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Green Preservation: Rehabilitating Buildings

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THESIS PROJECT

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Historic preservationists and environmentalists both consider using existing buildings to be an important part of maintaining our environment. Historic preservationists are concerned with the heritage of the environment, while environmentalists interests lie in protecting our surroundings for reasons such as maintaining biodiversity. Incorporating these ideas into the rehabilitation of buildings will not only preserve our heritage but also our air, water, and natural resources.

Two types of studies were conducted in order to determine the present situation and where changes would need to be made in order to incorporate thes ideas. A project fully incorporating preservation and environmentalism was not found. Therefore, the first study involved two cases which demonstrate the difference between a project designed according to historic preservation standards and a project concerned with environmental issues. The example of environmental practices is a fairly well known building in New York City called the Audubon House. For the historic preservation example, a building in Milwaukee, Wisconsin, the Curry-Pierce Building, was examined. These two examples are explained using six specific issues, compared, and then an ideal situation is formulated.

Secondly, an investigation of what regulating information is currently available was conducted. For example, many of the issues which are important to both groups are covered in the Preservation Briefs published by the National Park Service. In conclusion, and ideal situation which includ3es all the issues in the case studies and suggestions for preservationists and environmentalists to incorporate each others ideas of using existing buildings to help improve our environment.

Douglas A Tyler 5.3.96

Major Professor (Signature) Date

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Historic Preservationists and Environmentalists

Separately, and often in opposition, historic preservationists and environmentalists work to better our environment in order to improve our quality of life. It seems it would be easier for them to work together for this important common goal. Integrating the issues of both interests in the rehabilitation of buildings would be one step toward creating a better environment.

Common Problems

There are many issues environmentalists and preservationists deal with separately that, if faced together, they could resolve more successfully. If they come together on the situations they do share, it may be easier to be more sensitive and understanding about the issues they do not have in common. A few examples of issues they share are:

- takings law (explained below)
- lack of awareness/education
- brown fields
- transportation
- tourism
- rural countryside destruction
- greenways and heritage corridors[1]

Takings Law[2]

One area where the goals of historic preservationists and environmentalists have indirectly come together is in the legal battles over the just compensation clause of the Fifth Amendment, or the takings law. A demonstration of how they have worked together for this is the source of much of the information presented here: "Takings Law In Plain English." The publication was produced for the American Resource Information Network which is governed by a committee including the following organizations:

- American Planning Association
- Chesapeake Bay Foundation
- Izaak Walton League of America
- National Audubon Society
- National Trust for Historic Preservation

- National Wildlife Federation
- Natural Resources Defense Council
- Trust for Public Land

The law involves the entire environment, allowing the government to take any property for public use as long as the owner is justly compensated. The complication of the law comes from the definition of what constitutes a property being "taken."

A property is considered "taken" if the owner cannot use it so as to make a reasonable return on his/her investment. In other words, the property must, in result of a law, be a financial burden. If the owner can make money, the property is not "taken." Recent cases have shown that the law regulates the use of property for the benefit of a community. Cases have included pollution prevention, resource protection, historic preservation, design controls, and scenic view protection. However, the cases usually involve one issue or another, so preservationists and environmentalists are not usually working directly together. They have worked together indirectly to ensure that the law remain on the side of the community rather than the individual.

One famous example of a case involving this law is Penn Central Transportation Company versus New York City in 1978. This case was extremely important for the historic preservation movement in particular. The courts upheld the decision that an owner must loose all reasonable use of his/her property in order for a taking to occur. The owners had wanted to build an office skyscraper above Penn Central, but their proposals were determined to be harmful to the integrity of the landmark by the Landmarks Commission of New York City.[3] But, they admitted that they gained a reasonable return on the investment they made in the station. The case went all the way to the Supreme Court. Five important aspects of the law were established:

1. Preservation of landmarks is a legitimate governmental objective.

2. Private owners are not entitled to demolish a landmark simply because another use may yield many times its existing value.

3. Landmark owners are entitled to a minimum reasonable economic use of their property.

4. Judicial inquiry should focus on the use of the entire landmark parcel, not just on that portion restricted from economic exploitation.

5. Transfer-of-development-rights programs may help meet the economic use requirement, by allowing landmark owners to transfer unused air rights above landmarks to other properties.[4]

The five issues developed because of this case set the standard for the use of the takings law in general.

During the Supreme Court case the following statement was made recognizing the goals of local preservation ordinances:

> Over the past fifty years, all fifty States and over five hundred municipalities have enacted laws to encourage or require the preservation of buildings and areas with historic or aesthetic importance. These nationwide legislative efforts have been precipitated by two concerns. The first is recognition that, in recent years, large numbers of historic structures, landmarks, and areas have been destroyed without adequate consideration of either the values represented therein or the possibility of preserving the destroyed properties for use in economically productive ways. The second is a widely shared belief that structures with special historic, cultural, or architectural significance enhance the quality of life for all. Not only do these buildings and their workmanship represent the lessons of the past and embody precious features of our heritage, they serve as examples of quality for today. Historic conservation is but one aspect of the much larger problem, basically an environmental one, of enhancing—or perhaps developing for the first time—*the quality of life for people.*

In particular the last line holds great importance here, showing a case where the government has formally recognized the importance of the environment in providing a good quality of life for people. So, the actions of historic preservation aided the cause of what the court considered the bigger problem, an "environmental one." Although the intention of preservationists was not specifically to help environmentalism, indirectly they did. The Penn Central Case still sets the precedent for the Takings Law today. In this particular case preservationists in particular have been successful. However, they are not always so fortunate.

Conflicts

Traditionally the practitioners of historic preservation and environmentalism concern themselves with their cause and do not have the time, money, or energy to consider other causes. Often because of their dedication to what they have decided to defend blinds them to what may be the best decision in the end. Also, sometimes there is no right decision to be made; it just is not that simple. The following example demonstrates the type of conflicts that preservationists and environmentalists sometimes face.

Cumberland Island, Georgia[5]

Preservationists and environmentalists battle over the destiny of a historic mansion on Cumberland Island in Georgia, one of the only undeveloped islands in the country. A part-time resident of the island wants to renovate her family's dilapidated mansion into an artists' colony. This would add another thirty people to the island, almost doubling the current population of only thirty-five. The National Park Service, which is presently maintaining the structure, does not have the funds to keep the mansion, so will gladly turn it over to someone else. Preservationists want to save a great old mansion built by the family who originally owned ninety percent of the island. On the other side the environmentalists do not want the island's ecosystem to be damaged or destroyed by the extra population. If an environmental impact study is required, the project will probably not be able to continue, because of the extra expense of the study. The built and natural environmental preservationists should come together on maintaining this entire island, mansion, and ecosystem. As stated by the author of an article about this problem, as budget cuts continue to include these groups, battles such as this one can be expected to become common.

Summary

The previous information was presented to demonstrate the situations historic preservation and environmentalism share, not just buildings. There are problems they both need to manage and conflicts that may never be easy to resolve. At the base of all this lies the objectives of both groups greatly overlapped. The individuals involved seem to realize our environment is not a group of separate things, but one large system where the separate elements need to be in harmony. Unfortunately, environmentalists and historic preservationists have not yet come together in the practice of rehabilitating buildings. The following chapters will discuss how and why this should occur.

Notes

[1] Edward T. McMahon and A. Elizabeth Watson, "In Search Of Collaboration: Historic Preservation and the Environmental Movement," Information Series No. 71, Washington, D. C.: National Trust for Historic Preservation, 1992, p. 3-5.
[2] unless otherwise noted all information in this section was taken from the following: Christopher J. Duerksen and Richard J. Roddewig, "Takings Law In Plain English," Washington, D. C.: American Resources Information Network, 1994.
[3] Jerold S. Kayden, "Penn Central: ten years after 'high noon'," 1988.
[4] Kayden.
[5] Kevin Sack, "Art and Ecology Collide on a Barrier Island," *The New York Times*, Mon., Oct. 2, 1995, p. A6.

Historic Preservation and Buildings

A Brief History of Historic Preservation

The historic preservation movement began with the goal of maintaining a tangible past for present and future generations to learn and understand the country's history.[1] Although not fully instituted in government until 1966, many citizen groups were formed before that time demonstrating the public concern for the nation's heritage. In 1853 Ann Pamela Cunningham formed the Mt. Vernon Ladies' Association of the Union to save George Washington's home. The society still maintains the house today.[2] Historic preservation has grown since that time into a diverse group of individuals wanting to maintain and improve the existing environment for many different reasons.

Through the years preservationists have realized saving buildings and other historic places can have positive impacts on communities and the environment in general. In a letter to President Ronald Reagan in 1982, Alan S. Boyd, then Chairman of the National Trust for Historic Preservation wrote:

> Preservation is not a luxury to be discarded in the hard economic times; it is part of the solution to the problem of unemployment, poor housing, blighted and depressed inner cities, declining small towns and energy conservation.[3]

The Main Street program, establish by the National Trust for Historic Preservation in 1980, is one example of how preservation has helped many towns across the country create a positive image of a declining urban environment. The program assists communities in revitalizing their downtowns. Initiated by community volunteers, the program works by doing such things as helping to organize the people needed to make the process successful and giving design advice.[4]

The Main Street program is just one example of how the preservation movement has matured. Citizens coming together to save the hearts of their communities, just as Ann Pamela Cunningham and her cohorts did to save the home of George Washington, demonstrates the continued and well established public desire to preserve our heritage.

Relevant Issues

The question of which buildings should be saved has been a long running debate among preservationists. The federal and local governments have typically established that any structure of architectural, cultural, or historical significance can be designated to a historic register. However, often it has been argued that every building is worth saving, but at the same time realized this may not be practical or even physically possible. J.W. MacNeill, former Secretary of the Ministry of State for Urban Affairs, recognized the threat to the urban environment in Canada in his book Environmental Management. This also applies to the United States.

> Congestion and blight also threaten sites of historical and cultural value. The history of Canada is reflected in the older buildings and neighborhoods located in or near the downtown core of our cities. These old buildings and neighborhoods, in addition to their functional and social importance to the people who use and live in them, often comprise irreplaceable and outstanding symbols of our nation's history and heritage. Some may be of national significance, others provincial, others local. Some sites and buildings of historical and cultural value have been saved, but more have been lost. With higher education levels, rising incomes and greater leisure time, the importance of these areas could increase in future years enriching the lives of residents and nonresidents alike. Yet many sites are threatened by the encroachment of blight and well intentioned 'raze and rebuild' renewal programs designed to eradicate it.[5]

The 1982 Report to the President and Congress of the United States by the Advisory Council on Historic Preservation stated all old buildings have "heritage," value in some way.[6] More recently in a 1994 issue of *Architectural Record* the following statement was in an article about preservation and its growing popularity: "a vast stock of underutilized buildings that, distinguished or plain, is increasingly seen as having more potential than new development sites."[7] There are many good buildings standing abandoned by their occupants just waiting to be useful.

Realizing the usefulness of existing buildings, we must understand how to use the buildings without destroying them physically or destroying their integrity. Historic preservationists have been doing this for many years. So, understanding the issues they hold important is an essential step to maintaining our environment.

Existing buildings should be respected for what they have contributed to their cities and for the many years they have survived. Irreversibly changing a building could be a mistake not realized until completed. We have seen this happen to many beautiful buildings throughout the country. When reading historic preservation literature, the preservation of the character of a place is often presented as the foremost goal of preservationists. The philosophy presented by Ann Falkner in her book Without Our Past?: a handbook for the preservation of Canada's architectural heritage well represents the philosophy of historic preservation. She first states this rule:

> ...do not diminish architectural detail or humiliate the original principle or character of the building; do not destroy its integrity; do not alter, modernize, or add discordant details to the facade of the structure."[8]

This belief to preserve a building in its entirety with no changes is realized to be impractical in the "concept." She states:

> The present-day reuse of heritage building must of necessity employ a great deal of imagination and a degree of new thinking about the use of space. Just as architects and designers are defining spatial dimensions and proportions in new buildings, so we must convert earlier space to contemporary requirements. Since a new structure is not being created for a specific purpose, it may be necessary either to create a use that fits the specific structure, or to reevaluate the interior space to accommodate a new use.[9]

This also relates to the Secretary of the Interior's Standards for Rehabilitation, in the realization of what will make preservation projects feasible and logical.

In a publication by the National Park Service, Preservation Brief 17, "Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Pre-

serving Their Character," three steps are established for examining the character of a building. The information in these three steps together constitutes the visual character of a building:

- Overall Aspects
- Close Range Details
- Interior Features[10]

These three aspects will be used in the case studies in Chapter 5. Below is a description of what each area of information includes.

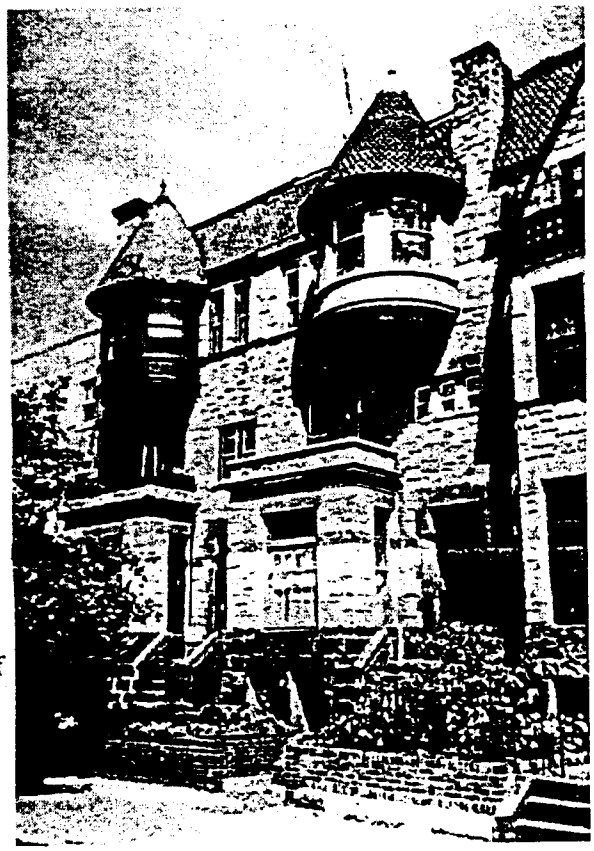


Figure 1: Overall Aspects

Overall Aspects

The overall visual aspects of a building include the basic characteristics of the building, or what can be seen from a short distance away. This includes:

- shape,
- fenestration patterns,
- recesses or projections,
- setting, and
- roof features.

