Rethinking of the Boundary between Architecture and Urban Public Space

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ABSTRACT

Throughout the architecture history, the definition of architecture has been shifted from "enclosed, worshipful" by encircling confined space to "open, interactive" by building up the urban atmosphere in every aspect (function, space, circulation). The boundary between architecture and urban public space has become more obscure, and the crucial change should be attributed to the moment when architects realize the importance of the relationship between architecture and urban public space.

This paper is focusing on the discussion between architecture and public space, with five different projects, in five different sites. As the function, user group, cultural background, and location changes through sites, the complexity within a city/ an architecture rises, especially in the shared zone (public space). The urban public space is born for the public; therefore, the public space follows the public's activities and movements — sometimes it is created according to how people move through a city between all the infrastructures, sometimes it just grows within a building spontaneously, and sometimes it could happen in the void space in between buildings, or the architecture itself becomes the public space. In most cases, the public space is the area that can be interpreted by a human with their own emotional attachment, and it can be evolved in various forms and typologies. The paper will introduce some possibilities of the relationship between architecture and public space.

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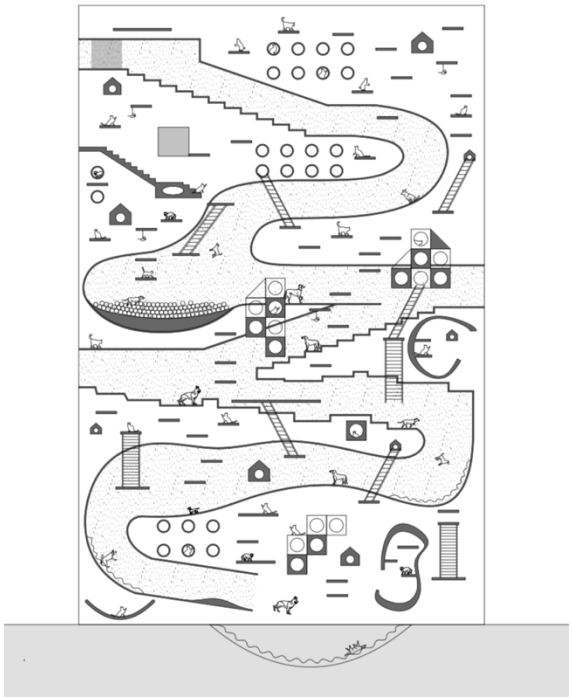
Urban public space usually appeared as an area with clear functions and orderly spatial structures back in the old days, in which the functions did not overlap and the design tended to be more rational. The simple and uniform material space lacked the expression of human emotion, but that used to be the method architects used to avoid the very complexity of designing the public space. This complexity was far beyond the architects' ability to handle. Corbusier's Ville Radieuse was a great blueprint to mask the reality of social condition and human needs: distinct hierarchy of the roads, equal spatial division for the residential area, and well-ordered landscape design. Under Corbusier's utopia, everyone should live like the way as architects designed. Over the next century, Ville Radieuse as a template of urban design had been practiced and criticized over and over, for the reason of concealing the complexity of human ecology.

More scholars started to address the relationship between architecture and urban public space. Jane Jacobs thinks that the essential characteristic of a city is human intervention, which always follows certain paths. Thus, the most vibrant area in a city is the public space. Blurring the boundary between architecture and public space is one way to break the rational structure and to create diversified and multilayered space, which can reflect the internal mechanism between human intervention and spatial organization. This goal can be achieved in multiple ways, and each should be unique to its location, function, users, and local culture. The place for human intervention should not be limited to an open space — it can happen anywhere, in any form of space and locations.

In the Spring 2020 option studio, the project site was given in Hamerkwartier, in the north of Amsterdam. In the Netherlands, there is a large number of families living with pets. By 2018, over 2.6 million pet cats were living in the country. In the city center, the living expense is too high for human living with their pets to afford a large space; and during special moments like the rainy season or the pandemic lock-down when animals have to stick with human all day, there is no way to have high-quality life in a regular old European city apartment. The site given has adequate space for designing some big apartment units containing both human living space and animal's own space, but the story would be too simple without considering the human-pet relationship. Using the dog

as an example — dogs rely heavily on human in their daily life, from eating to showering and being walked, so they are affiliated to human, and human is taking domination in the house. Therefore, everything in architecture is designed based on the human scale. If the story was reversed so that dogs take domination, the building would be designed based on a dog's scale, whose creation of human inaccessibility to most spaces would surely provide dogs with more personal space and freedom. The goal of this project is to go one step further to design a community where humans, dogs, cats, and birds can co-exist harmoniously, so the user group is four species, and the design should be based on four different perspectives and scales.

Since animals' wellbeing is highly dependent on outdoor activities, I have designed a lot of public space for them throughout the building. There, the public space takes the form of the regular movements of each species: cats like jumping around, moving three-dimensionally, hiding in narrow space, so all the cat-walks are mounted on the walls or connected with ladders and stairs; dogs usually move in a straight line, but they can use ramps and slides as passageways to move faster, so dogs' paths in this building are a continuous tunnel, which will bring dogs to the ground floor pool in the end; birds live in the outside world and have the freedom to choose where to nest and lay eggs, so their activities happen at the top of the building within a confined space; human's public space is on the ground floor so that they can walk and observe all the animals in the indoor garden. Each species' public space is defined by their scale and habits, at the same time interweaving with one another, forming a new ecology in the building (human + cat = cat café; human + dog = dog park; dog/cat/human + bird = observatory; cat + dog = arena). Apartment units are inserted in the leftover irregular space. Hence, the public space grows organically inside the architecture and serves some



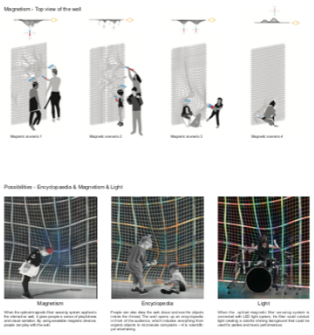
playful purposes for other species beyond humans. (cf. Drawing Index page 13 - 24)

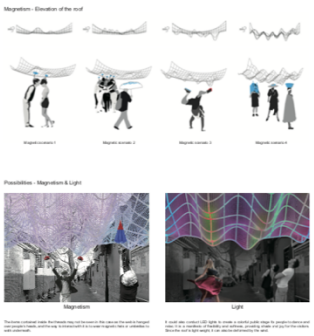
In the 2019 Fall Option Studio, the site was located in a very traditional and nostalgic Asian area. The Zhongxiao Dunhua blocks in Taipei, known by its vibrant neighborhood and "well-formed" illegal structures. The illegality grows three-dimensionally all over the architecture and the public space: all the tubes and wires climbing on the building surface, water tanks and signages being positioned everywhere, window cages growing dramatically and becoming dangerous balcony, people using cloths and plants to claim more public space and illegal aluminum houses on top of buildings. Living in an organized and spacious community may not be the universal tendency, as some people enjoy finding happiness through urban chaos and disorder by adding more elements to the existing condition. The boundary between architecture and public space has vanished, but it forms a unique eco-system that can only happen in that area. Architects sometimes keep questioning the essential living needs and claim the general aesthetics for people's homes but neglect the specificity of the community. I came up with a list of activities and places that appear in Taiwanese daily life: 1. Land-God Temple; 2. Shrimp fishing; 3. Karaoke; 4. Mahjong. 5. After-school tutoring; 6. Taoism fortune teller 7. High school dating 8. Nail salon; 9. Claw machine; 10. Sleeping cell; 11. Convenient store; 12. Dining Car. These are all closely related to Taiwanese culture and habits and could be found in hidden spots, shopping centers, messy streets or public spaces. By designing a building that can fit all these programs in and enables people to visit all of the places at once, an architect can turn it into public

space that holds the local culture and emotion firmly as a container. Due to the area's limitation, programs have to be tightly placed next to one another when arranging the programs on site. The juxtapositions cannot happen randomly: it is an essential way to tell the story, since the order by which a person passes through different programs generates distinct experiences. Though being a building itself, it is at the same time a public space that grows vertically and orderly, a mini-city that continuously goes up with vertical streets. (cf. Drawing Index page 25 - 30)

Architecture and public space sometimes do not have a solid form, but the existence can be cast through other media. In the Summer Architecture and Urbanism studio, my team has designed an interface that can be projected on restaurant facades and interior walls, allowing people who pass by or wait in line to visualize the situation inside a restaurant. The customers can browse the menu, see the real-time scene in the dining area and kitchen, play games, and see the estimated waiting time from the projection. People sitting inside the restaurant can interact with people who are waiting outside by playing games, and they can see the real-time scene from the streets, or 3D effects triggered by each specific dish to create a multi-sensational experience. In this case, the place where the projection casts on has become the public space, where people are having interactions with the space and the content (either on a vertical façade or on the floor). The boundary helps to reshape the definition of architecture (the restaurant's envelop with projections on) and the public space (interface taking the form of ground or surfaces). (cf. Drawing Index page 31 - 32)

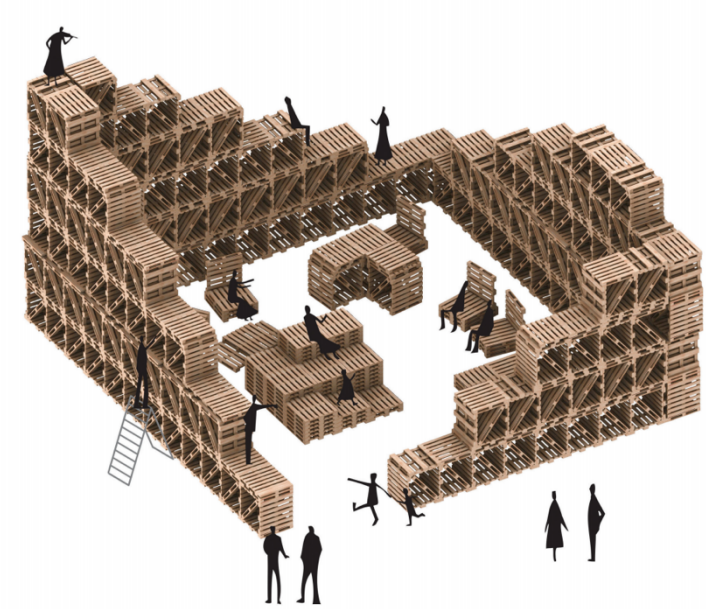
By positioning installations on a public space, its properties can be modified through its functions of use. In the Summer 2019 Architecture and Material Studio, resin as a common type of material was thoroughly studied and analyzed. Resin can be fabricated and turned into other forms by using roughly 12 methods, and its material state between liquid and solid is interchangeable. After putting additives such as fine particles, metal fibers, fragment solutions or small insects into the polyester (resin) fibers extruded from a spinneret machine, along with magnets powder and fluorinated polymer, the fibers would have magnetic poles with even magnetic force. Through weaving and assembling processes, the fibers come together as a big magnetic net, and its form is defined by the visitors wearing and holding magnetic devices; in other words, the installation has a flexible form that is designed by every visitor in every second. The two proposed sites to set this installation vary in location and purposes: the first site is located in the Cornell AAP NYC campus. The pin-up wall in the studio is usually in use during reviews and remains as a visual barrier for the rest of the time. By attaching the resin fiber net on the pin-up wall, we intend to make the installation an interactive device with students. With all different additives from the microcosmos, it also serves as a metaphor of encyclopedia, presenting the world as a small museum. In another proposed site, people play with the interactive roof in a narrow Hutong in Beijing. During the day, people wearing magnetic devices can walk underneath the resin fiber net and see it flying over the head; at night, while the resin fibers are connected with an LED light system, the net becomes a moving piece of street decoration. The two locations





used to be a plain public space for people to walk and perform various activities; when the resin fiber net is installed there, the way that people interact with the public space is changed: they go close and observe the content, stop and play with it, and engage with it. When architecture is being set up in public space, the meaning and function of that space will be transformed. (cf. Drawing Index page 33 - 35)

