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An Architecture of Amelioration

A Thesis
Presented for the
Master of Architecture Degree

The University of Tennessee-Knoxville

Geoffrey Russell Plagemann
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Dedication

To my family; parents and brother, thank you for putting up with the many crazy endeavors throughout my life. To Emma, I would not have survived the last three years without your compassion and smile. To my friends, whom I consider family, without their support this would not have been possible.

Acknowledgements

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Abstract

Scar: *A lingering sign of damage or injury, either mental or physical.*

Technological advancement scars the landscape. It has been our practice to ignore, or worse, hide these marks that have been made as society continues to advance. Industries past left us relics and ruins of bygone eras of promise and production. The time we live in has recognized the untenable failures of past generations, however there are methods of industry that continue to injure the landscape. We will leave our scars.

In this time we must rethink the scar, define it, and recognize its beauty. The first step of reclamation is acquiring awareness of where the scar came from. Whether it is an injury, an accident, or a natural disaster, some traumatic event caused lasting damage. Traumatic events whether natural - *hurricanes, floods and earthquakes* - or manmade - *wars, genocide and assaults* - can cause both physical and emotional scars. Human tissues can repair themselves leaving scars, but there are also the scars of repair. Even technological advancements in medicine cannot eliminate the scar. Scarring is the natural healing process, yet we view them as unnatural.

Once recognized, we must accept the scar so that we do not destroy it. We must accept the traumatic cause/effect relationships, and be conscious of the healing process. The scar must be appreciated: the time that it takes to make it, the time that it takes to heal, the history it can teach, and the story that it can tell. To hide it would only be an injustice to those who came before us and to those yet to come. With acceptance a scar's beauty can be seen.

Every new era of technology, every successive generation, leaves a scar. The opportunity to aid the greatest healer – time – is now. Every scar tells a story.

Reclamation: *A restoration, as to productivity, usefulness, or morality.*

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I. Thesis Statement

An Architecture of Amelioration

This is an investigation into the creation and perception of ameliorative architecture, through an understanding of the natural healing process. The study of the healing process contains three parts: the wound, the mend, and the scar. The knowledge gained from this investigation will inform a comprehensive architecture that enhances the awareness of the scars created by our built environment through conscious exposure of the wounding, the mending, and the scarring processes.

II. Amelioration and the Built Environment

Goals and Perspective

> "Knowledge is at the core of reason. People learn, remember, and are self-aware. They *know* not only as an end in itself, but in order to have a basis for acting." (Woods 14)

A study of precedents that take different approaches to the idea of healing through architecture will frame this discourse in a theoretical and historical context. The understanding of the healing process in these studies can influence an approach to architectural design in which the healing process is exposed, thereby heightening the awareness and social responsibility of the users by reestablishing environmental and historical connections. This process will then be applied specifically to a project in association with a Tennessee Valley Authority (TVA) site - a site inherently steeped in the wounding, mending, and scarring of natural and built environments - in order to reconnect the users to their actions.

Architectural Issues

> "I do not wish to hear or speak of that which is new, of that which is different, as these words do not interest me. I am only interested in that which is original, *original* in the sense of origin, of re-establishment, of beginning again, of going to the source, which implies the existence of something incontrovertible. This, to me, is the complete opposite of the negation of significance. It is in the 'significant' that resides all of the strings that are there to be pulled."
>
> - Carme Pinos (Noever 73)

In associating this thesis with what are arguably this country's Modern masterpieces, it would be easy to lose focus on the architectural issues being

explored. The idea of healing and scarring can be considered in any project, so the idea of healing was applied to this country's decaying infrastructure. While the results of the research should be able to be applied to any incorporation of design for infrastructure improvements, a more fitting problem needed to be found; a problem where site and program could express the ameliorative experiences of wounding, mending, and scarring. Each of these ideas needs to be expressed to heighten the awareness of the occupant. These issues will be addressed via the scales of the site, the program, and the user, each having unique experiential qualities.

Amelioration: Definition and Significance

The understanding of amelioration has multiple contexts, ranging from social, to memory, to physical, and in this case, spatial. Ameliorate means to make or become better, more bearable, or more satisfactory. It refers to the improvement of a situation. An architecture of amelioration can easily be a literal repair or patchwork, however the aspirations of this project are for that architecture to influence the programmatic elements, and ultimately, the conscience and actions of the users. Programmatically the ameliorative process will again have literal elements, but the ability of the program and the path to influence thought will be the objective. The experience will incite the user to evaluate the scarring created by development, thereby recognizing the wounds created, and the ensuing natural healing process.

Lebbeus Woods: Sarajevo, Havana, San Francisco

In his work, theorist/artist/architect Lebbeus Woods explores the ideas of an architecture that reacts to traumatic events. These three theoretical projects show a progression in the work of Lebbeus Woods. In war-torn Sarajevo, the ideas of *scabs, scars, and new tissue* are used in repairing the city's urban fabric. Scrap material is used, presumably by residents, to patch and repair the bombed out buildings of the city. The resulting scars are a reminder of the costs of war, while at the same time they also begin the ameliorative process (fig 1-2). The Havana project looks at the damaging forces of Cuba's economic and political scene. The old Spanish colonial city wall is reborn to define new spaces of experimental living, while at the same time exploiting the process of decay. The inhabitable walls will be an ever-changing reaction to the city and the needs of its residents. A new boardwalk that stretches along the seawall is also a part of the plan. Here we see Woods reacting to the forces of nature, as the wall can adjust according to the forces of the tidal surge to protect the city from flooding during storms. The third project in San Francisco is again a reaction to nature. This time Woods uses the destructive lateral forces of earthquakes, proposing structures that use the energy of these forces to change/move/adjust, but not collapse. Something Woods states all current buildings in seismic zones will inherently do.

> "Space is permeable. Flows go both ways, in and out of it; space is permeated and permeating. Woods exploits and produces spaces that are not sanctified as privileged, pure, distinct, and holy (of the *hieros)*, but instead are hole-y, spaces of vergence, of the diaspora, the mulatto of cross-breed, or even the infected, the impure."
>
> -Michael Menser (Woods 165)

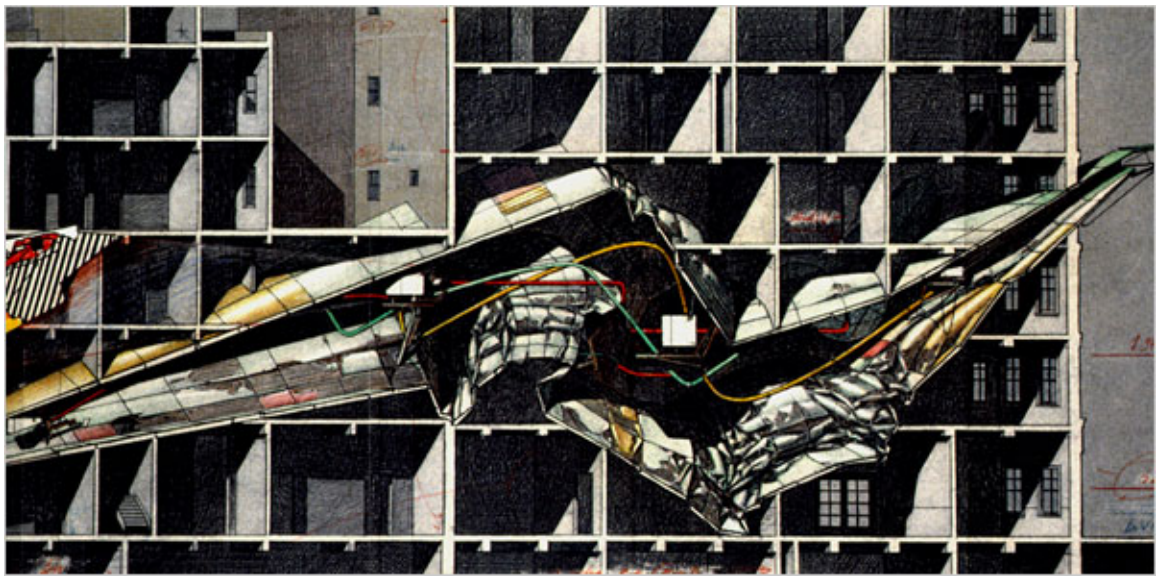


Fig 1: Mending the wound (Source: Woods)

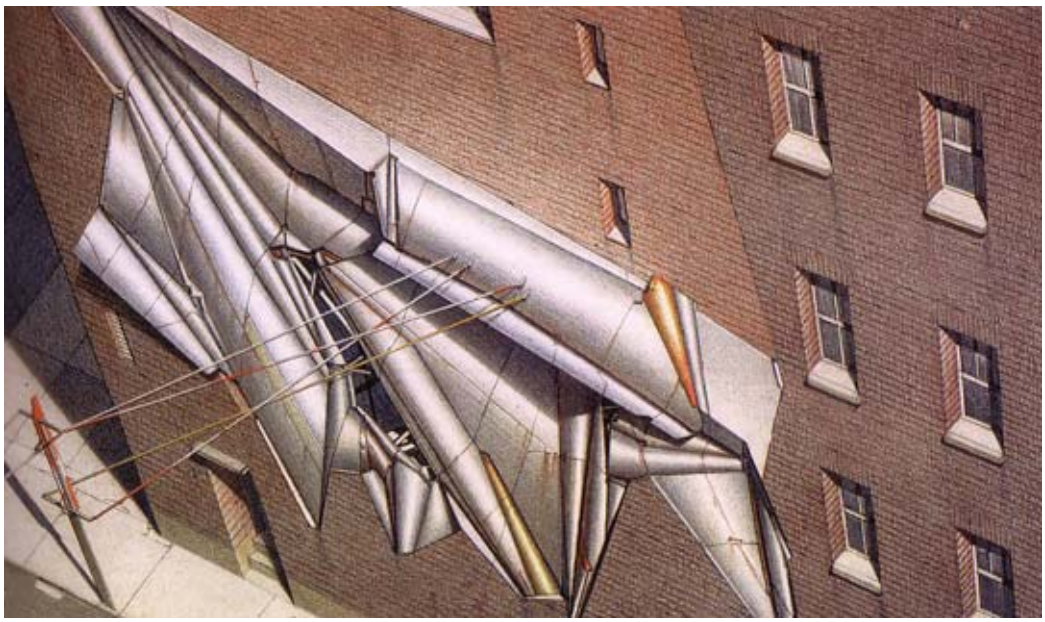


Fig 2: Formation of the scar (Source: Woods)

Woods' post-apocalyptic drawings are visual scars, but their ability to actually heal in the face of disaster is lacking. However, the connection to Woods is more than epidermic for this thesis. What are most intriguing in Woods' work are the reactionary qualities of his Havana and San Francisco projects. The interaction between environment and landscape and user is valuable. The theories are a foundation for testing the ameliorative qualities of built form. To what extent can architecture heal a wound, and at what point does it become one? To what extent can architecture be proactive? Can architecture prevent a wound?