Changing any of these aspects of a building would make a dramatic difference in its overall appearance.

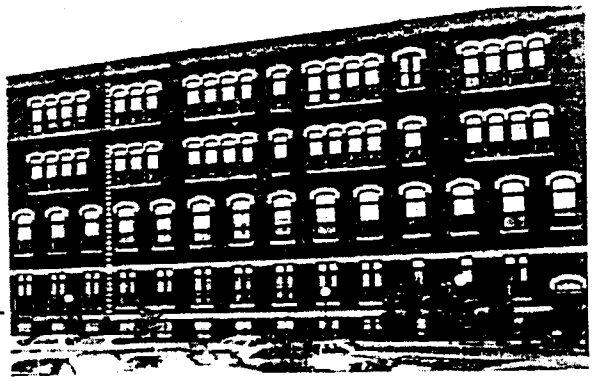


Figure 2: Overall Aspects

For example, in figure 1 the semicircular projections are important parts of the character; without them the building would appear much different. In figure 2, the pattern of the windows plays an important role in the character of the building.

Close Range Details

The second category of information includes:

- materials
- craft details.

Together these two aspects make up the details of the exterior. What materials were used to construct a building can tell as much about it as the overall design.

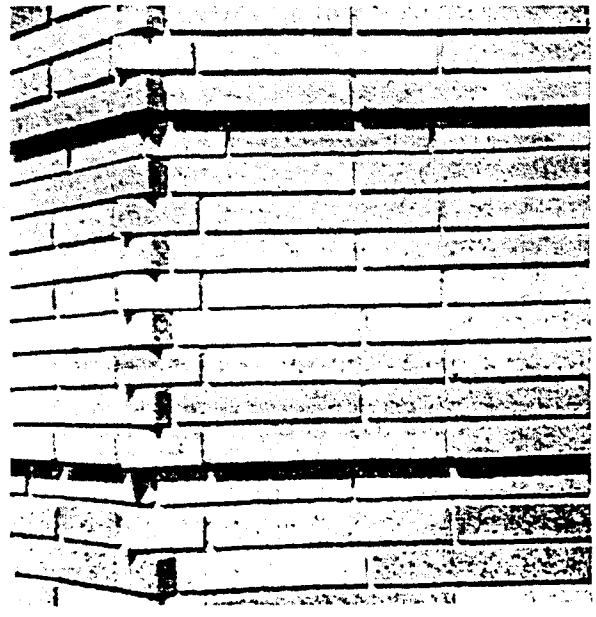


Figure 3: Close Range Details

In an article published in *The British Journal of Aesthetics* titled "The Identity of a Work of Architecture," an argument comparing architectural design to a musical score is discussed. The comparison in the original article being that both can be interpreted differently depending on who is doing the interpreting. An argument is made in this article that a work of architecture derives its identity from its design and its materials together. A piece of music only lasts while the notes are sounding, and the notes are not in existence except during the performance. The materials of a building, however, were in existence before the construction of the building. If either the design or the materials are taken from the structure, it is no longer the same work. Therefore, after a historic building has been repaired to a certain point and so many materials have been replaced, it is no longer an old building with repairs. It becomes a new building with an old building incorporated into it.[11]

Figure 4: Close Range Details

What a building is constructed of and by what means tells a lot about it. The

history of the building is embodied in the materials and craftsmanship. An old brick looks different than a new brick. While sometimes it may not be feasible to use the original material or methods for repairs or replacements, it should always be considered first before resorting to an alternative.

To remove existing materials which are important to the character of the building is an important decision. The decision must be made with the reasons why it should be changed. If this is not well thought through, mistakes in removing precious materials may not be able to be reversed.

Interior Features

The last aspect covered here is the interior. This can include:

- spaces/sequence of spaces,
- character defining features,
- surface finishes and materials, and
- exposed structure.

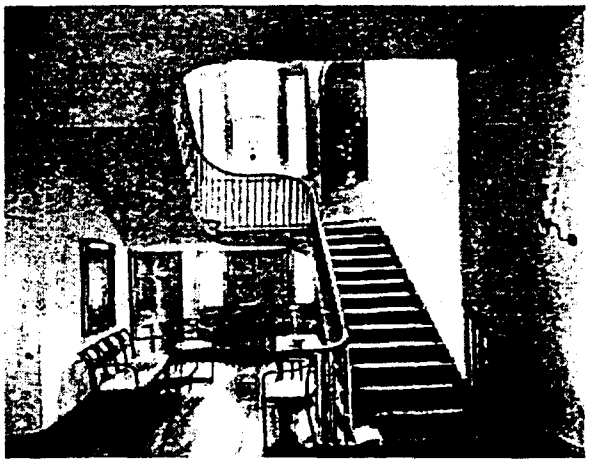


Figure 5: Interior Feature

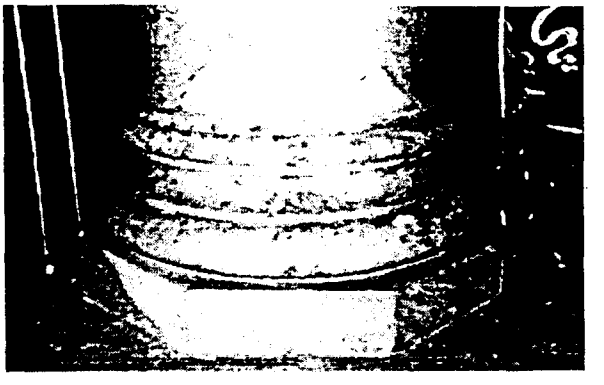


Figure 6: Interior Feature

Together these issues of a building describe its character on the interior. Spaces of importance, such as entrance halls, may give a certain impression of the building, which if changed would create an entirely different feeling. Many different interior features can be important to the identity of the building, such as fireplaces, wood trim, stair cases, arched doorways, and so on. Also, the finishes on the walls, ceiling, and floors can be important to the buildings visual character.

Summary

These three building aspects just describe together constitute the visual identity of a building. Often these aspects, along with a few others, are what make a building interesting, a desirable place to be. Considering the visual character of a building is very important to maintaining it and the place it creates. In the case studies, the consideration of the character of the building will be examined using the three issues just described.

Government Regulations

In 1966 the National Historic Preservation Act was passed in order to establish a national preservation program. The program set up the following under the direction of the Secretary of the Interior:

- National Register of Historic Places
- program of matching grant-in-aid to states for preservation projects
- matching grant-in-aid program for the National Trust for Historic Preservation
- Advisory Council on Historic Preservation to advise the President and the Congress

This act was one of the most important pieces of legislation for the historic preservation movement. It established a solid program in the national government system. This basis of the program which developed from the 1966 act is explained in this passage from With Heritage So Rich published in 1983:

> The pace of urbanization is accelerating and the threat to our environmental heritage is mounting; it will take more than the sounding of periodic alarms to stem the tide.
>
> The united States is a nation and a people on the move. It is in an era of mobility and change. Every year 20 percent of the population moves from its place of residence. The result is a feeling of rootlessness combined with a longing for those landmarks of the past which give us a sense of stability and belonging.
>
> If the preservation movement is to be successful, it must go beyond saving bricks and mortar. It must go beyond saving occasional historic house and opening museums. It must be more than a cult of antiquarians. It must do more than revere a few precious national shrines. It must attempt to give a sense of orientation to our society, using structures and objects of the past to establish values of time and place.
>
> This means a reorientation of outlook and effort in several ways.
>
> First, the preservation movement must recognize the importance of architecture, design and esthetics as well as historic and cultural values. Those who treasure a building for its pleasing appearance or local sentiment do not find it less important because it lacks "proper" historic credentials.
>
> Second, the new preservation must look beyond the individual building and individual landmark and concern itself with the

> historic and architecturally valued areas and districts which contain a special meaning for the community. A historic neighborhood, a fine old street of houses, a village green, a colorful marketplace, a courthouse square, an esthetic quality of the townscape—all must fall within the concern of the preservation movement. It makes little sense to fight for the preservation of a historic house set between two service stations, and at the same time to ignore an entire area of special charm or importance in the community which is being nibbled away by incompatible uses or slow decay.
>
> Third, if the effort to preserve historic and architecturally significant areas as well as individual buildings is to succeed, intensive thought and study must be given to economic conditions and tax policies which will affect our efforts to preserve such areas as living parts of the community.
> In sum, if we wish to have a future with greater meaning, we must concern ourselves not only with the historic highlights, but we must be concerned with the total heritage of the nation and all that is worth preserving from our past as a living part of the present.[12]

A series of checks and balances has been maintained to help preserve the nations heritage. Along with this, state and municipal governments have also established regulations.

One project examined in Chapter 5 is located in Milwaukee, Wisconsin, is on the local, state, and national registers of historic places, and applied for state and federal tax benefits; therefore, the Milwaukee Historic Preservation Commission reviewed the project along with the representatives of the state and federal government. The Milwaukee Historic Preservation Commission was established in 1981 and consists of nine unpaid citizens. This board recommends local historic places for designation to the register.[13] A group such as this has better access to the local properties, so they have more control over what is happening to the historic properties in their area.

In order for a project to be eligible for tax credits, it must meet the following criteria:

(Federal 20% Rehabilitation Tax Credit plus Wisconsin 5% supplement)

- Property must be historic
- Minimum Investment
- Must comply with Secretary of the Interior's Standards for Rehabilitation
- Formal application is required

- Property must be a building
- Property must be income-producing
- All work on exterior or interior eligible for tax credits
- Cannot sell building or destroy its historical significance for five years
- May apply after work has begun to receive federal 20% credit; must apply before work begins to receive additional Wisconsin 5% credit

Wisconsin 25% Rehabilitation Tax Credit

- Property must be historic
- Minimum Investment
- Must comply with Secretary of the Interior's Standards for Rehabilitation
- Formal application is required
- Property must be an owner-occupied personal dwelling, or an outbuilding (such as a barn) that contributes to the historical significance of the property
- Property must be non-income producing
- Eligible work limited to exterior work, window rehabilitation, and electrical, mechanical, plumbing, and structural repairs. Architectural plans and state register nomination costs also eligible
- Cannot sell building or destroy its historical significance for five years
- Must apply in advance and receive approval before starting physical work[14]

The Historic Preservation Act of 1966 fully established preservation in the government. Because of this, and the local commissions which oversee their communities, many buildings have been saved from demolition. Also, the federal, state, and local tax benefits have encourage more people to become involved in preserving buildings. These regulations all played an important part in one of the case studies examined in Chapter 5.

Notes

[1] United States, Advisory Council on Historic Preservation, Report to the President and the Congress of the United States, Washington, D.C.: 1982-1990.
[2] William J. Murtagh, Keeping Time: The History and Theory of Preservation in America, New York: Sterling Publishing Co., Inc., 1993, p. 28.
[3] United States.
[4] Wisconsin Department of Development, "Wisconsin Main Street: A Traditional Business District Revitalization Program."
[5] Ann Falkner, Without Our Past?, Toronto, Buffalo: University of Toronto Press, 1977, p. 8, from J.W. MacNeill, *Environmental Management*, Ottawa: Information Canada, 1971.
[6] United States, 1982, p. ?.
[7] Charles K. Hoyt, "More Than Preservation," *Architectural Record*, Feb., 1994, p. 86
[8] Falkner, p. 121.
[9] Falkner, p. 125.
[10] Lee H. Nelson, *Preservation Brief 17, Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character, 1982*
[11] A. MacC. Armstrong, "The Identity of a Work of Architecture," *The British Journal of Aesthetics*, April, 1995, vol. 35, no. 2, p. 165.
[12] From With Heritage So Rich, "Conclusions to the Findings," in Murtagh, Keeping Time: The History and Theory of Preservation in America.
[13] Preservation Topics no. 1, Historic Preservation Commission, City of Milwaukee "The Milwaukee Historic Preservation Commission"
[14] rev. 5/16/94 Division of Historic Preservation, The state historical society of Wisconsin "Wisconsin Preservation Information: Wisconsin Historic Preservation Tax Credits"

Figures

[1] Nelson, p. 5.
[2] Nelson, p. 3.
[3] Nelson, p. 7.
[4] Nelson, p. 7.
[5] Nelson, p. 9.
[6] Nelson, p. 10.

Environmental Movement and Buildings

A Brief History of Environmentalism

The environmentalists of our country have accomplished many things in the improvement of our natural environment. Environmentalists began at the end of the nineteenth century with two interest groups: one of conservationists wanting to stop the squandering of our natural resources and a smaller group wanting to preserve the environment for its own sake. The institution of this movement matured in April of the year 1970 with the first Earth Day. Over the next several years, interest levels varied as the novelty wore off for those who jump from cause to cause. But, in 1990, the twentieth Earth Day showed the true success of this movement. Record numbers of people came out to rally for the only planet on which the human race can survive.[1] Today, the environmentalists seem here to stay. They come from all different backgrounds and have many different interests leading them to save our natural environment. Some of the most recognized activities include helping species survive, pollution control, and forest preservation. One area of more recent concern and involvement is the sustainability of the built environment.

> ...it is the "American way of life" that is one of the greatest threats to sustainability. We are setting all the records for consumption, waste, and pollution. Our designs are causing stress, illness, and reduction in productivity, in addition to excessive consumption and pollution. Our community designs are contributing to the isolation, separation, and fear that grips and debilitates our society. Ironically, just as we are becoming aware of the flaws in these existing designs, the developing world is rushing to duplicate the American way of life.[2]

Many things are being done in the construction industry to help further develop the knowledge and information available to the average architect, builder, or developer. For instance, The World Fair planned for the year 2000 will contain an exhibit of environmentally conscious architectural technology. The exhibit will be based on "Hanover Principles" which define living as "part of the earth." Also, the American Institute of

Architects' Committee on the Environment is working to educate architects on green architecture. A part of their efforts was publishing the Environmental Resource Guide for architects which contains environmental information about many materials.[3]

Relevant Issues

Three issues were selected from the environmental research examined to use as a basis for the information in this report. They are

- energy conservation,
- indoor air quality,
- indirect environmental impacts.