Another example of transforming space with installations is the Summer 2019 Architecture of Waste Studio, where the assignment was to find a recycled material, turn it into a pavilion through transformation and aggregation, and place it on Roosevelt Island. There are thousands of pallets disposed from warehouses every day in New York, and they are usually made of hardwood with good quality. By building pallet modules and stacking them up, a mountain-shaped pavilion can be constructed for people to relax and perform activities. The pavilion can be walked on top of its outer periphery, and also can be walked inside its semi-enclosed space surrounded by the pallet walls. The pavilion as a piece of architecture does not convey any architect's interpretation of the ways that people use it, because the material can be assembled and disassembled freely, but users can define their utility by choosing to stack them as furniture or crates in the way they want. The space inside pavilion can be understood as a changeable public space — in this picture, the courtyard space is semi-enclosed, and space can be altered constantly through users' hands. (cf. Drawing Index page 36 - 37)



The boundary between architecture and public space has always been in a blurry state in these projects, as human interventions and behavior always come with extreme complexity. This

complexity is written into history, culture, living pattern, new technology and human behavior, making public space intertwined with architecture. Rather than creating isolation, the blurry boundary between architecture and the public space can generate more intriguing possibilities in different stories.

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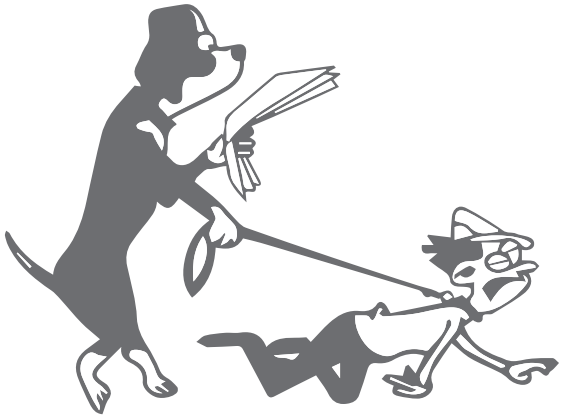
Rethinking of Pet-Human Relationship



Human Walking Dog

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Domestication and Domination

↓

Priority of Architecture:
Scale Based on Human

Dog Walking Human

↓

More Personal Space and Fun

↓

Priority of Architecture:
Activities Taking over Territory

Sharing Living Space

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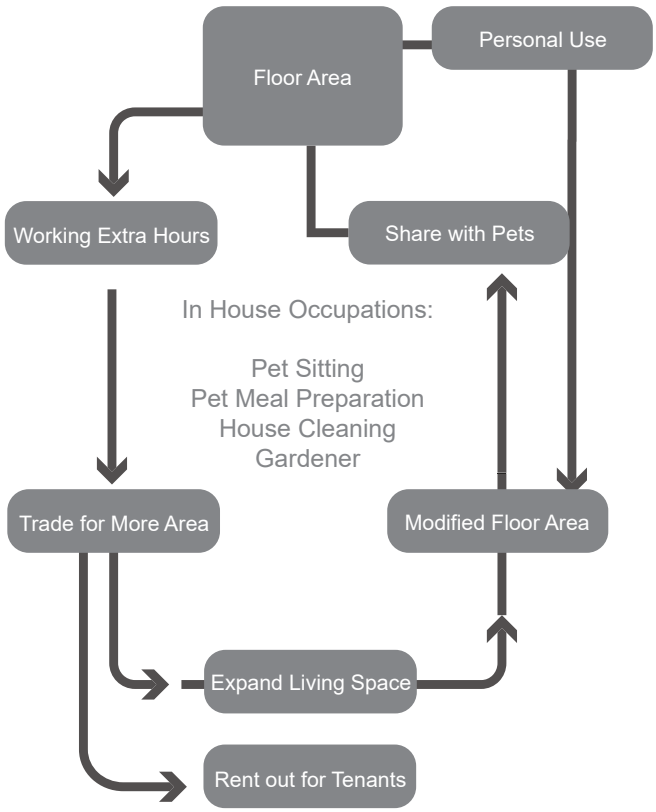
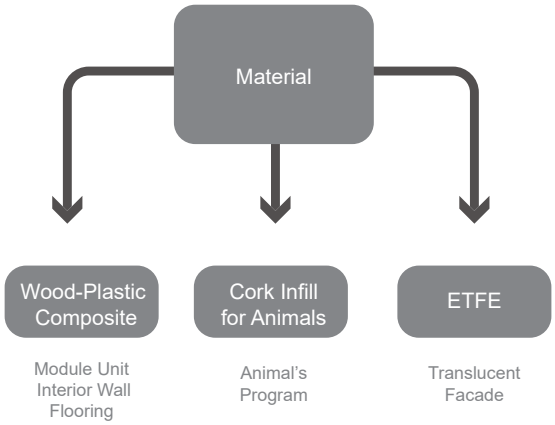
Pets Walking Freely in Architecture
Human's Function Follows after
No Petting and Being-Petted

