Characterized by pervasive symptoms of intrusion, numbing, and hyperarousal, coping with PTSD can be a tenacious and lifelong challenge for sufferers (Cahill and Foa 2010). Given the recent surge of war veterans resulting from Operations Enduring and Iraqi Freedom with a high prevalence of PTSD, landscapes may provide a free and accessible means for veterans to successfully cope with their PTSD symptoms and seek treatment.

The intention of this project is to merge holistic therapies for PTSD with successful landscapes for trauma patients into the creation of adaptable design principles. Guiding Principles for PTSD will be incorporated into the design of a Healing Woodland for wounded warriors at the Walter Reed National Military Medical Center in Bethesda, Maryland, while also providing potential solutions for other sites aiming to incorporate holistic therapies for PTSD into the landscape.
HEALING INVISIBLE WOUNDS:
LANDSCAPES FOR WOUNDED WARRIORS SUFFERING FROM
POSTTRAUMATIC STRESS DISORDER (PTSD)

By

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Dedication

This project is dedicated to the wounded warriors who risk their lives for our safety and freedom.
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Thank you to all members of my thesis committee for not allowing me to get lost in research, but still encouraging the pursuit of a cross-disciplinary approach.

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Chapter 1: Introduction

Given the recent surge of war veterans resulting from Operations Enduring and Iraqi Freedom with a high prevalence of PTSD, landscapes may provide a free and accessible means for veterans to successfully cope with their PTSD symptoms and seek treatment. A recent study concluded that nearly 29% of nearly 1.7 million troops involved in operations in Iraq in 2001 developed incidence of PTSD upon returning home (Upali et al. 2010). Of the veterans that experience symptoms of PTSD, less than 50% seek help, and of those who do, less than 50% receive minimally adequate treatment (Kreski 2012). Characterized by pervasive symptoms of intrusion, numbing, and hyperarousal, coping with PTSD can be a tenacious and lifelong challenge for sufferers (Cahill and Foa 2010).

Increasing awareness of PTSD and the positive impact nature has on psychological healing coupled with recent efforts regarding patient centered design in healthcare facilities, provides an opportunity for the discovery of a more intimate relationship between man and landscape, one that can be experienced through the healing process.

Research in healthcare design has acknowledged the importance of nature views from hospital rooms during the patient recovery process as well as the use of landscape as a healing mechanism (Barnes 1994; Francis and Hester 1990; Francis and Cooper Marcus 1991; Hartig et al. 1991; Kaplan 1973; Kaplan and Kaplan 1989; Relf, 1992; Ulrich 1979, 1981; Ulrich 1984; Ulrich 1986). While it is understood that patients can benefit from the use of outdoor spaces, there is a lack of understanding regarding the direct link between landscape design and treatments for specific disorders such as
PTSD. In addition, the potential impacts that this link has on the improvement of patients’ mental health and physical well-being is yet to be fully understood (Marcus and Barnes 1999).

Patients with PTSD suffer from personal, social, and cultural symptoms. Flashbacks and intrusive memories of the trauma may lead to alterations in psychological processing including depression, anxiety, poor coping skills, hostility, and detachment or dissociation from the physical body and reality (Schnurr and Green 2004). PTSD may also result in difficulty with attentional processing such as altered perception of their symptoms and mislabeling. In addition to psychological issues, patients with PTSD may also experience biological alterations such as reduced immune functioning, which lead to frequent sickness and worsening previous struggles with allergies, headaches, and bodily aches among others. Coping measures may include substance abuse, smoking and generally poor self care, which may lead to isolation and avoidance of social situations. Those who suffer from this disorder may become overly obsessed with morbidity and mortality further isolating themselves from social interaction. In severe cases of PTSD, the individual may attempt or complete suicide if feelings of confusion or despair become too overwhelming and seem unending. Individuals who experience abuse at a very young age may be more susceptible to experiencing chronic symptoms of PTSD (Cahill and Foa 2010, Rothschild 2003).

This project will examine relationships between these symptoms and challenges, while incorporating therapies associated with PTSD and landscape. In doing so, new perspectives and approaches regarding the design of healthcare facilities, specifically for patients suffering from PTSD may be uncovered. Research of therapies for PTSD
and site-specific design considerations will inform development of a landscape master plan for the Green Road and a series of garden spaces for wounded warriors at WRNMMC.
Chapter 2: Project Context

2.1 The Green Road

In the spring of 2012, a team of designers, also known as the Green Road Team assembled to realize the vision of a healing woodland garden for wounded warriors on the Walter Reed National Military Medical Center Campus in Bethesda, Maryland. The site of interest sits alongside what is known as the Green Road, a trail built by the United States Navy that travels from the southwest corner of the campus to the northeast corner bisecting the site in two relatively equal halves. The Rock Creek Tributary, a perennial stream, follows the Green Road flowing from the southwest portion of the site to the northeast corner where it terminates into a pond. The woodland corridor of the WRNNMC campus provides many opportunities for experiencing the most natural areas of the site, and is the focus of this thesis project.

In order to realize the full potential of the woodland, the team held a charrette with local experts in healthcare design and met with focus groups of wounded warriors undergoing various struggles in order to gain a clear understanding of how the woodland garden may best serve the needs of wounded warriors, families and staff.

After being one of eleven project teams nationwide to be awarded a planning grant from the TKF Foundation’s Open Spaces Sacred Places (OSSP) award program, design concepts for the healing woodland garden began to take form. Desired healing and gathering spaces within the woodland include a council ring for gathering, a space for close interaction with the stream, shelter, a restroom, a glade and a commemorative overlook pavilion whose design was inspired by wounded warriors comments during a series of meetings.
During the planning stages of design, the team worked to assemble a design proposal that would allow for realization and construction of the initial phases of the project. This included a plan for scientific testing of the impact these spaces have on the individuals using them. Several measures for the testing of changes in bodily responses include user surveys, GPS heart monitors, sweat packs and cortisol tests. These measures will provide insight into the restorative powers of nature and a better understanding of the impacts that individual spaces have on the user.

In February of 2013, the team was awarded the OSSP design grant from the TKF Foundation allowing for further design development and construction of the initial phases of the healing woodland project and associated research. The ideas presented in this thesis project are further explorations of the Walter Reed Green Road Teams’ Healing Woodland Garden proposal and expand the scope of the project to a series of gardens within the larger woodland. Participation as a team member responsible for research and design greatly influenced design decisions for a series of therapeutic gardens that more closely focus on integration of therapy into the landscape for wounded warriors suffering from PTSD. Work as a Green Road Team member also reinforced the idea that the woodland offers an escape for wounded warriors, and provides a necessary element of wildness otherwise void in the urban context that may prove necessary in therapeutic efforts for patients with PTSD.
2.2 The TKF Foundation & Open Spaces Sacred Places

The philosophy of the TKF Foundation recognizes the importance of escape from stress and the overwhelming technological world around us. The foundation recognizes that the need for open and sacred spaces within the urban context is more important than ever and the relationship between man and nature cannot be lost. Contemporary restorative gardens provide a reconnection between people and nature and should be in the forefront of the designer’s considerations. Design of open spaces in such a way that allows them to be sacred will lead to a deeper human experience (TKF Foundation 2013).

An Open Space Sacred Place (OSSP) is described as an outdoor environment accessible to all where one can feel safe, reconnect with oneself and others, and provide a deeper connection with nature that allows for individual healing or transformation. A TKF sacred green space within an urban setting typically includes four design elements or features that seem to be common throughout the world (TKF Foundation 2013).

Design elements include the use of portals, destinations, surround, and paths. A portal is simply an opening or gateway that an individual passes through to arrive at a destination of space. The portal may be as simple as an archway or a special tree, but it should be well defined regardless of the form it takes. The portal helps to define the space as separate from everyday life and is special in some way (TKF Foundation 2013).

Paths are necessary to lead one to and through the sacred place and help to ground the individual in time and space while also providing structure. Paths can lead
the individual to a specific destination through a linear experience or take them through a series of destinations with a meandering path. Having a destination or a series of destinations is also necessary. A destination in simplest terms is a defined point which one is drawn to and moves toward along a path (TFK Foundation 2013). According to the TKF Foundation, the sequence of entering a portal, traveling a path and arriving at a destination initiates the spiritual experience of a pilgrimage, representing the lifelong process of human growth and development.

The last design feature of an OSSP is surround, which can be provided through site elements such as vegetation, sculpture, and fencing among others. These elements provide boundaries, feelings of safety and enclosure within the space. The sense of surround allows the user to feel safe until he/she chooses to travel back on the path, through the portal and into everyday life (TKF Foundation 2013).

The team at Walter Reed considered how these design elements and philosophies align with the goals of the healing woodland garden, and incorporated design features of sacred green spaces.
Chapter 3: Contemporary Restorative Gardens and Landscapes for PTSD

3.1 A Brief History of Restorative Gardens

The idea that environments are restorative is not a contemporary one. Utilizing outdoor environments for personal reflection and meditation that lead to restoration of the body, mind, and spirit has emerged time and time again over the centuries (Cooper Marcus 2007).

Dating back to early monastic gardens of the Middle Ages, healing gardens in the form of arcaded courtyards translated the therapeutic benefits of sensory elements like birdsong and fragrance as well as greenery and privacy. Although the decline of monasticism led to the temporary disappearance of these gardens until the 19th century, many of the same principles have re-emerged in contemporary healing spaces. Less common is the use of restorative principles in outdoor settings to treat specific disorders, which may prove beneficial for the treatment of Posttraumatic Stress Disorder (PTSD).

In the mid 1800’s, Florence Nightingale’s discovery of the Germ Theory of Disease uncovered that disease occurs as a result of pathogenic agents. Furthermore, this discovery helped researchers to determine the disease’s severity while giving doctors a more organized, systematic way to treat the disease. In addition, the hospital discovered a new purpose in healthcare as a center for research (Paine et al 1997).

The rise of Romanticism in the late 1800’s revisited the possibility that nature plays a role in bodily and spiritual restoration, leading to the emergence of horticultural and gardening therapies as forms of treatment. (Paine et al 1997, Rogers 2001).
The 20th century represents great strides in the healthcare industry including the use of gardening as a rehabilitative activity for those with physical ailments post WW1. During WWII, horticultural therapy emerged as a profession along with special gardens for veterans, the mentally ill, and elderly people. By the late 20th century, hospital buildings themselves improved dramatically as did the surrounding landscape. Air-conditioned rooms, entry landscaping, interior design and interesting art filled hallways proved that design was now a consideration. At the time, some roof terraces or courtyards were designed for stress-reduction (Paine et al 1997, Rogers 2001), but this has only recently become much more prominent practice.