Bernard Khoury: B-018, Beirut, Lebanon

B-018 is a wound and a scar. Designed by Bernard Khoury, B-018 is a nightclub on the site of a former quarantine for arriving crew members. During Beirut's war time it was a camp for Palestinian, Kurdish, and South Lebanese refugees. The surrounding area was densely populated, but militia attacks leveled the entire urban fabric. When closed, the club, which is a wound carved into the earth, is covered by metal doors nearly flush with the concrete surrounds – militant (fig 3). At night the doors open, revealing the *place of nocturnal survival.* Mirrors on the underside of the doors provide glimpses inside, while from below they reflect the lights of cars navigating the encompassing circular parking lot (fig 4).

Critics of B-018, and Khoury, say it is a "vision of post apocalyptic decadence." And worse, one disgusted critic claimed any patrons were, "dancing on the graves of refugees killed on the site by local militia" (www.bernardkhoury.com). Khoury's counter is that his architecture is a truthful reflection of Beirut that refuses to smooth over the contradictions that lie just beneath the city's new surface.

> "I don't believe in a sentimental past or a naïve idea of the future.
> I have my feet firmly planted in the present."
> - Bernard Khoury (Ouroussoff)

Khoury's built work is an extension of his theoretical. Khoury, while studying under Lebbeus Woods, developed his *Evolving Scars* theory. It examines the ideas of replacement and time, in a city that devours itself while rebuilding. Recognizing that architecture can both heal and deepen wounds is important to this project. Where Khoury's work has a focus on war-damaged buildings, this research extends to the wounds of societal and technological advancement.

Fig 3: Representing the scars of memory on the landscape (Source: Khoury)

Fig 4: Activating the scar (Source: Khoury)

With the realization that all development is itself another scar, then the goal is to predict and prepare for its created changes in perception.

Although Khoury enjoys sites that hold historical references to Lebanon's war-torn history, his work is simply placed into these settings. These works could be constructed on any site. The fact that it is built on a former quarantine makes no difference in its design, only in its perception. The fact that the site is again being used is part of a healing process. However, any building built on the site would create the same affect. The building cannot erase the memories of the site, therefore it is not the architecture that is responsible for the healing process.

Norman Foster: Reichstag, Berlin, Germany

Foster's renovation and addition to the Reichstag is an example of the principles being strived for in an ameliorative architecture. The building, ravaged by war and left in disrepair, has been brought back to prominence through the combination of historical respect, construction technology, and societal advancement (fig 5). In the early stages of renovation, the buildings history was revealed. Original interiors and finishes were found, but more striking was the graffiti left by Soviet Soldiers during occupation at the end of World War II. This history, although somewhat controversial, was incorporated into the makeup of the new building. There are also several important aspects of Foster's glass dome addition. The dome's construction technology, with its allowance of natural light and ventilation, is an environmental improvement. The transparency of the dome's construction and materials was also designed to represent the implied restructuring of the governmental and public relationship into a more open one. The dome, with its spiraling public viewing ramps, allows views into the debating chamber of the House of Representatives (fig 6). This hierarchical move symbolizes the new significance of the public roll in government functions.

The abilities of Norman Foster and his associates in this project extend beyond the reuse of the old structure and the ingenuity of the addition. Through these moves of intentional exposure, Foster provides a constant reminder of how devastating human intervention can be. The reclamation of the Reichstag is an ideal example for this thesis to follow due to the significance of incorporating history – site, culture, etc. – while avoiding the pitfalls of nostalgic mimesis.

Fig 5: The Reichstag, old and new - Berlin, Germany (Source: Foster)

Fig 6: Transparency of the dome (Source: Foster)

The Process of Amelioration

> "The machinery of Society, profoundly *out of gear,* oscillates between an amelioration, of historical importance, and a catastrophe." (Le Corbusier 53)

Through the analysis of scars and mending, a process for the creation of an ameliorative architecture has been fashioned. The procedures include scarring, path, and transparency. Scarring is visual and tactile, where the user recognizes an abnormality and is forced to confront it. The path is a journey, between nodes of history, program, and forced views, where the user follows a meaningful route laced with lessons. The importance of the path was as equally important to the architects and planners of the TVA.

> "Wank says to it that [the dams] were approached as one would the Acropolis, seen suddenly as one came from around the wooded flank of the mountainside, and presented with a heightened appreciation of scale. He led one up to the best view. There he provided a "lookout" where a subtle combination of technical information and TVA philosophy was offered."
>
> - Todd Smith (Culvahouse 112)

Transparency, also extremely popular with Modernist design, exposes the user to all of these natural and built systems that were previously taken for granted. The synchronization of these procedures creates a space that has the ability to alter the consciousness of the user.

The process will be applied to a fish hatchery, in order to create a space that is simultaneously ameliorative for the existence of nature, the site, and the users. The fish hatchery will be reconstructed in a way that emphasizes the healing nature of the hatchery. By exposing the various ameliorative qualities of each piece of program as a series of moments on a path, the integral space will

ultimately work together to alter the consciousness of the users. The transformation via the ameliorative dialogue between the site, structure, program, and user, emphasizes the project's goal of *constant awareness*.

III. Wolf Creek Dam: Scarring and Amelioration of the Site

Site Selection

> "... a wooden pallet piled with seventy-pound bags of powdered caulk – it is hard to imagine a more compelling metaphor for the Tennessee Valley Authority and its campaign to hold back the unruly forces of nature. One is reminded of the powerful conclusion to Goethe's *Faust*: "Those foolish dikes and dams," scoffs Mephisto at the pretensions of the modern, technological man. "All your labors are for naught: The Elements belong to us." It is the nature of the physical universe to leak."
>
> - Barry M. Katz (Culvahouse 80)

The initial thesis of scarred landscapes required a site that was facing a possible trauma. Since the thesis began to focus on the scarring of technology, I turned to this country's recent discussion on failing infrastructure and the enactment of the $787 billion Recovery Act (fig 7). Two events led me to the Wolf Creek Dam site. The first was a discussion of aging dams in the Tennessee area. Much of the infrastructure built by the Tennessee Valley Authority is half a century old. This discussion led me to a *Popular Mechanics* (fig 8) article that listed the top five possible infrastructure disasters facing America. Number two on that list was the breeching of the Wolf Creek Dam.

As the thesis has continued to evolve, so did the site research. What became fascinating was the area of land immediately below the dam. Due to the secluded nature of the site, all of the uses on it were not immediately realized. However, as the uses emerged from the shadow of the dam, the site began to focus the thesis.

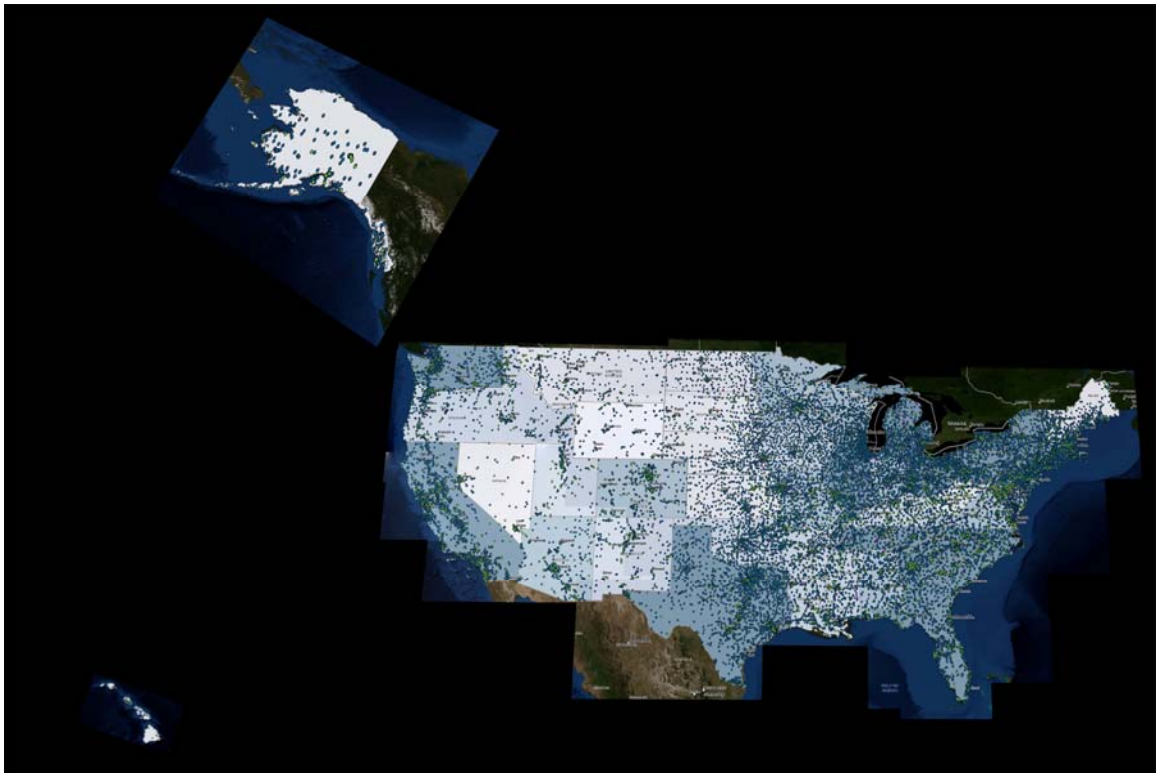


Fig 7: Recovery Act project locations (Source: Author)

Fig 8: Editorial cartoon on America's failing infrastructure (Source: *Popular Mechanics*)

History of Wolf Creek Dam

Wolf Creek Dam has been failing since it was built. The mile-long, earthen and concrete dam, located in south-central Kentucky, 10 miles southwest of Jamestown, KY, was built on karst topography (fig 9-11). Karst topography is a limestone sub-stratum layer that was deposited by ancient seas. This layer contains easily eroded sandy deposits. As ground water flows through the layer, these deposits wash out, creating unstable pockets, or caverns, below the earth's surface. This is the reason for the many caves in this region of Kentucky and Tennessee. When these pockets collapse, they are commonly referred to as sink holes.

Several caves were found during the initial site preparation for the construction of Wolf Creek Dam (fig 12). The belief and construction techniques of the time were to simply fill the caverns in with earth and concrete (fig 13). While seemingly stable at the finish of construction in 1952, the dam has been in need of constant healing ever since.

The earthen dam began to show signs of seepage soon after completion. Caulking projects were completed in the '60's and '70's to stop the leaks, at a cost of $30 million, but the problem persisted. Constant monitoring was done into the 2000's, when boring samples were taken and it was found that the added pressure of the water forming Lake Cumberland was expediting the erosion of the limestone underneath the dam. The potential for a breech was high if additional measures were not taken. In 2006, the water level of Lake Cumberland was lowered to half of its usual depth. This lessened the pressure on the stressed layers and a second multi-million dollar repair job was planned. The repair work focuses on the ¾-mile-long, earthen portion of the dam. Concrete caissons are being drilled into the backside of the dam for

Fig 9: Aerial of site in relation to Jamestown, Kentucky and Tennessee state line (Source: Google)

Fig 10: Wolf Creek Dam as a scar on the landscape (Source: Google)

Fig 11: Aerial of the site (Source: Google)

Fig 12: Engineers overlook one of the overwhelming number of caverns found at the dam construction site (Source: Applegate)

Fig 13: Bulldozers were used to fill the caverns by pushing concrete, rock, and dirt into them (Source: Applegate)

reinforcement. Most of the estimated $584 million patch work is being paid for by Recovery Act funding.