Information Chart

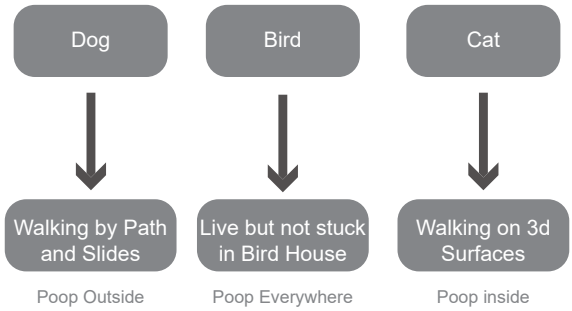
Human

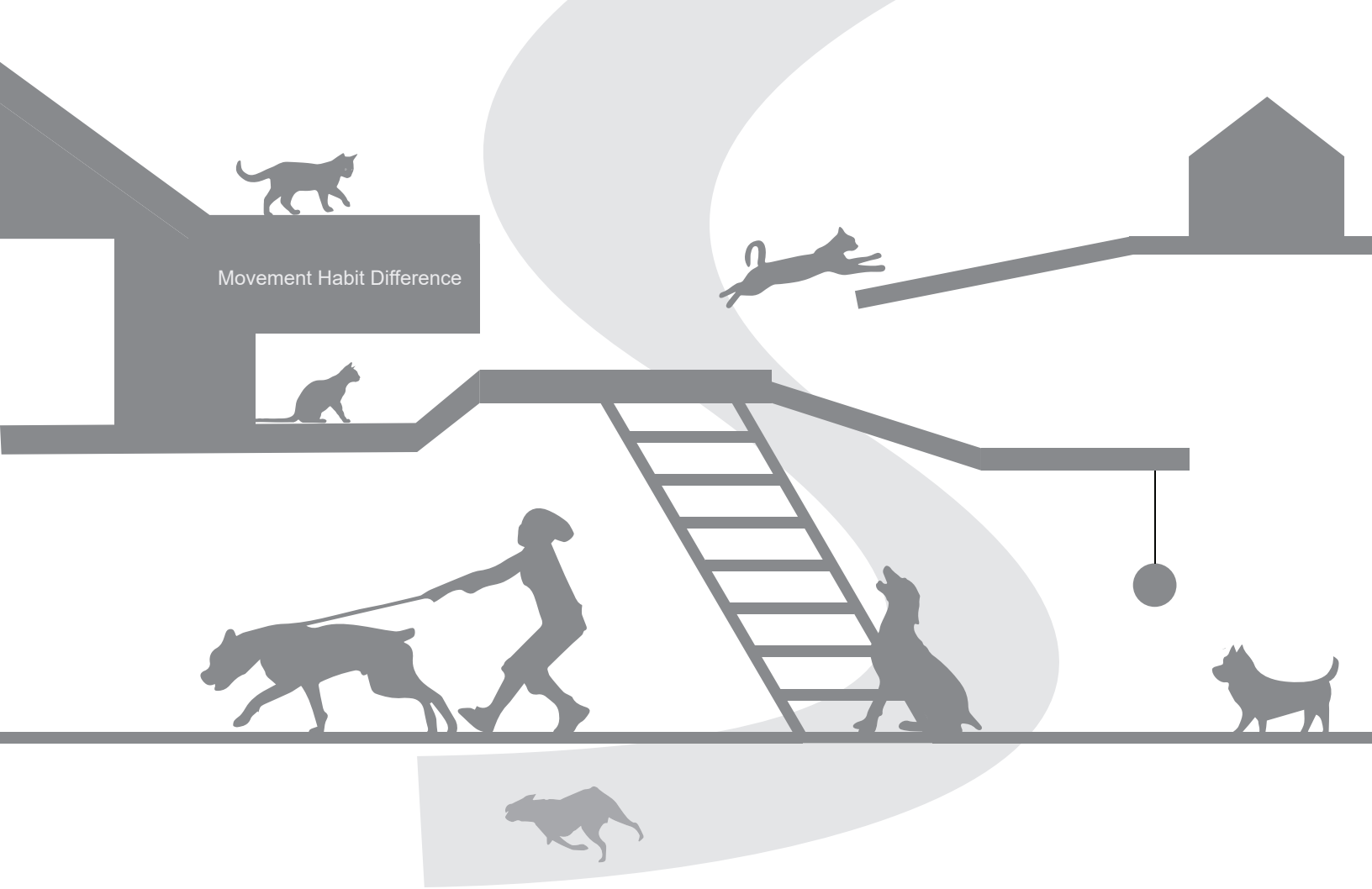


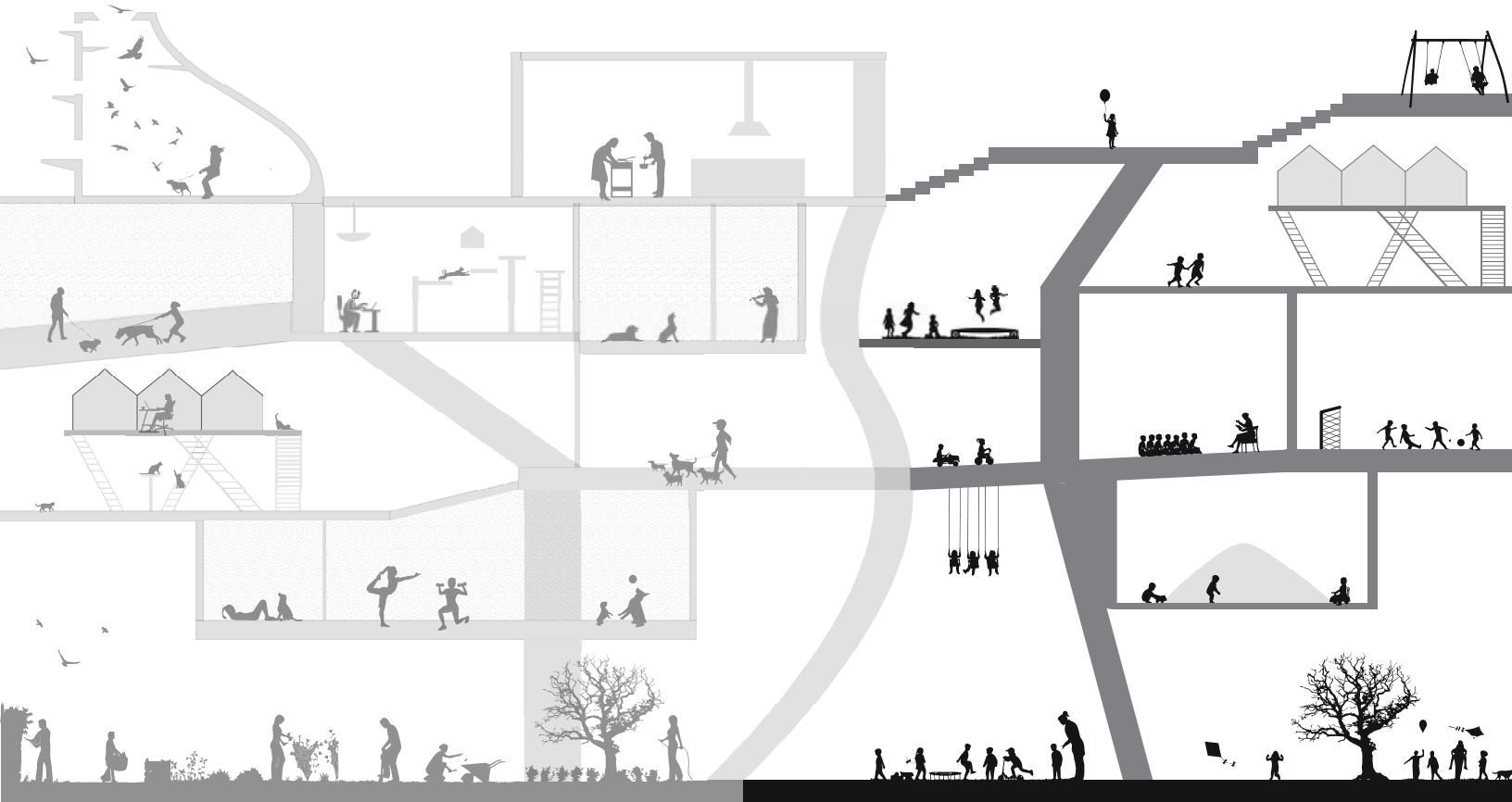
Building

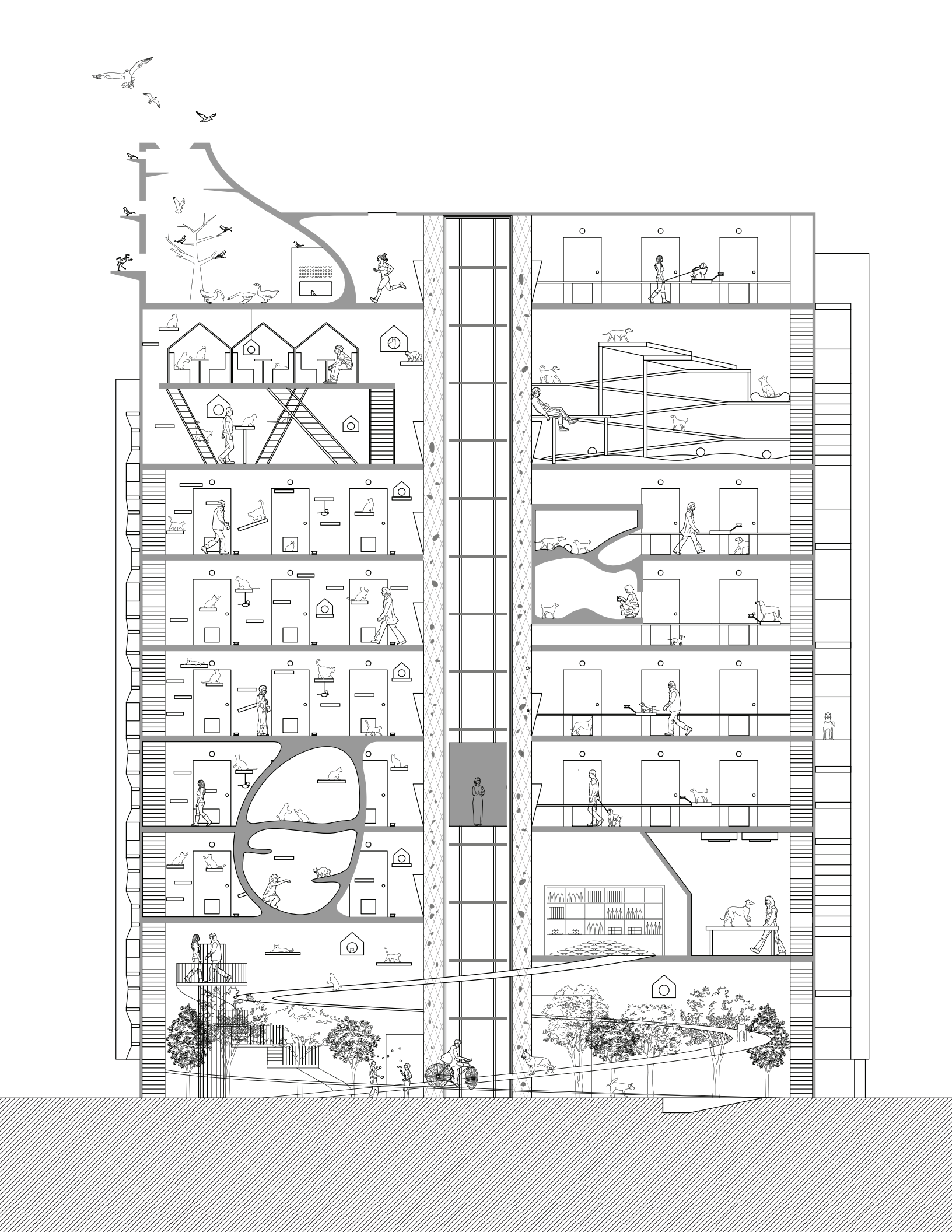


Pet

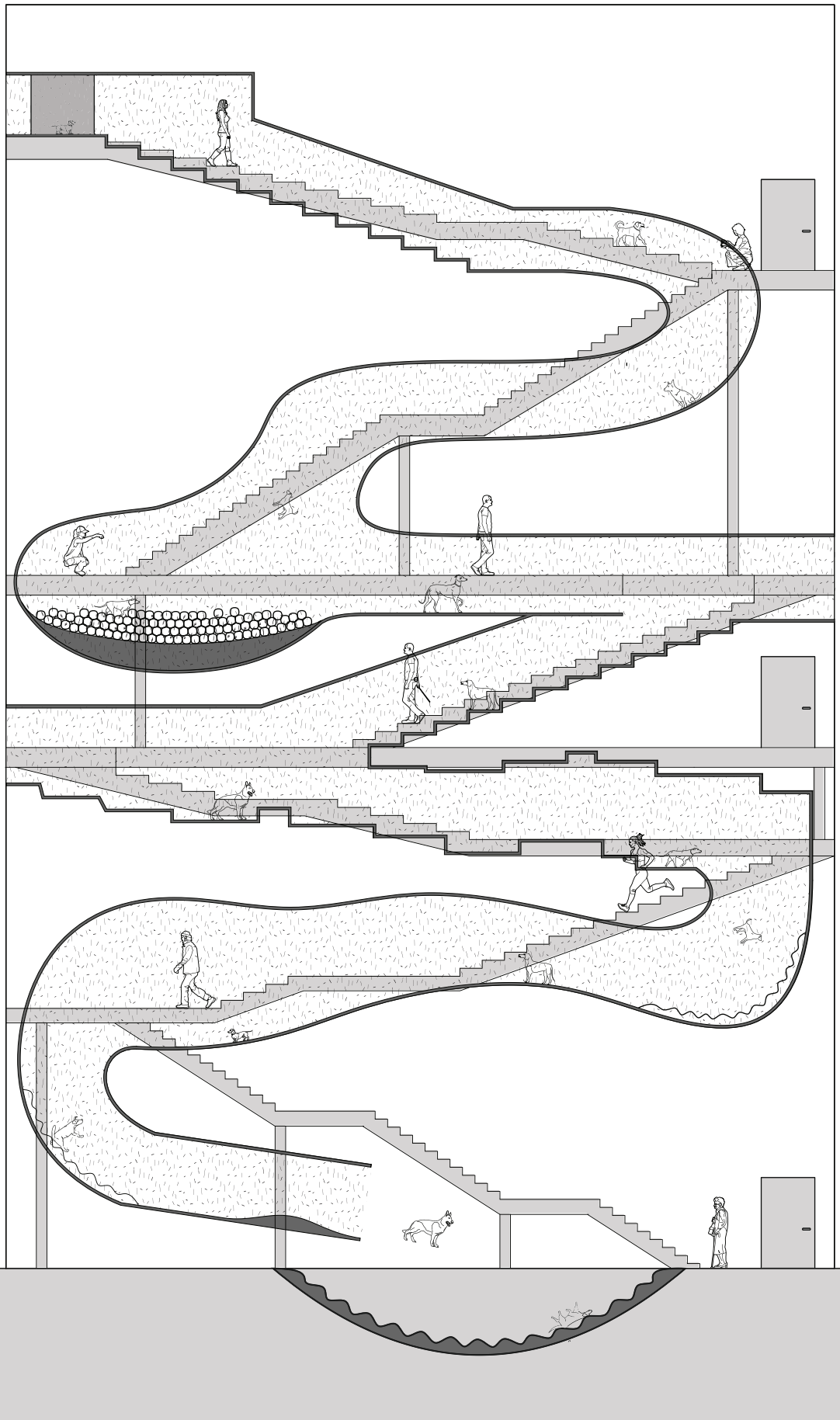



Movement Habit Difference

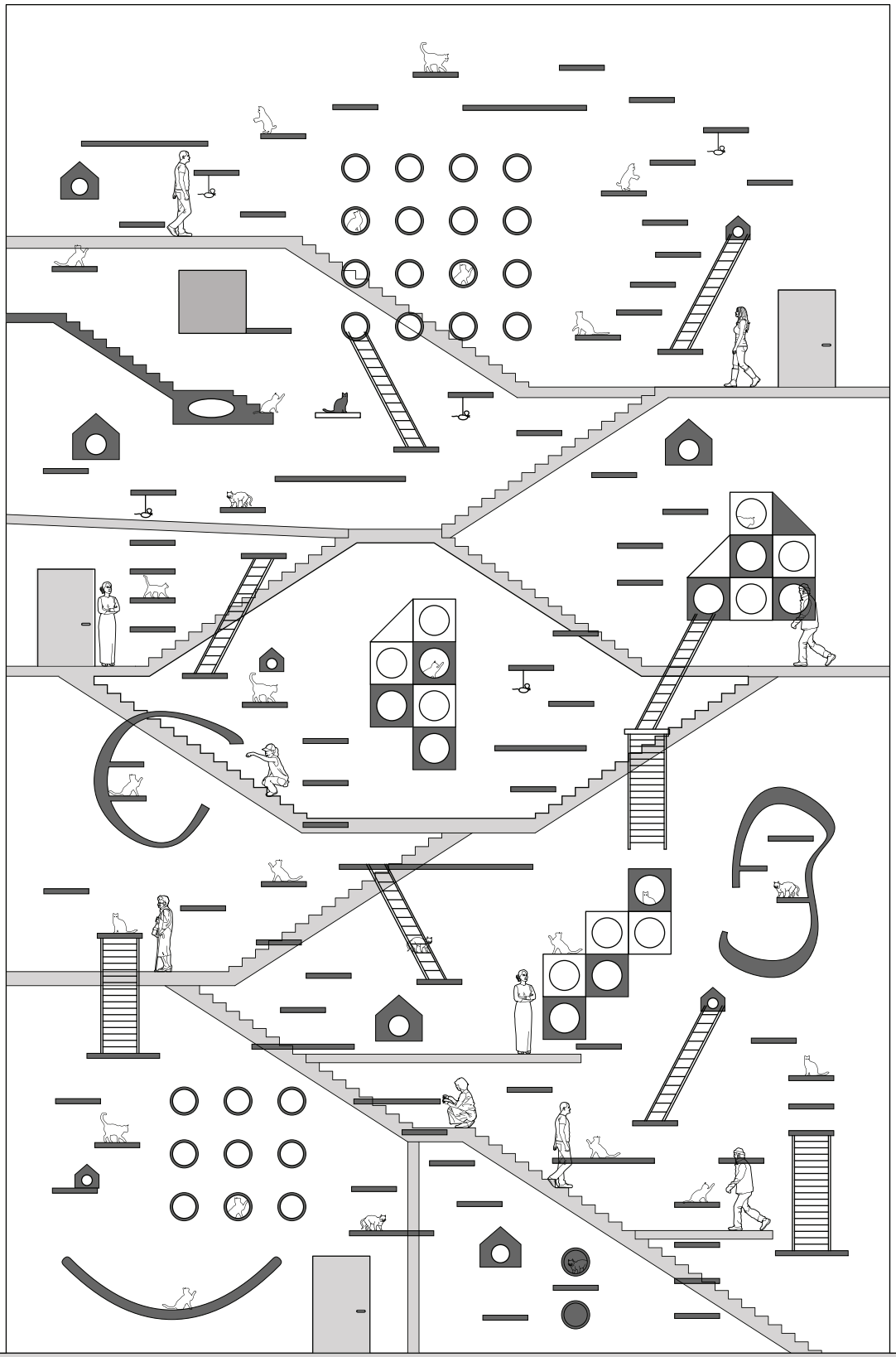




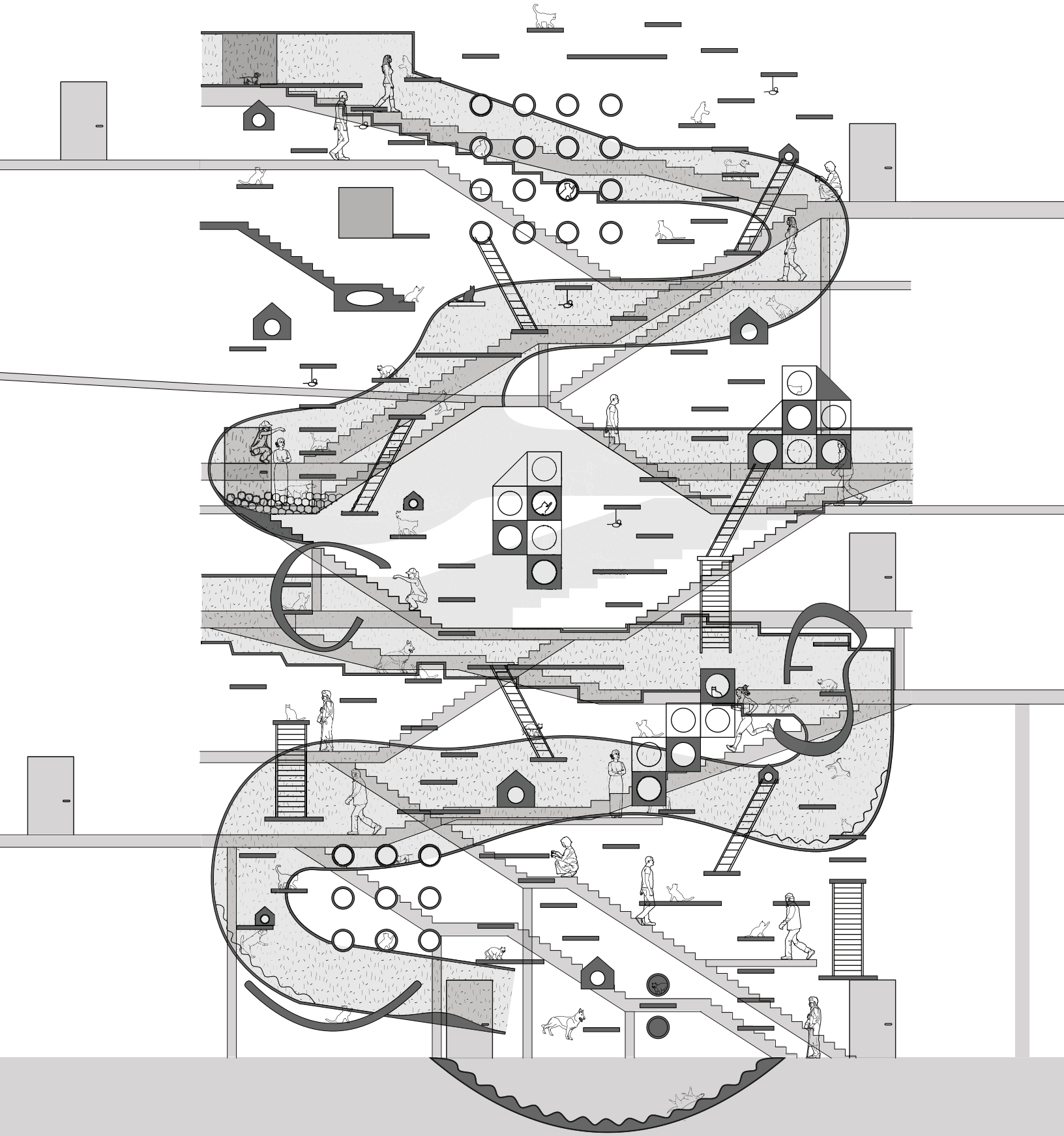
DOG WALKING ON FACADE



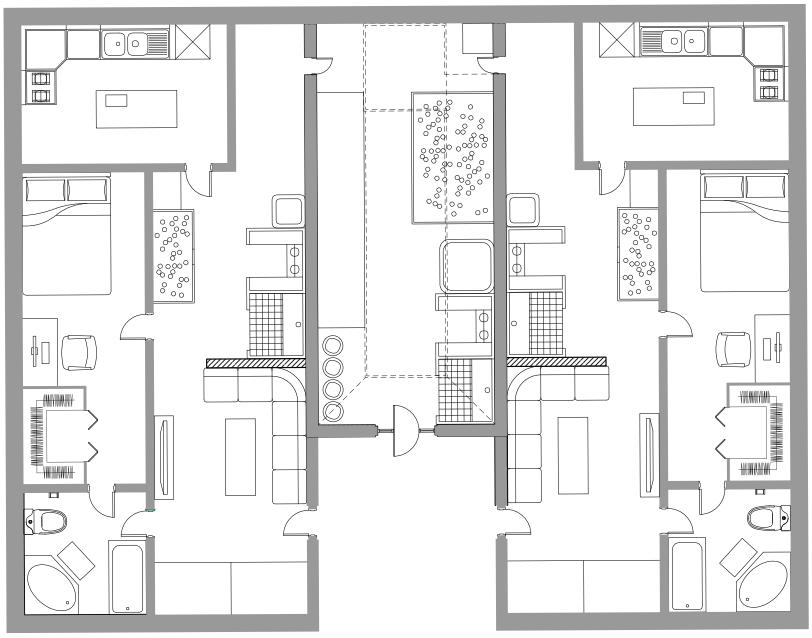
CAT WALKING ON FACADE



