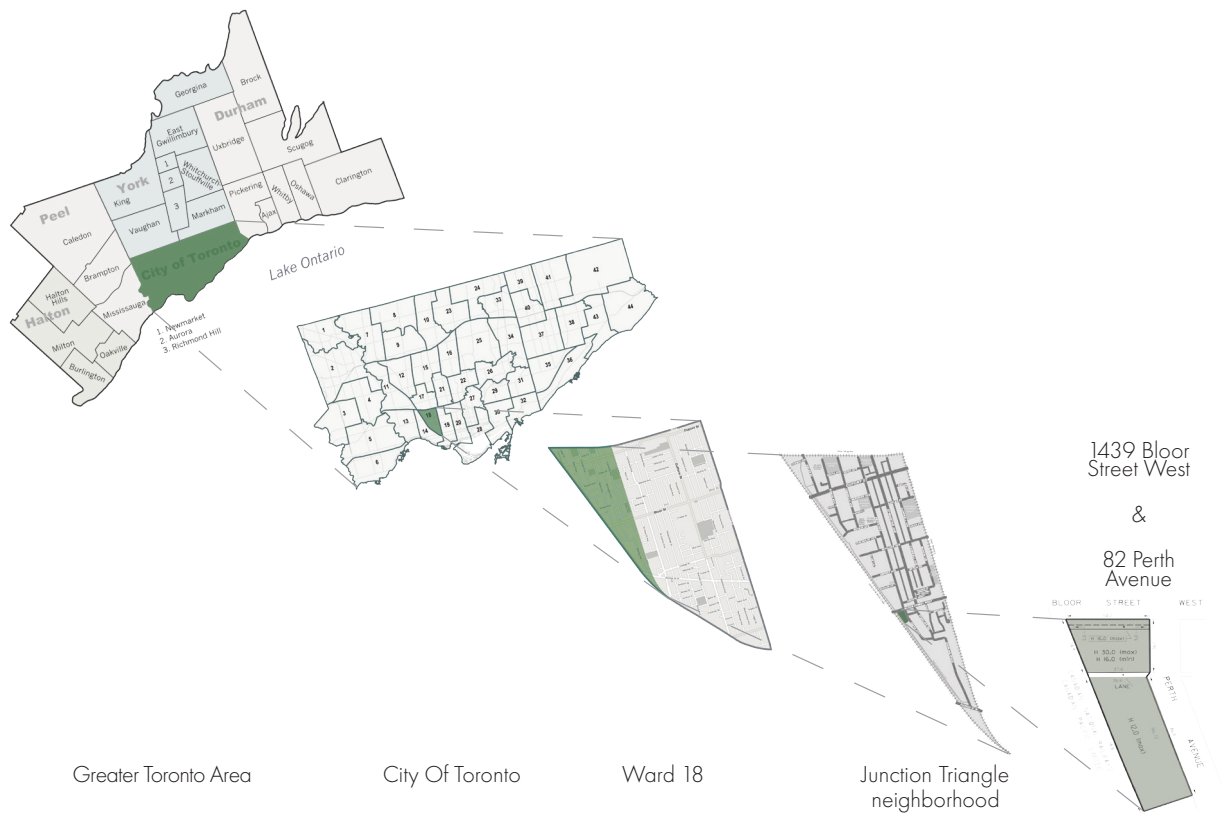


Fig 29. Hierarchy

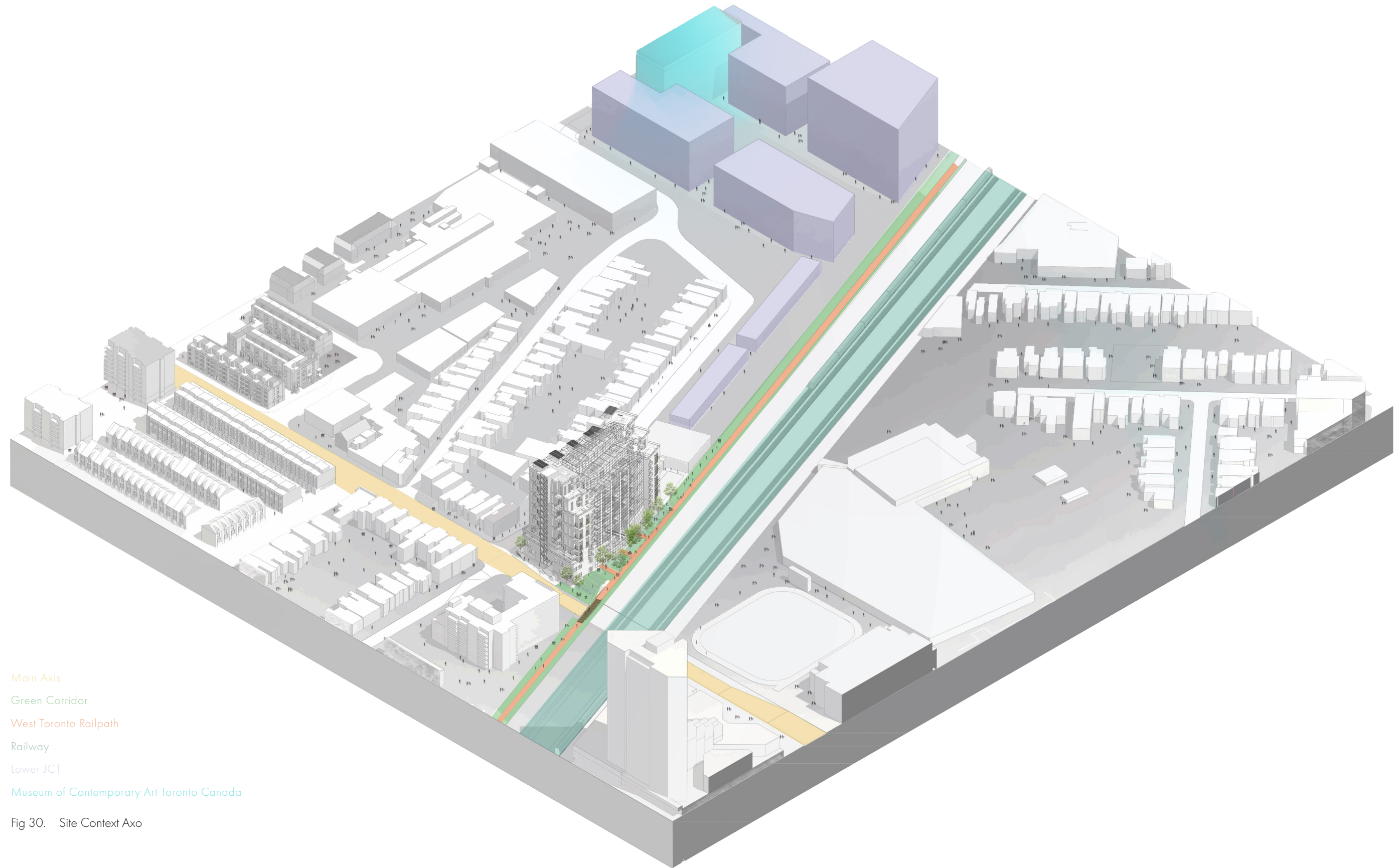
## Site & Context

The proposed site, 1439 Bloor Street West, is situated in the Junction Triangle, a neighbourhood in Ward 18 of the city of Toronto. This site is located on Bloor Street adjacent to the Union Pearson Express railway and the West Toronto Rail path and to its East, Perth Avenue. This neighbourhood is rapidly changing its demographic from industrial use to a vibrant, high density residential and commercial area.

Located at the entrance of Bloor St W and Sterling road, the site possesses unique qualities of accessibility to public transit and main street retail. It is also very well positioned to serve as an introduction to the MOCCA, acting as a gateway to the cultural scene of the Junction Triangle.

To the west of the site, the West Toronto Railpath invigorates disused industrial lands to reinforce a community. With the retreat of heavy industry from the old city of Toronto, the rail transportation linkages that once fed these enterprises became surplus and fell into disuse. These graded strips of land, now freed from their steel tracks, became ideally suited for conversion into trail networks, Serving to unify communities, create new recreation space and provide a new multi-use trail, the Railpath references the industrial character of the neighbourhoods through which it passes to maintain an authenticity of Place.<sup>1</sup>

The west Toronto railpath also serves as a green corridor, where numerous species of plants, trees and also wildlife can act as a small biome. Plans to extend this linear path from 7.15km to 15 are currently underway. For the purpose of this study, the design incorporates this corridor to extend its attributes into the building.



- Main Axis
- Green Corridor
- West Toronto Railpath
- Railway
- Lower JCT
- Museum of Contemporary Art Toronto Canada

Fig 30. Site Context Axo

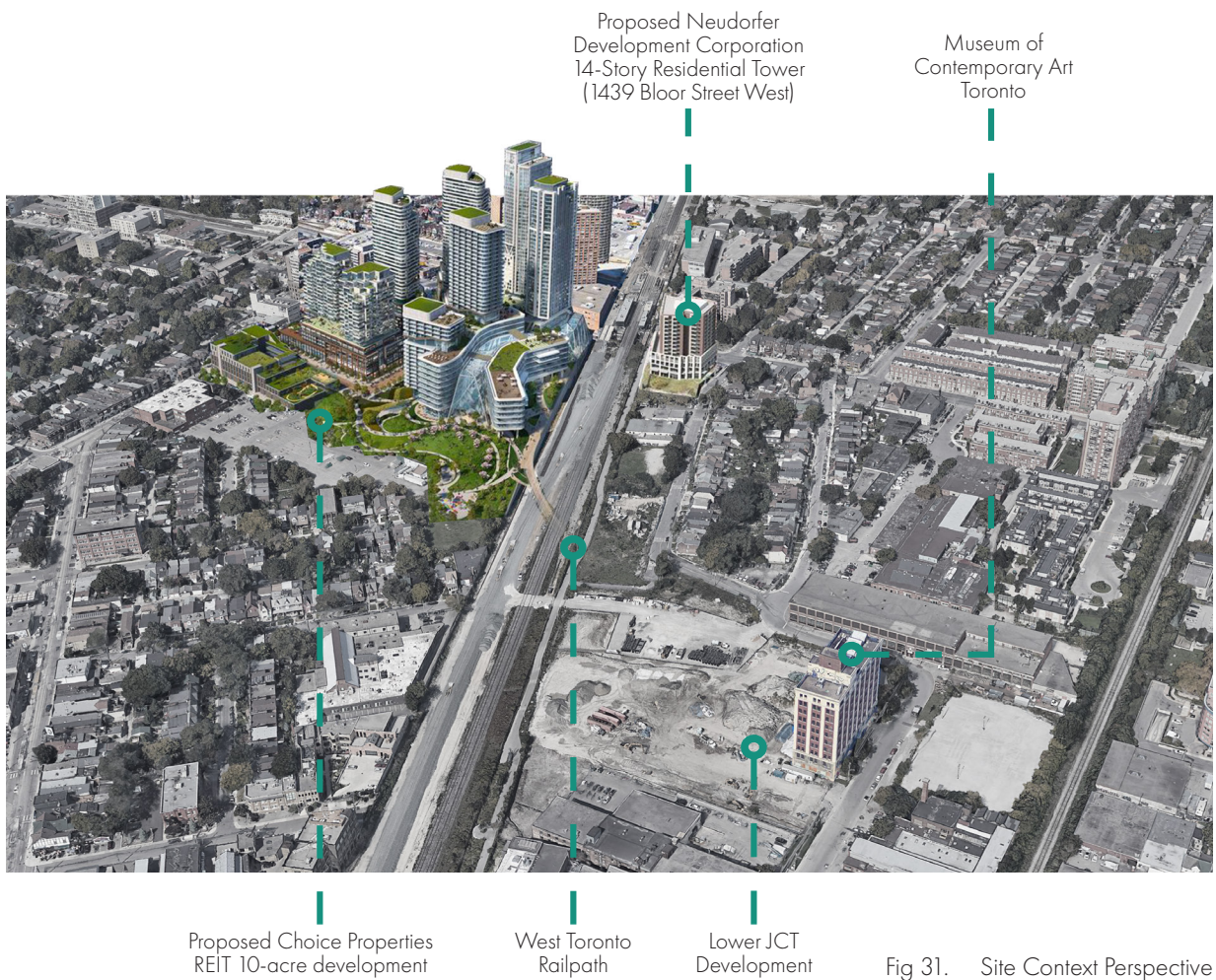
To the sites south, Castlepoint and Grey brook's project in the lower Junction triangle, Lower JCT, is a new eight-acre neighbourhood project located in the lower end of the Junction Triangle at Perth Avenue and Sterling Road. This new multi-use community will be home for 1,000 new residents and will support a number of community improvements, including a new park and open spaces, a new daycare facility and affordable housing.<sup>2</sup>

Adjacent to the Lower JCT, the new Museum of Contemporary Art Toronto Canada houses many activities including spaces to rent for workshops, rehearsals, weddings and large social occasions plus cafés and restaurants, a bookstore and a members' lounge. Chantal Pontbriand, at first and now former director of the Museum, resigned for reasons not made public, made the statement that it must become the "Agora," a "meeting place," and the "nexus" – "a space for exchange and networking" – open, eventually, daily from noon through midnight, where patrons aren't so much visitors as "activators."

