CONNECTIONS

MATERIAL TIME & PLACE

This book is dedicated to my wonderful wife, Michelle. Without you I would not be where I am, you are my everything.

This thesis is submitted to the faculty of Virginia Polytechnic Institute and State University, by Bradley A. Boal, in partial fulfillment of the requirements for the degree of Master of Architecture. The thesis was defended on the campus of Virginia Polytechnic Institute and State University in Blacksburg, Virginia, on the 13th of May, 2005.

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Committee Member, William Galloway

Committee Member, Hans Rott

CONNECTIONS
MATERIAL TIME & PLACE

BY BRADLEY ALAN BOAL

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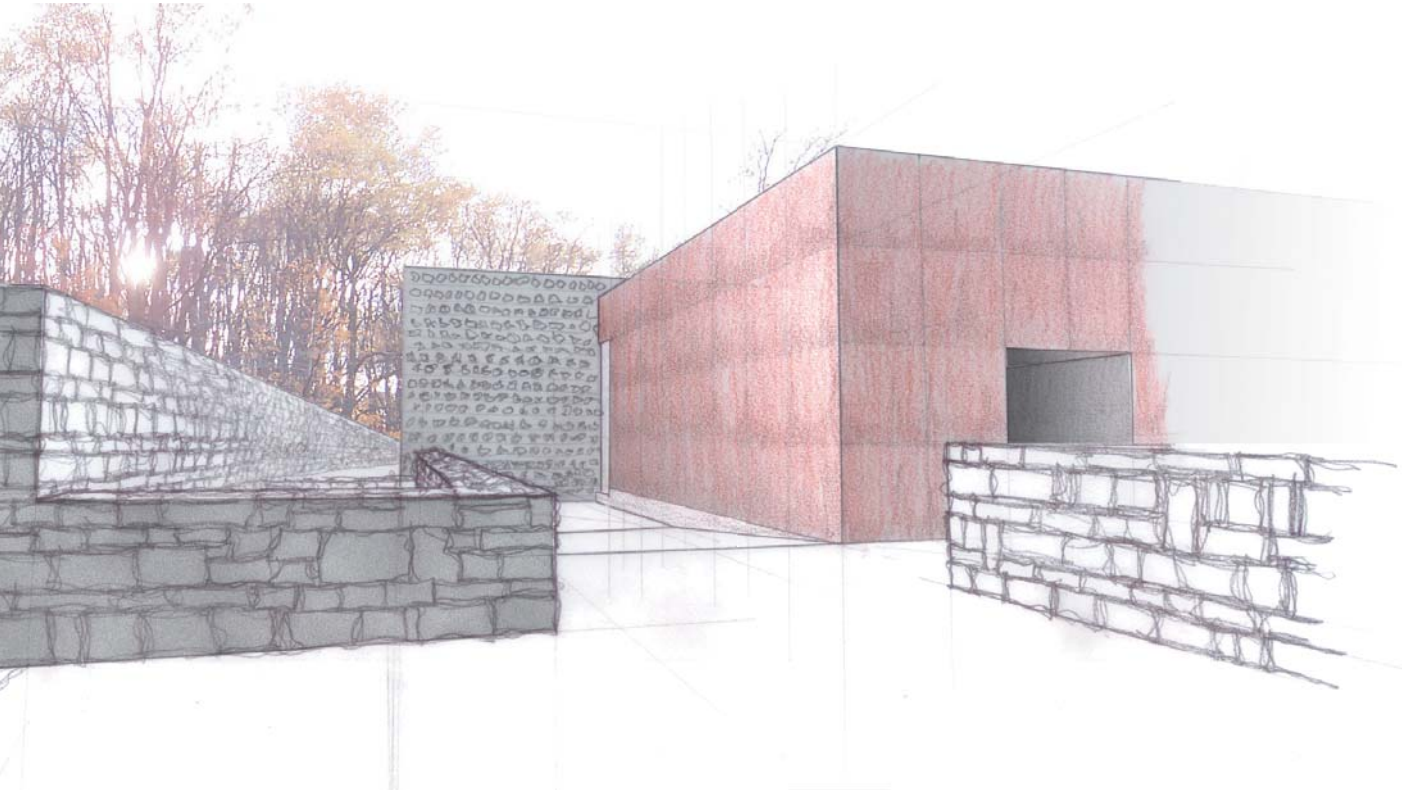
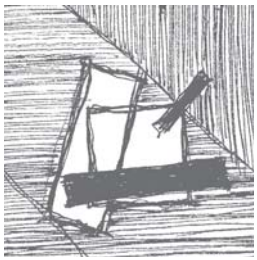


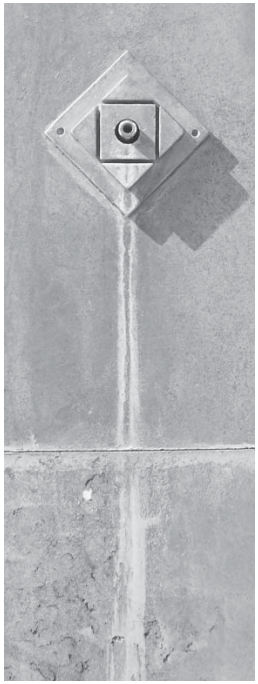
ABSTRACT

The way things connect with each other plays an important role in our everyday life. A work of architecture is inevitably a series of connections between objects, people, and places. This study is an exploration into the idea of strengthening the connections to a place, and perhaps it is possible to give the visitor a heightened awareness of the history of that place. As a part of what allows a building to connect with a place, history and memory play a vital role in the strength of the connection. A building can be a physical manifestation of the story of history and connect people to the past.

The materials we use to construct built environments play a crucial role in the connection of a building to a place. Inherently some materials embody the history of a site, and through the passage of time this history can be brought to the surface. The question then becomes can the material subtly project the history of the place to a visitor in such a way that it can be clearly understood. One way this can be accomplished is to make the material react with multiple senses. Obviously materials play a major role in our visual and tactile experience of a place, but how can the other senses be made aware of the surroundings.

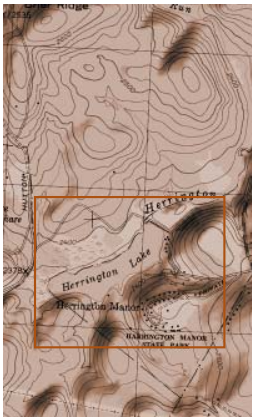


Each object we touch has a story to tell, perhaps how it was made, or maybe how it came to be in a certain place. So in this way a building is a compilation of stories of materials, and the relation of these stories can help us to understand a place. The stories embedded in materials can at the same time make us aware of the passage of time through their aging and decay. With these ideas we start to explore how the connections to a place occur.

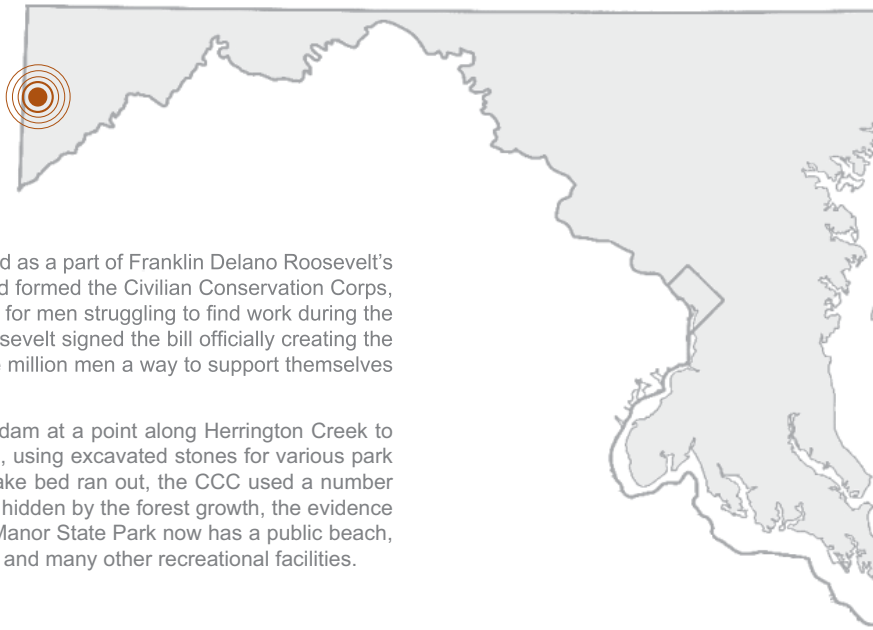


On the subject of architecture, it is not important to write the story of life, the dream of reality, but to enable the story between the characters to be read. - Wiel Arets[1]

THE PLACE



Nestled on the Allegheny Plateau of the Appalachian Mountains, runs Herrington Creek, named after Abjiah Herrington. Herrington was said to be a soldier with the Sandy Creek Rangers during the American Revolution. As the story goes, Herrington built a large manor house on land adjacent to the creek in the late eighteenth century. In 1906 some 2,000 acres of land including the creek, were donated to the state of Maryland.

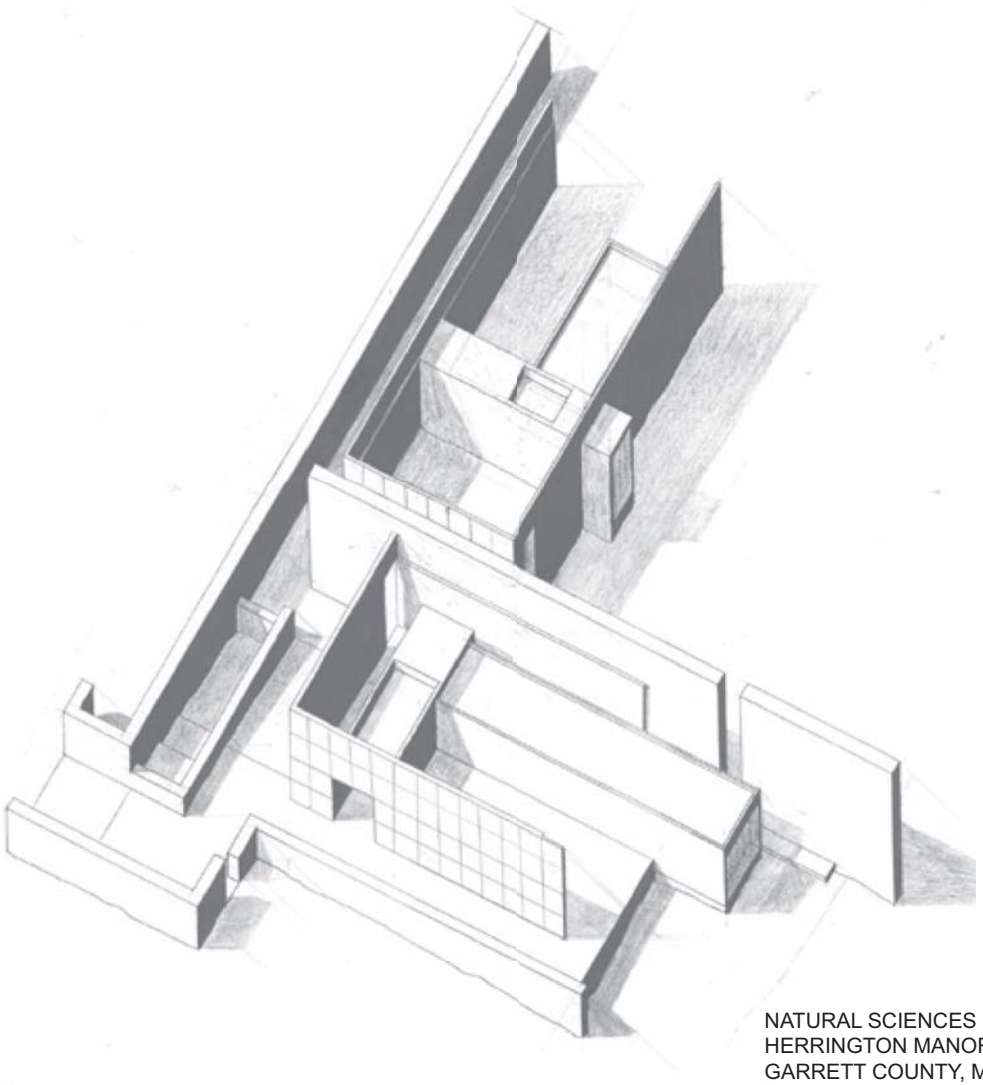


The idea of using this land for a state park was adopted as a part of Franklin Delano Roosevelt's "New Deal". As a part of the "New Deal" Roosevelt had formed the Civilian Conservation Corps, or the CCC as it became known. The CCC was a way for men struggling to find work during the depression to make money. On March 31, 1933, Roosevelt signed the bill officially creating the CCC. From 1933 to 1942 the CCC gave roughly three million men a way to support themselves and their families.

