

# **CommunityCare:** An Outpatient Autoimmune Clinic

Fostering a Network of Patients and Caregivers through Medical,  
Educational, and Social Interaction

Alex Bautz

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Bob Mugerauer

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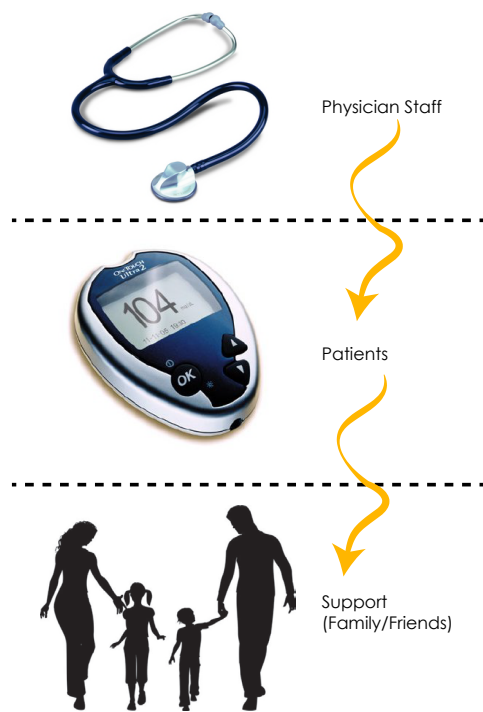
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To create a greater healing environment for autoimmune disease, rather than having specialized treatment centers, those affected by these linked conditions should be centralized in a space that integrates medical, educational, and social interaction to feed into a collective knowledge for the community.

# Chapter 1: Introduction

## **Problem Statement**

Healthcare has always been and will always be an integral part of the infrastructure of both the built environment and the psychological environment. The spaces that house medicine and healing are often also houses for sources of acute and chronic stress through the five main stressors: fear of pain, loss of control, loss of privacy, social isolation, and guilt. The implications of these stressors directly affect the patients inhabiting the space, the family/friends supporting the patients, and the healthcare professionals that work to aid the patients. The built condition of the space can greatly affect the amount of stress on inhabitants, whether directly through poor design strategies, or indirectly through preventing these 3 inhabitant group from coming together and aiding each other through tense situations. Whether its anxiety from a diagnosis or treatment, depression about a long-term ramification, or frustration from having too many patients, the stress of these situations can disrupt lifestyles if they are not mitigated. A true healing environment should treat the psychological strains as well as physical ailments.



**Figure 1: Typical Clinical Hierarchy**

Typically, the hierarchy of healthcare starts at the physician staff who provide the care and information to the patients, who then involve their support system.

Any new epidemic that sweeps through the world contributes substantially to the collective stress of the medical community and the general public. One such epidemic that is quickly outgrowing any comparison is autoimmune disease; a condition in which the body's own immune system attacks healthy, native cells and tissue rather than an invading virus. Some types of autoimmune diseases have grown to as much as five times the affected population that existed only 40 years ago. This rapid spread of the diseases has physicians and patients alike confused and concerned. Despite the bloated number of autoimmune cases, there are still few answers as to a cause for the illness, and no cure, only lifelong treatment. The mystery that surrounds these diseases has created a number of theories for explanation and treatment of autoimmune conditions like multiple sclerosis, lupus, and type 1 diabetes. The theories range from medically founded causes like an idle immune system response and Vitamin D deficiency to radical treatments for the prevention of the disease, such as infusing tapeworm eggs into one's body in order to trigger an immune response counter to that of autoimmune illness.

Once diagnosed with an autoimmune illness, individuals often feel isolated and struggle to maintain social connections that existed prior to the condition. There are support groups to help these instances, but often they can be difficult to find or meet with any regularity. The stress that patients are subjected to is amplified when they are partitioned from people that could provide assistance.

## Hypothesis

The purpose of this thesis is to explore the proposition that, while the medical treatment of chronic illness patients is paramount for a clinical setting, the social healing and stress mediation for patients, family, and clinic staff is equally critical in a successful healing environment. A successful project, therefore, would foster connections between these parties and alleviate the prominent stressors of chronic illness in collaboration with a treatment facility.

The primary function of the project is an outpatient health clinic. The clinic incorporates patients with autoimmune conditions of: Type I Diabetes, Lupus, Multiple Sclerosis, Psoriasis, Rheumatoid Arthritis, and Celiac Disease. Because of the interwoven nature of these diseases, the treatment of these patients brings together a team of physicians with specialties in Endocrinology, Rheumatology, Neurology, and Nephrology, as well as a care team of nurses, physician assistants, and lab technicians. The clinic would also house a series of transient professional consultants for the patients, such as nutritionists and physical therapists. These treatment facilities also serve as a catalyst in order to bring together a rich collection of patients.

In order to provide opportunities for patients to socialize, the clinic will also house educational “flex” space. The educational spaces are managed by the clinic staff, and can be used as a clinical resource, but patients or neighborhood visitors are able to sign out the space for anything from a support group to a backpacking seminar. These spaces attempt to break down the barriers of healthcare, and provide a layer of transparency into the clinic or out to the neighborhood. This aspect of the clinic “de-institutionalizes” it, and



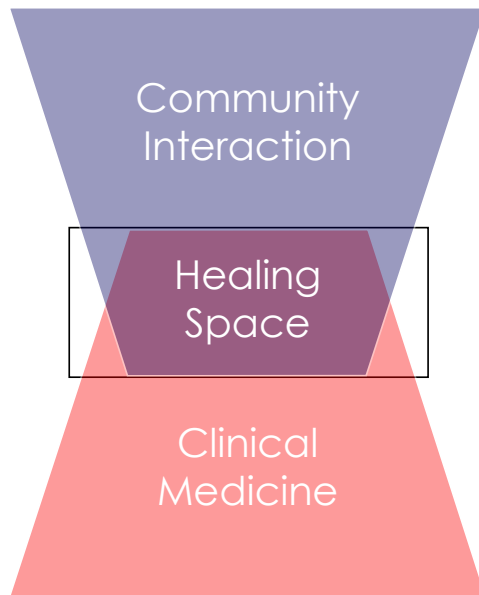
**Figure 2: CommunityCare Hierarchy**

With autoimmune disease, everyone involved with the illness has unique knowledge and experience that can be valuable, so there is no true hierarchy within the healthcare environment. Physicians could learn from patients, who might learn about a treatment from a family member with prior experience.

integrates healthcare into the culture of the area, rather than fragmenting the culture.

The combination of a collaborative treatment team, opportunities for social interaction, and a well-designed space to incorporate the natural environment with pleasant spaces in the built environment should create an atmosphere that helps alleviate the stresses that seem inherent to healthcare settings in the patients and staff alike. The intervention could become a space where patients frequent even without an appointment with a physician. The intervention could even become an important part of the urban fabric, lending to activity on the street not only during typical office hours, but also into the night around the week due to the educational space.

Other factors that would be integral to the success of the intervention as a part of the community include the connectivity to natural daylight and ventilation, the site itself, urban infrastructure, and the surrounding context. All of these factors must work together in a Gestaltian style with the physical design in order to create a holistic healing atmosphere.



**Figure 3: Conceptual Approach**

The healing environment will provide two faces- one focus on clinical medicine, and one focus on community interaction. Both of these goals work to make the space successful

# Chapter 2: Theoretical Framework

## **Background of Autoimmune Disease**

A chronic illness is a health condition or disease that is persistent or otherwise long lasting in its effects. According to the World Health Organization, chronic illnesses account for over 60 percent of all deaths each year, presenting the largest challenge to healthcare of any illness type.<sup>1</sup> There are plenty of chronic diseases prevalent in modern healthcare. Diseases like cancer and coronary heart disease are well known, and have countless outlets for public awareness, social support groups, and treatment facilities. These diseases are firmly established and feared by the general public, and rightfully so, probably because they have touched most everyone in a very personal way. Most people can identify these diseases with some loved one that battled through the condition. After all, approximately 12.7 million people worldwide are currently dealing with cancer<sup>2</sup>, and another 22 million people in the United States are living with coronary artery disease.<sup>3</sup> Those are staggering numbers that present a very real danger to global health, but there is another number that belongs in the discussion, 23.5 million. According to the recent studies,

there are approximately 23.5 million Americans suffering from autoimmune diseases currently. <sup>4</sup> In just the United States, that is just under twice the population of people fighting cancer. While it is comparable to coronary disease now, these numbers continue to escalate, especially in the five major conditions of autoimmune (Lupus, Multiple Sclerosis, Type I Diabetes, Scleroderma, and Rheumatoid Arthritis), and may soon be in a class of its own.

According to the Mayo Clinic, the cases of lupus in the US have tripled in the last 40 years. The statistics for MS are similar in Scandinavia, where the cases have tripled in the last 50 years. The most alarming of these statistics, however, is that of Type 1 Diabetes, where the global amount of diagnoses has, over the last 40 years, increased five-fold. <sup>5</sup> This does not include Type 2 cases, which is not an autoimmune illness and very different from Type 1 Diabetes.

Despite the growing statistics, 9 out of 10 people in the United States cannot name a single autoimmune disease. From this, it is evident how necessary it is for public education on autoimmune conditions. Since there are so many types of autoimmune, and the effects on the individual vary so dramatically, it is important to start with a universal definition. <sup>6</sup>

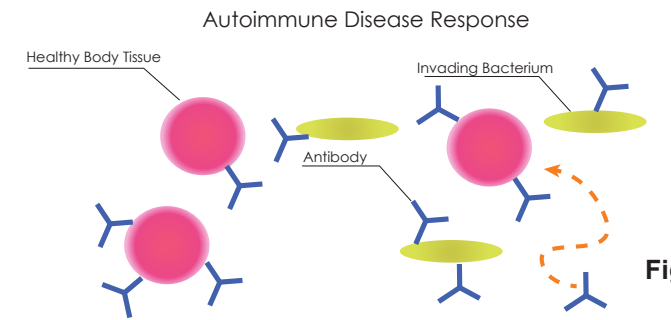
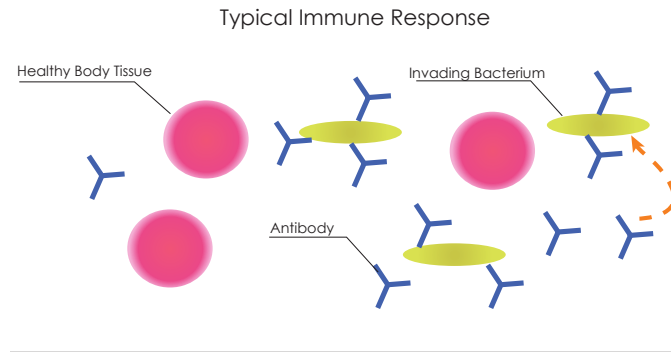
According to the Center for Disease Control, an autoimmune condition is a condition where “antibodies or T cells attack molecules, cells, or tissues of the organism producing them” <sup>7</sup>. This means that a person's immune system attacks healthy cells rather than an invading virus/bacterium. The immune response can happen anywhere in the body, and can affect organs, tissues, cells, ligaments, or even bones. The affected location of the condition determines the classification of the autoimmune illness. Scaring on the spinal cord due to deterioration of the myelin sheathing is multiple sclerosis. Inflammation of

the joints that presents symmetrically on both sides of the body is rheumatoid arthritis.<sup>8</sup> This attack can also be either a one time, permanent attack (in Type 1, the beta cells of the pancreas are destroyed and cannot be regenerated) or a remitting and relapsing series of attacks (like Multiple Sclerosis).

There is no established cause for the onset of autoimmune conditions. The most consistent theory incorporates several factors. The basis of the illnesses is a genetic mutation that can lie dormant, inactive, for an indeterminate period of time. This explains why even the diseases that have specified age groups can still present at variable ages. In the case of Type 1 Diabetes (formerly known as Juvenile Diabetes), most of the cases are diagnosed before age 12, but there are large portions of the population diagnosed between ages 16-25, and even well into age 40.<sup>9</sup> The widest held theory for the triggers for the immune response is a combination of viral and environmental factors.<sup>10</sup>

According to the viral explanation, a virus introduced into a person's body can confuse the immune system. Because of the genetic mutation in the person, the immune system struggles to differentiate between the invading virus and a specific healthy, native tissue. Even after the immune response has destroyed the invading virus, T cells continue to attack the native tissue. This explains why patients often present with an illness, like the influenza virus, a few months before presenting with symptoms of autoimmune conditions.<sup>11</sup>

The other main potential catalyst for the onset of autoimmune disease is the environment. The climatic conditions that are believed to trigger the conditions are typically colder temperatures and a lack of sunlight. These factors help to explain the boom of T1D and MS diagnoses in the Pacific Northwest United States and in Scandinavia.<sup>12</sup>



**Figure 4: Immune Response Diagram**

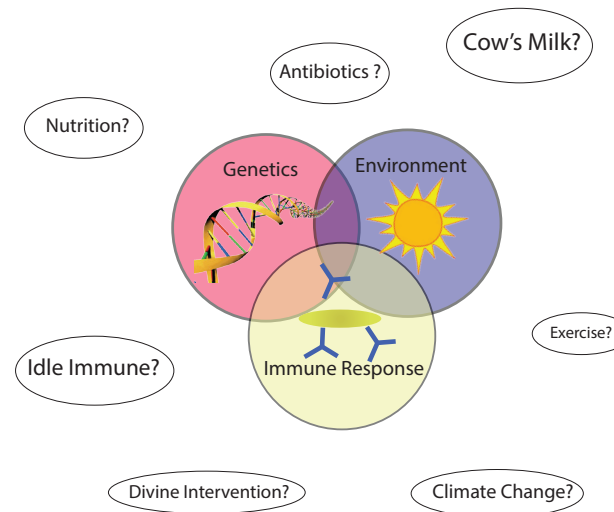
The healthy immune system attacks invading bacteria and viruses.

With Autoimmune disease, the T cells instead target healthy, native tissue.

**Figure 4**

**Figure 5: Autoimmune Catalyst Theories**

There are countless theories on the possible catalysts for Autoimmune disease, ranging in practicality. The most widely regarded answer is threefold: genetics, environmental conditions, and a heightened immune response. These are still not confirmed though



**Figure 5**

Map 2.5. New cases of type 1 diabetes (0-14 years per 100,000 children per year), 2011

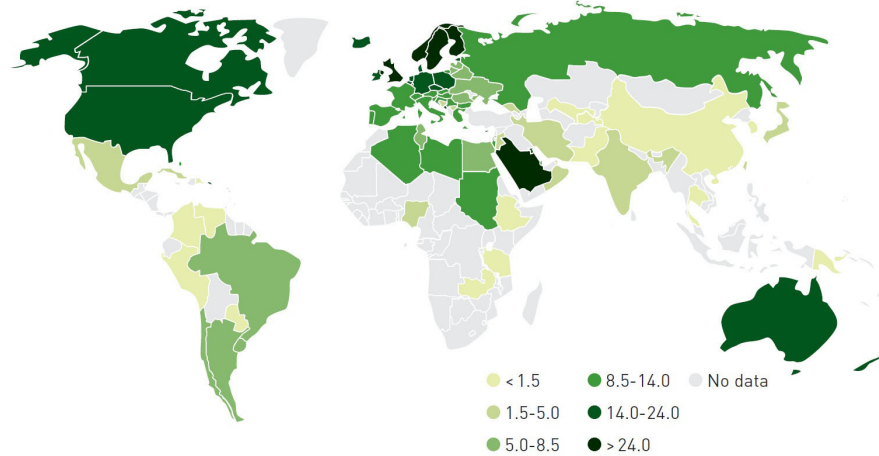


Figure 6

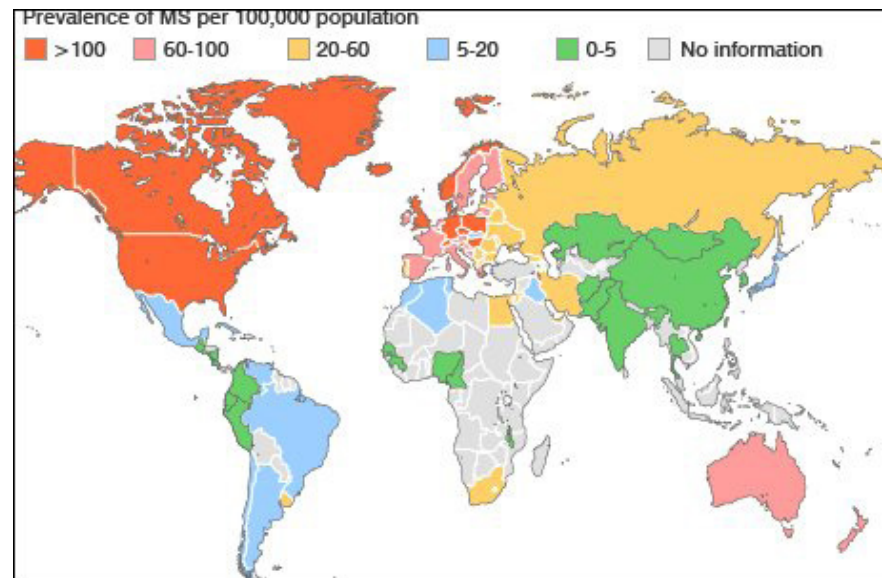


Figure 7

**Figure 6: Type 1 Diagnosis Map**

*Image Courtesy of IDF*

The map shows new diagnoses of Type 1 in children 0-14 in 2011. The map illustrates the prominence of the disease in northern climates, which promotes theories of environmental condition as a catalyst.

**Figure 7: Multiple Sclerosis Diagnosis Map**

*Image Courtesy of MSRC*

The map shows the prominence of MS diagnoses across the world. Like figure 6, the map illustrates the prevalence of the disease in northern climates.

In addition to the mystery around the exact cause for the onset of autoimmune conditions, it is often very hard to tell when the onset occurred. The initial symptoms are often broad and intermittent, fatigue and thirst are not the warning signs that bleeding or losses of sensation are. This is compounded by the fact that many specialist physicians are not aware of the relationships between autoimmune diseases, let alone general practitioners. On average, 45 percent of autoimmune patients are diagnosed as hypochondriacs because of their symptoms prior to the true diagnosis of their condition. The symptoms are often invisible to everyone other than the person affected, including medical staff and family members, so the time prior to diagnosis can be as alienating as the time afterward.<sup>13</sup>

Since the origin of autoimmune diseases is genetic, the diseases tend to run in families. The specific rates vary for each condition, but across the board, rates increase when one family member has developed a condition. In fact, once developing a particular autoimmune condition, a person, as well as family members, have an increased risk of developing other conditions that are associated with a similar genetic sequence.<sup>14</sup> This is the case with the endocrine diseases of Type 1 Diabetes, Celiac Disease, and Hypothyroidism/Hyperthyroidism, or with Multiple Sclerosis and Lupus.

While certain diseases may seem to affect a specific part of the body, most autoimmune diseases have far reaching long-term implications. Diseases like Type 1 Diabetes and Lupus, if not properly managed, can result in kidney failure, liver failure, and heart disease, in addition to issues such as blindness and gangrene.<sup>15</sup> These complications of the diseases loom over the patients for their

entire lives, and can arise unpredictably, which causes an increased level of stress for patients.

The overlap of these diseases can be used as an advantage with treatment. Many of these diseases are currently treated with immunosuppressant drugs to slow the progression, for instance Psoriasis. Other diseases are experimenting with these treatments to see if they positively affect patients. An example of this is a clinical study currently underway that is using a Psoriasis treatment on newly diagnosed Type 1 Diabetics to see if it prolongs the honeymoon phase, the early phase of the disease where the body still produces smaller quantities of insulin. Also, for most of the conditions, symptoms can be at least mildly alleviated if not partially mediated by sunlight and physical activity.

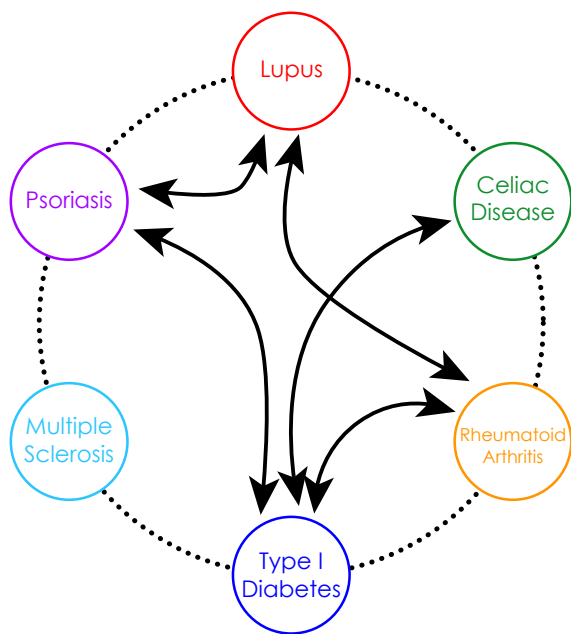


Figure 8

Locations of Autoimmune Attacks

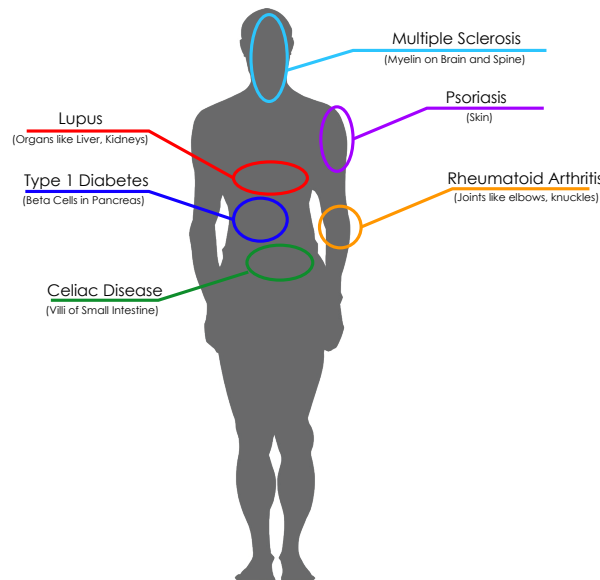


Figure 9

Figure 8: Autoimmune Linkage

The diagram shows the prominent links between certain autoimmune conditions. While many conditions have light links to others, some autoimmune conditions have very strong links, and can even seem to group together. A patient with 3+ conditions has what is known as multiple autoimmune syndrome (MAS).

