Green Building: Late 18th Century Eco-friendly Construction Techniques and Design Principles Used in the Construction of the Gardner House

Early in the semester of my American Architectural History class, one of my classmates asked if there were any new trends in architecture. Short of the ueber-modern steel and glass business of the day, I struggled to find any new trends in the rolodex of my brain. It wasn't until after class that it occurred to me that the new buzz-word in architecture is "green." Having spent the last several years working in the preservation trades and thus thinking primarily about historic structures, not new construction, my mind began the germination not of an answer, but a question: Is green building a new trend? Or is it a contemporary name given to something that is the modern version or the culmination of generations of practice and experience? Henry Glassie, in *Vernacular Architecture*, writes "When the builder's attentions are narrowed by training, whether in the dusty shop of a master carpenter or the sleek classroom of the University, past experience is not obliterated" (Glassie 20). I am inclined to agree with Glassie in this instance, especially if the meaning of that statement is expanded across generations.

I contend that green building is not a new trend but that it has in fact been practiced and passed down since time immemorial and is now effectively a tradition upon which the new generation of architects and craftsmen are building. It is only now, from the twentieth century forward that we have NEEDED to think of, pay attention to and coin a term for building green. Prior to the common use of electricity and diesel or gas-powered tools and factory-made and chemical-based materials, all buildings were green in that they required relatively little of the environment short of the materials extracted.

There was no gasoline being burned to get the materials from the earth or to the site, no rivers dammed up to provide electricity for saws and no impervious surfaces being laid to improve the speed with which materials could be moved.

Yet even the greenest house has an effect on the environment. In fact, that is the prime intention of the builder: to create an arena wherein he is in control. Glassie contends that early architecture can be seen as a struggle between man and the environment. He writes of the early builder, "He built to make the world better, to secure a place of control and reason within the madness…," (Glassie 33-34). Glassie also writes that "The decision to create a building is the decision to destroy some part of the material universe. Things are wrecked—trees are toppled, stone is broken, old houses are razed---to make life better. The desire is for improvement. The process of the desire is technological" (Glassie 22). In short, Glassie indicates that technology is, for humans, the ongoing and natural realm of improvement. We amend our environment to control it. As such, once the wilderness is tamed, we must look to new and different things to control in new and different ways. Technology is a continually moving horizon and the green movement of today is an extension of that horizon.

While it would be meaningful here to discuss the very early building practices of the Romans, Egyptians and others, I will use the building practices of the late eighteenth and early nineteenth century in the United States as the focus for my argument. More specifically, I will show that the design principles, building practices and tools of the craftsmen involved in the building of one specific house, the brick hall and parlor style Gardner House, were the very epitome of our current theme of stewardship of the environment even while essentially being the McMansion of the day. People in the South

typically lived in one or two room houses until at least the early nineteenth century (Hymes 268). Our example has four rooms, twice as many as were common for the time, all while making wise use of local materials and efforts.

The practices of the historic craftsmen are the predecessors of the greenest of all building practices, natural building. The website greenhomebuilding.com offers a definition that seems to me to sum up the ideas behind natural building: "Natural building is an umbrella term than connotes any sort of building that is accomplished with the use of natural materials primarily, as opposed to the use of man-made or industrial materials" (greenbuilding.com). The Gardner House can also be termed vernacular, using the term as I define it: a structure created without the aid of an architect or a conscious application of architectural trends, as well by English writers who look first to the material to define vernacular. "Vernacular buildings are composed of local materials, they argue[d]" (Glassie 25). Dell Hymes wrote in his article "The Power of Things" that he defines vernacular architecture not as a category, but as an "approach to architectural studies that complements more traditional architectural historical inquiries" (Hymes 263), a very folkloric perspective wherein the term is reduced to the "other" or the things not covered by other disciplines.