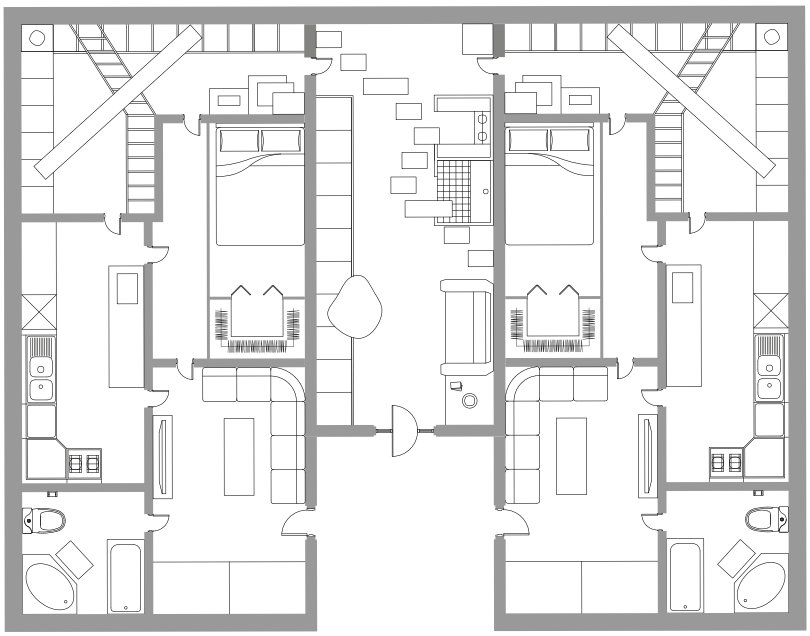
DOG WALKING ON FACADE



Typical Floor Plans

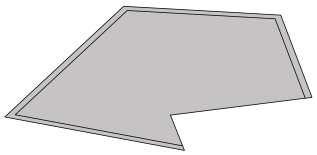


Typical Dog Apartment Unit

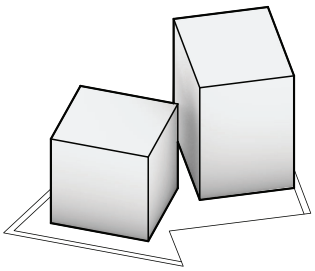


Typical Dog Apartment Unit

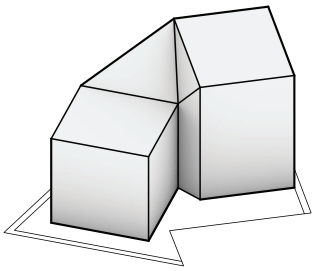
Massing Diagram



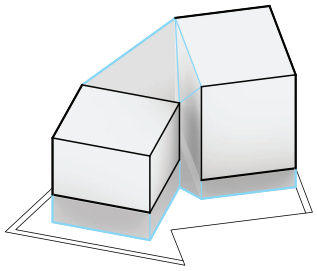
Site Boundary



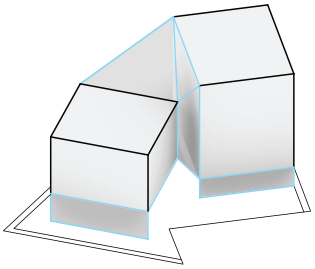
Two Volumns Reaching
Maximum Zoning Height



