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From Waste to Wonders

Thesis Proposal is Presented to the
Faculty of the Department of Architecture
School of Architecture and Construction Management
by

Katrina Alano

In partial fulfillment of the requirements for the Degree:

Bachelor of Architecture

Kennesaw State University

Kennesaw State University

Department of Architecture
College of Architecture and Construction Management

Thesis Collaborative 2016 – 2017

Request for Approval of Project Book

Katrina Mariz Javelosa Alano

From Waste to Wonders

Thesis Summary

Can you change someone's life with a pair of scissors and a plastic bottle? This thesis takes inspiration from the existing resilient use of material in the slums and explores the material properties of the most abundantly found and discarded material, the plastic bottle. By experimenting with the capabilities of the plastic bottle, the goal of this thesis is to create a surface tectonic that enhances the experience for the currently oppressed women, while also arguing the notion that the right to the city is a collective privilege—everyone, regardless of gender, has the right to space. According to Farshid Moussavi's writings on Function of Form, the overall feeling and atmosphere of a space is derived from the materiality of the surfaces; Building upon this notion, the thesis inquires: how can we utilize the simple material of the plastic bottle to create liberating spaces for the women? How can we use the atmospheric quality of space & material utilization for the empowerment of women?

Student Signature _____Date_____

Approved by:

Internal Advisor 1: Professor Arief Setiawan _____Date_____

Internal Advisor 2: Professor Christopher Welty _____ Date_____

Thesis Coordinator: Professor Liz Martin _____Date_____

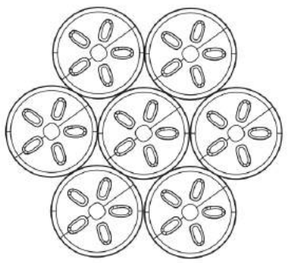
Department Chair: Dr. Tony Rizzuto _____Date_____

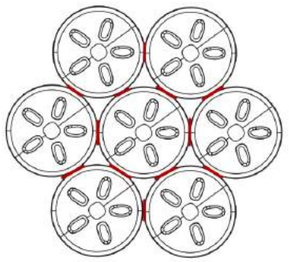
I would like to thank the Slum Master: Professor Arief Setiawan and Bottle Master: Professor Christopher Welty for their guidance, support, and passion throughout this year. Thank you for always coming in with laughter, smiles, (and bottles) every single day, making this design process truly enjoyable.

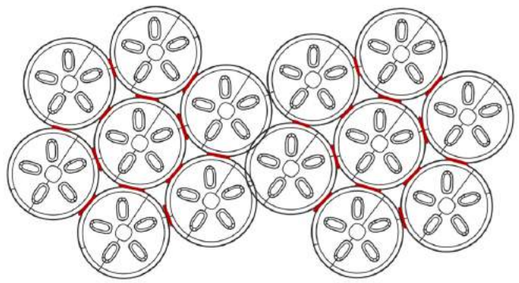
To my architecture family, Damari Weaver, Laura Sherman, Jonne Smith, and Giovonni Reese, thank you for always being there for me during these five years. You guys have brought me so much happiness and laughter throughout architecture school, and I'm extremely lucky to have you guys as my best friends.

To Brandon, thank you for always believing in me. I can't thank you enough for the amount of love, support, and happiness you have brought me during our years in architecture school. Thank you for always pushing me to my greatest potential.

& Finally to my family, thank you so much for the love and support I recieved during my five years of architecture school, I couldn't have done it without you guys.







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1.0 Design Theorem

1.1 Introduction

Currently, the world's population is growing at a static rate, specifically within developing countries. With this growing number, the vast majority focuses on where to reside and what benefits will be given to them in their selection. Most people view the urban core or city for this solution, due to the fulfillment of financial comfort of the close proximity of job opportunities. Approximately, 95% of this final build out of humanity will occur in the urban areas of developing countries, whose population will double to nearly 4 billion over the next generation[1]. However, with this growing number, housing becomes an issue, and the formation of "slums" develops around the urban areas of these developing countries.

A typical slum consists of elements such as makeshift structures, innovative use of building material, inadequate access to safe water and sanitation and urban segregation. Slums typically grow organically, and cities within developing countries are magnets of migration. This results in sprouting, or the organic growth, along the main fringes and interstitial spaces of cities. These slum communities harbor "squatters" or residents that illegally occupy and share living quarters with either relatives, or other they bought rights in these rented spaces[2].

Slum dwellers construct their living spaces with locally sourced materials, specifically corrugated metal sheets, plywood panels, concrete blocks, and stretched fabric. Typically, a slum is comprised of one room that is a flexible space for multiple uses, including domestic activities, as well as, sleeping and eating. Generally, either one large family or multiple families occupy these spaces together, and the exterior alleyway spaces surrounding the dwelling are highly flexible and active. Dwellers use these alleyways for domestic, social, and economic activities.

Figure 1

Figure 2: Mumbai Slums

Women slum dwellers spend more time at home conducting home-based activities such as, childcare, cooking, laundry, and economic activities, while the men leave the home and receive income. The spaces the women inhabit, while completing their duties, have atmospheric qualities of constraining, tight and dark. Through a spatial analysis of slums, based off of the physical boundaries and materiality, the characteristics of the space for women posess a limited spatial experience.

Figure 3: Manila Women in Slums

Figure 3: Manila Woman in Slum

PLANET OF SLUMS

Mike Davis

"the classical definition of a slum, characterized by overcrowding, poor or informal housing, inadequate access to safe water and sanitation, and insecurity of tenure"[9]

"Urban segregation is not a frozen status quo, but rather a ceaseless social war in which the state intervenes regularly in the name of "progress," "beautification," and even "social justice for the poor" to redraw spatial boundaries to the advantage of landowners, foreign investors, elite homeowners, and middle-class commuters."[10]

"As much as 60 percent of the city's growth is the result of people, especially women, heroically building their own dwellings on unserviced peripheral land, while informal subsistence work has always accounted for a large proportion of total employment." [11]

"Squatters trade physical safety and public health for a few meters of land and some security against eviction" [12]

Key Words:
Spatial Inequality • Urban Segregation •

Urbanization is happening at a rapid rate worldwide, increasing the numbers of the urban poor population. With rapid urbanization, there is little to no planning to accommodate people coming into the city[3]. One of the fundamental problems with the growth of the urban poor is spatial inequality, which is the concentration of poverty on a limited size of land, limited access to infrastructural amenities, and fragmentation of the urban society between the rich and the poor.

There are most extreme differentials between the rich and the urban poor. The polarization reflects geographically, through seperation, and is also relfected through a growth of social and economic inequalities[4]. Often as the slum grows, rich residents of third world countries would build gated communities to avoid interaction with the urban poor. This reduction of interaction between the rich and the poor impacts the city and creates urban fragmentation and social segregation.

The growth of slum is different from what First Worldist so-called Marxists predicted, because rather than a place of prosperity, slums have become a dumping ground for excess humanity[5]. The typical slum-dweller is not a factory worker, but the slum economy is ruled by the informal sector, not the traditional productive sector[6]. Typically jobs in the informal sector are low paid, with low job security, ranging from domestic help, street vending, construction labor, or self employment.

Mike Davis defines slums as a situation of overcrowding, poor or informal housing, inadequate access to safe water and sanitation, and insecurity of tenure[7]. Slum dwellers live in squalor and decay, in excrement and waste, usually without urban planning, sanitation and services[8]. The housing construction materials are diverse and range from thin wood, to corrugated metal panels, and trash scavenged. Within the slum spaces, they are densley packed with one or more family living in a single space. Although they live in poor conditions, the spaces they live in are flexible and multi-layered.

Figure 5: Mumbai Slums

Figure 6: Manila, Philippines Slums

Figure 7: Mumbai Slum

Figure 8: People in slums gathering

Figure 9: Aerial view of Manila Slums

Figure 10: Aerial view of slums

"Improving rather than replacing slums has become the less ambitious goal of the public and private intervention" [13]

Figure 11: Slum in Jakarta

Figure 12: People in the alleyway

Fixing slums through replacement rather than improvement, and helping slums through top-down approaches were proven not to have been successful according to Mike Davis. When considering the layout and function of cities, there are two simple ways of considering the design moves; top-down approaches versus bottom-up approaches. Top-down strategies incorporate interventions that lack the community participation, and often give the communities designs without their voice.There is difference in designing for people and designing for the person. One cannot just simply assume that a redevelopment plan of a developing country's slum communities would solve the issue.

Although slums may be viewed as versatile and to some, disturbing, they are still in the end homes for a family. Through future projections and data, slums are not in the nearby future going to be "eradicated" any time soon. The infrastructure of these makeshift homes are so deeply imbedded into the landscape of the city that one cannot just rebuild new homes nearby and expect all the slum dwellers to migrate there.

Space within the slums may not be able to be physically fixed overnight, but something even more effective could happen. With the first evolution of slums, they were seen as adaptable and resilient, and to this day, they have evolved even more so with those characteristics. If a design implementation were to be done on the slums, it would need to take precedent into its adaptability element. Spaces in the slums have unlimited room for adaptable solutions in order to make the living space more enhanced, rather than just a new one. For most slum dwellers, their makeshift structure may have issues, but regardless, it is still their home and sense of place. Fixing the issues of the existing home without changing its major characteristics is what an effective design solution would be for the slums.

Key Words:

• Bottom-Up Approach •

Writings on Cities: The Right to the City

Henri Lefebvre

"The right to the city cannot be conceived of as a simple visiting right or as a return to traditional cities. It can only be formulated as a transformed and renewed right to urban life. "[16]

"The right to the oeuvre, to participation and appropriation, are implied in the right to the city" [17]

Key Words:

Participation • Right to the City • Shaping the City • Inhabitant Participation • Appropriation

Henri Lefebvre explains the Right to the City, on how the rights of all urban dwellers, regardless of citizenship, ethnicity, ability, or gender, to participate in shaping the city[14]. His ideas are for inhabitants to be a part of the production of the city, to claim their right to urban life. Lefebvre uses the term the right to the city because access to and use of the space of the city is a vital element in achieving a true urban society.

To appropriate something is to take it to oneself, to make it ones own[15]. He talks about appropriation is therefore a "right" in the way that users have a normative right to the space of the city. In claiming a right to the city, inhabitants take urban space as their own, and they appropriate the space.

Inhabitant participation results in inhabitants managing the production of urban space, themselves. As inhabitants become increasingly activated in managing the city themselves, they are effectively appropriating the city and the production of its space. By taking control of the conditions of their own experience, and inhabitants are making the city their own again.

Through the participation and engagement of the urban poor, this gives them a chance to contribute thoughts and special perspectives on their own spatial needs. Giving them the opportunity to voice their opinions, allows them to effectively appropriate their city and the production of its space, to allow for improvement on their current issues and spatial conditions.

Figure 13: People coming together

Figure 14: Women gathering together

Figure 15: Hundreds March through together to show support

The Right to the City

David Harvey

"The right to the city, therefore, far more than a right of individual access to resources that the city embodies; it is a right to change ourselves by changing the city more after our heart's desires" [18]

"The right to the city is, therefore, far more than a right of individual access to the resources that the city embodies: it is a right to change ourselves by changing the city more after our heart's desire. It is a collective rather than an individual right" [19]

David Harvey argues the right to the city is more than just access to what we already have; it's ultimately the right to change our city. The right to the city is the idea of taking ownership and control of your urban experience, and exercising your right as an urban dweller.

Harvey focuses more on the collective body of society, rather than the individual as a means to "resync the processes of urbanization". The idea of not just an individual change, but a collective change amongst the inhabitants[20]. Realize the role of the community as an active agent in taking a part, and claiming the right to decide what kind of urban experience they want. By building the space collectively, people can create better urban environments resulting in a better life for both themselves, and their communities.

This thesis aims to implement the ideas of "The Right to the City", by incorporating bottom-up, grassroots solutions that will empower the collective to take ownership of their space. By taking ownership of the existing environment gives the ripple effect in collective responsibilities in improving their community's environment. This thesis aims to empower the collective and incorporate design interventions that will uplift the community and change the urban environment.

Figure 16: Slum Community Gathering Togther

Figure 17: Urban poor reclaiming public space

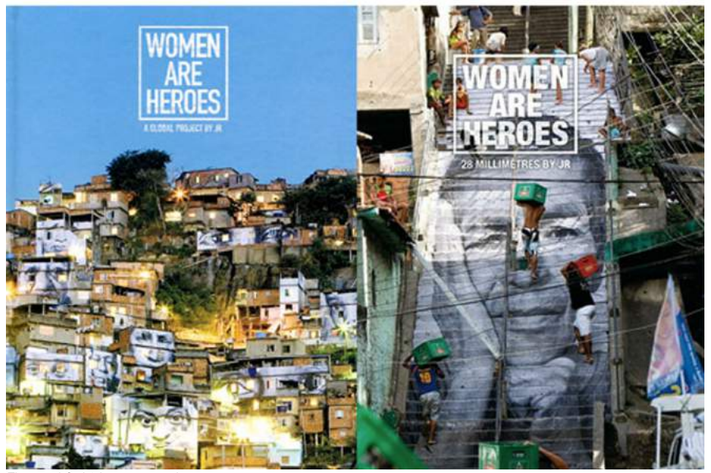


Figure 18: Women are heroes

Key Words:
Urban Experience • Right to the City • Collective • Right to Change the Urban Environment • Community

Gender Inequality: Women In Slums

"While the burdens of survival [for the family] are enormous, those of the women are even greater" [21]

"Poor urban women are terrorized by the catch-22 situation of being expected to maintain strict standards of modesty while lacking access to any private means of hygiene. "The absence of toilets is devastating for women. It affects their dignity, health, safety, and sense of privacy, and indirectly their literacy and productivity"" [22]

While women mostly work in lowly paid, competitive dead-end jobs such as laundresses, domestic help or scavengers, women also work in home-based productions. Women commonly experience an additional time burden due to the simultaneous maintenance of the household, and childcare activities, and also have limited access to education because of the time spent with childcare and domestic activities.

While providing for their families through domestic means, such as laundry, cooking, cleaning and childcare, the women are limited to two spaces: the slum, and the alleyway next to the slum. Because of their role in society, the women are static within these leftover external spaces of the alleyways. The materiality and tectonics of the space that the women primarily inhabit in the slums create atmospheric qualities that are dark, tight, and constraining. Because of these depriving qualities, the primary inhabitants, the women, are seen and treated as such due to the atmospheric conditions they reside within.

Figure 19: Manila women doing laundry

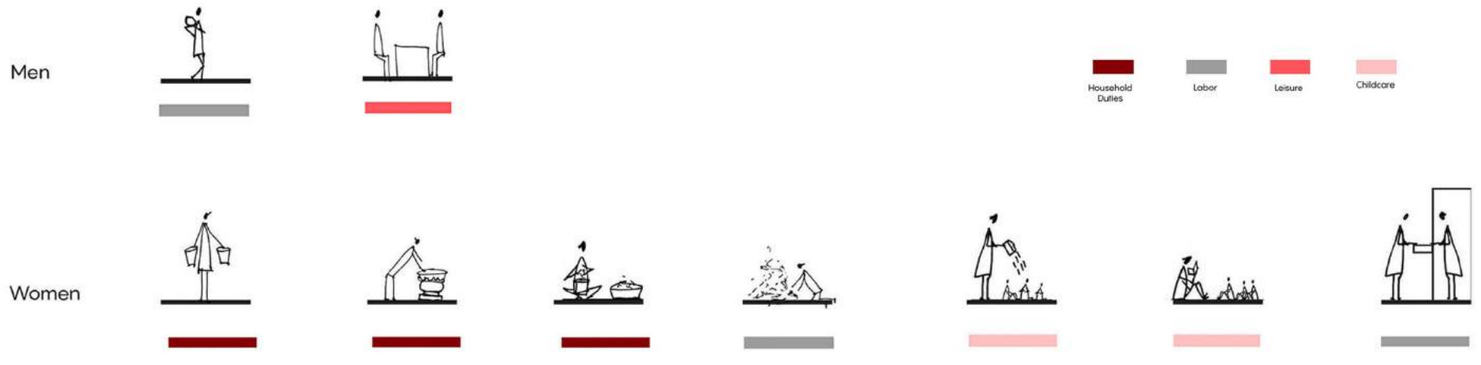
Figure 20: Manila woman taking care of child

Figure 21: Sindu, age 9, cooking a meal for her family

Figure 22: Mother bathes her child in public

Figure 23: Women cooking within community

Figure 24: Women collecting water



Key Words:

Gender Inequality • Constraining Spaces for Women in Slums •

Figure 25: Manila woman doing laundry in alleyway

Figure 26: Manila women peeling garlic

Figure 27: Woman in Alleyway

Figure 28: Slum girls doing laundry

Figure 29: Manila slum woman taking care of child

The Function of Form

Farshid Moussavi

"The perception of an architectural form involves two stages. First, an affect is transmitted by a form. This affect is then processed by the senses to produce unique affections-thoughts, feelings, emotions and moods. As an affect can unfold into different affections or interpretations in different beings, it embeds a form with the ability to be perceived in multiple ways" [23]

"Moreover, it enables us to incorporate greater levels of complexity within built forms, allowing multiple inputs to interact simultaneously on the same plane to generate a multitude of novel forms, each with unique expressions, sensations, and affects." [24]

Key Words:
Affect • Experiential Qualities • Senses • Perception • Materiality

Moussavi focuses on the idea that architecture is not about the form, but is more about the surfaces, and how the surface's use of material and tectonics create experiential qualities. She states that architectural forms have "affects", and affect is then processed by the senses to produce thoughts, feelings, emotions, and moods for the user experiencing the space. The creation of surfaces allows people with differing views and sensibilities to develop an affective relationship with their environment. Thus, the affect of the architecture's surfaces and materials influences the human body through senses and perception.

Moussavi explores different architectures that bring atmospheric qualities for the inhabitant. The Dominus Winery's surface and material are a combination of small, medium, and large stones held within a wall of mesh cages. The varying sizes of stones create the visual affect of rusticated and also allows for the passage of natural light. The combination of the varying size stones with the penetration of the natural light creates a dappling light affect, allowing for the body to experience the warmth of dappled light.

The surface and material of the space can also create program distinction within the building allowing the inhabitants to engage in the architectures atmosphere, visually. Moussavi explores the Laban Dance Center and how it creates the affect of Tonal. Within the dance center, different programs indicate different colors. The materiality of the facade, polycarbonate layer, blurs the different colors in a series of tonal gradients. By creating the series of tonal gradients, this activates the inhabitants visual sensory.

The surface and materiality of spaces determine the atmospheric quality, and affect it brings to the inhabitant of the space. Surfaces with specific materiality can trigger the senses, and stimulate the spatial experience for the user. The design of surface and materiality of the architecture can create liberating experiences for the inhabitant.

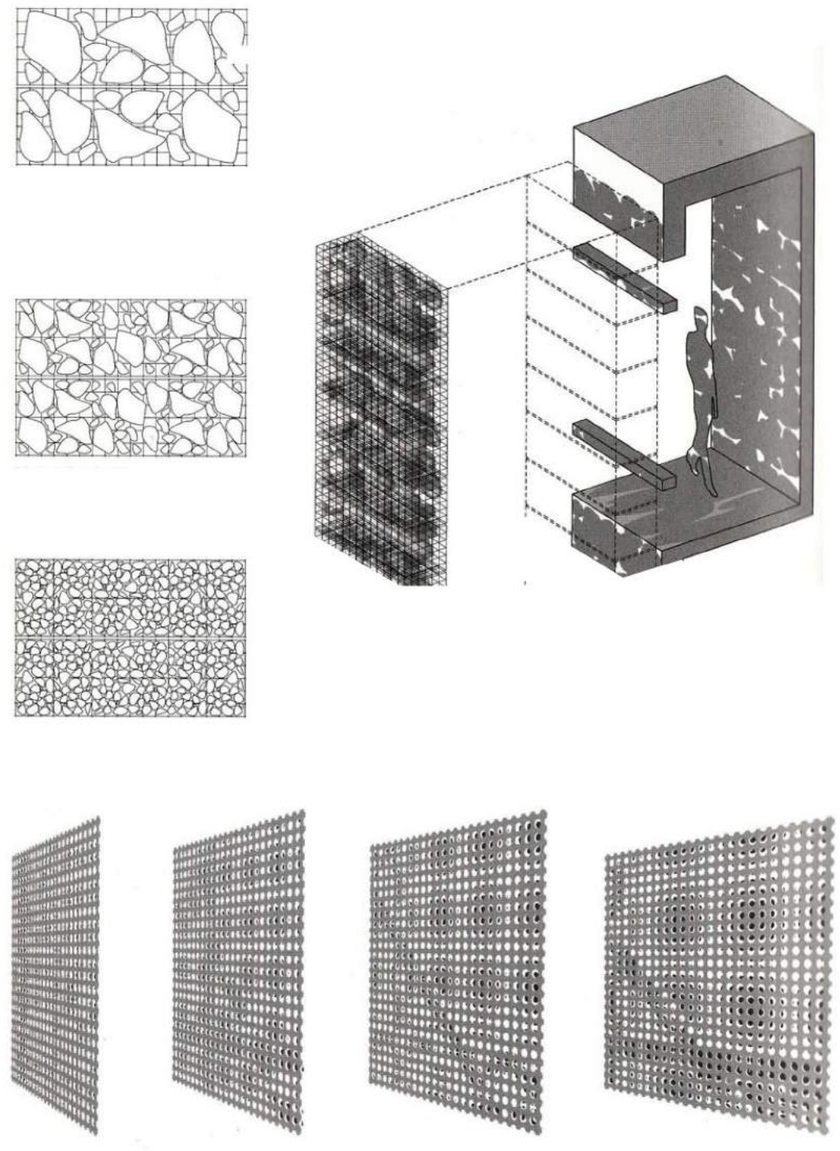


Figure 30: Dominus Winery

Dominus Winery
Material Construction -> Affect: Rusticated

Constructs rusticated affect through materiality:
-Exterior gabian wall of wire mesh cages filled with a gradient of stones from small to large.
-Varying sizes in material (stone) create Visual affect of Rusticated

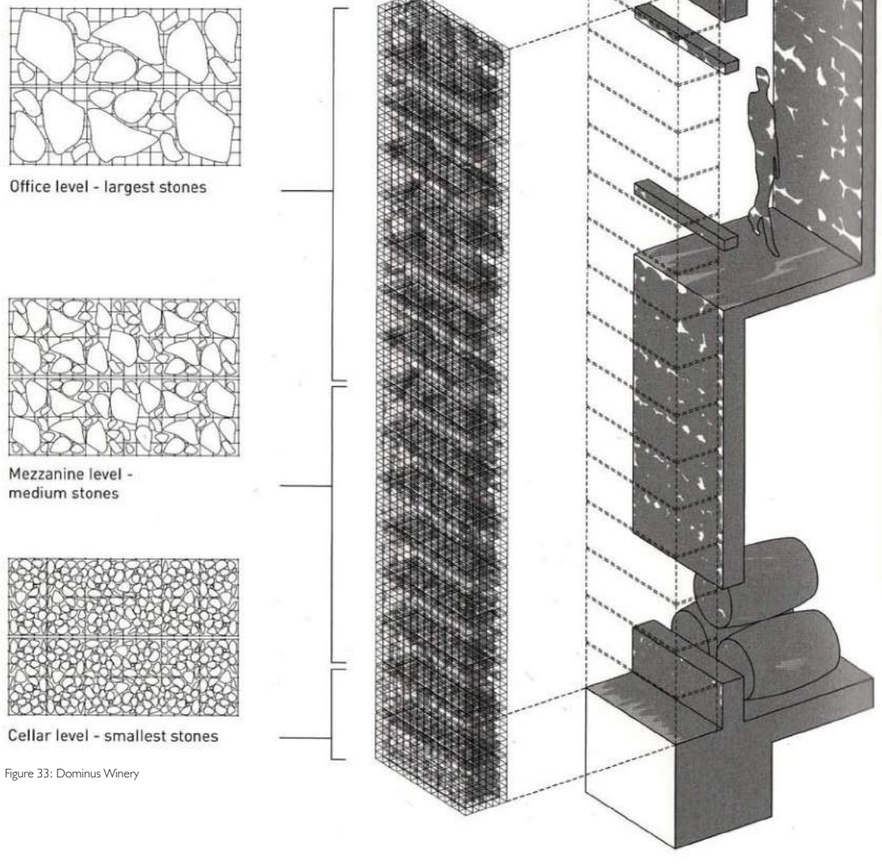


Figure 33: Dominus Winery

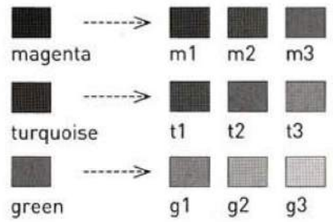
Figure 31: Interior: Dominus Winery

Figure 32: Interior: Dominus Winery

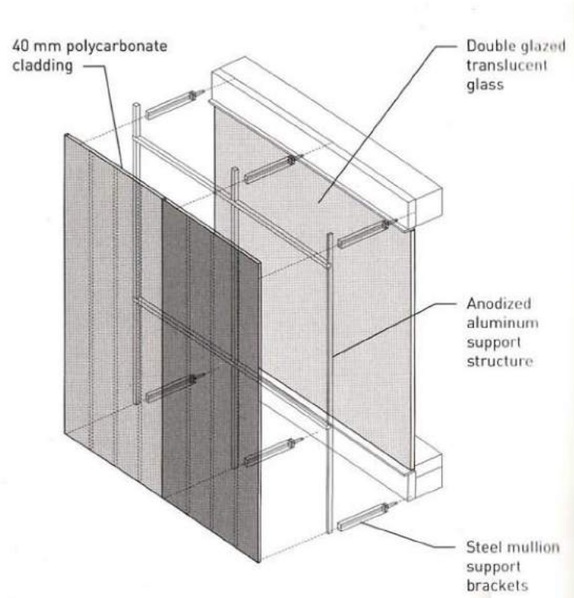
Laban Dance Center
Material Color -> Affect: Tonal

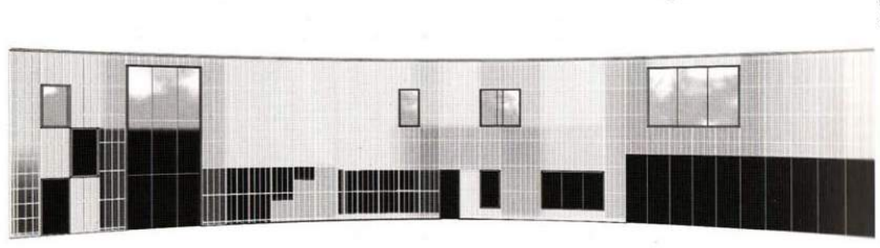
Constructs Tonal affect through material color:
-Different programs indicate different colors
-Outer polycarbonate layer blurs different colors into a series of tonal gradients
-Visual affect of Tonal

Figure 36: Laban Centre in London

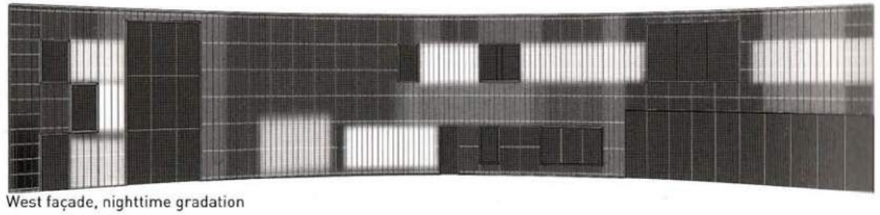


The chromatic system is composed of three colors, each with three tonal variations.





