



ACT FOR

# CHILDREN

BY: KELSEY JARRETT

# **ACT FOR CHILDREN**

## FORMATIVE ENVIRONMENTS





# PROLOGUE

## SIGNATURE PAGE

### ACT FOR CHILDREN

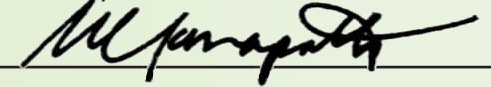
This Design Thesis was submitted to the Department of Architecture and Landscape Architecture of North Dakota State University. By Kelsey Jarrett, in partial fulfillment of the requirements for the degree of Master of Architecture.

By

Kelsey Jarrett



Primary Thesis Advisor



Thesis Committee Chair

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## THESIS PROPOSAL

Tara Leshar Figure 1. A child and her elephant



# ABSTRACT

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**CAN ARCHITECTURE SERVE AS AN EDUCATIONAL AID IN EARLY CHILDHOOD DEVELOPMENT?**

**CAN WE AS DESIGNERS HELP CHILDREN LEARN WHILE PROVOKING DISCOVERY AND CREATIVE THINKING?**

**HOW CAN WE AS DESIGNERS BETTER PREPARE OUR NATION'S YOUNGEST GENERATION FOR SUCCESS?**

Our future rests on the success of our children. Due to social and economic trends, there is a tremendous need in our society for quality child care. The impact of the built environment within these facilities can drastically impact many aspects of development. If we as designers can successfully identify the needs and wants of our users, we can create an environment that fosters learning. My thesis seeks to explore redefining the typical day care center into an educational facility which prioritizes learning. I seek to achieve this by identifying key prepared environments that facilitate learning in early childhood development.

“Architecture should offer an incentive to its users to influence it whenever possible, not merely to reinforce its identity, but more especially to enhance and affirm the identity of the users.”

- Herman Hertzberger, Lessons for Students in Architecture





# THE NARRATIVE

## WHY IT MATTERS

### EXPLANATION OF THESIS

One of the hardest things any parent must do is to trust your child with someone else. Child care is a critical component of all livable communities for families. Today most parents work full time, many depending on child care facilities. The impact of the built environment within these facilities can drastically impact a child’s cognitive, language, and social development skills, which is often overlooked by society. From the minute, a child is born they become ready to learn. The brain develops most of its neuronal connections between birth and three years of age. The ability to intake new information becomes critical in forming neurological pathways. Without these early foundations, it becomes difficult for a child to move on to more complex concepts.

Child care in the United States has become a financial burden for many American families. The struggle to find a balance between providing economic resources for their families and providing nurture for their children has become a major economic problem. Though this is troubling decision, as a society we should be making this decision painless for families. Based on research, a quality daycare center can be a very enriching experience for children if they are designed successfully.

I have always been fascinated by how children fuse themselves within an object. They immediately become transformed into an object of their play. For example, a boat is not merely just a boat, a dog is not merely just a dog. If we closely examine the children’s play, it’s not just the simple pushing and pulling of the toy. It’s the roaring sound of water hitting the boat, it’s the wind whispering past the ears and it’s the piercing noise of a horn. A simple plastic toy has become integrated into the imagination of a young child. This is imagination and learning in and of itself. I am concerned that our current educational institutions are making little to no attempt to foster these stages of development.

# TPOLOGY

## TPOLOGY: DAY CARE CENTER

To successfully examine the theoretical premise, I will create an early elementary education facility that represents, implements and reflects the discovered research during the fall semester. Declaring this facility as a child care center will help provide a clear scope of the research discovered.



# CLIENT / USERS

## STUDENTS

Children ages 6months-5 years old will be the primary users of the facility. They will inhabit the building during typical business hours. Most children will live in a nearby community, but some may travel a distance due to a parent’s job.

## EDUCATORS

Teachers will supervise and engage their students in activities to ensure they are providing an environment that fosters learning. Teachers will be the secondary users of the space.

## OFFICE

Their primary role is to manage the day to day activities at the daycare facility. Some tasks include answering phone calls and scheduling meetings.

## VOLUNTEERS

The job of a volunteer usually requires listening to the children, offering comfort, resolving conflict and helping with day to day operational duties. The primary role is to maintain focus on the children to help maintain a safe, friendly, and supportive environment.

## PARENTS

The typical role of a parent is to ensure their children are dropped off and picked up at a designated time. Parents will typically only occupy the space during this time and during meetings and events.

## MAINTENANCE

Custodians, gardeners, will occupy the site based on necessary needs. These occupants require a small portion of space to perform their duties.

# MAJOR PROJECT ELEMENTS

## GARDEN

Gardening is an educational activity that allows children to develop new skills including; responsibility, discovery, creativity, self-confidence and understanding.

## PLAYYARD

Outdoor play spaces are an extension of the classroom. Playing outside allows children to experience a constantly changing environment well being exposed to natural daylighting, open air, physical activity, and natural elements.

## STORAGE

Adequate, well organized and accessible storage is essential. Centers should include a wide range of storage types including small or large walk-in closets; freestanding and built-in cabinets; open and closed shelving.

## LAUNDRY, MAINTENANCE AND MECHANICALS

Important functional areas include laundry facilities, a janitorial closet and a mechanical room.

## MULTIPURPOSE ROOM

It is ideal in almost every climate to have opportunities for gross motor activities indoors. This space will serve as a gross motor room during the day time and meeting spaces in the evening

## KITCHEN

Almost every center will have some type of kitchen space. It is important to decide early in the design process on how the facility plans to use the kitchen. For example: Does the kitchen only warm and hold food? Do children bring their own food?

## ENTRY AND RECEPTION

A trellis, front porch, seats and warm welcoming front door all create a memorable entrance transition for children and parents.

## ADULT AND SUPPORT SPACES

These spaces include; adult bathrooms, staff breakroom and resource rooms, a meeting room and dedicated parent spaces.

## CLASSROOMS

Flexible indoor space that provides a space for children to learn.



# PROJECT EMPHASIS

Studies have shown the importance of the physical environment in supporting childhood development. The emphasis for my thesis is to analysis the developmental stages of children and from the research create a facility that fosters and enhances learning. Some of the concepts considered in this project include: scale, movement, daylighting, materiality, spatial organization, connection to nature, and social interaction. The goal of this thesis is to redefine the typical child care center into a facility which fosters learning.

**HOW CAN THE ORGANIZATION OF SPACES EFFECT THE PROCESS OF LEARNING?**

**HOW CAN WE DESIGN AN EDUCATIONAL FACILITY IN WHICH CHILDREN LEARN THROUGH INTERACTION AND EXPERIENCES?**

# SITE

## CITY OF WOODBURY

Woodbury is located in the Midwest United States in the eastern part of Minnesota.

**CITY**  
Woodbury is a suburb located just east of St. Paul. The population of Woodbury according to the 2016 Census is 68,820, making it the ninth largest city in Minnesota. The site was chosen because of the projected population growth within the next couple years. Based on the U.S. Census Bureau, Woodbury has grown 9.9 percent from 2010 to 2016. The projected population growth in 2020 is 72,690 and in 2030 it is projected to be 80,500. This continuous growth makes Woodbury a perfect location for a thriving business environment.

**SITE**  
The selection of site for this project is located off Bailey Road in Woodbury, Minnesota. The site is an ideal location for a new day care facility because of its proximity to interstate 494, 94, and 694. The building will serve all four communities including Cottage Grove, Newport, St Paul Park, and Woodbury. As mentioned early, the projected population growth expected within these cities also impacted the decision to locate the project here.

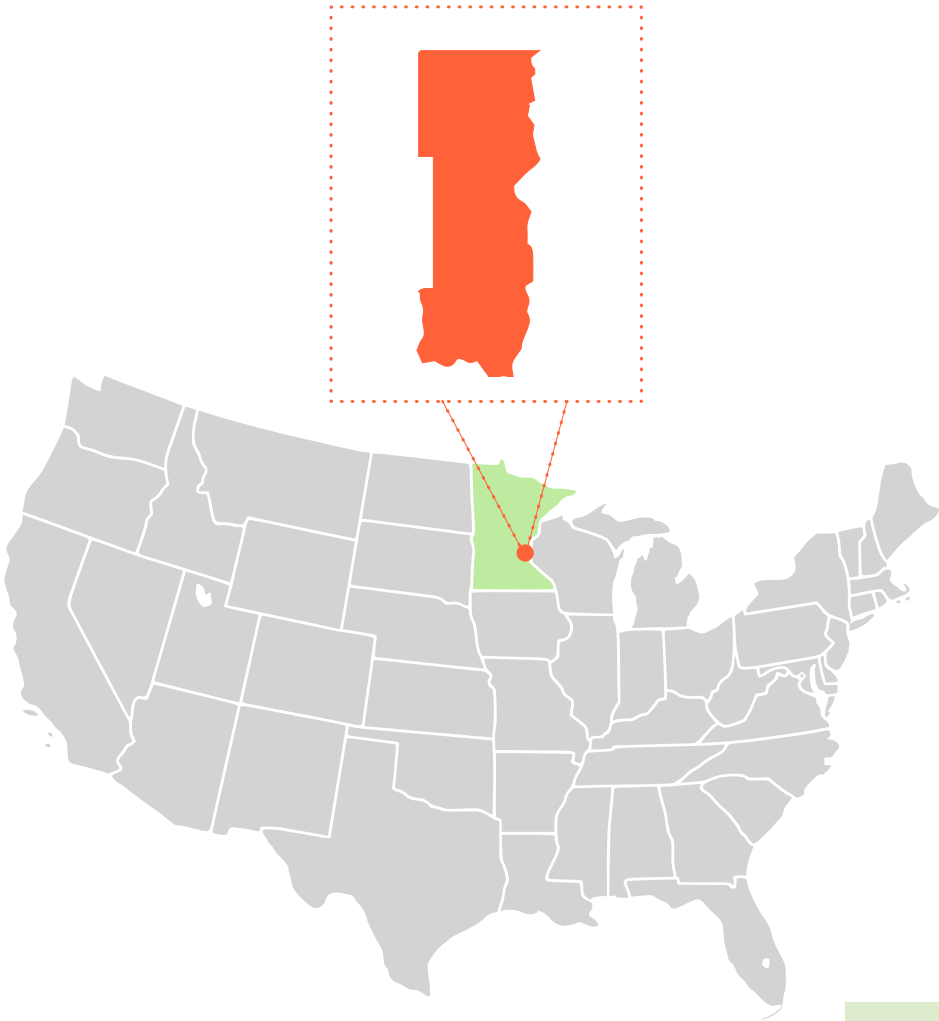


Figure 2. Site Map

# GOALS

## PROFESSIONAL, ACADEMIC & PERSONAL

The scope of this thesis project aims to inspire children through architectural space. Through design, we as architects can not only shape space and improve space, but we also can positively impact the users within the space.

The goal of the project is to provide children with developmentally appropriate architecture which stimulates cognitive, emotional, social, and physical and language development.

In the end, this thesis is designed to demonstrate that designing for children requires awareness in the way which child develop, learn, play and interact with the world around them. The final design solution will provide a developmentally appropriate setting balancing the practicality of a day care center while evoking a sense of wonder, delight, and meaning to children.

### PROFESSIONAL

Professionally, I hope to take the lessons learned from my thesis and apply the knowledge in a successful firm which specializes in educational facilities. "Education must shift from instruction to discovery- to probing and exploration"- Marshall McLuhn. We as architects can impact the next generation by simply linking learning with meaningful opportunities. Our role is to assist teachers by providing a physical environment that promotes and encourages creativity and innovation. This topic has always been an interest of mine, so by having this experience and knowledge I hope will provide an advantage over other potential applicants. Wherever life takes me I plan to improve the lives of countless people through design.

### ACADEMIC

The academic goal of this thesis project is to receive Master of Architecture degree at North Dakota State University. Through the design process, I hope to apply the knowledge I have gained so far at North Dakota State University well understanding new concepts that can be applied to my future endeavors. I hope in the future that the thesis project serves as a reference for current graduate students whom share the same passion in bettering educational facilities.

### PERSONAL

The most important personal goal I have for the thesis project is to produce a solution that I can be proud of. I have set very high standards and I hope the end solution will succeed my expectations. Accomplishing this project makes my journey to become a licensed architect one step closer. This is not the end but merely the beginning of something new.



# CASE STUDIES

## INTRODUCTION

The following three case studies were selected to understand how to foster learning in early childhood design.

Typological Case Studies:

### KINDERGARTEN IN GUASTALLA

### RAA DAY CARE CENTER

### CHILDREN’S HOUSE

Studying the precedents will allow interpretation, analysis and new ideas to blossom. Through researching the precedents of day care centers, the following research will find insight on optimal spatial arrangements, scale, views, light and movement.

Figure 3. Snowy Day



Figure 4. High Peaks



Figure 5. Curvy Wonderland



# KINDERGARTEN IN GUASTALLA

**ARCHITECT:** Mario Cucinella Architects  
**LOCATION:** Guastalla RE, Italy  
**LANDSCAPE:** Marilena Baggio  
**AREA:** 1400.0sqm  
**PROJECT YEAR:** 2015

## INTRODUCTION

The building form is highly expressive and playful which reflects the users directly. The glazing on the exterior of the building allows visual connection between the exterior, as well as create a sense of security for the children using the facility. The interior space is a mirror image of the exterior environment incorporating natural elements and neutral tones. However, I feel that the whimsical and expressive form stops as we evaluate the interior color scheme. Through the evaluation and research, I believe through modification that these precedent studies can be a good resource to help develop a child care facility that successfully fosters learning.

The philosophy of the building is to create a space suitable for children and teachers which is welcoming and safe which provides children with the opportunity to explore the world. The overall design stimulates the interaction of the children with the surrounding environment.



Figure 6. Wood Cuts



# ANALYSIS

## KINDERGARTEN IN GUASTALLA

Figure 7. Structural Elements



Figure 8. Exterior Area



Figure 9. Natural Interior



### SPACES

Connection spaces between classrooms stimulate curiosity and exploration. Though the building is a simplistic linear space it provides paths of different experiences. The widening and shortening of the spaces, play and interaction spaces and large transparent windows allow a glimpse of the outdoor areas. Mindfulness of space, materials, light, colors and sounds articulate an extraordinary design which considered the importance of providing children with enriching spaces to help foster the growth of the children.

### PROGRAM ELEMENTS

- Classrooms
- Laboratories
- Play areas
- Niches
- Kitchen
- Unloading and service area
- Green Spaces

Figure 10. Guastalla Spatial

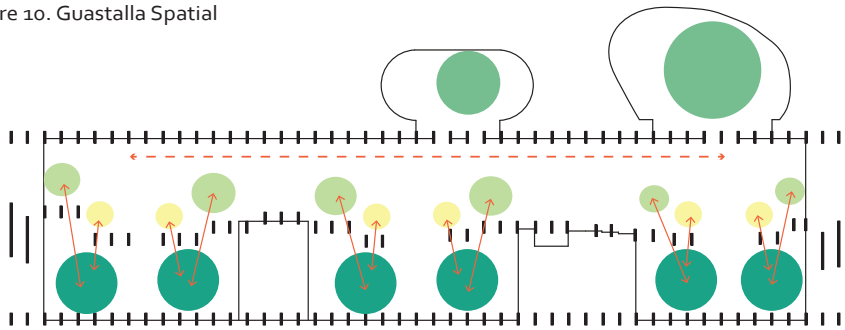


Figure 11. Guastalla Circulation

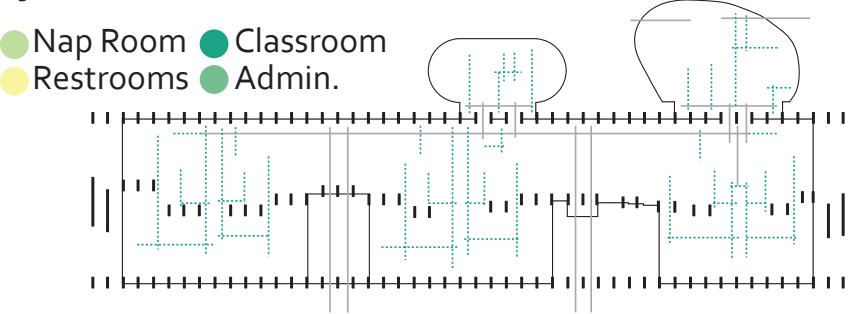


Figure 12. Guastalla Entry

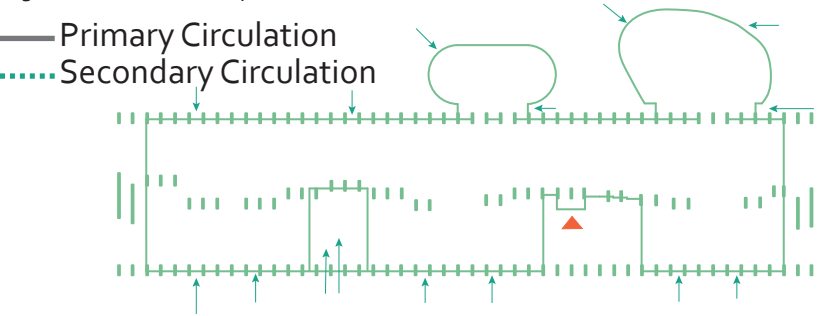
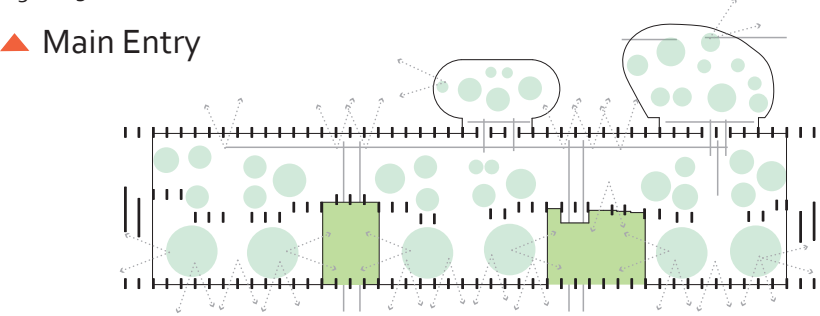


Figure 13. Guastalla Views



### SPATIAL LAYOUT

Indicated from the spatial diagram we can infer that it is essential to have the restroom area near the classroom space. Easy mobility between the restroom, classroom and napping area seems to be a reoccurring pattern through the case study examination

### CIRCULATION

The floor plan accommodates easy movement through the day care center by positioning the main corridor along the north-west side of the building. The building uses repetition through spatial organization that have similar functions.

### ENTRY CONDITION

The simple massing of the building is comprised of one large rectangle. The main entry is subtracted from the simple building mass which makes for a distinguishing entry condition. Overall the building is highly expressive with elegant curves creating a sense of wonder and connection to the environment.

### VIEWS

Throughout the kindergarten low interior windows to adjacent classrooms allow children to visually and physically sprawl out utilizing gross motor skills. Instead of using walls as barriers the architect decided to utilize windows which allow children to live in a constant relationship with nature and their environment. The diagram illustrates the connection between indoor and outdoor spaces.



# ANALYSIS

## KINDERGARTEN IN GUASTALLA

Figure 14. Guastalla Site

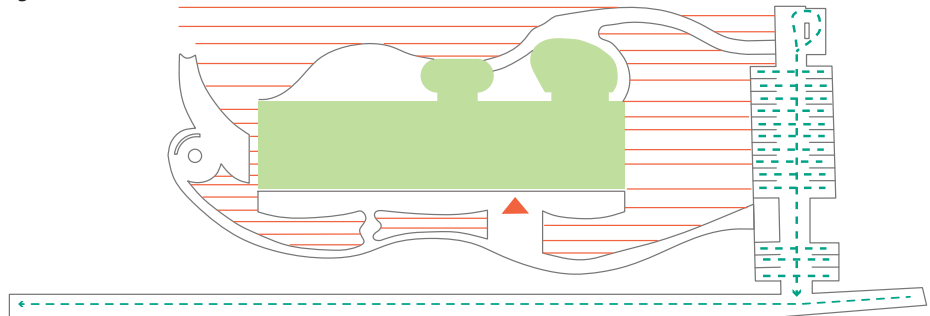
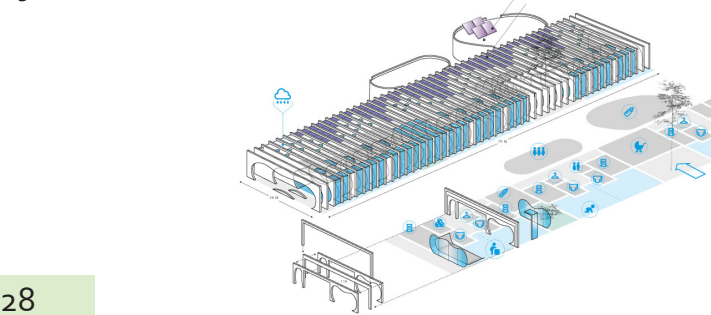


Figure 15. Guastalla Section



Figure 16. Guastalla Isometric



### SITE DEVELOPMENT

The site plan imitates the highly expressive and playful building through providing users with a journey towards the main entry. Kindergartens should be a place for children to explore and a place which stimulates imagination.

### SECTION

The form of the building creates a sensory experience by integrating trees seamlessly into the structure of the building. The unique shape mimics the energy and wonder in which children possess.

### TAKEAWAYS

The final design will include a timber structure which is exposed in specific areas throughout the center creating a visual connection between indoor and outdoor space. Also, the curvy pathways used around the building site will also be implemented into the design. This is important because the gentle curves provide an interesting experience and stimulate exploration.

# RÅÅ DAY CARE CENTER

**ARCHITECT:** Dorte Mandrup Arkitekter  
**LOCATION:** Kustgatan 1, 252 70 Raa, Sweden  
**AREA:** 525.0 sqm  
**PROJECT YEAR:** 2013

### INTRODUCTION

#### FROM ARCHITECT:

When you look at the day care center of Råå, the term “becoming part of the landscape” comes to mind. In Råå, a small fishing village outside Helsingborg in Sweden, Dorte Mandrup has designed a preschool with the utmost respect for its surroundings. With an entirely wooden surface, the building imitates the neighboring sand dunes with its sloping and jagged roof tops as well as the traditional typology of the city’s small fishermen houses. The building seems to argue that children also deserve a space that makes them feel connected to the everyday life and landscape all around them (Mandrup, n.d).



