BODY POSTURE DEFINED BY ENVIRONMENT

By

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Jason Tyler Stamp

April 2011

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ABSTRACT

The environment that a person occupies plays an important role with how that person's body is perceived in that space. While in the space the body reacts and conforms to the space in different postural configurations. Body posture directly relates to specific environments. When people think of body posture they automatically think of good posture or bad posture, and although this plays a role in the effects that the environment has on the body's posture, it is not the focus of this thesis. The focus of this thesis is to understand how the body posture of a person is directly influenced by their surroundings. Because architecture is about the human habitation of distinct environments, it is important to understand how people are interacting and reacting in different environments.

Body posture is an element of expression that is a result of the person's surroundings and feelings. The environment can range from elements like a physical wall to temperature or humidity of a space. Body posture can correspond to different architectural elements that are placed within the environment. When influenced by the environment the human body will find new ways of inhabiting it.

When a person is in a space, they are being influenced by their surrounding through their senses. The body is the interface for the interaction between environment and person. Sight, sound, smell, taste and touch are the receptors that translate information from the environment to the person. The body is its own entity, but there is a set of relationships that it uses to engage with the world around us. Without the body we would not be able to experience our surroundings and without the environment the body would have nothing to experience.

Different types of spaces have different affects on body posture. When designing a space, the understanding of how people respond to space according to body posture plays a significant role in how the space that is created. As designers it is important to understand that body posture is in direct correspondence to the environment of the person.

Intro

"We feel pleasure and protection when the body discovers resonance in space. When experiencing a structure, we unconsciously mimic its configuration with our bones and muscles: The pleasurable animated flow of a piece of music is subconsciously transformed into bodily sensations, the composition of an abstract painting is experienced as tensions in the muscular system, and the structures of a building are unconsciously imitated and comprehended through the skeletal system. Unknowingly, we perform the task of the column or of the vault with our body" [1]

The environment that a person occupies plays an important role with how that person's body is perceived in that space. While in the space the body reacts and conforms to the space in different postural configurations. Body posture directly relates to specific environments. When people think of body posture they automatically think of good posture or bad posture, and although this plays a role in the effects that the environment has on the body's posture, it is not the focus of this thesis. The focus of this thesis is to understand how the body posture of a person is directly influenced by their surroundings. Because architecture is about the human habitation of distinct environments, it is important to understand how people are interacting and reacting in different environments.

Body posture is an element of expression that is a result of the person's surroundings and feelings. The environment can range from elements like a physical wall to temperature or humidity of a space. Body posture can correspond to different architectural elements that are placed within the environment. Some of these elements are specifically designed to interact with the body in particular ways; for example chairs are thoughtfully

1 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 185



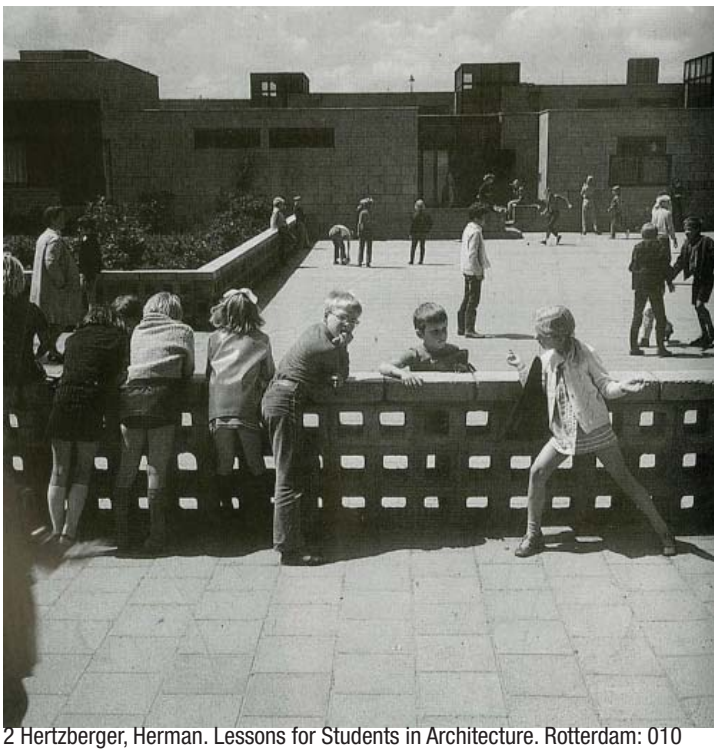
designed to hold the body in a precise way depending on the activity the person is partaking in while sitting in the chair. Lounge chairs have a more reclined back and sometimes a foot rest to put your feet up on. A dining chair is designed with less of an angle allowing the person an upright posture, suitable for dining. When influenced by the environment the human body will find new ways of inhabiting it. For instance, when the body is tired it will seek out any form of refuge. When there are no benches or chairs in a space people will sometimes find refuge perched against a wall or sitting on a step. These architectural

[1] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 67

elements are not specifically designed to be used in this fashion, but they influence body posture in unexpected ways.

When a person is in a space, they are being influenced by their surrounding through their senses. The body is the interface for the interaction between environment and person. Sight, sound, smell, taste and touch are the receptors that translate information from the environment to the person. Sight and sound are the more obvious sense preceptors, but they are not the only elements that affect the body and its posture in response to the environment. It is important to understand that body posture is not only affected by sight and that the other senses are important to a person when experiencing a space, whether they consciously know it or not. “We behold, touch listen and measure the world with our entire bodily existence, and the experiential world becomes organized and articulated around the center of the body.”[2] The body is its own entity ,but there is a set of relationships that it uses to engage with the world around us. Without the body we would not be able to experience our surroundings and without the environment the body would have nothing to experience. They are a separate entities but one could not exist without the other and the sum of both effect body posture.

Different types of spaces have different affects on body posture. When designing a space, the understanding of how people respond to space according to body posture plays a significant role in how the space that is created. As designers it is important to understand that body posture is in direct correspondence to the environment of the person.



2 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 168

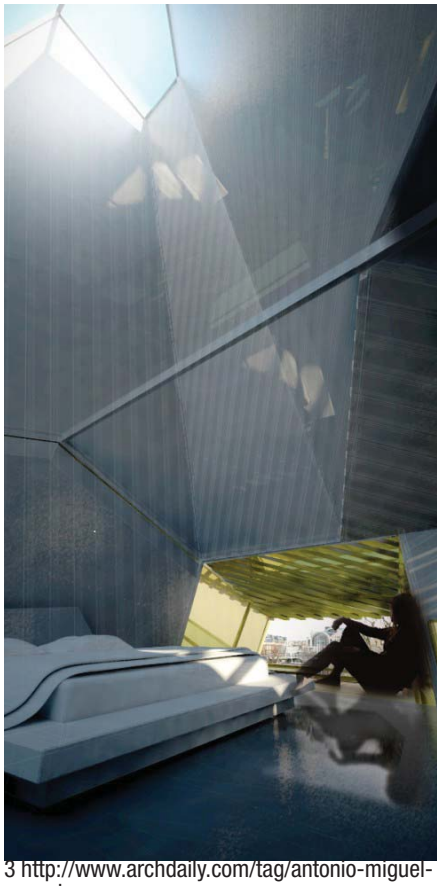
[2] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 64

Defining the body

body(bod•y)

noun (plural bodies)

1 the physical structure of a person or an animal, including the bones, flesh, and organs:it's important to keep your body in good condition



3 http://www.archdaily.com/tag/antonio-miguel-goncalves

"We behold, touch listen and measure the world with our entire bodily existence, and the experiential world becomes organized and articulated around the center of the body."[3]

The body is an intricate system of interactions that enable the person to perceive their environment around them. The person is able to perceive and interact with the environment through their senses. The goal of this section is to define how the person uses their senses as receptors to influence body posture by receiving information for the environment. Exploring how sight, sound, taste, smell and touch affect body posture. Each of the senses can influence body posture individually or together while the body experiences the environment. Through the breakdown of each of the five senses, this section will give the reader a greater understanding of how the senses influence the body's posture.

Sight is he seemingly most dominate sense. As a species we have become reliant on our vision to get us through our daily lives, therefore sight plays an important role in the way our bodies respond to our environment and inevitably our posture. Vision allows us to see elements in the environment that affect our body posture in numerous ways. Sight allows us to perceive different elements like scale, and configuration, along with many different aspects of the environment that will be covered in the next section "Defining the Environment." An example of this would be someone interacting with a space in a building where there is a window placed above head height. A high window would cause the person's gaze to be directed upward, changing their body posture. The unique thing about sight is that it enables us to perceive different elements in our environment from a distance. Unlike touch, the body does not have to come in contact with the elements to enable us to investigate them.

"The eye is the organ of distance and separation, whereas touch is the sense of the nearness, intimacy and affection. The eye

[3] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 64

surveys, controls and investigates, whereas touch approaches and caresses."[4]

Arguably the second most dominant sense is touch. Being able to touch enhances the life of the person in a profound way. Having the ability to feel the texture of a wall or the unevenness of the surface below our feet is important to the way that our body posture responds to the environment. Not only does touch inform us of texture, but it allows us to tell if an object is hot or cold, smooth or rough, heavy or light, among many other elemental qualities. Having the ability to tell if a surface is warm or cold is important to the way our body posture responds to the environment. For example if the sun has been hitting the surface of a concrete wall all day, the wall will have absorbed the suns energy, allowing the wall to radiate the heat back into the air. The body will recognize this heat through touch, allowing the person to comfortably lean against the wall. The person will have a relaxed and comfortable posture because they are not concerned about how much contact they are having with the wall due to its warmth. On the other hand, if the wall had not been hit by sun and was cold, the body posture would be much different. If the person chose to lean against the wall the body would lightly touch it with a tense posture. The person would minimally touch the wall, maybe only allowing the shoulder blades to make contact. The reason for the tense body posture and the lack of contact with the wall is because the person does not want to lose any heat to the wall. There are many other elements that can affect body posture through touch such as texture, which will be discussed later on.

"The way spaces feel, the sound and smell of these places, has equal weight to the way things look."[5]

Although one could categorize the senses by common understanding of dominance, one could argue that there is no hierarchical order to the importance of the senses. Experiencing our environment involves the use of all our senses. Hearing

allows the person to “see” objects or environments at a distance or around corners with their ears. The human hearing can detect subtle changes in the environment that the eyes might not be able to detect, or before the eyes can focus on or find the origin. This allows the person to be able to tell or “see” if something is approaching from behind. The moment someone detects these changes in the environment the person will turn around, focusing all of the senses to the point of concern.

“The protective function of our ears is enhanced by the fact that sound travels around corners- not just in straight lines as light rays do. Thus, we are warned even of invisible dangers. And wisely, I think, nature did not supply us with “ear-lids” to shut ourselves off from the sounds of approaching disaster. In contrast to our eyes, our ears are always on guard.”[6]

Hearing affects body posture whether we consciously know it or not. It causes our bodies to shift and turn to the direction of the sounds. If there is a faint noise that we cannot see and are curious or concerned about, our heads will turn so that our ears are perpendicular to the sound. At this point all of our other senses will become secondary, as our ears become the dominant source of perceiving our surroundings. The body will slow down attempting to make as little noise as possible. The person will control their breathing, while trying to slow the pace of their heartbeat. The person may stop walking or doing any other activity, to allow their ears to focus on the sound. All of these reactions to sound change the posture of the person’s body.

Smell and taste are “considered as seeking the same information, one by eating solubles, and the other by breathing volatile components of solids”,[7] therefore the two will be grouped together for the sake of explaining this portion of this thesis. These two sensory receptors are unique when considering them as experiencing the environment. They are the only senses that physically digest the environment. The other senses are perceived through waves (sound waves and light waves) or

[4] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 46

[5] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 7

[6] Schroeder, Manfred R. *“Listening with Two Ears.”* JSTOR. Web. 08 Jan. 2011. <http://www.jstor.org/stable/40285570>. Pg 255

[7] Bloomer, Kent C., and Charles Willard Moore. *Body, Memory, and Architecture*. New Haven: Yale UP, 1977. Print. Pg 33

by experiencing the surface of objects. Eating or smelling the environment around us involves having small particles from the surroundings, enter our body, and be processed through digestion. Smell responds similarly to sound, in that it can perceive smells from a distance and around corners because the components do not have to travel in straight lines. Smell is the most powerful trigger for our memory. When someone smells something good or remnant of a past experience the person will sometimes closes their eyes dampening all the other senses, allowing the nose to focus on the pleasing smell, allowing that person to reminisce and relive that moment. The posture of the body at this point is a relaxed and calm if the smell is pleasing or if the memory is positive. On the other hand if the smell is unpleasant the posture could be tense where the person has to put their hand up to their nose covering it to not let the smell in.

Eating is a social experience that influences body posture. Society has changed the way humans eat in groups and in private. “To some observers, the withdrawal to privacy would seem to indicate a lively suspiciousness, as if each one feared that somebody was going to snatch the food out of his mouth, or as if, while engaging in the biological indulgence, he was venerable to attack, and so he sits with his back against a tree.”[8] Today humans are more comfortable eating around other people because of the changes in society that have occurred over time, but there are still a variety of postures that happen while eating. The way people lean over the table or their plate to make sure that they do not get any food on their clothing, or the way people are trained to sit up straight with their elbows off the table are social influences that cause different posture changes in the body while people are eating. These posture changes described are caused by the social environment. Different cultures engage in different styles of eating that affect body posture as well. If one was to look at cultures such as India and Asia, they sit on the floor or on a pillow where they are closer to the ground creating a body posture where the person crosses their legs. In western cultures the normal configuration of dinning takes place while sitting in a chair that is raised about sixteen inches off of the

ground. The chair allows the person's body posture to be less balanced because the persons legs can comfortably rest on the floor. These chars normally have seat backs for the occupant to lean against, which also allow the persons posture to be less balanced and more relaxed. This is a digression from the actual taste sense but it is important to know how eating informs body posture due to the social context of the person eating. The social aspect of eating is not the only element that is important to the taste sense in informing the person body posture. When a person eats something that tastes good their posture changes, and in the same way, when someone eats something that tastes bad to them their body rejects the food causing the posture to respond in a different way. Taste is not constrained to bad and good tastes; the person can experience taste of hot, spicy, tart, sweet, along with other tastes that can affect body posture.

[8] Goodman, Paul. *"Meaning of Functionalism."* JSTOR. Web. 08 Jan. 2011. <http://www.jstor.org/pss/1424019>. Pg 35

Defining the environment

environment(en•vi•ron•ment)

Noun

1 the surroundings or conditions in which a person, animal, or plant lives or operates.
2 (the environment) the natural world, as a whole or in a particular geographical area, especially as affected by human activity.

