

**AN ARCHITECTURE OF VERTICALITY**

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fulfillment of the requirements for the degree of

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In

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## **ABSTRACT**

An Architecture of Verticality

One of the chief characteristics of a high-rise building is its verticality. However, it seems that most high-rise buildings do not directly pursue the architecture of verticality. Moreover, verticality is rarely perceived within this building type. This thesis investigates the potential of verticality in a residential high-rise building.

Together with the aspect of verticality, the thesis pursues an idea that even in a residential high-rise, the sense of community that typically exists in low-rise settlements on the ground and other connections to the outside can be at least partially preserved.

In summary, the proposal aims the architecture to celebrate the verticality of the high-rise as a part of the skyline, expressing the verticality through its facade. For the dwellers, sky gardens offer a sense of verticality with constructed views connecting the outside with world. Six two-story-apartments adjoin the sky garden with a double height living room suggesting the apartments in a high rise shouldn't be flats. This double height vertical space extends into the balcony spaces suggesting a local verticality at the apartment level.

## **ACKNOWLEDGEMENT**

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## INTRODUCTION

Architecture of Verticality

The most important collaborator of verticality is the horizon because it gives a sense of elevation. Le Corbusier, in the Villa Savoye, used pilotis to elevate the volume off the ground to present the horizon with horizontal ribbon windows. Frank Lloyd Wright emphasized horizontality as a part of his organic architecture, embracing the flat grounds where life exists.

As Wright and Le Corbusier explore the horizontal emphasis, the increase in high-rise typologies suggests a similar engagement of an architectural verticality.

## THE CITY

In Mumbai, India, next to Hiranandani gardens a site offers a view of Powai lake on the north and a view of the mountains on the south. Mumbai's growing population makes buildable land very precious and naturally increases the demand for high-rise residential buildings.



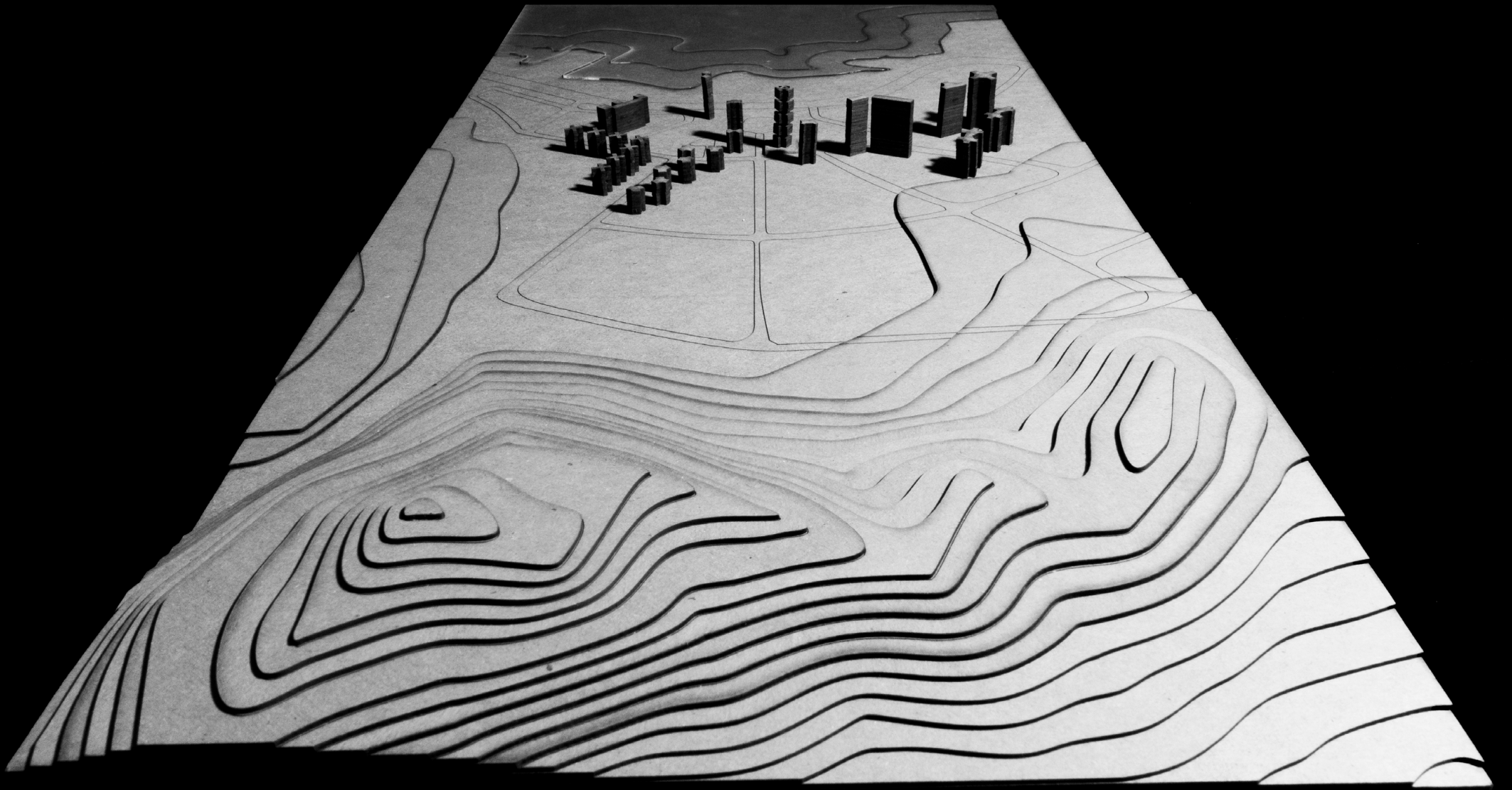


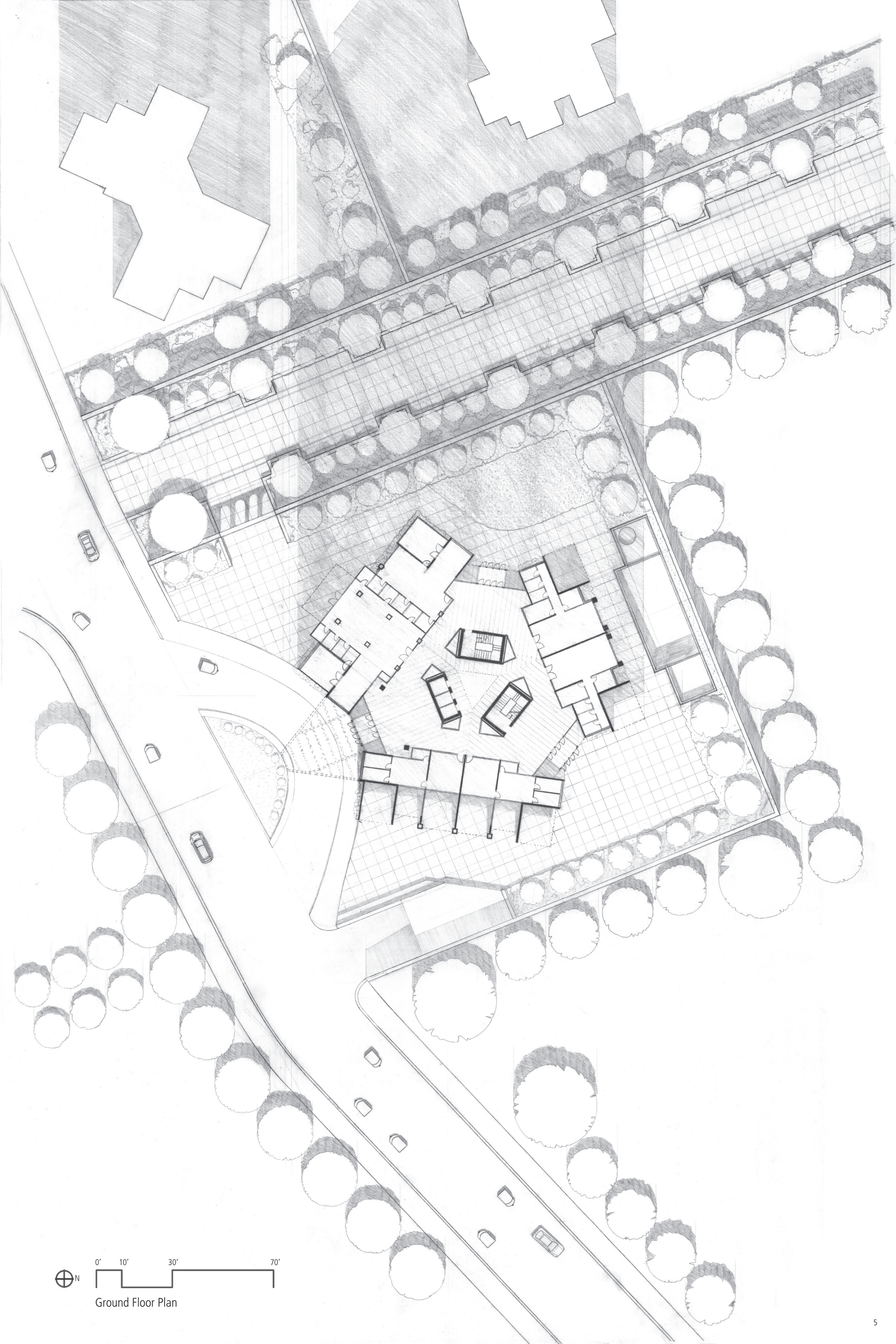
## THE SITE

The location, south of the Powai Lake, in close proximity to the Hiranandani Gardens offers a place to socialize and relax. The direction of the breeze west to east avoids the direct humidity from the lake and offers an amazing view from higher building floors. A tall building here becomes a part of the skyline of Powai.









0' 10' 30' 70'  
Ground Floor Plan



Site Pictures of Hiranandani Garden and Powai Lake

## HORIZONTAL VS VERTICAL

From what we know, a common complaint in residential high-rises is the lack of contact between people within the building. Confined apartments and direct routes to front doors offer practically no public space anymore. From an architectural view, the verticality of the high-rise building is never perceived within the building.

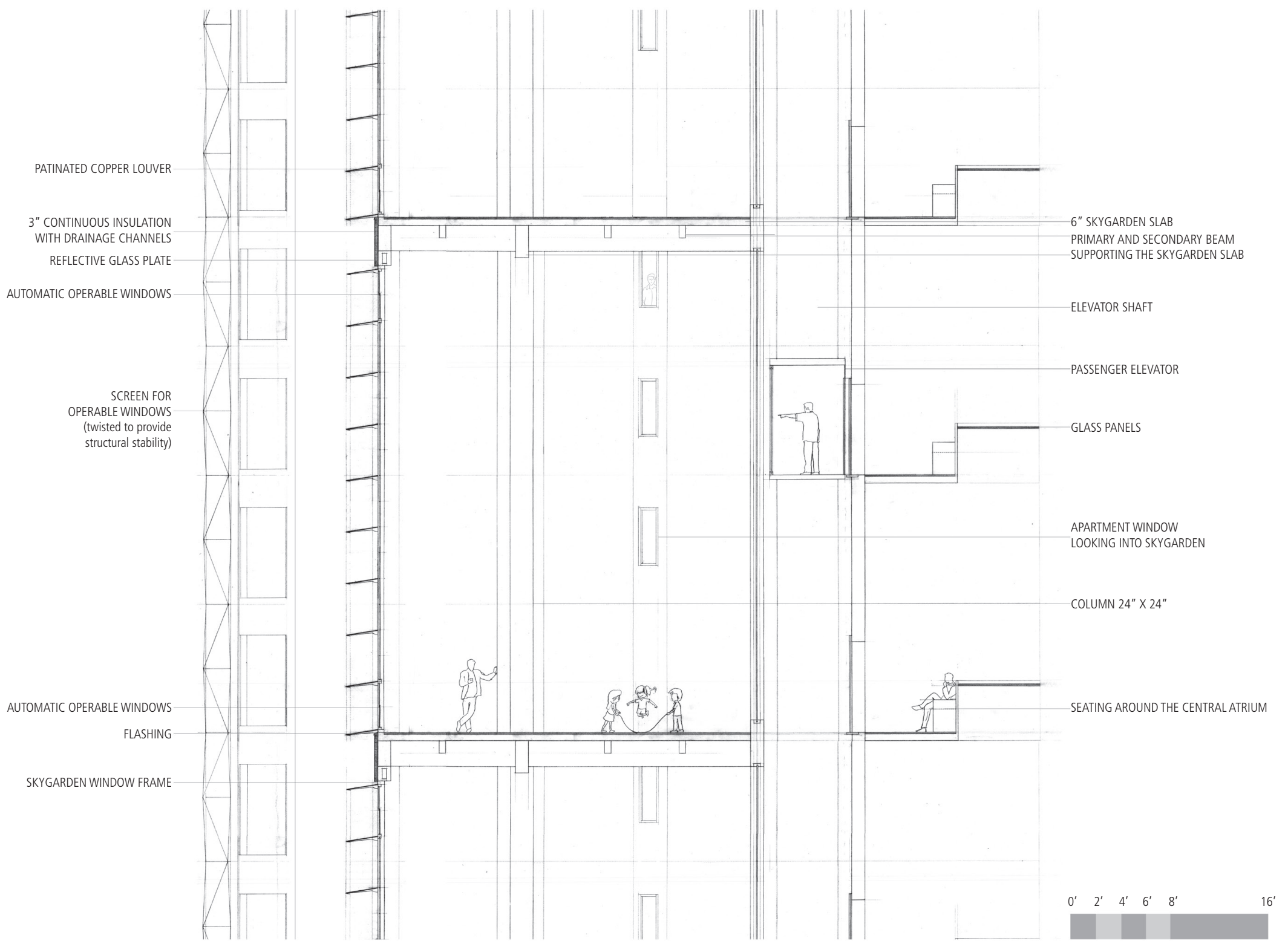
Living closer to the ground usually offers public space with a sense of openness, which invites direct communication and a broader connection to the outside world.