Energy Conservation

The United States is very good at using energy. The energy crisis in the seventies brought to reality that natural resources used to produce energy will not last very long if we continue use at even today's rate. This, plus the depletion of the ozone through burning natural resources and the fact that we still want air conditioning, automobiles, and television, means we need to make as efficient use of our resources as possible. Buildings are one area where improvements can still be made. The following statement was made by Amory Lovins:

> Buildings are rarely built to use energy efficiently, despite the sizable costs that inefficient designs impose on building owners, occupants, and the utility companies that serve them. The reasons for this massive market failure have to do with the institutional framework within which buildings are financed, designed, constructed, and operated: many of the roughly two dozen actors who play a role in this process have perverse incentives that reward inefficient practice. Fragmented and commoditized design, false price signals, and substitution of obsolete rules-of-thumb for true engineering optimization have yielded buildings that cost more to build, are less comfortable, and use more energy than they should.[4]

When a building is demolished and buried in a landfill, not just the materials are wasted, but the energy to produce the materials and construct the building are also wasted. This is referred to as *embodied energy*. By keeping a building, all of this energy is saved. By using the materials of the building the energy used to construct the building is wasted, but the energy used to produce the materials is saved. In an environmentally ideal situation, we do not waste any of this energy and use buildings as

they are, maintaining them in good working order.

Not only can energy be saved through using existing buildings, but also through the systems used in those buildings. Many strategies have been developed to aid in the reduction of the use of energy. The following systems have been investigated for this research:

- lighting;
- HVAC;
- thermal envelope.

Lighting

Lighting is one system that can greatly reduce energy use by incorporating a few, relatively simple ideas. First, lamps and ballasts are now on the market which are much more energy efficient. Electronic ballasts, for instance, use less energy than the often installed magnetic ballasts. A second application is to include sensors. Occupancy sensors installed in a room that is not continuously occupied will ensure the lights are not on while no one is in the room. Also, there are dimming sensors for daylight. If enough light is being supplied naturally, the lights will dim or turn off completely.

There are also many design ideas that can maximize the use of natural light. Things such as interior windows, situating the most used spaces closest to the windows, and open floor plans can all be helpful to reduce the amount of artificial light needed, thus reducing the use of energy.

HVAC and Thermal Shell

Heating, ventilation, and cooling systems have come a long way in the past twenty years in particular in energy conservation. Many engineers know the need to give a client the most energy efficient system. Many different types of systems, composed of several parts, have been designed, each working well for a particular situation.

Computer programs have been developed that design systems and demonstrate their efficiency in different types of buildings. One important issue with HVAC, particularly when an existing building is concerned, is to look at each case and design looking at the climate, building use, types of spaces, and especially the buildings shell.

Together the shell of the building and the HVAC system maintain the environment inside the building. If they are not considered together, one system could make the other fail. The walls, windows, and roof make up the thermal shell, holding in and letting out certain amounts of warmth. Milton Meckler, an engineer, CEO and president of the Meckler Group, gives steps to follow for energy efficient HVAC/thermal shell design:

> (1) select initial system from real-life experience according to clients needs
> (2) use a computer program to optimize the shell
> (3) next optimize and alter the HVAC system to achieve overall optimization
> (4) if the HVAC system changes too much, examine the shell more closely for changes that could be made there[5]

Thus, in order to design the most efficient HVAC system or thermal shell, both systems must be studied together and ultimately work together.

Indoor Air Quality

Just as the air outside is polluted, our indoor air can become polluted as well. People can suffer from minor respiratory problems to serious illnesses from being in a building with polluted air. The importance of the air quality to people's health was apparent long ago. Hypocrites recognized in his treatise, "On Air, Water and Places," the significant affects of the quality of the air, water, food, overall living conditions, and climatic elements.[6] Benjamin Franklin wrote, "no common air from without is so unwholesome as the air within a closed room that has been often breathed and not changed."[7] Today, with technology allowing practically air tight buildings to be constructed and the increase in the amount of time spent in buildings, the quality of air

maintained inside has proved to be an important question. Problems resulting from indoor air pollution have been designated with terms such as: problem building, building related illness, sick-building syndrome, tight-building syndrome, and crisis building.[8]

One well publicized case resulting in twenty-nine deaths was the American Legion convention in Philadelphia in 1976. The illness came from air borne pathogens growing in and being circulated by the HVAC system in the hotel where the convention was held. Not only did many people who attended the convention become ill, but even some people who passed by the hotel on the street. This form of pneumonia became commonly termed as Legionnaire's Disease.[9]

Until recently, all the problems of indoor air pollution were not fully realized. It has finally come to the forefront, however, in the concerns for creating a healthy indoor environment. The 1995 November/December issue of "Environmental Building News" listed "indoor air pollution" as the top priority in the category of "Major human health problems" for building designers to consider.[10]

Products which contain volatile organic compounds (VOC's), or materials which contain toxins which evaporate into the air, for instance formaldehyde, are air polluters. Eliminating such materials and ventilating together can maintain a healthy indoor environment. A general base for ventilation levels is the cubic feet of outside air coming into the building per minute per person occupying the building (cfm/person). Through human response, it has been estimated that the air is comfortable when there are less than 1000 parts per million of carbon dioxide in the air. To achieve this in an office situation as studied here, it has been determined that 20 cfm/person needs to be supplied while the building is being used.[11]

One source of indoor air pollution can be avoided through managing the sequence materials are put into the building. Absorbent materials such as carpet are considered "sinks." The absorbent material has the potential to soak up any toxins

emitted by wet products installed after them. Thus, installing in the correct order will eliminate sinks.

Another scheduling solution involves an appropriate airing-out of the building. The occupants should not plan on using the building until a sufficient amount of clean air has passed through it to flush out a large percentage of the toxins produced by the installation of some products. This ventilation should be done with the return air vents closed to ensure that no toxins get into the duct system, which could cause problems after the building is occupied. Generally, the return air ducts send the air back to the HVAC system to be filtered, conditioned, and blown through the building again. Even if the filter was able to remove the toxins from the air, this would unnecessarily fill up the filter.

An 1991 issue of "Indoor Air BULLETIN," presented several ideas that could help reduce toxins in a building project. These suggestions serve as a good summary of common ideas for improving indoor air quality. They are:

- **Isolate Construction** - Fully isolate construction zones in partially occupied buildings. Keep these areas under negative pressure relative to the adjacent spaces.
- **Select the Right Building Materials** - Carefully select building materials to avoid using unnecessarily strong emitters or those that contain known irritants and toxins. Require manufacturers to provide data on their products' contents and chemical emissions (if tested) and evidence that they have addressed IAQ concerns.
- **Schedule Activities Appropriately** - Schedule construction/ installation to minimize the build-up of high levels of contaminants that can't be removed before occupants enter or return to the space.
- **Plan Adequate Airing-out Periods** - From the beginning, plan adequate time for the installation and move-in process. Airing-out a construction area with 100% outside air and no recirculation before occupancy is essential. A sufficiently long airing-out period (weeks instead of days) can drastically reduce airborne concentrations of most contaminants.
- **Maximize Ventilation** - Maximize ventilation during installation. Seal return-air ducts and use direct exhaust to the outdoors either through openable windows or through temporary openings — possibly with fan-powered assistance.

- **Avoid Creating Sinks** - Whenever possible, avoid installing adsorptive surfaces such as textiles, insulations, and carpets, adhesives, paints, sealants, etc.
- **Ventilate Wet Products** - Never install any "wet" product without maximum outside air ventilation — preferably at least five air changes per hour.
- **Commission the HVAC System** - Commission the HVAC system thoroughly to avoid problems for occupants in buildings with newly constructed ventilation. This is much more than the routine "testing, adjusting, and balancing" that is normally required for new HVAC systems. It means defining the performance criteria for the system and measuring that performance to demonstrate system acceptability.[12]

Creating airtight buildings for energy efficiency is often blamed as a cause of indoor air problems. While a building allowing less uncontrolled infiltration indirectly relates to these types of problems, it is not the cause. The cause is what pollutes the building. The first step to stopping indoor air problems before they begin involves use of nontoxic materials and proper maintenance of not only the traditional surfaces on the interior, but also the systems, particularly the HVAC system.

Indirect Environmental Impacts

The last issue studied here encompasses many things which can be looked at together as the indirect impacts on the environment. There are many different ways in which a building project indirectly impacts the environment including things such as:

- waste from the production of products used to construct the building
- pollution and energy used to transport materials
- recycled content or recyclability of the materials
- disposal of demolition debris

When considering materials for the building, not only should those materials which occupants will be exposed to be examined, but all the materials being used. For instance, the insulation or ducts should be examined. The designer needs to ask the manufacturers for information about the manufacturing of their products to best determine the impacts it has on the environment. For instance, when polyvinyl chloride plastic (PVC) burns, toxins are emitted. This then should not be used. Whatever the

advantages are to using PVC, they are greatly outweighed by the potential toxic production as an after use affect. In an article in a 1991 issue of *Progressive Architecture*, the following list of questions to ask product manufacturers was given:

- Are any components of the product installation method responsible for long term off-gassing?
- What chemicals are used to install your product?
- Can you provide an antimicrobial agent as an integral part of your product?
- What materials do you recommend to maintain the product?
- What chemicals are required to remove repair your project in case of repair or renovation?
- Do you provide written life safety test results?
- Do you provide written toxicity test results?
- Do you have any recommended program recycling your product?[13]

A product ideally would produce no toxins through waste or otherwise; it would be produced within the local region, be made from recycled materials and be able to be completely recycled after use, along with performing well for a good price. Realizing this is a tall order considering today's market, this study examined if the designers considered these ideas when selecting materials rather than simply if they fulfilled them.

The basic reasons for asking about products in such a way is to ensure the manufacturing of a product does not pollute the air or water; or, after a product is used, it does not simply become part of a landfill.

- In 1991, a whopping 280 million tons of waste was generated, of which 75 percent ended up in landfills, 10 percent was incinerated, and only 14 percent was recycled.[14]
- The construction industry uses 54 percent of the energy we expend as a nation, not just in heating and cooling but in "embodied energy"
- It has been estimated that by the year 2020, all natural area in the U.S., besides the national reservations and parks, will be developed.[15]
- Approximately 10-20% of landfills is construction and demolition materials.[16]

One key issue brought out by environmentalists is the amount of waste in this country. We waste energy, natural resources, and just about anything else we can find. The main solution for solid waste problems at this point is to put garbage in landfills

and let a future generation deal with the problem. Even these landfills, which no one wants to live near, are becoming full, and there is no place for new ones. New England, having the least vacant land and been populated for the longest time, is feeling the garbage crunch particularly hard. So, something must be done about the materials which are being put into landfills. Recycling debris from construction and demolition is part of a solution to this problem.

Summary

If these three issues were properly addressed in rehabilitation projects, the natural environment would be in a better state. One example of this will be discussed in Chapter 5.

Government Regulations

The regulations on the issues discussed previously generally come from building codes. These codes are established by the government to ensure that buildings are safe for their occupants. Relative regulations include a minimum amount of ventilation which must be supplied, a minimum thermal rating which must be met, and regulations for materials determined to be hazardous to our health. There are also standards established by ASHRAE which are typically more stringent than the local building code. These guidelines are often what is used by engineers to design systems rather than the building codes because practitioners consider the development of ASHRAE guidelines to be ahead of that of the codes. For instance the Wisconsin Administrative Code requires only 5 cubic feet per minute per person of fresh air while the ASHRAE guidelines suggest 20 cubic feet per minute per person of fresh air, four times the amount. Building codes are required by law; therefore, unlike preservation which is somewhat voluntary, all buildings must comply to the locally accepted codes.[17]

Summary

This chapter began with the overall ideas which made the environmental movement and went on to examine three specific issues which relate directly to rehabilitating buildings. These three issues, energy conservation, indoor air quality, and indirect environmental impacts, will appear again in Chapter 5 as a basis for analyzing the two case studies presented. The next chapter examines the regulating historic preservation and environmental information for overlaps. The same three issues were considered when examining those documents.

Notes

[1] Edited by Riley E. Dunlap and Angela G. Mertig, American Environmentalism: The U.S. Environmental Movement, 1970-1990, p. 2.
[2] Michael J. Crosbie, Green Architecture, A Guide To Sustainable Design, Rockport, Massachusetts: Rockport Publishers, 1994, p. 5.
[3] Beverly Russell, "Ego-building to eco-building," *New Statesman & Society*, Jan. 15, 1993, vol. 6, no. 235, p. 35.
[4] "Performance-Based Compensation: Getting Paid for Good Design," *Environmental Building News*, Mar./Apr., 1995, p. 14.
[5] Milton Meckler, Innovative Energy Design For the '90s, Lilburn, Georgia: The Fairmont Press, Inc., 1993, p. 1.
[6] Tang G. Lee, "Health and the Built Environmnet: Indoor Air Quality," *Vital Signs Curriculum Materials Project*, p. 2.
[7] Bardana, Montanaro, and O'Hollaren, Occupational Asthma, Philadelphia: Hansley & Belpus, 1992, p. 237.
[8] Bardana, p. 238.
[9] Bardana, p. 244.
[10] Hal Levin, "Don't Downplay Human Health Priorities," *Environmental Building News*, vol. 4, no. 6, p. 3.
[11] ASHRAE- Contaminant and Ventilation Control for Indoor Air Quality and Energy Efficiency
[12] Hal Levin, "Building Detoxification," *Indoor Air BULLETIN, May*, 1991, p. 12-14.
[13] Karen Randal, "Architects, Carpet, and the Carpet Industry," *Progressive Architecture*, Mar., 91, p. 131 article goes through 32
[14] National Audubon Society and Croxton Collaborative, Audubon House: Building the Environmentally Responsible, Energy-Efficient Office, New York: John Wiley & Sons, Inc., 1994, p. 132.
[15] Francesca Lyman, "Draw it. Build it. Show sustain 'Ability.'" *The Amicus Journal*, Summer, 1993, vol. 15, no. 2, p. 71.
[16] Heather Hepler, "C & D Waste Recycling: Razing Consciousness," *American City & County*, Jan., 1994, p. 32.
[17] Meckler, p. 146.

Examining Regulating Publications

One way to understand the present relationship between environmentalism and historic preservation is to examine the regulating information for overlaps and conflicts. The following three publications were examined:

- Secretary of the Interior's Standards for Rehabilitation
- Preservation Briefs
- Wisconsin Administrative Code

Secretary of the Interior's Standards for Rehabilitation

The Secretary of the Interior's Standards for Historic Preservation Projects are distributed by the federal government as a guide to historic building projects. The Secretary of the Interior is responsible for advising the federal government about historic preservation projects and has developed several standards and guidelines for acquisition, protection, stabilization, preservation, rehabilitation, restoration, and reconstruction. The projects being examined in the Case Studies are rehabilitation projects; therefore, the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings were selected to analyze for their concern for the overall environment.

