HEALING ENVIRONMENTS: ELEMENTS OF RETREAT

by

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TABLE OF CONTENTS

1. HEALING ENVIRONMENT....1

2. MULTIPLE SCLEROSIS....6

3. ELEMENTS....10

Sun....10
Precedent Study – Alvar Aalto, Sanatorium....13
Cognitive Response....15
Color....18
Precedent Study – Aldo Von Eyck, Hubertus House....20
Light....22
Precedent Study – Sam Bhama Clinic in Bhopal India....27
Precedent Study – Peter Zumthor, Thermal Vals....29
Sustainability....31

4. HEALING ENVIRONMENTS....32

5. HEALING CENTER....33

Quantitative Program....33
Qualitative Program....35
Site Analysis....39
Code Analysis....44

5. DESIGN PROJECT – MS HEALING CENTER....49

Schematic....49
Plans....51
Renderings....54
Sections....57

REFERENCES CITED....58
IMAGES CITED....61

LIST OF FIGURES

Figure Page

1. Myelin Sheath Diagram.....6

2. World Distribution of MS Map.....6

3. Diagram of MS Classifications.....10

4. Aalvar Alto's Sanatorium Balcony View.....13

5. Aalvar Alto's Sanatorium Floor Plan.....13

6. Aalvar Alto's Sanatorium Floor Plan Schematic Sun Study.....13

7. Aalvar Alto's Sanatorium Floor Plan Section Sun Study. 14

8. Aldo Von Eyck's Hubertus House Exterior View of Building.....20

9. Aldo Von Eyck's Hubertus House Exterior View of Colored Wall.....20

10. Aldo Von Eyck's Hubertus House Schematic Color Study 20

11. Aldo Von Eyck's Hubertus House View of Color Use in Building.....21

12. Separation of Light Through a Prism.....22

13. Susquaqa Spa Healing Garden View.....22

14. Susquaqa Spa Healing Garden View of Tree Connection to Space.....24

15. Hospital Cancer Center. Healing Garden Water to Building Connection.....24

16. Sambhavana Clinic Exterior Panoramic View.....27

17. Sambhavana Clinic Floor Plan.....28

18. Peter Zumthor's Thermal Vals Interior View of Stair.....29

19. Peter Zumthor's Thermal Vals Interior View of Bath Pools.....29

ABSTRACT

Multiple sclerosis (or MS) is a chronic, often disabling disease that attacks the central nervous system (CNS), which is made up of the brain, spinal cord, and optic nerves. Symptoms may be mild, such as numbness in the limbs, or severe, such as paralysis or loss of vision. The progress, severity, and specific symptoms of MS are unpredictable and vary from one person to another. Today, new treatments and advances in research are giving new hope to people affected by the disease. MS is a highly misunderstood disease and due to that it is very difficult to cope with this disease.

In the field of architecture we may find opportunities to fight and alleviate those who are affected by MS. There are many elements of architecture that can offer haven and sanctuary for those affected. By implementing ideas and strategies of healing environments such as sun exposure, color, or materiality we can help those affected by MS.

It is believed by some that MS is the result or is aided by the body becoming out of balance for one reason or another. These "stressors" can be physical, environmental and/or emotionally based. Healing can occur only when the body is returned to a state of homeostasis or perfect balance. The human body is designed to "heal itself" once we provide the 'necessary' tools and a healing environment. Our surroundings affect our physical and spiritual self. They can contribute to stress and general malaise or balance and strengthen us. Although personal preferences differ widely, there is a level of aesthetic response that we all share. If we look objectively at this, we can understand how different qualities of environment can nurture both body and soul.

The intent of this thesis is to develop a system of architectural design using technologies, methods and products that may help to alleviate symptoms and provide an immediate and long lasting sanctuary of peace for those affected by MS and their families. Ultimately, this thesis will seek to enhance the lives of MS patients spiritually, emotionally, and mentally.

HEALING ENVIRONMENT

We as human beings have an inner connection with our environment by physical, mental, emotional and spiritual means. This connection can create a dynamic life that people can thrive from in every aspect. Through work, aging or learning, people are able to participate and contribute to this connection with our environment. In our built environment we often interact with the buildings themselves without realizing the great influence that such built environments and surroundings hold. This great power holds influence in our lives for good or bad, happy or sad, stressed or relaxed in every physical, emotional and spiritual way. This connection with our environment is key in keeping a balance within ourselves.

Our environment can even help to keep us in balance or alternatively force us out of balance. How people choose to live their lives and what they let influence them are some things that can tip the scale in favor of one or the other. These influences and choices can often stress us to the brink, severing the harmony's connection with our environment. This connection links our health and wellness to the society in which we as individuals develop, thrive and nourish. Each of us flourishes on this connection to society as it is woven together with families and communities that complete ourselves and enliven us. This connection when severed from our environment can set our state of being "out of whack," affecting our natural state of being. This natural state, when in check or harmonies allows our body to be in a healing, healthy state. As Hippocrates, the great philosopher and pioneer of early medicine stated, "The natural healing force within each one of us is the greatest force in getting well."[1] With this in mind, one must truly be aware of their natural state in order to take full advantage of their inner healing force.

This natural healing force in all of us is often not considered in typical western medicine practices. Western medicine does not focus on healing the illness as holistic medicine does. Its main purpose is to cure the ailment or disease. It does not care or manage the individual nor social response that a person needs in order to begin recovering from their disease. According to Huelat, David Sobel M.D. of Kaiser Permanente's patient education, western medicine is mostly concerned with "objective, non-personal, physiochemical explanations, instead of healing systems that are centered on personal and social experiences of the phenomenon of disease."[2] Many diseases are caused or influenced by controllable behaviors in our life. Western medicine often doesn't have answers to provide for these lifestyle behaviors. Western medicine is often prescriptive, meaning that it is a set of processes, exams and tests that often have results but sometimes do not. In conjunction to this medical professional Larry Dossey in his book *Meaning and Medicine; Lessons from a Doctor's Breakthroughs in Healing* states:

We will see that healing often is not the mechanical,

[1] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress.

[2] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress

> physical process we generally believe it to be, not just a matter of having physical exams and tests, taking medications, or having surgery. Genuine healing is frequently unexpected and radical, seemingly out of the blue, and often depends not on what we do but on how we choose to be the role of belief, hope, prayer, and the miraculous are examined, along with evidence for a benevolent, invisible healing force within each us.[3]

With this understanding of healing we can then turn to Deepak Chopra, M.D., and author of many books concerning healing. He affirms Mr. Dossey's conclusions and then associates health with spirituality,

> Health is our natural state. More than the World Health Organization's definition of being something more than the absence of disease or infirmity – health is the state of perfect physical, mental and social well being. To this may be added spiritual well being, a state in which a person feels at every moment of living, a joy and zest for life, a sense of fulfillment and an awareness of harmony with the universe around him. It is a state in which one feels ever youthful, ever buoyant, and ever happy. [4]

He then goes on to conclude that, "…such a state is not only desirable but quite possible."[5] With the promise of such great sensations we should all try to regularly be within a state of health.

There are many factors and forces that can break this "state," causing our natural healing force to disintegrate. These destructive forces are actually often times barriers in creating healing environments. The first step in attaining a true healing environment is to identify these barriers and remove them. Such barriers can deal with any range of the following: attitude, emotion, physical handicaps, finances and the list could go on and on. Other barriers are stressors or things that relate to our connection with the society in which the people live. These stressors are conflicts relating to such things as family situation, work, self-esteem, changes in lifestyle and there are a vast variety of other causes as well. Stressors like these also contribute to the imbalance of our natural healing state within each of us that promotes growth and vitality. [6]

Professionals in the medical and physiological fields agree that these stressors limit our body's ability to resist disease. They overwork our minds, exhaust our bodies, slow our mental reactions and lower our immune responses. Therefore, our bodies become vulnerable physically, mentally and physiologically. This vulnerability invites disease to infect our body when otherwise it would have

[3] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress.
[4] Chopra, D Qtd in Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress.
[5] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress.
[6] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, p 8-9.

little to no affect. People have the ability to change these stressors, to turn them around so that their natural healing force can remain strong. Carol Venolia writes in her book *Healing Environments; Your Guide to Indoor Well Being,*

> When we feel low in confidence, helpless to influence the course of our lives, lacking means of self-expression, without a positive vision of our future, and isolated from love and support, we are most likely to succumb to illness. On the other hand, high self-esteem, coping skills, self-expressiveness, an ability to find satisfaction and support, self-awareness, and a feeling that there is a place for us in the world can all increase our resistance to disease. Terminally ill patients who significantly outlive their expectancy tend to be more creative, more receptive to new idea, flexible, and argumentative.[7] Pg 9

These people are motivated not by a fear of death, but by a desire to be alive and to achieve personally meaningful goals. Thus when encroached upon by any stressors or barriers they remove them or knock them down to allow for their healing environment to continue.

It is important to recognize that we are the creators and the managers of these healing environments. This gives us the opportunity to create places that are healing to us as well as being healers of these places we create. Ultimately, people have to find a balance in their environment. They are participants having a great stock in the creation and management of these environments. However, one must keep in mind that healing environments are created with certain qualities. Implementing these qualities help to enable us to attain this natural state of health. Carol Venolia has suggested that to implement such qualities some of the things the people can do are:

1 -- stimulate positive awareness of ourselves;
2 -- enhance our connections with nature culture, and people;
3 -- allow for privacy;
4 -- do us no physical harm;
5 -- provide meaningful, varying stimuli;
6 -- encourage times of relaxation;
7 -- allow us to interact with them productively;
8 -- contain a balance between familiarity and flexibility;
9 -- be beautiful[8].

Achieving such qualities to better attain a healing environment can also be directly tied into our every day built environment. Our current architectural practices promote illnesses by creating an environment of afterthought. These afterthought environments don't allow us to interact with people and our surroundings. Thus, they generate barriers

[7] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, p 9

[8] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 10-11

starting us on a downward spiral.

Often inhabitants don't think much about the built environment. They don't think that it can affect us so much, and that it can be a source of disharmonies through physical, emotional and mental stressors. What people often don't realize is that we do have control of the stressors within our built environment. We have the capability to create our surroundings in a way that will encourage relaxation, relieve mental anxieties, create a higher self-esteem and enhance the feeling of supportiveness. As Venolia states, "At base, healing environments do two things particularly well: they connect us with vital, positive forces and they enhance our ability to respond to the anti-life forces we may encounter." [9] These forces that a healing environment brings are what promote wellbeing and repose.

To establish healing environments individuals must recognize that for every dimension of health or well-being there is a corresponding aspect of our built surroundings. Designers create these spaces and structures to cater to our physical, emotional, physiological, and psychological needs. Physically we create these shelters to respond to our call for protection from the elements and to be a comfortable place. In this comfort, people realize emotional stability and this in turn affects us physiologically and psychologically. Our shelters protect us from the forces and elements of our outside environment. What people often don't realize is that as we are protecting ourselves from the sometimes harmful exterior elements we often are being harmed by our perceived "comfortable, emotionally stable" environments. One must become aware that our indoor environments necessitate a less harmful atmosphere to entertain a peaceful state of being. They also have a significant affect on our triggers and stressors, so it is vital to become more conscious of our desired state of being which will then influence our state of health.

We also need to specifically rethink our indoor environment's connection to our exterior settings. This is just one of the many fundamental connections that people need to maintain and enhance our environment. On the other hand there are many factors that need to be resolved in order to create this healing environment and for us to become healers ourselves. One cannot simply change the state of the spaces by cleaning up or turning off the lights, it is a complete awareness of how our surroundings affect our senses and physical state. "Awareness isn't just the first of a series of steps; it is an ongoing state that is the core of healing yourself and your environments." [10] Through this awareness one can begin to understand all that needs to be done in attaining a healing environment.

Once awareness of the task at hand is achieved, the work to fix the situation can then commence. However, in order to better explore what is needed to make up a healing environment, we need to look at a specific disease. Multiple sclerosis (or MS) is a chronic, often disabling disease that attacks the central nervous system, which is made up of the brain, spinal cord, and optic nerves. Symptoms of MS may

[9] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 10-11

[10] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 26

be mild, such as numbness in the limbs, or severe, such as paralysis or loss of vision. The progress, severity, and specific symptoms are unpredictable and vary from one person to another. Today, new treatments and advances in research are giving new hope to people affected by the disease. MS is a highly misunderstood ailment and due to that and its unpredictability, it is very difficult to cope with this disease.

However, within the field of architecture we may find opportunities to fight and alleviate those who are afflicted by Multiple Sclerosis. Doing so through the use of design elements can offer haven and sanctuary for those influenced. Also, by implementing ideas and strategies of healing environments such as sun exposure, acoustics, geometric balances, materiality or color designers can help those suffering from MS. There are many typologies of architecture that have already focused on similar design intents like this for centuries, such as: feng shui, holistic architecture and green architecture to name a few. They hold some of the keys to unlocking the criteria for creating a healing environment suited for those with MS.

The history of multiple sclerosis (MS) started in the early 19th century, however, the specific origin of the disease is hard to define. In those early years, physicians relied on superstition and medical ideas were not tested. Once medical ideas were more thoroughly tested, MS was among the first diseases to be explained scientifically. Drawings from autopsies done as early as 1838, clearly show what we today recognize as MS. In 1868, Jean-Martin Charcot, a professor of neurology at the University of Paris, "the father of neurology", carefully examined a young woman from which he found the characteristic scars or "plaques" of MS.[11]

MS was recognized by England in 1873 and in the United States by 1878 as a disease[12]. At this time, scientists assumed that some form of environmental toxin or poison caused MS.

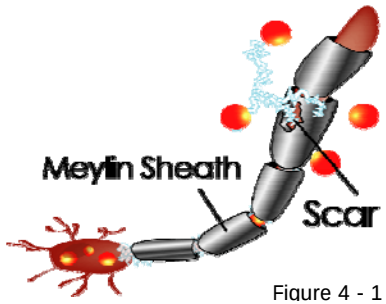


Figure 4 - 1

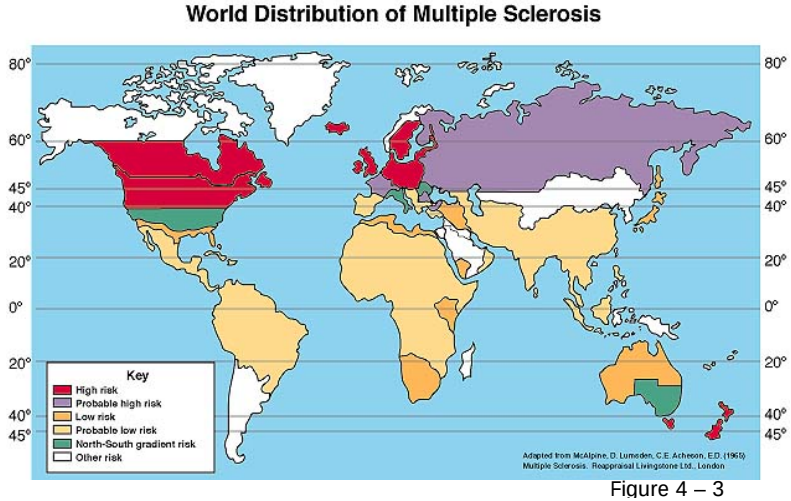


Figure 4 – 3

What we do understand today about Multiple Sclerosis is that it is a chronic disease affecting both the brain and spinal cord where the flow of information between the brain and body becomes interrupted. This makes for an unpredictable, often disabling disease of the central nervous system. The symptoms range from reduced or lost mobility to numbness and tingling and can even lead to blindness and / or paralysis. MS is a crippling, lifelong illness that can follow several different patterns.[13]

Some of the more common patterns for Multiple

[11] Multiple sclerosis: The history of multiple sclerosis. Retrieved October 28, 2008, from Website: http://www.protector.pair.com/ms/

[12] Multiple sclerosis: The history of multiple sclerosis. Retrieved October 28, 2008, from Website: http://www.protector.pair.com/ms/

[13] Multiple sclerosis: The history of multiple sclerosis. Retrieved October 28, 2008, from Website: http://www.protector.pair.com/ms/

Sclerosis progression are: Relapsing/Remitting, Secondary Progressive, Progressive Relapsing and Primary Progressive. Relapsing/Remitting MS is characterized by relapses followed by periods of remission, during which time the person fully or partially recovers from the deficits acquired during the relapse. Secondary Progressive MS begins initially as Relapsing-Remitting MS but develops as a gradual deterioration in nerve function and reflects a worsening of the disease between relapses. Apart from having some remission following relapsing episodes there is no real progress towards recovery. Progressive Relapsing MS shows a distinct progression towards disability from the time that the symptoms first begin. There can sometimes be significant recovery immediately following a relapse but between relapses there is a gradual worsening of symptoms. Finally, the pattern of Primary Progressive MS shows a gradual progression of the disease from its onset with no signs of remission. Also, the initial activity is in the spinal cord and not in the brain;

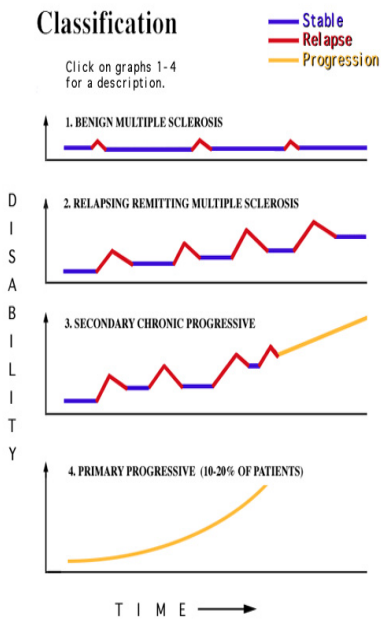


Figure 4 - 1

however, it often does migrate into the brain later[14].

