

**A DAY IN THE LIFE: LIVE/WORK ARCHITECTURE  
UTILIZING AUTISM-BASED INCLUSIVE DESIGN**

by

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## **ABSTRACT**

This thesis explores architectural implications of autism spectrum disorder (ASD) and tests design strategies in a live/work complex on the waterfront of Yarmouth, Nova Scotia. Manifestations of ASD differ enormously between cases, so establishing comprehensive design principles is a challenge. What may be considered 'normal' daily tasks for some are completely overwhelming for others, yet architecture can assist those with autism to navigate these complexities, helping them become more independent, while simultaneously easing the burden on their caregivers.

The architecture draws on the vernacular and celebrates the tradition of wooden boatbuilding. Design strategies such as the notion of preview and retreat, program clarity and sequencing, and a thorough investigation in thresholds will be applied throughout the project. These features are no longer adaptations to disability but qualities of universal value bringing a sense of clarity, predictability and a range of stimulation for all individuals anywhere on or off the spectrum.

## **ACKNOWLEDGEMENTS**

To my mom, dad and brother, thank you all so much for your unconditional love and support over the years; I'm here today because of you.

To my thesis committee: Emanuel and Eric, thank you for your guidance and advice throughout this challenging process; It's been a pleasure.

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## CHAPTER 1: INTRODUCTION

### The Problem

With a rapidly expanding global population and topics of diversity and inclusion dominating social and political discourse, the need for inclusive design in architecture is currently at an all time high. Inclusive design is not a step-by-step design guide that can be utilized from one project to next; inclusive design refers to guiding principles or goals with intentions to allow all peoples the opportunity to use and experience space, objects, activities, etc. to the best of their abilities. In other words, inclusive design is meant to benefit everyone with no sense of discrimination toward any race, sex, age, religion, disability, non-disability, so on and so forth. People with disabilities have gone through the ups and downs of being shunned by society and treated as 'different', to being institutionalized and to finally being treated with the respect and dignity they deserve in modern day society. Government policies and programs have needed to adapt over time as awareness and research continue to uncover what is required to aid those in need, and architecture must continue to do the same.

This thesis will use the waterfront of Yarmouth, Nova Scotia as a testing ground for inclusive design strategies within the architectural discourse, specifically derived from characteristics associated with Autism Spectrum Disorder (ASD). This thesis does not prioritize people with ASD, however it does recognize that the specificities surrounding this particular group and the way in which they perceive space will require an in-depth investigation in formulating a thoughtful architectural response. Individuals with autism may be non-verbal, have severe motor function impairments, require twenty-four-hour care and have over or under-responsive senses; this makes navigating daily activities extremely challenging.

## **Thesis Question**

How can truly inclusive architecture derived from the Autism Spectrum Disorder allow for control over daily stimuli, giving individuals on and off the spectrum a greater sense of independence and comfort?

This covers a few different aspects. First of all, architecture is used as a tool to help those with autism and their specific challenges cope with all aspects of daily life; in this case, we will be dissecting life at home, and life at work. As a result, the challenges the caregivers undertake every day while aiding those with autism will lessen, ultimately leading to a heightened sense of independence. This reduces the stress on each staff member, allowing for their production to increase, freeing them to aid another individual with greater needs. Furthermore, it is anticipated that the design strategies formulated and implemented will not only satisfy the needs of those who are autistic but would also be attractive to all individuals who interact with the spaces developed.

## **The Scope**

The intervention will insert itself between industry and public space along the Yarmouth waterfront, and provide at one end, a healthy mix of residential typologies from single bedroom units up to six-bedroom units and on the other end, job opportunities in the form of a traditional wooden boat building shop. The mix of forward thinking and inclusive design strategies coupled with traditional vernacular will bring a sense of pride and ownership to the townspeople of Yarmouth as they are reconnected to the tradition of wooden boat building while simultaneously learning the importance of inclusive design. The mix of program will ease the transition from the currently established industry and public spaces, while offering services to people with disabilities and the able-bodied alike.

The design profession holds the key to empowering people with all types of physical or cognitive disabilities to integrate as fully as possible into the mainstream of daily life. Legislated changes notwithstanding, it is designers who will decide whether accessibility will take the form of better

design for everyone, or simply unattractive, costly, band-aid responses to annoying code requirements.<sup>1</sup>

Chapter 2 will set up a timeline describing how events such as the First and Second World War affected government policies and activist groups as part of the disability rights movement. From being considered 'different' and widely shunned by society, to the eventual implementation of legislations such as the Declaration on the Rights of Disabled Persons in 1975, people with disabilities now have a wide array of programs and organizations at their disposal. We will also be introduced to a few key players surrounding cognitive disability services and the work they have put forward in attempts to serve the population in need. Unfortunately, the number of people needing help versus the amount of services offered leaves many people with disabilities without adequate housing or work opportunities ultimately inhibiting their chance at public social interactions.

Chapter 3 shifts focus from the broader concerns surrounding disability services, to the specifics of the autism spectrum disorders and why it is important for architecture to be proactive in doing its part to lend a hand. Designing for autism has a very specific series of architectural questions to be asked, giving the thesis a clear path. The town of Yarmouth, Nova Scotia, regional centre for the Tri-Counties, was chosen as a testing ground for the intervention.

Chapter 4 describes in detail the design principles which have developed as a result of all the research conducted and discussed in chapters 2 and 3. Strategies such as the notion of preview & retreat, program sequencing and clarity, and a thorough investigation in thresholds will be applied throughout the project at various scales. The focus is set on increasing the sense of serenity in a space and allowing the ability for individuals to dictate the amount of stimulation they may receive based off of their position within the space. An example of this could be, sitting below the height of a windowsill and eliminating the view to the exterior, or, standing and receiving the view

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<sup>1</sup> Ronald L. Mace et al, *Accessible Environments: Toward Universal Design* (New York: Reinhold, 1991), 41.

the window has to offer.

Chapter 5 is the culmination of the research, siting, and design principles, bringing about architectural form. A boat building shop and an apartment complex have been located on the Yarmouth waterfront which has been designed utilizing the strategies in the previous chapter, ensuring all individuals the ability to experience the space in a safe manner as they see fit.

## CHAPTER 2: DISABILITY SERVICES, THEN AND NOW

### Disability Rights Movement

The subject of human rights has garnered massive attention at a global scale for centuries with topics such as the abolishment of slavery, women's rights and disability rights dominating social and political discourse. With regards to the latter, people with disabilities have seen their position within this discourse fluctuate dramatically. Beginning with the growth of industrialization in the 19th century, political institutions such as psychiatric hospitals, schools for the blind, Houses of Refuge and church-run homes began to accommodate large numbers of people with mental health issues and various disabilities.<sup>2</sup> Although this was largely seen as a step in the right direction, people with disabilities were seen to be 'different' and subsequently shunned by society.<sup>3</sup> Conditions began to change dramatically after the devastation of the First World War. Disabled veterans began receiving generous pensions upon their return from combat as the various physical and mental injuries they had suffered caused them difficulties of reintegration into mainstream society. In comparison, civilians who had suffered workplace injuries received next to no financial help and this disparity grew even larger at the end of the Second World War.

In the middle of the 20th century, the divide between disabled war veterans and civilians grew, eventually hitting its breaking point and awoke many activist groups. These groups argued that people with disabilities ought to have the right to participate in mainstream society and lobbied for 'deinstitutionalization', with organizations such as the Canadian Association for Retarded Children, later named Canadian Association for

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2 Dustin Galer, "Disability Rights Movement in Canada," *The Canadian Encyclopedia*, 2015, <https://www.thecanadianencyclopedia.ca/en/article/disability-rights-movement>.

3 Kenneth Bayes and Sandra Francklin, *Designing for the handicapped: The mentally retarded, The mentally ill, The maladjusted, The blind, The deaf, Those with learning disabilities, The gifted or exceptional child* (London: George Godwin Limited, 1971), 1.

Community Living leading the charge.<sup>4</sup> From that point forward, we see organizations such as the Council of Canadians with Disabilities founded in the late 1970s and government legislations such as the Declaration on the Rights of Disabled Persons in 1975 issued by the United Nations and the Employment Equity Act in 1986. This propelled people with disabilities to finally be included alongside women, visible minorities and Aboriginal people in Canada.<sup>5</sup>

Just as the social position of people with disabilities was trending positively, the global recession of the late 1980s and early 1990s negatively affected all people, but especially those with disabilities. Social assistance rates and subsidies to disability organizations all but disappeared and continued to decline until their resurgence in the 21st century; on March 11th, 2010, Canada ratifies the Convention on the Rights of Persons with Disabilities (CRPD). The CRPD is a series of measures and principles in place with the goal to eliminate all forms of discrimination versus peoples with disabilities, allowing them "... the full and equal enjoyment of all human rights and fundamental freedoms...".<sup>6</sup> The CRPD along with this idea of social equity is exactly what society ought to be striving for, but it has yet to be achieved. Currently, a group of individuals, joined by the Disability Rights Coalition of Nova Scotia, are in a legal battler versus the province of Nova Scotia, and claim to have been discriminated against and forced to live in an institutional setting instead of being given the opportunity to be integrated into community living options.<sup>7</sup>

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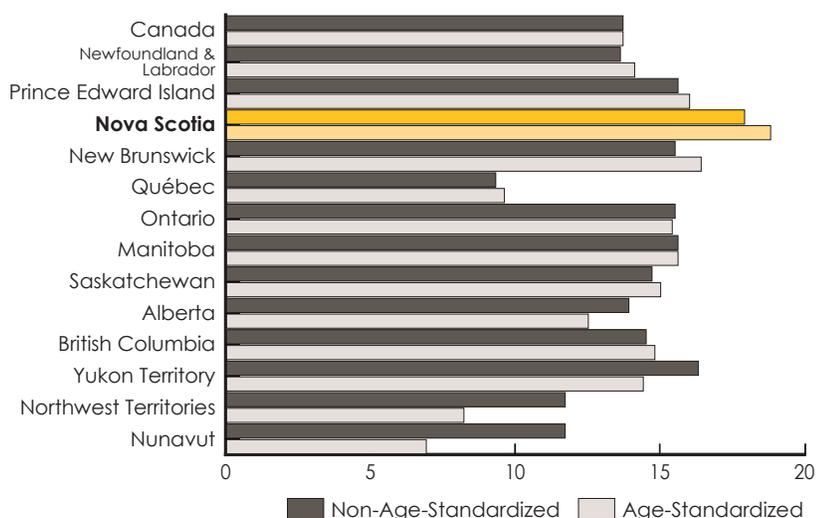
4 Galer, "Disability Rights Movement in Canada."

5 Ibid.

6 "Convention on the Rights of Persons with Disabilities and Optional Protocol," United Nations, 2006, <https://www.un.org/esa/socdev/enable/rights/convtexte.htm>.

7 "MacLean, Livingstone, Delaney and Disability Rights Coalition of Nova Scotia v. Province of Nova Scotia Hearing Resumes," Government of Nova Scotia, Last modified November 1st, 2018, <https://novascotia.ca/news/release/?id=20180829004>.; "Nova Scotia discriminated against people with disabilities, rights hearing told," CTV News, Article published October 30, 2018, <https://atlantic.ctvnews.ca/nova-scotia-discriminated-against-people-with-disabilities-rights-hearing-told-1.4155450>.

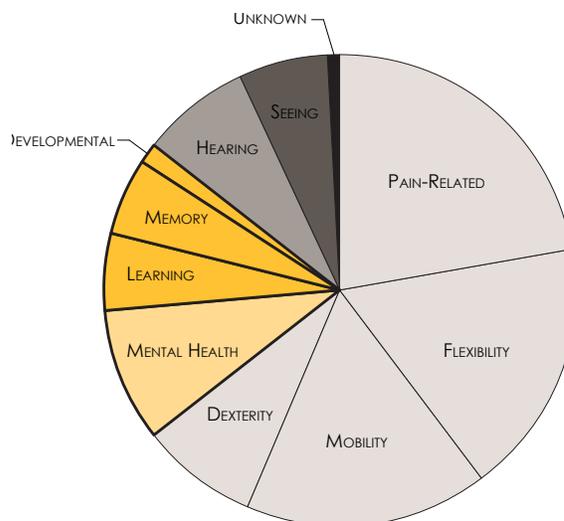
With nearly fourteen percent of Canadians aged fifteen years of age or older currently living with one or multiple forms of disabilities,<sup>8</sup> and examples of discrimination and stigmatization as described above, it is clear that society must continue to assess its behavior toward people with disabilities and improve its efforts in developing not only an inclusive cultural mindset, but inclusion which permeates throughout every facet of our daily lives. Disability services have been beneficial for most seeking aid, but still has significant room for improvement. Government legislations and organizations have been refined over the decades to the point where they ensure individuals with any form of mobility, olfactory and visual impairments receive adequate aid in establishing a lifestyle in which they can live safely and independently away from the stigmatization of being 'disabled'. Where disability services have been severely lacking is in support for those with cognitive disabilities.



Prevalence of disabilities aged 15 years or older, 2012; Data from Statistics Canada, 2012.

In 2012, Statistics Canada reported that roughly nine percent of Canadians over the age of 15 have been diagnosed with a form of cognitive disability, but also state that this number may be low considering the population living

8 Statistics Canada, "A profile of persons with disabilities among Canadians aged 15 years or older," Last modified 15 February 2017, <https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2015001-eng.htm>.



Prevalence of disabilities by type, aged 15 years or older, 2012; Data from Statistics Canada, 2012.

in institutions were excluded from their survey.<sup>9</sup> I will not pretend to think that there are not individuals still suffering from physical pain, financial stress, mental health issues etc. related to mobility, hearing and/or visual impairments and are being let down by unsatisfactory treatment options or benefits; there is always room for improvement. With regards to cognitive disabilities, governing bodies and private organizations alike have had difficulties in establishing clear, concise regulations, support programs and the like due to the immense variations within what is considered to be a 'cognitive disability'. Down syndrome, dementia, attention deficit disorder (ADD), Alzheimer's and autism spectrum disorder (ASD), to name a few, all fall into the cognitive disability categorization and each have supremely specific yet complex mental capabilities and differences. Visual impairments can be monitored and measured using eye examination technology which precisely indicates visual capabilities, but to measure cognitive functions of an individual at an equal level of precision and to determine how their environment might influence them is a challenge yet to be solved. Scientific and medical research have only just begun to scratch the surface in search of providing clear, concise definitions of what it means to for example, be

<sup>9</sup> Statistics Canada, "A profile of persons with disabilities among Canadians aged 15 years or older," 2012.

on the autism spectrum and because of this, disability services in this field are still in their infantile stages. This extends to nearly all dimensions of society including the built environment which is where this thesis finds its basis.

Although` government legislations, aid programs and architecture have yet to fulfill the necessary requirements in aiding those with cognitive disabilities, there are notable individuals and organisations throughout history that have done immensely important work in this regard; these include people such as Wolf Wolfensberger and his Principle of Normalization and the founder of the globally known L'Arche communities, Jean Vanier.

### **The Principle of Normalization**

The term normalization, as an ideology of human management, began to be heard in human services around 1969 as influential personalities such as the head of the Danish Mental Retardation Service, Niels Erik Bank-Mikkelsen, and German-American academic, Wolf Wolfensberger Ph.D. employed the term in many of their writings, advocating for the rights of people with disabilities.<sup>10</sup> Wolfensberger defines normalization in his book, *The principle of normalization in human services*, as a “Utilization of means which are as culturally normative as possible, in order to establish and/or maintain personal behaviors and characteristics which are as culturally normative as possible.”<sup>11</sup> If we were to unpack this quote, the first half, “utilization of means which are as culturally normative as possible,…” implies a process; this process is understood to be flexible, or adaptable, based on place and its cultural context. This statement may be vague, but it implies an empirical process which will, upon investigating a particular place, offer clues as to how to appropriately apply the principle in said place. The second half of Wolfensberger’s definition, “...to establish and/or maintain personal behaviors and characteristics which are as culturally

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<sup>10</sup> Wolf Wolfensberger, *The Principle of Normalization in Human Services* (Toronto: Leonard Crainford, 1972), 27.