"Form and behavior have an intricate relationship. The form of an organism or city affects its behavior in the environment, and a particular behavior will produce different results in different environments, or if performed by different forms in the same environment."[9]

The purpose of this section is to give the reader an understanding of the meaning of "environment" in this paper. For the purpose of this thesis the environment is not limited to space defined by walls or by elements found in nature. Environment encompasses everything that can be experienced by the human body. I will attempt to explain all aspect of the environment that can affect body posture. The lists of elements that affect body posture within the environment correspond to the elements that were discussed in the previous section that defined the body.

The following are not the only elements that define posture and do not define posture in the same way for each person. The way that body posture responds to each person is different according to their previous experiences and the way their sense act and react to the environment. It is safe to say that our experiences, although different, will be similar enough, that we can categorize environment with scale, texture/materiality, climate/temperature, society/people, weight/resistance, and configuration.

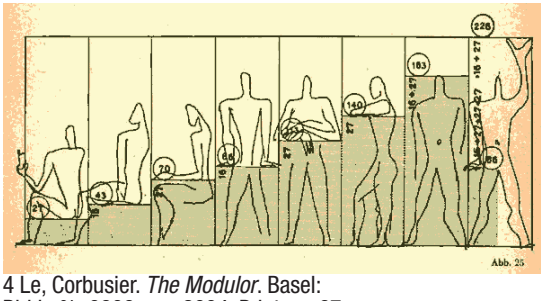
Scale

When discussing body posture, scale can affect the body in a variety of ways, and can be categorized into numerous ideas about the environment. Scale can be the size of walls, openings or other objects in the environment. Scale is also the mass of elements, along with human scale. There are techniques that can change the way elements "feel".

"As Geoffrey Scott had observed, there is a distinction between the appearance of bigness and the feeling of bigness that a

[9] Weinstock, Michael. *The Architecture of Emergence*: the Evolution of Form in Nature and Civilisation. Chichester: Wiley, 2010. Print. Pg 26

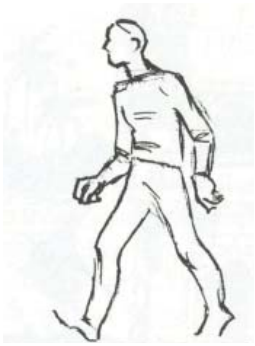
building gives, and only the latter, he added, has to do with aesthetic experience. He seems to have been warning us not to accept a standard of architectural beauty derived from visual criteria alone."[10]
As stated in the previous quote the senses used to perceive scale is not only vision, the feeling of size can be experienced through all the senses. For example when sound bounces from wall to wall in a space the echo created by that sound is different from a small space, opposed to a large space like a canyon setting. This echo is perceived by the body, informing the person of the size and feeling of the space.



4 Le, Corbusier. *The Modulor*. Basel: Birkha%u0308user, 2004. Print. pg 67

Scale is not only defined by the size of objects in the environment but also encompasses the scale of a person, depending on the person's size reflects how that person's posture will be affected in the environment. For instance, if there is a wall that is roughly four feet tall, the interaction between the wall and a person that is six feet tall is going to be different than that of a child that is three feet tall. The person that is six feet tall will be able to see over that wall, while allowing that person to place their elbow on the top of the wall to rest. They could also easily sit or perch on the wall giving the body a different experience than that of a child. The child may find more comfort with the wall because they do not perceive anything beyond it so they have that primal instinctual feeling of being fully protected from predators. They can lean against the wall, but they cannot easily sit on top of it. If they were to climb up and sit on it their posture will be much different than that of the taller person. Their feet will not touch the ground unlike the person perching against it, so their feet will dangle. As you can imagine if we were to reverse the roles of scale, and keep the size of the person the same but change the size of the object, the postural experience will be much different, in a similar fashion with the different sized people.

5 Thiis-Evensen, Thomas. *Archetypes in Architecture*. Oxford: Oxford UP, 1987. Print Pg 385



Texture/ materiality

Texture and materiality are important to the environment because every element in the environment has a specific materiality that has a unique texture to it, which can interact with the human body in different ways. Touch and sight are the main senses that perceive texture, and affect the person's posture. Through touch our bodies can pick up the unevenness or instabilities on the ground plain through our feet. For example, we can look at two different ground surfaces that affect body posture. The first surface is a regular concrete sidewalk, and the other, a sidewalk covered in ice and snow. The pace that the person travels on the regular concrete surface is a "normal" speed. The posture is what we would call normal as well; the person walks with their head up, arms to their side swinging in sync with the strides of their legs. The contact between the ground and their feet is "normal" as well; the heel of the foot hits the ground first, and then rolls to the balls of the feet and eventually to the toes, until the foot is lifted off of the ground. The body posture of the person walking on the concrete sidewalk is standard and something that we experience on a daily basis. As soon as one's body comes into contact with an abnormal surface, such as ice, our body posture immediately changes. The speed at which the person is traveling is more cautious and slower. The position of the is head tilted down, scanning the surface of the ground, looking out for slicker patches and easier routes of travel. The arms are being used more consciously for balance sometime raised in front or to their side, occasionally making abrupt movements to balance and catch the body from falling. The person will walk at a slower pace because the steps taken are shorter than normal and each step is monitored by the body. The legs and feet are not searching for powerful strides, instead the feet are flat when they come into contact with the surface allowing for more surface area, increasing friction and decreasing the likelihood of slipping.

[10] Bloomer, Kent C., and Charles Willard Moore. *Body, Memory, and Architecture*. New Haven: Yale UP, 1977. Print. Pg 32

The materialities of objects people come in contact with are not limited to the feet. The body can sense the different

materiality through the entire body. The body can feel the difference in materiality of two different chairs through their back, legs, and posterior. The posture is different depending on the texture and materiality of the chair; if the chair is concrete it will be cold and hard making the persons less comfortable and more tense. Contrarily if a chair is upholstered in a softer fabric

"The elderly have difficulty finding comfortable chairs that allow good seating posture and are easy to sit down in or get up out of. Bruno Mathsson of Sweden manufactures a superbly designed and crafted chair made of wood laminate and upholstered in a cotton-based fabric, it is handsome and anatomically healthful" "Chairs usually made of chrome steel tubing, a material as cold as a corpse and as unpleasant to touch. The upholstery is usually some vinyl-coated fabric or other plastic-based material. These materials become sticky when they are sat on all day"[11]

Climate/ temperature

Climate is something that is experienced through the entire body, the skin can sense different temperatures that exist in the environment. The posture of a person's body can change with the change in temperature in the environment. For example, if we look at two different temperatures in an environment, one cold and one hot, we can see they have different affects on body posture. Cold temperature can cause the persons posture to be tense. The tense posture can consist of the person crossing their arms, while their shoulders shrug, and if the person is in a sitting or lying position they will bring their legs closer to their chest. The hands might be placed between the person's arms and body or just balled up into fists. These posture changes happen because the body is attempting to bring the limbs close to the body to get as much heat as possible to the bodies' core. If someone is doing a physical activity the body will naturally be heated by itself because the person is exerting energy. If the person is not doing any physical activity the body will

shake or shiver on its own to try and heat up the body. In hot temperatures the posture of the body is opposite of the cold climate. The limbs of the body are far away from the body. The person may have their arms hanging by their side, slightly away from the body, while their legs are apart from each other. These postures allow airflow to be maximized with the amount of skin being cooled. Because the body is hot the person becomes lethargic and wants to minimize the amount of energy they have to exert, so the person conserves energy by not moving around much.

The temperature or climate does not only affect the body directly, but indirectly as well through other elements in the environment. Every element in the environment absorbs heat, whether it is because of the temperature in the air or because the sun or other form of energy is hitting it directly. Each element holds and releases this energy or heat at different rates, so depending on that element the body will respond different to each element. An example of the way posture is affected by the elements according to temperature was discussed earlier in the Touch part of the "Defining the Body" section.

People/society

People and society have evolved over the extent of humans' existence, while developing relationships with one another in the environment. Society has changed, creating rules and etiquette forcing people to act in certain ways around other people. Some of these rules have changed and evolved over time because of religious beliefs, social status, among many other aspects of human life. The way people react is not only dependent on the rules that society has set up, but survival skills that we have gained throughout the existence of humans, passed down from our ancestors. These survival skills have changed with the development of society, but there are still remnants of these basic survival skills that define our body posture among

[11] Papanek, Victor J. *Design for Human Scale*. New York: Van Nostrand Reinhold, 1983. Print. Pg 25

other people. The instinctual quality of survival determines some aspects of body posture. The way people orient themselves in the environment to make themselves feel comfortable or safe influences their body posture. If a person is feeling threatened by the environment or the people in the environment their body posture will change. There are many configurations that the body might take on through posture but some of the common configurations may be: crossing of the arms, lowing of the head to try to not make eye contact, or the broadening of shoulders while sticking out chest to make themselves look bigger.

Throughout history the society has determined that humans should act and look a certain way when presenting themselves to others. Some of these social rules consist of things like table manners or looking someone in the eye when they are shaking their hand. These social rules along with other rules affect the way one's body posture is in the environment.

Weight/ resistance

Weight and resistance can be referred to as physical weight that a person may come in contact with in an environment or resistance on the body because of fatigue brought on by weight and resistance in the environment. Physical weight can be of weight of objects like doors, windows, among other elements in the environment. These elements change the person's body posture depending on how much weight the person has to move or how much resistance is met by the object. The more weight or resistance causes more stress on the body, therefore making the posture much different than if there is less weight or resistance. If a person has to open a door that is heavy their posture may be something like, a lower center of gravity while the legs are spread to get good balance. The center of gravity, in the horizontal, will be away from the door (depending on what kind of door) to be able to counter the weight of the door.

If someone is constantly lifting heavy objects or exerting effort, such as climbing or hiking, their body posture will change due to fatigue. The resistances of the persons own weight can change the way that a person performs while affecting their posture. While a person is climbing a large set of stairs, their posture will change from a normal posture at the beginning of the climb to a hunched over exhausted posture. The person will put their hands on their knees to try and help the legs carry the body up the climb. Not many people would experience a change in posture like this on a normal set of stairs but they would if they were hiking or encounter a large set of stairs in a tall building.

Configuration

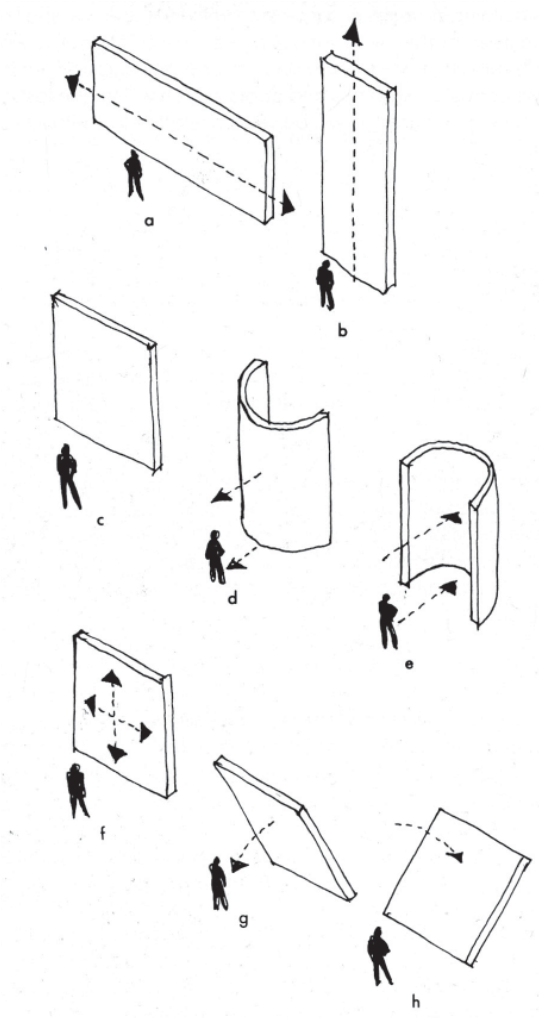
Configuration refers to the arrangement of any of the previous elements. Configuration is not just the way objects are laid out in an environment, but can be the shape or form of the objects that fill the environment as well. Configuration can be the shape of a wall, whether it is convex or concave, it can also be the exact shape of a chair or other piece of furniture. The configuration of objects in the environment changes the way people interact with the environment, which inevitably changes the posture of one's body. It is important to understand that configuration directly affects a persons body posture. Through our senses or body can scan and read the environments configuration.

"When we face a concave wall, the feeling is one of being received; the interior space seems to yields to our forward movement. As a consequence, the wall is a visualization of two expressions: the embracing and receiving, and the yielding and pliant"[12]

When we face a convex wall we do not have the feeling of being received, instead it is an uncomfortable feeling of

[12] Thiis-Evensen, Thomas. *Archetypes in Architecture*. Oxford: Oxford UP, 1987. Print Pg 49

being pushed on, around the curve until we find a location that is suitable for rest. The reason for the difference in feeling is because when we are inside a concave wall we feel protected, as if we were in our mother's womb. The convex wall places us on the outside exposing us to threats and predators. The configurations of the wall, being convex or concave can change the person's body posture by being more relaxed and comfortable in the concave wall, opposed to the convex wall the person may be tense and alert because they are exposed. Good examples of experiencing convex and concave walls are Richard Serra's steel art pieces. These works of art play with the different feelings that people have while engaging with the art. The different scales and radiuses of the curved walls allow the body to experience a variety of postures while viewing the art. It is important to understand is that body posture is affected by the configuration of elements in the environment, and that as designers the way we set up an environment can change the way someone feels in a space, affecting their body posture.



