Embrace the Leak

by

Jaya Kanal

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A thesis
submitted in partial fulfillment
of the requirements for
the degree of Master of Science, Architecture
School of Architecture
Pratt Institute

February 2022

MS Programs Introduction

We began the 2021-2022 MS program year musing on the Anthropocene, the geological period marking the undeniable impacts of human activity on the planet; and we undertook our research on Governors Island in entirely new learning conditions that, on some level, usher in the "post-Anthropocene." With the increase of face-to-face learning and field studies this spring and summer, we encounter the smoke from California wildfires and record hot temperatures, reminding us of the urgency for design to engage climate crisis. With the culminating research in the winter of 2021-22 we find new virus variants, returning us to a now familiar state of isolation, concern and quarantine, as varied authors link the pandemic to the post-Anthropocene.

What does it mean to be post-Anthropocene? The term "post" yokes us to our environmental condition: it means that we wrestle with our anthropocentric exploitation of the planet; that we examine and acknowledge the inextricable relationship between racism and environmental degradation; and that we look at the manner in which social inequity is inscribed in the built environment.

Governors Island
Access Badge

Jeffrey Anderson

Faculty
Pratt Institute

Start Date: 4/12/2021
End Date: 11/19/2021

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Governors Island
Access Badge

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Faculty
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Jubin Titus

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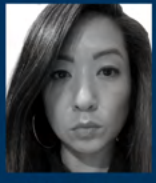

Olivia Vien

Faculty
Pratt Institute

Start Date: 4/12/2021
End Date: 11/19/2021

Pratt

Pandemic brought us into new dialogues with the effects of the Anthropocene. Infection is not limited to animals and humans, but describes, as well, a structure of interactions that are reconfiguring around pandemic, racism, isolation, and environmental catastrophe. The conventional physical aggregation of non-diverse academic bodies makes way to zoomed discussions across time-zones and perspectives; studio reviews, the province of top down expert monologues makes way for new platforms of committed listening, engaged looking and real dialogue. Simultaneously, forays into in-person fabrication accomodated making immersive interiors, replete with an uncanny domesticity for repurposed historical houses.

Any "nature" left in the city is highly unnatural: it is constructed, cultivated and maintained by man and machine. It has few if any provisions for non-human species. The domestic interior, in a period of quarantine, must contain a world within its walls: wildness, energy, heating and cooling, water and fresh air. The MS programs in Architecture and Urban Design worked closely together in taking these constraints as cues, with intensive explorations of water, moss, biochar and biogel surfaces as new material for building interiors, seeking to bring the palette of nature into new public spaces. Artificial islands, archipelagos, tides and currents flowed into urban designs that embraced the flows of New York Harbor.

We suggested that it may be timely to bring nature's "wilderness" inside. The problem posed in the program asks whether architecture can re-imagine biophilic interiors as interiorized wildernesses – we see that the densely programmed interior cores that you designed anticipate and relieve the pressure of quarantined living. Your proposals explored the architectural reconfiguration of the domestic interior in integrating a constructed wilderness as well as a feral water, energy and waste services. The definition of "service core" as a space for plumbing, circulation and power was radically redefined to embrace ecological services: plant-life generators, algae-producing units, carbon sequestering media, desalization

platforms and stormwater retention give new dynamics to the domestic core. These proposals explored environmental affects as well, in producing spaces that integrate nonhuman presence, that manifest actors outside of human perception. Volumetric interior landscapes created new outputs, from oxygen-rich air to biodiverse vertical surfaces to lighting that unfolds new potentials for domestic space under the confines of quarantine. Architecture proposals focused on ecological service cores that channel and filter stormwater, that nurture plant, algae and other animal life, that produce new lighting systems, and that condition air in novel ways. Urban design created new islands reaching into the Buttermilk Channel, connecting historical and ecological concerns.

The MS Architecture and Urban Design projects worked across several different scales, starting with an interrogation of the soils, histories and legacies of Governors Island. Soil studies contended with Lenape archaeology, brackish water-tables and lead contaminants on this urban island park whose checkered history is writ across its geological strata. Research posed questions of pressing concern: how can a park serve as a outdoor school? how can we create potable water for an island tethered to the mainland? how do we address geological racism in this island's colonial heritage? Studio faculty (Jonas Coersmeier, Ariane Lourie Harrison, Erich Schoenenberger, Olivia Vien, Jing Lui and Ray Rui Wu) and Mediums instructors (Jeffrey Anderson, Mia Landsbergis) worked through the "rewilded" interior at multiple scales. Electives in fabrication, exhibitions and urban adaptations tested concepts from Governors Island in new material and geographic contexts. And pro-seminars (Cynthia Davidson, Sanford Kwinter and Beatrice Galilee) developed theoretical and cultural frameworks for architectural interventions on Governors Island.

The culminating project site on Governors Island afforded a unique and relevant locus of exploration. In the early 20th century, the Army Corps of Engineers doubled the island, adding millions of cubic yards of fill to


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the south side. West 8's masterplan brought artificial mounds to the island. Governors Island was a constructed nature. In 2016 on Governors Island, the British artist Rachel Whiteread furnished one of the island paths with a concrete cast of a small home titled *Cabin*. The domestic inscribes the island. Governors Island opened its thirty-odd Victorian homes for cultural, environmental and educational residencies. Pratt GAUD has occupied Building 14 in one of these residencies, with The Climate Museum, the NYC Audubon and the Urban Soils Institute as neighbors. This set of resources, along with recreation and arts programming, brings nearly one million visitors each summer.

The MS Architecture and Urban Design projects adapted the historic structures of Building 14, the Eastern Development Zone Shoreline and Building 3 with cores that, in addition to providing water, energy and air climatization, bring new formulations of wilderness into the interior. This work will become the subject of Pratt GAUD's "Re-Coring" exhibition in the Summer of 2022, along with an ongoing "Pratt Climate Provocations" exhibition for Fall of 2022.

The project team working with the Guerilla Science's "Communicating Climate Science Through the Arts" workshop drew heavily upon on the contributions and vision of MS students Dhvani Shah, Simran Shah, Vineeta Mudunuri and Jubin Titus. The contributions of MS students to this climate literacy effort has established a platform upon which Pratt SoA seeks to build an annual and ongoing program of workshops and exhibitions.

It is important to recognize the degree to which MS Architecture program work has received recognition for its curricular focus on Governors Island. Directed Research has been published in architectural journals, included in the 2021 Italian Virtual Pavilion at the Venice Biennale and related Pratt microsite, and featured in Dean's and Chair's talks on post-pandemic education. And the MS effort of Governors Island figured in the January 2022 award to Pratt of a three-year residency on Governors Island beginning in Summer 2022. Also, the MS cohort held an active role in the Pratt SoA, with Vineeta Mudunuri developing graphics and communication for the Dean's office, with Graduate Student Council representation by Jubin Titus, and with varied Graduate Assistant positions held by all members of the 2021-22 MS cohort.

It is a testament to your resiliency, your commitment to your education and your understanding of the significance of this period – one of pandemic and climate emergency – will mark a significant change for architecture and urban design. We are different now. Your culminating projects suggest that we have already ushered in the post-Anthropocene: that, in acknowledging the blinkered perspectives of the Anthropocene period, architects and urban designers will now envision, fabricate, and script more inclusive engagement in a global environment circumscribed by pandemic, climate change and inequitable socio-economic policies.

Ariane Lourie Harrison
MS Architecture and Urban Design Programs Coordinator


brooklyn
manhattan
'Breathing organism
through natural
filteration processes
greywater recycling
'Self
Sufficient'
Private
rainwater harvesting
through facade
membranes
House 14
micro
Governors Island
macro
Lorem Ipsum
Public
desalinisation
of seawater
'architectures'
of desalinisation
supported by
solar energy
Climate
Resiliency
new jersey

Victorian Domesticity

Governor's Island

The Site

Back in the history Governors Island continued to serve an important military function during the American Civil War, though it was no longer used primarily for physical defense of the Harbor. Physically, the Island changed greatly over the years during the early 20th century. Using rocks and dirt from the excavation of the Lexington Avenue Subway and dredge from New York Harbor the Island was developed over time. The Trust and the City of New York analysed the climate crises and launched a global competition seeking an anchor university and research institution as part of the Center for Climate Solutions.[1]

The rapid Climate change and water challenges in governor's island is giving rise to the long winded construction and its directed that water and society should no longer be categorized as two distinct entities but rather be understood as part of complex interactions that influence the quality and movement of water.[2] The core of this project centers on a material exploration for water filtration along with an aesthetic sensibility approach for the systems and creating unique structure along with a form evolution that emphasizes the filtering feature (filtering rainwater to produce freshwater).

The site, house 14 on Governors island was built in 1987 designed to house officers during the British occupancy at Nolan Park that reflects this modernist ideology towards water service.[3] This Victorian domestic architecture hides the role of water and its functions in the house. The project probes the position that this house can occupy in present day as a social cultural and educational hub for water in Architecture. Inspite of the abundant availability of brackish water in the soil 3 feet below ground level on Governors island , currently this house does not have any water supply. This project enhances the role of water in house 14.

Figure 1: Exterior of House14 with wet wall impressions

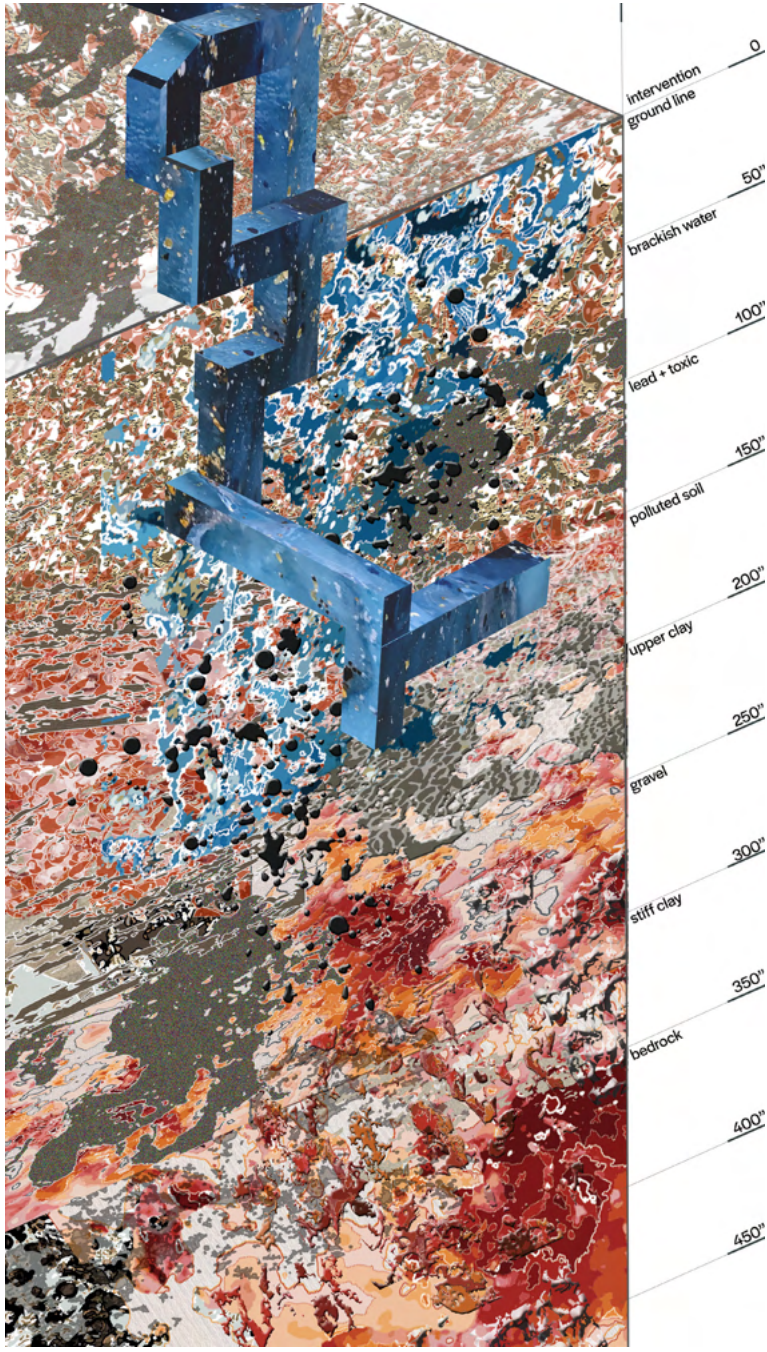


Figure 2: Speculative Deep section

The Climate Crisis

Data show that more than 70% of the world's population lives within 70 km from the seaside. Sea- level rise may compromise sources of fresh water at the coastline. Therefore, Desalination is considered to be the most practical method to continuously provide a source of freshwater.[4]

Water is one of the most pressing issues of current time and an essential need that everyone rely on it as a vital resource. The competition for fresh water escalates around the world, the strain of growing populations, increasing demands of agriculture and industry, ageing infrastructure, water pollution, the worsening impacts of climate change and political tensions add even more pressure to ensure equitable access to water.

Governor's Island, with its 2.2 miles of coastline, becomes a productive site for introducing a broad public to new architectures of desalinization. Compared to the other two commonly used methods of freshwater withdrawal-underground water withdrawal and remote water diversion, the energy consumption for seawater desalinization, while high presents a significant space for innovation and energy efficiency as fresh water becomes an increasingly scarce resource.[5] The island is rich in multi layers of soil along with brackish water available at 3ft below the ground level. The figure 1 is an illustration of the groundwater and brackish water and the project focuses on tapping the potential energy resources at Governor's Island to tackle the problem of climate change and promote sustainable development as a bigger picture on the Island. This is a great opportunity for the Island to develop as an independent water infrastructure. The project is a concept of a 'new generation' plumbing system that packages natural processes and recombines them in ways to create a beneficial outcome such as plumbing.

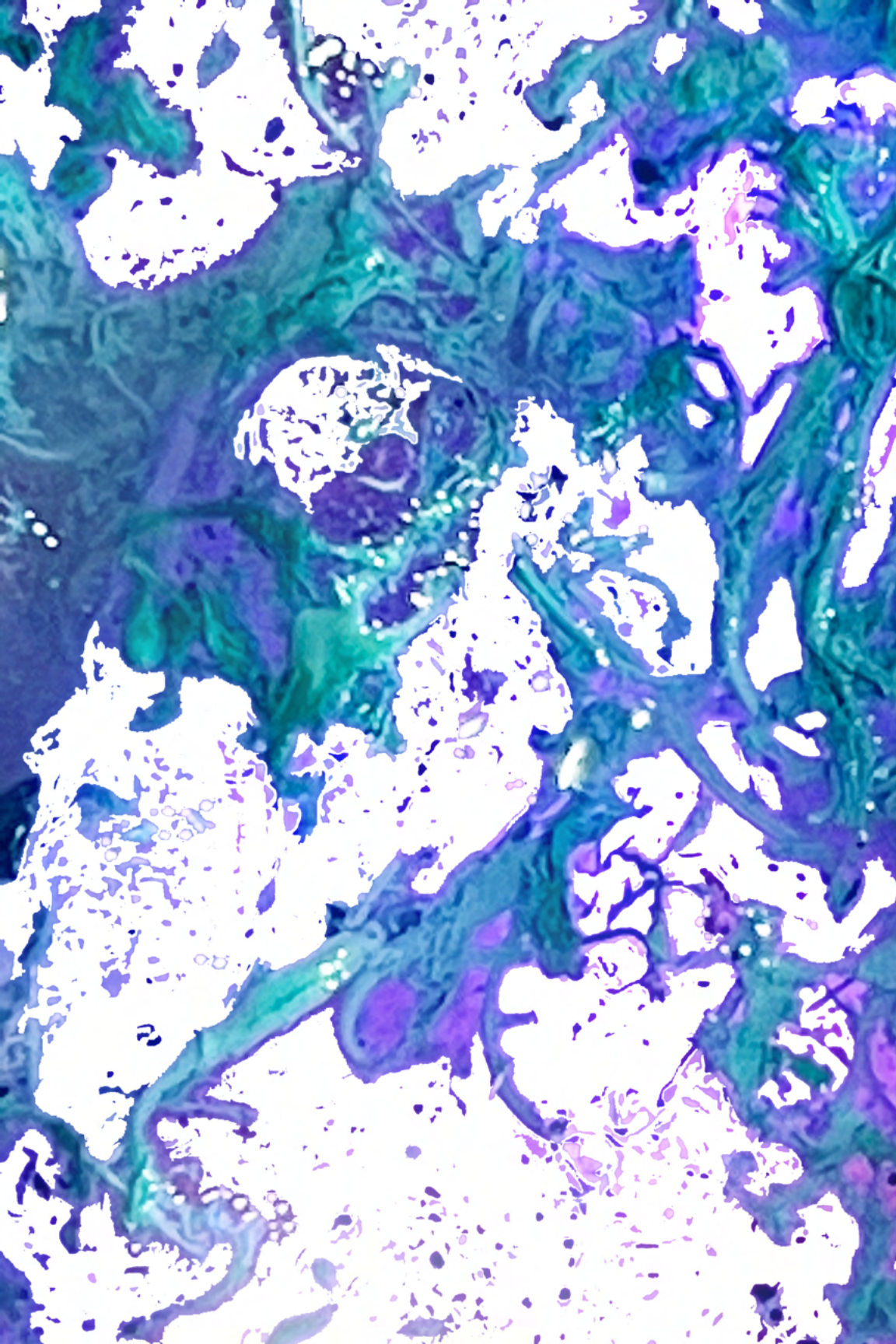
The Wet wall

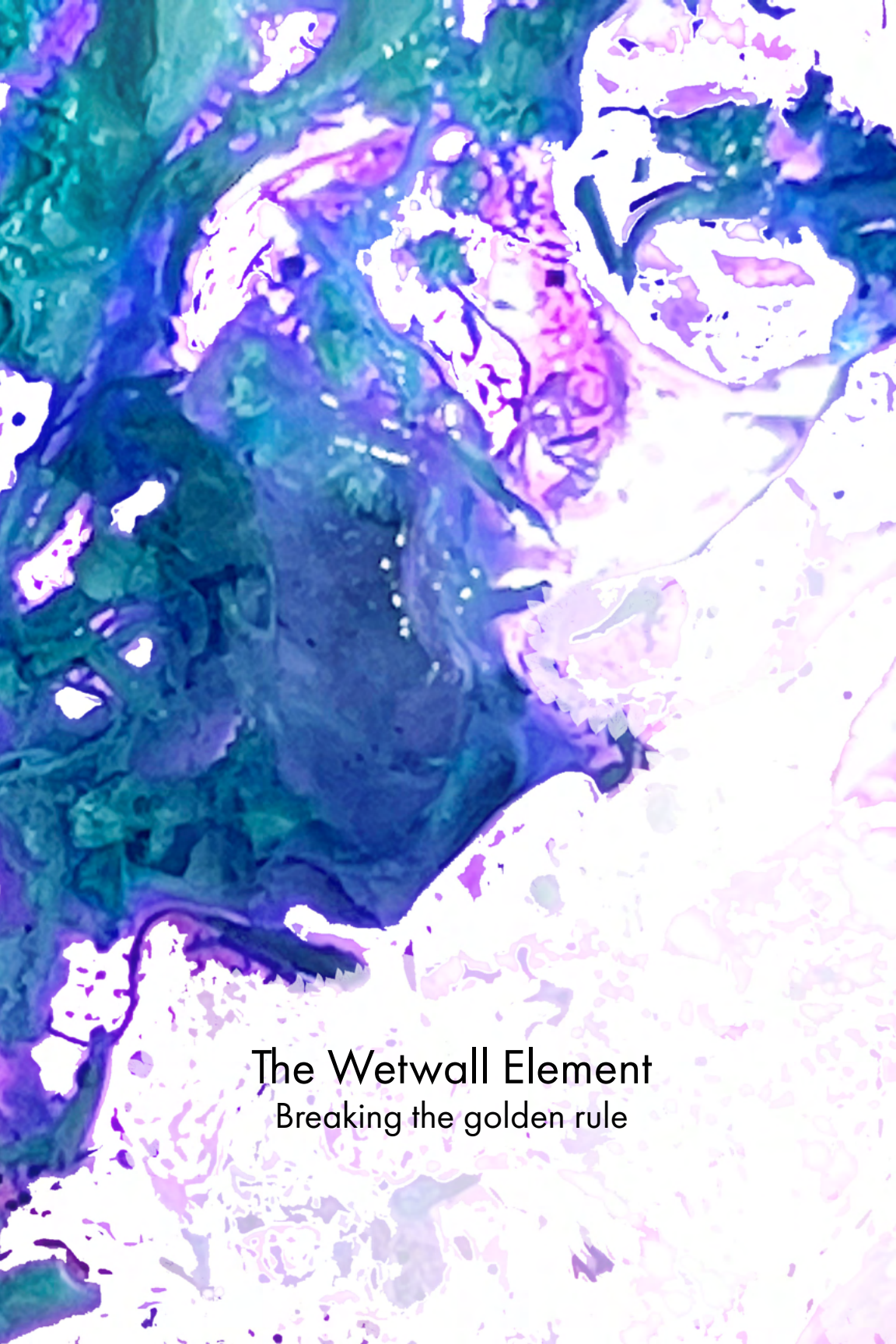
Everything about Victorian domesticity hides function. Water's functions such as water closets and piping are hidden behind panels and euphemisms. How can the historic Victorian house operate in a 21st century in which water becomes the most valuable commodity on the planet? The project centers on Nolan 14, exposing in a "wet wall," the value of water in a unique format as a Victorian home brought into 2021 as an educational and cultural space on Governors Island, an urban park and historic site destined to become a climate center for the 21st century.

The project reimagines water distribution and filtration through a materially intelligent 'Wet Wall,' taking House 14 as a prototype. Water filtration of brackish and salt water may become an increasingly essential function in residential architecture as well as a signifier of the global water crisis. The concept of a thick 'Wet Wall' running around house 14, pushing and filtering water through a novel material, provides a platform for new atmospheric and educational conditions, bringing Victorian domesticity into the 21st century.

The Wet wall addresses filtration as an essential element in architecture by examining its eco performances and materiality in house 14. In result, about the water crisis we face globally in current day to day life, the aim is to create this concept of a thick ' Wet Wall' running around house 14, pushing and filtering water through provides a platform atmospherically, educationally and spatial experiential spaces.

1. The Trust for Governors Island. **The History of Governors Island,** https://www.govisland.com/history.
2. The Trust for Governors Island. **Center for climate solutions: Anchor Educational and Research Institution RFEL.** https://gov-island-site.s3.amazonaws.com/pages/RFEL_AnchorEduResearchInstitution_2021_06_27.pdf?mtime-20210629085845. Accessed March 24, 2021.
3. The Trust for Governors Island. **All about the fortification & Revolution war.**
4. Stapinski, Helene. **"Is This the End of Governors Island?" The New York Times.** 2021. https://www.govisland.com/history.
5. New York Open data. **School Districts.** January 31, 2013. https://data.cityofnewyork.us/Education/School-Districts/r8nu-ymqi. Accessed March 2021.




The Wetwall Element
Breaking the golden rule

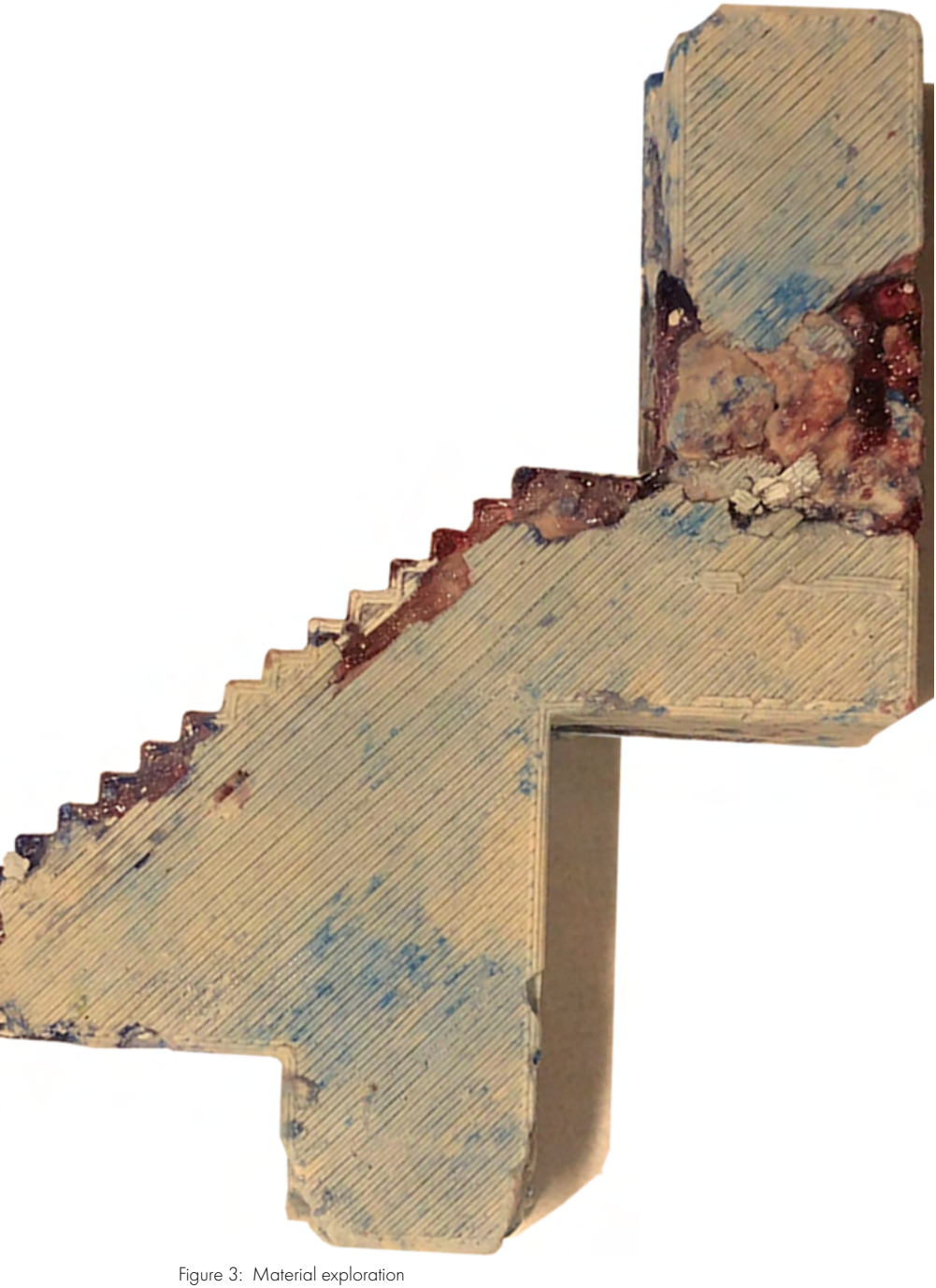


Figure 3: Material exploration

The Element

The project sections building technology, revealing water functions that includes filtration and climatization. Its the approach to domestic water services and in order to highlight the importance of fresh water in our current period of sea level rise and climate change. The research explores ways of making fresh water collection and brackish water filtration increasingly visible in building 14, formerly a domestic space and now used for cultural and experiential programming. Through the project, I wanted to reimagine water distribution and filtration through a materially intelligent ' Wet Wall' taking house 14 as prototype.

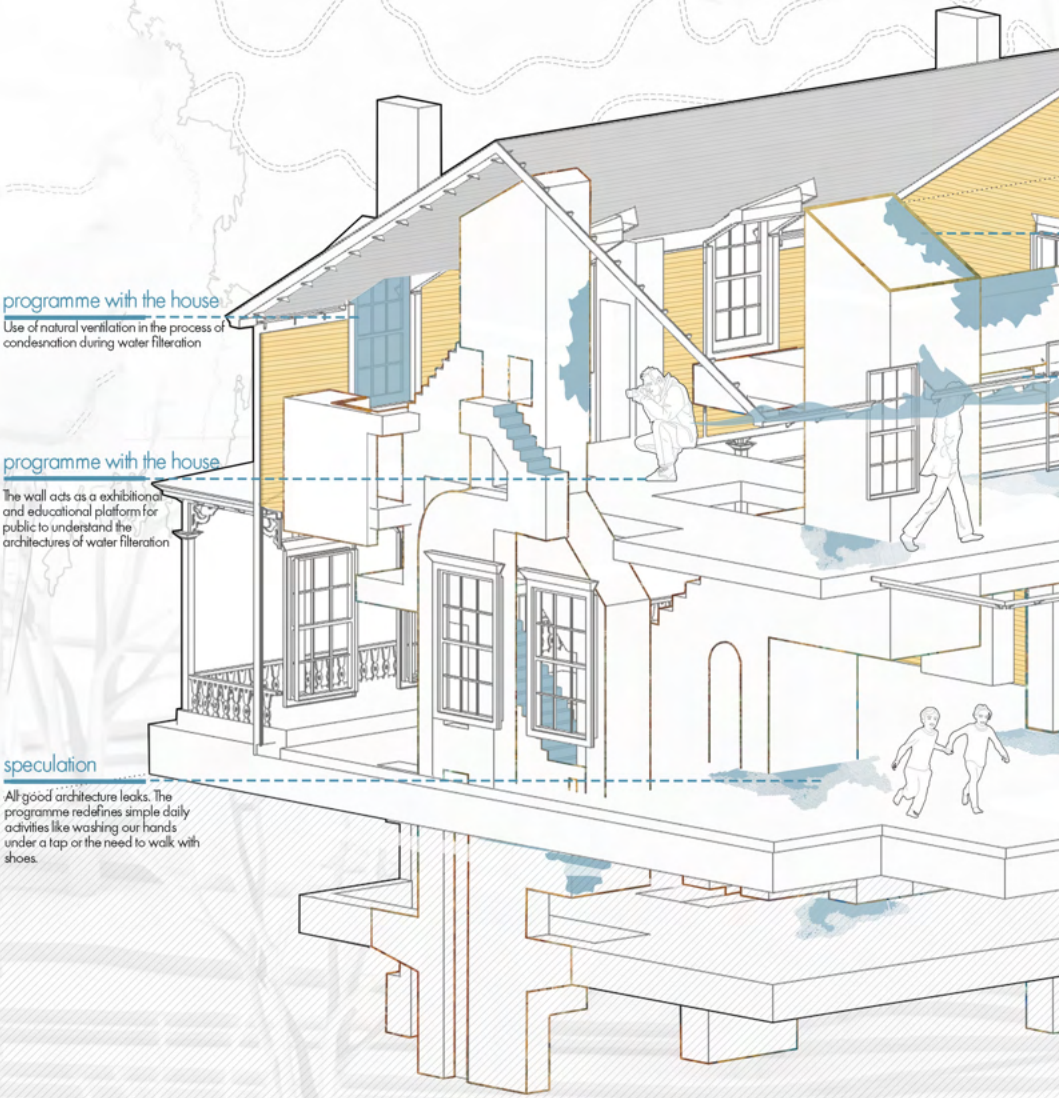
The water system element defines the site by studying ground and roof level water touchpoints. The main plan is to study the different mechanics of water and the other details that includes the speed flows, assemblages, staining, and embrace these into a visual languages.