Ameliorative Duality

> "Just as the river was mesmerizing and ever flowing, she was equally erratic and volatile with sudden flooding of her banks. Residents living in the floodplain grew to expect being awakened by the ringing of church bells warning of rising water." (Applegate 9)

The incision of Wolf Creek Dam was billed by the TVA as a monumental and technological achievement; however, there are always more sides to a story. What was forgotten were the cities, families, and culture that were wiped out by the creation of Lake Cumberland. The city of Burnside, the busiest port city on the Cumberland River upstream of Nashville, was the only town that was completely relocated to higher ground (fig 14-17). Yet, after the relocation, and the flow of the river stopped, so too did the heart of the city.

> "Not everyone was happy about the building of the dam. Residents knew their lives would be forever changed when they were forced to move to higher ground and leave their lives and land behind." (Applegate 93)

The dam that flooded out an entire region's existence would also be the birth of its new identity and primary source of revenue. The TVA posted signs glorifying the tourist values of the new 65,530 acre Lake Cumberland. The lake, now a warm water fishery, with 1,255 miles of federally protected shoreline attracts an estimated 7 million vacationers and sport fisherman every year. Striper, largemouth and smallmouth bass, and walleye are plentiful thanks to stocking, making the lake a sportsman's paradise (fig 16). Lake Cumberland is also known

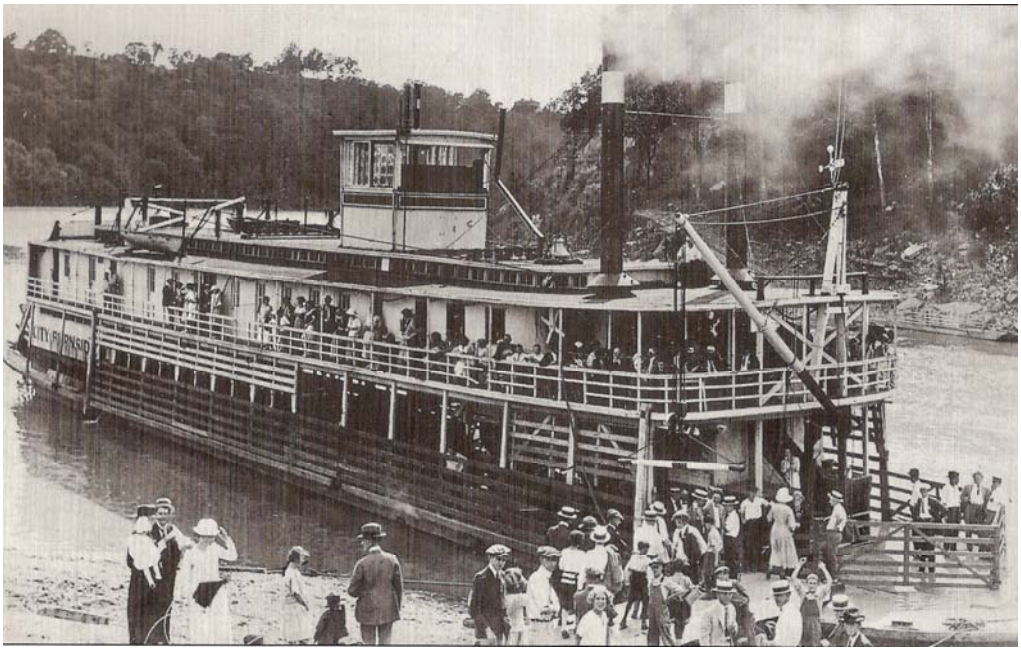


Fig 14: Many steamboats paddled the Cumberland River. Pictured here is the *City of Burnside*, named after the busy port city where she was built (Source: Applegate)

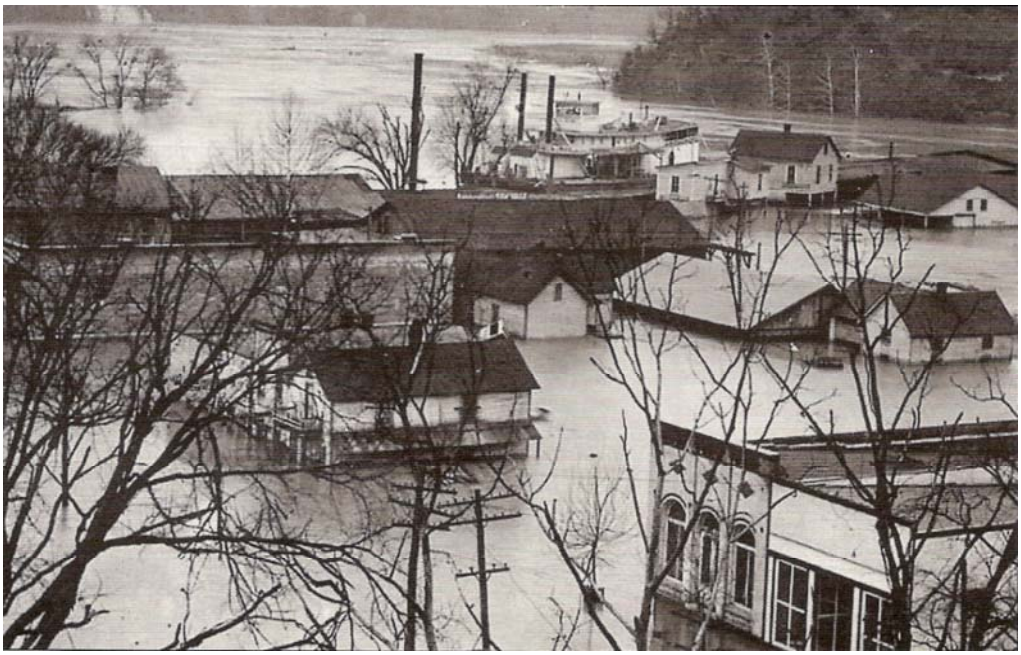


Fig 15: Burnside was always at risk of flooding (Source: Applegate)

Fig 16: Citizens watching floodwaters (Source: Applegate)

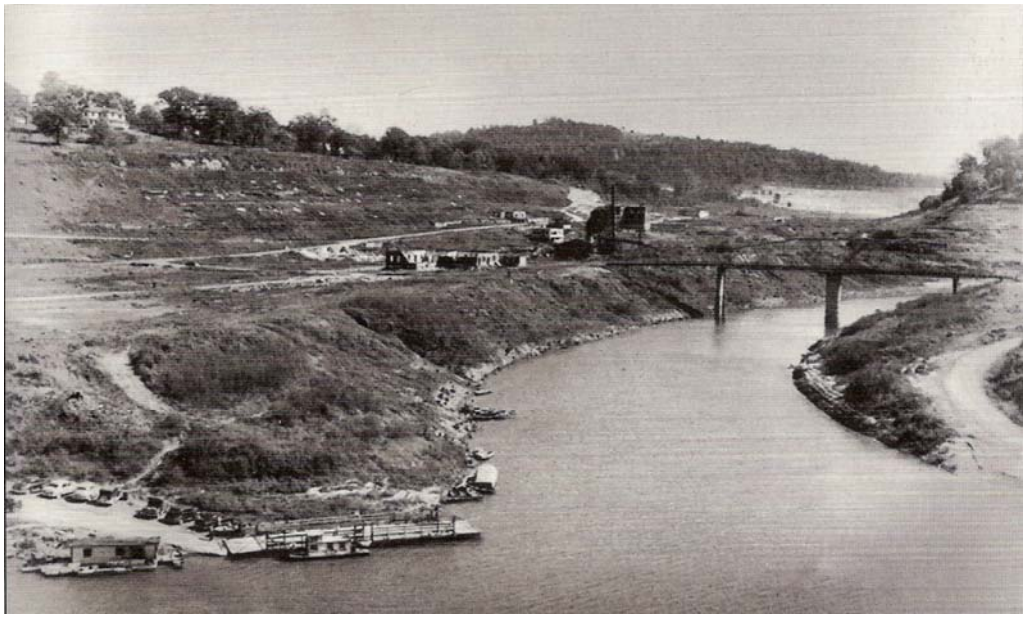


Fig 17: Remnants of Burnside, KY after the entire city was moved to higher ground (Source: Applegate)

as the *Houseboat capital of the world* (fig 17). This new lake culture brings an estimated $159 million to the local economy annually.

This is why the wound needs to be recognized and healed. Construction repairs to Wolf Creek Dam have happened in several phases. It is an on-going stitching and patching of an iconic American structure. The largest dam in America east of the Mississippi River, it annually produces an estimated $13 million in hydro-electric energy, enough to power a city of 375,000 people. The reservoir, Lake Cumberland, supplies drinking water to 200,000 people. The downstream benefits are just as important. The flood control aspects of the dam are estimated to have saved $34 million in flood damage. The reservoir has such great capacity, that the spillways on the dam have only been used eight times, with no issues. These benefits are threatened since the levels of the lake have been dropped to reduce pressure on the dam. The lake drawdown reduced the lake to 35,820 acres, almost half its original size. This caused a loss of $12 million in tourism in 2007 for the area. It was also damaging to the operations of the Wolf Creek National Fish Hatchery, located just below the dam.

