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Learning Through Play

A Playful Phenomenology

Request for Approval of Thesis Research
Project Book Presented to:

Arief Setiawan and Chris Welty

and to the
Faculty of the Department of Architecture
College of Architecture and Construction Management

by

Niloufar Mehrjerdian

In partial fulfillment of the requirements for the Degree

Bachelor of Architecture

Kennesaw State University
Marietta, Georgia

May 1, 2020

DEDICATION

I would like to dedicate this book to everyone who was part of this journey with me.

To Professor Arief Setiawan and Professor Chris Welty, thank you for always showing up with a smile, encouraging words, and great stories. Thank you for your guidance and support throughout this thesis and my architectural education.

To my architecture family, the Penguins, Caleb, Ana, Eddie, Hala, Asbiel, Nhan, and Diego, thank you for all the laughs and adventures and happiness throughout the past 5 years.

To Michelle and Diana, thank you for always having my back and encouraging me to keep going even when I wanted to give up. I would not have gotten through architecture school without you guys.

To Noah, thank you for being the best thesis partner I could've asked for. You encouraged me and pushed me to work harder than I thought I could.

Finally, to my family, Nasrin, Masoud, and Nikki, thank you so much for your unconditional love, support and encouragement you've always given me. None of this would've been possible without you.

IF CHILDHOOD IS A JOURNEY, LET US SEE
TO IT THE CHILD DOES NOT TRAVEL BY
NIGHT¹.

-ALDO VAN EYCK, 1962

TABLE OF CONTENTS

SECTION I

CHAPTER 1: THEOREM ----- 1

1.1 THESIS STATEMENT

1.2 THEORY OF COGNITION AND PLAY

1.2.1 FREDRICH FROEBEL

1.2.2 JEAN PIAGET

1.2.3 HENRICH PESTALOZZI

1.2.4 JOHN DEWEY

1.3 COGNITIVE STAGES

CHAPTER 2: ANALYSIS ----- 17

2.1 CURRENT CONDITIONS

2.2 DESIGN STANDARDS

2.3 PRECEDENTS

2.4 CASE STUDIES

2.4.1 AMSTERDAM ORPHANAGE

2.4.2 LION'S PARK

SECTION II

CHAPTER 3: PLAYFUL EXPLORATIONS ----- 45

3.1 EXPLORATIONS AND ANALYSIS

CHAPTER 4: DESIGN ----- 63

4.1 LIVING AND LEARNING CENTER

CHAPTER 5: BIBLIOGRAPHY ----- 77

5.1 WORKS CITED



Fig 1

CHAPTER 1: THEOREM

At the South Border of the United States, children are being held in facilities for days. While at these facilities, these children do not have the opportunity to learn like other children around their age do. This thesis explores ways to design spaces for children that encourage cognitive development.

By looking at research done by Jean Piaget, Friedrich Froebel, Johanne Pestalozzi, and John Dewey, the thesis will examine the development of a child's brain, and the development of cognition from birth to adulthood. Jean Piaget, a psychologist, divided the human brain's development into four stages, the sensorimotor stage, the pre-operational stage, the concrete operational stage, and the formal operational stage. These stages which start from birth and go into adulthood show how the brain develops throughout our lives. Friedrich Froebel, the father of kindergarten, considered play as an important factor in the cognitive development of a child. He, like Piaget and many others before and after him, explored the development of cognition. His studies led him to his theory that play allows a child's mind to grow, by using imagination, creativity, and haptics to develop their cognition and become critical thinkers.

The research led to key words, such as play, imagination, complexity, and haptics. Using the keywords and the research, a set of geometric volumes were created, which were then used to design a Living Learning Center for the children at the South Border of the United States.

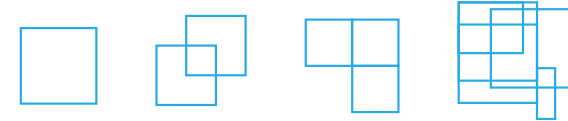
The Living Learning Center is designed to encourage the development of cognition in children. The Center provides living and educational spaces for each child. A child's development should not change based on a his/her race, culture, or background. Circumstance or status should not deprive any child from their basic needs. Just because these children are locked up, should cognitive development stop? Can play be the agency for change?

FRIEDRICH FROEBEL

According to Robert Downs in *Friedrich Froebel*, Froebel played an important part in the education system. He was named the father of Kindergarten, and believed that kindergarten should focus on play and teaching through play. He designed the Gifts and Occupations as a method of teaching through touch. The gifts were designed to teach the child, while the occupations were designed to use the knowledge from the gifts.

GENERAL PRINCIPLE

Simple to Complex



Cognition



Haptic Learning



Play



EXPLANATION

- The gifts: starting from basic shape and making it more complex as the child's cognitive development evolves
- Breaking the most basic shape into smaller, more complex shapes

- Repetition
- Patterns
- Geometry

- Learning by touching
- Sensory learning

- Teaching through play
- Imagination
- Playgrounds

SUMMARY

Froebel believed that a child learns by starting their education with learning simple geometric shapes, then having the shapes divided into more complex shapes, differing in shapes and sizes.

In relation to the gifts, he made the shapes, such as the cube, repeat in each gift, giving the gifts a pattern. The repetition and patterns allow children to remember the elements and morphology better.

He believed children learn better by touching and feeling the objects, rather than being lectured about things. When the senses are used, children get a better understanding of the objects.

Froebel believed that kindergartens should focus on play and teaching through play. Play allows the child to use their imagination, using creativity and allowed them to be productive.

QUOTES FROM THEORIST

Of the gifts: It is clear that the use of such objects may serve as an admirable introduction to mathematical, artistic, and other realms²

The second gift is the basis of the kindergarten system; all the other gifts are derived from it³

[Froebel] followed the Pestalozzian principle of stressing firsthand knowledge, rather than empty theory⁴

Froebel also saw the child as a growing organism, developing through creative activity⁵

GIFTS

Gifts 1 and 2

Gifts 3-6

Gift 7

Gifts 8-10

EXPLANATION

A soft ball connected to a string. The ball was small, perfect fit for a small child's hand

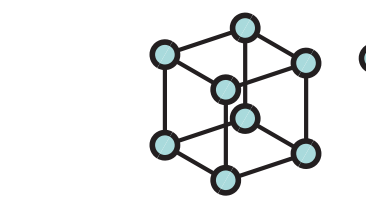
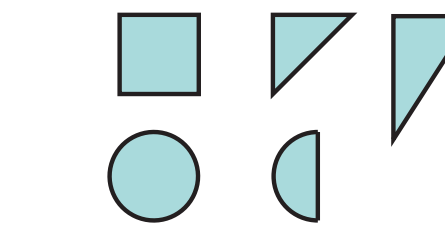
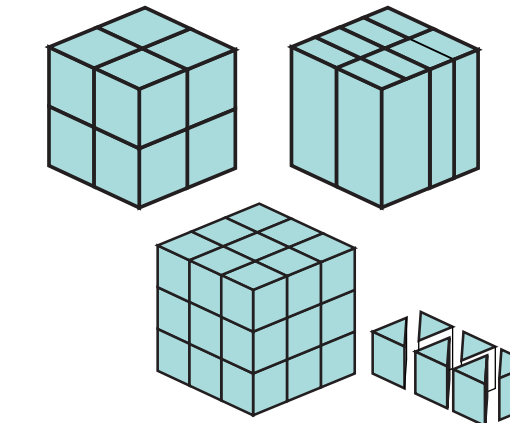
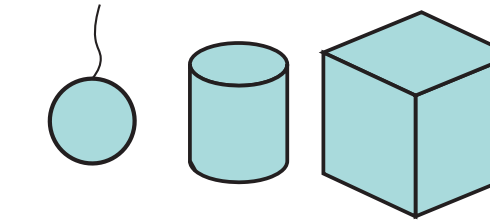
A set of cube, prism, and sphere. The set was made of wood, because at this stage, a child would enjoy the sound of a hard, noisy ball more than a soft ball. The cube is stable while the sphere is easy to roll around. The sphere is a mixture of the cube and sphere⁶

The cube broken down into smaller pieces. The purpose of it was to introduce division, and how one thing could be made up of smaller things. It was for the child to understand the relations of part to whole and part to part. The different sizes and numbers of the pieces started making the child think about numbers and forms, getting the child ready for mathematical studies.⁷

A set of different shapes, such as squares, right, acute, and obtuse-angled triangles. The set was made of wood, plastic, and paper. This gift brings in the geometrical shapes the child has already learned through the previous gifts, but because of its flat shape, it makes the child think about surfaces and the relations of area to volume. This gift also allows for the child to play with different colors, which will lead to artistic designs⁸

A combination of sticks, rings, and points. At this stage, a child is able to make the shapes/outlines of the shapes he has learned about in the previous gifts with the sticks. This step also contributed to the learning of writing, with the sticks being used to teach the alphabets to the child⁹

GRAPHICS



RELATIONSHIP TO COGNITION

- Pattern
 - Simple to complex
- Geometric Shapes

- Geometric Shapes
- Repetition
- Pattern
- Division

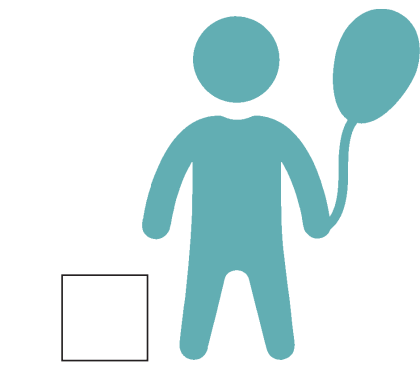
- Geometric Shapes
- Basic Elements
- Relationships
- Scale

- Basic Elements
- Relationships
- Scale
- Complexity

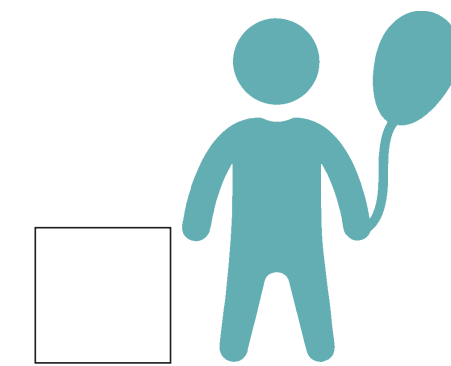
GIFT 1: HUMAN SCALE

CUBE

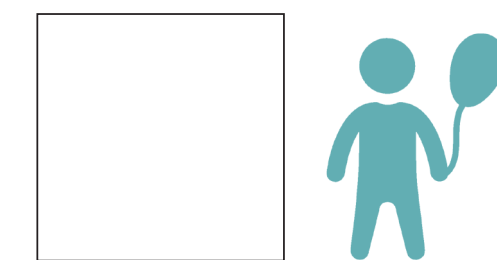
SECTION



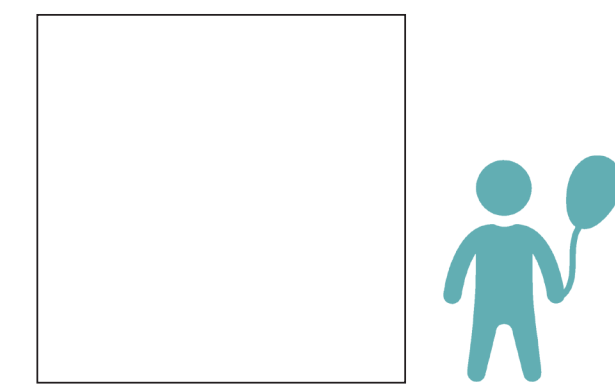
Small



Medium

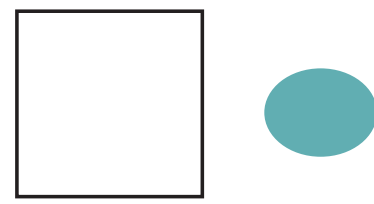


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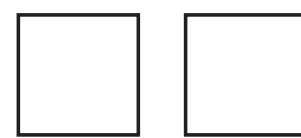


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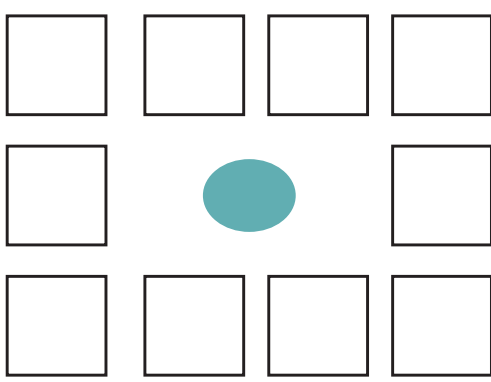
PLAN



One

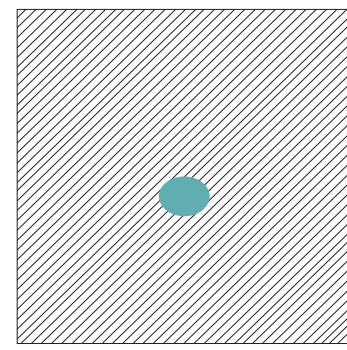


Few

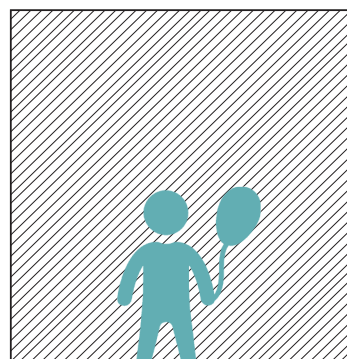


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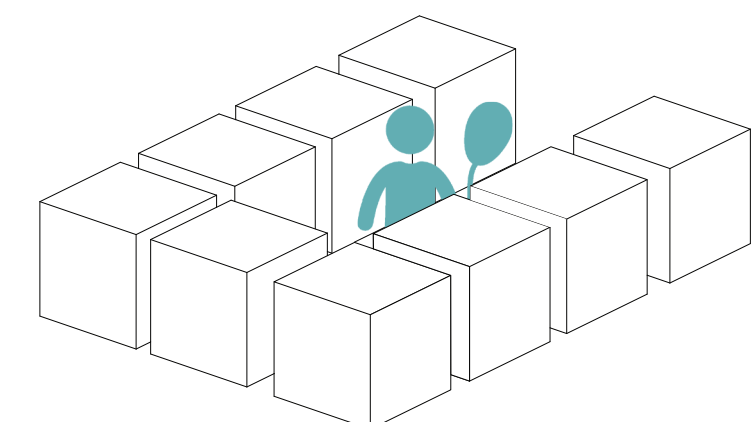
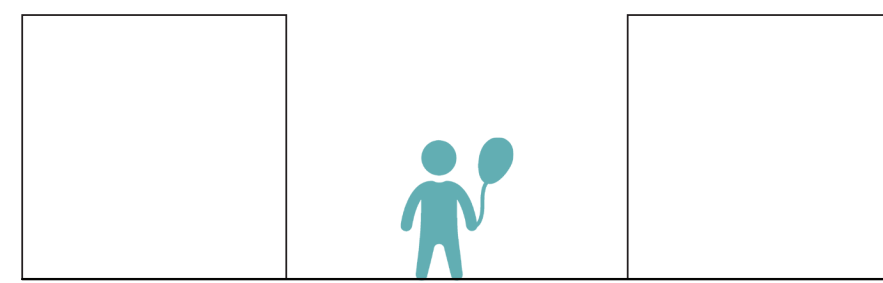
INSIDE CUBE (SPACE)



Plan



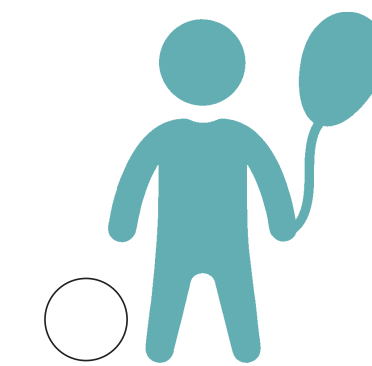
Section



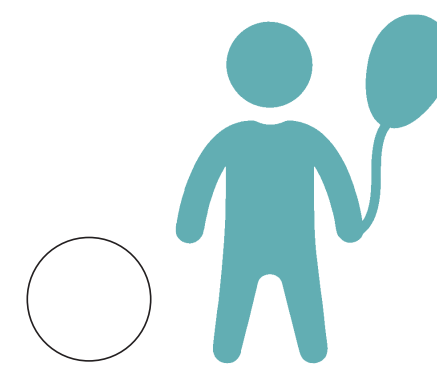
GIFT 1: HUMAN SCALE

SPHERE

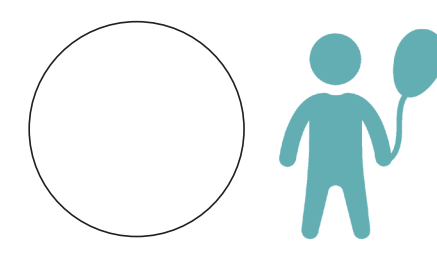
SECTION



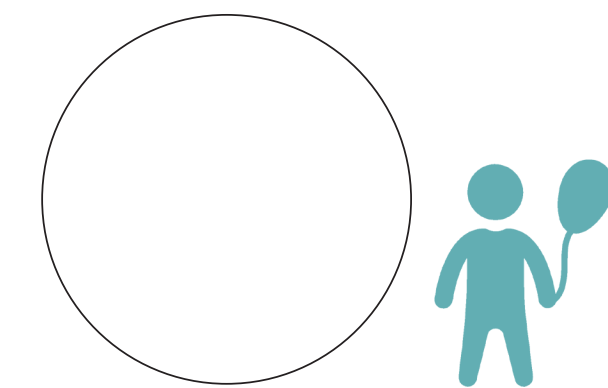
Small



Medium

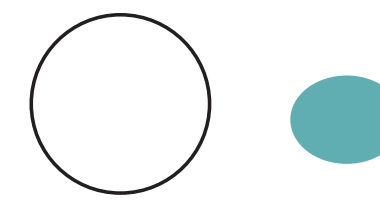


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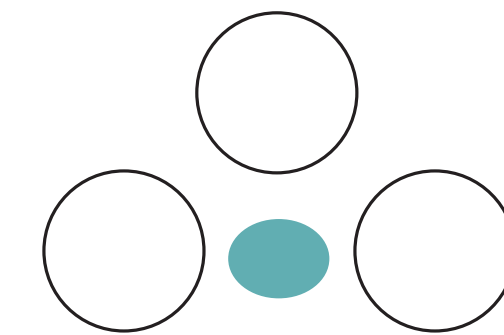


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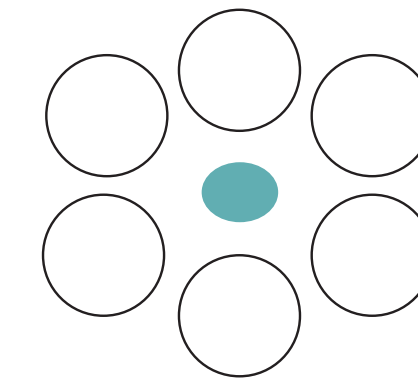
PLAN



One

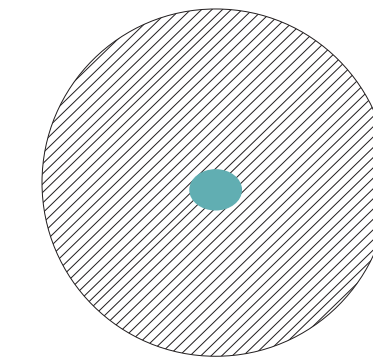


Few

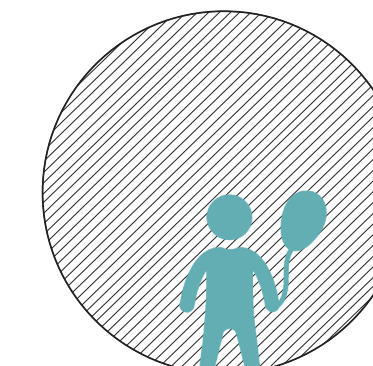


Many

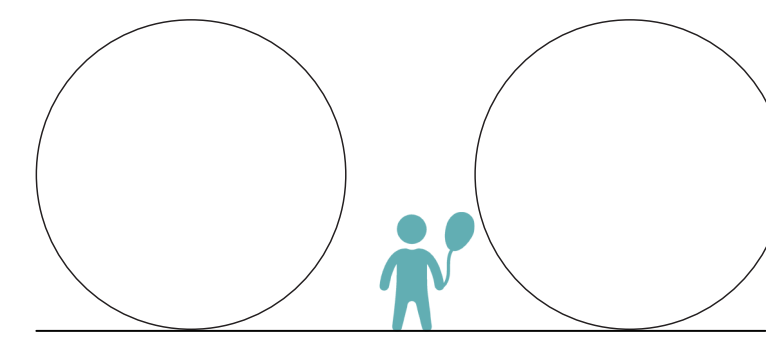
INSIDE SPHERE (SPACE)



Plan



Section



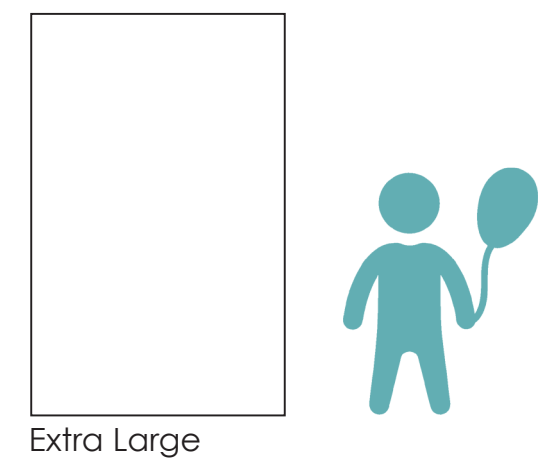
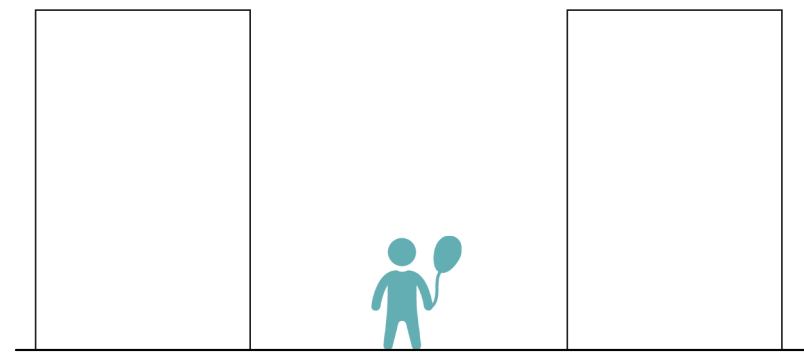
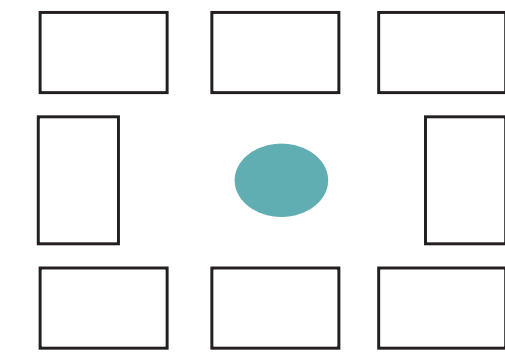
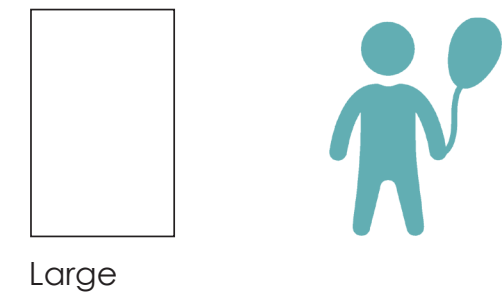
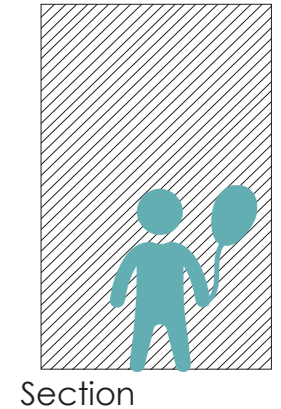
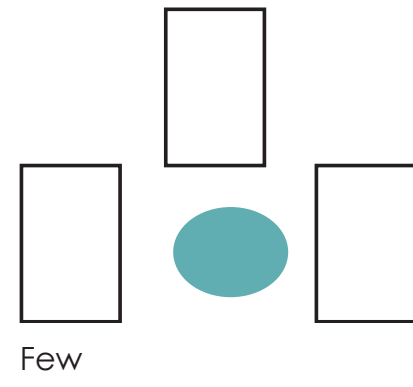
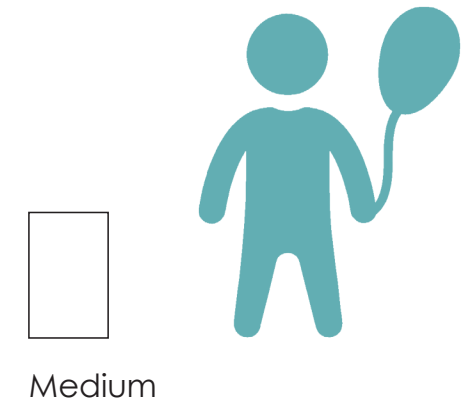
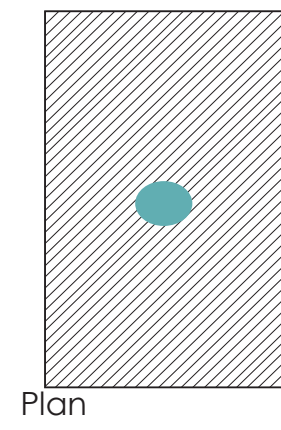
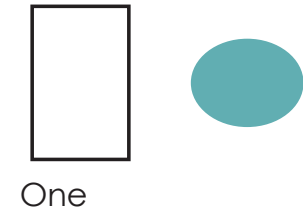
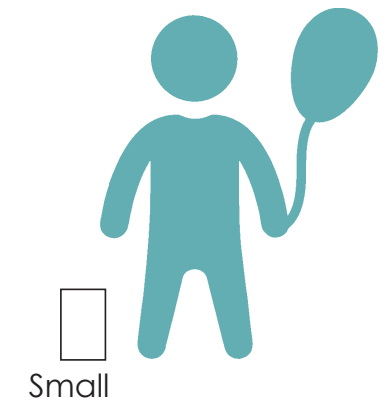
GIFT 2: HUMAN SCALE

DIVIDED CUBE

SECTION

PLAN

INSIDE CUBE (SPACE)



JEAN PIAGET

According to Kendra Cherry in "What are Piaget's Four Stages of Cognition" and the article "Education Theory/Constructivism and Social Constructivism" by UCD, Jean Piaget proposed that learning is a dynamic process comprising successive stages of adaptation to reality during which learners actively construct knowledge by creating and testing their own theories of the world. He was one of the first to conclude that children think differently than adults. He created four stages of cognition that start from birth and go into adulthood.

GENERAL PRINCIPLE

Cognitive Development:

EXPLANATION

- The 4 Stages of Development in Children¹⁰
 - Sensorimotor
 - Pre-operational
 - Concrete Operational
 - Formal Operation
- Dividing the learning development of a child into age groups and their characteristics

Education

- Learning is a dynamic process
- "Knowledge" wouldn't be forced on the child
- Symbolic thinking

SUMMARY

He was one of the first to conclude that children think and learn differently than adults. He divided the development of a child's brain into four stages, where at each stage, a child learns or develops a new way of learning. The stages help in teaching children by ensuring the child is only taught in ways s/he will understand.¹¹

He thought of learning as a dynamic process, where knowledge isn't forced on the children. Instead they are encouraged to construct their knowledge by doing and testing "theories"¹²

GENERAL PRINCIPLE: COGNITION STAGES¹⁷

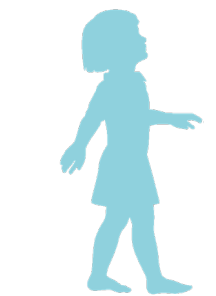
Sensorimotor Stage



Pre-operational Stage



Concrete Operational Stage



Formal Operational Stage



EXPLANATION

- 0-2 years old
- Children know the world through their senses and movements¹³

- 2-7 years old
- Development of language and symbolic play¹⁴
 - Imagination

- 7-11 years old
- Logical thought exists but the children can't think in abstract or theoretical ways yet¹⁵

- 12+ years old
- Children start to think in abstract ways and reasoning¹⁶

SUMMARY

At this age, a child is only able to understand the world through their senses. They learning about things by touching, smelling, or seeing the objects.

During this age period, the idea of imagination is important. It is how a child learns to express their feelings, through "symbolic" play. This is shown mostly in the playground where the child has the ability to move around and use their imagination in play.

During this period, the child begins to understand how the world around them works. This is also the stage where the child starts to think of others around him, rather than just what he sees and believes and feels.

During this period, the child begins to think in abstract ways and see reason behind everything. They understand more complex subjects and are able to relate what they know to what they see.

JOHANN HEINRICH PESTALOZZI

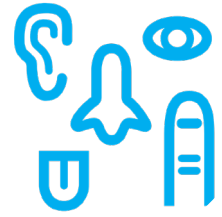
According to F.H. Hayward in *The Educational Ideas of Pestalozzi and Froebel*, Johann Pestalozzi was a man who supported education for all, even the poor. He believed in learning through head, heart, and hand and that earning through first-hand knowledge is more affective than empty theories.

GENERAL PRINCIPLE

Simple Elements



Haptic



Play

EXPLANATION

- Lines, shapes, angles

- Believed in learning through heart, head, and hand
- Learning through touch, feelings, etc.

- Learning through play
- Using imagination
- Connecting with nature

SUMMARY

He broke everything into the simple elements, its lines, shapes, sizes, and angles. By looking at these simple elements, a child is able to better understand things, such as the alphabets because he is understand the basic structure of them.

He believed a child learns better by being able to touch the objects and understand its characteristics.

He believed that the more a child played outside, the more a child is able to understand the laws of nature, leading to understanding rules.

QUOTES FROM THEORIST

Even the letters of the alphabet were not sufficiently simple elements for Pestalozzi, and he preferred to start with lines, angles, curves, and squares¹⁸

JOHN DEWEY

According to Robert Downs and Oscar Handing, in his book *John Dewey's Challenge to Education*, Dewey was a supporter of Froebel's ideas, defending Froebel's use of play as a learning device. In his book *Democracy and Education*, he states that "play can produce an important educational by-product. Mental and moral growth are facilitated, as he states, if the school sets up a proper environment of work and play"^{19,23}

GENERAL PRINCIPLE

Haptic Learning



Creativity



Critical Thinking

EXPLANATION

- Learning by touch
- "Hands-on" learning

- Creative activity
- Collaboration

- Analyze
- Evaluate

SUMMARY

Dewey believed children learn better by touching and feeling the objects. He was a strong believer that students need to interact with their surrounding environments.

Dewey believed children learn best when they are able to collaborate with their peers and show their knowlege by performing creative activities, such as drawing or playing. He was against the idea of being taught by memorization and repetition.

Dewey believed in a child thinking for themselves, instead of having knowledge forced upon them. He believed a child should have the opportunity to analyze the things around him, evaluate it, come up with a conclusion of how the things around them work.

QUOTES FROM THEORIST

In the spirit of Froebel, Dewey and his followers agreed that children should be permitted to move about in the classroom, learn with their hands as well as their minds, associate freely with their companions, and thus live in a normal school society.¹⁹

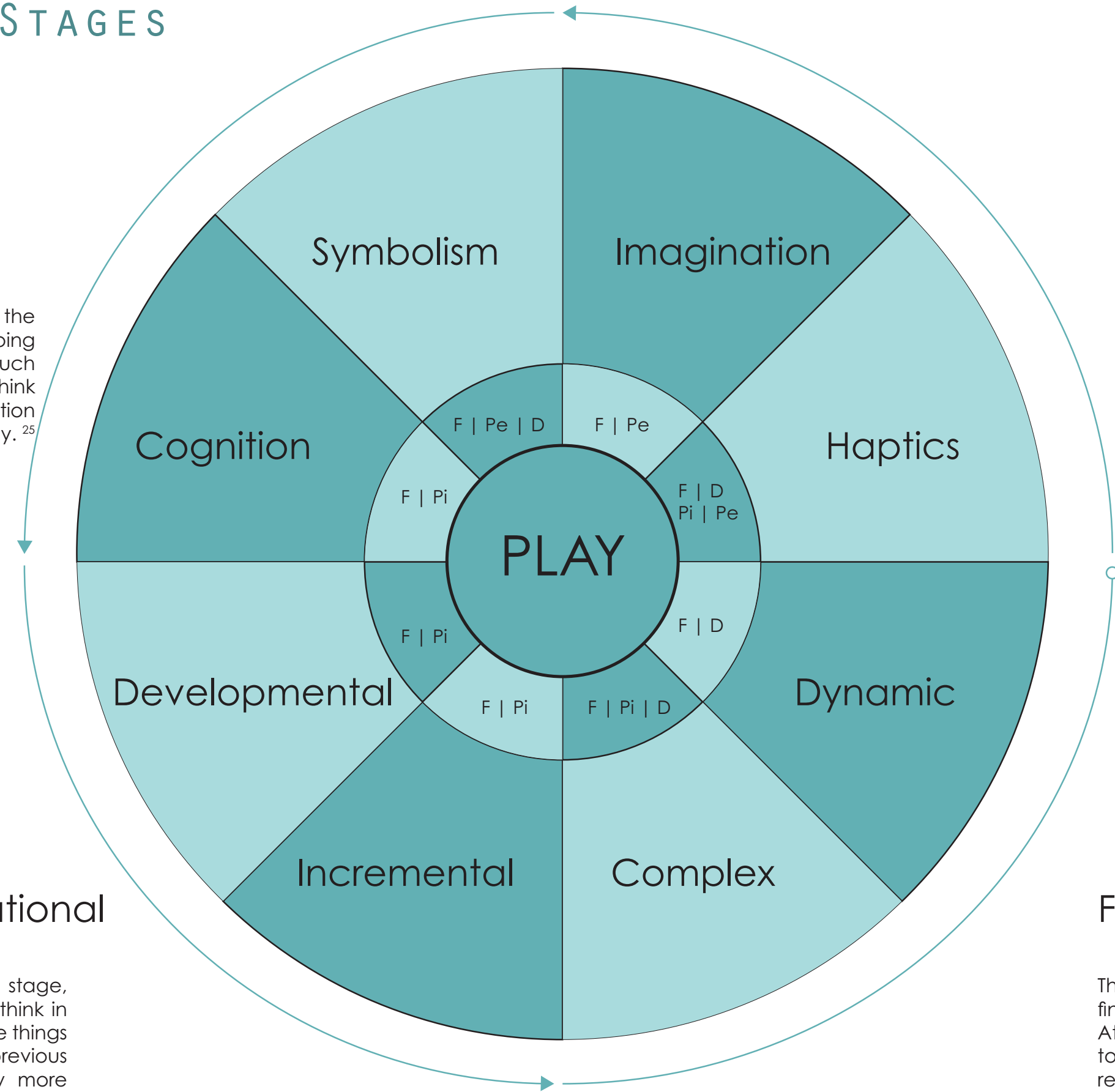
John Dewey rejected the notion that schools should focus on repetitive, rote memorization and proposed a method of 'directed living' - students would engage in real-world, practical workshops in which they would demonstrate their knowledge through creativity and collaboration.²⁰

Students should be provided with opportunities to think for themselves and articulate their thoughts.²¹ Interest in the achievement of a practical end could steadily be transformed into interest in the process, that is into 'thinking things out' intellectually or theoretically²²

COGNITIVE STAGES

Pre-operational Stage

At the preoperational stage, the child, age 2-7, starts developing more aspects of cognition, such as morphology. They start to think in symbols, and using imagination during their activities, such as play.²⁵



Sensorimotor Stage

Sensorimotor is the first stage of development, according to Piaget. At this stage, the child, age 0-2, uses his senses to touch objects and start to understand them by their shape, texture, material, etc. They understand everything in the simplest forms and terms.²⁴

Formal Operational Stage

The formal operational stage is the final stage of cognition in a child. At this age, the child has learned to think in more "dynamic" ways, reasoning in more abstract terms. The child has now learned to think critically, questioning what he sees or learns.²⁷

F : Froebel Pi: Piaget Pe: Pestalozzi D: Dewey

Concrete Operational Stage

At the concrete operational stage, the child, age 7-11, starts to think in more complex ways. Using the things he has learned through the previous stages, his cognition is now more developed.²⁶

Pestalozzi

- Simple Elements
- Haptic Learning
- Play

Froebel

- Simple to Complex
- Cognition
- Haptic Learning
- Play

Piaget

- Cognitive Development
- Dynamic Learning
- Symbolic thinking

Dewey

- Critical Thinking
- Haptic Learning

Pestalozzi, Froebel, and Piaget's theories focused mainly on the fact that children need to be taught in a simple manner at a young age, then moving to a more complex way of teaching as their cognitions develop.