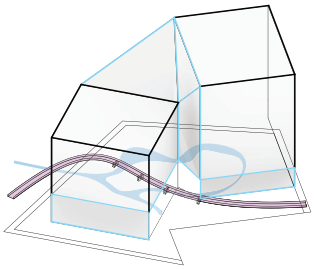
Circulation Connecting Two Volumns



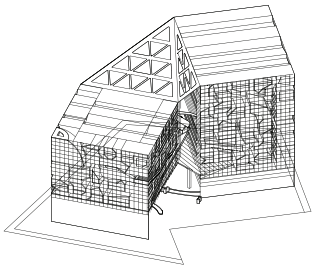
Defining Transparency



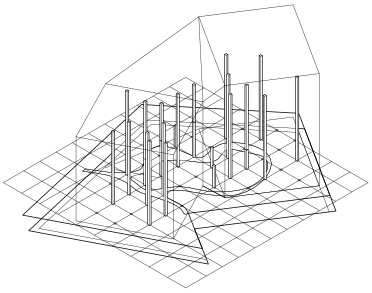
Bottom Void for Ventilation



Creating Bicycle Path
and Water Feature

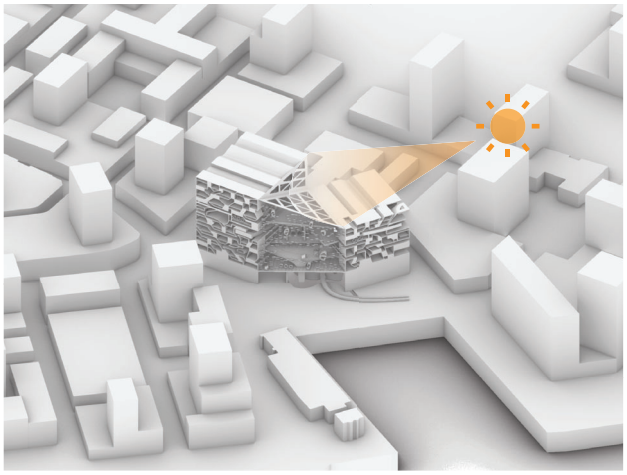


Using Grid to Create
Apartment Module

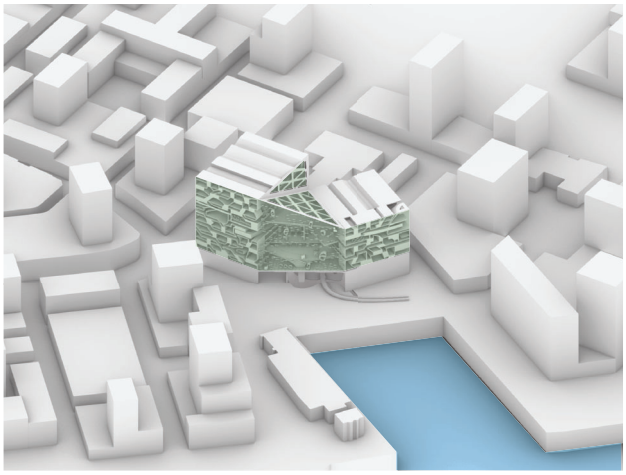


Creating Column Grid
and Positioning Columns

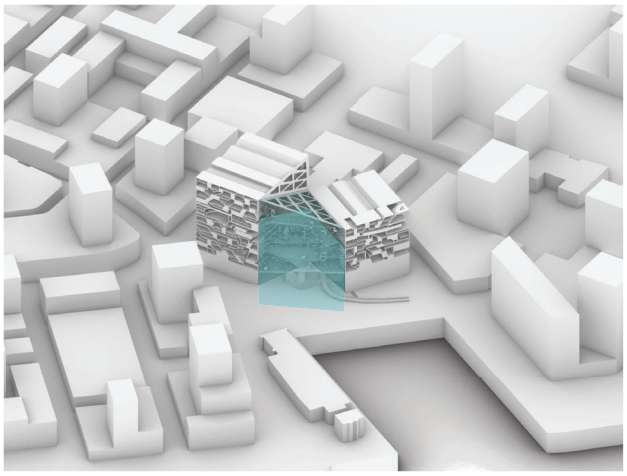
Massing Diagram



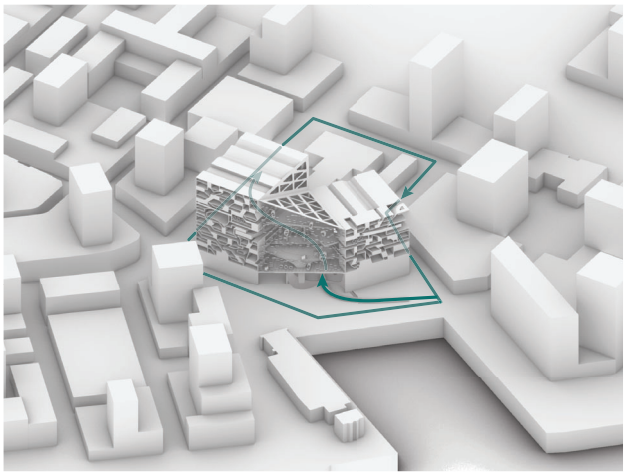
Atrium Opening For Sun Exposure



Transparent Area Exposing to Waterfront

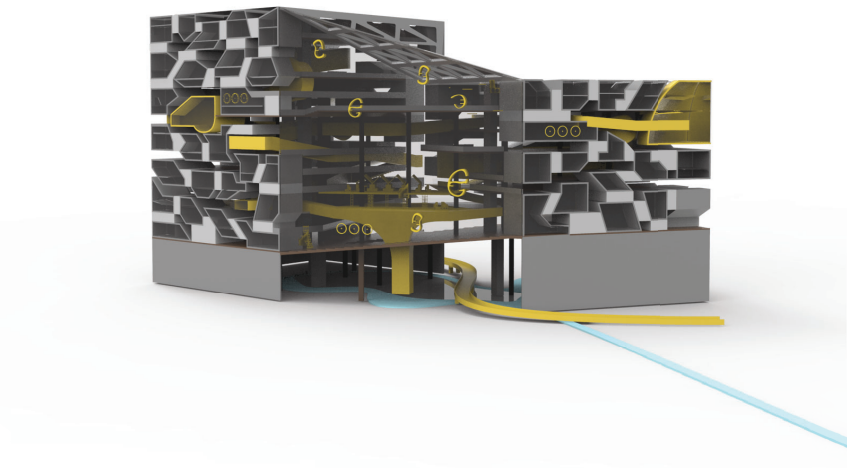


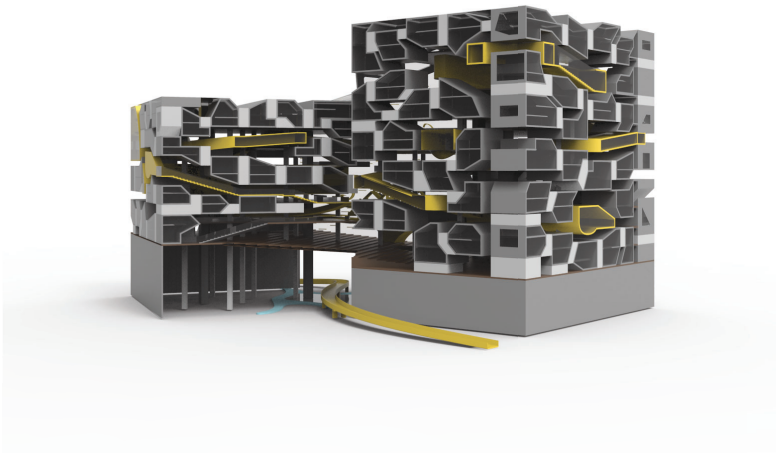
Three-dimensional Courtyard

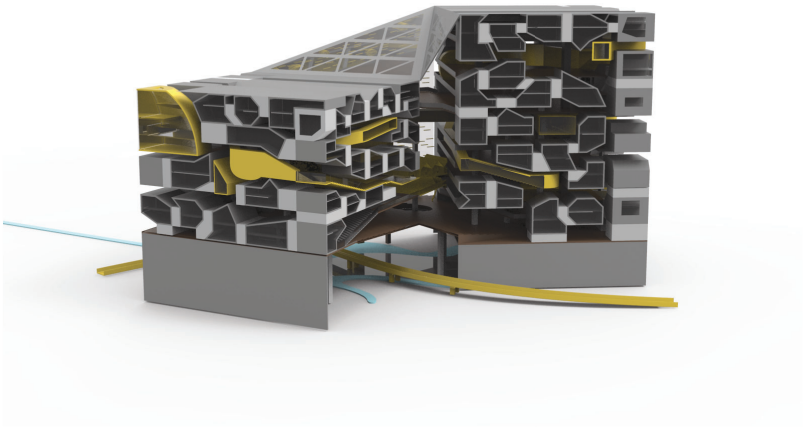


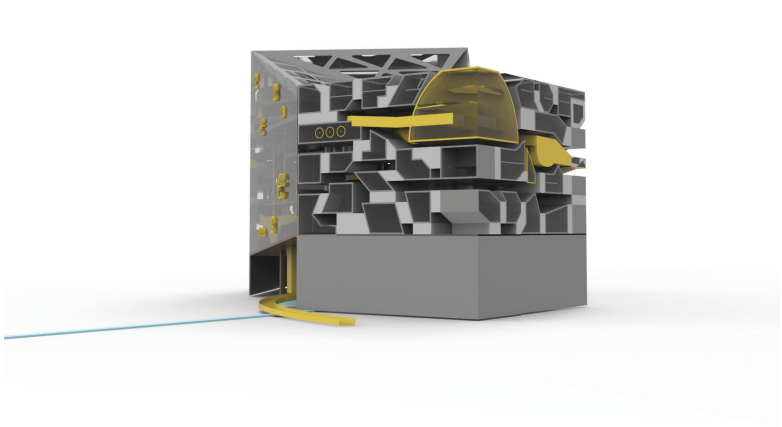
Circulation Around the Site

Models on Site

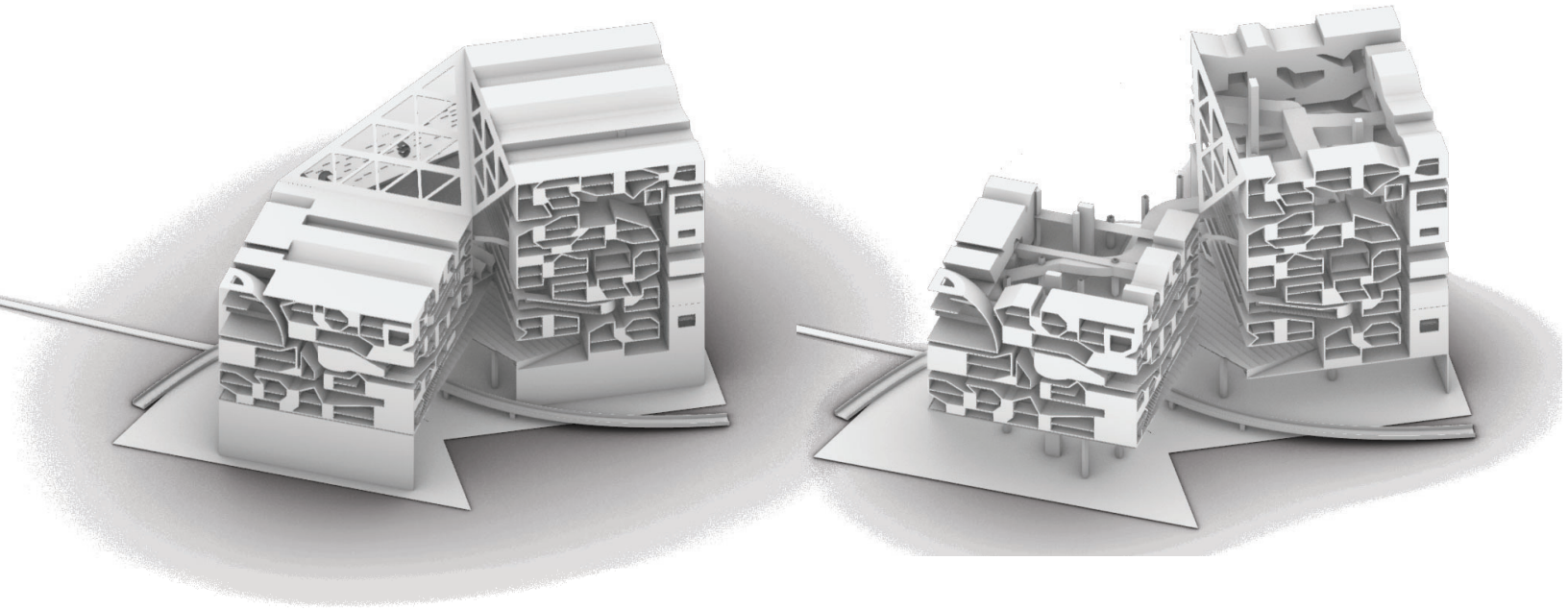


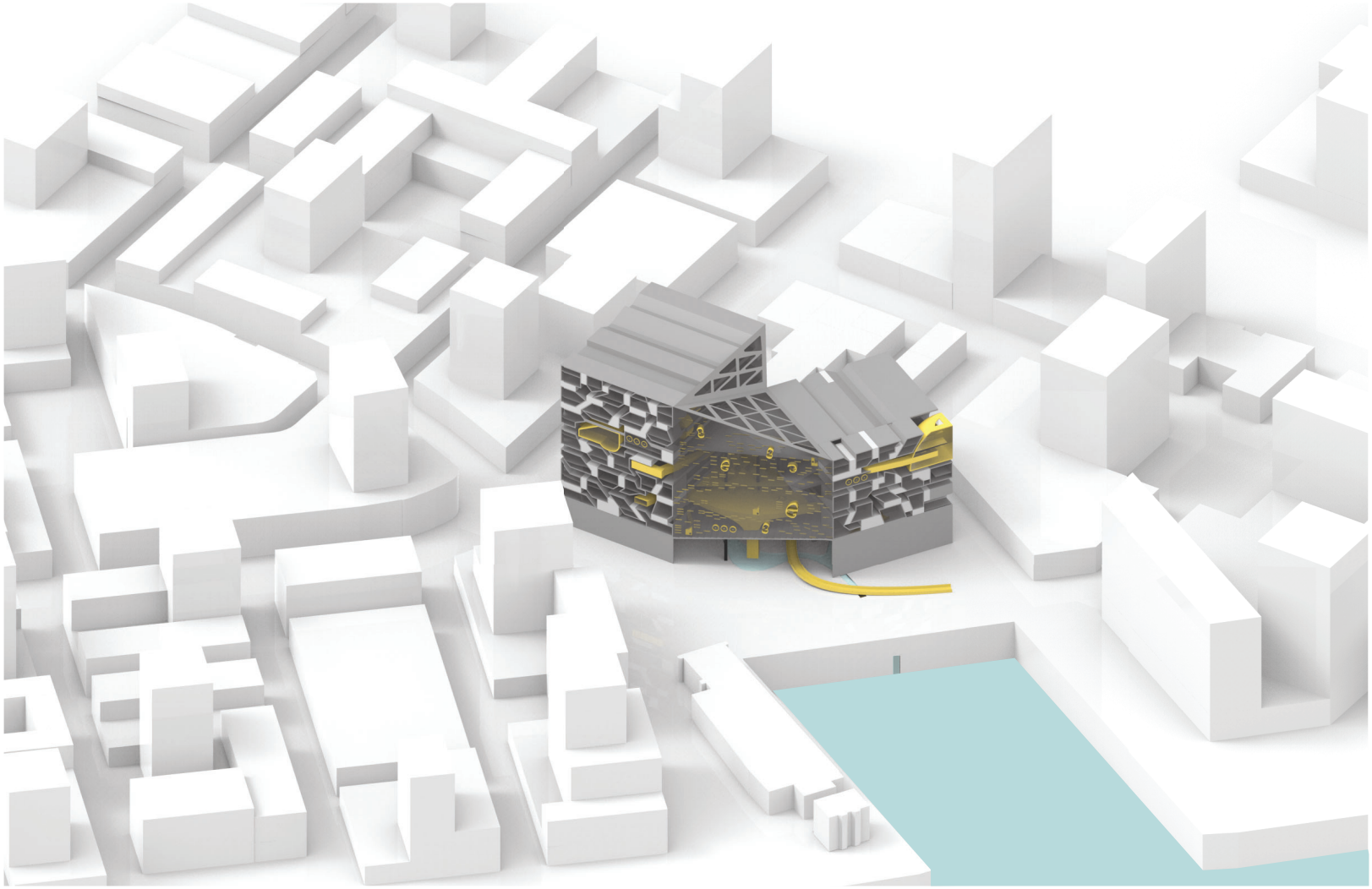


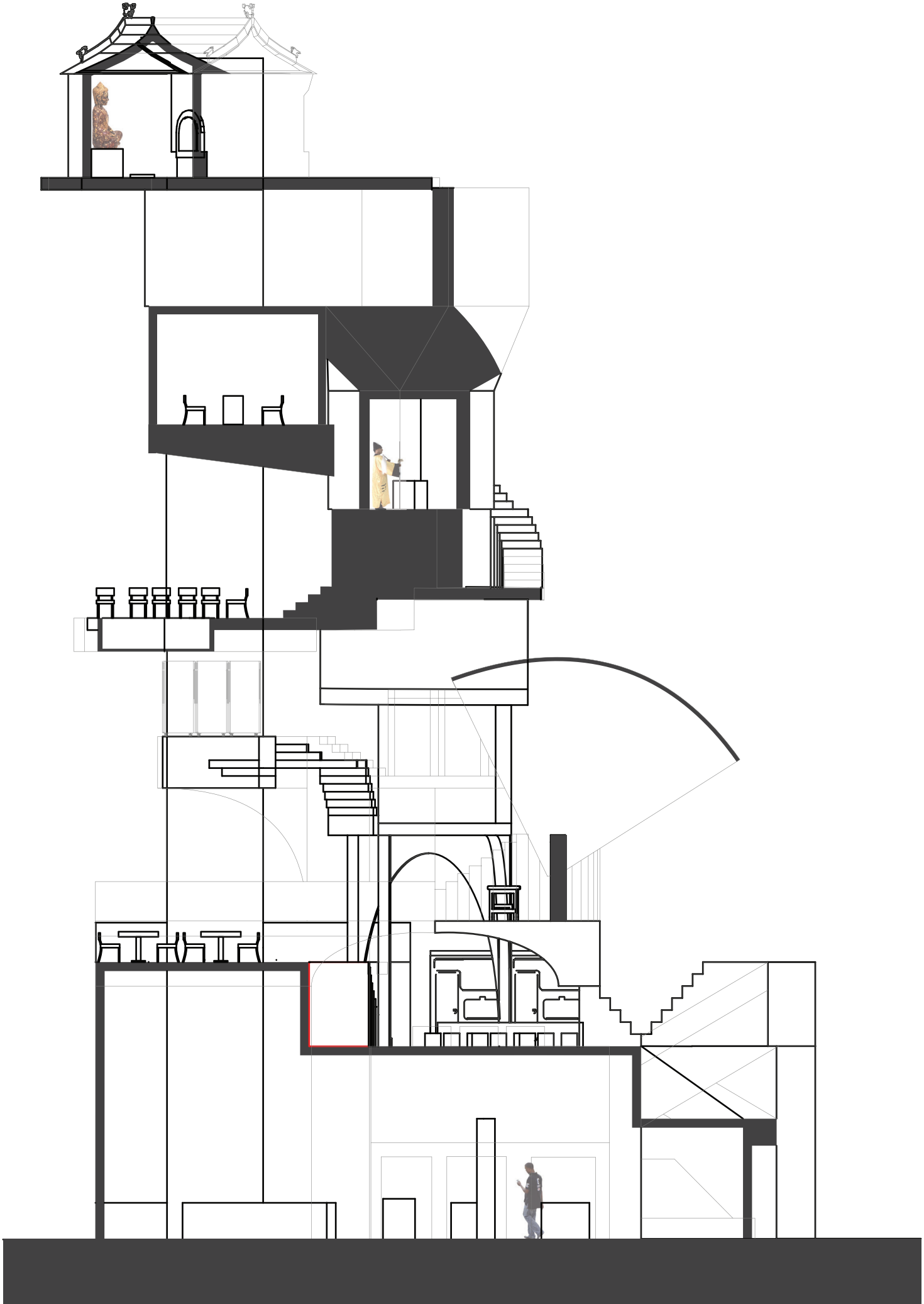


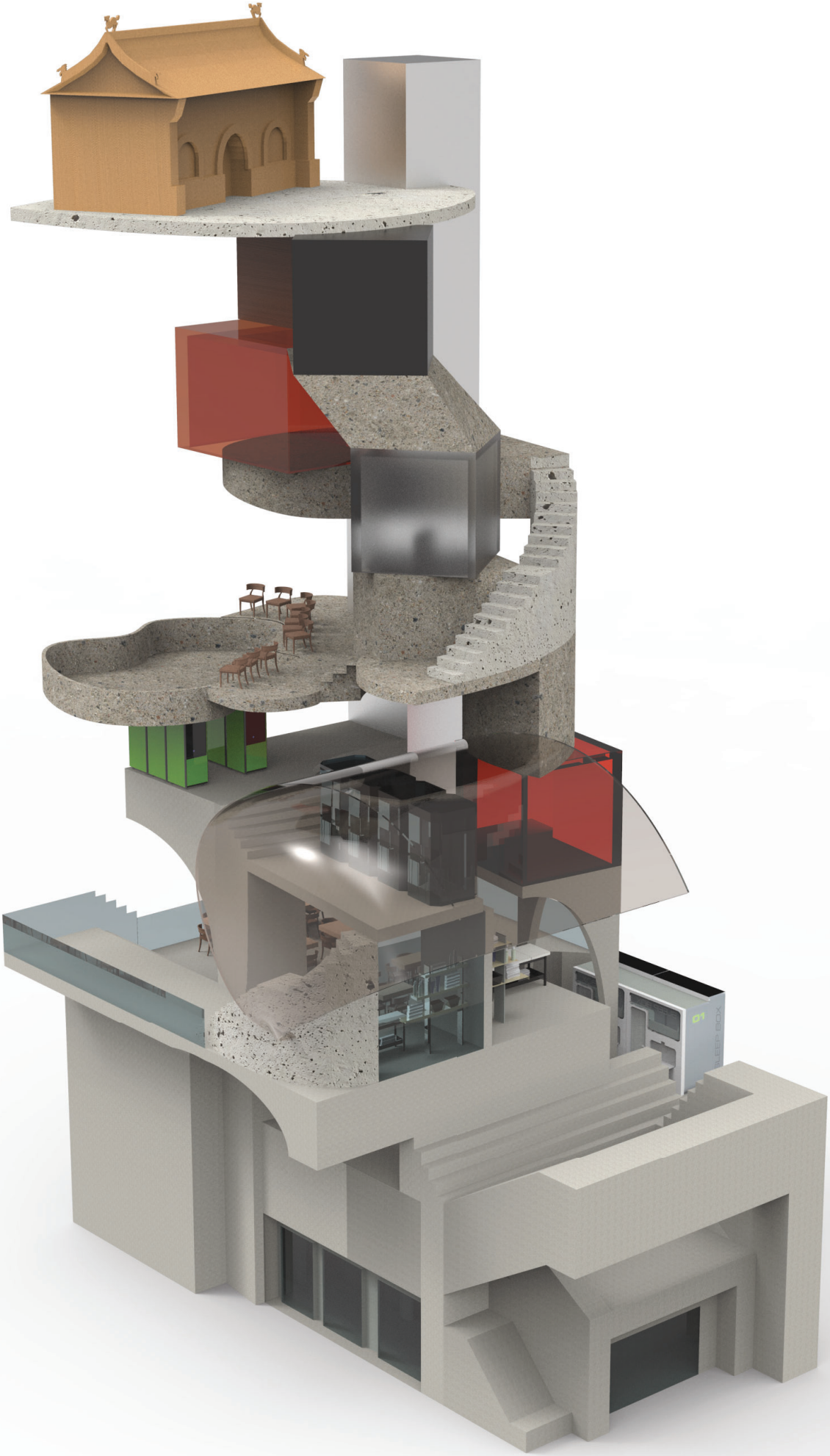


Peeling Off Layers








SLEEP BOX


福興宮
人生門命相館
問事
愛婚姻
免取名
斗數
財運
數學家教
A+B
C
K
Brad
發
煎
鮮蝦餛飩麵
牛肉麵
蚵仔
台灣担仔麵

ARCH 7111: DESIGN A
A+U: MAP to MEASURE / MEASURE to MAP

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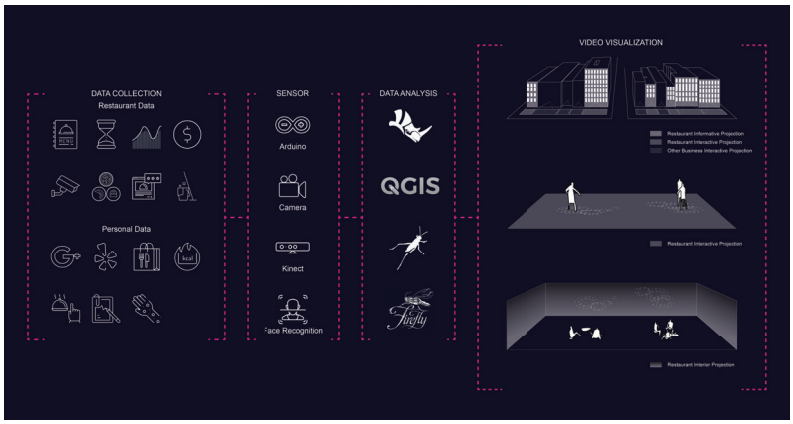
Mengyi Yan, Tongyu Zhang, Zeran Zhao

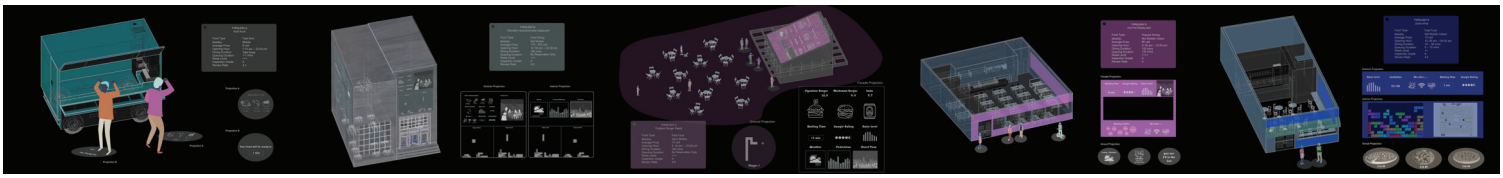
Dining with Data

How can interactive façade projection affect consumer experience and urban streetscape?

City Mapping



Workflow Diagram



Restaurant Typology


PIZZA
GAMES


麻辣计划
餃子


BOULANGERIE & PATISERRIE

Panel 1 - Resin - Analysis

Red Bienmandado

Mengyi Yan Tongyu Zhang Zeran Zhao

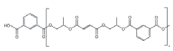
In polymer chemistry and materials science, resin is a solid or highly viscous substance of plant or synthetic origin that is typically convertible into polymers. Resins are usually mixtures of organic compounds. This article focuses on naturally-occurring resins.

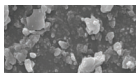
Plants secrete resins for their protective benefits in response to injury. The resin protects the plant from insects and pathogens.Resins confound a wide range of herbivores, insects, and pathogens, while the volatile phenolic compounds may attract benefactors such as parasitoids or predators of the herbivores that attack the plant.