Figure 4: Chunk model for material exploration

The system of the wetwall

The project addresses filtration process as an essential element in architecture by examining its eco performances and materiality and also as a signifier of the water crises that we face globally. By creating this concept of a thick 'Wet wall' around house 14, pushing and filtering water through provides a platforms atmospherically and educationally.

That mainly includes areas like Spatial Organization, Functional Organization, Scale and Speculative Narrative. The Spatial and functional organization allows the volumetric enclosure to other ornamental elemnet along with capturing and filtering water for desalination as its paired with a sensory experiences for the users. The wet wall is identified on different scales and materials where it exposed with different experiential spaces and environment.


programme with the house
Use of natural ventilation in the process of condesnation during water filteration
programme with the house
The wall acts as a exhibitional and educational platform for public to understand the architectures of water filteration
speculation
All good architecture leaks. The programme redefines simple daily activities like washing our hands under a tap or the need to walk with shoes.

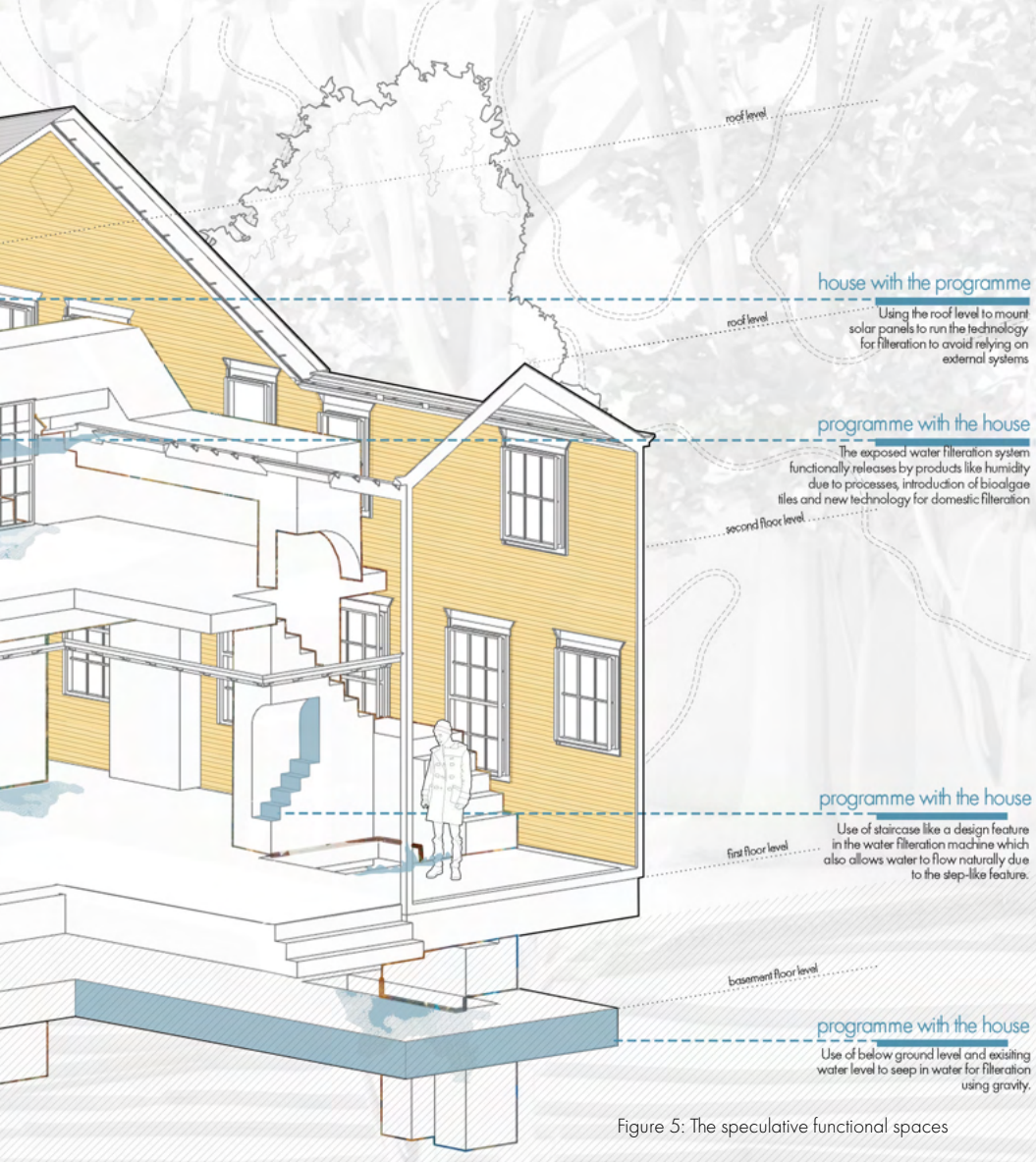


Figure 5: The speculative functional spaces


Water capture roof level with the use of sieve
Using the roof level to mount solar panels to run the technology for filteration to avoid relying on external systems
Indoor algae wall has multiple advantages like: air purification humidity control
Staircase like feature to activate natural flow of water through the house
Collection tanks to be of organic shapes that promote the natural flow of water into them

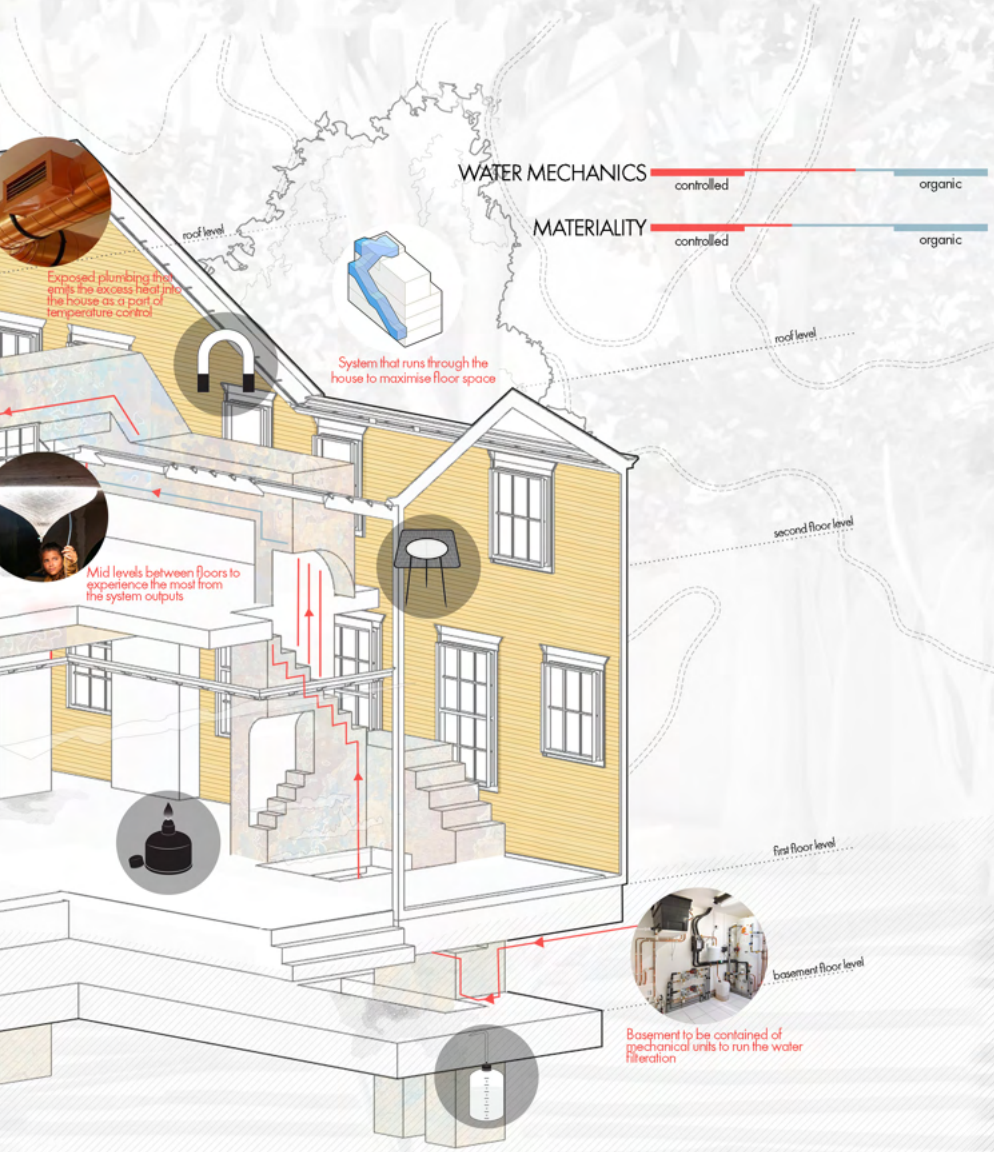
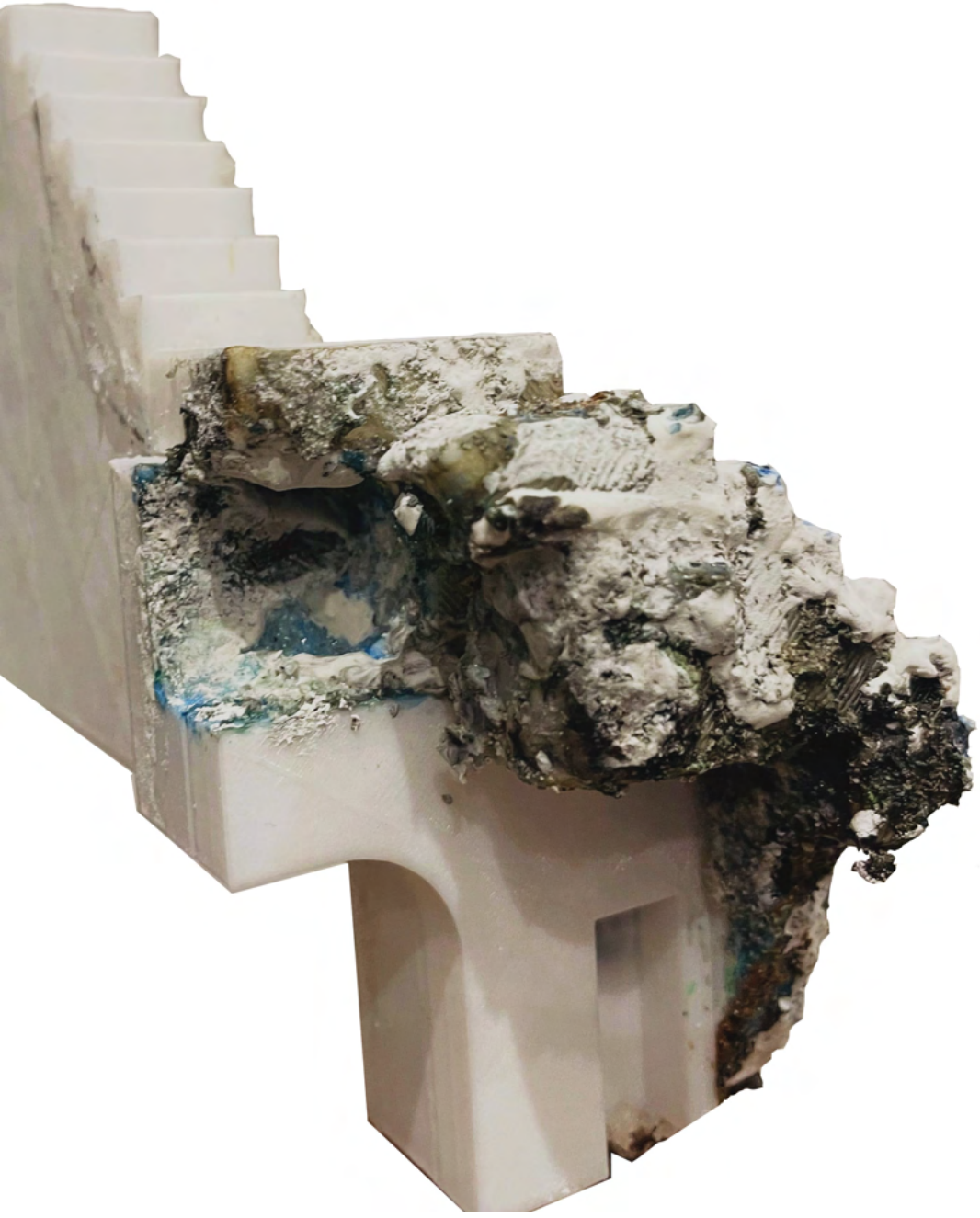


Figure 6: Water Mechanics



Material Life
The ingredients

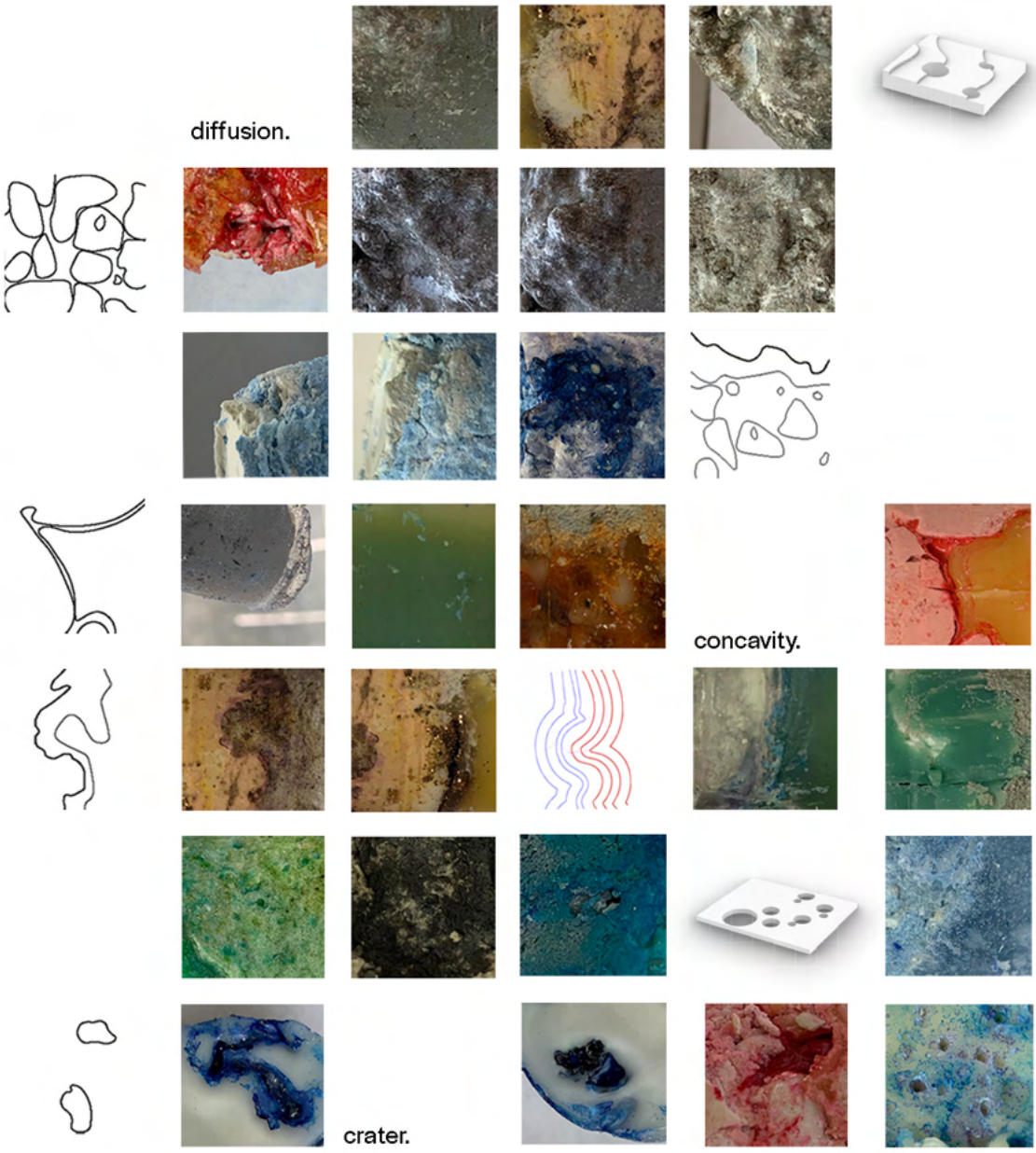
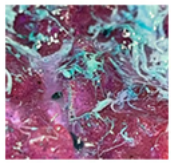
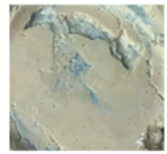


Figure 7: Material Sampling









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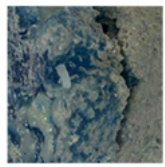
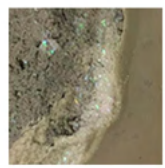






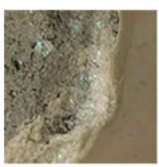
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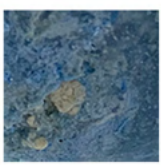
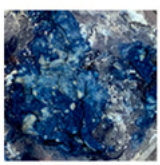
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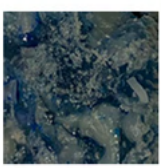
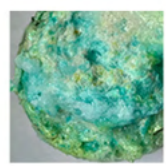
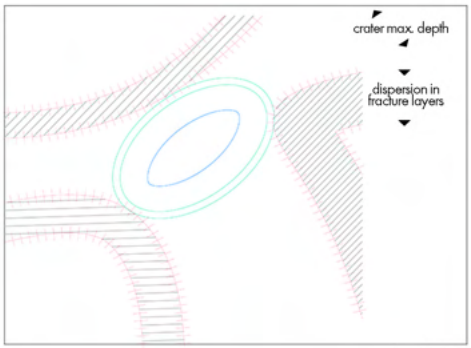




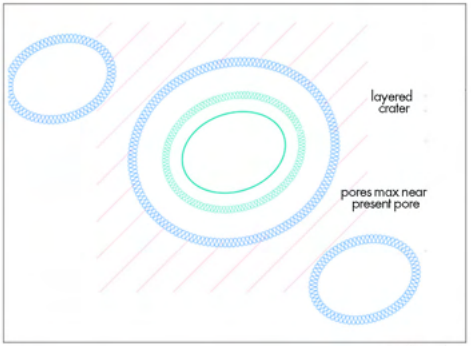




embedded

crater

fluidity



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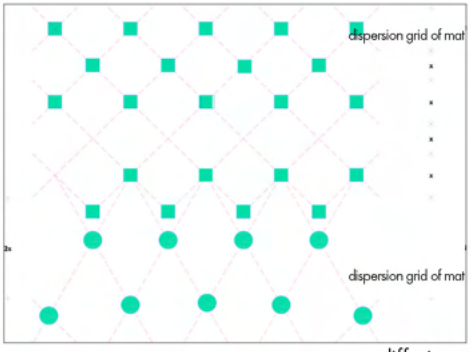
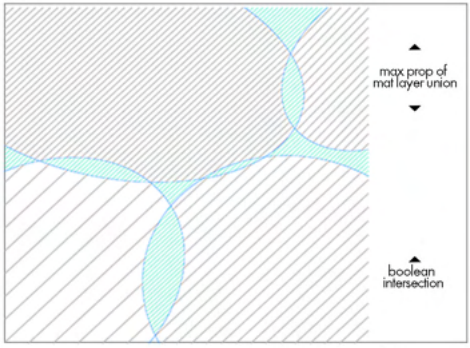