Figure 17. Raa Day Care Exterior

# ANALYSIS

## RÅÅ DAY CARE CENTER

Figure 18 . Raa Playground



Figure 19 . Raa Sharp Sunlight



Figure 20 . Raa Neutral Interior



### PROGRAM ELEMENTS

- Administration Spaces
- Wardrobe
- Large group classroom (10 children)
- Small group spaces (1-2 children)
- Cave
- Outdoor area

Figure 21 . Raa Spatial

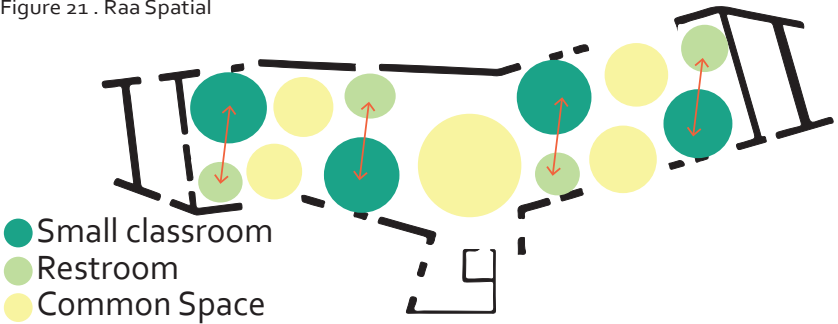


Figure 22 . Raa Circulation

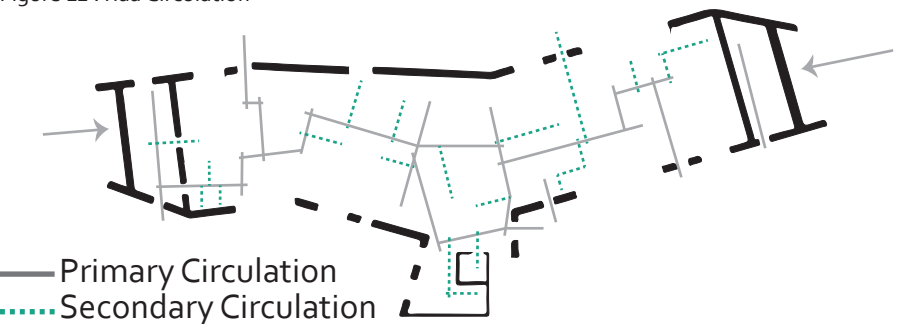


Figure 23 . Raa Entry

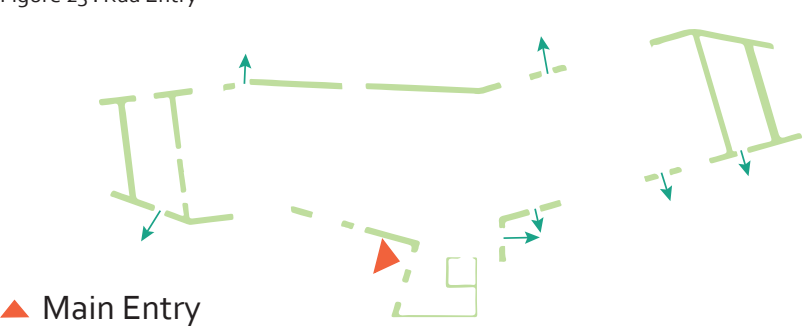
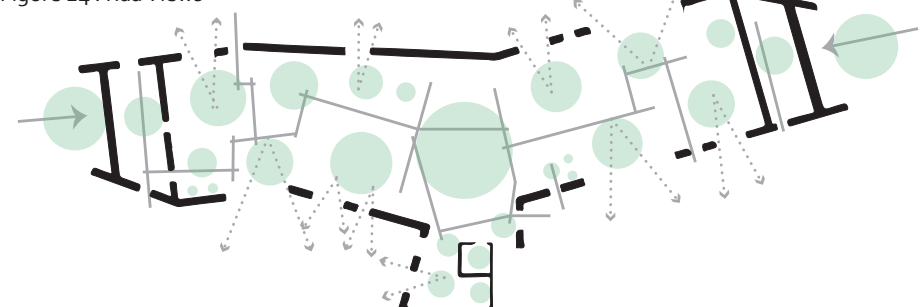


Figure 24 . Raa Views



### SPATIAL LAYOUT

The floor plan illustrates that each classroom space which holds approximately ten children has an adjacent common space for large groups and a restroom facility nearby.

### CIRCULATION

The circulation analysis emphasizes a linear pathway through the center of the building. Secondary pathways branch off the main corridor which allows each classroom to have a strong visual connection to the outdoors. This precedent study illustrates the importance of site development, orientation, and exterior development.

### ENTRY CONDITION

The main entrance is very important when designing day care centers. The entrance needs to be welcoming and easily identifiable well balancing the practical needs such as security. In this study the entrance is unique because occupants must enter the Råå södra skola which is the exiting school built prior to Råå Preschool.

### VIEWS

The indoor environment is crucial to the health, safety and development of any child. Råå Preschool uses skylights and large windows to the exterior to ensure ample daylighting year-round. Transparency through the exterior development and interior development conveys can idea that education should not be hidden but visible and celebrated.



# ANALYSIS

## RÅÅ DAY CARE CENTER

Figure 25. Raa Site Plan

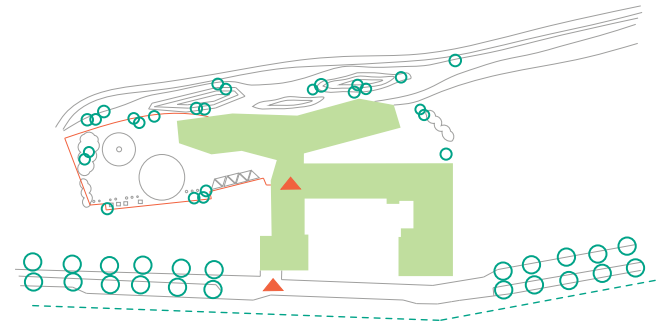
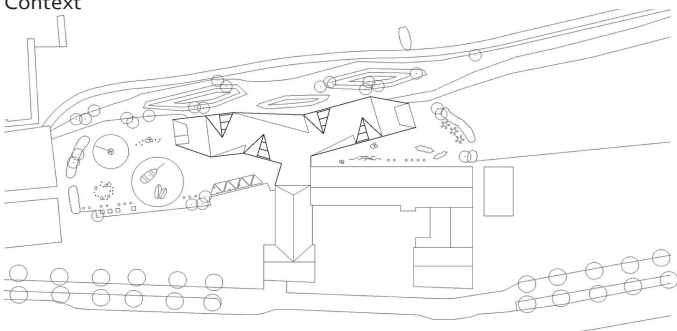


Figure 26. Raa Section



Figure 27. Raa Context



### SITE DEVELOPMENT

The site plan illustrates the importance of boundaries when it comes to designing a playground for children to explore. The location of the playground is positioned as far away from the street as possible to ensure safety for the children. Understanding site elements and providing an adequate environment for healthy growth and development is crucial when it comes to designing the site.

### SECTION

The section reveals that parts of the building contain lower ceilings. This architectural element provides children with a more intimate space where they can retreat if they are feeling overwhelmed or over stimulated. When children are feeling ambitious and ready to explore they can move to the common spaces where the ceiling gradually increase.

### TAKEAWAYS

Takeaways which will be implemented into the final design solution include the linear spatial layout. The day care center has one main corridor with classrooms or open spaces branching off. Also, in section you can see higher ceilings were implemented in the individual classroom creating a visual division between the classrooms and the rest of the facility.

# CHILDREN’S HOUSE

### ARCHITECT:

MU Architecture

### LOCATION:

Briis-Sous-Forges, France

### ARCHITECT IN CHARGE:

Maira Caldoncelli Vidal

### AREA:

640.0 sqm

### PROJECT YEAR:

2014

### INTRODUCTION

“The imposing presence of the forest on the site has always been a leading point to our design,” Grégoire Dubreux, Associate Architect at MU Architecture

Children’s House is a primary school which provides after-school care and summer school care for young children. The tree inspired school is in Briis-Sous-Forges, France which is the heart of the forest. The unique organic form elegantly weaves its way through the dense forest. Circular openings seen throughout the roof line allows for natural tree growth which seamlessly integrates natural elements within architecture. Every aspect of the design was viewed as a literal or abstract interpretation of a forest.



Figure 28 . Nature Within



# ANALYSIS

## CHILDREN’S HOUSE



### PROGRAM ELEMENTS

- Changing room
- Maternal Activity room
- Break room
- Storage space
- Preschool
- Art room
- Administration offices
- Tea room
- Toy library
- Social housing
- Terrace

One thing I found interesting regarding Children’s House was the unique program elements. A tea room and social housing would typically not be found in a day care center located in the United States. Also, the building has a second level which serves as a small living quarter. This is a unique idea and resembles a tree house which is a poetic expression of being a part of nature.

Figure 32. Children’s House Circulation

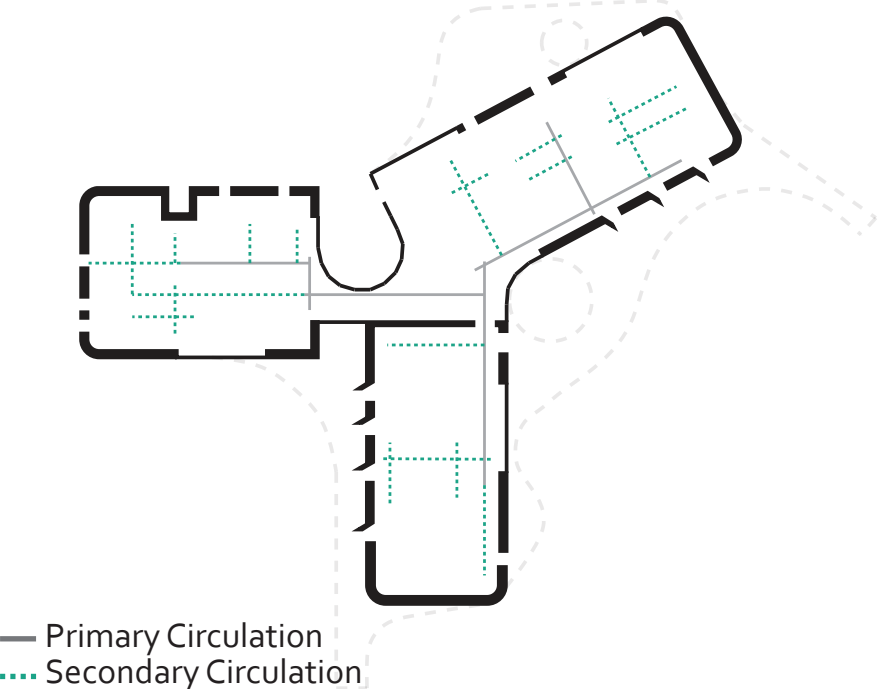
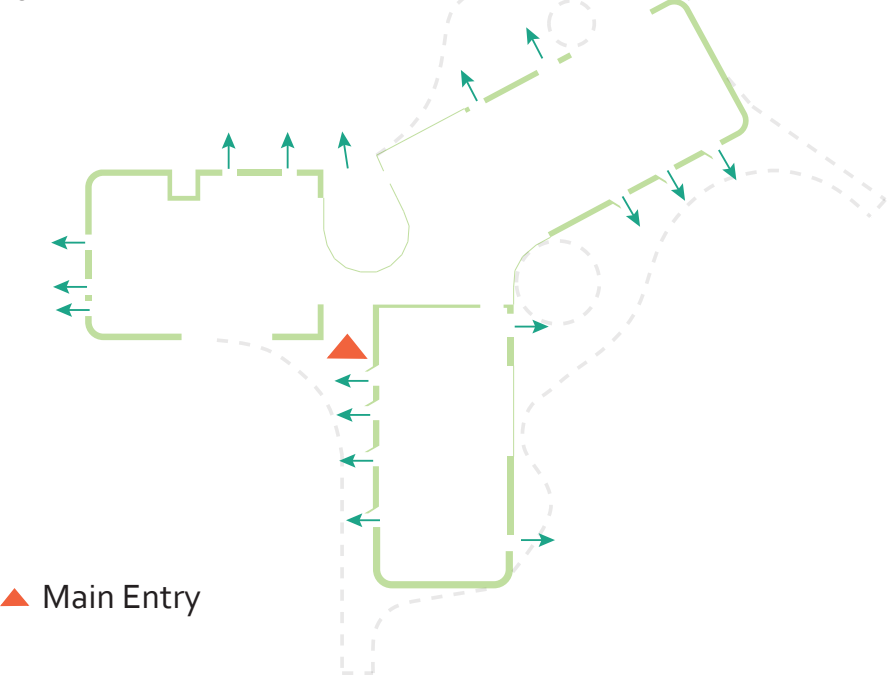


Figure 33. Children’s House Entry



### CIRCULATION

The building footprint contains one central node with three individual wings expanding outwards. Many of the primary circulation routes are located near glass facades which allow children direct sight to the exterior. Easy movement between indoors and outdoors is evident by classrooms having direct access. This adjacency is critical because it allows children to run spontaneously outside without any obstructions. Also, a south facing porch with a hard-covered surface was provided marking the transitional zone. This space allows messy activities to easily spill out relieving any congestion.

### ENTRY CONDITION

The entry condition is slightly subtracted from the central node. I find it very difficult to identify the main entrance because the free-forming roof extends around the vast majority of the building.

Figure 34 . Children's House Views

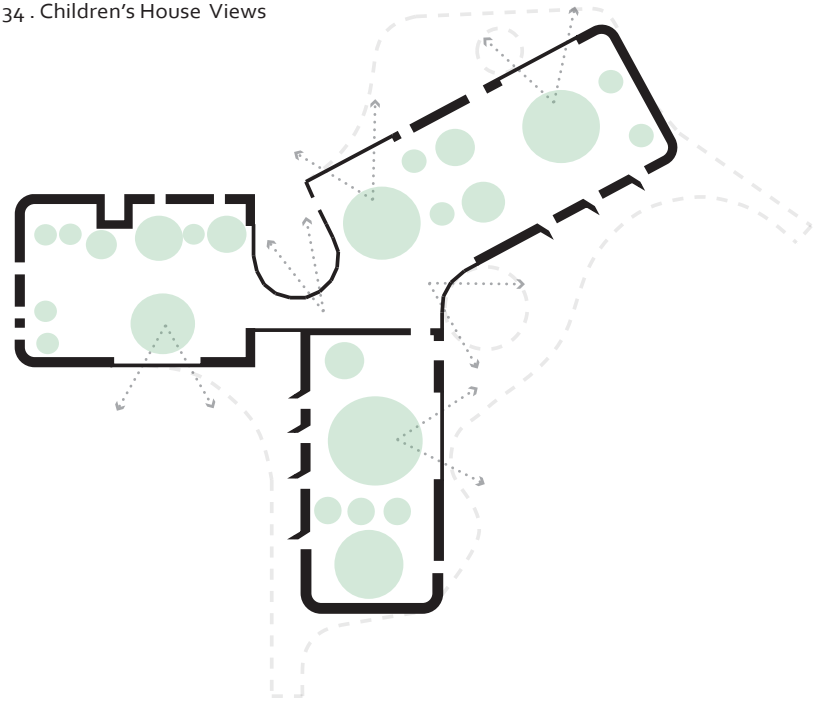
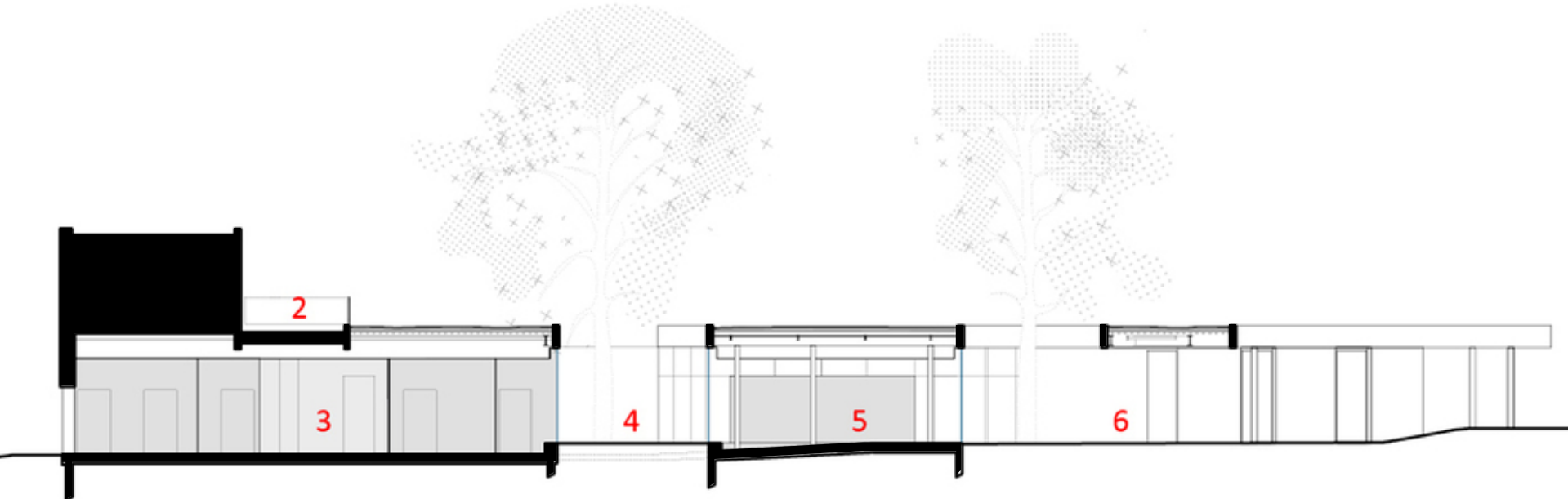


Figure 35 . Children's House Section



### VIEWS

Demonstrated from the graphic, each classroom has direct access and views to the outdoors. This is important because it allows children to explore their environment, develop muscle strength and coordination, and gain self-confidence. Also, natural lighting is important because it provides physical and physiological benefits. Natural lighting has been shown to benefit the health and concentration of children.

### SECTION

The form of the building creates an experience for children occupying the structure. Although the building does not have any ceiling height variations frequent holes incorporated within the exterior overhang allow children to visually connect with nature. Also, through subtracting a portion of the building, this allowed a unique court yard. The building truly reflects the playful and poetic aspects of nature and a forest.

## TYPOLOGICAL RESEARCH SUMMARY

Early childhood education was the focus of all three of my case studies: Kindergarten in Gustalla, Raa Day Care Center and Children's House. Information I found relevant throughout my research investigation was a projects response to integrating nature into the built environment and the importance of environmentally sensitive design. Spatially all three case studies show the importance of the physical environment supporting childhood development. Inappropriate design elements are fatal to the development of children. Children cannot simply adapt to inappropriate design errors so as designers we need to simply design age-appropriate architecture. Some unifying principles seen amongst the precedent studies include; Easy access to the play yard from the classrooms, adequate lighting, building scale and spatial arrangement. The biggest takeaway was that everything in the environment impacts a child's development.



Research is not a linear process, it is guided by the discoveries which lead to new avenues and conclusions.

Figure 36 . Knowledge

# PLAN FOR PROCEEDING

## DESIGN METHODOLOGY

Within the iteration design process, the use of established methodologies will be used to help facilitate design decisions. During the design process, the following research methodologies will be used to explore the thesis premises; modeling, descriptive, historical, correlation, and interpretative research. The blending of existing knowledge and knowledge which I have gained through qualitative research will ensure that I am obtaining a holistic view of the needs of young children. The end objective of the research is to reach one comprehensive conclusion on how to create meaningful design which is responsive to its users.

SYSTEM OF INQUIRY	STRATEGIES	TACTICS	PHILOSOPHY/THEORY
<b>Emancipatory</b> There are multiple realities, but they all overlap. These realities are developed through historical, social, cultural and empowerment identity.	<b>Qualitative</b> Learning the needs of the building users by individual interviews and observations.  <b>Logical Argument</b> Multiple iterations can lead to new forms that fit the site and program better. This will be performed through the physical and digital modeling environment.  <b>Holistic Case Studies</b> Reviewing multiple examples of existing structures can show what works and what doesn't based on functioning buildings.	<b>Personal Interviews</b> Interview groups or individuals with expertise within the subject matter.  <b>Iterative Design</b> Learning from the past attempts to find the best design solution  <b>Observation</b> Visit local child care centers and gain insight on the day to day operations.  <b>Literature Reviews</b> Books and scholarly papers which contain substantive findings, as well as theoretical and methodological contributions within a subject	<b>Montessori Method</b> Based on self-directed activity, hands-on learning and collaborative play. Nature and learning are one.  <b>Waldorf Education</b> Imagination in learning  <b>Reggio Emilia</b> Self-directed, experiential learning in relationship-driven environments

Figure 37 . Methodology



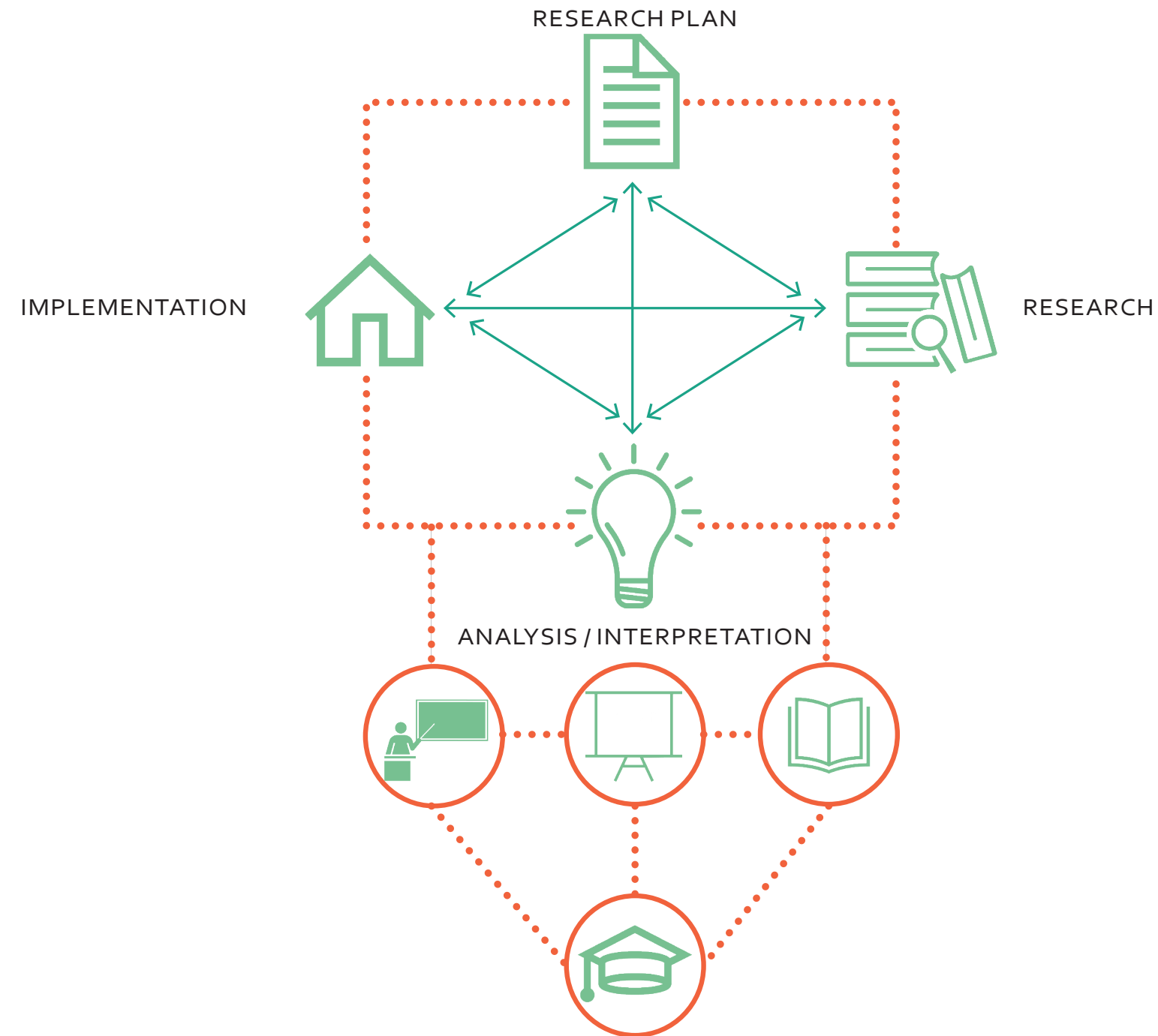


Figure 38 . Graphic Process

## DESIGN PROCESS PLAN DOCUMENTATION

The documentation of this thesis will be a continuous process and thorough as possible throughout the semester. Any interviews with experts will be documented using photography, text or audio recording. Process work will be documented by weekly scanning any sketches or diagrams. All information that has been gathered for the project at the end of the semester will be compiled in a categorized system. The documentation of this thesis will be a continuous process through the following methods:

- Maps & Diagrams
- Interviews & Personal Experiences
- Models- Physical and Computer
- Sketching
- Writing
- Research
- Computer Analysis

The cumulation of research and documentation will be compiled into a comprehensive book which will be a part of requirements to fulfill my Master of Architecture degree. This design thesis will be preserved digitally as a part of North Dakota State University Repository for future reference and use.



Figure 39 . NDSU Day Care Center

DELIVERABLES

**THESIS BOOK**  
A comprehensive report including project proposal, project program, process documentation, project solution, and a photograph of the project installation.

**FINAL PRESENTATION BOARDS - CONSTRUCTION DOCUMENTATIONS, RENDERINGS**  
Final presentation boards will represent all information pertinent to the thesis project. This can be done through renderings, iterations, floor plans or whatever media that demonstrates the project cohesively.

**PHYSICAL MODELS**  
Process models and design iterations will be displayed to showcase the design process. A final model will be constructed if I feel it articulates the final design solution in a way which digital technology does not.

**THESIS PROJECT FINAL REVIEW**  
Blind critics and your primary advisor will review your thesis project based on an oral presentation that will least for one hours. Thesis students are required to allot for half hour of questions by the thesis jury.