Properties

Sythetic Resins

Polyester Resins

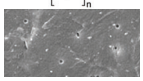




Application

Drawing Coating Adhesive

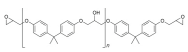
Acrylic Resins

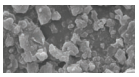


Application

Drawing Printing Ink Coating Binders

Epoxy Resins



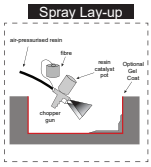


Application

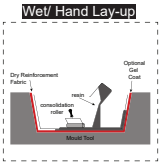
Marble Laminating Panel Boat Coating

Fabrication

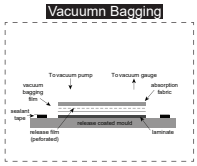
Spray Lay-up



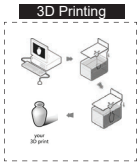
Wet/ Hand Lay-up



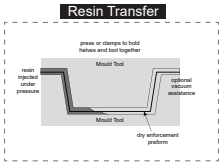
Vacuumn Bagging



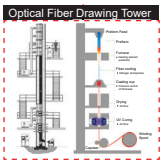
3D Printing



Resin Transfer

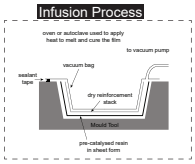


Optical Fiber Drawing Tower

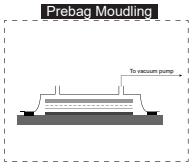


Drawing tower frame, Preform feeding system, fiber draw Graphite induction furnace, temperature keeping furnace,
bare fiber diameter measurement,bare fiber tension measurement, bare fiber PMD measurement & control, fiber coating diameter gauge and defect detection, fiber cooling system, coating system,UV curing system, capstans, PMD fiber spinning device, DDW twin spooler, clean air system, heating exchange and cooling,
mass flow controller, gas control,100 grade air purification unit.

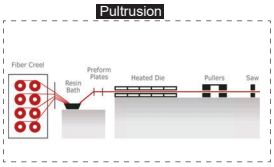
Infusion Process



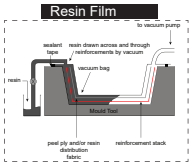
Prebag Moudling



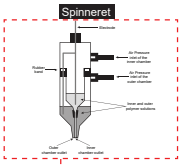
Pultrusion



Resin Film



Spinneret



Media Lab Fiberbots

FIBERBOTS is a digital fabrication platform fusing cooperative robotic manufacturing with abilities to generate highly sophisticated material architectures. The platform can enable design and digital fabrication of large-scale structures with high spatial resolution leveraging mobile fabrication nodes, or robotic "agents" designed to tune the material make-up of the structure being constructed on the fly as informed by their environment.