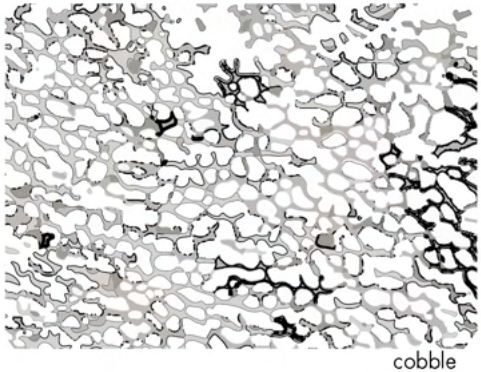
diffusion

modules

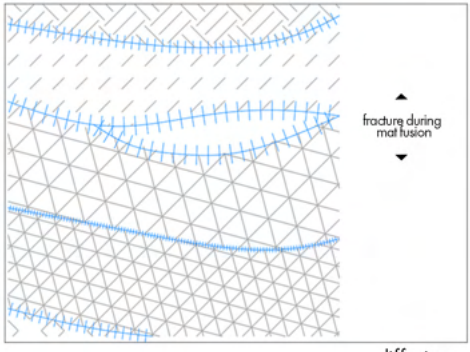


layering

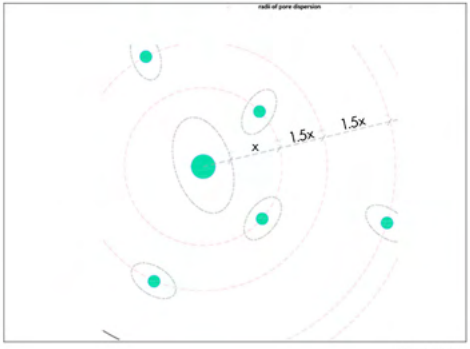
layering



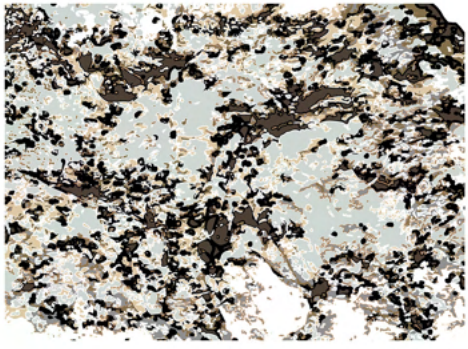
cobble



diffusion

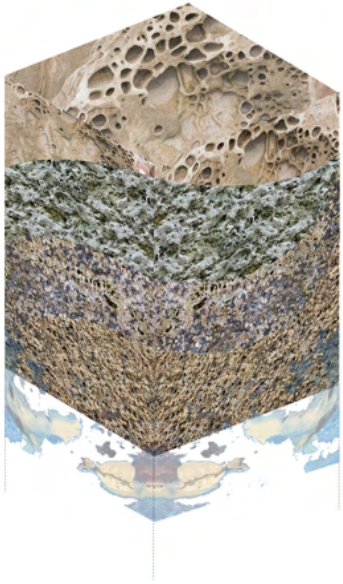


porous

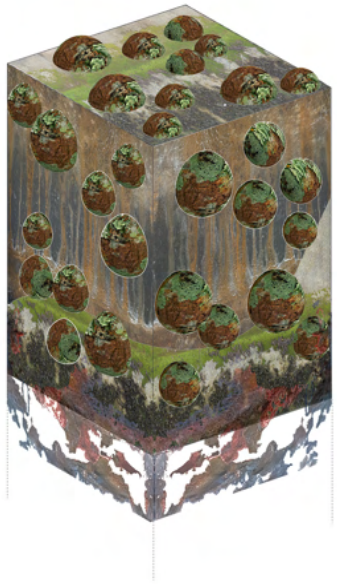


porous

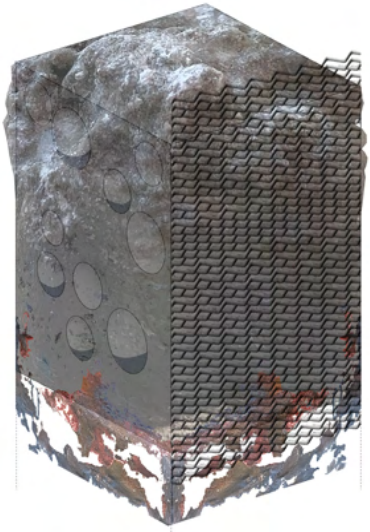
Figure 8: Water Dynamics



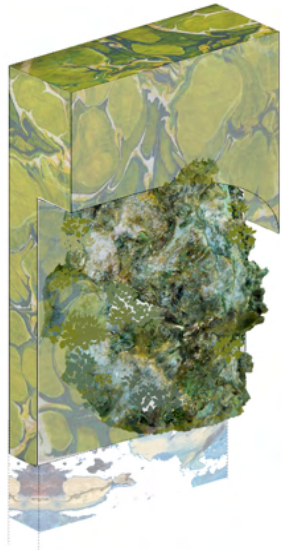
Granular filtration
/functional



Bio algae wall
/functional



Rainwater Harvestor
/functional



Bio algae wall
/exhibitional

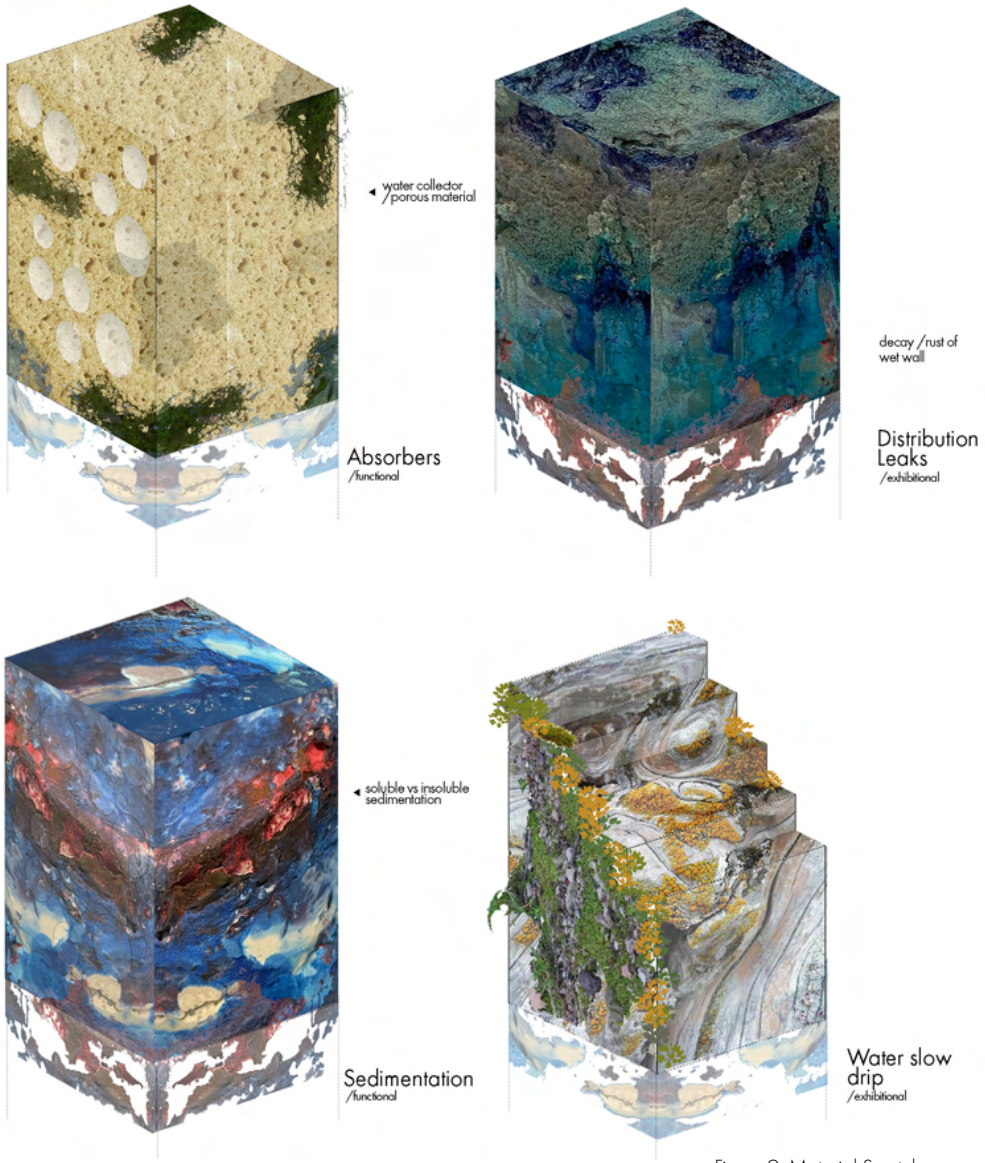


Figure 9: Material Swatches

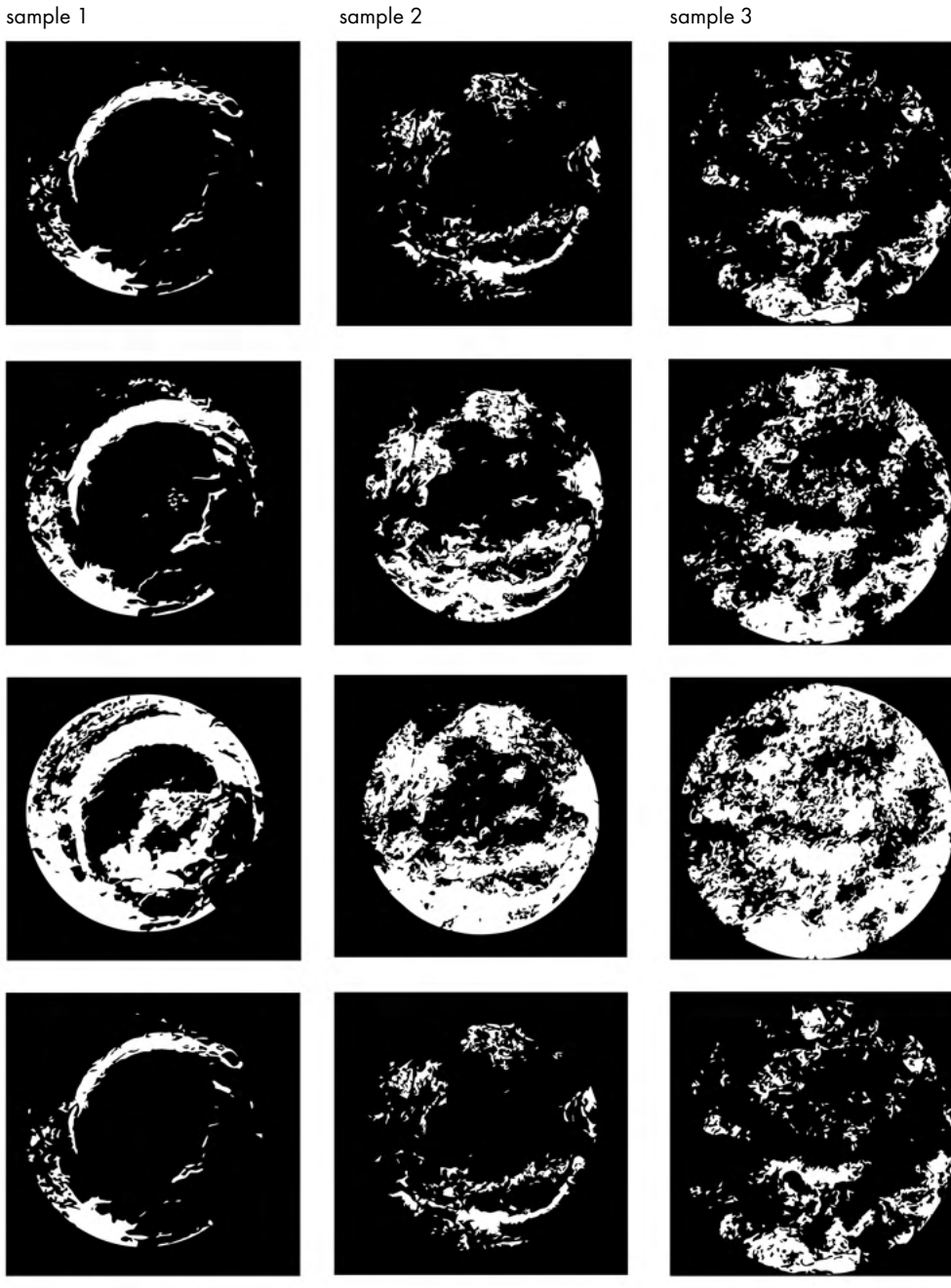
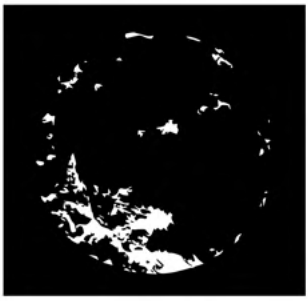
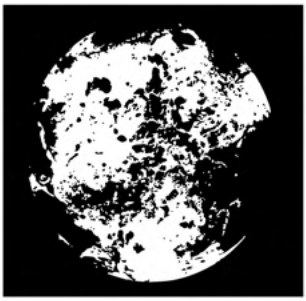


Figure 10: Water Dynamics, exploring the behavior onto our materials of interest.

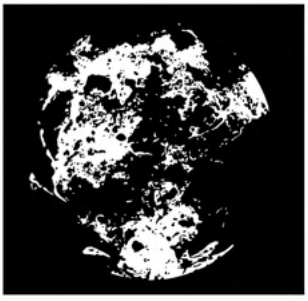
sample 4

sample 5

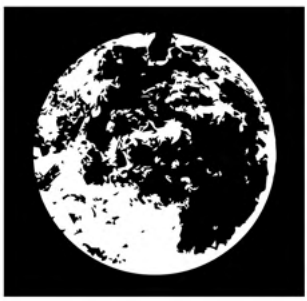


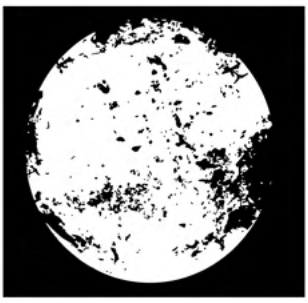


spill area 1

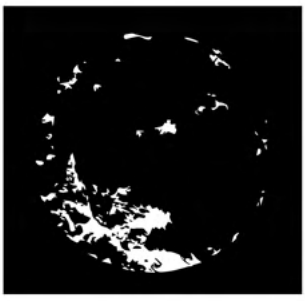


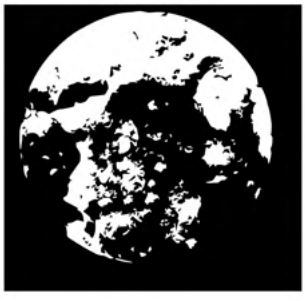
spill area 2





spill area 3





spill area 4

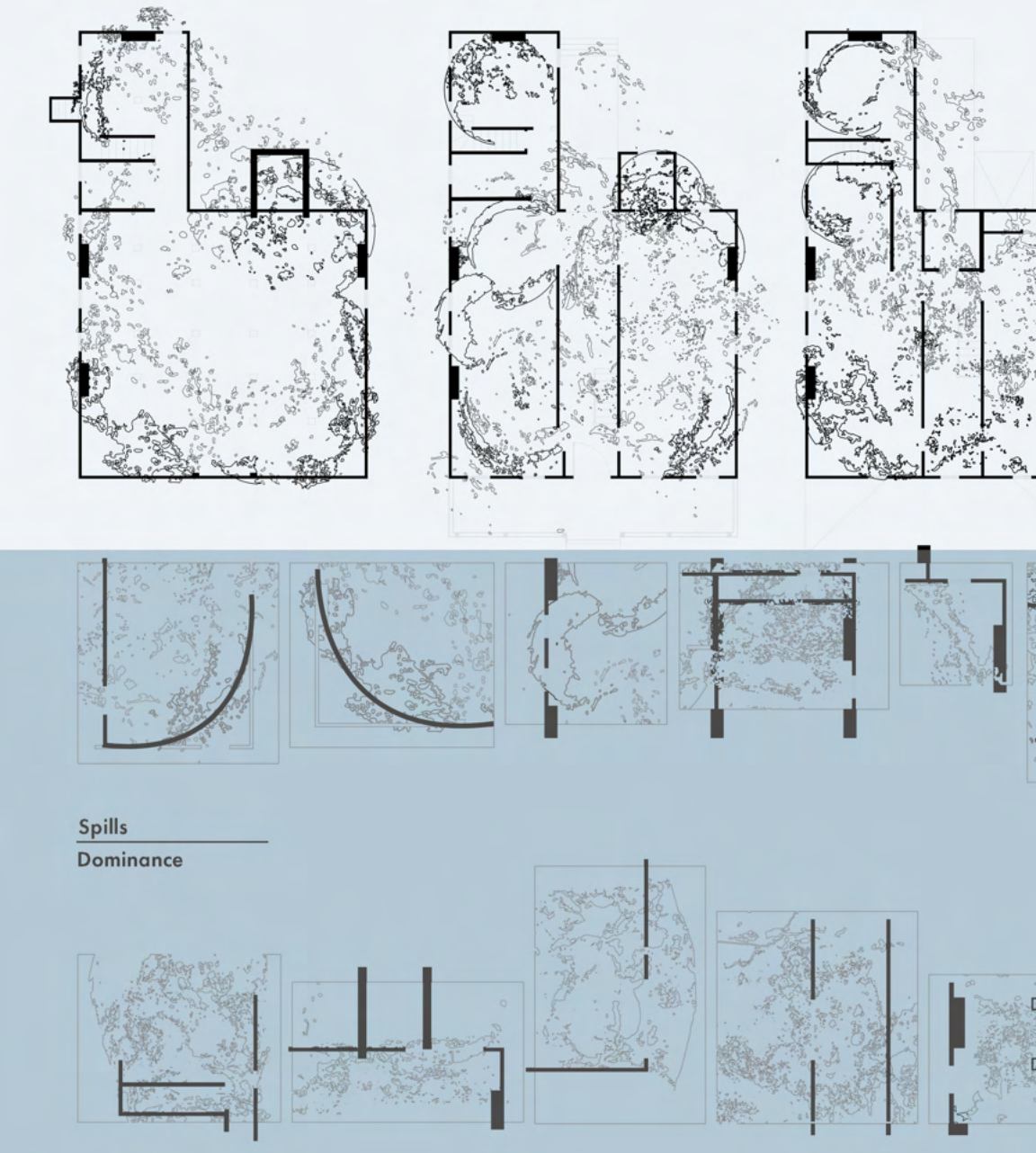
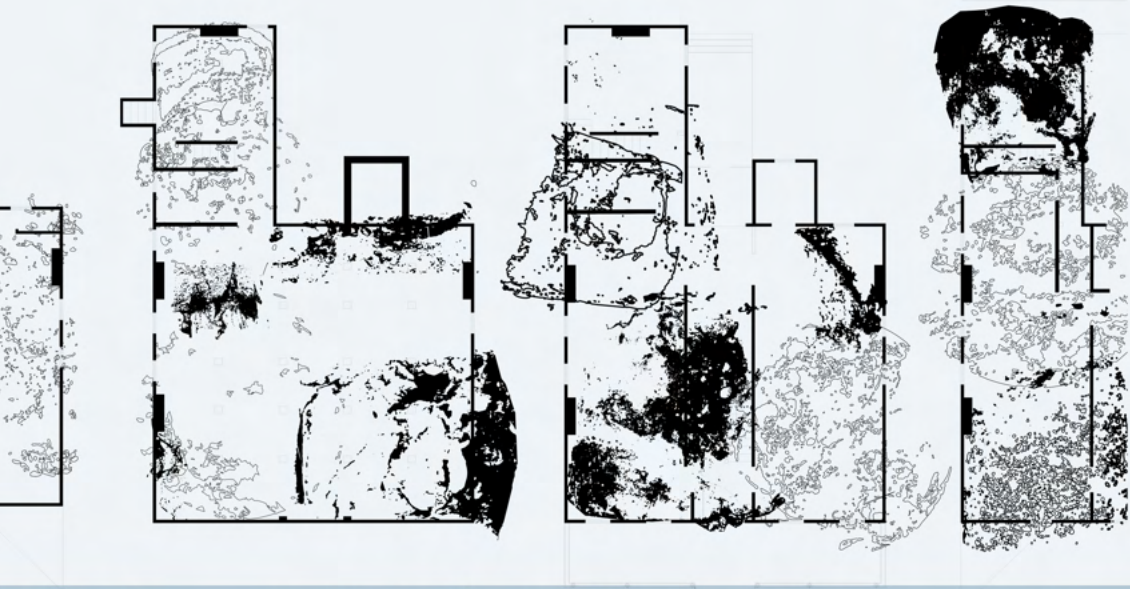
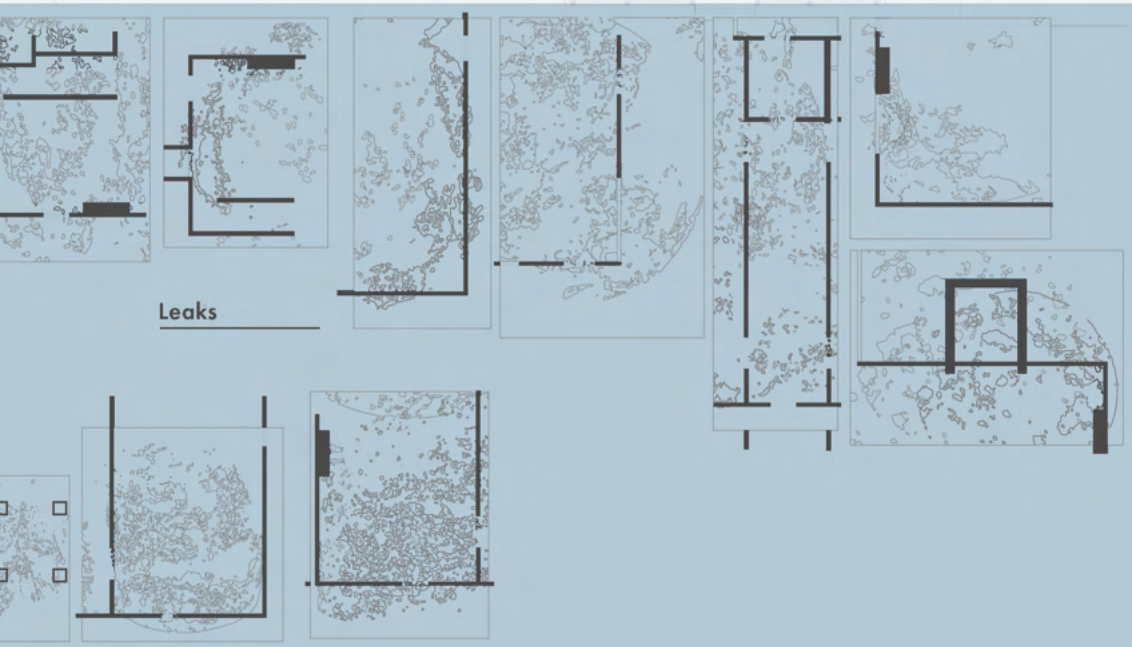


Figure 11: Water Encroachment on house 14




Leaks

Material follows function
System outline

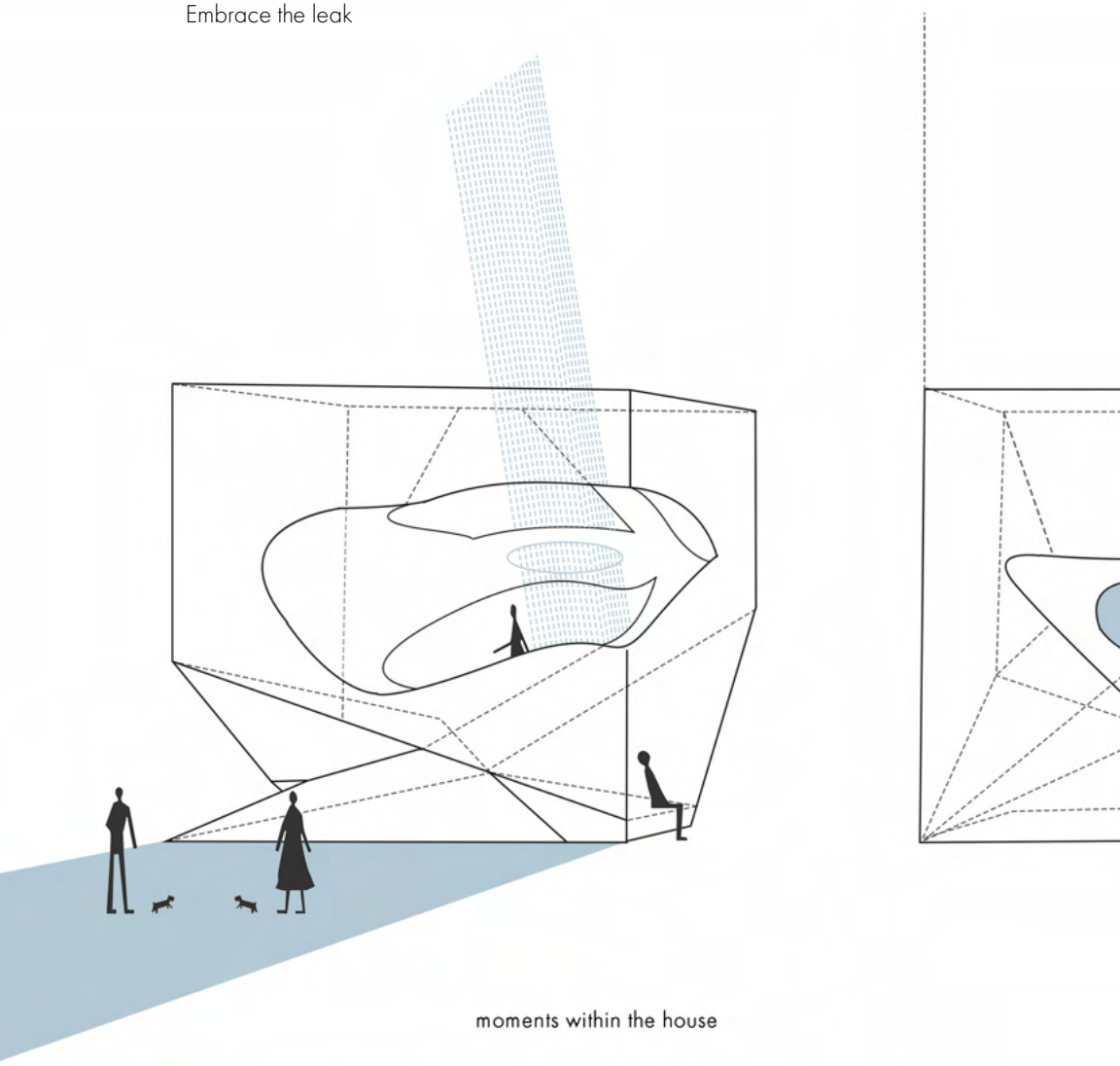
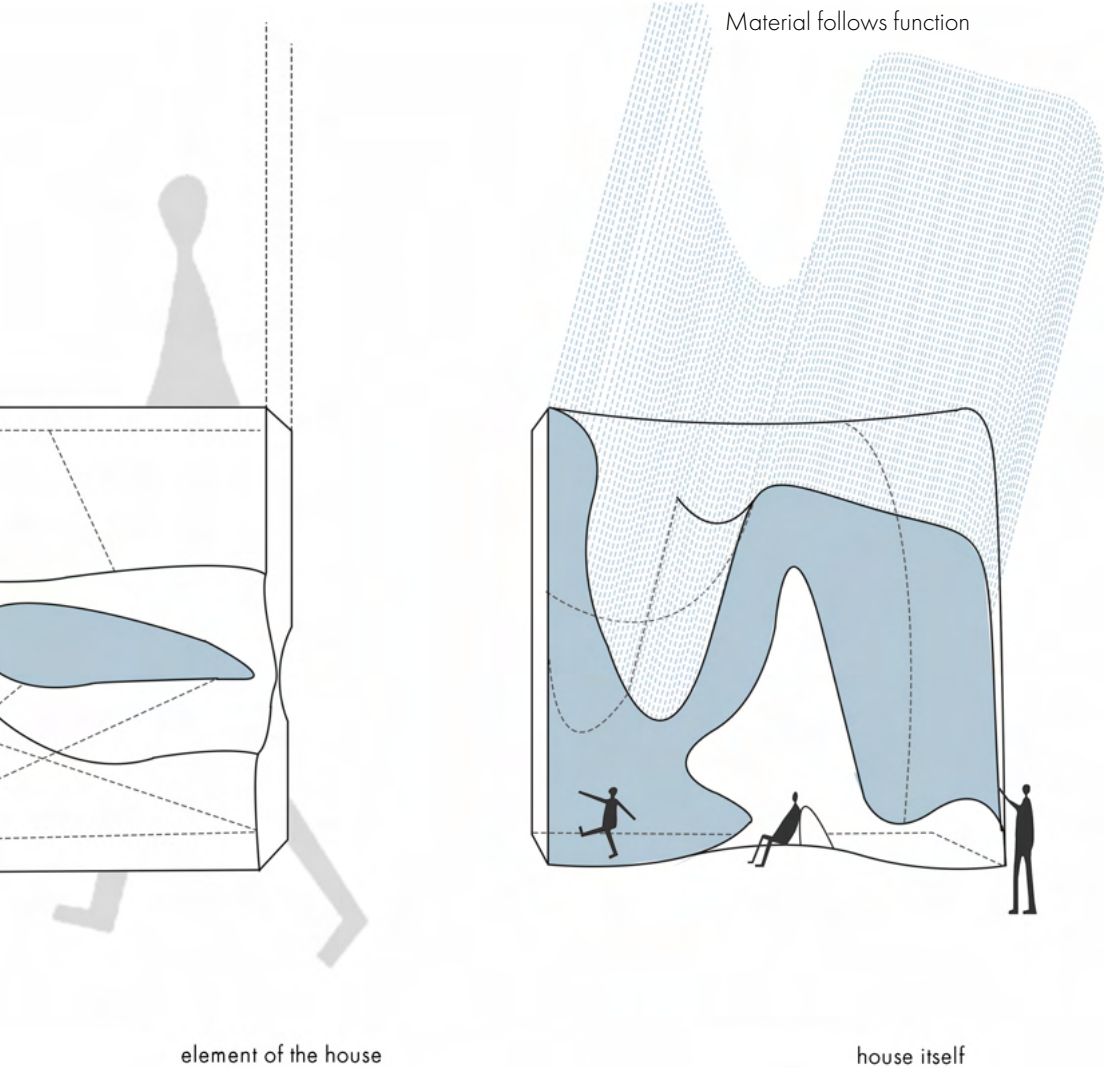


Figure 12: Volumetric representation of wet wall

The experience by the Wet Wall is enhanced through the haptic environment it establishes itself in- through sensory experiences, to a user outside house 14: one can notice a void on the roof and the back wall that helps to flow water. But the proposal within creates a new architecture for filtration.



element of the house

house itself

The concept was later developed to play with scales to recognise areas where the wet wall itself becomes house 14 and areas where the users can see the exposed parts of it. The wet wall embraces the complexities of water mechanics by staining into a visual language and rewilding as a lens, not only to investigate but also to independently develop real and speculative solutions for the futures of indoor sustainable spaces through architecture, material exploration, and computation, to creatively apply and implement feasible inventions at different scales.

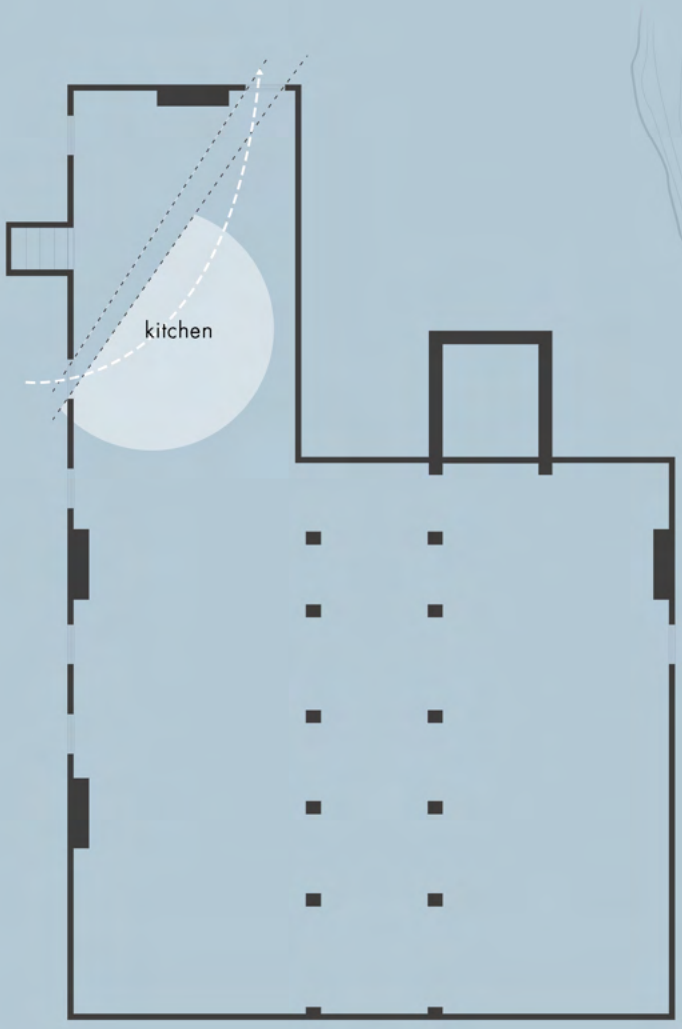
Figure 13: Speculative water encroachment narration on house 14 section

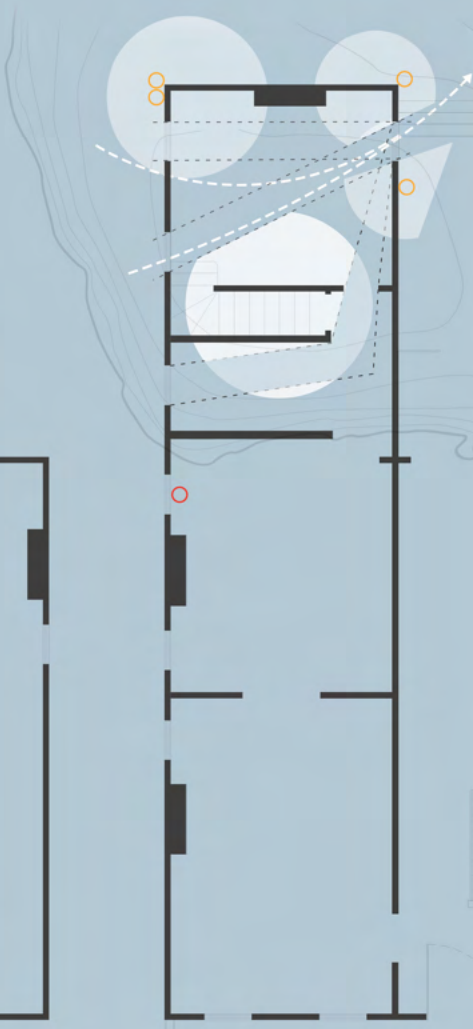
The Form and materials

The intend of understanding water dynamics through material explorations , I have found out that value of architecture observing how it improves and rearranges reality.[1] It establishes a shared use of wet domestic activities within the house, Coining the term water expressionism. In few areas within the house, where the role of water becomes dominant for example basement where we introduce pools of filtered and unfiltered water for the users to experience.

