supportive learning: live, grow.

Virginia Hausladen

Figure 1 *Child In Tree*
Hausladen, G. (2012). *Child in tree* [Designer]. Modified from "Nature and Play Go Together". 2012, *Nature's child: Exploring the innocent world of children in nature and barefoot living.* http://nature-schild-natureboy.blogspot.com/2012/02/nature-and-play-go-together.html

Supportive Learning: Live, Grow.

A Design Thesis Submitted to the Department of
Architecture and Landscape Architecture of
North Dakota State University

By

Virginia Hausladen

In Partial Fulfillment of the Requirements for the Degree
of Master of Architecture

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abstract

This thesis is an investigation into how design can facilitate and enhance learning for students with Autism Spectrum Disorders. By designing for groups of people with very specific needs, we learn how architecture can adequately provide for the more general population. In doing so, the research brings into question how best we can educate children with special needs and how design can adapt to provide for the changing needs of students today . Located on the Red River in Fargo, North Dakota, the development of a specialized school for children with ASD allows architecture to become a tool in and of itself for learning and personal growth.

Keywords: School, learning techniques, education, special needs, Autism.

problem statement

How can design facilitate and enhance learning for students with autism?

statement of intent

statement of intent

Typology

A specialized school and residence for children with autism spectrum disorders.

Claim

Many students with special needs, specifically autism spectrum disorders (ASD), develop skills and learn differently than typical students.

The actors are the students (preschool to middle school aged), their families and their teachers. The actions are seeing, hearing, smelling, tasting, and touching.
The object acted upon is the school and the surrounding environment.

Unifying Idea

Failure to respond to typical teaching methods is a common trait among youth with autism ("Talk about curing," 2012). Many autistic children require a separate and specialized learning environment than those of mainstream education do for teaching to be effective.

With the development of a specialized school for children with ASD, architecture can become a tool for facilitating learning and for promoting personal growth.

Premises

Buildings should accommodate and provide for people of all abilities and developmental stages.

Learning environments should be personal, supportive and encouraging to the unique needs of each student.

Materials, textures and scale have unique opportunities in every program to reflect and express user characteristics.

Project Justification

Research regarding the specific needs of youth with ASD has emerged in recent years and is still developing. Many parents and educators remain baffled and confused when it comes to helping these children. This project will define a place to support the entire family in this ongoing struggle.

Furthermore, this project will provide a precedent for a new branch of universal design. By designing a school for a group of under-represented people, this thesis will explore how students best learn and how architecture can support these strategies.

proposal

It seemed to be an inherent trait little brothers are born with: annoying. He had to have the exact same place on the couch, the exact same blanket, the exact same tricycle. He would throw a kicking-and-screaming tantrum at the store if he saw a toy he wanted or at the restaurant if his food tasted funny. He would lie on the floor in the middle of the aisle at the grocery store until we forced him to move. If I walked past him and accidently brushed against him he would become aggressive and strike out, never able to communicate what was wrong. I was constantly frustrated that we would never get along. It felt as if everyone was staring at us wherever we went: 'Why can't you control your child?'

My brother was finally diagnosed with Asperger's Syndrome when he was nine years old. Asperger's Syndrome is an Autism Spectrum Disorder (ASD) on the higher-functioning end of the spectrum. My family had never heard of this disorder, seeing as Asperger's was only recently becoming widely recognized and diagnosed. My parents explained as they learned how my brother could not help that he reacted to things differently, and we should therefore approach interacting with him differently. I began to forgive my brother more, though I still had little understanding of his needs and struggles.

ASD occurs in one in eighty-eight children in the United States ("Talk about curing," 2012). Though many children improve substantially once diagnosed and treated, many others may continue to struggle if kept in mainstream education. Children with more severe ASD could show much stronger results of growth when the approach to teaching them is specialized.

I firmly believe that our childhoods shape the adults we become. Having worked with young children for over ten years in daycare, summer camp and athletic settings, I can reaffirm that all children need to feel supported and encouraged to succeed. Fueled by my own family experience, I feel pangs of sympathy for children who are not included in activities or picked on for seeming different, and empathy for their families who desperately want to help. Children should be allowed to play, socialize, exercise, and learn in ways that make sense to them. I also firmly believe that society should instill in children a desire to learn and the freedom to be curious. Architecture, furthermore, should reflect the values of today's society. To paraphrase countless politicians, I believe investing in children is investing in the future.

Architects design buildings for people. A building should provide for and enhance the needs of users for today and for tomorrow. To what extent can the users interact with and learn with the help of the design? How can architecture, designed for a unique group of people, support their needs and help them grow?

Fargo has the largest youth with Autism population in North Dakota, but could benefit from a more specialized facility to help them grow into contributing members of society. Though children with ASD are only one of many groups with special needs, providing for one can act as an example of how architects can provide for all.

user/client description

Users

This project will be designed primarily for youth with Autism Spectrum Disorder (ASD), but also for their teachers, physical and/or occupational therapists, and families.

The facility will provide spaces to teach and provide therapy to preschool-aged to middle school-aged children on the Autism Spectrum. The teachers and therapists will be specialized in working with this disorder. The designed spaces will also provide for parent and sibling visitors to assist in the therapy of the ASD children, and to receive support, counseling and lessons regarding the disorder.

Number of Users

In 2009, Fargo and West Fargo reported having 154 children ages three through twenty one with ASD (Sanstead, 2009). Because this facility will focus on children on the more severe end of the spectrum, it is estimated that it will serve between thirty to fifty children at a time from Fargo and West Fargo, North Dakota, Moorhead, Minnesota, and surrounding small communities. The center will employ between ten to fifteen teachers and therapists, one counselor, one Center Director, one Administrative Assistant and two custodians/building managers.

Affiliation and Peak Usage

This building will be privately affiliated with and funded by the North Dakota Autism Center. As a school, the peak usage will be between 8:00am and 5:00pm, but will allow for occasional night or weekend gatherings.

Autistic Children

Autism affects 1 is 88 children nationwide, typically influencing an individual's communication, social skills, behavior, learning, and medical issues. Its influence is diagnosed on a spectrum, meaning its severity varies from person to person. It also affects each individual differently. Though autistics may share many typical traits, it is unlikely to find two with the exact same issues. For typical traits, see Table 1.1. Although this list is nowhere near exhaustive, it reinforces the concern that, when symptoms such as these are significant, it is difficult to teach and help autistic children in mainstream schools.

Autism is four times more common in boys than in girls, but does not discriminate between race, ethnicity, or economic status. Of the students in North Dakota with autism listed as their primary disability, 44.9% are identified as having a secondary disability as well. Secondary disabilities range from speech and language disabilities as the most prominent, to emotional disturbances, to vision impairment or physical handicaps (Sanstead, 2009). Therefore, universal accessibility will be a priority in the design.

major project elements

Classrooms
Places of learning that may incorporate the physical, mental, social and emotional needs of the children.

Group Activity Spaces
These spaces will allow for development of gross motor skills indoors while promoting interaction with peers to develop social skills as well. This space will double as a cafeteria and a large-group space for parent meetings or school productions.

Kitchen
The kitchen will not only service students, faculty and staff during regular school hours, but will also be open for resident usage on nights and weekends. It will also serve as a life-skills teaching space for older students.

Physical Therapy Rooms
For children who may require physical or occupational therapy to meet one-on-one with a professional.

Faculty and Staff Offices
These spaces will respond to the needs of faculty and staff to maintain record keeping, plan lessons or activities, and use digital media for professional development and communication.

Dormitories
Private living spaces for autistic children from rural areas of North Dakota to stay year-round to receive education and services. These will be supervised by trained staff twenty four hours a day.

Community Living Room
Open gathering space for live-in students to relax, spend free time, and socialize.

Conference Rooms
Spaces in which families can meet with faculty and staff to discuss their child's needs and progress.

Outdoor Sensory Spaces
Outdoor spaces in which children can exercise, develop large motor skills, and learn about their natural environment with direct sensory interaction.

site information

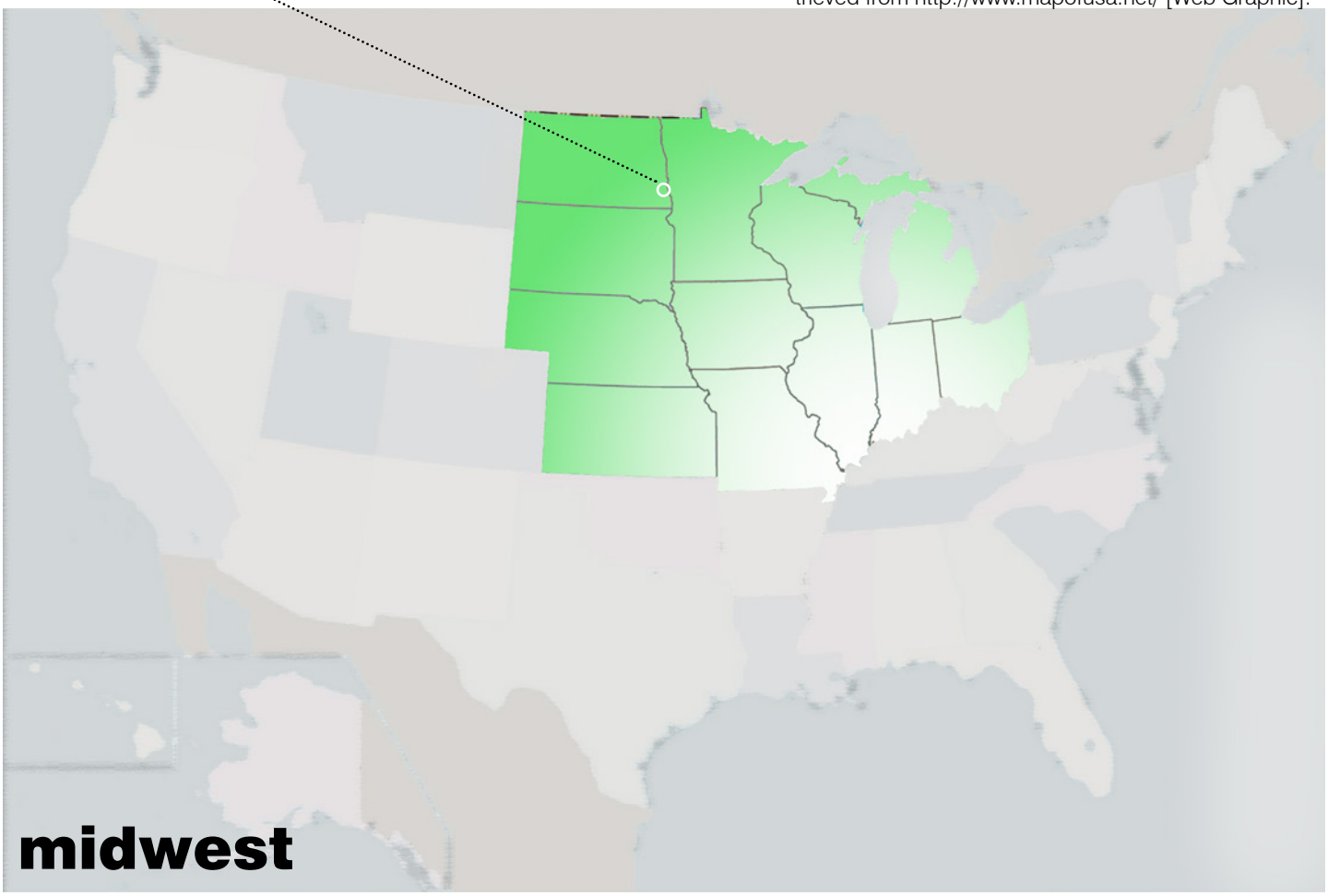


Figure 2 *Macro Region*
Hausladen, G. (2012). *Macro Region* [Designer] . Map retrieved from http://www.mapofusa.net/ [Web Graphic].

The metro area, including Fargo, West Fargo, Moorhead and surrounding communities, are growing rapidly in both size and population with a family-friendly reputation. Having worked in child care in Fargo, ND for four years, I can account for the city's excellent support of its youth, specifically in its range of programming, activities and available services. The city is also striving towards greater universal inclusion in public facilities to support all community members. A facility such as this would make an excellent addition to the community's progress and development.

Figure 3 *Fargo Region*
Hausladen, G. (2012). *Fargo region* [Designer] . Map retrieved from Google Earth [Web Graphic].

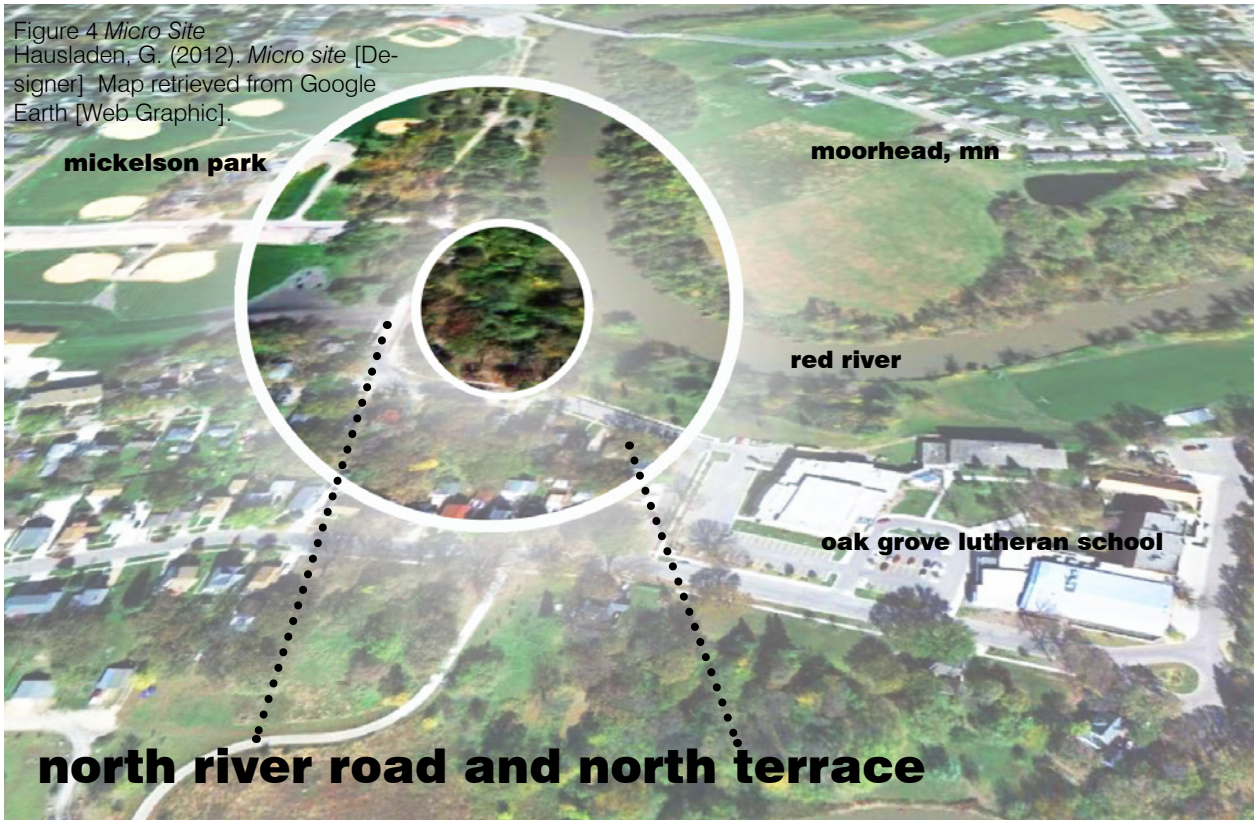


Figure 4 *Micro Site*
Hausladen, G. (2012). *Micro site* [Designer] Map retrieved from Google Earth [Web Graphic].

site information

Figure 5 *Street Signs*
Hausladen, G. (2012). *Street signs* [Photographer]

The corner of North Terrace and North River Road in Fargo, ND is an ideal site for this kind of facility. It is set apart from noisy, busy areas of the city, yet is easily accessible to many in the greater community. The site has great views and is connected by bike and walking trails to the Red River, several parks and Oak Grove Lutheran School. The site allows for exploration of connections to the natural environment, city infrastructure and community places. The site does rest on a flood plain, which will present design challenges and opportunities.

Figure 6 *Site View 1*
Hausladen, G. (2012). *Site View 1* [Photographer]

plan for documenting design process

The documentation of my design process, consisting of concept sketches, models, and digital drafts, will need to be compiled and organized into a clear, sequential format. To do so, I intend to maintain digital copies of all process, including scans and photographs, as well as physical copies when applicable, throughout the design phase. This will be updated by the completion of each design phase.

All of this information will be backed up every Monday at a minimum to insure against technological failure. When my design has reached its final stage, I will review all documentation, edit as necessary, and graphically compile all images into one document that will be made public via the NDSU Library Digital Repository.

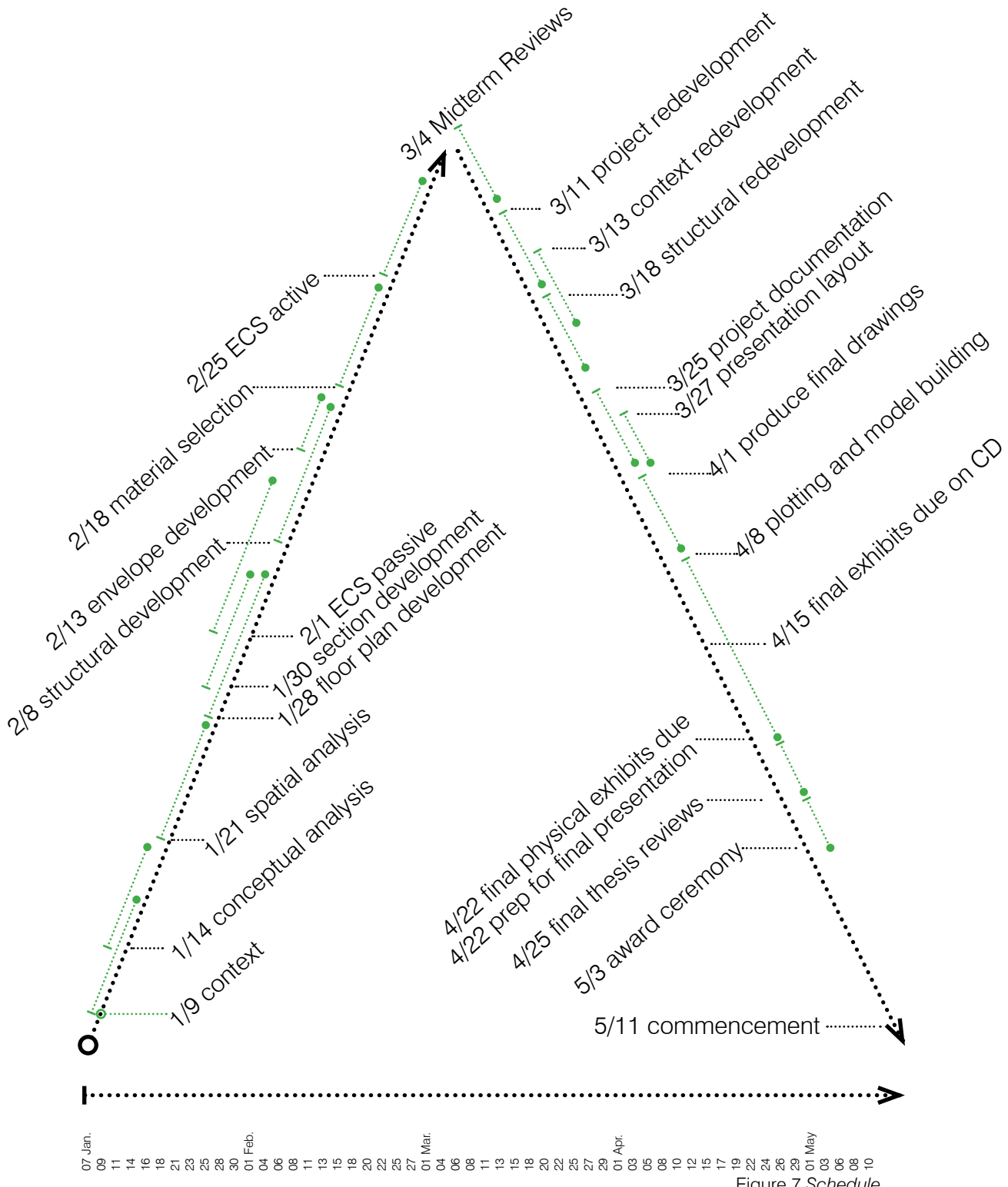


Figure 7 *Schedule*
Hausladen, G. (2012). *Schedule* [Designer]

project emphasis

This thesis aims to thoroughly examine ways in which architecture can not only promote learning, but also be utilized as a learning tool itself for youth with special needs. The foundation for this exploration is the design of a school for children with autism. Experts continuously debate how school design can support evolving teaching methods. Designers of schools should maintain a solid understanding of successful and/or experimental teaching practices in order to insure that design can respond. With this proactive approach, designers can provide children with higher quality education.

plan for proceeding

Plan of Design Methodology

The design process will utilize mixed method analysis to allow for a thorough understanding of the project's potential.

Quantitative research should reveal accurate data regarding statistics about the disorder, effective teaching methods, school-related economics, programmatic scale needs, etc.

Qualitative research will involve the subjects of school design, ASD, play space design, ADA needs, teaching methods, learning styles, etc. Interviews with professionals in the field will help gain insight into the needs, desires, and visions for facilities such as these.

Graphic and digital analyses will also be essential tools for visualizing the project as a reality. The focus of the research will be in student experiences, and the quantitative research will take place concurrently with the qualitative.

Research Direction

In order to develop a project completely and thoroughly, I first intend to do substantial research on, but not limited to, the following topics: Architecture as a tool for learning and facilitating learning, school design, the history and development of teaching methods for autistic students, analysis of the site, program requirements, and the specific needs of students and families struggling with autism.

previous studio experience

2nd Year

Fall 2009 Professor Darryl Booker

Tea House - Moorhead, MN

Boat House - Minneapolis, MN

Spring 2010 Professor Joan Vorderbruggen

Montessori School - Fargo, ND

James Stirling Bird House for Chickadee

Sustainable Dwelling - Marfa, TX

3rd Year

Fall 2010 Professor Milt Yergens

Center for Celebration - Churchill, MB

Snow Symposium - Winnipeg , MB

Interdepartmental Snow Sculpture Competition

Free Mason Lodge - New Ulm, MN

Spring 2011 Professor Mike Christenson

6th St. House

4th Year

Fall 2011 Professor Bakr Aly Ahmed

High Rise - San Fransico, CA

Trash to Treasure

KKE/DLR Group Design Competition

Spring 2012 Professors Don Faulkner, Frank Kratky

Scandinavian Consulate - Fargo, ND

Marvin Windows Design Competition

Plan for City Renewal - Kindred, ND

5th Year

Fall 2012 Professor Mark Barnhouse

Water Treatment Facility - Linton, ND

research

theoretical premise/unifying idea

introduction

In the eyes of a student, a teacher has the ability to make or break a school subject. Regardless of the type of lesson, most students would agree that a bad teacher can spoil the desire to learn. On the flip side, a really good teacher has the potential to spark within students an interest in a subject that previously seemed boring.

Architecture has this same ability. Poorly-designed spaces can prevent students from reaching their full potential, while well-designed spaces can stimulate the mind, spark interest, and shape positive learning experiences. By considering concepts such as universal design, design for children, and the specific client and their learning needs, a school designer can creatively help children with autism reach their maximum academic and personal potential.

universal design

As society has grown more accepting and responsive to the needs of the disabled, architecture has responded with excellent advances in universal design. Most associate the term “universal design” with handicap (wheelchair) accessibility, but in reality it pertains to so much more. Merriam-Webster defines “universal” as “including or covering all or a whole collectively or distributively without limit or exception; especially: available equitably to all members of a society” (Merriam-Webster, 2012). In this way, buildings should be accessible to all people of every level of development and ability.

The national movement for disability rights gained heavy momentum in the 1960s and 1970s in the United States. Proponents argued that it was the built environment that hindered full and equal participation in society, not their unique physical conditions. This movement drew much attention to the drastic areas where buildings lacked accessibility elements and pushed for change. Finally, in 1990, the Americans with Disabilities Act (ADA) established minimum standards to which buildings should abide (Hanson, Arnold, Catlin & Sandow, 2002). Although enforcement of these standards is often, unfortunately, lacking, architects are making great strides in the right direction.

If a building only abides by the suggested minimum standards, however, it can lose the entire purpose of universal design. When a person in a wheelchair has to go around to the back of a building to find an entrance with a ramp, do they get the same experience as their friends and family who follow the standard building circulation path? If universal design is incorporated into the original schematic design phase, architects can avoid these awkward instances that demonstrate clear afterthought.

Before beginning any project, architects must consider the seven principals of universal design and how they may be incorporated into the building. Buildings should be designed to allow for: equitable use, flexibility in use, simple and intuitive function, perceptible information, tolerance for errors, low physical effort on the part of all users, and appropriate size and space for approach, reach, manipulation and use (Hanson, Arnold, Catlin & Sandow, 2002). When a building can be navigated and understood easily and equally to all people, then all people will have the opportunity to get the same experience for which the building is intended. If a building is intended for learning, then it is essential for all students to experience its maximum potential.

designing for children

Designing for adults is relatively easy. Most public buildings that people use on a day-to-day basis are designed primarily for adults, involving elements of scale, program, spatial understanding, and basic needs. Getting into this mindset should be easy as most designers are fully-functional adults. Designing for children, however, is a bit trickier. This job pushes the designer to get back into their childhood shoes, recalling a place he or she has not been in too long. As challenging as this may be, it is certainly a fun exercise because as a child, opportunities are seemingly endless.

Recalling one's childhood is often a pleasant, nostalgic experience. One remembers a time where everything was much simpler and there was far less work to be done. One of the largest, most prominent elements of childhood is play. Two hundred years ago, early childhood educators recognized play as a necessity for child development, and this notion is still upheld today. Helen Woolley maintains that play and outdoor activities help children develop collaborative skills, confrontation and resolution of emotional crises, conflict management, moral understanding, negotiation, language and language comprehension, experimentation and problem solving skills, to name a few (Woolley, 2005).

For teaching, play is a fun and exciting way to practice new skills or consolidate previous learning. In addition, many types of play help children develop creative and aesthetic appreciation (Woolley, 2005). Play also has physical benefits. Indoor activities may help children develop fine motor skills, while outdoor play offers opportunities for gross motor development. Knowing all this, the challenge for designers is to devise a way to provide fun opportunities for the development of all these skills, but to do so in a safe, controlled and structured way.

As all buildings should be designed for their intended users, so should schools be designed as a child's "world". For children to really get the most from their environment, it should invoke energy, curiousity and interest (Leonard, 2007). This could be accomplished with arrangements of windows, stairs, nooks, crannies, colors, materials, textures, etc. Furthermore, school designers should always remember that children see the world at a different scale (Dudek, 2000). Therefore, for maximum play and learning potential, these spaces need to be suited for a child's physical needs and abilities just as the concept of universal design dictates.

students with autism

The Individuals with Disabilities Education Act (IDEA) declares that states which provide special education opportunities, or "Free Appropriate Public Education" in the least restrictive environment, will receive federal funding and benefits (Powers, 2000, p.216). This is a strong move on behalf of the United States government to provide all citizens with access to adequate education.

Research, however, confirms that individuals with autism learn quite differently than average students, and oftentimes overstimulation (as frequently takes place in a typical public school environment) can hinder these students' development (as well as distract other students from learning). Though many argue that children with autism should be totally immersed among their neuro-typical peers in a typical school setting to broaden their experience in the "real world", there is little research to confirm that this helps students obtain the basic skills they need. In fact, little sound research exists pertaining to how best to educate students with autism at all. However, as psychologists are learning more about autism as a disorder, architects are experimenting more with design techniques and testing theories for the unique education needs of these students.

Autism is a unique disorder in many ways, and research to fully understand the multitude of symptoms is ongoing. Experts do know, however, that autism is "a physical disorder of the brain that causes a lifelong development disability." In addition, children with autism often display symptoms in different ways and to different extremes. The six major symptoms experts recognize are: failure to develop normal socialization; disturbances in speech, language and communication; abnormal relationships to objects and events; abnormal responses to sensory stimulation; developmental delays and differences; begins during infancy or childhood (Powers, 2000). Due to these great needs, a low student-to-faculty ratio is generally required, experts recommend three-to-one, to give each student the attention they require.

There is a variety of skills that teachers and therapists may work with students to improve and develop, tables of which can be found on the following pages. In order for these lessons to be fully effective, faculty needs to work with parents to educate them on their child's needs and abilities so that parents may continue to practice with their children at home. To prevent digression, experts also recommend year-round programs. Because of this great list of symptoms, parents often become overwhelmed and struggle to understand their child. Though they may work with their child on a variety of skills, they may become discouraged at the apparent lack of progress. Schools should provide family support groups as well (Powers, 2000). Though there is not a known cure for autism, experts say early intervention and constant efforts will help improve symptoms substantially (Powers, 2000).

most recognizable symptoms	specific attributes
Failure to develop normal socialization	Do not interact with others well or at all Difficulty understanding and expressing emotion Few or unusual signs of attachment "seem to live in a world of their own"
Disturbances in speech, language, and communication	40% do not speak at all Echolalia common: parrotlike repeating Little to no understanding of symbolic gestures May appear to have little control over pitch or volume Little understanding of social conventions Often become "stuck" on a topic or single-minded
Abnormal relationships to objects and events	"need for sameness" "predictability and routine" Unusual play Little imaginative play With time and treatment, children may learn to use toys or objects for their intended use
Abnormal responses to sensory stimulation	Tendency to "overattend to some stimuli and underattend to others" Difficulty "filtering out" useless stimuli Overstimulation or focus on certain stimuli may cause distress or behavioral issues Fascination with lights, color patterns, logos, shapes, or configuration of letters and words May be preoccupied scratching or rubbing certain surfaces May furiously avoid certain textures or colors May respond to motion or pressure in unusual ways Appear to use taste and smell over hearing and vision to explore
Developmental delays and differences	75% score in the range of mental retardation Poor generalization
Begins during infancy or childhood	Inherent lifelong disability

Figure 8 *Autism Symptoms*
Hausladen, G. (2012). *Autism symptoms* [Designer] Content from Powers, M. (Ed.). (2000). Children with autism, a parent's guide. (2nd ed.). Bethesda, MD: Woodbine House.

theories: designing for autism

Designing buildings specifically with autistic students in mind is a relatively new concept. As researchers are still exploring the causes and symptoms of this disorder, it has proven difficult to conclusively judge the level of success these few projects have had. After examining the specific needs of these students, autism architects have developed several theories that have driven these designs. Full understanding of these approaches and reasoning is essential before starting a related project.

First, for design purposes, the autism characteristics of poor generalization and over-sensitivity to sensory stimulation are the key symptoms to fully understand. Powers defines “poor generalization” as the inability to use the same skills in different areas, places, situations or with different people. He uses the example that, though a child may learn to use the restroom at home, he may wet himself in a public restroom because he does not understand how to apply the skill elsewhere (Powers, 2000). According to Christopher Henry (2011d), this quality may be the result of the autistic brain’s inclination to discriminate between fine details. This provides an incredible design challenge for architects striving to provide spaces that promote not only knowledge acquisition, but also retention and the ability to apply it in other circumstances. One suggestion is to present the same teaching methods in different places or situations, indicating to children that the part that stays consistent is the important part to know (Powers, 2000). Could this multi-purpose approach to spaces help skill retention?

Next, the autistic symptom of responding abnormally to sensory stimulation poses another design challenge for architects, and arguably contradicts easy solutions to the issue of “poor generalization”. When a mother visits a grocery store, she may find it easy to look at her list then search for those items with minimal stress. Her autistic child, however, may exhibit behavioral issues or signs of anxiety because she is noticing every person in the store, every movement, the flicker of the lights, and the colors of every can on the shelf. Powers describes this phenomenon as “overstimulation”, and it is a daily hazard for someone with autism (Powers, 2000). These opposing qualities are probably a big part of the reason it took experts decades to understand this disorder.

When designing for children with autism, architects disagree on how to approach these conflicting symptoms. On the one hand, an architect may take the "Neuro-Typical Approach", and design spaces mimicking those similar to many public buildings in hopes that students learn to adapt and apply their skills outside of school (Henry, 2011d). Proponents of this theory reason that, because not all children suffer from the same level of sensory processing dysfunction, it may be more productive to address the greater concern of generalization (Henry, 2011d).

On the other hand, architects may take the "Sensory Sensitive Approach", and design spaces that are highly controlled, limiting stimuli that could cause anxiety in hopes that they will provide a stress-free environment in which to learn (Henry, 2011c). Proponents of this theory argue that a child needs to comfortably learn a skill before they can generalize it, and learning in a neuro-typical environment is much more difficult (Henry, 2011d). Both approaches have very well-reasoned arguments, but neither has yet been tested using sound research methodology (Henry, 2012a). At this point, a combination of both approaches seems most appropriate.

Once the designer fully understands the spatial needs of the children, he or she needs to consider how to create a physical environment to best support these. Sustainability has become a huge movement in architecture in recent years, and one major feature up for constant discussion is natural daylighting. In schools, natural daylight is widely believed to enhance student performance, improve overall health, and reduce sick days and attrition rates (FGM Architects, KJWW Engineering Consultants & Turner Construction Company, 2011).

Studies also demonstrate that the subject matter in exterior views play a role in physical well-being. Views of nature, for instance, may help lower levels of frustration and provide workers with higher life satisfaction and overall health (Henry, 2011a & 2012b). However, due to extreme sensitivity to sensory stimulation, many architects believe that contemporary wisdom regarding natural daylight and exterior views does not apply to students with autism. Sensory sensitivity multiplies issues such as glare,

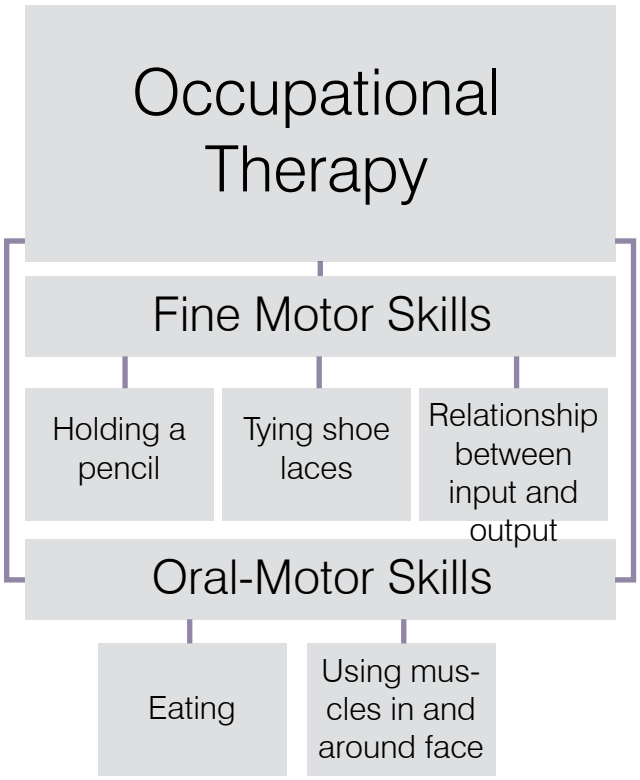


Figure 9 *Occupational and Physical Therapy*
Hausladen, G. (2012). *Skills to teach* [Designer] Content from Powers, M. (Ed.). (2000). Children with autism, a parent's guide. (2nd ed.). Bethesda, MD: Woodbine House.

general skill sets needed	specific skills to teach		
Social Skills	Engagement, the ability to remain focused and responsive to a person or object Asking peers for assistance	Responding to peers when they initiate social interactions	Initiating social interactions Waiting turns
Communication Skills	Using alternative communication systems i.e. sign language or pictures Using one-, two-, three-word sentences	Master concepts of recurrence, negation, and affirmation Basic attending skills i.e. eye contact	Using objects and/or action words Imitating others' actions, words, sounds
Self-Help Skills	Dressing and undressing Grooming and personal hygiene	Caring for one's belongings i.e. making the bed, washing clothes	Cooking and meal preparation Using the toilet
Motor Skills	Riding a tricycle Applying make-up	Placing coins in a vending machine Shaving	Cutting with scissors Catching and throwing a ball
Vocational Skills	Library assistant Printer	Food service worker Cable operator	File clerk

Figure 10 *Skills to Teach*
Hausladen, G. (2012). *Skills to teach* [Designer] Content from Powers, M. (Ed.). (2000). Children with autism, a parent's guide. (2nd ed.). Bethesda, MD: Woodbine House.

high contrasts between sun and shadows, or distractions from exterior views. Furthermore, shifting patterns of daylight often complicate the visual environment, which can be incredibly bothersome for the autistic tendency to desire "sameness" in all aspects of his or her world (Henry, 2011a). Even when handled with care, it is unknown if the same productivity and health benefits of natural daylight and exterior views apply to autism. Experts argue, because of this uncertainty, the benefits for staff may outweigh the possibility of detracting focus from students (Henry, 2011a). One approach could be to allow moments with excellent exterior views in places where some distraction is acceptable, like hallways or free spaces, and control natural daylighting in classrooms with higher or translucent windows to allow light penetration but limit distracting views.