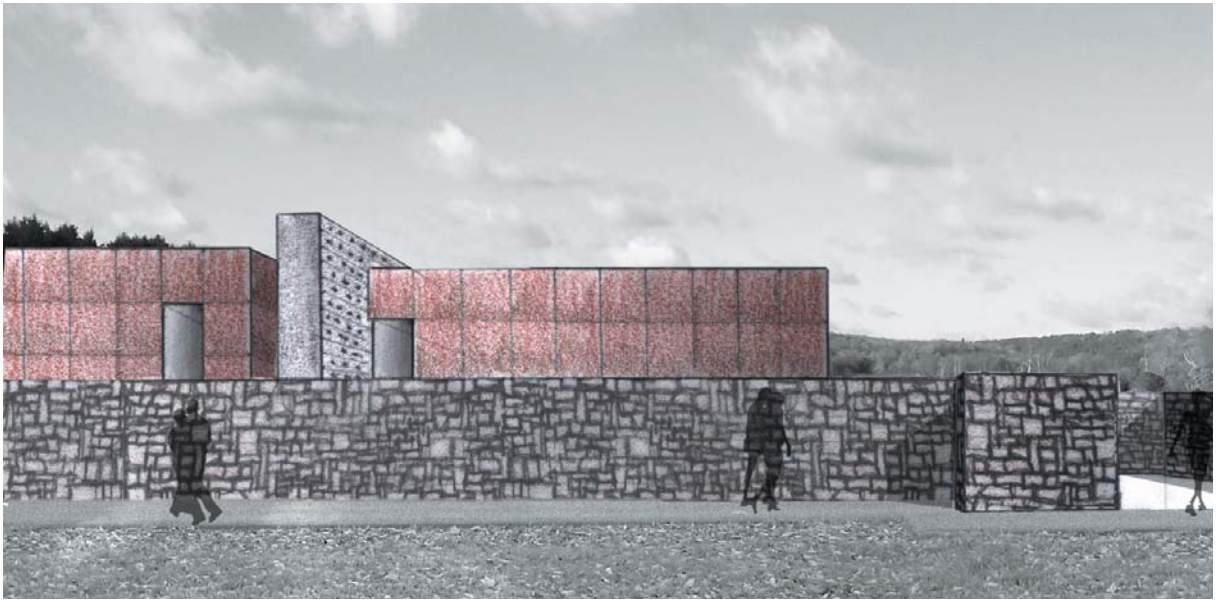
In 1939, the decision was made to place an earthen dam at a point along Herrington Creek to create a 53 acre lake. The men dug out the lake bed, using excavated stones for various park buildings and earthworks. When the stone from the lake bed ran out, the CCC used a number of small quarries nestled in the area. Although slightly hidden by the forest growth, the evidence of these quarries is still accessible today. Herrington Manor State Park now has a public beach, small rental cabins, hiking and cross country ski trails, and many other recreational facilities.

Herrington Manor State Park
Garrett County, Maryland
Longitude 79W 27’ 24”
Latitude 39N 27’ 20”

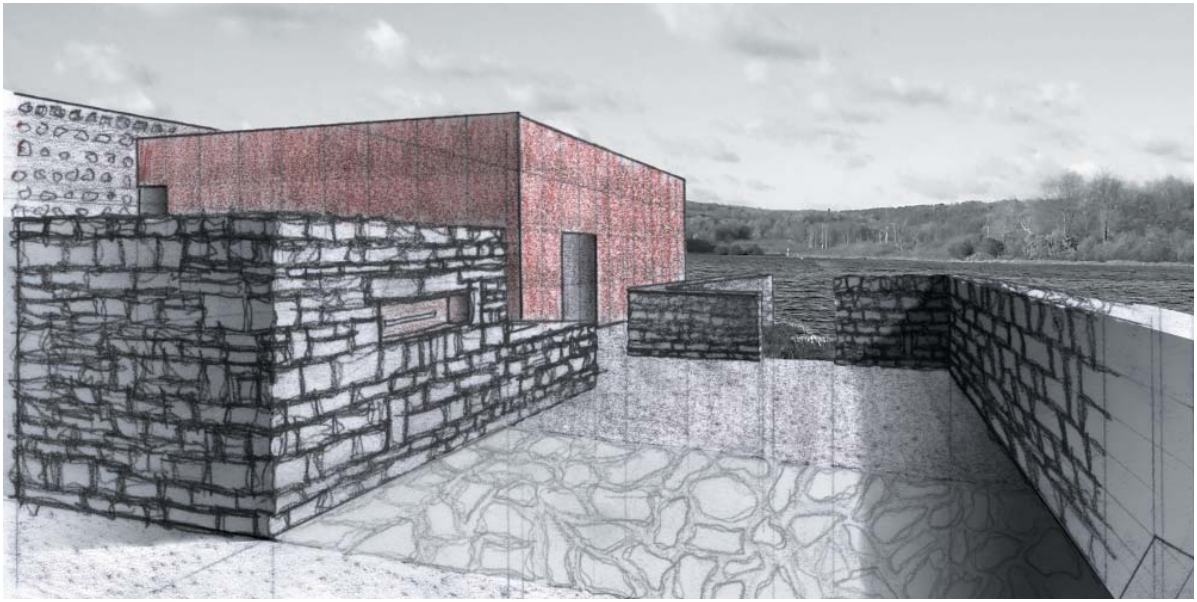
THE NATURAL SCIENCES CENTER

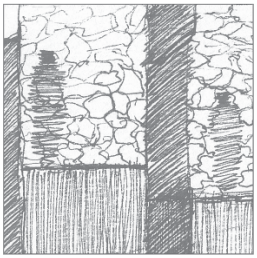


NATURAL SCIENCES CENTER
HERRINGTON MANOR STATE PARK
GARRETT COUNTY, MARYLAND

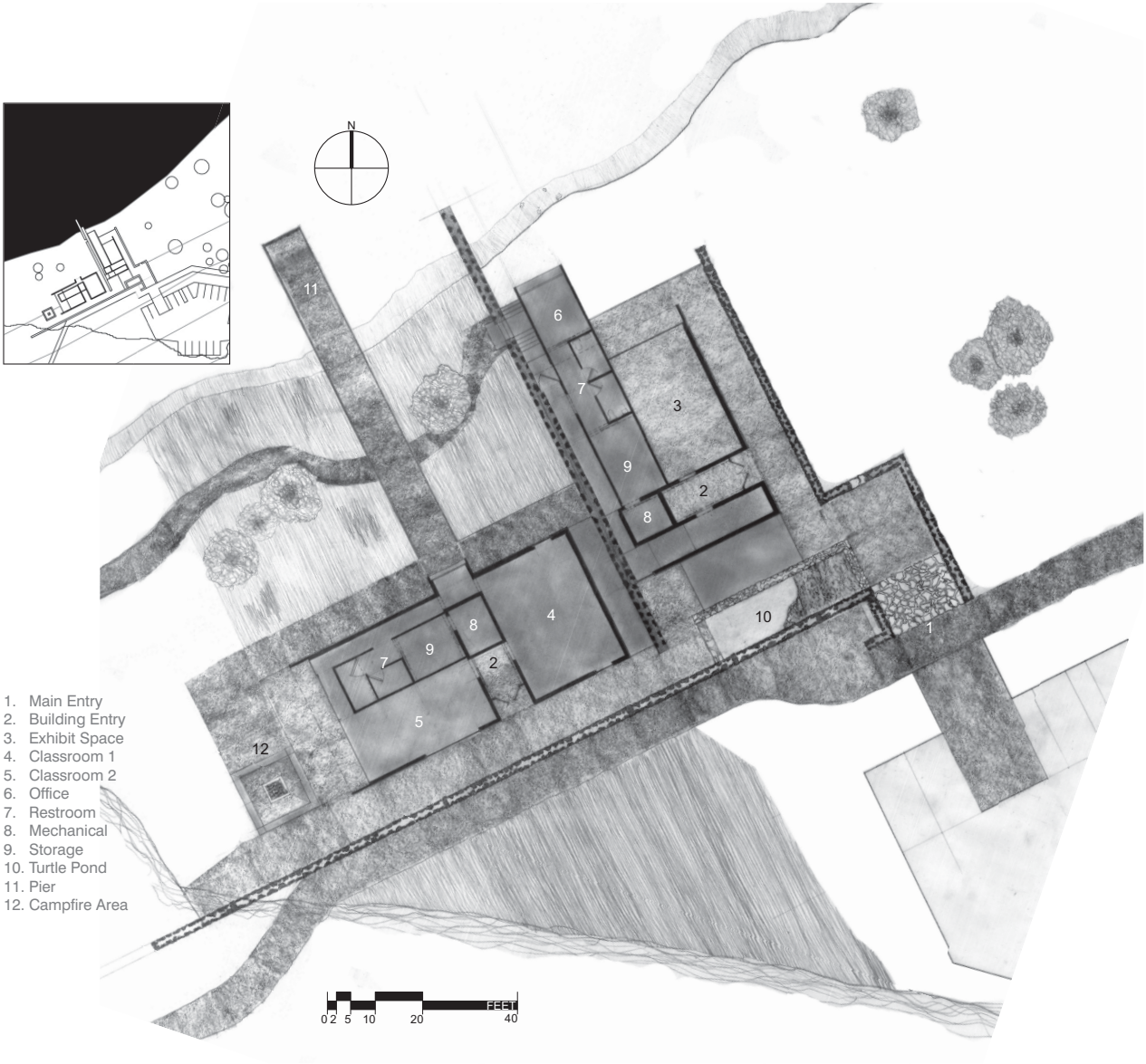


The Natural Sciences Center is intended to be a complex that can be used by both the park and its visitors for a multitude of reasons. Just a sampling of the intended uses are as a museum, a nature center, classrooms for local school districts, community meeting spaces, cross country skiing warming station to name just a few. The center occupies the site that is currently a parking area for the boat launch. The site has access from the hiking trail and the paved road, and it is bordered by the public picnic area. All of the different pieces coming together in this one place make this site one of the most crucial spots in the park as an introduction to the public sector of the park. The image above depicts the view of the Natural Sciences Center from the parking area.

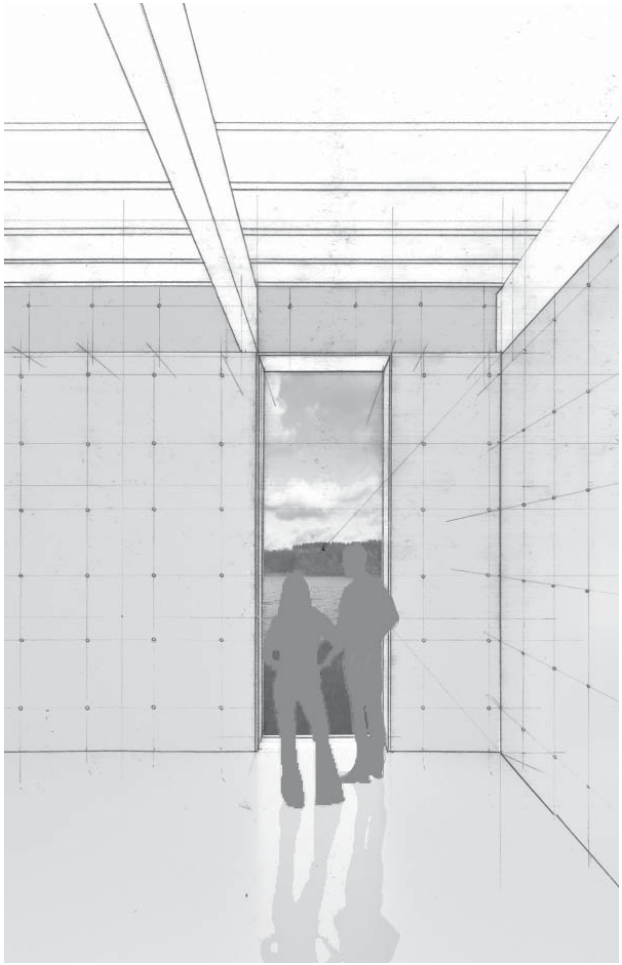




The complex consists of two buildings separated by pathways and ramps. One building is set up to house a museum/exhibit space dedicated to the Civilian Conservation Corps, while the other building houses the classroom/meeting spaces. The spaces surrounding the buildings become integral parts of the experience of the park and the Natural Sciences Center. Many of the exterior spaces are important to the process of teaching people about the park, they become exterior classrooms. This idea grows from the principle that the complex becomes an extension of the path, or hiking trail, through the park.