Glassie has made a career of focusing on form, but he recognizes that all cultures he has visited, and there are many, themselves classify houses into groups based on materials: thatch or metal roofs, clapboards or log, stone or brick, etc. (Glassie 25). These differences indicate as much a separation in social and economic class as in material. The Gardner House, though built entirely out of local material, was still an ostentatious display of wealth. Its brick patterns and high quality craftsmanship and

joinery would have made this a very expensive building to construct, even if cost were only defined in terms of man-hours. With or without the excessive use of fossil and carbon fuels, the embodied energy in the structure is still vast. Locals took note: Jean Bush McGuire, a resident of the house in the 1930s or 1940s gives an account of limestone steps that led to the door on the northern side of the structure (Baum) and Vilma Jean Kinney, a local historian, told me that the steps were very large and impressive (Kinney, personal communication).

It is likely the legend of its original supremacy over other homes in the area that kept it from being razed many decades ago as it sits on tillable land in the midst of what was previously a tobacco farm. This house hit the skids many years ago, and by the time it was taken over by the department had serious aesthetic and structural issues. It had been uninhabited by rightful owners for over thirty years and had been inhabited for many more years by people of low socio-economic status. Contemporary preservationists, and I am one, may use the term "demolition by neglect", but the Gardner House is a case of what I will call "preservation by neglect." In many ways, it is this lack of stewardship that has saved the structure from serious and irreversible alteration. People who don't have the funds to make changes make do.

The folks who inhabited the Gardner House most recently, in the 1970s, when faced with drafty windows, used duct tape to seal the air gaps. A more fiscally solvent owner may have elected to replace the windows with the newest technology, vinyl. They also may have elected to furr the walls out to accommodate insulation, which would have counter-acted some of the integrated passive heating and cooling principles I will explain in further detail later. They most certainly would have added plumbing and a

mechanized heating and cooling system, all of which would have caused damage to the structure through the necessary cutting of floors and piercing of foundations. It could be argued that this house was saved from all of that damage simply because the owners couldn't afford to inflict it.

My graduate assistantship in the Folk Studies and Anthropology Department at Western Kentucky University is essentially to restore the Gardner House, a one and one-half story home in Hart County, Kentucky that is owned by the University and more specifically by our department. That assistantship came into being through my work on the home as an independent consultant/contractor leading hands-on workshops for graduate students who were enrolled in historic preservation classes in the department. I was so moved by the questions the folklore students asked me about the builders and occupants that I decided to enter the program myself so that I could gain a better foothold on how to get at the stories behind the objects.

Before my assistantship began, I had already spent many hours learning about this particular house through reading Rachel Baum's stellar and successful National Register Nomination for the structure along with transcriptions and field notes of interviews conducted by students with locals as well as through my hands-on time with the house as contractor. As my hands-on time crosses many areas of preservation/restoration and so that the reader may gain a more thorough understanding of my intimate involvement with the house, I offer a detailed account of brick-and-mortar projects I have been or am currently involved in relating to the Gardner House.

My first contact was through leading a graduate student workshop on mothballing the structure, which is an involved process which for this house entailed covering two of

three doorways and all windows with ventilated covers to keep out pests and water while allowing the house to breathe, removal of a modern concrete porch that was encouraging the introduction of water into the structure, capping one of two chimneys, replacing one door with a temporary slab to allow locking of the house, building temporary stairs to the door, top-to-bottom sweeping and doing a complete inspection of structural members. I also undertook the ongoing repair of four full-timber floor joists that were damaged due to water intrusion. Failing masonry led me to mix my own lime-putty and ultimately my own mortar specifically for the building and to lead workshops beginning the long-term work of repointing sections of masonry.

Since the start of my assistantship, I have removed and restored the majority of the window sashes, removed loose plaster and peeling paint from the interior walls and led a flooring workshop for three graduate students teaching proper removal of rotted flooring to allow for sensitive and inconspicuous repairs. I have also led a weekend workshop for twelve graduate students during which we added half-round gutters and round downspouts to the house to divert water. In short, I am familiar with this structure on many levels, from the structural to the aesthetic. I have seen the chisel marks on the stone, the sawtooth patterns on the wood and the extremely fine hand-planed detailing that make this house a living piece of historic natural building and a testament to control of the local environment.

