

a house on Tee street

Kristin Powers

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

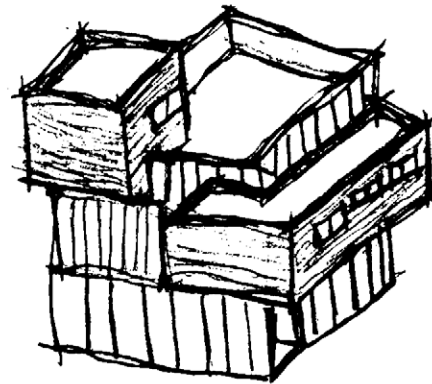
Master of Architecture.

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Abstract

“All architecture is shelter. All great architecture is the design of space that contains, cuddles, and exalts or stimulates the persons in that space.”

-Phillip Johnson

Combining both roof and shelter into one creates several design opportunities for a small house for college students living in Blacksburg, VA. The roof will serve many purposes, including structure, rain water collection, and inhabitable space. The house has two volumes overlapped into a large cubic volume to create different spaces which can be reached through overlapping stairs leading to the different levels of the house.



To those we lost during the tragedy at Virginia Tech

Acknowledgements

I would like to thank my professors, my family, and my friends in studio. You have all been very supportive as I pursued an education in design.

A special thanks to my friends and colleagues from Riva; you made all of the hard work worth it!

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“The greater danger for most of us lies not in setting our aim too high and falling short, but in setting our aim too low and achieving our mark.”

-Michelangelo

Introduction

“Space, light, and order. Those are the things that men need...”

-Le Corbusier

A growing college town located in southwest Virginia is in need of dwellings for future students, whether apartment, townhouse, or house. This work is focused on using overlapping geometries to create space which in turn harmoniously unifies the different parts. Modulation of light is also instrumentally engaged towards this end. Diffused light is prominent in the public, more open spaces, like the family room, while more direct light is used in the bedrooms.

The exploration of the design of this small building will include the study and implementation of “sustainable and green” architecture practices. The house collects rainwater from the roof, uses natural day lighting and ventilation, and can be built using many renewable materials.



House on site

Site

Blacksburg, Virginia

“Always design a thing by considering it in its next larger context—a chair in a room, a room in a house, a house in an environment, and an environment in a city plan.”

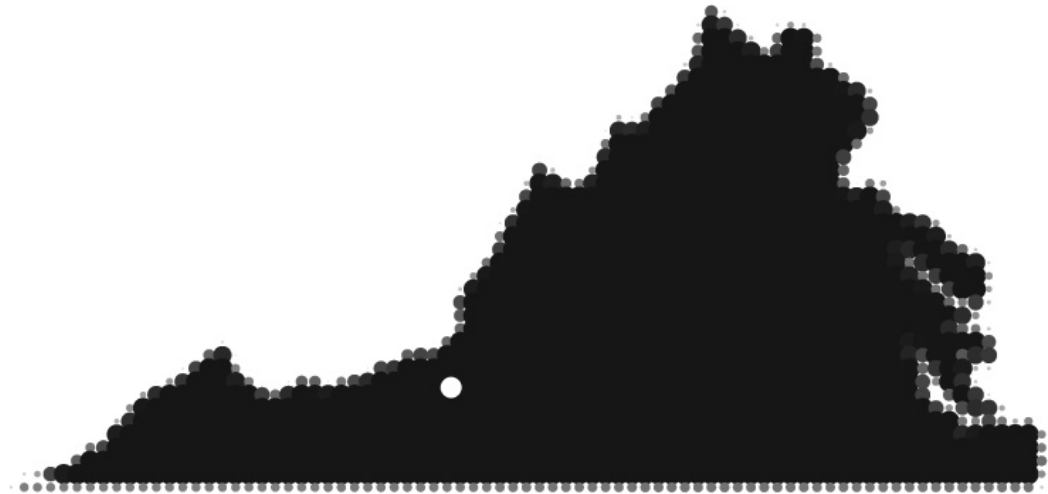
-Eliel Saarinen

Blacksburg is located in southwest Virginia’s New River Valley, between the Appalachian and Allegheny Mountains. The town’s population of 43,000 includes more than 26,000 college students attending Virginia Polytechnic Institute and State University. Over 50% of the residents in Blacksburg are between the ages of 20-34, and this number is growing, as the university grows each year, increasing the need for more student housing.

The site of the house is a little less than two miles from the downtown and adjacent campus. This allows the residents to easily get around town by walking, bike, or bus,