3.2 What Defines a Restorative Garden?

The terms healing, restorative, and therapeutic are currently used interchangeably by many professionals to describe enhancements to individual well-being. The three aspects of the restorative process, which can be addressed through landscape design, are awareness and relief from physical symptoms, stress reduction and increased comfort, and improvement in the patient’s overall sense of well-being (Cooper Marcus 1999). For patients with chronic conditions, a sense of well-being has been shown to increase their level of functioning, while those who are recovering show decreased feelings of hopefulness and faster rates of improvement (Cooper Marcus 1999). Similarly, wounded warriors suffering from PTSD need rest and recuperation as a result of mental fatigue, irritability, and decreased attention span in order to feel restored (Kaplan, Kaplan and Ryan 1998). Landscapes can provide a free and accessible means of stress relief and an improved sense of well-being.
3.2.1 Characteristics of the Restorative Garden

Restorative environments include a variety of characteristics that aid in this restorative process. Natural settings, either viewed or experienced do not need to be dramatic to be effective and even a short exposure time can be helpful to the individual (Kaplan, Kaplan and Ryan 1998). Responses to many studies have suggested that natural elements such as trees and plant materials are critical in triggering patient mood changes because they represent a complete contrast to the experience of being inside of a hospital. These natural elements stimulate the senses and seem to be a necessary prompt for experiencing feelings of calm or centeredness (Cooper Marcus and Barnes 1995). In addition to providing a connection to natural elements such as wood and stone, restorative environments can promote quiet fascination that makes it possible for one to reflect and unravel thoughts in the mind. Other site elements or characteristics that may promote this type of quiet fascination are sound patterns, intensity of form and color, and motion such as animals, streams, or leaves changing with the season to name a few (Kaplan, Kaplan and Ryan 1998).

3.3 Theories of Restorative Gardens & The Healing Power of Nature

Several theories concerning the relationship between man and nature create a framework for projective design ideas concerning design and treatment for specific mental disorders, including many of the symptoms and challenges associated with PTSD. Theories that help to explain our deep desires to experience the natural environment include Attention Restoration Theory, Theory of Supportive Garden Design, garden design in healthcare settings, and transitional phenomena.
3.3.1 **Attention Restoration Theory**

Attention Restoration Theory (ART) is based on past research supporting the idea that our attention can be divided into two categories, involuntary and voluntary. Involuntary attention is captured by intriguing or important environmental stimuli, and voluntary attention, also known as directed attention, occurs when directed by cognitive control processes (Berman, Jonides and Kaplan 2008). Involuntary and voluntary attentions vary both neurologically (Berman, Jonides and Kaplan 2008; Buschman and Miller 2007; Corbetta and Shulman 2002; Fan, McCandliss, Sommer, Raz, and Posner 2005) and behaviorally (Berman, Jonides and Kaplan 2008; Fan, McCandliss, Fossells, Flombaum, & Posner 2002; Jonides 1981).

Directed, or voluntary, attention involves top-down control and typically requires the resolution of conflict and simultaneous suppression of distracting environmental stimuli. One’s ability to concentrate, or focus their attention is limited and the capacity for such attention will eventually wear the individual down, resulting in mental fatigue (Kaplan, Kaplan and Ryan 1998). Mental fatigue can become problematic by exacerbating difficulties focusing and promoting unintentional shifting of focus to other events in the environment or thoughts going through one’s head. Actions are also affected by mental fatigue as the result of impulsive or poor decision-making, irritability, impatience and the increased likelihood of error (Kaplan, Kaplan and Ryan 1998). Recent studies have also shown that directed attention plays an important role in short-term memory as well (Berman, Jonides and Kaplan 2008).

ART reveals that directed attention is positively affected by interactions with nature, which contains inherently fascinating stimuli. Natural processes such as sunsets...
use involuntary attention sparingly, allowing voluntary (directed) attention mechanisms to restore and replenish (Kaplan, 1995). Experiences that limit directed attention requirements allow for attention to be captured from the natural environment in a non-dramatic fashion, or from the bottom-up. Urban environments, while they capture attention involuntarily, are more likely to do so in a dramatic fashion that requires a response utilizing directed attention to deal with the over-stimulation (Berman, Jonides and Kaplan 2008). However, a great deal of research supports the positive results of interaction with natural environments and improvements on attention restoration and memory (Berman, Jonides and Kaplan 2008; Berto 2005; Cimprich 1992, 1993; Cimprich and Ronis 2003; Faber, Taylor, Kuo, and Sullivan 2002; Hartig et al., 2003; Ottosson and Grahn 2002; Tennessen and Cimprich 1995).

3.3.2 *Theory of Supportive Garden Design*

Developed by Roger Ulrich, the theory of supportive garden design states that by allowing patients and staff to escape the interior building environment, designers can encourage exercise, choice, social support, and nature distraction through access to the outdoors. This theory has become particularly important in acute care hospitals as credible scientific evidence shows these four elements will reduce stress in users (Cooper Marcus 2005). A basic premise underlying this theory is that an environment’s potential to promote improved health outcomes is directly linked to its ability to facilitate stress (Ulrich 1997).
3.3.3 Transitional Phenomena

Literature on outdoor environments within the past decade describes how the presence of transitional phenomena within landscape can promote the restorative process and reduce stress. Transitional phenomena can exist within landscape as one element or encompass many elements. Whatever the scale, these spaces offer feelings of security and comfort and serve as stepping stones toward self-actualization and recovery from traumatic memories (Korpela 2002; Manzo 2003, Watkins 2010). Self-actualization can become restorative when it leads one to feel secure enough to let their guard down without feeling vulnerable (Kaplan, Kaplan and Ryan 1998). Spaces that allow for transitions in the individual’s mental or emotional state should be separate from distraction, and in many cases, this involves various types of enclosure so that one feels private and focused (Korpela 2002; Manzo 2003, Watkins 2010). In smaller spaces, marking areas of separation with changes in texture and vertical features will aid in providing a sense of enclosure. For larger landscapes, designers can encourage transitional experiences by creating distinct “rooms” or framing vistas are other ways to realize a sense of enclosure (Kaplan, Kaplan and Ryan 1998).

3.4 The Role of Nature in Psychiatric Disorders

As stated previously, the idea that nature has a restorative effect is not a new sentiment. Green vegetation, sunlight, and fresh air have been essential to patient recovery since the medieval monastic healing gardens (Cooper Marcus 2005, Cooper Marcus and Francis 2007, Sacks 2011).

Since the 1970’s, guidelines for outdoor therapeutic spaces in hospital facilities have emerged with concerns for more patient centered design approaches to facility
planning. As awareness of the restorative benefits of these spaces has become more widely understood, specific design considerations for specialized facilities such as psychiatric facilities and sensory processing disorders have also developed.

Studies by Ulrich and Hartig supported the theory that having views of nature positively influenced recovery time and health outcomes (Ulrich 1981, 1984, 1992; Hartig 1991, 1993, 1996). A more recent post occupancy study in 1994 revealed that while people appreciate traditional garden features like trees, lawn, flowers and water, ninety percent of users experienced an elevated mood after spending time outdoors (Cooper Marcus and Barnes 1995). Potential reasons for this positive change in mood are attributed to the contrast between the indoor and outdoor environment including a greater variety of textures, sensory experiences and organic forms outdoors as well as potential metaphors that nature provides as an ongoing cycle of life (Cooper Marcus 1997).

3.4.1 The Epidaurus Project

In the 1990’s, a shift toward patient-centered design approaches began to take shape (Foote 2012), but not until 2001 was there a project to pave the way for new initiatives in the design of contemporary restorative environments.

In 2001, The Epidaurus Project: Holism in Department of Defense Health Facilities was revealed as an advanced initiative in holistic medicine that has operated in the Military Health System (MHS) with the intention of engaging civilian experts in the field of healthcare to optimize the patient experience (Foote 2012).
The four major components of the Epidaurus Project are:

1. Evidence-based building design (EBD),
2. Family-centered approaches,
3. Interdisciplinary care integration, and
4. Wellness

The Core Principles of Patient-Centered Design are:

1. Integrity of the Clinical Encounter
2. Empowerment of the Patient
3. Focus on the Relief of Suffering
4. Promotion of Lifelong Health and Wellness (Foote 2012)

Currently, activities incorporating Epidaurus principles focus on the incorporation of nature, spirituality, and art into facilities within the Military Healthcare System. Equally as important, is the discovery of new metrics for testing these spaces and understanding their true impacts on wellness (Foote 2012).

The Epidaurus Project was a significant effort to merge civilian expertise in medicine and healthcare with the needs of patients. The military was able to benefit from this effort and has incorporated discoveries from meetings into their efforts to provide a healing woodland site for the wounded warriors at WRNMMC. Historically, a shift in thinking is common during war times and tends to become a significant driver of innovation in the healthcare system (Foote 2012).
3.5 Design Approaches to Contemporary Healing Gardens

The desire to acknowledge and utilize nature as an integral part of the healing process in healthcare settings provides new insight into the treatment of disorders and diseases on a more specific basis. Rather than designing landscapes for general populations of healthcare patients, an opportunity exists to more effectively address and treat individuals for their specific ailments. Gardens within the last decade have addressed methods of lowering levels of stress and anxiety, which leads to feelings of being grounded in the present. This is particularly important for patients suffering from PTSD who tend to suffer from detachment and dissociation from their physical body (Schnurr and Green 2004).

The general goal of healing gardens throughout history has been to provide engagement with nature and an escape from the stresses of life and to provide the user with a sense of control. In order to achieve this, it is necessary to ensure the garden is accessible and comfortable (Cooper Marcus, 1997). These overarching goals remain prominent in contemporary healing and restorative gardens, only with more understanding of particular elements that may initiate the restorative process.

Research has shown that the more engaged we are through sensory experiences, the more likely we are to lower stress levels and reduce anxiety (Cooper Marcus and Francis 1998). Once anxiety levels dissipate, we become less focused on our pain, more grounded in the here and now, and aware of feelings of control. For patients with PTSD, lowering stress and feeling in control is essential to preparation for therapy. Many patients with this disorder carry feelings of guilt due to a situation that took away their sense of control (Cahill and Foa 2010), making this aspect of the
contemporary healing garden very important. Ways to initiate lower stress levels include lush plantings, limited use of paving, appropriate use of seasonal color in plantings, provision of various textures, viewing or hearing the movement of water, utilizing vegetation that attracts wildlife and visualizes movement such as grasses, views of the sky and cloud formations, and reflective water surfaces such as pools (Cooper Marcus and Francis 1998).

In addition to the provision of physical elements within the landscape to reduce stress, contemporary healing gardens have also acknowledged that social gathering and interaction improves the likelihood of healing. For this reason, restorative gardens provide a variety of settings that allow for couples, small groups and larger gatherings (Cooper Marcus and Francis 1998). In the case of wounded warriors with PTSD at WRNMMC, space for warriors and family members to converse is particularly important. Many of the warriors have families living on campus including young children and may benefit from their love and support.

3.6  Design for Psychiatric Disorders

3.6.1 Therapeutic spaces

The design of outdoor spaces for individuals with mental and psychological problems, rather than just physical, have emerged through a series of therapeutic outdoor spaces in hospitals and community spaces. As we learn more about specific disorders and trauma patients specifically, we begin to incorporate helpful elements that aid the individual in relieving stress (Cooper Marcus 2005).
3.7 Successful Design Approaches: Landscapes for Trauma Patients

Approaches to therapeutic design vary between designers, who draw inspiration from various precedents to inform each specific project. While many of the landscape approaches used for trauma patients are not yet evidence-based, surveys and post occupancy evaluations have proven them to be successful (Cooper Marcus 2005).

