

An Urban Dwelling Place for Farmers

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of

Master of Architecture in Architecture

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ABSTRACT

It is my intention to plan for the types of activity carried out by future inhabitants of vertical farms. Through a twenty-six storey high building, a conceptual farm with housing for the producers, situated amongst dense urban fabric of Baltimore Maryland, architecture is explored. Utilizing form, order and space, architecture has a responsibility to construct the interalia or main theatre of human function. The architect has a fiduciary responsible to determine the design and purpose of the stage, setting limits on the types of drama that the inhabitants play.

From spacious rural cultivator with evocative farmhouses, to confined urban neo-farmer, the stage for dwelling is extremely critical to determine. These displaced farmers do not perform all typical city functions, but they are confined as city dwellers. For them, it remains critical to be connected with nature and neighbor. Urban farmers need housing that enhances their quality of life. Rather than imposing regulated apartment space for one inhabitant, the city comes forth to them in a different light, with many open neighborhood spaces for interaction and farm activity within a merging dual structure. The dialog the two concepts (city dwelling and farming) play as they join, dwell on a relationship of graphic tools such as rotation, scale, thickness and transparency. Further opportunity exists to investigate the act of labor (natural) and work (physical) of the urban neo-farmer, in a tall building in an effort to provide insight to their human condition. One activity that is part of being an urban neo-farmer may be the practice of cleaning off boots and placing them in lockers before returning home after a long work day.

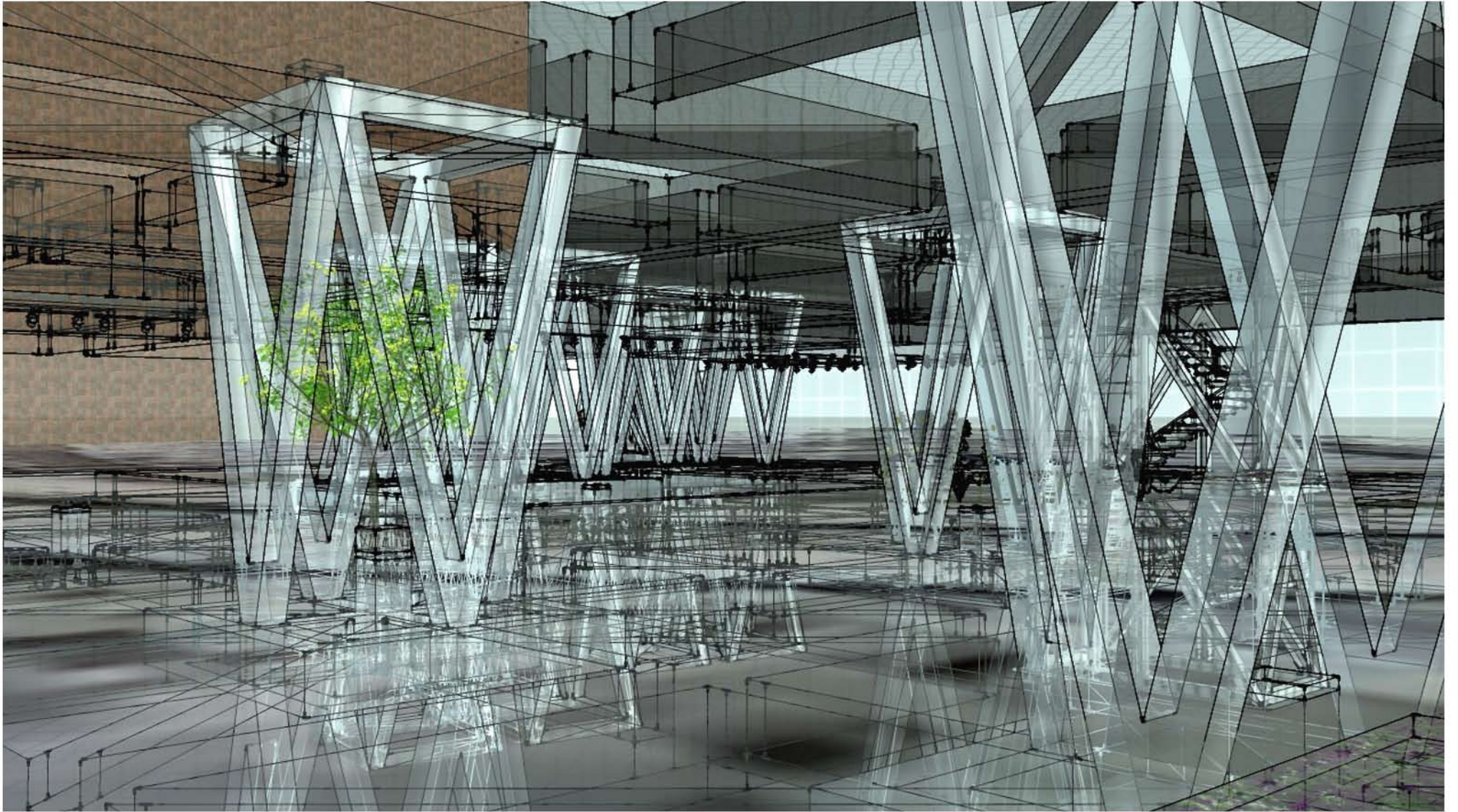
This book is dedicated to my father, Ronald L. Saracino.
(2-6-1955 to 6-12-2008)

Acknowledgements

First, I would like to express my thanks to Professor Susan Piedmont Palladino. If it were not for her inspirational literature on the Jersey Devils which I encountered as an undergraduate exploring the terms “green and sustainable” I may never have discovered my passion for architecture. I am very grateful for your patience and willingness to see me succeed. Further, I thank Professors, Jaan Holt and Marcia Feuerstein, for their contributions in discussion, for the struggle of reading drawings that were not yet in a fully developed architectural language, and for helping me achieve that ability. Without all of your long lasting interest, I would never have been comfortable in pursuing my own research. Lastly, I would like to thank Steve Thompson for his support and abundant wealth of knowledge in architecture which has allowed me to fully engage in my graduate research experience and choose the correct words to do so. I thank you all for the experience that represents my time here at Virginia Tech. To Cindy Saracino, Stanley Mathews, and Joseph McFadden, who had confidence in me when I needed it the most, and were supportive the entire time, I truly appreciate this.

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INTRODUCTION

In an effort for me to further an understanding of architecture it is essential to make initial intuitive design decisions for a projected building. In this thesis these initial actions defined the buildings architectural space, i.e. its boundary. Initial notion on site, order, and enclosure worked together with materials, systems and space to make building plans. Each idea contributed to the final documentation even if not apparently so. Plans are a diagram of the spaces and their relationship to each other. Space, which comes from the greek word, chora, has always been recognized as a construct of society.¹ Physical space is quantifiable and ordered.² The human brain's amygdala is responsible for processing and comprehending space.³

However, personal space is highly variable. In fact, those living in a densely populated place at this time, like in Tai Pei, have a smaller personal space. Therefore, space and density are highly relative.⁴

Mapping of spaces for good navigation is known as cartography.⁵ Spatial planning is a way of organizing the use of space.⁶ Most important, to me, is the ways in which space can impact human and cultural behavior, in architecture, where it impacts the design of buildings and structures.⁷ Space is allocated to different functions; be it buildings, bridges, farmland, down to zoning of residential, commercial, agricultural, further divided into public and private amongst groups, further down to hierarchy or class.⁸



figure 1.1



figure 1.2

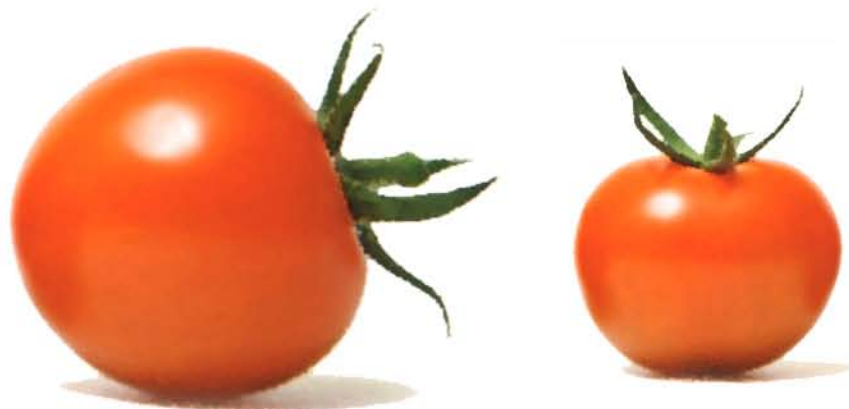


figure 1.3



figure 1.4

This visual thesis explores the concept of space, with a goal to grow produce on different levels of the building for public city dwellers and private building inhabitants while minimizing the need for artificial lighting.

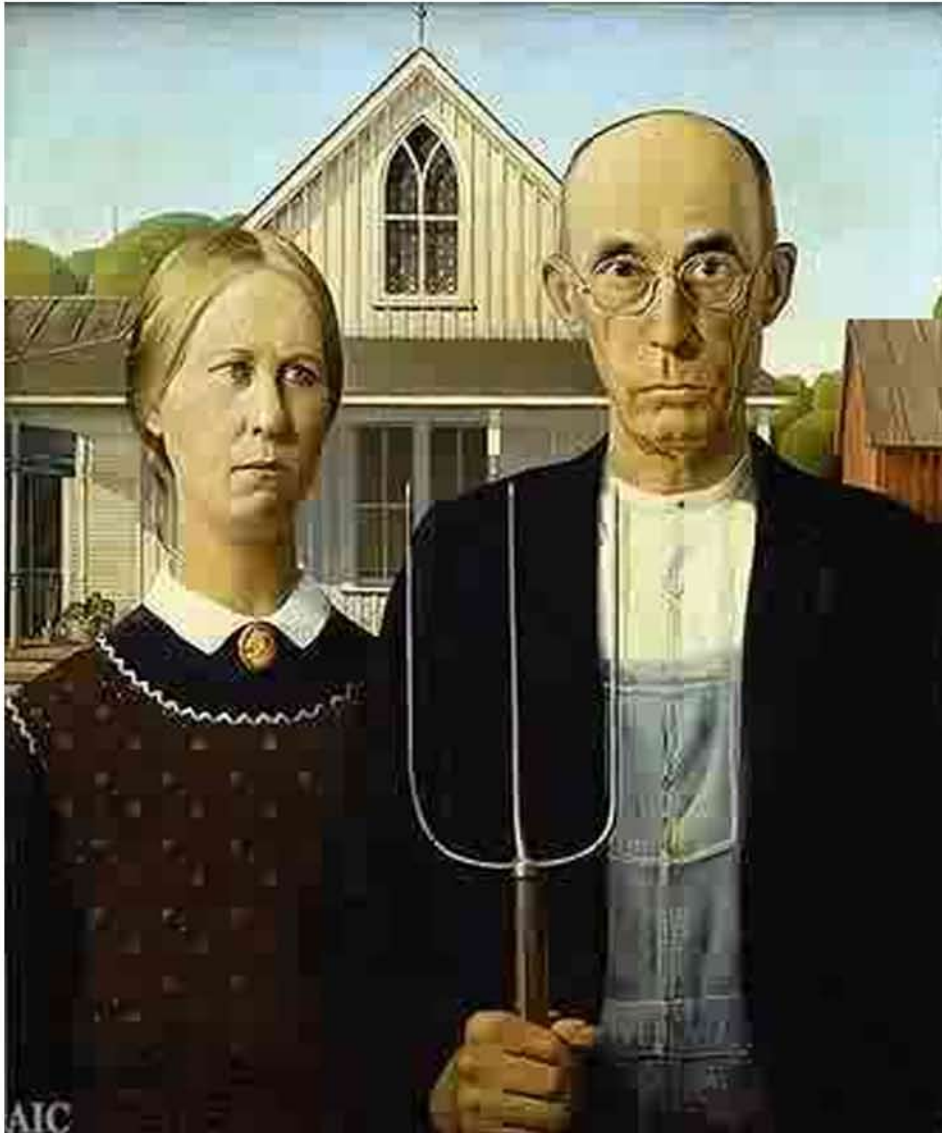


Some space is referred to as public space, where areas of land are owned by the community collectively and accessible to everyone. In contrast, private property is space culturally owned by an individual or company, for their own use and pleasure.⁹

My favorite expression of space is cosmology, from Greek kosmos, "universe"; "logia, "study or logic"), in strict usage, which refers to the study of the Universe in its totality as it is now (or at least as it can be observed now), and by extension, humanity's place in it. But metaphysical cosmology has also been observed as the placing of man in the universe in relationship to all other entities, i.e. nature and artifact.¹⁰ This is demonstrated by the observation made by Marcus Aurelius of a man's place in that relationship: "He who does not know what the world is does not know where he is, and he who does not know for what purpose the world exists, does not know who he is, nor what the world is."¹¹ As a designer on the threshold of reality and futurism, and soon enough, an architect, I have been fascinated by the ability of the mind to explore the building types that may come to exist, whether out of necessity, or even fancies.

John Wheeler, a distinguished physicist, believes that we are part of a universe that is in construction, that we are but tiny little fragments of the universe, looking at itself and prospecting. It is veritable that we have concluded little, both of the present and of the past. Our conjectures; theory based off highly educated constructs, are based off our present observations, and pose only one of many possible histories of the universe. Wheeler believes the physical cosmos is determined by the consequences of innumerable interactions at every moment in time. Perhaps much like the saying, "If a tree falls in the forest, and nothing is around to hear it, does it make a sound?" Wheeler postulates that the universe is full of events with the potential to happen, that have not occurred with a conscious observer; thus concluding that the past is not ascertained.¹²

Dickson Despommier has chosen to perceive the future as a highly dense, urban place with limited land for growing agriculture.¹³ His view is not grim, rather, more progressive. He feels that we need to build upward and make farms in the sky. As vertical farm is a conceptual and theoretical construct, in which farming can be grown indoors on a large commercial scale within tall buildings there is much controversy about the feasibility. Critics believe that the costs of additional energy needed for artificial lighting, heating and other vertical farming operations would outweigh the benefit of the buildings close proximity to the areas of consumption.¹⁴ A vertical farm needs thorough examination of a particular site, its climate and its position to the sun. It also needs form and structure which do not obstruct the particular goals of the vertical farm. This visual thesis explores the concept of space, with a goal to grow produce on different levels of the building for public city dwellers and private building inhabitants while minimizing the need for artificial lighting.

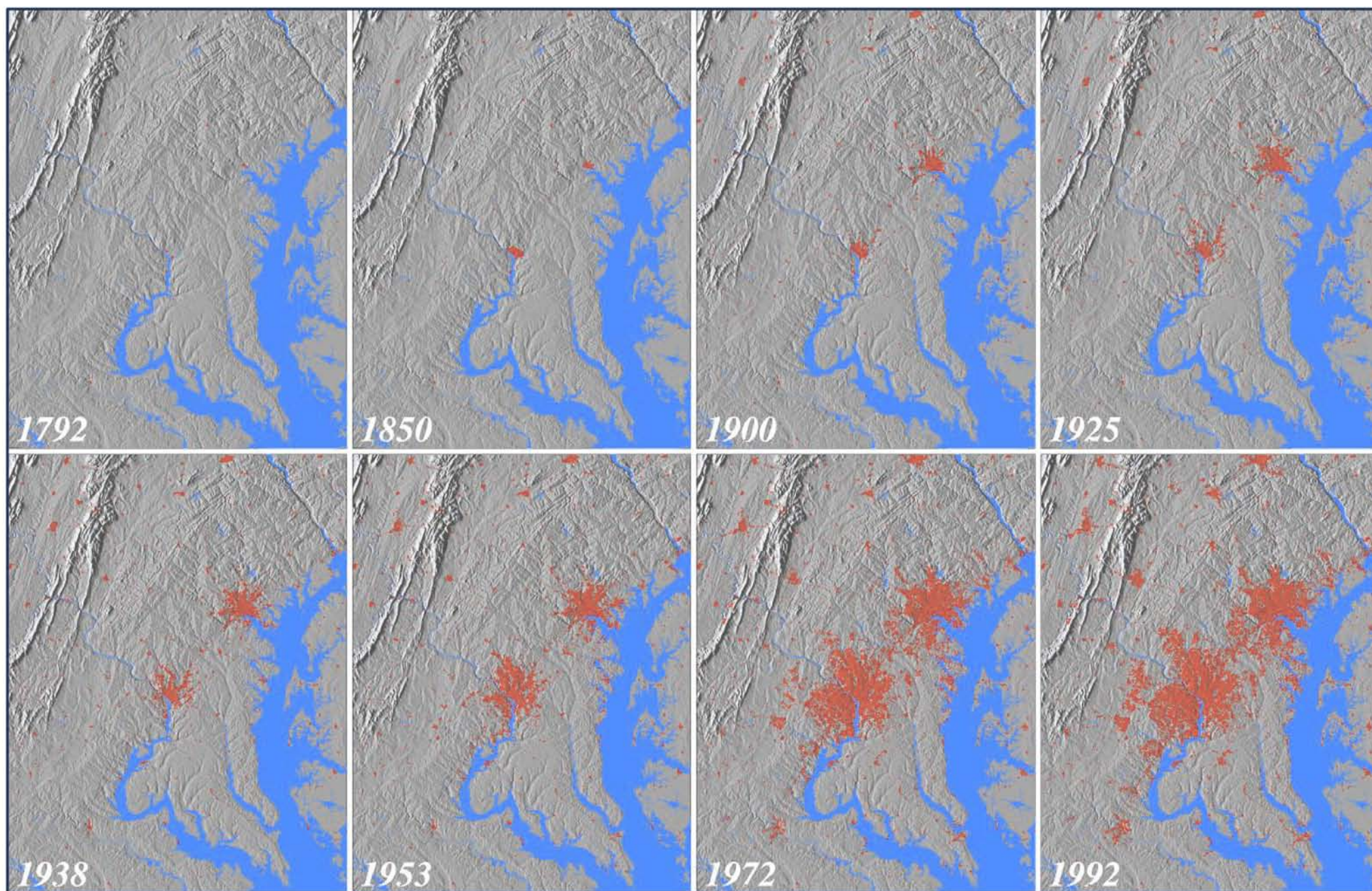


(fig. 1.5) Grant Wood decided to paint the house along with "the kind of people I (he) fancied should live in that house."

"The Vertical Farm is a concept that seeks to address the major concerns of the environmental degradation of the modern city by composting, recycling waste and farming in a standard tenement building. The "ecological footprint" of the city will be lessened and therefore the city will become a more sustainable setting. The reduction of wastes and the production of foods for consumption will in turn increase the quality of life for all those within the city and its surrounding area. The reduction in transportation of both wastes and of food products and the use of abandoned buildings will directly increase the quality of the urban setting."

~Dickson Despommier

Through form, order and space, architecture has a responsibility to construct the interalia of human function. The main theater of a vertical farm is a program in which tenants that maintain the "land," have instant access to each farm for both use and maintenance and can dwell within close proximity to their farm. The farmer's housing must be equipped for city life, allowing smaller spaces than farmhouses for these urban dwellers, however, still must respond to the activity of farming. These farmers are similar to actual farmers. They must work the same hours, driven by the natural process of the sun, and they must maintain cleanliness, typical of agribusiness. However, they are not typical farmers. From spacious rural cultivator with evocative farmhouses, to confined urban neo-farmer, the stage for dwelling is extremely critical to determine. These displaced farmers do not perform all typical city functions, but they are confined as a city inhabitant. For them, it remains critical to be connected with nature and neighbor. Urban farmers need housing that enhances their quality of life. Such that, vertical farms have elevators on their farm, they do not have tractors. While they get dirty and they live adjacent to their farm, the functions carried out in the barn and silo are present only in a different form.



(fig. 1.6) *Impervious Surfaces, Paving the Bay*

So why farm in a city, and why farm in the city of Baltimore? The space for farmland that used to divide Baltimore MD and Washington DC is rapidly decreasing. As few as 25 years ago there was a prominent distinction between the two cities. Given that the land is now used for urban development, ever expanding highways, and other transportation facets, it is no wonder that Baltimore MD has the nation's 6th worst ground level ozone problem.¹⁵ Therefore, Baltimore needs to replace the farmland area that used to exist. One way to do that is to build upward.

“No truth is more certain, more independent of all others, and less in need of proof than this, that everything is there for cognizance, and so this entire world, is only object in relation to the subject, perception for that which perceives it, in a word, presentation.”