Figure 40 . Model



DESIGN SCHEDULE

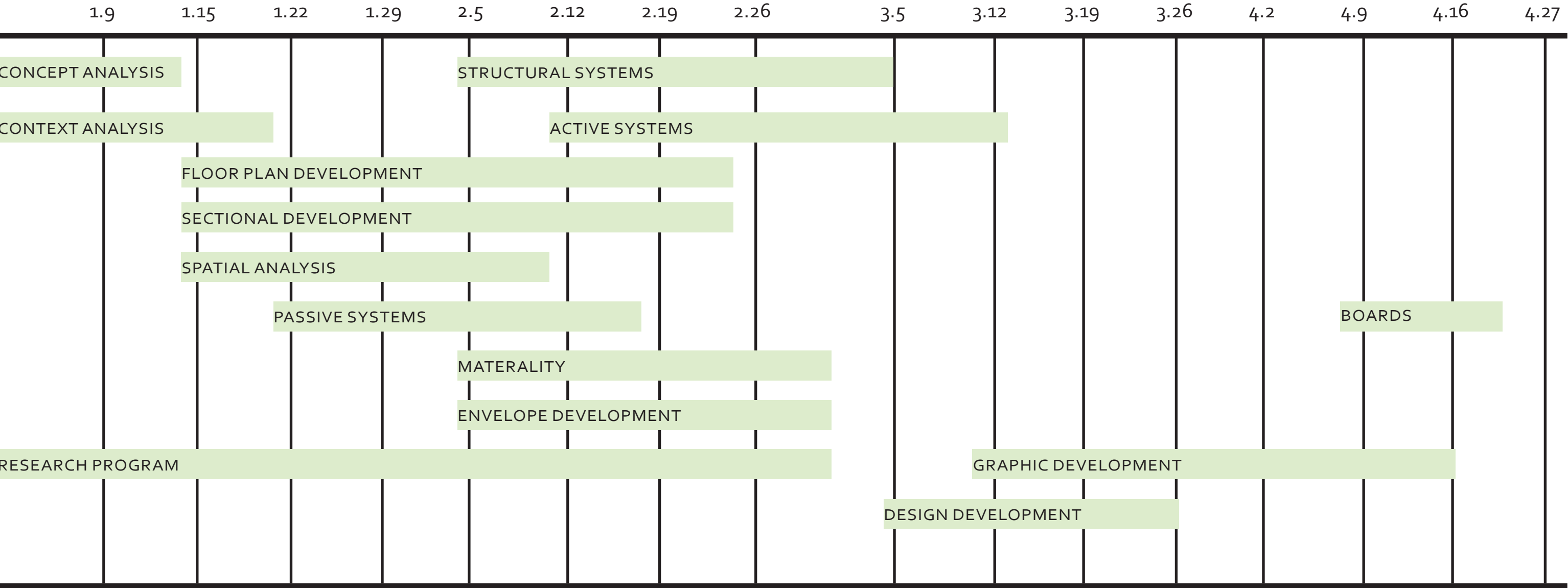
To successful complete the thesis project at its designated date, a strict schedule will be developed to ensure its completion. This coming spring semester I will strictly focus on thesis. Daily process will be expected to help ensure a successful final project. During the design process, the typical design steps will occur including; pre-design, schematic design, design development and final documentations. To help reduce the amount of stress and pressure at the end, presentation models and documentation will be developed throughout the design process. This will help alleviate some of the chaos at the end of the semester.

IMPORTANT DATES

9 Jan.	First Full Day of Classes
5 March	Mid-semester Thesis Reviews
20 April	Thesis Project Digital Submittal
23 April	Thesis Project Board Display
2 May	Final Thesis Review
7 May	Digital Copy of Final Thesis Documentation Due
11 May	Final Thesis Documentation Due to Repository

# PROJECT SCHEDULE

Figure 41 . Schedule







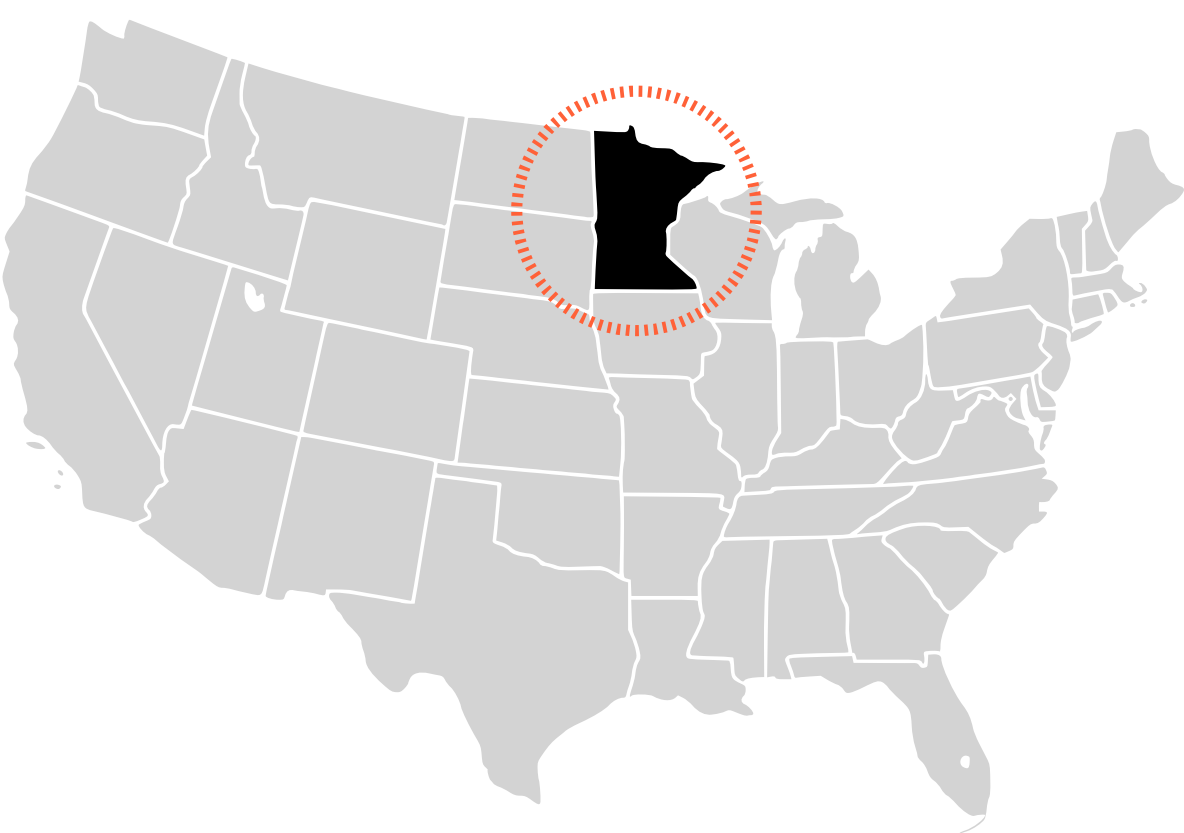
## THESIS RESEARCH

# SITE ANAYLSIS

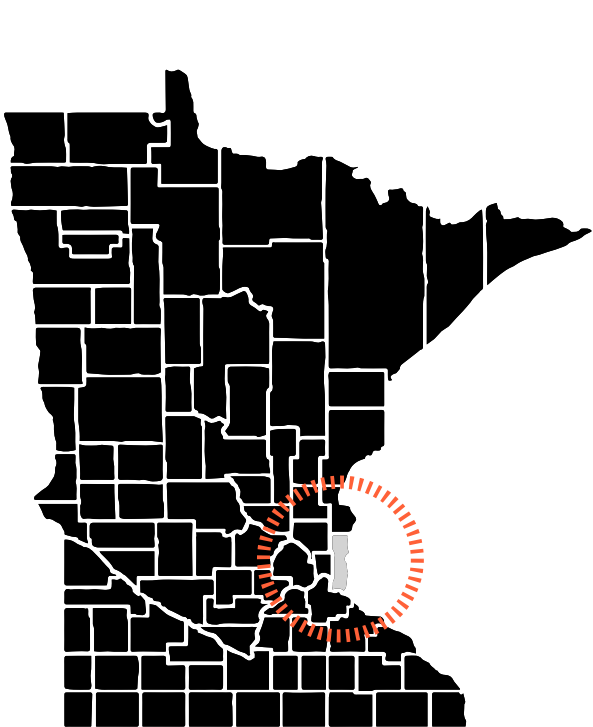
## LOCATION & PARCEL INFORMATION

Figure 43. Site Introduction

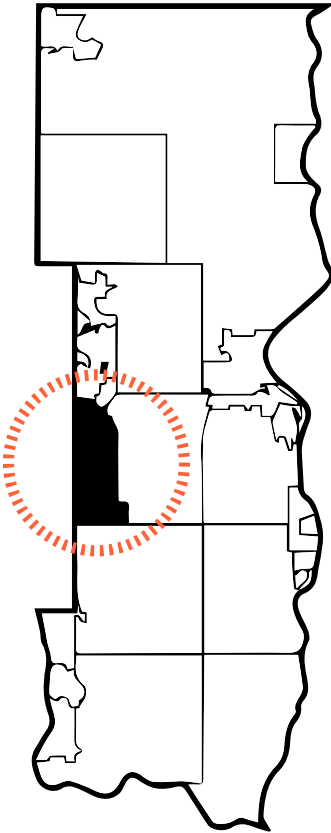
Site inventory and site analysis. Based on the building typology, an appropriate site location was determined. Inventory and analysis on items such as light, sun, wind, traffic, views and nearby context helped establish and inform the beginning of the design process.



Minnesota within the United States



Washington County within Minnesota



Proposed site within Woodbury



Figure 44. Site Location



Figure 45. Agricultural Land



Parcel ID: 30.028.21.41.0002

Address: 6820 Military Rd,  
Woodbury MN 55125

Owner: Hinz Family Farm

Use Desc 1: 100 Res 1 Unit

Use Desc 2: 200 Agricultural

Poly Acres: 22.17

Total Value = \$539,800

# SITE ANAYLSIS

## INTRODUCTION

When visiting Woodbury Minnesota in October and November I had two sites in mind. The first option was located right along Bailey Road near Bielenberg Sports Center. The site was quickly eliminated since the property has already been bought by the City of Woodbury for future expansion of the sporting complex. Also, although nature was incorporated, nearby traffic located on three sides of the site allowed for a quick elimination of the potential site. The second site, which is the one I will be developing for my thesis, is located along Military Road near the border of Woodbury, Newport and Cottage Grove. After visiting the site on two different occasions, I realized the sense of place and the essence of the site would be perfect of a child care center. Although, it is located on the outskirts of Woodbury, future development will make it an ideal location for many young families.

Also, close proximity to U.S. Highway 10 which connects Cottage Grove and Saint Paul and interstate 494 make it ideal location for any parents working within the surrounding area. A variety of other reasons for selecting this location include evaluation of economy, potential growth of Woodbury Minnesota and adequate outdoor space.

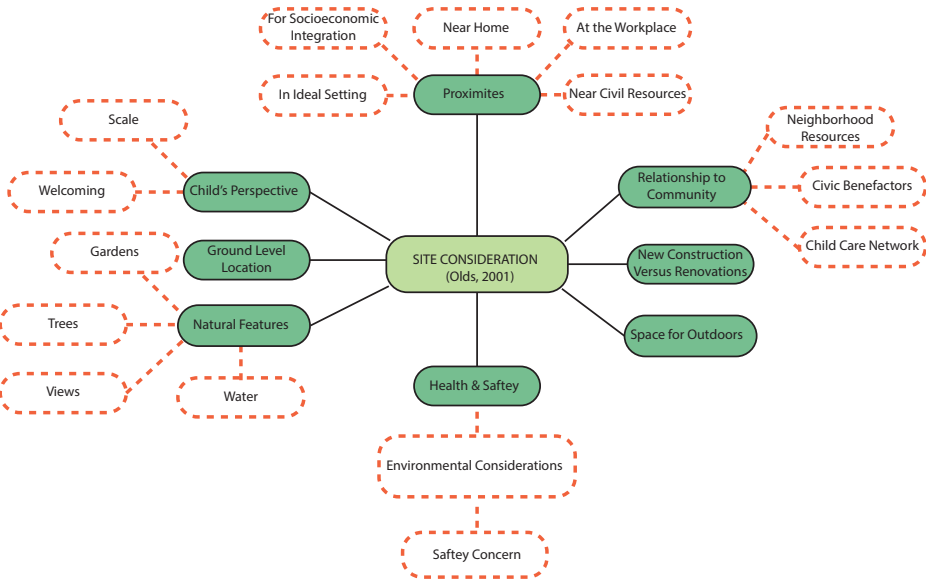


Figure 46. Site Considerations



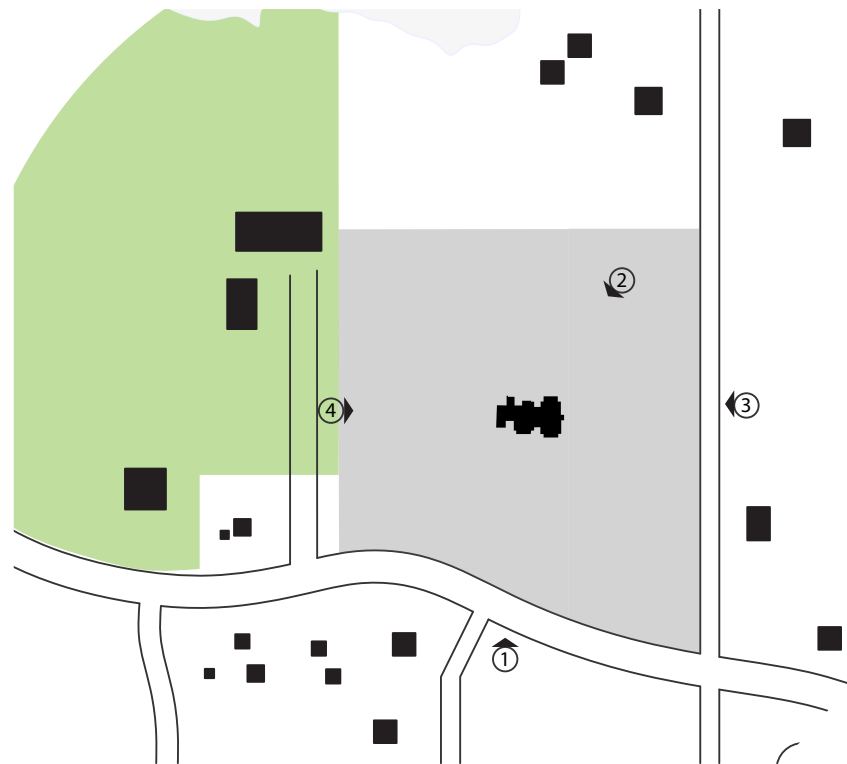


Figure 47. Site Views

#### VIEWS NEAR THE SITE

The site is in the rural part of Woodbury, Minnesota. Although the site is located off two nearby streets, the site provides an escape from the hustle and bustle of the city. With Woodbury's rapid population growth and development, sites like this are extremely rare to come by. One can step outside and embrace the beautifully colored sunset without a view encumbered by new housing developments. In essence a field which once grew corn, wheat and soy beans will now serve as the foundation for learning.

Figure 48. Site View-Looking North



Figure 50. Site View-Looking West



Figure 49. Site View-Looking South



Figure 51. Site View-Looking East





Figure 52. Views- La Lake



Looking north from the proposed site is La Lake. Over the years, the City of Woodbury has slowly purchased land bringing the park to 80 acres of wooded landscape. The close proximity to La Lake offers a challenge to connect the nearby park while also designing the site to respond to the nearby landscape. Currently, the proposed site is being used for urban agriculture which offers a unique challenge in finding potential solutions in how to seamlessly integrate two different landscapes. Though, the site is not directly located in the park land, offering trails and connections to this beautiful landscape is ideal.

Figure 53. La Lake Event Center



Just northwest of the proposed site is a rambler style house which is part of La Lake Park. In 2015, Woodbury City Council approved the final plans for the new La Lake Park. Plans in the near future include a three-seasonal event center, nearby community garden, playground and restored native prairie land. The cities goal is to provide a unique experience different than any other typical community park.

# SITE ANALYSIS

WIND, CLIMATE, SOIL, TRAFFIC, ZONING, CONTOURS & VEGETATION

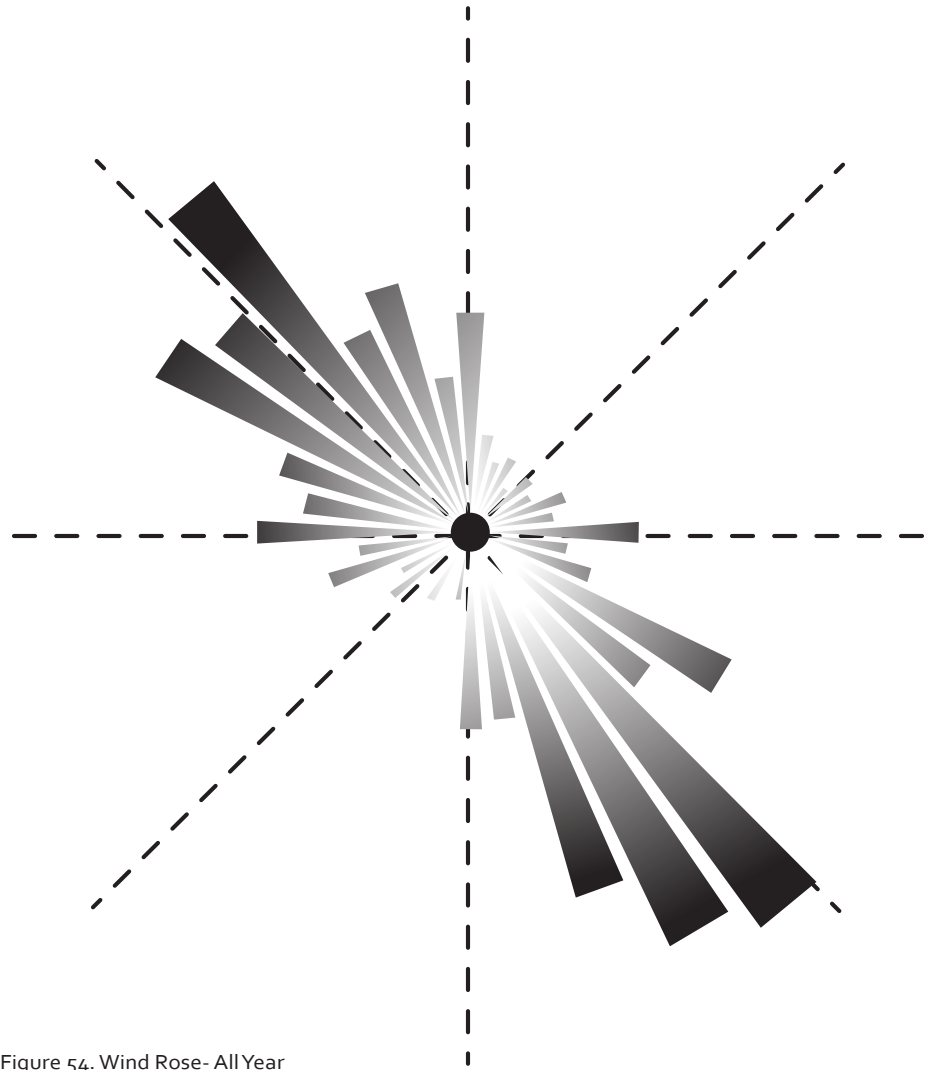


Figure 54. Wind Rose- All Year

## ALL YEAR WIND ANALYSIS

The nearest weather station is located at Saint Paul Downtown Airport. Though the weather station is northwest of Woodbury, this will provide the most accurate wind patterns in relation to the site because of its proximity.