This concept will be noticeable upon arrival on the main floor of Auto BLDG. At its previous location on Queen West, the museum functioned as a hub for creative exchange and played a crucial role in shaping the city's contemporary art scene. Through a commitment to collaborative partnerships with leading like-minded artists, organizations, institutions and festivals from Toronto and further afield, the ambition of the relocated, higher profile MOCA is to connect the city to its local community as well as to a national and global network.<sup>3</sup>

As for the connectivity of the site, it is located a minute's walk from Bloor GO station, occupants and visitors of this site are easily connected to the entire city by train, decreasing the need for cars. In consequence, using less fossil fuels and in turn, minimizing the production of Carbon dioxide.





## Parti

### Grade

In keeping with the cultural aspect of sustainability and resilience, the building is comprised of a mix of public and private spaces. Lower grade levels are entirely public and encourage the neighbourhood to have a presence. The central corridor acts as an informal exhibition space, communication center and a place for leisure with natural vertical gardens to create a hospitable environment. Furthermore emphasizing the cultural aspect is a gallery facing the main street that can display art pieces formed on the second floor. These workshops are also designed to be accessible to the general public to at least generate more revenue and recognition for the tenants. Recreational space in the form of a three-storey restaurant, bar, and café is provided. The café, accessible from Bloor Street and also on the entrance of the West Toronto rail path serves the general public. The restaurant on the ground floor and the Bar/Restaurant on the second, however, are positioned to gear towards the residence and visitors of the building itself. This facility is conceived to have great views and function as a part of the green corridor.

The main entrance is set to collaborate with Perth Avenue, essentially creating an axis (pathway) to the west Toronto Railway path. The Entrance and this main axis act as a window to the green corridor, entering through a humble, relatively dark entrance and subsequently arriving at a large, high well lit atrium full of hanging gardens invoking a sense of fantasy harking back to the ancient ziggurats and what is more famously known as the hanging gardens of Babylon.

Main corridor, temporary  
Exhibition space, Green  
corridor extension  
Recreational space  
Gallery  
Classrooms  
Artist's workshops

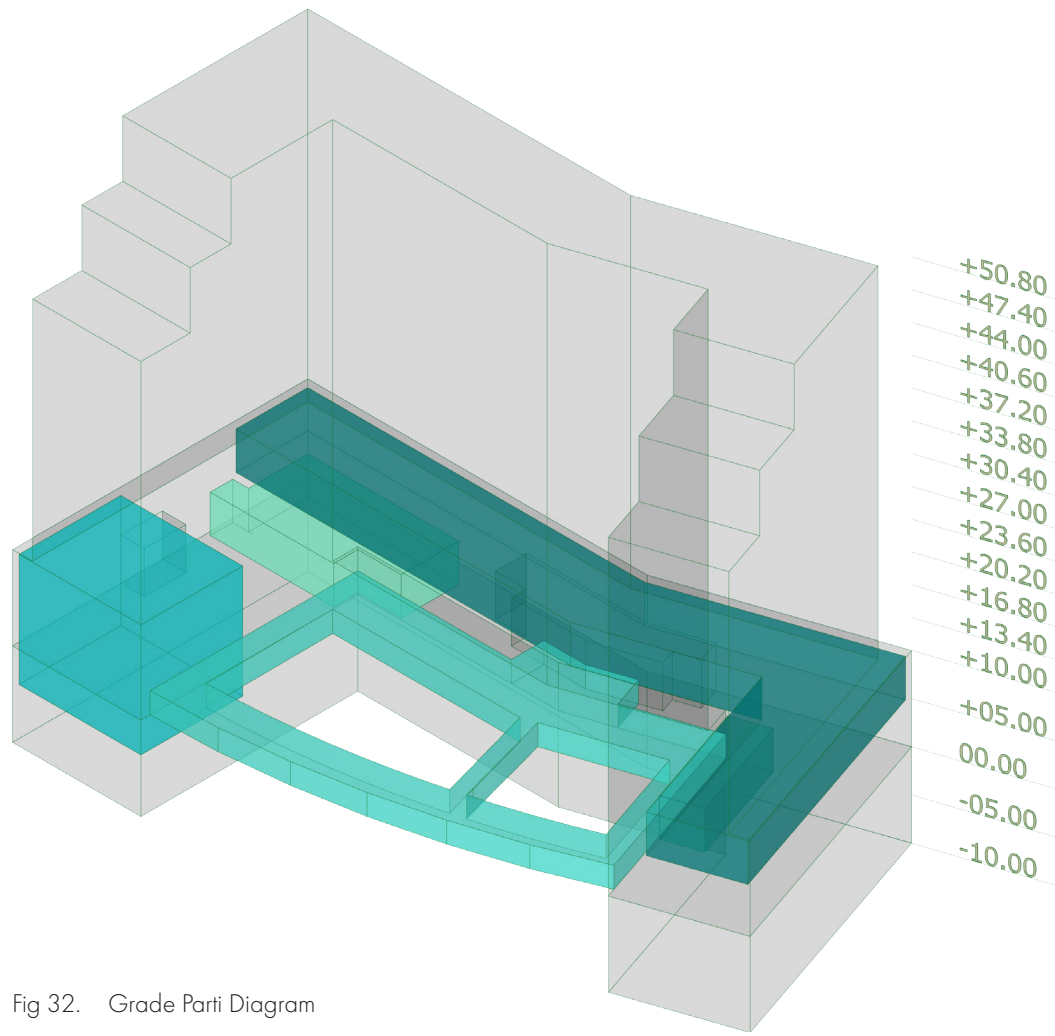


Fig 32. Grade Parti Diagram

Above grade

As aforementioned, this mid-rise building is designed as a neighbourhood hub, completely public on its ground floors but gradually changing to a more private nature progressing upwards. The residential section of the building starts at the third level with humble yet comfortable single storey units aimed at upcoming artists in keeping with the neighbourhoods changing demographics, progressing to more spacious double storey units aimed at a higher income demographic starting at the fifth floor. Concluding at the top with four larger units that have private courtyards and perfect views all around them.

Double story residence  
Single storey Upcoming artist's residence

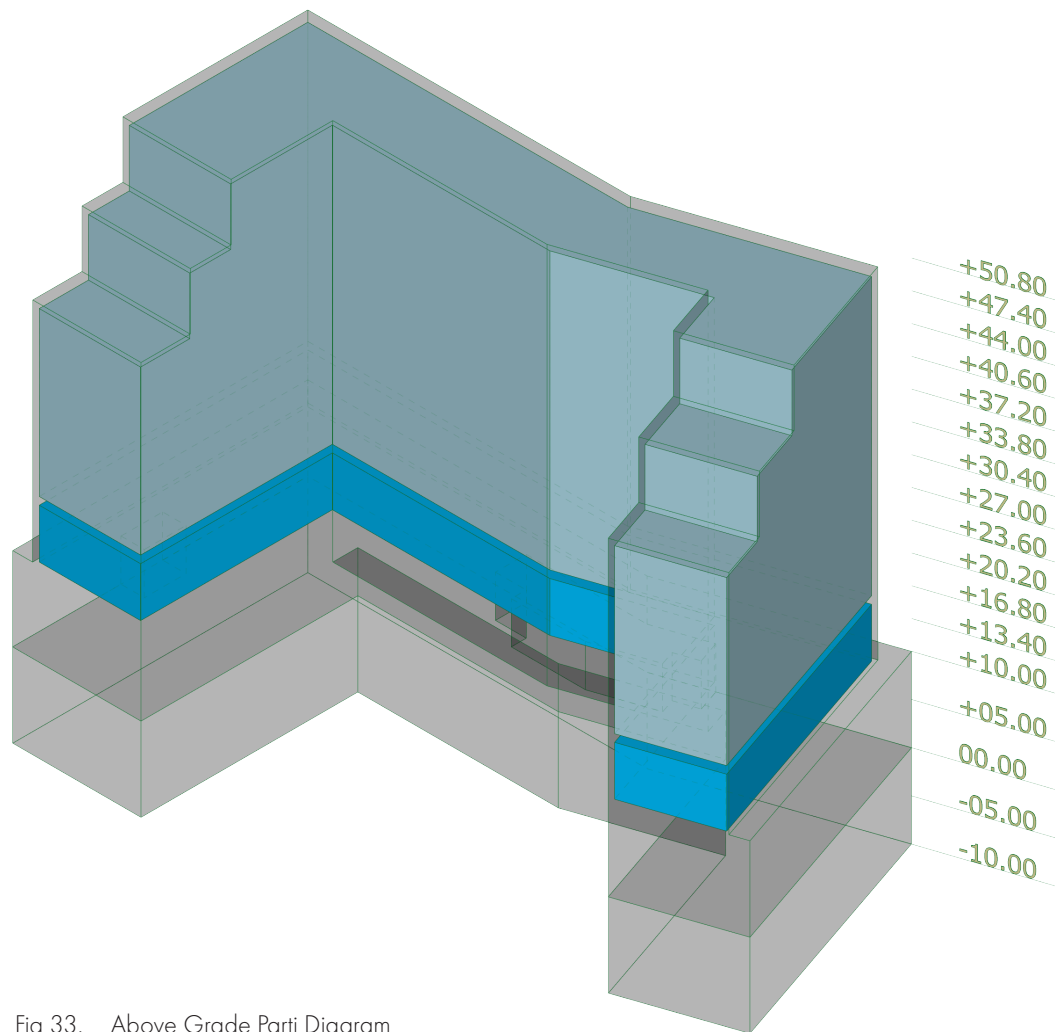


Fig 33. Above Grade Parti Diagram

Below grade

Structured to be the driving factor for ecological sustainability, the Ecocell begins from the highest floor with a rooftop garden serving as an intake for rainwater, circulating downwards throughout the building and ending at the lowest level with a rainwater management reservoir.

Furthermore, the second parking floor houses a natural waste treatment plant to reuse the natural waste created by the tenants as compost in the Ecocell.

- Ecocell
- Green roof, rain water intake
- Rain water reservoir
- Natural waste treatment
- Mechanical rooms

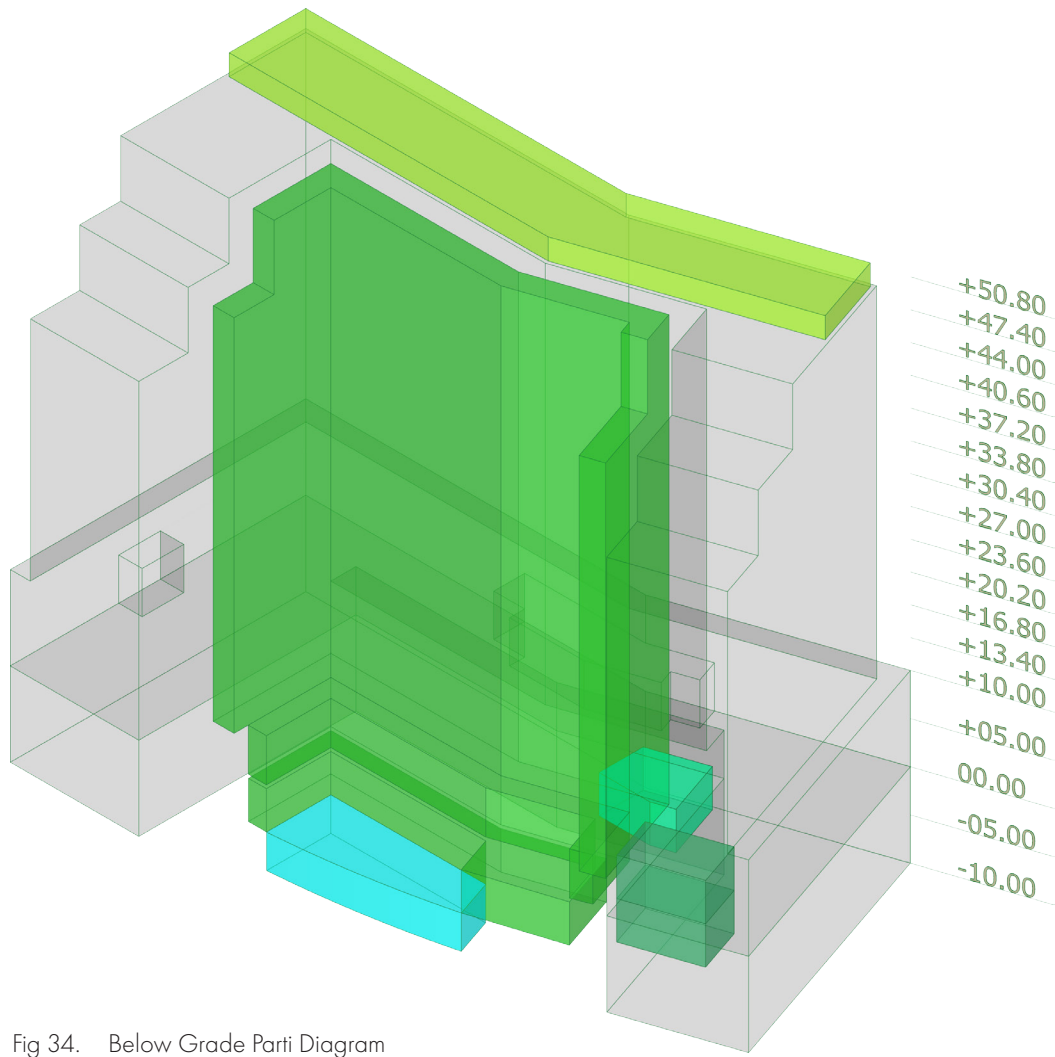


Fig 34. Below Grade Parti Diagram





Fig 35. Full Ecocell View



## Plans

Situated on the cornerstone of Bloor street west and Perth Avenue, the ground floor acts as an Agora for the neighbourhood, encouraging social interaction and exchange. The building can be entered through both streets, but prevalence is given to the Perth Avenue Entrance to the East.

