

IN SEARCH OF INDEPENDENCE

Progression for Young Adults with Autism Spectrum Disorder



IN SEARCH OF INDEPENDENCE

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

by

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



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Figure 1 | Michael Moscariello
photo credit | <http://www.commonhealth.wbur.org>

May 2016
Fargo, North Dakota

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Figure 2 | Malcolm Fairweather
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01 THESIS ABSTRACT

“Vocation provides identity and self-esteem, things we all need.”

- Laurie Monsebraaten

Autism Spectrum Disorder (ASD) continues to affect a larger number of people as the medical world expands and broadens its definitions. This disorder currently touches the lives of millions of individuals, leading to an increase in demand for higher continued education, training services, and more affordable housing. As available resources fail to meet this ever-increasing demand, families struggle in their search for answers, support and help as society pays the price with inefficient, ineffective, and short-term solutions.

As we begin to cater more and more towards the needs of children diagnosed with Autism Spectrum Disorders, it is as equally important that we look to the future lives of these individuals. This thesis project aims to create a community living and workplace training center in Rochester, Minnesota that aids young adults with ASD, struggling with the transition into society after high school. Research in architecture designed specifically for autistic needs investigates and analyzes how the built environment can respond positively to moments often negative or overwhelming. It is through these experiences that opportunities occur in these individuals for greater skill-building and communication.



Figure 3 | *Erin's Hope for Friends*

photo credit | <http://www.erinshopeforfriends.org/>

02 THESIS NARRATIVE

“Individuals with autism deserve a positive design approach not because of their autism, but because that is how everyone should be treated.”

- Christopher N. Henry

The Unifying Idea

Autism Spectrum Disorder affects an estimated 1.5 million people in the United States, with the Centers for Disease Control and Prevention (CDC) officially estimating that ASD affects one in 68 children, a number that has tripled over the last decade. However, recent government surveys of parents suggest that this number might be closer to one in 50, a result from a 2013 study. The two most common conditions of ASD include autistic disorder (autism), the most severe and known form, and Asperger Syndrome, a developmental disability that affects social interactions and communication skills. ASD varies depending on the person, with some instances being more severe than others, but people with the disorder normally show signs of impaired social interaction, difficulty in communication skills, and repetitive, restricted behavioral patterns. It is important to understand and note that no two people diagnosed share the exact same symptoms or disorder patterns.

With awareness of Autism Spectrum Disorder on the rise, many families today now have access to multiple forms of information and help when understanding and treating the effects of ASD in children. However, there are even more complications awaiting these children as they grow into young adults. A 2012 study from Washington University in St. Louis estimates that only 55% of young adults with autism had a job following the first six years after high school, with a total combined unemployment and underemployment rate estimated between 80-90% worldwide. Drexel Autism Institute found that only a little over a third of all young adults ever will have the ability to live apart from their parents or independently, with one in four individuals found socially isolated or receiving very little interaction with others.

While there are now more learning centers available for families and children affected by ASD, there is an alarming lack of proper continuing education and training facilities for these young adults, as well as affordable residencies that cater to people with special needs. We no longer have the option to simply intervene with children diagnosed with Autism Spectrum Disorders at a young age. It is time that we look at the bigger, complete picture and realize that many of these children go on to lead unfulfilling lives removed from society as they transition out of high school. By recognizing the issues that are prevalent in people with ASD, design can begin to better understand, respond, and adapt positively to these users. Ultimately, it can assist in developing and building upon the skills needed for a fulfilling job and the ability to live independently as many others do.

Most architecture built today fails to respond to or even acknowledge the many needs of people with autism spectrum disorder, let alone people with general special needs. Through studies and continued research within the last decade, architects now have a better understanding of how to design for people with ASD. As a pioneer in the field through conducting some of the first major research into this issue, architect Magda Mostafa outlines seven issues that she found affect positive behavior and skill development in users with autism and ASD:

1. Acoustics
2. Spatial sequencing
3. Escape spaces
4. Compartmentalization
5. Transition spaces
6. Sensory zoning
7. Safety

By responding to the sensory environment, architecture can change and improve the lives of people with ASD. In a life where many everyday moments may be painful or overwhelming, architecture can provide opportunities in its design where one becomes free from this outpouring of sensory information. It is in these moments where we find the ability to teach skills and create meaningful experiences without the struggles, challenges, or distractions within the built environment.

KSS Architects, a firm that has specialized in designing for autism, expands upon Mostafa's research and summarizes these issues into a three-principle design philosophy that guides their architecture. Firstly, most children and adults with ASD suffer from forms of sensory overload. Light, color, smell, noise, and textures may be drastically different to these users and create moments of intense discomfort. It is therefore vital to simplify the sensory environment. Secondly, transitions and change can be a jarring event for many people with ASD, an issue not limited to only entirely moving between environments, but also when moving from one room to another. And lastly, ASD users require plenty of space when moving to allow for their gross movement activity, such as a sudden outburst of running, jumping, or pacing. By designing with a balance of health, wellness, and durability, architecture can begin to lay a foundation for creating meaningful and successful spaces for people with ASD.

The Site

Rochester, Minnesota continues to prove itself as an international medical destination center with the Mayo Clinic recently ranking as the top performing hospital in the nation on U.S. News & World Report's Honor Roll. Located near the Zumbro River, Rochester started out as a small town in 1858, drawing travelers and settlers to the region for its cheap, fertile farm land. In 1863, William Worrall Mayo, an immigrant physician from England, arrived and became the doctor of the county. It was not until 1883 when a severe thunderstorm destroyed a large portion of the city and left hundreds injured, that the Sisters of Saint Francis and Dr. Mayo, along with his two sons, came to the aid of the city, eventually establishing the St. Mary's Hospital. It was

this initial medical building that attracted practicing doctors from around the region to move to Rochester, expanding the field of research and medical knowledge. In 1955, patient demand increased and the need to expand facilities mounted, resulting in the Mayo Clinic building many recognize today. Since then, many more expansions and additional facilities have been built to address the increase in medical technology and advances.

Rochester is also currently the home to two separate centers for children and adolescents with autism spectrum disorder. The Rochester Center for Autism, founded in 2004, and the Minnesota Autism Center, founded in 1995, both offer multiple therapy programs that address the needs of children and teenagers, working towards improving skill levels, task independence, and behavior reduction.

Rochester offers a certain advantage for the program and planning of a project like this, namely from the existing medical community and location in southeastern Minnesota. There are currently very few community living options found in the Upper Midwest that cater to young adults and adults with ASD. The site selection comes from an understanding that this could potentially attract families and individuals from nearby states, such as North Dakota, South Dakota, Iowa, and Wisconsin, as well as become a viable example for other cities to build off of and explore within their own context. The specific site rests on an undeveloped plot of old farmland that sits between an elementary school and pharmacy center. This space shows promise over other potential sites due to its distance away from the highway, proximity to the Douglas State Trail and multiple parks, a strong rural feeling, and relatively short distance from shopping services, such as Wal-mart, Sam's Club, Target, and Hy-Vee, and the downtown area.

The Typology

As the Rochester Center for Autism and Minnesota Autism Center both focus on the needs of children and teenagers, there is at present an increasing gap in both design and services in Rochester when dealing with young adults once they outgrow the current therapy programs. Rather than allow these individuals to struggle on their own with living situations and unemployment, there exists an opportunity for architecture to offer up a solution. However, care must be given that the solution and typology does not hinder or limit the independence that these people are looking for nor can it isolate them from the community. Most criticism with living communities of this type seems to draw from the programs trying to do either too much or failing in providing enough. Another sensitive area to be mindful of is the existing neighborhood and infrastructure that surrounds the chosen site and potential impact of future development.

Building both a community living center and workplace training center in this area of town does several things. First, it strengthens the ASD community already established by both the Rochester Center for Autism and Minnesota Autism Center through offering advanced assistance in living, continued education, and job placement programs. Second, the community's awareness of the program allows for a better understanding of the major issues that face teenagers as they grow into young adults while dealing with ASD. Third and lastly, it provides a way for these people to ultimately gain independence and meaningful jobs in a community that is already committed to advancing medical research and support on a national level.

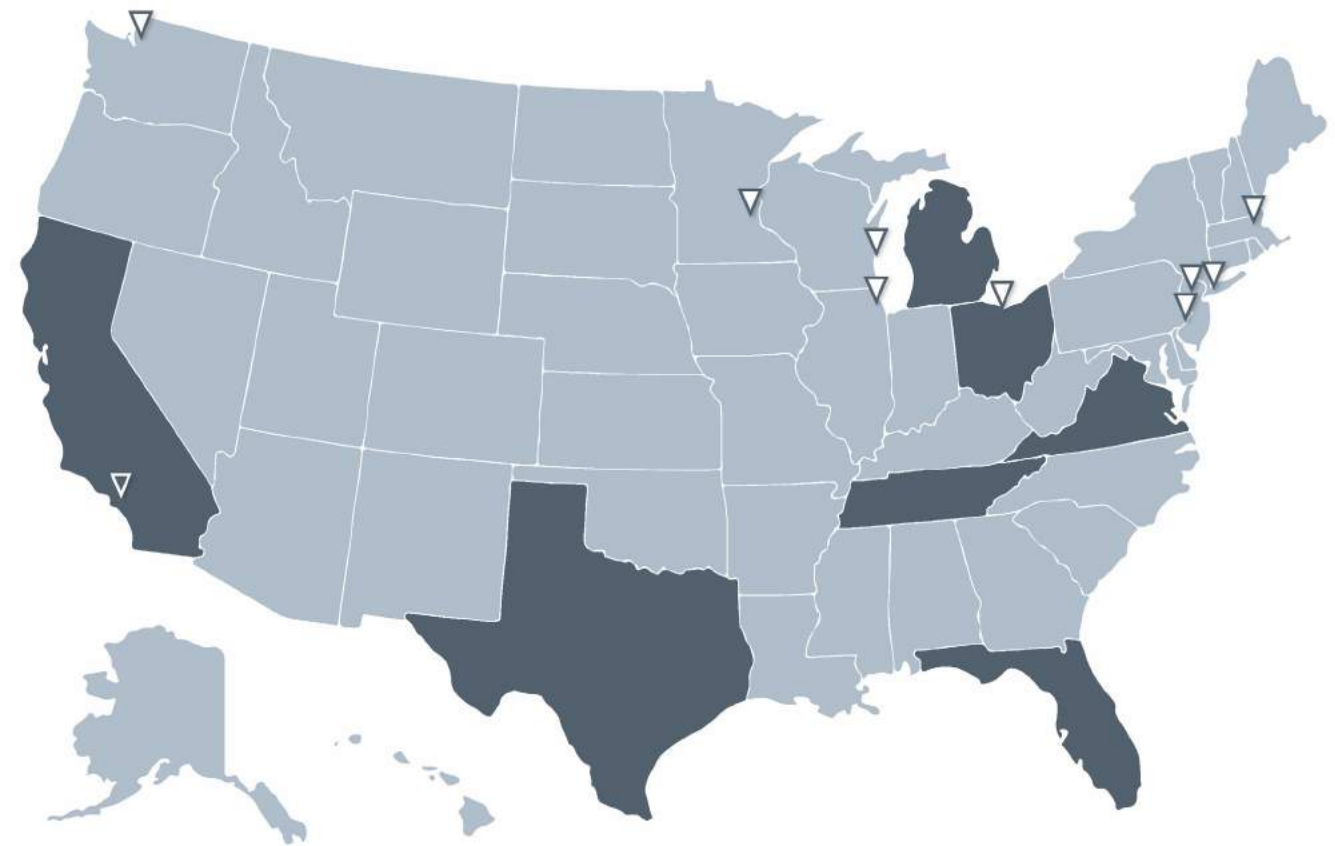


Figure 4 | Map of Best and Worst Places to Live with Autism in the United States of America

From the 2011 Autism Speaks community survey, the top 10 metropolitan areas and cities, indicated by markers, for children and adults with autism to live include: the greater New York, Los Angeles, Chicago, Cleveland, Philadelphia and Boston, Northern New Jersey, Minneapolis/St. Paul, Seattle and Milwaukee.

Highlighted by a darker shade of color, the states that fared among the worst include: Texas, Virginia, Tennessee, Ohio, Florida, Michigan and California.

03 PROJECT TYPOLOGY

“Under a positive approach the architect’s primary role is to make individuals more able not less disabled.”

- Christopher N. Henry

Community Living & Workplace Training Center

One of the larger concerns when designing a community living building for people with Autism Spectrum Disorder is creating segregation and restriction. It is an unfortunate consequence that may happen if the goal of the project is to simply build living spaces behind a fenced in area of a neighborhood, removing all interaction and freedom from participating and interacting with society. Another concern rises from the needs of the existing residential community. There needs to be a balance between the understanding of what this project typology is bringing and has to offer to this neighborhood and vice versa. Depending on the future residents of the community living center, certain design choices and decisions ought to be recognized and considered during the process and planning phases.

In addition to a community living building, a workplace training center will offer these young adults an opportunity to continue their education and learn valuable workplace-specific skills. It is critical that services like this become available across the country as an article from USA Today states that one in three young adults with autism have no paid job experience or continued education seven years after graduating from their high school programs. Therapy programs, like the ones offered by the Rochester Center for Autism and Minnesota Autism Center, are vital when dealing with children or teenagers, but we must also look to their futures as adults and what our society currently offers to them, which is significantly lacking. Architecture can respond to the specific needs of ASD and create meaningful spaces where communities can teach valuable life skills without worry or distraction.



Figure 5 | Michael Moscariello

photo credit | <http://www.commonhealth.wbur.org>



Figure 6 | Sweetwater Spectrum Community Living in Sonoma, CA
photo credit | Tim Griffith, <http://www.archdaily.com>

04 TYPOLOGICAL RESEARCH

“With greater recognition and diagnosis come changes in educational models, services and support – as well as new ideas in design for how to create the best possible environments for learning and living.”

- Merilee Meacock, KSS Architects

Eden Family of Services

EDUCATION & OUTREACH CENTER

LOCATION: Princeton, New Jersey

BUILD YEAR: 2011

SIZE: 38,300 SF [12,900 SF Renovation + 25,400 SF Addition]

COST: \$8,000,000

ARCHITECTS: KSS Architects

RECOGNITION: AIA New Jersey Merit Award 2013

FEATURES: Classrooms with kitchens, restrooms, offices, observation rooms, multipurpose room, gymnasium, weight room, occupational/physical therapy sensory room, vocational and educational centers, school store, butterfly-shaped roof

TAGS: K-12, Education, Planning, Private, Special Needs

Eden Family of Services, a private, nonprofit organization founded through the Eden Institute program in New Jersey, specializes in helping fulfill the needs of children, young adults, and families struggling with autism by offering different educational and outreach programs. Beginning as a small school that served only 17 children, Eden's previous location for over 20 years was in a former telephone switching station. However, the site presented a problem of being too isolated from the community. KSS Architects worked with Eden to choose a site within a mixed-use development, known as Princeton Forrestal Village. The new location allows students to interact with the community, share athletic and event resources, and provides lots of open space in the form of walking trails.

A further example of Eden's program taking advantage of the proximity to the community is a partnership with the Wawa convenience store chain. In this small scale store, supervised students can work and learn valuable communication and job skills in a real-world setting. While it is only open to the public part-time, this is a unique instance that illustrates the importance of consideration to the type of interaction and planning that goes into a school designed around autism.

“The building has a comfortable residential scale but with an inherent gesture in the design signifying a civic purpose.”

(KSS Architects)



Figure 7 | Southeast Elevation of Education and Outreach Center

photo credit | KSS Architects, <http://www.kssarchitects.com>

The main facility is part renovation and part addition, focusing on design decisions based off of collaboration between teachers and specialists. With an emphasis on a program catering to early-intervention for children and outreach programs for young adults, the school incorporates many features designed specifically to respond to autism. Wider hallways, lots of daylighting and natural light, views and access to outside greenery, flexible teaching rooms with round tables and space to maneuver, and sensory controls, like indirect lighting and acoustic separations, all build off of the foundation established by KSS Architects for autism-specific design. Some classrooms also feature a home-style kitchen for students to learn life skills, such as food preparation, shopping, and cleaning. The school also features both a multipurpose gym and interior courtyard, which allows the kids a place to explore and play. Sarah Amelar describes in an article for Architectural Record, titled “Handled with Care”, that “exercise is important for both its calming effects and motor-skill development”.

Analysis

KSS Architects and Eden successfully established an education facility in an existing context that most would have found difficult to work with. In addition to this, the project also creates a link within the community by partnering with a nearby grocery store chain to offer work opportunity for some of the student body. This is a critical step to focus attention on when dealing with programs aimed at individuals with ASD. It is important to interact with the community and context while maintaining safe boundaries and privacy.

This idea carries further in the design where the architects placed the exterior gym in the inner courtyard made by the buildings. Even though the space is located outside, the surrounding architecture frames it on all sides, letting views and observations happen from inside while providing security for the children outside.

Other design considerations that enable these children include wider hallways, durable materials and finishes, flexible teaching spaces that can be rearranged depending on the activity, natural lighting wherever possible and indirect lighting techniques that do not cause sensory overload, and acoustic separations to control noise and sound levels.

There are definitely components of this project that should be referenced during design of both the residential living community and workplace training center. Following the high standards that KSS Architects maintain while producing attractive and positive architecture will allow my own design to stand out in the same merits and lead to a better user and community experience.



Figure 8 | Education and Outreach Center Entry
photo credit | KSS Architects, <http://www.kssarchitects.com>

LMS Architects

SWEETWATER SPECTRUM COMMUNITY

LOCATION: Sonoma, California

BUILD YEAR: 2013

SIZE: 16,315 SF on 2.8-acres [Four 3,250 SF bedroom homes / 2,300 SF community center]

COST: \$6,884,896

ARCHITECTS: Leddy Maytum Stacy Architects

RECOGNITION: AIA COTE, Top Ten Green Building Award

AIA National, Housing Award

AIA California Council, Honor Award

AIA California Council Residential, Merit Award

AIA Redwood Empire, Citation Award

AIA San Francisco, Citation Award

ASLA Northern California, Honor Award

FEATURES: Permanent housing, staff offices, restrooms, utility rooms, storage, community center, fitness center, library, teaching kitchen, pantry, therapy pool and spa, hammock garden, urban farm, orchard, and greenhouse

TAGS: Community Living, Healthcare, Multifamily, Specialized Housing

Founded as a nonprofit organization in 2009 through several families, the Sweetwater Spectrum Community has become a national model for high-quality, supportive housing for adults with autism, winning multiple awards and receiving national attention for its built services. Lead by Leddy Maytum Stacy Architects, the project focuses on addressing autism spectrum-specific needs while also providing Universal Design and Sustainable Design strategies, offering 16 permanent homes for adults with autism spectrum disorder. Because of its location in Sonoma, California, the team responded to the site by incorporating unique landscaping and sustainability services, allowing for a 100% on-site management of stormwater. Photovoltaics provide for over half of the electricity and power, along with features built-in to expand the building's system to become net-zero at some point.

Other sustainable features include high-performance glazing, insulated exterior envelope, natural ventilation, radiant heating and cooling systems, sloped roofs to maximize solar access for photovoltaics and hot water panels, and a maximization of daylighting to reduce energy use. The organic garden, orchard area and greenhouse allow members to produce their own food on site, not only providing an opportunity for various skill building but also serving as a therapeutic value. With a large emphasis on creating a safe environment, each home features highly durable materials, fixtures, finishes, and doors



Figure 9 | Sweetwater Spectrum Community Center
photo credit | Tim Griffith, <http://www.archdaily.com>

to withstand outbursts and provide easy maintenance and repair if needed. Individual living spaces are fully customizable to accommodate personal preferences and needs. Living and community spaces also address many concerns regarding sensory stimulation by reducing ambient sounds and certain visual patterns and distractions to make a simple, anticipated home environment.

“Sweetwater Spectrum Community is the first critical step in a concept that can be reproduced in communities around California and the United States.”

(LMS Architects)

To offset the higher price of living here, the state offers scholarship and leasing opportunities to both families and adults. On average, the annual cost to live at Sweetwater Spectrum is roughly \$39,000. Monthly rent is set at \$650 with an association fee of \$2,600 on top of that, totaling \$3,250. Some of the individuals do have subsidy arrangements, upwards of \$2,250 a month, to help offset the higher price of living that comes with the state of California. Some may consider this a far cry from affordable housing, but the services and design of the community seem to make up for more than that. With staffing available around the clock, the community definitely offers more than just another place to live.

Overall, the entire design comes together to form one holistic community that more than meets the needs of individuals with autism spectrum disorders; it provides a sense of place where one can develop an independence to live life with purpose and dignity. The project addresses many of the autism spectrum disorder concerns through innovative methods and strategies to truly create a safe, peaceful community for individuals without isolating them from the rest of neighborhood.

Analysis

This project features 4 permanent homes with 4 individual bedrooms in each unit for adults with ASD as well as a skill developmental center. As other studies suggest, 4 bedrooms separated over one unit appears to be one of the higher negotiable numbers. When there are 6 or more persons in one house, it becomes a situation of not enough privacy or personal space. Leddy Maytum Stacy Architects has developed a wonderful floor plan that has many views into open exterior and interior spaces for social interaction and shared activities. It also allows staff members or resident caregivers a separate room for privacy, relaxation and rest. All of these considerations are important to keep in mind when designing the program and architecture of my own project.

The cost of living at this particular community is relatively high. This is due most likely because of its location in the city and state of Sonoma, California. The price of rent/mortgage is an issue that I may need to research further and study as I would like my project to allow for affordable housing. If residents are paying almost \$40,000 a year in rent alone, that to me is not successful. However in the defense of the Sweetwater Spectrum Community, the architecture and program offers a lot of extra services and spaces for its residents



Figure 10 | Sweetwater Spectrum Community Center
photo credit | Tim Griffith, <http://www.archdaily.com>



Figure 11 | Sweetwater Spectrum Community Center
photo credit | Tim Griffith, <http://www.archdaily.com>

that most would otherwise leave out. Finding a balance between these two aspects will be a challenge, but an important point to answer. I have yet to determine what the staffing needs of the program will or should be in regards to 24/7 staffing or designated times throughout the week for specific caregiver assistance.

The graphical representations for the design layout are wonderful examples of how the architects considered the design goals and guidelines contained within *Advancing Full Spectrum Housing: Designing for Adults with Autism Spectrum Disorders* by Sherry Ahrentzen and also referenced by Magda Mostafa. Each piece of the design aids in the overall transition to independence for the residents. It will be important to exercise a similar design concept map like this when looking at the initial design concept and program.

The overall design of this project includes many key sustainable practices including stormwater management and retention, solar panels and photovoltaics that produce more than half of the energy for the buildings, high-performance glazing, insulated exterior envelope, natural ventilation, radiant heating and cooling systems, sloped roofs to maximize solar access for photovoltaics and hot water panels, and a maximization of daylighting to reduce energy use. While the proposed thesis takes place in Minnesota, a region quite different from California, sustainable practices of this caliber should still be implemented throughout the design. Finding the correct solar angles for the best gains during all seasons at my selected site should be included in the site analysis and research portion. Other smaller sustainable practices, such as material choices, finishes and fixtures will need to be designated during the final design process and work.

Ramsey Housing Inc.

AIRMOUNT WOODS

LOCATION: Ramsey, New Jersey

BUILD YEAR: 2014

SIZE: 6,000 SF on 1.6-acres [Eight 400 SF residencies]

COST: \$2,800,000

ARCHITECTS: Virgona + Virgona Architects / James Virgona

RECOGNITION: Supportive Housing Associate of New Jersey, Innovation Award

FEATURES: Long-term housing, quiet rooms, eight bedrooms, common restrooms, common living spaces, passive and active outdoor recreation areas, community kitchen and dining areas, flexible spaces, and a connecting breezeway

TAGS: Community Living, Healthcare, Multifamily, Specialized Housing

Airmount Woods is one of the very first models for community living built in the country specifically designed to meet the needs of individuals with autism spectrum disorder. James Virgona, the lead architect, tailored the overall design to match the surrounding aesthetic of the neighborhood and community. Airmount Woods is a housing project that features twin four-bedroom houses, allowing room for up to 8 long-term male and female residents. All units are handicap accessible and have built-in features to assist in every day tasks. A breezeway and an active and passive recreation area connect the two homes, giving residents ample amounts of space for exercising and outdoor activities.

The funding for the project came from major contributors such as Ramsey Housing Inc., a nonprofit organization, the Bergen County United Way, and Madeline Corp. Without assistance from programs such as these, it is most likely that Airmount Woods would still only be just an idea. The cost to support and continue funding community homes like this can be a rather large strain for organizations, especially nonprofit ones. The project was able to be fully realized due to interest and backing from the Mayor, United Way, and a nonprofit developer.

“It’s my true hope that this project becomes a shining star within our town, our country, our state and serves as a model for other projects in like-minded and willing communities.”

(Chris Botta)



Figure 12 | Airmount Woods Exterior
photo credit | <http://www.bergenunitedway.org/>

The housing design implements many different techniques and considerations to make the environment more suitable to the tenants with autism spectrum disorder. For instance, most of the windows have tempered glass to minimize glare and shadow, the walls are a heavily durable material, countertops are hypo-allergenic, bedrooms open up to large community spaces, each home has a shared kitchen and dining space, and a sensory room in both units for individuals to go use for calming purposes and recreation. The homes also feature sightlines for the caregivers to have eyes on individuals and spaces as much as possible, which was one of the challenges facing the architects. Rooms are fully customizable, giving residents the freedom to design their individual spaces. Ultimately, the design, like many others, functions to serve the safety and security of the users through a sensitive sensory stimulation approach.

Analysis

This is a much more modest project when compared to the previous case studies. The architect made sure to match the existing context of the surrounding neighborhood, a choice that works rather well for this example. Too often, architecture tries to break the mold and force itself into the existing neighborhood fabric, but usually that does more harm than good for the overall community. This project was sensitive to the surrounding infrastructure while providing a successful living community for adults with ASD.

One of the interesting aspects to this project was the support it received from not only the neighborhood but the Mayor of New Jersey and United Way. If such support was not received, the project would have most likely been delayed or never completed. This is an important aspect to keep in mind if my thesis should be considered to be proposed as a real project. Where will funding for the project come from and will it be enough? If not, where can additional funds be located? These questions all contain merit that I should attempt to answer in the program and design portion of my thesis.

Even though this project is modest when compared to something like the Sweetwater Spectrum Community, the architect and developer still made sure to include considerations specific to individuals with ASDs. The floorplans allow for privacy and personal space with bedrooms connected off of shared main areas, both units contain a special sensory room for calming and recreation purposes, open sightlines for caregivers to observe at a distance and respect the personal space of residents, and the ability to fully customizable bedrooms creating a sense of independence and dignity by having greater control over a personal space.

One of the design choices I really appreciate in this project is the two types of exterior activity space. There is a smaller shared space that is accessible to all residents and then a much larger, open outdoor space for events, activities and interactions. With views from both community rooms in each unit, the views and sightlines outwards are maximized, creating a stronger relationship between the two units and the outdoor spaces. This is certainly a consideration I want to keep in mind as I move forward with my project's design.



Figure 13 | Airmount Woods Interior

photo credit | <http://www.pinterest.com>

05 TYPOLOGICAL RESEARCH SUMMARY

Architecture for individuals with autism spectrum disorders does not require too much change from the usual construction and developmental techniques used to build most residential projects. These case studies offer a nice range of project size, budget, use, and location and give me a clearer idea of the elements I want to include in the program and building design. While the projects included different typologies and scale, most contained shared features that really benefit individuals with ASDs and enable their lifestyles and development, such as safety, links to the community, opportunities for privacy and social interaction, durability, sustainability, and an opportunity for dignity and independence.