Figure 55. Wind Rose- December

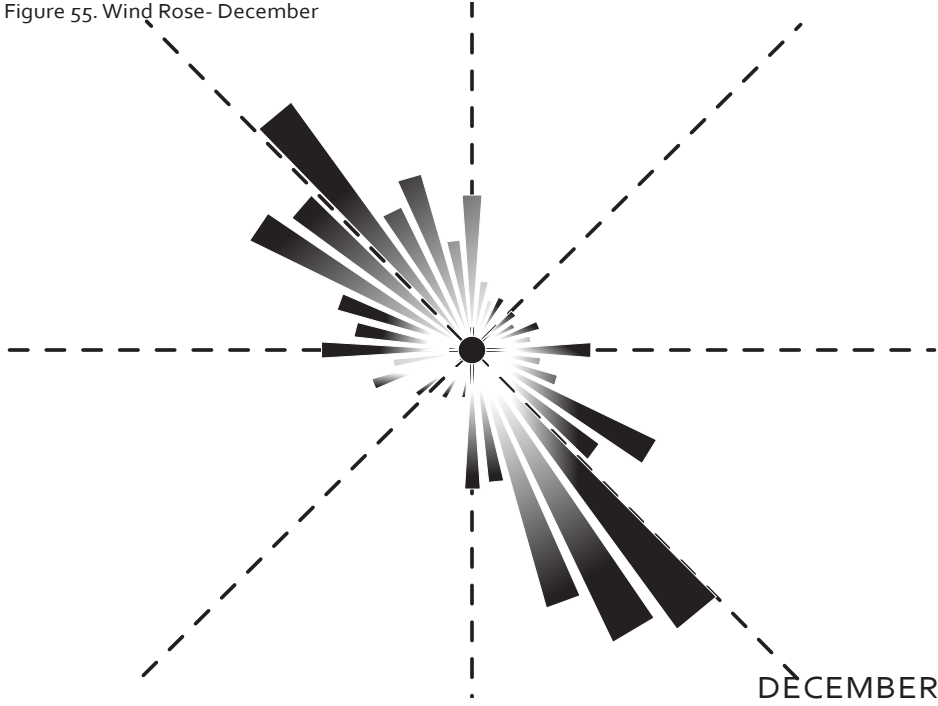


Figure 56. Wind Rose- September

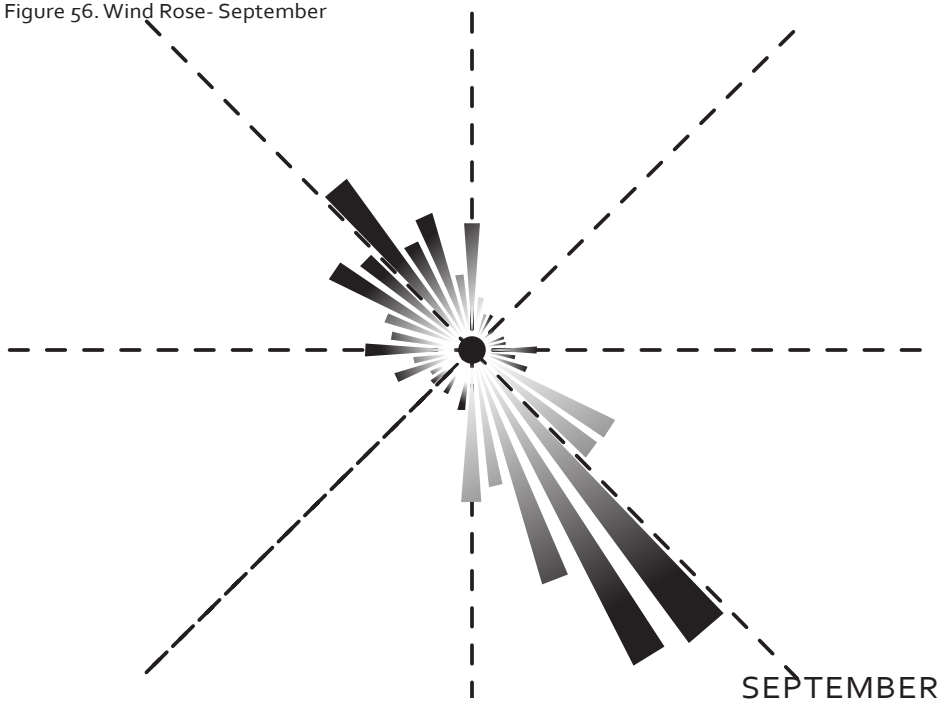


Figure 57. Wind Rose- June

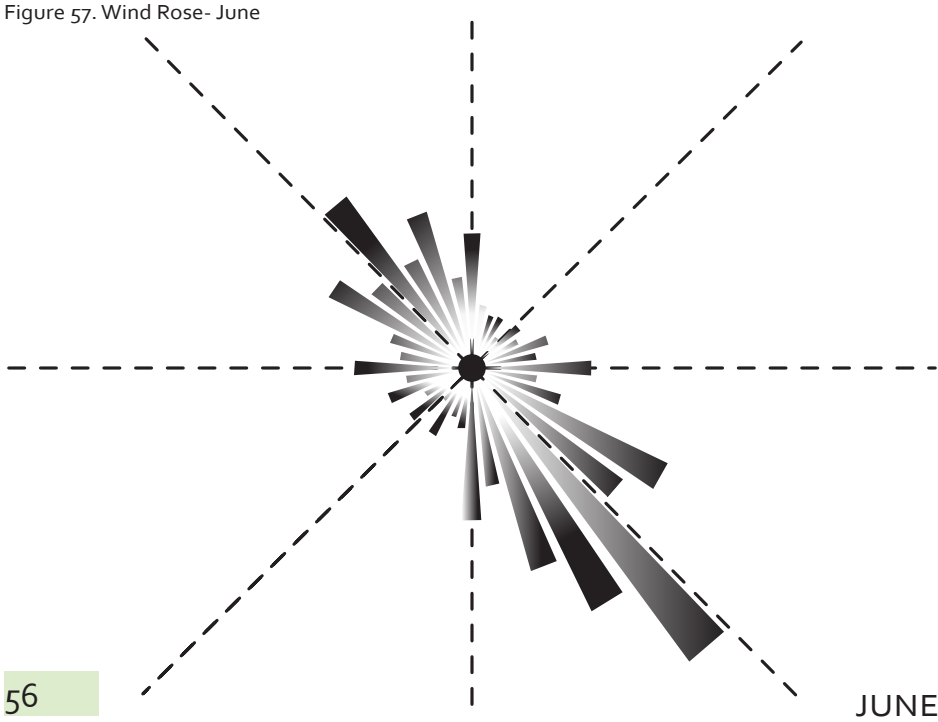


Figure 58. Wind Rose- March

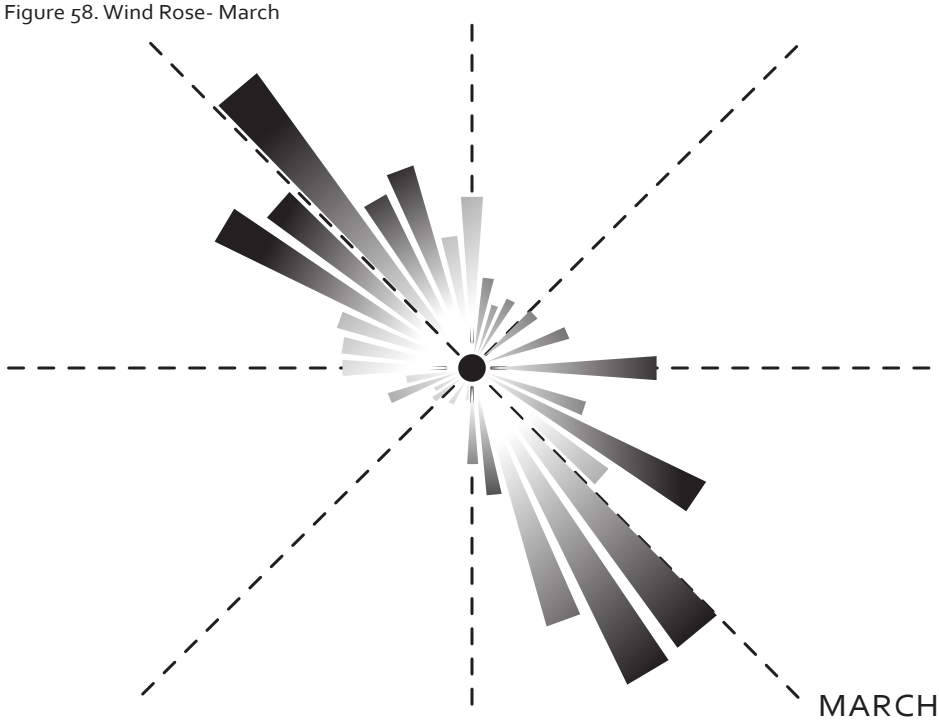


Figure 59. Sun Path

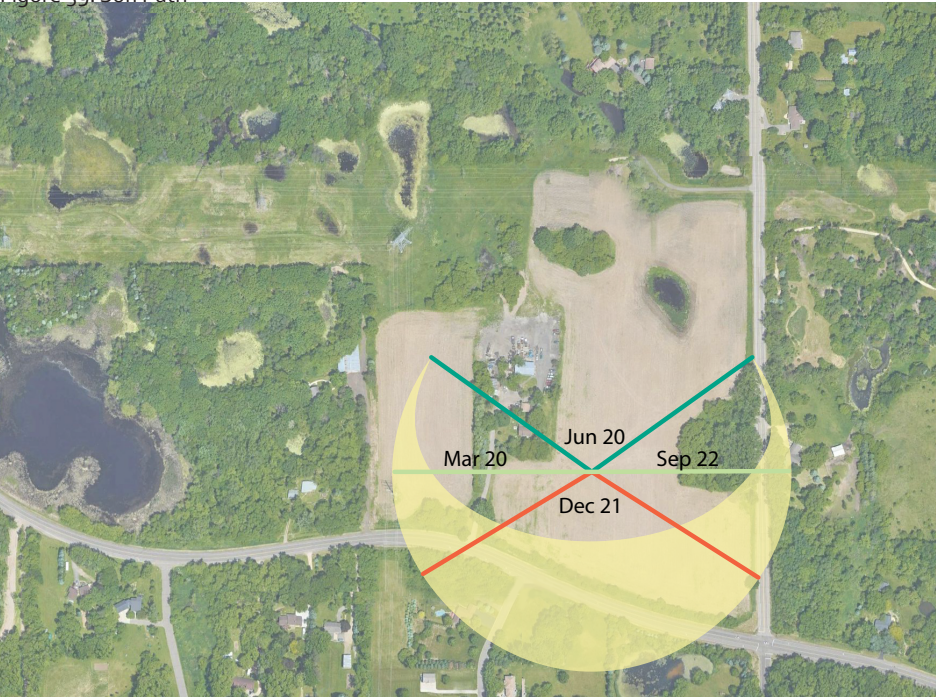
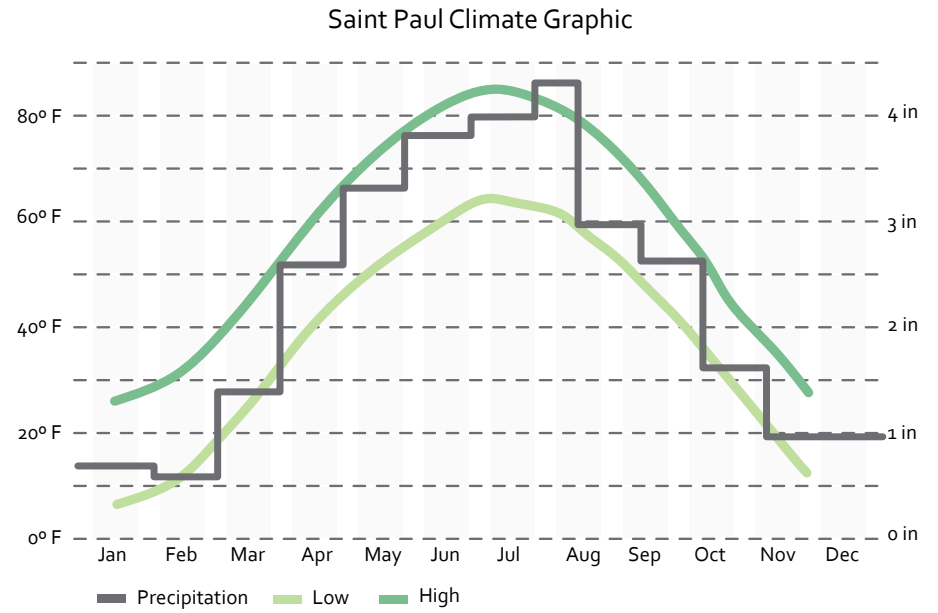


Figure 60. Climate Graph



**CLIMATE ANALYSIS**

Minnesota experiences a wide variety of climates with hot and humid summers and harsh and frigid winters. The following figures below begin to paint a picture of the rather dynamic Minnesota climate.

The first image shows the sun diagram for the 44-degree north latitude. Because there are no buildings located on the site, the winter sun and summer sun will reach the building at any time during the day. Incorporating passive solar design will be integral to the success of this thesis design.

The chart below gives yearly averages based on the weather data collected by National Climatic Data Center for precipitation and temperature. Based on the information the coldest month is January with an average temperature of 4.3 degree Fahrenheit. The warmest month is July with an average day time temperature of 83.3 degree Fahrenheit.



SOIL COMPOSITION

49B	Antigo silt loam, 2-6% slope	12.4	25.1%
342C	Kingsley sandy loam, 6-12% slope	8.1	16.5%
302C	Rosholt sandy loam, 6-15% slope	13.7	27.8%
153B	Santiago silt loam, 2-6% slope	8.0	16.1%

Most of the soil on the site are indicated above and on the map. The composition of the soil is suitable for this building typology because 302C, 342C, 153B and 49B are all well drained and sturdy to support the weight of the structure.

Figure 61. Soil



WATER TABLE

The city of Woodbury uses the Jordan aquifer as their primary means of water. Woodbury currently uses eighteen different production wells which reach approximately 400 to 500 feet in depth. According to the City of Woodbury, 7.7 million gallons of water is produced in a day. In the winter, well production often is lower with an average of 4.4 million gallons of water per day. The illustration below shows the different wells, depths and soil types.

Figure 62. Water Table

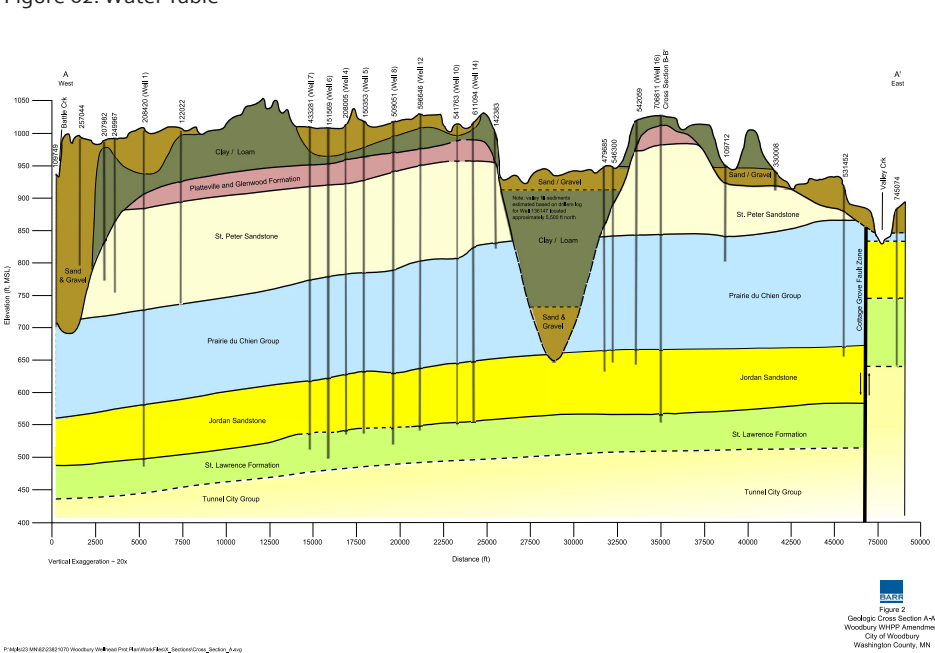


Figure 63. Roads



VEHICLE TRAFFIC

With Military Road just north of the site and Woodlane Drive just east, vehicular traffic can occur on two facades of the site depending on placement. The streets experience significant traffic Monday through Friday from 7-9am and 5-7pm but an abundance of land allows for the building to be thoughtfully placed while remaining accessible. The other sign of vehicular traffic is the nearby residences and the nearby community park. Since the City of Woodbury has not announced much information about La Lake, vehicular traffic on the road just west of the site is sparse. Planning for increased traffic should be considered because the City of Woodbury has already approved plans to make the community park a destination spot.

Figure 64. Woodlane Drive



PEDESTRAIN TRAFFIC

Limited sidewalks along main roadways surrounding the site make arriving by foot very difficult. Nearby houses indicate that adding a bike lane and pedestrian sidewalk would not only be beneficial for the projected building site but also for the nearby park. The site is near 80 acres of wooded landscape so by incorporating pedestrian sidewalks not only feasible for pedestrians but also bicyclist.



LA LAKE

Near the project site is La Lake which is owed by the city of Woodbury. Over the years, the city has slowly purchased land bringing the park to 80 acres of wooded landscape. The park currently includes a rambler style house which provides community members with a great place for meeting and parties. Though the park is still undergoing vast improvements, soon it will become a destination for any families living in Cottage Grove, Woodbury and Newport.

In 2015, Woodbury City Council approved the final plans for the new La Lake Park. Plans in the near future include a three-seasonal event center, nearby community garden, playground and restored native prairie land. The cities goal is to provide a unique experience different than any other typical community park.



Figure 66. La Lake

Figure 65. Hidden Gem



Figure 67. Zoning

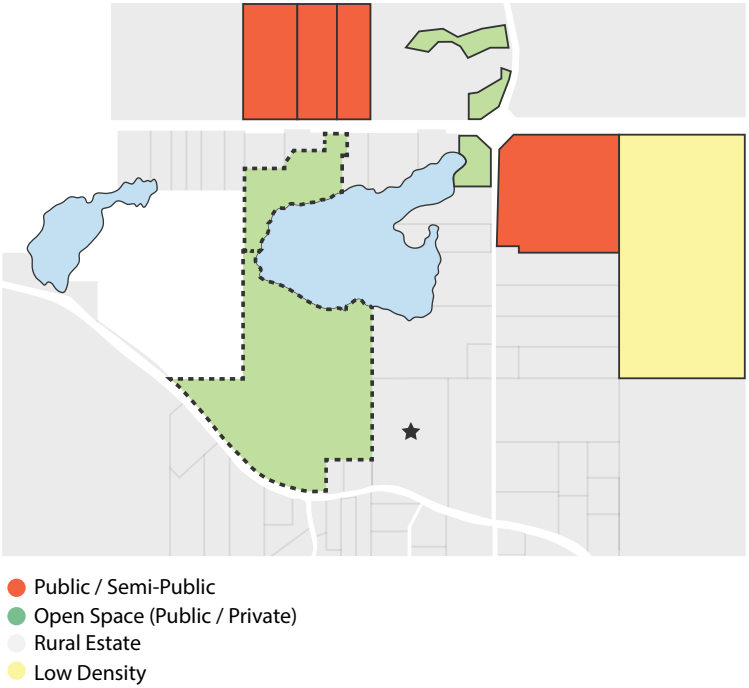
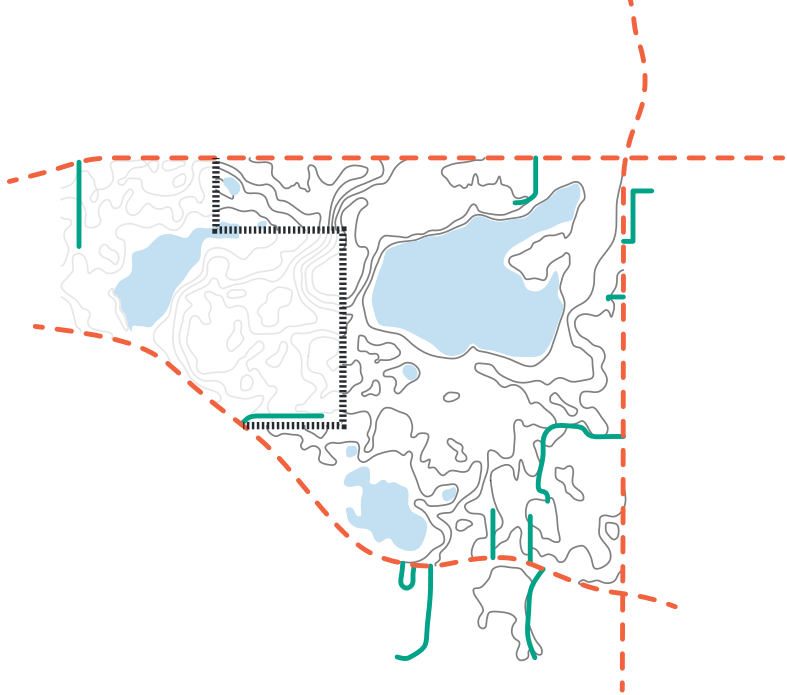


Figure 68. Contours



ZONING

The map illustrates the land use plan for Woodbury. Adjacent to the project site contains public and private open space represented by the green. The site itself is in the single-family estate district, which means that a variance will be required for the proposed project typology. Though, the surrounding project site is less dense, just north is a significant amount of existing low-density housing which will help promote the facility.

Southeast to the project site is a large zone for low density housing. As indicated from the 2040 land use map, Woodbury is projected to continue to grow meaning a need for more educational facilities. One of the goals included in the 2040 comprehensive plan is promote excellence in education. The city strives to promote and encourage a variety of options for educating children and provide opportunities for learning at all stages of life.

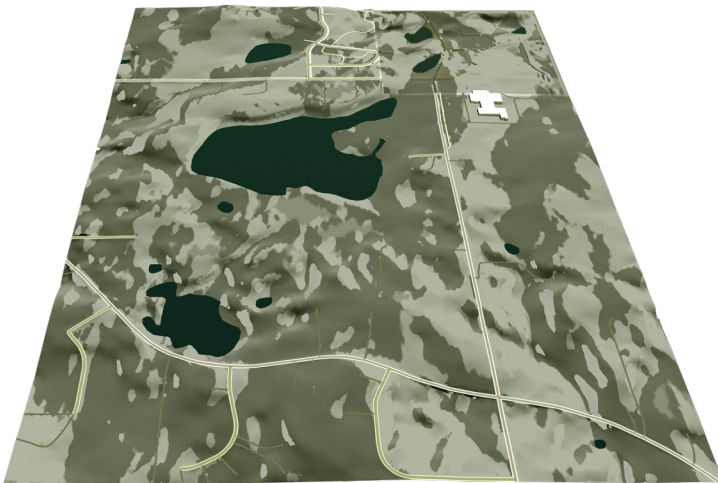
TOPOGRAPHICAL ANALYSIS

Understanding the site and its environment is an integral part of a building program and is a prerequisite for design. According to USGS topographic map, most of the site experiences a 1-2% change in grade. This indicates that the site is relatively flat with contours sloping in all four cardinal directions.

The lack of elevation changes has no significant changes on climate, but the nearby wooded landscape located just west and north of the site affect the climate. The density of foliage has significant impact on wind diversion and dissipation, temperatures, air pollutants and energy usage. But, overall the contours show little to no effect on micro and macro site.



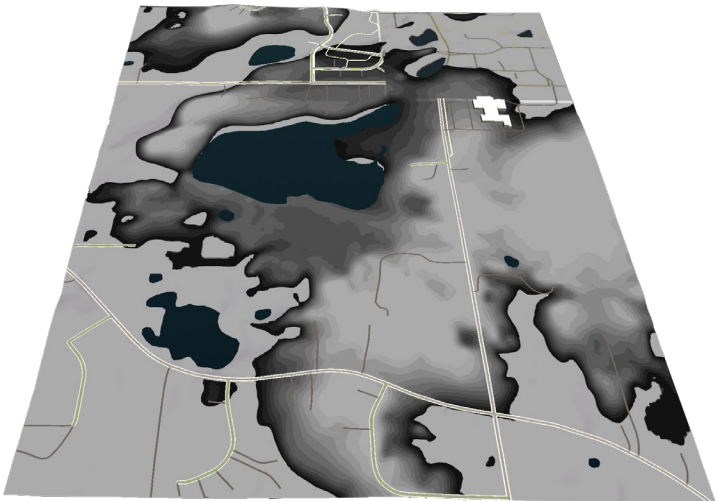
Figure 69. Aspect



**ASPECT**

The aspect will strongly influence temperature because of the angle of the sun directly overhead. Because the proposed site is flat the aspect is only useful in understanding the direction in which water will flow. From the graphic we can conclude that surface water will likely run in a variety of different directions. Locating the building on the top of the hill will be ideal for this reason.

Figure 70. Elevation



**ELEVATION**

According to the graphic, the proposed thesis site as little to no change in elevation. In Autodesk InfraWorks, the minimum value was set at 1000 feet with the maximum value set at 1044 feet. Since the number of rules was set at 22, the graphic illustrates a 2-foot contour change. As the contours change they gradually turn from black to white.

Overall this is not surprising since the site is currently being used as an agricultural field. Farm fields are usually flat to prevent soil erosion which could possibly make the field less fertile. The steeper the slope of the land is the faster water will move.

Figure 71. Site Vegetation



**TEXTURES & VEGETATION**

The density of the vegetation has a significant impact on how people experience a site. Near La Lake, scattered light occurs when sunlight shines through the dense trees. This is extremely noticeable when the sun is rising and setting. Although the vegetation on the site may be rather sparse due to the current land use, there are opportunities to increase greenery and vegetation through future thesis work. Since a large part of the thesis project is providing children with a connecting to nature, a play yard will be incorporated around the site. The land surrounding the outskirts of the play yard will be turned into native prairie land.

Figure 72. Site Human Characteristic



**HUMAN CHARACTERISTICS**

Currently the proposed site is a farmstead owned by the Hinz family. Based on the ideal location and the adjacent parcel containing power lines the farmstead will need to be bought out by a developer. Locating the child care center far away from the powerlines is crucial because leukemia and brain tumors have been associated with people living near power lines.



# RESULTS OF THEORETICAL PREMISE

## INTRODUCTION

Our future rests on the success of our children. Due to social and economic trends, there has become a tremendous need in our society for quality child care centers (Olds, 2001) (Gur, 2014). According to Olds, children spend an average of 10 hours a day, 5 days a week, 50 weeks a year essentially within the four walls of one room. The impact of the built environment within these facilities can drastically impact many aspects of development. The aim of early childhood facilities should be to provide children with a safe, caring environment with optimal opportunities for social, emotional, physical, and cognitive development (California Department of Education, 2016). Since, the first five years of life is a critical time for development, the experiences children have within these built environments have significant role in shaping the adults they will become (Olds, 2001) (California Department of Education, 2016). “During the preschool period, the socio-emotional, cognitive and physical developments are affected by his/her experiences, and interaction with the environment is a basic factor in his/her personality” (Gur, 2014). According to Piaget’s assumptions about children, he believed that children construct their own knowledge in response to their experiences (Morrison, g. s.1991). In other words, “infants do not have thoughts or minds, rather they come to know their world by acting on it through their senses and motor actions” (Morrison, g. s.1991). The development of children is shaped by the interactions with the physical built environment and with the interactions with peers.

Since children represent the next generation in society, design professions need to know and obtain the appropriate amount of knowledge to successfully design purposeful and meaningful environments that foster learning (Olds, 2001). Designing for children requires awareness of the ways in which children develop, learn, play and interact with the world around them. Young children are constantly being influenced by the built environment around them. Simply continuing to meet the minimum standards set out by state regulations is not enough. Though, these standards are constantly changing based on quantitative data, they fail to address the range of quality issues related to the built environment. Moving away from the formality in which state regulations have set out will allow for a warm, inviting, and comfortable environment for children, parents and staff. There are many examples of environmental research which demonstrates the importance of home-like elements in design such as pitched roofs, colorful and welcoming entrances, enclosed outdoor learning spaces, front porches, and residentially scaled buildings (Moore, Gary T. and Lackney, Jeffrey A.1994) (Gur, 2014). Rather than designing the stereotypical institutional building, home-like environments should be created. (Moore, Gary T. and Lackney, Jeffrey A. 1994). Regardless of what the final design solution looks like, the environment needs to provide a developmentally appropriate atmosphere that balances the practicality of a child care center while provoking a sense of wonder, delight, and meaning for young children.