Figure 9: Autoimmune by location

The figure shows some of the typical locations of autoimmune attacks. The location and style of attack determines the specific condition from the other 100+ autoimmune conditions.

Chronic Illness  
Population in US

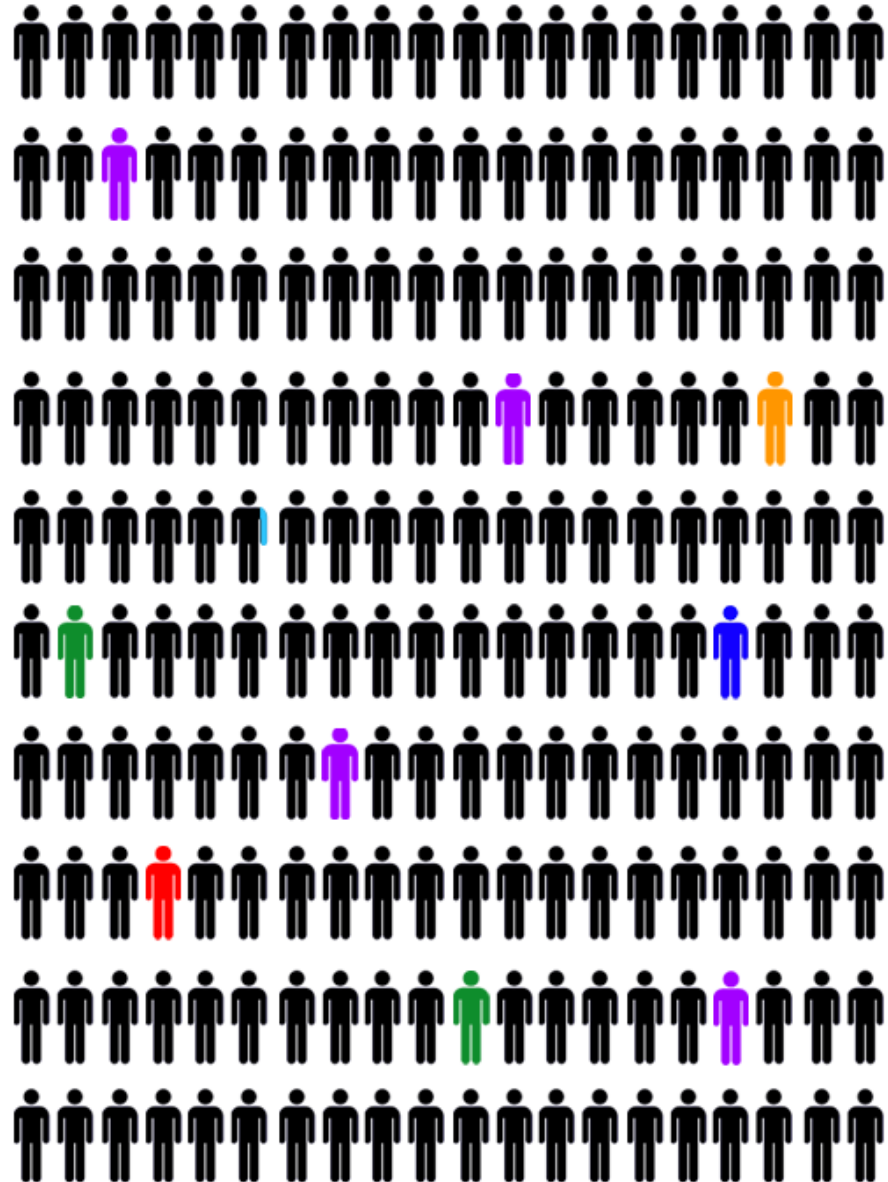
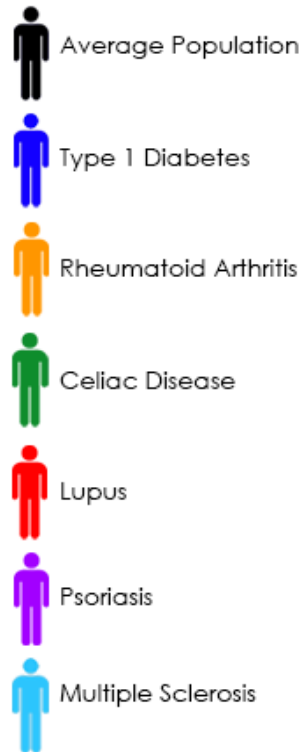


Figure 10: Autoimmune Population chart

The chart shows an average population of 200 people in the United States. It illustrates how hard it can be to find someone with experience with a given disease. The ratios illustrated are:

- Type 1 Diabetes- 1 in 200
- Rheumatoid Arthritis- 1 in 200
- Celiac Disease- 1 in 100
- Lupus- 1 in 200
- Psoriasis- 1 in 50
- Multiple Sclerosis- 1 in 1000

## History and Direction of Modern Medicine

Some aspects of design are constant, timeless, never needing to change because they fit basic human nature, such as the fundamental design of a private dwelling, with spaces for respite and rest. The needs for structures like this remain the same regardless of the era, and therefore the design remains for the most part consistent. Healthcare design, however, is not a constant, unchanging environment. The medical threats to humanity are constantly changing, so the space that treats these external forces must also be constantly changing.

From the times of Hippocrates, society viewed illness and disease as linked to linked to climatic and environmental factors. Hippocrates himself believed that urban planning, site orientation, and climate conditions like wind and sun orientation all held curative powers. This led to the birth of Roman baths, where everyone in the community could come together to cleanse themselves physically and psychologically in a social setting, regardless of class.<sup>16</sup> These strategies attempted to utilize natural conditions for treatment in a community based care system.

Times of epidemics, like the bubonic plague in the middle ages, or typhoid and tuberculosis in the mid to late nineteenth century, caused fundamental changes to the structure of healing spaces. The middle ages saw healthcare shift to monasteries that could house large quantities of patients, but still allow for natural ventilation and a close proximity to nature. Centuries later, smallpox, typhoid, and TB swept through civilization and reaffirmed the idea of large, narrow halls that could house high quantities of patients returned.<sup>17</sup>

During this time, the strategies that had been implicit through healthcare design were realized and recorded by Florence Nightingale, a nurse who understood how to best utilize natural conditions for a healing environment. The Nightingale principles fell into six categories: Natural Ventilation, Natural Daylight, Water and Sanitation, Landscape/Site Planning, Conservation of Historic Resources, and Local Building Materials/Self-Sustainability.<sup>18</sup>

Around World War II, though, hospitals became “patient towers” where the focus was on housing the equipment and as many patients as possible. These facilities, though, focused on the acute treatment of patients with the greatest efficiency, and discharging them, a “treat ‘em and street ‘em” approach according to physician slang. This made economic sense; it provided the greatest amount of turnover and patient care with the minimal space necessary.<sup>19</sup>

In recent times, the epidemic that has shifted the role of healthcare facilities is chronic illness. Chronic illness presents hospitals with a new typology of patients- a role of recurrence and familiarity. Spaces do not just need to house highly efficient technology, or have the most efficient use of space and finances with long-term and recurring patients, they need to exhibit comfort and tranquility for all the inhabitants. These spaces have to not only cure people once they are inside the space, but make people want to return if necessary. The new paradigm of design for healthcare has adopted the strategy of evidence based design in order to create a highly effective, efficient, and comfortable atmosphere for patients, family/friends, and staff workers.

## Evidence Based Design

Evidence Based Design is a strategy for design that relies heavily on quantitative and qualitative data for design decisions. The approach focuses the intensive research on practicality, efficiency, and quality of the space based on the performance and opinion of inhabitants. In healthcare, evidence based design focuses on three aspects: inhabitant-centric conditions, program efficiency, and financial efficiency.<sup>20</sup> These aspects are not mutually exclusive, and in fact affect each other in most cases. The healing environment should incorporate the "triple bottom line" of social, economic, efficient conditions in order to best situate the inhabitants.<sup>21</sup>

### *Inhabitant-Centric Conditions*

This aspect of evidence based design studies how the patients, visitors, and staff interact with the space. Inhabitants can experience physical and psychological effects from the built environment, especially in a building as stressful as a hospital. One of the modern goals of hospitals is to use evidence-based design to strengthen patient loyalty and recruit strong candidates for staff positions within the facility.<sup>22</sup>

Stress among patients, visitors, and staff will be discussed in further detail in Chapter 2.3 of this thesis.

### *Program Efficiency*

The program efficiency of a hospital can have widespread implications. The method of rebuilding facilities every 40 years to keep up with technology

that is outdated in 10 years is not a sustainable approach to design. Simple approaches, like higher ceilings and large structural bay modules, can help future adaptation to new health concerns. In addition to quickly becoming obsolete, inefficient spatial layout can cause stress among inhabitants, it can cost more money to maintain a standard of care, and it can strain safety/sustainability levels.<sup>23</sup>

The phrase “do no harm” from the Hippocratic oath should transfer from physicians to the building itself. Healthcare design has an obligation to protect the immediate health of occupants, as well as the health of the surrounding and global communities. If the environment in the community is not healthy, than the people will not be healthy.<sup>24</sup>

At the individual scale, there are several key factors to improve the inhabitants standard of care, as well as quality of experience. Some of these factors include monitoring indoor air quality, material resources, and best utilizing the natural conditions.

- Indoor air quality can greatly affect the health/productivity of occupants inside the space. Poor material choice or ventilation of space can result in conditions like sick building syndrome or chemical sensitivities. This is a crucial aspect in healthcare, where there are elevated amounts of chemicals in the environment. Healthcare workers account for approximately 40% of adult onset asthma patients due to poor work conditions.<sup>25</sup>

- The materials selected for the building also have a large effect on the

occupant condition, in addition to the effects to the environment that material extraction, fabrication, installation, and demolition can have. The materials inside a space could contribute odors or VOCs (volatile organic compounds) that degrade the air quality. <sup>26</sup>

- Finally, the building should key into the natural conditions of the site. The inherent qualities of topography and geographic location could help use daylight and natural ventilation. <sup>27</sup>

The local community can provide immeasurable assistance to hospitals through infrastructure. The factors of infrastructure for the hospital include: land use, transportation, water management, and waste management.

- Land use ordinances help to distinguish site orientation and the building's impact on the natural surroundings.

- Local transportation is a critical factor for program efficiency. The reduction of parking lot size and promoting carpooling can greatly increase the quality of the space for the occupants. Smaller lots create less storm water runoff and heat island effect. Also, with the rising cost of gas, patients are very receptive to cheaper alternatives to transportation to healthcare facilities, like public transportation and bicycle paths. <sup>28</sup>

- Water management can be a hard role for hospitals; the need for water is high. Typically water is used for irrigation, potable/sanitary, and industrial uses. The average hospital uses 80-150 gallons of water per bed

per day. Through on-site storm water and wastewater management, the burden due to potable, municipal water could be reduced.<sup>29</sup>

On the global scale, energy efficiency is the largest component. Healthcare building use accounts for approximately 4.4% of the nation's annual energy use, which is about 561 trillion BTUs.<sup>30</sup> One way to bring the energy use down is to create an integrated system for the skin, structure, and functions of the building, and allow them to operate in an optimized way. When these systems can perform multiple functions, the project cost comes down, but the performance increases.<sup>31</sup>

Program efficiency can also play a pivotal role in safety and health inside the building. The three of the largest health risks that originate inside the hospital are: hospital-born infections, medical errors, and patient falls.

- Hospital-born infections present in approximately 2 million patients in the US each year. The average cost of these infections is approximately \$4.5 billion, as well as the lives of 88,000 patients. These infections can occur with direct contact, be waterborne, or be airborne. Airborne and waterborne infections are less common than contact infections, and are relatively easily prevented through directional airflow and differential pressures in the contaminated area. Segregated ventilation systems also help to minimize the spread of airborne infections. Contact contaminants, however, are harder to combat. The contaminated surfaces could be practically anything from tabletops to keyboards to door handles. Often, the primary carriers for these infections are the

healthcare providers. Single-bed rooms and hand sanitizer dispensers at every bed help to promote hand washing and minimize the spread of contact infections.<sup>32</sup>

- Patient falls inside the hospital cause physical injuries, psychological effects, and can lengthen the stay at the hospital. Hospitals spend approximately \$20 billion each year on recovery from patient falls.<sup>33</sup> Most of these accidents happen in the patient's bedroom or bathroom, on trips from the bed. The main design issues that can cause the falls are: slippery floors, door operation issues, poor railing placement, and inaccurate furniture height. There is not much that proper hospital design can do to eliminate patient falls, but there are some options to help identify when a patient has fallen faster. One main design approach is to decentralize the nursing stations. This means that instead of one central hub for the floor nurses, there are a series of stations, where a single or a few nurses can closely observe a manageable number of patients more carefully. Another way to limit the damage from patient falls is to create single-bed rooms that have adequate space for family/visitor presence. Each of these supervision options helps to identify falls quicker.<sup>34</sup>

- Medical errors can occur in any environment, whether it is a very comfortable and pleasant work environment or a banal design with a sleep deprived intern. The physical layout of the hospital can help to alleviate some of these errors, however. The largest reason for mental and medication errors by healthcare professionals is an overtaxing work schedule. There are several strategies for avoiding the overtaxing of

hospital staff. First, decentralized nursing stations and pharmacies create a shorter distance for prescribing and obtaining medication for the patient. Also, the reduction of patient transfers within the ward/unit helps to minimize mistakes due to confusion, miscommunication, loss of information, or the change of care professionals. Finally, quality light in workspace has been proven to reduce error rates. The proper lighting range is approximately 450 to 1000 lux, below or above this can create issues with interpretation.<sup>35</sup>

### *Financial Performance*

The financial side of healthcare can be a tenuous aspect of the hospital. Often, healthcare facilities are non-profit based companies, and work in poor economic conditions in order to continue service for social goals in the community.<sup>36</sup> Evidence based design, especially when paired with graphic modeling technology, can help immensely in predicting the financial impacts of design. This can help estimate the return on investment factors, and help dissolve the theory that “green buildings cost more than brown buildings”<sup>37</sup>. The earlier that sustainable strategies are explored in a design, the cheaper the cost for design and construction. This price is also declining with the increase in market experience with new assemblies and materials. Both of these advantages are in addition to the lower operating costs, lower environmental costs, and increased patient and staff productivity within the space.<sup>38</sup>

Another way for the healthcare facility to gain financial stability is

clinical research. Typically, clinical research took place in private or government facilities, where the equipment and environment could be strictly controlled. Recently, there has been a shift in this approach within the medical community. Public/community health centers and clinics are winning grants for clinical trials to be researched and practiced within the facility. Trials and grants benefit their host hospital both financially and professionally, because the opportunity to participate in the trial entices both physicians and patients to come to the specific facility.<sup>39</sup>

## **Inhabitant Centric Considerations- Stress in Healthcare**

"The value of incorporating the memory of loss and hope into architecture cannot be quantified, but is always significant"<sup>40</sup>. In the human mind, place and memory are inexplicably linked. When recalling an important moment, a person can typically give a very detailed explanation of the light quality, smell, and texture of a space. Because of this, hospitals are one universally one of the most emotionally charged environments of all built environments, and every detail can contribute to the quality of the experience. A person's life typically begins, and often ends inside of a hospital, with several visits usually sprinkled between. Every inhabitant that enters a hospital has probably experienced some extremely joyous memories from a similar space, as well as some extremely painful and heart-wrenching memories.

The pure potency of these emotions makes hospitals inherently a very stressful environment. Whether the inhabitant is a patient, friend, or member of the staff, the stress is present, consistent, and can easily become overwhelming. A higher level of stress can cause a patient to heal slower through suppressing the immune system, can make a friend uncomfortable and hesitant to return, and can make the work environment for staff brutal, which could cause a high staff turnover.<sup>41</sup>

Stress can be divided into two main types: acute and chronic. Acute stress is the most common form, and derives from specific, singular, and finite sources of trauma. The effects of short-term stress can be discombobulating, typically acute situations of stress manifest in tension pain, irritability, and anxiety. Chronic stress is a constant distributed load of tension. The stress, since it is a

consistent force, can actually seem to disappear, only to manifest at seemingly innocuous moments.<sup>42</sup> The effects of long-term, chronic stress can be crippling. The effects of chronic stress that occurs in recurrent patients and hospital staff can manifest in clinical depression.<sup>43</sup> Both of these types of stress deeply affect everyone who enters a healthcare facility though; patients, family, and staff.

### Sources of Stress

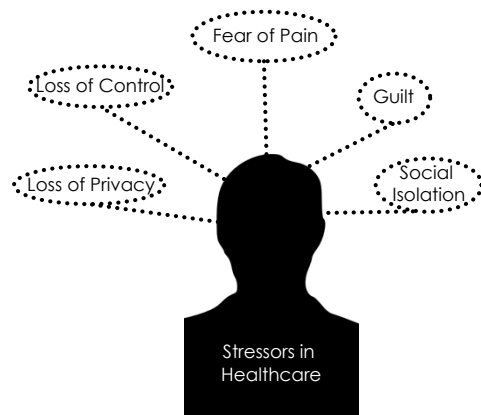
While there are a myriad of things that can cause elevated stress in a person, they can typically be broken down into several source categories. In the hospital setting, stress can characteristically be classified into one of these five groups: *Fear of Pain, Loss of Control, Loss of Privacy, Social Isolation, and Guilt*. The primary stressors (*Fear of Pain, Loss of Control, Loss of Privacy*) stem typically stem from an initial event, while the secondary stressors (*Social Isolation and guilt*) are typically reprises of the anxiety through another form.<sup>44</sup> Each of these groups has certain catalysts in a hospital setting, as well as strategies to alleviate them.

#### *Fear of Pain*

Beginning with the first, and probably most obvious, cause for elevated stress, the fear of pain is rooted in the memories of previous encounters as well as uncertainty with diagnosis, prognosis, or treatment. This type of stress most apparently manifests within the patient, but easily transcribes to family/visitors and staff that have been a part of the care team.<sup>45</sup> This stress derives from symptoms of the patient's condition, the prognosis of the condition, and even

the possibility of complications during treatment. The knowledge of suffering within the patient may subject the visitors and care team to stress, especially since they often must be idle and observe the symptoms in the patient, which will be discussed under “loss of control”.

An isolated event of this stress is easily treated, especially through distraction, but fear of pain/anguish can quickly become a chronic stressor in a chronic illness situation for all involved parties. This prospective stressor can cause physical ailments in the patient such as elevated heart rate and blood pressure. It can cause visitors and staff to become indecisive due to personal relationships with the afflicted person.



### *Loss of Control*

The loss of control due to a stay at the hospital is probably the most influential stressor, as well as one of the subtlest stressors, for patients, family, and staff alike. The term control refers to the autonomy of the person to do what they wish, what others to do them, and affect the surrounding environment. In addition to depression, loss of control has been linked to medical conditions such as reduced cognitive performance, elevated blood pressure, and suppression of the immune system.<sup>46</sup>

Patients obviously have their control stripped from them as soon as the ailment first strikes. The situation of being transported into a setting other than your typical environment fosters a separation from autonomy. Everything in the hospital, from the standardized meals, the white-coated gypsum walls and harsh fluorescent lighting, and the regimented treatment system, places the patient in

**Figure 11: Five Main Stressors**

The five main stressors in healthcare are: fear of pain, loss of privacy, loss of control, social isolation, and guilt. These stresses play into nearly every space inside a healthcare environment.

a position of passivity. This translates to the visitors of the patient as well, who are affected by the same stimuli in the environment, as well being in the position of having to watch someone suffer from an adjacent chair.<sup>47</sup>

Loss of control plays an immense role on the staff of a hospital as well. In Rita Numerof's study of stressors in the medical care providers, the study revealed that the top major stressors in nurses, doctors, and case managers are: having too many time demands, not meeting one's own level of patient care, seeing problems without a way to rectify them, and creating a well functioning staff team. All of these primary stressors that fell into the "high stress group" can be attributed to a loss of control by the care provider. In a chronic illness setting, an incurable illness places the staff further in a position of helplessness.<sup>48</sup>

### *Social Isolation*

Patients and staff alike can feel the effects of social isolation in a hospital. The stress from social isolation often overlaps with a loss of control, since in both circumstances, the affected person is a passive recipient of restriction.

For the patients, if they are admitted to the hospital, they are in an isolated location for medical purposes, and cannot maintain their pre-existing social agenda, whether for an acute or chronic ailment. Social isolation for the patient can occur even outside the hospital. Whether healing from an acute illness or enduring a chronic illness, the patient may feel that they are unable to continue some of the same activities that they previously could perform.<sup>49</sup> This can be anywhere from a soccer player feeling forced to the sideline by a

broken leg, or a person with Celiac disease who can not join his coworkers at a Happy Hour on a Friday night.