Wolf Creek Dam National Fish Hatchery

Below and adjacent to the dam are the generator house and the transformers. What was unexpected in the initial site investigation was the Wolf Creek National Fish Hatchery. The hatchery was established in 1975, and is the foremost supplier of brown and rainbow trout to the southeast region of the United States. Roughly 318 jobs around the region are attributed to the operations of the hatchery. The hatchery includes indoor and outdoor runs for the trout to grow from the eggs that are shipped to the facility. The hatchery pumps cold water, best for the trout, from the bottom of Lake Cumberland, through the entire

Fig 16: Striped bass caught on Lake Cumberland (Source: Applegate)

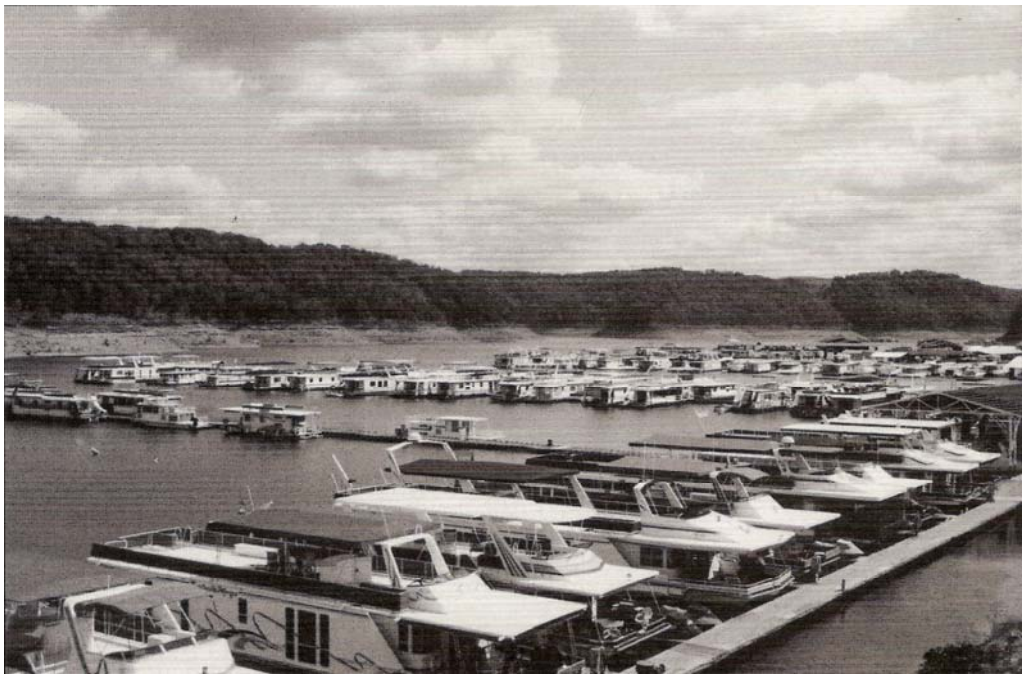


Fig 17: Houseboats on Lake Cumberland (Source: Applegate)

facility, and back into the Cumberland River below the dam. In 2007 the hatchery opened an education center on the site. The center has exhibits about the dam, the geological and biological features of the area, a small theater/class room and a gift shop.

The Surroundings

There is also a campground on the site that allows for both tent and RV camping. The grounds have river access for shore fishing and a boat launch. The water below the dam is a popular fishing location. Several restroom buildings are located throughout the campground, along with two playgrounds, an outdoor pavilion, and a snack bar. There are also three residences on the site, close to the hatchery. These are two-storey, single family homes.

These multiple uses are what started to frame the thesis of amelioration. There are several examples of amelioration: from the repair of a failed technology of the dam; to the raising and stocking of trout whose habitat has been destroyed by humans; to the drowning of the area's memories. Can these examples of healing be expressed through architecture?

IV. Hatchery: Amelioration and Program

Amelioration of the Dam and TVA

> "The [Cumberland River] was one of the last frontiers in the Eastern United States, unexcelled in beauty and unadorned by any semblance of modern improvements. Rich in raw materials, peopled by the finest stock of pioneers and unperturbed advancing civilization all around it, here was a prize that caused many steamboat captains to gasp for breath."
>
> - Byrd Douglas (Applegate 7)

The TVA advertised the dams, and all of the benefits that would come from them, but conveniently forgot to mention the sweeping changes that they would cause: the environment and habitat forever altered; the towns and lifestyles destroyed; the culture and history of an entire region drowned at the hands of progress. Two goals of the TVA were to restore the environment, and to tame nature in order to reclaim farm land. It could just as easily be said that the environment was completely severed and changed with the construction of the dam. And, that by eliminating the natural nutrient replenishing process of flood, the farming industry was as equally wounded.

In this project, those TVA goals are revisited. At the smaller scale, the museum and educational portions of the hatchery will teach its visitors about the TVA, Wolf Creek Dam, and the rich history of the surrounding area. There is also the establishment of a nature preserve below the dam, once all of the current uses are moved and consolidated into this new, comprehensive project. At the larger scale, the restoration of the dam has to happen. The Wolf Creek National Fish Hatchery is looking to expand. The first opportunity to pair these two related entities was squandered in the 1970's when the dam was being repaired, and the hatchery was being built. But there is now a second chance to weave these facilities together. Money from the Recovery Act should be used to fund both

projects, eliminating wasted time and money. Additionally, this would be a complete project, with all design phases involved, and would create even more job growth.

Amelioration of the Environment

The environmental healing will happen at two scales. The first is the creation of a preserve area. The land below Wolf Creek Dam has had program sprawled across it. Relocating the hatchery, and consolidating the campgrounds, would provide the opportunity to return this landscape to a more native habitat. The second is in the actual operations of the new fish hatchery. The new Wolf Creek National Fish Hatchery would supply both warm and cold water species. Cold water hatcheries are located below dams to take advantage of the cold water at the bottom of the reservoir, which is gravity fed through the flumes and piped to the hatchery. At the new Wolf Creek facility, the same cold water will be circulated through the entire hatchery system. However, the gravity fed pipes will have been replaced with solar powered pumps. The cold water flows from the indoor hatchery, out to the runs, through the education stream, where it flows back into the Cumberland River. The new hatchery will also include a warm water component that takes advantage of the warm waters of Lake Cumberland, behind the dam. Additionally, the new hatchery will have an endangered species laboratory. This important feature will ensure the continued existence of endangered, threatened, and rare fish species like the relict darter, lorenz topminnow, and the spotfin chub.

Amelioration of Conscience

By exposing the many cause and effect scenarios found on the site - including the building of the dam, the existence of the hatchery, and even our personal

actions – the project will ultimately leave the user with a heightened state of consciousness. Since September 11, 2001, the environmental education centers have also adopted the role of visitor centers for the dams that they are so closely attached to. While these terror attacks closed off access to the interior of the dams, and the many museums that each one housed, access still remains across the top of the dams, and on the lakes and rivers on either side of the dams. This is where cues can be taken from the Reichstag project, to rethink the current convoluted system, and implement qualities of transparency and accessibility.

Museum

The history of the dam, the lake, the cities and the people, can all be found in the museum portion of the new hatchery. The closing of public access to the dams after September 11, 2001, also locked away all of the associated visitor centers. This has left a void in the experience of visiting some of our countries landmarks. The new museum will fill this void. Historical exhibits will feature: the dam and its construction; the TVA and its role in shaping this country; and the bustling river community of Burnside. The museum will also offer an overlook that faces the Wolf Creek Dam powerhouse, with views of the face of the dam and the downstream Cumberland River Valley. These views re-associate the user to the grand scale of Wolf Creek Dam, as well as the state of the Cumberland River prior to 1950.

Warm Water Hatchery

The warm water hatchery will be new to this site. This portion of the facility will include a series of indoor basins for research, and raising eggs and fingerings. Outdoors there will be ponds for raising the fish to adulthood. This new

programmatic element will take advantage of the large warm water reservoir of Lake Cumberland. This portion of the project correlates with the idea of consolidating and building smarter. The U.S. Fish and Wildlife Service operate facilities all across the country, but none have both a warm and cold hatchery at the same location. Also, considering the importance of the sport fishing industry to the community, it will be a great benefit to have a local hatchery stock the lake.

Education Center and Gallery

Although geared towards the many young students who visit, the education center is still a learning experience for any visitor of the facility. It is here that the experience of learning becomes tactile. Exhibits will include flora and fauna of the region, the mission and operations of the U.S. Fish and Wildlife Service, and the workings of this facility. There is a small theater and classroom for presentations. The multi-storey gallery includes an exhibition space for interchanging exhibits. A book-lined ramp spirals up the outside of the room. Several offices and indoor and outdoor reading areas are also accessed from the ramp. The final leg of the ramp continues outside, until the view of Lake Cumberland with its rocky, tree-lined shores is revealed at the overlook.

Endangered Species Laboratory

The state-of-the-art laboratory is a new addition to the programmatic elements of the original facility. It is a unique piece of program that takes advantage of both the warm and cold water fisheries on site. The staff at the existing hatchery began this program in a makeshift laboratory, in a bay of the maintenance building. The laboratory is bordered by racks of aquariums that contain the links to preserving entire species. The laboratory bridges the dam

and highway, stitching the two sides of the dam with literal and figural moves. It is here that the worst environmental trauma, caused by human development and interference, is being healed. Using science and technology to undo what science and technology did.

Cold Water Hatchery

Since 1975, the Wolf Creek National Fish Hatchery has been producing rainbow and brown trout. These fish are used to stock rivers throughout the southeast, including the Cumberland River below Wolf Creek Dam. This is necessary because the entire aquatic ecosystem was altered below the dam, after construction. The river used to be a warm water habitat; however, the down river portion has been forever changed to a cold water habitat. Flowing water is a necessity for the raising and survival of the trout species. In the outdoor runs, the fish grow until maturity and are exposed to the elements and the flowing water needed for survival. Visitors are allowed to feed the adult fish with pellets purchased on site. They toss the food into the runs and watch the flapping and splashing as the fish fight for food.

The cold water hatchery and the outdoor runs also provide another literal healing connection to the dam. Both are supported by a new steel and concrete caisson wall that is being built as part of the rehabilitation of Wolf Creek Dam. The new caisson wall runs the length of the earthen dam, roughly ¾ of a mile, and extends up to 300 feet below the surface. This wall is yet another patch attempt to save the dam.

Manmade Stream and Wetlands

The existing manmade stream will be quadrupled in size for the new facility. Here students can explore river ecology. It will be open to the public for fishing and will be handicap accessible. There will also be three types of constructed wetlands to provide another outdoor classroom experience.

Cabins and Preserve

Small cabins onsite are available for the workers and visiting scientists, and can also be rented to tourists for additional income. Traditional camping sites provide an opportunity for vacationers to connect with nature. Nature trails allow visitors to weave through the 900-acre preserve area, stopping at various programmatic elements in the landscape. A boat launch provides access to the Cumberland River.

The Scientist and the Visitor

All users will follow a procession from the lower, living area, up a long ramp to the main building. The scientists will practice a daily ritual that will take them past their work, acting as a constant reminder as to the significance of their daily activities. Visitors will ascend to the hatchery up the ramp, at times weaving through openings in the caisson wall, finding shade underneath the outdoor runs, activating the entire face of the dam. As they gain elevation, the endangered species portion of the building will be seen bridging the path, acting as a gateway for the project. The experience of the hatchery will weave the paths of the scientists and the visitors.

V. Conclusion

An architecture of amelioration is possible. The ideas of the wound, the mend, and the scar, can and must be addressed. Yet, considering the scale of this project, it was frustrating not being able to develop to the greatest level of detail. It is possible that this project could have been divided into two different theses: structure and landscape. The structure thesis could take the ideas of ameliorative architecture into the details of the building and program, even going as far as creating experimental exhibits for the education center and gallery space. The landscape thesis could further exploit the interactions between the new caisson wall, the users, and the environment through further exploration of the new field of Landscape Urbanism.