Following the footsteps of traditional historical residences in ancient Persia, where only small glimpses of the interior were revealed from their locale, one only has a vague perception of the inner atrium, only once entered can the vast space be apprehended, invoking a sense of Curiosity. After entering the building, the user is immediately confronted with a high luminous green garden, inspired by the romanticism of the hanging gardens of Babylon.



Fig 36. Ground Floor Plan (Main Entrance)

The Second floor is a focal point to the new art scene of Junction triangle, where Artisans and craftsmen can create their pieces in the thirteen studios and display them in a number of spaces in or outside of the building. The corridors between these studios also have the capacity and width to showcase these pieces to the public. Artscape Wychwood Barns is the leading precedent of this function, a community cultural hub in Toronto's Wychwood neighbourhood.

A deadlift is also provided for the ease of access of raw materials or the crafts produced in the workshops to the Gallery space on the ground floor. Furthermore, a Bar/Restaurant is located on this floor to create a space where visitors and tenants alike can leisure or conduct business.

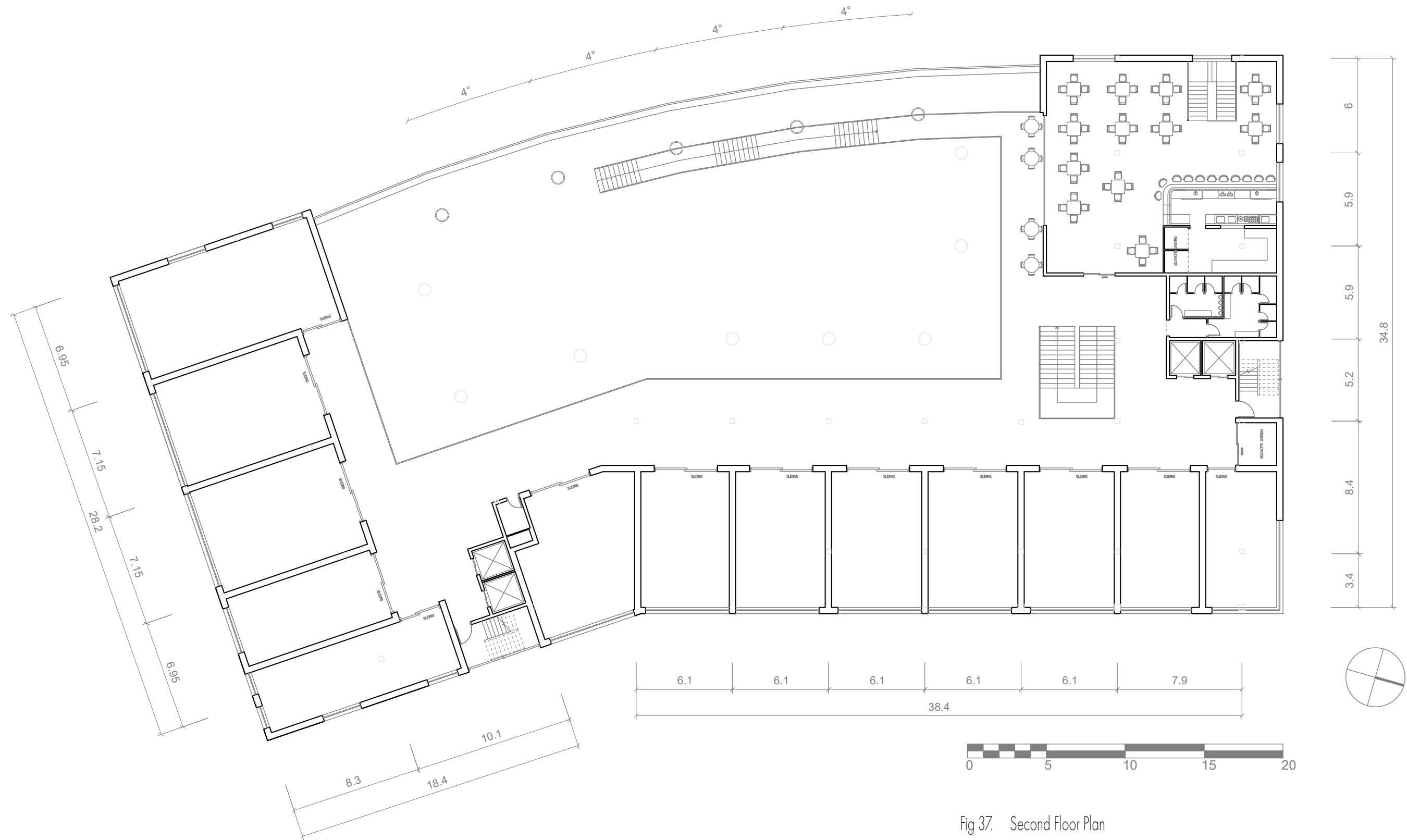


Fig 37. Second Floor Plan

The Third floor marks the start of the residential complex, with two levels dedicated to emerging artists who may not be able to afford the rising prices of this neighbourhood. The units on these two floors are relatively humble, in a modest 50 square meter range, These condos are designed to be as comfortable as can be, yet small enough to keep buying or renting prices low to accommodate for these young or struggling artisans with lower budgets.

The central corridor, the primary access to the units is meant to have a Park like quality, where tenants have the possibility to stroll and spend quality time or even sit and enjoy the views of the atrium and the railway outdoors in the seated pockets of the Ecocell. As the atrium is situated to the west, tenants can enjoy the sunset views of the space.

On the southern section of the building, a double hight green pocket Creative space has been devised to create a relaxing space where the tenants can leisure or work, promoting the mental health of its inhabitants.





Fig 38. Third Floor Plan

Continuing the functionality of the third floor with its upcoming artisan's condos, the fourth-floor houses another thirteen condominium units. These units retain their three meter high ceilings to avoid a sense of claustrophobia and spaces large enough to maintain a sense of place, in keeping with mental health guidelines.





Fig 39. Fourth Floor Plan

Marking the first floor of the double storey prevailing condominiums of the building, the fifth floor incorporates the entrances of these units with a seven-meter high corridor, purposefully made high enough to account for the trees and vegetation of the ecocell and also create a grand space sufficient in acting as an extension of nature and its surroundings.

This floor incorporates the main living quarters of the condominiums, comprised of a living room, kitchen and an office/workroom, larger units even house a guest bedroom. All units have double height living rooms to create a hospitable, well-lit environment that encourages free air flow(the wind tower effect) and communication between it and the bedrooms on the floor above.

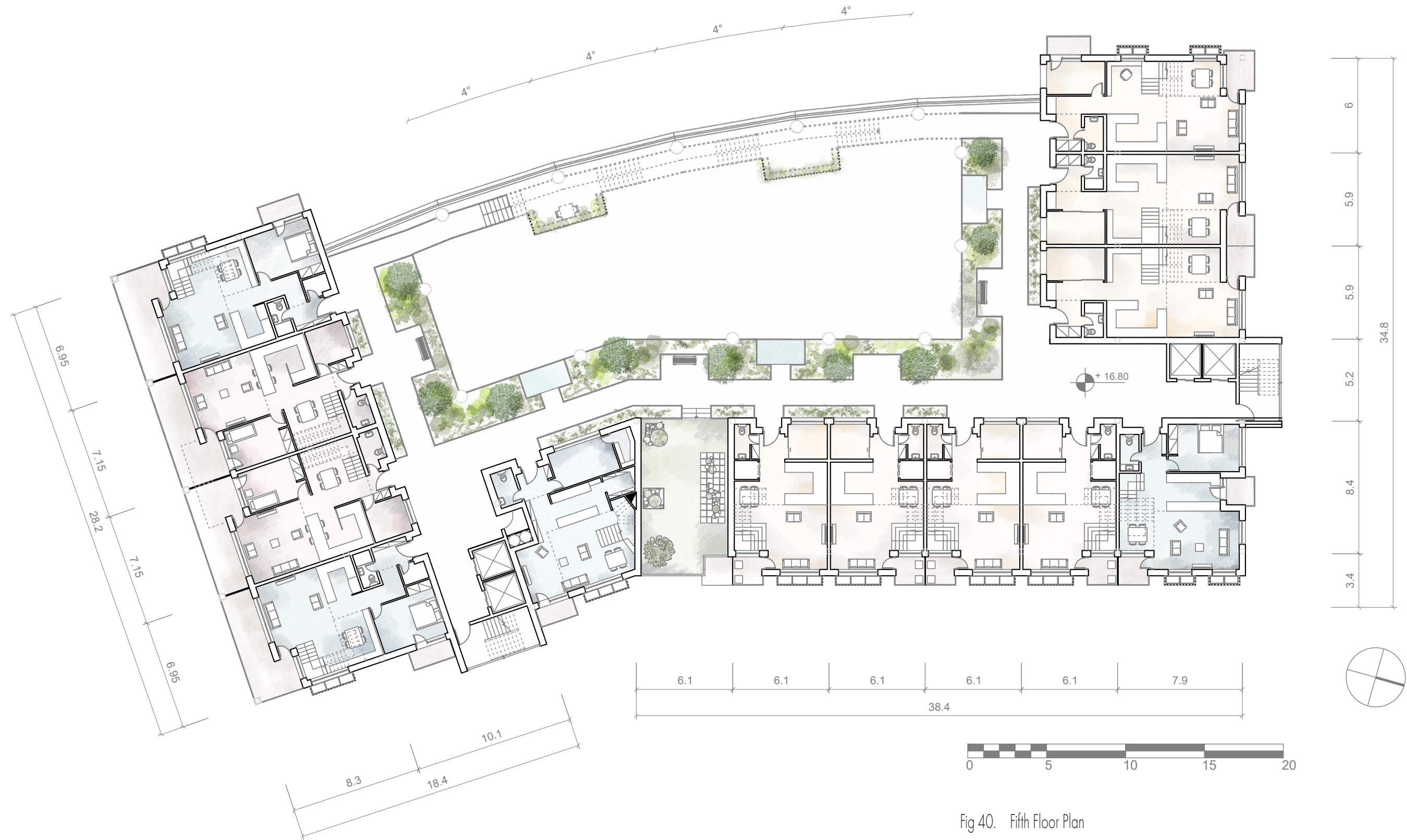
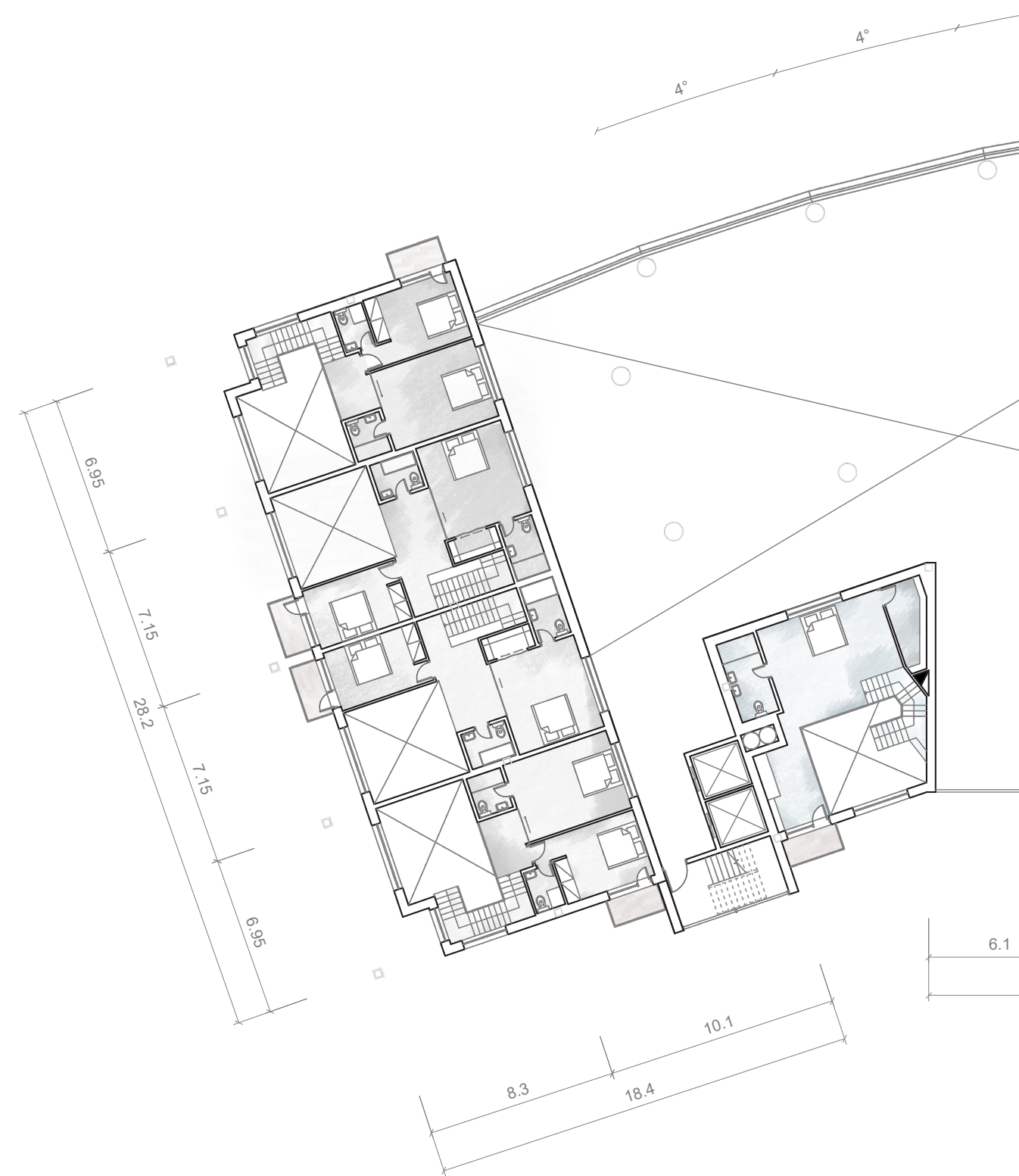