~Arthur Schopenhauer (p. 32)



Baltimore MD: This is Guilford Avenue looking north. Perpendicular to Guilford is E. Pleasant Street which runs under Interstate 83 and Presidents Street in downtown Baltimore. The proposed site is currently a small parking lot adjacent to Fallsway. The four heavily trafficked streets produce a lot of pollution directly above Fallsway's Patapsco River which feeds into the Chesapeake Bay. As a result this site has an increased carbon dioxide level in the atmosphere and is in close proximity to polluted waters. The increase in CO₂ and other pollutants in the waters are plant food. Readily accessible plant foods makes this a great environment for gardens to thrive.¹⁶



“Science is the art of creating suitable illusions, which the fool enjoys or argues against, but the wise man enjoys for their beauty or ingenuity, without being blind to the fact that they are human veils and curtains concealing the abysmal darkness of the unknowable.”
~ Carl Jung (p. 37)

“The heart and eye have had enough to do in the streets itself; they are contented there; nay they sometimes turn from the natural scenery, as if too savage and solitary, to dwell with a deeper interest on the palace walls that cast their shadow upon streets and the crowd of towers that rise out of the shadow into the depth of the sky.”
~John Ruskin (p. 465)



Columns are my favorite recognized architectural form. The shadows that extend the life of the post, demonstrate how they impose an opaque problem. At this time, most columns are impervious to light, with a few exceptions, one being Toyo Ito's Sendai Mediateque. Yet, only when a column sits directly in front of a person trying to view a performance do we really perceive the imposition of a column. In Cooper Union's renovation of the Great Hall by John Hedjuk, the columns have their own seats directly in front of people's seats. Nevermind the performance you came to see; if you get that particular seat, you are looking at column 100% of the show. You might notice then the way their form extended to the roof from the ground as a seamless and rational line. Maybe you would see the way light could pass through them unlike a wall or small aperture. Perhaps it might become obvious that the role of columns, not just another structure in architecture; guides peoples approach and implies that there is space beyond... Yet, superficially, columns had always been a thing of the past-an intrinsic architectural fossil, a way of distinguishing fashion; a time period in history through decorative form.

I put myself in the seat of Cooper Union's Great Hall, and I tried to watch the stage of a column for an hour. The place columns came into fruition was at the ceiling. The column erected upwards, extended and connected in one direction making a line on the ceiling, a shadow that continued beautifully above my head and that reached its next column, then back to the ground. I will never forget that moment. Those columns unified the space, brought order, orientation, shadows to lights, formed place and existential sensibility; it was an event! It is no wonder the architect placed them in front of the seats, waiting for someone to discover what the "Great Hall" was.



"Material we now use in architecture we know only for its superior strength but not for its meaningful form. Concrete and steel must become greater than the engineer."

~Louis Kahn (p.75)

figure 2.1 Cooper Union's The Great Hall



figure 2.2

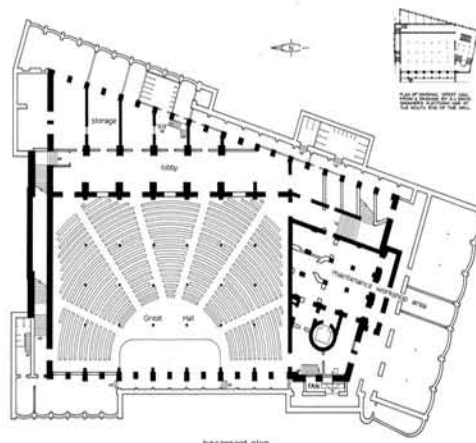
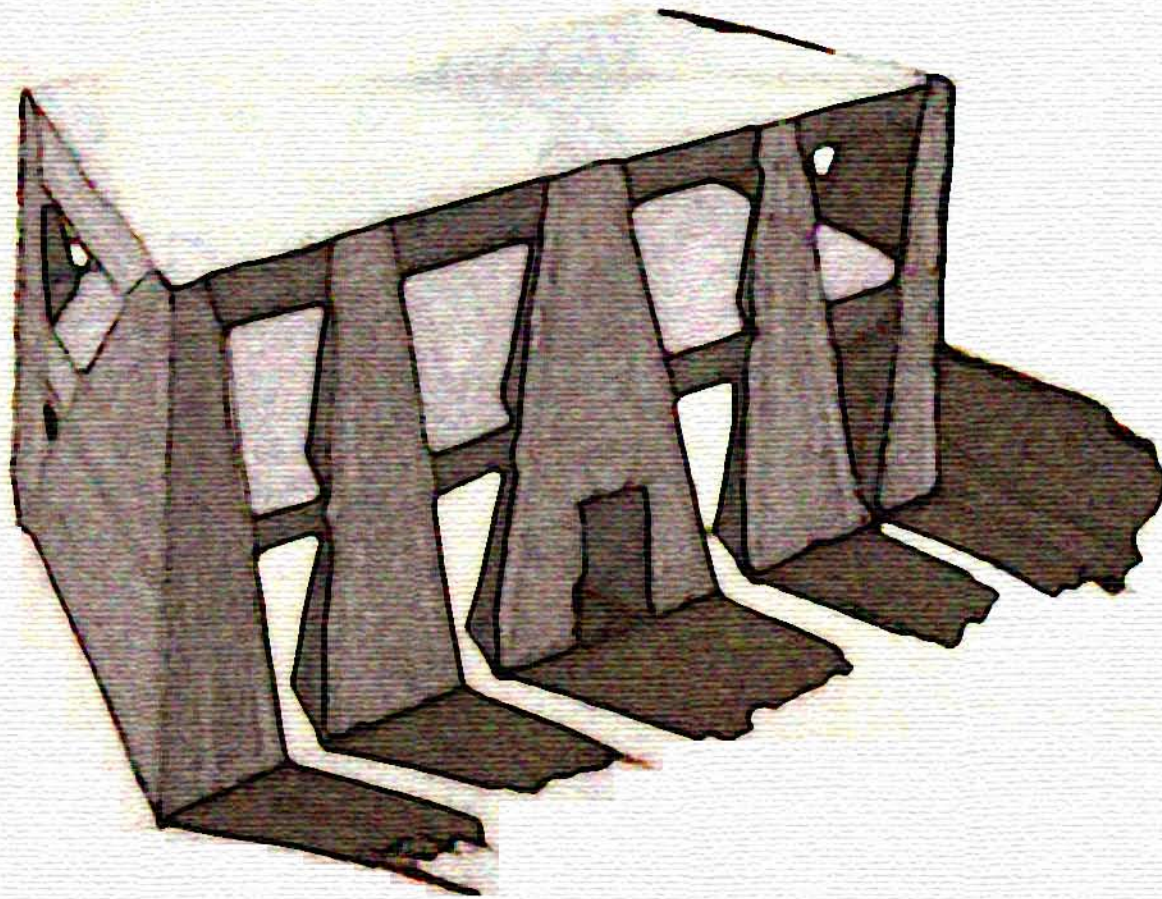


figure 2.3

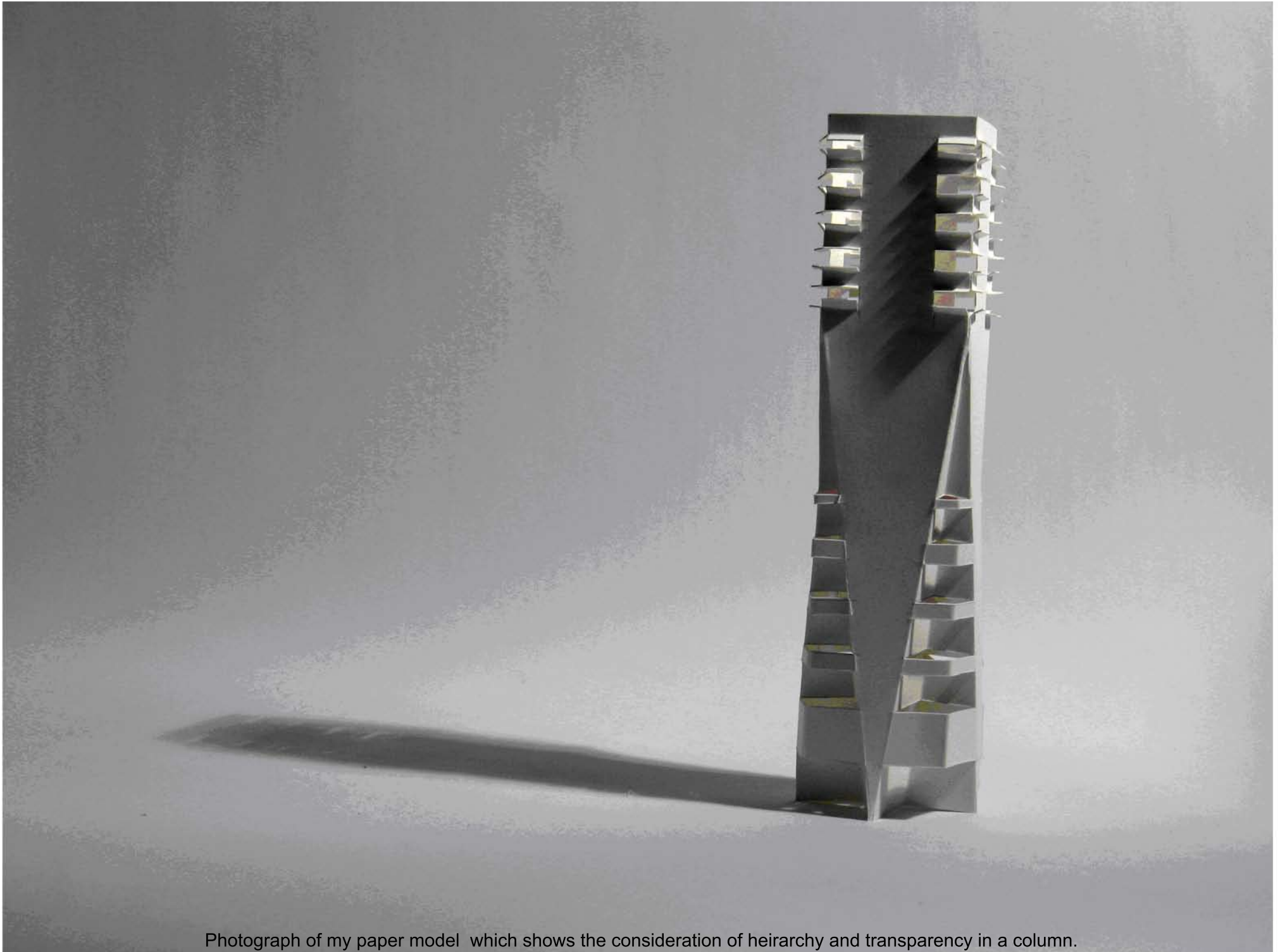
basement plan

0' 10' 20'



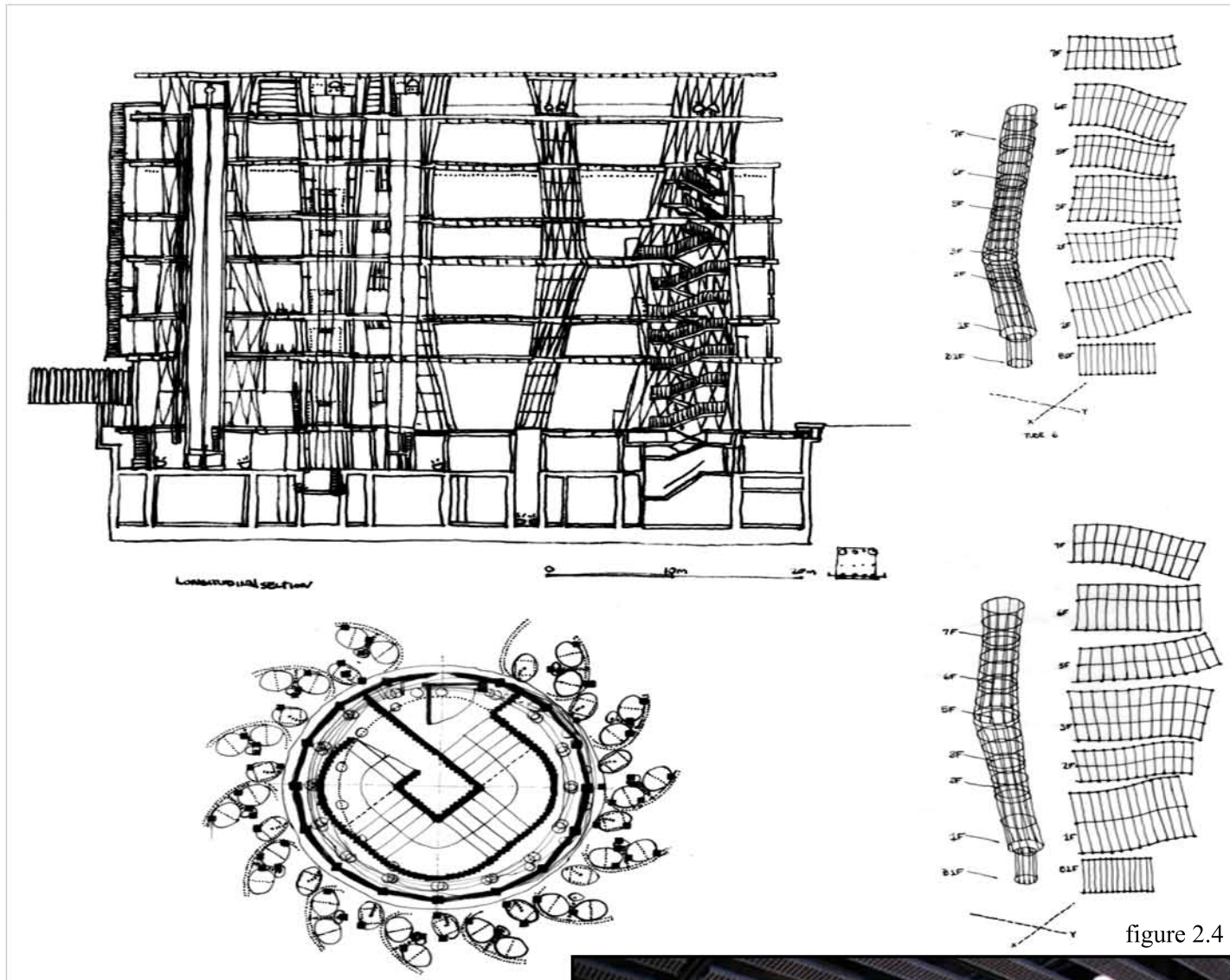
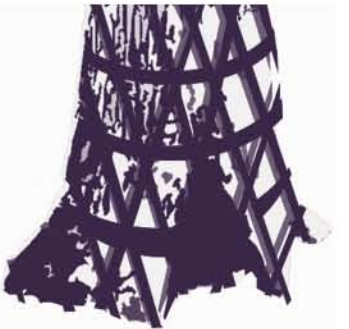


A column bridges contradictions; connecting earth and sky, solid and void, space and place, private and public, shadow and light. Architecture enables us to explore the interaction of column's place, material, thickness, height, proportions, spacing, joining, quantity, human condition and juxtaposition. The goal's of this vertical farm are to create continuity, transition, repetition, hierarchy and in part of the building, translucency. To get there, each design decision was explored, exploited, revised and reconsidered before it was used in the final building.



Photograph of my paper model which shows the consideration of heirarchy and transparency in a column.

From the bottom, with a heavy protruding base and pedestal, exaggerated strength and fortitude is shown. As is normal of a column, the majority of the load is pressed upon the ground. To the top, the capital is light and decorated with a rational motif. The shaft is short and uniform, with a witty sensibility as if it bears a load which compressed it. The column is the way in which I want to see it. It is not a classical way, however there is an understanding of those principles. The column is logical.



Sometimes interpreting something out of context is the result of reading something in context to something else. If someone attempts to copy the original, does it do justice to the original or change the meaning? Such concepts of imitation or mimesis are thoroughly acceptable by Plato and Vitruvius. Vitruvius states “I cannot too strongly insist upon the need of a return to the methods of old times” agreeing that imitation of what is perceived as good is essentially good. Even still, everything is a result of imitation.¹⁷ The architecture of the Greeks was a mimesis of nature. Socrates discusses the beginnings of any work as the most important and crucial time for imitation to occur. He believes that at his time, “...the character is being formed and the desired impression is more readily taken.”¹⁸

The desired impression of structure for this vertical farm building is light permeable columns that supports a major load from soil and water and plants. A good example in nature, which does this well are plant stems, stalks and trunks. From nature to built form, Toyo Ito has developed a rational way to create a tree trunk that lets light through, without realizing it.¹⁹

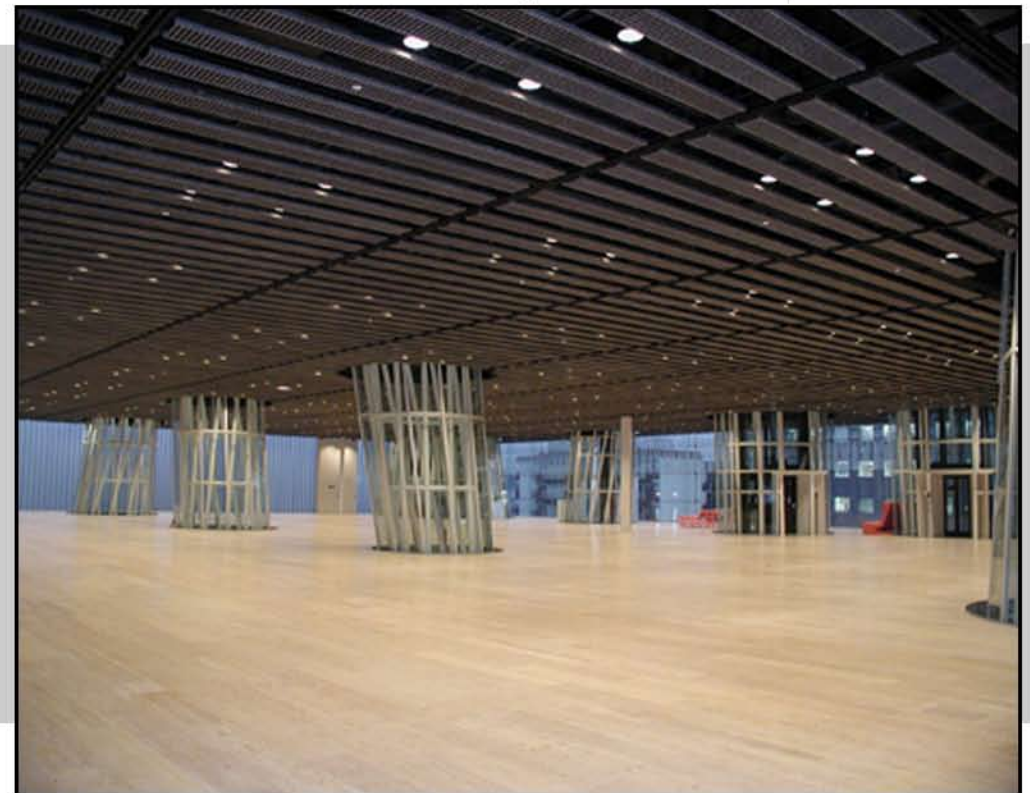


figure 2.5

A column's form is important to consider in a vertical farm, since plants need the maximum daylight to grow indoors, and columns are an intrusive structure.

Considering that columns become lighter (less material) as they approach the sky... less material means more opportunity to allow light to pass through space.

Increasing light means more food for plants. More food means a better habitat for agriculture. Therefore, a successful vertical farm.