The image is a detailed architectural floor plan of the Commerzbank building in Frankfurt. The plan shows a central atrium area with two large, spiraling sky garden areas. The building's layout is characterized by a central core with two main wings extending outwards. The wings are segmented into four-story office clusters. The sky garden areas are located at the top and bottom of the building, providing a visual and social focus for the office clusters. The plan also shows a grid of office spaces and a central staircase area.

### COMMERZBANK, FRANKFURT

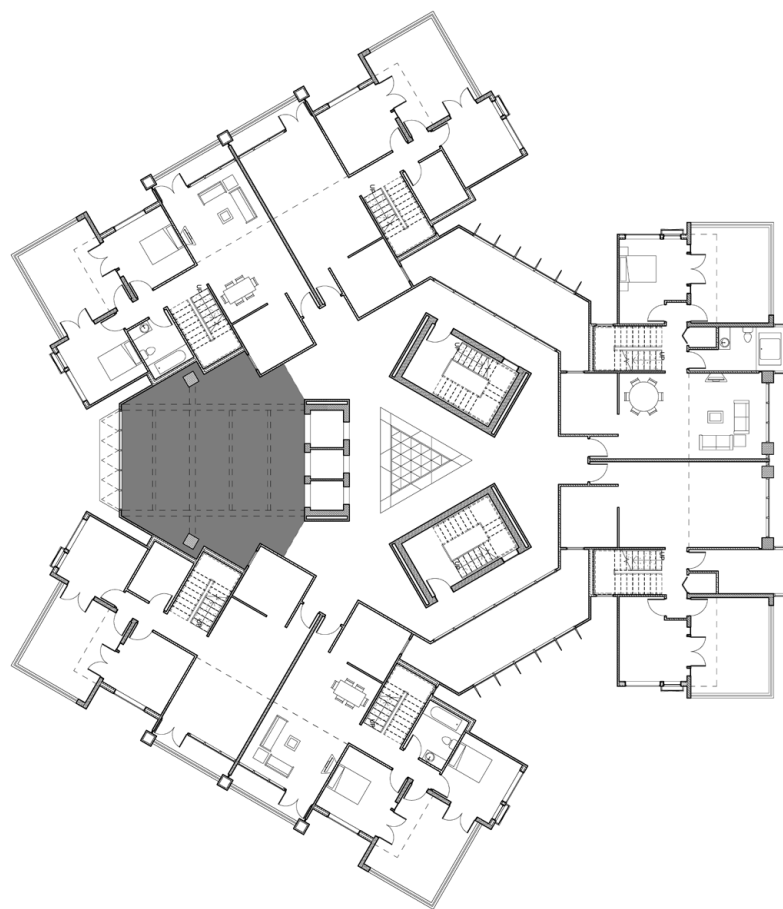
Norman Foster's Commerzbank building in Frankfurt, Germany, an office setting, provides sky garden areas spiraling up around a central atrium. They become the visual and social focus for four-story office clusters. He provides segmented or compartmentalized communities in the high-rise volume to meet colleagues or relax during breaks.



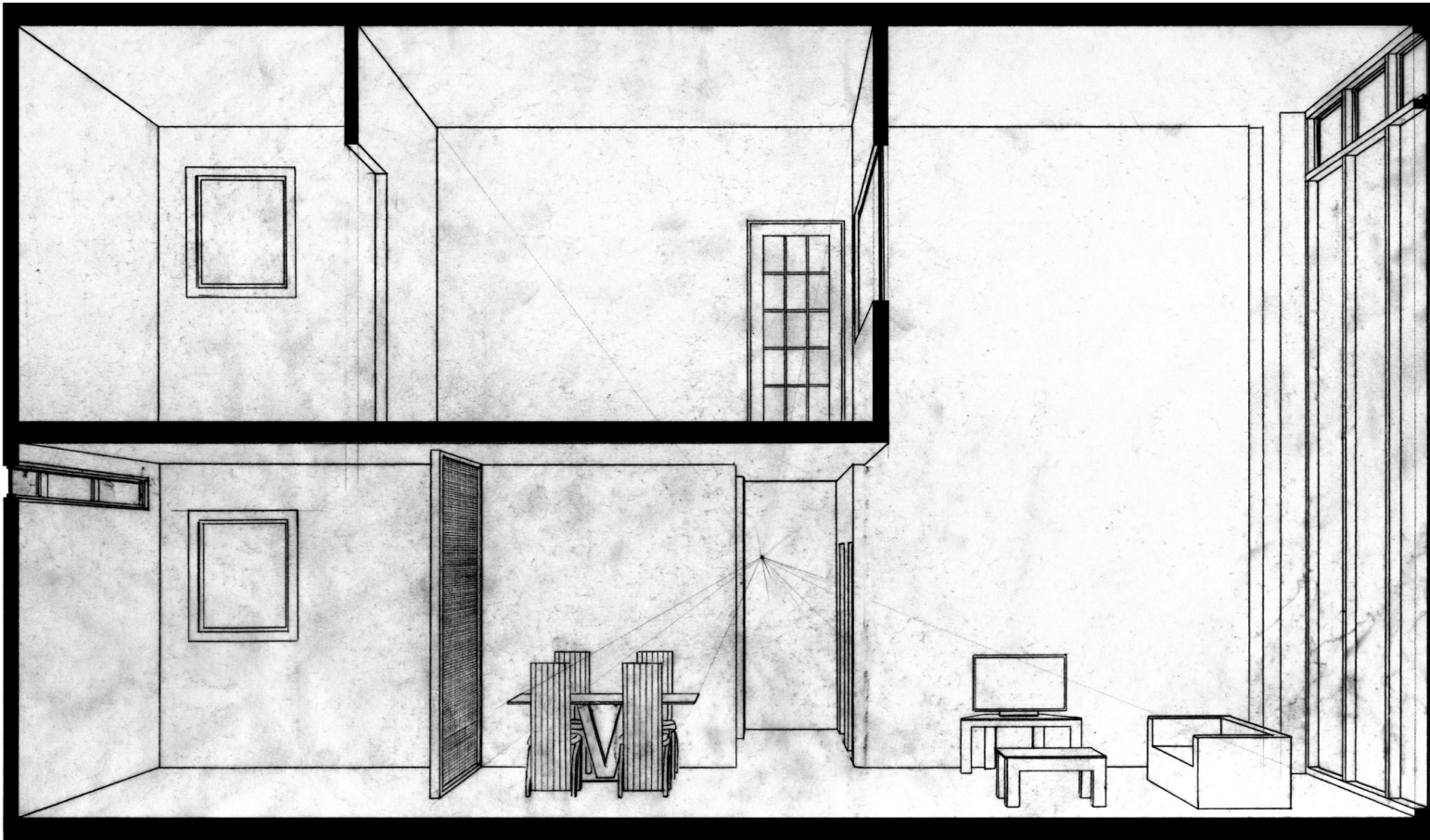
### DWELLING WITH THE VERTICALITY

In the proposed design, the sky gardens similar to those of Foster's are the meeting places for families and provide a playground for children. It is the substitute for the public space on the ground and could be considered a safe environment to socialize.

The sky gardens also offer a view of the mountains on the south as a datum to help sense the verticality of the building.







### LIVING THE VERTICALITY

Each apartment has two main vertical spaces, the living room and the balcony, operating with spatial expansion and compression. The two-story apartment creates a high-rise building without conventional flats, while also providing a private connection to the outside.



SECTION B-B'

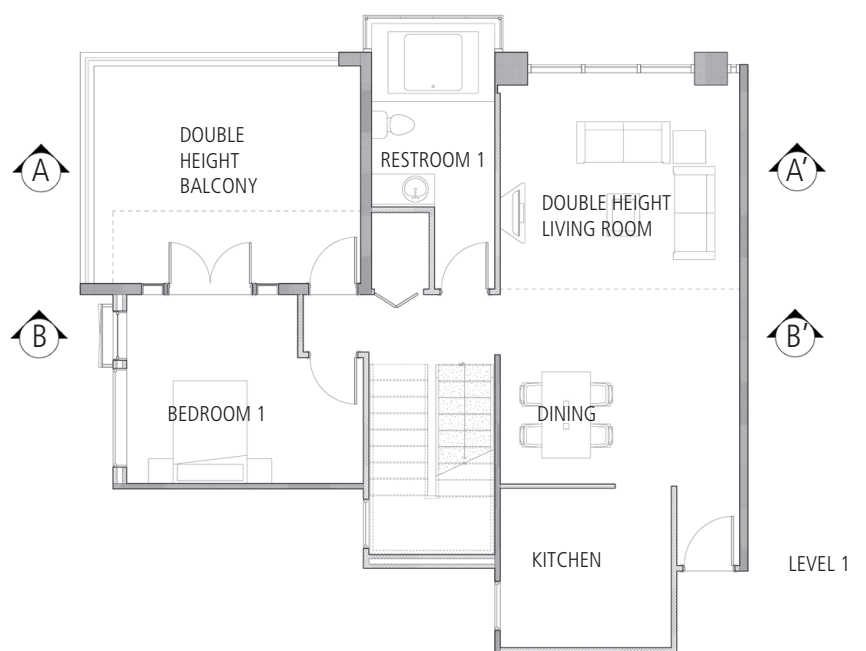


SECTION A-A'



**LIVING THE VERTICALITY**

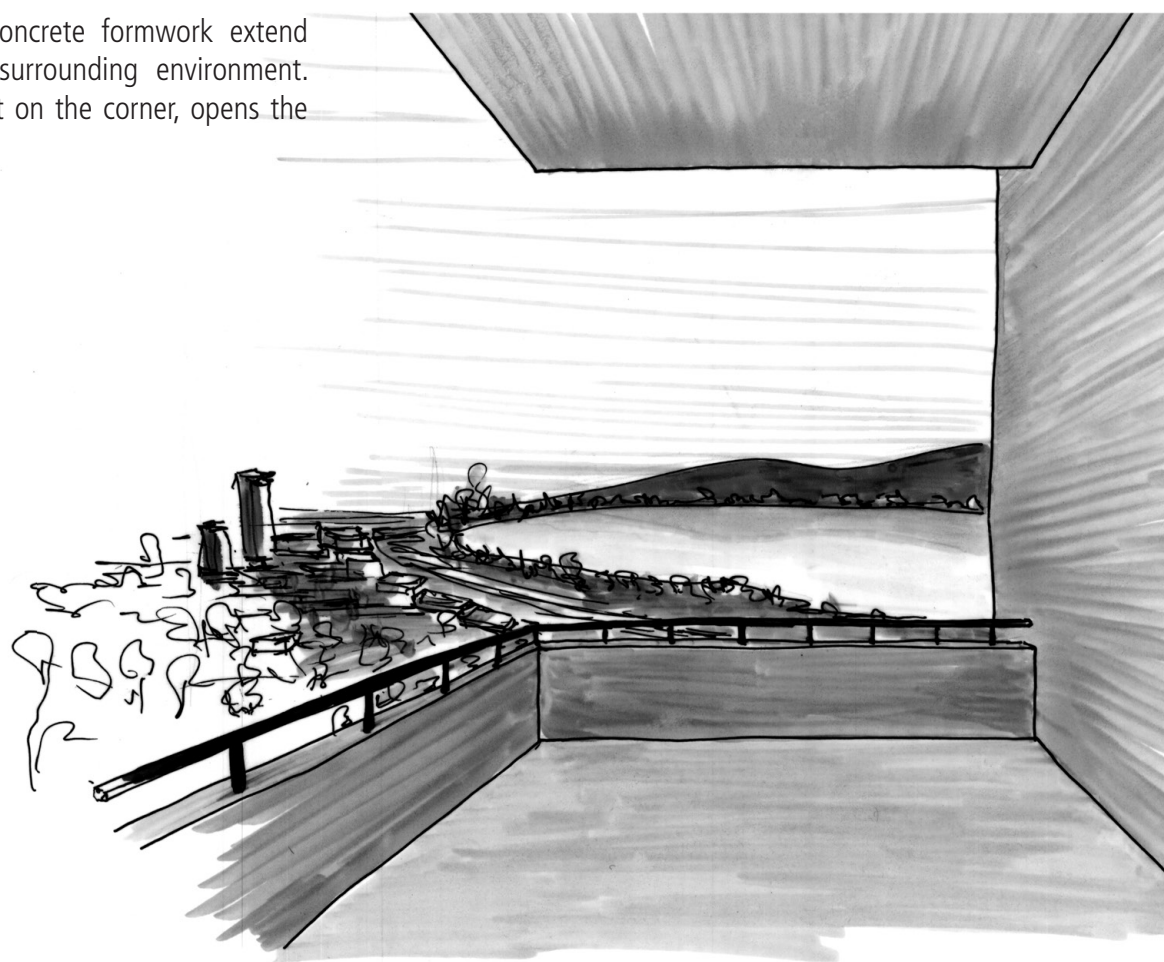
A single apartment consists of two bedrooms with shared bathrooms, master bedroom with attached bathroom, kitchen, double height living room and double height balcony.