6 Thiis-Evensen, Thomas. *Archetypes in Architecture*. Oxford: Oxford UP, 1987. Print Pg 438

[12] Thiis-Evensen, Thomas. Archetypes in Architecture.
Oxford: Oxford UP, 1987. Print Pg 49

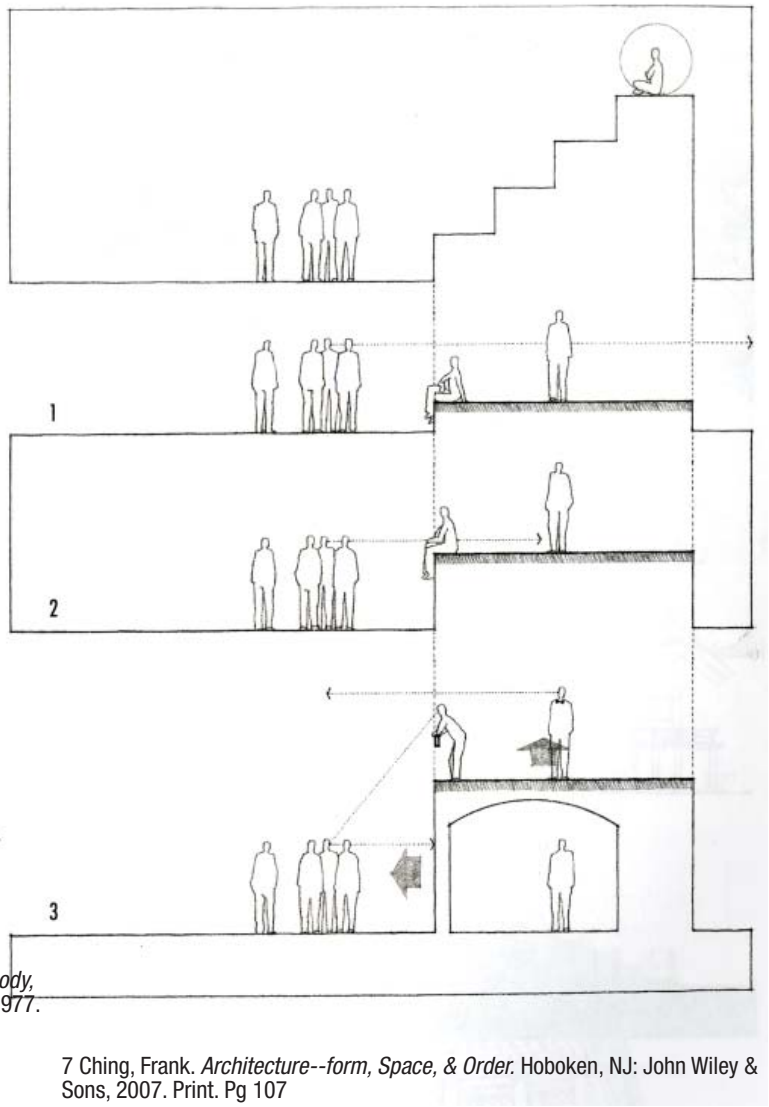
Analyzing Images

"Basic orientation refers to our postural sense of up and down which, because of its dependence on gravity, establishes our knowledge of the ground plane. A consequence of this postural orientation is our need to symmetries frontally the stimulus impinging on the sense of site, sound, touch, and smell. For example, if a hunter senses danger he will turn his head and focus his eyes and ears symmetrically on the source in preparation for an attack or defense. This mobilized orientation involves total body balance."[13]

21.

[13] Bloomer, Kent C., and Charles Willard Moore. *Body, Memory, and Architecture*. New Haven: Yale UP, 1977. Print. Pg 34

Body posture changes in relationship to how a person is responding to their environment. This interaction can be influenced by many aspects of what the body is experiencing. In these images body posture is responding to spatial organization in the vertical plain while also responding to the interaction of other people in the space. In the first image the person is completely isolated from the others which makes the body posture respond in an isolated fashion. This is not necessarily the exact body posture that someone would be in every time they are isolated from a group, but the idea behind isolation resides within the emotion and posture of the body. In the next two images the social interaction is more prevalent. The person sitting is physically closer to the group which changes their body posture. The visual connection that the group has with the individual sitting influences the posture of the person sitting. When the person is sitting lower it causes the person to lean back and have an upward gaze. In the third image the person, on the higher ledge, changes to a more attentive posture which has the person leaning forward with their hands on their knees. They are in a more attentive state and leaning forward because they are not feeling the pressure of the downward gaze from the group of people. The environment or architecture in this case is affecting the way people interact, therefore changing the body posture. Simple level changes can make a person feel isolated, part of the social scene, or in between the two.



[13] Bloomer, Kent C., and Charles Willard Moore. *Body, Memory, and Architecture*. New Haven: Yale UP, 1977. Print. Pg 34

7 Ching, Frank. *Architecture--form, Space, & Order.* Hoboken, NJ: John Wiley & Sons, 2007. Print. Pg 107

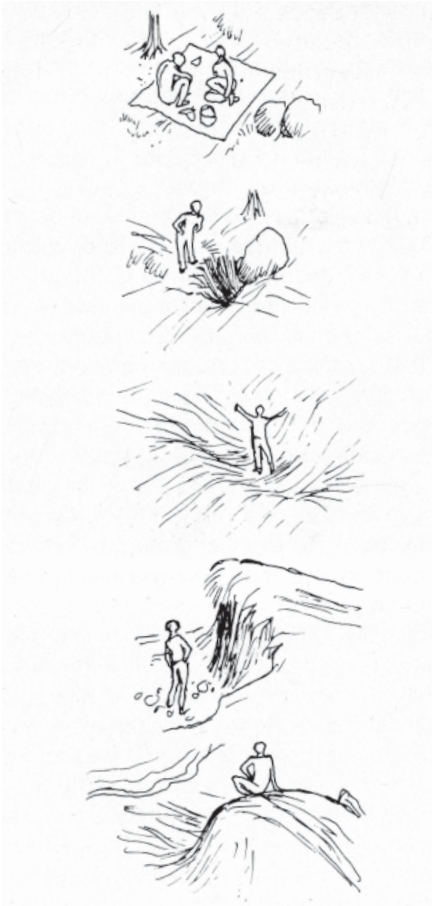
II

"The body knows and remembers. Architectural meaning derives from archaic responses and reactions remembered by the body and the senses architecture has to respond to traits of primordial behavior preserved and passed down by the genes. Architecture does not only respond to the functional and conscious intellectual and social needs of today's city dweller; it must also remember the primordial hunter and farmer concealed in the body."[14]

As an experiment I went to different locations in the wilderness that have not been altered by humans, there I photographed myself in different postural orientations determined by the environment. I attempted to allow the environment influence my orientation and posture by individual elements such as grass, logs, trees and rock. The intention of this experiment was to see how my body responded to the environment through posture. The two images are purposely chosen to show contrasting environments. One photo shows an environment that is more protected by trees and foliage while the other is shot in an open field where there is little protection from predators.

In the first image there were no individual elements that I could perch against or sit on. This made my body posture limited in its interaction with the environment. I found that it was most comfortable for me to be in a crouching position, situating my vision just above the blades of grass. The grass offered enough protection for me to hide in while allowing me to be able to see my surroundings. If I sat on the ground I would be to low and not be able to see if someone or something was approaching. The standing position made me feel too exposed and inevitably became a posture of transition through the field.

The second photo was taken around a group of trees



8 Thiis-Evensen, Thomas. *Archetypes in Architecture*. Oxford: Oxford UP, 1987. Print Pg 40





where one had fallen creating a seating element. The space had more elements that allowed for different postural positions. In this environment I felt more comfortable because I was not as exposed and there were elements that I could put my back to. The trees in the background offered an area for me to perch against while the fallen log created a space to gather. This experiment reflects our archaic memory of our instincts to find shelter or comfort in a place.

[14] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 60

III

In this image there is a young family gathered on a community porch or balcony. The couple is having a conversation with one another, while perched against the concrete railing. The first element that is affecting the couple's posture is the temperature and climate. The two have positioned themselves in the sunlight for warmth; otherwise if it was a hot day they would be in the shade of the overhang, attempting to stay cool. The two have chosen to perch against the railing instead of sitting on the bench that is located in front of the camera. If they were to sit on the bench they would not have a view of the city, this may be why they chose to convene next to the railing. Another reason why they chose not to sit on the bench could be that they feel uncomfortable sitting with their backs to a public walkway. The reason why they chose to perch against the railing instead of sitting on the bench can be debated, but what is important is that the environment is affecting their orientation, which affects their posture. The railing that they are leaning against is a good height for the two people to lean against. It is tall enough to make them feel comfortable leaning against and not feeling like they could fall over it. At the same time the ledge is low enough so they can place their elbows on top of it, allowing for a relaxed posture. Another element that is causing them to have a relatively relaxed posture is the people or lack of people surrounding them. The two know each other creating a comfortable atmosphere allowing for a relaxed posture. This image shows how the climate, temperature, configuration and scale define how people will orient themselves in a space, and how that orientation determines their posture.

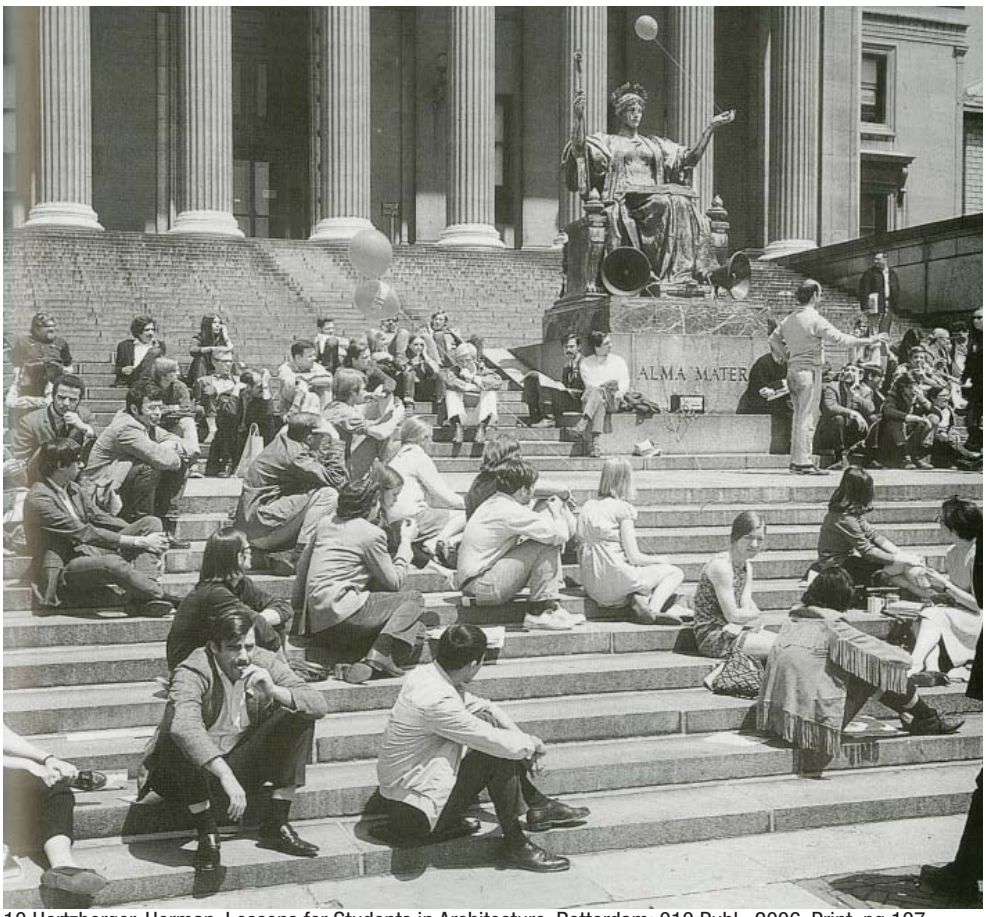


9 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 55

[13] 1 Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 60

VI

Grand staircases such as the one seen in the photo are often used as seating and for people to gather. This is not necessarily the design intention but the architect has to recognize that it will happen and embrace the fact that the body will interact with this environment. In this photo we can see people doing just that. There are people gathering on the steps listening to someone speak. We can see that the people's posture is being defined directly by the environment they inhabit. The slope of the steps are shallow creating a unique sitting posture for the people. The people's knees are closer to their chest allowing them to lean forward, while resting their arms on their knees. The man speaking is in an unusual location, where in a normal lecture setting the speaker is below everyone allowing the listeners to have a comfortable sitting posture with their attention directed forward, parallel with their seat. In this instance the speaker is halfway up the steps causing the people listing to have to turn their heads and twist their back to be able to see the man. In this case the listeners' posture is strained due to this social configuration. Each person's posture is different depending on their location on the steps, because their location determines how much they have to strain their body to view the speaker. The people that are sitting above the speaker are able to have the most relaxed posture, where they can lean back on the step behind them. They are also able to stretch out their legs to the steps below as they lean back. This image shows good examples of the scale and configuration, along with social interaction affecting the person's body posture.



10 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 107

[13] 1 Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 60

precedent studies

The following precedent studies are taken from my personal experiences and posture changes in these spaces.

The Jewish Museum
Berlin, Germany
Daniel Libeskind

The Jewish Museum by Daniel Libeskind provokes specific postural experiences in specific spaces of the building. The two spaces that will be described and elaborated upon, will be the Holocaust Tower and the "Void" space that contains the artist, Menashe Kadishman's steel sculpture "Shalechet" (Fallen Leaves).

When approaching the Holocaust tower you are on a sloped floor that leads you to a large heavy door. At this point your body is in a weary and tense posture because of the oddly sloped floor. When you reach the door you have to put some force into opening it because of the weight. As you are opening this heavy door the body is intimidated, not only because of the door but also because of the dark and cold space within. The interior space is forty feet tall with only one opening at the top of the wall. The surfaces of the space are exposed concrete. The opening in the wall is exposed to outside and there is no heating or cooling in the space. As one enters the space they get quiet and pause, anxiously waiting for their eyes to adjust. The unnerving feeling that others could be in the space and you not being able to see them makes the body tense and it forces some people to find their way to a wall to seek out what little comfort the space provides. As your eyes adjust to the darkness the body loosens up and goes into a depressed state. The scale and lack of energy in the space creates a somber mood. The hard surface of the walls creates an atmosphere where those within keep quiet and reflect on the mood that the architect is trying to invoke. As people move to the edges of the space their posture change. They lightly lean against the wall as their gaze is directed upward towards the only source of light. Once they



34.

have fully adjusted to the light, temperature and sound, they will slowly peal themselves off of the wall and unhurriedly walk out with a new emotive memory of the space.