This research paper points out a variety of prepared environments that positively enhances the development of young children. The aim of this paper is to sheds light on the importance of child care center design within the architectural profession. Many firms specialize in hospitality, healthcare, retail, and entertainment but rarely dedicate their resources to early childhood educational facilities (Olds, 2001). However, as society begins to realize the importance of quality and the lasting affects it has on children, child care centers will provide a unique opportunity to become its own specialty. As designers, it is ethical duty to provide enhancing spaces for the users, in this case, provide spaces for effective and enhanced learning. Designing for children is not simply fitting a daycare center into a commercial building but rather going above and beyond providing smaller tables and chairs to meet the needs of young children (Olds, 2001). “Education is an investment in our future” (Cunningham Group, 2002).

1. Scale & Perspective
2. Provide easy access to green space or outdoor play areas, Connection with nature and transparency
3. Warm and welcoming environments
4. Use of colors, textures and materials appropriately
5. Optimal Spatial Arrangements for classroom
6. Control noise levels by reducing reverberation, harmonious acoustic environment
7. Adequate natural and artificial lighting
8. Environment which encourages movement, comfort, competence and sense of control

Figure 73. Play

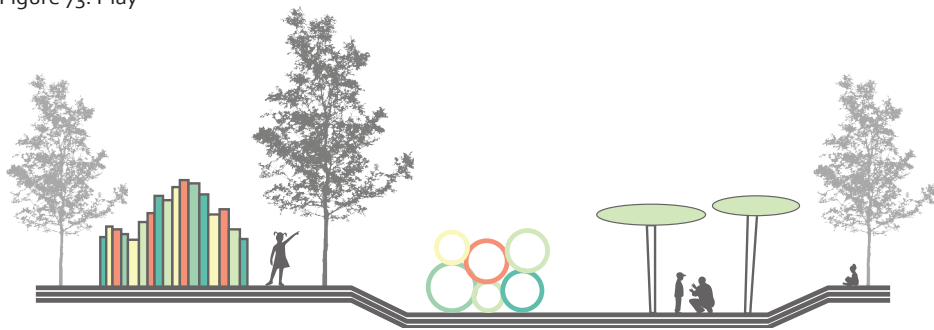


Figure 74. Play Mound



Figure 75. Interactive

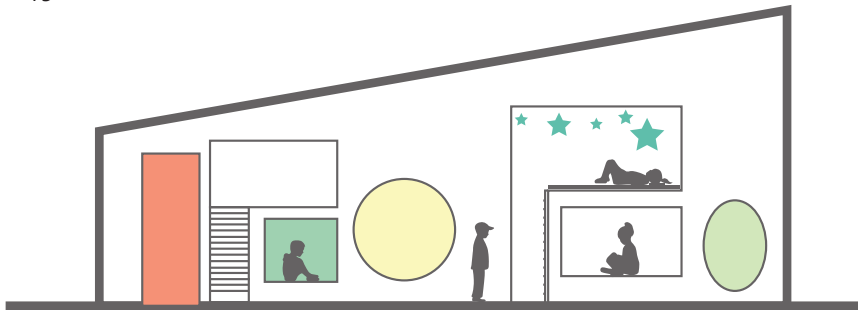
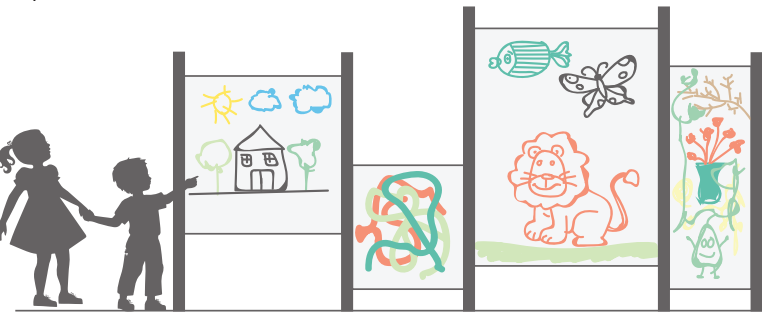


Figure 76. Children and Art



SCALE & PERSPECTIVE

Whether we realize it or not, children are affected by their environments which can either produce beneficial or detrimental impacts on children. Architects need to adopt and adjust the buildings scale to fit the growth of a child in terms of not only functionality but also aesthetic value. Any space available for children is viewed as a playground. “Children experience spaces in different ways, and that different spaces have different meanings for children. Experience and meaning both play a role in how knowledge about a space is acquired” (Bell, 2012). For example, take a simple long corridor, adults view this space to get to further spaces or an end destination. Children on the other hand, view this space as a gymnasium or running space. Providing a variance in spatial heights and widths will allow children to discover and explore within.

Scale is an essential element in the design of child care centers because of its prominent effects on the emotional, social and cognitive development of children. Once children start walking and talking, they don’t look at people’s faces as much (Anonymous 2. 2017, October 18). Providing opportunities for children to get a little higher to the adult level instead of the caregivers always having to get down to the child’s level (Anonymous 2. 2017, October 18). In a previous study (Clark, 2007), one of the common design issues identified was scale and perspective in day care facilities. From the research, it was concluded that children paid greater attention to the ground, rooftops and the sky (Clark, 2007). Also, within the environment there were multiple examples that served as a disadvantage to young children. For example, “a typical school entranceway with brick walls appeared very daunting from the perspective of a 3-year old” (Clark, 2007). When designing, it’s important to take in account close-up details and consider far-away spaces.

Some architectural solutions to address scale and perspective

includes; designing floating clouds on the ceiling to mimic the sky, providing lower shelves and cupboards and lastly provide unique flooring patterns such as circles (Clark, 2007). According to interviewee 1, North Dakota State University achieves scale by draping materials along the ceiling tiles and hanging mobiles or toys from the ceiling. NDSU child care center is located on main campus in E. Morrow Lebedeff Hall. Since the building was originally designed to accommodate adults and college students, unique solutions have been implemented to help lower the ceiling and soften the environment for children of all ages (Anonymous 1. 2017, September 26).

PROVIDE EASY ACCESS TO GREEN SPACE OR OUTDOOR PLAY AREAS, CONNECTION WITH NATURE AND TRANSPARENCY

Doctor Maria Montessori once said that “every child is born as an explorer” (Standing, E. 1962). Any child who is two or three years of age will engage themselves in exploration, experimenting and discovering” (Standing, E. 1962). As architects, they should assist in the natural tendency of children and provide space which will enable them to travel alone maximizing the opportunities for individual growth and research (Standing, E. 1962). Providing easily accessible natural spaces provides many cognitive, social, physical and emotional benefits. Allowing varies opportunities for children to play has significant impact on their social and gross-fine motor skills (Muzaffar, F., & Mirmoradi, S. 2012). According to a study conducted by Moore and Wong (1997), active outdoor learning environments stimulate all aspects of development sooner than any indoor environment (as cited in Muzaffar, F., & Mirmoradi, S. 2012). In studies conducted by Louv (2005), Taylor, (2001), Moore and Wong (1997) and Palmer (1993) some of the benefits of connecting children with nature include; development of senses improvement in concentration, vocabulary and collaboration skills, increase in environmental concern, develop of large motor skills, (Nair, p & Fielding, R. 2005) and lastly observation, awareness and reasoning skills (as cited in Muzaffar, F., & Mirmoradi, S. 2012). Some design strategies to seamlessly integrate nature into the built environment along with successfully design outdoor play areas include;

- Provide a variety of different surfaces so children can take their little scoters out on the cement or have a nice softer material such as grass to watch the clouds go by (Anonymous 1. 2017, September 26).
- Provide transparency between the indoor and outdoor spaces which creates an extension of the indoor learning

(Nair, p & Fielding, R. 2005).

- Provide children with specialized equipment.
- Private spaces for individual children (Olds 2001)
- Design spaces for small gardens (Muzaffar, F., & Mirmoradi, S. 2012).
- Allow for areas with different shading (Anonymous 1. 2017, September 26).
- Create views to the natural spaces from the indoors, transparency (Muzaffar, F., & Mirmoradi, S. 2012).
- Divide the play yard into different age groups (Olds,2001)
- Provide landmarks to assist in wayfinding (Olds, 2001)
- Easily accessible storage space (Olds, 2001)

Although this is not a complete compilation of the benefits of connection children to natural environments, one thing is known, outdoor environments are crucial in the development of young children. Regardless if a child is indoors or outdoors, space needs architectural expression well addressing and meeting the needs of young children (Muzaffar, F., & Mirmoradi, S. 2012)

### WARM AND WELCOMING ENVIRONMENTS

Home-like environments have become a template for new educational facilities (Moore and Lackney, 1994). Transitioning from home environments to institutionalized educational facilities is a very difficult time for any young child (Moore, Gary T. and Lackney, Jeffrey A, 1994). Unpredictable environments “increases children’s lack of ease and control” (Olds, 2001). Providing home-like features such as front yards, front porches, and a friendly entry conditions can help reduce a child’s anxiety and help reassure both the child and parent that the interior aesthetics will also successfully reflect a warm and welcoming environment (Moore, Gary T. and Lackney, Jeffrey A. 1994).

Research has shown that children establish symbolic meanings on built elements during their early years (Olds, 2001). “Floors represent support and emotional security, walls represent both separation and enclosure, and a roof symbolize shelter (Olds, 2001). Every object within the built environment teaches children “properties of the physical world and is incorporated into a child’s thoughts and feelings (Olds, 2001). Children naturally establish properties and emotional thoughts and feelings towards homey environments. Identification markers such as a gable roofs, reflects the typical form of a home. Also, a low, visible, sloping roofline provides feelings of security (Olds, 2001). By providing children with friendly and welcoming environments this will allow children to establish their own sense of place, sense of belonging and sense of stability. “When children feel comfortable in their physical surrounding, they will venture to explore materials or events around them” (Olds, 2001).

### CONTROL NOISE LEVELS BY REDUCING REVERBERATION, HARMONIOUS ACOUSTIC ENVIRONMENT

Noise occurs all around us, but the most common noises children are exposed to are transportation, music, and other people (Evan, E. W, 2006). Chronic noise which occurs repeatedly within an environment can have effects on cognitive development, long-term memory, reading abilities and speech perception (Evan, E. W, 2006). In addition, teachers are also directly impacted by chronic and acute noise exposure. “Teachers in noisy schools are more fatigued, annoyed, and less patient than teachers in quieter schools (Evan, E. W, 2006). Finding solutions in addressing noise-related problems in child care centers is important in preventing elevated blood pressure levels and neuroendocrine stress hormones in children. “Babies need to be able to hear words that are spoken to them. Having an abundant amount of background noises within a space is going to obstruct and overwhelm the hearing of young children” (Anonymous 2. 2017, October 18).

A variety of design solutions can be implemented to manage the amount of noise in a classroom. For example, carpet on the floors versus concrete or wood allows absorption of noise, absorbent tile on the ceiling and spatial arrangement can all drastically reduce the amount of acoustics in a room. Noisy activities such as music and blocks should be in transition areas or away from quiet spaces. Considering noise levels in classrooms are often forgotten by designers. “The architect, along with acoustical engineers, needs to consider design options that help reduce sound transmission within and between spaces” (Siegel, na). Acoustical goals for designers should include; “to create a harmonious and pleasing acoustic environment” (Olds, 2001) and lastly “to control, absorb, or dissipate unwanted noises” (Olds, 2001).

### USE OF COLOR, TEXTURES & MATERIALS APPROPRIATELY

Color selection in child care centers is a critical component not only for architects but also for interior designers. Color can evoke emotional appeal and if used improperly it becomes very clear physically, cognitively and emotionally. Offering a balance of bright colors and neutral colors will provide children will a comfortable yet an engaging environment. Bright colors should be applied primarily to draw the child’s attention to an area, space or object. Softer colors can be used in areas in which the activity evokes and reflects a calmer atmosphere; reading space, napping area and quiet play space. Research as shown that “children are wonderfully sensitive and responsive to nuances in both lighting and color. For example, children are particularly attuned to the colors of nature and human skin tones” (Nair, p & Fielding, R. 2005). As designers we need to be aware that color-aesthetics are highly subjective, and each user may or may not experience different emotional responses. Based on direct observations of the North Dakota State University day care center and based on an interview conducted, neutral colors were used for the toy shelves, carpet, and walls to ensure that the children and the toys within the space can be the color (Anonymous 1. 2017, September 26). From the research conducted, conclusions can be formed that the furnishings and finishes should serve as backdrop to the bright bold toys within that space. However, color is not the only element to consider when design a facility. Textures and materials are equally important to color. According to interviewee 2, textures is one way to help encourage the sharing of information between children to children or between children to adult. (Anonymous 2. 2017, October 18) Different types of surfaces within an environment allow children to physically touch and explore the environment. Providing these opportunities for children will assist in neurodevelopment. (Anonymous 2. 2017, October 18) “Everything in the outside

world shapes development through experiences that a child’s senses-vision, hearing, smell, touch and taste-absorb” (Brotherson, 2005). Once these experiences are made, the neural circuits become wired which facilitate learning (Brotherton, 2005). The optimal time for visual development is during the first few months, which allows children to perceive and interact with the world. As indicated from the research, textures are important for the physical, social and emotional development of young children from birth to twelve years of age (Brotherton, 2005).

The Appropriate use of Colors, textures, and materials serve to assist in wayfinding, spatial orientation, space definition and prevent overstimulation. By successfully implementing these tools, architects will not only positively influence development but also provide features which separates the typical institutional space as well as add richness to the environment.



### OPTIMAL SPATIAL ARRANGEMENTS FOR CLASSROOMS

Room size, scale, proportions, arrangement, furniture all play a significant effect on the development of young children. Awareness of the needs of children during each stage of development is important in designing environments that support them. A poorly designed room can create obstacles not only for the staff but also for children’s growth and development. Below is a discussion of design considerations suggested for infants, toddlers and preschoolers.

“The needs of infants and toddlers can be most easily discussed in three separate areas: the need to be held and carried, the need for sensation, and the need for movement” (Olds, 2001). The need to be held provides children with the most basic human experiences of safety, security, and love (Olds, 2001). Often, child care centers recommend that infants remain in the care of their mothers for the first six months to help promote the need for physical contact (Olds, 2001). Although, design cannot provide physical contact for infants, design can provide solutions to help supplement experiences of physical contact (Olds, 2001). For example, group size, opportunities for fostering movement, optimal sensory experiences and comfort are all ways to foster or distract from physical contact. (Olds, 2001) Also, another important thing is ensuring infants and toddlers are within sight and sound always (Anonymous 1. 2017, September 26). Architecturally, avoiding any sharp angles, columns or spatial layouts which create visual obstructions should be avoided at all costs. (Anonymous 1. 2017, September 26) Clear sight lines must be provided for all teachers throughout the whole room. (Anonymous 1. 2017, September 26)

Furthermore, infants and toddlers are also undergoing the sensorimotor stage. During this period of development, infants are discovering the relationships between their bodies and the environment (Olds, 2001). Sounds, colors, light, shadows and

tactile experiences are all ways to ensure a plentiful environment for young children. Also during this crucial year in development children are mastering movement; bending, crawling, climbing, and walking (Olds, 2001). To help foster this stage of development providing a nurturing environment which fosters safe movement is essential. Ways to achieve this include;

- “Use walls to support play panels,vertically mounted toys, grab bars, textures, mirrors, and reflective surfaces at different heights” (Olds,2001).
- Use a variety of different flooring surfaces.
- Walls can be subtracted to provide unique alcoves or seating.
- Provide changes in levels and platforms (Olds,2001).

“Preschoolers and kindergartens grow at a relatively calmer and more steady pace compared with the rapid changes they experienced during their first three years” (Olds, 2001). Children are developing a greater sense of independence and self-control well slowly expanding their social circle to other peers besides their immediate family. Providing spaces that facilitate a wide range of activities will accommodate a variety of interests well promoting exploration (Olds, 2001).According to interviewee 1, When it comes to language development, more affordances for movement, interactions and motor skills will allow language to be produced naturally (Anonymous 1. 2017, September 26). For example, wide open spaces versus contained spaces allows and encourage children to share information between children to children or between children to adult. (Anonymous 2. 2017, October 18) There are many different types of children, some are shy, quiet, timid, outgoing, friendly and self-confident (Anonymous 2. 2017, October 18). Providing opportunities for a variety of different types of children would be helpful. For example, cozy nooks for timid children or large spaces for the children who are very exuberate. (Anonymous 2. 2017, October 18).

### ADEQUATE NATURAL AND ARTIFICIAL LIGHTING

For children to perform their best, light needs to be bright enough but remain comfortable. “Daylighting is important because there are direct connections between our physiological well-being as humans and the amount of daylighting we get” (Nair, p & Fielding, R. 2005). Too much light in a space plays a significant role in harming visual development (Siegel, na). This can cause stain on the eyes resulting in fatigue, crankiness, headaches and visual perception. Because of infants and toddlers limited mobility and limited amount of outdoor time, classrooms should be located on the south side of the building to optimize sun gain and classrooms should have easy access to the outdoors (Olds, 2001). Since children spend a vast amount of time trapped in educational buildings, understanding the direct correlation between development and lighting is crucial (Nair, p & Fielding, R. 2005). The lighting within a space should reflect to the activities being performed within a space. For example, spaces where children are playing on tables or painting should use task-oriented lighting which is designed for a specific task. Although, lighting is often overlooked in many child care centers because of budget, the lastly effects of lighting are prominent and should always be considered.

One way to increase the amount of natural lighting is through transparency. If children can see activities within a space, this can help reduce and relieve anxiety and apprehensions (Clark, 2007). Transparency using windows creates a sense of openness and brightness within a space. Also, daylighting can be implemented into the facility through skylights, windows, and light selves (Nair & Fielding). In addition to natural and artificial lighting, noise also substantially influence and effect children’s comfort and performance in child care centers.

**ENVIRONMENT WHICH ENCOURAGES MOVEMENT, COMFORT, COMPETENCE AND SENSE OF CONTROL**

An environment which encourages movement, comfort, competence, and sense of control should be considered during every aspect of design (Olds, 2001).

One key design element is to allow for more affordances for movement. Providing a safe and secure environment serves as an invitation for children to move freely, create boundaries, and explore (Olds, 2001). Ramps or stairs can be incorporated into the built environment to help foster motor development (Anonymous 2. 2017, October 18) Restricting movement repetitively can create a variety of learning and behavioral deficiencies such as hyperactivity, attention deficits and poor motivation (Olds, 2001).

The second design component which is essential is providing comfort. “When children feel comfortable in their physical surrounding, they will venture to explore materials and events around them” (Olds, 2001). According to interviewee 1, for a child to engage in independent play, children must have a trust worthy relationship with the teachers. Children must have the basis of feeling comfortable and safe to participate in play. No play usually begins until this relationship is established. According to study conducted by Olds, as performance increases so does stimulation. Having changes in stimulation is better than having a static environment based on optimal levels of responsiveness. Architecturally, this can be accomplished through variations in elements such as scale, ceilings, textures, materials, furnishings, height, light and noise. Each space within a child care center offers a unique opportunity for children to seek out different levels of stimulation.

The third basic environmental need is to provide a facility that promotes and fosters competence. As discussed previously

scale is a constant design problem forcing young children to feel intimidated, frustrated and helpless. The normal day to day things which adults take for granite such as a light switch, faucet, drinking fountain and chair are inadequately designed to accommodate the needs of children (Olds, 2001).

Lastly, providing an environment which encourages a sense of control through privacy, predictability and orientation is important in the development of young children. children’s need for privacy is directly linked to the development of sense of self. Infants, have no knowledge of privacy because they are unaware that other individuals exist. Also, another important attribute to consider when designing is predictability. A well-designed center will have predictable paths and wide-open spaces for children to interfere future activities.

In summary, balancing all four basic needs; movement, comfort, competence and sense of control are important in designing any child care center. Every child care center provides an opportunity to improve the concept of design. Quality design needs architects, interior designers, developers, corporations, educators and specialists to look beyond budgets, schedules, time-frames and look at the welfare of the users- the children.

**CONCLUSION**

During the research gathering and while interviewing, it became obvious that to create a design that fully meets the needs of the client, it is important to understand what the use of the space is. Though children view space as a playground, space should be designed to promote the holistic development of a child. As research has shown, specific prepared environments- spatial layout, warm and friendly environments, lighting, scale, perception, nature, color and textures all play a significant role in foster learning. In the future, breaking away from the typical “intuitional” day care center and pushing away from the standard will allow designers to create a healthy, nurturing and safe environment which facilities growth and development (Gur, 2014). With present emphasis on education within society and the vast amount of time children spend in day care centers, more than ever, it is time to consider the physical environment and the impacts it has on a child’s developmental process.

**IMPLICATIONS**

The presented in this study, though still in the beginning stages, provide beginning knowledge on how architectural design can impact the development of young children. Moving forward, further quantitative research is needed to conduct the direct impacts of the physical environment of schools on children’s developmental outcomes. Although there is a significant amount of research investigating the direct impacts of school quality on children’s achievements, the next step is to dig deeper and understand the direct impacts on the cognitive, social, emotional, language, and physical development of children.

One clear indication taken from the interviews and literary reviews is that the delivery of design services, relating to educational design, is becoming an increasingly complex task. To successfully deliver, it has become clear that there is a need

to apply theories, quantitative findings and environmental psychology to the application of environments for children. Though, designing a developmentally appropriate environment may be more difficult, this change is needed to ensure the well-being and optimal development of children. A child care center is not just a place for parents to drop of their children, but a place which allows children to explore and develop. In the future, designers should assist children in their learning process and make every minute spent in an environment meaningful and enjoyable. Architects need to understand not only what children “want” but also understand the developmental process behind such ideas. This will allow design to move beyond the typical preconceptions of child care design.

## CONCLUSION / SUMMARY

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As research has shown, specific prepared environments; spatial layout, warm and friendly environments, natural lighting, scale and perception, connection to nature and color and textures all play a significant role in foster learning. In the future, breaking away from the typical “intuitional” child care center and pushing away from the standard will allow designers to create a healthy, nurturing and safe environment which facilitates growth and development (Gur, 2014). With present emphasis on education within society and the vast amount of time children spend in day care centers, more than ever, it is time to consider the physical environment and the impacts it has on a child’s developmental process.





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# HISTORICAL CONTEXT

## EDUCATIONAL PHILOSOPHIES

The Montessori Method was developed by Dr. Maria Montessori and is a child centered educational approach based on scientific observations. The approach has been tested and used throughout many diverse cultures and originates from the idea that children are constantly eager to learn if they are in supportive and prepared environments. The approach widely values the whole aspect of a child including physical, social, emotional and cognitive.

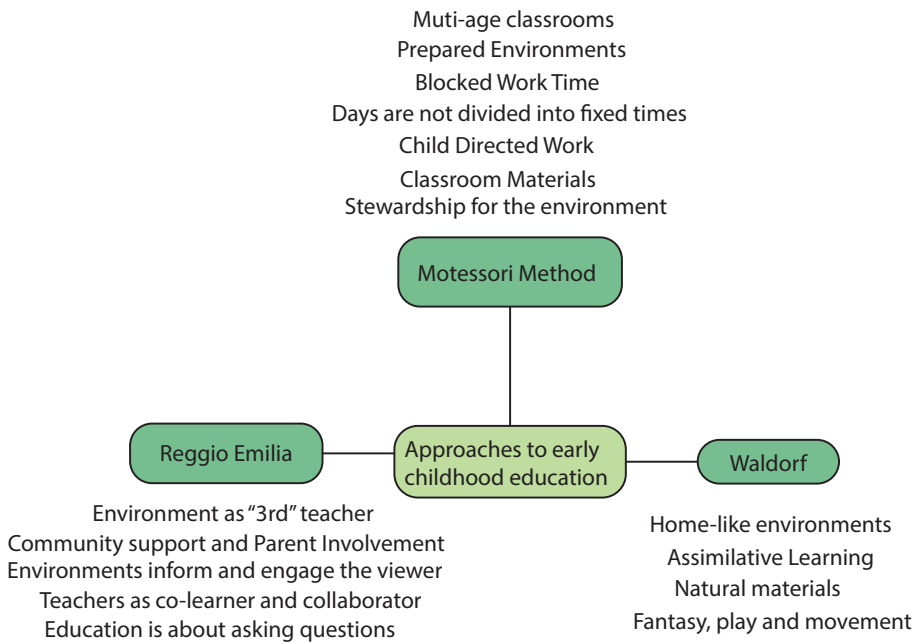
Waldorf school education is based on an anthroposophical view and understanding of the body, soul and spirit of a human being. The goal of the method is to give children a well-rounded background based off a board curriculum including academics, art and music education, physical education and social and emotional education. When further analyzing the system, the goal is to bring and create meaning into a child’s life. The play-based approach provides children with a dependable routine, set activities, mixed-age classrooms and the same teacher for multiple years. One of the difference to the curriculum of Waldorf education is the lack of computers or electronics and lake of academics meaning tests and homework.

