

# The Children's House

A Montessori School in Alexandria, VA

Behnaz Nozari

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

Master of Architecture in Architecture

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# THE CHILDREN'S HOUSE

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### Abstract

Montessori education is a pedagogy based on the development of a child's natural intuition and curiosity. The teachers lead rather than teach, motivating the student to explore through activity. The student's spontaneous exploration cannot be dictated or controlled by the environment; therefore, the architect's role is to create an experiential architecture, one that exploits the context of pedagogy, site, and material to create a series of spaces to inspire within the individual a feeling unique to each.

This thesis aims to create an environment that promotes the learning process through the design of a private Montessori school in Alexandria, VA on the Potomac waterfront. The concept of the thesis suggests that success in education can be associated with the school's environment and design. The building teaches by itself and improves the learning process by creating a comfortable and didactic space. Furthermore, designing an elementary school demands the architect to look at the world through the child's eyes since their scale is different from adult people. Architects should consider the scale of the spaces, both in terms of size and perception of a child, to efficiently use the space. And by incorporating design aspects that are usually disregarded in traditional schools, such as daylighting and natural ventilation, the school becomes less of an institution and more like a welcoming home, just as Maria Montessori described it.

"A more just and charitable attitude would create an environment in which children were free from the oppression of adults, where they could really prepare for life. The school should feel like a shelter from the storm or an oasis in the middle of a desert, a safe haven for the child's spirit." - Maria Montessori

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### General Audience Abstract

Montessori education is a pedagogy based on the development of a child's natural intuition and curiosity. The teachers lead rather than teach, motivating the student to explore through activity. The student's spontaneous exploration cannot be dictated or controlled by the environment; therefore, the architect's role is to create an experiential architecture, one that exploits the context of pedagogy, site, and material to create a series of spaces to inspire within the individual a feeling unique to each.

This thesis aims to create an environment that promotes the learning process through the design of a private Montessori school in Alexandria, VA on the Potomac waterfront. The concept of the thesis suggests that success in education can be associated with the school's environment and design. The building teaches by itself and improves the learning process by creating a comfortable and didactic space. Furthermore, designing an elementary school demands the architect to look at the world through the child's eyes since their scale is different from adult people. Architects should consider the scale of the spaces, both in terms of size and perception of a child, to efficiently use the space. And by incorporating design aspects that are usually disregarded in traditional schools, such as daylighting and natural ventilation, the school becomes less of an institution and more like a welcoming home, just as Maria Montessori described it.

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## Acknowledgements

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This thesis is dedicated to my incredible family, especially my husband Mostafa. Thank you all for your endless love, support, and encouragement in this journey!

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“We must await this spontaneous investigation of the surroundings, or, as I like to call it, this voluntary explosion of the exploring spirit. In such cases, the children experience a joy at each fresh discovery. They are conscious of a sense of dignity and satisfaction which encourages them to seek for new sensations from their environment and to make themselves spontaneous observers... One of our little four-year-olds while running about in the court one day suddenly stood still and cried out, “Oh! The sky is blue!” and stood for some time looking up into the blue expanse of the sky.

The greatest triumph of our educational method should always be this: to bring about the spontaneous progress of the child.”

Maria Montessori, *The Montessori Method*

# THESIS PROPOSAL

Can architecture and design expand the definition of “education”, and provide a space that encourages learning by responding to the children’s educational and physical needs and community it serves?

## PROGRAMMING NEEDS

- Classrooms (Indoor and Outdoor)
- Sport Facilities
- Library and Media
- Outdoor Space (For Pupils and Community)
- Offices
- Entrance/Intake Space (School and Community)

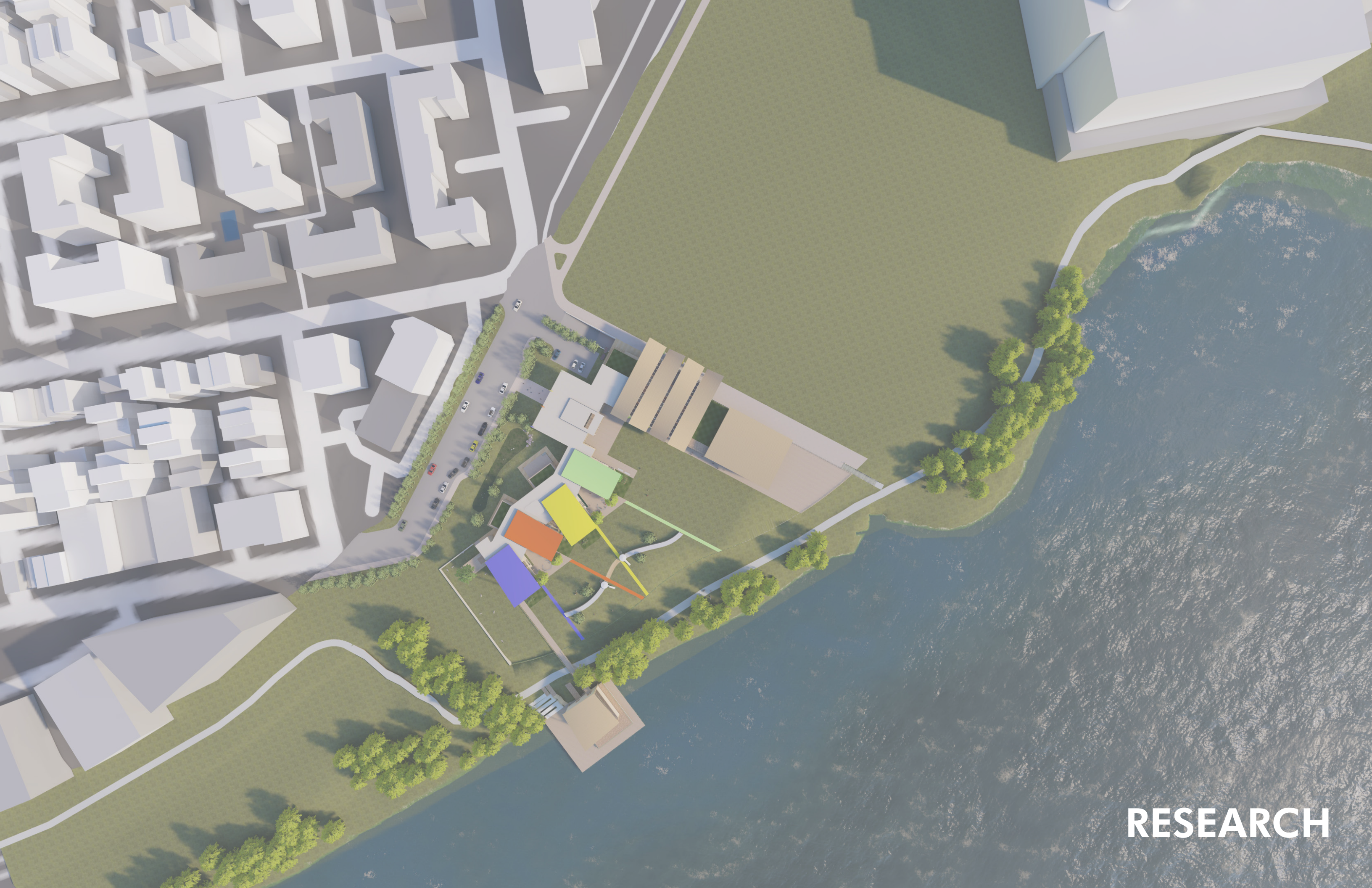
## DESIGN OBJECTIVE

- Provide didactic and efficient spaces for pupils that responds to their educational and physical needs
- Provide spaces that allow hands-on learning
- Create a space for community outreach and education opportunities
- Create community engagement and encourage the Montessori program

## DESIGN FACTORS

- Security
- Natural Light
- Acoustics
- Ventilation
- Cleanliness
- Community





RESEARCH

# MONTESSORI PEDAGOGY

Maria Montessori started to develop her educational method in the 20th century. In general words, the method is a scientific pedagogy that encourages an education that positively contributes to the development of children's brains, concerning their individuality and promoting their autonomy, self-confidence, and self-esteem.

A significant aspect of Montessori's original approach to pedagogy as it related to the students' learning environment revolved around the adaptation of spaces that were already grounded in the lives of students. During early experiments involving underprivileged children she established Children's Houses in the lower levels of tenement buildings, allowing the children to learn in familiar environments while decreasing anxieties of working parents who might otherwise have had to leave their children unattended. Montessori teachers guided pupils in activities related to their daily life that would carry from the classroom to the home including housework, good manners, and language. The students exhibited pride when cleaning public spaces and tending to garden plots; others living in the complex soon began similar routines.

In contemporary practice, the school is separated from the house; the classroom is considered the "second home" of the child, viewed as an object separate from the child's familial home. Yet it may have the same meaning: it is a space to be safe, to be fed and to learn. It is a miniature of living.



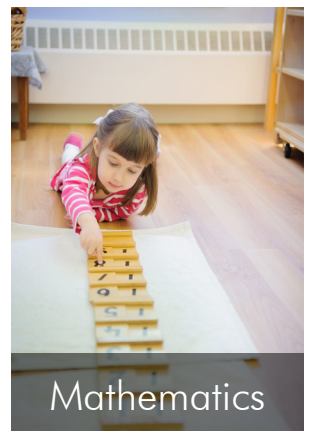
Practical Life



Language



Sensorial



Mathematics



Culture & Art

Fig. 1 Montessori Curriculum

# MONTESSORI PEDAGOGY

The child's action and reflection on that action become the engine for learning in a Montessori school. The perception of objects, as well as their material and tactile qualities, are valued. The child approaches his or her world with an inquisitive attitude; a child's educational journey is guided by an intrinsic passion for exploration rather than societal obligations. As a result, Montessori architecture should function as a complement to the child's development. The school setting should provide opportunity for him or her to discover the physical and tactile character of their surroundings. Rough, smooth, loud, quiet, soft, hard, huge, little, heavy, light, together, separate, above, below, bright, dark, vast, enclosed; If a Montessori school's teaching is based on how a kid explores and interacts with his or her environment, the design should reflect that.

The school's early organization was driven by the second home and experiential education concepts. The sequence of spaces a student would encounter should be varied and dynamic, and the arrangement should represent Montessori's archetypal home-community system. There should be a space for communication between parents and teachers, a space to be both within and without at the same time, a space for functioning, a space for growing, a space for being around, a space purely for the child, a space to create; while operating in the context of pedagogy, the architecture must be something other than education, something that gives something to the child.



Fig. 2 Examples of Montessori Classroom

# LEARNING THROUGH PLAY

Playful learning includes free play, guided play, and games. When somebody thinks of children’s play, they usually think of free play, that children play with little or no guidance from grown-ups or the environment. Free play is a great way for children to explore the world around them, interact with others, and innovatively imagine new realms.

While children benefit from the unrestricted social interaction and joy of free play, evidence indicates that more guided types of play can help children to develop their abilities in language, math, literacy, and other areas. In guided play, adults or the built environment gently guide children’s play, consciously enhancing its learning elements.

A playful learning environment is a safe place that fosters **choice**, **wonder**, and **delight**, enabling children to engage in deeper, more meaningful learning through play. It makes visible connections between children’s lives and curricular studies/school.

A playful environment incorporates:

- access
- comfort
- agency (learners making decisions)
- flexibility

## TYPES OF PLAY

FREE PLAY

GUIDED PLAY

GAMES

Initiated by:	Child	Adult	Adult
Directed by:	Child	Child	Child
Explicit learning goal:	No	Yes	Yes

## THE DIFFERENCES BETWEEN

### FREE PLAY

Climbing the pole to the playground netting? That’s free play.

Kids on a playground near a bus stop? Free play

Stocking a library with more toys? That encourages free play

### GUIDED PLAY

Add hatch marks with numbers to those same pole and kids talk about how high they climbed - playful learning

Add puzzles targeting spatial skills special hopscotch games that build impulse control and you create playful learning

Add tangram blocks that invite families to play with geometric forms and a climbing wall with letters and you get playful learning.

# LEARNING THROUGH PLAY

In this project, it is considered how the following environmental elements can support learning through play by fostering **choice**, **wonder**, and **delight**.

## 1. Do the furnishings and arrangement offer...?

- flexibility to move chairs, tables, cushions
- novelty: furnishing/arrangement change sometimes
- variety of work areas, centers

## 2. Are you able to use the architecture...?

- variety of spaces for different types of activities
- flexibility such as opening doors, partitions
- creativity by using fixed architectural features in novel or playful ways

## 3. Are the materials...?

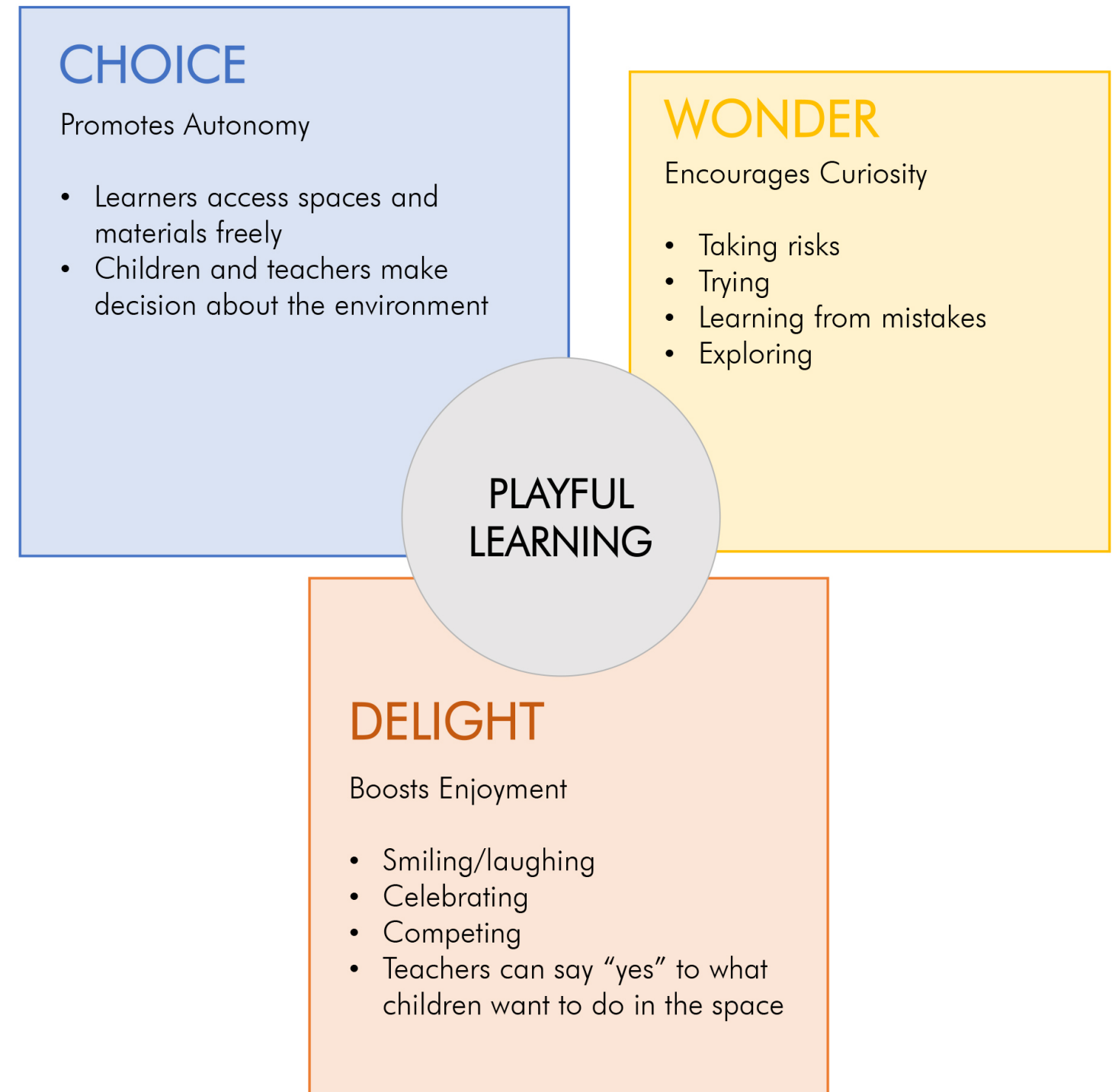
- natural
- authentic
- novel
- appealing to the senses
- connected to learner's lives/unit of study
- supportive of learner's independence
- supportive of dramatic play

## 4. Does the storage...?

- make materials visible and accessible at learner's height
- have space to store works-in-progress
- have a clear organization

## 5. Do the aesthetics of the space feel playful?

- colors, sounds, light, textures





**CASE STUDIES**

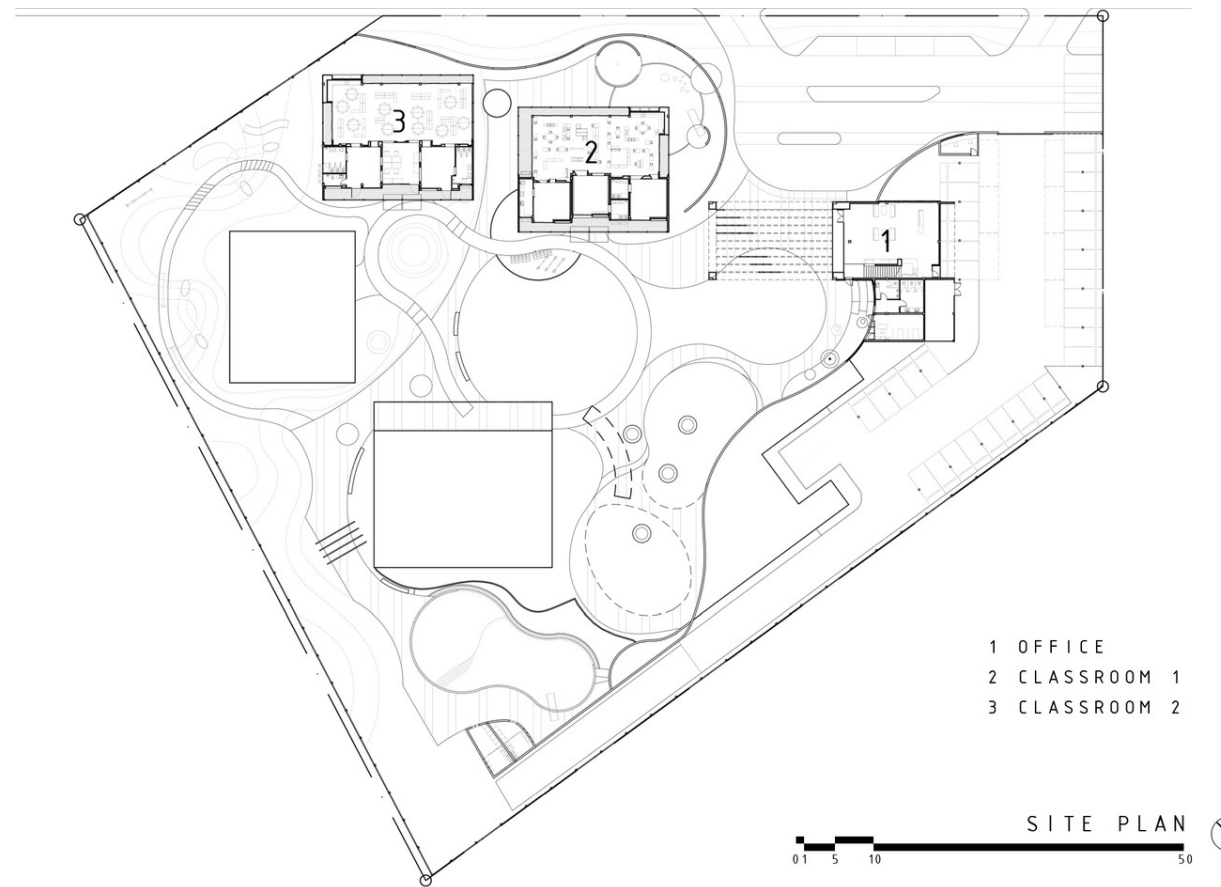
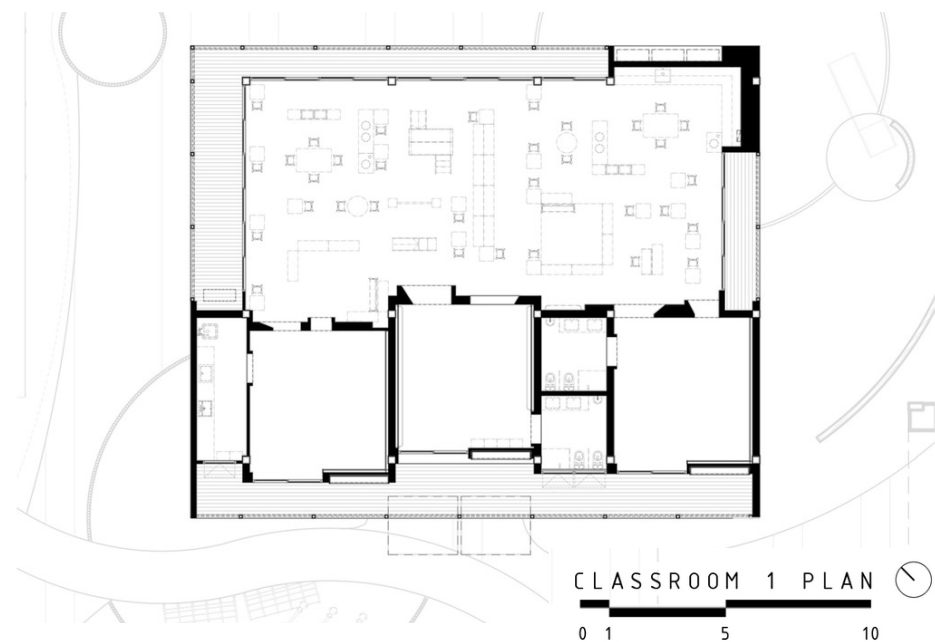
# RATCHUT SCHOOL

- Location: TAMBON HUA NONG, THAILAND
- Architects: Design in Motion
- Area: 1100 m<sup>2</sup>
- Year: 2016

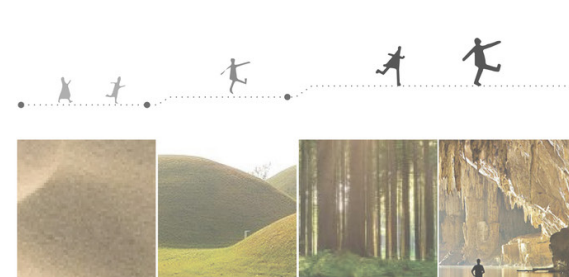
The project reflects the Montessori ideal learning environment, where a learning space should resemble a home more than a typical classroom. Hence, the learning area is divided into multiple small-sized rooms, where the children could feel more like home whenever they come to school. The design layout of these “rooms” relates with each of children’s activities.