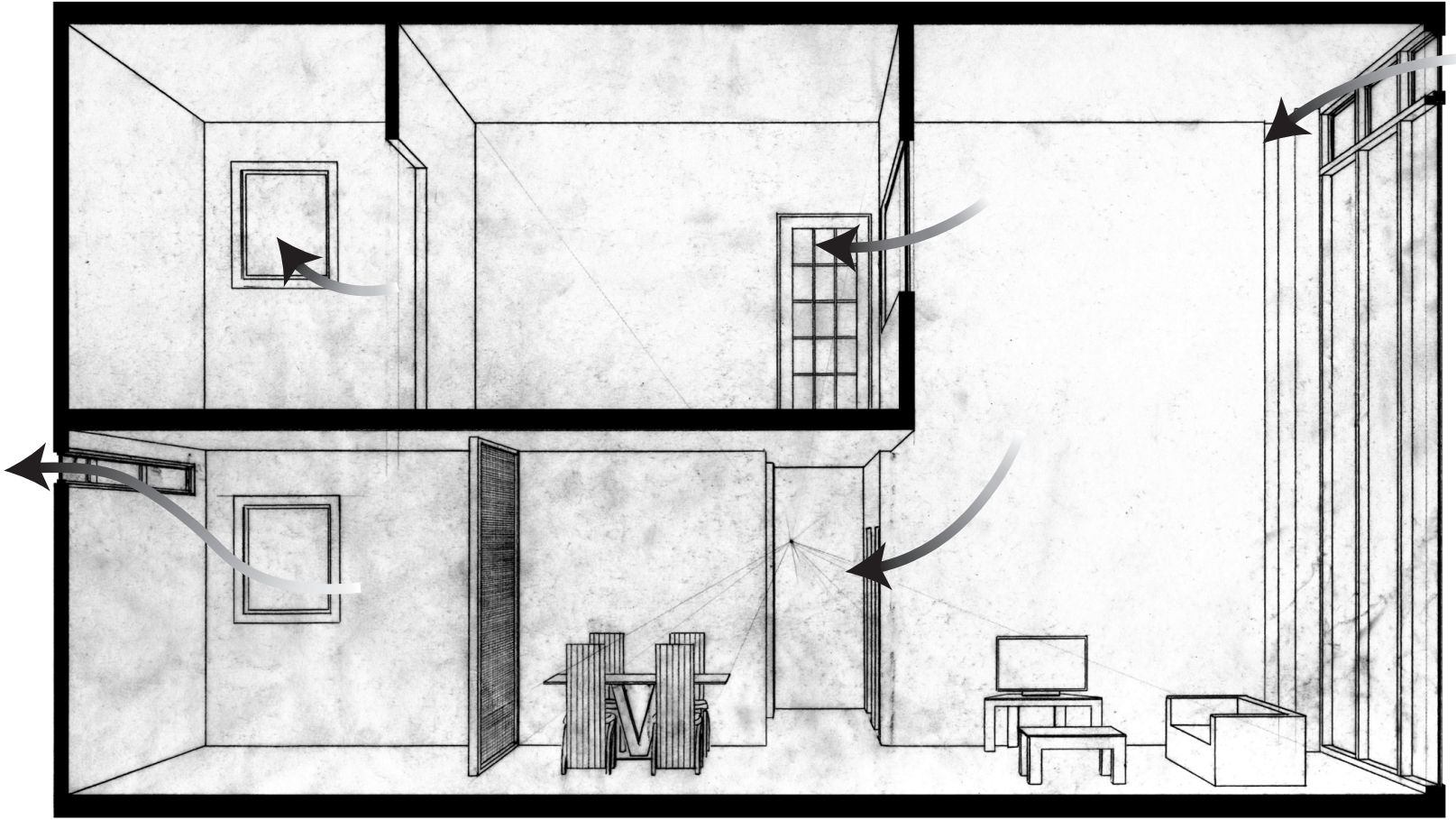






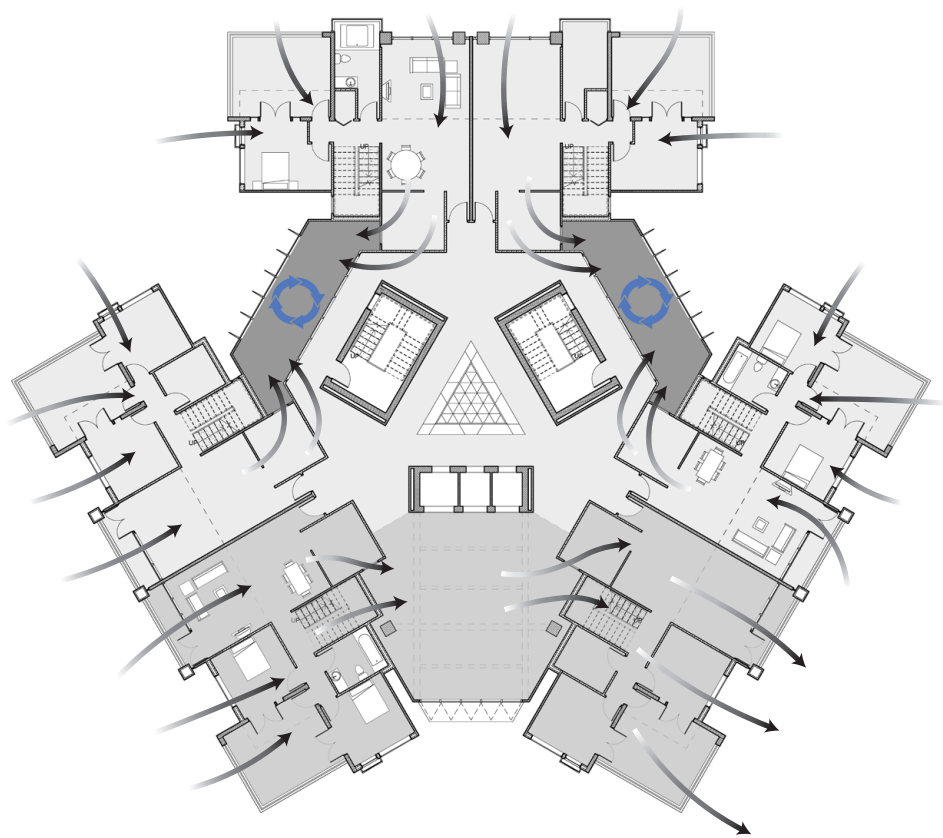
The horizontal lines of the concrete formwork extend the balcony space into the surrounding environment. The cantilever, with no support on the corner, opens the viewshed.





## VENTILATION

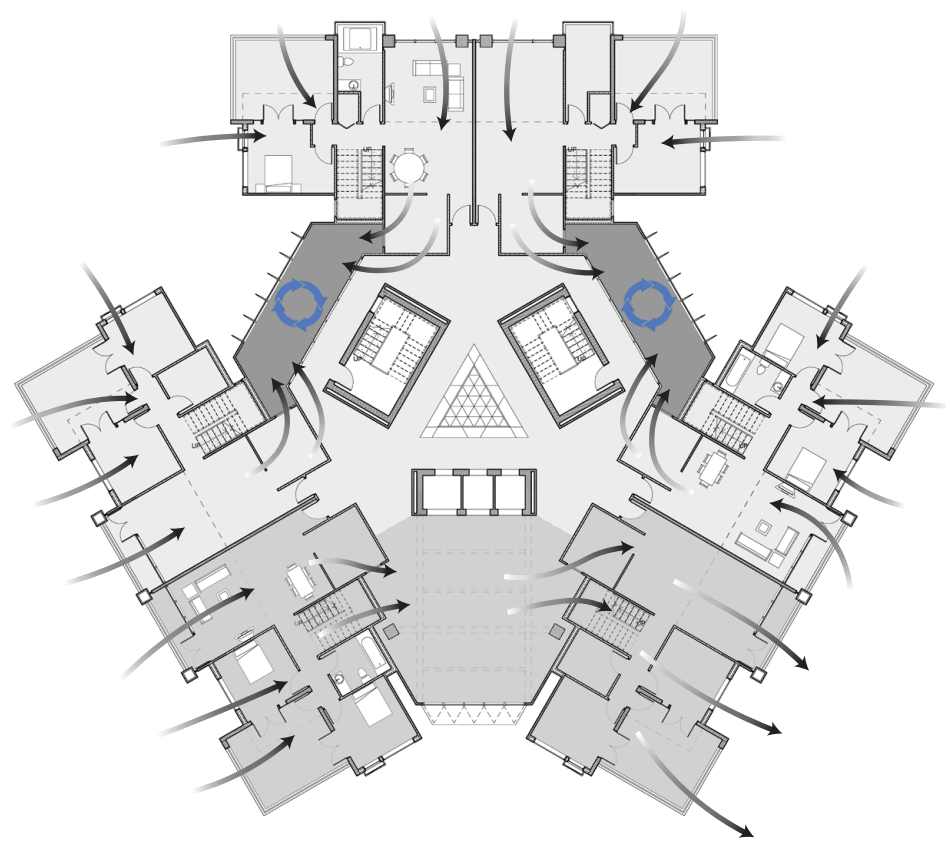
A stacked ventilation strategy is used for the two apartments on the North side and one apartment on the west and east side of the building. For the two apartments on the south side, existing winds are harnessed to provide natural ventilation.

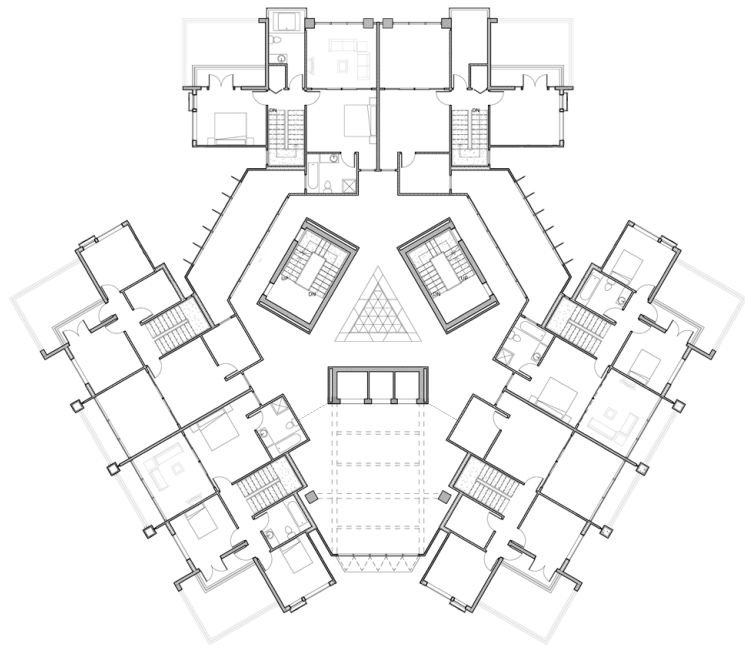




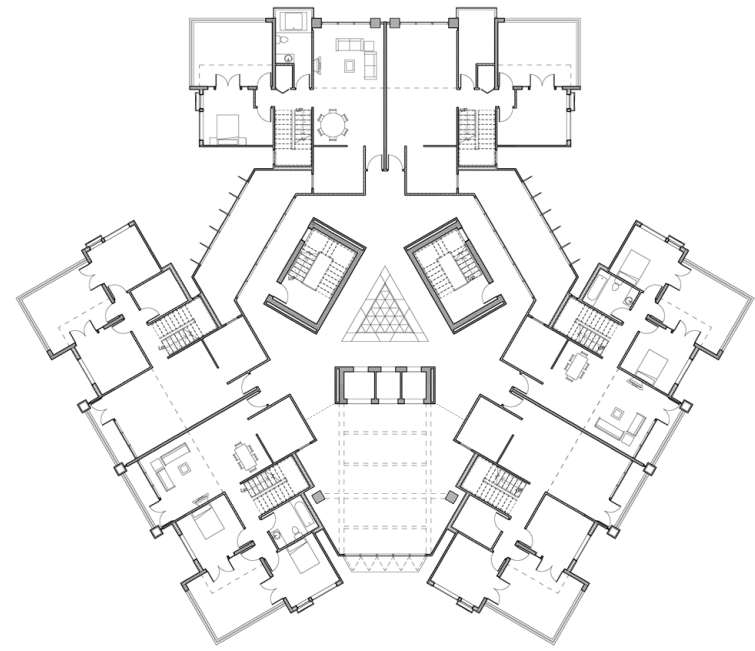
## VENTILATION

The breeze experienced by the occupants on higher levels, as compared to the apartments closer to the ground, will be different, which gives a sense of identity.





LEVEL 2



LEVEL 1

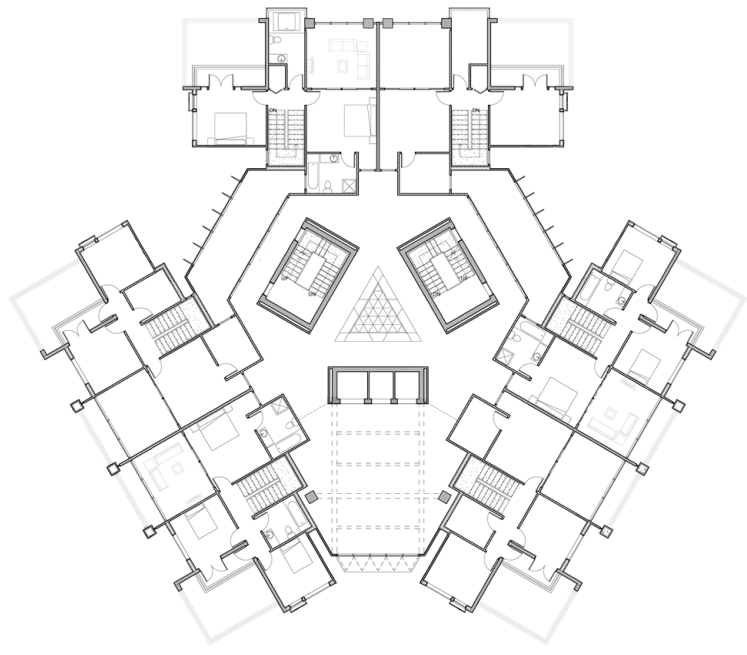
### VERTICALITY ON THE EXTERIOR

Verticality on the exterior is emphasized by the central band which is formed by the 4-story sky garden spaces. The south facade gets plenty of sun during the daytime. Horizontal louvers generate a vertical band of shadow on the central part of this facade. The intermitted horizontal lines provide an optical measure for the vertical.