Reggio Emilia schools are well-known for their project-based approach. The Reggio Emilia philosophy continues to develop and evolve because of extensive time and experience within the system. Fundamental principles include; children can construct their own learning, children are communicators, children form

an understanding of themselves and their place in the world through their interactions with others, the environment is the third teacher and the adult is a mentor and guide.

Though, this thesis project does not conform to one approach it, it is hoped that the general design principles can be applied regardless of the educational philosophy.

Figure 77. Approaches



# HISTORY OF EDUCATION

## CITY OF WOODBURY

In 1855 the first school opened in Woodbury, Minnesota which was a small house owned by William Middleton. In the years to come seven new schools were built between 1852 and 1868 which were all located in private homes. In 1860 the first school was built which was approximately 40 by 22 feet. Later, in 1870 an addition was built on to the already existing schoolhouse. During this time in history, there were two terms which included; winter term which was October or November through March or April and summer term which was May through July. “In 1950, Woodbury rural schools were gradually phased out as a state law mandated consolidation of rural districts”. (History of Woodbury. n.d.)

Today the previous 16 separate districts before consolidation all made up which is now South Washington County schools. “In addition to south Washington schools, parts of the community are today served by Stillwater area schools (district 834) and North St. Paul-Maplewood-Oakdale (district 622).” (Denson, 2017, April) Soon after in the 1960’s Woodbury experienced a boom in population and urban development causing Woodbury to petition to incorporate the township as a village. Woodbury today continues to see a tremendous population growth which is no surprise because of the community’s excellent schools is. “the schools, which the pioneers worked so hard to promote, laid the foundation for excellent schools in Woodbury today”. (History of Woodbury. n.d.)

Figure 79. History



Figure 78. Old School



Figure 80. Middleton School in 1954



# SOCIAL CONTEXT

## EDUCATION

## CITY OF WOODBURY

Education is the key to success. Without it one may find it hard to achieve success within one’s life. During the early years, children learn and develop mentally, emotionally and socially. It is no wonder why educators, researchers, parents, politicians have honed in on the importance of early childhood education as a means to invest in the future of America. One way we can expand and improve early childhood education is by understanding more about it and why it’s so crucial. In addition to the long-term impacts that preschools have on children they also have impacts on the economy. These facilities provide working parents, the ability to better balance work and their caregiving responsibilities. Working parents have three ways in which they can secure child care; stay at home and care for their children, pay out of pocket for child care which is often very costly for families, or lastly apply for federal or state funded child care which is very limited for pre-k programs. As a society it is essential to understand that high-quality care is not only essential to working parents but also the future of our children. Investing in our nation’s youth at an early age not only pays back socially but also economically while paving the path for success in the future.

“One of Minnesota’s fastest growing cities, Woodbury is now the state’s 9th largest city. The population of close to 70,000 (26,000 households) is projected to reach 88,000 by 2040 and is expected to continue attracting new residents for years to come.” (History of Woodbury. n.d.) Over the last few years Woodbury has been recognized as a great place to live, work and thrive. Woodbury offers a variety of different shops, restaurants, trails, parks, community facilities, housing options and jobs. Woodbury offers an ideal location for any growing family and is committed to high quality development and meeting the needs of the community members. Also, the city is known for its healthcare and wellness industry including Woodwinds Health Campus, Allina Health, Woodbury Healthcare, Summit Orthopedics, Health Partners and Anytime Fitness Headquarters.

# PROJECT JUSTIFICATION

- DEMAND
- (CHILD CARE HAS BECOME TRADITIONAL FOR THE LARGE MAJORITY OF CHILDREN UNDER 5 YEARS OF AGE)
- NEED FOR REDEFINITION
  - AFFECTS MOST FAMILIES
  - SITE RELEVANT





# PROJECT JUSTIFICATION

The years that young children spend in child care are the most critical years of their developmental process. Not only are children growing physically but cognitive, social and emotional aspects are being developed laying the foundation for whom they will become. Instead of simply just meeting the standards of child care centers, it is time to realize that children are the future and they deserve more than just the adequate, but they deserve the exceptional (Olds,2001). Exceptional meaning understanding the need of young children. Doctor Maria Montessori once said that “every useless aid, given to a growing organism, arrests development” (Standing, 1962). Therefore, designing spaces which are developmentally appropriate while ensuring that the environment is providing inspiration and meaning. “Education is a natural process carried out by the child and is not acquired by listening to words but by experiences in the environment” Maria Montessori (Standing, 1962). When assessing many built pre-school facilities, it became evident that both architects and educationalists are failing to develop certain fundamental issues which are key to the development of our youth. “Educationalists frequently make reference to the environment and its importance to preschool educational curricula, but seldom touch upon the architectural agenda in any significant detail”. (Dudek, 2000). This project is important to me for a variety of different reasons. As designers we have a responsibility and ethical duty to not only create space, but also to create space which supports the activities and individuals within the environment. Through my educational

experience at North Dakota State University we have always been taught that environmental design should enhance and support the lives of the users. Though as a look around at child care centers surrounding our region, I see facilities being fit into existing buildings without considerable consideration of how the environment influences our youth. Though early child care design is often overlooked in the architectural field, I believe as society begins to realize the importance and lasting effects of quality child care, there will be an opportunity for child care design to become its own specialty. It is my mission to shed light on the importance of architectural design in early childhood develop and shed meaning on how to meet the needs of our youth. As Maria Montessori once said, “everything within the environment should be constructed to correspond with the physical, mental, social and spiritual aspects of a child” (Standing, 1962).

# PERFORMANCE CRITERIA

## CHILD CARE CENTER

The interaction net above illustrates the interrelationships between the programmatic requirements for a child care center. Currently the illustration represents a same-age cluster which locates infants, toddlers and preschoolers in different parts of the building. Though, this approach has many advantages such as grouping children with similar levels and shared storage it also has disadvantages such as segregating children from interacting with different age groups.

From the diagram there are three main spaces in a child care center. The first space is the common area which allows people to meet, interact informally and have shared experiences. The second and third main areas include the learning communities and outdoor spaces. These spaces allow for learning, exploration, creativity and discovery.

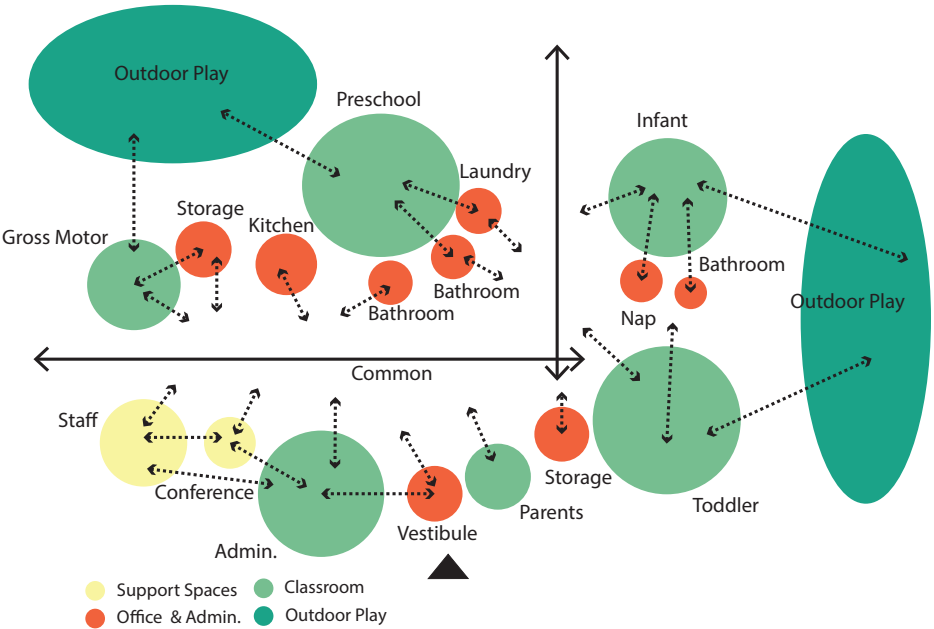


Figure 85. Adjacency Diagram

Figure 86. Adjacency Matrix



Figure 87. Space Allocations- Option 1

Spaces	Sqaure Feet Typical
Office Administration	
Reception Area	250
Program Director Office	100
Assistant Director Office	100
Nurse Office	160
Book Keeper	80
Support Rooms	
Gross Motor Room	1,500
Conference Room	400
Staff Lounge / Preperation Space	300
Kitchen	450
Storage	250
Laundry Room	100
Janitors Closet / Utility Sink	75
Adult Restrooms (Varies Based on Codes)	300
Classrooms (Includes Required Indoor and Outdoor Sqft)	
Infant	920
Nap Room (30sqft per child)	240
Diapering / Toileting 1 toliet + 2 sinks (1 child, 1 adult) + diapering	100
Food Preparation (1 adult sink)	0
Infant	920
Nap Room	240
Diapering / Toileting 1 toliet + 2 sinks (1 child, 1 adult) + diapering	100
Food Preparation (1 adult sink)	0
Toddler	1610
Nap Room	150
Diapering / Toileting 2 toliets + 3 Sinks (2 child, 1 adult) +diapering	100
Food Preparation (1 adult sink)	0
Toddler	1610
Nap Room	150
Diapering / Toileting 2 toliets + 3 Sinks (2 child, 1 adult) +diapering	100
Food Preparation (1 adult sink)	0
Preschooler	2300
Nap Room	150
Restroom (2 toliets + 2 Sinks)	60
Food Preparation (1 adult sink)	0
Preschooler	2300
Nap Room	150
Restroom (2 toliets + 2 Sinks)	60
Food Preparation (1 adult sink)	0
Total without Tertiary Spaces	15325
Tertiary Spaces	
Entries, Corridors & Stairs (20%)	3065
Mechanical / Electrical (8%)	1226
Total Building Square Feet (Indoors)	19616
Minus Outdoor Space Required Since its calculated into Classroom Size	5700
Total	13916
Site / Parking	
Staff Parking (15 spots at 300sqft each)	5400
Parent Parking/Drop Off (10 Spots at 300 sqft each)	3000
Outdoor Space Required	5700
Total Building Indoor and Outdoors	28016

Figure 88. Space Allocations- Option 2

Spaces	Sqaure Feet Typical
Staff & Parent	
Vestibule	60
Reception	100
Assistant Director Office	150
Assistant's Office	80
Sick Space	80
Staff Area / Lounge	200
Conference Room ( 2 each at 100 sqft)	200
Adult Restrooms ( 2 each 60 sqft)	120
Service Area	
Janitors Closet / Utility Sink	80
Kitchen	300
Technology	80
Laundry Room	100
Common Spaces	
Gross Motor Room (Multi Purpose Space)	800
Storage	100
Play Yard Storage	200
Classrooms (Includes Required Indoor and Outdoor Sqft)	
Infant	920
Nap Room (30sqft per child)	240
Diapering / Toileting 1 toliet + 2 sinks (1 child, 1 adult) + diapering	100
Food Preparation (1 adult sink)	0
Infant	920
Nap Room	240
Diapering / Toileting 1 toliet + 2 sinks (1 child, 1 adult) + diapering	100
Food Preparation (1 adult sink)	0
Toddler	1610
Nap Room	150
Diapering / Toileting 2 toliets + 3 Sinks (2 child, 1 adult) +diapering	100
Food Preparation (1 adult sink)	0
Toddler	1610
Nap Room	150
Diapering / Toileting 2 toliets + 3 Sinks (2 child, 1 adult) +diapering	100
Food Preparation (1 adult sink)	0
Preschooler	2300
Nap Room	150
Restroom (2 toliets + 2 Sinks)	60
Food Preparation (1 adult sink)	0
Preschooler	2300
Nap Room	150
Restroom (2 toliets + 2 Sinks)	60
Food Preparation (1 adult sink)	0
Total Building Square Feet (Indoor)	13910
Tertiary Spaces	
Entries, Corridors & Stairs (15%)	2087
Mechanical / Electrical (10%)	1391
Total Building Square Feet (Indoor)	17388
Minus outdoor space which is calculated into classroom size	5700
Total Building Square Feet (Indoors)	11688
Outside Space	
Staff Parking (15 spots at 300sqft each)	5400
Parent Parking/Drop Off (10 Spots at 300 sqft each)	3000
Play Yard ( Required per student)	5700
Total Building Square Feet (Indoor & Outdoors)	25788



Bathroom Arrangements	Approximate Sqft
Diapering only	50
Diapering + 1 Sink + 1 Toliet	80
Diapering + 2 Sink + 2 Toliet	100
2 Sinks + 2 Toliets	70
Adult ADA Sink + Toilet	60

Figure 89. Programming Restrooms

Group	Age Group	Max Group Size	Adult / Child Ratio
Infants	6 Week -16 Months	8	1/4
Toddlers	16 to 33 Months	14	1/7
Preschooler	33 Months to Kindergarten	20	1/10
School-Age	Kindergarten to 12 Years	30	1/15
Total		72	0.6

Figure 90. Programming Classrooms

Room	Age Name	Age Group	Group Size	75 Sgft / Child Outdoors	40 Sgft / Child Indoors (Minimum is 35)	Total Square Feet Per Room
1	Infant	6 Week -16 Months	8	600	320	920
2	Infant	6 Week -16 Months	8	600	320	920
3	Toddler	6 Week -16 Months	14	1050	560	1610
4	Toddler	6 Week -16 Months	14	1050	560	1610
5	Preschooler	16 to 33 Months	20	1500	800	2300
6	Preschoolers	16 to 33 Months	20	1500	800	2300
Total			76	5700	3040	8740

Figure 91. Programming Square Footage

# CODE ANAYLSIS

## WHY DOES LICENSURE MATTER?

The goal of this thesis project is to design a child care center which fosters learning and development. Meeting the minimum state licensing requirements protects the health, safety and rights of all children. As designers we need to be aware that the task of designing a day care center is not like a typical office, factory or hotel building. Children are extremely vulnerable during the first five year so making informed decisions are crucial. During this time children are removed from people and places in which they feel secure and trust. “In part they will build their sense of expectation, understanding, and love for life on the space, colors, materials, and furnishings that those of us who design their spaces intentionally provide” (Olds, 2001). As Olds (2001) said, every project provides the opportunity to improve the concept of child care center design and the lives of children who are shaped by it. Constantly repeating the same design is not allowing designers to exceed beyond what we believe in. Constantly evaluating and questioning every design beyond just budget but for the welfare of the child is what designers need to do moving forward.

# CODE ANAYLSIS

## MINNESOTA LICENSING REQUIREMENTS

- Outdoor activity area: Outdoor space must be at least 1,500 square feet total and at least 75 square feet per child; be within 2000 feet of the center; be enclosed if adjacent to traffic and other hazards; be free of litter and other hazards; and have the required outdoor large muscle equipment (Minnesota Department of Human Services, 2017).
- Indoor space: The licensed capacity is limited by the amount of indoor space. A minimum of 35 square feet is required for each child (Minnesota Department of Human Services, 2017).
- Toilets and sinks: A child care center must have one sink and one toilet for each 15 children and proper toilet training equipment for toddlers. Hand sinks, other than for infants, must be in the toilet areas. Single service towels or air dryers must be in each restroom. Fixtures must be placed at age-appropriate heights. Water temperatures must not exceed 120 degrees Fahrenheit (Minnesota Department of Human Services, 2017).
- Furnishings, equipment, materials and supplies: A child care center must have the quantity and type of furnishings, equipment and materials specified for infants, toddlers, preschoolers and school-age children (Minnesota Department of Human Services, 2017).
- Floor plan and designated areas: Indoor and outdoor space to be used for child care must be designated on the facility floor plan (Minnesota Department of Human Services, 2017).
- Interest areas: creative arts & crafts, construction, dramatic or practical life activities, science, music, fine motor activities, large motor activities, sensory stimulation activity (Minnesota Department of Human Services, 2017).
- Quiet napping Area: Napping area needs to be in a quiet area which is physically separated from activities which could be disrupting (Minnesota Department of Human Services, 2017).
- Staff to child ratios maintained
- Maximum group size maintained
- Toilets, sinks & faucets- located at appropriate height leaves for toddlers and preschoolers (Minnesota Department of Human Services, 2017).
- Diaper changing area: separate from areas used for food preparation and eating 4 (Minnesota Department of Human Services, 2017).
- Outdoor area enclosed
- Outdoor area: Space must be located 2,000 feet from the center (Minnesota Department of Human Services, 2017)

# CODE ANAYLSIS

## IBC 2012 & ADA

- Group I-4, day care facilities. This group includes non-medical day care facilities for six or more occupants of any age (not including staff)
- Maximum floor area allowance per occupant: 35 net
- 1006.2.2.4 - day care facilities, rooms or spaces where care is provided for more than 10 children that are 2 ½ years of age or less, shall have access to not less than two exits or exit access doorways.
- Maximum travel distance- 200’ sprinklered
- Maximum common path of egress travel- 75’
- Largest area with single exit- 10 occupants
- Minimum door width- 32”, maximum door width- 48”
- Minimum corridor width 44” serving more than 48 occupants
- Minimum length of dead-end corridor- Greater of 20’ or 2.5 x width of corridor
- Type V-B unprotected, wood light frame construction, sprinklered, maximum area is 36,000 square feet, maximum height 60’.
- 1210.3.1 Exception- toilet rooms located in child day care facilities and containing two or more water closets shall be permitted to have one water closet without an enclosing compartment
- 1210.3.2 Exception- toilet rooms located in child day care facilities and containing two or more urinals shall be permitted to have one urinal without partitions
- 1109.5.1 Exception- where drinking fountains are primarily for children’s use, drinking fountains or people using wheelchairs shall be permitted to comply with the children’s provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches minimum above the floor





## DESIGN SOLUTION



# PROCESS DOCUMENTATION

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## PERSONAL INTERVIEWS & SITE VISIT

# PERSONAL INTERVIEW QUESTIONS

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What key components are needed in a child care facility to be successful?

What constitutes as quality care?

Where would you like to see early educational design go in the future? What can architects do better to design for children?

What is important when designing environments which promote play?

Are there key architectural elements which are critical in enhance child development?

Can you explain what developmentally appropriate care means to you?

Can you explain what is important when spatially organizing a child care center?

How can the environment nurture exploration?

Figure 93. Child Sized Facilities



Figure 94. Zoning a Group Room



Figure 95. Entry Condition

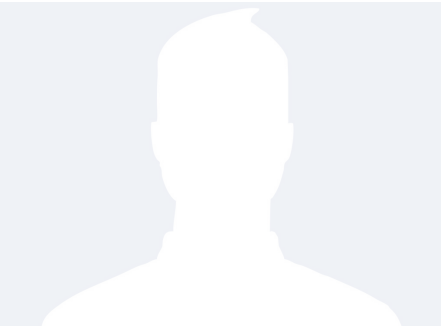


Figure 96. Infant Nap Room





# INTERVIEWS / SITE VISIT



NDSU Center for Child Development

## TAKEAWAYS

“The other things architects often forget is space away from the children. Teachers need space for lesson planning and space to meet with parents.”

“You want a variety of surfaces and type of surfaces incorporated indoors and outdoors. This is important because if children want to take out their little scooters or little push trikes they can go on the cement. But, it’s also nice to have softer and natural material also.”

“You want a variety of surfaces and activities outdoors to accommodate different age groups but also activities that foster different developmental skills.”

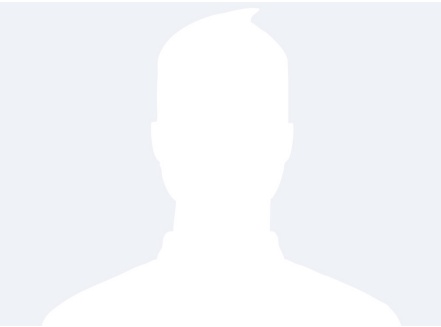
“According to group size and licensing and accreditation there must be a classroom, there must be a separator, there must be a wall.”

“Storage areas are often forgotten about in child care centers. You need storage, so you can rotate toys in and out of rooms.”

Center for Child Development, North Dakota State University



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Human Development and Family Science

## TAKEAWAYS

“Neurological development is going to depend on the types of experiences the child has. The more affordances for interactions are going to be most helpful.”

“One of the things that have been shown to help with language development is having visual connect with the children. Once children start walking and talking they don’t look at people’s faces as much which is kind of ironic because you would think that they would. Maybe something where there are places for children to get a little higher to the adult level.”

“Wide open spaces versus more contained spaces. There are different types of children. Some temperaments tend to be more fearful and some tend to prefer places that are closed off or secluded.”

“There are different types of play pretend play, parallel play, unoccupied play, and dramatic play. Having environments that are going to promote each different types of play would be helpful. For example if you are building an environment for a child, having the ability to immediately go outdoors so children can engage in outdoor play, could be helpful.”