There is little mention, if any, of the impacts the process of rehabilitating a building may have on the rest of the environment in the Standards or Guidelines. In fact, when something that would coincide with environmentalist concerns is mentioned, the intention is to protect the building being rehabilitated - the rest of the environment is not mentioned. "The intent of the Standards is to assist the long-term preservation of a property's significance through the preservation of historic materials and features."[1] Because of this intent, most of the information is focused directly on those specific issues relating to the rehabilitation of the historic fabric of buildings. However, economic feasible is a concern mentioned in the Standards; overall environmental impacts

should be also.

The following statement is given in every relevant section of the Guidelines, "If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered." If the individuals examining a project believe environmentally damaging materials would fall under "...not technically...feasible," then this could allow someone to not use original materials for environmental reasons, but if they do not believe that it could be denied. In other words, there is nothing specific, so whether or not the Standards are applied in an environmentally sensitive way is dependent on the individuals reviewing the project. Table 1 on the following two pages gives examples of the types of statements found which in some way relate to environmental issues.

Table 1: Standards and Guidelines Analysis

Statements from the Secretary of the Interior's Standards from Rehabilitation and Guidelines for Rehabilitating Historic Buildings	Comments on the Relevance to the Concepts of Environmentalism
...particular care must be taken not to radically change, obscure, damage, or destroy character-defining materials or features in the process of rehabilitation work to meet code and energy requirements. (p. 10)	This aspect of historic ppreservation traditionally sparks disagreement between environmentalism and historic preservation. A greater understanding of the others ideals and a greater willingness to work together would help to curb these disputes.
Not Recommended for Masonry Repair: Repointing with a synthetic caulking compound. (p. 14)	This is environmentally good idea, as well as being sensitive to the building.
Recommended for Wood Protection and Maintenance: Applying chemical preservatives to wood features such as beam ends or outriggers that are exposed to decay hazards and are traditionally unpainted. (p. 17)	Comments could be included about the hazards of these chemicals and the options of using some chemicals which are better environmentally than others. It is recommended to follow the manufacturer's instructions, but this is only helpful to a point.
Not Recommended for Wood Protection and Maintenance: Using chemical preservatives such as creosote which can change the appearance of wood features unless they were used historically. (p. 17)	This is also good for the overall environment.
Recommended for Wood Protection and Maintenance: Using chemical strippers primarily to supplement other methods such as handscraping, handsanding and the above-recommended thermal devices. (p. 17)	Looking at the amount of toxins in stripping agents could be suggested to prevent as much exposure to them as possible.

<table>
<tr><th>Statements from the Secretary of the Interior's Standards from Rehabilitation and Guidelines for Rehabilitating Historic Buildings</th><th>Comments on the Relevance to the Concepts of Environmentalism</th></tr>
<tr><td>Recommended for Window Protection and Maintenance:
Making windows weathertight by recaulking and replacing or installing weatherstripping. These actions also improve thermal efficiency. (p. 26)</td><td rowspan="2">They mention thermal efficiency as simply a bonus to what they want done. While it has been shown that these methods can create a better window than some, these simple measures can not create as efficient a window as some more recent units, yet replacement must be done sensitively. The decision to replace windows completely is an important one. This is one issue where environmentalists and historic preservationists are very often on opposite sides.</td></tr>
<tr><td>Not Recommended for Window Protection and Maintenance:
Retrofitting or replacing windows rather than maintaining the sash, frame, and glazing. (p. 26)</td></tr>
<tr><td>Recommended for Health and Safety Code Requirements:
Complying with health and safety code, including seismic codes and barrier-free access requirements, in such a manner that character-defining spaces, features, and finishes are preserved.

Working with local code officials to investigate alternative life safety measures or variances available under some codes so that alterations and additions to historic buildings can be avoided. (p. 53)</td><td rowspan="2">These statements undermined the importance of health and safety codes. While the point is taken that the best solution is to avoid as much change as possible to the building, the fundamental purpose of a building seems to be forgotten - to provide shelter. It seems these guidelines are much more lenient in practice than it is stated here.</td></tr>
<tr><td>Not Recommended for Health and Safety Code Requirements:
Altering, damaging, or destroying character-defining spaces, features, and finishes while making modifications to a building or site to comply with safety codes.

Making changes to historic buildings without first seeking alternatives to code requirements. (p. 53)</td></tr>
</table>

Preservation Briefs

Preservation Brief's are informational pamphlets published by the National Park Service covering different historic preservation issues. Each Brief examines a specific topic or material, gives examples and suggestions of how to handle situations, and often tells where to find more information. For example, Preservation Brief 1, "The Cleaning and Waterproof Coating of Masonry Buildings," gives various information that would be helpful to someone undertaking such a process. This first Brief was published in 1975. Since that time, over thirty-five more have been published in the continuing effort to circulate historic preservation information.

For this study the Briefs were examined for information concerning environmentalism. The following issues relating in some way to environmentalism were discovered:

- Health/Life Safety of People
- Conserving Energy
- Concerns About Harmful Chemicals
- Recommend Using Harmful Chemicals or Materials
- Disposal of Materials Determined Hazardous by Government Regulations
- Importance of Maintenance and Quality Workmanship

All of these issues appear in at least one Brief, but are typically mentioned with concern for the building, not the overall environment. In fact, the regard for the overall environment is somewhat minimal throughout the Briefs. However, there are also some which deal directly with environmental issues. This demonstrates some awareness of environmental issues, but also the need for more. The following information discusses each of the issues mentioned above. A table, which summarizes these issues, follows the discussion.

Health/Life Safety of People

Preservation Brief 24 includes the following statement in the first paragraph:

> Decisions to install new HVAC or climate control systems often result from concern for occupant health and comfort, the desire to make older buildings marketable, or the need to provide specialized environments for operating computers, storing artifacts, or displaying museum collections. *Unfortunately, occupant comfort and concerns for the objects within the building are sometimes given greater consideration than the building itself.* In too many cases, applying modern standards of interior climate comfort to historic buildings has proven detrimental to historic materials and decorative finishes. (italics added) [2]

It seems from this statement, the building is more important than the occupant. This statement appears to convey a different message than what might have been intended, but the statement conveys the idea that concern for the building comes before concern for people. This directly conflicts with the idea of preserving our ecological system.

Most of the Briefs do not mention anything about the occupants of the building or the safety of those who work on the building. The ones that do, generally do not make the types of comments mentioned above; instead they show concern for safety. Preservation Brief 10 considers safety issues more than any other Brief examined. It states:

> ...whether liquid or semi-paste, there are two important points to stress when using any solvent-base stripper: First, the vapors from the organic chemicals can be highly toxic if inhaled; skin contact is equally dangerous because the solvents can be absorbed; second, many solvent-base strippers are flammable. Even though application out-of-doors may somewhat mitigate health and safety hazards, a respirator with special filters for organic solvents is recommended and, of course, solvent-base strippers should never be used around open flames, lighted cigarettes, or with steel wool around electrical outlets.[3]

This particular statement warns of hazards and recommends precautions. In the "Conclusion" the author states that there is "no completely safe and effective method" of removing paint; therefore, the recommendations are cautious. More of the documents need to include this type of information and suggestions for where to find it.

Conserving Energy

Energy conservation seems to be the topic most commonly addressed by people in general. As mentioned in the chapter on environmental issues, energy conservation has become almost common place since its beginnings following the energy crisis in the 1970's. Preservation Brief 3 is dedicated to the issue. Titled "Conserving Energy in Historic Buildings," this Brief suggests many passive methods for conserving energy that could probably easily be found in an environmental publication. For example:

- lowering the thermostat in the winter, raising it in the summer
- controlling the temperature in those rooms actually used
- reducing the level of illumination and number of lights (maximize natural light)
- using operable windows, shutters, awnings and vents as originally intended to control interior environment (maximize fresh air)
- having mechanical equipment serviced regularly to ensure maximum efficiency
- cleaning radiators and forced air registers to ensure proper operation[4]

Many of these things could relate to other environmental issues as well, like air quality.

The author does not deny the continued fight of preservationists to preserve as much as possible. As typical for preservationists, the mention that irreversibly changing a building for the technology of the day is definitely not a successful solution. This is where the environmentalist must respect the building. Preservation Brief 3 states the following under "Preservation Retrofitting:"

> When considering retrofitting measures, historic building owners should keep in mind that there are no permanent solutions. One can only meet the standards being applied today with today's materials and techniques. In the future, it is likely that the standards and the technologies will change and a whole new retrofitting plan may be necessary. Thus, owners of historic buildings should limit retrofitting measures to those that achieve reasonable energy savings, at reasonable costs, with the least intrusion or impact on the character of the building.[5]

Brief 3 is the main mention of energy conservation. Other Briefs that mention energy conservation issues discuss window repair; aluminum and vinyl siding; and

heating, ventilating, and air conditioning systems. Any mentions of energy efficiency is simply in passing; few details are given.

Concerns About Harmful Chemicals

The four Briefs which contain information about problems with harmful chemicals state specific activities or materials which are dangerous. Although the number of Briefs is small, the information is detailed. Brief 1 states:

> **Environmental concerns:** The potential effect of each proposed method of cleaning should be evaluated carefully. Chemical cleaners, even though dilute, may damage trees, shrubs, grass, and plants. Animal life, ranging from domestic pets to song birds to earth worms, also may be affected by the run-off. In addition, mechanical methods can produce hazards through the creation of airborne dust[6]

Although generally the Briefs state a particular chemical can be harmful and advise caution, they are not as specific about the affects the chemicals could have on the whole environment as the above statement. Chemicals for cleaning masonry, chemicals used to remove paint, and the chemicals in wood preservatives are the only types of chemicals mentioned with warnings. They do generally mention, however, that the product manufacturer's instructions should be followed.

Recommend Using Harmful Chemicals or Materials

The previous section dealt with the chemicals that come with warnings about being harmful to your health, but there are many chemicals mentioned which are also harmful, yet recommended for use. For example, Preservation Brief 6, "Dangers of Abrasive Cleaning to Historic Buildings," chemical cleaners are recommended as an alternative to abrasive cleaners. This is mentioned after water and steam cleaning, but no precautions are given. The only warnings mentioned are for heat guns or that when using water, one must be certain it will not lay in cracks or openings and freeze. These are important concerns, but the hazards accompanying chemical agents should also be

mentioned.

Some materials suggested can also be harmful only in a less direct way. For instance, both epoxy and fiberglass are suggested many times as acceptable substitutes for other materials. First, it should be understood that the suggestions of using alternative materials seems to come as a last resort. Preservation Brief 16 states:

> It is important to remember that the purpose of repairing damaged features and of replacing lost and irreparable damaged ones is both to match visually what was there and to cause no further deterioration. For these reasons it is not appropriate to cover up historic materials with synthetic materials that will alter the appearance, proportions and details of a historic building and that will conceal future deterioration.[7]

The concerns for materials is from the standpoint of maintaining the building, not from an environmental stand. Preservation Brief 16 would be an extremely important section to include all the potential hazards of these substitute materials. This has been done to a degree. For instance, the Brief includes a section, "Pros and Cons of Various Substitute Materials," which describes several materials, tells the applications they can be used for, and lists the advantages, disadvantages, and a number of questions to answer. For instance, for fiber reinforced polymers, or fiberglass, the disadvantages listed are:

- requires separate anchorage system
- combustible (fire retardants can be added); fragile to impact
- high co-efficient of expansion and contraction requires frequently placed expansion joints
- ultra-violet sensitive unless surface is coated or pigments are in gel-coat
- vapor impermeability may require ventilation detail[8]

This should mention that fiberglass is not biodegradable and toxic when burned. There is no place for fiberglass after use except a landfill. The disadvantages of epoxies include along with others:

- materials are flammable and generate heat as they cure and may be toxic when burned
- toxic materials require special protection for operator and adequate ventilation while curing[9]

These disadvantages show a better picture of what epoxy really is than the fiberglass disadvantages do.

Disposal of Materials Determined Hazardous by Government Regulations

Lead and asbestos removal/encapsulment is addressed in the Briefs. Generally materials the government has determined to be hazardous are discussed as simply something that must be removed or controlled. However, Preservation Brief 37, "Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing," published in April, 1995, explains in detail what to do with lead paint in particular in an historic house.[10]

This Brief demonstrates the possibilities for the incorporation of environmental ideas into the practices of historic preservation. Everything someone rehabilitating an old building would need to know about lead paint is either explained in this Brief or a source of information is recommended. The history of lead paint is described, along with a short description of the Department of Labor, Occupational Safety and Health Administration code and where to find the code in full are all given. There is also information about how to find a certified risk assessor, paint inspector, or paint laboratory. Much of the information presented addresses how to handle historic elements covered with lead paint, but all of the other information is also given. A chart, "Impact Of Various Paint Removal/Abatement Techniques," on page nine of the document lists "Impact on Worker" and "Impact on Environment" as two categories demonstrating the environmental importance of hazardous materials realized by the authors of this Brief. The Brief emphasizes health and safety along with the concern for the building, rather than putting the building first. In the conclusion of the publication the following statement is made: The key to protecting children, workers, and the environment is to be informed about the hazards of lead...In all cases, methods that control lead hazards should be selected that minimize the impact to historic resources while ensuring that housing is lead-safe for children.[11] This is an excellent example of Preservation Briefs could consider the whole environment rather than just part of it.