Hospital staff, especially doctors and nurses, can suffer from extreme social isolation. Just as with the loss of control stimuli, health care providers often have overbearing work schedules. This causes life outside the hospital to become secondary, and often overlooked.<sup>50</sup> The heavy workload during the shifts also allow for little down time. This does create a strong camaraderie within the staff, however.

#### *Loss of Privacy*

The loss of privacy stems from a vulnerability that the patient feels while suffering an ailment or subjected to a treatment. Privacy is an issue that the medical community works very hard to maintain. Through regulations such as HIPAA laws, medical professionals attempt to retain information, and prevent personal information from getting to uninvolved parties. The hospital setting still fosters a loss of privacy, though. Patients always prefer a single bed patient room to a multiple bed patient room with curtain separators. Many patients can be insecure in explaining a full medical history to their primary care giver, even if they are in a private room. Whether as an inpatient or outpatient, the person with an acute or chronic illness does not want to feel he is on display for the public.<sup>51</sup>

A multi-bed room contributes to the loss of privacy in many ways. The patients are immersed into an environment where they are simply not alone, with temporal partitions separating them at best. Anything from information to

illness can spread right through the partitions, usually cloth curtains. This setting is also stressful because multi-bed rooms are often very noisy, due to patient care, symptoms, and treatment equipment from multiple inhabitants. The hard and sound reflective surfaces cause echoes from various factors, and the ambient noise can approach as much as 90 decibels (approximately equal to walking next to a large truck on the highway). The added noise escalates the tension in the environment.<sup>52</sup>

While this stress often does not affect the medical staff (their experience is completely voluntary), it can present in family/visitors who feel they are forced into a public situation.

### *Guilt*

Guilt is a hidden source of stress in the hospital. This stressor typically affects patients and visitors more than physicians and staff in a hospital. It is a complex secondary stressor; it derives from a sense of responsibility that the patient feels they have not fulfilled. With long-term treatments, if a patient lapses slightly from a regimen, it could cause a strong sense of guilt when talking with the care team. Patients can also develop stress from guilt in regards to visitors and family. Long-term, chronic patients often fear that they are a burden on their support group, and do not want to drag others into what they perceive as a personal battle.

Family and visitors also often feel a sense of guilt through an ailment. This sensation is less of a failure of a responsibility than with the patient, and more of an inability to provide assistance. With diseases acute and chronic, an

associate of an ill person will typically want to help them with their recovery in some tangible way, but that is not always possible. Especially with chronic illnesses, the patient's support team can feel powerless, even if they are providing the critical support of an emotional brace to hold the ill friend upright.

### Treatment of Stress

There are several strategies employed in order to treat/relieve both acute and chronic stress in the healthcare environment for the patients, family, and staff. Some of these strategies are: the use of distractions, customizable spaces, social support, and healing gardens.<sup>53</sup> These strategies work to alleviate the common causes of stress through designed conditions. Each of these strategies uses design in order to provide a sense of control while fostering physical movement.

#### *Positive Distractions*

One of the most efficient ways to alleviate stress is to present the person facing a stressful situation with an alternative environment to focus on. A moment of tranquility can be very beneficial for stressed individuals. Distractions are especially effective with acute stress, since a temporary distraction can relieve a larger proportion of the ailment. This is very true for a hospital setting, where conditions and treatments can be the source of great anxiety in patients.

The most utilized and appreciated example of a positive distraction for an admitted patient is an exterior view. In fact, a view of nature typically reduces stress measurably in 3-5 minutes, and can happen in as little as 20 seconds.<sup>54</sup>

Natural light alone has extremely beneficial effects on physical condition as well as emotional condition. Light can reduce depression, and improve sleep patterns and circadian rhythms in patients. Exterior views have the ability to orient the patient, and provide a connection to a place of tranquility. The reduction of external stimuli in the environment causes a piece of mind in the patient. People also view less congested locations as a reprieve from normal life that is very dense with city functions.<sup>55</sup>

Nature is not always beneficial, and sometimes can be a negative distraction for stressed individuals. Urban factors such as loud noise, ambiguous artwork, and smoking can add to the stress the inhabitant came to alleviate. Harsh sunlight conditions can also cause not only emotional strain, but physical strain on the eyes and skin for inhabitants.<sup>56</sup>

Another extremely potent positive distraction is exercise. Physical activity, with almost any illness, accounts for significant health benefits: it can increase healing time and strength, as well as provides fresh air, energy, and natural light. Even in the general public, moderate levels of exercise greatly reduce the mortality risks for all people. These benefits are all in addition to the ability for physical activity to greatly alleviate stress levels. Physical activity is especially efficient in combating anxiety and depression.<sup>57</sup>

### *Customizable/Personable Spaces*

If a standardized room with a whitewashed gypsum board wall and no windows is the catalyst of stress due to loss of control, then the optimal solution is to create a space where the inhabitant can in some way manipulate his

surroundings. A customized, partition-able space would allow the inhabitant to open up the space and allow external stimuli into the environment. The patient could also close off the space, making it a solitary space in order to focus on singular stimuli. This could apply to interior walls and exterior walls, where a single patient room could become a multiple patient room, or allow an insulated interior space to bleed right into the exterior condition. The concept of interior space that continues through to the exterior is referred to as “theraserialization”. This practice uses a series of spaces that move from public to semipublic to private in order to create subtle but potent barriers in continuous space.<sup>58</sup>

Sometimes, rooms that are located deep inside the hospital or house private treatment functions do not have access to exterior views or extended space. In order to provide a personalization of these spaces, hospitals employ the use of surrogates. A surrogate in healthcare design is an object that takes the place of a view of nature or other public space. They can range from a potted plant and a television to a wall mural of a landscape scene. Hospitals are now using a series of monitors on interior walls to project what the view of the exterior condition would be if there were a window in that location. These strategies help to open a confined space for occupants, they relieve stress and decrease staff turnover.<sup>59</sup>

Personable spaces also need to have a clear delineation of purpose and organization. If ambiguity and confusion can cause stress, then clarity of space is the cure. The solution for difficult way finding goes beyond the superficial use of signage. Healthcare facilities need different strata of information- the local, external, and global layers. This strategy refers to regional identity within

different areas of the facility, as well as a dialogue between the interior and exterior language of the building. The facility as a whole should also present a unified image and a standardized system of distributing visitor information. These strategies help occupants to quickly identify where they are in the design, and where they need to go. <sup>60</sup>

### *Social Support*

“Life has to be lived, and since we are all in the same boat, we must live it hand in hand, together.”- Brazilian Architect Oscar Niemeyer believes that each experience is enriched when in commune with others, and “the stories we share are a touchstone.” <sup>61</sup> Social support can refer to a wide range of things; showing care for someone, making the patient comfortable to show emotion, providing a social network, or even assisting in a physical and tangible way.

Typically, patients with a larger social support system have lower stress retention through treatment. This happens because the support system creates a buffer for the stress inherent to the situation. A support system also allows a compartmentalization of the issues, which prevents smaller, acute stresses from compiling into a much larger stressor.

### *Healing Gardens*

The healing garden is a powerful example of a hybrid of a positive distraction and customizable/personable space. The healing garden is a space that provides the opportunity for physical activity and personal interaction with the natural condition within a healthcare, and possibly a social, setting.

Despite being a very public space, the garden often feels very personal. The scale of the garden provides a human sized environment, with pockets of activity and inactivity, paths for movement and nodes for respite. <sup>62</sup>

The garden also works as a landmark and way finding device. The occupants of the hospital can orient themselves inside the building by the position of the gardens. In the same way, the garden can be a space where groups of occupants meet up, whether for lunch or recovering from a treatment.

The flora often creates layers of privacy, allowing for the individual or groups of occupants to interact with the space in a comfortable way. This also makes the garden a socially healing space, where it does not matter if the occupant is a patient or staff worker. <sup>63</sup>

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## Chapter 3: Case Studies



**Figure 12: Swedish Mill Creek Exterior Rendering**  
*Image Courtesy of Mahlum*

*Swedish/Mill Creek Freestanding Emergency Dept. and Ambulatory Care Center (Mill Creek, Washington – Mahlum Architects – 2010)*

The Swedish/ Mill Creek Center is a three-story, 86,000 square foot center in Mill Creek, Washington. The center integrates a freestanding Emergency Department and Diagnostic Imaging Lab with an outpatient clinic. The first floor is the Emergency Department and intensive imaging lab space. Outside of this space, the rain gardens to the west of the building help to orient the visitors, and lead them from the parking lot to the appropriate entrance. <sup>1</sup>

The interior uses a “front of house- back of house” approach, which utilizes a single loaded corridor in the front of the building to allow patients to essentially check themselves in and go to their assigned room with privacy. Behind this,



**Figure 13: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*

The image shows the patient’s path from admittance to their private exam room. The hall has a view to the exterior to help relieve patient’s stress



**Figure 14: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*

The image shows the transparency from the nurse station into the exam rooms



**Figure 15: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*

The image shows the reception desk and waiting area for a specialty clinic



**Figure 16: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*

The Clinic uses decentralized nursing stations to maintain the most efficient monitoring system of patients

however, the double loaded corridors have transparency so that the staff at the care stations can observe their assigned patients with ease, and transport them from their rooms to a necessary treatment room in the rear of the building without invasion on privacy.<sup>2</sup>

The second floor houses the outpatient clinic space. This has a series of care teams oriented in a rhythmic pattern to create layers of privacy. Each care module has an outward admitting desk, and a care station immediately behind that. The center of the module has the treatment room, storage, and restrooms, while the exam rooms are along the sides of the module.

This clinic focused on a collaborative physician team, and created paired offices for two or more physicians in order to foster a team environment. The clinic also used a ratio of three exam rooms to each physician. This clinic uses a hybridized version of decentralized nursing stations with a collaborative care team. The care stations are divided amongst a series of patient rooms (approximately six) that can be reasonably managed with line of sight, while also allowing the care team a space to chart patient data and discuss treatment options. This is not a fully integrated care station, however, due to the separated physician offices.<sup>3</sup>



**Figure 17: Swedish Mill Creek Floor Plans**  
*Image Courtesy of Mahlum*



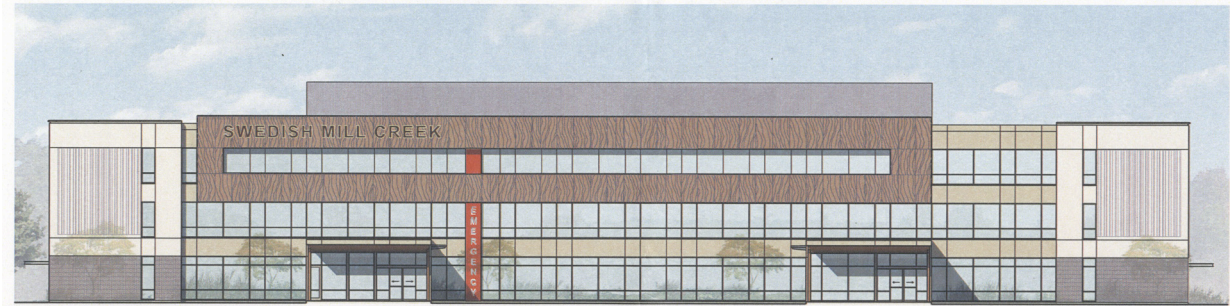
**Figure 18: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*



**Figure 19: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*



**Figure 20: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*

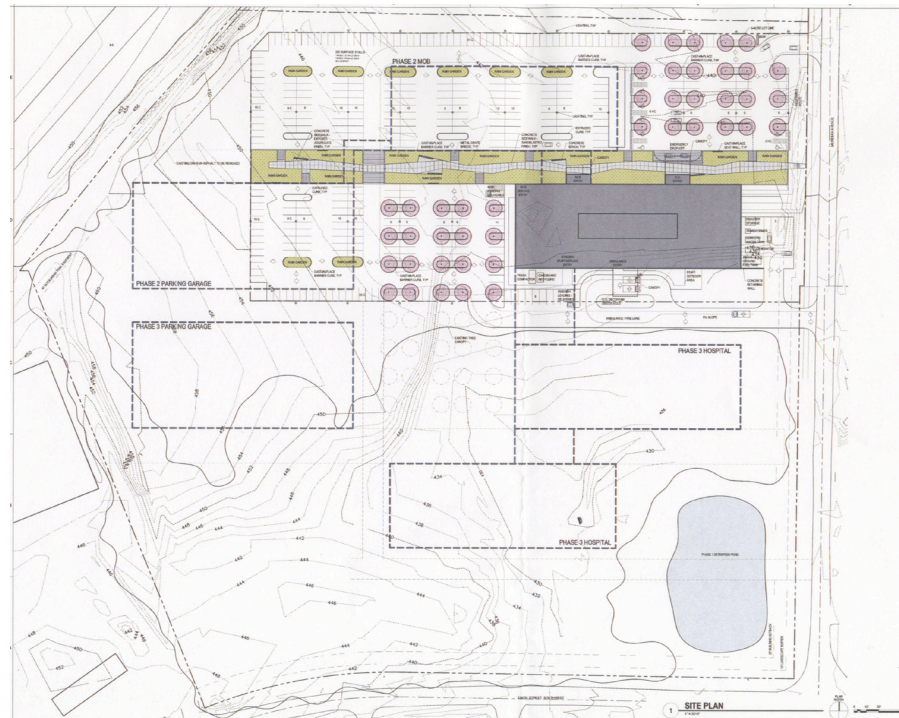


**Figure 22: Swedish Mill Creek Elevation**  
*Image Courtesy of Mahlum*



**Figure 21: Swedish Mill Creek Interior**  
*Image Courtesy of Mahlum*

The image is of an exam room, showing the interior organization of space and medical instruments.



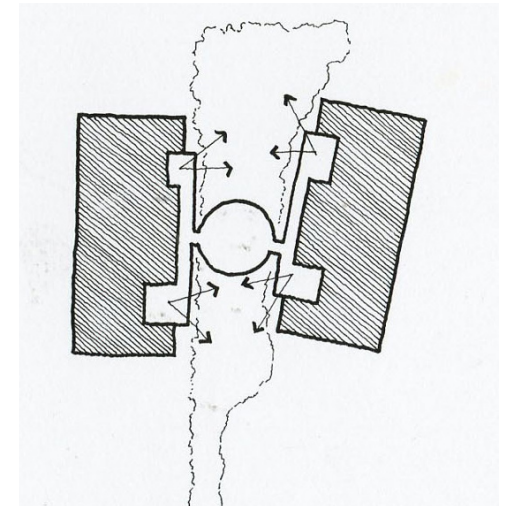
**Figure 23: Swedish Mill Creek Site Plan**  
*Image Courtesy of Mahlum*

*Martinez Health Center  
(Martinez, California – Anshen + Allen – 2003)*

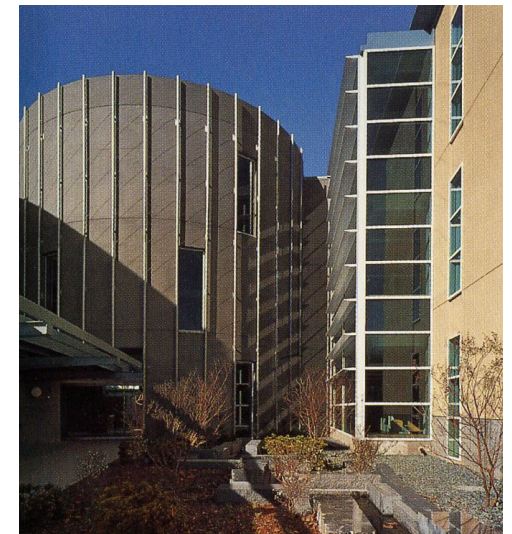
The Martinez Health Center is a 60,000 square foot ambulatory care center. The Health Center creates a healing center for everyone in the neighborhood, regardless of his or her ability to pay. The focus of the Health Center is creating connections to the surrounding natural environment.

The space uses strategically placed openings and clerestory windows in order to obtain the maximum amount of daylight, while orienting the patients toward views of the surrounding nature. The Health Center also uses a centric entry pavilion, and two program wings with single loaded corridors. This design approach allows for all of the spaces, the corridors, clinics, and exam rooms to have views to the exterior courtyard space, quiet water pools, and a redwood grove. This also makes the patient circulation inside the health center very clear and simple.

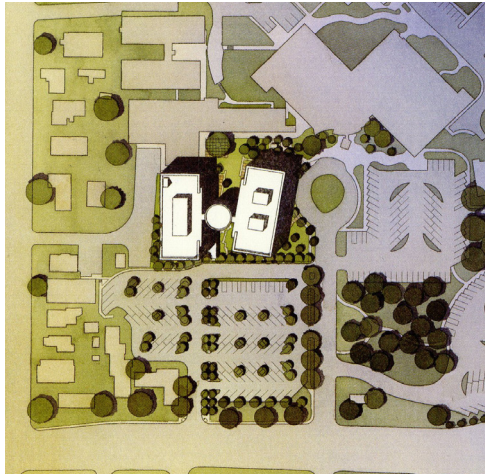
The exterior edges of the wings house a ring of specialty diagnostic



**Figure 24: Martinez Center Diagram**  
*Modernity in Healing and Learning*



**Figure 25: Martinez Center Entrance**  
*Modernity in Healing and Learning*



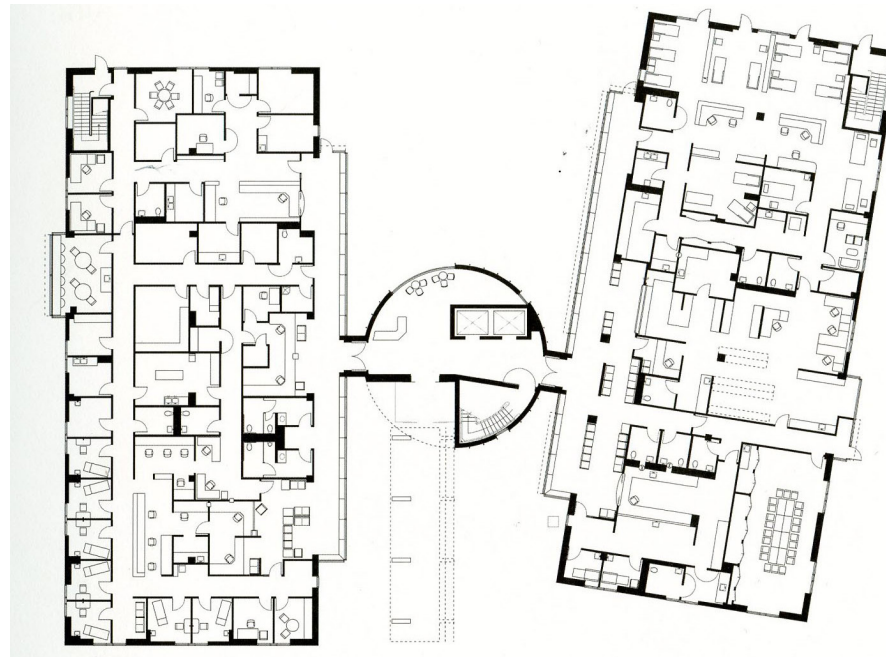
**Figure 26: Martinez Center Site Plan**  
*Modernity in Healing and Learning*



**Figure 27: Martinez Center Garden**  
*Modernity in Healing and Learning*

clinics and open workstations. The interior of the health center houses the imaging technology and offices. The ground floor of the building is a cancer center, which features a private garden where patients are given the option of receiving chemotherapy treatment outdoors in the garden.

The central entry space is a two story glazed atrium that is equidistant from all of the interior clinic waiting rooms. This minimizes the distance that patients have to navigate inside of the clinic. The atrium will gradually be overtaken by the surrounding garden, as ivy grows up and over the skin. <sup>4</sup>



**Figure 28: Martinez Center Plan**  
*Modernity in Healing and Learning*



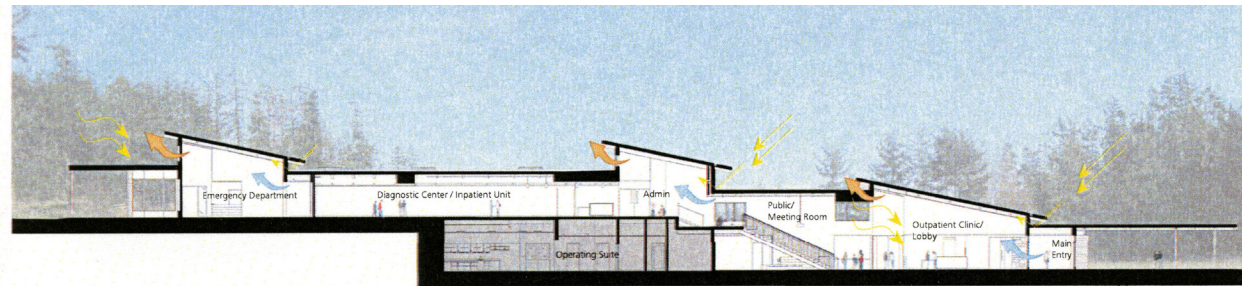
**Figure 29: Martinez Center Lobby**  
*Modernity in Healing and Learning*



**Figure 30: Martinez Center Garden**  
*Modernity in Healing and Learning*



**Figure 31: Martinez Center Waiting Room**  
*Modernity in Healing and Learning*



**Daylighting**

The orientation of the buildings will maximize the use of passive solar heating, natural ventilation and daylighting. The thin building footprints and strategic window placements will allow for day lit interior environments for patients and staff throughout the facility.