Haptic learning uses the senses, such as touch, smell, and sight, to learn about the objects surrounding the person. All of the theorists believed that the child needs to start learning through haptics. By feeling the things around them, the child will be able to easier understand the object and its characteristics and remember it.

The stages of development start at birth and go until the child is an adult. At each stage, the cognition level of the child is higher, and he understands more about the world around him. Play is an important factor in the development of cognition, allowing the child to freely express and explore the world with no rules.

Critical thinking comes from the development of cognition. Symbolic thinking is part of critical thinking.



Fig 2

CHAPTER 2: ANALYSIS

2.1 CURRENT CONDITIONS

At the southern border of the United States, thousands of people, men, women, and children of different age groups, travel by foot, bus and boats to reach the border of Mexico and the United States. Because of circumstances in their home countries, such as poverty, war, and even extortion, the people are forced to leave their homes and embark on the long journey from their countries to the United States, hoping for a better future for themselves and their children.

Because of the high number of migrants traveling, there are buses and boats that carry more people than they could hold. On their journey to the United States, the immigrants are forced to walk thousands of miles, cram into buses and boats, to reach their destination. With a high number of the immigrants traveling from Honduras currently, the journey takes over a month (from San Pedro Sula to Tijuana – as shown in fig 4 and fig 5).

According to the data done by the American Civil Liberties Union (ACLU), there are 2,654 children currently separated from their families at the United States Border cities. Out of this number, more than half of the children (64.5%) are boys, with 41.3% being ten years and older.²⁸ The number of the children has grown over the past few years; however, the spaces they are being held in has not gotten bigger, which has resulted in thousands of children put together in small cages with no bed, or even privacy. While in these facilities, the children do not get any time outside, with no access to fresh air or natural sun light.

With over high of children being held at facilities in cities at the United States Border, it is important to ensure that these children are getting the care they need, especially in the development of cognition in the child's life. Without the proper equipment, setting, and activities that encourage cognitive development and critical thinking in children, such as play, the future of the kids' lives could be affected in negative ways. Because of the high number of immigrants, the amount of time these children spend at the facilities has increased. With the increase in time, there needs to be a better way and better place to house the children while they are in the care of the government.



Fig 3. Overcrowding at the Border Patrol's McAllen, Texas, Centralized Processing Center



Fig 4. A tent city for migrant children in Tornillo, on the Texas border.



Fig 5. Security personal stand before shoes and toys left at the Tornillo (Texas) Port of Entry where minors crossing the border without proper papers have been housed after being separated from.



Fig 6. Length of time it took to complete journey



Fig 7. Migration Path of the caravan



Fig 8. Destinations of the immigrants

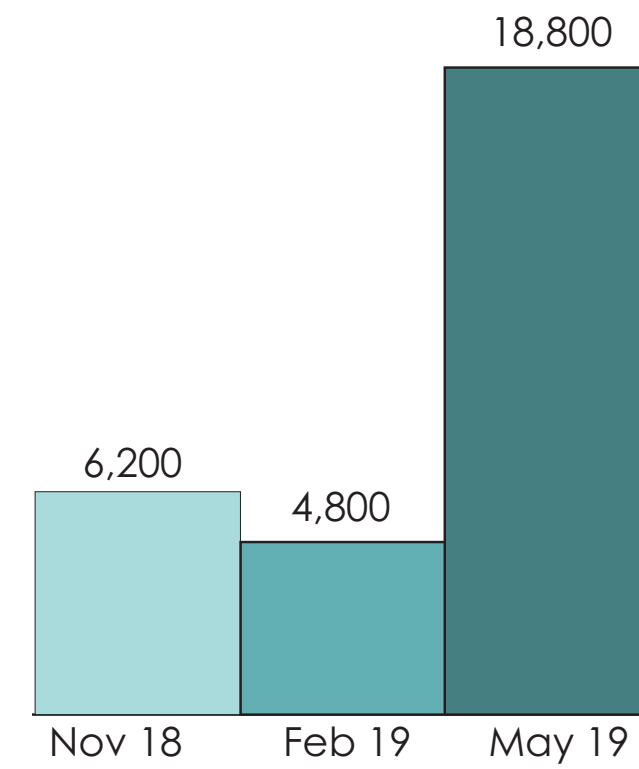


Fig 9. Number of asylum seekers waiting at the Mexican border to enter the U.S.



Fig 11. Locations of facilities where children are held

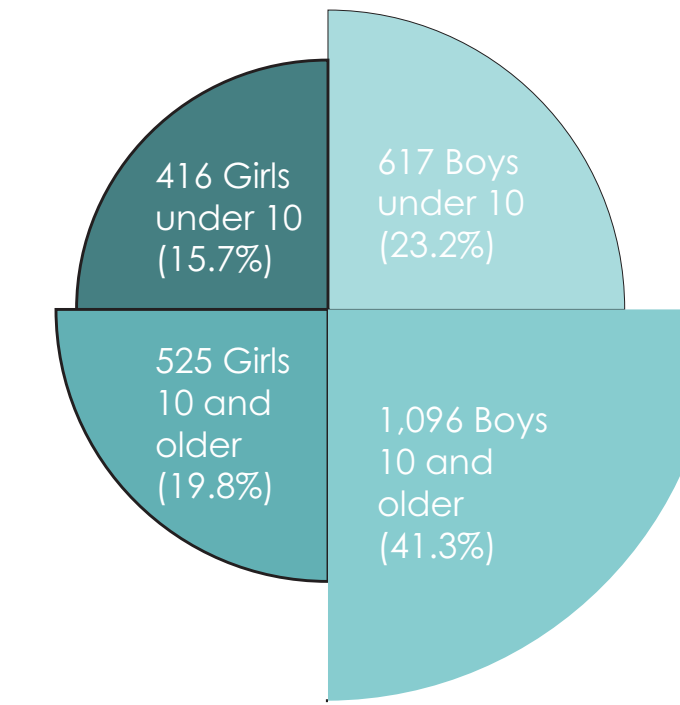


Figure 10. Number of children (2,654 total) separated from their parents

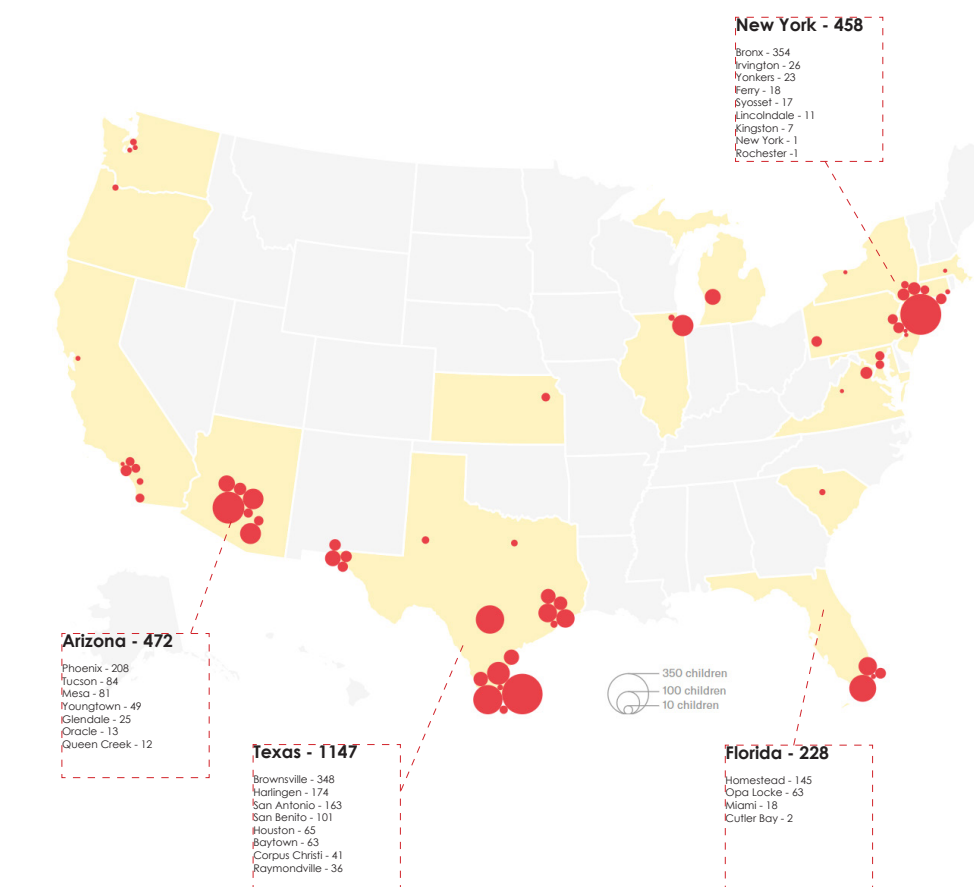


Fig 12. Number of children held at each location

STANDARDS BY USE

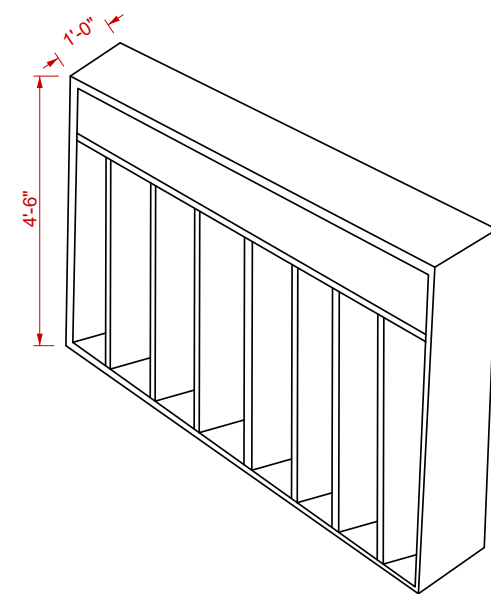
GROUP HOMES

Based on the Time Saver Standard for Building Types, by Joseph de Chiara and John Callender, the building standards for this project type were extracted and analyzed.

Group homes, identified as residential spaces³², are spaces that have enough space to accommodate a group of children, with different age groups. These homes contain different programs, such as recreational spaces, kitchens, and play areas. The bedrooms are designed to allow up to three people maximum to stay in the rooms. The dining areas allow for enough space for a larger group of people to eat together and still have enough space to move around the tables without running into obstacles.

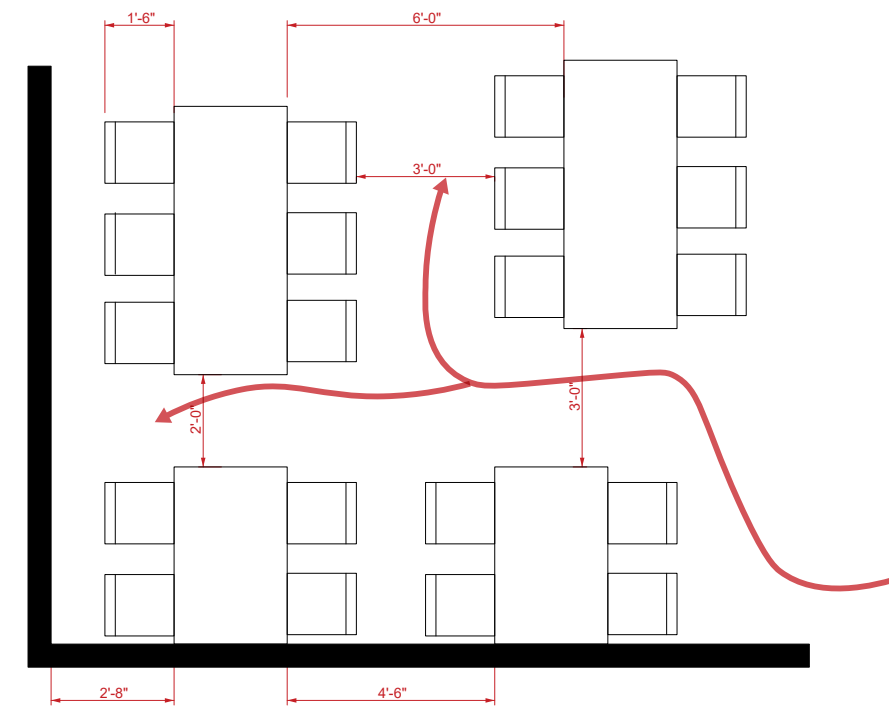
Required Spaces:

- Major Entry
- Minor Entry
- Recreational Spaces
- Kitchen
- Dining
- Bedrooms
- Bathroom
- Office



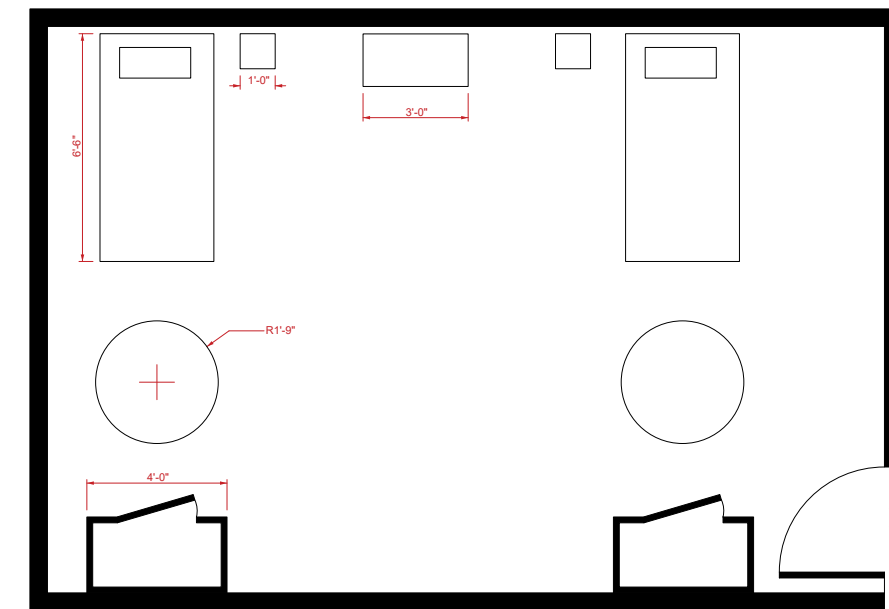
Cubicle

Cubicles used as storage for the children. The height cannot be taller than 4'6", with a foot of depth to allow enough space for to store the children's things³¹



Dining Area

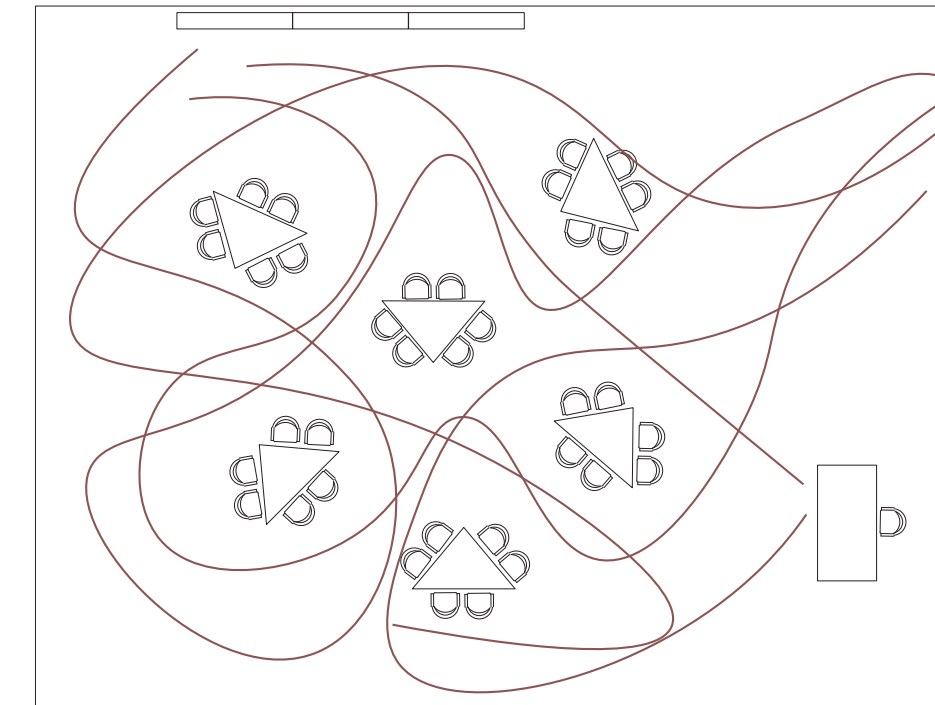
The dining room requires enough space for a person to be able to move freely throughout the space without running into obstacles. There is a required minimum of 3'0" circulation clearance. The seating clearance between seats and walls is 2'8".²⁹



Bedroom

Bedrooms are required to have enough space to allow up to three bed, but no more than three. There is a required diameter of 3'6" in front of the closet for dressing. Each person should have a closet, a bedside table and a bed.³⁰

STANDARDS BY FORM



Classroom Setting

The proposed floor plan for a classroom focuses on collaborative space, allowing the children to collaborate with their peers. It also gives space for a dynamic circulation within the classroom.



Fig 13

Proposed Floor Plan

The proposed floor plan by Time-Saver Standards for Building Typology shows the placement of the required program. The placement of each room allows for a smooth, flowing circulation throughout the building.³³

2.2 PRECEDENTS

VITTRA TELEFONPLAN

ARCHITECT: ROSAN BOSCH
STOCKHOLM, SWEDEN

Vittra Telefonplan is a school without walls. The school's design focuses on collaborative spaces where the children are taught different subjects and use different areas but there are no walls acting as boundaries. "Students are taught in groups according to level based on the school's pedagogical principles of 'the wateringhole', 'the show-off', 'the cave', 'the campfire' and 'the laboratory'"³⁴

The different spaces create boundaries and force a certain movement throughout the space.

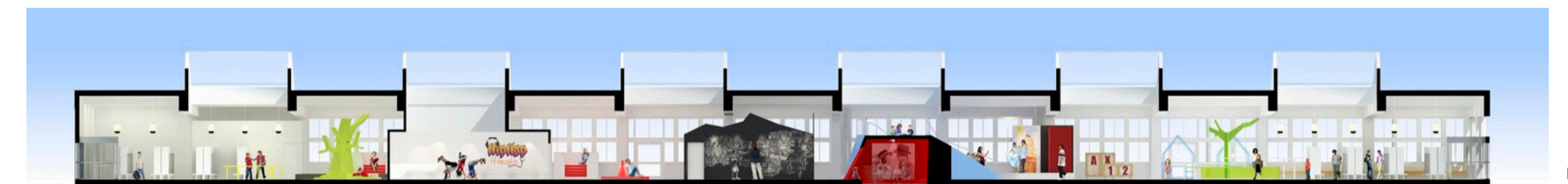
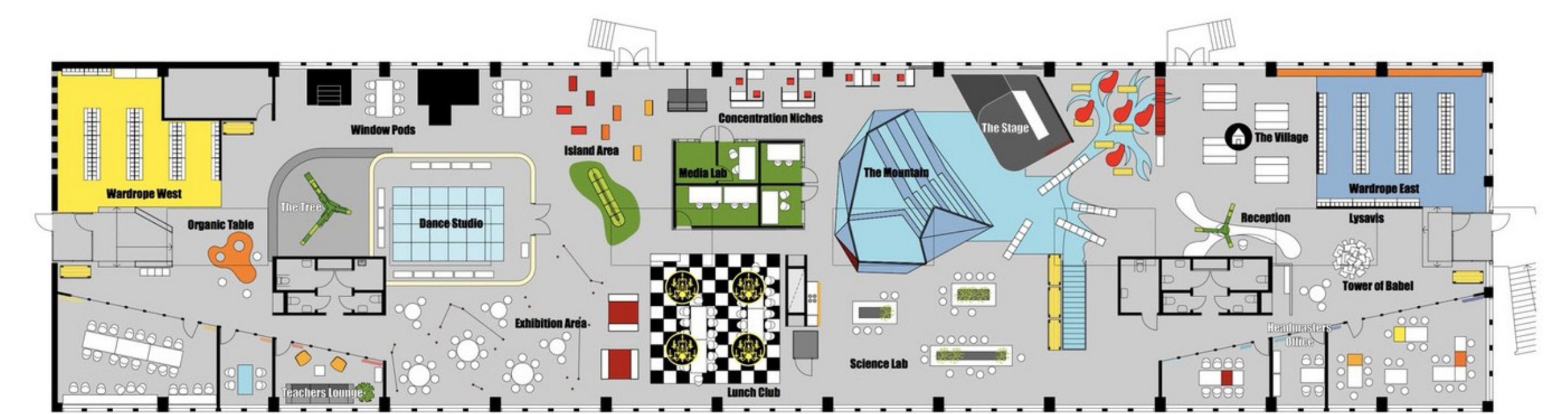
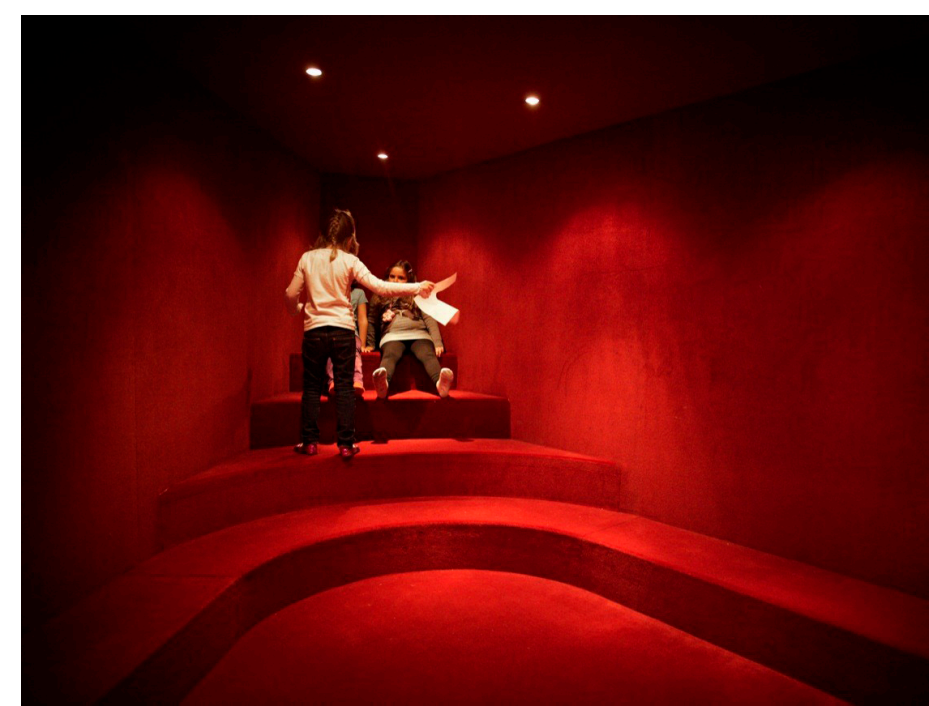


Fig 14

Fig 15

FUJI KINDERGARTEN

ARCHITECT: TEZUKA ARCHITECTS
TOKYO, JAPAN

The Fuji Kindergarten is another school that does not use walls as boundaries. The school is open, with sliding glass doors only closing during cold weather. The building was designed to “encourage children to play and interact by breaking down the physical barriers found in the typical early childhood educational architecture”³⁵



Fig 16

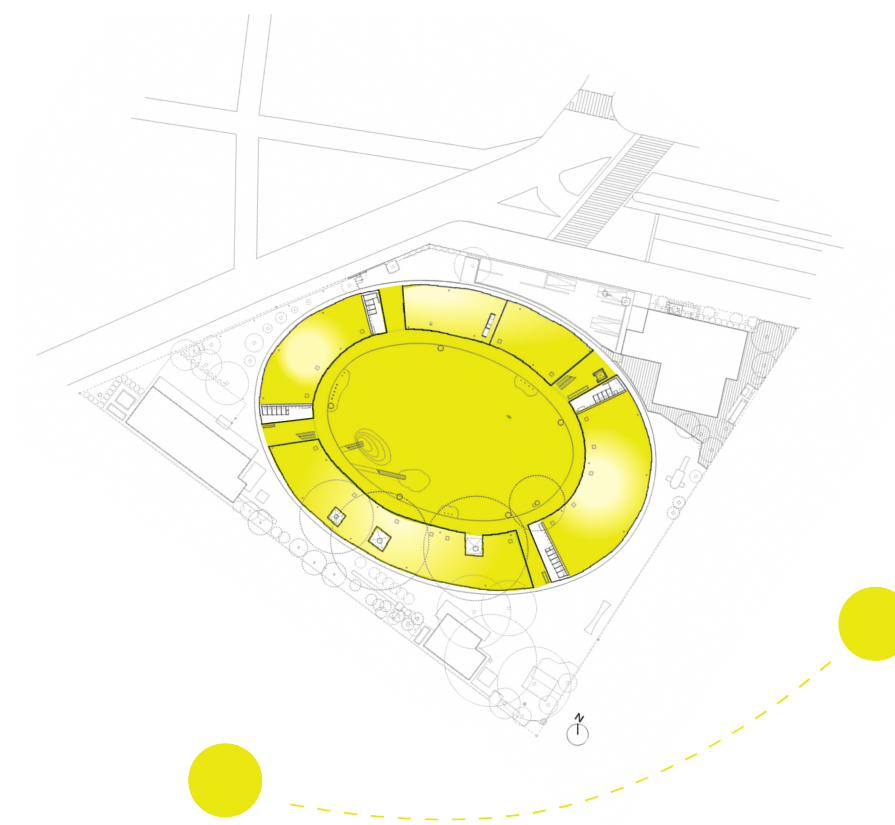


Fig 17. Light Analysis

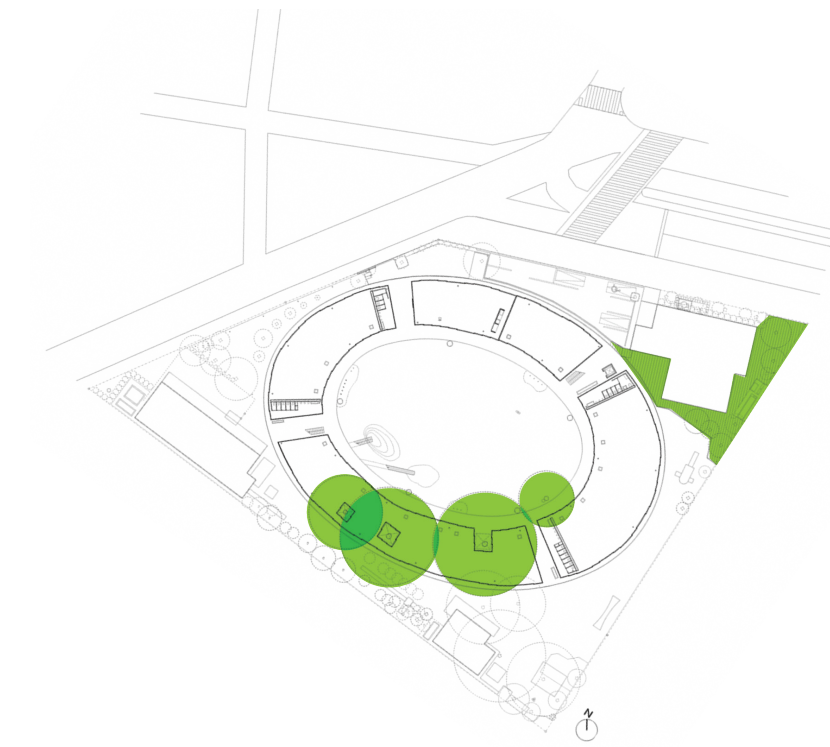


Fig 18. Green Spaces

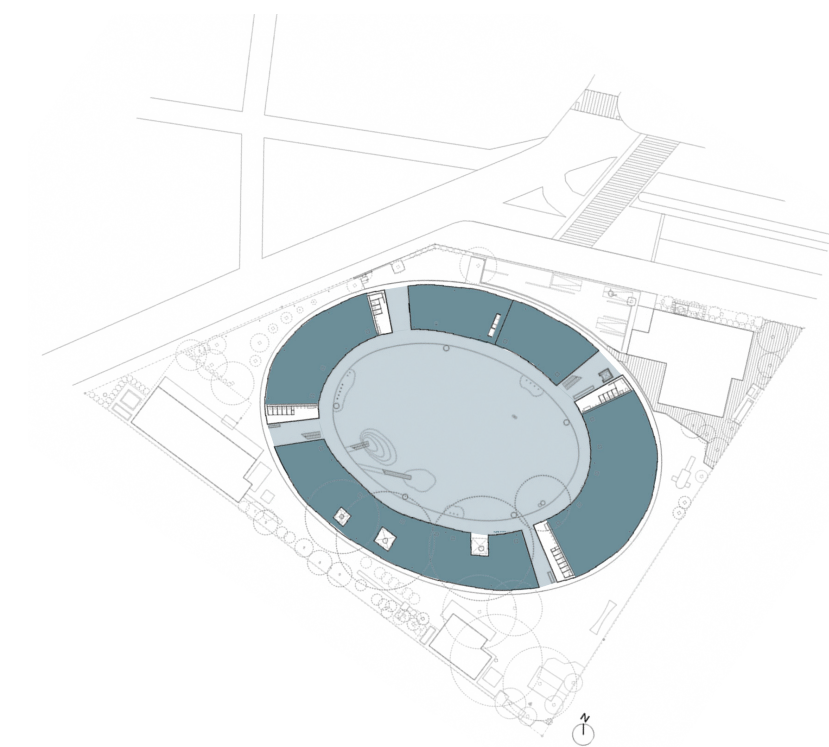


Fig 19. Exterior vs. Interior

SKANDERBORGGADE DAY CARE CENTRE

ARCHITECT: DORTE MANDRUP
ARKITEKTER
COPENHAGEN, DENMARK

The Skanderborggade Day Care Centre was designed with focus on outside spaces. The building is divided into three sections for the three age groups using the building.