Fig 40. Fifth Floor Plan



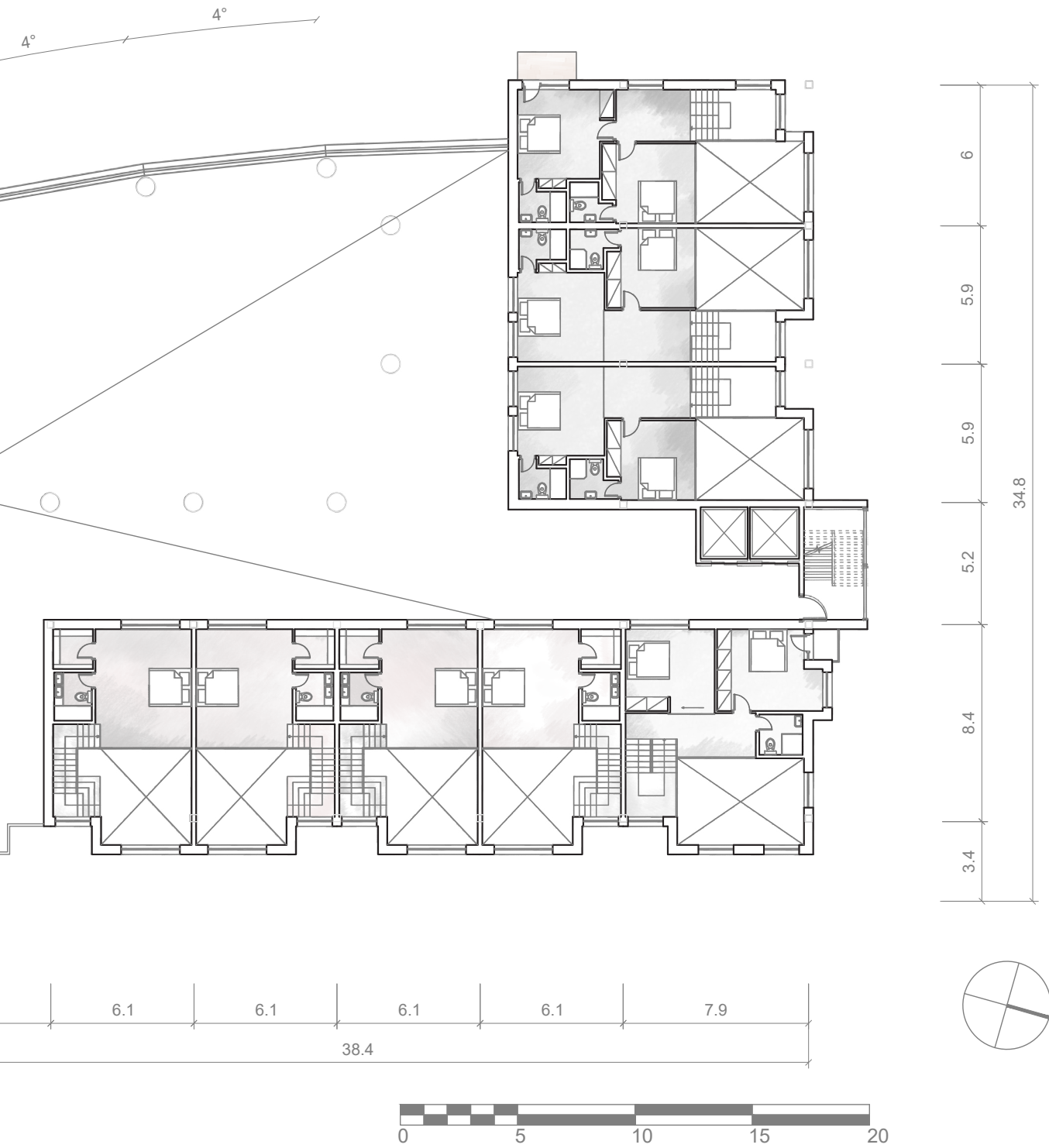


Fig 41. Sixth Floor Plan







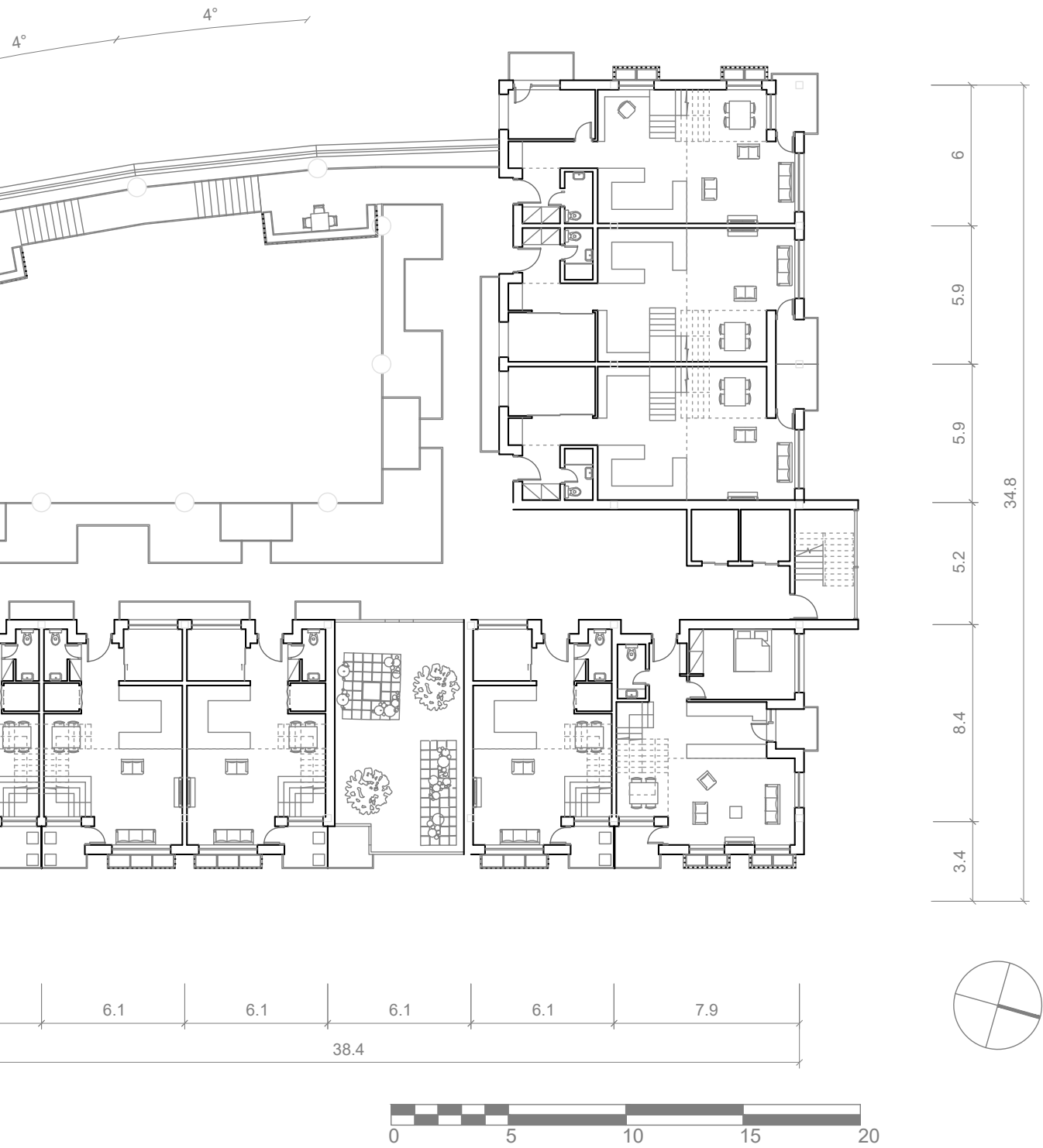


Fig 42. Seventh Floor Plan





Fig 43. Eighth Floor Plan