The idea of creating new and engaging abstract form through the interaction of material and geometry is further explored with the lens of generating architectural spaces that highlights one's attention to one's body in space. The rich mix of materials that are used to constitute the figurals augment their complexity and ambiguity as these materials flow from one surface to another defying the confines of the shape outlines. The texture and tactility of the different materials used further adds a layer of perception to the spaces created. This leads to, as Roland Barthes, in his book Mythologies calls it, the "Great tactile phase of discovery, the moment when visual wonder is about to receive the reasoned assault of touch". [2]

There are two main speculative drawings created from the material exploration throughout the studies which is deep section and plan. The combination of the varying rigidity, profiles and voluminous characteristics of the complex forms, together with the varying densities, transparencies and finishes of the different materials, generates sensory spaces that evoke different experiences.





below ground level
level 0

ground level
level 1

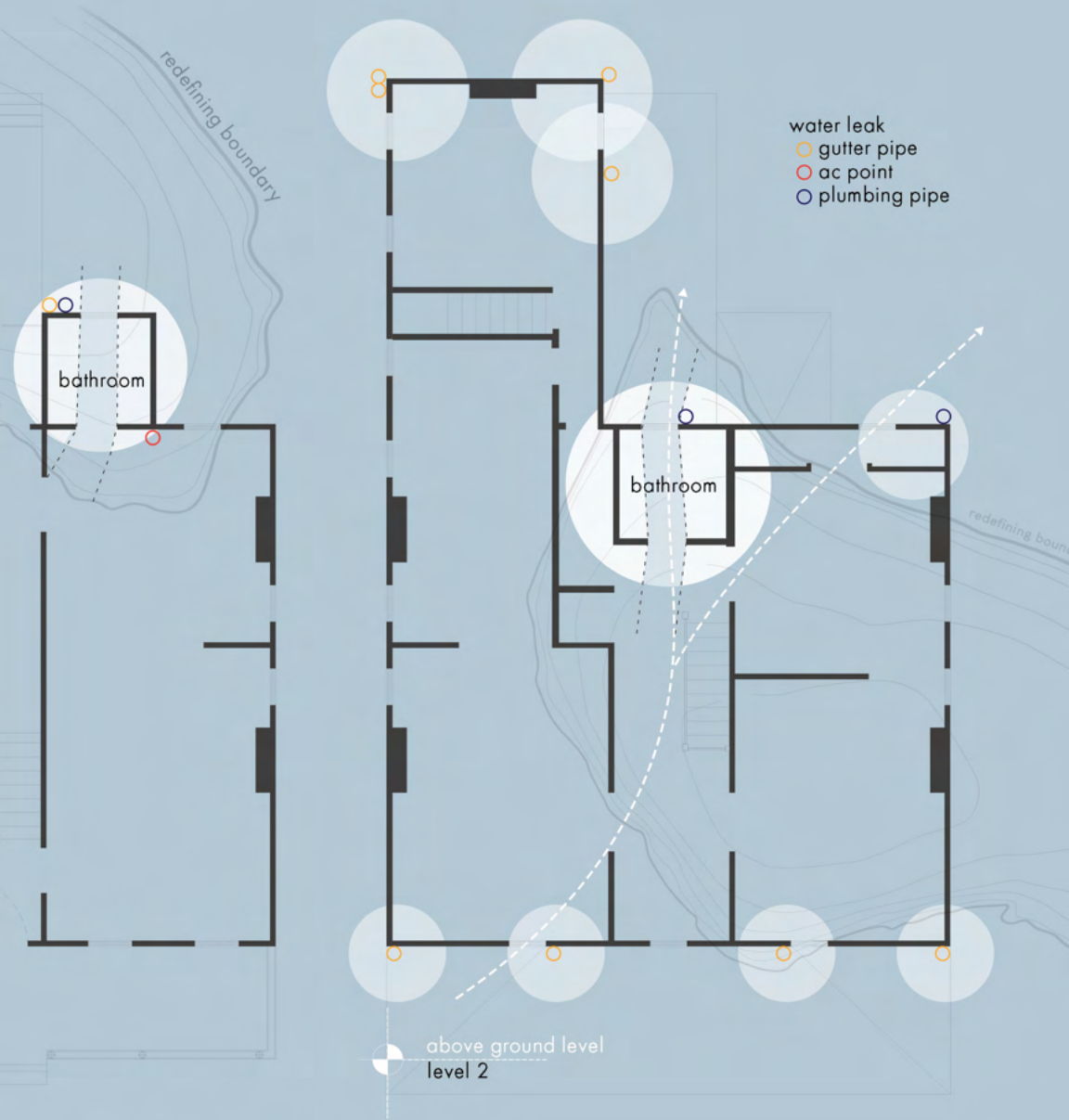
TAXONOMY

formal language of water

wind
water fluidity

water leaks
leak zones

humid vs damp
atmospheric quality



private vs public mystery cultural haptic

position of water exposure controlled interaction

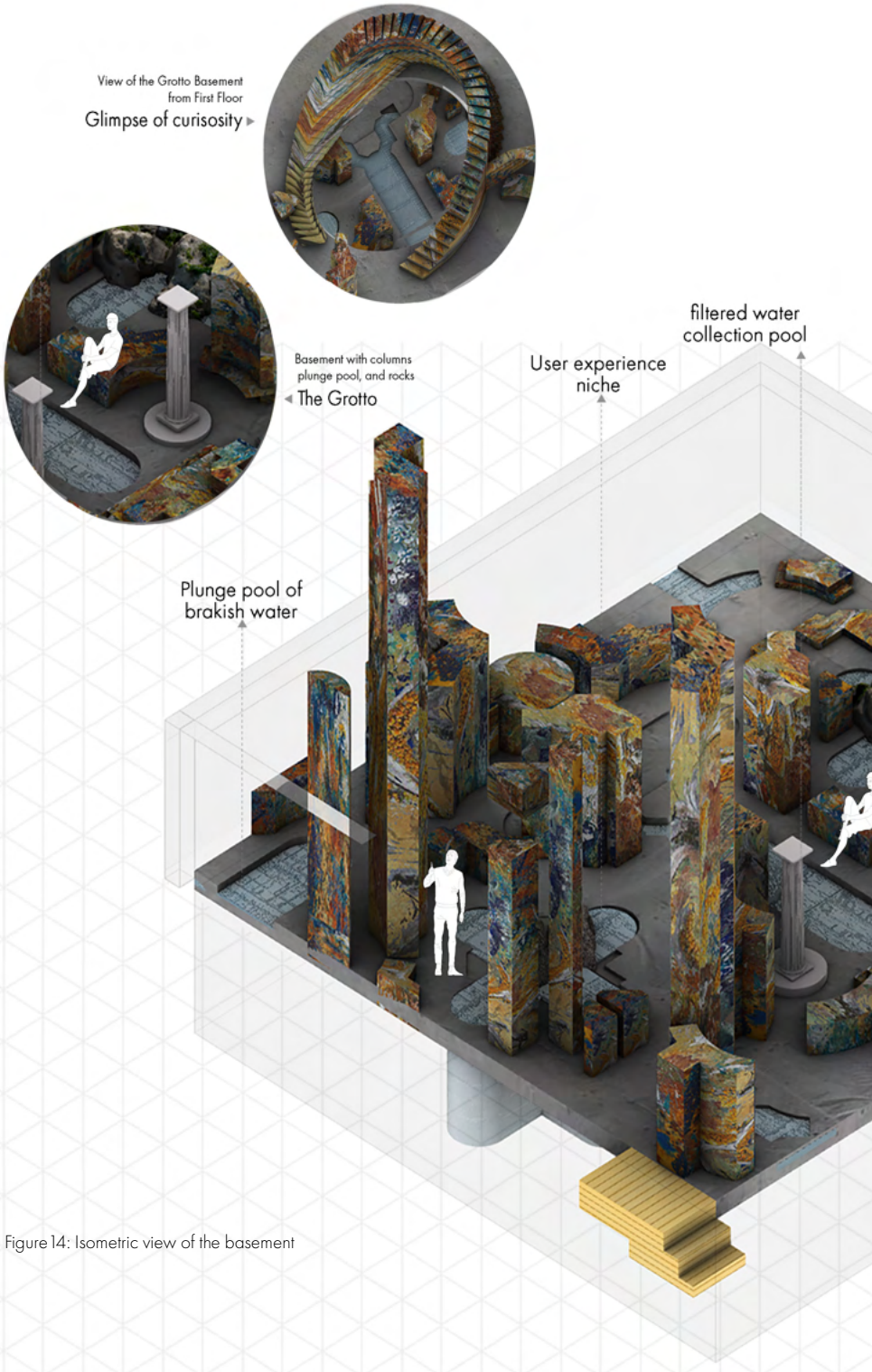


Figure 14: Isometric view of the basement

The transitional nature of
Wet wall to activating spaces
Seating to Seperator

Carbon tubes
placed to imiate the
Fluidity of water

Algae pools

Brackish water pool

Desalinization unit

Figure 15: Basement plan - house 14

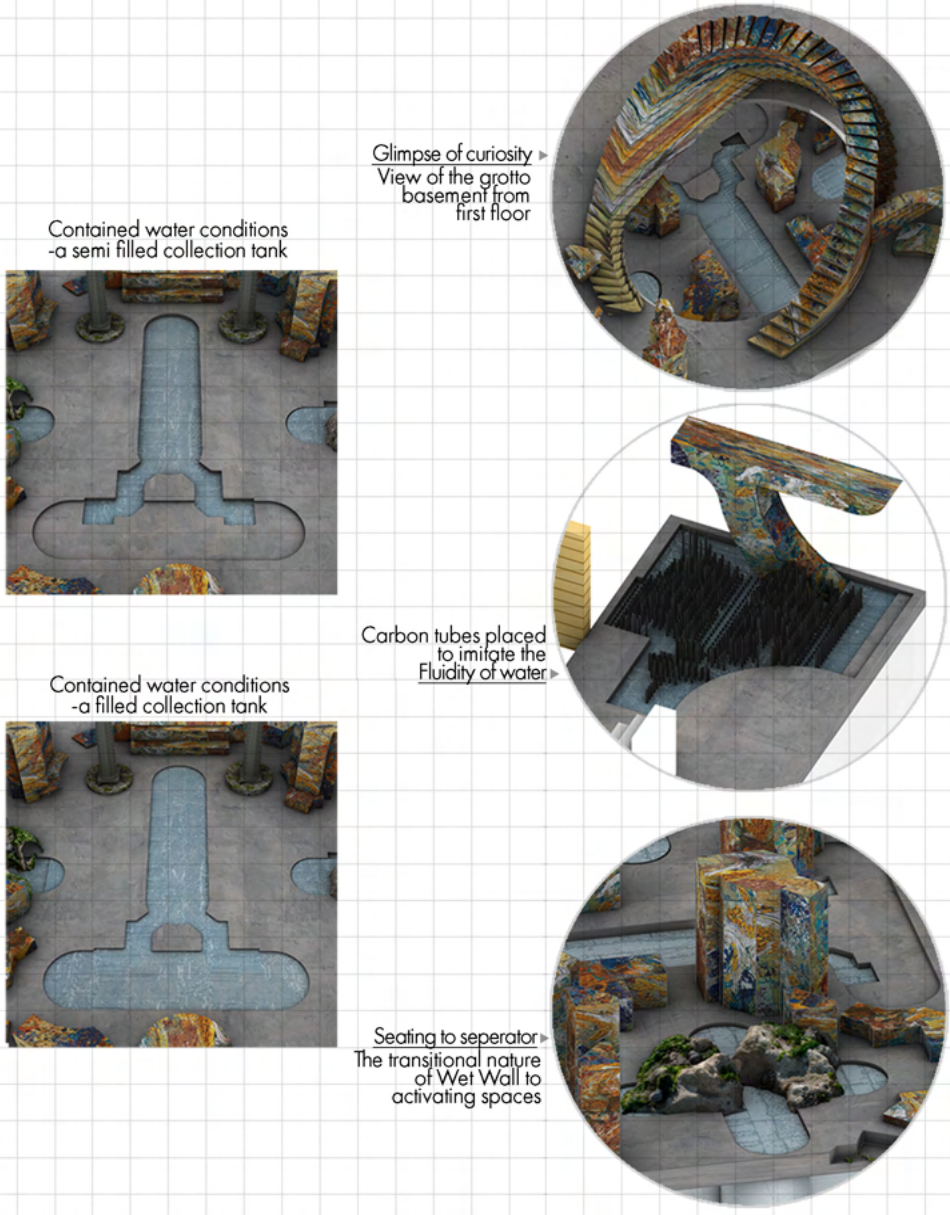


Figure 16: Spatial spaces in Basement level

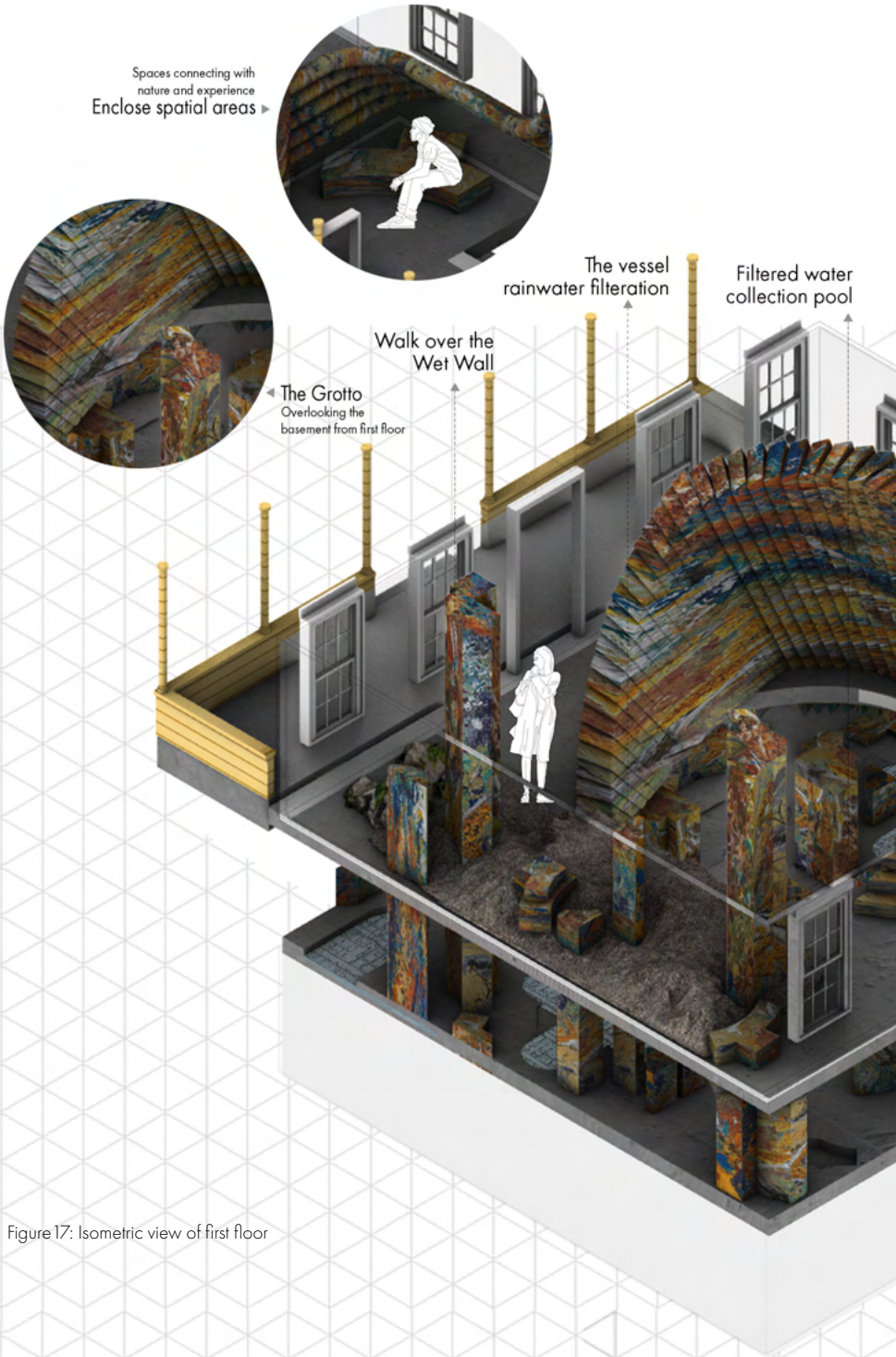
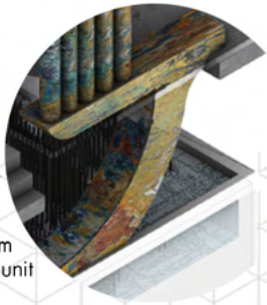


Figure 17: Isometric view of first floor

The grotto environment creating experiential spaces

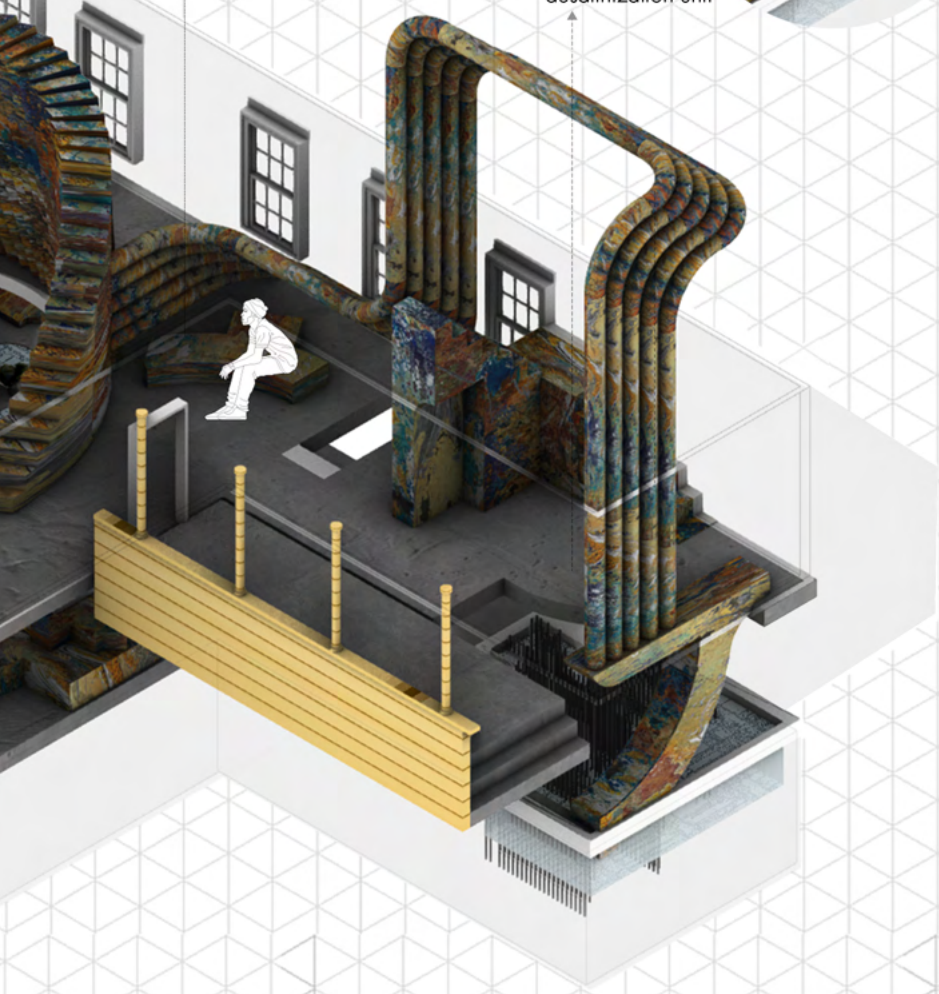
The rocks



Carbon tubes placed to imiate the Fluidity of water

The humid room desalinization unit

Inside out plumb room filtered brackish water to main collection tank



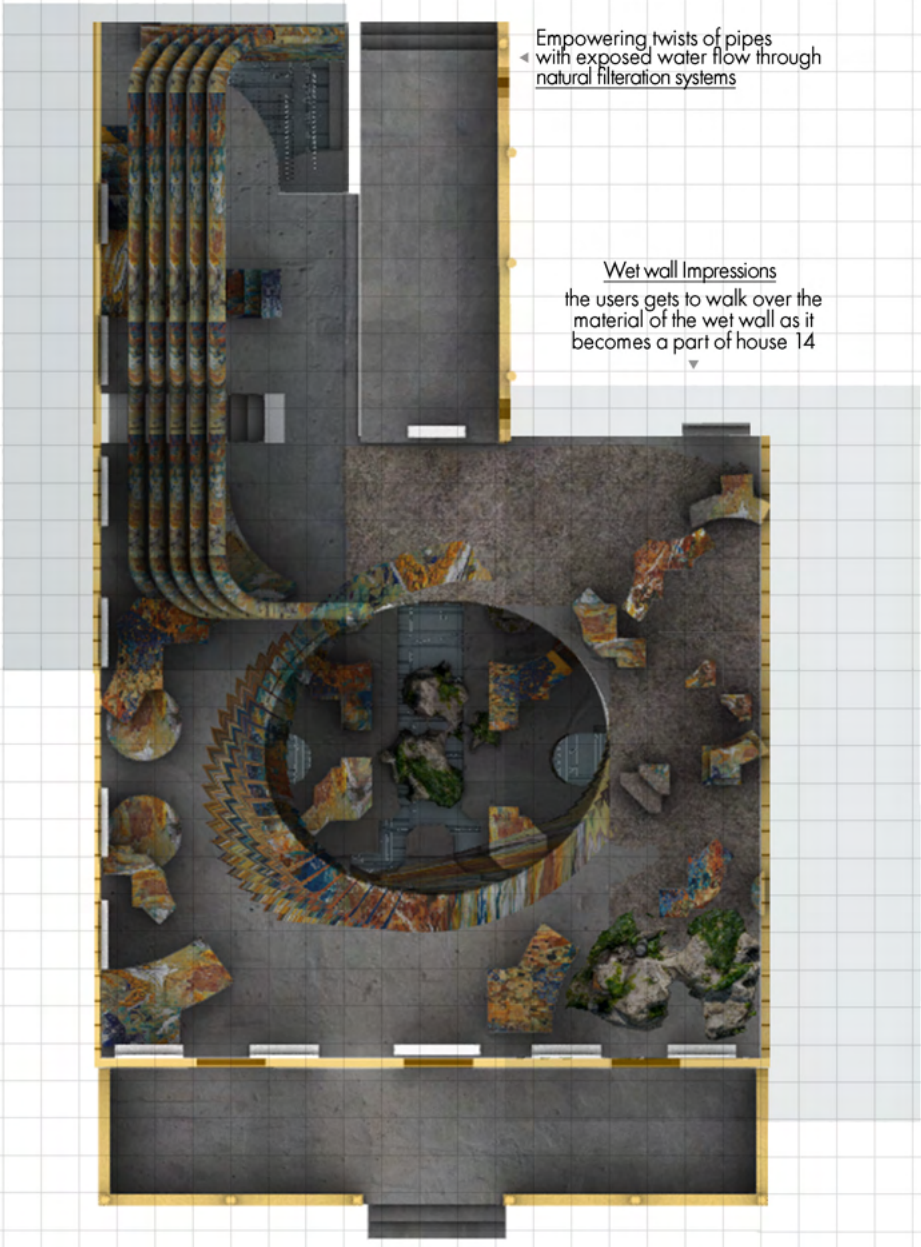
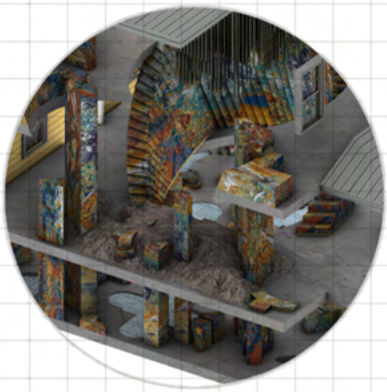
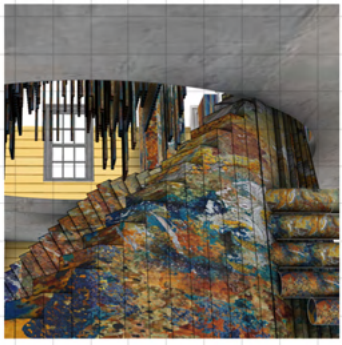


Figure 18: First floor plan - house 14

Redefined floor cut outs for glimpses



Walk, feel, hear, smell the wet wall
Staircase feature around the vessel



Exposed filteration work

overlooking the grotto from upper level

Repetition and scaling of elements related to water movement facilating

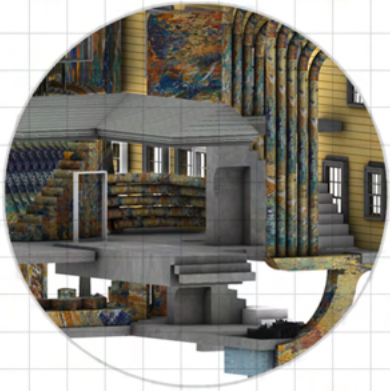


Figure 19: Spatial spaces in first floor level

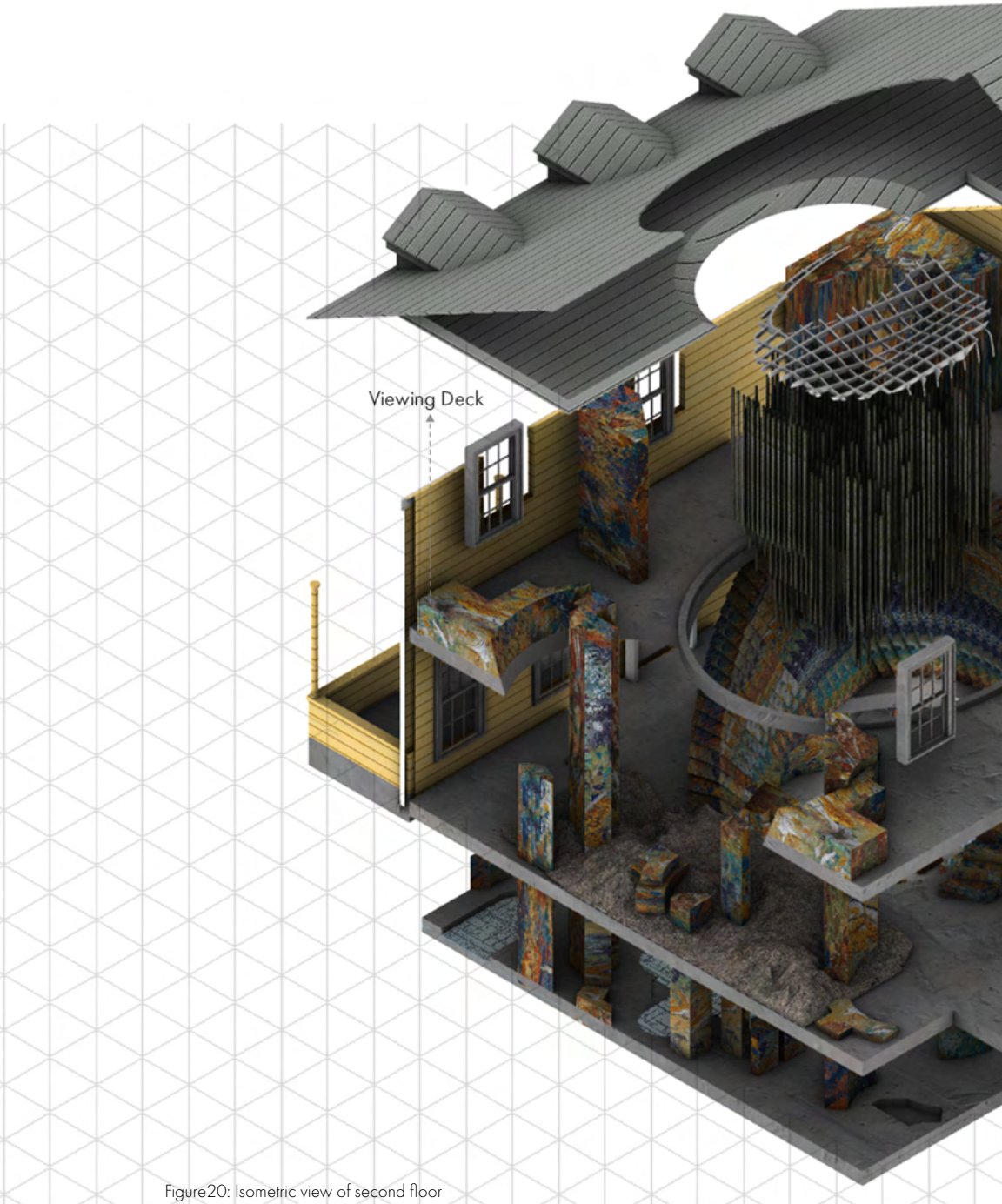
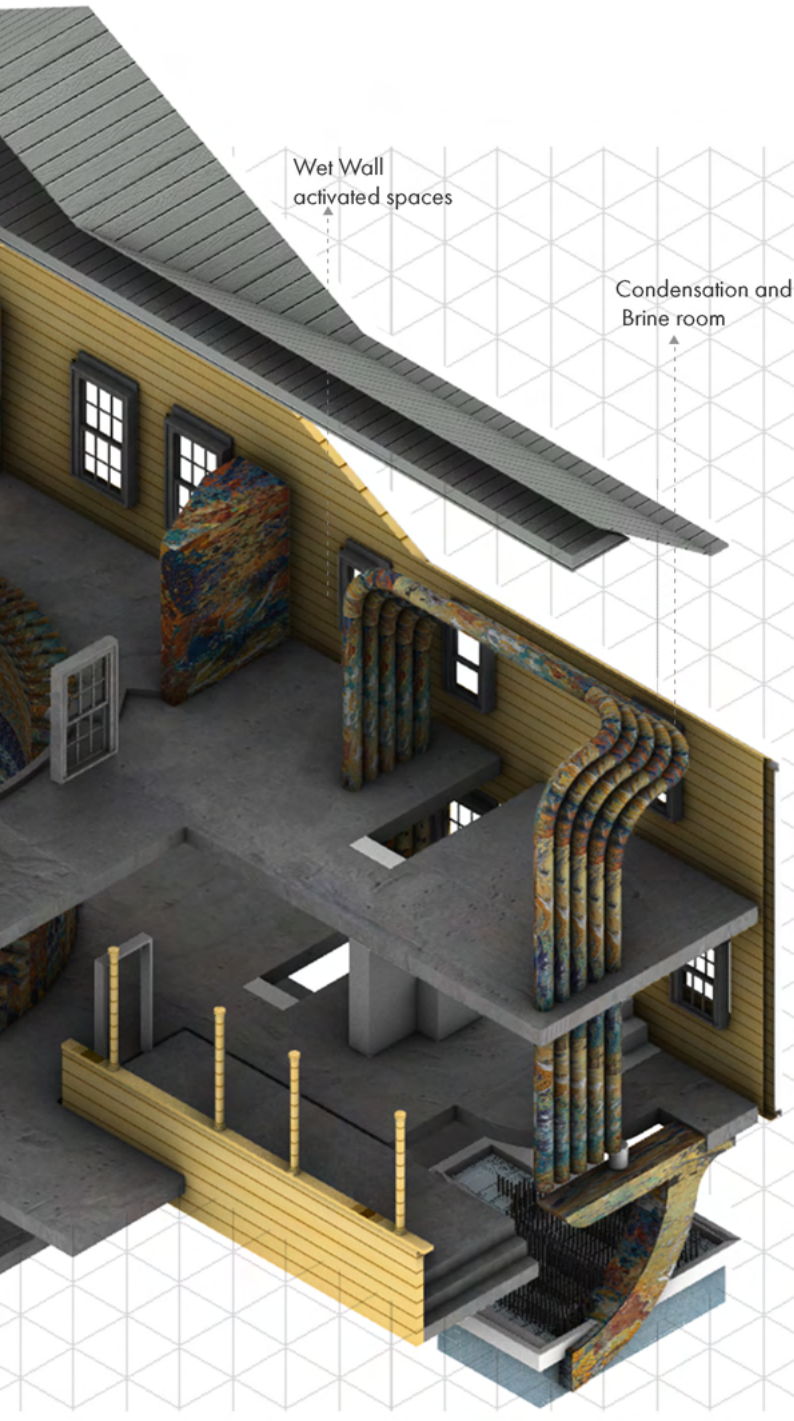