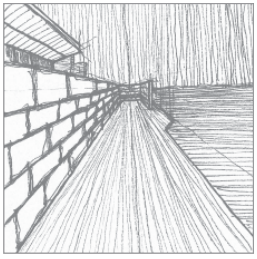


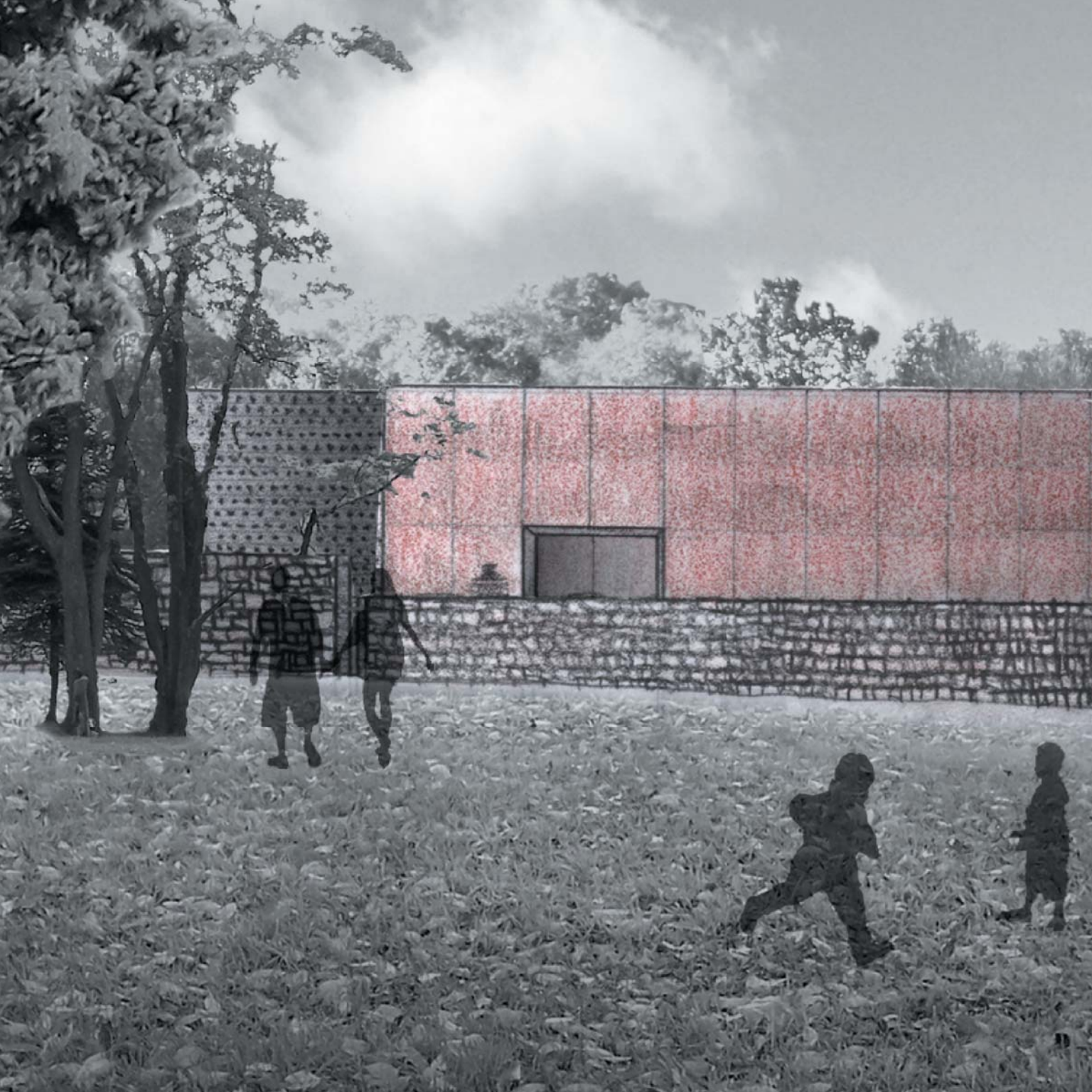
1. Main Entry
2. Building Entry
3. Exhibit Space
4. Classroom 1
5. Classroom 2
6. Office
7. Restroom
8. Mechanical
9. Storage
10. Turtle Pond
11. Pier
12. Campfire Area



Architecture emancipates us from the embrace of the present and allows us to experience the slow, healing flow of time. - Juhani Pallasmaa[2]

The images on these pages depict various places throughout the Natural Sciences Center. On the facing page are images which show a few of the different window openings in both Building 1 and Building 2. The image directly to the left is a view from the campfire area back to the main entrance. Below are two concept sketches looking at either side of the stone perimeter wall.



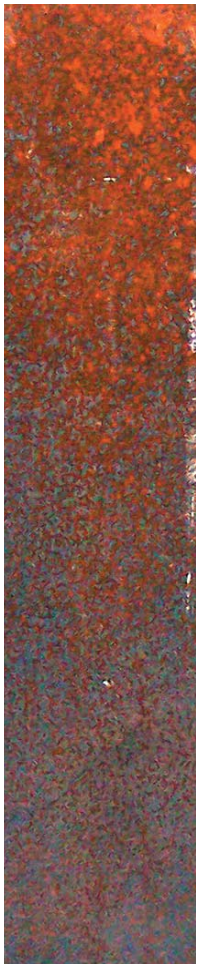


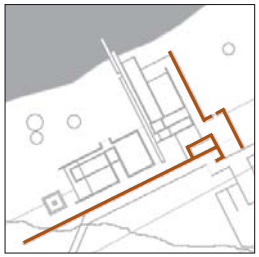
MATERIAL AS TIME

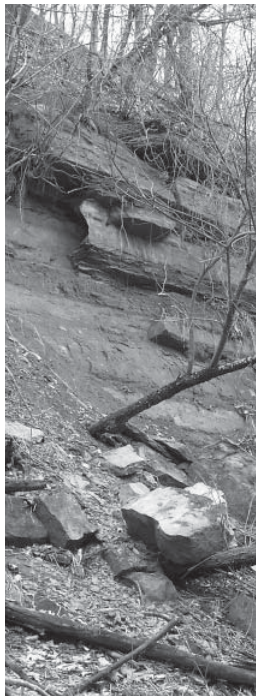
As mentioned in the abstract, the materials we choose to use when building our environment have a direct effect on the way we experience that environment. The use of materials that take advantage of all of the senses can heighten the sensations we experience in a place and give the visitor a different connection to the building. Juhani Pallasmaa writes in *Eyes of The Skin* "A pebble polished by waves is pleasurable to the hand, not only because of its shape, but because it expresses the slow process of its formation; a perfect pebble on the palm materializes duration; it is time turned into shape"[2]. Certain materials have the innate ability to give us the impression of a heavy weight, or something light as air. All of these properties keep the visitor in tune with the architecture by keeping the mind in constant motion.

So the question then becomes how best to use materials to take advantage of these properties? Each specific place has many variables which can adjust the way in which we use materials, but technology has allowed for nearly limitless possibilities. That being said, I feel there is a great responsibility to use materials in a noble way and respect their properties as well as their origins. This section is a series of explorations of the materials used in the Natural Sciences Center.

They were the raw materials of a planet dropped from an unseen quarry, which the vast chemistry of nature would anon work up, or work down, into the smiling and verdant plains and valleys of the earth. - Henry David Thoreau[3]

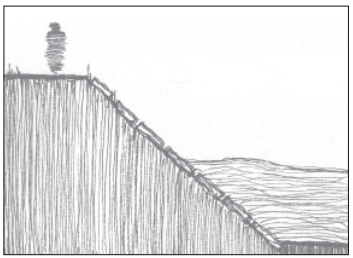


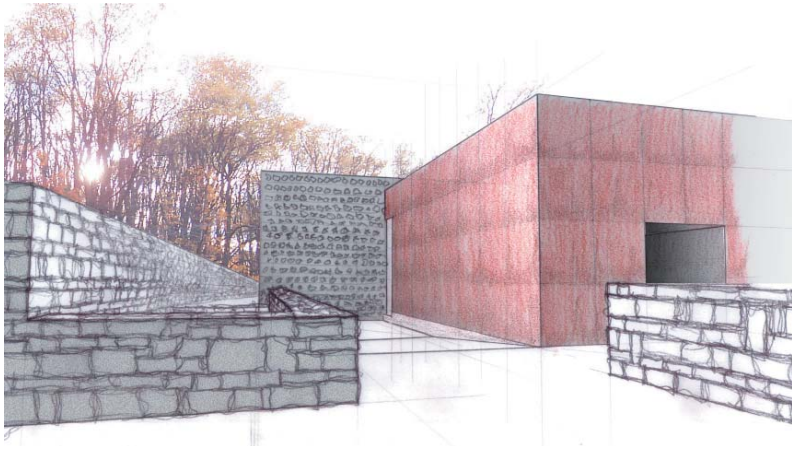



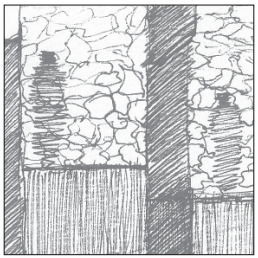


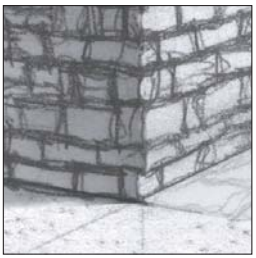
STONE

Stone is a material that has an inherent connection to a specific place. The stone speaks of the ancient processes of erosion and weathering that created the landscape we see today. The type of stone most commonly found and quarried in and around Herrington Manor are sandstone and shale. These stones were formed in the Pennsylvanian Age, about 350 million years ago. Some of the quarries the CCC used to obtain the stones for the dam and various buildings are still hidden away in the forest. As the images on the facing page show, the stone has banding of dense iron. This physical characteristic allows the stones to bleed, or rust, leaving their influence on their immediate surroundings. The stones however, are not easily cut for building stone, and do not have the best thermal properties for framing interior space. For these reasons, the stone is used to create a border around the complex, in a sense a massive stone threshold.





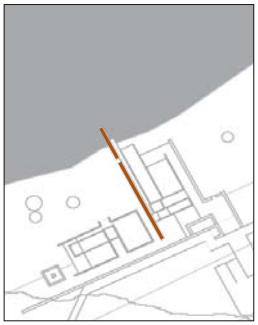




Working from left to right, a concept sketch of entrance condition, drawing of stone wall proportion, and detail of stone from rendering.

The images to the right are photos of various stones, mostly shales, taken from the site at Herrington Manor State Park.