Wounds, like those of the environment, and of memory, are exposed throughout the project with mending qualities that are literally and figuratively everywhere. The path of the user expresses the stitching metaphor, weaving the landscape, dam, and hatchery together. The bridge represents multiple connections between habitats, hatcheries, and extinction, each with varying levels of transparency. The majority of the new hatchery will be glass, exposing the structure, use, and occupants. Contrastingly, the aluminum panel cladding expresses the metaphor of memory and reflection. The merging of the concrete foundation and caisson wall is literal, in an effort to echo the neighboring Modern monument, while still exposing the amelioration of the dam.

Ultimately, an architecture of amelioration exists at every scale of life. In this project, the attempt was made to stitch these varying scales together: from national policy, to the repair of Wolf Creek Dam, down to the forgotten history of generations past. Every scar tells a story.

References

Literary Review

Mississippi Floods is a visual history of the ever-changing channel of the Mississippi River. The book covers the entire river, but its main focus is on the southernmost stretches, predominantly, the river delta. The shifting river has continued to flood and carve and scrape the landscape while human existence continues to develop along the changing shorelines. The argument turns towards whether or not these natural fluctuations should be controlled, more than they are currently, or if humans need to succumb to nature. In the case of the Wolf Creek Dam site, nature that was once tamed is now proving to be more powerful than human engineering. Prior to the construction of the dam, the Cumberland River was prone to terrible flooding. Hence, one reason given to construct the dam, and arguably the primary reason, was to control this annual flooding. With the dam now undergoing an expansive repair, the human versus nature argument can be discussed again.

Dice Thrown is a book published about an exhibition on the Ohio Agricultural Landscape which examines the development of the American farmsteads in conjunction with the American city, and the role that Modernism had in shaping the agricultural landscape. Once the Wolf Creek Dam site was chosen, this small series of essays was suggested as a look at organization patterns of building clusters in rural settings. The site below the dam, with its multiple structures and multiple uses, will have to accommodate future development. The new development can also bring some organization to the site, tying together the old structures with the new.

Radical Reconstruction, by Lebbeus Woods, is a useful collection of three of his most well known theoretical projects: Sarajevo, Havana, and San Francisco. Much of Woods' work depicts post-apocalyptic landscapes. However in this

book, three separate yet similar scenarios are examined. In war-torn Sarajevo, the ideas of *scabs, scars, and new tissue* are used in repairing the city's urban fabric. The Havana project looks at the damaging forces of Cuba's economic and political scene and uses inhabitable *walls* to define new spaces of experimental living while at the same time exploiting the process of decay. A new seawall is also a part of the plan, one that reacts to strong tidal forces to protect the city from storm surge. The final project in San Francisco is a reaction to the lateral forces and failure of our buildings to said forces in earthquakes. Woods' association with the scar in architecture provided an apparent link to my thesis. Unfortunately this book lacks much of his written theory. However, the imagery included is rousing and thought provoking. The projects in this book were inspirational for the site and program of this project.

Architecture and Disjunction by Bernard Tschumi is another collection of essays, this time of one man's work over fifteen years. Tschumi's essays sever ties with modernist theories in that space cannot simply be created by form - space is something that is *felt*. What is interesting is the progression of Tschumi's beliefs on the essence of architectural creation. Reacting to modernist ideals, he states that the architect is the *conceiver of form*, but later evolves this thought to include the importance of action and program in defining spaces. This change coincides with the shifts from postmodernism, to decontructivism, to the epitome of today's theory.

Towards an Architecture is Le Corbusier's standard of the Modernist movement. Post-modernism began as a reaction, but has since split into factions with varying beliefs and philosophies, especially regarding historical references to Modernism. To define an architecture of amelioration it is important to recognize any historical affiliations, and establish its groundings to justify its existence and acceptance in moving forward. *Three Reminders to Architects* is blunt and

honest, and in it, Le Corbusier's love of pure forms, namely those he witnessed in North America, led me to American infrastructure as a programmatic starting point.

Lewis.Tsurumaki.Lewis: Opportunistic Architecture was a surprise find. The L.T.L. firm has established themselves in the field by taking creative perspectives on constraints and limitations placed on design. Their thought process of using restrictions as inspiration leads them to finding solutions in innovative ways. Ameliorative architecture could also be defined as "opportunistic" so this reading provides contemporary precedents to study.

S, M, L, XL, by the group O.M.A., is a collection of essays written from the postmodern perspective. Koolhaas was once considered a deconstructivist. However, he, like most others, has distanced himself from the style/title that made his name known. The initial reaction would be to place this thesis as a faction of post-modernism, and further as a carcinoma of the deconstructivist movement. Although drawing from the past, these essays help differentiate a new place in modernity.

Interviews and Reports

I have read and listened to several interviews with Lebbeus Woods via different websites. These have been the best resource, to date, to understand Woods' architectural theory. Another valuable resource is Woods' own website containing small doses of his writing. Additionally, articles and interviews with Lebanese architect Bernard Khoury have produced a common thread tying Woods' theory to Khoury's built work to the validation of an ameliorative architecture.

Other websites that I have accessed have been governmental in nature. In an attempt to find a site, I have read several reports pertaining to the status of America's infrastructure, especially following the collapse of the interstate bridge in Minnesota. An architecture of amelioration has a proficiency to appear in post-disaster settings, and my research of these reports has led me to two dangerous dams, both of which would have serious casualties if they were to fail, including Nashville and rural areas along the Cumberland River in Kentucky and Tennessee.

Bibliography

Applegate, Kris, and Jarenda Miller. *Around Lake Cumberland*. Charleston, SC: Arcadia Pub., 2009. Print.

Bernard Khoury / DW5. Web. 28 Oct. 2009. <http://www.bernardkhoury.com/>.

Culvahouse, Tim, ed. *The Tennessee Valley Authority: Design and Persuasion*. New York: Princeton Architectural, 2007. Print.

Ennead Architects. Web. March. 2010. <http://ennead.com/>.

Flynn, Stephen. "5 Disasters Coming Soon - American Infrastructure - Stephen Flynn - Popular Mechanics." *Automotive Care, Home Improvement, Tools, DIY Tips - Popular Mechanics*. Web. Autumn 2009. <http://www.popularmechanics.com/technology/engineering/infrastructure/4227310>.

George, Geoffrey S. *G.S.G. Films*. Web. Sept. 2009. <http://www.gsgfilms.com/photos/decay/decay.html>.

Gianni, Benjamin. *Dice thrown*. New York, N.Y: Princeton Architectural, 1989. Print.

Gray, James. "Wolf Creek National Fish Hatchery Staff." Personal interview. 19 Mar. 2010.

InfrastructureUSA. Andigo New Media, 2009. Web. Sept. 2009. <http://www.infrastructureusa.org/>.

Johnson, Philip, and Mark Wigley. *Deconstructivist Architecture: The Museum of Modern Art, New York*. New York, New York: Little Brown and Company, 1988. Print.

Koolhaas, Rem, and Bruce Mau. *S, M, L, XL*. New York, New York: Monacelli, 1995. Print.

Le Corbusier. *Toward an Architecture*. Los Angeles, CA: Getty Research Institute, 2007. Print.

Lewis, Paul, Marc Tsurumaki, and David J. Lewis. *Lewis.Tsurumaki.Lewis: Opportunistic Architeture*. New York, New York: Princeton Architectural, 2008. Print.

Loures, L., and T. Panagopoulos. *Sustainable reclamation of industrial area in urban landscapes*. Rep. no. 10.2495/SDP070752. Vol. 102. WIT, 2007. Print.

Mathur, Anuradha, and Dilip Da Cunha. *Mississippi Floods Designing a Shifting Landscape*. New York: Yale UP, 2001. Print.

Noever, Peter, ed. *The End of Architecture?: Documents and Manifiestos, Vienna Architecture Conference*. Munich: Prestel, 1993. Print.

"Online Innundation Maps." *U.S. Army Corps of Engineers Nashville District Home Page*. Web. 31 Sept. 2009. <http://www.lrn.usace.army.mil/wolfcreek/maps_online.htm>.

Ouroussoff, Nicolai. "Middle-East Pieces." *The New York Times Magazine* 21 May 2006: 89-99. *Http://www.bernardkhoury.com*. Bernard Khoury / DW5. Web. 28 Oct. 2009. <http://www.bernardkhoury.com/ArticlesPDF/NEW%20YORK%20TIMES%202006.pdf>.

"Postopolis!: Lebbeus Woods." *City of Sound*. Ed. Dan Hill. 8 June 2007. Web. 21 Sept. 2009. <http://www.cityofsound.com/blog/2007/06/postopolis_lebb.html>.

Powers, Kyna. *CRS Report for Congress: Aging Infrastructure: Dam Safety*. Rep. no. RL33108. CRS, 2005. Print.

Stamp, Jimmy. "Lecture Review: Lebbeus Woods." *Life Without Buildings*. 17 Sept. 2006. Web. Sept. 2009. <http://lifewithoutbuildings.net/2006/09/lecture-review-lebbeus-woods.html>.

The Story of Lake Cumberland. Prod. Delaney Communications, Inc. Sentimental Productions, 2006. DVD.

"The US Army Corps of Engineers Wolf Creek Dam Seepage Rehabilitation Project." *Www.lrn.usace.army.mil*. U.S. Army Corps of Engineers, 8 July 2009. Web. 31 Sept. 2009. <http://www.lrn.usace.army.mil/WolfCreek/>.

Tschumi, Bernard. *Architecture and Disjunction*. Cambridge, Massachusetts: The MIT, 1996. Print.

Waldheim, Charles. *The Landscape Urbanism Reader*. New York: Princeton Architectural, 2006. Print.

"Without Walls: An interview with Lebbeus Woods." *BLDGBLOG*. Future plural, 03 Oct. 2007. Web. Sept. 2009. <http://bldgblog.blogspot.com/2007/10/without-walls-interview-with-lebbeus.html>.

Woods, Lebbeus. *Lebbeus Woods*. 2007. Web. Sept. 2009. <http://lebbeuswoods.net/>.

Woods, Lebbeus. *Radical Reconstruction*. New York, New York: Princeton Architectural, 1997. Print.

Zoccola, Michael F. "Graduate Student Research." Message to the author. Apr. 2010. E-mail.