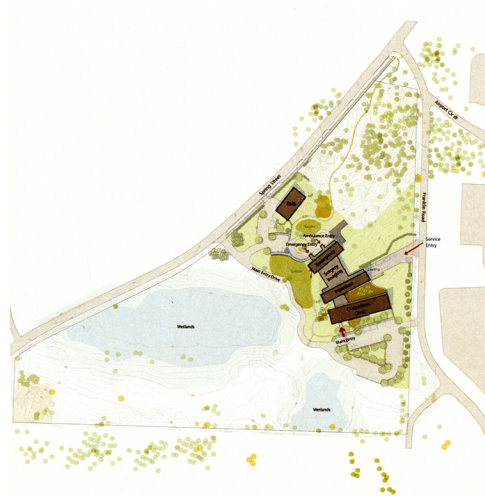
**Natural Ventilation**

All patient rooms will have the option to be naturally ventilated with operable windows to allow patients to control their environment. Excess heat from selected areas will be recovered and transferred to areas with heating need.



Ground Source Heat Pump (diagrammatic only)

**Figure 32: Peace Island Diagram Section**  
Image Courtesy of Mahlum



**Figure 33: Peace Island Site Plan**  
Image Courtesy of Mahlum

*Peace Health Peace Island Medical Center  
(Friday Harbor, Washington – Mahlum Architects – 2011)*

The Peace Health Peace Island Medical Center is a 38,500 square foot medical center on Friday Harbor, Washington. The goal of the project was to provide vastly needed medical facilities for the small area without disrupting the neighborhood context. Mahlum wished to “de-institutionalize” the healthcare facility, and create a healing space that responds to the site. The medical center contains an Emergency Department, Surgery Imaging, and Inpatient and Outpatient Clinics. Each of these services is housed in a specific unit, and is one of five buildings that cascades down the steep-sloped site.<sup>5</sup>

From the initial design, Mahlum wanted to create a net-zero healthcare facility, following the guidelines of the Living Building Challenge. From this

framework, the natural conditions of the site became extremely important. On the site for the project on Friday Harbor were preserved wetlands, forests, and wildlife habitats, so the placement of the intervention had to tread carefully between these. Mahlum used the steep slope on the site to maximize floor area while using a small footprint and human scaled buildings. This approach also allowed natural daylighting and natural ventilation to be most efficient on the project. <sup>6</sup>

The progression of spaces in the medical center creates a series of transparencies for privacy for the incoming patients. The south entrance at the outpatient clinic quickly establishes a space more similar to a cabin than a hospital, with a human scale and warm, earthen materials, as well as a fireplace and grand staircase to the inpatient clinic. In this main space, there is a general admittance desk, which leads to a more secluded series of admit desks where patients will feel more secure in giving a full medical history. <sup>7</sup> There is also a discreet Cancer Treatment Clinic off the main lobby that allows visitors to quietly enter their specific care center.

While the outpatient clinic is small and compact, the design enables relatively easy future expansion if the medical center grows and needs more space. The care center module used in the outpatient clinic plugs into the structural rhythm, with all of the partitioned space fitting strictly into a standardized grid. The physician offices were designed to the same dimensions as the exam rooms, in order to allow for future flexibility with expansion. <sup>8</sup>



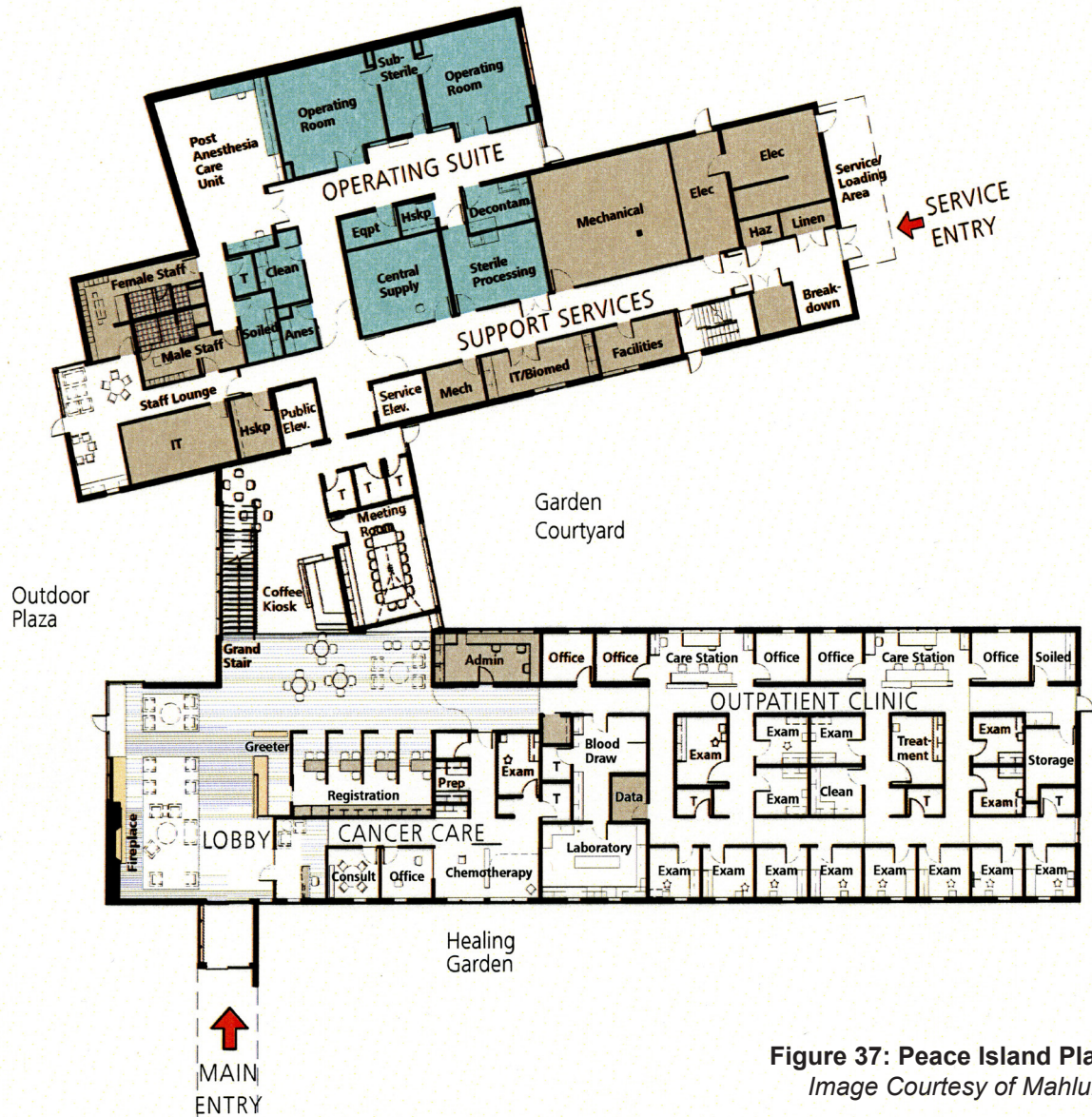
**Figure 34: Peace Island Interior**  
*Image Courtesy of Mahlum*



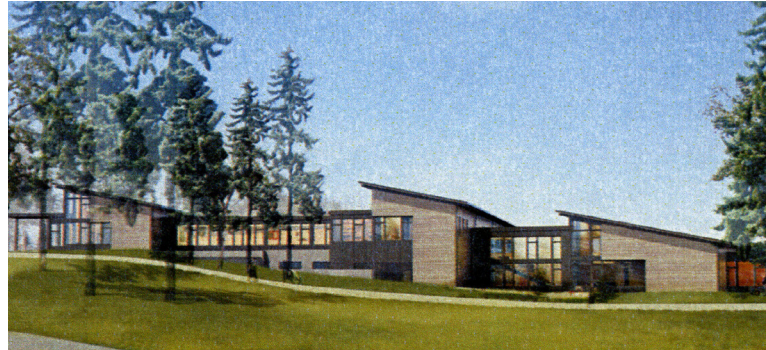
**Figure 35: Peace Island Interior**  
*Image Courtesy of Mahlum*



**Figure 36: Peace Island Plan**  
*Image Courtesy of Mahlum*



**Figure 37: Peace Island Plan**  
*Image Courtesy of Mahlum*



**Figure 38**



**Figure 39**

**Figure 38: Peace Island Exterior**  
*Image Courtesy of Mahlum*

The clinic nestles into the landscape, using the site grade change to separate more sensitive and private program from public areas

**Figure 39: Peace Island Exterior**  
*Image Courtesy of Mahlum*

The design uses the vast landscape to create a space of tranquility for the visitors on approach to the medical center

**Figure 40: Peace Island Waiting Room**  
*Image Courtesy of Mahlum*

The waiting room uses overhands and wood textures to break down the scale and materiality of the space to the human scale.



**Figure 40**

**Figure 41: Peace Island Exam Room**  
*Image Courtesy of Mahlum*

**Figure 42: Peace Island Care Station**  
*Image Courtesy of Mahlum*

The care station is the space where nurses and doctors discuss patients and work on the charts. The design uses windows behind the station to provide natural light, while not giving glare to the workstation.



**Figure 41**



**Figure 42**



**Figure 43: North Portland Clinic Exterior**  
*Image Courtesy of Mahlum*

*North Portland Clinic, Providence Health and Services  
(Portland, Oregon– Mahlum Architects – 2007)*

The North Portland Clinic in Portland, Oregon is a 19,475 square foot, single story outpatient clinic. The primary goal of the clinic was to break the barriers between the neighborhood community and healthcare in the area. The neighborhood was suffering from gentrification due to a commercial strip that followed the light rail track, and the clinic attempted to use regional artwork and transparency to retain and reflect the diversity of the neighborhood. <sup>9</sup>

The public domain encroaches from the neighborhood into the clinic. Using the modular care center orientation, the building created layers of space transitioning from public to private. The west face of the clinic uses a glass curtain wall to allow a visual permeation into the space, and visitors to see the



**Figure 44: North Portland Clinic Artwork**  
*Image Courtesy of Mahlum*



**Figure 45: North Portland Clinic Artwork**  
*Image Courtesy of Mahlum*

The North Portland Clinic uses artwork from local artists with contextual themes to allow the visitors to identify with the space



**Figure 46: North Portland Clinic Entry**  
*Image Courtesy of Mahlum*

wall murals with cultural artwork in the waiting area. The communal waiting area also encourages family members and friends to accompany patients into the clinic.<sup>10</sup> This allows for a stronger emotional support group, and the relieving of stress from loss of control and social isolation. The raised curtain wall façade also allows natural light deep into the building.

The site used integrates well into the urban infrastructure. There is a light rail station right at the clinic, as well as bus routes and bike paths in the surrounding context. This not only allowed Mahlum to greatly reduce the amount of parking necessary on the site, but promoted patients to use sustainable transportation means.

This clinic incorporates decentralized nursing stations at each care center module. The nursing stations act as “hubs between the waiting rooms, examination rooms, and doctors’ offices, providing points of connection between patients, families and caregivers”<sup>11</sup>. The nursing station, therefore, becomes the catalyst of communication and treatment.



**Figure 47: North Portland Clinic Neighborhood Section**  
*Image Courtesy of Mahlum*



**Figure 49: North Portland Clinic Hallway**  
*Image Courtesy of Mahlum*



**Figure 48: North Portland Clinic Artwork**  
*Image Courtesy of Mahlum*



**Figure 50: North Portland Clinic Privacy Diagram**  
*Image Courtesy of Mahlum*

*University of Wisconsin Cancer Center at Johnson Creek  
(Johnson Creek, Wisconsin– Cannon Design [OWP/P] – 2005)*

The UW Cancer Center at Johnson Creek is a 14,300 square foot clinic in the quiet Johnson Creek community, just outside Madison. The design required “stat-of-the-art diagnostics and treatment services, efficient and seamless care, a humanizing experience for both patients and staff, and aids in the recruitment of the leading clinicians in cancer treatment”<sup>12</sup>. The goal was to create a space that encouraged potential patients to frequent the clinic by making them feel as comfortable and at peace as possible. The University of Wisconsin also wanted to use this clinic as a flagship for their cancer research, and recruit top tier physicians to the clinic by displaying the beauty and efficiency of the project.<sup>13</sup>

In this specialized clinic, the focus of design was on patient comfort rather than spatial efficiency. “By acknowledging the landscape, the building becomes a part of it”<sup>14</sup>. The building sits on the site in the least intrusive way possible. The clerestories and curtain walls allow light in by seemingly

shearing pieces of the building, which makes the landscape “as much a part of the palette as the carpet or brick”<sup>15</sup>. Each of the treatment spaces has a view out to the wooded hillside and winding paths in the natural landscape, which create areas for distraction and relaxation. The extended time treatment rooms that are used for chemotherapy infusion allow for partition manipulation to either be open and communal or private.<sup>16</sup> This allows the patient to feel in control of their environment, and thus helps alleviate some of the stress of the situation. The communication with the landscape also provides patients, staff, and visitors the opportunity for physical exercise and attachment to nature.



**Figure 51: Johnson Creek Exterior**  
*Image Courtesy of Cannon Design*



**Figure 52: Johnson Creek Exterior**  
*Image Courtesy of Cannon Design*



**Figure 53: Johnson Creek Interior**  
*Image Courtesy of Cannon Design*

The nurse station areas have views to the exterior to promote tranquility among the staff



**Figure 54: Johnson Creek Interior**  
*Image Courtesy of Cannon Design*

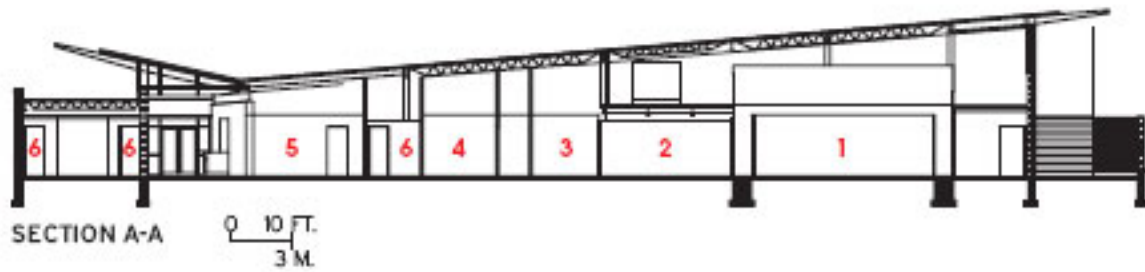


**Figure 55: Johnson Creek Waiting Room**  
*Image Courtesy of Cannon Design*

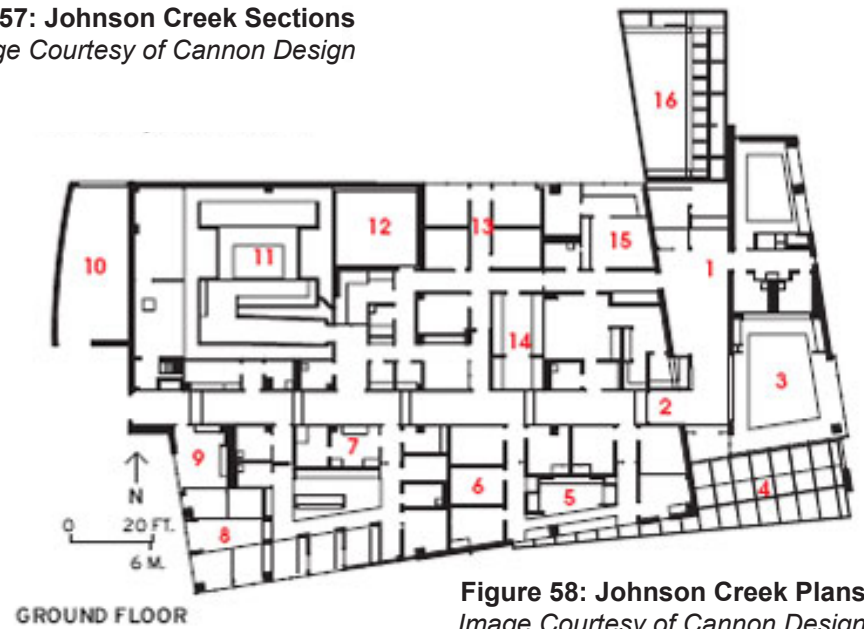
The waiting room uses patient controlled sunshades on the clerestory windows to maximize patient comfort



**Figure 56: Johnson Creek Chemotherapy Rooms**  
*Image Courtesy of Cannon Design*



**Figure 57: Johnson Creek Sections**  
*Image Courtesy of Cannon Design*



**Figure 58: Johnson Creek Plans**  
*Image Courtesy of Cannon Design*



**Figure 59: Blakely Clinic Hall**  
*University of Washington Library*

The Blakely Clinic uses partitionable interior walls to allow for greater permeability and interchangeability within the building



**Figure 60: Blakely Clinic Exterior**  
*University of Washington Library*

*Blakely Psychiatric Clinic*  
*(Seattle, Washington– Paul Kirk – 1956)*

The Blakely Psychiatric Clinic in Wallingford, Seattle was designed by a well-known local architect, Paul Kirk. The clinic is a small, neighborhood psychiatric clinic, with a total of 4,768 square feet of program area. The inspiration for the clinic came from 8 psychiatrists who formed a syndicate to purchase the land and provide necessary assistance to the neighborhood.

The goal of the design was to create a space that blended interior and exterior space, while providing a stress free environment for the patients and staff of the clinic. The structure of the building employs heavy timber in order to ground the project into the site. The design juxtaposes stone wall assemblies with rhythmic screen and glazing system that promotes a high degree of

transparency. The exterior façade of the building along NE 51<sup>st</sup> Street uses a screening system to provide a private garden space for the occupants. The garden becomes a courtyard for the doctors in their offices, as well as the patients in the treatment rooms and waiting room. The spaces have sliding partitions between interior and exterior space, easily allowing an interior office to become a stress relieving healing garden.

The partition walls are also used between the hallways and some treatment rooms to maximize the circulation flow of the occupants.



**Figure 61: Blakely Clinic Doctor's Office**  
*University of Washington Library*



**Figure 62: Blakely Clinic Doctor's Office**  
*University of Washington Library*

The doctor's offices have sliding exterior walls to garden spaces, which softens the barrier between interior and exterior.



**Figure 63: Blakely Clinic Exterior**  
*University of Washington Library*



**Figure 64: Blakely Clinic Exterior**  
*University of Washington Library*

### *Healing Gardens*

The healing garden has several variations that can each provide a specific service in a certain environment. It can be an interior or exterior space, and have variant size, but it should always have a therapeutic effect of the majority of visitors that frequent it.<sup>17</sup> These spaces do, however, typically follow three paradigms of design: referencing tradition, displaying regional botany, or encouraging patient interaction.<sup>18</sup>

The Japanese garden of Ryoan-Ji is a healing and reflective space that references a landscape far too large to be observed as a whole in nature. The dry rock garden uses grooves raked into the gravel to represent movement in the ocean. The scene strips away unnecessary distractions and stimuli, which allows the inhabitant to calm their mind and reflect on a specific object.



**Figure 65: Ryoan-Ji Garden**



Figure 66: Ryoan-Ji Garden



Figure 67: Ryoan-Ji Garden



Figure 68: Ryoan-Ji Garden



Figure 69: Ryoan-Ji Garden

The second approach of displaying regional botany maintains the genius loci, while implementing sustainability to the garden. Native plants and systems will best fit the naturally occurring climatic conditions. The Makahikilua Garden at the North Hawaii Community Hospital uses such a strategy in order to soothe the patients and the landscape. <sup>19</sup> The gardens include a mini-farm, mini-orchards, and self-sufficient Hawaiian gardens in order to be “spiritually healing as well as physically therapeutic” and “moderate temperatures; pump oxygen; create privacy, a lovely view and the sounds of nature; muffle noise and pollution; and create an easy focal point for patient contemplation and relaxation” <sup>20</sup>.