West façade, daytime gradation



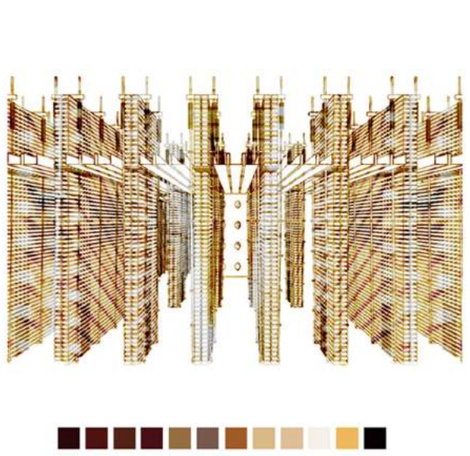
West façade, nighttime gradation

Figure 34: Exterior View: Laban Centre in London

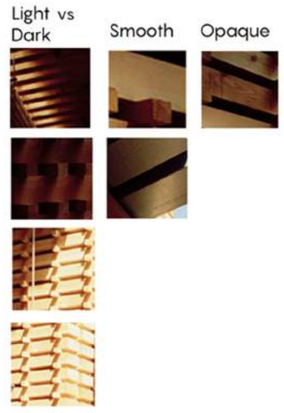
Figure 35: Exterior View: Laban Centre in London

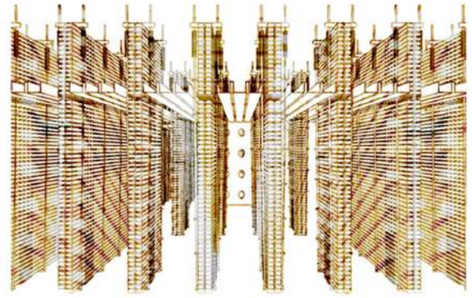
Swiss Pavilion_Peter Zumthor

Figure 37: Swiss Pavilion



Sense_Visual





Sense_Touch

Bruder Klaus Field Chapel_Peter Zumthor

Figure 38: Exterior Bruder Klaus Field Chapel

Figure 39: Interior View Bruder Klaus Field Chapel

Figure 40: Interior View 2

Sense_Visual

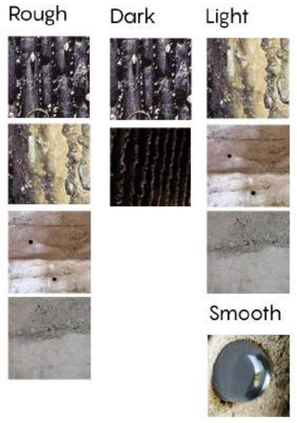
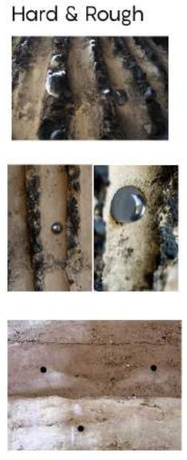
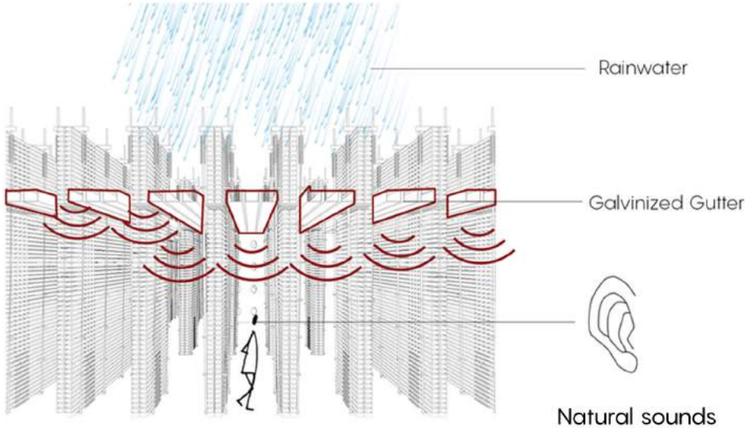


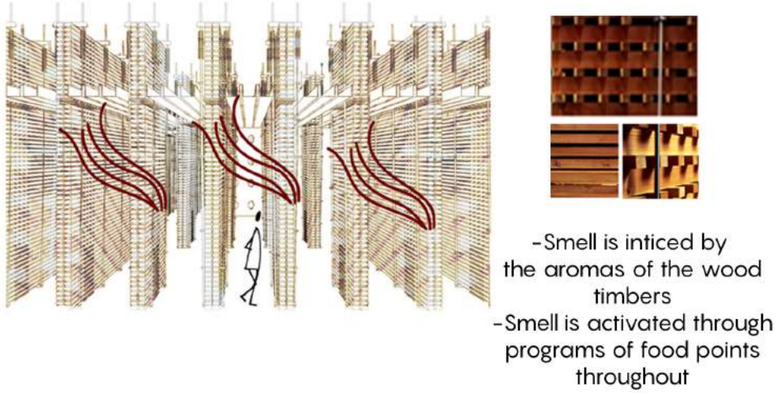
Figure 41: Interior View 3

Sense_Touch



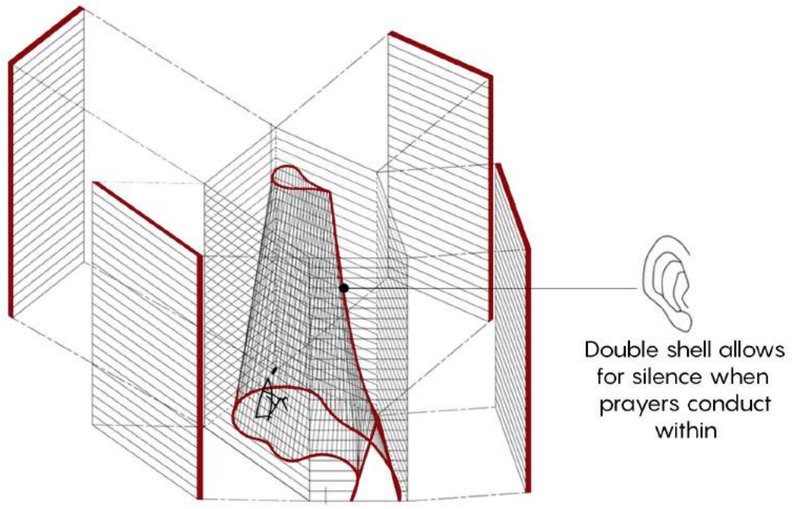


Sense_Acoustic

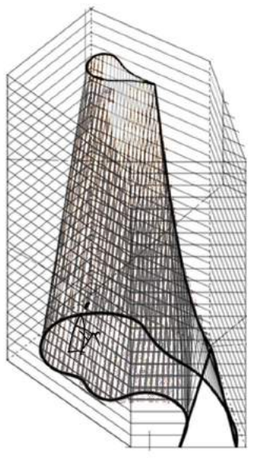


Sense_Smell

The Swiss Pavilion done by Zumthor exemplifies different senses for the human body. He incorporates music, lighting and aroma as aspiring features towards this design. When the light pours in, it illuminates the golden wooden texture in a rhythmic pattern similar to a trellis. And the same wood has a juxtaposition of hard and soft surfaces that allow the user to physically feel the difference of the surface as they progress through. And during rainfall, the sounds of water crashing into the surface of the roofing material create an ominous white noise effect. Lastly, the natural cut and sawn lumber of the wood creates the aroma of freshness and quality, as one perceives the space.



Sense_Acoustic



Sense of smell is triggered through the materiality, reminiscing the smell of burnt wood

Sense_Smell

The Bruder Klaus Field Chapel is another one of Zumthor's experiential creations. With this project, as one enters the center space, they can glance up and see the ascension of endless light that is presented as "divine." And next, the rough texture of the concrete, that was casted around a group of 120 tree trunks, cut at a local forest, and then slowly burned, creates both an ominous physical sense of touch of the texture and a relaxing aroma of burnt wood and concrete. And lastly, the double thickness of the wall assembly creates a soundproof space, which allows the user to be placed within a serenity of thought with no external acoustical distractions.

Chapel of St. Ignatius_Steven Holl

Figure 42: Interior View

Figure 43: Interior View 2

Figure 44: Interior View 3

Sense_Visual

Figure 45: Interior View 4

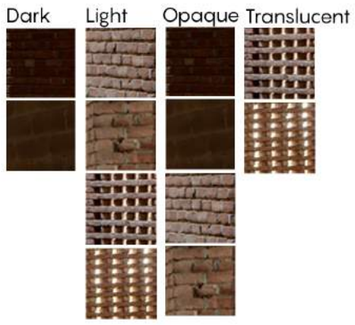
Sense_Touch

Bait Ur Rouf Mosque_Dhaka Bangladesh

Figure 48: Interior View

Figure 49: Interior View 2

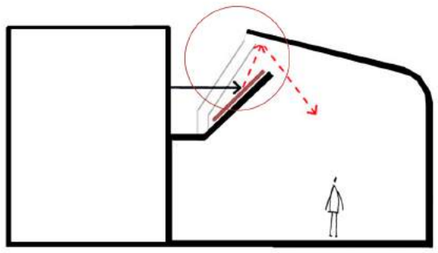
Figure 50: Interior View 3



Sense_Visual

Figure 51: Interior View 4

Sense_Touch



Holl creates phenomena by overlapping surfaces and bouncing light off of colored surfaces

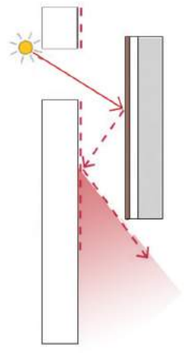


Figure 46: Interior View 5

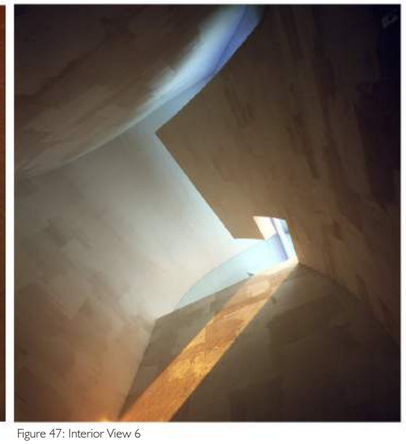
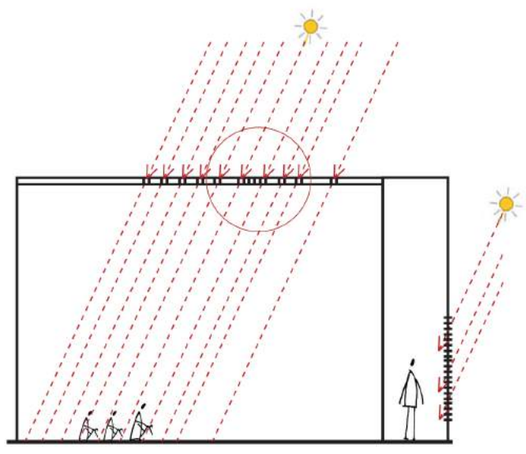


Figure 47: Interior View 6

The Chapel of St. Ignatius is about the metaphor of light, beginning with the concept of , "A Gathering of Different Lights" [2] Holl creates the phenomena of the space with the use of light with color to create spatial experience. He planned the areas of light phenomena, before he planned out the spaces of the chapel. Within the spaces there are different qualities of light which are caused by the reflection of light off of the overlapping colored glass and color fields. The lights create a reminiscent of stained glass through the use of reflected light, instead of transmitted light.

Sense_Visual Emphasized



Light filters through a series of fenestrations on the roof, creating the experience of dappled light during prayer.

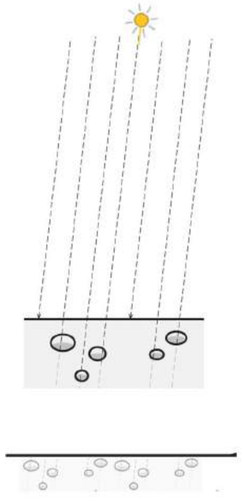


Figure 52: Interior View 5

Figure 53: Interior View 6

Figure 54: Interior View 7

The Bait Ur Rouf Mosque in Dhaka is a remembrance structure dedicated to a late husband of the client who funded it. Although the design is simple, it can be quite deceiving. One of the main phenomenons within the space was a dappled lighting effect that is handled with such skill to make the interior and brickwork rich with mood and texture. This essentially makes the interior space enlighten with promotion of prayer through both dappled lighting and passive cross ventilation done by the pours façade of brick on all four sides.

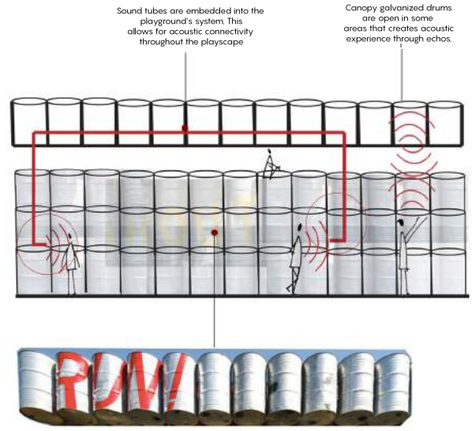
Sense_Visual Emphasized

CASE STUDIES_Urban Spaces_Atmospheric Qualities

Lions Park_Rural Studio, Newbern Alabama

Figure 55: Rural Studio's Lions Park

Figure 56: Lion's Park Playscape



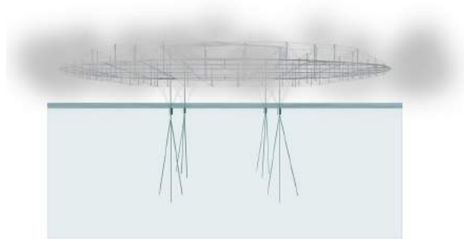
Recycled Galvinized Drums

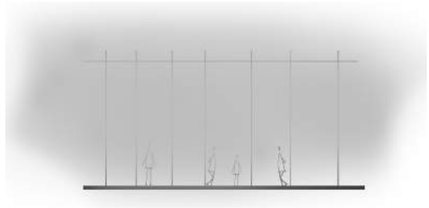
Lions Park in Newbern, Alabama is a prime example of material revitalization and the exploration of sound and play. With the repetitive use of recycled aluminum water drums, the young architects of Auburn's rural studio designed and fabricated a play park that exemplifies the sense of sound. This is shown through the material of lightweight metal and its ductility. When one climbs on the structure, it is heard everywhere due to echo and reverberation of the material. And within the structure, sound tubes are implemented to allow users to vocally call out to one another from across different sides of the design.

BLUR_Diller & Scofidio

Figure 57: Blur Building

Figure 58: Blur Building





The BLUR pavilion done by Diller Renfro and Scofidio explores space making through a translucent lens. With this pavilion, 30,000 high-pressure fog nozzles are implemented to disperse water vapor into the air to create thick, fogged space. This foggy space goes against the typical enhancement of space through high definition visual environment, but one can see nothing and hear nothing once within. This created a space that could feel unlimited in size but reduced in visual perception, allowing the space to perpetually enhance multiple senses.

SOFT Rockers_MIT - Massachusetts Institute of Technology

Figure 59: Soft Rockers

Figure 60: Soft Rockers

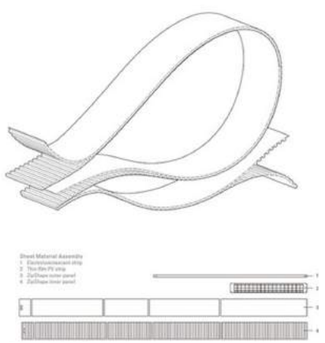


Figure 61: Soft Rockers

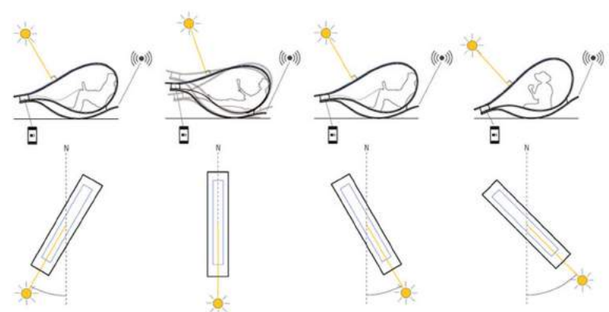


Figure 62: Soft Rockers

At MIT in Cambridge, a design of clean energy charging stations that could double as rocking outdoor lounges are implemented as public space enhancement. Through the storage of DC power by solar strips on the topside of the form, these stations invite modern day users to recharge their electronic devices while relaxing in a dynamic furniture design, while sitting with other friends. These designs are meant to enhance the urban setting by advertising towards modern day technology and usage towards communal, collective space activation.

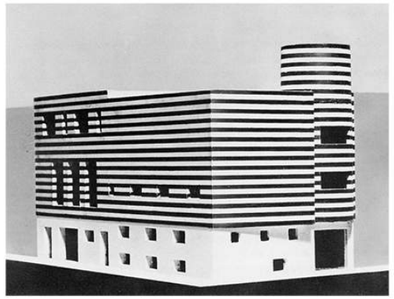
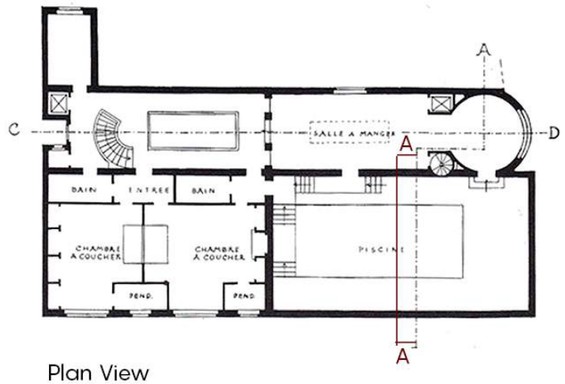
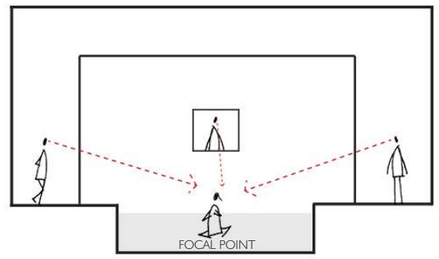


Figure 63: Joséphine Baker House

Josephine Baker House, Adolf Loos



Plan View



Section through the Pool Room

The three-story house featured a café and at its center, an indoor swimming pool with windows for underwater viewing. He designed the swimming pool so that Baker's guests could watch her swim in the pool, a quality in Baker that he saw deserved an architectural glorification. Loos saw in Baker a chance to express his view of her modernity through the language of architecture.

Figure 64: Eileen Gray et Le Corbusier

e1027 House, Eileen Gray

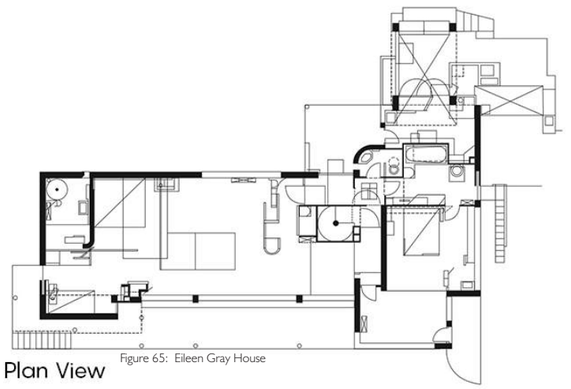
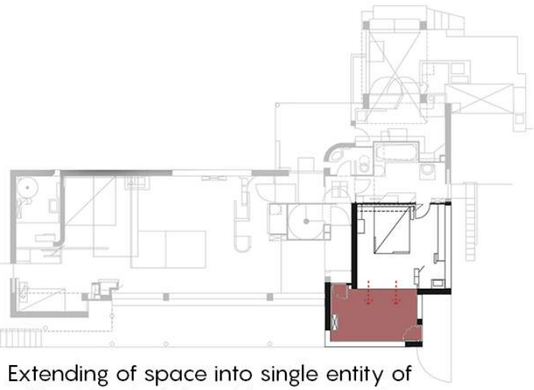


Figure 65: Eileen Gray House

Plan View



Extending of space into single entity of a "budoir-studio" ;making a masucline space transformed to a feminine space

Eileen Gray's house focused on the interior which can be traced to the idea that traditionally women's roles were significantly centered on the interior of the house. Gray reveresed the gender associations traditionally assigned to these spaces. She inverted their relative positions, placing a bed alcove off the lliving room and her own work space off the master bedroom. She termed her workroom a "budoir-studio", merging historically **gendered spaces of budoir and study into a single entity.** Gray reassings the meaning of space.

Figure 66: Le Corbusier, Villa Savoye

Villa Savoye, Le Corbusier

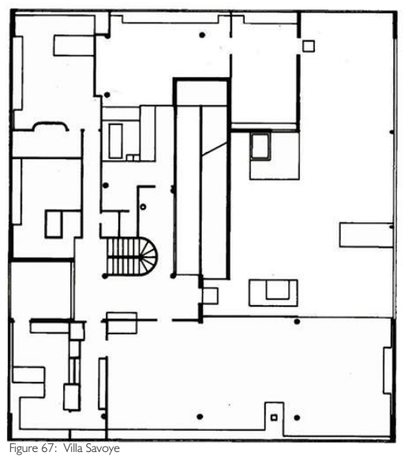
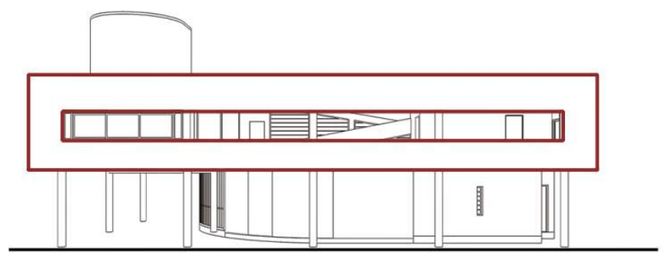


Figure 67: Villa Savoye

Plan View

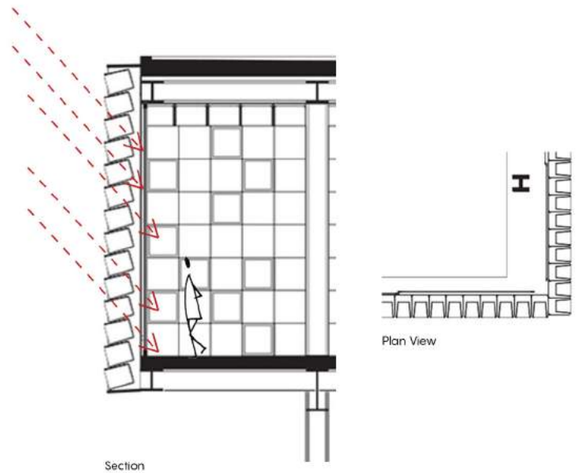


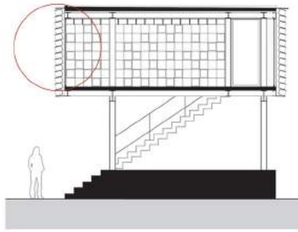
Controlled Symmetrical Geometrical Form

Opposing both Grey and Loos's ideology on emphasizing feminine qualities in design, Le Corbusier saw architecture as machine. This meaning that the structure's white walls and controlled symmetrical form with clean lines gives it a clinical masculine/ **heterosexual appearance**. Also, Villa Savoye focues primarily on it's "free plan" and less on it's interior characteristics.

Figure 68: Taman Bima Microlibrary's facade

Figure 69: Library in Indonesia





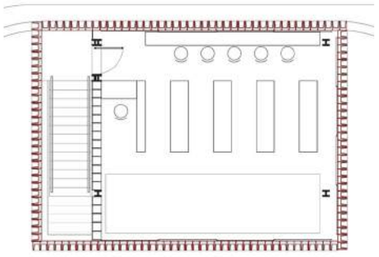


Figure 70: Recycled Materials for Indonesian Library

Figure 71: Recycled Materials for Indonesian Library

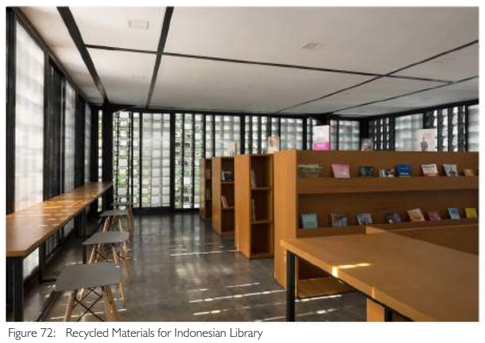


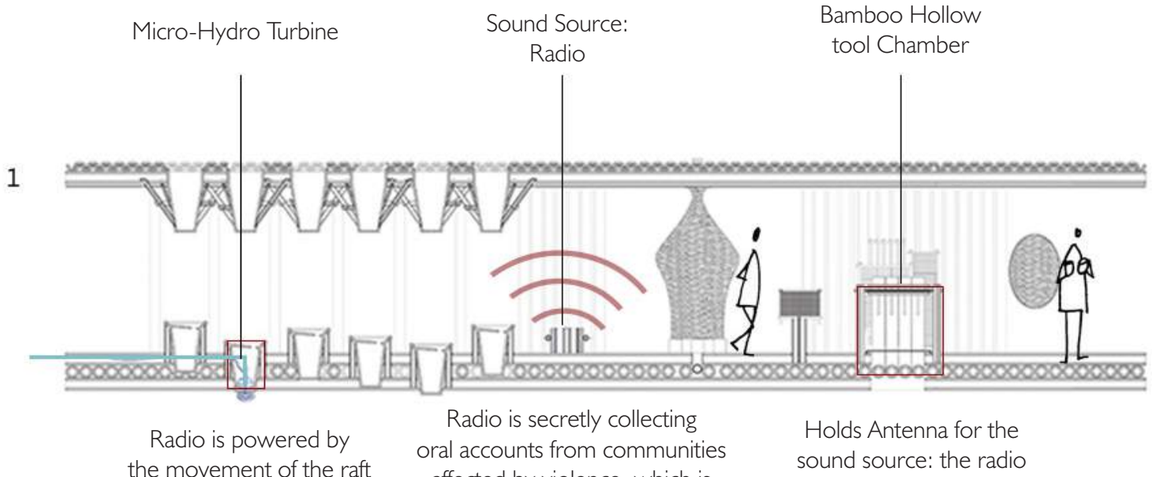
Figure 72: Recycled Materials for Indonesian Library

Bima Microlibrary_Jawa Barat, Indonesia

Approach: Tectonic, Programmatic

The goal of this microlibrary is to recreate interest in education by creating a space for learning. The Microlibrary creates identity and empowers the people within the neighborhood. The facade symbolizes education and learning, and the use of recycled plastic ice buckets creates a facade that creates an atmosphere of an indoor ambience of light. Because the diffused ambient light is created, it creates an exciting, peaceful place for children to come and learn. The recycled plastic ice buckets surface scatters the light throughout the space, creating an affect that influences the emotions of the inhabitants within the space.

• Recycled Plastic Ice Buckets • Light Ambiance • Scatter Direct Sunlight • Identity • Learning • Education •



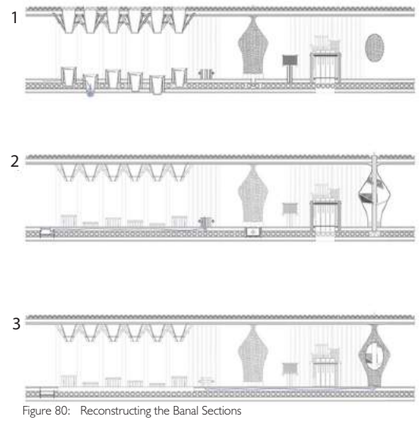
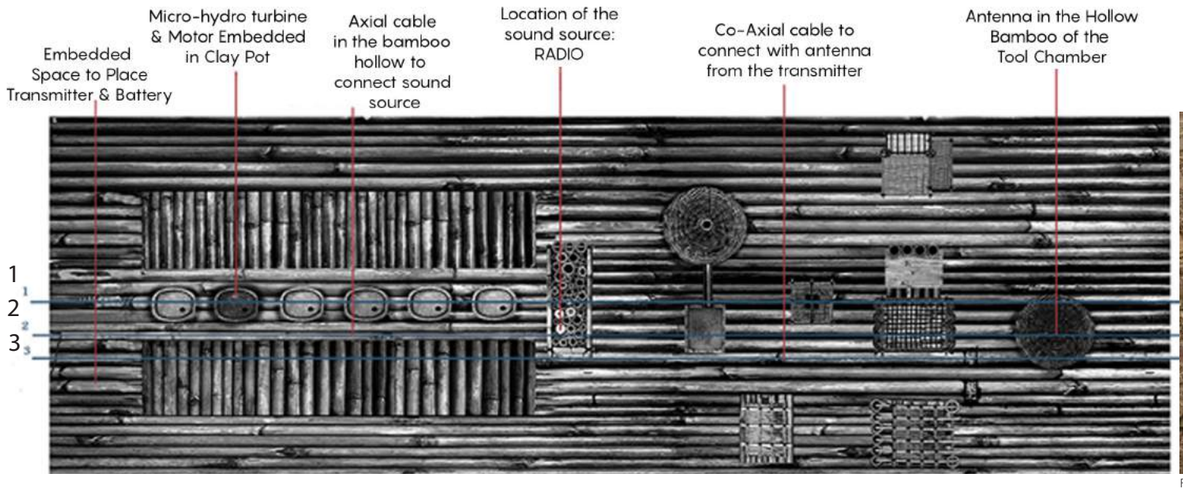


Figure 80: Reconstructing the Banal Sections

Section 1

Figure 73: Reconstructing the Banal



Plan View

Figure 79: Reconstructing the Banal

Materials & Construction

Reconstructing the Banal_Bakassi Peninsula

Approach: Tectonic, Programmatic

This project raises awareness by voicing the people of the community through their design. With the area of Bakassi Peninsula in conflicts, the voices of the people remain hidden. The solution to the current invisible people is a bamboo raft that doubles as a secret radio station. The program of the bamboo raft is a smoke house, but it secretly voices the communities ideas when floating throughout the waters between the countries of Nigeria and Cameroon. The project utilizes low technological strategies such as bamboo and radio, but creates a larger impact on the community.