“The three group rooms are designed to be different in shape and orientation. One group room has direct access to the circular courtyard and the façade facing Skanderborggade. The second has access to the western courtyard and the façade facing Skanderborggade. The third group room has access to the western courtyard and the napping courtyard”.³⁶



Fig 20



Fig 21. Light Analysis

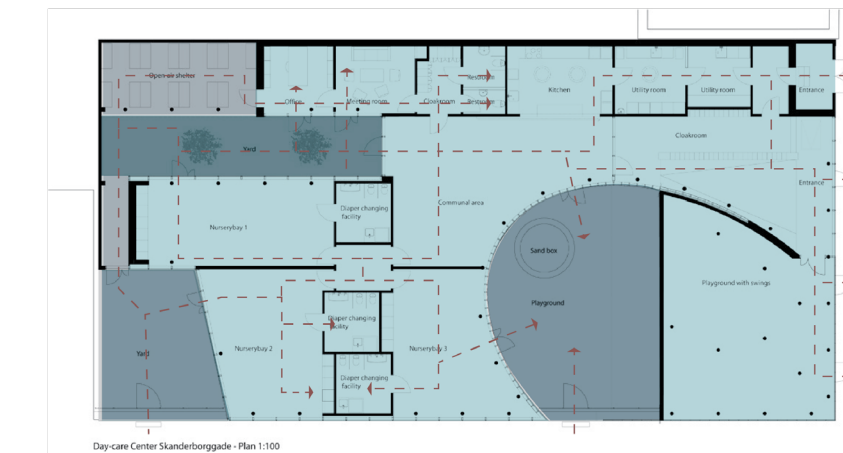
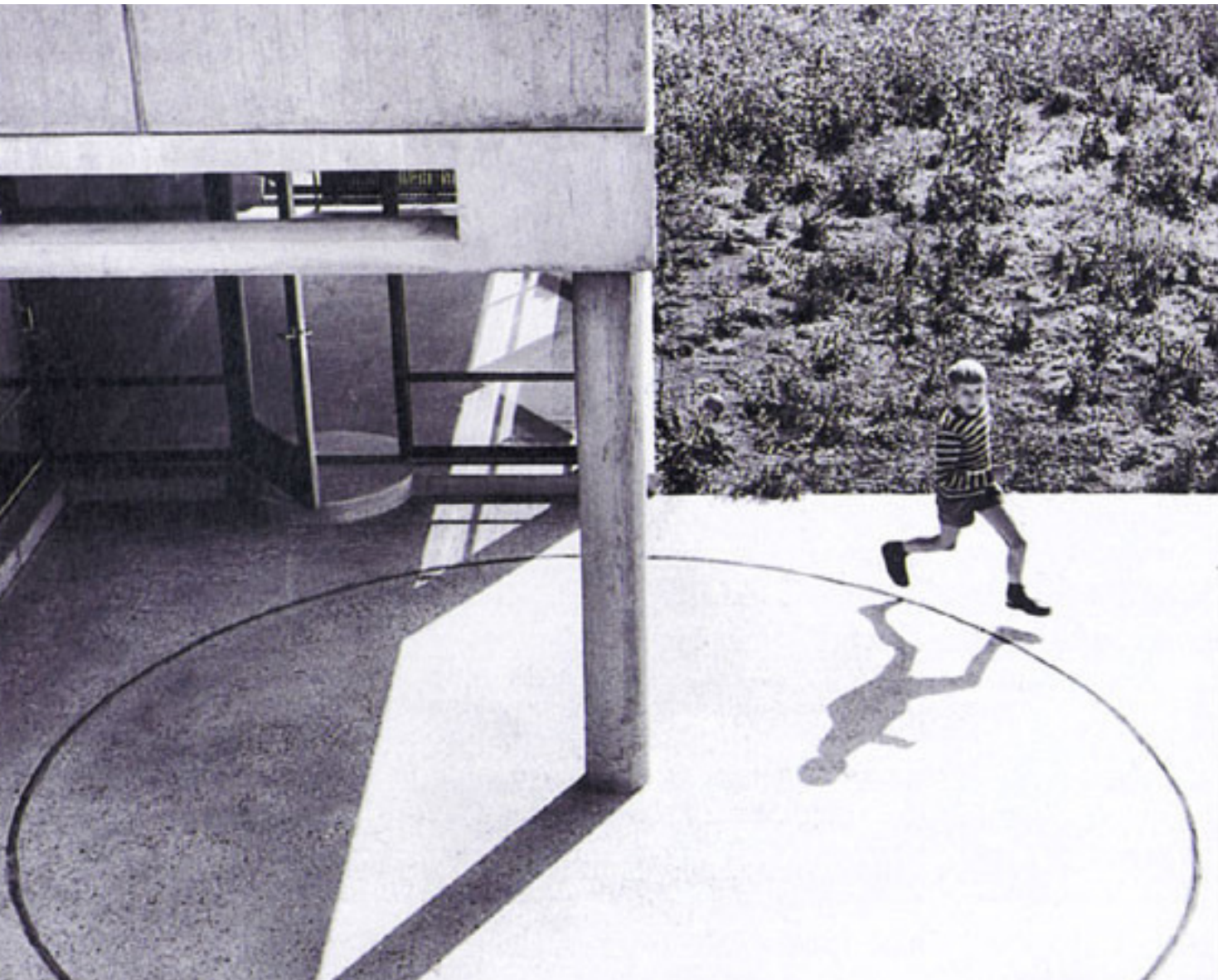


Fig 22. Exterior vs. Interior



Fig 23. Exterior Spaces

2.3 CASE STUDIES



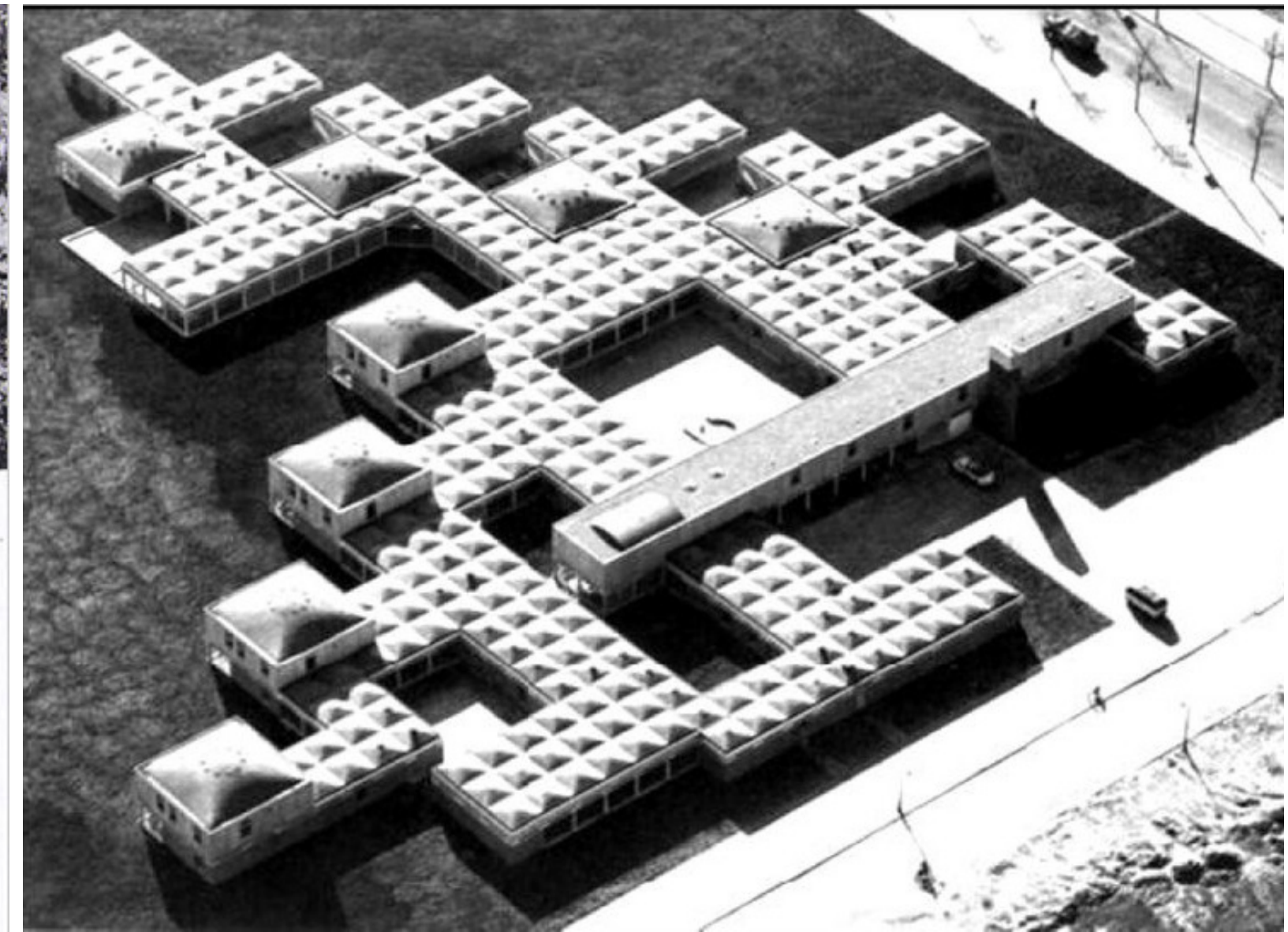
AMSTERDAM ORPHANAGE

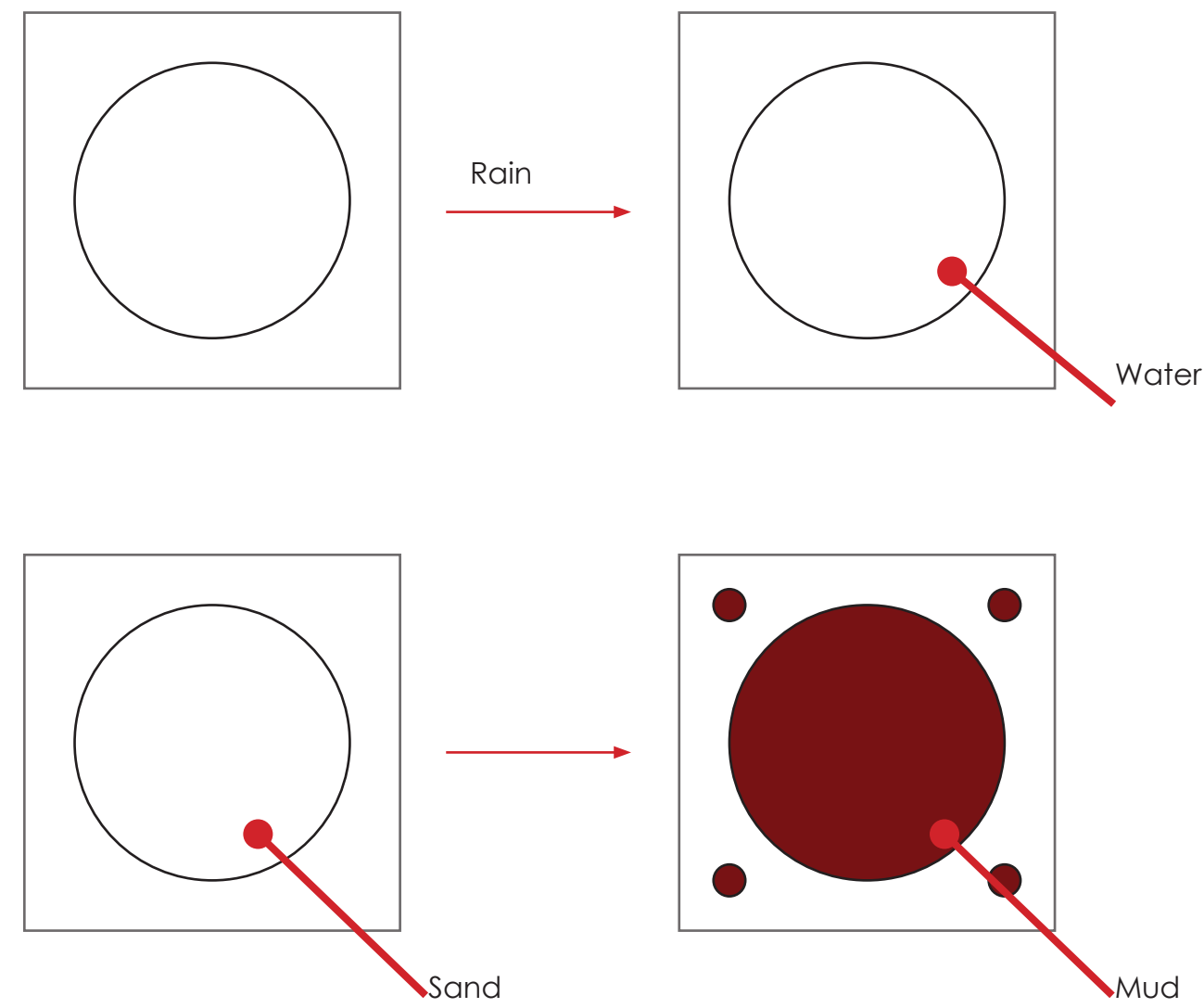
ARCHITECT: ALDO VAN EYCK
AMSTERDAM, NETHERLANDS

Aldo van Eyck's Orphanage was used as a case study for its program, design, and materiality. Looking at the design of the orphanage, study was done on the formation of spaces, circulation inside the building, and the separation of spaces and its geometries.

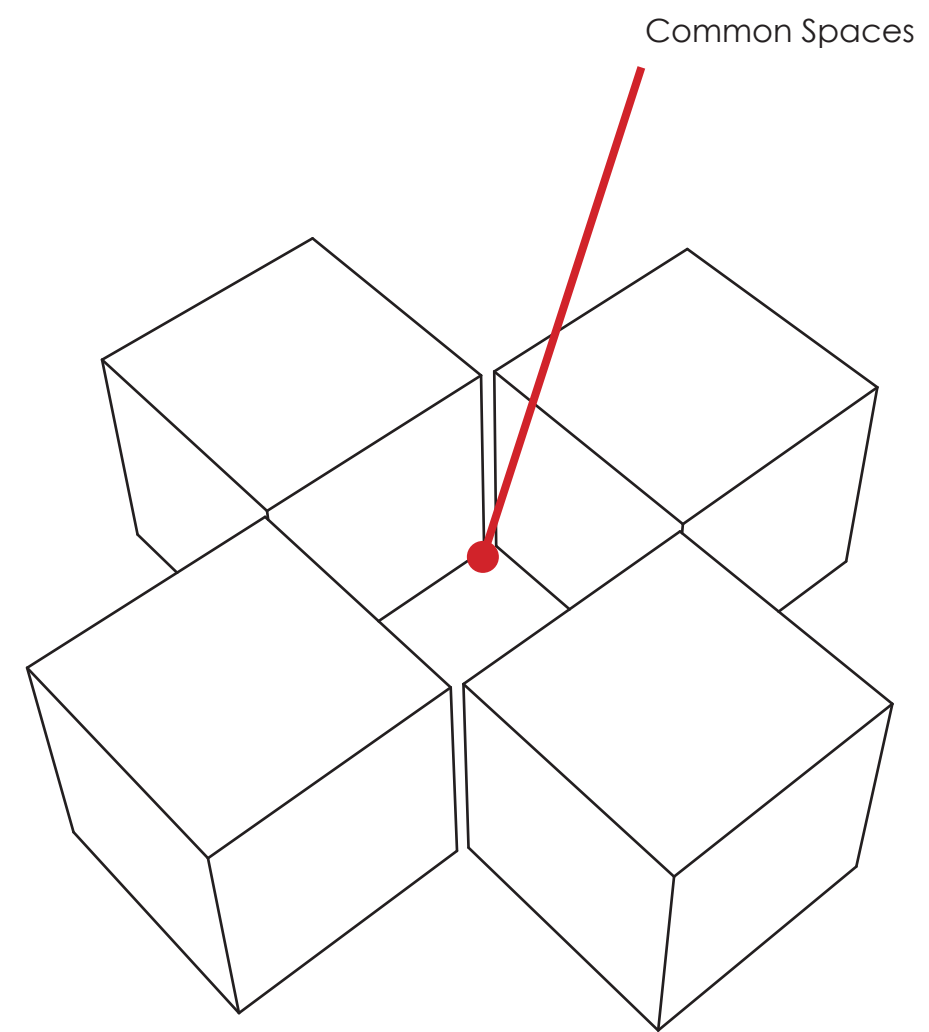
The space was then broken down into simple, basic geometries, relating back to Froebel's Blocks.

Fig 24



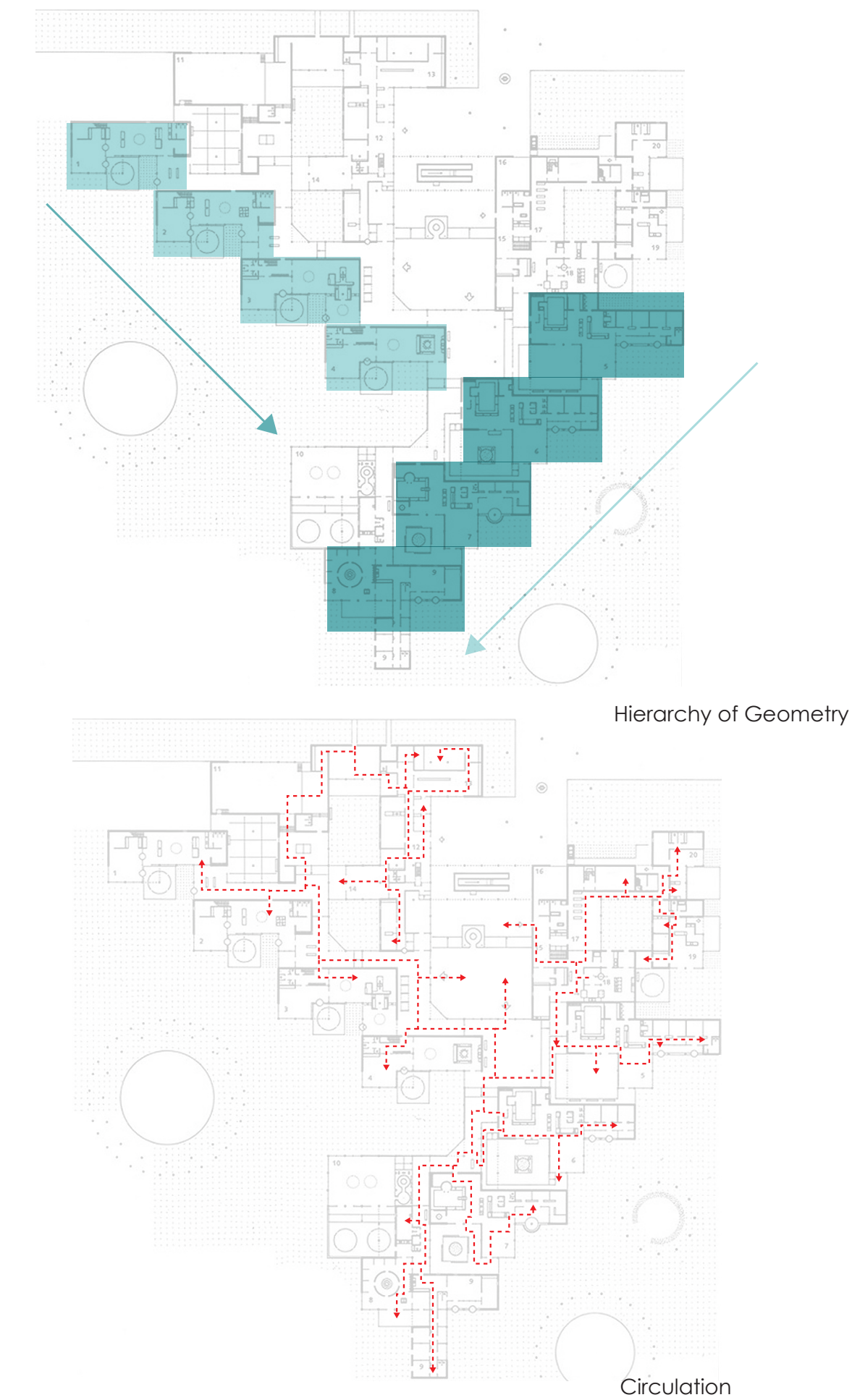
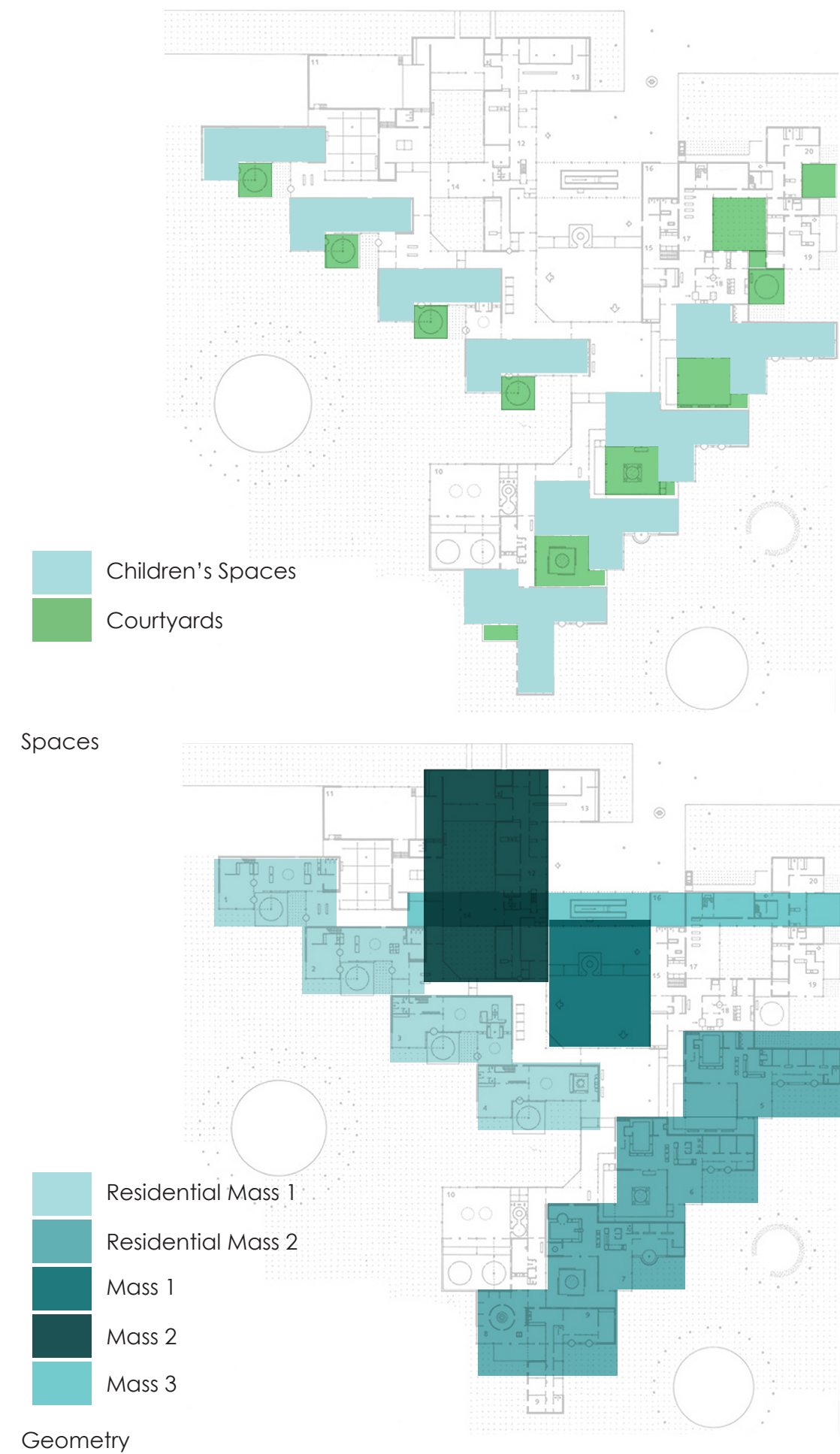


Each Children's area had holes in the ground in their courtyard, which depending on the material inside of it, it gave the children a different thing to play with. The ones with sand allowed the child to play with sand, and after rain, when the sand turned into mud, the children had a different material to play with

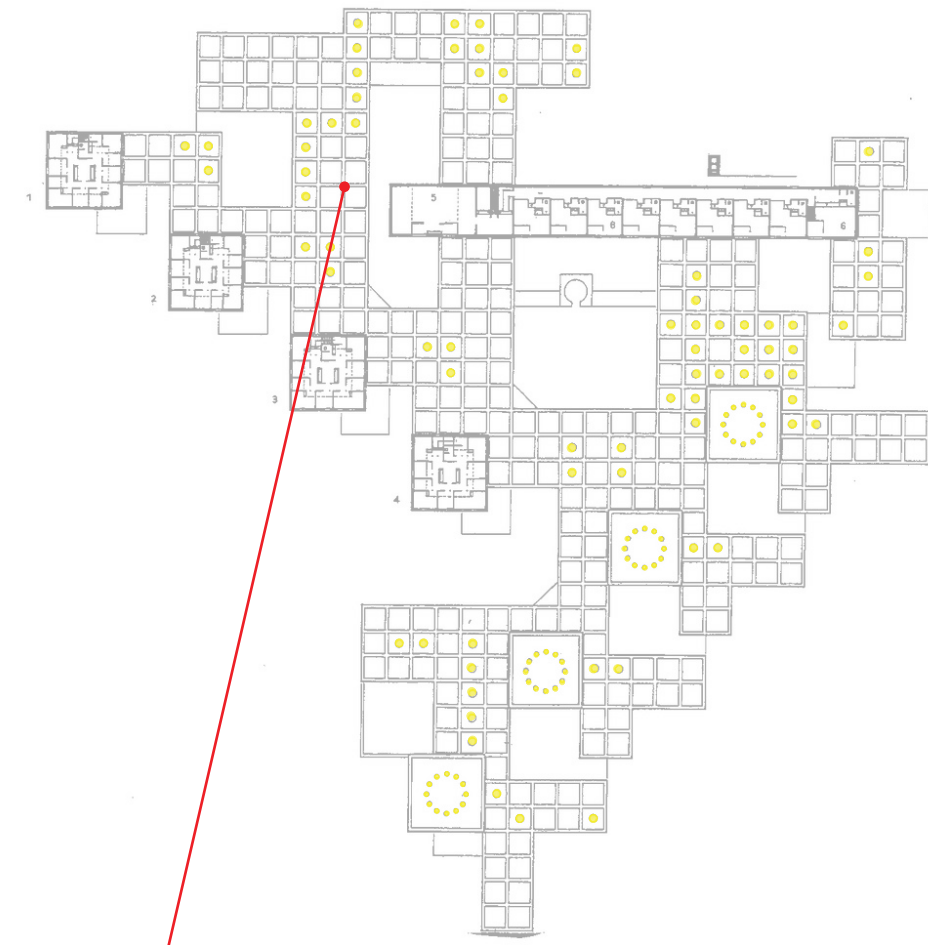


Each space is formed of different boxes of spaces, all meeting together to form a central common area for the child to use and interact with different people.

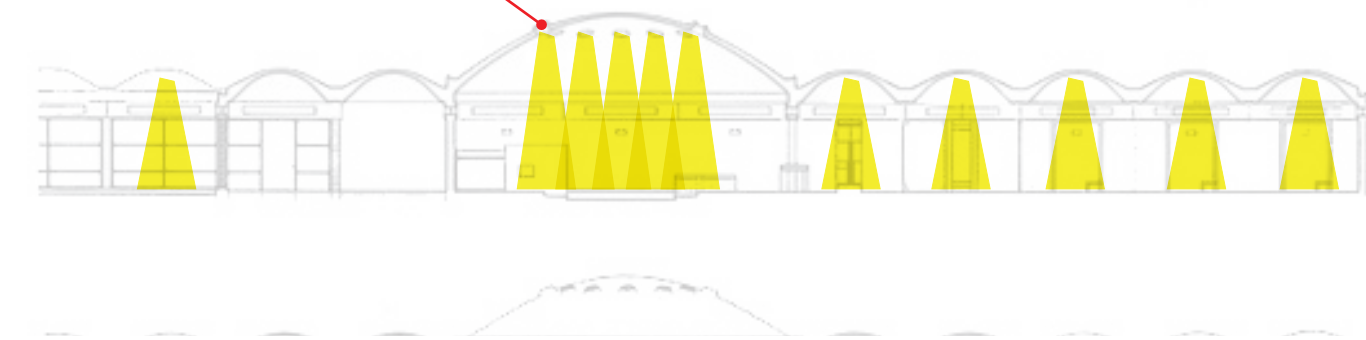
All diagrams drawn over plans and sections from: <https://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck>.



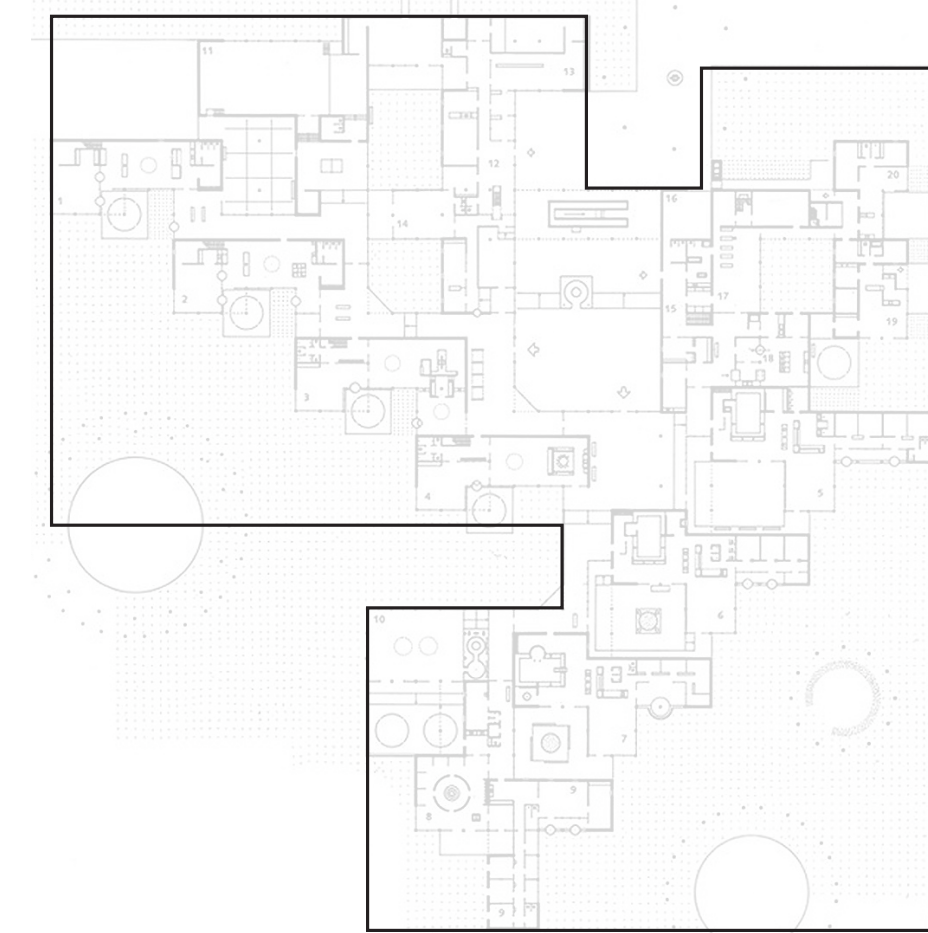
Circulation



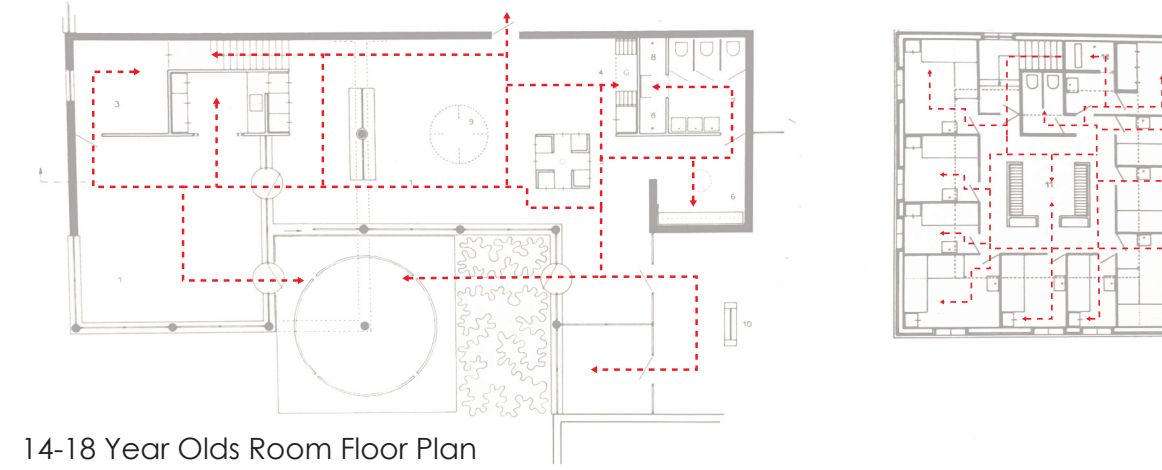
Light wells



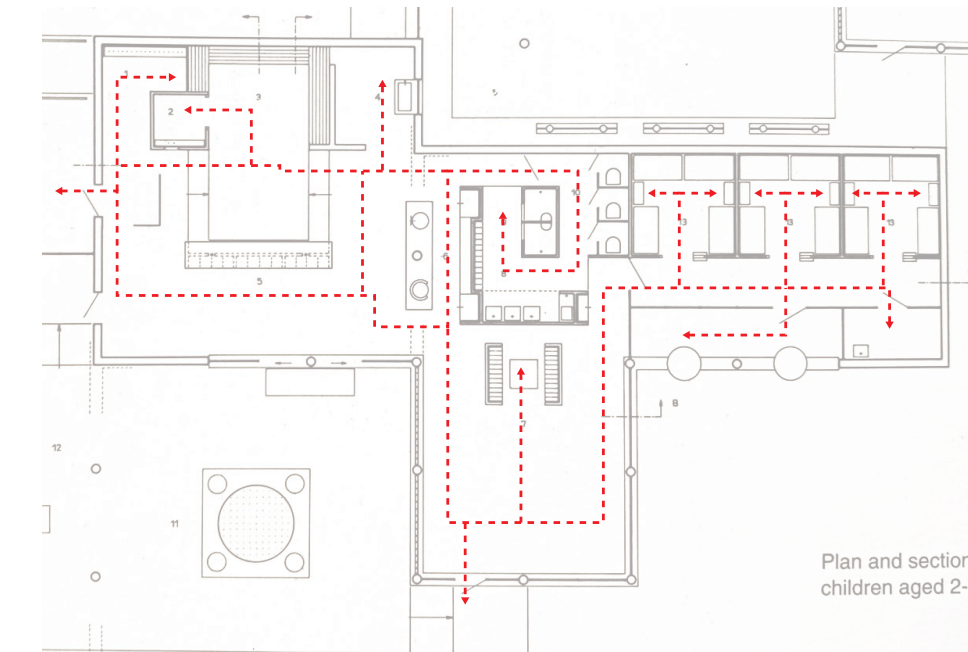
Natural Light



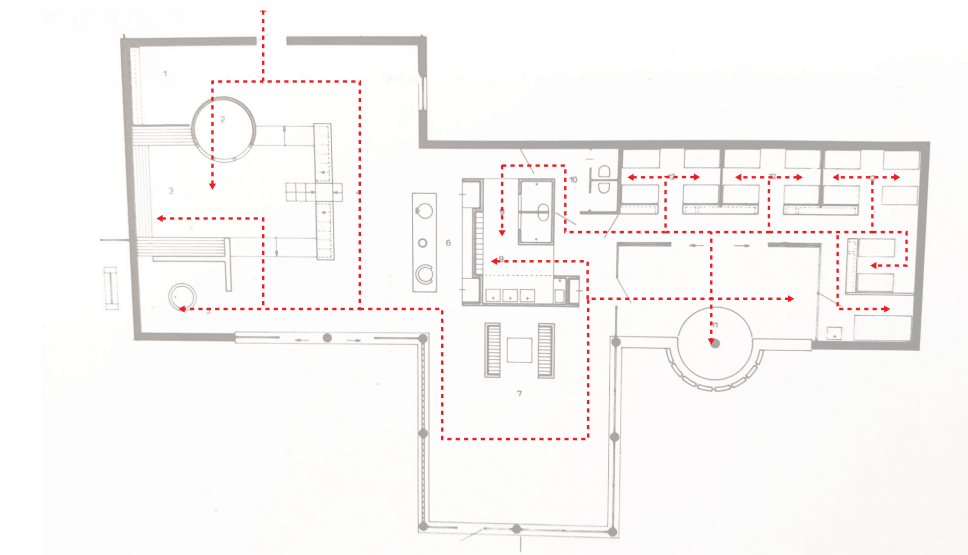
Geometry of overall plan



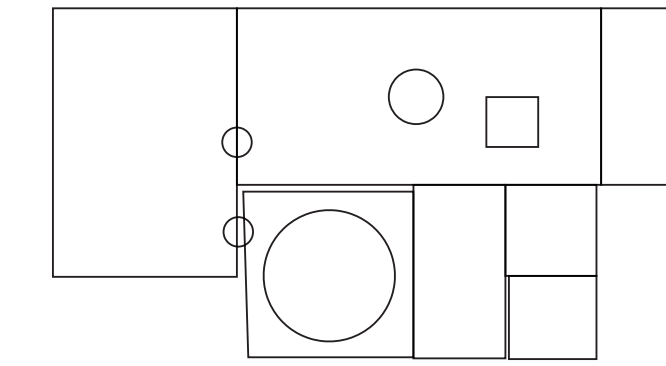
14-18 Year Olds Room Floor Plan



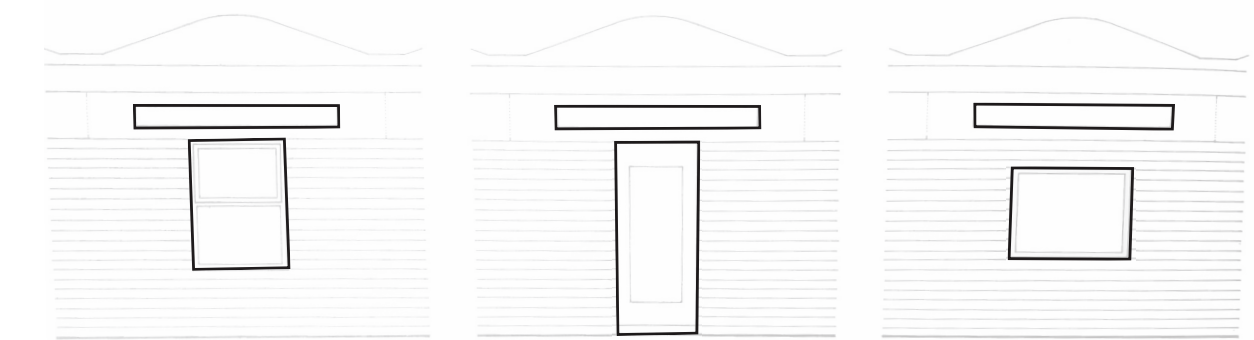
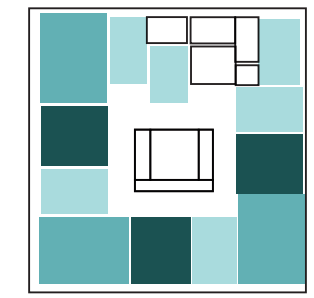
2-4 Year Olds Room Floor Plan



