CONFLICT AND COLLABORATION:

HISTORIC PRESERVATION AND ACADEMIC, GOVERNMENT, AND NONPROFIT SUSTAINABLE REHABILITATION PROJECTS IN THE UNITED STATES, 1989-2005

A Thesis Presented

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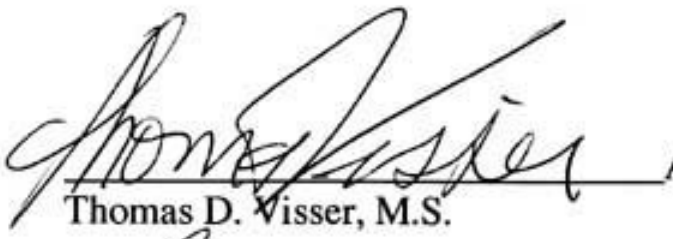

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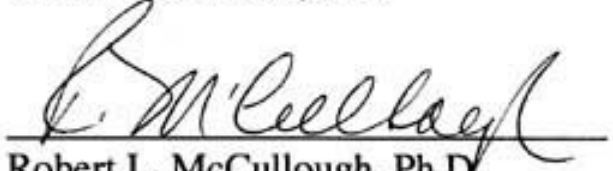

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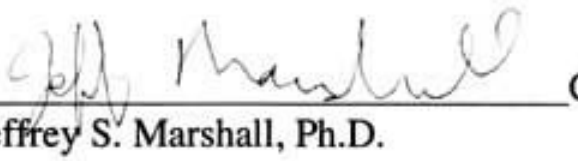

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Abstract

Since the 1980s, an increasing awareness of how human industrial activities, including the construction and operation of buildings, contribute to worldwide environmental degradation has led many in the global architectural profession to reexamine their own practices and instead adopt a series of environmentally-sensitive approaches broadly know as sustainable or green design. Many observers have noted that sustainable design strategies used in historic building rehabilitations can be at odds with historic preservation aims, thus putting the supposed allies of sustainability and preservation in conflict rather than collaborative comrades in defense of scare resources, natural and cultural. In many ways, the history of sustainable rehabilitation in the United States from 1989 to 2005 can be defined as one of conflict and collaboration.

This document investigates American sustainable rehabilitation practice during that seventeen-year period in an effort to: (1) examine significant process, design, and preservation aspects of pioneering and representational American institutional sustainable rehabilitation projects; (2) categorize those projects into "historical" periods based on timeframe and theme; (3) identify significant themes of change over time, emerging trends, and, as possible, the mechanisms driving this change; and (4) assess what the discussed projects imply and offer in answering whether good preservation and good sustainable design can be practiced collaboratively. In addressing that latter aim, the empirical evidence assembled in this document suggests that an alleged mutually exclusive and intrinsic choice between good historic preservation and good sustainable design is an unnecessary and false choice.

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Introduction

In May 2001, a meeting of the Washington, D.C., chapter of the American Institute of Architects turned heated. Consensus seemed fleeting and tempers flared; one meeting participant, as reported by journalist Alex Hawes, challenged energy efficiency advocates to replace the historic windows in her historic building "over her dead body." The topic of discussion: could good preservation and good sustainable design be practiced collaboratively, or must they be mutually exclusive and in conflict?[1]

The rise of the sustainable, or green, design movement in the 1990s and 2000s is not the first time the historic preservation community has faced challenges from and argued with environmental and energy conservation advocates. The antecedents of the present conflict lie, of course, in American responses of the 1970s and early 1980s to the sudden end of the era of cheap petroleum, i.e., the energy crisis of the 1970s. That dramatic, geopolitically-motivated reduction in global oil supply – triggered by the 1973-1974 Arab oil embargo against Israel's Western allies and, to a lesser extent, by the Iranian Islamic Revolution of 1979 – changed thinking about energy in the United States and in the developed world. Response by the developed West to the energy crisis included exploration of solar and other alternative energies, exploitation of petroleum sources from outside the Middle East, and experimentation by government, industry, and society with energy-efficient vehicles, lifestyles, and architecture.

In the United States, the energy crisis era emphasis on conservation led to historic building renovations and rehabilitations that frequently diminished architectural integrity and damaged or removed historic fabric. For instance, insensitively added rooftop panels for passive and active solar power could jarringly detract from historic appearance and form, while thermal envelope tightening strategies like window replacement and comprehensive insulation installation, especially as part of an interior gut renovation, could result in significant loss of historic materials and integrity.[2] The American preservation profession of the 1970s and early 1980s responded to such energy conservation-driven renovations with practical advice counseling historic building owners to "mak[e] buildings work as they were [historically] intended,"[3] i.e., to use and restore original architectural features that could help achieve heating, cooling, lighting,

and other building comfort goals through non-mechanical or limited energy means. Proper use of double-hung sash windows, preservationists noted as an example, provides natural ventilation and cooling, while historic shutters, porches, and awnings can reduce unwanted indoor summer heat (solar gain). Other preservationists urged owners of old buildings to apply certain energy conservation practices and inexpensive improvements that could be unobtrusive, minimally invasive, or relatively undamaging to historic fabric and features, e.g., properly insulating hot water heaters and attics, weather-stripping window and door openings, and installing winter storm windows.[4] The National Park Service detailed similar technical advice with its 1978 publication of "Preservation Brief 3: Conserving Energy in Historic Buildings."[5]

Significant preservation response to the energy crisis involved the concept of embodied energy. First articulated in 1976 (*Energy Use for Building Construction*) by researchers from the University of Illinois at Urbana-Champaign and from Richard Stein Associates Architects,[6] the embodied energy concept seeks to quantify the energy "invested" within an existing building as measured by the present-day energy needed to construct a replacement structure of the same size and out of the same materials. This embodied energy measurement should be an honest and comprehensive assessment of all components of construction, e.g., extraction and processing of raw resources into construction-ready materials; transit of construction materials to job site; site preparation; energy expended in actual construction. Analyzed through this embodied energy concept, an energy-inefficient (operating) historic building could have an inherent energy "advantage" over a similar but energy-efficient (operating) new construction replacement in that the old building requires no new energy expenditure for construction and its related processes, i.e., the old building already exists. "The fact is that an existing building," explained John Sawhill in a 1981 National Trust for Historic Preservation (NTHP) publication, "represents a certain repository of value [embodied energy]. It took energy, materials, and human labor to put it up."[7] As a preservation argument, embodied energy suggests that building preservation and rehabilitation is inherently an act of energy conservation.

American preservationists of the 1970s and early 1980s attempted to use the embodied energy concept to argue, qualitatively and quantitatively, for historic (existing)

building reuse and rehabilitation as key strategies in "solving" the energy crisis. NTHP, for instance, dedicated its May 11-17, 1980, "Preservation Week" public awareness campaign to "Preservation: Reusing America's Energy." The campaign's logo[8] of a handheld gasoline canister resembling a historic building visually attempted to suggest the qualitative embodied energy positives of preservation compared to new construction. The federal government's Advisory Council on Historic Preservation (ACHP), on the other hand, sought to quantify embodied energy (and thus preservation's energy-saving benefits) through scientific assessment modeling.[9] In one 1979 case study evaluated under embodied energy models, ACHP calculated that it would take "more than one and one-half times the energy" embodied in a New Deal-era government housing project to build a new replacement complex,[10] and that that historic complex would have a "net energy investment advantage over an equivalent new [energy-efficient] complex for more than fifty years."[11]

Energy conservation and efficiency issues declined in American public and political importance in the early 1980s as oil costs stabilized and then declined.[12] By the mid-to-late 1980s, however, an increasing recognition of how human industrial activities, including construction and operation of buildings, contributed to environmental degradation helped to reawaken interest in energy-efficient architecture. Of course, postwar environmental consciousness and institutional responses predated the 1980s, peaking particularly during the early 1970s, with (e.g.) the first U.S. Earth Day in 1970; Greenpeace's founding in Vancouver, British Columbia, in 1971; the Club of Rome's *Limits to Growth* report advocating "zero growth" in 1972; and the enactment of several American environmental laws, including the Endangered Species Act of 1973.[13] But by 1987, the intensity, scale, and implications of global environmental degradation – natural resource depletion, water pollution, land erosion and desertification, destruction of ecological habitat, loss of biodiversity, damage to the ozone layer, world climate change – achieved unprecedented worldwide acknowledgment with the publication of *Our Common Future* by the United Nations World Commission on Environment and Development.[14] Perhaps *Our Common Future*'s greatest influence was its prescription for human development through "sustainable development," famously defined as

"meet[ing] the needs of the present without compromising the ability of future generations to meet their own needs."[15]

The sustainable development moral framework and approach to human activity implied an expansion in architectural thinking and experimentation, bringing issues of land, water, natural resources, and ecological habitat protection into consideration along with earlier concerns for energy efficiency.[16] This synthesis (which variously would be called sustainable/green design, sustainable/green architecture, sustainable/green construction, and, of course, sustainable/green building) also incorporated a new emphasis on maximizing buildings' indoor air quality to improve the health of the human occupants. Gradually recognized and conceptualized in the mid-1980s (especially through the efforts of the William McDonough + Partners architectural firm) "building related illness" (BRI) and "sick building syndrome" (SBS)[17] articulate the detrimental effects of modern architecture on human health from inadequate air exchanges as well as from harmful volatile organic compounds (VOCs) and other toxic chemical vapors "off-gassed" from modern construction materials, coatings, adhesives, and finishes.[18] Ironically, SBS and BRI can often be traced to architectural responses to the energy crisis, i.e., to a design emphasis on the super-sealed thermal envelope and to energy savings from reductions in mechanical air exchanges. Such design strategies can result in high indoor concentrations of both carbon dioxide and VOCs, with consequent negative implications for building occupant productivity, comfort, and health.[19]

In the United States, among the first buildings holistically addressing these energy, environmental, and human health concerns, i.e., some of the earliest self-consciously conceptualized, described, and designed American examples of modern green architecture,[20] were constructed in the mid-to-late 1980s for the New York City offices of three national environmental nonprofit organizations: the Environmental Defense Fund headquarters, completed in 1985 by William McDonough + Partners; the Natural Resources Defense Council headquarters, completed in 1989 by Croxton Collaborative Architects; and the National Audubon Society's Audubon House headquarters, completed in 1992 by Croxton Collaborative Architects.[21] In contrast to the merely energy-efficient experimental architecture of the 1970s, these three nonprofit projects incorporated new design ideas for increased ventilation, avoidance of chemical

off-gassing, and consideration of construction impacts to the environment at "upstream" (construction materials extraction, processing, manufacturing, and transit) and "downstream" (materials disposal, hazards, recyclable potential, and effects on human health) timeframes. There was also a conscious effort to make these early projects conventional in appearance and aesthetically pleasing, so as to help reverse popular opinion of energy-efficient and environmentally-friendly design "as a marginal countercultural pursuit, associated with the most inurbane and unrefined of construction."[22]

While the first two projects involved either completely new construction (Environmental Defense Fund) or dramatically new interior construction within a leased portion of an existing structure (Natural Resources Defense Council),[23] the third involved the green rehabilitation of an entire historic (existing) building. That third project, the National Audubon Society's Audubon House, also generated one the earliest English-language texts addressing the sustainable rehabilitation of a historic building. Authored by several individuals from the National Audubon Society and Croxton Collaborative Architects, *Audubon House: Building the Environmentally Responsible, Energy-Efficient Office* (New York: John Wiley & Sons, Inc., 1994) details the motivations, techniques, and design outcomes of the pioneering Audubon House rehabilitation project in an extended, book-length case study style. It is infused throughout with a strong, yet intellectually honest, green evangelical undercurrent, stressing the relative affordability of the "environmentally responsible, energy-efficient office" to the skeptical commercial architect, corporate developer, and public. Only limited portions of the text, however, address historic preservation issues, and most of that discussion is focused on the embodied energy advantage of reusing an existing structure.

Similar to *Audubon House*, the anthology *Rebuilt Green: The Natural Capital Center and the Transformative Power of Building* (Portland, Oregon: Ecotrust, 2003) adopts the extended case study style to tell the story of a sustainable historic building rehabilitation led by its authors. *Rebuilt Green* is an in-depth, yet highly readable and accessible text that excellently lays out broad sustainable architecture principles, the rehabilitation program's objectives, and the project's specific green strategies and implementation. In contrast to *Audubon House*, *Rebuilt Green* also includes a good,

chapter-length discussion of historic rehabilitation issues and relationship to the project's ultimate design approach.