The best learning environment for young children is nature, that is why the building layout has been carefully designed to support children’s self-learning and integrated both outdoors and indoors spaces to provide various learning activities. This layout incorporates different “nature” elements, each one suitable for different phases of child’s development. The selected natural elements that have been utilized to create an ideal learning environment for this project include caves, sand, mounds, and trees.

Maria Montessori believed outdoor play is where children learn a sense of order and an appreciation of beauty, that’s where they also become aware of the seasons and the life around them.



INSPIRATION : EXPLORING IN NATURE



SITE AND CLASSROOM

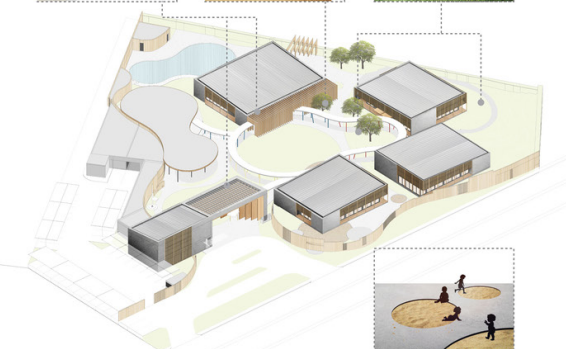
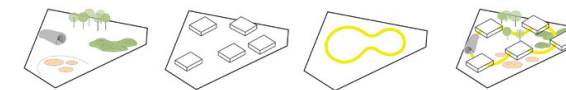


Fig. 3 Design Documents of Ratchut School, Thailand

# BEIJING PENINSULA KINDERGARTEN

- Location: DAXING, CHINA
- Interior Designers: ArkA
- Area: 8000 m<sup>2</sup>
- Year: 2017

Mixing the Montessori education with the architecture, the designers aim to create a more suitable space and safe environment for the growth of children, allowing them to play and learn freely and happily.

The original building was an open-plan office, with its entire space being divided into 4 floors. The first mission is to make over the space according to kids' physical proportion. In the design, they add several small houses which offers the kids a sense of ownership, protection, and safety.

The design of the classroom resembles a simple house. The library is altered into an open space with a tree planted in the center, just similar to the main square of a rural town. Corridors become a multifunctional open space where kids move around spontaneously and play with others, and it is easy for teachers to supervise at the same time. Some hallways are portrayed as fields for the children to experience seasonal changes and roam around.

A safe and easy design is applied to the corners and doors so that younger children can also use without worrying about the sharp corners.

A big blue staircase links every floor, as if it were a canal from the old times. The composition of those houses and staircase introduces an image of a village built along the river, bringing the kids closer with nature. Same as a harmonious village, the Montessori Kindergarten serves as a community where children and adults engage in learning and interacting, and they enjoy the experience.

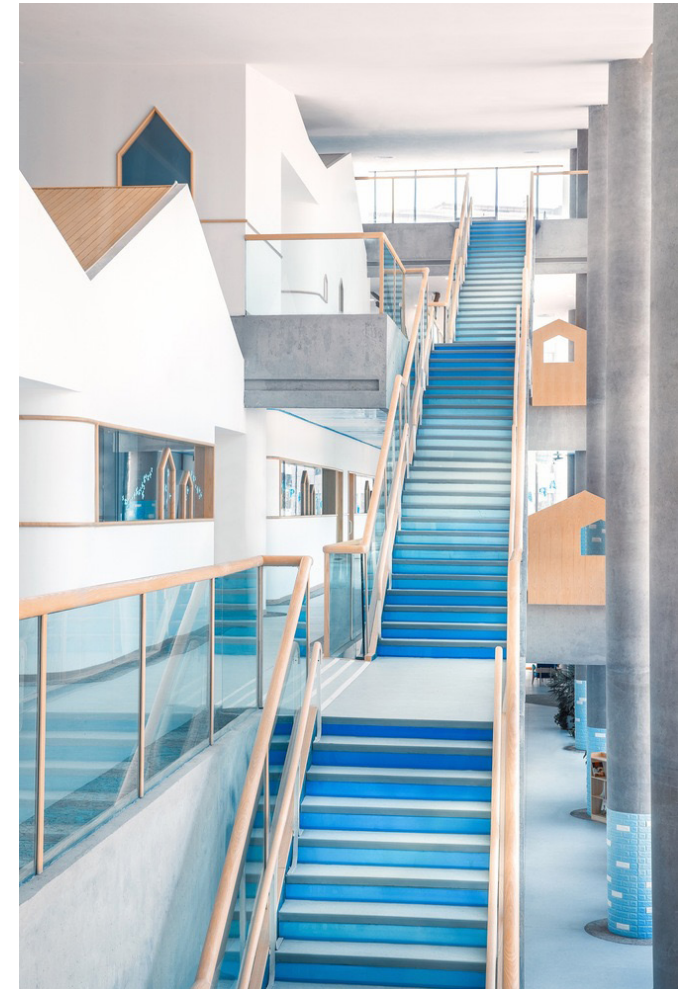
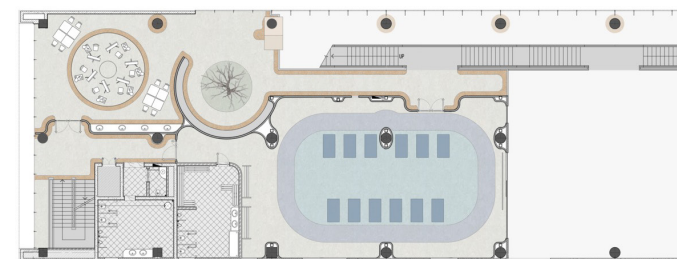
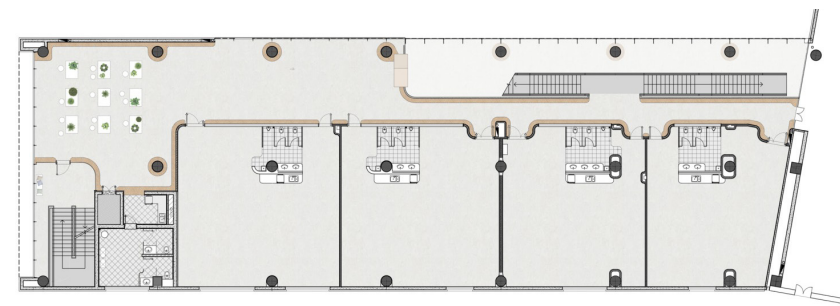
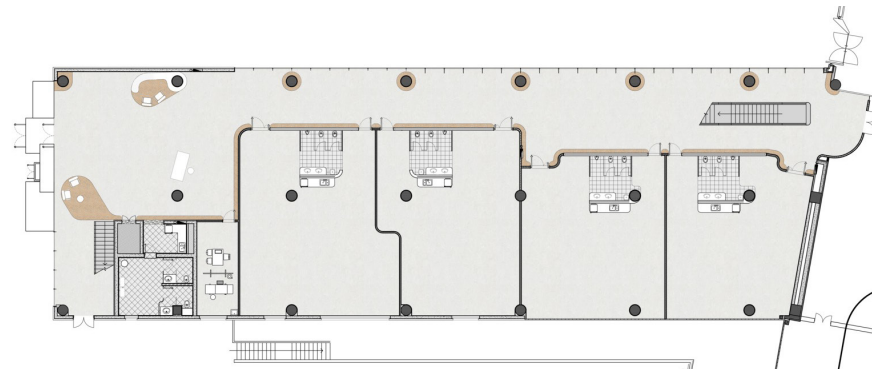
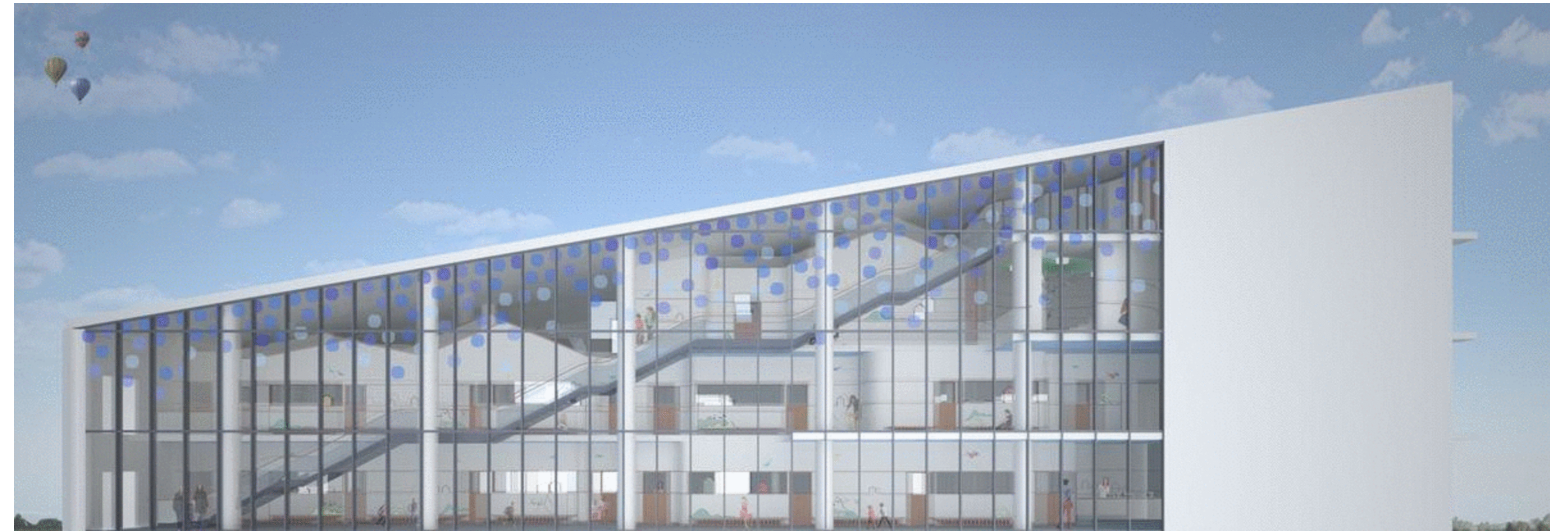


Fig. 4 Design Documents Beijing Peninsula Kindergarten, China



# FAYETTEVILLE MONTESSORI ELEMENTARY

- Location: FAYETTEVILLE, AR
- Architects: Marlon Blackwell Architects
- Area: 7937 ft<sup>2</sup>
- Year: 2012

This Montessori Elementary School sits in the small triangular remainder of a site prone to flooding and houses classrooms, a conference room, and a new commercial kitchen.

The ground floor opens to include a raingarden that retains and filters rainwater to help mitigate flooding. A green roof atop the single-story eastern volume also helps reduce runoff and serves as further insulation. A second floor is provided along the western edge, housing additional classrooms.

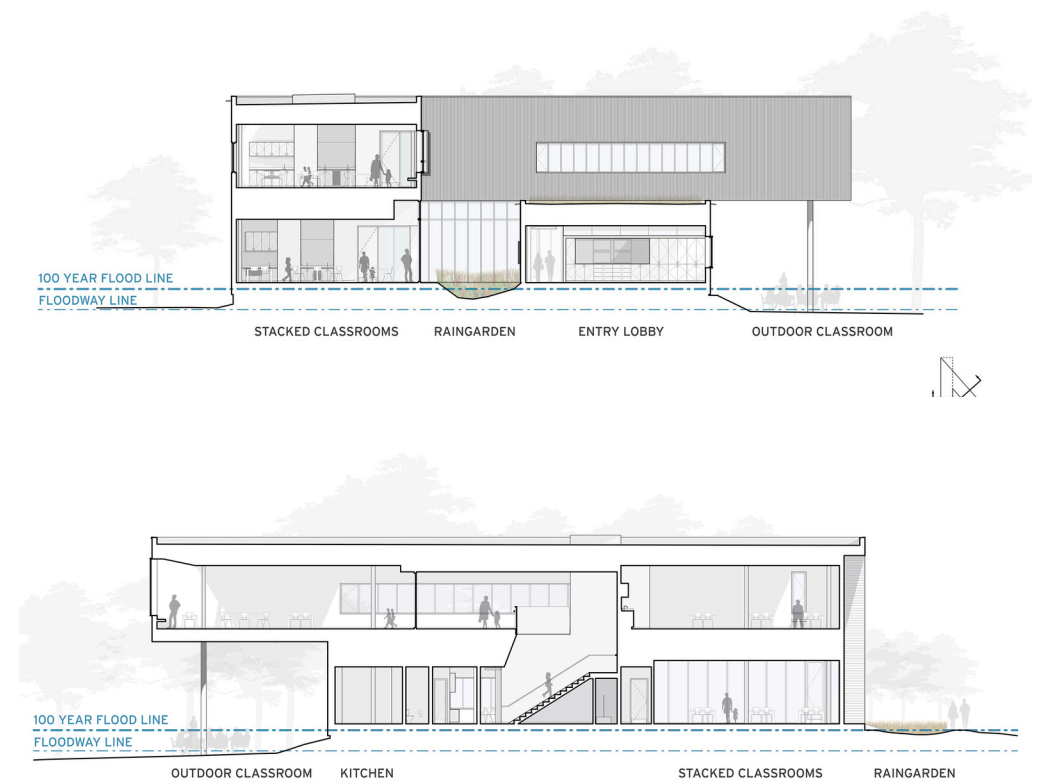
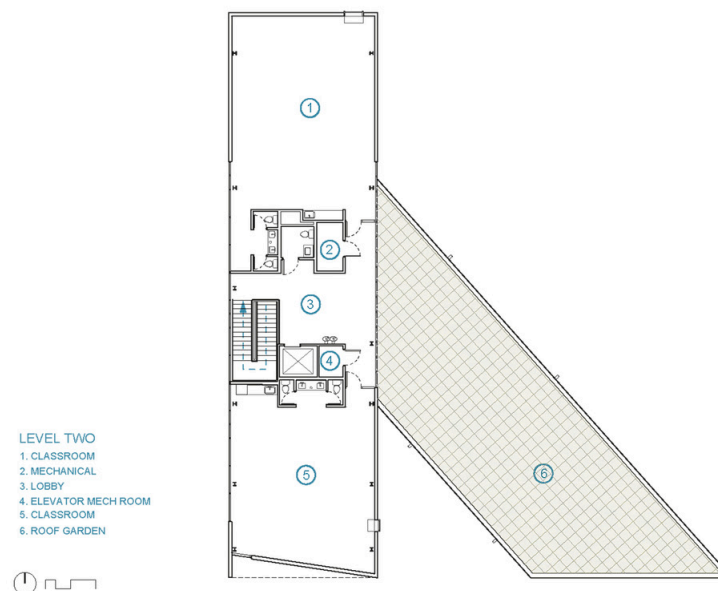
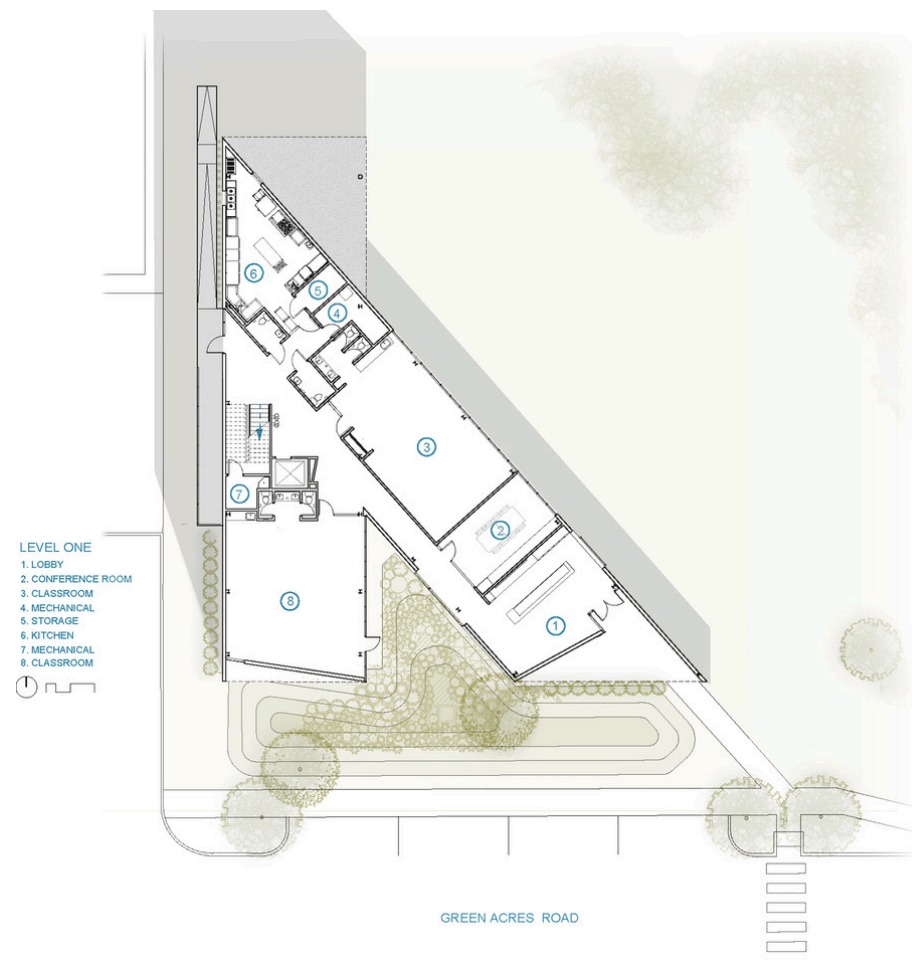


Fig. 5 Design Documents of Fayetteville Montessori Elementary School, US



**SITE ANALYSIS**

# SITE SELECTION CRITERIA

The City of Alexandria, VA, currently has 13 existing elementary schools, and there is only a Montessori school in Alexandria, which is located in Old Town. To determine the site selection for the proposed private Montessori elementary school, the existing schools were mapped. Mapping the existing schools revealed a great demand for a new school in North Old Town. This neighborhood lacks an elementary school that is walkable and bikeable, a place that could bring many benefits to its vicinity by providing playing fields and the availability of after-school facilities for community activities.

