EVIDENCE-BASED HEALTHCARE DESIGN: A THEORETICAL APPROACH TO A SUBSTANCE ABUSE TREATMENT FACILITY INTERIOR DESIGN

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ABSTRACT

EVIDENCE-BASED HEALTHCARE DESIGN: A THEORETICAL APPROACH TO A SUBSTANCE ABUSE TREATMENT FACILITY INTERIOR DESIGN

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This thesis aimed to develop a theoretical background on two major healthcare design theories: Nightingale's (1859) Nursing Environmental Theory and Ulrich's (1991) theory of Supportive Design. Ulrich's ideas eventually led to the development of Evidence-based design, the practice of basing design decisions on extensive research (Hamilton, 2003). Utilizing the theoretical background, The Supportive Design Space Assessment Matrix was developed. This matrix was used to assess supportive design elements in two pre existing substance abuse treatment facilities, one of which was an evidence-based design, and the other which was a retrofit design. Based on the matrix, it was found that the evidence-based design was more successful in providing a supportive environment for its patients. The other goal of this thesis was to utilize the theoretical framework, case studies, and Supportive Design Space Assessment Matrix to develop a retrofit design for a substance abuse treatment facility. The design for this thesis project was created using the concept of a hummingbird, which symbolizes that all obstacles can be overcome. This is a suitable concept for this project because it demonstrates strength and courage for teens who are undergoing a difficult time in their lives. The proposed design for this thesis incorporates strategies that encourage social support, sense of control, and positive distractions through nature. Proposed floor plans and computer renderings demonstrate how substance abuse treatment facilities can successfully foster coping with stress and promote healing.

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CHAPTER 1. INTRODUCTION

1.1 Background

Quality of care in a hospital environment can greatly affect patient health and wellness (Nightingale, 1859); however, the impact of the built environment on patient health cannot be overlooked. Roger Ulrich (1984) began researching this topic when he conducted a ground breaking study which revealed that patients recovering from surgery who had views of nature suffered fewer complications, used fewer pain medications, had fewer nursing complaints, lower blood pressure readings and shorter hospital stays than recovering surgical patients who had views of a brick wall (Ulrich, 1984). Although healthcare facilities are centered on patient care and safety, staff wellbeing is just as vital. In 2002, registered nurses had a turnover rate averaging 20 percent, and quality of care in many of today's hospitals was lacking (Ulrich, 2004). This was suspected to be due to a number of reasons hidden within the confines of the built environment, such as the lack of a variety of patient room types, poorly functioning ventilation systems, over-crowding, excess noise, and inefficient layouts (Marberry, 2006). The Joint Commission on Accreditation of Healthcare Organizations found that poor physical working conditions, such as long hours, over-crowding of workspaces, and inadequate lighting contribute to staff burnout (Ulrich, 2004). Evidence-based design practices in the design of healthcare environments can remedy this issue, and as a result reduce staff stress and fatigue, thereby increasing quality of care. This practice improves patient safety, reduce patient stress, and improve overall well-being (Ulrich, 2004).

Evidence-based design is the practice of basing design decisions on research that improves health care delivery in quantitative and qualitative ways. Evidence-based design practices in the healthcare environment are used to create therapeutic environments that are

physically and psychosocially supportive, economically efficient, and spiritually restorative for staff and patients undergoing stress (Hamilton, 2003). Hamilton (2003) discussed the four levels of evidence-based design.

According to Hamilton (2003), level-one practitioners (architects, design professionals) make the effort to create a design based on readily available evidence. One example of a level-one project would be a design for a hospital whose concepts were based on reviews of other evidence-based projects and interpretations of published research. Level-two practitioners not only explore available evidence to create a healthcare environment, but they also hypothesize expected results from the proposed design interventions. Level-three practitioners take this a step further and report findings in the public eye through trade magazines, press conferences, etc. This practice contributes to advances in evidence-based design and serves as available evidence for future evidence based design practitioners. Level-four practitioners, like level-three practitioners, publish their findings in the public arena, however level-four practitioners publish their work in scholarly journals that require peer review.

Many healthcare facilities in the United States have successfully shown that the designs of their facilities have contributed to the overall health and wellbeing of the patients, visitors, and staff. Many of these facilities were constructed as part of The Pebble Project, which is "*a unique and dynamic collaborative, where forward thinking healthcare organizations, architects, designers and industry partners work together to identify built environment designs and solutions that measurably improve patient and worker safety, clinical outcomes, environmental performance and operating efficiency"* (Pebble Project, 2013). The Pebble Project is associated with the Center for Health Design as the center's main research initiative, and it strives to use evidence-based design principles in the construction of healthcare buildings around the world.

Design stakeholders, in conjunction with the Center for Health Design's research consultants, develop approaches to implement, record, and report the findings of their actions. At least 38 healthcare facilities have been constructed as part of the Pebble Project ("Pebble Project," 2013). The project has published at least 40 reports and papers that link the built environment to patient outcomes. Facilities constructed as part of the Pebble Project would be considered level-4 evidence-based design projects, according to Hamilton's research (2003).

A variety of healthcare facilities, such as hospitals, specialty hospitals, long term care facilities, short term care facilities, and inpatient/outpatient care facilities have been constructed around the principles of evidence-based design, and several have been featured in the public eye, thus contributing to the overall realm of evidence based design practices. Although there are several published evidence-based design healthcare facilities, very few publications feature substance abuse treatment facilities utilizing this approach to design. A substance abuse treatment facility is a specialized facility whose programs are designed to help patients recover from alcohol and/or drug additions. According to the Michigan Department of Community Health, 60% of Michigan adults used alcohol in the past month, while 16% of youth between the ages of 12-17 consumed alcohol (Fussman, 2012). In addition, 27% of adults admitted to binge drinking within the last month, and 10% of the youth population admitted to doing the same (Fussman, 2012).

In 2011, the Michigan Department of Community Health conducted a survey (Fussman, 2012) which suggested that the more a high school student consumes alcohol, the more likely it is that he or she will partake in recreational and prescription drug use. The data found that binge-drinking students admitted to consuming prescription painkillers and other prescription drugs without a doctor's written consent. These types of behaviors have been shown to lead to long-

term addictions to alcohol and illicit drugs. Half of all lifetime cases of mental and substance abuse use disorders in Michigan begin by age 14 and 75% by age 24. In 2012, 50,586 people were reported to be currently seeking treatment through one of 17 substance abuse treatment agencies in Michigan, and only 29.3% of people were reported to have completed their treatment programs, 24% transferred to another facility, while 28% left against staff advice.

According to the 2012 National Survey on Drug Use and Health (NSDUH), the rates of substance addiction in the United States for persons aged 12 or older highest for the Western region and second highest in the Midwest (National Survey, 2012). Of all participants surveyed who admitted dependency to drug and/or alcohol abuse in the last year, 95% said that they did not need treatment for their illnesses, while 4% believed they needed treatment but did not make an effort to do so, and only 1% made an effort to seek treatment for their addiction. Not knowing where to go for treatment was one of many reported reasons for not seeking treatment (U.S. Department of Health and Human Services, 2012).

1.2 Problem Statement

Due to the overwhelming number of addicts who do not seek treatment for their addictions, the National Survey on Drug Use and Health (NSDUH) discussed the need for additional specialty treatment facilities nationwide. These types of facilities included the addition of inpatient treatment hospitals, drug or alcohol rehabilitation facilities (both inpatient and outpatient), and mental health centers (U.S. Department of Health and Human Services, 2012).

Chronic stress has shown to lead to drug abuse and relapse among vulnerable individuals (Sinha, 2001). To better provide an environment for recovering addicts, substance abuse treatment facilities should be designed to help patients reduce their stress levels. Westreich,

Heitner, Cooper, Galanter and Guedj (1997) found that a lack of social support leads to elevated stress levels among recovering addicts, which ultimately leads to relapse. While there are a number of substance abuse services in the greater Lansing, MI area, few serve as long-term treatment facilities that serve teenagers between the ages of 12 and 18, and even fewer show any evidence to have been designed using any kind of theoretical background to promote stress reduction and recovery. Utilizing an evidence-based design approach to creating a youth rehabilitation facility in the Lansing area could help alleviate chronic stress among patients, thereby reducing the rate of relapse among youth in the area (Westreich et al., 1997).

1.3 Purpose and objectives

This thesis aimed to utilize theoretical framework and case studies to develop a space assessment matrix, which was used to design a long-term substance abuse treatment facility designed to foster coping with stress and allow for natural healing. The facility serves the needs of youth ages 12-18 in the State of Michigan. The design of the new treatment center integrates the ideas of Roger Ulrich and Florence Nightingale in a space that provides an optimal healing environment that promotes coping with stress. Based on the idea that chronic stress leads to relapse (Sinha, 2001), a facility that utilizes supportive design strategies to alleviate stress encourages recovery and helps prevent relapse among facility residents (Ulrich, 1991; Westreich et al., 1997). The success of this thesis project relied upon the following objectives:

1. **Review Supportive Design Theory and the Nursing Environmental Theory.**

   This objective was achieved through a close look at existing literature. The literature includes the findings of Roger Ulrich's (1984, 1991) Theory of Supportive Design as well as the findings of Florence Nightingale (1859) and her followers' contributions to the development of Nursing Environmental Theory. For the purpose of this

research, all elements of supportive design, as described by Roger Ulrich were reviewed, while Florence Nightingale's research served as supplemental information to enhance Ulrich's findings. Ulrich's and Nightingale's research was used to develop a list of supportive design guidelines to be applied to the new facility design.

2. **Evaluate the implications of these theories on existing facility designs.**

   The list of supportive design guidelines that were developed in objective one were used to evaluate the existing conditions of two substance abuse treatment facilities. The Brighton Center for Recovery is a treatment facility that has been retrofitted multiple times since the 1940's to accommodate to the changing needs of the campus. The Rosecrance Health Network, on the other hand, is a newly constructed facility that was built utilizing principles of evidence-based design. The facilities were toured, and photos of the built environment documented any evidence showing examples of the use of Supportive Design Theory and Nightingale's Nursing Environmental Theory.

3. **Redesign a vacant building to serve as an addiction treatment facility.**

   The design process for this thesis includes an in-depth literature review pertaining to existing theories as well as design strategies known to correlate with findings in past theoretical research. Case studies discuss existing rehabilitation facilities that utilize theory in the design of their buildings. After this extensive preliminary research was conducted, the schematic design phase commenced. During this process, the design concept along with conceptual images, space planning, and ideas were implemented. Following the schematic phase, the design development process began, where space

planning, ideas, concepts, finishes and materials were finalized, and spatial images were rendered using computer imaging software.

1.4 Expected Outcomes

Although this thesis was not developed as part of the Pebble Project, there are many aspects of The Pebble Project that were considered. It is important to consider collaboration with various key stakeholders such as healthcare directors, members of the staff, contractors, building users and the surrounding community. The success of the development of design for this project relied upon preliminary interviews with facility managers and staff members at existing facilities. These conversations provided insight as to what design aspects should be considered in order for the new facility to function optimally to promote healing. In addition, attending site visits to pre-existing substance abuse treatment facilities helped explain how this type of facility is supposed to operate, what problems are often encountered in the physical design of these facilities, and how solutions to these problems have been achieved. By utilizing these strategies, this project envisioned a successful, functioning design that promotes healing for patients and reduces stress through supportive design techniques.

CHAPTER 2. REVIEW OF LITERATURE

2.1 Introduction

Studies have shown that the built environment can have a positive and/or negative impact on patient stress and overall health. This review of literature aimed to define the concept of stress in a substance abuse treatment facility setting while also illustrating the importance of the built environment in affecting patient health. Many of these findings were based on the ideas of Roger Ulrich's Theory of Supportive Design (1991), which is derived from Nightingale's Nursing Environmental Theory (1859). All elements of supportive design, as described by Roger Ulrich, were reviewed, while Florence Nightingale's research served as supplemental information to enhance Ulrich's findings; only elements directly related to the built environment were reviewed in detail.

2.2 Theoretical Research

a) The Nursing Environmental Theory (Florence Nightingale, 1859)

Florence Nightingale's (1859) research, although mainly focused on quality of care, discusses the built environment's impact on health in her Nursing Environmental Theory. Nightingale's Nursing Environmental theory suggests that it takes a combination of nursing and the surrounding environment to create an "optimal setting for God to act naturally" (Nightingale, 1859). To Nightingale, the surrounding environment was more than just nature and built structures. She was concerned with ventilation, light, room temperature, and mental stimulation as well as food intake, water consumption, and medication use (Libster, 2008). Although established in the late 1800s the theory describes several elements that coincide with current healthcare building practices. For example, Nightingale describes ventilation as the single most important element of a

healthcare environment and that health care providers should provide access to natural ventilation without affecting the thermal comfort of the patient (Nightingale, 1859). In addition to ventilation, Nightingale also suggests a list of other canons she believed contributed to optimal healing environments including temperature, lighting, noise, variety, social support, diet, health of houses, and cleanliness. Roger Ulrich began further exploring temperature, lighting, noise, variety, social support, and diet in the early 1980's, which led to the development of Supportive Design Theory (Selanders, 2010).

b) Supportive Design Theory

Healing and patient wellness, although dependent on patient care and adequate medication, is also greatly influenced by the built environment, as it is described in Supportive Design Theory. Roger Ulrich, one of the main researchers in the area of the built environment's impact on health developed a Theory of Supportive Design, which explains essential aspects of healthcare facilities that create the optimum environment in which patients can heal. Although Supportive Design Theory does not encompass all factors that might influence wellness, it focuses on how the built environment can improve overall health. The theory suggests that a healthcare environment will be psychosocially supportive if it is designed to increase a perception of control in patients, offers access to social support, and provide access to positive distractions like art nature, art, and spaces for therapeutic activities. The theory also suggests that target groups are not only patient-focused, but also includes visitors and staff (Ulrich, 1991).

c) Stress as it relates to Supportive Design Theory

Supportive Design Theory was developed around the concept of stress. During his research, Roger Ulrich defined stress as, "A major obstacle to healing." He indicated

in his research that there are often at least two identifiable sources of stress for a patient: the illness or injury itself and the physical environment (Ulrich, 1991). He suggests that elevated stress levels can lead to a variety of adverse physiological effects such as elevated blood pressure, muscle tension, suppressed immune systems, and psychological effects such as depression, anxiety, feelings of helplessness, sleeplessness, social withdrawal, and drug or alcohol abuse. The idea behind Supportive Design Theory is that a healthcare facility should be designed to alleviate stress levels by limiting features that could become stressors and by incorporating features that are designed to have stress-reducing influences (Ulrich, 1991). For example, Ulrich describes an "unsupportive" healthcare environment as a poorly designed facility that is noisy, denies visual privacy, and presents wayfinding difficulties (Ulrich, 2000).