The next “Void” space which contains the sculpture by Menashe Kadishman’s allows the body to react emotively similar, but through its design it does not allow the body to react in the same way. As a person approach the space all you hear is the loud clanking sound of steel being rocked back and forth hitting oneanother. With the visual sense blinded from the origins of the noise, it makes the person wonder what the sound could be. Could it be the sound of shackles banging against each other? This sound alone sends chills up the spine preparing the person for another emotional experience. As the occupant approaches the room they catch a glimpse through one small opening at eye level looking into the space where the noise is coming from. They cannot see much other than the wall on the opposing side and maybe someone’s legs as they walk by. The opening causes the body to slow the approach, allowing them to digest the sound more while keeping the body in tension and anticipation. When they turn the corner there is a spot to observe the space as an outsider. There is a ledge that sits about chest height that people can lean against in an observational posture. Once they get the courage they climb a steep ramp into the space where they are forced to walk on plasma cut steel faces. The faces vary in thickness, ranging from one half inch plate steel, up to two inch plate steel. These faces resemble the Jewish people who were prosecuted during the Holocaust. As they are walking on the faces the steel shifts and slide, creating loud noises. Similar to the last space disuses, all of the surfaces of the space are exposed concrete which amplify the sound. The feeling of disrespectfully walking on the faces along with the amplified sound causes the person to walk as gently as possible, forcing the body to be aware of every step they take. “This difficult walking exercise provokes a profound feeling of uneasiness since not only is it hard to keep one’s balance, one is also unconsciously reluctant to trample a work of art which, in



36.

addition, represents such painful feelings”[16] Because of the faces on the ground and the feeling that one needs to walk lightly makes the people look down while they are walking. When the person wants to look around they will stop and look up at the tall narrow space that they are in. When the person walks towards the back of the space the ceiling compresses to a smaller height, which along with the space getting darker, makes a person’s body posture change into a more tense state. The darker smaller space changes the mood of the space to a confined and alone feeling. This smaller confined space becomes a more individualized experience the body posture starts to become tighter and almost crouched because of the feeling of the smaller space.

Both of these spaces in this building connects to the human body’s posture and makes them respond in specific ways, allowing them feel the environment around them. The body feels the emotions of the spaces and becomes one with the environment. Through the emotional mood, the body’s posture changes to accompany the emotive quality of the space.



[16] "Arturo Schwartz." Menashe Kadishman. Web. 12 Jan. 2011. <http://kadishman.com/works/shalechet/Articles/Arturo_Schwartz/>.

Baumschulenweg Crematorium
Berlin, Germany
Axel Schultes & Charlotte Frank



http://www.house42.net/htm/pla012.html



"'People die and they are not happy'- architecture can't change that. A place of rest, a space for silence: that is something it still manages to provide, despite the fact that not even stones are heavy as they were in more solid epochs with a firmer belief in the eternal, as in Saqqara, as in Giza, for example.
Our final road is uncertain. Neither church nor temple of the dead offer a model for path to nothingness or angel hood. In lending shape to freedom and necessity, the intensity, the texture of Maghreb mosque comes closest to meeting the task: the Piazza Coperta, a place in the middle of this cenotaph, where many can assemble and yet the individual is shielded; a catalyst for all our feelings. In this room – 5000 years young – the columns with their capitals of light establish the only reference left to us: a cosmological contrast between populated stacks of clay and the sun with its light."[17]

The Baumschulenweg Crematorium is a space that was created to provide the human with a full body experience. The idea of life and death resides in this space, and the building has the occupant pondering both. As the person approaches the seemingly symmetrical building they are lead into the space by a datum line that is aligned with the main alter in the building. As they climb the up the plinth along the datum line into the massive entrance space, where almost all human scale is lost, "A slot in the concrete ceiling directs one's gaze on ahead into the building; the entrance, however is through a sliding door to one side."[18] The procession to this point is one of alignment and the body responds in the same way. The person feels an understanding of the known with the world around them because of the symmetry and alignment of the exterior of the building. Once they have reached the top of the steps the body is forced off of this datum line and through two large sliding steel doors. At this time the person gains an understanding of human scale through the contrast of the size of the building and the main door. The size and mass of the doors make the person use their strength and balance to gain entry into the space. A combination of the mass of the door and the fact that it is a sliding door causes the body posture to change quite drastically wile opening it. Sliding doors are not commonly found in public buildings and therefore it makes the user aware of their weight against the building. With one or two hands the person will grip the door handle and lean with their center of gravity on the opposite side of the door handle. Once the door handle is past the center point of the body the mechanics and posture of the body change. The center of gravity switches to the opposite side and the operation of pulling changes to pushing. The door is an important threshold in this building because it acts as a transition from the ordered to the unknown almost symbolizing life and death. The architects set up a procession that informs the body of this transition in order.

Once inside the space almost all order is lost. The person moves into a hypo style hall of columns that seems to be randomly laid out. The persons gaze is directed upward to the roof where it seemingly floats and gives the impression

[17] Schultes Frank Architekten | Axel Schultes, Charlotte Frank, Christoph Witt. Web. 08 Jan. 2011. <http://www.schultesfrankarchitekten.de/>.
[18] Stegers, Rudolf. *Sacred Buildings*. Basel: Birkha%u0308user, 0820. Print. Pg 234

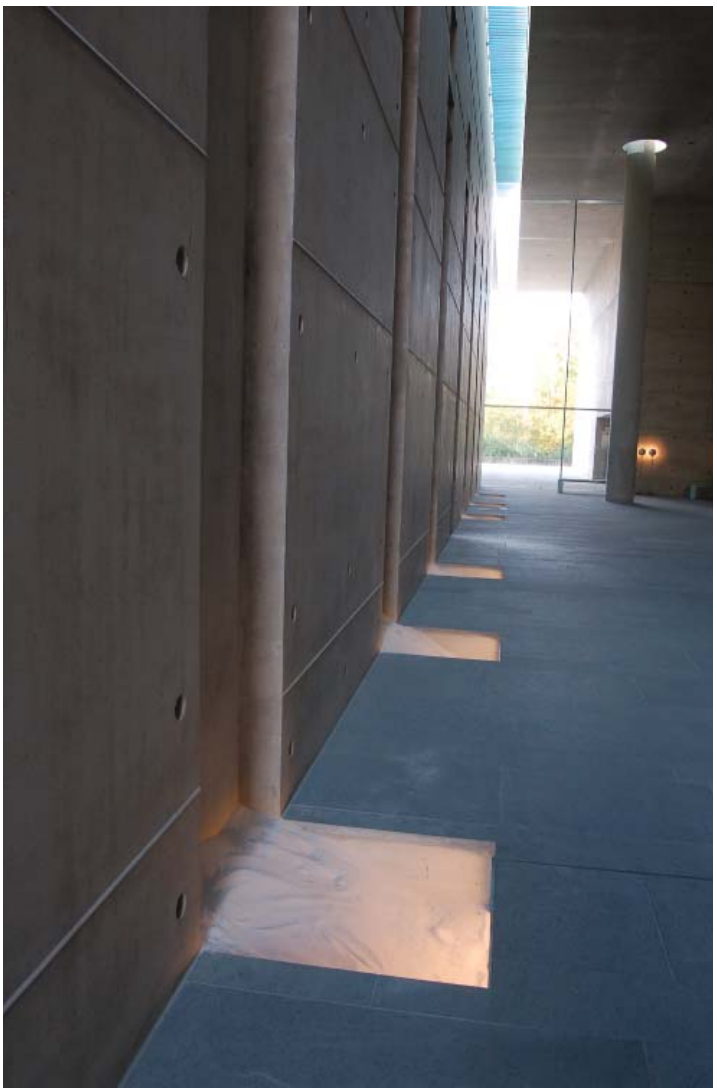
that it could come crashing down. The architects designed the structural columns to have “capitals of light” to give an uneasy feeling to the space. Where the columns touch the ceiling there is a revile that lets day light into the space, illuminating the column. There is only a small point on one side of the column that connects to the ceiling, but is almost invisible because of the contrast of the dim space to the bright light coming in. “The Shafts form small “Clearings”; in this ‘forest’ each group of mourners can find their own space to congregate.”[19]

The mourning over the death of someone changes the body posture of a person on its own. People are commonly found crossing their arms to make them feel safe and comforted. At the same time they may put their head down to reflect on the passing of the loved one. The architecture of this building almost comforts the body by drawing the person’s attention upward towards the mystical ceiling and columns, allowing the person’s body posture to open up. There are two moments in this building that makes the body posture change to having the head looking down. There is a small fountain or reflecting pool in the center of the space that re-aligns the person in the space to the main datum line. Above the pool, hovers a small egg shaped object that is suspended by an almost invisible string. The person is now focusing on the pool and the idea of refection, not only the physical reflections of the space but reflection on past memories with the deceased. The egg implies the fragility of life and makes the occupant aware of this. The second feature is in this space that focuses the person gaze downward are the niches cut out of the wall and filled with sand, then dramatically lit. These spaces occur along both walls that are parallel with the main datum line disrupting the solid concrete wall creating places for people to pause. The materialities of this space are all finely crafted concrete which facilitate the need and want for silence during time of mourning. The acoustical quality of concrete make people speak softer, creating a more intimate space between the people talking to one another. In the main space there are only a few benches to sit on. Other than these benches there is nothing in the space that hints at human scale. This makes the occupants feel small and therefore changes the body posture. The sense of feeling lost or insignificant in the space resides in the body.





[19] Stegers, Rudolf. *Sacred Buildings*. Basel: Birkha%u0308user, 0820. Print. Pg 235

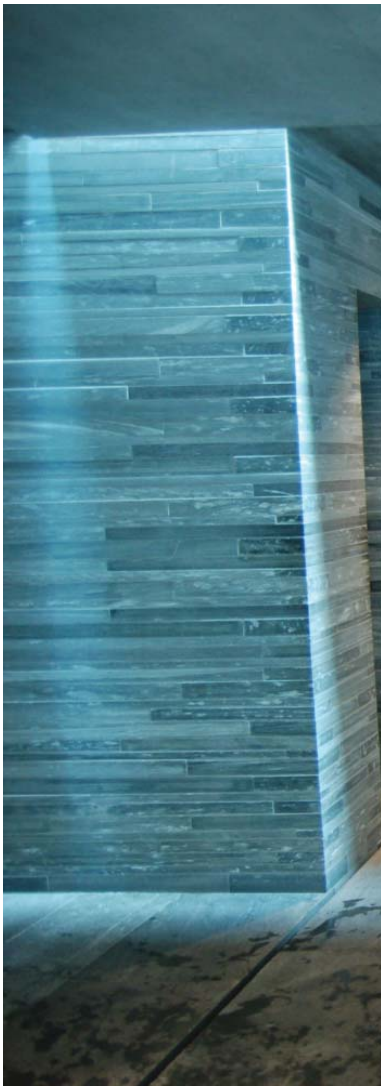


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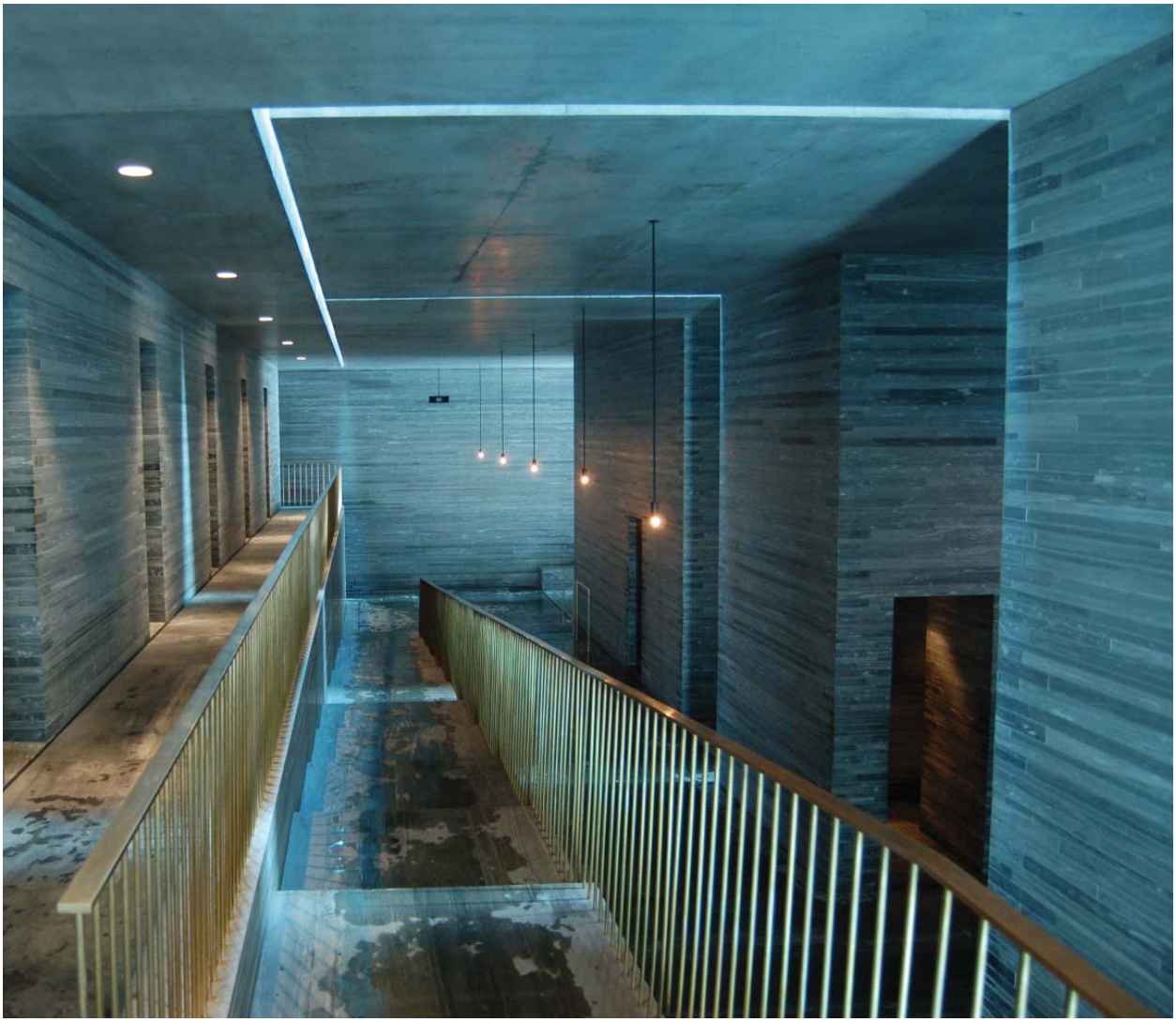
"The design for the new crematorium seeks to evoke an authentic, mystical experience of life and death through architectural means developed in classical antiquity and classical modernism."[20]

[20] Schwarz, Ullrich. *New German Architecture*: a Reflexive Modernism. Ostfildern-Ruit: Hatje Cantz, 2002. Print. Pg 174

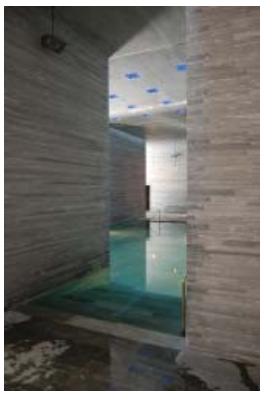
Thermal Baths
Vals Switzerland
Peter Zumthor



The Thermal Baths in Vals Switzerland is a building that was designed to invigorate the body. The architect, Peter Zumthor recognized the need for the person to experience the whole building through all of their senses. From the moment the user enters the building through the underground passage, from the hotel to the actual spa; their body undergoes many postural changes. This passage into the baths is much like a cave experience. The space is short and narrow, causing the body to feel compressed and recognize that they are underground at that point. The movement through the space is fast until the person reaches the changing room entrance. At this point the body recognizes the water seeping out of the walls through spouts. The calming sound of the water relaxes the body and leaves a cue to turn into the changing rooms. The changing rooms act as a transition point from this cave like passage into the larger bathing rooms. Once in the larger bathing area there is an obvious change in the body, it is now more relaxed and calm. The hard surfaces of the interior finishes echo the sound water splashing, along with the dim lighting and soothing temperature cause the body to act this way. Moving from the entrance level



down to the bathing level the person has to move down a set of stairs which have a subtle rise to run enabling the person to look around as they are traveling down.