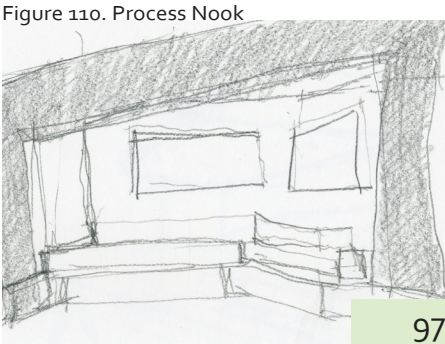
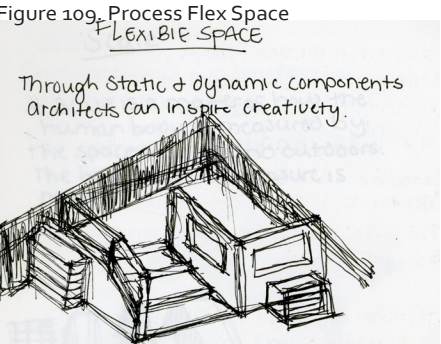
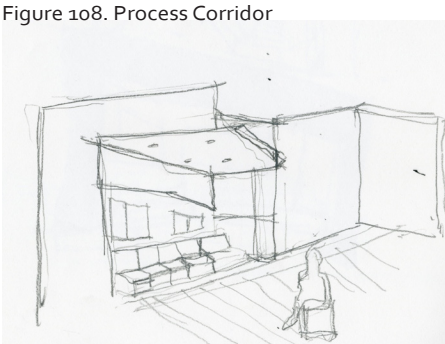
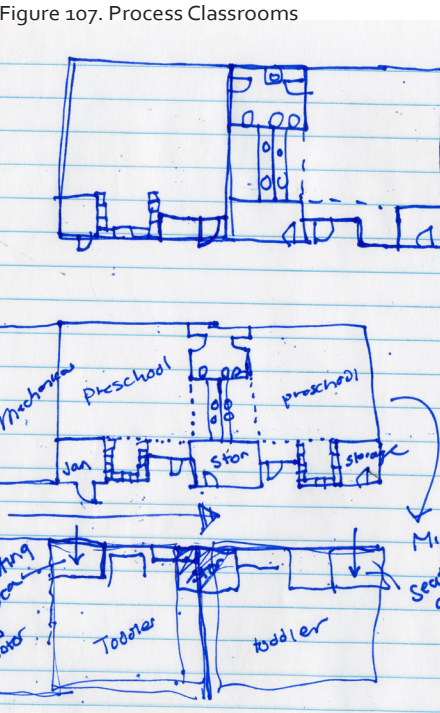
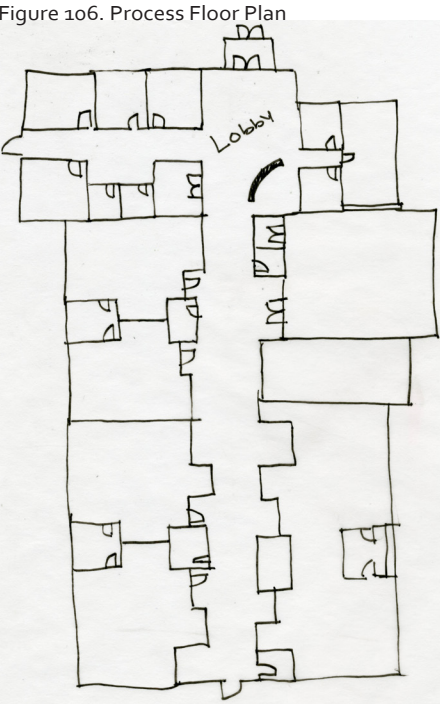
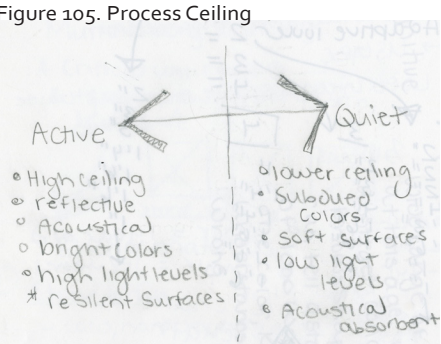
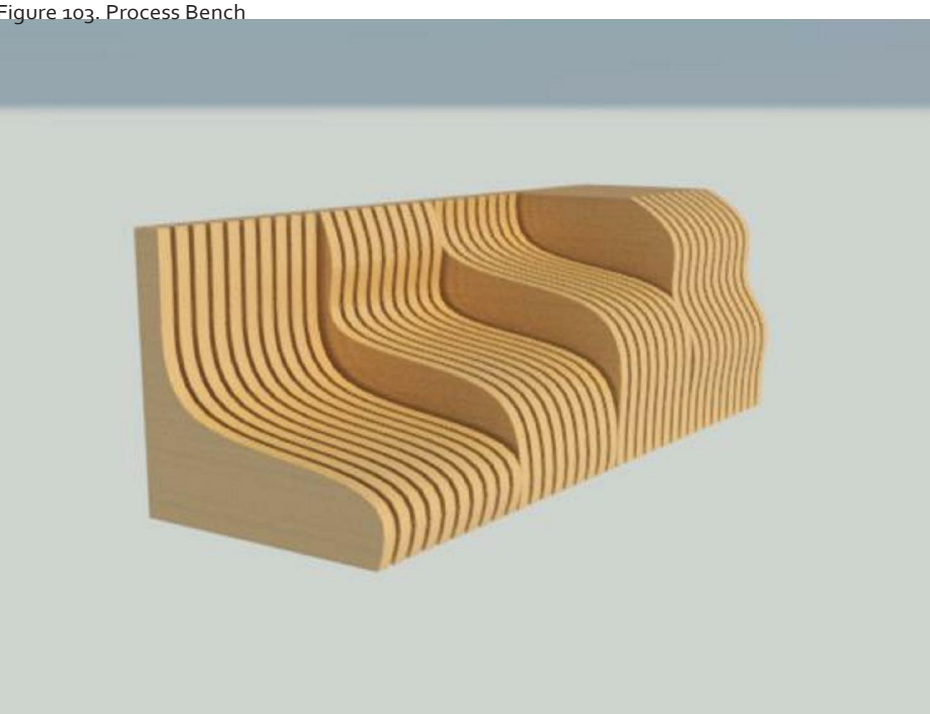


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# PROCESS DOCUMENTATION

## ITERATIONS





# ITERATIONS

## SPATIAL AND FORM EXPLORATION

Figure 111. Process Spatial

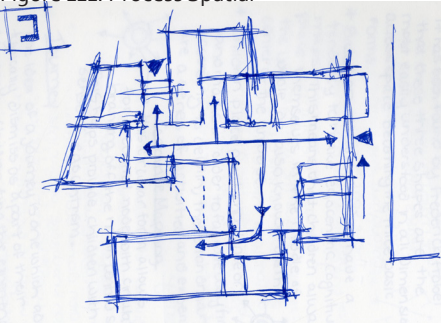


Figure 112. Process Spatial

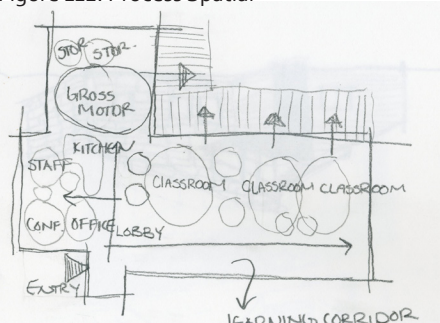


Figure 113. Process Form

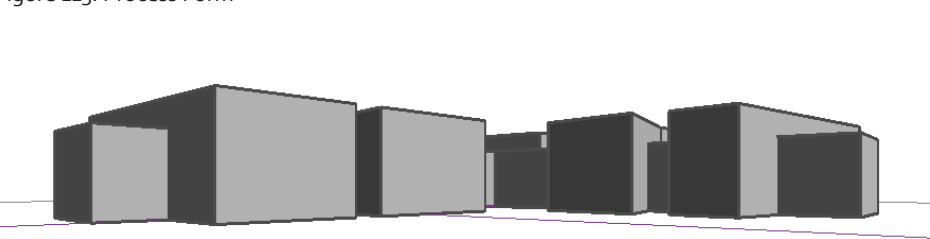


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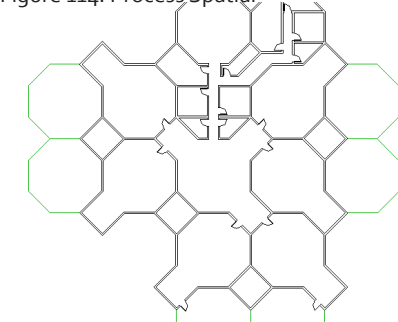


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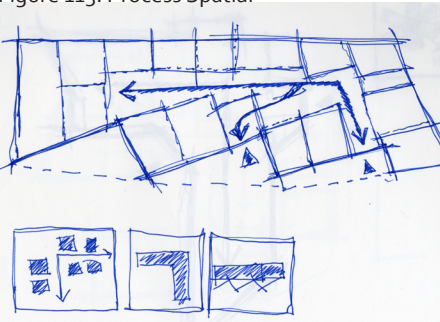


Figure 116. Process Form

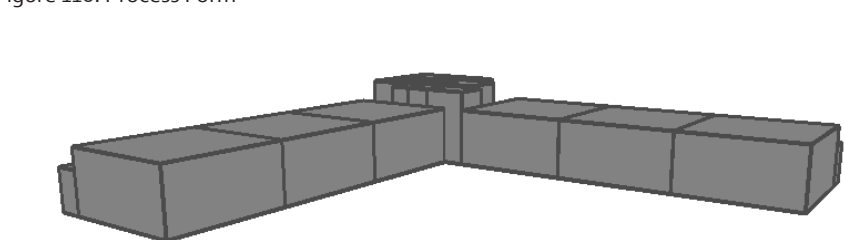


Figure 117. Process Spatial

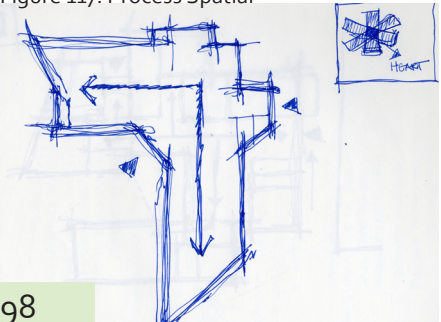


Figure 118. Process Spatial

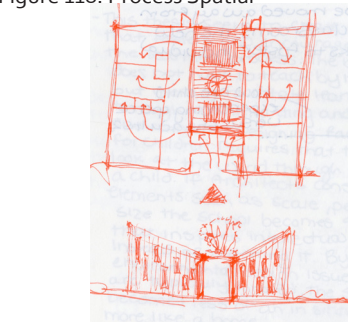


Figure 119. Process Form

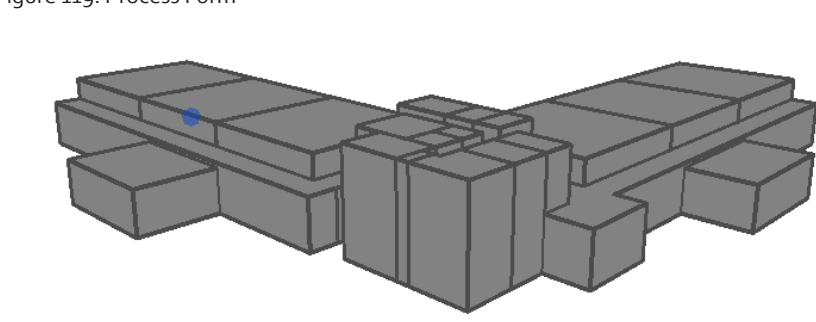


Figure 120. Process Iterations

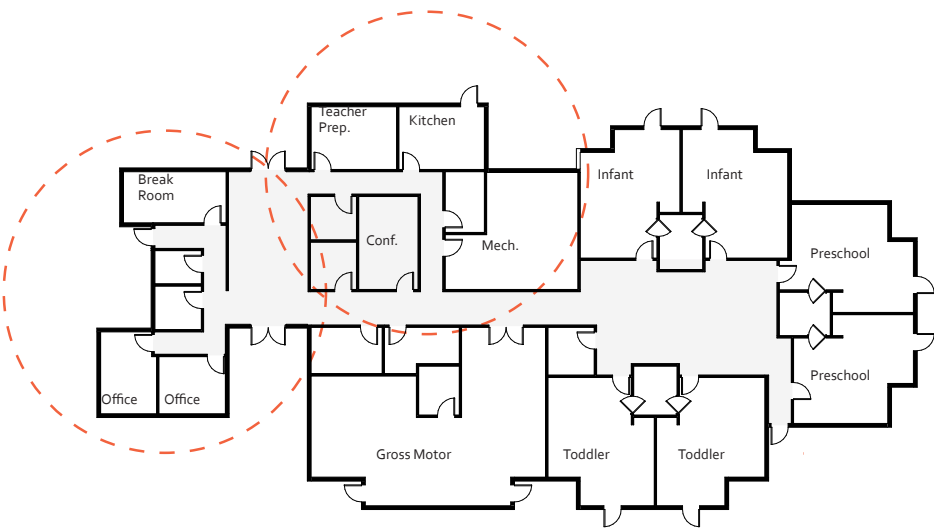


Figure 121. Process Iterations

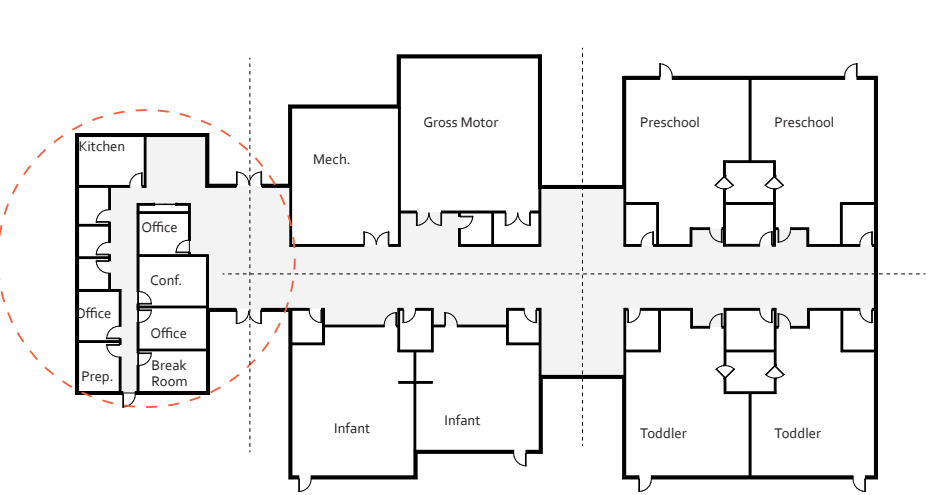


Figure 122. Process Iterations

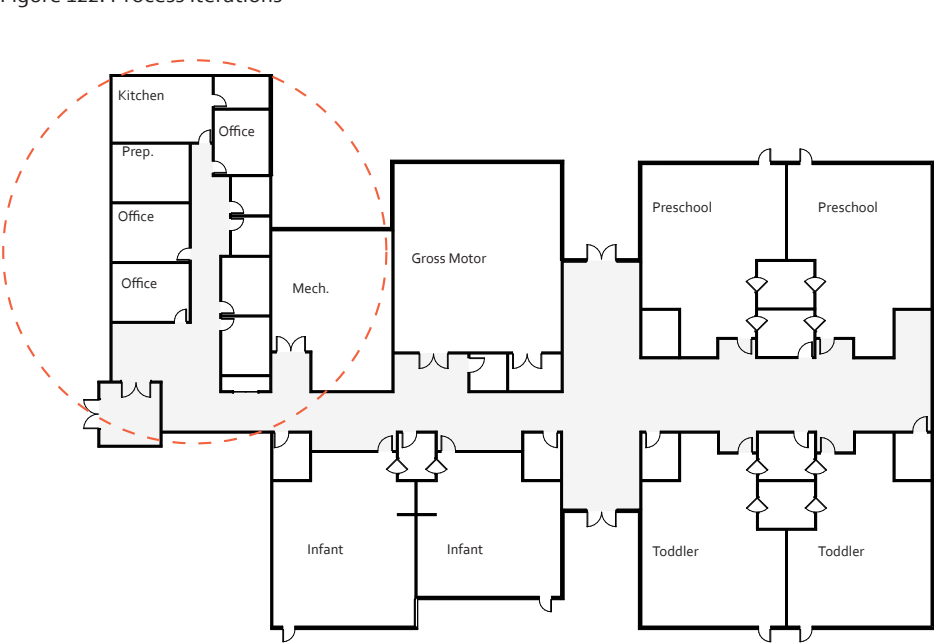
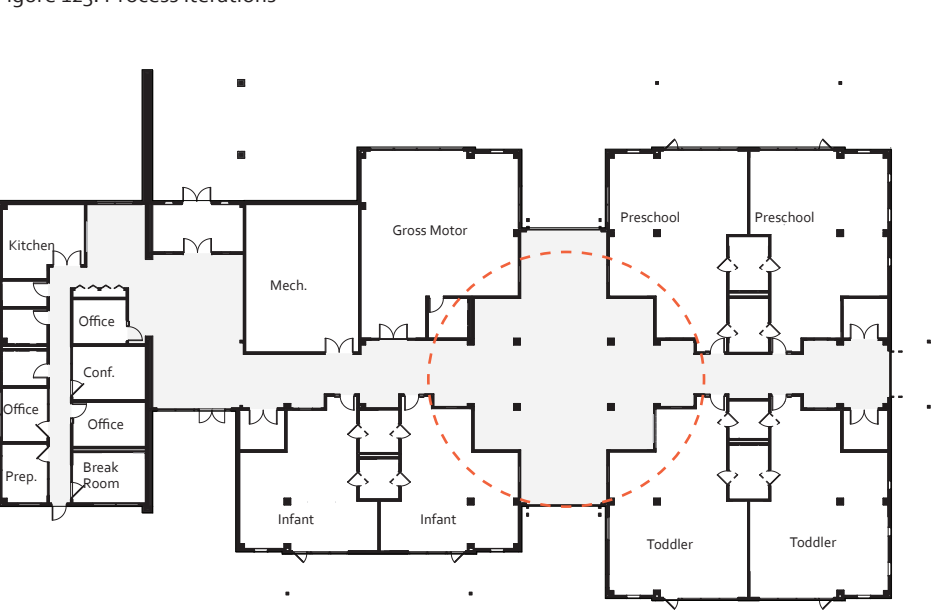
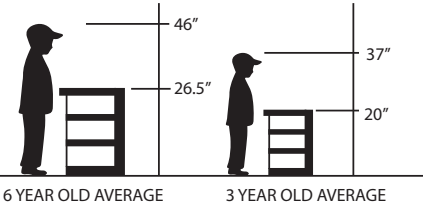


Figure 123. Process Iterations



# SUCCESSFUL DESIGN ELEMENTS

HILD COUNTER HEIGHTS FOR THE AVERAGE 3 AND 6 YEAR OI



THESE DIMENSIONS CAN ALSO BE USED FOR TABLES, BOOKSHELVES AND SENSORY TABLES.  
Figure 124. Scale & Perspective

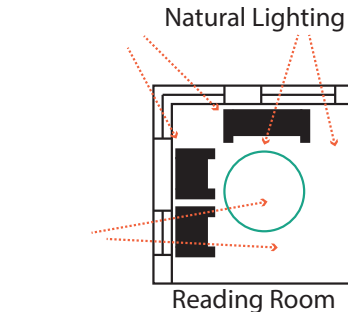


Figure 126. Natural Lighting



Figure 128. Connection to Nature

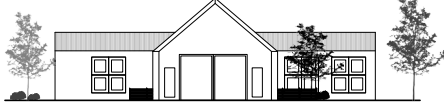


Figure 125. Home-Like Environments

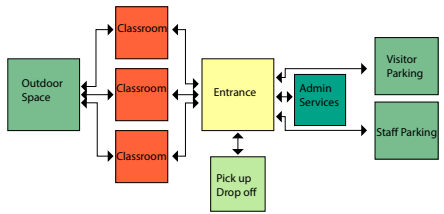


Figure 127. Optimal Spatial Layout

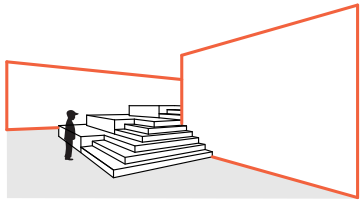


Figure 129. Movement

- Scale and perspective
- Natural lighting
- Access to the outdoors and connection to nature
- Home-like environments
- Optimal spatial arrangement
- Environments which encourage movement, comfort, competence and sense of control

Architecture needs to provide for:

- Developmental Skills:
- Social
  - Physical
  - Cognitive
  - Emotional

Figure 130. Outdoor Activities

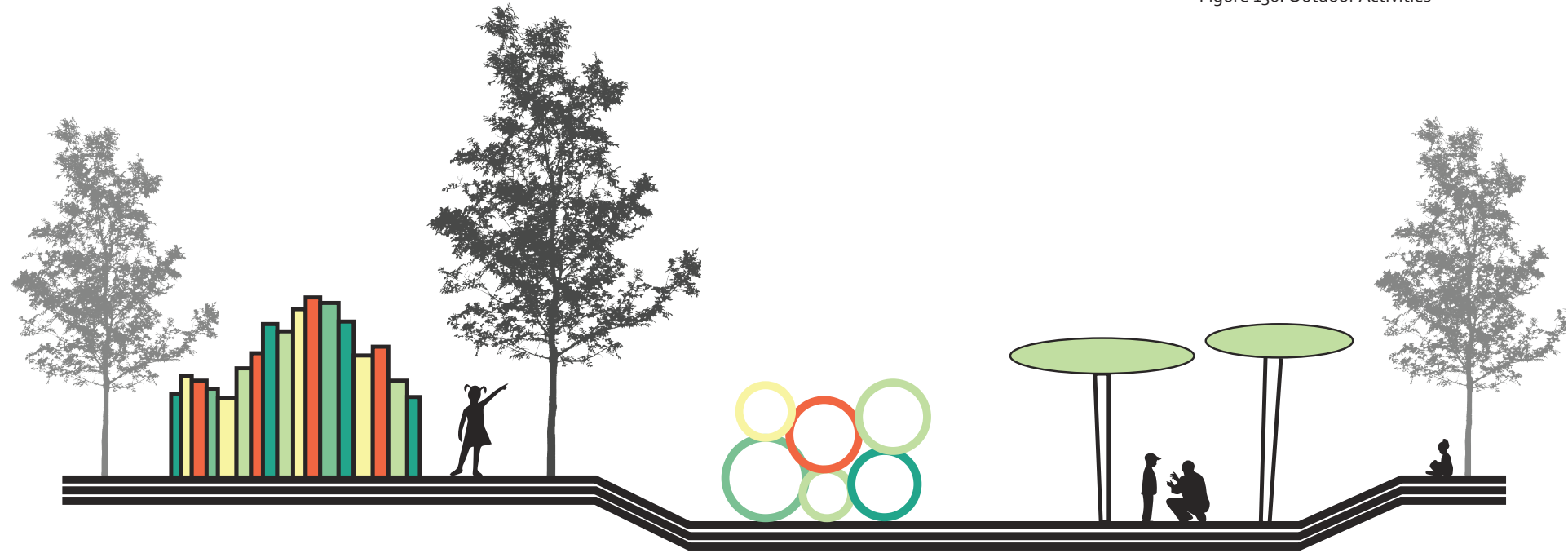


Figure 131. Hills





# PROJECT SOLUTION DOCUMENTATION

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Figure 132. Money Shot Rendering