A spinneret is a device used to extrude a polymer solution or polymer melt to form fibers.Streams of viscous polymer exit via the spinneret into air or liquid leading to a phase inversion which allows the polymer to solidify. The individual polymer chains tend to align in the fiber because of viscous flow.This airstream liquid-to-fiber formation process is similar to the production process for cotton candy. The fiber production process is generally referred to as "spinning". Depending on the type of spinneret used, either solid or hollow fibers can be formed. Spinnerets are also used for electrospinning and electrospraying applications. They are sometimes called coaxial needles, or coaxial emitters.

Geometry

SOLID
Application
Polmer Component, Furniture, Artcrafts

FIBER
Application
Signal Transmitting, Cloth textile

LIQUID
Application
Spray, Resin raw material

Additives

Degradable

Hemp

Color Changing

Pigment paste

Glow additives

Properties Obtain

Electrical conductivity

Magnets Powder

Properties Enforced

Fire Retardants

Facilitate removal of parts from molds

Properties Suppressed

UV Inhibitors & Stabilizers

Reduce viscosity

Special Cladding

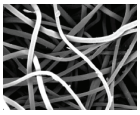
Fluorinated Polymer

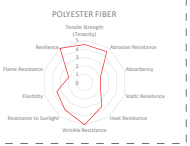
As cladding of the optical fiber

As component of the fiber make the fiber obtain the magnet properties.

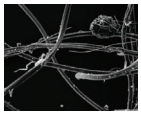
Products

Polyester fiber





Acrylic fiber



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Biodegradable Fiber

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Magnet Fiber

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Optical Fibe

Reference List

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Panel 2 - Resin - System

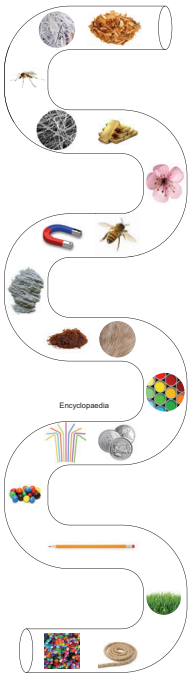
Red Bienmandado

Mengyi Yan Tongyu Zhang Zeran Zhao

Additives

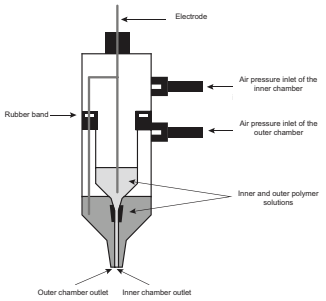
Magnets Powder

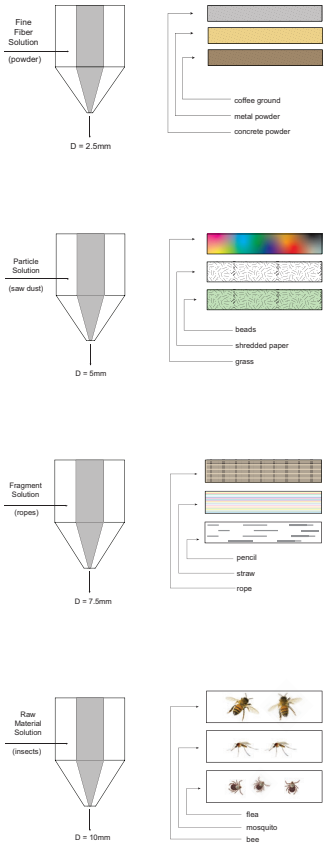
Fluorinated Polymer



Encyclopaedia

Extrusion

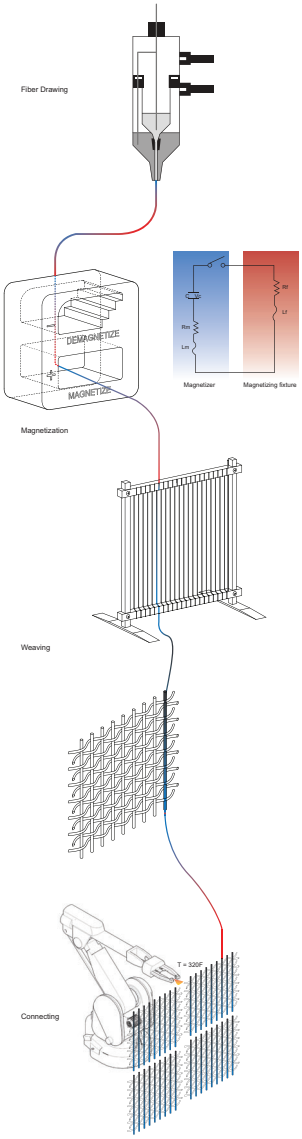




Fiber

Weaving

Assembling



Magnetization

Magnetic powder

Ferrimagnetism is exhibited by ferrites and magnetic garnets. The oldest known magnetic substance, magnetite (iron(II,III) oxide; Fe3O4), is a ferrimagnet.