Once on the bathing level the person moves from bathing room to bathing room or what peter Zumthor call the blocks. These blocks are the structural modules that make up the building. Inside these blocks are the individual bathing rooms that set up different bodily experiences. These spaces vary in size, temperature, smell, texture, and seating arrangements. The first space that will be talked about is warmest bathing room. When entering this space, the occupant has to move down a corridor that is narrow and tall. They can see the back wall with two ledges to sit on. The water is hot, 42 degrees centigrade, which, along with the visual elements of scale and seeing only the back wall makes the body posture tense and anxious, because the person is unaware of what is around the corner. Once the person gets down the stairs the room opens up and they are able to see other people in the room. There is a two tiered ledge to sit on against two walls. The users will quickly move into the space and find a place to sit where they do not feel like everyone is staring at them. When they find a seat and are fully submerged in the water there body posture changes. As the body relaxes the feet and arms begin to float while their gaze is directed up the tall red walls. The second tier of seating poses as a multi functional element which changes the posture of the body depending on how the user inhabits the space. If they are in the water it creates a spot where they can rest their head and stair up at the tall narrow space. The other use is to get out of the water and sit on this ledge if they are too hot. When sitting on this ledge the wall behind them is vertical which does not ergonomically accommodate leaning back on so they are forced to put their hands on their knees and lean forward. Once the person is done with this room they will slowly get up and make their way to the stairway exiting relaxed and calm.

The next block is not necessarily about relaxation. The

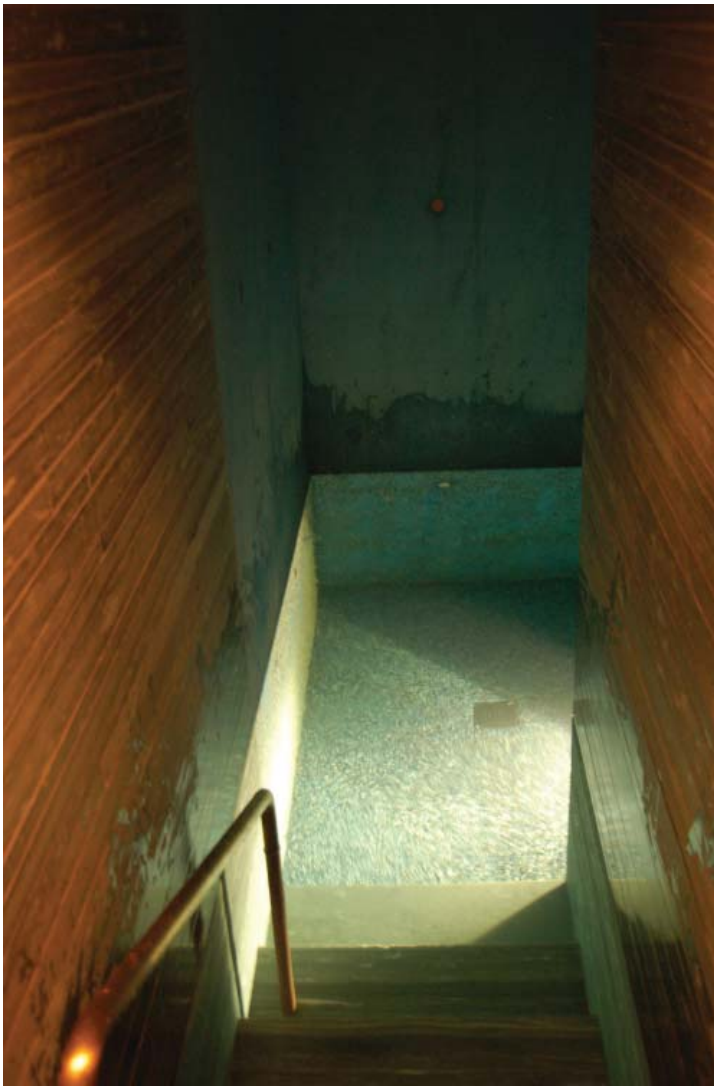
water temperature is the coldest of all of the blocks, 14 degrees centigrade. This space, for obvious reason is situated just across the hallway from the last room that was discussed. When entering the room the user cannot see the water because there is a ninety degree turn to get into the bath. This is set up so that the person has to experience a temperature change in the air while entering the space. As the person enters they can feel the cool air coming off of the water and as soon as they make the turn they see a small room with blue walls. All of these elements cause the body to tense up and prepare for the cold. After making the daring plunge into the cold water their body for a moment curls up under that water and then they quickly exit and go to a warmer pool. The space inside which the person probably doesn't pay attention to is small, and has no places to sit. This is because the user is too cold and does not linger for long. There is a direct relationship with the environment and what the architect wants the body to do. He does not want or expect the person to spend a large amount of time in this room, so he makes it smaller without any elements for sitting.

The next blocks water temperature is 32 degrees centigrade which enables the person to spend more time in the water. The procession into the space is much different than the others. The user walks down a set of stairs into a larger pool that has a view from the upper level down into the pool. At this point the space is open to the rest of the bath area and becomes a transition space for people to gather, allowing them to be louder and have a public conversation. There is only one small seat that is located below the opening to the level above which allows peoples body posture to vary in this space. You will find people standing, leaning against walls or submerged in the water up to their necks moving through the space. There is a small opening just to the right of the stairs that is the transition into the actual block. This low opening is just below head height which makes people immerse themselves in the water, changing their body posture into a crouched walking position. Once in the main space they are in this same crouching position as they find a spot

against the wall. All four wall have no seats or ledges, instead there is a brass railing that sits just above the waterline which changes the body posture once again. Because of the properties of the water it allows the person to feel weightless and enables them to hang from this railing, keeping their head above water with little effort. The occupant will occasionally turn around and hang from the railing while examining the texture of the wall. The wall finishing is rough cut stone which give the space a much different acoustic quality. This stone in particular makes the person feel as though they are in the hill side, because of the rough cut texture. Since the stone throughout the building is quarried less than a mile away the occupant subconsciously connects to more than just the building. They connect to the place on a primitive level recognizing the stone and the hot springs come from the surroundings. The scale of the space along with the finishing makes the reverberation similar to a church and if a person in the space is humming it sounds similar to monks chanting. The lighting within the space is artificial and is located below the water pointing up, creating interesting shadows on the rough cut stone Walls. The water level causes the body posture to always be in a kneeling or crouched position. The scale, acoustics, and lighting make the gaze of the occupant go upward while hanging on the rail. Their bodies will float up towards the surface of the water, changing the way the space is viewed and the position of the body. People inside the space rarely stand up because of the water level and the transition element into the space set up by the architect.

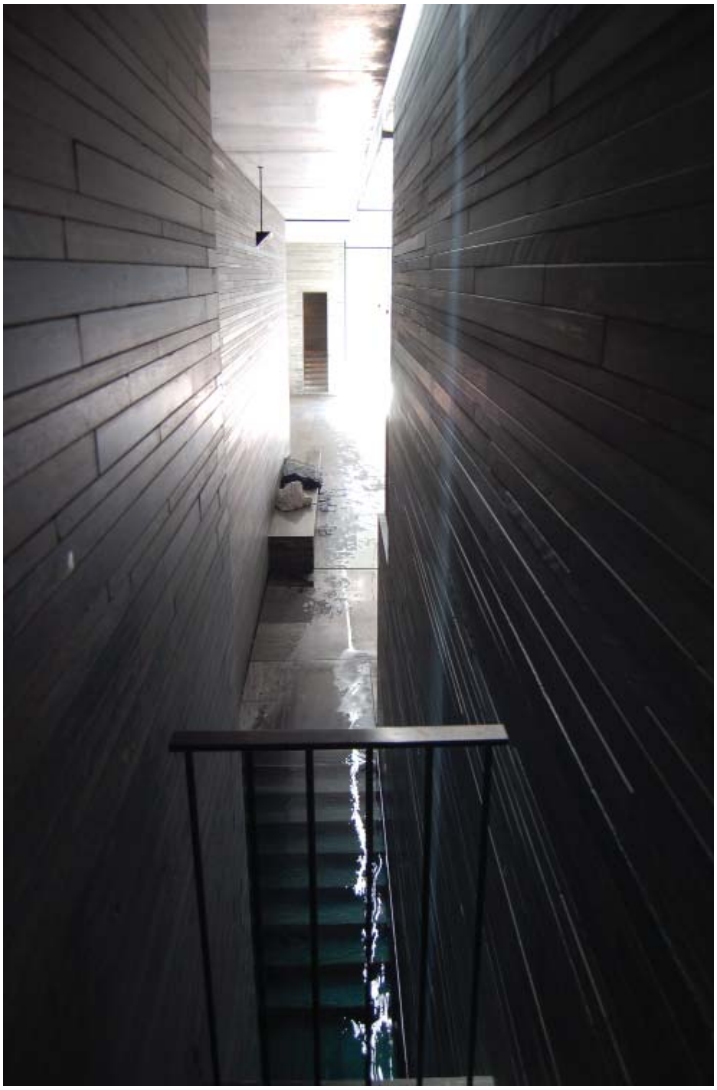
"My way of inventing architecture starts with a strong image, not just an idea. The idea is always accompanied by a powerful image, and the visual of a bodily or physical event" [22]

In the design of this piece of architecture the architect exploited all of the human senses by setting up different environments for the humans' posture to respond in different ways. Even though the building is based on similar "block" modules, each space within them is choreographed to make the



[22] *Architectures*. Dir. Richard Copans. Arte Vidéo, 2001. DVD.

body have new experiences within them.



The Incline
Manitou, Colorado

The Incline is currently an abandoned incline railways system that is being used by locals as a source of exercise. The Incline was originally used to support the construction of a hydroelectric plant and its waterline in 1907. It was a 1 mile long cable tram railway that, after serving its purpose for the hydroelectric plant, was turned into a tourist attraction, taking people up and down the 2000 foot vertical railway. Due to rock slides, making the cost of maintaining the railway to high, the Incline was closed down in 1990. The only remnants of the railway are the wooden ties that create an opportune setup for hikers to take on a challenge. I decided to take on this challenge, which led to an interesting bodily experience. [23]

"A greater inclination slows down the movement and demands more expenditure of energy; conversely, a lesser inclination speeds up the movement and requires less effort from the body"[24]

At the beginning of the hike the trail starts out as a subtle sloped trail, with no railroad tie risers. My pace is steadily at the beginning of the trail; my gaze is directed upward to the unusually straight hiking trail. At this point in the hike my body posture is in a relatively normal configuration for walking. My back is straight with my arms to my side. I soon as I reach the point on the trail where the rail road ties create steps with a long run my body posture is affected by making me more aware of my foot placement. My gaze in now directed downward at the ever-changing placement of ties, making sure that my footing is in the correct location. Every once and a while my body will get used to the rhythm of the steps allowing me to look up again at my destination that does not seem to be getting any closer. The altitude begins to wear on my body; I begin to breath deeper



11 http://whitespider.broeking.com/incline.htm



12 http://4.bp.blogspot.com/_ks1ZRojRD8k/TH2mstAGzuI/AAAAAAAACmk/yIFFiT1qV18/s1600/incline_up.jpg

[23] "History of the Manitou Incline." Manitou Incline. Web. 09 Jan. 2011. <http://www.manitouincline.net/history.htm>.

[24] Malo, Alvaro, and Christopher Trumble. *"Matter and Memory."* ACSA International Conference (2003): 151-56. Print. Pg 153

gradually feeling more and more fatigued. The trail starts to get steeper and steeper changing the configuration of the steps. At this point my body needs a break so I pull off of the trail where I find refuge perched against a rock. With my hands on my knees I am able to look back down the trail for the first time and see how far I have come. To my surprise the elevation change seems much greater from this vantage point, opposed to that from the bottom. Once I feel rested I get back on the trail gazing upward at the climb to come. My eyes are quickly focused back down to the steps where the configuration of the ties has drastically changed to a much steeper rise to and a shorter run. My posture has changed from a normal up right position to a hunched over, fatigued position where I sometimes find myself placing my hand on my knee for additional support. Even though my body is tired it is still alert because of the loose gravel that exists in-between the ties. In some spots the gravel has washed onto the shifted ties making me slip, and forcing my body to catch itself. At the middle of the climb the trail becomes so steep that I have to use my hands on the ties for support and balance. The change in slope along with fatigue has my body moving slower in a hunched over posture. When I am not having to use my hands on the steps for balance they are on my knees attempting to help my leg muscles lift my body up the mountain. At various points during the climb I have to stop for rest. My posture during these resting points depends on the surrounds. If there is a good rock or log to sit on I will sit, if there isn't anything to sit on I will place my hands on my hips or over my head. While resting I push my chest out to stretch my back, giving some relief from the constant hunching over that I am doing during the climb. In almost each situation I will orient myself to be looking back down the hill. Right before I start to climb I will gaze up to see how much farther I have to go. There is a point on the trail that seems as if it is the top because the slope levels off a little giving the first timers a false sense of being done. Once I reach this point I am disappointed to see that there is one last steep section until I reach the top. Once I am at the actual top I see a few people, all sitting on anything they can find, some are on rocks, others are on the last few steps of the trail, but I find a small concrete

pad to sit on that is a remnant from the structure that was used for the mechanism that was used to pull the cars of people up the railway. Here I sit, exhausted with my hands on my knees breathing deeply, excited that I finally made it to the top.