In addition to fenestration, autistic children have particular spatial needs. First, the size and scale of spaces for autistic children should be considered carefully. Due to the fact that many with autism struggle with coordination and body awareness, architects should work to develop spaces that help users comprehend their place in the environment, embracing their spatial awareness. One approach taken in the design of the River Street School by Fletcher Thompson was to keep ceiling heights low, spatial volumes small and learning spaces intimately proportioned, especially when teacher-student interaction is primarily one-on-one (Henry, 2011 c). On the other hand, many argue that smaller spaces are hindering to people with poor body awareness. Close proximity to others who have the potential to invade one's personal space easily may induce stress for those with autism, or they may become guarded and feel threatened. This can be pictured as the need for a "bubble of space to perceive, evaluate, and react to potential hazards" (Henry, 2011c). Consequently, larger spaces allow room for escape, or to sit aside and act as an observer of an activity rather than a participant. Both sides make valid points here, and from these conclusions it is reasonable to believe both intimate and larger spaces could be effective, depending on the intended activity and number of participants (human or object).

Next, when deciding arrangements within spaces, designers must remember that students with autism react poorly to change. For teachers, allowing classroom spaces to be flexible is usually great, but for an autism school this flexibility should be limited or designed with care (Henry, 2011c). This desire for "sameness" should also be considered when determining transitions between spaces. One approach is to allow a progression of scale, from big circulation, to medium classroom, to small one-on-one so as to ease the student from one to the other (Henry, 2011c). The more comfortable the student is, the easier it will be to focus on teachers and activities.

approach: designing for autism

Due to the lack of conclusive research regarding this subject, designers need to take great care when they approach a project of this circumstance. When a parent learns their child has autism, they may enter into a state of helplessness, loneliness, and/or desperation to help at all costs (Powers, 2000). A concerned parent may look for any way to help their child. For a disorder without a known cure, the last thing a responsible designer wants to do is to mislead a parent in this state of mind. As previously described, there are schools exhibiting a range of untested theories, and architects need to work to advance the subject rather than contribute to the pool of unknowns. An architect should be prepared to provide evidence that their solution is adequate, perhaps by finding ways to measure factors of behavior, sensory regulation, or social integration, before producing the project (Henry, 2012a).

Next, architects should work to provide for the clients' abilities, rather than their disabilities. By focusing solely on a client's limitations, the project becomes a compilation of avoided worst-case-scenarios as opposed to an exciting opportunity for clients to thrive (Henry, 2011b). For any child to grow, the emphasis should be on constant encouragement and praise as opposed to non-stop rules and limitations. Though there are many elements to a building for autism that should be addressed to provide safety, sustainability, and mental health, they should not be the sole determinants of the program. As Christopher Henry states so well, the goal of the architect should be to make the client "more able not less disabled" (Henry, 2011b).

summary

In conclusion, by considering key elements of the client's needs, an architect can design to help enhance a learning experience. First, a designer needs to truly know and understand their client's abilities, qualities, strengths and needs to understand their full potential. Only by knowing the client can an architect create for them effectively. This research paints a thorough picture of wide range of circumstances surrounding this client, from their various symptoms to their families to their educational needs.

For a client as unique as a child with autism, understanding their abilities is not enough. As demonstrated in the array of theories, an autism designer needs to thoroughly analyze available information, and then make decisions based on untested theories. In this case, it will be important to negotiate between aspects of the Neuro-Typical design approach and the Sensory-Sensitive design approach. Though this is a big task, the results and rewards could far outweigh the initial efforts.

When getting to know the client, an architect must remember that a child with autism is first and foremost a child. Designers should not disregard all they know about creating environments for children and start from scratch in this case. That would be incredibly counter-productive. Regardless of ability differences, children still like to play. A designer should first approach the project as a place for children, and then consider the special circumstances involved. In doing so, they effectively design for the client's gifts and abilities rather than their restrictions and limitations as Christopher Henry emphasizes.

The extent of this research provides a range of opportunities for general design direction, as well as specific details to consider later in the process. Incorporating universal design strategies and autism design strategies into the world of a child could result in a very successful project. These ideals, pushed to their creative limits, certainly show how architecture can be utilized as a tool for maximizing learning potential and personal growth for children with autism.

case studies

new school design competition winner: koning eizenberg

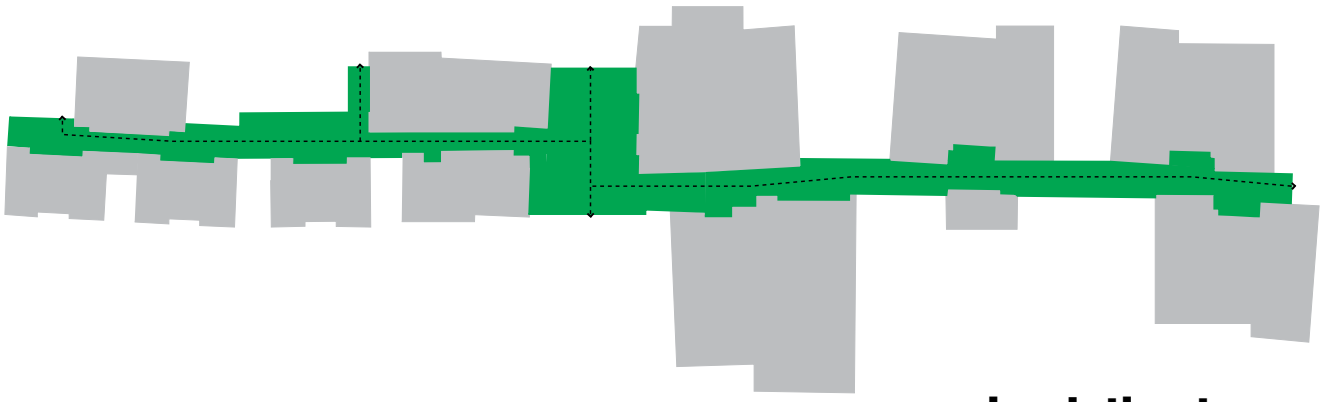
chicago, il

Figure 11 *New school exterior perspective*

Koning Eizenberg Architecture (Designer, Artist). (2002). *Preschool perspective* [Print Graphic].

This preschool-elementary school complex, by Koning Eizenberg, was the winning design for the Chicago Public Schools Design Competition in 2002. Program elements include an entrance courtyard, classrooms, dining commons, library, gymnasium, music room, playground, health center, therapy room, Rambla, and sensory stimulation center.

This project is different than the average Midwest elementary school with its "neighborhood" system of classroom arrangements. With this strategy, the designer breaks down the larger program into more intimate, comfortable mini-schools which students and teachers can make their own. It is similar to the BGSG Creative Learning Center in that it aims to maximize indoor-outdoor connections through a wide use of glass. This certainly helps create appealing places to learn while giving children a sense of place within their larger context, however may provide too much stimulation or distraction for a student with autism. The buildings also consider designed places for casual social encounters with breakout conference spaces and viewing areas placed intermittently about the main circulation hall.



circulation to use

Figure 12 *New school plan*
Koning Eizenberg Architecture (Designer, Artist). (2002). *Plan* [Print Graphic].

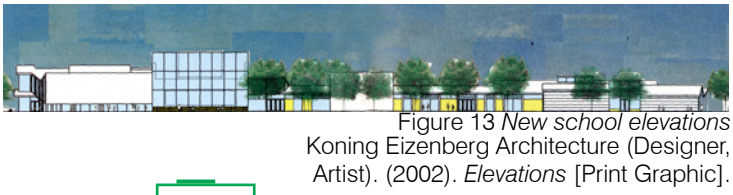
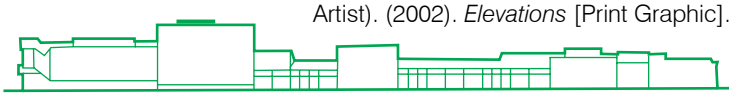
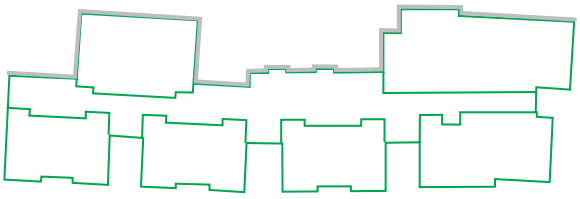
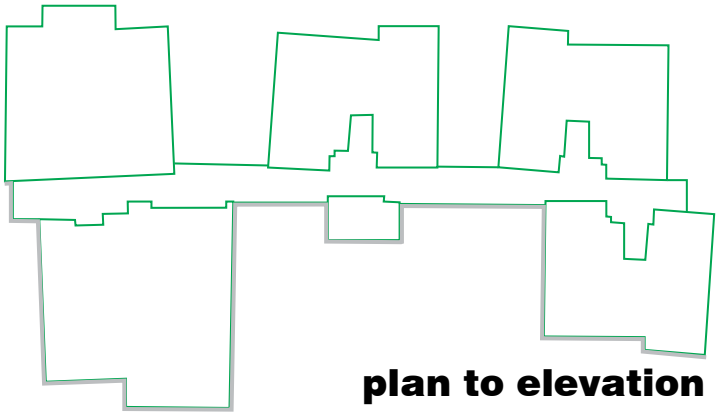


Figure 13 *New school elevations*
Koning Eizenberg Architecture (Designer, Artist). (2002). *Elevations* [Print Graphic].





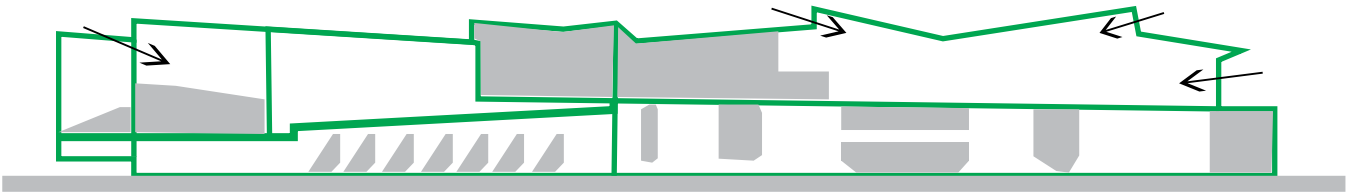


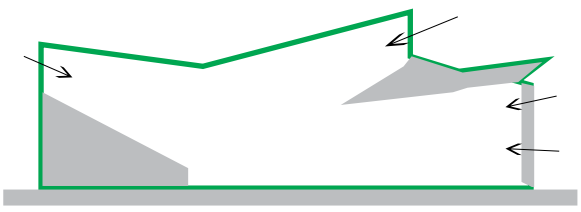
plan to elevation

The manner in which this project addresses the site is interesting. The project proposes the closure of the east-west street dividing the property to create a Rambla. Not only does this provide a safe connection between the schools, it creates an interesting pedestrian plaza, a convenient parking location, and a gathering place for special events or outdoor lunch. The design also incorporates the site nicely in its playground design. The trees not only provide shade, but also define zones of use. This is an excellent alternative to using walls or fences, while still making spaces feel more private or intimate when needed. This outdoor play area is directly adjacent to the indoor play area, which opens up to double the size of space during nice weather, while providing a warm and dry play alternative during the colder months. All spaces, entrances and exits are accessible to children of all abilities, encouraging maximum inclusion.

When considering some of the approaches taken by Koning Eizenberg for school design, some stand out as applicable when designing specifically for students with autism. First, breaking the school down into "neighborhoods", though certainly not to this scale, is an excellent strategy for children who struggle to process too much information, and is executed visually through different materials as well. This breakdown could help children practice easing between different scales of spaces while designating one as their "home base". Next, the approach to the outdoor play space is notable as well. Not only should a play space for this thesis project be accessible, but it should offer a variety of options for the children to choose from, depending on their needs. Some spaces should provide climbing equipment, some with space to run, some with places for quiet time. These spaces should be broken down carefully, with smooth transitions, and encourage socialization.

Figure 14 New school section
Koning Eizenberg Architecture (Designer, Artist). (2002). Section 1 [Print Graphic]





natural lighting

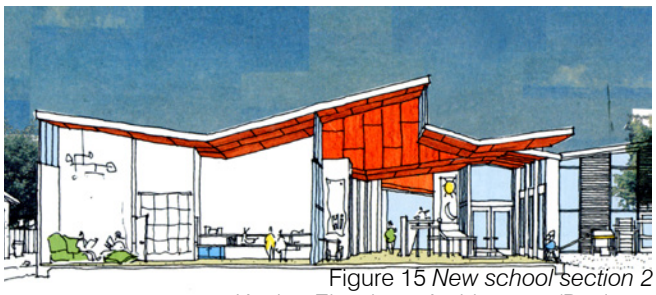
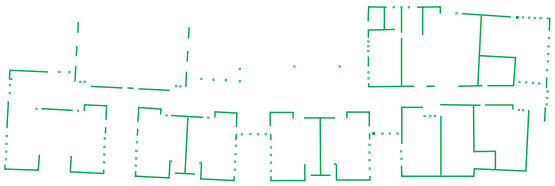
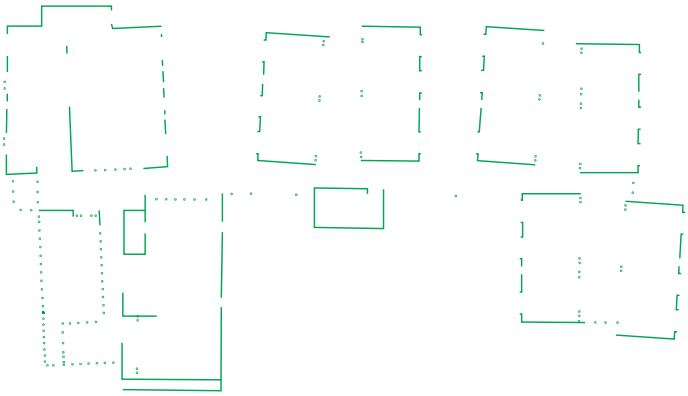


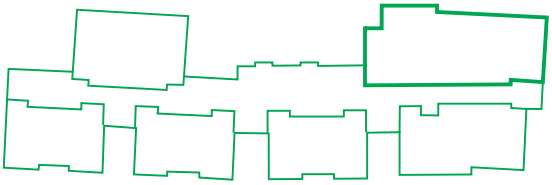
Figure 15 *New school section 2*
Koning Eizenberg Architecture (Designer, Artist). (2002). *Section 2* [Print Graphic].

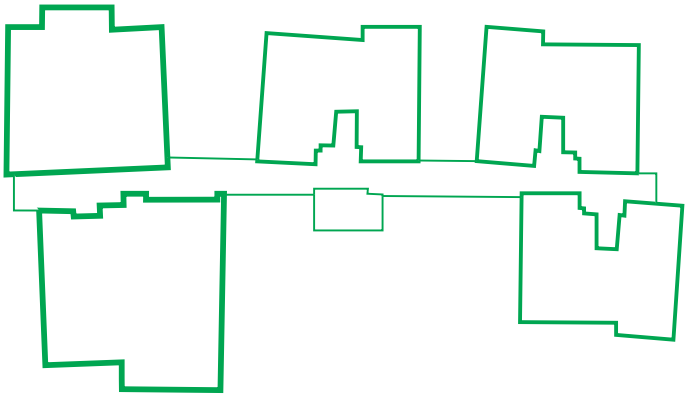




structure

geometry





heirarchy

massing

creative learning center
brisbane grammar school for girls
m3architecture◦ brisbane, australia

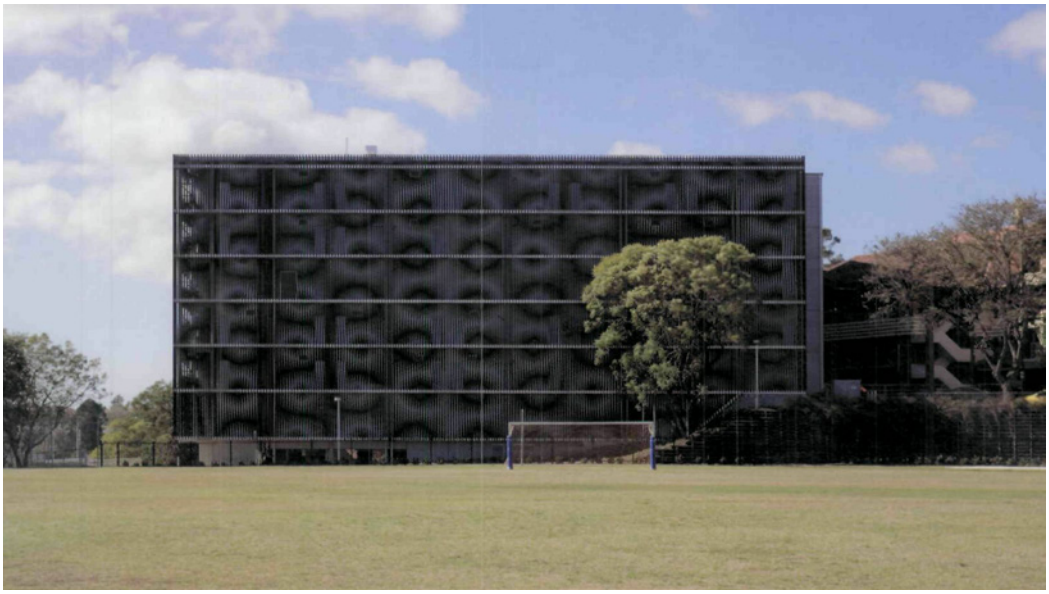


Figure 16 *BGSG west elevation*
Linkins, J. (Photographer). (2007). *West elevation* [Print Photograph].

Figure 17 *BGSG perspective*
Linkins, J. (Photographer). (2007). *Looking into the central circulation space* [Print Photograph].

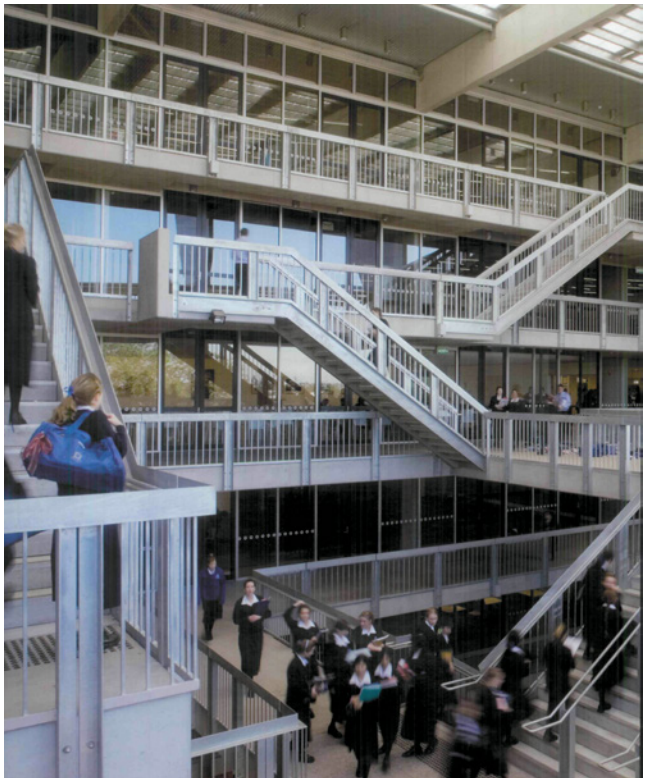
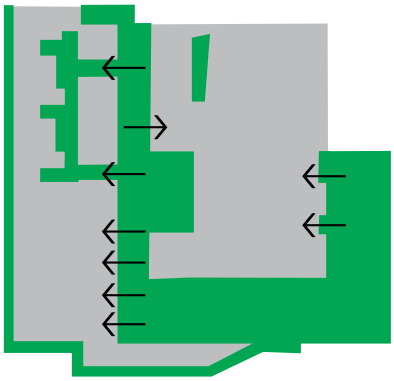
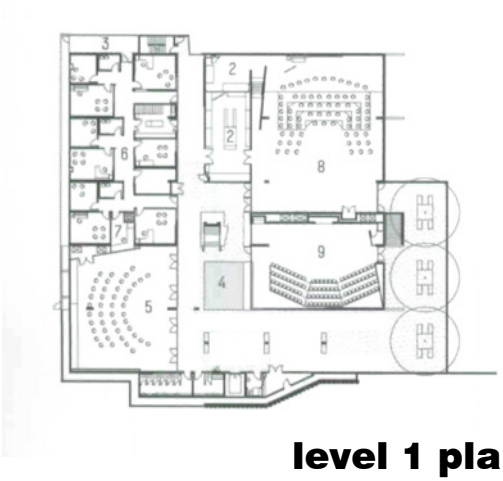
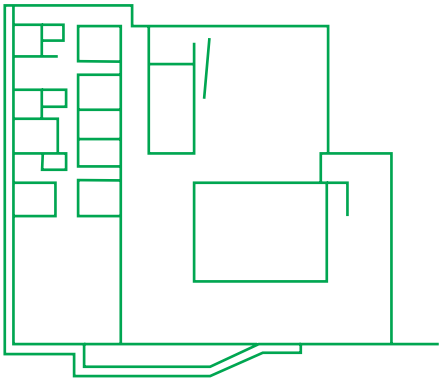


Figure 18 *BGSG central public space*
Linkins, J. (Photographer). (2007). *Central public space* [Print Photograph].



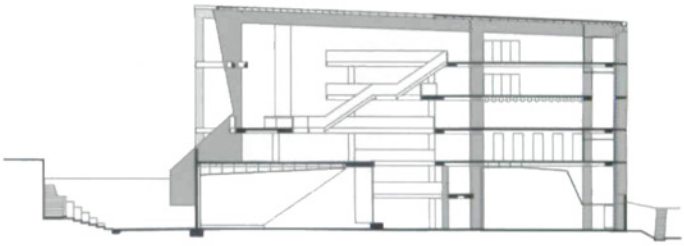
circulation to use

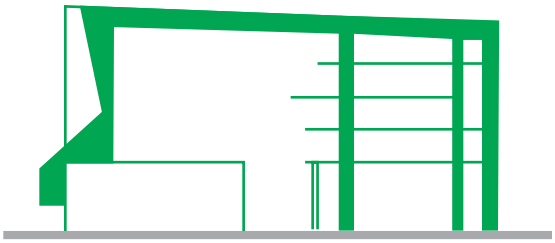




level 1 plan

Figure 19 *BGSG plan*
m3architecture (Designer). (2007). *Level 1: Co-Curricular music* [Print Graphic].





section b

plan to section

Figure 20 *BGSG section b*
m3architecture (Designer). (2007). *Section b* [Print Graphic].

The Creative Learning Center, of the Brisbane School for Girls in Australia, is a facility designed specifically for the students, aiming to holistically promote their growth and success. Project elements include creative arts facilities, staff parking, dining hall, café, terraces, gallery, staffroom, and additional performance and rehearsal spaces.

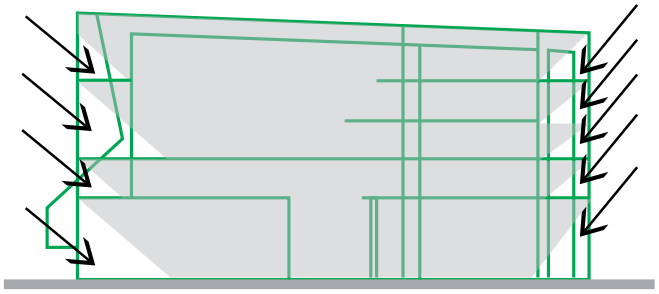
As one of twelve facilities on the education complex, the design of the Creative Learning Center faced many site-related challenges. The plan emphasizes internal connections within the campus on different floor levels to ease the interaction between buildings. The south entry cuts diagonally into the building on the fourth floor to fit nicely into the neighboring building, while also framing view across the campus. The entry cut is lined with concrete blades fanning out over a huge terrace as if reaching out to its surroundings, and with the dining hall just inside, this creates a connected and prestigious feeling for the girls in the public spaces. The terraces and balconies act as great visual transition spaces between the school and the site as well, allowing students to further understand their sense of place. When used for performing spaces for the choir, orchestra, or band, these spaces encourage the surroundings to take notice of the building and understand its function.

The Center's western elevation engages the active highway and train traffic with an undulating façade almost like an optical illusion. This makes the building appear permeable while also providing sun and noise protection. The school as a whole, according to school officials, "can contribute positively to wider issues and public debate as well as philanthropy"; therefore, the building form should mimic this civic identity, which it does with its bold and unique design (Kaji-O'Grady, 2007).

The Creative Learning Center also clearly understands and supports its users. Though no school building can dictate the level of a student's education or social interactions, the design can provide opportunities for students to make these experiences successful. In this case, provides spaces for students to mingle and interact that are both quaint and permeable, so as to confront typical teen issues of social exclusion and tribalism. Many social spaces are also integrated with learning spaces. From anywhere in the center of the building, a student can view into many rehearsal, performance, and classroom spaces. Students here are able to go about their daily routines and maintain an understanding of their school's place and function.

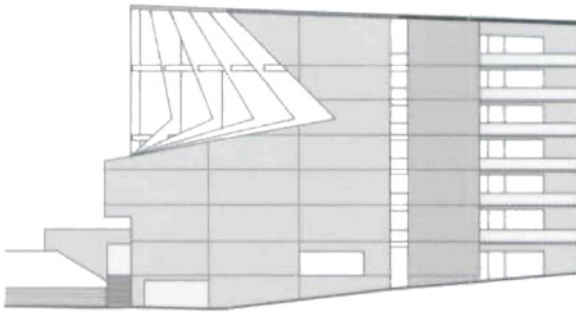
These design approaches stand as excellent examples that can be manipulated to apply to any project. The school's approach to site integration is notable, as the natural environment will be utilized as a learning tool for children with autism and incorporated somehow into the design. Socialization, furthermore, is a huge component in the education of children with autism. Just as the Creative Learning Center provides intended spaces for socialization, with carefully considered scales and connections to other spaces, so should a school for autistic children. Autistic children, like many teenage girls, struggle with communication and social anxiety. The design must consider these needs to help them grow yet make them feel comfortable.

This project's great consideration of site, sense of place, and programmatic function makes it a desirable place to learn for children of any age, size, gender or ability.

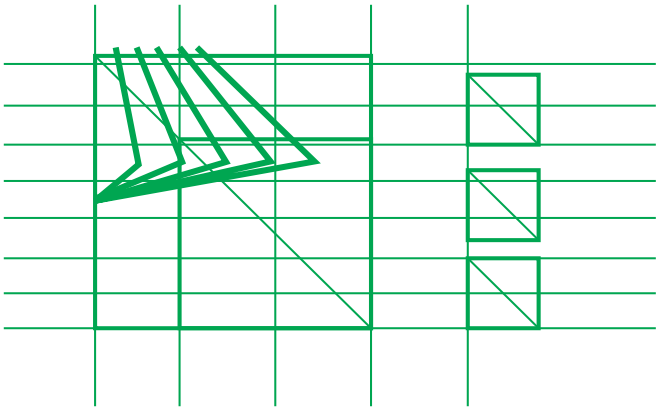


natural lighting

structure

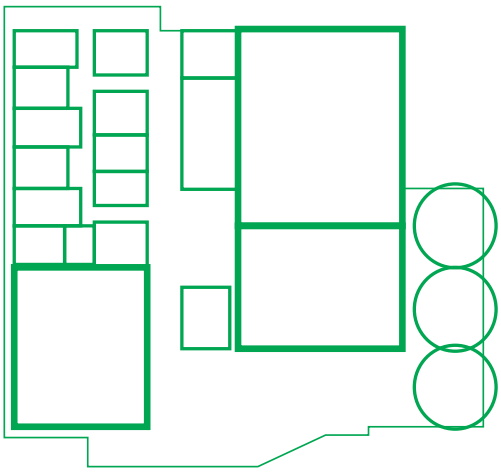


north elevation

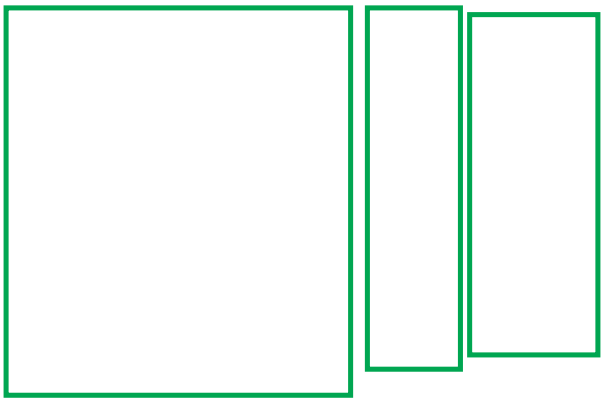


geometry

Figure 21 *BGSG elevation*
m3architecture (Designer). (2007). *North elevation* [Print Graphic].



heirarchy



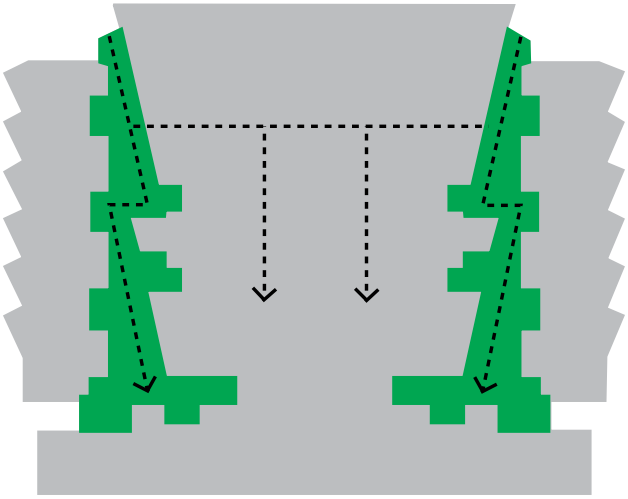
massing

sunfield's rowan and oak house
ga architects, 2004
stourbridge, west midlands, uk

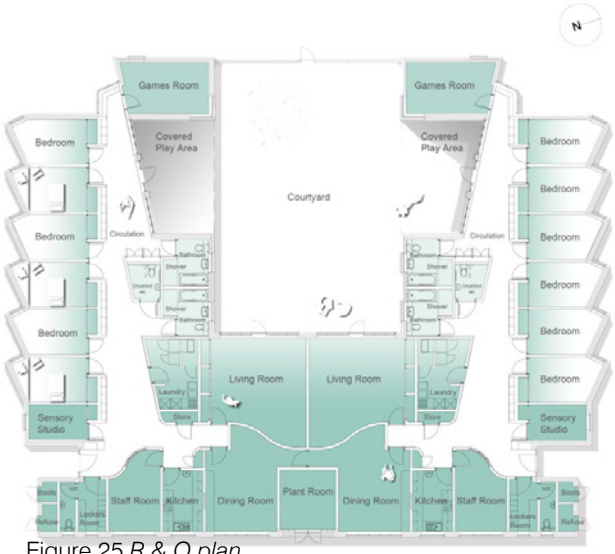
Figure 23 *R & O interior 2*
Benson, R. (Photographer). (2011). *Sunfield's Rowan and Oak house*. [Web Photograph]. Retrieved from http://www.archdaily.com/179359/designing-for-autism-spatial-considerations/

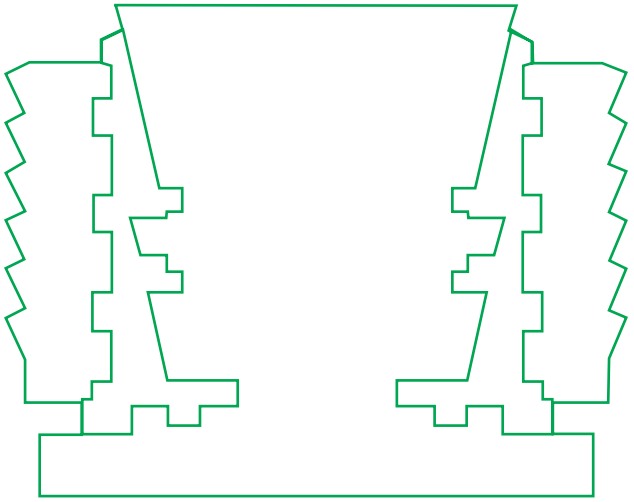
Figure 22 *R & O interior 1*
Benson, R. (Photographer). (2011). *Sunfield's Rowan and Oak house.* [Web Photograph]. Retrieved from http://www.archdaily.com/179359/designing-for-autism-spatial-considerations/

Figure 24 *R & O exterior*
Benson, R. (Photographer). (2011). *Sunfield's Rowan and Oak house.* [Web Photograph]. Retrieved from http://www.ga-architects.com/?portfolio=sunfield-residential-unit#!prettyPhoto



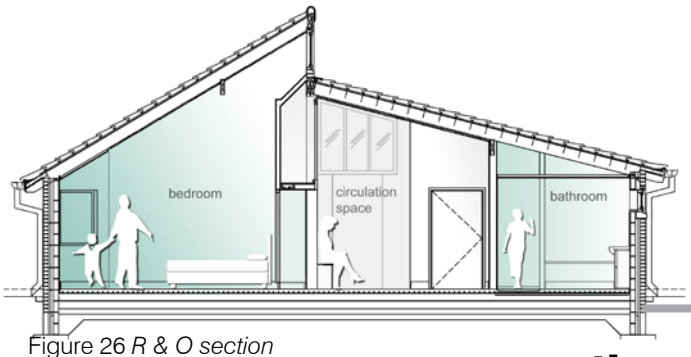
circulation to use

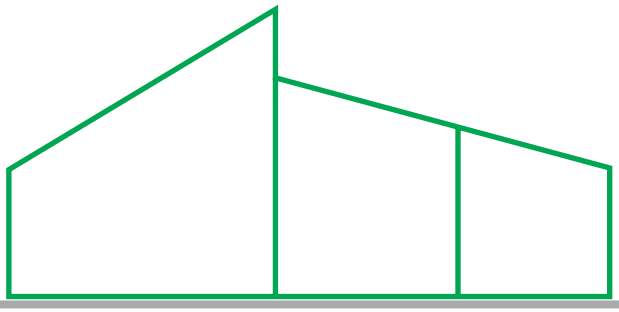




plan

Figure 25 *R & O plan*
GA Architects. (Designer). (2011). *Plan of sunfield's rowan and oak.* [Web Graphic]. Retrieved from http://www.archdaily.com/179359/designing-for-autism-spatial-considerations/





section

plan to section

Figure 26 *R & O section*
GA Architects. (Designer). (2011). *Section of sunfield's rowan and oak*. [Web Graphic]. Retrieved from http://www.archdaily.com/179359/designing-for-autism-spatial-considerations/

This home, in Stourbridge, UK, was designed by GA Architects for 12 children with severe Autism. The facility contains individual bedrooms, bathrooms, living, dining and kitchen facilities, commercial laundry and sensory room.