Although there are certain patterns in Multiple Sclerosis, it has been found to have non-homogeneous distribution, a worldwide variation in trend, changed risk for migrants and clustering. This suggests that MS not only originates in those with a genetic predisposition but as a consequence of exposure to several environmental factors. Sun exposure, especially during childhood, is associated with a reduced risk of MS. Also, exposure to ultraviolet radiation from the sun indicates protection or lessening of immune attacks. However, location also plays a role. There is a greater prevalence for the disease in latitudes farther away from the equator than latitudes closer to the equator. Exposure to environmental toxins more prevalent in regional areas is another environmental factor. Lastly, cognitive impairment with a link to low IQ scores was found as another factor. Besides these environmental factors associated with the cause of MS, there are also correlations from genetic, infectious and viral factors.[15]

Figure 4-3

After the factors are all considered, the likely course and outcome from Multiple Sclerosis will only incur a slight impairment in the first five years. although, two-thirds of people with MS are also relatively stable over a period of 15 years. Being an unpredictable illness that differs in each individual, sometimes there are favorable outcomes. This

[14] MS Network. Be informed take action. Retrieved October 14, 2008 from What is MS. http://www.msnetwork.com/intl/msnetwork/general/guide_understanding_ms/what_is_ms/what_causes_MS/infectious_factor.jsp

[15] National ms society: About MS. Retreived October 3, 2008, from http://www.nationalmssociety.org/index.aspx

could come in the form of a complete remission of disturbances or simply the slight interference to sensation or vision. It may even allow for the loss of impairment for a period of five years. However, at times there is a rapid increase of impairment causing pronounced weakening after about 15 years. In the instance of this less favorable course, there are many times paralytic symptoms at the onset of the illness, advanced age and even a higher rate of episodic attacks in the course of the disease. [16]

With such sporadic and unpredictable episodes, Multiple Sclerosis has proven to be a non-uniform illness that is impossible to predict. While taking this into account, it is important to remember that it is typically not a mortal disease and only a few people die from complications of far-advanced MS. On the contrary the life expectancy of people with MS is approximately equivalent to people without the disease. In fact, about one half of those affected can look forward to a quality life without severe limitations.[17]

In today's day and age these favorable circumstances are now truer than ever because of the many current medical trials and studies researching treatment options for those with Multiple Sclerosis. One study involving adult stem cells in mice has the goal of repairing the damaged nervous system in people with MS. Other investigations target children with the disease and study how the intervention of cognitive functions can help minimize impact from relapses. Yet another is collecting growing evidence suggesting a link between sunlight exposure and resistance to developing MS as wells as the possible protective mechanisms obtained from the synthesis of vitamin D. Although many of these studies are still in their research phase there are many other treatment options for patients with MS including prescription medicines targeting disease-modifying agents that can help alleviate many of the symptoms and slow down the course of the disease. The use of such products will aide in a full and active life even with the presence of MS.[18]

The real dilemma now is how a healing environment can be developed to help those affected with M.S. First, one must consider both how to help relieve the stressors that cause the triggers as well as what exactly good health really is? Lenard Duhl M.D. stated in *Healing Environments* that good health means that there is a balance in life, a connection and competence in terms of the whole. [19] Duhl has also remarked that this connection to the whole has as the outer limits the earth and the inner limits the heart. Having this connection and competence as a whole can lead to good health. By participating in life, people can attain this health through the sustaining nourishment of our environment. There are two environments to consider, both our local ecosystem containing our relationships and our work but also our overall environment; the sun, air, water,

[16] Health-cares.net, (2008). Can vitamin D reduce multiple sclerosis risk?. Retrieved September 11, 2008, from Health-cares.net: Your fitness guides Web site: http://neurology.health-cares.net/multiple-sclerosis-vitamin.php

[17] National ms society: About MS. Retreived October 3, 2008, from http://www.nationalmssociety.org/index.aspx

[18] National ms society: About MS. Retreived October 3, 2008, from http://www.nationalmssociety.org/index.aspx

[19] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 7.

earth, plants and animals. This state of health is very dynamic; it is generally not something that can remain static. On the contrary, it is something that the people ought to strive for, seek out and interact with.

Along the same lines as our state of health, it is believed by some that Multiple Sclerosis is the result of or is aided by the body becoming out of balance for one reason or another. These "stressors" can be physical, environmental and/or emotionally based. Healing can occur only when the body is returned to a state of homeostasis or perfect balance. The human body is designed to heal itself once provided with the necessary tools. A healing environment could be considered such a tool seeing that our surroundings affect our physical and spiritual self. Thus if designed in the proper fashion our surroundings would contribute to the alleviation of stress and general malaise as well as balancing and strengthening us. Although personal preferences differ widely, there is a level of aesthetic response that people all share. If one looks objectively at this, they can understand how different qualities of environment can nurture both the body and soul of those with MS.

To bring about nurturing, designers must take advantage of a system of architectural design that uses technologies, methods and products. This will in turn help to alleviate and provide an immediate and long lasting sanctuary of peace for those affected by MS and their families. Moreover, it will enhance the spiritual, emotional, and mental quality of daily life for all those involved. This process of healing has to initially take place from within ourselves. Such a process must be supported and enhanced by the quality of actions, processes and activities that can create healing environments and the healing qualities of environments. [20]

To allow for interaction and healing, designers need to take a look at the environmental factors that greatly affect diagnosis and prognosis of Multiple Sclerosis. As stated previously these environmental factors for MS are: Sun exposure, equatorial site location, environmental toxins, physical activity and cognitive response. [21] In order to create a healing environment for someone with MS we need to encourage those with and without the illness to participate in the dynamic web of life by deriving nourishment from the sun, air, water, earth, plants, animals and people. This is something that can be developed and implemented in architectural practices. These practices can help inform those without MS and alleviate those with MS so that all may lead richer, fuller lives.

In the sections to follow, the areas of sunlight, color, light, and sustainability will be discussed as factors that can create a healing environment, as described by Carol Venolia, which will contribute to the health and well-being of MS patients and their families.[22]

[20] Day, C. (2007). Places of the soul: Architecture and environmental design as a healing art. Oxford, UK. Elsevier Ltd., 203

[21] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 7.

[22] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 10-11

ELEMENTS OF HEALING

Sun

Sun exposure is one of the key environmental factors that designers can look at in order to help prevent Multiple Sclerosis in the overall population and to help relieve symptoms in those who have already incurred the disease. Sun exposure is one latitude-dependant environmental factor that is inversely related to MS instance and prevalence according to Dr. Islam of the University of Southern California from the department of preventative medicine. [23]

People have begun to shelter themselves indoors, due to more indoor activities, indoor building climates,minimizing the key environmental factor. These shelters cut us off from our nourishment, mainly sunlight, which may be a reason for the spike in diagnosis of Multiple Sclerosis. Our body relies on sunlight in order to produce adequate amounts of vitamin D. Vitamin D helps with our immune system, in fact, it has strong immunoregulatory affects. According to the Harvard School of Public Health and the division of preventative medicine Vitamin D prevents EAE, experimental autoimmune encephalomyelitis, and autoimmune disease in animals which is used as a medical model of MS. Many studies on MS have found that a possible environmental factor is that those diagnosed with MS have insufficient levels of Vitamin D. It has also been shown that periods of low Vitamin D precede occurrences of high lesion activity whereas periods of high vitamin D precede low lesion activity. [24] This means that sun exposure to those with MS reduces the affects of MS overall. Also, in the same study from researchers at Harvard Medical School they found that women who have the highest Vitamin D levels were 40% less likely to develop MS.

Some suggest that Vitamin D levels that fluctuate with seasonal UV light exposure could be a significant environmental factor. This seasonal UV light factor can influence Vitamin D by biosynthesis. Vitamin D plays a very important immunomodulating role on the inflammation of the central nervous system. [25] This shows us that we need to derive more nourishment from the sun, in fact, a study done by Dr Islam from the Department of Preventative Medicine from USC studied childhood sun exposure in Tasmania. In this study Tasmanians with two to three hours of good sun exposure on average per week were found to have nearly a 60% reduction in the risk for Multiple Sclerosis. [26]

The study goes on to state that responsible sun

[23] Munger, [K.L.], Zhang, [S.M.], O'Reilly, E., Hernan, [M.A.], Olek, [M.J.], Willet, [W.C.], Ascherio, A., (Jan. 13, 2004).Vitamin D intake and incidence of multiple sclerosis. Neurology. 62, 1, [60].

[24] Munger, [K.L.], Zhang, [S.M.], O'Reilly, E., Hernan, [M.A.], Olek, [M.J.], Willet, [W.C.], Ascherio, A., (Jan. 13, 2004).Vitamin D intake and incidence of multiple sclerosis. Neurology. 62, 1, [66].

[25] Casetta, E. Grantert (2000).Prognosis of multiple sclerosis: environmental factors. Neurological Science. 21, S839-S842.

[26] Islam, T., Gauderman, [W.J.], Cozen, W., Mack, [T.M.] (July 24, 2007).Childhood sun exposure influences risk of multiple sclerosis in monozygotic twins. Neurology. 69, 4, 381.

tanning and other sun exposure throughout all seasons during both hot and cold days will be a great benefit with respects to lowering the risk for Multiple Sclerosis. Designers can and must apply this theory of sun exposure to how they think about shelter. Our shelters must be built in such a way that will allow us to benefit from the great source of the sun. Altering our environment so that it benefits us is imperative. "Buildings have a valid role as mediators between us and an outside world that is not always safe or comfortable. But it is unnecessary, even deadly for our indoor environments to be as impoverished as they are."[27] With such serious consequences, people must obtain the responsibility to take some serious actions in regard to our surroundings.

Designers need to create a healthy connection between indoors and outdoors. It is feasible to bring the benefits of the sun into our buildings through site location, site orientation, natural light and electric light. First of all one has the choice of site location. Often times an individual does not have the choice of where they live for any length of time and you don't initially choose your geographic location. However, this factor can affect the likelihood of getting Multiple Sclerosis and even alleviating the stressors and triggers for those with MS. The epidemiology of MS shows ones the equatorial location raises the risk of being diagnosed with the disease. It also occurs more frequently in Caucasian populations but even amongst Caucasians there is a distinct increased prevalence in countries or regions of increased northern latitude in the northern hemisphere. Some believe that at these high latitudes, ultraviolet sunlight is too low to produce adequate amounts of Vitamin D. It is also suggested that adult immigrants retain the risk factor of their country of origin whereas their children tend towards the risk factor of the country they have immigrated to. The exact delineation of increased prevalence is the 37th parallel in the northern hemisphere. The prevalence rate nearly triples for those living above the 37th parallel.[28] Generally MS occurs with much greater frequency between forty and sixty degrees north and south latitude. [29] (National MS society, 2008)

After assessing the site location, designers must begin to understand the orientation of a building so that the maximum benefit can be attained from sunlight. Such light can impact human health by controlling the body's circadian system, affecting mood and perception. This also enables critical chemical reactions in the body such as Vitamin D biosynthesis. Exposure to daylight directly or indirectly reduces depression, improves sleep, lessens stress, can cause us to experience less pain and creates more overall comfort. [30]

Daylight also contains full spectrum UV light which provides more comfort and holds crucial biological components that our bodies need. Manufactured light does not usually contain full spectrum UV light. In fact, full

[27] Venolia, C (1988). Healing environments: Your guide to indoor well-being. Berkeley, CA: Celestial Arts, 20

[28] Munger, [K.L.], Zhang, [S.M.], O'Reilly, E., Hernan, [M.A.], Olek, [M.J.], Willet, [W.C.], Ascherio, A., (Jan. 13, 2004).Vitamin D intake and incidence of multiple sclerosis. Neurology. 62, 1, [66].

[29] Multiple sclerosis: The history of multiple sclerosis. Retrieved October 28, 2008, from Website: http://www.protector.pair.com/ms/

[30] Joseph, A (August, 2006). Issue Paper. The impact of light on outcomes in healthcare settings, 2, Retrieved September 11, 2008, from "http://www.healthdesign.org/research/reports/documents/CHD_Issue_Paper2.pdf" , 3

spectrum UV light is virtually absent from interior lighting and also is blocked by normal window glass. In order to benefit from full spectral wave lengths in interior spaces we need to implement the use of full spectrum fluorescent lighting. This lighting is superior to other artificial light sources because it provides a full wavelength, similar to natural light. Thus it includes some of the health advantages of natural light. Aaron Joseph, author of *The impact of light on outcomes in healthcare settings, 2*, has alleged that these full spectrum fluorescent lights are six times more expensive and provide less light per unit of energy. Therefore, to maintain light levels, more full spectrum lights would be needed resulting in higher energy. However, the health benefits outweigh the disadvantages in this case because this type of light provides the full spectral wavelength needed in order to help your body synthesize Vitamin D. In turn this helps to immunoregulate your immune system, aiding in a healthier body. [31]

The knowledge that adequate light is needed to help heal weak bodies is no new theory. Years ago, before antibiotics, the only known "cure" for tuberculosis was to get lots of rest within an environment containing clean air and plenty of sunshine. Thus the age of sanatoriums was born.

[31] Joseph, A (August, 2006). Issue Paper. The impact of light on outcomes in healthcare settings, 2, Retrieved September 11, 2008, from "http://www.healthdesign.org/research/reports/documents/CHD_Issue_Paper2.pdf" , 10

PRECEDENT SUTDY – ALVAR AALO, SANATORIUM

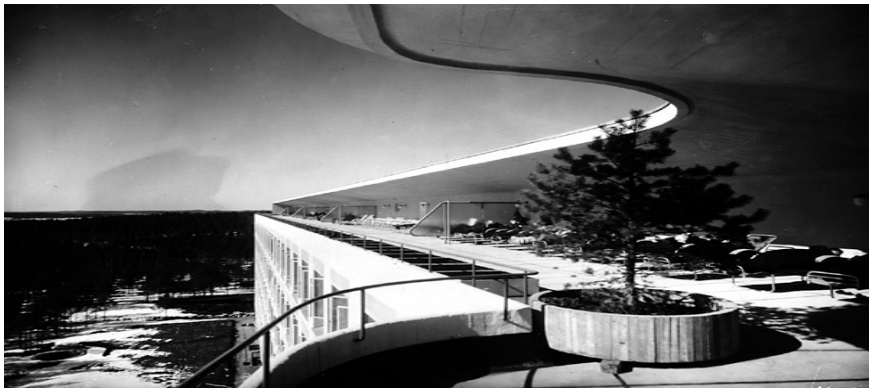


Figure 3 - 1

A Sanatorium, originally referred to as a sanitarium, is essentially a medical facility for long-term illnesses. In fact, the word sanatorium is adopted from the Latin root *sano* meaning to heal. Tuberculosis was the primary illness treated by sanatoriums and the treatment was a regime of rest and good nutrition. This "medicine" seemed to offer the best chance that the sufferer's immune system would be able to fight off the tuberculosis infection. [32]

Specifically, Alvar Aalto's Sanatorium was designed with the same "medicine" in mind. He chose a site location that was within an isolated forest area. This set the stage for patients to be exposed to plentiful amounts of high altitude sunshine and fresh air as well as good nutrition. This is represented in Aalto's most important architectural element within his designed environment, the sunning balconies. Such balconies were implemented within each individual patient's quarters. This allowed for the weak patients, whose exercise was restricted, to be pulled out in their beds. These important spaces were all designed to face south in order to gain the most direct sun exposure.

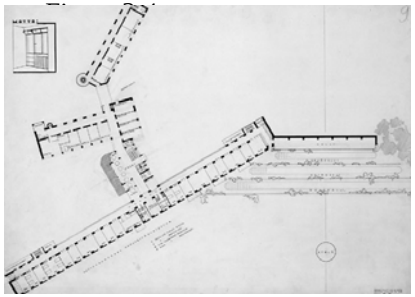


Figure 3 - 4

However, the sunlight treatment didn't stop there; healthier patients had access to a roof-top terrace where they could lay all day on specially designed chairs. As several of these patients would spend several years at the "hospital" it was necessary for treatments to occur in the winter and summer alike. For winter sun bathing there were sheepskin "sleeping bags" that were designed to be apart of the sun beds.

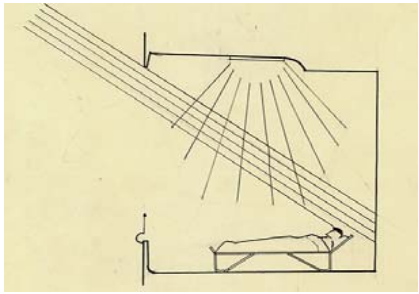


Figure 3 2

Aalto's

[32] Alvar Aalto. Paimo sanatorium 1928-1933. Retrieved October 4, 2008 from website: http://www.alvaraalto.fi/alvar/buildings/paimio/paimio.html

inspirational design for the sanatorium was to make the building a contributor to the healing process. He understood the necessity for healing environments and liked to call the building a “medical instrument”. With this in mind, considerable attention was given to the design of the patient bedrooms. Each patient had a private sun room, a non-splash basins,lamps placed out of the line of vision, and specially designed cupboards. Even the color pallet was mindfully examined. The ceiling of each room was painted a relaxing dark green in order to avoid glare. All the public areas had color schemes of blue, yellow, grey and white. This was said to create a fresh and cheerful yet peaceful atmosphere.

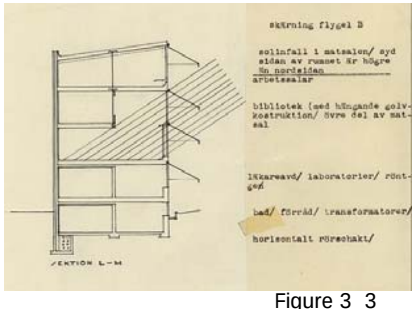


Figure 3 3

Although all these details where thought through carefully none where studied at as thoroughly as the lighting. Aalto began by creating a staircase that opened into the foyer and extended through the building; this allowed daylight to filter in from both the east and the west. The corridors outside of patient’s rooms contained strip windows which let yet more natural light in. Aalto even studied the angle of the sunlight in conjunction with the heating system and placed sun blinds outside the windows to cut down on solar gain. Finally, in the patients’ rooms was placed a double-height window so that natural light would filter into the farthest corner of the room and fully envelope each patient.

Though tuberculosis is a far different illness than that of Multiple Sclerosis the healing implications of light are the same in both scenarios. With Aalto’s Sanatorium but several sanatoriums throughout the country and the world we can see how sunlight was used as a key environmental factor for the well being of those facing chronic disease. From the healing that was achieved by this sanatorium we can deduce that such treatments must surely still be applicable today for overall health and well-being, particularly in MS patients.

COGNITIVE

Cognitive response is a very important area that needs to be addressed in any healing environment especially a healing environment suited for Multiple Sclerosis patients. Perception plays a key role in the cognitive response and ability to mitigate and alleviate mental, physiological and spiritual blocks. Perception is termed as the act of apprehending by the senses and having a single unified awareness derived from sensory processes.[33] Perception affects all five senses and can be used as a holistic way to help the body cope. The mind and body, through the different types of perception, are able to experience and be one with their environment. This relationship between man and his environment is not as simple as it may seem at first sight. In *Intentions in Architecture*, Norberg-Schulz posses the question,

> How does architecture (the environment) influence us? It is a truism to say that the environment influences us and determines our 'mood' that architecture is a part of our environment is just as evident. If we take this point of departure, architecture has not only an instrumental purpose but also a psychological function.[34]

He goes on to pose questions of our experience with architecture and the environment. Depending on day to day circumstances and moods we can have a completely different experience in the same environment. These circumstances can be influenced and implied through architecture. Sensor memory is the means to the understanding of three dimensional spaces. There are sensory memories individually attributed to each of the five senses. According to psychologist James J Gibson the senses are more than passive receivers they are aggressively seeking mechanisms. He also talks of the five sensory systems which are: Visual system, auditory system, the taste/smell system, the basic orienting system and the haptic system. [35] In order to understand the healing nature of the senses Bachelard in *The Poetics of Reverie* talks about how a walk through the forest is invigorating and healing due to the constant reaction of all sense moralities. He calls this the 'polyphony' of the senses. In his multi-sensory experience he describes that the eye collaborates at all times with the body and other senses. [36] These senses are, including vision, extensions of the haptic sensory system. They define the interface between the skin and the environment and the opaque interiority of the body and the exteriority of the world. The sense of vision reveals what the sense of touch already perceives. Some of these are: Color, materiality and light.