Raise Awareness • Community Voice • Local Materials • Identity • Radio Powered by HydroElectricity •

Figure 81: Kampung Kali

Figure 82: Kampung Kali Community

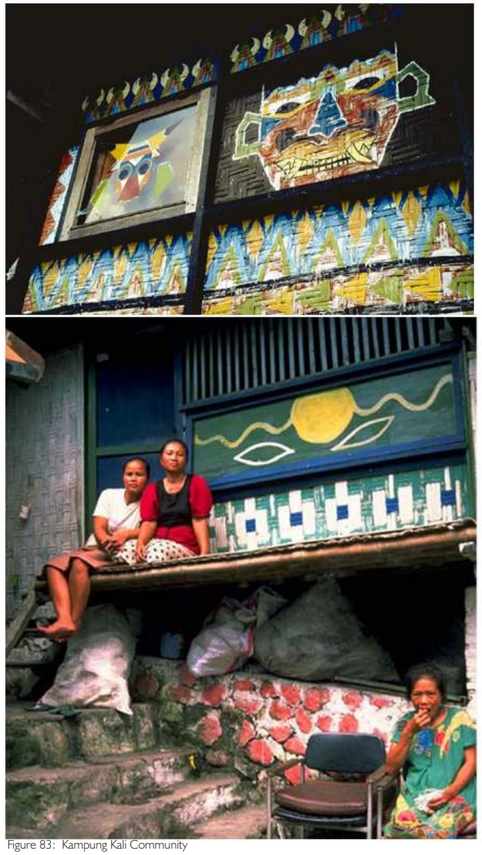


Figure 83: Kampung Kali Community

Section Through the Site

Surface Qualities

Kampung Kali Cho-de_Yogyakarta, Indonesia

Approach: Tectonic

This project incorporates the community within the design process and design intervention. By incorporating the community when changing their space, it empowers them to strive for a better living condition, and gives the community a sense of ownership towards the design, instead of the design being handed to them. Tenants paint the exteriors of their homes changing the surfaces of the material. The surfaces were dark and grey before; after, they are bright, colorful, and inviting, changing the entire atmosphere of the spaces within the community.
The surfaces have transformed into cartoons and art textures, enhancing the existing materials. Although the design intervention is at a small scale, by incorporating the community within the design process, gives the community a sense of empowerment, and ownership towards their space.

Surface Transformation • Material Enhancement • Color • Community • Enrichment of the Existing Community

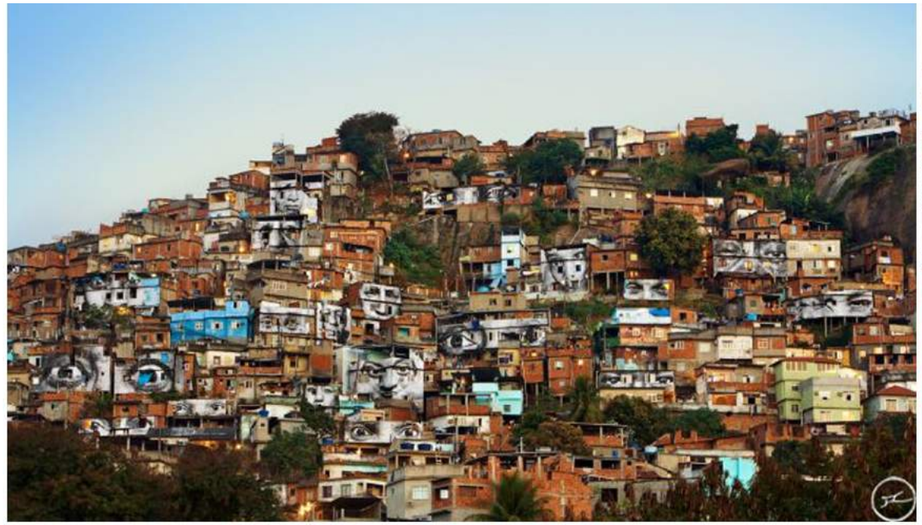
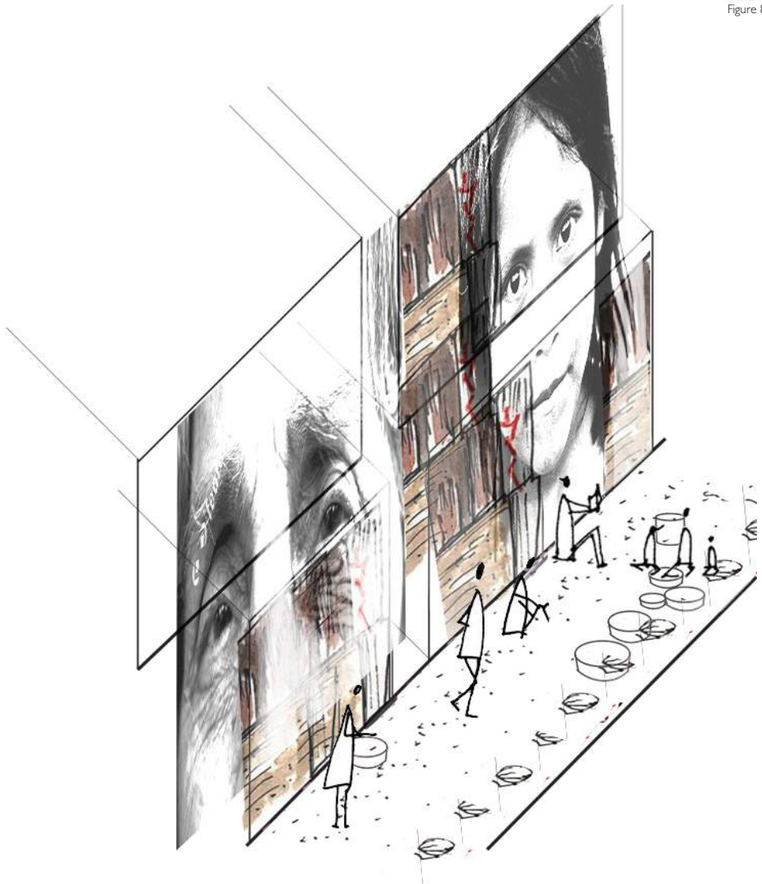


Figure 84: Rio Flavelas

Figure 85: Amazing Street Art from Brasil

Figure 86: Women are Heroes



Surface Qualities

Women are Heroes_Rio De Janeiro, Brazil

Approach: Tectonic

Within this project, artist JR pays tribute to the women who play an essential role within the society. By changing the surfaces of the homes of the favela, he transforms the atmosphere of the community. He incorporates women's faces and eyes all over the walls of the favela to showcase their identity and humanity. This project empowers the women, and shows them that they are not invisible. These transformed surfaces within the urban landscape showcase the women as important figures within the favela communities.

• Identity • Humanity • Empowerment of Women • Surface Transformation • Enrichment of the Existing Community •

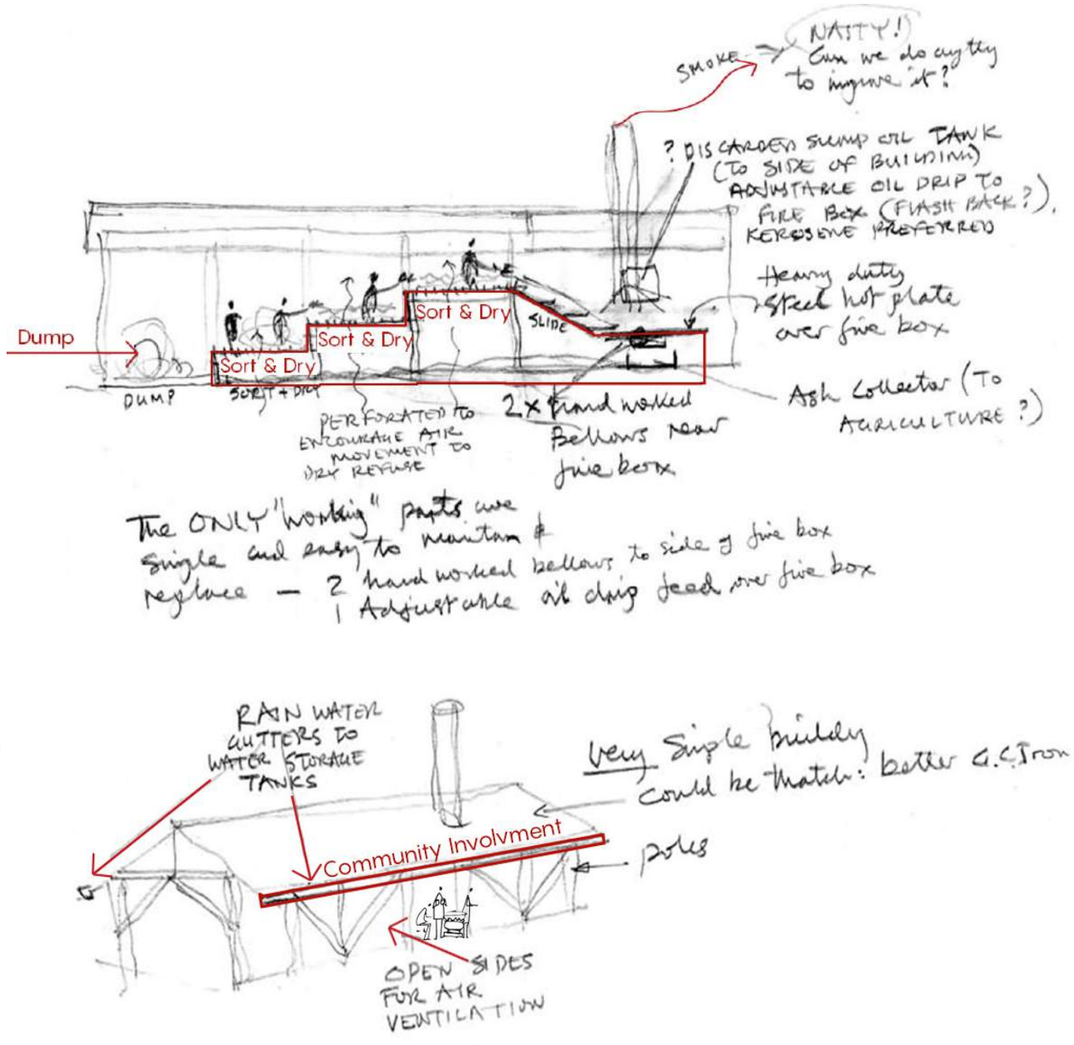


Figure 88: Community Cooker

Figure 89: Community Cooker

Figure 87: Community Cooker

Figure 90: Community Cooker

Community Cooker (Jiko Ya Jami)_Nairobi, Kenya

Approach: Programmatic

Currently within Kenya, there is a practice that utilizes wood and charcoal fires for cooking. The fires create greenhouse gases, cause respiratory issues, and enhance deforestation. The Laini Saba community created a communal oven that utilizes trash for fuel. By using discarded material, the community collectively comes together to collect, transport, and sort trash for cooking. This solution reuses discarded material, and brings the community together within the informal settlement.

• Communal Cooker • Trash as Energy • Community Involvement • Collecting Trash: Exchange for Cooking & Basic Needs •

Figure 91: Community Latrine

Figure 92: Community Latrine

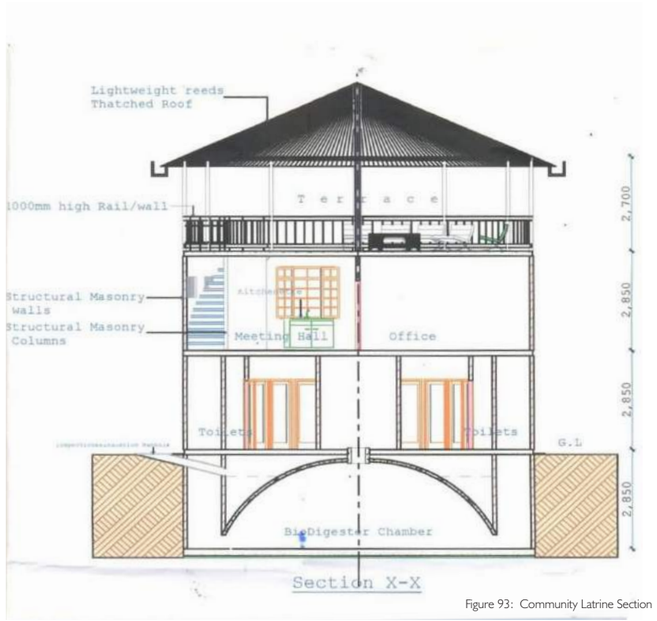
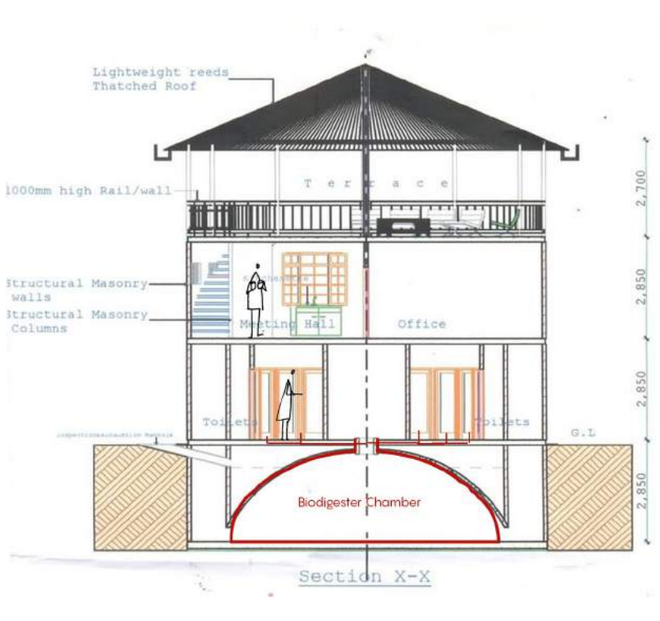


Figure 93: Community Latrine Section



BioCentre_Kenya

Approach: Tectonic, Programmatic

Within the slums of Nairobi lies an issue of having one public toilet for one community. This causes women and girls to use open spaces after dark to use the restroom, which a great safety risk. Access to the latrine is also difficult for the elderly and children within the community. This project incorporates a design intervention that incorporates the residents of the slums to design, plan, and construct the BioCentres. BioCentres incoporate free toilets, showers, kiosks to sell water, and communal spaces. This design intervention is impactful because it incorporated the community within the design process.

• Safe Spaces for Women Needs • Local Available Technology • • Communal Spaces • Clean Water •

DESIGN THEOREM_SYNTHESIS

SYNTHESIS OF THEORIES

Planet of Slums

Urbanization in third world countries has led to the increasing numbers of the urban poor. One of the fundamental problems with the growth of the urban poor is spatial inequality, which is the concentration of poverty on a limited size of land, limited access to infrastructural amenities, and fragmentation of the urban society between the rich and the poor.

•SPATIAL INEQUALITY•

Gender Inequality: Women in Slums

Underneath the spatial inequality, lies the issue of gender inequality within the slums. Women are static within the leftover spaces within the slums, managing the households, raising their children, and running businesses to help with family income. Women tend to be less educated and paid less, and are limited to spaces that have atmospheric qualities of: tight, constraining, dark, and oppressing.

•GENDER INEQUALITY• WOMENS ISSUES• SPATIAL EXPERIENCE OF WOMEN•

Writings on Cities: The Right to The City

Henri Lefebvre explains the Right to the City, on how the rights of all urban dwellers, regardless of citizenship, ethnicity, ability, or gender, to participate in shaping the city. His ideas are for inhabitants to be a part of the production of the city, for their needs and aspirations.

•RIGHT TO THE CITY• •PARTICIPATION• •TO SHAPE THE CITY• RIGHT TO SPACE

The Right to the City

Harvey focuses more on the collective body of society, rather than the individual as a means to “resync the processes of urbanization”. The idea of not just an individual change, but a collective change amongst the inhabitants. Realize the role of the community as an active agent in taking a part, and claiming the right to decide what kind of urban experience they want. Implementing bottom-up, grassroots solutions, that incorporate the community. The slum dwellers are active agents in changing their spaces.

•RIGHT TO THE CITY• •COLLECTIVE• •URBAN EXPERIENCE•COLLECTIVE CHANGE• RIGHT TO SPACE

The Function of Form

Moussavi focuses on the idea that architecture is not about the form, but is more about the surfaces, and how the surfaces create experiential qualities. She states that architectural forms have “affects”, and affect is then processed by the senses to produce thoughts, feelings, emotions, and moods for the user experiencing the space. The creation of surfaces allows people with differing views and sensibilities to develop an affective relationship with their environment.

AFFECT• ATMOSPHERIC •QUALITIES• •SENSES•PERCEPTION • SURFACES • • Materials & Tectonics •

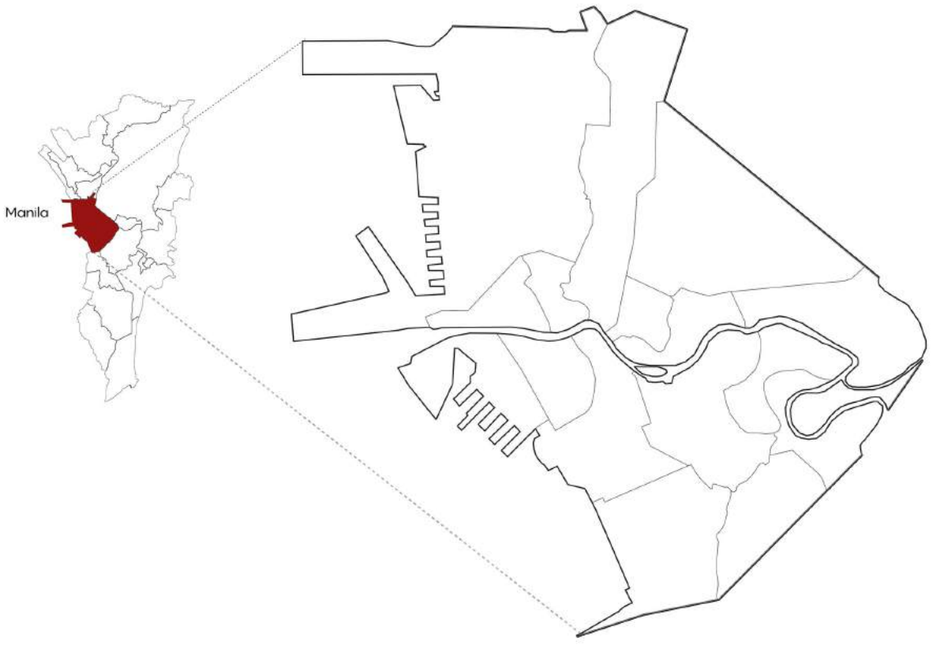
Existing Spatial Inequality & Gender Inequality within Slums= The right to the city= The right to the space = Creating Spatial Experiences Capitlizing on the Materials People in Slums Have

SITE RESEARCH_MANILA, PHILIPPINES

Site_Manila, Philippines

Within the developing country of Philippines, at its core of Metro Manila is one of the most densely populated areas in the world. The average price of one square meter anywhere near the active commercial centers in the urban core, greatly exceed the average income of a taxi driver or security guard. Therefore, the overall nature of possibilities that involve high generating income would influence anyone to reside as close as possible to this core. Mainly because the increased distance away from the main source of income, which in Philippines case is the downtown core of Manila, increases time which decreases income.

Manila's main reasons for its heavily dense population are due to its proximity of work in the downtown sector, and the majority of residents live on the perimeter. This develops the main issue of Globalized Property Values, which then collides with the desperate poor that live on the edge of the perimeter to be near the central sources of income of the inner core[28]. Like most other developing countries, this forces the poor that can't afford the inner city property values, to then create makeshift housing structures, made up of primarily cheap building material and other sources of leftover industrial waste. Even then, the housing of these makeshift housing slums become over populated, which forces some residents to result in wide spread squatting, or inhabiting small portions of slums that are owned by someone else and residing "rent-free."[29]



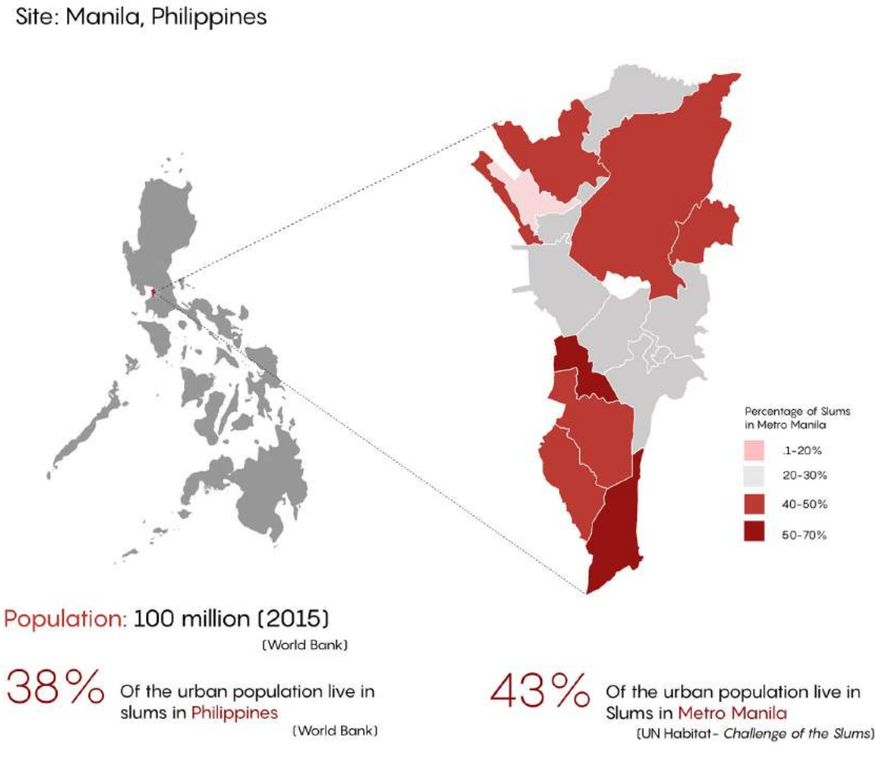


Figure 94: Aerial view of Philippines

Spatial Inequality

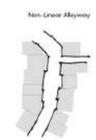
Resilient Use of
Materials for Shelter

Urban Fragmentation Between the Rich and the Poor

Informal Housing

Programmtically
Multi-Layered

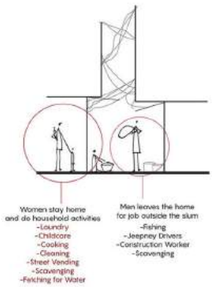
MACRO: SPATIAL ANALYSIS_SLUMS

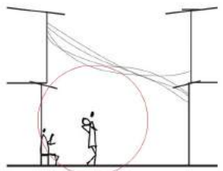


The physical urban form can be described as organic in its overall morphology.

Slums grow organically and are created very close proximity with one another. This creates tight alleyways inbetween each home.

Women stay home to for childcare, and domestic activities, such as laundry, house cleaning, and cooking.

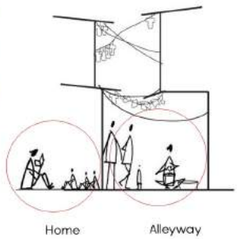


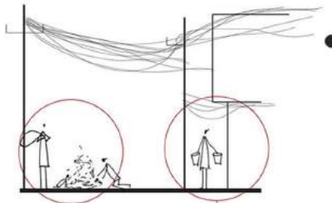


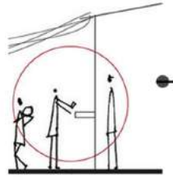
Men leaves the home for job outside the slum
-Fishing
-Jeepney Drivers
-Construction Worker
-Scavenging

Men leave the home all day for work. They experience changing environments.

The two main spaces women inhabit are the slum & the alleyway next to the home.

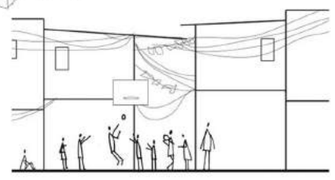


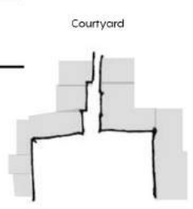




Street Vendors are an extension off a slum. Women re primarily sell fruits, handmade rafts, and food items for income.

Slum communities in Manila have alleyways that open up to basketball courts, which are used by the men of the community.



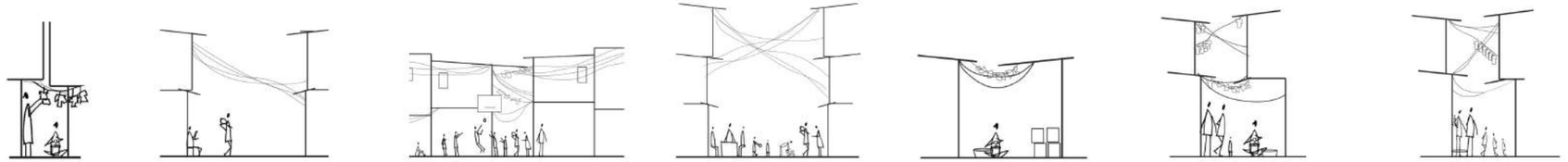


MICRO: SPATIAL ANALYSIS_SLUM ALLEYWAYS

Existing Conditions

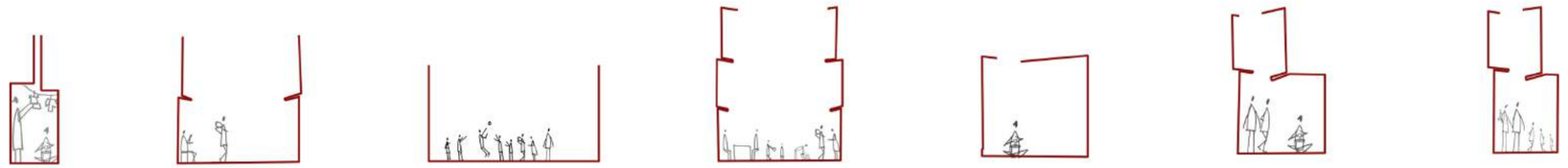
The slum alleyways are highly active with many programs throughout the day.

Conditions in Section



Slum dwellers mainly inhabit outside their homes, making living spaces not limited to the interior of the slum.

Scale



Due to limited spaces within their slum, the spaces (interior and exterior) are often multi-functional rather than being fixed and static.

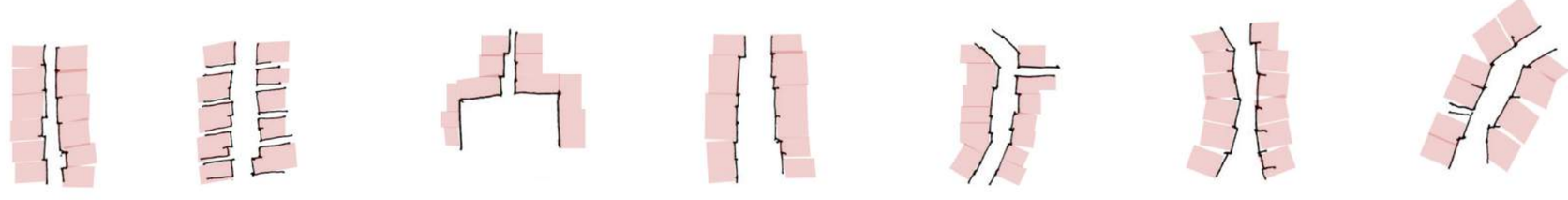
Alley Typology

The physical urban form can be described as organic in its overall morphology.