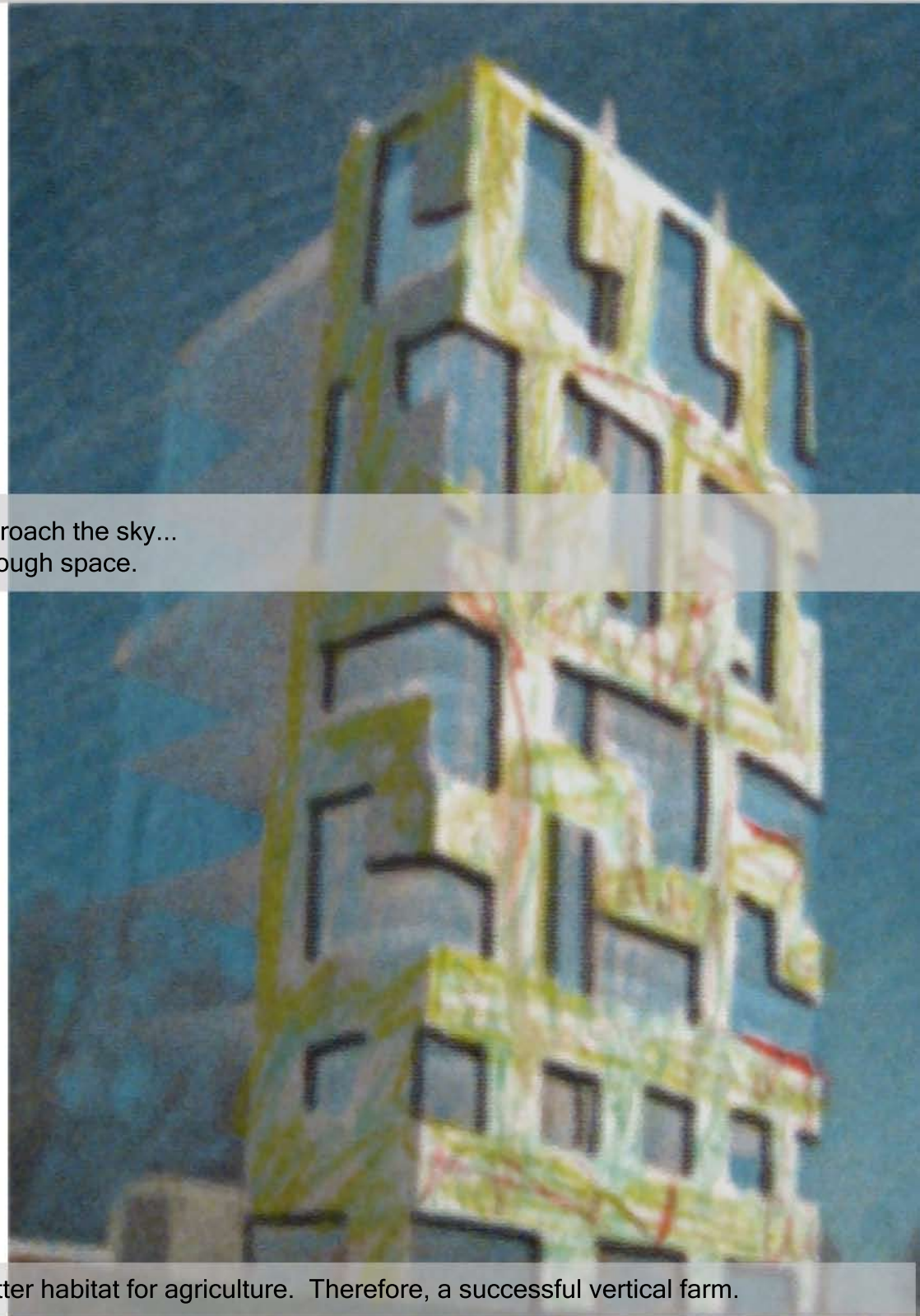




figure 3.1

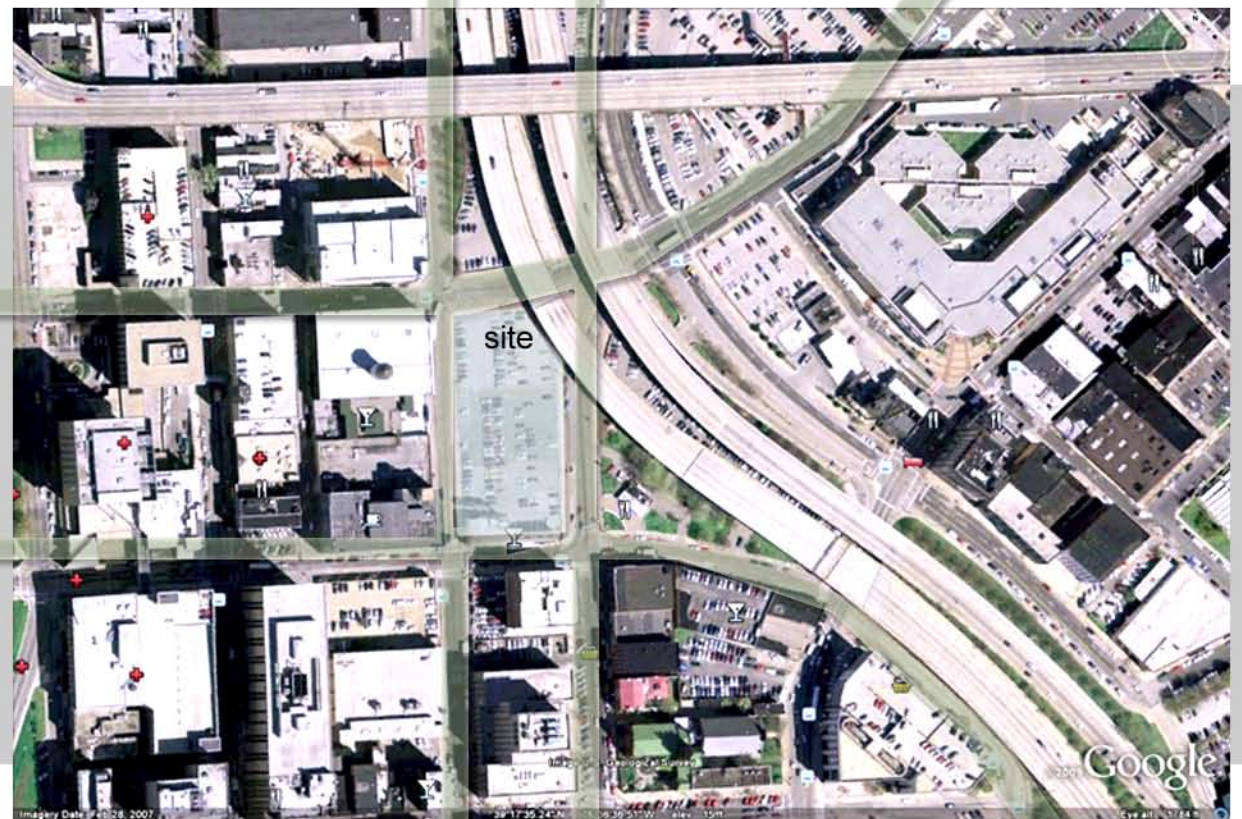


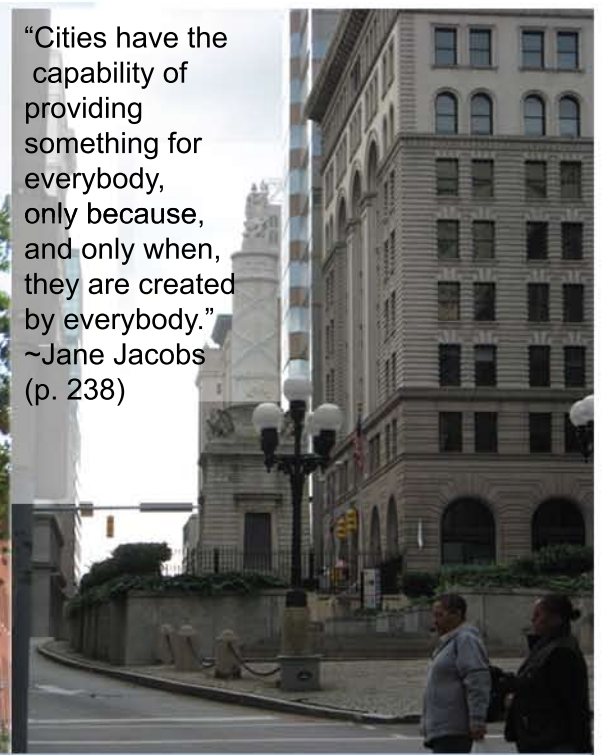
figure 3.2

If not architects and planners, who would question land use patterns? Who investigates transportation? And who realizes the need to confine and reduce waste? As makers, we must create visions of ways of living that not only protect the planet yet further offer satisfying levels of opportunity and comfort for the inhabitants.

When Captain John Smith of Virginia, first explored the Chesapeake Bay, he called the streams fells. This is because of the way water fell over rocks until “they met the tide, where they became and are called rivers.” Coincidentally, an area east of Inner Harbor referred to as Fells Point was founded by William Fell in 1730. On the border of Fell’s Point, the Patapsco River continues to extend from the Chesapeake Bay north, situated below Interstate 83 known locally as the Jones Falls Expressway. The Jones Fall’s Patapsco River was first confined in 1912 due to severe flooding damage. Gradually more and more highway propositions bridged over the river below. Finally in 1950, the city of Baltimore fully enclosed the Jones Falls a.k.a. Patapsco River, with the freeway. Interestingly, the foundation of what is now the Jones Falls Expressway rests on soft soil and piles which go down approximately 125 feet to bedrock.²⁰ Below, (fig. 3.3) shows the path in which the Patapsco River flows (concealed under the highway.) The bold green area is the site of this thesis.



figure 3.3



“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.”
 ~Jane Jacobs (p. 238)



Baltimore is made up of a conglomerate of materials and forms. One walks through Fells Point, or Federal Hill, or Mount Vernon, and you either belong or you do not belong! This city is extremely neighborhood oriented. The architecture around town is a beautiful synthesis of old and new buildings. Federal Hill is primarily row houses with much life and character. Mount Vernon has beautiful old churches and cathedral faced apartments and hotels. Inner Harbor is the most urban, with: the greatest, tallest, glassiest and best views of water, money and material can afford. Fells Point is humble and offers quiet adoration for the old times, a shipyard city that went through good times and hard times. Yet despite diversities, many homes in Baltimore are adorned with plants and trees. In all neighborhoods; concrete, stone and brick make up many exterior building facades, however newer construction methods have started to change the mix and there are now quite a few steel and glass buildings throughout Baltimore.

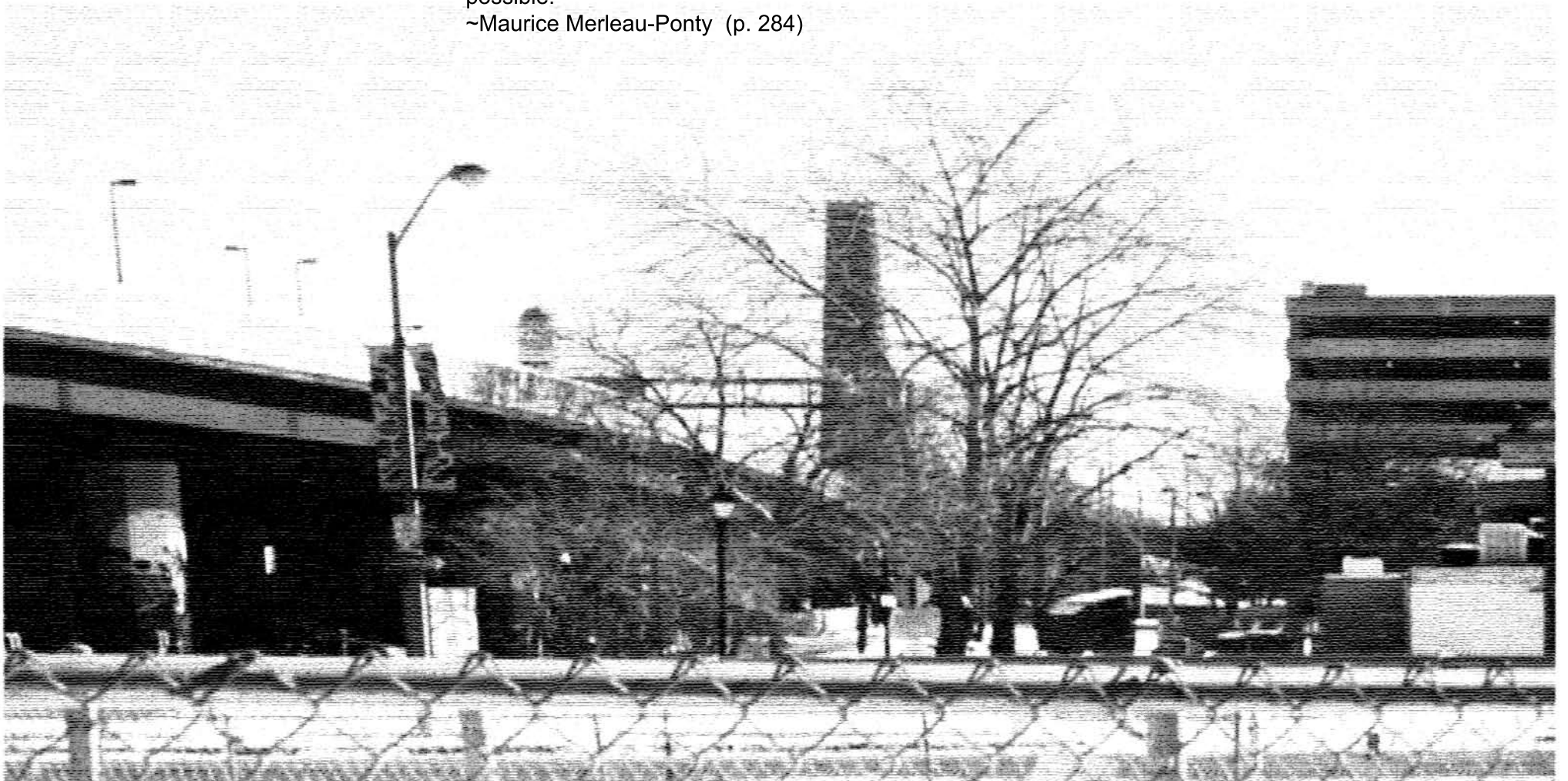


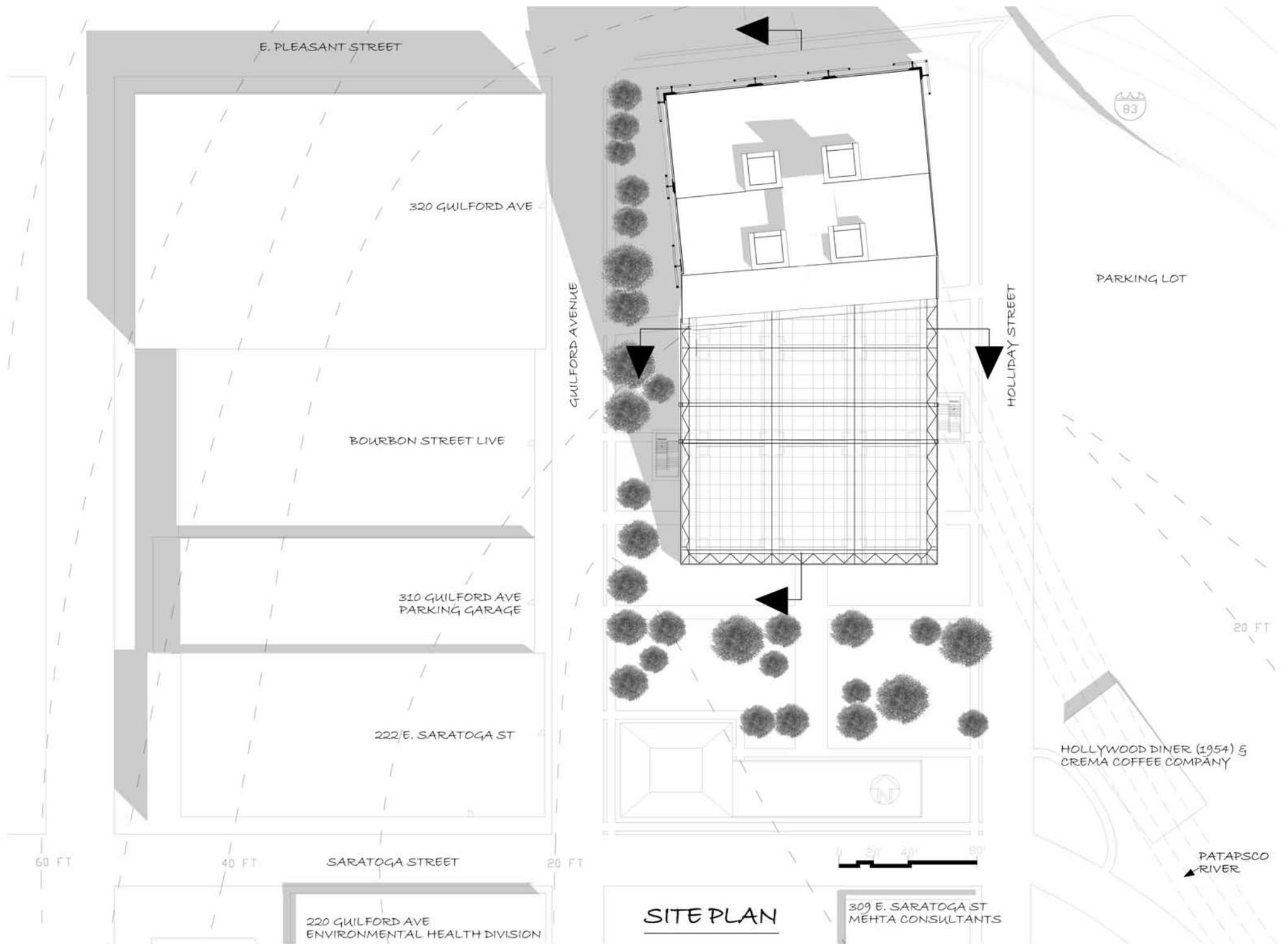
This is presently the site of the Baltimore Bazaar and Farmers Market. Every time I visited it, except Sunday, it is desolate. Architecturally speaking, the function of this space needs a make-over.



“Space is not the setting in which things are arranged, but the means whereby the positing of things becomes possible.”

~Maurice Merleau-Ponty (p. 284)

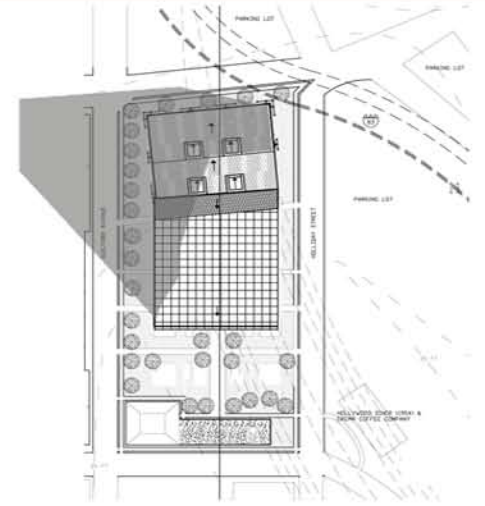
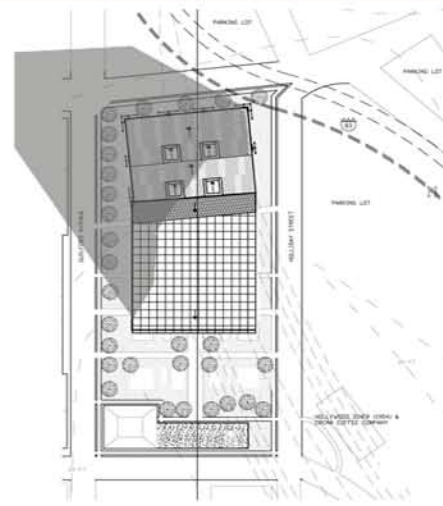
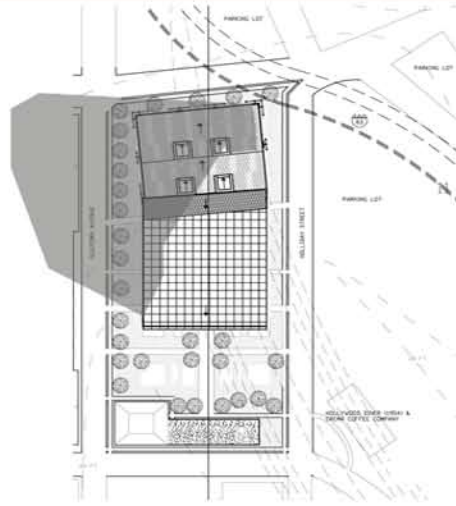
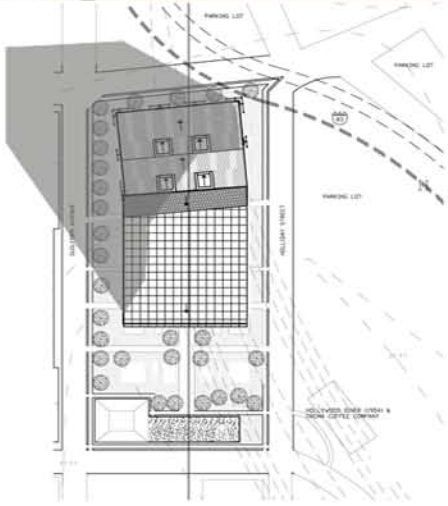




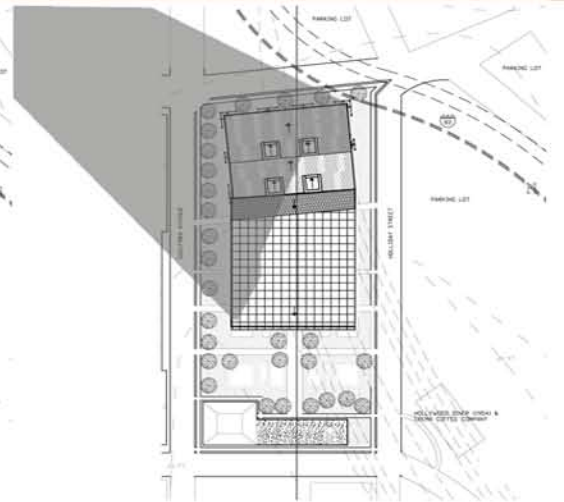
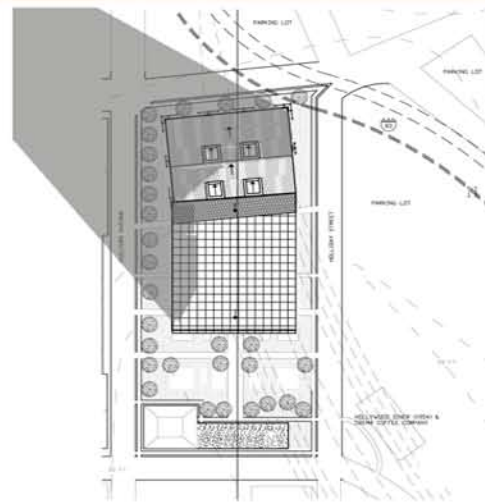
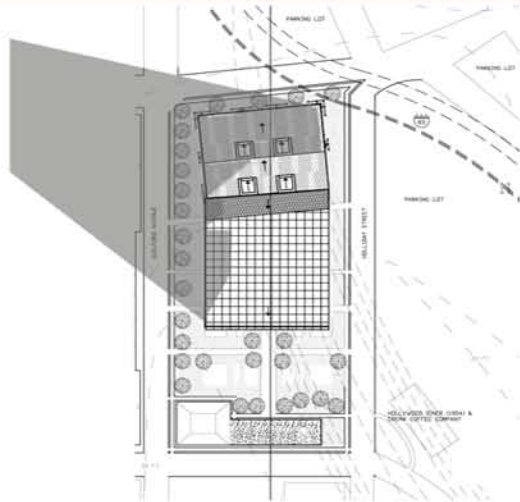
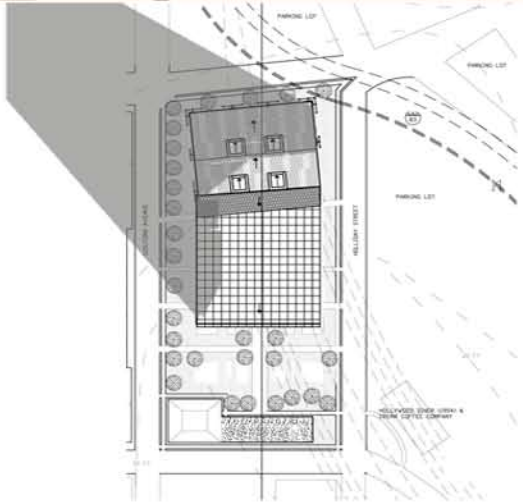
SITE PLAN