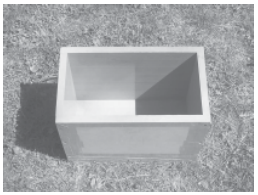
Stones tell long stories. They are natural objects that reflect the process of growth and decay through the course of time. - Werner Blaser[4]

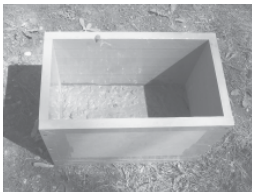


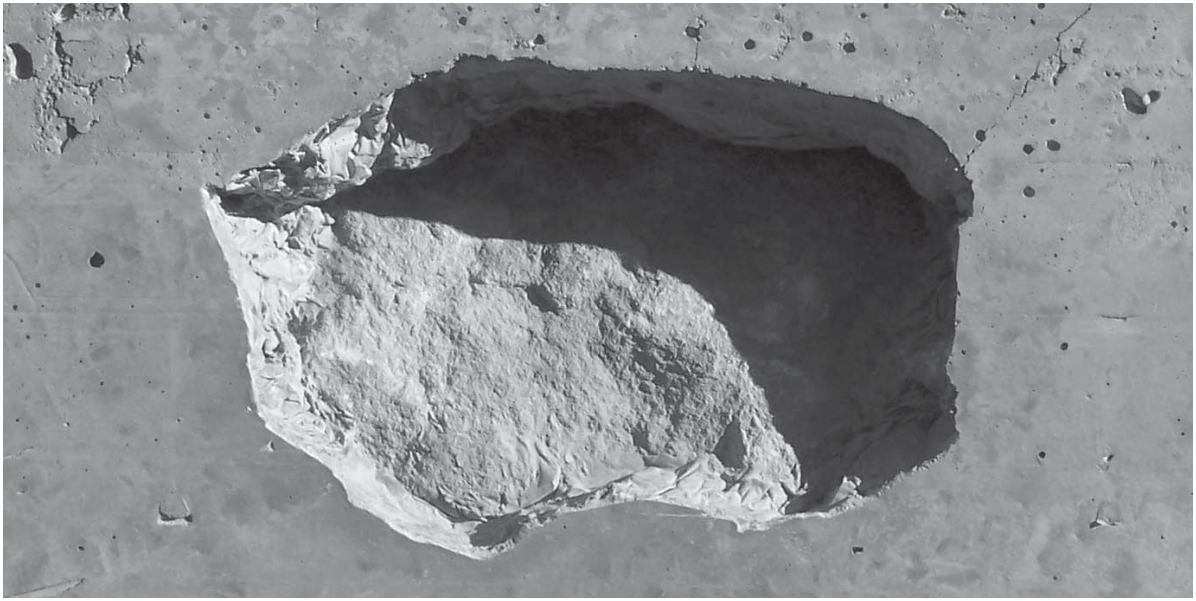
FORM MOULDED STONE

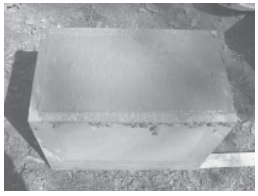
Since the sandstone and shale do not lend themselves well to being cut and shaped for an interior wall, other ways in which the stone could be used were explored. One of the ways in which undressed stones can be used is called form moulded stone. This wall becomes, basically, a reinforced concrete wall with oversized aggregate that becomes exposed on the wall face. The process by which a form moulded stone wall is created is a rather complex one. First the raw stones are collected, with the only size restriction being the dimensions of the formwork. Then a small lift of concrete is poured into the formwork. The concrete for the form moulded wall should have a water cement ratio of roughly .55. This allows for the concrete to help to hold the stone when the formwork is vibrated, and keeps the stone from sinking rapidly. The next step is to place the stones on the bed of concrete after it has cured for at least 24 hours. The stones can be set back from the form and then plastic packed in front of them. This gives the stone a strong shadow on the finished wall and allows the wall to track the sun clearly. Finally, the formwork is filled and then the steps are repeated.

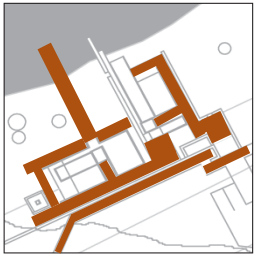
The final product of this process creates a wall surface that reveals the intricacy of the stone set against the stark contrast of the reinforced concrete wall. The recessed voids also serve to track the sun as it passes through the sky by their ever-changing shadow. The tactility of the stone is also set in contrast with the smooth concrete wall.





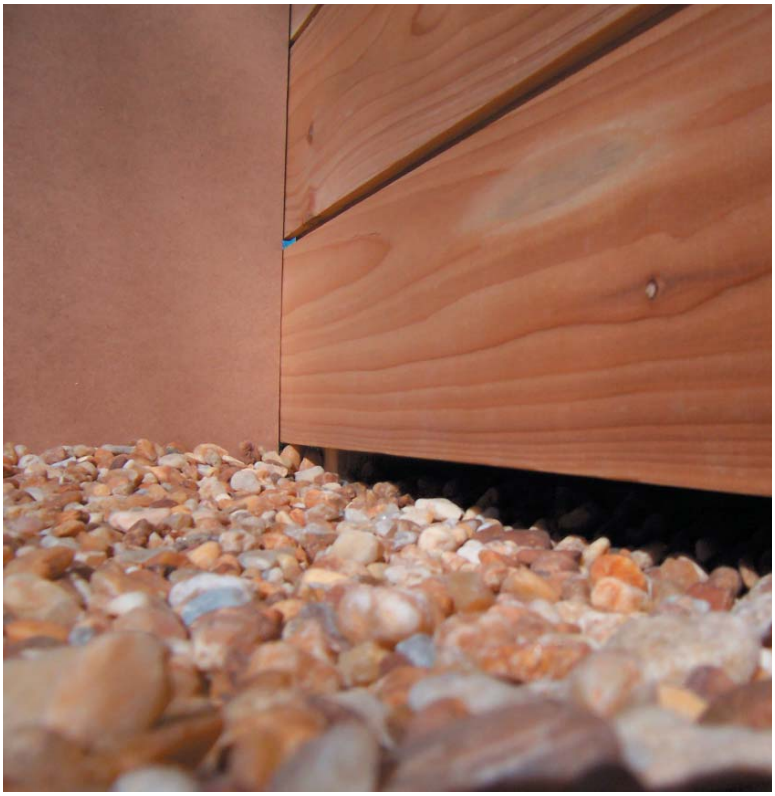


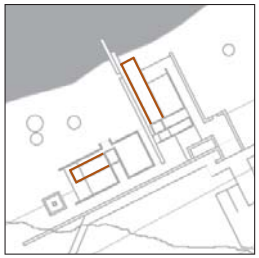




GRAVEL

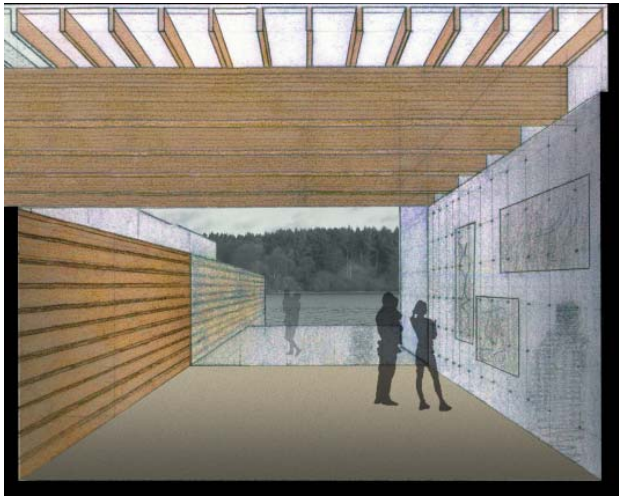
The gravel serves many purposes for connecting the project to the landscape. As with the cedar, the pea gravel to the left embodies many of the same tones and values of the native stone. The gravel also makes for a smooth extension of the existing path winding its way through the Natural Sciences Center. Along the same lines, the gravel can slow a person down without making that person aware of their pace. The pea gravel also adds an acoustic dimension to the project so that the steps of the user bounce about the walls of the complex, creating echoes throughout.

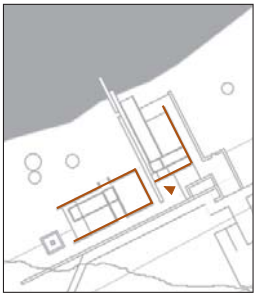


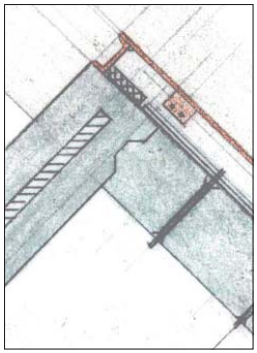


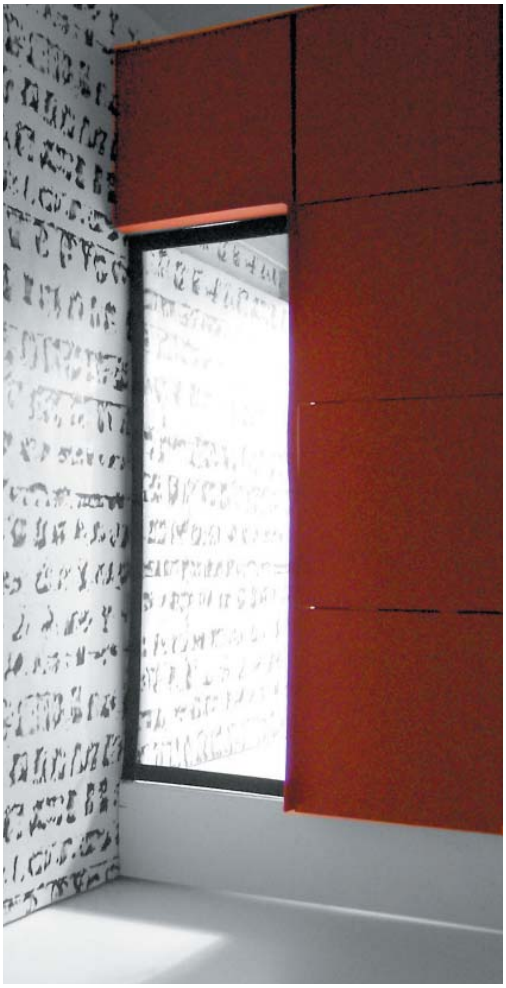
WOOD

When exposed to the elements, wood can help to depict the passing of time as it begins to show its age. As time passes though, some species of wood begin to rot and the decay weakens the wood until it disintegrates. There are a few species of wood which contain oils that allow the wood to resist the rotting caused by exposure, and one of these species is the Eastern Red Cedar. This species of wood is native to the park and the surrounding areas. By using the wood as both an exterior and interior sheathing for part of the Natural Sciences Center, one can experience the slow passage of time through the gradient that the cedar takes on as it passes from inside to outside. As an added benefit, the cedar has a reddish yellow color before weathering, but then takes on a medium gray tone over time. Each of these colors relate to the tones and colors visible in the stones of the site creating a certain visual harmony between the two materials.



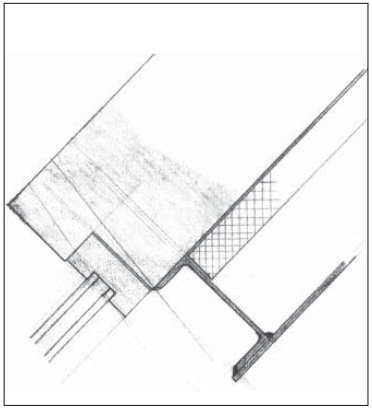




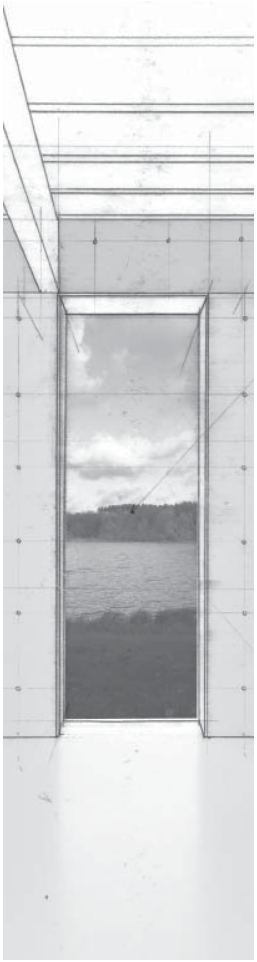


STEEL

The idea of the rain screen allows the exterior skin of a building to breathe, while the insulation creates the enclosure of the envelope. Steel is also used as a formwork material in the construction of reinforced concrete walls. Certain types of steel, more specifically A-588 steel, have the ability to create a protective layer of rust on their outer layer. This protects the steel from deteriorating by the forces of the weather. For these reasons Corten steel was selected to be used first as a formwork for the concrete walls that frame the interior spaces, then flipped and used as the exterior skin of the structures. The runoff from the steel then bleeds out into the environment. This gives the steel a connection back to the stone on which the building rests.