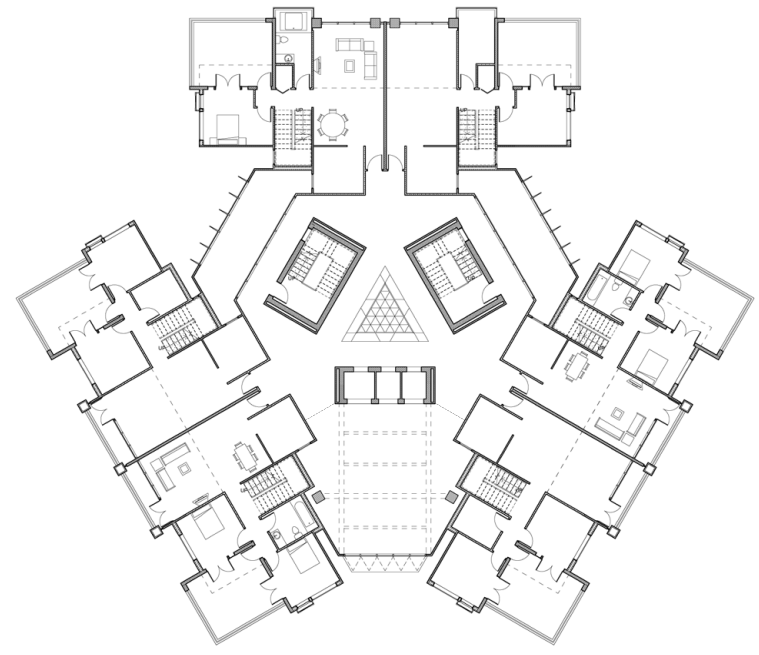


0' 10' 20' 40'

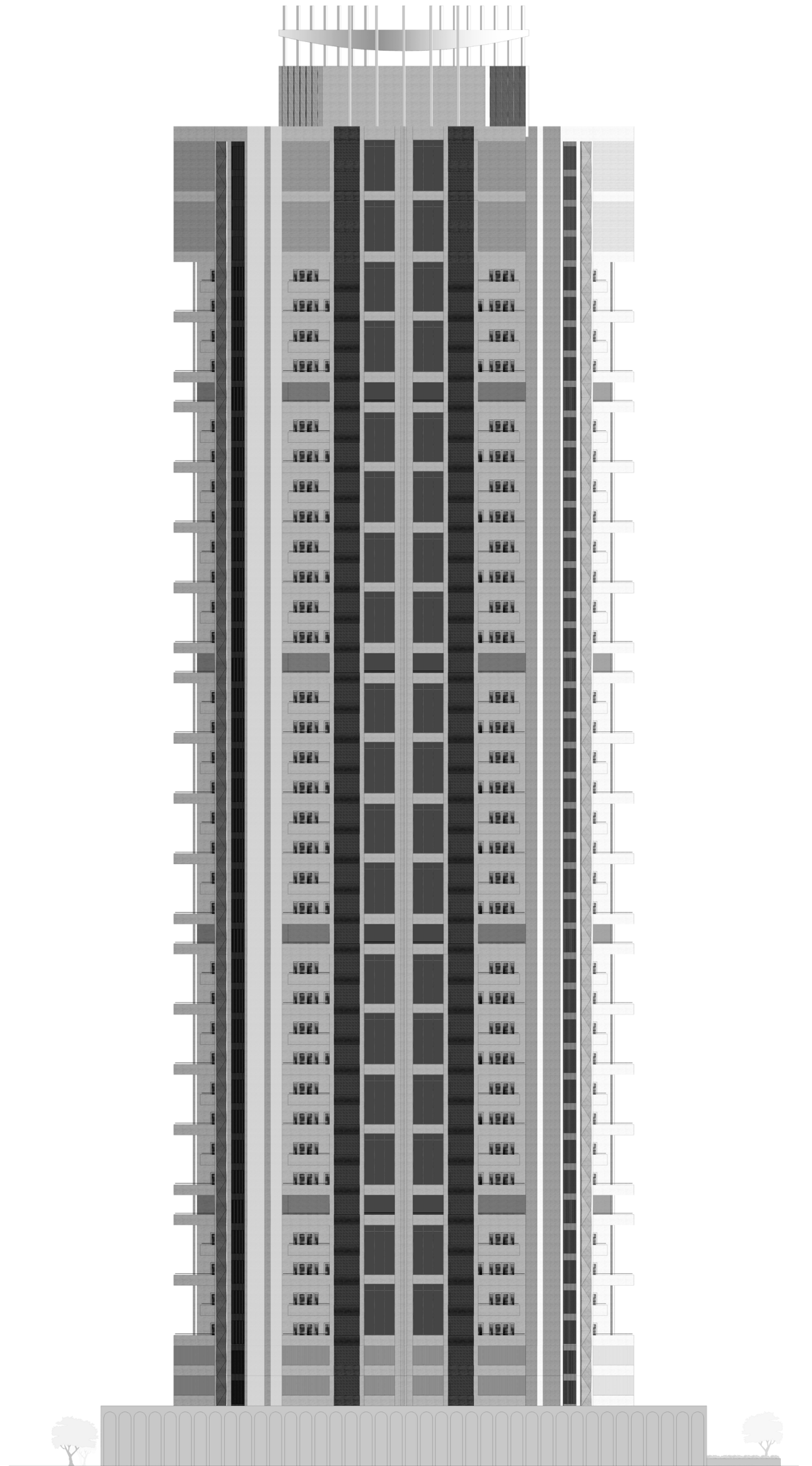
South Elevation



LEVEL 2



LEVEL 1



0' 10' 20' 40'

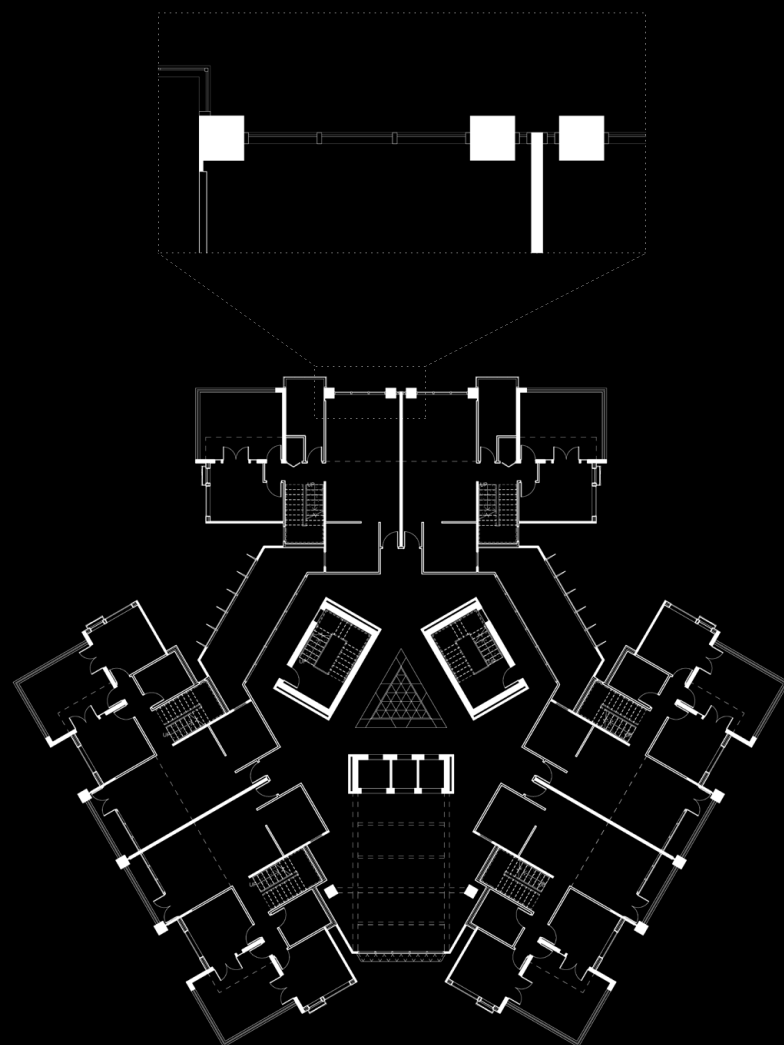
North Elevation



Structure: Core of the building

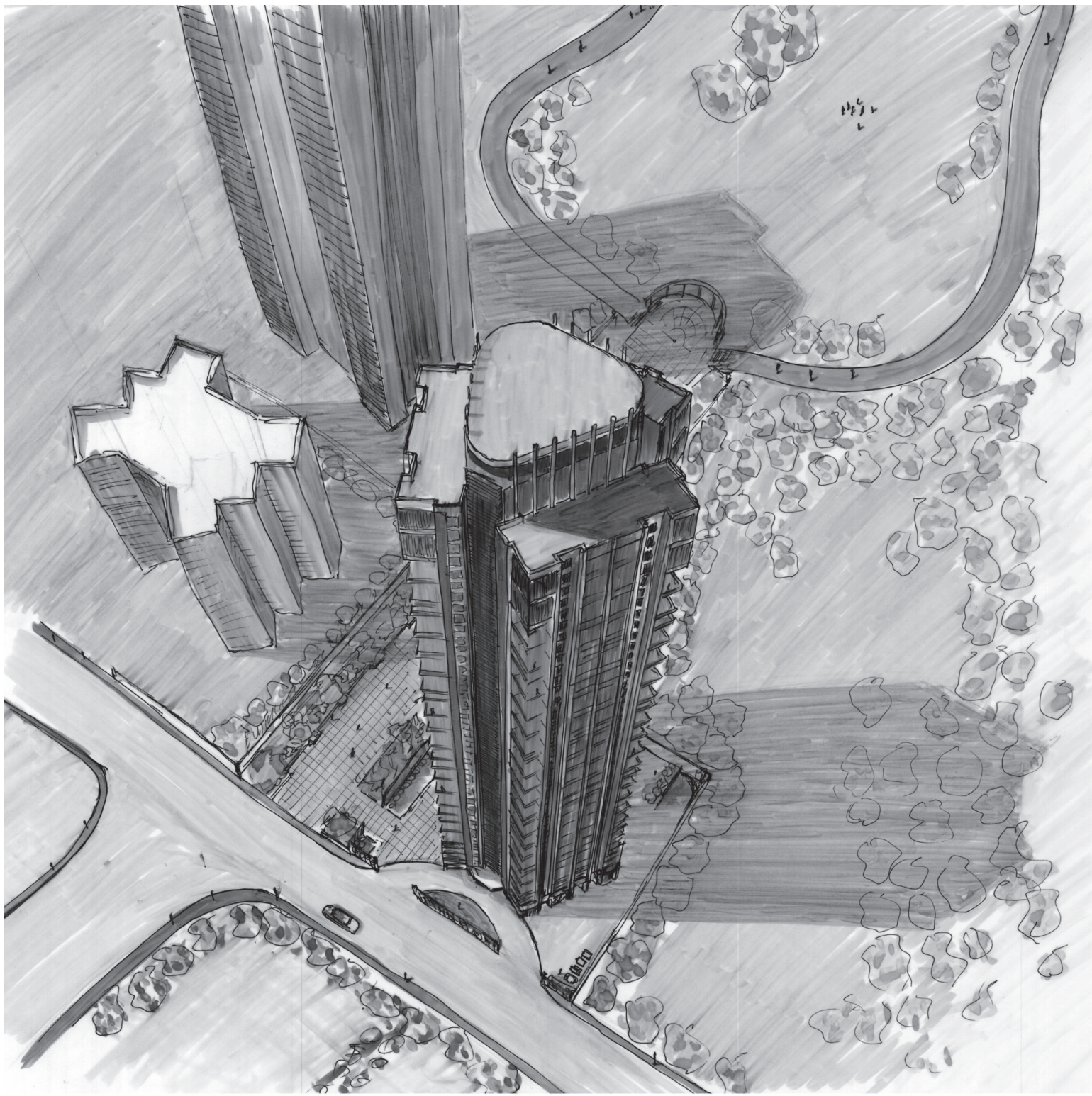
## STRUCTURE

The building is constructed using cast-in-place, reinforced concrete. The central core acts as the primary structure of the building. The walls of the apartment buildings both separate the dwelling and operate as a shear wall system. The balconies are cantilevered from the shear walls. Two beams meet each other forming an L-shaped structure which supports the balcony slab. These L-shaped beams also become the parapet for the balcony space. Column, a vertical element in architecture, is revealed in the apartments and the sky garden area to help sense the verticality within the building.



Structure: Plan

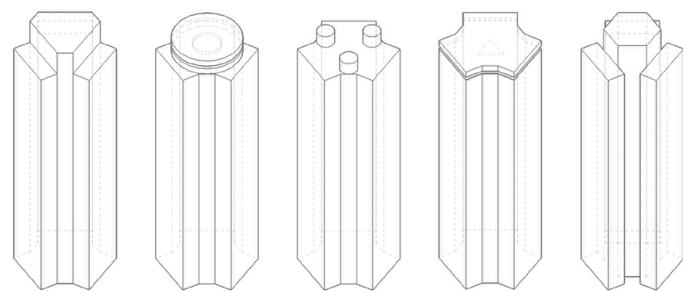




### BEYOND THE VERTICAL

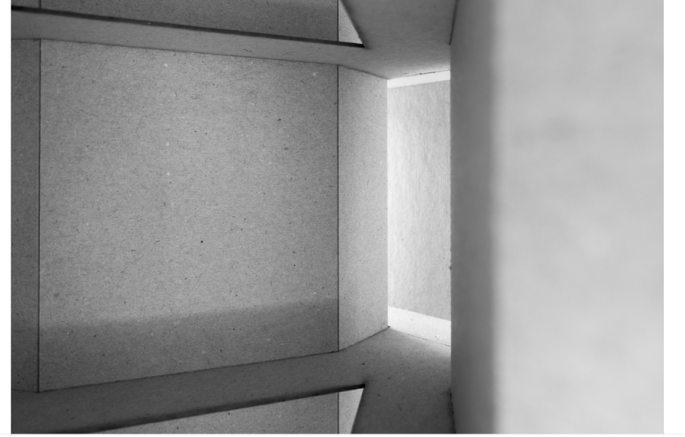
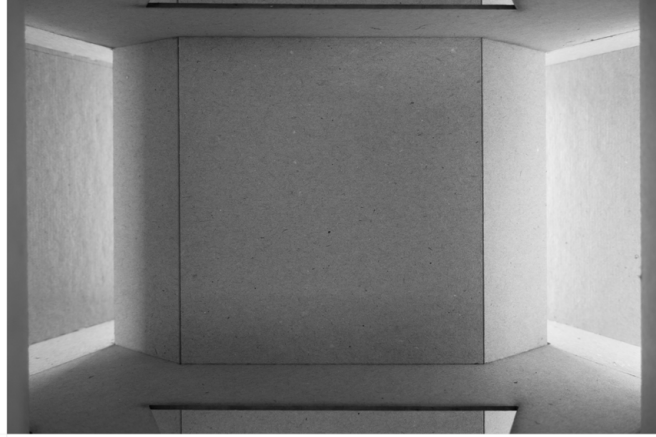
The meeting of the high-rise top and the sky is very critical.