View of Blacksburg from Brush Mountain



Map of Virginia showing Blacksburg as the white dot

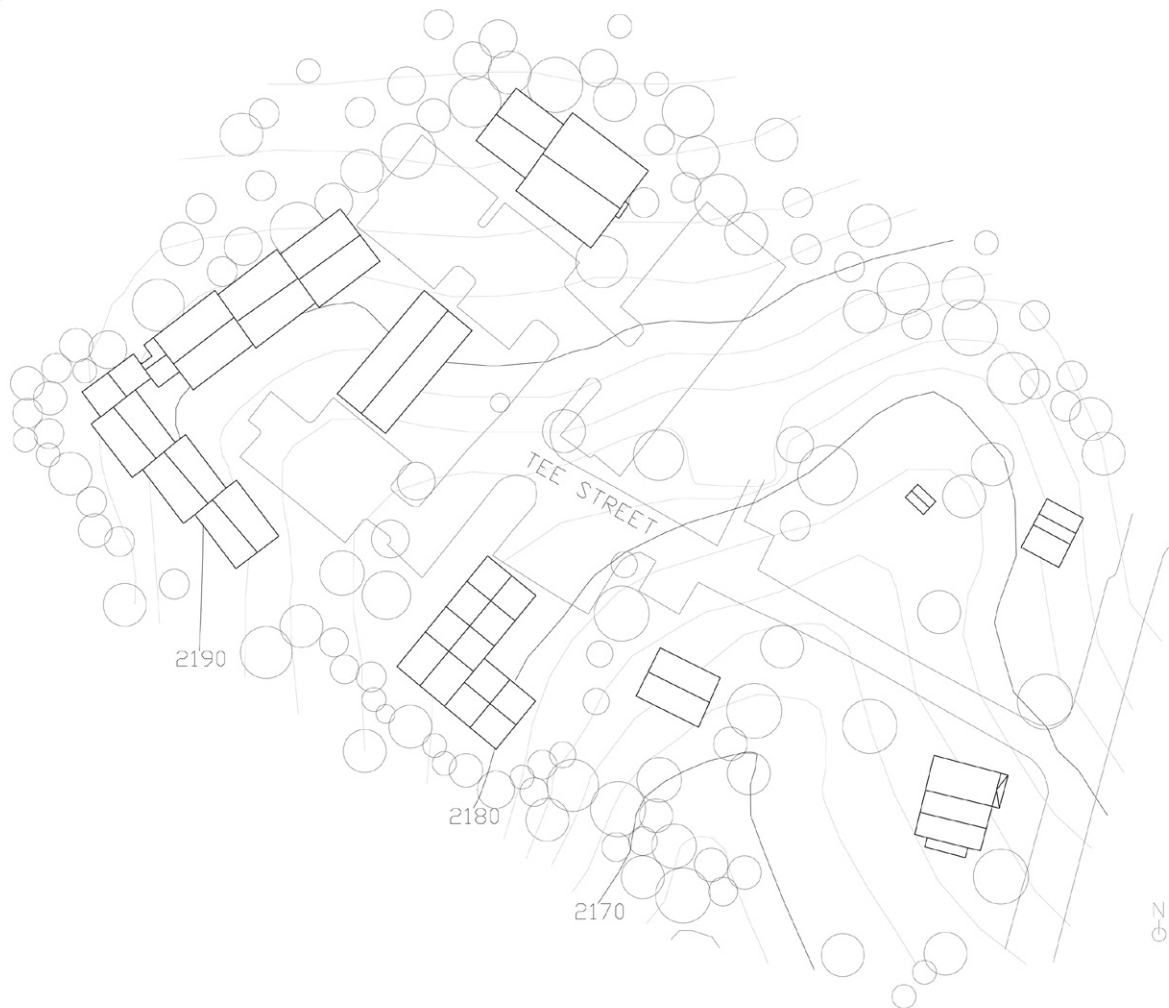


Downtown Blacksburg and adjacent Virginia Tech campus

instead being dependent on a car. Just a short drive from Blacksburg is the New River and the Appalachian Trail, keeping many students involved in outdoor activities such as hiking, backpacking, rock climbing, spelunking, and kayaking.

Blacksburg is a small town with a large university at its center. The downtown is on the eastern side of the campus and has a bi-weekly farmer's market, where local farmers sell their seasonal goods. The local restaurants and merchants host several events throughout the year like the International Fair, Stepping Out, and pep rally's for Virginia Tech's football team. During these events the streets are closed to cars, so the community can come together to enjoy food, music, and arts.





Site map

Tee Street

Tee Street is not just another college student neighborhood in Blacksburg; it's a community. There is a variety of housing on Tee Street, including apartments, townhouses, and single family homes. The neighborhood is surrounded by trees, with most of the housing facing inwards, forcing all of the residents to interact on a daily basis as they come and go from their homes.

In the center of the neighborhood is a large, five bedroom house, known as the "Center House" which traditionally has been the center of the social scene in the neighborhood hosting casual weekend cook-outs or the latest holiday party. Behind the Center House is a well-kept horse shoe pit, where most of the neighborhood interaction takes place on a nice sunny day. There is a community laundry room located in the western corner of the neighborhood and an open lot on the eastern corner of the

neighborhood. Adding another house in this location, specifically designed for students, will help to complete the circle around the “T-intersection” and Center House and set an example in Blacksburg of well designed student housing.

Currently, the choices for housing for college students include on-campus dormitories or one to four bedroom apartments, townhouses, and small single family homes throughout the town. The main problem with the design of these buildings is that the student is usually not in mind when designing the floor plan. There is usually a difference in the size of the bedrooms, causing problems with roommates about who gets the big room or the room with its own bathroom. Inadequate closet and storage space is always a problem in most college student housing in the Blacksburg area. There is also no thought given to how a student lives in the difference in public and private spaces, which can cause further tension among roommates.



The site



Existing buildings on Tee Street



Images of Tee Street



a house on Tee street

The House

"I believe that the way people live can be directed a little by architecture."

-Tadao Ando

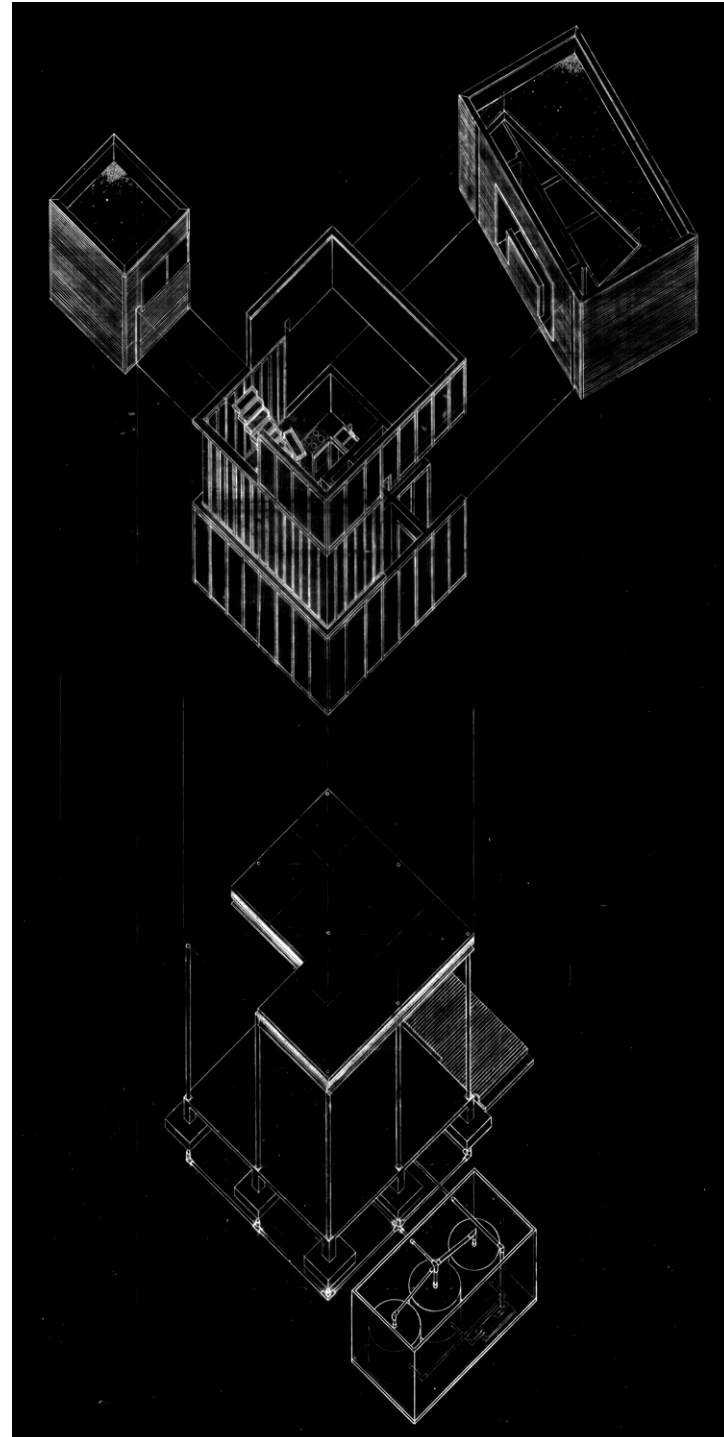
The house is approached from the southeastern side where the outdoor porch is located. The first floor is the most public space in the house with a large, open to the second floor, living and dining area. Connected to that is the kitchen, a large closet, and small bathroom. The stair leads to the second floor where a separate volume holds the two bedrooms and shared bathroom, all facing towards the east to take advantage of the morning sun. Up the next flight of stairs leads to the third floor where there is a small space intended to be used as a library, office, or studio space. There is also an outdoor roof terrace to serve as entertaining space, an alternative place to eat, or just hang out on during warm summer nights.