Unifying color, materiality and light has a great

[33] Norberg-Schulz, C. (1965). Intentions in architecture. Cambridge, Massachusetts: The M.I.T. Press. 18

[34] Norberg-Schulz, C. (1965). Intentions in architecture. Cambridge, Massachusetts: The M.I.T. Press. 22

[35] Pallasmaa, J (2005). The eyes of the skin: architecture and the senses. West Sussex, England: Wiley-Academy.41-2.

[36] Bachelard, G., The poetics of reverie, Beacon Press, Boston, 1971, 6.

influence on the inhabitant within the space. These factors help to enhance and show the many shapes, forms and spaces that can be a useful tool in the healing process. These shapes and forms can have a quite, visual force that has life altering attributes. [37]

Similarly, the attributes of materiality within the realm of building and finish materials enhance the experience of a space. These materials introduce elements of nature and promote the idea of a healing environment. Natural materials, those derived from nature with little or no modification, are favored for materials that provide healing attributes. Wood is one of these characteristic materials and great affection is directed towards it. In many cultures, wood has been seen as life, energy and even as giving a spiritual renewal. In the Mayan culture, trees were the tallest objects in the landscape, the closest thing to their gods. Therefore the tree and the material of wood was sacred and denoted spiritual purity. In the Christian culture, Christ described himself as "…I am the vine, you are the branches." In many other cultures and philosophies, wood is related to plant growth which signifies growth and development and spiritual well being. People and trees are often seen symbolically in the same way. A young new tree denotes energy and growth. The opposite, an older tree, symbolizes feelings of comfort and permanence. Wood, in the natural and built environment, has a linear power and strength. This provides feelings of an expansive calming view. In addition to all this, the different colors of wood provide warmth and beauty. When used on floors and ceilings it can denote a sense of awareness and relaxation. These are all fine qualities but perhaps wood is appreciated most and more useful as part of a healing environment in areas that can be touched. [38]

Natural mineral such as stone, rock, slate can also promote the idea of a healing environment. Stone gives a sense of permanence, of solidity. It has been used in many healing environments from ancient times to the present; in mosques, cathedrals, shrines, and temples. It communicates that the building is permanent. When applied to a certain facility it conveys that the structure in which it is apart of is a permanent rock for the community and for the people it serves.

With any material chosen, the key is to create a balance or harmony. Creating the connection with the local environment, a contact with nature, our body can derive shelter, warmth, and comfort from natural elements. These elements of nature can provide healing and satisfaction to our body, mind and spirit. All materials have distinct attributes, for example; wood is warm, brick still has a sense of warmth leftover from the kiln, steel and metal are hard and cold, plastic is foreign, while concrete emanates a cold sense. [39] The attributes identify the materials. It is difficult to redefine these characteristics. The material's properties come from the history and the appearance of materials. The attitudes and perceptions that we have towards them are hard to redefine. Therefore, in order to supersede these

[37] Norberg-Schulz, C. (1979). Genius loci: Towards a phenomenology of architecture. New York, N.Y.: Rizzoli International Publications, Inc..

[38] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress. 165.

[39] Day, C. (2007). Places of the soul: Architecture and environmental design as a healing art. Oxford, UK. Elsevier Ltd. 168.

misconceptions it is important to derive a sense of place of the architecture. Achieving such a feat can be accomplished through the use of local materials. This in turn gives the occupants a recognizable atmosphere and directly / immediately connects them to the architecture.

COLOR

Color often has different meanings to different cultures and is an immensely evocative medium, possessing powers to provoke immediate and marked reactions in the viewer. Its use in the architectural field dramatically affects everyone's perception of architectural space and form. Even in western societies, the meanings of various colors has changed over the years. One of the biggest issues with color is that each person reacts differently based on their culture, gender, and own personal experiences, and it has always been one of the most unpredictable areas within the built environment. According to Harold Linton in *Color in Architecture* "Almost any generalization that can be made about color can be overturned in practice." [40]

There is power in color. Each color has ability to affect architectural planes which allows it the power to accentuate shapes and forms. Also it can contradict the true form and expression the building wants to be. Color can imply proud architecture or display the building as abstract art. With the many applications of color, it has the power to change our environment to make a connection with our environment, body, mind, and spirit. Leonardo da Vinci believed that the power of meditation increases 10 times when done in a purple light, as in the purple light of stained glass.[41]

"Color feeds us emotionally; it is not just aesthetic. Every color creates a mood. We all need all colors at different stages of our life." [42] In a healing environment, emotional affects can help or hinder our overall well being and the effects of MS. "Color in an architectural context, is not a simple perceptual entity. It is perceived within the parameters of space, time, movement, and environmental changes. The color image of the architectural space is generated by integrating sequential perceptions of individual scenes into a coherent whole."[43] The color impressions evoked by the individual scenes are in themselves the result of the combination of many elements.

The Chinese art of placement known as Feng Shui also addresses color and healing. One of the methods for keeping the flow of ones energy – chi - in balance is through the use of color placement. Only when our chi is in balance can both our spiritual and physical health be attained. If at any time someone's chi is blocked or stagnant, energy buildup can then result in stress and illness. Therefore, with the use of more vibrant and energetic colors comes the fluent flow of energy through a space. This enhanced color can then affect us in several dynamic ways. One example for instance is how varying shades of yellow can raise ones emotional state, infusing vitality. These yellows can also

[40] Linton, H. (1999). Color in architecture: Design methods for buildings, interiors, and urban spaces. New York, N.Y.: The McGraw-Hill companies, Inc.. 3.

[41] Ott, J. (1982). Light, radiation, and you: How to stay healthy. 22-30

[42] Qtd by Eva Fay in Linton, H. (1999). Color in architecture: Design methods for buildings, interiors, and urban spaces. New York, N.Y.: The McGraw-Hill companies, Inc..

[43] Qtd by Eva Fay in Linton, H. (1999). Color in architecture: Design methods for buildings, interiors, and urban spaces. New York, N.Y.: The McGraw-Hill companies, Inc..

increase concentration and improve memory providing an advantageous effect on mental activity.[44] The effect of color on the well-being of people is crucial just like lighting and has been documented since the 50's. In some of this research and studies it is suggested to use blue and pinks in correctional facilities in order to calm and soothe inmates. We absorb color through our eye's retina, color itself is made up of different light waves at different frequencies, and these frequencies affect certain organs of the body that carry those same frequencies. That being stated, different colors can affect different organs in a variety of ways. Disease changes these organs, and by introducing colors that can affect those organs, it can help the organ regain its natural state. In color therapy, each color generally focuses on a certain area. Red stimulates. Yellow soothes and rejuvenates. It affects nerves, brain, and motor stimulation. Green is soothing, cooling and calming. Blue reduces nervous excitement and can be both calming an uplifting at the same time.[45] We can't talk about black, white and shadows without talking about light. To think and feel with clarity we need light and shadows. Our stimulating world of bright light paralyzes the imagination, and light is probably the single most important concept in making a space feel right.[46]

While some colors aid the mind others, green for instance, helps to build muscles, bones and connective tissue. It even has a cooling, soothing and calming affect on individuals, both physically and mentally. It does so through the sympathetic nervous system by relieving tension in blood vessels which then lowers blood pressure. Nonverbal activity is influenced by the color violet and is often associated with religious and spiritual issues. The slightly different color purple affects the brain and central nervous system. In doing so it promotes health, creativity, inspiration, mental balance and also supports both artistry and spirituality.

[44] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress. 82-4

[45] Gallup, J. (1999). Wellness centers: A guide for the design professional. John Wiley & Sons, Canada. 160.

[46] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress. 84.

PREDEDENT STUDY – ALDO VON EYCK,

HUBERTUS HOUSE, AT AMSTERDAM, THE NETHERLANDS, 1973 to 1978.



Figure 3 3

Architect, Aldo Van Eyck was born in Driebergen, Holland in 1918. He was educated in England in …… and was known as a 'humanist' in the architectural field.

One of Van Eyck's great works is the Hubertus House, a home for single parents and their children, completed in 1978. It was designed as a multi-family housing project done in the architectural style of the Dutch Structuralist Modern. A six-story complex designed "for their own sake and cheerfulness." [47] In other words he designed the compound as a healing environment for families.

When describing the Hubertus House Van Eyck said, "It is concerned with the spirit and the establishment of a comfortable scale for the building of this type and size-an open 'home' for single parents and their children-with the creation of a non-stressful environment, in a block that seems to say 'house'." [48]

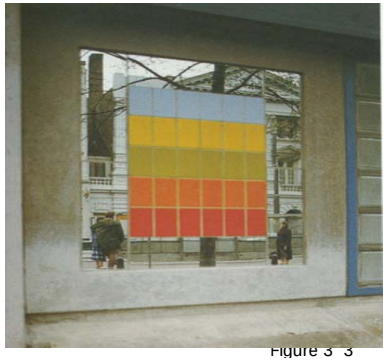


Figure 3 3

Van Eyck was adamant about everyone, especially the children, having more than just a balcony for light. He designed the new building into the old, tucking it back and stepping back volume floor to floor, allowing fresh air and sunlight to penetrate space.

Not only was the light very important to Van Eyck but color as well. "Yes the rainbow sets me off! … the particular beauty of two adjacent colors has always lured me…don't ask for a rainbow – fetch it!" Van Eyck said. The spectral color was carefully laid out in the building. To insure that the colors were to neither abrupt nor gradual, Eyck chose 12 colors; two violets, three blues, two greens, two yellows, one orange, and two reds. Upon

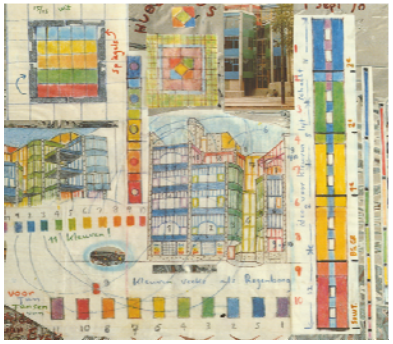


Figure 3 3

[47] Van Eyck, A. (1999). Aldo Van Eyck works compilation by Vincent Ligtelijn. The concerned authors and THOTH publishers, Bussum, Netherlands. 188.

[48] Sharp, D. Twentieth century architecture: a visual history. 363.

arriving at the building an individual is flooded by the brilliant spectrum of colors organized to bring immediate excitement and cheerfulness to both child and parent.

The spectral colors were carefully laid out with the blues on the left and right-side of the building then to the bays with green. Blues and greens are more soothing, calming colors and were carefully placed to be the first colors they would see. Once they went inside their apartment, the colors are just details, left as reminders of that excitement and cheerfulness they have upon arriving at home. The colors are not overwhelming on the interior especially where the old building links to the new. They are there to provide and element of color as a decorative note. The partially spectral tiles (red-orange-green-yellow-blue) with mirrors all around are repeated on the interior in the water closet, reducing the width, forming a narrow strip. Between the road and the water closet, "the intensity changes but not the scale." Which shows that "only Alice, after all, grows bigger and smaller in turn." Or in other words everything around us is expanding and contracting, things are too big or small, but the building itself is always constant and there. This small detail was designed to instill hope and security to the parents and children in order to create a positive healing environment. There are even moments of curiosity that Eyck developed for the children. He designed downward curving glazing in certain areas to be at the right height for a child to peer into the next space. All in all there is an explicit and thoughtful compilation of color in architecture creating an atmosphere of a healing environment for all within the Hubertus House's walls.

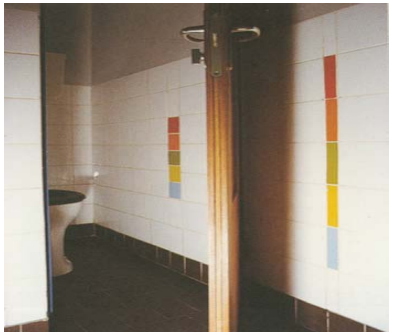


Figure 3 3

LIGHT

Ever since the invention of the light bulb in 1879, our lifestyles have dramatically changed. Communities have changed from outdoor societies to indoor societies. With this change, many thought nothing of the effects artificial lighting has on human beings. As a society, we receive less than 1% of the light we are supposed to receive naturally. As a consequence, people suffer physically, psychologically, and emotionally.[49] Natural light, with its full spectrum of radiation, including ultraviolet and infrared radiation, is a life-sustaining element and a basic human nutrient.

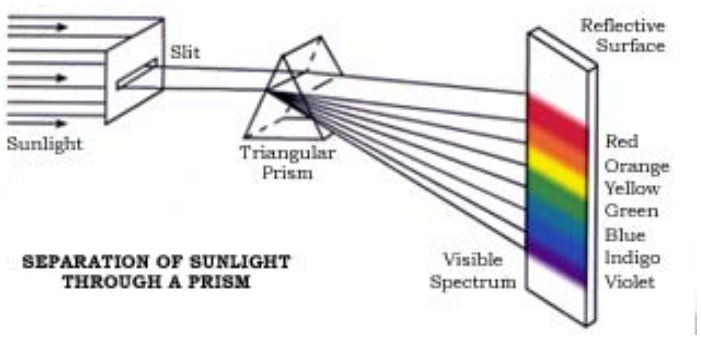


Figure 3 3

However, light, whether it is natural or not, improves our emotions and attitudes. As sunlight passes from the eye to the brain, it dramatically affects the entire body. "All color is light, light is energy, and energy affects every cell of the body."[50] Small sunny spaces allow for a lot of interaction and therapeutic environments. People natural gather in well illuminated and naturally lighted spaces. These spaces, such as window boxes, solariums, courtyards, patios, and plazas allow for the healing environment to take hold.

According to scientist Dr. John N. Ott in *Light, radiation, and you: how to stay healthy*, natural daylight is a true "white" light, which contains a balance of energy throughout the entire range of the visible spectrum.[51] Full-spectrum lighting is the most accurate reproduction of natural sunlight available. John N. Ott was a pioneer in full-spectrum lighting[52]. As a result of his work, he helped create the first full-spectrum fluorescent tube which he called Vita-Light.[53]

In addition to full-spectrum light, there is another form of light which only the sun provides. UV is just as important to our health as the other parts of light. Remembering that it should be experienced in moderation, UV is the part of light which allows our bodies to produce

[49] Ott, J. (1982). Light, radiation, and you: How to stay healthy

[50] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress. 167.

[51] Dr. John Ott. The father of full spectrum light. Retreived Oct 25, 2008 from website: http://www.kaliszincolor.com/light-therapy/A_dr_ott.htm. Light therapy.

[52] Ott, J. (1982). Light, radiation, and you: How to stay healthy
There are two primary factors in choosing true full spectrum lighting. The color rendering index (CRI) rates the light's ability to duplicate the entire visible spectrum. Any light that has a rating of over 90 CRI is considered full-spectrum lighting. The sun has a CRI of 100. Also, the correlated color temperature is a way to measure the temperature at which the lamp burns. 5,000- 6,000 degrees Kelvin is required for a lamp to be considered full-spectrum. Therefore a full-spectrum light-source needs to have at least a CRI of 90 and a color temperature of 5,000 to 6,500 Kelvin.

[53] Dr. John Ott. The father of full spectrum light. Retreived Oct 25, 2008 from website: http://www.kaliszincolor.com/light-therapy/A_dr_ott.htm. Light therapy.

vitamin D. Without it, people become vitamin D deficient. Also UV light assists our body's physiological processes in many ways. UV light even assists in weight loss, reducing cholesterol, lowering blood pressure. In one experiment, patients with hypertension and related circulatory problems were exposed to UV light. Two hours after the first exposure, 97% of the patients had almost a 13% decrease in serum cholesterol levels. [54] It was first noticed in the early 1900s that UV radiation from the sun lowers blood pressure in both normal individuals and those with elevated blood pressure. In fact, in one study, people exposed to just one treatment of ultraviolet light noticed a dramatic lowering of their elevated blood pressure. They found that the effect lasted from five to six days. UV light activates the synthesis of vitamin D, which is a prerequisite for the absorption of calcium and other minerals from the diet. Additionally, access to day lighting has been found to favorably affect people's moods, attitudes, and health.



Figure 3 3

In the northern parts of the United States it is dark enough during the winter season that vitamin D synthesis shuts down completely. Research indicates that insufficient exposure to ultraviolet radiation and natural daylight may be an important risk factor not only for multiple sclerosis but also cancer as well as many other health issues.[55] While these may be significant risk factors for incurring such illnesses they are also part of the key to help in the prevention and in improving the following conditions: Cancer, Diabetes, Heart Disease, Arthritis, Fatigue, and Obesity.[56]

Utilizing light to visually illuminate interesting features can also help to create a more sustainable, therapeutic environment. Thinner floor plates, properly oriented, for instance can maximize the penetration of natural light, allowing users to connect with the external environment. Natural views can then create interesting, stimulating or relaxing environments and thus improve circulation because of the physical activity that it promotes in people. Adding such simple features within our buildings is imperative because of the health incentives and can easily be done.

The effect of color on human emotion is far more powerful than generally assumed. Color can be used to relax or excite, to stimulate conversation, or create a quieting effect. Color sends a message to the human psyche, which, through recent advances in science and technology is becoming quantifiable.

[54] Ott, J. (1982). Light, radiation, and you: How to stay healthy

[55] Islam, T., Gauderman, [W.J.], Cozen, W., Mack, [T.M.] (July 24, 2007).Childhood sun exposure influences risk of multiple sclerosis in monozygotic twins. Neurology. 69, 4, [381-389].

[56] Joseph, A (August, 2006). Issue Paper. The impact of light on outcomes in healthcare settings, 2, Retrieved September 11, 2008, from "http://www.healthdesign.org/research/reports/documents/CHD_Issue_Paper2.pdf"

Healing gardens because of their natural and vibrant colors are a restorative meditative space that can do much in the way of therapeutic healing. For example, Marin General Hospital Cancer Center, selected SEAM Studio to design a healing garden for their patients.[57] Through interacting in the garden, with the aesthetic of nature, being outdoors, experiencing sunlight, listening to the sounds of the garden and viewing the natural color palette of the garden, it can have a great measurable stress-reducing benefit.[58]

Healing gardens, like the Sasanqua Spa, Kiawah Island, in North Carolina, are so effective because a particular color is affected by the colors near it. This is why the selection of color is often a timely process. The size of the area in which the color will be used, the relationship of one color to another, the degree to which colored surfaces are textured, and the ambient light in the room in which they are displayed all affect how we perceive color itself.