In the proposed design, the core rises above the rest of the structure, leading the eye to the top. The core is surrounded by extended columns suggesting that the verticality continues.





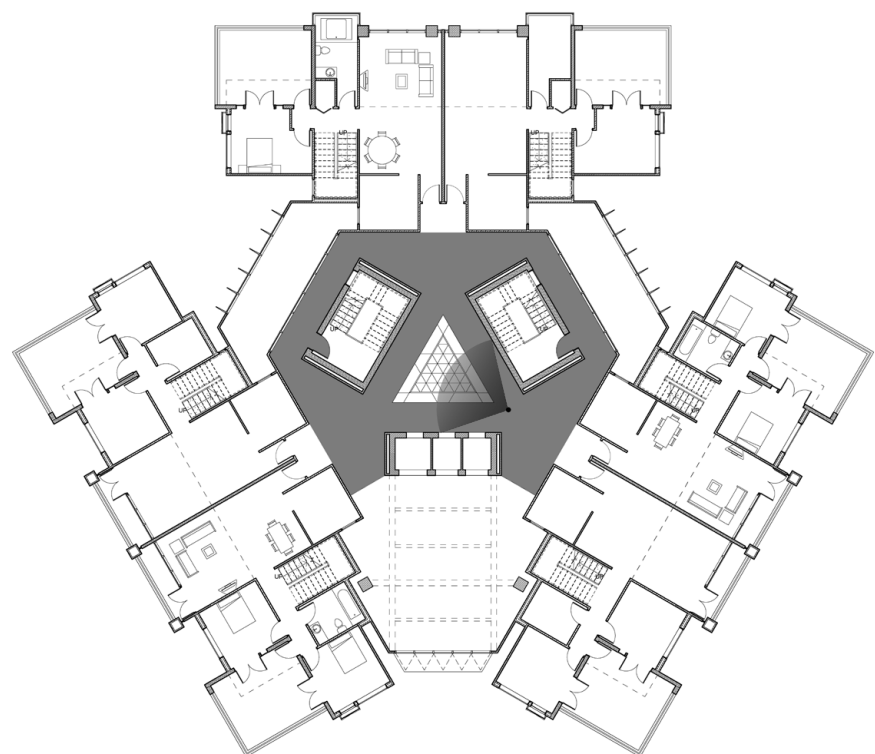


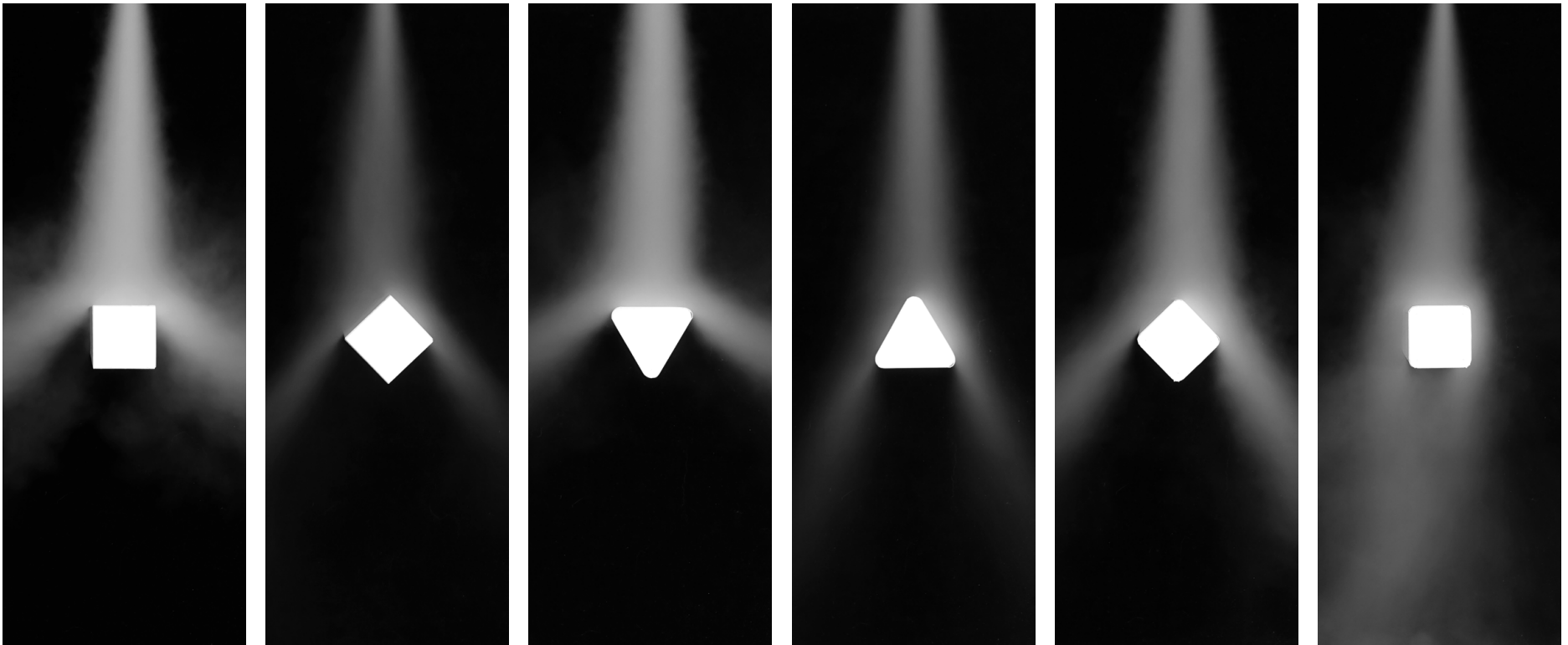


**DESIGN PROCESS**  
LIGHT STUDY FOR THE CORE

A light study was done to test the natural light condition in the core of the building.

The light coming through the skygarden and the two ventilation shafts into the core provides sufficient day light.



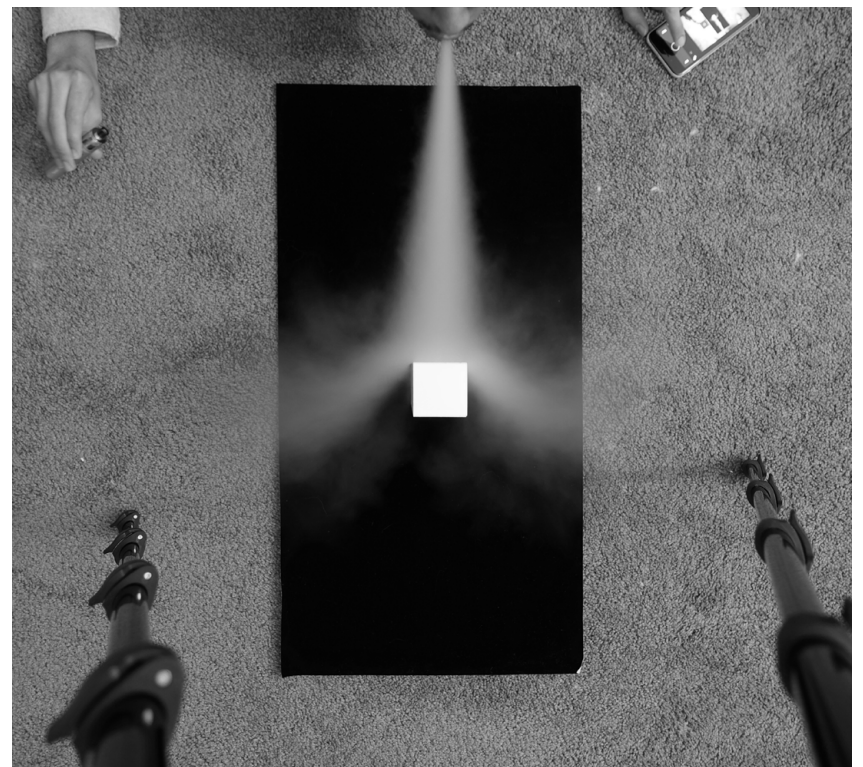


## DESIGN PROCESS

WIND STUDY

This initial study aimed to understand the relationship of building form and air flow. The setup includes various building models exposed to blowing smoke to test the effect of wind.

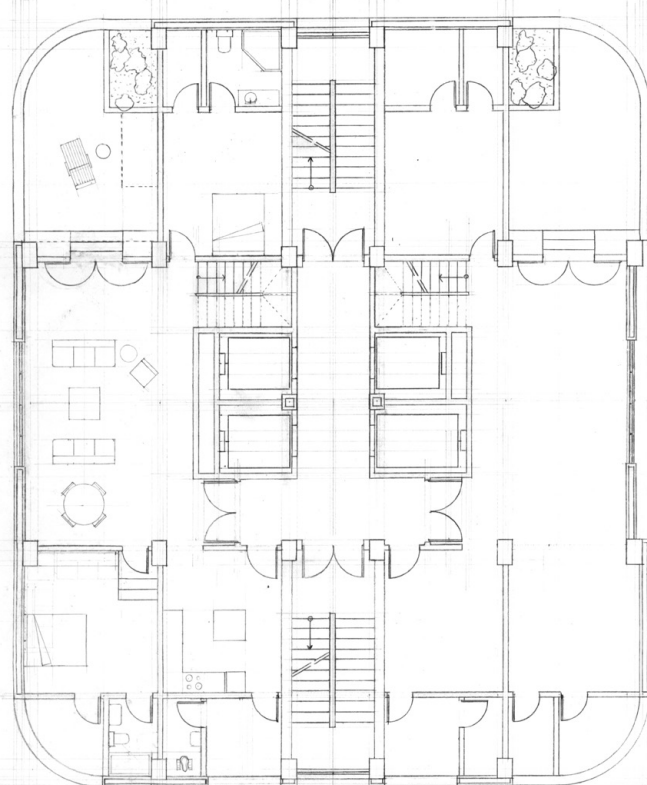
There is more resistance to the wind from all proposed forms except the last case which uses curved edges which seems to guide the air around the building more easily.





**DESIGN PROCESS**  
FORM BASED ON WIND STUDY

The first scheme for the high rise residential building employed the curved edges with a central core and the apartments on either side of it.