2.3 Elements of Supportive Design Theory and Nightingales Nursing Environmental Theory

For the purpose of this review of literature, the Nursing Environmental Theory was used to support the current research related to Supportive Design Theory. Advances in medicine have eliminated many of Nightingale's original strategies for maintaining a healthy environment, such as utilizing fireplaces for warmth in a hospital environment. However, there are various environment-related elements of the Nursing Environmental Theory that can be linked to the current ideas outlined in Supportive Design Theory, such as temperature, light, noise, variety, and social support ("chattering hopes and advices").

Nightingale's canon of temperature encourages nurses to help the patient maintain their appropriate body temperature with blankets, open windows, or lit fireplaces (Nightingale, 1859). Although a more modern interpretation of this idea, Supportive Design Theory similarly discusses the importance of thermal comfort in maintaining a sense of control in a healthcare

environment (Ulrich, 1991). Nightingale discusses the importance of access to natural light in the healthcare environment. This idea can be linked to Roger Ulrich's modern opinions about maintaining sense of control through individual lighting control in patient rooms and providing positive distractions through access to natural light. Nightingale's concept of noise control can be linked to a variety of design strategies outlined in the modern concepts of Supportive Design Theory. For example, Roger Ulrich argues that sense of control in the healthcare environment can maintained through increased privacy. He indicates in his research that one way to maintain privacy in a space is to control noise levels with sound-absorbing materials or sufficient room layouts (Ulrich, 1991). The Nursing Environmental Theory stressed the importance of variety in a healthcare setting, which could be maintained by providing positive stimuli in the space (Nightingale, 1859). Supportive Design Theory similarly discusses maintaining positive distractions to reduce stress levels among patients. Lastly, Nightingale explained that social interaction could be beneficial to the natural healing process (Nightingale, 1859). This idea can be linked to modern design strategies that encourage social support in Supportive Design Theory.

2.3.1 Perception of Control

Not all patients are capable of achieving control over their own bodies due to injury or illness; it is possible, however, to provide them with control over the built environment. There are several strategies to create an environment in which the patient has complete control. Adequate wayfinding, increased privacy through the availability of private rooms or curtains, personal control over lighting and room temperature, personal control over television channels, and the availability of areas for pursuing personal interests are all positive design strategies from which patients can greatly benefit (Ulrich, 1991).

a) Wayfinding

Hospital occupants can easily become disoriented and stressed when there is a lack of efficient wayfinding cues in the environment. In order to prevent disorientation among staff, patients, visitors, etc., Carpman (1984) discusses that signage should be placed at every intersection and major destination within the hospital environment. However, directional cues do not stop at the written word. Environmental design cues should also indicate a change in location. For example, changes in flooring material, wall color, or overall theme could help distinguish varying destinations within the built environment (Carpman, 1984).

b) Privacy

Maintaining a patient's privacy can elevate his or her sense of control in a healthcare setting. There are several design strategies that increase privacy for patients, such as the availability of single occupancy rooms, privacy curtains, and acoustically absorbent building materials. According to a recent study, the most common reason for a room transfer request from a double-occupancy room to a single-occupancy room is a lack of privacy (Chaudhury, Mahmood & Valente, 2005). In an attempt to increase privacy in multi-patient room settings, privacy curtains are typically installed; however, one study found that patients believe privacy curtains to be inadequate. Although useful as a visual barrier, curtains are useless for filtering dialogue. Under these circumstances, many patients expressed frustration that their respective roommates had been able to hear private conversations regarding treatment plans and personal information (Malcolm, 2005).

c) Noise

According to the Nursing Environmental Theory, one of the standards of nursing is noise control (Nightingale, 1859). Nightingale suggests that excess noise can wake a sleeping patient, which will cause more harm than good in the healing process. Although this theory was introduced 150 years ago, today's hospitals still suffer from excess noise. In fact, most hospitals exceed the World Health Organization standards of average noise levels (Ryherd & Zimring, 2010). Uninterrupted sleep is a main source for good physiological and psychological health, and noise is one of the main causes of disturbed sleep, which can have adverse health effects (Berglund et al., 1999). For example, patients who suffer from disturbed sleep as a result of excess noise may experience extended hospital stays, the need for more medication, and the decreased ability to communicate clearly, all of which contribute to higher stress levels (Ryherd & Zimring, 2010). One of the goals for achieving a supportive design is to diminish or filter these unwanted sounds to allow for uninterrupted sleep. Highlighting serene sounds such as birds chirping and rippling water can enhance the therapeutic environment (Dilani, n.d.). Studies have shown that improvements to the acoustics in a healthcare environment, such as the addition of sound-absorbing materials, directly correlate with medical staff's perception of improved noise control and enhanced patient sleep patterns (Ryherd & Zimring, 2010).

d) Lighting

Lighting is an integral part of any building, and it can have positive or negative effects on its occupants. It is common knowledge that certain types of lighting can cause sensitivity in migraine-prone occupants, while natural lighting and/or broad spectrums

can have therapeutic effects. A recent study indicated that exposure to sunlight had a positive effect among patients who had undergone spinal surgery. 89 patients were randomly assigned to dim or bright rooms, of which 46% had access to natural light. According to the study, patients assigned to the brighter rooms required 22% less pain medication and reported significant reductions in stress (Walch et al., 2005).

Exposure to sunlight also has a significant effect on the length of time patients reside in the hospital. Beauchemin and Hays (1998) explored the effect of natural light on mortality rates and length of stay among heart attack victims. The study indicated that female patients exposed to sunny rooms spent a full day less in the hospital than those assigned to a room without sunlight. In addition, mortality rates among both men and women were higher among patients who did not have access to natural light (Beauchemin & Hays, 1998). Other studies have linked the absence of windows to more instances of anxiety, depression, and delirium in patients than patients assigned to a room with windows (Parker & Hodge, 1976).

e) Thermal Comfort

According to the U.S. Department of Energy, today's hospitals maintain high ventilation rates to lessen the risk of microbial contamination (Taddonio, 2011). Adequate ventilation has been a focus of hospital facilities at least since the time of Florence Nightingale. Nightingale discusses the importance of adequate ventilation and thermal comfort in her novel. According to Nightingale (1859), an optimal healing environment should provide clean, fresh air to the patient without chilling him or her, and ventilation should be provided to prevent the spread of sickness. Nightingale's Nursing Environmental Theory suggests that it is the responsibility of the nurse to provide a

thermally comfortable environment. Supportive Design Theory also suggests that thermal comfort and adequate ventilation is an integral element to any healing environment, but Roger Ulrich suggests that by allowing patients to control their own thermal environment, perception of control can be increased, and stress can be reduced (Ulrich, 1991). For example, by providing cabinets with extra storage for blankets, patients do not have to rely on outside sources to be thermally comfortable. Also, by providing individual thermostats within the space, patients have the opportunity to rest in an environment in which they are thermally comfortable without affecting the comfort of other patients (Ulrich, 1991).

2.3.2 Social Support

The Nursing Environmental Theory suggests that patients benefit from support from friends and family (Nightingale, 1859). It emphasizes, however, that these social networks have to provide the appropriate types of support. Nightingale (1859) discussed in her findings that patients do not benefit from false hopes and repetitive health advice; rather, patients benefit most from casual conversation with another human being. Roger Ulrich (1991) found in his research that patients recover more rapidly when in the company of friends and family. Unlike Nightingale, his research does not seem to show whether or not the types of conversations have any effect on recovery rates among patients. Supportive Design Theory has described a variety of design strategies that can encourage social support in healthcare facilities such as appropriate furniture arrangements, designated social spaces and accommodations for visitors.

a) Furniture Arrangements

Sommer and Ross (1958) found in their research that certain furniture arrangements could encourage social interaction, while others can diminish it. Upon

observation in a geriatric ward, it was found that early in the day, chairs were arranged in a side-by-side formation against the walls, and by the end of the day, various family members had moved the furniture into small groupings in order to converse more comfortably (p. 129). It was found in the study that social interaction is reduced when chairs are arranged in a side-by-side format rather than in small groupings. This reduction in social interaction was even greater when chairs were placed along walls in a space. In addition, it was also found that heavy, stationary furniture inhibits social interaction (Sommer & Ross, 1958). Roger Ulrich utilized Sommer and Ross' (1958) findings in the development of the, "social support" aspect of Supportive Design Theory. According to Ulrich's theory, in order to encourage social interaction in a social gathering space, it is important to incorporate small groupings that contain light, moveable furniture (Ulrich, 1991). Not only will light, mobile furniture promote interaction, but it will also give visitors, patients and staff a sense of control within the space, helping reduce overall stress levels.

b) Social Spaces

Although single occupancy patient rooms have been shown to improve privacy among patients, the availability of multi-occupancy rooms has shown to increase social interaction among patients and helps reduce stress levels (Chaudury et al., 2005). Supportive Design Theory also suggests that comfortable visitor areas separate from public waiting areas should be provided. These spaces should incorporate light, moveable furniture to encourage social interaction and support among visitors of seriously ill patients (Ulrich, 1991). Ulrich emphasized in his research that outdoor gardens and sitting areas should also be provided throughout the campus to encourage

social interaction. In addition, he discussed that although social support is an integral element to any successful healthcare design, designers should create a space that does not promote interaction to the point of denying access to privacy (Ulrich, 1991). Any interior space that provides patients with control over their contact with other patients and visitors will ensure that social support will have stress-reducing effects rather than increasing stress (Ulrich, 1991).

c) Accommodations

Although multi-occupancy patient rooms have demonstrated increases in social interaction with other patients, single-occupancy rooms offer greater flexibility when accommodating family members, thus increasing family interaction (Chaudhury et al., 2005). According to Ulrich (1991), healthcare facilities provide separate overnight accommodations within the building for families of patients in order to successfully promote social support and reduce stress among patients and visitors.

2.3.3 Positive Distractions

According to The Nursing Environmental Theory, variety and positive stimulation is integral to the healing process. "…the degree would be quite inconceivable to which the nerves of the sick suffer from seeing the same walls, the same ceiling, the same surroundings during a long confinement to one or two rooms" (Nightingale, 1859). Nightingale explained that the longer a patient is exposed to the same environment, the more he or she craves a variety of different objects or scenery, and these cravings are often indicative of what is necessary for recovery (Nightingale, 1859). Roger Ulrich also discussed the importance of positive distractions in his Theory of Supportive Design. He explained that moderate amounts of positive stimulation can successfully promote patient well-being. Ulrich emphasized that the levels of

stimulation in a space have to be appropriate. For example, if stimulation levels are too high due to intense sounds, lighting, and colors, it can increase stress levels. On the other hand, if stimulation levels are too low, boredom and depression can arise, which can diminish overall health (Ulrich, 1991). Wilson (1972) found that sensory deprivation in the healthcare environment can lead to elevated levels of anxiety and depression among ICU patients. Roger Ulrich (1991) defined positive distraction as an element that holds the interest of the patient while creating positive feelings. In his Theory of Supportive Design, Ulrich described several design strategies that can help alleviate stress through positive distraction. He described what he considers to be the most effective positive distractions in a healthcare design, which includes nature and animals (Ulrich, 1991).

a) Nature

A relatively large body of research has discussed the stress-reducing influences of exposure to nature. Nightingale found in her studies that patient suffering was often a result of a lack of windows or adequate views of nature in the space. She noted how patient recovery was often elevated when the patient was sent flowers or plants (Nightingale, 1859). She discussed the importance of plants in the interior environment and that an interior space can never have too many plants. Nightingale (1859) discussed the superstition that having plants in a patient room was unhealthy. She defended this by suggesting that the presence of indoor plants creates variety for the patient, and the oxygen produced by the plants can help improve air quality (p.34).

Roger Ulrich has heavily explored this concept in his research during the development of Supportive Design Theory. His ground breaking study, "view through a window may influence recovery from surgery," found that patients recovering from

surgery who had views of nature recovered more rapidly and took fewer pain medications than patients with views of a brick wall (Ulrich, 1984). Several of Ulrich's findings have suggested that natural elements may help with recovery because they elicit positive feelings, reduce negative emotions, and reduce stressful thoughts (Ulrich, 1991). Coss (1990) conducted a study that explored the effects of ceiling mounted images on patient wellness. It was found that patients who were exposed to images displaying nature and water had lower systolic blood pressure than patients who did not (Coss, 1990). Past research has suggested that while short-term exposure to nature has shown to have positive effects on patient stress, individuals who experience long-term exposure to nature in a confined setting seem to benefit more (Ulrich, 1991).

A number of Ulrich's studies suggest a variety of design strategies that can incorporate nature into a healthcare setting. Ulrich has discussed the importance of indoor plants, indoor healing gardens (Ulrich, 2002), exterior views of nature (Ulrich, 1984), and art portraying natural scenes (Ulrich, 1991). In displaying art, Ulrich stresses the importance of incorporating natural scenes that do not depict any urbanscapes. He has theorized in his writings that the stress-reducing effect of natural content, such as water scenes, may be due to evolutionary responses to unthreatening situations (Ulrich, 1991).

b) Animals

The company of animals in the hospital environment is said to help alleviate some of the stresses associated with hospitalization. One study explored how canine visitation therapy influenced perception of pain in pediatric surgery patients. The study found that the canine visits reduced the perceived pain in children recovering from surgery. The

findings suggest that the perceived reduction is in pain is due to the distraction caused by the animal visitations. The pet therapy distracted children from pain-related thoughts and was able to activate feelings of companionship (Sobo et al., 2006). Pet therapy has shown to improve quality of life in hospitalized cancer patients by decreasing pain, improving vital signs, providing distraction, decreasing fear, increasing socialization, and decreasing emotional distress (Lazenby & Urbanski, 2012). Encounters with animals are also beneficial to patients in non-hospital settings. One study observed the effects of animal therapy on patients in a nursing home setting. The study found that nursing home patients reported improvement in overall mood as measured by depression, anxiety, and positive affect assessments upon interacting with therapy dogs (Johnson, 1997).

One strategy for incorporating animals into a healthcare setting, as outlined by Supportive Design Theory, is to display artwork depicting natural settings with animals. Ulrich stresses the importance of incorporating artwork that depicts the animals at an appropriate distance. If an animal appears to be too close, it could lead to elevated stress levels, and if the artwork appears to be too abstract, it could produce negative attitudes among patients (Ulrich, 1991).

c) Physical Activity

Patients entering into a substance abuse treatment facility often experience heightened feelings of depression or anxiety (Brown & Evans, 1997). Evidence has suggested that regular exercise can be as effective as psychotherapy or prescription medication in the treatment of anxiety and depression (Zangeneh et al., 2007). Ulrich (1991) has suggested that incorporating spaces for mild exercise such as wide corridors,

walking gardens, and exercise rooms could serve as a positive distraction for patients with these types of conditions.