Figure20: Isometric view of second floor


Wet Wall
activated spaces
Condensation and
Brine room

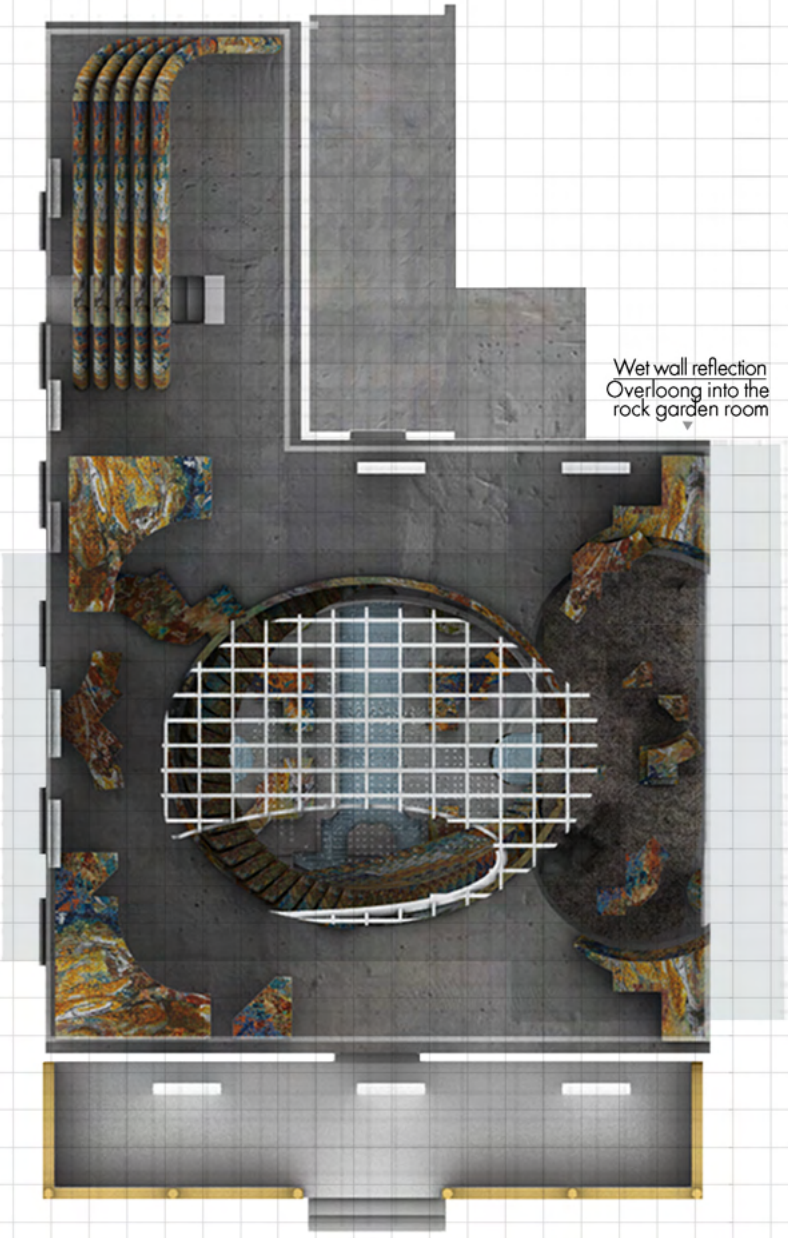
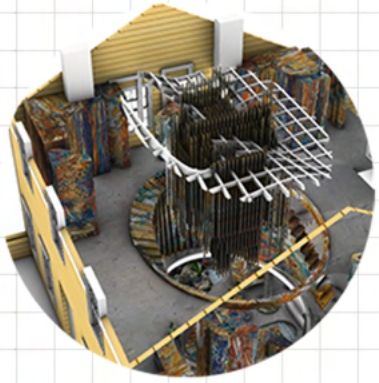
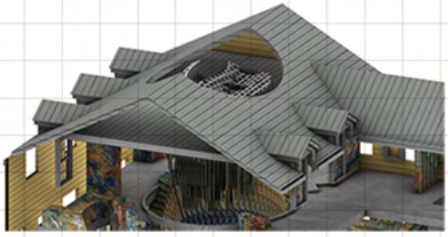


Figure21 : second floor plan - house 14

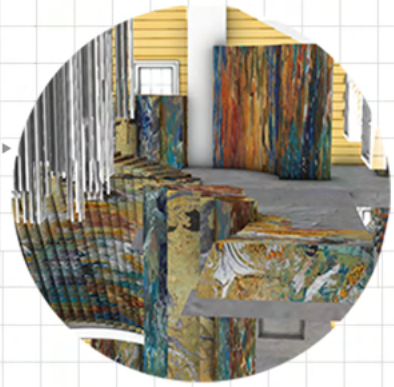
The Layered vessel
sectional from roof
to basement



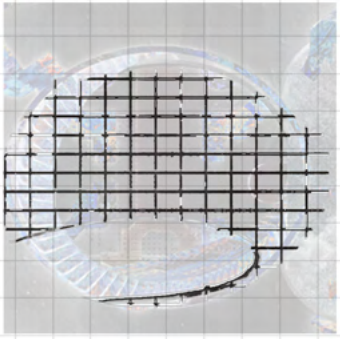
Vessel cut out
on the roof to help navigate
the roof rainwater runoff into the vessel



Walkable wet wall
Walking around the
vessel enclosing a
chandelier like bio algae
and packaged rock
tubes filtering water



the gate filter on roof for
Rainwater collection

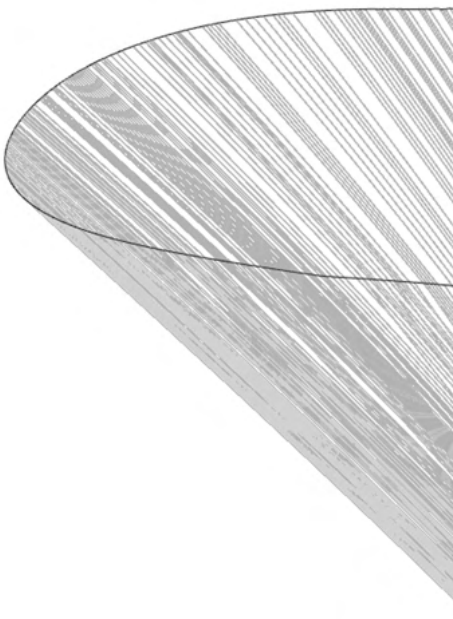


Pipe room
with salt deposits

Figure22: Spatial spaces in first floor level

1. Peter Eisenman, **10 Canonical Buildings (Princeton NJ, Princeton University: School of Architecture**, 2008), 75.
2. Roland Barthes, **Mythologies (New York, Hill and Wang,** 1979), 90.

The vessel
Filtration



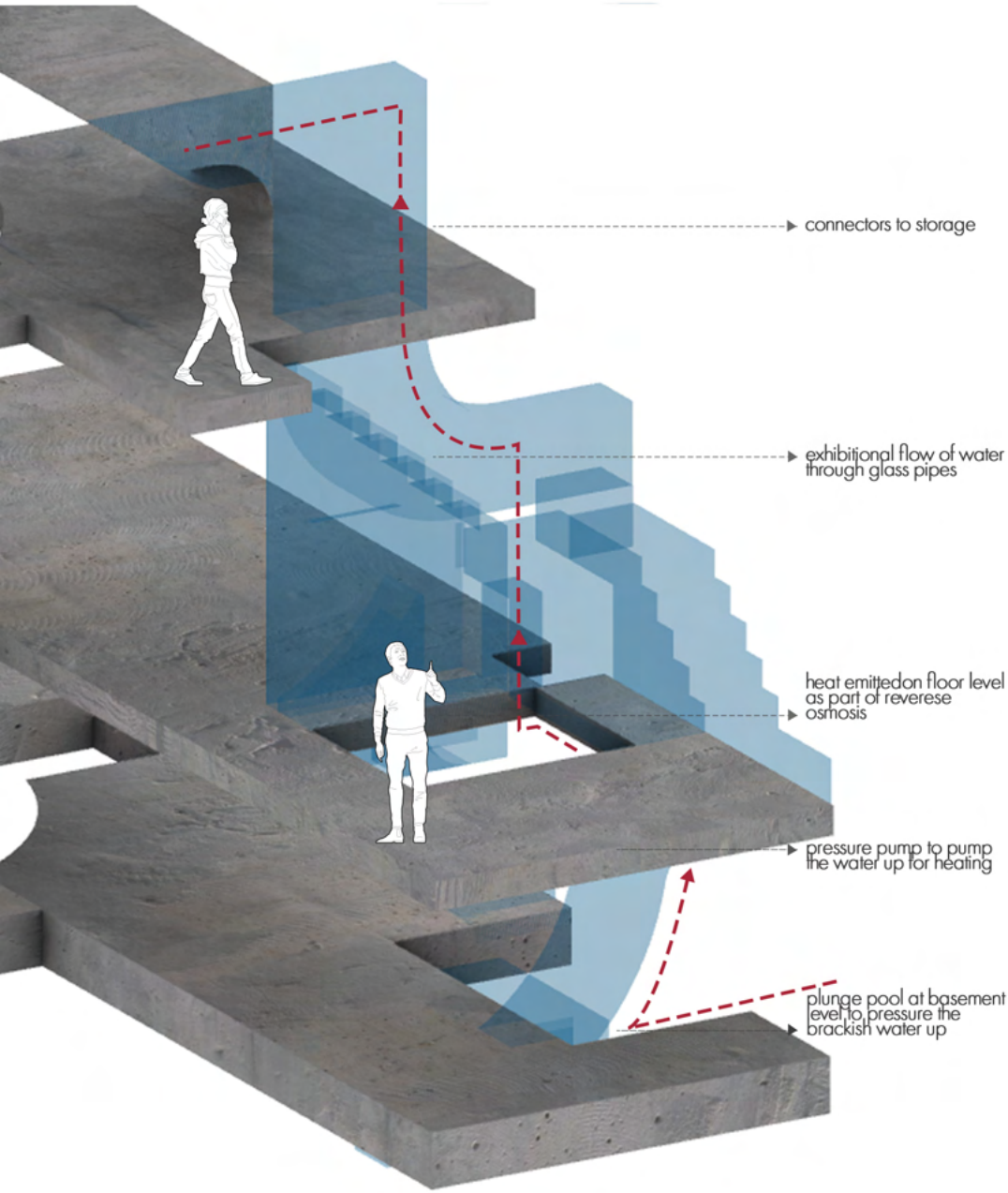


Figure 23: Diagram representation of desal water f iltration

Figure 24: Material study of desal water filtration

The idea of filtration and desalination of brackish water and rainwater, which is essential to the eco performances and also state of water crisis globally. The first of the system is the vessel which captures and transfers filtered rainwater from roof to basement level and also the desalinated water to the storage vessel in the basement withdrawal-underground water withdrawal and remote water diversion, the energy consumption for seawater desalination is low, and raw seawater resources are abundant.

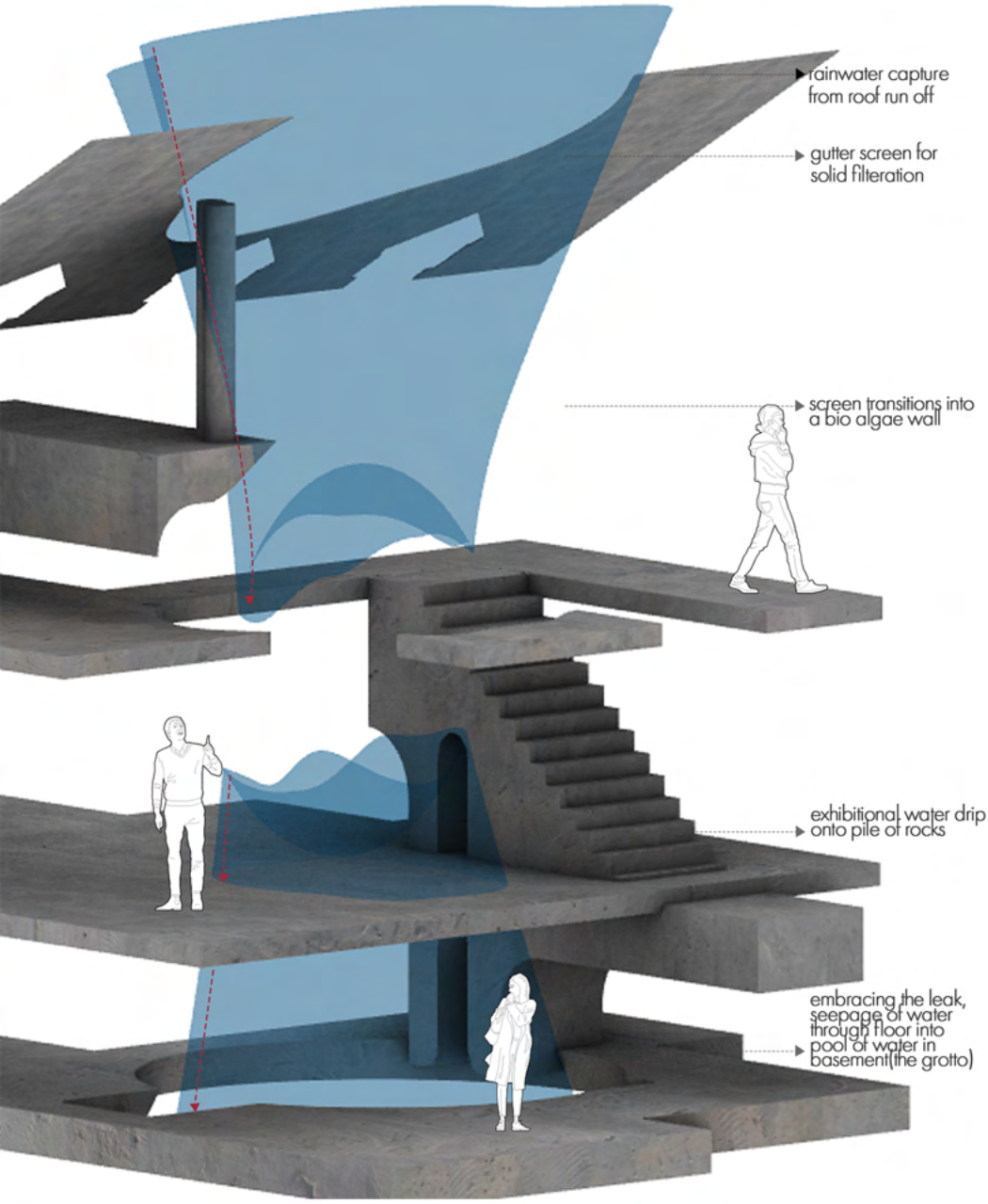


Figure 25: Diagram representation of rainwater filteration

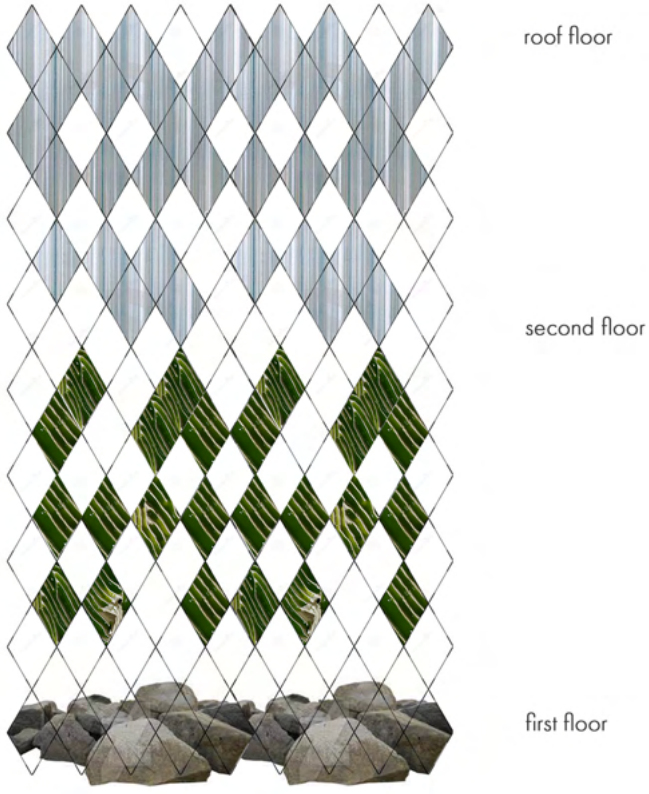


Figure 26: Material swatch of the vessel

The vessel is located by the stairs which is the main feature of house 14 allowing users to explore the water being filtered as they move along the house. Water is no longer hidden behind walls and is celebrated through house 14.

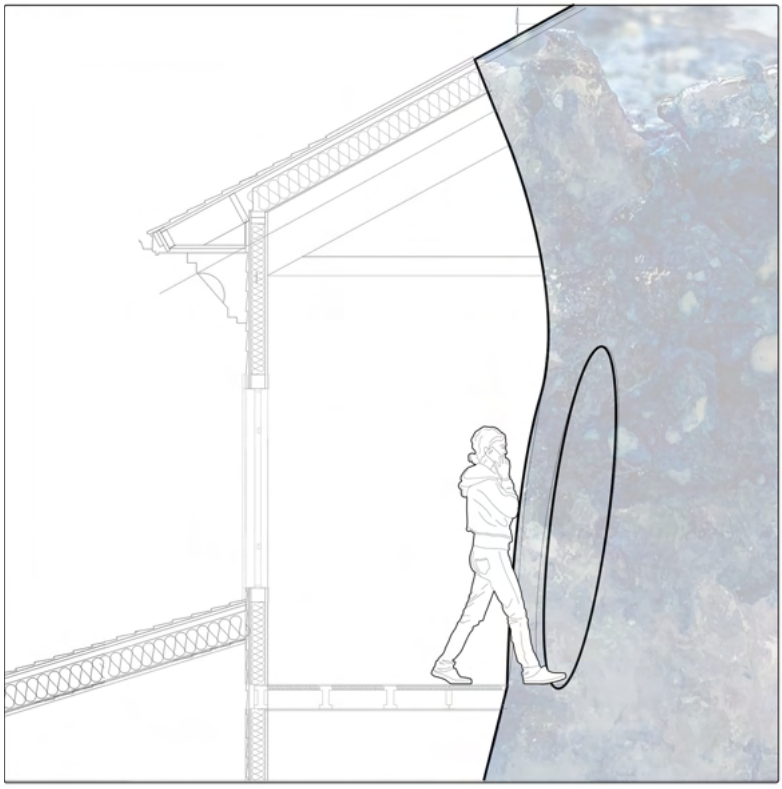


Figure 27: Vessel with the void

The vessels breaks open in the middle of house 14 letting the captured water drip down to a room with a filled with pile of rocks which naturally helps to seep the water through the slabs by embracing the leak in the basement where you see leaky ceilings. Voids created and strategically placed within the vessel help users to walk in to experience of this water environment.

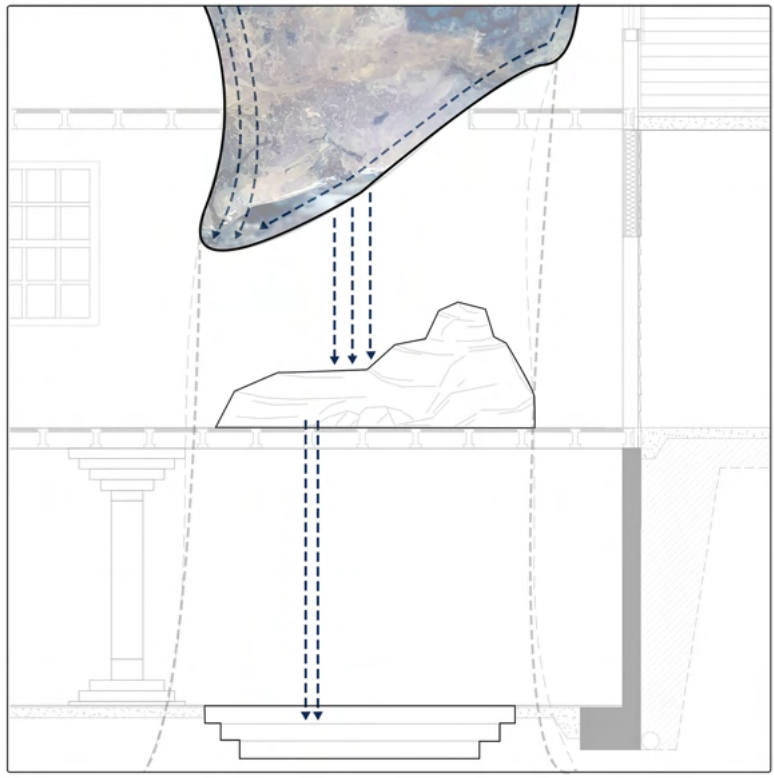


Figure 28: Diagram representation of rainwater filtration

When people walk into House 14, they at first will notice the vessel at the center attached on the truss system, the light emitted by the sun will pass through the cut out on the roof into the vessel by creating experience with water dripping on the surface. The rainwater ones collected from the roof is directed with the help of materials layered on the vessel toward the grotto area in the basement.

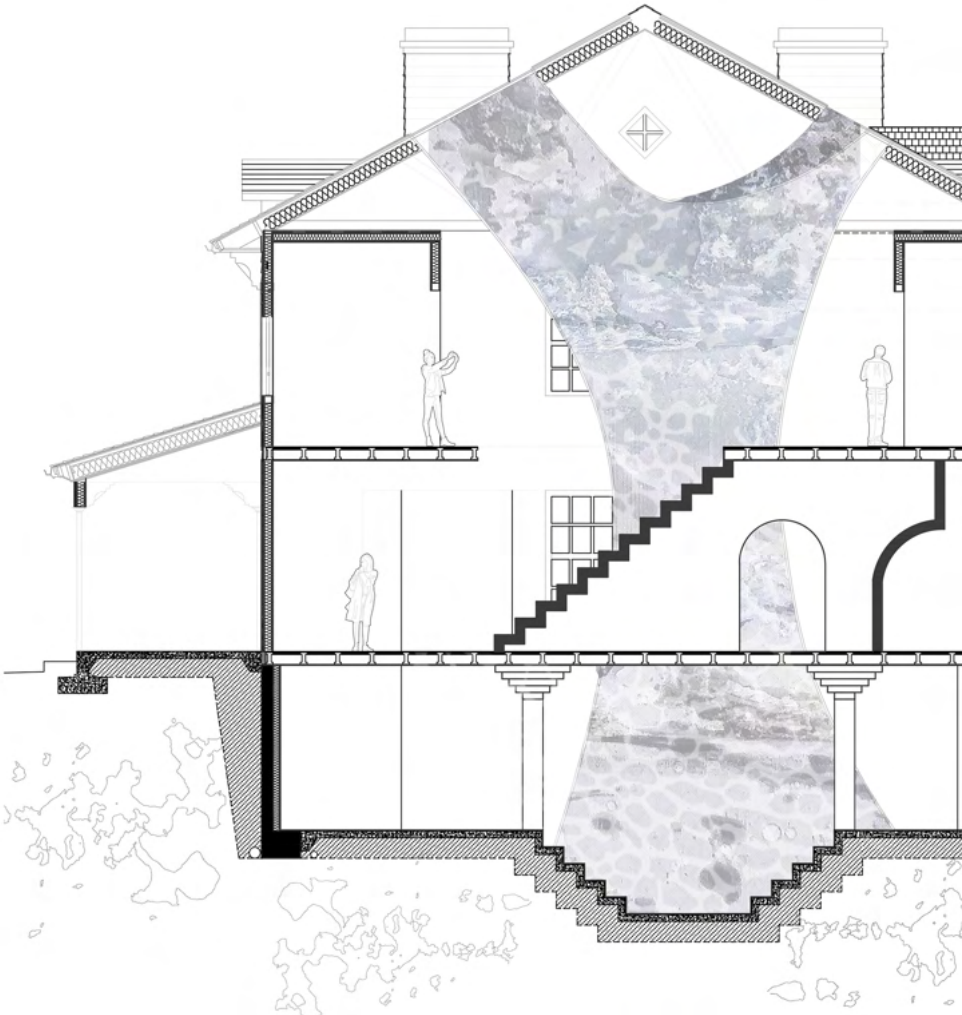
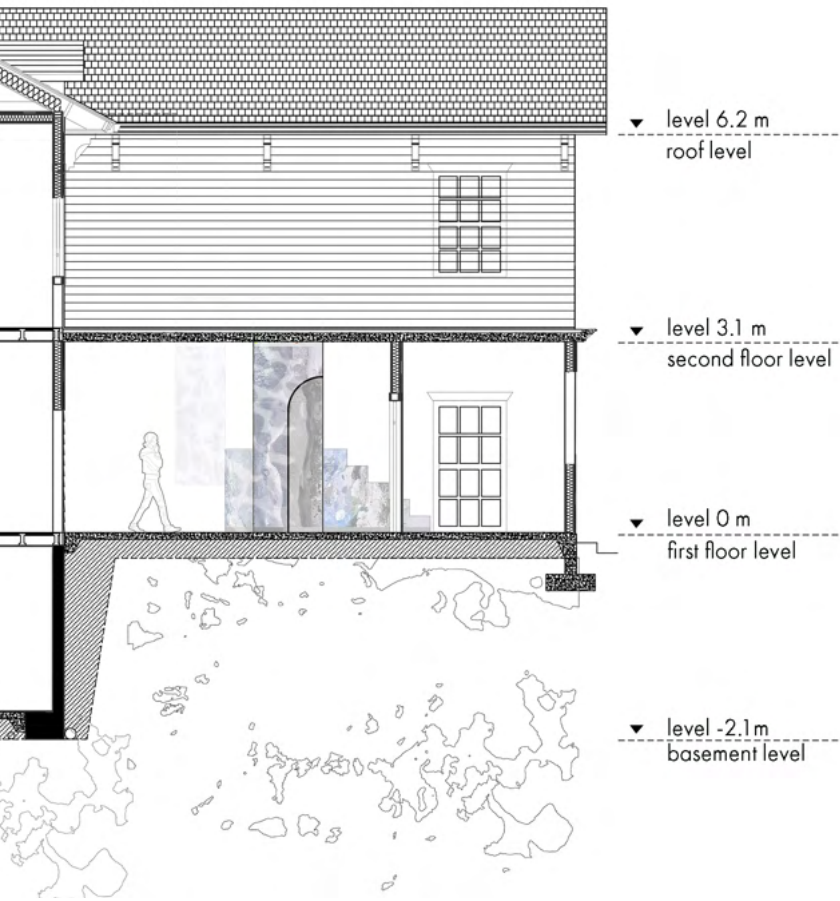


Figure 29: Section, desalination facility with an interactive experiential value in house 14

"Architecture gives a conceptual and material structure to societal institutions, as well as to the conditions of daily life. It concretizes the cycle of the year, the course of the sun, and the passing of the hours of the day"[1]. We are interested in how these spaces relate to the body at different levels. In terms of materiality in the section above we are looking at the play of textures, level of visibility and the functionality of water filtration that passes through the wetwall at different scales and intensities to create space that keeps changing.