Visibility

The amount of visibility between the slums is high. There are many moments of visibility, blurring the lines between street and individual slum

Public vs Private



Because of the density of the neighborhood, closeness, and porosity between the slums, there is a blurring defintion of public versus private spaces

Activities

Slum dwellers share public zones such as streets, and basketball courts, creating a sense of ownership of public spaces

TECTONIC ANALYSIS_SLUM DWELLERS REUSE DISCARDED MATERIAL AS BUILDING MATERIAL

Understanding Tectonics & Materiality

Materials

Color

Concrete

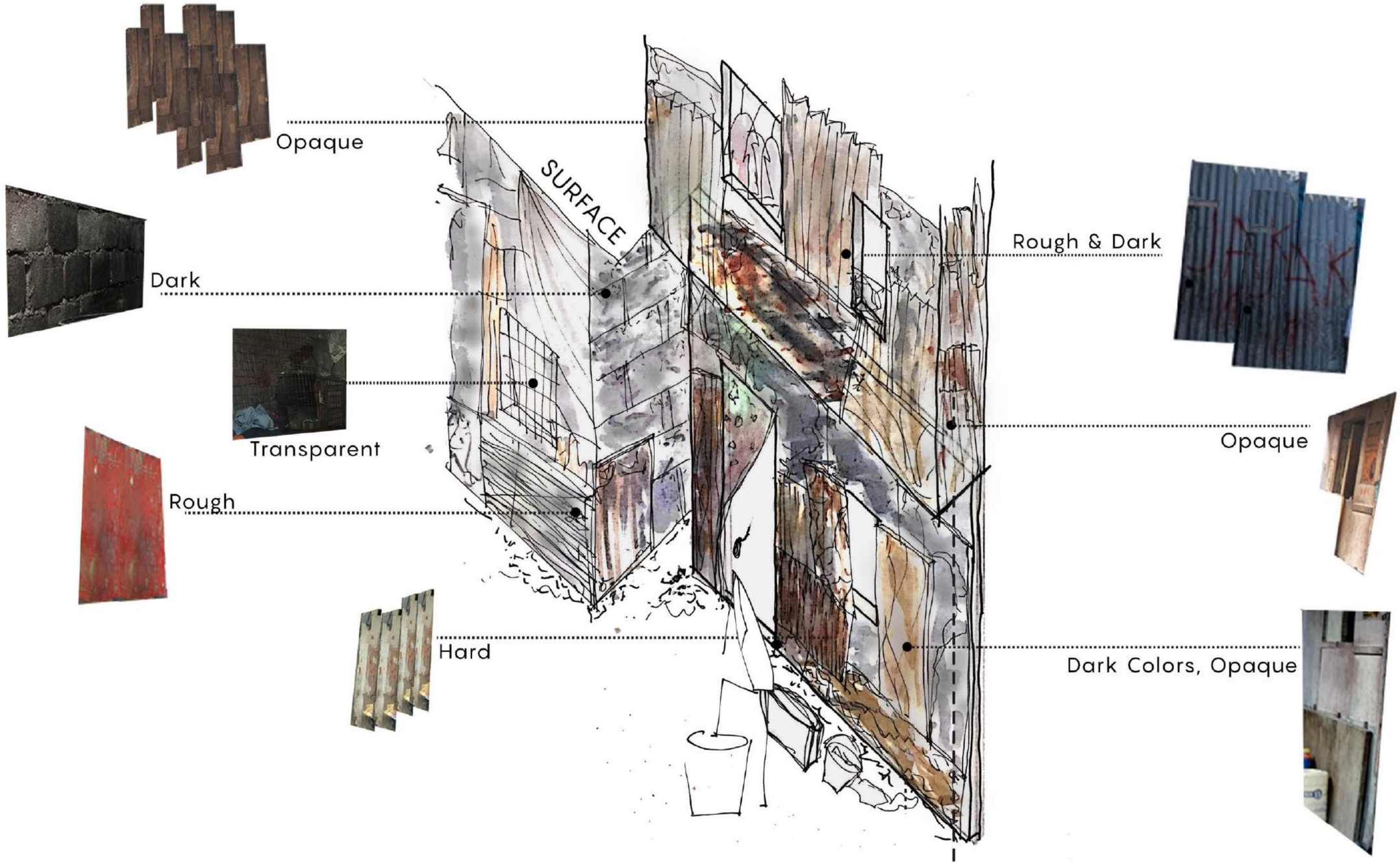
Wood

Metal

Plastic

Cloth

Hard vs Soft

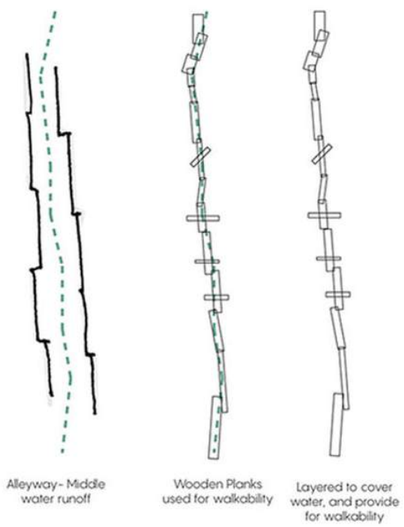


MATERIALS OF SPACE CREATE ATMOSPHERE

SITE ANALYSIS_VISIBLE vs INVISIBLE INFRASTRUCTURE

Visible Infrastructure

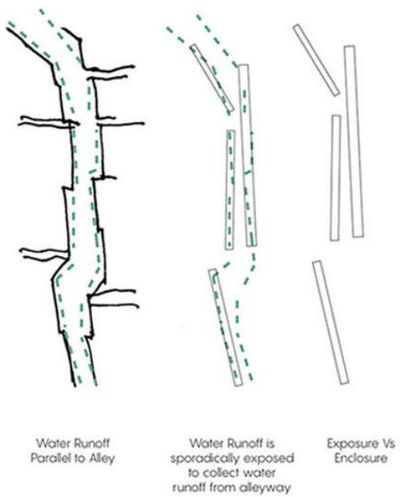
Waste Water



Alleyway- Middle water runoff

Wooden Planks used for walkability

Layered to cover water, and provide for walkability

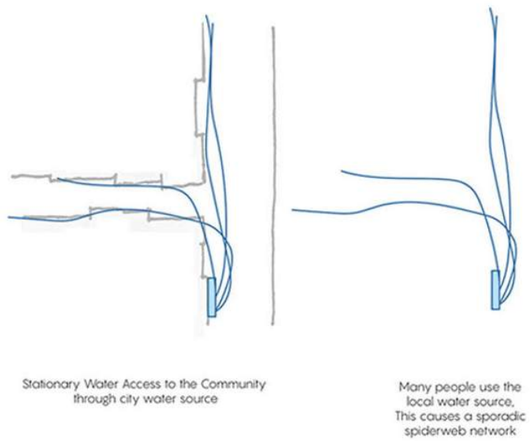


Water Runoff Parallel to Alley

Water Runoff is sporadically exposed to collect water runoff from alleyway

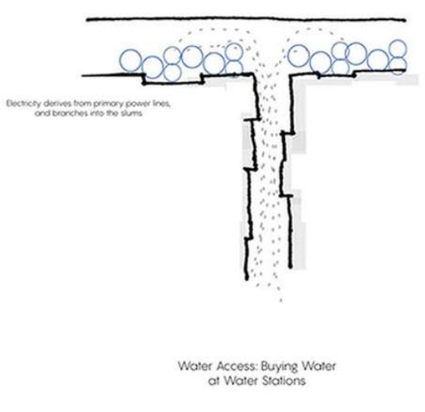
Exposure Vs Enclosure

Water Access

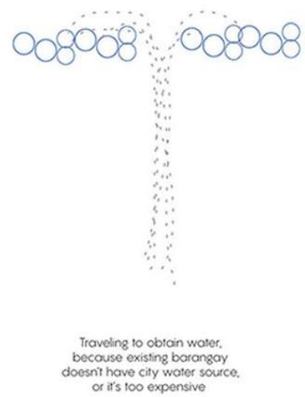


Stationary Water Access to the Community through city water source

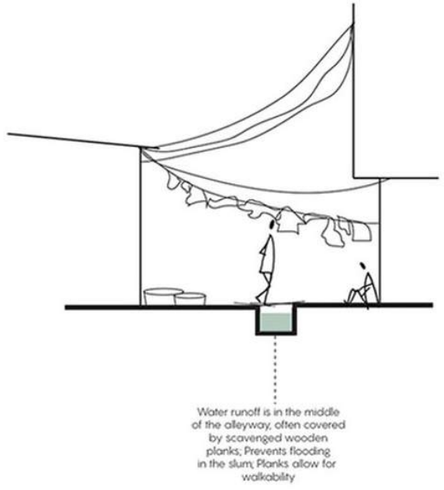
Many people use the local water source, This causes a sporadic spiderweb network



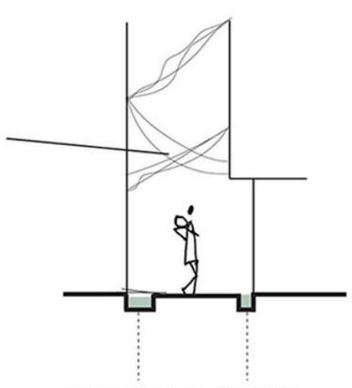
Water Access: Buying Water at Water Stations



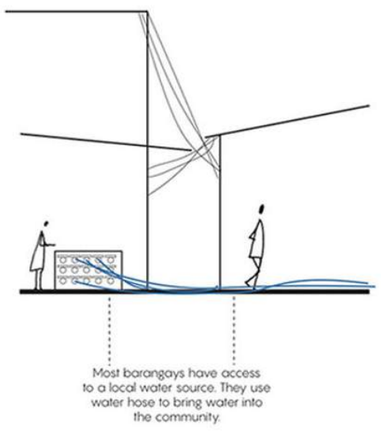
Traveling to obtain water, because existing barangay doesn't have city water source, or it's too expensive



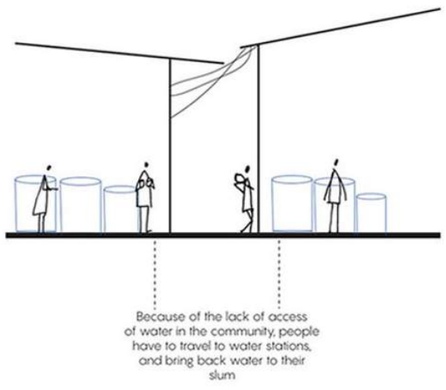
Water runoff is in the middle of the alleyway, often covered by scavenged wooden planks; Prevents flooding in the slum; Planks allow for walkability



Water runoff can run parallel to the slum. to prevent flooding; Moments of exposure and enclosure



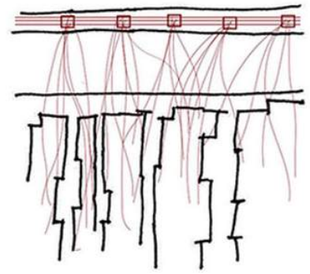
Most barangays have access to a local water source. They use water hose to bring water into the community.



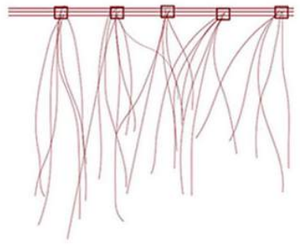
Because of the lack of access of water in the community, people have to travel to water stations, and bring back water to their slum

Figure 95: Woman in Alleyway

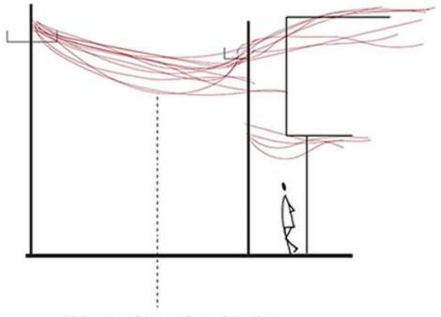
Electricity



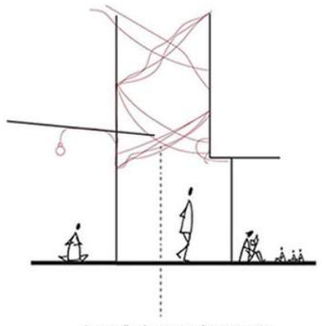
Electricity derives from primary power lines, and branches into the slums



Sporadic distribution of power causes spiderweb network of powerlines



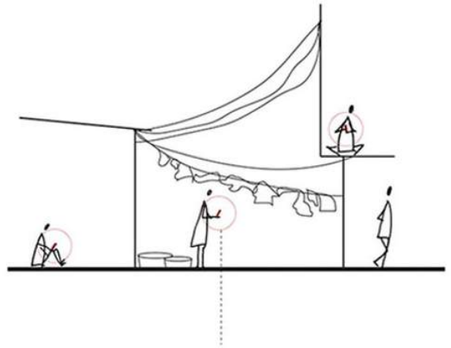
Main power lines are linear, but when they branch into the slums, they become more irregular, and sporadic



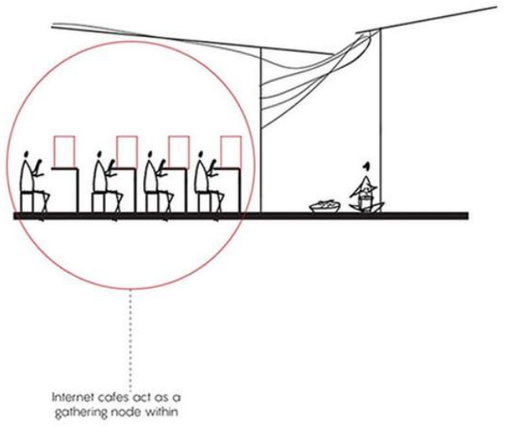
Internally, the power lines remain in the spiderweb network.

Figure 96: Manila Powerlines

Invisible Infrastructure

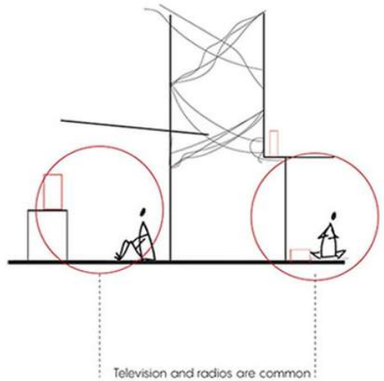


People within the slums have cellular technology



Internet cafes act as a gathering node within

Figure 97: Internet Cafe



Technology acts as a gathering node within a community

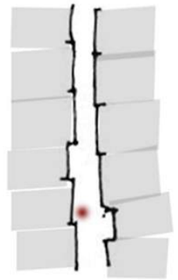
Figure 98: Little Slum Boy at Internet Cafe

SPATIAL ANALYSIS_WOMEN SPACES VS MEN SPACES IN SLUMS

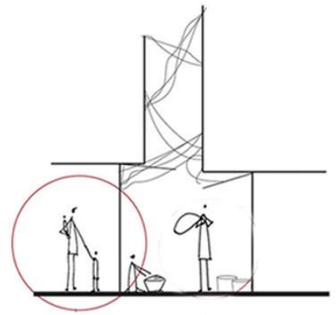
Women Spaces

Figure 99: Manila slum woman taking care of child

Woman & Childcare, Alleyway Besides Slum

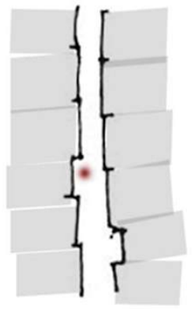


Tight Alleyway Outside Slum

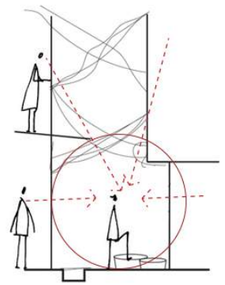


Spaces that women take care of their child are often tight in scale, for the location is always inside the slum or outside the slum in the alleyway. Women typically stay within the slum and surronding alleyways. The spaces for childcare are often dark, cramp, and tight. Many of the colors derive from the household items of the space, ie buckets, bottles, and clothing.
Space: Private Setting & Communal

Woman & Laundry, Alleyway Besides Slum



Tight Alleyway Outside Slum



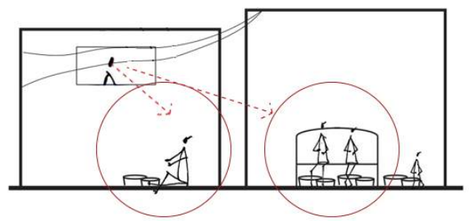
Laundry is an activity
mostly seen by the neighboring
people in the slum

Spaces for domestic activities like laundry are also often tight in scale, for the location is always inside the slum or outside the slum in the alleyway. Women do laundry outside for there is access to infrastructural amenities to partake in the activity. Many of the colors derive from the household items of the space, ie buckets, bottles, and clothing.
Space: Communal Setting

Figure 100: Manila women peeling garlic

Woman & Income Based Activity
Alleyway Besides Slum

Tight Alleyway Outside Slum



Women partake in activites together, outside
of the slum

Spaces outside of the slum and in the alleyway are common women spaces. Women would gather and do their domestic activities together. The location of this is outside of the slum, for there isn't any designated space for their activity.
Space: Commnal Setting

SYNTHESIS

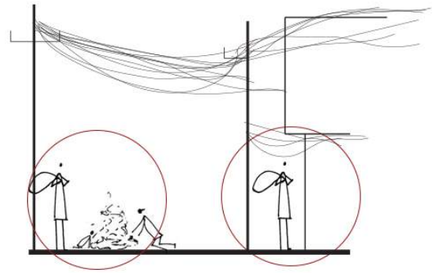
Because of their domestic activity responsibilities for the home, the spaces the women do their activities in are in the alleyways just outside of their home. The alleyways are often tight, dark, and constraining.

Male Spaces

Figure 101: Men scavenge through garbage

Man & Income Based Activity
Outside of slum & neighborhood

Spaces away from the slum

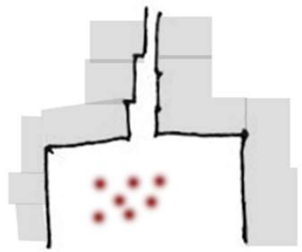


Men leave the home for work, so their environment is constantly changing.

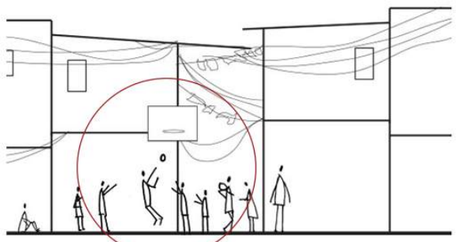
Spaces outside of the barangay in the urban streets, are where you would find males. Males leave the home for income based activities, so their spaces are constantly changing. A lot of their time is not spent at home.
Space: Communal Setting

Figure 102: Men playing basketball in slums

Man & Leisure Activity
Spaces outside slum, designated specifically for basketball courts



Open Public Courtyard Space

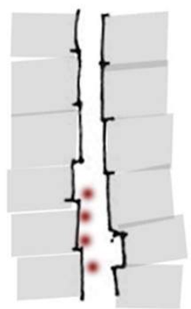


Men have designated public spaces like basketball courts where they can play sports together in an urban setting.

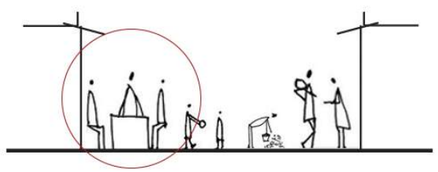
Males claim the basketball courts of the barangay. The space of the basketball court are for leisure, typically for men that play the game.
Space: Communal Setting

Figure 103: Men hanging outside of the slum

Man & Leisure Activity
Men gather outside of the slum for leisure activities



Alleyway Outside Slum



Men are also outside of the slum. Many don't stay inside of the slum because of the tight space. Typically they are right outside of their home, usually with other men gathered.
Space: Communal Setting

SYNTHESIS

Men experience changing spaces, unlike the women in slums, for they have to leave the home for income. Spaces that are typically male-based in slums are more open, for example basketball courts. In comparison to the spaces that women are typically in, the men are in open and wider spaces.

Figure 104: Manila woman doing laundry in alleyway

VISUAL

TOUCH

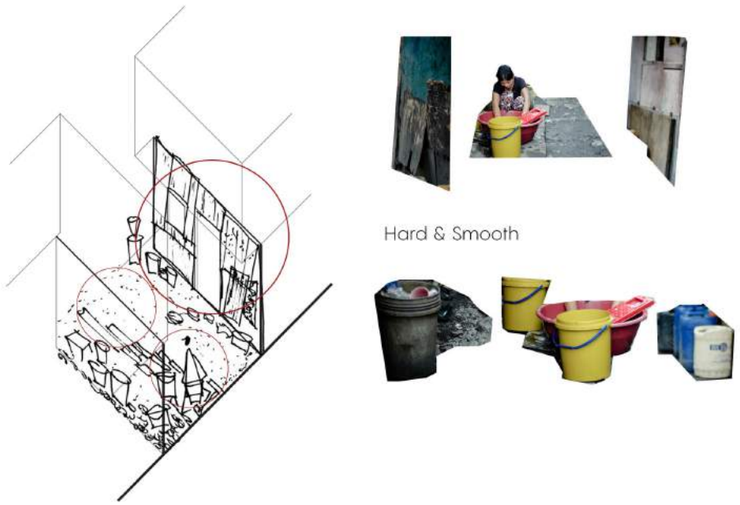
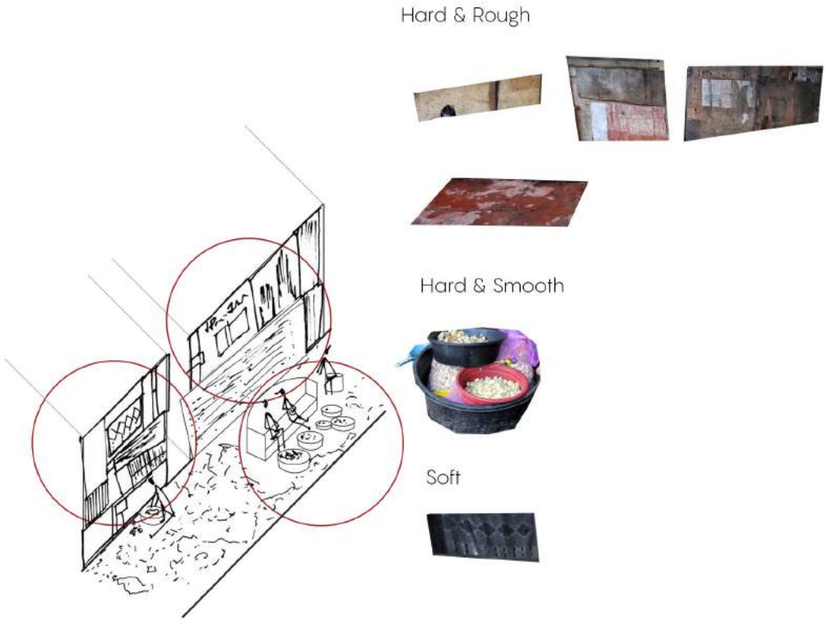
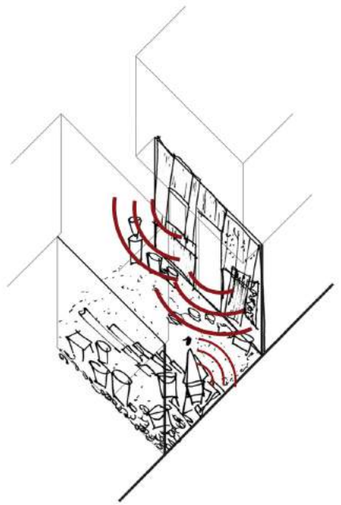


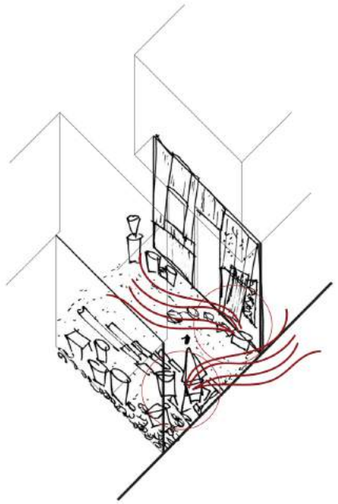
Figure 105: Manila woman doing laundry in alleyway

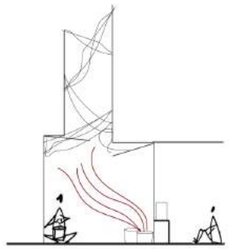


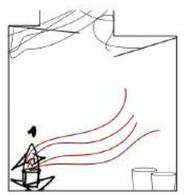
ACOUSTIC



SMELL

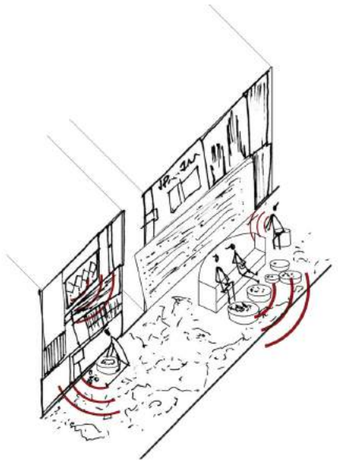


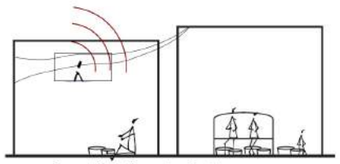


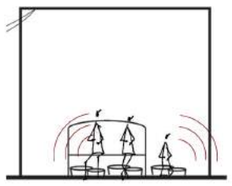


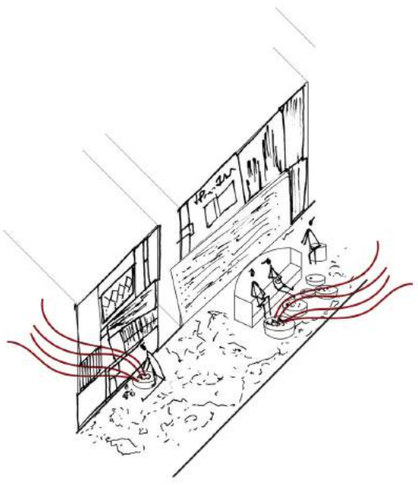
SYNTHESIS

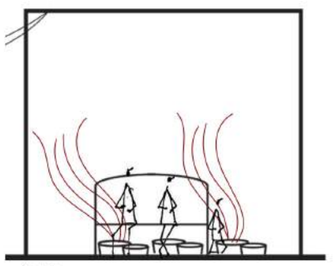
The spaces are multi-layered with sensory. Visually there are more rough surfaces than smooth surfaces. The color pallet of the space is diverse, ranging from greys, to vibrant colors. Acoustically, the spaces is really loud, with sounds coming from the laundry activity in the alleyway, and as well as the neighboring slums. Because of the program and items in the alleyway, the smell is strong.





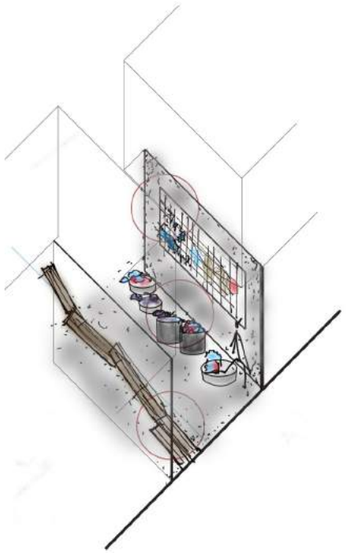




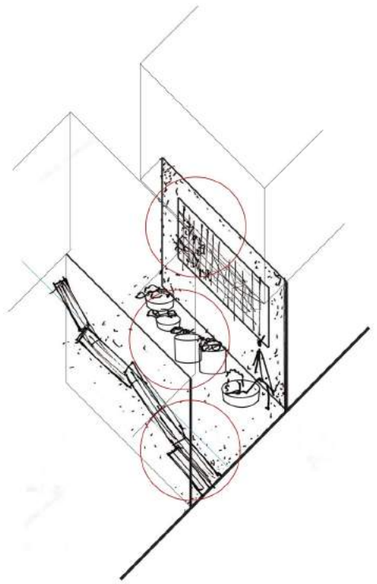


The spaces are multi-layered with sensory. Visually there are more rough surfaces than smooth surfaces. There are more opaque surfaces, as well. The color pallet of the space is mainly browns because of the materials used in the space. Acoustically, the spaces is really loud, with sounds coming from the laundry activity in the alleyway, and as well as the neighboring slums. Because of the activity peeling garlic, it creates the scent of the space.