A review of sustainable rehabilitation literature suggests that this case study approach dominates the limited genre. There is also an apparent tendency for those writing in this field to be advocates for and even practitioners of green rehabilitation and design. For example, some (primary source) texts are like *Audubon House* and *Rebuilt Green* in that their authors are direct participants in, and presumably natural proponents of, the projects they describe. The U.S. Environmental Protection Agency's *Leading By Example: Two Case Studies How The Environmental Protection Agency Incorporated Environmental Features into New Buildings* (Washington, D.C.: U.S. Environmental Protection Agency, December 1997) and Maggie McInnis and Ilene R. Tyler's journal article "The Greening of the Samuel T. Dana Building: A Classroom and Laboratory for Sustainable Design" (*APT Bulletin* 36 (2005): 39-45) are good examples of this tendency.

Other case studies are more secondary source observations and critical analysis. Elizabeth Johnson and Rachel S. Cox, for example, focus on the development process for a greened historic buildings complex at the Presidio of San Francisco in their informational booklet "The Thoreau Center for Sustainability: A Model Public-Private Partnership" (Washington, D.C.: National Trust for Historic Preservation, 1997). Anglea Thompson's Master of Architecture thesis "Green Preservation: Rehabilitating Buildings" (M.Arch. thesis, University of Wisconsin-Milwaukee, May 1996), one of the earliest of the handful of American academic theses to address sustainable rehabilitation, uses the case study approach to compare and contrast the Audubon House sustainable renovation with a conventional tax credit-seeking (RITC) historic rehabilitation project.

While the case study tendency in the literature frequently provides ample details of an individual project's green features and design challenges, this approach nonetheless threatens to leave missing a description of the larger contexts of continuity and change occurring in the field. That is, how have sustainable rehabilitation projects changed over time? Are there changes in technology? Are there changes in the design process? Are there changes related to public policy? What factors are contributing to changes? Are there recognizable trends? And, as is perhaps most germane to historic preservationists concerned about the challenges posed by the sustainable design movement, has the

empirical long-term relationship between sustainable design and historic preservation proven fundamentally conflictive or collaborative? These "historical" (change over time) questions remain largely unanswered or only marginally addressed in the available sustainable rehabilitation literature. Even a chronological survey or history of American sustainable rehabilitation remains fleeting, though both *Building Design & Construction* magazine's "White Paper on Sustainability" (November 2003) and David Gissen's *Big and Green: Toward Sustainable Architecture in the Twenty-First Century* (New York: Princeton Architectural Press, 2002) offer good narrative timelines of the broader U.S. green building movement and its significant projects and events.

In light of these limitations and gaps in the literature, the intent of this research project is, then, to investigate American sustainable rehabilitation practice from 1989 to 2005 (i.e., from its earliest period to just before the time of writing) in an effort: (1) to examine significant process, design, and preservation aspects of pioneering and representational American institutional sustainable rehabilitation projects; (2) to categorize those projects into "historical" periods based on timeframe and theme; (3) to identify significant themes of change over time, emerging trends, and, as possible, the mechanisms driving this change; and (4) to assess what the discussed projects imply and offer in answering whether good preservation and good sustainable design can be practiced collaboratively or whether those goals must be mutually exclusive and in conflict.

Research efforts for this document were focused on projects in which academic, government, and nonprofit institutions, as units of analysis, were the primary actors, as these three sectors have been the early leaders in pioneering, popularizing, and providing the market demand and necessary organizational framework for the American green building field.[24] The research strategy followed here involved a conventional survey and investigation of primary and secondary source materials (e.g., published scholarly literature, popular press articles, brochures and newsletters, websites and other electronic resources, photographs, unpublished archival and project documents) combined with interview communications by telephone, email, and in person with a number of green projects participants. These oral histories helped shed light on some of the conflicts, compromises, and decision-making that occurred while projects were being

conceptualized, designed, and constructed. These particular project aspects are undoubtedly important to a history of American sustainable rehabilitation, but are often difficult to identify because they are frequently unwritten, are in limited or cryptic note form, are kept confidential between architect and client, or are forgotten once a project is complete. The research presented here is also significantly informed by: the author's summer 2005 National Council for Preservation Education (NCPE) internship at the U.S. General Services Administration's Center for Historic Buildings and related exposure to sustainable design projects, policy, and issues at the federal level; a compensated green preservation research project completed by the author in May 2006 for Shelburne Farms, a Shelburne, Vermont, nonprofit environmental organization;[25] and firsthand site visits the author made to sixteen new and rehabilitated green buildings in the New England, Great Lakes, and metropolitan Washington, D.C., regions between March 2005 and March 2007.[26]

The findings presented here broadly suggest that American institutional sustainable rehabilitation can, at the time of writing, be divided into four periods delineated thematically and chronologically (with some time overlap). Chapter One uses a case study approach to investigate three high-profile national projects from the pioneering phase (1989-2002) of American sustainable design and rehabilitation. Chapter Two examines three projects from the next period, which, though it is delineated chronologically (1996-2003), is also characterized thematically by projects receiving less attention and national visibility (as compared to earlier national pioneers). These "local demonstration projects" were also undertaken before or without significant reference to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. Chapter Three addresses the beginnings of LEED-rated green construction (1998-2003) and its role in transforming American sustainable architecture and rehabilitation. Chapter Four explores more recent (2002-2005) American institutional sustainable rehabilitation practice and identifies an emerging trend in which sustainable rehabilitation projects, which were largely completed as "leading by example" and "practice what we preach" models for environmental mission actors in the 1990s, are increasingly executed under green building policies and for purposes not directly environmental in mission or motivation. Finally, Chapter Five argues that this

document's findings empirically suggest that a supposedly mutually exclusive and intrinsic choice between preservation and sustainable design goals is a false choice, or at least need not be true.

The document offered here is, in short, primarily a history of a particular aspect of the recent past. As with any work addressing historical trends still ongoing and evolving at the time of analysis and writing, it must necessarily suffer from what historian Eric Hobsbawm has described as a limited perspective focused on "relatively short-term movements of the historical weather, as experienced by those who live through them."[27] The historian working at greater temporal remove from his subject is, in other words, afforded the longer view, which provides a better opportunity to understand how the mundane fits into broader themes and trends of society. With this in mind, it is this author's hope that this document offers an effective thematic-chronological categorization scheme for understanding the initial history of American sustainable rehabilitation as well as highlights empirical project examples and strategies useful for achieving collaborative convergence between sustainable design and historic preservation.

Chapter One: National Pioneers, 1989-2002

Environmental degradation with international cause and scope – damage to the ozone layer, pollution of the global commons of the air and oceans, and world climate change – came to be recognized by international elites, non-governmental organizations, and, increasingly, the public at large by the mid-1980s and early 1990s. Internationally, the United Nations World Commission on Environment and Development report of 1987 led to the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, in 1992.[28] Attended by some 170 governments and 2,400 non-governmental organizations, this global conference culminated in the adoption of *Agenda 21*, a "wide-ranging blueprint for action to achieve sustainable development worldwide,"[29] addressing concepts and methods for improving worldwide qualify of life, for using natural resources efficiently, for protecting global commons, and for managing human settlements, waste, chemicals, and economic growth in a sustainable manner.[30] A follow-up conference in Kyoto, Japan, in 1997 produced the Kyoto Protocol, which bound states to reductions in greenhouse gas emissions that contribute to global climate change.[31]

In the United States, the 1993 inauguration of President Bill Clinton signaled a revived federal emphasis on environmental objectives in government. On Earth Day 1993, the Clinton Administration announced a "Greening the White House" initiative, with the aim of reducing water and energy consumption by up to fifty percent at the historic presidential complex.[32] That same year, Clinton issued a number of environmental executive orders (EO), including EO 12843 minimizing federal purchases of ozone-depleting products, EO 12852 establishing the President's Council on Sustainable Development, and EO 12873 incorporating recycling and waste reduction programs into government operations.[33] Other Clinton Administration environmental orders followed in subsequent years, including, among others, EO 12902 ("Energy Efficiency and Water Conservation at Federal Facilities") in 1994, EO 13101 ("Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition") in 1998, EO 13123 ("Greening the Government Through Efficient Energy Management") in

1999, and EO 13148 ("Greening the Government Through Leadership in Environmental Management") in 2000.[34]

These executive orders and other policy decisions led to gradual institutional implementation of environmental standards, programs, and thinking in the federal government bureaucracy. In 1994, for example, the National Park Service's Denver Service Center issued *Guiding Principles of Sustainable Design*, a document intended "to provide a basis for achieving sustainability in [National Park Service] facility planning and design, emphasize the importance of biodiversity, and encourage responsible decisions."[35] From a preservation perspective, this early document is notable for its consideration of sustainable design impacts on historic resources. The *Guiding Principles of Sustainable Design* would be referenced in the Thoreau Center for Sustainability rehabilitation project at the Presidio of San Francisco, as discussed below.

Nonprofit organizations also played significant early roles in advancing the American green building movement. In 1992, for example, the American Institute of Architects (AIA) Committee on the Environment (COTE) began compiling the *Environmental Resource Guide*, the first American guide to building products measured according to life-cycle assessment or analysis (LCA), i.e., an objective assessment of a product's comprehensive environmental impacts throughout its normal long-term "lifetime." In June 1993, at the World Congress of Architects convention, in what has been recognized as "a turning point in the history of the green building movement," AIA and the International Union of Architects addressed the central convention theme of sustainability in architecture. That same year, the U.S. Green Building Council incorporated as a Washington, D.C., nonprofit organization, with its initial objective the creation of a sustainable building rating system – which it would achieve in 2000 with its public release of the Leadership in Energy and Environmental Design (LEED) program.[36]

Among the earliest examples of American green buildings[37] were constructed within this late 1980s and early 1990s context of gradual change in institutional attitudes, policies, and thinking about environmental protection. These early American green buildings were pioneered by nonprofit environmental organizations and the U.S. federal government. Moreover, the more prominent of these pioneering examples of sustainable architecture involved rehabilitations of historic buildings – an often explicit recognition

that reusing an existing structure is a very green practice. Three of the U.S.'s earliest and most nationally influential modern green rehabilitations are described below: the National Audubon Society's Audubon House project; the U.S. Environmental Protection Agency's Federal Triangle national headquarters; and the Thoreau Center for Sustainability at the "institutionally green" Presidio of San Francisco.

Audubon House

Founded in 1905, the National Audubon Society (NAS) is one of the oldest wildlife and environmental advocacy nonprofit organizations in the United States. NAS has perhaps pursued a more moderate educational and scientific approach to wildlife and habitat conservation than the public policy lobbying and advocacy agendas of the Sierra Club, the Natural Resources Defense Council, and other national environmental organizations. Despite significant successes in the 1960s and 1970s (notably including helping pass a ban on DDT insecticide use in the United States) and major advocacy campaigns in 1980s (e.g., against oil drilling in the Arctic National Wildlife Refuge, against degradation of the Platte River from dams and irrigation drain-off, and for protection of wetlands nationwide), NAS in the late 1980s was perhaps better known for its annual Christmas Bird Count and for sponsoring outdoor recreational-educational activities than as a comprehensive nonprofit environmental leader.[38] The organization's 1991-1992 green rehabilitation of the century-old Schermerhorn Building perhaps changed that impression for many, as it put NAS at the forefront of the American green building movement.