Construction Tools, Techniques and Materials

Prior to the mid-twentieth century the overwhelming majority of energy involved in the construction of a building was the energy of the felling and preparation of trees, quarrying of and preparation of stone and making of brick and mortar, all of which involved primarily human or animal energy (horses, oxen and donkeys used to transport materials) and little use of fossil fuels. In fact, only the making of bricks, mortar and metal hardware involved the use of wood or coal for fire; all other jobs on and around the historic construction site required exclusively animal or human energy, not fuel, for completion. Certain tools that involved the use of metal also used fuel in their creation, but as the tools were extremely expensive in their time they were reused on several projects during their lifespan, making the energy use negligible. While Glassie is referring to the thatched roofs of Ballymenone, Ireland when he wrote that "[thatching] takes knowledge and skill, it is a job for the man called handy, but it is a technology that requires no money" it is a concept easily applied to the construction of the Gardner House (Glassie 26). To help with understanding this concept, it is worthwhile here to give the expansive and perhaps seemingly superfluous details of the construction techniques, tools and materials used in the building of the Gardner House.

As a folklorist-in-training, I feel it necessary to start my description with a bit of local legend. The local lore about the construction of the house is that it was built entirely by slaves (Kinney, personal communication). Though that is a possibility, this house demonstrates excellent craftsmanship and perfect attention to details that only access to years of training and the best of tools could provide. As such, I put forth that while slave labor was probably used for gathering material such as sand from the river

and in moving soil for the foundation or making bricks, this house was constructed by superior craftsmen of their day. The trades of old were very precise as to the work to be completed by each craftsman.

Edward Hazen, in his 1837 *Panorama of Professions*, describes eleven different building trades: architect, brickmaker, bricklayer, carpenter, glazier, joiner, painter, plasterer, blacksmith, nailor and stone mason. While we will never know for certain due to lack of records, it is my opinion that there were a maximum of six professionals in these trades represented on the Gardner House construction site: bricklayer, carpenter, glazier (possibly done by another profession), plasterer (perhaps the bricklayer did this work, too), blacksmith, and stone mason. As the style of the house is a traditional folk style, I do not believe there was an architect involved in the process and I would assume that, given the rural location of the house and the limited use of nails in the construction, both hardware and nails would have been made by the same tradesman. It is likely that other jobs would have likewise been combined, especially trades based on work with similar material such as joiner (window and door maker) and carpenter (structural woodworker). While we know that trades were very specialized in their work, for ease of understanding, I will treat trades working in the same materials as using the same name.

The Gardner House is a through-and-through brick structure, meaning that the bricks are the structural units of the walls. It is built completely in the decorative and expensive Flemish Bond pattern using glazed headers, a brick turned across wythes, or layers, of brick to tie them together, leaving the short end of the brick (the header) exposed. While this pattern required additional brick due to the turning sideways of more brick, it created a beautiful pattern. In the days when the Gardner House was being built,

brick was made and laid by hand, though typically not by the same person as each job was full-time in nature. Brick-making was an important part of the process, for improperly formed or fired brick could postpone work for many days. The brick-making process at the Gardner House probably went something like this: a large amount of clay was dug and placed in a pit dug for the occasion; water and sand from the nearby river were added to the clay and stomped (often by the feet of children or women) into the material to increase the water content. The mixture, once consistent in smoothness, was pulled from the pit and formed into brick-sized lumps which were then covered in sand and thrown, literally, into wooden molds. These molds were taken to sand beds where they were allowed to drain and dry for a week or so, then transferred to a covered area to dry for six more weeks. The dried brick were stacked into a "clamp" which is basically a kiln made directly of the bricks. The kiln was fired for approximately a week using wood as fuel, and then cooled for another week before the kiln was dismantled. Many different qualities of brick resulted from this process, one of which was the slightly overheated or glazed bricks (not the burned and unusable "clinkers") which were used as headers in the construction of the Gardner House. The process was a minimum of nine weeks long, but required only natural, local materials and lots of physical energy from workers. This house has the added decorative elements of the use of glazed headers to create an easily discernible pattern in the brickwork, a rounded brick cornice at the roofline on the non-gabled ends and penciled joints, all of which certainly show a high level of expertise in both brickmaking and bricklaying. We know that the brickmaking process occurred on site as the remnants of the Gardner House kiln, located on the

western end of the house, were discovered in 2007 by Dr. Darlene Applegate's summer Archaeology class.