The main interest in this project was the materiality that seeks to enhance interaction with building surfaces at different scales that seem outsized or undersized to humans –as a way to materialize the scales and sense of things that are not human. Exploring the relation between these surfaces and materials, we tried to create spaces that allow for different types of experience and relate to the body and to outside elements such as light, sound of water dripping while its filtering. In conclusion we are looking at the relation of the space to a constellation of things or objects that includes the human body as an object.[2]

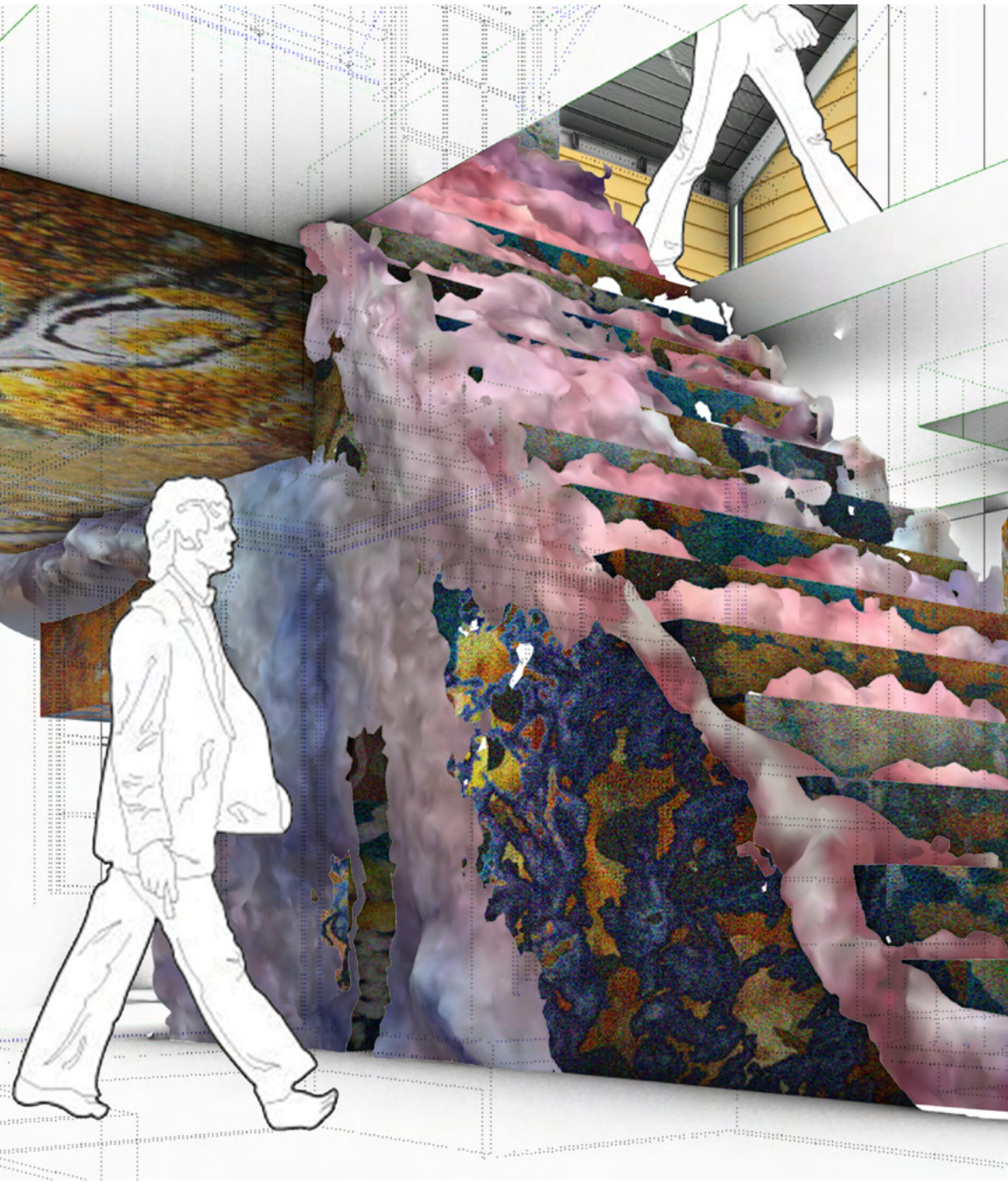
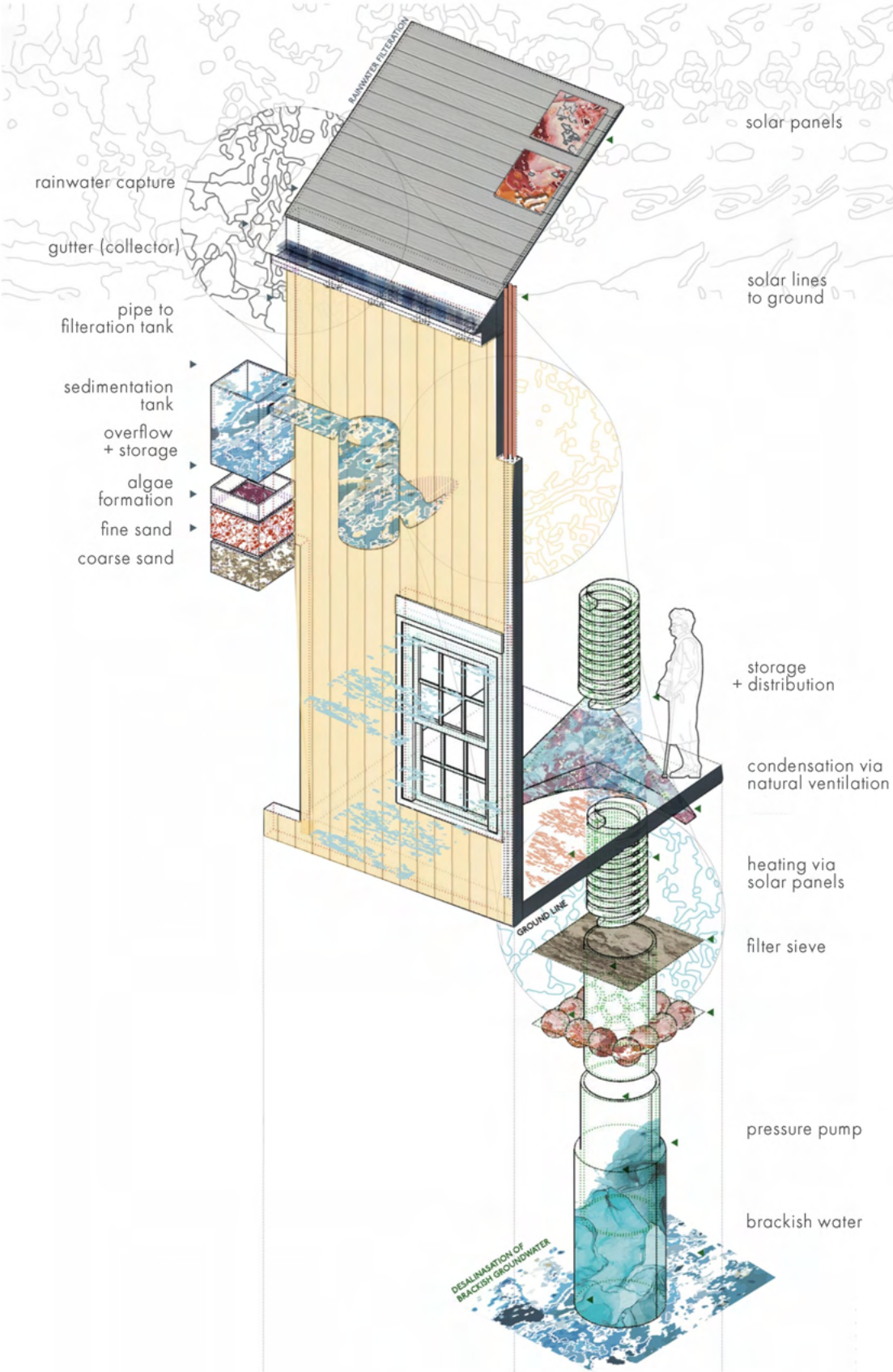


Figure 30: Reimagining the staircase as it's an ideal program for exploring user experience through form and material due to its close connection with users and ability to animate the space.

1. Pallasmaa, Juhani. **The Eyes of the Skin: Architecture and the Senses. Academy,** 1996, 10, 11, 19, 39, 41.
2. Cambridge Academic Content Dictionary (UK, Cambridge University Press). Architecture, Definition in the Cambridge English Dictionary, dictionary.cambridge.org/us/dictionary/english/architecture.

The Live desalinator
Proposal


RAINWATER FILTERATION
solar panels
rainwater capture
gutter (collector)
solar lines
to ground
pipe to
filteration tank
sedimentation
tank
overflow
+ storage
algae
formation
fine sand
coarse sand
storage
+ distribution
condensation via
natural ventilation
heating via
solar panels
GROUND LINE
filter sieve
pressure pump
brackish water
DESALINASATION OF
BRACKISH GROUNDWATER

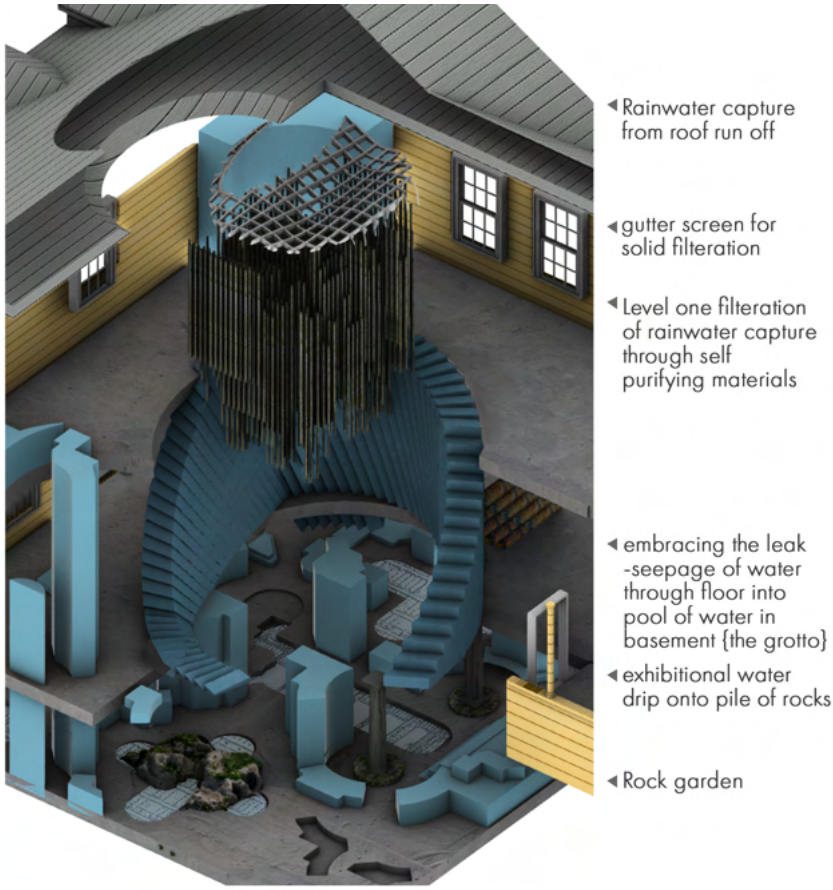


Figure 31: Sectional Isometric view of the vessel

The flow of water from the roof is through a grater system which fliters and allows the water to flow through the vessel surface on to the basement. The water experiences filtration through bio materials as it transitions from top to bottom: ending in filtered rainwater falling into the plunge pool in the basement where grotto is being an experintial factor. This vessel consists of materials transitions from polycarbonated sheets which captures rainwater to bio algae walls that helps to filter rainwater naturally when it runs through them.

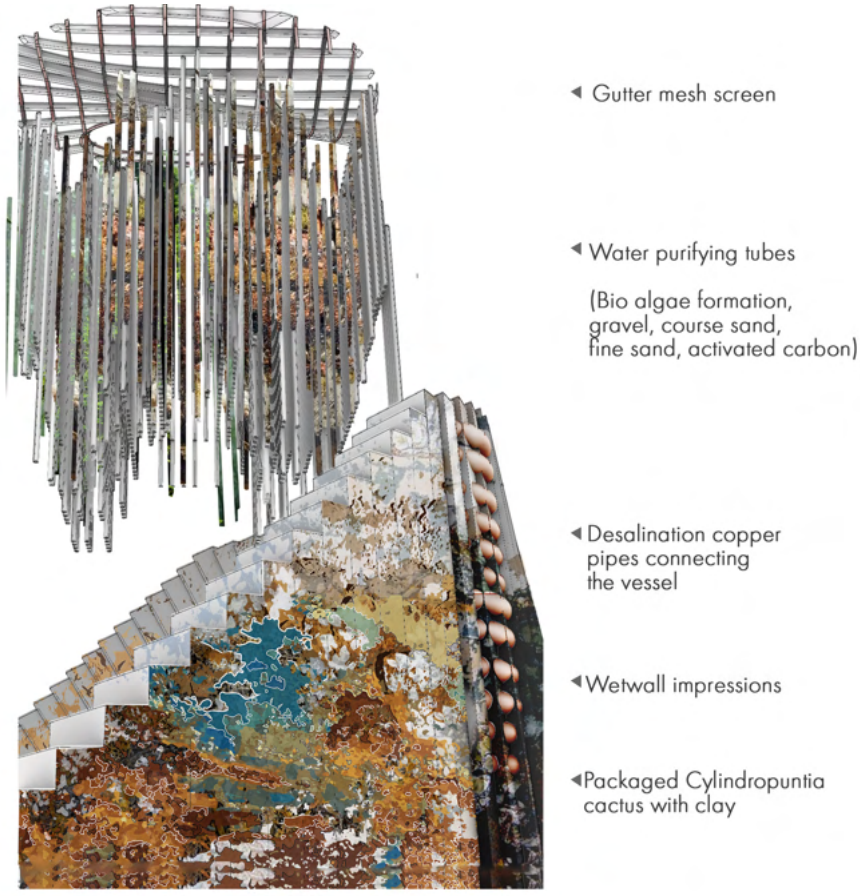


Figure 32: Material exploration

Taking in brackish water from the basement the desalinator helps to filter water through a combination of mechanical and natural processes. This unit consists of mechanical and material units like pressure pumps, glass tubes fro reverse osmosis and layers of course sand that help in this process,the second unit for the wet wall is the live desalinator that exposes the role of water desalination occuring from the basement to the roof.

Exhibitional flow of water through copper pipes

Water Droplets formed on the surface of pipes as a part of reverse osmosis

Pressure pump to pump the water for heating

Plunge pool at the basemnet to pressure the brackish water up

brackish water ulled into pool through activated carbon pipes

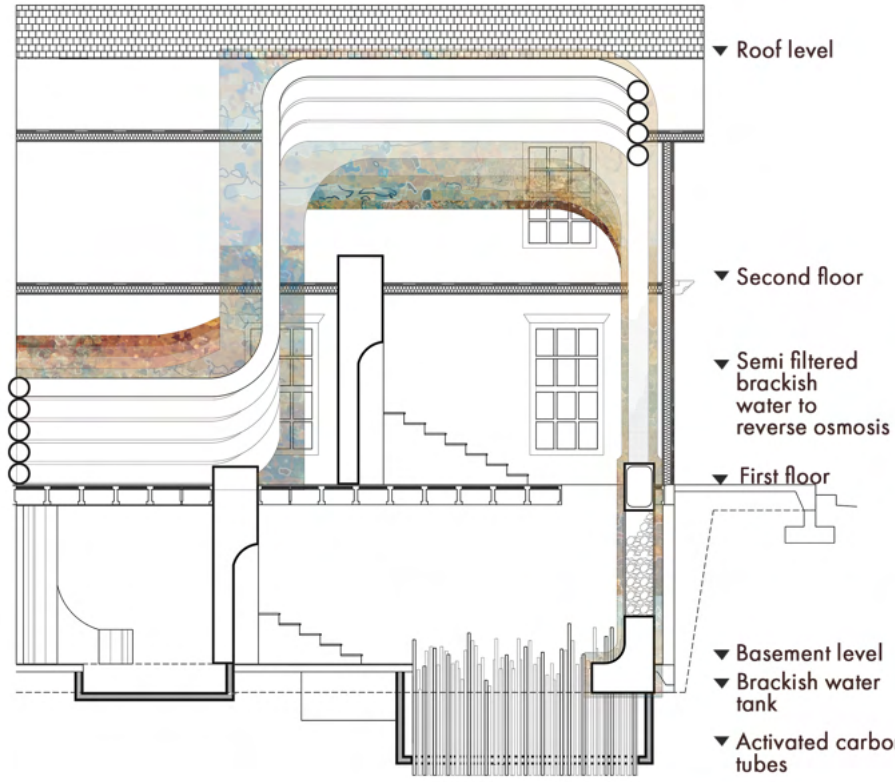


Figure 34: Section showing the carbon pipes and water pipes running through

The vessels breaks open in the middle of house 14 letting the captured water drip down to a room with a filled with pile of rocks, which naturally helps to seep the water through the slabs by embracing the leak in the basement where you see leaky ceilings. Voids are created and strategically placed within the vessel that are meant to help the users to walk in to experience of this water environment. The main aims of this project is to 'resocialize' water within the private houses on Governors Island.

Figure 35: Isometric view with material exploration and respresentation

The changing behavior of forms, lights and textures create a phenomenological atmosphere in the space within the house 14 where the condition and time of the material is based on changes of the colors created within the materials with different experiences, which causes the visitors to perceive the atmosphere in many different varieties.

These perceptions of the space can be transformed into other senses or perceptions in different zones and phases of the live desalinator. In this case, the biological and natural processes of materials used to filter water engages the senses of the visitors in house 14.

Figure 36: Triptych view, 4: Re-imagining minute pores in the material with openings and pathways created by the form with rich formal and tactile experience within the house 14. The salt is extracted from water during the desalination process.

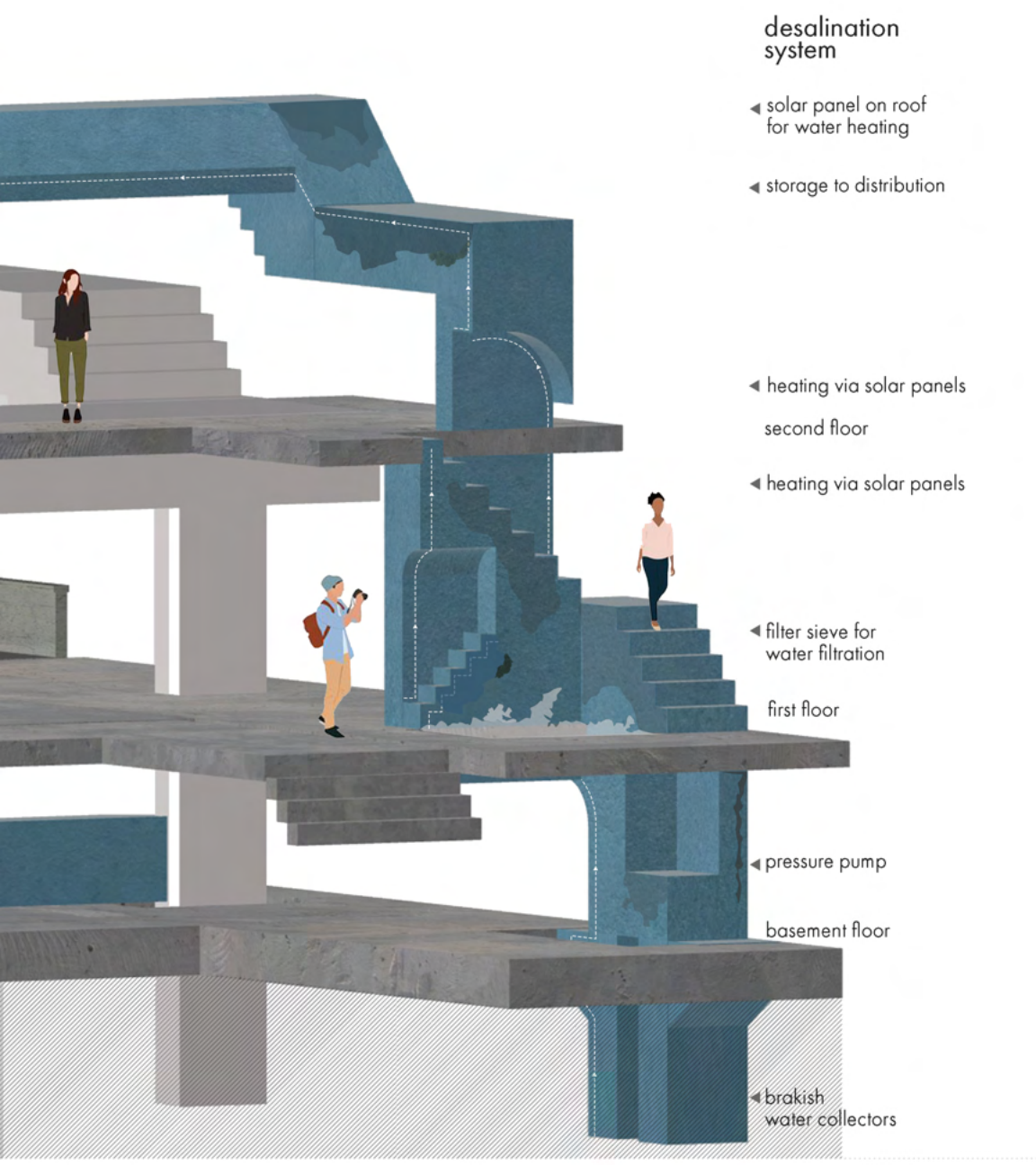


Figure 37: Process diagram of desalination function

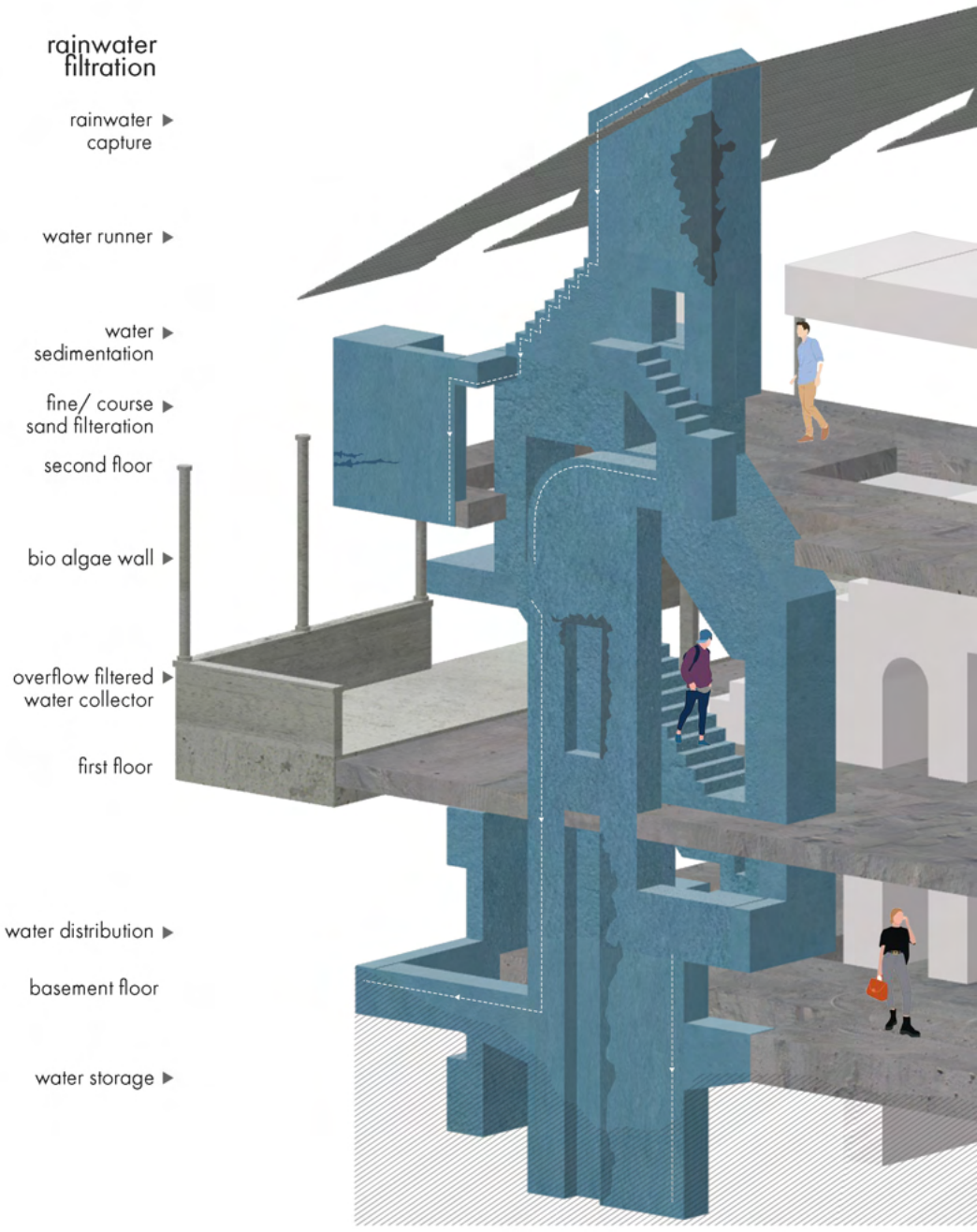


Figure 38: Process diagram of rainwater filtration

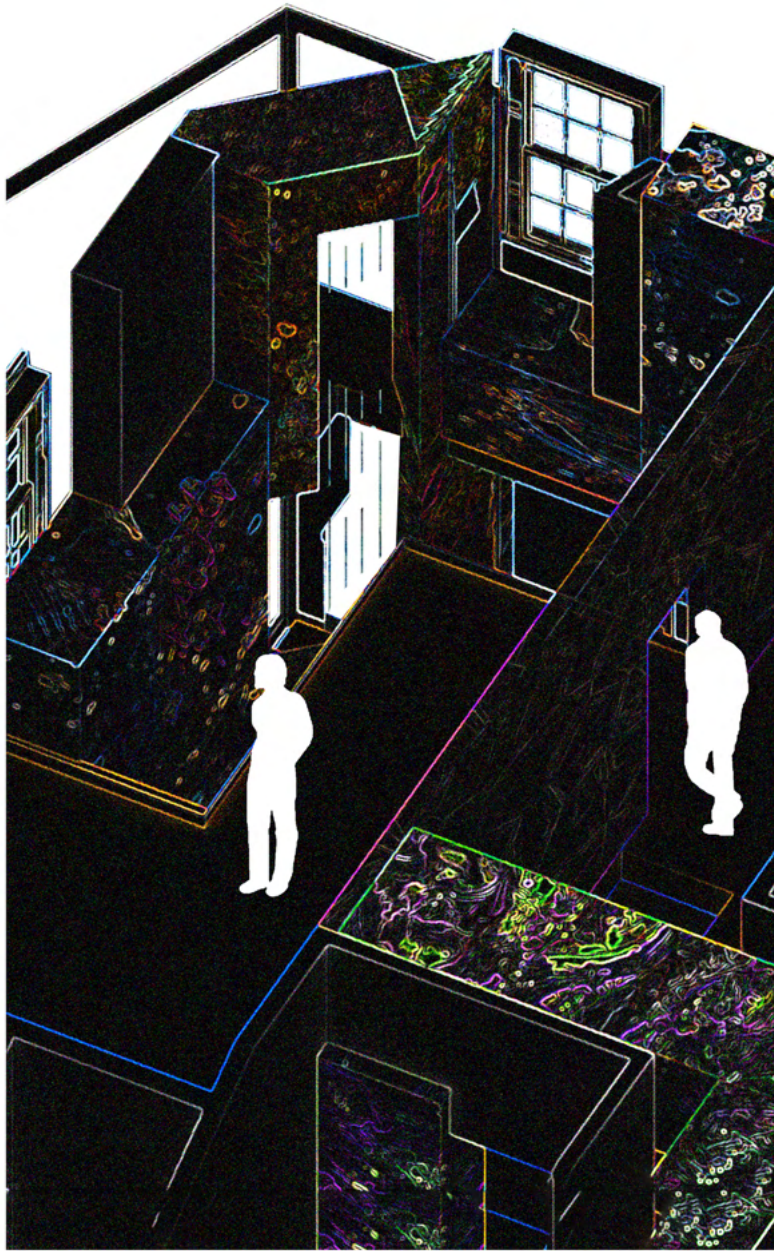


Figure 39: Aerial view of the space when reinterpreted as an architectural entity which has multiple layers that are generated as a result of the formal and material explorations.

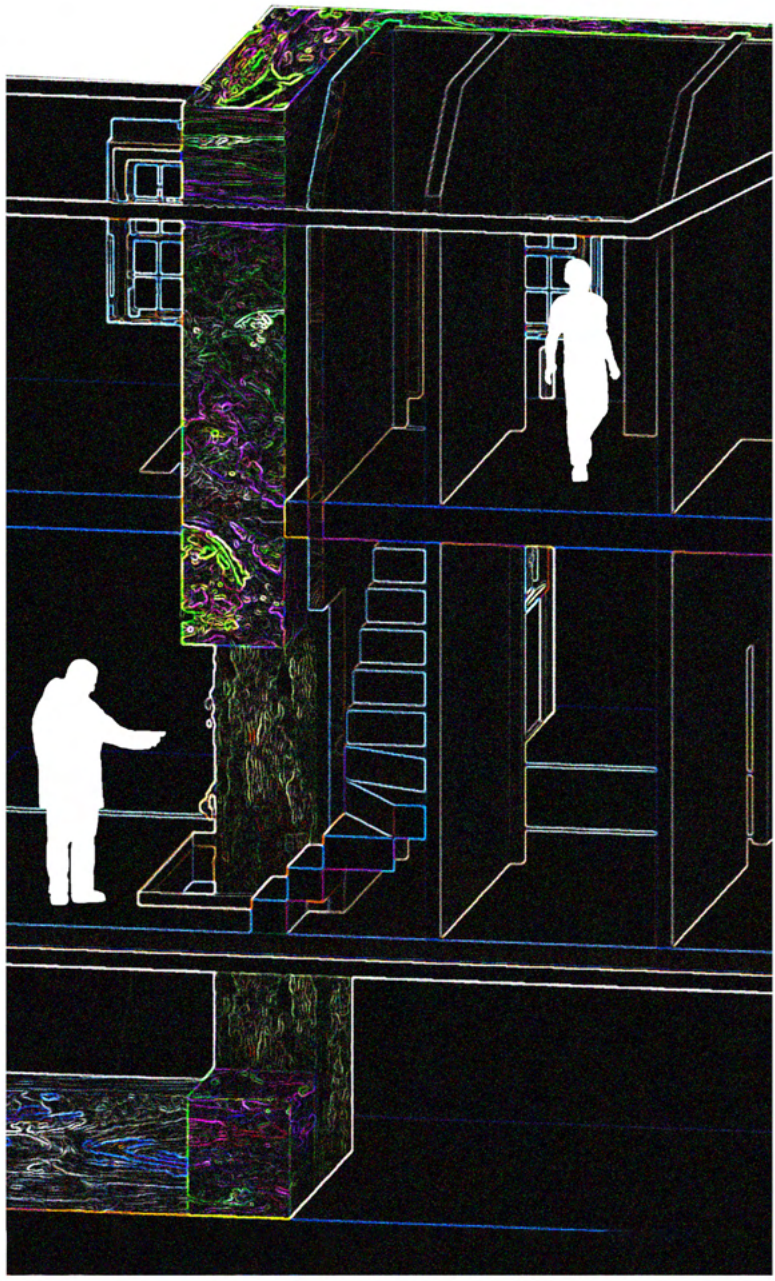


Figure 40: In search of the spatial potentials of the wetwall with algea grown on the surface.