Architecture built in mind with autism spectrum disorders was the clear focus of my three selected case studies: the Eden Family of Services Education & Outreach Center in Princeton, New Jersey, Sweetwater Spectrum Community in Sonoma, California, and Airmount Woods in Ramsey, New Jersey. All of the examples presented successful designs and features in different typologies and scales. One case study highlighted an education and outreach program while the other two covered different types of residential living communities. Sweetwater Spectrum offered 16 units between 4 major buildings compared to the 8 units open between the two main units in Airmount Woods. Airmount Woods also connects between several exterior covered pathways and activity spaces while Sweetwater Spectrum takes up a larger portion of land and features a lot more open outdoor space that serve as connections. Overall, the proposed thesis project most likely falls somewhere in between these two case studies. There exists opportunity on the selected site to distance the units from each other, but, because of the location, this might not be as successful when compared to the Sweetwater Spectrum layout.

The case studies present a lot of design goals and ideas I am interested in fulfilling. Seeing the extent to which the Sweetwater Spectrum Community went to achieve sustainability is quite surprising. Usually with residential projects one simply sees the bare minimums implemented. This project serves as a source of inspiration to attempt to attain a higher sustainable level with LEED or perhaps even challenge myself to design using the Living Building Challenge guidelines. If the project aims to become a beacon or example of successful design in terms of housing for individuals with autism spectrum disorders, it should also aim to lead the way in sustainable practices and efforts. Airmount Woods, while meeting some sustainable strategies, seems to fail in doing more in these terms. Instead, the project seems to have had to make a choice between sustainability and ASD practices. Why cannot it serve both? This is my train of thought as I prepare myself for the building program and design portion of my thesis.

While these three are the only case studies I formally present, I have come across multiple other farmsteads, residential communities, and educational facilities designed for individuals with ASD. Most of these projects proved difficult to find floor plans, sections, and additional architectural information. However, they did share a lot of common elements, much like the ones shared in the three case studies, as far as designing full

spectrum housing. The main reason I chose not to include any of the farmstead examples is because my site and program does not lend itself to being located too far away from public infrastructure, services and amenities. There is a lot of the ASD population out there that really enjoys these farmstead projects though, mainly because they offer a very safe environment away from a lot of distractions and stressful environments found within the city boundaries. This typology also offers successful summer programs for nonpermanent services and living opportunities, but my main point of focus is on year-round living options with the chance of living assistance if needed. These other case studies did help better frame my thesis direction and definition as I was able to see the different and unique types of options already existing against the country for children and adults with ASD.

The workplace training center is an area of my program where I want to give the opportunity for non-residents to utilize. Continued education is a factor that many young adults, adults and families wish to focus on after high school. These programs need to offer options such as skills development, college-level school, and workplace training to allow individuals with ASDs a chance at leading a more meaningful life. Studies show us that only a third of all young adults with ASDs will go on to find a job after high school. There is also a large percentage of the population that lacks the knowledge of basic living skills, like cooking and cleaning. Clearly this presents an opportunity to incorporate the community even if they do not live within the residential housing. By offering different programs and services throughout the week, we can make a stronger connection between residents and community members. Not only will addition individuals with ASDs be able to participate in the workplace training center, but they will be able to interact with the current residents of the housing units. This is why the Eden Educational & Outreach case study was quite important to include with the rest of my case studies as it presented a very successful design and program.

The Sweetwater Spectrum and Airmount Woods case studies share two ideas that I particularly enjoy and did not initially consider for my program or part of the major design elements. Both of these case studies included various outdoor spaces in the forms of passive and active choices. For Airmount Woods, these spaces represent an option for different activities to be happening at the same time. The passive space that connects under the sheltered pathway between the units allows users a chance to share meals outdoors, sit and relax in privacy away from the street and other neighbors, and extends itself as being part of the shared open spaces in the units. This type of multifunctioning design is quite impressive and needs to be an element considered in this thesis when designing the outdoor and connected spaces shared by the landscape. Sweetwater Spectrum, on the other hand, offers much more outdoor access rather than just one larger active space at Airmount Woods. They have various areas for sitting, relaxing, resting, walking or exercising, and even swimming. There is a lot more space for exploration by residents and all of it feels safe and secure within the community boundaries. The current selected site for this thesis appears to be within future development property, so early planning for future neighbors will help direct the outdoor spatial arrangements and choices. Access to the nearby hiking and biking path might be worth considering if exterior space needs to be contained or limited.

The analysis of the selected case studies has helped immensely with formulating design considerations for my project. The case studies I did find also confirm and support my thesis narrative that this world needs more architecture that serves people on the spectrum. There are plenty of recent success stories that allow this project's typologies to be viable.

06 MAJOR PROJECT ELEMENTS

"In as much as it hinders their independence, appropriate architecture can help regain it."

- Magda Mostafa

Common Elements

Using the guiding principles behind the work of KSS Architects and the aspects outlined by Magda Mostafa in her research, the community living and workplace training center share a list of general goals:

1. Minimize and simplify the impact of the sensory environment
2. Design for acoustics and soundproofing with respect to the existing neighborhood
3. Design clear and simple transitional spaces, room layouts, and spatial sequences
4. Create ample amounts of room for movement, moments of outbursts, and activity
5. Design with both natural and indirect lighting in mind
6. Compartmentalization of spaces for ability to focus with as few distractions as possible
7. The project ought to balance sustainable and durable materials and goals
8. The environment should be safe for everyone part of the community and neighborhood
9. Focus on design that enables and inspires individuals

Living Community Building

The living community building will be located on the east side of the site, establishing a presence closer to the existing neighborhood. Considerations for spaces to include are:

- **Site context** - designing with the existing community context is a key element
- **Site development** - landscaping and exterior spaces around the building play an important role with engaging the users and creating views
- **Bedrooms, bathrooms, storage space** - these spaces will be the most important as they become the new homes for the users
- **Mechanical/utility room** - adequate space for the systems that help keep the building operating

- **Laundry room** - a community space for users to carry out a common task
- **Community leisure rooms/spaces** - open spaces with close proximity to the bedrooms for individuals to meet and interact with one another, as well as space to host any guests and visitors
- **ADA accessibility** - designing accordingly for the special needs of users with ASD
- **Community garden space/exterior activity space** - community interaction spaces with ample room
- **Parking** - for users and visitors as well as space for shuttle service to and from jobs

Outreach & Workplace Training Center

The main purpose of the workplace training center will be a focus on continued education through multiple offerings, which include a computer lab, art studio, teaching kitchen, and flexible classroom space. Aside from staff offices and meeting rooms, there are no designated bedrooms or living spaces, allowing a clear definition of the program and intention of the spaces.

The workplace training center will be located near the parking, but remain separated from the living community center. The two proposed buildings for this thesis project will not be connected or necessary right next to each other on the site. The programs and service can be successful apart and might actually stand to be less restrictive if separated. Landscape design and central exterior spaces between the two buildings may provide a nice visual communication and allow users of both services to interact more freely.

- **Staff offices, meeting rooms/conference space** - as an outreach and training center, employees will need ample amounts of spaces to carry out their activities
- **Common areas** – frequent open spaces for users to relax, read, and carry out leisure activities
- **Educational/therapy rooms** – compartmentalized spaces that limit distractions for users to focus on learning skills and possible therapy programs yet offer flexibility for different learning courses
- **Computer lab access** – area for training users on technology programs, conducting research, and having access to career building websites
- **Teaching kitchen/dining area** – area designated to teaching cooking skills and participating in community meals
- **Library/reading space** – a small library space that offers users a quiet opportunity to study or read
- **Art prep and studio space** – ample room and space devoted to letting the users engage with various mediums of art
- **Restrooms** – a common element in all public and private buildings
- **Exercise room** – opportunity for exercise, therapy and general workout routines for users
- **Mechanical** – a space big enough for the equipment required to keep the building operating
- **Site Development** – landscaping and exterior design of community living, possibly creating a central park or green space to share

07 USER / CLIENT DESCRIPTION

“I don’t want to sort through huge piles of batteries, I want actual job satisfaction.”

- Michael Moscariello

The main users of the residencies and quality outreach and workplace training center will be young adults with autism spectrum disorder. The living community would be designated for individuals at least 21 years of age or older, but not necessarily reserved only for ASD tenants. The workplace training center can accommodate older teenagers in their later years of high school, 16 years old and up, as well as recent graduates or students seeking continued education.

Community Living Building

The goal is to create a community that does not restrict or isolate these individuals, but instead offers affordable spaces designed with their needs in mind and creates the ability and opportunity for support from people who are going through the same stages of life. Ideally, the community living would be able to provide three to four separate residencies with four to six bedrooms in each, mainly one bedroom options with shared amenities. Mixed use of tenants is something to consider as the program ought to encourage and create opportunities for interaction between as many individuals as possible. In the article, “Troubled Future for Young Adults on Autism Spectrum” by Martha Bebinger of CommonHealth, May Moscariello talks about driving her two sons with Asperger’s to meet other families, “because all these kids want to feel is that they belong. [None of the] medical stuff is really going to help them as much as having a friend.” Adequate parking will be available for all potential tenants with temporary parking spots reserved for visitors, as well as room for any potential shuttle or taxi service.

Outreach & Workplace Training Center

The workplace center also requires moderate levels of staffing from therapists, instructors and teachers who can aid in the learning of valuable job skills. These staff positions will include chefs, artists, computer sciences and technology assistance, athletic coaches, and counseling services. Existing employees at the Rochester Center for Autism and Minnesota Autism Center can possibly fulfill some of these positions if staffing is available. Anyone not familiar with ASD individuals will need to complete separate courses and training before assisting in the proposed programs and services. The center will most likely see a bulk of the action, supporting between 20 and 25 users and 5 to 7 staff members, a number that supports a 1:4 ratio of employees to residents. Peak times will be during normal business hours, 8:00am to 5:00pm, with the option to host weekend events depending on community interest. Parking will need to accommodate this influx of staff members, users and family members, as well as transportation services, during the day.



Figure 14 | Andrew Parles, left, with his mentor outside their community home
photo credit | <http://www.theatlantic.com/>

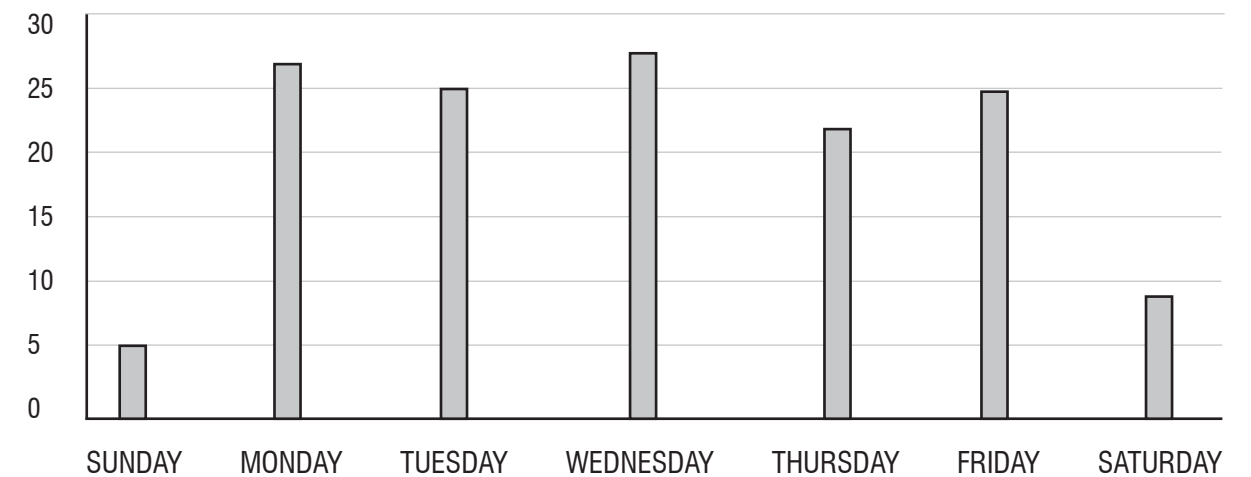


Figure 15 | Peak number of users for the Workplace Training Center during each day of the week

08 SITE INFORMATION

Site Selection

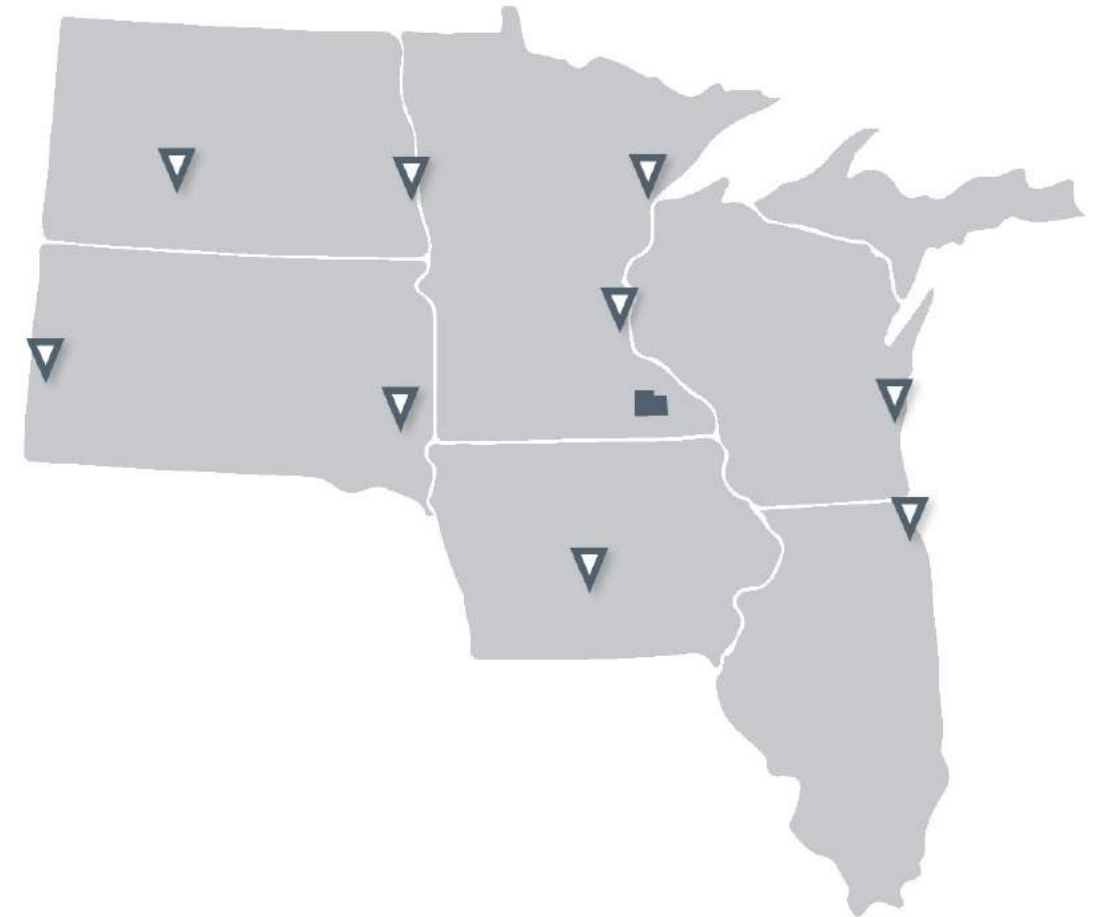
Rochester is located in Olmsted County, a south-eastern region in Minnesota. It is widely known for the world-famous Mayo Clinic, the headquarters of IBM, and the general quality of life, often ranking on the “Best Places to Live” list. I chose this area due to the familiarity of the city since I was born there. No matter what side of the town you live in, downtown is never far and there are always plenty of choices for shopping, eating, and other activities. Rochester is also quite a friendly and inviting metropolis, emitting a certain feeling and level of safety throughout the entire city.

The site selected is an undeveloped piece of land located in the northwestern part of town. The space shows promise due to the nearby neighborhoods, access to parks and biking paths, especially the Douglas State Trail, pharmacy center, Wal-mart, Sam’s Club, Target, Hy-Vee (a local grocery store chain), and a short distance, roughly 10 minutes, from the heart of downtown Rochester. However, some of the challenges associated with the site include the prospect of future development, current location of construction, and the established community. The last one is important to note because the thesis project aims to place a community living and workplace training center within an existing context. It is not the goal to interrupt or separate from this context, but rather become an inclusive part that benefits everyone.

Other features in the nearby area to take note of include multiple community parks, a newly developed elementary school, a public golf course, a retirement living community, multiple private schools and churches, and multiple restaurants and dining options. While these features might not immediately impact the site in any way, they do provide options for job placement connecting the workplace training center. The relatively short distance from a lot of these opportunities also allows for easy travel for anyone living in the community building.

City of Rochester’s Values

- **Customer Focus** – Rochester values the needs and input of everyone and strives to continually improve in all aspects
- **Respect** – Actively listen, be compassionate and fair, and create an environment free of disrespect
- **Integrity** – Be honest; follow everything through effectively and efficiently and respect the privacy of residents
- **Safety** – Be responsible; ensure safety guidelines are in place at every level of the city
- **Excellence** – Be professional and knowledgeable; meet or exceed the needs for one another



Figures 16 and 17 | Map of Olmsted County in relation to Upper Midwest and travel distances to nearby major cities



Figure 18 | Regional Context of Olmsted County, Rochester, Minnesota
photo credit | Google Earth



Figure 19 | Northern City Context, Rochester, Minnesota
photo credit | Google Earth



Figure 20 | Surrounding Site Context, Rochester, Minnesota
photo credit | Google Earth



Figure 21 | Photo from site visit in Rochester, MN



Figure 22 | Photo from site visit in Rochester, MN

09 PROJECT EMPHASIS

“People have worth regardless of whether they have special abilities.”

- Ari Ne’eman, president of the Autistic Self Advocacy Network

Community Awareness & Outreach

According to recent studies by the CDC, estimates state that one in 68 children have some form of Autism Spectrum Disorder with several other recent, unofficial surveys suggesting a number as high as one in 45. As this number increases, the amount of care, assistance, and services will increase as well. However, with a general focus on the youth we are missing a large portion of adolescence and adults that have this disorder as well. Many out there remain undiagnosed. Services and programs need to include the growing needs of young adults and adults, including more continued educational programs, workplace training, and affordable residencies that address the special needs of the users.

Design to Address the Needs of Autism Spectrum Disorder Users

As discussed earlier with regards to the research by Magda Mostafa and KSS Architects, there are many needs that the built environment ought to address when dealing with people with ASD. Some of these include paying close attention to the acoustics, spatial arrangements, progressions and transitions, natural light levels, and the overall safety and security of spaces. The goal should be to focus on enabling rather than restricting or limiting.

Incorporating Sustainable Strategies

With all potential projects, aspects of sustainable strategies should be included during the design process. This project stands to benefit the community at large, so it should do everything possible to minimize the impact on the neighborhood and the environment. By following the LEED design principles or even some aspects of the Living Building Challenge, the project can measure and outline steps to successfully be sustainable.

Identify & Explore Aspects of Sensory Design

There are many aspects that most of us take for granted in the built environment. By exploring texture, color, smell, and light, architecture can produce positive impacts on people with ASD through manipulating different aspects of the design. What would once be a bright, frustrating, and overwhelming space can transform into a calm and relaxing getaway where one can focus on developing lifelong skills.



Figure 23 | Kai Markham

photo credit | <http://www.medium.org/matter>

10 GOALS OF THE THESIS PROJECT

"I continually strive to be successful in my both design studio and regular courses, I work closely alongside my friends and with my professors to gain invaluable input and suggestions to better my design solutions, assignments, and myself."

- Benjamin Strehlow

Academic

One of my hopes by completing this thesis project is that other students will recognize the importance of designing for special needs clients. Raising awareness of Autism Spectrum Disorder is imperative, but I want to also focus on the inherent abilities people with ASD have that are being stifled in today's society. Many of these individuals can work in the same businesses and career fields as people not diagnosed with ASD or other disorders. From a lot of the research and studies, many families want to help their children find meaningful employment outside of the usual ABC programs, which are great in their own right but rather limiting for some individuals. They deserve an opportunity at a job or career that leads to a significant and enjoyable life like so many others.

Through diverse research and investigation into relatable case studies, I want to be able to design a building and center that gives young adults with ASD an environment tailored to helping them succeed. Many of the structures built today fall short in addressing needs for disabled individuals. This project will need to be extremely sensitive to the users and clients, which will be reflected in all design decisions and aspects. In the same instance, I do not want to isolate them from the surrounding community, but rather extend the program so they may be included within the existing context.

I want to focus on sensory design and how it influences the built environment and users. A lot of people with ASD have issues with sensory overload, often times because of florescent lighting, cramped spaces, rapid changes in the surrounding environment, and/or unfamiliar spatial patterns. We like to talk about how one can customize the sensory environment in design, but we often fail to actually make it flexible and sensitive to special needs users. We need to be able to do more than simply calculate out the sizing of windows and instead ask how these choices impact the people using the space and what design can do to better reflect those changes.

The designated typologies, a living community and training center, are two that I have not yet had a chance to tackle throughout my studio career. Improving more than my portfolio, I am excited to build a breadth of knowledge through completing studio and thesis work that produces a wide range of projects and typologies. Hopefully all my completed work helps establish my presence in a competitive industry and allows me the chance to become part of some very important teams and projects.

Professional

I am interested in pursuing a career that relates to hospitality, healthcare, and adaptive re-use. This thesis project allows me to focus on two of those interests and develop a meaningful sample of work on my own accord. I also see this as an opportunity to produce a better understanding of the developmental and creative process behind producing and designing a project of this particular typology.

My thesis idea felt a bit typical at first, despite it focusing on a special needs typology. From reviewing previous projects, I found several past students chose it as their thesis. To my knowledge, this thesis, as it is currently, stands to be the first one in the Architecture and Landscape Architecture Department's history that explores the issues facing young adults with ASD. I wanted to explore something different and unique so that I would challenge myself to complete deeper research, creating a more expressive project.

I want to understand the built environment better and gain knowledge on why we make certain design choices when dealing with specific clients. In this regard, I want to be better able to add a voice to designing for those with special needs in mind. Despite what future project I am working on after graduation, perhaps I can add a voice in the beginning of the design process that might otherwise be overlooked. Through the compiling of research and analyzing successful examples of architecture in the form of case studies, I will gain the ability to recognize and thoughtfully propose alternative strategies that address specific development disorder issues such as autism spectrum disorder.

Personal

Above all, I want to further my understanding for what every day events and spaces are like for someone with ASD. As an architecture student, we hardly touch on issues when it comes to ADA compliance, let alone specific disorders or special needs. If I can better learn and understand how we as designers can create a better and more positive environment, then I will be able to recognize how to help a large amount of people who often go overlooked.

I have two separate cousins on different sides of the family that fall on the autism spectrum: Isaac Gafner, born and diagnosed as autistic, and Gavin Strehlow, diagnosed with Asperger's syndrome at seven years old. I want to be able to better understand the needs that my relatives face as these two grow into young adults. Isaac himself turned 18 last year and faces a situation like this much sooner while Gavin is currently finishing high school. Both of these gentlemen face unique challenges that I never did transitioning into adulthood. It is my hope that one day the knowledge generated through this thesis might be useful when they are looking at living options when they come of age.

I want to inspire others to take note of this issue and similar ones like it. Spreading awareness is critical, but creating a lasting impression that others act upon is my ultimate goal. I feel at the heart of it, architecture is a humanitarian response. By choosing a thesis project that aims to better humanity and tackle social issues, we grow not only as students and designers, but also as fellow human beings. A certain level of compassion and empathy is elevated once we are better able to understand the concerns hundreds of thousands face every day.

11 PLAN FOR PROCEEDING

Definitions of Research Direction

The following section aims to create and define a collection of research areas that will aid in developing a holistic solution to the overall design problem. These goals will provide a foundation for guiding the direction of the research and design process for the project.

Theoretical Premise & Unifying Idea:

1. Precedents in architectural design that enhance and promote positive behaviors and social development in people with ASD
2. Precedents in architecture that focus on sensory design, spatial organization and sequencing, acoustical design, escape spaces, compartmentalization of spaces, transitory spaces, safety of environment, and materials used throughout entire project
3. Integrating design with the existing and established framework and fabric of the neighborhood
4. Challenges within creating community living for people with ASD without isolating or alienating them from the rest of the public
5. Sustainable strategies implemented along with the rest of the architectural design

Project Typology:

1. Precedents in residential community design
2. Precedents in continuing education training facilities and centers
3. Identify and define goals of clients and users

Historical Context:

1. What are the cultural and social issues that people with ASD face?
2. How do these issues relate to architectural design?
3. Precedents in sensory design through history
4. How does the project typology fit in with the existing structure of the community?
5. What communities support both a residential living and workplace training center?

Site Analysis:

1. How does this proposal fit in with the existing site?
2. How does the site influence specific design and sustainable and renewable strategies?
3. How will residential living for people with ASD impact the immediate community?
4. What advantages does the specific site offer over other locations within the city?
5. How do the surrounding infrastructure, businesses, and buildings influence or impact the design?

Programmatic Requirements:

1. Precedents in residential design for people with specific disorders and/or mental health issues
2. How does sensory design influence spatial arrangements and organization patterns?
3. Planning spaces for employee and user interaction on multiple scales
4. Precedents in safety design for people with ASD or other similar disorders

Design Methodology

Using a mixed method strategy that employs both quantitative and qualitative analysis, I will follow a Concurrent Transformative strategy throughout the research stages and design process. The theoretical premise and unifying idea will guide and impact the rest of the methodological choices used through research questions and data collection. In this way, one can analyze the theoretical perspective at different levels through all stages of design, strengthening the questions, interpretations, and areas of influence.

Graphic analysis will include different iteration and diagrammatic drawing styles, both by hand and digitally, to convey and inform future design choices and decisions.

Digital analysis will occur through modeling software, such as AutoCAD, Revit, SketchUp Pro 2015, and Rhinoceros 3D, by exploring iterative investigation and analysis software to inform design decisions and help formulate different design options. Much of the analysis will include a focus on exploring sensory design choices as well as looking at ADA guidelines and how one can better integrate these codes into a holistic design.

I will also conduct interviews between the Rochester Center for Autism and Minnesota Autism Center to explore existing issues and potential solutions in the current system for children with ASD. Many of these interview questions will focus on investigating the existing programs offered by both centers. Once compiled, I will compare and graphically organize the answers from both centers to help influence the design direction and formulate a design proposal that directly speaks to these results.

Documentation of the Design Process

Intended Medium & Software for Graphical Investigation and Representation:

- **Hand Sketching**
- **Hand Modeling**
- **Adobe Creative Suite** - Photoshop, Illustrator, and InDesign

Intended Software & Programs for Digital Study and Analysis:

- **Autodesk AutoCAD 2016**
- **Autodesk Revit 2016**
- **SketchUp 2015**
- **Rhinoceros 3D**

Design Preservation Methods:

1. Creation of graphical representations
 - a. High quality scanning of all relevant hand sketches and drawings
 - b. Professionally photographing of all physical models and built design ideas
2. Collecting and recording all feedback from faculty and thesis advisor(s)
3. Weekly material, images, and files sent to primary thesis advisor
4. Written notes taken in any personal sketchbooks – titled and dated for any future reference
5. Citing any and all sources used in-text or referenced following the APA guidelines
6. Citing and giving proper credit to drawings, diagrams, and figures in reference sections
7. Proper documentation of all research material, both physical and digital references
8. Digital files backed up in multiple locations, such as Google Drive and Dropbox
9. Digital files backed up on USB and external hard drive - updated at the end of every week

Publication of Material:

All appropriate information and material will be properly recorded and credited in the final thesis book, made available for public use through:

1. North Dakota State University Institutional Repository
 - a. All individual final image files used in final thesis presentation
 - b. All final board image files

- c. Final copy of thesis presentation
- d. Final digital copy of thesis book

2. A final physical copy of the thesis book designed using a professional template from Blurb

Thesis Project Schedule:

Below is a monthly schedule to help better graphically represent the on-going deadlines and list of research items to be completed throughout the thesis project. This schedule will highlight critical stages of development and aid in keeping the project on task by establishing deadlines for meeting the various goals and objectives.