<sup>11</sup> Ibid., 28.

normative as possible.”, is understood to be the goal of the principle. Again, this implies an empirical process as the needs differ from person to person and the help they require must be tailored specifically to those needs. This is best illustrated in the Equality versus Equity diagram by Robert Wood Johnson Foundation. The goal is to allow all individuals the ability to express themselves with confidence as they are given the opportunity to integrate themselves as seamlessly as possible into mainstream society within living conditions, work opportunities and public social interactions.

### Equality



### Equity



Equality Versus Equity; Image adapted from original by Robert Wood Johnson Foundation.

Within the text referenced above by Wolfensberger, the following table describes the expression of the normalization principle at three levels: the person level, the immediate and intermediate social systems level, and the societal social systems level. These three levels are then split into two dimensions of action in which the principle of normalization will affect; firstly, the individual or group of individuals directly, and secondly, the outward perception of these individuals by others.

What we must understand is that inclusive design, and likewise the principle of normalization, is meant to benefit everyone; we all have our own obstacles or ‘disabilities’ to overcome in life. At this point I would like to

reiterate that although this thesis is particularly interested in the specificities surrounding the group of cognitive disabilities, the resulting architectural intervention is meant to be inclusive to all persons.

| Levels of action                        | Dimensions of action   |   |
|---|--|---|
|   | Interaction  | Interpretation  |
| Person                                  | Eliciting, shaping, and maintaining normative skills and habits in persons by means of direct physical and social interaction with them  | Presenting, managing, addressing, labelling, and interpreting individual persons in a manner emphasizing their similarities to rather than differences from others  |
| Primary and intermediate social systems | Eliciting, shaping, and maintaining normative skills and habits in persons by working indirectly through their primary and intermediate social systems, such as family, classrooms, school, work setting, service agency, and neighborhood | Shaping, presenting, and interpreting intermediate social systems surrounding person or consisting of target persons so that these systems as well as the persons in them are perceived as culturally normative as possible |
| Societal systems                        | Eliciting, shaping, and maintaining normative behavior in persons by appropriate shaping of large societal social systems, and structures such as entire school systems, laws, and government  | Shaping cultural values, attitudes, and stereotypes as to elicit maximal feasible cultural acceptance of differences  |

Table from Wolfensberger, *The Principle of Normalization in Human Services (1972)*

For a more in-depth analysis into Wolfensberger's table and principle of normalization, please refer to the attached appendix, and to his book *The Principle of Normalization in Human Services*.

## L'Arche and Camphill Movements

There are currently programs and not-for-profit organizations in place worldwide that are contributing to the cause of inclusion in ways that far surpass all others, setting precedents on what it truly takes to aid someone in need. L'Arche and The Camphill Association are two examples of not-for-profit organizations who have dedicated themselves in pursuit of their

goal of social inclusion and offer a multitude of job opportunities and housing options in locations spread out all over the globe. In 1964, L'Arche began as a single-family home renovated by Jean Vanier in the small town of Trosly-Breuil, France, but today it has expanded enormously to one hundred and forty-nine separate communities located within thirty-seven countries around the world.<sup>12</sup> L'Arche offers companionship, learning opportunities, job opportunities and housing for people with intellectual disabilities, all adding to a higher sense of value and confidence within them. As importantly, it also serves as valuable teaching opportunities to those who may be ignorant toward the disability demographic. Camphill, a similar organization to L'Arche, was founded by Dr. Karl König in Aberdeen Scotland, in 1939. Camphill found its way to North America in 1959, and now has over one hundred communities worldwide.<sup>13</sup>

Both the L'Arche and Camphill models have been influential in the creation and development of many other not-for-profit organizations geared toward providing safe places for individuals both with and without intellectual disabilities to live, work and socialize together. The aim of this thesis is to evaluate and learn from what has transpired in the past, from our knowledge of inclusive design and cognitive disabilities and push the boundaries of what has previously been deemed 'appropriate', or 'satisfactory'. To quote R. H. Lusher and R. L. Mace in their writings *Design for Physical and Mental Disabilities*,

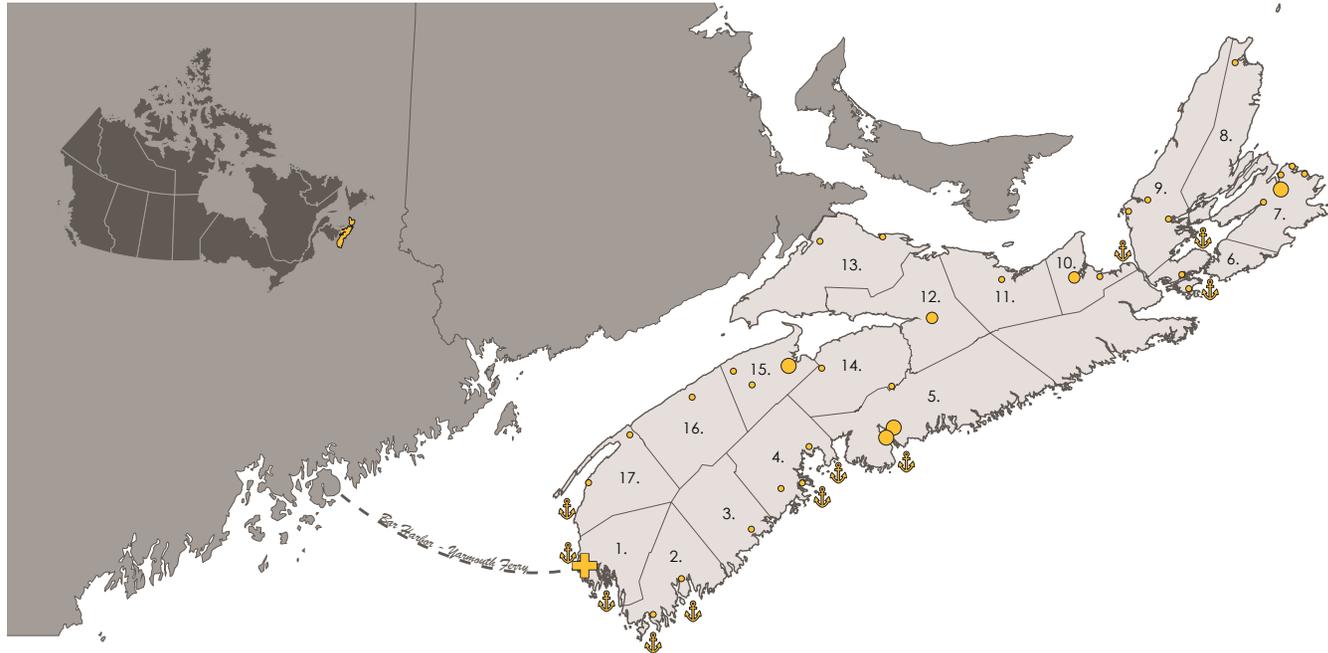
Instead of responding only to the minimum demands of laws which require a few special features for disabled people, it is possible to design most manufactured items and building elements to be usable by a broad range of human beings including children, elderly people, people with disabilities, and people of different sizes. This... is a concept that is now entirely possible and one that makes economic and social sense.<sup>14</sup>

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12 L'Arche Canada, "A brief history of L'Arche," accessed 25 November 2018, <https://www.larche.ca/about-larche/our-history>.

13 Camphill Association of North America, "The History of the Camphill Movement," accessed 25 November 2018, <https://www.camphill.org/history/>.

14 R. H. Lusher and R. L. Mace, "Design for Physical and Mental Disabilities," In *Encyclopedia of Architecture: Design Engineering and Construction*, ed. J. Wilkes and Sons, Volume 3 (John Wiley & Sons INC, 1989), 754.



**1. YARMOUTH COUNTY**

Yarmouth Association for Community Residential Options (YACRO)  
Yarmouth Life Skills  
Kaye Nickerson Centre

**2. SHELBURNE COUNTY**

Shelburne Association Supporting Inclusion (SOSI)  
Barrington Developmental Residence (SOSI)

**3. QUEENS COUNTY**

Queens Association for Supported Living

**4. LUNENBERG COUNTY**

The Ark Lunenburg County Association for the Specially Challenged  
Riverview Enhanced Living Society  
Bonny Lea Farm

**5. HALIFAX REGIONAL MUNICIPALITY**

Community Living Centres INC  
Independent Living NS  
Halifax Association for Community Living  
Autism NS  
L'Arche Halifax  
Gateway Homes INC.  
Isaiah House Special Care  
Metro Community Housing Association  
Our Neighbourhood Living Society  
Regional Residential Services Society  
Support Services Group  
Co-operative  
YACRO

**6. RICHMOND COUNTY**

Isle Madame Small Options Society  
Louisdale Community Homes Association

**7. CAPE BRETON REGIONAL MUNICIPALITY**

Community Involvement of the Disabled  
Breton Ability Centre  
Cape Breton Housing Association  
Cape Breton Residential Society  
New Dawn Home Living  
Resi Care Cape Breton  
Society for the Treatment of Autism  
Supportive Living Society  
Unity House

**8. VICTORIA COUNTY**

Highland Visions

**9. INVERNESS COUNTY**

L'Arche Cape Breton  
ROC Society  
Cape Breton West Community Action 2000 Society  
Cheticamp Area Residential Educational Society  
Mawifa'mk Society  
Inverness County Small Options

**10. ANTIGONISH COUNTY**

L'Arche Antigonish  
CACL - Antigonish Branch  
Celtic Community Homes Association  
Heatherton Group Homes Association

**11. PICTOU COUNTY**

Highland Residential Services Society

**12. COLCHESTER COUNTY**

Colchester Residential Services Society  
Canadian Mental Health Association  
Hub Residential Services Society

**13. CUMBERLAND COUNTY**

Amherst and District Residential Services Society  
The Sunset Community  
Bridge Adult Service Centre

**14. HANTS COUNTY**

Corridor Community Options Society  
Kings Meadows Residence Society

**15. KINGS COUNTY**

Community Living Alternatives Society  
L'Arche Homefires  
Valley Community Learning Association  
The Flower Cart  
Brigadoon Village  
The Beehive

**16. ANNAPOLIS COUNTY**

Carleton Road Industries Association

**17. DIGBY COUNTY**

CACL - Clare Branch  
Conway Workshop Association

## CHAPTER 3: SITUATING

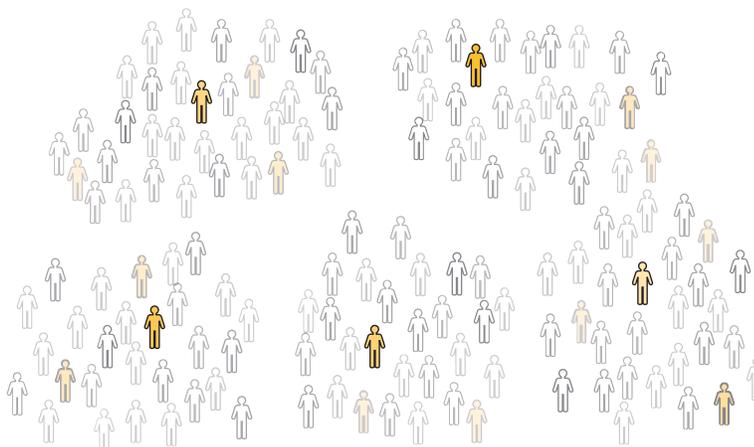
### Autism Spectrum Disorder

To truly do this thesis justice, it is absolutely necessary for it to be clear, concise and focussed on a particular topic surrounding an architectural issue or question. As has been previously mentioned, the issues surrounding the complexities of cognitive disabilities is difficult to pin-point, as for example, an individual with Down Syndrome has different needs than that of someone with Alzheimer's. To bring a further level of clarity and focus, the design will seek guidance of principles derived from the specificities of the autism spectrum disorder (ASD). Autism was chosen to be studied for multiple reasons; ASD is relatively new within the disciplines of psychology and medicine, making it an important field of study through an architectural lens as there has been very little done in the past. Furthermore, individuals with ASD also perceive and interact with physical space much differently than someone who is not on the spectrum making the architectural exploration something quite different to what may be seen as typical. Lastly, and on a personal note, I grew up in a home alongside a family member with ASD making this a topic very special to me. My hopes are to contribute to a very important cause and to inspire others to continue research in this field. In 2018, the Government of Canada released its first-ever national ASD statistics. It was found that approximately one in sixty-six children between the ages of five and seventeen have been diagnosed with autism.<sup>15</sup>

In 1942, Austrian-American psychiatrist, physician and social activist Dr. Leo Kanner was reportedly the first to recognize autism (first named early infantile autism) while working at the Johns Hopkins Hospital, Baltimore,

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15 Government of Canada, "Public Health Agency of Canada Releases First-Ever National Autism Spectrum Disorder (ASD) Statistics," Last modified 29 March 2018, <https://www.canada.ca/en/public-health/news/2018/03/public-health-agency-of-canada-releases-first-ever-national-autism-spectrum-disorder-asd-statistics.html>.



The prevalence of autism spectrum disorder in 2018 among 5-17 year olds is **1 in 66**, however, autism effects everyone differently; Data from the Government of Canada

Maryland.<sup>16, 17</sup> Autism is a neurodevelopmental disorder that includes impairments in language, communication skills, and social interactions combined with restricted and repetitive behaviours, interests or activities.<sup>18</sup> It is considered a spectrum due to the fact that each individual exhibits differences in symptoms, deficits and abilities; because of this range in characteristics, ASD is further categorized into three levels of severity. What was once considered either ‘high functioning’ or ‘low functioning’ individuals are now categorized into level 1 – requiring support, level 2 – requiring substantial support, or level 3 – requiring very substantial support.<sup>19</sup> While the possible cause for ASD is still to be determined, research is being conducted today into genetics, differences in biological brain function, pre- and post-natal brain development, environmental factors, viral infections and immune responses and deficiencies.<sup>20</sup>

16 Philip M. Ferguson and Amy McKenna, “Leo Kanner: Austrian-American Psychiatrist,” *Encyclopedia Britannica*, 2013, <https://www.britannica.com/biography/Leo-Kanner>.

17 Autism Canada, “Evolution of Autism,” Last modified 24 August 2018, <https://autismcanada.org/about-autism/evolution-of-autism/>.

18 “Autism Spectrum Disorder,” *American Association: Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (Arlington, VA: American Psychiatric Association, 2013). <https://doi.org/10.1176/appi.books.9780890425596>.

19 Ibid.

20 Autism Canada, “Evolution of Autism,” 2018.

On top of the social communication difficulties and behaviours, individuals on the spectrum often suffer from sensory conditions varying from hypersensitive to hyposensitive or a combination of the two.<sup>21</sup> Regardless if an individual was deemed to be level 1, 2 or 3 on the ASD scale, each person will react to sensory inputs differently. Some may find pungent smells distracting to the point of a breakdown, while another may enjoy tactile variance and seek out surfaces to run their hand or body upon. This amount of variance can be difficult to achieve in a balanced, well thought through architectural response while catering to the needs of everyone. The way in which this issue will be addressed is to allocate sensory stimuli in thoughtful areas throughout the project that can be sought out by individuals when the need arises. Within spaces such as individual units, calming, serene spaces have been designed where stimulation can easily be added in the form of electronic devices, paintings/art, and tactile elements whenever needed.<sup>22</sup>

Where does architecture fit in to all of this? Individuals with autism have difficulties with social interaction, often feel overwhelmed in over-stimulated environments and require a sense of repetitive behaviors and routines to feel comfortable. Architects deal directly with the physical environment with which they interact and can drastically effect all of these characteristics. A poorly designed space can make navigation extremely difficult while overloading an individual with stimuli and emotions, whereas a thoughtfully designed space can give a sense of calmness, serenity, predictability and user friendliness. Tactics implemented for helping those with autism typically deal with how to properly cope with stressful situations when they arise, however, architecture has the unique ability to help eliminate these situations before they ever occur.<sup>23</sup> This is best captured in a quote from

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21 Kim Steele and Sherry Ahrentzen, *At Home with Autism – Designing Housing for the Spectrum* (Bristol, United Kingdom: Policy Press, 2016), 50-54.