To understand the community of North Old Town, it was essential to look at what other public, community-oriented services were located in the area. After doing some research, it was evident that because of the waterfront and Mount Vernon Trail, this area is a community magnet, with existing and planned community services scattered along the Alexandria waterfront. The chosen site for the school acts as an excellent complementary service to the existing and planned mixed-use zone along the waterfront.

## SELECTION CRITERIA:

- Unutilized site or vacant site
- Residential/commercial mixed-use area
- Adjacent to libraries, parks, museums, and other community services
- Accessible by walking, biking, and public transit.
- Diverse, vibrant neighborhood identity
- Connected to a cultural district
- Connected to nature and green space
- Takes full advantage of existing resources

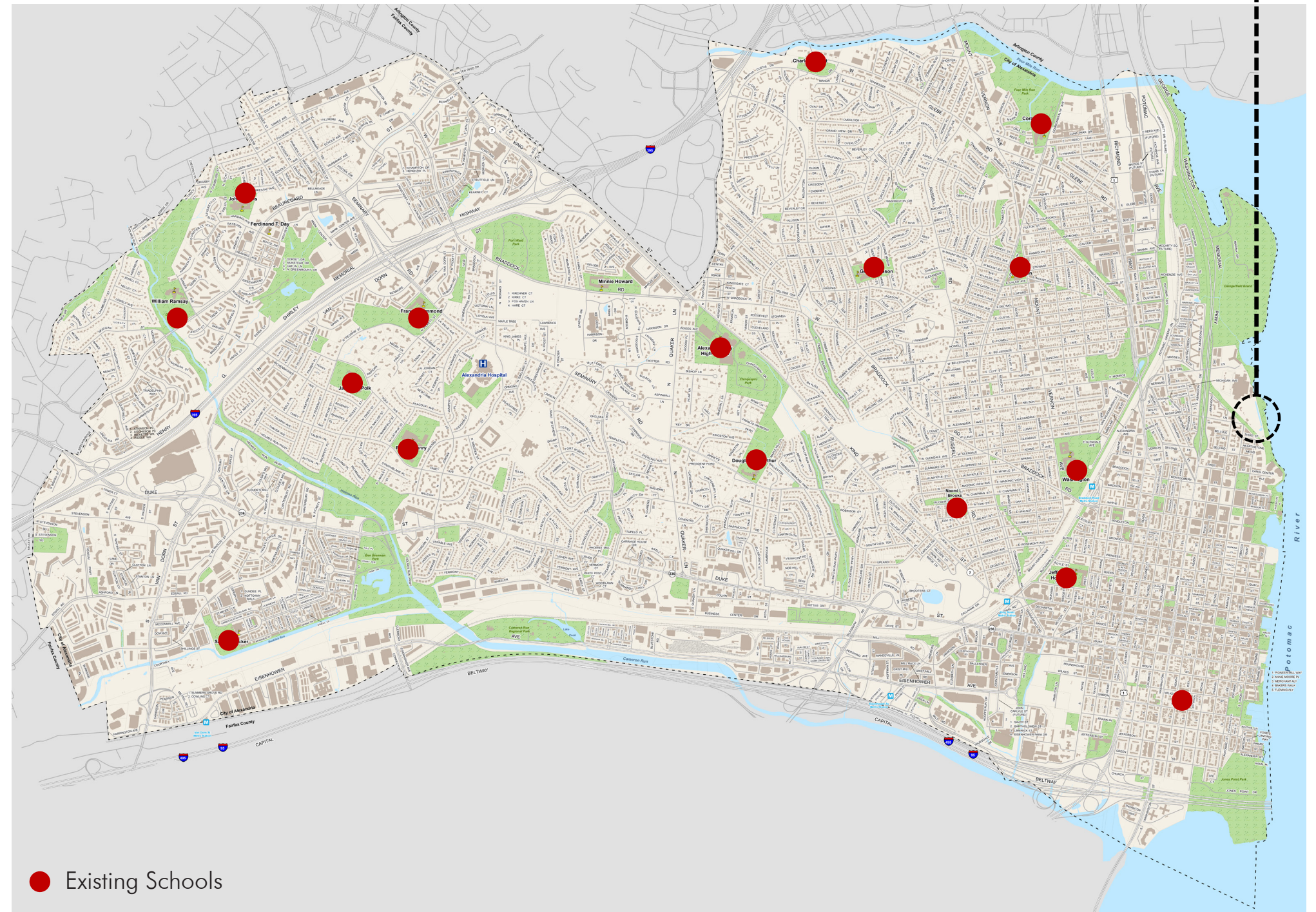
## DESIRED CHARACTERISTICS:

- Waterfront
- Interesting topography
- Opportunity to create a new community center

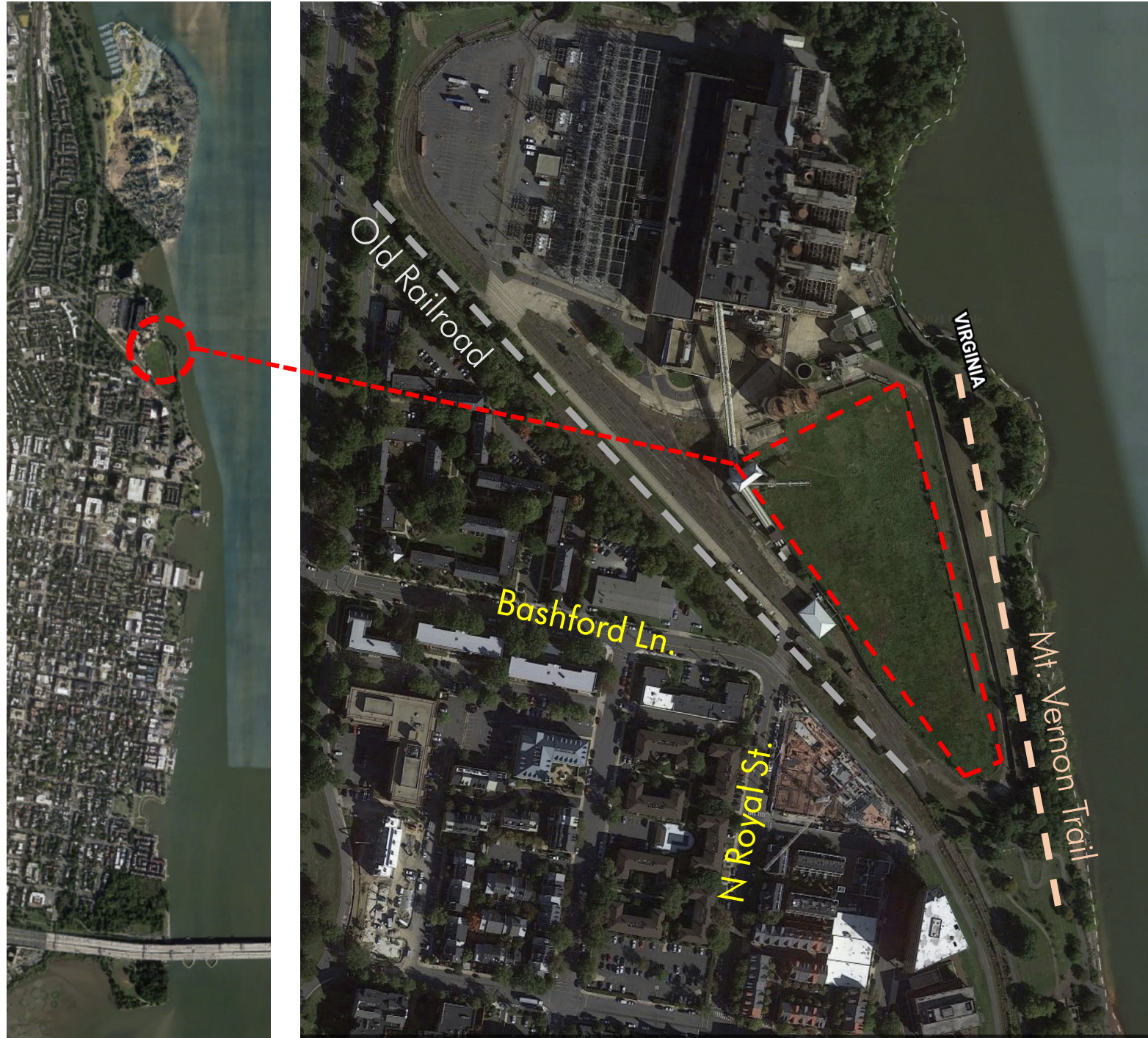
## Selected Site Location:

South of Alexandria Old Powerplant at the intersection of N Royal St. and Bashford Ln.

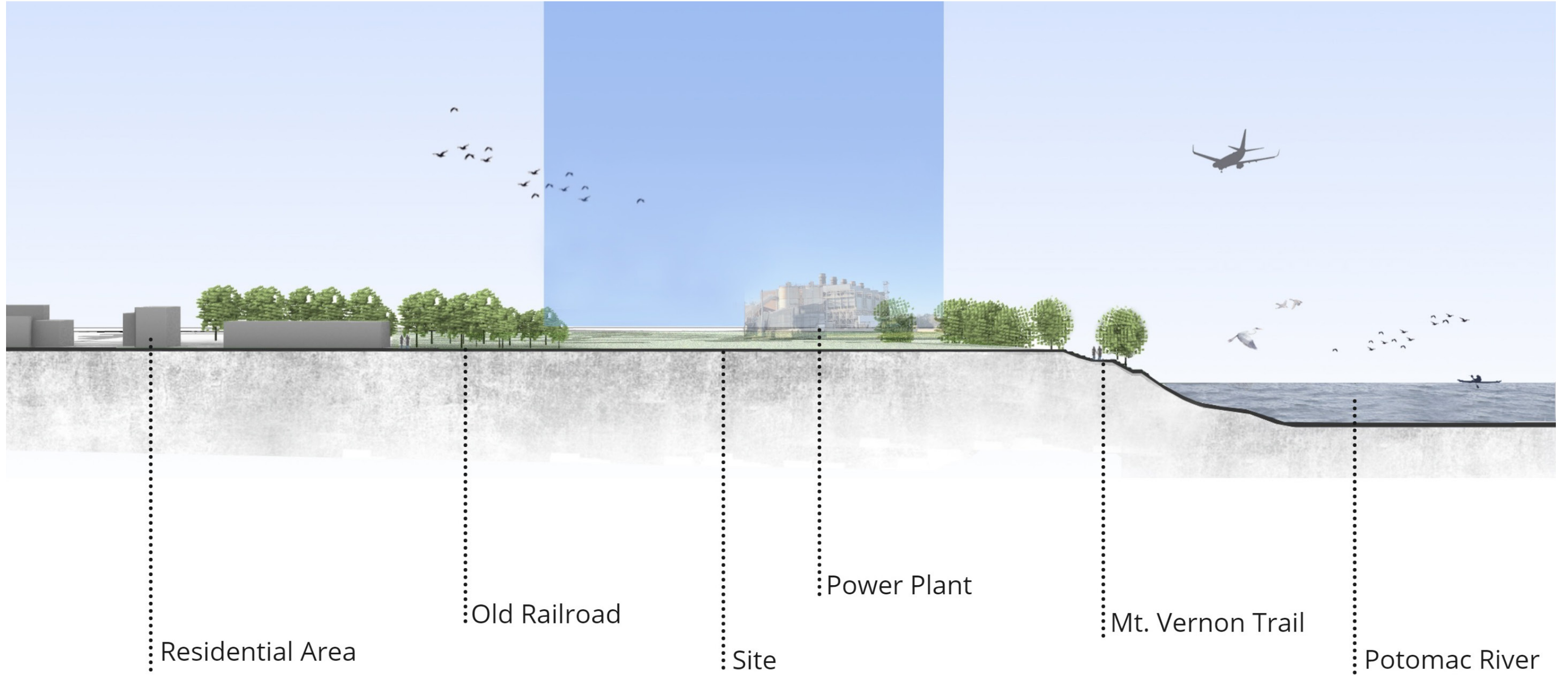
Map of Alexandria, VA



# SITE LOCATION AND ACCESSIBILITY



# SITE SECTION



# SITE PHOTOS

1 Mt. Vernon Trail to North



2 Mt. Vernon Trail to South



3 Alexandria Coal Power Plant



4 Old Railroad



5 Panorama view from the site to Potomac River





**DESIGN PROPOSAL**

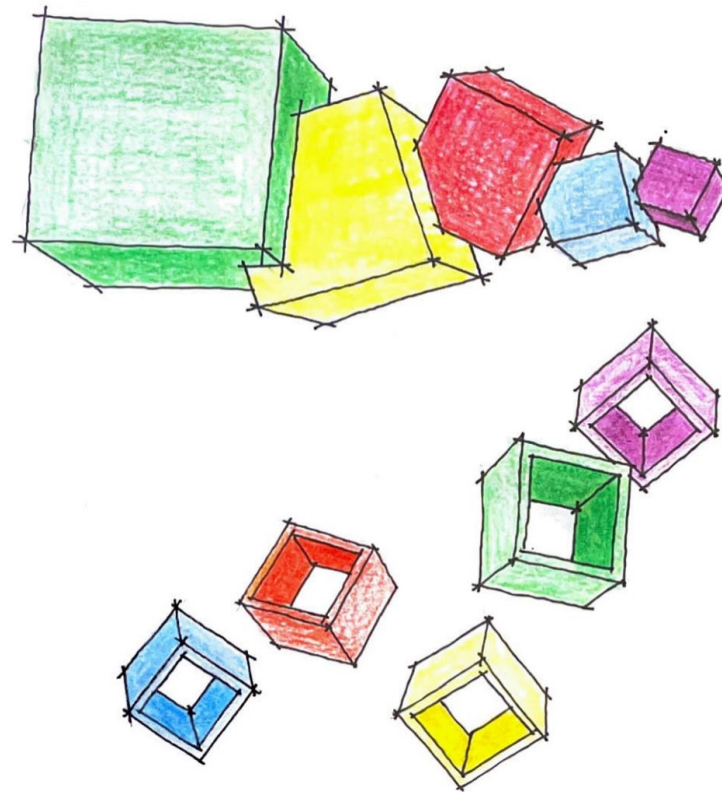
# DESIGN CONCEPT

There were many important factors in the design of the final Montessori school. One of the major concepts was to understand the idea of playful learning and what that looks like in architecture. Moreover, schools are in need of both indoor and outdoor spaces and understanding how these two areas intersect and interact is integral to the way the space is used. Throughout the many interactions of concepts and sketches, creating a design that thoughtfully considered all of the needed program and interacted in a way that allowed children to learn through the playful spaces was the goal.

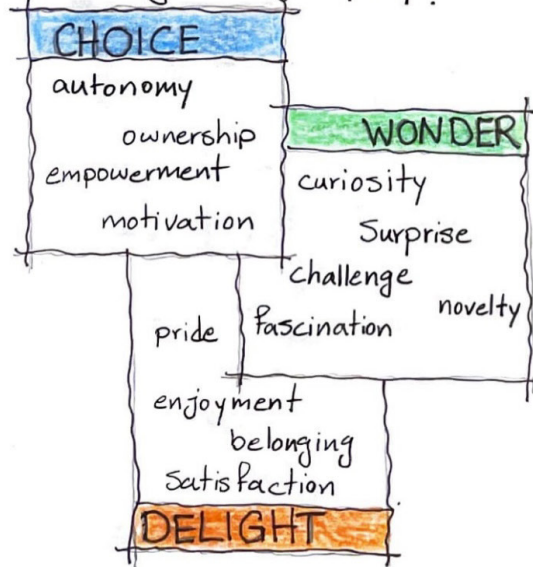
One of the Montessori materials in sensorial curriculum is the pink tower which contains different size of cubes that students assemble to make a tower. The initial concept of imagining a playful learning environment was to play with these cubes and organize them into the site to create the building mass. As the design progressed, situating and scaling these cubes to the site started to develop the final design.



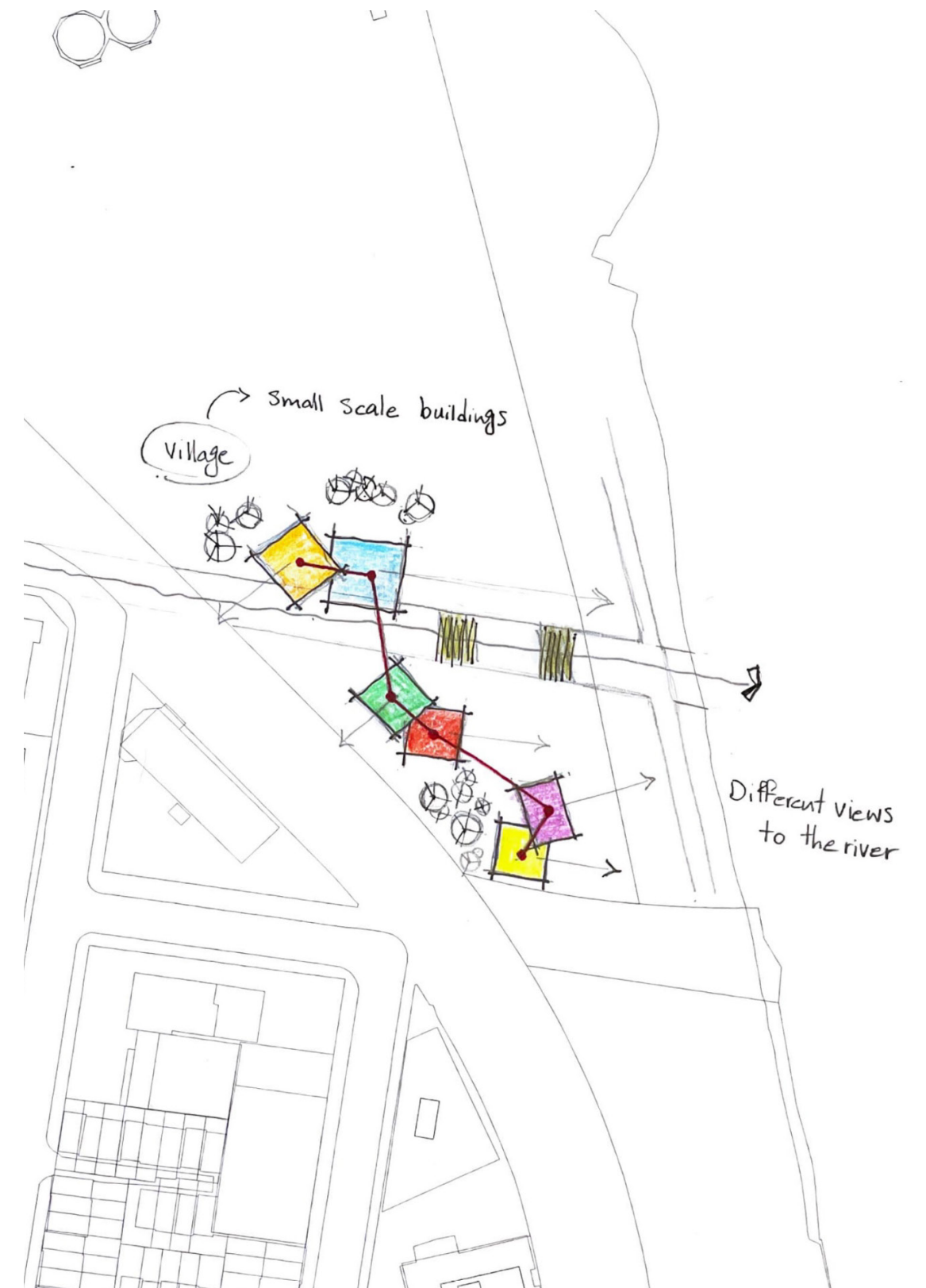
Pink Tower, Montessori Material



How can environment support learning through play?