**Figure 70: North Hawaii Hospital Exterior  
Healing Gardens**

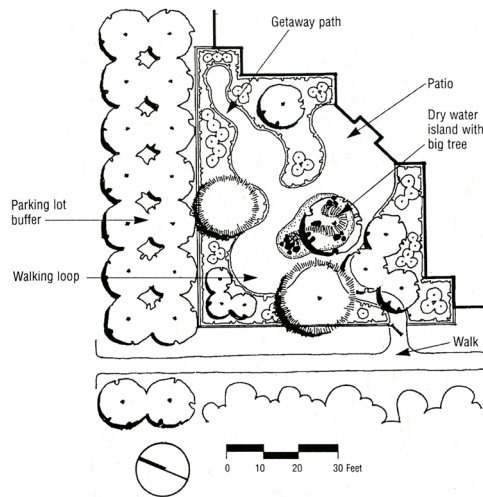


**Figure 71: North Hawaii Hospital Interior  
Healing Gardens**



**Figure 72: North Hawaii Hospital Garden  
Healing Gardens**

The third approach is a person-oriented approach. It is blatantly about the interaction of humans and the surrounding environment, rather than humans observing the surrounding environment.<sup>21</sup> The gardens of the Sedgewood Commons Alzheimer's facility in Falmouth, Maine function at a high level to activate and energize the patients and staff on site. The facility uses a "Remembrance" therapy in order to treat the patients. This therapy is reinforced through the gardens by representing the fundamentals: fostering autonomy and risk taking, providing emotional and physical safety, creating an identifiable orientation, and utilizing sensual stimulation without stress. The Hawthorne Garden, for early stage patients, fosters autonomy through using aspects of typical New England housing styles to remind the patients of individual living, such as white picket fencing, tool sheds and compost piles, and winding walkways.<sup>22</sup>



**Figure 73: Hawthorne Garden**  
*Healing Gardens*



**Figure 74: Hawthorne Garden**  
*Healing Gardens*

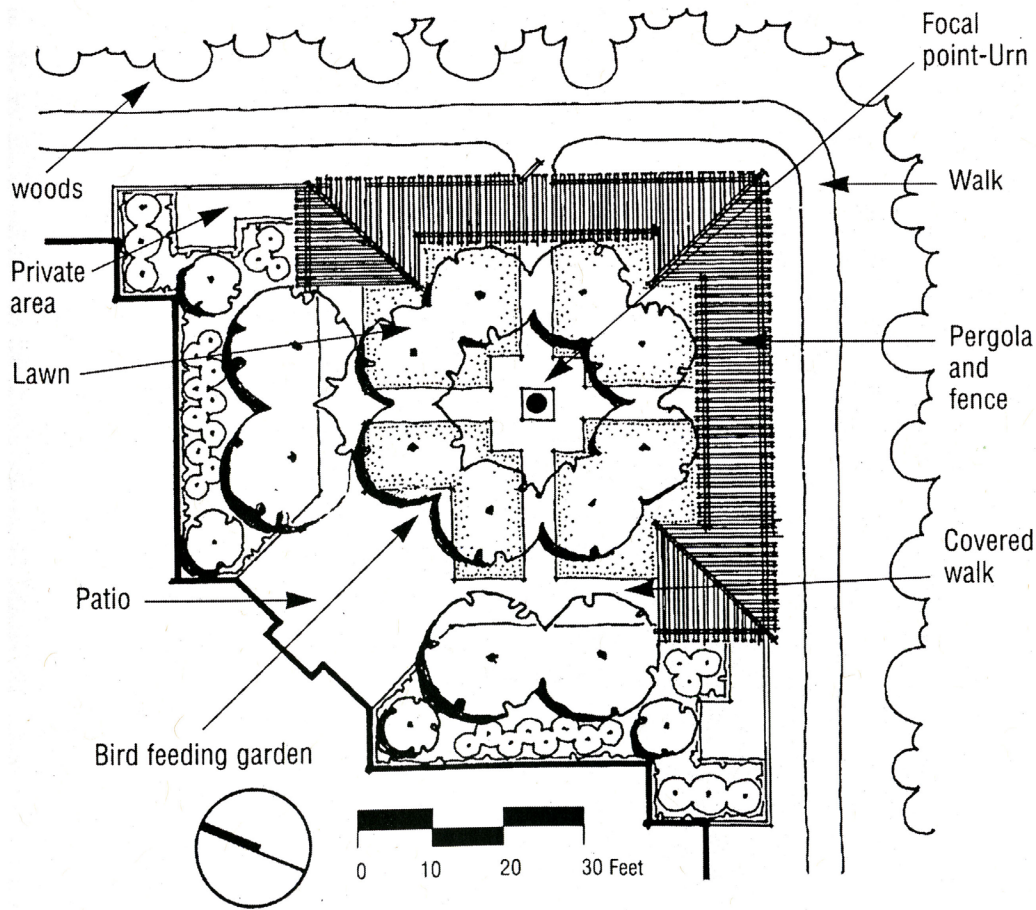


Figure 75: Hawthorne Garden  
Healing Gardens

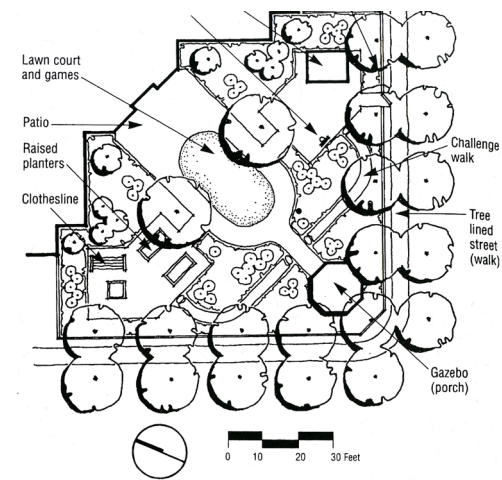


Figure 76: Hawthorne Garden  
Healing Gardens

## Notes

1 Jenner, Rachel. "Mahlum Healthcare Discussion."

2 Ibid.

3 Ibid.

4 Palmer, Sarah, and Nancy Sul. *Modernity in Healing and Learning: The Architecture of Anshen + Allen*. pg 61

5 Jenner, Rachel. "Mahlum Healthcare Discussion."

6 Ibid.

7 Ibid.

8 Ibid.

9 Ibid.

10 Ibid.

11 Ibid.

12 "UW Cancer Center at Johnson Creek." *Cannon Design*

<<http://www.cannondesign.com/projects/project-catalog/uw-cancer-center-at-johnson-creek/>>

13 Hudson, Christopher. "UW Cancer Center at Johnson Creek"

14 Guenther, Robin, and Gail Vittori. *Sustainable Healthcare Architecture*. pg 8

15 Ibid. pg 8

16 Hudson, Christopher. "UW Cancer Center at Johnson Creek"

17 Marcus, Clare Cooper., and Marni Barnes. *Healing Gardens: Therapeutic Benefits and Design Recommendations*. pg 30

18 Ibid. pg 92-93

19 Ibid pg 102-103

20 Ibid. pg 102

21 Ibid. pg 103

22 Ibid. pg 483

# Chapter 4: Site Analysis

## **Program Analysis**

In order to create an integrated treatment environment for autoimmune, the Ballard clinic will house physicians working in a collaborative team to treat autoimmune diseases such as Type I Diabetes, Lupus, Multiple Sclerosis, Celiac Disease, Psoriasis, and Rheumatoid Arthritis. The specialty physicians that will constitute this collaborative team will be endocrinologists, neurologists, nephrologists, and rheumatologists. Each of these specialties will be mixed together in care teams in order to further the physician's understanding of how the diseases are linked, as well as provide more consistent care for patients with varying symptoms. There will also be transient professionals that will float between locations similar to this project. The transient professionals will consist of physical therapists, nutritionists, and dermatologists. Most of the full-time physicians will share a series of offices in order to foster a comprehensive approach to diagnosis and treatment, while there will be some individual offices. The transient staff will use "flex" offices that can be manipulated to best house the current condition in the clinic. The comprehensive office approach

also transfers to the care stations, where a team of nurses, physician assistants, and any other members of the care team, can organize charts and discuss treatment options. These care stations represent a hybrid in the decentralization movement for nursing stations. There is one station per clinic unit, which allows for a manageable number of patients per care team to supervise. The care stations will also house small quantities of pharmaceutical supplies and nourishment stations for treatment options.

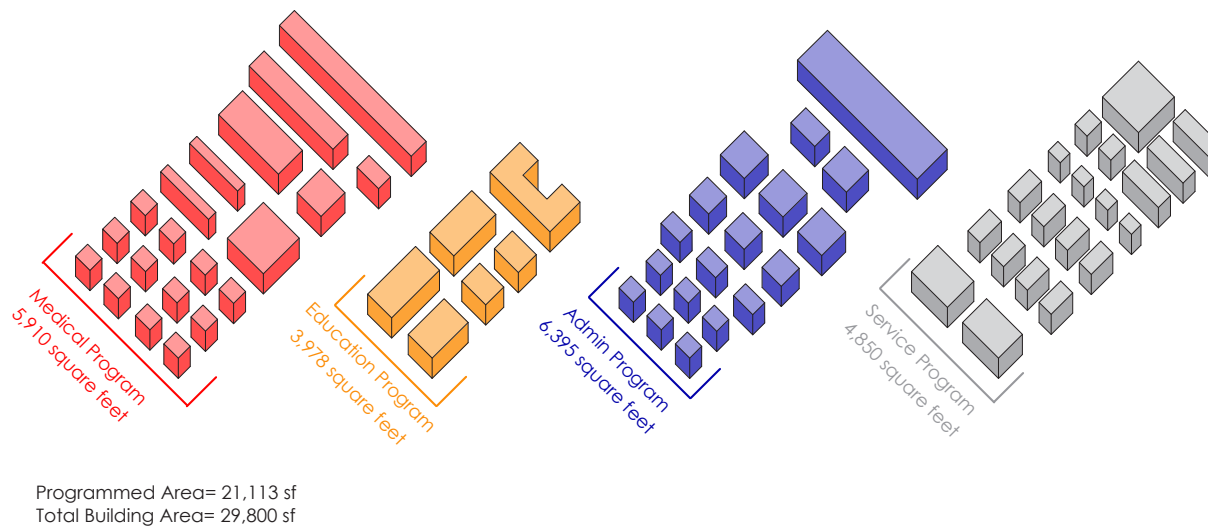
The clinic will have moderate patient turnover for the staff, so the typical ratio of 3 exam rooms per physician will be less important than a complete and thorough examination/discussion between the patient and care team. There will also be a “treatment” room. This space is larger than an exam room, and would be where specific treatments that may require more space can operate. These spaces could also house operations that require more time, and may be better with multiple patients in the space simultaneously. An example of this would be a dialysis treatment, where the patients would spend hours in a stationary position. These spaces could also become more social, allowing for inter-patient interaction.

There will also be a blood draw space and blood lab for on-site testing and housing of samples. Both the patients and staff would appreciate the convenience of on-site blood draw and testing, which would provide speed of results retrieval. This would also help the clinic receive grants for new clinical treatment studies for the different illnesses represented at the clinic.

Outside of the outpatient practices of the clinic, there will be educational spaces that are managed by the clinic staff, but can be utilized by the patients

or the public for various reasons. The intention of these spaces is to provide an atmosphere of education and socialization between patients, as well as between the clinic and the public. Also, to promote proper nutrition and responsible personal care, there will be an in-house pharmacy and café that has a specialized menu for dietary restrictions.

In addition to the prescribed program area for interior space, the design also depends on a relation to the site and natural environment. The design achieves this through the use of healing gardens and views to landmarks, built and natural, near and far. Through the integration of landscape and infrastructure, the clinic will be able to entice a wide range of inhabitants to the space that extends far beyond the primary patients of the clinic.



**Figure 77: Program Analysis**

The program of the clinic has to balance medical, educational, administrative, and service elements in a cohesive system. These elements make up approximately 21,000 of the 30,000 square feet of the building envelope.

Program for CommunityCare Autoimmune Clinic			
	Space	Amount	Net Area
	<b>Medical</b>		
1	Exam Rooms	12	1500
2	Care Stations	2	400
3	Treatment Room	1	830
4	Blood Lab/Draw	1	400
5	Clean Room	1	180
6	Soiled Space	1	400
7	Waiting Room	1	1000
8	Research Labs	1	300
9	Pharmacy	1	900
	<b>Educational</b>		
10	Lg Educational	1	800
11	Sm Educational	2	608
12	Class Expansion	1	670
13	Cooking Class	1	600
14	Terrace	1	1300
	<b>Administration</b>		
15	Full-time offices	4	500
16	Collab offices	3	480
17	Transient offices	2	250
18	Careteam Lounge	3	795
19	Staff Lounge	1	400
20	Admin	1	700
21	Entry/Reception	1	500
22	Lobby/ Café	1	2400
23	Conference	1	370
	<b>Service</b>		
24	Loading	1	650
25	Storage	3	900
26	Public Rest	6	1080
27	Staff Rest	2	360
28	Patient Rest	2	160
29	Records	1	500
30	Utility	2	240
27	Janitorial Closet	2	160
28	Café Kitchen	1	800
	Total Prog Area		<b>21133</b>

Figure 78: Program Analysis

The program list is broken down into the medical, educational, administrative, and service elements within the clinic.

## Site Selection

The success of the neighborhood clinic depends heavily on the proper site conditions. The site itself has to foster many of the medicinal and communal design cues for the project and therefore must be carefully selected. The two most important factors for site selection in this project are neighborhood context and public transportation.

### *Neighborhood Context*

The intervention would be most successful in an urban, neighborhood setting. This environment houses many residents that could be potential inhabitants of the space, and already are a valuable part of the community with which the clinic hopes to identify. A neighborhood setting would also provide a tighter, more personal scale through site context than a site in an industrial or business district of a city. Since the project will be in the Seattle area, this means that neighborhoods such as Fremont, Ballard, Greenwood, and Phinney Ridge would be more appropriate than downtown neighborhoods like Belltown or Capitol Hill.

### *Public Transportation*

A very important part of the site context is infrastructure and public transportation. The more convenient the site is for the wide breadth of potential users and staff. The current bus routes throughout the neighborhoods north of downtown Seattle provide an amazing network of mass transit that can serve this purpose. The future expansion of the “Link” light rail system from Belltown to northern neighborhoods will also provide a great opportunity for the site to link

into the city's infrastructure.

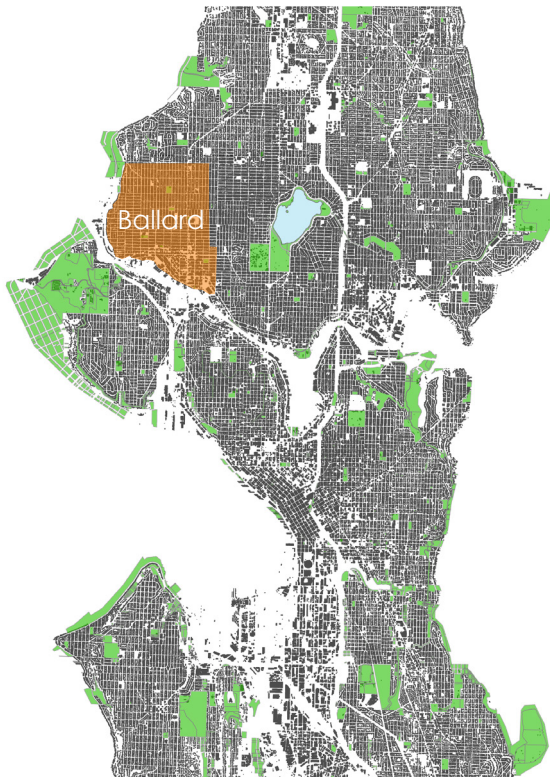
Another very important factor with public transportation is the accessibility for bicycle and pedestrian traffic. The culture in the Pacific Northwest heavily promotes both bike and pedestrian transportation, and both can also be extremely beneficial with the treatment of chronic diseases. One of the most convenient and prominent places for pedestrian and bike traffic is the Burke Gilman Trail, which runs near or along the waterfront from the northern tip of Lake Washington to the shore of the Puget Sound at Golden Gardens beach, west of Ballard. The best place for this intervention to incorporate as many of these low impact commuters as possible would be a site along the Burke Gilman Trail.

#### *Possible Sites*

Through these main two qualifying criteria, these are the possible successful sites for the neighborhood clinic. Each of these sites has a reasonable proximity to public transportation and an adequate context scale for the clinic.

- Potential Site #1: 5980 Seaview Ave NW
- Potential Site #2: 5500 Seaview Ave NW
- Potential Site #3: NW 54<sup>th</sup> St and 14<sup>th</sup> Ave NW
- Potential Site #4: NW 55<sup>th</sup> St and 14<sup>th</sup> Ave NW
- Potential Site #5: 2034 NW 56<sup>th</sup> St
- Potential Site #6: Shilshole Ave NW and 22<sup>nd</sup> Ave NW

- Potential Site #7: NW 54<sup>th</sup> St and 32<sup>nd</sup> Ave NW
- Potential Site #8: NW 43<sup>rd</sup> St and 7<sup>th</sup> Ave NW
- Potential Site #9: NW 41<sup>st</sup> St and 3<sup>rd</sup> Ave NW



**Figure 79**



**Figure 80**

**Figure 79: Seattle Map**  
*Courtesy of UW GIS data*

The map shows the Seattle area, with the neighborhood of Ballard called out. The map shows that Ballard is just north of Salmon Bay.

**Figure 80: Ballard Map**  
*Courtesy of UW GIS data*

The map illustrates the popular transit lines in Ballard. Red identifies high traffic areas, blue indicates bus routes, and green represents bicycle trails.

The selection of these sites created a further set of criteria for the optimal site conditions. The location should have adjacencies to natural landmarks. Since views of nature are very important in a clinical setting. With these sites, most of which falling in the Ballard neighborhood of Seattle, the view could be out to the Puget Sound, the Botanical Gardens, or sculpted views like the Ballard library and the park nearby.

A site with topography could create more of a language between the project and the landscape, and allow the building to sit firmly in a position rather than sitting lightly on a flat site. These qualities could play important roles with the programming of the project, which has spaces calling for a range of natural conditions.

Light quality is a very important aspect of the site. Natural daylight will play a critical role within the clinic, and therefore must have a strong presence on the site.

## Ballard

Ballard is the perfect setting for the clinic. It houses a strong neighborhood community, with vibrant life on Market Street and small to medium scale residential development.

Swedish Medical Center gives Ballard a stable presence of healthcare. It provides an icon of healing, while maintaining a community approach to medical treatment.

The zoning classification for most of downtown Ballard is Neighborhood Residential, with a 65 foot height restriction. This means that the scale of the neighborhood will be rising, and the image of Ballard will be changing. This change can be seen in the development along NW 56th Street, with the Public Library and proposed mixed use residential buildings.



Figure 81: Market Street



Figure 82: Swedish Medical Center



Figure 83: Ballard Public Library

### *Site Selection*

Using the site guidelines set out, which maximize proximity to public transportation and local landmarks, two sites were found to embody these characteristics best: 5980 Seaview Avenue NW and 2034 NW 56<sup>th</sup> Street.

The first site, 5980 Seaview Avenue NW, is a triangular lot with a maximum width of 100 feet, and a length of 530 feet. The lot size is 18,075 square feet. The site offers several unique benefits for the proposed health clinic. The site falls directly along the Burke-Gilman Trail as it steers north toward Golden Gardens Beach. Seaview Avenue hosts the 46 route public bus line, which goes from Golden Gardens, through Ballard, Fremont, and Wallingford en route to the University District. This bus line would allow a wide breadth of patients and staff to easily commute to the clinic. Seattle also recently constructed a wide pedestrian promenade along the western edge of this segment of Seaview Avenue, which is used heavily by joggers and bicyclists throughout the day. This site is in a neighborhood, and is zoned as “Single Family 5000”, but could be rezoned for small-scale commercial use. This zoning provides a great scale for the neighborhood clinic. Lastly, the placement of the site along the shoreline of the Puget Sound would create dramatic and fantastic views of the Sound, and to Queen Anne across the water.

Despite these conditions, however, this site was deemed insufficient due to several drawbacks. As mentioned before, the zoning of the site is single family residential, and while that could be changed, it would present a possible obstacle for construction. The site also possesses a very dramatic slope from East to West that is in excess of 40% rise on the South end of the site. Also, the

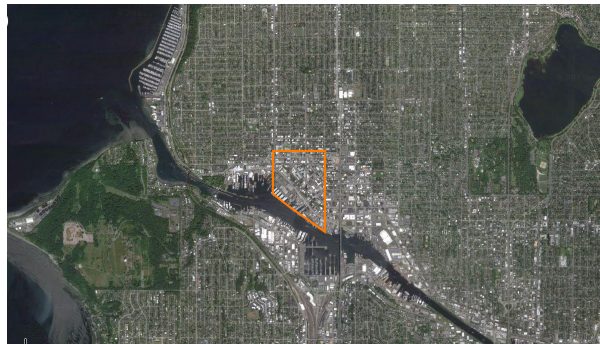
triangular geometry and tight area (the rough program square footage is 20,000 sf) suggest that fitting the program elements, sufficient parking, and additional design cues on the site could be very problematic.

The second site option, 2034 NW 56<sup>th</sup> Street, is just to the East of the Ballard Library. It is adjacent to two vacant lots (to the East and North), all three of which are currently in use as a series of parking lots. The combined area of these three lots is 24,500 square feet. This area has a zoning of neighborhood commercial 3, with a height restriction of 65 feet. This zoning fits the program of the health clinic perfectly. The site has a slight slope from North to South of approximately six feet, which is much less prohibitive than the previous site. There are no soil or environmental conditions that warrant special consideration. This site is next to the public landmark of the Ballard Library, is one block from the Ballard Commons Park, and is one block north of the main Ballard commercial strip. In addition, one block north of the site begins dense residential development, which would allow more neighborhood residents to interact with the project.

The site is well integrated into the urban infrastructure. One block south, on NW Market Street, several bus lines run from Ballard to the various neighborhoods of Seattle. These bus lines are the 17, 18, 44, 46, 75, and 81 routes. Currently, the Burke Gilman Trail runs slightly further south on Shilshole Avenue NW, but that has been problematic for riders, and the trail route could be modified slightly to be nearer the site and in a more secure environment for bicyclists. In addition to the existing public transportation in the area, there is a plan to extend the Seattle Link Light Rail into this area. The light rail would run

on Leary Avenue NW until it intersected with NW Market Street, then turn up 24<sup>th</sup> Avenue NW and terminate at the Ballard Commons Park. This would be a main terminal for the link light rail just two blocks from the site. This location provides the great convenience of having a major transit hub within close proximity of the project, but not too close to the site as to cause a disruption. Having the hub two blocks away should keep traffic, pedestrian congestion, and noise pollution down.

Because of these conditions, this site of 2034 NW 56<sup>th</sup> Street seems to best embody the goals of the proposal to foster a community of education, socialization, and healing.