Successful landscapes for trauma patients include archetypcal spaces such as hills, caves, woodlands, streams, and bridges among others. These spaces or elements have shown to promote a sense of comfort and familiarity. Metaphors in the landscape such as the stream as a representation of the cycle of life have also been proven to be successful in lowering stress levels and promoting therapies for trauma (Cooper Marcus 2005).

A more specific type of design, the English strolling garden has been discussed also as successful for these patients. A meandering path creates anticipation by hiding and revealing desirable views while leading the individual to a variety of rooms or subspaces. This type of path also incorporates all four of Ulrich’s elements in his Theory of Supportive Garden Design including exercise, choice, social support and nature distraction (Cooper Marcus 2005).

Another potentially successful landscape for trauma patients may be statement art (Cooper Marcus 2005). While this approach has been recorded as unsuccessful by post occupancy surveys, it is important to note that in most cases, the statement art is being produced by an outside artist verses the patients themselves. Incorporating works from the current Art Therapy program at WRNMMC as statement art may prove much more successful. These elements can serve as transitional phenomena, or help to
create preferred places that balance desires for familiarity, security, curiosity, and exploration. A place where one feels secure enough to explore and imagine new ideas. When new ideas emerge, the space becomes “transitional” for the patient by serving as a stepping-stone toward self-actualization (Korpela, 2002; Manzo, 2003; Watkins et al, 2010).

3.8 Recent Studies on Therapeutic Landscapes for PTSD

Despite the wealth of literature and research existing on restorative and healing environments, little research exists on the design of outdoor environments for the treatment of patients with PTSD specifically. Recent research and literature have attempted to identify and address the environmental needs of veterans and civilians struggling with this disorder. In order to identify the users’ needs and the most appropriate successful approaches to site design for trauma patients, it is necessary to understand the symptoms, struggles, and treatments associated with the disorder.

3.8.1 Symptoms and Challenges of PTSD

As stated in the Chapter 1 of this paper, some physical and social symptoms associated with PTSD include disturbances with clinically significant distress, physical ailments and frequent sickness, or impairment of social areas of functioning. In addition, patients may also experience difficulty falling asleep, sudden outbursts of anger, and hypervigilence and dizziness. Some individuals may experience loss of memory after the traumatic experience, which may lead to somaticism, or translation of psychological pain into the physical ailments (Smith and Segal 2012, Rothschild 2003). Bodily pains,
headaches and nausea are potential experiences among others. Flashbacks, nightmares and hallucinations may intensify or trigger these physical symptoms as well. Overlaps with other psychiatric disorders such as sensory processing disorders and dementia provide a useful starting point for considering design choices. (Smith and Segal 2012, Rothschild 2003).

Scientists have also discovered social struggles associated with PTSD include efforts to avoid thoughts, feelings or conversations associated with the trauma, inability to recall important aspects of the event, diminished interest in participation in activities, feelings of detachment or estrangement towards others, and a sense of foreshortened future in terms of career, marriage, children, or life span (Green, Kaltman and Schnurr 2010; Montgomery 2004).

3.8.2 Research linking PTSD and Restorative Environments

Research presented at the Healing Through Nature: Healthcare Gardens for Veterans and Children with Sensory Processing and Spectrum Disorders at the Chicago Botanic Gardens in July of 2012 stated that individuals with PTSD have similar needs to those with sensory processing disorders (Kreski 2012). Unless an environment is perceived as safe, the individual’s nervous system will continue to function at a very basic level, one of survival. While different characteristics constitute “safe” environments for different individuals, there is some common ground. An environment can be considered safe when it is stimulating without be overwhelming and calming without inducing boredom. This type of environment will prime the nervous system for a state of
arousal, which allows the individual to be available for treatment or learning (Kreski 2012).

Documented improvements to restorative environments include physical, emotional, and social aspects. Reduced stress and anxiety, lowered physical pain, decreased blood pressure, increased attention span and mobility are all noted improvements. Doctors studying this relationship between the environment and human restoration note that methods, which reduce stress while addressing the parasympathetic autonomic nervous system response is essential to the health of veterans struggling with PTSD (Detweiler, Detweiler and Lane 2012).

3.9 **Holistic Therapies for PTSD**

Of the many potential forms of therapy for trauma, some stand out as particularly relevant to one’s experience in the landscape. Several sources note that PTSD is the body’s normal reaction to an abnormal situation, and that the fastest way to ground oneself again is to experience nature (Smith and Segal 2012, Cahill and Foa 2010). Therapies that can be experienced or practiced in nature include light exercise such as walking or jogging, meditation and yoga, tai chi, or group activities such as art therapy (Rothschild 2003). Other types of therapy specific to PTSD, such as Eye Movement Desensitization and Reprocessing (EMDR), somatic experiencing or cognitive behavioral therapy, can be practiced in an outdoor environment or incorporated into the design of the environment as well (Smith and Segal 2012).
3.9.1 Somatic Experiencing

In patients with PTSD, a traumatic experience has resulted in a hyper-arousal state of the nervous system. Somatic Experiencing therapy aims to release a highly activated nervous system and bring it back into equilibrium in the same way that all animals do post trauma. However, humans may prevent this release of pent up energy if the “rational” part of the brain takes over natural instinct. Symptoms of trauma will appear when the body attempts to contain this unused energy and keeps it pent up in the nervous system. The resulting imbalance is thought to cause feelings of disconnection from our body and spirit as well as others around us (Levine 1997).

Somatic experiencing therapy acknowledges that some patients may translate the mental and emotional pain associated with their traumatic experience into physical ailments. Individuals may feel nauseous or vomit when reminded of the event in addition to experiencing headaches, migraines, excessive allergies, photosensitivity, rapid heartbeat and other bodily sensations (Friedman et al 2007, Levine 2010).

Somatic Experiencing therapy reverses this process to some degree. This therapy takes advantage of a human’s unique ability to heal from the outside in rather than the inside out. This therapy works with bodily sensations, rather than thoughts and memories about the traumatic event. By concentrating on what’s happening in the one’s body, the individual can access trauma-related energy and tension. From this point, natural survival instincts take over and pent-up energy is expelled through various forms of physical release such as shaking, crying, among other forms (Levine 2010, SAMHSA 2012).
3.9.2 Eye Movement Desensitization and Reprocessing (EMDR)

Research suggests that outcomes resulting from certain cognitive and behavioral therapies used to treat PTSD such as EMDR, can be incorporated into the day to day environment (Smith and Segal 2012, Cahill and Foa 2010, Kreski 2012). Helpguide.org discusses the use of red and blue visuals in alternating patterns within one’s environment can aid in similar outcomes as EMDR therapy, unlocking new thoughts and ideas by allowing the right and left sides of the brain to communicate with each other (Smith and Segal 2012, Cahill and Foa 2010, Rothschild 2003). In some cases, these new thoughts allow the individual to accept traumatic events and losses (Kreski 2010).

One unique and promising aspect of PTSD is the ability for individuals to practice forms of therapy on their own. After learning and understanding a few simple steps, the individual has the opportunity to ground themselves utilizing techniques of EMDR therapy whenever they desire as long as there is a quiet space to use where they can feel relaxed and at peace.

Helpguide.org, a non-profit organization suggests along with other researchers, that symptoms of PTSD can be addressed by the individual (Smith and Segal 2012). Therapies can be initiated alone such as the following self-help exercise to stay grounded in the present. The exercise is meant to address feelings of disorientation, confusion, or upset typically felt by patients struggling with this disorder. For the exercise, the individual should sit on a chair and notice their feet meeting the ground. The individual then presses on their thighs, focusing on bodily awareness, noticing their bottom on the seat and their back against the chair. Next, the individual looks around and finds six objects consisting of red or blue elements. These colors in particular will
help the individual to feel grounded and in their body, in the present while focusing on breathing in and out. The individual takes note of his/her breath as it becomes deeper and calmer. The authors suggest that doing this exercise outside may be beneficiary. Sitting in the grass can be peaceful and allows one to feel their body supported by the ground (Smith and Segal 2012).

3.9.3 Meditation and Yoga

Recent studies discussed by medical doctors interested in the healing potential of landscape suggest forms of yoga that emphasize coordination of breath, sound, attention and movement can increase feelings of relaxation and in most cases, a quieting of the heartbeat rhythms. Scientists have discovered that breathing patterns are tightly linked to heart rhythms at the same frequency, allowing particular breathing techniques to have a calming effect. Meditation types that focus on breathing move the bodily system from a rigid, nondynamic state to a healthy one. Other forms of meditation that focus on breathing include Chinese Chi, yogic, and Zen traditions and have also been observed as forms of relaxation. Scientists Goldberger and Benson concluded through various studies that while there are many paths to relaxation with various complex effects on heart rhythms and breathing, attention to breathing has emerged as an important component in all methods (Sternberg 2009).

Among other practices that involve slow but purposeful movements, breathing, and meditation is Tai Chi. Tai Chi can improve the individual’s quality of life both subjectively and objectively. The patients’ subjective ideas concerning quality of life will
improve while objective measures of the cardiac function also improve (Sternberg 2010).

Walking meditations such as mazes and labyrinths have also been suggested as potential calming measures, however, in the case of PTSD, care must be taken to avoid confusing patterns or overly complex way finding that results in the onset of symptoms such as dizziness or nausea (Kreski 2010, Cahill and Foa 2010). An alternative to mazes or labyrinths may be other forms of walking meditations practiced in various religions such as Buddhism. For example, the Buddhist prayer wheel involves a large, embellished brass drum where individuals may leave slips of paper where prayers are written while slowly walking around the drum while turning. The pace remains slow due to the heavy weight of the drum, which in turn slows breathing that will match the deliberate walking pace (Sternberg 2009). This exercise may prove useful in slowing heart rate and regulating slow breathing while also allowing warriors to leave mementos or prayers in honor of fallen warriors.

3.9.4 Art Therapy

Art therapy is a form of psychotherapy that allows the image making process to play an important role. The use of imagery allows one to communicate non verbally issues that he or she may not be comfortable or consciously aware of in the present. This helps to establish patterns of imagery that may unveil the root cause of trauma or anxiety caused by a traumatic event (Cooper Marcus and Barnes 1999).

Art therapy aims to encourage new forms of communication through various media as well awareness of oneself and those around them. In addition, it aims to facilitate
communication and exploration into the unconscious while allowing the individual to make discoveries and deal with issues in constructive ways. This method has been noted as successful for patients suffering from Integrated Mood and Anxiety Disorders, Traumatic Stress and/or Posttraumatic Stress Disorder, as well as a variety of Eating Disorders (Cooper Marcus and Barnes 1999).

3.9.5 Horticulture Therapy

Homewood Health Centre hosts the largest and longest-running horticultural therapy program in Canada and provides a great example of how this therapy can be successful. Horticultural therapy promotes a pure and natural sense of wellness. (Cooper Marcus and Barnes 1999).

Horticultural therapy provides an opportunity for patients to develop positive leisure skills and heighten self-esteem. Each class uses horticulture or related crafts to develop a therapeutic relationship and to teach skills that can be used upon discharge. Horticultural therapy projects are customized to meet the patient’s capabilities. Each month offers seasonal projects, events and horticultural tasks (Cooper Marcus and Barnes 1999).