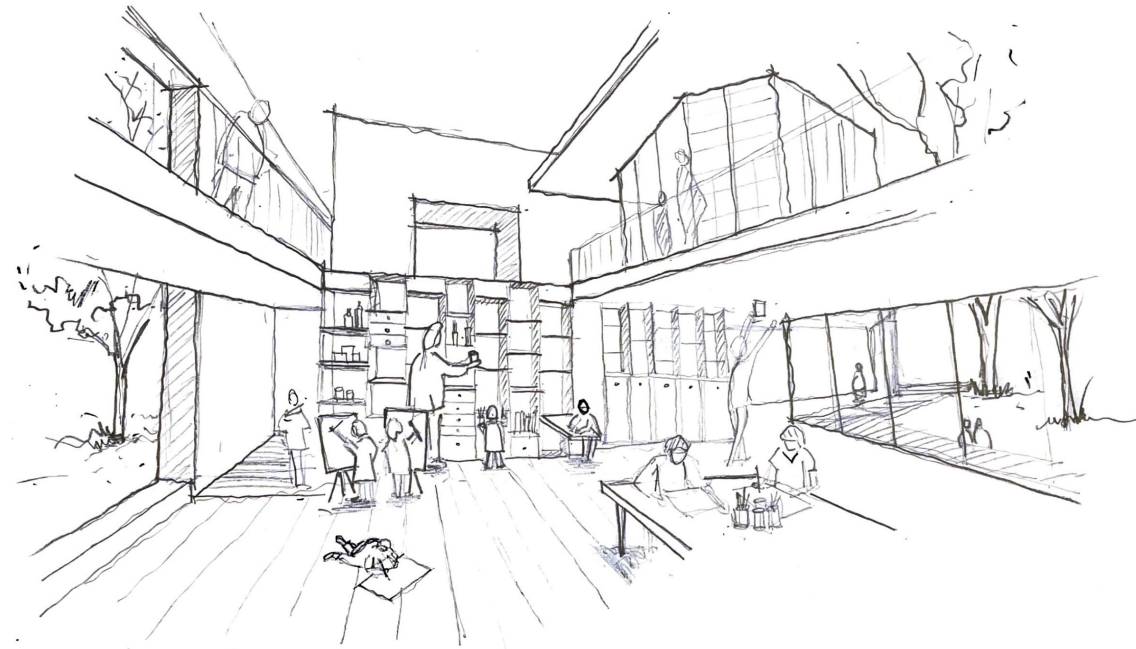


PLAYFUL LEARNING

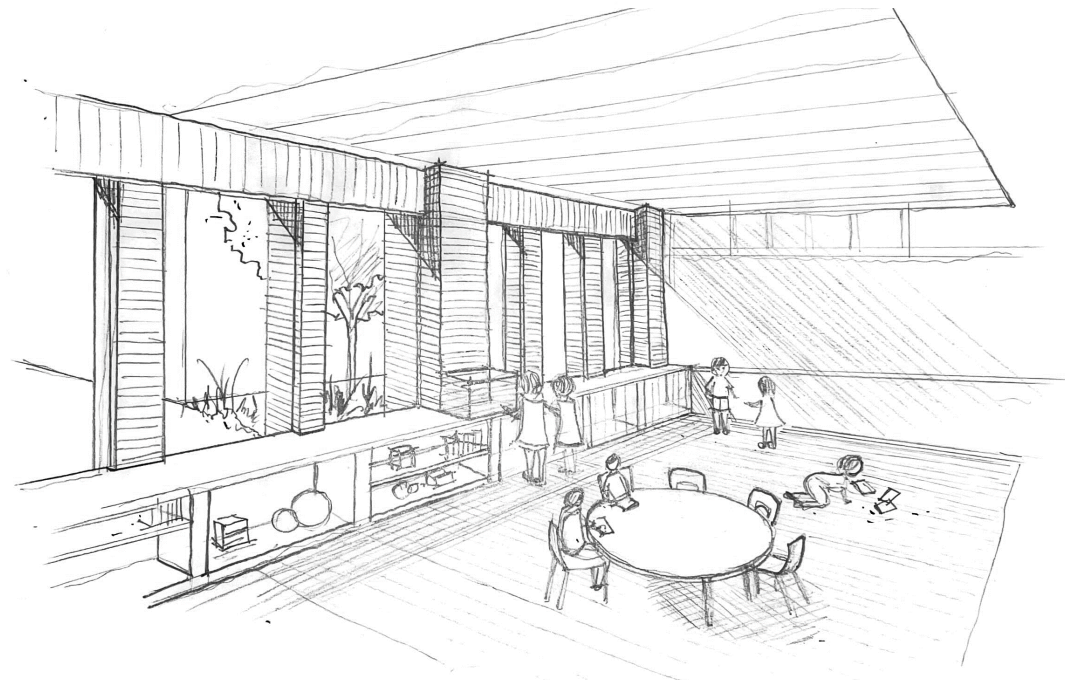




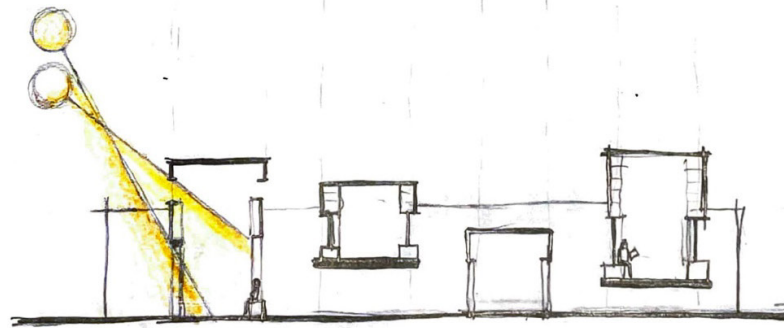
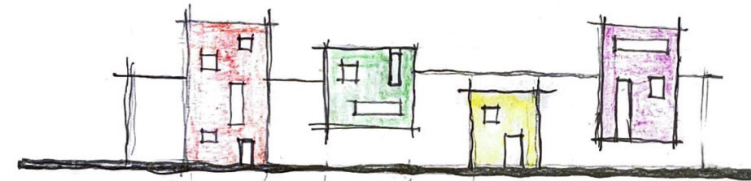
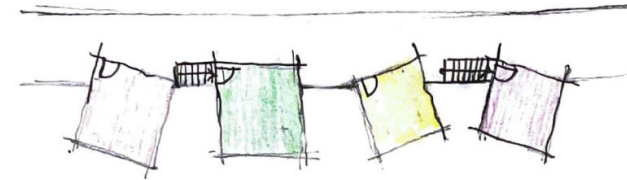
# DESIGN PROCESS



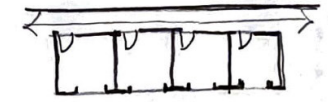
Common Area



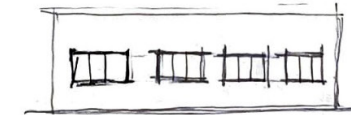
Class room



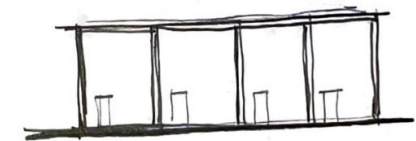
Conventional



Plan

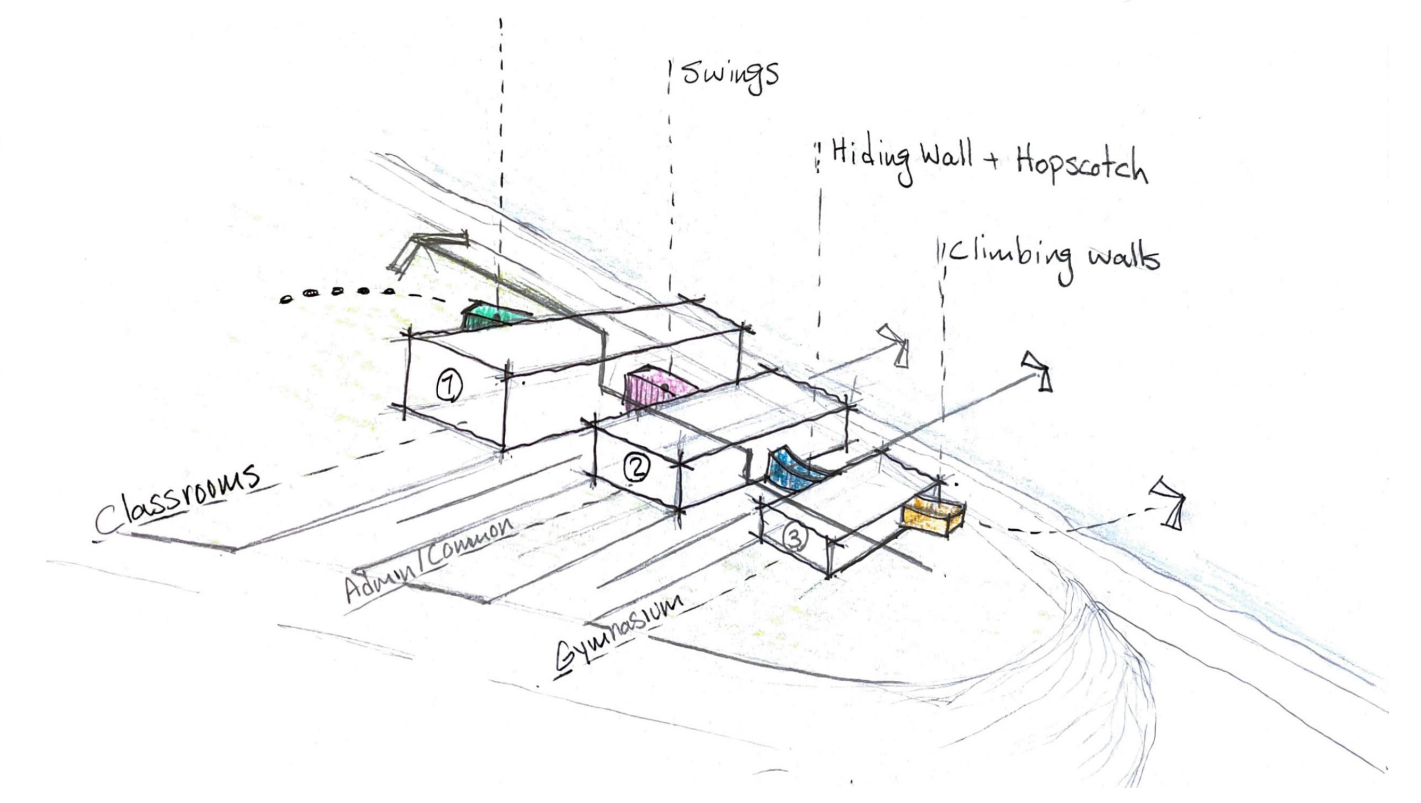
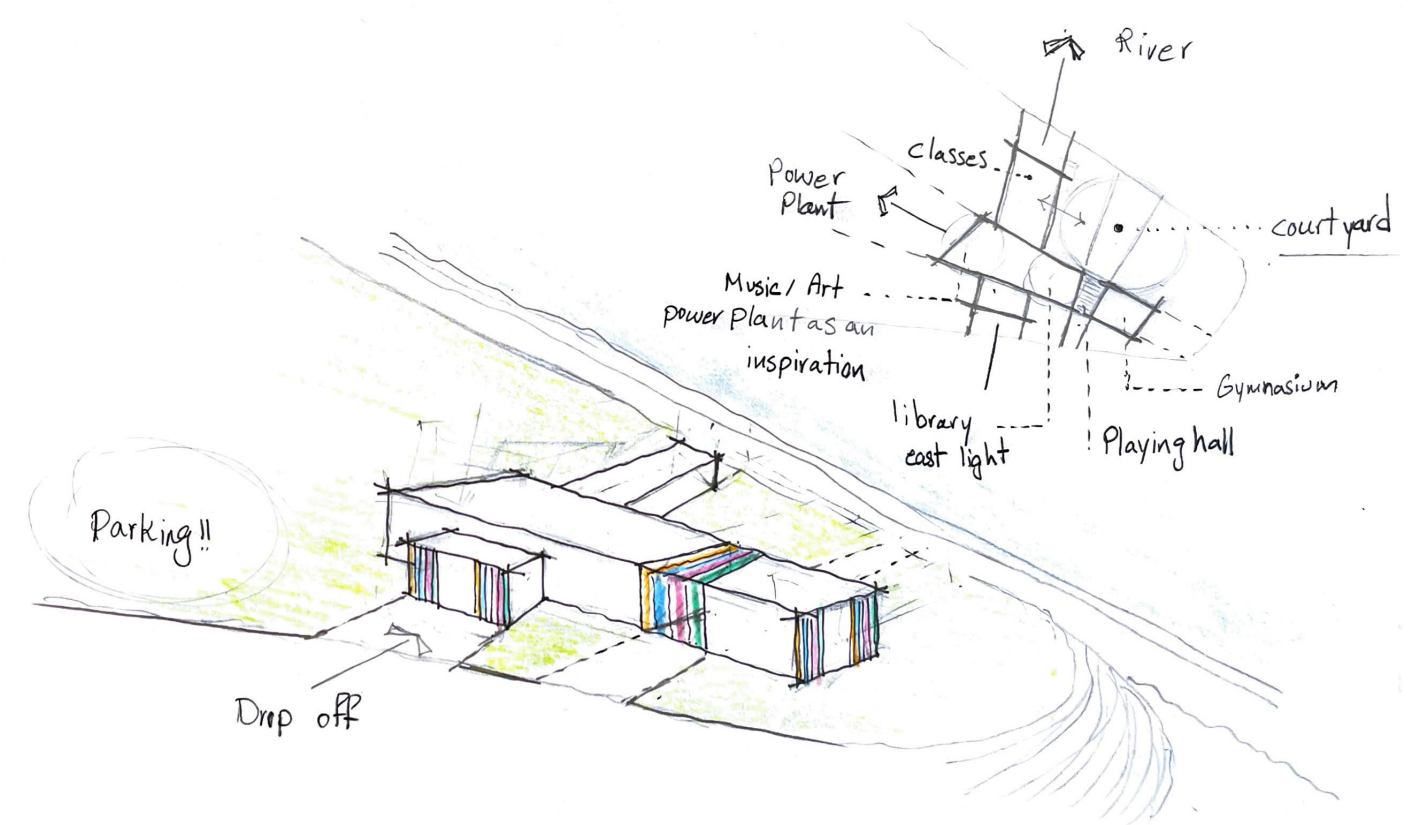
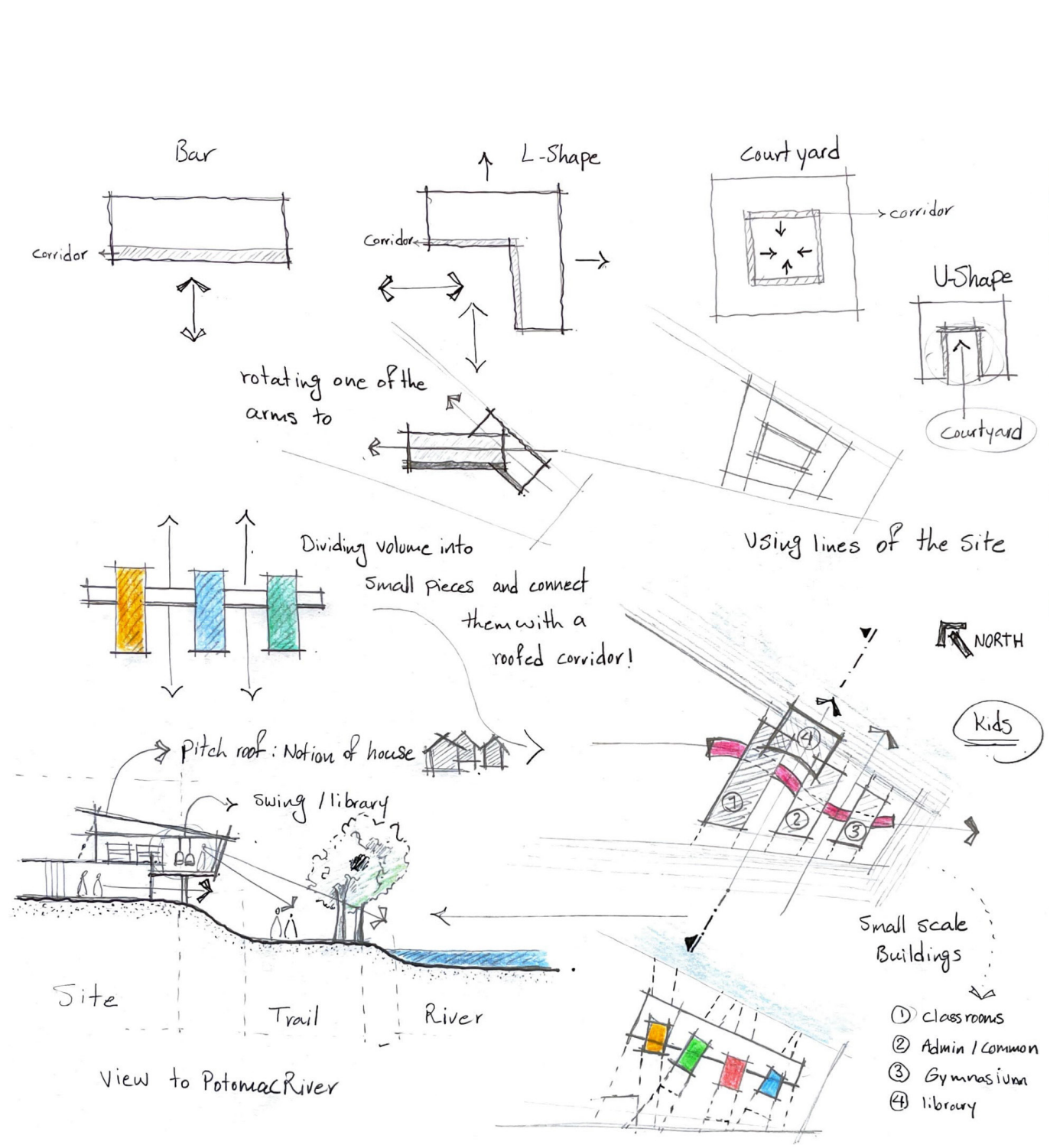


Elev.



Sec.