Low lighting situations also affect how individuals view color and help with bringing down blood pressure and excitement, which in turn helps to lower stresses. Therapeutic lighting is in the form of full-spectrum light: bright-light therapy, ultraviolet (UV) therapy, syntonic optometry, cold laser therapy, and colored-light therapy.



Figure 3 3

Color therapy, the therapeutic use of color, can be included successfully in all healthcare environments. As people age, we perceive colors that are brighter with more clarity. [59] This suggests that the use of clear, bright colors in various areas would be beneficial in order to aide in allowing the eyes to communicate the power of color to those patients with diminishing cognitive issues. Pastels should be used with caution, especially those that are at the end of the hue. As long as the light is controlled in a space, bright colors are welcome. Light colors reflect light and dark colors absorb light. Light sources reinforce certain colors, and the type of light greatly affects this phenomenon. Warm light, such as incandescent affects colors differently than cool light like that emitted by fluorescents.



Figure 3 3

Natural and full-spectrum light is an area that should be implemented in design. Full spectrum light mimics natural daylight closer than any other source. Other lights, such as incandescents, fluorescents, and others, lack the full

[57] Delaney, T. Seam Studio. Hospital Cancer Center. Healing Gardens:Therapuetic Landscape Database. Retrieved Jan 11, 2009. http://www.healinglandscapes.org/sites.html

[58] Healing Gardens:Therapuetic Landscape Database. Retrieved Jan 11, 2009. http://www.healinglandscapes.org/sites.html

[59] Gallup, J. (1999). Wellness centers: A guide for the design professional. John Wiley & Sons, Canada. 158

spectrum, which inhibits the body in absorbing nutrients. John, Ott, research scientist and author believes that "the kind of light needed for adequate health must be… full-spectrum light and natural daylight." [60] With the health of occupants at hand designers must give lighting a priority.

The effect of color on the well-being of people is crucial just like lighting and has been documented since the 50's. In some of this research and studies it is suggested to use blue and pinks in correctional facilities in order to calm and soothe inmates. We absorb color through our eye's retina, color itself is made up of different light waves at different frequencies, and these frequencies affect certain organs of the body that carry those same frequencies. That being stated, different colors can affect different organs in a variety of ways. Disease changes these organs, and by introducing colors that can affect those organs, it can help the organ regain its natural state. In color therapy, each color generally focuses on a certain area. Red stimulates. Yellow soothes and rejuvenates. It affects nerves, brain, and motor stimulation. Green is soothing, cooling and calming. Blue reduces nervous excitement and can be both calming an uplifting at the same time. [61] We can't talk about black, white and shadows without talking about light. To think and feel with clarity we need light and shadows. Our stimulating world of bright light paralyzes the imagination, and light is probably the single most important concept in making a space feel right. [62]

One way in which designers can make a space feel right is to look at the relationship between windows as the source of daylight within a building and objects, walls for example, that withhold the light. Windows can be deep-set into a naturally thick wall allowing for increased illumination that is reflected off of the side walls. This helps to soften the intense natural light of the sun before it illuminates the space within. The softening effect gives a purity and calmness to the light. It is also important to consider the materiality of the wall and how light will react as it enters into that space. Light also plays a significant role in the finer qualities of a space. It accentuates the meeting of forms. Christopher Day wrote in *Places of the Soul* about the importance of light and enhancing the characteristics of a space.

> Many of the finer qualities of a space – the complexity of meeting forms and planes, metamorphosis of one shape, form, space into another, effects of natural and artificial light – can only be approximately and inadequately anticipated. The must be made. [63]

[60] Dr. John Ott. The father of full spectrum light. Retreived Oct 25, 2008 from website: http://www.kaliszincolor.com/light-therapy/A_dr_ott.htm. Light therapy.

[61] Gallup, J. (1999). Wellness centers: A guide for the design professional. John Wiley & Sons, Canada. 160.

[62] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress. 84.

[63] Day, C. (2007). Places of the soul: Architecture and environmental design as a healing art. Oxford, UK. Elsevier Ltd.166.

With the capability of such design illusion and importance to one’s healthiness light must be taken full advantage of within our spaces to create any ideal healing environment.

PRECEDENT STUDY – SAMBHAVANA CLINIC IN BHOPAL, INDIA

In Bhopal, India the Sambhavna Clinic was built to provide medical care to survivors of the world's worst industrial chemical accident. It all started on the night of December 3, 1984, when a Union Carbide plant began leaking 27 tons of the deadly gas methylisocyanate. As a result, over 500,000 people were exposed to the gas and an estimated 20,000 have died as a result of the exposure. Even today more than 120,000 people still suffer from ailments caused by the accident—including blindness, breathing difficulties, growth problems, and gynecological disorders.[64]

Due to the obvious and overwhelming medical need, the



Figure 2 - 1

birth of the Sambhavna Clinic initially took place in 1996. It was named using the Sanskrit/Hindi word that means “possibility.”

From the start, the building was designed with one goal in mind: to be a place of healing. It was to be a place where people could come not only to receive medical care but also to benefit from the space, tranquility, and natural vegetation. With this approach in mind the clinic focuses on minimizing the use of unnecessary and harmful prescription drugs. Prior to Sambhavna's opening, symptomatic treatment with steroids, antibiotics, and psychotropic drugs was the medical response to the accident.

In stark contrast to this the Sambhavna Clinic provides rehabilitation using traditional herbal and yoga therapy, in combination with modern medicine, to choose a regimen best suited to each patient. The therapeutic effects of practicing Yoga have been successfully applied at Sambhavna. After years of research they found that regular Yoga produces significant and sustained improvement in lung function, decreases airway restriction and greatly lowers dependence on drug-based therapies. Other treatments including Panchakarma have been found to be particularly beneficial in the treatment of chronic back and joint pains. Also Shirodhara is most effective for insomnia and anxiety. With the clinic's overwhelming success in providing effective care for more than 12,000 patients came the need for an additional facility.[65]

[64] Stephens, J. (June 2006). . The architecture of healing: The Sambhavna Clinic in Bhopal, India, provides medical care to survivors of the world's worst industrial chemical accident. Healthcare design

[65] The Bhopal Medical Appeal & Sambhavna Trust. Retrieved October 24, 2008 from That night Web site: http://www.bhopal.org/

The construction of a new, two-story, 17,000-square-foot facility was completed in April 2005 with a large center courtyard and playground. The new clinic houses a waiting lounge and reception area, medical care unit, offices, a documentation center, two meeting halls, guest accommodations, and a large yoga hall. The main feature of the new clinic grounds is a two acre, organic ayurvedic medicine garden which grows more than 90 different species of herbs for use by clinic personnel.[66] More than 30 medicines are prepared at the clinic from these herbs. Even many of the shrubs, trees and climbing plants surrounding Sambhavna, while contributing to a soothing environment for gas-affected visitors, also have a specific use in Ayurvedic medicine. Ayurveda works on the principle of helping the body/mind heal itself. Disease, according to this system, occurs as a result of dis-equilibrium and healing comes from restoring this equilibrium.

The Sambhavna Clinic was constructed using green building and design techniques. Reflecting this is its ability to enable natural ventilation to cool rooms and corridors. The design also includes concrete fretwork for greater surface areas to enable heat dissipation. Double-skinned walls provide insulation while also conserving energy. Strategically placed windows and glass skylights provide plenty of natural light. Rainwater is even collected from the tiled roofs to be stored underground for later use. Grey water is also put to use both in the garden pond and to irrigate landscaping and the medicinal garden. Sunlight is captured using a 10 kw/h photovoltaic system to help meet the clinic's electricity needs.

With all these techniques put to practice the Sambhavna Clinic is a great example of combining a holistic healing environment with green building sustainability.

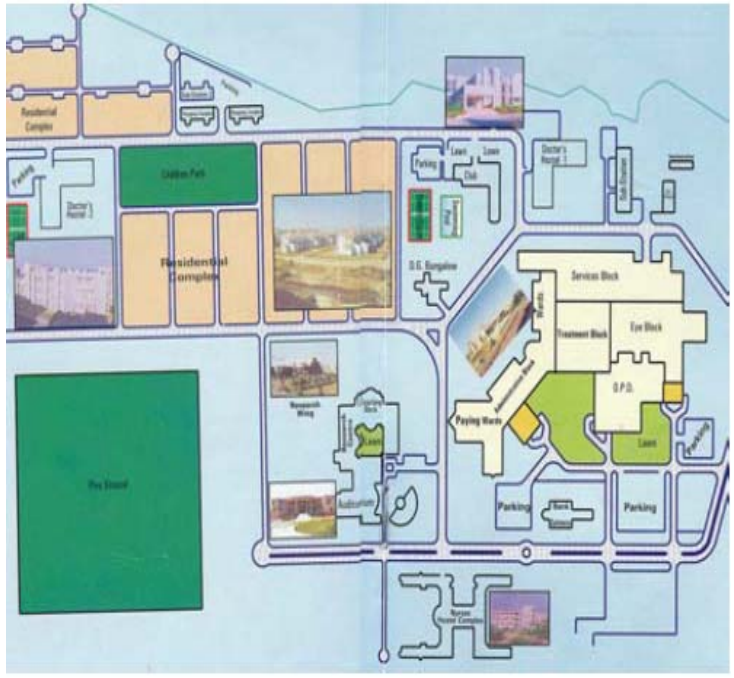


Figure 3 2

[66] Stephens, J. (June 2006). . The architecture of healing: The Sambhavna Clinic in Bhopal, India, provides medical care to survivors of the world's worst industrial chemical accident. Healthcare design

PRECEDENT STUDY – PETER ZUMHOR, THERMAL VALS

Vals is a remote alpine village in the state of Graubünden, Switzerland. In the early 1980s Vals bought an old hotel consisting of three buildings and commissioned Peter Zumthor, an architect with phenomenology ideas, to build a new thermal bath. [67] Upon completion, the building was an immediate success because of his use of quarried rock and flowing water which permiates the entire design intent of the building.



Figure 5 -2

Zumthor ’s main design concept was “mountain, stone, water”. Part of that intent was the use of local materials such as local Valser quartzite and concrete. Also the use of the natural geothermal heat sources added to the ritual of the thermal bath.

[67] Hauser, S. and Zumthor, P. (2007). Therme vals. Scheidegger & Spiess. Switzerland.

The ritual of bathing is what Zumthor used to organizes the building layout. Upon arrival, One enters through an underground tunnel. Directly from there, the bather enters onto a long balcony overlooking the many pools. The main floor is organized by a series of volumes or 'stones' that contain the different baths: cold pool, fire pool, flower pool. One can then move through these baths and onto the terrace and outdoor pool. [68]



Figure 5 -3

He was successful in this design in many ways. Seemingly static at first glance, the spatial concept is in fact completely dynamic, and this duality of impression between the still and the kinetic makes the building a place of relaxation through action, an awakening of senses.

Zumthor's declaration that “architecture is a balance of emotion and reason” stands out in the Thermal baths. [69] This mood is created through the rectilinear plan, the

[68] Thermal Spa Vals, Switzerland Retrieved Oct 26, 2008 from website: http://www.archidose.org/Jun99/062199.htm

[69] Hauser, S. and Zumthor, P. (2007). Therme vals. Scheidegger & Spiess. Switzerland.

functionality of spaces and materiality. He also taps into the physical, emotional, and spiritual side of the body with the use of color. The treatment of materials and light in the design allow for the emotional side to come out. Sight, touch, and smell are experienced with how he designed with material and light. The success of Zumthor's work is in his ability to remember the experiences that give a rise to us emotionally and use them to envision a new design that attempts to achieve the same level of excitement.

SUSTAINABILITY

Healing environments have been places that support healing elements. These healing elements that affect the physical, mental and spiritual areas of our being are interwoven with the activities and participation that we have with our society as a whole. Huelat describes this connection with our society in this way, "Our health and wellness are interdependent upon the society in which we live. We are individuals woven within a society that develops and thrives together." The society interdependence is linked not only to the individuals and communities within our society but also our connection to the natural environment.

Of the many responsibilities of architecture a healthy healing environment is to also be eco-responsible. This responsibility is vital. The places where we live, work, shop, and play drastically affect human health and in turn the environment. This can affect energy usage and air quality affecting the overall health and well being of our society. The new field of environmental health is linking diseases and disorders to exposure to toxic chemicals .[70] The health of everyone that uses buildings can be profoundly affected by the quality of the indoor air which in turn is dependent upon physical design, building materials choices, air quality management and life-cycle building operations and maintenance. Chemicals from heating and air conditioning systems insulation, contemporary materials, plastics and cements are all major contributors to chemical pollution of the environment.

Architecture has the duty to minimize the effects on the environment and has a moral obligation to minimize the environmental effects on its occupants. These environmental responsibilities involve energy conservation, careful selection of building materials, taking into account occupants health and building health.

Environmental toxins have increased the rate of prevalence of diseases by more than tripling the prevalence in some cases: multiple sclerosis, cancer, diabetes, heart disease, asthma, lymphoma, arthritis, fatigue, and obesity, etc... The signs of this environmental disease burden are extremely troubling. The new field of environmental health is linking each of these diseases and disorders to exposure to toxic chemicals. [71] We are learning that exposure to toxic chemicals, at levels thought to have been safe, is increasing the chronic disease burden of millions of Americans.

Exposure to toxins at important times of human development can have grave health impacts later in life. Chemicals are absorbed in our bodies and build-up over time. This build-up contributes to health impact and can intensify a health problem. Today it is more important than ever to create healing environments. However, as observed above it goes much deeper than that, we must also create sustainable, eco-friendly environments. This needs to occur not only to counteract all the pollutants around us but for our well-being and to fulfill our moral obligation to society.

[70] Cohen, G. (2006). First do no harm. Designing the 21st century hospital. Concord, CA. Center for health design.

[71] Cohen, G. (2006). First do no harm. Designing the 21st century hospital. Concord, CA. Center for health design.

HEALING ENVIRONMENTS

After researching what a healing environment looks like and feels like; the question now is what should it be? It should be more than texture, light, color, form and style or even the latest trends. It should provide more than shelter and must support personal and professional activities. We as humans are all dramatically different; we have many varying needs, wants and beliefs. Also, people function at diverse physical, mental and spiritual levels. The holistic design of a place is more than just a façade but rather an ever changing, living, moving thing. This is the vital purpose to creating such healing spaces. In *Healing Environments*, Karen Franck and Bianca Lepori begin to describe what a holistic healing environment should accomplish.

> It is the light, movable chairs in the park that allow people to follow the sun on a spring day and to find shade at the height of summer that give the people the chance to be alone, in a pair, or in a group. It is the ledge, window sill, or wall wide enough to sit on,… It is an architecture that attends to the small and large movements, that supports variety and choice, which recognizes that life is movement and rest of individual, fleshed bodies.[72]

The concept of healing environment design is one that requires a great deal of forethought. It entails good design balance of the use of form, color, texture and scale. One needs to recognize that every design component is an opportunity to impact the health and well-being of the occupant and passerby. Experiences that are formed throughout one's life begin with an understanding of space and the boundary that is placed between us and that space. Once one merges with space and breaks the boundary, they are one in the same with that space and are able to gain more experiences and begin to benefit physically, mentally and spiritually. These experiences and benefits can impact the health and well-being of those who have committed themselves to this inner-exploration. From these experiences of space, one can begin to be connected and understand oneself more.

[72] Huelat, B (2003). Healing environments: Design for the body, mind & spirit. Arlington, VA: Peecapress.

HEALING CENTER--
QUANTITATIVE PROGRAM

Public:

Waiting Lounge	300sf
Reception Area	150sf
Meeting/Community Center	750sf
Restrooms	300sf
	1, 500 sf

Private:

Administrative offices (2)@100sf	
Storage/services	250sf
Alt. Medicine	
Offices/ Consult Rooms (4)@120sf	
Therapeutic Area	
Yoga Room/Pilates(cap. 10)	800sf
Locker Rooms (M/F)	1000sf
Showers 10(4x4) —	40sf
Restroom –	400sf
Lockers --	500sf
Indoor pool (25x30)	750sf –
Hot pool (15x15)	225sf –
Cold pool (10x15)	150sf –
Flower pool (10x15)	150sf –
Acupuncture/Stone room (10x15)	150sf –
Exercise Facility (25x35)	1,000sf
Resonance Room (10x12)	120sf –
Steam Room (10x12)	120sf –
Massage room (10x12)	120sf –
Relaxation room (10x17)	175sf –

Staff:

Locker Rooms (M/F)	300sf
Showers 4(4x4) — Restroom, Washroom 150sf	40sf
Lockers --	100sf
Break room	
	4,449sf

Utilities / Services

Mechanical - Geothermal (20x20)	400sf --
Storage	300sf

600 sf

subtotal 5,599

Circulation

(30% of overall sf) 2000 sf

Total 1,680sf

Building Total 7,280sf

Exterior

Outdoor pool (Winter/Summer) (30x50)	1500sf --
Courtyard	1000sf
Patio (5)@200sf	
Rooftop Terrace/Rooftop Garden	1000sf
Healing garden	1000sf
Parking(30)	7500sf

Total 13,000 sf

Program Total 12,090sf

QUALITATIVE PROGRAM

PUBLIC:

Waiting Lounge

The lounge is an open space with high ceilings that opens to the views of the city. There will be several sitting areas, some formed to be private and some for larger groups. It will be a place for people to pass a few minutes while waiting for others to arrive or for their appointment to begin. The floor will transition the user from the exterior environment to the interior activities which start at the reception area. The room will remain an open space even as it transitions to the reception area.

Reception Area

The reception area is a small area surround by plants and natural materials. A main counter will be the delineation point between the lounge and the reception area. It will house several desk spaces, file storage shelves and a small storage area all with a softer floor material for the administrative assistants to be comfortable.

Meeting/Community Center

The meeting community center is a centrally located space that is meant to be an open, cheerful, calming place where people can gather. Several seating arrangements will be necessary to accommodate different types/sizes of small or large gatherings. The combinations of light and shade, open and enclosed spaces will be key to create these pockets of gathering.

PRIVATE:

Administration

Small, intimate spaces open to the reception area to give them access to the reception services and to the storage filing areas. Each indivial administrative space will require a working area with adequate room for a client and guest to receive a consult. Light levels will be attained from the open connection to the lounge/reception area.

Storage/services

Storage services will have two types of storage types: open and secure. Open storage will be directly adjacent to reception and the secure space will be towards the back enclosed as to keep confidential files.