Importance of Maintenance and Quality Workmanship

Most of the Briefs consistently emphasized the importance of proper maintenance of a building. This is one area, it seems where environmentalists and preservationists are in agreement. Beginning with a quality product and maintaining it well, will prolong its usable life. Yet, in this 'throw-away' society, getting people to properly maintain something is difficult. The following statements from Preservation Brief 24, "Heating, Ventilating, and Cooling Historic Buildings: Problems and Recommended Approaches," demonstrate how important preservationists believe maintenance is:

> Maintenance staff should learn how to operate, monitor, and maintain the mechanical equipment. They must know where the maintenance manuals are kept. Routine maintenance schedules must be developed for changing and cleaning filters, vents, and condensate pans to control fungus, mold, and other organisms that are dangerous to health. Such growths can harm both inhabitants and equipment. Maintenance staff should also be able to monitor the appropriate gauges, dials, and thermographs. Staff must be trained to intervene in emergencies, to know where the master controls are, and whom to call in an emergency. As new personnel are hired, they will also require maintenance training.
>
> Routine tests for air quality, humidity, and temperature should indicate if the system is performing properly.
>
> Equipment must be accessible for maintenance and should be visible for easy inspection. Moreover, since mechanical systems last only 15-30 years, the system itself must be "reversible." That is, the system must be installed in such a way that the later removal will not damage the building. In addition to servicing, the back-up monitors that signal malfunctioning equipment must be routinely checked, adjusted, and maintained. Checklists should be developed to ensure that all aspects of routine maintenance are completed and that data is reported to the building manager.[12]

Important environmental issues are addressed here. This demonstrates the overlap between historic preservation and environmentalism as well as any statement in the Briefs. These ideas of what is called commissioning, are also stressed by environmentalists.

Table 2: Preservation Briefs Analysis

Issues Investigated	Example Statements	Preservation Briefs Mentioning Issue
Health/Life Safety of People	Because all chemical paint removers can involve potential health and safety hazards, no wholehearted recommendations can be made from that standpoint. (Brief 10, p. 10)	1, 10, 18, 24, 33, 37
Conserving Energy	[suggested] operational controls: • lowering the thermostat in the winter, raising it in the summer • controlling the temperature in those rooms actually used • reducing the level of illumination and number of lights (maximize natural light) • using operable windows, shutters, awnings and vents as originally intended to control interior environment (maximize fresh air) • having mechanical equipment serviced regularly to ensure maximum efficiency • cleaning rediators and forced air registers to ensure proper operation (Brief 3, p. 2)	3, 8, 9 13, 24
Concerns About Harmful Chemicals	Preservatives tend to change the color or appearance of the logs. In addition, many are toxic, they tend to leach out of the wood over time, and like paint, must be periodically reapplied. (Brief 26, p. 12)	1, 10, 26, 28
Recommend Materials/Chemicals Considered Harmful by Environmentalists	Some materials have been used successfully for the repair of damaged features such as epoxies for wood inrilling, cementitious patching for sandstone repairs, or plastic stone for masonry repairs. Repairs are preferable to replacement whether or not the repairs are in kind or with a synthetic substitute material. (Brief 16, p. 3)	6, 7, 10, 13, 16, 19, 27, 28, 33, 34
Disposal of Materials Determined Hazardous by Government Regulations	Before undertaking any project involving paint removal, applicable State and Federal laws on lead paint abatement and disposal must be taken into account and carefully followed. These laws, as well as any requirements prohibiting volatile organic compounds (VOCs), should be requested from the State Historic Preservation Officer in each State. (Brief 28, p. 13)	4, 10, 28
Importance of Maintenance and Quality Workmanship	...like any historic building, a log structure is a system that functions through the maintenance of the totality of its parts. (Brief 26, p. 15)	2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37

Wisconsin State Administrative Code[13]

The Wisconsin State Administration Code issued by the Department of Industry, Labor and Human Relations, contains the building codes for the state and this is also the set of codes used for Milwaukee, the city where one of the case studies for this research is located. The chapters used here include: Chapter ILHR 63, Energy Conservation; Chapter ILHR 64, Heating, Ventilating, and Air Conditioning; and Chapter ILHR 70, Historic Buildings.

Chapter 70 on Historic Building indirectly includes the environmental issues mentioned here in the purpose, but not specifically through the rest of the code. For instance, In 70.01 Purpose part (3) states, "Encourage energy conservation," and part (5) states, "Provide for the health, safety and welfare of occupants and visitors in qualified historic buildings." As mentioned previously, energy conservation seems to be a mainstream idea, so naturally this is mentioned specifically. As for the quality of the indoor air or any other impacts on the environment, they are not specifically mentioned, but could be under part (5). Of course this is almost contradicted by part (1) of the Purpose which states, "Provide alternative building standards for preserving or restoring buildings or structures designated as historic buildings." This section gives projects involving historic buildings the right to sidestep the other building codes, which are in some respects not sufficient as it is. The reasoning behind the easement in standards is to keep historic buildings usable without too many major alterations.

As can be seen in the Case Studies table, the code required environmental conditions do not compare well to what has been determined by ASHRAE and environmentalists. Codes on ventilation are lower, little concern is given to materials, and energy efficiency is still very minimal in today's market. Though the realization that historic buildings can be and have been irreversibly damaged through "updating" efforts, this should not excuse them from being rehabilitated to their highest quality.

What this code really attempts to establish is a system which examines each building and takes into consideration the specific cases. Section 70.21 gives the following seventeen parameters used to evaluated historic buildings:

- Number of Stories
- Building Area
- Building Setback
- Attic Compartmentalization
- Firestopping
- Mixed Occupancies
- Vertical Openings
- HVAC Systems
- Smoke detection
- Fire Alarms
- Smoke Control
- Exit Capacity
- Dead ends
- Maximum Travel
- Emergency Lighting
- Elevator Controls
- Sprinklers

For each parameter a number which is determined by comparing the existing buildings to the present building code is given. This method allows older buildings to be usable rather than simply razing them.

Summary

None of the regulations examined incorporate the ideas of historic preservation and the ideas of environmentalism in any formal manner. In fact they are considered separately. Unfortunately, the concept of buildings working with the rest of the environment has not yet been fully realized in any regulations.

Environmental ideas are mentioned in Preservation Briefs though. But, these are only informational pamphlets, no regulation backs much of this information. When mentioning an important environmental issue, the Briefs could specify one or more sources for more information on the topic. This would help with the problem of a preservationist who hardly has time to investigate preservation issues, so if s/he has to search for a source of information before investigating, it just does not happen. Instead through learning more historic preservation information, s/he could learn more about the whole environment. To learn more about historic preservation, an architect or builder can examine the Briefs also. If more environmentally sensitive practitioners read them, maybe more suggestions of how to incorporate environmental ideas would be given.

Notes

[1] Preservation Assistance Dividion, National Park Service, U.S. Department of the Interior, *The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*, Washington, D.C.: 1990, p. 5.
[2] Sharon C. Park, *Preservation Brief 24, Heating, Ventilating, and Cooling Historic Buildings: Problems and Recommended Approaches*, Washington, D.C.: Government Printing Office, 1991, p. 1.
[3] Kay D. Weeks and David W. Look, *Preservation Brief 10, Exterior Paint Problems on Historic Woodwork*, Washington, D.C.: Government Printing Office, ,1982, p. 11.
[4] Baird M. Smith, *Preservation Brief 3, Conserving Energy in Historic Buildings*, Washington, D.C.: Government Printing Office, 1978, p. 2
[5] Smith, p. 3.
[6] Robert C. Mack, *Preservation Brief 1, The Cleaning and Waterproof Coating of Masonry Buildings*, Washington, D.C.: Government Printing Office, 1975, p. 2.
[7] Sharon C. Park, *Preservation Brief 16, The Use of Substitute Materials on Historic Building Exteriors*, Washington, D.C.: Government Printing Office, p. 3.
[8] Park, *Preservation Brief 16*, p. 12.
[9] Park, *Preservation Brief 16*, p. 13.
[10] Sharon C. Park and Douglas C. Hicks, *Preservation Brief 37, Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing*, Washington, D.C.: Government Printing Office.
[11] Park, *Preservation Brief 37, p.* 14.
[12] Park, *Preservation Brief 24*, p. 13.
[13] *Wisconsin State Administrative Code*, Department of Industry, Labor and Human Relations, June, 1995, No. 474.

Case Studies

Issues for Analysis

One way to determine the sensitivity or awareness people have about an issue is to examine actual projects. For this report, to establish a basis for an argument about creating fully environmentally sensitive projects, two studies were conducted. The first study, the Audubon House, involves a building which is considered by some critics to be an excellent example of green architecture. The second project, the Curry-Pierce Building, is a typical project which followed all the regulations mentioned in Chapter 2 to receive historic preservation tax credits at both the state and federal levels and is considered a good preservation project. So, the first study involves an environmental rehabilitation and the second, an historic preservation rehabilitation. In the end the point is to combine these ideas to create a project which responds to the overall environment.

Before beginning these studies the issues to be investigated must be established. Many published examples of projects and interviews with individuals working in the construction industry led to the following issues:

- Energy Conservation
- Indoor Air Quality
- Indirect Environmental Impacts

- Overall Aspects
- Close Range Details
- Interior Features

These issues were all explained in previous chapters. The first three issues were taken from historic preservation information and are explained in Chapter 2. The second three issues, explained in Chapter 3, are environmental concerns. While these involve separate building aspects, they also greatly overlap. So, something like material selection would be considered with respect to indoor air quality, indirect impacts on the environment, and in the considerations of interior features. These six areas can also be further divided to include most aspects of the process of rehabilitating a building.

Along with these issues, the intentions and overall goals of the people involved in the projects were examined.

Overall Goals

The goals or intentions of the design team are very important at this stage of the relationship between historic preservation and environmentalism. No true plan has been set for people to follow; no meeting of the minds on issues. The goals of each project are what will demonstrate the knowledge of the designers about the issues of environmentalism and historic preservation and what they intended to do even if in the end it was not possible. For this reason what the design goals were when creating these projects is pivotal.

Table 3: Summary of Case Studies

	Ideal Situation	Audubon House	Curry-Pierce	Regulations[1]
Overall Intentions	To consider every impact every decision will have on the whole environment; from the visual impact of the building to water pollution.	The survival of the Earth's diverse ecosystems and the species that inhabit them, or 'biodiversity,' was the highest priority ...Ultimately the steps taken... all come back to the issue of biodiversity.[2]	Considered what they were readily informed about; little or no attempt was made to investigate anything further if it passed all regulations, was reasonably priced, and performed relatively well.	Overall building codes are intended to ensure physically safe buildings. The Secretary of the Interior provides standards to ensure the preservation and protection of National Register properties.
Energy Efficiency	Passive methods for thermal and lighting comfort used whenever possible. Lighting occupancy and daylight sensors Highly efficient HVAC systems Low heat loss through thermal envelope	Occupancy and daylight sensors were used in particular areas. Highly efficient HVAC systems were used. The exterior walls and roof were heavily insulated and windows using Heat-mirror technology were used	No lighting sensors The highest efficient HVAC system for a reasonable price was used. The exterior walls and roof were insulated on the interior and double-hung, double-paned wood-framed windows were installed.	watts per square foot R-values
Indoor Air Quality	Ventilation: 20 cfm/person; 6 Air changes/hour[3] No toxins emitted by any building materials. Sensors in the ventilation system to ensure proper ventilation.	Ventilation: 26 cfm/person 6.3 Air changes/hour Attempted to not use any materials which would emit toxins	Ventilation: 5 cfm/person 1.5 Air changes/hour Did not consider materials toxic emissions beyond regulations.	Ventilation: 5 cfm/person 1.5 Air changes/hour A few particular materials are not to be used, such as asbestos insulation.
Indirect Environmental Impacts	No pollution caused by the production of building materials Limit use of natural resources by using local or regional materials Limit use of natural resources through the use of recycled and recyclable materials	Materials whose production caused pollution were only selected when there was no other alternative. All local or regional materials were used. Recycled and/or recyclable materials were used when available and financially feasible.	No particular attention was given to the indirect impacts anything would have on the environment.	Permits are required to dump materials in landfills, hazardous or otherwise. Certain hazardous materials are controlled in the manufacturing process

[1] Taken from the Wisconsin Administrative Code and the Secretary of the Interior's Standards for Historic Preservation.

[2] Audubon House, p. 59.

[3] Johnson Controls Research

	Ideal Situation	Audubon House	Curry-Pierce	Regulations[4]
Overall Character Features	Retain shape, fenestration patterns, secondary features, etc. which are important to the character of the building.	The windows were replaced with a different type of window. The shape and pattern of fenestration were maintained.	All overall character features were maintained.	Cause as little harm as possible to the original character of the building to make a project feasible.
Close Range Features	Retain all existing reapairable materials important to the character of the building. Repair with original methods. Do not destroy original character created by original construction methods.	Important elements on the exterior were repaired. Little work of this nature was necessary.	Original materials were used everywhere they were practical and important to the character. Some were replicated rather than repaired.	Removal of historic materials or alteration of features and spaces that characterize a property shall be avoided. If using the same material is not technically or economically feasible, then compatible substitute materials may be considered.
Interior Features	Retain original configuation of spaces, finishes, and materials which are important to the character of the buidling.	Interior was completely demolished and removed.	Important features on the interior were maintained or replicated. Configuation of spaces was changed.	Repair with original materials and methods where feasible.

[4] Taken from the Wisconsin Administrative Code and the Secretary of the Interior's Standards for Historic Preservation.