2.4 Summary

This review of literature was conducted to gain a better understanding of the elements of Supportive Design Theory and how these elements relate to the ideas of Florence Nightingale. Nightingale's Nursing Environmental Theory has a care-focused background with elements of environmental impacts on patient well-being. Roger Ulrich further developed the environmental aspects of Nightingale's Theory in the development of his Theory of Supportive Design. Although the two theories were developed in different eras and with different backgrounds, it is quite clear that the two theories share many of the same environmental aspects of patient well-being, such as wayfinding, privacy, noise, lighting, thermal comfort, social support and exposure to nature. Table 1 illustrates these common ideas found in both theories as described throughout this literature review.

Table 1. Common Ideas Found in Both The Theory of Supportive Design and Nightingale's Nursing Environmental Theory

DESIGN ELEMENTS	***Nightingale's (1859) Canons***				
Theory of Supportive Design Guidelines (Ulrich, 1991)	Temperature	Light	Noise	Variety	"Chattering"
Perception of Control					
Wayfinding				▒	
Privacy			▒		▒
Noise			■		▒
Lighting		■		▒	
Thermal Comfort	■			▒	
Menu Options				▒	
Social Support					
Furniture Arrangement				■	■
Social Spaces			▒	▒	■
Family Accommodations				▒	■
Positive Distractions					
Nature/Artwork	▒	▒		■	
Animals/Artwork				■	
Space for Physical Activity			▒	■	▒
Activity Spaces			▒	■	▒

■ Direct Relationship

▒ Indirect Relationship

□ No Relationship

CHAPTER 3. METHODS

3.1 Introduction

Before the design process begins, two pre-existing substance abuse treatment facilities were visited. The Brighton Center for Recovery is an example of a retrofitted facility with needs for improvement, and the Rosecrance Health Network is an example of a facility that was built utilizing evidence based design practices and supportive design strategies. Each of these site visits was useful in determining how a substance abuse treatment center differs from other healthcare facilities, and it helped contribute to the knowledge of how these types of facilities operate.

3.2 Approach to Design

This project was completed in three phases: Predesign, Schematic Design, and Design Development. Although this approach was followed as closely as possible, when certain design elements were not working, other areas had to be readdressed. John Zeisel's (2006) approach to the design process was utilized. Figure 1 illustrates the cyclical process required during the design process, and how theoretical information is constantly fed into the process in order to develop a more effective design outcome.

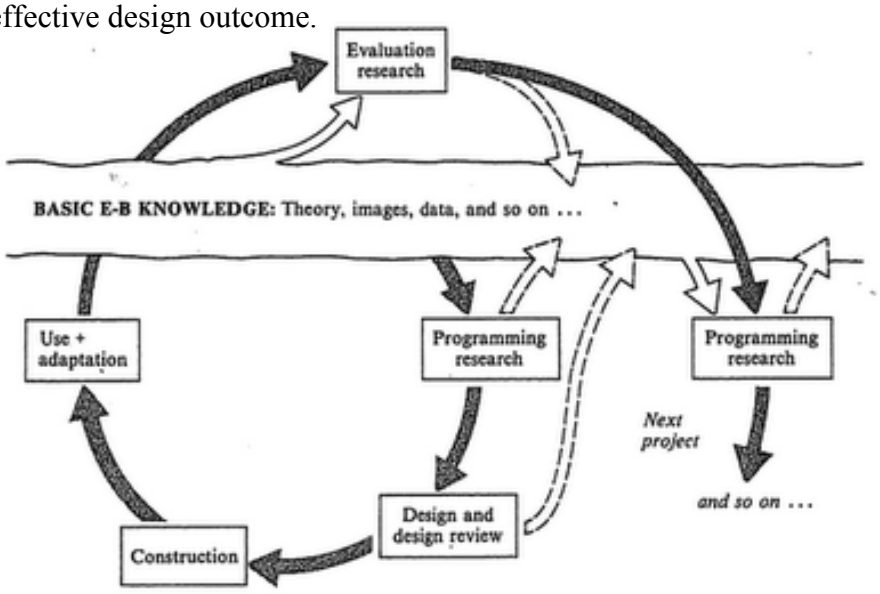


Figure 1: John Ziesel's (2006) Model of the Design Process

3.3 Case Studies

The Brighton Center for Recovery is a facility that was retrofitted from an original small farmhouse. The visit to the Brighton hospital was beneficial because this thesis utilizde a preexisting facility for the substance abuse treatment facility redesign. After the site visit, there was a better understanding of how a retrofitted facility encounters certain design limitations. Chapter 4 explains these limitations and needs for improvement in detail.

The Rosecrance Griffin Substance Abuse Treatment Center is a facility that was built keeping evidence-based design and Supportive Design strategies in mind. It displays how a successful operation can be built with fewer limitations than that of a retrofitted facility. It serves as an example of what a substance abuse treatment facility should offer in the design of the building and what types of spaces should be offered in order to foster coping with stress. Chapter 4 explains the space and program success in detail.

3.4 Target Site Visit

a) Target Project Site

This thesis aimed to utilize the existing literature and case studies (as outlined in Chapters 3 and 4) to redesign a vacant building in the greater Lansing, MI, area to serve as a long-term substance abuse treatment facility designed to foster coping with stress and allow for natural healing. The facility serves the needs of youth ages 12-18 in the State of Michigan. The design of the new treatment center unites the ideas of Roger Ulrich and Florence Nightingale to create a space that provides an optimal healing environment that promotes coping with stress. The functions of the space were based on the findings from the site visits as described in Chapters 3 and 4.

b) Location

The vacant building was previously used as a public elementary school (See Figure 2). The property is large enough that additions can be made to the facility if necessary. One unique feature of the new facility is that it will incorporate spaces for public outreach programs; the proximity to the neighboring homes and community will attract the public to participate in these programs. The property also features a large, open green space that can be redesigned to incorporate outdoor healing gardens and places for group reflection. To prevent substance infiltration, a hefty security program will be implemented. Refer to Chapter 5 for more details.

Figure 2: Site Map

c) Exterior Conditions

The exterior consists of mainly brick and cinder block construction. A student-made mosaic and an area for a flagpole highlight the main entry into the building (See Figure 3). The flagpole is surrounded by a garden space that currently consists of only mulch (See Figure 4). This area provides the new facility an opportunity for a welcoming entryway. The entry into the facility looks out onto the parking lot and neighboring homes (See Figure 4). The existing parking lot is in need of repair. There is a large open space behind the building to the east. It served as open space for students and included a soccer field, baseball diamond and a vegetable garden (See Figure 4).

Figure 3: Entry (left), student mosaic (right)

Figure 4: Flag Pole (top left), Parking lot and surrounding neighborhood (top right), community garden (bottom left), open space (bottom right)

d) Interior Conditions

This building was vacated in Fall 2010, so it has seen some neglect and is in need of updating and repair. Although the building was vacant for nearly three years, some spaces in the building have been reclaimed and are currently being used for community office spaces. The current layout features a large variety of spaces including several classrooms with individual restrooms, cafeteria, gymnasium, administrative offices, a staff lounge and a centralized media center (See Figure 5).

The interior walls consist of mainly painted concrete block, while the corridor floor material is a commercial-grade, low-pile broadloom carpet. The ceilings throughout the entire building are 2'x4' acoustical ceiling panels. Portions of these

ceiling panels are missing in the centralized media center. The main entry of the building is a small vestibule that is visible through a window in the main. Upon entry into the building, there is an interior room with windows that look into the interior of the space (See Figure 6). This space could serve as a welcome reception area to the new rehabilitation facility, or it could serve as a public space for a community outreach program. There are 15 classrooms approximately 500 square feet in size located throughout the building.

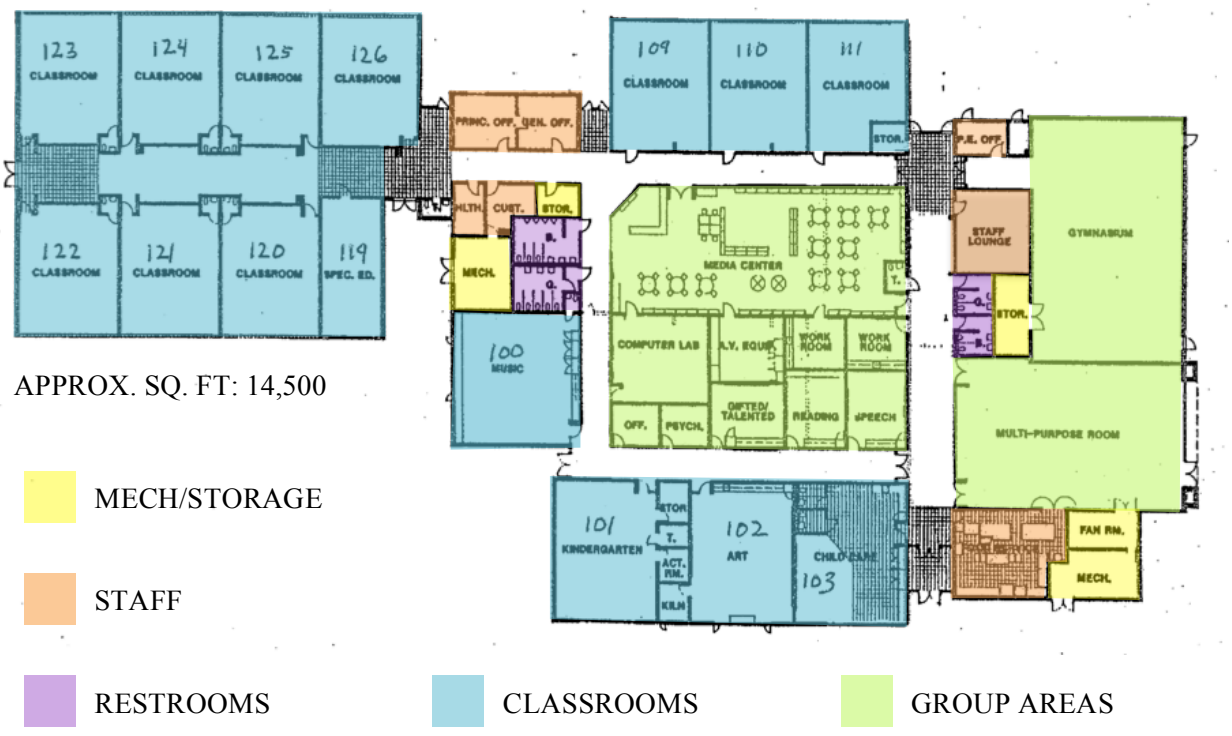


Figure 5: Floor Plan (Not to scale)

Figure 6: West entry with window to office (top left), front entry (top right), view of media space (middle left), concrete block and blue low-pile carpeting (middle right), brick and concrete block in media space (bottom left), missing acoustical ceiling panels (bottom right)

CHAPTER 4. CASE STUDIES

4.1 Introduction

Utilizing the guidelines outlined in Supportive Design Theory, the Supportive Design Space Assessment Matrix was developed as part of this thesis. Two existing facilities were analyzed based on their supportive design elements in order to test the theoretical framework in a substance abuse treatment facility setting and to clarify the difference between an evidence-based design and a retrofit design. The Rosecrance Health Network is a treatment facility that was built within the last decade, and was designed and constructed utilizing the principles of evidence-based design. The Brighton Center for Recovery is a substance abuse treatment facility that has been retrofitted to accommodate to the changing needs of patients since the 1940s.

4.2 Case Study 1 - Retrofitted Design

The Brighton Center for Recovery

- **Location:** Brighton, MI
- **Square Footage:** 79,700
- **Year Established:** 1948
- **Acreage:** 92
- **Latest Addition:** Mid 1970s

4.3 History

The Brighton Center for Recovery is a substance abuse treatment facility located on 92 acres in Brighton, MI, as a member of Ascension Health, St. John Providence Health System. The building that is the Brighton Center for Recovery today began as a small farmhouse

established in the 1930s. Harry Henderson modified the building to create the Brighton Hospital in 1948. It was the first of its kind for substance abuse treatment in the state of Michigan.

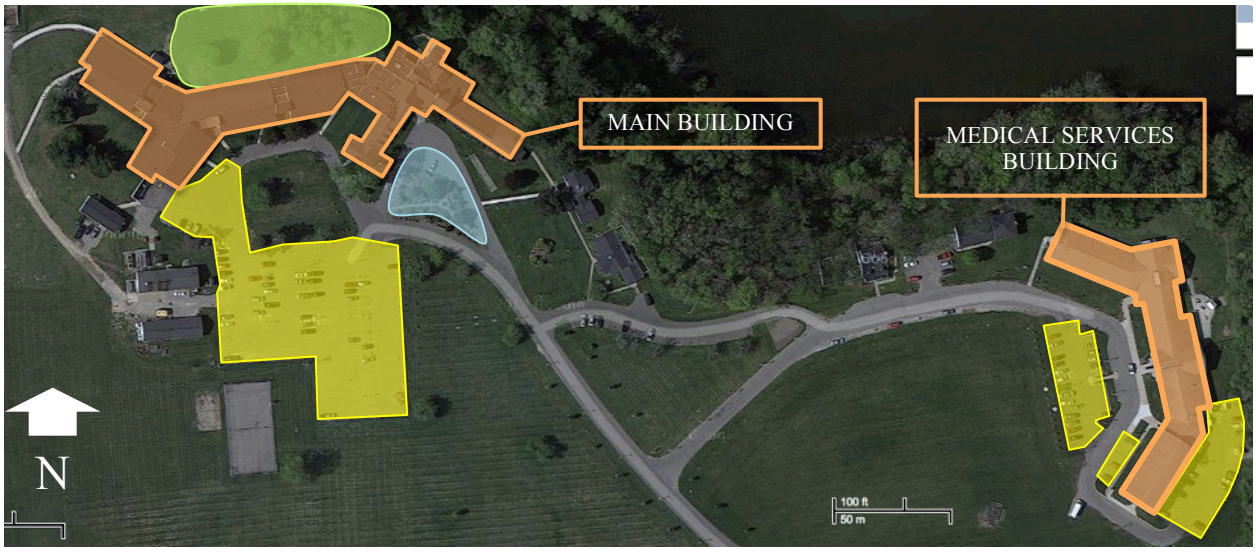
4.4 Site Conditions

The 92-acre campus is located in Brighton, MI, with easy access from I-96, a major highway in the State of Michigan (See Figures 7-8). Although its proximity to a major highway allows for easy wayfinding for visitors and new patients, it poses a possible threat to privacy and security for patients undergoing treatment. According to the Director of Operations, the facility's location makes it susceptible to substance infiltration.