NAS's national headquarters in the mid-1980s was in leased office space at 950 Third Avenue, a thirty-story modern glass skyscraper, in Manhattan.[39] Staff often complained about the building's poor heating and cooling, its inadequate ventilation, and about seemingly building-related human discomforts like headaches, fatigue, and respiratory problems, i.e., complaints by modern building occupants that are known by the catchall phrase "sick building syndrome" (SBS). In the late 1980s, these SBS complaints as well as concerns about the negative environmental impact of their office operation and ever increasing rental costs led NAS leadership to begin looking for a new headquarters site. The search was limited to New York City as that location was seen as

preferable for the organization's publishing and fundraising activities as well as to avoid the potentially massive staff turnover that moving to another city might entail.[40]

Beyond cost considerations, NAS's key goal in the selection of a new headquarters was to incorporate environmentally-friendly innovations into office construction and operation. Environmental goals outlined included enhanced energy conservation and efficiency for building operation, improved indoor air quality, and minimization of environmental impacts, direct and indirect, from materials selected for office construction and operation. NAS's leadership also wanted their green building to demonstrate the competitive financial viability of sustainable design vis-à-vis conventional modern architecture. The motivation for that final goal came from both internal institutional imperatives for strict stewardship over organizational finances and also from a mission-based strategy advocating for sustainable design as practical and financially viable architecture and thus suitable for the mainstream market.[41] In the words of NAS president Peter A. A. Berle, the project was "not only a chance to put four walls around [NAS] but [also] to demonstrate, on a cost-effective basis, that you could cut energy consumption in a commercial building to half the existing norm."[42]

In 1989, NAS purchased the Schermerhorn Building (1891), located at 700 Broadway in Manhattan's NoHo neighborhood, for $10 million.[43] The eight-story, Romanesque Revival style commercial structure constructed in multihued glazed masonry, carved stone, and terra cotta was designed for the Schermerhorn family, an old New York merchant dynasty, by George B. Post. (Post was responsible for several significant works of architecture, including the Equitable Life Assurance Society building (1868-1870) in New York City, the Manufactures and Liberal Arts Building (1892-1893) at the World's Columbian Exposition in Chicago, the New York Stock Exchange (1901-1903), and the Wisconsin State Capitol (1906-1917).) Around the time of the Schermerhorn Building's 1891 construction, neighboring eight- and ten-story commercial structures in Neoclassical, Romanesque Revival, and other newly fashionable, exuberant Victorian-era styles were replacing the luxury residences that had been built along that uptown Broadway corridor in the 1830s and 1840s.[44] The Schermerhorn Building and its similarly stylish neighbors made up one of Manhattan's major late nineteenth century retail shopping and wholesale dry goods centers, and were part of the post-Civil War

uptown movement of fashionable commerce.[45] Several of these neighboring late nineteenth and early twentieth century commercial structures were designed by regionally and nationally prominent architectural firms, including: McKim, Mead, and White; D.H. Burnham; and De Lemos and Cordes.[46] Into the twentieth century, the district gradually turned more industrial with overcrowded garment-making workshops; illegal sweatshops, for instance, reportedly once occupied the Schermerhorn Building's upper-floors.[47] By the time of the NAS purchase in 1989, however, the Schermerhorn Building had been vacant, except for street-level retail tenants, for more than ten years.[48]

NAS selected Croxton Collaborative Architects to lead the Schermerhorn Building sustainable rehabilitation. A year earlier, Croxton Collaborative had incorporated green features into interior renovations of the Natural Resources Defense Council's three-floor leased office space in lower Manhattan. That project incorporated daylighting strategies, energy-efficient light fixtures coupled with occupancy sensors, low-toxic construction materials, and insulating windows designed to decrease summer heat gain.[49] Lessons from the Natural Resources Defense Council renovation were applied to the NAS project, including a design mindset, known as "integrated design," thought to be crucial in achieving successful sustainable design results.[50] Perhaps coined as a phrase by Croxton Collaborative, integrated design describes a design process that reverses the isolated specialist reductionism that is seen as characterizing conventional modern construction. That is, an integrated design process brings together, as applicable, the building owner, building maintenance, representative building occupants and users, the project architect, the project interior designer, the project landscape architect, the project engineer, the project builder / general contractor, project subcontractors, and various other key professional specialists and stakeholders to reach collaboratively a design scheme that solves problems and achieves sustainability outcomes for the whole building, not just for individual systems and components. An emphasis on integrated design recognizes that individual specialists acting independently and with reference only to professional rules of thumb and standards can unwittingly undermine whole-building sustainable goals.[51]

NAS and Croxton Collaborative decided at the outset to preserve the Schermerhorn Building's historic exterior façades as they generally were at the time of

purchase, i.e., not restore the structure to a selected historic period appearance.[52] According to one account, the architect consciously retained the building's external "marks of age" not only out of a reluctance to spend energy and funds to remove them, but also out of an "unwilling[ness] to rub out the history [that those] marks represent."[53] Changes to the building's exterior that were contrary to orthodox American preservation practice included installing heat-reflective, insulating (R-4) replacement windows, making grade changes to reconfigure the entrance lobby for wheelchair accessibility, and the addition of a new rooftop conference center that was, however, recessed back from the building's historic cornice parapet.[54] New York City code also required that the project team replace the old vaulting beneath the sidewalks to ensure that fire trucks could safely drive and park on the sidewalks in emergency situations.[55] In contrast to these preservation-insensitive changes, historic exterior architectural features, including decorative windows pilasters, arches, and cornice-level, gargoyle-like, face caricatures, were conserved.[56] (The New York-based firm Building Conservation Associates was retained as the project's historic preservation consultant.)[57]

Unlike the exterior, the interior was completely renovated and reconfigured to meet the project's sustainable goals. In fact, the interior was gutted for the insertion of completely new construction, e.g., modern stairwells, an open-floor plan for most office space, and a few enclosed private offices along the building's western and northern perimeter.[58] As part of the project's environmental impact reduction goals, significant quantities of waste iron, tin, steel, wood, concrete, and masonry from the demolition were recycled.[59]

Audubon House was dedicated December 3, 1992.[60] The $24 million project ($10 million for building acquisition, $12 million in rehabilitation costs) came from a variety of foundation, corporate, and individual sources including the Kresge Foundation, the Gas Research Institute, the Clark Foundation, the Vincent Astor Foundation, the Glidden Company, the Merrill Lynch & Company Foundation, the J.P. Morgan Foundation, and the New York Times Foundation as well as from tax-free bonds issued through the New York City Industrial Development Agency.[61] The basic renovation cost for Audubon House ($122 per square foot) was comparable to similarly-sized conventional construction in the early 1990s New York City market ($120-$128 per square foot).[62]

Figure 1.1: The historic Schermerhorn Building in New York reopened in 1992 as Audubon House, the greened national headquarters of the National Audubon Society. View looking north. Fall 2007. Photograph by Douglas Royalty. Used with permission.

Figure 1.2: Historic exterior architectural details above the main entrance to Audubon House (700 Broadway). Fall 2007. Photography by Douglas Royalty. Used with permission.

Upon opening, NAS occupied the Audubon House's top five floors; two lower stories were reserved for other nonprofit tenants and the street-level floor was leased as retail space.[63] (NAS administrators originally had wanted to avoid becoming landlords, but their failure to find a smaller building that would meet their needs meant that they had to become such.)[64]

After rehabilitation, Audubon House used over sixty percent less energy than an equivalent sized, minimally code compliant (early 1990s) New York City building, resulting in some $100,000 in estimated operating cost savings.[65] These energy savings came from a tightened thermal envelope (Air-Krete insulation on the masonry interior walls and Heat-Mirror replacement windows) and reduction in electric lighting demand through daylighting strategies, including a (mostly) open-floor plan, transom-like interior windows to "share" daylight, and the use of focused task lighting instead of extensive background light.[66] Energy-efficient artificial lighting fixtures and layout, occupancy sensors, and an efficient natural gas-fired chiller heating / cooling system were also intended to help minimize energy demand and reduce emission of air pollutants (especially nitric oxide, carbon monoxide, and carbon dioxide).[67]

Audubon House's enhanced indoor air quality and reduction of negative environmental impacts from construction and operation distinguished it as green architecture, in contrast to the highly energy-efficient model buildings and experimentation of the earlier energy crisis period. The building's indoor air quality was maintained at high levels (to reduce SBS and other human health harms) through the selection of low-to-no off-gassing paints, carpeting, furniture, and other finish materials, a rooftop fresh-air intake to avoid street-level automobile exhaust and other pollutants, greater air changes than were conventional at that time, and the option of natural ventilation from operable windows.[68] Before construction, NAS's in-house scientific staff, in what transcended the normal client-architect/builder relationship, thoroughly researched project materials to determine their environmental impacts "upstream" (extraction, processing, manufacturing) and "downstream" (recycle potential, disposal hazards, durability). Project materials were then selected based on least environmental impact, with recycled content materials preferable.[69] Demolition waste was also recycled

whenever possible, and full-building, vertical recycling "chutes" were installed throughout the building to make recycling easier for Audubon House occupants.[70]

Rehabilitation, as defined in the *U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties*, is preferred preservation practice in the United States for historic structure reuse. The concept involves preservation of significant existing historic architectural features while allowing for changes to the building to meet new uses.[71] From this preservation perspective, the Audubon House project can be called a measured success. The project can be said to have met a number of rehabilitation standards, e.g., building reuse (office and street-level retail) compatible with its historic commercial use (Standard One), conservation and retention of historic exterior façades and features, including window openings, though not windows (Standards Two and Six), and recessing the clearly new rooftop addition back from the cornice and the sightline of the street-level observer (Standards Nine and Ten).

NAS also directly cited the embodied energy concept – that is, the inherent energy value of reusing an existing building over new construction – in justifying its decision to purchase and rehabilitate the Schermerhorn Building.[72] Since the 1970s, preservationists have accused green architecture practitioners of discounting and even ignoring the embodied energy of existing building in environmental impact calculations. NAS told a different story: "[s]imply by 'recycling' an existing building, Audubon saved 360 tons of steel, 9,000 tons of masonry, and 560 tons of concrete – not to mention a building of great character and historical significance."[73]

Although the Victorian Society in America (a national nonprofit dedicated to education and preservation of "nineteenth century heritage") gave NAS a 1993 Preservation Award for its "outstanding exterior restoration and environmentally innovative interior remodeling" of Audubon House,[74] there can be no doubt that the project's radical interior renovations caused clear preservation losses. Croxton Collaborative's architect-founder (Randolph Croxton) and interior design director (Kirsten Childs) both freely admit that they and NAS made design decisions that would not have passed municipal preservation review, e.g., window replacement and reconfiguring the lobby entrance for wheelchair accessibility.[75] (In 1989, the Schermerhorn Building was under no municipal, state, or federal historic designation or

protection. The renovated building was incorporated as a contributing structure into the municipal NoHo Historic District in June 1999.)

Perhaps, a better legacy and understanding of the project is that of a benchmark and an influential, positive early example of how sustainable design can be integrated into a historic building in a relatively preservation-sensitive manner. The project's legacy and example have reached not only those who have taken building tours, but also readers of *Audubon House: Building the Environmentally-Responsible, Energy-Efficient Office* (New York: John Wiley & Sons, Inc., 1994), a book on the project co-authored by NAS and Croxton Collaborative. For instance, decision-makers involved in Denison University's 1997-1998 sustainable rehabilitation of that institution's historic Barney Memorial Hall specifically referenced the green approaches and choices described in *Audubon House* when designing their project.[76] *Audubon House*, despite being about sustainable design technology and techniques that, at time of this document's writing, are hardly revolutionary, is still perhaps the most accessible, widely available, non-technical book on green preservation – and as a result serves to extend the Audubon House project's influence long past its opening in the early 1990s.