309 E. SARATOGA ST
MEHTA CONSULTANTS

10:00 am



8:00 am



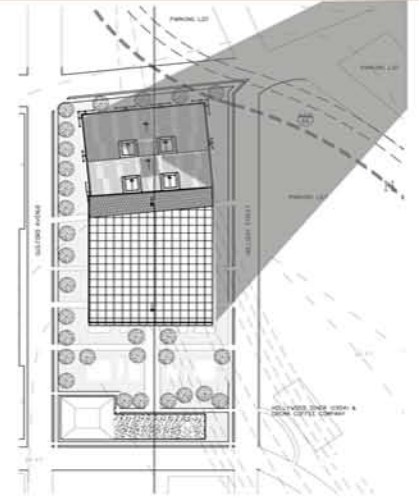
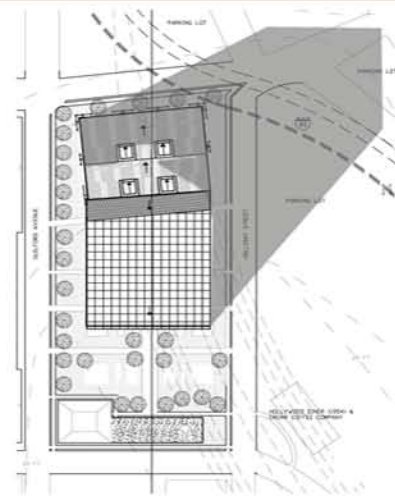
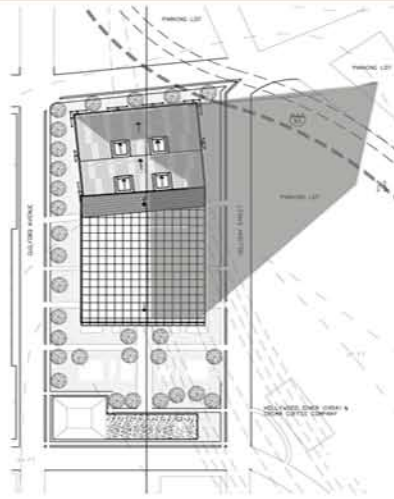
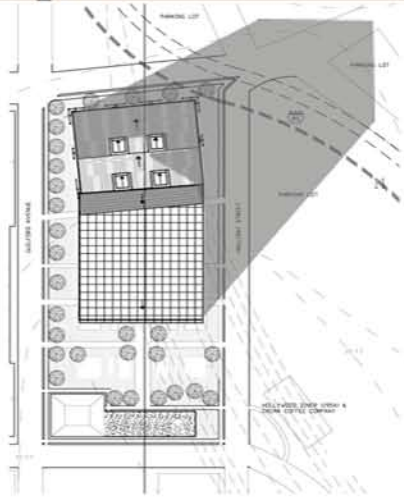
march 21 (spring equinox)

june 21 (summer solstice)

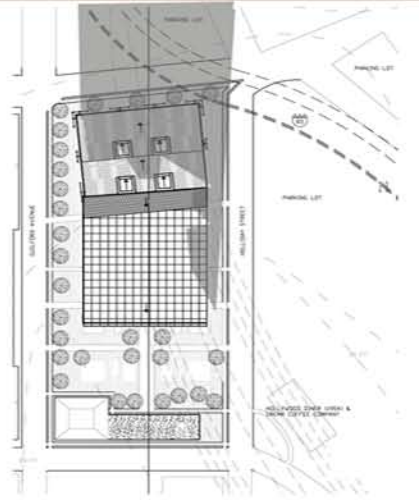
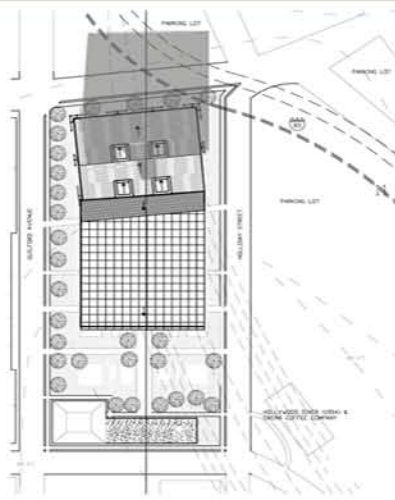
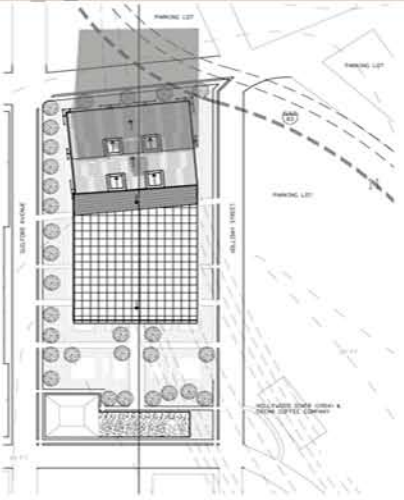
september 21 (fall equinox)

december 21 (winter solstice)

4:00 pm



12:00 pm



march 21 (spring equinox)

june 21 (summer solstice)

september 21 (fall equinox)

december 21 (winter solstice)



sun study

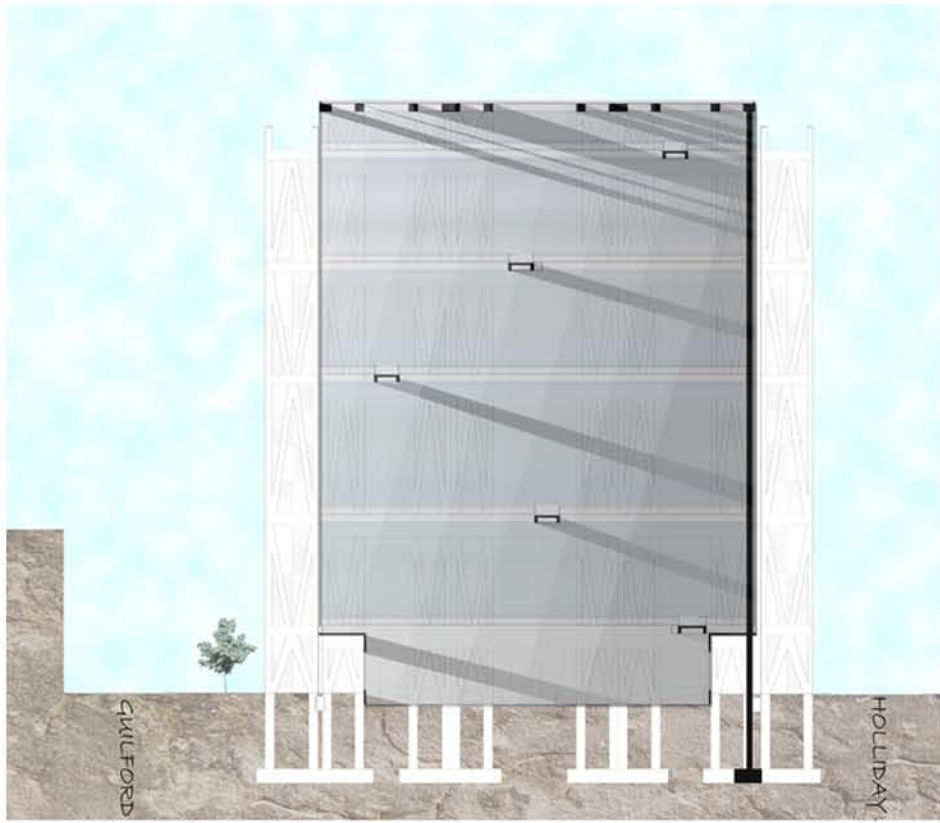
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10:00 am



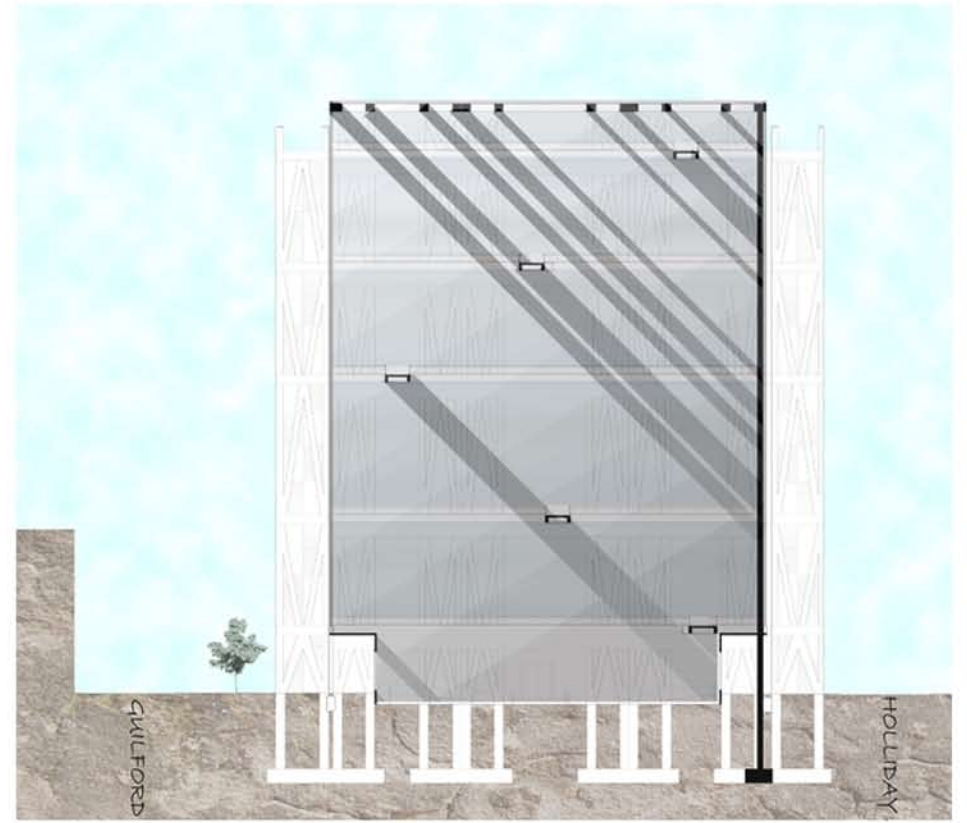
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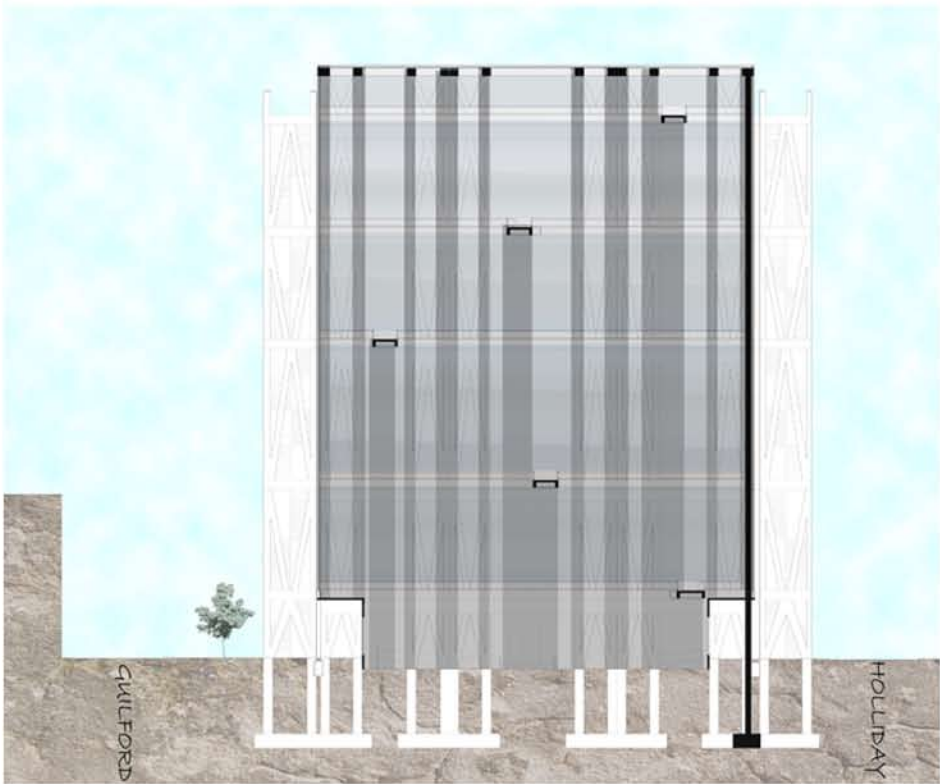


June sun study

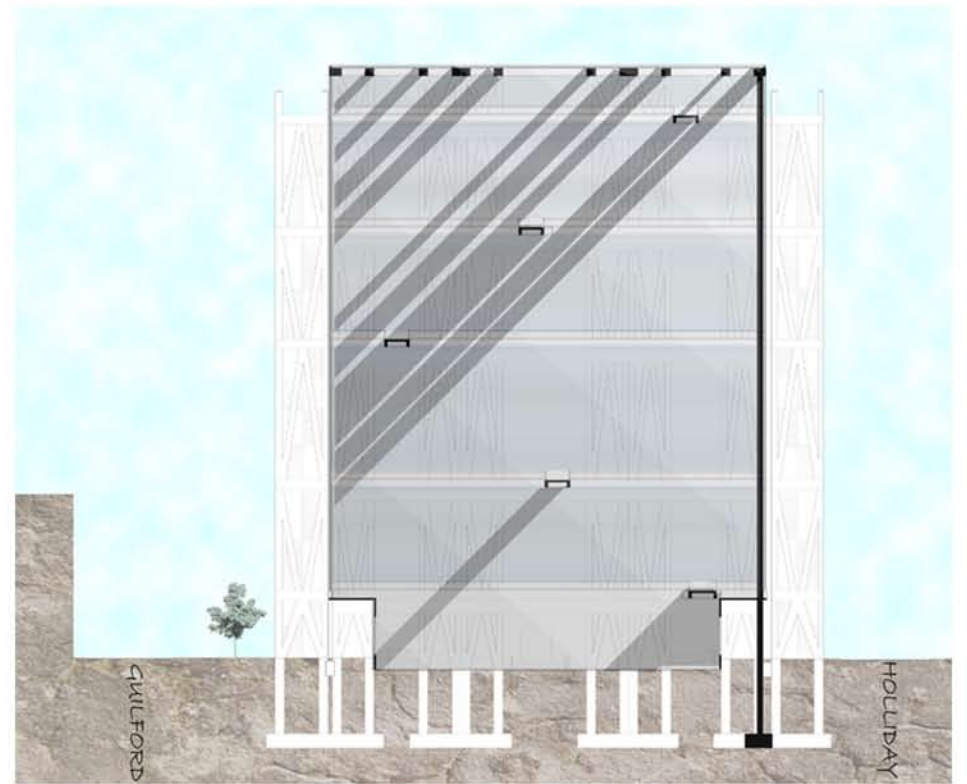
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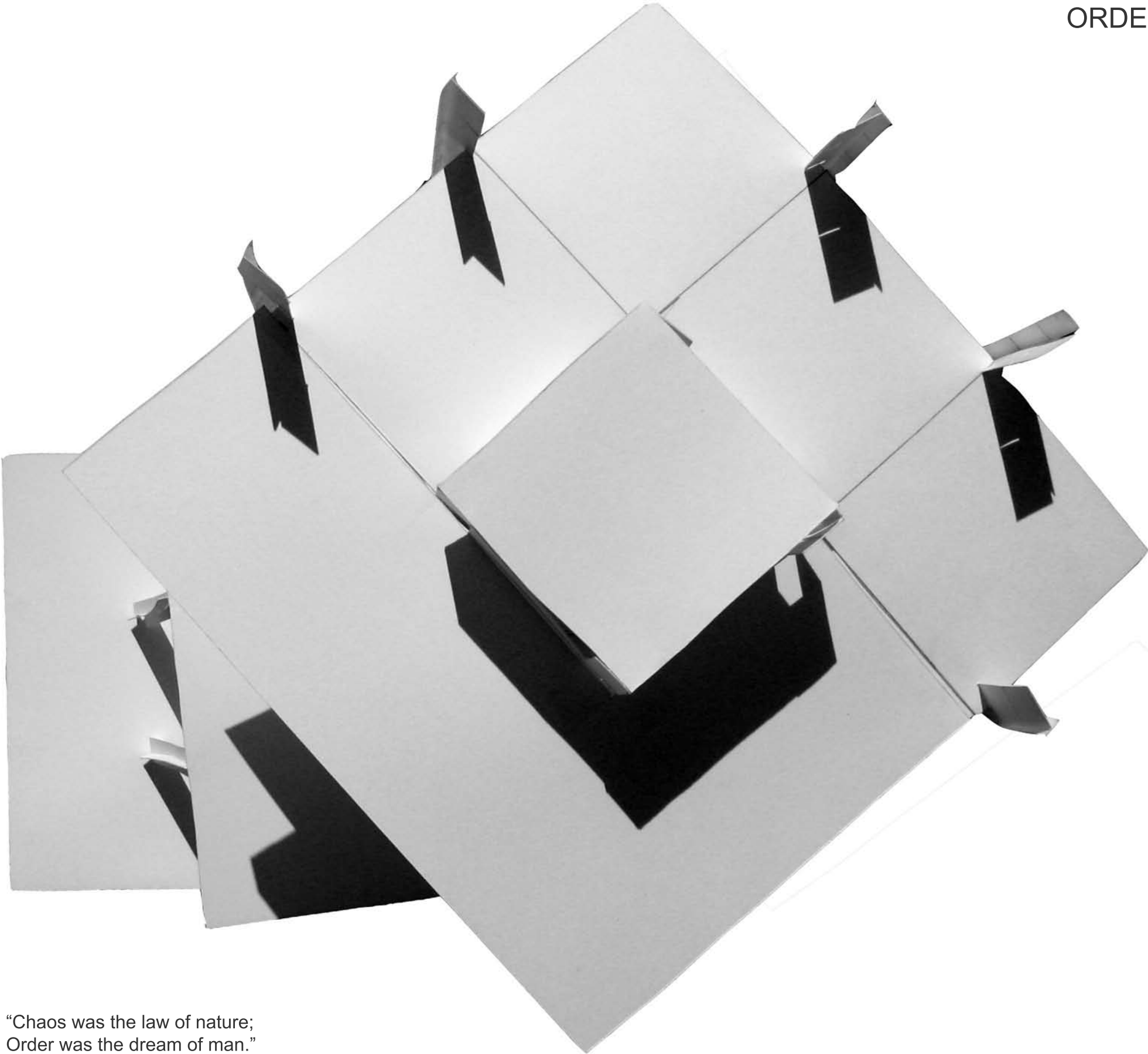
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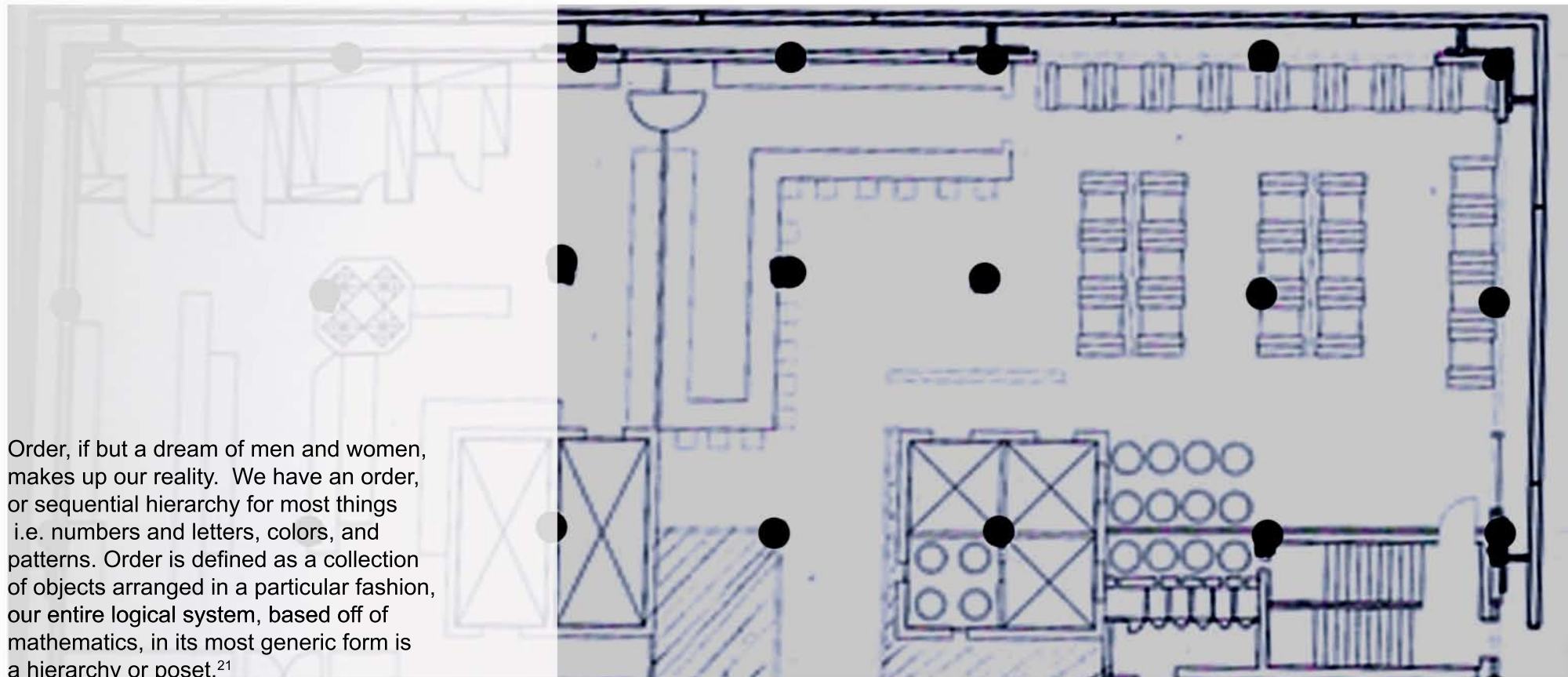
12:00 pm