**Figure 85: Ballard Aerial Photo**  
*Google Earth*

**Figure 85**

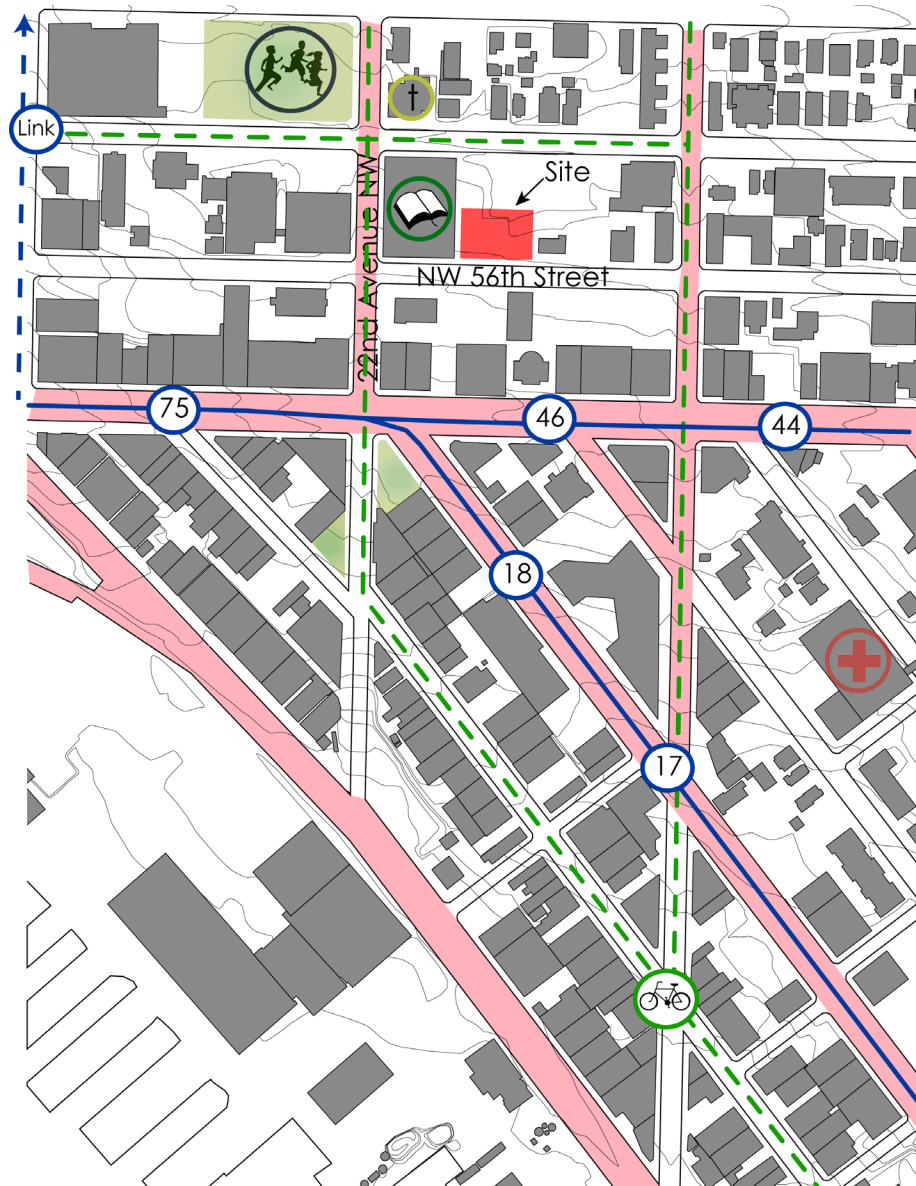
The relevant site context is called out from the aerial photo of Ballard.



**Figure 86: Ballard Aerial Photo**  
*Google Earth*

**Figure 86**

The image shows the surrounding context of the selected site on NW 56<sup>th</sup> Street.



**Figure 84**

**Figure 84: Ballard Transit Map**

The map shows the popular transit routes in the surrounding site context. In addition, the important civic spaces are identified, such as the park to the Northwest, and Swedish Medical Center to the Southeast of the site.



**Figure 87: NW 56th Street South Elevation**

The elevation of NW 56th Street shows the character of the street on which the project will be built. Currently, there is low level commercial, but the street will develop into a dense residential core with a 65 foot height limit.



**Figure 88: NW 57th Street South Elevation**

Just one block North, the character of the street is very different. It is a strong residential area, with buildings approximately 40-50 feet high.

## Design Concerns

The development of the proposal framework and site conditions has created several design concerns and considerations for the intervention. These considerations vary from building size and orientation to programmatic adjacencies.

The intervention should maintain a neighborhood scale that corresponds to the surrounding context of both the residential buildings and civic structures like the Ballard Library. The maximum zoned building height in the area is 65 feet, but this is probably excessive. The buildings should be two to three stories maximum to best maintain the human scale that is important for pedestrian interaction on the street as well as patient interaction on the interior.

The orientation of the building on the site will be determined by the relationships of the interior program to the external stimuli on the site. Because there is residential development to the north and commercial development to the south of the site, the clinical functions of the building may orient to the south, while the educational classrooms and social aspects of the design may orient to the north. The placement of the building itself will reconcile these two forces in addition to landscaping and healing garden spaces. The placement will also have to best incorporate the public transportation that the Burke Gilman Trail, the Link Light Rail, local bus lines and pedestrian activity bring to the site.

The importance of sunlight and natural ventilation will also help educate the design of the project. As seen in the framework, sunlight is a crucial aspect to healthcare, and especially Autoimmune Illness. One goal of the project will

be to obtain daylight in as much of the interior spaces as possible.

The program structure of the project will rely on a module of exam rooms and offices to best foster a healing environment. Exam rooms and treatment rooms will have flexibility in arrangement so that the space can adjust for future development. The spaces will focus on patient comfort, and attempt to minimize stress by granting the patient control of certain elements. The space will have a type of decentralized nursing stations, which will exist in care stations that house nurses, physician assistants, and technicians in a collaborative environment. The doctors, who will work in teams to best understand the varying conditions of the patients, will also have collaborative office spaces.

# Chapter 5: Design Development

## Concept

The movement from research to design meant a shift in the focus from the built form back to the interactions of the visitors to the clinic. Questions of privacy and necessity for the possible inhabitants became the drive for the design. The logical first step was to create a fictional network of community members who would inhabit the clinic on a regular basis. These community members would have various roles within the clinic, which range from patients to parents of patients to staff. The way these community members would use the space and could make it a unique experience would help to inform the design process. This approach immediately focused each site and program response on its effect on the inhabitants of the space.

Once this approach had been established, the focus became how the space could help to bring in the community members, how it could pull them through the clinic, and how it could enable them to interact with each other. The different activities that the patients, care providers, and neighborhood visitors would participate in would start to inform the gestures in form, spatial relationships, and atmosphere.

## Fictional Clinic Community Members



Erica

She has had Lupus for 15 years. She is at the clinic for a check up and some lab tests for anemia.



Patricia

She is an RN at the clinic, working with a variety of doctors and PA's in a careteam. She is constantly on the move in the clinic, but enjoys spending free moments on the roof terrace.



Robert

He has psoriasis, and is a part of a clinical trial at the clinic. He returns weekly for labs, which often take 2-4 hours.



Donald

He has had Type 1 for 19 years. This is his first visit to this clinic, so he is looking to establish a care team as well as meet other local Type 1's.



Veronica

She is a part-time nutritionist at the clinic. She typically works two days a week at the clinic, and helps to shape the cafe's specialized menu.



Andrea

She is a receptionist in the lobby of the clinic. She works at the clinic to understand more about her son's MS diagnosis.



Brian

He has a recent MS diagnosis, and knows very little about how to manage his condition. This is his first visit to the clinic, and he is very anxious about it.



Phil

He has a daughter with Type 1 and Celiac. He often goes to the clinic to stay involved in the activities sponsored by both the staff and patients.



Jordan

He is a neurologist at the clinic, working four shifts a week. He also leads an autoimmune athletes support group every month in the classrooms on the second floor.

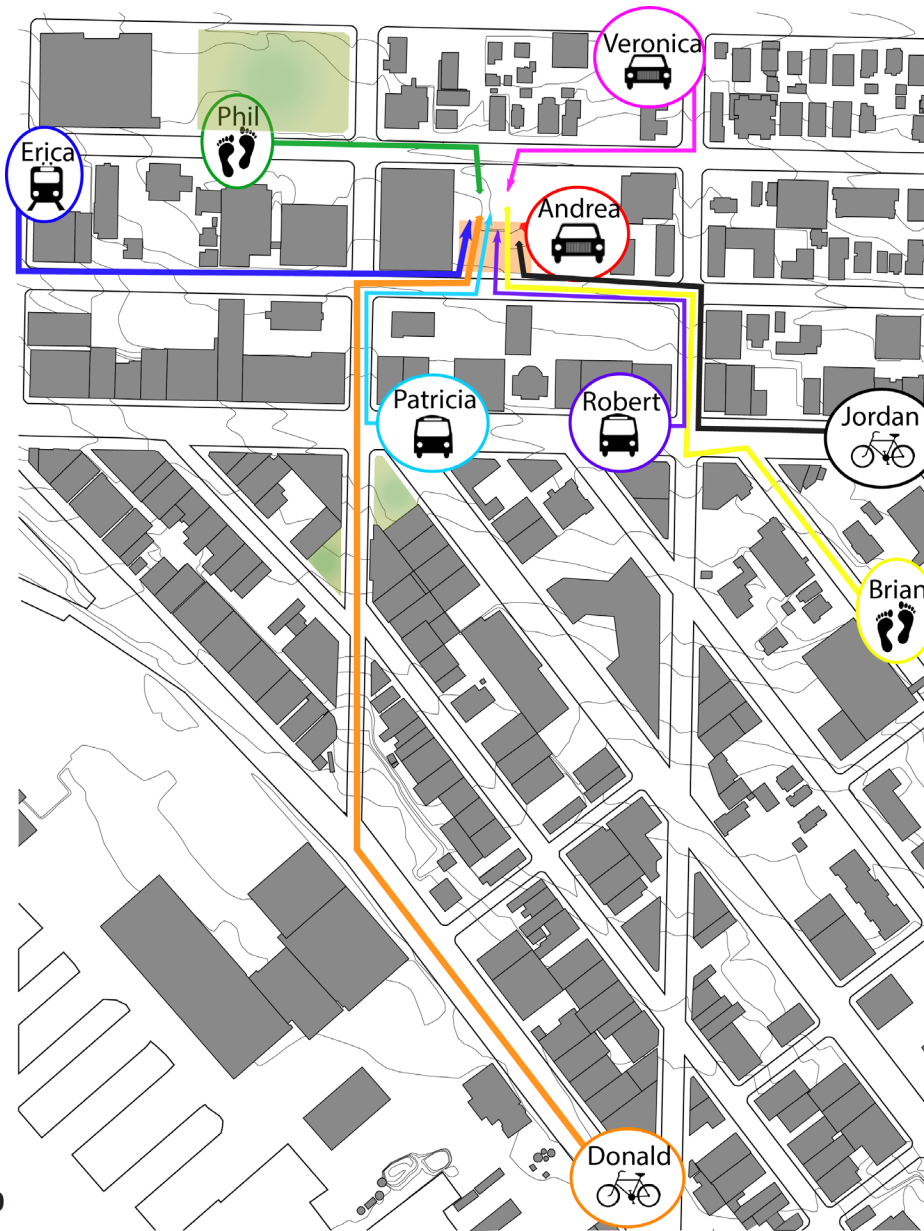


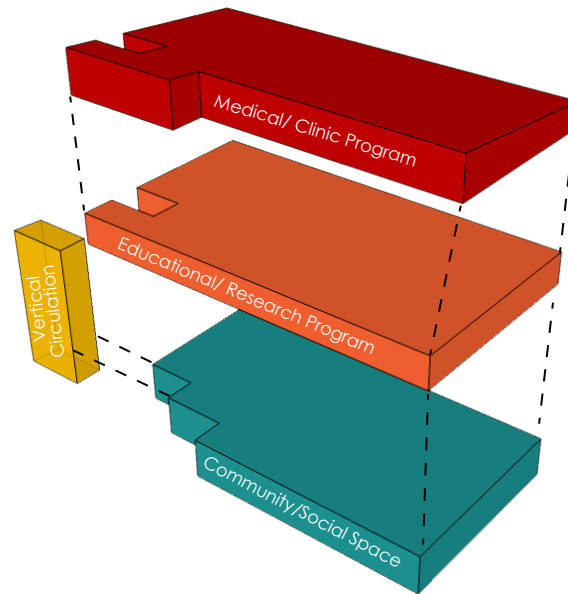
Figure 89

**Figure 89: Community Member Approach**

The image shows the transit methods that potential clinic visitors could use to arrive at the site. By studying the arrival methods, the design can better respond to the site condition.

**Figure 90: Program/Privacy Diagram**

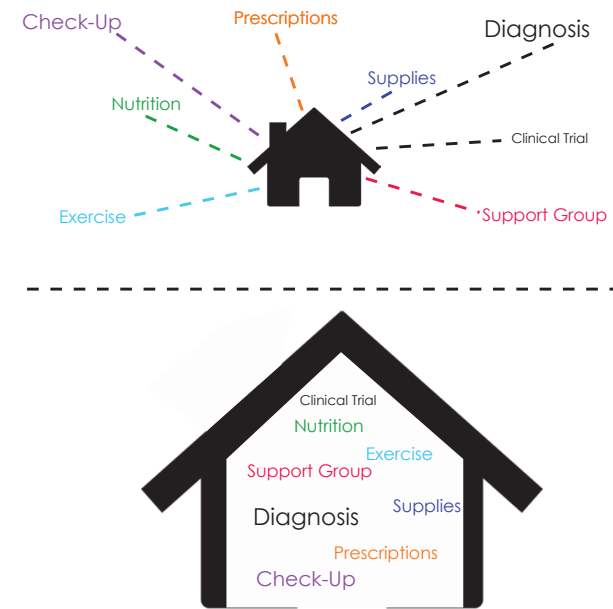
The form of the design separated the program into tiers of privacy, then organized it vertically, with the most sensitive program furthest from the street activity.



**Figure 90**

**Figure 91: Fragmented Treatment Diagram**

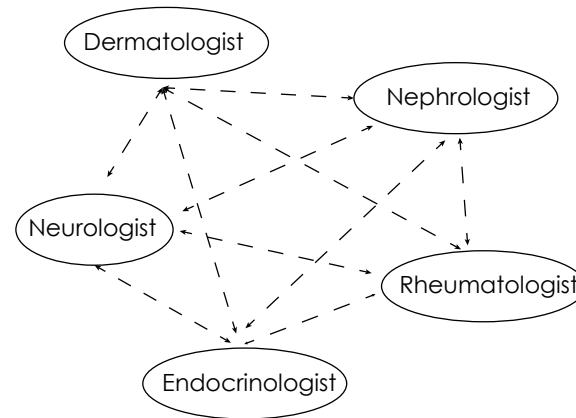
After diagnosis, the patient typically has to travel to separate spaces for each of the treatment needs. If these activities could all be connected under one roof, the efficiency would rise, as well as the opportunity for the patient to interact with others in a similar position.



**Figure 91**

**Figure 92: Doctor Linkage**

A center that brings together physicians with different specialties also allows them to interact in a way that typically would not occur, which promotes new ways of thinking about disease treatment



**Figure 92**

**Figure 93: Collective Knowledge**

The presence of a diverse community of people affected with autoimmune can create a rich collective knowledge of experience



**Figure 93**

The first exploration was to identify how each community member arrived at the site. The various methods of transit to the site each provide a different experience for the user. The community profiles showed that the majority of the visitors of the clinic would approach the site from the west, from 22nd Avenue NW, and walk along the south face of the Ballard Library. This information helped to inform the location of the main entrance. Since the majority of visitors came from the west, and the Library does not have any perforations along its south elevation, the design needed to open to the west, and provide pedestrians a place to rest from fatigue or environmental conditions.

The clinic also needed to house a few parking spots for regular staff or disabled patients who need more convenience. The amount of parking spots provided on site could be reduced due to the ample opportunity and proximity of public transportation. This allowed there to be a small, rear parking lot on grade, rather than a garage like the Library.

Once the external approaches were determined, the important interactions that were to occur within the clinic ordered themselves, and began to create vital moments. The patients would need spaces where there was conscious interaction (lounge space, classroom space) as well as unconscious interaction space (waiting room, treatment room). The care team of physicians, nurses, and assistants would need spaces to speak to the patients as well as places to talk amongst themselves about difficult cases, in addition to offices where less formal discussions could occur. The community would need spaces to flood into the building. These spaces ranged in privacy needs, which could begin to order the interior layout. The juxtaposition of each of these sensitive areas would influence heavily how the community members within the clinic began to establish their network of connections.

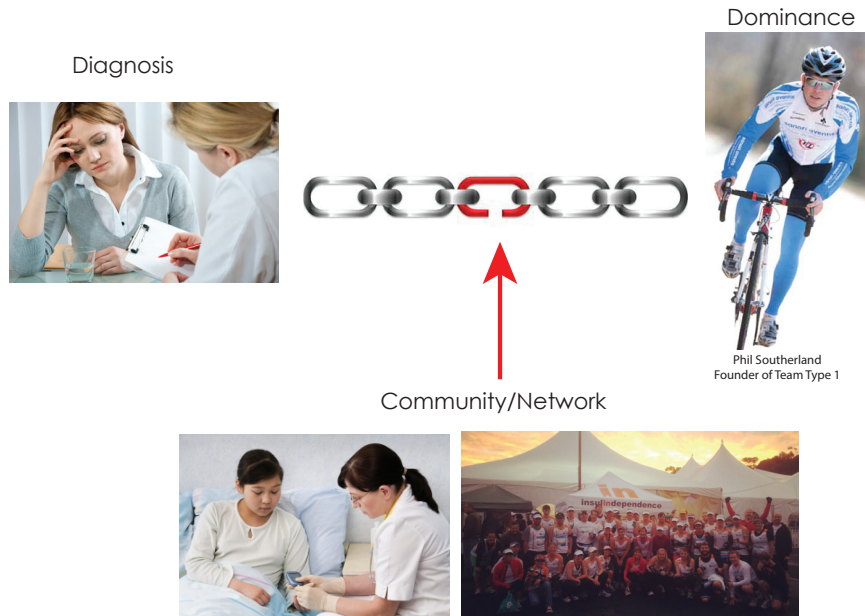


Figure 94

**Figure 94: Diagnosis to Dominance**

Autoimmune disease management requires knowledge and experience that is not available at diagnosis. The best way to dominate the condition is to create a network of support

**Figure 95: Personal Network**

This graphic shows the lengths that patients sometimes have to go to in order to set up a network of support. There is no centralized system, and finding each piece of the puzzle can take substantial periods of time.

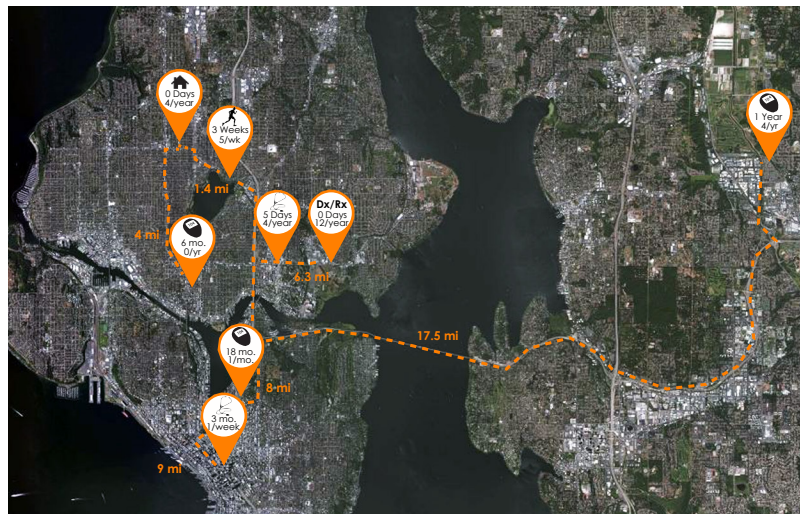


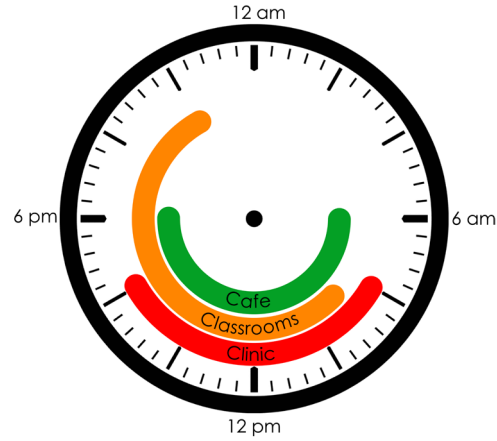
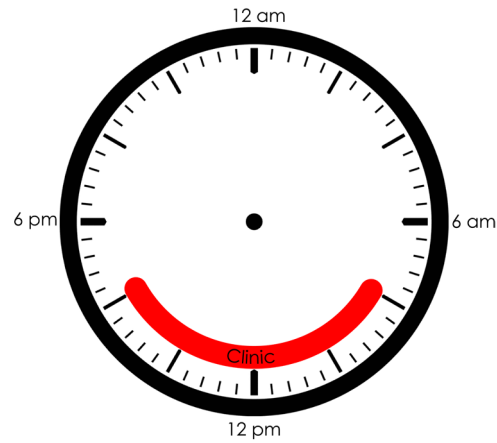
Figure 95

## Strategies

Once the conceptual framework had been finalized, several strategies were employed to best foster the interactive healing environment. First, the project's program created an opportunity for the building to interact with its environment more than the typical clinical hours of 9am to 5pm five days a week. The cafe, educational spaces, and research housed within the clinic could extend those active hours to 6am to 10pm, as well as open hours over the weekend. This would compliment the Library, and allow the building to be an asset in the neighborhood fabric more consistently.