(Project addendum: NAS sold its Audubon House headquarters building in December 2006 to Lincoln Property Company, a Dallas-based real estate developer, for $53 million. NAS cited decreases in its New York City-based staff and the potential for significant return on its real estate investment as reasons for the sale. NAS plans to lease space in New York City for its future national headquarters. Before the sale, Audubon House operated as a de facto multi-tenant nonprofit center, with most of its leased space occupied by nonprofit organizations. Most of these organizations are reportedly not expected to renew leases (likely much more expensive) in Lincoln Property's renamed "700 Broadway" building.)[77]

EPA National Headquarters

President Richard Nixon's executive order creating the U.S. Environmental Protection Agency (EPA) in 1970 gave the new agency authority over federal environmental regulatory and oversight functions that were previously housed in various other departments and agencies.[78] In subsequent years, the agency gained increased

responsibilities and program scope, including, e.g., implementation of the Superfund (1980) and school asbestos abatement (1986) programs and co-administration of the Energy Star rating system for energy-efficient consumer products (1992).[79]

EPA's initial headquarters at Waterside Mall Towers in Washington, D.C., could not house the expanding agency's national staff, which by the mid-1990s included 6,800 employees spread among ten sites in the federal capital region. Such decentralization resulted in redundancy in support staff and lost time in employee travel between sites.[80] Although EPA internally discussed consolidating national staff at a single central location as early as 1981, it was not until 1988 that the EPA New Headquarters Project task force formed and began serious planning conversations with the U.S. General Services Administration (GSA), the federal agency responsible for managing construction, maintenance, and rental of most non-military government office space.[81] In December 1993, GSA Administrator Roger Johnson announced that EPA's new national headquarters would occupy five buildings in Washington's monumental Federal Triangle, a prestigious and historically significant government location lying prominently between the U.S. Capitol, the White House, the National Mall, and Pennsylvania Avenue.[82]

Four of the buildings designated for EPA's new central headquarters were monumental, Classical Revival style, historic structures from the 1930s. The Ronald Reagan Building and International Trade Center, the fifth building in the new EPA complex, was new construction (1990-1998) that replaced a surface parking lot and was designed in a contemporary classical style compatible with its historic neighbors.[83] The historic U.S. Customs Service (originally the U.S. Department of Labor Building; now known as EPA West), Andrew W. Mellon Auditorium (also known as the Connecting Wing), and Interstate Commerce Commission (now known as EPA East) buildings – a three-structure attached complex constructed between 1931 and 1934 – all front Constitution Avenue, across from the Smithsonian Institution's National Museum of American History. The historic Ariel Rios Federal Building (1931-1934) fronts Pennsylvania Avenue and Twelfth Street N.W., just behind the Interstate Commerce Commission Building and across from the Internal Revenue Service and the Old Post Office Pavilion buildings. Ariel Rios is also above the Federal Triangle Metro station, a major transfer point between Washington's blue and orange subway lines.

Figure 1.3: U.S. Customs Service Building (lower left), Treasury Department Auditorium (center), Interstate Commerce Commission Building (right), and New Post Office Department Building (upper center), as seen from the top of the Washington Monument. Absence of National Museum of American History (lower right) suggests photograph dates before the late 1950s. View looking northeast. Photograph by Theodor Horydczak. Source: Theodor Horydczak Collection, Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: LC-H824-L01-003 <P&P>[P&P]; digital ID: (intermediary roll film) thc 5a47985 http://hdl.loc.gov/loc.pnp/thc.5a47985; card number: thc1995013078/PP.)

Figure 1.4: U.S. Customs Service Building (left), Treasury Department Auditorium (center), and Interstate Commerce Commission Building (right), circa 1940. View looking northeast. Photograph by Theodor Horydczak. Source: Theodor Horydczak Collection, Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: LC-H814-A08-002 <P&P>[P&P]; digital ID: (intermediary roll film) thc 5a37501 http://hdl.loc.gov/loc.pnp/thc.5a37501; card number: thc1995010699/PP.)

These four historic buildings are contributing structures within the larger Pennsylvania Avenue National Historic Site, which was listed as a historic district in the National Register of Historic Places in 1966. Pennsylvania Avenue, the northern edge of the block that includes the EPA headquarters buildings, forms the geographic and symbolic core of the district. National Park Service literature calls this street "America's Ceremonial Way,"[84] as Pennsylvania Avenue, at its most internationally visible moment, hosts the presidential inaugural parade from the Capitol to the White House.

Planning for the Federal Triangle (the seventy-acre triangular district of mostly Classical Revival style, monumental government buildings south of Pennsylvania Avenue, north of the National Mall, and between the White House and the Capitol) began with the Senate Park (or McMillian) Commission and its 1902 report that focused both on reestablishing L'Enfant's 1791 urban design and on improving the federal city's stateliness and grandeur through the introduction of concepts advanced by the City Beautiful movement. "[A] sentiment has developed both among the residents of the District [of Columbia] and also in Congress," read the commission's 1902 report to Congress, "that the area between Pennsylvania [Avenue] and the [National] Mall should be reclaimed from its present uses by locating within that section important public buildings." The buildings then lining Pennsylvania Avenue were, in the opinion of the commission, "entirely unworthy of the conspicuous positions they occupy."[85]

Development of the Federal Triangle as a monumental government district began two decades later with the passage of the Public Buildings Act of 1926, which authorized federal funding for private architects to design government buildings. Design of structures within the new Federal Triangle was supervised by the Board of Architectural Consultants, under direction of U.S. Treasury Secretary Andrew Mellon and Chicago architect Edward Bennett. Mellon and the Board of Architectural Consultants chose a unified, classically-inspired architectural palette for the Federal Triangle, reasoning that the Classical Revival style suitably evoked the power and permanence of the U.S. federal government.[86]

The eight-story, Classical Revival style Ariel Rios Federal Building, originally known as the New Post Office Department Building (1931-1934), was designed by architects William A. Delano and Chester H. Aldrich as national headquarters for the

U.S. Post Office Department, which had outgrown the Old Post Office (1899) just across Twelfth Street. (The building was renamed the Ariel Rios Federal Building in 1985 to memorialize a Bureau of Alcohol, Tobacco, and Firearms agent killed in the line of duty.) The limestone-clad building has an unusual footprint form of two semi-circles back-to-back with two adjoining wings, evoking its intended design as a central element within the Federal Triangle complex. Prominent interior features include twenty-four New Deal-era murals, two seven-story marble circular staircases, and high quality lighting fixtures, woodwork, and flooring.[87]

The Classical Revival style, three-building complex of the Mellon Auditorium, the U.S. Customs Service, and Interstate Commerce Commission buildings was designed under the supervision of San Francisco architect Arthur Brown, Jr., and constructed between 1931 and 1934. The Andrew W. Mellon Auditorium, known as the Treasury Department Auditorium until renamed in 1995 after the former treasury secretary, features a Doric columned portico topped by a pediment with "Columbia," an allegorical patriotic sculpture by Edgar Walter. Inside, the richly decorated, four-story, 2,500-seat auditorium has been host to many public ceremonies, receptions, and events, including the 1949 international signing of the North Atlantic Treaty, which established the North Atlantic Treaty Organization (NATO). The Mellon Auditorium's twin, red terra-cotta tiled wings (the U.S. Customs Service to the west and the Interstate Commerce Commission to the east) repeat the Classical Revival style, Doric motifs of the main block.[88]

By any measure, adaptive reuse of these buildings necessitated a sensitive preservation approach given their prominent location within central Washington's government core, their historic significance within the unified Classical Revival style Federal Triangle ensemble, and their individual architectural merit. GSA, the federal agency owning and managing the rehabilitation, was responsible for ensuring historic preservation was considered in accordance with Sections 106 and 110 of the National Historic Preservation Act of 1966. An author visual survey of the buildings' exteriors in summer 2005, as well as an examination of historic and recent photographs, suggests historic preservation results were excellently met. Historically significant interior spaces were restored, including the complex's library, lobbies, rotunda, the Interstate Commerce

Figure 1.5: The Andrew W. Mellon Auditorium (left) and the former Interstate Commerce Commission Building (right) are both part of the U.S. Environmental Protection Agency's Federal Triangle national headquarters in Washington, D.C. View looking northeast. Summer 2005 Author photograph.

Figure 1.6: Historic exterior architectural details on Ariel Rios Federal Building, part of the U.S. Environmental Protection Agency headquarters complex. Summer 2005. Author photograph.

Figure 1.7: Historic interior photograph of the Treasury Department Auditorium. Circa 1940. Photograph by Theodor Horydczak. Source: Theodor Horydczak Collection, Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: LC-H814-A08-005-A <P&P>[P&P]; digital ID: (intermediary roll film) thc 5a45279 http://hdl.loc.gov/loc.pnp/thc.5a45279; card number: thc1995010701/PP.)

Figure 1.8: Andrew W. Mellon Auditorium interior after rehabilitation. Circa 2007. Courtesy of Event Emissary. Used with permission.

Commissioner's office suite, the Secretary of Labor's office suite in the Customs Building, and the Mellon Auditorium.[89]

While EPA's primary project motivation was the realization of functional, consolidated office space, it also had statutory, executive order, and agency mission-based reasons to minimize adverse environmental impacts, especially energy consumption, at its facilities. For example, Executive Order (EO) 12759, issued by President George H.W. Bush on April 17, 1991, mandated a twenty percent reduction in federal agency energy usage by 2000, while EO 12902, issued by President Bill Clinton on March 8, 1994, added water conservation to those reaffirmed energy efficiency goals.[90] At this same time, EPA was also developing guidance materials to aid federal agencies in purchasing environmentally-friendly products and services, as stipulated by President Clinton's EO 12873 (issued October 20, 1993). EPA's draft version for comments of this document was published in the *Federal Register* on September 29, 1995.[91]

In August 1995, EPA issued a *Green Buildings Vision and Policy Statement* as one approach to help meet such statutory and executive order requirements. The policy set out ten broad green design and operations objectives, including constructing energy-efficient building envelopes, maximizing indoor air quality, minimizing building waste through reuse and recycling, optimizing environmental efficiency and protection through careful site selection, and using renewable energy. The policy's explicit theme was that EPA's progressive role in green buildings could serve as a positive model encouraging the incorporation of sustainable practice in other public and private construction. That is, EPA could "lead by example" through its green construction.[92]

The EPA new headquarters project was a staged process, occurring over eight years (1994-2002).[93] Between 1994 and 1996, EPA staff moved into the south half of the Ariel Rios Federal Building, which GSA had previously rehabilitated conventionally. For the other historic buildings (and the portion of the new Ronald Reagan Building that EPA would occupy), GSA and EPA assembled a joint team to make design decisions, an unusual action departing from the conventional GSA-led building process. Joining the decision-making process were RTKL Associates (the architectural firm GSA hired for the project) and the team of Gruzen Samton, LPP / Croxton Collaborative, selected by EPA

for space planning and design.[94] EPA input influenced, among other sustainable features and choices: materials selection in favor of low off-gassing paint, coatings, carpet, and furniture as well as incorporation of operable windows, all designed to maximize indoor air quality; low-flow plumbing fixtures in faucets and toilets to meet water conservation goals; selection of construction materials with recycled content; and daylighting, task, and other lighting strategies designed to reduce energy demand and consumption.[95]

The EPA headquarters design team faced product purchasing decisions that needed to satisfy sustainable goals. Yet, few manufacturers identified and, more importantly, verified their products according to sustainable criteria, as there was little-to-no green market demand at that time. Project designers from EPA and Gruzen Samton / Croxton Collaborative drew up guidelines to shape GSA product selection choices, including those for paints, carpets, and furniture.[96] For instance, EPA's twenty-page *New Headquarters Project: Environmental Testing Requirements for Furniture* guidelines, issued in 1996, prescribed that furniture selected for the project must off-gas no more than certain amounts. Manufacturers were required to bear the financial cost of independent laboratory testing that would verifying a product's satisfactory performance vis-à-vis these standards.[97]

In December 1997, EPA's Office of Pollution Prevention and Toxics released *Leading by Example: Two Case Studies Documenting How The Environmental Protection Agency Incorporated Environmental Features into New Buildings*, a seventy-page publication summarizing the Federal Triangle headquarters project and work on EPA's Research Triangle Park, a new green research facility in North Carolina. The document outlines the complicated, multi-year rehabilitation process that was at the report's publication date still ongoing. In addition to summarizing the sustainable features incorporated into the Federal Triangle buildings, the document traces the project's history, including a basic description of the various actors involved in the rehabilitation, their roles and perspectives, and the institutional and design challenges that needed to be overcome. Particularly interesting is the document's discussion of "lessons learned" for successful federal sustainable rehabilitation collaboration. These lessons included: early involvement of all parties (EPA, GSA, and the two architectural teams) in project planning; constant teamwork, communication, and cooperation to build trust

between "landlord" (GSA) and "tenant" (EPA); and the institutional willingness to learn and to apply new knowledge in situations and choices where precedent is lacking.[98]

Those Federal Triangle "lessons learned" – that is, the EPA and GSA institutional memories about the challenges, concepts, and design strategies of a sustainable rehabilitation process – are probably even more significant than the superb green preservation project in the Federal Triangle. In keeping with its 1995 *Green Buildings Vision and Policy Statement*, its agency mission, and various federal executive orders and policy, EPA has pursued green construction and operations practices at several of its facilities, with at least eight of those buildings certified or anticipated to receive a Leadership in Energy and Environmental Design (LEED-NC) "Silver" rating or better from the U.S. Green Building Council.[99] Since November 2000, EPA's green construction has been institutionalized as a formal agency program, the Sustainable Facilities Practices Branch within the EPA Office of Administration and Resources Management.[100]

Since the Federal Triangle headquarters project, EPA has undertaken only one other sustainable rehabilitation of a historic building. The John W. McCormack Post Office and U.S. Courthouse in Boston, Massachusetts, is (as of writing) scheduled to house EPA's New England regional office in 2009. Originally constructed 1931-1933 by Cram and Ferguson, the Art Deco style skyscraper's 2005-2008 rehabilitation is planned to incorporate sustainable design features (such as a vegetated roof, water conservation fixtures, and energy-efficient lights with occupancy sensors and daylight-sensing dimmers) along with preservation of the building's historically significant courtrooms, single-pane windows, and granite exterior.[101] As with the Federal Triangle headquarters, GSA is also involved in this EPA project. This time, however, green design has been institutionalized into GSA's bureaucratic framework with a Sustainable Design Program and as a standard requirement for GSA construction and rehabilitation.