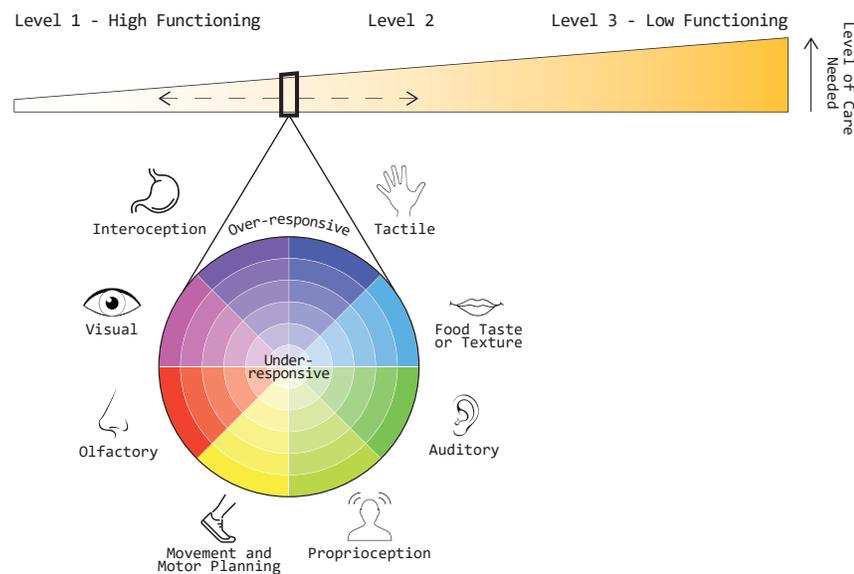
22 *Ibid.*, 52.

23 Magda Mostafa, "An architecture for autism: concepts of design intervention for the autistic user," *International Journal of Architecture Research* 2, no. 1 (2008): 191.

| <b>Severity Level</b>                           | <b>Social Communication</b>   | <b>Restricted, repetitive behaviors</b>  |
|---|---|--|
| Level 3<br>"Requiring very substantial support" | Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only direct social approaches.  | Inflexibility of behavior, extreme difficulty coping with change, or other restricted/repetitive behaviors markedly interfere with functioning in all spheres. Great distress/difficulty changing focus or action.   |
| Level 2<br>"Requiring substantial support"      | Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited to narrow special interests, and who has markedly odd nonverbal communication.  | Inflexibility of behavior, difficulty coping with change, or other restricted/repetitive behaviors appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action. |
| Level 1<br>"Requiring support"                  | Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful responses to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to-and-fro conversations with others fails, and whose attempts to make friends are odd and typically unsuccessful. | Inflexibility of behavior causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.  |

Magda Mostafa, PhD, Architect, and Associate Professor at the American University in Cairo.

Most interventions for autistic individuals, predominantly medical, therapeutic and educational, deal with the sensory malfunction itself and the development of strategies and skills for the autistic individual to use when coping with these malfunctions. It is the contention of this research that autistic behavior can be influenced favorably by altering the sensory environment, i.e. the stimulatory input, resulting from the physical architectural surroundings (color, texture, ventilation, sense of closure, orientation, acoustics etc.) before, rather than after the sensory malfunction occurs.<sup>24</sup>



Autism Spectrum Disorder and Sensory Sensitivities; Adapted from original image by Rebecca Burgess

Utilizing architecture as means to reduce the likelihood of sensory malfunction will benefit a number of people. First, it will clearly benefit the individual, as they can feel at ease in their surroundings enabling them to concentrate on tasks and increasing independency; this independency will in turn help the caretakers. Caretakers can be friends, family members or social workers who have dedicated themselves to aiding an individual, or groups of individuals in managing their daily lives. Former Director of Queens Association for Supported Living, Murray Kirkpatrick explains that caretakers undergo extraordinarily difficult workdays as they are tasked with

<sup>24</sup> Mostafa, "An architecture for autism," 191.

cooking, cleaning and caring for children and adults who are sometimes self-abusive, have tendencies of elopement, have not been toilet trained and are on heavy dosages of medications.<sup>25</sup> This can cause elevated stress levels and high attrition rates of caregivers. According the U.S. Department of Health and Human Services, there is an average annual attrition rate of nearly fifty percent.<sup>26</sup> The goal is then to utilize architecture as a device to increase independence amongst individuals with autism, allowing for self-development and the ability to transition from significant need of support to living semi-independently.

## **Location of Interest**

### **Nova Scotia, Canada**

Within the province of Nova Scotia, L'Arche has four locations situated amongst a multitude of other similarly focused organizations. At a first glance, this gives the illusion that there are adequate services for all peoples with cognitive disabilities within the province, however, this is not the case. Unfortunately, according to the Nova Scotia Department of Community Services Disability Support Program, there are approximately 1020 people requesting a change in service type/location and 530 people currently on a waiting list to access Disability Support Programs.<sup>27</sup> The Department of Community Services is a provincially governed program responsible for reviewing each applicant, subsequently determining the needs of each individual as well as programs and services for which they qualify. The applicants are then placed on the aforementioned waiting lists until an organization is capable to assist them. In theory this system seems to be a logical, non-discriminatory way to ensure all applicants receive equitable assistance, but due to the lack of resources in place, there is a large population group receiving inadequate help.

<sup>25</sup> Murray Kirkpatrick, Retired Director of Queens Association for Supported Living, Communication on 25 January & 11 June, 2019.

<sup>26</sup> U.S. Department of Health and Human Services, 2002, Notice, Federal Register, 67, 69223-69225.

<sup>27</sup> Disability Support Program, Department of Community Services of Nova Scotia, Communication on 15 July 2019.

No data is currently available regarding the number of people within Nova Scotia that are in need of and subsequently receiving aid from disability services. I have personally contacted many directors and caretakers from various not-for-profit organizations around the province, and the message was unanimously clear – more work needs to be done to provide housing and work opportunities for people with disabilities. There must be advancements made in many areas surrounding these issues, but this thesis addresses at least two in particular. Firstly, if it were to be realized, it would provide more housing options and work opportunities for those in need. Secondly, and most importantly, the carefully constructed design principles and considerations that have developed throughout the research are of utmost importance and ought to be implemented in all projects surrounding cognitive disabilities, and arguably all projects despite the clientele. As I will be discussing in the following chapter, although there has been research done to establish design principles, most examples of architectural precedents found seem to have missed the mark as far as properly implementing them.

### **The Town of Yarmouth**

The town of Yarmouth, Nova Scotia is the regional centre for the tri-counties (Yarmouth County, Shelburne County and Digby County), and one of the most important towns within the Nova Scotia Western Health Authority Zone. With a population of 6,700 within the town proper,<sup>28</sup> and nearly 56,000 people accounting for the tri-counties,<sup>29</sup> there are only a handful of organizations offering disability services, resulting in significant disparity. Although organizations such as the Shelburne Association Supporting Inclusion (SOSI) in Shelburne County, and the Yarmouth Association for Community Residential Options (YACRO) in the town of Yarmouth offer both housing and working options to people with disabilities, the data

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28 Town of Yarmouth, "A Brief Town of Yarmouth History," accessed 26 November 2018, <https://www.townofyarmouth.ca/a-brief-town-of-yarmouth-history.html>.

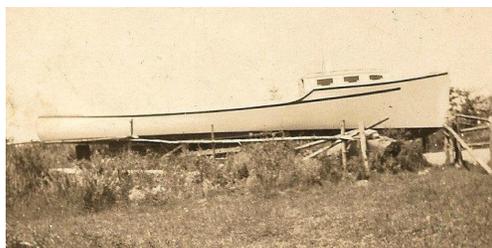
29 "List of counties of Nova Scotia," *Wikipedia*, 2018. [https://en.wikipedia.org/wiki/List\\_of\\_counties\\_of\\_Nova\\_Scotia](https://en.wikipedia.org/wiki/List_of_counties_of_Nova_Scotia).

gathered clearly demonstrates how deeply the need is for more supporting program.

Founded in 1761, the town of Yarmouth has undergone massive change on the back of its boat building culture, reaching its peak in 1879 at which time it was known as the second largest port in Canada. The shores along Yarmouth Harbour lay host to many industries over time such as the construction of sailing vessels and steamers, textile mills and fish plants which continue to be of significant importance even today.<sup>30</sup> With the reinstatement of the ferry service in 2014 between Yarmouth and Maine increasing tourism traffic in the town, and the ever-constant reliance on fishing and related businesses, industry is still integral to the waterfront of Yarmouth. Where this begins to become an issue is where industry and public space collide, creating awkward, unattractive spaces along highly sought-after waterfrontage. The proposed architectural intervention will ease the transition between currently established industry and public spaces situated on an underused plot of land fronting Water Street as well as the harbour's edge.



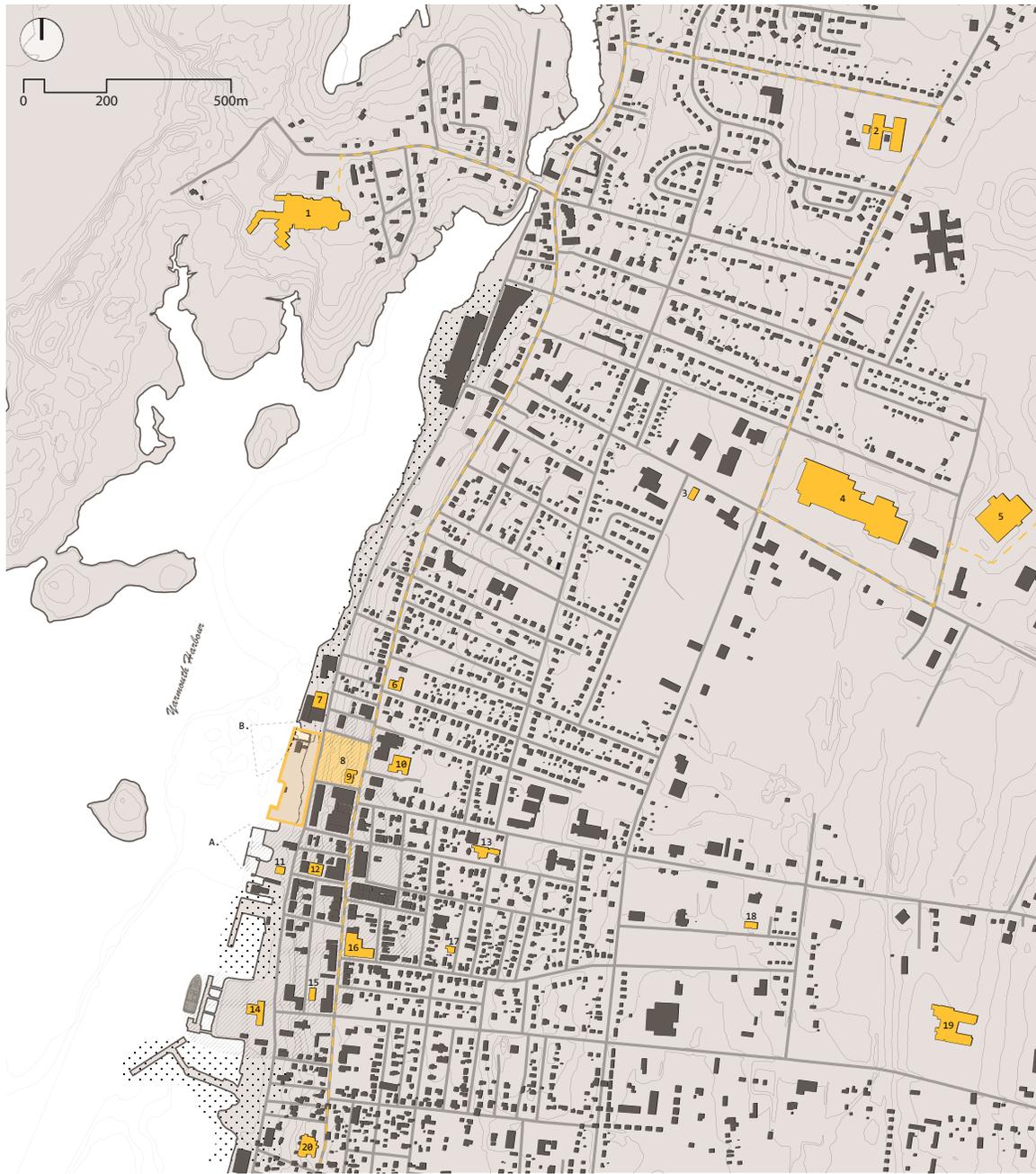
A photo of the Killam Brothers Shipping Office on Water Street, Yarmouth, circa 1869. This is a prime example of architectural vernacular of the area; photo credited to the Yarmouth County Museum and Archives



This photo is of a Cape Islander fishing boat, taken in the mid 1930's was built by Trové Surette. This would be what a typical fisherman of the period would use while out fishing to provide for his family; original photographer unknown, photo received from Guy Surette.

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30 Town of Yarmouth, "A Brief Town of Yarmouth History," 2018.



--- TRANSIT ROUTE      ▨ DOWNTOWN YARMOUTH COMMERCIAL DISTRICT      ··· INDUSTRIAL WATERFRONTAGE

- |                               |   |   |
|-------------------------------|---|---|
| 1. YARMOUTH REGIONAL HOSPITAL | 8. FROST PARK                             | 15. YARMOUTH LIFESKILLS                           |
| 2. NSCC BURRIDGE CAMPUS       | 9. YARMOUTH TOWN HALL                     | 16. YMCA OF YARMOUTH                              |
| 3. VON CANADA                 | 10. IZAAK WALTON KILLAM MEMORIAL LIBRARY  | 17. YACRO   |
| 4. YARMOUTH MALL              | 11. KILLAM BROTHERS SHIPPING OFFICE       | 18. KAYE NICKERSON CENTRE                         |
| 5. ATLANTIC SUPERSTORE        | 12. THE STORE NEXT DOOR & THE SHANTY CAFÉ | 19. YARMOUTH CONSOLIDATED<br>MEMORIAL HIGH SCHOOL |
| 6. FIREFIGHTERS MUSEUM        | 13. YARMOUTH COUNTY MUSEUM AND ARCHIVES   | 20. YARMOUTH JUSTICE CENTRE                       |
| 7. SWEENEY MUSEUM             | 14. YARMOUTH FERRY TERMINAL               |   |

Partial map of the town of Yarmouth depicting services and amenities near the selected site for this thesis. Base map from the office of Planning and Development of Yarmouth.



Photograph of the only current public space along the waterfront in Yarmouth; Photo Credit: Yarmouth & Acadian Shores Tourism Association

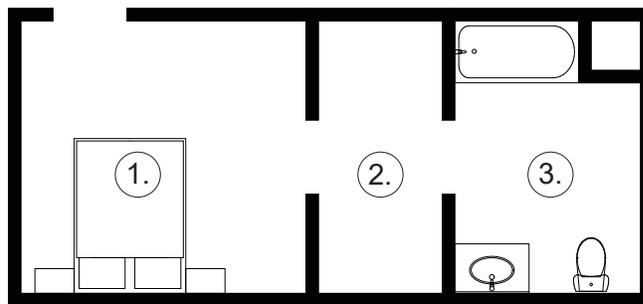


Photograph of the proposed thesis intervention site; Photo Credit: Jeffrey Bourque

## CHAPTER 4: DESIGN STRATEGIES

The following chapter is dedicated to explaining the key design strategies derived from all previously compiled research particular to the autism spectrum disorder. As described in chapter 3, people with ASD all have varying needs based on whether they are hyposensitive or hypersensitive to stimuli and fluctuate depending the severity of their sensitivities. To help reduce the possibility of outbreaks due to over-stimulation, I have outlined three major design strategies to be implemented in the architectural intervention: Program Sequencing, Preview and Retreat, and Increasing Serenity. These principles can be found throughout the design at diverse scales, from site configuration to detail.