Re-discovering the wonders of nature and the cycles of life can be an extremely positive, renewing and reaffirming experience. Horticultural therapy is unique in its use of living material, requiring nurturing and care, which provides tasks and activities to stimulate thought, exercise the body and encourage an awareness of the living, external environment (Cooper Marcus and Barnes 1999).
Horticultural Therapy Programs have been noted as successful treating patients suffering from any of the following disorders:

- Post-traumatic Stress Disorder
- Addiction
- Eating disorders
- Affective disorders
- Dementia
- Schizophrenia, and
- Other mental illnesses (Cooper Marcus and Barnes 1999)
3.10 Conclusion

To date, most hospital designs for psychiatric care facilities have more often than not, failed to directly consider the link between patients with mental illness and outdoor environments (Cooper Marcus and Barnes 1999). While literature on landscapes designed for PTSD has recently emerged, efforts to combat the results of trauma during war are becoming more prevalent and increasingly important. Recent designs for warriors suffering from PTSD have focused almost solely on the use of nature as a passive bystander in the therapeutic process. A gap in current efforts emerges in the disconnection between therapies specifically used to treat PTSD and interaction with or movement through the landscape. Design that directly incorporates landscape cues that ground the individual, initiate or encourage specific therapies for PTSD, and enhance the therapeutic experience through environmental healing have yet to be examined or studied. In addition, the potential for restoring degraded landscapes in such a way that encourages or promotes a therapeutic environment for those struggling with PTSD has yet to be examined.
Chapter 4: Precedents

4.1 Homewood Health Centre Guelph, Ontario, Canada

The Homewood Center, a psychiatric hospital and treatment center was established in 1833 and offers a unique, non threatening environment with over 55 acres of naturalized and maintained grounds for a variety of therapies. Located in Guelph, Homewood Health Center has a diverse land character including forested land, open lawns, gardens, and a meandering river. Vistas and historically significant buildings provide a serene environment, which is intended to be reminiscent of a past time or era (Perkins 1999).

Similar to the terrain at WRNMMC, Homewood is situated on a hill overlooking the Speed River Valley. Spanning over 47 acres, the center includes forested areas with walking paths, gardens, a labyrinth, open green spaces and program for various recreational activities. Recreational activities include tennis courts, a volleyball court a baseball diamond, and horse shoe pits. In addition, a clubhouse and several patios provide gathering space and shelter (Perkins 1999).

4.1.1 Therapies

Homewood emphasizes the necessity of a therapeutic atmosphere for healing. Healing the individual encompasses their body, mind, and spirit and is achieved through various therapies such as horitcultural, creative arts, occupational, recreation, massage, and pastoral care. Programs exist for a variety of issues such as traumatic stress recovery, integrated mood and anxiety, other types of psychiatric care, as well as a program for older adults (Perkins 1999).
According to the Homewood Center, recreational therapies are imperative for the treatment of mental illness as well as addiction. These patients typically require lifestyle changes as part of their recovery and benefit from social interaction (Perkins 1999).

4.1.2 Program Objectives

The location of Homewood offers a non-threatening environment that allows for emotional and physical rehabilitation. The intent of the program is to improve individual self-esteem through participation in horticultural therapies with meaning. Horticultural therapies may offer intellectual stimulation through psycho-aromatherapy or spark interest in plant care or studies of nature. These skills can serve as replacements for substance abuse or addictions by serving as a positive leisure activity and also encourages interaction and socializing with group members. The horticultural program is intended to serve as an outlet for stress and anxiety as well as positive energies like creativity by stimulating patients (Perkins 1999).
4.2 **Good Samaritan Hospital Healing Garden, Pheonix, AZ**

Designed as a collaboration between Barbara Crsip, Ten Eyck Landscape Architects, Kristina Floor, Joan Baron, and Joe Tyler, the Good Samaritan Hospital Healing Garden in downtown Pheonix, AZ serves as a precedent for providing a restorative escape in an urban context. In 1994, plans to redesign a 20,000 square foot over structure courtyard into a garden environment that aids in the healing process took place. Plans were initiated as a result of patient and staff satisfaction surveys, which revealed an overwhelming desire for a place to relax that respects their emotional and spiritual needs as well as those of their families. The creation of a Healing Environment Committee allowed for research on the importance of incorporating the sensory experience into the garden design (Cooper Marcus and Barnes 1995).

4.2.1 *Design Features*

Design features of the garden include the renovation of an existing concrete courtyard into a series of concrete terraced gardens that reflect the curvilinear architectural character of adjacent buildings. The terraced gardens provide various opportunities for respite, ample shade and seating, and a variety of materials and textures to stimulate the senses. A sinuous water course provides a metaphor for the cycle of life (Cooper Marcus and Barnes 1995; TELA 2013). A beginning fountain pool symbolizes the ‘source’ or birth of life and an ending pool symbolizes the ‘return’ in a quiet contemplative form that provides many opportunities to experience the sound of water underneath a shade network. Other elements taken into consideration include the use of art that engages the user and avoiding the use of too much light colored material.
that may increase issues with glare (TELA n.d.).

Repetition of form shown in the plan view drawing in Figure 1 help with wayfinding and provide the framework for a number of intimate spaces. The sinuous path movement provides a sense of strolling connecting various intimate and gathering or café spaces (TELA n.d.).

Figure 1: Photos of Good Samaritan Healing Garden, by: Ten Eyck Landscape Architects
4.3 Warrior and Family Support Center, San Antonio, TX

The Warrior and Family Support Center (WFSC) serves a similar patient base that includes veterans and wounded warriors who are active personnel suffering from severe injuries. Injuries range from limb loss, burns, TBI as well as PTSD. Like NICoE, the support center focuses on patient care, research and training and includes Fisher Houses for the entire family to stay in (Sachs 2012).

4.3.1 Design features

Designed by Brian Bainnson of Quatrafoil, Inc., the WFSC provides a home-like environment where families can go through the healing process with wounded love ones. Many physicians consider families an essential part of the healing process and recovery. Other efforts to rehabilitate patients include addition of specific design elements into the landscape that are thought to be beneficial for people returning home from combat with polytraumas. Polytraumas simply refer to multiple physical or emotional traumas, and although more research is needed, current research does show that providing a homelike environment with lots of shade, a sense of safety and a variety of walkways are helpful for these patients. Other potentially helpful design features like colored concrete to reduce glare, lush plantings, positive distractions such as water and plants that attract wildlife and an abundance of seating are also important (Sachs 2012).
Design features of both phases of development are listed below.

Phase I
- Tie in with existing buildings
- Courtyard surrounded on 3 sides with building
- Deep, shaded portals provide feelings of safety/security
- Lush planters with trees & vegetation
- Central water feature/soothing sound
- Portals extend beyond building & lead to butterfly garden and playgrounds
- Fountain & waterfall feeding to fish pond, feeling of oasis

Phase II
- Walking trails w/ variety of surfaces
- Distinct physical fitness trails w/ fitness elements to accommodate wheelchairs
- Easy/moderate trails for those beginning to test limits
- Moderate/hard trail for advanced therapy
- Each trail has 10 elements suited for various skill levels
- Well marked signage, demonstrating use of elements
- Each trail provides well-balanced routine for entire body
- Individual stations along jogging/walking path
- Provide alternative to facility based exercise & provides activity family members can also share
- Self-paced nature and strategically placed shade structures allow for numerous therapeutic opportunities (Sachs 2012)
Chapter 5: Site Assessment

What is currently known as the Walter Reed National Military Medical Center (WRNMMC), began as a general hospital located in Washington, D.C. named after a United States Army physician, General Walter Reed, who confirmed that yellow fever is transmitted by mosquitoes (WRNMMC 2013). Years later, the hospital became known as the Walter Reed Army Medical Center (WRGH) and not only served the U.S. Army, but congressman and presidents as well. It has since undergone many changes in the process of finding its new home as a joint venture between the U.S. Navy and the U.S. Army, located in Bethesda, Maryland. In 2005, the Department of Defense and the Military Health System collaborated on the Epidaurus Project, which arranged for experts to come together and discuss healthcare design with a more patient-centered approach (WRNMMC 2013).

5.1 Timeline

1900 - Major Walter Reed, a U.S. Army physician led the team that confirmed the transmittal of yellow fever is transmitted by mosquitoes rather than by direct contact. This is considered a milestone in biomedicine that opened new doors to research and humanitarianism.

1909 - Walter Reed General Hospital (WRGH) opened on May 1st in Washington, D.C.

1977 - Walter Reed Army Medical Center (WRAMC) opened as successor to WRGH. Served as the worldwide tertiary care medical center for the U.S. Army, utilized by congressman and presidents.

Riverside Walter Reed hospital opened in Gloucester, Virginia near Major Reed’s birthplace.

2005 - Epidaurus project, an initiative by the military health system (MHS) and the
Department of Defense (DOD) to involve civilian expertise in the design of healthcare facilities in order to create a more patient-centered design focus

2011 - WRNMMC in D.C. closed
Walter reed army institute of research (WRAIR) is largest biomedical research facility administered by the DOD. Walter reed national military medical center (WRNMMC) health complex constructed in Bethesda, md on grounds of the national naval medical center.

Today, WRNMMC is approximately 243 acres of various hospital and treatment services admitting over 16,000 patients per year and treating over 150,000 active and retired military personnel from all branches. There are over 600 staff physicians, 535 military and civilian registered nurses, and 600 licensed professional nurses tending to a daily average patient load of 131. In addition, the facility serves over 100 amputee patients on base at any given time (WRNMMC 2013).
5.2  *Physical Site Assessment*

A series of maps and diagrams examining the physical features of the WRNMMC campus inform considerations for the incorporation of therapeutic elements for PTSD into the landscape. Specifically, the site is examined in terms of accessibility and comfort identified as important by literature and precedents. Accessibility can be determined by examining elevation changes and slopes to locate drainage patterns as well as walkability from places of interest and open space. In addition, understanding infrastructure and circulation will be factors in determining accessibility.

For this project, comfort levels are determined not only by accessibility, but by examining site features such as tree canopy and materials. Tree canopy determines the potential for shade networks and connections between corridors, opportunities for protection, heat island reductions in an urban setting and even seasonal visual interest. Vegetation can further provide comfort on or near structures as noise abatement.

Desirable views in this project will be very important in determining potential therapeutic destinations for patients with PTSD as well as staff, family, and visitors. Due to changes in elevation, viewsheds will likely increase comfort levels by eliminating feelings of claustrophobia or entrapment potentially felt by patients within the woodland areas of the site. This may allow for increased opportunities for interaction with the stream.

5.2.1  *Accessibility*

In order to determine the most accessible areas of the site, it is necessary to examine topography and drainage patterns, slopes, location of desirable views, and circulation patterns.
Elevation study

Figure 2 below shows changes in elevation ranging from 194 feet above sea level up to over 300 feet above sea level. The dark blue portions of the map represent the lowest elevations and are located within and directly adjacent to the Rock Creek Tributary flowing southwest to northeast across the WRNNMC campus. Changes in elevation may restrict accessibility and comfort along the Green Road, particularly concerning access to the stream. Overall, the south and western portions of the site is significantly higher in elevation than the north portion.