Site Plan

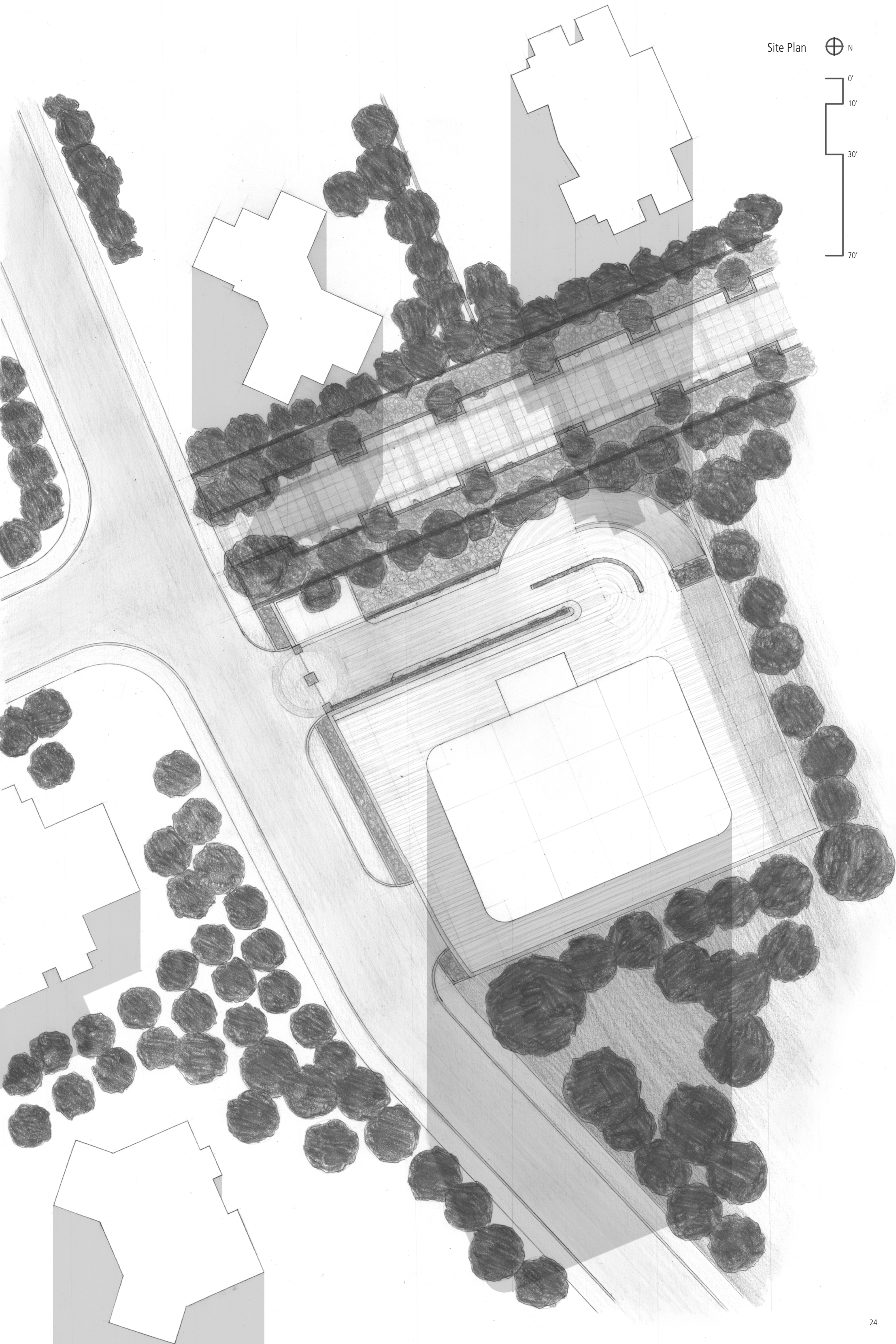


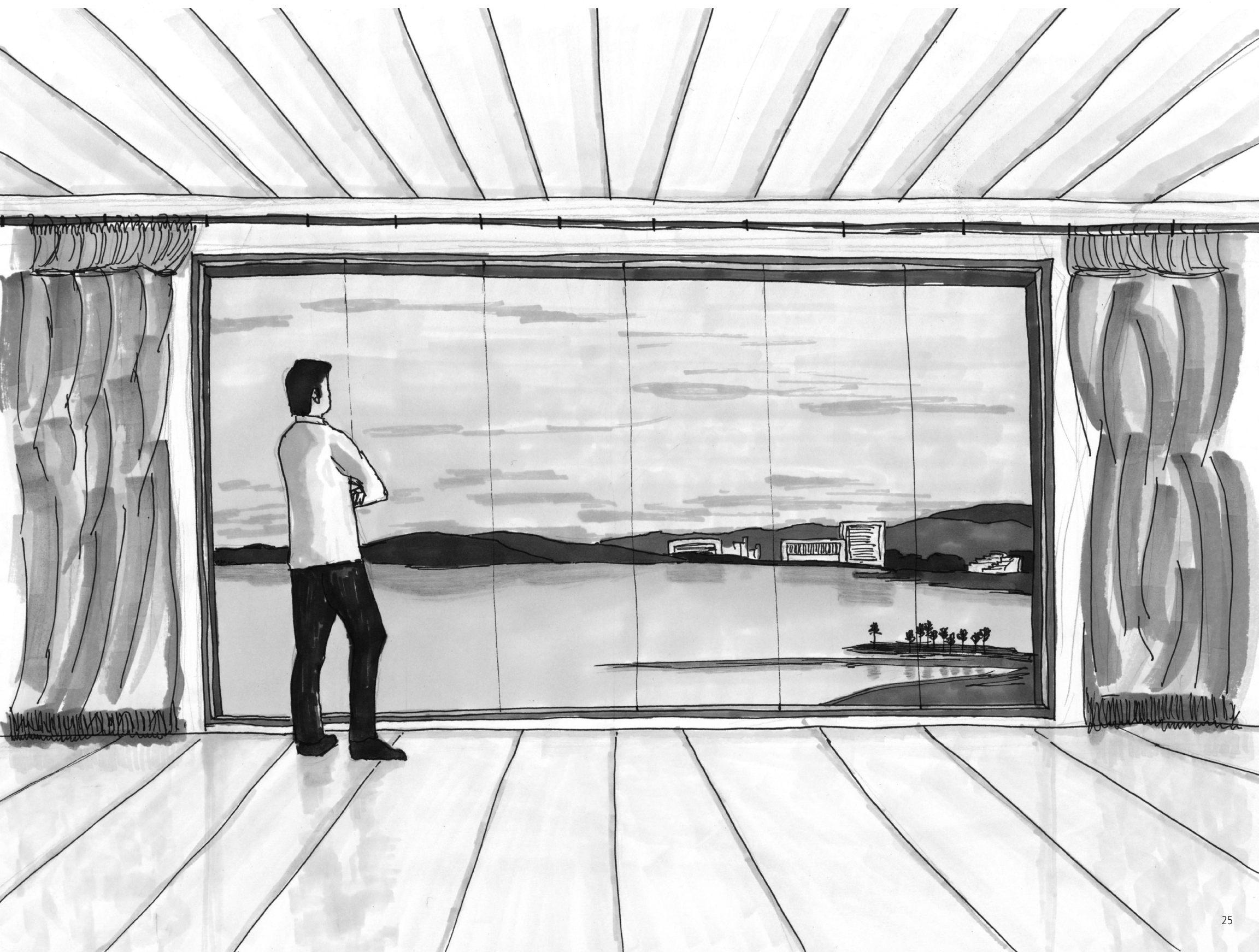
0'

10'

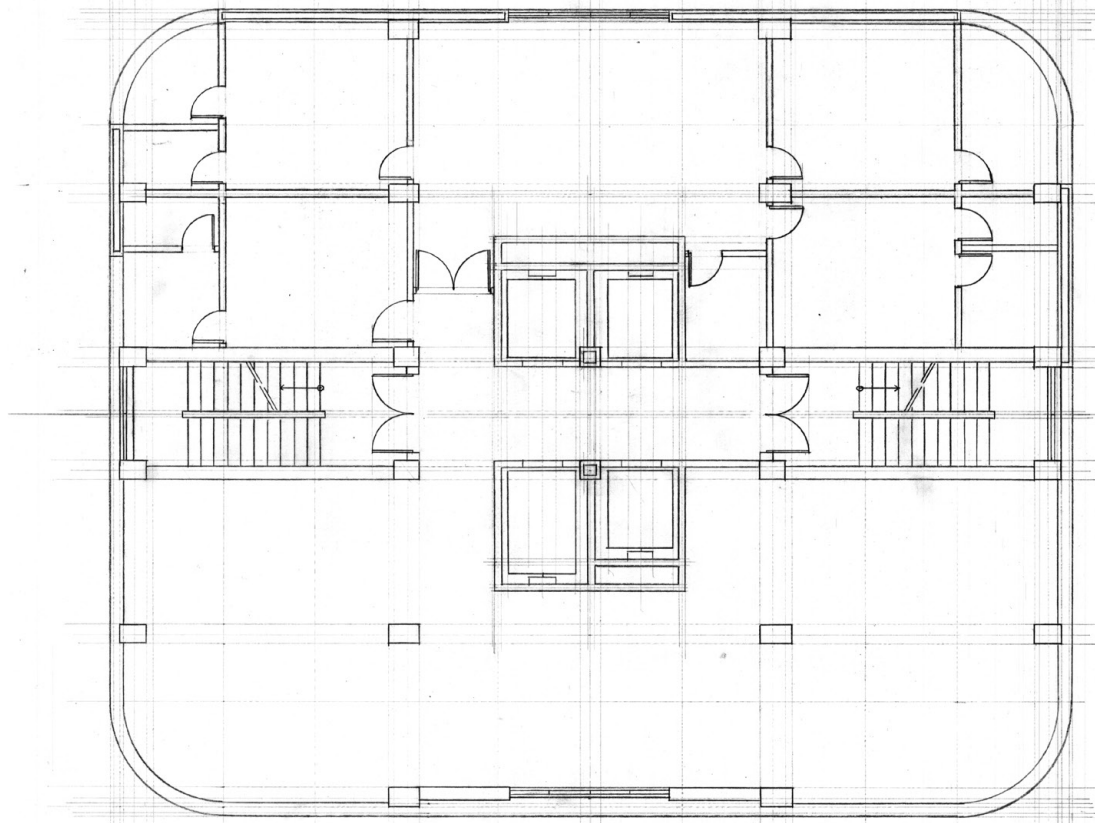
30'

70'