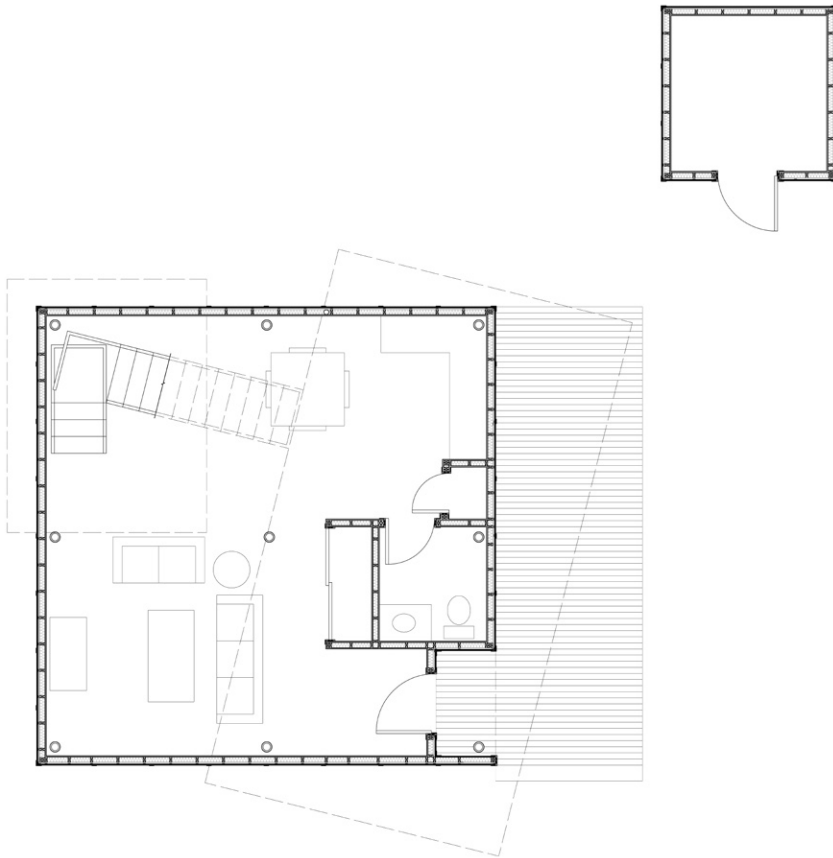


House on site

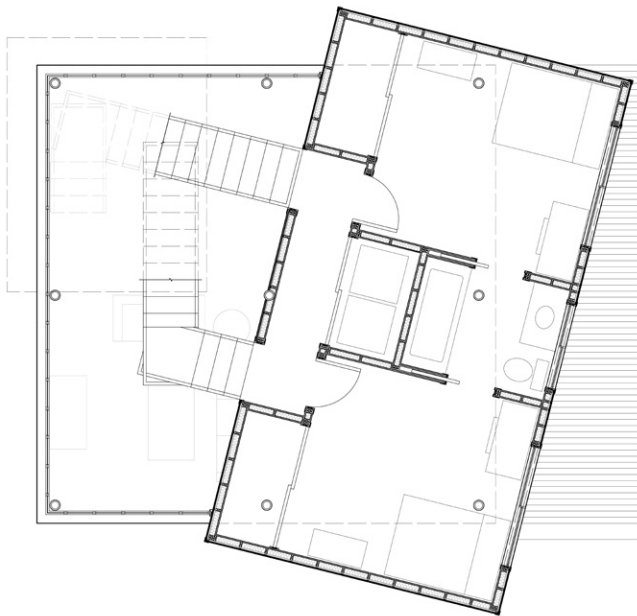
The house can be constructed with a combination of pre-fabrication and also by building on site. The two volumes that are inserted into the main cubic space will be constructed off-site in a factory. The facade of these buildings will be a natural wood siding, allowed to weather over time. These volumes will be made of a stressed-skin construction, similar to an airplane wing. The wood frame will be laterally supported by a plywood covering on the internal and external walls. Once these are connected to the steel frame on-site, the main cubic volume can be built around the pre-fabricated parts of the building. This space will be made of plywood board and batten.

The steel columns that hold up the concrete flooring on the third floor roof terrace, are sized larger than structurally necessary steel, so there is room to place PVC piping inside each column to collect rainwater in three large cisterns that are buried underground. The grey water is then filtered to be used for an outdoor garden, washing cars, toilets, or doing the laundry.