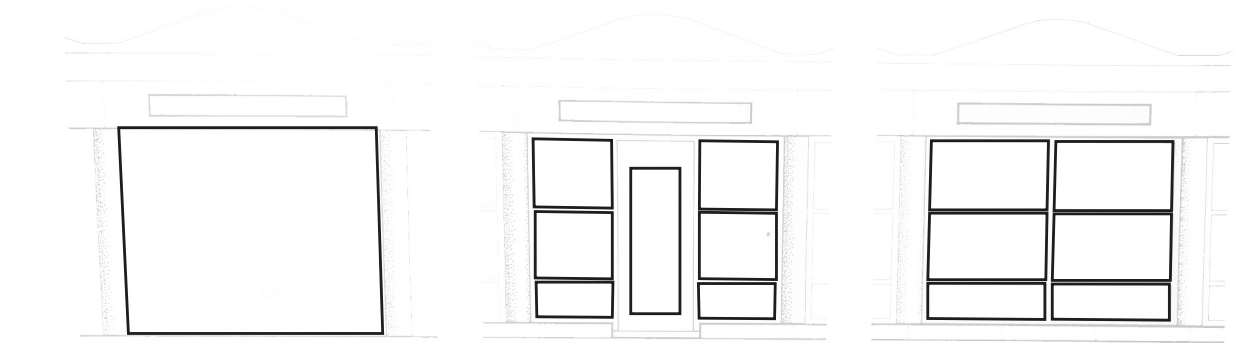
6-10 Year Olds Room Floor Plan



Geometric Shapes (Plan)



Geometric Shapes (Elevation)



Geometric Shapes (Elevation)

BREAKDOWN OF GEOMETRY OF FLOOR PLANS

Breaking down the building for each age group, the basic geometries that make the buildings were analyzed.

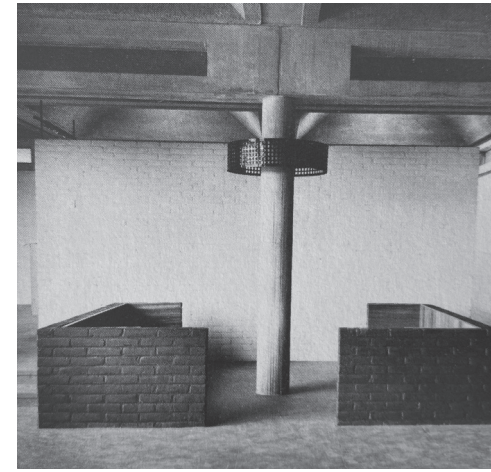


Fig 25

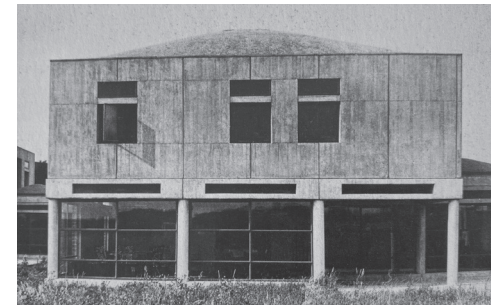
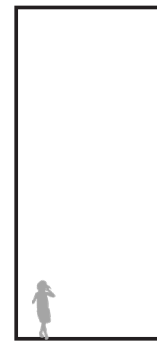


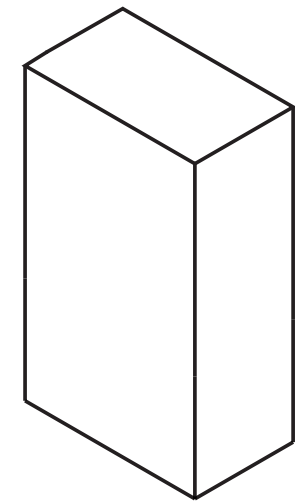
Fig 26



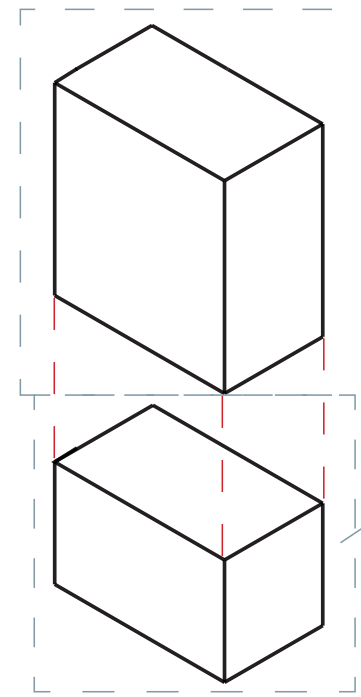
Plan



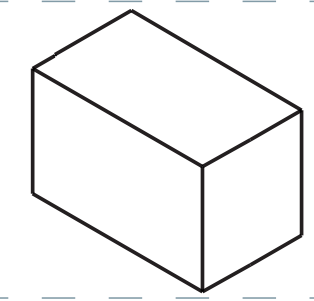
Section



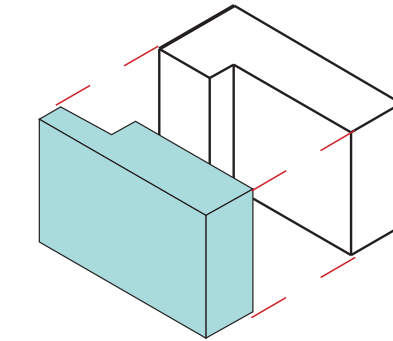
Long Rectangle



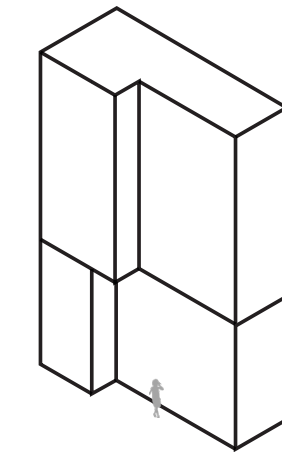
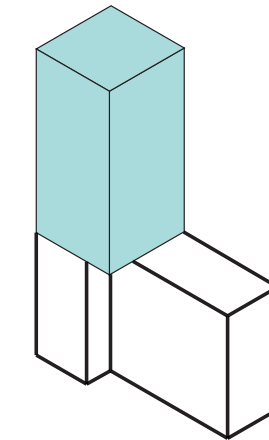
Division of geometry



Subtraction of geometry



Addition of geometry



Monumental Scale

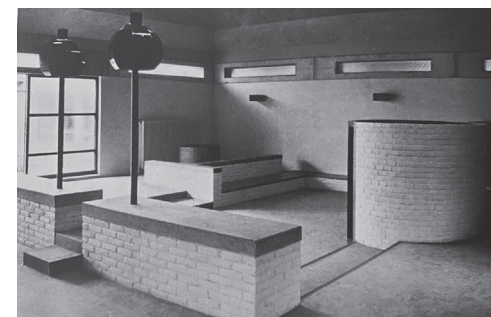
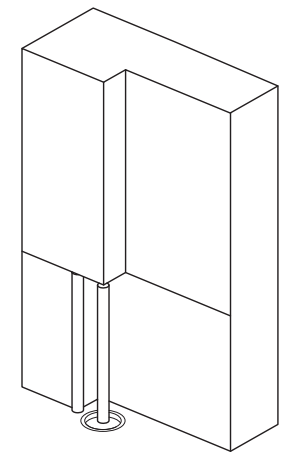


Fig 27



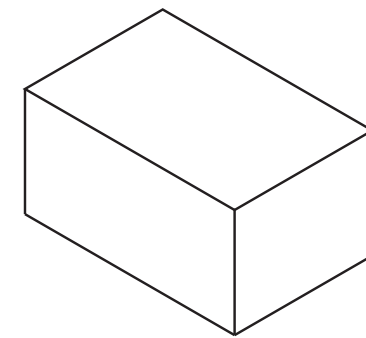
Fig 28



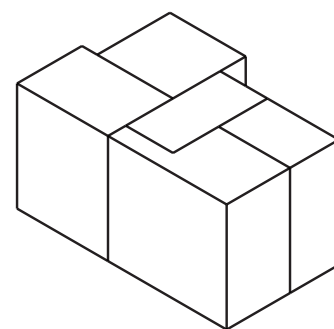
Plan



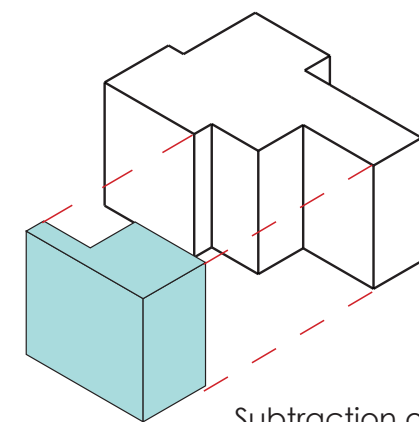
Section



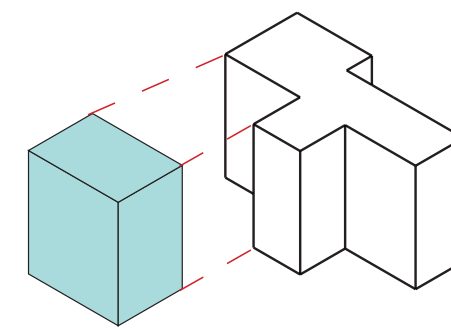
Compressed Rectangle



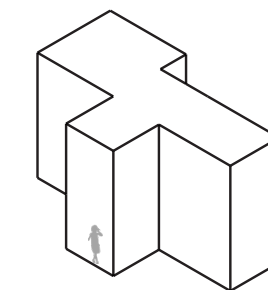
Subtraction of geometry



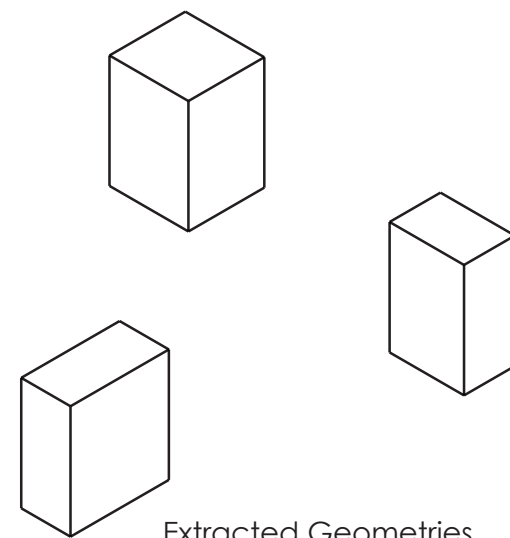
Subtraction of geometry



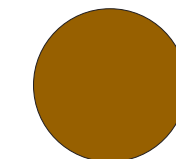
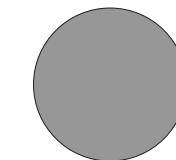
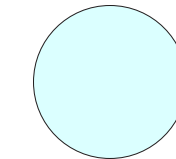
Normal Scale



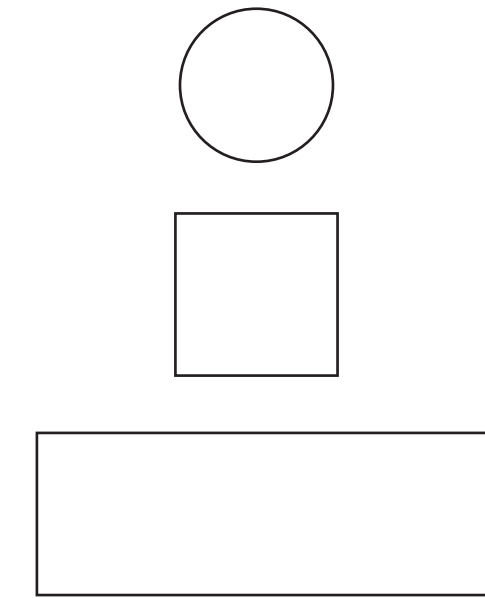
Extracted Geometries



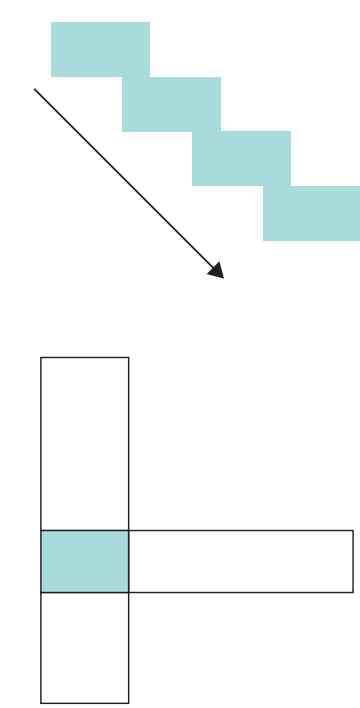
Color

-  Brown (brick)
-  Gray (concrete)
-  Translucent (glass)

Repeated Geometries

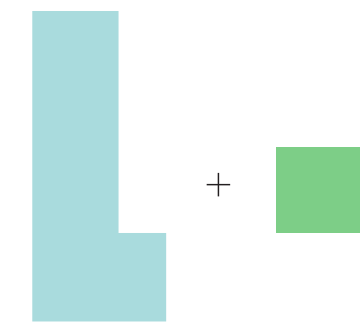


Rules



Linear pattern of rooms, offset of spaces

Interlocking of spaces, creating common spaces in-between



Geometry of rooms, plus the added courtyard for each private room section

From the analysis done on the plans and sections, a set of rules were extracted. The most common rules were the hierarchy, interlocking of spaces, and the addition of a courtyard to each building.

In relation to cognitive development, the materials used in the building along with the main colors are pointed out.

Materials



- Exposed Concrete Cupola
- Precast Concrete Beams
- Glass Blocks
- Brick Masonry

Fig 29

LION'S PARK PLAYScape

ARCHITECT: RURAL STUDIOS
GREENSBORO, ALABAMA

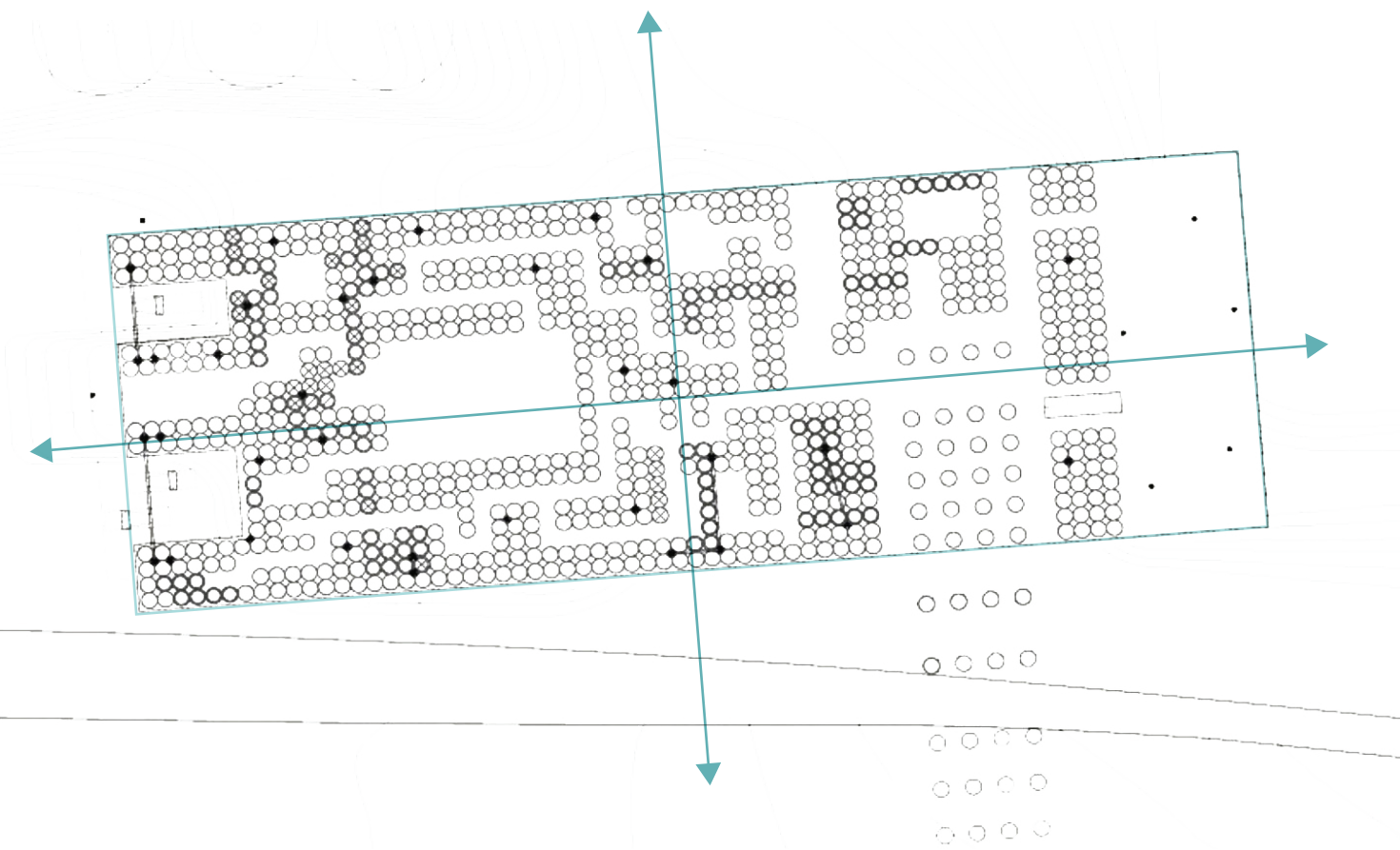
Lion's Park Playscape is a playground made up of recycled steel tins and tubes. The playscape was analyzed as a case study by breaking down the spaces created by the tins that act as boundaries. With the boundaries in place, the in between spaces and the movement within those spaces is analyzed.

The space was then broken down into simple, basic geometries, relating back to Froebel's Blocks.

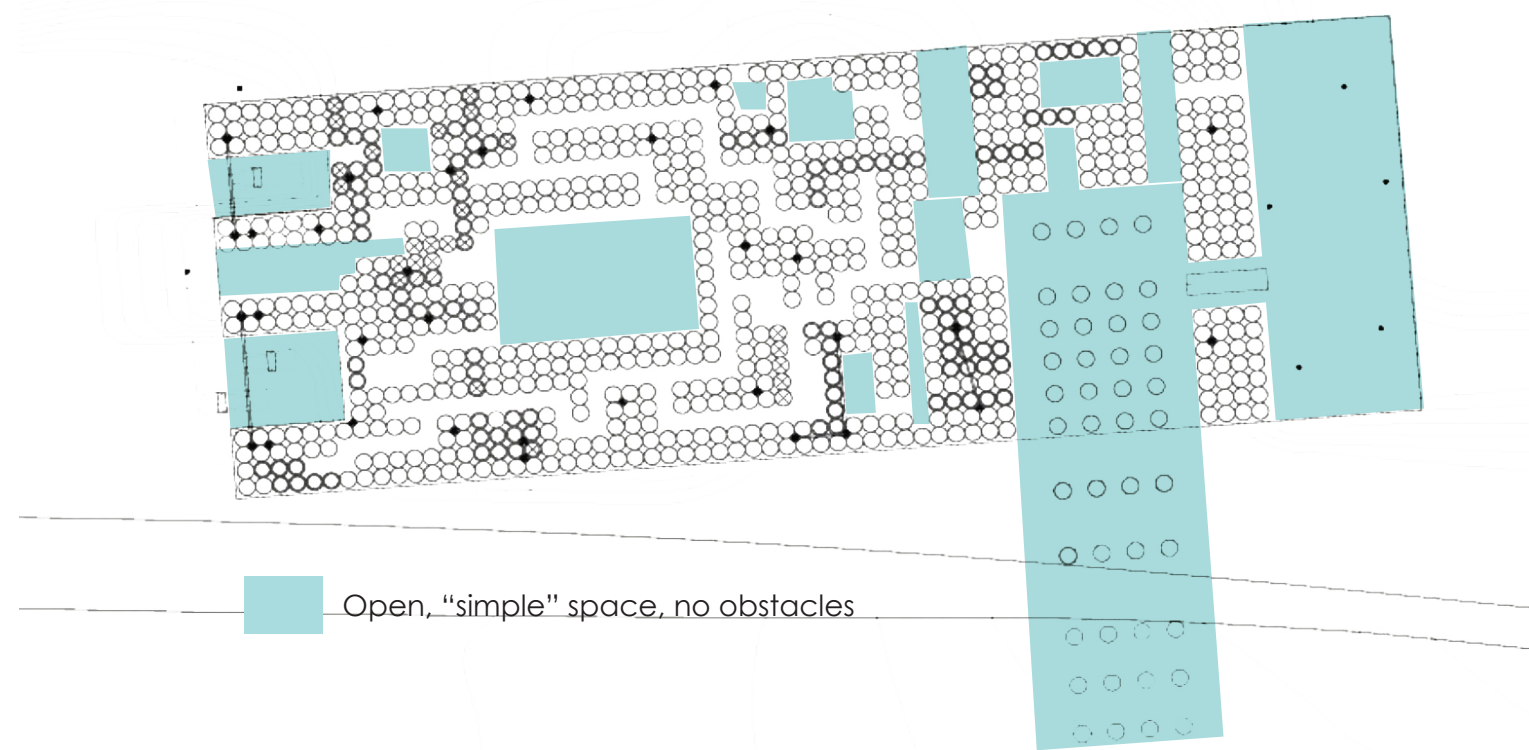


Fig 30





Axis



Spaces

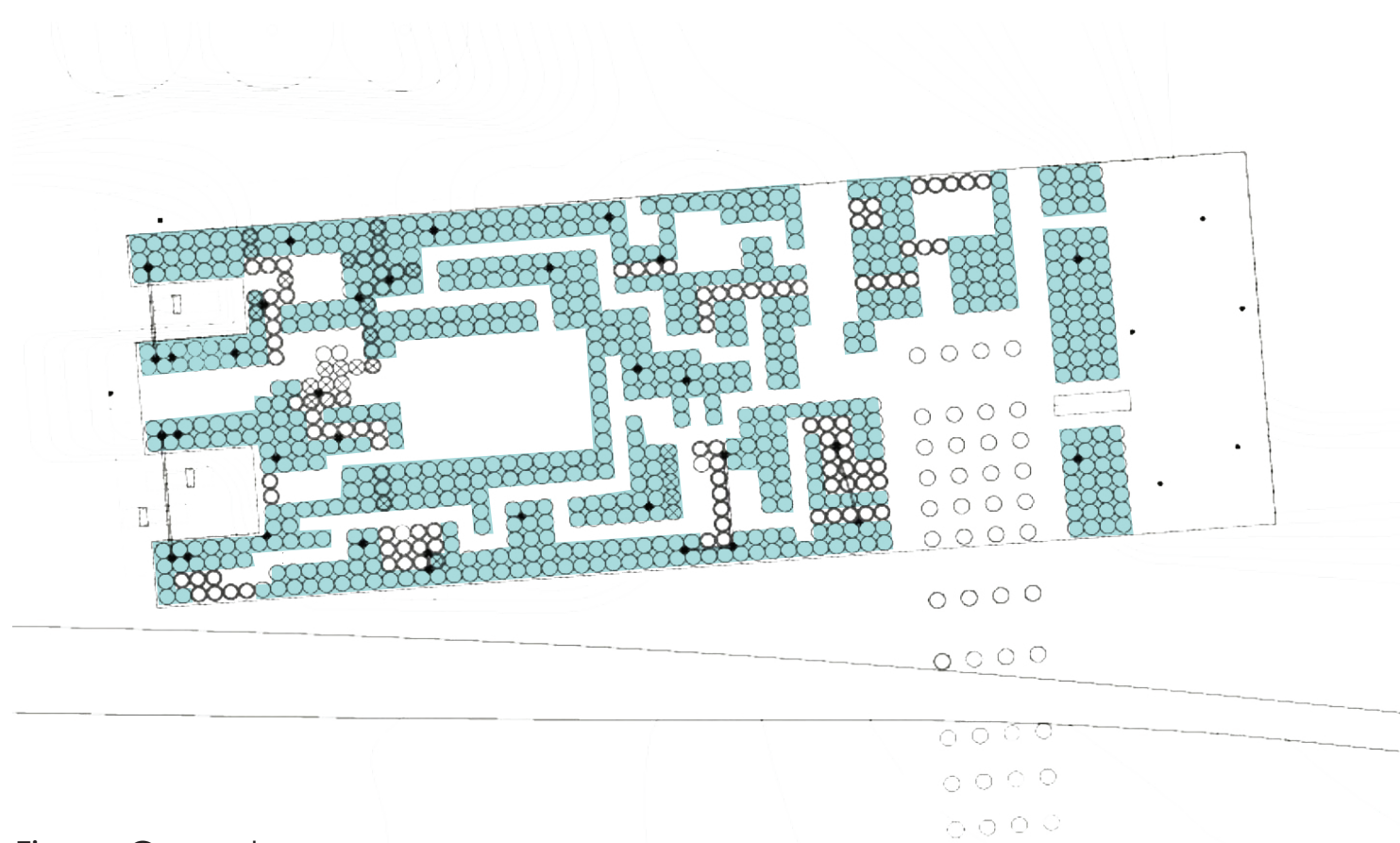
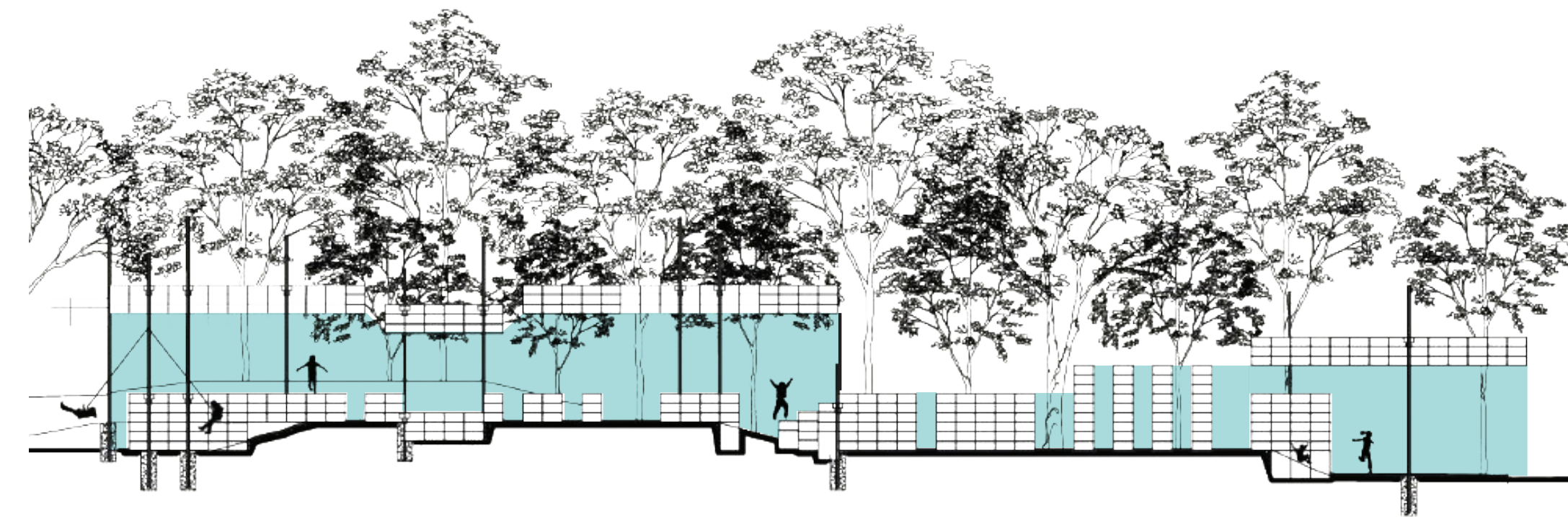
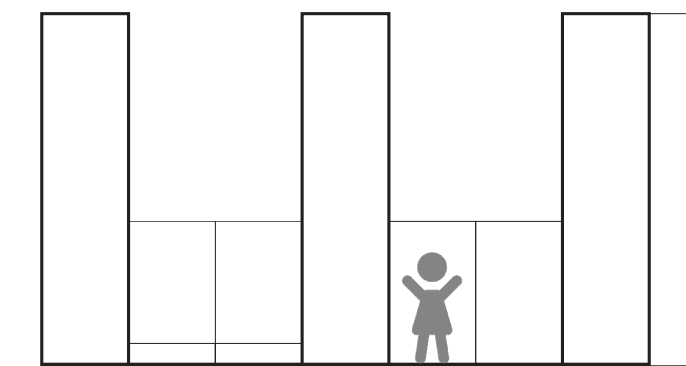
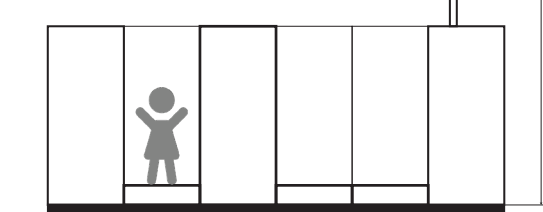
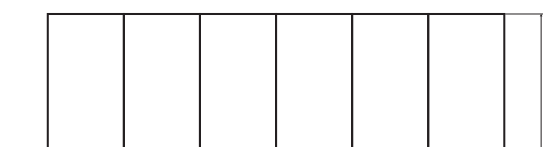
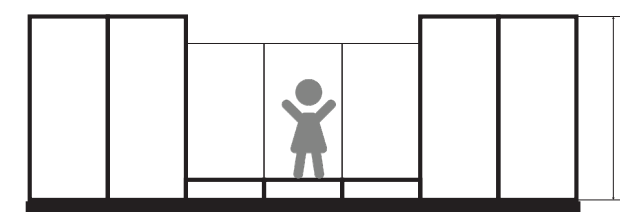
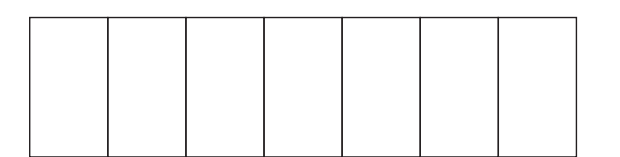