Appendices

Appendix A: Wolf Creek Dam Panoramas

Fig 20: Face of earthen dam (Source: Author)

Fig 21: Earthen and concrete connection (Source: Author)

Fig 22: Concrete face of Wolf Creek Dam (Source: Author)

Fig 23: Wolf Creek Dam from overlook (Source: Author)

Fig 24: Control gates on lakeside of Wolf Creek Dam (Source: Author)

Fig 25: Construction on lakeside of earthen dam (Source: Author)

Appendix B: Presentation Images

AN ARCHITECTURE OF AMELIORATION

A Proposal for the Wolf Creek National Fish Hatchery in Jamestown, Kentucky

Scar: *A lingering sign of damage or injury, either mental or physical.*

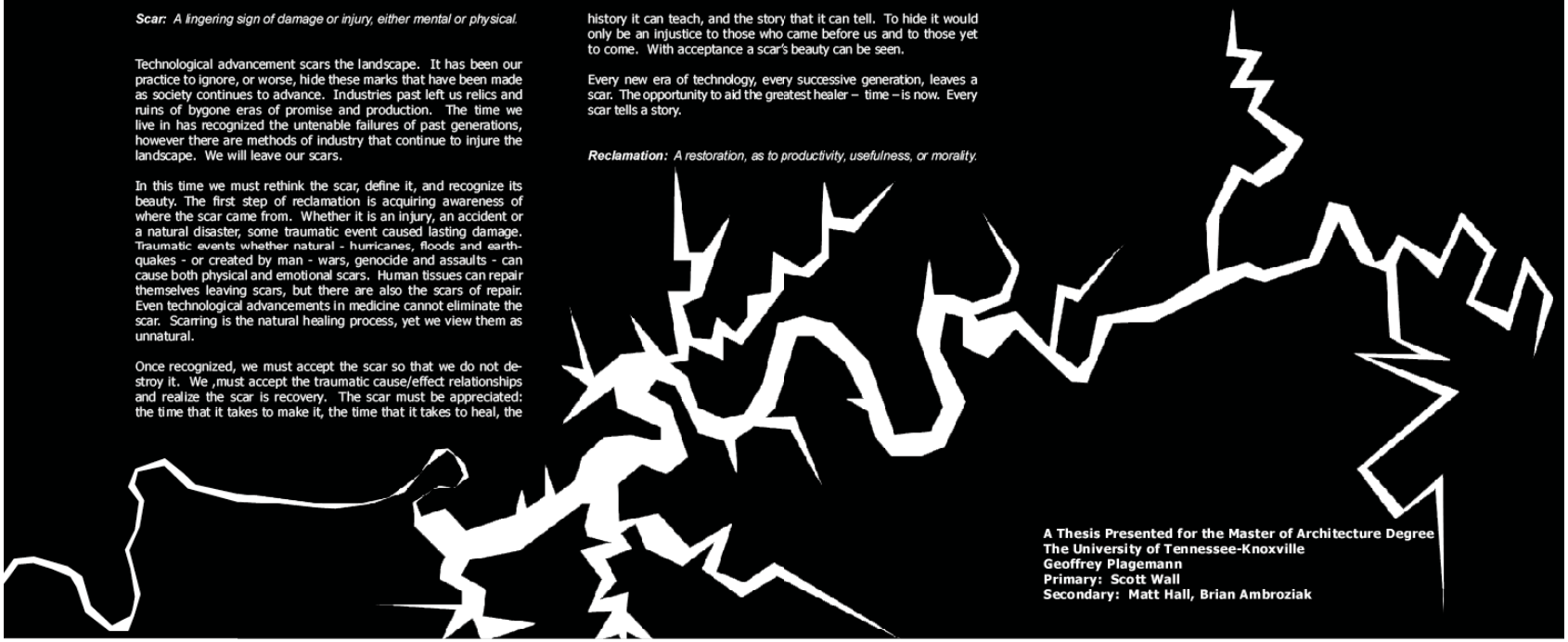
Technological advancement scars the landscape. It has been our practice to ignore, or worse, hide these marks that have been made as society continues to advance. Industries past left us relics and ruins of bygone eras of promise and production. The time we live in has recognized the untenable failures of past generations, however there are methods of industry that continue to injure the landscape. We will leave our scars.

In this time we must rethink the scar, define it, and recognize its beauty. The first step of reclamation is acquiring awareness of where the scar came from. Whether it is an injury, an accident or a natural disaster, some traumatic event caused lasting damage. Traumatic events whether natural - hurricanes, floods and earthquakes - or created by man - wars, genocide and assaults - can cause both physical and emotional scars. Human tissues can repair themselves leaving scars, but there are also the scars of repair. Even technological advancements in medicine cannot eliminate the scar. Scarring is the natural healing process, yet we view them as unnatural.

Once recognized, we must accept the scar so that we do not destroy it. We ,must accept the traumatic cause/effect relationships and realize the scar is recovery. The scar must be appreciated: the time that it takes to make it, the time that it takes to heal, the history it can teach, and the story that it can tell. To hide it would only be an injustice to those who came before us and to those yet to come. With acceptance a scar's beauty can be seen.

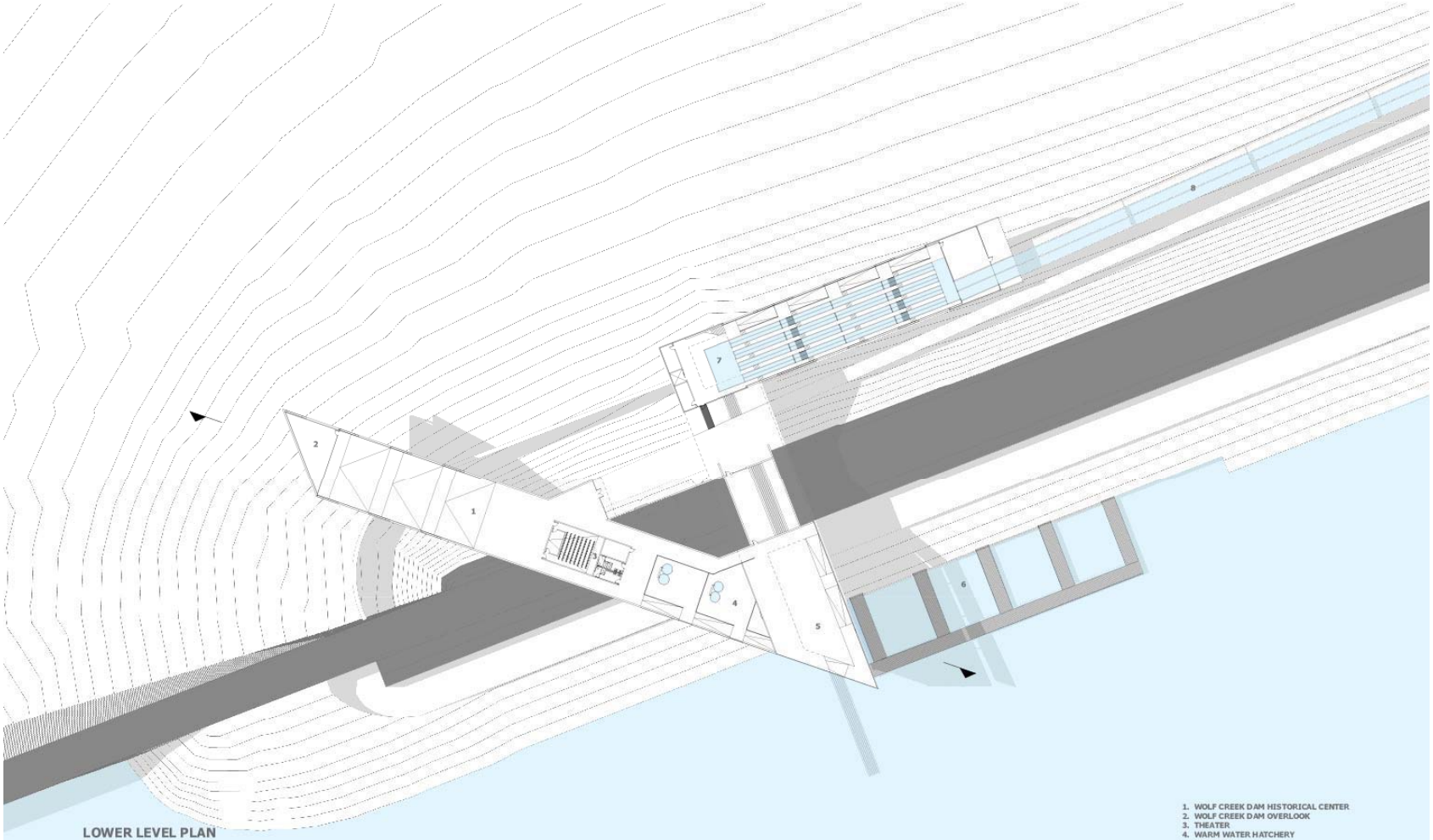
Every new era of technology, every successive generation, leaves a scar. The opportunity to aid the greatest healer – time – is now. Every scar tells a story.

Reclamation: *A restoration, as to productivity, usefulness, or morality.*



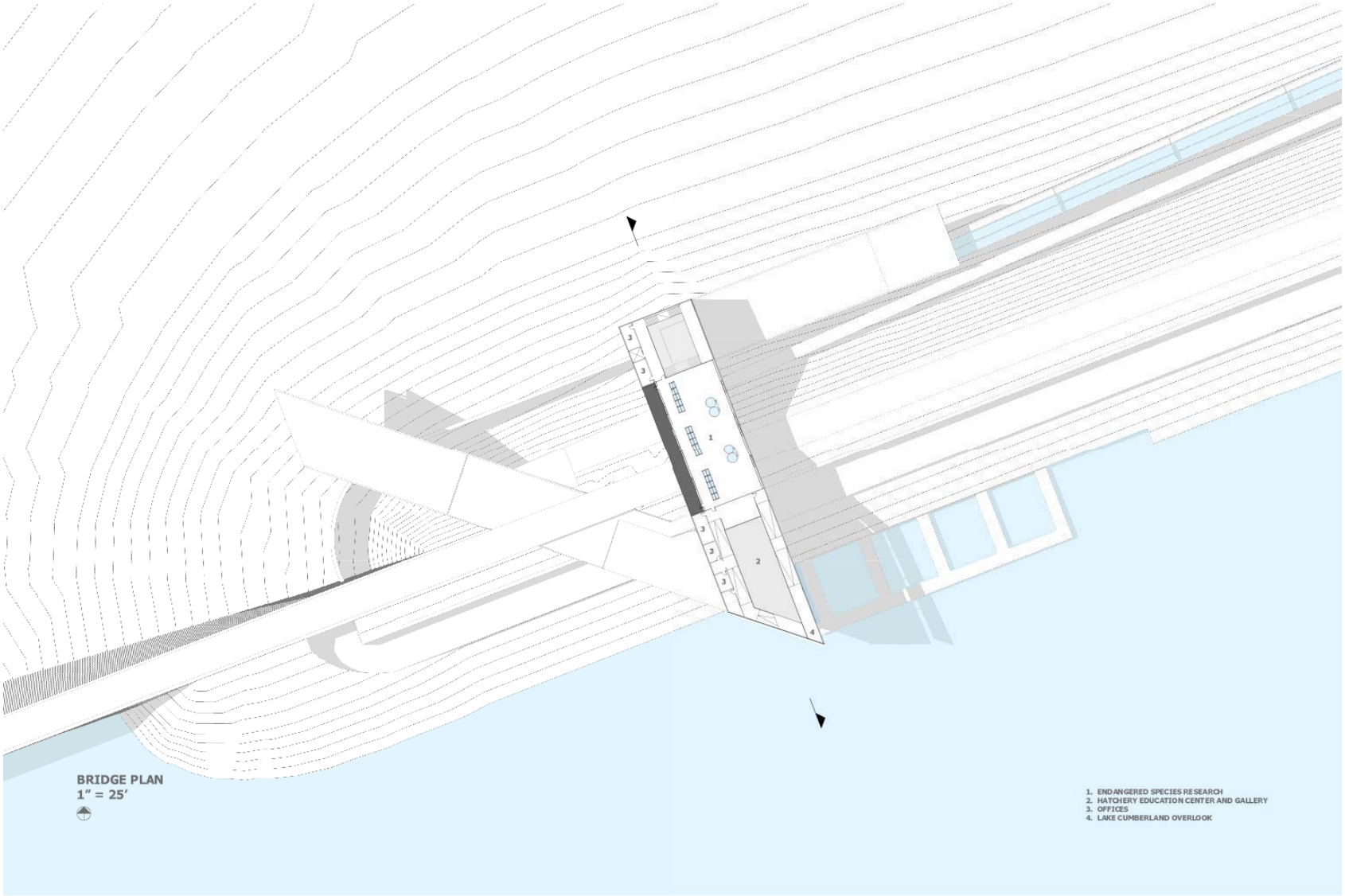
A Thesis Presented for the Master of Architecture Degree
The University of Tennessee-Knoxville
Geoffrey Plagemann
Primary: Scott Wall
Secondary: Matt Hall, Brian Ambroziak