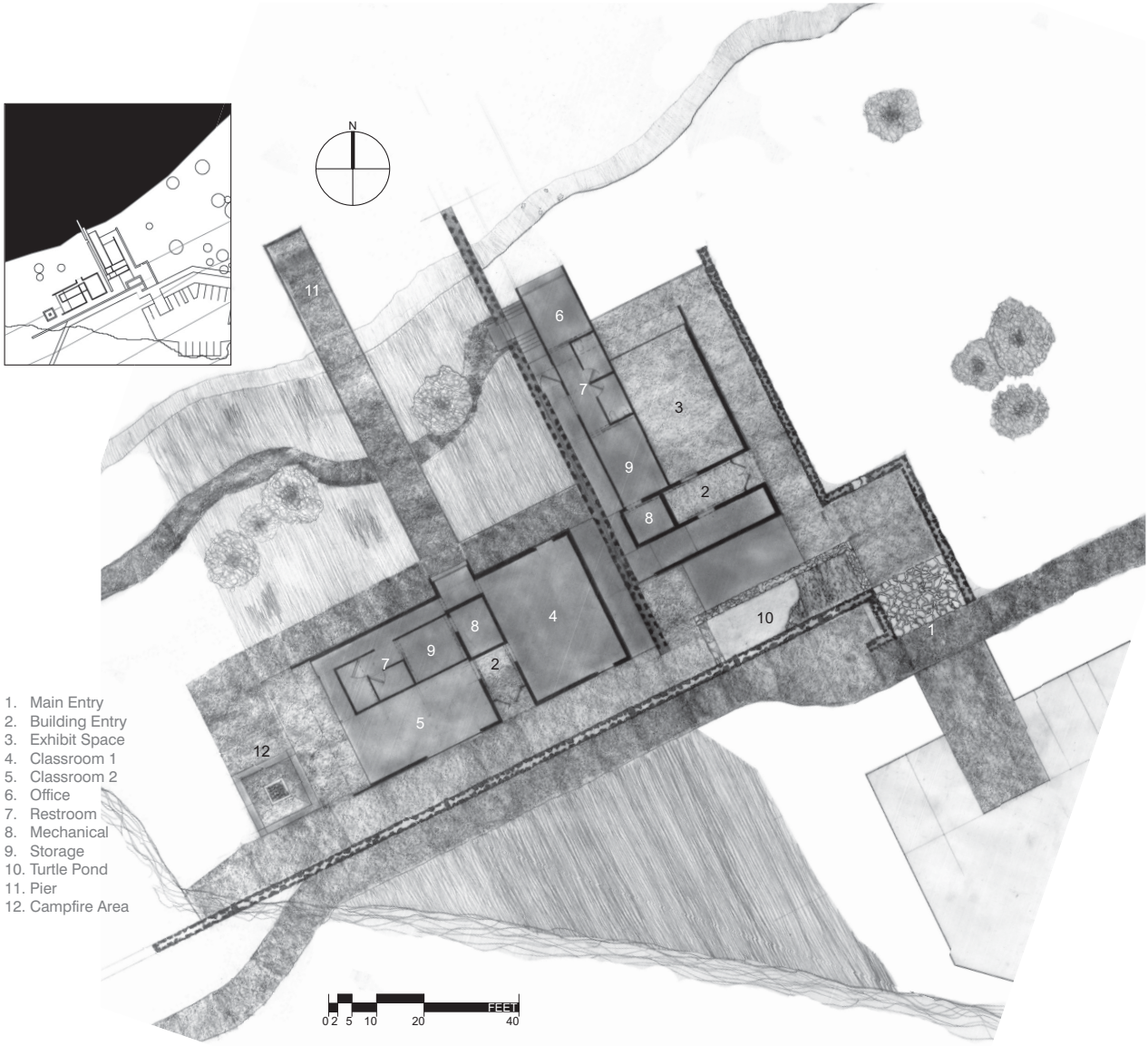
CONNECTING TO THE PLACE



Aside from just the materials used in a project there are a multitude of other ways in which the Natural Sciences Center tries to connect itself with the place. As mentioned previously, many of these ideas try to involve not only the visual sense, but also smell, sound, touch, and even taste.

Although the other senses can be brought into involvement with the space, the visual connections still carry the most weight. Throughout the complex, at every turn, there is a visual connection to the landscape beyond. This idea carries from the exterior spaces right into the interior spaces.

The use of the pea gravel as the surface under foot is a way to attempt to make the complex act as an extension to the existing hiking path. The sound of walking outside the complex has similar qualities to the sound of walking inside the complex. The speed at which the visitor can comfortably travel on the gravel also remains constant both inside and outside, changing only in those spaces where concrete ramps are used to allow for the change in levels. Finally, the gravel texture remains the same on the trail outside the complex, on the pathways inside the complex, and even into some of the enclosed space in the two buildings.



1. Main Entry
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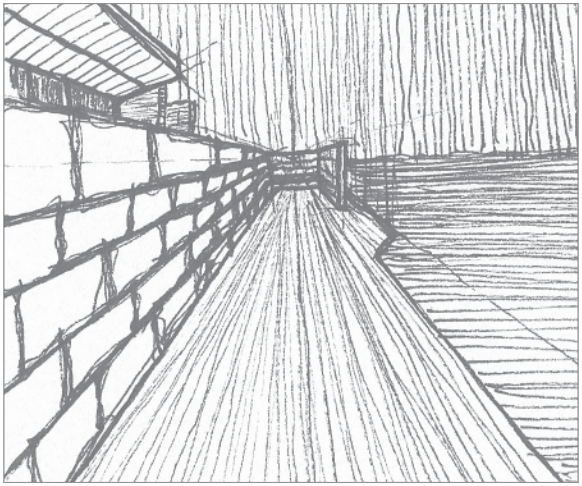
3. Exhibit Space
4. Classroom 1
5. Classroom 2
6. Office
7. Restroom
8. Mechanical
9. Storage
10. Turtle Pond
11. Pier
12. Campfire Area

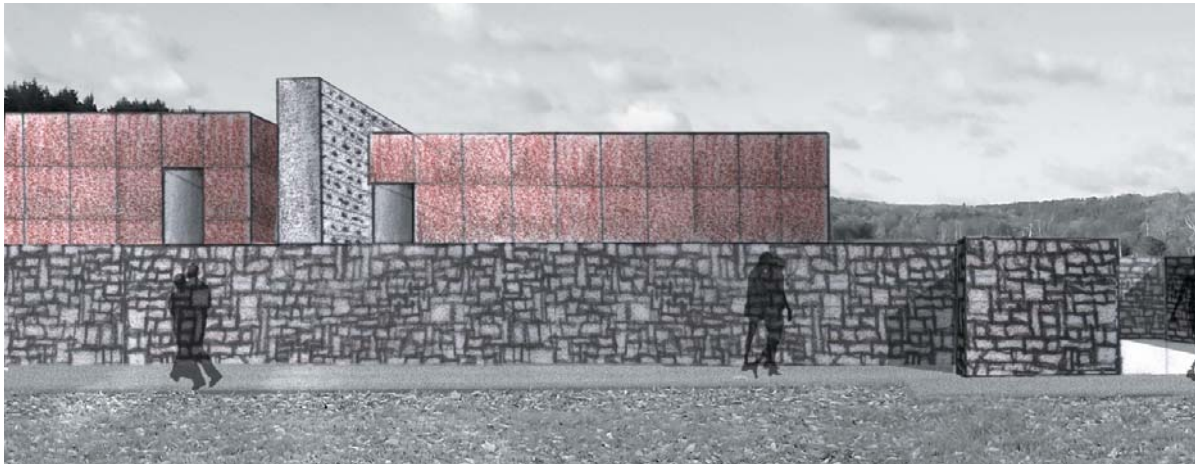
APPROACH

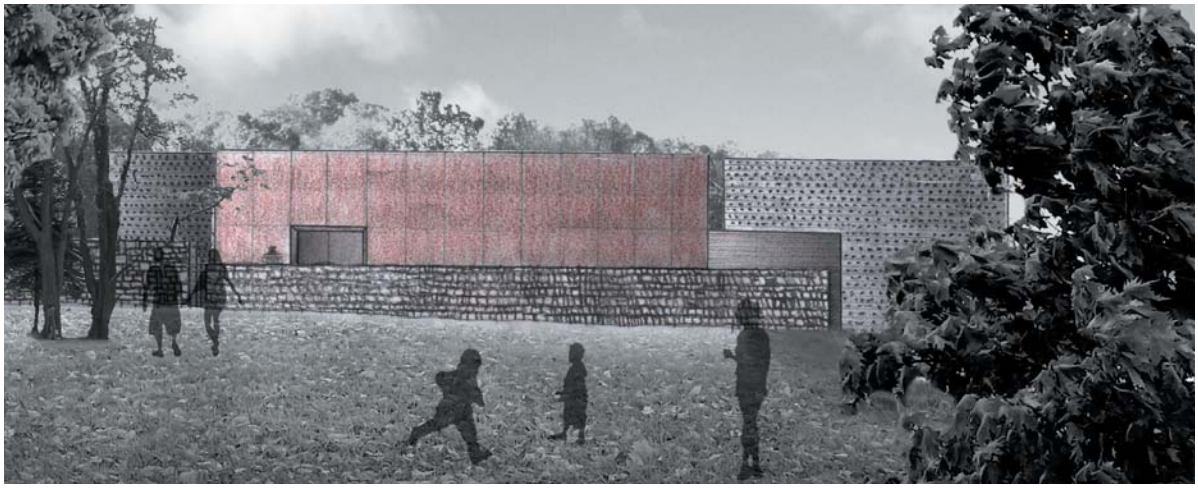
There are two directions from which the complex is approached, the emergence from the woods or the approach from the public picnic area.

The approach from the woods is a slow revealing of the building. There is a sequence of occurrences which bring the visitor into the mass of the complex. First, one hundred feet deep into the woods, the path changes from forest floor to the pea gravel depicted in the previous section. Next, twenty-five feet deep in the woods, a seven foot tall stone wall starts to block the view of the lake and surrounding landscape. The visitor continues on the pea gravel path along the wall until there is a break in the wall, the entrance to the complex.

From the public side, the building is revealed in a very different way. From the picnic area the complex and Building 1 are visible, but seem to be on a stone plinth held off the ground. From this view all of the major materials in the project are immediately visible.

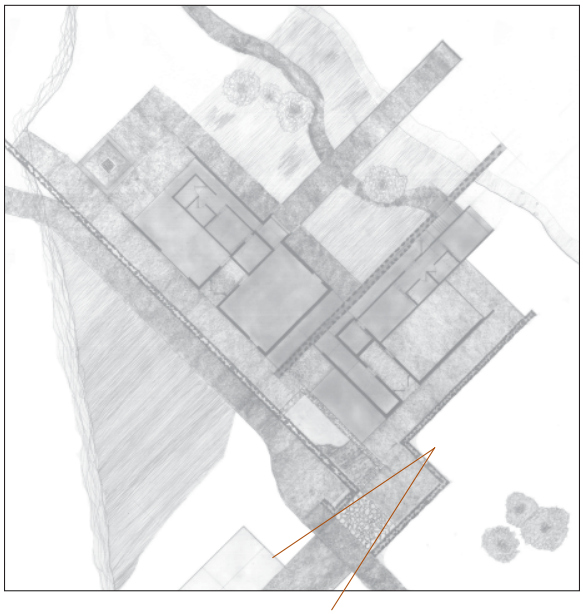


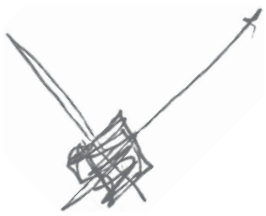


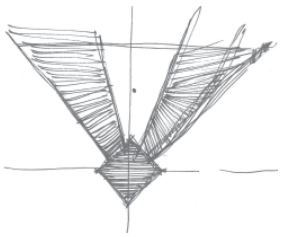


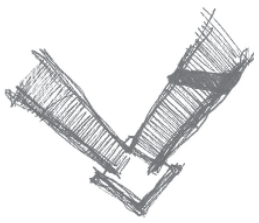
ENTRANCE

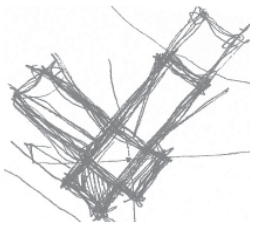
The entrance sequence to the complex is the physical connection between the outer park and the Natural Sciences Center. This makes this sequence crucial for the smooth transition between the old and the new. Through a series of studies, a clear and visually simple path was developed. One important aspect of this sequence is the breaking of the stone wall to allow the visitor to see the landscape beyond, maintaining a visual connection with the existing. Under foot, the pea gravel path stops briefly to make way for a flagstone threshold which preserves the continuity of the stone border around two sides of the Natural Sciences Center. From the stone threshold, the entrance to Building 1 is immediatley visible.