4:00 pm



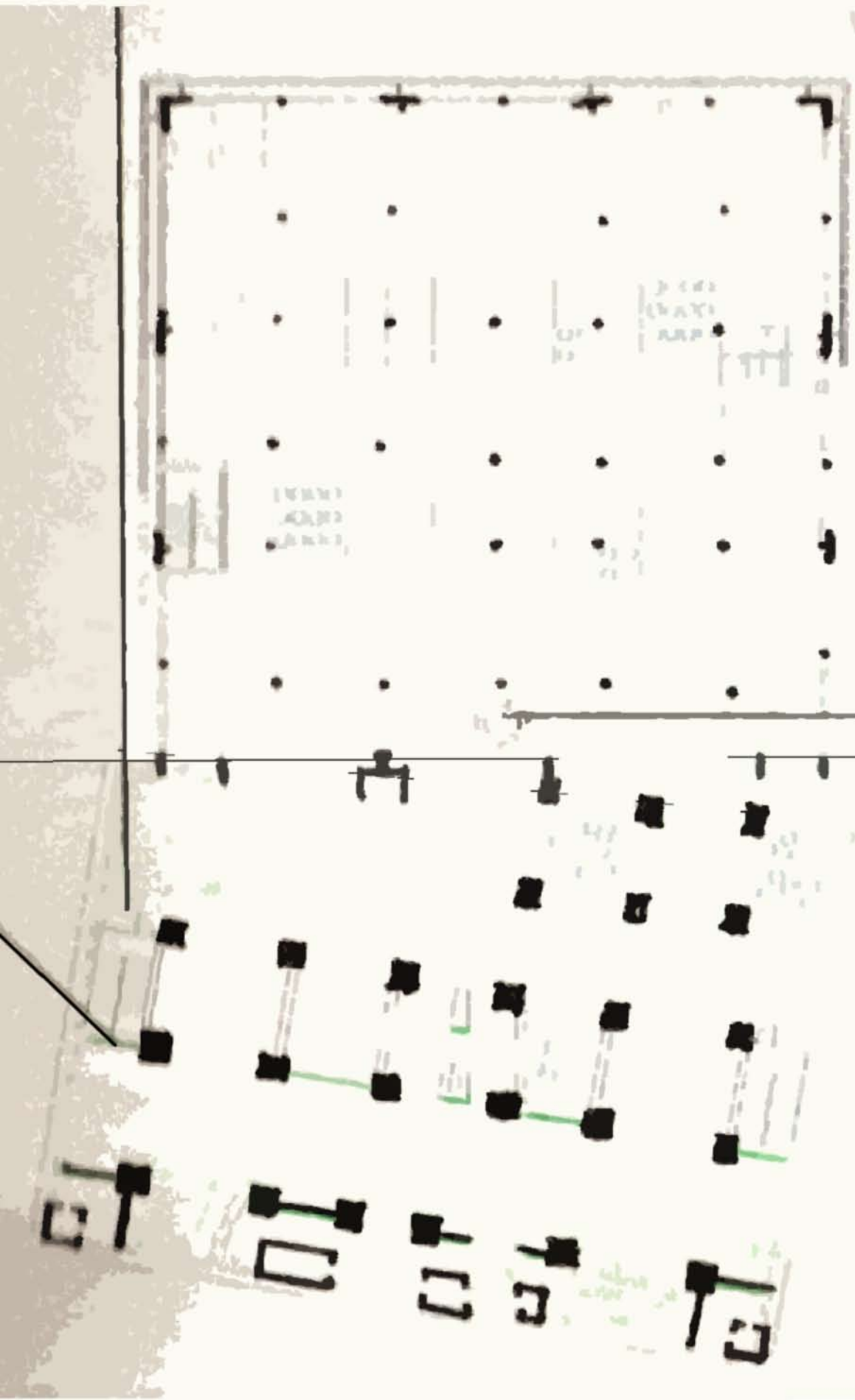
“Chaos was the law of nature;
Order was the dream of man.”
~Henry Adams (p. 451)



Order, if but a dream of men and women, makes up our reality. We have an order, or sequential hierarchy for most things i.e. numbers and letters, colors, and patterns. Order is defined as a collection of objects arranged in a particular fashion, our entire logical system, based off of mathematics, in its most generic form is a hierarchy or poset.²¹

Yet, order may also include natural relations of beings to one another. Insofar as the natural order is the ethical foundation from which the laws of nature seeks to utilize their influence.²² In a more physical sense, order is the arrangement of parts in a rational and cohesive form.²³ In architecture we order many parts. These parts are structure, spaces, light, openings, floors, stairs, rooms etc. At the start of the project, parts are known to be a certain square footage or quantity. The architect's responsible design adheres to ordering these.

Just how to put the parts together in a three dimensional space? One is constantly referencing a grid, the most rational order man knows.²⁴ From this point he ventures to translate the forms, shifting, sliding, rotating, mirroring, repeating, scaling and joining forms until he has a unified space. Though an architect's main comprehension of unifying space is physical alteration to achieve visual cohesion, there is an underlying logic behind the placing of particulars. Logic has been around since ancient times, and it came to be a discipline, as a mechanism for thought, by Aristotle.²⁵



“a grid is a system of two or more intersecting sets of regularly spaced parallel lines. It generates a geometric pattern of regularly spaced points at the intersection of the grid lines...the most common grid is based on the geometry of the square. The two forms can retain their individual identities and share the interlocking portion of their volume.”

~ Frank Ching (p. 72)