# DESIGN PROCESS



# PROGRAMMING

Entry Lobby & Reception

Administrative Supports

Children's Houses

Maker Space (Workshop)

Music /Dance

Health Care

Student Common Area

Kitchen

Library / Media

Gymnasium

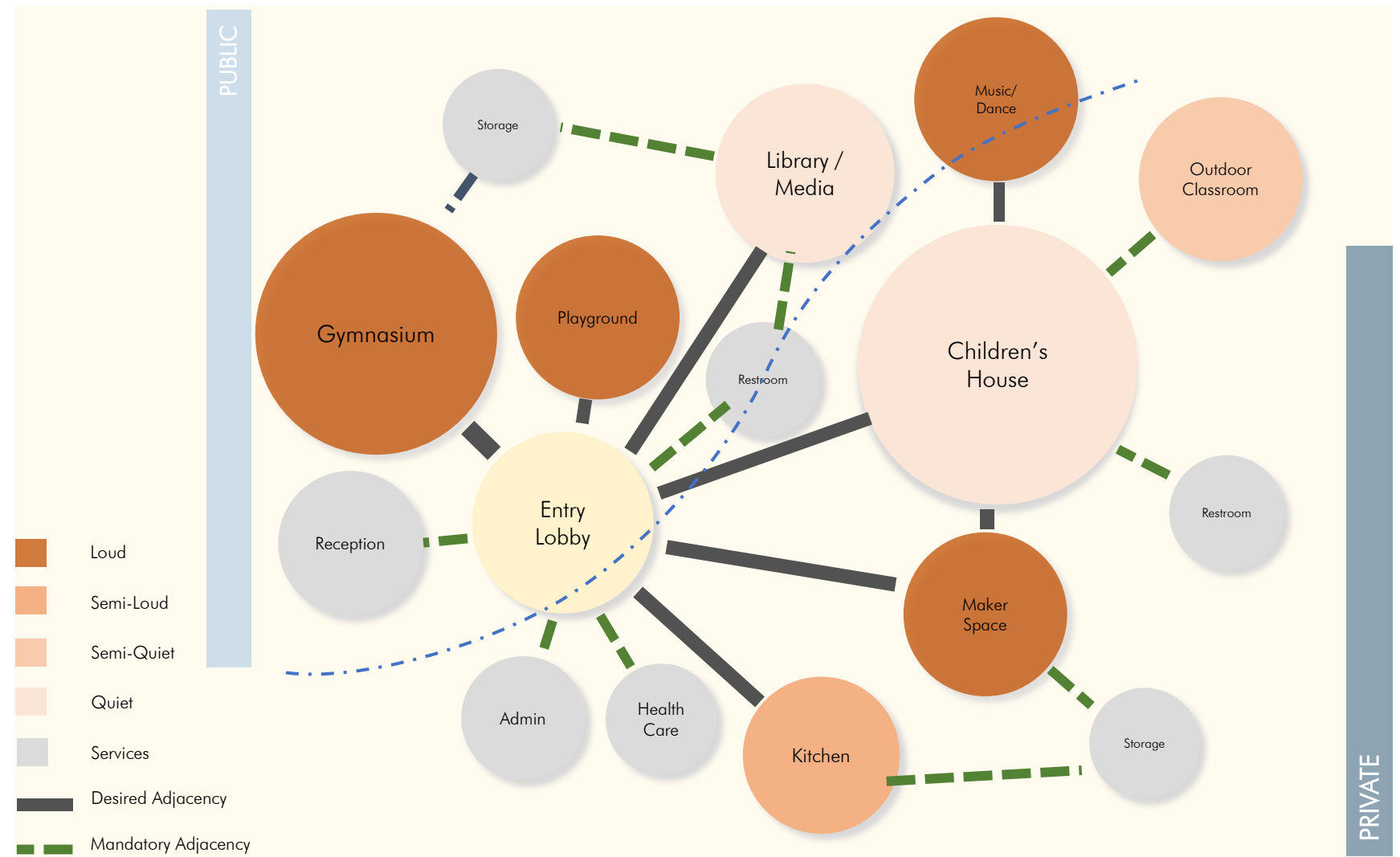
Outdoor Classroom

Playground

Community Garden

Goat Pasture

Bioretention Pond



# FINAL DESIGN

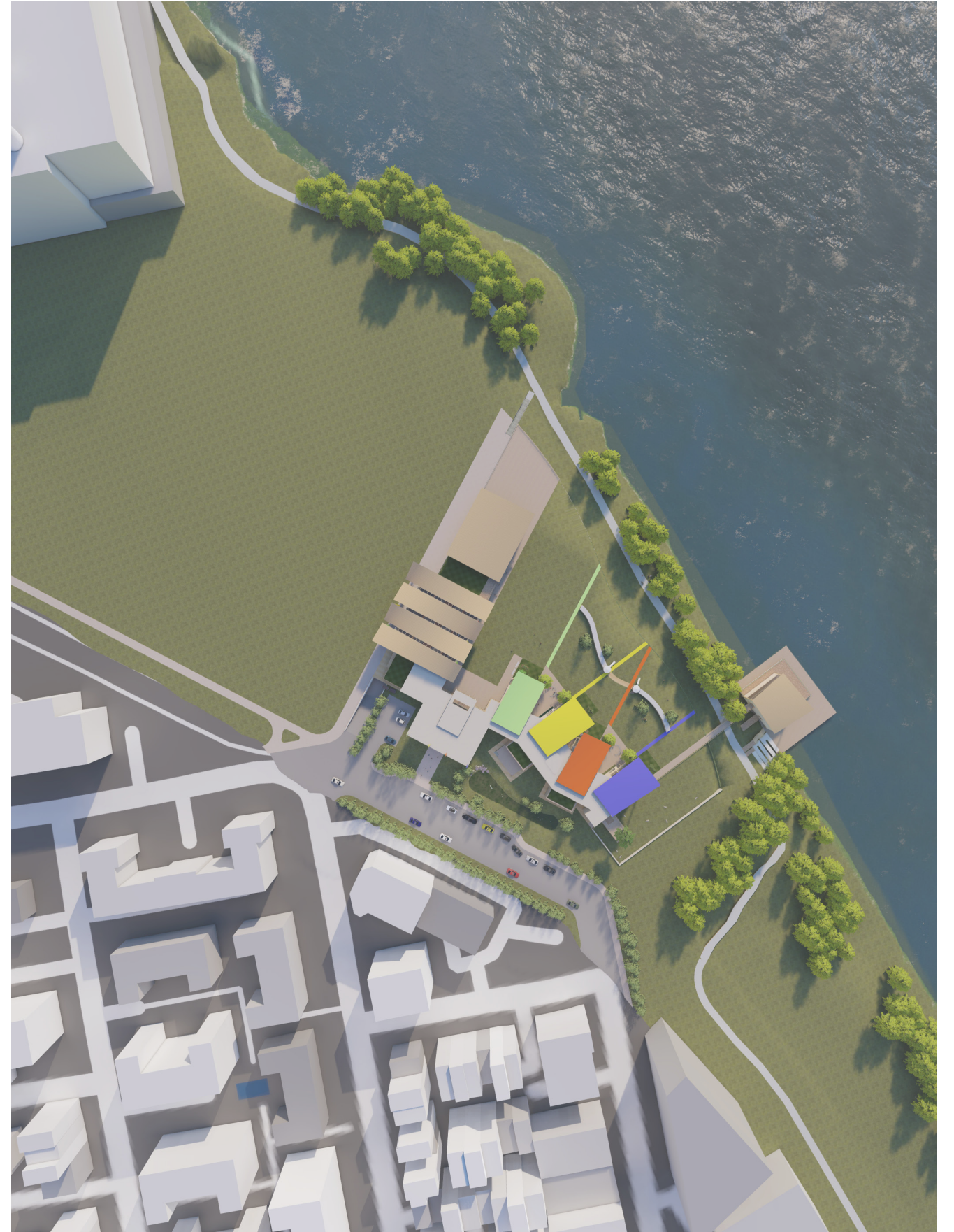
The final design nestles into the site between a proposed street (on the west) and the Mount Vernon Trail and Potomac river (on the east). By doing this, the main entrance to the school can be accessed via the proposed street to prevent traffic jams and provide easier access from the new neighborhood in the future. Students reach the school via sidewalks that pass by rows of trees and the bio-retention pond, leaving the city behind and step into a playful world. The main entry vestibule is set back and shifted to signal the entry and to give some protected waiting areas on the outside of the corner entry.

The building has an L-shaped floor plan that creates a private exterior space orienting to the river. This private exterior space includes the playground, outdoor classrooms, and elevated play path. Interaction with nature is prioritized, while there are no sports courts or soccer fields as the design seeks to forge calm, equal relationships between the students. The L-shaped plan also divides the building into two wings, the north wing, which is the public face of the building, while the south wing is the private face. On the public face, positioned to the north, the wing houses an entrance lobby space, the gymnasium, the library, and a variety of outdoor spaces, including community gardens and the library terrace. The public face is planned on the north side facing the Alexandria old powerplant to serve the community when the school is not in session. However, the private face, which includes the classrooms, workshops, and administration, is planned on the south side.

All classrooms maintain a visual connection with nature, which becomes the center of attention as there is no blackboard or teacher's table. The classrooms are divided into five areas that students can freely access according to their concerns and needs: sensory area, practical life area, language area, math area, and cultural studies area. The entrance to each classroom is through the playing corridor with lockers and benches where the children take off their shoes and remove their coats. First-floor classrooms are designed for preschool (age 3-5). These classrooms have a low-height mezzanine designed for the scale of a child. Upper-level classrooms are laid out for elementary (two classrooms for age 6-8, and two classrooms for age 9-11). These elementary classrooms have access to a balcony with a river view that serves as an outdoor classroom. All the upper-level classrooms also have a loft that serves as a quiet area for students who need some privacy to study. Double height vertical spaces between classrooms allow natural light and ventilation to enter the school while providing additional space and a transversal visual connection between classrooms, the playground, and the river.

The project's palette includes materials with the lowest ecological footprint: baked clay and wood. The building's load-bearing walls are made of perforated brick, while wood is used for the structure and the hyperbolic roofs, as well as in the interior and exterior enclosures.

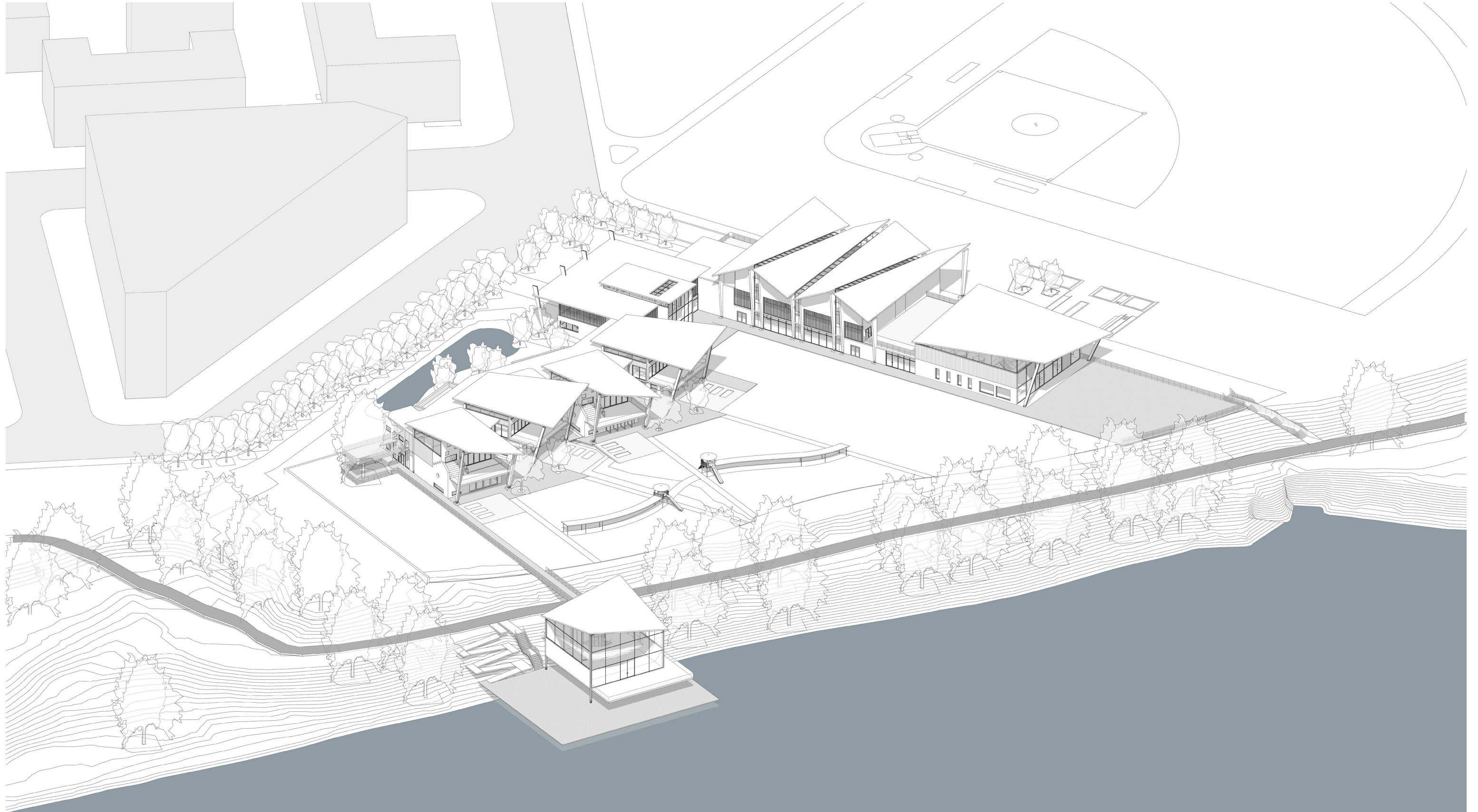
Overall, the final design determines an L-shaped building to allow for a private exterior space and create two different interior spaces that separate the public and private faces. In addition, the interaction of interior and exterior is integral to the design and the design process. Natural light, air, material, connection, and scale played a significant part in how the final design shaped itself.



# SITE PLAN

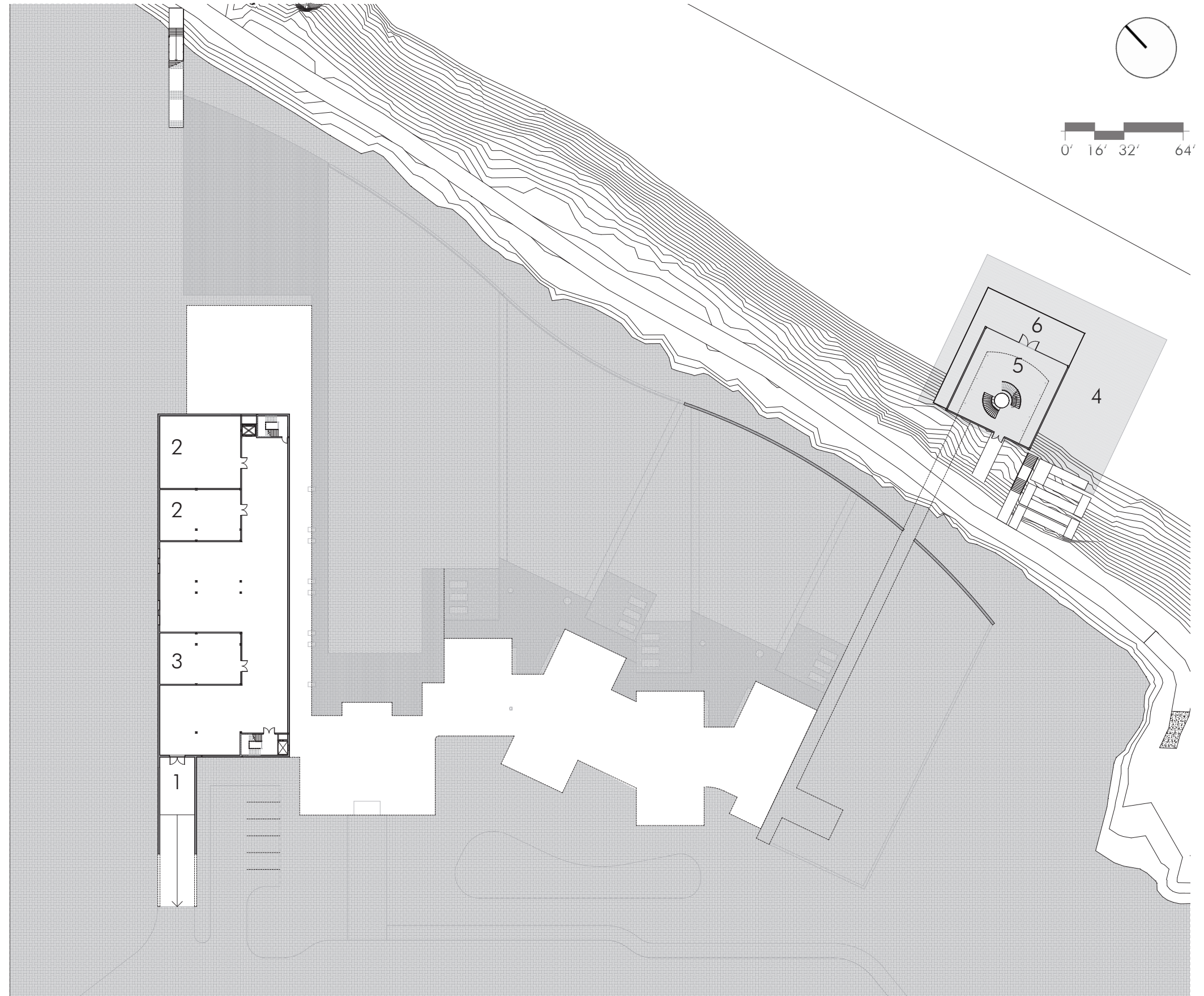


# SITE PERSPECTIVE



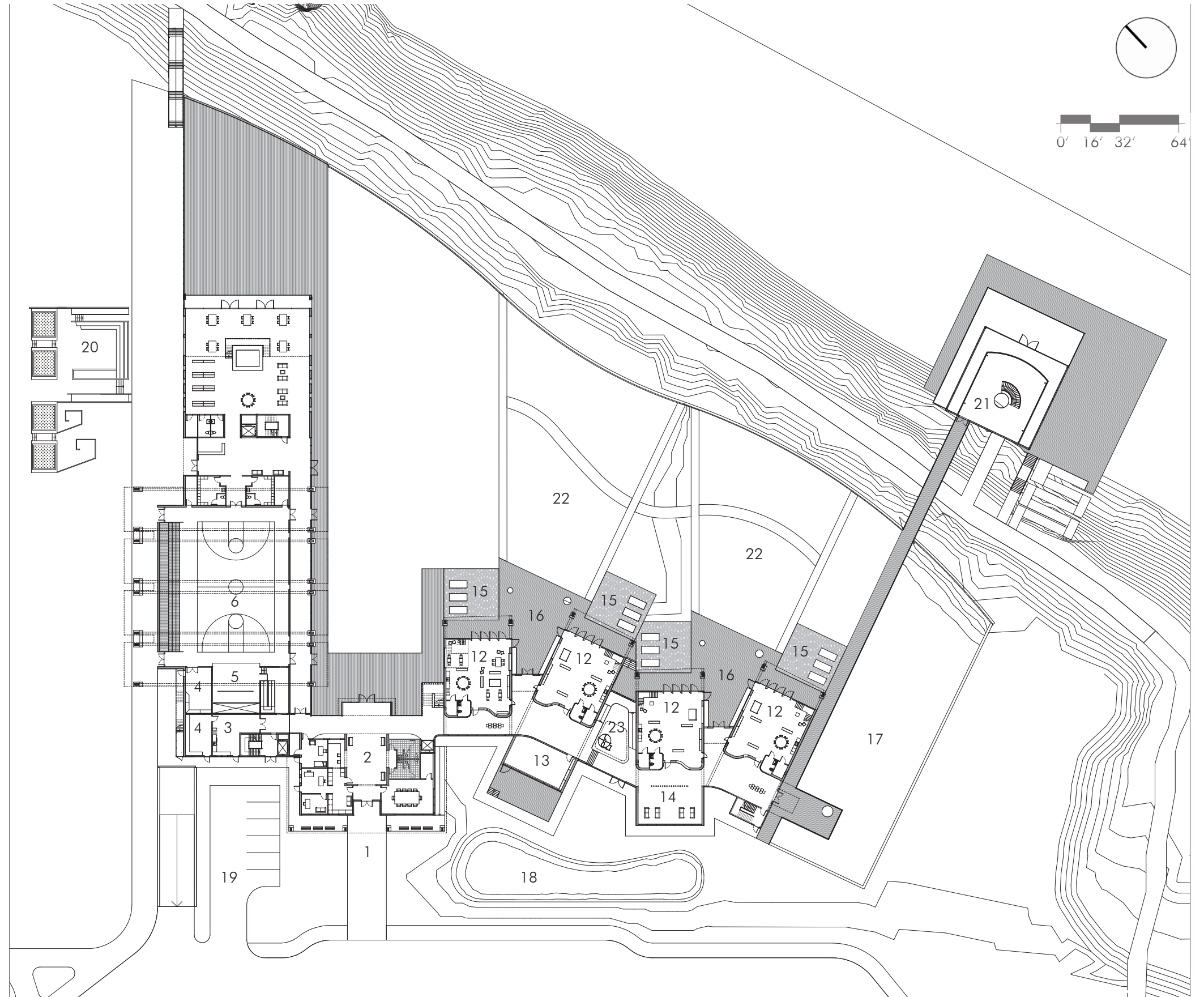
# BASEMENT PLAN

- 1. Basement Entrance
- 2. Storage
- 3. Mechanical/Electrical
- 4. Waterfront
- 5. Dance Room
- 6. Dance Room Terrace