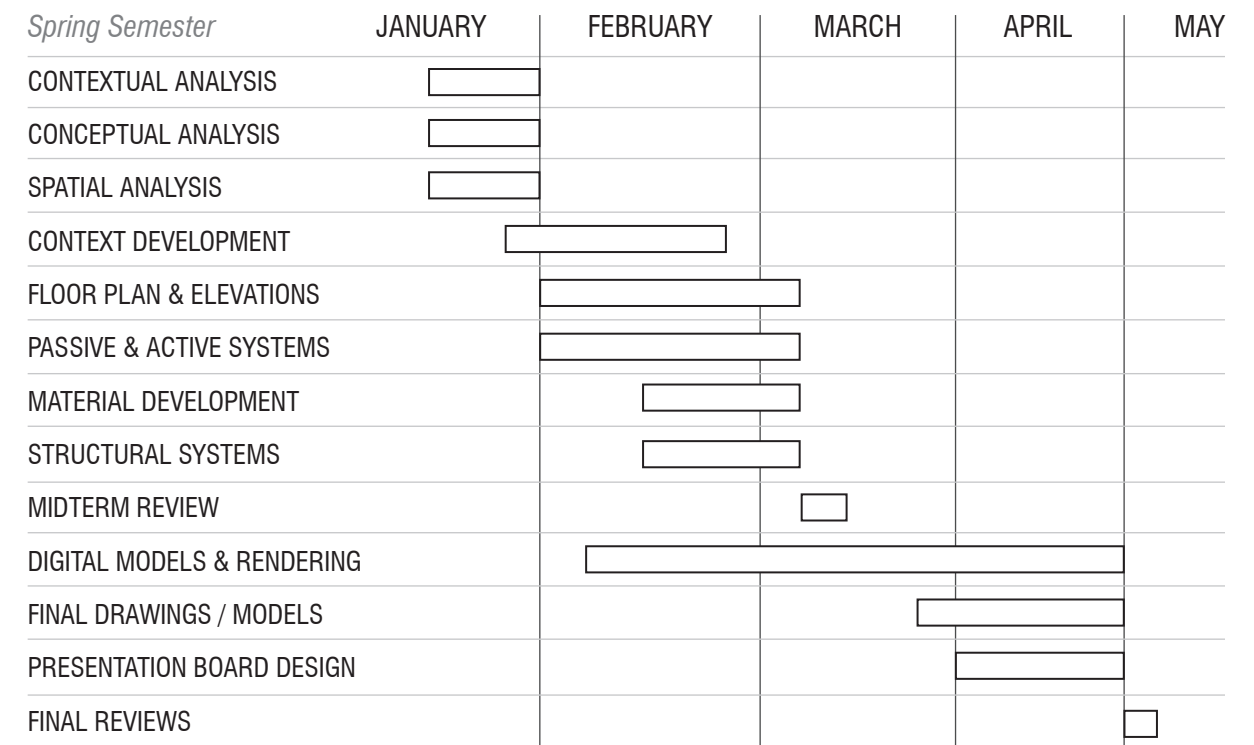
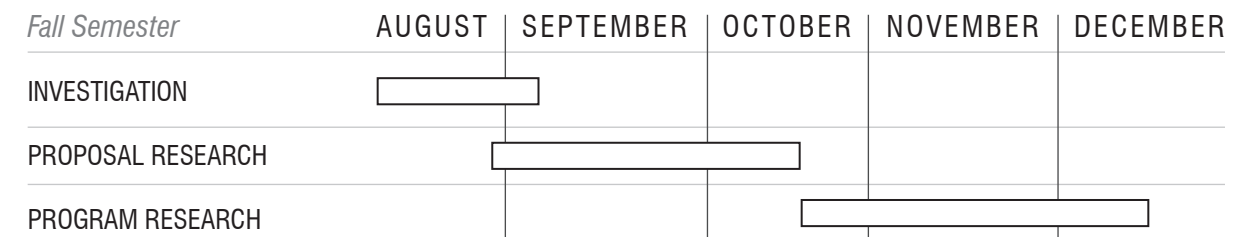




Figure 25 | Guido Abenes, left, shopping with his mentor
photo credit | Liz Hafalia, The Chronicle

UNIFYING IDEA RESEARCH

“Imagine being born into a world of bewildering, inescapable sensory overload, like a visitor from a much darker, calmer, quieter planet. Your mother’s eyes: a strobe light. Your father’s voice: a growling jackhammer. That cute little onesie everyone thinks is so soft? Sandpaper with diamond grit. And what about all that cooing and affection? A barrage of chaotic, indecipherable input, a cacophony of raw, unfilterable data.”

- Maia Szalavitz, Matter

12 UNIFYING IDEA REVIEWED

Understanding the Numbers

Autism Spectrum Disorder (ASD), as defined by the Centers for Disease Control and Prevention (CDC) and the American Psychiatric Association’s Diagnosis and Statistical Manual of Mental Disorders (DSM-5), is a group of different developmental disabilities which includes autism, Asperger’s syndrome, childhood disintegrative disorder and pervasive developmental disorder. ASD often impairs and greatly affects a person’s ability to communicate, interact socially, and control one’s behaviors or movements. As of August 2015, the CDC identifies and estimates that at least 1 in 68 children have some form of ASD, a number that has risen dramatically over the last few decades partially due to a greater expansion of the definition, ability to properly diagnosis cases, and increased awareness. This is a number that has increased over 600% since 1975 when, at the time, reports only listed 1 in 5000 children as having autism. ASD affects each individual differently, ranging from mild to severe cases and symptoms. There is no cure for autism or any of the other disabilities associated with autism spectrum disorder, meaning it is a life-long disability.

However, with greater range of diagnoses comes a greater attempt to understand. We are fortunate enough to have many different programs, therapies, and early intervention services available in the United States for families to help improve a child’s developmental abilities. But what type of life awaits these children as they grow and mature into young adults? One thing ASD does not interfere with is the lifespan of an individual; many people with ASD live just as long as unaffected persons. Still, there are many problems associated with aging and ASD, issues that include needing continued education, proper job skill training, and housing. Roughly half a million of children diagnosed with ASD will be reaching adulthood within the next ten years, posing an issue that immediately needs addressing. A new generation of young adults will need more intervention services and assistance than what the current system provides.

“We are doing a lot for our kids, but these kids are going to live to 80 or 90 years old – they’re going to live the majority of their lives as adults. What are we doing for them in that realm?”

- Jim Ball, board chairman of Autism Society

The transition after high school is one of the most difficult challenges someone with ASD faces. USA Today reports a study that found over one in 3 young adults have no paid job experience, college or technical school



Figure 26 | A graphic representation of the 1 in 68 statistic from Centers for Disease Control and Prevention

the first six or seven years after graduating high school. That's roughly more than 33% of all young adults with ASD who do not work or go on to continue their education compared to the less than 8% of young people with other disabilities who share the same situation. A vast majority of young adults also continue to live at home with their parents and families during this time. A study from Drexel University's A.J. Drexel Autism Institute found that only one in 3 had ever lived apart from their parents and that one in 4 of this finding was socially isolated. So not only are these young adults struggling with living independently, continuing their education, and finding a job, but they are also failing to make any friends and interact regularly with society.

“With the prevalence of autism, we’re talking about thousands and thousands of individuals across the U.S. who, when they leave high school, face a dead end.”

(Susan Parish, Brandeis University)

The Price of Autism Spectrum Disorders

Not many seem to be blaming young adults and adults with ASD in their struggle to find employment and social interaction. Instead, much of the blame rests on the social services responsible for ensuring these people find the transitional help and assistance that they need. Either way, the price of this level of failure is impacting our economy more than one might think. Autism Speaks published a research finding in March 2012 that found that autism is costing society roughly \$126 billion annually. Two years later in 2014, they published new findings placing the cost closer to about \$236 billion. In just two years it has nearly doubled.

Lifetime costs for taking care of a person with an intellectual disability totals \$2.3 million. Compare this to the lifetime costs of caring for someone unaffected by an intellectual disability which are \$1.4 million. These costs are likely to increase drastically unless we begin to develop a better comprehensive understanding of the needs of adults with autism and ASD. The quality of life for adults with ASD must improve and we, as a society, must be the ones that form this schema to help these members.

Most of the costs associated with raising a child with autism lie in special education services and lost parental income, meaning reduced and possibly missed work time and lost benefits. As an adult, the highest and most expensive costs relate to failure to find a job or lack of employment and residential care and rent. Previously mentioned research statements also tell us that at least one in three adults with ASD have difficulty and struggle finding and retaining a job. As we currently seeing a larger push-back in the workplace regarding better maternal leave policies, many supporters of autism spectrum disorder are calling for the same options for parents who have children with ASD. Lost parental income is a large area in which we can create and implement strategies to help these families and allow the parents to stay in the work force.

The Role of Architecture

There has been a shift over the last several decades from large institutional facilities towards residential living communities. Facilities today carry a negative connotation for most, inciting feelings of a mental institution or a living situation that features only isolation and depression. We are seeing a greater shift towards more community living options for young adults and adults with ASD that offer a positive approach to independent living and adult care services. Due to the varied nature of autism spectrum disorders, it is beneficial for cities and communities to have a wide range of living options for individuals to fit in based on their own personalities. Of course, this is the ultimate goal that many hope to one day see.

Currently, most cities offer very little in the way of residential living options for adults with ASD. However, if we look at what the eldercare industry used to be decades ago, the options for eldercare go far beyond simply nursing homes and family residences. Sherry Ahrentzen writes in *Advancing Full Spectrum Housing: Designing for Adults with Autism Spectrum Disorders* that we must create a path similar to that of eldercare for residential alternatives for adults with ASD. We can do this if we consider what options are currently available, document and review examples and case studies, and evaluate the strengths, weaknesses and appropriateness of these models.

Some of these methodologies, such as the findings from Magda Mostafa and design principles followed by KSS Architects, are familiar and widely regarded as base considerations when designing for persons with autism spectrum disorders. Ahrentzen expands upon these in her publication and simplifies the design goals for architects, housing providers, and families. Not all areas are necessary applicable as cases, just like the severity of the disorder, vary among person to person. What might be the right answer for one person is not going to be the exact same for another. Instead, these guidelines serve the purpose of helping create a better opportunity for the well-being of individuals in the built environment, perhaps eventually aiding in their search for independence.

The Purpose of Design

It is not unrealistic to believe that the location and environment that adults with ASD live impacts their overall quality of life. Therefore, it is critical to provide the best options available that not only cater to their disabilities, but enable them to live better. However, many developers, architects, contractors, and housing providers are unfamiliar with these aspects and fail to design residential housing that is successful in these improving these individuals' well-being.

Just as early intervention can aid a child with ASD and help prevent certain symptoms from continuing through life, proper design and neighborhood selection can benefit adults and assist in avoiding difficult issues related to moving and living situations. As someone with ASD is more susceptible to depression, anxiety, stress, and misunderstanding from lack of communication skills, it is critical for providers and architects today to be able to create good design. Not only does this benefit the individuals with ASD but it also helps caregivers provide a higher quality of service and care. Studies show that when caregivers

have better access to resources and respite in their working environments, they will be more likely to stay in their position, a challenge that many parents wish to avoid when placing their sons or daughters in residential care services.

“Clearly there is no one perfect model. There must be a range of options so that individual circumstances, needs, and inclinations can be accommodated.”

(Sherry Ahrentzen, Advancing Full Spectrum Housing)

Goals of Design

1. Ensure Safety & Security

Protecting the health, safety and welfare of clients is a part of all architects' livelihood as they study in school and work on their path to registration. Many codes and regulations already ensure that developers and architects see fit to address basic life safety and security issues, but unique circumstances, such as adults with ASD, receive very little attention past the usual standards. It is important to design in mind with these individuals as most have social, sensory, and learning impairments making it difficult to react in a situation such as a robbery, fire, or natural disaster.

The built environment must address these vulnerabilities and avoid any additional accidents due to poor design. In some instances, controlling access to outdoor areas and the residence prevents some individuals from wandering into a dangerous situation, but fences and gated communities might want to be avoided in order to prevent a feeling of isolation or separation from the surrounding neighborhood. Creating open floor plans to maximize sight-lines and observation help caregivers and provide an opportunity for exterior views. Understanding and choosing the right kinds of materials, furniture, paint, and flooring helps avoid toxic substances and off-gassing, especially with tenants who may be particular sensitive to these elements.

2. Maximize Familiarity, Stability & Clarity

Many autistic people struggle with transitions and change, especially when leaving their homes and familiar environments for the first time to live somewhere else. Design can help soften this experience by focusing on maximizing awareness and location of spaces in homes, workplaces and educational centers. Good design allows users to understand where they are at all times, accommodating space for repetitive events and patterns in terms of layout and arrangements. These dedicated spaces, such as kitchens, dining rooms and room for exercise, should be consistent with individual's routines.

Wayfinding through color and material selection is a strong design skill that can aid and highlight certain environments, making it easier to remember or navigate without becoming distracting or overwhelming.



Figure 27 | Zoe Gross participating at a rally against Autism Speaks
photo credit | <http://cinemalibrestudio.com/>

Clear and simple designs are easier to understand and allow for more predictability, two important cues individuals with ASD rely on in the environment as they go about their daily lives. There should also be opportunity to connect to the past, allowing families, guests or visitors a space to help with therapy and ease the transition period.

3. Minimize Sensory Overload

Sensory overload is a common experience for individuals with ASD, reacting adversely to what most would consider completely normal, such as smooth or soft surfaces feeling rough and jagged, a low humming of a fan or refrigerator sounding ear piercing and deafening, or the flickering of indirect fluorescent lights instead appearing overly bright or blinding. Sensory stimulation involves all the senses, so even smells from furniture and the kitchen area may cause issues and distress in residents. To avoid and counter these conditions simplify the sensory environment, bringing a sense of clarity and order that allows users to remain calm and collected. Designing with natural light instead of artificial light can produce positive health effects.

It is important to remember that certain fixtures or structurally embedded sources that cause over stimulation are permanent and cannot be removed compared to things like a television, chair, or painting. Residents may identify the surrounding environment and architecture through sensory zoning rather than the usual functional zoning patterns. This involves creating spaces with certain colors, materials or landmarks to communicate better to residents the function of the spaces or zones. Compartmentalization is another technique that helps certain individuals focus on the specific spatial use and not become distracted from other people, sounds or objects.

4. Allow Opportunities for Controlling Social Interaction & Privacy

Residents need opportunities to interact socially with other residents and caregivers on a regular basis. It is critical for therapeutic situations and the ability to create connections with others. Following the previous design goals, homes and centers should also include a variety of spaces where different levels and types of social interaction may take place. What we as architects and developers may perceive as adequate and proper in terms of space may actually be crowded or too small for individuals with ASD. This is especially true depending on how many other individuals are living in the same unit or building. Studies suggest that having more than six residents can cause complications and lead to a lack of overall space. It is better to focus on having two to three users within a unit so that spaces might be shared more easily and distractions can be limited.

If a room is going to be smaller than the larger, transitional spaces, it ought to be designed to give the illusion that there is additional space within the room. Designing a main common room, gathering space or meeting room allows users to mix and interact as well as create routines and patterns that fit their lifestyles. It is equally important to have separate or private spaces and rooms so that individuals may retreat or withdraw if they are feeling too overwhelmed by the situation. These spaces should also be clearly defined either by design or boundaries from other rooms. Caregivers and health personnel require specific spaces to be effective with residents and retreat for privacy or living. To help reduce stress and

anxiety among workers, design can incorporate views or allow sight-lines into spaces without invading the personal spaces of residents.

5. Provide Adequate Choice & Independence

Independence is most likely a value that a lot of us take for granted; the ability to make our own choices and have control over the events in our lives may become second-nature. However for individuals with ASD, self-worth and independence is riddled with problems as more than one choice may be threatening or create feelings of anxiety. Design can aid in this process of choice by offering a limited amount of options yet being flexible enough so that it adapt to the changing needs of the residents over time. Independence means that users will need to have the ability to complete common home tasks, such as cleaning and maintenance, keeping up with one's personal hygiene, cooking and making meals, etc. By specifying certain materials, finishes, fixtures and storage space, design can aid in these daily responsibilities and make them much more manageable.

“Having one’s own apartment is viewed as a hallmark of independence by many young adults with autism and developmental disabilities.”

(Sherry Ahrentzen, Advancing Full Spectrum Housing)

6. Foster Health & Wellness

Many young adults and adults with ASD often have other health issues that affect them. These can range from seizures, mental retardation and deafness to sleep disorders, restless leg syndrome and diarrhea. This is why it is critical that the built environment, the home environment, does not complicate or exacerbate on any of these issues. The overall design should help reduce stress and anxiety as well as crowding and unwanted levels of noise. A normal or standard corridor or ceiling height may not be appropriate in some situations with individuals with ASD. Design will need to accommodate for the extra movement and activity without causing any harm. Again, materials, finishes and furnishes should avoid any toxic substances or elements that may worsen one's chronic afflictions.

7. Enhance One's Dignity

While there is forward progress on raising awareness and creating a better understanding of people living with ASD, most still do not fully understand the condition. Creating a sense of dignity for these individuals is important in design as everyone should have the opportunity to be happy within the living environment. Designing homes that fit in with the neighborhood or context can help enhance this feeling. Recognizing one's individuality and being proud of it is a large part of dignity. Design should also allow for opportunities to make spaces truly personal. Some of the case studies examined within this project looked

at letting residents paint their own bedroom walls, put up additional shelving or storage, and allowed for personal items to be displayed anywhere within the home.

One of the often overlooked aspects of enhancing dignity understands that some people with ASD will want to live together as a couple. A lot of homes, apartments and farmsteads today focus purely on single or group living scenarios, but only a few allow for couple living arrangements. It seems like such a wrong view assuming that all people with ASD should never get married let alone date. As people may fall on different levels of the spectrum, some obviously function at a higher level and can maintain a relationship just as well as someone without special needs. Design should acknowledge and offer options for couple living or at least allow additional space for these desires in one's life.

8. Ensure Durability

Some symptoms associated with autism spectrum disorders include pacing, spinning, beating or hitting surfaces repetitively, rocking back and forth in a single location, and other actions that impact the environment. It is important that the design includes durable surfaces and materials for these reasons as it will help with long-term maintenance and safety issues. Design needs to find a balance between the more durable equipment versus domestic fixtures and furnishes. Spaces should not feel institutionalized or any less of a home due to these choices. Acoustical design is another area of durability that one needs to focus on. Sometimes individuals with ASD will scream loudly or uncontrollably if they are feeling uncomfortable, become angered or frustrated, or are stressed or anxious. It is important to care for the individuals, but also to respect the existing neighborhood and not create any further complications.

9. Achieve Affordability

Affordable living arrangements are often difficult to find in cities for residents with ASD or any special needs, especially within major metropolis. Design can play a key role in helping bring the costs down in terms of construction and development. Carefully considering the layout, shape of building, appearance, materials, fixtures, parking, and density can all help reduce the overall cost of the project and prices for rent or mortgages. Sustainable practices can definitely add to energy and water efficiencies and lower operational costs, especially depending on the location of design. Cutting corners is an ineffective and inefficient strategy to save money and often times places the resident's well-being and safety at risk.

10. Ensure Accessibility & Support in the Surrounding Neighborhood

Location is everything and this time it is no different. It is important for individuals with ASD to have access to a wide range of public services, resources and amenities, such as grocery stores, retail outlets, banks, entertainment, churches, schools, work, and restaurants. While not all residents will be able to drive or own a vehicle, effective transportation services and routes, such as taxis, shuttle services, or public transportation, should be within close proximity of the location. Marking these routes and times for residents helps create a clear and predictable schedule that can fit into their daily routines and lives.



Figure 28 | Jacob Barnett, a teenage math genius with an IQ higher than Einstein
photo credit | <http://www.alexlowery.co.uk/>

13 HISTORICAL AND SOCIAL CONTEXT

“Since 1938, there have come to our attention a number of children whose condition differs so markedly and uniquely from anything reported so far, that each case merits – and, I hope, will eventually receive – a detailed consideration of its fascinating peculiarities.”

- Leo Kanner, Autistic Disturbances of Affective Contact

An Introduction to Autism

Over the last century, the definition, explanation and understanding of autism have evolved drastically. Professor Eugen Bleuler, a Swiss psychiatrist, first coined the term “autism” in April 24, 1908 along with “schizophrenia” and “schizoid”. The word itself comes from the Greek word “autos”, meaning “self”, in which a fantasy life dominated over reality. Autism would continue to be associated as a symptom or condition of schizophrenia for many years to come. It was not until the 1940’s that researchers and scholars in the United States first began to use the term to diagnose social and emotional issues in children. It is during this period that two of the most prominent figures in autism’s history emerge and help redefine the term.

In 1943, Leo Kanner, an American child psychiatrist, is studying a group of eleven children. He notices that they all share difficulties in the same areas: social interactions, routine behaviors and patterns, sensory sensitivity, a strict and unusual diet and restricted, repetitive motions. However, he also observes they all share good memory, an ability to repeat information and words, and a higher intellectual potential. After studying this, he publishes his paper, “Autistic Disturbances of Affective Contact”, which describes these common traits, and names this condition as “early infantile autism”, now known today as simply “autism”. At around the same time in 1944, Professor Hans Asperger, an Austrian pediatrician and medical theorist, is observing a group of children that display the conditions summarized by Kanner. However, the children he was studying only seemed to exhibit several of these conditions, including poor motor and social skills. They also did not seem to have any of the same speech difficulties, instead displaying linguistic patterns much like that of an older adult. The term “Asperger’s syndrome” was not widely used until the 1980’s when British researchers used the work published by Asperger to help identify and define the condition.

It is equally as important to understand the misconceptions associated with autism throughout history. Many of these misinformed ideas have led to a better understanding and acceptance of the disorder through greater awareness and research into the subject. One of the first incorrect theories began in the 1950’s with Bruno Bettelheim. A professor and instructor at the University of Chicago, Bettelheim based his idea from the descriptions framed by Kanner’s publication on autism in children. As there was no biomedical evidence or explanation at the time for the disorder, he expanded upon the notion that the disorder stemmed from poor parenting, specifically from cold and distant mothers. The medical establishment widely accepted this

hypothesis, known now as the “refrigerator mother theory”. Many saw autism as a disorder or by-product of parenting and it went unchallenged until the 1960’s. In 1964, a psychologist by the name of Bernard Rimland, who had an autistic child, published a book, *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior*, attacking the hypothesis. He maintained that his child was not autistic due to his or his wife’s parenting skills. This signaled the start of a wide debate between autism seen as either a disorder of parenting or a factor of genetics.

During the 1970’s, many parents were still confusing autism as a form of mental retardation and psychosis, a form of disconnection from reality. Multiple foundations and non-profit organizations, such as the Erica Foundation, started to rally for proper education and therapy programs for children with mental or physical disorders, including autism and Asperger’s. Research into autism expanded exponentially during the 1980’s as more believed that the link between parenting and autism was unrelated. Instead, science began to see autism as neurological disturbances and other genetic issues. Currently, treatments for autism tend to focus on behavioral and language therapy as well as highly controlled and designed learning environments.

The Current Condition of Autism Spectrum Disorder

Today, many refer to the term autism as autism spectrum disorder (ASD) which includes multiple other disorders as part of the spectrum, including Asperger’s syndrome. Most of the symptoms vary among individuals, meaning everyone displays ASD differently, but there are three core characteristics used to currently define ASD.

1. Difficulties in social interaction

Most children with ASD display difficulty engaging in social interactions and situations. Common traits include avoiding eye contact, indifference to others, and preference to being alone or away from others. These children are at risk for developing and learning communication skills slower than their peers and have difficulty interpreting or being able to empathize with others. Some individuals also display moments of uncontrollable tantrums or fits of aggression, leading to physical harm or disruptiveness. These traits usually make it very hard to develop meaningful social relationships with others and may cause the public to misunderstand the child’s situation.

2. Difficulties in verbal and nonverbal communication

It is not uncommon for some individuals to never properly develop verbal communication; others may simply build their language skills at a slower rate than others or rely on images or pictures to convey their thoughts. Some have difficulty putting their words into a meaningful or complete sentence. Repetition of phrases or words is also often common in individuals with ASD. Sometimes even the body gestures or movements of a person may be misunderstood or fail to match what they are talking about. Because of these traits in verbal and nonverbal communication, it is tough for these people to let others know what they are thinking, wanting or needing.

3. Restricted, repetitive patterns of behaviors, interests and activities

Individuals with ASD usually display odd and unusual repetitive motions, such as spinning, repeating phrases or movements with their mouth, standing on all toes, and flapping or rapidly moving their arms around. Some display opposites of these motions where they either freeze in place or stop moving for extended periods of time. These individuals have a strong aversion to sudden change or a break in routine. Children with ASD usually live each day by the same excessive patterns, like watching a movie or scene over and over again, eating the exact same food or drink for each meal, and making motions or movements in the same location. They also demand and strive for complete consistency in their living environment. This type of pattern or lifestyle is one that can be slowly treated with correct interventions and some may grow out of it as they age.

In addition to these three characteristics, many individuals with ASD exhibit severe sensitivity to sensory experience. For some, sounds such as a telephone or school bell ringing may be extremely loud and painful. The touch of a very soft piece of fabric may instead feel sharp and unbearable. The turning on of a light or lamp may cause an individual to cover their eyes and lash out emotionally as a response. Individuals with ASD respond differently to all aspects of the sensory environment. In addition, strong urges, compulsions or desires are some of the emotional and behavior patterns that go along with autism. It is not uncommon for children to develop or have a mental impairment or psychiatric disorders with ASD, such as seizures, anxiety, obsessive compulsive disorder (OCD) and ADHD.

The Prevalence of Autism Spectrum Disorder

According to an official report published on March 27, 2014 by the Centers for Disease Control and Prevention (CDC), ASD now affects one in 68 children. That's an increase of 30% since the last update of around one in 88 reported two years earlier in 2012. Autism prevalence has been increasing substantially ever since first official reports in 1975 put estimates of children affected by ASD around one in 5000. In fact, in the last two decades alone it has increased by more than 600%. Today, we have unofficial reports from surveys done by Autism Speaks that seem to move the statistic up to about one in 45. It is important to understand why these numbers are on the rise and what it means for us as architects, designers, and, potentially, parents.

Many of the findings today seem to suggest that the reason for the surprising hike in ASD prevalence numbers relate to changes in how the disorder is diagnosed and general increased public awareness of ASD over time. The 1970's were still seeing a change in how researchers and professors viewed autism and the symptoms. It makes sense to see a lower number of children diagnosed during this period as our knowledge became more competent with the evolution of the biomedical field and medical studies. However, all this evidence relating to the increase of prevalence in ASD, while explaining factors for a portion of these numbers, does not fully explain this intense rise.