Figure 2: Elevation Diagram
Topography & Drainage

The Drainage Diagram, Figure 3 below shows the direction of water flow toward the existing stream, which diagonally bisects the WRNMMC Campus collecting stormwater runoff and pollutants from campus development until it reaches Rock Creek Tributary located downstream, north of Interstate 495.

Much like any other stream with a developed, urbanized watershed, the Rock Creek Tributary has been negatively impacted and undergone drastic changes to its channel dimensions and profile. Development over the years has led to alterations in the hydrologic characteristics of the land within the watershed, resulting in a significant increase in both the speed and volume of surface water flowing across the land and into ultimately downstream of this site. This increase and change in flow regime (frequency and quantity of storm water events) has resulted in erosion and rapid deepening of the channel’s bed and banks. Currently, the stream is continuing to erode its banks and deepen its bed, as suggested by the visible bedrock outcrops in the streambed.

As evident throughout the study area, the existing stream for the most part is inaccessible and deep, with steep eroding banks and neighboring side slopes.
Figure 3: Drainage Diagram
Slope Analysis

Slopes on the WRNMMC campus range from relatively flat to very steep as indicated in Figure 4 below. Areas in pale yellow are 5% or less, whereas darker gold areas range from 6-12% slopes. Areas in pink range from over 12% to 20% followed by blue which includes those slopes up to 33%. Areas in purple are the steepest areas of the site and contain slopes over 33%. Steeps slopes located along the stream potentially pose a problem to accessibility and comfortable movement across the campus.

Figure 4: Slope Analysis Diagram
Views

Viewsheds at WRNMMC exist in several locations along the Rock Creek Tributary as well as other locations on campus due to significant changes in elevation. A hillside and summit on the western portion of the site provide views of a pond and forest edges as well as recreational fields. Several overlook opportunities on either side of the stream banks also exist and provide views in areas that are inaccessible for direct contact.

Figure 5: Viewsheds Diagram
Circulation

Many opportunities for traveling within the boundaries of the WRNMMC currently exist, although it is not well connected to anything outside of the campus boundaries due to security measures. Several shuttle services travel different regions of the campus and offer service as early as 5:30am to as late as 6:30pm. The blue line, which runs through 6:30pm extends to the residential living quarters of warriors as well as the fisher houses. Opportunities for visitor parking exists in the form of both surface lots and large garages. While sidewalks exist in many heavily traveled portions of the campus, there are frequent gaps in connections between sidewalk segments, disrupting overall pedestrian circulation.

Figure 6: Circulation Diagram
5.2.2 Comfort

Comfort for the purposes of this project include examination of land use to locate potentially disturbing views or sounds, forest and tree canopy coverage to determine shade networks, and figure/ground to understand the likelihood of urban heat islands.

Land Use

Land Use on the WRNMMC campus is designated as both institutional and forest. Institutional uses account for approximately 75% of the site, and forest designation located on the western portion of the site accounts for the remainder. Surrounding uses include mostly medium and high density residential, institutional, and very little commercial.

Figure 7: Land Use Diagram
Forest Cover

Within the watershed, forest cover is approximately 4.8% with a large portion of tree canopy existing within the WRNMMC campus. While the overall coverage for the watershed seems low, the site itself is closer to 35% forest coverage, providing an ideal setting for wildlife (University of Maryland 2012).

Figure 8: Forest Cover Diagram
Figure Ground

Impervious surface coverage within the entire watershed is approximately 49%, which includes not only buildings, but roads, parking lots, and any other infrastructure that prohibits water infiltration into the ground. While impervious percentage within the boundaries of the WRNMMC campus is not as high, this may add to pollutants and volume of water being handled by the portion of the Rock Creek Tributary that traverses the site.

Figure 9: Figure-Ground Diagram
5.2.3 *Overlaps between Accessibility and Comfort*

Both accessibility and comfort related to the proposed sites are dependant on having destinations of interest to this specific patient population in walkable distance. Below are maps showing building types of interest on the WRNMMC campus, existing infrastructure networks, and walking distances from places of interest. These analysis maps help aid in the identification of the most suitable locations for garden sites within the proposed Healing Woodland.

**Building Type**

![Building Type Diagram](source: Data from Geographic Information Systems (GIS))

Figure 10: Building Type Diagram (needs a color key)
The National Intrepid Center of Excellence (NICOE) is dedicated to advancing research, diagnosis and education of warriors experiencing traumatic brain injury (TBI) and other psychological health (PH) conditions related to combat, such as PTSD. The 72,000 square foot facility was gifted to the Department of Defense (DoD) in 2010 and contains a variety of state of the art technological rehabilitation methods. Methods of rehabilitation include a driving simulator, CAREN (Computer Assisted Rehabilitative Environment), FATS (Fire Arms Training Simulator) and other virtual programs simulating Iraq and Afganistan all used to research and monitor psychological triggers. Triggers may include smells, objects, and people. In addition, NICoE offers an indoor healing garden with nature sounds and music as well as a variety of walking surfaces and a meditative labyrinth (NICoE 2013).

Of the patients utilizing NICoE, 70 percent have PTSD or anxiety related disorders that have not been resolved in the previous six months. Patients being treated for PTSD typically stay in one of four Fisher Houses on base and attend therapy in groups of five for four week intervals. Four groups of five are treated simultaneously for five weeks, meaning the facility treats approximately twenty warriors per month with severe anxiety related symptoms (NICoE 2013).

Comfort and Solace Halls (lodging)

Built in 1986 and 1993, Comfort and Solace Halls have been renovated to accommodate 168 sleeping rooms for warriors staying on base. With a completely ADA accessible first floor, living quarters are made more comfortable for warriors. There is
also recreational space and an underground parking facility (WRNMMC 2013).

Mercy Hall

Renovated in 2008, Mercy Hall also provides ADA compliant bedrooms as well as a family support center and communal spaces such as a laundry room and lounge areas. An outdoor space directly behind Mercy Hall allows for an outdoor escape from the indoor hospital environment and is intended as a space for patients to relax or chat with loved ones (WRNMMC 2013).

Sanctuary Hall

A future facility currently being constructed, Sanctuary Hall will be a 200 bed, ADA compliant facility. This building will offer single and two bedroom suites intended for wounded warriors and their extended families. Located in a more secluded area of campus, families and wounded warriors will be adjacent to the woodland portion of campus. The facility includes a laundry room, a communal kitchen and a day room along with access to a new parking garage (WRNMMC 2013).

Fisher Houses

Additional lodging for wounded warriors and their family members is available at the five Fisher Houses on base, which is the most Fisher Houses on any one base within the DoD system. The Fisher Houses provide 68 handicapped suites, and accommodates patients being treated at NICoE as well. Patients being treated for TBI or PTSD will typically stay in the Fisher Houses as well, which are a short distance from
NICoE. There is also a children’s play area located here (WRNMMC 2013).

Tranquility Hall (Building 62)

Located near Comfort and Solace Halls, this building is the location of Austin’s Play Room, an hourly childcare center. The service is primarily for families of wounded warriors and staff and provides care for children six weeks to twelve years of age five days a week (WRNMMC 2013).
Infrastructure

While the campus has a fairly intricate network of sidewalks and paths, there are many gaps and breaks in those connections due to difficult terrain. Both water and sewer lines travel alongside or near the Rock Creek Tributary bisecting the campus from the southwest to the northeast. This provides a strong likelihood for the provision of running water or restrooms in locations within or near the woodland.

Figure 11: Infrastructure Diagram
Land Character and Walking Distances

Ensuring comfort and accessibility requires the provision of different landscapes within walking distance. Figure 12 below shows a quarter mile walking radius from places of interest, identifying the most diverse areas in terms of landscape character being accessed from the future Sanctuary Hall and the Fisher Houses.

Figure 12: Walking Distances and Land Character Diagram
Places of Interest within Walking Distance

Perhaps the most important examination in determining levels of accessibility and comfort is Figure 13 showing quarter mile radii from places of interest on campus including the pond, the woodland glade, the water-cooling plant, the Fisher Houses, NICOE, and various warrior living quarters. Areas identified by black dashed lines indicate the most accessible areas of campus from identified places of interest and determine that the central portion of the woodland near the water-cooling building is the most accessible, while areas immediately adjacent to the northeast or the southwest are also highly accessible. The “most accessible” area is walkable from five or more places of interest while the “accessible” areas are walkable from at least four places of interest. This analysis diagram can aid in the identification of the most appropriate areas for unique therapies and gathering spaces accessible to the largest number of patients, family and staff.
Figure 13: Walking Distances and Places of Interest Diagram
Chapter 6: Opportunities and Challenges

A number of opportunities and challenges exist on the WRNMMC campus, however, for the purposes of this project, the scope has been narrowed to the woodland portion of the campus that follows the Rock Creek Tributary from the southwest corner of the site to the northeast corner. The woodland provides opportunities for interaction with the most natural area of the campus including the Rock Creek Tributary and contains a series of potential garden spaces ranging in size along the stream. More specific opportunities and challenges are listed below.

Opportunities:

- The Rock Creek Tributary and the Existing Green Road serve as a spine connecting a series of potential garden areas and provides a path system that is ADA accessible
- Archetypes (amphitheater, hill, stream, woodland) exist in a series along the existing Green Road and provide opportunity for experiencing directly or indirectly through views
- The woodland portion of the site provides an escape from the otherwise, very urban character
- Woodland portions of the site have wildlife - many deer, birds, squirrels – present opportunities for bird watching
- Unlike most urban streams, opportunity for interaction with the Rock Creek Tributary exist in select locations adjacent to the Green Road and presents ideal locations for therapy
· Steep stream banks present a challenge as well as a unique opportunity for overlook platforms to “float” over the stream

· A high tree canopy in the Beech woodland provides opportunity for programmed spaces with lush understory

· The water-cooling building creates a soothing, rushing water sound next to the Rock Creek Tributary

· Natural topographical changes allow for a variety of hillside meadows or gardens as well as the creation of an amphitheater for gathering or performances that may be used in therapy

· Existing recreational opportunities in the southeast portion of the campus provide ideal gathering spaces for users and already include shelters, restrooms, a volleyball court and two baseball/softball fields
Challenges:

- Eroded banks of the Rock Creek Tributary contribute to erosion, tree loss, and sediment transport and will require stabilization efforts
- Substantial changes in elevation and steep slopes potentially present a challenge to ADA compliance and accessibility to all areas of the proposed gardens
- Noise pollution from the surrounding road network may disturb therapeutic areas
- Upon several site visits, invasive species in the woodland were noted and may contribute to tree loss if not addressed
- A high level of security prevents Green Road connection or integration into the surrounding community
- There is a lack of transitional vegetation from the woodland edge to lawn areas, limiting wildlife and habitat diversity
Opportunities and Challenges, Healing Woodland

- Lack of transitional understory or ecotones from woodland edges to lawn provide opportunities for wildflowers and meadow plantings.
- Hard edge from woodland to lawn
- Accessible Pond, recent restoration
- Existing shelters for gathering & volleyball courts
- Location of family living adjacent woodland
- Iron Bridge, current portal, aesthetically pleasing
- Degraded stream condition, eroded and unstable banks, sediment transport
- Open glade, direct stream interaction
- Steep slopes, ADA accessibility
- Steep banks allow for overlooks
- Studies at USHUS on PTSD located adjacent to woodland
- Water cooling plant, sound of rushing water
- Open pathway, viburnums provide wildlife habitat, deer often seen here
- Overpass, potential noise
- Open hillside adjacent to Fisher Houses ideal for horticultural therapy
- Ideal location near woodland
- Walking distance to NICOE

Scale: 1" = 400'
Chapter 7: Design Philosophy

Many opportunities for restorative or therapeutic spaces exist along the Green Road in the form of existing challenges. Challenges take the form of degraded environmental features such as eroded stream banks, excessive sediment transport, and a lack of vegetative transition between woodland areas and open lawn. These challenges provide future opportunities to heal the environment while healing the patients. Identifying these areas along with accessibility and the potential for comfort inform where restorative garden settings for patients are located and transform them into opportunities. Gardens may provide direct or indirect interaction with environmental healing efforts and will provide the unique opportunity for patients to share the healing process with their environment. Awareness of and interest in one’s environmental surroundings grounds the individual, preparing him/her for meditative therapies and relieving stress. Once the individual is grounded, he/she can participate in self-initiated therapies for PTSD or small group therapy within these gardens.