Figure Ground



Circulation



All diagrams drawn over plans and sections from: ruralstudio.org/project/lions-park-playscape/



Fig 31



Fig 32

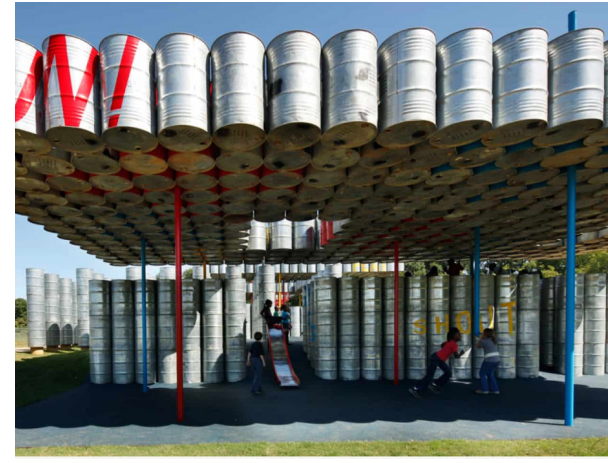
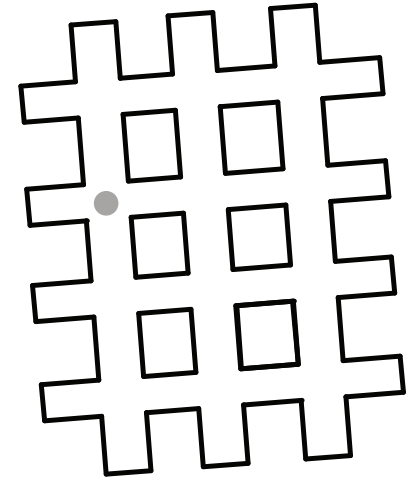
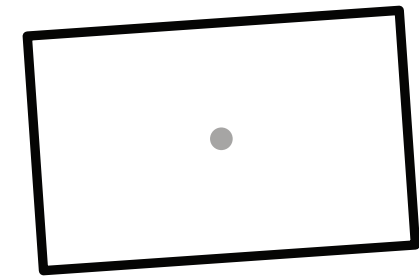
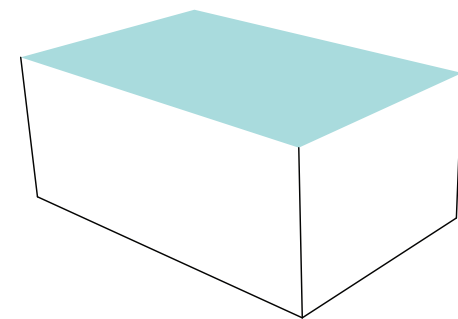
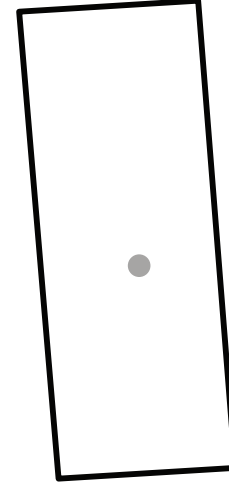


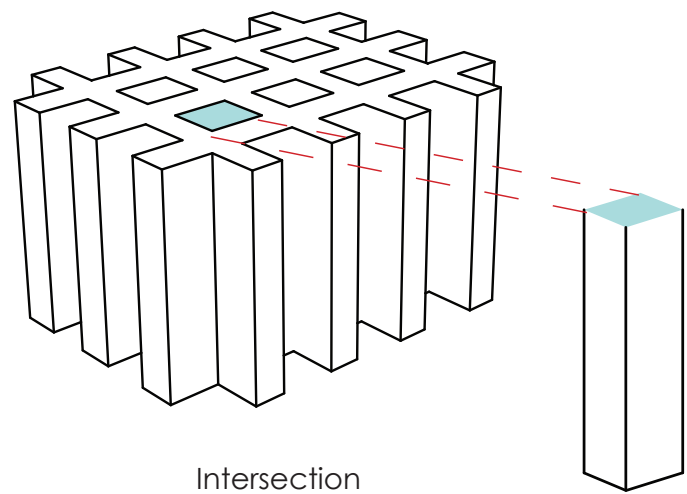
Fig 33



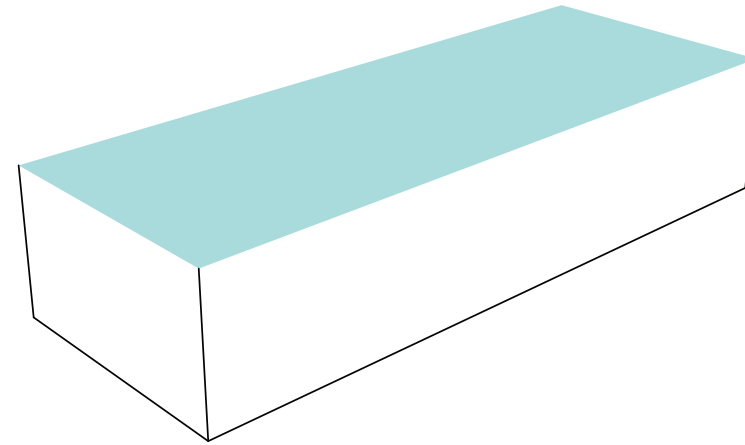
Repetition



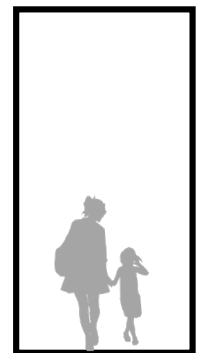
Compressed Rectangle



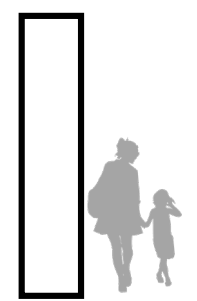
Intersection



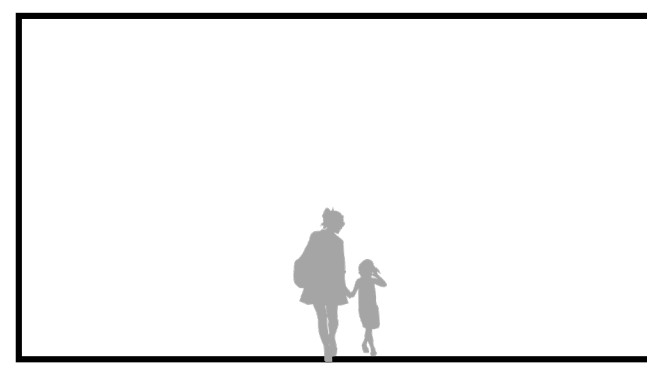
Long Rectangle



Scale: Normal

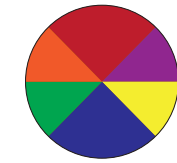


Scale: Small

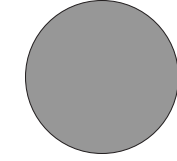


Scale: Normal

Color

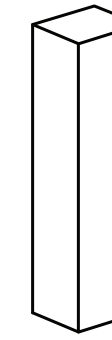
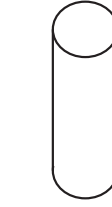
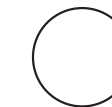


Primary colors (Pipes)

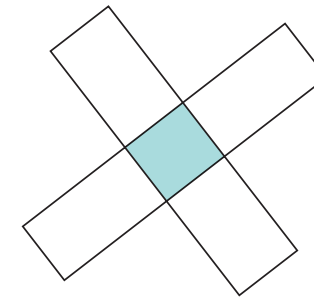


Gray (steel)

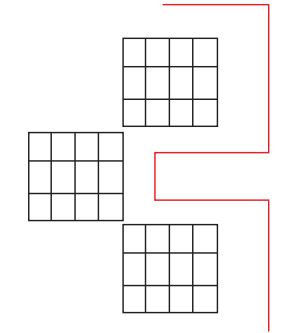
Repeated Geometries



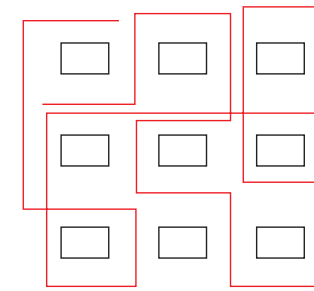
Rules



Intersections of spaces



Similarities in shapes, and the proximity to each other, creating barriers



Similarities in shapes, and the space in between each barrel creating space in between for circulation

Materials



Steel pipes

Recycled steel drums

Shaw

Grass

Fig 34

From the analysis, a set of rules were extracted. The most common themes were the intersection of spaces and how the tins were assembled in different ways to create boundaries and movement throughout the park. Relating back to materiality and colors used for cognitive development in children, an analysis was also done on the materials and colors used in the playscape.

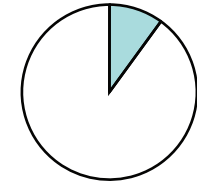


CHAPTER 3: PLAYFUL EXPLORATIONS

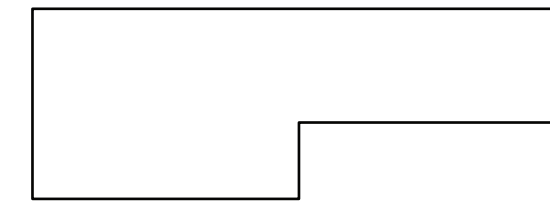


Image of blocks

Using Froebel's blocks, I created new formations by using different shapes and sizes of the building blocks. The new formations were then analyzed by breaking them down into different categories, analyzing their scales, perception of space, and geometries. These were then rated based on complexity with a set of rules that were extracted from the analysis.

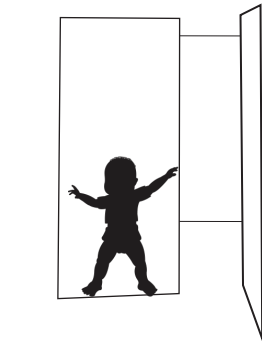


- Proportions: $x * 2x$
- Long space leading to another space
- Simple movement/ circulation
- Rules:
 - Interesction of spaces

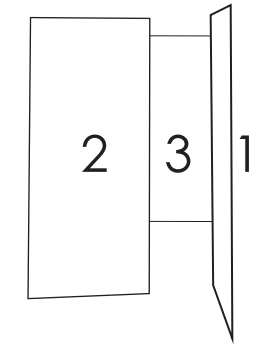


BASE SHAPE

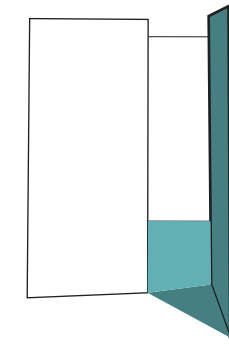
Using the new shape as a base shape, I created new geometries based on the Operative Design book³⁷, adding and subtracting volumes from the shapes and creating new spaces and volumes, with different configurations of each.



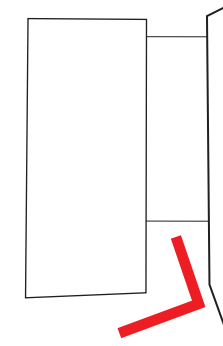
Scale in relation to child



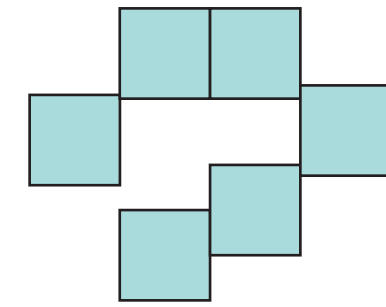
Number of layers perceived



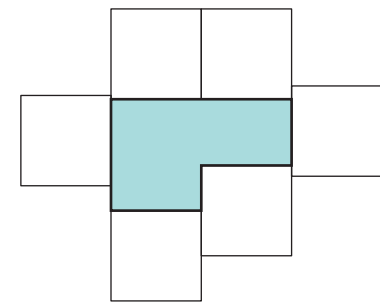
Space created by walls



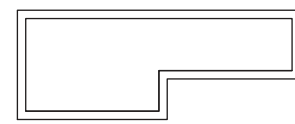
Movement within space



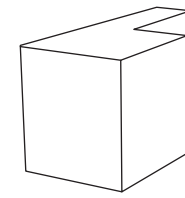
Blocks in plan



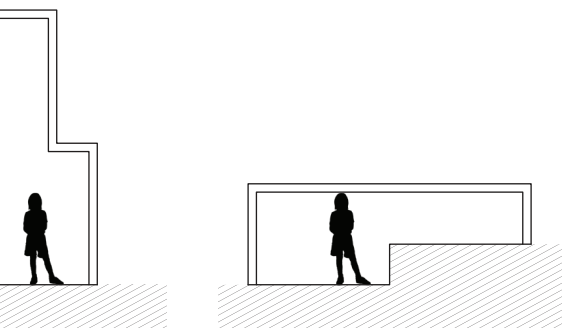
Space created by blocks in plan



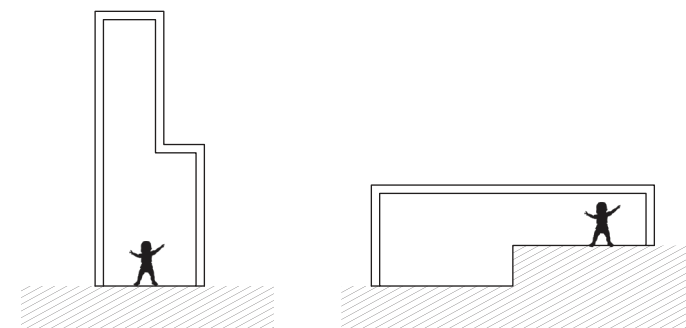
New Shape in Plan



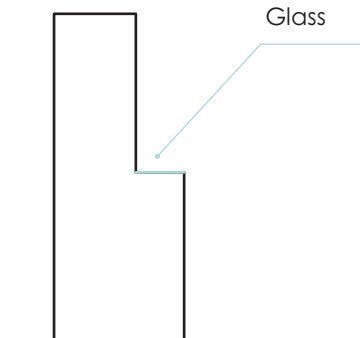
Volume



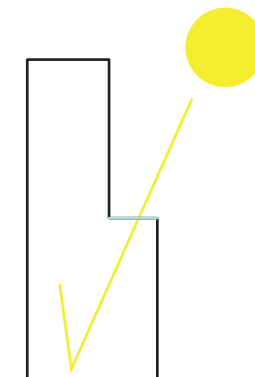
New shape used in section



New shape used in section

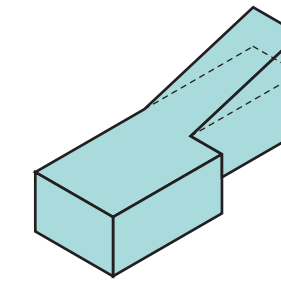


Variations of matrials



Sun analysis in section

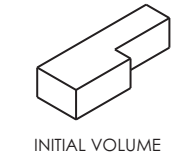
ADD:
EXPAND



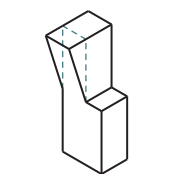
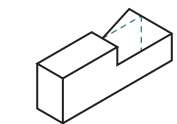
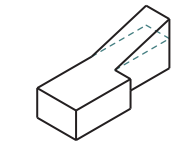
PROCEDURE



ORIENTATION



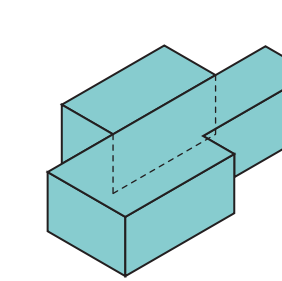
INITIAL VOLUME



VARIATIONS



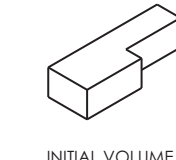
ADD:
EXTRUDE



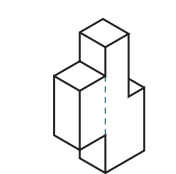
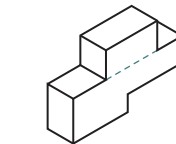
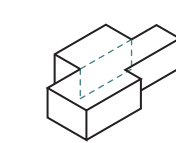
PROCEDURE



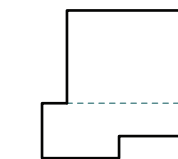
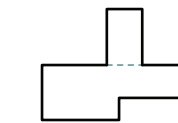
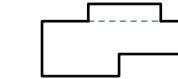
ORIENTATION



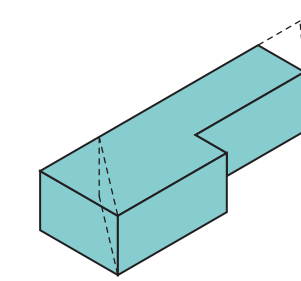
INITIAL VOLUME



VARIATIONS



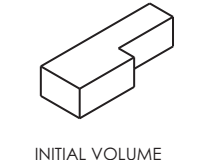
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SKEWED



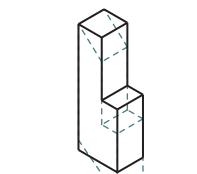
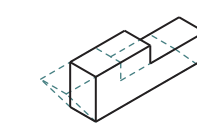
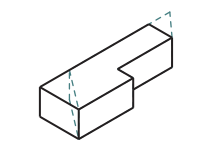
PROCEDURE



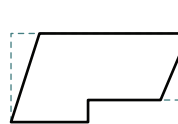
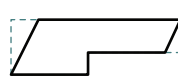
ORIENTATION



INITIAL VOLUME

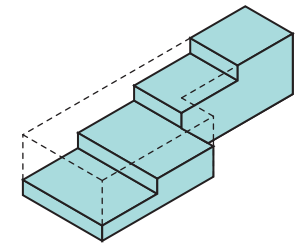


VARIATIONS

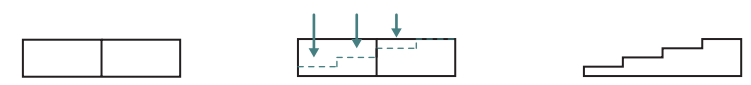


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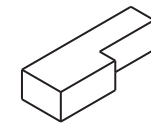
GRADE



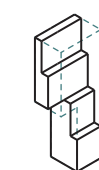
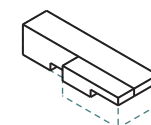
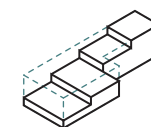
PROCEDURE



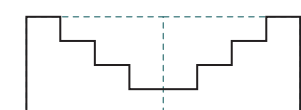
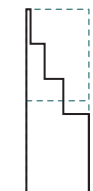
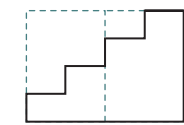
ORIENTATION



INITIAL VOLUME

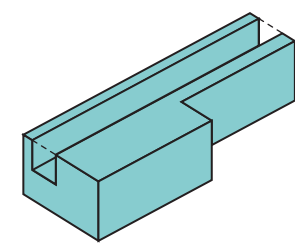


VARIATIONS

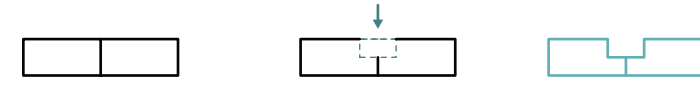


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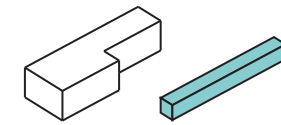
INSCRIBE



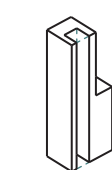
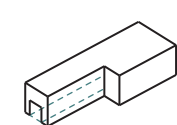
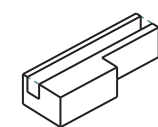
PROCEDURE



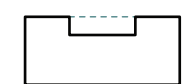
ORIENTATION



INITIAL VOLUME

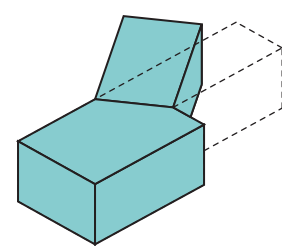


VARIATIONS



DISPLACED

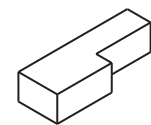
ROTATE



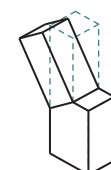
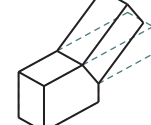
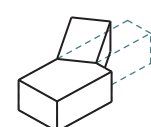
PROCEDURE



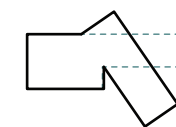
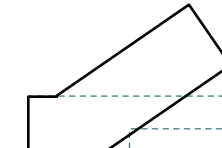
ORIENTATION



INITIAL VOLUME



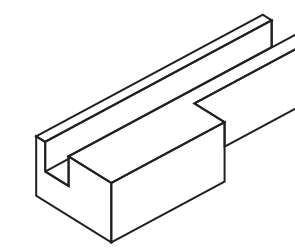
VARIATIONS



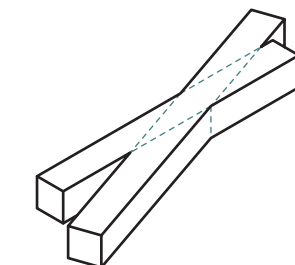
COMBINATION

INSCRIBED + INTERSECT

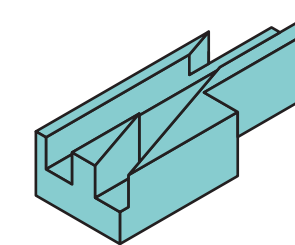
INSCRIBE



INTERSECT



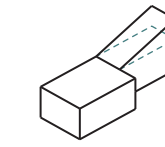
COMBINED RESULT



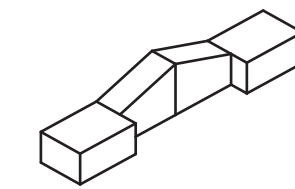
AGGREGATIONS

REFLECT

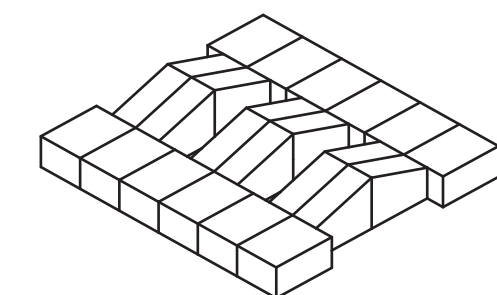
EXPAND



REFLECT



RESULT



VARIATION

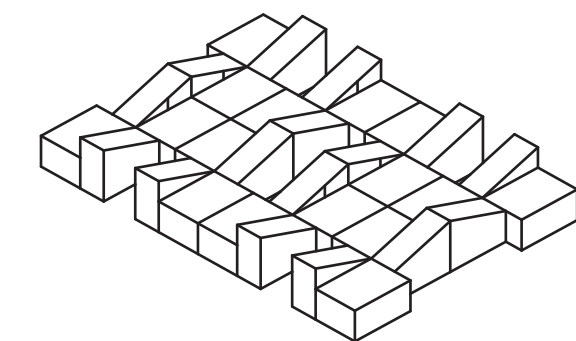
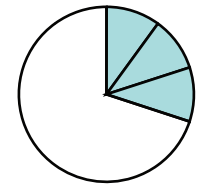
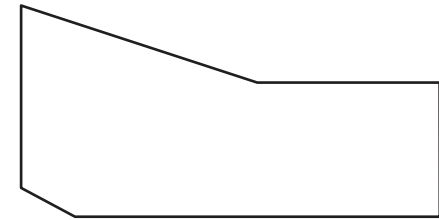




Image of blocks



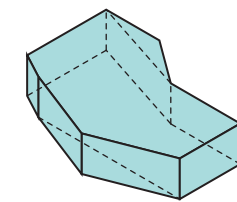
- Proportions: Higher in vertical than horizontal
- Narrow space
- More movement allowed



BASE SHAPE

ADD:

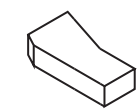
INFLATE



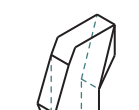
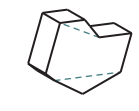
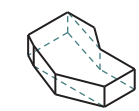
PROCEDURE



ORIENTATION

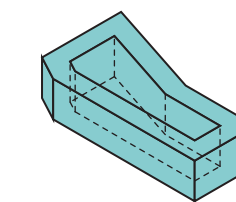


INITIAL VOLUME



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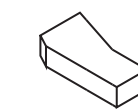
OFFSET



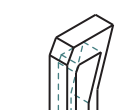
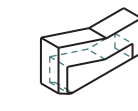
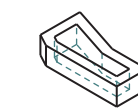
PROCEDURE



ORIENTATION

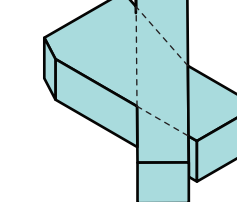


INITIAL VOLUME

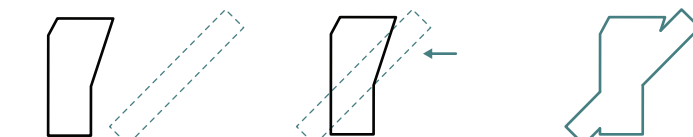


DISPLACED

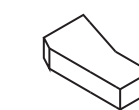
INTERSECT



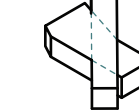
PROCEDURE



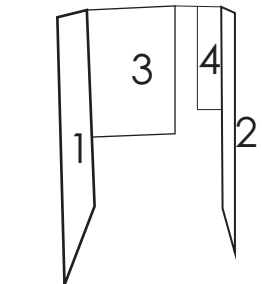
ORIENTATION



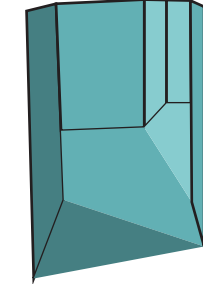
INITIAL VOLUME



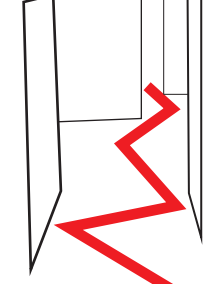
Scale in relation to child



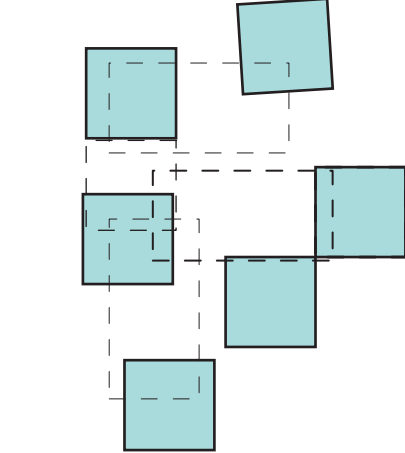
Number of layers perceived



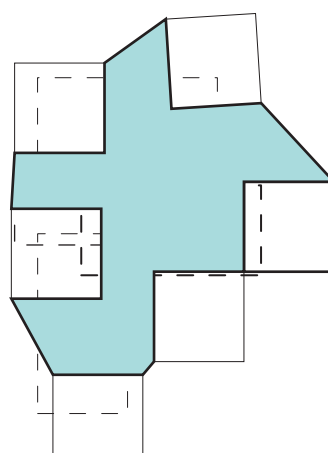
Space created by walls



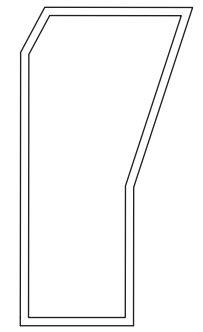
Movement within space



Blocks in plan

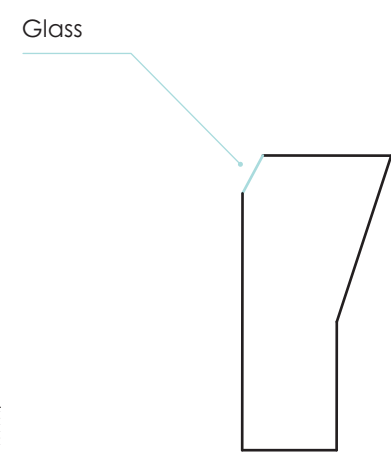


Space created by blocks in plan

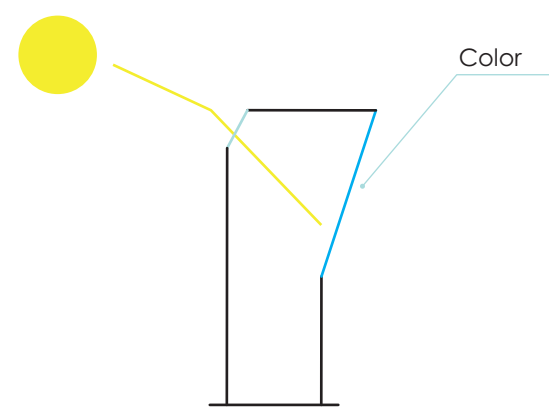


New Shape in Plan

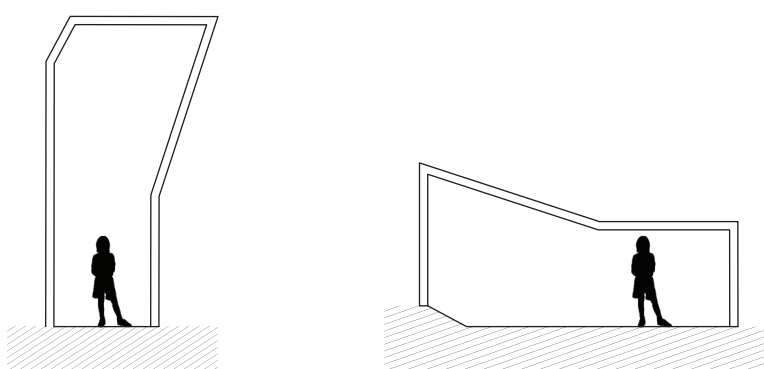
Volume



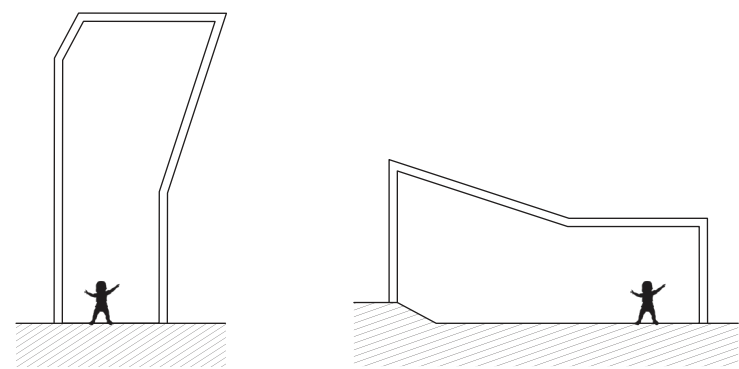
Variations of materials



Sun analysis in section



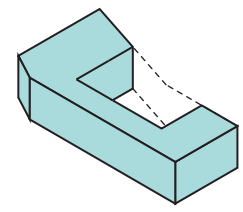
New shape used in section



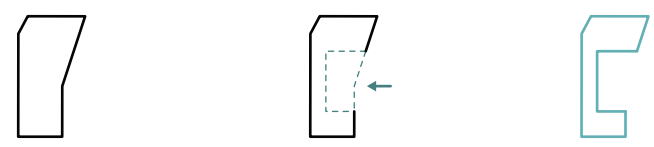
New shape used in section

SUBTRACT:

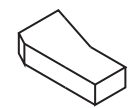
CARVE



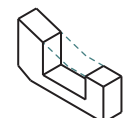
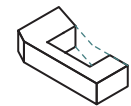
PROCEDURE



ORIENTATION



INITIAL VOLUME

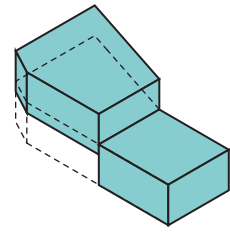


VARIATIONS

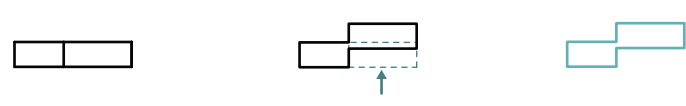


DISPLACED

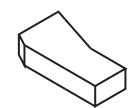
SHIFT



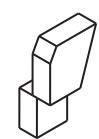
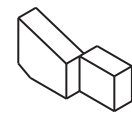
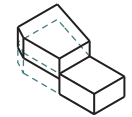
PROCEDURE



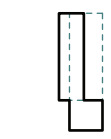
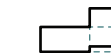
ORIENTATION



INITIAL VOLUME

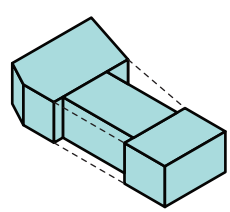


VARIATIONS

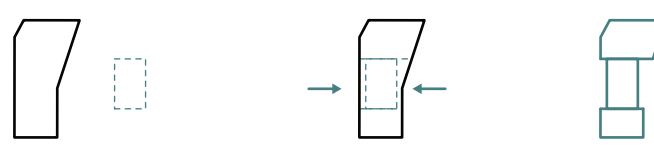


DISPLACED

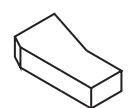
LODGE



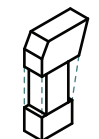
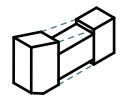
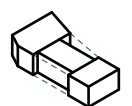
PROCEDURE