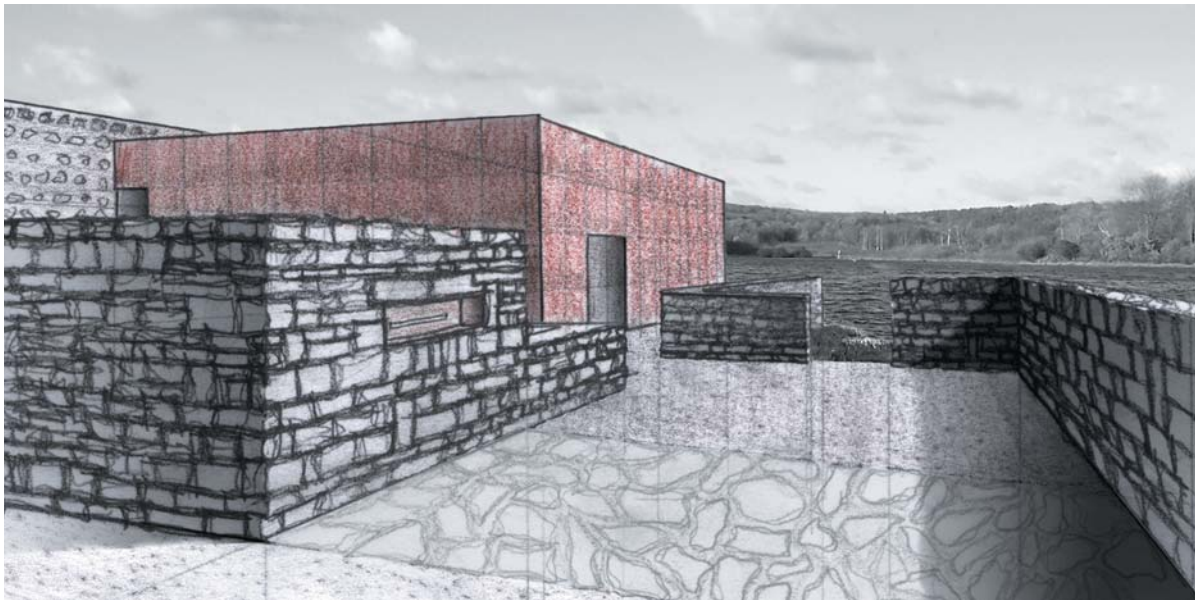


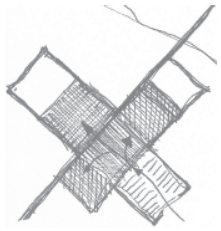


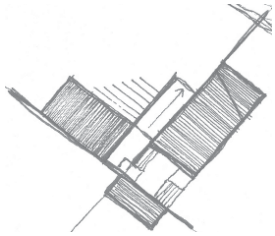


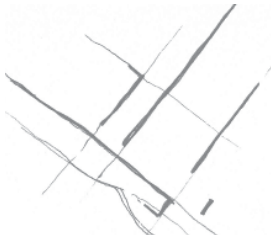


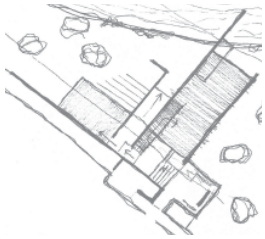


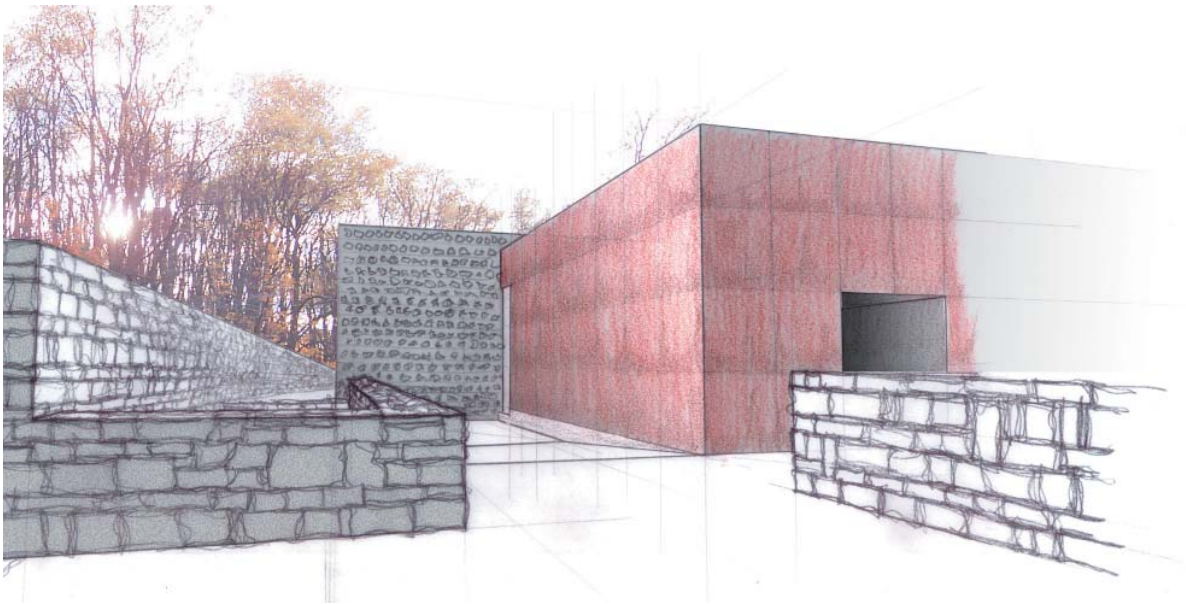






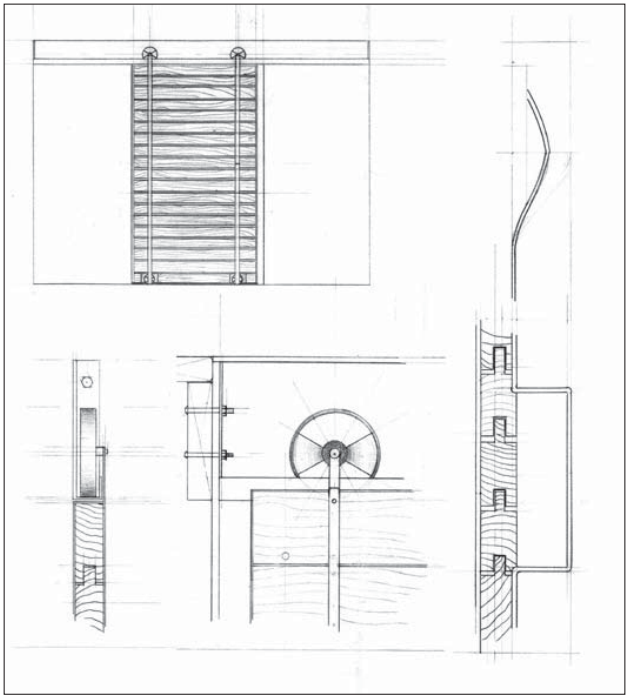


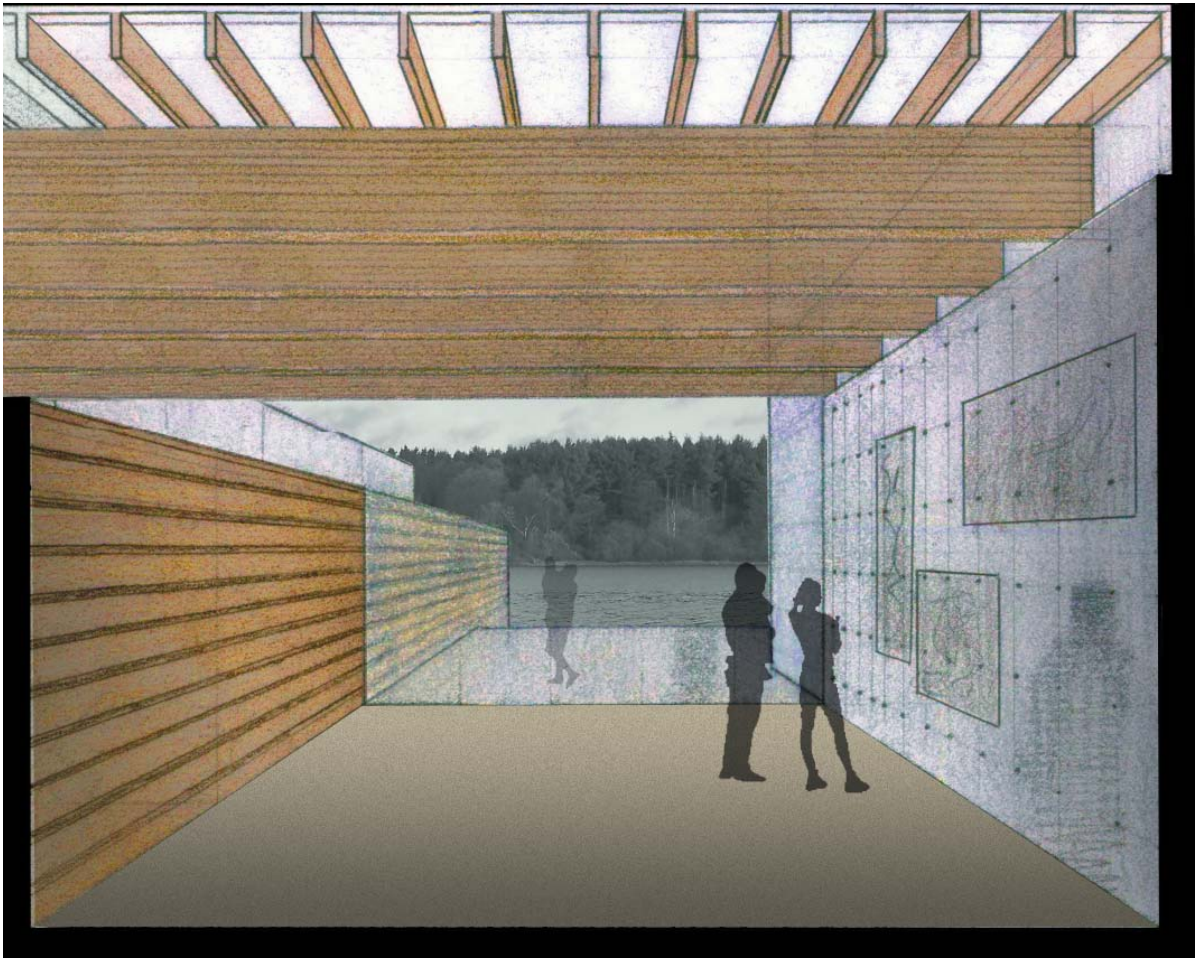




Once the stone entrance threshold is crossed, the visitor is able to view the extent of Building 1 in its entirety. The entrance to Building 1 appears as a subtraction from the outer wall of the structure. The visitor also gets the first view of the turtle pond to the left of the entrance. The pond is surrounded by a natural stone wall 36" high. This pond gives the Natural Sciences Center a small piece of wildlife that is native to the park, while also serving as an exterior classroom for people to learn about park wildlife. Also from this vantage point the visitor has a visual connection to the campfire area and treeline along the stone wall. The ground surface texture is the same pea gravel that is used on the trail immediately outside the complex adding for textural continuity.