This case is unique because it is one of the few facilities in the world designed specifically for users with Autism. The programming, design and material choices cater to the particular needs of children with Autism, taking a "sensory-sensitive" approach. In the sensory-sensitive approach, the designer aims to limit the sensory load on the user. The goal of this approach is to keep autistic users from becoming overwhelmed with stimuli from their environment. The Rowan and Oak House exhibits this technique with its soothing colors, soft materials, and minimal use of decoration and signage. It also utilizes natural lighting in a careful way, so that users can feel the benefits without the distraction or overstimulation of exterior views.

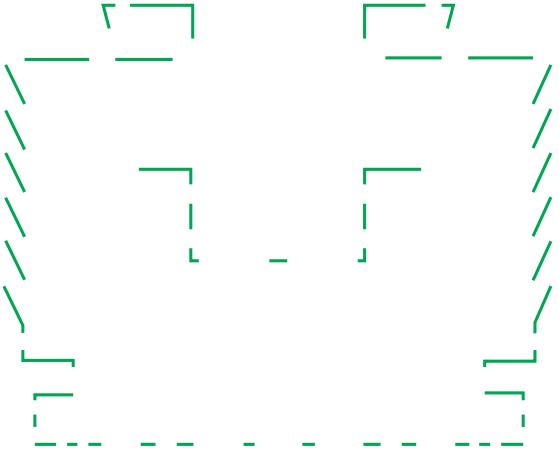
This directly contradicts the "neuro-typical" approach, which aims to mimic a typical building with regards to sensory stimuli so that autistic children can get used to a more realistic setting.

The Rowan and Oak House also demonstrates specialized spatial considerations for its autistic users. The circulation spaces also act as group play spaces, promoting social interaction among children who struggle with peer-to-peer communication. These spaces lay right outside the bedrooms, however, allowing children the comfort of retreat if they become overwhelmed.

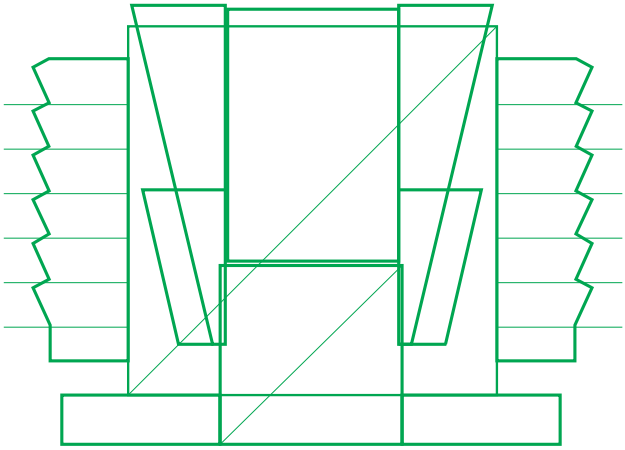
Children with Autism typically struggle with change, so designers need to be sensitive to the transition between spaces. The Rowan and Oak House uses a progression of the scale of spaces to ease users from one space to another. This is also apparent in details, such as some slight curves in the plan and the room entries that are set back from the circulation spaces.

This case study is notable for Autism design because it provides concrete examples of the issues architects must consider and the decisions they must make regarding untested theories. The details were obviously considered carefully and with clear intention. The case seems successful in providing a home-like feeling in addition to encouraging physical, social, and intellectual growth for these unique children. The larger program is broken down into comfortable, more personal spaces that are also aesthetically pleasing.

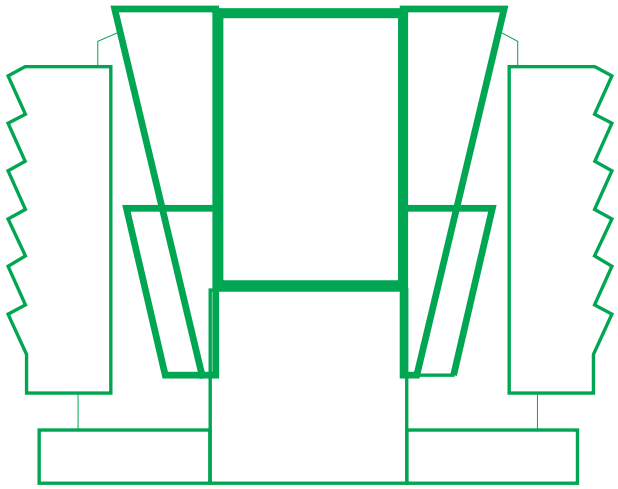
In all, the case provides excellent conceptual examples that will be considered in the design of this thesis. Ideally, researchers will begin conducting post-occupancy studies to determine the level of success for this design approach.



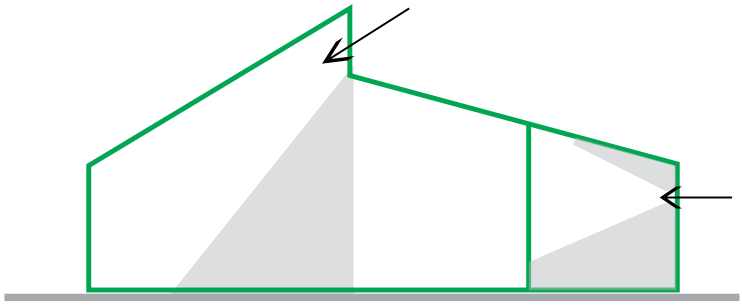
structure



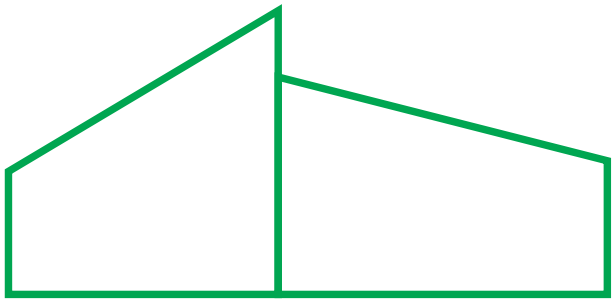
geometry



heirarchy



natural lighting



massing

conclusion

Overall, this selection of case studies reinforces the claim that architecture can be a tool for facilitating learning and personal growth. The Koning Eizenberg school is designed for preschool and elementary school children, the BGSG Creative Learning Center for adolescent girls, and the Rowan and Oak House for children with autism. I intentionally chose only one facility designed specifically for autism to compare how the approach to designing typical schools compares. It was useful to examine one specific autism design, but many strategies taken in mainstream schools could certainly be applicable as well.

Each design considers, at different levels, social interaction spaces and how they can influence student experiences. This is a huge component of personal growth for children with autism. All three also consider material choices and arrangements in different ways. The Rowan and Oak House and the Chicago School focus more on the interior and ways in which the materials can either relax or energize the spaces. On the other hand, the Creative Learning Center shows the most interesting material arrangement on the exterior, using it as a strategy to both mimic and buffer exterior noise. Sensory stimulation is another problem-area concerning children with autism, so material selection and design will be another focus area for the project that needs to be considered carefully.

The three case studies take different approaches to site design and integration. The Creative Learning Center is a great example of how to create places that improve spatial awareness within the greater context, with forms that symbolically reach out to their surroundings. This building also considers its place within society with a design that is both bold and welcoming. The Koning Eizenberg school thinks more about site design and how the outdoor spaces function with the school and its program. This is incredibly important, as children can learn so much from the natural environment. The Rowan and Oak House, however, demonstrates little consideration of site development with the exception of the courtyard. In this case, with the courtyard enclosed on three sides, it can be assumed that the intention was to provide a highly-controlled outdoor space that protects students from the greater site. Though the true intention is unknown, this may not be the best approach when deciding how design can help children grow to their full potential.

Finally, each case considers spatial and functional relationships differently to achieve the desired learning experience. The Koning Eizenberg School design is organized as both linear and clustered, the BGSG Creative Learning Center is highly centralized, and the Rowan and Oak House focuses on transition and scale. The Koning Eizenberg School works as a series of separate units, putting essential spaces together in one “neighborhood” and consequently making the whole school community-like. The Creative Learning Center celebrates the students’ hard work by putting the students on display. The performance spaces are emphasized and open, located just off the main circulation. In the Rowan and Oak House, the architects group the spaces by

function, perhaps to allow for less transitions and a greater emphasis on the current activity. Summing up, each method is appropriate in many ways to its respective application.

Though all different in program and context, each case study is designed with the intent of supporting the educational and personal development in children. The variety in the studies demonstrates the range of possibilities that one intent can achieve, and more exploration in these areas would be incredibly beneficial. Each well-designed facility provides great ideas that could be applied to a school for children with autism.

inspirational ideas

Figure 109 *Chopstick Perspective* Visiondivision. (Designer). (2012). *Night Perspective*. [Web Graphic]. Retrieved from http://www.archdaily.com/301547/chop-stick-visiondivision-2/

chop stick visiondivision, 2012

indianapolis, in

Figure 110 *Chopstick Swings*

Visiondivision. (Designer). (2012). *Chopstick Swings*. [Web Graphic]. Retrieved from http://www.archdaily.com/301547/chop-stick-visiondivision-2/

This concession stand and playset is a beautiful display of nature fully utilized in a built project. A 100-year-old yellow poplar tree provided a horizontal beam for the play structure, bark to clad the concession stand, extra wood for structural support, chairs, tables, swings, and syrup for the concession stand. The architects stated that they aimed to "harvest something as gently as possible so that the source of what we harvest is displayed in a pure, pedagogic and respectful way" (Visiondivision, 2012).

This project redefines the way in which children play in trees. The same concept and motif is alive, but altered slightly. When reassembled in this manner, the tree provides a welcoming, safe, and educational experience for children, which is not usually present when children play in standing, living trees. Not to say at all that we should discourage children from playing in natural settings. On the contrary, this project is a great example of how we can start designing more natural play spaces but yet in a safe, structured way. In this thesis project, I aim to do just that. I aim to bring children to nature, and bring nature to the children.

Figure 111 *Tree House Perspective 1* mmp Architects. (Designer). (2012). *Tree House Perspective 1*. [Web Graphic]. Retrieved from http://www.archdaily.com/240006/hp-tree-house-mmp-architects/

hp tree house
mmp architects, 2012
cairns, austrailia

Figure 112 *Tree House Perspective 2*
mmp Architects. (Designer). (2012). *Tree House Perspective 2*. [Web Graphic]. Retrieved from http://www.archdaily.com/240006/hp-tree-house-mmp-architects/

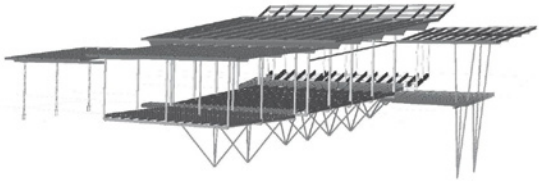


Figure 113 *Tree House Frame View*
mmp Architects. (Designer). (2012). *Tree House Frame View* [Web Graphic]. Retrieved from http://www.archdaily.com/240006/hp-tree-house-mmp-architects/

This literal Tree House, suspended above the rainforest of Mt. Whitfield in Cairns, Austrailia, is a beautiful demonstration of a structure that reflects, mimics, and integrates into its surroundings. The structure is elegant and honest, lifting the home into the treetops for excellent views, natural light, and airflow.

This building embodies the aim of this thesis. That is, to lift its inhabitants above ground distractions, surrounding them in a beautiful natural setting which one can imagine is incredibly serene. The structural and passive energy systems are also great examples that could be utilized in this thesis.

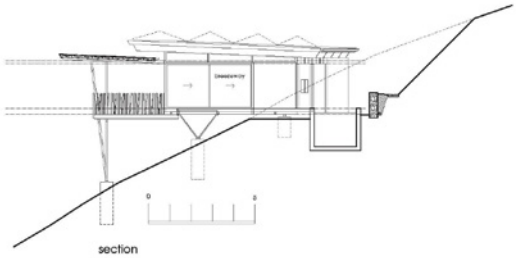


Figure 114 *Tree House Section*
mmp Architects. (Designer). (2012). *Tree House Section* [Web Graphic]. Retrieved from http://www.archdaily.com/240006/hp-tree-house-mmp-architects/

river street school
james vance & associates, 1989
windsor, ct

Figure 115 *River Street School*
James Vance & Associates Architects. (Designer). (1989). *River Street School* [Web Graphic]. Retrieved from http://www.archdaily.com/177293/designing-for-autism-lighting/

The River Street School was designed specifically for children with autism ages six through eighteen. Here, the architects dealt with the issues of lighting and exterior views in an obviously intentional way. The building utilizes over five feet of roofing overhangs to minimize strong shadows and/or bright glare (limiting contrast), and brings windowsills up high to direct views upward into the trees, away from distractions at ground level. Consequently, the building still provides a high amount of natural light for its occupants. This approach seems incredibly logical for classroom spaces, but may not be necessary in others.

netley school
haverstock associates, 2004
london, england

Figure 116 *NetleySchool*
Haverstock Associates. (Designer). (2004). *Netley School* [Web Graphic]. Retrieved from http://www.archdaily.com/177293/designing-for-autism-lighting/

This school for autistic children takes another interesting approach to natural lighting. Here, North facing skylights direct light towards the tops of walls. This both limits views, but also diffuses light again by bouncing it off the walls and therefore eliminates issues of glare and deep contrasts.

historical context

fargo, north dakota

Figure 27 *Historic Broadway*
Lileks, J. (Scanned). (2007). *Fargo: Then and now.* [Postcard]. Retrieved from http://www.lileks.com/fargo/index.html

The city of Fargo was founded in 1871, settled where the Northern Pacific Railroad met the Red River. The city was named after William G. Fargo, director of the Northern Pacific Railroad and co-founder of the Wells Fargo Express Company. Railroads were a great factor in the development of Fargo, as well as the draw of cheap, fertile farmland. The population in 1876 was roughly 600, but by 1892 it had grown to over 8000 people. Initially, Fargo was a "rough and rowdy" frontier town, with a decent amount of bordellos and saloons, and people living in tents and shanties. However, after a devastating fire in 1893 that destroyed over 31 blocks of development, citizens in Fargo resolved to rebuild the city bigger and better than before. In less than one year, they built 246 new buildings. Many were designed by regional architects with far more care than before, and many still stand today. The City of Fargo Historic Preservation Commission works to keep these old buildings alive and inhabitable, maintaining the overall historic character of these parts of the city ("Fargo History – city," 2012).

As of 2010, Fargo has grown to 105,549 people. The median resident age is 30.2. Fargo residents reported their races with 89% white, 3% Asian, 2.7 % black, 2.2% Hispanic, and the rest two or more races. Today, Fargo is one of the more prosperous and fast-growing cities in North Dakota, with a 2.9% unemployment rate and a median household income of $38,212. (City-Data.com, 2012).

Figure 28 *Old Fargo*
Lileks, J. (Scanned). (2007). *Fargo: Then and now.* [Postcard]. Retrieved from http://www.lileks.com/fargo/index.html

Figure 29 *Fargo Then*
Lileks, J. (Scanned). (2007). *Fargo: Then and now.* [Postcard]. Retrieved from http://www.lileks.com/fargo/index.html

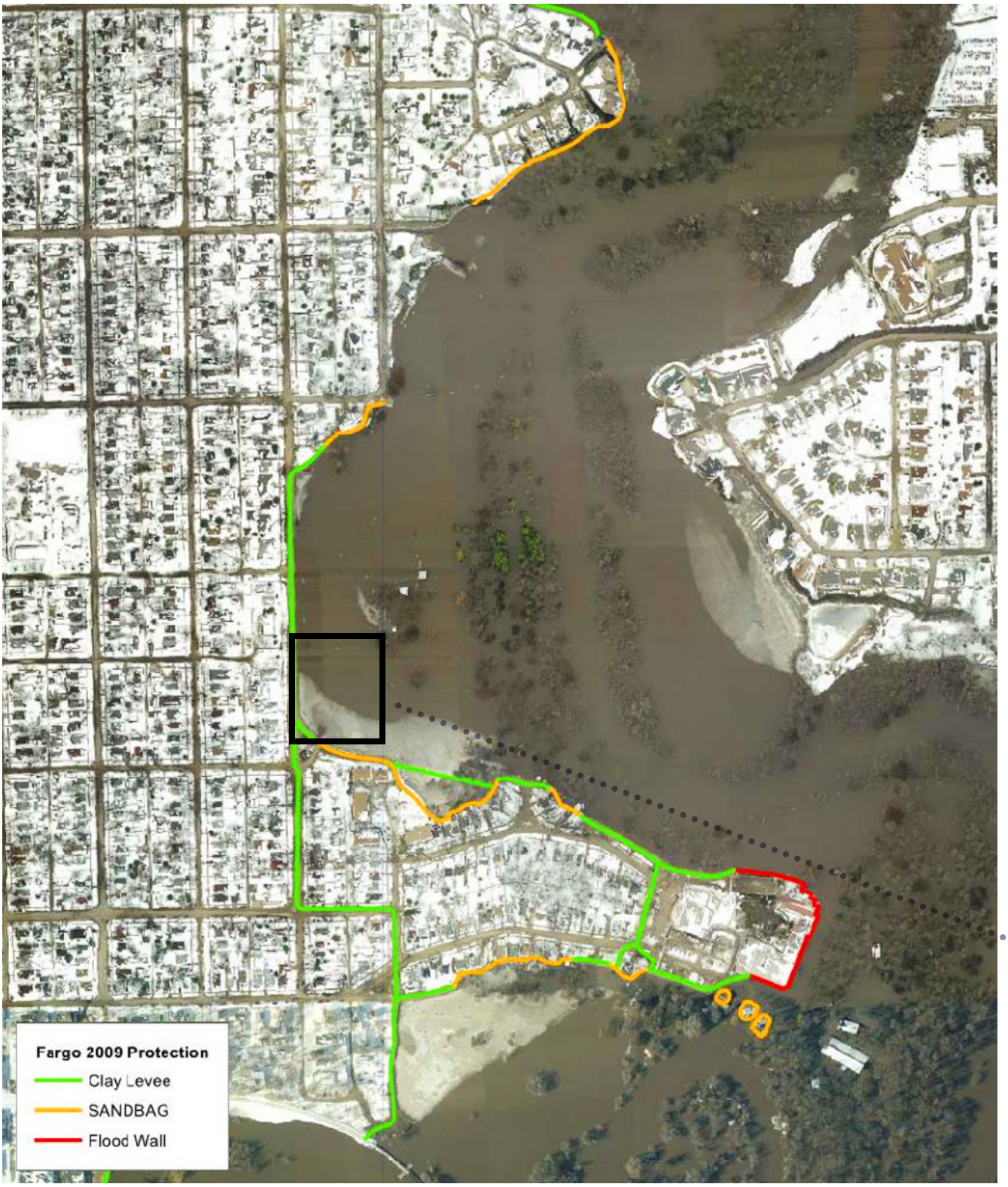


Figure 30 *2009 Flood Damage*
Bents, J. City of Fargo, Department of Engineering. (2012). [Web Graphic] *Mickelson field area flood risk management project 5902: Public information meeting.* Retrieved from http://files.cityoffargo.com/content/7ddfc13db562c10afb372b23ff0a1b3b0efd5f87/2012-07-12_Mickelson_-_Public_Meeting.pdf

flooding

Flooding has historically been an issue in the Red River Valley. As the site for this project is on the river, the flooding potential must be considered. In the last 200 years, flooding with significant damage happened in 1897, 1997, and 2009 cresting at 39.1 feet, 39.7 feet, and 40.8 feet, respectively (Schwert, 2009).

The NDSU Department of Geosciences attribute four main factors to the frequency and severity of flooding in the Red River Valley. First is the tendency for springtime thaw to coincide with the northbound flow of the river. Melting and runoff in the south flows north, meeting up and accumulating with that in the north. Similarly, broken ice that comes with springtime thaw flows north and accumulates, consequently building up and hindering water flow. Next, looking at history and geography, the Red River Valley is the floor of the ancient Glacial Lake Agassiz, and is currently one of the flattest regions in the world. Therefore, when the river floods, it covers an unusually great expanse of land, much like a cup of water overflowing onto a table. Finally, the slope of the river adds one more log to the fire. In Fargo, the slope is about 5 inches per mile, but to the north it drops as low as 1.5 inches per mile, therefore moving slower and accumulating further (Schwert, 2009).

In the past, nearby Mickelson Park has completely flooded by a river level of 25 feet. On the other hand, a sizable corner of the site, right against the intersection, is safe until a river level of 37 feet. Most of the grounds, however, would flood at the same time as Mickelson, preventing any outdoor activities for months. This must somehow be addressed.

A recent USACE evaluation claims there is a 1% chance a flood in Fargo could reach 42.4 feet, in which case neighborhoods 5 blocks inland of the site in Fargo would be underwater. Due to this pressing issue, the City of Fargo is recommending the following actions for the neighborhood: construction of an earthen levee providing protection up to 44 feet, construction of a new lift station in the place of the current Mickelson Park recycling center, storm sewer outlet structure, storm sewer improvements, dry stormwater pond, and general landscaping/grading (Bents, 2012).

Figure 31 *2009 Mickelson Park*
Bents, J. City of Fargo, Department of Engineering. (2012). [Web Photograph] *Mickelson field area flood risk management project 5902: Public information meeting.* Retrieved from http://files.cityoffargo.com/content/7ddfc13db562c10afb372b23ff0a1b3b0efd5f87/2012-07-12_Mickelson_-_Public_Meeting.pdf

site

schools

"The school of tomorrow will be a garden city of children; that is to say a place of many shelters – a township, if you will, of small schools built as one community but with every shelter organized as a separate unit designed to meet the needs of children of specific age or stage of life"

– Margaret McMillan, a much respected British pioneer of nursery education in 1928 (Dudek, 2000)

Johann Heinrich Pestalozzi

Architecture for small children was not considered a 'building type' until the mid- to late-twentieth century. In fact, the common view was that children did not need or deserve quality architecture, and any ideas suggesting the opposite were considered radical until the early- to mid-twentieth century. The first child-centered institution was founded by Johann Heinrich Pestalozzi in 1805 at Yverdon. His educational philosophy was centered around the fundamentals of speaking, counting and measuring, among others, and became the basis for essential Kindergarten principles that many would take and adapt (Dudek, 2000).

Robert Owen

Inspired by Pestalozzi, Robert Owen established another unique child care institution in New Lenark, Scotland in 1815. Robert Owen was a Scottish mill owner in the early nineteenth century, who became known as a pioneer of childhood education in Britain. He was committed to the ideal that promoting children's education would raise the quality of living in a community. To Owen, education should begin at an early age, with children as active participants. Education was, to him, an instrument of social change, as he was a huge proponent of socialism. His school itself was highly functional in design, representative of the factory settlement in which it was situated. Owen is notable here as he was one of the first educators to use the environment as a primary resource (Dudek, 2000). Though his manner of execution may not be applicable today, several of Owen's approaches are notable. Based on personal experience alone, involving children actively in learning is far more effective than having them as observers. Research shows that young children learn through play and exploration, and Owen's integration of the environment into his "curriculum" is innovatory.

Friedrich Froebel

Friedrich Froebel was one of the most influential education thinkers of the nineteenth century. Many of these first child care facilities and those that sprung after them followed the teachings of Froebel. Froebel's philosophy was called Naturphilosophie, which stressed children's need to learn from nature, and viewing scientific progress in a more spiritual context. Froebel embraced the idea of the Naturphilosophie, and was noted for approaching education as a complement to home life rather than replacing it. The Froebel play system, embracing "the gifts and occupations" of children, influenced important people from the Nazis in Germany to architects such as Frank Lloyd Wright. He was one of the first to encourage children to see and create their own interpretations of the world artistically. Experts believe many influential artists attended Kindergartens with these activities. Froebel's approach was much more intellectually stimulating than Owen's, whose style is described as more play-oriented (Dudek,

2000). Children should certainly be encouraged as independent thinkers early in their education. The more they are exposed to, though in a tactful manner, the more materials, objects, and ideas they will have in their knowledge base to solve problems they encounter.

Rachel and Margaret McMillan

All of these institutions, until the early twentieth century, were just that, the institution without a building on any architectural form or intent. In 1913, Rachel and Margaret McMillan took the development of this typology further by establishing an open-air nursery school, the first large-scale building for underprivileged children in Britain. The McMillan sisters approached education with the fundamental belief that children have a basic need for fresh air and physical games. These ideals of educational development and socialization within a nature-based context became the framework of Kindergarten today (Dudek, 2000). The consideration of socialization is what makes the McMillan sisters relevant here. Perhaps they were some of the earlier educators to consider how the physical environment, designed or naturally occurring, could encourage socialization between children. The average elementary school in the United States today allots time for recess, or outdoor play of some kind. Though children possess a much greater ability to entertain themselves than do many adults, I can ensure, from personal experience, that children are much more drawn to an activity space with objects to climb or run around, designed or naturally-occurring, than to an open field without so much as a tree. Designers realize this too, as they have worked for years to devise ways to structure these active play spaces to be controlled and safe. For children, physical activities make socialization much less strenuous. Could this apply to autistic children in some regard?

Maria Montessori

While Froebel idolized the rural environment, and focused his educational philosophy on children's natural abilities, Maria Montessori concentrated on the immediate environment and ways children learned through sensory exploration of this environment. A Montessori education emphasizes independence, exploration, and individuality. Coming a long way from her school, the Case dei Bambini, thousands of Montessori schools still function around the world today (Dudek, 2000). Autistic children are recognized for their tendency to display unusual play, or using toys in ways other than their intended purpose. A Barbie doll, for instance, has a clear purpose to be used for imaginative role play. It would be an interesting experiment to observe an autistic child work with typical Montessori toys, as their "purpose" is not exactly clear.

Twentieth Century Tendencies

Industrialization of large cities and enlightened thinking had a backwards effect on early education in the first half of the twentieth century. This idea of the 'machine aesthetic' dictated the styles of far too many school buildings, built on the need for efficiency and prefabrication. This displayed the school as a more mechanized learning place. World War II, however, drove this functionalism movement further, with the necessity for more nursery schools in a short amount of time as women took the places of their husbands in the workforce. It took more than thirty years after WWII for architectural theory to make significant efforts to relate back to basic early-childhood educational needs (Dudek, 2000). A respectable exception is Le Corbusier's rooftop play space in his Unite d'Habitation, which manipulated a flexible space on a machine-like building into more playful

forms. It provided a retreat from the stagnant regularity of the present style.

The word Kindergarten originated in Germany, and resulted in the idea of a school as a metaphorical garden. This paints the image of a garden of children as "unfolding plants" needing to be nurtured (Dudek, 2000). This should not, however, stop at Kindergarten. Every school, for children of all ages and abilities, should provide physical and intellectual nourishment to children of all ages, sizes, and abilities. The term "school" here is ambiguous. When determining improvements to the U.S. educational system, experts have focused most attention on teachers and curricula as opposed to the school as a learning facility. Most research regarding quality of education and the physical environment has looked more at utilitarian aspects of the building, such as functional layouts and standards of space sizes, as opposed to the more qualitative aspects (Dudek, 2000). This is not to say by any means that teachers and curricula do not play an important, essential role in the quality of education. They most certainly do. However, extra factors come into play.

Upon hearing the word "child", the first words that come to mind are "energy", "colorful", and "play". In the past, school architects failed too often to understand the spatial needs of a child's imagination, or the educational curricula under which they learned best. School function is certainly important, but if it is the driving force for design, the opportunities for imagination, space, light, color, texture, fantasy, and play are easily forgotten. If it is a functionalist environment in which children are spending so much of their time and energy, then it is likely they will grow up to view the world as such, viewing the environment as having little to no consequence (Dudek, 2000).

Unfortunately, too many schools in the United States still display this outdated perception. According to the American Institute of Architects, the average age of public schools in the U.S. is 42 years old (Smith, 2003). Furthermore, in older U.S. cities, 20 percent of schools were built prior to 1920 (Ficklen, 1988). Experts believe the development is moving in the right direction. In the past, large, impersonal schools have been the standard, but mainstream public schools are beginning to reject this notion in favor of smaller, more personalized schools (Smith, 2003). Research confirms that large institutions are detrimental to the quality of education. "The big, factory-style schools of the last century are antithetical to strong community and individual identity" (Klonsky, 2002). Indeed, it is exciting to see the variety and personalization that the small school design movement is displaying. When picturing a garden, the image of a small, beautiful place comes to mind, where the gardener treats each plant with concern and care. A large garden, on the other hand, is called a farm, where the farmer uses a tractor to till whatever it can. Personally, in terms of education, the small garden is more appealing.

autism spectrum disorders (asd)

Around 1911, a Swiss psychiatrist named Eugen Bleuler began using the term “autism” to describe some symptoms associated with schizophrenia. “Autism” is derived from the Greek word “autos”, meaning “self”. It adequately describes a person who often experiences social isolation, or removes his or herself from social context. Thirty years later, Leo Kanner, a doctor from Johns Hopkins, started using the term describe children with unusual emotional or social issues (Alli, 2012). Most professionals, however, still associated autism with schizophrenia until the 1960s (Powers, 2000). It was at this time that the general population began hearing the term.

Methods of treatment at this time are shocking indeed. Medications such as LSD, electric shock, and/or pain and punishment behavior change tactics were common options. Finally, by the 1980s and 1990s, behavior therapy in a controlled environment became the accepted treatment of preference. These are still employed today, complimented by a mix of communication, medical, dietary, art and/or music therapy (Alli, 2012).

Around the time Kanner starting using the term “autism”, Hans Asperger, a Viennese pediatrician, was conducting research on children with similar, yet less obvious traits. This research was not widely recognized until the 1990s in a condition known today as Asperger’s Syndrome. Asperger’s, as well as Pervasive development disorder, Rett syndrome, and childhood disintegrative disorder, are all conditions placed along the autism “spectrum” and are known as Autism Spectrum Disorders (Attwood, 1998).

Today, experts still debate the causes of autism, though most agree that it is somehow genetic. There is not a known cure, but early intervention and medical treatment can produce significant improvements (“Talk about curing”, 2012).

In the realm of education, there is still little research regarding effective design techniques and theories. Architects take different approaches, but with improved awareness of the issues, are moving in the right direction to see what methods fit best (Henry, 2012a).

project goals

academic

In order to provide a conclusive project, I plan to research all aspects completely and thoroughly. Through my research, I hope to expand my knowledge of universal design, encompassing a full range of special needs, and how architecture has reacted and could progress. I believe the inclusion of all people in the built environment should be a fundamental component of an architectural education. Furthermore, as an architecture student I should be learning and developing graphic skills throughout the course of my time at school. This includes expanding my skill set in digital drafting programs, and well as hand-crafted modeling and basic hand-drawing. I also want to expand my portfolio by exhibiting a range of project styles and elements. Throughout the design process, I want to explore new structural and materials systems that provide innovative, creative solutions to the problem. At the conclusion of the project, I want to demonstrate the full range of my design skills in the visual presentation. I hope to communicate my project effectively through a clear and confident oral presentation. In all, I plan to complete the full project to the desired caliber to receive a Master of Architecture degree.

professional

Throughout the project development, I want to stay active with IDP progress and future employment opportunities. My research and other findings can provide ideas for future career directions. I also want to make sure I share my research with professionals working on similar topics. I plan to provide intellectually sound research and conclusions that can contribute to the ongoing study of how to design for autism. By the end of the project, I hope to have developed my computer, graphic, presentation, organization and time management skills that will be essential in an architectural career setting. The final project should showcase my range of skills, abilities, and understanding of the built environment. Ultimately, I want to give an oral and visual presentation of the project at a professional level.

personal

I am an incredibly indecisive person, and it took far too long for me to settle on a reasonable topic that fully interested me. The more I research, the more excited I am about my decision. This area of study is in need of solid research and development, and I plan to pass on my project to related professionals and agencies as an example of autism design approach. Consequently, I hope to add to the bank of knowledge and research regarding universal design approaches. As I work, I hope to stay diligent with my time management in order to make continuous progress. Ultimately, I want to submit a project in which I can take full pride, and which represents my interests and skills completely.

site analysis

site narrative

Bodies of water have an inherent quality that draw people. Growing up in Minnesota, I have spent all of my summers flocking to the lake with friends and family. You do not even need to go in the water to get the feeling. The atmosphere is relaxing, whether you are lying in the grass alone reading a book by the water, or with a group of people buzzing around, grilling and playing volleyball. Maybe it is a sense of "get-away" that is so appealing. Whether you are at a remote cabin or in the middle of a big city, the wide open space water naturally creates helps ease some claustrophobia. Maybe it is the scenic variety that is so intriguing. Most of us do not get to spend our work days lakeside, so the change of elevation and state of matter gets us excited. They are certainly appealing to the senses, and oftentimes to all five. Whatever the quality that brings people to bodies of water, I knew it was essential to have one on my thesis site.

Though I did not initially know much about children with autism, I knew from the start that one of the main issues that set them apart was sensory-related. Therefore, when searching for an adequate site, I looked for a variety of natural elements that could be incorporated into the design. I stumbled upon this particular site during a bike ride along the river one day and immediately knew it was perfect. It had some topography, it was uniquely shaped, it had a variety of trees and plants, it was connected to trails, and most importantly, it had excellent views of the river. I found a day to spend some time at my site, which completely reinforced my decision. Walking around on the sidewalk, I noticed how little vehicle and pedestrian traffic passed. When it did, the noise was minimal. Neighbors across the street took out trash or raked their lawns, occasionally chatting with one another. I could not hear any noise from nearby Mickelson Park or the Oak Grove Lutheran School. Roaming down the hill toward the river, fall leaves crunched beneath my feet. The slope was not strenuous, but enough to make me watch my step carefully. Fallen branches, dead trees, bushes and overgrown grass were scattered wildly on the hillside all the way to the river. Here, I was tucked away from the main, buildable part of the site and its neighbors and immersed in the calm, beautiful landscape. Squirrels scurried by, the grasses swayed, the river flowed. The air smelled clean and brisk. The quiet sound of the river was soothing. This site absolutely had the appeal of a "get-away" place that is still close to home, perfect for children with autism who often become overstimulated by crowded places with too much activity.

Though the feeling of the site fits, the site's characteristics pose many design challenges that must be addressed. First, flooding is historically an issue as is made plain by the dike running straight through it. Instead of leveling the dike and compromising the neighborhood, the building will need to become a flood protection structure in of itself; not just replacing the existing flood protection but enhancing it. Second, the site's shape is long, narrow, and curvy which will limit programmatic arrangements. The building could work into the hillside somehow as well. Finally, the site is scattered with many large, old trees that must be removed or integrated somehow into the design.