SITE PLAN
1" = 300'
1. WOLF CREEK DAM
2. WOLF CREEK NATIONAL FISH HATCHERY
3. NATURE RESTORATION AND PRESERVE
4. CABINS AND
5. CAMP SITES
6. AMPHITHEATER
7. FACILITIES AND CLEANING STATION
8. CUMBERLAND RIVER BOAT ACCESS



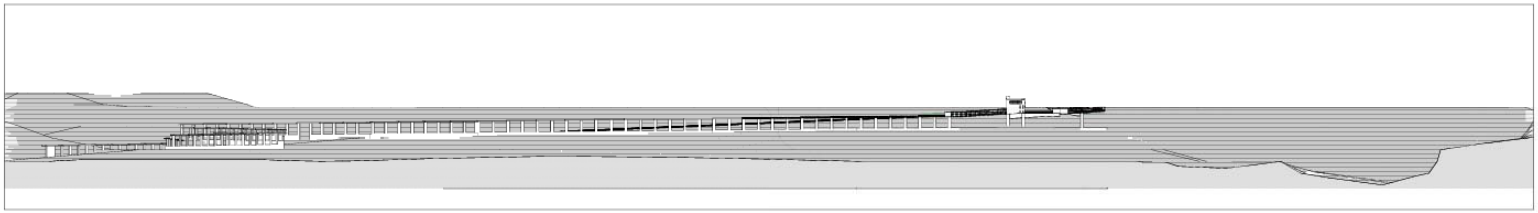
LOWER LEVEL PLAN
1" = 25'

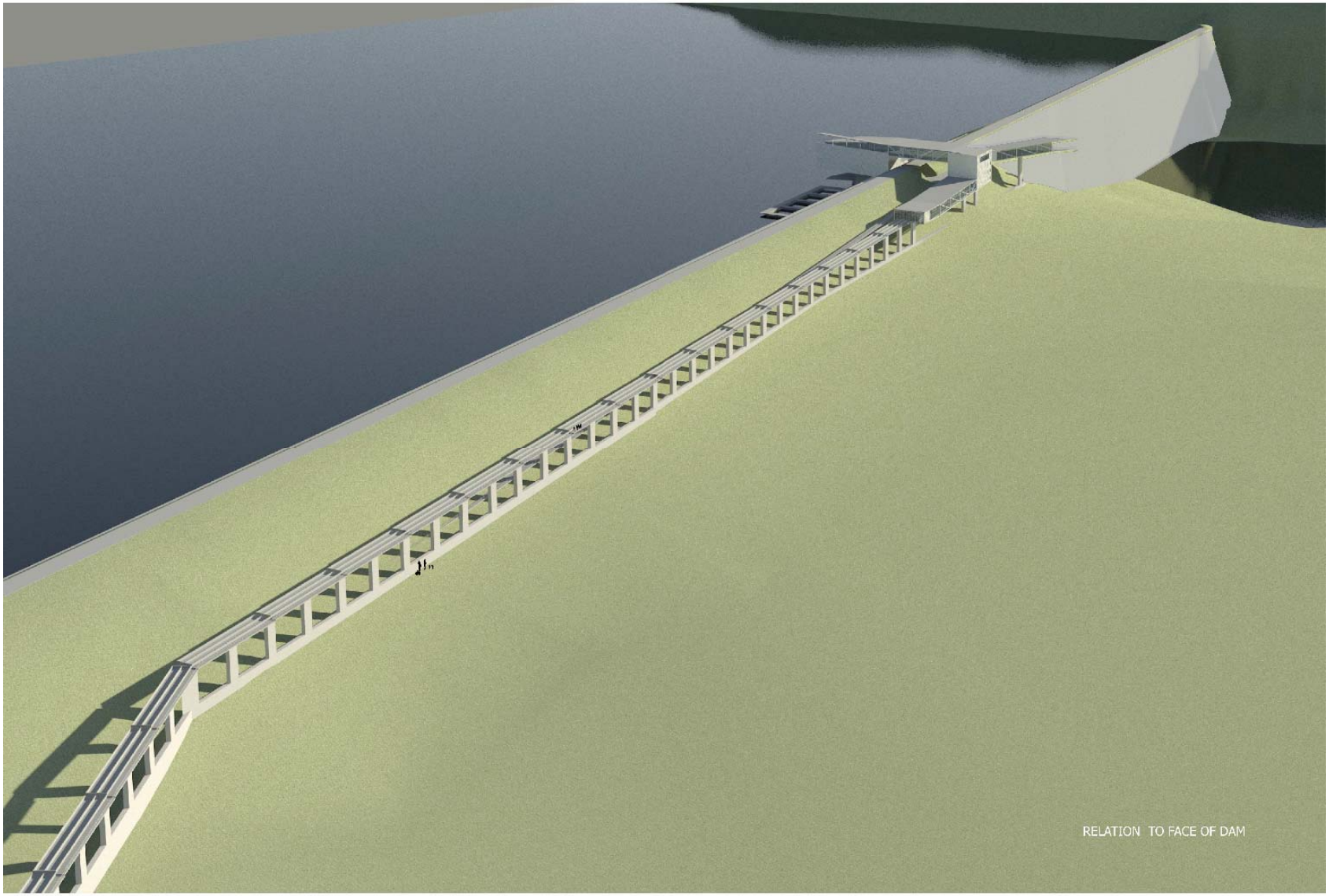
1. WOLF CREEK DAM HISTORICAL CENTER
2. WOLF CREEK DAM OVERLOOK
3. THEATER
4. WARM WATER HATCHERY
5. GALLERY
6. PONDS
7. COLD WATER HATCHERY
8. TROUT RUNS



BRIDGE PLAN
1" = 25'