Diagnostic practices along with the criteria for assessing autism spectrum disorders have



Figure 29 | Dan Selec, one of the founders of NonPareil Institute, working with an autistic young adult
photo credit | <http://www.bizjournals.com>

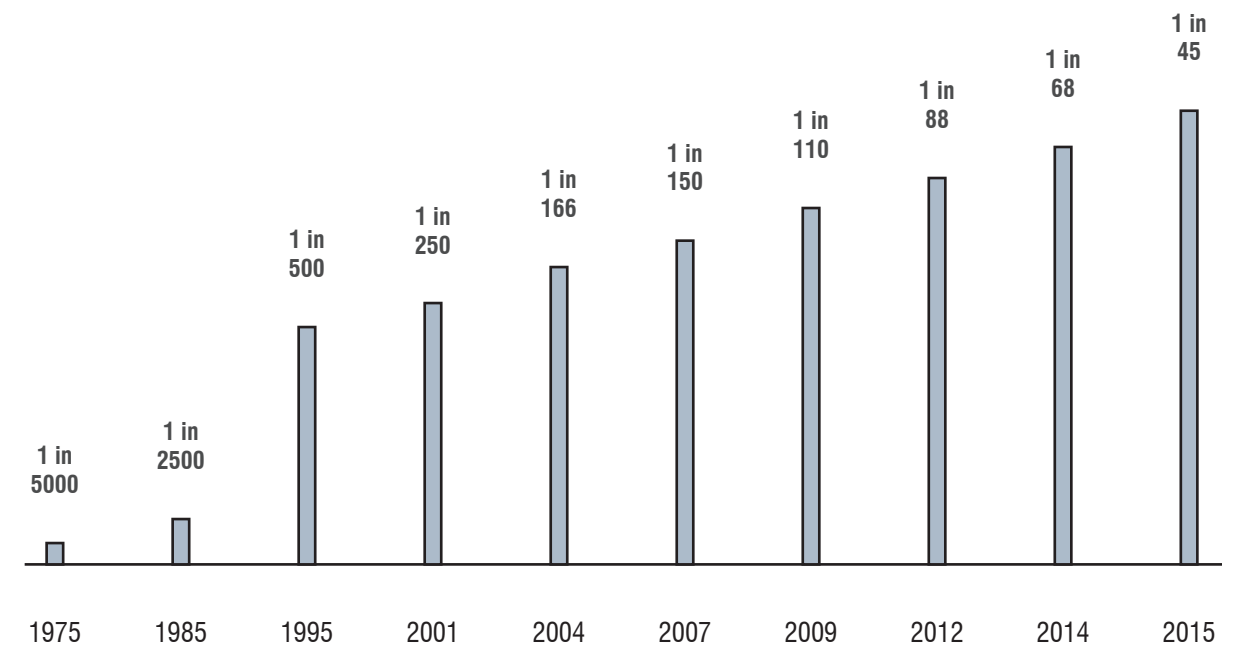


Figure 30 | Chart of the prevalence of autism spectrum disorder in children over the last four decades

seen some significant change over the past two decades. This has led to a broader range and increase in diagnoses and identifications of individuals with ASD that we otherwise overlooked or did not properly diagnose at one time. Autism Speaks uses an example from a study performed by researchers at Columbia University on children in California. They found that due to the change in diagnostic criteria, California saw an increase of roughly 26% autism cases between 1992 and 2005. Overall this meant that at least one in 4 children diagnosed with autism in California would not have been actually diagnosed using the previous diagnostic criteria.

Greater awareness of autism among the general public and healthcare professionals has also added to the increase of prevalence as many more people alive today are familiar with the disorder or know someone affected by it. As autism is properly diagnosed in more children, there is an increase of knowledge among parents of potential symptoms or signs to watch out for in their own children, a process known as information diffusion. For this reason, a portion of the overall rise we see each year can be attributed to social influence and increased awareness.

Additionally, a factor that researchers are beginning to incorporate into the increase of autism prevalence is the advanced age at which parents are having children. Multiple publications and studies investigating the relationship between the parental age and autism show an increase in the risk of older parents having children diagnosed on the autistic spectrum. The California Department of Public Health reported in 2009 that above all the maternal age is a significant risk factor for autism, putting mothers age 40 or older at the highest risk. The exact relationship between a parent's age and increased risk for autism is currently under further examination.

Over 50% of the increase in autism prevalence over the decades may be explained by the changes in diagnostic patterns, greater public awareness, and an increase of parental age. However, this means that half of the increase remains unexplained and not linked with the aforementioned factors. Researchers believe that the areas left unexplained may be correlated with environmental factors and how they may influence genetic vulnerability. Research and supported projects today aim to look into these two areas to help explain the remaining half of prevalence increase.

The prevalence of autism spectrum disorder is growing public health crisis that demands attention. It is not only children that are at risk, but young adults and adults as well as parents and families. While much has been done to suggest and explain the increase of numbers among children, there appears to be very few epidemiological surveys of the prevalence of adults with ASD. It is unknown how many current adults are living undiagnosed, but figures from the United States Census declare that of the total population of 15 years and older, roughly 16 million (7%) have mental disabilities. This list includes ADHD, autism, Alzheimer's disease, senility, mental retardation and other developmental disabilities. Of that 7%, it is unclear how many specifically are limited to having ASD. Instead, it helps frame a view of the sheer amount of young adults and adults living with disorders or disabilities that require a certain level of help.

Resident Living Options

In addition to the lack of information of prevalence of adults with ASD, there is also very little research into where and how they live. While some go on to live independently, there is research that shows a vast majority remain at home with their parents. A study by Easter Seals in 2008 interviewed young adults, who were between 19 and 30 years of age and finished high school, and asked what their current living arrangements were. 79% of the interviewed individuals with ASD acknowledged to living at home with their parent(s) or guardian. Compare this number to the 32% of people with no special needs remaining at home in the same situation. Only 4% of young adults with ASD live independently compared to 58% of young adults without special needs. These numbers only convey young adults up to the age of 30, leaving out a larger section of the population.

So what happens to those who are older? Where are they living? Are they even able to consider living independently or do they require 24/7 care? There is an attempt to answer these questions using documentation records of living accommodations for adults with intellectual and development disabilities (I/DD). Along with the increase of autism prevalence over the last several decades, we have moved away from large institutional facilities to community residential services. Of this population of I/DD residents, about 26% of them live within their own homes that they own or lease. However, over 45% of those receiving in-home care services, such as Home and Community Based Services, live with their own parent(s), guardians, or families. The demand for these services and residential options is predicted to continue to increase, especially as over 500,000 children come of age and require post-high school services in education and living opportunities.

What Autism Costs Us

The cost of autism affects more than just individuals and family members. Autism is costing our society approximately \$236 billion annually in the way of both direct and indirect costs, such as healthcare services, residential placement services, therapy programs and options, medical costs, and lost or impaired work time and income, and reduced work hours. Among these listed, adult care and lost productivity are the largest components to the costs. Lifetime costs for taking care of a person with ASD and an intellectual disability averages around \$2.4 million and is approximately \$1.4 million when a person with ASD has no other intellectual disability. By understanding the amount ASD is costing our society, we can better prepare and plan for the services and programs to offer individuals and families. It is an important factor to help determine the best way to reduce costs while improving the overall quality of life for people affected by autism spectrum disorders.

The financial aspect is crucial to understand as we examine the potential living options and opportunities children will have as adults. An autism diagnosis is a lifetime of increased costs in healthcare, parental and care-giving services and continued/specialized education. While it is important to increase access to early intervention, potentially offsetting some of the staggering costs associated with ASD, we need to also look at long-term interventions for those young adults and adults who are already too old to qualify for societal support. Luckily, as awareness grows, so does support for future studies and surveys into tracking these risks and outcomes.

A BRIEF HISTORY OF AUTISM SPECTRUM DISORDERS

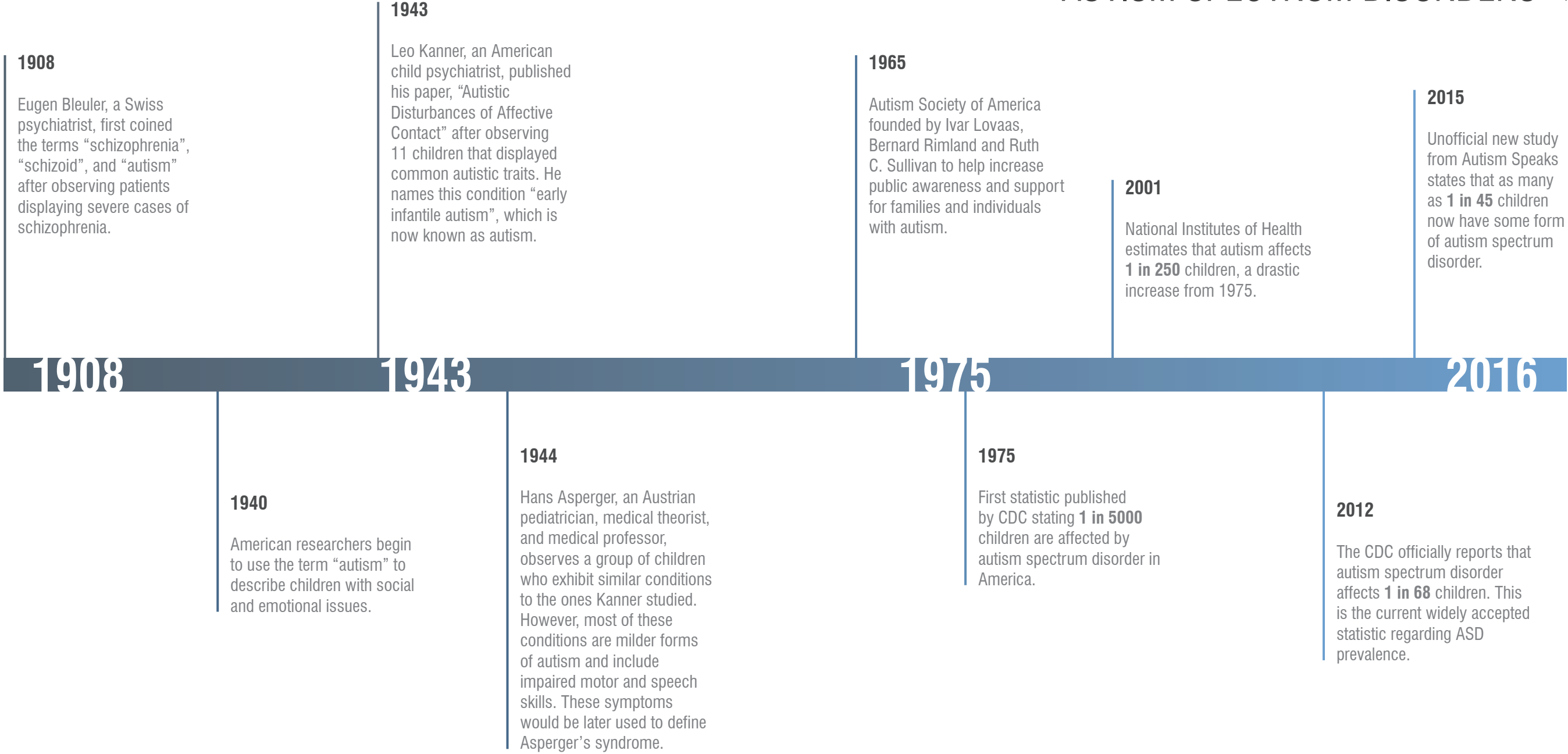


Figure 31 | A timeline of the history of autism spectrum disorder

14 RESEARCH SUMMARY

In Summary

Autism spectrum disorder is on the rise due to a multiple number of factors. Greater awareness, diagnostic practices, advancing parental age and genetics all seem to play a role in the current statistic of one in 68 children in the United States having some degree of autism spectrum disorder. The disorder affects everyone diagnosed differently and therefore makes it difficult to create unique programs or services that cater to specific levels of ASD. However, the history of autism and autism spectrum disorder has been making a lot of forward progress and, while there is no known cure in sight, multiple therapy options and treatments have been discovered. We are becoming more prepared to deal with the disorder at an earlier age, but we must also realize that a large population of young adults and adults remain undiagnosed or understood. There is a very real lack of affordable and proper housing options and continued education programs that cater to the needs of individuals with ASD. Studies suggest that another 500,000 teenagers with ASD will be reaching adulthood within the next decade in the United States, adding to the already expansive number of adults living with autism spectrum disorders. Most of these young adults will not have the advantage to continue college after high school, find a meaningful job or fulfilling career, and remain living at home with their aging parents.

As architects, developers, designers and family members we can aid in the process of life after high school for those reaching adulthood and those already living as adults with ASD. New studies into the architecture and design of residential housing options targeted for people with autism spectrum disorder provide a base of general guidelines and goals that one can build upon. By following these design considerations one can positively impact the behavioral and skill development issues originally outlined by Magda Mostafa in her 2008 study. It is too often that housing considerations for new construction fail to even meet the lowest of ADA codes and regulations. Apartments are going up without any elevators, stairwells include steeper steps to save space, door frames become all the same minimum width, cabinets are installed at heights with no consideration to wheelchair accessibility, and entrances fail to include handicap accessibility options. By failing to meet these needs or even acknowledge them, individuals with special needs cannot feel any dignity, safety or independence. As sustainability becomes a holistic part of all current designs, so too should designing in mind for individuals with ASD and other disorders.

Architect has a history of impacting and influencing the senses. Spatial creation can go far beyond the code minimums and standards used today by contractors and construction developers. Poor design hinders and prevents individuals from realizing their self-worth and attaining independence. It can complicate lives and have a lifetime of negative consequences. However, good design with a right sense of direction can impact and improve someone's well-being and health. Individuals with ASD experience the built environment quite differently from those that have no special needs.

Impact of Research

The proposed thesis outlined a program that included a residential living community and workplace training center for young adults and adults with autism spectrum disorders. Research into multiple case studies, the history and context of existing programs, and design goals and guidelines specific for individuals with ASD has introduced to me a new way of understanding the program and options for my thesis design. The user and client group that I attempt to target will be very important as design choices change depending on the potential individuals.

At a base level, several considerations will be the same no matter the client or user and ought to provide enough of a platform to build a successful program. Such design guidelines and goals include minimizing sensory overload, providing opportunities for interaction, privacy and predictability, durability of materials and surfaces, enhancing dignity and enabling users, and providing adequate safety and security through design. While my design might be successful, I understand that it may not be appropriate for all individuals with ASD. But, this is still a welcomed outcome as it at least provides another opportunity and option for housing and continued education programs in a community that needs to be able to offer more choices.

Continued research will search areas of historical precedents in sensory architecture that might better help create a meaningful design. It is simple to build a house, apartment, or complex that matches the existing character of the context. This thesis calls for a unique example of architecture that not only answers all the proposed design guidelines, but incorporates sustainable practices, successful programs and services, and provides a chance at independence.

Influence on the Program

It is clear how important even the smallest design considerations are to individuals with ASD. From choosing the proper materials and finishes to controlling how certain smells, sights and sounds affect and create a sensory zone; designing for autism spectrum disorders goes above the usual ADA codes and regulations. It will be important to lay out multiple options when designing the spaces that the clients and users will be living within, including parking and the continued education center. A lot of the considerations for ASD are not that much of a far cry away from existing residential housing and buildings. Instead, the design is more sensitive to enabling users and aiding them in their overall well-being and self-worth. These are things that architecture ought to aspire to create in every aspect. The built environment is something that everyone engages with throughout all hours of the day. It is no longer acceptance to ignore or overlook other groups of the population just because of their needs.

In order to create a more successful program, the design will need to address the issues that individuals with ASD go through on an everyday level. It has to be more than community housing. It has to fit in with the existing structure and fabric of the neighborhood while allowing the users opportunities to interact yet have their privacy as well. It cannot isolate or further the stigma of the disorder. Instead, it has to become an example of positive architecture that is affordable and attractive to individuals all over the United States. By adding to the successful housing opportunities, it is more likely that communities will respond by building other options for these individuals.

15 PROJECT JUSTIFICATION

“Here is a truth about children with autism: they grow up to become adults with autism. And yet the life expectancy of people with autism is more or less average. Here is another truth, then, about children with autism: they can’t stay at home forever.”

- Michael Tortorello, The New York Times

Advocates estimate the number of individuals with ASD reaching adulthood in the United States over the next decade to be around 500,000. This is a figure that does not include or acknowledge those individuals already living as adults with ASD, where some remain undiagnosed or unaware of their condition(s). Many parents worry over where their children might one day live and work, knowing they will not be around forever to take care of them. Some of these children will go on to do great things, such as attend college, find a meaningful job, or move out and successfully live on their own. However, according to multiple surveys and studies, most will not be able to do any of these things. Roughly 79% of young adults with ASD today remain at home with their parents and only about a third ever found a job or continued their education. It is time we all realize there is a growing problem that many Americans will one day face as these children transition into adults after high school. So how does this change? Scholars, designers, and even parents are beginning to find common ground and develop potential solutions for these problems. Architecture plays a critical role in helping create better environments in which people with ASD can learn, live, and lead a better life.

Sustainability is not the only emerging factor that needs to be incorporated with all aspects of design. We need to make sure we are doing as much as we can to include individuals with special needs or disabilities in our design solutions. The Americans with Disabilities Act (ADA), signed into law in 1990, has helped a bit, but as architects and designers we need to make sure we are doing more than following simple rules in a handbook or consultant’s advice. Specific projects require unique solutions that go above simply using standard requirements. They require a certain level of understanding on how to make a solution more holistic and inclusive. My project aims to add to the growing list of architectural models for living communities and workplace training centers that aid young adults and adults with ASD.

Construction of new residential buildings and apartments today seems to always take the most efficient and inexpensive route. A lot of the time we see this equating to cheaper materials used overall, defaults and standards for spatial sizes, and usually including only the bare minimum of requirements for people with disorders or disabilities, sometimes ignored altogether. In my opinion, this is a far cry from good design. These buildings are failing an increasing number of people, which is unacceptable. The value of this project will be associated with how I can design a mix of typologies that enable and improve the lives of adults with ASD while being sustainable and affordable. I will also incorporate and build off of the common ground strategies and concepts for designing architecture for full spectrum individuals, such as the ones created by Magda Mostafa and KSS Architects. Understanding and successfully applying all of these concepts will demonstrate the skills and knowledge I have gained as an architecture student.



Figure 32 | Amelia Schabel, right, with art director Andrew LaBounty, left, at nonPareil Institute
photo credit | <http://www.npr.org>

16 SITE ANALYSIS

Site Narrative

Located in the southeastern portion of Minnesota, Rochester is best known for the Mayo Clinic and headquarters of IBM. Downtown Rochester makes up most of the medical campus with residential development stretching in all directions around it. The current population of Rochester is over 111,000 and appears to be increasing by almost 10,000 people every 5 years. This rapid growth is most likely due to the international services provided by the Mayo Clinic and proximity to Minneapolis and St. Paul. With a lot of these larger cities on the rise, many people are looking to live in Rochester as a cheaper alternative with arguably better services. There are currently plans to expand the downtown medical campus and attract more tourists, businesses, and college students. The Destination Medical Center (DMC) initiative aims to make Rochester an international destination for premier medical services. With this in mind, there seems to be an opportunity for Rochester to begin building housing and continued education services that address the needs for people with autism spectrum disorders. As a frontrunner for medicine, I believe Rochester should also create programs and architecture such as the Sweetwater Spectrum Community and Airmount Woods, two of the earlier case studies.

The site selection for the thesis project is located on a plot of undeveloped land in the northwestern part of Rochester. The original site was actually a different location within Rochester, but the decision to look for a better site happened after completing the first site visit. The original site was a much smaller size of land located right next to Rochester Center for Autism and very close to a major highway. The reason for the change stemmed from the surrounding buildings, such as a gas station, medical supply storage building and several vehicle repair and service businesses. Even though it was by a nice neighborhood and in close proximity of key amenities, the site felt like it would be too difficult to build multiple community living houses and an educational center on the same piece of property. Many of the surrounding buildings also seemed like that might work against residential homes for individuals with special needs, i.e. the bright fluorescent lights that remain on 24/7 at the gas station and the sound of traffic from the highway. The current site, however, offers much more space for growth and interaction with the future development of a new residential neighborhood. It is also located far enough from the busy interstate and highway roads so sound from traffic is minimal.

Upon visiting my site, I immediately saw the opportunity for my proposed thesis project. Currently, the site remains undeveloped farmland with no actual built roads or foundations. There is evidence of future planning as I did find fire hydrants and manhole covers to the sewer. This is hopeful as the project will be able to grow alongside the other future development and better fit in with the community. The nearest buildings around the site include condominiums, residential houses, a dance school for children, an elementary school, and an



Figure 33 | Image of selected site in Rochester, MN looking northwest



Figure 34 | Image of selected site in Rochester, MN looking northeast

Olmsted Medical Center office building and employee fitness center. Other features near the site include the Douglas State Trail, multiple public parks, and a public golf course. There are also signs that several of the current streets will connect to the existing roads in the near future, meaning the site will eventually have street access. For now, nature remains the primary owner of the site.

One of the oldest structures near the site is an old farmstead that is being used as storage for construction equipment. One of the only indications of this farm is one old silo next to a simple post-and-beam metal shed. I had the opportunity to walk around this farmstead and investigate what else had been left behind. To my surprise, most of the original cement blocks used for the foundation remained intact and unremoved. There was clearly no house or any sort of structure left behind on this foundation, but one can easily tell which parts made up the basement and main level.

This discovery was quite important for understanding the history of the site. Previously owned private farmland makes up a majority of my site, as well as the surrounding properties and area. Another surprise was that my family actually knew the previous owner of the farm as the grandfather of a family friend. It's hard to tell exactly when the farmstead was sold, but my mother did mention the city bought it at one point as it expanded its residential community out north and northwest. Using Google Earth, the satellite images taken at different years help paint a picture of when the surrounding development took place. It appears as if the farm remained in service until 2002 or 2003. It was around this time that the first development on the eastern side of the site began. By 2006, construction crews began to remove and flatten the farmland, creating the circulation paths now visible for future roads and drainage. The elementary school looks as if it was built between 2009 and 2010, being fully finished with parking and street access in early 2011. If Google Earth is correct, the Olmsted Medical Center was built in the span of just 3 months. It appears as if the fitness center on the western side of this property was developed within a year and now makes up the southern built environment to the south.

Site Impressions

The impression my site gives off is close to rural feeling or taking a visit to the country. Despite the proximity of the medical buildings and existing houses, I still felt removed from Rochester in a way that felt secretly enjoyable. US Highway 52 is only about 5 minutes east of the site with a giant Wal-mart and Sam's Club closer to 3 minutes. Yet the site remains largely quiet and peaceful. Traffic is limited to residential during the weekends with some increased activity during the weekdays for the elementary school towards the west. All this adds to the sensation that this site would work very well for housing designed for young adults and adults with ASD. They need to be close to a lot of community services and amenities, such as a grocery store, shopping, banking, churches, school, and work, but at the same time they should be living in a community that isn't distracting or agitating their senses. A site located in an area like this also allows maximum views to existing landscape, ample amounts of sunlight, and opportunity for outdoor activities (lower amounts of traffic, less dangerous roads, devoted hiking and biking trails, and established neighborhood community).

It is crucial to keep in mind the design goals outlined in the research section when looking at the current landscape and surroundings of the site. Some living communities for individuals with ASD include farmsteads and country homes. While the site may give off this impression to an extent, I do not think that creating a



Figure 35 | Image of remaining farmstead near site



Figure 36 | Image of the existing original foundation for the farmhouse

farmstead of this kind will be as successful as the original proposed typologies. For one, the site is still well within boundaries of the city. Roughly 10 to 15 minutes away downtown, transportation services can move anyone that needs medical attention quickly enough to the Mayo Clinic. Another reason I want to avoid the farmstead is the fact that the future home development will most likely happen on the northern and western sections of the site. Luckily, a portion of the land around the Douglas State Trail is marshy, meaning it will most likely be left alone and possibly utilized for additional drainage services.

Built Features

As the site itself is largely undeveloped, the only built features are part of the surrounding existing infrastructure. To the north of the site lies the Douglas State Trail, enclosed by small areas of marshland and streams seen in the distance in Figure 27. Right across the street to the east sits several newly built town homes available to rent or own. To the south and southeastern part of the site sits both the Olmsted Medical Center and the OMC Employee Fitness Center, observable in Figures 30 and 31. These two structures are the largest built features that are within close distance of my site. As I visited my site during the early and mid-afternoon hours, I took note that the shadows from these buildings will not obstruct any natural light. To the far west sits the old abandoned silo and equipment shed and more undeveloped farmland seen in Figure 28 and 31. In Figure 26, The elementary school and residential homes are visible from this location and provide a nice backdrop for the Minnesota wildlands and sky.

Light Quality

As there are very few built features or structures on or near my site, this leaves a lot of open space to the sky. There should be no issue of receiving sunlight on all sides of the proposed buildings when designing the layout and plans. The Olmsted Medical Center may have emergency lights that remain on through the night, as well as lights from the parking lot just south of my site. It will be important to note this and possibly conduct a follow-up site visit during the evening hours to see if these light sources impact the area on and around my site. As individuals with ASD can sometimes be very sensitive to lights, care will be given to not design any bedrooms or overnight areas facing this direction.

Solar panels or photovoltaics should stand to gain a fair amount of the daylight with such exposure to light. Depending on the angles needed to maximize solar energy, the structures may need to be built separate from the architecture. If the angles allow for it, space can be conserved by constructing the panels on the roofs of the buildings.

Vegetation

The site currently is overgrown with lots of small bushes, different types of tallgrass prairie, prairie sage, western wheatgrass several small trees and switchgrass. Most of the existing vegetation will most likely be removed during the construction phase, so it will be important to plan out landscaping to bring back most of the lost natural plant life. Landscaping will also help ensure more trees are planted around the building, aiding in protecting the building from the cold northwestern winds during the winter. Some of the vegetation will



Figure 37 | Image of selected site in Rochester, MN looking southeast towards Olmsted Medical Center



Figure 38 | Image of selected site in Rochester, MN looking southwest towards OMC Fitness Center

remain as it surrounds small reservoirs of marshland that will not likely be viable for development.

Water

The site sits very close to several small pockets of wetland and is framed by what appears to be two ditches. These were most likely dug out after the farmland was purchased by the city and sold to a developer for future use. Directly to the west of the site sits a large ditch that creates a small valley between the site and another plot of land. There is a fire hydrant along with manhole covers to the sewer system at the start of this channel, which can be seen in Figures 32 and 33. This landmarks help frame an idea of where the future street will be laid to complete 56th Street NW. The other large source of water appears to be a stream that the Douglas State Trail follows. This is pretty far north of the site and will most likely not have any impact on the proposal or program. This creek is not visible in any of the images I took during my site visit.

Wind

The selected site has very little in terms of ground cover and built features meaning that the wind is free to flow across the plains without any disruption. The site is at the base of a gentle hill which forms a valley of land that is only filled with small amounts of vegetation up until the Douglas State Trail. This may direct the wind to feel stronger as it moves across the site, so averages for the area and Rochester, Minnesota, may actually be a little higher in this specific spot.

The data collected from multiple weather sources helps present the averages in terms of max, mean, and minimum daily values. In Rochester, the average max wind speed reaches around 22 mph, a fresh breeze, and occurs between January and April. The average mean for the year is about 13 mph, a moderate breeze. The average minimum wind speeds reach about 10 mph, a gentle breeze, and occur during the summer months of July and August. The winds largely come from the south and southeast during the spring and summer months with fall and winter seeing winds primarily come from the northwest and west.

Human Characteristics

I did not observe any types of human intervention during my most recent site visit. However, it is clear that future development is going to happen. There are already several manhole covers for sewer access and fire hydrants along the southern portion of the site. This is most likely going to be the path that connects 56th Street NW to 55th AVE NW. For the purposes of the program and design development, this path will be treated as if there is already existing street access. The ditches that will be used for future drainage and flood control are other signs of human intervention on the site. These can be observed from current aerial photos and by walking the site.

South of my site also sits a current landfill for excess rock, dirt, and soil from construction in the area. This will most likely be removed and flattened one day and used for development. I did not observe any traffic, but it might be used heavily when the rest of the area around my site and the neighborhood around the elementary school are finally developed. It will be important to note the possible construction traffic and noise that may



Figure 39 | Image of fire hydrant west of the site



Figure 40 | Image of manhole covers for sewer access south of site

occur during this future phase and the impact it will have on the residents if the community living and centers are built before the rest of the neighborhood.

Site Traffic

As the site is currently, there are no connecting roads or sidewalks to the site. The area is largely undeveloped, although there are signs of planned development, such as the fire hydrant and manhole access to the sewer system. It is most likely that this area will be filled in and developed within the next five years. Most of the main traffic stems from the 55th Street NW access right to the south of the site. This roadway goes on to provide access to Highway 52 and West Circle Drive, two very important roadways for northwestern Rochester. No current bus routes come out this far or connect near the site, but it is hopeful that eventual site development will allow for multiple pick-up and drop-off access points for shuttle services and families.