Presidio of San Francisco

On December 29, 1988, the federal Defense Base Realignment and Closure Commission (BRAC) recommended to outgoing Secretary of Defense Frank Carlucci the closure of eighty-six domestic military bases and related defense facilities, including the

then 140-year old U.S. Army base at the Presidio of San Francisco. Under the 1988 legislation that had created the bipartisan BRAC, once the defense secretary had accepted the closure list Congress had review power but only to reject the commission's closure recommendations in total. That is, Congress could not choose individual military facilities for closure or continued operation based on congressional district location, constituency, or party affiliation – a past political practice that had hampered defense department base closure attempts. Congress did not reject the list during the specified review period, and outgoing President Ronald Reagan signed the recommendations into law. The historic Presidio of San Francisco military base, designated in 1963 a National Historic Landmark with 510 contributing structures, was scheduled to close between 1991 and 1995.[102]

Military garrisons at the Presidio of San Francisco had guarded the Golden Gate straits entry to San Francisco Bay under three countries, Spain (1776-1820), Mexico (1821-1846), and the United States. Under American control since 1846, the nearly 1,500-acre Presidio continued its role as a frontier military garrison and guardian of San Francisco Bay. Troops mustered at the Presidio for action in the Civil War, the Indian Wars, the Spanish-American War, the Philippine Insurrection, the First and Second World Wars, the Korean War, and the Vietnam War. Presidio troops also played important civil roles in the adjacent city of San Francisco, especially in helping reestablish order following the devastating San Francisco earthquake of 1906.[103]

San Franciscans have had a long history of coveting the Presidio's land for its natural beauty, for its urban recreational potential, and as prime real estate. As early as the 1870s, for example, there were calls from California's U.S. senators, the city's chamber of commerce, and other prominent San Franciscans for the Presidio to be released from federal ownership for conversion into a new park, a residential neighborhood, or a business district.[104] In the early 1930s, the Presidio was cut in half for the public approach road and anchors for the new Golden Gate Bridge.[105] Following the Second World War, calls increased for the U.S. Army to vacate the Presidio. Most proposals were for commercial real estate development, though President Harry Truman also suggested the military base could become the headquarters of the new United Nations.[106] But even those postwar attempts at disposal-and-redevelopment proved to be

dead ends; the army continued to assert the necessity of the Presidio to Cold War national defense. A local citizens group, the Presidio Society, even formed in the late 1950s to support efforts to preserve the historic military presence at the Presidio.[107]

The post-military future of the Presidio was decided in 1972. In that year, Phillip Burton, a U.S. representative from San Francisco, introduced legislation to create Golden Gate National Recreational Area (GGNRA), a new urban national park echoing President Richard Nixon's "Parks to the People, Where the People Are" initiative. The GGNRA legislation, which Congress passed and President Nixon signed in 1972, not only incorporated federal land around San Francisco into the new park, but also stipulated that the Presidio would become part of GGNRA should the defense department ever vacate the military post.[108]

The 1988-1989 BRAC closure decision for the Presidio triggered GGNRA language about the Presidio's incorporation into the park. What followed in the next several years was a complex political odyssey at the local and national (congressional) levels about park economics and differing conceptions of what a park ought to be. The ultimate result was bipartisan congressional approval in October 1996 for the Presidio's incorporation as a park unit of GGNRA. As with the rest of that national recreational area, the National Park Service (NPS) would own the land of the Presidio.[109] Operation of the inland portion of the Presidio park unit after July 1, 1998, however, was left to the Presidio Trust, a newly created government-owned corporation responsible for "leasing, maintenance, rehabilitation, repair and improvement of property within the Presidio."[110] In another twist, Congress mandated that the Presidio Trust must be financially self-sufficient by 2013. Proceeds from leasing Presidio property to public and private tenants was intended to help the trust meet that goal.[111]

During the Presidio's transition period (1989-1994) from military base to park, NPS had developed a management plan, officially described as an amendment to the GGNRA general management plan of 1980, for the new unit. Highlighted in the plan were preservation and adaptive reuse of the base's significant historic buildings as well as an emphasis on integrating themes of environmentalism into the Presidio-as-park. In the words of the 1994 *General Management Plan Amendment*, the Presidio should become a "global center dedicated to addressing the world's most critical environmental, social,

and cultural challenges."[112] Sustainable design and rehabilitation was intended to be an integral part of that vision.[113]

The Thoreau Center for Sustainability was the first major lease project at the new GGNRA Presidio unit. It was also the first sustainable rehabilitation of former base buildings.[114] Completed in March 1996 (phase one) by Tanner Leddy Maytum Stacy Architects,[115] the Thoreau center is a multi-tenant nonprofit center, with its office space leased to local and national environmental, social justice, health, arts, and philanthropic nonprofit organizations. Example tenants include the Wilderness Society, the Alliance for California Traditional Arts, and Grant Makers Without Borders.[116]

The Thoreau center is housed in former historic Letterman General Hospital buildings on the Presidio's northeastern edge. Once home to the U.S. Army's largest and most important military medical operations, the Letterman hospital complex dates to the 1898-1899 Philippine Insurrection against American colonial rule. The Presidio, which then lacked medical facilities beyond a field hospital, hosted significant numbers of troops embarking for and returning from the Philippine Insurrection. Illness weakened many of the soldiers, especially those returning with tropical diseases uncommon in the mainland United States. The U.S. Army General Hospital, formally established at the Presidio on December 1, 1898, was designed to meet these medical needs.[117] (The U.S. Army General Hospital was renamed the Letterman General Hospital in 1911 in memory of Jonathan Letterman, medical officer for the Union's Army of the Potomac during the Civil War.)[118] The multi-building Letterman hospital played key roles in caring for San Franciscans injured in the 1906 earthquake, in treating soldiers wounded in various twentieth century wars and conflicts, and, with the opening of the Letterman Army Institute of Research in 1974, in medical research.[119] As part of the Presidio's BRAC closure, the Letterman hospital reduced operations during the early 1990s, officially closing August 1, 1995.[120]

At its initial opening in March 1996, the Thoreau Center for Sustainability occupied four historic Letterman hospital buildings: the hospital administration building (Building 1016) and three wards (Buildings 1012, 1013, and 1014). A second rehabilitation phase, completed by November 1997, added eight more additional historic Letterman buildings to the Thoreau center complex (Buildings 1000, 1001, 1002, 1003,

1004, 1007, 1008, and 1009).[121] Building 1016, designed by local architect W.J. Wilcox and constructed in 1899 as the original Letterman hospital building, is a three-story, wooden structure, executed in an eclectic local military style with early Craftsmen, Mediterranean, and Mission Revival influences.[122] Buildings 1016 and 1007 (constructed in 1901) are the only structures remaining from the original Letterman hospital quadrangle; the other original buildings were either replaced in the 1920s and 1930s or demolished in the 1970s.[123] Buildings 1000, 1001, 1002, and 1004 are two-and-one-half story, Colonial Revival style, wood-frame houses, constructed circa 1908 as residential quarters for Letterman's medical officers.[124] The remaining Thoreau center buildings were constructed in the 1920s and 1930s as Mission Revival style-influenced, reinforced-concrete hospital wards (Building 1014 from 1924, Building 1009 from 1930, Buildings 1008 and 1012 from 1931, and Building 1013 from 1933) that replaced earlier Letterman structures.[125] The Thoreau center's buildings exhibit historic significance and integrity as an ensemble, reflecting the military hospital's spatial planning, ideas about medicine, and regional and military architectural styles from the first half of the twentieth century.

The Letterman hospital buildings housing the Thoreau Center for Sustainability are leased from the Presidio Trust by Thoreau Center Partners, L.P., a for-profit partnership created specifically for the project by the nonprofit Tides Foundation and Equity Community Builders, a for-profit real estate development firm.[126] Unlike a nonprofit actor, the for-profit Thoreau Center Partners, L.P., could arrange project funding from private corporate investment and was also able to take the Rehabilitation Investment Tax Credit (RITC), a federal tax credit worth twenty percent of qualifying costs incurred in rehabilitating a National Register of Historic Places-listed property provided that the rehabbed structure be used for income producing activities (in this case, leasing office space). According to a project assessment by preservation professional Elizabeth Johnson and writer Rachel S. Cox, the $1.05 million RITC was a critical factor in the financing of the Thoreau center's initial $5.5 million (phase one) rehabilitation.[127]

Sustainable design was a key goal in the Thoreau center rehabilitation, with the project team referencing the NPS *Guiding Principles of Sustainable Design* as a conceptual framework. Rehabilitation demolition waste was recycled whenever possible, e.g., seventy-three percent of demolition waste was recycled in the phase one project.

Figure 1.9: Center portion of a panoramic photograph showing the Letterman General Hospital, on the grounds of the Presidio of San Francisco, in 1920. View looking north. Photograph by James David Givens. Source: Panoramic Photographs, Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: PAN US MILITARY - Camps no. 85 (E size) [P&P]; digital ID: (digital file from intermediary roll film copy) pan 6a30594 http://hdl.loc.gov/loc.pnp/pan.6a30594; card number: 2007664172.)

Figure 1.10: The former Letterman Hospital's Building 1016 after being rehabilitated as part of the Thoreau Center for Sustainability complex. View looking northeast. Circa 1996. Photograph by Richard Barnes. Courtesy of Leddy Maytum Stacy Architects. Used with permission.

Figure 1.11: Circa 1901 photograph of hospital ward at U.S. Army General Hospital, Presidio of San Francisco. (The U.S. Army General Hospital was renamed the Letterman General Hospital in 1911.) Courtesy of Thoreau Center for Sustainability. Used with permission.

Figure 1.12: A corridor in the rehabilitated Thoreau Center for Sustainability's Building 1013, a former Letterman Hospital ward. Circa 1996. Photograph by Richard Barnes. Courtesy of Leddy Maytum Stacy Architects. Used with permission.