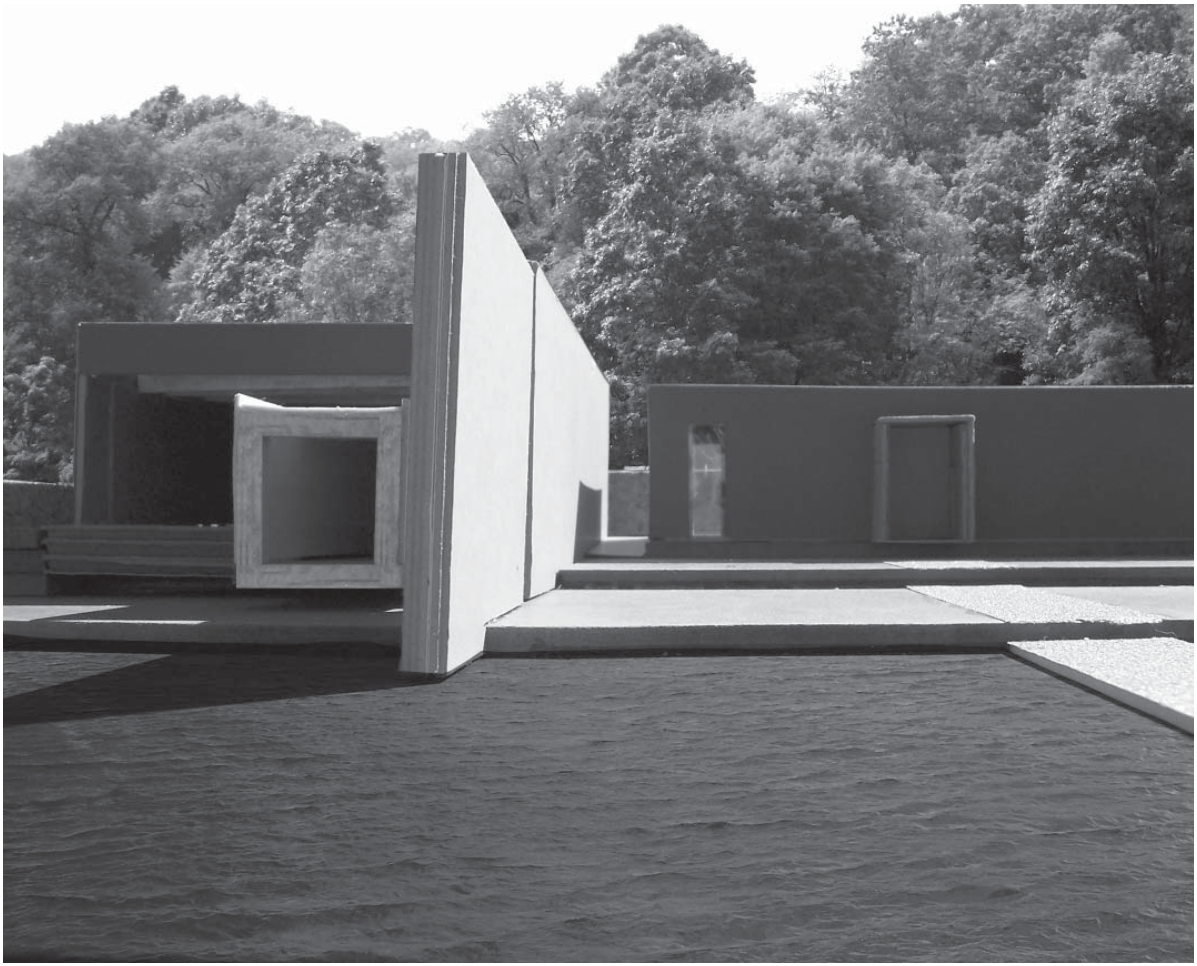
The pea gravel continues into the entrance to Building 1, where there are two wooden sliding doors. These doors lead to either the exhibit space or the auxiliary spaces. The doors are hung from cold rolled steel tracks above with cast steel wheels. The weight of the door makes the process of opening the door a bit slower than expected, and allows the visitor to connect with the weight of the material. The handle of the door is part of the steel strapping bent out to allow just enough space for the hand to grab. The movement of the door will be a loud event taking place inside the building, making entrance and exit an audible experience.





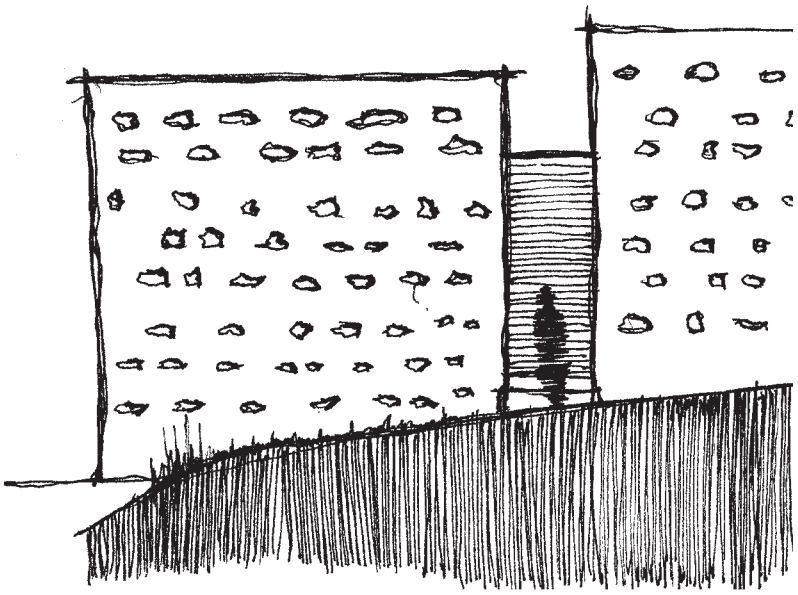
CONNECTING TO HISTORY

One of the main purposes behind the idea of the Natural Sciences Center is that of a museum and exhibit space dedicated to the Civilian Conservation Corps. The corps is directly responsible for the crafting of this landscape in order to create a public place. It is important then for the CCC to have its own place within the park, to not forget the men who created the lake, the trails, the buildings, and all of the park amenities. This space is the first space where the visitor comes into contact with the cedar ship lap siding. The cedar reaches out of the exhibit space directly into the landscape, again heightening the experience of the passage of time. Along with the continuity of the cedar, the floor surface is again the same pea gravel used on the trail, and the gravel travels from inside to outside. There is a reinforced concrete wall on the right that is used as the primary wall-hung exhibit space. This wall is left as it was when the Corten steel formwork was removed. The form-ties used in the construction of the wall are then used for the primary points of attachment for the wall exhibit panels using a series of threaded rods and nuts. The stark gray of the wall surface, seen in the image below, is an attempt to contrast the colors of the natural surroundings, and the colors of the other materials in the space.



SEPARATION

Building 1 and Building 2 are separated by the massive form-molded stone wall. For Building 1 the wall serves to reflect the sounds from the beach area, while for Building 2 the wall serves as the privacy screen between the recreational and educational sides of the facility. There is a small break in the wall that allows a visitor to pass through the wall from one side to the next, leaving an open connection between the two buildings. The visitor can walk along the wall back onto the path which will lead to the entrance of Building 2.

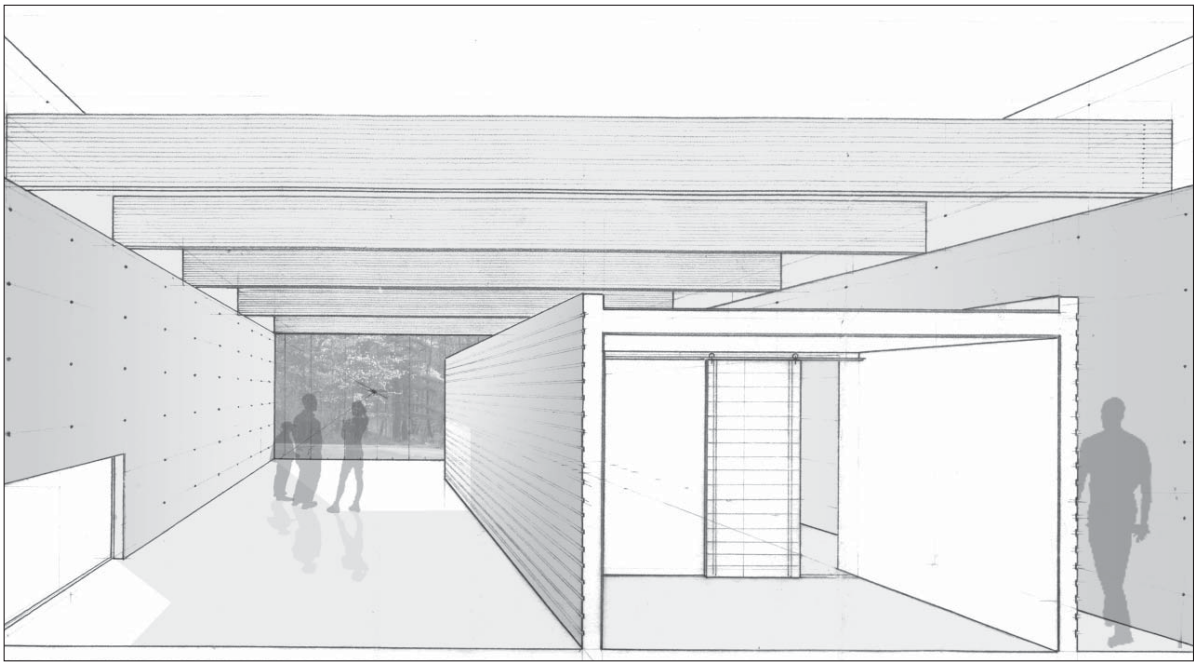


LEARNING

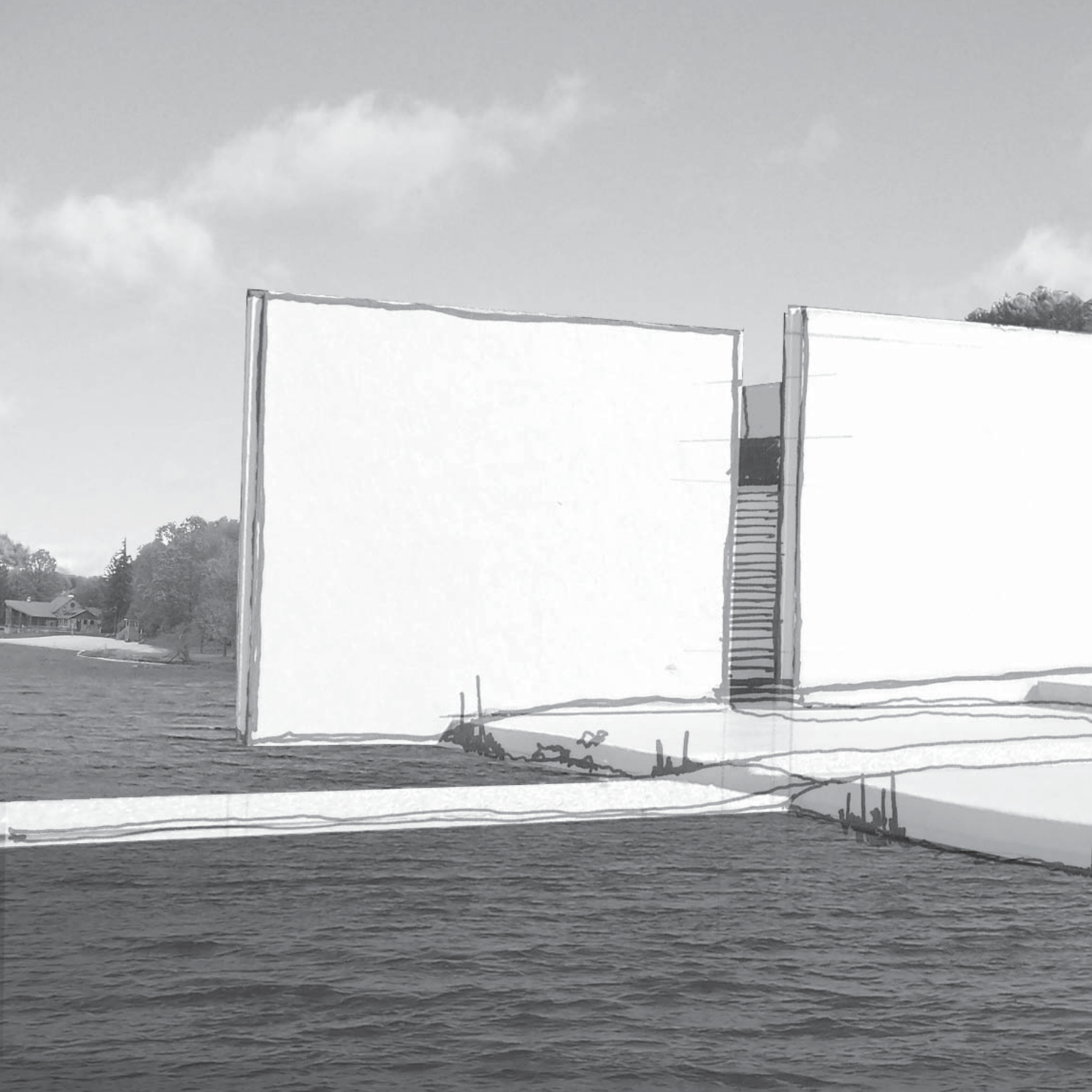
Building 2 houses the two classroom and meeting spaces, either of which can be entered through wooden sliding doors. The spaces are intended to be places at which the fundamental principles of geology, ecology, biology, and many other disciplines can be taught to the public, or to local school classes visiting the park. The spaces can also be used by the residents of the county as places to hold small events for the community. Classroom 1 contains both a North and South facing opening. The South facing opening looks back onto the path taken when arriving and also at the stone wall. The light through this opening serves to track the sun as it passes through the sky as seen in the photos to the right. The opening that faces North gives the visitor a condensed view of the shore, water, opposite shore, treeline, and sky in clear horizontal bands.