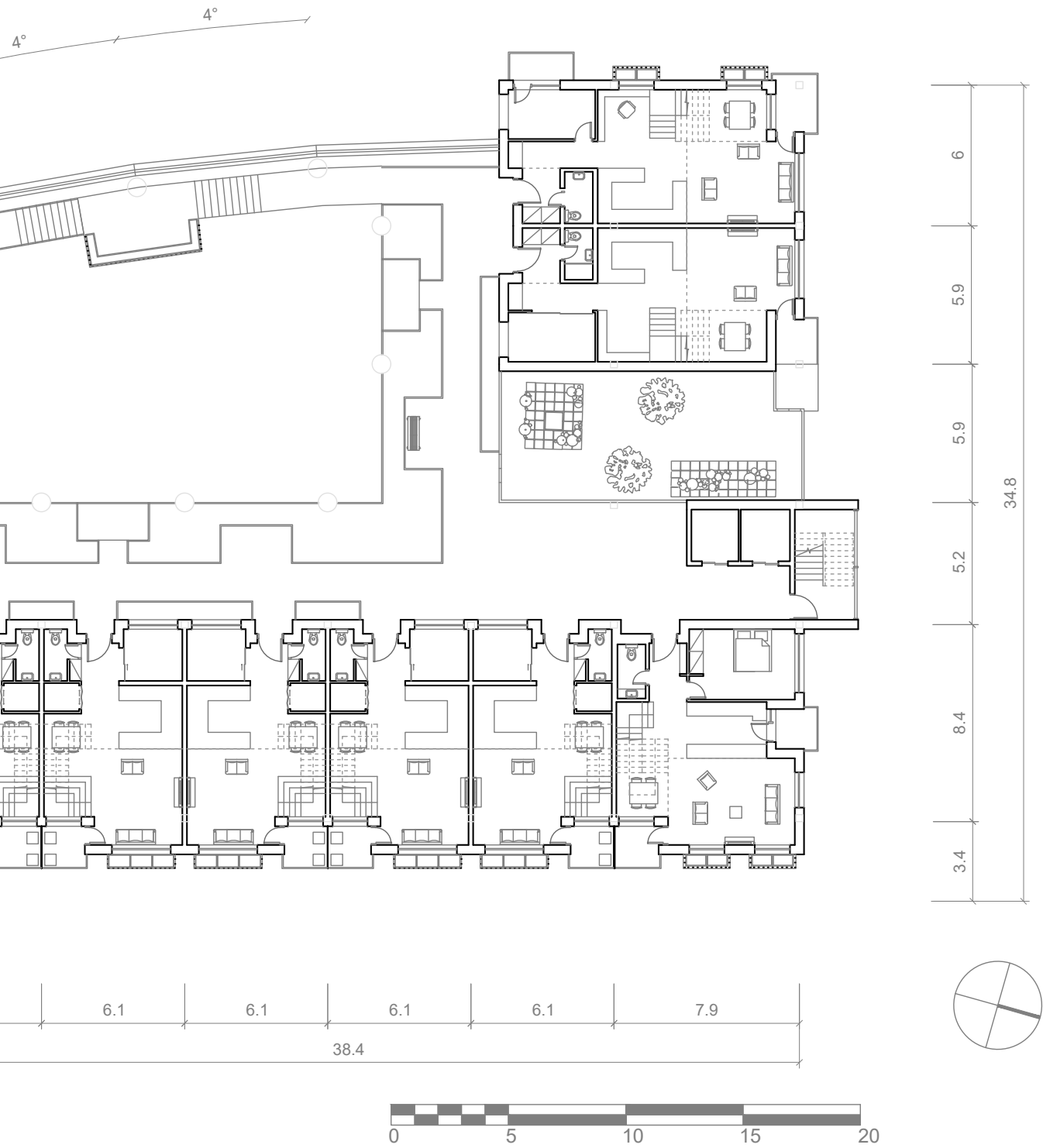


Fig 44. Ninth Floor Plan



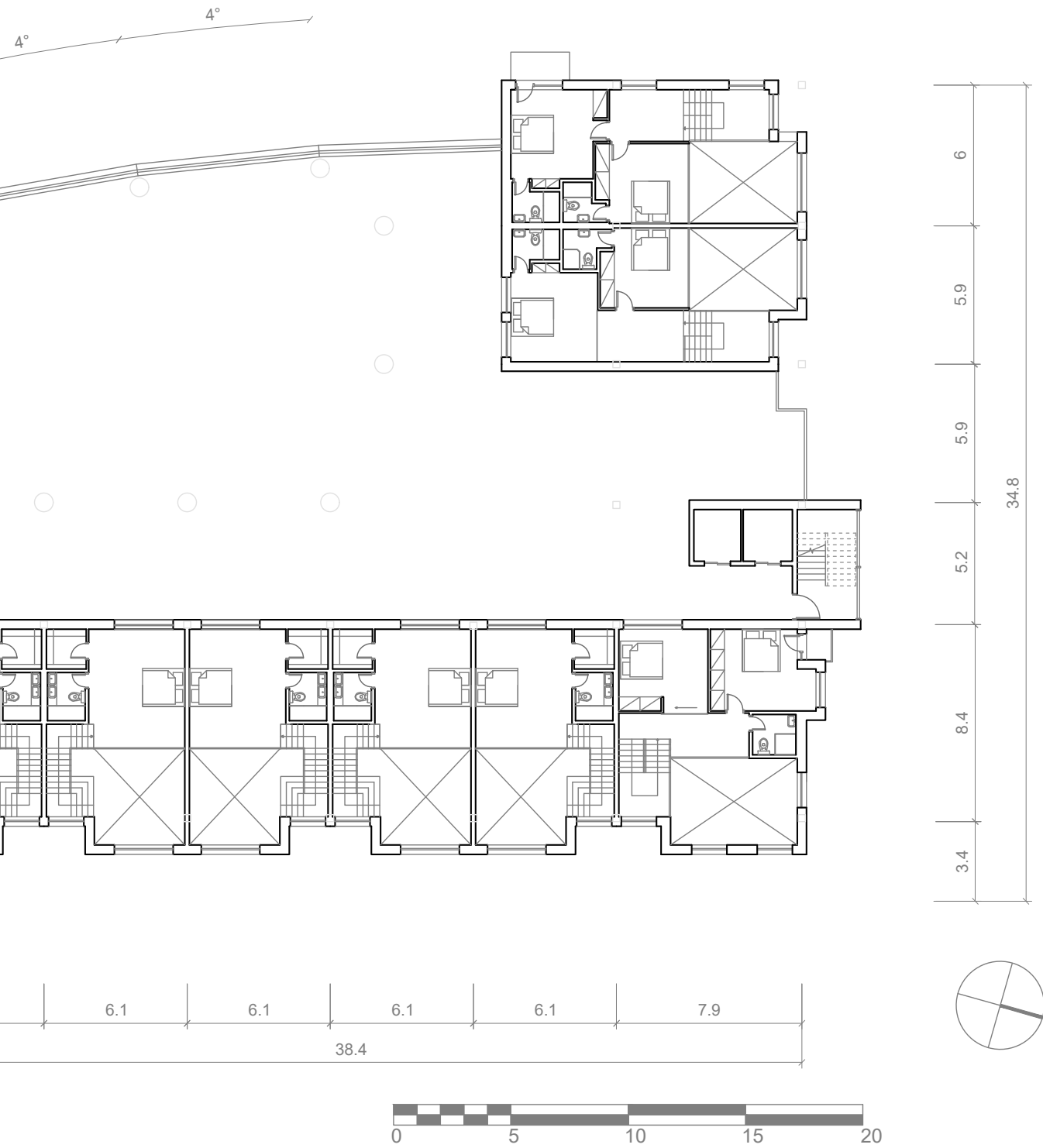


Fig 45. Tenth Floor Plan





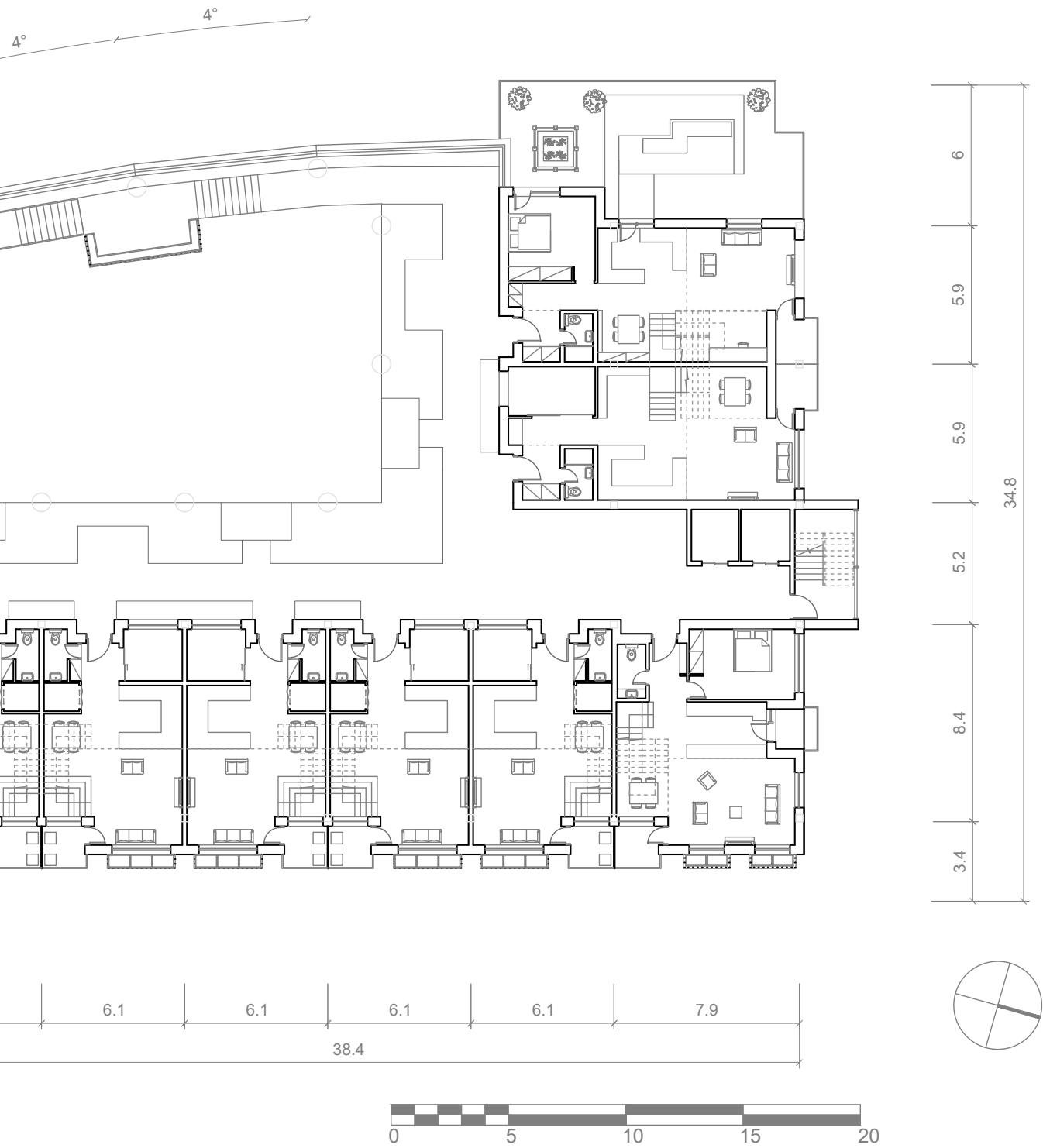


Fig 46. Eleventh Floor Plan