To the north lies the Douglas State Trail, which provides excellent opportunity for biking, hiking, and outdoor recreation. Residents would be able to establish a routine with service workers, friends, and family that allows them to make great use of this feature to stay fit and healthy. Other nearby amenities include multiple small parks and open green space for outdoor activities. Plenty of options for residents should the proposed site plan take up more space than planned.

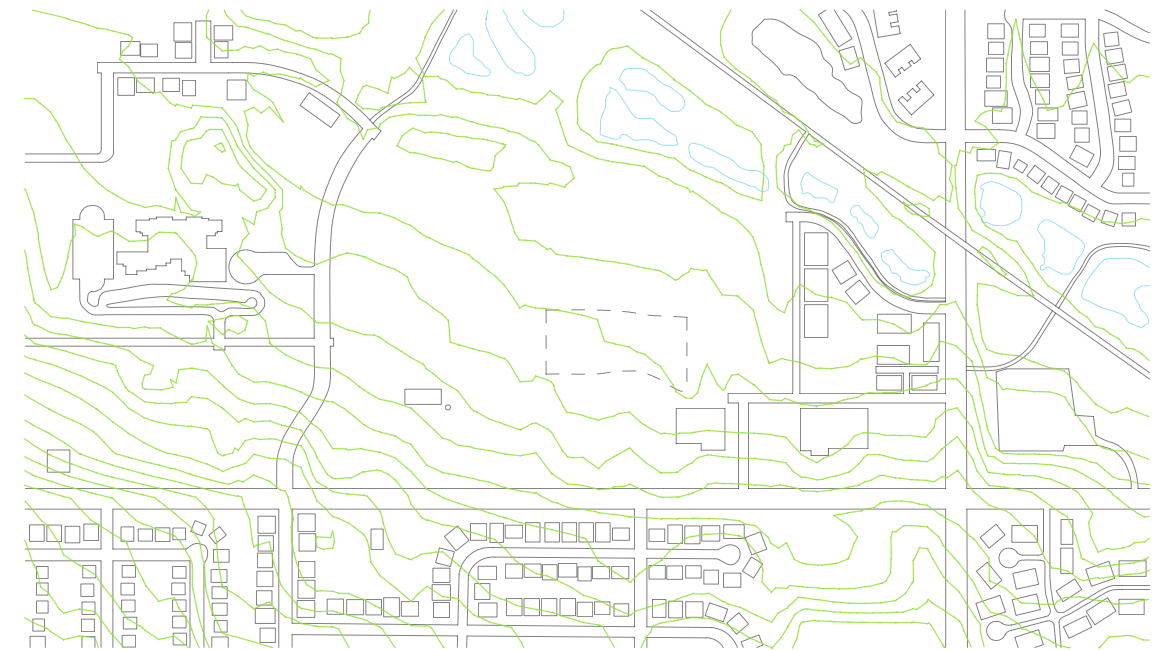


Figure 42 | Site topography of surrounding context.

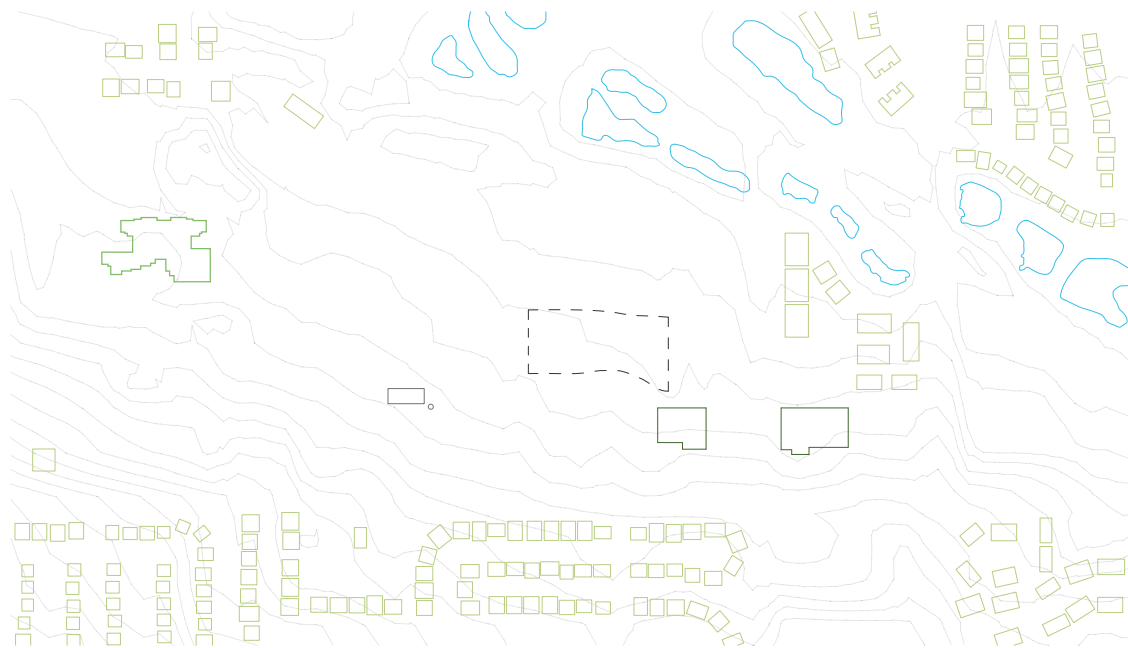


Figure 41 | Site map investigating existing building typologies.

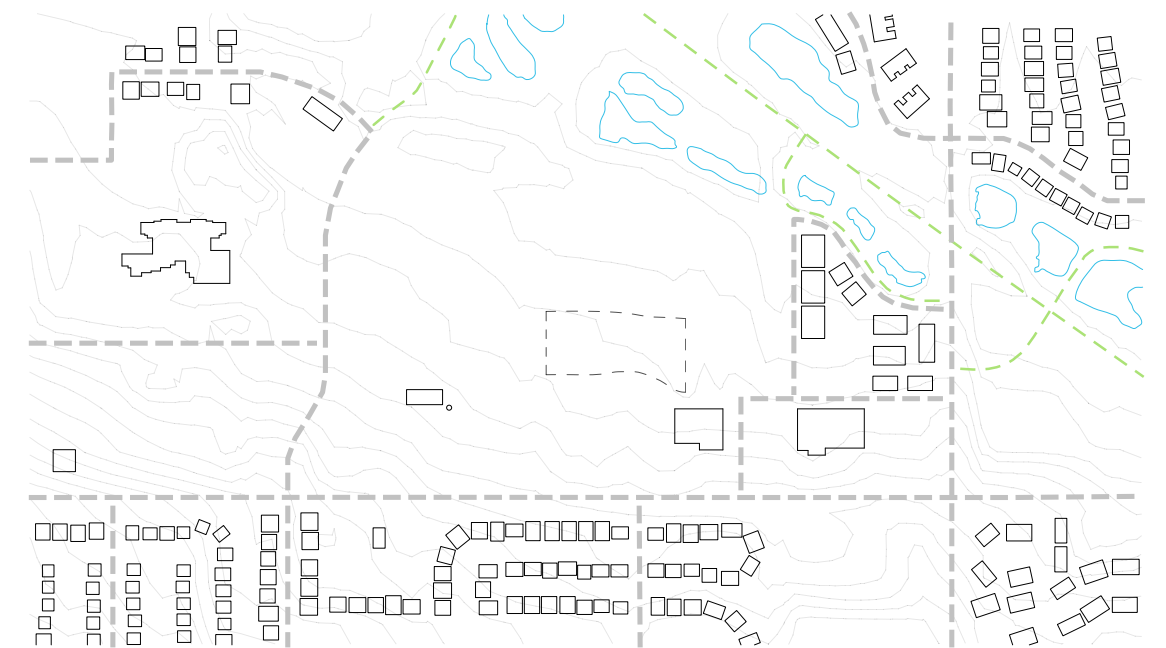


Figure 43 | Site map investigating circulation and travel paths of vehicles (grey) and pedestrian (green).

17 BUILDING PROGRAM

Weekly Program Schedule

While the community living homes will be most likely occupied and utilized 24/7 year-round, it is important to distinguish the operating times for the various programs offered by the workplace training and outreach center. These programs include an art studio, private library, a computer lab for online access, teaching kitchen to build cooking skills, an exercise space in the fitness center for both residents and community members, and a staff meeting room for conferences and training new caregivers. Rochester, Minnesota, commonly follows an 8:00am to 5:00pm workday, but the center will most likely need certain spaces open longer to provide more flexibility for residents and visitors. Staff members will only need to arrive shortly before opening and after closing hours, allowing the center to close overnight for cleaning and security.

This schedule gives a good sense of the peak times that residents and visitors will be using the building and outlined programs. Understanding a better flow of traffic allows for spatial planning and certain site considerations, like parking and building access.

Programmatic Requirements

Most of the estimated square footage numbers come from general averages as well as from the three separate case studies I reviewed earlier. These case studies present a similar typology for both the community living home and workplace training and outreach center. Programmatic spaces may be added throughout the design process and development phase, so the numbers do not represent anything final. Instead, they will be used to help begin thinking in terms of the scale and size of the proposed thesis project. Along with spatial relationship diagrams, this information helps present a better understanding for the rest of the building program requirements and potential project budget.

Community Living Building

- Bedroom (4) - 400 to 500 sq ft (1600 to 2000 sq ft)
- Bathroom - 100 sq ft
- Closet Space - 20 sq ft
- Staff Office and Living - 250 sq ft
- Staff Bathroom – 80 sq ft
- Storage Space – 100 sq ft

Weekly Program Schedule - Workplace Training & Outreach Center

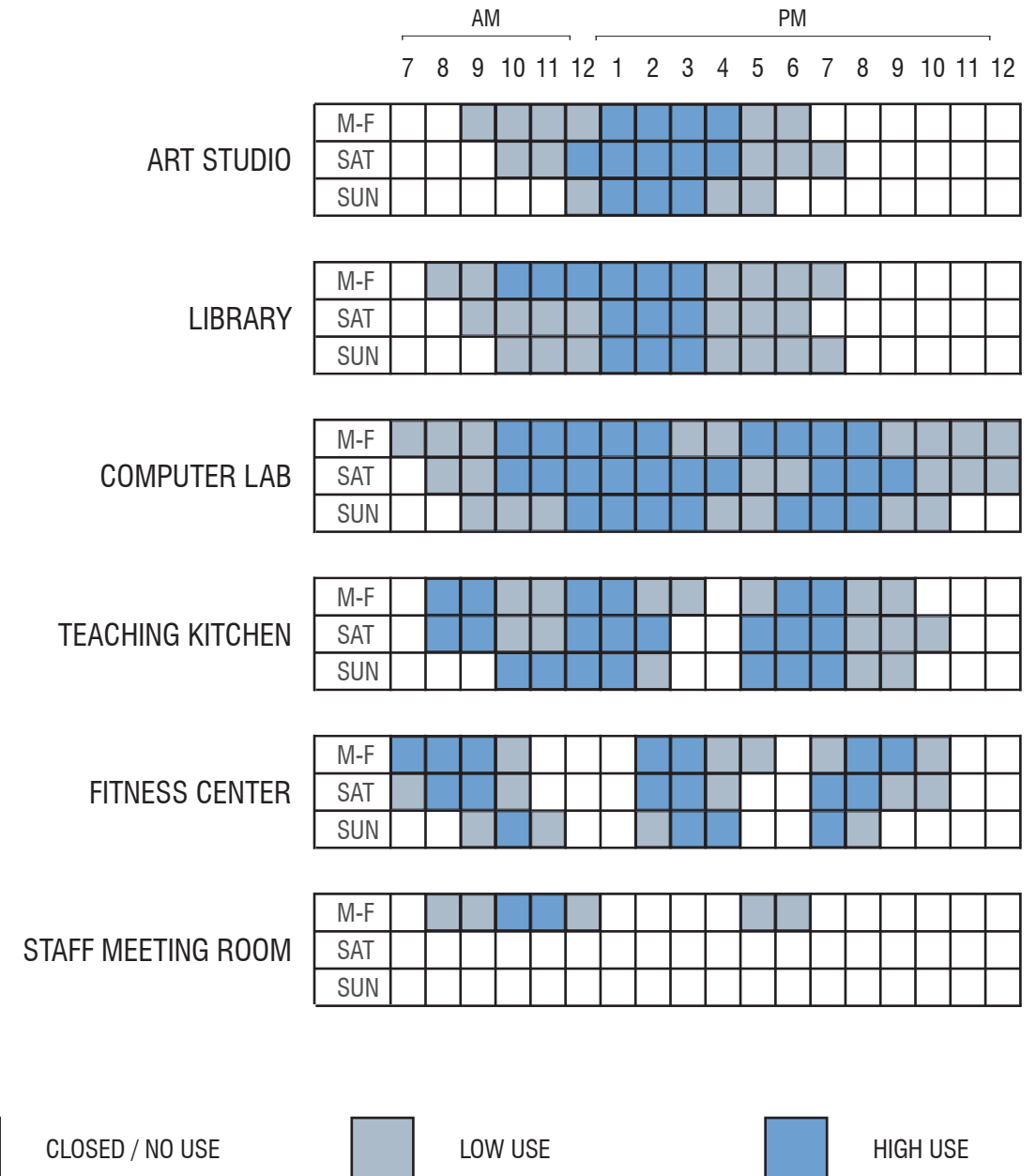


Figure 44 | Diagram of the Weekly Program Schedule for the Workplace Training & Outreach Center

- General Living Room – 320 sq ft
- Community Laundry Room – 80 sq ft
- Kitchen – 240 sq ft
- Dining Room – 192 sq ft
- Utility Room – 48 sq ft
- Circulation – 240 sq ft

Total Space Allocation - 3,670 sq ft

Workplace Training & Outreach Center

- Art Prep & Studio - 200 sq ft
- Computer Lab - 400 sq ft
- Fitness Center and Exercise Room - 500 sq ft
- Staff Office - 200 sq ft
- Staff Meeting Room - 150 sq ft
- Storage Space - 200 sq ft
- Common Area - 384 sq ft
- Library - 384 sq ft
- Teaching Kitchen - 240 sq ft
- Pantry - 24 sq ft
- Utility Room - 80 sq ft
- Restrooms (2) - 36 sq ft

Total Space Allocation - 3,059 sq ft

Project Budget

Judging square footage sizes and the sizes from the case studies, a preliminary look at the budget may price it anywhere from \$3,000,000 to \$7,000,000. A lot of this number comes from interior furnishes and material choices as well, so care must be given to make specifications during the design development phase. This cost also does not include price to acquire the property or any addition construction costs associated with the initial building period, such as the price to move equipment to site, prepare and create foundations, etc.

Spatial Interaction Matrices

Locating particular spaces from the program will be an important part of the overall design layout. Certain spaces require adjacency while others need to share similar spaces in order to work most effectively and

efficiently. The bedrooms in the residential homes will need to provide privacy away from the main common room, yet still be in close proximity for safe egress in emergency situations or if a staff member would need quick access to the individual rooms. By planning out a spatial interaction matrix for each typology and building, one can quickly gather information of how close each space ought to be in relation to other similar or dissimilar spaces. However, the information provided may be changed or adjusted as needed during the design development phase of the project. Another note to make is that spaces may be added or removed depending on further research of residential living communities and educational and outreach centers.

The two grids help define and determine spatial relationships in a logical methodology. As bubble diagrams give an opportunity to loosely join and arrange spaces, the spatial interaction matrix allows one to better match up how spaces will be connected while presenting a vague design direction for multiple options to be explored during the later design process.

Interaction Net Diagram

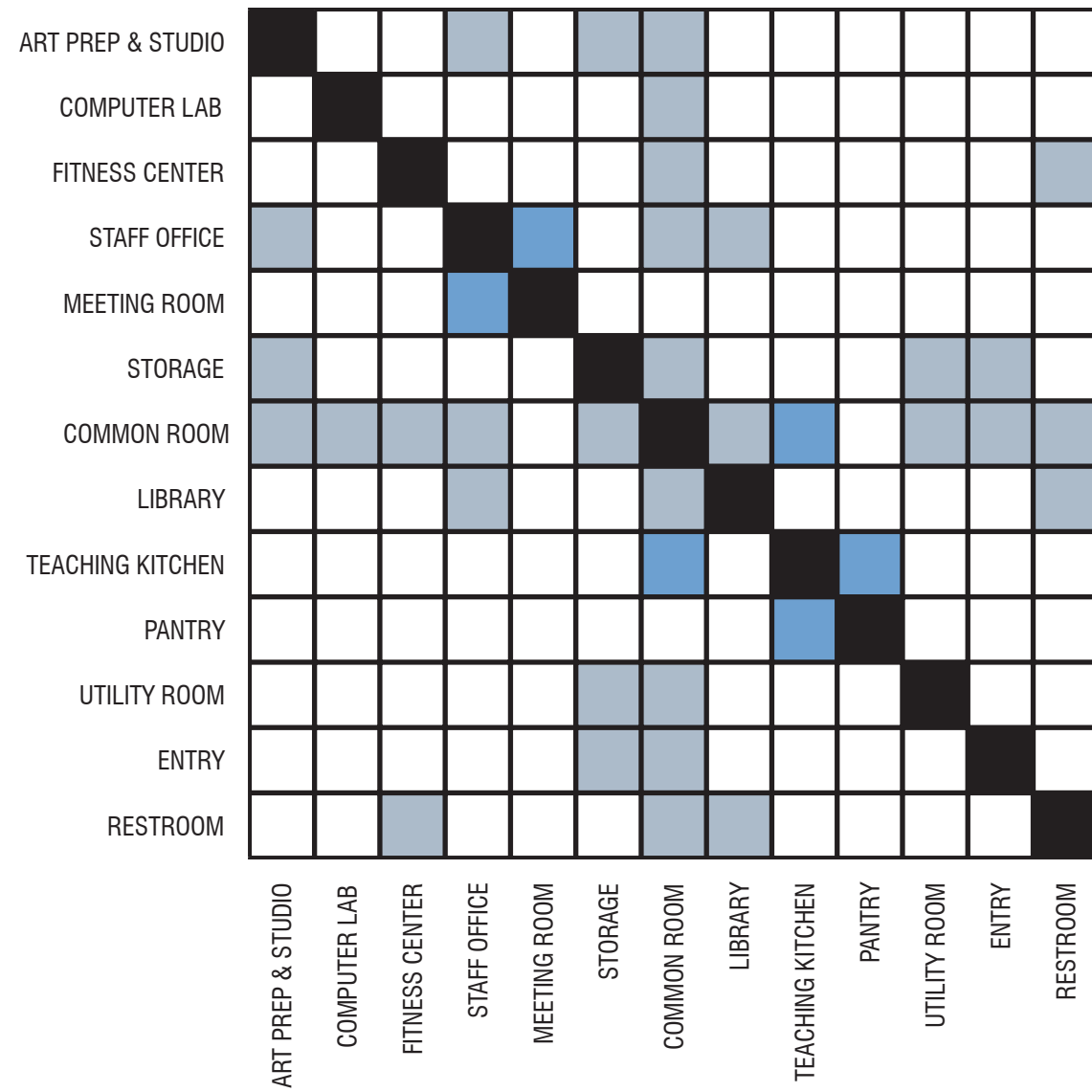
By creating an interaction net diagram, one can better understand how the public and private sides of the spaces interact with each other. This diagram also shows potential connections and relationships of spaces in a visual representation. It builds off of the information presented in the spatial interaction matrices and compares the community living buildings with the workplace and outreach center. These examples help prepare a frame of mind in understanding how spatial connections influence the overall architecture during the development and process phases. It is important to consider how public and private spaces are both separated and connected as potential residents may need more distance to maintain personal space. However, anticipating instances like these, one can develop a design that allows these residential spaces to remain private while still inviting residents to interact and utilize the spaces in the center with the public community.

Miscellaneous Information

Other building program information includes looking at the light quality levels in each space, the psychological impact of the spatial relationships and overall design, color finishes or ideas as far as overall appearance of spaces, materials and necessary furnishings for the designated program spaces, and possible support services, such as secondary and tertiary environmental programs or spaces. These will be explored in depth and expanded upon throughout the design portion of the project, once spaces are actually modeled and developed. However, some information, like light level, intensity, quality and amount needed for spaces, can be reviewed within this portion.

As natural light has been found to improve overall health, daylighting should be used wherever possible. Special consideration will need to be given to residents as individuals with ASD are more sensitive to the sensory environment. Still though, natural light is preferred over indirect or fluorescent lighting, especially in bedrooms and common areas. The design should allow for maximizing natural light sources with regard to information found during the site analysis. In turn, this also allows for views and sights to the exterior landscape and greenery.

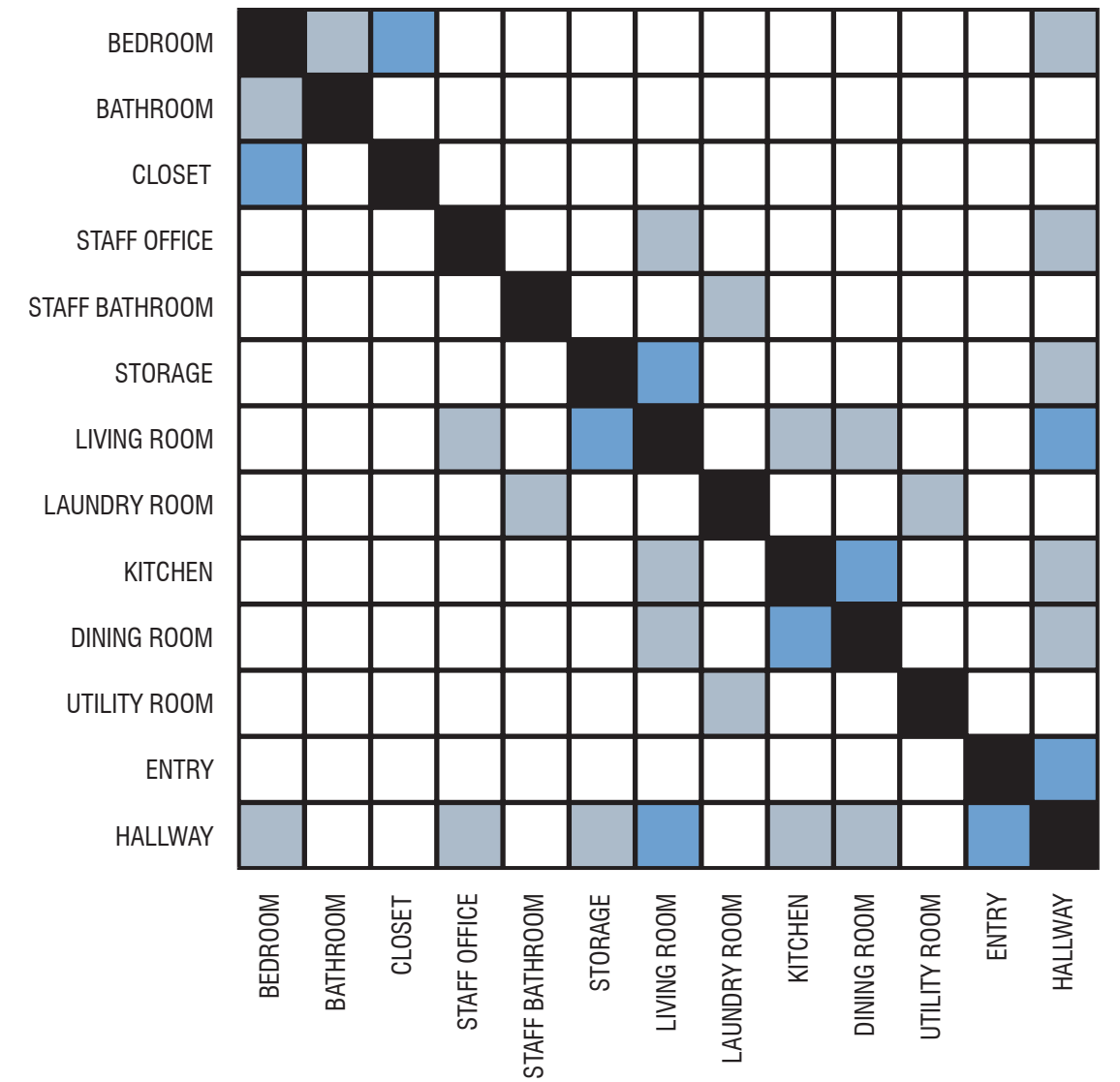
Spatial Interaction Network - Workplace Training & Outreach Center



NOT CONNECTED
 ADJACENT
 SHARED SPACE

Figure 45 | Spatial Interaction Network diagram for the Workplace Training & Outreach Center