# 1ST FLOOR PLAN

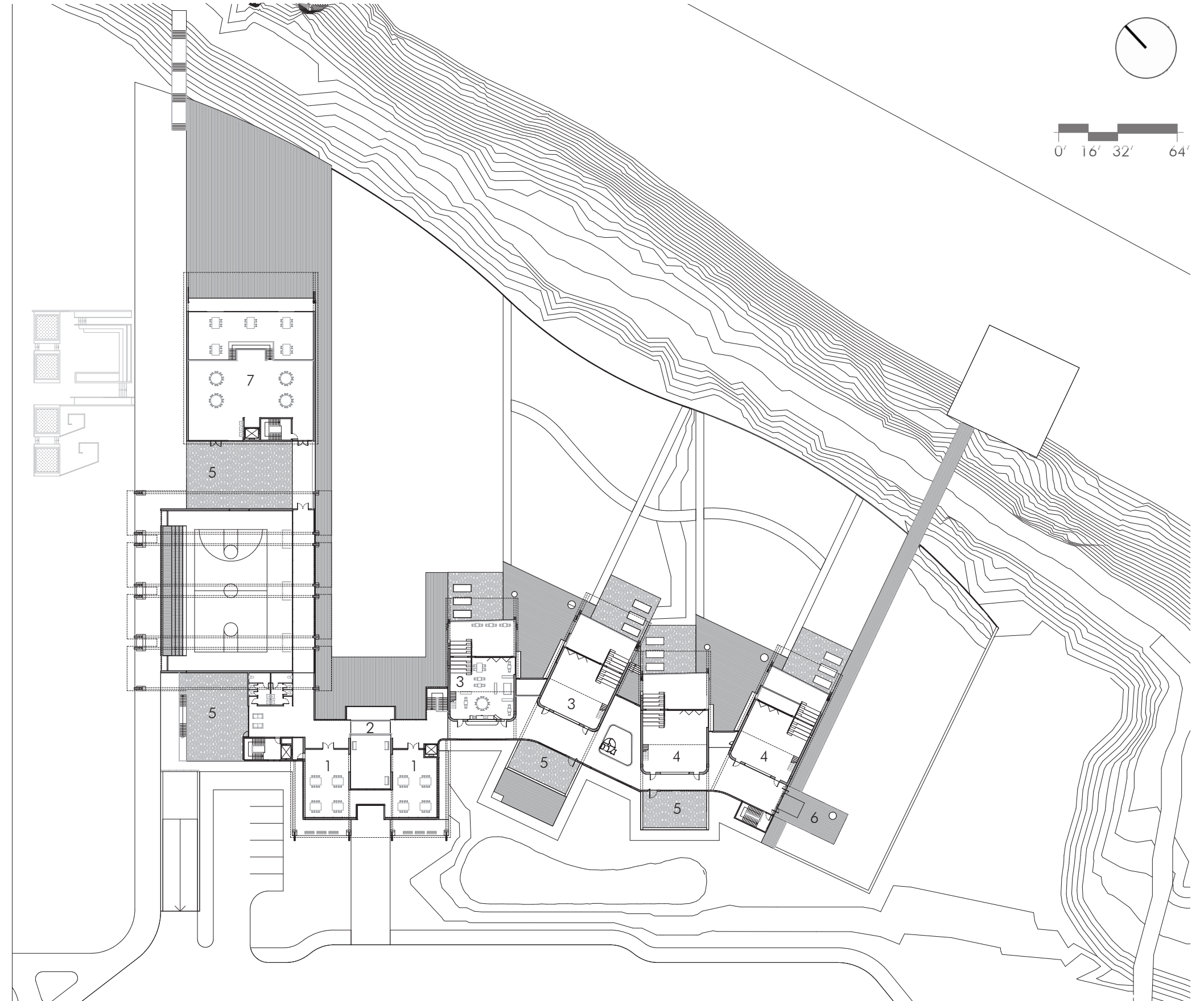
- 1. Main Entrance
- 2. Lobby/Admin
- 3. Kitchen
- 4. Storage
- 5. Platform
- 6. Gymnasium
- 7. Locker Rooms
- 8. Community Entrance
- 9. Library/ Media
- 10. Library Terrace
- 11. Play Corridor
- 12. Children's House (Age 3-4-5)
- 13. Teacher's Room
- 14. Assembly
- 15. Class Garden
- 16. Outdoor Classroom
- 17. Goat Pasture
- 18. Bio-Retention Pond
- 19. Parking
- 20. Community Garden
- 21. Music Class
- 22. Playground
- 23. Ball Field



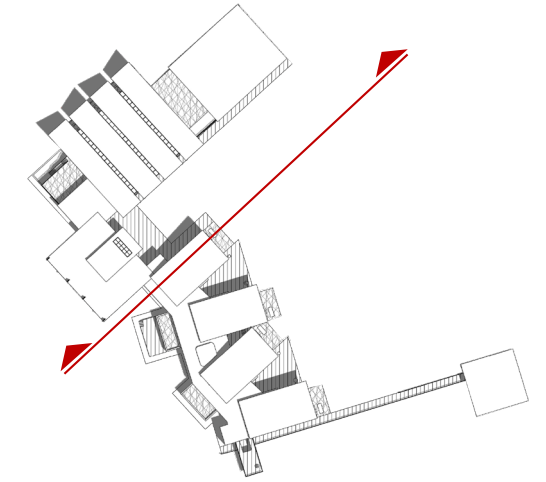


# 2ND FLOOR PLAN

1. Maker Space
2. Suspended Bridge
3. Children's House (Age 6-7-8)
4. Children's House (Age 9-10-11)
5. Outdoor Classroom
6. Tree House
7. Art Room

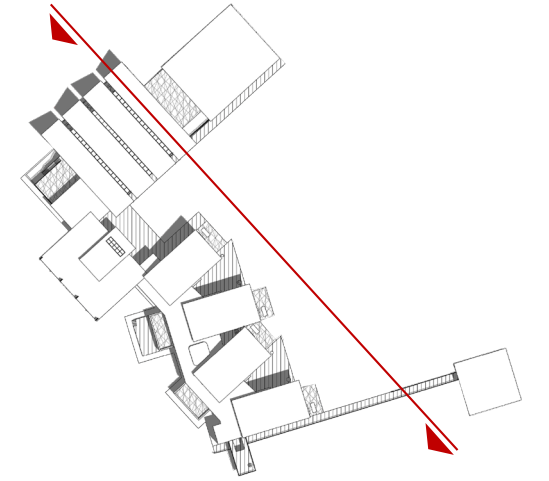


# BUILDING SECTION



0' 16' 32' 64'

# BUILDING SECTION



0' 16' 32' 64'

# WEST ELEVATION

Masonry: Beige Brick



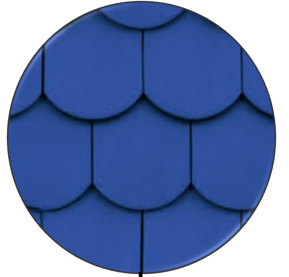
Vertical Wood Siding



Vertical Wood Louver



Color Roof Tile



Aluminium Curtainwall With Wooden Cover



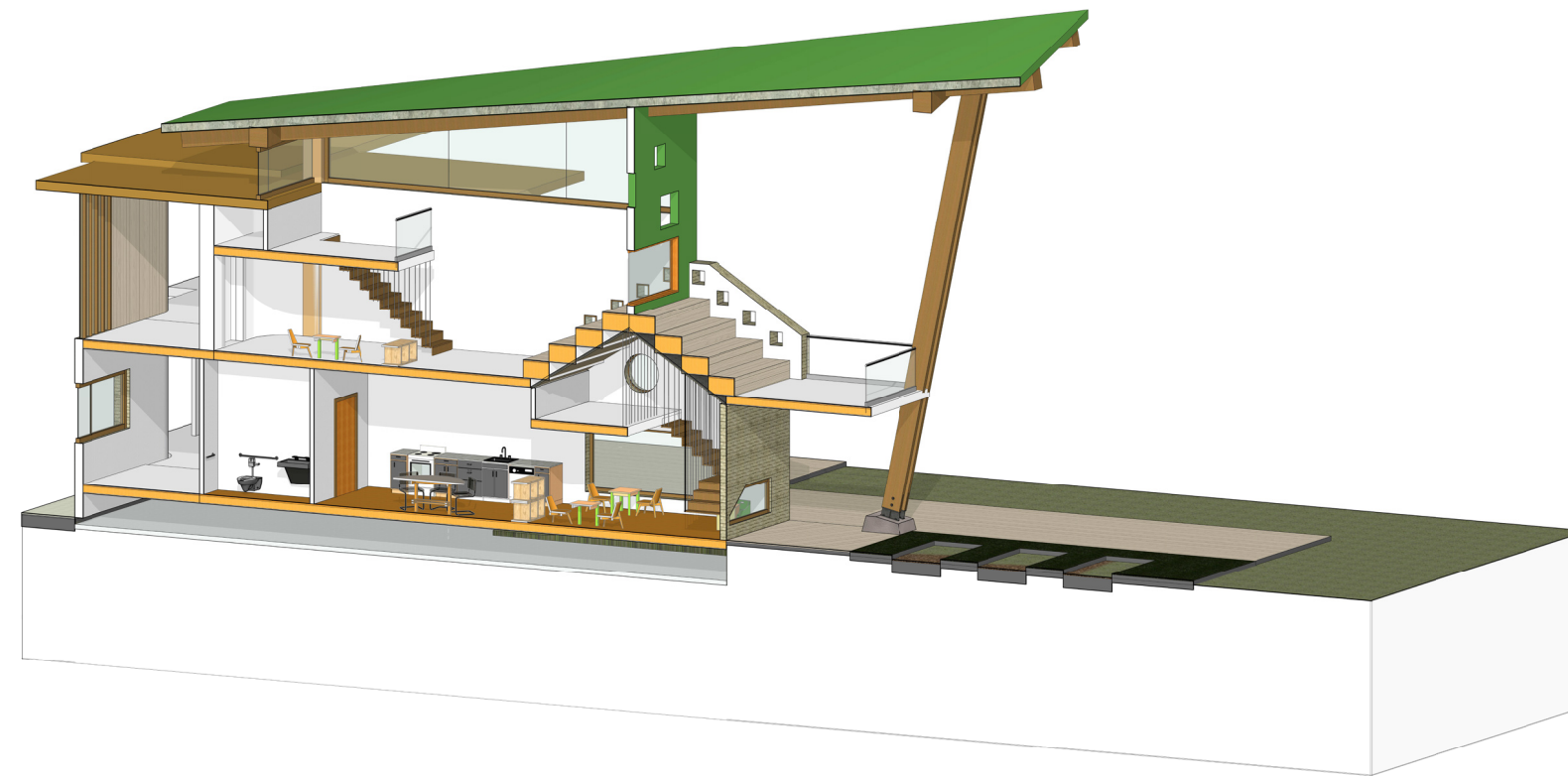
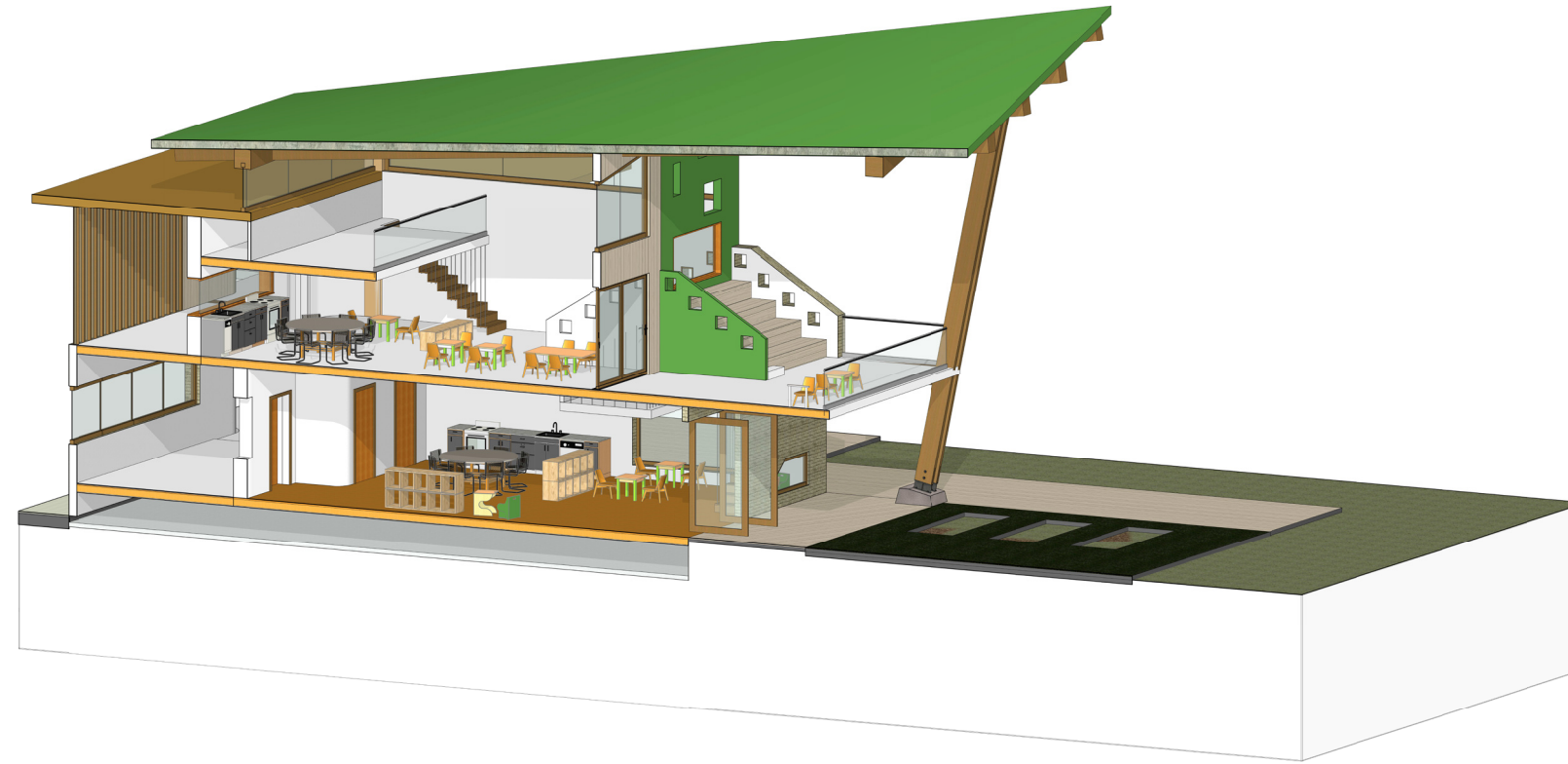
# NORTH ELEVATION



CLASSROOM EXPLODED AXON



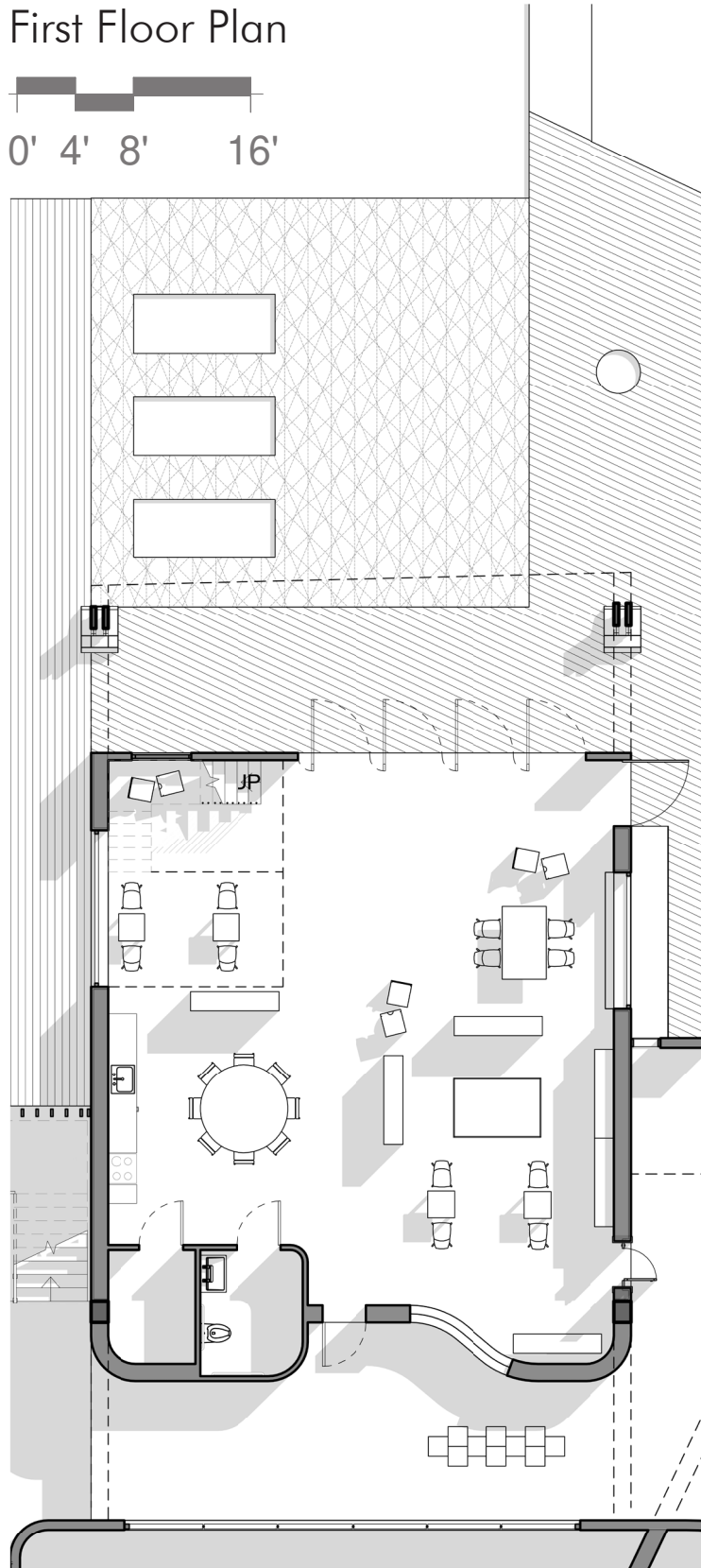
# CLASSROOM AXON SECTIONS



# CLASSROOM PLANS

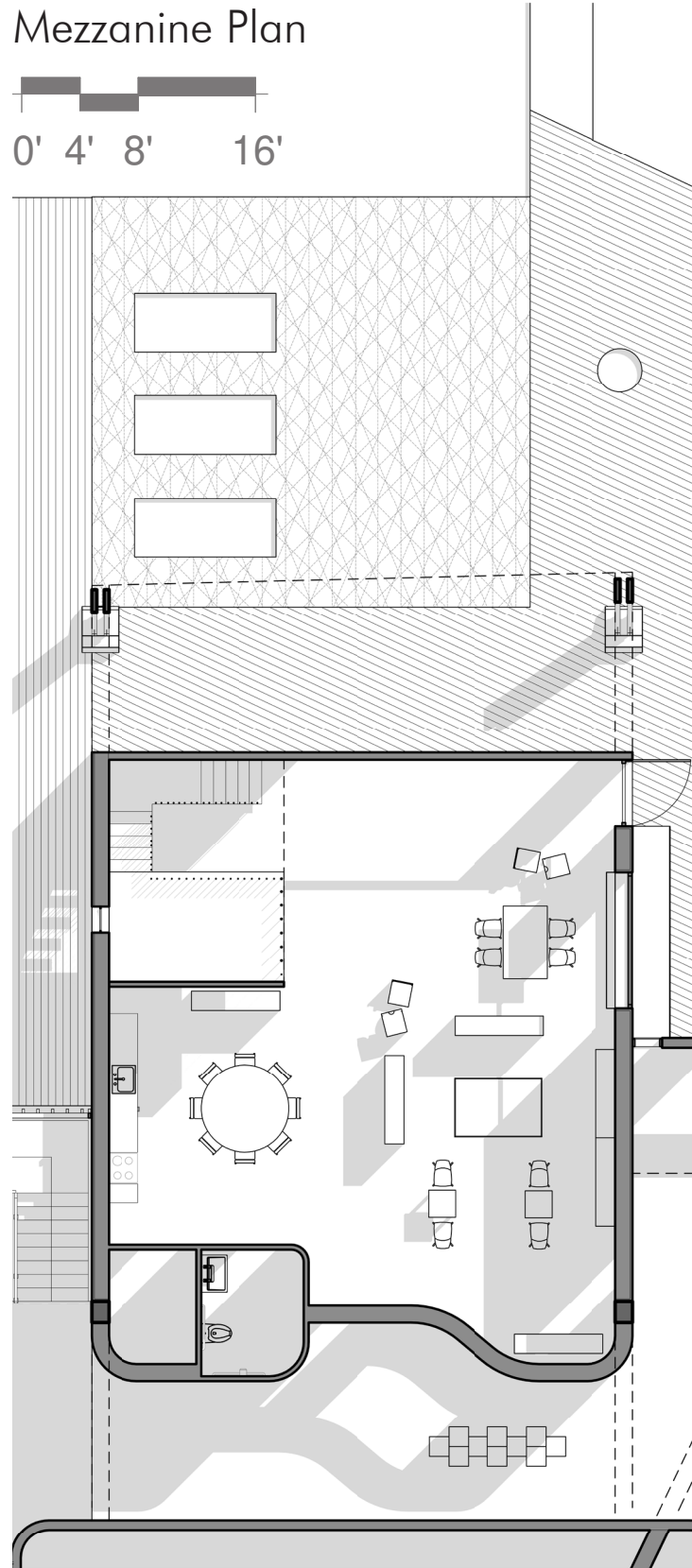
First Floor Plan

0' 4' 8' 16'