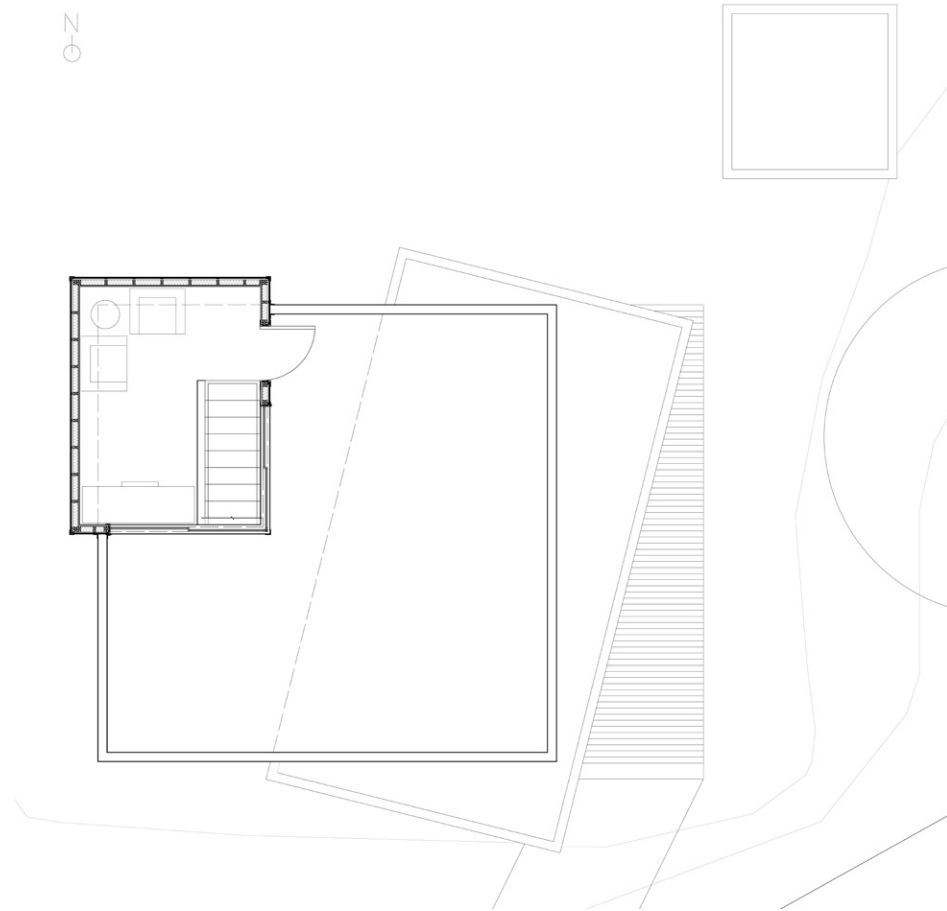




First floor plan



Second floor plan



Third floor plan

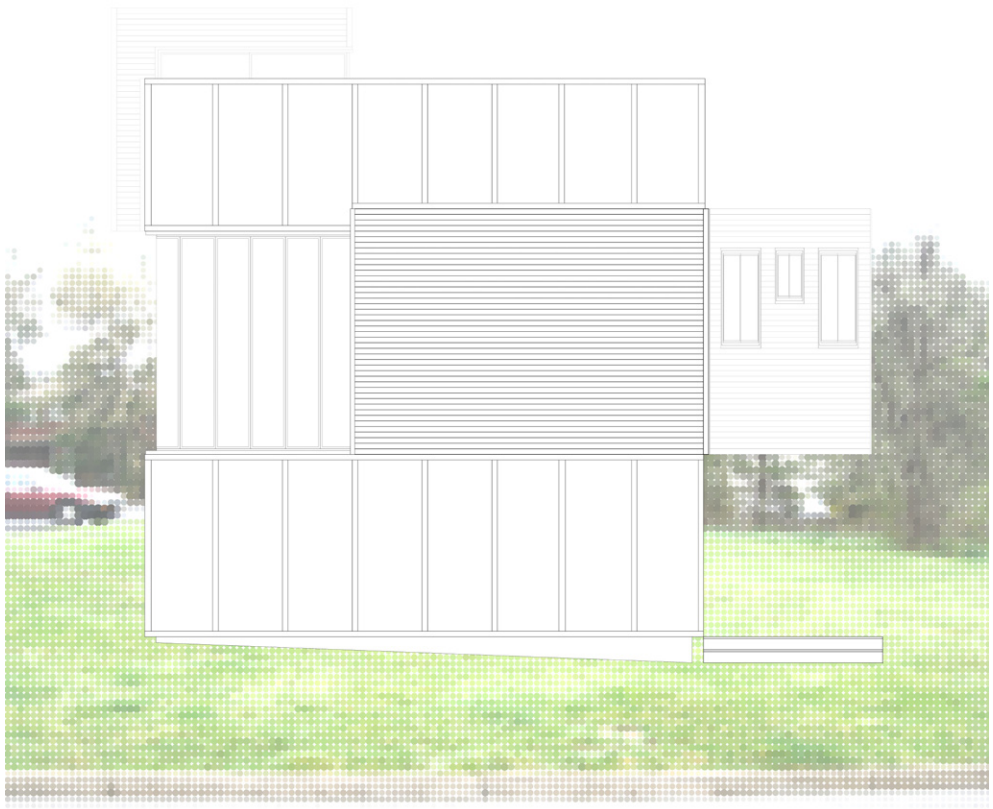
Each floor of the house has different spaces to be used by two student occupants. The main living area is on the first floor and is the most public space in the house. With such a small footprint for the house (25 ft. by 25 ft.), this space was left open to the third floor, allowing for a ceiling height of 18 ft. and large frosted glass windows, making this room seem larger. The second floor is the most private space holding the two bedrooms of the same dimensions and a shared full bathroom, which can only be reached by going through one of the two bedrooms. There is also a large closet on this floor for storage and a washer and dryer. The one room on the third floor is large enough to be used as a small office, library, or studio space, but too small to be another bedroom. This is the most semi-private space in the house, since it is the only way to access the outdoor roof terrace. There is also a small shed located on the northeast corner of the site for added storage space for the students to store bikes, canoes, camping gear, outdoor tools, etc.