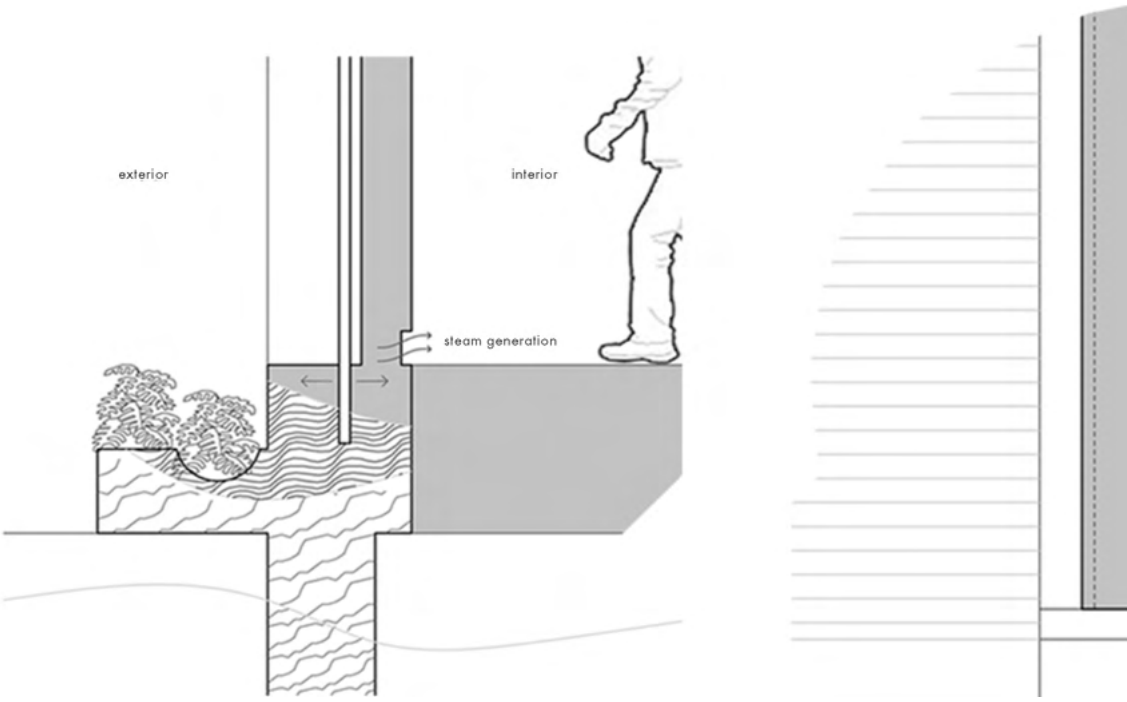


Figure 41: Temperature control diagram (evaporation - transpiration)

This meandering wet wall celebrates moments of desalination and rainwater filteration at house 14 through design desicions based on its functionality. Although abstract, the various forms used to create these objects do not collide or compete with one another, but come together harmoniously to create forms with multiple layers of ambiguity and an uncanny appearance of coherence. The figure above is trying to explain various moments captured by spaces that do not follow the boundaries of the individual components of the object and flow from one surface to another. Thus adding a layer of obscurity, yet consolidating in the form.

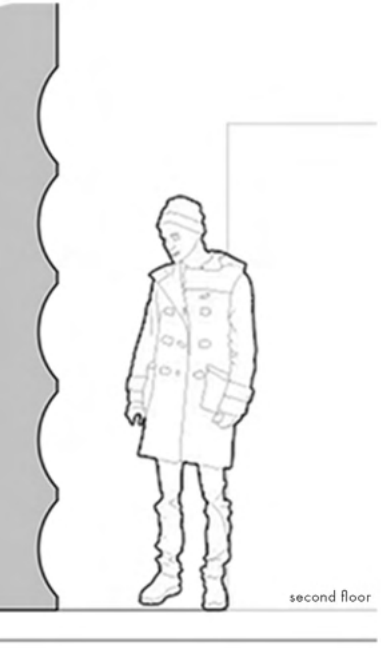


Figure 42: heat generation diagram

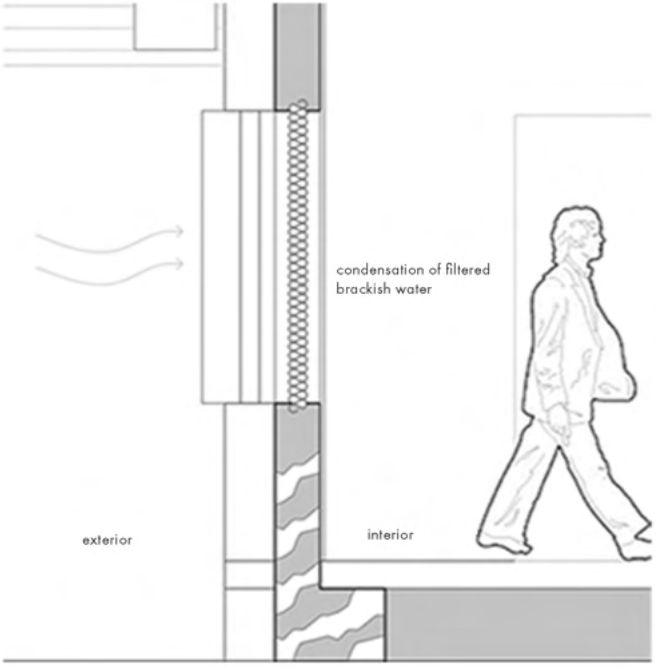


Figure 43: filteration through house 14

The two main systems, where rainwater is collected from the roof, stored in the tank and the second process where the desalinated and brackish water is pulled from 3 feet below ground level undergoes a number of filtration processes, at the end of which a filtered and reusable water reservoir is created in parallel within the house. The combination of the varying rigidity, profiles and voluminous characteristics of the complex forms, together bring with the varying densities, transparencies and finishes of the different materials, generates sensory spaces that evoke different experiences while the water is filtered simultaneously.

The water core consists of machines for brackish water filter, a 800 gallon water storage bag, and rainwater collecting pipes. we stack the machin and water bag closely

The Core
evolving through time

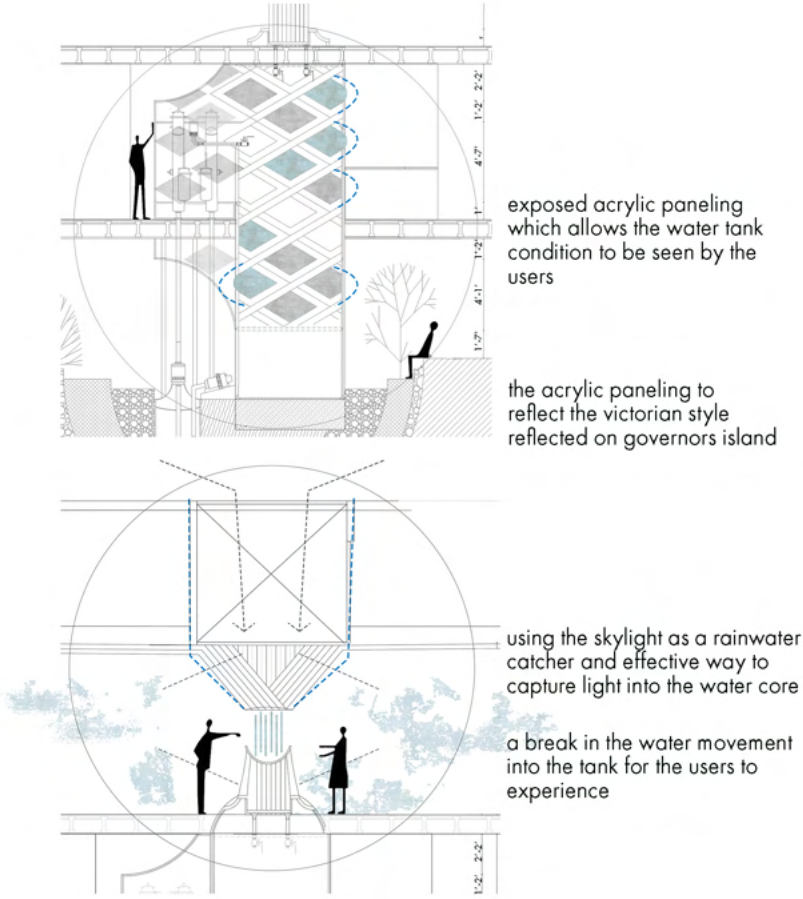


Figure 44: Concept diagrams of the vessel with material panelling and breakpoints for experience

The machine and material stack is highlighted in the above diagram and in the water touch point experiences, the users have through house 3 with the introduction of the water core.

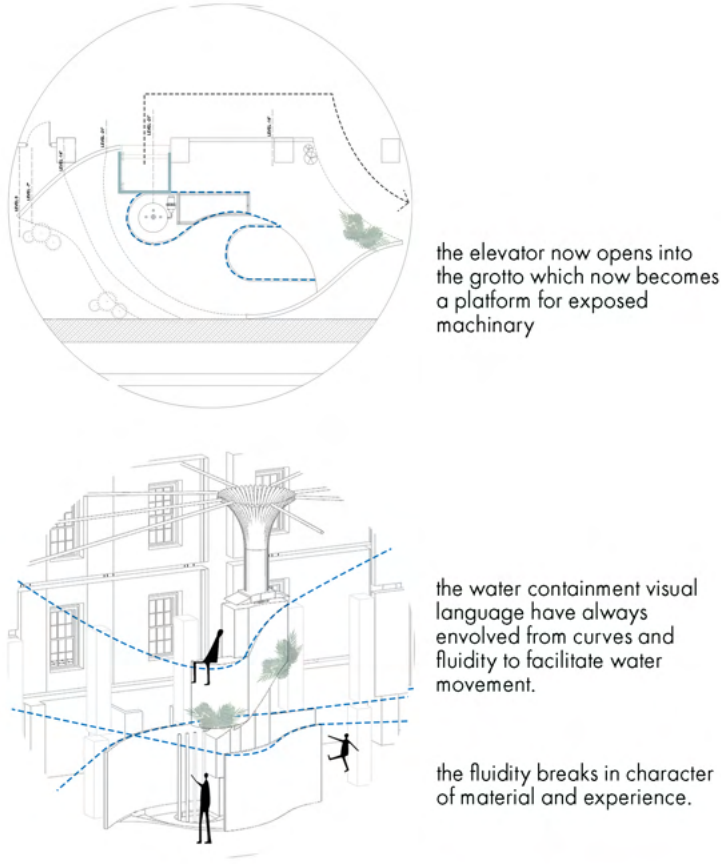
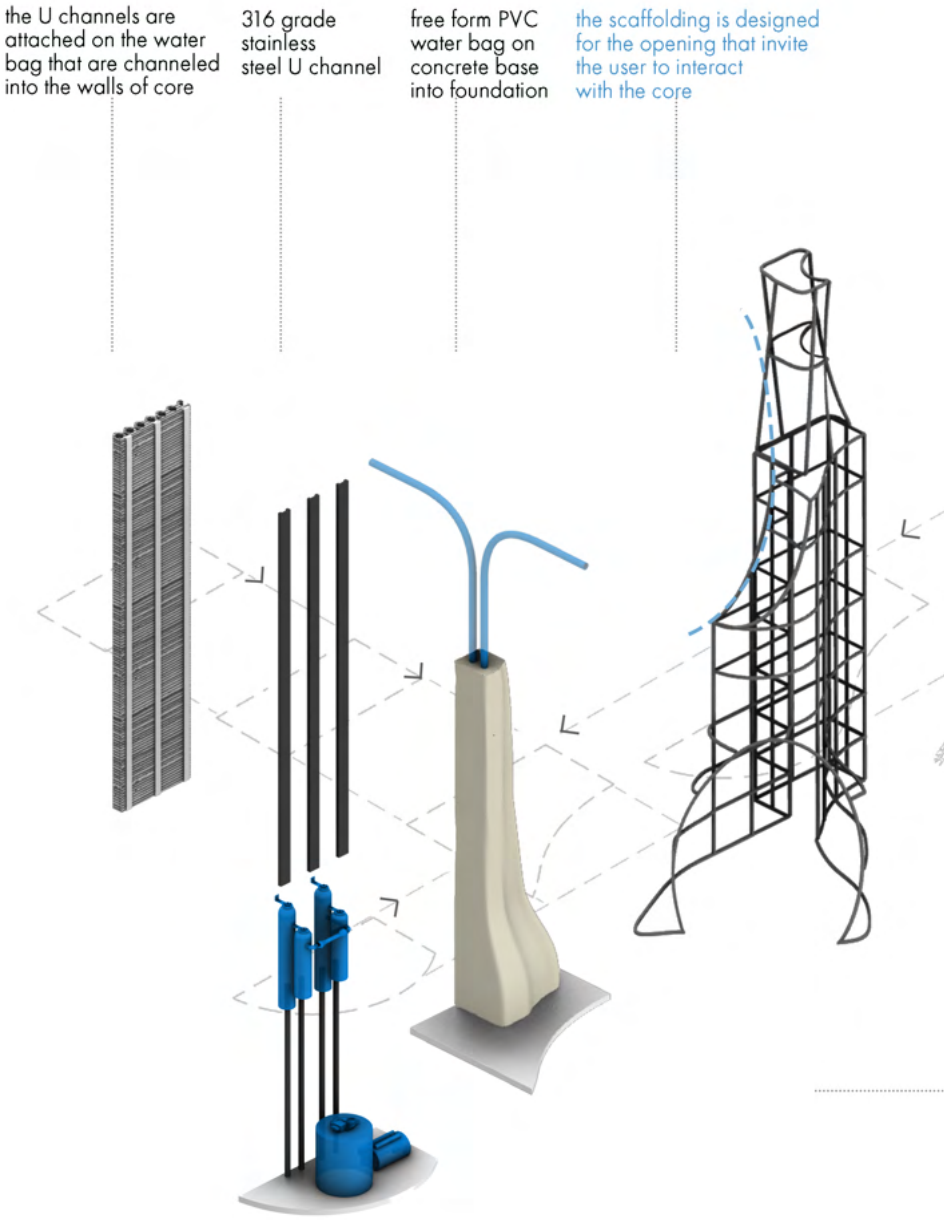
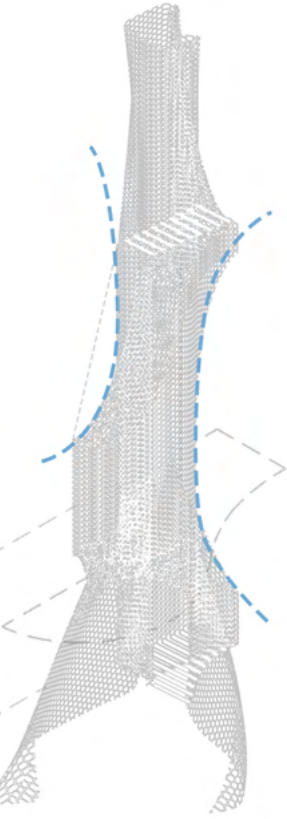


Figure 45: Conceptual diagram with experiential spaces

One of these design strategy was to introduce various cut outs within the core on all floors which would enable the users to experience the shrinking and filling of the water storage bag as the core filters the water.

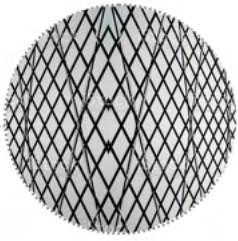


The water core consists of machines for brackish water filter, a 800 gallon water storage bag, and rainwater collecting pipes. we stack the machine and water bag closely into a steel scaffolding layered with wire mesh.

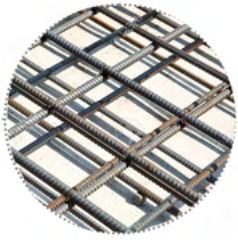


the wire mesh has cut outs on every floor for water touch points

wire mesh



steel scaffolding



the reported proxy metrics of water use intensity (WUI) for office buildings range from 25 gallons/ 1000 sqaure ft/ day

1 person - 25 gallons in an commercial setting 25 x 25 is 625 gallons per day (2635.5 L)

free form PVC water bag

The scaffolding helps to keep the core intact structurally and the thin wire mesh helps to alter the shape of the core when the water bag is filled and it pushes against the scaffolding wire mesh leaving an impression.

From the material and model studies we develop a strong weave pattern that the carbon fibre would now take around the core and also loosens in some area where water can be exposed through the framework.The different type of fibre weaves is an opportunity the express the filling water bag.

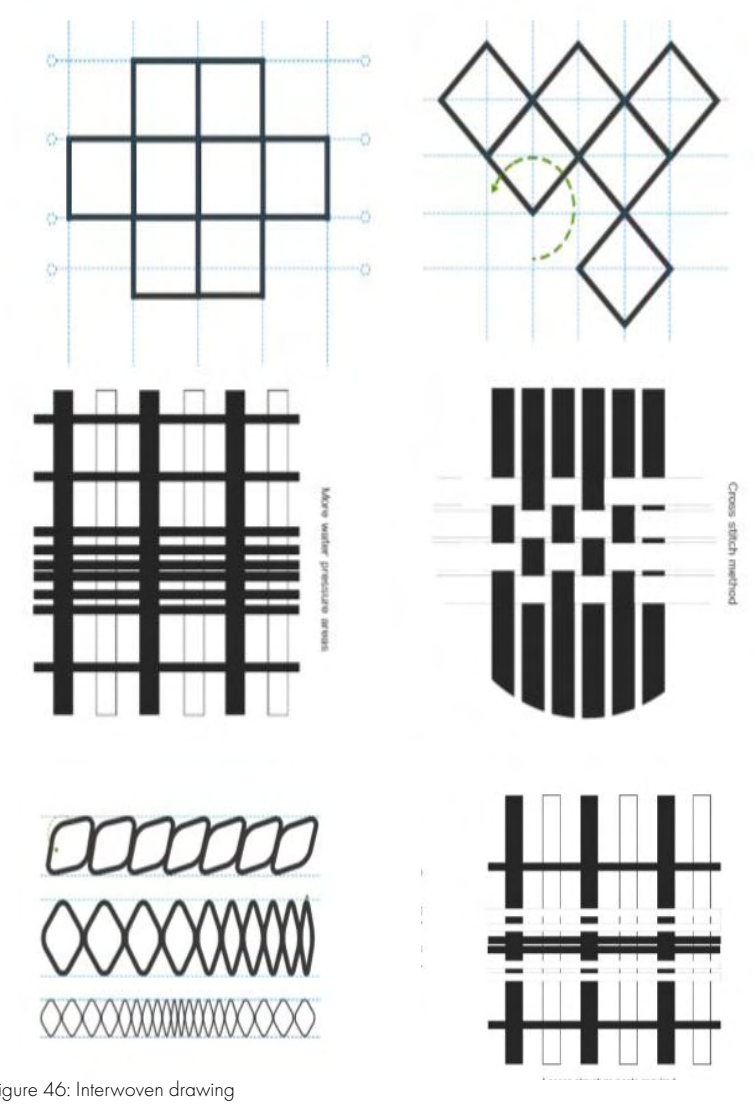


Figure 46: Interwoven drawing

Figure 47: machine view on first level

We use rewilding as a lens to investigate and independently develop real and speculative solutions for the futures of indoor through architecture, material exploration, and computation, to creatively apply and implement feasible inventions where the filteration machine is partly eexposed on a floor level. However, an overwhelming scale or dramatic use of material is not what makes the system such a unique architectural feature.

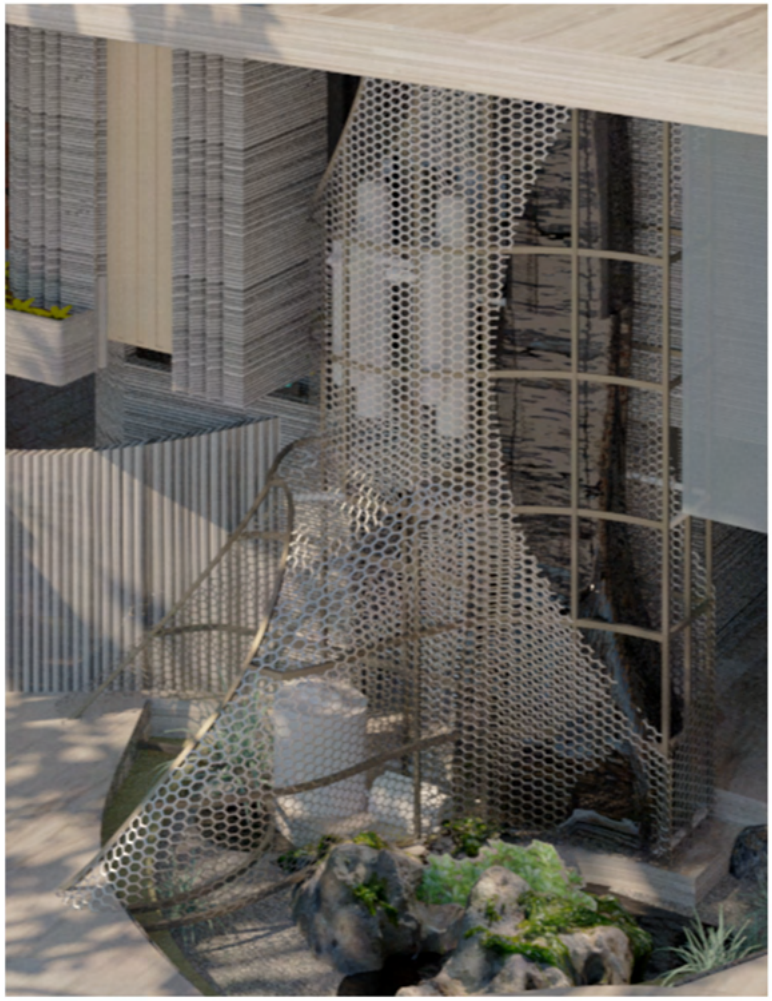


Figure 48: the grotto view

The water core is well connected from roof level to ground level with layer of mesh around it. This idea about the filteration system as the core of the house is important in our project as it contains several different scales of grids and frames: the structural columns and beams (interior), the contour of the building (exterior), and we have tired to coordinate all the other functions of the house for making the house as self sustainable.

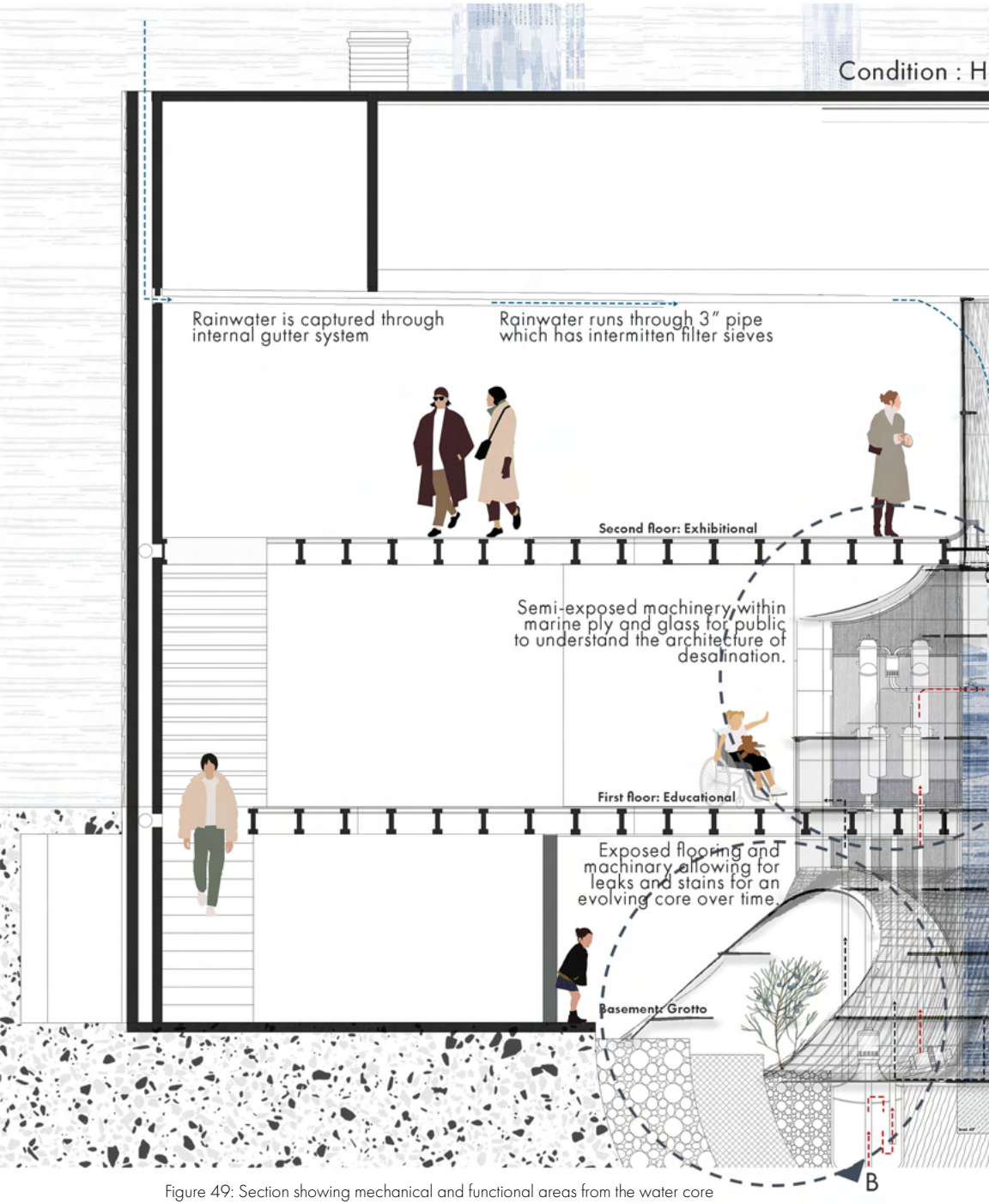
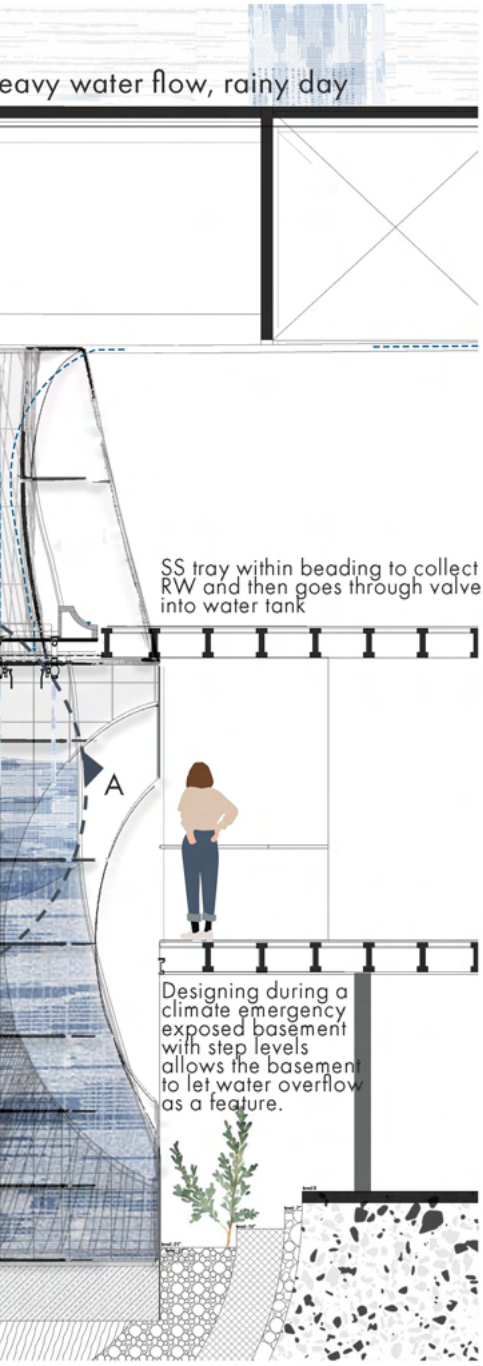