### Program Sequencing



Example of program sequencing which will promote a routine.  
1: Bedroom, 2. Closet, 3. Washroom

Program sequencing speaks to the physical arrangement of programmatic elements in proximity to one another and has three key elements which define its success. Firstly, to achieve program sequencing each space must be clearly defined. In architecture, private spaces, semi-private spaces, semi-public spaces and public spaces are the underlying zones within a design, and the argument is that each of these zones must be clearly defined from one another.<sup>31</sup> Many others echo this idea as Magda

<sup>31</sup> H. Osmond and K. Izumi, "The mentally ill," *Designing for the handicapped: The mentally retarded, The mentally ill, The maladjusted, The blind, The deaf, Those with learning disabilities, The gifted or exceptional child* (London: George Goodwin Limited, 1971): 31-34.

argues for the design of compartmentalization as it limits the possibility for added stimuli and distractions, subsequently increasing focus and concentration.<sup>32</sup> Steele and Ahrentzen continue on to say that even the type of furnishings and finishes found in a particular space offer clues as to how the space is intended to be used.<sup>33, 34</sup>

Washrooms are clearly washrooms as they offer specific equipment for personal use and hygiene, but what happens when the use of a space is not so clearly defined? In residential units today, the trend is to have large, interconnected spaces with next to no thresholds from one 'space' to the next; the best example being the interconnectedness of the living area, kitchen and eating area. Are these open-plan floor plans suitable for individuals with autism? In group living situations where caretakers are involved, it is beneficial as they offer clear sightlines from one space to the next, however, I believe there to be a better alternative which can satisfy both the need for supervision while achieving the spatial clarity of compartmentalization. Threshold conditions must be clearly defined and located as to inform the user they have entered a new space, yet allow for some connectivity to other complementary program. This can be done through material change (material, colour, texture etc.), change in ceiling heights, placement of furniture and partitions.

The second element of Program Sequencing is the way in which distinct programmatic elements are grouped. We outlined the importance of clearly defined uses and threshold conditions from one space to the next, but how then do they relate to one another? A simple example is once again to visit a typical North American home; there you can often find the dining area adjacent to the kitchen. This makes obvious sense as one would not want to wonder throughout the home with their dinner, however, we can also

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32 Mostafa, "An architecture for autism", 193.

33 Steele and Ahrentzen, *At Home with Autism – Designing Housing for the Spectrum*, 102.

34 Kristi Gaines et al., *Designing for Autism Spectrum Disorders* (New York and London: Routledge, Taylor and Francis Group, 2016), 100.

view this as a sensory grouping of two similar program when analysing how the spaces are used, as well as their potential stimulus input. Public and private spaces must be grouped together based off these potentials for high and low stimulus and separated by transitional spaces to ensure an easy flow from one type of space to the next.<sup>35, 36</sup> This allows for example bedrooms, which are typically seen as safe, private spaces for individuals, to be kept at a distance from areas such as kitchens which produce many sounds and smells which could disrupt hypersensitive individuals. Magda explains that one way to think about this is that, to increase the chances of fluid movement to or from an area of high stimulus and to decrease the odds of distraction for an individual with ASD, there ought to be a “transition zone” which can take the form of a hallway, garden, courtyard, etc.<sup>37</sup>

The last element is one that will occur naturally if Program Sequencing is properly implemented; this is the notion of routine. Routines are incredibly important to maintain for people on the spectrum as it allows for some familiarity and predictability in their lives; this helps encourage concentration and limits sensory inputs.<sup>38</sup> I can say from personal experience at home that routines are very important in keeping an individual with autism at ease. Even an exciting holiday such as Christmas, which is filled with happiness, family and delicious food, the prospect of this big event looming is enough to throw both emotions and sensitivities spiraling out of control. There are many people, including myself, who can sympathize however, as routines allow for comfort and productivity to increase. This furthers the principle of universal design, that anticipating the needs of one sector of the population can benefit all persons.

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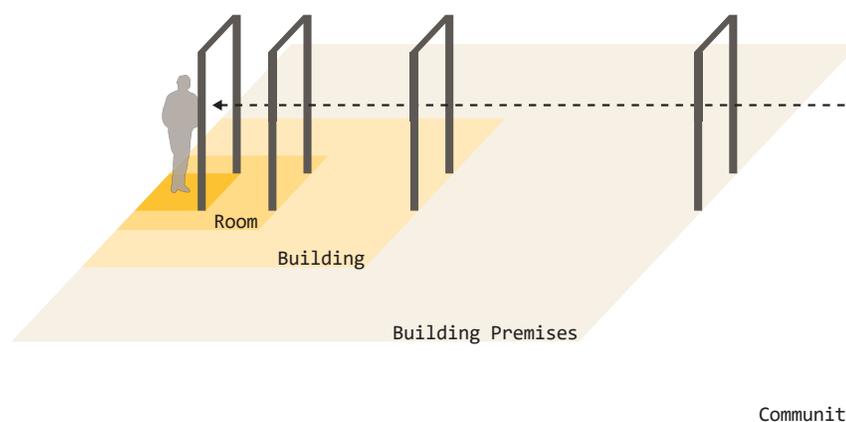
35 Osmond and Izumi, “The mentally ill”, 34.

36 Kenneth Bayes and Sandra Francklin, “The therapeutic environment,” *Designing for the handicapped: The mentally retarded, The mentally ill, The maladjusted, The blind, The deaf, Those with learning disabilities, The gifted or exceptional child* (London: George Goodwin Limited, 1971), 19-25.

37 Mostafa, “An architecture for autism,” 193.

38 Gaines et al., *Designing for Autism Spectrum Disorders*, 98.

## Preview and Retreat



Preview and Retreat diagram; Adapted from original by Leddy Maytum Stacy Architects

Feeling safe in an environment is of utmost importance and is the crux of the design strategy Preview and Retreat which I have borrowed from the Sweetwater Spectrum Community project by Leddy Maytum Stacy Architects.<sup>39</sup> To recap, autism is a neurodevelopment disorder which primarily effects communication skills, social interactions and repetitive behaviours, and because of this, they typically need time to assess environments, people and activities before deciding whether they feel safe joining in.<sup>40</sup> Sidelights in bedroom or residential unit doors seem to be an area of contention when it comes to both Preview and Retreat as well as safety. Some authorities call for sidelights as they allow views out into adjacent spaces, empowering the individual in deciding on whether to venture out or not, but poorly placed sidelights compromise the retreat.<sup>41,42</sup> The solution is to place sidelights so that the view inward is obstructed or facing away from areas in need of

39 "Sweetwater Spectrum Community / LMS Architects," *ArchDaily*, 12 November 2013. <https://www.archdaily.com/446972/sweetwater-spectrum-community-lms-architects>.

40 Steele and Ahrentzen, *At Home with Autism – Designing Housing for the Spectrum*, 57.

41 *Ibid.*, 104.

42 Murray Kirkpatrick, Retired Director of Queens Association for Supported Living, 2019.

privacy, but allows the individual to peer outward if the need arises. Preview and Retreat is also a key concept in *Designing for Autism Spectrum Disorders* where the theory of prospect and refuge is applied such that individuals may preview spaces before entering and once inside, offer multiple pockets or zones within a space to allow for smaller social interactions.<sup>43</sup> If we use a common living space within a residential unit as an example, there could be a window seat located on one side of the room or small seating arrangements near a table for card playing while the sofa and large seating area are at the opposing end. This allows for someone to be a part of the larger group, without necessarily being the center of attention; in the book *Designing for Autism Spectrum Disorders* they call this “interstitial edge conditions”.<sup>44</sup>

There have been some diverse reactions to compartmentalising spaces as opposed to larger multi-use spaces as supervision and sightlines are integral for a safe living environment.<sup>45</sup> Some people prefer the ability to see into the kitchen for example while in the living room, however, this may also increase visual stimulus which can be extremely distracting for some.<sup>46</sup> The solution for this is to develop thresholds between differing spaces by utilizing furniture and partitions which give a sense of compartmentalisation while still offering sightlines in key areas for safety concerns. Another element which can be implemented in Preview and Retreat are courtyards. Courtyards offer a buffer between the business of the impending street and sidewalk beyond, which also fulfills criteria for the previous design principle of Program Sequencing. Research has also been conducted suggesting that stress levels in adults with autism are significantly reduced when well designed green spaces are located near their homes as it enhances focus and reduces anxiety.<sup>47</sup> The courtyard typology is one that is implemented within the design and lends itself perfectly to the third design principle as well, Serenity.

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43 Gaines et al., *Designing for Autism Spectrum Disorders*, 15.

44 Ibid., 32.

45 Murray Kirkpatrick, Retired Director of Queens Association for Supported Living, 2019.

46 Steele and Ahrentzen, *At Home with Autism – Designing Housing for the Spectrum*, 58.

47 Ibid., 67-68.

## Increased Serenity



This image highlights the necessity for serenity as the sensory stimuli encountered throughout the day may be difficult for someone on the spectrum to navigate, causing a breakdown to occur.

The final design principle is Increased Serenity. It encompasses aspects from each of the previous principles and may take varying shapes and forms depending on the user. Autism appears rather differently from one person to the next in form of hyper- or hypo-sensitivities which require a myriad of spaces with differing levels of stimulating features depending on the need.<sup>48</sup> Designing for hypersensitive individuals and having the ability to add stimulation for the hyposensitive is the appropriate approach as it is much easier to add stimulation to a space, rather than subtract. Simple architectural moves such as ensuring a space is large enough to accommodate prescribed activities and avoid overcrowding, to the thickening of walls around bedrooms and washrooms to increase privacy can increase the sense of serenity without much effort.<sup>49</sup> Where design considerations become more interesting, and require a deeper level of investigation are when dealing with visual stimulations.

Visual stimulations take many forms such as: differing sill and header

<sup>48</sup> Ibid., 51-53.

<sup>49</sup> Ibid., 112, 156.

heights, light patterns and sharp contrasts cast by natural or artificial lighting, textured surfaces, clutter caused by insufficient storage, sharp edges of walls or furniture, patterns and colour palettes of surfaces and furniture, activities taking place both indoors and outdoors, and the view from a window. Many sources discourage these forms of visual stimulation and encourage the creation of “sensory neutral” spaces,<sup>50</sup> but as Henry describes in his article, *Designing for Autism: More Able Not Less Disabled*, architects ought to be increasing visual stimulation depending on the type and context.<sup>51</sup> Some examples given in another of Henry’s articles regarding lighting argues that windows facing courtyards are favourable as the courtyard space can be design to be a serene environment. When the view is not preferable however, measures such as using clerestory windows, brise-soleil and deep window setbacks are ways to mitigate potential stimuli.<sup>52</sup> What if an individual needed visual stimulus on account of being hyposensitive? The architecture must then be flexible enough to adapt to all individuals who may inhabit the space.

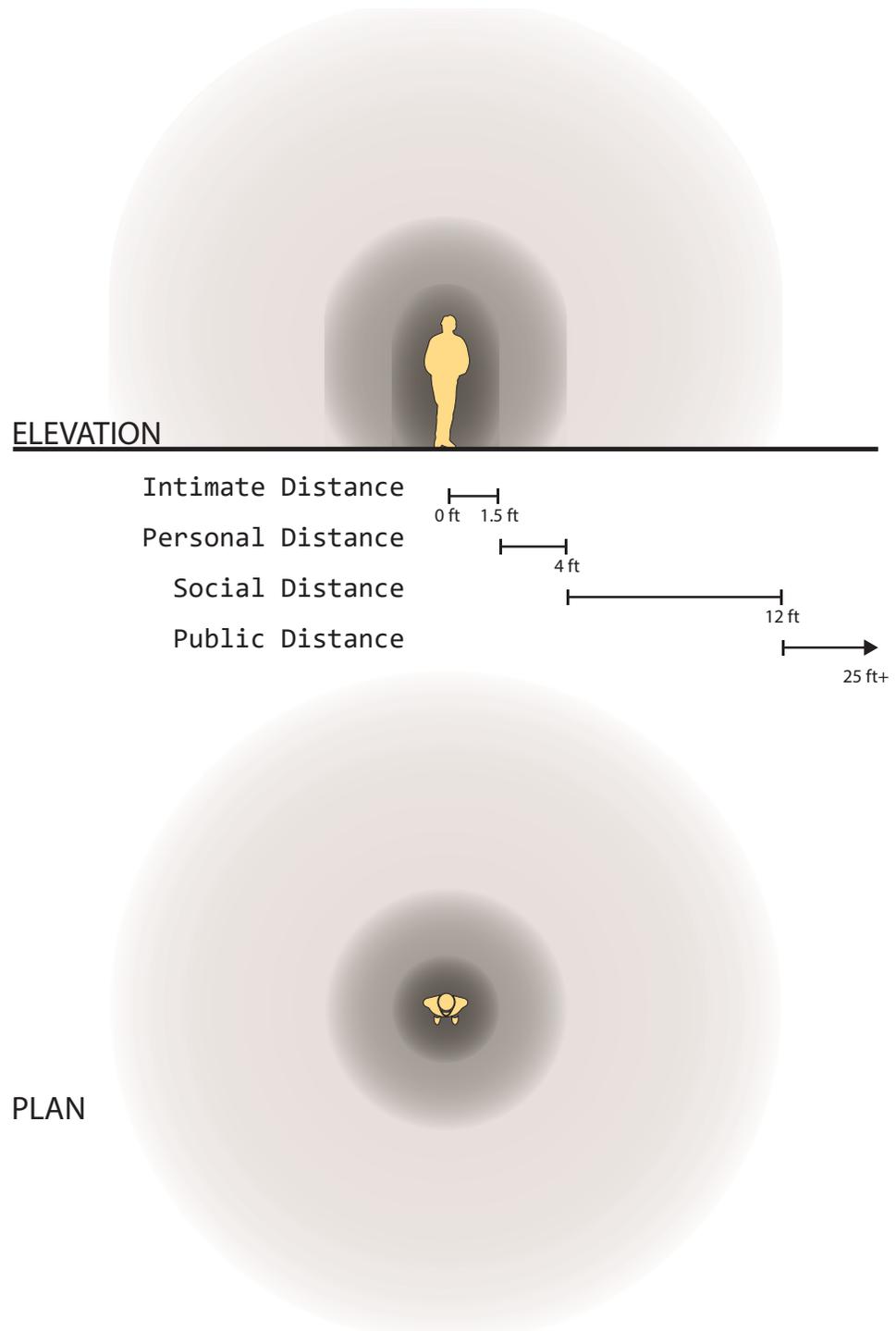
Flexibility in the realm of architecture can take many forms, but the definition of flexibility I shall be implementing here is offering the ability to the users to control incoming stimulation based off of their position within a space. Windows will be positioned to allow differing views outdoors with varying sill heights based on perceived activities within the space. For example, in the dining room where concentration is necessary to finish eating a meal, windowsills will be placed above eye level while in a seated position. This allows for natural lighting, yet avoids an abundance of stimulation unless sought out, in which case the individual may stand and take in the view of the outdoors. This idea of flexibility will bring a higher sense of independence to all individuals and is a major point of design for this thesis.

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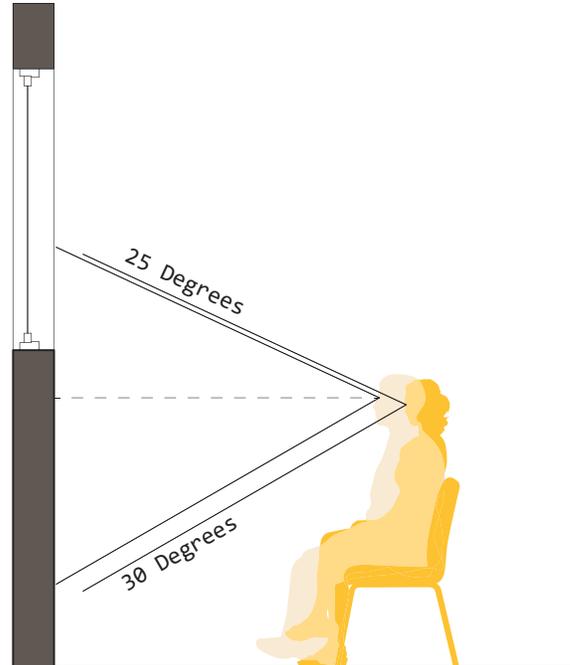
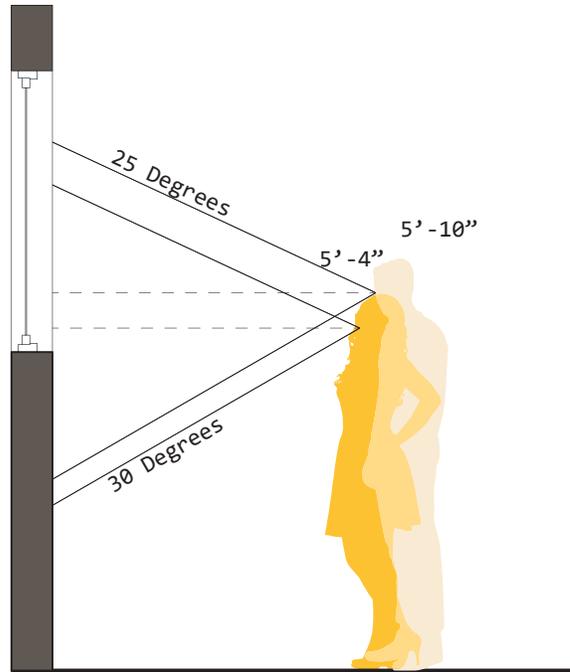
50 Steele and Ahrentzen, *At Home with Autism – Designing Housing for the Spectrum*, 93.