VISUAL



TOUCH

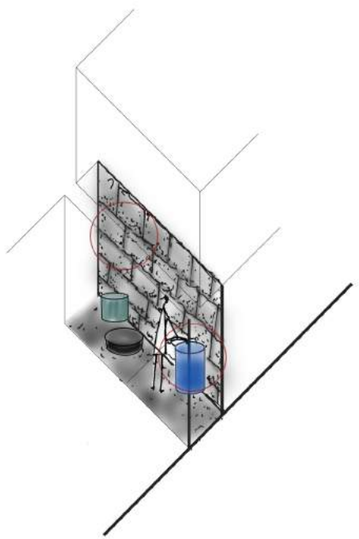


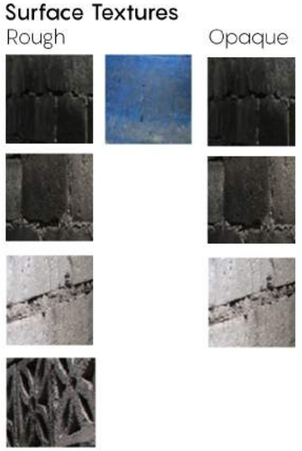
Hard & Rough

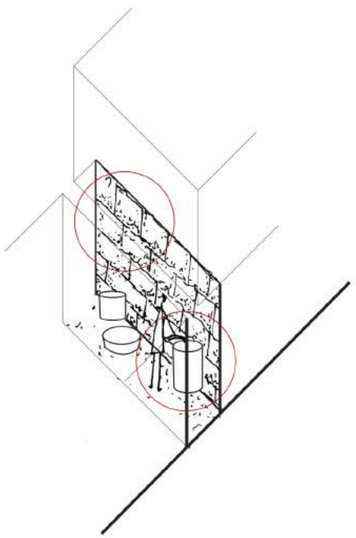
Hard & Smooth

Soft

Figure 106: Woman in Alleyway

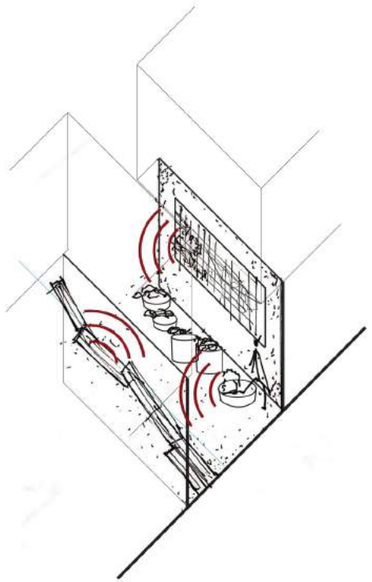


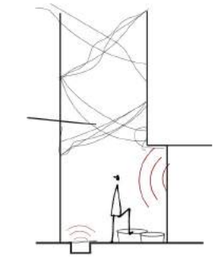




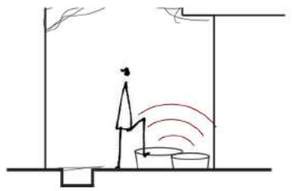
Hard & Rough

ACOUSTIC



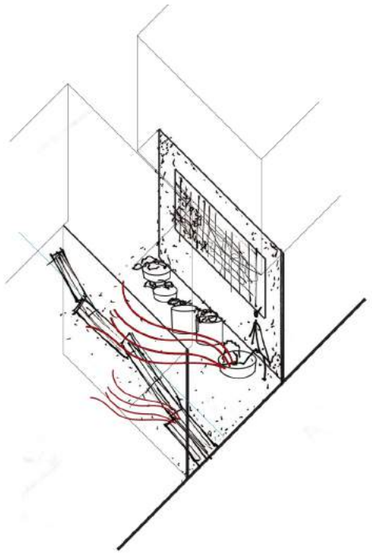


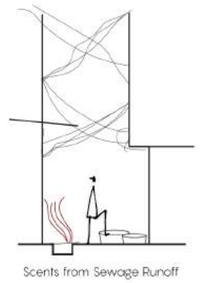
Sounds:
-Talking from dwellers within the slum
-Water running from sewage



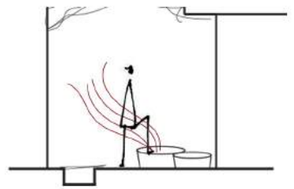
Sounds from Washing:
-Splashing Water
-Scrubbing

SMELL





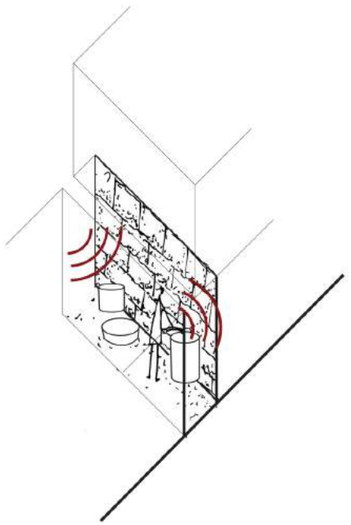
Scents from Sewage Runoff

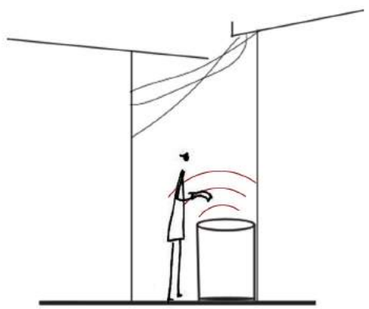


Scents from Laundry
-Water
-Dirty Clothes
-Soap

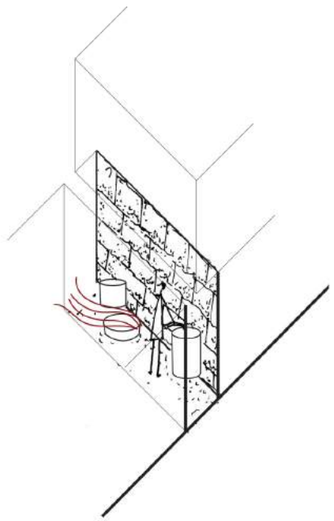
SYNTHESIS

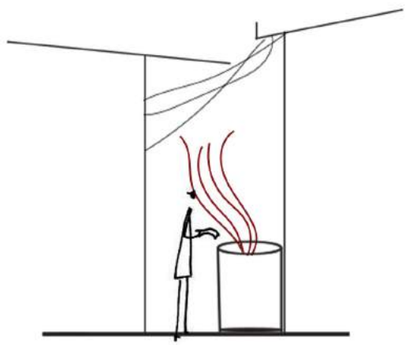
The spaces are multi-layered with sensory. Visually there are more rough surfaces than smooth surfaces, but there is soft surfaces coming from the clothing of the laundry. The color pallet of the space is diverse, ranging from greys, to vibrant colors. Acoustically, the spaces is really loud, with sounds coming from the laundry activity in the alleyway, and as well as the neighboring slums. Because of the program and items in the alleyway, the smell is dirty laundry, soap, and water.





Sounds from Washing:
-Splashing Water
-Scrubbing



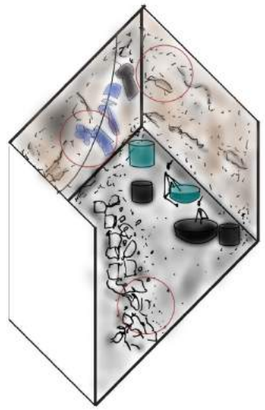


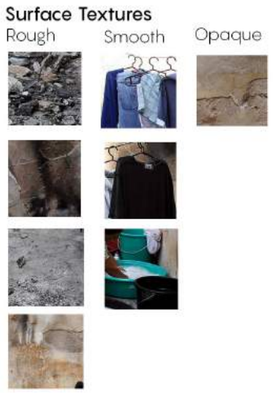
Scents from Laundry
-Water
-Dirty Clothes
-Soap

This space is more tight and dark. Visually there are more rough surfaces than smooth surfaces. The color pallet of the space is mostly grayscale, with the pop of color from the water buckets and hose. Acoustically, the sounds come from the laundry activity in the alleyway, and as well as the neighboring slums. Because of the program and items in the alleyway, the smell is dirty laundry, soap, and water.

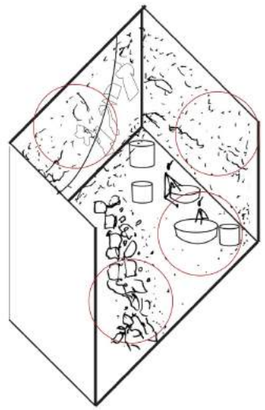
Figure 107: Slum girls doing laundry

VISUAL

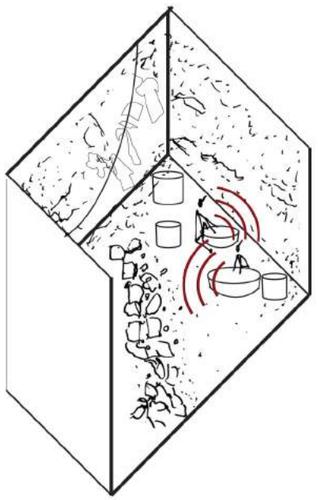


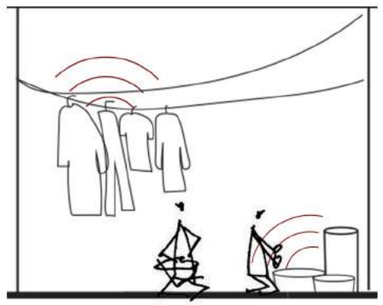


TOUCH



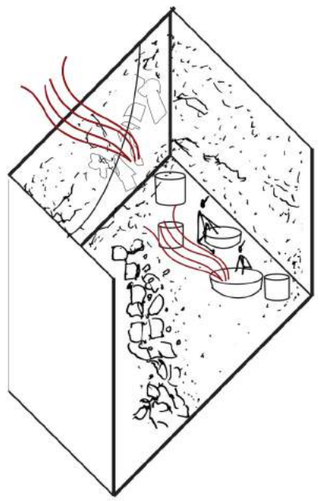
ACOUSTIC

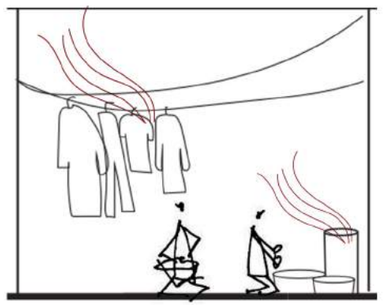




Sounds from Washing:
-Splashing Water
-Scrubbing
-Wind hitting against hanging clothes

SMELL

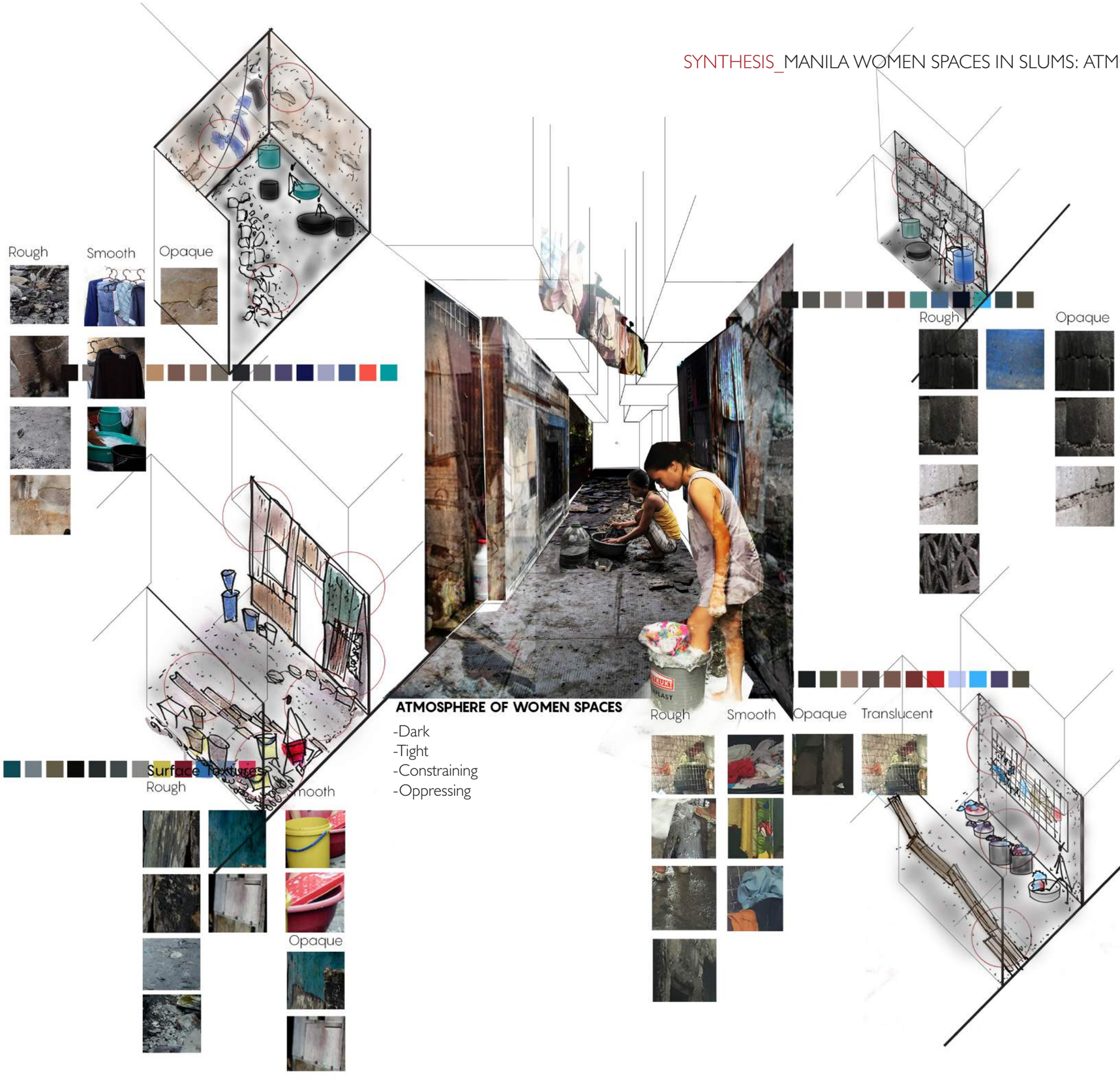




Scents from Laundry
-Water
-Dirty Clothes
-Soap
-Clean Clothes

SYNTHESIS

This space is more tight and dark. Visually there are more rough surfaces than smooth surfaces. The color pallet of the space is mostly grayscale, with the pop of color from the water buckets and hose. Acoustically, the sounds come from the laundry activity in the alleyway, and as well as the neighboring slums. Because of the program and items in the alleyway, the smell is dirty laundry, soap, and water.


Rough
Smooth
Opaque
Rough
Opaque
Surface Textures
Rough
Smooth
Opaque
ATMOSPHERE OF WOMEN SPACES
-Dark
-Tight
-Constraining
-Oppressing
Rough
Smooth
Opaque
Translucent

SITE VISIT_ MANILA, PH

DAY IN THE LIFE OF A SLUM DWELLER_SITE VISIT INTERVIEWS

Site Visit Family Interview: Mama Letty & Tito Delio

"For the past twenty years, my husband and our six children have been living here. I work as a laundress, and wash clothes for income, while my husband peels and sells garlic for a living. We have five small children, and one teenage daughter. While my husband and I are working, our daughter takes care of the children, and often tutors them here at home. We all live in this one space. We eat, sleep, work, and spend time together here. I spend the majority of my time within the alleyway because my duties require me to work outside my home. My husband is out selling garlic the majority of the day. We also often scavenge for materials, and food daily. We view it as treasure hunting. My one wish is for my kids to have a place where they can learn within the community" - Mama Letty

COMMUNITY MEETING WITH
WOMEN LEADERS OF TONDO SLUM

SITE VISIT DATA GATHERING:

PROGRAMMATIC:
1) Women Activities:
- Childcare
- Laundry
- Economic

2) Women activities are performed:
- Within the alleyway, next to the slum
- Exterior Spaces

3) Alleyway spaces within slums are highly active and heavily programmatic

Interview with Women Leaders of Tondo Slum:

Women wants:

- More flexible spaces so women can gather for community meetings

- Wanting educational zones for chidlren

DAY IN THE LIFE OF A SLUM DWELLER_SPATIAL ANALYSIS

Daily Timeline

Site Documentation

Exterior Typology

Program Plan

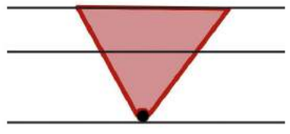
Program Section

Actors & Activities

Change in Spatial Qualities

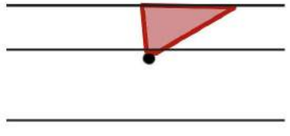
6AM	7AM	8AM	8AM-11AM	11AM-12PM	12PM	1PM	2PM	2PM-5PM	5PM	6PM	7PM	8PM
Tito Delio and Mama Letty wakes up family and starts their day	Mama Letty bathes children outside, Tito Delio gets ready to leave to go to the vegetable stand to get garlic.	Tito Delio comes back home to start his work, peeling garlic cloves.	Mama Letty starts her work: washing clothes. She washes her family's clothes, and also the people of the communities' clothes for income.	Eldest daughter Melba buys small lunch for the family, and prepares lunch.	Lunch with the family. Bringing children inside from playing. Tito Delio and Mama Letty stop work to eat.	Children are tutored within the living space by older sister	Tito Delio sells his peeled garlic in the streets of the barangay and to the vegetable stand.	The rest of the family scavenges for food to make "pogpog" for dinner	Mama Letty prepares pogpog for the family.	Dinner gathering, eating of the pogpog with the entire family.	Spending time with family, playing games inside.	Day ends with family; Sleep time.

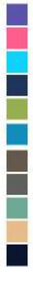
Exterior Typology	Program Plan	Program Section	Actors & Activities	Change in Spatial Qualities
Linear Alley Way	Activities -Laying -Sitting -Talking	Shared space for rest	Man: Tito Delio Woman: Mama Letty	Rest/Eating Work Education
Linear Alley Way	Activities -Bathing -Prepping For Work -Talking	Father prepares for work; Mother bathes children in exterior alley way		
Linear Alley Way	Activities -Peeling Garlic -Sitting -Working	Father works within slum; children play; Mother washes clothes in the exterior alley way		
Linear Alley Way	Activities -Washing Clothes -Sitting -Moving Clothes -Hanging Clothes -Talking	Father peels garlic inside the slum; Mother hangs clothes in the alley		
Narrow & Wide Mix Alley	Activities -Walking -Buying -Selling -Carrying -Talking	Sister buys food at the food kiosk, in the alley		
Linear Alley Way	Activities -Eating -Talking -Sitting -Drinking	Family comes together to eat lunch inside		
Linear Alley Way	Activities -Teaching -Talking -Sitting -Learning -Reading -Writing	Mother tutors the children		
Narrow Alley Release to Wide Alley	Activities -Selling -Talking -Standing -Walking	Father sells peeled garlic in the community		
Linear Alley Release to Street	Activities -Scavenging -Talking -Standing -Walking -Digging -Collecting	Family scavenges through trash (to leftover food) which is later-used to make pogpog.		
Linear Alley Way	Activities -Cooking -Talking -Sitting -Walking -Stirring	Father plays with kids, while mother prepares pogpog for dinner; Mother prepares pogpog for dinner outside		
Linear Alley Way	Activities -Eating -Talking -Sitting -Walking -Drinking	Family gathers and eats dinner inside slum		
Linear Alley Way	Activities -Playing -Talking -Sitting -Laying -Watching t.v	Family comes together -and plays games		
Linear Alley Way	Activities -Sleeping -Laying	Family rests in the shared space		



Materials within Space

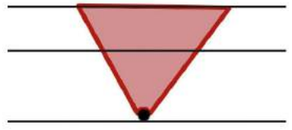
Textural Qualities





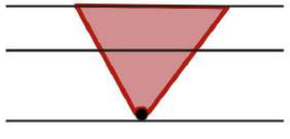
Materials within Space

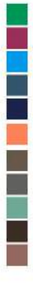
Textural Qualities



Materials within Space

Textural Qualities

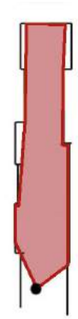




Materials within Space

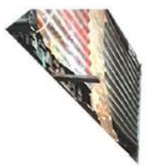
Textural Qualities

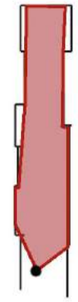
SITE VISIT_MATERIALS + TECTONICS



Materials within Space

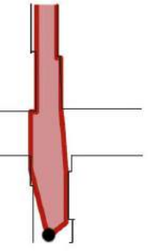
Textural Qualities

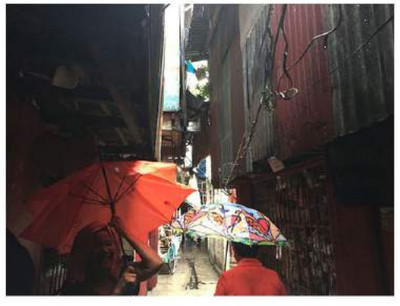




Materials within Space

Textural Qualities





Materials within Space

Textural Qualities

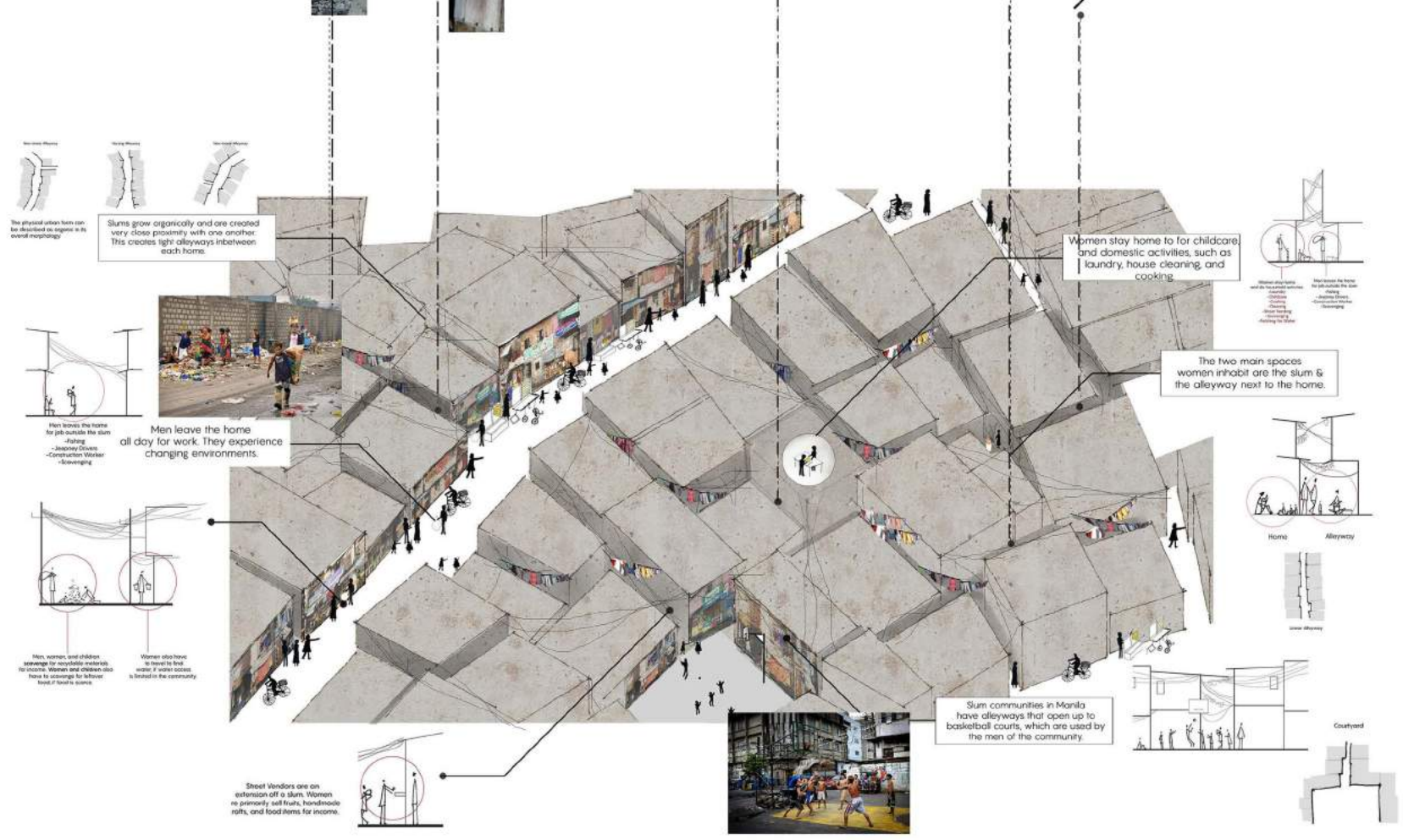
SITE VISIT OBSERVATIONS

The people within the slums are resilient with their materials and techniques. They reuse discarded material, and use it as a building material. They building with whatever they can find, in whatever space they can find.

DESIGN THEOREM + SITE RESEARCH_ SYNTHESIS

SYNTHESIS OF THEORY & RESEARCH

THESIS FOCUS: Enhancing the **existing spatial experience** for the women by using locally found material. Manipulating the material to **enhance the atmosphere and the experience for the EXISTING women spaces** within the slums.



ARGUMENT

This thesis argues the overall right to the city, specifically with the urban poor. The urban poor dwellers are entitled to the production to their urban space, and should have the collective right to appropriate the city and the production of its space. Within these dwellers, reside another layer of inequality, the women of the slums. Although the hardship for dwellers in general is high, those of the women are even greater. As a woman within the slums, they are automatically proclaimed to be the laborious workers for not only them, but also the family they provide for.

While providing for their families through domestic means, such as laundry, cooking, cleaning and childcare, the spatial qualities that inhabit these activities are limited in spatial experiences. These limited experiences are derived from the materiality of the space, and the bodily experiences it brings; primarily in the areas where women inhabit within the slums. The atmosphere of the spaces are constrained, non-exposed, and tight. Because of these depriving qualities, the primary inhabitants, the women, are seen and treated as such due to the atmospheric conditions they reside within.

By improving the spatial qualities and overall atmosphere of the spaces that the women inhabit, this begins to empower them to strive for a better quality of space and identity for themselves. Through looking at materiality experiences and tectonic alterations, the methodology of this thesis will be through exploration and experimentation of local materials to then enhance the existing spatial qualities within the spaces for the women. Due to their gender and current roles in society, women in slums are restrained in the spatial experience. How can we as designers stimulate the urban experience of space, through the collective participation, using the existing materials and tectonics? How can we manipulate local materials to create a liberating experience for the women in the slums?

DESIGN RESEARCH- Questions

Investigating Space, Program, and Activities
-How to empower women?
-How to create spatial experiences capitlizing on the materials the people in the slums have?
-How can we stimulate the urban experience of space through collective participation, using existing materials and tectonics?

Investigating Materials and Tectonics
-How can we use materials and tectonics as a means of application for intervention?
-How do you design surfaces and materials that will give a liberating experience?
-How can we create an intervention through a bottom-up design that is versatile and creates spatial experiences for the women in slums?

2.0 MATERIALITY EXPLORATION_ MATERIAL MISUSE

TESTING TO FAILURE: MATERIAL MISUSE

SARAH M. HIRSCHMAN

"Tehrani's tectonics push the physical capacities of the material itself while allowing for certain patterns to emerge that are often in fact parametric or computational". [25]

"Rather than replicating structures they had already seen work, the team used advanced structural modeling software to push the limits of what was known about these techniques" [26]

"understanding of tectonics as a connection between the designer and the experiences he creates with his buildings." [27]

Key Words:

• Pushing the Physical Capacities of the Material • Connection between Tectonics and Experience •

Throughout the slums of Manila, Philippines, there consists of a diverse collection of materials, which are either currently used for slum construction or reuse for profit. However, these materials have the audacity to be used to a stronger potential in regards to experimentation.

In the text, Testing to Failure: Material Misuse, the concept is pushing the physical capacities of materials and tectonics, and creating a connection between tectonics and experiences. This narrative would be applied towards this thesis and its conditions within the slums of Manila, by the exploration of existing materials to stimulate the urban experience for the women in the slums.