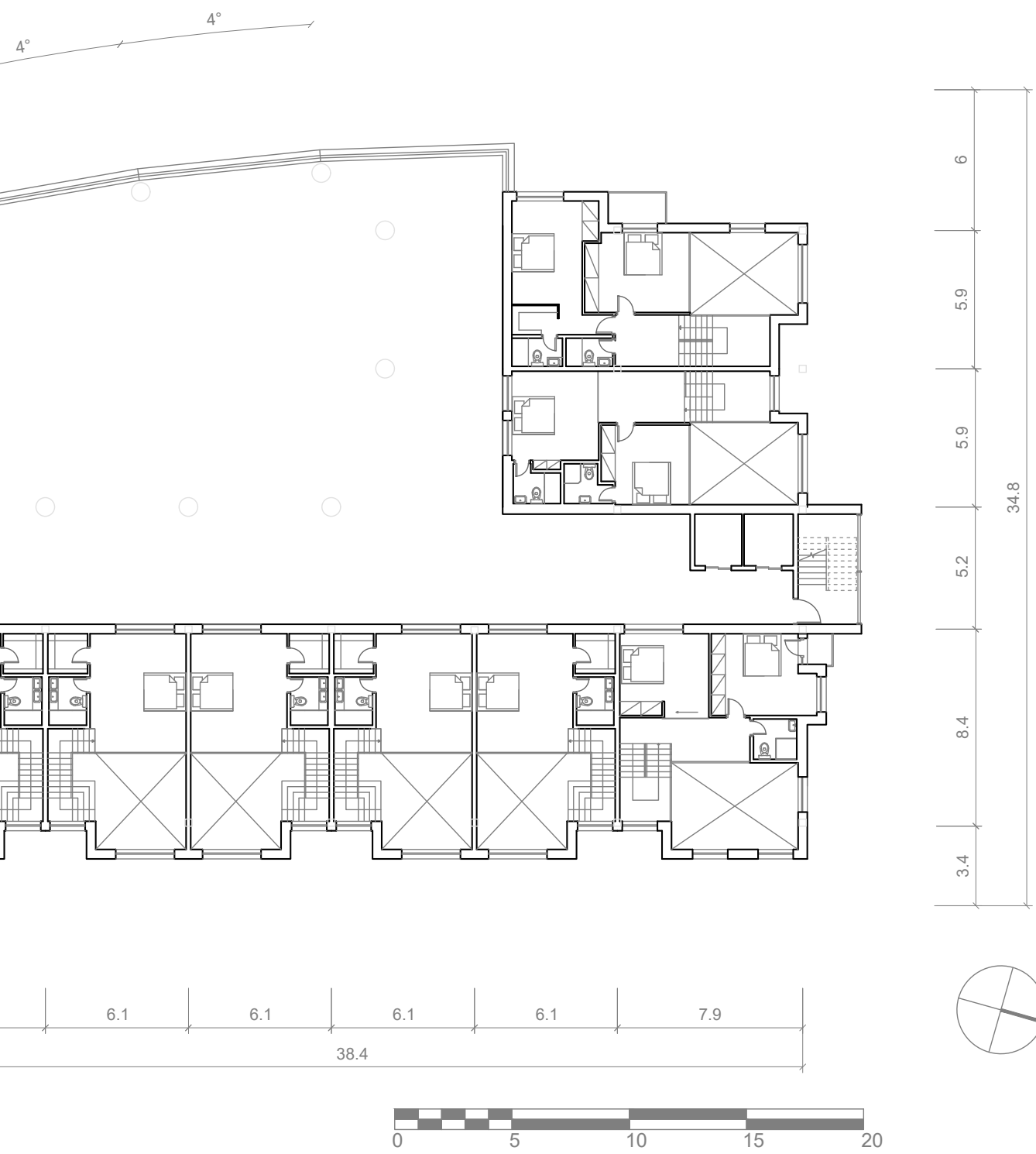


Fig 47. Twelfth Floor Plan



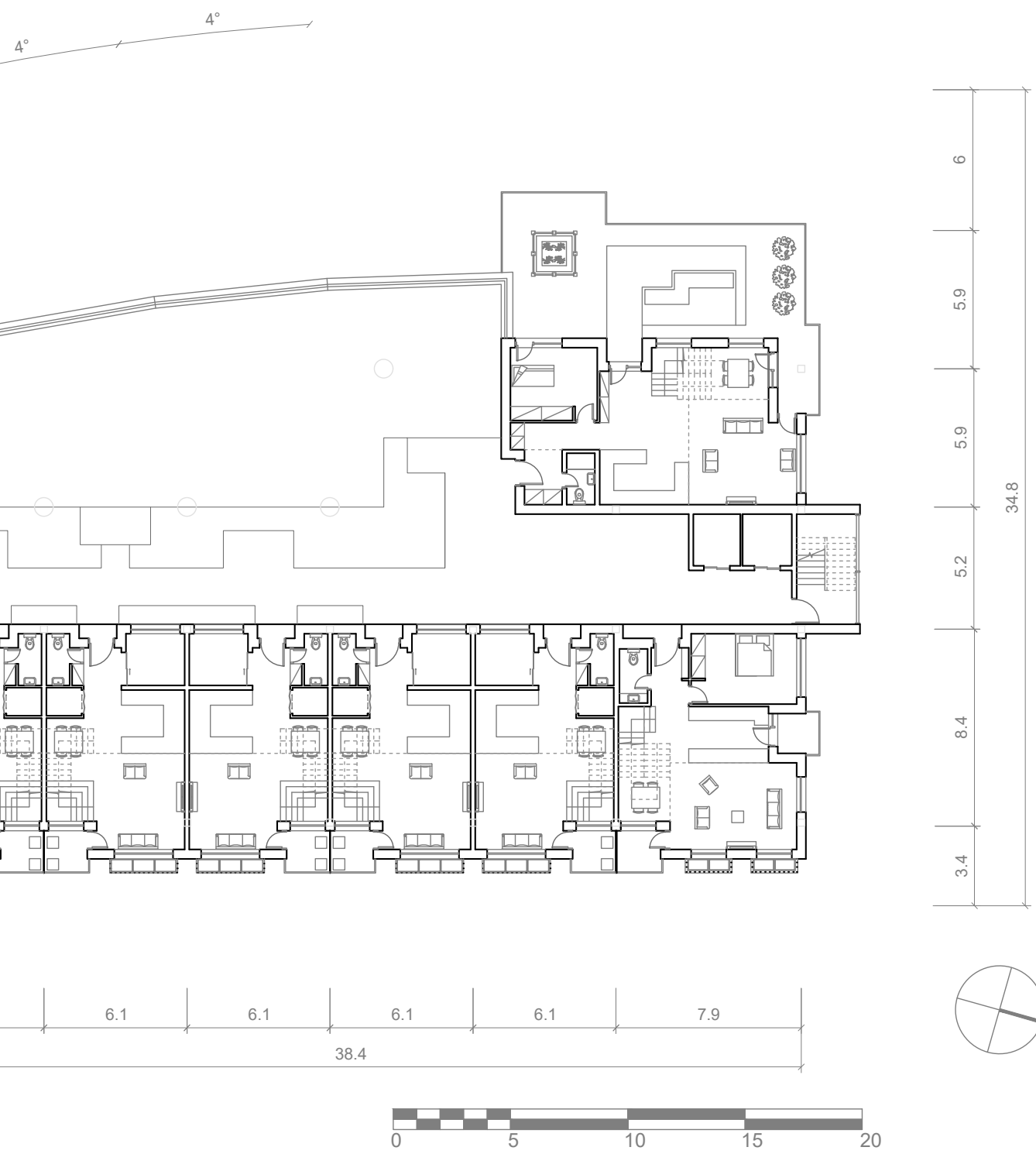


Fig 48. Thirteenth Floor Plan





4° 4°

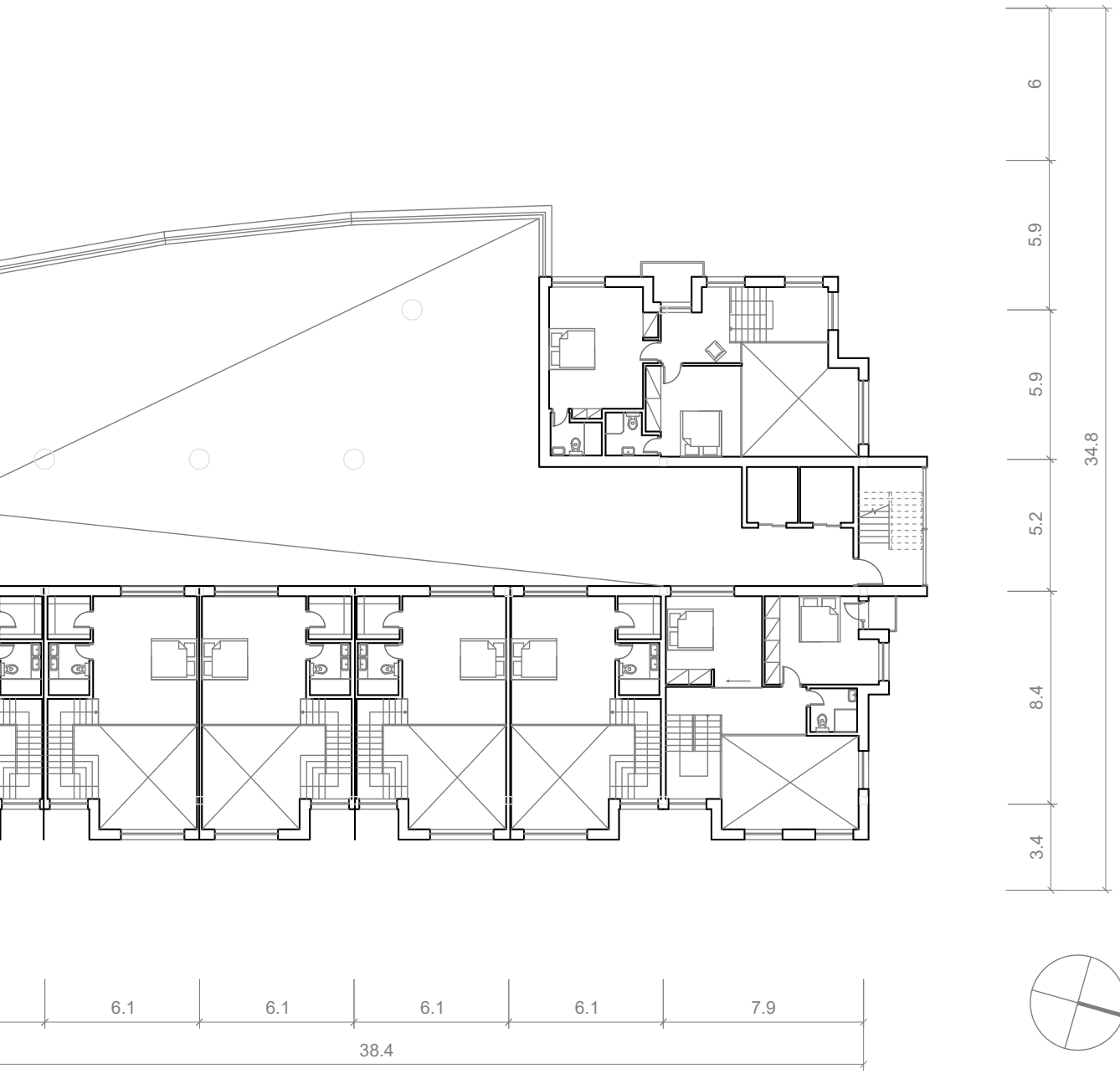
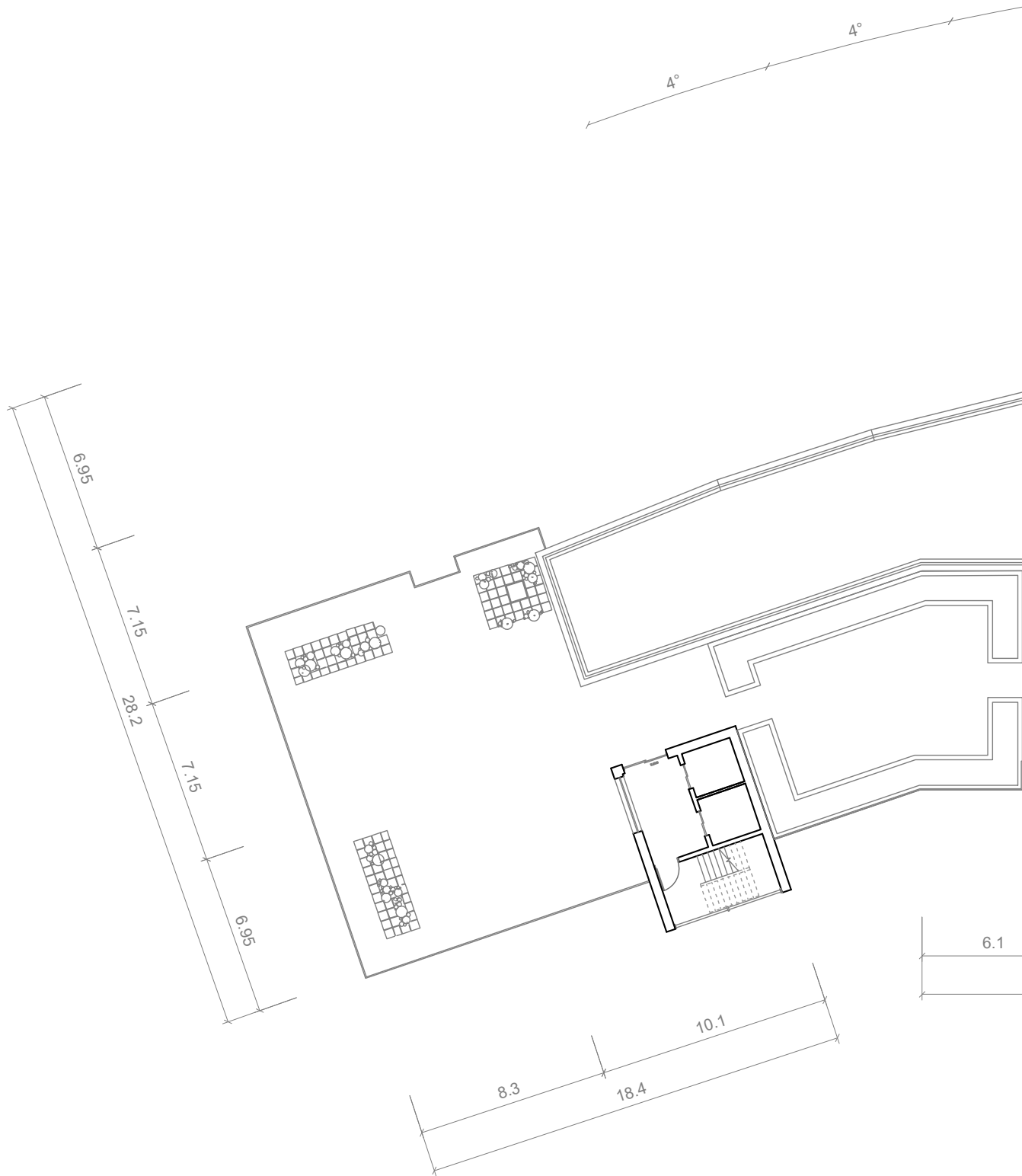