Consult Offices

Consult offices are similar to that of the administration spaces with access to minor medical equipment. Cabinets, base and overhead will house the needed equipment with a consult bed in the room. This will need to be an easy to maintain room for sanitary purposes with durable and easy to maintain floor and wall materials. Lighting needs to be adequate for working tasks using a combination of artificial light and daylight.

Therapeutic Area

Yoga Room/Pilates

This studio space will offer a space for developing an awareness of self and body. The room will be open with a combination of a durable hard floor surface and a removable softer floor material for different activities. Mirrors will be placed in strategic areas as to enhance the activities performed. Storage areas will be accessible to hold accessories and equipment used in the different sessions. An audio system to broadcast the trainer's voice and music will be available. The space will need to be free of distractions. It will require the minimum amount of items and no more as to not clutter nor distract.

Locker Rooms

The locker room will be a generously open space. Their will be small accessible changing rooms, securable lockers, showers and several sinks as well as wash room areas that separate the bathroom stalls from the general locker room space. There will be both private and public areas that will be clearly defined. The floor will be warm and textured as to be pleasant to the skin. Light will be both artificial and natural light. Natural light sources will be located high and frosted for privacy concerns. This space will have two exits: one to the public reception area and the other to the therapeutic area.

Indoor pool

An open plan with high ceilings where one can see in a 360 degree view. The floor materials will need to be warm and textured to provide both safety and comfort. It will contain an 8 foot deep pool area suitable for different uses: private relaxation spaces and public therapeutic water activities. There will be plenty of open circulation space around the pool. An ADA accessible entrance to the shallow end will be provided. The materials will need to be water-proof/water resistant to be in the semi-humid. Lighting levels will be fed by natural overhead lighting. Handrails will be needed for safety.

Hot pool

This space will be semi-enclosed as to provide privacy. The small hot pool will be surrounded by small benches and spaces to store accessories. In order to maintain a relaxing environment, lighting elements will focus in from several locations bathing floor and wall elements to enhance the calming effect that the hot water gives. The floor materials will need to be textured and handrails placed for safety.

Cold pool

This space will be semi-enclosed as to provide privacy but adjacent to the indoor pool. The small pool will be surrounded by several seating arrangements and spaces to store accessories. It will be large enough to provide space for two to three guests to do cold water therapy. In order to maintain a relaxing environment, lighting elements will be brought in to bring warmth to the environment the area while the occupants are receiving cold water therapy. The floor materials will be warm to the touch for comfort and will need to be textured with strategic handrails placed for safety.

Flower pool

Sounds of splashing water and pleasant fragrances begin the experience as you enter this space. It will be

located on the edge of the building with plenty of natural light reflecting on the stone, wood and flowers creating a room filled with amazing colors that changes dependent upon the amount of light and the type of flowers.

Stone rooms

An intimate space where natural light focuses upward providing a low lighting experience. It is deemed necessary for stone and acupuncture therapy giving the occupant the ability to focus and ponder.

Exercise Facility

This space will have a very open floor plan that overlooks many of the features of the building. This space contains a lot of natural daylight in order to help invigorate the users to participate with their all.

Resonance Room

This is a dry relaxation chamber where resonance therapy is applied through the natural sounds reverberating through the space. It is a small confined space with natural light illuminating the high ceiling room. Several comfortable seating spaces and an area to lie down will be needed to provide a relaxing space.

Steam Room

This is near the back of the baths buried; adding to a more grounded area where one can relax and meditate. Natural light is minimal; however it highlights the path to the room. The air is humid and full of aroma from the natural cedar wood that highlights the room and plays with the light. It is a confined small space with a heater and steam rocks to bring warmth to the room. Floor and wall materials need to dissipate heat quickly as to not retain it and be too hot to the touch. Seating arrangements are necessary for private and small gathering areas.

Massage room

An intimate space where natural light focuses upward providing a low lighting experience deemed necessary for the therapeutic experience. Wall and floor materials need to block out noise from the exterior activities. There is a small storage and working space with a small massage bed centrally located.

Relaxation rooms

An intimate space containing seating and beds where one can sit and reflect on the experience. The floor will be warm for comfort. The natural ground water is diverted and pumped directly to a drinking fountain edged by stone. Natural light focuses on the entrance of the water into the relaxation room, giving the occupant the ability to focus and ponder.

Utilities / Services

Mechanical – Geothermal

This space will house the boilers used to pump the water from the earth to the structure. It will also be built to accommodate the pipe manifolds.

Storage

There will be various storage spaces located in discrete areas that are otherwise unusable. They'll be used for convenient storage and will need to have shelves, cabinets and cubbies.

Circulation

The circulation areas will be oriented in such a way to allow for a fluent flow of movement and will be spacious enough to accommodate the influx of guests.

Exterior

Outdoor pool (Winter/Summer)

This outdoor space allows for bigger gatherings at the same time allowing for small private gatherings. The pool will be the main focus with seating arrangements being incorporated directly in and along the pool. The area will be focusing on the surrounding views and will allow for the fresh air to circulate. The floor and pool material will be textured providing safety and it will need to be ada accessible. During winter the space can be enclosed with a diffusing panel allowing sunlight to enter and flood the space.

Courtyard

The Courtyard to the Healing Center is the gateway to the healing experience. It rises gracefully on a knoll, beckoning you to enter. Naturalized plantings of trees and shrubs line the gently curving drive leading to the entrance and parking facilities

Patios

Intimate spaces placed at major program areas that allow the user to interact and reflect on the natural views and a time to relax from the activities. Natural light focuses on the entrance to the patios.

Rooftop Terrace/Rooftop Garden

This walled garden focuses on the use of indigenous sustainable building materials. The cobbled walk slows your pace so that you may enjoy the whimsy of the fountain and the local wildlife, which represents the connection between man and nature. Here you will find a focus on bloom and color throughout the year and plants which have attractive form and character, even in dormancy. The meandering paths allow guests to enjoy the beautifully framed views across the valley and to the mountains.

Healing garden

The Healing Garden reflects one of the fundamental uses of plants - for medicine and healing. A small garden whose size and symmetry help the user to attain spiritual healing through balance by contemplation, meditation and reflection. Plantings are accentuated by the material of the garden. It will be an open, free flowing space that will allow for short stays or long contemplations. Private and public seating will be provided along the path that passes by the gardens. It celebrates the sacredness of nature and provides a place for quiet contemplation.

SITE ANALYSIS

Contextual Site Analysis



Location -- Overall



Location -- Macro



Location -Micro

Salt Lake City surrounded by mountains on three sides with the Great Salt Lake to the northwest. The Wasatch Mountains five miles to the east have peaks to nearly 12,000 feet above sea level. Their orographic effects cause more precipitation in the eastern part of the city than over the western part. The Oquirrh Mountains seven to eight miles to the southwest of the city have several peaks above 10,000 feet The Traverse Mountain Range at the south end of the Salt Lake Valley rises to above 6,000 feet. These mountain ranges shelter the valley from storms from the southwest in the winter, but are instrumental in developing thunderstorms which can drift over the valley in the summer.

Salt Lake City, UT
City - 200,000
Metro - 1 Million
State - 2.7 Million

Site Location

MS Prevalance - Site Analysis

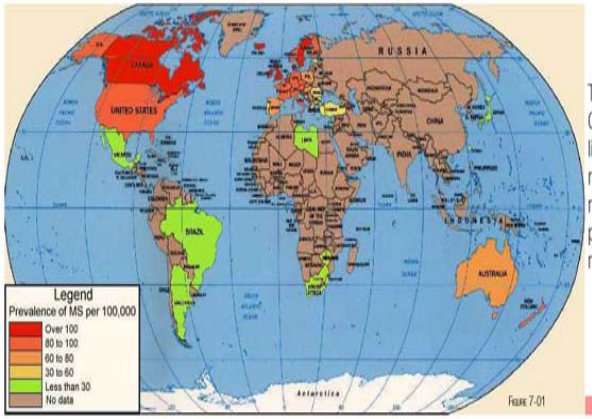


Figure 7-01

The population of Salt Lake City, UT is 200,000 people living in the city. In the direct metropolitan area is over 1 million. The states overall populaton exceeds 2.7 milion

Site Location

Prevalance - Macro

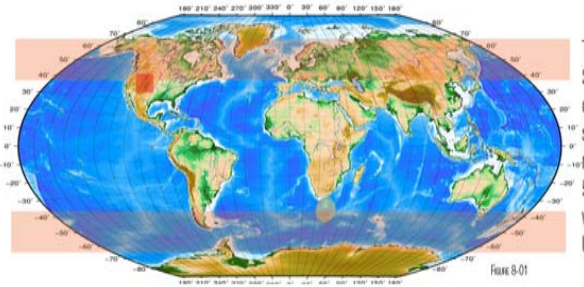


Figure 8-01

The prevelance of Multiple Sclerosis in the United States on average is over 100 persons per 100,000 are diagnosed. There are over 500,00 people diagnosed with Multiple sclerosis i the USA.

Equatorial prevalance - Macro

One ohter major factor for the prevalance of MS is equatorial site location. The 40th-60th parallel hias the highest incidence and prevalance of MS.



Figure 6-01

The site location of SLC, Utah was chosen in order to be in one of the states with the highest rates of MS. In this way it can help the most

Prevalance - Micro

Solar - Site Analysis



Sun Paths

Salt Lake City has a great environment for sunshine. The chart shows the average percent of days of sunshine in the area[45].

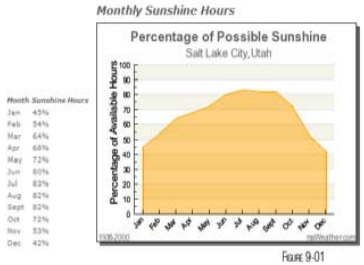
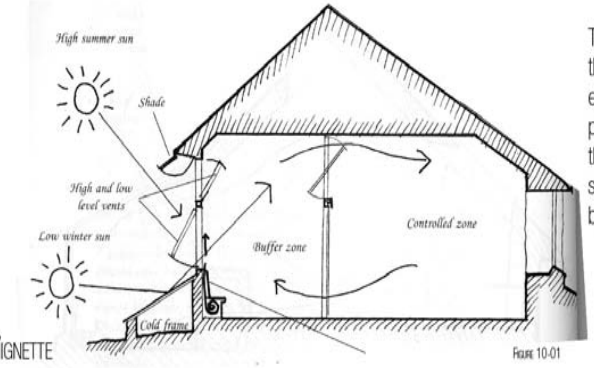


Figure 9-01

Data

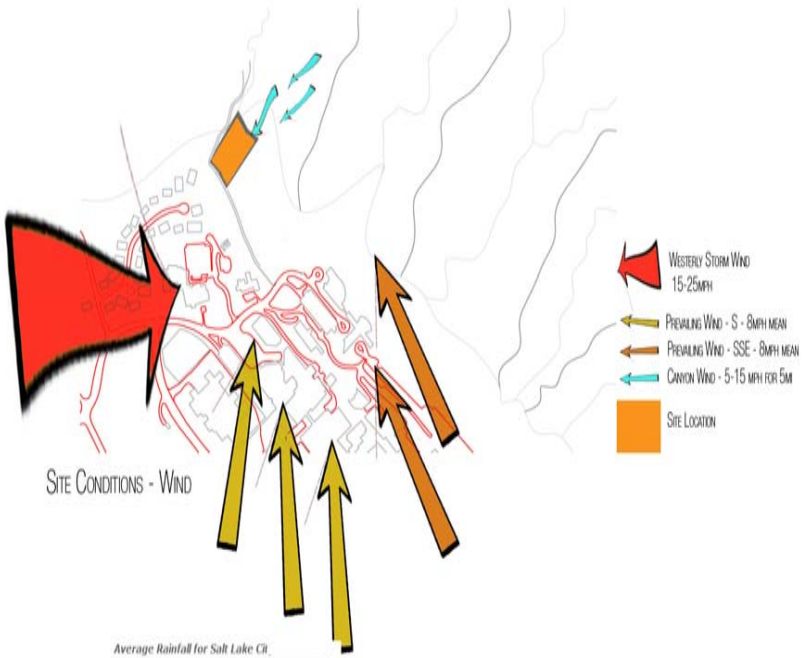


Response Vignette

Figure 10-01

The response vignette to the left shows some strategies that can be employed to a building to use the summer and winter sun to the benefit of the building and the client.

Wind - Site Analysis



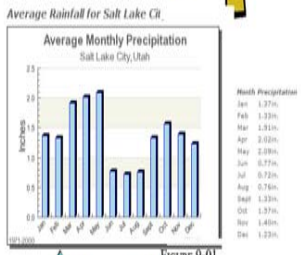
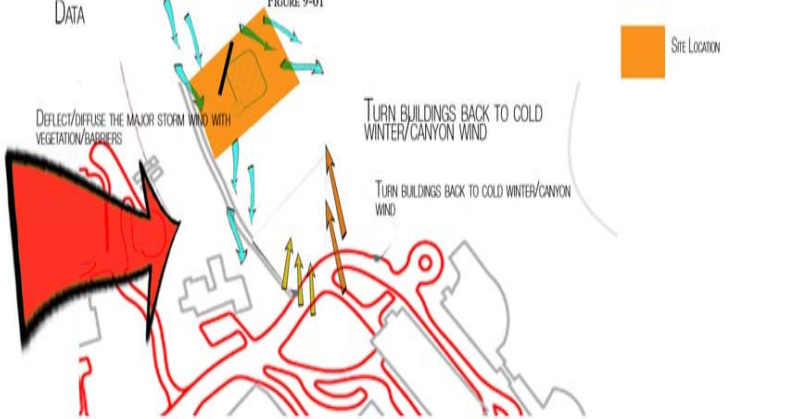


Figure 9-01

Data

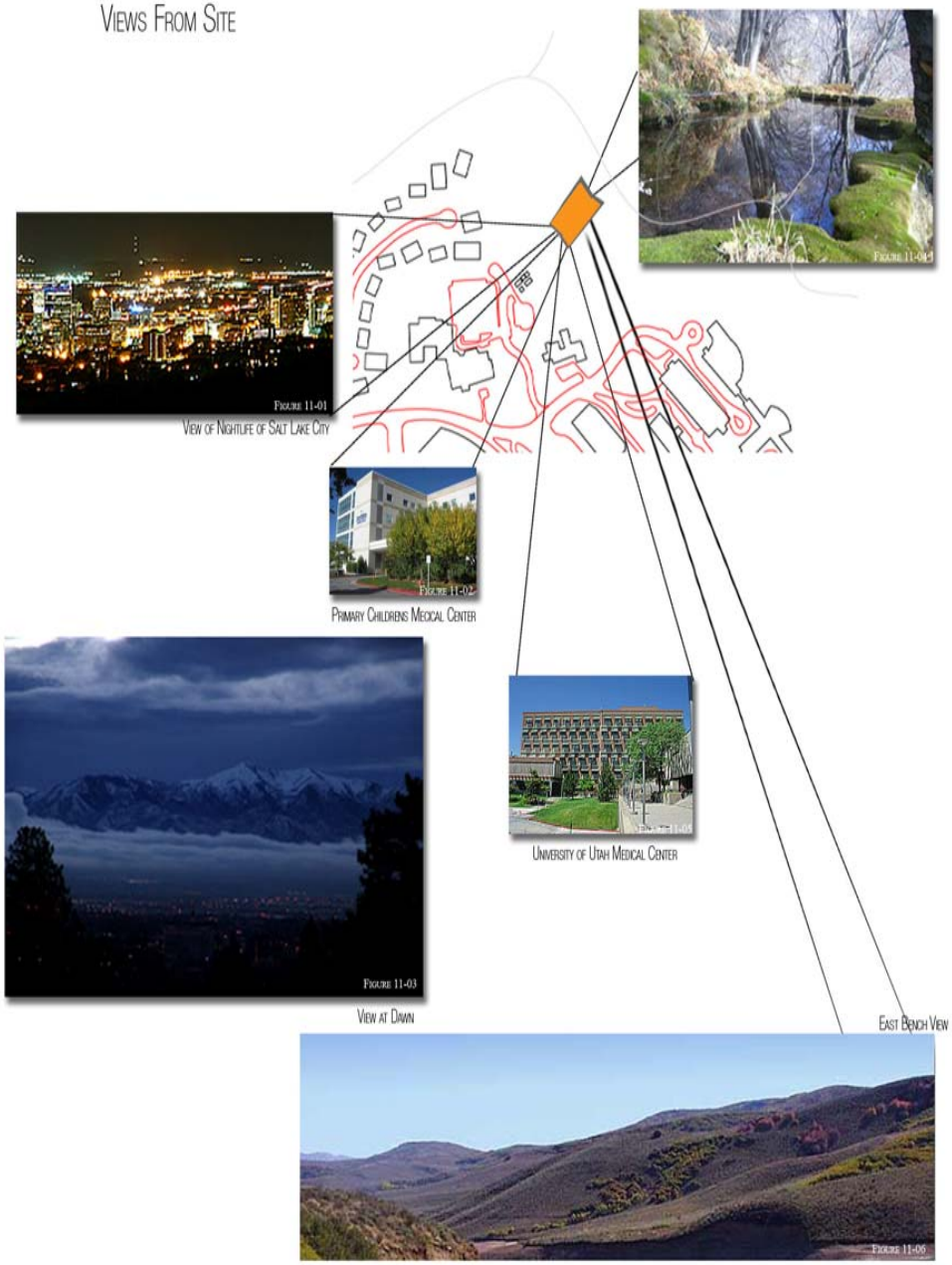
Dir
S to SSE
Speed
8 mph mean
15-25 mph -
Easterly
Storm Winds
5mi extension - Canyon winds[45]