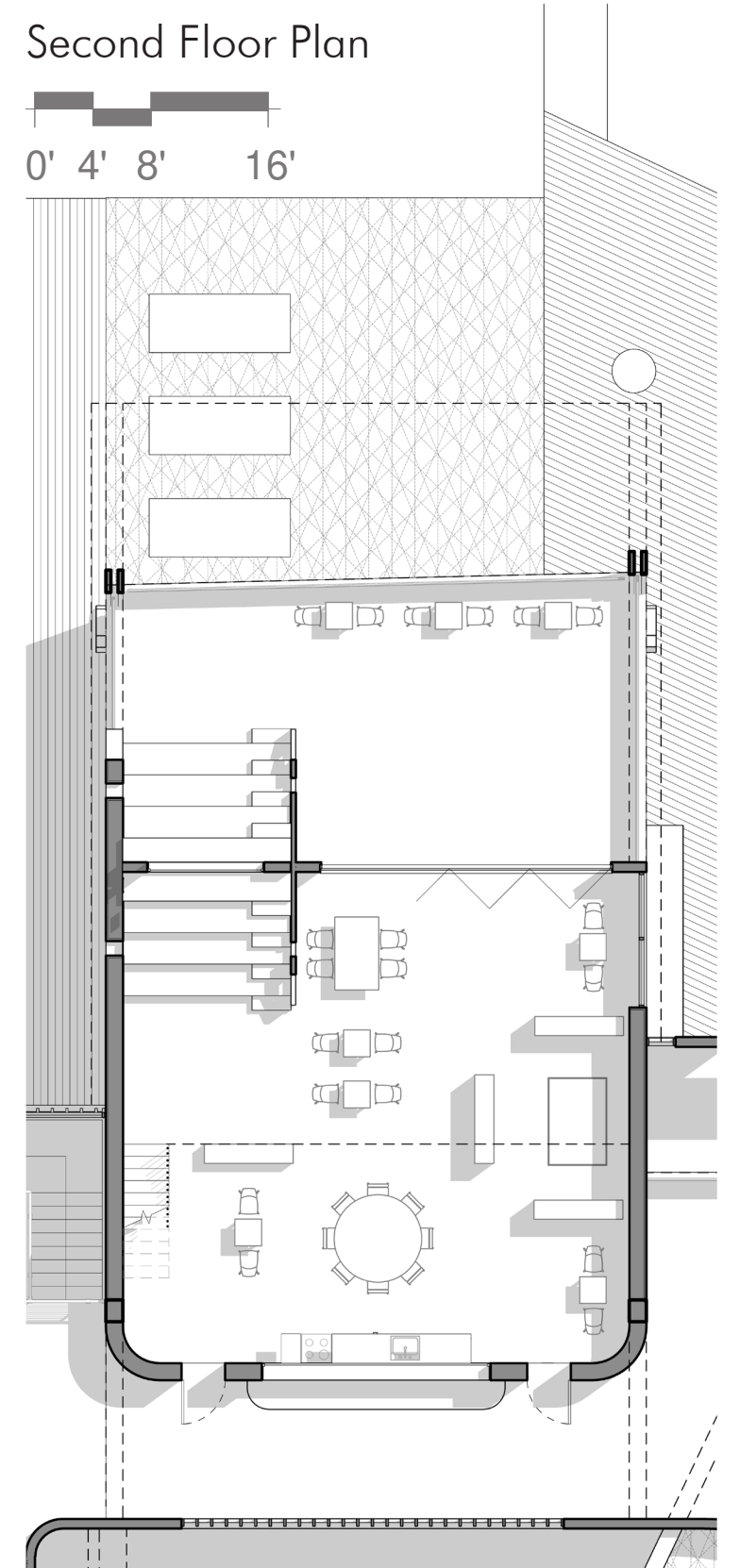
Mezzanine Plan

0' 4' 8' 16'



Second Floor Plan

0' 4' 8' 16'