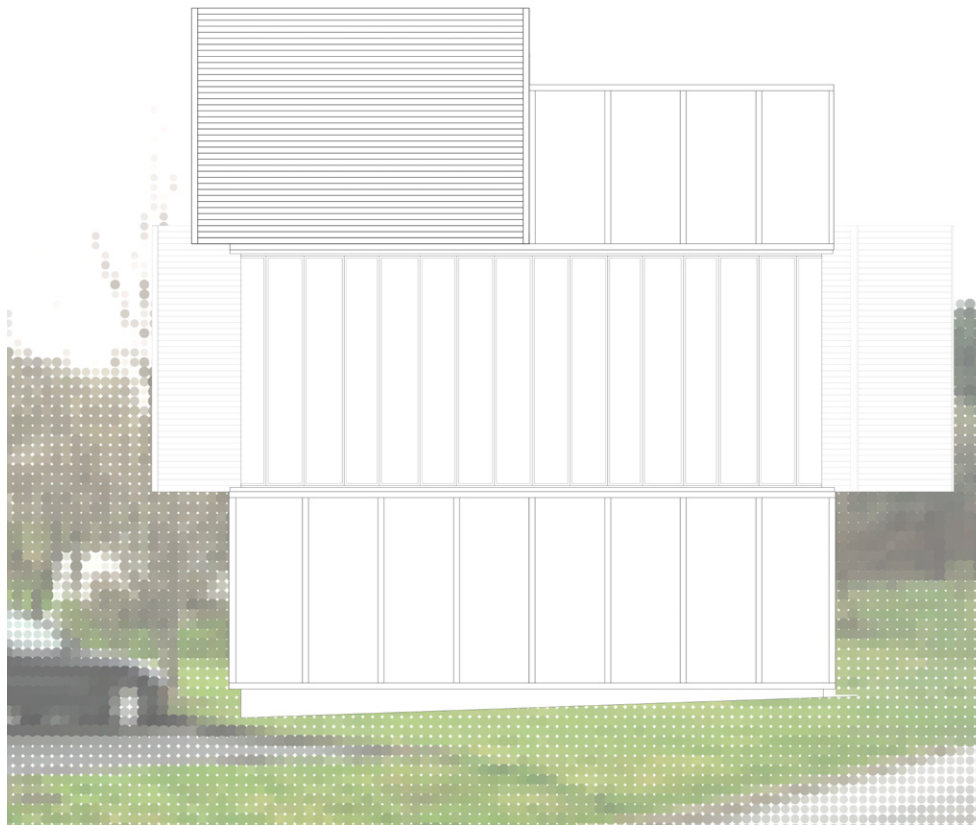




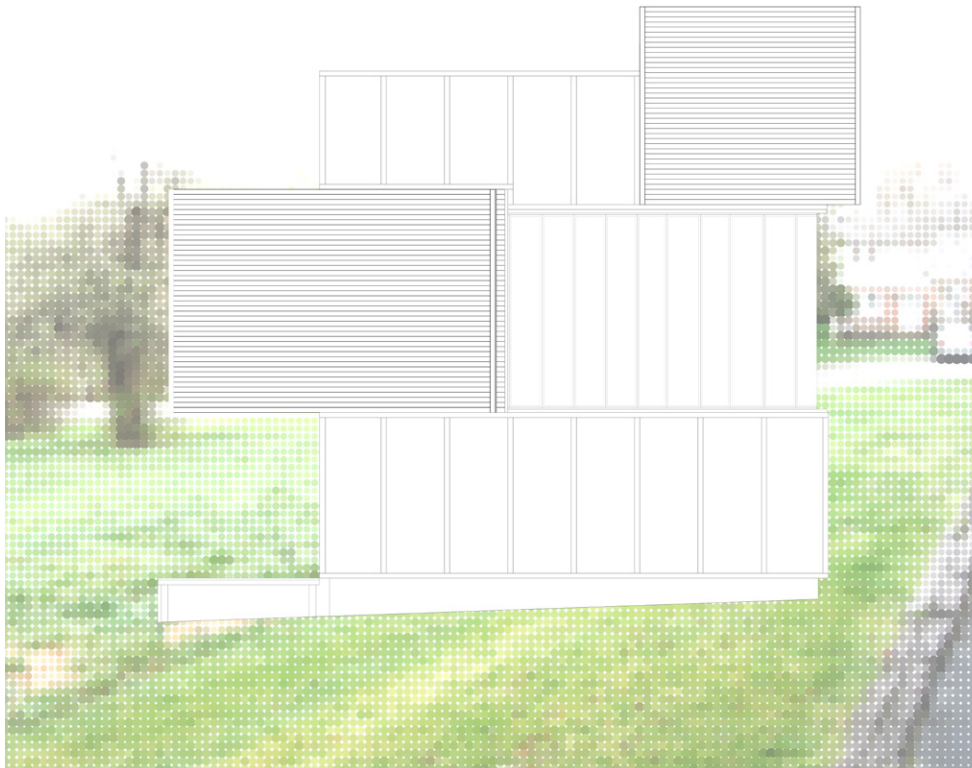
East Elevation



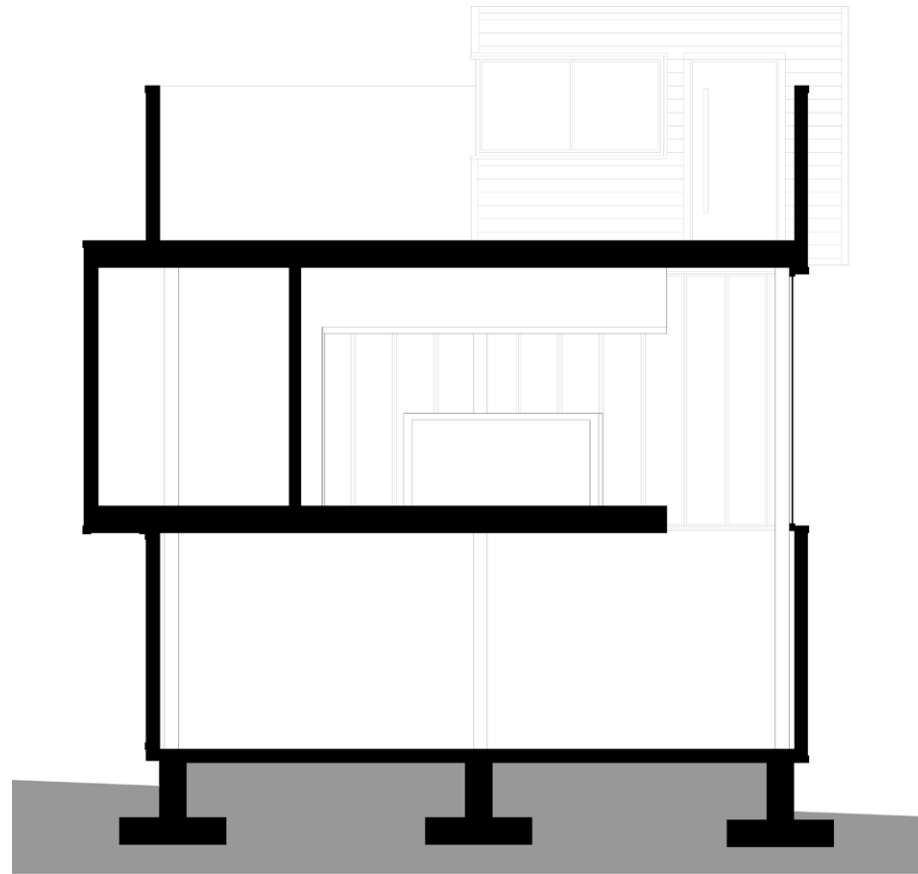
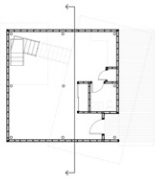
South Elevation



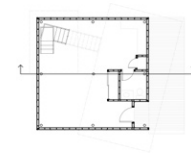
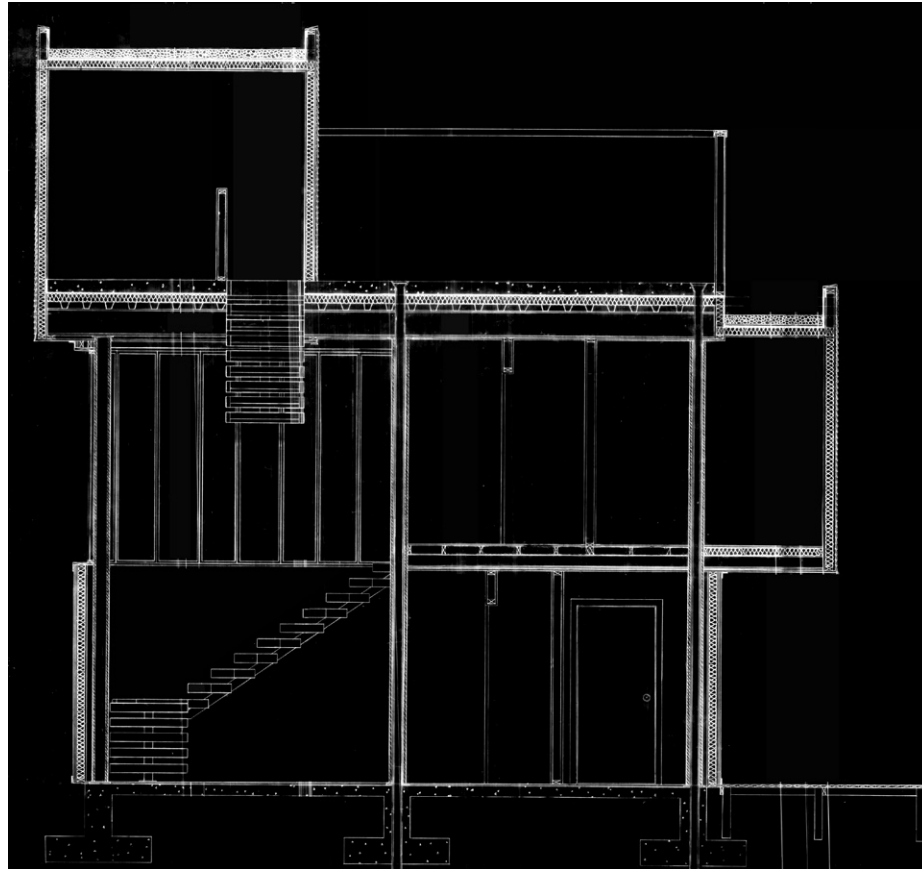
West Elevation