Vignette

Views - Site Analysis

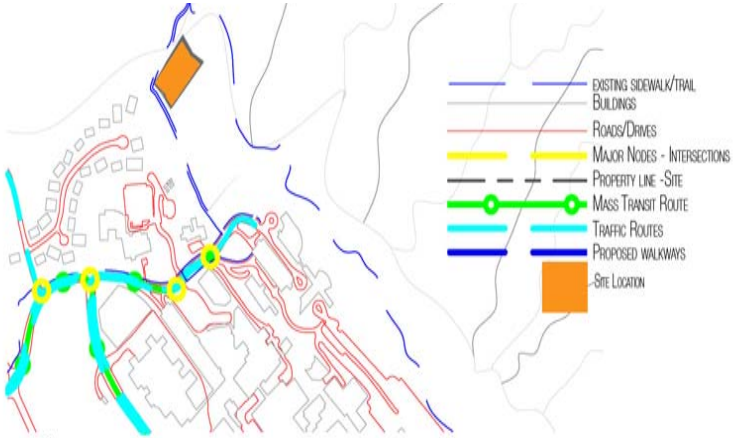
Views From Site



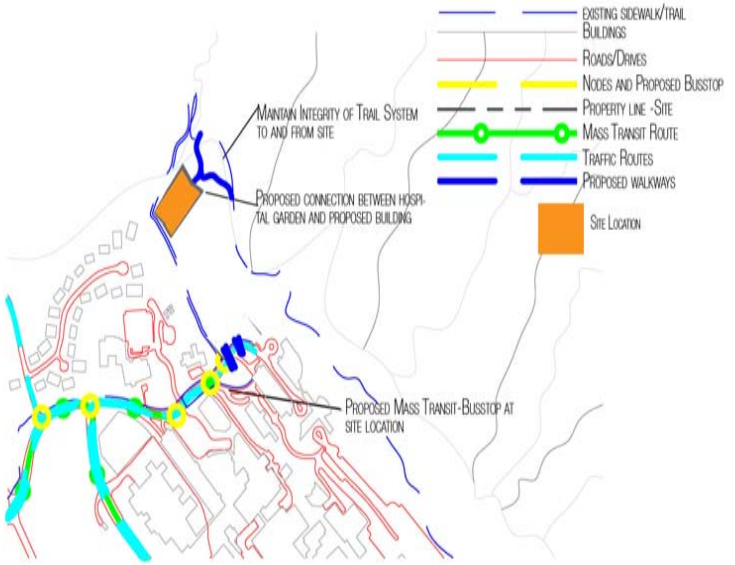
Circulation - Site Analysis

INITIAL

SALT LAKE CITY HAS A GREAT ENVI-



CIRCULATION - ACTUAL



CIRCULATION - RESPNSE

Zoning - Site Analysis

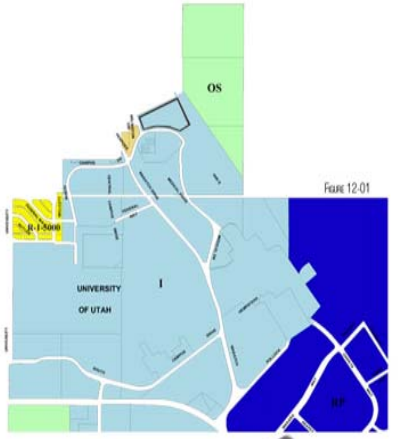


FIGURE 12-01

I - INSTITUTIONAL
OS - OPEN SPACE
PL -PUBLIC LANDSOPEN
R1-5000 -SINGLE FAMILY RESIDENTIAL
R1-7000 -SINGLE FAMILY RESIDENTIAL
RP - RESEARCH PARK

ZONING

MAXIMUM BUILDING HEIGHT: BUILDING HEIGHT SHALL BE LIMITED TO THIRTY FIVE FEET (35'). BUILDING HEIGHTS IN EXCESS OF THIRTY FIVE FEET (35') BUT NOT MORE THAN SEVENTY FIVE FEET (75') MAY BE APPROVED AS A CONDITIONAL USE; PROVIDED, THAT FOR EACH FOOT OF HEIGHT OVER THIRTY FIVE FEET (35'), EACH REQUIRED YARD SHALL BE INCREASED ONE FOOT (1').

LANDSCAPING SETBACKS-

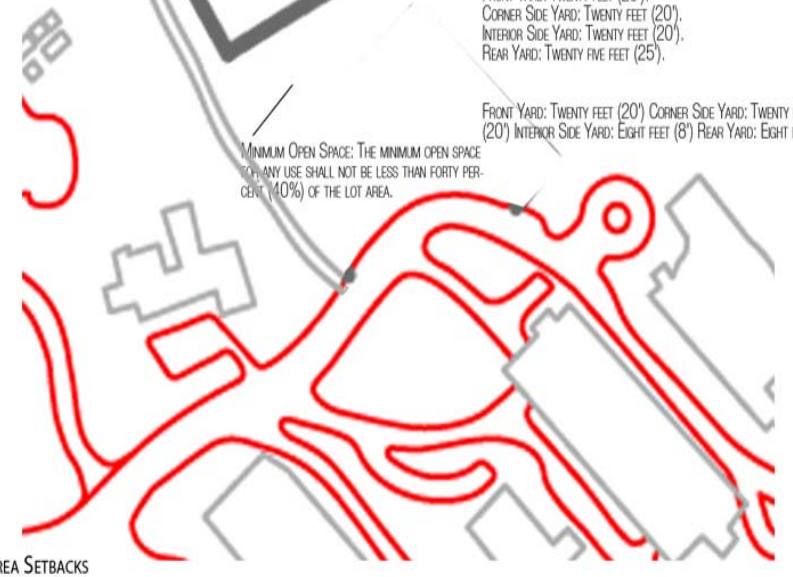
FRONT YARD: TWENTY FEET (20').
CORNER SIDE YARD: TWENTY FEET (20').
INTERIOR SIDE YARD: EIGHT FEET (8').
REAR YARD: EIGHT FEET (8').

SETBACKS-

FRONT YARD: TWENTY FEET (20').
CORNER SIDE YARD: TWENTY FEET (20').
INTERIOR SIDE YARD: TWENTY FEET (20').
REAR YARD: TWENTY FIVE FEET (25').

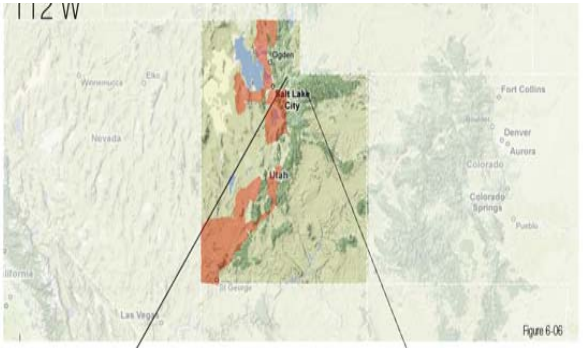
FRONT YARD: TWENTY FEET (20') CORNER SIDE YARD: TWENTY FEET (20') INTERIOR SIDE YARD: EIGHT FEET (8') REAR YARD: EIGHT FEET (8').

MINIMUM OPEN SPACE: THE MINIMUM OPEN SPACE FOR ANY USE SHALL NOT BE LESS THAN FORTY PERCENT (40%) OF THE LOT AREA.



AREA SETBACKS

Sustainability



in the rock and fluid that fills the fractures within the rock in the earth's crust. Low-temperature (< 200°F) water, used for greenhouse heat, aquaculture and other light commercial uses; geoexchange systems utilize rock, soil, or ground water at temperatures from 40°F to 100°F as a heat source in winter and a heat sink in summer for space conditioning in commercial and residential buildings[52]

Stone, Trees, & Water


Figure 13-01

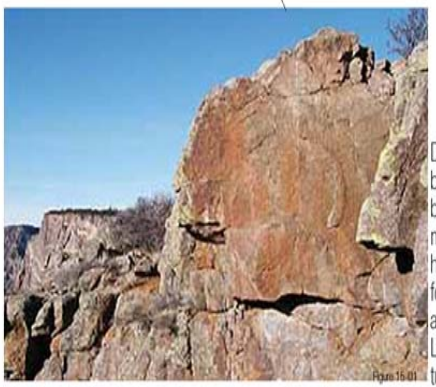

Figure 15-01


Figure 14-01

Due to its strength, durability, and capability of being quarried in large massive blocks, granite has historically been used for imposing government and religious structures. Lava with interesting textures and rhyolite with intricate color banding are frequently used as building veneers[52].

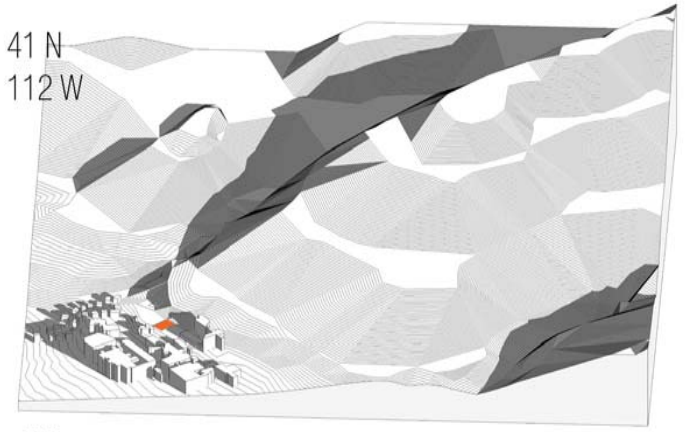
Cedar trees are abundant in the northern region in Utah. They are known for their durable, decay-resistant scented wood.



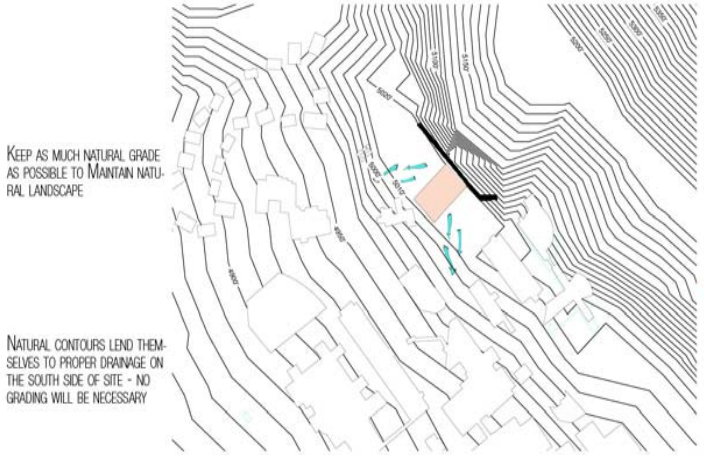
Thermal Springs
25°- 30°C (77°- 86°F)
> 30°C (86°F)
Thermal Wells
> 50°C (122°F)
Heat-Flow Contour values in mW/m²
Geothermal Potential Areas

Bathing Temp is 70- 100 de-

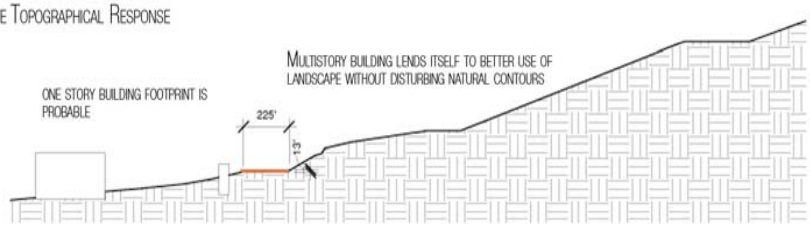
Geothermal Energy - Micro



Overall 3D Topographical context



Site Topographical Response



Section Topography Cut

Max rise across site - 13' W to E
Max rise lengthwise - 4' S to N

CODE ANALYSIS

BUILDING CODE ANALYSIS

Project Name: Elements of Retreat

Location: Black and Main Street, Bozeman, MT

Client:

Analysis Prepared By:	Adam Zetterquist
Project No.:	Arch 590
Date:	11/6/2008
Reviewed By:	

APPLICABLE CODES:	***VERIFY ALL OF THE BELOW-LISTED CODES (AND DATE OF LATEST ISSUE) WITH PARTICULAR MUNICIPALITY***
1. Zoning Ordinance:	Salt Lake City, Wasatch County, Utah
2. Building Code:	2006 International Building Code (IBC)
3. Life Safety Code:	*2006 International Fire Code*
4. Fire Code:	*2006 International Fire Code*
5. Handicapped Accessibility:	Title III Regulations: Public Accommodations and Services Operated by Private Entities, 1990
6. Environmental Code:	2003 International Energy Conservation Code (IECC)
7. Electrical Code:	2005 National Electric Code (NEC)
8. Mechanical Code:	2006 International Mechanical Code (IMC)
9. Plumbing Code:	2006 Uniform Plumbing Code (UPC)

I. AUTHORITIES AND CONTACTS

Authority	**Address**	**Contact Name**	**Phone / Fax**
Bozeman			
Building Department	451 S State Rm 215-218 SLC, UT 84111	http://www.slcgov.com	801.535.7752 FAX 801.535.7750
Department of Planning	PO Box 145480 Salt Lake City UT 84114-5480	http://www.slcgov.com/planning	801.535.7757 FAX 801.535.6174
Fire Department	211 S 500 E	http://www.slcgov.com/fire	Phone: 801-799-FIRE
Plan Reviewer			

Accessibility Code	451 S State Rm 215-218 SLC, UT 84111	801.535.7752 FAX 801.535.7750

II. ZONING

	ref #	code	comments
A. Zoning District	Chapter 21A.32.080	I Institutional District:	A. Purpose Statement: The purpose of the I institutional district is to reg the development of larger public and semipublic uses in a manner harmonious with surrounding uses. The uses regulated by this district a generally those having multiple buildings on a campus like site.
1. Permitted Uses	Chapter 21A.32.080		
2. Performance Standards			
a. Governing Authorities		Salt Lake City	
b. Hazardous Materials		none within city limits	
c. Noise		no noise which causes a nuisannce	
d. Glare and Heat			
e. Noxious, Odorous, and Toxic Matter			
f. Smoke			
B. Floor Area Ratio	Chapter 21A.32.080	40% Min.	Minimum Open Space: The minimum open space for any use shall not l less than forty percent (40%) of the lot area.
		and parking	
C. Building Height	Chapter 21A.32.080	35 feet in the core area;	D. Maximum Building Height: Building height shall be limited to thirty fiv (35'). Building heights in excess of thirty five feet (35') but not more than seventy five feet (75') may be approved as a conditional use; provided, for each foot of height over thirty five feet (35'), each required yard shall increased one foot (1').
D. Yards	Chapter 21A.32.080	Front Yard: Twenty feet (20').Corner Side Yard: Twenty feet (20'). Interior Side Yard: Twenty feet (20'). Rear Yard: Twenty five feet (25').	Accessory Buildings And Structures In Yards: Accessory buildings and structures may be located in required yard areas subject to table 21A.36.020B of this title.
Landscape Yard Setbacks		1. Front Yard: Twenty feet (20') Corner Side Yard: Twenty feet (20') Interior Side Yard: Eight feet (8') Rear Yard: Eight feet (8').	G. Landscape Yard Requirements: Landscape yards, as specified belov shall be required for each use in the I institutional district and shall be improved in conformance with the requirements of part IV, chapter 21A. this title. H. Landscape Buffers: Landscape buffers shall be provided wi a use in the I institutional district abuts a lot in a residential district, as specified in part IV, chapter 21A.48 of this title.
E. Off-street Parking	Chapter 21A.32.080		Traffic And Parking Impact: Traffic and parking study shall be submitted the city in conjunction with the site plan review provisions of this title whenever an expansion of an existing use or an expansion of the mapp district is proposed.
F. Off-street Loading	Chapter 21A.32.080		18.80.030 Walls, screening and bumper curb requirements. The parking lot shall be provided with attractive walls, guardrails or screening shrubbery, at least along the street side, to limit points of ingress and egress, to prevent encroachment of parked vehicles on any sidewalk.
G. Signage	Chapter 21A.32.080		

III. OCCUPANCY REQUIREMENTS

	ref #	code	comments
A. Buildin			
1. Use Grc			nor
		worship, recreation or amusement and other assembly uses not classified else-where in Group A including, but not limited to	others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functi recreation, food or drink consumption; or awaiting transportation
2. Occupancy Separation	IBC 508.1 General N/A		Rooms with boilers where the largest piece of equipment is over 15 psi a 10 horsepower--1 hour or provide automatic fire-extinguishing system

V. STRUCTURAL DESIGN CRITERIA

	ref #	code	comments
A. Live Loads			
1. Floor Live Load	IBC 1607.1 Table 1607.1	100-125psf dependant on exact Occupancy use	Live loads are those loads defined in Section 1602.1.
2. Roof Live Load	IBC 1607.1.30	20 psf	Live loads are those loads defined in Section 1602.1.
D. Seismic Loads			
1. Seismic Use Group		SITE CLASS. A classification assigned to a site based on the types of soils present and their engineering properties as defined in Section 1613.5.2.	

VI. MECHANICAL SYSTEMS - THIS SECTION NOT USED

VII. ENERGY CONSERVATION CODE

A. Insulation Requirements.

VIII. ELECTRICAL SYSTEMS - THIS SECTION NOT USED

IX. CONSTRUCTION REQUIREMENTS

	ref #	code	comments
A. Construction Type	IBC 602	Type II A	TABLE 601 FIRE-RESISTANCE
Type IIA	Table 601		1 hr rating for structural, bearing (ext, int.)
B. Maximum Allowable Height	IBC 504.1	Type II A	Group A3 - 65' Max Ht. - 3 Stories
3 stories	Table 503		
C. Max. Allowable Area / Floor	IBC 504.1	Type II A	Group A3 - 3 Stories @ 15,500 sq ft
15,500 sf	Table 503		
D.	IBC [F] 903.1.1 IBC F] 903.2		F] 903.1.1 Alternative protection. Alternative automatic fire-extinguishing systems complying with Section 904 shall be permitted in lieu of automatic sprinkler protection where recognized by the applicable standard and approved by the fire code official.
E. Fire Resistive Ratings			
1. Loadbearing Walls	IBC 601.1		
a. Exterior Loadbearing Walls	IBC Table 601	1 hour	IBC Table 601 - e. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substitutedfor 1-hourfire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code
b. Interior Loadbearing Walls	IBC Table 601	1 hour	
2. Nonloadbearing Walls	IBC 601.1		
a. Exterior Nonloadbearing Walls	Table 602	1 hour	IBC Table 602 - d. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
b. Interior Nonloadbearing Walls	Table 602	0 hours	
3. Structural Frame	Table 601	1 hour	IBC Table 601 - a. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and bracing members designed to carry gravity loads. The members of floor or roof panels w
4. Floor Construction including Beams	Table 601	1 hour	
5. Roof Const ructio	Table 601	1 hour	IBC Table 601 - c Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking. d. In all occupancies, heavy timber shall be allowed where a 1-hour or less
6. Fire Walls and Party Walls	IBC 705.4	3 Hours	IBC Table 705.4 a - Walls shall be not less than 2-hour fire-resistance rated where separating buildings of Type II or V construction.
7. Fire Separation Assemblies			
a. Fire Enclosure of Exits	Table 715.4	1 hour	
b. Shafts	707.4 & Table 715.4	not less than 1 hour	
c. Mixed Use and Fire Area Separatic	Table 715.4	1 hour	
8. Fire Partitions			
a. Exit Corridors	Table 715.4	1 hour	