In addition to the medical buildings on the campus, the Brighton Center for Recovery also features a variety of outdoor spaces including open spaces, garden spaces, and an on-site lake. Although these outdoor areas are part of the campus, many are inaccessible to residents due to possible security breaches, such as substance infiltration, into the facility from outside sources.

KENSINGTON RD. GRAND RIVER RD. SITE I-96

Figure 7: Area map



GARDEN OPEN SPACE PARKING BUILDINGS

Figure 8: Site Map

4.5 Parking

The campus provides ample parking for visitors and events. A large parking lot is available on the west side of the campus near the main building where large events, community meetings, and public Alcoholics, Anonymous meetings are held (See Figure 9). There are parking spaces available on the east side of the campus near the Medical Services Building where inpatient and outpatient services are provided. Campus parking can be better illustrated in the site map (See Figure 8).

Figure 9: Parking lot (left), main building entry (right)

4.6 Buildings

The Brighton Center for Recovery, with its original construction in the 1930s, is an example of a rehabilitation facility in need of renovations (See Figure 10). The treatment facility currently features a variety of spaces, many of which have been added onto the existing farmhouse, which now serves as the reception and lobby area for the hospital. The facility also features a large patient wing, with 70 beds for men or women over the age of 18 at any given time. A large, centralized nursing station located in the main building is operated 24 hours per day to assist patients going through recovery. There is additional space in a separate building on the campus, The Medical Services Building, which can house an additional 29 patients (See

Figure 10). This building also features a centralized nursing station, although smaller than the nursing station located in the main building.

Figure 10: Chapel (left), Medical Services Building (right)

4.7 Staff Areas

Despite its large size, the director of operations discussed the need for expansion in the nurse's station in the main building to allow for more space for medical staff. By providing a larger space for staff, more patients can have access to nursing care. According to the director, the nursing station in the medical services building is more effective in administering proper care to patients. The main building features a small wing designated for administrative offices. The administrative hallway serves as a means of egress from the lobby area to the chapel, where community meetings are held. The director of operations for the center discussed the need for more privacy for administrative staff.

Figure 11: Sofa in break room (left), eating area (right)

The facility staff also has access to a small break room located in the main building on the campus. Despite its small size, the space serves a variety of functions. It features a small food preparation and storage space, eating area, seating area, small restroom, and staff mailboxes (See Figure 11). The space is not large enough to effectively accommodate all staff members in the main building.

4.8 Patient Rooms

Patient rooms are broken up into wings. The women and the men are located in separate parts of the main building. Patient rooms in the main building accommodate up to two patients at one time, and each room features a shared restroom. In the Medical Services Building, patient rooms accommodate up to three patients at one time, and each room features a shared restroom. The patient detox center is part of the medical services building, which can accommodate up to 8 patients at a time. Patients in this area receive visual privacy through privacy curtains, but lack privacy otherwise. Each patient room has exterior windows, many which have views of natural elements. In addition, each patient room features individual storage areas for personal belongings (See Figure 13).

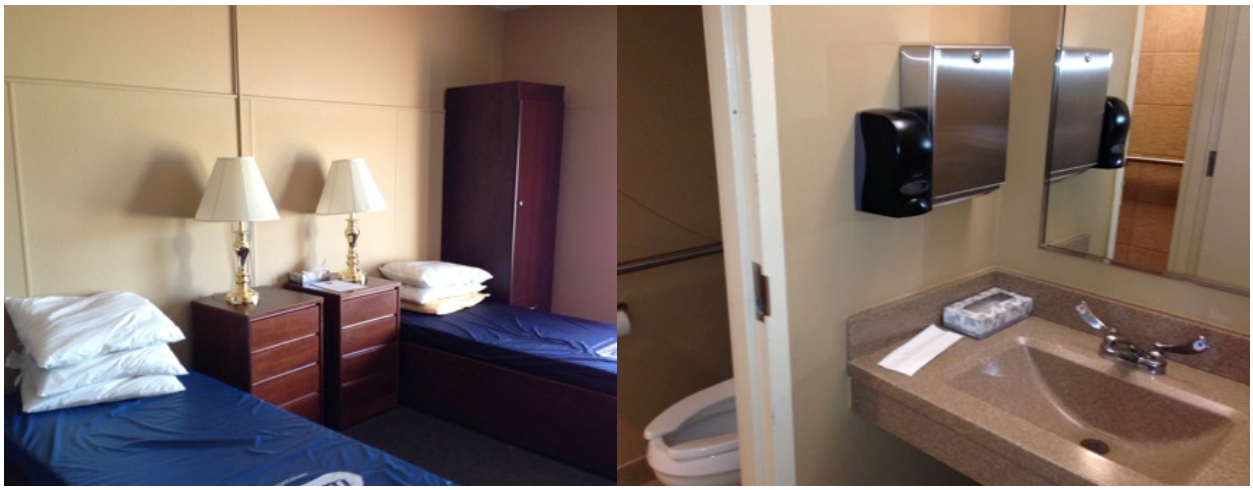


Figure 12: Patient room in Medical Services Building (left), patient restroom in Medical Services Building (right)

Figure 13: Patient room window (top left), resident shower (top middle), resident storage (top right), main building resident corridor (bottom left), detox center (bottom right)

4.9 Indoor Gathering Spaces

There area variety of indoor gathering spaces located throughout the facility. The Chapel is the Center's community meeting room (See Figure 14). Every week, staff members and patients alike gather here to discuss the weekly schedule, patient progress and upcoming events. This space is also used for public AA meetings. The campus also features a large gymnasium,; however, it is not used very frequently. The main purpose of this space is to host community events and banquets. The facility also features a wide variety of meeting spaces that can accommodate up to 100 people, depending on the particular space. Each of these meeting spaces includes light, flexible furniture, which better accommodates individual group needs (See Figure

14). The cafeteria in the main building also serves as an interior meeting space, but only during mealtime. The cafeteria in the Medical Services Building serves the same purpose, but differs from the main building cafeteria in that it features a floor-to-ceiling storefront window that looks out to the nearby woods (See Figure 14). There are no family-specific gathering spaces.

Figure 14: Chapel interior (top left), meeting room interior (bottom left), cafeteria in Medical Services Building (right)

4.10 Outdoor Gathering Spaces

The campus features very few outdoor gathering spaces. The campus features a large open space located to the north of the main building (See Figure 15). This area can be utilized for individual and group gathering. Group meetings can be held here, but the space does not feature any group-specific meeting areas. The gazebo, located to the south of the main building, is sometimes utilized for group meetings under the supervision of a counselor (See Figure 16). Meetings here do not happen often due to its proximity to the main road and parking lot. The

administration at the Brighton Center for Recovery believe that residents are more likely to encounter substances from outside sources if they are provide access to areas near the main road and/or parking lot. Another outdoor space, located to the south of the main building, features a garden with a walking path, patio, and fountain (See Figure 17). Although this space can be accessed for staff gathering, patients do not have access due to its proximity to the parking lot. The cafeteria in the main building used to feature an outdoor patio, but this feature was removed; also for security purposes. Rather than implementing design strategies to enhance security, the administrative staff has limited the amount of spaces to which residents have full access.

Figure 15: Open space view from the north side of the main building

Figure 16: Gazebo view from main parking lot

Figure 17: Walking Garden located on the south side of main building

This section evaluates the Center's need for upgrades and offers design suggestions to successfully improve the facility. The Supportive Design Space Assessment matrix (Table 2) lists the main aspects of Supportive Design Theory as outlined in the review of literature (Chapter 2). These elements were used as design guidelines when evaluating the exiting spaces within the facility. As Table 2 illustrates, the Brighton Center for Recovery needs to see improvement in order to meet the basic standards as laid out by Supportive Design Theory.

Table 2. Supportive Design Space Assessment Matrix
The Brighton Center for Recovery

Design Guidelines		Notes
Perception of Control		
Wayfinding		Patient rooms in multiple buildings; few signs
Privacy		Administrative hallway serves as main egress
Noise Control		Acoustical ceiling panels; thin walls
Lighting		2x2, 2x4 fluorescent lighting; no ambient/task
Thermal Comfort		Temperature controlled by main source
Menu Options		Predetermined menu; no vegetarian/gf options
Social Support		
Furniture		Light, moveable; damaged, uncomfortable
Social spaces		Small spaces; large and heavy furniture
Accommodations		No family accommodations; no visitor spaces
Positive Distractions		
Nature		Open space available; no access to gardens
Animals		Therapy dog
Physical activity		Gymnasium and exercise therapy facility
Activity spaces		Meeting rooms; no designated activities

Available

Needs Improvement

Unavailable

4.11.1 Security

Patients have restricted access to many areas of the campus that could be beneficial to their health. For example, a healing garden has been planted to the south of the main building, but due to its proximity to a main road and the parking lot, patients cannot utilize the space. This is an attempt to limit substance infiltration into the facility. The director of operations discussed that the proximity of the campus to the main road is cause for substance infiltration, which is an issue that needs to be addressed. In the past, patients have received illegal substances from outside sources via cars using the main road and an easily accessible parking lot. The Center has previously considered installing gates at the facility entry, but has no plans to install them any time soon, according to the Director of Operations.

In addition to substance infiltration, this facility also has a problem with theft. Although each patient is given individual storage space for belongings, there are several reports of theft. This could be due to a lack of lockable storage; however the Brighton Center for Recovery does not allow lockable storage in order to monitor substance infiltration. To help solve this problem, the Brighton Center for Recovery could implement a program in which the staff monitors patient belongings. This could be done through a cubby system behind the reception counter or a separate space that is only accessible with a staff key.

4.11.2 Interior

The Brighton Center for Recovery serves as a long-term substance abuse treatment facility that has been retrofitted from an early 1930s farmhouse. In order to keep up with the changing needs of the staff and patients, the facility has undergone

several renovations throughout the years. Based on the evaluation laid out in Table 2, it is clear that the facility is in need of updating and improvements. The director of operations discussed a variety of changes that should be made to better improve the interior function and design of the space.

a) Floor surfaces

Commercial-grade, low-pile broadloom carpeting has been installed throughout most of the facility, which has caused several maintenance and cost issues throughout the years. Carpeting is susceptible to staining, especially when installed in a high-traffic healthcare facility. According to the director of operations, the housekeeping staff cannot keep up with spills on the carpet, and as a result has become permanently stained. The current carpeting is broadloom and is costly to replace. In order to better meet the needs of the housekeeping staff and keep costs low, hard-surface flooring materials that can be easily cleaned should be installed in high-traffic areas. In areas where carpet is desired, modular carpet tiles should be installed.

b) Interior rooms

The interior layout of the space could be improved to increase staff productivity, staff and patient privacy, and separation of spaces. The nursing station in the main building needs to be increased in size in order to more effectively serve patients on a 24-hour basis. Currently, one hallway serves as means of egress to administrative offices as well as the community chapel. A separate hallway to the administrative offices should be added in order to increase privacy in those areas and designate separate spaces for staff and patients.

4.11.3 Exterior

There is currently only one exterior space to which patients have access. Although it is a large, open area that can accommodate all patients at any particular time, it does not incorporate any designated spaces for healing, meetings, or individual reflection. A walking garden has been planted on the south side of the main entrance; however, patients do not have access to this area due to its proximity to the main road and parking lot. Security should be improved in the parking lot area in order to allow patients to access the healing garden. In addition, designated areas for group meetings, healing, and reflection should be added to the open area.

4.12 Case Study 2 - Evidence-Based Design

Rosecrance Health Network – Griffin Williamson Campus

- **Location:** Rockford, IL
- **Square Footage:** 67,000 sq. ft.
- **Latest Addition:** 2013
- **Year Established:** 2004
- **Acreage:** 50 acres

4.13 History

The Rosecrance Griffin Williamson campus serves 80 teenagers between the ages of 12 and 18 who are addicted to drugs and alcohol. It was built in 2004 utilizing evidence-based design principles (Hamilton, 2003; "Rosecrance Serenity Garden," 2007) and serves as an example of a successful facility that features design elements outlined in Supportive Design Theory to promote healing. Reminiscent of a modern mountain lodge, this facility's interior design and vast outdoor healing garden is intended to reduce stress and promote patient healing.

Rosecrance's adolescent substance abuse treatment offers an initial psychological assessment upon admission, which is located near the reception and administrative offices. This space offers a private family waiting area that is separated from the public waiting area. The facility also features inpatient treatment, outpatient treatment, gender-specific counseling services, an onsite school and an onsite chapel. In addition, the program offers a variety of spaces that are utilized for experiential therapies including a fitness center and a horticulture conservatory. Each of these therapy programs serves as positive distractions to reduce stress and promote healing, according to Supportive Design Theory (Ulrich, 1991).

4.14 Site Conditions

Rosecrance is located in Rockford Il, among newly developing sub-divisions in the area. The large size of the property allows for a private drive, which provides access to the facility parking lot. The site is located less than ½ mile from a main road in Rockford, IL and 1 mile away from I-39, one of Illinois' major highways.