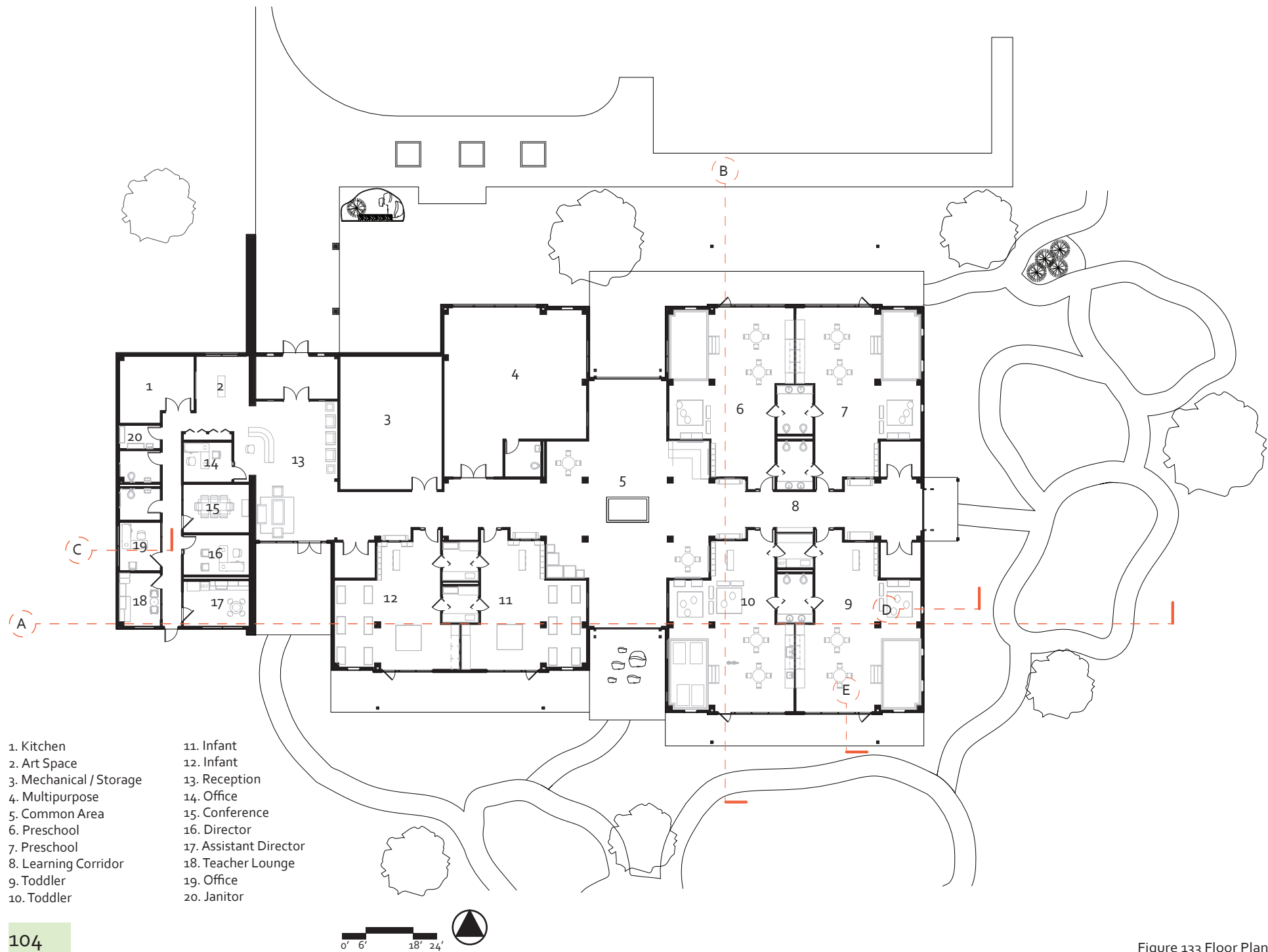


Figure 133 Floor Plan

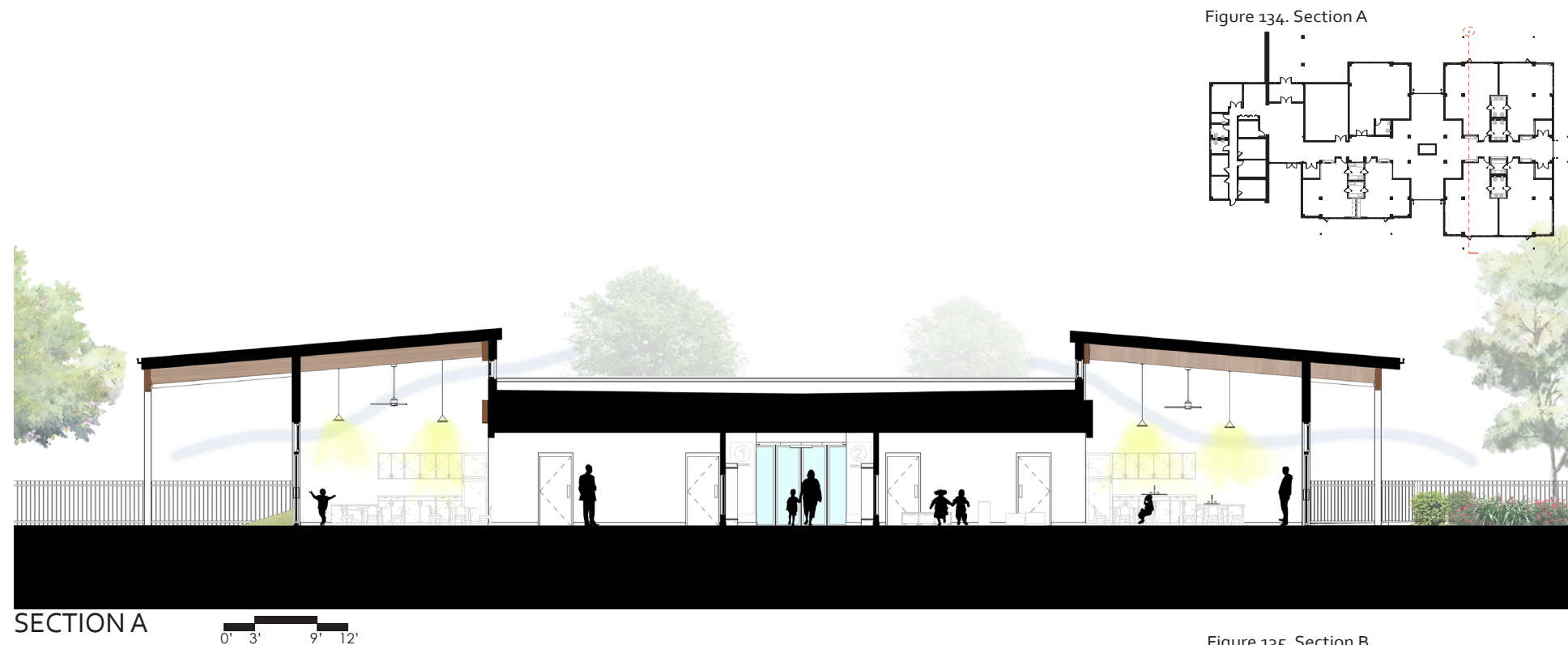


Figure 135. Section B





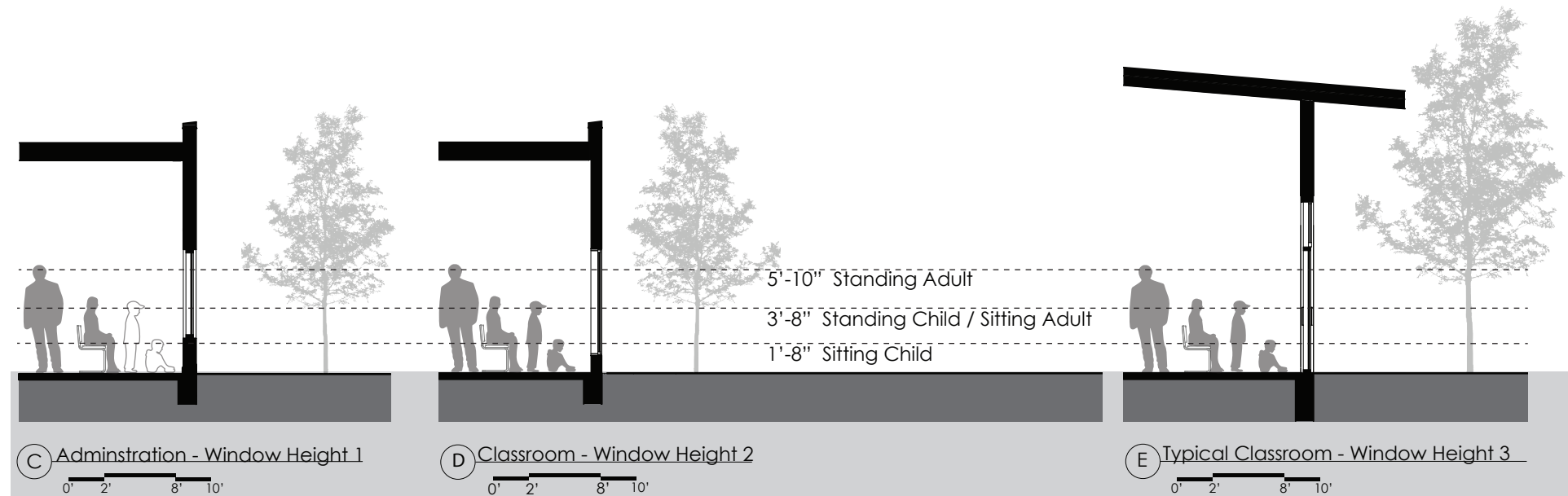
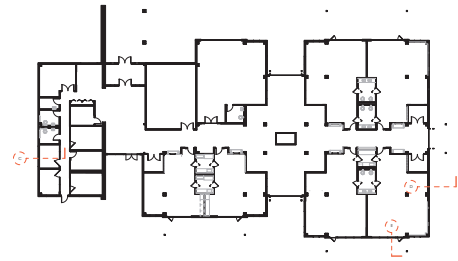


Figure 136. Section C, D & E



Figure 137. East Elevation



Figure 138. South Elevation



Figure 139. North Elevation



# APPLICATION OF RESEARCH

## FLOOR PLAN

The building is arranged so that the circulation from the entrance leads progressively to activities and rooms requiring more privacy. For example, group rooms are more private than the administration space.

## SECTION A & B

Shown in the section is this idea of using clerestories to achieve cross ventilation. Operable windows and natural daylighting allow children to follow the course of the sun throughout the day but also have a lot of health benefits. The clerestory windows provided in each classroom space also provide varied ceiling heights. Lower ceilings provide a more intimate social interaction and are located over the quiet areas versus higher ceilings create social interaction and are located over active areas such as the messy play area.

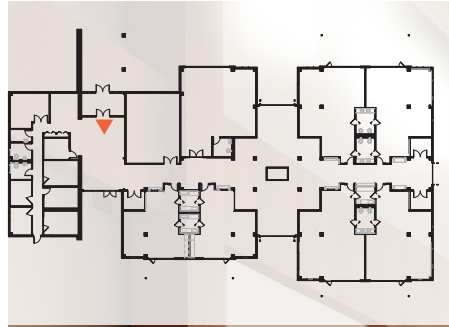
## ELEVATIONS

From the elevations you notice that the primary exterior building materials are warm materials like wood and brick. Natural materials give children roots and connections to the source of substances in their world versus synthetic materials. The varied roof lines also help reduce the scale and increase the friendliness of the building providing children with feelings of shelter and security. This concept is also implemented into the entry condition which will be discussed later.



Figure 140. Residential Entry Condition





# APPLICATION OF RESEARCH

## ENTRY CONDITION

Creating a highly visible entry condition assists infrequent visitors and facilitates protection of the building. Other key home-like features which were included in the design solution include; a memorable entry condition which consists of seating and vegetation, a large overhang and lastly a welcoming front door with sidebars of glass enabling children to preview the interior before entering. Creating a welcoming and friendly entrance with gentle curves in the landscape and large overhang signify the transition from the outer world to the inner world. Any features like this along with a greater transition encourage resting points and encourage children to stop to smell the flowers or play in the front yard.

One might wonder why this important or how it effects development while Research shows that a child's acceptance of a new environment is deeply influenced by the aesthetic quality of its approach and entry condition. (Olds, 2001) Also, having a friendly entry condition helps reduce a child's anxiety and helps reassure both the child and parent.

## LOBBY

The high ceilings allow for an abundance of natural lighting to enter the facility but also pushes children into more of the private zones creating a sense of discomfort. Shown in the rendering is a receptionist located right as children and parents enter the building which enhances the friendliness and efficiency of the center. Not only does this person greet and monitor who comes and goes, but they also provide security for the center. As you notice an adult height counter was positioned at 42 inches high and a counter for kids was designed at 18 inches high. This is important, so children can "sign themselves in" while the parent signs them in. (Olds, 2001) This action of feeling included all contributes to the essence and feeling of the facility. Children learn through the act of doing so.



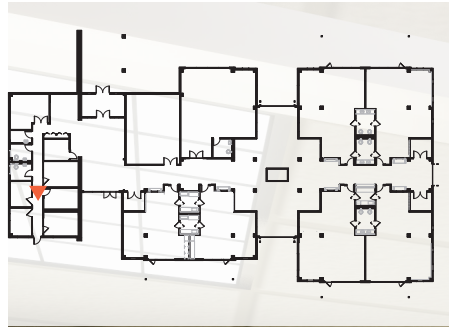


Figure 142. Teacher Prep

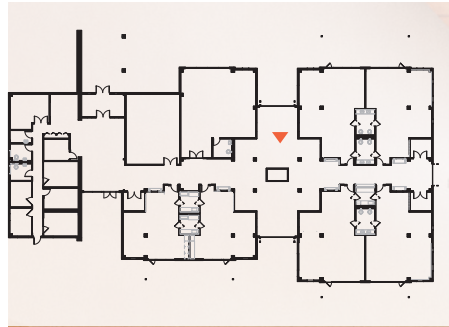
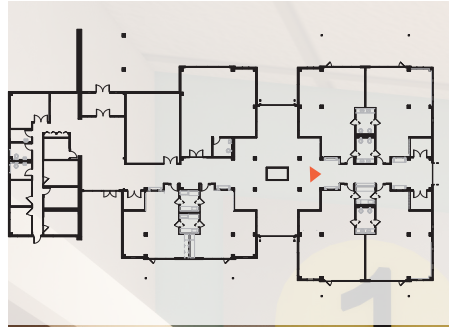


Figure 143. Central Node





# APPLICATION OF RESEARCH

## CENTRAL NODE

The central node is one of the primary focuses of the building, this serves as the heart of the building which is essentially an extension of the classroom. A variety of small spaces accommodating individual or group activities were also incorporated within the central node. One of the distinctive features within the central node is a “podium”. The podium was deliberately placed in the middle of the node obstructs the flow of circulation. Children must either go around the stationary object and or interact with the form. This podium can be used for sitting, reading or stage performances. This object was inspired by the Delft Montessori School. Also, incorporated within the central node are varied ceiling heights which create a visual division between the different activity zones.

## LEARNING STREET

Walls are added or staggered setting up an articulated zone at the entrances to each classroom, which helps mediate between the public zone of the hall, and the private zone of the classrooms, much like a front porch does for a house. From the rendering you can see that the corridor is made up of a series of nodes which allow children to constantly have visual connection to nature. When designing the corridors, I envisioned the space being used for informal learning, a place to display work, a destination to meet and to reflect.

Window boxes scaled appropriately to different aged children allow children to observe into the different classrooms which allow children to learn through imitation and observation. A typical corridor with metal lockers now offers children a space to slow down and interact in new ways which would typically be restricted by circulation.





Figure 145. Typical Classroom



Figure 146. Connection



# APPLICATION OF RESEARCH

## TYPICAL CLASSROOM

Each classroom was designed to accommodate a larger minimum square footage per child. Currently, Minnesota Department of Human Services requires a minimum of 35 square feet per child; unfortunately, this has become the standard. According to research children’s social behavior reveals that densities of one child per 40-50 square feet optimize positive social interaction (Olds, 2001). Window heights are placed according to the heights of children. Orientation to the exterior provides control, with views, offering physical and emotional healing benefits, as well as cognitive benefits of increasing their knowledge of the natural world.

The form of the classroom was determined based off areas with no views and areas with views. Once children make their way past the classroom entry (transition area) adults can easily see and supervise children from all angles in the room.

## CLASSROOM CONNECTION

Young children have no perceptual difference between an exterior landscape and an interior landscape. Because of this thoughtful design was implemented into each classroom space by providing ample natural lighting, ventilation and access to the outdoors. A large overhang located outside of each classroom helps with the transition between indoor and outdoor space. This space is an extension of the classrooms usable space.

Also Indicated throughout my research a “special” window place is necessary in making a classroom feel warm and welcoming. This has an impact on the emotional development of children. As you notice in the rendering, a raised platform was designed which provides spatial variety and allows children to feel as if they are in a quiet space giving them a sense of power and privacy. In addition, this platform can be used for other quiet zone activities.

“We discovered that education is not something which the teacher does, but that it is a natural process which develops spontaneously in the human being.”  
  
Dr. Maria Montessori



Figure 147. PlayYard



Figure 148. Play Mound



Figure 149. Site Plan



- A. Bike Path
- B. Porch Overhang
- C. Sand Box
- D. Open Lawn
- E. Play Mound
- F. Gross Motor Equipment
- G. Stumps / Stepping Stones
- H. Messy Mud Area W/ Rocks, Logs and Water
- I. Vegetable Garden
- J. Stage
- K. Play Mound
- L. Shade Arbor
- M. Short Term Parking



# APPLICATION OF RESEARCH

## PLAYYARD & SITE PLAN

Providing spaces that facilitate a wide range of activities will accommodate a variety of interests well promoting exploration (Olds, 2001). According to interviewee 1, When it comes to language development, more affordances for movement, interactions and motor skills will allow language to be produced naturally (Anonymous 1. 2017, September 26).

A variety of play zones including different activities such as small hills covered with grass encourage children to use gross motor skills while climbing, rolling or sledding. The play yard offers a wide variety of experiences including a mix of natural elements including gardens, play mound and water. Also located in the play yard is a wooden box which demonstrates imagination in and of itself. The box can be used as a stage, sandbox or seat. The determination to explore is an essential ingredient for learning and healthy social development. The outdoor space pictured creates situations which afford children with a sense of adventure where they can test their mental and physical coordination with a strong illusion of their own independence.

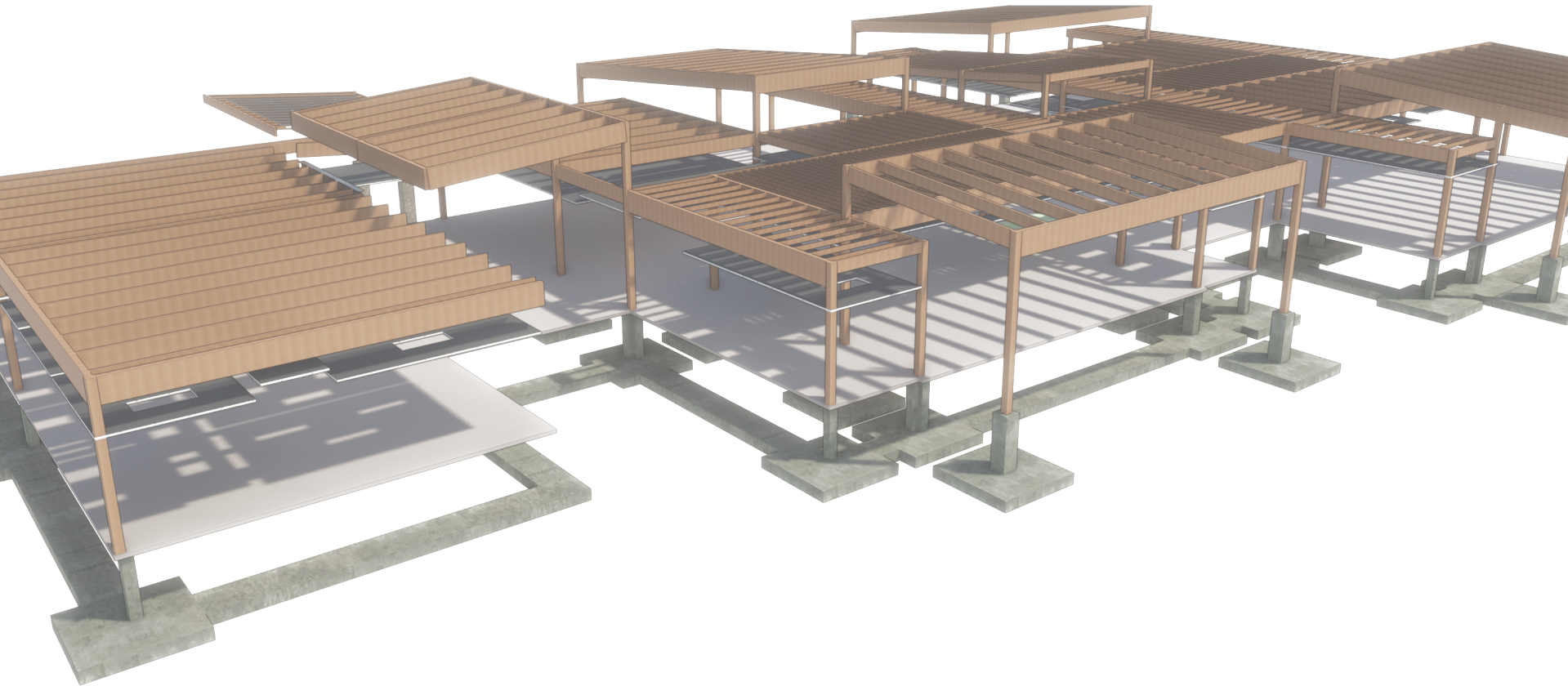


Figure 150. Structure

# RESPONSE TO:

## TYPOLOGICAL OR PRECEDENT RESEARCH & SITE

### TYPOLOGICAL RESEARCH

The project differs from the precedent analysis in many ways, but still maintains the positive aspects taken from each study. I found that the end result was successful in pushing the envelope in flexible or open space provided within the facility. Concepts identified by Richard Louv in his book Last Child in the Woods, helped drive the design, which promotes strong connections to nature. In the book it says that decreased exposure to nature can result in a “nature-deficit disorder” which not only harms children but also society.

The final design gives children ample opportunities for exploration, creativity and interaction which all contribute to healthy development. As Maria Montessori once said, every child is born as an explorer. It is our job as architects to image what it would be like to be a child. We must imagine the world as something new and wonderful full of knowledge and experiences.

### SITE

The project responds to the site in many key ways. A few include the relationship with the community, the close proximities to homes and businesses, ample outdoor space and lastly the building helps with socioeconomic integration. As mentioned earlier this facility will not only serve for the city of Woodbury but also for Cottage Grove, Newport and St Paul Park.

# RESPONSE TO:

## GOALS AND PROJECT EMPHASIS

The primary goals of this thesis was to identify the needs and wants of children to create an environment that fosters learning. Through understanding child development we could redefine the typical child care center into an education facility which prioritizes learning through prepared environments. Those prepared environments include:

- Scale and perspective
- Natural lighting
- Access to the outdoors and connection to nature
- Home-like environments
- Optimal spatial arrangement
- Environments which encourage movement, comfort, competence and sense of control

It is my belief that i have met and exceeded these goals throughout the design process. I successfully implemented research based design through case studies, interviews, literature reviews and iterations to support every single design decision.

On a personal level, the goal was to create a thesis that provided me with the ability to research and design accordingly while providing professional renderings, plans, and images. These goals have been successfully achieved based on a personal stand point.

### CONCLUDING THOUGHTS

The final proposal of act for children is a preview into the possibilities of how architecture plays a vital role in the development and growth of children. If nothing else, I hope that my thesis has opened everybody’s eyes on the importance of the environment on children’s development. As design for early childhood slowly begins to gain recognition within the architectural profession it is my hope that in the near future it begins to receive the attention it truly deserves. When considering the design of spaces for children, adhering to minimum standards and state regulations i believe is not enough. However, as designers we pose the opportunity to make a difference and impact the lives of others by creatively finding solutions. While simply following the standards will provide adequate and safe care for children, it is time to realize that children deserve more than just adequate; they deserve exceptional. The final design solution provides a developmentally appropriate setting balancing the practicality of a day care center while evoking a sense of wonder, delight, and meaning to children.





Figure 151. Smell the Flowers

Tara Leshner

## APPENDIX

# [APPENDIX A] - PRECEDENT ANALYSIS REFERENCES

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# [APPENDIX B] STUDIO EXPERIENCE

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Fall 2014

Prof. Darryl Booker

**Tea House - Fargo, ND**

**Boat House (Minneapolis, MN)**

This studio focused on meaning behind design. It allowed for me to create a narrative and poetic expression behind every design decision that I made.

Spring 2015

Prof. Cindy Urness

**Montessori School- Fargo, ND**

**Bird House Competition - Fargo, ND**

**Community Dwelling- Marfa, TX**

This semester focused on designing spaces and the connections between those spaces. We were also able to develop architecture in full scale and engage in a competition among their peers.

Fall 2015

Prof. Steve Martens

**Fire Station - New Ulm, MN**

**Community Center - Duluth, MN**

This semester really pushed the boundaries of how structure can be integrated into a building. Focus was primarily on programming a building and creating architectural enhancing spaces within those restricted boundaries.

Spring 2016

Prof. Regin Schwaen

**Floating Art Gallery - Nekoma, ND**

**620 Folsom - Nekoma, ND**

This semesters focus was on digital programs and skills needed to successfully design. It allowed students to explore structural materials well pushing me to seek how steel and concrete can blend harmoniously into a cohesive design solution.



Fall 2016  
Prof. Don Faulkner  
**Cumulative Design High Rise - San Francisco, CA**  
This semester took all the knowledge we had received through four years of school into one design studio. I designed a multiple-use high rise building in which every aspect of the building, including structure and mechanical systems, was accounted for.

Spring 2017  
Prof. Don Faulkner  
**Urbanism**  
This semester focused on urban design and looking at the bigger context of design. The class focused on analyzing different planning regulations which accompany design including sustainable design, icon village (Dubai), pattern language, DPZ (Duany Plater-Zyberk), Laissez Faire (minimum governmental interference) and traditional. This semester also allowed me to hone in on my model making skills.

Fall 2017  
Prof. Ganapathy Mahalingam  
**Architectural Research Studio**  
This architectural research studio allowed an analysis on the developmental stages of early childhood, and the different kinds of learning that happen during those stages, to inform my design of a day care as a thesis project.

Spring 2018  
Prof. Ganapathy Mahalingam  
**Design Thesis: Act for Children - Woodbury, MN**  
This thesis experience has greatly increased my knowledge of early childhood design. I truly believe that continuing to simply meet the standards set out by state regulations will provide adequate care for children, but it is time to realize that adequate is simply not enough; children deserve exceptional design. Through the process these last nine months, I have been able to acquire knowledge on an array of topics which will be with me in future endeavors as I strive to become an exceptional designer.

# [APPENDIX C] FINAL THESIS INSTALLATION



Figure 152. Final Model



Figure 153. Final Contours



Figure 154. Final Contours

# [APPENDIX D] IDENTIFICATION

Figure 155. Final Boards



Figure 156. Final Boards



KELSEY M. JARRETT

8991 Highview Lane.  
Woodbury, MN 55125

P (651) - 731 - 3942  
E kelsey.jarrettg@yahoo.com  
W https://ndsustudent.wixsite.com/kelsey

“We shape our buildings; thereafter they shape us”

Winston Churchill



Figure 157. Personal Identification