At the time of initial site selection, flooding issues were acknowledged as an exciting design opportunity, but the present strictness of city regulations was not. After some discussion with a city official, I have reaffirmed my belief that this site should not be ignored as a place of great building potential, despite current city limitations. After recent severe flooding in 2009, I have noticed a general shift in attitude regarding the river. Many Fargo and Moorhead residents have begun seeing the Red River as

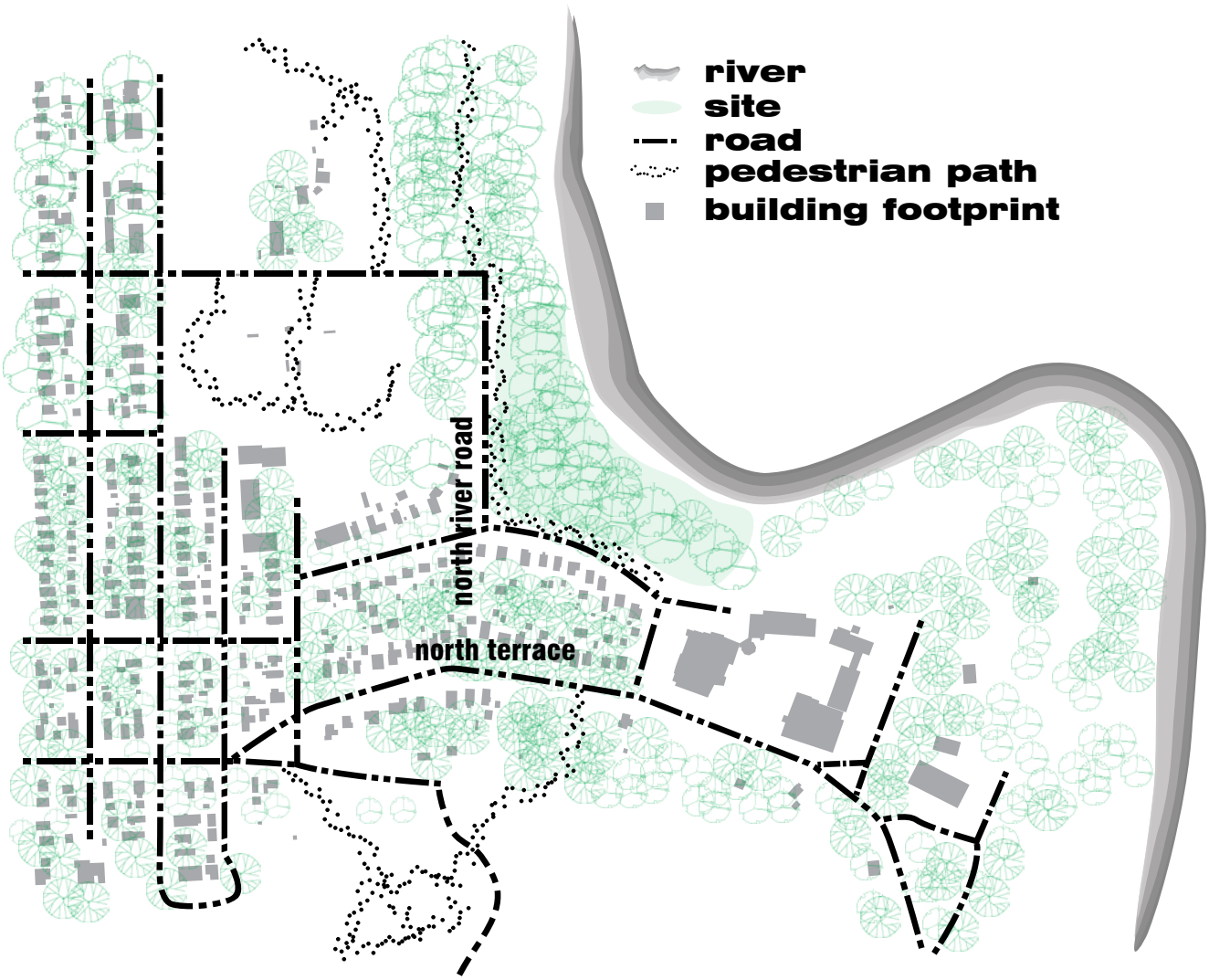


Figure 32 *General Site Drawing*
Hausladen, G. (2012). *General site drawing* [Designer] Map retrieved from maps.google.com

more of a threat than a beautiful landscape element. As noted earlier, Fargo's history began on the river, which is further reason that it should be embraced, rather than blocked off as is the current movement.

As research continues, I have recognized similarities of this current mindset to that regarding the education and inclusion of children with disabilities. Too many schools take children with autism, put them in a classroom and try to get them to interact and learn alongside their neuro-typical peers, tolerating their disruptions. I acknowledge that many schools do provide special programming for these students, but this will typically take place in a standard school room with teachers making adjustments to the setting. Specialized design, however, can provide so much more. When the attitude changes to see a school as an opportunity to showcase a group with unique and special attributes rather than a group of school-room nuisances, then designers can positively change perspectives. Education of children with autism, much like flooding on the Red River, should be approached from the standpoint of embracing a unique circumstance as it exists, providing a beautiful way to enhance its qualities and educate the public.

Figure 33 *View from site 1*
Hausladen, G. (2012). *View from site 1* [Photographer]

Figure 34 *View from site 2*
Hausladen, G. (2012). *View from site 2* [Photographer]

Figure 35 *View from site 3*
Hausladen, G. (2012). *View from site 3* [Photographer] [left]
Figure 36 *View from site 4*
Hausladen, G. (2012). *View from site 4* [Photographer] [right]

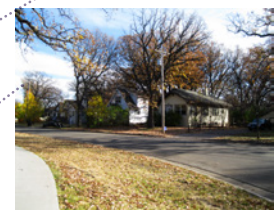


Figure 37 *View from site 5*
Hausladen, G. (2012). *View from site 5* [Photographer] [left]
Figure 38 *Site view 2*
Hausladen, G. (2012). *Site view 2* [Photographer] [right]

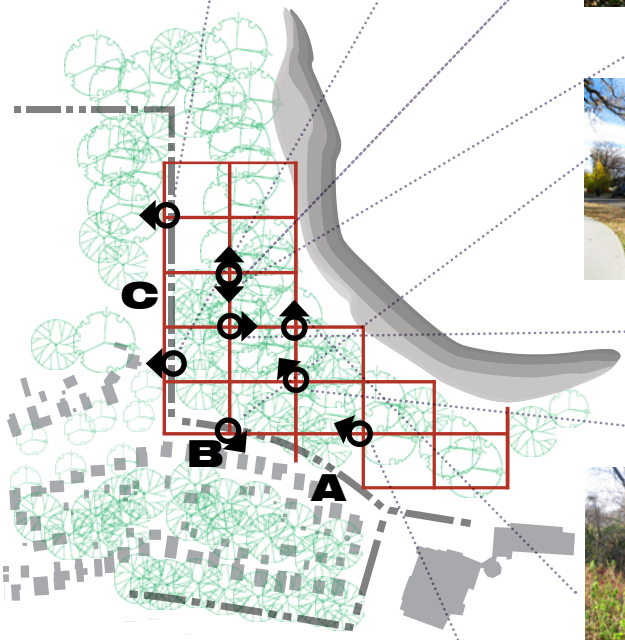


Figure 42 *Site grid views drawing*
Hausladen, G. (2012). *Site grid views drawing* [Designer] Map retrieved from maps.google.com

Figure 39 *Site view 3*
Hausladen, G. (2012). *Site view 3* [Photographer]

Figure 40 *Site view 4*
Hausladen, G. (2012). *Site view 4* [Photographer]

Figure 41 *Site view 5*
Hausladen, G. (2012). *Site view 5* [Photographer]

Figure 43 *Site panorma A* Hausladen, G. (2012). *Site panorama A*. [Photographer] [top]
Figure 44 *Site panorma B* Hausladen, G. (2012). *Site panorama B*. [Photographer][middle]
Figure 45 *Site panorma C* Hausladen, G. (2012). *Site panorama C*. [Photographer][bottom]

air movement

Though old, tall deciduous trees protect the site from all sides, wind impact may be hindered in the summer but not winter. This impact will be especially noticeable with harsh north winter winds. A few bigger weak spots are the corridor created by North River Road on the west side of the site, and that created by the river on the east side. This could cause wind tunnel-like effects when north winds occur.

views

Figure 46 *River View D*
Ginnie Hausladen (Photographer). (2012).

Figure 47 *River View E*
Ginnie Hausladen (Photographer). (2012).

human influence

Presently, locals use the site indirectly, rather than as a destination. Bikers, rollerbladers, and walkers pass on the Fargo Mickelson Bike Path that runs around the west/south perimeter of the site, but few probably stop and explore. The site even deters pedestrians from cutting through the site as a short-cut with the dike in the way. In fact, the protection provided by the dike is how neighbors use the site most indirectly.

After some exploration, I did find other small evidences of human influence on the site. First, the site hosts a fire hydrant and telephone polls for the neighborhood, as well as a bird house on one tree. The purposes of the other instances are more unclear. I found an out-of-place concrete block and wooden bucket, and a stone wall and steps suggesting a pre-existing structure. Finally, the lack of litter provides further proof that the site is rarely occupied.

Figure 48 *Human Influence*
Hausladen, G. (2012). *Human Influence*. [Photographer]

wildlife

Though most examples of wildlife are the expected squirrels, rabbits, deer and common birds, wild turkeys could also show up. Any built addition to this site should maintain as much natural habitat as possible, or even provide opportunities for children to learn about these animals.

Figure 49 *Site Wildlife*
Hausladen, G. (2012). *Site Wildlife*. [Photographer]

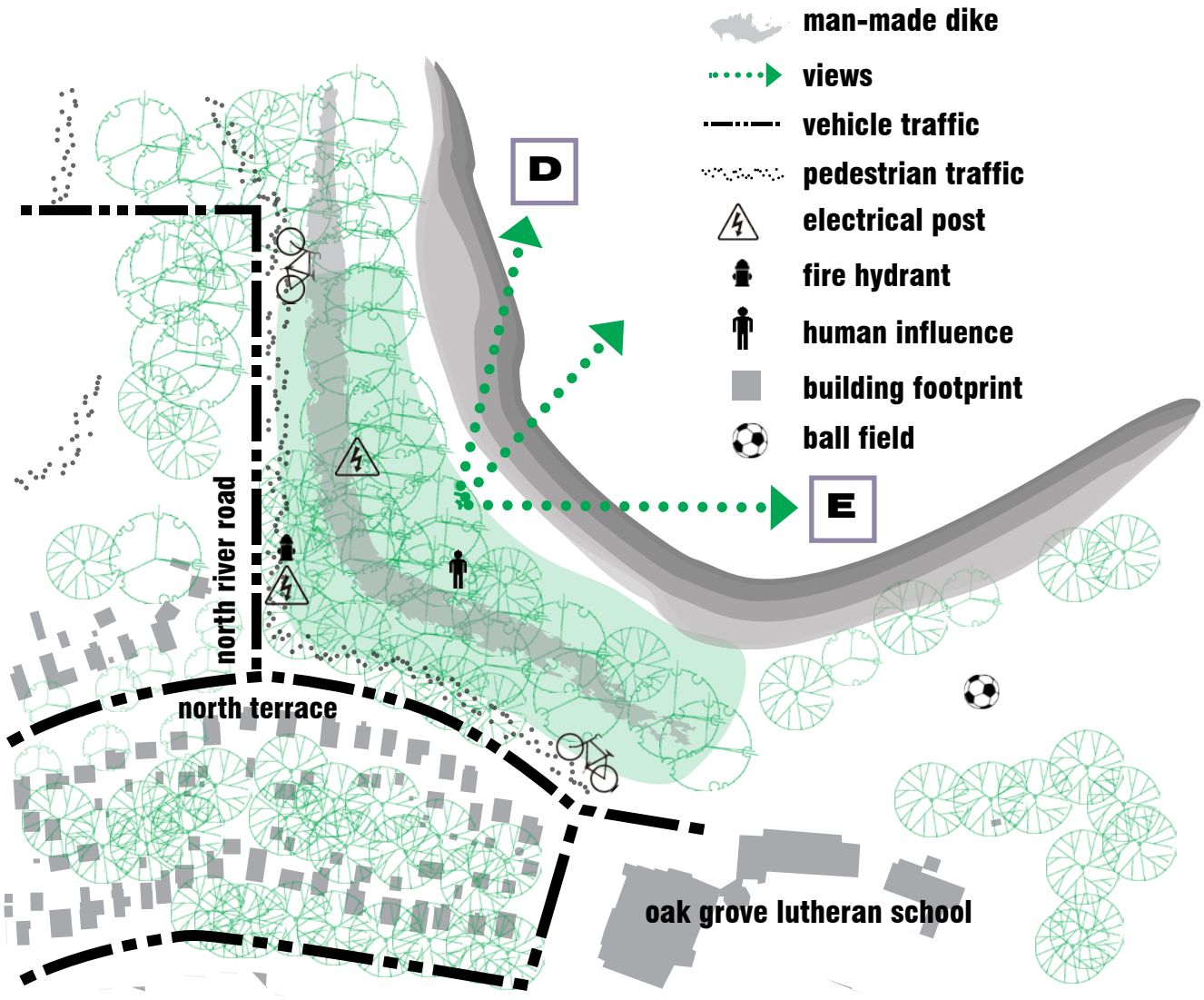


Figure 50 *Site Specific Characteristics*
Hausladen, G. (2012). *Site Specific Characteristics*. [Designer] Map retrieved from maps.google.com

site texture

Large, old trees are abundant on the site, providing excellent shade but still with plenty of space between them. The design should allow as many trees to be maintained as possible to keep the protected feel of the site. Down the hill, towards the river, the vegetation is much less tame and much more varied. Features including dead trees and overgrown brush are other indicators of minimal site usage and maintenance. The long, wild grasses right next to the river are arguably the site's most beautiful vegetation feature with rich colors and textures. These grasses also bring peaceful movement to the site with the help of a light breeze.

Figure 51 *Site Texture 1*
Hausladen, G. (2012). *Site Texture 1*. [Photographer]

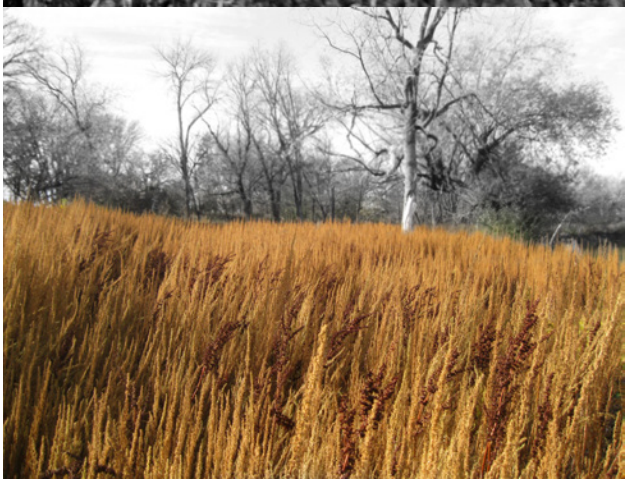


Figure 52 *Site Texture 2*
Hausladen, G. (2012). *Site Texture 2*. [Photographer]

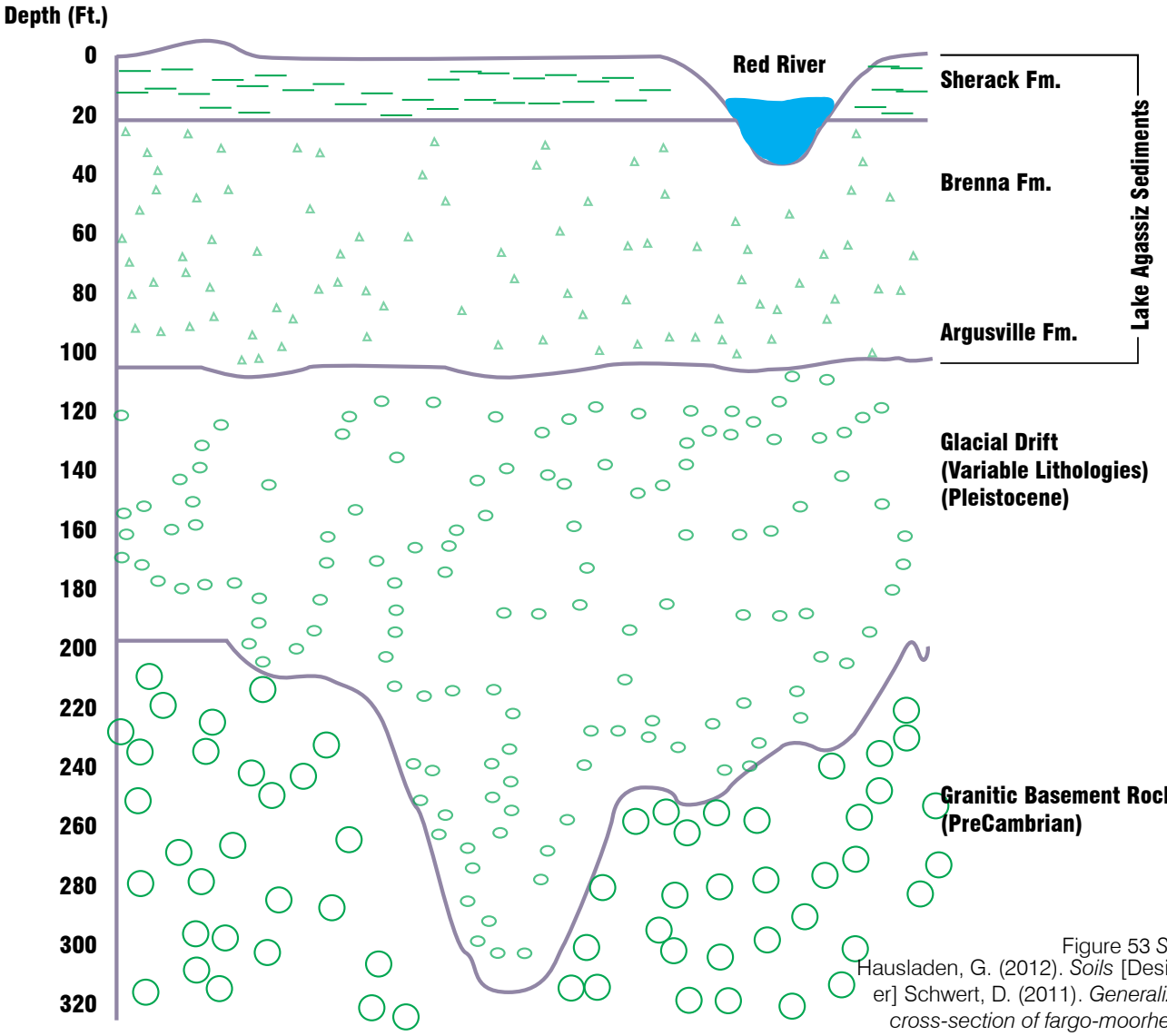


Figure 53 *Soils* Hausladen, G. (2012). *Soils* [Designer] Schwert, D. (2011). *Generalized cross-section of fargo-moorhead.* [Designer]. [Web Graphic]. Retrieved from http://www.ndsu.edu/fargo_geology/xsection.htm

The site is located in a Lake Plains region, with a soil composition of 65% Urban Land and 35% Aquerts, clayey and similar soils – 1901A. The parent material is Clayey glaciolacustrine deposits. This type of soil is poorly drained with frequent ponding. It is classified as nonsaline to moderately saline (0.0 to 15.0 mmhos/cm) with a maximum sodium absorption ratio of 20.0. Profile: 0 to 60 inches: Silty Clay.

Its available water capacity is rated High, about 9.1 inches. The frost-free period for the region is between 110 to 135 days a year. (Web Soil Survey, n.d.). The soil's PL (plastic limit) is 30, LL (liquid limit) is 85, N (number of blows for Standard Penetration Test) is 12, Qu (unconfined compressive strength in lbs/ft ^ 2) is 3000 at a depth of 1-6 meters. (Schwert, 2011).

slope analysis

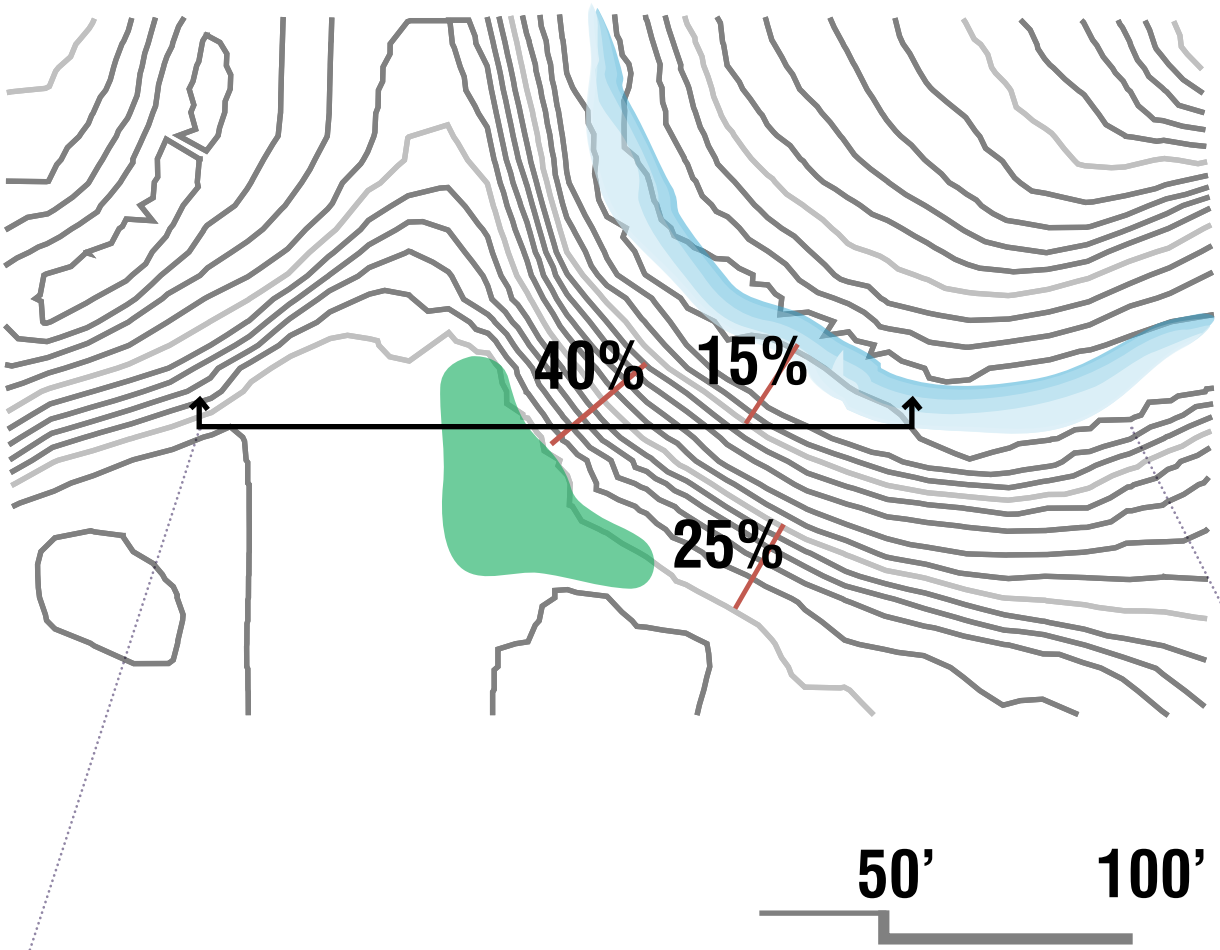


Figure 54 *Site Topography*
Hausladen, G. (2012). *Site Topography*. [Designer]

Figure 55 *Site Cross-Section*
Hausladen, G. (2012). *Site cross-section* [Designer] [below]

floodplain

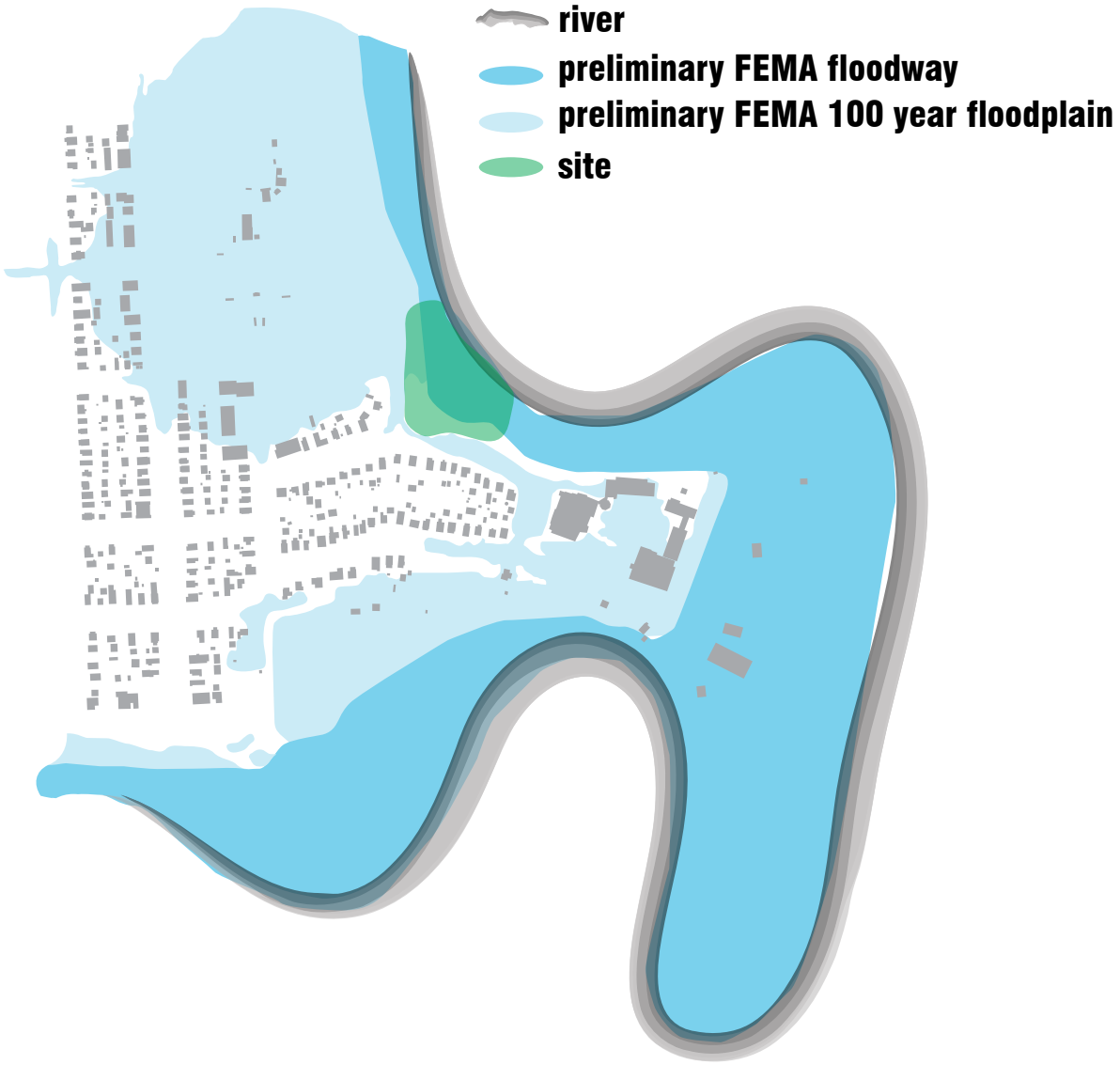
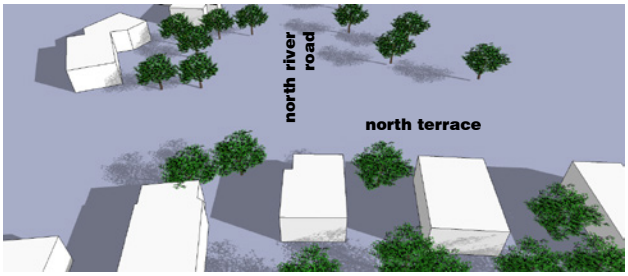
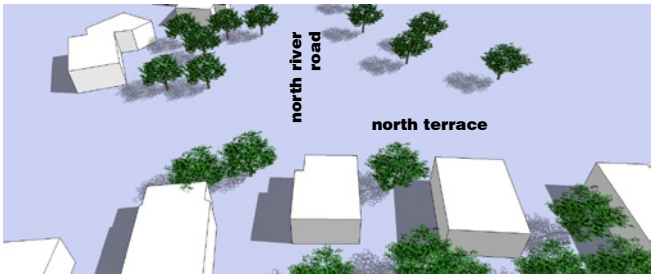


Figure 56 *Floodplain*
Hausladen, G. (2012). *Floodplain*. [Designer] City of Fargo. (Producer). (2012). Preliminary 100 year floodplain. [Web Map]. Retrieved from http://www.cityoffargo.com/CityInfo/Departments/Fire/Fargo-FloodInformation/

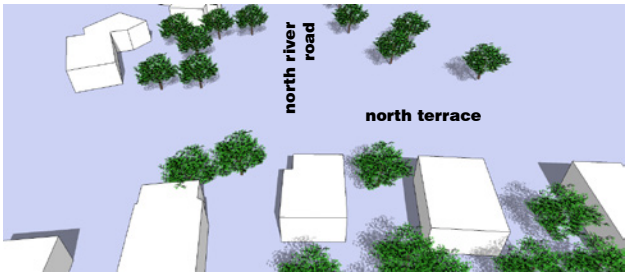
shadow studies



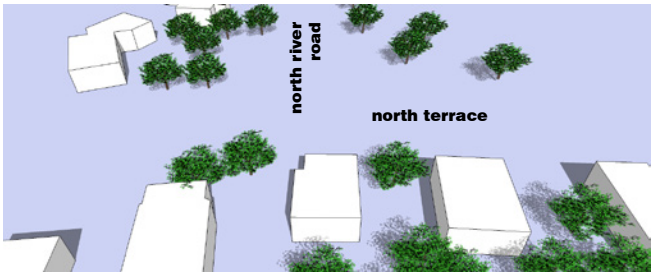
9:00 am



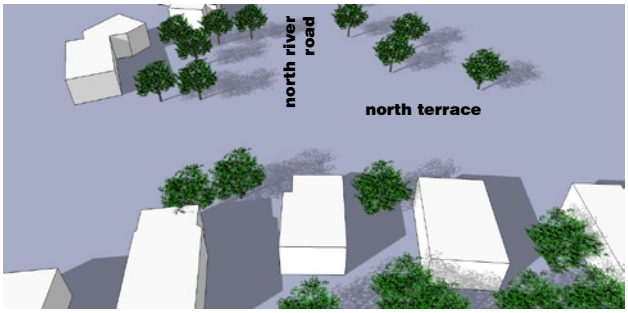
9:00 am



12:00 pm

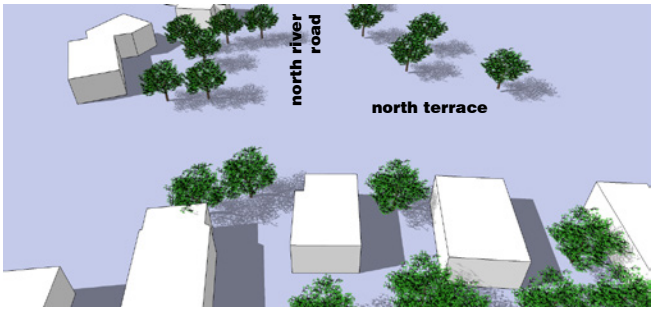


12:00 pm



4:00 pm

Figure 57 *Spring Shadows*
Hausladen, G. (2012). *Spring shadows*. [Designer]



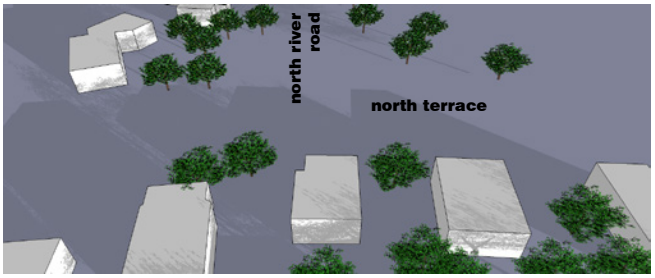
4:00 pm

Figure 58 *Summer Shadows*
Hausladen, G. (2012). *Summer shadows*. [Designer]

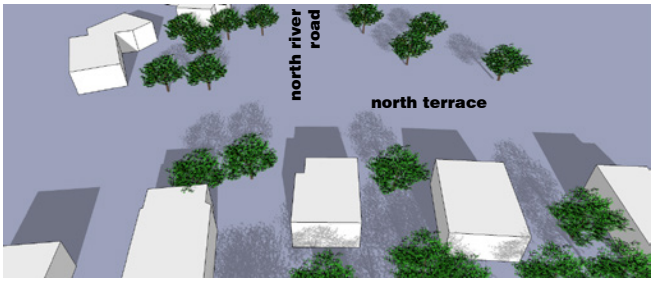
spring equinox

summer solstice

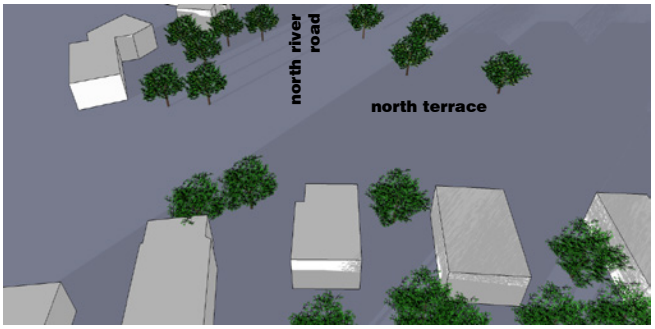
light quality



9:00 am



12:00 pm



4:00 pm

Figure 59 *Winter Shadows*
Hausladen, G. (2012). *Winter shadows*. [Designer]

winter solstice

Though the site is shaded nicely, the open spaces created by North Terrace and North River Road to the south and west of the site allow mid- to late-day sun to penetrate the tree cover. This is especially true during the winter with less greenery to block sunlight access. The river, additionally, not only creates another open space through which morning light may penetrate, but also provides the site with a beautiful reflected light experience which helps accent the landscape's colors from below.