The clinic could also explore opportunities to create customizable and personable spaces for the patients and staff. Once such instance could occur in the exam room enclosure. Having a versatility in the exam room setting could allow patients and staff to choose in which environment they are most comfortable, and even control light/ventilation in that space. Three strategies were explored in the design process of varying privacy levels: a completely enclosed room, a room with a skylight, and a room with a skylight and windows. These three options presented the inhabitant with the opportunity to have exterior views/natural sunlight, or complete privacy.

On a larger scale, the skin of the clinic should provide transparency for a dialogue between the interior and exterior, but also provide a texture for the visitors to interact with, especially with the complications possible due to Autoimmune disease. Having these two ideas come together in a way to identify where the skin is manipulatable could help the visitor understand the space



### Daytime Street Interaction

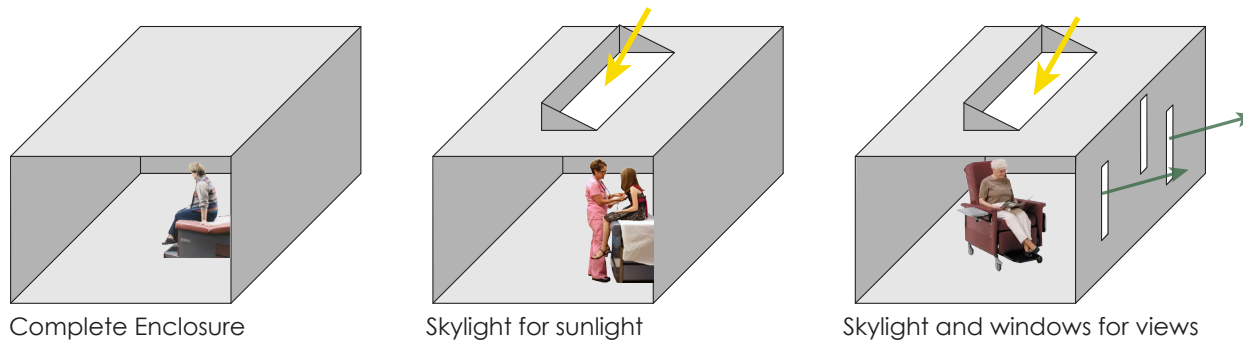


### Nighttime Street Interaction



**Figure 96: Hourly Usage**

The additional program inside the clinic extends its daily usage hours from the typical hours of 9-5 Monday-Friday. The clinic could have hours closer to 6am-10pm during the week and abbreviated hours on the weekend

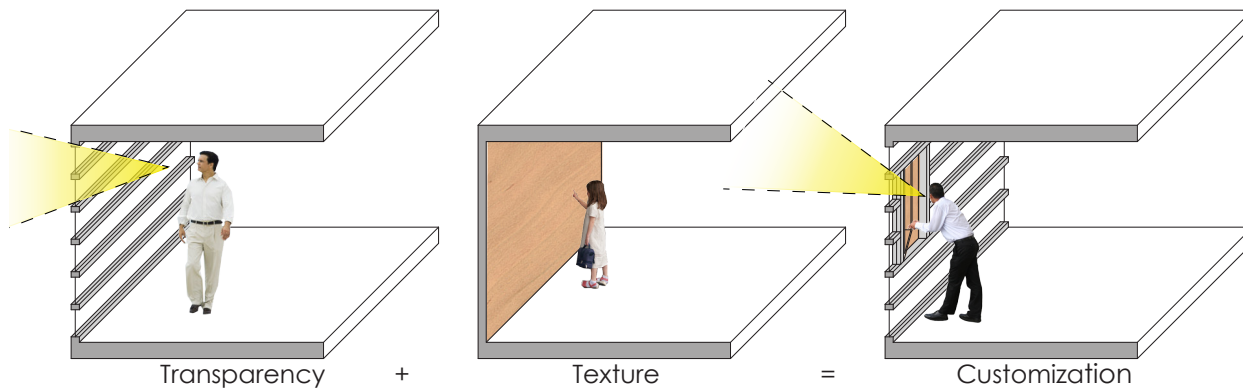


Complete Enclosure

Skylight for sunlight

Skylight and windows for views

**Figure 97**



Transparency

+

Texture

=

Customization

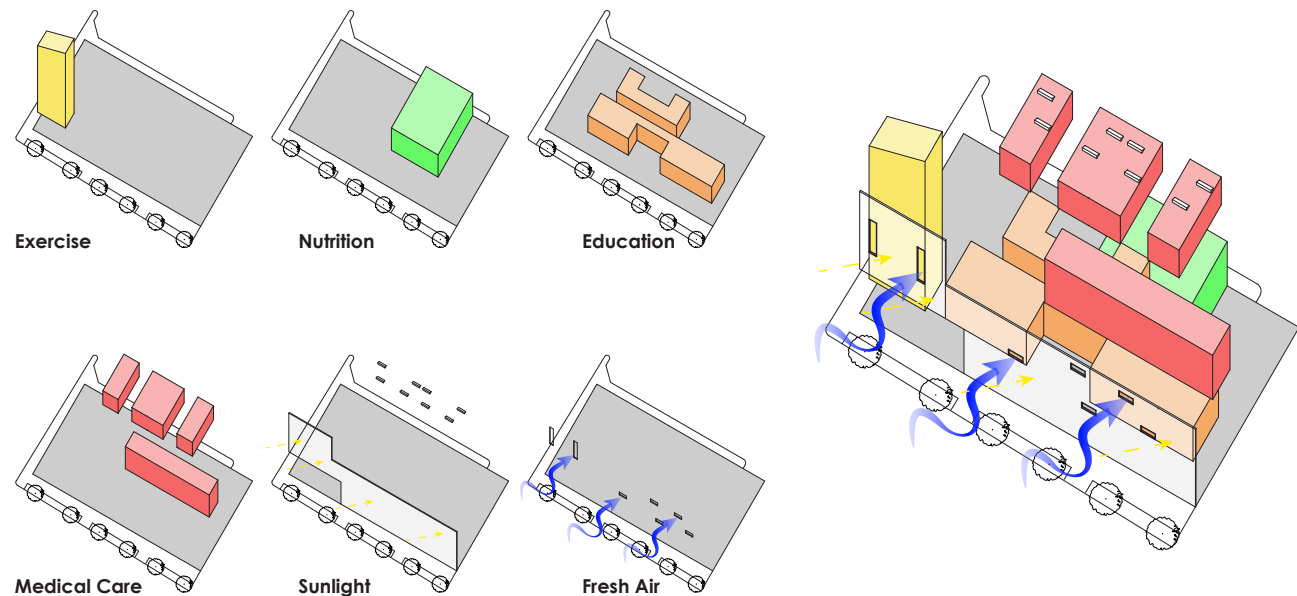
**Figure 97: Exam Room Versatility**

Both patients and staff have differing opinions on the optimal level of privacy for exam rooms. By providing a series of options, the space allows the inhabitant to choose the room that matches their comfort level.

**Figure 98: Materiality Interaction**

The skin of the building should allow for a dialogue between the interior and exterior spaces, but also provide a texture for the visitors to interact with and manipulate.

**Figure 98**



**Figure 99: Teaching through Form**

The building, through form, could begin to educate visitors on important treatment options that can be self-administered, such as exercise and nutrition.

The building itself could begin to explain through massing how the patients can manage their conditions. Exercise, Nutrition, Sunlight, Fresh Air, Education, and Treatment are important factors in all of the conditions involved in this project, and each could be emphasized in the physical manifestation of the project.

## **Final CommunityCare Clinic Design**

The final design for the clinic starts with the arrival to the site, whether from the West on 22nd Avenue NW or the East on 21st Avenue NW. On the approach, the exterior of the building takes on some of the language from the Public Library, like materiality and scale. The building is heavy timber construction, and uses expressed wood structural members to clearly illustrate the structure to occupants. On the East and West elevations, the clinic uses vertical wood cladding. This material provides a textural and temporal characteristic to the building with which the occupants can connect. The South elevation displays a curtain wall system that runs glazing from the street to the roof. This strategy utilizes the south light available on site, and gets natural daylighting deep into the clinic. The mullion system creates a grid of approximately 60" by 30" for each window, which helps to break down the scale of the building and personalize the space. The glazing also allows for a level of transparency, and creates a language between the interior and exterior spaces. Inside this curtain wall system, places where occupants can interact with the skin change material from the steel curtain wall frame to a wooden frame. This situation occurs in three ways: the entrance, operable windows, and ground floor awning doors.

At the entrance, the south wall sets back twelve feet on the west edge of the site, but only on the first floor. The covered setback creates a soft edge where pedestrians can rest or escape the weather, where cyclists can park their bikes, and visitors can enter the building. Here, the main stair cuts through the building with a glass volume in order to emphasize the vertical circulation and promote physical exercise. The staircase also shows people on the street that there is access to the roof terrace.

22nd Avenue NW

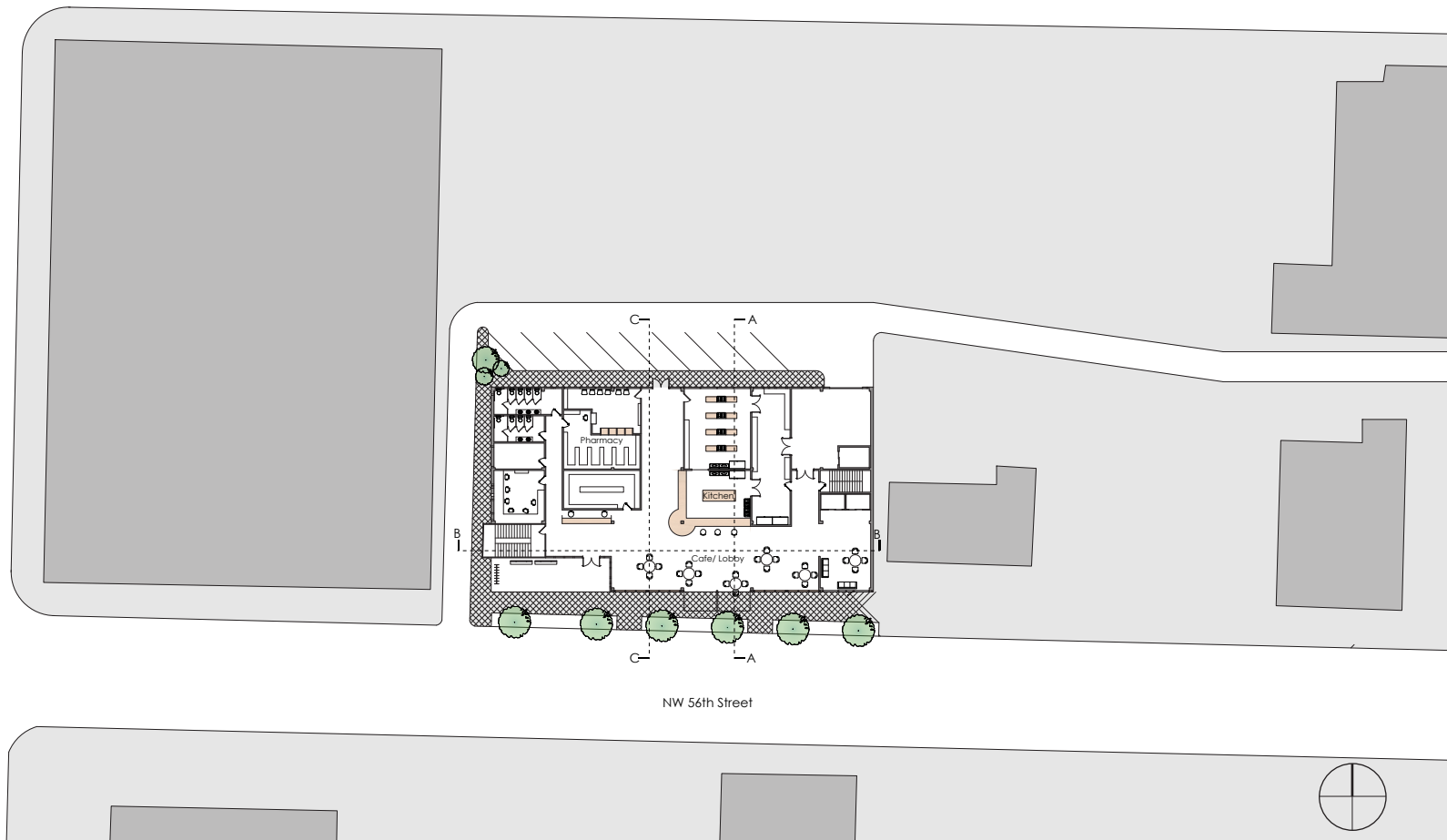


Figure 100: Site Plan at 1/64"-1'

The operable windows on the south curtain wall have a wooden frame inside the steel grid system. This approach immediately informs the occupants where they can manipulate the skin and begin to make the space their own. These windows manifest in three manners: a small casement window or an awning window in single height spaces, and a large casement window in double height spaces.

The third installment of the operable system happens only on the first floor in the cafe/lobby area. Here, to promote flow and help entice people from the neighborhood into the cafe, six awning doors open and create an overhang. This approach helps to soften the barrier the building facade presents, as well as inform the public of some functions within the space. When the doors are opened, cafe tables can slide out to an exterior space, and occupants can enjoy a cup of coffee outside and engage the street activity.



**Figure 101: Approach to the Clinic from 22nd Avenue NW**



**Figure 102: Approach to the Clinic from 21st Avenue NW**



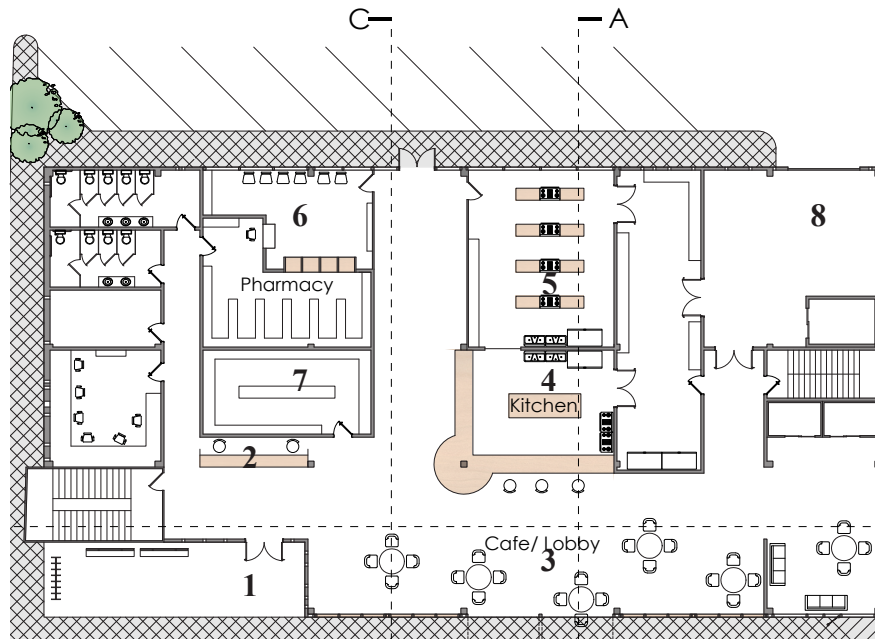
**Figure 103: South Elevation**

The glazing on the south facade sets up a dialogue between the surrounding context and the interior program, but it also acts as a screen when necessary. During the day, the first floor seems very permeable with the operable doors and windows, as well as the line of sight through the glazed skin. This makes the cafe and reception area a very public space. The same system works in a very different way on the upper floors. Because of the light differential between interior and exterior space, it would be difficult for pedestrians on the street to see into the program on the upper floors. Instead, the glass would be more reflective. In addition, the most private space, the treatment room on the third floor, is set back an additional twelve feet and rests behind a garden terrace. This move completely, but subtly, separates the most private space from the public front.



**Figure 104: South Elevation at Night**

The role of the south curtain wall changes completely at night. The medical functions of the clinic typically begin to wrap up about the time the sun goes down. At this time, the private functions inside the clinic have ceased, and a typical clinic would close for the day. With the addition of social and educational program, the building remains active, and now becomes a beacon to the neighborhood. The curtain wall becomes transparent when it is dark out, and the classrooms and cafe can clearly be seen from the street. Now, if a pedestrian walking past the building looks up at the second floor, they might see an interesting activity. They might even be intrigued and want to go inside to get involved, even if they previously had no connections to the clinic. The transparency at this stage of the day allows the building to passively educate the neighborhood.



**Figure 105: First Floor Plan at 1/32"=1'**

**Plan Key**

- 1- Main Entry**
- 2- Admittance Desk**
- 3- Cafe/Lobby Area**
- 4- Kitchen**
- 5- Cooking Classroom**
- 6- Pharmacy**
- 7- Records Storage**
- 8- Loading/Storage**

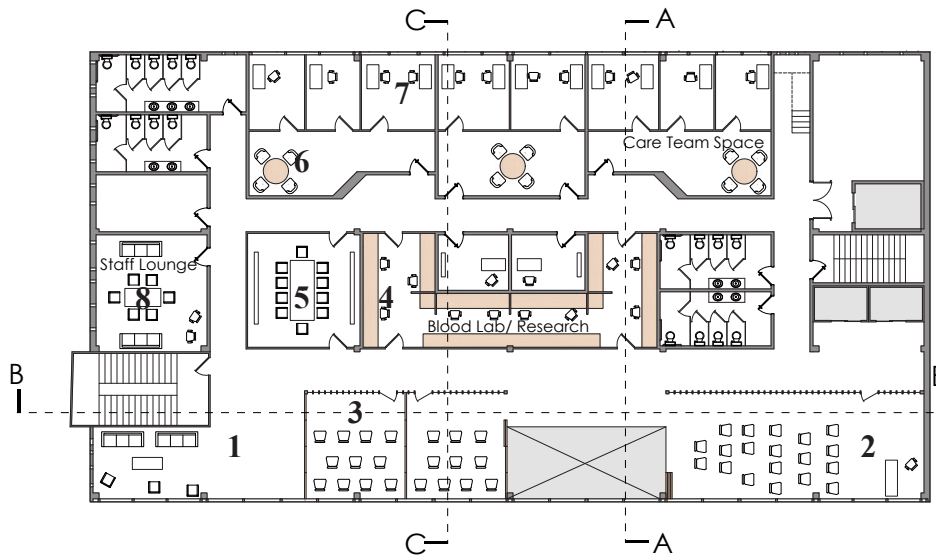
The first floor plan houses most of the public functions, and works to entice both clinic visitors and community members into the space. Once through the main entry, visitors approach an admittance desk, which acts as a buffer to make sure visitors go to the appropriate space, rather than wandering to private spaces. The proximity of the stairwell to the admittance desk helps to reinforce the idea of exercise when possible. The two elevators are located on the east side of the building, so they are easily accessible, but not celebrated.

The hallway to the right of the desk leads to the pharmacy and the cooking classroom. The cooking classroom presents visitors with the opportunity to learn to cook for specialized menus that many patients may explore as part of their treatment. The classroom also connects with the kitchen for the cafe, so that there can be a shared storage space and direct communication between the two areas.



**Figure 106: Cafe Rendering**

There are ways to enter the building: the main entrance, the operable doors on the south facade, and the rear door that leads to the parking lot. At a centric location between these entrances, the cafe works as a landmark to orient visitors. The cafe would tailor toward specialized dietary options for patients at the clinic. This would also act to educate the community who may enter the building with no knowledge of autoimmune disease, but may leave understanding how gluten affects the body, or the glycemic index of their standard breakfast order. The cafe would also engage staff through this dietary specialization. The part time nutritionist may be the one who organizes and explains the nutritional values of the food offered.



**Figure 107: Second Floor Plan at 1/32"-1'**

**Plan Key**

- 1- Patient Lounge**
- 2- Classroom (Large)**
- 3- Classroom (Small)**
- 4- Blood Lab/Research Area**
- 5- Conference Room**
- 6- Care Team Breakout Space**
- 7- Physician Offices**
- 8- Staff Lounge**

The second floor mainly consists of educational program. A visitor exiting the main stair first comes to the patient lounge, a double height space on the southwest corner of the building. This space would allow for patients to socialize in a less formal space. It could have items like an activity board where community members post interests they have in hopes of forming a group. There is also a view from this space to the third floor terrace garden.

Along the south face of the building, there are three classrooms, two small and one large to accommodate a wide variety of activities. For a lecture, they could remain closed. For larger events, like a treatment expo, the partition walls of the classrooms could collapse, and create a single, contiguous space. The walls on the north edge of the rooms are not partitionable, but are a wood slat and glass system to screen out some confusion from the hall, but allow transparency with purposeful intention.

On the other side of the hall from the classrooms, a glass panel system allows visibility into the blood lab/ research area. This is the space where researchers test the samples taken upstairs, as well as conduct clinical



Figure 108: Classroom Open



**Figure 109**

**Figure 109: Classroom Closed**

The classroom spaces, when the partition walls are closed, offer a variety of sizes of space for meetings or lectures

research trials. Transparency here allows visitors who are walking to a classroom to look in and see the work that is underway to find new treatment systems and potential cures.