E. PLEASANT STREET

DRAWINGS

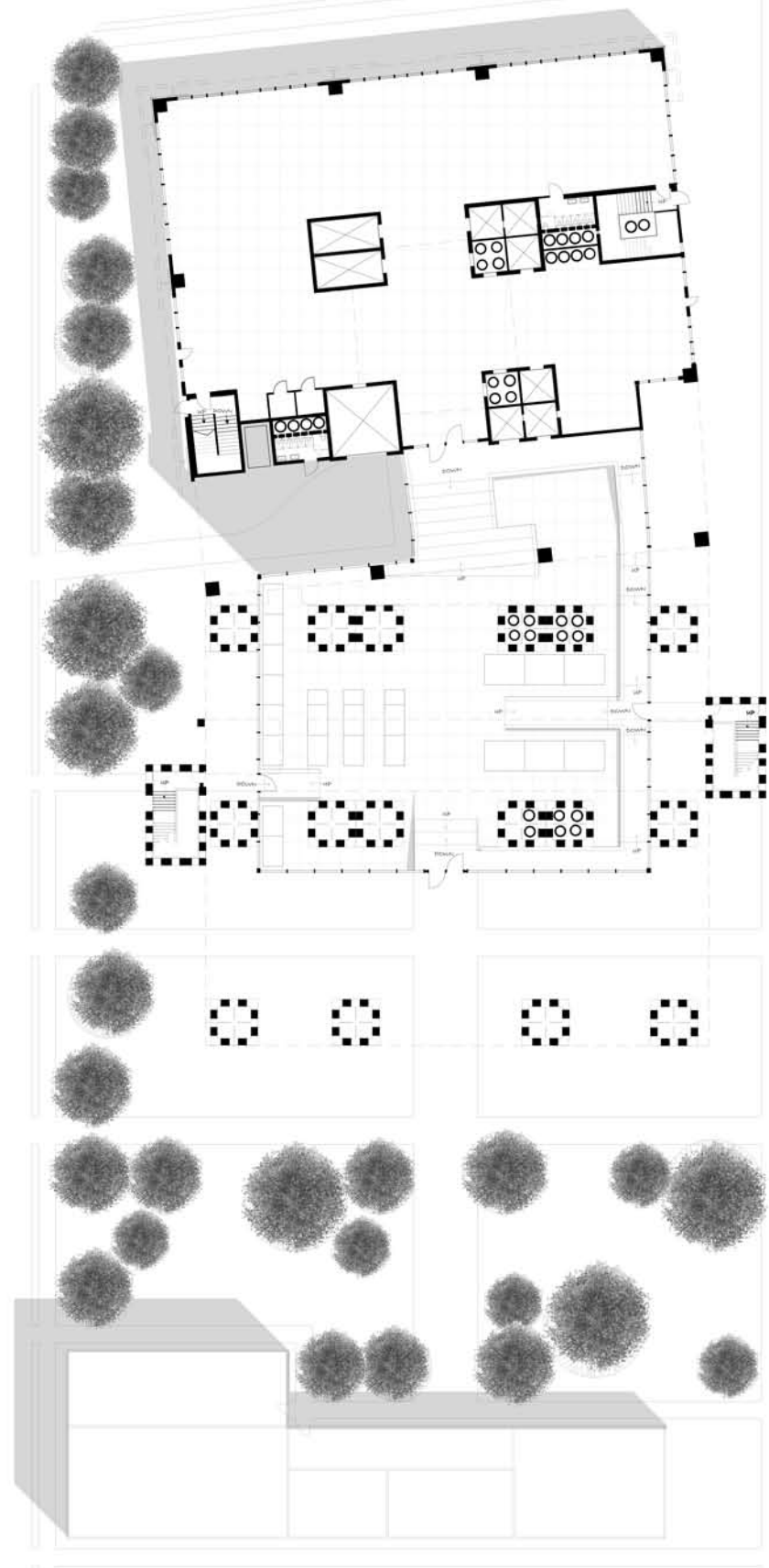
QUILFORD AVENUE

HOLLIDAY STREET

SARATOGA STREET



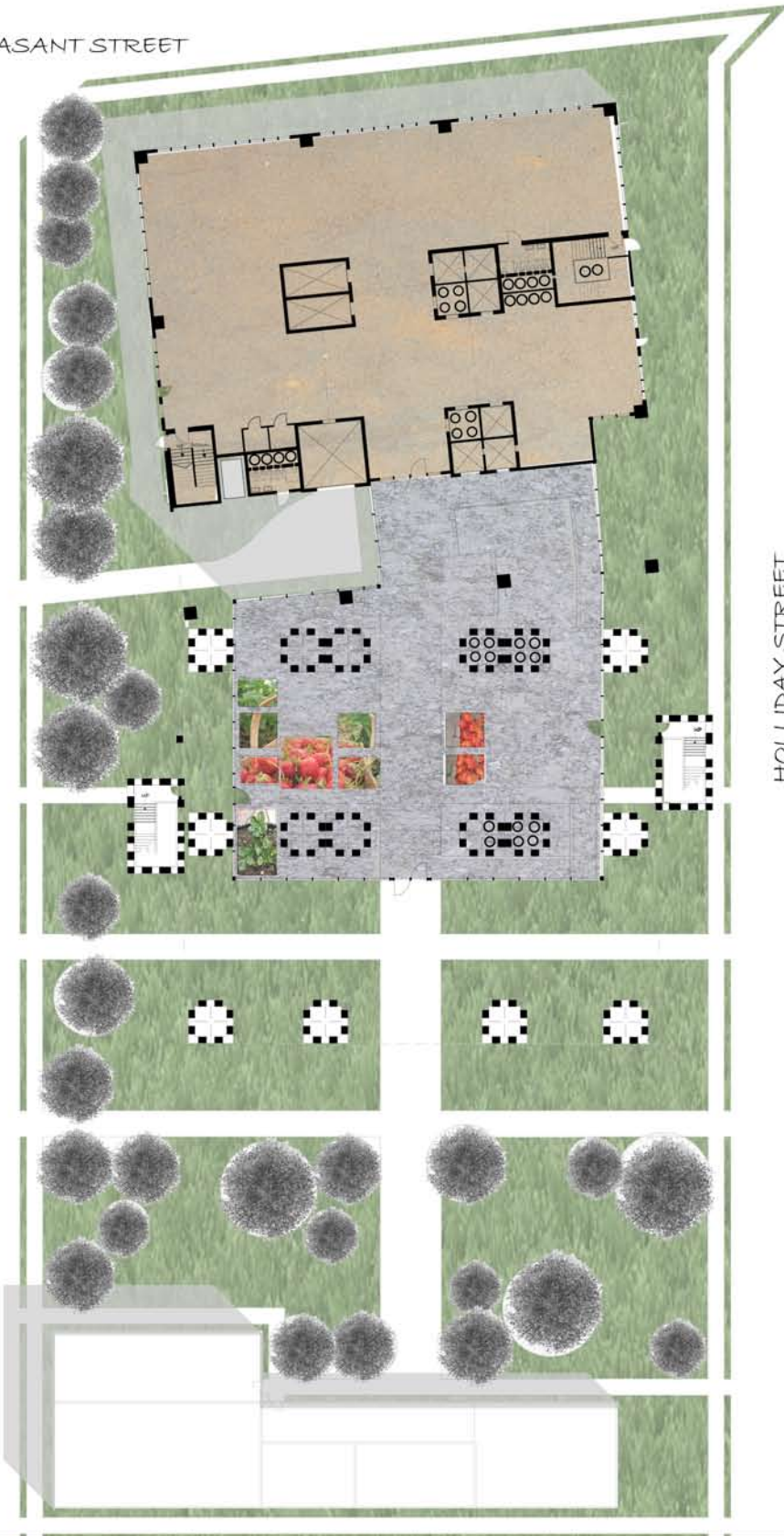
GROUND PLAN



E. PLEASANT STREET

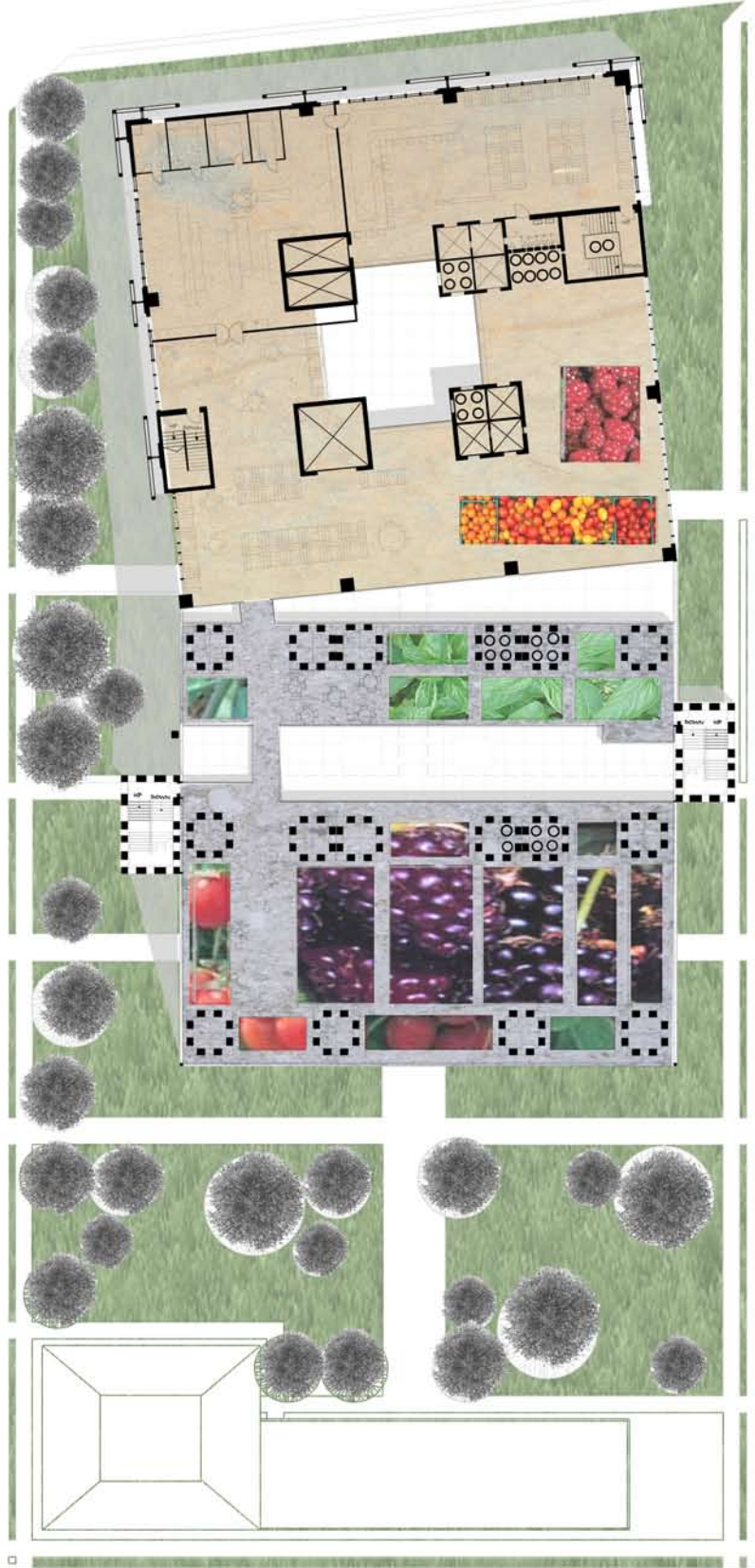
QUILFORD AVENUE

HOLIDAY STREET

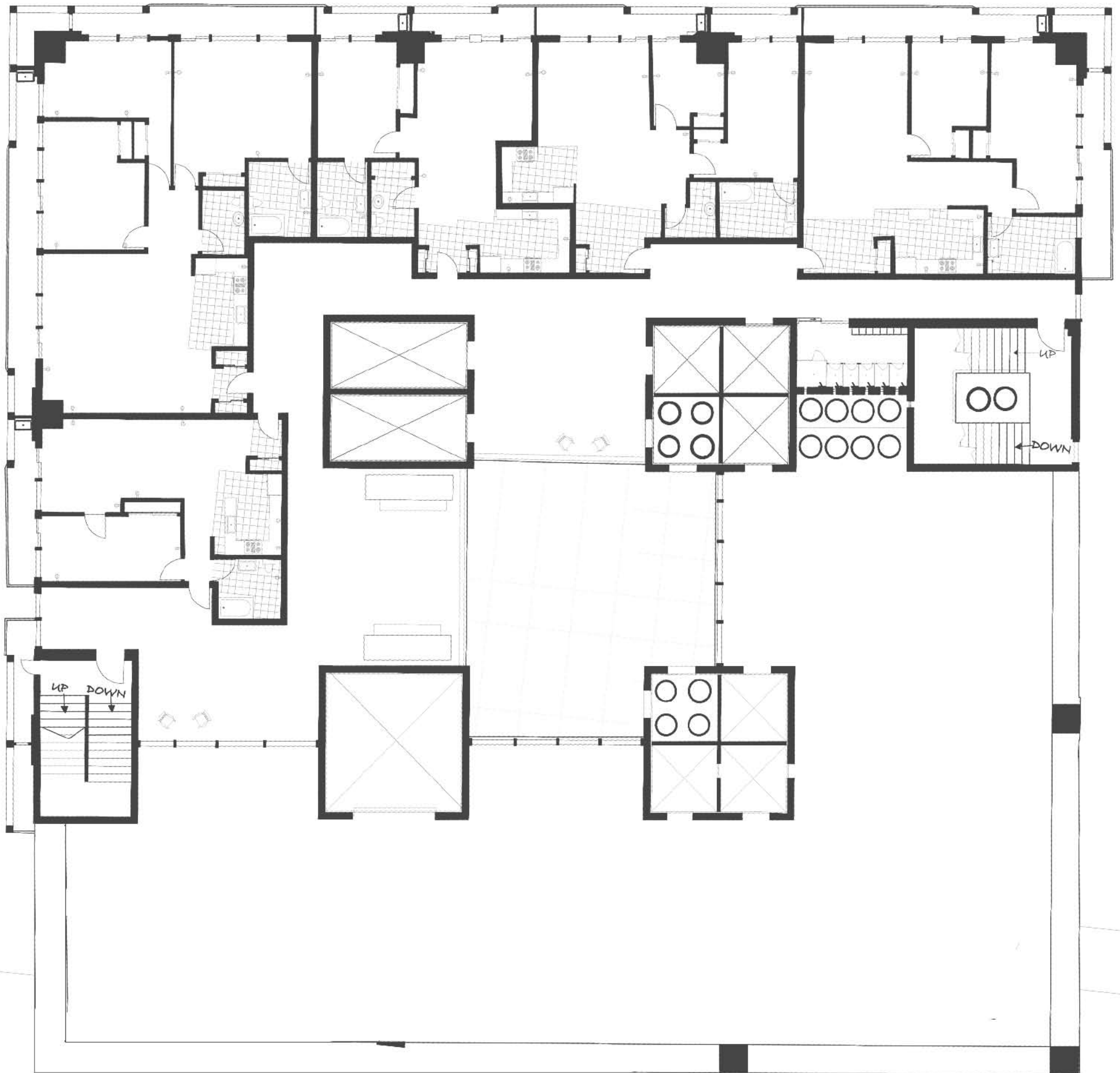


SARATOGA STREET

GROUND PLAN

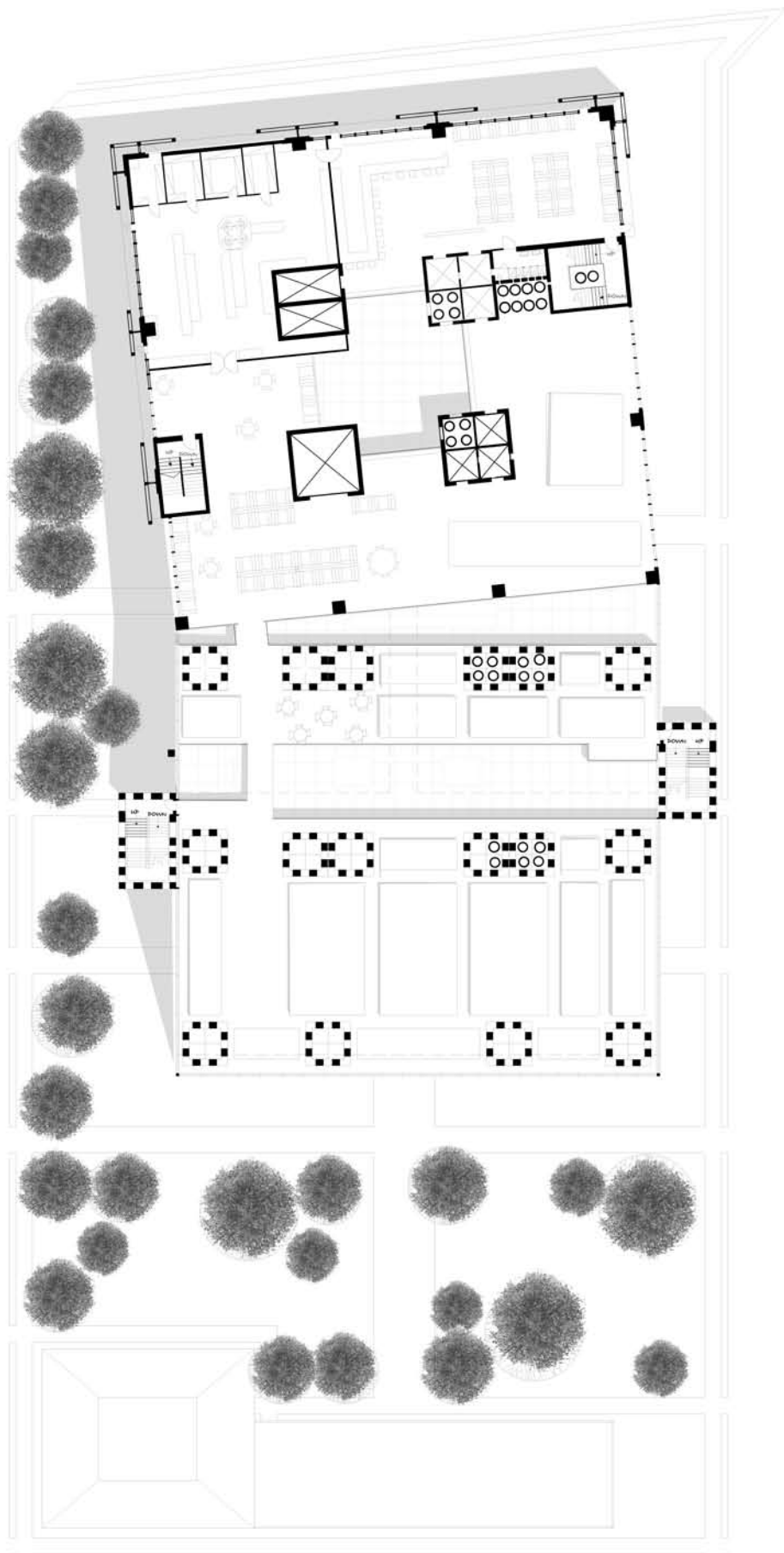


LEVEL 2 PLAN

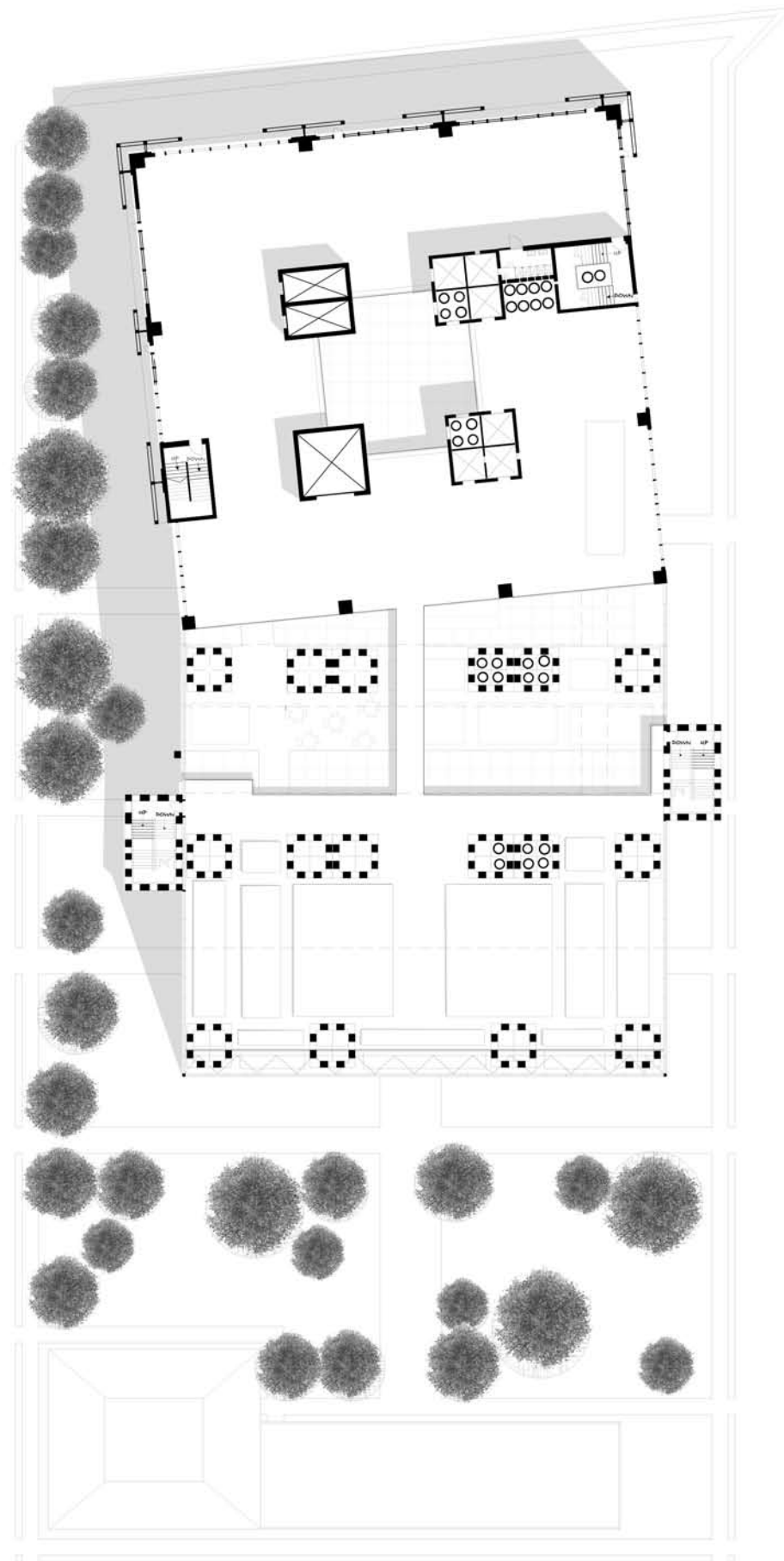




APARTMENT PLAN

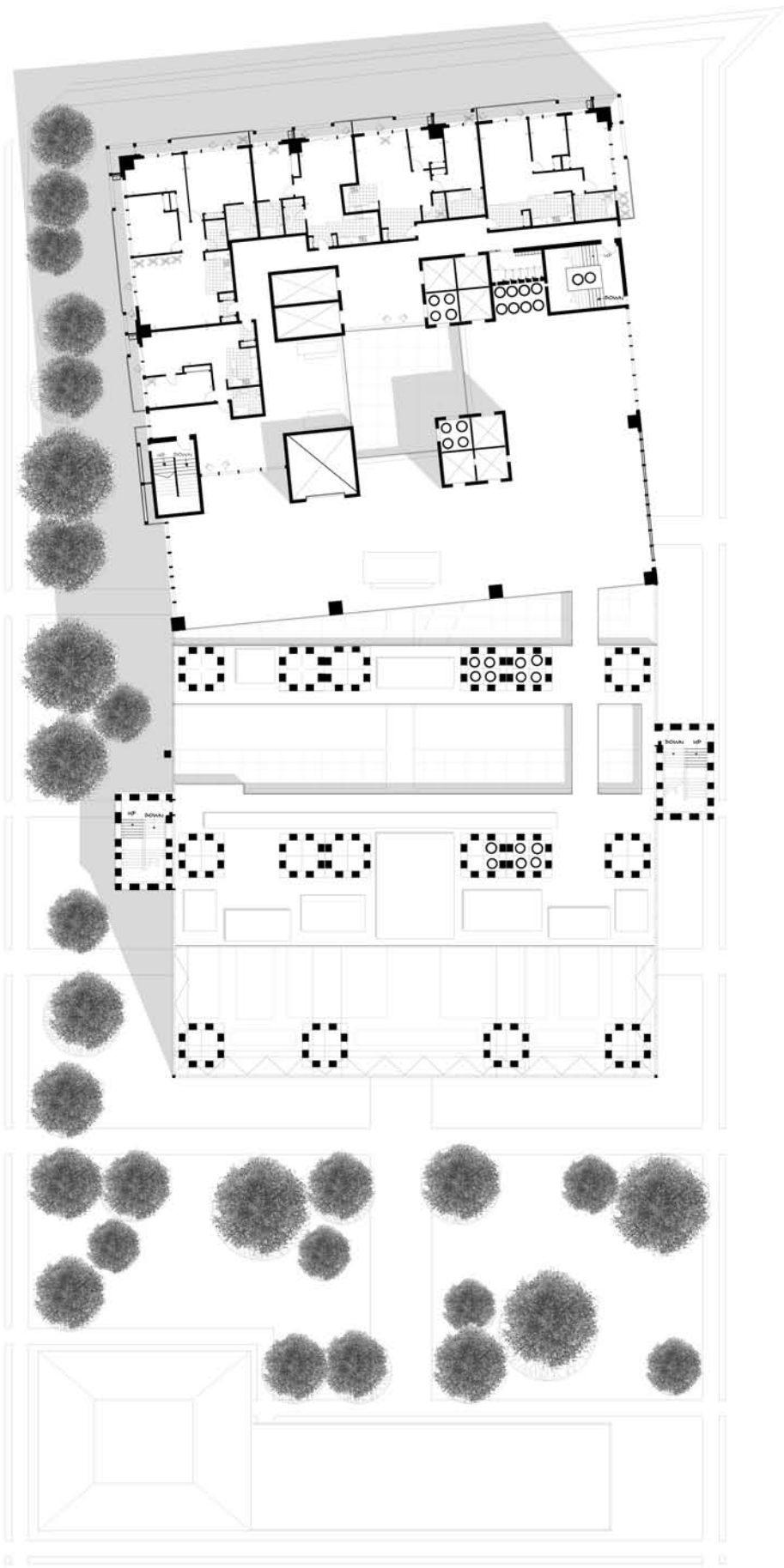


LEVEL 2 PLAN