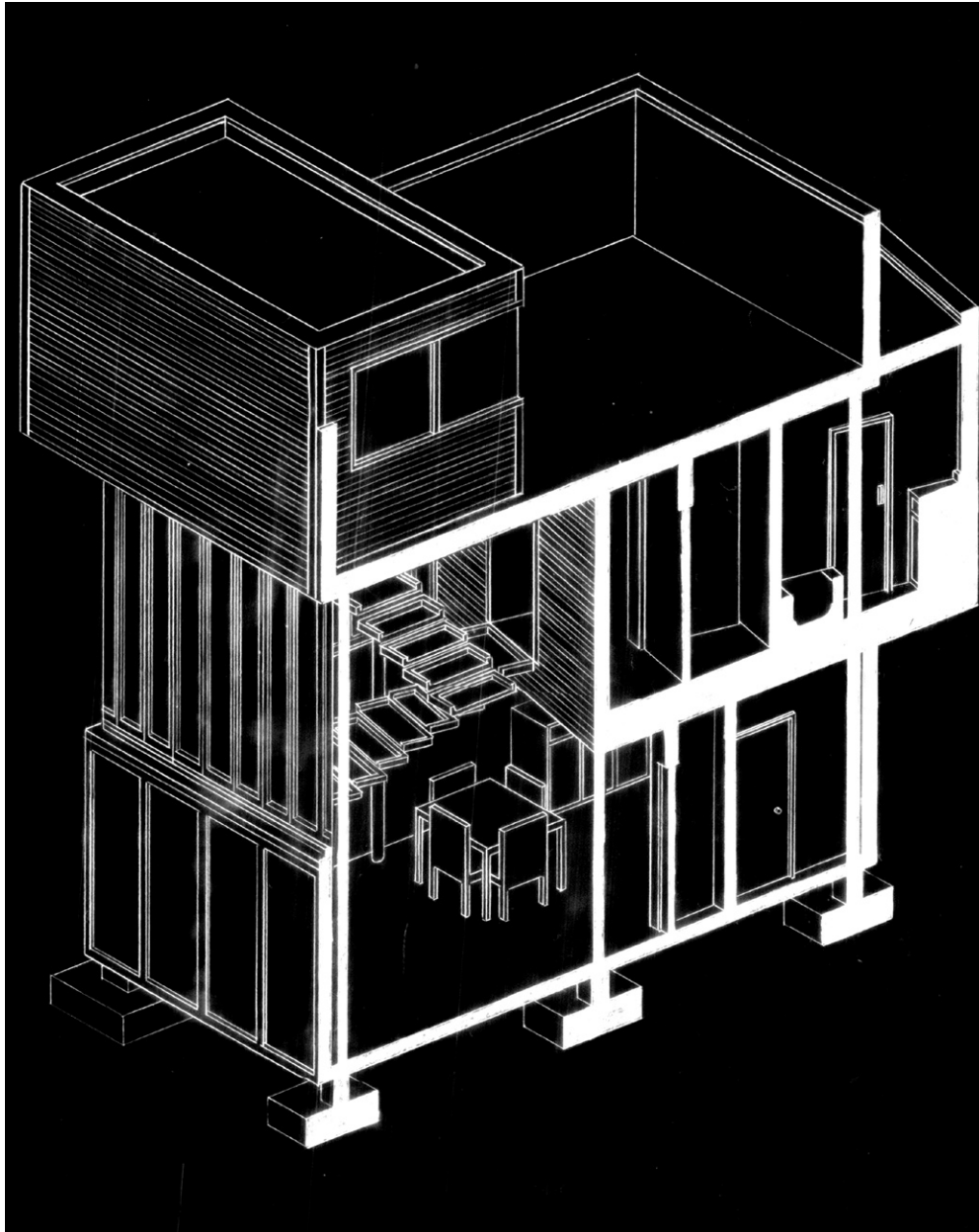
North Elevation



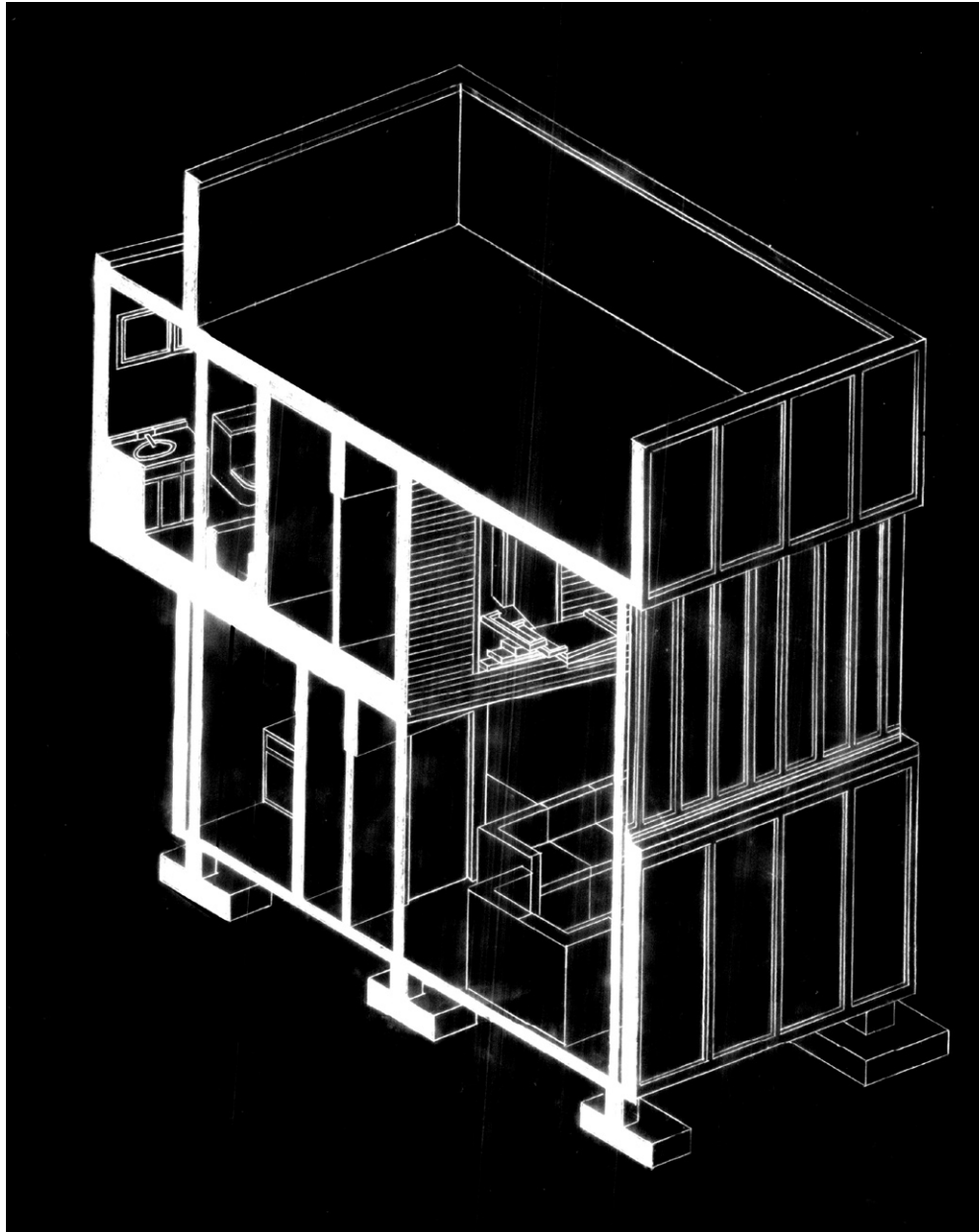
Section



Detailed section



Bisected axonometric drawing



Bisected axonometric drawing