Fig 49. Fourteenth Floor Plan



4° 4°

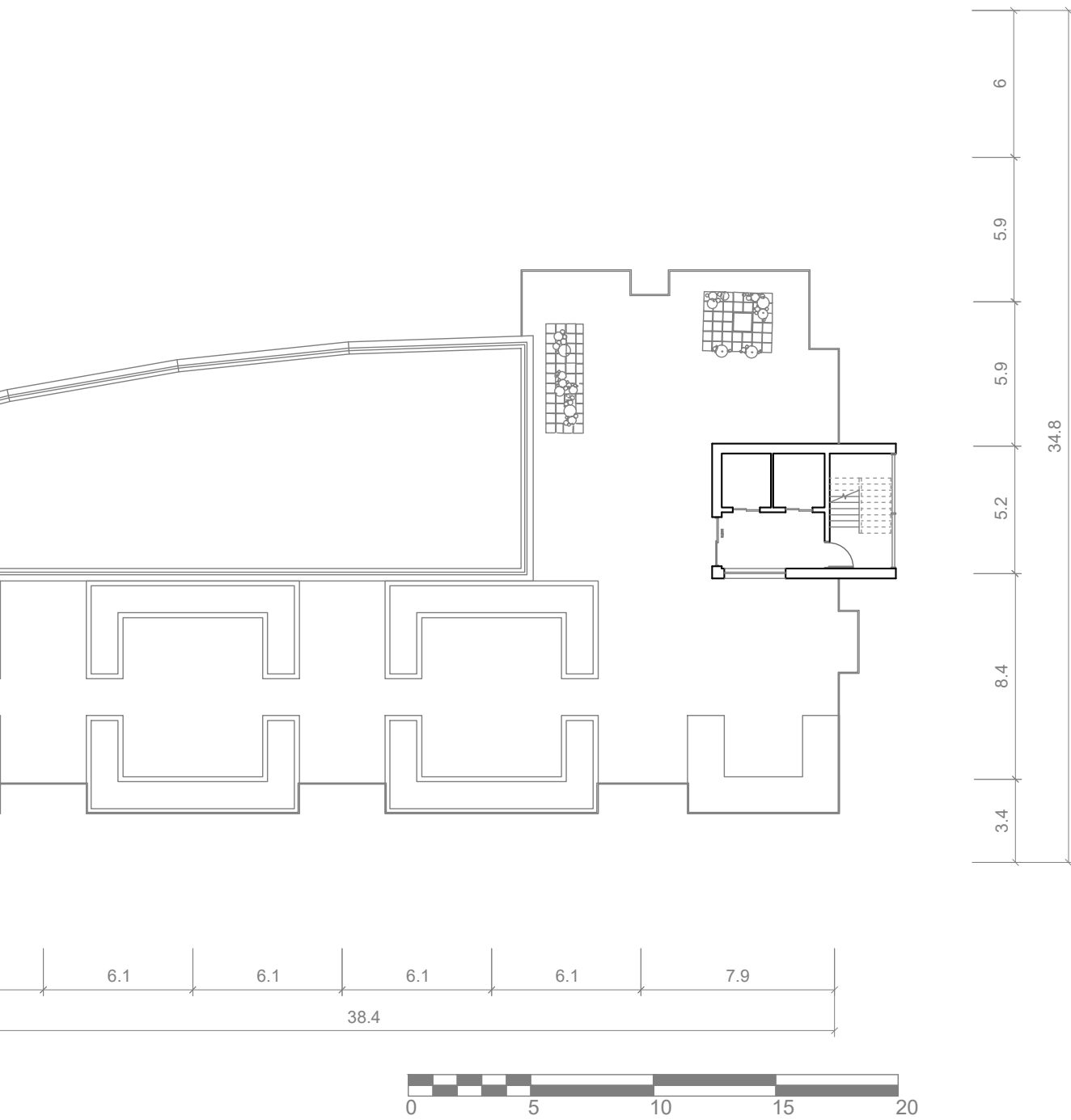
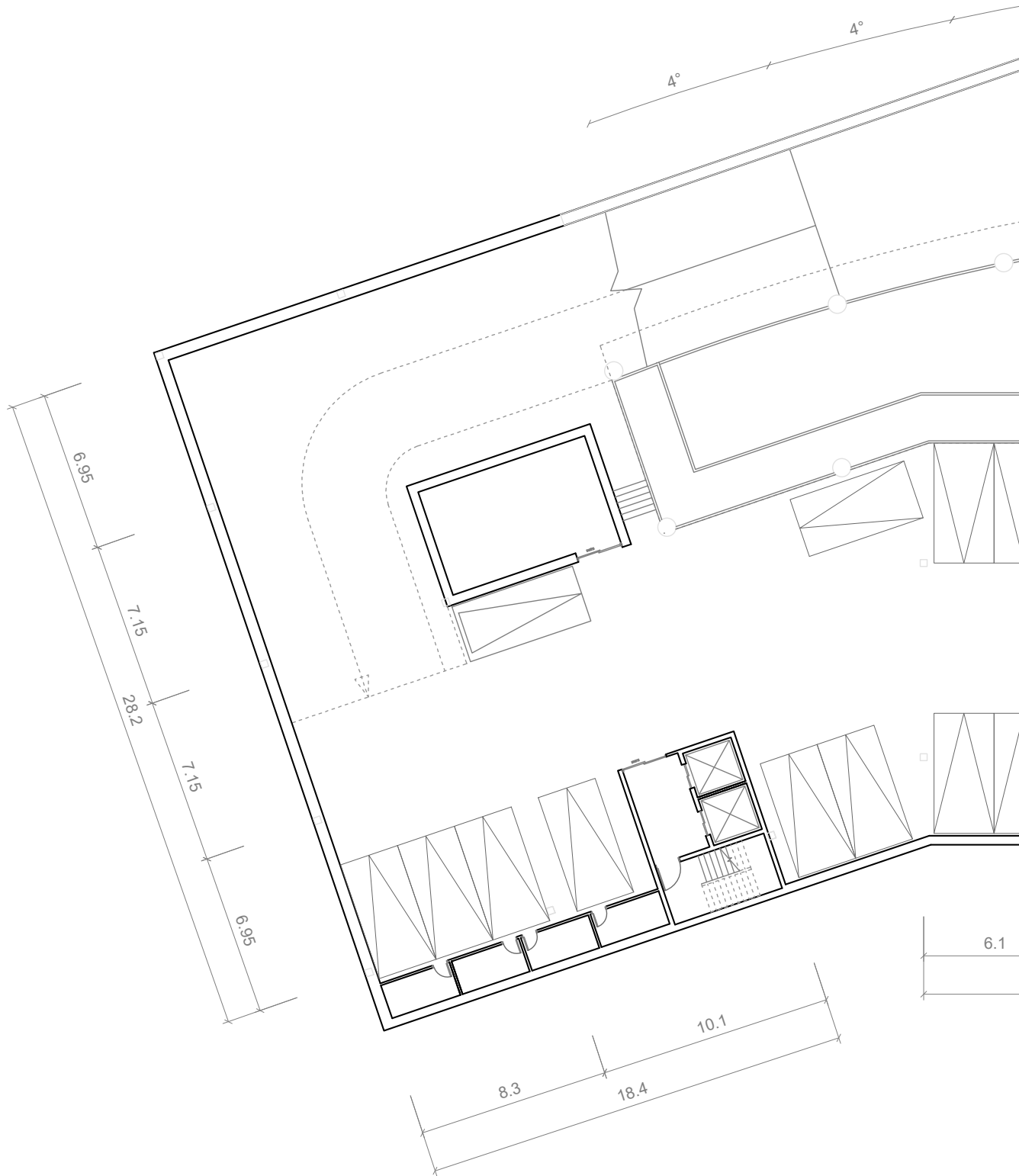


Fig 50. Fifteenth Floor Plan



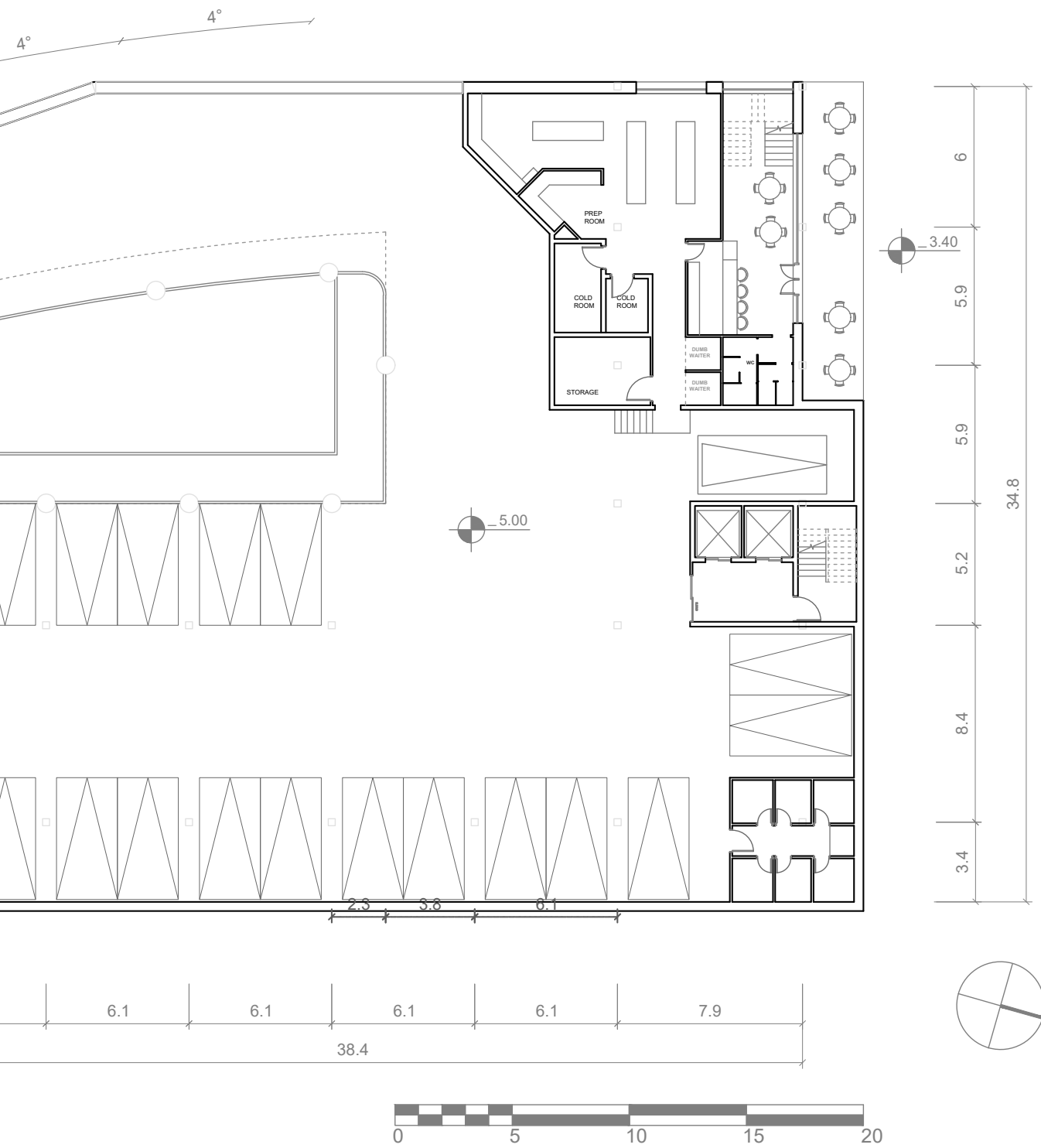
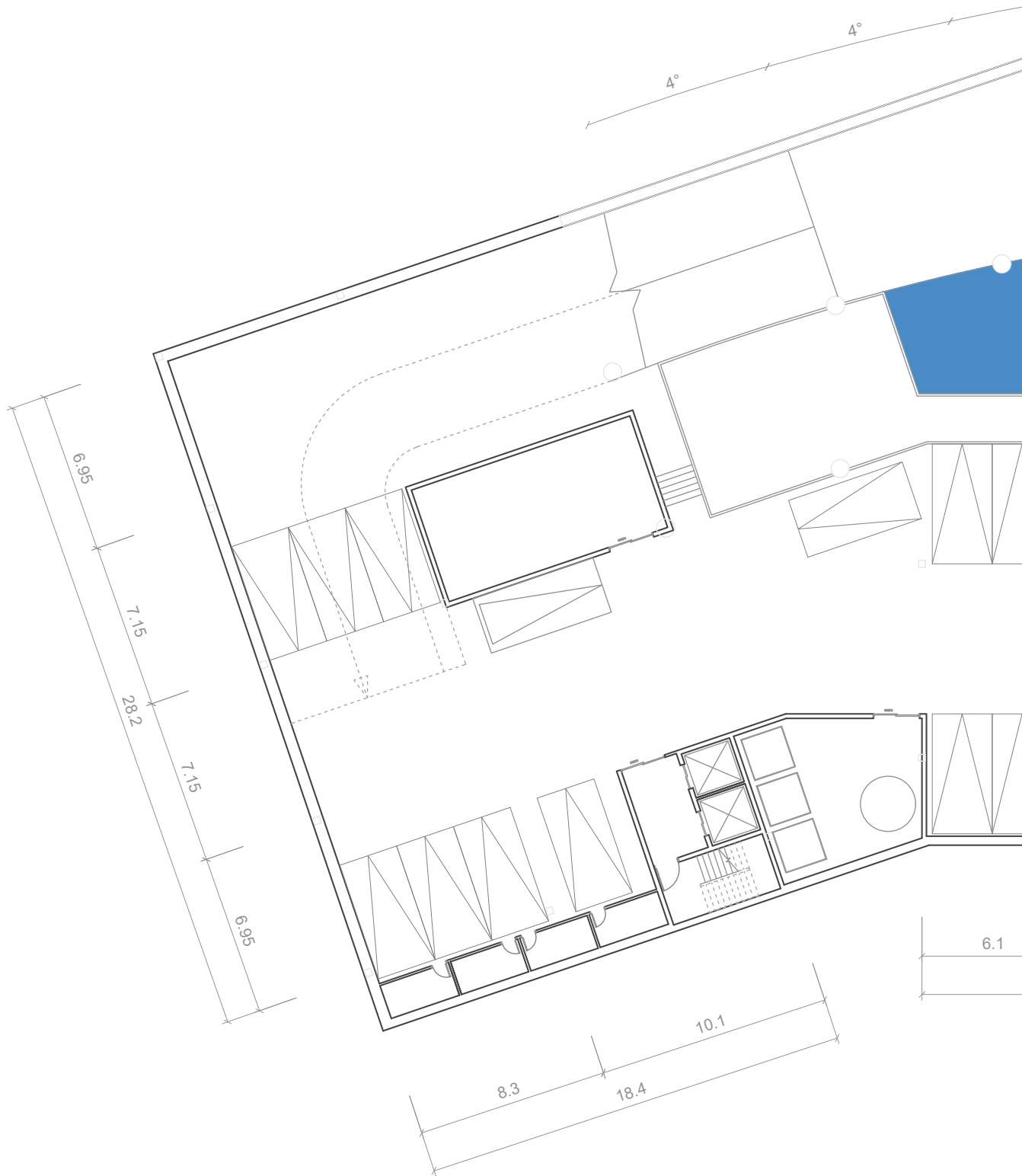