Spatial Interaction Network - Community Living Home



NOT CONNECTED
 ADJACENT
 SHARED SPACE

Figure 46 | Spatial Interaction Network diagram for a Community Living Home

Interaction Net Diagram - Workplace Training & Outreach Center

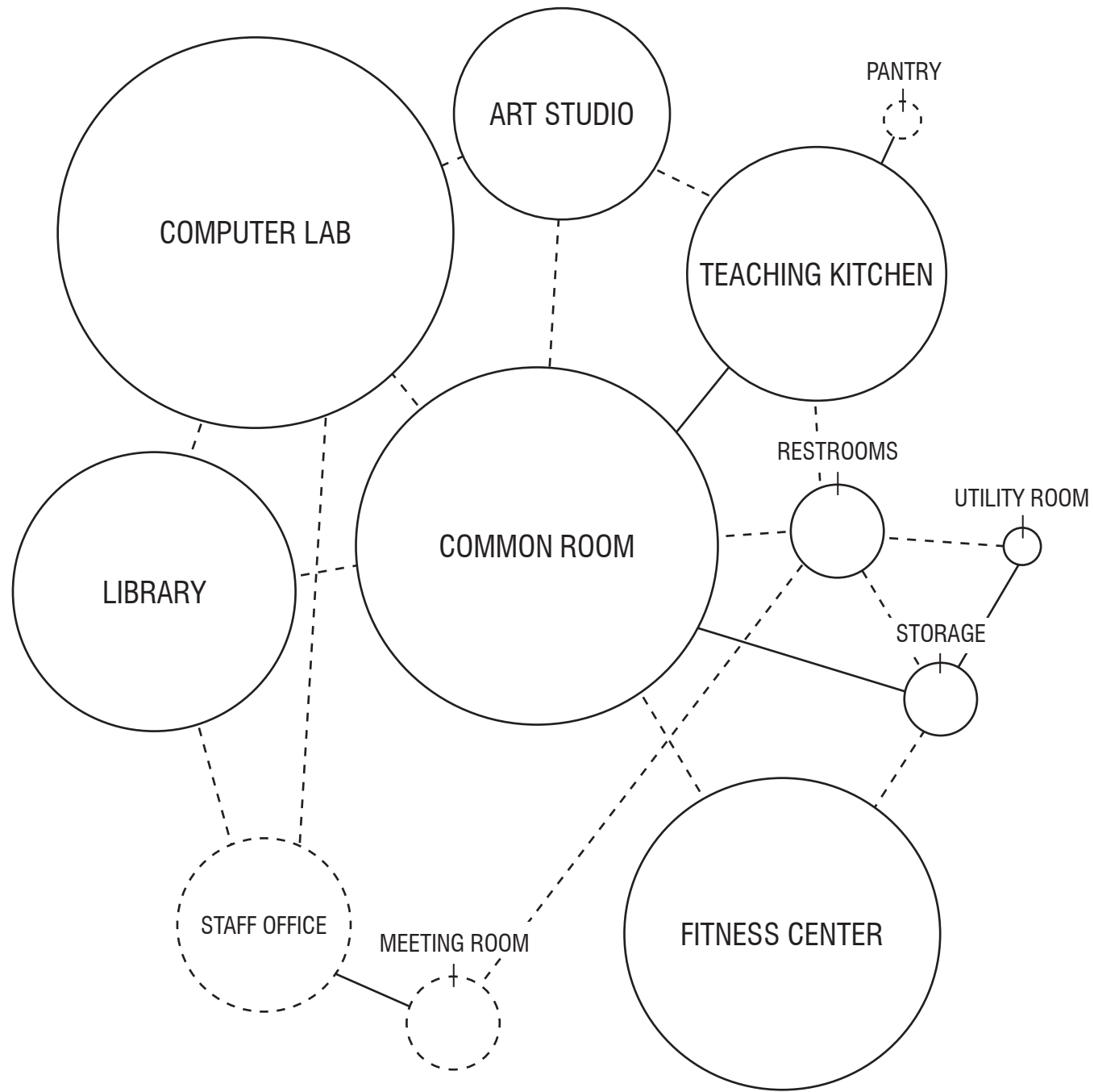
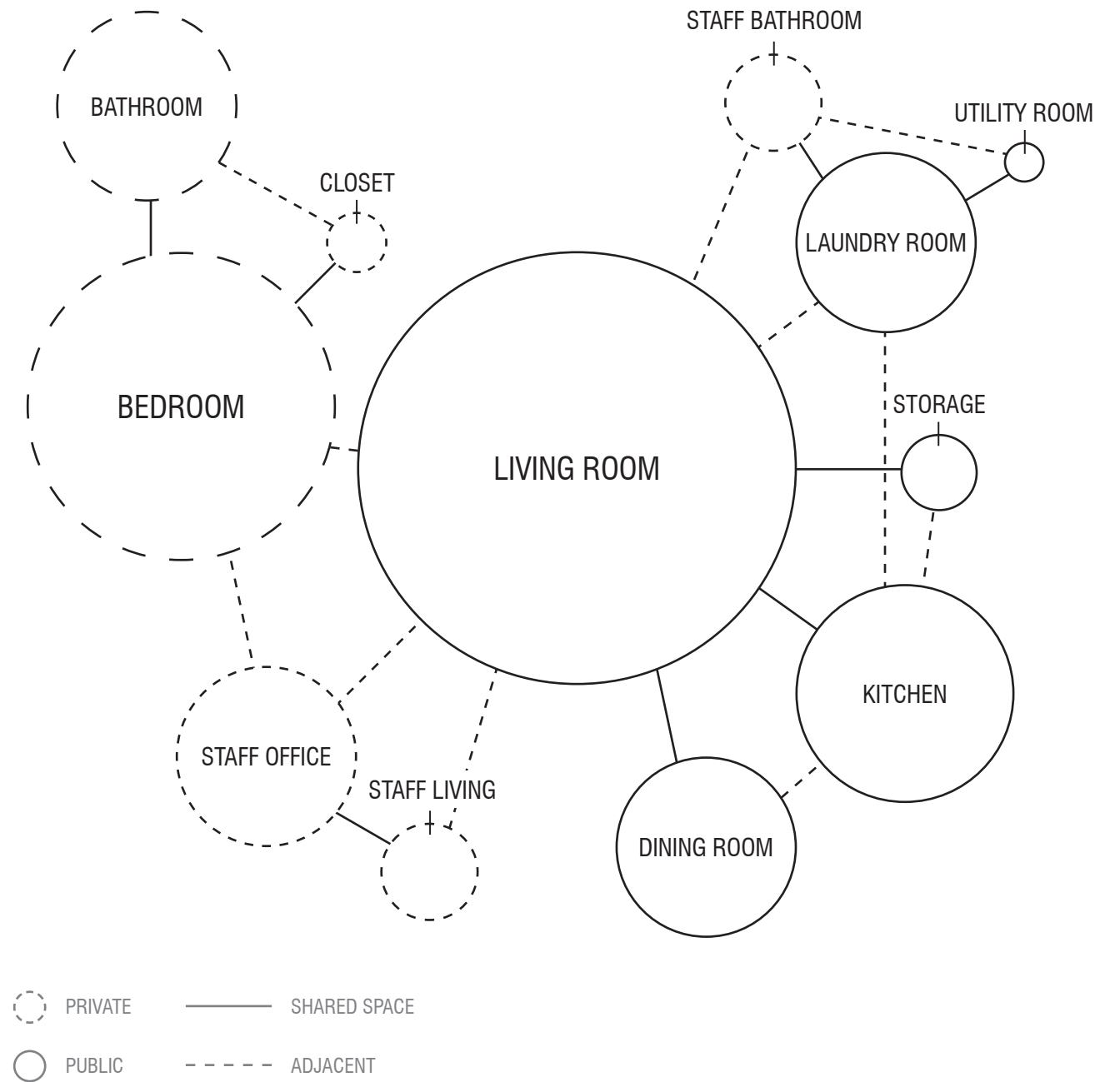


Figure 47 | Interaction Net Diagram for the Workplace & Outreach Center showing relationship of spaces

Interaction Net Diagram - Community Living Home



PRIVATE SHARED SPACE
 PUBLIC ADJACENT

Figure 48 | Interaction Net Diagram for a Community Living Home showing relationship of spaces

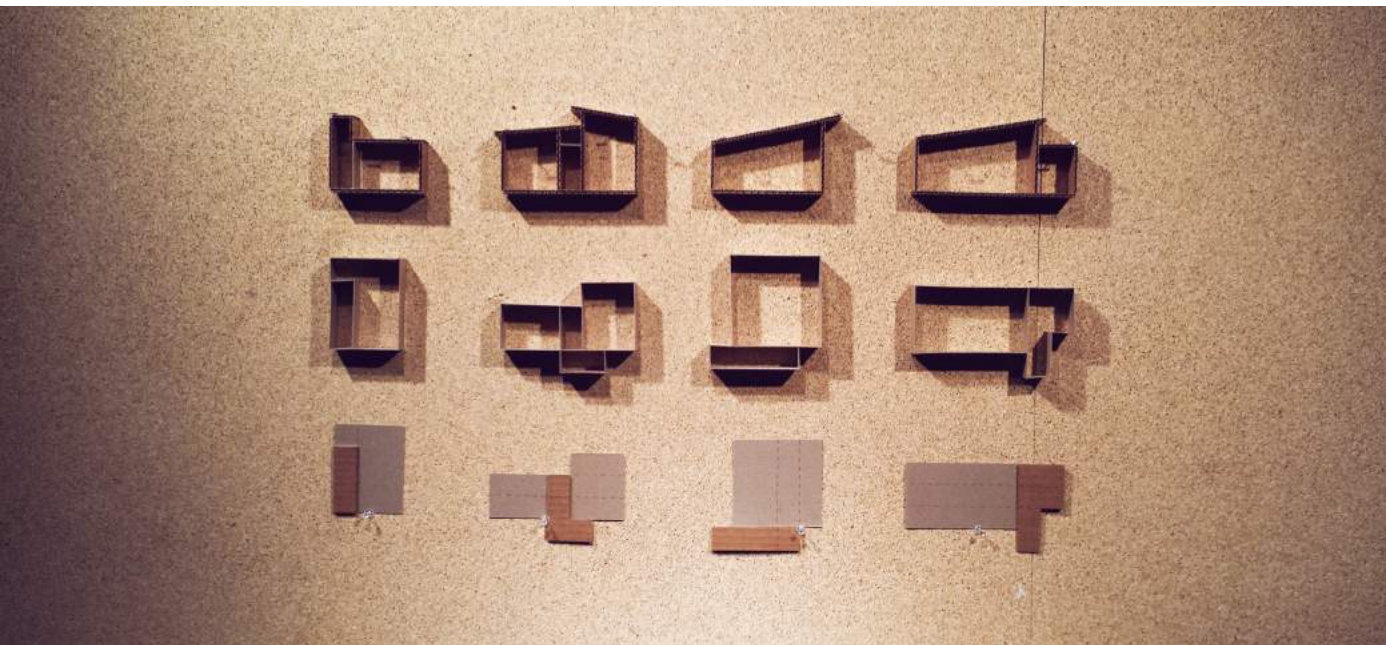


Figure 49 | Process models investigating spatial organization

DESIGN SOLUTION

“Architects need to demonstrate that their design decisions are not only statistically significant, but also statistically meaningful.”

- Christopher N. Henry

18 PROCESS DOCUMENTATION

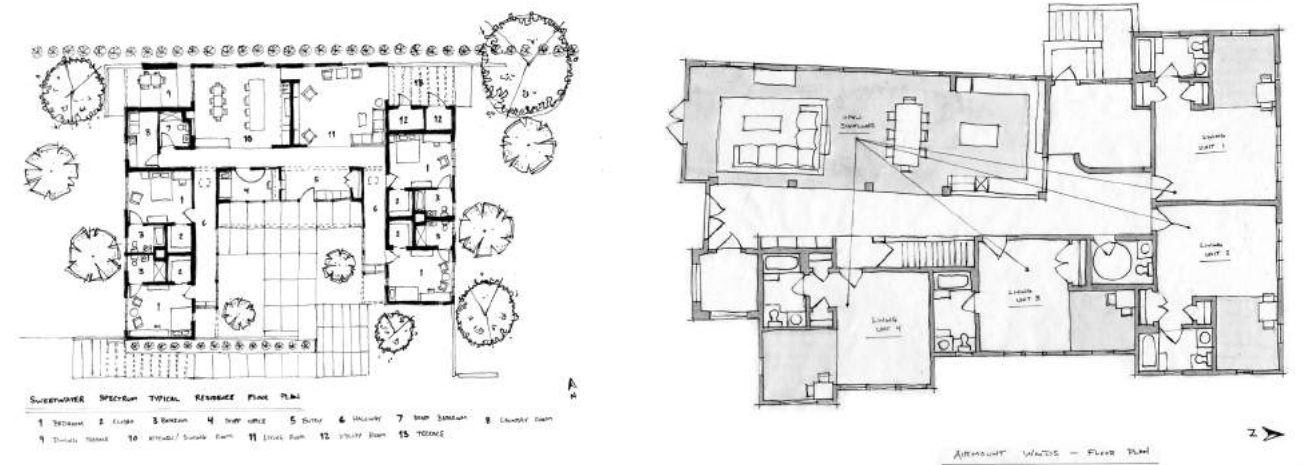
Initial Design Investigations

The first move I made towards investigating any possible design decisions began with me revisiting several of the case studies that I had researched during the fall semester. I wanted to revisit the Sweetwater Spectrum Community and Airmount Woods designs to better see how these solutions addressed the needs of individuals with ASD. This process eventually also allowed to me uncover actual family testimonials about each location, weighing in the positive and negative aspects during post-occupancy. Seeing as my design was going to have answer some very tough questions regarding comprehensive design, it was very helpful to look more carefully over the previous research.

I first sketched out the floor plans of both the Sweetwater Spectrum housing option and the Airmount Woods building. This was an exercise to better understand the spatial relationship of rooms, layout and functionality, and proportioning of spaces. A large area that was important to look at was the placement of the bedrooms in relation to the kitchen and living spaces. I recognized this sort of design as a way to create a clear separation of high activity spaces or moments between low activity and private spaces, possibly including escape or transitional spaces. The two case studies revealed a different approach to the overall architectural solution of building for those with ASD. In various ways, this helped me understand certain aspects that I should look to incorporate into my future design decisions or avoid altogether.

Further studies into the site context were also conducted during these initial investigations. It was relatively important to begin the process to create a digital landscape that I could use for contextual information later. Using the geo-location system in SketchUp accelerated this step quickly. I was even able to pull topographical information and set myself up for a more accurate sun study during the design exploration phase. Another part of this site study process included laser cutting out a small site model that included surrounding buildings, roadways and bike paths, and bodies of water nearby.

The last bit of investigation I carried out before moving into actually building or designing spaces was to revisit the overall principles and guidelines. I attempted to take the exhaustive lists of design considerations and summarize them down into a few sentences and categories to make accessing them easier. It was challenging to keep all these design principles in mind while exploring a new design opportunity. Although by writing everything out in this way again allowed for my thesis advisor, Mike Christenson, to also better understand the considerations and information that I would be applying as I moved forward into design aspects. It was important to help show that designing for individuals with ASD needed to go above simple ADA and International Building Codes (IBC) requirements, as a lot of the environments need to be approached differently in design. This list, as well as the original principles, would be utilized later on before and after midterm reviews of the project and process.



Figures 50 and 51 | Floor plan drawing of Sweetwater Spectrum Community (left) and Airmount Woods (right)

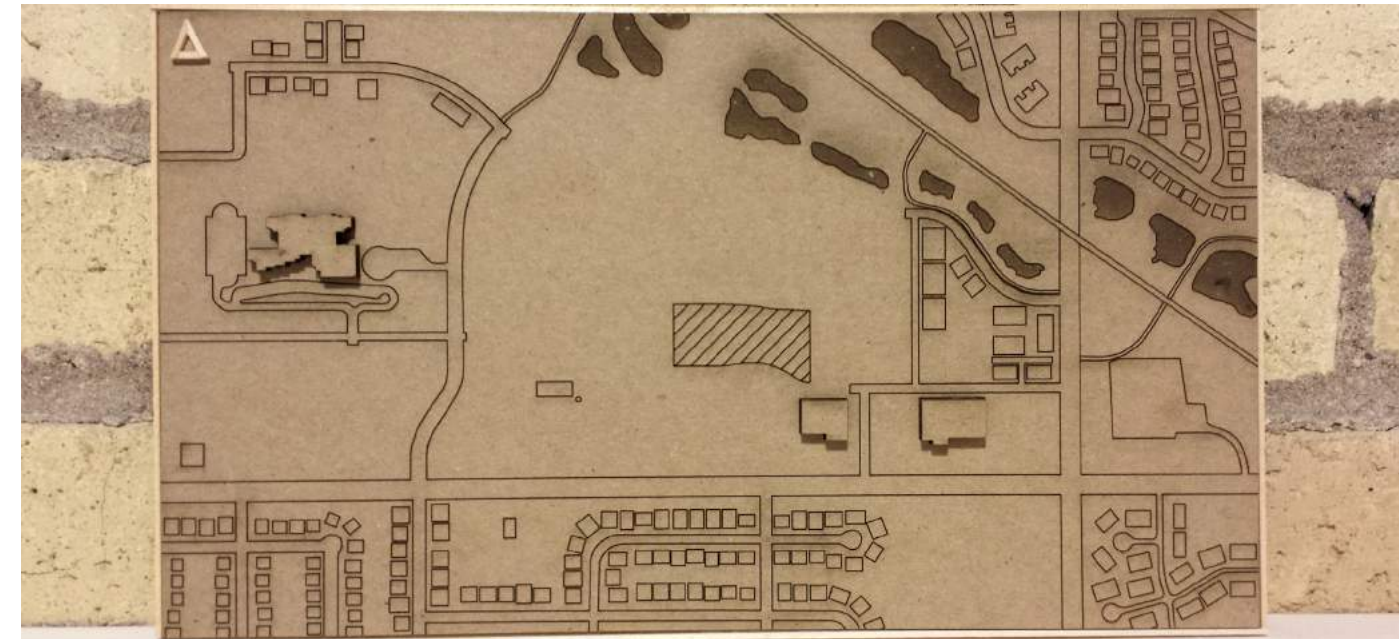


Figure 52 | Laser cut model displaying surrounding site context

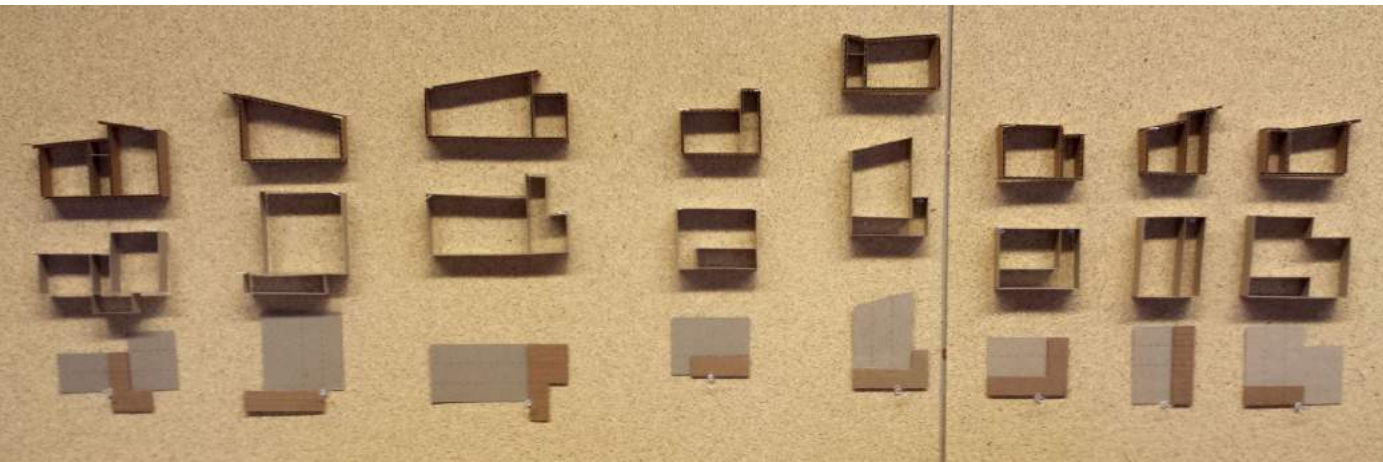


Figure 53 | Image of set of models showcasing spatial, proportion, and sectional studies

Spatial and Sectional Models

Creating physical models is something I always have enjoyed doing. However, most of the models I would create would only explore three dimensional floor plan spaces and openings. I would often miss the opportunity to study the sectional properties of a design, so by creating various iterations of small models that examined all these qualities became important. It also allowed for quick and easy process to create different ideas and designs. The original modeling process looked at three different aspects, which are spatial relationships, proportional studies, and sectional qualities of spaces. I did this two different times with a minimum of four separate models for each of these qualities creating 24 different models which I could respond towards. The spaces that each model studied looked at examining only two different program elements. The first four models looked at the relationship between the main entry and shared common space with the other four looking at the relation between a bedroom and a hallway or transition space. There was no indication of this left on the models, as I felt it that keeping them fairly simple and clear produced better conversation.

The studies also involved only two different types of material, cardboard and chipboard, to help simplify the responses. It was not my aim to begin looking at the actual materiality of what the purposed spaces would be, but rather to start a discussion off of these on what it might be or various other possibilities. Further models eventually explored alternative materials, but these remained relatively straightforward for the beginning process.

Sectional Models Revisited

It was recognized early on that these models were difficult for others to interpret. The point was made several times that explaining them and how I arrived at my final design would need to be touched on whenever they were presented. This made it clear that going forward any other models produced would need to be more specific or show a clearer intention for why they were created. However, during one of the discussions several people interacted with the models in a way I hadn't planned. They picked up two of the sectional models and rearranged them next to each other to create different models and spaces altogether. This made for some interesting iterations and really helped me to start thinking about how the whole building would come together instead of just the two immediate spaces. This entire process was a big step for me in my early design consideration stages and helped me work through spaces before creating anything digitally.

Most of the design considerations that carried over were the roof arrangements and sectional hierarchies, such as the interior roof heights. A part of me realizes that some of these created a lot more interesting spaces or sequences than other designs and I did not give myself a very wide range to explore. I feel like I might have limited myself in terms of design and theory because I placed the need for the evidence-based design principles to come first before trying to add in other design elements. If I had the opportunity to conduct this thesis again, I would most likely try to push the boundaries in terms of what architectural qualities work alongside designing with ASD clients specifically. The ultimate goal of the residential buildings was to invoke a home-like quality, but there could have been moments where the different design considerations would have lead to a unique building aesthetic.

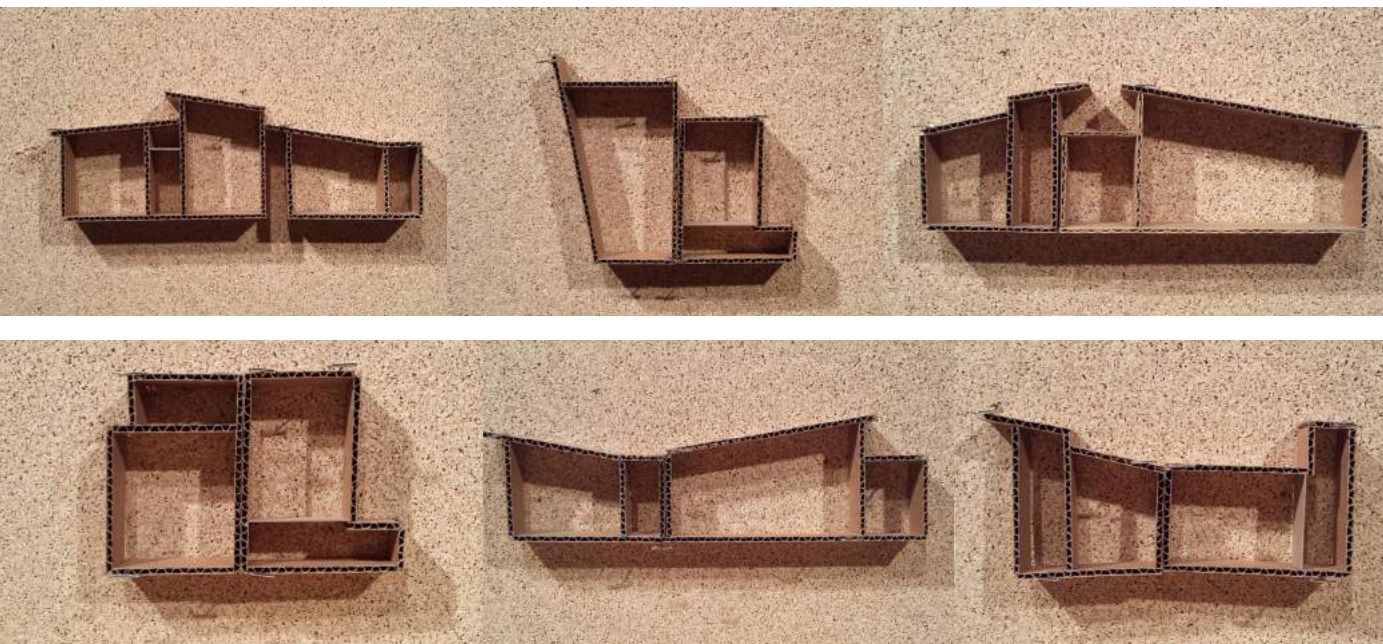


Figure 54 | Image of sectional models being combined for more design considerations

Additional Model Studies

The next process of modeling for me included creating multiple spaces together and testing out the relationship between private and public zones. I ended up not creating as many models as I initially produced, but the few that I did showed a lot more details in design considerations, such as including more spaces and different material choices. These iterations were a break away from the initial process as I began developing further studies into the locations of the bedrooms in relation to the circulation and common living space. I also began to look more into the overall form and shape of the building as determined by the interior information. I think doing this led to more of the design choices I would make later on in regards to the appearance of the outside of the residential and community buildings. At one point, I also tried to integrate an interior courtyard idea with the process models to help create visibility between spaces as well as an exterior space that individuals could use in the warmer months. This idea ended up not being included in the final design due to a larger emphasis placed on security, circulation and transitions, and layout considerations.

Light and Shadow Studies with Physical Models

After all these various design iterations, two different layouts emerged as valid candidates for that would be used to base the final floor plans off of during the next several weeks. I used models with openings that reflected where most of the windows and doorways would be located to see how light entered the spaces and which spaces were left mostly in shadow. While this process could have been done easily through programs like Revit and SketchUp, and later was, my laptop had encountered a hard drive failure earlier in the spring semester. Since I had already designed a lot of the physical models, it was easier for me to utilize these in a dark space with a lamp rather than build the entire layout digitally using a computer in the school's lab.

The results from these studies did not reveal many new findings or revelations, but they did help me begin to seriously consider the layout of the spaces in location to sun patterns. It was at this stage I realized it was important to locate the bedrooms along the eastern side of the design, so that residents may wake up with the natural daylight patterns. Creating this opportunity for the people living within the building carried all the way through into the final design solution and played a large role in the overall layout of the spaces and zoning. Many of the initial designs did not look at specifically where the bedrooms or kitchen and living spaces were located, so in this way the sun studies did lead to a specific way I changed my design thinking.

Site Consideration and Layout

After conducting several different types of studies with all these process and iteration models, I began producing my digital content. One of the first things done was to create several different mass models of both the residential and community center and explore how they interact with the site. By arranging them in multiple different ways, I examined not only how much space each building program potentially took up but also the ways in which they could possibly react with one another. Many of the comments from this process stated that I ought to look into further ways the outside space could connect or become part of the program-specific considerations and guidelines. This type of site study would be done throughout the entire design process to see the ways in which I was developing my buildings would influence the impacts on the site.