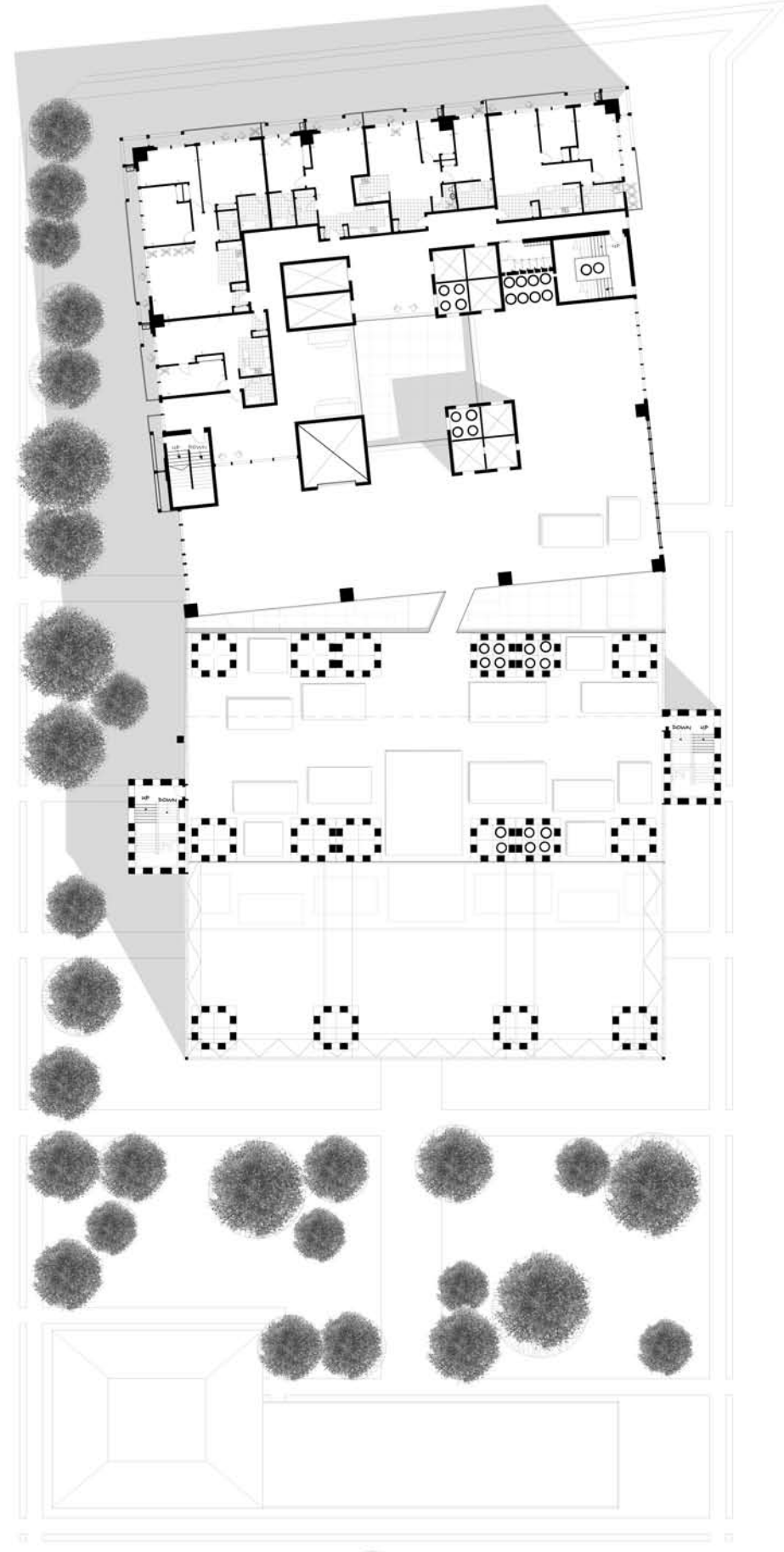


LEVEL 6 PLAN



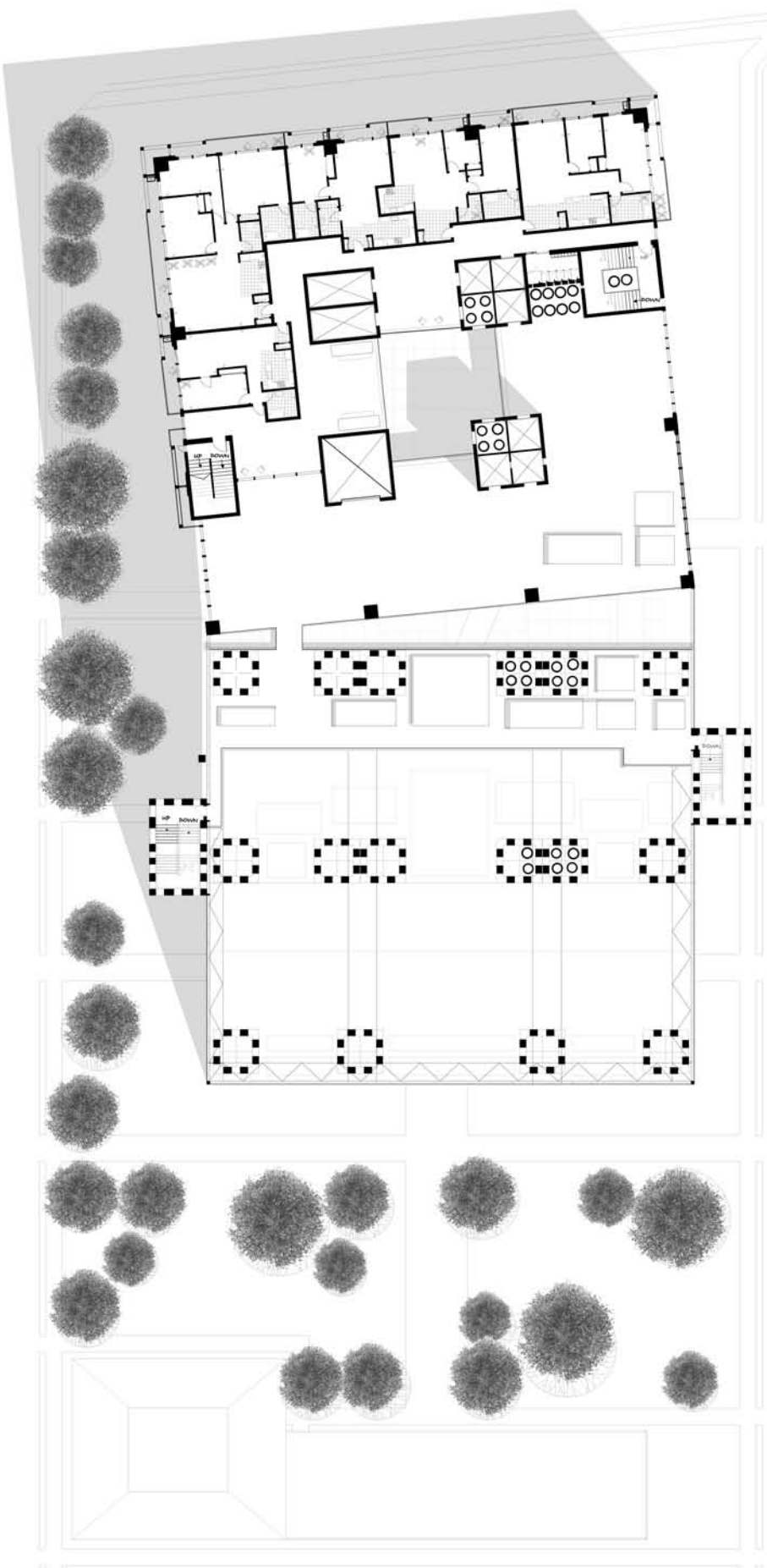


LEVEL 10 PLAN

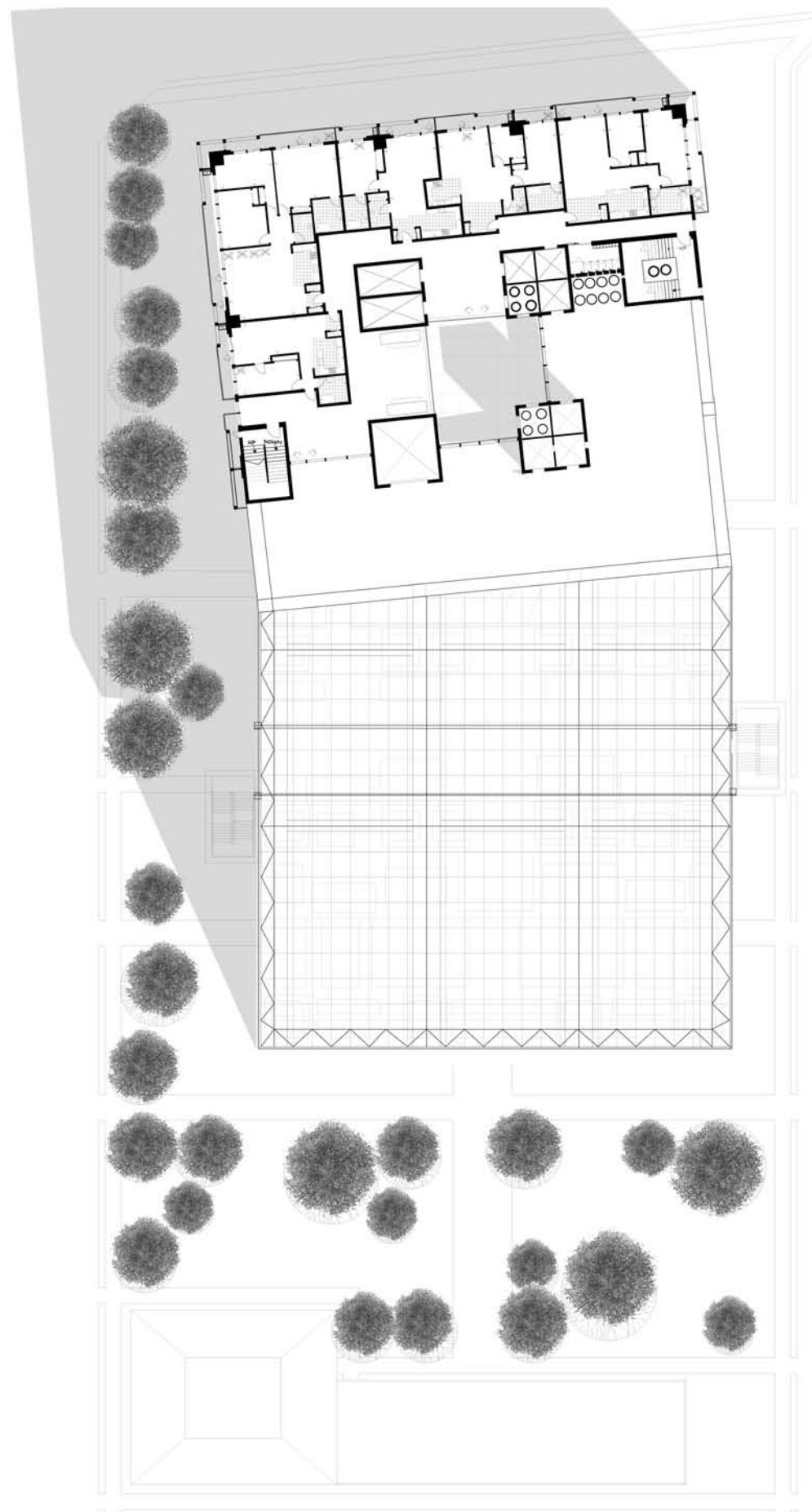


LEVEL 14 PLAN

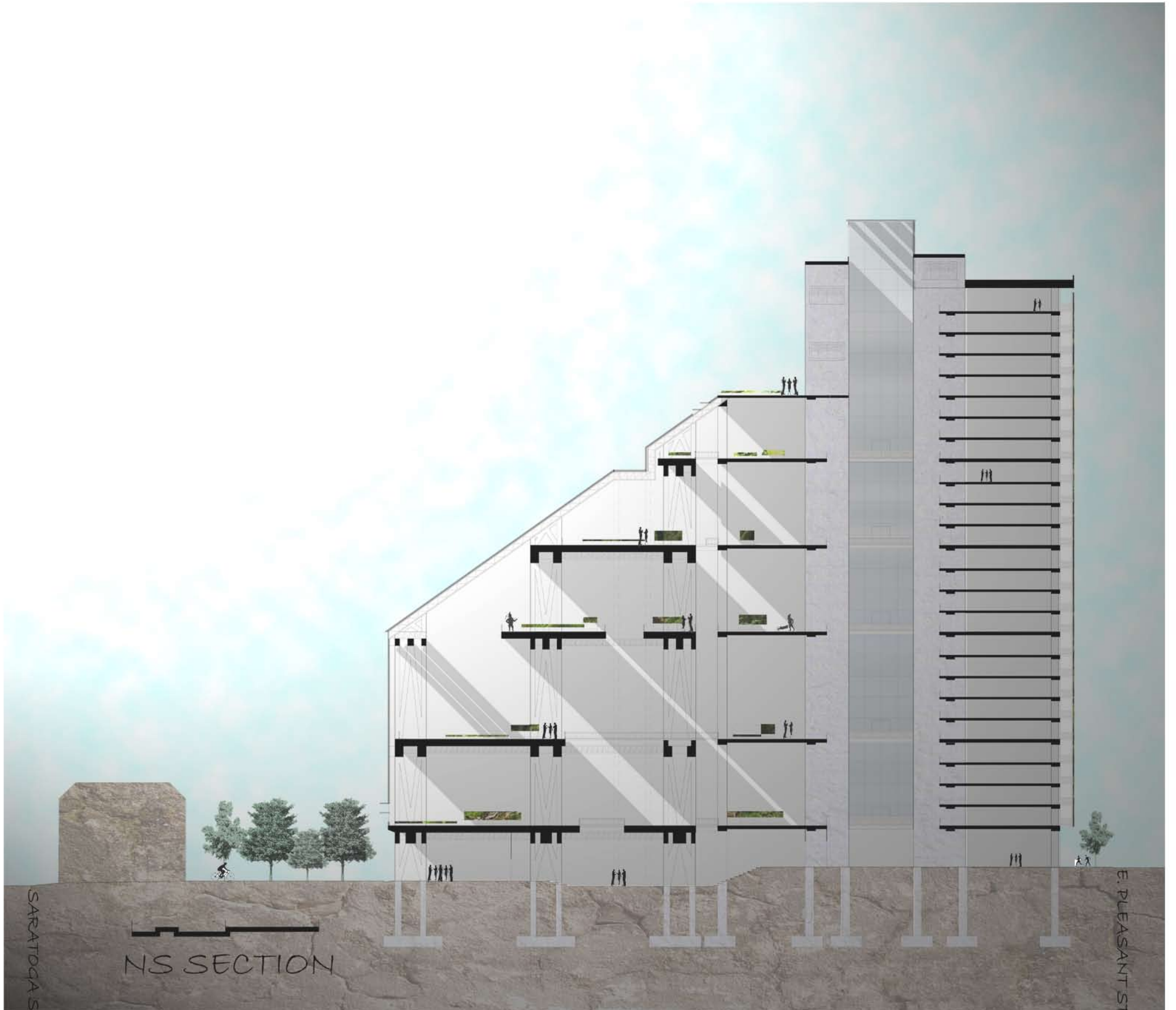


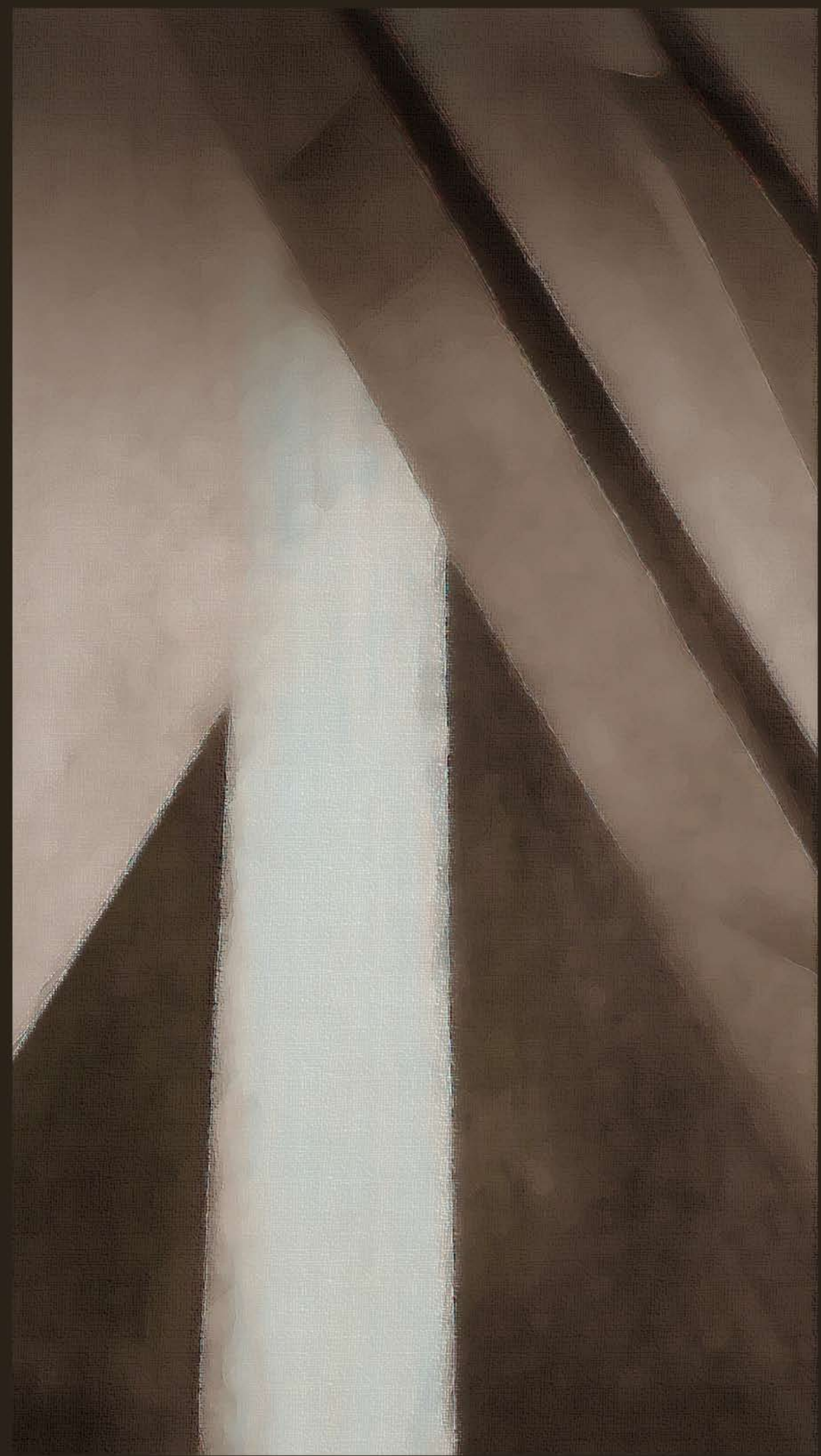


LEVEL 17 PLAN  0 20' 40' 80'

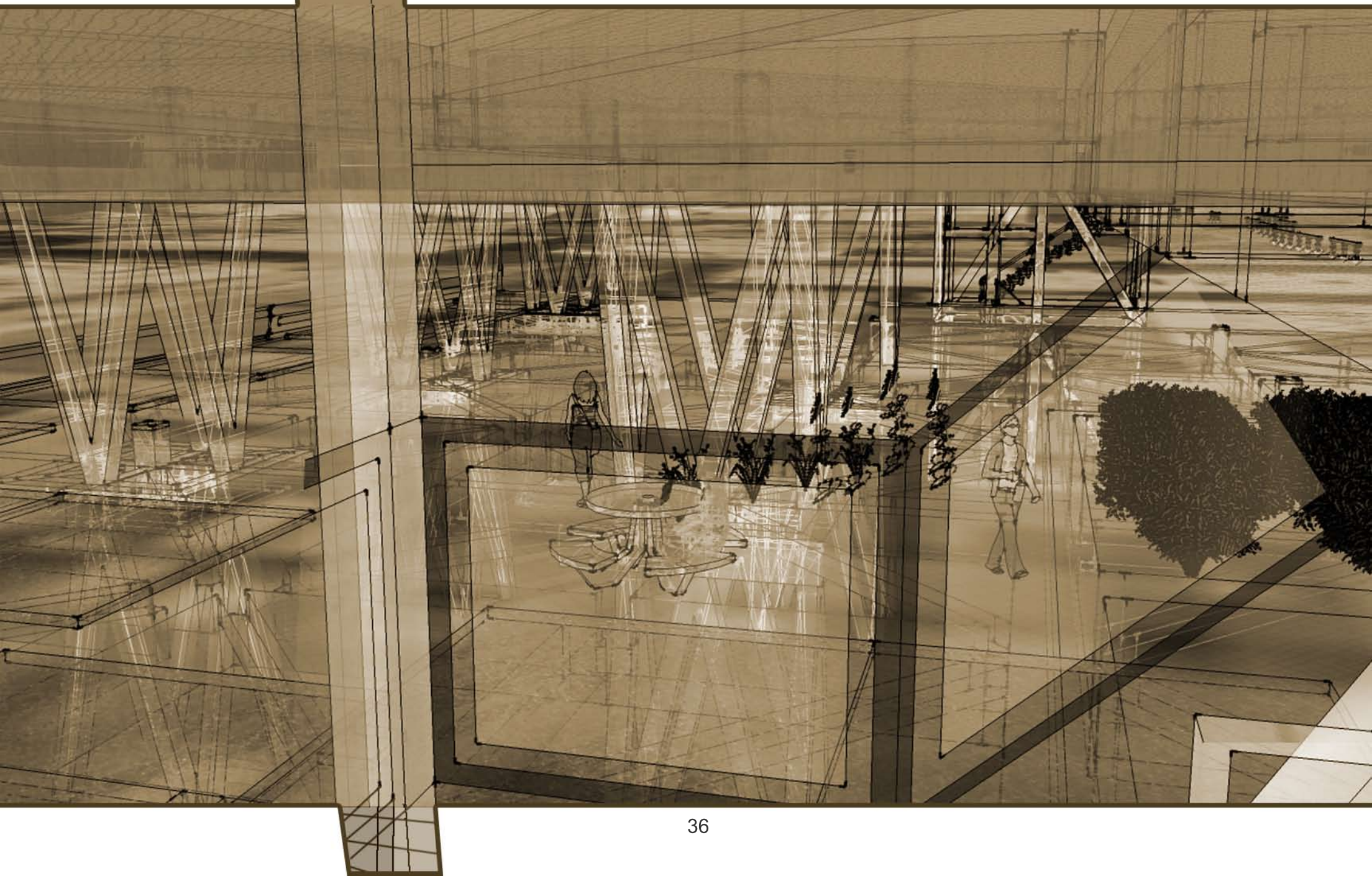
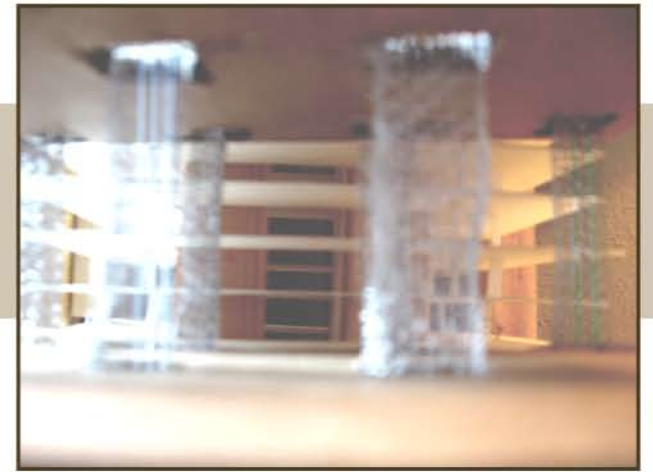


LEVEL 23 PLAN  0 20' 40' 80'



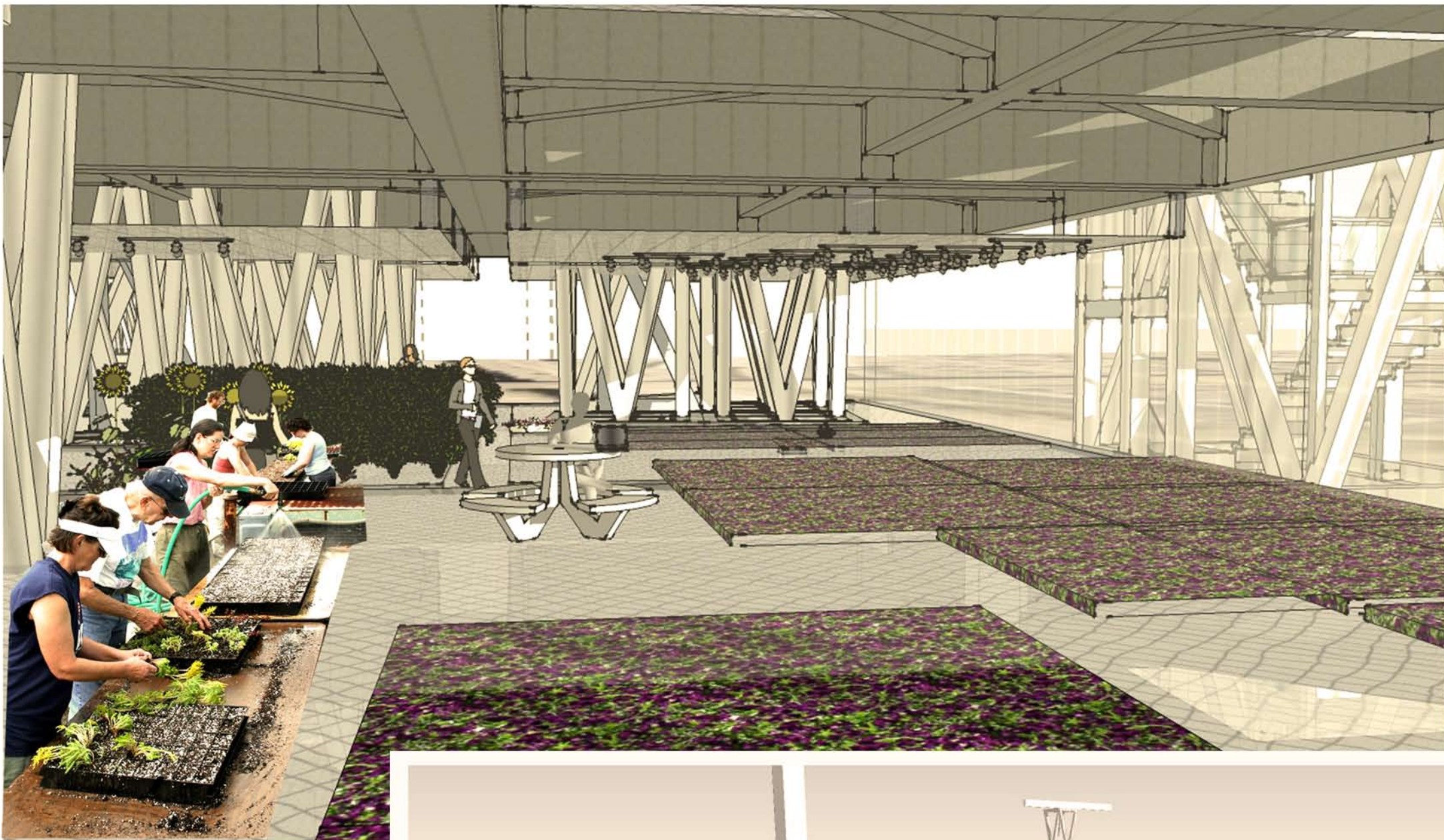


These images demonstrates the struggle between translucency and the structure.