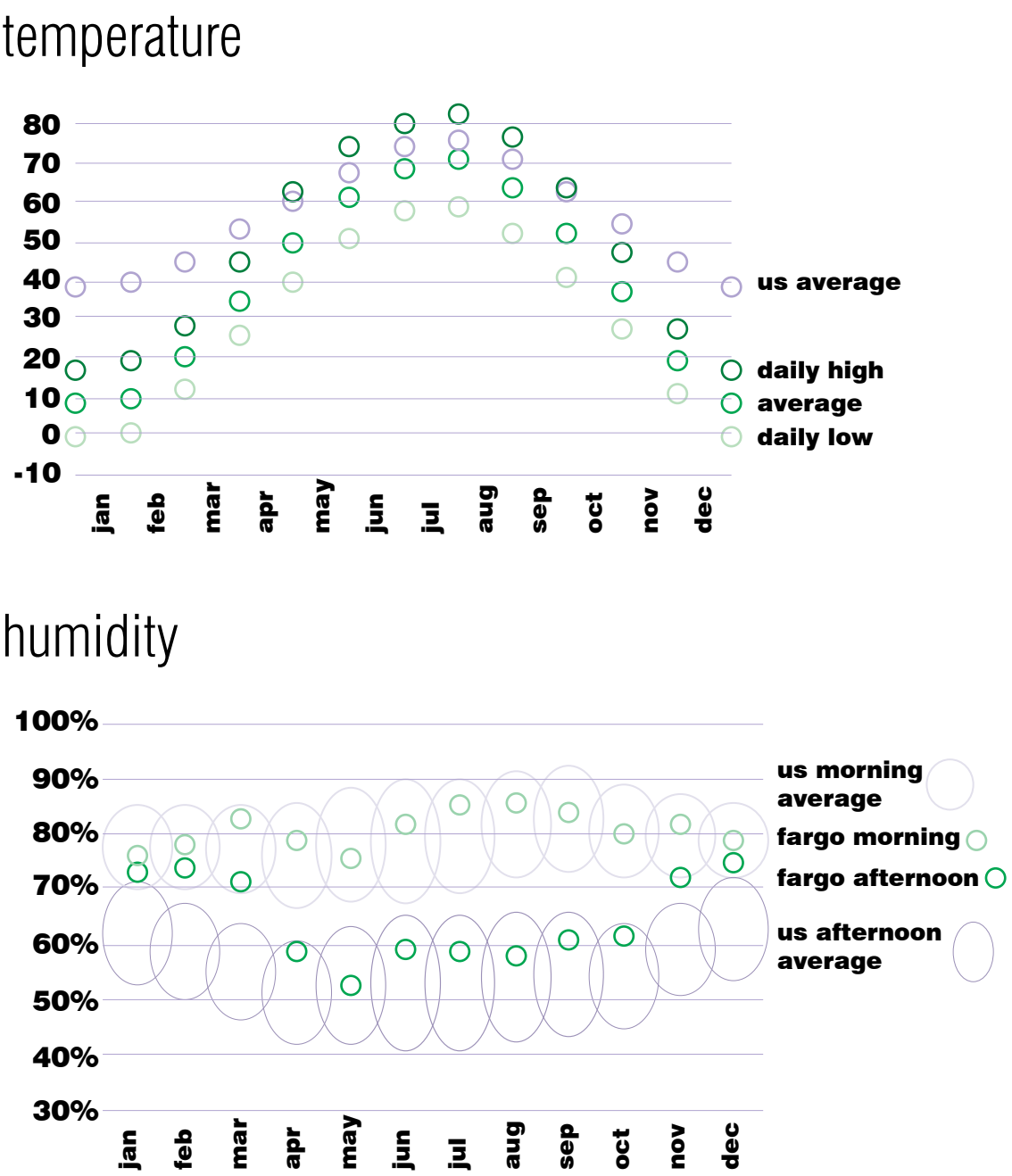
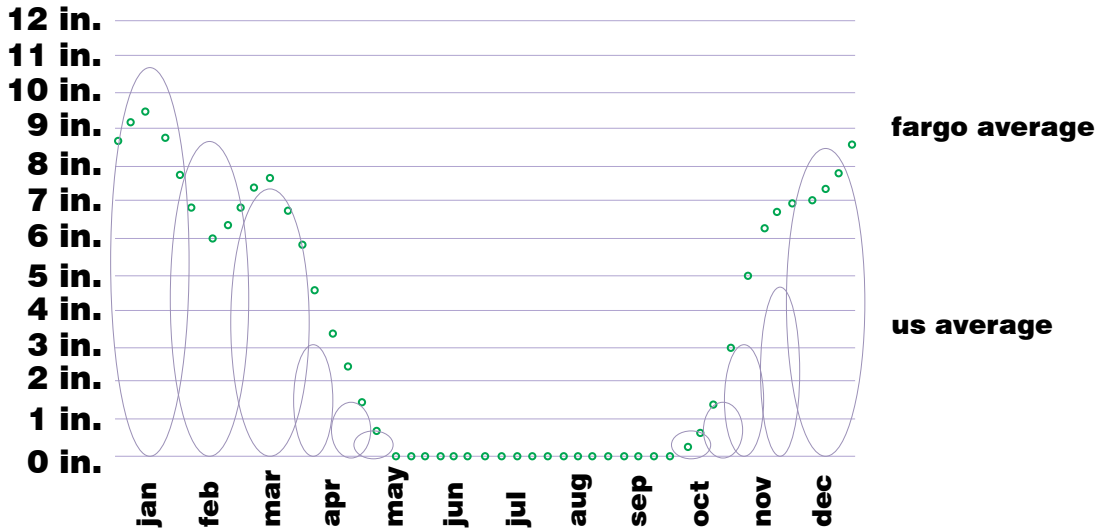
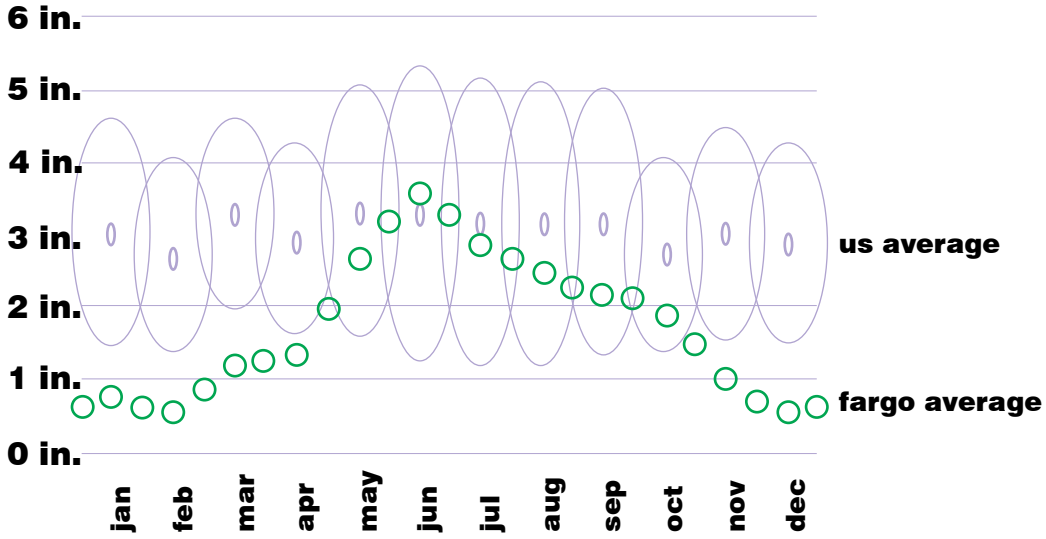


Figure 60 *Climate Data Diagrams*
Hausladen, G. (2012). *Climate Data Diagrams*. [Designer]
City-Data.com. (2012). Average climate in fargo, nd. Retrieved from http://www.city-data.com/city/Fargo-North-Dakota.html

snowfall



precipitation



solar diagram

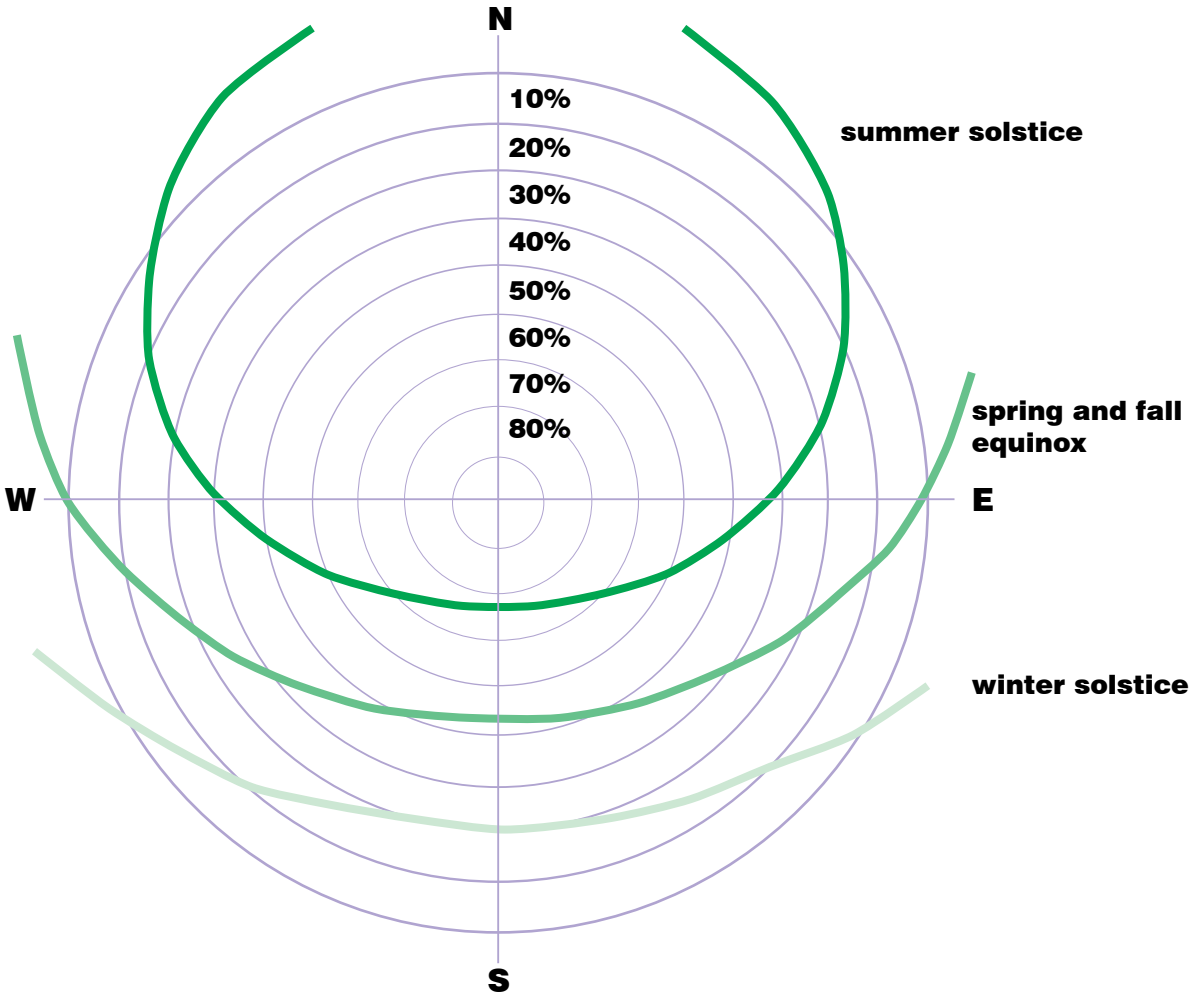


Figure 61 *Sun Path Diagram*
Hausladen, G. (2012). *Sun Path Diagram*. [Designer]
Tukiainen, M. (2012). Fargo, north dakota, united states - sun path diagram . Retrieved from http://www.gaisma.com/en/location/fargo-north-dakota.html

wind speed and direction

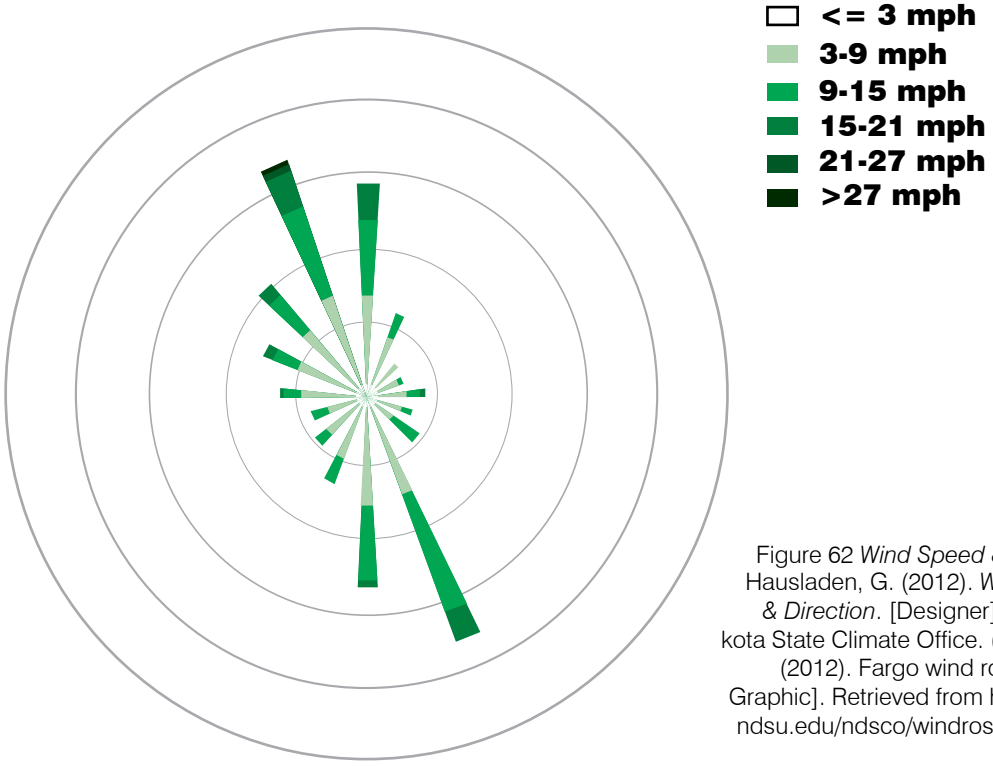


Figure 62 *Wind Speed & Direction*
Hausladen, G. (2012). *Wind Speed & Direction*. [Designer] North Dakota State Climate Office. (Designer). (2012). Fargo wind roses. [Web Graphic]. Retrieved from http://www.ndsu.edu/ndsco/windrose/farg.html

cloudy days

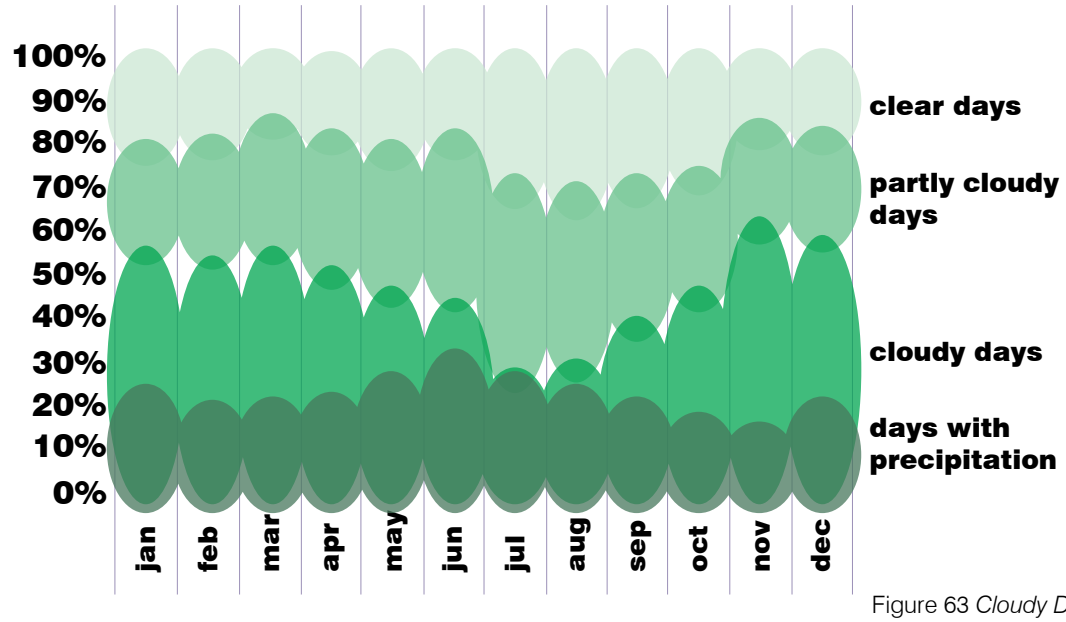


Figure 63 *Cloudy Days*
Hausladen, G. (2012). *Cloudy Days*. [Designer] City-Data.com. (2012). Average climate in fargo, nd. Retrieved from http://www.city-data.com/city/Fargo-North-Dakota.html

programmatic requirements

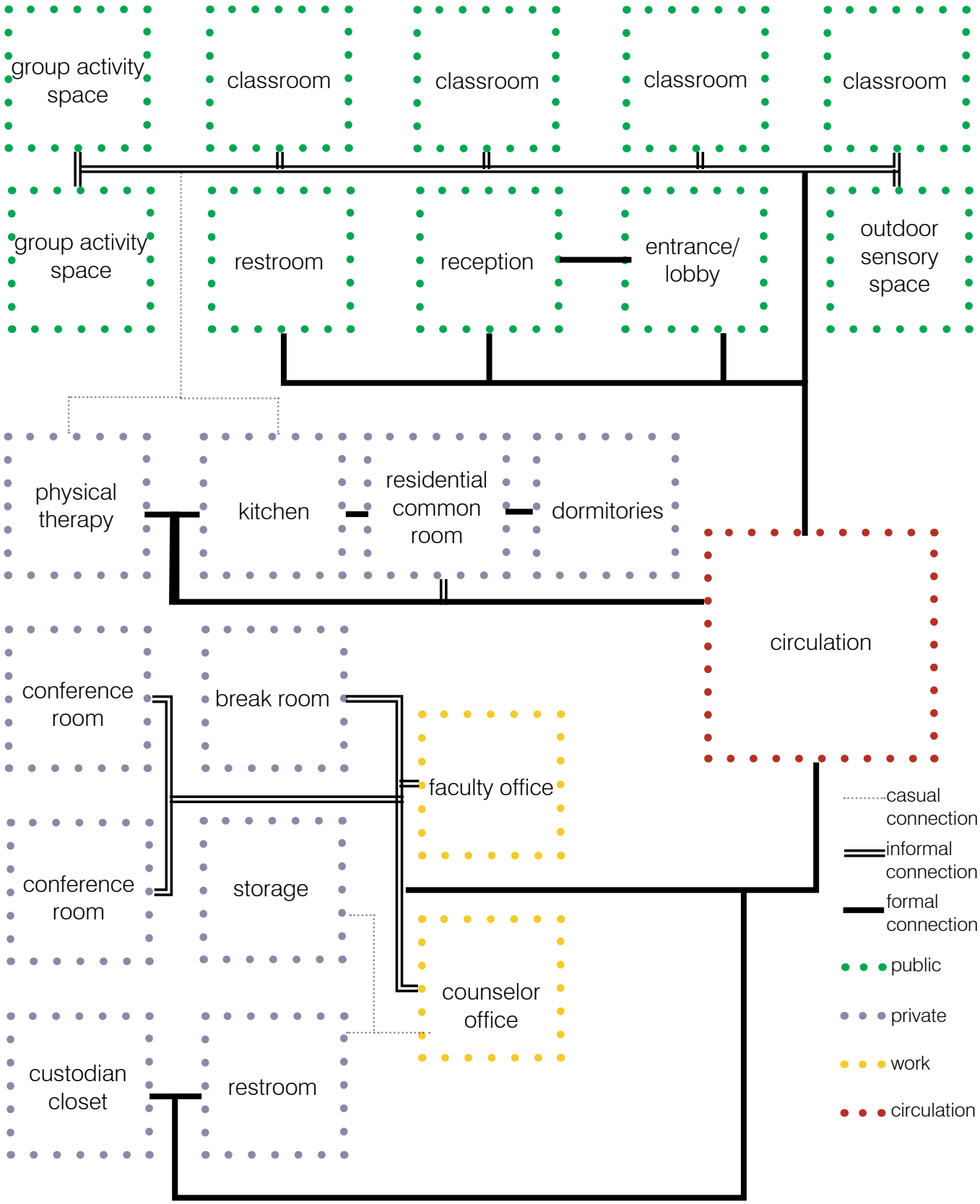


Figure 64 *Interaction Net*
Hausladen, G. (2012). *Interaction net*. [Designer]

interaction net

interaction matrix

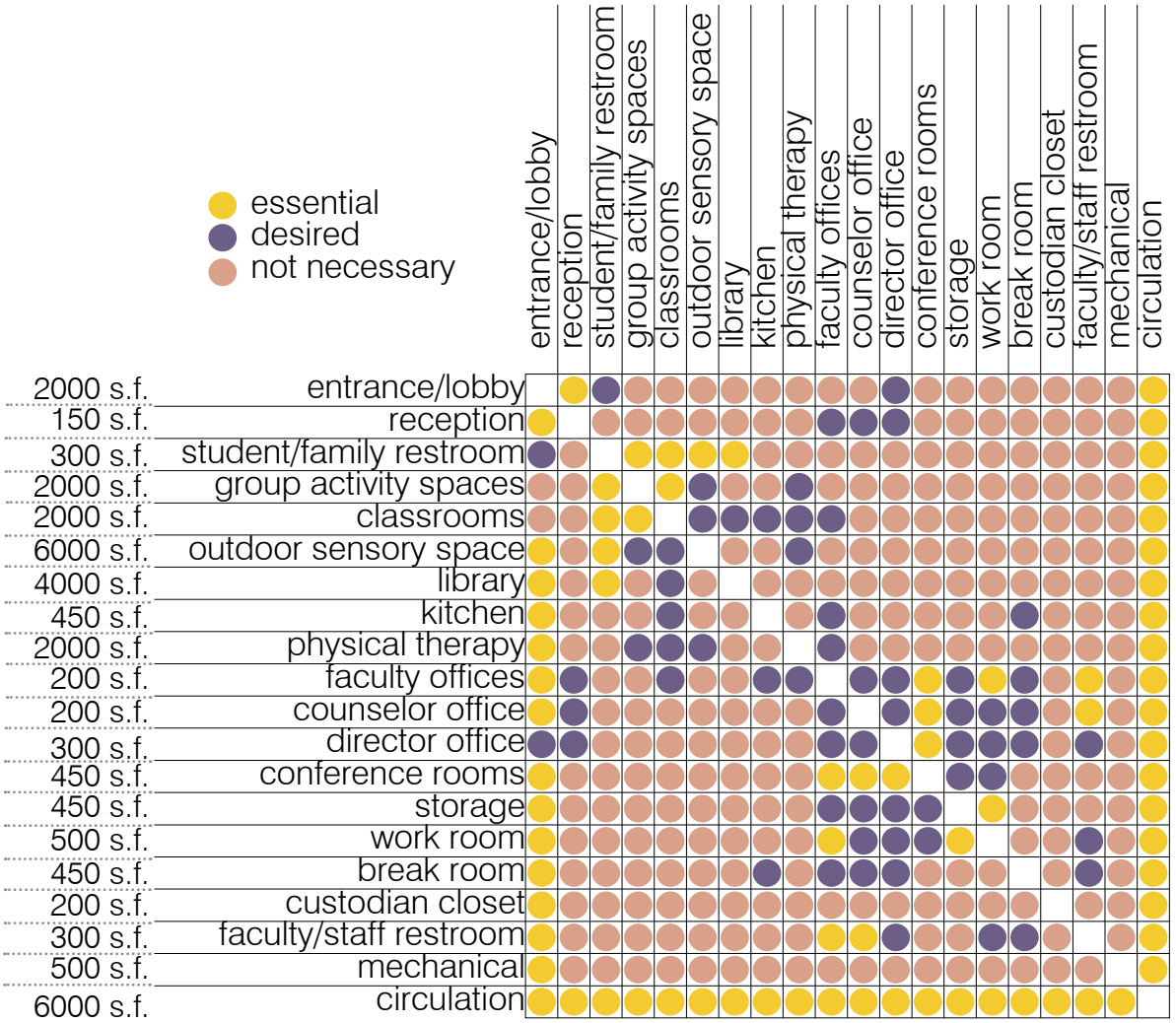


Figure 65 *Interaction Matrix*
Hausladen, G. (2012). *Interaction matrix*. [Designer]

design process

parti

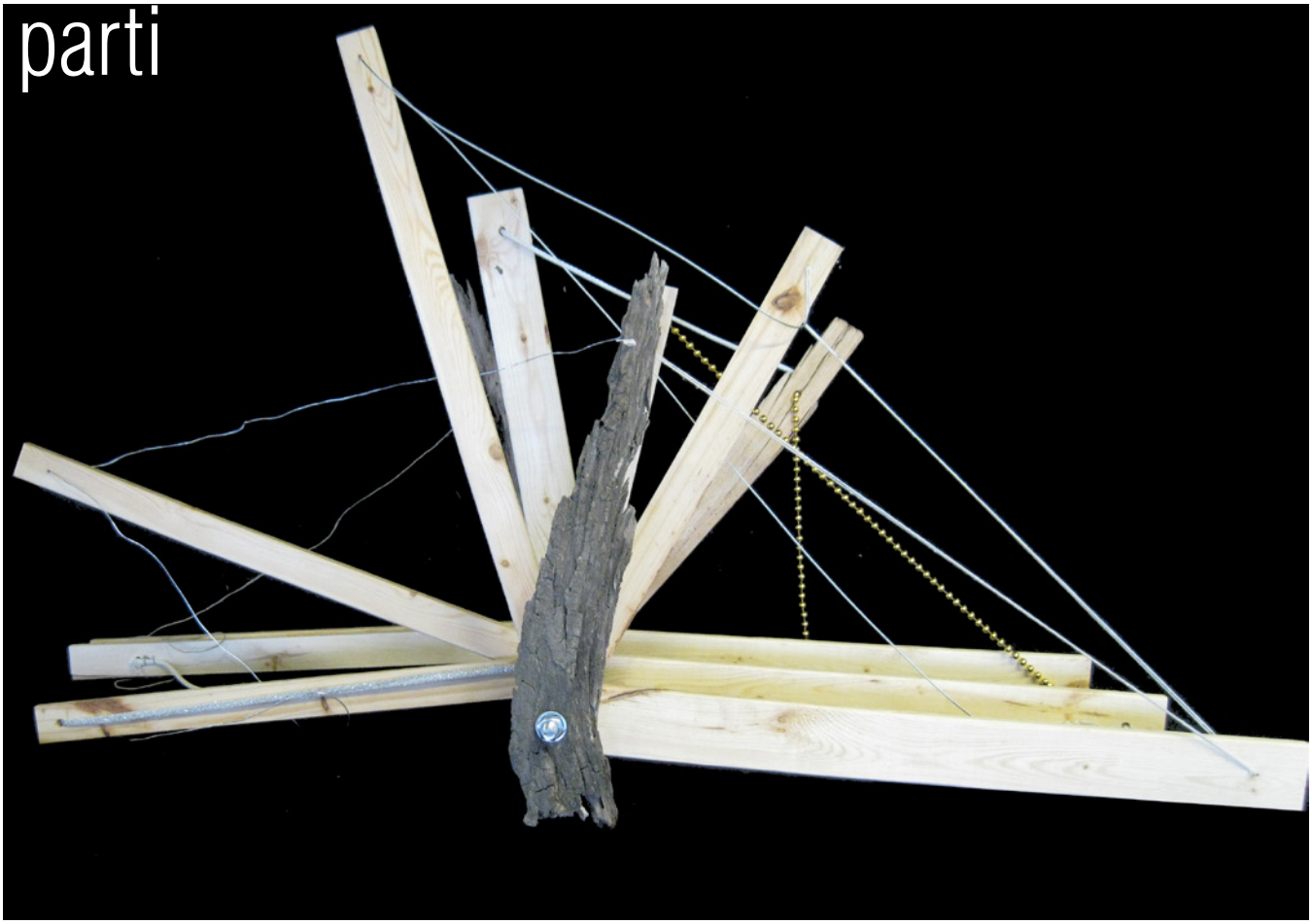


Figure 66 *Parti 1*
Hausladen, G. (2013). *Parti*. [Designer, Photographer] [top]

Figure 67 *Parti 2*
Hausladen, G. (2013). *Parti*. [Designer, Photographer] [right]

This parti model was inspired by my research into children with autism. Each piece of wood, a different length and texture, represents the variety of children with autism and their range of symptoms and needs. Each piece of wood is connected by some sort of textural string, rope, cable, etc., representing the variety of sensory needs. The parti is interactive and toy-like, an exploration of how this disorder could be interpretted architecturally. The log on each side, found on my site, demonstrates nature's protective and healing qualities.

process models

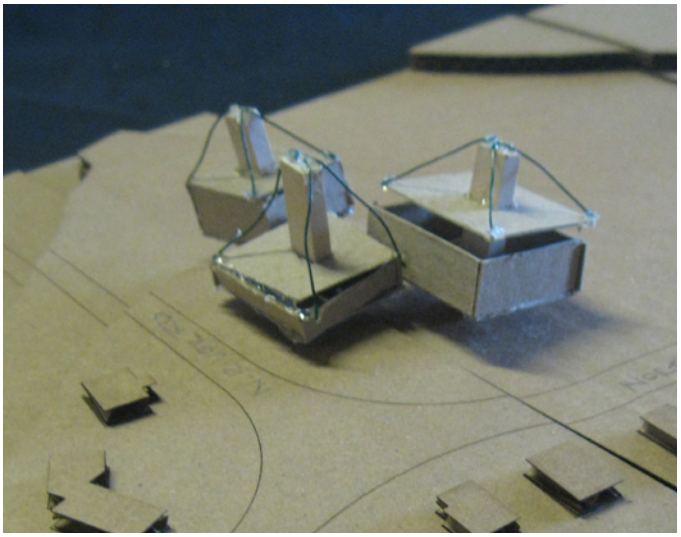


Figure 68 *Process Model 1*
Hausladen, G. (2013). *Process Model 1*.
[Designer, Photographer]

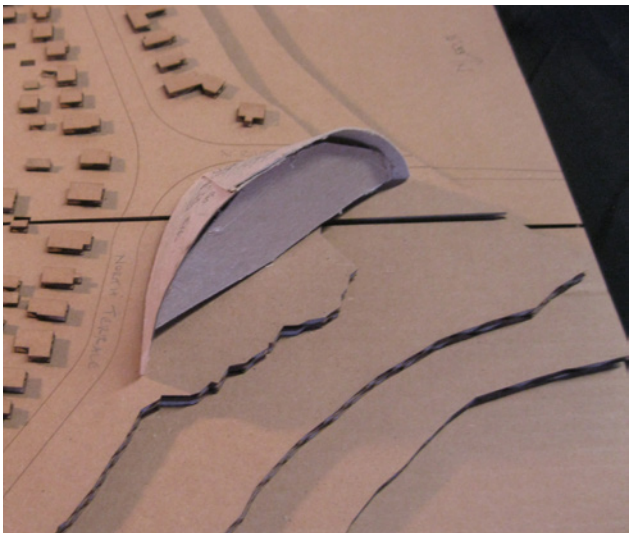


Figure 69 *Process Model 2*
Hausladen, G. (2013). *Process Model 2*.
[Designer, Photographer]

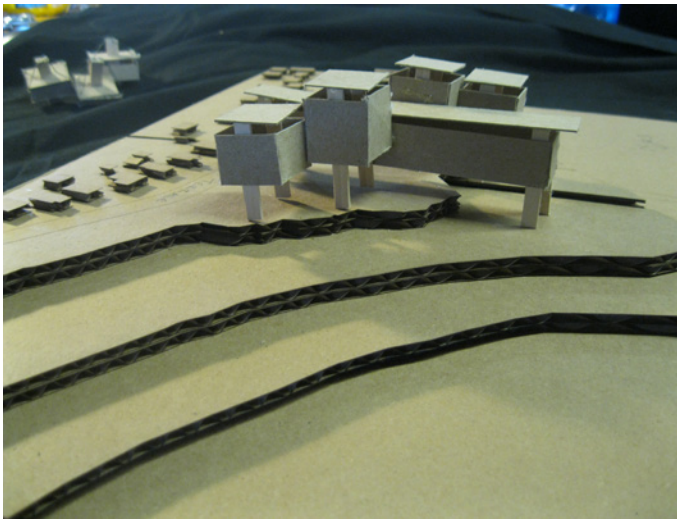


Figure 70 *Process Model 3*
Hausladen, G. (2013). *Process Model 3*.
[Designer, Photographer]

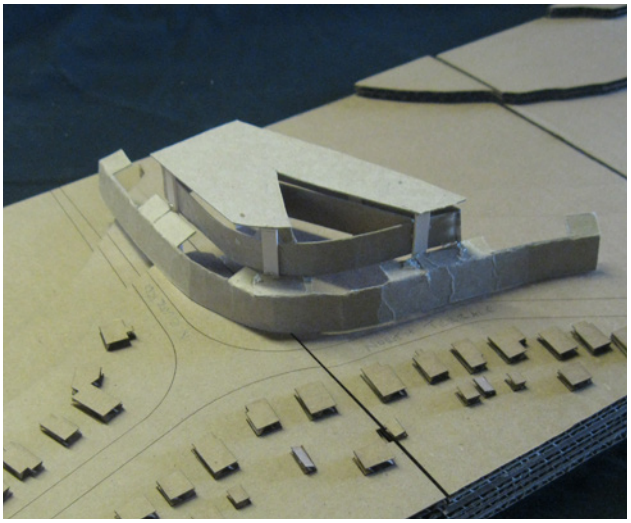


Figure 71 *Process Model 4*
Hausladen, G. (2013). *Process Model 4*.
[Designer, Photographer]

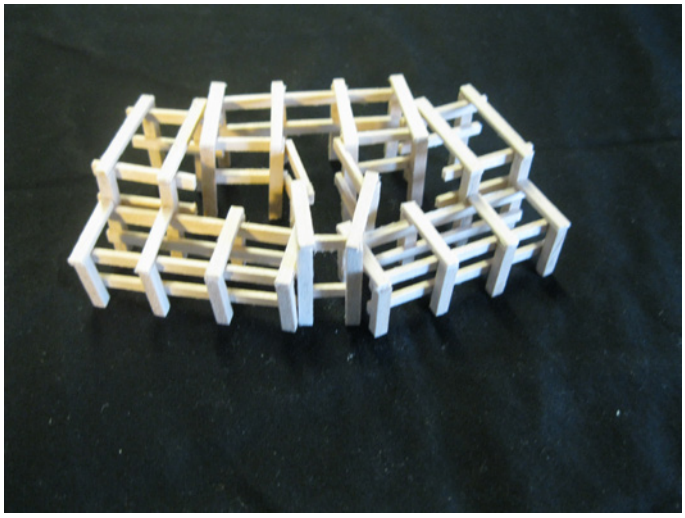


Figure 72 *Process Model 5*
Hausladen, G. (2013). *Process Model 5*.
[Designer, Photographer]

process sketches

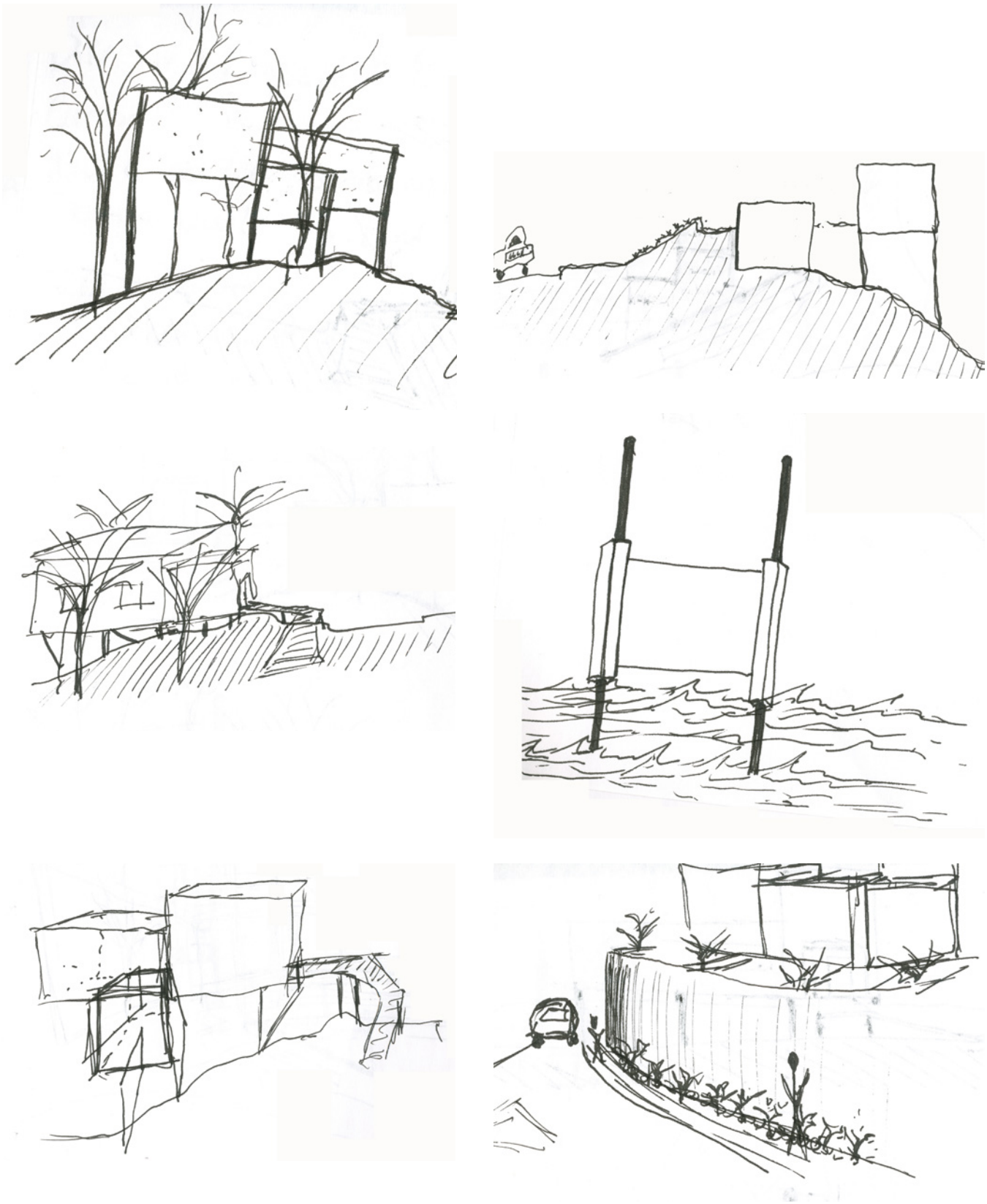


Figure 73 *Process Sketches 1*
Hausladen, G. (2013). *Process Sketches 1*. [Designer]