1. ENDANGERED SPECIES RESEARCH
2. HATCHERY EDUCATION CENTER AND GALLERY
3. OFFICES
4. LAKE CUMBERLAND OVERLOOK

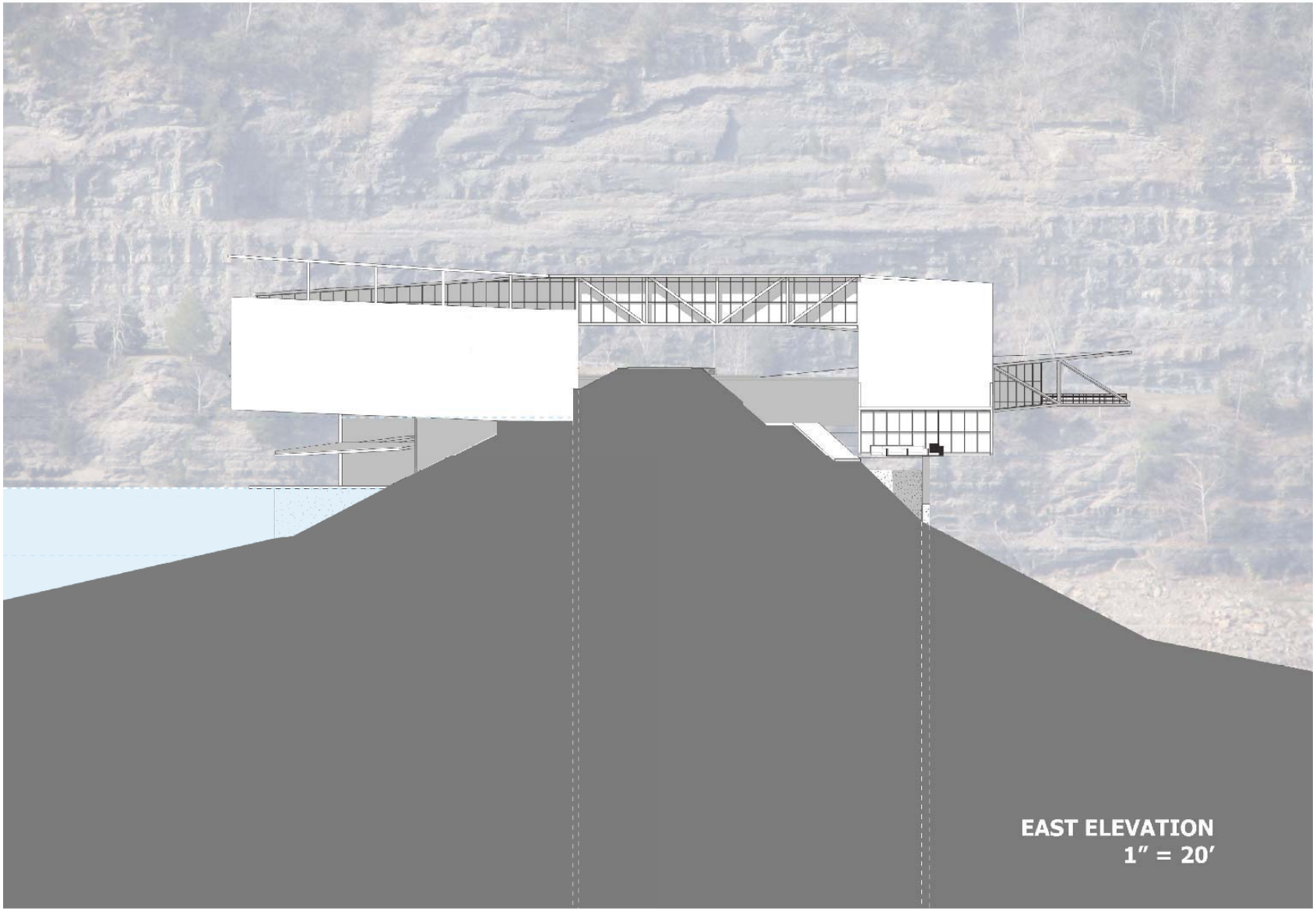



RELATION TO FACE OF DAM

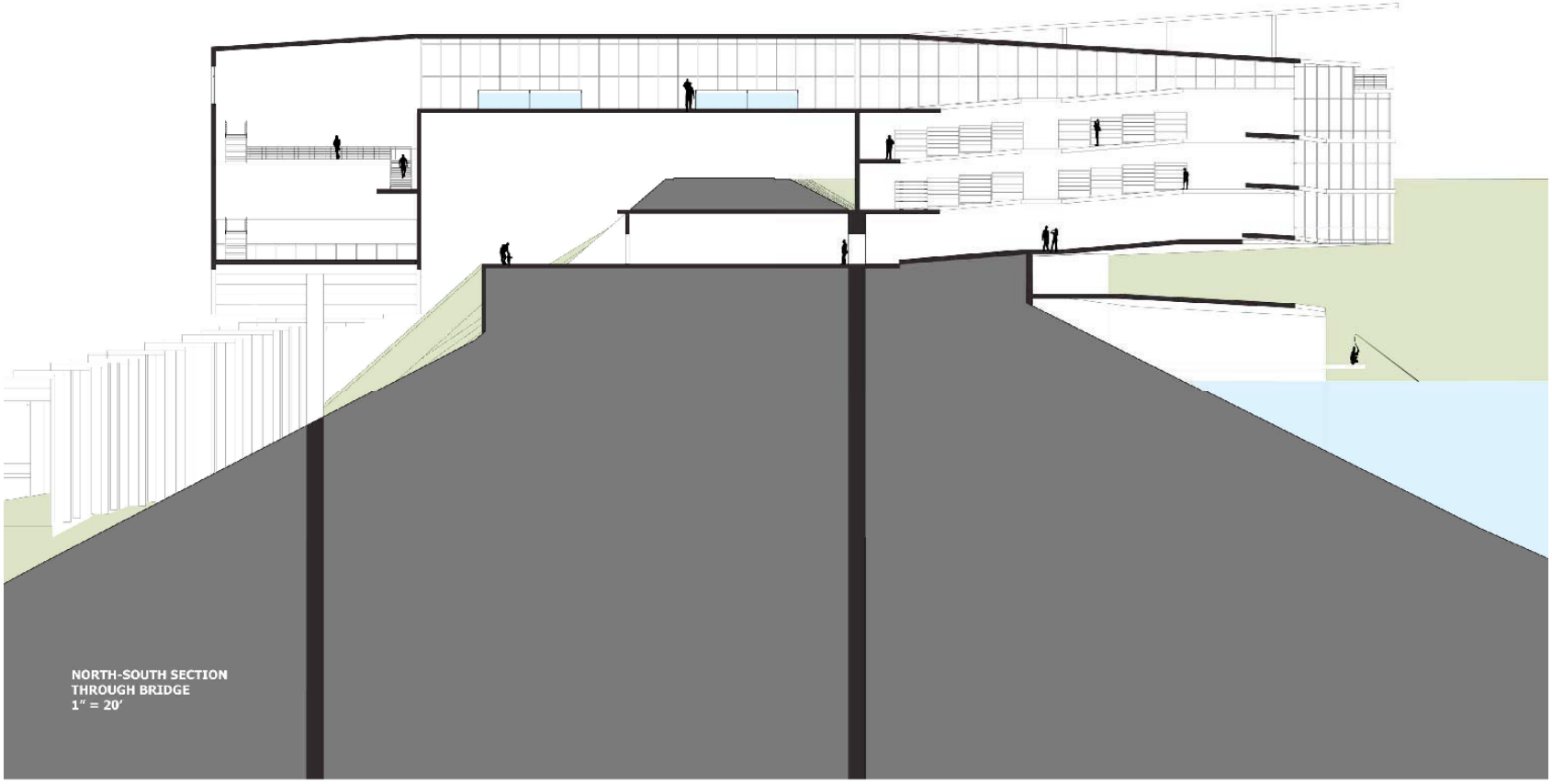
RELATION TO TOP OF DAM

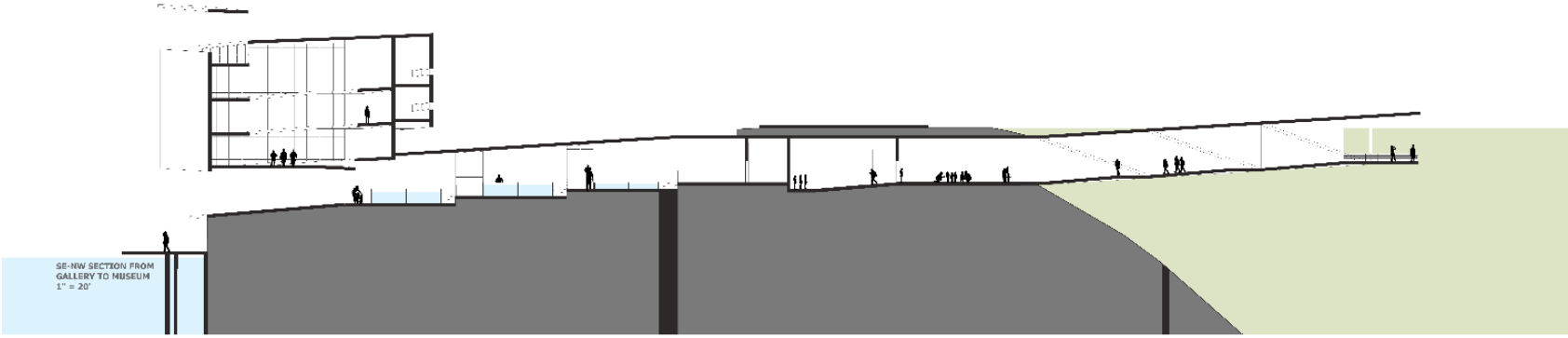
NORTH ELEVATION
1'=20'

SOUTH ELEVATION
1'=20'


EAST ELEVATION
1″ = 20′

WEST ELEVATION
1″ = 20′


NORTH-SOUTH SECTION
THROUGH BRIDGE
1″ = 20′


SE-NW SECTION FROM
GALLERY TO MUSEUM
1" = 20'

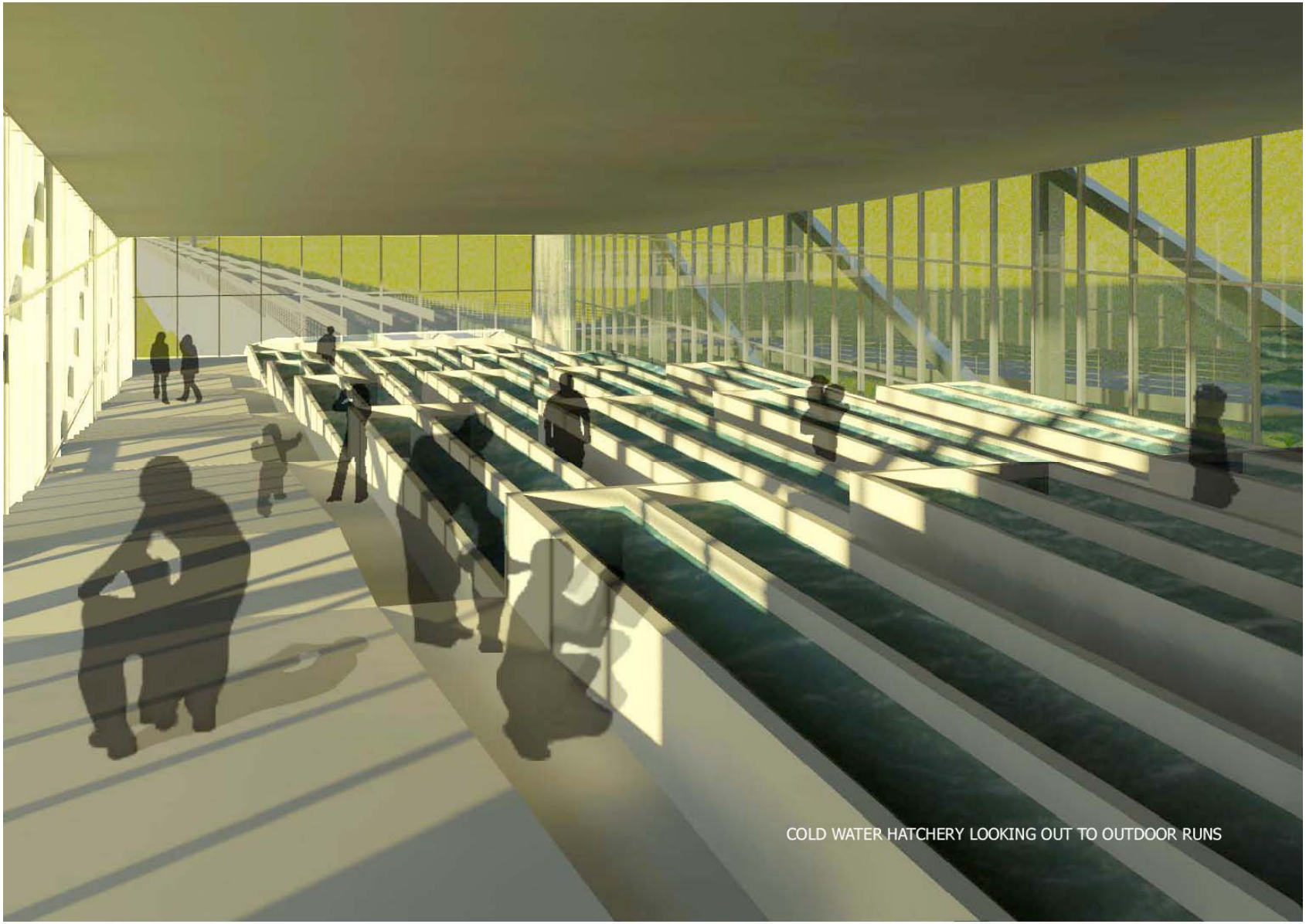
EXPOSURE OF SCAR

TOWARDS HATCHERY ENTRANCE FROM BEGINNING OF RAMP

BRIDGE AS GATEWAY TO ENTRANCE

TOWARDS COLD WATER HATCHERY FROM DAM OBSERVATION DECK

EDUCATION CENTER, GALLERY, AND LAKE CUMBERLAND OVERLOOK



COLD WATER HATCHERY LOOKING OUT TO OUTDOOR RUNS

TOWARDS CANTILEVERED MUSEUM FROM BASE OF DAM

VIEW FROM TVA OVERLOOK

Vita

Geoffrey Plagemann was born along the shores of the Mississippi River, in LaCrosse, WI where he lived with his parents, Russell and Carolyn Plagemann, and brother, Brandon. In 1991, the family moved to Madison, WI, and the following year to the suburb of Verona, where he graduated from Verona Area High School in 1998. He received his Bachelor of Science in Natural Resource Management from the University of Wisconsin - Stevens Point in 2003. From 2004-2007 he worked in South Florida in both public and private land use and neighborhood planning. Upon graduation from the University of Tennessee in 2010, he plans to pursue a career in architecture and urban design… somewhere… chip-chop-chip.