Figure 49: Section showing mechanical and functional areas from the water core



A

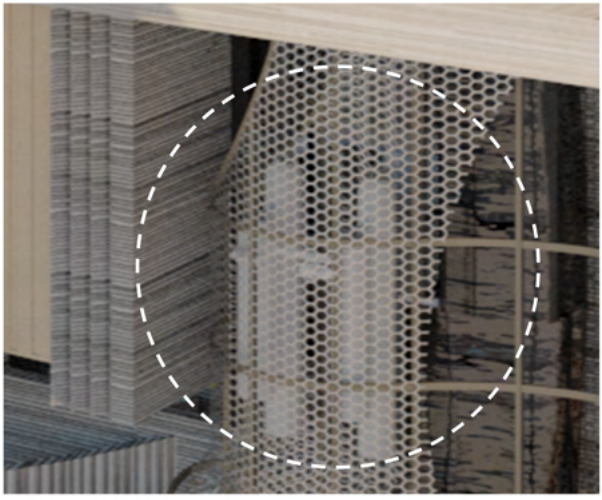


Figure 50: Filteration machines: pre filter, post filter & UV filter

B

Figure 51: Sump- extracts brackish water from below ground level

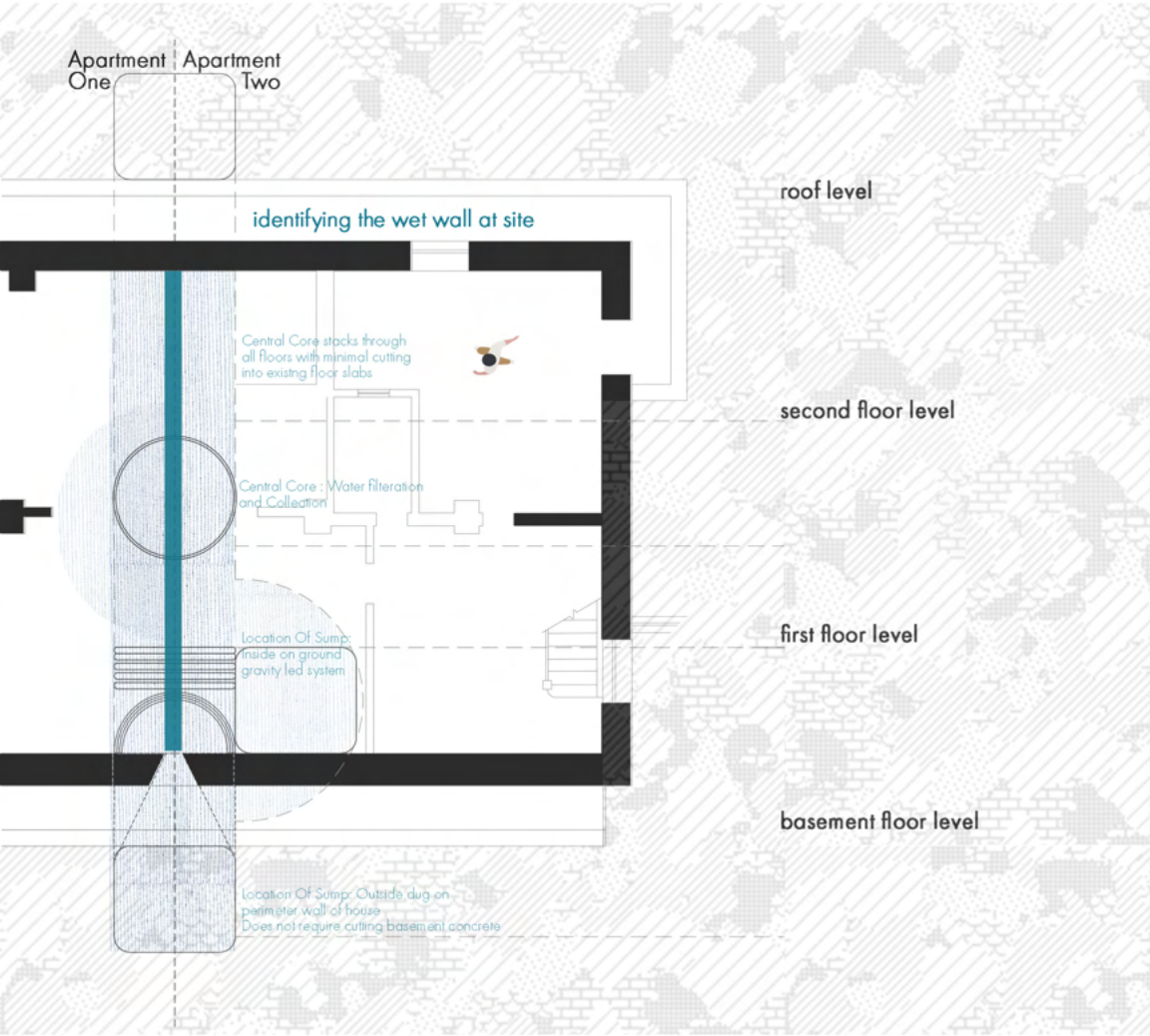


Figure 52: Plan showing spatial re-configuration of the house through the insertion of the water core as a central spine. This creates a micro environment within the house that the user constantly experiences while moving from space to another.

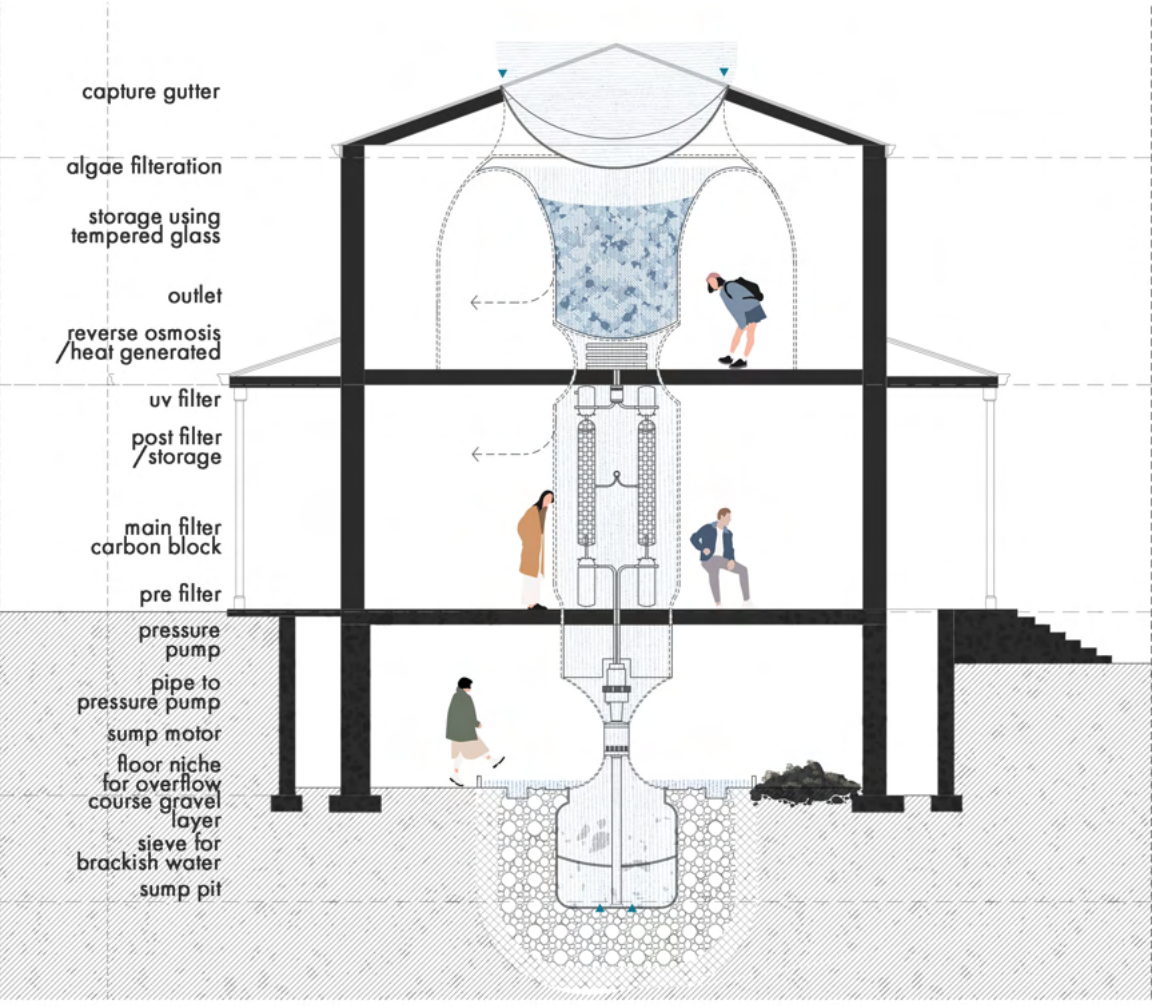


Figure 53: Section showing overall scheme of suspended water core that attempts to create the atmospheres and effects that were achieved in the previous analog with texture and material explorations through the use of different forms with sensory experiences in spaces.

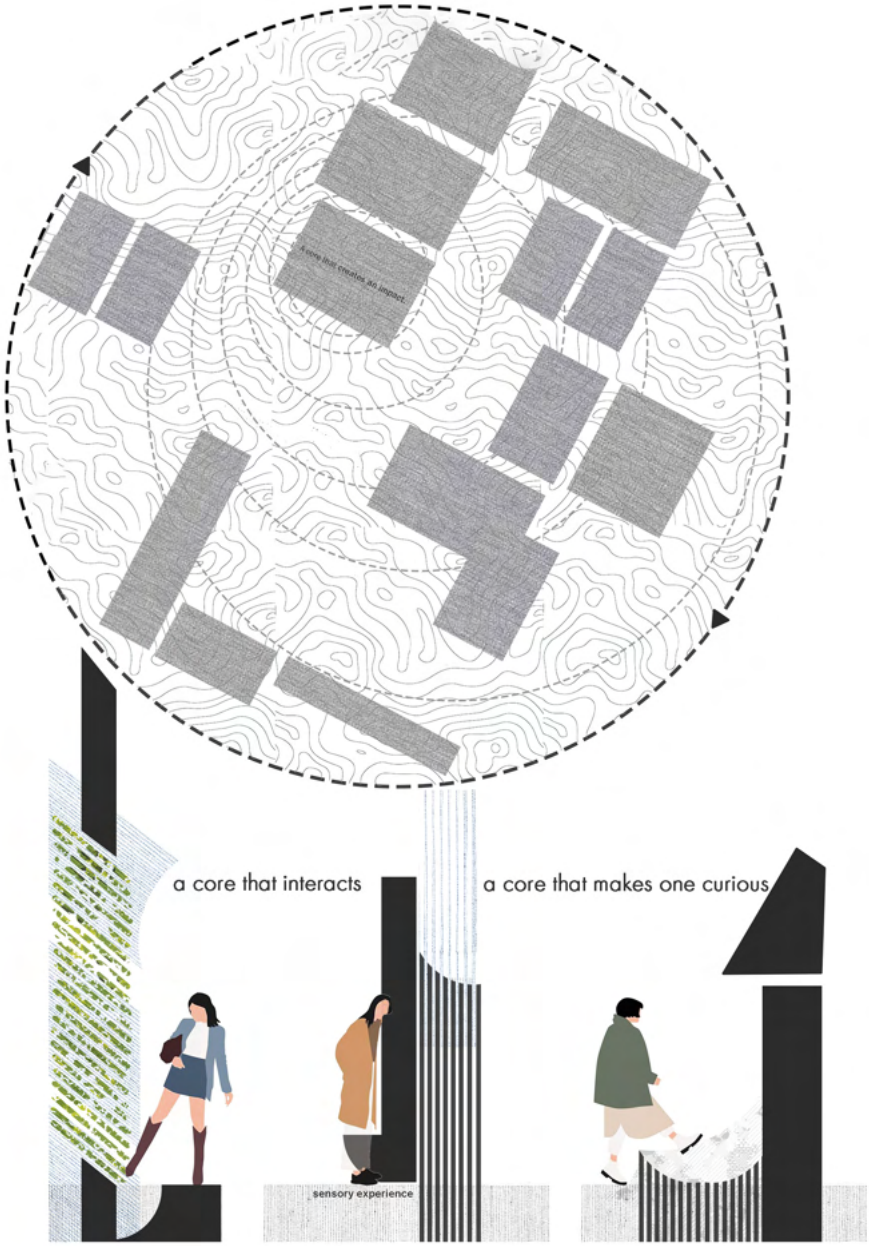


Figure 54: Graphical illustration showing sensory touch points

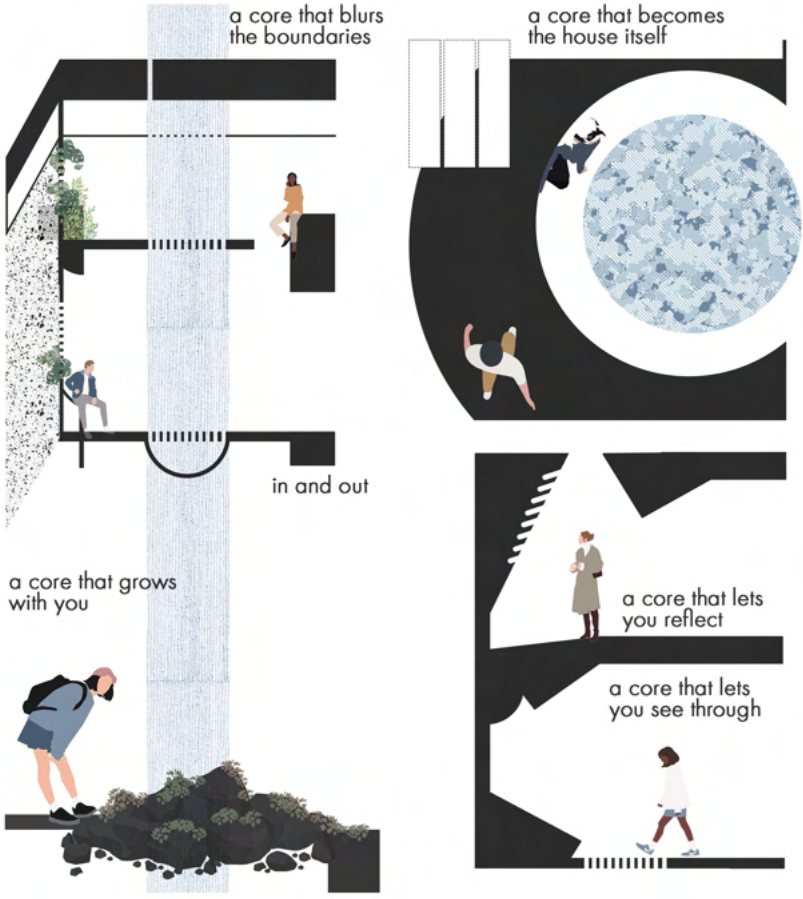
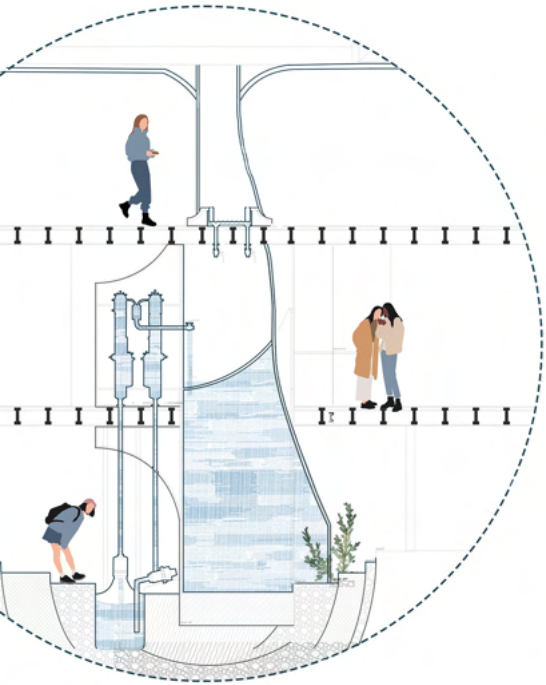


Figure 55: Diagram showing filteration system. The exposed water is about giving touch points and creating moments within the house. The rainwater, carbon dioxide and growth of natural moss from moist environment created by running water in the surrounding are the elements for this project while the waste matter is let out and thrownback to the filteration system for recycling the water.

The process is simple and effective where the raw materials needed are water, carbon dioxide, algae, sunlight and rocks. All of these are readily available at the site. When provided in a controlled manner to the algae, the algae grows overtime with the atmospheric conditions and releases oxygen as a part of the process for making the house sustainable and creating spatial moments.

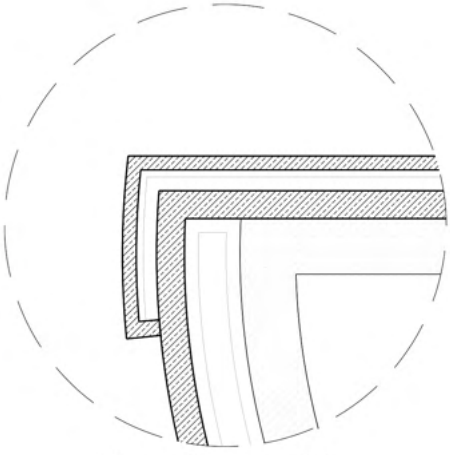


Condition: Normal water flow, no rain

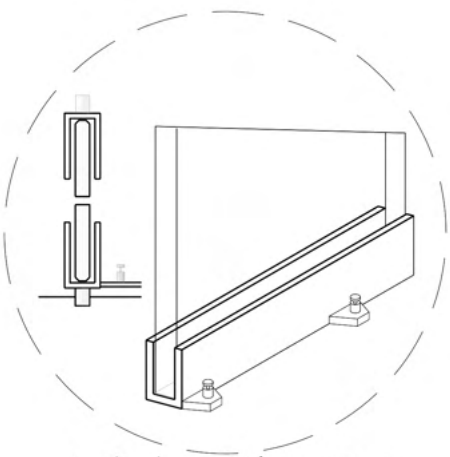
The sump continues to pull in the brackish water available 3ft. below ground water to be filtered and transfered into the water tank.

The Basement does not overflow.
House 3 continues to give back to itself.

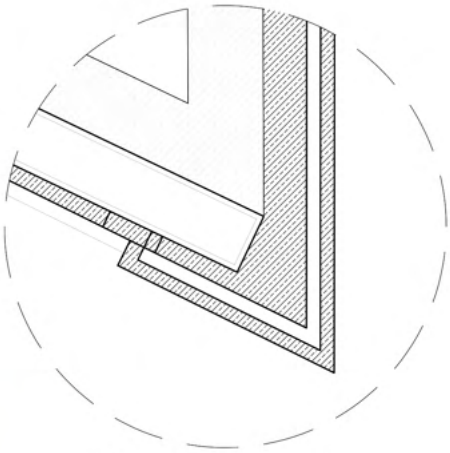
Water is usually a hidden element. We don't often see it until we open the faucet, wherein the project deals with breaking architecture rules. The diagram above shows the rainwater filteration that acts upon two main weather condition when there's going to be rainfall and secondly when there's no rain in summer. The desalination system pulls brackish water from below ground water and incase of overfilled situation the water overflows onto the plunge pool creating the grotto environment in basement. The water goes through the filtration process and is later stored in portable and flexible water tank which is at the center of the core.



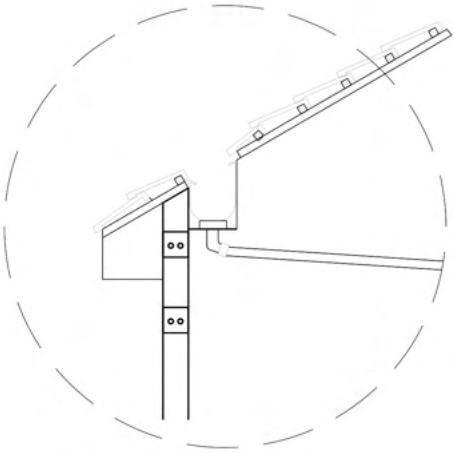
Water tank corner detail



Acrylic glass to SS frame joinery



Water tank corner detail



Internal gutter and pipe detail

The above diagrams are some details that we customised in focus to this project. The truss system under the roof is the support of the roof and the filtration system, and it also integrates with the plunge pool at basement, part of the members are also water pipes, allowing rainwater collected from the roof to enter the portable water tank. and excess water can also flow on to the plunge pool for recycling the water. The re-infiltrate water is transfered back to filtration system and then to thetank through the pipes to restore the water, thus keeping the function running.

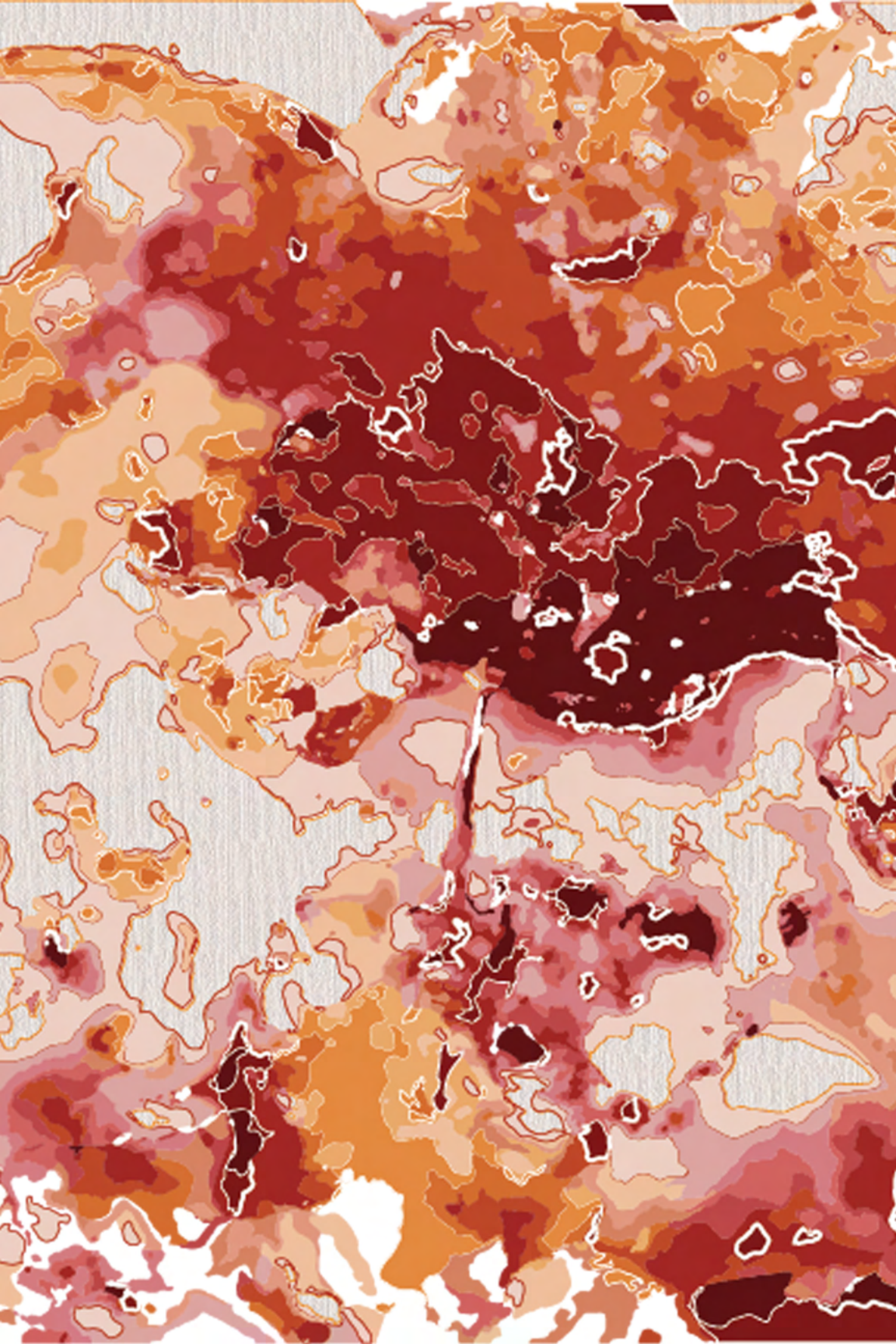
Core connectivity

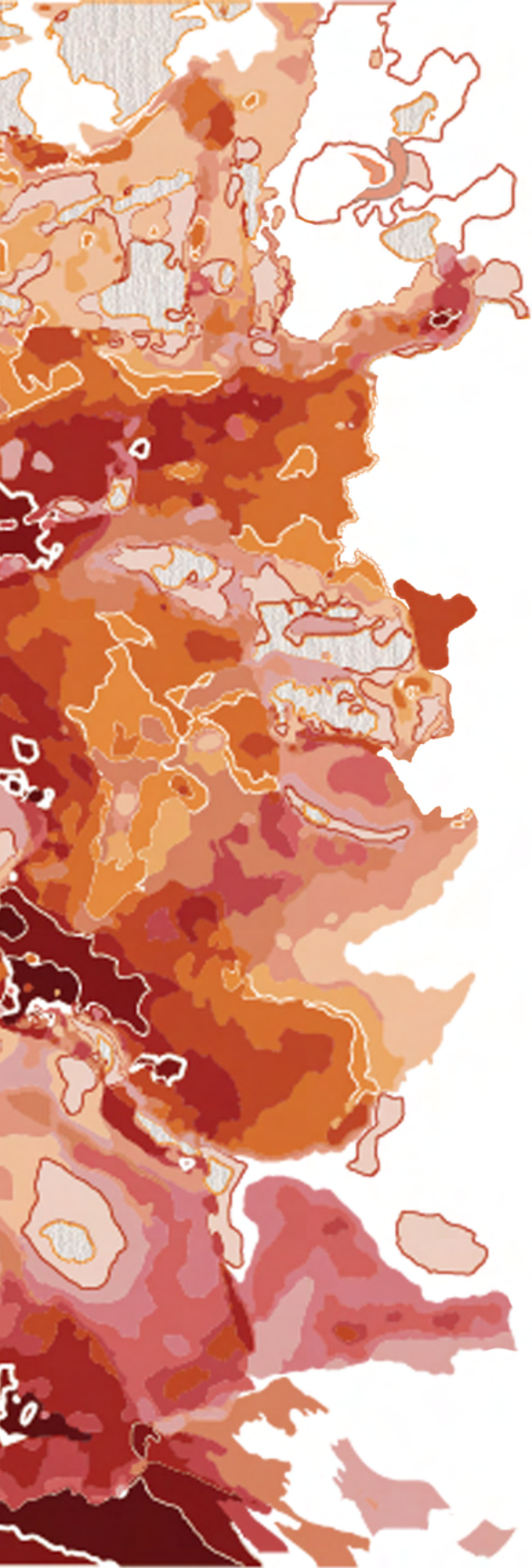
Architecture is the art and technique of designing and building, as distinguished from the skills associated with real world. The practice of architecture is employed to fulfill both practical and expressive requirements, and thus it serves both utilitarian and aesthetic ends just like the image shown from Karl Blossfeldt Photography collections. Although these two ends may be distinguished, they cannot be separated, and the relative weight given to each can vary widely in aspects of architectural spaces as every society is settled or nomadic has a spatial relationship to the natural world and to other societies. In nature most plants and vegetation have radial and organic organizations implant in their midst.

A radial organization in architecture works by combining a dominating central space and as an extroverted scheme that escapes its context and when the idea of that particular space is repeated with the same context is referred to Recursion.

In the composition of this photograph, similar to Architecture, the stem is the prominent and most upfront element, anchoring all of the elements and nuances to a framework that connects everything, and everyone in radial format and the leaves curling in outward direction. The organic form has a tangible feel and the structure constitutes a repetitive composition creating exclusive spaces within them and giving a unique look as a whole image.

Figure 56: Karl Blossfeldt, Macro Photograph, Ireland





The 'Wet Wall' break the tensions between the traditional axes of architectural design, elevating experiences by many as a set of technical achievements as the outcome of an aesthetic manifesto and understood generally as the core of the creative enterprise of the architect, or as a linear solution applied to a local problem.

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Acknowledgement

Presentation, Inspiration and Motivation have always played a key role in the success of any venture. This book is dedicated to my parents, **Laxman Kanal** and **Kiran Kanal** and my younger sister **Divya Kanal** without whom none of this would have been possible. Their support, guidance, constant strive for better, effort, sacrifice, and above everything else, love is deeply appreciated and valued by me. I hope to carry their last name proudly and for this to be only the first step into a great journey.

I pay my deep sense of gratitude to all those individuals who have helped and supported me for the successful completion of my research book in Master of Science in Architecture course. Special thanks to **Ariane Lourie Harrison**, for being kind and resourceful throughout the process of research, her teachings will stay with me wherever I go. I owe my sincere appreciation to **Julia van den Hout, Cynthia Davidson, Jonas Coersmeier, Erich Schoenengerger, Olivia Vien, Jing Liu, David Erdman** and **Beatrice Galilee,** for being patient and understanding with their continuous support. One Special mention to **Jeffrey Anderson** for his positivism and always looking to help. I am thankful to every individual who extended their co-operation and shared their valuable information, time and the feedback. I express my utmost gratitude to my friends for their constant support throughout the course. This book would have not been possible without any of you.

Thank you