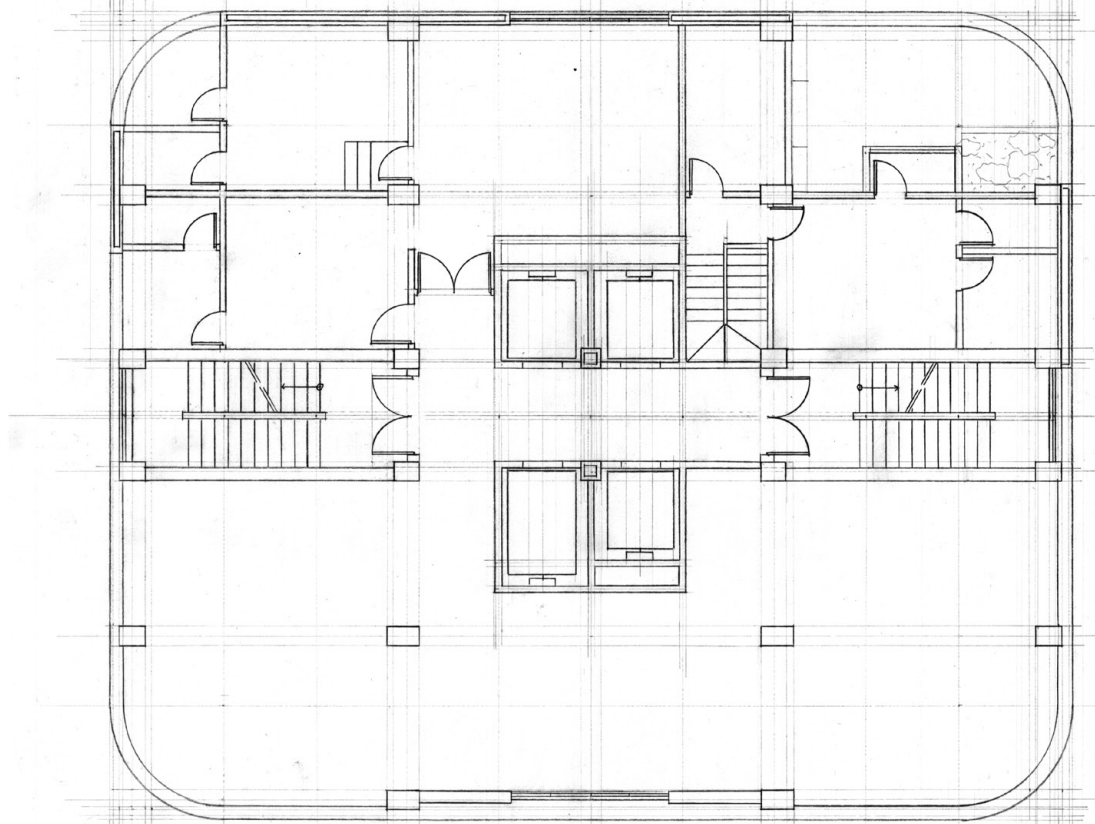




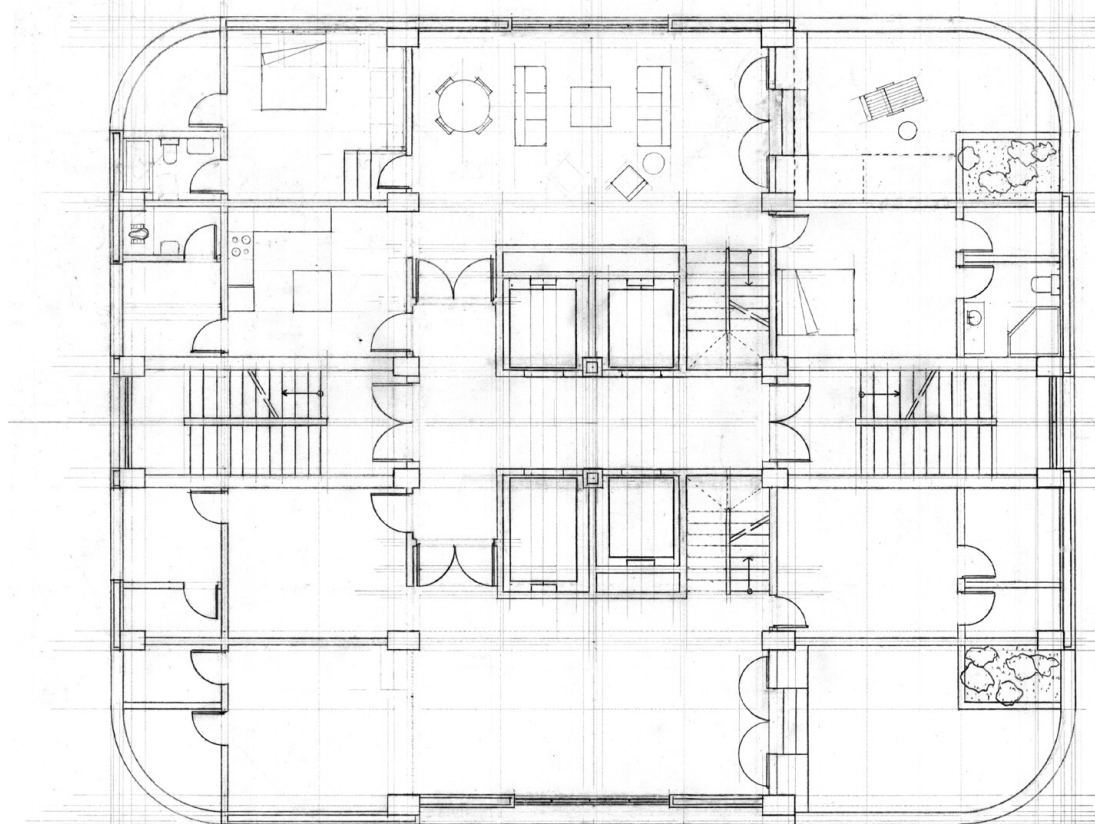
Floor Plan: Level 3

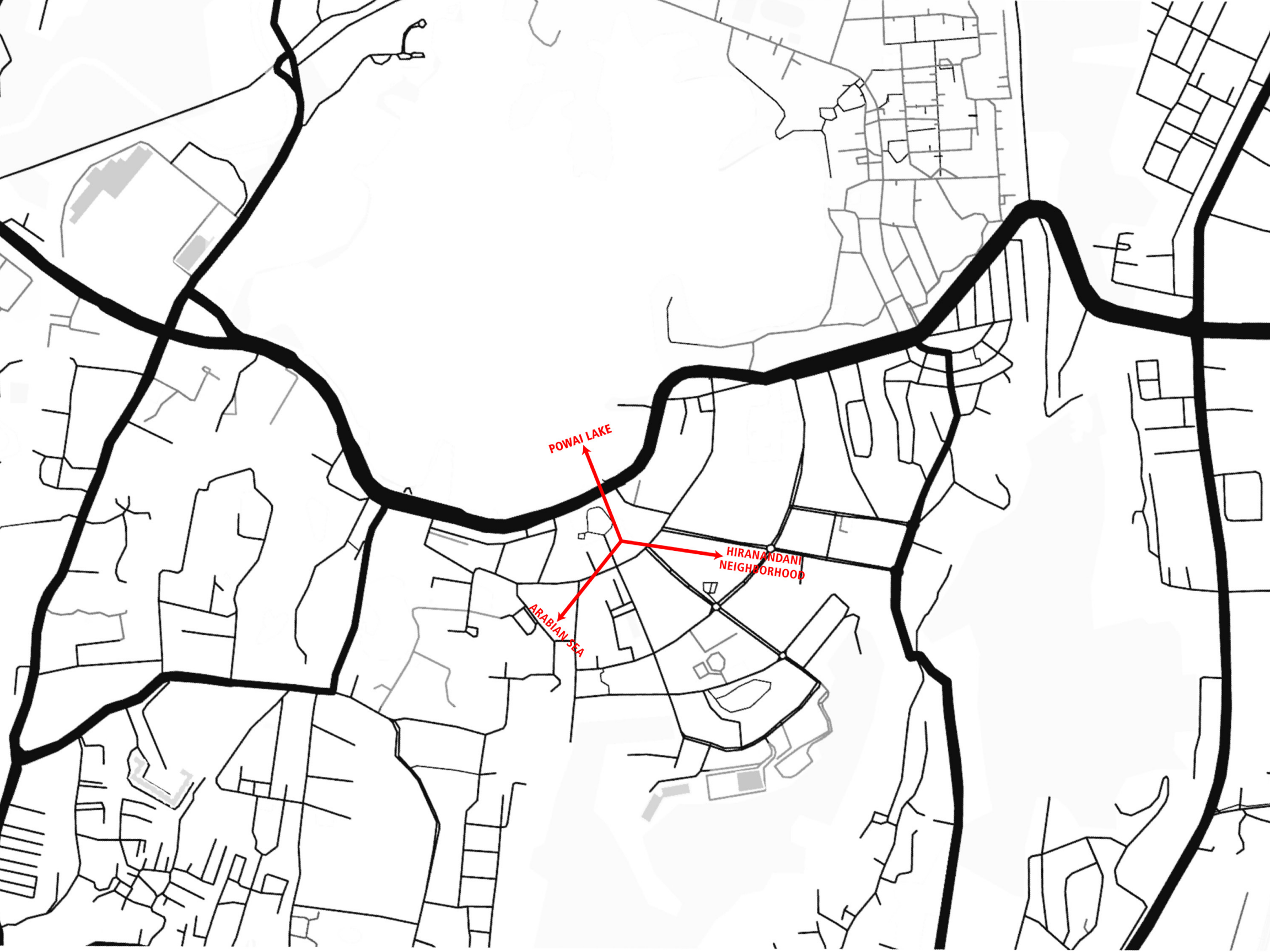


Floor Plan: Level 2



Floor Plan: Level 1





### DESIGN PROCESS

FORM BASED ON THE SITE

The next iteration was based on the site's orientation. The building was separated into three parts - towards the Powai Lake, towards the Arabian Sea and towards the Hiranandani neighborhood.

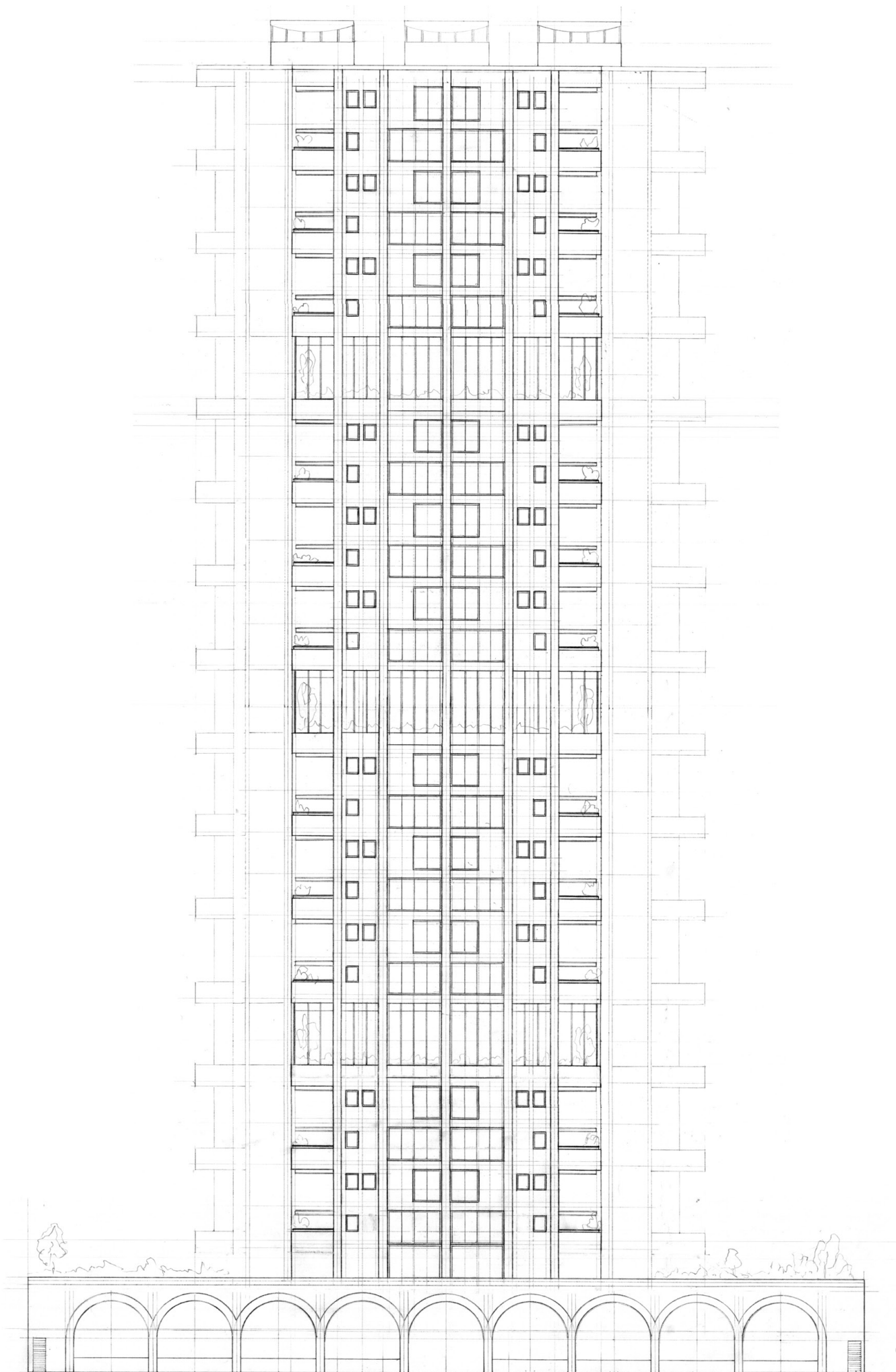
Since natural ventilation was desirable, stacked ventilation system was integrated into the building volume.