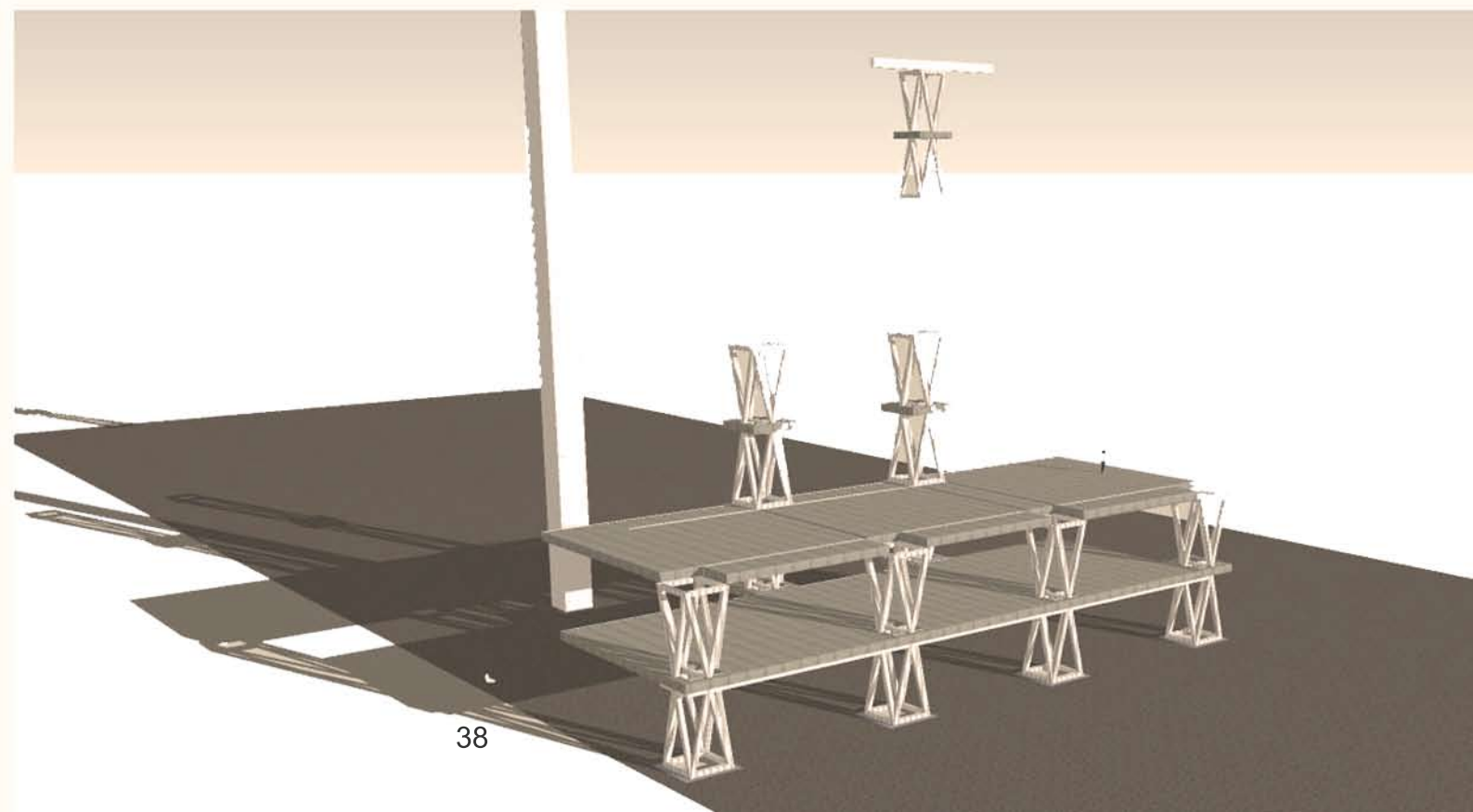


In the apartment foyer, a hallway leads to a barn door entry. Located here are lockers and showers. Beyond the doors, the space is illuminated by a tube carrying grey waters to the plants.



Above: Workers tend to sprouts here. They take the plants, and water them, and harvest them when they are at a premium growth. Then they replant and replace on the floor slab in the place sunlight is optimum for their growth. Beyond, bushes of blackberries grow in a darker area. Fullgrown Sunflowers have been moved to be harvested.

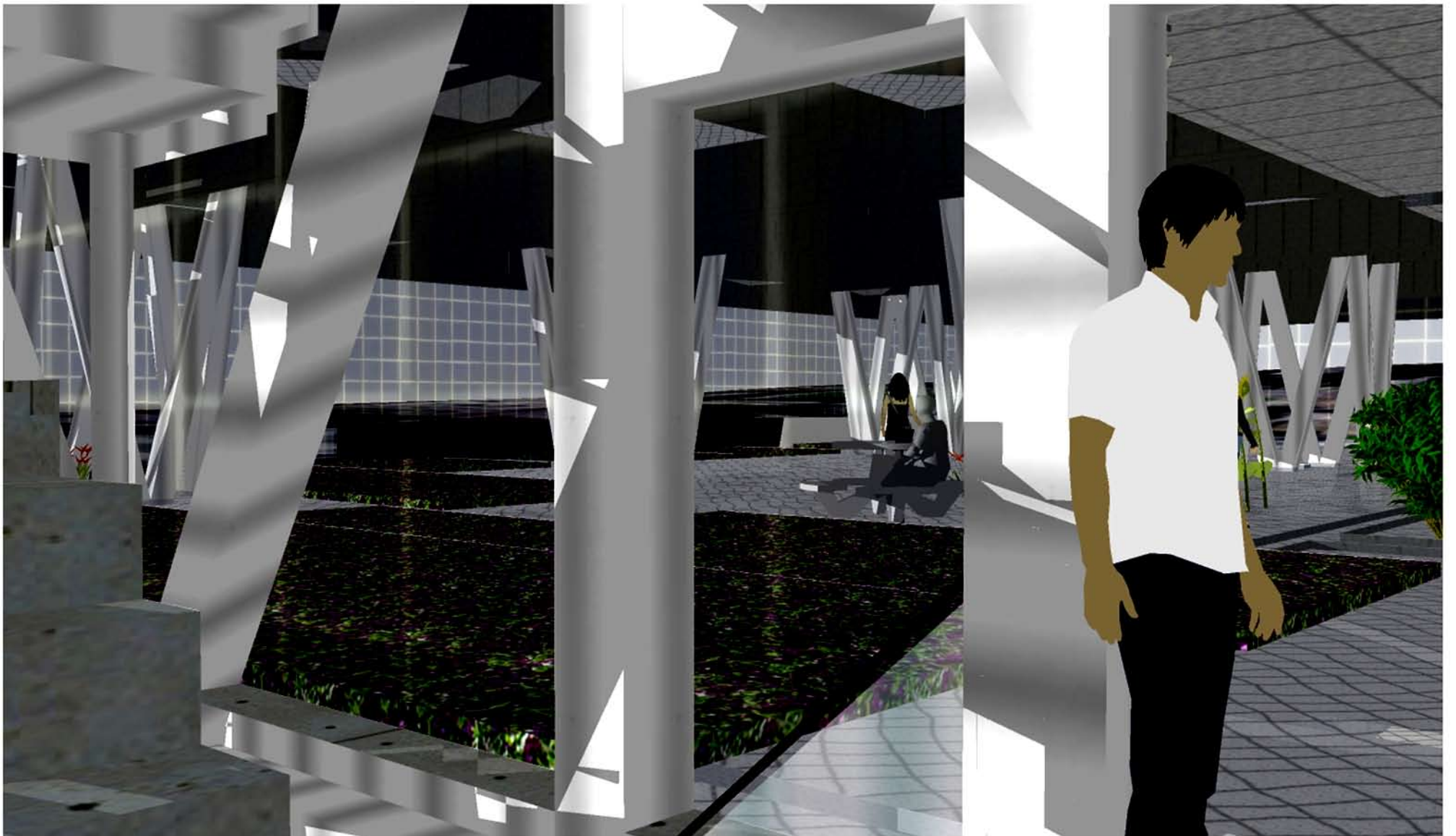
Right: The basic assembly of the building contains a kit of parts, 4 storey pre-assembled columns, floor slabs, and a glazed shell membrane. (seen here: columns and floor slab.)

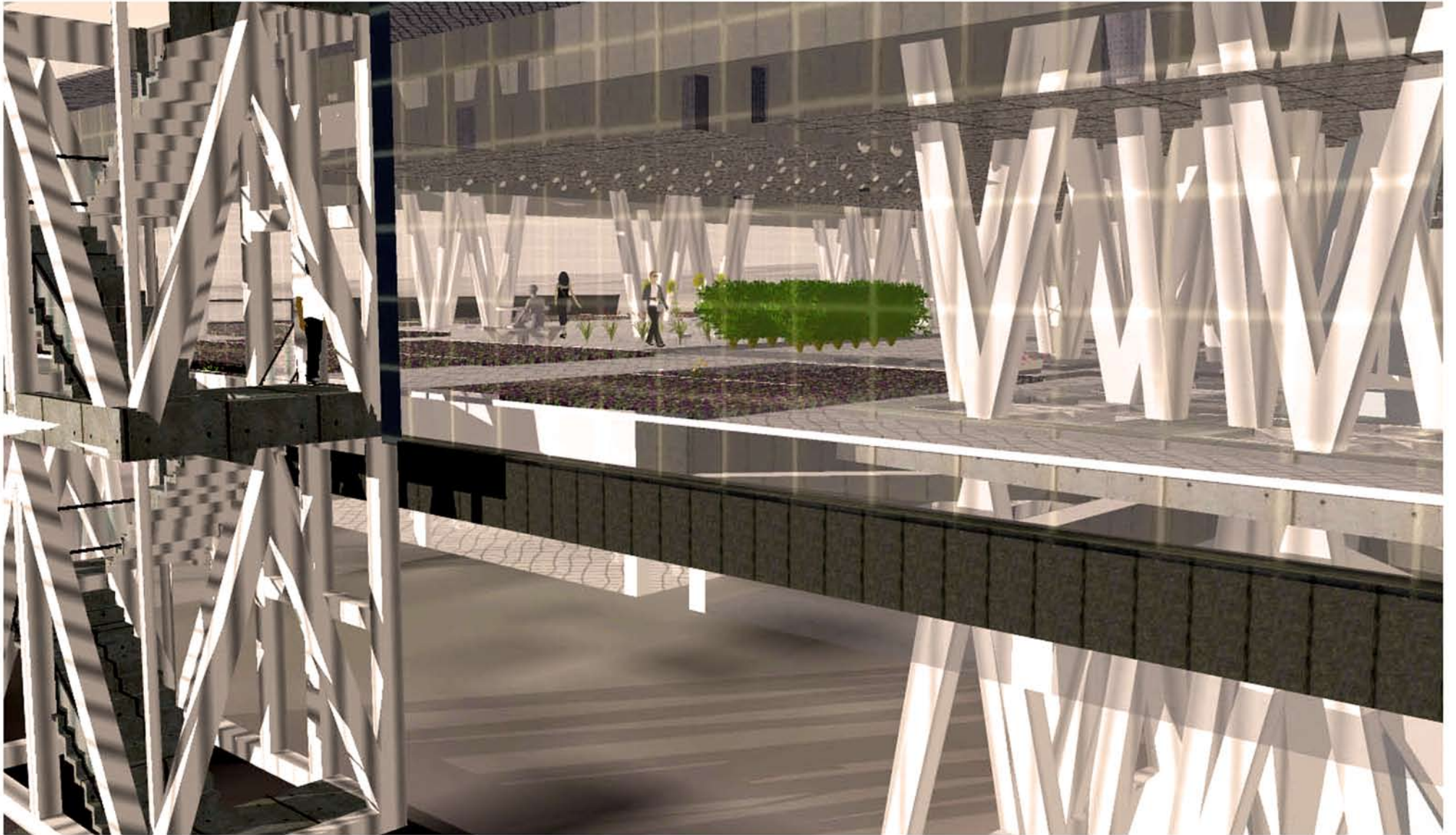




Workers on the inside, cultivate and water produce. The space feels overtly tall. To contrast that, moveable ceiling tiles are operated to make the work space's ambiance more suitable for human occupancy. These tiles may open just enough to emit light favorable to the workers needs.

As one approaches the stairs at 6pm on the second floor, the columns, are large, and support a great deal of plant materials. The glass is tinted to darken from the outside, only allowing the best rays of light, conducive to plant growth to permeate.





Here, the gardening area near the exterior firestair. The building is concrete and steel, with a machine operated moveable suspended sealing components that contain built-in lights. The glazing sits outside the structure and floors, acting as an independently supported shell membrane. The gardening area intentionally has no walls. The columns though static, appear to grow from within, and give the space energy by allowing light to pass through at various times of day.

FIGURES:

Fig. 1.1

“Locavore Fantasia.” Courtesy of WORKac. Artists Dan Wood & Amale Andraos, Vertical farm concept. Accessed November 2009. http://gnosticminx.blogspot.com/2009_07_01_archive.html

Fig. 1.2

Jacob, Chris. “Vertical Farm blog.” Accessed December 2009. <http://www.farmvertical.com/>

Fig. 1.3

“La Tour Vivante.” Courtesy of Atelier SOA Architects. Accessed January 2010. <http://www.verticalfarm.com/designs>

Fig. 1.4

Blake Kuresek, VFP, Accessed January 2010. <http://www.verticalfarm.com/designs>

Fig. 1.5 [public domain]

“American Gothic.” Painter Grant Wood, 1930. Art Institute of Chicago, oil on beaverboard.

Fig. 1.6 [public domain]

Dnr.state.md.us. “Impervious Surfaces. Paving the Bay.” Envirocast National Environmental Education & Training Foundation and the Center for Watershed Protection, February 2002. v1n4, September 2010.

Fig. 2.1

Associated Press Photo by Beбето Matthews; article written by Alan Portner. “Obama speech at Cooper Union may cement passage of financial reform” Examiner.com, April 22, 2010. <http://www.examiner.com/public-policy-in-washington-dc/obama-speech-at-cooper-union-may-cement-passage-of-financial-reform>

Fig. 2.2 & 2.3

Cooper Union’s, The Great Hall. http://library.cooper.edu/archive/foundation_building_frameset.html

Fig. 2.4

Trace sketches over Toyo Ito’s building details for Sendai Mediatheque in Sendai, Japan. Accessed December 2010. http://en.wikiarquitectura.com/index.php/Sendai_Mediatheque

Fig. 2.5

Sendai Mediatheque, Gallery 4200 6th floor. http://www.shift.jp.org/en/archives/2007/10/sendai_mediatheque.html

Fig. 3.1 [public domain]

Google Earth™ mapping service image of site location, US geological Survey.

Fig. 3.2 [public domain]

Google Earth™ mapping service image of site location, US geological Survey.

Fig. 3.3 [public domain]

Google Earth™ mapping service image of site location, US geological Survey.

QUOTES:

Adams, Henry. The Education of Henry Adams. (p 23).

Aquila, Richard (trans). Arthur Schopenhauer: The World as Will and Presentation. (p 5).

Ching, Francis D. Architecture: Form Space and Order. (p 26).

Dickson Despommier. <http://www.verticalfarm.com>. (p 3).

Jacobs, Jane. The Death and Life of Great American Cities. (p 16).

Latour, Alessandra., ed. Louis I Kahn: Writings, Lectures, Interviews. (p 8).

Routledge and Kegan Paul, (trans.). Merleau-Ponty, Maurice. Phenomenology of perception. (p 17).

Ruskin, John. Selections from the works of Johns Ruskin. (p 7).

Sy Safransky, ed. Sunbeams: A book of Quotations. (p 6).

CREDITS

1. Vallega, Alejandro. Heidegger and the Issue of Space: Thinking on Exilic Grounds. (p 35-36).
2. Poincare, Henri. Science and Method. (p 93-117).
3. Kennedy DP, Gläscher J, Tyszka JM, Adolphs R (2009). "Personal Space Regulation by the Human Amygdala." Nat Neurosci 12 (10): 1226–1227.
4. Kent, Susan. Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study.
5. Robinson, A.H. et al. Elements of Cartography.
6. "spatial." Merriam-Webster Dictionary. 2005.
7. Aiello, John R. and Donna E. Thompson. "Personal Space, Crowding and Spatial Behavior in a Cultural Context." (p 107-178).
8. Ching, Frank. Architectural Graphics. (p 49-51).
9. Carmona, Matthew. Et al. Public Places Urban Spaces.
10. Gay, Peter. The Enlightenment: An Interpretation.
11. Long, George (trans). The Meditation of Marcus Aurelius. Digireads.com
12. Wheeler, John. ABC Show online, 2011. <http://www.abc.net.au/rn/scienceshow/stories/2006/1572643.htm>
13. Dickson Despommier. The Vertical Farm: Feeding the World in the 21st Century.
14. Kuang, Cliff. "Farming in the Sky." <http://www.popsoci.com/cliff-kuang/article/2008-09/farming-sky?page=1>
15. Dnr.state.md.us. "Impervious Surfaces. Paving the Bay." September 2010.
16. Salisbury, Frank B. & Cleon W. Ross. Plant Physiology.
17. Morgan, Hicky. (Trans.) Vitruvius Pollo, The Ten Books of Architecture. (p 20).
18. Giovanni R. F. Ferrari, ed. Tom Griffith (Trans). Plato's The Republic. (p 82-86).
19. Richards, Brent. New Glass Architecture.
20. Olson, Sherry. Baltimore: The Building of an American City.
21. Priestly, H.A. and Davey, B.A. Introduction to Lattices and Order.
22. Bachelard Gaston, and Mary Jones. The Formation of the Scientific Mind.
23. Shellens, M.S. "Aristotle on Natural Law." Natural Law Forum 4, 1959.
24. Ching, Francis D. Architectural Graphics, 5th ed. (p 208).
25. Barnes, Jonathan. The Cambridge Companion to Aristotle. (p 27).

- Adams, Henry. The Education of Henry Adams. Boston: Houghton Mifflin Co., 1918; Bartleby.com, 1999.
- Aiello, John R. and Donna E. Thompson. "Personal Space, Crowding and Spatial Behavior in a Cultural Context." Altman, Rapoport and Wohlwill, 1980. (p 107-178).
- Aquila, Richard (trans). Arthur Schopenhauer: The World as Will and Presentation. New York: Longman Library, 2008. (p 32).
- Bachelard Gaston, and Mary Jones. The Formation of the Scientific Mind. Clinamen Press Limited, August 2006.
- Barnes, Jonathan. The Cambridge Companion to Aristotle. NY: Cambridge University Press, 1995.
- Branch, Mark Alden., Piedmont-Palladino, Susan. Devil's Workshop: 25 Years of Jersey Devil Architecture. NY: Princeton Architectural Press, 1997.
- Carmona, Matthew. Et al. Public Places Urban Spaces. MA: Architectural Press, 2003.
- Ching, Francis D. Architectural Graphics, 5th ed. Hoboken NY: John Wiley and Sons, 2009. (p 49-51, 208).
- Ching, Francis D. Architecture: Form Space and Order. Hoboken NJ: John Wiley and Sons, 2007.
- Dickson Despommier "The Vertical Farm: Feeding the World in the 21st Century." New York: St. Martins Press, 2010.
- Diner. Dir. Barry Levinson. 1982.
- Dnr.state.md.us. "Impervious Surfaces. Paving the Bay." Envirocast National Environmental Education & Training Foundation and the Center for Watershed Protection, February 2002. v1n4, September 2010.
- Future by Design. Dir. W. Gazecki. Perf. Jacque Fresco. Docflix, 2006.
- Gay, Peter. The Enlightenment: An Interpretation (v2). New York: W. W. Norton & Company, 1995.
- Giovanni R. F. Ferrari, ed. Tom Griffith (Trans). Plato's The Republic. Cambridge: Cambridge University Press, 2003. (p 82-86).
- Jacobs, Jane. The Death and Life of Great American Cities. New York: Random House, 1992.
- Kennedy DP, Gläscher J, Tyszka JM, Adolphs R (2009). "Personal Space Regulation by the Human Amygdala." *Nat Neurosci* 12 (10): 1226–1227.
- Kent, Susan. Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study. MA: Cambridge University Press, 1993.
- Kuang, Cliff. "Farming in the Sky." *Popscience Magazine*. pub. September 4, 2008. accessed October 2009. <http://www.popsci.com/cliff-kuang/article/2008-09/farming-sky?page=1>
- Latour, Alessandra., ed. Louis I Kahn: Writings, Lectures, Interviews. New York: Rizzoli International, 1991. (p 75-76).
- Long, George (trans). The Meditation of Marcus Aurelius. Digireads.com 2005
- Mathews, Stanley. From Agit-prop to Free Space: The Architecture of Cedric Price. London: Black Dog Publishing, 2007.
- Mishima: A Life in Four Chapters. Dir. Paul Schrader. Perf. Ken Ogata. Zoetrope Studios, 1985.
- Morgan, Hicky. (Trans.) Vitruvius Pollo, The Ten Books of Architecture. Cambridge: Harvard University Press, 1914. (p 20).
- Olson, Sherry. Baltimore: The Building of an American City. MD: Johns Hopkins University Press, 1997.
- Poincare, Henri. Science and Method. New York: Cosimo Inc, 2009 (p 93-117).
- Priestly, H.A. and Davey, B.A. Introduction to Lattices and Order. New York: Cambridge University Press, 2002.
- Richards, Brent. New Glass Architecture. Connecticut: Yale University Press, 2006.
- Robinson, A.H. et al. Elements of Cartography. 6th ed. New York: John Wiley & Sons, 1995.
- Routledge and Kegan Paul, (trans.) Merleau-Ponty, Maurice. Phenomenology of Perception. New York: Routledge Classics, 2002. (p 284).
- Ruskin, John. Selections from the Works of Johns Ruskin. New York: John Wiley & Sons, 1884. (p 465).
- Salisbury, Frank B. & Cleon W. Ross. Plant Physiology, 4th ed. California: Wadsworth Publishing, 1992.
- Shellens, M.S. "Aristotle on Natural Law." *Natural Law Forum* 4, 1959.
- "spatial." Merriam-Webster Dictionary. 2005.
- Sy Safransky, ed. Sunbeams: A book of Quotations. Berkeley CA: The Sun Publishing Company, 1990. (p 37).
- Vallega, Alejandro. Heidegger and the Issue of Space: Thinking on Exilic Grounds. Pennsylvania: The Pennsylvania State University Press, 2003. (p 35-36).
- Wheeler, John. ABC Show online, 2011. accessed March 2010. <http://www.abc.net.au/rn/scienceshow/stories/2006/1572643.htm>