Emphasis was placed on selecting, whenever possible, construction materials that were composed of recycled products or manufactured from sustainably harvested, renewable natural materials. For example, natural (non-vinyl) linoleum was used for flooring, counters, and desktops, newly added building insulation was composed of recycled newsprint (cellulose) and recycled cotton fabrics, and certified sustainably harvested wood was installed throughout the complex. Adhesives, paints, and finishes were selected for their low VOC off-gassing toxicity, while retention of the existing operable windows allows for natural ventilation. Historic and modern daylighting strategies, energy-efficient fluorescent lights, and motion sensor controlled corridor lights help reduce operational electrical demand, as does a demonstration photovoltaic solar array above the entry to Building 1006. Other operational sustainable features include: an electric car parking / recharging station; storage, showers, and changing rooms for building occupants who bicycle to work; and efficient boilers for building heat.[128]

Historic preservation goals were superbly met in the Thoreau Center for Sustainability project.[129] Adherence to the *Secretary's Standards for the Rehabilitation of Historic Properties*, with NPS pre- and post- project preservation technical review, was required for RITC approval. NPS played a significantly larger preservation review and regulatory role in the Letterman General Hospital / Thoreau center rehabilitation than in other RITC projects, as the buildings were (are) NPS-owned components of GGNRA and because Section 106, Section 110, and other preservation statues were applicable. Comparison of historic and post-project photographs also suggests that preservation goals were met. The Thoreau Center for Sustainability received honor awards from the National Trust for Historic Preservation in 1996 and the California Preservation Foundation in 1997.[130] The project also received considerable acclaim from the sustainable architecture community, including a "National Top Ten Green Project" award from the American Institute of Architects in 1998.[131]

The socially-oriented, environmental commitment of the original NPS Presidio management plan (an institutional environmentalism that envisioned private sustainable rehabilitation projects like the Thoreau center) has changed in the Presidio Trust's subsequent (2002) management plan. Developed by the Presidio Trust, the 2002 management plan places greater emphasis on the trust's need to achieve the financial

self-sufficiency mandated by Congress. In practice, this revised policy direction entails leasing the Presidio's building stock and land to a more diverse selection of tenants. The most prominent new tenant is Lucasfilm's Letterman Digital Arts Center (2005), a twenty-three-acre corporate campus constructed on the site of the demolished Letterman Army Medical Center (1968).[132] (The Letterman Digital Arts Centers is directly east of the Thoreau center complex.)

Some critics have bemoaned the Presidio Trust's new business-oriented leasing strategies, fearing that the Presidio is turning more into a high-end real estate development than the idealistic 1994 vision of the Presidio as a global center for culture, society, and environmental sustainability. But sustainable design and rehabilitation continues at the Presidio. Although new construction, the Letterman Digital Arts Center was designed to achieve a prestigious "Gold" rating under the U.S. Green Building Council's LEED-NC green building rating system. Presidio historic buildings also continue to be green rehabilitated, including the Presidio Fire Station (1917), Building 603 / Crissy Field Center (1939), and the Warming Hut (1909) visitor center-café-bookstore.[133]

The Presidio Trust and NPS have also produced significant planning and guidance documents aimed at collaboratively integrating preservation and sustainable design. In 1995, for example, NPS convened a "Greening of Presidio Charrette," assembling 125 stakeholders and interested parties to explore sustainability at the Presidio.[134] That same year, NPS issued *Guidelines for Rehabilitating Buildings at the Presidio of San Francisco*. Although the document focuses mostly on describing rehabilitative strategies that accord with professional NPS preservation standards, there are some connections made with sustainable design. For example, the document cautions about the negative environmental impacts from chemical strippers used for refurbishing historic architectural metals and wood, stresses the energy-saving attributes of historic architectural features like porches, transom windows, and shutters, advocates for sustainable design strategies like native plant landscaping and daylighting, and discusses embodied energy, thermal mass, and life-cycle analysis for the selection of new materials.[135] On the whole, however, the preservation connection with sustainability is

tangential to what is mostly a document guiding rehabilitation to meet the *Secretary's Standards*.

Significantly greater connection between preservation and sustainability has been made in the Presidio Trust document *Green Building Guidelines for the Rehabilitation of Historic and Non-Historic Buildings*. Adopted as Presidio Trust policy in 2002,[136] the *Green Building Guidelines* identify "requirements" and "opportunities" as guidance for achieving the sustainable goals necessary for successful Presidio permitting, while stressing the priority of legally mandated preservation aims (on the Presidio as federally-owned property) over conflicting sustainable designs strategies. Standing out, from a preservation perspective, is the emphasis placed on reusing and restoring historic architectural features (those existing, compromised, or removed) to achieve sustainable design goals. For example, the document's first requirement mandates that rehabilitation planning identify and evaluate historic building characteristics like solar orientation, interior daylight penetration, and "existing energy-efficient design features" (e.g., porches, transoms, skylights) that produce both green and preservation results. Requirement seventeen mandates investigation of construction materials salvageable from demolition. Additional related "opportunities" (numbers twenty-six and twenty-seven) suggest using salvaged construction materials from the Presidio Salvage Warehouse to gain historically appropriate and / or sustainable benefits.[137]

Similar to Audubon House and EPA's Federal Triangle headquarters, the Presidio of San Francisco pioneered American sustainable preservation in a number of very visible national approaches, all demonstrating that good sustainable design and good historic preservation need not be incompatible. Moreover, the Presidio marked the first instance where sustainable rehabilitation was institutionalized as federal agency policy, albeit in a geographically prescribed area. As discussed in Chapter Four, such institutionalization of green preservation policies increasingly has come to characterize federal, academic, and, to a lesser extent, nonprofit actors in the early 2000s.

Chapter Two: Local Demonstration Projects, 1996-2003

In the mid- and late 1990s, construction of sustainable architecture in the United States gradually broadened from its nonprofit and government beginnings to also include buildings designed for corporate and academic clients. Much of this American green architecture was new construction, a trend that continues at the time of writing. Corporate motivation for green construction was to boost employee productivity from improved indoor air quality and as a public relations demonstration of corporate "good citizenship" in environmental responsibility. The latter was especially true of businesses operating in "environmental" fields, such as outdoor recreation and energy production.

Completed in 1999 by the Fox & Fowle architectural firm, the forty-seven-story Conde Nast Building at Four Times Square in midtown Manhattan was one of the most nationally visible examples of sustainable (new) construction of its time and an American complement to Foster & Partners's celebrated green high-rise Commerzbank Tower (1997) in Frankfurt, Germany.[138] Other new green office buildings opened across the United States in the mid-to-late 1990s for corporate clients, including, e.g.: Norm Thompson Outfitters, Inc.'s headquarters in Hillsboro, Oregon, by Sienna Architects in 1995; Patagonia, Inc.'s offices and distribution center in Reno, Nevada, by Miller / Hull Partnership in 1996; S.C. Johnson Wax's world headquarters in Racine, Wisconsin, by HOK and Zimmerman Design Group in 1997; and GAP, Inc.'s 901 Cherry Street building in San Bruno, California, by William McDonough + Partners in 1998.[139]

Historic buildings were also green rehabilitated for corporate and commercial clients in the 1990s. In Kansas City, Missouri, for example, the New York Life Building, a ten-story Romanesque Revival masonry structure designed by McKim, Mead and White in 1888, reopened in 1997 as the headquarters of UtiliCorp United, a local utility company. The building's $35 million rehabilitation, by Gastinger Walker Harden Architects, preserved much of the downtown landmark, including its historic exterior, skylight-lit central lobby, and marble, terrazzo, and mosaic floors. In addition, the rehabilitation incorporated several sustainable elements, including operable windows, light shelves, occupancy sensors, and environmentally-friendly construction materials selected to maximize indoor air quality.[140]

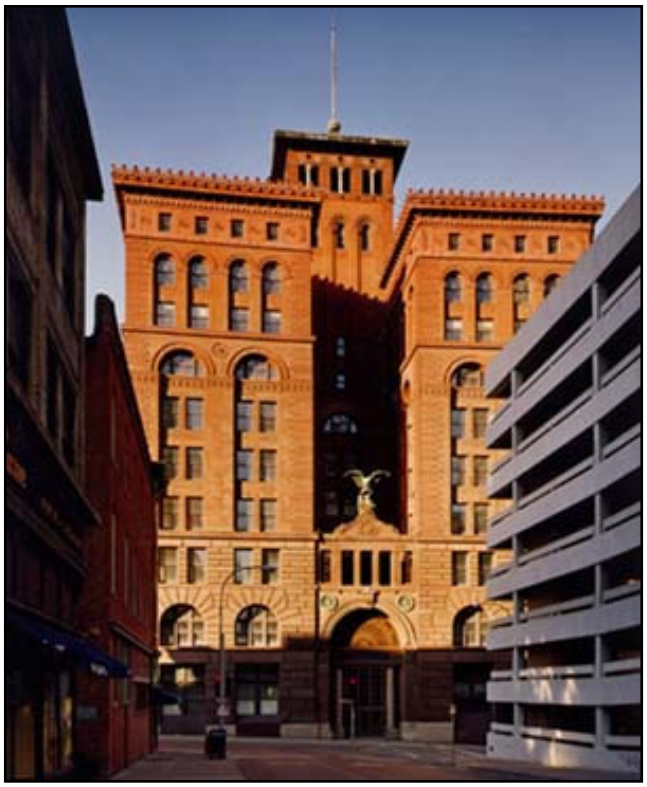

Figure 2.1: The historic New York Life Building, in downtown Kansas City, Missouri, was rehabilitated in 1997. Sustainable features include daylighting strategies, energy conservation measures, and low VOC construction materials. View looking north. Circa 1997. Photograph by Mike Sinclair. Courtesy of Gastinger Walker Harden Architects. Used with permission.

Figure 2.2: REI's Denver store, along the South Platte River near downtown, occupies the historic Denver Tramway Power Company Building. The building's 2000 rehabilitation earned awards from the American Institute of Architects ("Top Ten Green Project") and from the National Trust for Historic Preservation. View looking north. Circa 2000. Photograph by Robert Pisano. Courtesy of Mithun Architects + Designers + Planners. Used with permission.

In another corporate sustainable preservation example, Recreational Equipment, Inc. (REI) transformed the historic Denver Tramway Power Company Building (1901) into the company's Denver flagship store. The project, which received federal historic rehabilitation tax credits (RITC), maintained thirty historic windows, incorporated an energy-saving evaporative cooling system, complemented daylighting with efficient light fixtures and detectors, and salvaged demolition waste for reuse inside and outside.[141] Completed in 2000 by Mithun Architects + Designers + Planners, the REI rehabilitation earned acclaim from both the National Trust for Historic Preservation ("2001 Honor Award") and the American Association of Architects (one of the "2001 Top Ten Green Projects").[142]

American academia also began sustainable construction in the 1990s. Most of this early green architecture on academic campuses was for environmental, natural resources, and life sciences departments, reflecting program studies, missions, and an educational "theory-into-practice" sentiment. Academic green new construction from the 1990s included the University of Northern Iowa's Center for Energy and Environmental Education (1994), Northland College's McLean Environmental Living and Learning Center (1998) in Ashland, Wisconsin, and Middlebury College's Bicentennial Hall (1999) science building in Middlebury, Vermont. A friendly intrastate collegiate rivalry between Oberlin College and Denison University resulted in two Ohio academic green demonstration buildings by the end of the decade: Oberlin's Adam Joseph Lewis Center for Environmental Studies (2000), a new construction designed by William McDonough + Partners, and Denison's Barney-Davis Hall (1998), a sustainable rehabilitation described below.[143]

Throughout the 1990s, American environmental nonprofit organizations continued progress in demonstrating sustainable architecture's viability. In 1995, for instance, the Conservation Law Foundation moved to a new green renovated headquarters in downtown Boston. A year later, the American Association for the Advancement of Science moved their operations to a twelve-story, new construction, green building in central Washington, D.C. Other examples of green new construction built for nonprofit clients in the 1990s include: the Lady Bird Johnson Wildflower Center near Austin, Texas, by Overland Partners in 1995; the SouthFace Energy Institute

Resource Center in Atlanta, by Pimsler Hoss in 1996; and the Nature Conservancy's international headquarters in Arlington, Virginia, by HOK in 1998.[144]

In 2000, Greenpeace-USA moved into their new green headquarters in the upper-floors of five interconnected Victorian-era commercial buildings in Washington, D.C.'s Chinatown neighborhood. (Greenpeace's project involved only the interior as the office space is leased from Douglas Development Corporation, a Washington, D.C., private redeveloper focusing on adaptive reuse of historic buildings.) The year-long, $3.08 million sustainable rehabilitation led by Envision Design incorporated, among other green features, construction products selected for improved indoor air quality and according to environmental criteria, rooftop photovoltaic (for electrical generation) and passive solar thermal arrays (for heating water), low-flow toilets, and daylighting strategies. The daylighting strategies are particularly notable for their simplicity, yet effectiveness. For example, workspace in the open-floor plan office is along or near the building's perimeter, bringing daylight and external views in through the large historic window openings. Spaces that are used less or require more privacy (i.e., the mailroom, the copy room, conference rooms, "phone booth closets" for private telephone calls) are grouped in the center of the building. The intent of this grouping of office space by function is to reduce demand for artificial lighting.[145]

By the late 1990s, American sustainable architecture (new construction and historic rehabilitation) had reached beyond the initial national pioneers phase. But green buildings were hardly mainstream architecture. Despite some corporate examples, it was still non-commercial institutions, for instance the three examined below, that undertook most sustainable buildings projects. Beyond goals of increased and more functional office space, such projects were motivated mainly by organizational missions rooted in environmental advocacy, education, and science. (It also did not hurt that a green building project could raise an institution's local, regional, and even national profile.) In other words, a green building was a vehicle of mission outreach and evangelism, demonstrating the practicality, comfort, economic feasibility, and aesthetics of modern environmental construction and rehabilitation.