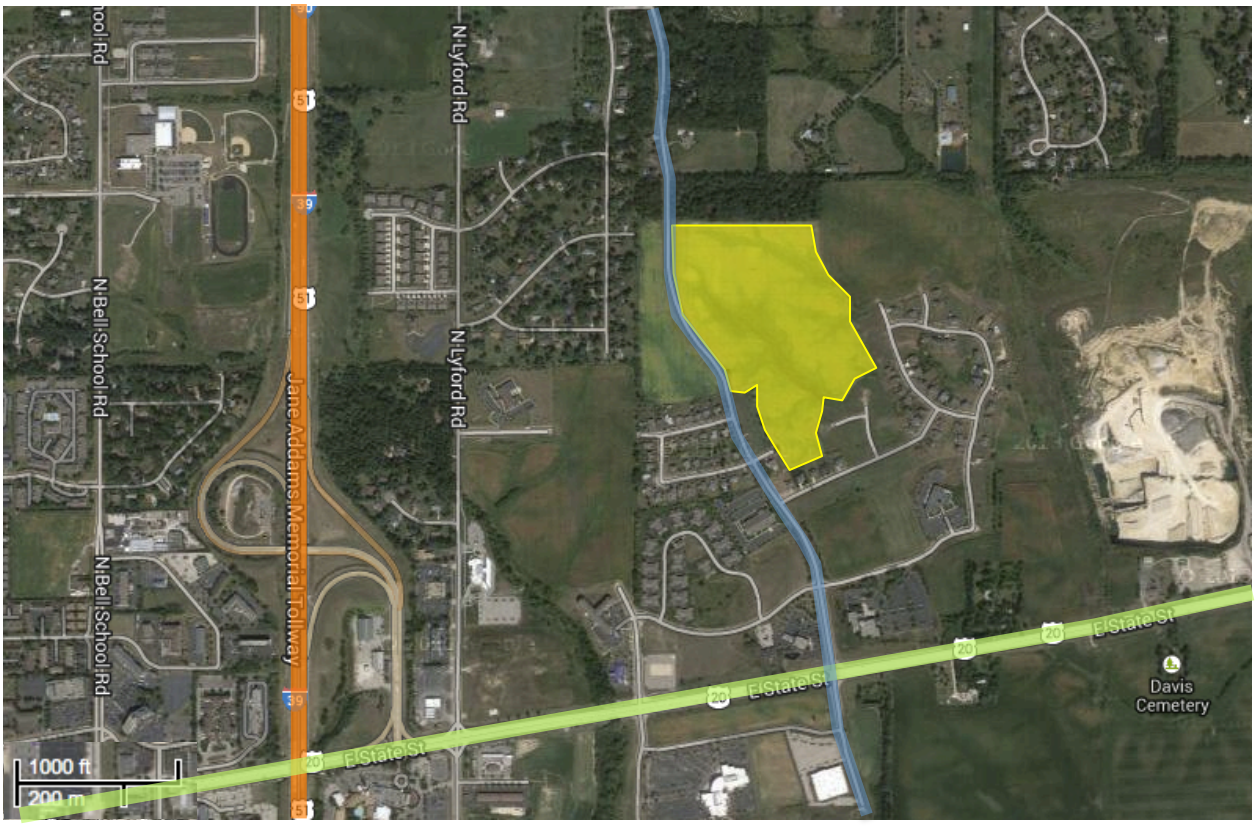


Figure 18: Site Location

4.15 Exterior

The exterior of the facility is reminiscent of a mountain lodge with modern features. It features a variety of materials including vinyl siding, natural stone, wood, metal and glass (See Figures 19). The building features several windows, allowing natural light into the space and creating views of the strategically planted landscaping. The back of the building features an

outdoor patio, which looks out onto the ponds and serenity garden. The serenity garden accounts for only about 10% of the campus, but serves as the main focal point of the campus. The garden, designed by landscape designer Hoichi Kurisu, has been designed to incorporate a private pond, walking paths, gathering circles, and a twelve-step waterfall, which is symbolic of the twelve-step program that is followed to reach recovery at the facility (See Figure 19). The serenity garden attracts a large variety of wildlife including bird, ducks, geese and other water foul. In addition, the ponds are full of underwater wildlife including bass, perch and koi. The space has been designed to naturally attract animals, which has shown to alleviate stress levels in healthcare environments, according to the Theory of Supportive Design. The idea of a supportive environment seems to have positive impacts on the adolescents at Rosecrance. "Whenever I am feeling sad, I walk through the gardens and all of my problems seem to go away," stated one patient ("Rosecrance serenity garden," 2007).

Figure 19: Main entry (top left), courtyard (top right), twelve step waterfall (bottom left), waterfall (bottom right)

Figure 20: Pond

4.16 Staff Areas

There is are a large variety of spaces designated for staff use at Rosecrance. According to Supportive Design Theory and Nightingales Environmental Theory of Nursing, staff stress reduction is just as important as patient stress reduction in improving quality of care in a health care setting (Ulrich, 1991; Nightingale, 1859). Upon entry into the building, there is a large reception area that is used by staff members to greet guests, check-in new patients, and checkout patients. Behind the reception area is a large administrative wing that can be accessed only by staff members. These administrative areas incorporate staff cubicles, private offices, and conference rooms for meetings (See Figure 21). The administrative wing also incorporates a small break area for staff in this part of the building. Another break area is located in the cafeteria of the building. Although patients can see into the space, they do not have access to it. This space is designated for staff use only.

The nursing unit is located on the 2nd floor of the building, and it serves all patients undergoing treatment for their addictions. This space not only incorporates exam rooms and consultation areas, but also private nursing offices. Staff privacy is a key strategy for maintaining quality of care, according to the theories. Counselor's offices are located in each patient wing of the facility in order to maintain a sense of community within each space.

Figure 21: Conference room (left), office wing (right)

4.17 Patient Areas

Rosecrance assigns each new patient to one of four patient wings. Each wing offers a variety of different spaces including resident rooms, a lounge/meeting area, a supervisory space, kitchenette, laundry facility, and counseling offices. The lounge and meeting area features lodge-style wood vaulted ceilings and large windows with views of the serenity garden (See Figure 22). Each unit accommodates approximately 14 adolescents and each patient room can hold up to three patients (See Figure 22). Each resident room features a window with a view of the landscaping that has been incorporated on the exterior. Multiple beds in in the resident rooms could lend to social support and alleviation of stress in patients; however, the décor in the resident rooms is lacking, and as outlined in Supportive Design Theory (Ulrich, 1991), could lead to emotional discomfort.

In addition to private resident areas, there are also a large variety of spaces for patients to share throughout the facility. Rosecrance offers a variety of therapy programs including art, horticulture, exercise and music. Each of these therapy programs has a designated space in the building. A gymnasium is available for patients who seek exercise as a positive distraction from their addiction. In 2013, the Ipsen Conservatory was constructed as a space for horticulture

therapy practices (See Figure 23). Residents may use the conservatory to learn about plants and horticulture. The idea behind the horticulture therapy program is that if a resident can learn to take care of another living thing, he or she can learn to take care of him or her self in a healthy way. In addition to these spaces, Rosecrance also encourages education through an in-house school on the lower level, and religion through a multidenominational chapel on the first floor. The school space features a bright, patterned carpet reminiscent of the landscaping occurring on the exterior of the facility. The walls, while constructed of concrete block, are decorated with artwork made by the adolescent residents as part of the art therapy program. The school hallway, as well as the classrooms, features windows which provide natural light and visual access to the surrounding landscape.

The cafeteria serves as a place for mealtime and social interaction. It is located on the lower level with views of the serenity garden. Furthermore, residents have the options of enjoying their mealtime on the outdoor patio, weather permitting. Supportive Design Theory discusses the importance of maintaining a sense of control in order to alleviate stress in patients. One strategy for maintaining control is offering a menu with a large variety of food from which to choose. Rosecrance accommodates to the needs of a wide variety of diets including vegan, gluten-free, and vegetarian options. While the cafeteria windows offer views to the exterior, the interior design of the space is lacking color and texture.

Figure 22: Resident lounge space (left), resident room (right)

Figure 23: Gymnasium (top left), Ipsen Conservatory (top right), school corridor (middle left), student artwork (center), classroom (middle right), cafeteria (bottom left), cafeteria serving line (bottom right)

4.18 Visitor Areas

There are several visiting areas throughout the Rosecrance Griffin Williamson Campus. Upon entry into the building, guests are faced with a welcoming waiting area complete with comfortable furniture, a fireplace, and windows with views to the outside. There is a large community room available for stakeholder use. While this area is often used for Rosecrance assemblies and guest speakers, donors and other stakeholders may utilize this space for conferences and large meetings. Visitors also have access to the multi-denominational chapel (See Figure 24) as well as various private gathering areas located throughout the facility. A private family gathering area is available for family members who are supporting new patients undergoing preliminary assessment. This area can only be accessed with a key card that is activated by a staff member at the reception desk. Each patient wing also features a designated private family gathering space for visitations (See Figure 24). These areas encourage family interaction and social support, which Supportive Design Theory has explained as a design strategy for reducing stress in healthcare environments.

Figure 24: Private family gathering space (left), multidenominational chapel (right)

4.19 Outdoor Gathering Spaces

The serenity garden, although built for Rosecrance, is available for public use. Visitors may check-in during business hours at the reception desk to receive a visitor's pass before walking in the gardens. To prevent substance infiltration, residents are heavily supervised while making use of the gardens. The gardens feature a variety of gathering spaces, including serenity circles that are typically designated for group meetings. Weather permitting, all group meetings are typically held outside. In addition to group meeting spaces, the serenity garden also incorporates spaces for small group, one-on-one, and individual reflection.

Figure 25: Serenity circle (top left and bottom right), outdoor gathering space (top right), private reflection space (bottom left)

4.20 Need for Improvement

This section evaluates the Center's need for upgrades and offers design suggestions to successfully improve the facility. The Supportive Design Space Assessment Matrix (Table 3) lists the main aspects of Supportive Design Theory as outlined in the review of literature (Chapter 2). These elements were used as design guidelines when evaluating the existing spaces within the facility. Rosecrance is a privately funded substance abuse treatment facility that was built utilizing elements of Supportive Design Theory, such as private family gathering spaces, multi-resident rooms, spaces for horticultural and exercise therapy, and an award-winning healing garden; however, there is opportunity for improvement.

Table 3. Supportive Design Space Assessment Matrix
Rosecrance Health Network

Design Guidelines		Notes
Perception of Control		
Wayfinding		Signage easily legible
Privacy		Separation of administration/residents; noise
Noise Control		Wall in lounge does not extend to ceiling
Lighting		Overhead, ambient, and task lighting
Thermal Comfort		Temperature controlled by main source
Menu Options		Vegan, vegetarian, gluten free, and diet options
Social Support		
Furniture		Comfortable, but not easily rearranged
Social spaces		Conservatory, lounges, garden, exercise rooms
Accommodations		Private family waiting and meeting rooms
Positive Distractions		
Nature		Healing garden; views of nature from inside
Animals		Therapy dog and space for dog
Physical activity		Gymnasium and exercise therapy facility
Activity spaces		Horticulture, library

Available

Needs Improvement

Unavailable

4.20.1 Exterior

There is possibility for further design on the second floor. The current view out of the second floor corridor looks out onto the parking lot and the roof of the first floor (See Figure 26). The view from the corridor to the parking lot on the second floor would be dramatically enhanced if Rosecrance were to pursue a small green roof as a project.

Figure 26: View from second floor corridor (left), wall does not meet ceiling in resident lounge (right)

4.21 Case Study Summary

After both of these facilities were visited, it was determined, based on the design guidelines, that the Rosecrance Health Network was more successful in providing an environment for patients that reduces stress and encourages healing through supportive design techniques. As illustrated in the side-by-side comparison (See Tables 4 and 5), it is clear that the Brighton Center for Recovery was in need of improvement in terms of supportive design.

Table 4. Brighton Center for Recovery Summary

Perception of Control	
Wayfinding	
Privacy	
Noise Control	
Lighting	
Thermal Comfort	
Menu Options	
Social Support	
Furniture arrangement	
Social spaces	
Accommodations	
Positive Distractions	
Nature	
Animals	
Physical activity	
Activity spaces	

Table 5. Rosecrance Health Network Summary

Perception of Control	
Wayfinding	
Privacy	
Noise Control	
Lighting	
Thermal Comfort	
Menu Options	
Social Support	
Furniture arrangement	
Social spaces	
Accommodations	
Positive Distractions	
Nature	
Animals	
Physical activity	
Activity spaces	

Available

Needs Improvement

Unavailable

CHAPTER 5. PROJECT DEVELOPMENT

5.1 Design Concept

The hummingbird's wings are so small that it should be impossible for them to fly; however, it flies anyways, which is why this bird is often referred to as, "the bird of the impossible." The hummingbird will be used as the concept for this thesis project because of what it symbolizes: difficulties can always be overcome, and lost parts of ourselves can always be recovered. This idea is relevant to overcoming major life challenges including those related to substance abuse and addiction, which is why it serves as an appropriate concept for the design of the new substance abuse treatment facility.

5.2 Applying the Theories

In order to create a space that meets the standards of Supportive Design Theory and Nightingales Environmental Theory of Nursing, the new facility incorporates adequate wayfinding cues, private areas for patients and staff, indoor and outdoor healing gardens, spaces for social interaction, and artwork. A central Atrium encourages social interaction and provides access to nature through indoor plants as well as a large amount of natural sunlight. Each patient room has a window to the exterior with views of nature and/or natural sunlight. In order to help patients foster coping with stress, the new facility encourages social interaction through private family gathering areas, positive distractions through nature and exercise facilities, and sense of control through maintaining patient privacy.

5.3 Space Program and Design Guidelines Based on Theoretical Framework/Case Studies

This section utilizes the theoretical framework of Supportive Design Theory and the Nursing Environmental Theory to develop a space program that incorporates design guidelines outlined by the theories and supporting literature. The design guidelines refer to the more

modern concepts of Supportive Design Theory while utilizing the Nursing Environmental Theory as a tool for validation of Roger Ulrich's ideas. Table 4 summarizes the supportive design guidelines that can be applied to each space in the new facility.

Table 6. The new facility spaces and their Supportive Design guideline applications

		Perception of Control						Social Support			Positive Distractions			
	Space	Wayfinding	Privacy	Noise Control	Lighting	Thermal Comfort	Menu	Furn. Arrangement	Social Spaces	Accommodations	Nature	Animals	Physical Activity	Activity Spaces
Staff Areas	Reception	■	■	■	■	■					■			
	Administrative Offices	■	■	■	■	■			■		■			
	Nursing Station	■		■	■	■					■			
	Staff Break Area(s)	■	■	■	■	■		■			■			■
	Outdoor Staff Break Area(s)	■	■						■		■	■	■	
	Storage	■	■		■									
	Kitchen	■	■	■	■	■	■				■			■
Staff/Patient Areas	Counseling Offices	■	■	■	■	■		■			■			
	Pre-Assessment Space	■	■	■	■	■				■	■			
	Cafeteria	■		■	■		■				■			■
	Gymnasium	■			■				■		■		■	■
	Exercise Room	■			■	■			■		■		■	■
	Group Meeting Rooms	■	■	■	■			■	■		■			■
Resident Areas	Resident Rooms	■	■	■	■	■		■			■			
	Resident Lounge	■	■	■	■	■		■	■		■			■
	Resident Kitchen	■	■	■	■	■		■	■		■			■
	Resident Laundry Facility	■	■	■	■	■								
	Horticulture Therapy	■	■	■	■	■			■		■	■	■	■
	Library	■	■	■	■	■		■	■		■			■
All	Waiting Room	■	■	■	■	■		■	■	■	■			■
	Atrium	■	■	■	■	■		■	■	■	■			■
	Healing Garden	■	■						■		■	■	■	■

5.4 Space Planning

This phase of the project incorporated an adjacency matrix, bubble diagram and block diagram to explore separation of spaces in the existing buildings. For this phase of the project, the existing building has been broken up into spaces designated for staff members, residents and staff, residents only, and all users. The nursing station has been placed directly adjacent to the private resident units in order to appropriately accommodate patients on a 24-hour basis. The resident wing consists of resident lounges, horticulture therapy spaces, a laundry facility, a kitchen area, counseling offices, and multi-patient rooms with private restrooms. Although much of the literature has indicated the importance of single-patient rooms in maintaining privacy for patients, many of those studies were conducted in hospital spaces, where the patients studied would be spending most of his or her time in the room.