Audubon House

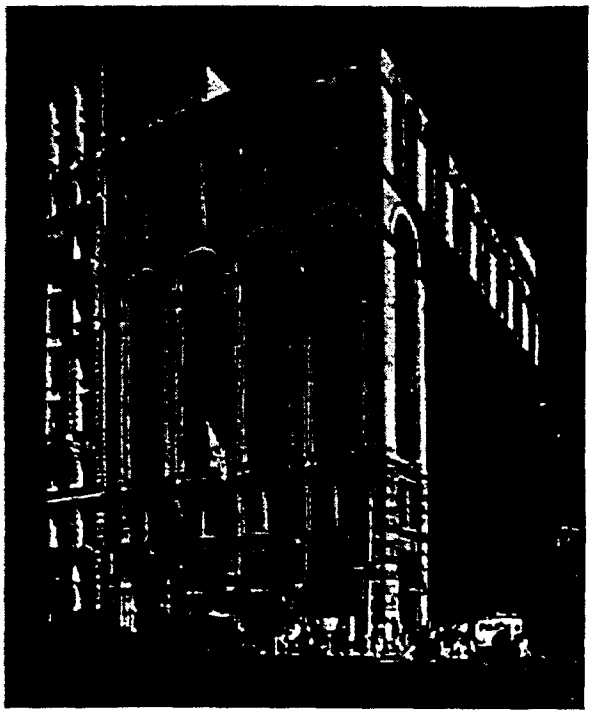


Figure 1: Audubon House

The focus of most of the National Audubon Society's work concentrates on "the protection and restoration of vital habitats for wildlife and the promotion of sustainable development to ensure a healthy environment for people as well as wildlife." Thus, when they began a search for a new office building in 1988, using an existing building and the concepts of sustainable architecture seemed natural.[1] They wanted the building to be an example to others that an environmentally conscious building is feasible, and does not mean expensive gadgets, or that it will look like a solar collector. The architects, Croxton Collaborative, were chosen because they are known for green architecture. In 1992 at 700 Broadway in New York City, they rehabilitated the 1891 building once known as the Schermerhorn Building designed by George W. Post.[2]

Overall Goals

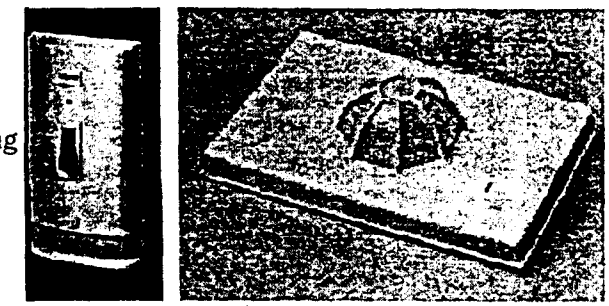
The designers of the Audubon House began with specific goals about the methods of selecting materials and the intentions of the design. The impact on the environment was constantly taken into consideration when making these decisions. This goal of constructing an environmentally sensitive building became the basis for the entire design.[3] Their dedication to the environment is demonstrated in their decision to select nothing using chlorofluorocarbons (CFCs). CFCs cause ozone depletion and, along with carbon dioxide, are known as greenhouse gases, in other words, gases which are trap-

ping the earth's heat causing global warming. Everything selected for the Audubon House involved an investigation into the impact it has on the environment, from the method in which things were manufactured to whether they are recyclable after use.

Energy Conservation

The reduction of energy use was very important to the Audubon Society. Also, because this has been a well recognized problem for several years now, the market for energy efficient building systems is becoming more extensive. As mentioned in the chapter on environmentalism, this section will discuss lighting and HVAC and the thermal shell.

Lighting



Firure 2: Daylight and Occupancy Sensors

The Audubon Team believes lighting to be the single most important energy saver.[4] By integrating daylighting more efficiently, using more efficient hardware for lighting, and being more aware of lighting design they were able to reduce their need for electricity for lighting by seventy-five percent.[5] Because of the large windows on two sides, the building was conducive to natural lighting. The team took advantage of this as much as possible.

A few techniques they incorporated to produce such an efficient system include interior windows into center offices, daylight sensors in the lights closest to the south exposure, venetian blinds with perforated slats, reducing ambient lighting and using more task lighting, and energy efficient electronic ballasts. The design, also, incorporated short (four foot high) sound-absorbing partition walls near the exterior, slightly taller partitions farther from the exterior, and then interior windows in the walls of the enclosed interior offices to allow the light to penetrate into the inner spaces of the office.

HVAC and Thermal Shell

The main source of heating and cooling for the Audubon House is a single gas-fired chiller-heater system. Several things lead to this decision including the climate, fuel source, and the fact that the system does not produce CFCs. The Audubon House is located in New York City which has cold winters. There were two general options for the energy source for heating: gas or fuel oil. Because of the environmental problems caused by oil drilling, such as loss of biodiversity, gas was the only viable choice. Electricity is not economical for heating in such a cold climate, but it would have been feasible for cooling. However, because of the opposition they have to some ways electricity is produced, gas was the better alternative.

Figure 3: HVAC could be smaller than normal because the thermal shell was so efficient.

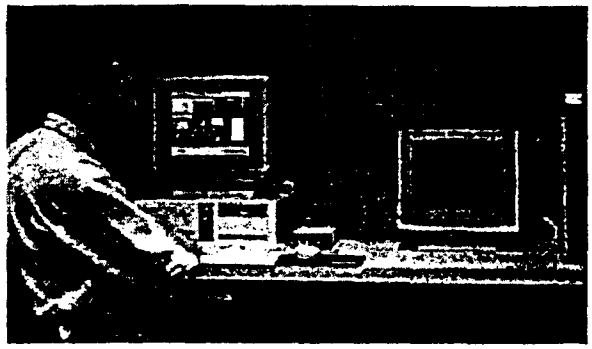


Figure 4: Terminal to control entire HVAC system.

The main system used to heat and cool Audubon house is considered an energy efficient system. By adding to this main system they further improved the energy efficiency of the overall heating and cooling. Two systems assist the main system. At night these systems draw in the cold night air, cooling the building naturally, helping to conserve energy since the cooling system does not need to cool as much air for the beginning of the work day. Also, each floor has control of its own temperature, which will keep from overheating the building. The entire HVAC system can be controlled by the building manager through a central computer. This high-tech system allows for optimum control over the air temperature of the building allowing for maximum comfort and energy efficiency of the system.

For a building's heating, ventilating, and air conditioning (HVAC) systems to be most efficient, a building's shell must be able to keep the conditioned air inside. It should be fairly tight to efficiently control the amount of air passing through the building. The thermal envelope includes the walls, window, and roof (and skylights). For the windows the Audubon Team used a new product on the market: Heat-Mirror windows. These windows have a coated film between the panes of glass which reflect the summer heat and absorb the winter heat. Along with the windows, the old walls and roof of the building were heavily insulated, creating an overall R-value (the resistance of a material to conduct heat) of greater than twelve. The combination of the Heat-Mirror technology of the windows, heavily insulated roof, and the insulated walls created a sound thermal shell for the Audubon House. This allows the building's HVAC systems to work much more efficiently.

Indoor Air Quality

Because of the goals of the Audubon Team, the quality of the air in the building played a pivotal role in many decisions. The Audubon Team determined the best situation to ensure clean air all along the ventilation path beginning with the intake. The system takes air in through a vent on the roof. By placing the intake on the roof they avoided exhaust from vehicles. The intake vent was also placed far away from the building's exhaust vents. This air then passes through a high-quality bag filter before it is incorporated into the HVAC system. After being mixed with return air in the system, the air passes through another filter. The double filtering of the outside air ensures that no outside pollution will be brought into the building.

This system not only supplies clean air, but a lot of it. Audubon House averages 26 cubic feet per minute per person of fresh air and 6.3 air changes an hour. This is over three times the air changes required at the time of the renovation.[6] However, the standard has increased the number of air changes since that time. The change of the

air in the building has been found to be very important in maintaining a healthy atmosphere for the occupants. However, this dilution of anything that is in the air is only one part of clean air. Proper materials needed to be selected to avoid indoor air pollution in the first place.

The materials selection proved to be a challenge for the Audubon Team. They began this process by deciding what criteria they would use to make their selections. In the end they decided to give first priority to indoor air quality because it affects the users the most, and it is easier to obtain accurate information about the chemical makeup of a product. To conduct this in-depth material research, the Audubon's chief scientist was very crucial. Their own expert had extensive experience in analyzing material for their effects on human-health. This, however, is a luxury that is in no way common in the typical building situation.

Having decided the chemical makeup of a product as the most important, they used several different sources to determine the contents of a product and the toxicity of those contents. This is where Audubon's own expert was of great help in determining the toxicity of materials mentioned. With this information they could then select the materials which off-gassed no toxins or the least toxins. This, combined with adequate ventilation, makeup a system for high quality indoor air.

Indirect Environmental Impacts

As previously mentioned the affect on the air quality was the number one priority when looking at materials. Next, though, they looked at the downstream impacts and finally the upstream impacts. Of course if there was an extreme case such as polyvinyl chloride plastic (PVC) which when burned emits toxic fumes, an exception to their rule was made. Naturally there were other criteria which were considered along with the previously mentioned, such as overall environmental policies of manufacturers, health and safety conditions at their factories, social responsibility, product's

performance, economy, comfort, and the aesthetic. One main source for the hazards associated with a material were Material Safety Data Sheets (MSDS). These sheets list what is in a product and tell a little bit about any hazards of the contents or using or installing the product.

One difficult material was insulation for the exterior walls. The most common insulations used are either foam insulation or rigid fiberglass. The manufacturing process of foam insulation produces CFCs and it also contains CFCs, so that was immediately out. Fiberglass insulation is known to cause respiratory irritation if its tiny particles are released into the air. So, this was not a choice which could meet the team's goals either. They decided to use a product which was new at the time called Air-Krete which was blown into the wall cavity. This product, however, could not be blown horizontally, so fiberglass insulation was used in the ceiling.

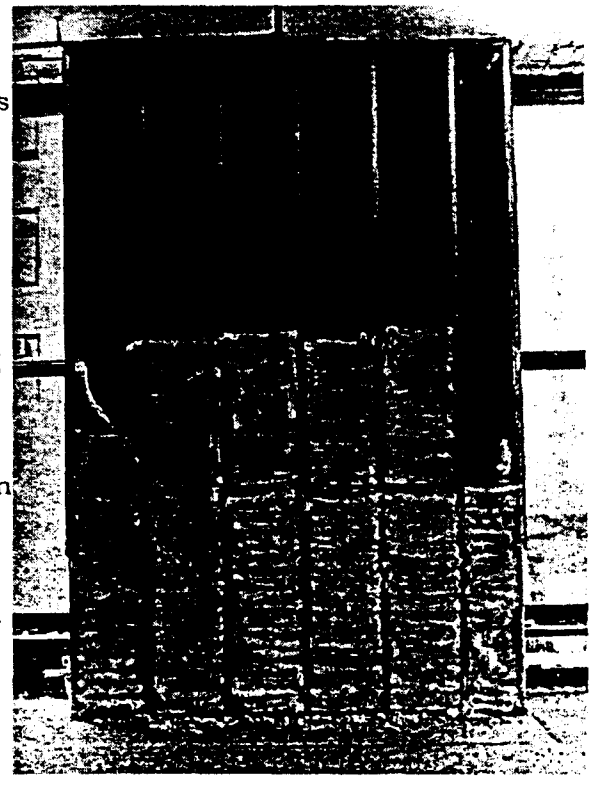


Figure 5: Air-Crete insulation

The Audubon Team addressed the problems of solid waste by establishing a waste program for the project which can be defined by the following:

1. "Recycling" the building: renovating an existing structure
2. Recycling materials from demolition
3. Finding building materials made with recycled content
4. Programming and designing a physical in-house recycling system to capture office waste
5. Establishing guidelines for the purchase of recycled and/or recyclable supplies (as well as waste reduction and reuse)

These five areas represent everything that could be done during the construction process to avoid using virgin materials. They began with avoiding using undeveloped land by renovating an existing building and recycling as much waste as possible; then,

they incorporated recycled and/or recyclable materials into the construction; and finally they established a recycling program within the office which included the purchase of products made from recycled materials. Because they were the owners, users, and directly involved in the construction process this holistic approach was possible. However, in many projects, involving so many different aspects would be much more difficult. Hopefully, in the future, this method of considering the impacts throughout the process and into the use of a building will become the norm.

One area that seems to be closing in on becoming the norm is the idea of recycling the materials from demolition. In New York City, where the Audubon House is located, there is already a shortage of landfill space. In fact the cost of recycling the debris from the Audubon project was less then what it would have been to dump the material.

The in-house recycling program, because it is not what people are used to, was implemented in stages. This allowed the employees to become accustomed to the new methods of disposal and separation of garbage. Along with this particular part of the program, they also included composting right on site.

Another program well designed for the Audubon House is its maintenance. Not only will the systems last longer if well maintained, but they will also reduce problems associated with sick buildings. Regular cleaning of the mechanical system and the spaces used directly by the occupants helps ensure a clean, healthy environment.

Overall Aspects

Most overall aspects of the building were maintained including the general shape, the fenestration pattern, and the secondary features. An addition was construction on top of the building of which a small part can be seen from the street level. The extent of the work on the exterior included cleaning and a few small repairs. Otherwise the building was in good condition as it was, and the design did not change it.

Close Range Aspects

Getting closer to the exterior rehabilitation, the details can be seen. Something which is visible is the material and style of windows installed. The original windows on a building from this time would have had wood frames and been double hung. However, the new windows have aluminum frames with the lower light as an hopper style window. The aluminum frame does not seem to have been designed to replicate the profile of the original frame. The difference in the style of frame and operable window changes the appearance because of the different shadows and other characteristics.

Figure 6: Windows are not true to the character of the building.

Interior Spaces, Features, and Finishes

None of the existing interior spaces, features, or finishes were left in the building. Whether or not there were any that would have contributed to the character of the building is not known; it was simply 'gutted' to the exterior walls.

Summary

The Audubon Team implemented many environmentalist ideas in their rehabilitation project. They also considered the building to be an important part of the character of New York City. They did not consider the character of the building fully, though, only generally. The next study will include an examination of the same aspects considered for the Audubon House. This second project, though, was oriented toward historic preservation issues rather than the environmental issues.

Curry-Pierce Building

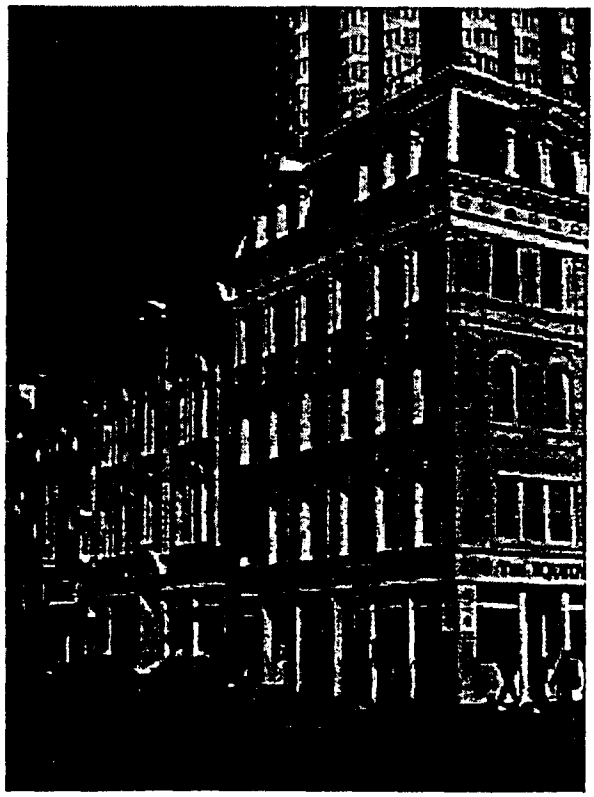


Figure 7: The Small Building and the Curry-Pierce Building, respectively.