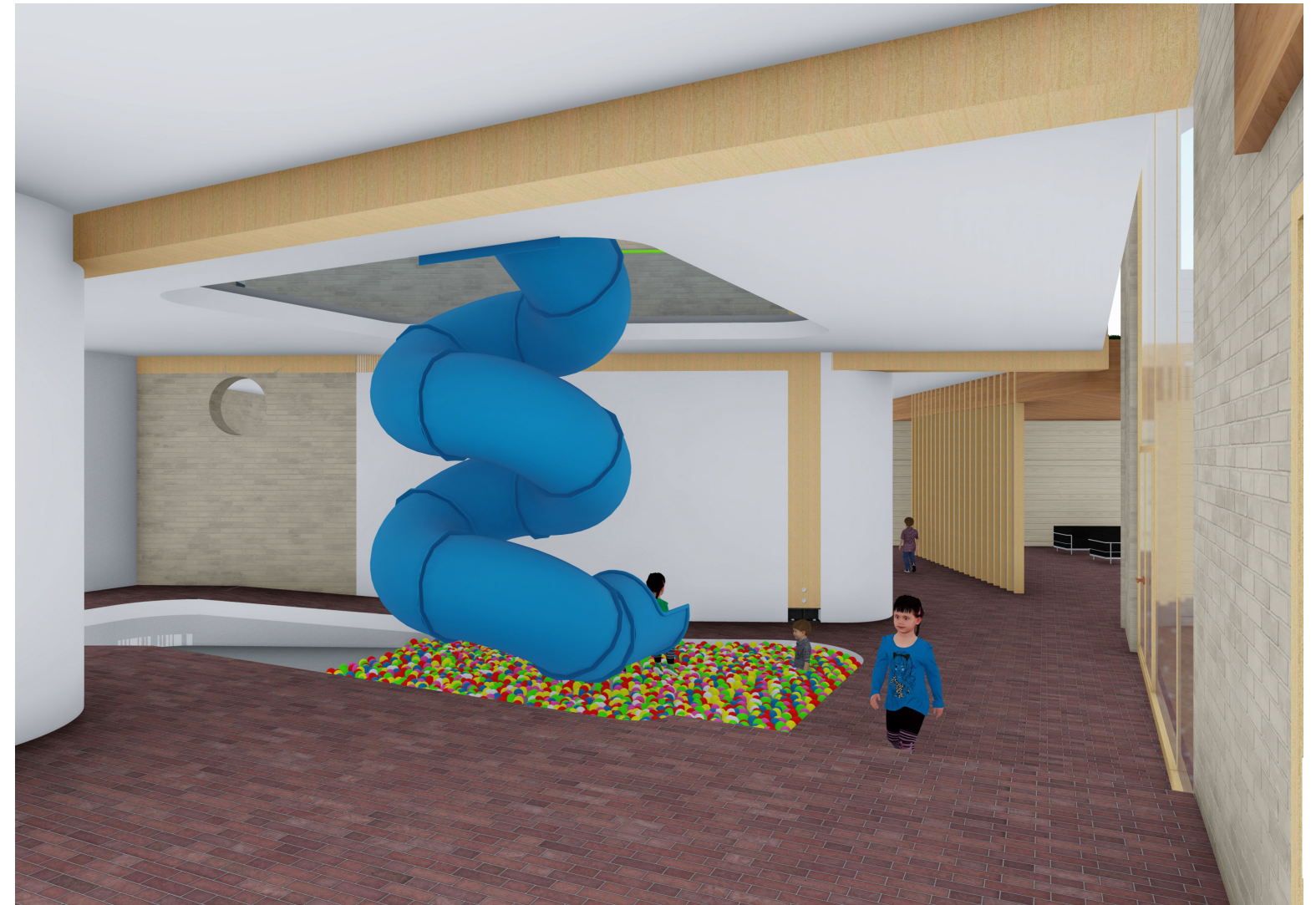




# ENTRANCE



# PLAY HALLWAY - BALL FIELD



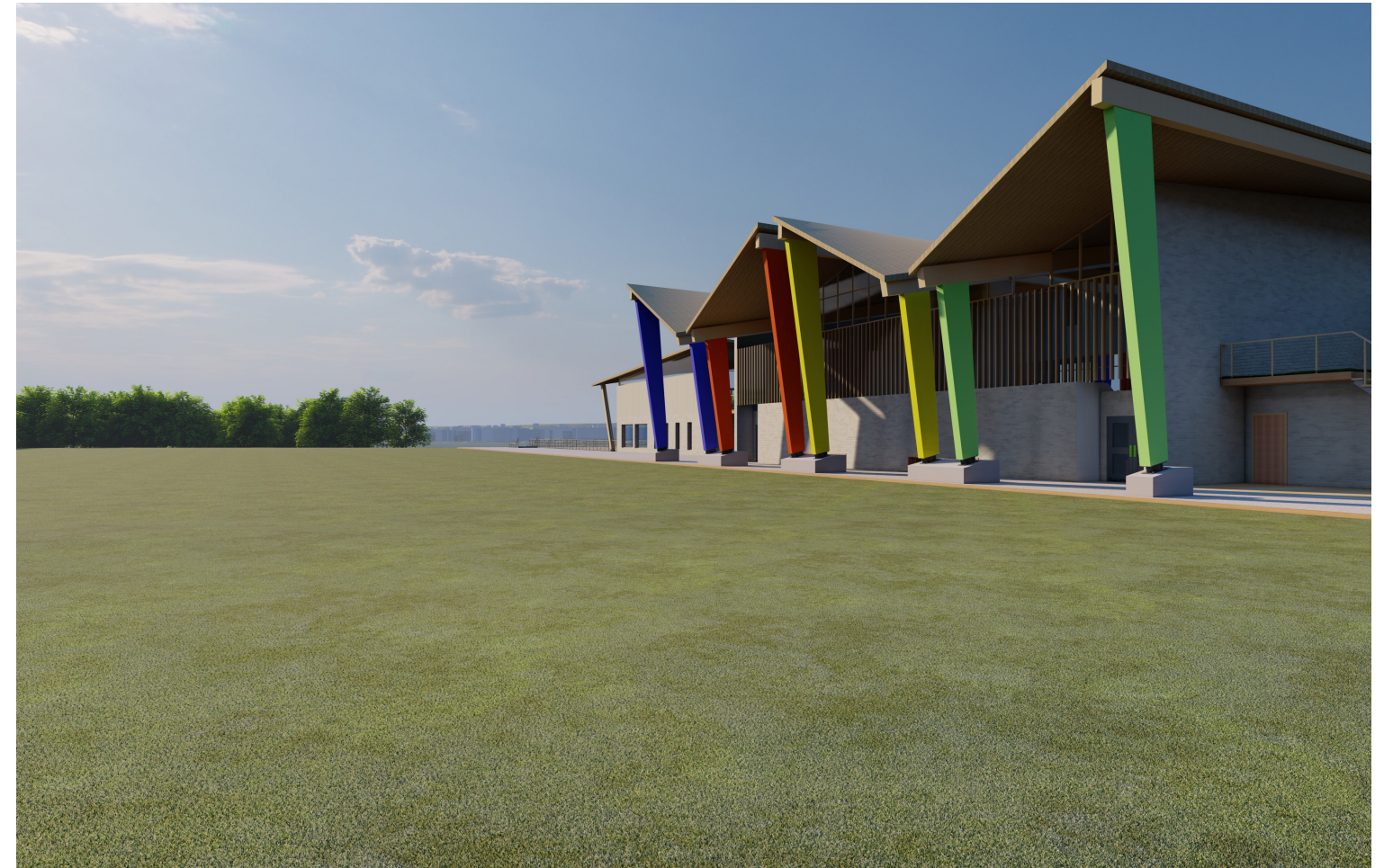
# PLAY HALLWAY - SUSPENDED BRIDGE



# GYMNASIUM



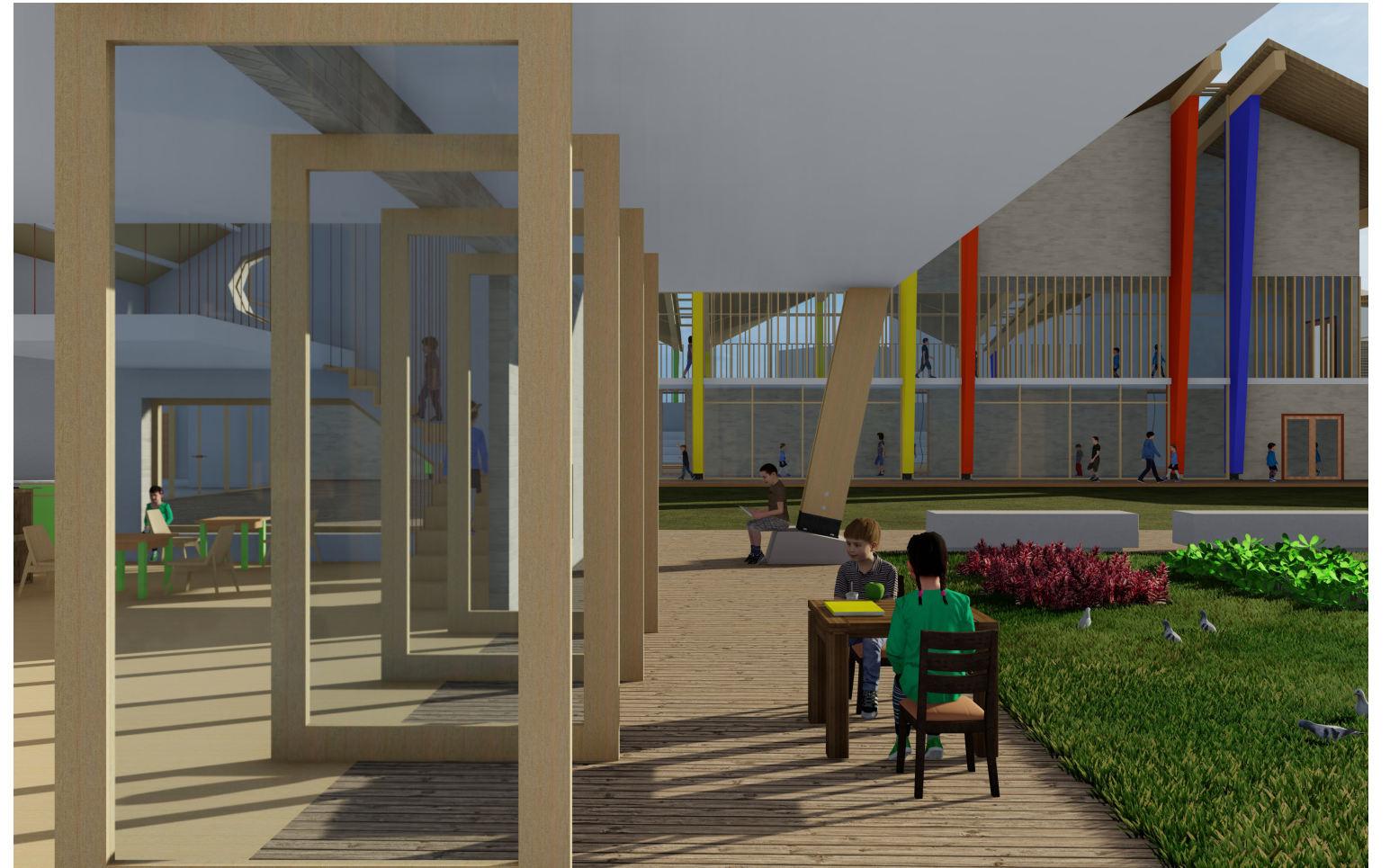
# GYMNASIUM



# CLASSROOM - FIRST FLOOR



# CLASSROOM - FIRST FLOOR



# CLASSROOM - SECOND FLOOR

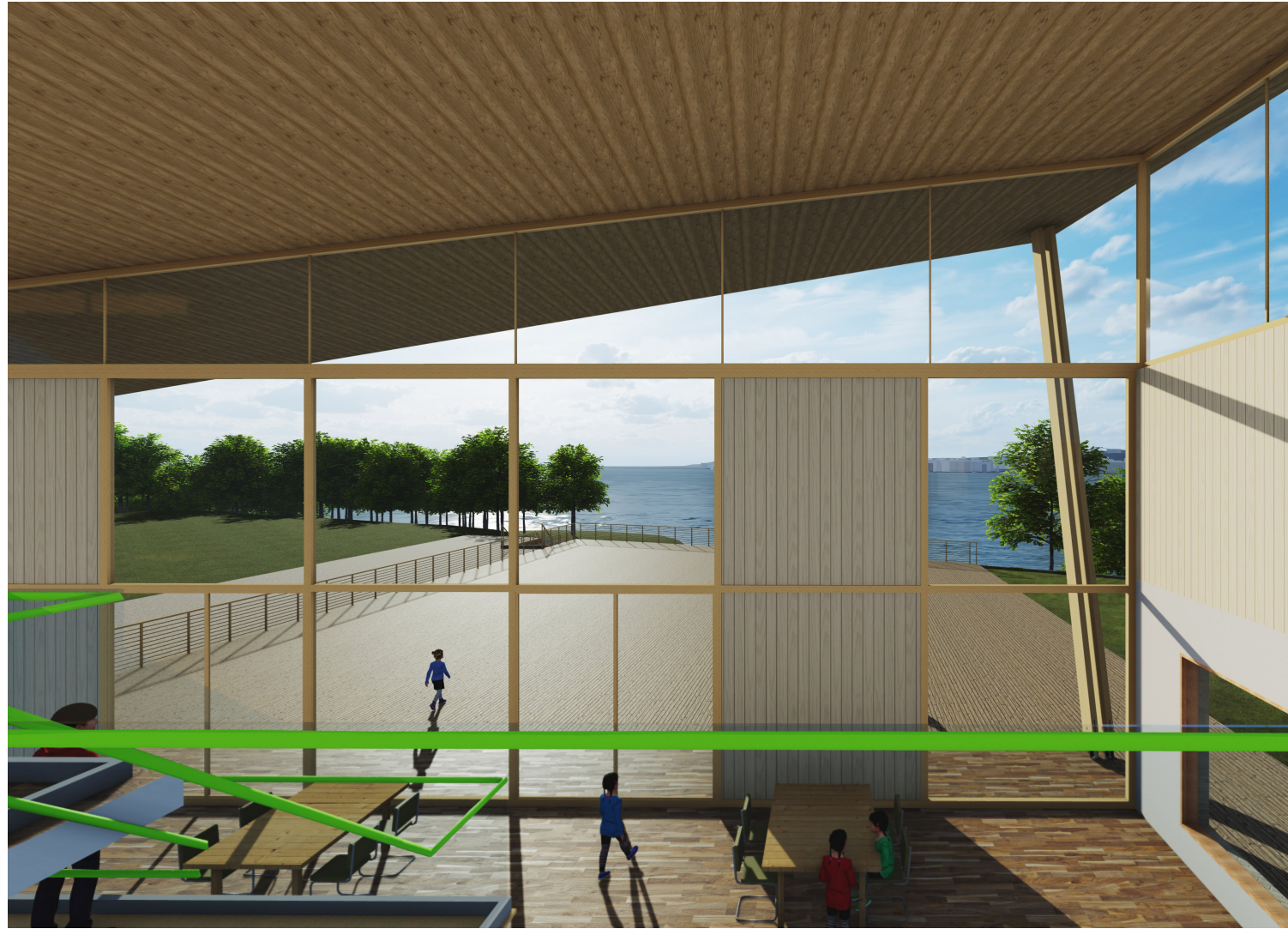




# PLAY HALLWAY



# LIBRARY/ ART CLASS



# PLAYGROUND



# PLAYGROUND



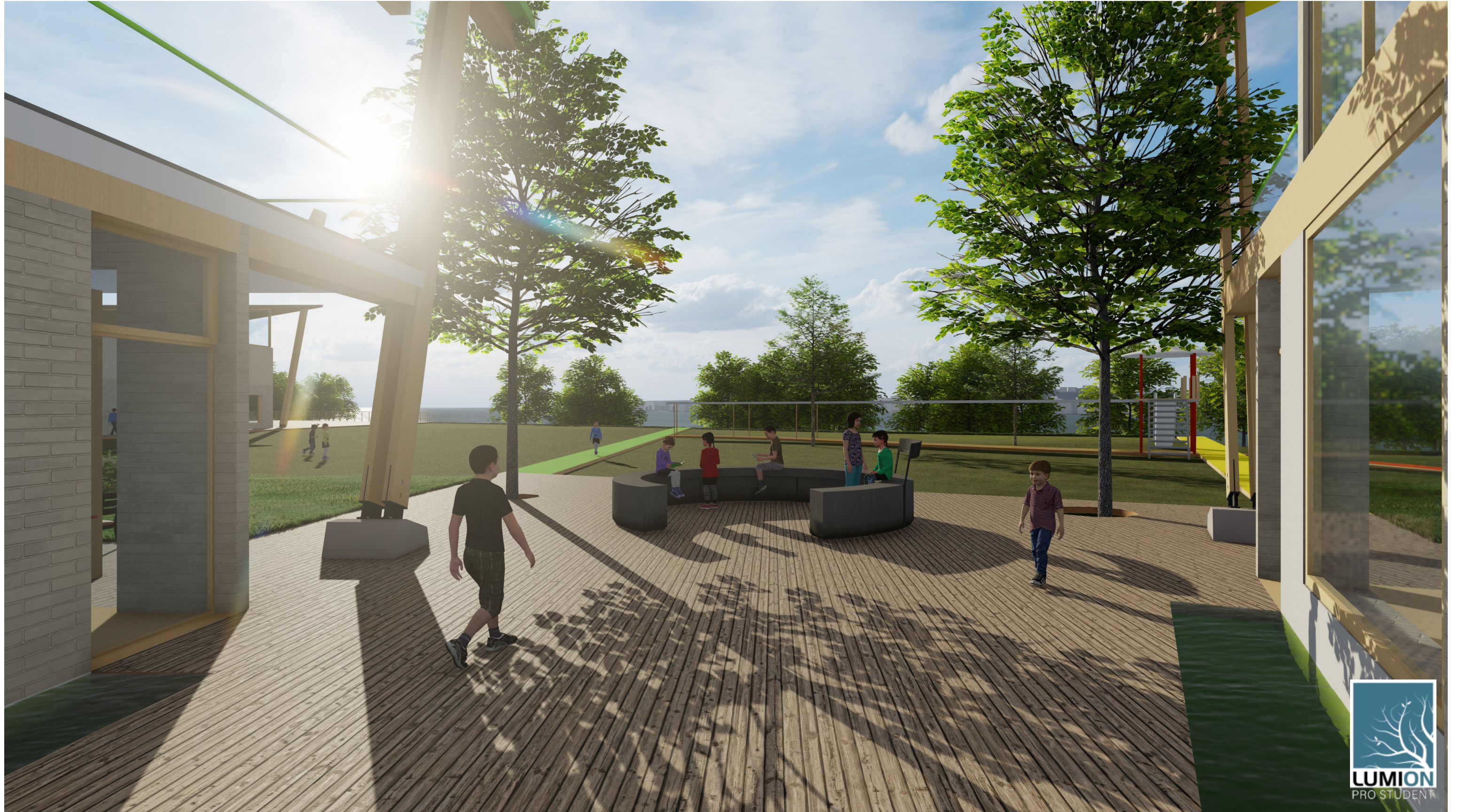
# SAND PLAYGROUND



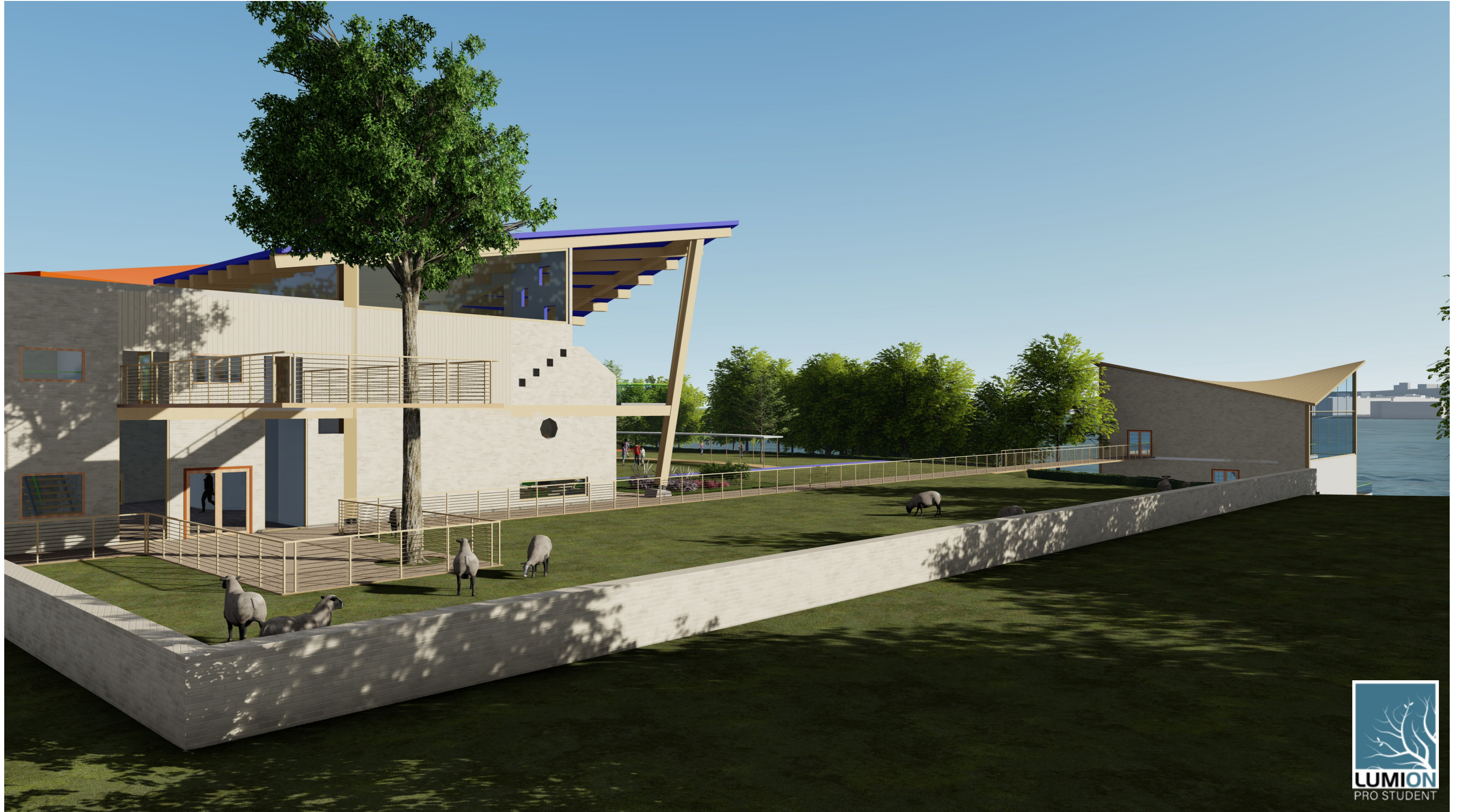
# MOUNT VERNON TRAIL



# OUTDOOR CLASSROOM

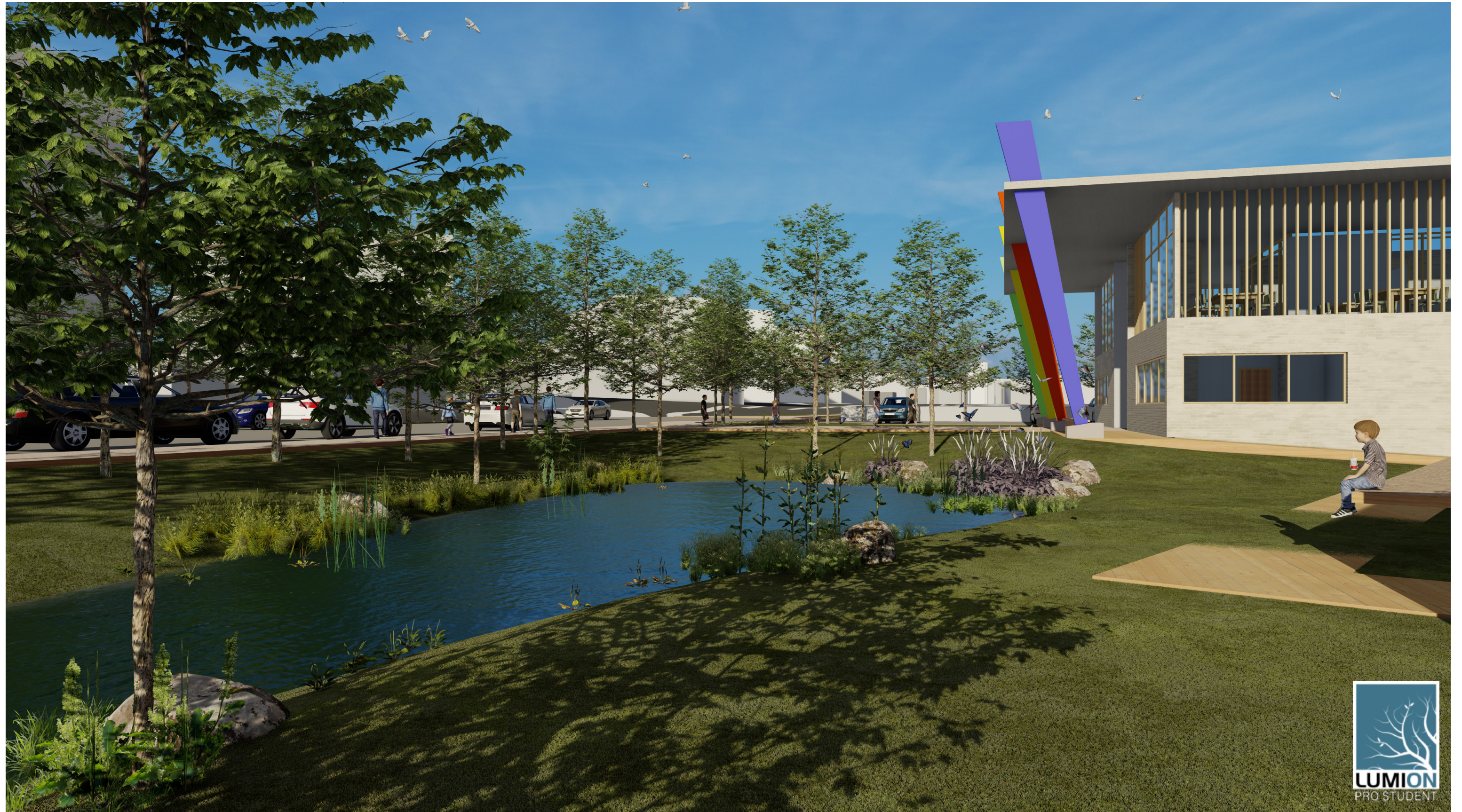


# GOAT PASTURE - TREE HOUSE

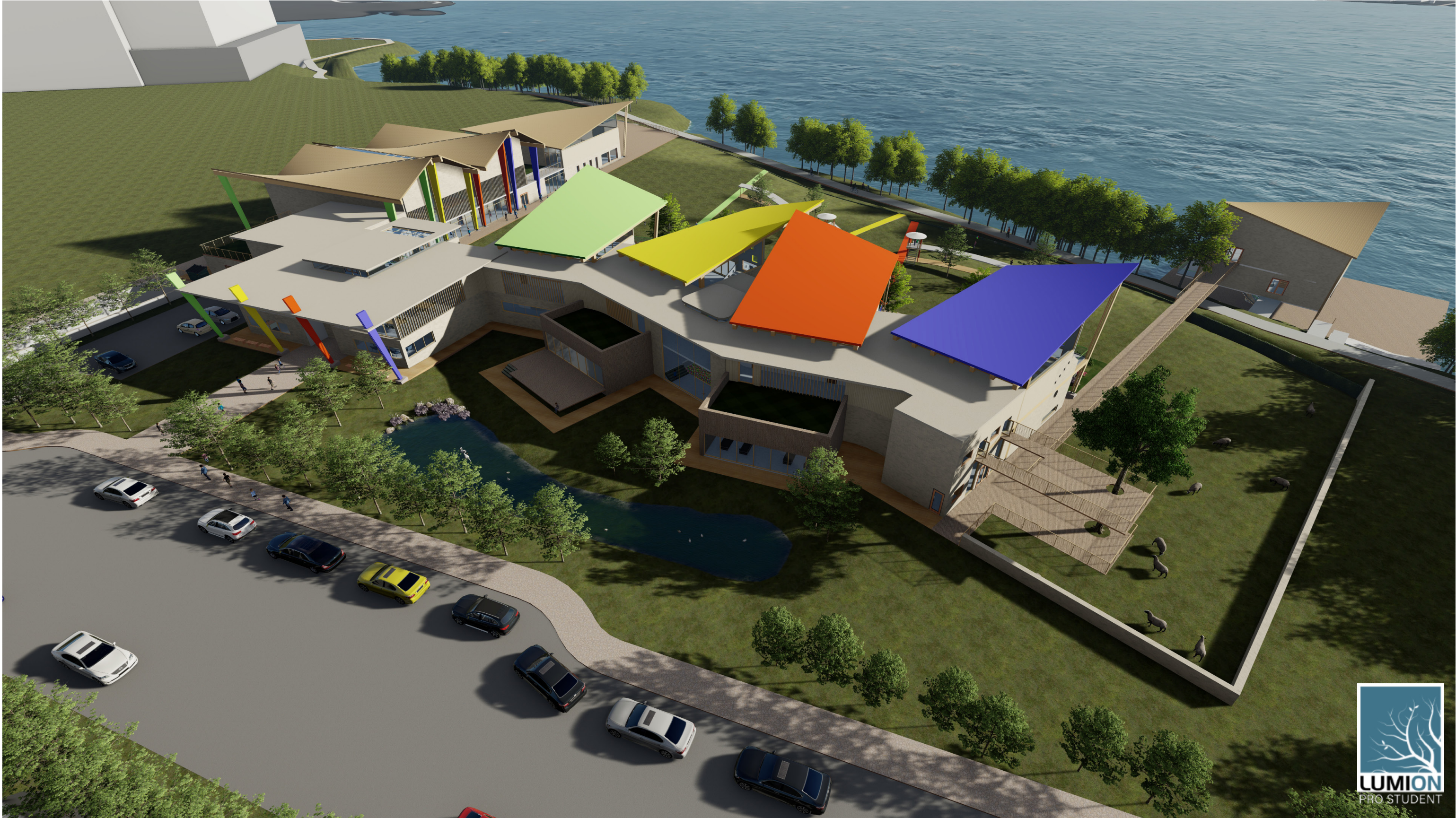




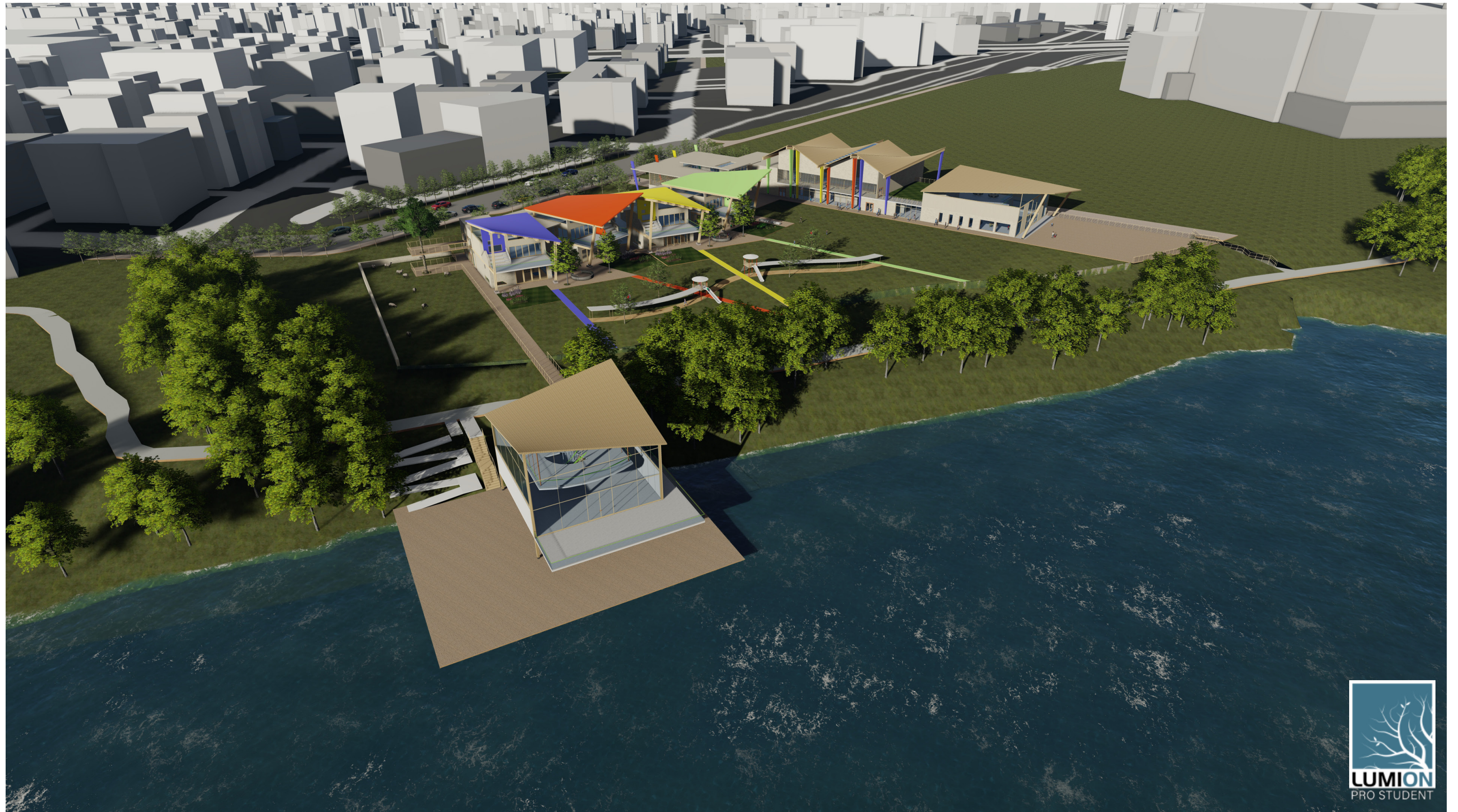
# BIO-RETENTION POND



ARIAL PERSPECTIVE



# ARIAL PERSPECTIVE



# ARIAL PERSPECTIVE



# REFERENCES

## Bibliography

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2. Montessori, M., *The Discovery of Child*, Fides Publishers, Inc. Notre Dame, In, 1967.
3. Montessori, M. *Spontaneous Activity in Education*, Robert Bentley, 1964.
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7. <https://montessoriacademy.com>
8. <https://www.archdaily.com/907109/montessori-kindergarten-arka>
9. <https://www.archdaily.com/896045/ratchut-school-design-in-motion>
10. <https://www.archdaily.com/776191/fayetteville-montessori-elementary-school-marlon-blackwell-architect>

## Image References

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Fig. 1 Montessori Curriculum, <https://www.rocklinranchmontessori.com/home>

Fig. 2 Examples of Montessori Classroom, <https://www.archdaily.com/930510/how-to-stimulate-childrens-autonomy-through-architecture-and-the-montessori-method>

Fig. 3 Design Documents of Ratchut School, Thailand, <https://www.archdaily.com/896045/ratchut-school-design-in-motion>

Fig. 4 Design Documents Beijing Peninsula Kindergarten, China, <https://www.archdaily.com/907109/montessori-kindergarten-arka>

Fig. 5 Design Documents of Fayetteville Montessori Elementary School, US, <https://www.archdaily.com/776191/fayetteville-montessori-elementary-school-marlon-blackwell-architect>