Other literature, on the other hand, has discussed the importance of multi-patient rooms in creating relationships and encouraging social interaction (Chaudury et al., 2005). This approach is appropriate for this type of facility because the residents will only be utilizing the patient rooms for sleep and day preparation, rather than spending most of their time in the space. It is more beneficial for this age group to rely on peers for support than to solely rely on privacy for stress reduction. The layout of the patient rooms and moveable partitions provide each resident with their own personal space, thereby enhancing privacy.

The administrative offices are located near the medical and public spaces to better accommodate to the needs of visitors and the paperwork involved with the medical aspects of the new facility. The residents, staff, and public have access to a healing garden space located on the East side of the building. The multipurpose space is directly adjacent to the public spaces due to the versatile nature of these space types. The adjacency matrix, bubble diagram and block

diagram illustrate the space classifications for the new design (See Figures 27-29). The name for this new facility is, “Riverside Recovery.”

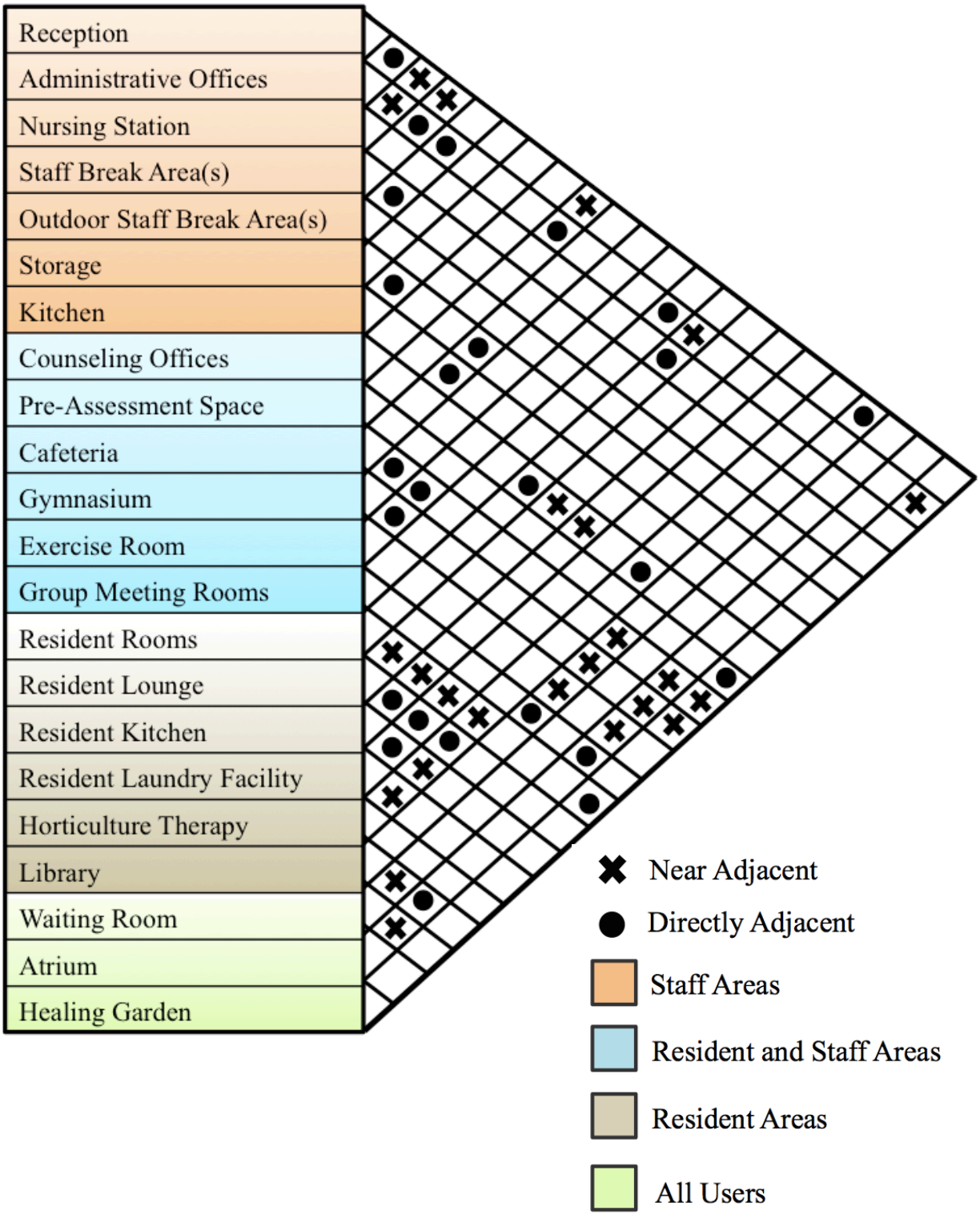


Figure 27: Adjacency Matrix

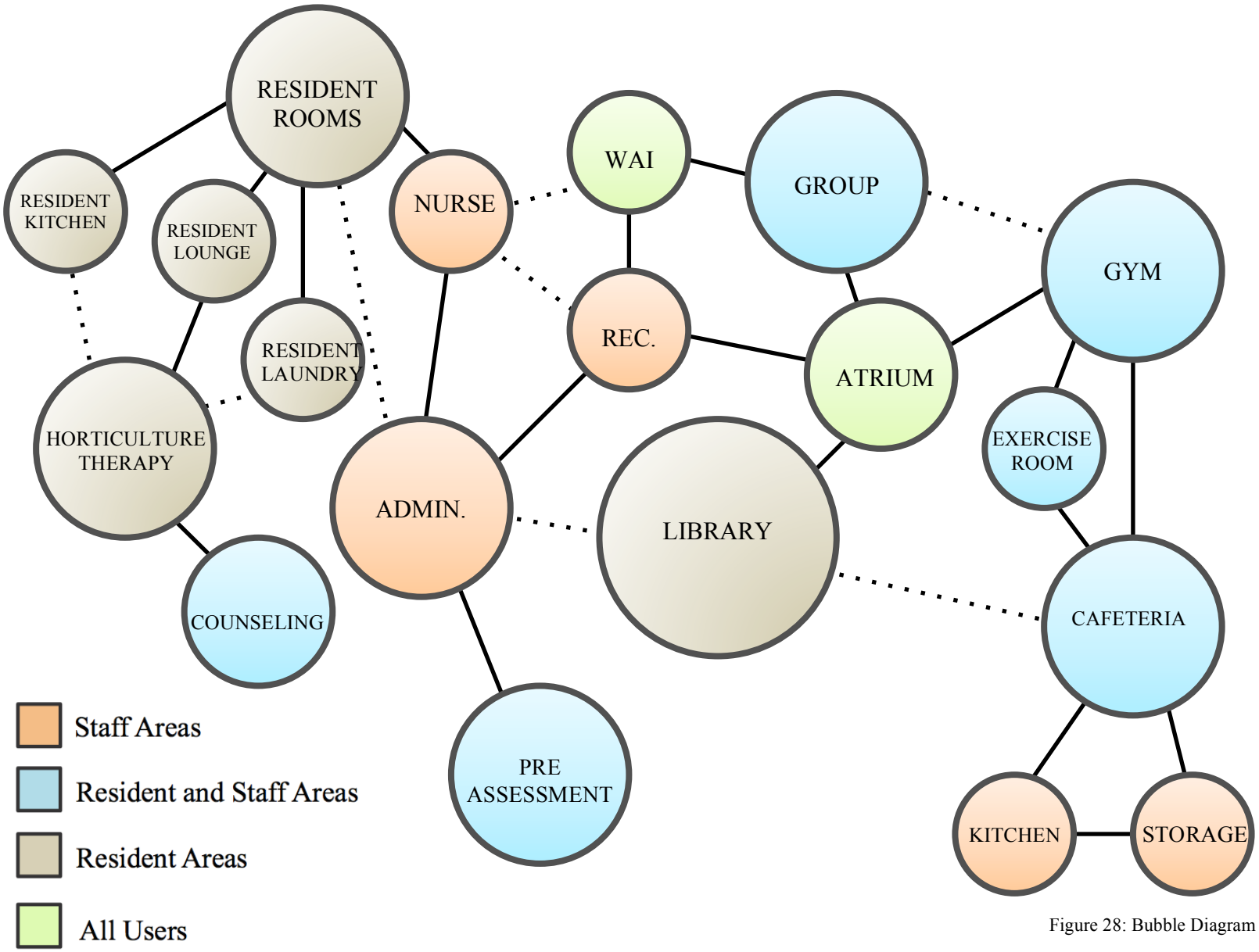


Figure 28: Bubble Diagram

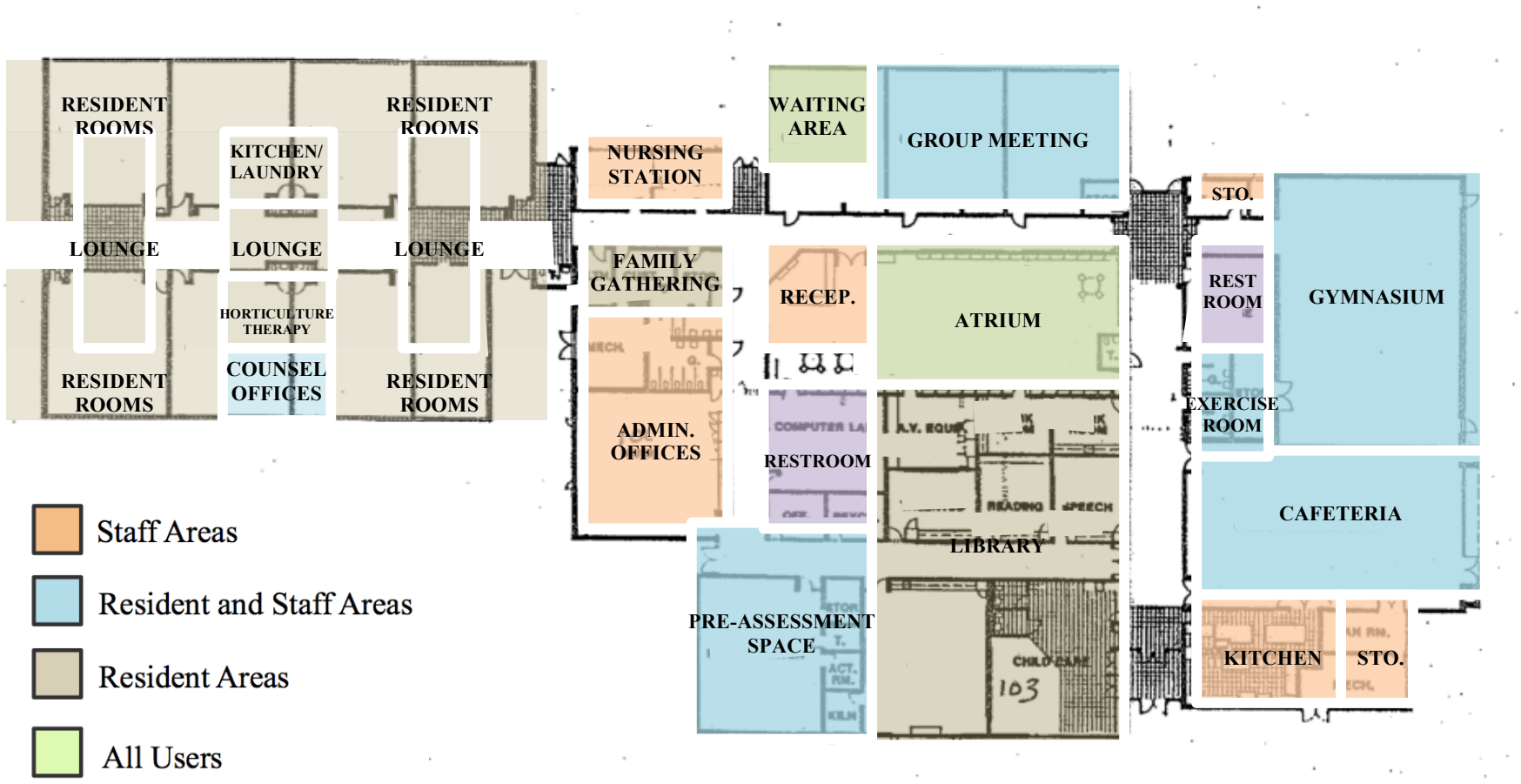


Figure 29: Block Diagram

5.5 Design Development

This phase of the project involved more in-depth development of the building layout and furniture plan. The final floor plan and renderings were assessed utilizing the design guidelines matrix as used previously in this thesis. In addition, materials, furnishings and fixtures were also finalized during this phase of the project. Computer renderings were developed to illustrate some of the proposed spaces in the new facility. Sections 5.5.2 through 5.5.7 exhibit proposed design options for the reception area, waiting area, atrium, patient common area, horticulture therapy space, and a patient room. The Supportive Design Space Assessment Matrix was readapted in this section as a checklist of supportive design elements. It was used as a tool to follow when designing each of the proposed spaces. The floor plans and renderings are provided in this section, while materials, furnishings and fixture information is available in the Appendix.

5.5.1 Final Floor Plan

Figure 30: Final Floor Plan

Table 7. Space Assessment for Riverside Recovery

Design Guidelines		
	Perception of Control	
	Wayfinding	■
	Privacy	■
	Noise Control	■
	Lighting	■
	Thermal Comfort	■
	Menu options	■
	Social Support	
	Furniture Arrangement	■
	Social Spaces	■
	Accommodations	■
	Positive Distraction	
	Nature	■
	Animals	■
	Physical Activity	■
	Activity Spaces	■

■ Achieved

Table 8. Theoretical Application for Riverside Recovery

Design Guidelines		Design Guidelines		Design Guidelines	
Perception of Control	Wayfinding • Reception easily visible from entry • Signage clearly posted • Waiting area located near reception • Floor plan broken up into clear sections	**Social Support**	Furniture Arrangement • Light, flexible furniture arrangements • Small groupings • Variety of seating options	**Positive Distractions**	Nature • Atrium incorporates trees and grass while providing adequate access to natural sunlight • Horticulture therapy spaces • Large windows in the waiting area provide views of nature and natural sunlight • Patient rooms have views of nature and/or natural sunlight with skylights • Indoor plants throughout facility
	Privacy • Patient wing separated from public areas • Private family gathering • Administrative offices separated from public areas • Private administrative offices; no cubicles		Social Spaces • Private family gathering • Atrium provides variety of social gathering options • Central patient gathering space • Patient "pods" encourage social interaction • Multi-patient rooms		Animals • Healing garden encourages animals to visit • Hummingbird concept • Artwork throughout depicts animals and/or nature
	Lighting • Windows with views of nature • Skylights throughout facility provide natural light throughout		Accommodations • Private family gathering space		Physical Activity • Gymnasium • Fitness Center • Healing Garden
	Thermal Comfort • Individual thermostats				Activity Spaces • Private patient library • Horticulture therapy spaces • Group meeting areas • Classrooms
	Menu Options • Large kitchen provides adequate space for preparation of a variety of food options				

5.5.2 Reception Space

Figure 31: Reception Space

Theoretical Application of Reception Area

The proposed image of the reception area (See Figure 31) demonstrates design guidelines as shown in Tables 9 and 10.