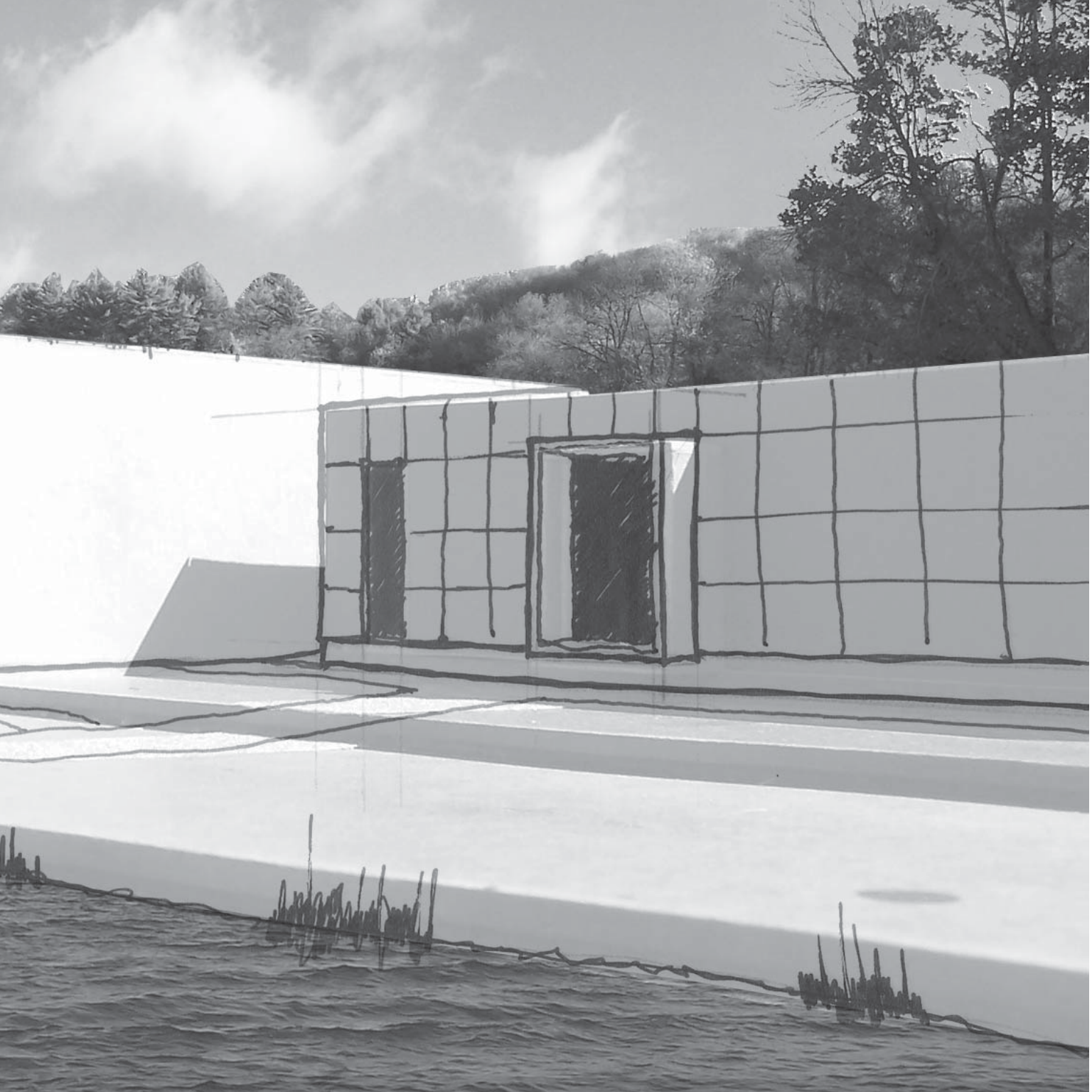




In Classroom 2, the visitor is again faced with the contrast of the concrete walls and a cedar shiplap siding wall. The wood wall in this classroom does not penetrate the building envelope, but remains completely contained in the space. This will allow the wall to retain its color for a longer period of time than the cedar that is in contact with the outside. This classroom looks out to the campfire area and the forest floor beyond. The sky has been cropped from the visitors view in this space so as to reveal the intricacies of the forest floor. The glass wall at one end of the classroom houses a large sliding glass door which allows a visitor to go from the classroom out to the campfire area. From the campfire area there is a line of sight back to the turtle pond and entrance area along the stone wall as seen in the photograph to the right. To the other side of the campfire area, the visitor is released back into the landscape.

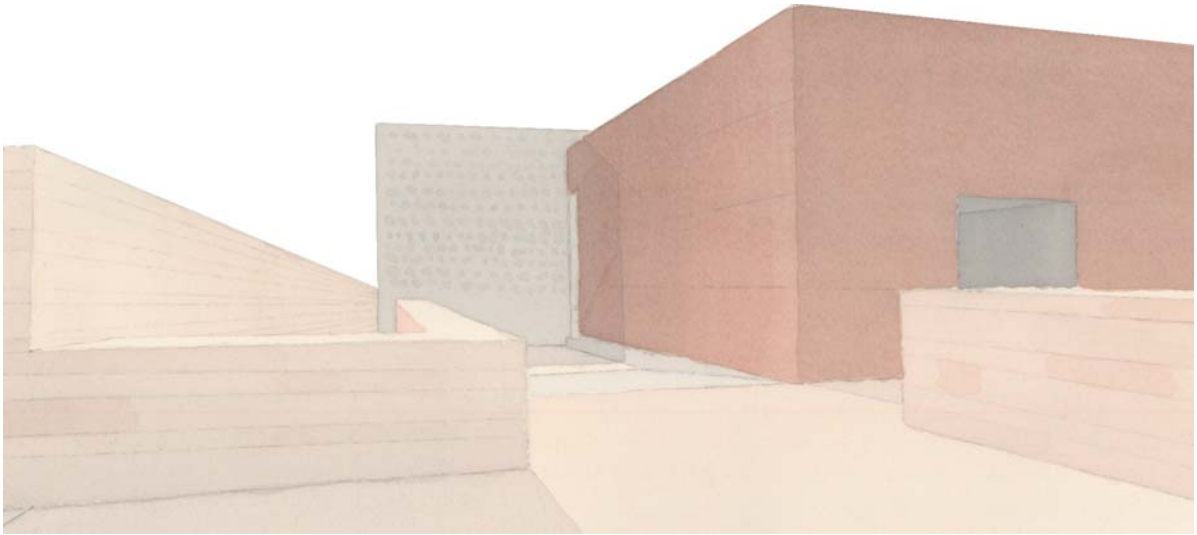


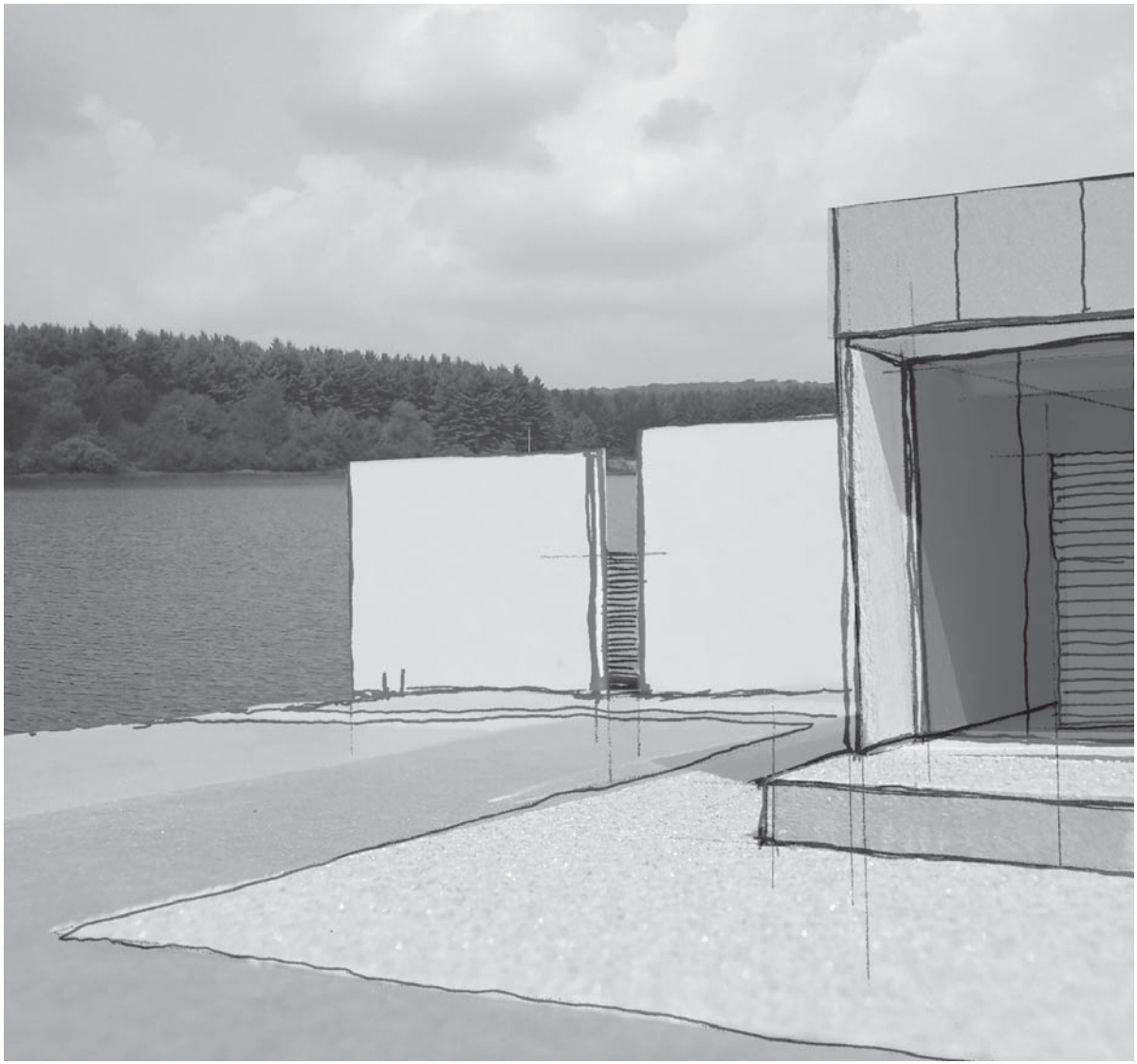


CONCLUSION

This study was intended to explore the connections between material, time, and place. The first thing that was important to the study was to obtain information about the place itself. Through site visits and research, I was able to understand the place and it's site specific characteristics. This research led to the most important part of the project, experimentation with the materials. Once the indigenous materials were determined, they could be studied in more detail and help to inform the decisions that followed. For example, through learning about the iron content in the shale from the site and then the observations of the stone over time I was led in the direction of the Corten steel. This direction evolved from watching the stone and the way it reacted to the elements and how it could rust and leave its mark on its surroundings. Once all of the materials were studied in great detail, the decisions in the development of the spaces became much easier, as if the material could tell me what to do. These ideas led to a clear and cohesive sequence of spaces.

This study of how the materials help connect a work to its place and time is a perpetual study. For every site and every place there are different materials and different types of connections to make. The lessons that material can teach are infinite, and the research continues.





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All photographs have been taken by the author, with the following exceptions:

Page 3-4, state map. http://www.netstate.com.

Page 4, Upper left. Herrington Manor State Park.

Page 36, left. Herrington Manor State Park.

ACKNOWLEDGMENTS

I would like to first thank my committee members Jim, Bill, and Hans. Your help and guidance has been so valuable. I also wish to thank all of the faculty who have given me the education I now enjoy. Of course, my colleagues are deserving of great thanks for the encouragement and criticism. I also thank my family for their continued support of my educational and professional goals. Michelle, I thank you for being the one to stand by me everyday, without you this is not even possible.

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