13 ”History of the Manitou Incline.” http://1.bp.blogspot.com/_ks1ZRojRD8k/TH2mmNeZBvI/AAAAAAAACmU/G8d8XDN-3U8/s1600/incline_down.jpg

Final Statement

The human body is a sacred element that enables us to interact with the environment in profound ways. Architecture is important to this interaction between the body and the environment. Architecture is much more than a building; it encompasses every element that is designed to interact with the human. As designers it is important to understand that people perceive the environment, not just through sight, but through the entire body. When people occupy an environment their senses are stimulated, allowing them to react to the environment through body posture. Sight, sound, touch, taste, and smell hold equal weight when a person occupies and environment. The senses are what allow a person to experience spaces such as architecture. Each sensory quality has been detailed to maximize the persons experience in the environment; whether it is the instinctual quality of survival, or the social interaction between others, the body is always alert and responsive to the environment. Body posture although a simple idea, is complex and can be determined by a variety of elements in the environment. The environment that humans inhabit are intricate in the way it affects the body. There are so many elements interacting with the senses that create numerous variations of posture, elements that can be controlled by design and elements that are uncontrollable. Some elements that are uncontrollable are out door temperature/climate, social interaction, and other elements. Just because these elements are uncontrollable doesn't mean that designers can't understand them and utilize them in design. The elements that can be controlled such as scale, materiality, indoor temperature, and overall configuration are even more important to understand the affects one posture, because these are the elements that we can manipulate, setting up specific moods or feelings of space. Architecture is an environment that informs the person of their body, while generating new experiences that can reside in their memory. It is important to understand that experiences in architecture correspond to body posture and as designers we can plan for some of these interactions and at the very least try to understand how and when these interactions will occur.

"The ultimate meaning of any building is beyond architecture; it directs our consciousness back to the world and towards our own sense of self being. Significant architecture makes us experience ourselves as complete embodied and spiritual beings. In fact, this is the great function of all meaningful art"[25]

[25] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 11

Program

Quantitative program description

Hotel _

rooms _	8,000 sq ft.
lobby _	1,600 sq ft.
restaurant _	1,8000 sq ft.
kitchen _	1,000 sq ft.
service _	2,000 sq ft.
circulation 20%	2,960 sq ft.
mechanical 10%	1,489 sq ft.
total _	19,249 sq ft.

Baths _

bathing area _	8,700 sq ft.
changing rooms _	700 sq ft.
reception _	400 sq ft.
sauna rooms _	200 sq ft.
therapy rooms _	1,800 sq ft.
service _	1,000 sq ft.
circulation 20% _	2,560 sq ft.
mechanical 10% _	1,536 sq ft.
total _	16,896 sq ft.

Qualitative program description

Thermal Baths Retreat

The program for this thesis is a thermal bath with a spa and hotel components. The bathing facilities will be open to the public on a daily basis. The spa and hotel components are the retreat aspect of the program allowing people to stay for multiple days. The hotel will incorporate a restaurant that will be available to those staying at the baths and to the rest of the public. Bozeman Montana is a town that offers many outdoor activities that connect people with their environment, such as hiking, biking, skiing, fishing, along with many other activities. The Thermal Baths Retreat will allow the people in Bozeman or surrounding towns to come to unwind and relax, connecting them with the environment in a unique way. Bathing is a common activity that people take part in after extraneous activities for healing and relaxation. The hot springs allows the person to experience the heat of the subsurface of the environment that we inhabit.

The architect Peter Zumthor, a Pritzker Prize winner, describes bathing as "an almost mystical or mythological ritual of cleansing and relaxation."[28] This mystical experience occurs because of the ritual act of ridding oneself of materiality and submerging themselves in water. Bathing is a healing experience that encompasses the body as a whole. All of the senses are engaged during this ritualistic act of cleansing and healing. Julani Pallasmaa, the author of The Eyes of the Skin, states that "A walk through a forest is invigorating and healing due to the constant interaction of the sense modalities." [27] Bathing is similar to a walk through a forest for its invigorating and healing qualities, but it is different in the way that the sensory receptors of the body interact with the environment. The posture changes that occur while bathing are more dramatic than that of a hike. The body experiences a variety of different texture, temperatures, resistance, scales, and social interactions in a plethora of configurations while bathing. While bathing the person experiences more resistance while in the water, at the same time

their bodies feel lighter in weight because of the buoyancy of the body in water. This alone has a unique effect on the person's body and creates an experience that cannot be experienced anywhere else on earth. The act of submerging and emerging from water accentuates temperature felt on the skin of the body. When one emerges from a pool the water on the skin enhances the coldness of the air. Because of the removal of everything material from our bodies, we experience textures through points on our body that we do not normally encounter. Our feet touch the cold or warm surface of the ground which causes us to be more aware of the materiality of the ground plane. The bathing experience is a unique healing experiences that invigorates the body through all of the senses and the goal of the program for the bath part of the structure it to allow the interaction between the building and person be consciously designed while understanding how the body posture will be perceived in the space.

The spa and hotel aspect will also create experiences that inform the occupant of their body and environment. The project is located in a valley with a variety of grand views that will be incorporated in the design and will be taken into consideration how they affect body posture. The configuration and scale affect the way one views the environment generating different postural experiences. The overarching goal of this program is to design spaces that affects, informs, and interact with the body through different postural configurations.

[2] *Architectures*. Dir. Richard Copans. Arte Vidéo, 2001. DVD.
[25] Pallasmaa, Juhani. *The Eyes of the Skin*: Architecture and the Senses. Chichester: Wiley-Academy, 2007. Print.Pg 41

Code analysis
2006 IBC

Chapter 3 Use and Occupancy Classification

Section 310_ Residential group R
hotel _ R-1

Section 303 _ Assembly group A
baths_ (swimming pools, indoor, without spectator seating)
A-3

Chapter 6 Types of construction

602.2 Type I and II
Type I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

Table 602: Fire resistance rating requirements for exterior walls based on fire

Separation distance

occupancy group A and R where the fire separation is greater than 30 feet there are no requirements for exterior wall fire rating (refer to table 602)

Chapter 10 Means of egress

Section 1004: occupant load

(refer to table 1004.1.1)

Swimming pools

_ pool 50 gross for 6,000 sq ft.=120
_ deck 15 gross for 2,700 sq ft.=180

Hotel (residential)

_ 200 gross for 19,249 sq ft.=96

occupant load _ 396 people

Section 10005 Egress width

1005.1 Minimum required egress width. The means of egress width shall not be less than required by this section. The total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by the factors in Table 1005.1 and not less than specified elsewhere in this code. Multiple means of egress shall be sized such that the loss of any one means of egress shall not reduce the available capacity to less than 50 percent of the required capacity. The maximum capacity required from any story of a building shall be maintained to the termination of the means of egress

Section 1015: exit and access doorways

1015.1 Exit or exit access doorways required
(refer to table 1015.2.1)

SECTION 1019 - NUMBER OF EXITS AND CONTINUITY
(refer to table 1019.1)

_ for floors with occupancy load 1-500=2
_ for floors with occupant load 501-1,000=3
_ for floors with occupancy load greater than 1,001

Chapter 29: Plumbing Systems

2902: Minimum Plumbing Facilities
(refer to table 2902.1)

A-3

water closet
male-1 per 125 1
female-1 per 65 2

lavatories
1 per 200 1

R-1

1 per sleeping unit

site



View of existing site

History

The Madison valley was occupied by Native American Indians, who utilized the surrounding cliffs as buffalo jumps for 2,000 years. A buffalo jump is a natural semicircular cliff that allowed the Native Americans to run herds of buffalo off the cliffs. The Indians would utilize every aspect of the buffalo for different forms of survival. The jumps cased to be used because of the introduction of the horse in about 1700. Just as the buffalo was utilized by the Indians, the land is utilizes in the same way today. After the settlement of the west people began to harvest the land for wheat, corn and other natural resources. The land in the Madison valley is still being farmed today.

The plot of land that will be used in this thesis originally had a private hot springs called Tice Springs. These hot springs are no longer being used, but the remnants of the pool still exist with hot water boiling up from the earth. There is a fence around the pool with parts of the pump systems scattered outside of the fence. The fence is there to keep out the cattle that graze on the surrounding land. [28]

Buffalo Jump near site



[28] *"Madison Buffalo Jump State Park." Official State of Montana Vacation, Recreation, Accommodations and Travel Information Website. Web. 12 Jan. 2011.*

site description

Logan Mt Usa (45 57 34 n, 111 26 44 w)

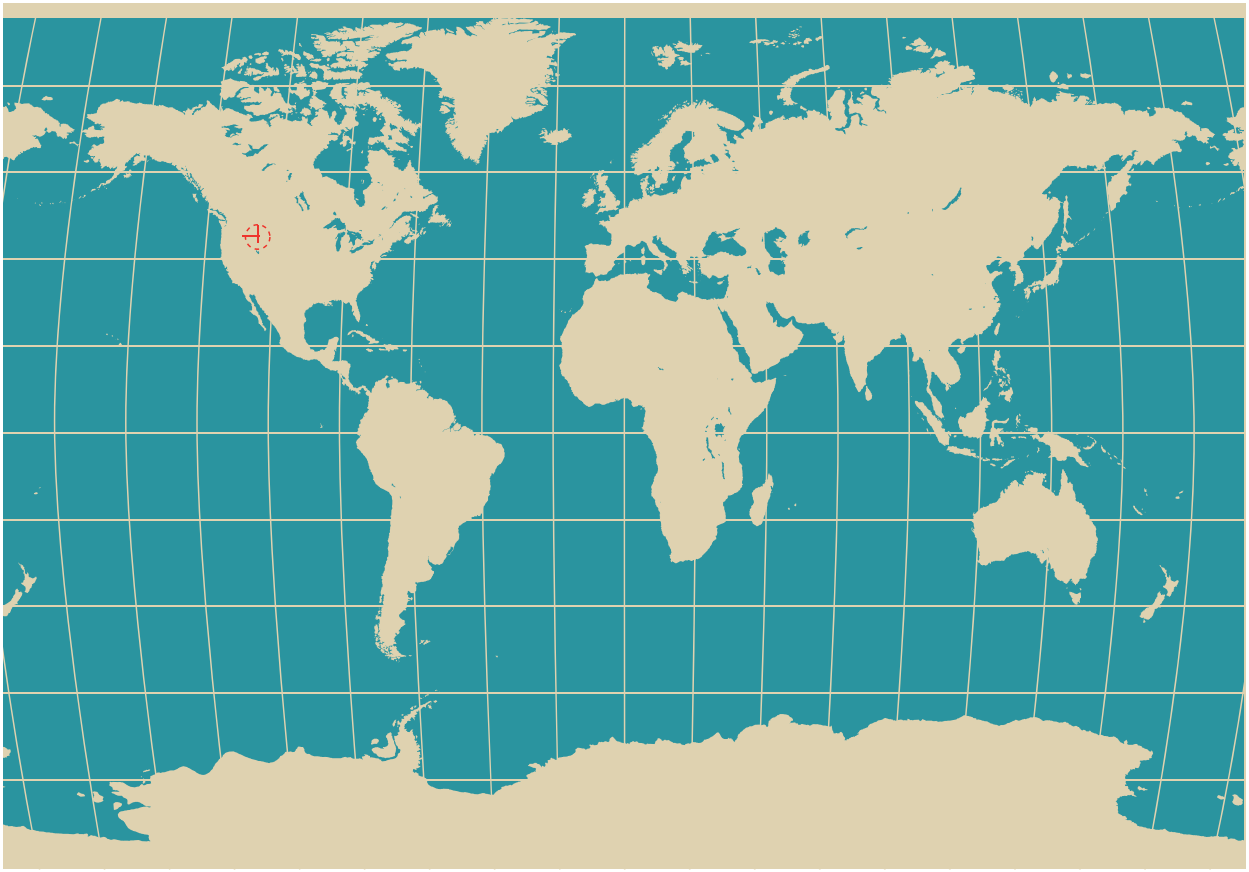
located 23 miles west of Bozeman mt on I 90

elevation 4470

BOZEMAN 6 W EXP FARM, MONTANA (241047)
Period of Record Monthly Climate Summary
Period of Record : 11/1/1966 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.6	38.3	45.9	55.6	64.8	73.0	82.0	81.8	71.2	58.4	42.4	34.1	56.8
Average Min. Temperature (F)	12.4	16.3	22.4	29.8	37.7	44.1	49.0	47.6	39.9	31.3	20.8	13.0	30.3
Average Total Precipitation (in.)	0.58	0.51	1.05	1.63	2.67	2.78	1.42	1.27	1.48	1.42	0.86	0.59	16.28
Average Total SnowFall (in.)	8.7	6.1	10.1	7.6	1.4	0.1	0.0	0.1	0.4	3.6	8.0	8.4	54.3
Average Snow Depth (in.)	4	3	2	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record.
Max. Temp.: 99.8% Min. Temp.: 99.8% Precipitation: 99.7% Snowfall: 99.4% Snow Depth: 97.7%
Check Station Metadata or Metadata graphics for more detail about data completeness.