Another product that would have been necessary for the construction of the house is mortar. Mortar of the period was relatively unchanged from Roman times: it still consisted of a 3:1 mixture of sand and lime putty. Lime putty is created through the burning of limestone chunks at temperatures above two thousand degrees to create a lumpy white substance called quicklime or calcium carbonate, which when mixed with water (always quicklime to water, never the other way around—it explodes), yields lime putty. This mixture was typically kept in a pit and allowed to slake or carbonate a minimum of three months, but longer was considered better, as the chemical process of carbonation takes place slowly. The ancient Romans actually outlawed the use of any lime putty that was less than three years old (Oikos Natural Building Website). We know that the mortar used in the Gardner House was made on site as evidence of burned limestone was found near the kiln site. The use of lime mortar requires skill and forethought to be successful. Quick drying of the mortar is something to be avoided as the lime in the mortar slowly turns back into limestone as the mortar cures slowly, often over years. Due to the long curing time, masons of the time were limited as to how many courses of brick they could lay in a single day; too many courses and the wall would topple under its own weight. Additionally, the environment has great effect on the curing of the mortar. Early masons working in hot climates such as Kentucky in the summer often ended their day by wrapping the newly laid area in wet burlap to allow it to hold its moisture in as long as possible. The techniques used in the Gardner House show a true mastery of the medium. The joints are very tight and evidence can be seen of penciling

in the joints. Penciling is a purely decorative, painted surface treatment over a mortar joint, often in a contrasting color (National Park Service Preservation Brief No. 2). This is a high-end finishing technique that requires intimate knowledge of the medium and a desire to showcase talent and wealth.

The interior brick walls of the house are covered in a three-coat system of plaster. This system uses the same lime putty as other projects on the house, mixed in a 3:1 sand to lime ratio for the first two coats and a 1:1 sand to lime ratio for the final or skim coat. The plaster was allowed to cure for several months prior to painting with the same paint used on the interior woodwork, windows and doors.

Locally quarried limestone was used as the foundation for the Gardner House. As the invention of dynamite was still nearly one hundred years off at the time the Gardner House was being constructed, quarrying techniques relied on heavy hammers, wedges and sheer determination. Transporting the stone to the worksite was done by man or animal, as no motor had yet been introduced. The stone was cut to shape by hand using special stonemason's chisels which left artistic and beautiful marks on every face of the stone which can still be easily seen today. The same mortar that was used for the brick was also used for the limestone, with the exception of the addition of larger aggregate or gravel/stone into the mixture to allow the mortar to catch hold in the wider joints created in the laying of the stone block.

The original roof, rafters and floor joists in the structure are all white oak manufactured in very eco-friendly ways. The original roof of the house was oak shake, which is an irregular and overlapping form of shingle, over nailing boards or purlins. The oak was most likely locally felled and transported by animal energy to the site where

it was shaped into its final form. The log would have been shaped either by a pit saw, which requires two people to push and pull the saw through the log, or by a water-saw, both of which were in existence at the time of the construction. The log was ripped into useable boards for rafters or the top was sawn off round for the full timber joists that span the entire width of the house. Shake would have been split or riven from a squared five inch, eighteen inch long thick board by the use of a frow, a "thick-backed, rigid, dull bladed steel knife about fifteen inches long and three and a half inches wide, hafted at right angles upward from its blade" and a frow club used to beat the frow down through the block (Mercer, 12). Man and animal energy were in high demand for these jobs.

Even the most decorative characteristic of the house, the reeding motif that is evident throughout the house, was created in green fashion. The windows jambs are splayed with the reeding evident in all three of the original windows and the door jambs show the reeding on the interior sections of both the door and transom jambs. The reeding is carried through to all four mantels, two upstairs and two downstairs. This pattern was created by use of a specialty hand plane or by careful use of a gouge, both of which require only human energy and sharp tools for production.