Fig 51. First Lower Ground Floor Plan



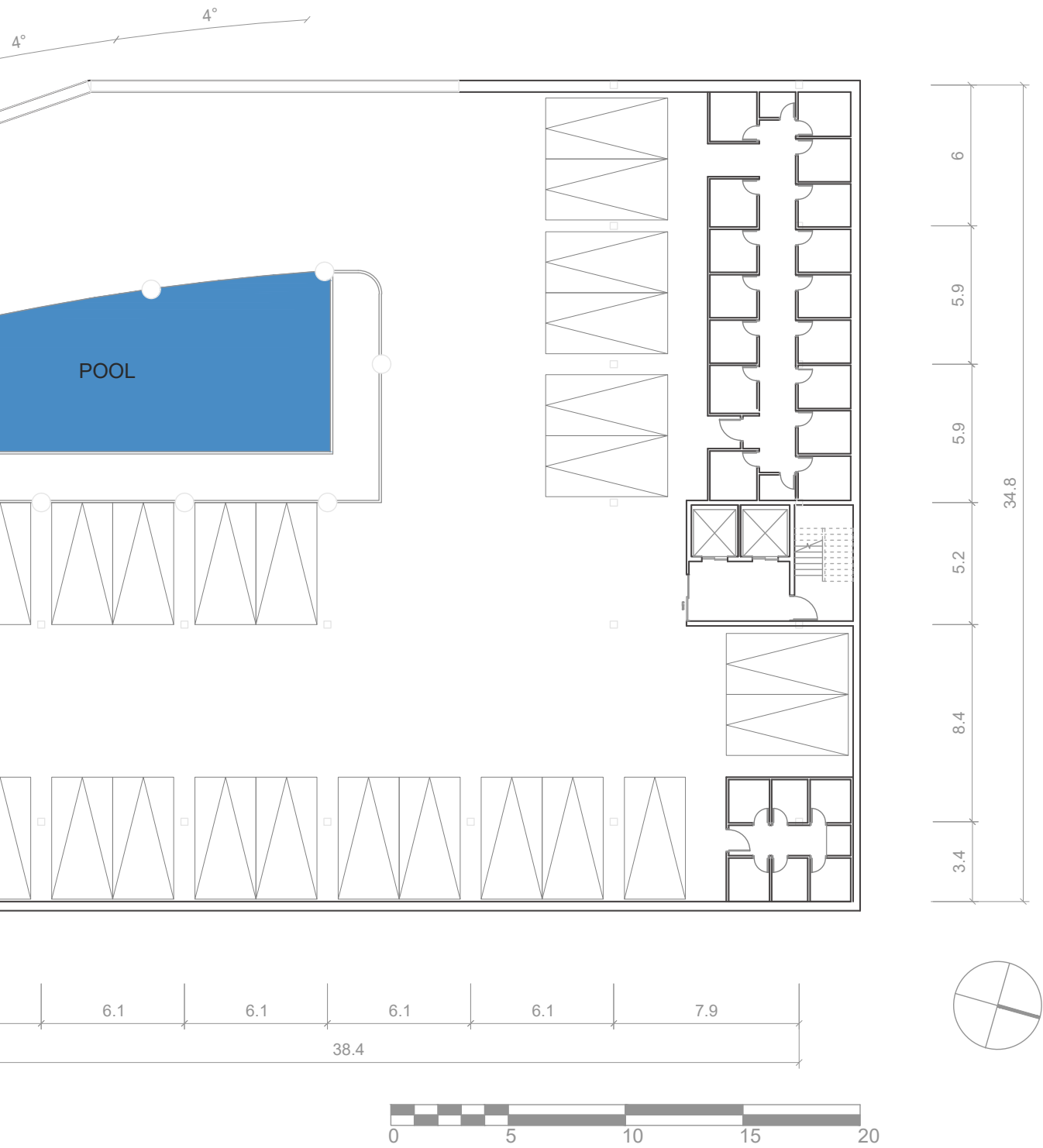


Fig 52. Second Lower Ground Floor Plan



While resembling the hotel designs of the 1970's, in particular, those designed by the neo-futuristic architect John Portman, the design process was not explicitly drawn upon by these Portman atriums, as they were meant as a showcase design features in the context of commercial architecture. A more relevant precedent while not an explicit reference, would be the nineteenth century Charles Fourier -inspired Phalanstère (or phalanstery), the Familistère at Guise, France, where the sizeable glazed atrium space was an integrated element of a socially programmed residential complex.<sup>4</sup>

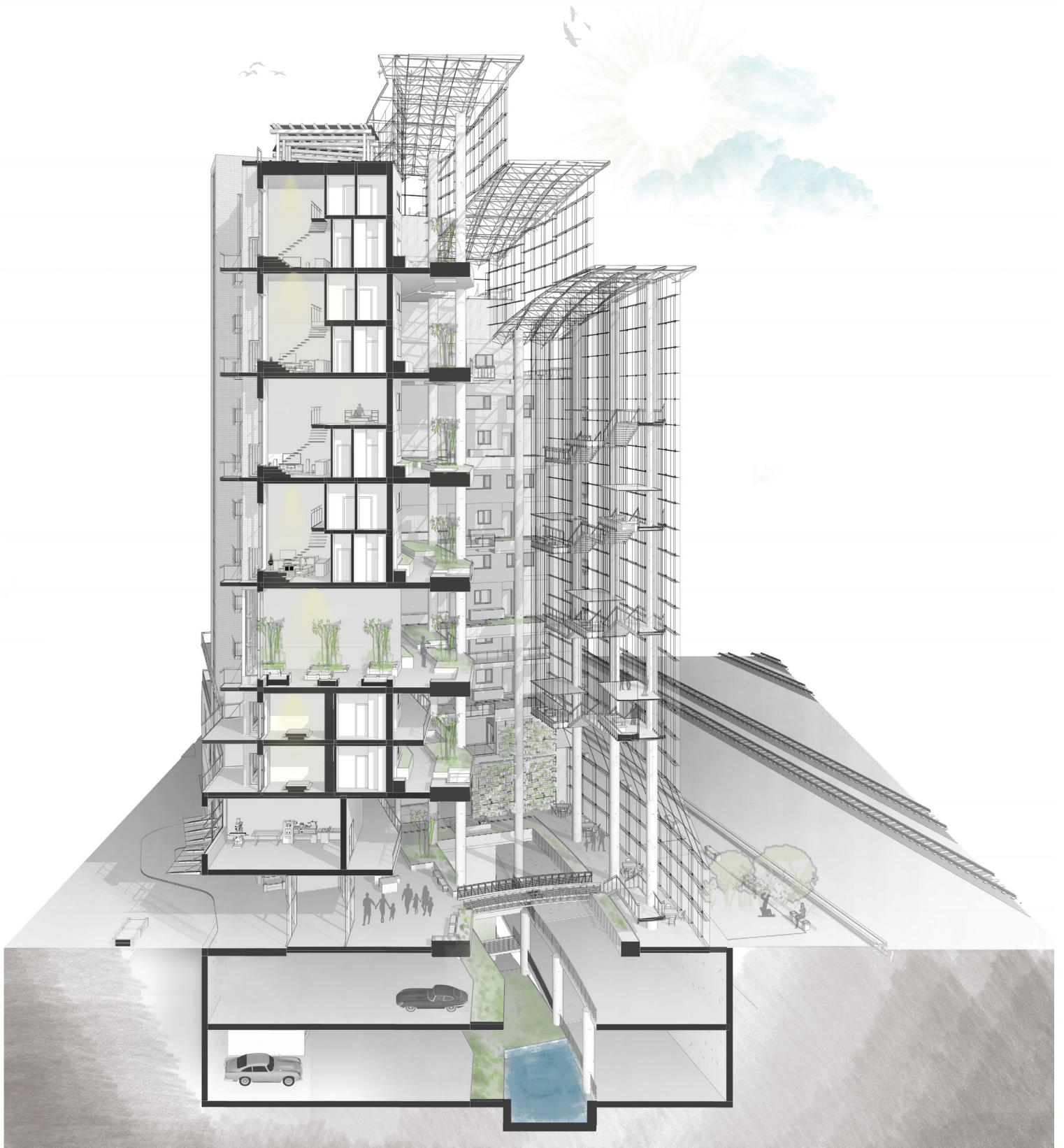


Fig 53. East-West Section

Inspiration for the East elevation comes from the industrial background of the Junction Triangle, a combination of red brick, indigenous to the greater Toronto area (adding to the sustainability factor of the project), glass and black painted steel as to harken back to the neighbourhoods factory buildings. The North, East and South facades all maintain this quality as they correlate to Bloor Street and Perth Avenue.





Fig 54. East Elevation Facing Bloor Street

As the West elevation faces pedestrians and cyclists of the railpath, a softer and more natural approach is taken, as most of the facade is comprised from the atrium of the Ecocell, with its hanging gardens and vitality fully visible to the public.





Fig 55. West Elevation (Facing Railpath)





Fig 56. East Elevation Facing Bloor Street







Fig 57. West Toronto Railpath View







Fig 58. Main Staircase View



Fig 59. Main Lobby View



## Notes

1 Evan Manning, "An Industrial Past Provides Design Inspiration for the West Toronto Railpath," <http://urbantoronto.ca/news/2012/08/design-inspiration-west-toronto-railpath> (accessed Mar 3, 2018).

2 Castle Point Numa, "Lower Junction Construction Updates," <http://www.lowerjct.com/updates/> (accessed Apr 21, 2018).

3 James Adams, "Toronto's MoCCA Gets New Name, Location and Vision," (Mar 29, 2016). <https://www.theglobeandmail.com/arts/art-and-architecture/torontos-museum-of-contemporary-canadian-art-gets-new-name-location-and-vision/article29415861/>.

4 philoursmars, "Familistère De Guise," <https://www.atlasobscura.com/places/familistere-de-guise> (accessed Aug 25, 2018).





## 04. Conclusion

In this day and age, many are questioning the ecological and social sustainability of our cities, our dependence on fossil fuels in every aspect of our lives from heating and cooling our spaces to everyday transportation. In the case of Toronto with its boom in new high and mid-rise construction, the massive opportunity to build a more sustainable, eco-friendly city should not be taken lightly. The success or failure of this approach is in how we configure our relation to the planet's ecology and its needs.

From the research, case studies, and ideas generated while drawing the proposed building, it has become more and more evident that one cannot generalize the same sustainable approach to all buildings and expect a viable solution. However, rather approach each project with a full understanding of its context to the neighbourhood, social structure and environmental needs to create site-specific viable solutions.

Ultimately one needs to view the construction industry in business terms. John Elkington (a global authority on corporate responsibility and sustainability) coined the phrase "The Triple Bottom Line" for sustainability in business, defined as the overlapping of the economy, social realities and environmental health. In the case of this proposal, the emphasis is firstly set on fossil fuel use reduction to minimize carbon emissions and set a net positivity in oxygen production (to create more Oxygen than the building and its occupants use both during construction and in the lifetime of the building) and also make proper use of Abiotics. Second, create enough density to minimize the impact of the price increase in the Junction Triangle due to the changing context of the neighbourhood and

the relocation of the MOCCA. Third, achieve cultural sustainability by reacting to the overwhelming artisan culture populating the neighbourhood by accommodating for living, working and exposition space. Last but not least raising mental and physical health by creating a space resembling and behaving more in line with a natural habitat than a condominium in a densely populated area.

Furthermore, the design looks to the immediate future, in anticipation of ever-changing lifestyles and progressive needs. In doing so, this design option has the potential to become a new typology in regards to Toronto's mid to high-rise residential construction, keeping in mind that all the requirements of the OBC have been met. The proposal has a certain level of optimism for the future in its context, believing in humanities understanding and adaptability to climatic change, enhancing the relationship to the natural world.

As a designer, the thesis was done in the hopes of promoting this line of thought, to encourage upcoming architects, planners, developers and the users (the general public) to think beyond the needs and wellbeing of our species and consider the desideratum of fauna and flora. In consequence, the thesis in its entirety becomes a critique of the building norms of Toronto, as to crudely put it a "double-loaded corridors in a glass box." As it has become painfully evident, even firms that specialise in sustainable architecture and heavily advertise "providing environmentally sound architectural solutions", only strive to achieve Passive House or LEED accreditation.

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