Figure 108: From Digital to Brick

Figure 109: Plastic Bottle Light - ALiterofLight.org

Figure 110: MIT Pavilion

Figure 111: MIT Pavilion

Figure 112: MIT Pavilion

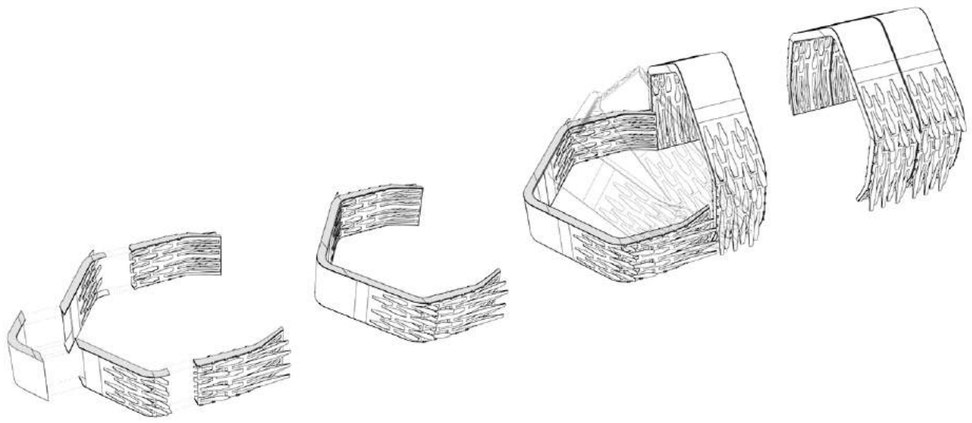


Figure 113: MIT Pavilion Complete Fabrication

Figure 114: Unflat Pavilion

Figure 115: Unflat Pavilion

UNFLAT Pavilion_Nick Gelpi

This project is constructed out of laminated plywood that bends into architectural elements such as windows, seating, columns, buttresses, and skylights. The structure incorporates cheap and low technological construction and uses an easy method of fabrication. This project mis-uses the material of the laminated plywood, and pushes its capabilities to create multiple moments of inhabitation and experience.

Figure 116: Plastic Bottle Light

Figure 117: Plastic Bottle Light

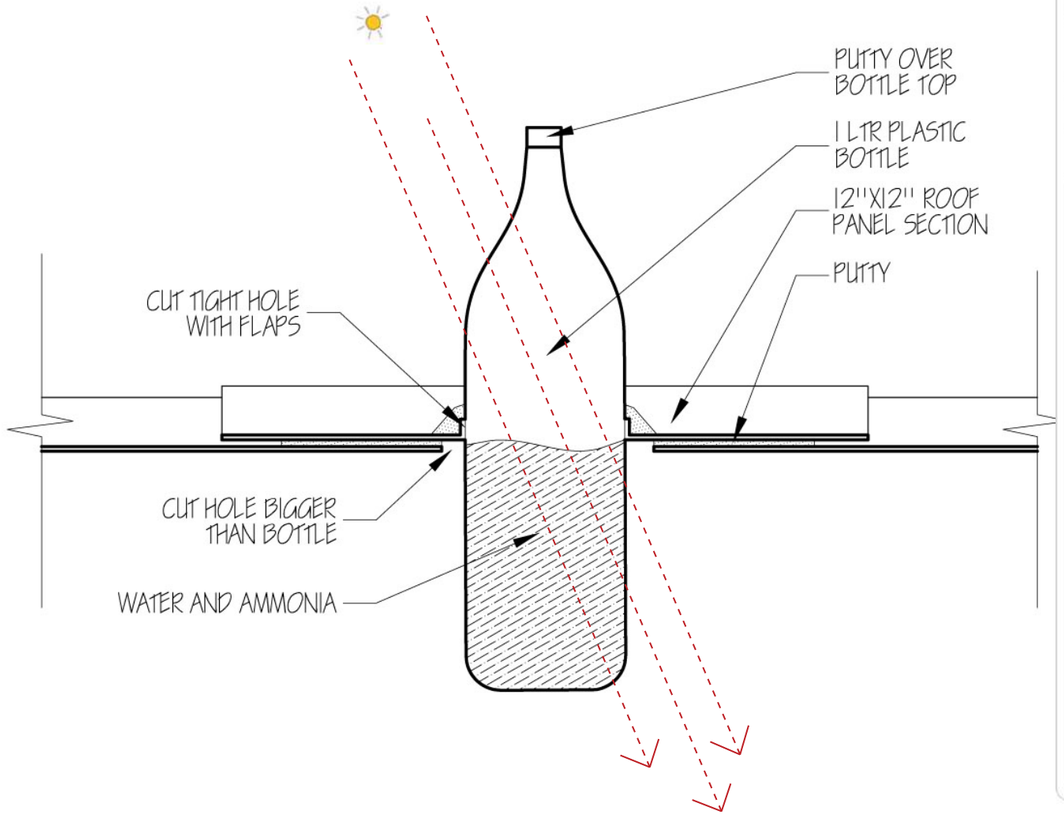


Figure 118: Plastic Bottle Light Instructions

Liter of Light

Liters of Light is a grassroots movement that aims to provide to people that lacks the access or is limited to electricty. Liter of Light provides affordable and low-technology solar light through recycled plastic bottles and locally sourced materials. Volunteers of the Liter of Light organization teaches communities on how to use local materials, such as plastic bottles, to illimunate the homes and streets within th neighborhoods. Empowering and educating the community is a goal of the Liter of Light foundation, and they aim to teach practices of simple construction with only using materials that are sourced from local communities, an constructing them in a low technological applications.

Figure 119: Coke Bottles

Figure 120: From Digital to Brick

Figure 121: From Digital to Brick

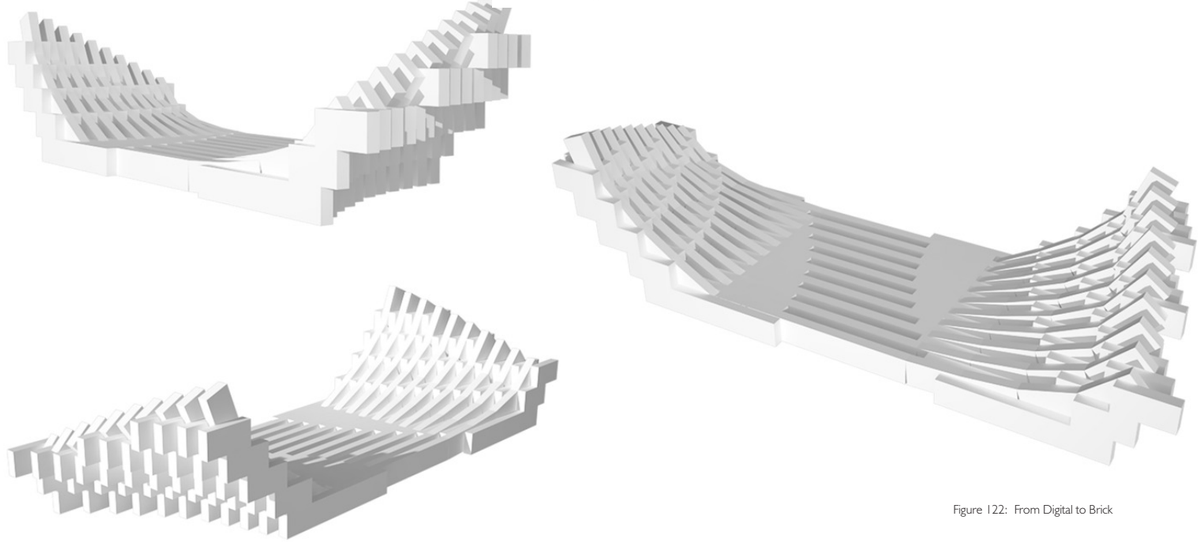


Figure 122: From Digital to Brick

From Digital to Built: Experimentations With Brick

This project tests the constraints of the material brick by using complex geometry, and a variety of brick laying techniques. The material experimentation starts with creating digital and physical model, then construction of the design. Through the applications of turning and shifting of the brick module creates a different and use of the tectonic and form.

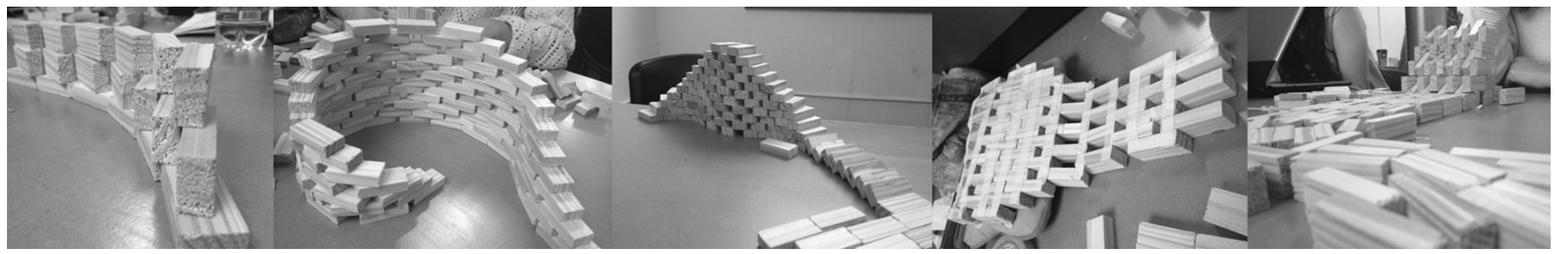


Figure 123: From Digital to Brick

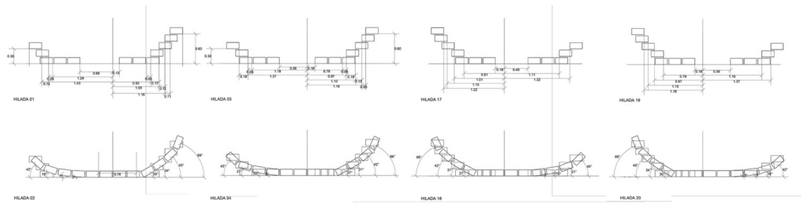


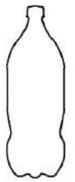
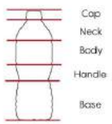
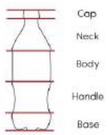
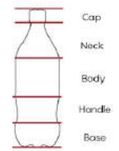
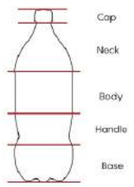
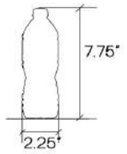
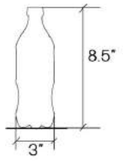
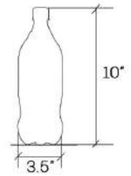
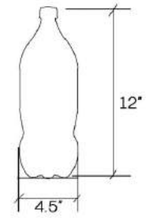
Figure 124: From Digital to Brick

MOST COMMONLY FOUND MATERIALS_Manila, PH

	Aluminum Cans	Paper	Metals	Cardboard	Glass Bottles	Plastic Bottles
Most Abundant Materials **Found in Manila**						
Recycling Process Lifespan How Many Times Can it be Reycled in a Recylcing Center?	**Infinitely** "Aluminum is a valuable commodity, and is **four times more valuable** than other recyclable materials, according to The Aluminum Association. The Aluminum Association also points out that aluminum is recycled very quickly, with one aluminum can being made into another in as little as 60 days[30]"	**5 – 7 times** **(into new paper)** " Materials like paper **do not have an infinite life**, but the answer to how many times paper can get recycled into new paper depends on the kind of paper. Newspaper is lower quality. It can be turned into new newspaper or egg cartons, but not into things like stationary and magazines (the way white paper can)[31]"	**Infinitely** "Common metals such as copper and steel can also be **recycled over and over** without losing any of their quality. It is cheaper to recycle metals like copper than to seek out new copper, According to Copper Investing News, and recycled copper is worth almost as much as new copper. Metals can be recycled rapidly.[32]"	**Finite Lifespan** "Cardboard can be broken down multiple times and **made into new paper products**, though it does eventually start to lose quality. Many recyclable materials like cardboard aren't repeatedly made into the same product the way glass or steel might be, so naming a specific amount of trips through the recycling process becomes more difficult.[33]"	**Infinitely** "Glass is a material that's **easy to recycle**. Glass doesn't lose any quality even when it's recycled over and over, according to Arizona Recycles. Like copper, it is also more cost effective to recycle than to create new glass.[34]"	**One Time** "Plastics, like paper products, degrade when they're recycled, so they often **are only remade into their original products once**, according to National Geographic and the New York Times.[35]"
Recyled Material Avg Selling Price per KG to the Recycing Center **Philippines Currency: Pesos (P)**	Aluminum Cans: P60.00	Newspapers: P4.00-5.00 Bond Paper: P7.00	Copper: P210.00 Steel: P8.00	Cardboard: P3.50	Glass Bottles: P2.00	Plastic Bottles: P14.00
Longevity of Materials	Aluminum Can 200-500[36] years	Newspaper 6 weeks[37]	Metals:	Cardboard Box 4 weeks[38]	Glass Bottle 1Million years[39]	Plastic Bottles 400 years[40]
Manipulation Ability	Easily Cut	Easily Cut	Harder to Cut Metal	Easily Cut	Harder to Cut Glass	Easily Cut
Ability to Withstand & Perform over **Time**	Waterproof	Detoriates when affected by water	Rusts over Time	Detoriates when affected by water	Waterproof	Waterproof

The plastic bottle's material is strong, cheap, easily manipulated, and waterproof. This thesis will explore the capabilities of the material, and use the discarded material as a building material.

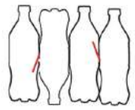
TYPOLOGY OF A PLASTIC BOTTLE

	Water Bottle	Soda Bottle	Soda Bottle	Soda Bottle
Plastic Bottle Type				
Size	16.9 fl oz	20 fl oz	1 liter	2 liter
Form				
Parts				
Dimensions				
Deconstructed				
Color				
Texture				

MATERIAL EXPERIMENTING: ATMOSPHERIC QUALITIES OF THE PLASTIC BOTTLE

MATERIAL EXPERIMENTATION_Studying the Atmospheric Qualities: Visibility, Light, Texture, Strength

Full Bottle



Visibility

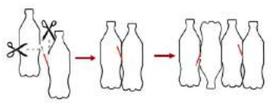
Light

Texture/Touch

Strength

Compressive Strength: PASS

Assembly



Crushed/Melted Bottle

Visibility

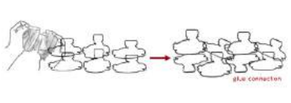
Light

Texture/Touch

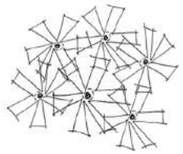
Strength

Compressive Strength: PASS

Assembly

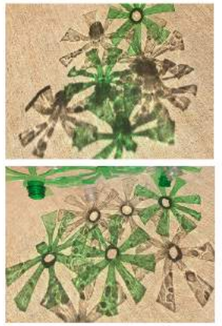


Half Bottle

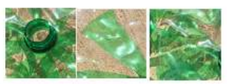


Visibility

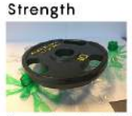
Light



Texture/Touch

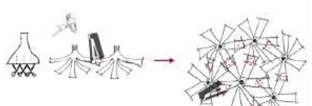


Strength



Compressive Strength: PASS

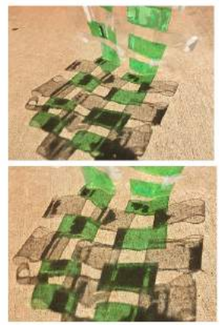
Assembly



Body

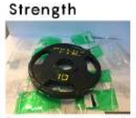
Visibility

Light



Texture/Touch

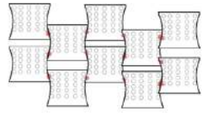
Strength



Compressive Strength: PASS

Assembly

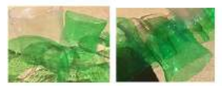
Handle



Visibility

Light

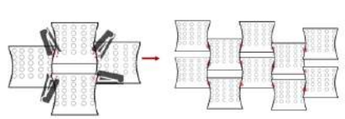
Texture/Touch



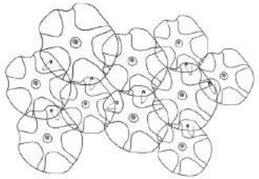
Strength

Compressive Strength: FAIL

Assembly



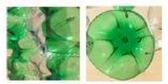
Base



Visibility

Light

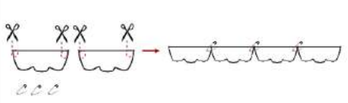
Texture/Touch



Strength

Compressive Strength: PASS

Assembly



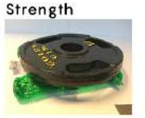
Half Bottle

Visibility

Light

Texture/Touch

Strength



Compressive Strength: PASS

Assembly

MATERIAL EXPERIMENTATION_Studying the Atmospheric Qualities: Visibility, Light, Texture, Strength

Full Bottle

Visibility

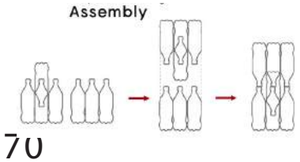
Light

Texture/Touch

Strength

Compressive Strength: PASS

Assembly



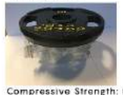
Crushed/Melted Bottle

Visibility

Light

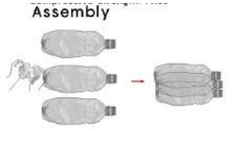
Texture/Touch

Strength



Compressive Strength: PASS

Assembly



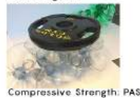
Half Bottle

Visibility

Light

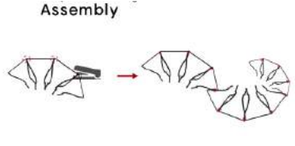
Texture/Touch

Strength



Compressive Strength: PASS

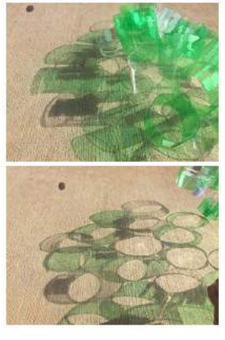
Assembly



Body

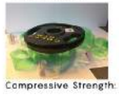
Visibility

Light



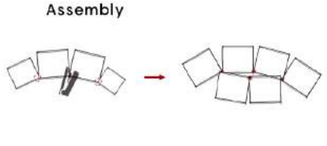
Texture/Touch

Strength



Compressive Strength: FAIL

Assembly



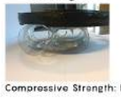
Handle

Visibility

Light

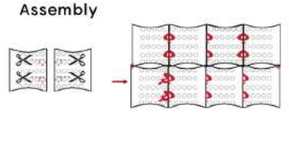
Texture/Touch

Strength



Compressive Strength: FAIL

Assembly



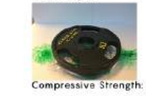
Base

Visibility

Light

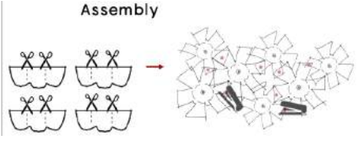
Texture/Touch

Strength



Compressive Strength: PASS

Assembly



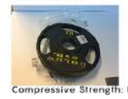
Half Bottle

Visibility

Light

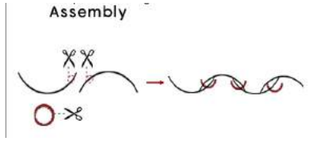
Texture/Touch

Strength



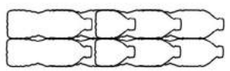
Compressive Strength: FAIL

Assembly



MATERIAL EXPERIMENTATION_Studying the Atmospheric Qualities: Visibility, Light, Texture, Strength

Full Bottle



Visibility

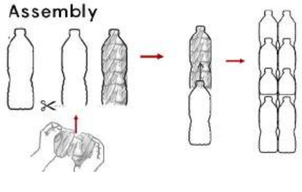
Light

Texture/Touch

Strength

Compressive Strength: PASS

Assembly

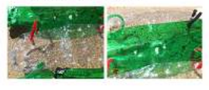


Crushed/Melted Bottle

Visibility

Light

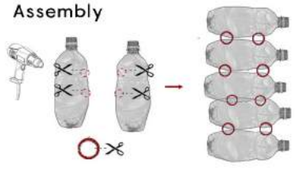
Texture/Touch



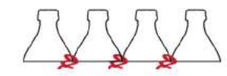
Strength

Compressive Strength: PASS

Assembly



Half Bottle



Visibility

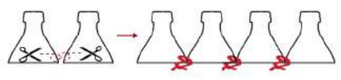
Light

Texture/Touch

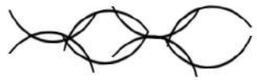
Strength

Compressive Strength: PASS

Assembly



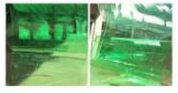
Body



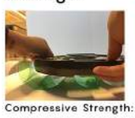
Visibility

Light

Texture/Touch

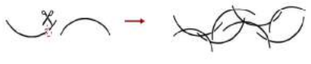


Strength



Compressive Strength: FAIL

Assembly



Handle

Visibility

Light

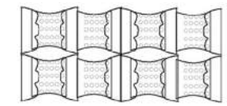
Texture/Touch

Strength

Compressive Strength: FAIL

Assembly

Handle / Base

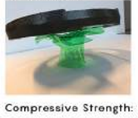


Visibility

Light

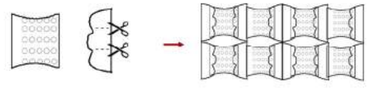
Texture/Touch

Strength



Compressive Strength: PASS

Assembly



SUCCESSFUL BLOCK MODULES

ATMOSPHERIC QUALITIES

-Structural
-Zero to no visibility
-Not varied in light phenomenon
-Not varied in visibility experience

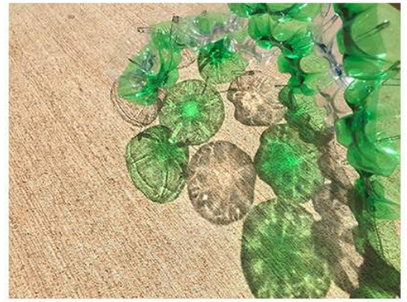
-Handles compressive strength
-Controls visibility with levels
of transparencies
-Light phenomenon

SUCCESSFUL SURFACE MODULES

ATMOSPHERIC QUALITIES

-Different visibility levels
-Diverse Light Phenomena
-Strong in compression
-Strong in Tension

-Flexible module
-Handles compressive strength
-Controls visibility with levels
of transparencies
-Light phenomenon

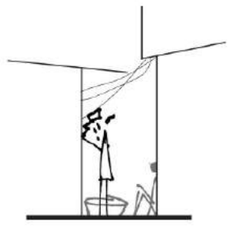


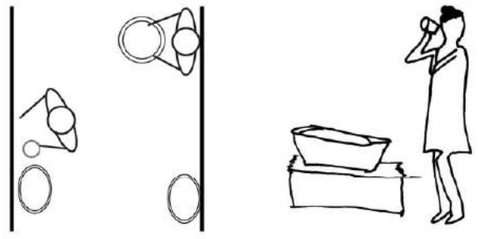
-Flexible module
-Handles compressive strength
-Controls visibility with levels
of transparencies
-Light phenomenon

PROGRAMMATIC ANALYSIS: WOMEN EMBODIMENT IN THE SLUMS

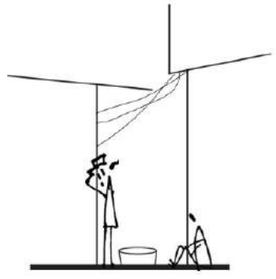
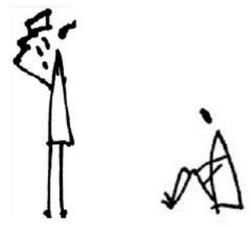
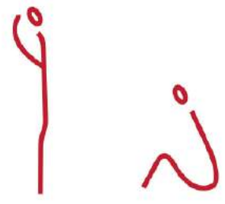
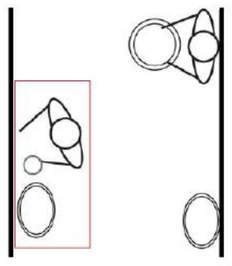
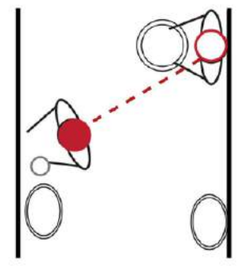
Personal Activity

Activity: Bathing
- Sitting
- Squatting
- Standing
- Washing

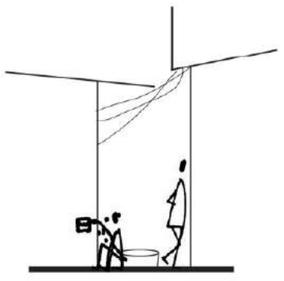
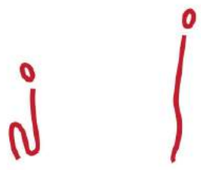
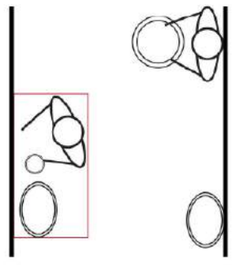
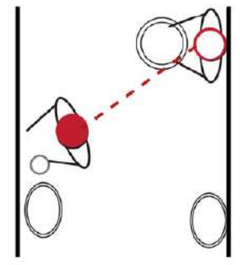




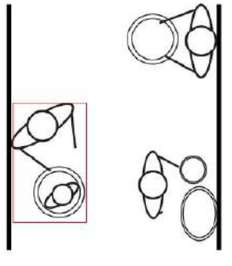
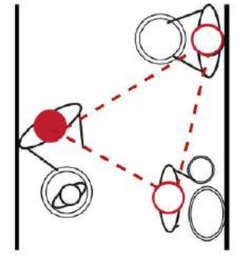
Synthesis:
- Overlapping spaces between private activities and public activities
- Bathing is in the same space as every other activity
- Currently there's no privacy for bathing activity

Bathing: Standing	Body	Body Gestures	Plan: Body in Space	Spatial Relationship
				

Bathing: Sitting

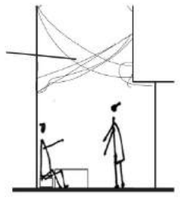
				

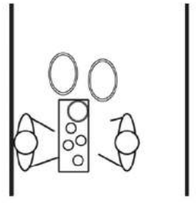
Washing Children

Economic Activity

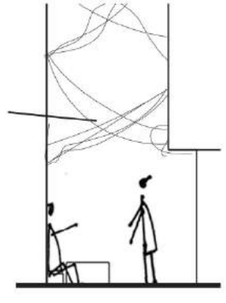
Activity: Selling
-Sitting
-Talking
-Standing



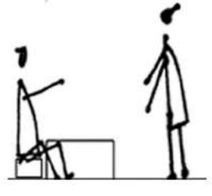


Synthesis:
-Alleyway spaces are used for economic activities
-Activities that women partake in are selling crafts, fruits, or goods
-Women are mainly sitting when conducting economic activities

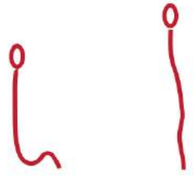
Selling Stand



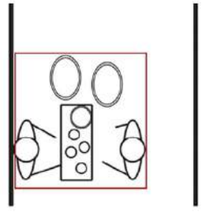
Body



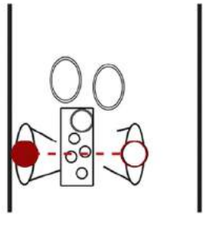
Body Gestures



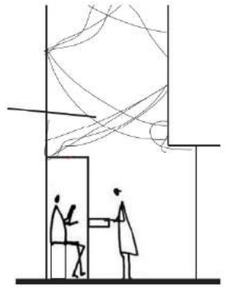
Plan: Body in Space

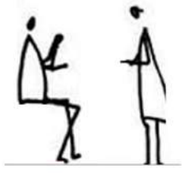


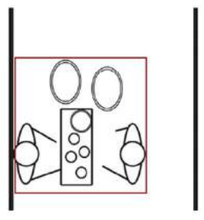
Spatial Relationship

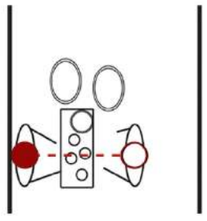


Shop Keeping

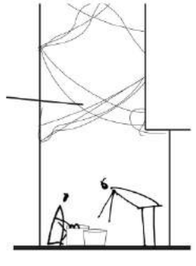


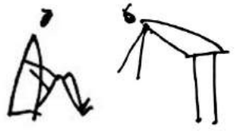


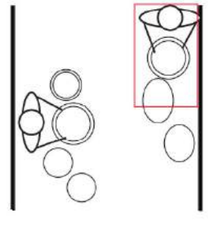


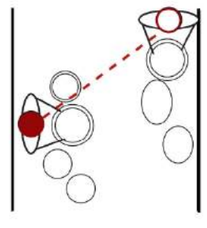


Peeling Garlic



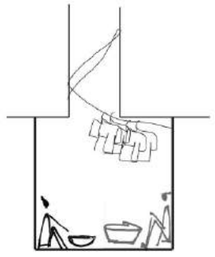


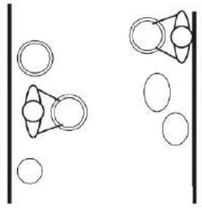




Domestic Activities

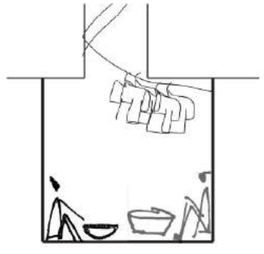
Activity: Laundry
-Sitting
-Hanging clothes
-Talking
-Standing
-Washing