Figure 2.3: Greenpeace-USA headquarters (second floors in connected buildings), summer 2005, in Chinatown, Washington, D.C. View looking southwest. Author photograph.

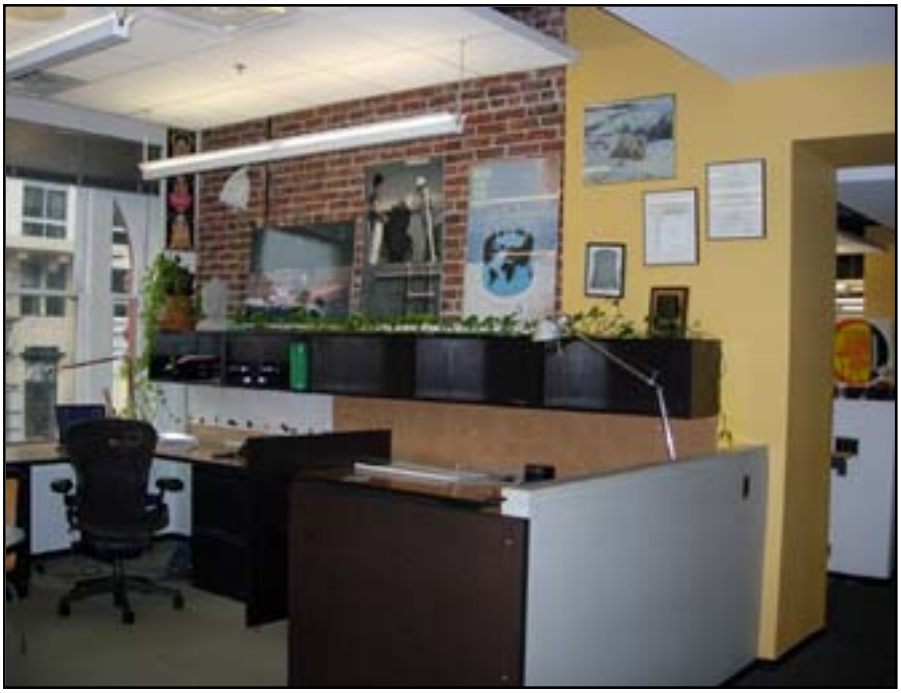

Figure 2.4: Typical Greenpeace-USA office workspace, with ample access to daylight and exterior views from large historic window openings. Summer 2005. Author photograph.

Burke Building

Pittsburgh's great fire of April 10, 1845, devastated the city. About one-third of the southwestern Pennsylvania city burned, including some 1,200 buildings and the wooden Monongahela Bridge.[146] "The fire, as though impelled by the hand of the Destroying Angel," wrote a contemporary witness, "rolled on from building to building, with the flight of a fiery flying serpent, consuming every house with the angry fury of a Vulcan, threatening the whole city …. Never did any event appear more like Judgment Day."[147]

One structure that escaped that apocalyptic fate was the Burke Building. The three-story, Greek Revival style, limestone-clad building had been constructed in 1836 by architect John Chislett for lawyer-brothers Andrew and Robert Burke.[148] In subsequent years, the downtown building variously housed, among others, a daguerreotype store, an artist's studio, headquarters of the Denny Estate, the Western Savings Bank, an insurance agency, a fountain pen service company, a barber shop, an antiques retailer, law offices, Arthur's Restaurant, and, since 1997, the headquarters of the Western Pennsylvania Conservancy.[149] The Burke Building was individually listed in the National Register of Historic Places in 1978.[150]

As of July 30, 1979, the Burke Building was incorporated as a contributing structure within the Market Square Historic District, a municipal overlay zoning district created by Pittsburgh City Ordinance 20 with façade preservation and design review enforcement exercised by the Pittsburgh Historic Review Commission (HRC) through the issuance or denial of certificates of appropriateness.[151] An October 2006 review by the author of the commission's project files revealed only limited interaction between HRC and Burke Building owners and occupants. Example communications include: an undated application to HRC from building tenant Arthur's Restaurant for erecting a sign below the street-level entrance; a May 16, 1995, HRC certificate of appropriateness (#95-052) to John C. Hegnes for mortar repointing, stone cleaning with water, application of water repellant to stone, installing a new cement landing at the entrance, and other stone repairs; and a March 20, 1998, application to HRC from Landmarks Design Associates Architects, on behalf of their client the Western Pennsylvania Conservancy, for stair stone work and installation of a new iron railing (permission was apparently granted by

HRC on September 28, 1998, under Certificate of Appropriateness #98-113, a reissue of #98-029).[152]

The Burke Building's historic significance is undeniable: it is the second oldest[153] structure in downtown Pittsburgh, a lone survivor from the city's transformative period in the first half of the nineteenth century when Pittsburgh grew from frontier garrison town beginnings into a major industrial city. Its refined classical façade, with twin Doric columns flanking the central entry, probably closely resembles the building's original 1836 appearance, with little loss of historic integrity. Surviving original interior features include the wooden window casings and interior shutters.[154] Most of the interior's historic features, however, date from the early twentieth century, following a circa 1900 fire that caused significant interior damage, but did not compromise structural integrity.[155] Surviving early twentieth century interior features include pressed-tin ceilings, wainscoting, doors, wood floors, and a grand central staircase.[156]

When constructed in 1836, the Burke Building's rear façade bordered the Diamond, then Pittsburgh's premier market square and home to the region's first county courthouse, jail, post office, and newspaper.[157] Yet, the booming industrial city's political and commercial life gradually shifted away from the Diamond in the next century. In 1961, the Diamond Markethouse (1914), the third such structure at that location, was demolished and replaced by an open, landscaped Market Square Park. Photographs from the 1960s and 1970s show a relatively deserted Market Square Park green space, in marked contrast to the congested sidewalks and streets of shoppers and retailers pictured in pre-Second World War images of the Diamond.[158] In mid-1970s images the Burke Building looks even more deserted and drearier than Market Square; in one of these mid-1970s photographs, the building is surrounded on all sides by bleak asphalt parking lots and fronts the street with what appears to be boarded-up window openings.[159]

The Market Square area's fortune began a tentative turnaround with the 1981-1984 construction of PPG Place, a six-building neo-Gothic, postmodern skyscraper complex designed by architect Philip Johnson.[160] Erected on the southwest corner of Market Square and adjacent to the Burke Building, PPG Place's modern office and retail spaces, events plaza, and underground parking garage brought greater business and foot

Figure 2.5: Burke Building, circa 1975, in downtown Pittsburgh, Pa. View looking northeast. Source: Allegheny Conference on Community Development Collection, Library and Archives Division Archives, Historical Society of Western Pennsylvania, Pittsburgh, Pa. (Historic Pittsburgh Images Collections, http://images.library.pitt.edu; item MSP285.B002.F24.I06.) Used with permission of Historical Society of Western Pennsylvania.

Figure 2.6: Burke Building, headquarters of the Western Pennsylvania Conservancy, in downtown Pittsburgh, Pa. View looking northeast. Summer 2005. Author photograph.

traffic to the area. Yet, even with PPG Place nearby, the Market Square area, like a significant portion of Pittsburgh's downtown, can still feel deserted, neglected, and even unsafe outside weekday working hours.

It was within this context that the Western Pennsylvania Conservancy (WPC) purchased the Burke Building in February 1996 for their headquarters. Founded in 1932 as the Greater Pittsburgh Parks Association, WPC is probably best known as the owner, since 1963, of Fallingwater (1936-1939), the world famous house-over-a-waterfall designed by Frank Lloyd Wright. Despite conserving and interpreting this internationally significant piece of architectural heritage, WPC's mission is more focused on conservation of the natural environment, including water, land, and ecosystem protection and restoration, within the Pittsburgh and western Pennsylvania region. WPC accomplishes its mission through acquisition of land and conservation easements, partnerships with governments and other organizations, and public policy advocacy. Notable WPC initiatives at time of writing include an urban community gardens program, regional watershed protection and restoration, and rural sustainable forestry.[161]

Despite WPC's environmental mission, initial encouragement for incorporating green features into the Burke Building rehabilitation came from the Vira I. Heinz Endowment, a major Pittsburgh-based foundation focusing on the city and southwestern Pennsylvania.[162] The endowment funded WPC's consultation with sustainable building experts, including those from Carnegie Mellon University, Conservation Consultants Inc., Rocky Mountain Institute, Oak Ridge National Laboratory, and the U.S. Department of Energy.[163] "After learning about these [sustainable design] principles," said Cynthia Carrow, then WPC's executive vice-president / chief operating officer and manager of the rehabilitation project, in a 2002 interview with the Pittsburgh-based Green Building Alliance, "[WPC] quickly concluded that [implementing sustainable design] would be the environmentally responsible way to proceed [with the rehabilitation]. We were anxious to create a model for others to follow."[164]

WPC's sustainable rehabilitation of the Burke Building began in March 1996; tours of the completed facility were offered less than a year later, on February 6 and 7, 1997.[165] The project incorporated sustainable design when selecting insulation (green content), heating and cooling technology, finish materials, lighting technology and

strategies, paints and adhesives, and operation practices. The Burke Building rehabilitation won a Pennsylvania Governor's Award for Environmental Excellence in 1997 for a renovation that "protected historical values while achieving green building standards."[166]

To tighten the building's thermal envelope, cracks in walls and around doors and windows frames were sealed with expanding polyurethane, a product manufactured without producing ozone layer damaging chlorofluorocarbons (CFCs). The front walls were insulated with CFC-free polystyrene board, while the attic was insulated with blown cellulose, manufactured from recycled newsprint. (Other interior walls received conventional fiberglass insulation.)[167] The effort to tighten the thermal envelope was also aided by the building's thick, historic masonry walls and the presence of occupied and heated structures on the Burke Building's three secondary sides.[168] A roof-mounted, natural gas-fired heater-chiller, combined with a humidity reducing desiccant wheel, was selected for its low pollution output, especially its lack of acid rain causing sulfur oxide emissions and ozone depleting CFCs.[169]

Inside, emphasis was placed on using natural and recycled materials as well as energy-saving technologies and strategies. Homasote, a wallboard made from recycled newsprint, was installed on some walls. Flooring coverings included refinished historic wood, natural (non-vinyl) linoleum, wool carpet, and synthetic carpet that can be recycled into plastic lumber. Daylighting strategies involved the creation of transoms in new office walls, the installation of a third-floor skylight, and the use of historic tin ceilings to reflect daylight further inward. Energy-efficient fluorescent lighting was also installed. Large, operable windows (for natural ventilation) combined with low VOC emitting paints and adhesives and green cleaning supplies and practices help maintain indoor air quality. WPC also made an institutional commitment to office recycling, sustainable office operational practices, and environmentally-friendly purchasing of green office supplies and energy-efficient office equipment.[170]

Rehabilitation project directors made a number of decisions that ensured positive preservation results. For example, WPC hired Landmarks Design Associates, a Pittsburgh-based architectural firm specializing in preservation, adaptive reuse, and infill construction, to design and oversee the rehabilitation. Also, when installing an elevator

in the building for accessibility, the design team salvaged the oak floorboards, reusing the waste historic wood to construct bookcases in styles compatible with historic woodwork found throughout the building.[171] Of course, the most important preservation decision came early in the project: the decision of WPC's Board of Directors against a "gut remodel" of the Burke Building.[172]

Those and other preservation friendly decisions and design approaches paid off: this author observed superb preservation results during an August 2005 building visit. The rehabilitated symmetrical front façade, having had municipal preservation protection since 1979, is in wonderfully preserved and cared-for condition, with even its modern replacement six-over-six windows lending the appropriate character. The interior, under no regulatory protection, is equally preserved. Interior architectural features like historic tin ceilings, wainscoting, wooden doors, interior shutters, window casings, brickwork, fireplaces, hardwood floors, an iron door with vault, and the open grand central staircase testify that the rehabilitated building has lost little of its historic integrity, i.e., aspects of design, workmanship, materials, and other qualities that are evidence of its authenticity and history. Even the interior room configuration survived in several significant spaces, e.g., the first-floor formal entry lobby flanked by rooms to either side and leading up the grand open staircase.