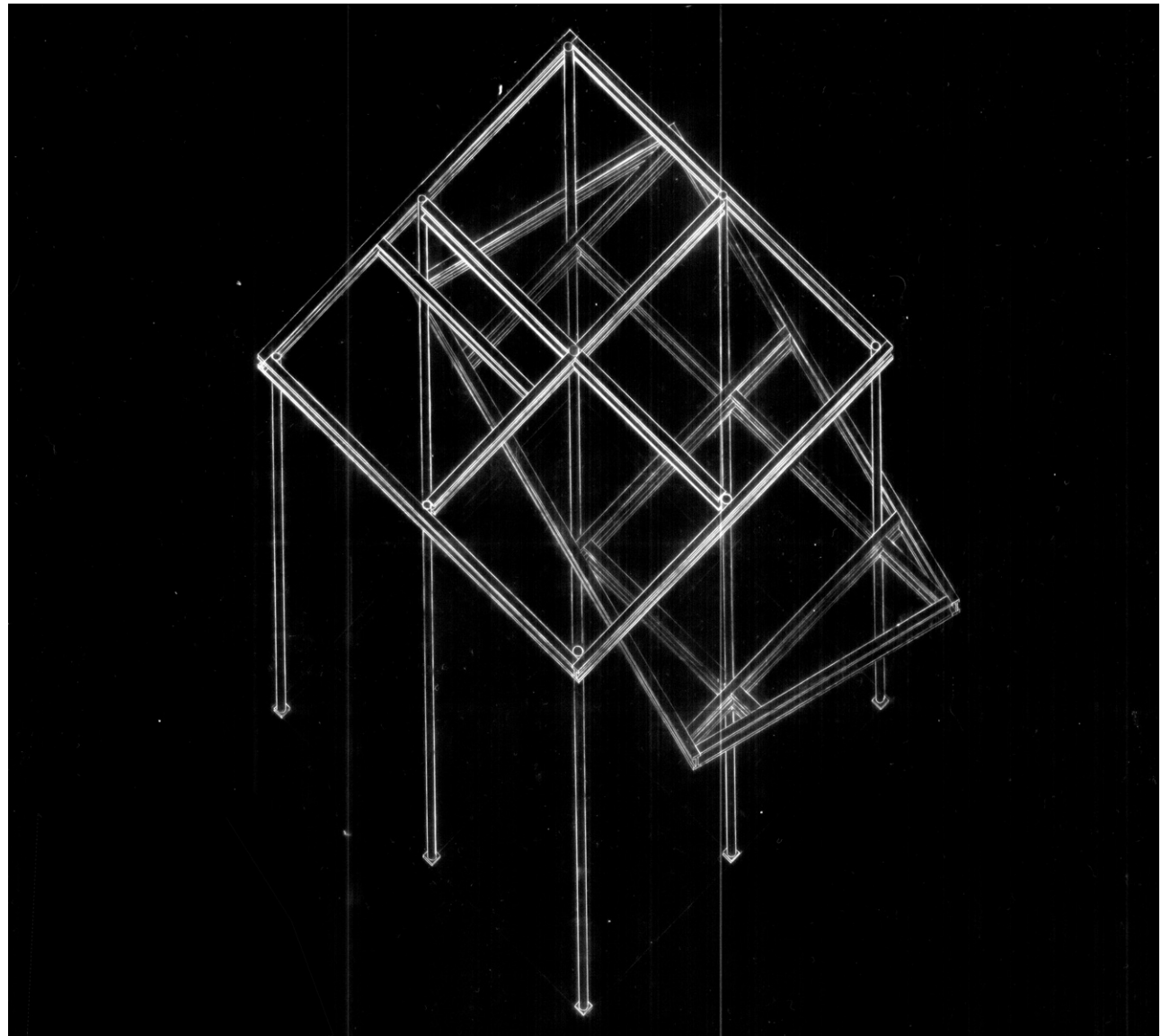


Structure

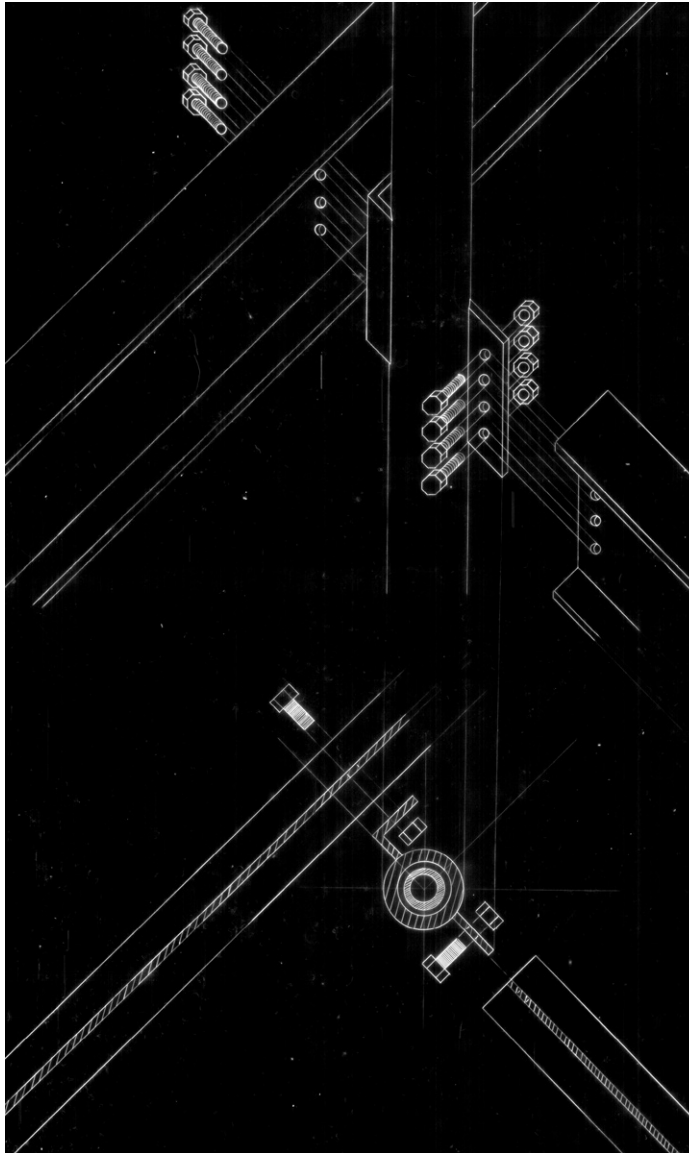
“Consider the momentous event in architecture when the wall parted and the column became.”