51 Christopher N. Henry, "Designing for Autism: More Able Not Less Disabled", *ArchDaily*, 07 December 2011, <https://www.archdaily.com/190322/designing-for-autism-more-able-not-less-disabled/>.

52 Christopher N. Henry, "Designing for Autism: Lighting", *ArchDaily*, 19 October 2011, <https://www.archdaily.com/177293/designing-for-autism-lighting/>.



Proxemics Diagram based on original by Edward T. Hall. It depicts social distances where people typically feel comfortable depending on relationship with another individual, or crowd size. Individuals with Autism see these distances vary drastically depending on their abilities to cope with public interactions.



This diagram represents the difference in which body position can influence incoming visual stimuli from a window depending on window sill height.

## Precedents and Analysis

### Shared Living for Adults with Autism

Shared Living for Adults with Autism by Michael Singer Studio in collaboration with The Center for Discovery, is a proposed new model for shared housing for individuals with ASD, located in Harris, New York.<sup>53</sup> Project description from the author:

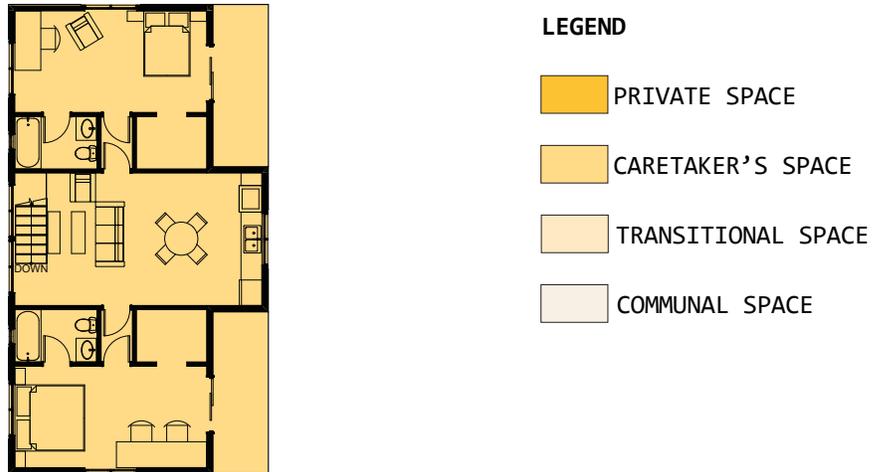
The shared living model is distinctive because it has several residents living together as the care providing family lives in a separate, but connected apartment. This housing arrangement allows for a higher quality of living compared to institutional or traditional group home settings, and fosters the formation of meaningful relationships between residents and the family. The shared living model is for four residents living in a ground floor apartment as part of a duplex home with a second floor apartment housing a couple, a young family, or two staff, who can provide individual and group care.<sup>54</sup>



Site plan: This diagrammatic site plan highlights different possible arrangements based on the unit depicted on the following page. Note: The solarium/hallway always remains on the southern-most face of each unit; adapted from original by Michael Singer Studio.

<sup>53</sup> Michael Singer Studio, "Shared Living for Adults with Autism," <https://www.michaelsinger.com/project/shared-living-for-adults-with-autism/>.

<sup>54</sup> Ibid.

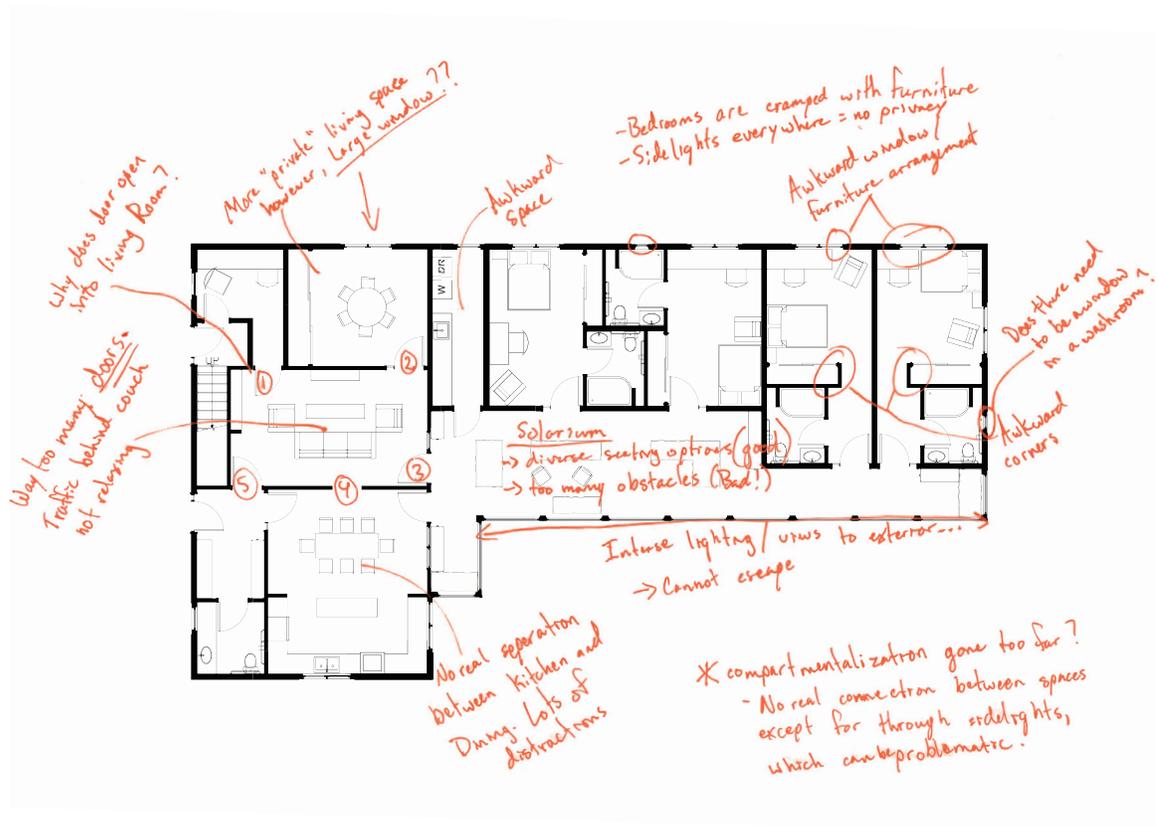


Typical Second Floor Plan



Typical First Floor Plan

The above floor plans were developed by Michael Singer Studio in collaboration with The Center for Discovery. The colour gradient helps clarify the programmatic zones within the unit, as well as differentiating the areas of high stimulus (ex. living area) to the areas in need of lower stimulus (ex. bedrooms); adapted from original by Michael Singer Studio.



Markup of a typical ground floor plan of the Shared Living for Adults with Autism by Michael Singer Studio.

One of the issues observed within the plan on the previous page is the awkwardness of the compartmentalized spaces. Although compartmentalization can be beneficial in the organization and clarity of intended usage of space as mentioned in the design strategies, the number of thresholds within the communal spaces is unacceptable. To imagine oneself sitting on the sofa in the living area, with the potential for distractions arriving through five separate doorways and foot traffic constantly passing behind you would be incredibly distracting and anything but calming. Another area of concern is the use of sidelights in most doorways. Although this can be a useful design tool for previewing the space beyond, it can also be a safety concern as privacy will be more difficult to establish. Some of the positives I believe the proposed model does achieve is the implementation of program sequencing as the private spaces are grouped together and separate from the communal spaces via a solarium-hallway. The design could also allow for healthy social interactions between the individuals with ASD and the family who lives in the attached apartment.

### **Sweetwater Spectrum Community**

Sweetwater Spectrum Community by Leddy Maytum Stacy (LMS) Architects, located in Sonoma California and completed in 2013, is "...a new national model of supportive housing for adults with autism, offering life with purpose and dignity."<sup>55</sup> The complex includes four 3,250-square-foot four-bedroom homes, a 2,300-square-foot community center, a therapy pool and spas, an urban farm, orchard and greenhouse.<sup>56</sup> The diagram illustrated in the preview and retreat section of the earlier described design principles was developed by LMS Architects in direct correlation to this project and is a principle in which they implement quite effectively at multiple scales. They clearly identify a series of threshold conditions both within each unit, as well as within the site plan which allow for opportunities

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<sup>55</sup> "Sweetwater Spectrum Community / LMS Architects," *ArchDaily*, 12 November 2013, <https://www.archdaily.com/446972/sweetwater-spectrum-community-lms-architects>.

<sup>56</sup> Ibid.

of social interactions as well as safe spaces for privacy and self-reflection. Where issues arise are, the design and placement of furniture within rooms as they feel over-crowded and door and window placements as they sometime collide awkwardly with other openings and do not offer protection from potential stimuli.



Site plan: 1. Welcome Building; 2. Parking; 3. House; 4. Stormwater Treatment Bio-Swale; 5. Community Center; 6. The Commons Plaza and Lawn; 7. Therapy Pool and Spas; 8. Orchard; 9. Trash; 10. Storage Building; 11. Irrigation Well; 12. Greenhouse; 13. Organic Farm; 14. Fire Access Road.

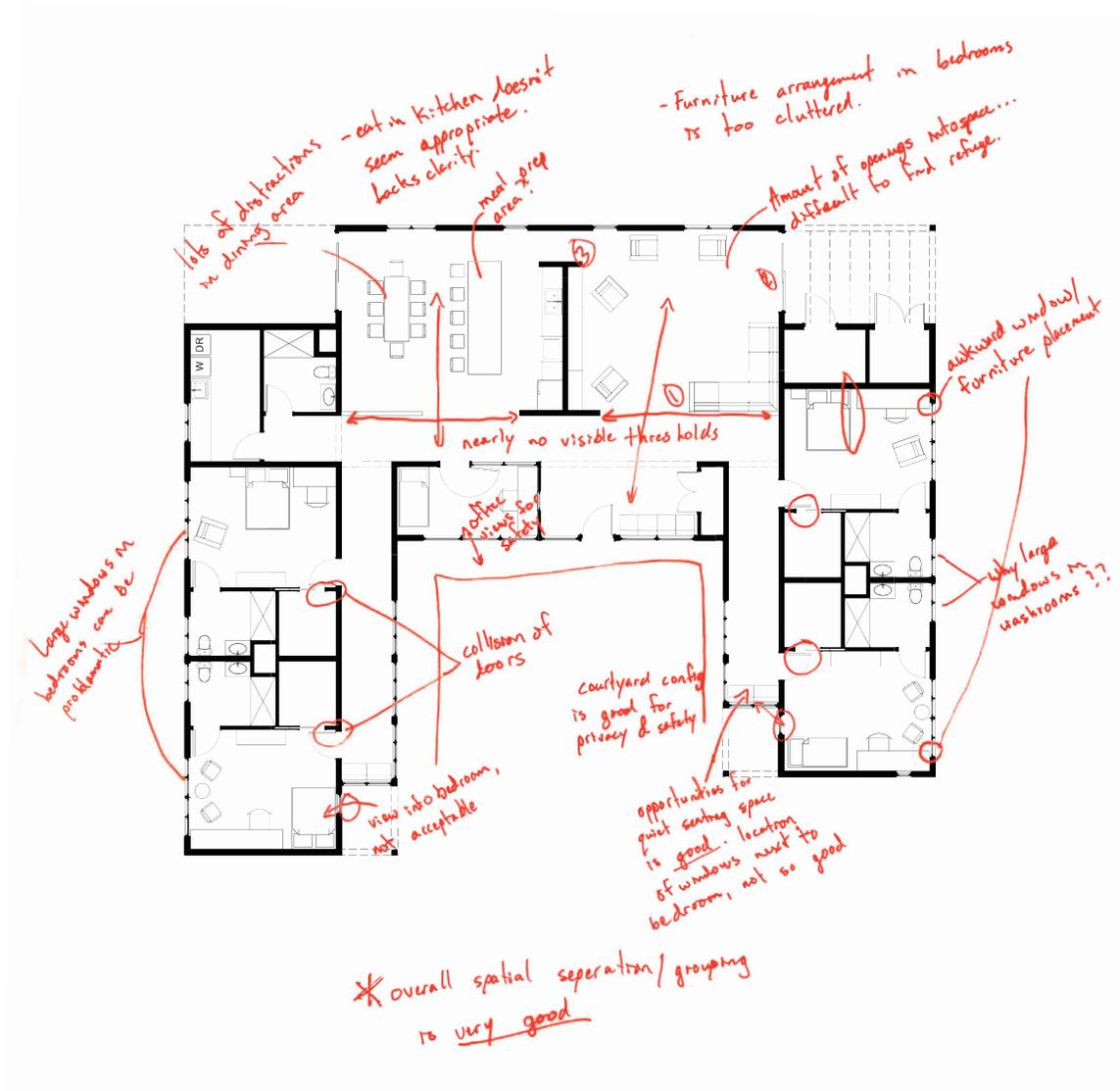
**LEGEND**

|   |                   |   |                    |
|---|-------------------|---|--------------------|
|  | PRIVATE SPACE     |  | TRANSITIONAL SPACE |
|  | CARETAKER'S SPACE |  | COMMUNAL SPACE     |



Typical First Floor Plan

The above floor plan was developed by Leddy Maytum Stacy Architects and represents a typical residential unit floor plan within the completed project of Sweetwater Spectrum Community located in Sonoma, CA. The colour gradient helps clarify the programmatic zones within the unit, as well as differentiating the areas of high stimulus (ex. living area) to the areas in need of lower stimulus (ex. bedrooms); adapted from original by Leddy Maytum Stacy Architects.



Markup of a typical ground floor plan of the Sweetwater Spectrum Community project by Leddy Maytum Stacy Architects.

While the principles laid out here are less than ground-breaking, their necessity cannot be understated. Many of the articles, journals and books that have been published within the last decade or two regarding design for autism highlight and discuss many of the same issues as this thesis, but architectural precedents seemingly have not found a way to merge principles to practice. Admittedly, designing for autism can be very difficult to grasp at first, as designing for a spectrum of individuals with varying cognitive abilities bares many challenges. What designers and architects and the like must remember, as highlighted in Christopher N. Henry's article *Designing for Autism: More Able Not Less Disabled*, is that individuals with autism deserve to be surrounded by inspirational architecture, not because of their autism, but because everyone ought to have access to beautiful, thoughtful design.<sup>57</sup> It is simply a state of mind we must use when approaching all form of design, leading to more thoughtful and attractive solutions which ultimately benefit everyone.