X. ACCESSIBILITY REQUIREMENTS

	ref #	code	comments
A. Accessit			
1. Width	1003.1		of electrical, mechanical or plumbing systems or equipment. 2. Thirty-six inches (914 mm)—With a required occupant capacity of less than 50.
2. Passing Space	ADAAG: A4.2.1-3	min 32" passing space	The IBC 2006 references the ADAAG, so the ADAAG was used.
3. Head Room	IBC 1009.2	not less than 80"	Stairways shall have a minimum head-room clearance of 80 inches (203 mm) measured vertically from a line connecting the edge of the nosings. Such headroom shall be continuous above the stairway to the point whe the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the stairway and landing. Exception: Spiral stairways complying with Section 1009.8 are permitted inch (1981 mm) headroom clearance
4. Slope	ICC-A117.1	1:12 or less with landings at doors and direction changes	
5. Protruding Objects		1102.1 Accessible Route defined as continous and UNOBSTRUCTED path	
B. Doors			
1. Clear Openings	IBC 1008.1.1	clear width min 32"	**1008.1.1 Size of doors.** The minimum width of each door opening shall sufficient for the occupant load thereof and shall provide a clear width of less than 32 inches (813 mm). Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with door open 90 degrees (1.57 rad). Where this section requires a minimum clear width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of inches (813 mm). The maximum width of a swinging door leaf shall be 4 inches (1219 mm) nominal. Means of egress doors in a Group I-2 occupa used for the movement of beds shall provide a clear width not less than inches (1054 mm). The height of doors shall not be less than 80 inches (2032 mm).
2. Maneuvering Clearances	ADAAG: 4.13.6 fig 25	24-54" depending on door swing	
3. 2 Doors in Series	IBC 1008.1.1	one leaf min 32" and max 48" ; space between 2 doors minimum of 48" plus width of a swinging door ; doors must swing same direction	Where this section requires a minimum clear width of 32 inches (813 mm and a door opening includes two door leaves without a mullion, one leaf provide a clear opening width of 32 inches (813 mm). The maximum widt a swinging door leaf shall be 48 inches (1219 mm) nominal.
4. Thresholds	IBC 1008.1.8.7 IBC 1008.1.6	not to exceed .5" in height, greater than .25" requires beveled edges	**1008.1.6 Thresholds.** Thresholds at doorways shall not exceed 0.75 inch (19.1 mm) in height for sliding doors serving dwelling units or 0.5 inch (12.7 mm) for other doors. Raised thresholds and floor level changes greater than 0.25 inch (6.4mm) at doorways shall be beveled with a slope not greater than one unit vertical in two units horizontal (50-percent slope).
5. Door Hardware	IBC 1008.1.8.1	hardware installed min 34" high and max 48". No tight grasping, pinching or twisting of the wrist requirements allowed	**1008.1.8.1 Hardware.** Door handles, pulls, latches, locks and other operating devices on doors required to be accessible by Chapter 11 shall not require tight grasping, tight pinching or twisting of the wrist to operate.
6. Opening Protectives	IBC 1008.1.8.4 & IBC 1008.1.8.5	no manually operated flush bolts or surface bolts ; unlatching of door leaf not to require more than one operation	
C. Toilet Rooms			
1. Toilet Rooms	IBC 1109.2	at least 1 toilet per room required to be accessible	1.In toilet rooms or bathing facilities accessed only through a private office, not for common or public use and intended for use by a single occupant, any of the following alternatives are allowed: 1.1. Doors are permitted to swing into the clear floor space, provided the door swing can be reversed to meet the requirements in ICC A117.1;

XI. EGRESS REQUIREMENTS

	ref #	code	comments
A. Length of Exit Access Travel	Table 1016.1	occupancy B: 200' or 250' if Sprinkled	Exceptions 1. Travel distance in open parking garages is permitted to be measured to the closest riser of open stairs. 2. In outdoor facilities with open exit access components and open exterior stairs or ramps, travel distance is permitted to be measured to the closest riser of a stair or the closest slope of the ramp.
B. Occupant Loads	Table 1004.1.1	Assembly, unconcentrated, without fixed seats: 15 sqft/occupant (133/floor) & Buisness Area: 100 sqft/occupant (max load:30)	**1004.1 Design occupant load.** In determining means of egress requirements, the number of occupants for whom means of egress facilities shall be provided shall be determined in accordance with this section. Where occupants from accessory areas egress through a primary space, the calculated occupant load for the primary space shall include the total occupant load of the primary space plus the number of occupants egressing through it from the accessory area.
C. Number of Exits	Table 1019.1	Occupant load 1-500: 2 exits per story	**1019.1 Minimum number of exits.** All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits required by Table 1019.1 based on the occupant load of the story, except as modified in Section 1015.1 or 1019.2. For the purposes of this chapter, occupied roofs shall be provided with exits as required for stories. The required number of exits from any story, basement or individual space shall be maintained until arrival at grade or the public way.
D. Exit Remoteness	IBC 1015.2.1	equal to or greater than 1/2 the maximum overall diagonal dimension of the area served	
F. Corridors			
1. Dead Ends		1017.3 not more than 20' unless sprinklered (50')	

2. Unit of Exit Width	Table 1005.1	0.15"/occupant
3. Minimum Requi		
4. Ceiling Height	IBC 1017.4.1 & 1003.3.1	80" minimum
G. Egress Doors		
1. Unit of Exit Width	Table 1005.1	.15"/occupant
2. Minimum Width	IBC 1008.2.2	min 32"
3. Minimum Height	IBC 1003.3.1	min 78"
H. Ramps		
1. Unit of Exit Width	Table 1005.1	0.15"/occupant
2. Minimum Width	IBC 1010.5.1	36" mimimum
3. Restrictions	IBC 1010.5.3	not to reduce width in direction of egress travel ; no projections into ramp width ; doors not to reduce ramp width to less than 36"
4. Slope for Means of Egress Ramps	IBC 1010.2	not steeper than 8%
5. Landing Width	IBC 1010.6.2	at least as wide as widest adjoining run
6. Landing Length	IBC 101.6.3	60" mimimum
7. Handrails	IBC 1010.8	if more than 6" rise, hand rails on both sides
I. Stairs		
1. Tread depth	IBC 1009.3	11" mim
2. Riser height	IBC 1009.3	4" min / 7" max
3. Min. width	IBC 1007.3	clear width of 48" min
4. Headroom	IBC 1009.2	mim 80" clearance

XII. PLUMBING FIXTURE REQUIREMENTS

419.2 OFTHE *INTERNATIONAL PLUMBING CODE)*	**Male**	**Female**
A. Water Closets	1 per 25 for first 50, 1per 50 after	1 per 25 for first 50, 1per 50 after
B. Urinals		
C. Lavatories	1 per 40 for the first 80	1 per 40 for the first 80
D. Drinking Fountains	1 per 100	1 per 100
E. Other Fixtures		

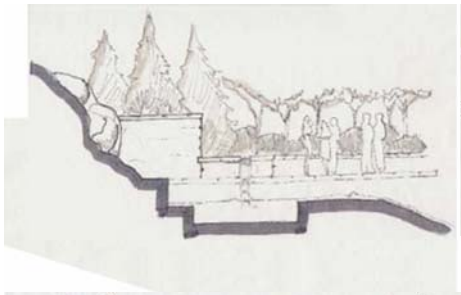
419.2 Substitution for water closets. In each bathroom or toilet roo urinals shall not be substituted for more than 67 percent of the required water closets in assembly and educational occupancies. Urinals shall not be substituted for more than 50 percent of the required water closets in all other occupancies.

403.1 Minimum number of fixtures. Plumbing fixtures shall be provided for the type of occupancy and in the minimum number shown in Table 403.1. Types of occupancies not shown in Table 403.1 shall be considered individually by the code official. The number of occupants shall be determined by the *International Building Code*. Occupancy classification shall be determined in accordance with the *International Building Code*.

410.1 Approval. Drinking fountains shall conform to ASME A112.19.1M, ASME A112.19.2M or ASME A112.19.9M and water coolers shall conform to ARI 1010. Drinking fountains and water coolers shall conform to NSF 61, Section 9. Where water is served in restaurants, drinking fountains shall not be required. In other occupancies, where drinking fountains are required, water coolers or bottled water dispensers shall be permitted to be substituted for not more than 50 percent of the required drinking fountains. 410.2 Prohibited location. Drinking fountains shall not be installed in public restrooms.

IPC 410-419

DESIGN PROJECT – MS HEALING CENTER



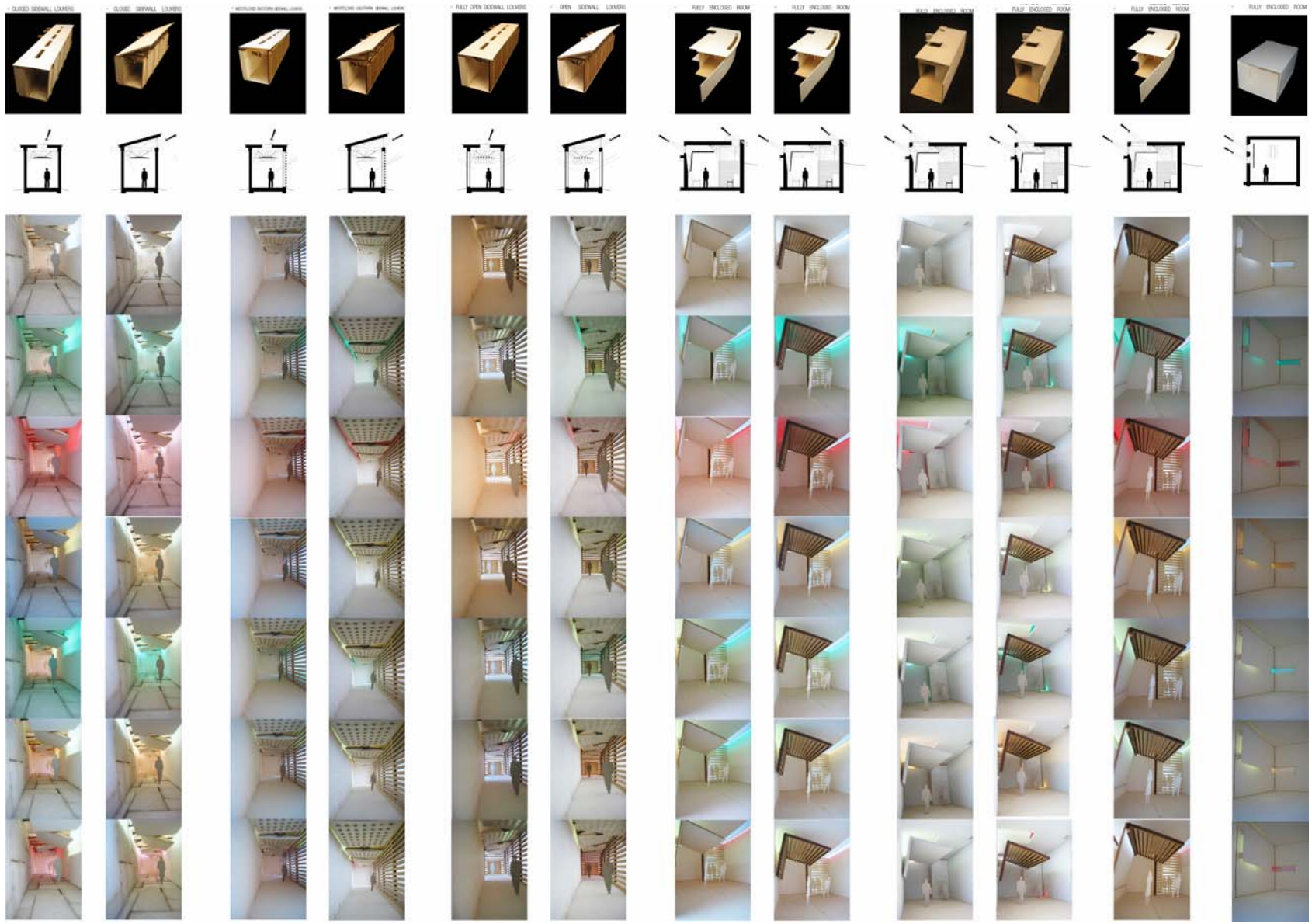




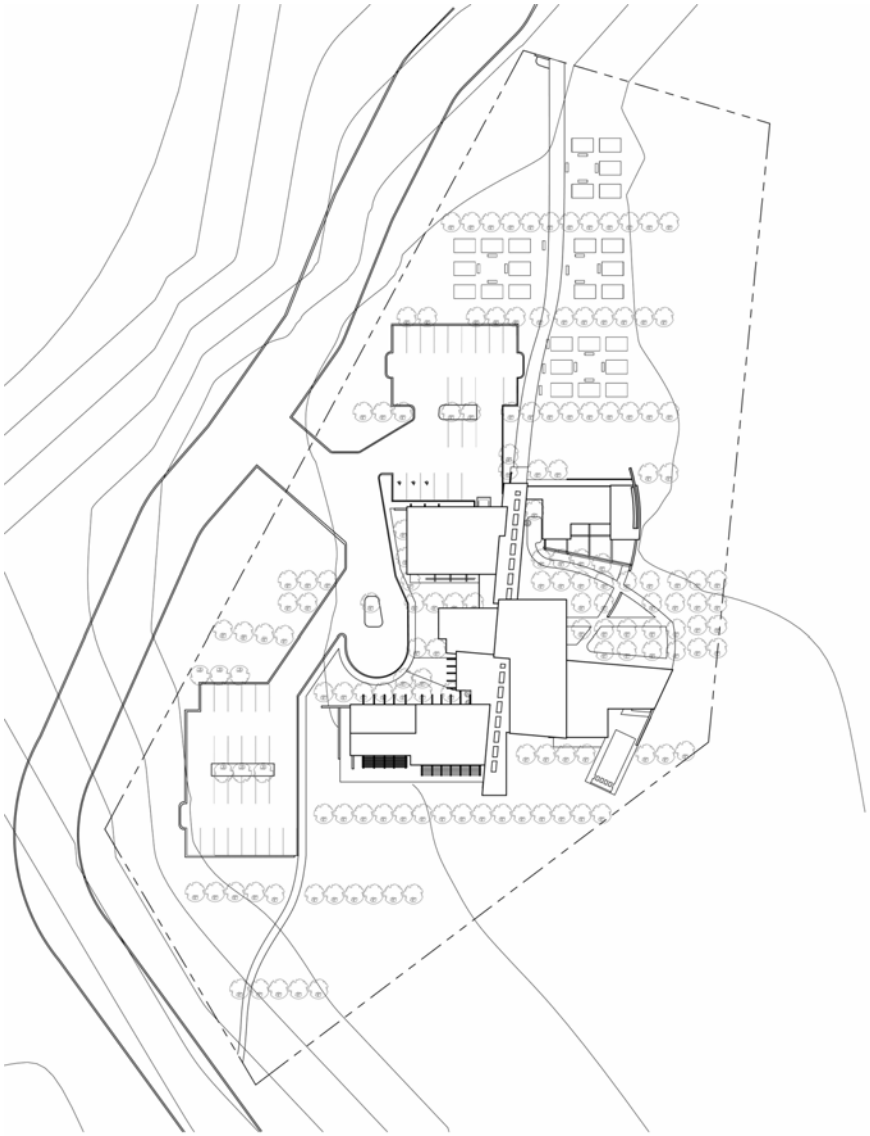








PLANS

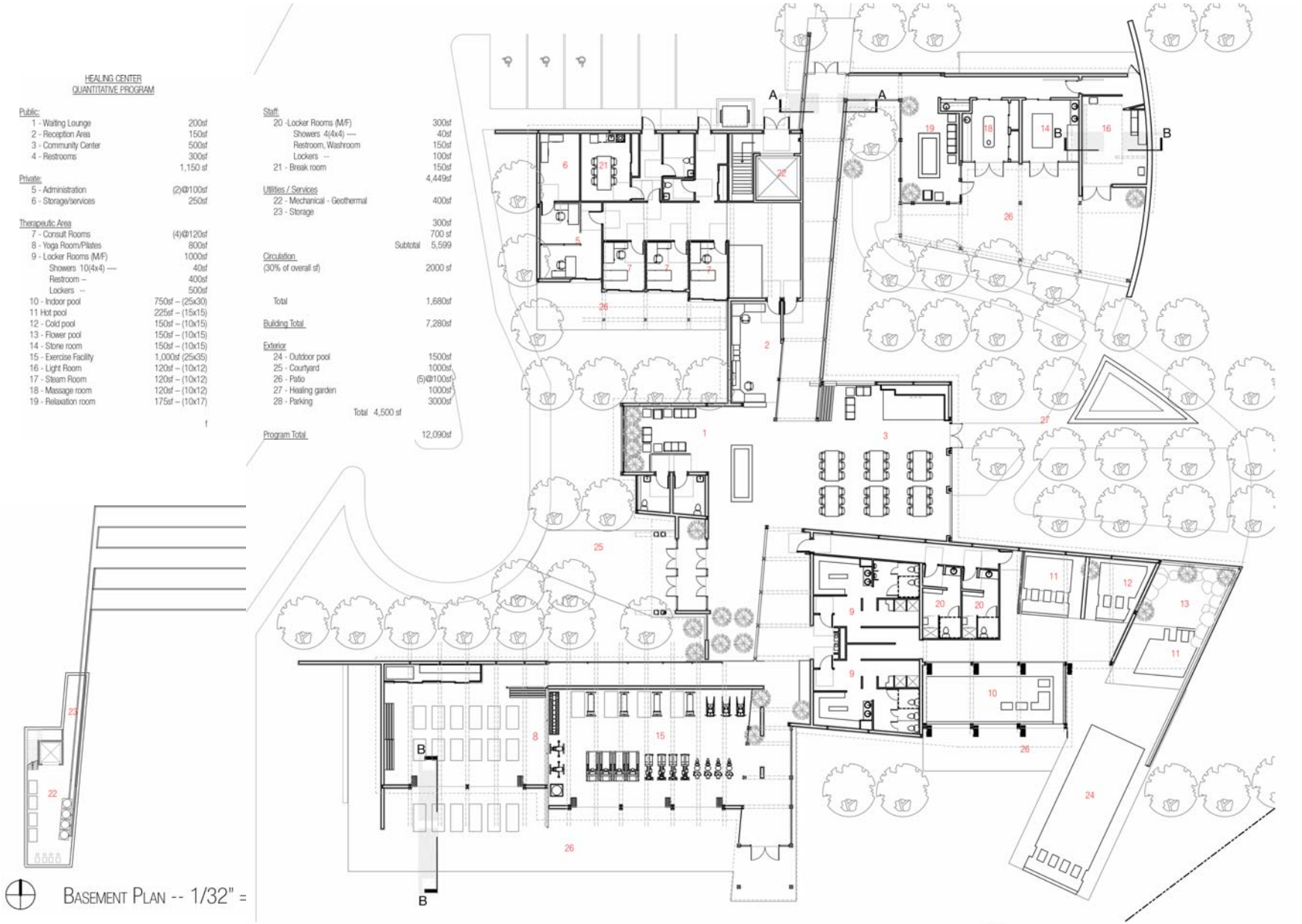


SITE PLAN -- 1/64" = 1'-0"