Synthesis:
-Alleyway spaces are used for domestic activities
-Women do laundry in a shared space
-Women are mainly sitting when conducting domestic activities, such as laundry

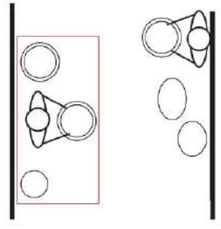
Washing: Sitting



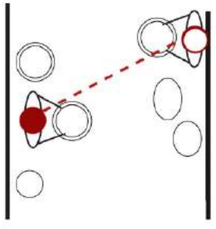
Body

Body Gestures

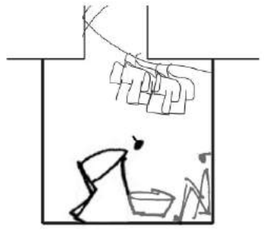
Plan: Body in Space

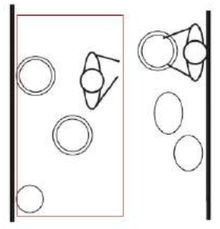


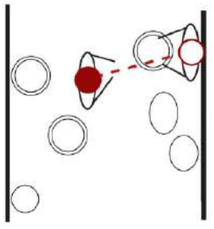
Spatial Relationship



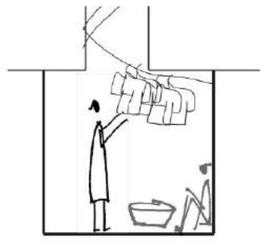
Washing: Bending Over

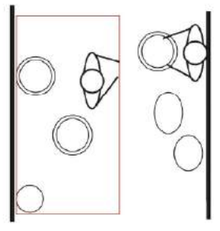


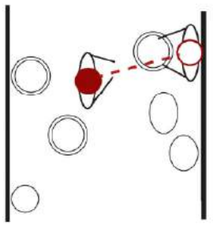




Washing: Hanging

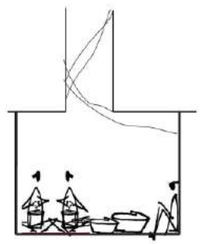


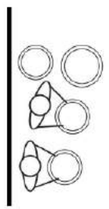


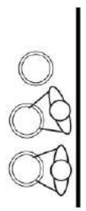


Communal Activities

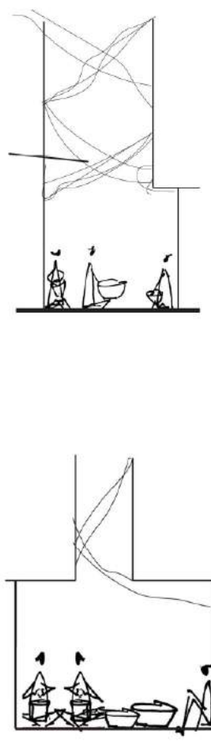
Activity: Laundry & Peeling Garlic
- Sitting
- Peeling Garlic
- Talking
- Standing
- Washing







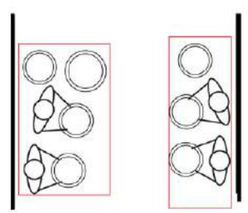
Synthesis:
- Women often gather with other women in the community to perform domestic activities
- Women are mainly sitting when conducting domestic activities, such as laundry

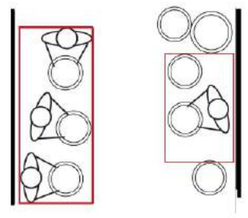


Body

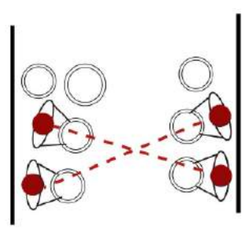
Body Gestures

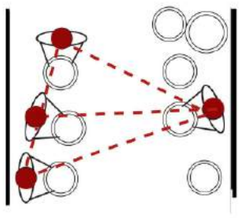
Plan: Body in Space



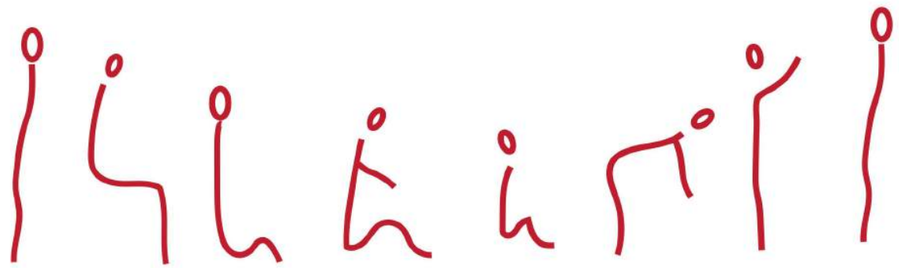


Spatial Relationship

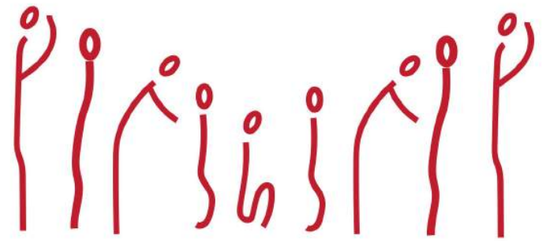




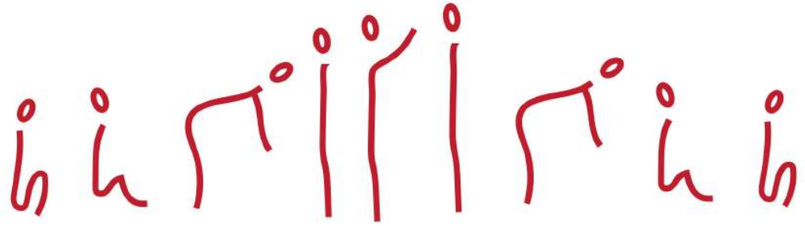
Economic



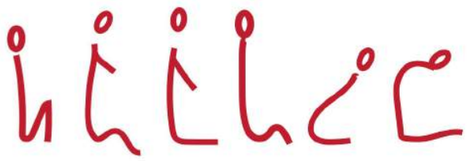
Bathing



Laundry



Communal



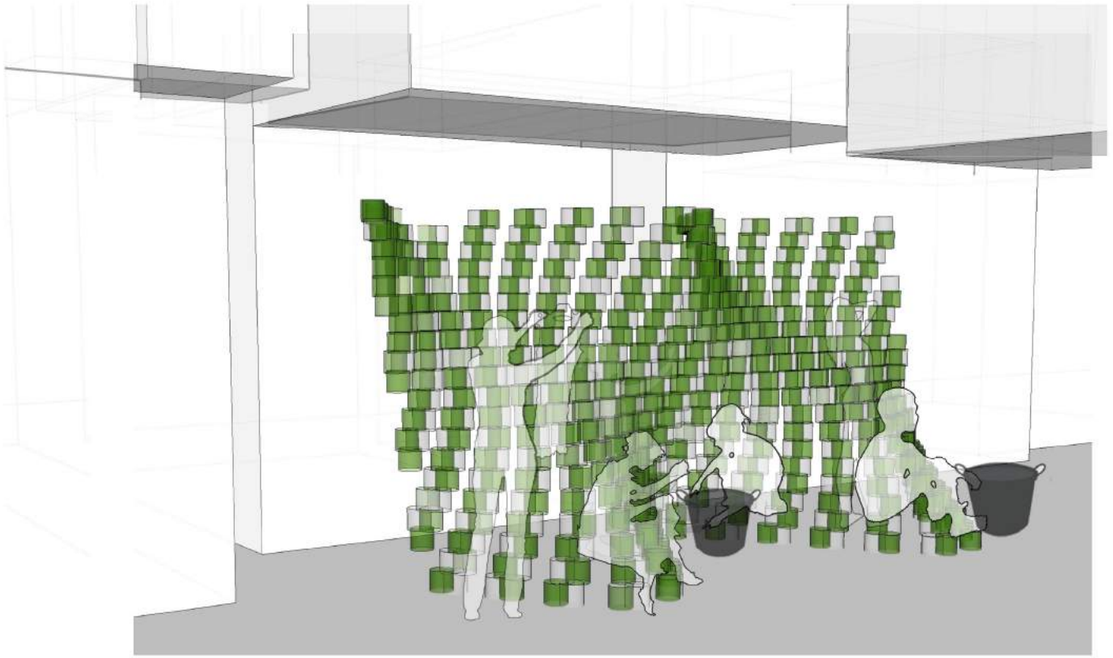
CONCLUSIONS: **WOMENS NEEDS**:

1) Controlling visibility/ privacy within the alleyway

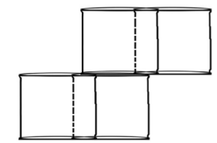
2) Providing seating/organization infrastructure to help with domestic activites (currently lack ing)

3) Create gathering spaces for group gathering

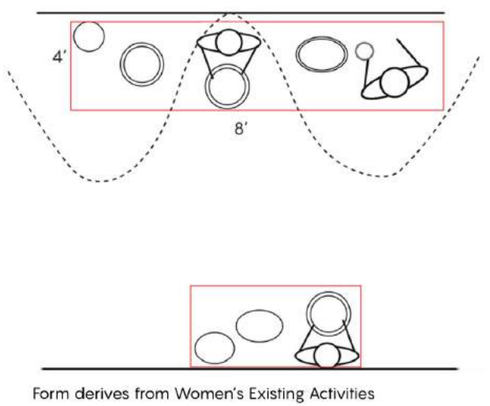
MANIPULATION 1 _Parametric Stacking with the Plastic Bottle



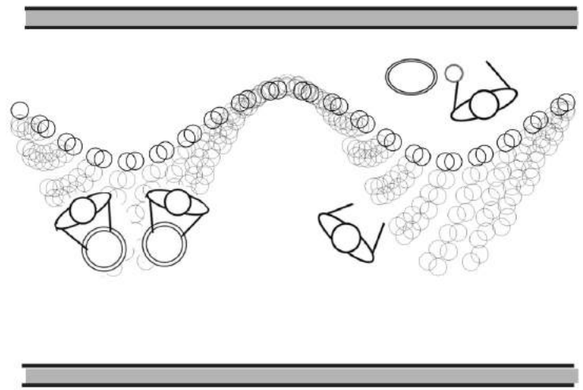
Introducing digital technologies with the plastic bottles creates greater variation and modulation through patterning and tessellation. This exploration incorporates both women embodiment and the plastic bottles to generate inhabital surfaces.



Plastic Bottle Module

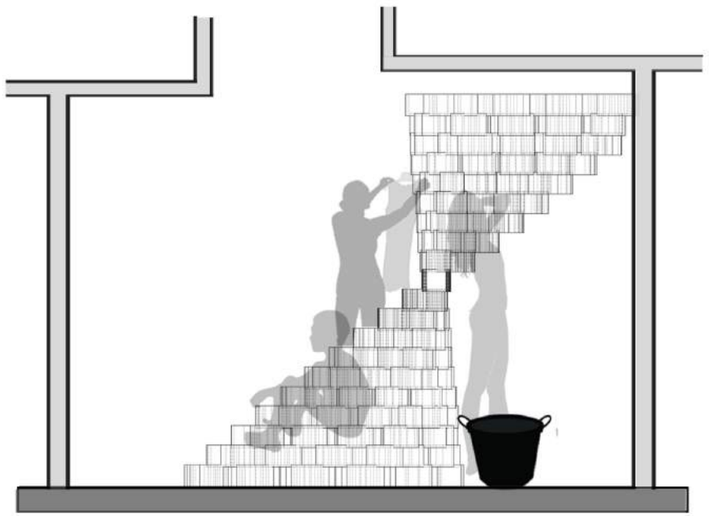


Form derives from Women's Existing Activities



Not to Scale*

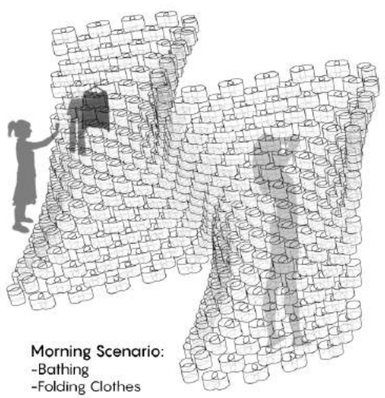
Plan View



Elevation

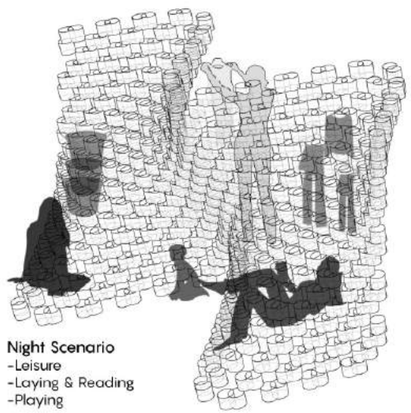
Scale 1"=1'-0

Programs Vary throughout the Day:
Wall Adapts to the temporal environment of the



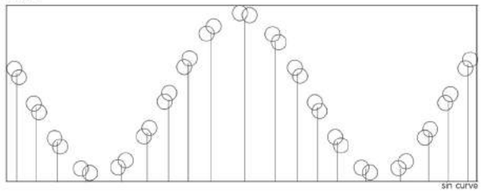
Morning Scenario:
-Bathing
-Folding Clothes

Mid-day Scenario
-Domestic Activities
-Rest

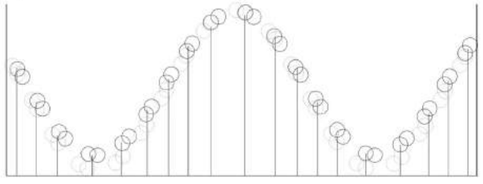


Night Scenario
-Leisure
-Laying & Reading
-Playing

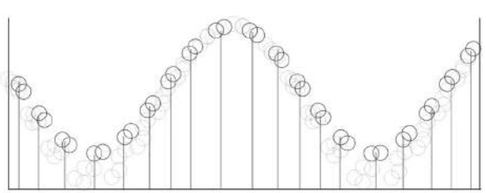
Layer 1



Layer 2

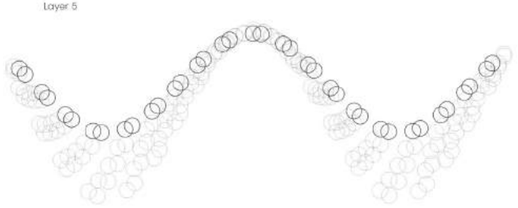


Layer 3

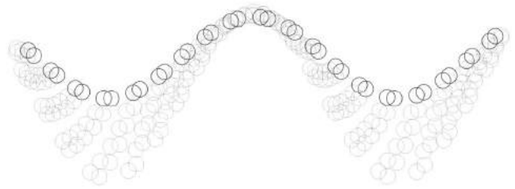


Layer 4

Layer 5



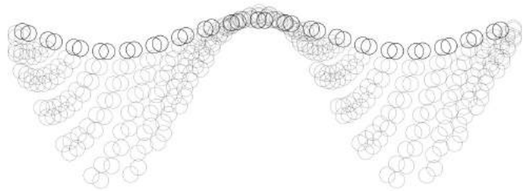
Layer 6



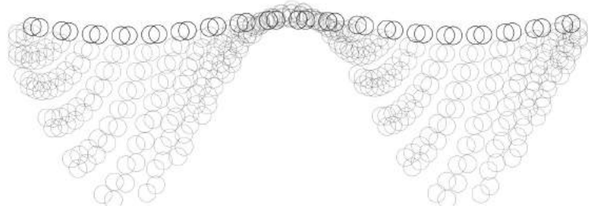
Layer 7

Layer 8

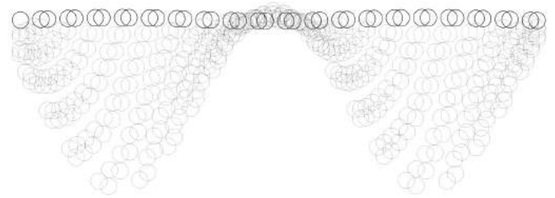
Layer 9



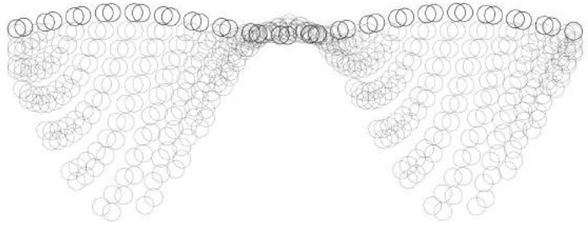
Layer 10



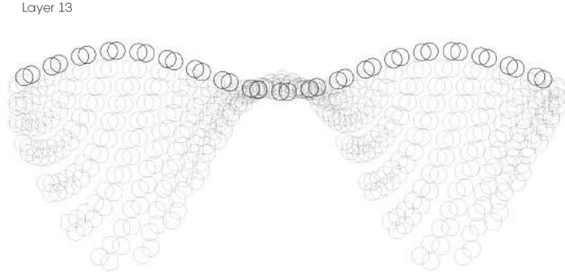
Layer 11

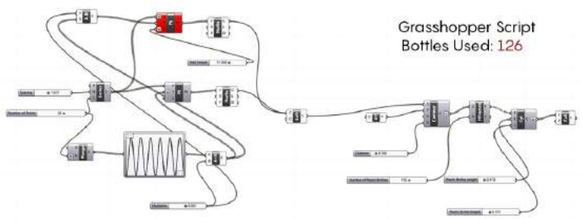


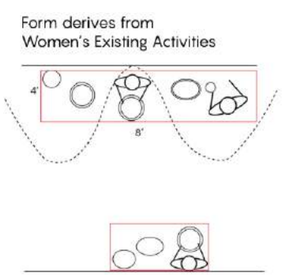
Layer 12

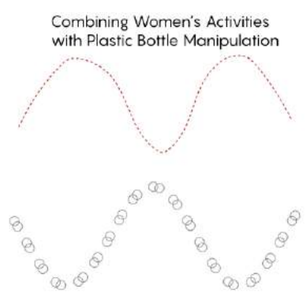


Layer 13

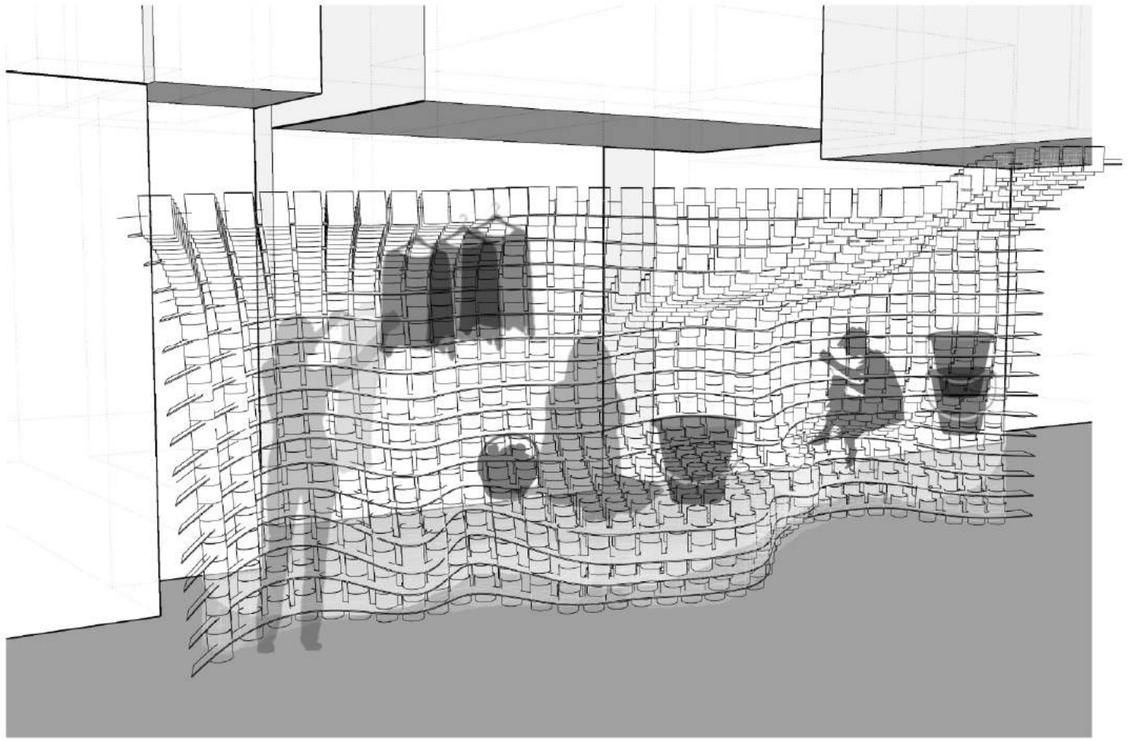




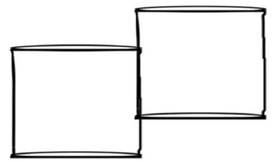




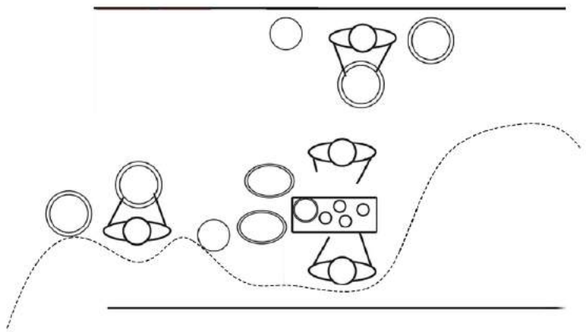
MANIPULATION 2_Body Movement Informing Wall Parametrics

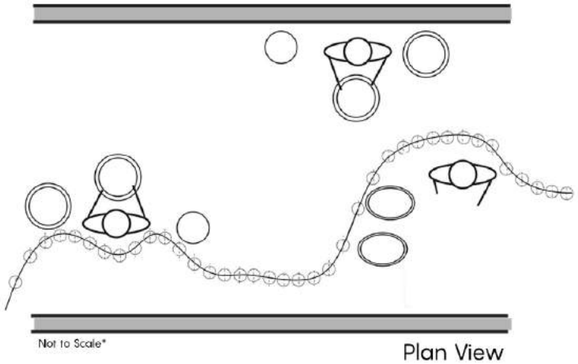


Form derives from
Women's Body Gestures & Movement



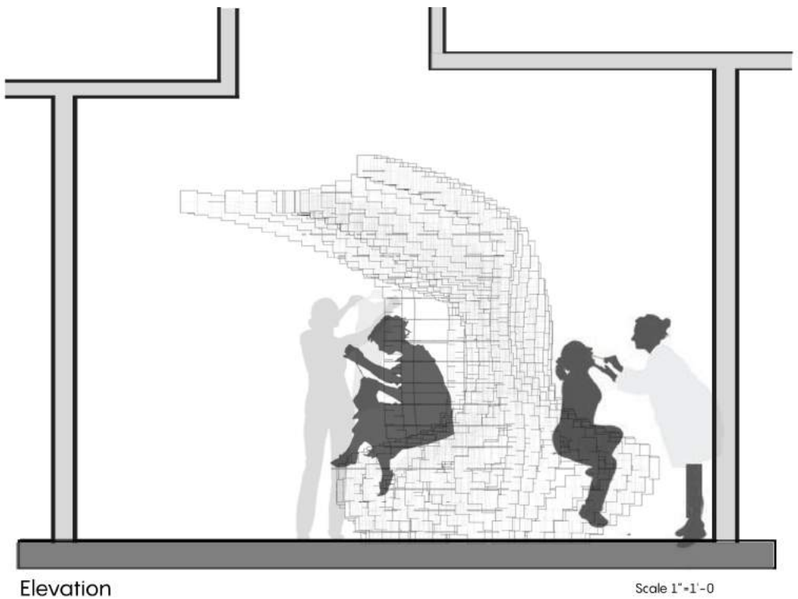
Plastic Bottle Module





Not to Scale*

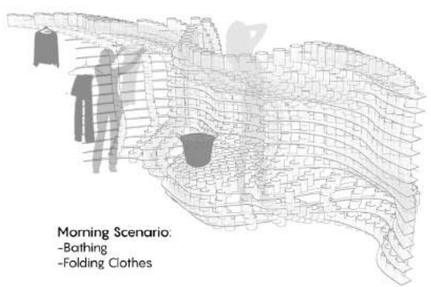
Plan View



Elevation

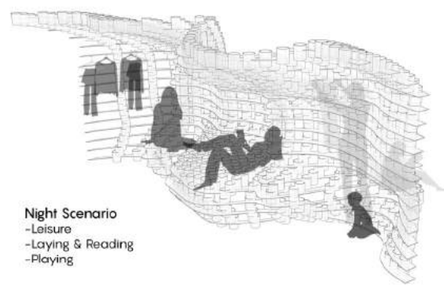
Scale 1"=1'-0

Programs Vary throughout the Day:
Wall Adapts to the temporal environment of the slums

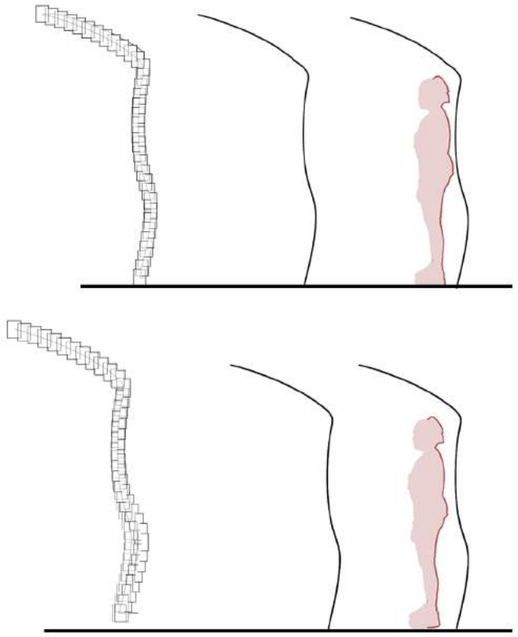


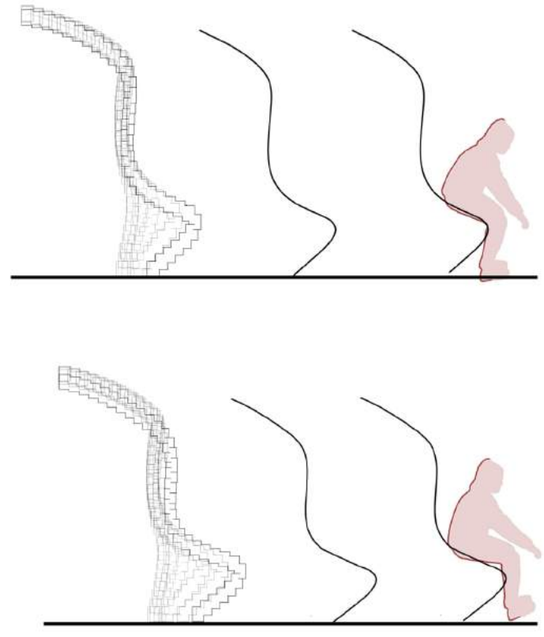
Morning Scenario:
-Bathing
-Folding Clothes