-Louis Kahn

The main structure of the building is made of steel I-beams and nine hollow steel columns. Steel brackets will be welded off-site to the columns, so there is a connection place for the I-beams. The I-beams will be connected to the welded brackets on the columns with large bolts, as shown in the detailed axonometric drawing.



Axonometric of steel framing

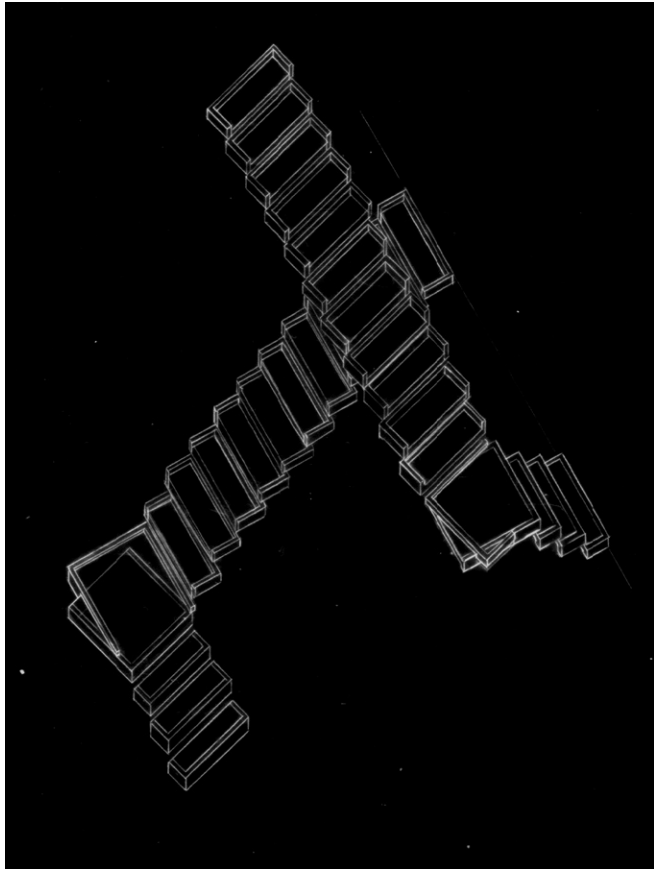


Axonometric detail of steel connections

Stairs

In keeping with the idea of overlapping geometries, the stairs are designed to also overlap in their geometries at the landing. The stairs that lead from the first floor to the second floor will start parallel to the cubic space, then turn to be perpendicular to the angled second floor volume. This change in the geometry is most vividly expressed at the landing. The second flight of stairs is the opposite of the first. It starts out perpendicular to the second floor geometry and then changes at the landing to be parallel to the cubic space. The stairs are made of solid wood and are supported by a steel beam beneath.





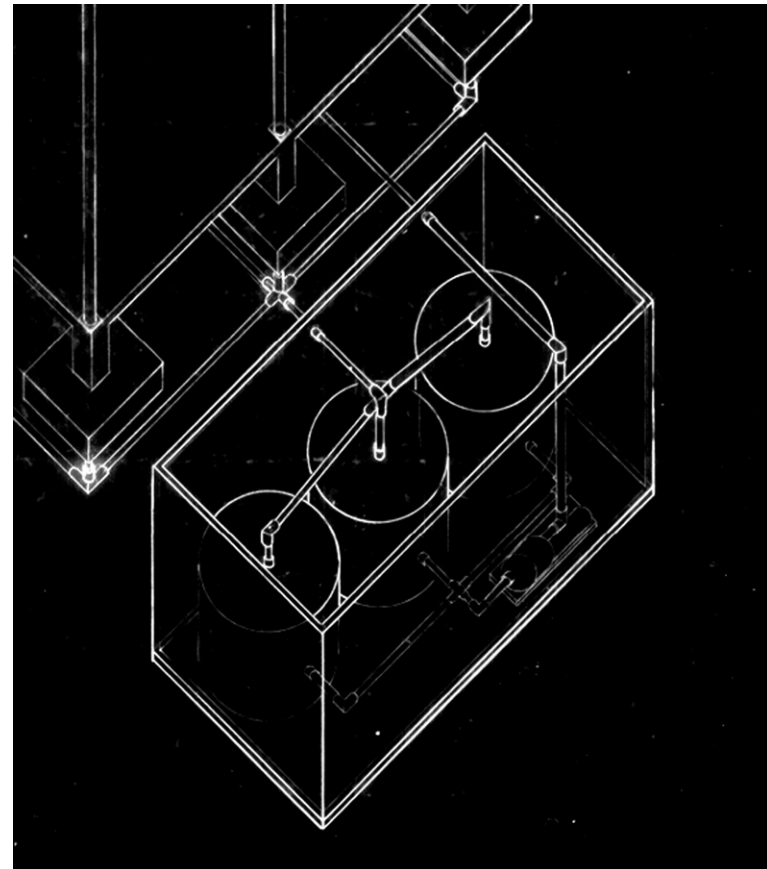
Axonometric of sairs

Sustainability

“Architecture is the triumph of human imagination over materials, methods, and men, to put man into possession of his own earth.”

-Frank Lloyd Wright

The house on Tee Street was designed with sustainable architecture techniques including collecting rainwater from the roof, natural day lighting and ventilation, and the ability to be built using many renewable materials. The main cubic volume has large glass windows which can be opened to allow for natural ventilation by catching the cross breezes in the main living area. These large windows are frosted glass to allow for the use of natural lighting during the day, without the glare of direct sunlight. Since most of the building is made of wood, which is a renewable resource, it can be either re-claimed wood or certified sustainable harvested wood.



Axonometric of underground cisterns

Conclusion

A house on Tee Street is more than just another house in Blacksburg, it's a model home for future student housing. Through overlapping geometries, the spaces in the house become more dynamic than just an ordinary college dorm or apartment allowing for the student inhabitants to fully engage in the building. The house addresses the way a college student lives and also sustainable architecture techniques.



References

Blau, Eve and Troy, Nancy. Architecture and Cubism. Montreal: Canadian Center for Architecture, 1997.

Boesiger, W. and Stonorov, O. Le Corbusier Oeuvre complete de 1910-1929. Zurich: Grisberger, 1937.

Le Corbusier. My Work. London: The Architectural Press, 1960.

Smith, Peter. Architecture in a Climate of Change. Oxford: Architectural Press, 2005.

Wilhide, Elizabeth. Eco An Essential Sourcebook for Environmentally Friendly Design and Decoration. New York: Rizzoli International Publications, Inc., 2002.

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