Bridger Mountain Range to the north





Madison Mountain Range to the south



Veiw to the west



Veiw to the east



View overlooking the site. Taken from east of the site



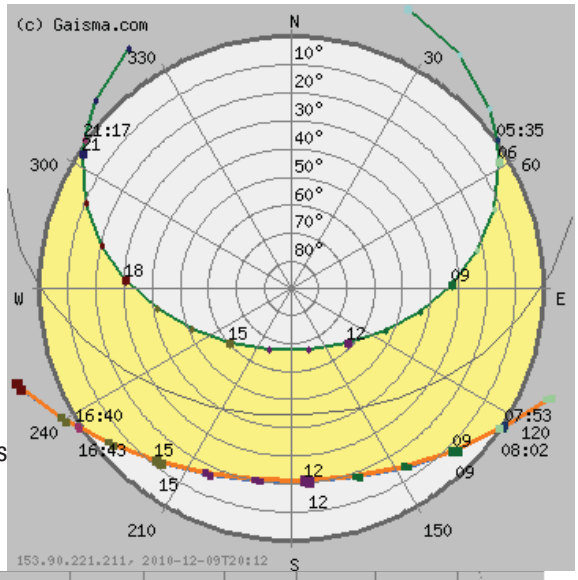
Steam still rising from the existing hot springs

Qualitative Site Analysis

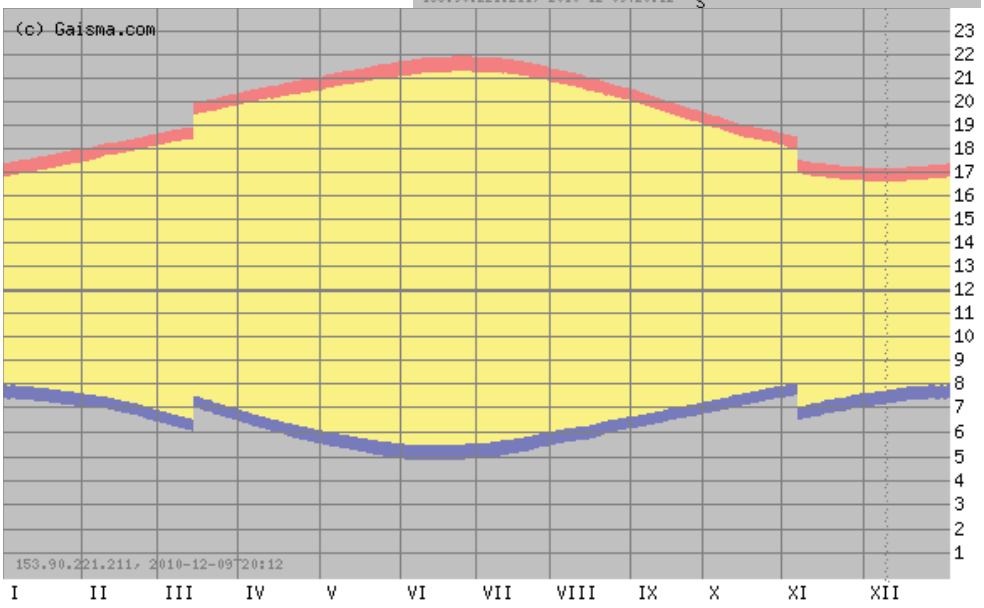
The site is located 10 miles south of Logan Montana, in the Madison Valley. This site is nestled between two plateaus. These plateaus are located to the east and west of the site, creating a corridor which directs ones attention to the north and south where the valley and plateaus frame large mountain ranges. To the north is the Bridger Mountain Range and to the south is the Madison Mountain Range which contains Loan Mountain. While standing at the site, the immediate surrounding is a prairie style landscape; there are no trees, only tall grass and small bushes. The landscape is vast, and does not offer any natural shelter or places of refuge from the element. The plateaus to the east and west abruptly rise from the prairie landscape with steep hills and cliffs that have been carved out by the Madison River. The tops of the plateaus are relatively flat creating another horizontal plane that runs parallel to the ground plain of the prairie. The cliffs to the west of the site are more dramatic and are physically closer to the site creating dark shadows in the afternoon. To the west the plateaus rise from the ground more subtle with fewer cliffs and more hills, they are farther away from the site. The site allows for three different categorized views, prairie, plateau, and mountain landscapes, each at different levels of interaction with the person. The prairie interacts directly with the person because the person occupies the space through touch. The plateaus are close enough to the site where they can influence elements of environment such as light and climate, but they do not physically touch the person. The last layer is the mountains that only affect the occupant by vision from a distance. Each levels of interaction can change the way a person “feels” or responds to the environment. The site only has one element that responds to human scale, the long grass, other than that there are no rocks, trees or other elements that hint at scale of the environment. The lack of defined scale in the landscape makes the space “feel” open, free, and unconstrained. To some the landscape may make

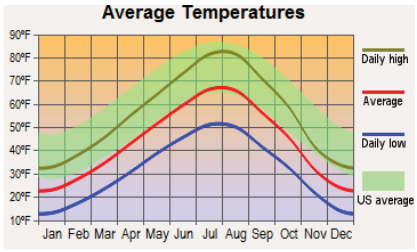
them “feel” small, alone or uncomfortable. When designing this building it will be important to respond to these feeling of the landscape with elements that responds to scale and comfort the person. This landscape has a variety of grand views and landscapes that can be incorporated in the design, while allowing the person to experience elements of the environment that they cannot see, like the subsurface of the earth through the hot springs, connecting the person on a more intimate level with the environment.

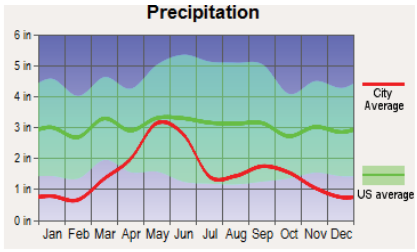
sun path diagram

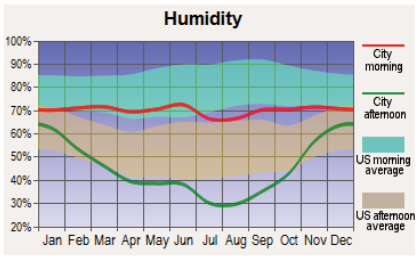


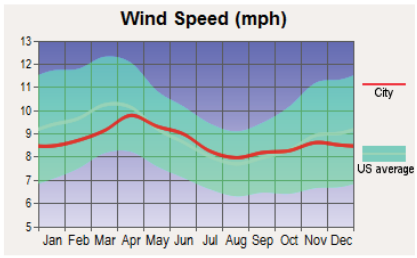
sunrise , sunset, dawn and dusk times graph