The doors, windows and floors in the Gardner House are fantastic examples of historic joinery techniques. Poplar was used for all three projects. Only two original interior doors remained at the start of my work on the house, and they will be used as a pattern to reproduce the three exterior doors. The door is created in panel style, meaning that the frame (not the jamb) of the door is rabbeted or cut out to hold one or more panels, creating an inset area within the door itself. The body of the door was probably created using plow and tongue hand planes (Mercer 124) that would make furrows and tongues

that would interlock, allowing panels to be joined effectively. The entire door is held together by simple wooden pegs at each joint. This configuration, along with the material, poplar, used, allows for the perpetual repair and adjustment of the door without destructive efforts.

The original sashes are in a nine-over-six pattern of individual glass panes, the frames for which are held together by wooden pegs at every joint. Window making is a very demanding skill, as many different tools are used to create the individual parts of the window. In the case of the original Gardner House sashes, there are twelve parts to be made and assembled for the top sash and eight for the bottom sash. The jambs would have required and additional four pieces, plus two more for the exterior lug sill and interior stool. All without the use of power tools or nails. Jack planes, trying planes and smoothing planes were necessary for smoothing the wood, rabbet planes for creating insets for the glass, gouges for creating holes for the pegs that hold it together and the master tool of the window-maker, the sash fillister, would have been employed to create the muntins that hold and divide the glass (Mercer). Two six-over-six windows were added after construction. These, I have discovered, were salvaged from another building that had sash weights as part of the mechanism. Reuse of materials is a key component of the green tenet and, though not part of the original construction, have remained in the house for decades.

Glazing, or the material used to make the window panes weather-tight, would have been made of linseed oil, chalk and lime. The original paint was most likely milk and lime based paint that would have used the lime putty from the mason's pit and milk from local cows (milkpaint.com). Milk paint is a very eco-friendly covering that has

recently come back into vogue as has the use of linseed oil paint, which is the paint being used in the restoration of the house.

The same plow and tongue planes that were used to create the rabbets for the doors would have been used to create the tongue and groove flooring that is original to the house. The flooring is held in place by wrought nails placed in the sides of the tongues and was likely finished using a floor plane (Mercer 108). All of these carpentry tools are hand tools, most of which are now relegated to the preservation tradesmen such as me. They also require a great amount of skill to master (I have yet to attain mastery of them) and would have been very costly to own even in their heyday. Numerous scrapers, squares, rasps, knives, chisels and possibly even a specialized tool called a peg cutter would also have been necessary to create the beautiful windows, doors, floors and trim of the Gardner House in the green techniques of yesterday (Mercer 100-135). Most of these tools were constructed of wood with iron blades, so even the tools themselves were eco-friendly. As is clearly seen through the lengthy descriptions of the work and materials performed, the entire process of construction was a green one.

Design Principles

Early homeowners and builders did not have the contemporary luxury of mechanized systems in the home. There was no mechanized lighting, no running water, no mechanized heating or cooling systems and no electricity or natural gas for cooking. The Gardner House, in spite of the fact that it was clearly built by someone very wealthy as evidenced by the Flemish bond pattern in the brickwork, the rounded cornice, and the extensive use of a reeding motif, was no different than its neighboring houses when it

came to the lack of mechanization. However, the builders of the Gardner House made decisions during the planning and building of the house that helped in many ways to compensate for the lack of mechanization-based heating, cooling and lighting.

The Gardner House walls are three wythes thick. As brick is primarily clay, the nature of brick is such that it gains and loses heat very slowly. This is important both in heating and cooling the home. The summer sun would take a great deal of time to warm the walls through to the inside; in fact, I have been in the house in Kentucky's stifling July weather and not been slayed by the heat. In similar fashion, heat produced by burning wood in the two end-placed chimneys would have warmed the brick not just on the fireplace, but also in the house walls, slowly, allowing the heat to radiate back into the home even after the fire was extinguished. The chimney in the hall, or larger room of the house, is slightly deeper than the one in the parlor, indicating that the hall fireplace was used in the cooking process, at least in the cooler months of the year. Though we haven't found evidence yet of a summer kitchen, it makes sense that the heat of cooking would have been removed from the structure in the dog days of summer.