Mid-day Scenario
-Economic Activities
-Selling

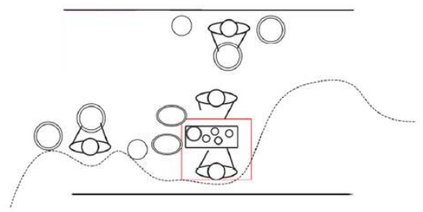


Night Scenario
-Leisure
-Laying & Reading
-Playing

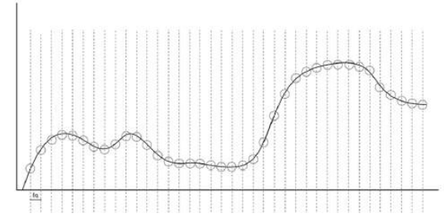


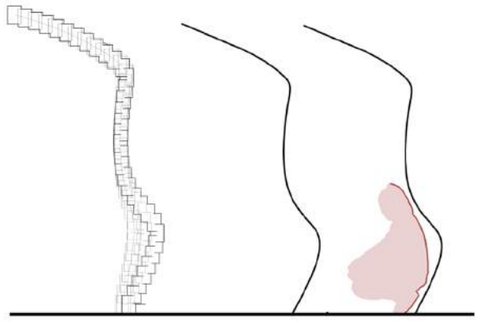


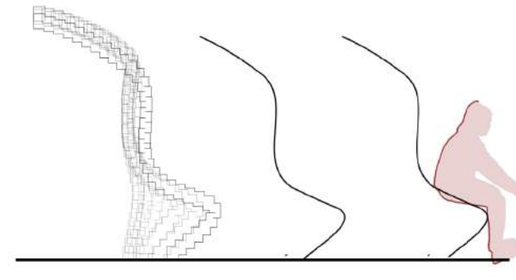
Form derives from
Women's Existing Activities



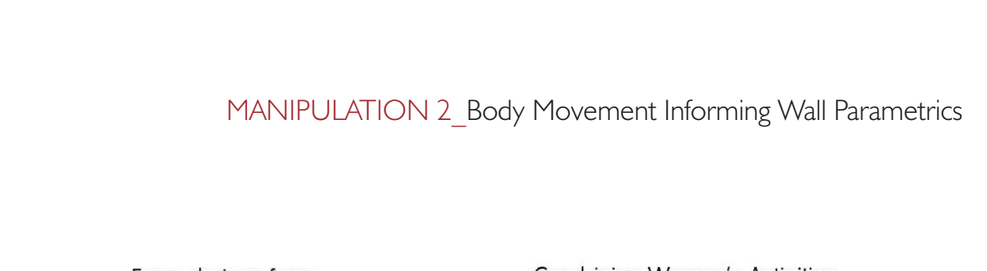
Combining Women's Activities
with Plastic Bottle Manipulation

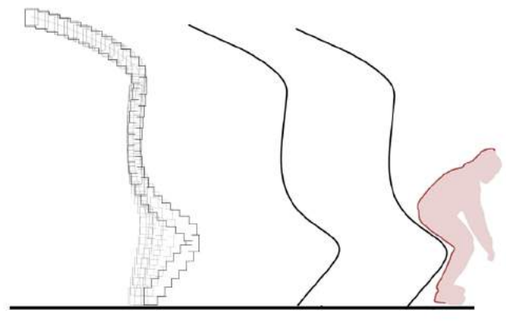


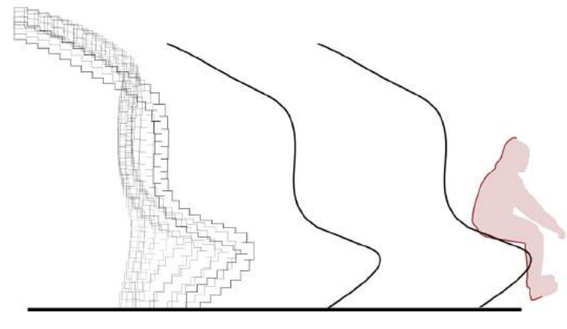


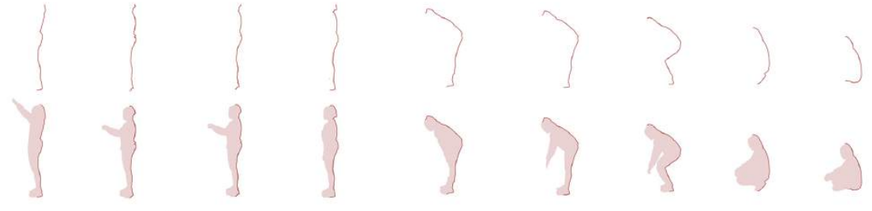


Grasshopper Script
Bottles Used: 26 Bottles per Column







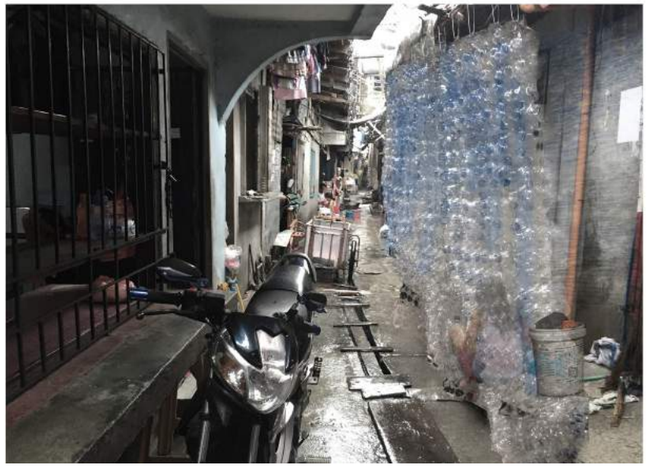


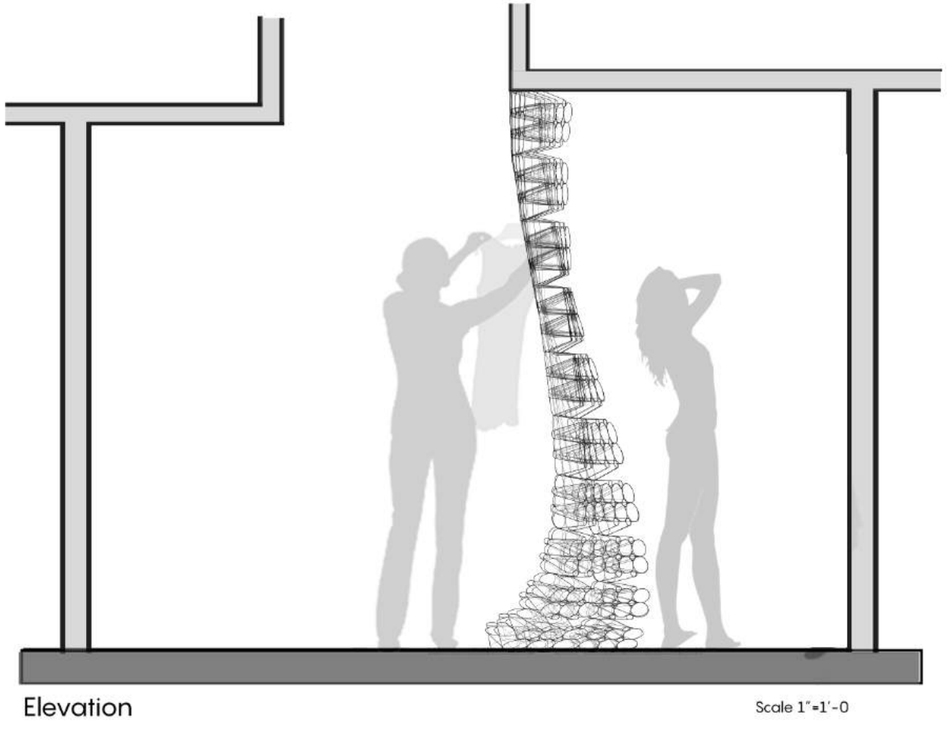
Form derives from
Women's Body Gestures & Movement

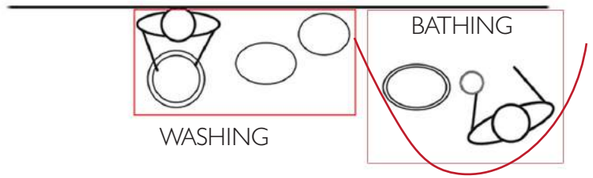
MANIPULATION 3_Surface Paneling

Existing Condition: Little Girl Bathing in the Alleyway

Morning Condition with Surface



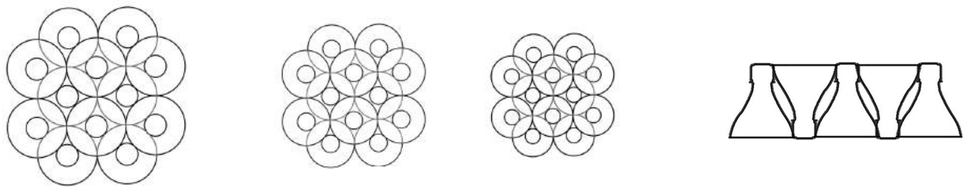




Block Panel

Surface Panel

Surface Panel

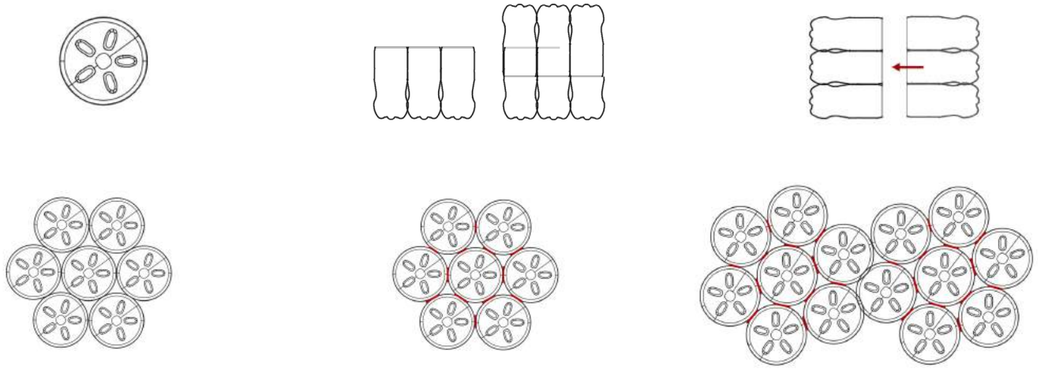


1 3 x 3 Connections

2 Connecting Rows

3 Combining Rows

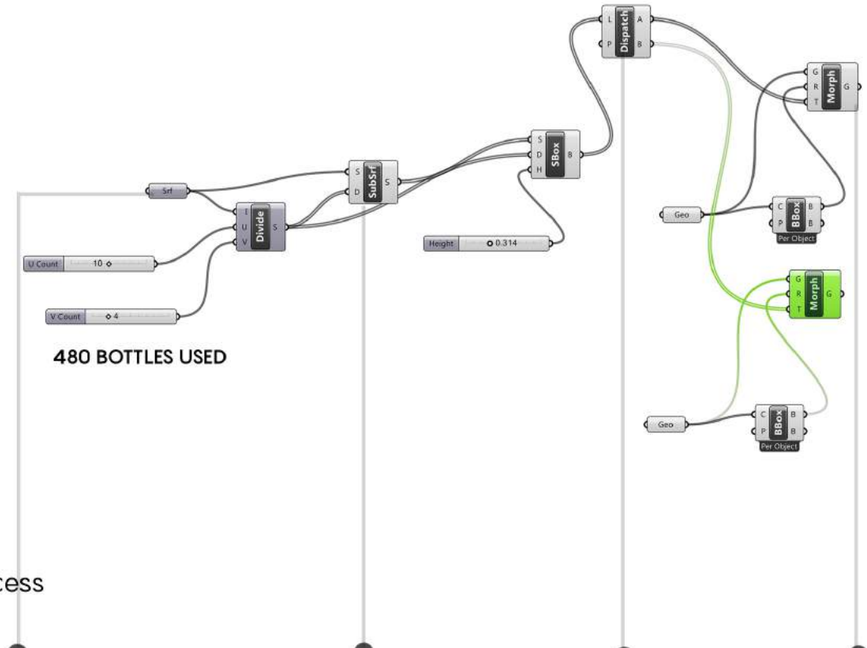
Block Panel



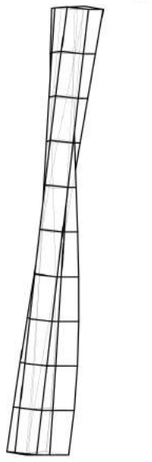
1 3 x 2 Connections

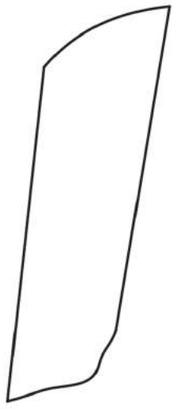
2 Connecting

3 Combining Panels

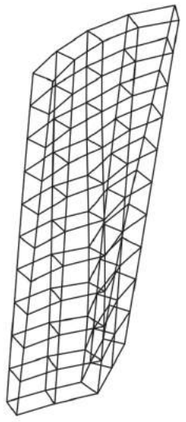


Form Process

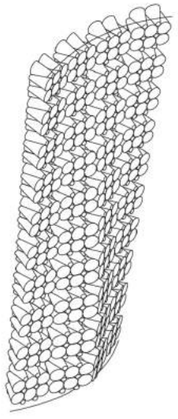




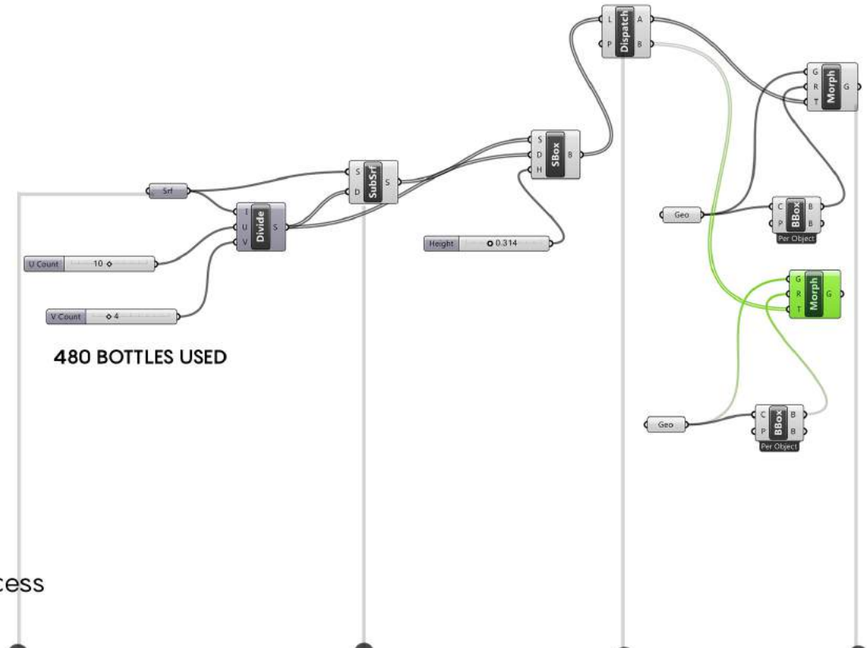
Surface Curve derived from Women in slums



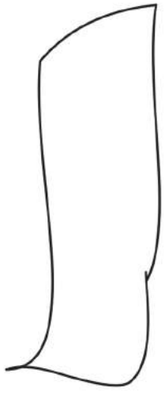
Paneling throughout Curve



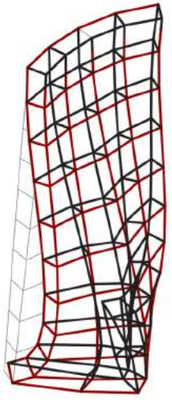
Paneling throughout Curve: bottles panels applied



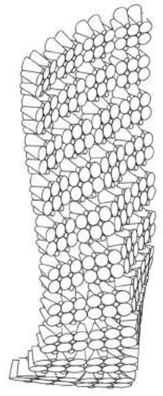
Form Process



Surface Curve derived from Women in slums

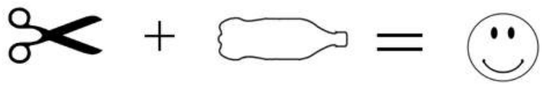


Paneling throughout Curve



Paneling throughout Curve: bottles panels applied

3.0 DESIGN INTERVENTION_Plastic Bottle Kit of Parts



Plastic Bottle: Kit of Parts: Catalog

Tools Provided Within Kit:

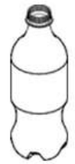
Stapler

Scissors

Zip Ties

Instructions

You find:

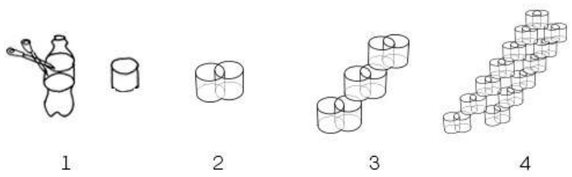


Plastic bottles

Tools Used:

YOU FIND:

STACKING

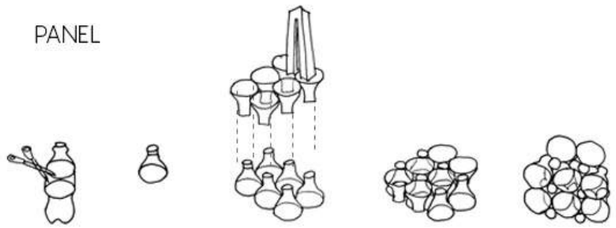


1 2 3 4

Tools Used:

YOU FIND:

PANEL



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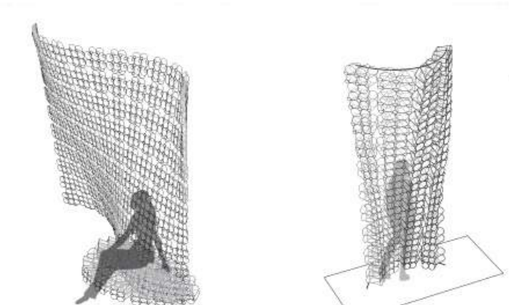
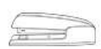
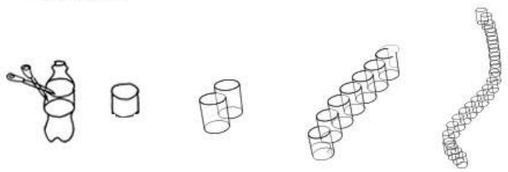


Tools Used:

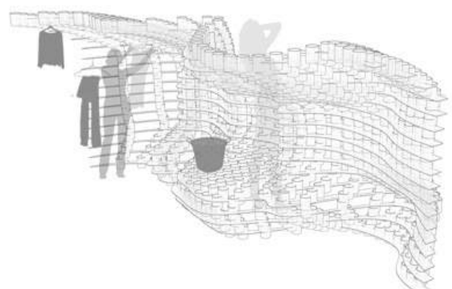


YOU FIND:

Columns



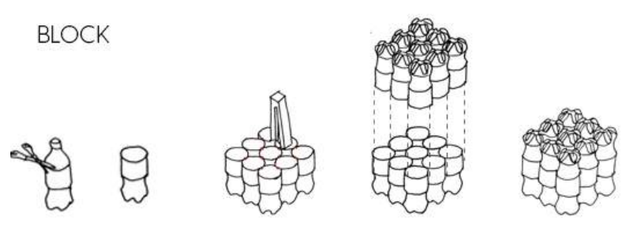
1 2 3 4



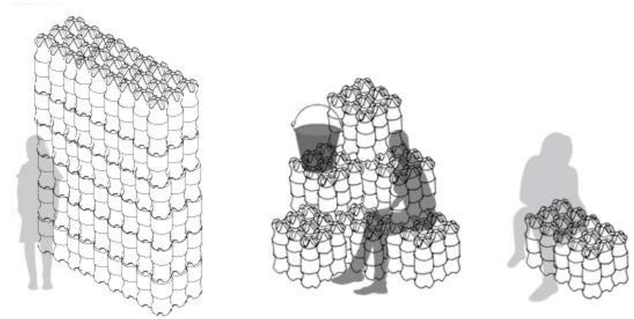
Tools Used:

YOU FIND:

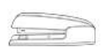
BLOCK



1 2 3 4

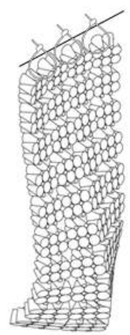


Tools Used:

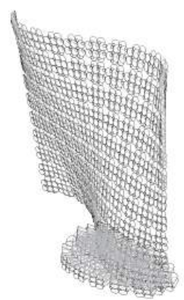


Structure Tips:

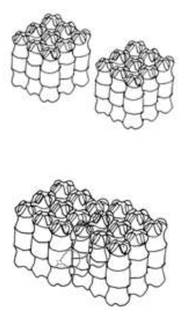
1 Zip Ties to hang surface



2 Hybrid of Surface + Block



3 Zip Tie Connection



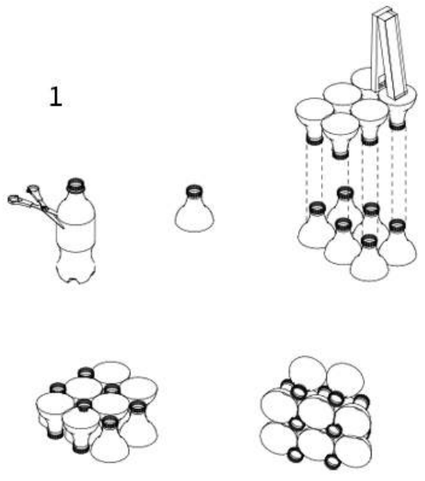
EMPOWERMENT THROUGH EDUCATION

Women coming together collectively to claim their
Right to the City and change their space. By using the kit of parts,
Women will utilize an abundantly found, discarded material
of the plastic bottle, and use it as a building material to change
their space based off of their needs.

Full Scale Surface: Instructions

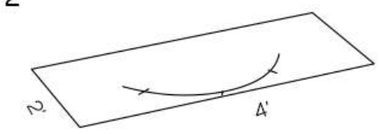
Tools Used:

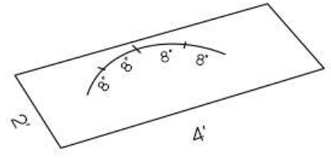
1



Creation of Panel

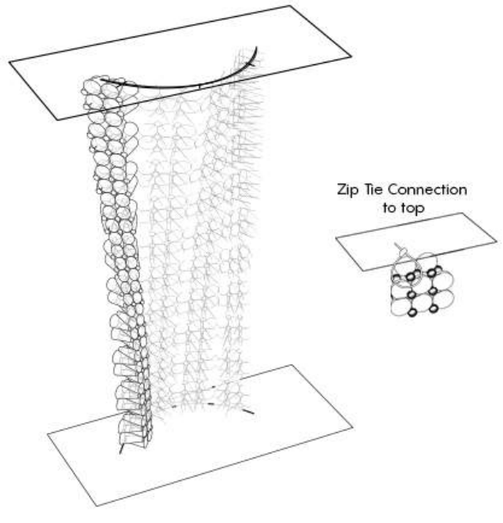
2





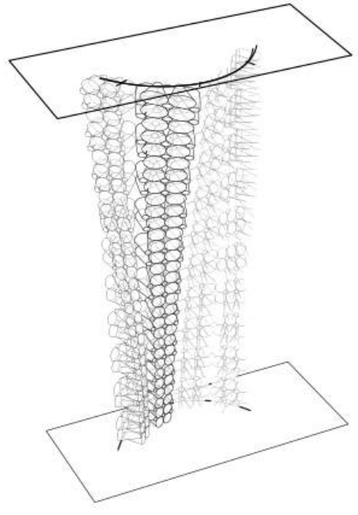
Setting Guidelines

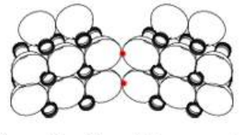
3



Assembling by column

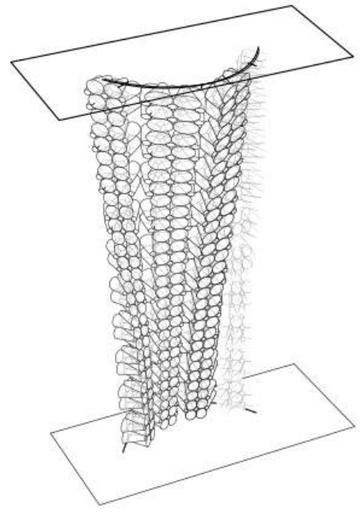
4





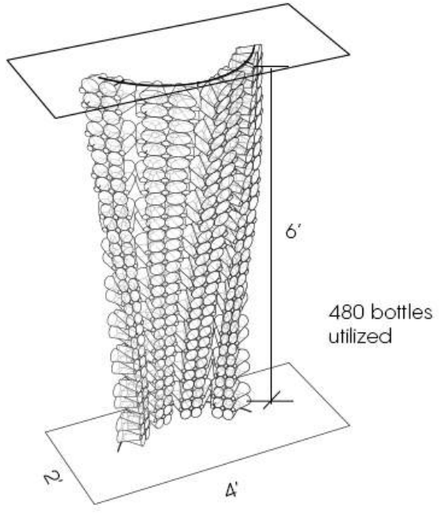
Panel to Panel Connection
via Stapling

5



Assembling by column
cont.

6



Surface Created

DESIGN INTERVENTION_PLASTIC BOTTLE KIT OF PARTS _Full Scale: Design Build: From Digital to Built

Seating/ Table/ Shelf Infrastructure within Wall Surface

Atmospheric Qualities: Controlling Visibility | Creating Privacy

Atmospheric Qualities: Light Phenomenon |

1 person
72 hours Construction Time
528 bottles utilized

DESIGN INTERVENTION_Performance within Context

4.0 WORKS CITED

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2 Ibid., 40

3 Ibid., 2

4 "The Slum within the Global Countryside." Leading Light Communist Organization. 2016. Accessed December 07, 2016. http://llco.org/the-slum-within-the-global-countryside/.

5 Davis, Mike. *Planet of Slums.* London: Verso, 2007, 175

6 "The Slum within the Global Countryside." Leading Light Communist Organization. 2016. Accessed December 07, 2016. http://llco.org/the-slum-within-the-global-countryside/.

7 Davis, Mike. *Planet of Slums.* London: Verso, 2007, 23

8 Ibid., 23

9 Ibid., 25

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14 "The Right to the City: Reflections on Theory and Practice." Polis. Accessed December 07, 2016. http://www.thepolisblog.org/2009/11/right-to-city-reflections-on-theory-and.html.

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31 Ibd.

32 Ibd.

33 Ibd.

34 Ibd.

35 Ibd.

36 Ibd.

37 Ibd.

38 Ibd.

39 Ibd.

40 Ibd.

LIST OF EXTERNAL FIGURES

Figure 1: https://www.africanexponent.com/profile/editor

Figure 2: https://istihbaratalani.wordpress.com/2013/03/31/mumbay-contrasts-3/

Figure 3: Manila Women in Slums -http://www.alamy.com/stock-photo-manila-women-cut-the-remains-of-the-loops-of-rubber-slippers-in-homework-17072698.html

Figure 4: Manila women in slum- http://blogs.ft.com/photo-diary/tag/squatter/

Figure 5: Mumbai, India slums- http://jorgeoetteldai2013.blogspot.com/

Figure 6: Manila, Philippines slums- https://xiaochua.net/2013/06/22/

Figure 7: Mumbai slum- http://www.karmaindia.com/experiences/slum-walk-out-of-misconceptions.html

Figure 8: People gathering in slums- http://gazettereview.com/2016/06/top-10-poorest-countries-world/

Figure 9: Aerial view of Manila slums- http://www.philstar.com/modern-living/2014/09/06/1365687/filipino-landscape-aesthetic

Figure 10: Aerial view of slums- http://doubtfulnews.com/2013/10/the-slums-of-scientific-peer-review/

Figure 11: Slum in Jakarta- https://nacoesunidas.org/atual-modelo-de-urbanizacao-e-insustentavel-onu-habitat-relatorio/

Figure 12: People in the alleyway- http://eatingasia.typepad.com/eatingasia/street-food/

Figure 13: People coming together- https://prathamfoundation.quora.com/

Figure 14: Women gathering together- http://warrenfyfenews.org/the-sanitary-pad-revolutionary/

Figure 15: Hundreds March through together to show support- http://theirworld.org/news/kenya-rises-upforschool-as-hundreds-march-through-kibera

Figure 16: Slum Community Gathering Togther- http://newmansownfoundation.org/stories/kennedy-odede/

Figure 17: Urban poor reclaiming public space- http://www.huffingtonpost.com/josephine-dallant/how-the-urban-poor-are-re_b_4086362.html

Figure 18: Women are heroes- http://www.patternpulp.com/book-reviews/book-review-women-are-heroes/

Figure 19: Manila women doing laundry- http://www.alamy.com/stock-photo/blumentritt.html

Figure 19: Manila women doing laundry- http://www.alamy.com/stock-photo/blumentritt.html

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