The Curry-Pierce Building is a rehabilitation project which received historic preservation tax credits. Therefore, it is assumed to be an acceptable example of historic preservation. The analysis is intended to demonstrate an example of the current typical methods relating to the issues previously presented endorsed by the Department of the Interior and the local historic preservation advisory board.

The Curry-Pierce Building is located on the northeast corner of Milwaukee Street and Wisconsin Avenue. The Small Building, which is located to the north and faces Milwaukee Street, shares a party wall with the Curry-Pierce Building. These two buildings have been incorporated as one building on the interior and together are the topic of this analysis. Both the Curry-Pierce Building and the Small Building were built in 1866. They are considered architecturally significant and contribute to the East Side Commercial Historic District of the National Register of Historic Places. The rehabilitation began in 1991 by TMB Development with MSI General as the contractor. By this time many changes had been made to the interior of both structures. The exteriors were fairly well intact with the exception of the storefronts on the ground floor.

According to several preservationists involved in this project, the process involving the conditions for receiving historic preservation tax credits was typical. The State Historic Preservation Office and the National Park Service reviewed the proposed initial

design and the state of the buildings before any work. The architect most involved with the project had not worked with the historic preservation standards prior to this project. He commented during an interview that the people involved in approving the building were easy to work with and seemed flexible and open to the solution presented.

Overall Goals

The goals for this project were similar to those of a typical successful developer. In other words the financial gain of a project lies under everything in one way or another. Through the owners' personal interest in cities and historic buildings and experience in managing construction development projects, they began in 1981 rehabilitating old buildings with the financial assistance of a preservation grant from the State Historical Society. Realizing the need for people to develop old buildings and the money available from cities wanting to improve, preservation grants, and tax credits, they continued their business to preserve many buildings throughout Wisconsin. This sets the stage for the intentions at the core of the Curry-Pierce project.

The overall goals include two main ideas: preserving the historic buildings and their important elements and making the project financially successful. These goals will be referred to again through the continued analysis of the project.

Energy Conservation

The overall efficiency of the building was a major concern throughout this project and one that everyone was aware of. The three systems examined for energy efficiency, lighting, HVAC, and the thermal envelope, were all recognized. The decisions on systems seemed to include a balance between efficiency, cost, and sometimes preservation Standards; in other words, the most efficient, quality system for the cost that fit into the building.

Lighting

The lighting system was probably given the least consideration for energy efficiency of the systems. This is also the most difficult system in this project to make overall judgments about, because each tenant designed its own space, sometimes including the lighting. In general though no occupancy or daylighting sensors were installed. No one seemed to even have considered them because of their cost. Many lights are on all over the building where people are not using the spaces, or where there is enough daylighting that the artificial lights are unnecessary at many times of the day. There are several offices which are very brightly lit by natural light even on overcast days and both ambient light and task lights are still illuminated almost all the time.

Energy efficient ballasts were installed in the public spaces and some other spaces. This is the largest demonstration of concern for the efficiency of the lighting system. The architect stated that MSI General usually specifies electronic ballasts. This practice began for them when the energy company started giving rebates for using electronic ballasts, making them cheaper than the other less efficient types. However, there are no longer any rebates, but the company continues to specify these ballasts, because they know they are some of the most energy efficient.

Because the tenants pay for their own electricity, the owner has no financial reason to not install the cheapest lights possible. However, they do not do this. Even though the entire system could be improved, some steps are made to create an efficient lighting system.

HVAC and Thermal Shell

The HVAC system consists of several heat pumps powered by electricity and an air handling unit at each leasable space containing a makeup electric heater. This system was selected because it is the most efficient for the least expense and the most practical for the building. This does not mean that it was the least expensive or the most efficient, simply that they were concerned with finances as well as energy effi-

ciency. According to the engineer, however, this system is above average in energy efficiency. Each leasable unit has control of its own temperature. This not only allows the tenants to make adjustments when needed or know when the system is not working, but also gives a greater feeling of control over their direct environment.

The original building shell consists of a masonry wall made of three wythes of brick. The rehabilitation added one and a half inches of rigid insulation and gypsum board on the interior of the entire exterior wall. This gives the wall a heat loss factor, or R-value, of 14.2. The windows were replaced with custom double glazed, double hung, wood framed units. The typical glass area has a R-value of 1.8.

Although these values would not be considered highly efficient to an environmentalist, they are typical for a rehabilitated masonry building with wood framed windows. Many architects and contractors have been led to believe that metal framed windows are always more efficient and less expensive than wood framed windows. While this is generally true of quality steel framed windows, it is definitely not true of all metal windows particularly some aluminum framed windows. Once again, the energy efficiency of the overall envelop of the building basically conforms to regulations.

Indoor Air Quality

The concerns for air were limited to the regulations for ventilation and the use of operable windows. The ventilation standards at the time of the project only required 5 cfm/person (cubic feet per minute per person) of ventilation for an office; therefore, this is what the system was designed to supply. The Wisconsin State Administrative Code now is requiring 5 cfm/person of ventilation. However, the comfort level has now been determined by ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) to be 20 cfm/person of ventilation. This being the case, people are more likely to feel the air is not fresh enough for comfort and open the windows. Unfortunately, during the winter the heat of the building will go out the window, making the

whole HVAC system much less efficient.

The owners realize that the opening of the windows will decrease the efficiency of the building, and, therefore, would like to stop occupants from doing this. Operable windows are also a very humanizing addition to a building.

They do provide operable windows, so if people are uncomfortable, they can open the window. Operable windows are also a good marketing tool for renting the spaces, demonstrating the knowledge of employers that employees will work better feeling some sense of control over their environment, but not necessarily a knowledge of indoor air problems. So, not only are the operable windows good for people psychologically and to get rid of unpleasant air, they are also good for business.

When going through the suggestions in the "Indoor Air BULLETIN" mentioned previously, most of them were not addressed in the Curry-Pierce project. The only one that actually can be discussed is the isolating of the construction zones. The building was vacant during the overall rehabilitation and all the windows were removed so there was quite an air flow at that point. Each unit has its own duct system, so the construction in one space does not affect the air of the already occupied spaces. However, there was little if any concern beyond regulations for: selecting the right building materials, planning adequate airing-out, maximizing ventilation, avoiding sinks, ventilating wet products, or commissioning the HVAC system.

Indirect Environmental Impacts

Unfortunately, no indirect environmental impacts were considered by the Curry-Pierce team. This is worth noting. It is a simple demonstration that the average person does not realize how much what they purchase affects the environment. The demolition materials were put into a landfill, all new materials were used, and no consideration was made for the extra use of natural resources and production of pollution caused by the transportation.

When speaking with the architect who designed a couple of the interiors for the Curry-Pierce Building, he noted that although he did not consider environmentally friendly products when specifying them for the Curry-Pierce project, in the last six months or so he has begun to ask more environmental questions of the manufacturers. For example, he says he has made it a habit to ask where the product is actually produced. This will tell him what the travel of the product will be. Maybe he could find a regionally produced product that will work instead of something produced across the country, or even in another country.[7]

Overall Aspects

Figure 8: The two story addition was considered important to the overal shape of the Curry-Pierce Building.

Because this project applied for historic tax credits, unlike the Audubon House, the design was reviewed ensuring that the original building character was carefully considered throughout any changes made to the building. The shape, fenestration pattern, and all existing exterior details which were sympathetic to the character of the building were retained. The metal cornices on both the Small Building and the Curry-Pierce Building were repaired. An exterior feature carefully considered in the rehabilitation was the ground floor storefront. The designers examined old photographs of the building in order to determine something which represented the original appearance. The original proposal was acceptable to the preservation reviewers with exception of a few suggested changes which were implemented by the design team. The storefront which was there did not match the rest of the building in any way. The Curry-Pierce Building had a metal clad rooftop penthouse addition which could not be seen from the street. This was removed. Generally the overall visual details composing the character of the exterior of both

buildings were in good condition; therefore, not requiring much work besides maintenance to the majority of the exteriors.

Close Range Aspects

One important element which is often first examined by a local council or the advisory board is the windows. Not just the openings for the windows, but the materials, style, and reflectivity are important to the character of the building. For this project, it was suggested that the developers consider repairing the existing windows rather than replacing them. However, the windows which were original were in such bad condition that it was considered acceptable to replace them. The replacements were custom made to replicate the original windows.

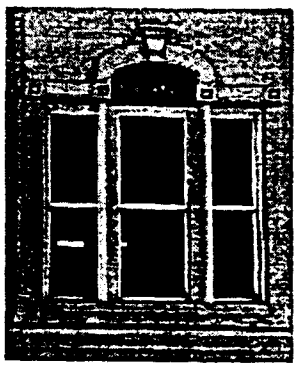


Figure 9: Small Building window detail

The existing materials were generally all preserved on the exterior of the building. One area of importance on the exterior mentioned previously was the new storefronts. In this case the designers chose materials which would have been used originally: brick columns and wood panels painted to match the rest of the building.

Interior Spaces, Features, and Finishes

Two spaces on the fifth floor of the Curry-Pierce Building were considered as important. They were added to the building in the two-story addition in 1879. No other spaces were considered to be of any importance to the character of the building.

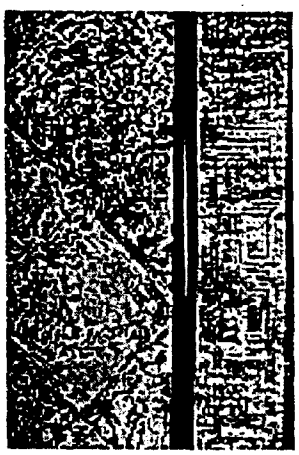


Figure 10: Small Building - first floor tin ceiling

The fifth floor also contained some plaster work and two leaded glass windows which were considered as important

to the building's character. Both were retained or repaired as needed. In both the Curry-Pierce Building and the Small Building some original trim work around the windows and baseboards still existed. The trim was not in good condition, however, and would have required more cost to repair than to replace it with replicated trim. Therefore, the trim was all replaced. The preservation representative required the trim to be repaired or replaced on the exterior walls only, but the owner installed the trim almost completely through the building, particularly in all the public spaces in order to maintain the character of the building. In the Small Building a tin ceiling existed above acoustical ceiling tile. The tin ceiling was retained.

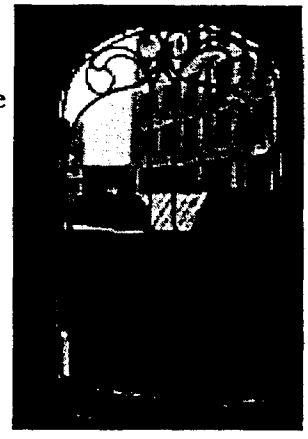


Figure 11: Curry-Pierce Building - 5th floor - leaded glass window

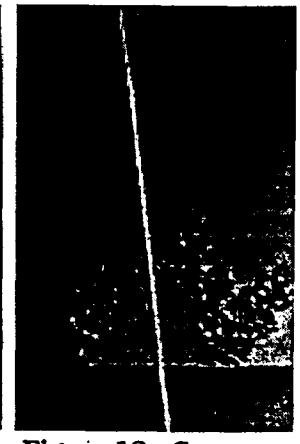


Figure 12: Curry-Pierce Building - 5th floor - plaster work

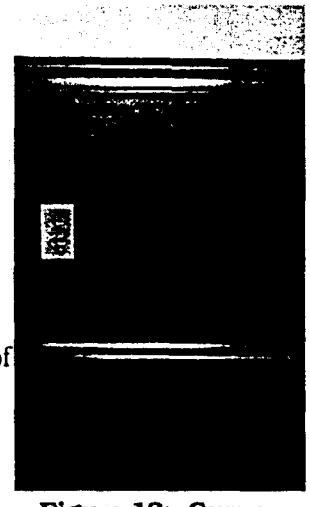


Figure 13: Curry-Pierce Building - 3rd floor - base board

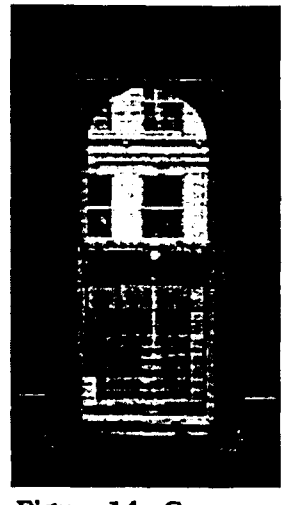


Figure 14: Curry-Pierce Building - 3rd floor - window trim

The original features creating a special appearance were all maintained or replaced throughout this project. Though this was through the requirements of the historic preservation tax regulations, the developer seemed to believe the elements added to the character and assisted in creating unusual spaces which would not normally be saved.

Comparative Analysis

Given here were two examples of rehabilitations of historic office buildings. The first example demonstrates how a building can be rehabilitated in an environmentally friendly way with the heritage of the building consider later. The second example concentrated more on the historic value of the building with much less regard for the broader environmental issues. While both in the end are good projects by today's general standards, hopefully one day all these issues will be naturally considered when rehabilitating buildings. Both projects missed great opportunities for an incorporation of the ideas of historic preservation and environmentalism together.

The similarities and differences between the two projects are summarized in Table 3 on the previous page. A more detailed comparison based on this information follows the table.

Overall Goal

The goals of the two projects are where the differences were initially established. The Audubon House was concerned with environmental ideas and the Curry-Pierce project focused on historic preservation issues. Neither project concentrated on historic preservation and environmentalism equally, but each project gave some consideration to both areas.

Energy Conservation

Lighting

As mentioned previously, energy conservation is one of the most recognized issues concerning the environment. Because of this the team for the Curry-Pierce Building did consider the efficiency of the systems installed. However, they did not

address the problem as fully as the Audubon Team. The Curry-Pierce project could have included sensors or better recognized the amount of natural light offered by the windows.

HVAC and Thermal Shell

This is a somewhat difficult comparison because of the different ways the buildings are used. The Audubon House was designed for one user, but the Curry-Pierce Building has many different users who all individually pay for their own utilities. Therefore, the HVAC systems are also different. Once again the Curry-Pierce team did not take as much into consideration as the Audubon Team when selecting a system, but they did install a system which, according to the engineer, is more efficient than the typical. Both projects used somewhat unusual systems designed specifically for the way the building would be used, the system for the thermal shell, and the climate. Neither project simply installed a generic system without considering the specific situation. This consideration is exactly what is mentioned as one of the most important steps to designing an efficient system in Meckler's book on energy efficiency which is quoted in Chapter 4 in the discussion of the HVAC and Thermal Shell system.