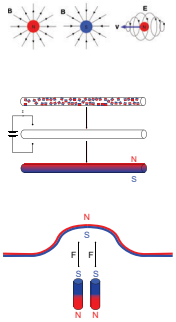
Ferromagnetic ordering in the strict sense

Commercial magnets are made of "hard" ferromagnetic or ferrimagnetic materials with very large magnetic anisotropy such as alnico and ferrites, which have a very strong tendency for the magnetization to be pointed along one axis of the crystal, the "easy axis".

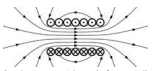
During manufacture the materials are subjected to various metallurgical processes in a powerful magnetic field, which aligns the crystal grains so their "easy" axes of magnetization all point in the same direction. Thus the magnetization, and the resulting magnetic field, is "built in" to the crystal structure of the material, making it very difficult to demagnetize.

Reference:
https://en.wikipedia.org/wiki/Magnetism
https://en.wikipedia.org/wiki/Ferromagnetism

Magnetize



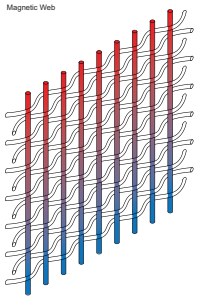
Electromagnetic or magnetic induction is the production of an electromotive force (i.e., voltage) across an electrical conductor in a changing magnetic field.



An electromagnet is made from a coil of wire that acts as a magnet when an electric current passes through it but stops being a magnet when the current stops. Often, the coil is wrapped around a core of "soft" ferromagnetic material such as mild steel, which greatly enhances the magnetic field produced by the coil.

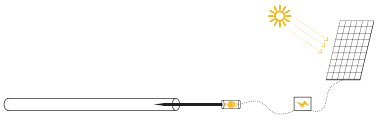
This magnetic field is invisible but is responsible for the most notable property of a magnet: a force that pulls on other ferromagnetic materials, such as iron, and attracts or repels other magnets.

Magnetic Web

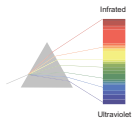


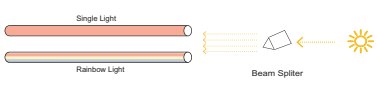
The fiber becomes magnetic after using magnetizer, and it is weaven into a entire web with the north pole on one side and the south pole on the other.

Direct Light



LED Light with Solar Panel



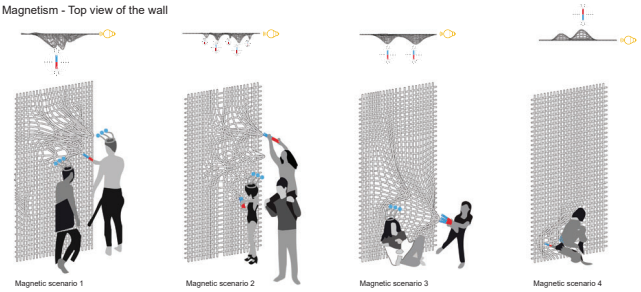


Panel 3 - Resin - Proposal
Red Bienmandado

Mengyi Yan Tongyu Zhang Zeran Zhao

Site1 - Interactive wall for architecture students at Cornell AAP NYC
We choose to put this interactive wall in the pin-up space in our studio to give classmates the pleasure when this wall is no longer a wall only for pin-ups.

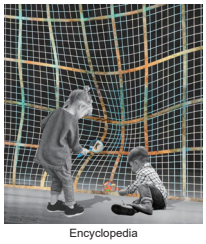
Magnetism - Top view of the wall



Possibilities - Encyclopaedia & Magnetism & Light

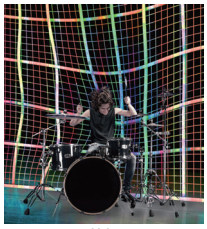
Magnetism

When the optical-magnetic fiber weaving system applies to the interactive wall, it gives people a sense of playfulness and visual variation. By using wearable magnetic devices, people can play with the wall.



Encyclopedia

People can also draw the web closer and see the objects inside the thread. The wall opens up an encyclopedia in front of the audience, which includes everything from organic objects to microscale composite —it is scientific yet entertaining.

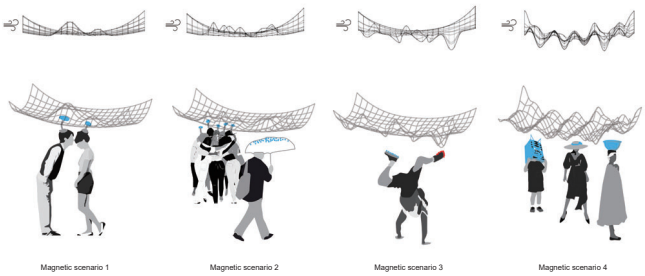


Light

When the optical-magnetic fiber weaving system is connected with LED light system, the fiber could conduct light creating a colorful shining background that could be used for parties and music performances.

Site2 - Interactive roof at Dongsi Hutong in Beijing for public activity
The free-formed roof is a flying web on top of Dongsi Hutong wich is a narrow street in Beijing, and it is tied on the roof of the nearing single-story brick houses.

Magnetism - Elevation of the roof



Possibilities - Magnetism & Light

Magnetism

The items contained inside the threads may not be seen in this case as the web is hanged over people's heads, and the way to interact with it is to wear magnetic hats or umbrellas to walk underneath.

Light

It could also conduct LED lights to create a colorful public stage for people to dance and relac. It is a manifesto of flexibility and softness, providing shade and joy for the visitors. Since the roof is light weight, it can also be deformed by the wind.

Why Choosing Pallets?

WASTE QUANTITY

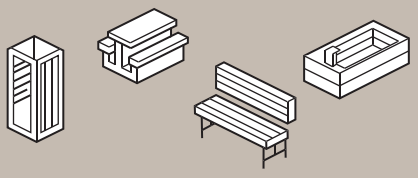
500 MILLION pallets are produces every year in the US alone to replace the worn pallets that we discard each year. Nearly **2 BILLION** wodden pallets are currently in circulation in the US with a majority of them replaced each year. This consumes an estimate **50 PERCENT** of the country's annual hardwood harvest and is equivalent to **7.6 BILLION** board feet of lumber.

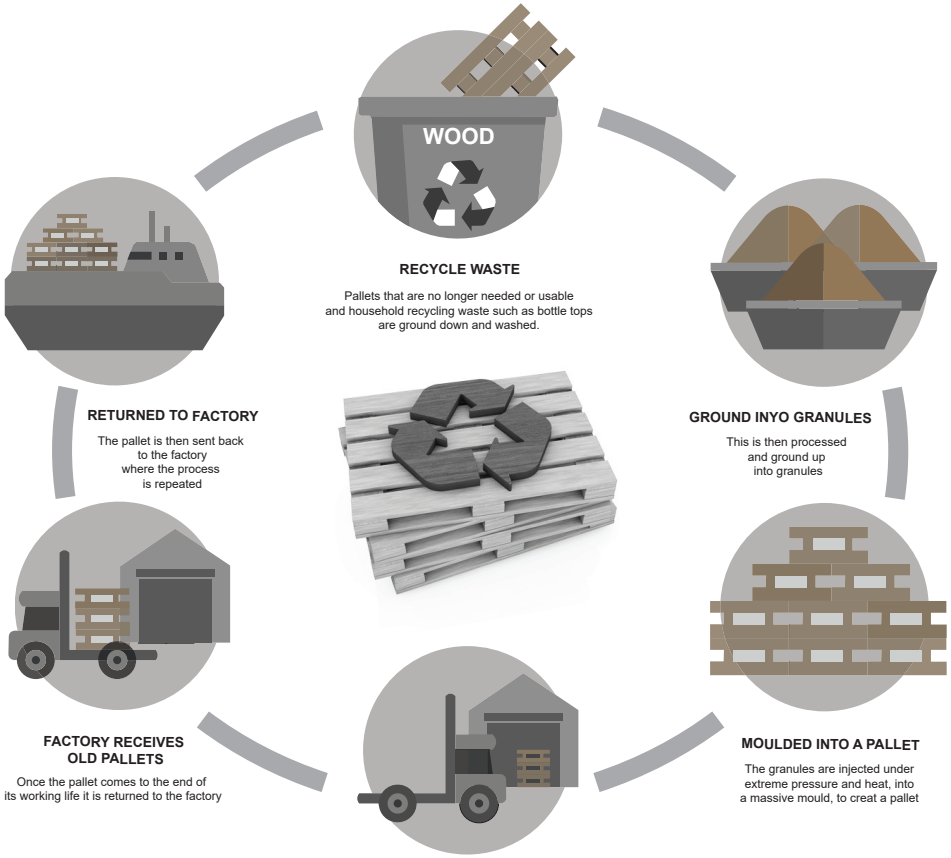
DURABLE

The production of pallets accounts for 43% of hardwood and 15% of softwood usage in the US Pallet is often in excellent condition, and could make ideal material for reuse, rather than simply being binned.

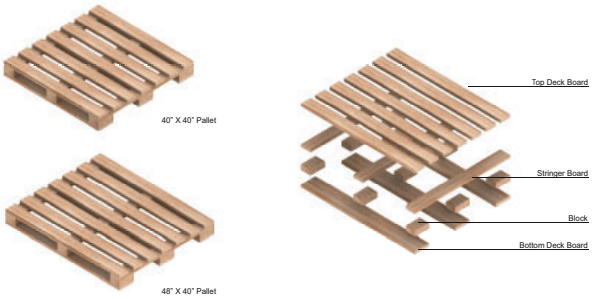
RECYCLABLE

Pallet is often in excellent condition, and could make ideal material for reuse, rather than simply being binned. Peple use old pallets to make new furnitures. The material used for this project will be eventually reclycled for future use.





Axonometric View of Material



Module Aggregation
Truss System

Corner Effect

Stepping Effect

Elevation Effect

Module Aggregation
Piling up

Furniture Set

Chair

Bench

Tea Table

Sitting Deck

Reading Deck