ORIENTATION



INITIAL VOLUME



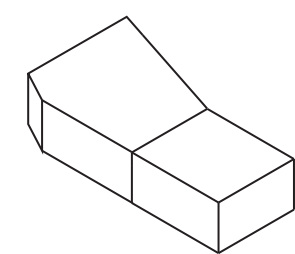
VARIATIONS



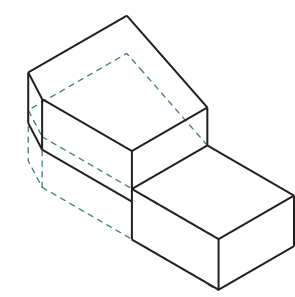
COMBINATION

SHIFT + INTERSECT

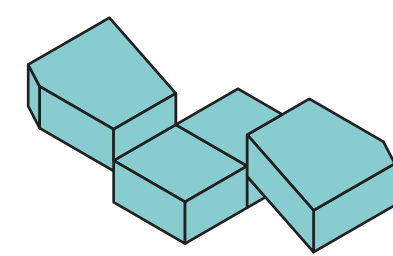
INITIAL VOLUME



SHIFT

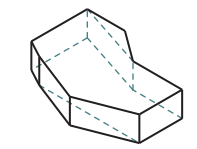


COMBINED RESULT

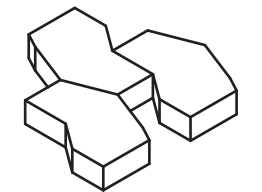


AGGREGATIONS

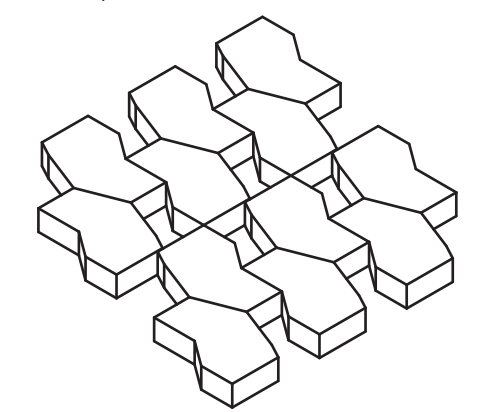
PACK



INFLATE

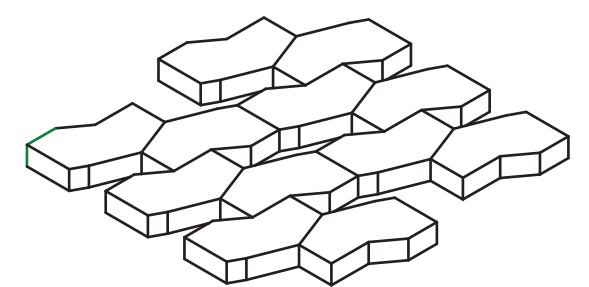


PACK



RESULT

VARIATION



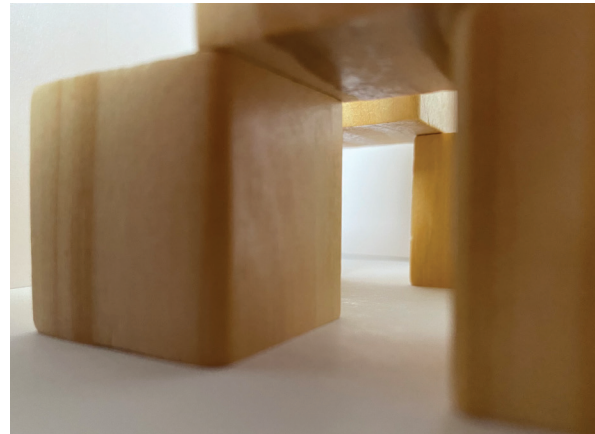
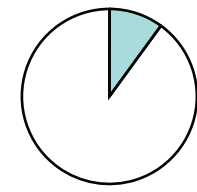
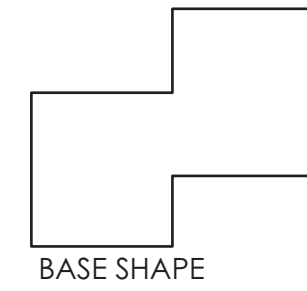


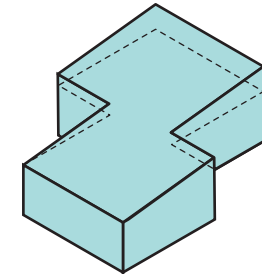
Image of blocks



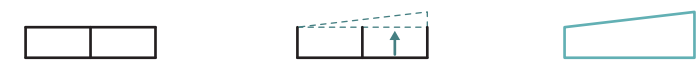
- Equal proportions on each side
- Space for movement and habitation
- Simple circulation
- Rules
 - Simple geometries (squares/ Froebel's Second Gift)
 - Interception of spaces



ADD:
EXPAND



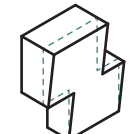
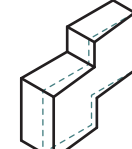
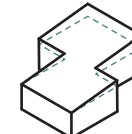
PROCEDURE



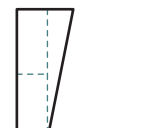
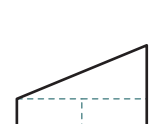
ORIENTATION



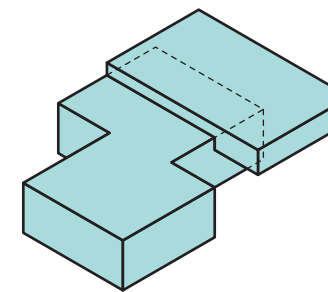
INITIAL VOLUME



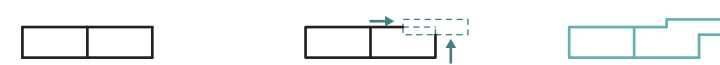
VARIATIONS



ADD:
MERGE



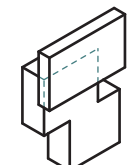
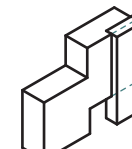
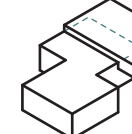
PROCEDURE



ORIENTATION



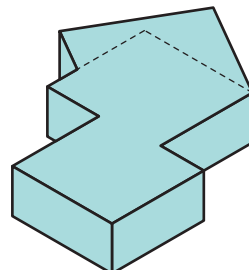
INITIAL VOLUME



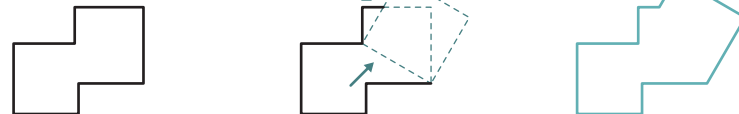
VARIATIONS



DISPLACED
BEND



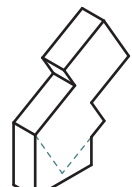
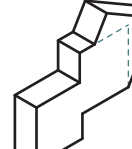
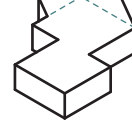
PROCEDURE



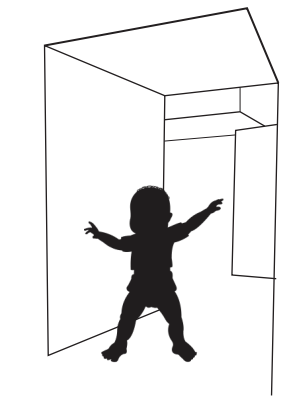
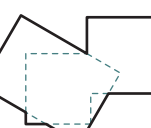
ORIENTATION



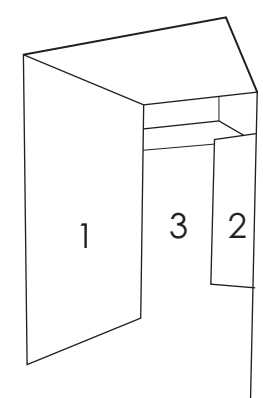
INITIAL VOLUME



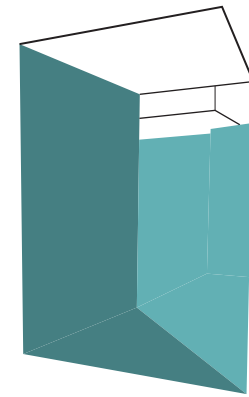
VARIATIONS



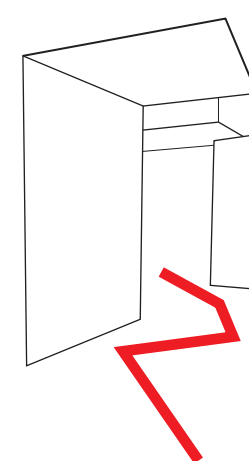
Scale in relation to child



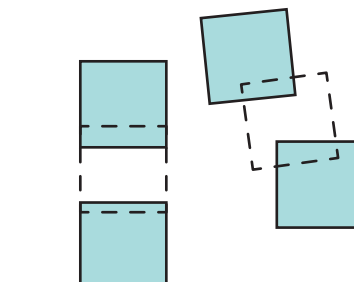
Number of layers perceived



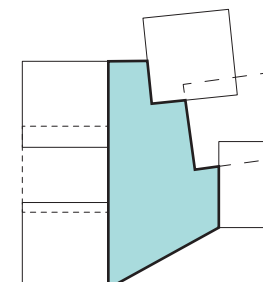
Space created by walls



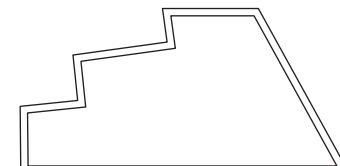
Movement within space



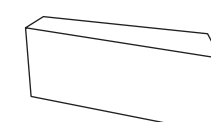
Blocks in plan



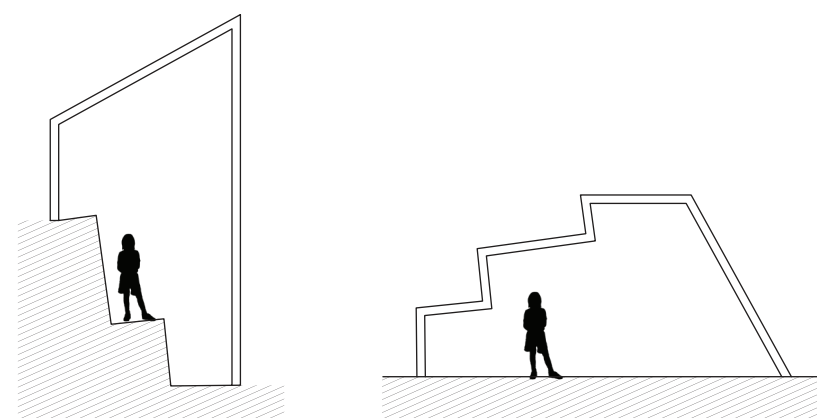
Space created by blocks in plan



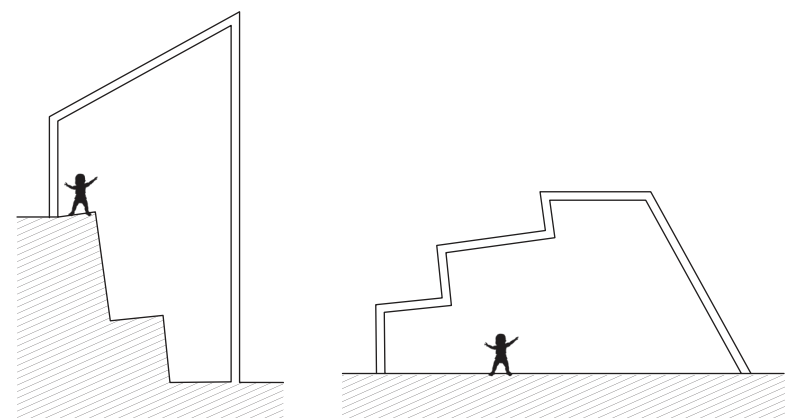
New Shape in Plan



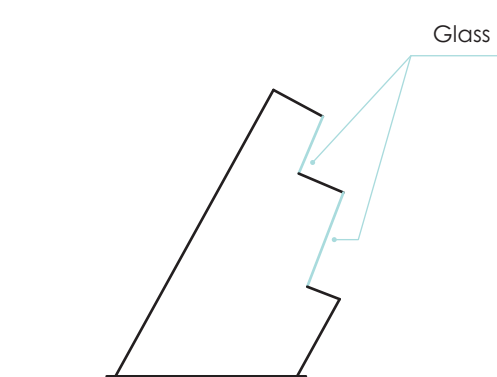
Volume



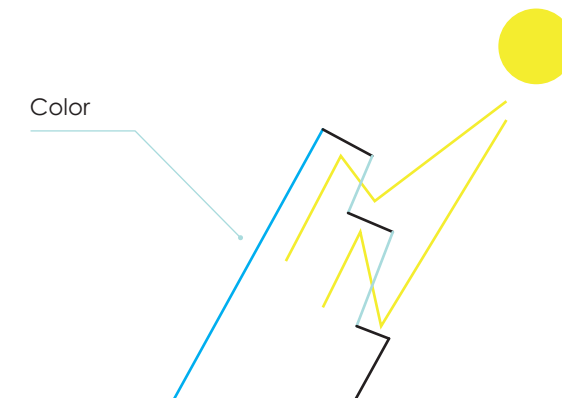
New shape used in section



New shape used in section



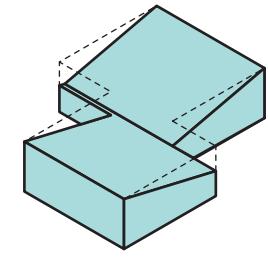
Variations of materials



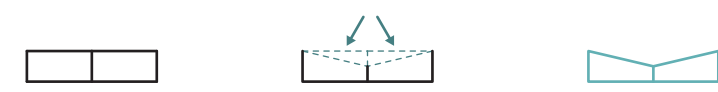
Sun analysis in section

SUBTRACT:

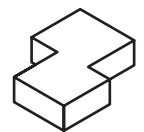
NOTCH



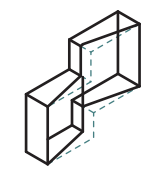
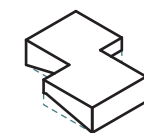
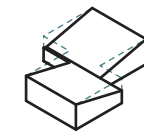
PROCEDURE



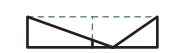
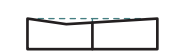
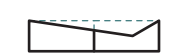
ORIENTATION



INITIAL VOLUME

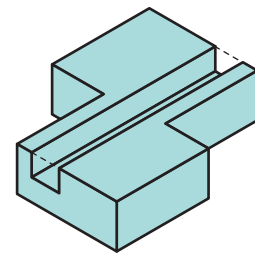


VARIATIONS



SUBTRACT:

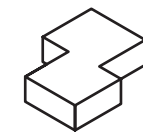
INSCRIBE



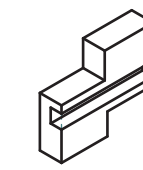
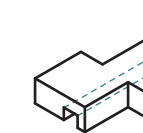
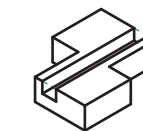
PROCEDURE



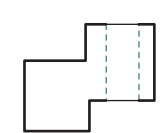
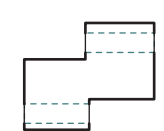
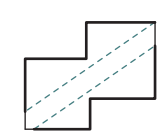
ORIENTATION



INITIAL VOLUME

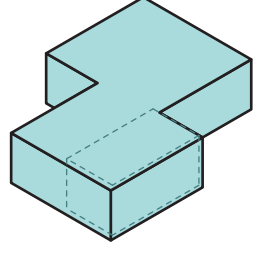


VARIATIONS

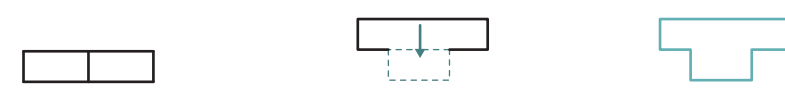


DISPLACED

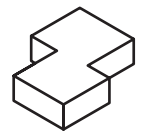
LIFT



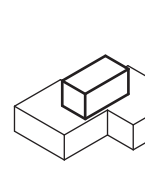
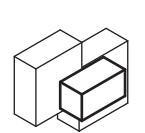
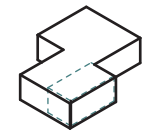
PROCEDURE



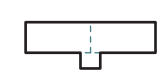
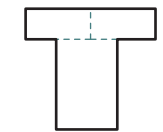
ORIENTATION



INITIAL VOLUME



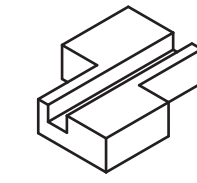
VARIATIONS



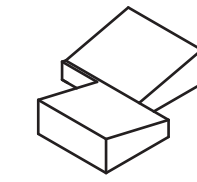
COMBINATION

INSCRIBED + NOTCH

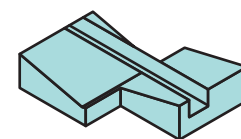
INSCRIBE



NOTCH



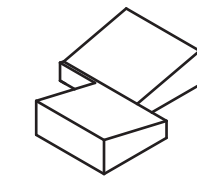
COMBINED RESULT



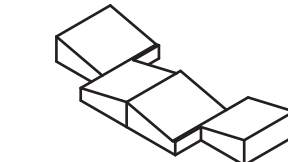
AGGREGATIONS

JOIN + ARRAY

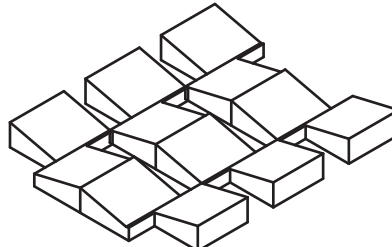
NOTCH



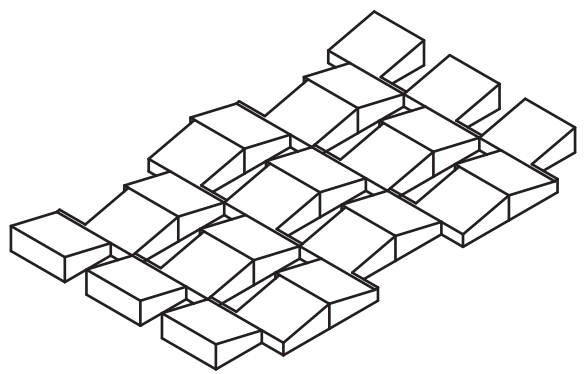
JOIN



RESULT



VARIATION



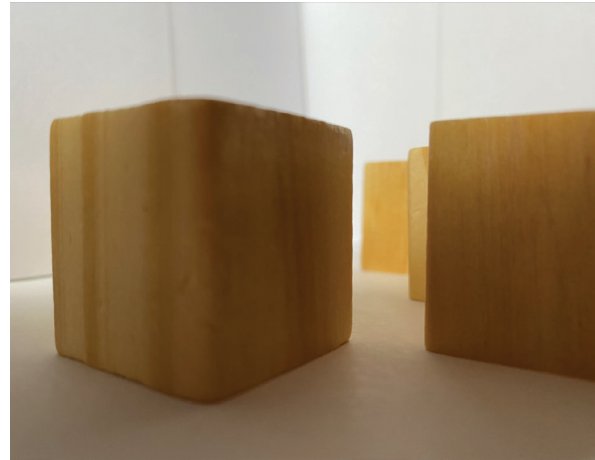
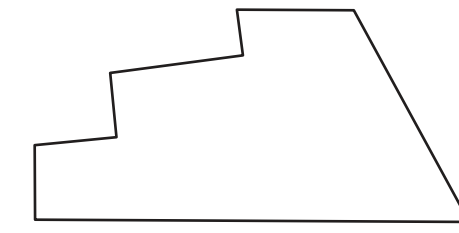


Image of blocks



- Proportions: $x * 2x$
- Narrow space
- Movement becomes more complex, with more vertical movement allowed

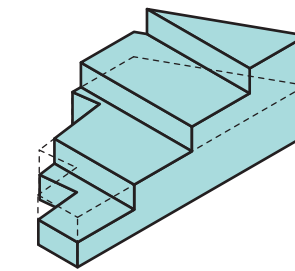
- Rules
 - Intersection of spaces
 - 3+ geometries used
 - Introduction of angles



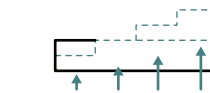
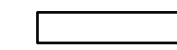
BASE SHAPE

ADD:

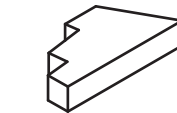
GRADE



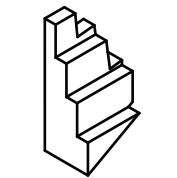
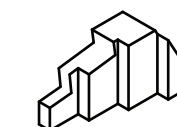
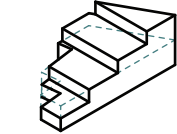
PROCEDURE



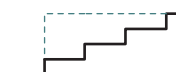
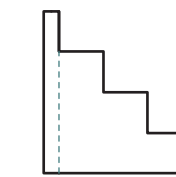
ORIENTATION



INITIAL VOLUME

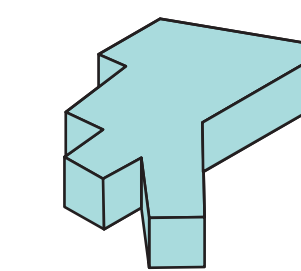


VARIATIONS

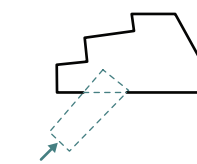


ADD:

BRANCH



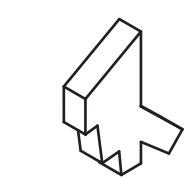
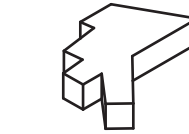
PROCEDURE



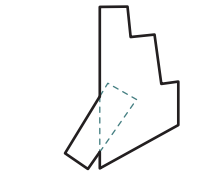
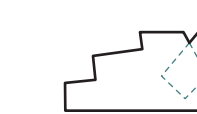
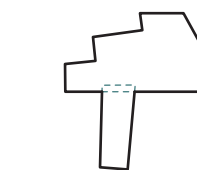
ORIENTATION



INITIAL VOLUME

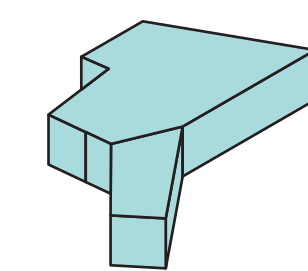


VARIATIONS

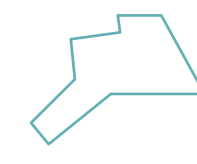
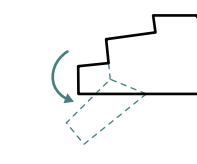


DISPLACED

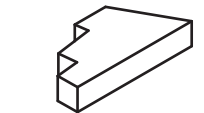
ROTATE



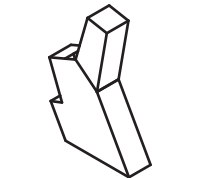
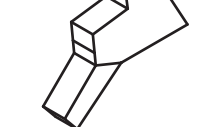
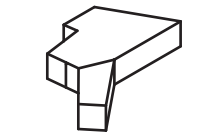
PROCEDURE



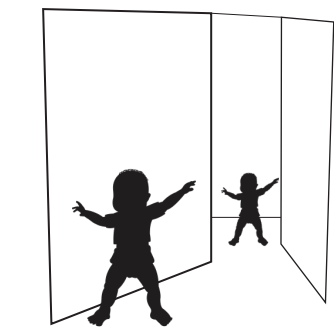
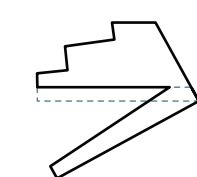
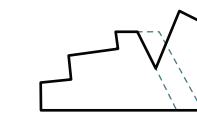
ORIENTATION



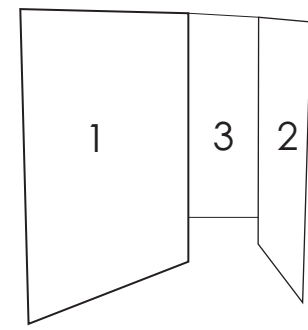
INITIAL VOLUME



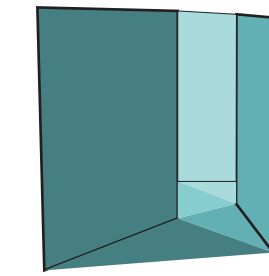
VARIATIONS



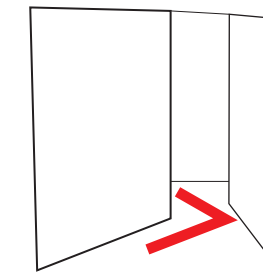
Scale in relation to child



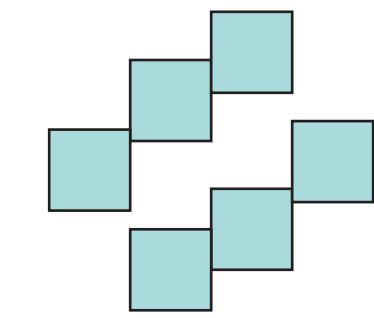
Number of layers perceived



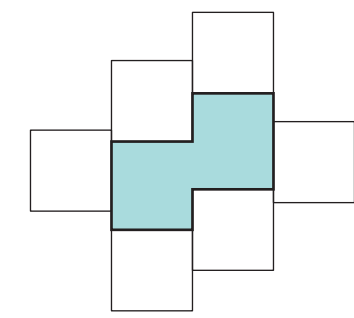
Space created by walls



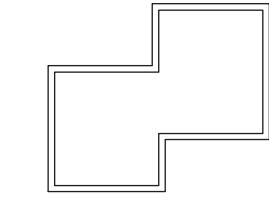
Movement within space



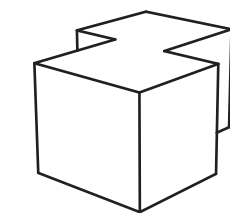
Blocks in plan



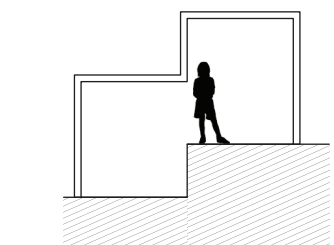
Space created by blocks in plan



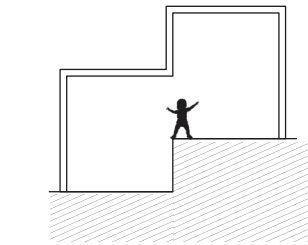
New Shape in Plan



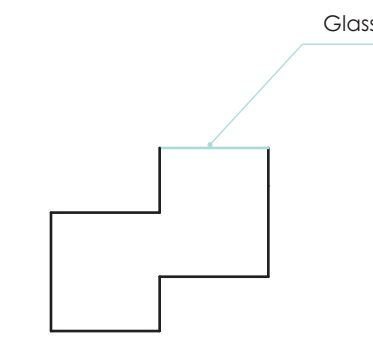
Volume



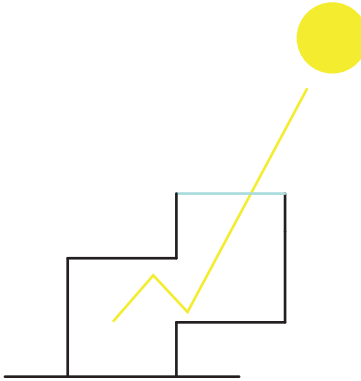
New shape used in section



New shape used in section

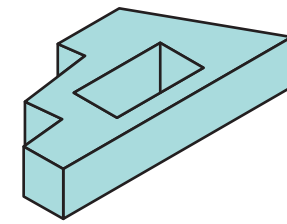


Variations of materials

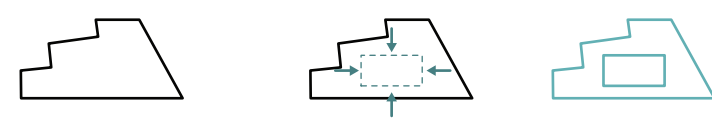


Sun analysis in section

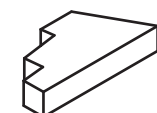
SUBTRACT:
EXTRACT



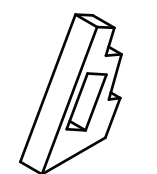
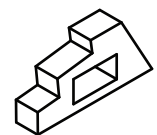
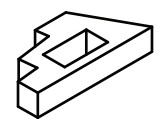
PROCEDURE



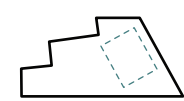
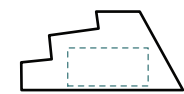
ORIENTATION



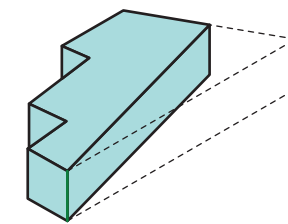
INITIAL VOLUME



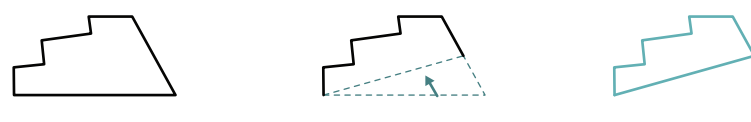
VARIATIONS



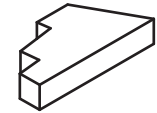
SUBTRACT:
SHEAR



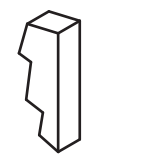
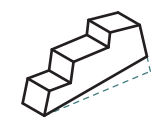
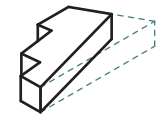
PROCEDURE



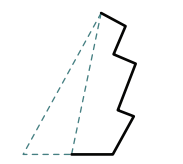
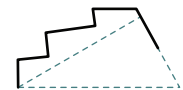
ORIENTATION



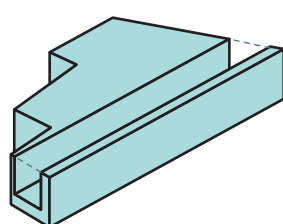
INITIAL VOLUME



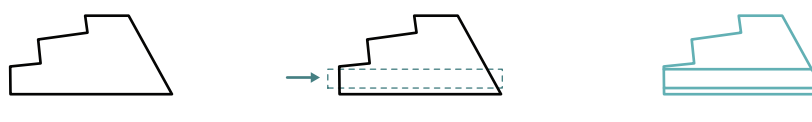
VARIATIONS



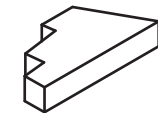
DISPLACED
LODGE



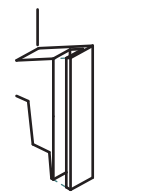
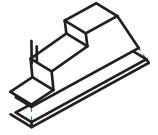
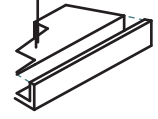
PROCEDURE



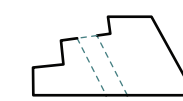
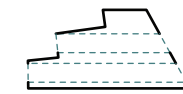
ORIENTATION



INITIAL VOLUME

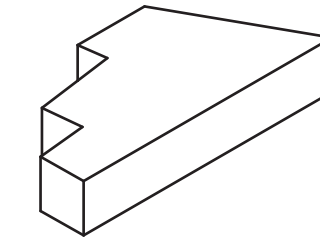


VARIATIONS

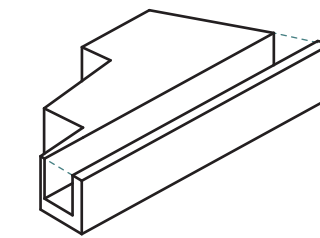


COMBINATION
SHIFT + INTERSECT

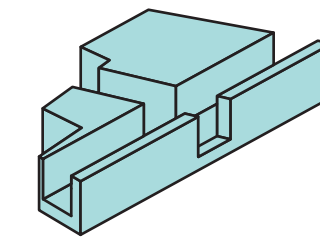
INITIAL VOLUME



INTERSECT

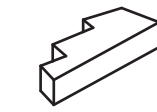


COMBINED RESULT

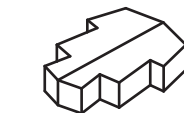


AGGREGATIONS
SHEAR + REFLECT

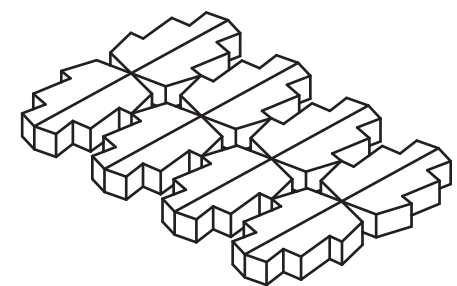
SHEAR



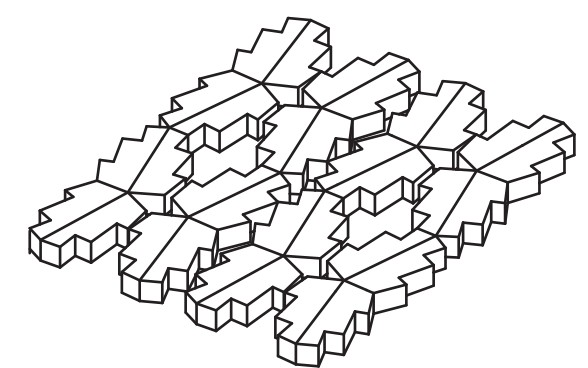
REFLECT



RESULT



VARIATION

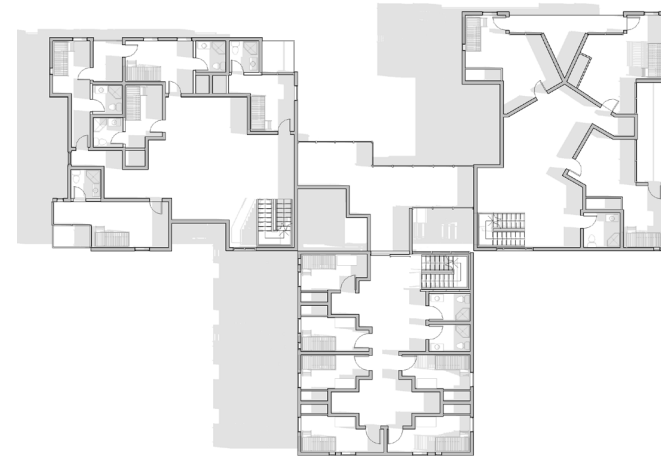




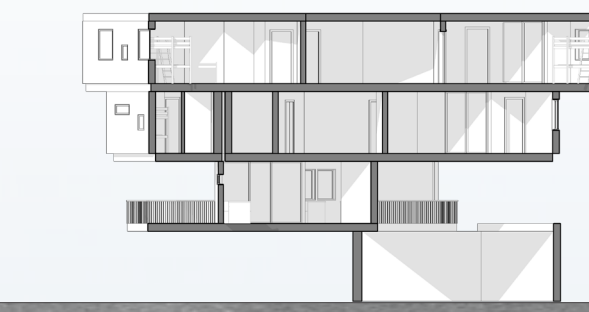
CHAPTER 4: DESIGN

LIVING AND LEARNING CENTER

Using the previously found geometries, the building was designed to include living and educational spaces. The ground floor consists of the main entrance with offices for the staff and a food court, leading to the educational spaces (classrooms) in the back with a playground in the middle. The second through the fourth floor include the living spaces, with different geometries and different configurations of those geometries used to form the floor plans of each floor.