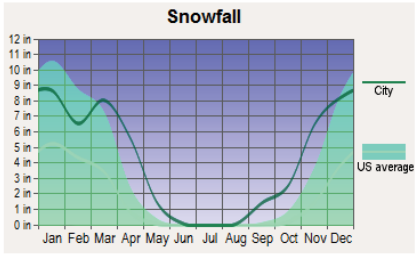


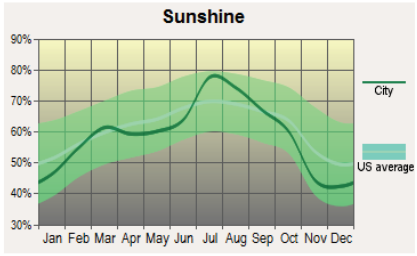


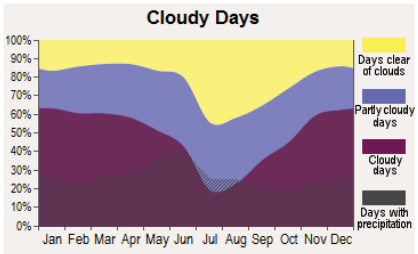






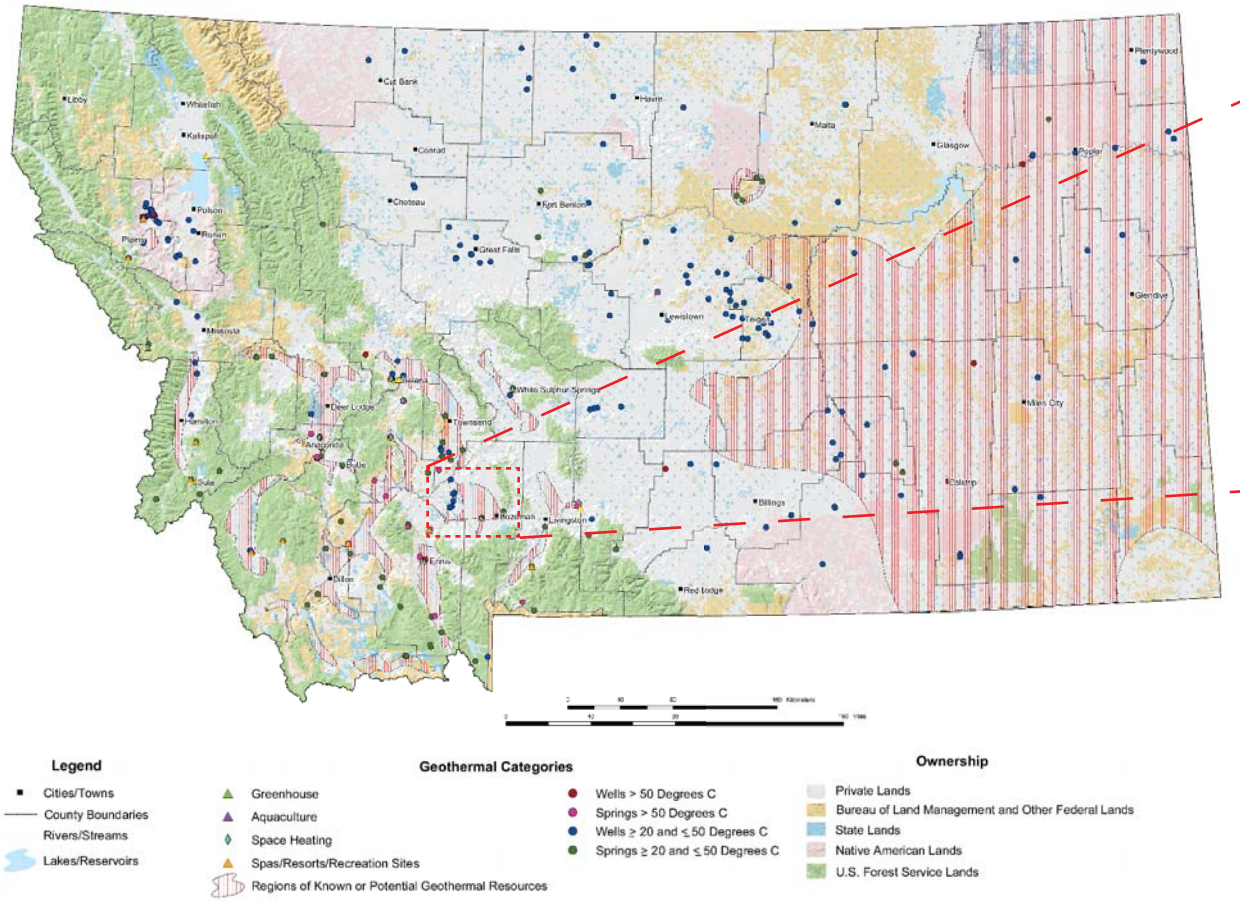




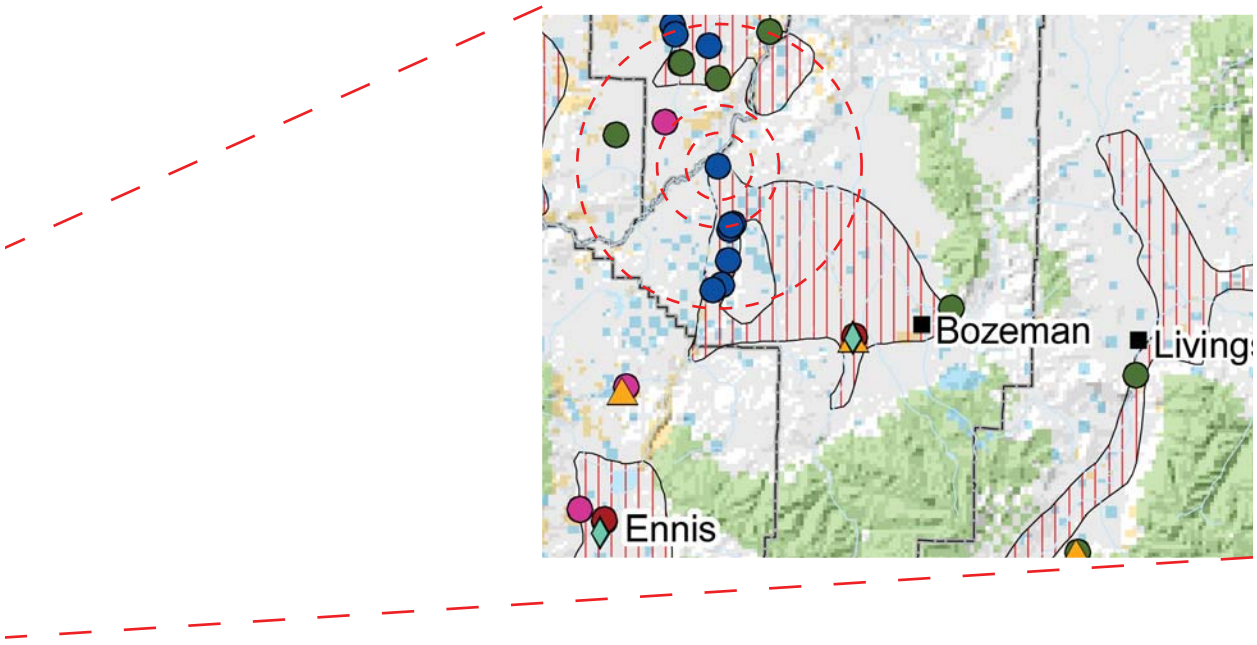


14 http://www.city-data.com/city/Bozeman-Montana.html

Geo thermal map of Montana



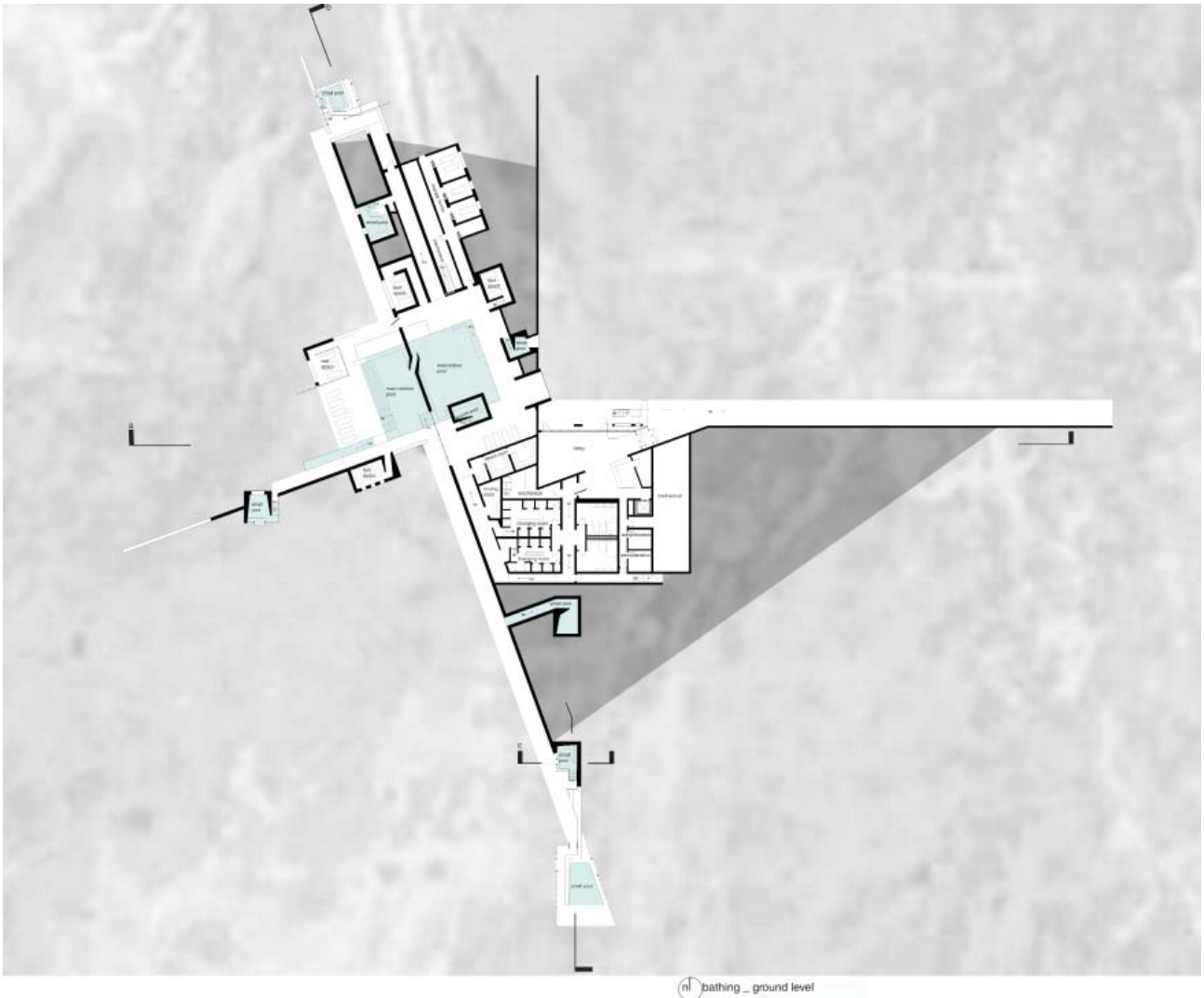
15 http://geothermal.id.doe.gov/maps/mt.pdf


Bozeman
Ennis

Building







nl bathing _ ground level



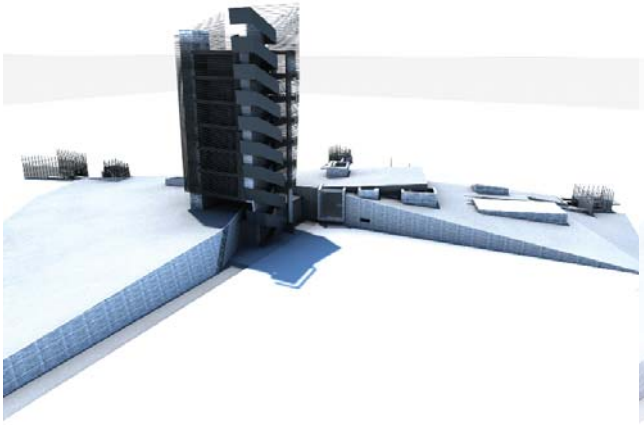
refectory _ level 7



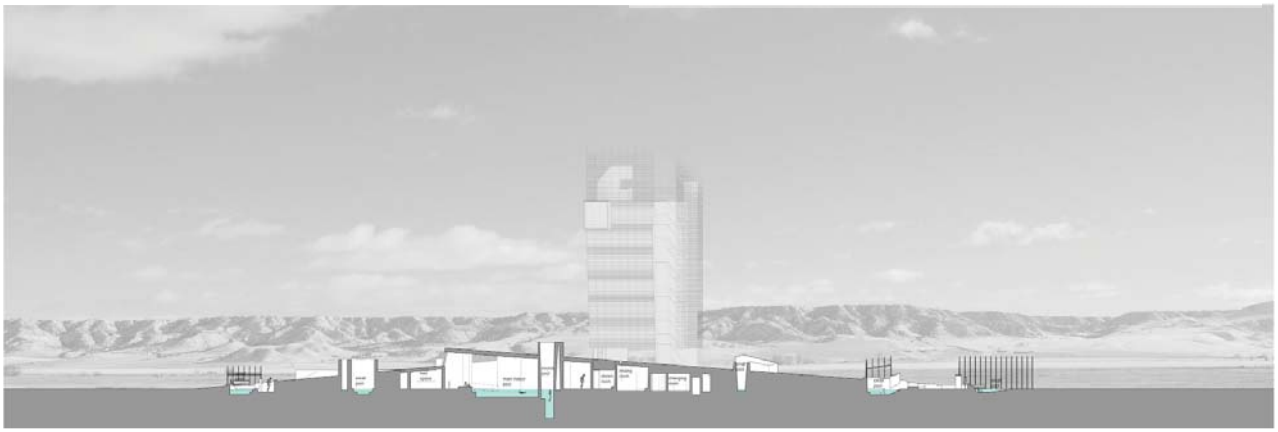
overnight accommodations _ level 6

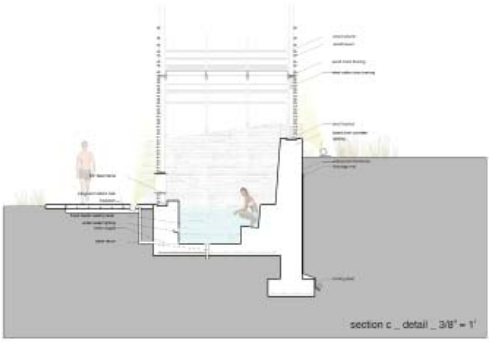


overnight accommodations _ level 2

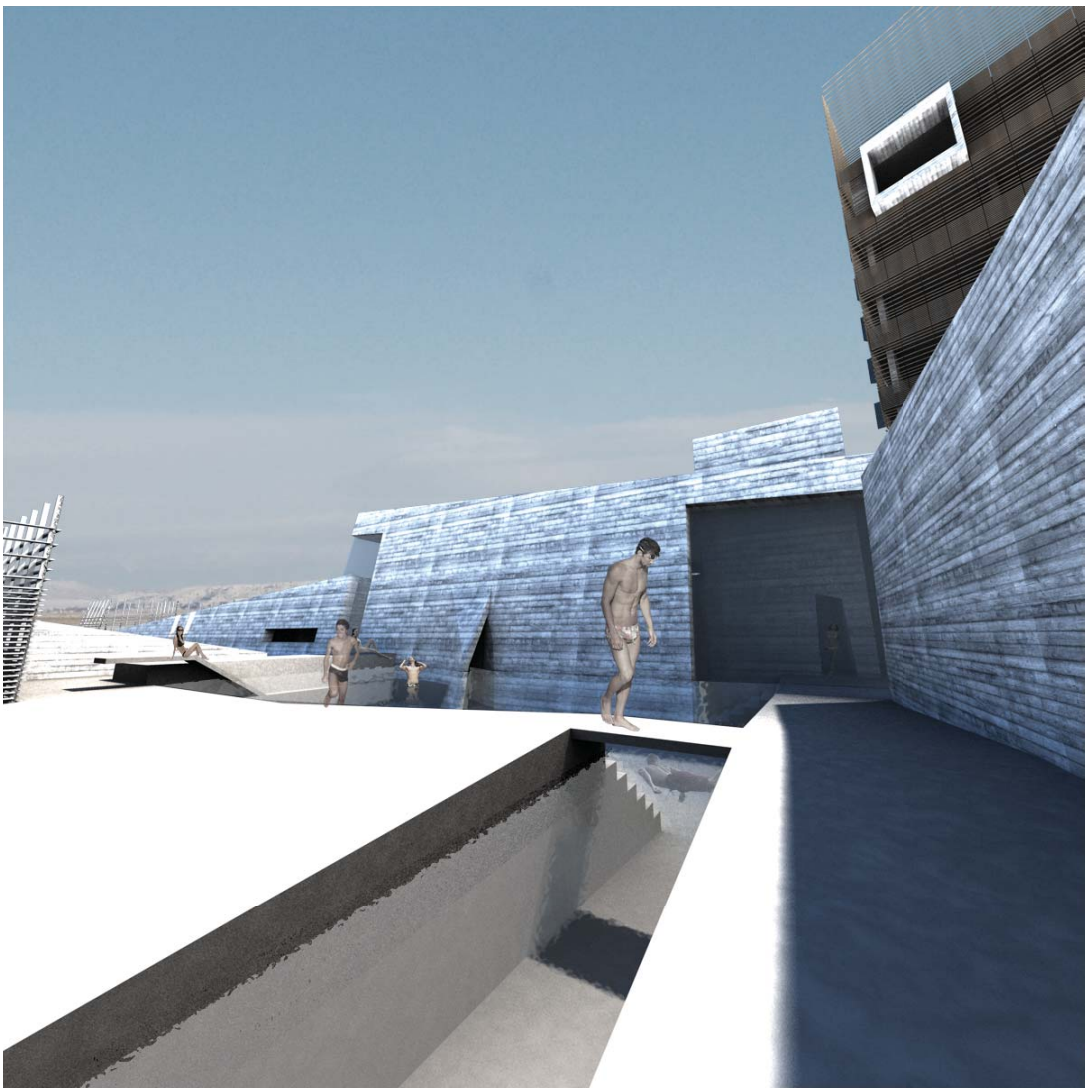






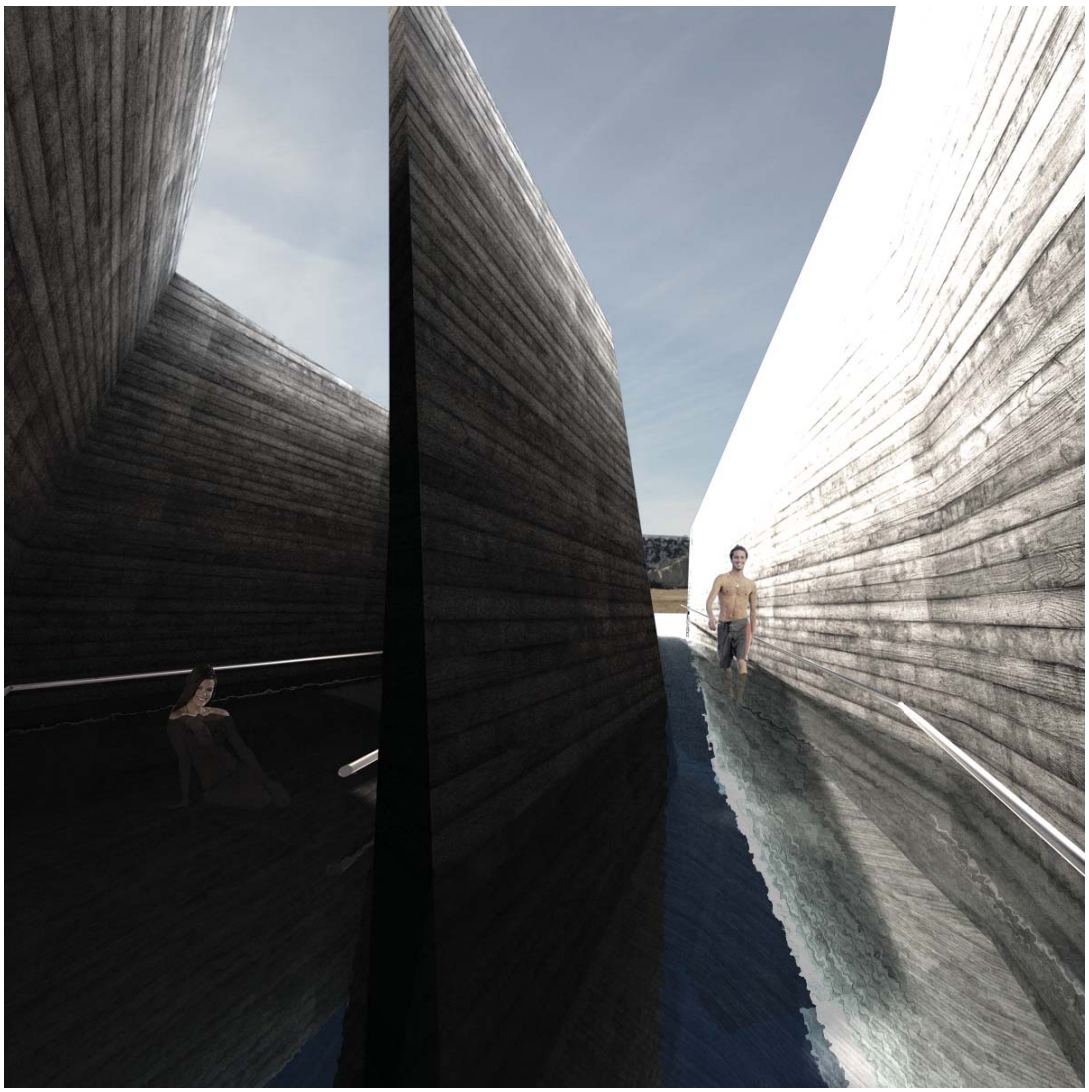

section c _ detail _ 3/8" = 1'


section a _









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Images

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2 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 168

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5 Thiis-Evensen, Thomas. Archetypes in Architecture. Oxford: Oxford UP, 1987. Print Pg 385

6 Thiis-Evensen, Thomas. Archetypes in Architecture. Oxford: Oxford UP, 1987. Print Pg 438

7 Ching, Frank. Architecture--form, Space, & Order. Hoboken, NJ: John Wiley & Sons, 2007. Print. Pg 107

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9 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 55

10 Hertzberger, Herman. Lessons for Students in Architecture. Rotterdam: 010 Publ., 2006. Print. pg 107

11 http://whitespider.broeking.com/incline.htm

12 http://4.bp.blogspot.com/_ks1ZRojRD8k/TH2mstAGzuI/AAAAAAAACmk/yIFFiT1qV18/s1600/incline_up.jpg

13 ”History of the Manitou Incline.” http://1.bp.blogspot.com/_ks1ZRojRD8k/TH2mmNeZBvI/AAAAAAAACmU/G8d8XDN-3U8/s1600/incline_down.jpg

14 http://www.city-data.com/city/Bozeman-Montana.html

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