Methods for examining the incorporation of therapies specific to PTSD into the landscape include research of existing literature and studies on PTSD, design of contemporary healing spaces, and design of landscapes for trauma patients. Other methods include precedent studies of successful landscapes for trauma patients and an interview with a therapist at NICOE on the WRNMMC campus who treats wounded warriors with PTSD.

The diagram below shows the conceptual approach to this research, which involves examining therapies for PTSD as well as the symptoms and challenges associated with the disorder. Overlaps that emerge between therapies for PTSD and
current design strategies of outdoor environments for trauma patients, specifically those accommodating psychiatric facilities are most relevant. By considering the potential struggles of the wounded warriors and a variety of design strategies, I will be able to identify and develop those specific to the WRNMMC campus that are most appropriate for veterans struggling with PTSD.

Figure 16: Methodology Diagram
7.1 Guiding Principles: Landscape Design Strategies for PTSD

Strategies for merging therapies used to treat PTSD and design approaches for trauma patients will aid in the identification of appropriate design interventions within the landscape that encourage, initiate, and support therapies for PTSD. Guiding principles are a set of strategies, which outline how to combine historically successful approaches to design for trauma patients and therapies for PTSD. These principles may be adapted in creative ways unique to different sites and reinterpreted through design, and are applied to the WRNMMC campus in the following section, Design Goals.

Successful strategies of landscapes for trauma patients + Therapy for PTSD

1) Strolling garden + EMDR therapy
2) Metaphor + Environmental Healing
3) Emphasis around Archetypes + Meditative therapies
4) Statement art (form of Art therapy) + Art and EMDR therapy
5) Enhanced Sensory elements + Somatic Experiencing therapy
7.1.1 *Strolling Garden + EMDR Therapy*

As discussed in the previous sections on design for contemporary healing gardens, strolling gardens have been a long standing precedent for invoking mystery and anticipation in the user by hiding and highlighting views as one travels through a landscape. This is typically achieved by providing meandering path forms and vegetation that successfully masks or frames different views of the landscape. This type of movement is ideal for initiating EMDR therapy for patients suffering from PTSD. Planting understory in such a way that promotes a pattern of right to left eye movement, specifically with the use of red and blue visuals, will ground the user and make his/her aware of his/her surroundings. Connecting the right and left sides of the brain is essential to the promotion of new thoughts and ideas, helping the patient to consider new perspectives and ways of analyzing his/her trauma, which possibly leads to the healing of traumatic memories.

7.1.2 *Metaphor + Environmental Healing*

*Environmental Healing* for the purposes of this project refer to enhancements and restorative efforts to the environment in the form of stream realignment, stream bank stabilization, and the creation of appropriate ecotones from woodland to grassland. While other sites may provide more diverse opportunities for environmental healing efforts, any restorative effort can provide a unique metaphor for patients struggling with PTSD by allowing the individual an opportunity to share the healing process with their environment. Noticeable restorative efforts to improve environmental health by increasing wildlife and providing habitat will also provide more ideal spaces for
therapies. Healing efforts in the environment will remind the patient that healing is a process, even in nature, but it can be successful with the right interventions. The landscape adapts to changes, as do humans. Like a newly aligned stream will settle into a comfortable flow, so will the wounded warrior in time. These efforts will help repair the environment, but also the human condition through promotion of relaxation and stress relief.

7.1.3 Archetypes + Meditative & Horticultural Therapies

Archetypes in the landscape such as streams, meadows, woodlands, and hills or mountains provide ideal locations for meditative therapies such as yoga, ti chi, or personal reflection. Archetypes provide familiarity through experience or as a distant view. Providing spaces within or with a view of archetypal landscapes provides feelings of safety and control if the individual has the choice to prospect or seek refuge. Choices provide a sense of control and for PTSD patients; control is essential for lessening feelings of confusion and being overwhelmed. The sound of water also aids in stress relief. Therefore, creating destinations adjacent to water features like streams or ponds supports meditative therapies. Finding opportunities to enhance the sound of rushing or flowing water through restorative efforts also provides a unique opportunity to connect environmental healing with patient healing.

7.1.4 Statement art + Art & EMDR therapy

Although statement art has not been considered one of the more successful approaches to therapy for trauma patients, it is worth examining the use of statement art as a result of patient therapy rather than the incorporation of an outside artist who is
disconnected from the patients. Art therapy has been recorded as successful by those treating wounded warriors and other patients with PTSD and may be an opportunity to connect the individual to the environment in a more permanent manner. The creation of functional art pieces, such as birdhouses may be reflective of the individual and also be located in a permanent position within the environment, allowing the individual to feel some form of ownership or personal connection to the space. This may result in more frequent visits by the individual or other patients struggling with the same disorder. The use of art resulting from art therapy as a statement in the environment may serve as a powerful reminder to others struggling with the disorder that they are not alone, and that there is light at the end of the tunnel.

7.1.5 Enhanced Sensory elements + Somatic Experiencing therapy

In its most basic form, PTSD is a constant state of hyper arousal due to pent up energy being contained within the nervous system. As the individual struggles to accept a traumatic event, the individual may dissociate from the physical body as well as other people. Therefore, designs that exaggerate visual and sensory elements in the environment in a way that grounds the individual in the present without being overwhelming or visually confusing is ideal. For example, areas that are constrained to narrow corridors could be visually exaggerated even more with understory or groundcover to create more anticipation for the open space waiting on the other end. The use of lush plants that ignite sensory responses through pleasant smells, textures, and colors may help to increase bodily awareness and increase focus and way finding as well. Once the individual is grounded, they are may release pent up traumatic energy through various bodily sensations.
Chapter 8: Design Goals

The following goals will guide the design response of each of the proposed gardens on the WRNMMC campus. Design decisions will be influenced and inspired by therapies for PTSD and areas in need of environmental healing that simultaneously allow for patients, families, and staff to have interaction with these spaces.

GOAL 1: Incorporate landscape features that act as positive triggers, allowing reconnection to oneself, nature, and those around them

Objective 1.1: Increase the number of accessible garden experiences

Objective 1.2: Incorporate familiar materials such as wood or stone within landscape design elements

Objective 1.3: Use lush vegetation with red and blue blooms or foliage

Objective 1.4: Provide views of restorative environmental efforts and archetypal landscapes

GOAL 2: Reinforce landscape’s role as a grounding agent for the user in order to initiate or encourage meditative therapies for PTSD.

Objective 2.1: Incorporate successful design methods of restorative gardens for trauma patients

Objective 2.2: Exaggerate features of the natural environment to help ground the individual, focus these efforts in transitional areas between destinations

Objective 2.3: Enhance or restore environmental features such as eroded stream banks, bare hillsides and abrupt transitions from woodland to lawn in
such a way that enhances therapeutic use

a. *Woodland Garden* - i.e. realigning the point bar, stabilizing the bank, allowing for direct interaction with the stream, reducing erosion and sediment transport, and providing increased sound of rushing water through the use of in stream structures.

*Objective 2.4:* Include vegetation that stimulates different senses and somatic experiencing therapy

**GOAL 3:** Incorporate specific therapies or elements of therapies for PTSD into the landscape

*Objective 3.1:* Design spaces close to or with views of archetypes such as the stream, hill, woodland and the pond.

*Objective 3.2:* Use red and blue visuals to encourage new thoughts and aid in EMDR therapy

*Objective 3.3:* Improve the state of the Rock Creek Tributary in such a way that simultaneously allows for more interaction with the stream

*Objective 3.4:* Incorporate artful methods or solutions for areas with visual or noise clutter that also initiate meditative therapies or EMDR

*Objective 3.5:* Incorporate results of art therapy by PTSD patients into the landscape

*Objective 3.6:* Use hillsides for meadow plantings and/or horticultural therapy for patients

*Objective 3.7:* *Provide space for yoga and ti chi*
Objective 3.8: Encourage social interaction by providing spaces that accommodate small and large groups within walking distance from intimate spaces
Chapter 9: Healing Woodland Master Plan

9.1 Design Response

The boundary of the proposed Healing Woodland along the Green Road has been determined by land character and accessibility. The woodland adjacent to the Rock Creek Tributary provides a central campus location, which is accessible to the greatest number of patients, families, and staff. Boundaries for each of the four therapy gardens within the Healing Woodland were determined by the potential for interaction with environmental healing and restorative efforts, useable open space adjacent to the stream, and accessibility from residence and therapy locations.

The Green Road travels through the proposed Healing Woodland and offers two distinct experiences for patients, staff, or families exploring the gardens. Three major portals mark entry points on the far north and south ends as well as a central location. Users beginning their journey at either the north or south portal will travel through group therapy and gathering spaces first and end up in a more intimate experience in the center of the proposed Healing Woodland. The central, Stream Overlook Gardens are intended to be the most intimate of garden spaces and can be used for meditative therapies. Users beginning at the central portal will experience these intimate spaces first and traveling either north or south, will move into a series of small group to large gathering spaces as they approach open meadow and grassland. Providing the option of different experiences allows the patients to control the level of social interaction.
The WRNMMC Green Road garden experience provides a number of opportunities for linkages between successful approaches to design for PTSD and landscape interventions. Outdoor spaces on the campus should feel safe and accessible with opportunities for group gathering and individual respite as well as space for children to play and explore. Other improvements such as bridging gaps in green infrastructure through additional tree canopy coverage will provide a complete shade network through the urban and woodland portions of the improved green road while providing additional habitat for wildlife.

Other initiatives that will increase biodiversity and wildlife while promoting therapy include the creation of ecotones in the form of meadows to transition between woodland and grassland area, realigning a portion of the stream and stabilizing much of the eroded stream banks that currently exist throughout much of the Rock Creek Tributary located on this campus. These efforts help to target potential spaces for therapy, allowing direct or indirect interaction with the environment being restored. In areas where the stream is not directly accessible, opportunities are provided through the use of overlook structures or directed views.