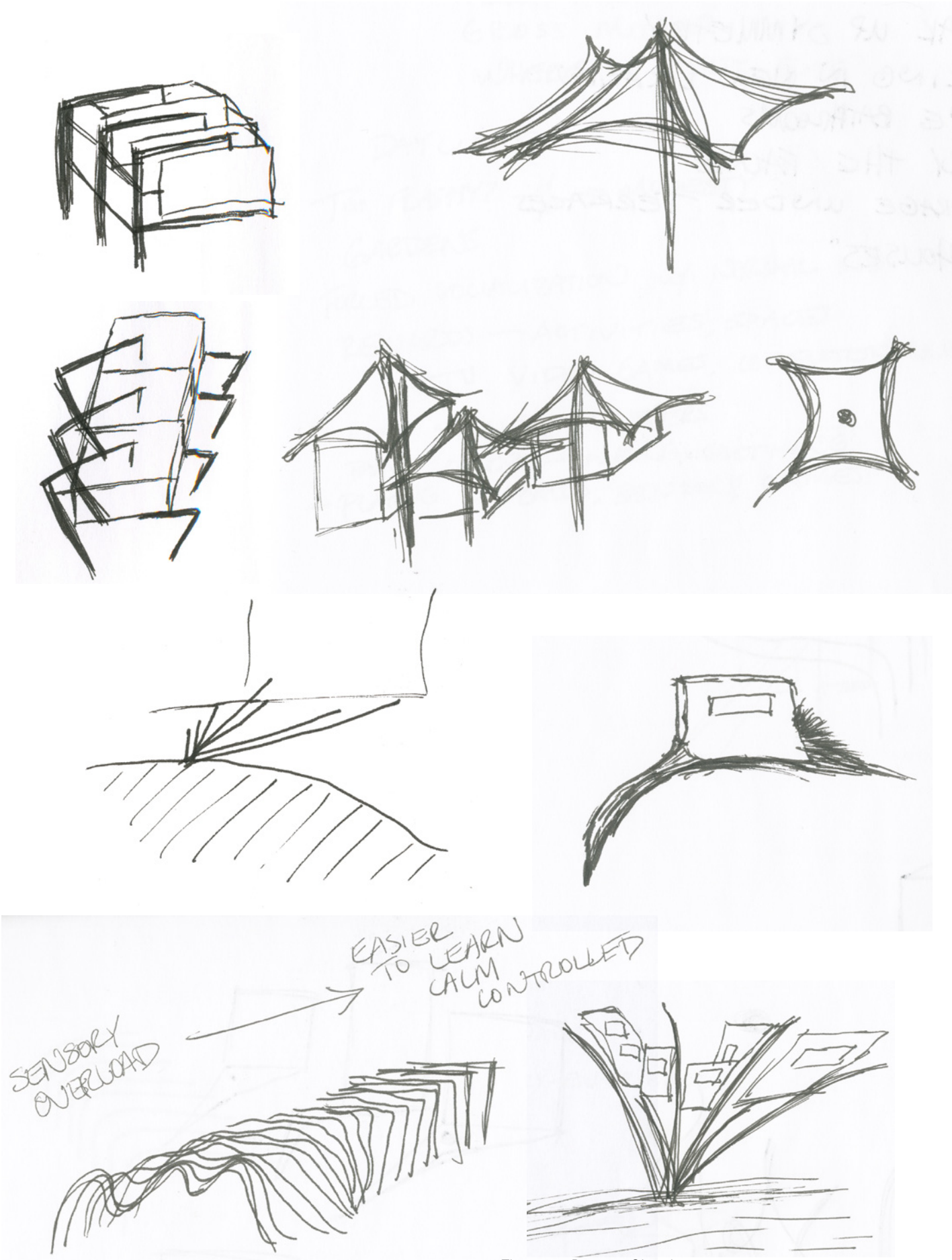


Figure 74 *Process Sketches 2*
Hausladen, G. (2013). *Process Sketches 2*. [Designer]

spatial arrangement sketches

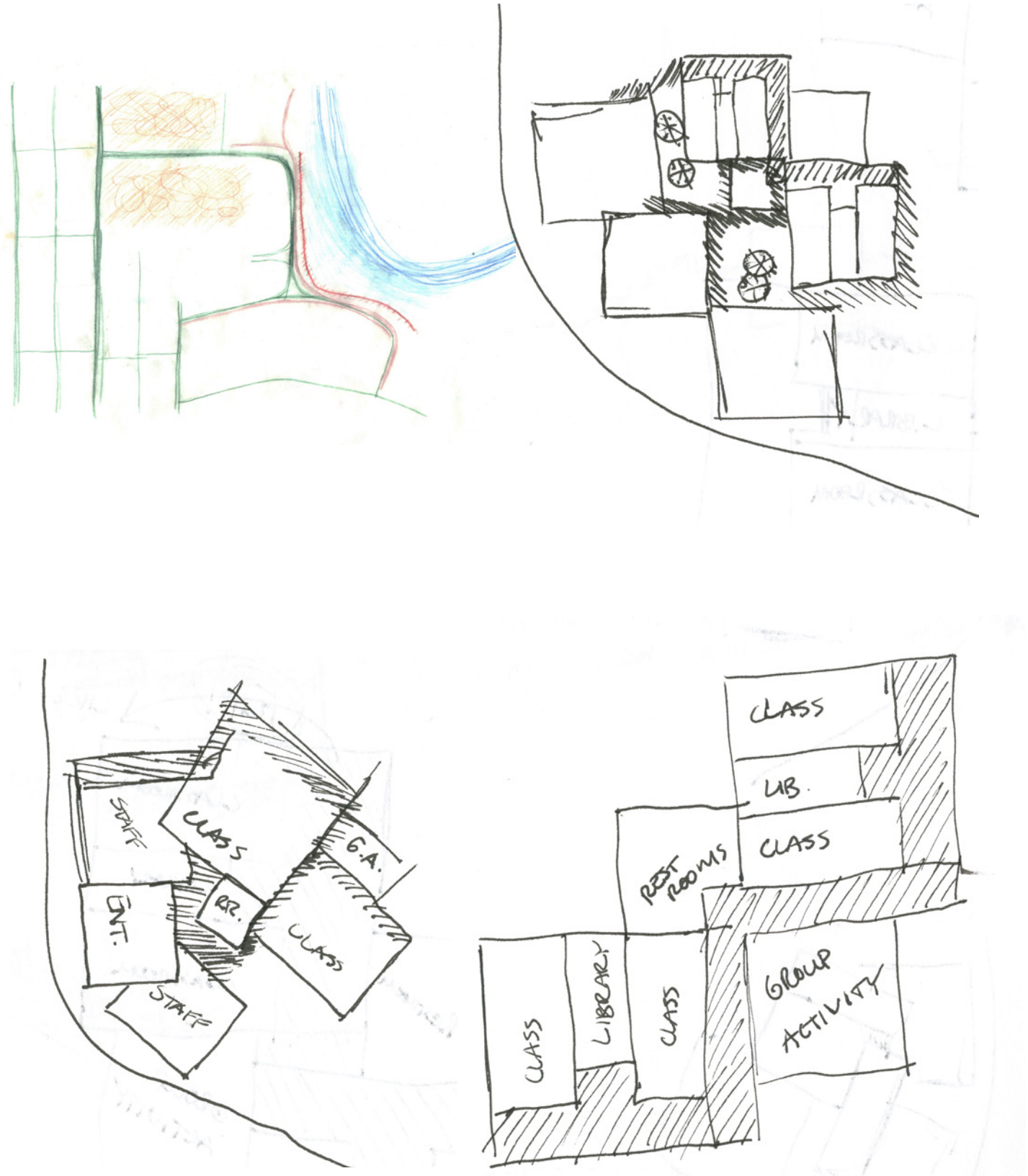


Figure 75 *Spatial Arrangement Sketches 1*
Hausladen, G. (2013). *Spatial Arrangement Sketches 1*. [Designer]

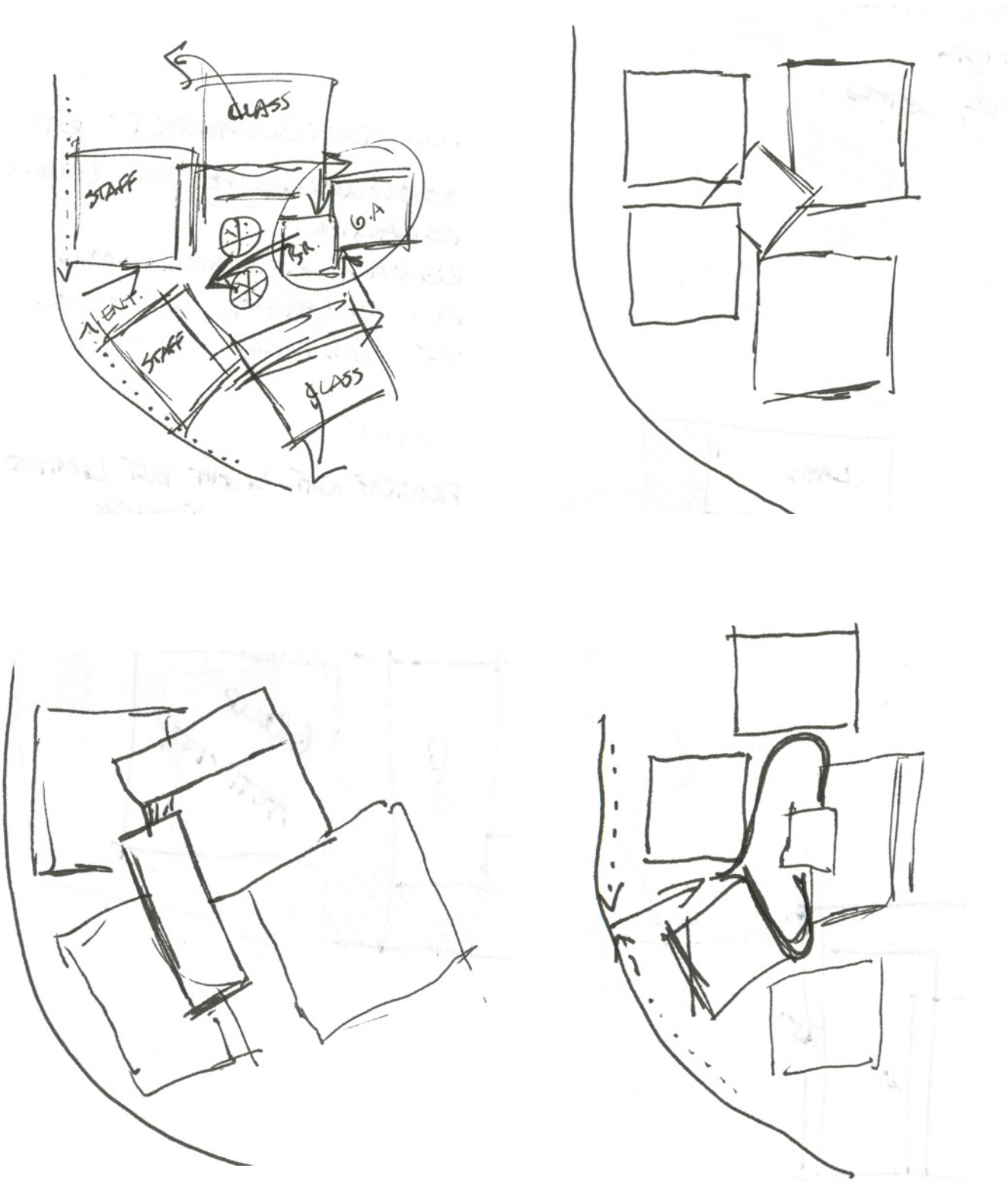


Figure 76 *Spatial Arrangement Sketches 2*
Hausladen, G. (2013). *Spatial Arrangement Sketches 2*. [Designer]

3D mass modeling

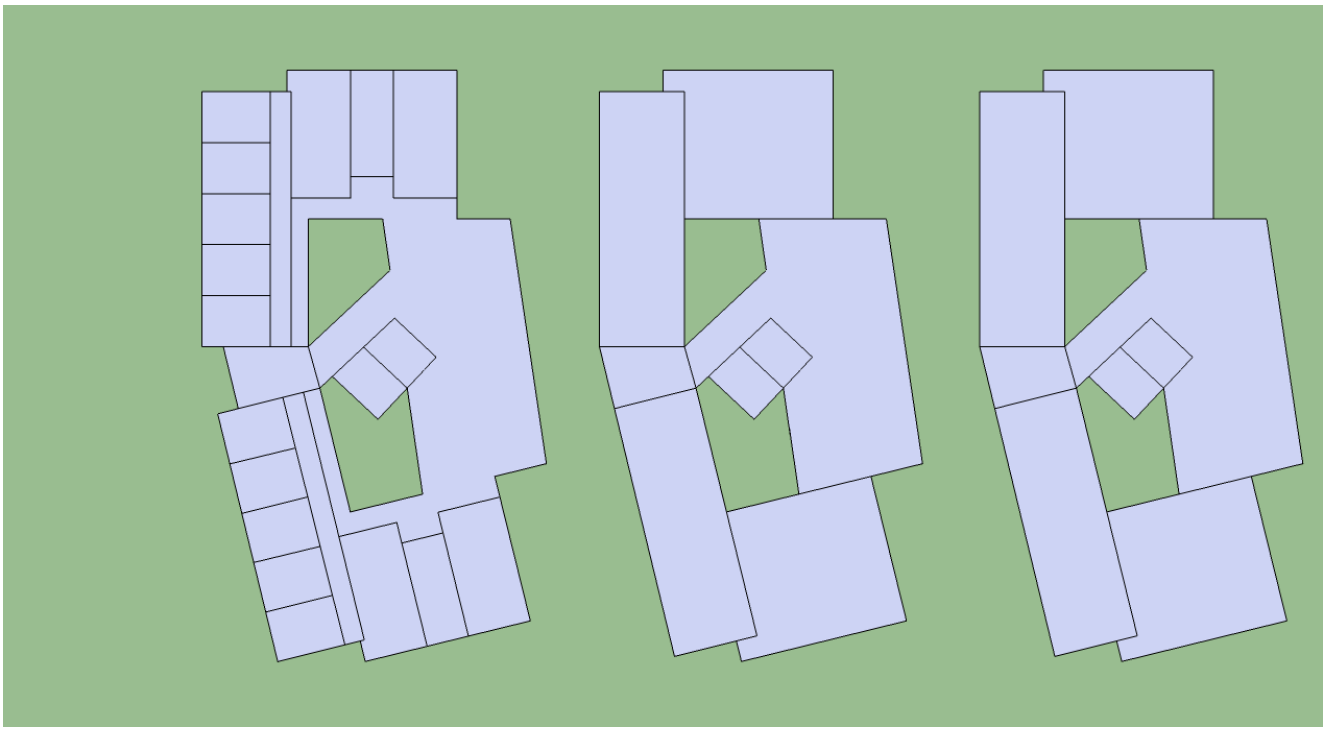


Figure 77 *Sketchup Plan Sketches*
Hausladen, G. (2013). *Sketchup Plan Sketches* [Designer]

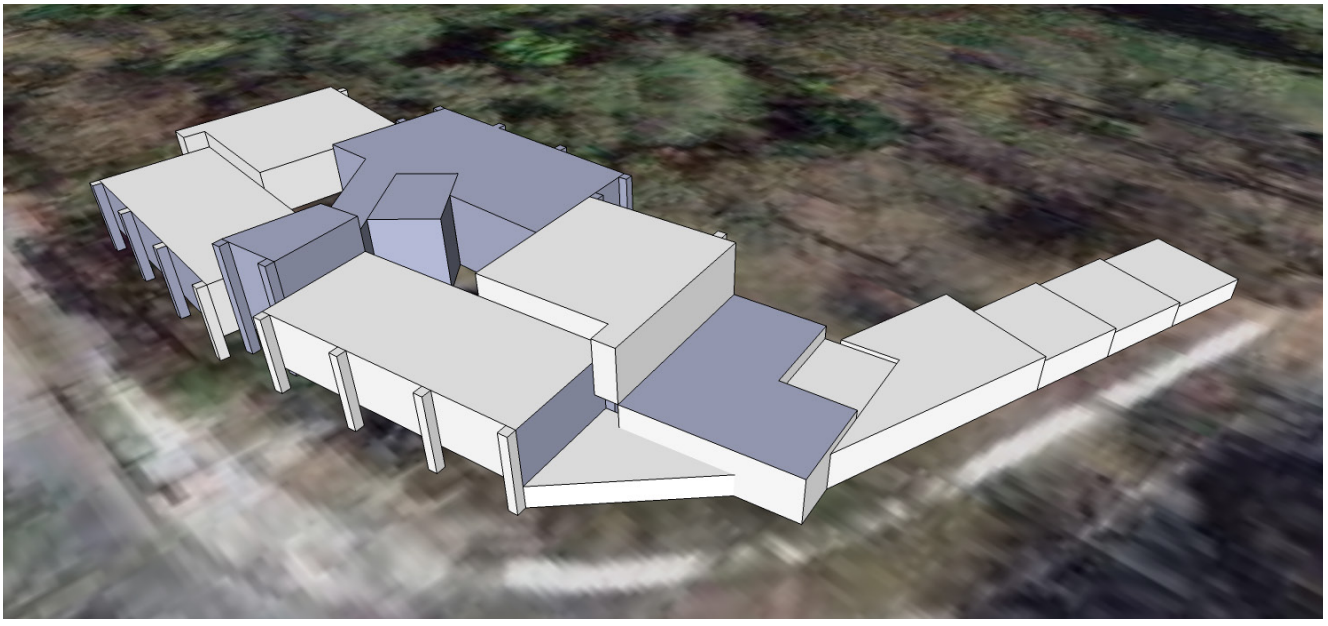


Figure 78 *3D Massing 1*
Hausladen, G. (2013). *3D Massing 1*. [Designer]

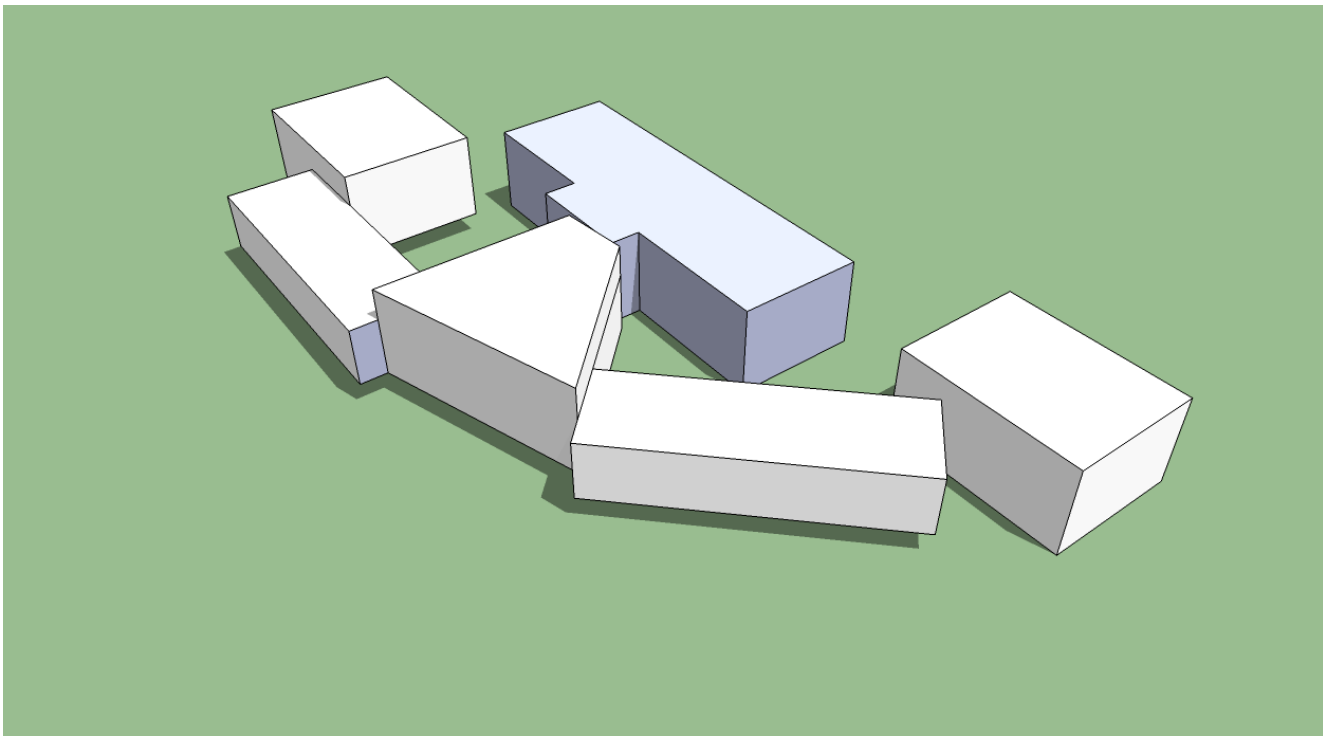


Figure 79 *3D Massing 2*
Hausladen, G. (2013). *3D Massing 2*.
[Designer]

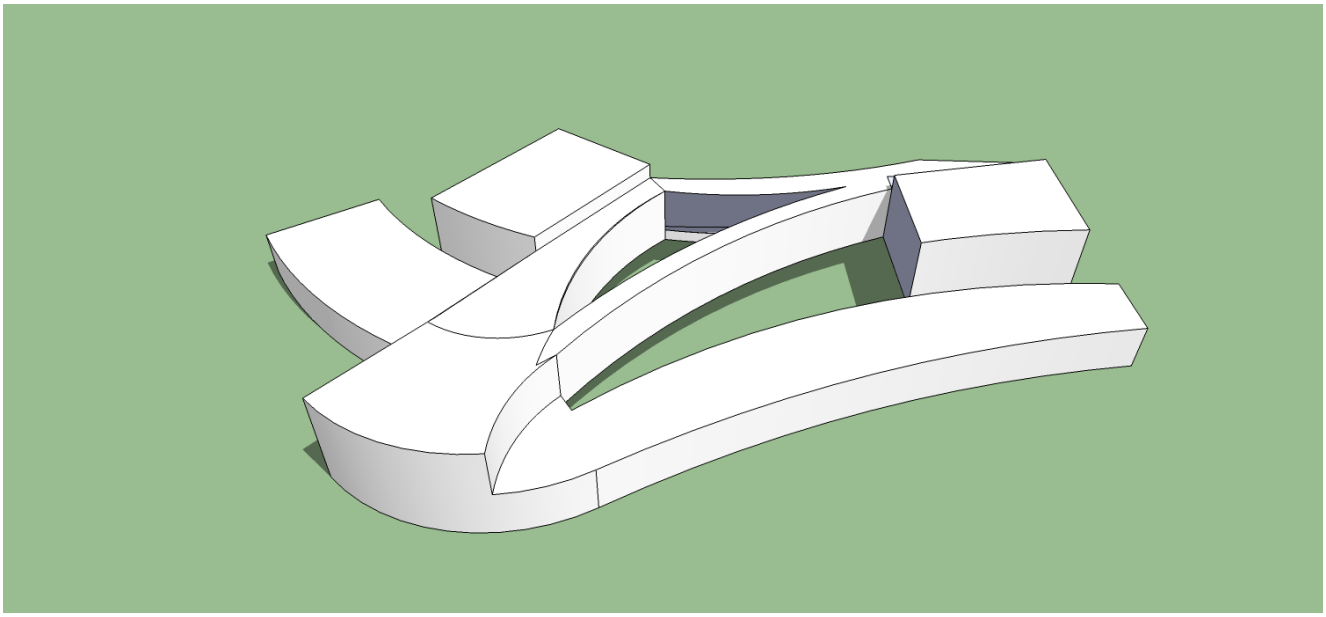


Figure 80 *3D Massing 3*
Hausladen, G. (2013). *3D Massing 3*.
[Designer]

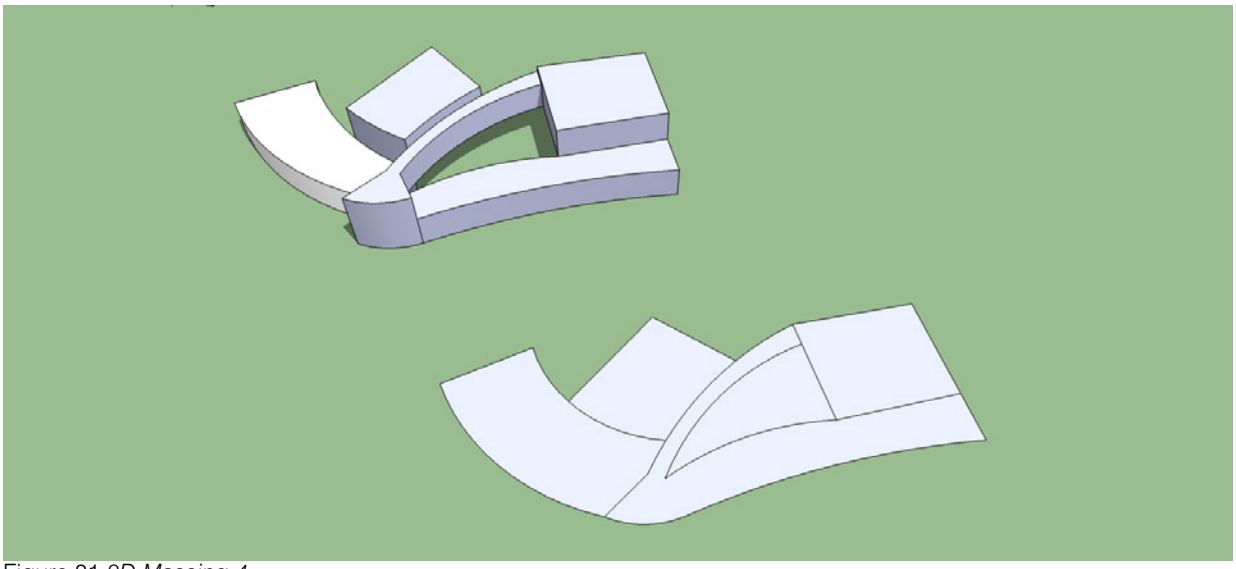


Figure 81 *3D Massing 4*
Hausladen, G. (2013). *3D Massing 4*.
[Designer]

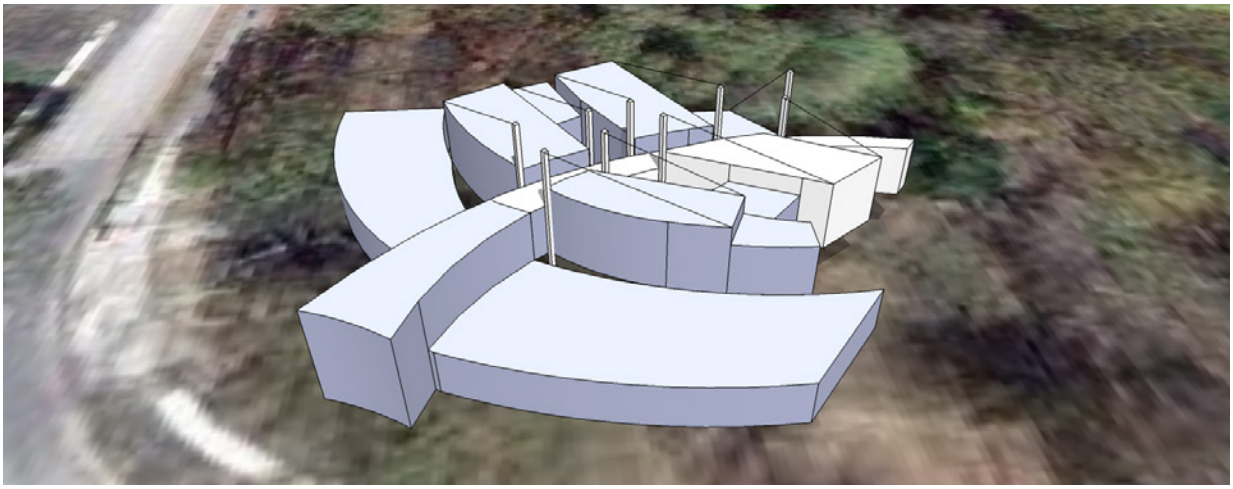


Figure 82 *3D Massing 5*
Hausladen, G. (2013). *3D Massing 5*.
[Designer]

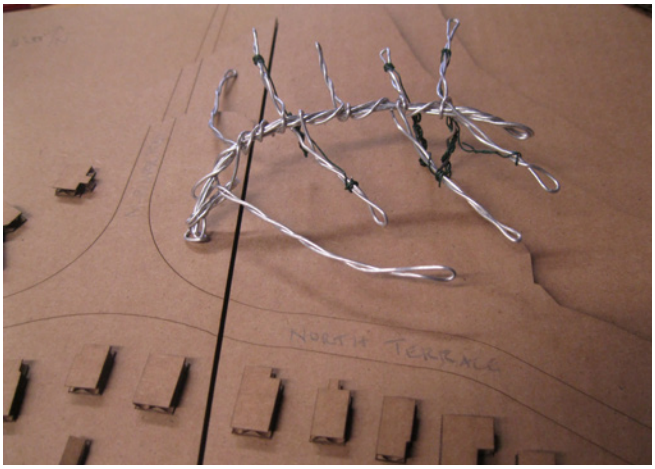


Figure 83 *Process Model 6a*
Hausladen, G. (2013). *Process Model 6a*.
[Designer, Photographer]

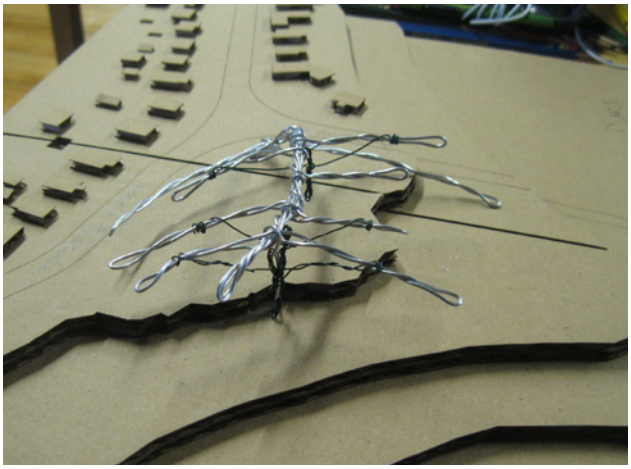


Figure 84 *Process Model 6b*
Hausladen, G. (2013). *Process Model 6b*.
[Designer, Photographer]

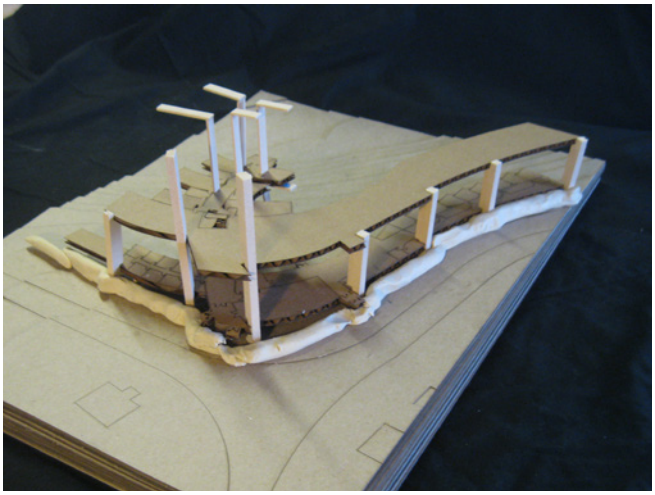


Figure 85 *Process Model 7a*
Hausladen, G. (2013). *Process Model 7a*.
[Designer, Photographer]

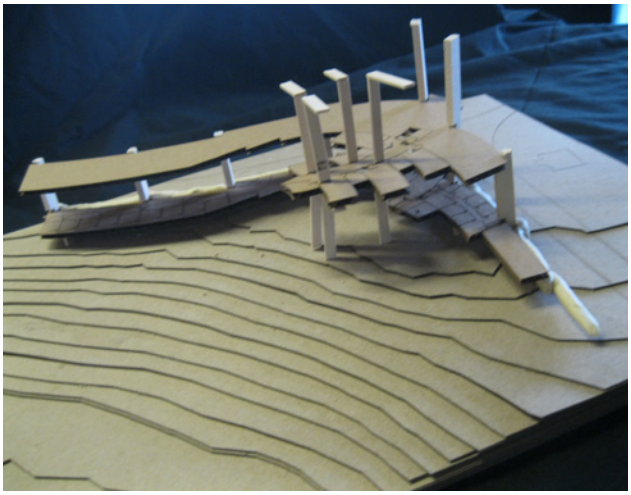
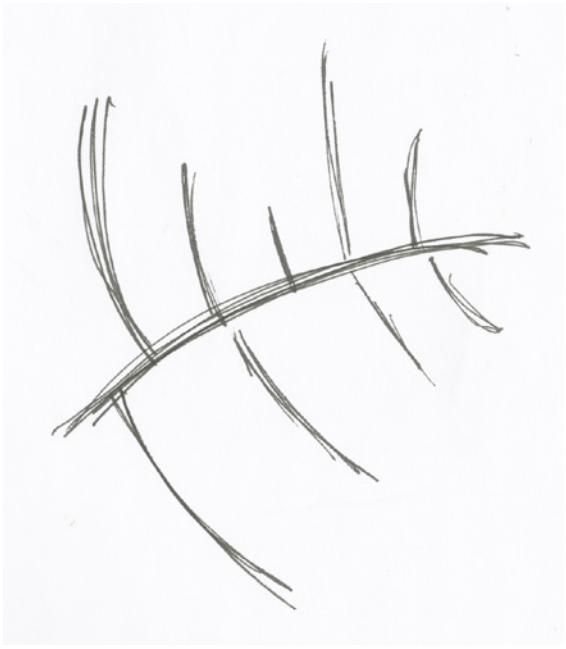


Figure 86 *Process Model 7b*
Hausladen, G. (2013). *Process Model 7b*.
[Designer, Photographer]