Table 9. Theoretical Application of the Reception Space

Design Guidelines		**Design Guidelines**	
Perception of Control	Wayfinding • Reception easily visible from entry • Signage clearly posted • Waiting area located near reception	**Social Support**	Social Spaces • Waiting area located nearby • Atrium located nearby
	Privacy • Separate reception office • Divider wall provides more privacy, but still allows for natural light and visual access to atrium	**Positive Distractions**	Nature • Access to natural sunlight • Views of nature through waiting room window • Views of indoor nature in atrium
	Lighting • Natural light from atrium and waiting area • Adequate overhead and ambient lighting		Animals • Views of nature, including animals • Hummingbird logo • Artwork depicting animals in waiting room visible from reception
	Thermal Comfort • Individual thermostats		

Table 10. Space Assessment for the Reception Space

Design Guidelines		
	Perception of Control	
	Wayfinding	■
	Privacy	■
	Noise Control	■
	Lighting	■
	Thermal Comfort	▒
	Menu options	
	Social Support	
	Furniture Arrangement	
	Social Spaces	▒
	Accommodations	
	Positive Distraction	
	Nature	▒
	Animals	▒
	Physical Activity	
	Activity Spaces	

■ Major Elements

▒ Secondary Elements

□ Not Applicable

5.5.3 Waiting Room

Figure 32: Waiting Room

Theoretical Application of the Waiting Room

The proposed image of the waiting room (See Figure 32) demonstrates design guidelines as shown in tables 11 and 12.

Table 11. Theoretical Application for the Waiting Room

Design Guidelines		Design Guidelines			Design Guidelines
Perception of Control	Wayfinding • Waiting area located near entry and reception • Atrium visible and accessible	**Social Support**	Social Spaces • Arrangements encourage interaction • Access to other spaces, such as atrium	**Positive Distractions**	Animals • Views of nature, including animals • Artwork depicting animals • Hummingbird concept
	Privacy • Private waiting area available		Furniture • Variety of options • Flexible arrangements • Small groupings		Activity Spaces • Waiting area can serve as multi-purpose activity space for large events • Access to Atrium, which serves as community outreach space
	Lighting • Natural light through large windows and atrium	**Positive Distractions**	Nature • Large windows provide visual access to nature • Indoor plants • Access to natural sunlight • View of atrium		
	Thermal Comfort • Passive solar heating with large windows				

Table 12. Space Assessment for the Waiting Room

Design Guidelines	
Perception of Control	
Wayfinding	■
Privacy	■
Noise Control	■
Lighting	■
Thermal Comfort	▒
Menu options	□
Social Support	
Furniture Arrangement	■
Social Spaces	■
Accommodations	□
Positive Distraction	
Nature	▒
Animals	▒
Physical Activity	□
Activity Spaces	■

■ Major Elements

▒ Secondary Elements

□ Not Applicable

5.5.4 Atrium

Figure 33: Atrium

Theoretical Application of the Atrium

The proposed image of the Atrium (See Figure 33) demonstrates design guidelines as shown in tables 13 and 14.

Table 13. Theoretical Application for the Atrium

Design Guidelines		Design Guidelines		Design Guidelines	
Perception of Control	Wayfinding • Atrium visible from entry • Accessible from reception and waiting area	**Social Support**	Furniture Arrangements • Variety of seating options including tables and lounge furniture • Flexible arrangements • Small groups	**Positive Distractions**	Animals • Views of nature, including animals • Artwork depicting animals • Hummingbird concept
	Privacy • Serves as a space for weekly meetings and community outreach; other spaces reserved for private meetings		Social Spaces • Furniture arrangements encourage social interaction		Activity Spaces • Atrium serves as multipurpose space, weekly meeting space, and community outreach space
	Lighting • Natural light through large windows and skylights	**Positive Distractions**	Nature • Skylights and large windows provide access to natural daylight • Indoor plants • Grassy areas		
	Thermal Comfort • Large windows allow for passive solar heating • Individual thermostat				

Table 14. Space Assessment for the Atrium

Design Guidelines	
Perception of Control	
Wayfinding	
Privacy	
Noise Control	
Lighting	
Thermal Comfort	
Menu options	
Social Support	
Furniture Arrangement	
Social Spaces	
Accommodations	
Positive Distraction	
Nature	
Animals	
Physical Activity	
Activity Spaces	

Major Elements

Secondary Elements

Not Applicable

5.5.5 Patient Common Area

Figure 34: Patient Common Area

Theoretical Application of the Patient Common Area

The image of the Patient Common Area (See Figure 34) demonstrates design guidelines as described in tables 14 and 15.

Table 14. Theoretical Application for the Patient Common Area

Design Guidelines		Design Guidelines		Design Guidelines
Perception of Control	Wayfinding • Central location • Counseling offices visible	**Social Support**	Furniture Arrangements • Variety of seating options • Small, flexible groupings	**Positive Distractions** Animals • Views of nature, including animals • Hummingbird concept • Artwork depicts animals
	Privacy • Patient use only • Storefront window sallow for counseling privacy		Social Spaces • Furniture arrangements encourage social interaction	Activity Spaces • Horticulture therapy spaces nearby • Kitchen allows for socializing and group events • Laundry facility
	Lighting • Skylights • Adequate ambient and overhead lighting	**Positive Distractions**	Nature • Skylights and large windows provide access to natural daylight • Visual access to horticulture therapy space	
	Thermal Comfort • Individual thermostats			

Table 15. Space Assessment for Patient Common Area

Design Guidelines	
Perception of Control	
Wayfinding	■
Privacy	▒
Noise Control	■
Lighting	▒
Thermal Comfort	▒
Menu options	□
Social Support	
Furniture Arrangement	■
Social Spaces	■
Accommodations	□
Positive Distraction	
Nature	■
Animals	▒
Physical Activity	□
Activity Spaces	■

■ Major Elements

▒ Secondary Elements

□ Not Applicable

5.5.6 Horticulture Therapy Space

Figure 35: Horticulture Therapy Space

Theoretical Application for the Horticulture Therapy Space

The proposed image of the Horticulture Therapy Space (See Figure 35) demonstrates design guidelines as shown in tables 17 and 18.

Table 17. Theoretical Application for the Horticulture Therapy Space

Design Guidelines		Design Guidelines			Design Guidelines
Perception of Control	Wayfinding • Central location • Counseling offices visible	**Social Support**	Furniture Arrangements • Moveable work tables allow for flexibility in the space	**Positive Distractions**	Animals • View of exterior including animals • Views of artwork depicting animals
	Privacy • Patient use only • Glass walls allow visual access but overall privacy		Social Spaces • Access to common patient area		Activity Spaces • Patients learn about horticulture • Patients learn to grow and maintain plant life
	Lighting • Skylights • Adequate ambient and overhead lighting	**Positive Distractions**	Nature • Skylights and large windows provide access to natural daylight • Indoor plants • Patients learn to care for plants		
	Thermal Comfort • Individual thermostats				

Table 18. Space Assessment for the Horticulture Therapy Space

Design Guidelines	
Perception of Control	
Wayfinding	
Privacy	
Noise Control	
Lighting	
Thermal Comfort	
Menu options	
Social Support	
Furniture Arrangement	
Social Spaces	
Accommodations	
Positive Distraction	
Nature	
Animals	
Physical Activity	
Activity Spaces	

Major Elements

Secondary Elements

Not Applicable

5.5.7 Patient Room

Figure 36: Patient Room

Theoretical Application of the Patient Room

The proposed image of the Patient Room (See Figure 36) demonstrates design guidelines as shown in tables 19 and 20.

Table 19. Theoretical Application for the Patient Room

Design Guidelines		Design Guidelines		Design Guidelines
Perception of Control	Wayfinding • Patient wing separated from remaining building • Easily navigable layout	**Social Support**	Furniture Arrangements • Beds are arranged to encourage personal privacy • Multiple beds encourages communication	**Positive Distractions** Animals • Artwork depicts animals • Hummingbird concept • Views of nature encourage visual interaction with animals
	Privacy • Layout encourages privacy • Bed frames divide the space • Individual storage		Social Spaces • Multi-patient rooms encourage social interaction and support from peers	
	Lighting • Natural light with windows • Overhead lighting	**Positive Distractions**	Nature • Indoor plants • Views of nature • Artwork depicts nature and/or animals	
	Thermal Comfort • Individual thermostats			

Table 20. Space Assessment for the Patient Room

Design Guidelines	
Perception of Control	
Wayfinding	
Privacy	
Noise Control	
Lighting	
Thermal Comfort	
Menu options	
Social Support	
Furniture Arrangement	
Social Spaces	
Accommodations	
Positive Distraction	
Nature	
Animals	
Physical Activity	
Activity Spaces	

Major Elements

Secondary Elements

Not Applicable

CHAPTER 6. SUMMARY AND CONCLUSION

This section summarizes the theoretical background and design process for this thesis. In addition, implications, project limitations, and potential for future research are discussed.

6.1 Summary

Florence Nightingale (1859) focused her research on quality of care and the built environment's impact on health. This is outlined in her Nursing Environmental Theory. Her theory suggests that it takes a combination of nursing and the surrounding environment to create an "optimal setting for God to act naturally" (Nightingale, 1859). Nightingale focused on a wide list of principles that she believed contributed to this optimal healing environment including ventilation, temperature, lighting, noise, variety, social support, diet and cleanliness. Roger Ulrich began further exploring temperature, lighting, noise, variety, social support, and diet in the early 1980's, which led to the development of his Theory of Supportive Design (Selanders, 2010). Roger Ulrich emphasized in his research the importance of creating spaces that are designed to promote healing through stress reduction by increasing sense of control, social support, and positive distractions through art and nature. Roger Ulrich's research eventually led to the development of an entire new design field that quickly has become known as evidence-based design, which is the practice of basing design decisions on research and is used to create therapeutic environments that are physically and psychologically supportive.

Although extensive research has been conducted on the role of a supportive environment in a healthcare setting, very little research focuses on Supportive Design Theory in a substance abuse treatment facility setting. Because Supportive Design Theory is centered around the concept of alleviating stress, and patients undergoing treatment for substance abuse are a under a

considerable amount of stress, it is important to see if the principles of Supportive Design Theory can be applied in a substance abuse treatment setting. Utilizing Ulrich's (1991) guidelines of Supportive Design Theory, a Space Assessment Matrix was developed as part of this thesis to analyze the supportive design elements of substance abuse treatment facilities. Two existing facilities were analyzed based on their supportive design elements in order to test the applicability of this matrix and to clarify the difference between an evidence-based design and a retrofit design. Based on the findings from utilizing the space assessment matrix, it was found that the evidence-based design facility was more successful in achieving a supportive environment for patients, visitors and staff than the retrofit design.

Although there are several published evidence-based design healthcare facilities across the United States, very few publications feature substance abuse treatment facilities, specifically, utilizing this approach to design. The Michigan Department of Community Health has demonstrated with statistics the need for substance abuse treatment facilities for youth between the ages of 12 and 18. Although there are currently a number of substance abuse treatment facilities in the Lansing, Michigan area, few serve as long-term treatment facilities that serve this targeted age group.

Utilizing a level-one evidence-based design approach, the purpose of this project was to utilize the healthcare design theories to develop a retrofit design for a substance abuse treatment facility for youth between ages 12 and 18 using an existing building in the greater Lansing, MI area. The design for this project was created using the concept of a hummingbird. Hummingbirds are referred to as, the bird of the impossible." Because of their weight-to-size ratio, they should not be able to fly; however, the tiny bird has overcome this impossibility and flies for the majority of its life, symbolizing that all obstacles can be overcome. This is a suitable

concept for this project because it demonstrates strength and courage for teens that are undergoing a difficult time in their lives.

This design was developed utilizing the principles laid out in Supportive Design Theory as well as Nightingales Nursing Environmental Theory. The new design incorporates separate patient, public and administrative spaces in order to enhance privacy and sense of control in the space. In order to encourage social support, a variety of gathering spaces, including a private family gathering area have been integrated into the design. In addition, small flexible furniture arrangements have been incorporated. Indoor gardens, a well-lit atrium, skylights, views of nature, horticulture therapy rooms, artwork and exercise facilities all contribute to creating positive distractions in the space. Inspired by the hummingbird concept, the design for this project incorporates bright colors and interesting textures. Floor plans and computer renderings help show how the design ideas for this project create a supportive environment for healing. By utilizing strategies outlined in these two healthcare design theories, patients, staff and visitors can benefit. According to the theories, access to nature, social support, and sense of control in a space contribute to a supportive environment and enhance the healing process.

6.2 Implications

The findings of this research suggest multiple implications that have potential to be applied to real-world analysis and design of supportive environments; specifically, substance abuse treatment facilities. The findings of this research suggest that the principles of Supportive Design Theory can be applied to substance abuse treatment facility settings. In addition, it is also suggested that the Supportive Design Space Assessment Matrix can successfully analyze supportive design elements of healthcare facilities, specifically, substance abuse treatment facilities.

6.3 Limitations

Although several aspects of this project have shown successful results, there are also multiple limitations. This research conceptual design focused on theoretical applications and is ideal for students and educators since budget and construction limitations were not considered. Because the conceptual design for this thesis was based on design theories, construction documents were not developed. In addition, certain interior elements were repeated because this thesis focused on the applications of theory-based design principles. For example, the same lighting fixture was used throughout the design because it presents the researcher's intention to provide an aesthetically successful and energy-efficient space.

6.4 Future Research

There are several possibilities for future research and design on this project. Although several aspects of design were considered for the proposed designs, lighting was not addressed. Future design students could produce a lighting project as a supplement to this thesis. According to Hamilton's (2003) definition of evidence based design, this project currently serves as a Level 1 evidence based design project because it utilizes reviews of other evidence-based design projects and interpretations of published research. In order to produce a Level 2 evidence based design project, future researchers could hypothesize expected results on these proposed design interventions. If these findings were published in the public eye, it could then become a Level 3 evidence based design project, and it could develop into a Level 4 project if the findings are published in a scholarly journal that requires peer review (Hamilton, 2003).