HEALING CENTER
QUANTITATIVE PROGRAM

Public:		
1 - Waiting Lounge	200sf	
2 - Reception Area	150sf	
3 - Community Center	500sf	
4 - Restrooms	300sf	
	1,150 sf	
Private:		
5 - Administration	(2)@100sf	
6 - Storage/services	250sf	
Therapeutic Area		
7 - Consult Rooms	(4)@120sf	
8 - Yoga Room/Pilates	800sf	
9 - Locker Rooms (M/F)	1000sf	
Showers 10(4x4) —	40sf	
Restroom --	400sf	
Lockers --	500sf	
10 - Indoor pool	750sf – (25x30)	
11 Hot pool	225sf – (15x15)	
12 - Cold pool	150sf – (10x15)	
13 - Flower pool	150sf – (10x15)	
14 - Stone room	150sf – (10x15)	
15 - Exercise Facility	1,000sf (25x35)	
16 - Light Room	120sf – (10x12)	
17 - Steam Room	120sf – (10x12)	
18 - Massage room	120sf – (10x12)	
19 - Relaxation room	175sf – (10x17)	
	f	

Staff		
20 -Locker Rooms (M/F)	300sf	
Showers 4(4x4) —	40sf	
Restroom, Washroom	150sf	
Lockers --	100sf	
21 - Break room	150sf	
	4,449sf	
Utilities / Services		
22 - Mechanical - Geothermal	400sf	
23 - Storage		
	300sf	
	700 sf	
Subtotal	5,599	
Circulation		
(30% of overall sf)	2000 sf	
Total	1,680sf	
Building Total	7,280sf	
Exterior		
24 - Outdoor pool	1500sf	
25 - Courtyard	1000sf	
26 - Patio	(5)@100sf	
27 - Healing garden	1000sf	
28 - Parking	3000sf	
Total 4,500 sf		
Program Total	12,090sf	

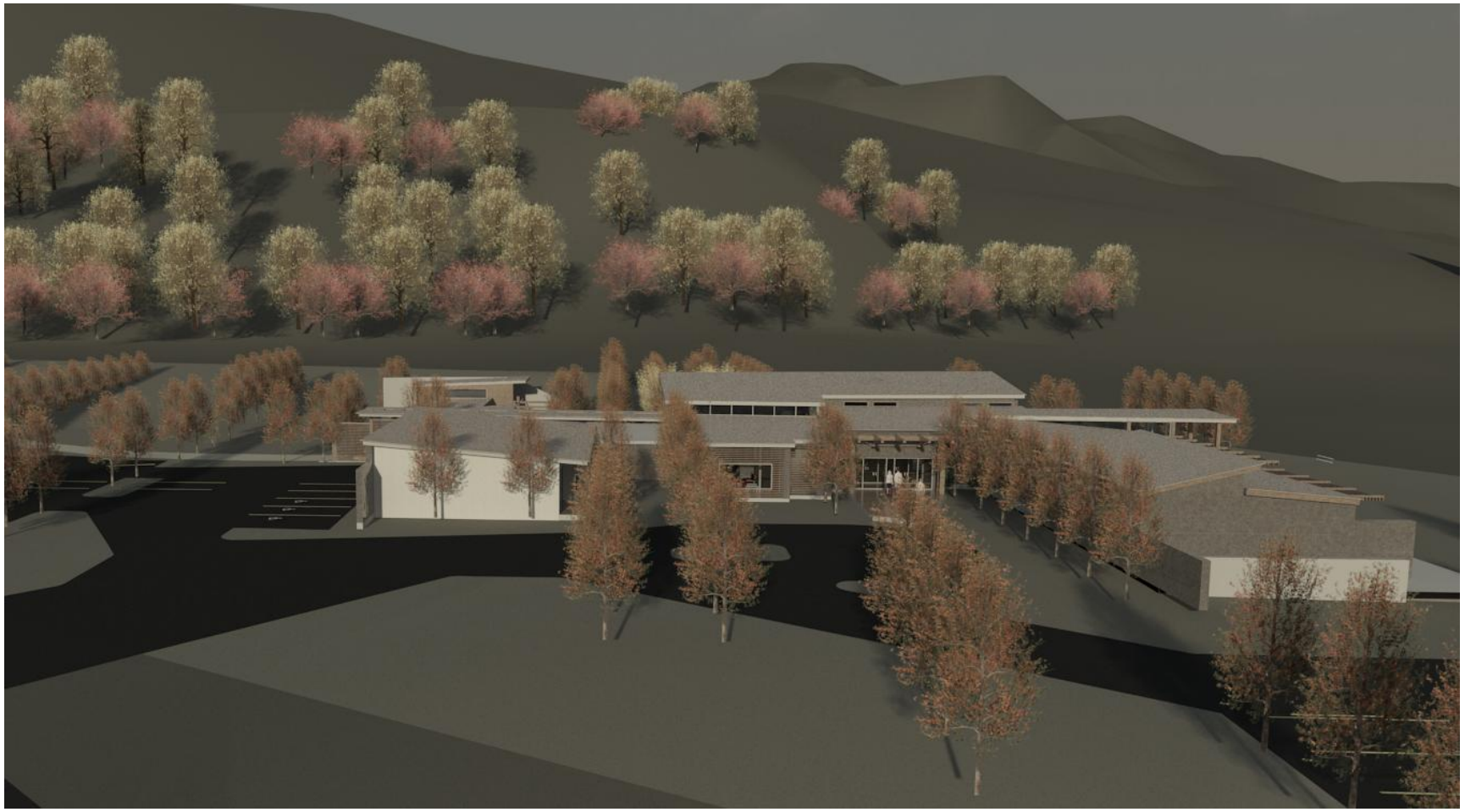


BASEMENT PLAN -- 1/32" =

GROUND FLOOR PLAN -- 1/16" = 1'-0"

RENDERINGS

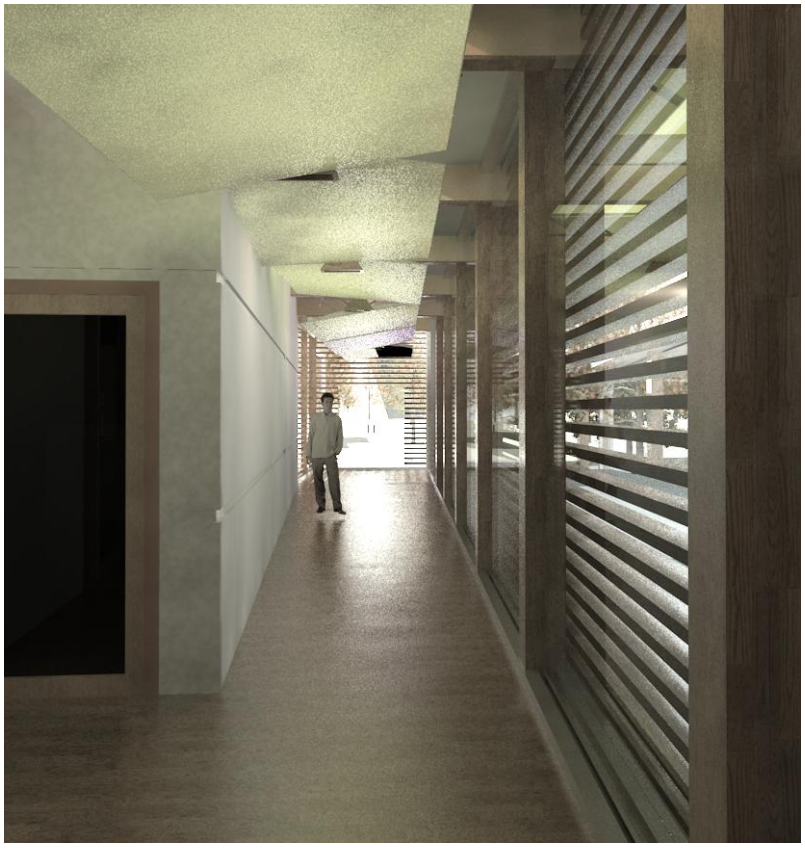
Healing Center Exterior View



Meeting/Community Center



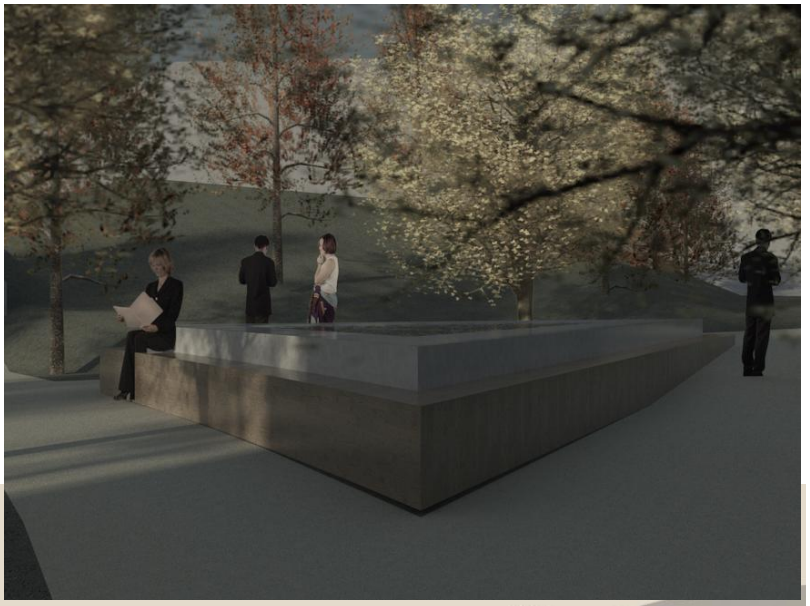
Sequence Color Hallway



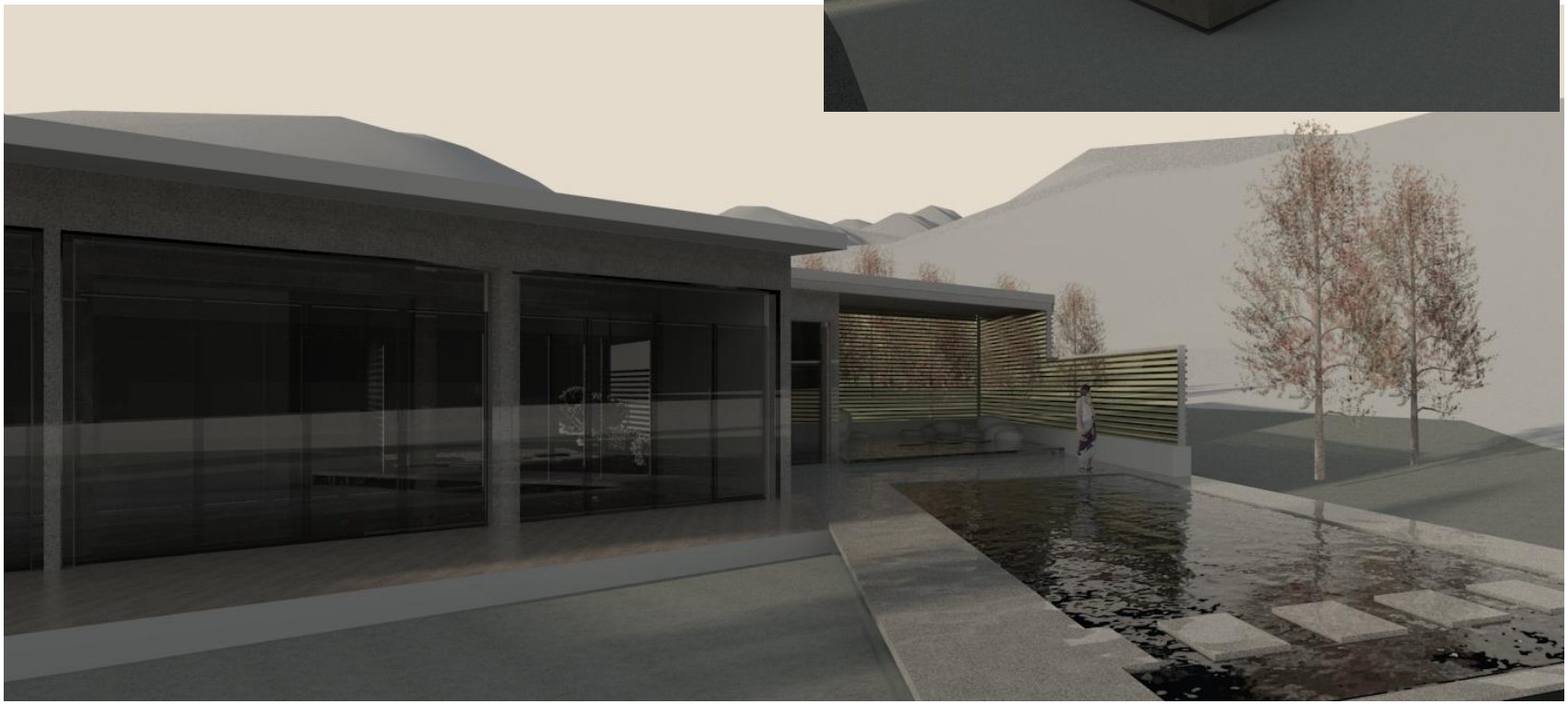
Light Room



Exterior Healing Garden



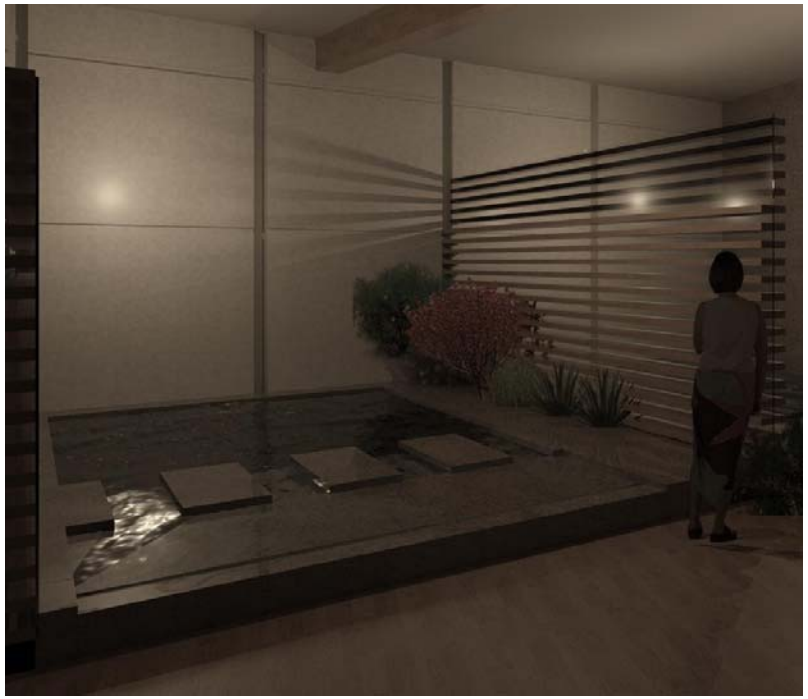
Exterior View at Outdoor
Therapy Pools



Yoga Room



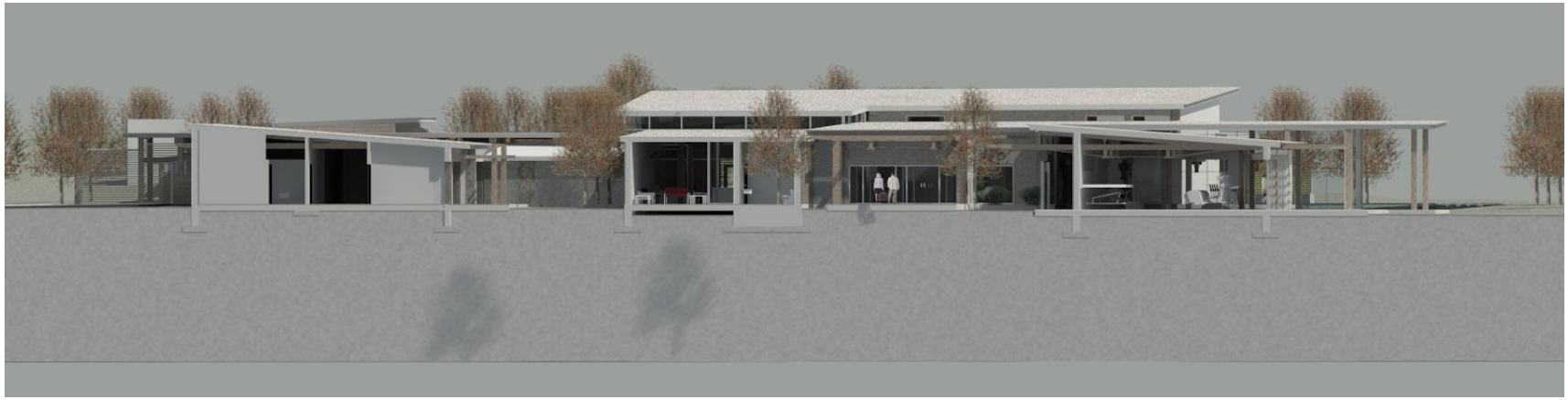
Indoor Therapy Hot Pool

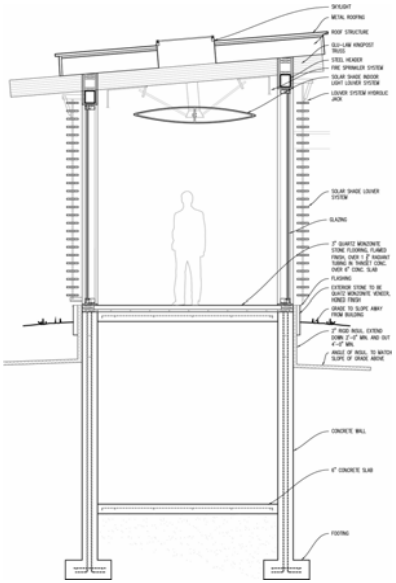


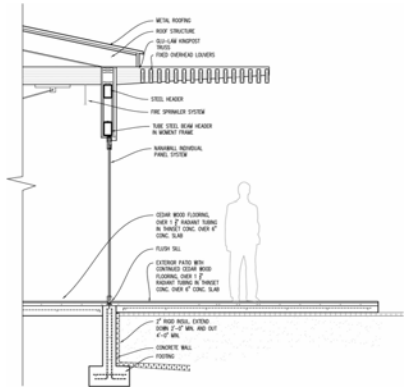
Main Entrance to Healing Center

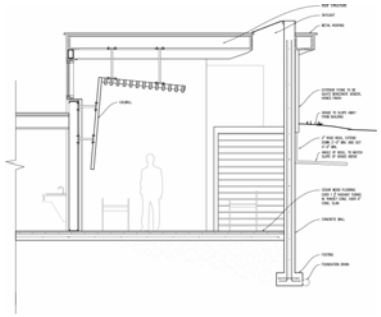


Section Perspective Through Yoga at Entrance









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