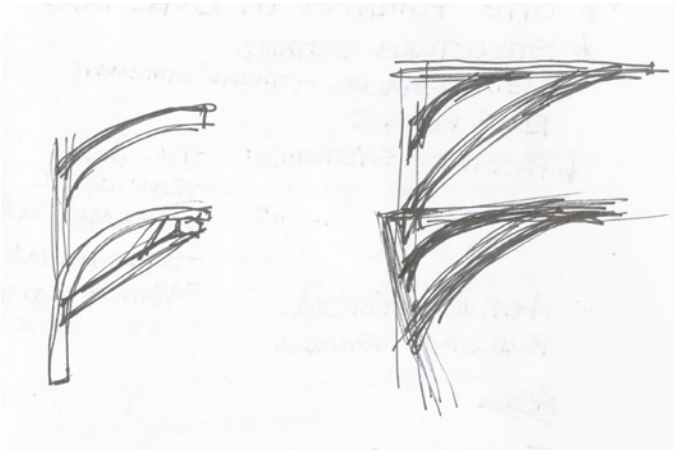
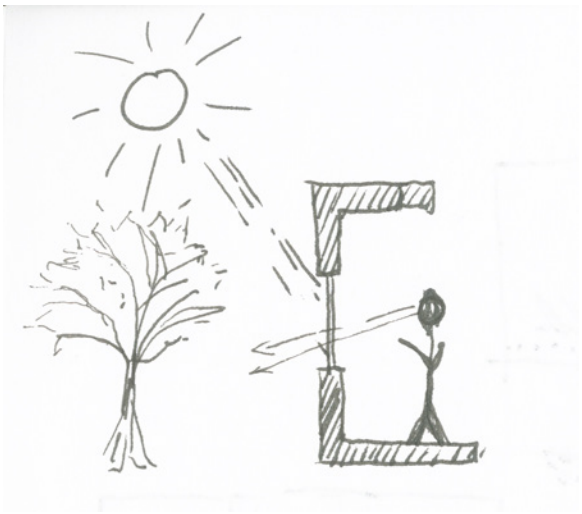
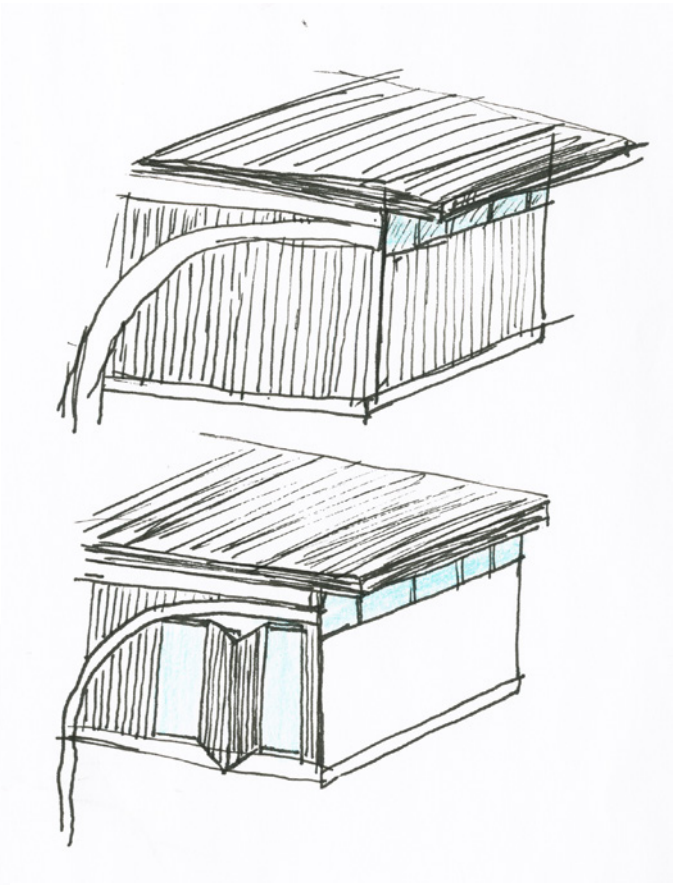
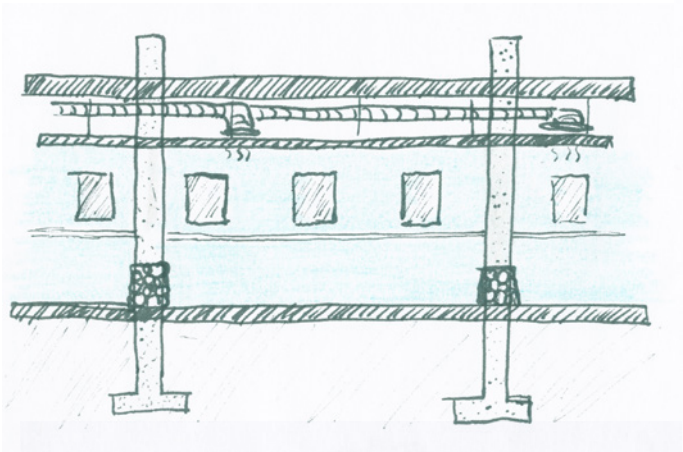


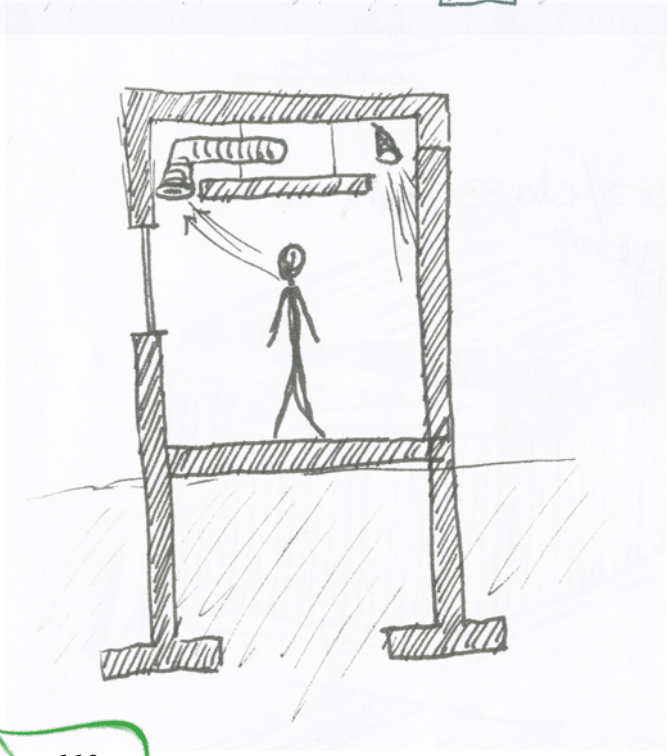
Figure 87 *Process Sketches 3*
Hausladen, G. (2013). *Process Sketches 3*.
[Designer]

process sketches









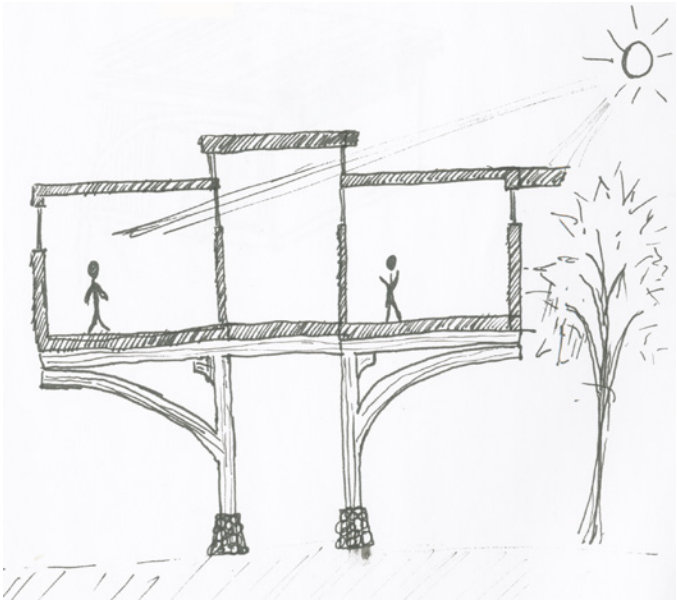
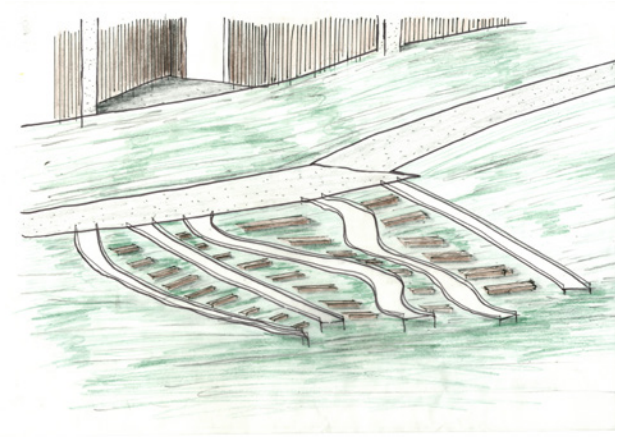
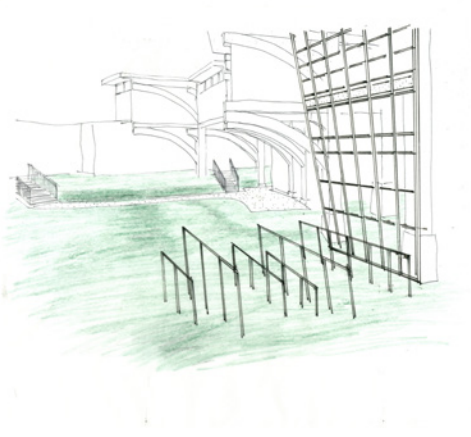
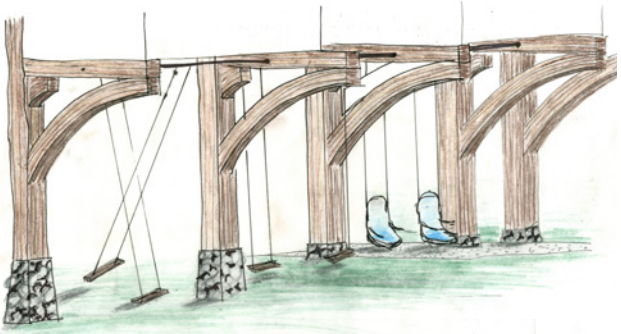
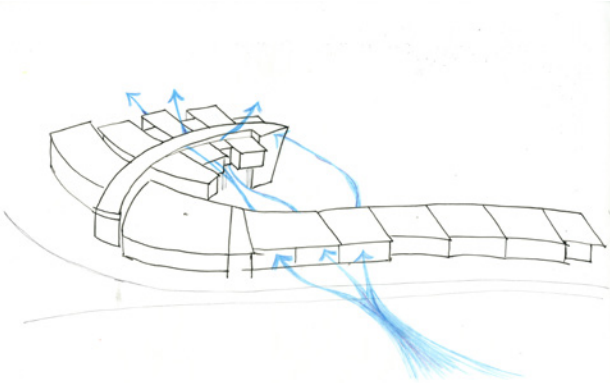


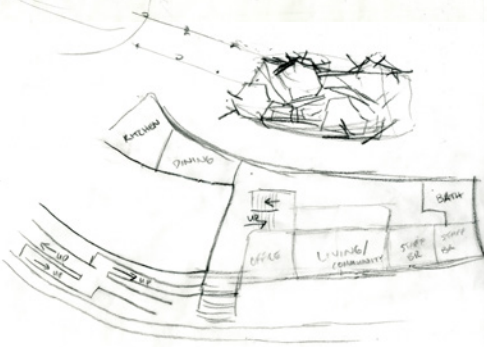
Figure 88 *Process Sketches 4*
Hausladen, G. (2013). *Process Sketches 4*. [Designer]











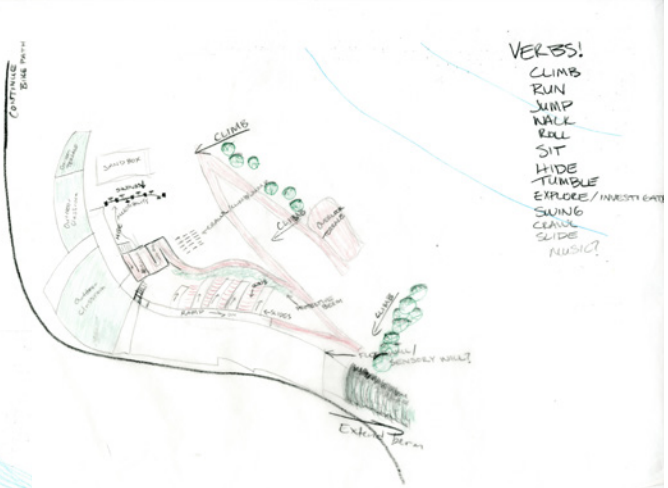


Figure 89 *Process Sketches 5*
Hausladen, G. (2013). *Process Sketches 5*. [Designer]

midterm

Figure 90 *Midterm Exterior Perspective 1*
Hausladen, G. (2013). *Midterm Exterior Perspective 1*. [Designer]

Figure 91 *Midterm Exterior Perspective 2*
Hausladen, G. (2013). *Midterm Exterior Perspective 2*. [Designer]

final design

small site plan

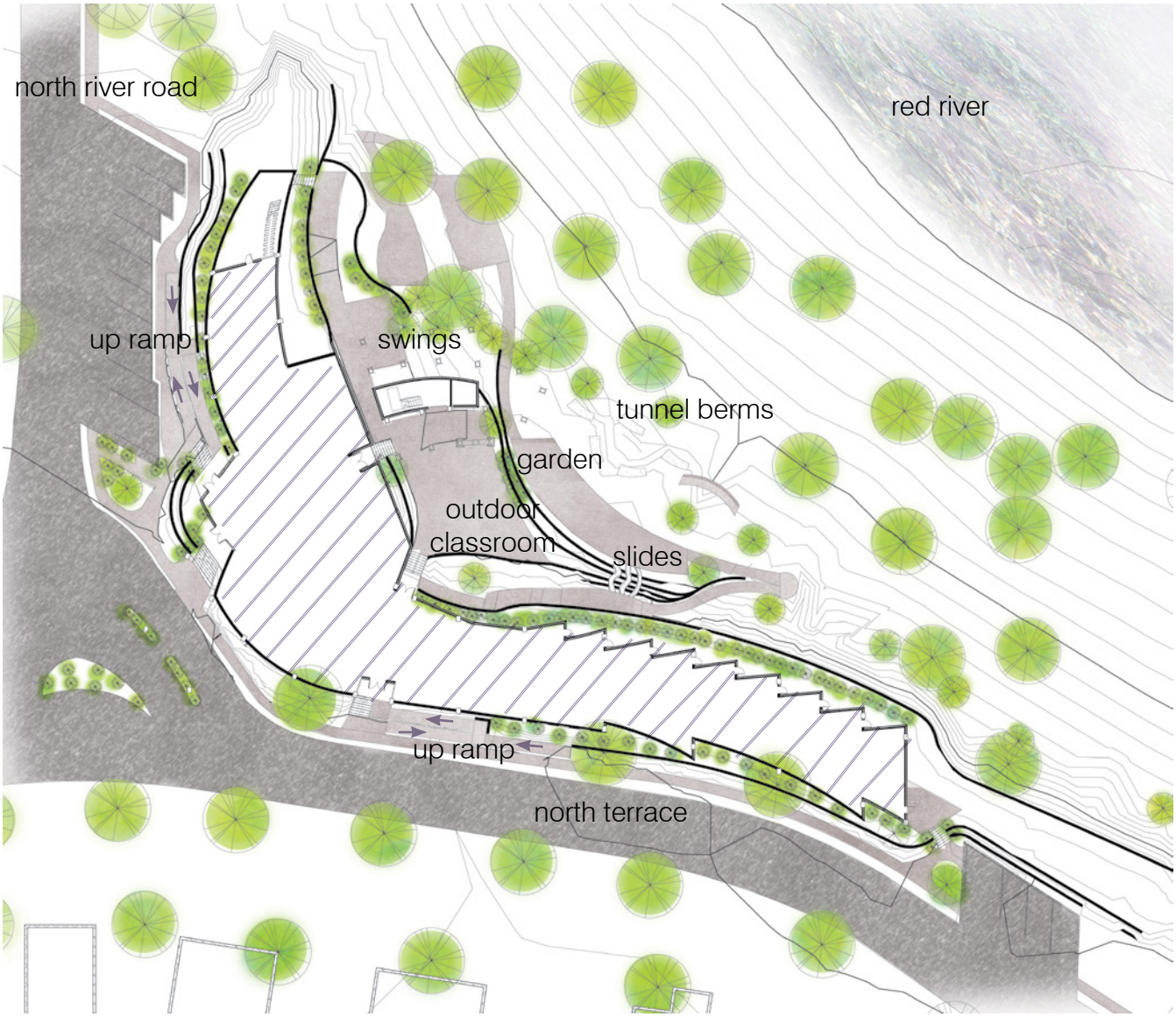


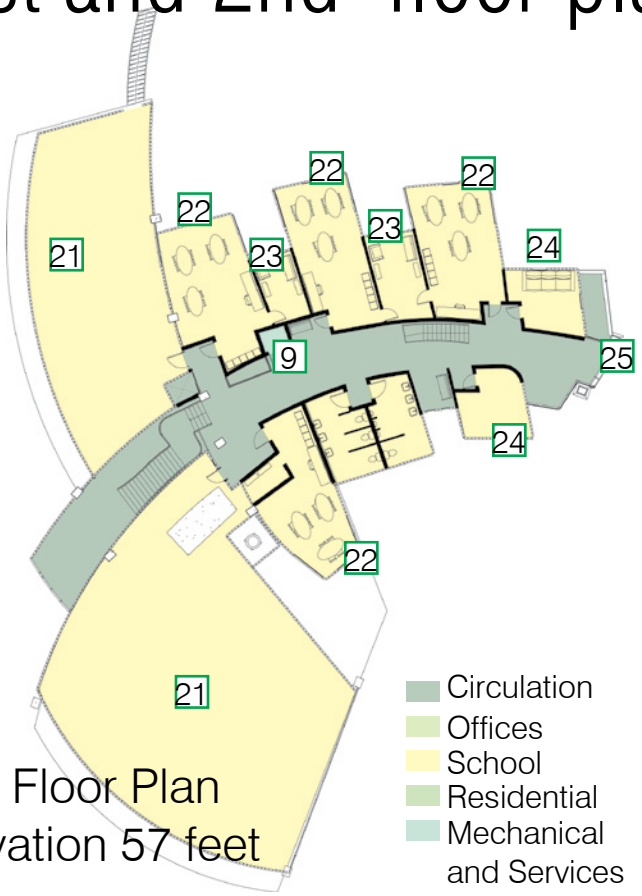
Figure 92 *Final Small Site Plan*
Hausladen, G. (2013). *Final Small Site Plan*. [Designer]

Ground
Elevation 40 feet

This Ground Floor Diagram shows the site design elements in relation to the building access points. In this cut, the building footprint is shown in order to see the relationship, but is actually cut through the ground, which can be seen more clearly in the Residential Section Perspective.

1st and 2nd floor plans

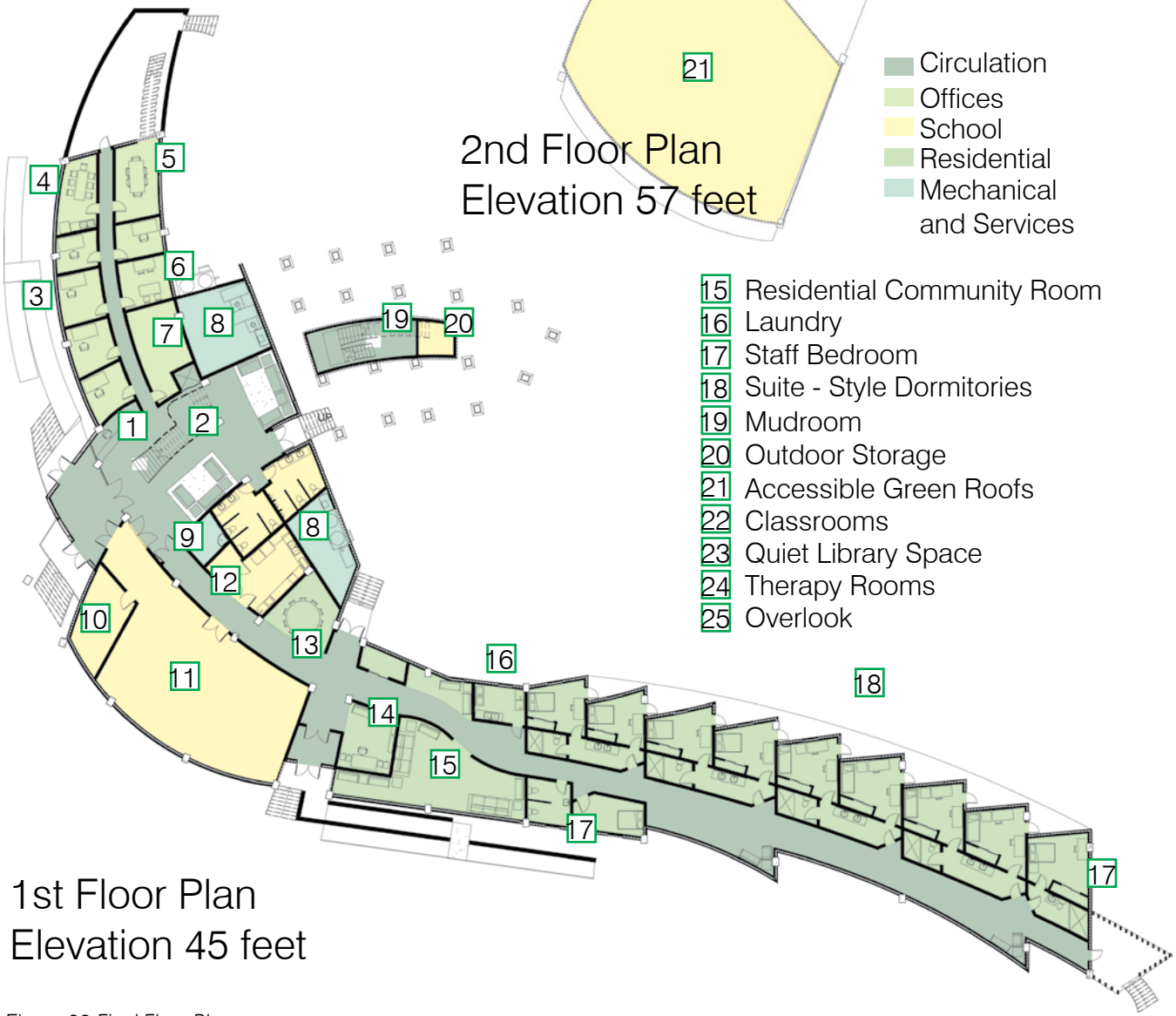
1 Reception
2 Atrium
3 Offices
4 Break Room
5 Conference
6 Work Room
7 Storage
8 Mechanical
9 Janitor Closet
10 Group Activity Storage
11 Group Activity / Cafeteria / Flex Space
12 Kitchen
13 Dining Room
14 Residential Office



2nd Floor Plan
Elevation 57 feet

Circulation
Offices
School
Residential
Mechanical and Services

15 Residential Community Room
16 Laundry
17 Staff Bedroom
18 Suite - Style Dormitories
19 Mudroom
20 Outdoor Storage
21 Accessible Green Roofs
22 Classrooms
23 Quiet Library Space
24 Therapy Rooms
25 Overlook



1st Floor Plan
Elevation 45 feet

Figure 93 *Final Floor Plans*
Hausladen, G. (2013). *Final Floor Plans*. [Designer]

bird's eye perspective

Figure 94 *Final Bird's Eye Perspective*
Hausladen, G. (2013). *Final Bird's Eye Perspective*.
[Designer]

Structural Materials:
Concrete columns 18 x 24, timber columns 18 x 24, two-way concrete slab, CMU up to 3' then steel studs

Building Facade:
Fieldstone covering CMUs and retaining walls, Cedar tongue and groove siding

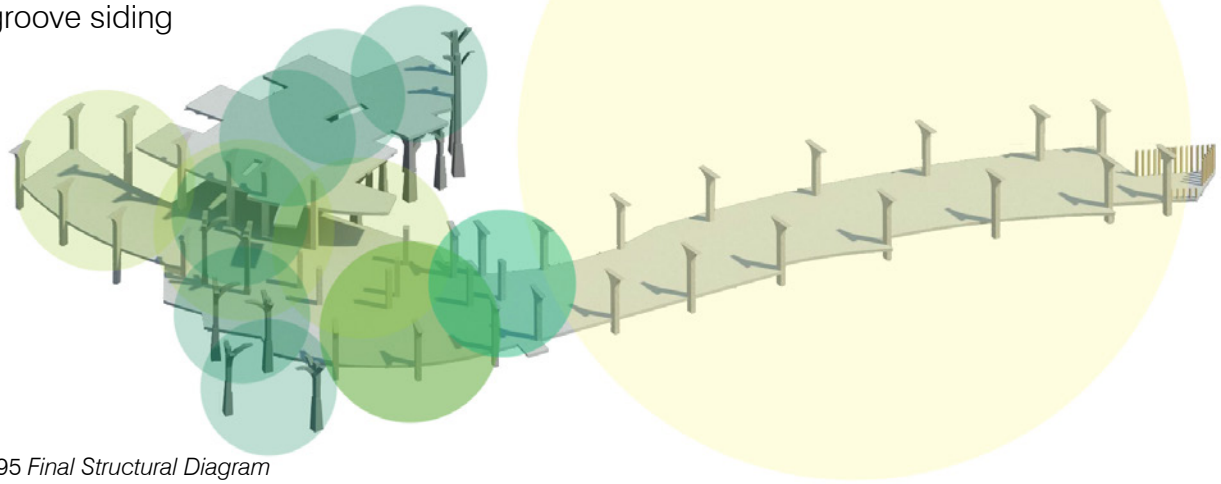


Figure 95 *Final Structural Diagram*
Hausladen, G. (2013). *Final Structural Diagram.*
[Designer]

front entry perspective

Figure 96 *Final Entry Perspective*
Hausladen, G. (2013). *Final Entry Perspective.* [Designer]

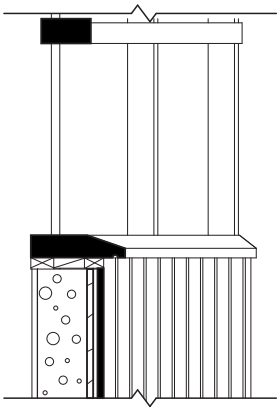
The final design is the result of countless design explorations and decisions throughout the course of the semester. The curves in the overall form are a response to the streetscape as well as to the flow of the river. The great length of the building is to help maintain the flood protection to the surrounding neighborhood and to maintain the visual protective element the site currently has with a clay dike. The school wing that is elevated in the back is intentionally tree-house-like. This gesture not only protects the school from floodwaters, but also literally lifts the students away from ground-level stimulation and distraction to fully integrate them with nature in the treetops.

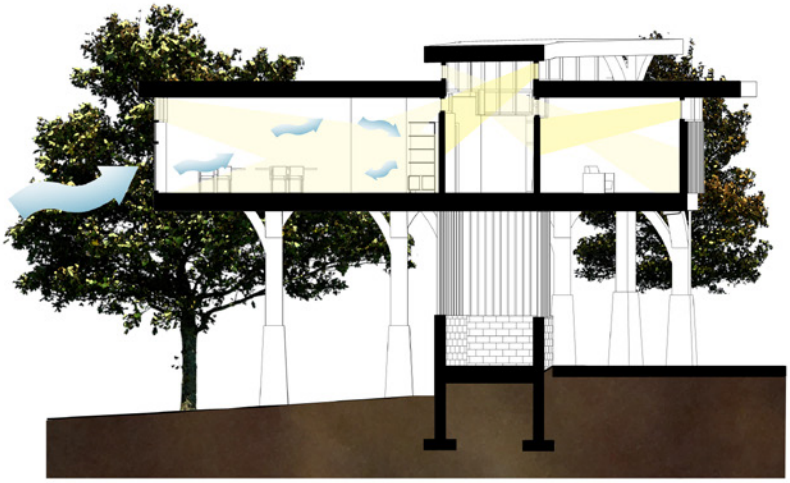
The entirety of the school is visually and programmatically broken down to feel more personal and individualized. Spaces are broken down even further, as can be seen in plan and in interior perspectives, to ease transitions between spaces, encourage socialization, and allow areas of relief if the larger spaces become overwhelming.

atrium perspective

Figure 97 *Final Atrium Perspective*
Hausladen, G. (2013). *Final Atrium Perspective.* [Designer]

Lighting is very carefully controlled in all of the spaces. In classrooms, overhangs, clerestories and high transom windows provide diffuse natural light while limiting distracting views. Walls on tracks, however, can be moved by teachers if class behavior will allow for more views. Artificial lighting is all uplighting to avoid hazardous glare and high contrast. Natural ventilation is provided by operable windows.





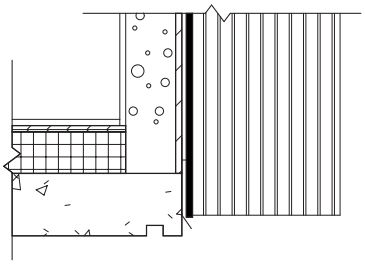
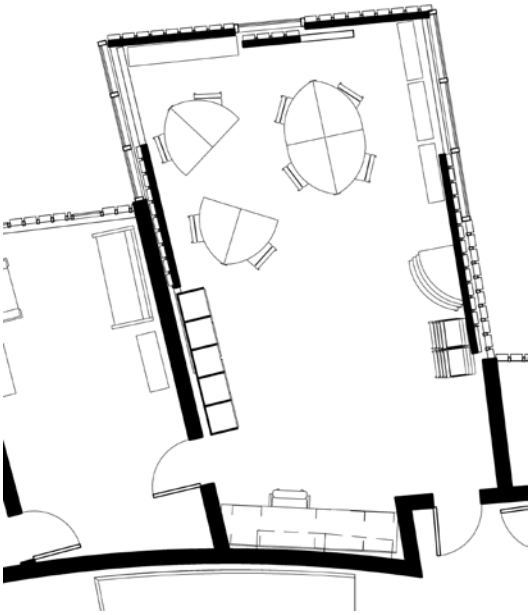


Figure 98 *Final Classroom Wing Section and Details*
Hausladen, G. (2013). *Final Classroom Wing Section and Details.* [Designer]

classroom section perspective

Figure 99 *Final Classroom Section Perspective and Details*
Hausladen, G. (2013). *Final Classroom Section Perspective and Details.* [Designer]

As children with autism all have different needs, the learning spaces are flexible and adaptive. Tables can be rearranged to seat 1, 2, 3, or 4 children depending on children's social and communication skills and needs. Seating is flexible with this table design, which can accommodate basic chairs and benches, as well as bouncy balls. Carpet tile flooring with wood laminate below allows children to personalize the textures in their personal space. The HVAC system is covered by the suspended ceiling in all areas of the interior except within 3 feet of each interior wall. This visually eliminates the busyness of the systems at most points in the building, but allows children to explore near the edges of the walls to learn about the HVAC if interested. The quiet library spaces between classrooms act as a noise barrier between the busy classrooms and as a place for children to take a break if they cannot behave or focus in the classroom.



hvac plans

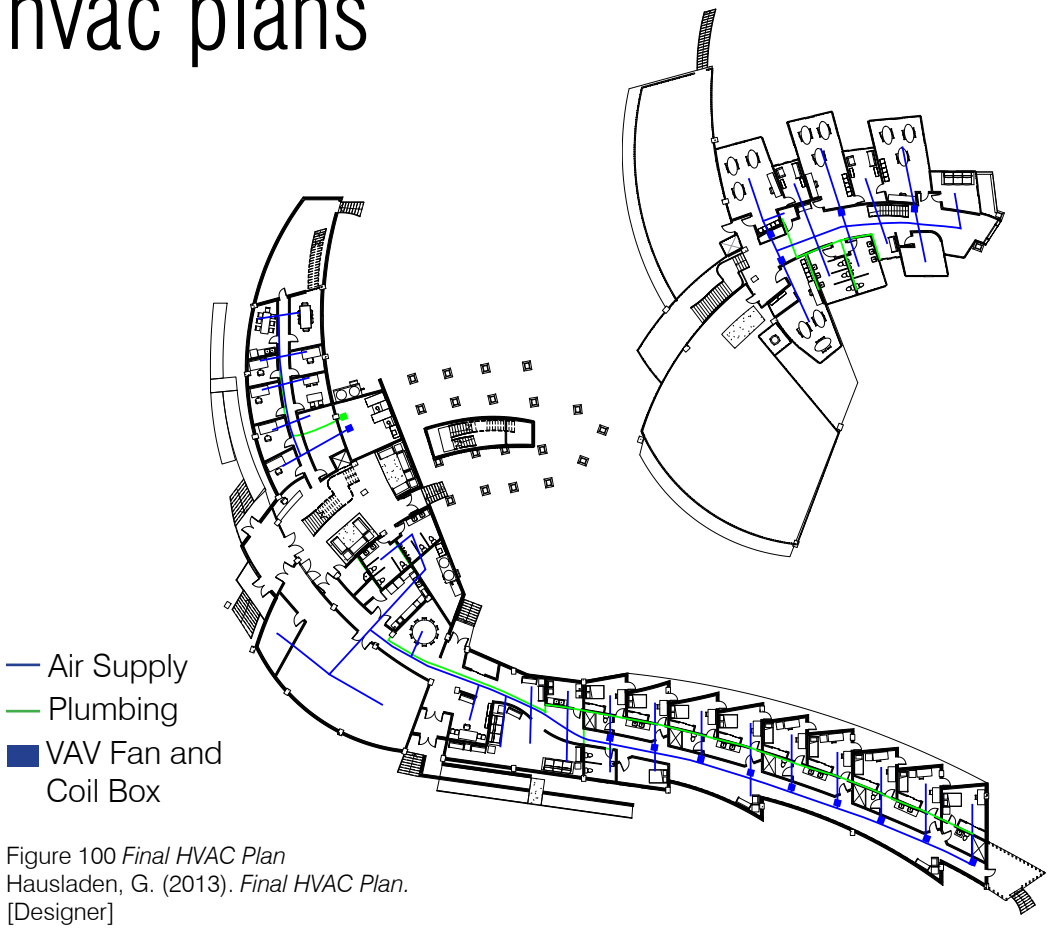


Figure 100 *Final HVAC Plan*
Hausladen, G. (2013). *Final HVAC Plan.* [Designer]

flood foundation

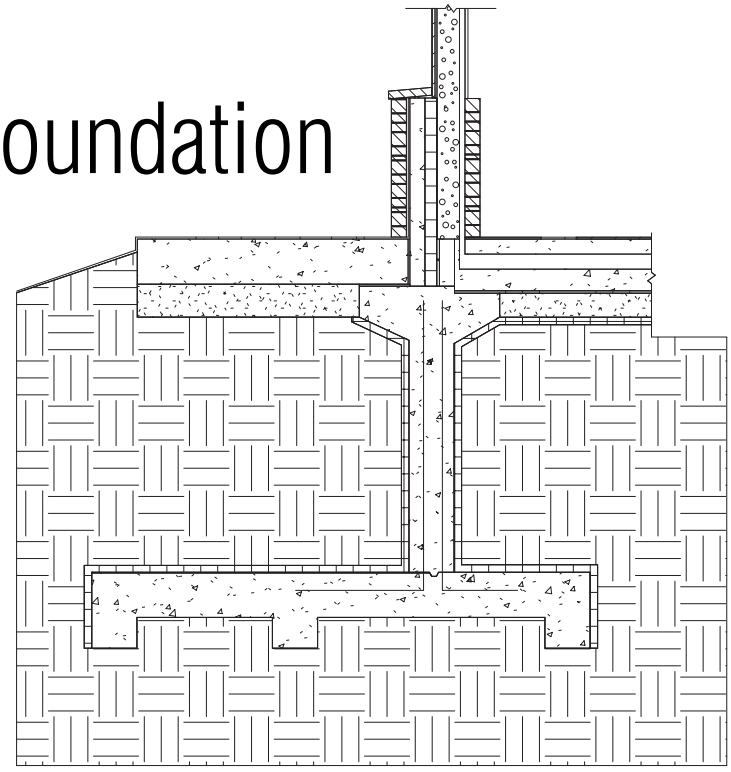
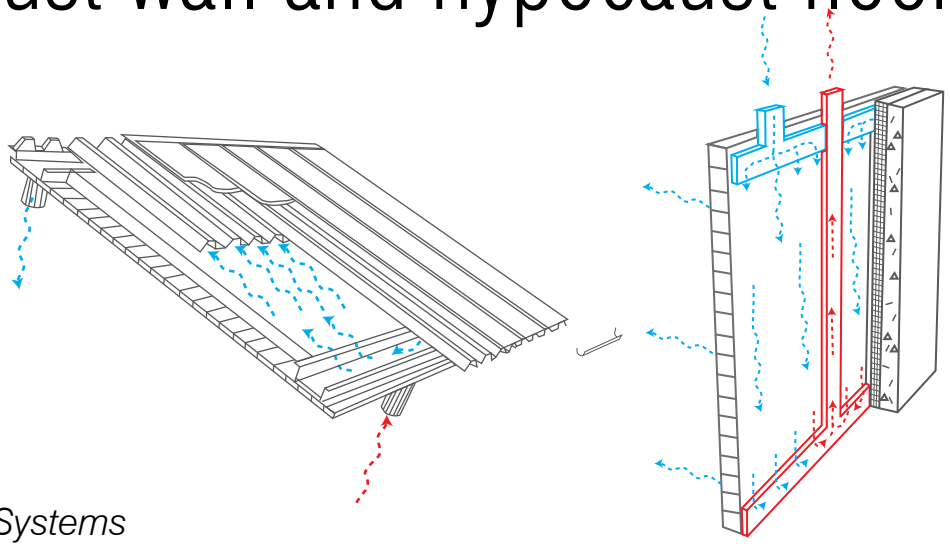


Figure 101 *Final Floodwall Detail*
Hausladen, G. (2013). *Final Floodwall Detail.* [Designer]

murocaust wall and hypocaust floor



Active and Passive Air Systems

The HVAC system is Variable Air Volume (VAV), which allows for personal control of air flow and temperature to the residential units and classrooms. Fan and coil boxes are in the hallways to hinder excess noise in the bedrooms. When viable, the murocaust wall and hypocaust floor system will provide a more uniform distribution of heat.