The rectangular house is situated with its long side on an east-west axis. Though there is some disagreement as to which façade of the house was originally used as the front façade, it is my belief that the southern façade would have been used as the front. I base my belief on the level of decorative trim and transoms surrounding the doors on the southern façade but absent on the north door. To be fair, the north door appears to have been replaced at some point, as the jack arch above the door has been repaired and is still askew. It is, however, significantly lower than the other doors and as the brick above the

door seems to match the other brick in the house, I see no indication that it ever had a transom.

Bearing only one exterior door to the south façade's two, the north façade's single door opens directly into the larger and arguably more public hall. The northern façade has two windows to the south's one. This indicates a decision made by the builders to maximize light transmission on the cooler northern façade while minimizing the heat build-up caused by excessive light transmission on the hotter southern façade. Transoms on the south side would have been thrown open in the summer to encourage the flow of air in the fashion of what we now call convective cooling which allows for the escape of warmer air which has risen to the ceiling and encourages the movement of the lower cooler air resulting in a slight breeze. Another part of the convective cooling system, the original windows of the house are single hung, meaning only the bottom sash is moveable. However, the entire top sash is easily removed from the jamb in the summer to allow for maximum air flow. The windows are large, allowing light to enter the building in great quantities and providing solar heating in the winter daylight, but would have been covered in the night by heavy material to keep the heat in.

The ceilings in the house are approximately twelve feet high, higher than the standard for later structures, which in the early twentieth century would have dropped to approximately ten feet and to eight feet by the mid-twentieth century. Vilma Jean Kinney remembers a reaction that she had to the house the first time she saw it in the 1940s: "I thought those were the tallest ceilings I had ever seen in my life—and they might have been." (Baum) These extra-tall ceilings allow the air to circulate freely through the rooms through doors, windows and transoms. The height also gives the hot

air extra room to rise above the occupied space and encourages nighttime convective cooling to occur.

Green Restoration of the Gardner House

The current green movement and the preservation movement have many touching points. For example, the Association for Preservation Technology International has a sub-committee titled Technical Committee on Sustainable Preservation or TC*SP that uses as its slogan "the greenest building is… the one that is already built." Robert Young**,** Associate Professor of Architecture & Historic Preservation Program Director College of Architecture and Planning at the University of Utah, in his paper titled "Stewardship of the Built Environment: the Emerging Synergies from Sustainability and Historic Preservation" which was presented at a conference of the Association of Collegiate Schools of Architecture states that "Sustainability, stewardship and preservation have reached a nexus and are beginning to espouse similar values—economic, ecologic and social viability." It is with awareness of the links between preservation and green building and out of respect for the work done by the builders of the house that the restoration of the Gardner House was undertaken in a green manner.

The built environment has a great impact on the natural environment, human health, and the economy. According to Terracon Consulting Engineers and Scientists, the Environmental Protection Agency says that "buildings in the U.S. account for 39% of the nation's total energy use, 12% of its total water consumption, 68% of total electricity consumption, and 38% of the carbon dioxide emissions" (Terracon, 2007).

In the U.S. and Canada, where seventy-five percent of the housing stock is more than thirty-five years old, houses of the Gardner House vintage and condition are few but those that do exist add nothing to the energy consumption figures offered here if left as they stand (TC*SP). When the decision was made to return the Gardner House to its former glory, I looked into the materials that were available on a commercial basis and essentially decided to take the opportunity to use as many local, organic and eco-friendly substances and tools as possible in the work.

No threatened wood species are being used in the restoration. In fact, local red cedar from a local lumber mill is being used for floor joist repair. I am using hand tools such as planes, chisels and saws in the flooring repair project and most other projects, keeping greenhouse gases as low as possible. Borax has been used in place of harsher chemicals to treat pest infestations found in the wood. No heavily processed and industry reliant Portland cement is being used in the process and brick are, pending approval, being salvaged from the on-site kiln for reuse in areas where brick is needed. This green restoration has been able to keep some items from becoming landfill as well: salvaged glass and wood have been used in the repair of the window sashes and salvaged wood is being used to repair the window sills, which has kept the windows themselves and the wood being salvaged out of the landfill and has kept greenhouse gases low because new sashes are not being created from vinyl or through the cutting of additional trees.