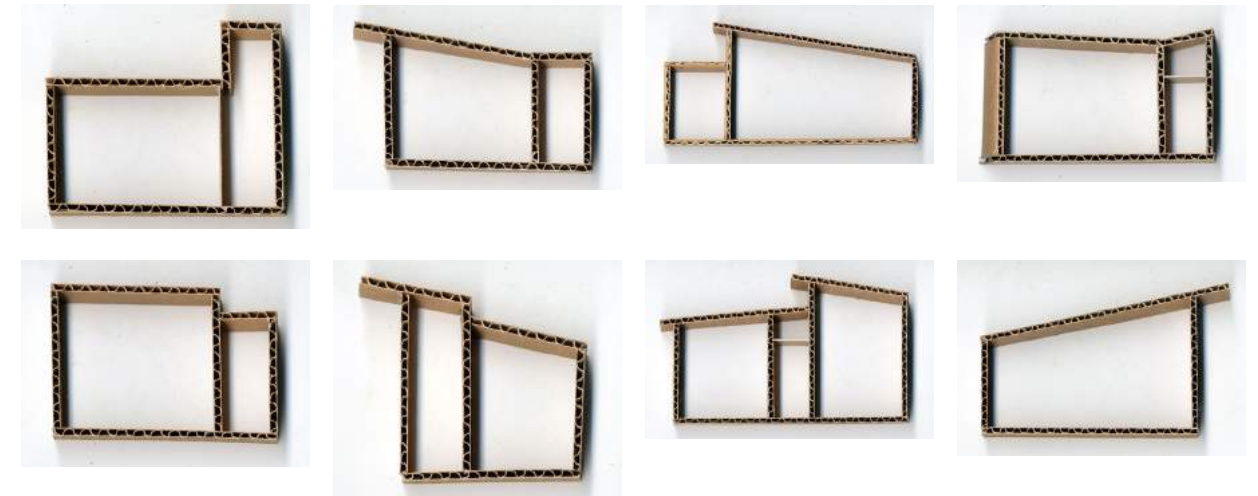
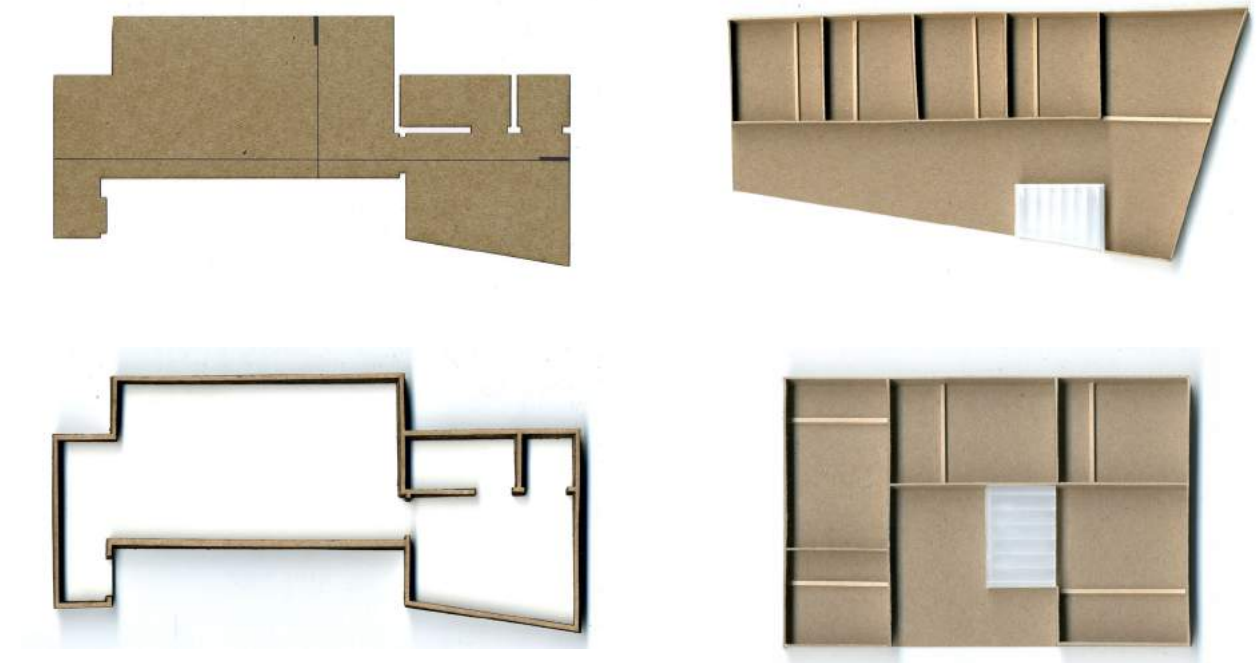


Figure 55 | Images of the eight individual sectional models at a larger scale



Figures 56 and 57 | Images of new spatial study comparing private and public zones (left and right)



Figure 58 | Light and shadow studies completed through various model forms and scales

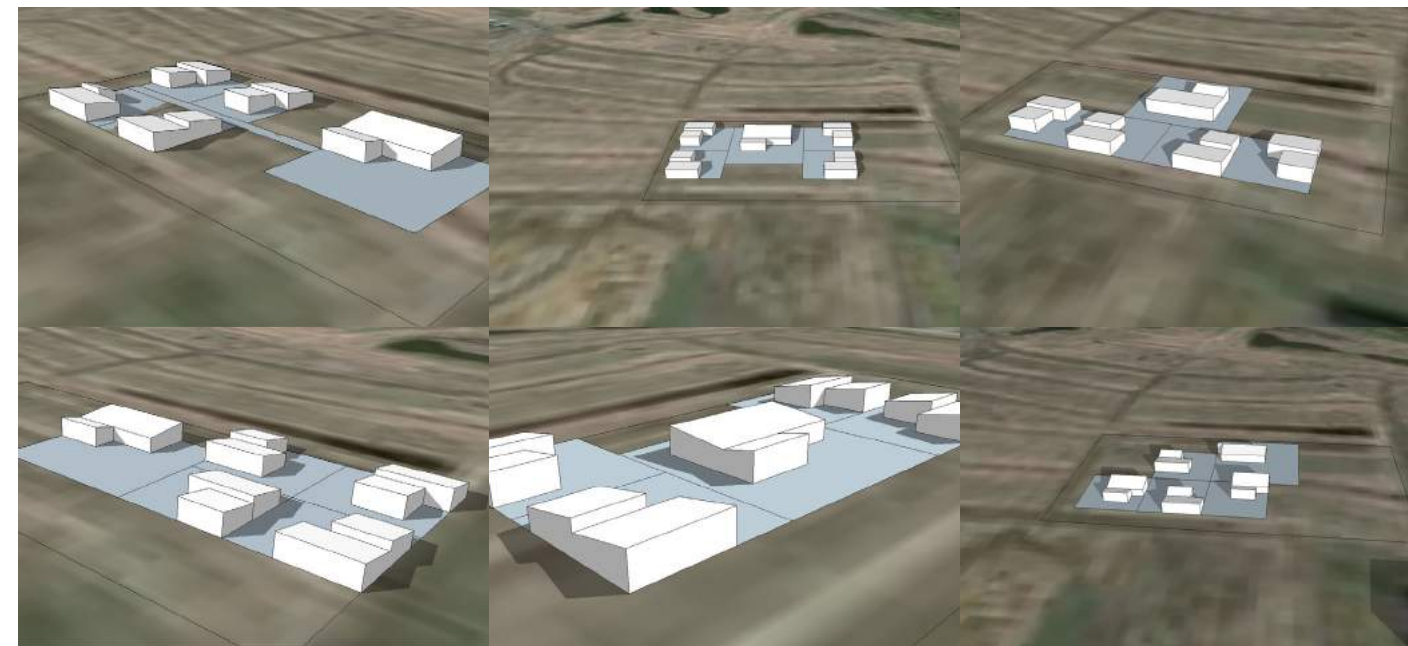


Figure 59 | SketchUp models investigating site layout and relationships between buildings

Analysis of Existing Floor Plans and Layouts

As I started to work out the floor plans of the residential buildings, I realized I needed some way to integrate and test the design principles and guidelines from my research in a visual method. This is the point of the process where I came up with attempting to illustrate these methods through various diagrams that looked at both an existing floor plan of an apartment building and my currently developed floor plans. These diagrams then also took into consideration the ways in which ASD considerations were either being incorporated or ignored.

I believe the intent of this process was valid and good, however I am not quite sure if it ended up being understood properly. This was especially evident when I presented my midterm presentation and received several questions on how exactly this process worked and what it added to the overall design. I still chose to include it and continued with the method of investigating which areas incorporated the guidelines better. I believe that this helped me be ever-mindful of the considerations and had me paying closer attention to the relationship of spaces as I redeveloped the floor plans after critiques.

The existing apartment floor plan I chose to focus on was one used from the Cityscapes Plaza apartment building, located in Fargo, North Dakota. The reasoning behind this was because the program of the apartment included four bedrooms, one common living space, one kitchen, two shared bathrooms, and various storage and closet spaces. In a much tighter and smaller square footage, the design of this apartment was analyzed in terms of the eight overall design guidelines (the diagrams showcase this in the following order as well):

1. Safety and Security
2. Familiarity, Stability and Clarity
3. Minimizing Sensory Overload
4. Social Interaction and Privacy
5. Adequate Choice and Independence
6. Health and Wellness
7. Dignity
8. Durability

As mentioned earlier, these same eight guidelines were applied to the current model I had been working on and examined the relationship of these spaces with one another. This process led to an investigation of how often the highlighted areas, colored green for positive aspects and red for negative, affected the future design choices. It was found that whenever multiple corners matched spaces ended up being over-designed or confusing. This was especially helpful in bringing about a clearer and simplified floor plan and layout. Though the highlighting could be viewed as quite subjective, it still resulted in some interesting comparisons between built spaces and the ones I was developing. For these iterations I explored the floor plans using a combination of Revit, SketchUp and Adobe Photoshop.

It was important to create a system that tested and examined my methods alongside existing conditions so that anyone viewing my project would be able to understand better how I arrived at my final design decisions. It was also the week before midterm reviews, so I did want to have something to show guest critics.



Figure 60 | Exploration of Cityscapes Plaza apartment spatial layout and integration of the eight ASD guidelines



Figure 61 | Review of floor plans and the positive response to the eight ASD design guidelines

Towards the Final Design Solution

Midterm reviews provided an opportunity for me to present the research and design work I had been conducting so far. The feedback was fair and provocative. It sparked several questions about my intentions and iterations that I had overlooked or missed during the process phases. The bedroom arrangement was called into question as well as basic architectural understands, like structure, egress, mechanical systems, etc. It was clear that although the semester was half over there was still a lot of work to be done before final thesis presentations.

The floor plans underwent the most redesign during this point of development. It was clear that the patterns about creating a more natural rhythm with the sun needed to be implemented better. I attempted to create a hierarchy of low and high activity moments with transitional spaces in between to help define boundaries. The kitchen and common space is part of the high activity and stimulus zones due to the nature of use, cooking, watching television, socializing, eating, etc. The hallway and staff office act as a way to break up the noise between the public and private spaces, allowing a transition from high to low and vice versa. The bedrooms are the most private and low activity spaces. Here, individuals are allowed to create their own space as they see fit. By adding individual bathrooms and closet spaces, residents would also be able to take more ownership of his or her rooms, leading to a moment of being able to build confidence and pride.

Circulation and the general shapes of spaces also helped form the roof slopes and location of windows and doorways. The main entry way allows residents to enter either the high or low activity zones without making the choice for them. The staff office was also located close to the entry for security purposes.

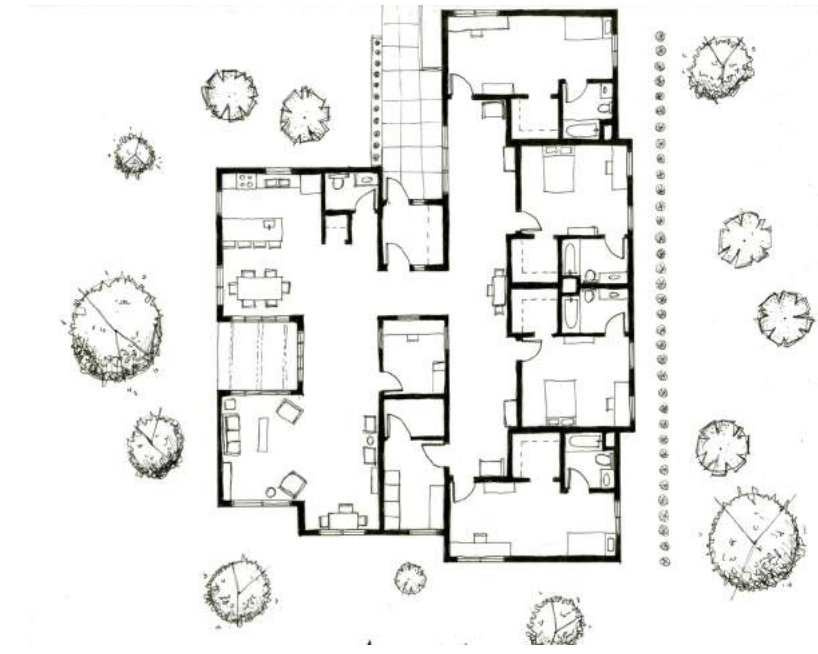
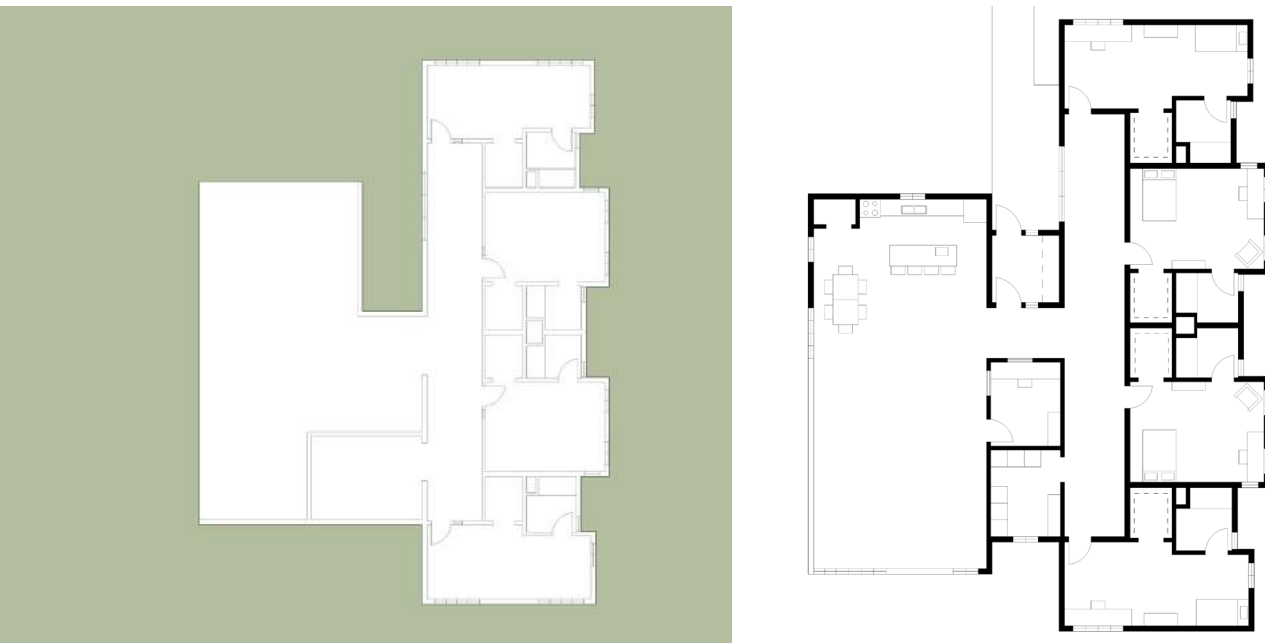


Figure 64 | Proposed floor plans for the residential building



Figures 62 and 63 | Working floor plan images post-midterm review and feedback

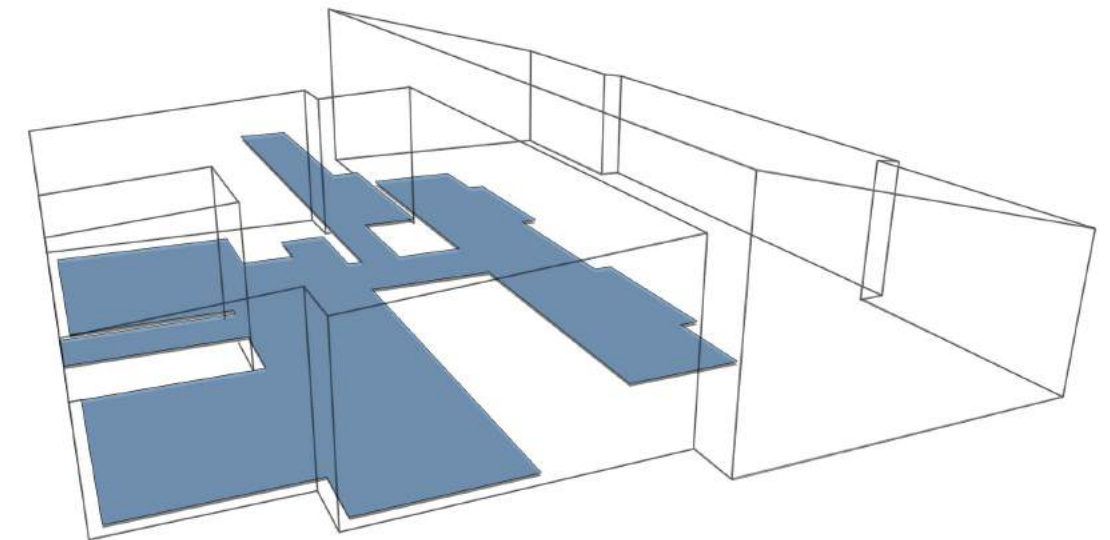


Figure 65 | Circulation diagram for the proposed residential building

19 PROJECT SOLUTION DOCUMENTATION

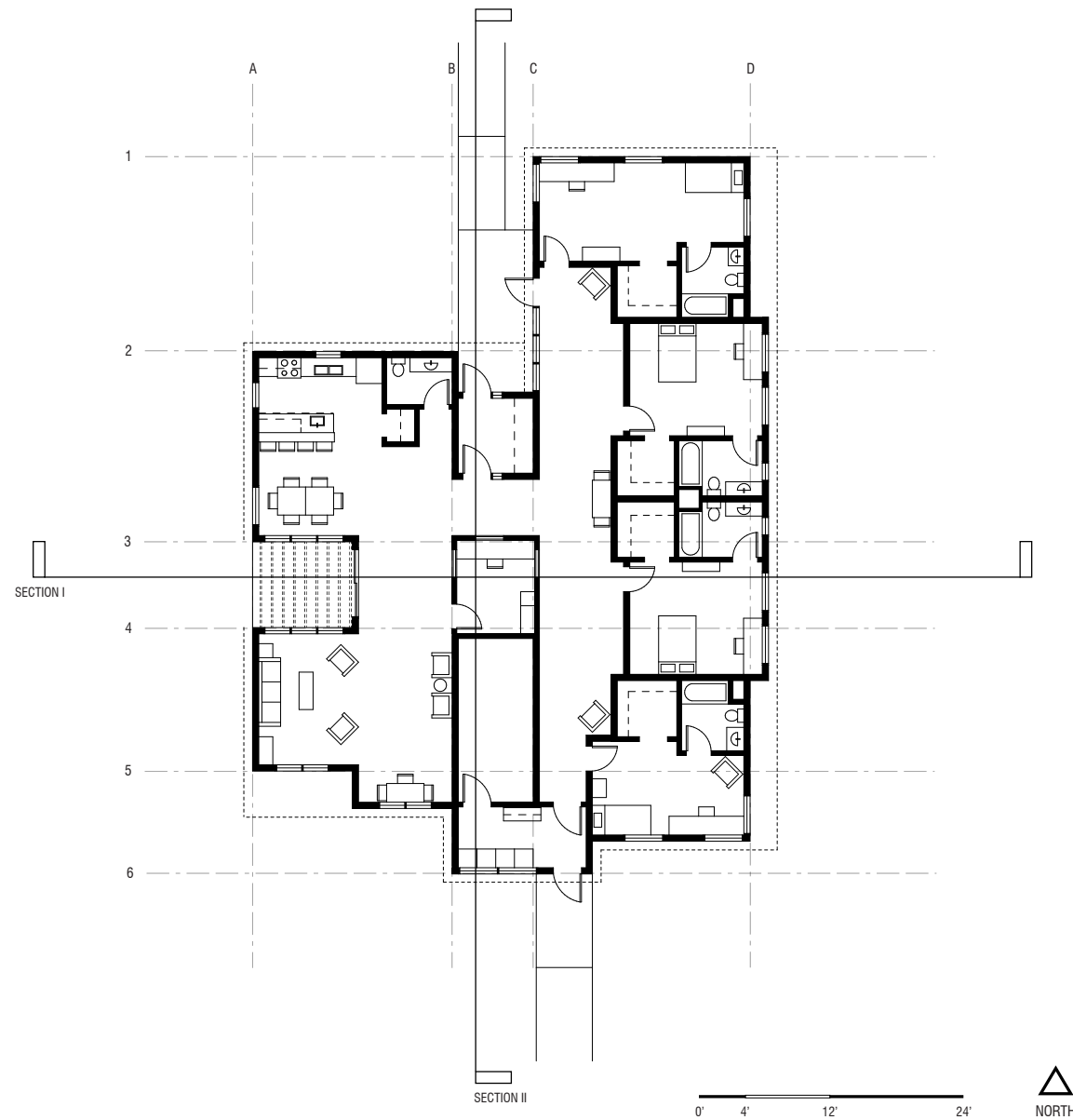


Figure 66 | Final floor plans for the residential building

Final Floor Plan Diagrams

The following images showcase the final proposed floor plans for the four separate residential buildings and the community center. Many of the program elements remained the same from the initial proposal, but several spaces did not make it into the final layout. The staff office was omitted from the community center to provide a smaller square footage, as well as the idea that the staff ought to be able to meet within the provided shared common room space before or after operating hours.

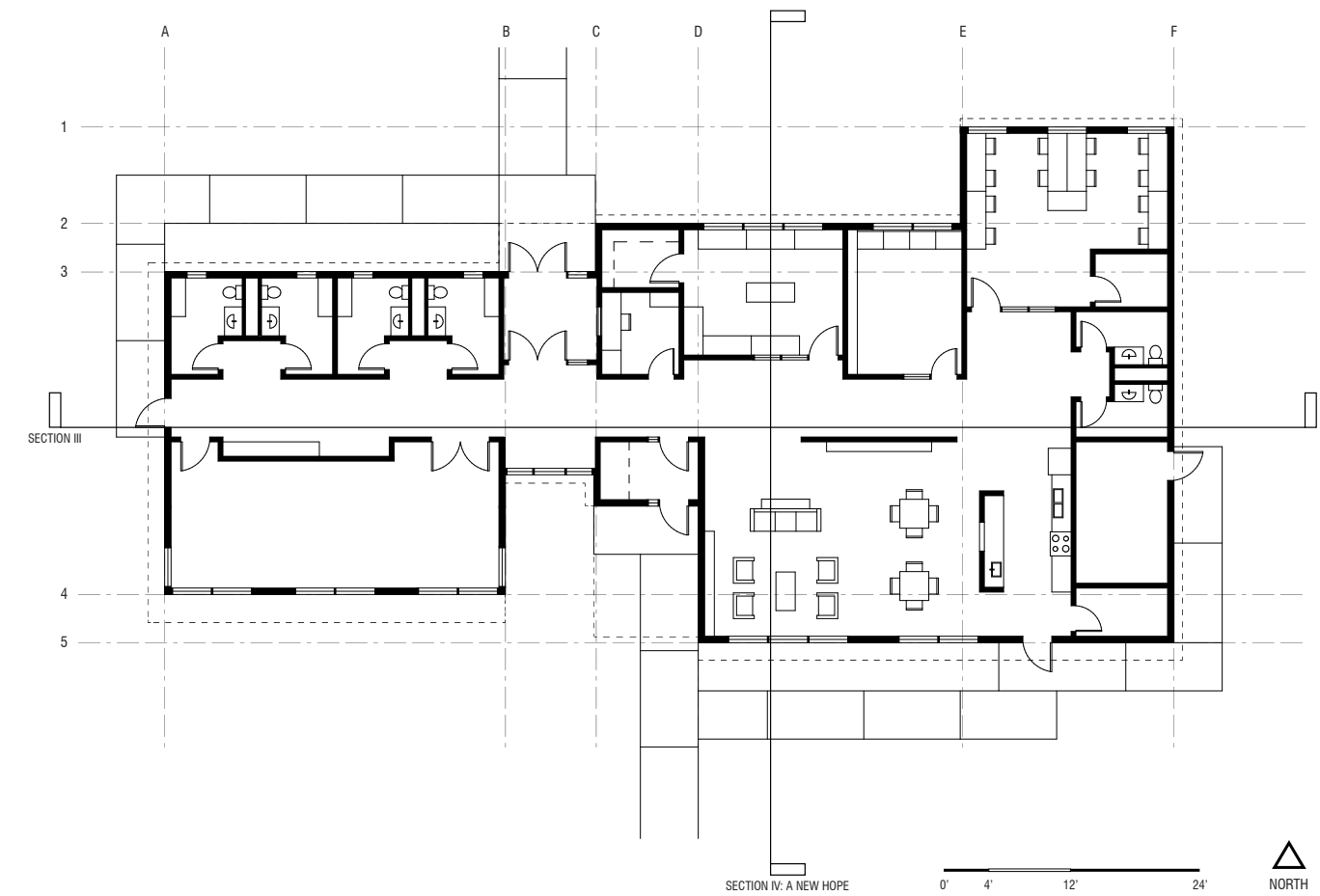


Figure 67 | Final floor plans for the community center building

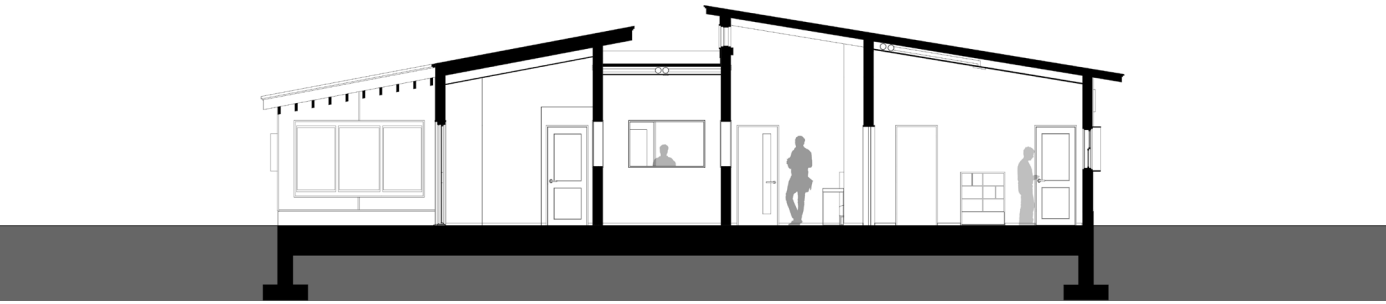


Figure 68 | Section I from residential floor plan

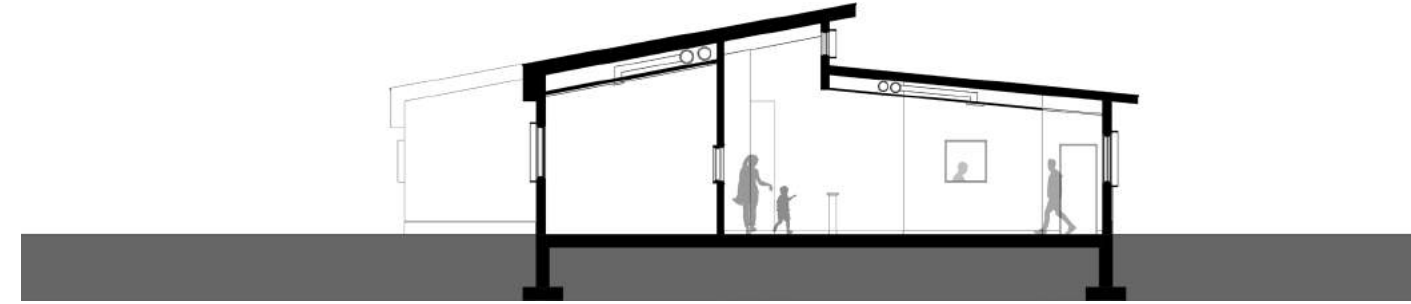


Figure 71 | Section III from community center floor plan

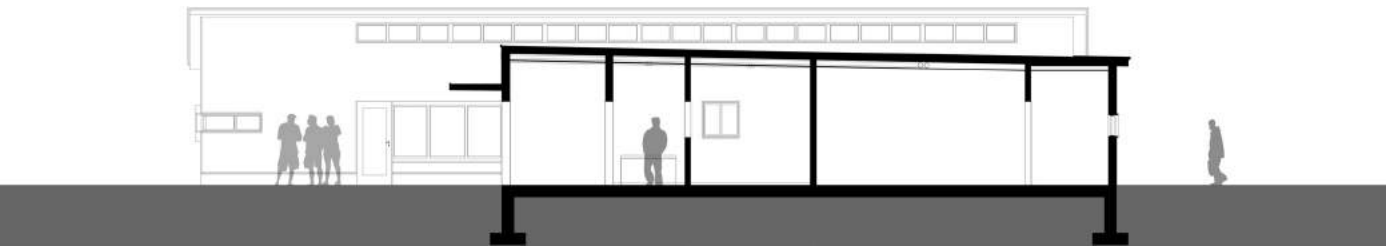


Figure 69 | Section II from residential floor plan

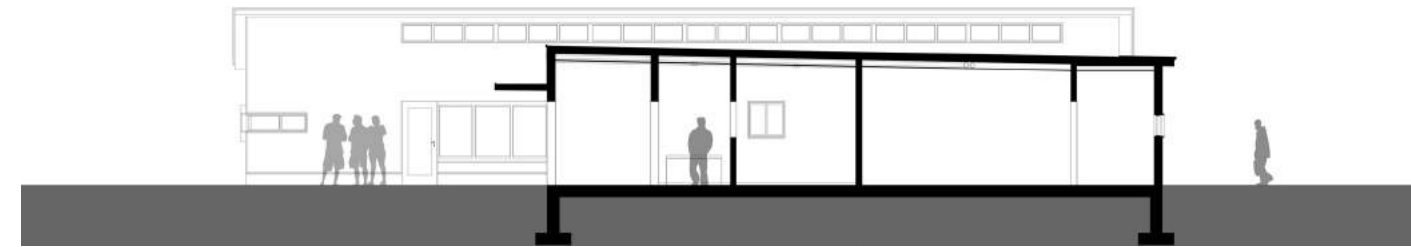


Figure 72 | Section IV from community center floor plan



Figure 70 | Final model representing Section I from the residential buildings



Figure 73 | Final model representing Section III from the community center

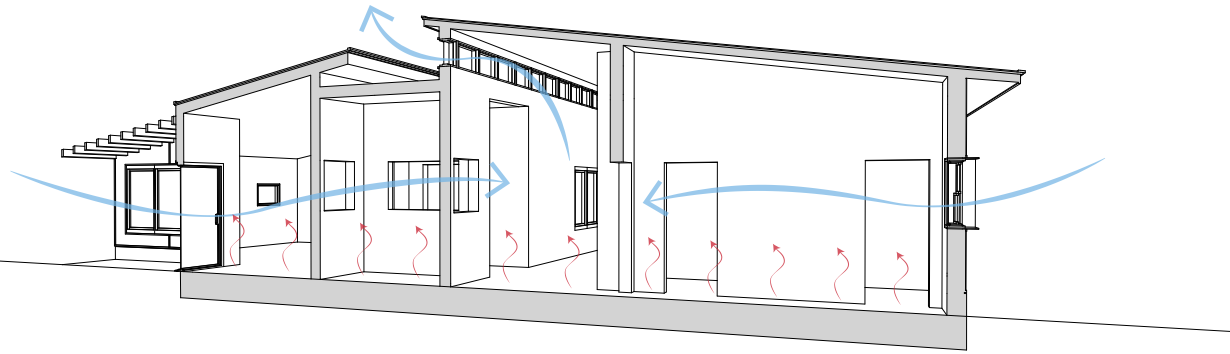


Figure 74 | Sectional perspective showing natural ventilation and radiant floor heating used in the residential buildings