Flood Considerations

The floodwall foundation is a proposed adaptation from that used in the current floodwall in Grand Forks, North Dakota. I have proposed that it be integrated into the building to protect the building from potential floodwater pressure. The retaining walls would probably need a similar foundation. Geotextiles would also be integrated into the hill to prevent erosion. These were found in the levees that did not fail in New Orleans during Hurricane Katrina (Dendurent, 2009). This is not an engineering project, it is simply an exploration of a potential method to enhance protection without cost considerations.

residential section perspective

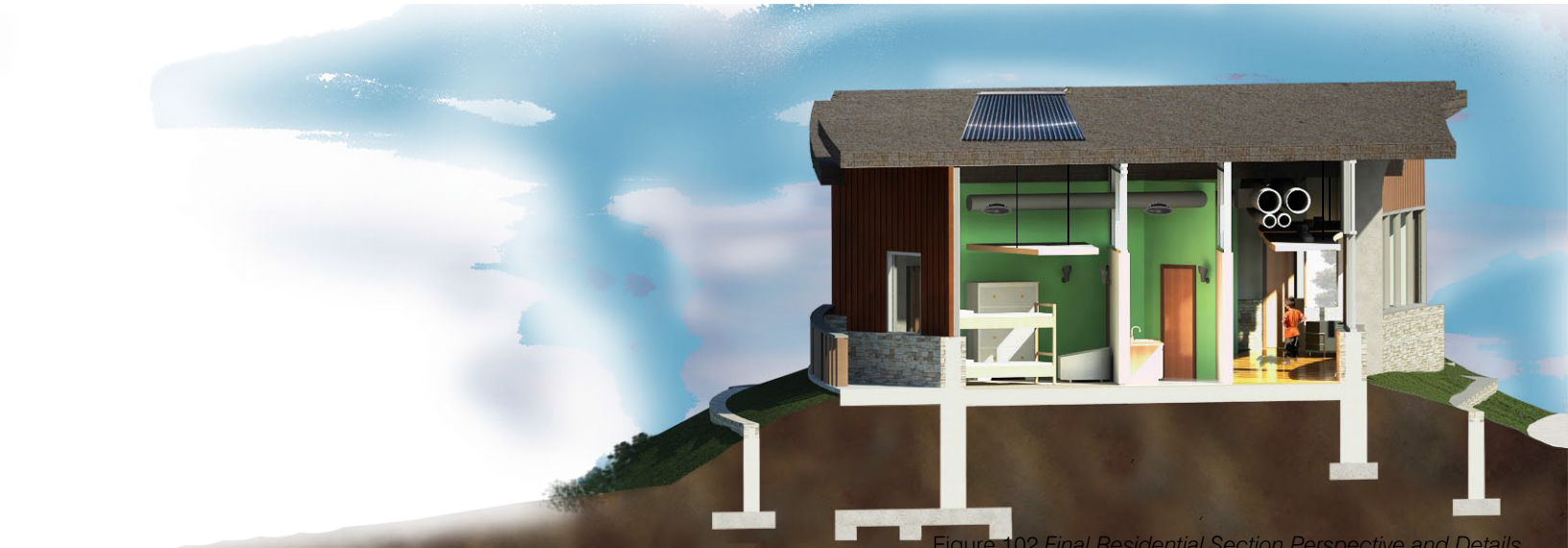


Figure 102 *Final Residential Section Perspective and Details*
Hausladen, G. (2013). *Final Residential Section Perspective and Details.* [Designer]

flood progression

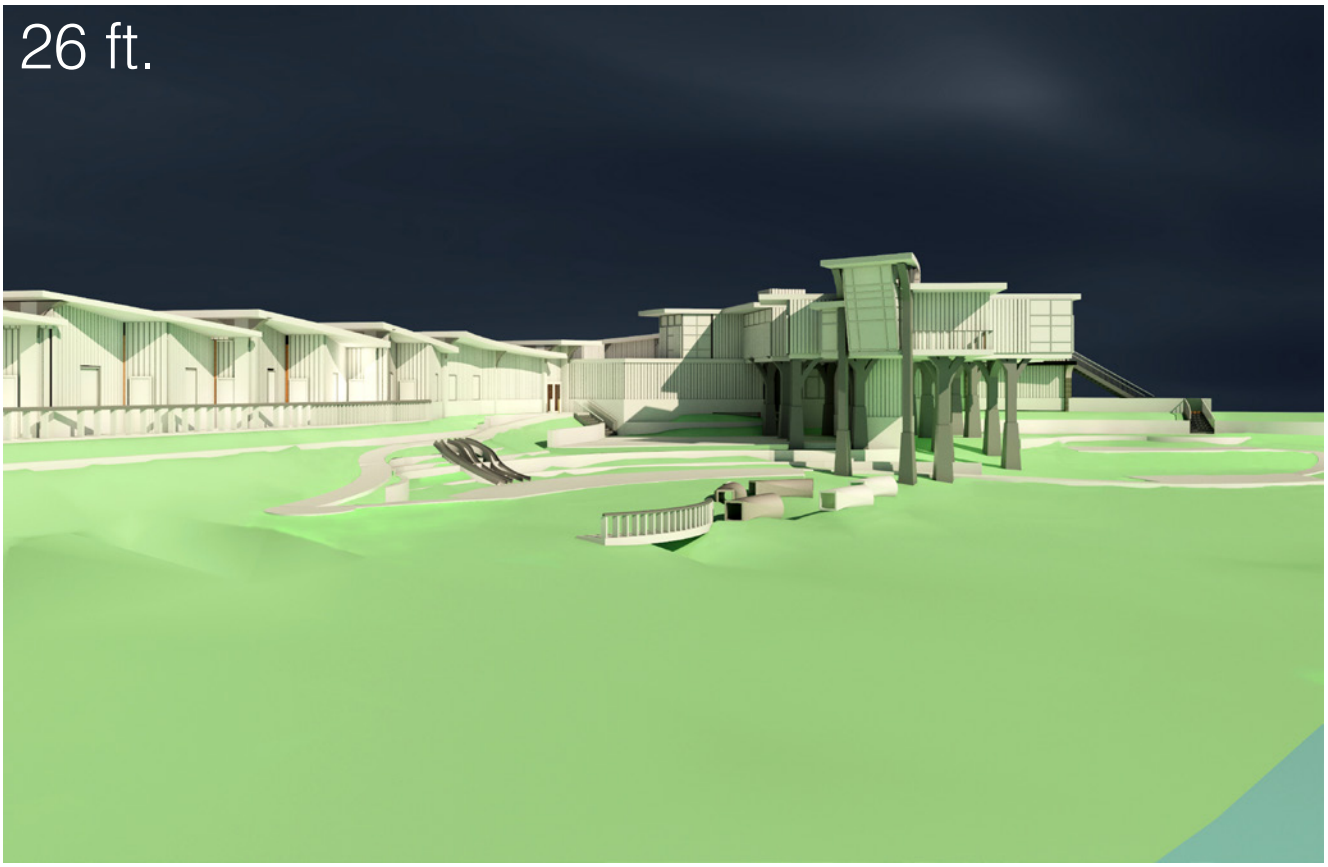
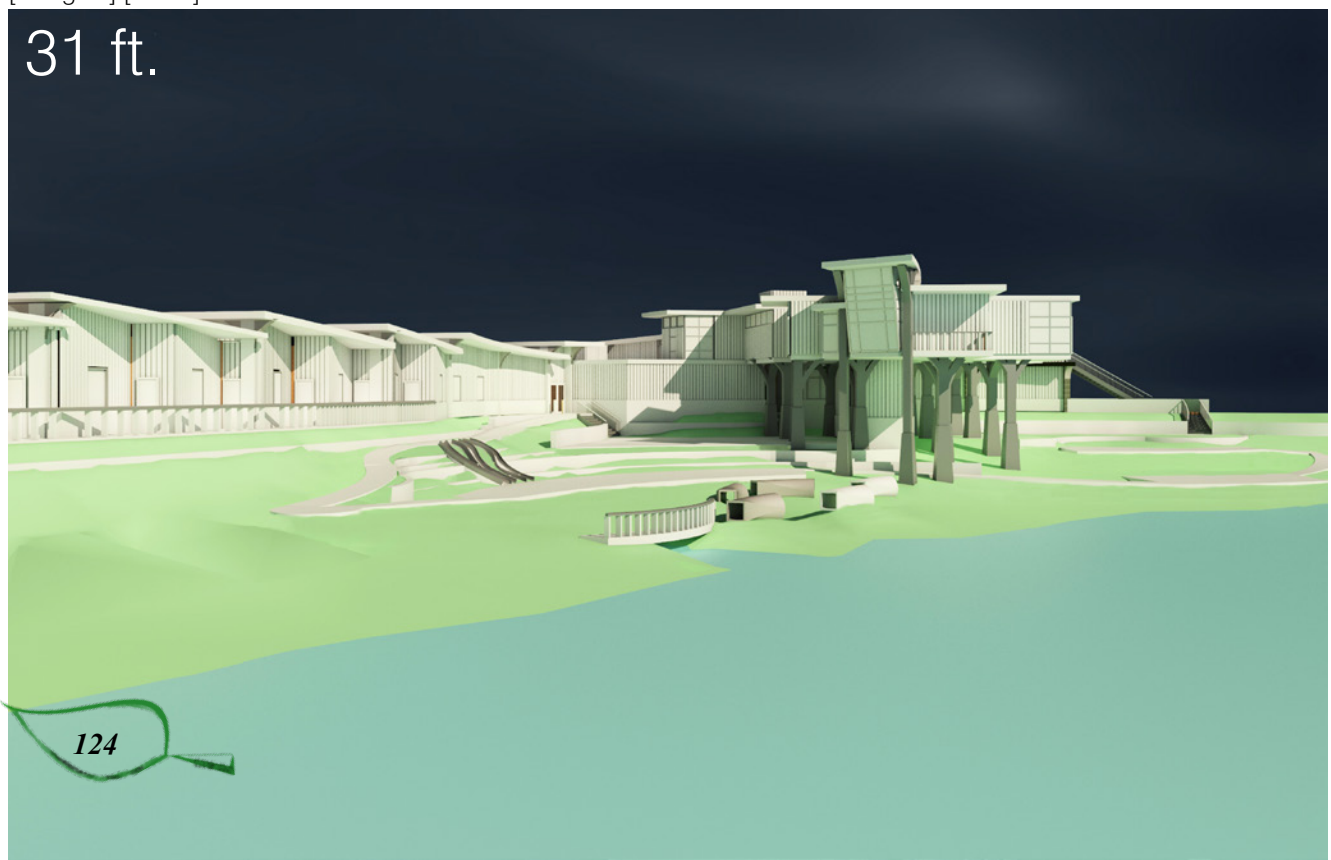


Figure 103 *Final Flood Progression 26 Feet*
Hausladen, G. (2013). *Final Flood Progression 26 Feet.* [Designer] [top]

Figure 104 *Final Flood Progression 31 Feet*
Hausladen, G. (2013). *Final Flood Progression 31 Feet.* [Designer] [below]



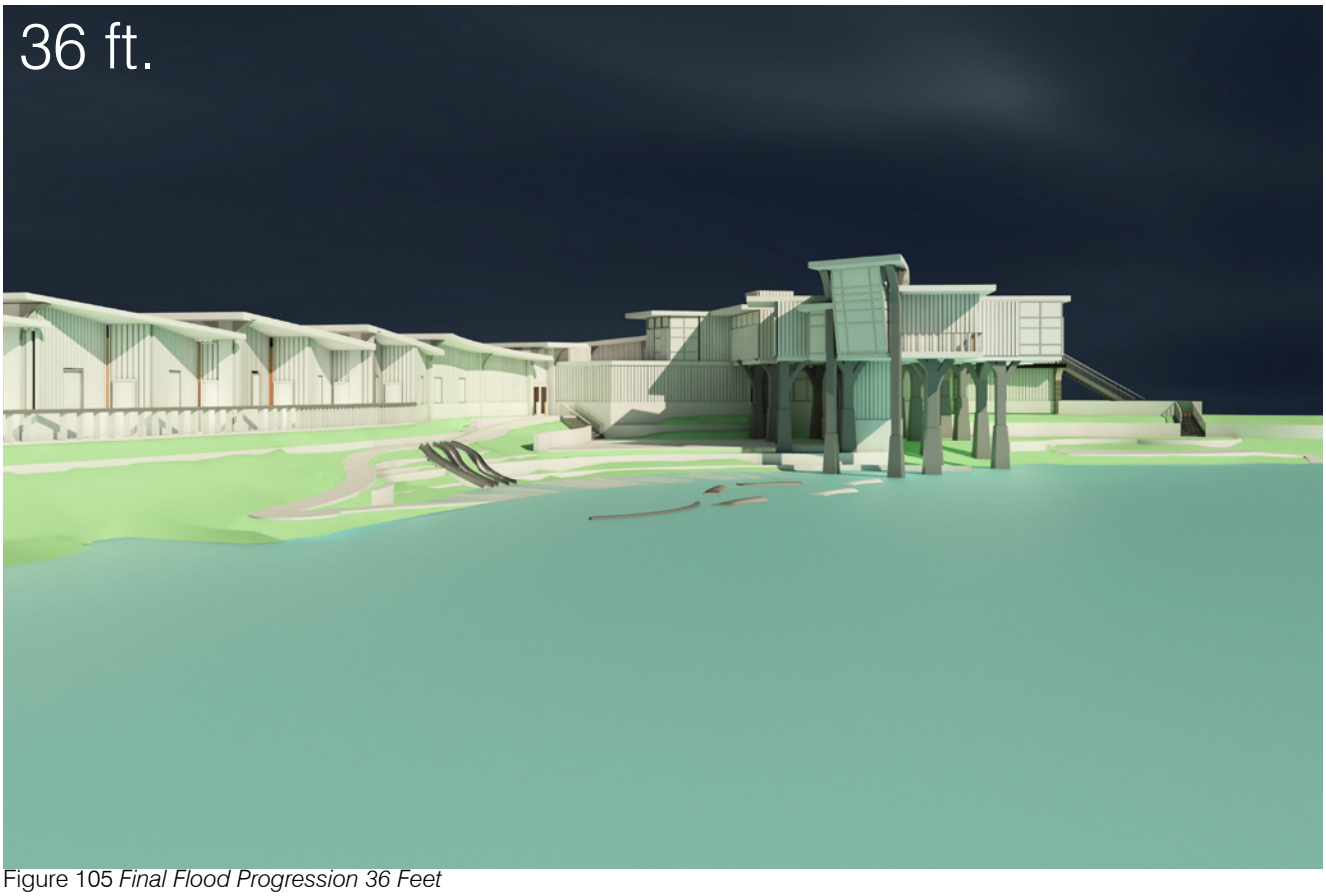
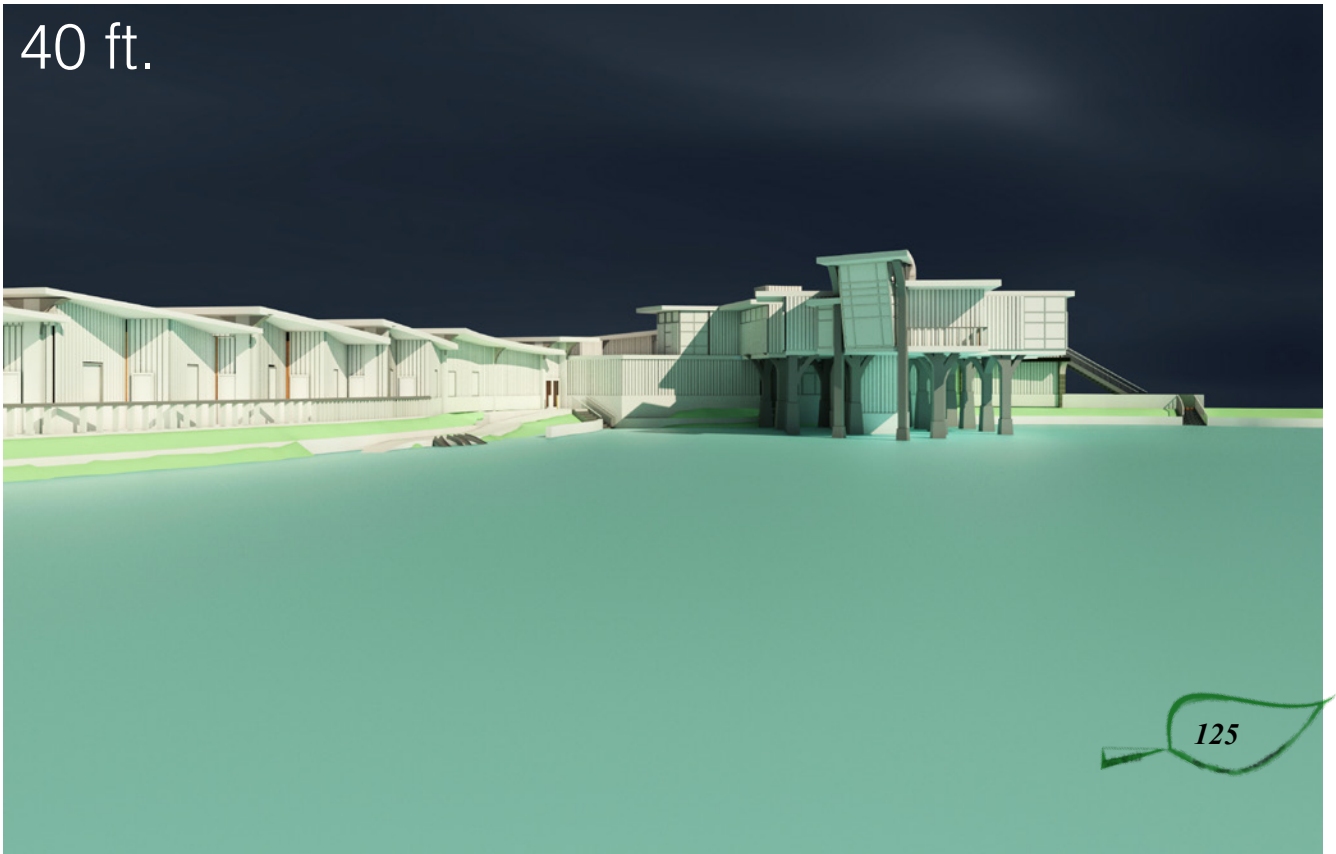


Figure 105 *Final Flood Progression 36 Feet*
Hausladen, G. (2013). *Final Flood Progression 36 Feet.* [Designer] [top]

Figure 106 *Final Flood Progression 40 Feet*
Hausladen, G. (2013). *Final Flood Progression 40 Feet.* [Designer] [below]



floodwall plan

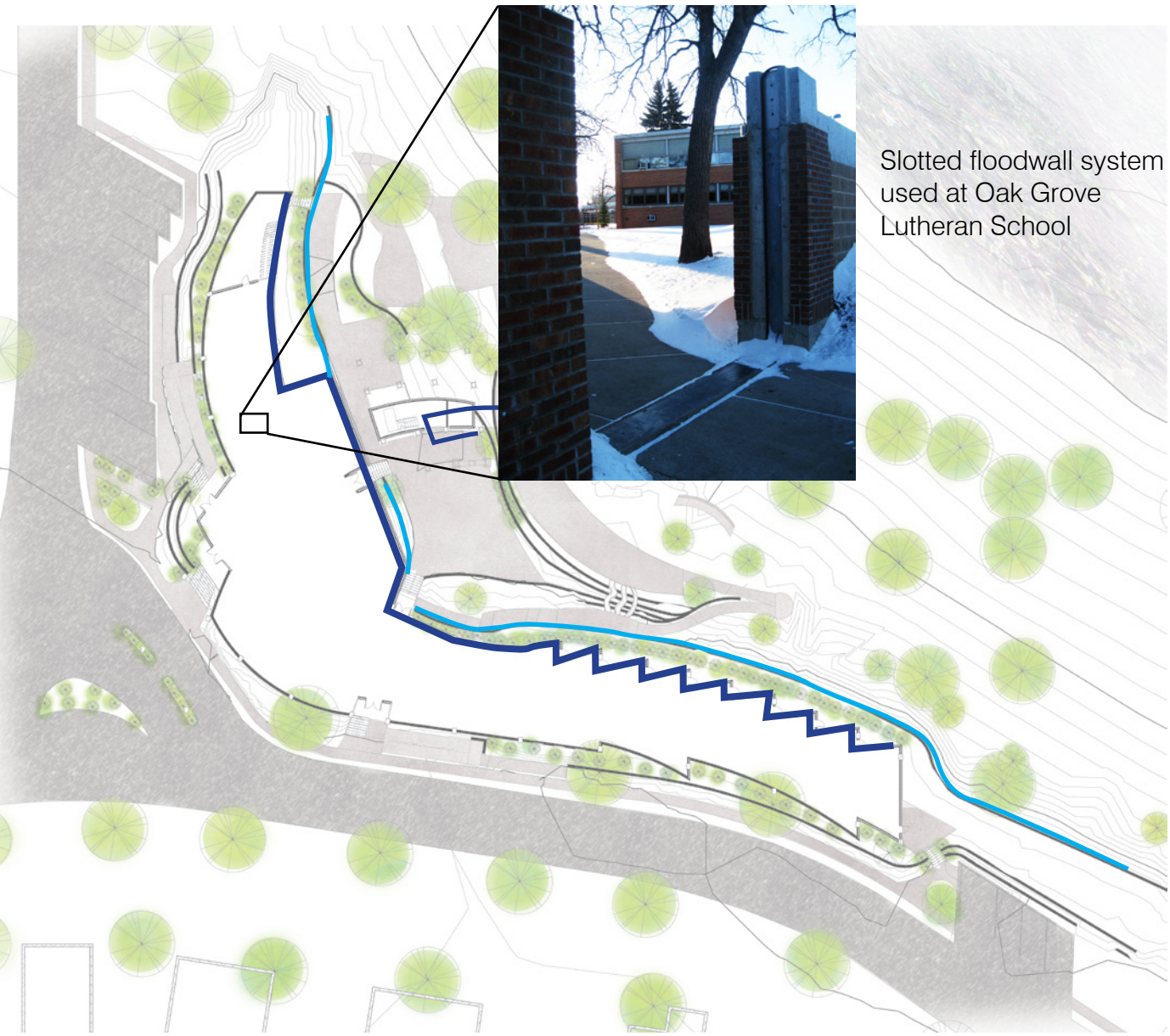


Figure 107 *Final Floodwall Plan*
Hausladen, G. (2013). *Final Floodwall Plan.* [Designer]

The building is fully protected up to 45 feet. Retaining walls protect the landscape and prevent erosion up to 43 feet. For building access where floodwalls break, a slot system is used similar to that in neighboring Oak Grove Lutheran School, where additional wall could slide in to protect the building if an emergency arose.

backyard perspective

Figure 108 *Final Backyard Perspective*
Hausladen, G. (2013). *Final Backyard Perspective.* [Designer]

physical presentation

Figure 117 *Final Presentation Set-up 1*
Hausladen, G. (2013). *Final Presentation Set-up 1.* [Designer] [Photographer]

Figure 118 *Final Presentation Set-up 1a*
Hausladen, G. (2013). *Final Presentation Set-up 1a.* [Designer] [Photographer]

Figure 119 *Final Presentation Set-up 1b*
Hausladen, G. (2013). *Final Presentation Set-up 1b.* [Designer] [Photographer]

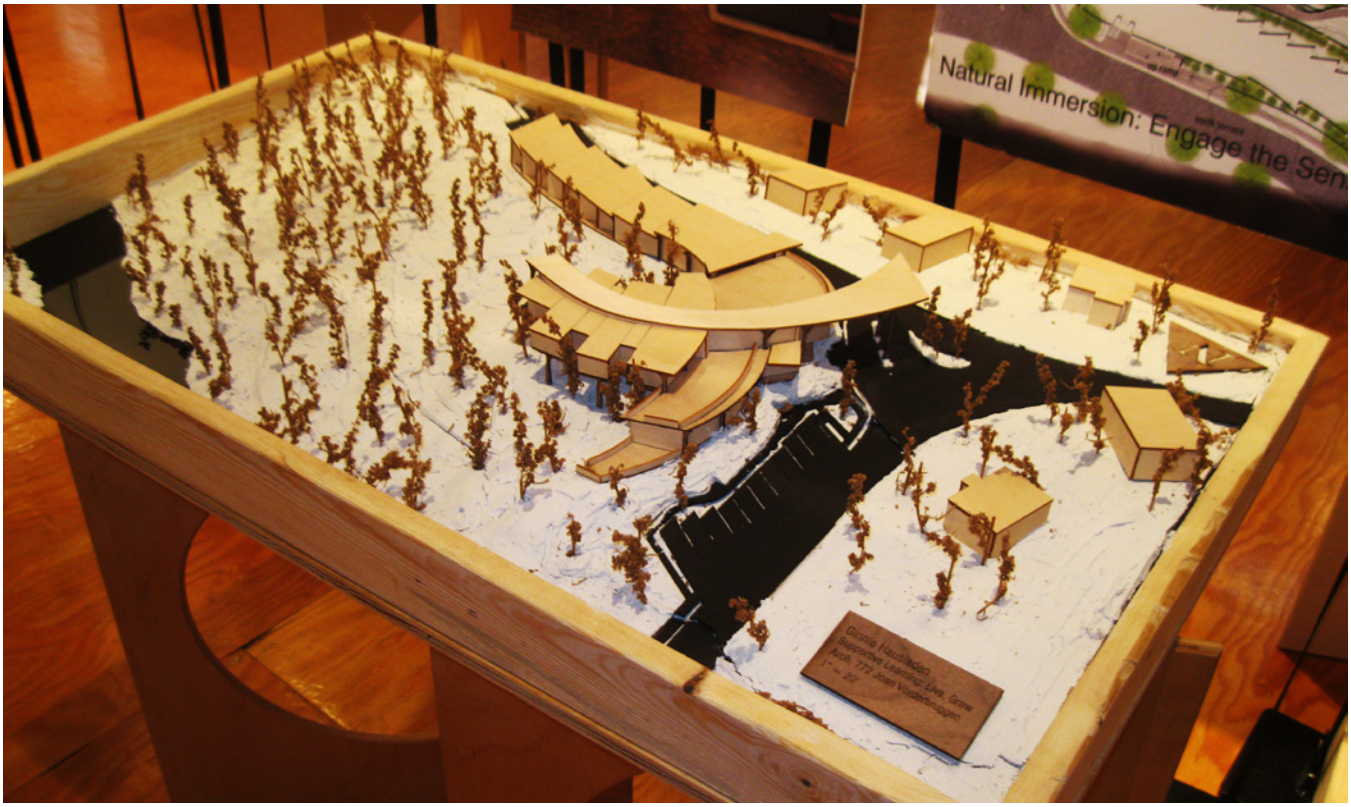


Figure 120 *Final Model 1*
Hausladen, G. (2013). *Final Model 1.* [Designer] [Photographer]

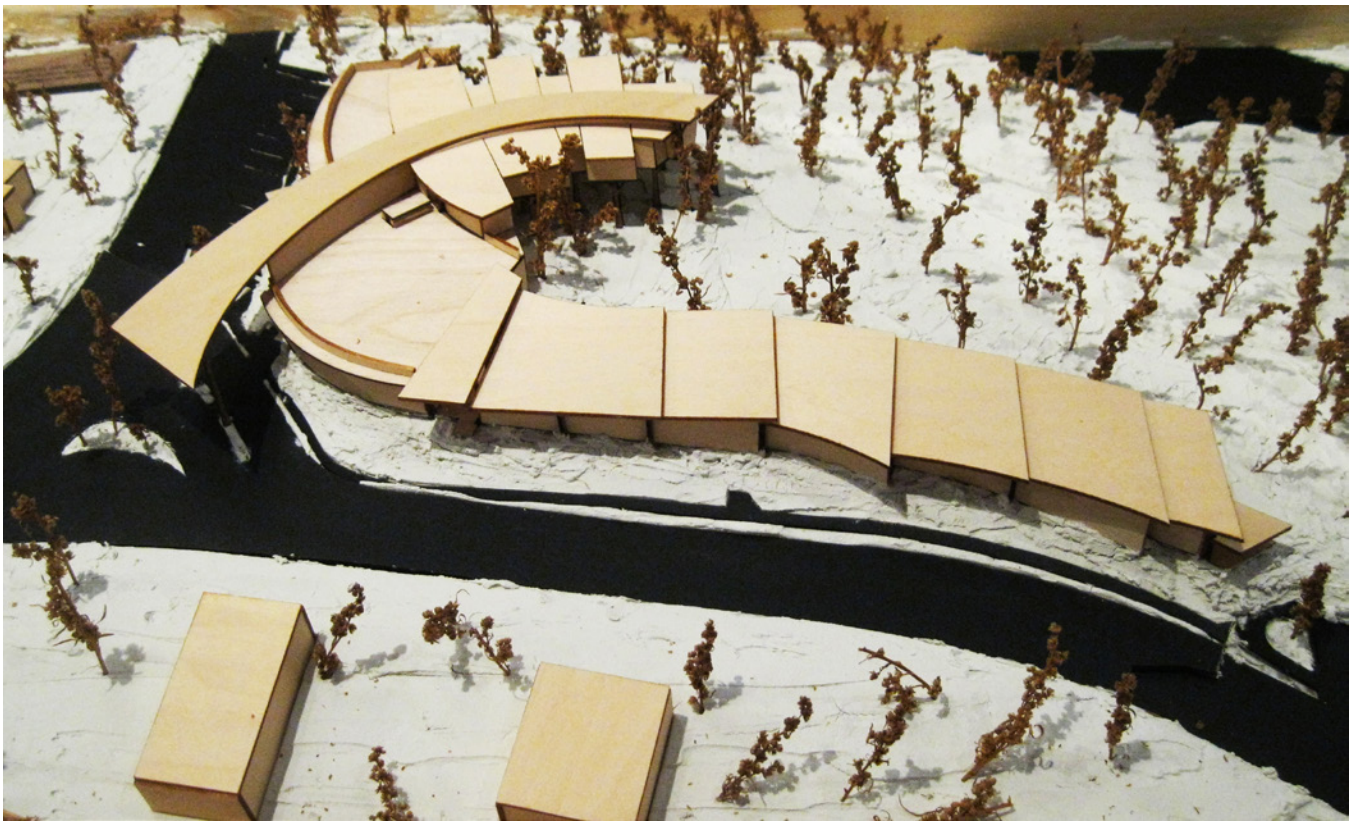


Figure 121 *Final Model 2*
Hausladen, G. (2013). *Final Model 2.*
[Designer] [Photographer][top]

Figure 122 *Final Model 3*
Hausladen, G. (2013). *Final Model 3.*
[Designer] [Photographer][bottom]

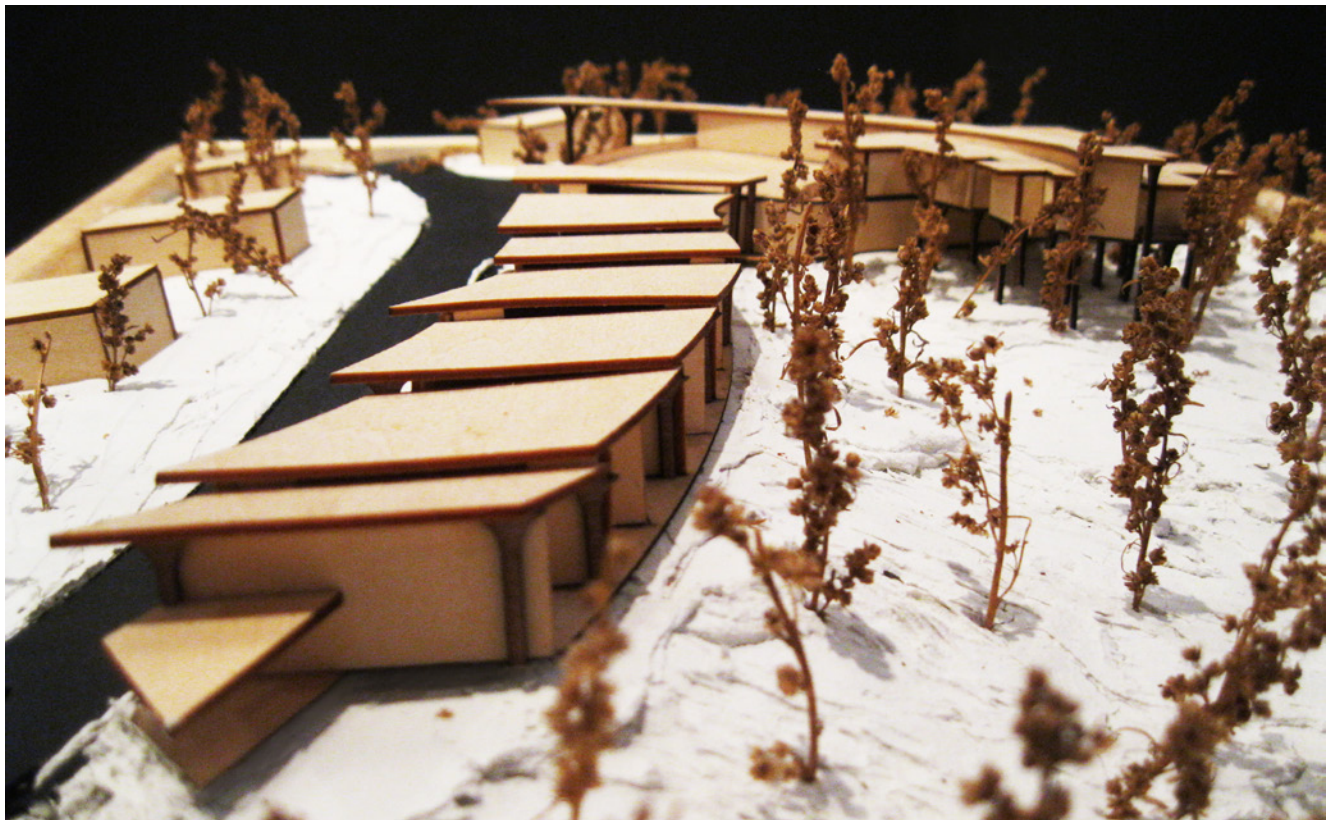


Figure 123 *Final Model 4*
Hausladen, G. (2013). *Final Model 4.*
[Designer] [Photographer][top]

Figure 124 *Final Model 5*
Hausladen, G. (2013). *Final Model 5.*
[Designer] [Photographer][bottom]

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Figure 125 *Ginnie Hausladen*
Davis, K. (2011). *Ginnie Hausladen*. [Photographer]