The shell of the Audubon House is more energy efficient than the shell of the Curry-Pierce Building. Both buildings have well insulated walls, but the Audubon House has a more heavily insulated roof and much more efficient windows. The R-value of the Audubon windows is 3.7. The Curry-Pierce windows though only have an R-value of 1.8. Also, because of the Heat-mirror technology in the Audubon House they will reflect the heat to the proper side better than the typical windows installed in the Curry-Pierce Building. Overall in the area of energy conservation, the Audubon House is much more efficient than the Curry-Pierce Building, but most of the ideas incorporated into the Audubon House could have easily gone into the Curry-Pierce project.

Indoor Air Quality

Indoor air pollution has only recently become a well investigated topic. Because of this, during the design of the Curry-Pierce Building the only consideration of the quality of the air was meeting the building codes for ventilation. The designers did not take the great care in selecting materials as did the Audubon Team. The Audubon Team though had the advantage of a chemist from the National Audubon Society being able to look at the contents of products and determining if they would pollute the air.

The ventilation of the Curry-Pierce project is also much below that of the Audubon House. The Curry-Pierce Building is ventilated with 5 cfm/person and the Audubon House with 26 cfm/person. The ASHRAE standards suggest that 20 cfm/person for an office building is sufficient for maintaining a comfortable environment based on carbon dioxide levels. From an air quality stand point there is not a problem with having too much ventilation, only with too little. From a energy conservation view though too much ventilation wastes energy. Therefore, the Curry-Pierce Building definitely could use more ventilation and the Audubon House could have a little too much.

Indirect Environmental Impacts

Once again the team for the Curry-Pierce Building did not take much into consideration in this area, especially when compared to the Audubon Team. The Audubon project incorporated many issues into the selection of products that the designers for the Curry-Pierce project did not even think to consider. The Curry-Pierce project removed asbestos from the building and obtained a permit to dump the debris from demolition into a landfill. This was the extent of their concern. The Audubon project attempted to look at every issue they could about the products.

The one thing that both projects do that is extremely important to the rest of the environment is they used existing buildings, in particular buildings which had been

neglected for a significant time period. By doing this they avoided some of the impacts a new structure has on the environment. There were fewer materials used; therefore, less energy used and pollution caused by the production and transportation. Also, they did not have to use a piece of land which had not been previously developed. One goal that seems to have been forgotten once inside the building is embodied energy. The materials inside the building should be considered for their usefulness as they are. Although the idea of saving the energy was not the reason for maintaining some interior features, the Curry-Pierce project did do this, and the Audubon House did not.

Overall Aspects

When comparing the historic preservation issues, the buildings change places. The Curry-Pierce Building becomes a well accepted example and the Audubon House a typical project overlooking some important issues. One thing that is different with some of the preservation issues is that the information missed was more available for the Audubon House than the environmental information was for the Curry-Pierce Building. The historic preservation programs are generally known in communities by the local architects, but some of the environmental information presented is not as well established. This is demonstrated in the regulations involved. The preservation issues are regulated by the government while the environmental issues presented are more stringent than the government regulations for building.

The Audubon Team did consider their building to be historically significant, as did the Curry-Pierce designers and owners. The main difference is that the Curry-Pierce project continuously made decisions based on the affect they would have on the character of the building. The Audubon Team did repair the exterior of the building and maintain the overall character, but this only seemed to have happened to the point of what fit in with their environmental goals.

Close Range Aspects

The Curry-Pierce team maintained or replicated the important elements of the building. The Audubon Team once again only did so when it did not interfere with their environmental goals. As mentioned previously in this chapter, the windows installed in the Audubon House would not be accepted as maintaining the character according to historic preservation standards. The original material and style was not respected as it was in the Curry-Pierce project.

Interior Spaces, Features, and Finishes

Once again on the interior the Curry-Pierce team took much more care in determining what was important to the character of the building. The Audubon House, however, did not look at what was originally there. They simply removed everything and designed the interior to suit their needs. The idea of reusing to save embodied energy seemed to simply drop beyond the exterior of the building.

Summary

Overall, there does not seem to be many reasons for one project to not incorporate what the other did. The two sets of issues have more in common than in opposition. The next and final chapter summarizes an ideal situation which incorporates all the issues discussed up to this point.

Notes

1 National Audubon Society, p. xii.
2 National Audubon Society, p. xi.
3 National Audubon Society, p. 47.
4 National Audubon Society, p. 73.
5 National Audubon Society, p. 71.
6 National Audubon Society, p. 115.
7 Louis Wasserman, interview.

Figures

1 National Audubon Society, p. 156.
2 National Audubon Society, p. 83.
3 National Audubon Society, p. 92.
4 National Audubon Society, p. 98.
5 National Audubon Society, p. 85.
6 National Audubon Society, p. 56.
7 Photo by Angela Thompson, 1996.
8 Photo by Angela Thompson, 1996.
9 Photo by Angela Thompson, 1996.
10 Photo by Angela Thompson, 1996.
11 Photo by Angela Thompson, 1996.
12 Photo by Angela Thompson, 1996.
13 Photo by Angela Thompson, 1996.
14 Photo by Angela Thompson, 1996.

Bringing It All Together

The previous chapter reviewed and compared two projects which included environmental and historic preservation issues. Neither project, however, included every issue. But, by using some ideas from each project, and examining ideas in the regulating information, an ideal project can be formulated. The following information describes how the ideal project would address the same issues presented previously, gives suggestions of ways for preservationists to incorporate environmental issues and for environmentalists to incorporate the ideas of historic preservation, and mentions any similarities or important conflicts which exist. Together this information would create a rehabilitation project that would not harm our environment, built or natural. Instead, the project would help to maintain and improve our environment.

Overall Goal

Ideal Goal:

The initial intention of the project should be to enhance and never harm our surroundings.

What to do:

Historic preservationists and environmentalists have to consider and become educated about each others issues along with their own concerns.

Similarities/Conflicts:

Preservationists and environmentalists already share ideas about creating a good project. They both believe the project needs to be well planned, consider other issues besides finances, and quality should prevail over quantity. Both also want to enhance a part of our environment. The main difference in the goals are rooted in the specifics: environmentalists consider the natural environment first and preservationists consider the building first.

Energy Conservation

Ideal Goal:

The most energy efficient systems which do not harm the character of the building should be installed.

What to do:

Because of the wide spread information about energy conservation, preservationists lean more toward the environmental side of this issue than environmentalists do toward the preservation side. Preservationists, however, need to continue their education on different methods for creating an energy efficient building. Environmentalists on the other side need to remember that systems can damage a building and more than likely will be replaced in the future by a better system. Using the second best system in order to save the character of the building is a sacrifice energy conservationists need to make.

Similarities/Conflicts:

The biggest conflict is the windows. The original windows should be examined, and then the most efficient window which gives the same appearance to the building should be selected. In the case of the two studies explained previously, a wood framed, triple pane window with a low emissivity (Low E) coating on two panes and argon gas between the panes would be the best selection. These windows typically have an R-value of 4.3 to 5.9. If the cost of these windows is too much, a double pane window also with a Low E coating and argon will give an R-value of approximately 2.5. This particular window was selected because it can be custom designed and have an all wood frame, which would maintain the original character of the buildings.

Indoor Air Quality

Ideal Goal:

In this ideal situation all the products installed in the building, including those used for repairing existing elements, should be nontoxic and not pollute the air. The ventilation of the building should be sufficient to ensure a comfortable environment, but not waste energy. In the two studies examined, the ideal ventilation rate according to ASHRAE research should be 20 cfm/person.

What to do:

Preservationists need to become educated on the materials which cause indoor air pollution. When needing to repair important elements, the materials used should be examined for air polluting chemicals as well as similarity to the existing material.

Similarities/Conflicts:

The biggest issue here is a similarity between what an environmentalist would suggest and what a preservationists would suggest for a material. The Preservation Briefs are a good example of what preservationists suggest. In general it is stated in the Briefs that certain materials should not be used because they may cause harm to the building. Many times the materials which will harm the building are materials which would pollute the air.

Indirect Environmental Impacts

Ideal Goal:

When selecting materials a cradle-to-cradle consideration should be made. This means the product's impact on the environment will be

considered from the methods of obtaining materials to produce it, the production of it, and what happens to it after it is used will all be considered when making a selection.

What to do:

This is also an area where preservationists could improve. They simply need to consider the ideal goal when selecting materials. This is not currently a common practice.

Similarities/Conflicts:

The similarities here are basically the same as they are for air quality control. Both groups generally suggest using the same types of products for different reasons. Unfortunately, as materials which are harmful to the environment have become used more commonly in general construction, they have become more commonly accepted in preservation practice.

Overall Aspects

Ideal Goal:

The important overall characteristics should be considered when rehabilitating a building.

What to do:

Environmentalists need to remember that the character of the building is also an important part of our environment. Buildings can be easily damaged by someone who believes modernizing them is the best practice. Often modernizing has led to unnecessary deterioration and loss of character, making the building less useful to the next generation.

Similarities/Conflicts:

The conflict here compares to the conflict of the overall goals. Environmentalists and preservationists are initially concerned with different aspects of our environment. Preservationists are saving what we produce while environmentalists are protecting what is here naturally. Environmentalists should realize that the way our environment has been shaped by those who have come before us is also important.

Close Range Aspects

Ideal Goal:

The important characteristic details of the exterior should be respected when rehabilitating a building.

What to do:

Environmentalists need to respect the important details of the exterior and not ruin them in an attempt to update the building. For preservationists, when repairing these elements they need to remember the environmental issues.

Similarities/Conflicts:

The conflict here is probably the thought of how important these details are to the character of the building. The details of the building are often thought to be trivial, and less important than the shape or openings. The details, types of material and craftsmanship are essential to the character of the building, as was discussed previously. These things make the building what it is.

Interior Spaces, Features, and Finishes

Ideal Goal:

Interior features which are important to the character should be respected when rehabilitating a building.

What to do:

Environmentalists should not simply remove everything on the interior of the building. There are usually some interior elements remaining which are important to the character and can be useful in the rehabilitation. At the very least an examination of what is in the building and what affect it has on the character should be done.

Similarities/Conflicts:

Environmentalists are using an existing building partially because it is better for the environment to use what we already have rather than to unnecessarily create something new. This philosophy seems to stop with the exterior of the building. The standards established for rehabilitation projects are practical about what should be maintained. They only expect the important or special features which make the building what it is to be maintained. Once these elements are removed, they are gone.

An Example Of Incorporation

In order to further demonstrate the incorporation of environmental and historic preservation ideas, the following example will be explained.

The two cases studied used different types of windows for different reasons. Neither window selection though incorporated the ideas the other used to select their window. For a window to respect both the character of the building and the environment in general, it must recognize the issues presented previously. A particular window manufacturer was found to meet much of the criteria given in this research. The following describes the issues discovered about the window:

- can be custom designed with an all wood frame using high quality craftsmanship
- a triple-pane window with a low-emissivity coating is available
- the company generally recognizes the need to be environmentally conscious of its practices, and is being used as an example of an environmentally conscious company in the state of Minnesota
- the waste from producing the windows is recycled

The one thing found when investigating this product was that the wood does not come from a sustainable source. In other words, it comes from someone who cuts down whole forests at once ruin the chances for the ecosystem of the forest to continue or for it to produce quality tress. However, this is probably a compromise that would have to be made. But, the individual specifying the windows could tell the company the environmentally sensitive, high quality approach is greatly appreciated and would be even better if certified sustainable wood was used. This may seem like a lot of work, but it did not take more than thirty minutes to discover this information. Most companies will want to promote a product and will want sales people to be informed about any sensitive issues they address in a conscious way.

Summary

If architects and builders simply used the information presented in the Preservation Briefs and learned the proper questions to ask about product manufacturing, the rehabilitation of buildings could become extremely successful in the fight to maintain our environment. The first and foremost decision that must be made is to use our urban fabric and to do so in a way which improves our whole environment.

Overall the most important thing that both environmentalists and preservationists need to remember is to consider the impacts of the decisions they make. Environmentalists need to remember the building makes an important contribution to the built environment, while the preservationists need to remember there are many other parts of the whole environment which can be affected by the built environment. Both interest groups already agree that good maintenance, high quality, and good planning are important parts of a successful project. If they bring these ideas into every level of the rehabilitation process, they could produce even better projects.

Appendix A:

The Secretary of the Interior's Standards for Rehabilitation

The following Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility.

(1) A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

(2) The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

(3) Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

(4) Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

(5) Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

(6) Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

(7) Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

(8) Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

(9) New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

(10) New additions and adjacent of related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

As stated in the definition, the treatment "rehabilitation" assumes that at least some repair of alteration of the historic building will be needed in order to provide for an efficient contemporary use; however, these repairs and alteration must not damage or destroy materials, features or finishes that are important in defining the building's historic character. For example, certain treatments—if improperly applied—may cause of accelerate physical deterioration of historic building. This can include using improper repointing or exterior masonry cleaning techniques, or introducing insulation that damages historic fabric. In

almost all of these situations, use of these materials and treatments will result in a project that does not meet the Standards. Similarly, exterior additions that duplicate the form, material, and detailing of the structure to the extent that they compromise the historic character of the structure will fail to meet the Standards.

Notes

1 *The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*, Washington, D.C.,: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1990, p. 6-7.

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Dean, Jeff - Wisconsin State Historic Preservation Officer

Haden, Paul - Victorian Society, New York City

Kaul, Dave - architect for Curry-Pierce project

McCormick, Brian - Wisconsin State Historic Preservation Architect

Morgan, Lynn - Waste Management

Randall, Kathleen - author of "The Audubon Building Renovation," *Building Renovation,* Nov/Dec 1992.

Reed, Larry - Local Preservation Coordinator

Reiter, Lauren - Croxton Collaborative, architect

Rogers, Dan - engineer for Curry-Pierce project

Rosier, Carol - Assistant County Archeologist, Oxford

Sewell, Jim - Wisconsin State Historic Preservation Architect

Trainer, Charles - TMB Development

Trelstad, Derek - editor of *Building Renovation*

Vollmert, Les - City of Milwaukee, Department of City Development

Wasserman, Louis - Louis Wasserman and Associates, architect