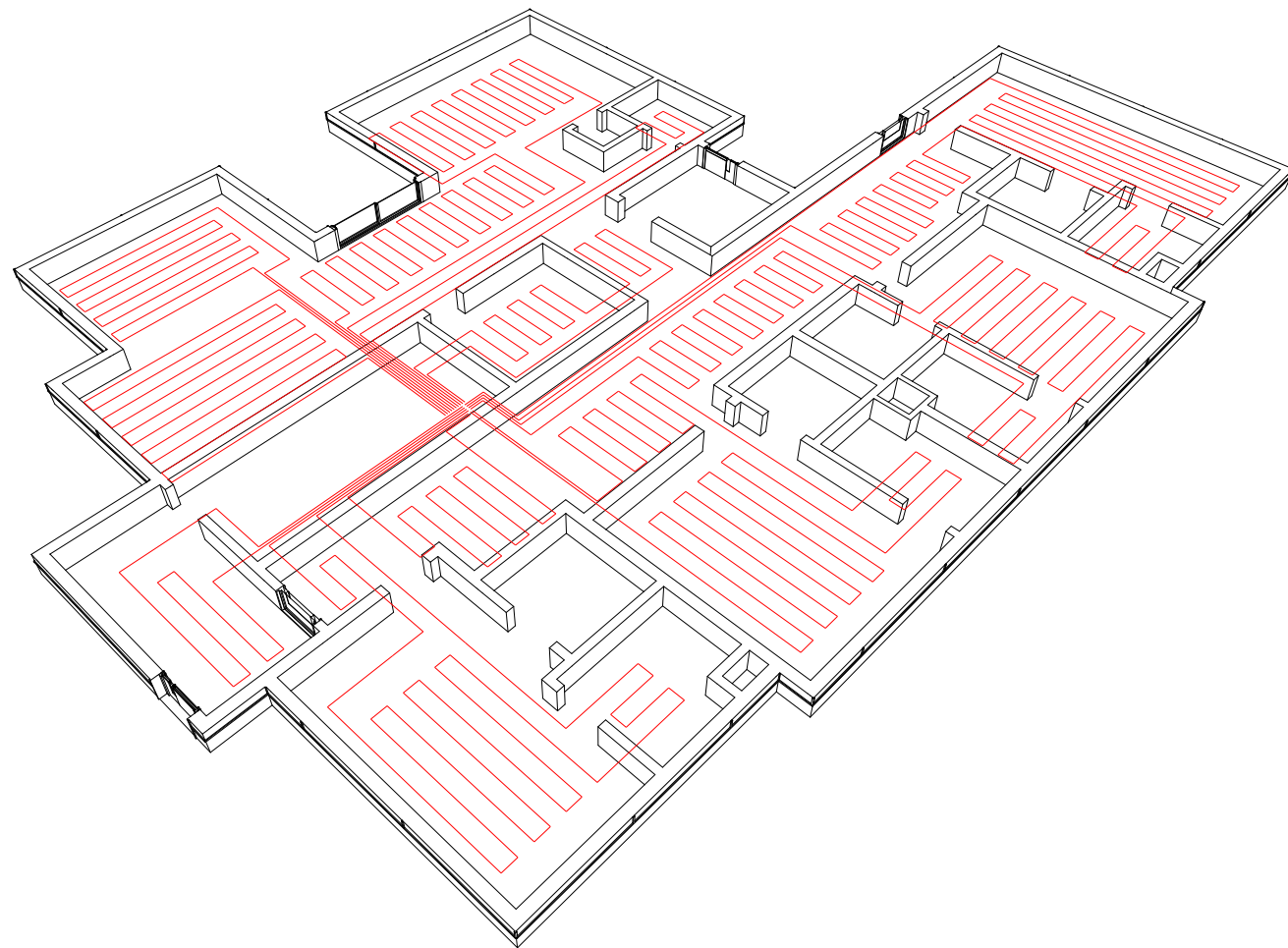


Figure 75 | Diagram showing proposed radiant floor heating layout for the residential buildings

Radiant Floor Heating and Natural Ventilation

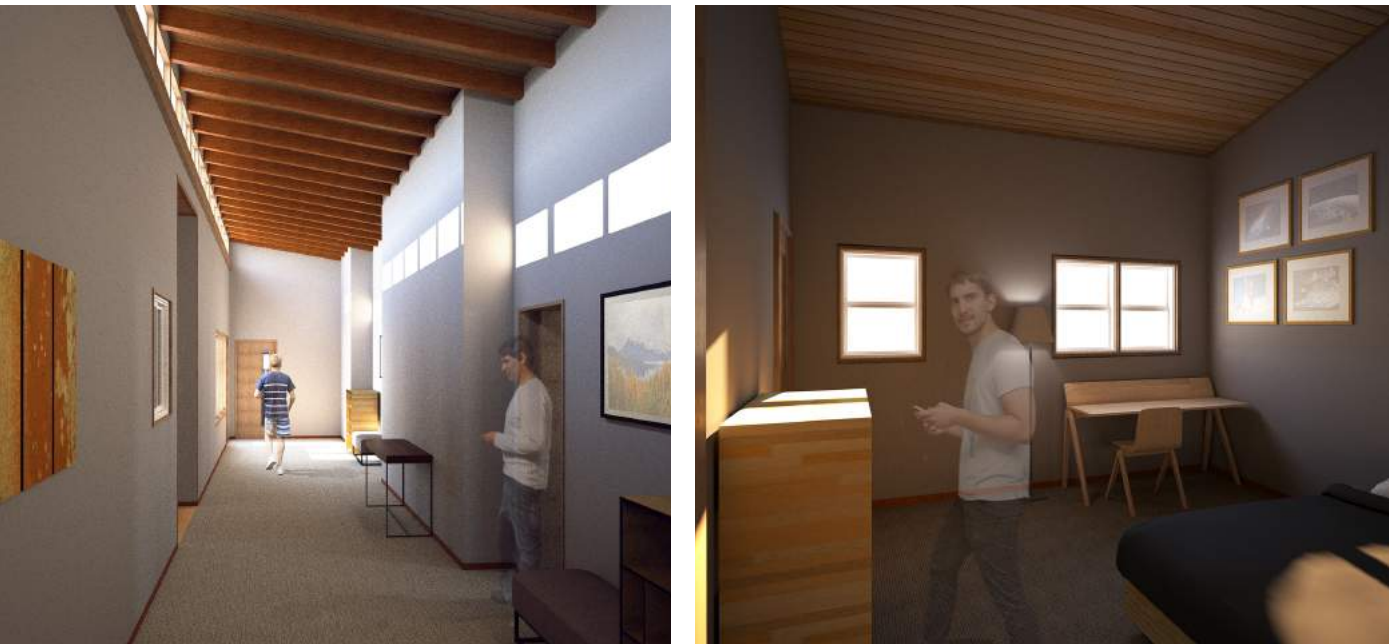
Mechanical systems are usually thought of as noisy and intrusive in most residential and commercial buildings. Some areas of the research pointed out that such noise can be harmful to individuals with ASD, seeing as each of them has sensory issues to varying degrees. Because of this, the research did mention several different mechanical systems that would be able to provide enough heat and cooling to keep residents happy without nearly as much noise or duct work. A radiant floor system works well to provide a more consistent amount of heat to residents as well as eliminates the need for radiators or vents. Each space has a level of control over the actual amount of heat being released, including the bathrooms. Natural ventilation and cross ventilation was sought out due to the clerestory windows in the hallway and the amount of windows on both the east and west sides of the building. This type of passive system will allow the building to naturally pull cooler air inwards and push warmer air out, creating a quiet solution in the summer months.

Heat Exchange System

Along with the radiant floor and natural ventilation strategies, a heat exchange system is also proposed to help with moving fresh and stale air during the colder months. In this way, the system pulls fresh air into the spaces that need it the most, including bedrooms, shared common spaces, and other public spaces. At the same time it pulls old, stale air from the kitchen, bathrooms, and restrooms and vents it to the outside. The system actually performs better when the air and temperature outside the building are much colder, allowing the radiant floor to pair well with the heat exchanger.



Figures 76 and 77 | Mechanical plans showcasing the proposed heat exchange system and function



Figures 78 and 79 | Interior perspectives showing the hallway transition space (left) and an example of one bedroom (right)



Figures 81 and 82 | Interior perspectives of the main common space (left) and the open exercise space (right)



Figure 80 | Main perspective showing an exterior view of a residential building



Figure 83 | Exterior perspective of the proposed Olmsted Spectrum Community Center

20 RESPONSE TO SITE

Final Proposed Site Plan

The final layout of the residential buildings and community center comes together to form around a community garden space. Seeing as the site is surrounded by undeveloped land and property, the Olmsted Spectrum Community can be built up as a catalyst for the new neighborhood and community. The land was once used a primary means of growing food, so the ability to make that historical connection with a garden and invite the public to take part was an important design consideration when planning out the final site program. The residential units are located around the sides of the site to give easy access to the specific parking spots. Most residents would most likely not be able to drive, so having adequate pick-up and drop-off points was critical for each building, especially as some individuals may have different schedules and routines to follow if he or she has a job off site.

The overall layout aims to respond to the existing site conditions by taking advantage of the sun and wind patterns. The kitchen is located in the northwest corner to shelter from most of the colder winter winds while providing heat during use. The common living spaces are located in the southwest corner to coincide with the afternoon sun and southern exposure. An exterior patio space is located on the western side to provide a break between these spaces and allow for afternoon or evening activity, such as grilling, relaxation, socializing, etc. The bedrooms are all located along the eastern side to allow residents to wake with the sun and move throughout the higher activity spaces as the day carries out. While the transitional space is mostly located on the interior, it does provide a large string of clerestory windows to maximize indirect light for the space and provide natural ventilation throughout the day.

Interaction with the Community

As stated earlier, the existing site is currently nothing but undeveloped land. Rather than locating a project in an already existing community and developed neighborhood, this project has the ability to be at the start of the development, the center for this eventual new community. While the future development of the surrounding property is a large guess at this point, various views from Google Earth and from the site itself show that planning has already started for future roadways. It was important to create a site map that attempted to highlight the integration that I speak about for others to see and understand the opportunity and potential for this specific site. Project typologies such as this one seem to try to force themselves into an already developed area or fabric. Many times this causes much concern and outrage from the neighborhood communities. That is why I believe developing this during the beginning stages for the rest of this area of Rochester is important and will possibly work better than previous site selections.

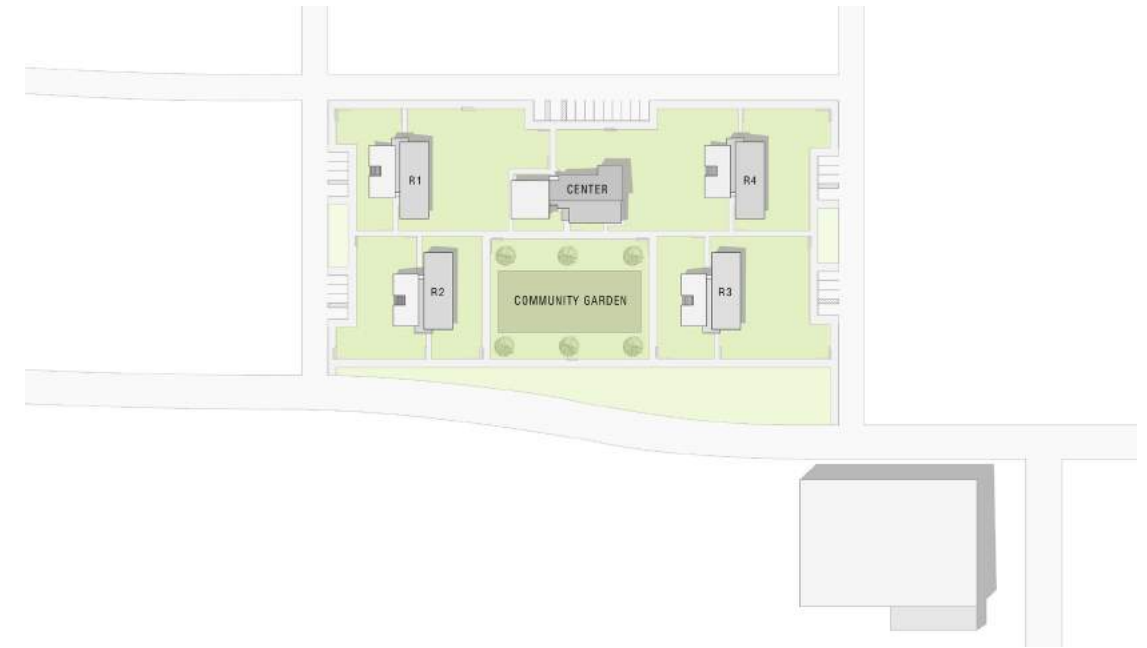


Figure 84 | Final site plan showing proposed connection to new roadways and potential parking spots

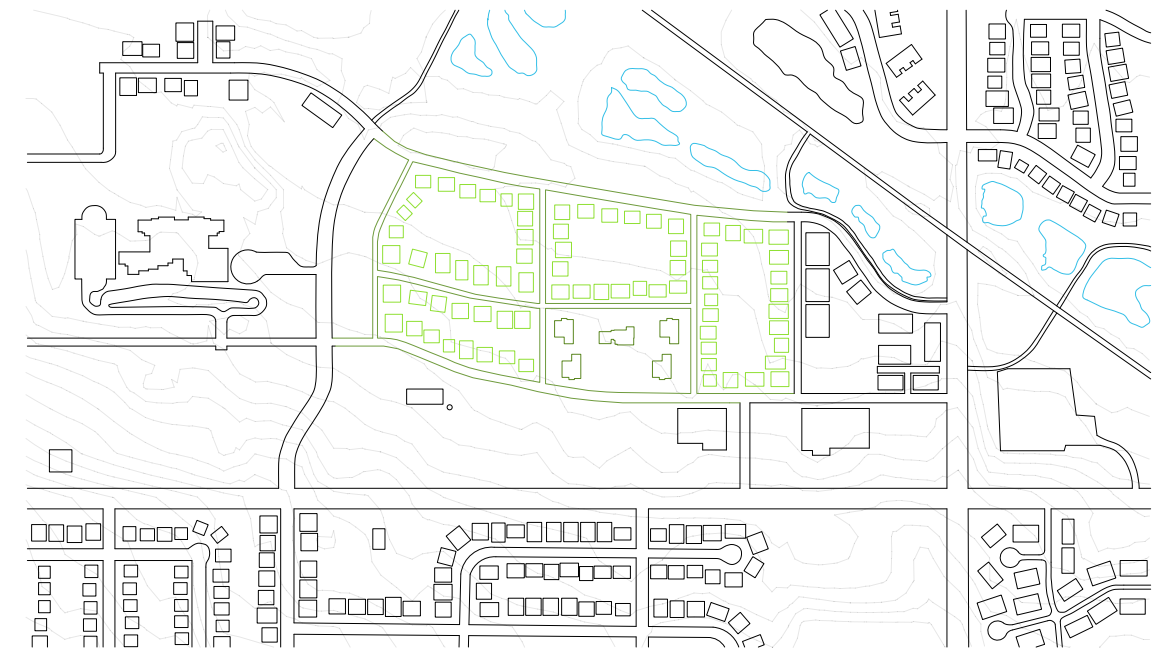


Figure 85 | Site map showing proposed site plan as well as potential future development around the site

21 RESPONSE TO PRECEDENT RESEARCH

The Influence of Typological and Precedent Research

First, this project would not be possible without any of the case studies or precedent design studies I researched during the year. Many of these are relatively new, with some of the earliest examples dating to 2008 or 2009, which surprised me as I began this thesis. It is clear that we, not just the United States of America but the whole world, has a long way to still go with designing for autism spectrum disorders. A large portion of the new projects focus on childcare services and education, but it is time we begin seeing the same amount of opportunities for young adults and adults. Overall, I feel more confident when discussing this type of design, having a semester and more of research under my belt. I would love to find myself in a position one day where I am able to contribute more to actual architectural profession and what we as designers can truly do to make the built environment a better place for individuals with ASD.

The Sweetwater Spectrum Community and Airmount Woods case study projects were two of the most influential precedent studies I found. Both offered very different design options for residents and had quite different responses from the communities they were built around. Sweetwater Spectrum continues to be the number one example nationally of a “successful” autism spectrum disorders community, whereas Airmount Woods remains recognized only in its own state. I think for these reasons from both it was important to study and compare the two projects. The interior spaces and floor plans both contained different approaches to the design guidelines and principles now considered to be standard when designing for ASD. There were definitely elements that I deemed successful or right that I found myself pulling into my own design process. Adding exterior features, such as the concrete and wooden signs, that served as both a place for rest and way-finding for building identification was one such example.

Variations and Changes Made During the Design Process

The floor plans and overall form of the residential building saw the most intense revisions and changes over the course of this semester. The time I spent on the community center was not nearly as long due to the fact that I really wanted to make sure I was hitting all the design specifications outlined in the principles and guidelines for residential design. If I had the opportunity to continue on with my design, I am confident that the community center’s floor plans and look would continue to improve with each iteration and become closer to a more acceptable layout. Other areas that I found myself scaling back included the exterior patio space and staff office rooms. As the residential buildings grew to be over 3,000 square feet I realized that I needed to limit myself from building out anymore. Ideally, these spaces should have totaled closer to 2,000 square feet to help reduce the overall footprint and impact on the site. It is likely that by making these changes, the interior spaces could have lined up a bit better and created more escape and transitional spaces for the residents, seeing as the only space that addressed those needs was the hallway in front of the bedroom spaces.

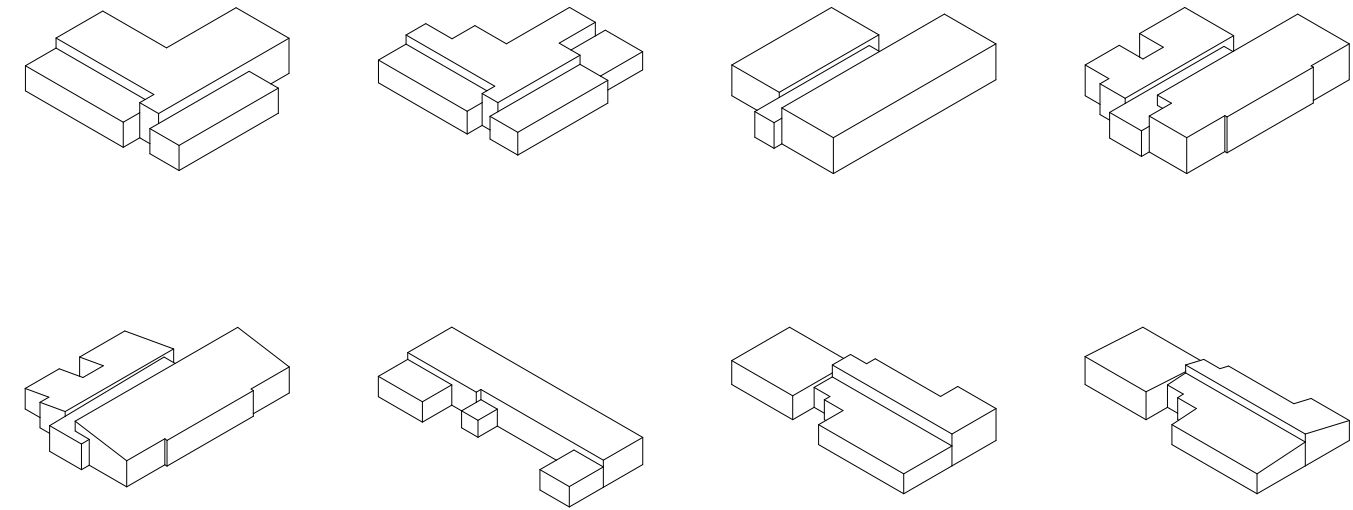


Figure 86 | Digital models showing the influence of process on the final shape and form of the buildings

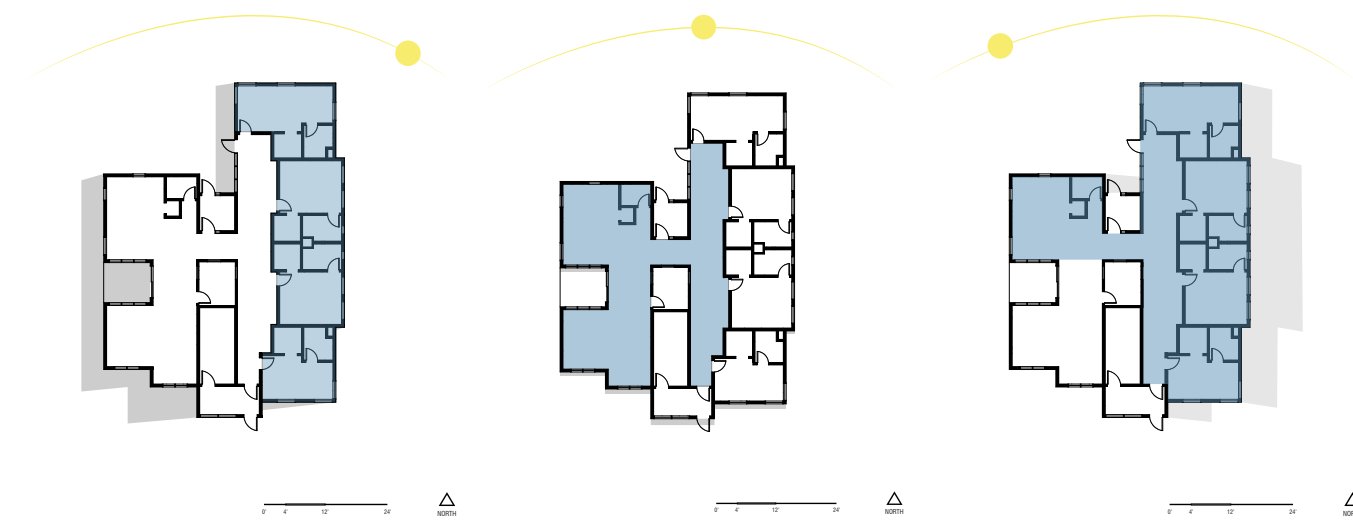


Figure 87 | Plans showing off intended influence over sun pattern and daily routines

22 RESPONSE TO GOALS & PROJECT EMPHASIS

Reflection on the Original Goals of the Project

I understood from the start of this project that most of the design decisions and choices would come from an evidence-based design approach. Implementing a theoretical approach or side was something very difficult, seeing as I felt that the project required more focus on showing it's potential to be a real idea. The final design and presentation might have suffered a little as a consequence, but I can say without hesitation that I surely know more about how to develop a project to be more inclusive for people with autism spectrum disorders.

A lot of the intended goals and areas of emphasis I had set out to achieve seem to have happened. I know more and can hold a conversation about the consequences for and against design that includes ASD principles and guidelines. I can see how often we fail or fall short in providing meaningful spaces and designs that allow individuals with ASD to flourish. I understand how important it is to plan out not just the floor plans and layout of interior spaces, but also to consider the sensory aspects of the environments we create and plan. Most of these stem from design issues, such as mechanical systems, openings in regards to amounts of natural lighting over artificial, proximity of spaces or rooms, and the final material choices for walls, ceilings, furnishings, etc.

Sustainability was one of the areas of emphasis that might have fallen short during my project development and process. I was unable to further research areas outside the mechanical and ventilation systems that would provide a greener footprint and educate the public in ways we can design more sustainably. If I had the opportunity to continue this thesis, I would certainly look into the methods for creating a solar energy farm for not just the Olmsted Spectrum Community, but also for the surrounding neighborhood and community. It would have been a reasonable opportunity to promote sustainability education and a chance to take advantage of the mostly open site space. The community garden idea could have also been pushed further to incorporate other methods or program elements that include public interaction opportunities and education about how much the ASD community has to actually offer for services.

Final Comments and Thoughts on this Thesis Project

I am glad I took the opportunity to look into previous thesis projects and select one that has yet to be approached. I think it is important to find an area of research and typology you are very much interested in doing one day and that's what this project embodies for me. I want to be able to create architecture with others that ultimately assists humanity in a way that has yet to be successfully solved. It is easy to choose a project where you can envision a solution within the first few seconds, but one that tests you throughout and challenges you certainly provides more learning opportunities. I want to always approach problems with the ability to allow room for change during my process and development. It is how I become a better designer.



Figures 88 and 89 | Displays from quarterly studio section reviews (left) and midterm presentations (right)

23 FINAL PROJECT INSTALLATION

Final Presentation Schedule

May 4th, 2016
1:20 PM
5th Floor Renaissance Hall

CRITICS:

Julio Bermudez
Associate Professor of Architecture
The Catholic University of America, Washington, DC

Sharon Roe
Retired Lecturer
University of Minnesota, Minneapolis, MN

Darryl Booker,
Associate Professor of Architecture
North Dakota State University, Fargo, North Dakota



Figure 90 | Image of final thesis boards installed on 5th floor of Renaissance Hall

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PREVIOUS STUDIO EXPERIENCE

2ND YEAR

Fall | Joan Vorderbruggen

Tea House | Fargo, North Dakota

Exploration of architectural elements, materials, and design integrated with site development

Minneapolis Rowing Club | Minneapolis, Minnesota

Design through creating program elements in response to site integration and limitations

Spring | Stephen Wischer

Twin House | Fargo, North Dakota

Exploration of architecture inspired by narrative and artifact design

Baroque Performance Center | Fargo, North Dakota

Utilized music as a catalyst for narrative, artifact, and architecture

3RD YEAR

Fall | Milton Yergens

Boat Museum | Gloucester, Massachusetts

Architectural design with wood as main structural element

Literary Center | Glasgow, Scotland

Urban infill on restricted site with masonry as main structural element

Spring | Bakr Aly Ahmed

Culinary School | Fargo, North Dakota

Urban infill with concrete as main structural element

ACSA Border Crossing Competition | Cambodia - Thailand Border
2014 Steel competition with Brooklyn Burmeister as a teammate

4TH YEAR

Fall | David Crutchfield

High Rise | San Francisco, California

Urban design, adaptive reuse, and site development with Katelyn Kostad as teammate

Spring | Steven Martens

Adaptive Reuse of Grand Forks Woolen Mills | Grand Forks, North Dakota

Integrating new use into a historic structure while maintaining original identity and integrity

5TH YEAR

Fall | Regin Schwaen

Krakow Oxygen House Competition | Krakow, Poland

Complete design process working as a team with Cory Cwiak and Matthew Axtmann

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