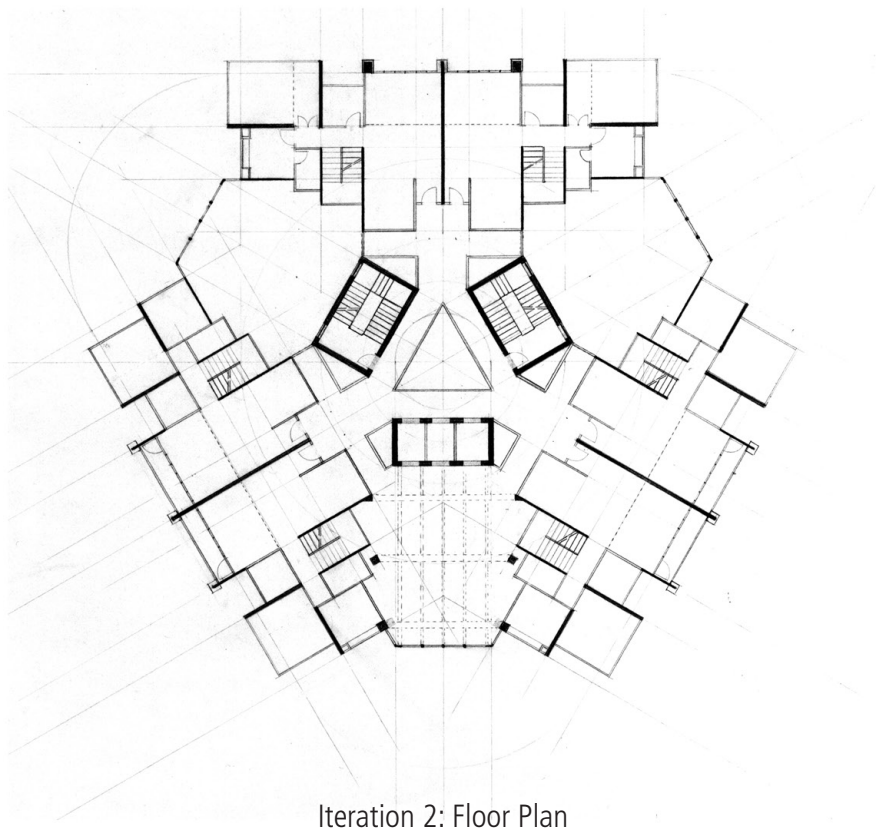


Iteration 1: Floor Plan

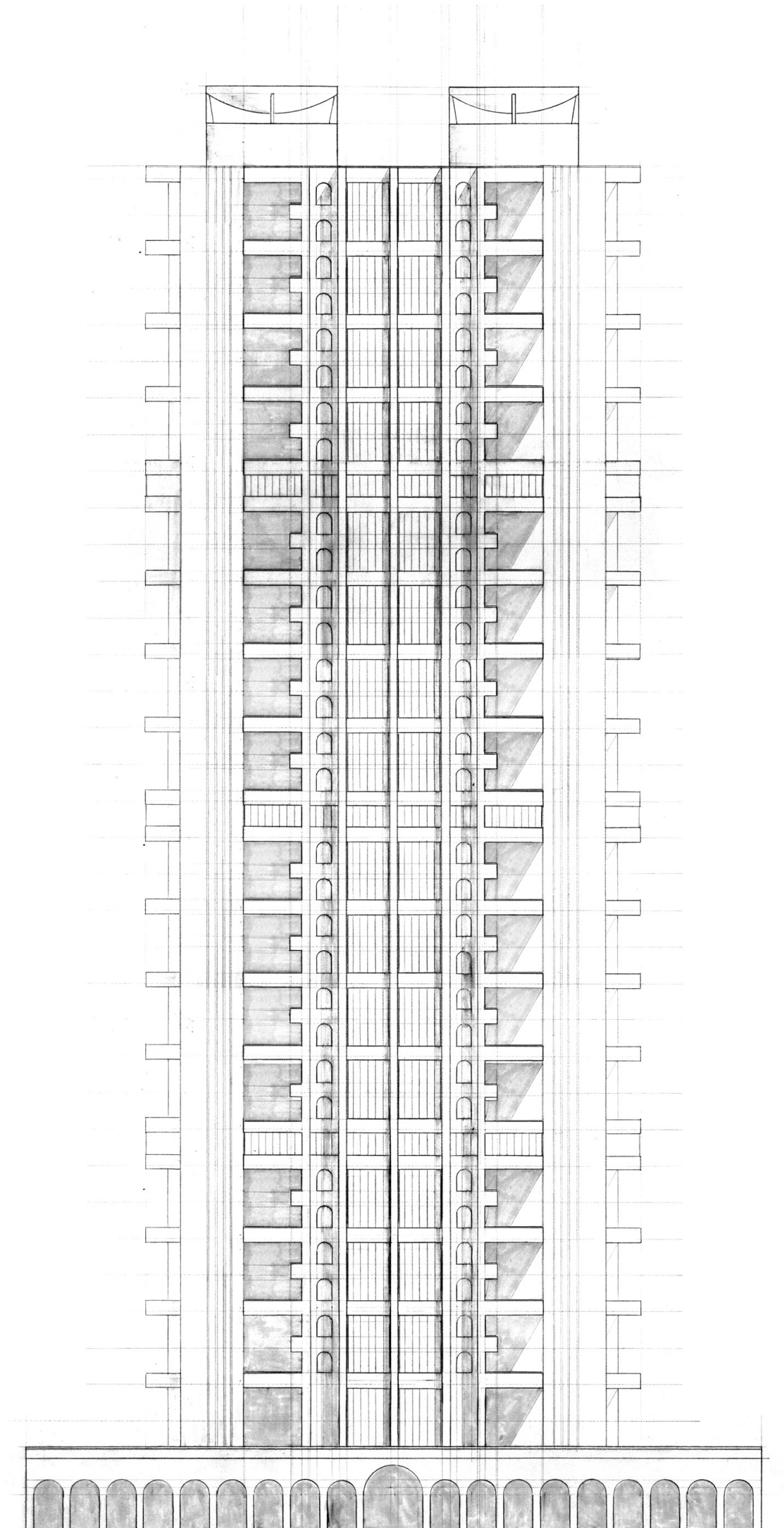


Iteration 1: South Elevation



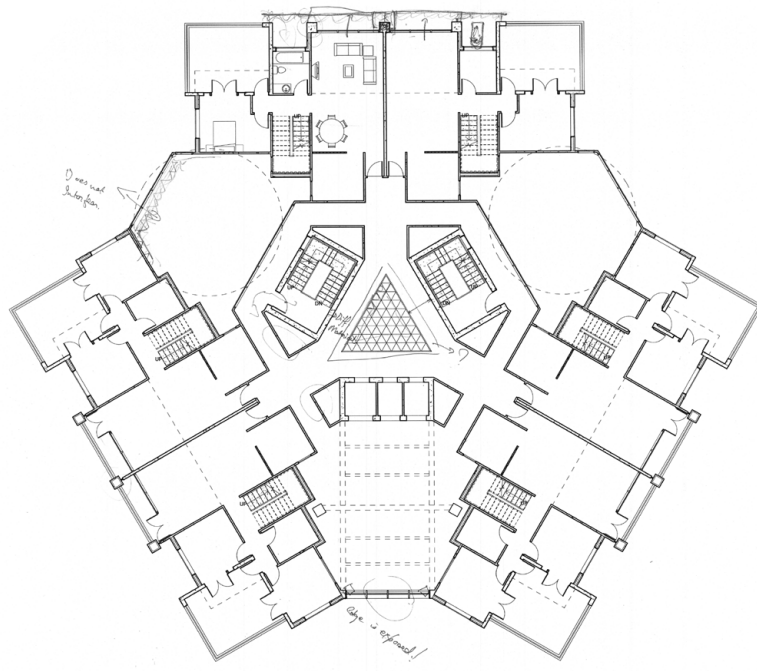


Iteration 2: Floor Plan

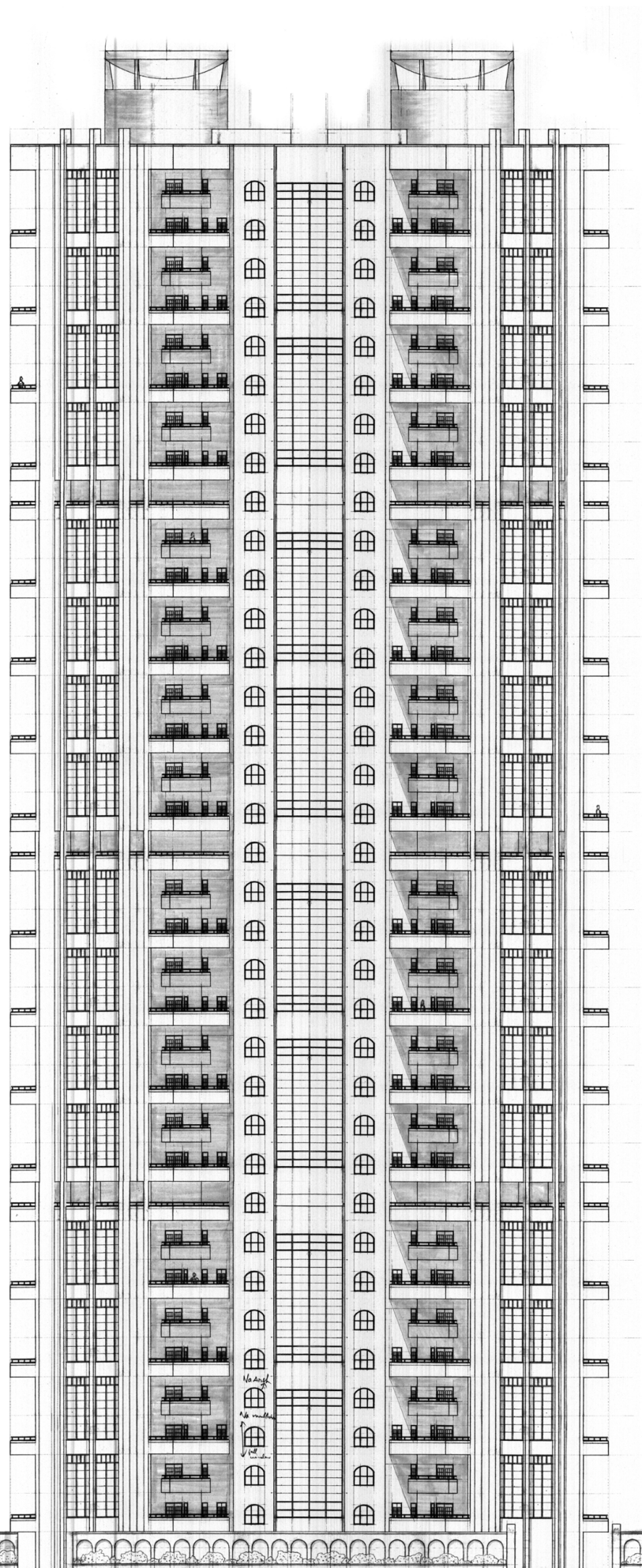


Iteration 2: South Elevation

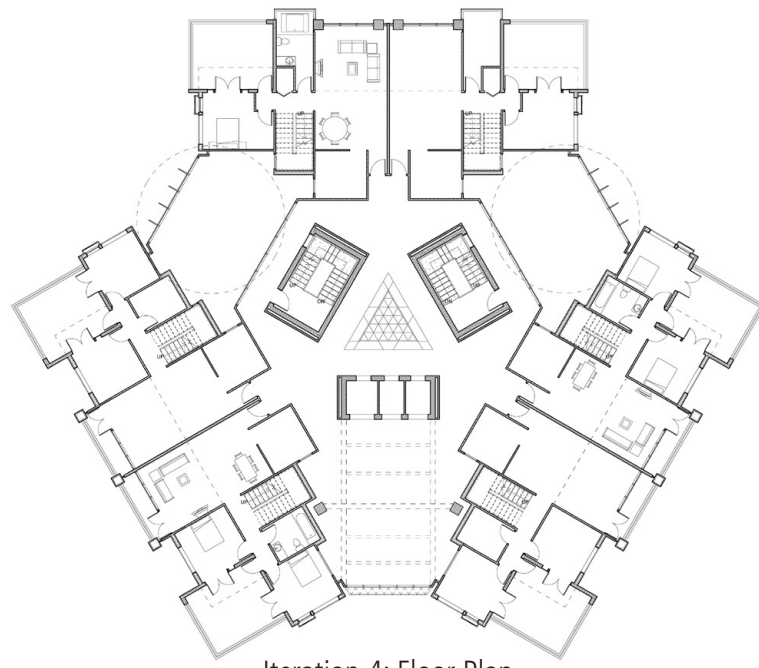




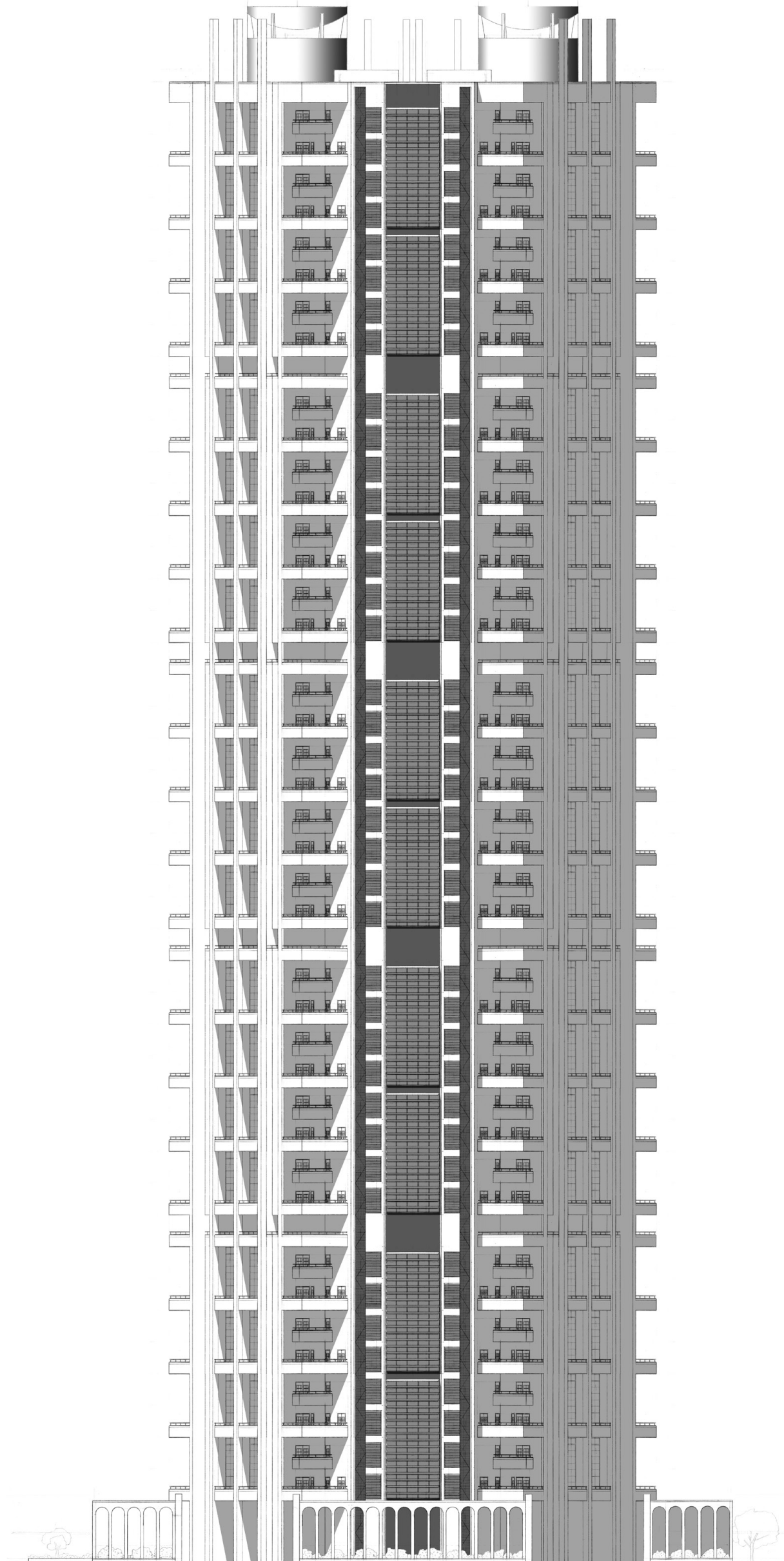
Iteration 3: Floor Plan



Iteration 3: South Elevation

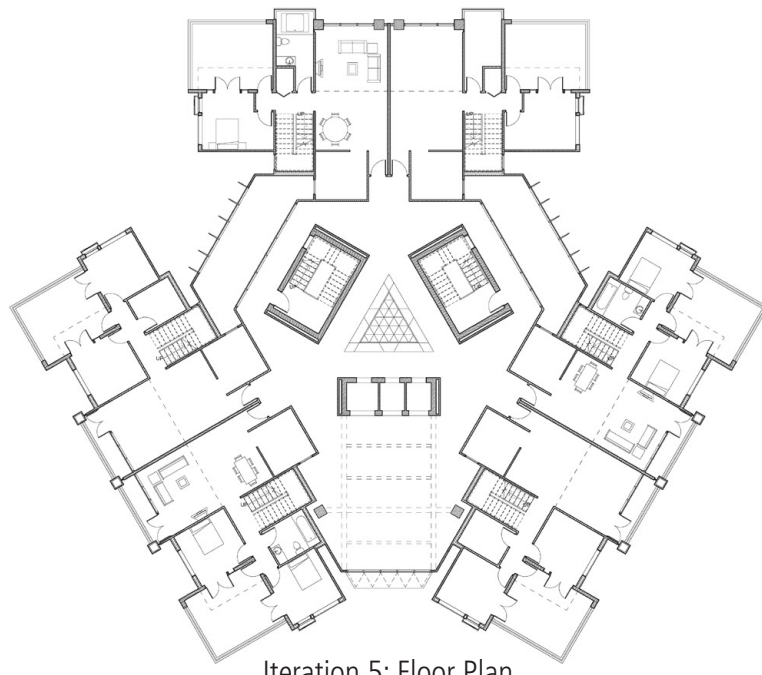


Iteration 4: Floor Plan



Iteration 4: South Elevation





Iteration 5: Floor Plan



Iteration 5: South Elevation



## **CONCLUSION**

Verticality is emphasized on the exterior facade through the vertical band created by the sky gardens. The sky gardens substitute for the typical familiar public spaces present in low-rise dwellings close to the ground surface. Placed at regular intervals of six stories, the gardens offer a safe environment to socialize. The sky gardens contribute to sensing verticality from inside the building by offering a framed view of the mountains with the horizon serving as a reference datum. In the individual apartments, the balcony space provides a connection to the outside as well as a sense of identity.

Embedded in the constructive nature of a high-rise are the cumulatively stacked flat planar floor surfaces. When subdivided in each floor, the vertical nature of the high-rise building tends to disappear. Here, an architectural attempt is made to preserve at least in part a sense of verticality. From the outside, verticality can be sensed in the building's construction and appearance, while from the inside - not stacked floor slabs - but stacked multi-story communities propose a better quality of life.

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