Within the Pond Garden, there are opportunities directly adjacent to both the large and small ponds as well as along the woodland edge leading up the hill to existing recreational fields for intimate or group therapy experiences. The area adjacent to the pond in particular provides an ideal location for small yoga groups or other therapies such as ti chi.
The Beech Garden provides a special opportunity for direct interaction with the stream in an area greatly in need of restoration. Realignment in this portion of the stream will help to prevent further erosion and sediment transport and will provide an accessible bank to the stream. This effort will also provide additional white noise for patients visiting the garden through the use of stone structures that will redirect water away from the outer bend toward the glade bank.

Moving southeast along the Green Road, the Stream Overlook gardens allows for an indirect interaction with the stream in the form of overlooks and allows the user to feel as if they’re “floating” above the stream, enhancing the sound of moving water and providing a feeling of complete emersion with vegetation and the environment. The second of these two gardens, bisected by one of three major portals in to the Healing Woodland experience, contains green screens that weave through the woodland in a whimsical manner, encouraging exploration and discovery while also providing a series of smaller, intimate spaces for individuals. Green screens also provide opportunities for therapy by supporting vines with red and blue tone blooms of foliage. The red and blue visuals promote EMDR therapy.

The southern-most garden, the Hillside Garden is located within walking distance of NICOE as well as the Fisher Houses, providing a convenient and accessible opportunity for wounded warriors to be outdoors and participate in horticultural therapy. This garden utilizes the natural topography to provide hillside gardening for horticultural therapy. Food, herbs or medicinal plants could be grown in this space in place of the meadow serving as the transitional vegetation along woodland edges in other portions of the proposed Green Road gardens.
Intent of these spaces is to be used by all, but specific design considerations accommodate the patients suffering from PTSD. While these spaces prioritize the incorporation of therapeutic elements for PTSD within the landscape, they are not intended to be restricted to only these patients. Various garden spaces can serve as restorative experiences for families, staff, and other patients as well.
Chapter 10: Garden Site Designs

10.1 Pond Garden

Figure 19: Site Opportunities and Challenges

- A small catchment area created by recent pond restoration efforts presents an opportunity for a more intimate water garden than the larger pond.

- A lack of transitional understory at the woodland edge presents an abrupt visual shift from mature trees to lawn, and limits habitat diversity and movement through green corridors.

- A large pond, recently improved, already serves as a place of escape for many wounded warriors and provides an opportunity for meditative therapies for PTSD.

- The existing bridge serves as a portal into the northeast portion of the proposed Healing Woodland.
Site Assessment and Design Response

The northern most garden site within the Healing Woodland consists of two ponds, the larger serving as the termination point for the portion of the Rock Creek Tributary that travels through the WRNMMC campus. The recently restored pond is surrounded by a relatively flat portion of land, allowing for visitors to walk the Green Road path that travels from the bridge to the woodland. A smaller pond serves as the first point of capture for water running down the large hill. Challenges in this portion of the Healing Woodland include a lack of transition from woodland to lawn, leaving abrupt visual edges and unnatural transition spaces. However, this also provides an opportunity to increase wildlife and habitat diversity through the creation of a wildflower meadow, which is the naturally occurring transition in this region between woodland and open space. Wildflower meadows provide visual interest in the landscape as well and also emphasize movement as plants move with slight breezes.

Design proposals in this space aim to lay lightly on the land, while enhancing the experience and creating a more relaxing, meditative environment. Water, known for encouraging relaxation and reflection in the landscape, provides an ideal opportunity for programming that accommodates meditative group therapies such as yoga and tai chi. The design in Figure 20 shows the proposed locations of a yoga platform and a group therapy area, both adjacent to the pond overlooking a water garden. Adding vegetation will not only add visual interest, but will improve water quality and habitat diversity as well. Grasses line the Green Road path, serving to capture and cleanse water and provide somatic experiencing therapy through the use of texture, color, fragrance, and medicinal uses. EMDR therapy can also be performed in this space and is encouraged
by a swath of red and pink blooming grasses adjacent to the Green Road. Ample opportunities to sit, reflect, and view both ponds are provided along the pond edges. In addition, a secondary Green Road path has been proposed, traveling along the northeastern woodland edge, connecting the bridge to the recreation and gathering areas at the top of the hill. This path travels a steeper slope and provides a challenge for patients working on strength and endurance, but is visually more appealing due to the addition of the wildflower meadow and a row of transitional dogwood trees.

Figure 21 shows a cross sectional view through both ponds. The existing topography allows for a unique experience in the area designated for a yoga platform. Surrounded on either side by water, feelings of being immersed in the pond are encouraged and may enhance the meditative experience.

Program:

- Transitional understory/Meadow
- Yoga platform
- Pond side space for meditative therapies, including Ti-Chi
- Water gardens
- Floating vegetation
- Sensory/medicinal planting (St. John’s wort, Serviceberry, Cranesbill, grasses)

Therapy for PTSD:

- EMDR
- Meditation
- Yoga and Ti Chi
- Events, social interaction
- Somatic experiencing
Figure 21: Section A: Looking northeast toward yoga platform

- Woodland leading to warrior family living
- Bank stabilization/deep rooted grasses
- Pond w/ Willow & Blue Flag Iris
- Yoga platform
- Green Road path/grasses
- Pond/water garden
- Path to pond garden
- Hillside meadow
Figure 22: View 1 of existing pond

Figure 23: View 1 of proposed yoga platform garden and water garden
Figure 24: View 2 of pond side path, looking toward the Iron Bridge
Intentionally left blank
10.2 Beech Garden

Figure 25: Site Opportunities and Challenges

An open hillside that currently increases issues with erosion and sedimentation in the stream channel also presents an opportunity for a wildflower or hillside meadow, which can be viewed from the glade.

The existing sharp stream bend poses issues with bank stabilization, but is also an opportunity for environmental healing efforts through realignment also providing opportunity for interaction with stream.

Topography allows for a natural overlook, but may cause problems with accessibility into the Beech Garden.

A smaller tributary feeding into Rock Creek requires a bridge to connect the Beech Garden to the primary Green Road path. This also serves as a threshold from the Green Road primary path into the Beech Garden.
Site Assessment and Design Response

This portion of the woodland contains mostly Beech trees, which creates an open forest with a high tree canopy where one can clearly see through the vegetation. However, problems do exist with invasive vines that should be addressed in order to preserve the integrity of trees along the stream banks. Several mature trees have been lost along the stream banks due to eroded banks, further adding to erosion and sediment transport downstream. Other interesting features of this site include a natural overlook near the primary Green Road path and a streamside glade with a hillside view. Unlike most urban streams, this reach of the Rock Creek Tributary provides several opportunities with the woodland for direct interaction.

As shown in Figure 26: Plan of Proposed Beech Garden, thresholds in the form of a bridge and a fallen Beech tree serve as portals into the garden, leading the user to a strolling path, which connects each smaller experience. Entering from the bridge portal, the user first comes to a shade garden where there is opportunity for direct interaction with the stream and a TKF Bench for resting and reflecting as well as a variety of textural vegetation including ferns and hotas. An area with potentially high sensory experience, this garden would be ideal for somatic experiencing therapy and other meditative therapies.

Opposite the shade garden is a council ring for group gathering as well as a commemorative overlook as shown in Figure 27: Section B. The commemorative overlook is a series of stone retaining walls that work with the natural typography and are intended to allow warriors a place to remember their fallen brothers and even leave momentos in their honor.
Continuing along the strolling path, which is planted with alternating red and blue visuals, the user may experience the beginning stages of EMDR therapy just by walking. The alternating red and blue visuals help to connect the right and left sides of the brain, allow for new thoughts, and also for the release of pent up stress and traumatic memories. The central portion of the Beech Garden contains a shelter in the form of an arbor for sitting and viewing the stream and a fire pit. The fire pit serves as another small gathering space for group therapy or personal reflection.

Traveling from the arbor toward the southwest portal, the user discovers another TKF bench looking toward the proposed hillside meadow and glade. The glade leads to direct interaction with the stream and environmental healing efforts while also providing nice scenery for those traveling the path.

The design response for the glade portion of the Beech Garden attempts to work with existing environmental challenges by restoring the highly eroded stream bend while enhancing the therapeutic components of the space simultaneously. Improvements to the stream, further discussed in section 10.2.1, increase potential for interaction with the stream, provide a series of riffles and pools to increase habitat diversity that increase the sound of rushing or flowing water, and provide stabilization for the stream banks to control future erosion.

Program:

- Council Ring
- Fire Pit
- Communal Structure
- Glade
- Arbor/Shelter
- Commemorative overlook

Therapy for PTSD:

- EMDR
- Meditation
- Group therapy
- Small social gathering
- Commemoration
Figure 26: Plan of Proposed Beech Garden
Figure 27: Section B, Shade Garden, Council Ring and Commemorative Overlook
Figure 28: View 3 of existing woodland condition facing Iron Bridge

Figure 29: View 3 of proposed Shade Garden facing the Iron Bridge
Figure 30: View 4 through arbor and fire pit, facing southwest toward the Glade
Existing Stream Condition
Beech Garden

Figure 31: Existing Stream Bend

Key Plan

Scale: 1" = 30'
10.2.1 Proposed Stream Re-alignment

As shown in Figure 31, the stream reach has a meander bend with a sharp radius of curvature, causing excessive erosion on the outside left bank facing downstream toward the Iron Bridge. With available space on the gently sloping right bank (facing downstream) and adjacent areas, there is the opportunity to shift the channel and increase the radius of curvature of the meander thus eliminating the erosive forces that are currently there. An in stream structure, a j-hook vane, will also be utilized and placed within this new section of channel to further provide protection to the outside left bank where a majority of the erosion and degradation to the stream can occur (Figure 32: Proposed Stream Realignment Plan).

The j-hook vane consists of an upstream pointing line of boulders that originate from the left bank and extend diagonally into the middle of the stream. The most upstream portion of the structure slopes downward and is embedded into the streambed while bending back on itself in the shape of a “J”. The orientation, shape, and unique placement of this structure provides protection to the left bank by directing water towards the center of the channel. At the same time, a white water effect and associated white noise sound is generated as the water falls over the structure along both the J section and the straight-arm section and enhances the potential for grounding, meditative therapies and somatic sensing therapy.
Figure 32: Proposed Stream Re-alignment Plan

Beech Garden

- New C' of stream
- 20°
- J Hook redirects flow and prevents erosion, creates sound of small water fall
- Riffle
- Bank stabilization plantings
- Pool
- Created Bench
- 20°
- Stone steps into stream, interaction with water
- Groundcover plantings
- Riffle
- 70° RAD of Curvature
- Glade
- Beech Woodland
- Groundcover plantings
- Bench

Scale 1" = 30’
Figure 33: Section C, Through stream bend

- Existing grade/steep slope and lack of bank stabilizing vegetation.
- Bank stabilizing vegetation (Cardinal Flower, Blue Flag Iris, etc.) Gradual tie into existing hillside grade.
- Proposed grade/created bench
- Widen pond by grading back into glade. J-hooks allow for deeper pool area, which increases aquatic habitat and diversity.
- Use of stone steps to lead user from glade to interaction with the stream, use of wet plantings for further stabilization of stream bank.
Figure 34: View 5, photo of existing stream condition facing downstream

Figure 35: View 5 of proposed J-hook and stream interaction near Glade facing downstream
Figure 36: View 6 of proposed stream interaction and plantings near glade
A utility building, likely a water cooling plant, provides a unique opportunity for pleasant sounds resembling rushing water discovered during several site visits to WRNMMC. It’s placement next to the stream enhances the experience and helps to drown out distractions and potential vehicular noise.