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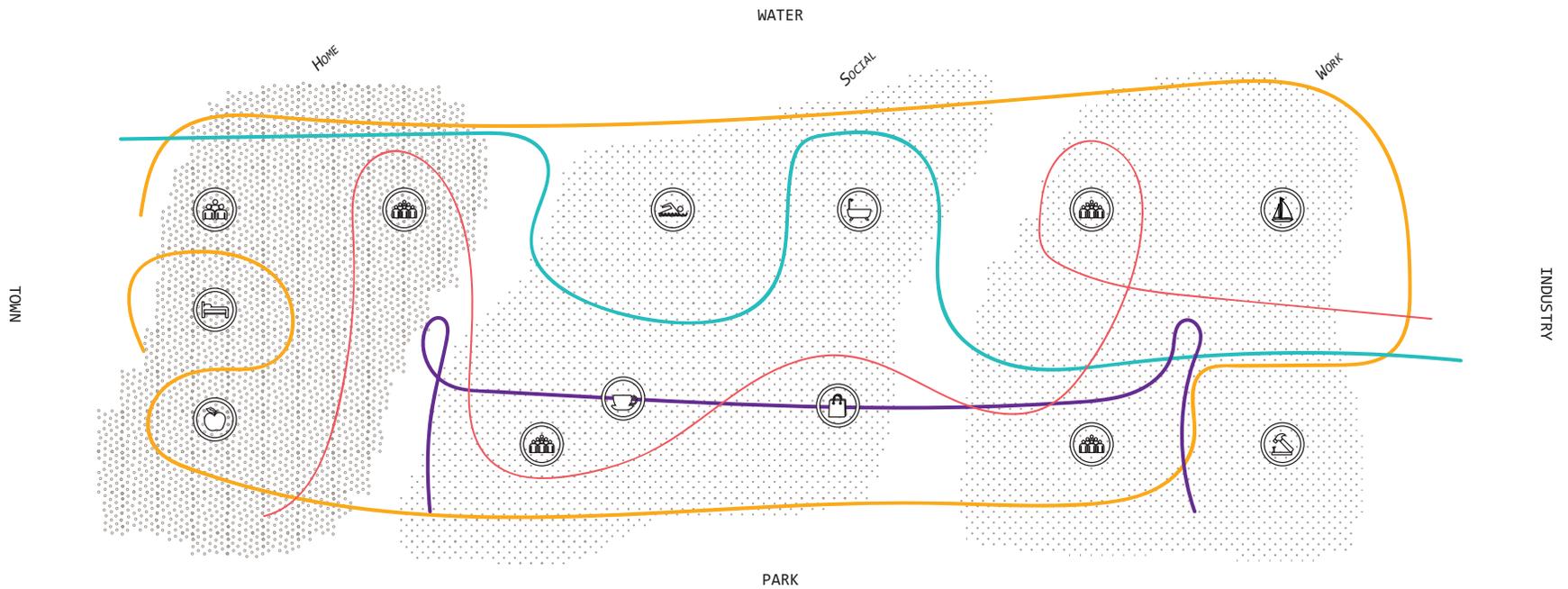
57 Christopher N. Henry, "Designing for Autism: More Able Not Less Disabled," *Archdaily*, 7 December 2011, <https://www.archdaily.com/190322/designing-for-autism-more-able-not-less-disabled/>.

## CHAPTER 5: WATERFRONT DESIGN

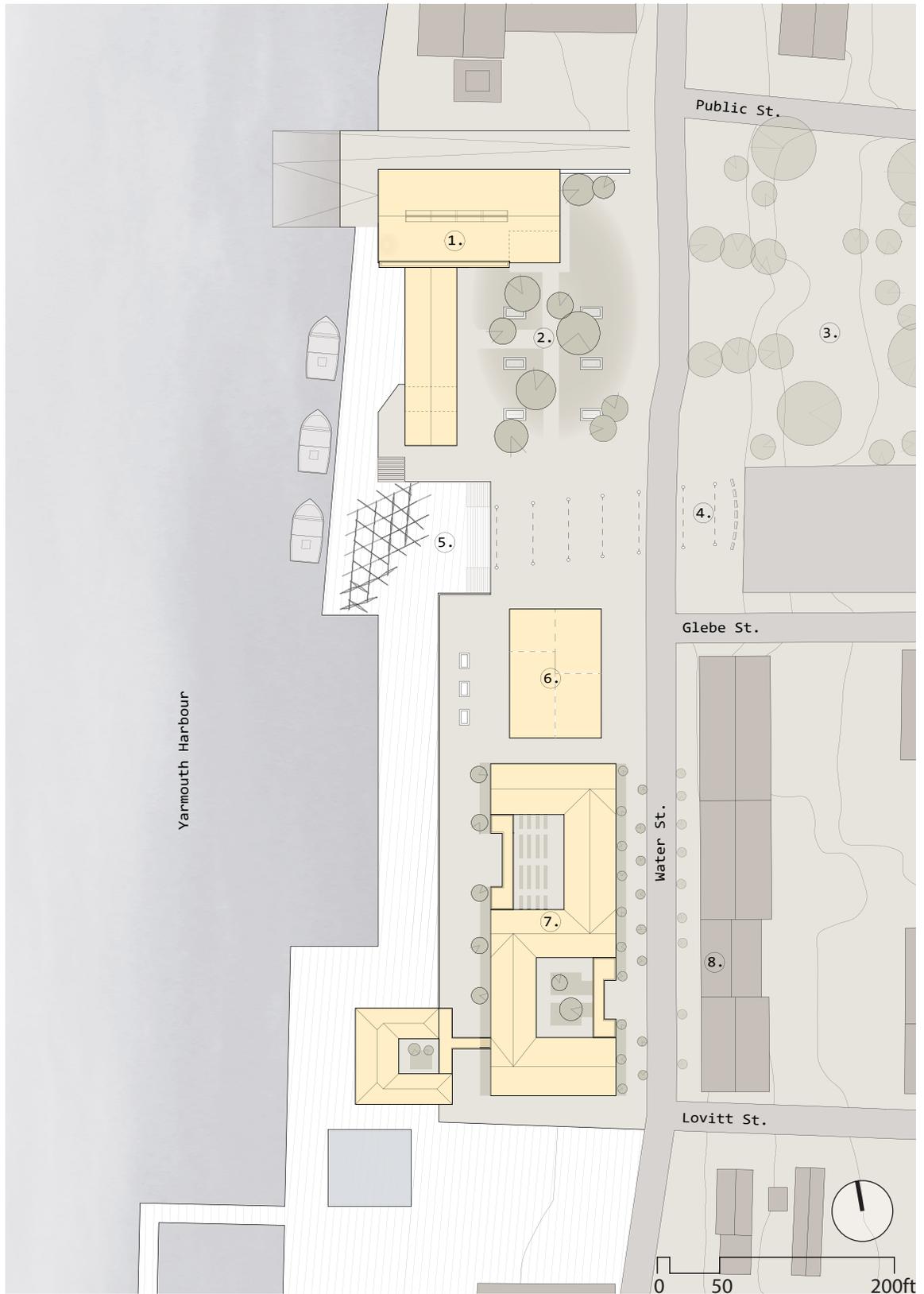
### Site Strategy

The site chosen for this thesis is located in downtown Yarmouth on a plot of land fronting Water St. between Public St. and Lovitt St. The site along with a few temporary structures are owned and used by a local fisherman as he and select others store their fishing equipment here during their off-season. Some of the elements surrounding the site include Frost Park, the Lost to the Sea Memorial which commemorates all the sons and daughters of Yarmouth County who have lost their lives at sea, the Pier 1 mix-use complex, and a few locally owned and operated restaurants and museums. The variety of these adjacent programs suggest that there would be a high rate of traffic surrounding the site compromising predominantly of industrial, tourism and local traffic, providing an excellent opportunity to test the previously outlined design principles.

The architecture responds directly to these surrounding elements and to the local vernacular. To the North, the Boat Shed borders the site, turning its back to the adjacent fish plant and opening itself to Frost Park. Its entry courtyard is meant to reflect the park while adding seating and shade as individuals approach the Boat Shed's entry. The residential building to the South fronts both Water St. and the newly implemented boardwalk. The three separate courtyards offer differing levels of experience for the user depending on their individual needs and can be used for gardening, relaxation or movement and exercise. Trees and plants add to the serenity of the sidewalk while creating a buffer between it and the street and provide a level of privacy to the ground floor units. The Boat Shed, the residential building, Frost Park, and the Lost to the Sea Memorial all converge near the center of the site where seating and a steam bent, wooden structure act as small event space that can play host to a number of local events such as the yearly Yarmouth Seafest.

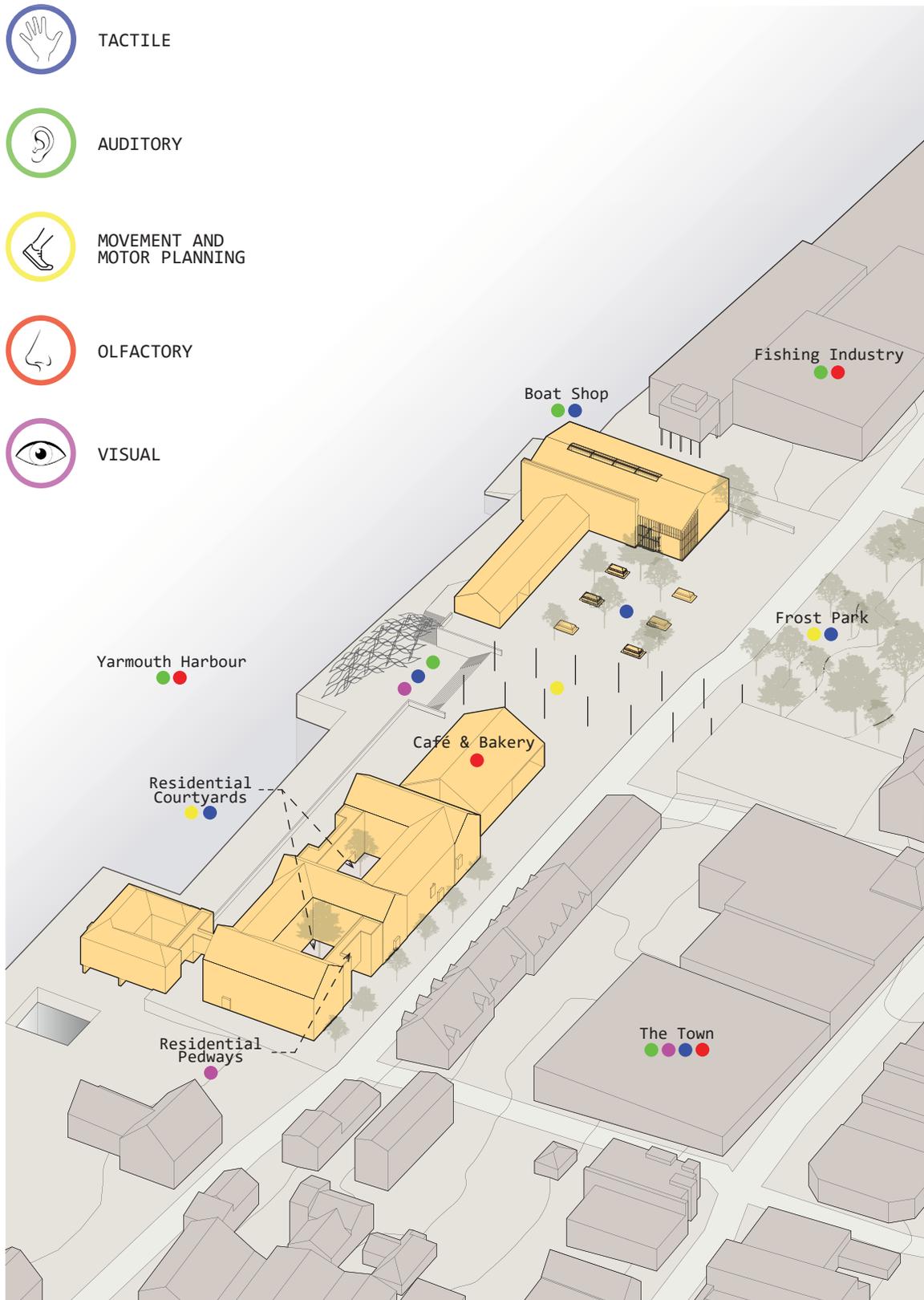


This abstract diagram was developed as part of an early site exploration and program adjancies exercise. The coloured lines represent different individuals that may visit or inhabit the site and the way in which the lines encircle the programmatic elements relates loosely to enclosure.



Site Plan

1. Boat Shed; 2. Boat Shed Entry Courtyard; 3. Frost Park; 4. Lost to the Sea Memorial  
 5. Event Space; 6. Bakery/Café; 7. Residential Building; 8. Pier 1 Complex



Site Axonometric

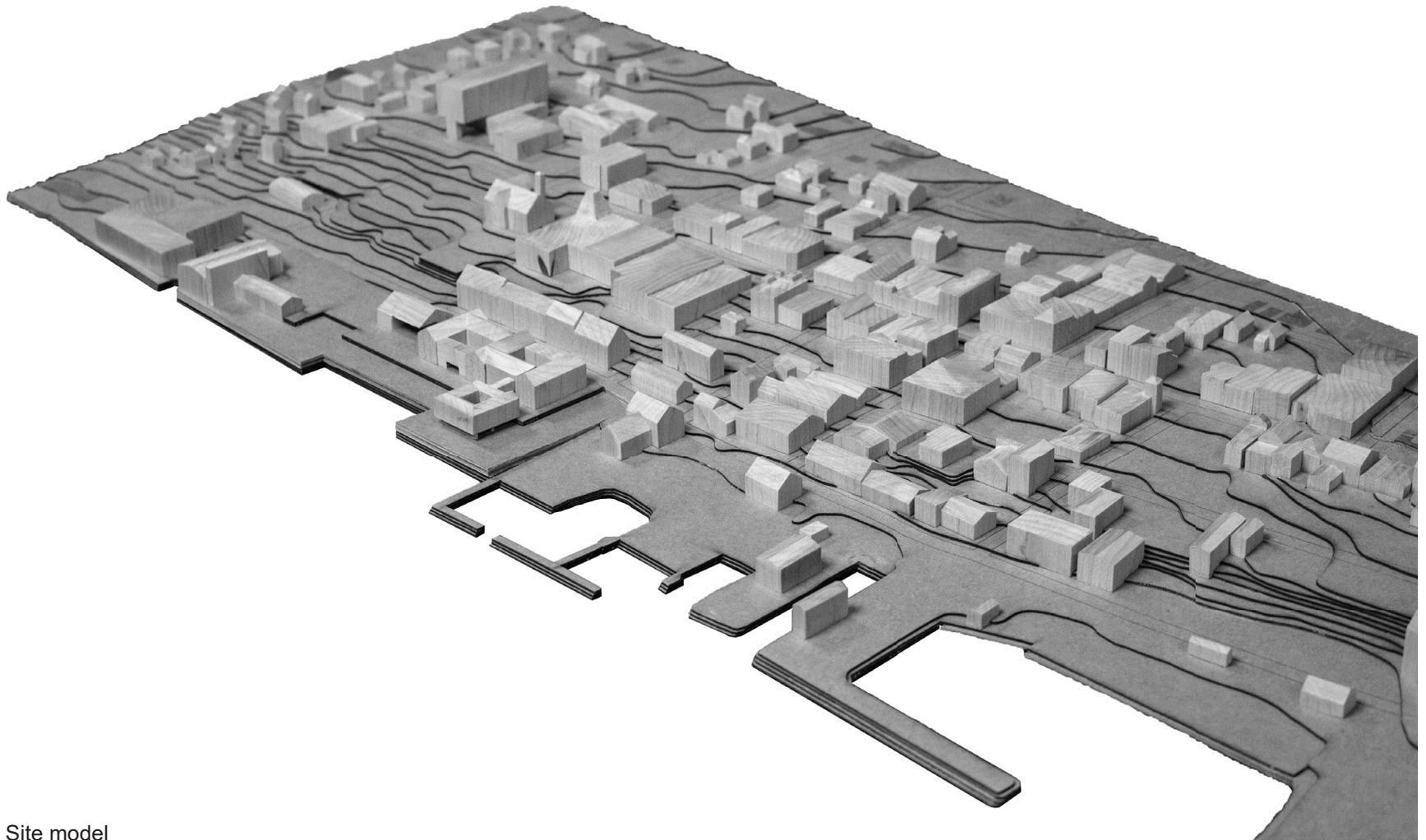
This drawing highlights potential sensory opportunities both current, and within the proposed design