Level 3 (Residential Spaces)



Section through Building 2



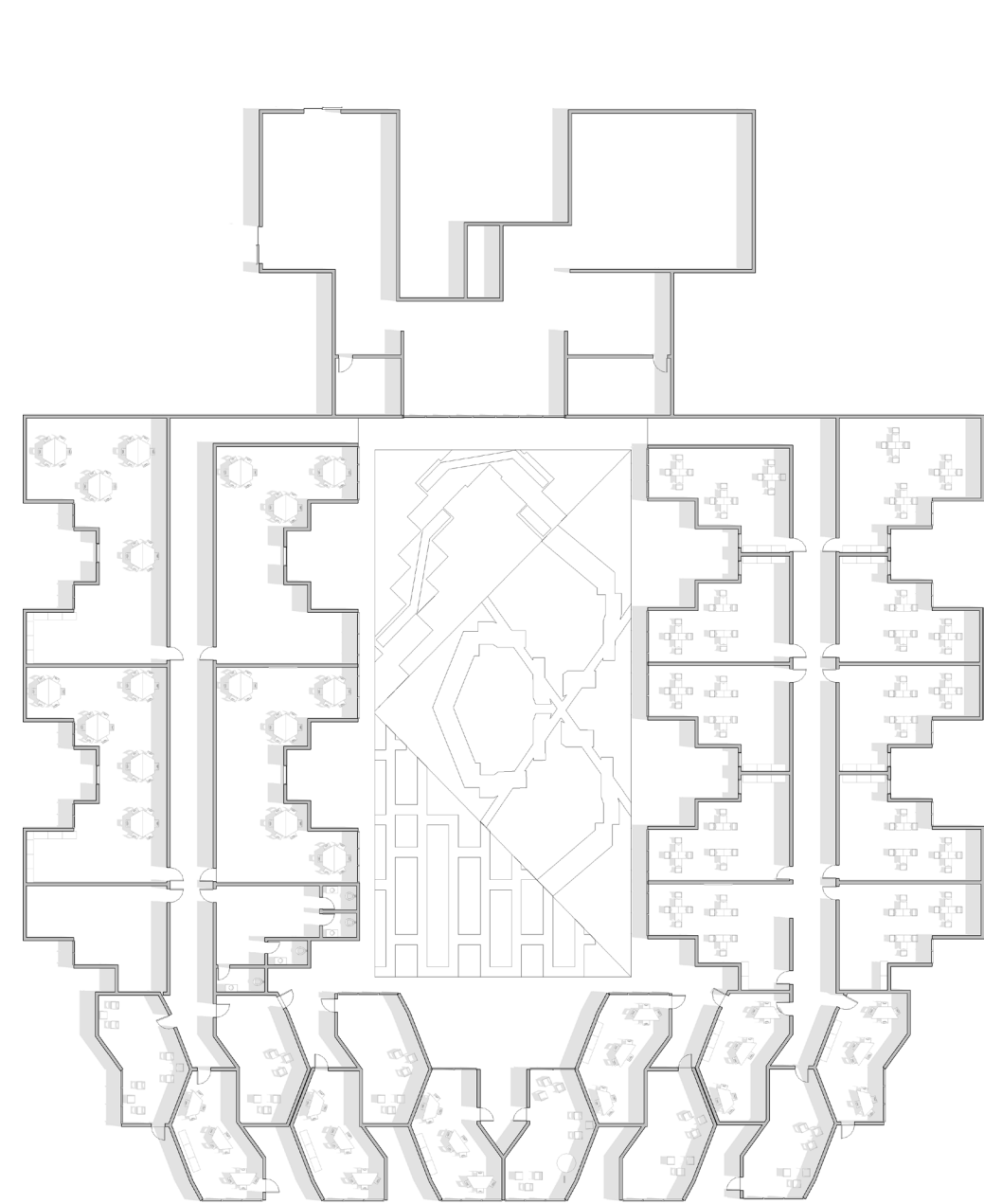
East Elevation



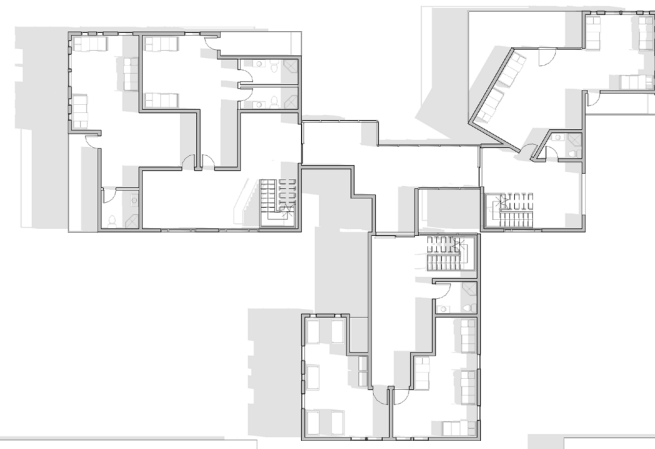
Section through Building 1



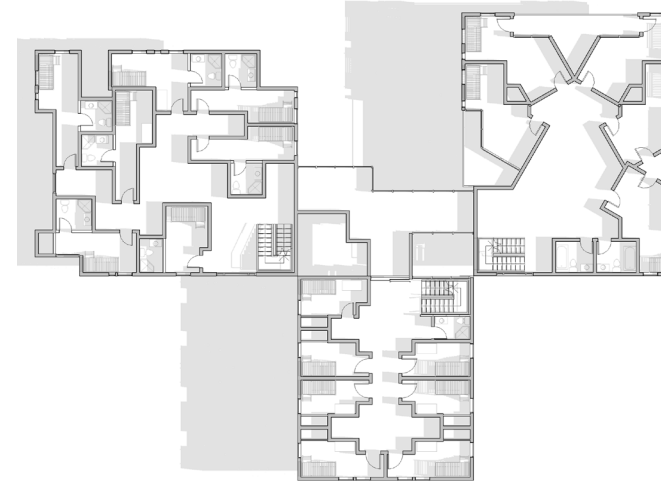
West Elevation



Ground Level (Educational Spaces)



Level 2 (Residential Spaces)



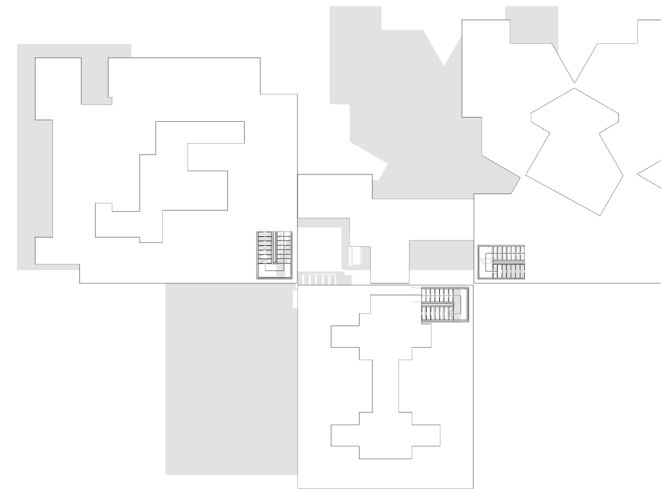
Level 4 (Residential Spaces)



Section through Building 3



North Elevation



Roof



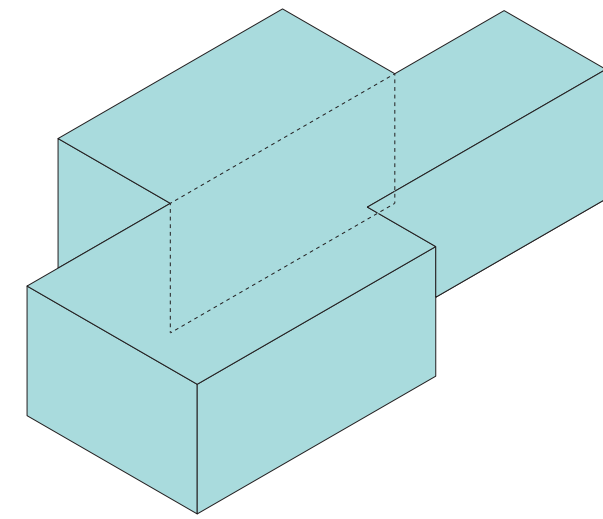
Section through Education Building



South Elevation

BUILDING 1 - HABITATION SPACE

Starting with the more simple geometry found, the floor plans for Building 1 was designed. Using the established rules, the floor plan consists of the below geometry, with the different configurations for each floor, starting with a more open floor plan and leading to a more complex formation of the geometries. The colors and materials used in the rooms are meant to encourage cognitive development.



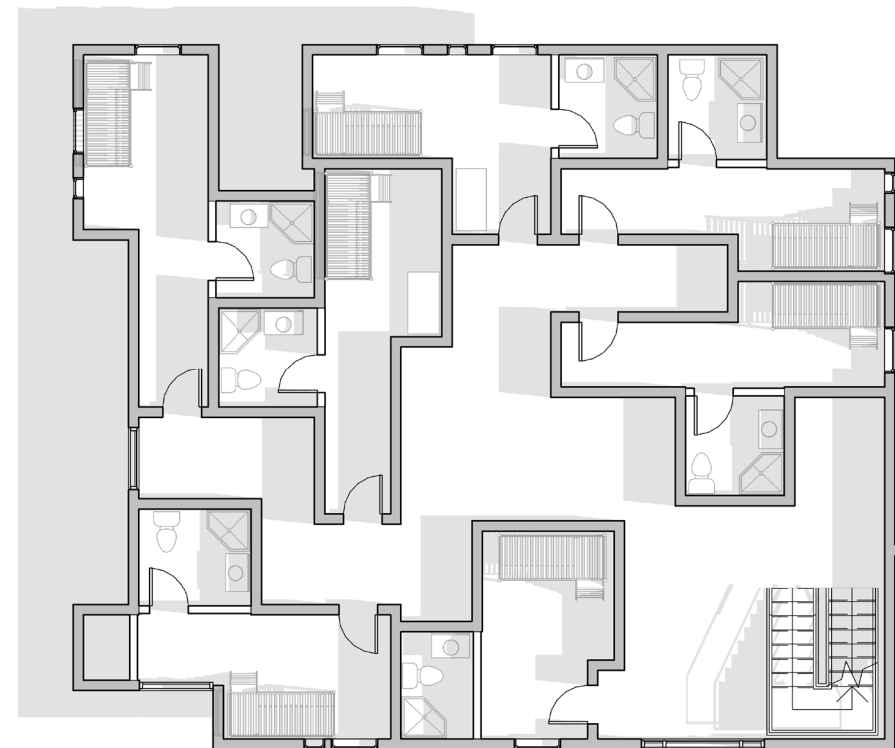
Base Volume



Level 2

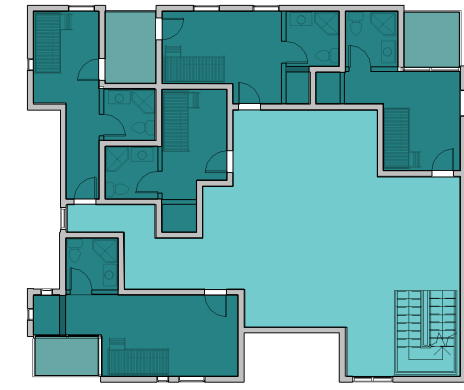


Level 3

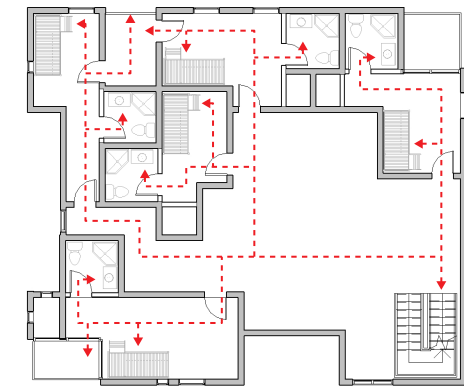


Level 3

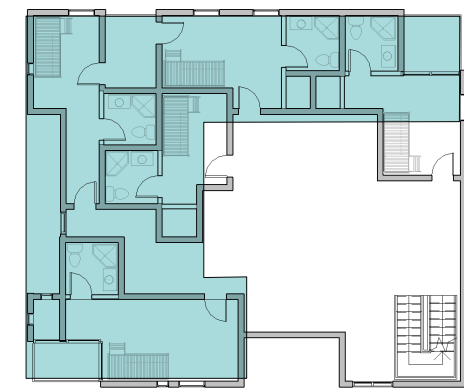
Diagrams



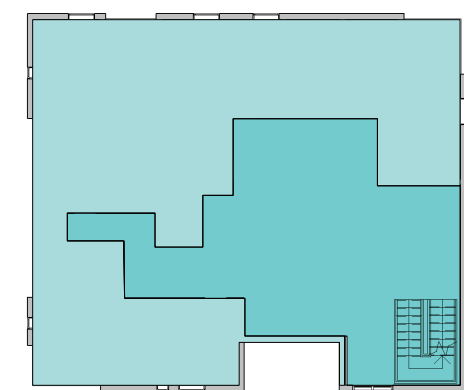
Program



Circulation



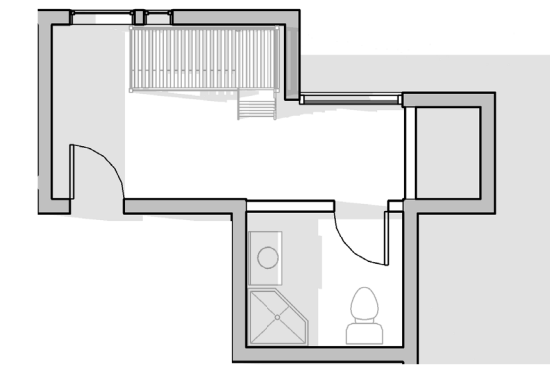
U-Shape Formation



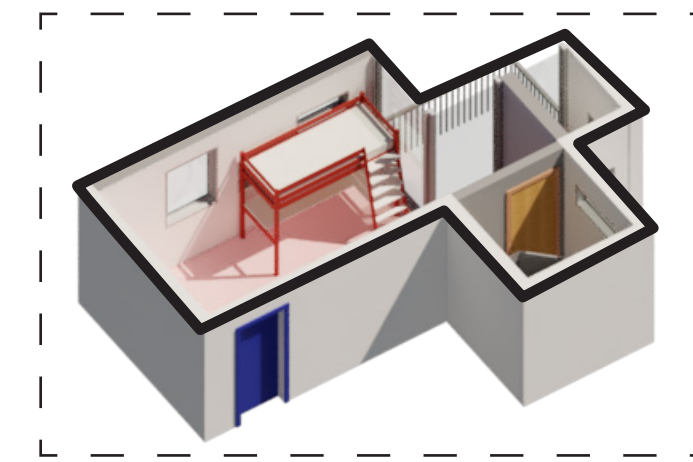
Private vs. Public

- Private Bedroom
- Common Spaces
- Exterior Space (Balcony)

- Private Room
- Common Spaces (Public)



Unit Plan

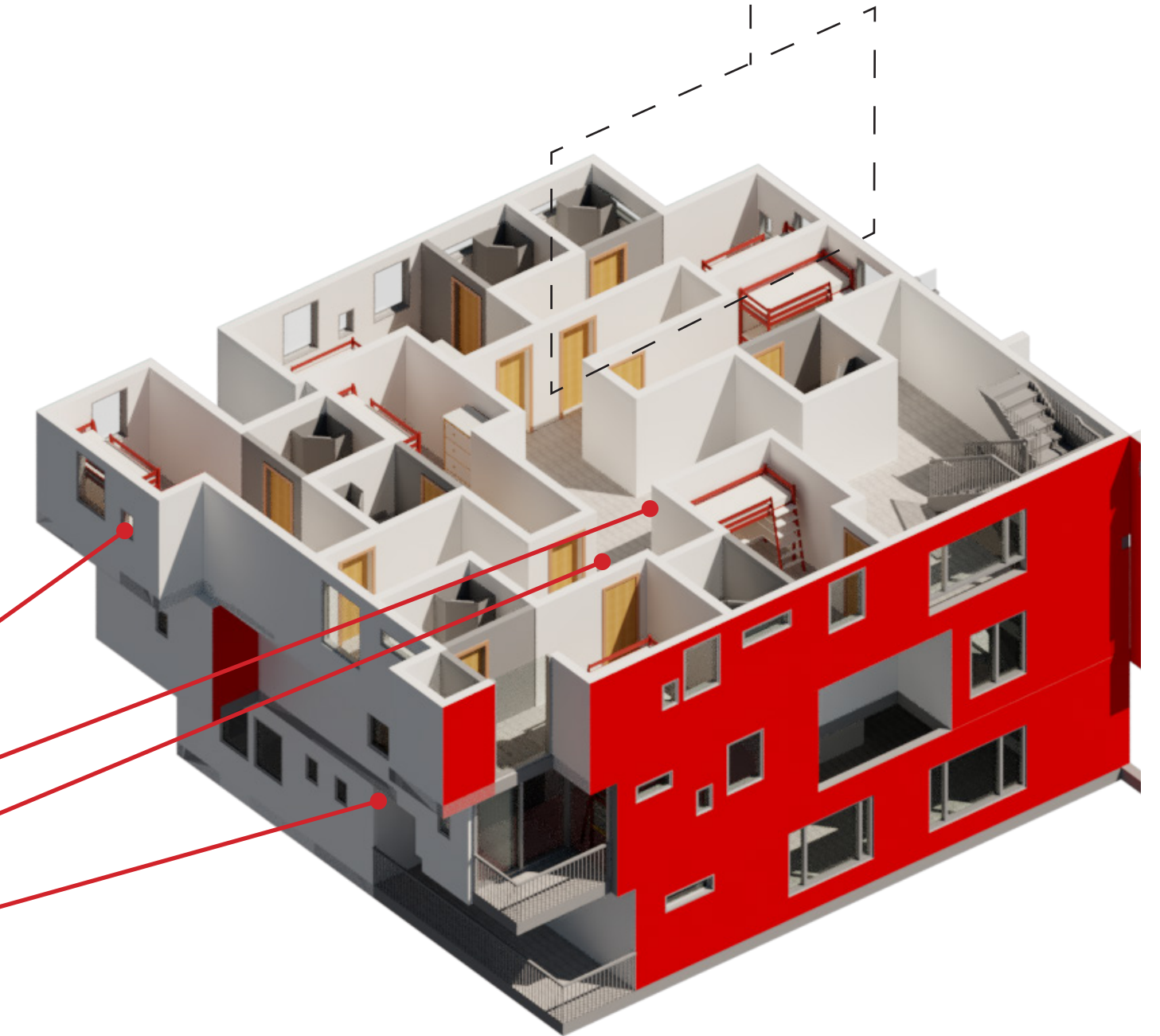


Color

- Primary colors (Walls)
- White (concrete)
- Translucent (glass)

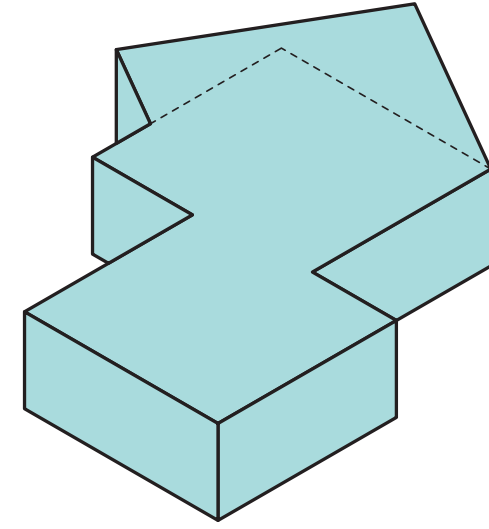
Materials

- Concrete Walls
- Carpet in Rooms
- Wood Doors
- Glass

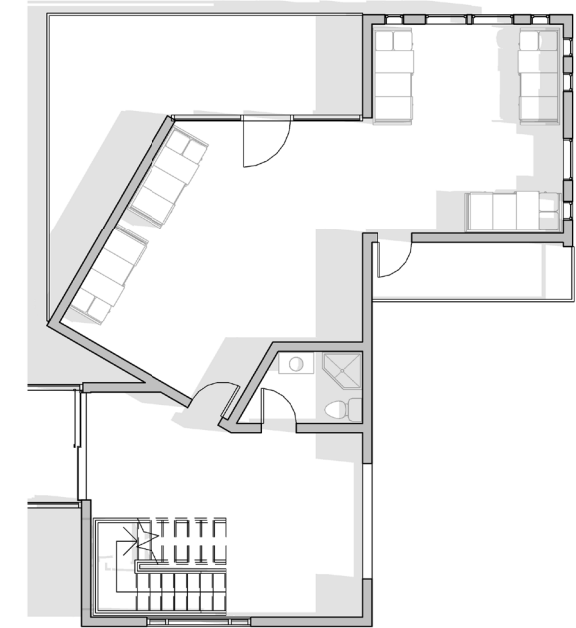


BUILDING 2 - HABITATION SPACE

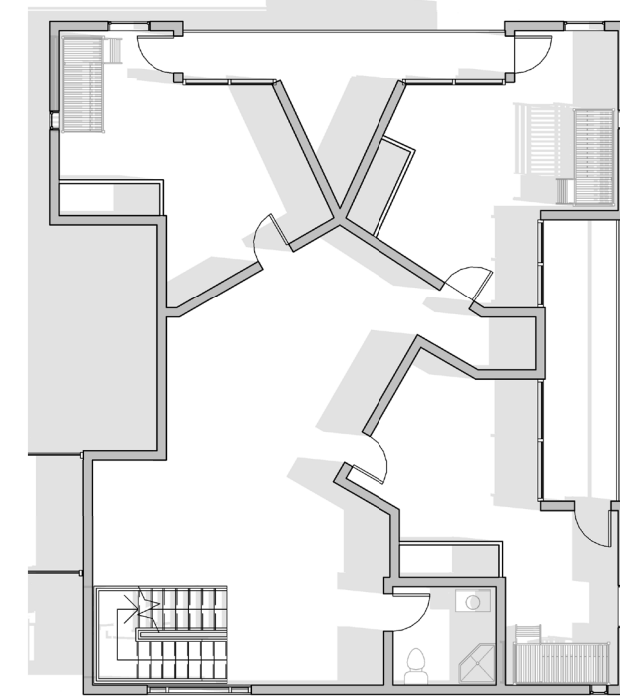
The geometry used for Building 2 consists of more sides and angles. Applying the rules to the floor plan, the geometry is used in different configurations that still allow for the rules to apply. Because of the geometry, each room includes a balcony.



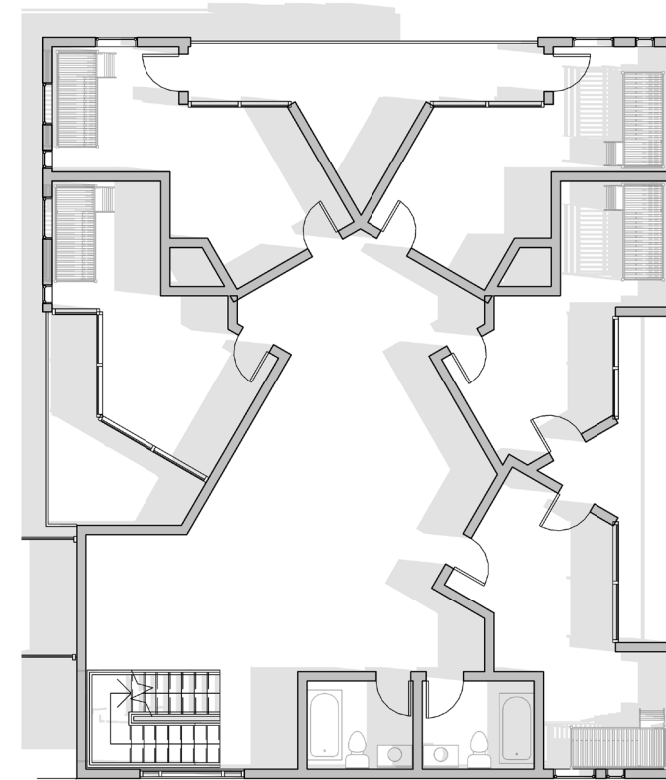
Base Volume



Level 2



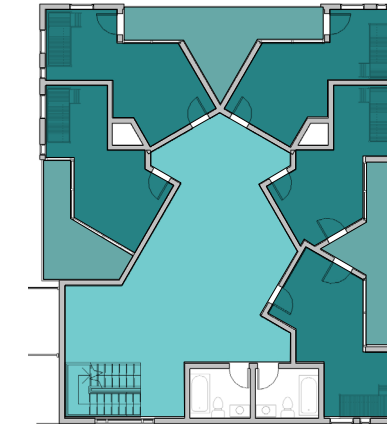
Level 3



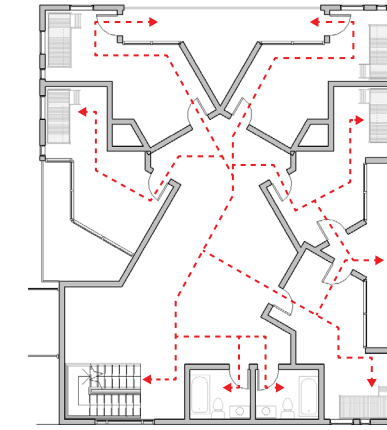
Level 3



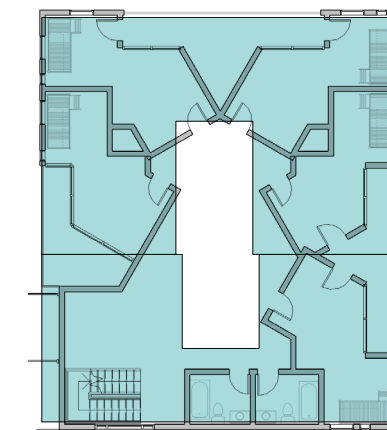
Diagrams



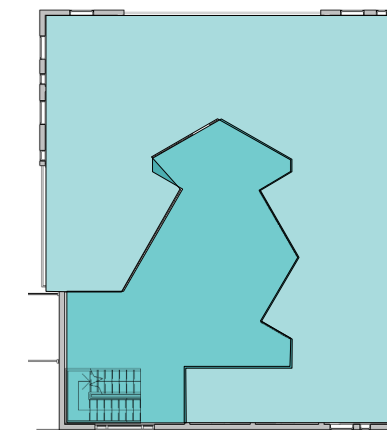
Program



Circulation

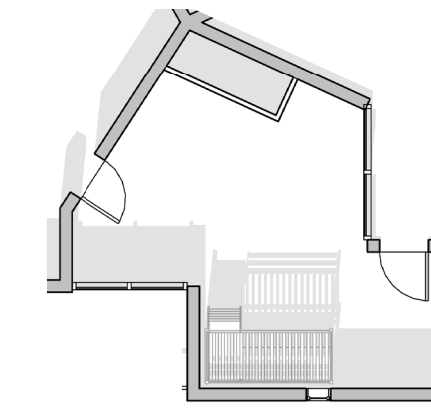


U-Shape Formation



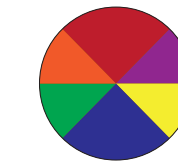
Private vs. Public

- Private Bedroom
- Common Spaces
- Exterior Space (Balcony)

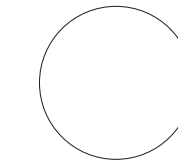


Unit Plan

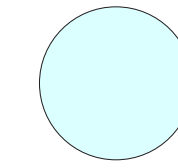
Color



Primary colors (Walls)



White (concrete)



Translucent (glass)

Materials

Concrete Walls

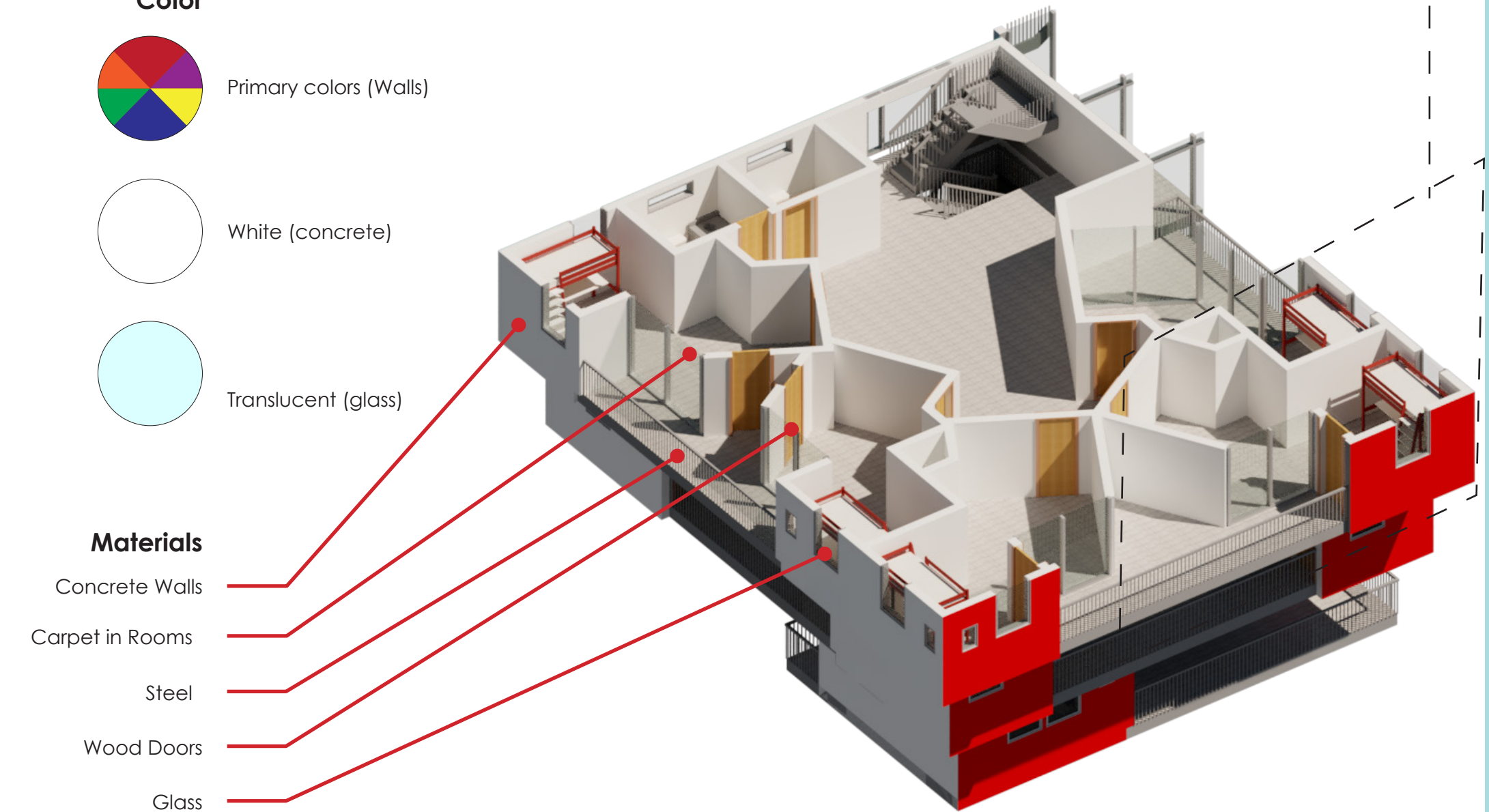
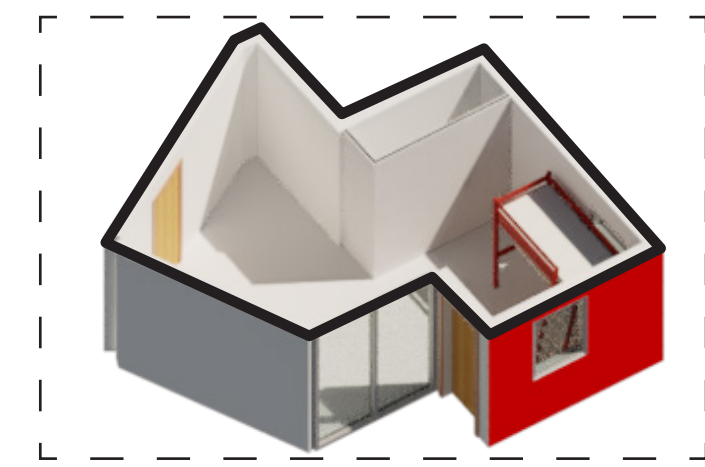
Carpet in Rooms

Steel

Wood Doors

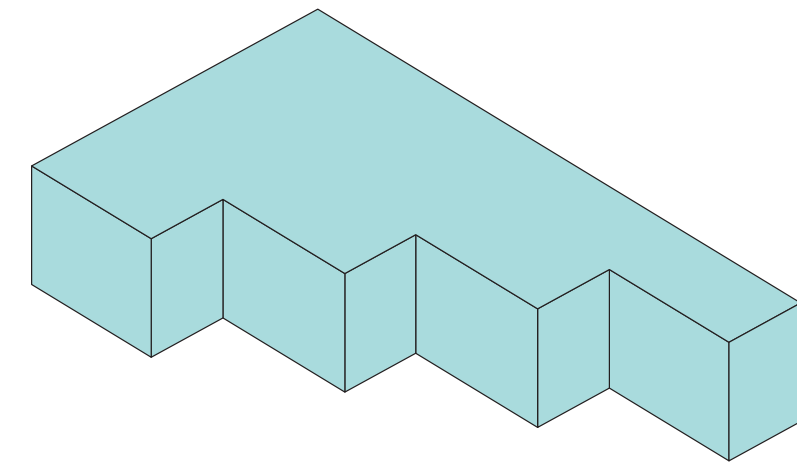
Glass

- Private Room
- Common Spaces (Public)

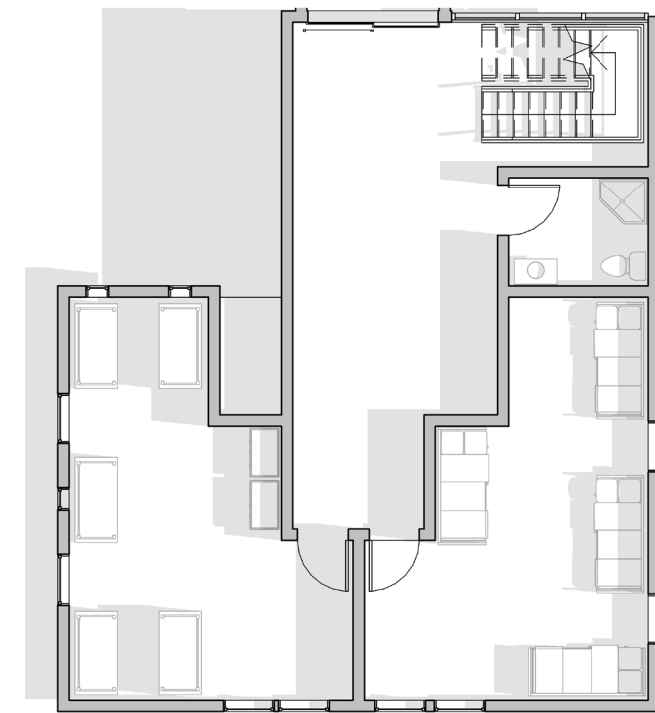


BUILDING 3 - HABITATION SPACE

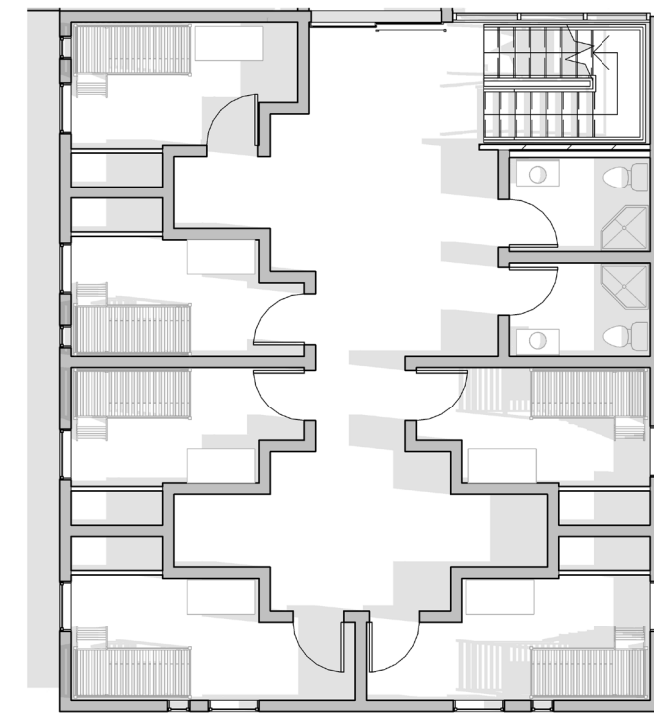
Building 3's floor plans use the same rules as the other floors; however, this building's formation is designed to have the most simple movement in the floor plans, even though the geometry used is the most complex.