In addition to design-related research, the Supportive Design Space Assessment Matrix could be tested in other healthcare environments such as hospitals, outpatient clinics, assisted living facilities and mental health facilities. Future researchers could use the matrix to analyze

the supportive elements of these environment types, and make any additions or changes to the matrix, if necessary. The matrix could be used as a tool when constructing healthcare facilities, and it could also be tested as a type of post-occupancy evaluation of evidence-based healthcare design projects.

APPENDIX

Site Visit Checklist

Location:

Square Footage:

Year built:

Lot size/acreage:

Building Condition:

- Parking conditions/location:
- Heating/AC control
- Visiting hours/location/terms:
- Visitors allowed in rooms?
- Phone use options:
- Resident lighting control options:
- Access to television:
- Access to computer:
- Types of recreation areas:
- Wayfinding strategies (signage, layout of building, etc.):
- Arrangement of furniture:
- Office areas:
- Availability of gardens/plants (indoor/outdoor/both):
- Availability of windows/ window locations:
- Type of windows:
- Window placement/views:
- Artwork (type, location):
- Menu:
- Color scheme:
- Staff offices location relative to resident and gathering spaces:
- Availability of separate staff gathering spaces:
- General noise level:

Questions to ask

What types of treatment services does your facility offer?

What types of gathering spaces does your facility feature?

What types of users do you serve? (Gender, age range, types of addiction)

How many residential users can your facility accommodate?

Does your facility feature any unique spaces that set you apart from other treatment centers?

What types of resident rooms do you offer? (private rooms, roommate style, suite style, combination, etc.)

Can you provide an example schedule of a typical day for a resident?

Does your facility offer any unique programs? (educational, pet therapy, art therapy, guest speakers etc.)

What are the needs of the residents?

What are the needs of the staff?

How efficient is the building layout for productivity?

How effective are the current furniture layouts?

What is the general comfort level of the current furniture?

What building design recommendations can you offer?

What is the most effective part of the facility?

What is the least effective part of the facility?

Patient Room Materials and Furnishings

Figure 37: Bedding by DesignTex (top left), bedding by Stinson (top middle), main wall color by Sherwin Williams (top right), accent wall color by Sherwin Williams (middle left), bamboo flooring by Morning Star (center), storage unit by Coalesse (middle right), bed style by Ikea (bottom left), area rug by Pantone Universe (bottom right)

Patient Common Area Materials and Furnishings

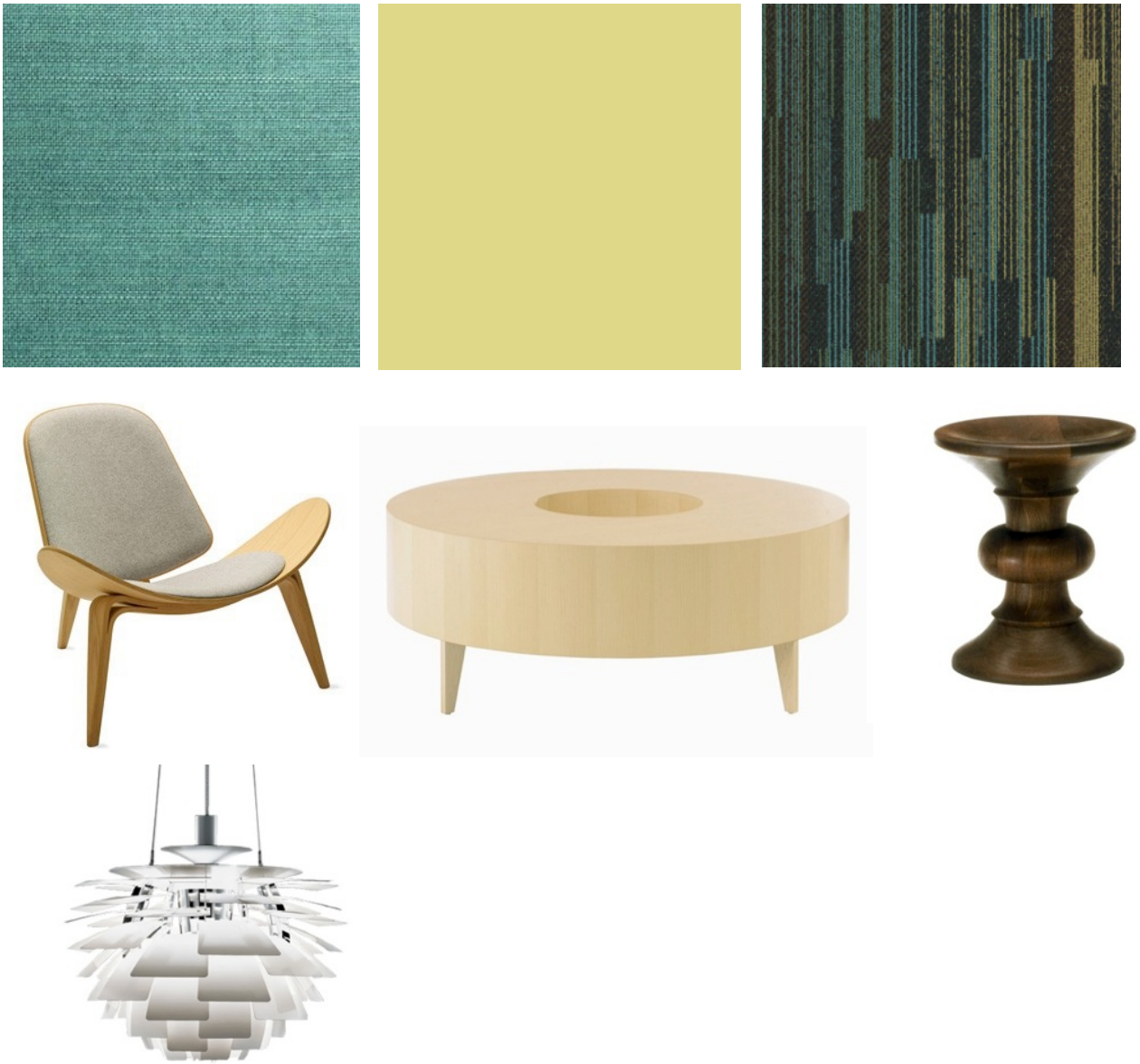


Figure 38: Wallcovering by Brewster Home Fsahions (top left), wall color by Sherwin Williams (top middle), carpet tile by Interface Flor (top right), side chair by Coalesse (middle left), coffee table by Coalesse (center), side stool by Herman Miller (middle right), lighting fixture by VLighting (bottom left)

Reception Area Materials and Furnishings

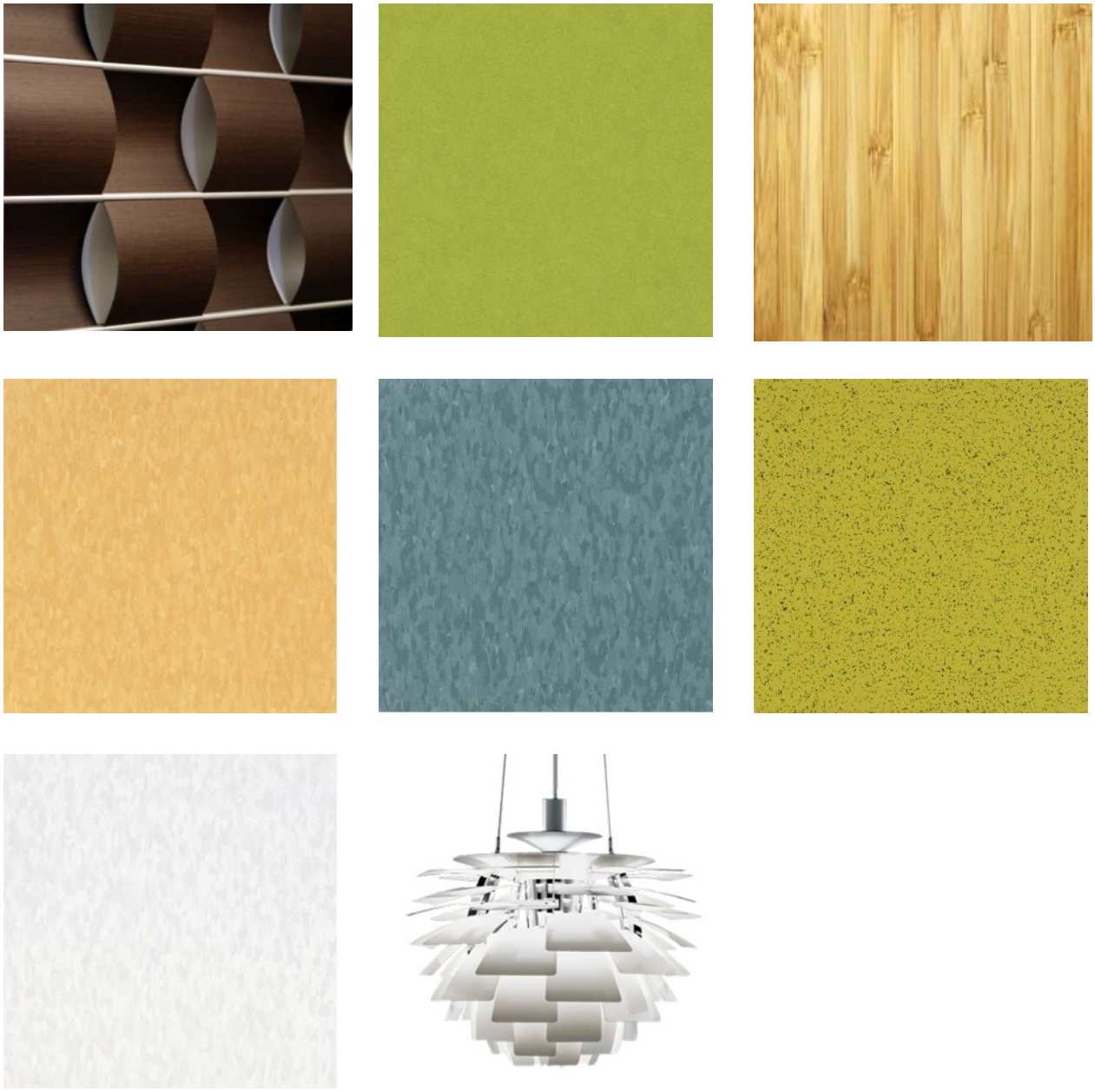


Figure 39: Ripple wall by 3Form (top left), countertop material by Compac (top middle), wood finish by Morning Star (top right), flooring material by Armstrong (middle left), flooring material by Armstrong (center), flooring material by Armstrong (middle right), flooring material by Armstrong (bottom left), light fixture by YLighting (bottom right))

Waiting Area and Atrium Materials and Furnishings

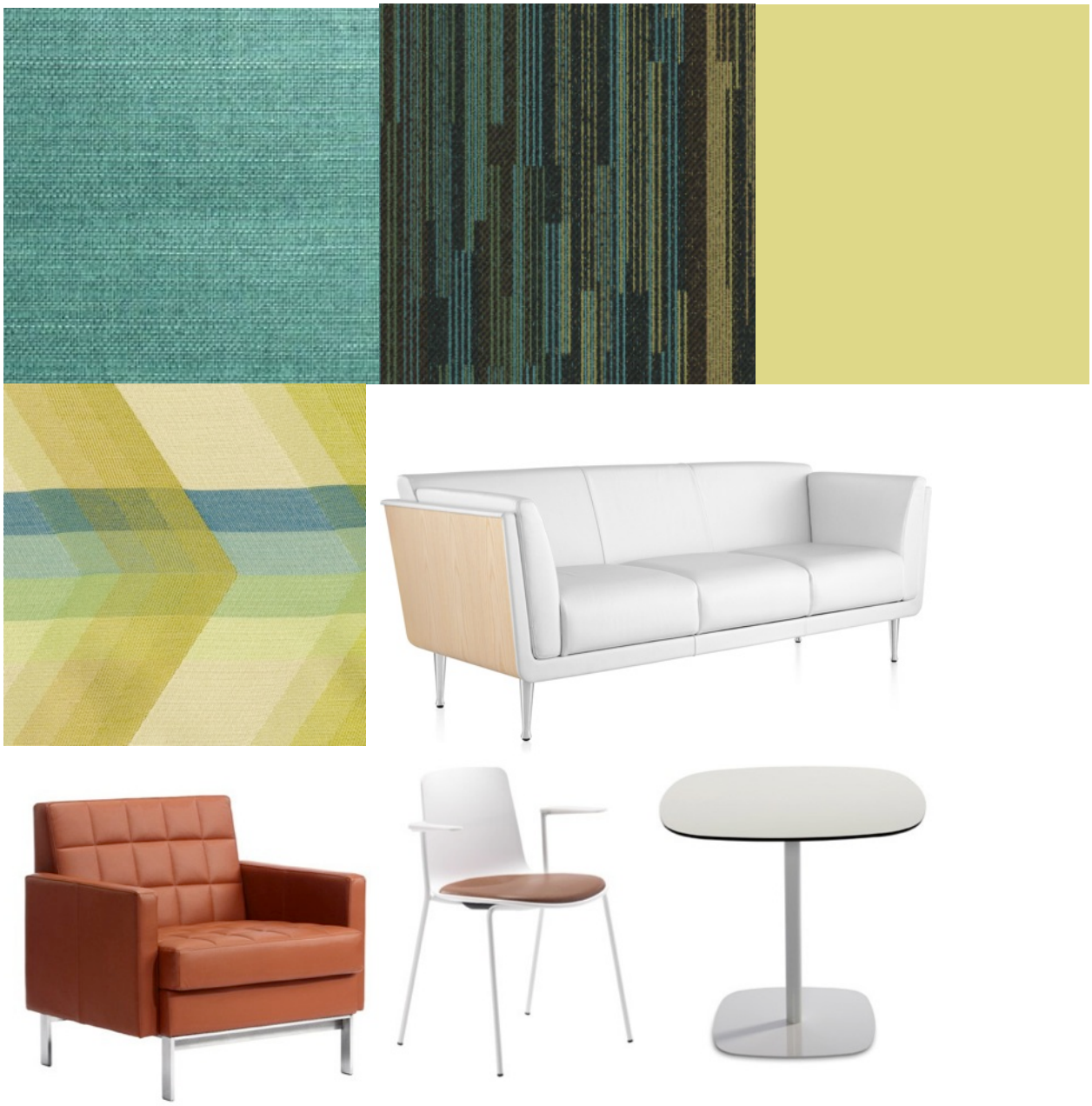


Figure 40: Wallcovering by Brewster Home Fashions (top left) carpet tile by Interface (top middle), wall color by Sherwin Williams (top right), upholstery by DesignTex (middle left), sofa by Herman Miller (middle right), lounge chair by Coalesse (bottom left), side chair by Coalesse (bottom middle), table by Coalesse (bottom right)

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