There is also a balcony between the two smaller classrooms and the large classroom. This double height space allows people in the cafe to observe activity on the second floor, and potentially venture upstairs to further explore.

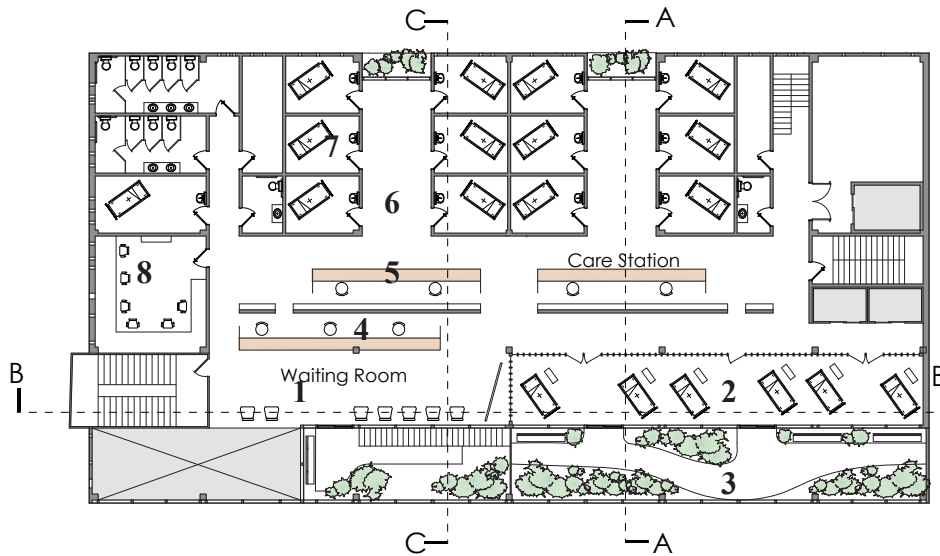


**Figure 110**

The north side of the second floor houses the physician offices and care team breakout spaces. The concept of combining different specialists into a comprehensive care team takes shape here. Some offices are for single doctors, while others are paired. The offices within a care team have partitionable walls, so they can be reorganized if the team shifts. Each of three care teams has a breakout space attached to their offices to allow for the physicians, nurses, and assistants to come together and discuss cases or issues.

**Figure 110: CareTeam Breakout Space**

The Care Team breakout space allows for the entire care team to meet and discuss difficult diagnoses or confusing complications.



**Figure 111: Third Floor Plan at 1/32"-1'**

**Plan Key**

- 1- Waiting Room**
- 2- Treatment Room**
- 3- Garden Terrace**
- 4- Reception Desk**
- 5- Care Station**
- 6- Care Team Pod**
- 7- Exam Room**
- 8- Administration Office**

The third floor houses the medical program of the clinic. Immediately after leaving the stairway, the visitor enters the waiting room. The reception desk works to divide the waiting room from the exam spaces on the north side of the building. On the other side of the wall behind the desk, the two care stations divide the twelve exam rooms into two pods. Each care team is responsible for six of the exam rooms. At the end of the hall for these pods, there is a small garden space that provides a view of vegetation to help relieve stress before the patient enters the exam space.

For longer treatments, there is a treatment room on the southeast corner of the floor. This space has six beds, with curtain partitions for privacy. Many patients at the clinic may occasionally have treatments that last between two and six hours (treatments like dialysis or mixed meal tolerance tests). During this time, many patients can feel the need to socialize with others in the treatment room, or close the curtain to be alone. This space has a private garden terrace to the south that provides relaxing scenery, and frames a potential view of Ballard, Salmon Bay, or maybe Mt. Rainier on a nice day. The patients, if they are not tethered to machines, are free to go outside and walk around the



**Figure 112: Treatment Room**

The treatment room is for patients undergoing longer procedures. It can be a very social area, and should provide a variety of experiences

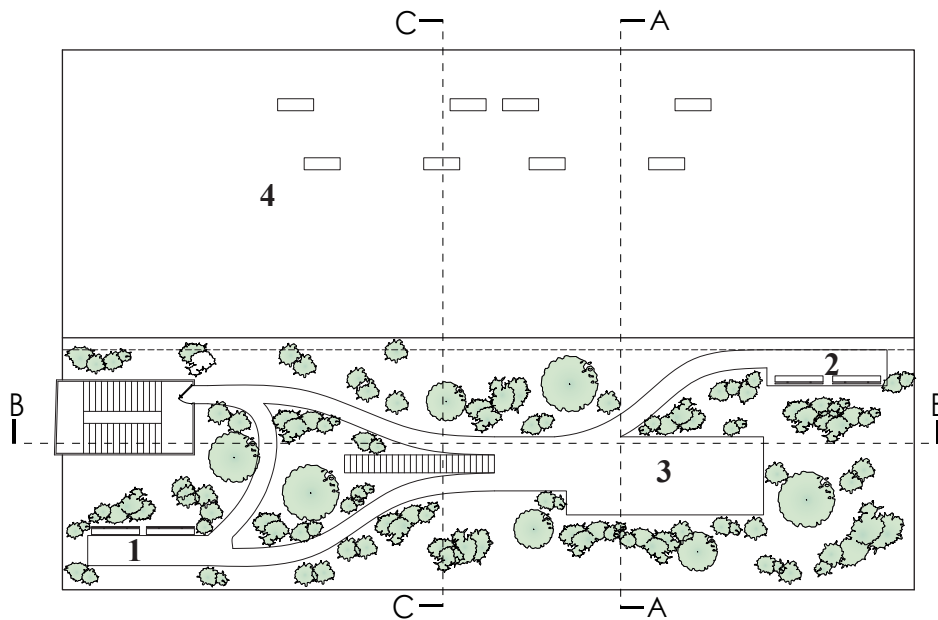


**Figure 113: Waiting Room**

The waiting room is a space where a multitude of patients and care providers can interact and share experiences.

garden space. The roof terrace is covered by the overhang roof, which makes the space comfortable regardless of the weather, whether it is sunny and warm or rainy and cold.

There is also a terrace garden off of the waiting room, so that people who may have time before their appointment can step outside and enjoy a nice day. On this section, there is a small staircase to the roof where there is a larger garden space



**Figure 114: Roof Terrace Plan at 1/32''-1'**

**Plan Key**

- 1- South overlook area**
- 2- North overlook area**
- 3- Group therapy area**
- 4- North Roof**

The roof separates into two elements. The south roof has an occupiable roof garden, which is accessible through either the main stair, or a small staircase from the waiting room terrace. Once on this space, a visitor may just want to wander around the healing garden to help alleviate stress, or set up a lunch.

There are also several program spaces on this terrace. There are two overlook areas, one looking south and one looking north, where people can observe the surrounding context. There is also a group therapy space where events like yoga for MS patients may occur.

The north roof is set five feet lower than the south roof. This creates a clerestory window for the waiting room and treatment room, while also lowering the ceiling height in the exam rooms to a more personable eight feet. This roof is not occupiable, but would have natural vegetation, as well as the skylights for some of the exam rooms.



**Figure 115**



**Figure 116**

**Figure 115: Roof Terrace Rendering**

The image displays the roof garden's identity as a healing garden. It can be a place where visitors relieve stress

**Figure 116: Roof Terrace Rendering**

The image illustrates the group therapy area during a "Yoga for MS" class. This space creates a space for a variety of outdoor activities to occur

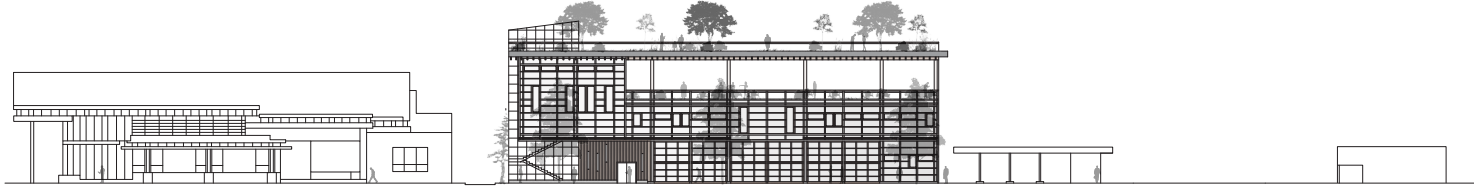


Figure 117: South Elevation at 1/64"-1'

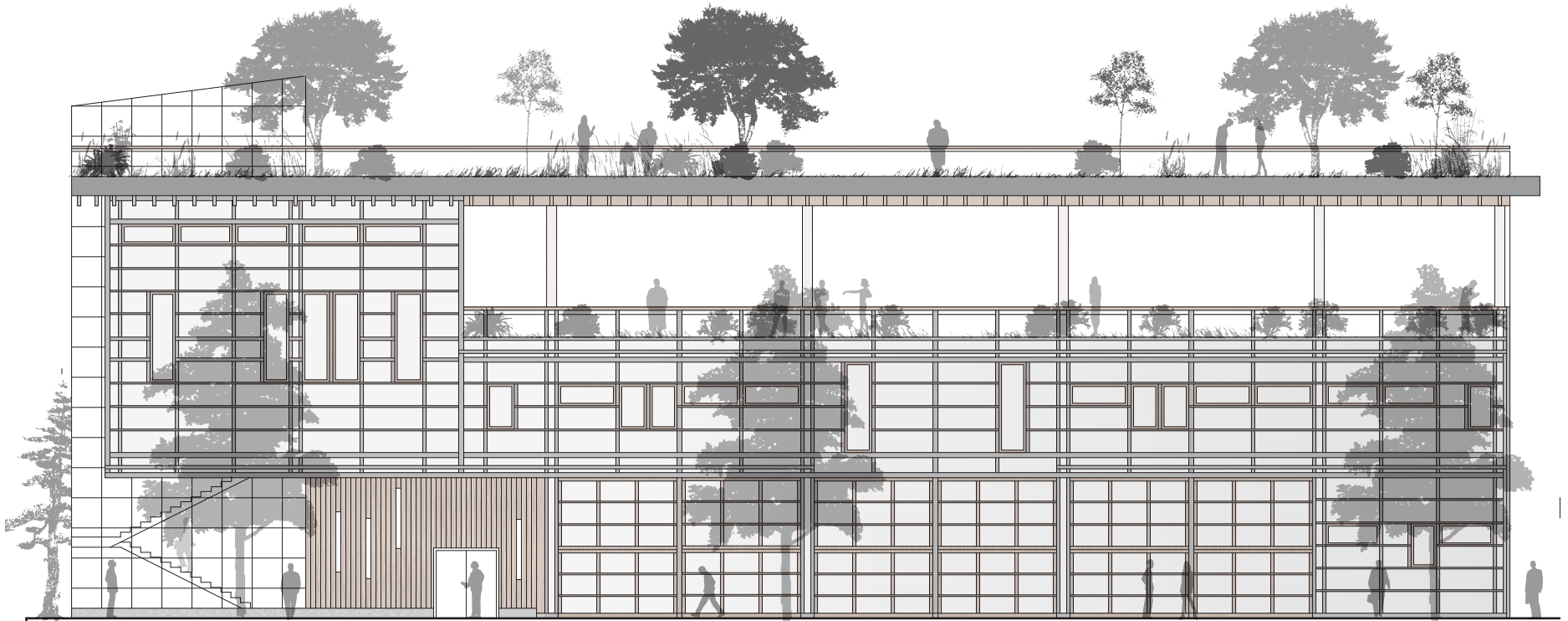


Figure 118: South Elevation at 1/16"-1'

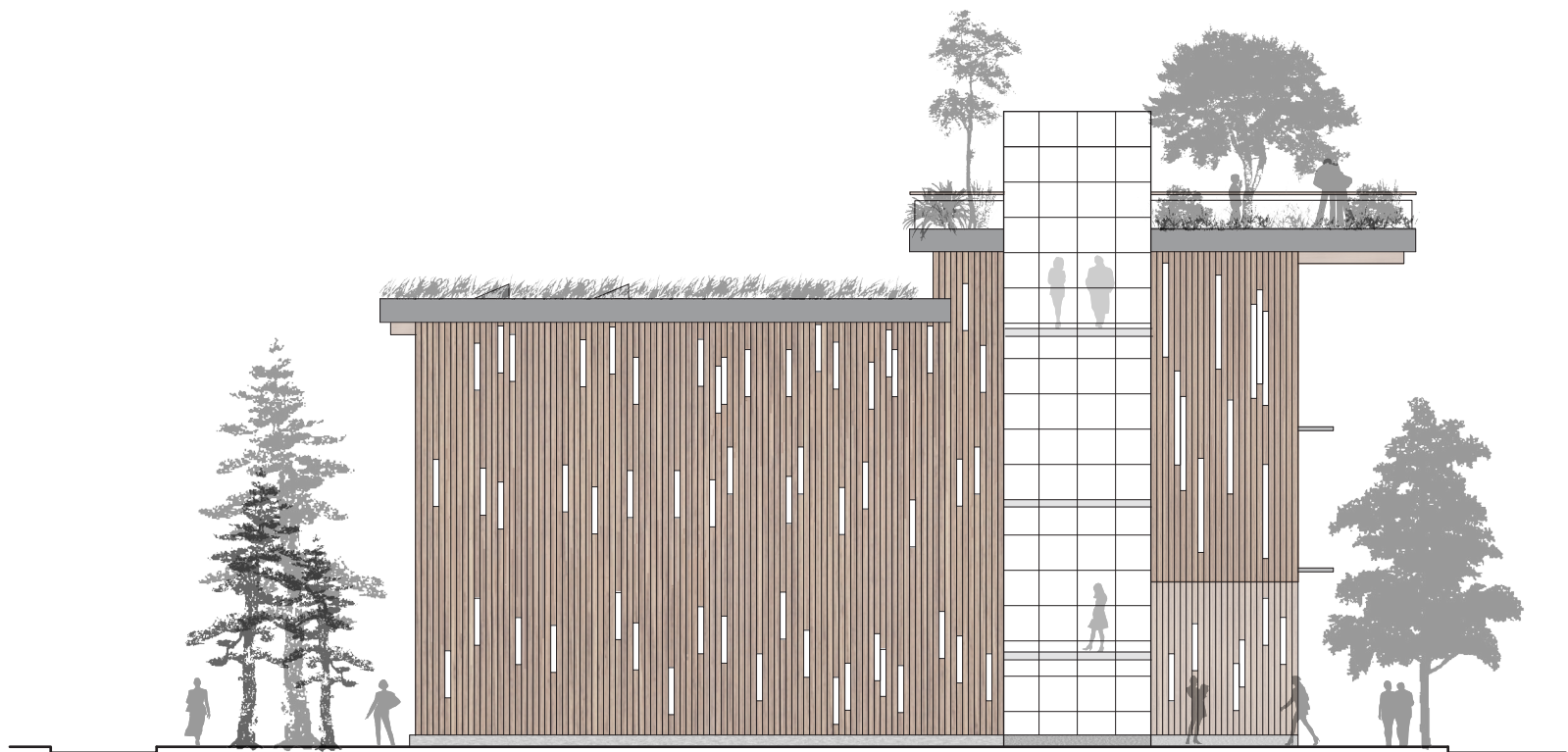


Figure 119: West Elevation at 1/16"=1'

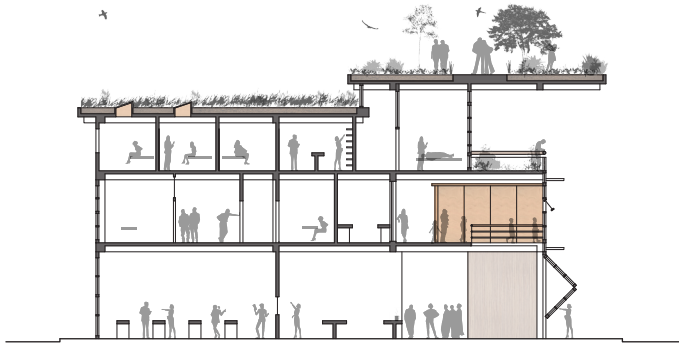


Figure 120: Section A at 1/64"-1'

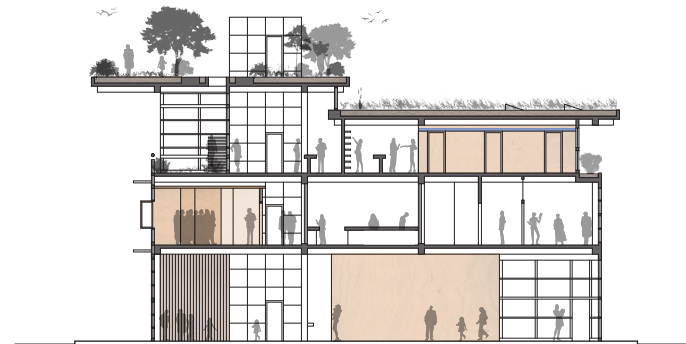


Figure 121: Section C at 1/64"-1'



Figure 122: Section B at 1/64"-1'

## Presentation Discussion

In the final presentation, several questions and comments were raised by the review jury in response to the clinic design. This section will reference many of these questions raised.

The jury questioned the transparency along the South Elevation of the clinic, specifically how it related to the privacy of the patients on the third floor. There was concern that the floor to ceiling curtain wall would make the patients in the waiting room and treatment room feel vulnerable, and could possibly allow people on the street or in nearby buildings to see into the private space. While I understand the concern of these comments on privacy for these clinic occupants, I believe the design offered many solutions for this. By shifting the treatment spaces to the third floor, the street occupants would not have a line of sight into the third floor. Also, the lots to the south of the clinic are not currently planned to build up to the 65 foot height restriction, so they also would not have a line of sight. If these solutions were not adequate in providing privacy for these users, then the design could incorporate fritted glass to screen visibility into the building. The review also raised an alternative strategy, to introduce opaque panels or translucent panels to the South curtain wall language.

Another question raised in the review regarded the roof terrace. The comments about the roof terrace mainly concerned two aspects: its feasibility in the Pacific Northwest climate, and the visibility from the street. First, the climate in Seattle would present a challenge for this space, due to the overcast and

### Final Review Jury:

**Joel Loveland, Committee Chair**

**Dr. Bob Mugerauer, Committee**

Heather Burpee- UW IDL

Jeff Boone- Public 47

Anjali Grant- Mahlum

James Thompson- UW BE Ph.D

wet weather through the majority of the year. During the winter months, this space would not be as active as in the summer, and it may become neglected. The response to this concern was presented from within the jury. The third floor covered terrace created a space that could be occupiable regardless of the weather conditions outside. The other concern, the visibility from the street, mainly insinuated that the occupants of the roof terrace would feel like they were on a podium on the roof, on display for the neighborhood. This is a valid concern, and I feel that with the appropriate scale of the roof terrace, as well as the arrangement of vegetation, the terrace would not appear to be a podium, and would limit invasion of privacy from the street, but would also allow the street occupants to see the vegetation and possibly be inspired to visit the space themselves.

The last main comment raised in the public defense concerned a communication between the floors of the clinic. The review questioned the relatively isolated nature of each floor, and wanted to see more spaces that could bridge the different program, and link activity. This was a design question that had been explored at great length during the design period. There was a struggle to connect the program, while maintaining a separation from public to private. Having a space that connected the cafe with the waiting room could have caused uneasiness and stress in the patients due to a lack of privacy. In addition, the design did not have a lot of flexibility along the south edge of the clinic, where the public functions are housed. The final design incorporated two spaces that opened up between floors- one in the lobby that allowed a connection between the cafe and the classrooms, where interactivity could create a more successful experience, as well as one between the second floor

lounge and the waiting room area, which would allow people in the second floor patient lounge to observe the third floor terrace. These moves were an attempt to break up the rigor of the program, but more development on these moments could help to foster a healthier environment.



## Chapter 6: Conclusion

This thesis began as an attempt to create a healing environment in which patients felt comfortable to interact and share experiences with one another. Fueled by my own struggles in the first two years after diagnosis with Type 1 Diabetes, I felt that this was an aspect of healthcare that was absent in the current clinic atmosphere. This idea of integrating socialization with healing remained the core concept from the day of inception to the day of completion. Over the eight months this project developed, the program added elements and focused on new areas such as neighborhood involvement and community education, but the fact that the initial concept remained the driving force helped to keep the message clear for the final design, and also helped to keep the project personally grounded, giving it a more humanistic touch.

The process of reviewing this document has revealed the impact of the pre-design research. Many of the design decisions that seemed simple and almost automatic can be traced back to the theoretical framework. One such decision was the customization/personalization of spaces like the south curtain wall or the classrooms. These were decisions that seemed logical to help individuals identify with their surroundings, but, on further review, were detailed

in the theoretical framework area of the research. Obviously there were decisions that were directly influenced by the research, such as the care team organization for offices and care stations.

One place the project really changed and grew is the neighborhood context. At the beginning of the project, the clinic was labeled as a “community care center”, but the ideas and approaches identified more with a stand alone, contextless clinic in a rural setting. Many of the sites initially surveyed were not a part of consistent urban fabric, and focused more on the natural landscape. Through the iterations of design though, the concepts revealed the importance of neighborhood context and strong adjacent ties. While natural form remained important, a building in a neighborhood can have a much stronger connection with the community than one set alone. Also, the language inside the space, the dialogue between patients and the built form, is much more important than the language outside the space.

My hope for the future is that this clinic design fuels the conversation that chronic diseases, namely autoimmune diseases, are not to be feared in isolation, but rather fought in commune with others. I hope that through this, the rigid program with which firms design clinics can loosen up, and have priorities in addition to treatment and efficiency. These changes would create a stronger holistic healing environment.

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