Modern paints are major source of volatile organic chemicals. In the Gardner House restoration, only organic all-natural and solvent free paints and floor finishes are being used helping to keep off-gassing to a bare minimum. Additionally, low-

temperature, non-lead-activating heat stripping techniques are being implemented instead of powerful chemicals in the process of stripping paint from all wood surfaces.

For the first time in thirty years, the field surrounding the Gardner House is regularly mowed. Vines and trees are kept away from the foundation in an effort to protect the masonry and discourage pests from seeking refuge in the building. A landscape design utilizing only native plants has been submitted to the department and is under consideration. Slowly, the house is being moved forward into its green future by looking back at its green past.

Conclusion

As the Gardner House makes its way back into the realm of architecture that is being utilized, it carries with it a legacy. It is a legacy born of natural building materials and of the touch of human hands and tools. It is also a legacy of supremacy and of control over the environment in which it exists. The small yet regal house sits proudly overlooking a stream that now runs only in the wet season. It seems to wait for my return and welcomes me each time I begin or continue a project. If you can ascribe a human emotion to a building, the Gardner House is hopeful where once it was saddened by the absence of human contact.

If the current trend in architecture is "green," then the Gardner House is the darkest shade of green imaginable. It still sits in the area where its parts were harvested and formed and it has been relatively unchanged during its two hundred plus years. The changes that have occurred were, luckily, reversible and most were non-threatening to the soundness and integrity of the structure.

There is more to learn from this house, and the house certainly has much more to offer in the way of green architecture education. Folks with one foot in the green movement and one foot in the preservation movement, such as Robert Young, use modern catch phrases such as embodied energy, sustainable preservation, stewardship and preservation in their efforts to encourage people to look first to existing structures when choosing a building to occupy. Certainly all of these apply to the Gardner House's construction and its restoration. But within and without the walls of the Gardner House, I find myself using the more personal terms of humanity and human effort, proper repair or craftsmanship, care-giving and rescue. There is something of the maker in the house, and I am sure I will leave something of myself there as well. If the green movement exists as a way to ensure that future generations will be able to enjoy the same planet we enjoy through lessening our depletion of natural resources, the Gardner House has something to teach the movement: History is not incompatible with the environment. Sound building and design principles at the onset make historic structures inherently green, and a new generation of craftsmen is being trained to care for these houses. With little effort, the Gardner House will see another two hundred years and maybe more, giving new (old) meaning to the words sustainable and green.

Works Cited

Association of Preservation Technology International Website. URL:http://www.apti.org/about/TCSP2007_Bro_single.pdf

Baum, Rachel. 2003. "National Register Nomination for the Gardner House." OMB No.1024-0018. United States Department of the Interior.

Glassie, Henry. 2000. *Vernacular Architecture*. Bloomington: Indiana University Press.

Hazen, Edward. 1836. *The Panorama of Professions and Trades; or Every Man' Book*. Philadelphia: Uriah Hunt. URL:http://books.google.com/books?hl=en&id=Fq4AAAAAMAAJ&dq=edward+hazen+the+panorama+of+professions+and+trades&printsec=frontcover&source=web&ots=mSv7gB8OlQ&sig=ZjSy0apv9Luby2y7v2x1EZSUmXI

Mack, Robert C. and John P.Speweik. 1980. "Repointing Mortar Joints in Historic Masonry Buildings" Preservation Brief No. 2. Technical Preservation Services, National Park Service, U.S Department of the Interior.

Mercer, Henry C. 1975. *Ancient Carpenter's Tools*. New York: Horizon Press.

Milkpaint Website. URL:http://www.milkpaint.com/about_history.html

Green Home Building Website.

URL:http://www.greenhomebuilding.com/natural_building.htm

Oikos Natural Building Website.

URL:http://oikos.com/library/naturalbuilding/lime.html

Terracon Consulting Engineers and Scientists Website.

URL:http://www.terracon.com/BasePortalContent/File/ds_summer_07.pdf

Young, Robert. 2004. "Stewardship of the Built Environment: The Emerging Synergies from Sustainability and Historic Preservation."

URL:http://www.arch.utah.edu/young/RCW/ACSA2004/Final%20ACSA%20Technology%202004_ry.doc