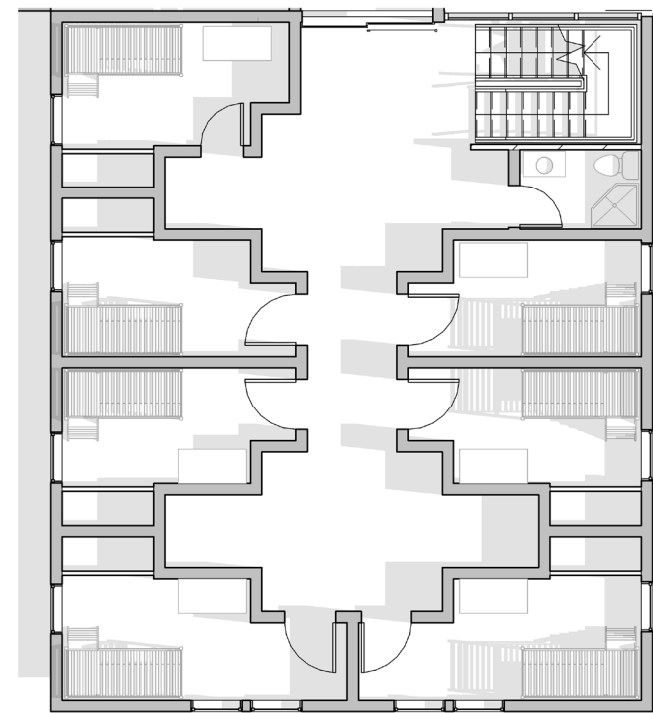
Base Volume



Level 2



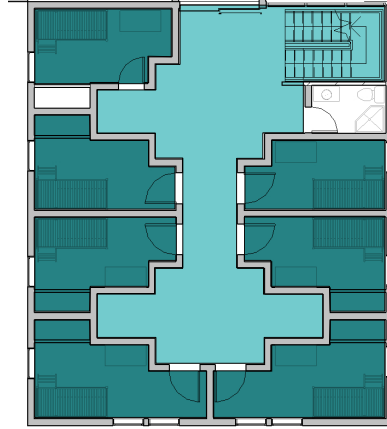
Level 3



Level 3

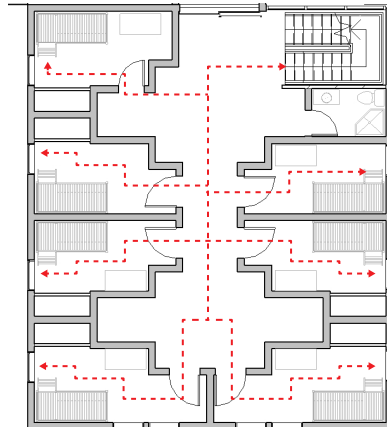


Diagrams

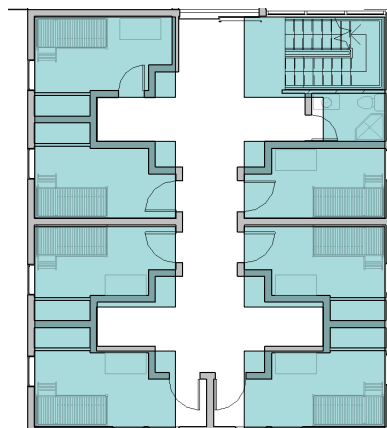


Private Bedroom
Common Spaces

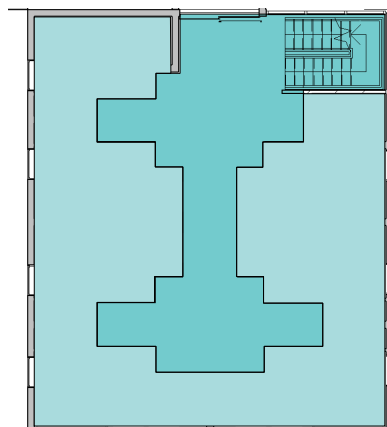
Program



Circulation

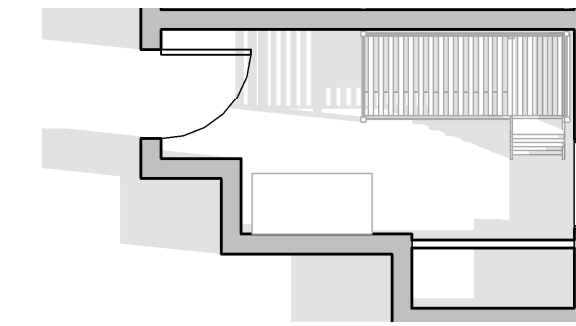


U-Shape Formation

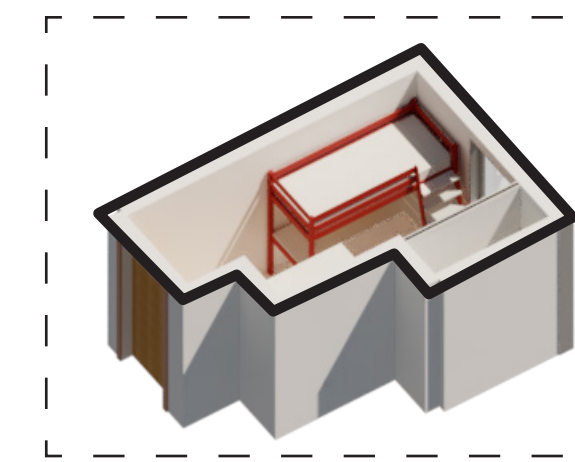


Private Room
Common Spaces (Public)

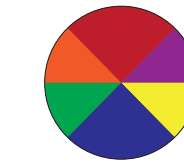
Private vs. Public



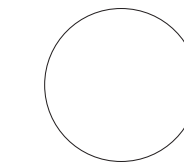
Unit Plan



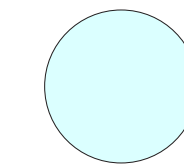
Color



Primary colors (Walls)



White (concrete)



Translucent (glass)

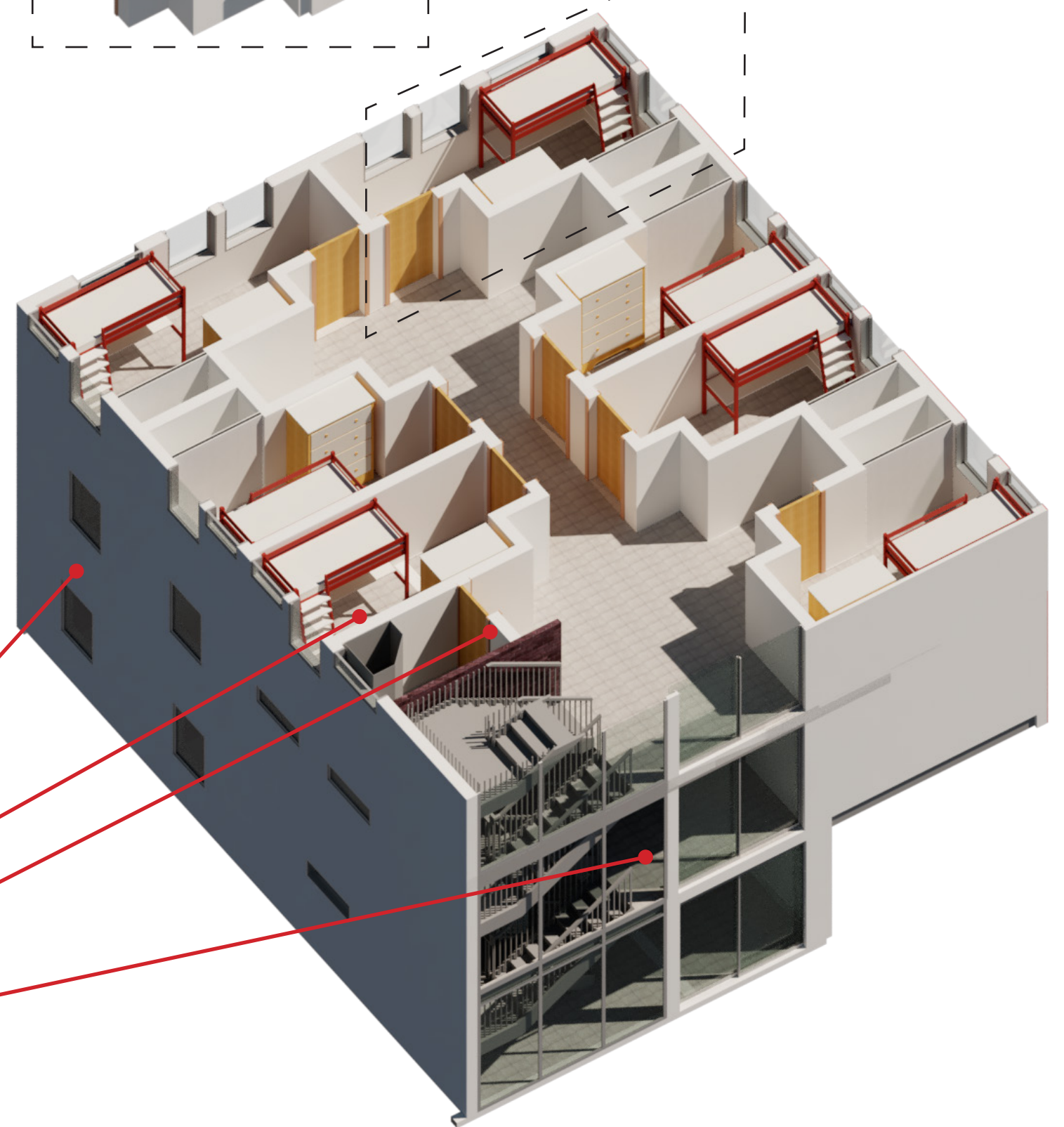
Materials

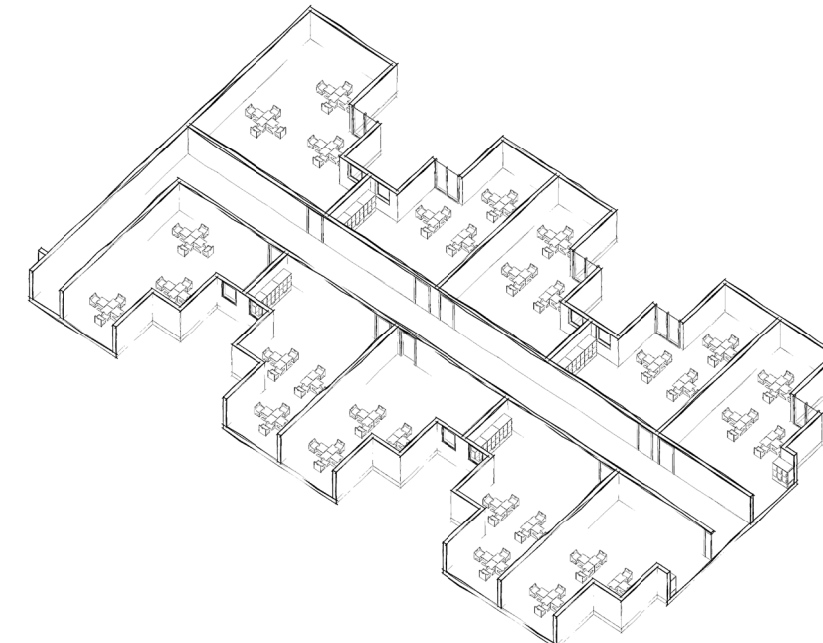
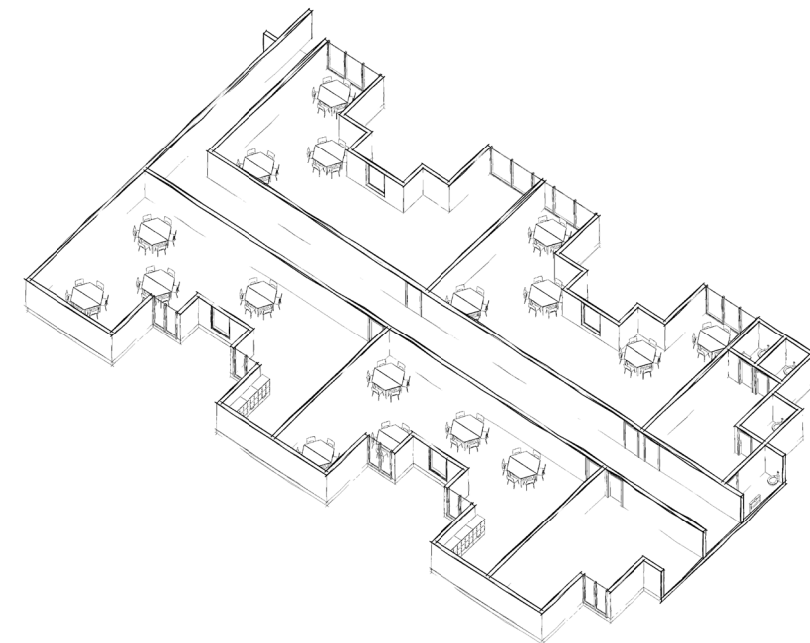
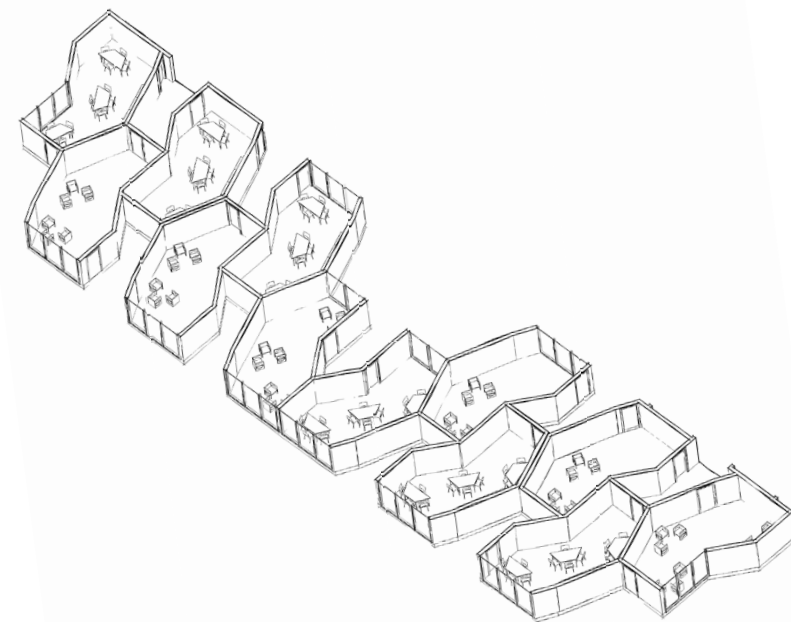
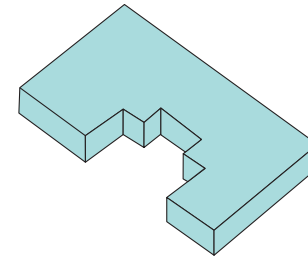
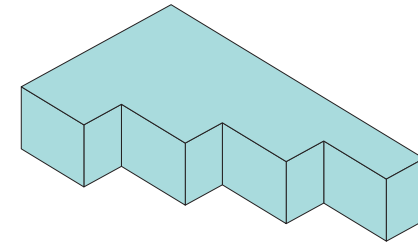
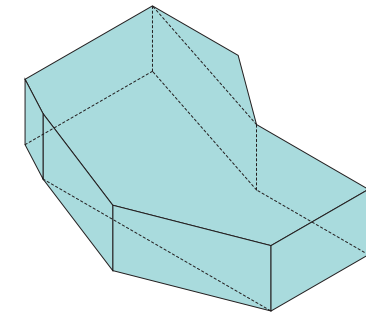
Concrete Walls

Carpet in Rooms

Wood Doors

Glass





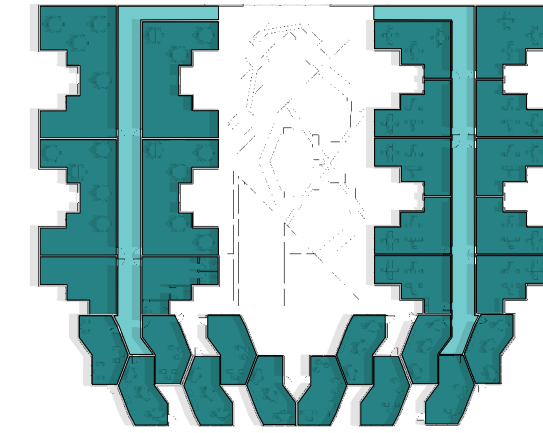
Pre-K - Kindergarten Classrooms

Elementary School Classrooms

Middle School Classrooms

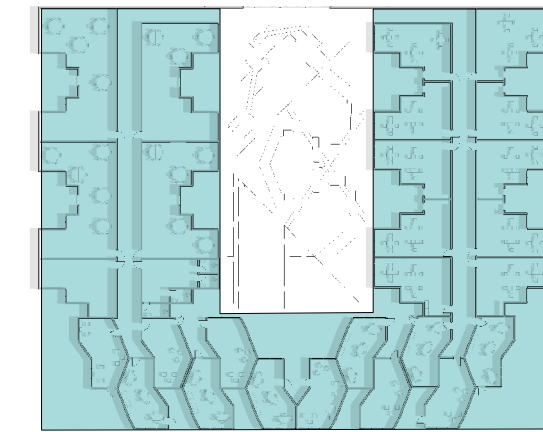
Diagrams

Program

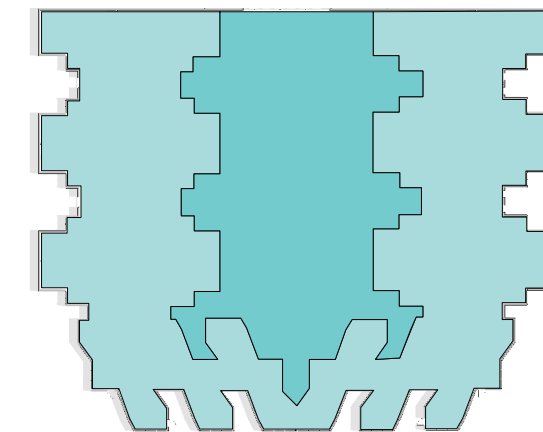


- Classrooms
- Hallways

U-Shape Formation

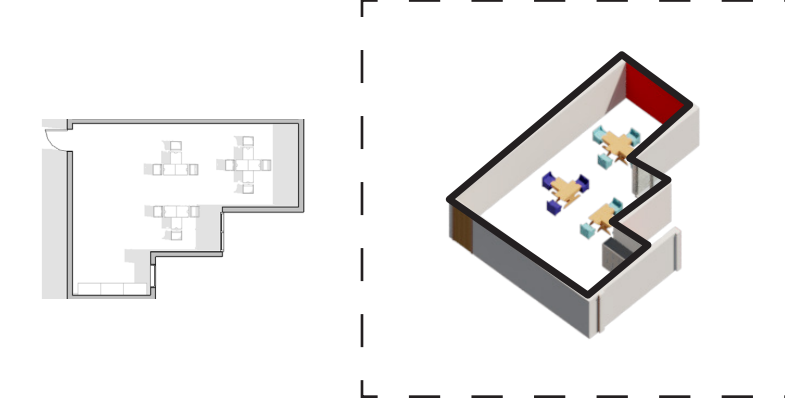


Private vs. Public

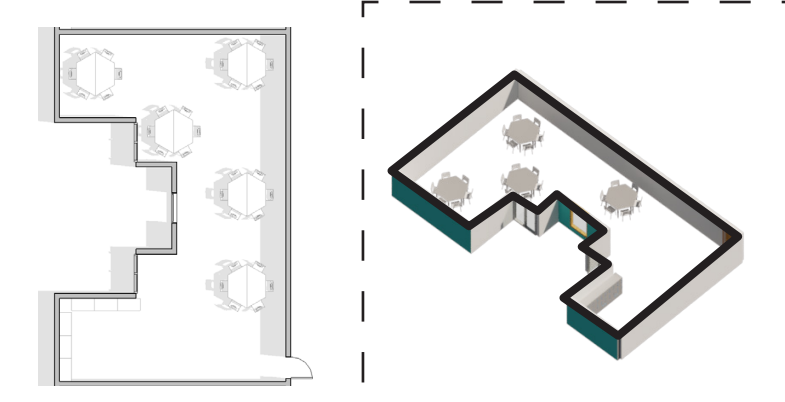


- Private Rooms (Classes)
- Common Spaces (Public)

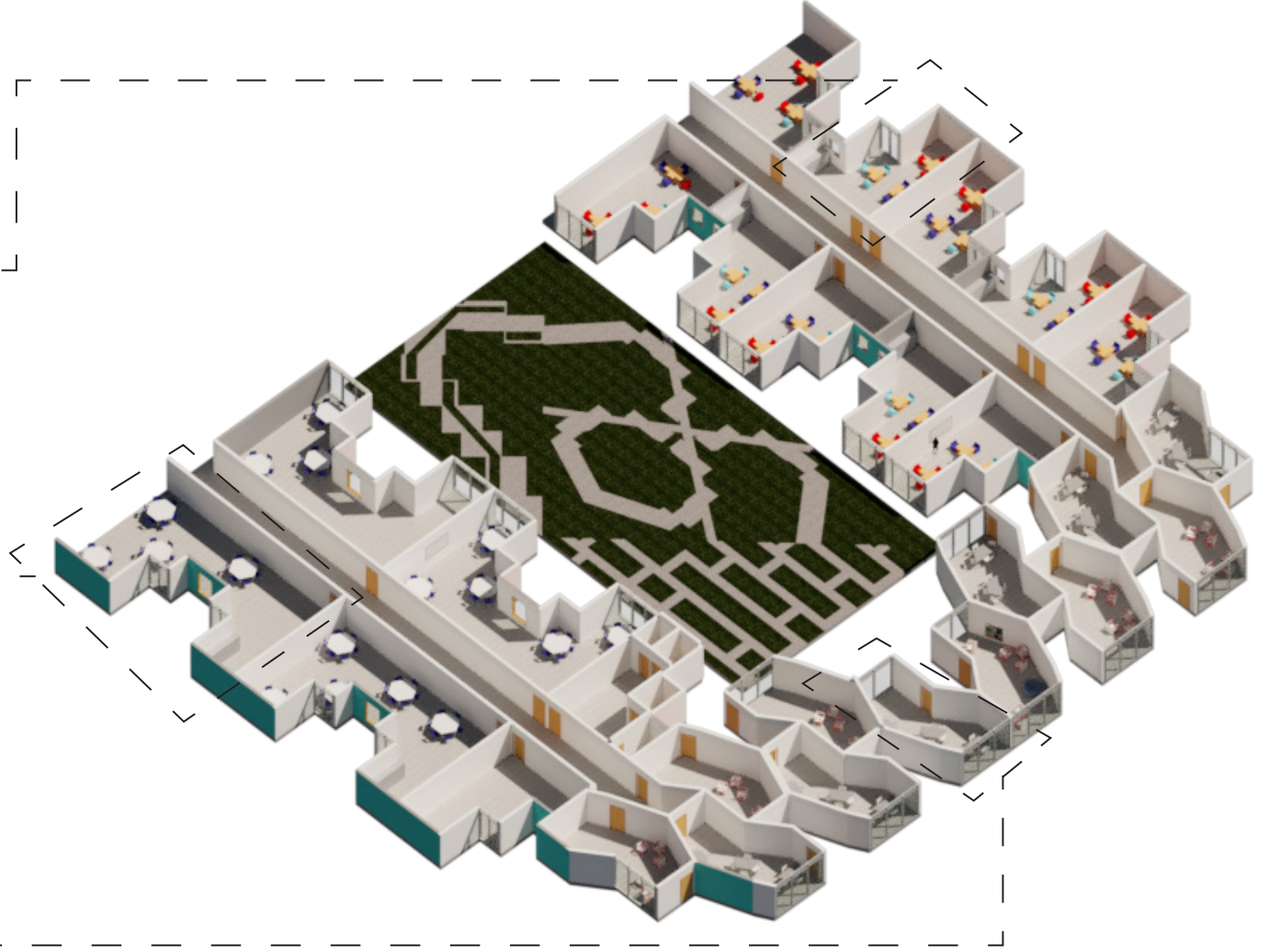
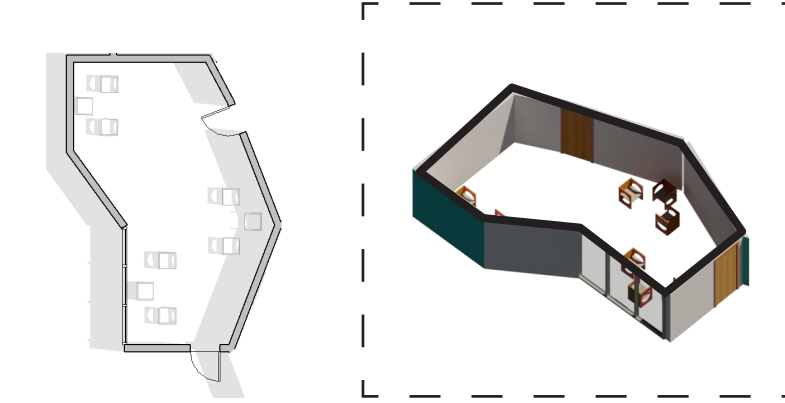
Elementary Classroom Plan



Middle School Classroom Plan



Pre-K - Kindergarten Classroom Plan

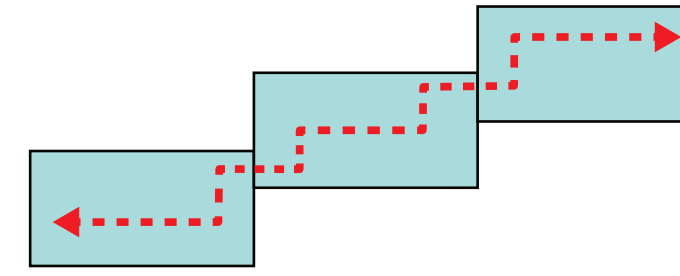


RULES

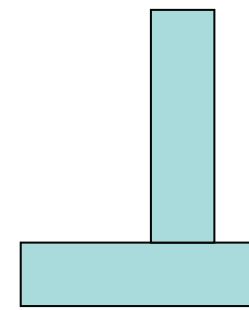
U-shape Formation



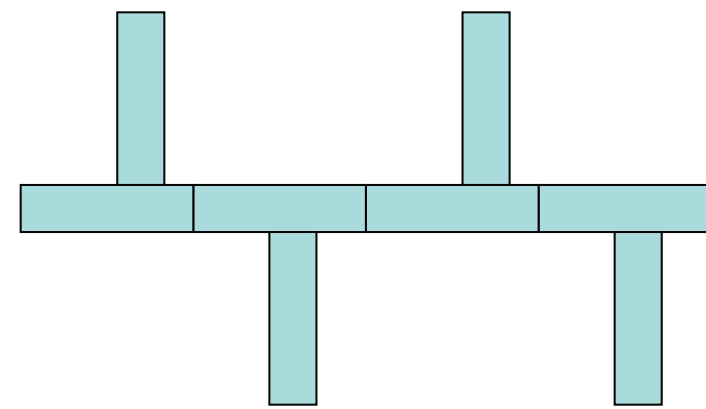
Zig-zag Movement



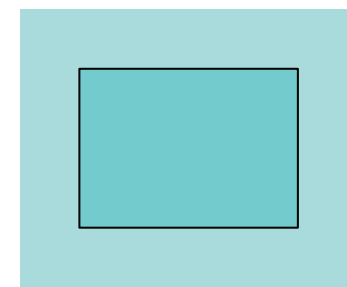
Interlocking



Repetition

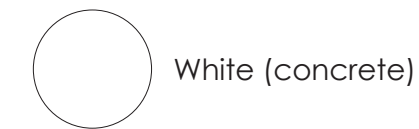


Public Spaces created by Private spaces



Private Space
Common/Public Space

COLORS



MATERIALS

Concrete
Carpet in Rooms
Wood Doors
Glass
Steel
Grass
Metal

Using what was gathered in the analysis and research part, I produced a set of rules that will be incorporated into each floor plan, no matter the geometry. The rules were formed in relation to cognitive development in children. Although there are a set of rules, each floor and building will have a different complexity level because of the geometries, the movement, and the space inside each building. Incorporating different color and materials also encourage the cognitive development in children.



CHAPTER 5: BIBLIOGRAPHY

Fig 35

BIBLIOGRAPHY

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EXTERNAL FIGURES

Figure 1 & 35: <https://unsplash.com/photos/tvc5imO5pXk>

Figure 2: "Lions Park Playscape." <http://ruralstudio.org/project/lions-park-playscape/>.

Figure 3: Migrant Detention Centers. <https://www.usatoday.com/in-depth/news/politics/elections/2019/07/16/migrant-detention-centers-described-2019-us-government-accounts/1694638001/>.

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Figure 6: "Migrant Caravan: Hundreds Reach Tijuana on US Border". <https://www.bbc.com/news/world-latin-america-46207034>.

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Figure 8: "Meet Some of the Migrants Heading for Canada via Risky Central American Route" <https://www.cbc.ca/news/world/african-migrants-mexico-dreams-canada-1.3992471>

Figure 9: "Thousands of Asylum-Seekers Left Waiting at the US-Mexico Border," <https://www.pri.org/stories/2019-06-17/thousands-asylum-seekers-left-waiting-us-mexico-border>.

Figure 10: "Family Separation by the Numbers." <https://www.aclu.org/issues/immigrants-rights/immigrants-rights-and-detention/family-separation>.

Figure 11: "Thousands of Asylum-Seekers Left Waiting at the US-Mexico Border," <https://www.pri.org/stories/2019-06-17/thousands-asylum-seekers-left-waiting-us-mexico-border>.

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Figure 15: Vittra Telefonplan. https://www.archdaily.com/202358/vittra-telefonplan-rosan-bosch?ad_source=search&ad_medium=search_result_all.

Figure 16: Fuji Kindergarten. https://www.archdaily.com/880027/tezuka-architects-fuji-kindergarten-wins-2017-moriyama-raic-international-prize?ad_source=search&ad_medium=search_result_all

Figure 17: Fuji Kindergarten. https://www.archdaily.com/880027/tezuka-architects-fuji-kindergarten-wins-2017-moriyama-raic-international-prize?ad_source=search&ad_medium=search_result_all

Figure 18: Fuji Kindergarten. https://www.archdaily.com/880027/tezuka-architects-fuji-kindergarten-wins-2017-moriyama-raic-international-prize?ad_source=search&ad_medium=search_result_all

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Figure 22: Skanderborggade Day Care Centre. <https://www.archdaily.com/6987/skanderborggade-day-care-centre-dorte-mandrup>.

Figure 23: Skanderborggade Day Care Centre. <https://www.archdaily.com/6987/skanderborggade-day-care-centre-dorte-mandrup>.

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Figure 31: "Lions Park Playscape." <http://ruralstudio.org/project/lions-park-playscape/>.

Figure 32: "Lions Park Playscape." <http://ruralstudio.org/project/lions-park-playscape/>.

Figure 33: "Lions Park Playscape." <http://ruralstudio.org/project/lions-park-playscape/>.

Figure 34: "Lions Park Playscape." <http://ruralstudio.org/project/lions-park-playscape/>.

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