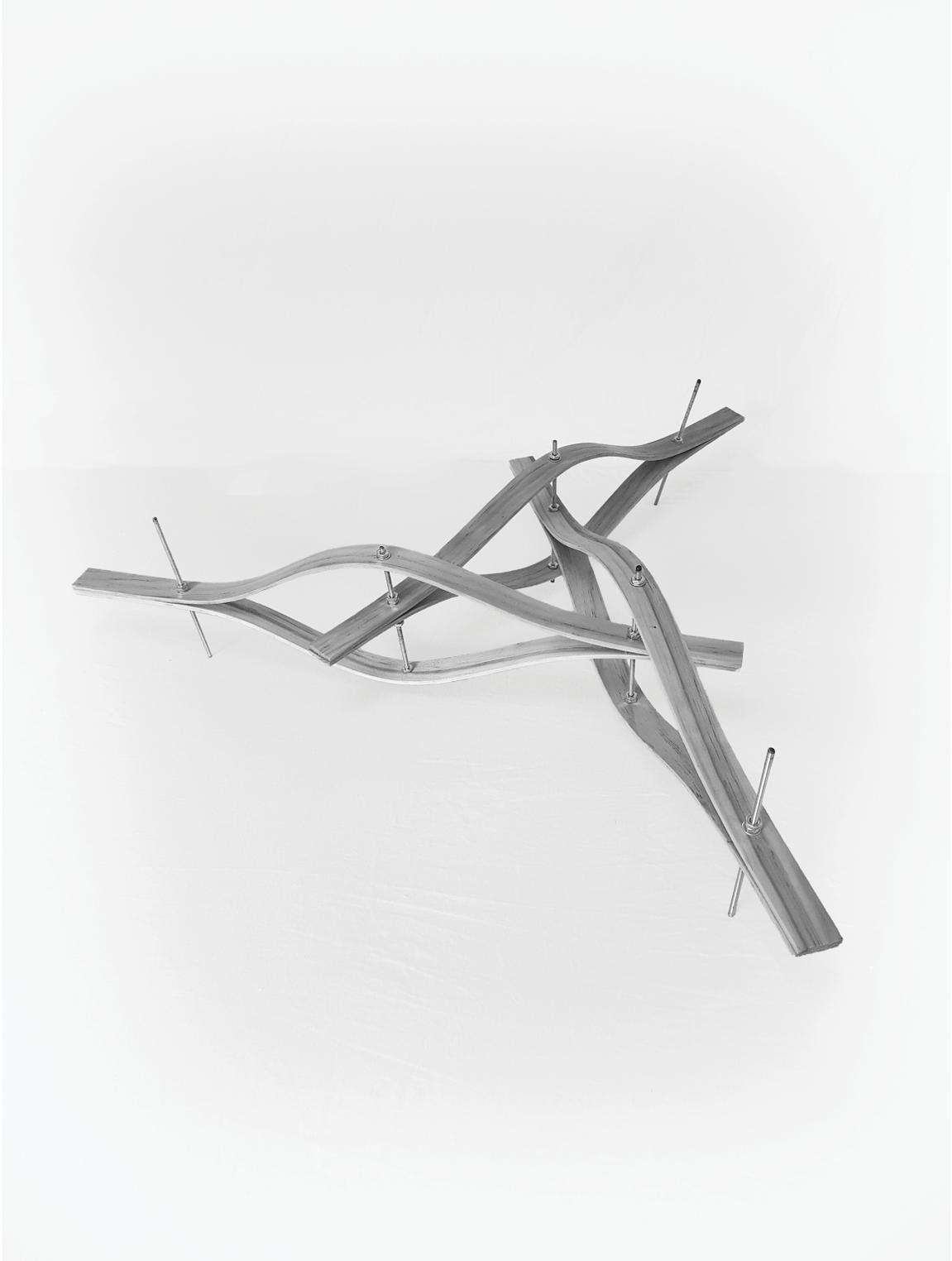
Complete site image



Site model



Site model

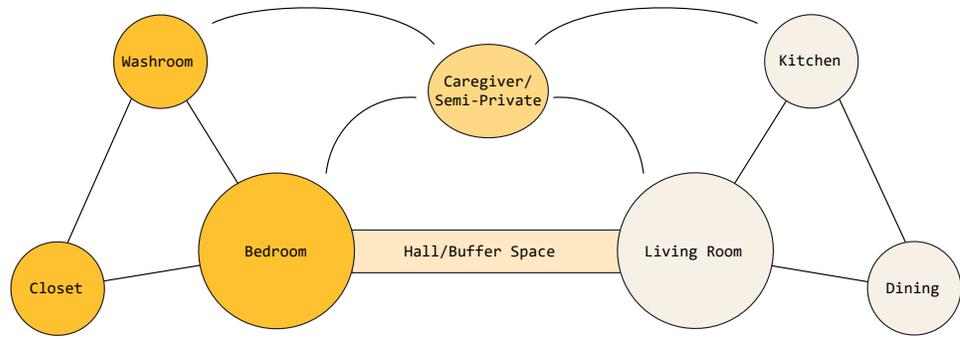


Scale model of a section of the steam bent wooden structure. Steam bending is a tactic used frequently in wood boat building as it enables wooden members to be formed around a ship's hull. Metal rods fasten the steam bent pieces together while simultaneously providing anchor points for possible textile cladding and connection to the ground.

## **Live — Residential Units**

The notion that the autism spectrum varies significantly from one individual to the next suggests that there must be a variety of unit types to suit a diverse range of needs. Based on my research and through speaking with experts in the field such as Kevin Walker of YACRO and Murray Kirkpatrick of QASL, three unit sizes have been developed: a single bedroom unit, a three-bedroom unit, and a six-bedroom unit. Each unit has been developed utilizing the design principles previously outlined and allow for variation in the number of housemates or family members with which they will be living. The differing unit sizes are also beneficial when considering the care needed by some individuals with autism; the larger six-bedroom unit for example is appropriate for those who require twenty-four-hour care as it focuses resources providing higher quality services at lower costs. The availability of smaller units can be used by those who require supervision on occasion and allows for the potential of personal growth. Individuals who develop greater independence could graduate from an intensive care environment, to a unit where occasional supervision is required, furthering the sense of independence.

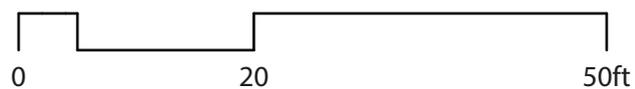
The architecture draws upon local vernacular in its design, using recognizable features, light wood frame structure and clad in cedar shingles or board and batten siding. It utilizes courtyards to strengthen the principle of preview and retreat while allowing individuals to gradually transition from the privacy and security of their residential unit, to the business of the street or boardwalk. Their unit is familiar to them and may be shared by a few people, the shared hallway might include a few strangers, the residential courtyard a small group of strangers, and finally the street which could hold a crowd of strangers. The courtyard spaces could be used as an area of relaxation, gardening, movement and exercise, and social interactions. The proposed design has courtyards opening onto differing threshold conditions, offering further diversity to the residences within.



This diagram identifies programmatic adjacencies and sensory zoning within the three units that have been developed. It follows closely that of those highlighted within the case studies previously discussed.



Six-Bedroom Unit (up to 24-hours of supervision required)



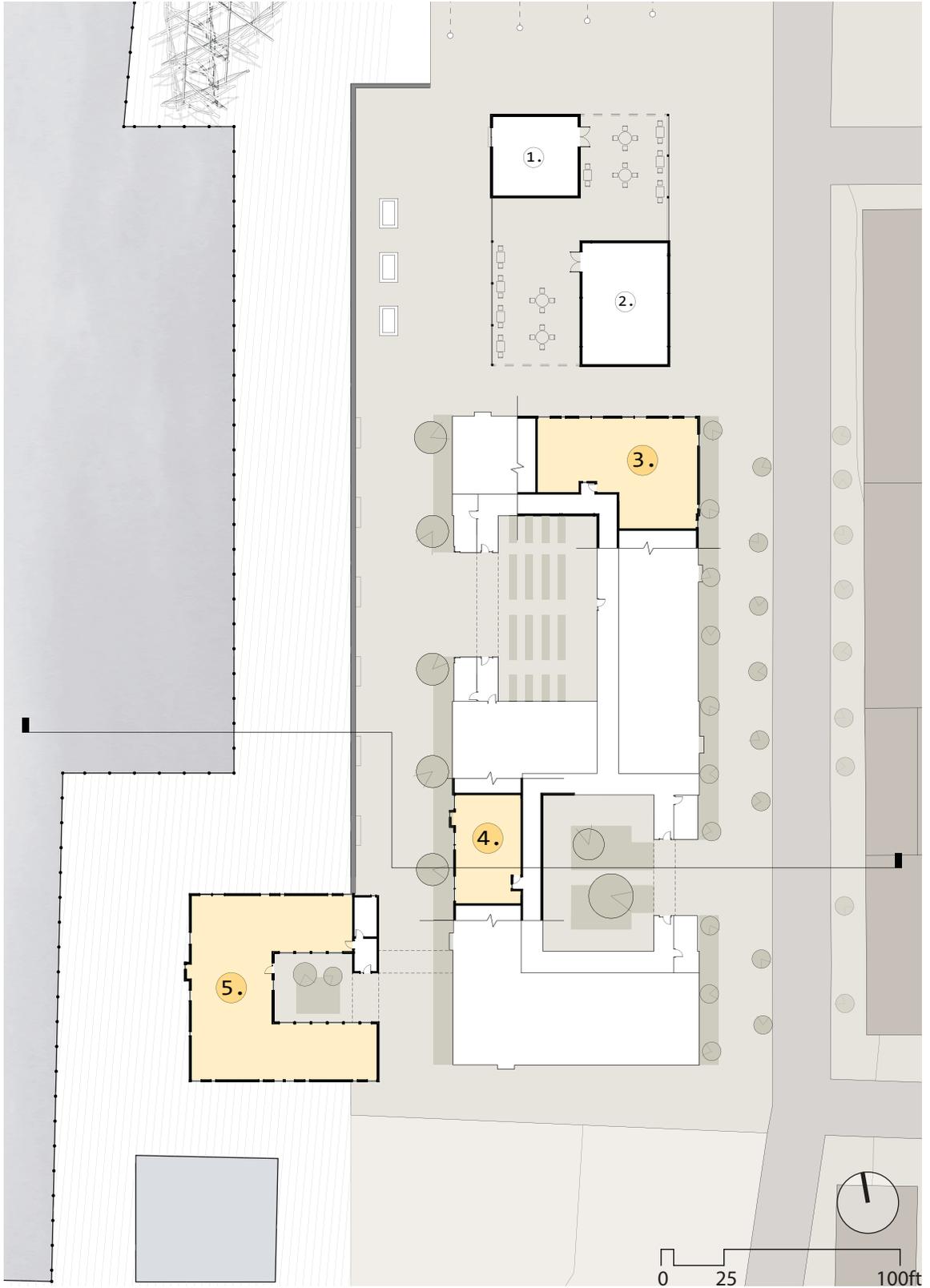


Three-Bedroom Unit (occasional/daily supervision required)



One-Bedroom Unit (little to no supervision required)





Typical Residential Floor Plan (with the three designed unit types)

1. Café; 2. Bakery; 3. Three-Bedroom Unit; 4. One-Bedroom Unit; 5. Six-Bedroom Unit



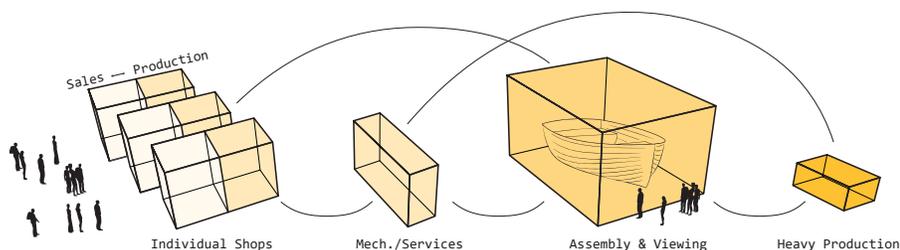
Residential Cross Section

0 10 25ft

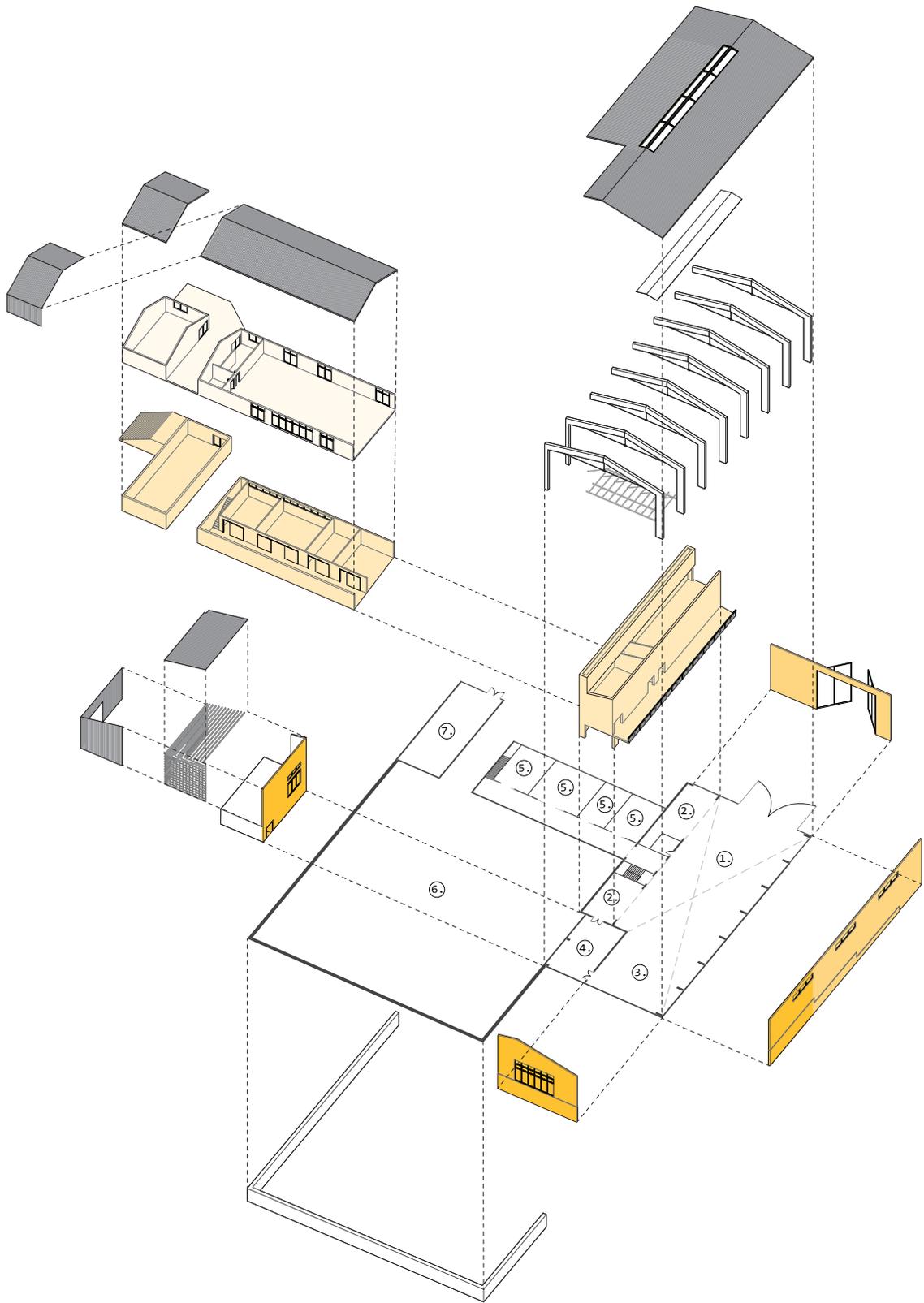
## Work — The Boat Shed

The art of boat building, whether it be as large as a sailboat, or small as a canoe, requires immense patience and craftsmanship to produce. For this reason, the proposition that a boat building workshop would serve as an appropriate program for individuals with autism was a subject of heavy debate throughout this thesis. The conclusion of this debate however is that individuals with autism often develop incredible skills in a very particular subject that interests them and prefer repetitive tasks and routines which are familiar to them. Within a boat building program, there are a myriad of tasks associated to the completion of a boat from carpentry, painting, sanding, sign making, sail fabrication, metal work so on and so forth allowing for individuals to find a niche with which they are comfortable, and can excel. These individual tasks can also operate as standalone businesses, offering services to the greater community, while also contributing to the construction of a boat. The idea that an individual can master a task while contributing to an impressive accomplishment of boat building would be immensely gratifying.

The boat shed is divided into five main components: the large assembly and viewing hall, the intense production area where most of the large fabrication is done, the small scale shops which would house the tasks such as the sign shop and sail fabrication, the retail space, and the core which provides office space, a staff lounge, washrooms and mechanical rooms. Lastly, the site for the proposed design is currently being used as a storage yard for a few local fishermen. As the fishing industry is of incredible importance to the town and is often a point of interest for tourism, space for the fishermen has been allocated along a portion of the board walk in order to dock their boats while storage is provided below the boat shed entry courtyard.