An existing parking lot seemingly only accommodates utility vehicles. Its location adjacent to the stream adds to the potential for decreased water quality from polluted surface runoff. This space would serve better as a transitional meadow from woodland to lawn or a place to rest and meditate for Green Road users.

Steep slopes on either side of the stream provide both an opportunity and a challenge. While creating access to the stream itself would cause too much environmental disturbance in this area, providing overlooks would allow the user to feel as if they are suspended above the stream, having a more intimate experience.

Taylor Road, located directly adjacent to this portion of the stream provides a challenge for meditative therapies, but is less bothersome due to the sound of rushing water from the water cooling building. It is a lightly traveled road but allows for parking in very close proximity to the Green Road.
As noted on Figure 37, there are both opportunities and challenges associated with this portion of the Green Road. This is the most constrained area of the Green Road due to its close proximity to Taylor Road and a water cooling utility building, but also the most accessible from therapy and residents’ locations. This segment of the stream has evidence of bank erosion and exposed tree roots, contributing to unstable banks and sediment transport downstream. Grading the stream banks back in order to create a shallower slope would be difficult and potentially very environmentally disruptive in this urban context. Stabilization of existing banks with retaining walls and understory plantings with deep root systems will protect banks from further erosion and create a lush environment for meditation, personal reflection, and self initiated EMDR therapy. Steep stream banks also provide an opportunity for a unique user experience. Allowing the individual to have an intimate space overlooking the stream will provide indirect, visual interaction with the stream and allow him/her to feel enclosed by tree limbs, lush understory and the stream, leaving a small opening to view the sky.

A wildflower meadow provides appropriate transition between the woodland surrounding the stream and the existing open lawn and parking lot area located adjacent to the water cooling building. Relocating the small parking area to the northwest side of the building facing Rixey Road would allow for this space to become functional and therapeutic for patients. Also, adding modular green walls along portions of the water cooling utility building allows for an attractive view with colorful plantings. Additional rooms and visual interest can be achieved through the artful use of green screens in the garden. Blue and Red plantings will allow for self initiated EMDR therapy.
Due to its high accessibility and unique physical challenges and opportunities, this garden is the most intimate experience of the Green Road and is intended for personal reflection, meditation and therapies for PTSD.

The proposed design shows how the integration of a looping path system, green screens, and stream overlook platforms become a destination along the Green Road as well as a place for therapy. Green screens are placed to allow for EMDR therapy from any bench within the garden.

Program:

- Stream overlook platforms
- Looping path
- Meadow
- Green screens

Therapies for PTSD:

- EMDR
- Meditation
- Somatic Experiencing

Figure 38: Stream Overlook Garden Precedent Imagery

Modular Green Screens, pulley system on steel cables allows for easy maintenance
Photo by: Jennifer Cheng, University of Washington

Copenhagen green wall

Example of wooden bench, Luray Gardens, Chicago
Photo by: author, SCA

Zuerich green wall
Photos (above) by: Michelle Gay
Figure 39: Proposed Plan for the Stream Overlook Garden
Water Cooling Building w/ modular green screens

5' path Grasses Overlook platform Plants & retaining for bank stabilization Rock Creek Tributary Plants and retaining for bank stabilization 10' Green Road Grasses On-street parking

Figure 40: Section D, Overlook piers facing downstream
10.4 Amphitheatre Garden

Figure 42: Site Opportunities and Challenges

Parking lot at Fisher Houses presents a small challenge as an eye soar from any space intended for healing. However, it does provide easy accessibility for those in wheelchairs to proposed uses and may be screened with everygreen plantings.

An existing topographical low provides an opportunity to accommodate existing and future performances by wounded warriors or visitors. This space also provides opportunity for passive gathering and family time. Topography allows for an amphitheatre or stage located directly adjacent to the primary Green Road path.

This area represents another opportunity for interaction with the Rock Creek Tributary. Lower stream banks and minimal change in elevation allow for direct access and viewing.

An open hillside with little future threat of shading from tree canopy presents an accessible opportunity for Horticultural Therapy directly adjacent to the Fisher Houses. This space could become one that also encourages social interaction amongst patients, visitors and staff.
Site Assessment and Design Response

The southwest portal into the Healing Woodland provides many opportunities for gathering as well as hillside gardens and/or horticultural therapy. Located directly adjacent to the Fisher Houses and within walking distance to NICoE, this space provides an ideal location for therapeutic efforts including social interaction.

Two path options are presented to the user entering the Hillside Gardens. The wider, primary Green Road path or the secondary memorial grove path lead the user to different experiences. Choosing the secondary path will lead the user through a memorial grove, originally suggested for another part of the WRNMMC campus, into an amphitheatre where grove trees dissipate as you reach the opposite side of the amphitheatre leading back to the primary Green Road path and eventually to horticultural therapy area.

The proposed amphitheatre is mostly lawn and trees. Little earth movement is necessary in this portion of the site because existing topography informed placement of the stone retaining walls. The area proposed for horticultural therapy uses a similar method of retaining walls, but spaced at a greater distance in order to allow for larger gardening beds that are ADA accessible.

Program:
Hillside garden plots
Amphitheatre
Grove

Therapy for PTSD:
Horticultural therapy
Small social gathering
Commemoration/remembrance
Figure 43: Proposed Plan for Amphitheatre Garden
Figure 44: Section E, Looking northeast through proposed amphitheatre
10.5 Vegetation

Potential vegetation is listed on the following pages based on its ideal habitat.

Figure 46: Pond, Stream and Perimeter Stabilization Plantings

Waterlillies, pond garden
Photo by author, SCA

Water-willow
*Justicia americana*
Photo by: Norman G. Flaigg

Water-willow bloom
*Justicia americana*
Photo by: R.W. Smith

Marshmallow Hibiscus
*Hibiscus moscheutos*
Photo by: Andy & Sally Wasowski

Black Willow
*Salix nigra*
Photo by: Joseph A. Marcus

Switchgrass
*Panicum virgatum*
Photo by: Bonnie L. Harper

Cardinal Flower
*Lobelia cardinalis*
Photo by: Nature Conservancy of Charleston

Great Lobelia
*Lobelia siphilitica*
Figure 47: Meadow Plantings

Beebalm
*Monarda fistulosa*
Photo by: Mary Ann Pickens

Poke Milkweed
*Asclepias exaltata*
Photo by: W.D. Bransford

Butterfly weed
*Asclepias tuberosa*
Photo by: Andy & Sally Wasowski

Blazing Star
*Liatris spicata*
Photo by: Julie Makin

Cranesbill
*Geranium maculatum*
Photo by: W.D. Bransford

Purple Astilbe
*Astilbe chinensis var. taquetii ‘Purpurlanze’*
Photo by: author, SCA

Purple Coneflower
*Echinacea purpurea*
Photo by: Paul Cox

Pale Purple Coneflower
*Echinacea papilla*
Photo by: Paul Cox
Figure 48: Woodland Groundcovers

Foamflower
*Tiarella cordifolia*
Photo by Albert F.W. Vick

Lenten Rose
*Helleborus orientalis*
Photo by author, SCA

Hosta

Figure 49: Transitional Woodland Trees

Serviceberry
*Amelanchier laevis*
Woodland edge plant, white blooms, berries for wildlife
Photos by: W.D. Bransford (left)
Sally & Andy Wasowski (right)

Eastern Redbud
*Cercis canadensis*
Woodland edge plant, white blooms, berries for wildlife
Photos by: W.D. Bransford

Flowering Dogwood
*Cornus Florida*
Woodland edge plant, white or pink blooms berries for wildlife
Photos by: Andy and Sally Wasowski
Chapter 11: Outcome & Opportunity

At some point in their lifetime, approximately seven percent of Americans experience posttraumatic stress disorder (PTSD) (Kessler 2005), and it is not isolated to soldiers and veterans. Other exposures to trauma such as child abuse, rape, or any legitimate threat to one’s life can result in stress, impairment of everyday functioning, and a decreased quality of life (Detweiler, Detweiler and Lane 2012). Design strategies discovered by this project can be implemented in other psychiatric facilities and can also be monitored for success through examination of patient recovery rates. Hopefully, discoveries of specific design strategies for PTSD will spark considerations of landscape design as a healing mechanism for other specific disorders as well.

This project reveals potential links between the environment and human behavior for a very specific population, which can be applied at a larger scale. Hopefully, this project will aid in future design considerations of therapeutic landscapes for PTSD, and will also encourage other landscape architects to realize the importance of thoroughly understanding the challenges of the populations they design for and the incorporation of research from other disciplines into their designs.

As shown in Figure 50, overlaps with other disorders provide opportunity for use of similar design principles. Opportunities for crossover of design concepts discussed within the Guiding Principles exist for dementia, sensory processing disorders, and other anxiety disorders such as panic disorder.
11:1  **Guiding Principles and Other Disorders**

The proposed Guiding Principles may prove beneficial for other disorders such as Dementia, Sensory Processing Disorders, and various degree of Anxiety and Panic Disorders.

11.1.2 **Dementia**

Difficulty focusing and confusion experienced by dementia patients may benefit from similar use of red and blue visuals in alternating patterns within the landscape. Issues staying grounded plague both PTSD and Dementia patients.
11.1.3 Sensory Processing Disorders

Providing vegetation or landscape elements that stimulate the senses encourage somatic experiencing therapy and have also been successful in addressing sensory processing disorders. Similar issues processing messages from the nervous system suggest similar treatment is effective. Finding opportunities to merge environmental healing efforts with sensory enhancements may prove effective for both PTSD and sensory processing patients.

11.1.4 Anxiety Disorders/Panic Disorder

Patients with PTSD often experience other anxiety disorders like Panic Disorder and display many overlapping symptoms with these patients (Cooper Marcus and Barnes 1999). Efforts to ground the individual in the present by enhancing environmental awareness through interaction with archetypes, environmental healing efforts, increased sensory awareness, red and blue visuals, and enhancing the sound of water may prove beneficial.

This project provides insight into the relationship between landscape and mental health, specifically PTSD. The potential of landscape design to address specific mental disorders within healthcare facilities and influence the creation of healthier environments in the everyday urban context has been explored. An understanding of a particular disorder that plagues a large portion of our population allows us, as landscape architects, to design healthier and more restorative environments that have significant
impact. Projects that continue this trend of exploration and understanding provide validity to our profession and also show our abilities as designers to research across disciplines and apply effective design solutions.
Sources


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