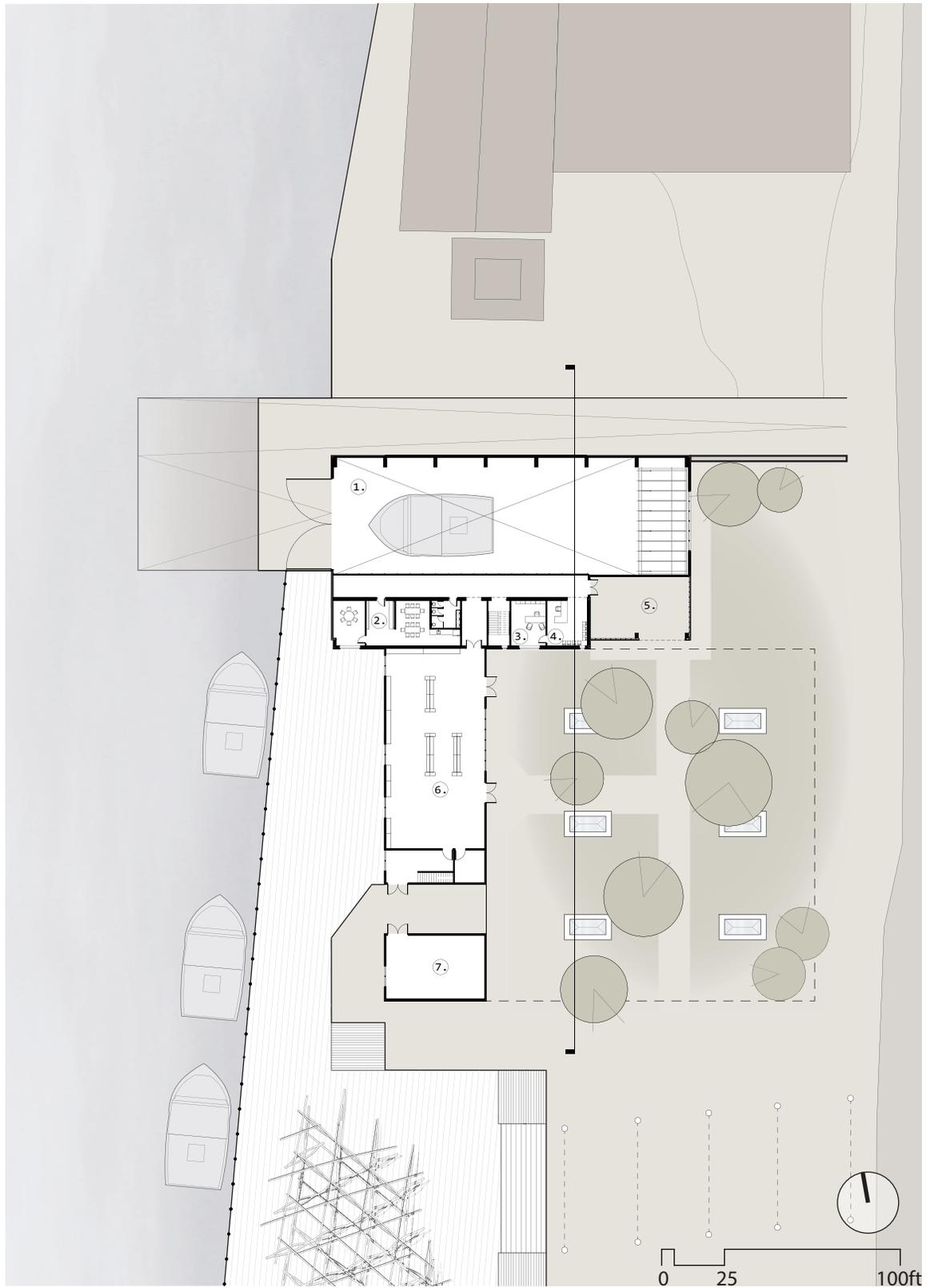


Boat Shed Program Diagram



Boat Shed Axonometric and Lower Floor Plan

1. Boat Assembly Area; 2. Small Bench Tools; 3. Large Power Tools; 4. Tool and Misc. Storage; 5. Light Manufacturing; 6. Lobster Pot Storage; 7. Fishery Storage



Boat Shed Upper Floor Plan

1. Boat Assembly Area; 2. Staff Area; 3. Office; 4. Reception; 5. Entry; 6. Sales Area; 7. Storage

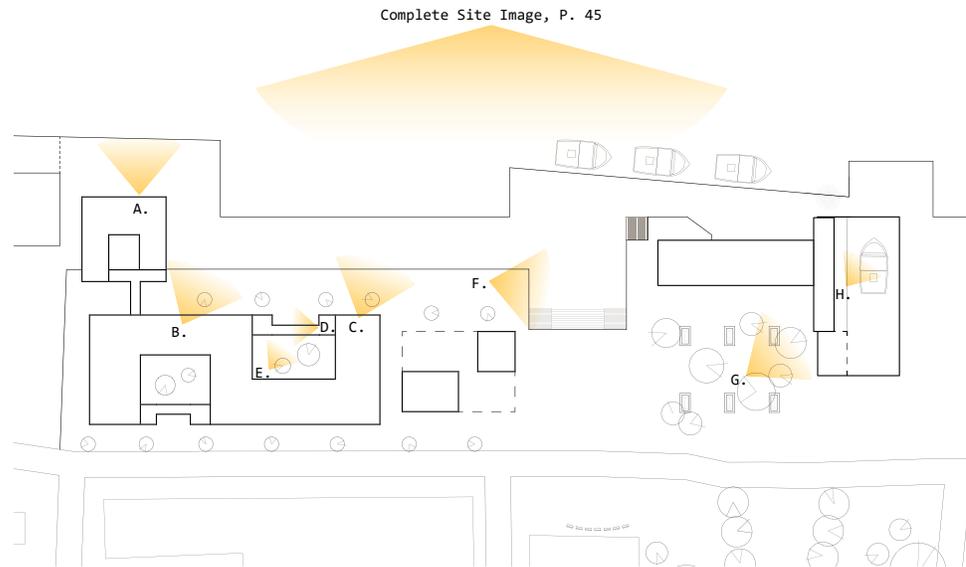


Boat Shed Long Section

0 10 25ft

## A Day in the Life

The following series of vignettes demonstrate what an individual who both lives and works on site may encounter throughout a typical day, from waking up in the morning, preparing and eating breakfast, relaxing before venturing out into the public space of the courtyards and boardwalk, and finally arriving at work. Below is a key plan as reference.



Key Plan. Letters indicate views on the following pages.





A. Bedroom Window Seat and Desk



B. Kitchen and Dining Area



C. Living Room



D. Apartment Building Pedway



E. Apartment Building Courtyard



F. Boardwalk Approaching Boat Shed



G. Boat Shed Entry Courtyard



H. Boat Shed Assembly Space

## CHAPTER 6: CONCLUSION

This thesis seeks to establish a set of design principles derived from the specificities surrounding the autism spectrum disorder in attempts to establish an inspiring architectural response allowing individuals on the spectrum to gain a level of independence otherwise unachievable.

The complexities of the suggested site and program of boat building pose questions of viability but offer a unique opportunity in testing the architectural response. Boardwalks are viewed to be highly social spaces which at first glance seems to oppose the design requirements for those on the autism spectrum, however, there is a deeper study of anthropology to be examined. Situating the project along the Yarmouth waterfront allows for positive public social interactions to manifest themselves, raising awareness of disability services and the importance of inclusion. It is worth mentioning however that the architectural implications surrounding a key aspect of the site must be investigated further. The challenge of the mixed program along with the vast amount of stimulus offered along a site such as the one suggested requires the careful design of a sensory-appropriate route from "live" to "work". Landscaping features such as trees and plants are useful elements in adding serenity to a space and can also be manipulated as a means of separation from one space to the next. Elevational change, materiality, colonnades, light fixtures and seating are all examples of elements which can be used to help designate specific routes while providing areas of prospect and retreat.

It was suggested that the design could have been taken a step further in developing a fourth unit type, such as a series of townhouses which could be rented as part of a 'for-profit' to aid in funding the remainder of the project. This would aid in furthering the diversity of the people living within the space, offer more flexibility and independence, and increase the chance of bonds being formed between those with and without disabilities.

The word 'institution' continually made an appearance in the literature and

conversations surrounding this thesis, attached to the topic of disability services. It seems that the word institution is taboo amongst those directly involved with working alongside individuals with disabilities as it places stigma and discrimination onto the demographic. It is also worth mentioning that there are cases where institutional buildings have become monuments within their respective cities, which raises the question of whether an institution can be viewed as something positive? My hypothesis on the matter given our current socio-cultural position and general ignorance toward inclusion, a project of this type should avoid the label of institution, remain modest in size and follow local vernacular. What should not be lost in this conversation is the importance of the outlined design principles which can be applied to any project scale or type.

Developing design principles for this project has proven to be difficult as experts in the field of disability services as well as architects who have attempted design for autism have varying perceptions on what are the appropriate measures and design considerations. Some advocate to maximize natural sunlight, while others suggest avoiding large areas of fenestration due to the possibility of over-stimulation, or, one might consider large spaces suitable to avoid the sense of overcrowding, while the next believes that smaller, more intimate spaces are preferred. These dichotomies pose an interesting challenge while determining the success or failure of a project is near impossible to predict until its completion and inhabitation. What is apparent however, is that architecture is a tool capable of aiding individuals with autism as it shapes the sensory environment with which we interact.

## APPENDIX A: DEFINITIONS OF DISABILITY TYPES

### Physical Disability

A physical disability is one that affects an individual's mobility or dexterity and often requires the need of equipment for assistance with mobility. Physical disabilities include but are not limited to, the loss of limbs, paraplegia, quadriplegia, multiple sclerosis, polio, and cerebral palsy.<sup>58</sup>

### Visual Impairment

A visual impairment effects a person's sight and can be caused by factors such as disease, accidents, and congenial illnesses. Five percent of the population with visual impairments do not have to ability to identify any amount of light, shadows, shapes etc.<sup>59</sup>

### Hearing Impairment

Hearing impairments effect a person's ability to perceive sound and can be caused by factors such as physical damage, disease, or exposure to very loud or prolonged noises. There are differences in the needs of those who are considered deaf and those who have a hearing impairment.<sup>60</sup>

### Cognitive Disability

Cognitive, or cognition, is defined as "The mental action or process of acquiring knowledge and understanding through thought, experience, and the senses."<sup>61</sup> Cognitive disabilities can affect memory, problem-solving, attention, reading, and linguistics thus influencing the way in which an

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58 National Educational Association of Disabled Students, "Making Extra-Curricular Activities Inclusive," 2019, [https://www.neads.ca/en/about/projects/inclusion/guide/pwd\\_01.php](https://www.neads.ca/en/about/projects/inclusion/guide/pwd_01.php).

59 Ibid.

60 Ibid.

61 *Oxford Dictionary Online*, s.v. "Cognition," accessed 14 July 2019, <https://www.lexico.com/en/definition/cognition>.

individual learns and the way they manage one or more mental tasks.<sup>62</sup> Some examples of cognitive disabilities are: Autism, Down Syndrome, dementia, attention deficit disorder, and dyslexia.

## **Intellectual Disability**

Intellectual disabilities, once called mental retardation, involves problems with general mental abilities and affects an individual's ability to learn, make decisions, solve problems, communicate, interact with others and take care of oneself.<sup>63</sup> Individuals with an intellectual disability suffer from significantly below average IQ, this differs from an individual with a cognitive disabilities as they could be incredibly intelligent even though they have difficulties learning. Examples of intellectual disabilities are: Autism, Down Syndrome, featl alcohol spectrum disorder, and fragile X syndrome.

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62 *WebAIM*, "Cognitive," Last modified 26 November 2018, <https://webaim.org/articles/cognitive/>.

63 American Psychiatric Association, "What is Intellectual Disability?" July 2017, <https://www.psychiatry.org/patients-families/intellectual-disability/what-is-intellectual-disability>.

## **APPENDIX B: WOLF WOLFENSBERGER'S PRINCIPLE OF NORMALIZATION**

### **Personal Level**

#### ***The Interaction Dimension***

Here Wolfensberger uses the example of teaching a child to walk, or reteaching someone with a disability to walk, with “a normal gait, using normal movements and normal expressive behavior patterns...”, rather than simply teaching them how to walk and potentially developing a preventable idiosyncratic gait.<sup>64</sup> In other words, he makes the point that a conscious effort must not only be made to teach an individual a valuable skill, but also how to appropriately apply that skill on a day to day basis or in a variety of situations, gaining independency.

As an architectural response to this, Wolfensberger alludes to the fact that buildings can be designed in such a way to help shape both the skills and habits of its users; space can promote adaptive decision-making which can increase a sense of independency, but space can also cause dependency for some if not designed properly.<sup>65</sup> Another point he discusses is that space ought to be designed to encourage small group gatherings rather than large, wide open spaces which lend to large gatherings.

#### ***The Interpretation Dimension***

Here Wolfensberger discusses ways in which people with disabilities can ‘fit into society’ without being blatantly visually different, and therefore, stigmatized. He lists simple things such as culturally appropriate haircuts and clothing ought to be chosen for those who are unable to make these mundane decisions on their own.<sup>66</sup> Allowing people to feel comfortable and confident in their personal hygiene and esthetic is ultimately the goal here as it leads to a multitude of health and mental health benefits as well as the

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<sup>64</sup> Wolfensberger, *The Principle of Normalization in Human Services*, 32-33.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid., 33-34.

confidence to socialize in public group settings.

## **Immediate and Intermediate Social Systems Level**

### ***The Interaction Dimension***

At the immediate and intermediate social systems level, the interaction dimension is focused on educating groups such as parents and teachers, for example, to better work alongside people with disabilities as they are incredibly important and influential in their development.<sup>67</sup> Wolfensberger is adamant that those with disabilities must be given then opportunity to work and learn alongside the able-bodied as the act of intermixing and socializing minimizes the chances of being stigmatized. These words are echoed in a periodical from *The Nursing Clinics of North America*, where the authors suggest that community-based activities where people with disabilities are encouraged to participate will result in the empowerment of others suffering from disabilities.<sup>68</sup>

This is equally as important in the integration of housing and supporting facilities for people with disabilities; these buildings ought to be designed and located as to be physically integrated into the community, maximizing the opportunities for social interactions.<sup>69</sup> When speaking with Executive Director of YACRO, Kevin Walker, he reiterated the importance of housing options which are spread throughout the town as it promoted healthy social habits and interactions amongst the townspeople with and without disabilities.<sup>70</sup>

### ***The Interpretation Dimension***

Physically integrating buildings within the community is clearly important

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67 Ibid, 34-38.

68 Beth A. Marks and Tamar Heller, "Bridging the equity gap: health promotion for adults with intellectual and development disabilities," *The Nursing Clinics of North America* 38 (2003): 205-228.

69 Bayes and Francklin, *Designing for the handicapped*, 5.

70 Kevin Walker, Executive Director of Yarmouth Association for Community Residential Options, Communication on August 30th, 2018.

within the normalization principle, but the naming and branding of a building or service is equally as important and is the crux of the interpretation dimension.<sup>71</sup> The architecture serving predominantly people with disabilities should not be evident as such, in any capacity. Whether it be a name given to a facility, the composition of façade elements and outward expression to the public, or specificities of interior detailing, all aspects must be done in a respectful, thoughtful manner as to avoid stigmatization. Vernacular architecture and critical regionalism are possibilities in which this thesis can successfully integrate the proposed intervention into its surrounding context.

## **Societal Social Systems Level**

### ***The Interaction Dimension***

At the societal social systems level, here we see the principle of normalization effect things such as: government policies and laws, funding and social worker training procedures. The idea is that by appropriately adjusting a system's core principals, such as a school system for example, the principle can then reach a larger population sample without over exerting valuable resources in adapting thousands of individual classrooms within that same school system.<sup>72</sup>

### ***The Interpretation Dimension***

The final point made by Wolfensberger is arguably his most important with regards to the perception of people with disabilities to society – the need to redefine that perception. Simply put, mainstream society must become more accepting toward each other's differences and learn to work together peacefully rather than stigmatizing and discriminating against individuals or groups of individuals.<sup>73</sup> It should be noted that the text by the author was written in 1972, and 45 years later, society has thankfully become

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71 Wolfensberger, *The Principle of Normalization in Human Services*, 38-40.

72 Ibid., 40.

73 Ibid., 40-41.

much more accepting in its mindset toward inclusion, but there is still some ignorance surrounding this topic.

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