WPC's excellent rehabilitation project provided headquarters office space for about forty of its scientific, advocacy, legal, development, and administrative staff, thus succeeding in its primary goal.[173] The project has had, however, greater impacts beyond its walls. Successful experiences with the Burke Building led WPC to undertake another sustainable rehabilitation, this time of a historic bank-barn near Fallingwater. The barn (a late nineteenth century, timber-framed, gable-roofed structure with an attached, 1940s-era milking parlor and an early twentieth century ceramic tile silo) had been acquired by WPC in 1963 as part of the Fallingwater property.[174] In 2000, WPC received initial grant funding from the Pennsylvania Department of Community and Economic Development to convert the barn, which had been renovated in the 1960s as a nature center, into a regional interpretative center.[175] The resulting 2003-2004 rehabilitation by Bohlin Cywinski Jackson Architects, produced WPC's Bear Run Interpretative Center (also known as the Barn at Fallingwater), a multipurpose building with office, interpretative,

Figure 2.7: Historic exterior architectural details on the Burke Building, Pittsburgh, Pa. Summer 2005. Author photograph.

Figure 2.8: The Burke Building's library features historic interior window shutters and built-in bookcases made from historic oak salvaged during the rehabilitation. Summer 2005. Author photograph.

exhibition, and meeting space. The Leadership in Energy and Environmental Design (LEED-NC 2.0) "Silver" rated[176] center incorporates significant green features (e.g., a ground-source heat-pump system for energy-efficient heating and cooling, bioswales and other site measures for controlling stormwater runoff and pollution impacts to a nearby stream, and renewable resources content materials) while preserving the barn's historically significant façades, attached silo, exposed timber framing, and interior hayloft.[177] The project received several awards, including a "2005 Top Green Project" designation from the American Institute of Architects.[178]

Barney-Davis Hall

Like the Burke Building, the story of Barney-Davis Hall begins with a fire. On March 30, 1905, fire spread through Denison University's Renaissance Revival style Barney Memorial Hall (1894), a science building constructed eleven years earlier on the small liberal-arts college's hilltop campus in Granville, Ohio. The fire destroyed the building's roof and interior, including most of the university's scientific equipment. Post-fire photographs suggest that all that remained of the original building were ruined masonry walls.[179]

Eugene J. Barney, a Dayton, Ohio, manufacturer and the science hall's original 1894 benefactor, again donated funds to Denison for Barney Memorial Hall's 1905 reconstruction. Designed by builders Handshay and Dunzweiler, the reconstructed hall had much the same exterior stone and yellow brick appearance as the original. The building's interior, however, was rebuilt with fireproofing construction materials, including ceilings, floors, and roof of reinforced concrete and partition walls of brick or hollow tile. Quality materials went into the interior reconstruction, including corridor floors of white tile and marble, white maple floors in the lecture rooms and laboratories, and other woodwork that was of the "finest quarter-sawn oak."[180]

As the 1894 Barney Memorial Hall had been, in the words of a contemporary, "crowded … beyond its reasonable capacity," Denison's administrators decided to move the departments of zoology, botany, and chemistry elsewhere on campus, leaving the new 1905 building, with its modern, well-equipped laboratories, for just the physics, geology, and engineering departments.[181] Eighty years later, however, the academic science units

Figure 2.9: Undated historic photograph of Barney Memorial Hall, Denison University, in Granville, Ohio. View looking southwest. Source: Archives and Special Collections, Doane Library, Denison University.

Figure 2.10: Barney-Davis Hall, Denison University, fall 2006, in Granville, Ohio. View looking southwest. Author photograph.

then occupying Barney Hall (the geology / geography, mathematics / computer science, and physics / astronomy departments) found the historic building cramped, antiquated, and generally unsuitable for modern scientific education. A particular concern expressed was the negative impression that Barney Hall was thought to give to prospective students (and their parents) who were "shopping around" for a college education. "The oak fixtures, tile floors, and equipment bulging out of hallway cases (Physics) or sitting in old-fashioned rooms (Geology)," wrote Barney Hall departmental chairs Ken Bork, Zaven Karian, and Lee Larson in a 1986 "Barney and its Evolution" memorandum to Denison University administrators, "may be great for a British museum, but may not have a salutary effect upon those students we most want to attract to Denison."[182]

The completion of the $6.1 million F.W. Olin Science Hall in 1994 provided a 44,000 square foot home for physics / astronomy, geology / geography, and mathematics / computer science, i.e., the academic departments previously housed in Barney Hall.[183] There was apparently some uncertainty about what Barney should be used for following the departure of the three science departments. The Welsh Hills School, a Granville-based private primary school, used some of Barney Hall in 1994.[184]

Alumni donations of $750,000 from the family of Samuel B. Davis in 1995 and $1.5 million from Walter McPhail in 1996 shaped the decision to rehabilitate Barney Memorial Hall to house the English department and the new McPhail Center for Environmental Studies. The project's architect (HRJL Architects, Inc., from nearby Newark, Ohio) conducted three design charrettes in fall and winter 1995 with Denison students, faculty, administration, and nationally-prominent energy conservation consultants. By at least January 1996, a design consensus emerged that Barney Hall's rehabilitation should follow innovative, environmental principles, i.e., sustainable design.[185] "The Barney renovation project," wrote Denison's environmental studies director Abram Kaplan to several design team members in a September 1996 memo,

> "is intended to produce a *statement building*: a place where environmental principles are upheld and demonstrated to the community. It should promote sustainability, use renewable energy sources, reduce toxins, recycle wastes, and serve as a laboratory and educational center for ecological themes." (emphasis original)[186]

A particular way in which the building served as a "laboratory and educational center for ecological themes" was Denison University student involvement in the sustainable rehabilitation process. During the spring 1996 semester, for example,[187] twelve environmental studies seniors in Abram Kaplan's Environmental Studies Capstone Seminar class divided into three groups – technology, materials, and input / output factors – with each group researching a different sustainable topic area relevant to the building rehabilitation. Based on their research, the class developed a series of green recommendations, which were presented to the Denison University Board of Trustees on April 19, 1996. These recommendations included methods to maximize indoor air quality, to conserve water and energy, and to minimize environmental impacts (by reusing construction materials and selecting sustainable materials).[188]

Some of the students' recommendations, like those in favor of low VOC materials and daylighting strategies, were incorporated into final rehabilitation project design (June 1997). Other ideas faced greater obstacles of practicality and regulation. For instance, the student proposal to actively reuse graywater (i.e., water already "used" by building occupants but not contaminated by human or other hazardous wastes) for onsite landscape irrigation and other non-potable water needs would have, according to project architect Carl Jahnes, met with considerable code resistance from the local health and sanitation authorities.[189] The proposal for a rooftop photovoltaic (PV) array faced practical and regulatory obstacles: architect Jahnes did not think PV made sense given the building's cloudy Ohio location and tree-shaded south façade; and there was, in the words of one Denison University official, "a general sentiment" in the village of Granville, which had regulatory review power over changes to the building exterior through a local architectural review zoning overlay district, against significant alterations to the structure's historic exterior appearance.[190]

Sustainable features that were incorporated into the rehabilitated Barney Hall were intended to: maximize indoor air quality; conserve water; reduce energy demands for lighting and heating-cooling; and minimize resource use. Whenever feasible in the late 1990s market, construction materials, paints, adhesives, finishes, and furniture with low VOC off-gassing and low toxicity were selected to maintain high indoor air quality. Operating with a greater-than-conventional number of building air exchanges, green

housekeeping (cleaning with nontoxic products), and green office supplies purchasing are also intended to maximize indoor air quality. Water is conserved through efficient toilet, faucet, and shower (for bicycling commuters) fixtures. The plumbing was set up for graywater reuse, though concerns from regulatory authorities have precluded actual graywater system operations.[191]

Energy demand was to be reduced through conservation strategies and efficient technology. Daylighting strategies for saving electric lighting demand involved returning historic transoms and large windows to their original uses, while also constructing new transoms, skylights, and light shelves. Energy-efficient fluorescent lighting was installed, as were on-off occupancy sensors (controlling artificial lighting) and detectors that dim artificial light as daylight increases. The building's two natural gas boilers (85-95% efficient) operate at significantly greater energy efficiencies than the campus's coal-powered physical plant (30% efficiency). Double-paned Stanek replacement vinyl windows tightened the building's thermal envelope, while a heat-reflecting film on the windows diminished excessive solar heat build-up. The building was also wired for a future PV array.[192]

To reduce resource use and environmental impacts, new construction materials were selected that were manufactured from recycled or sustainable / renewable content, whenever market-feasible. Examples included new carpets, ceiling tiles, restroom floor tiles, insulation, and furniture. Also, considerable historic building fabric was reused, including wood floors, the corridors' tiled floors, slate chalkboards, wood doors, and wood bookcases, saving the need for new products as well as maintaining historic character and authenticity.[193]

Construction work on the $3.6 million Barney Hall rehabilitation began on October 1, 1997. Work was completed less than a year later, in August 1998, in time for the fall 1998 semester. A formal grand opening was held April 23, 1999, to celebrate the rehabilitated building, which had been renamed Barney-Davis Hall in honor of its 1905 and 1995 benefactors, and also to dedicate the new McPhail Center for Environmental Studies, which had taken up residence in the building's lower two floors.[194]

During an October 2006 visit to Barney-Davis Hall, this author observed a green rehabilitated building excellently revealing its historic character. Original materials grace

Figure 2.11: Pre-rehabilitation documentation photograph of Barney Memorial Hall interior, showing historic stairs, banisters, and tile flooring. Circa 1997. Courtesy of HRJL Architects, Inc.

Figure 2.12: Post-rehabilitation photograph of Barney-Davis Hall interior, showing historic stairs, banister, tile flooring, woodwork, transom, and wood floor. Fall 2006. Author photograph.

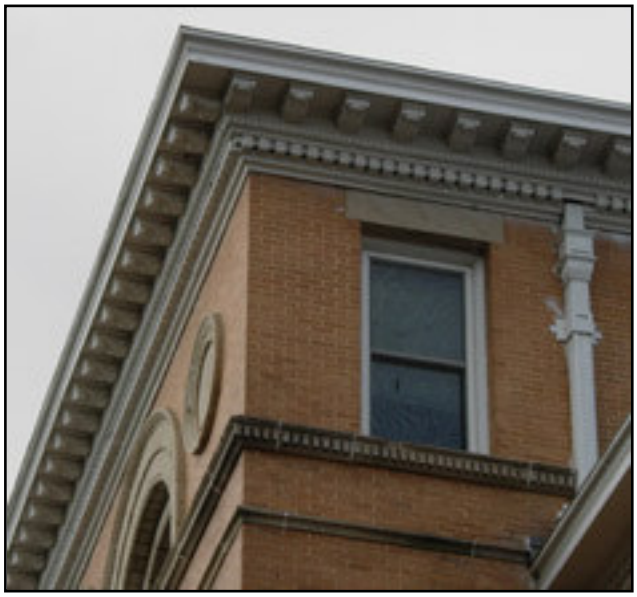

Figure 2.13: Historic cornice and other architectural details on Barney-Davis Hall. Fall 2006. Author photograph.

Figure 2.14: Typical post-rehabilitation classroom in Barney-Davis Hall, with historic chalkboard, door with transom, and woodwork as well as new transoms, lighting fixtures, ceiling, and furniture. Fall 2006. Author photograph.

many of the classrooms, offices, and corridors, and wood bookcases from the early twentieth century are given pride of place. Historic window openings, albeit with modern replacement windows, brighten an interior largely configured as it was in 1905. Only a modern, yet compatible entry porch seems to contrast today's Barney-Davis Hall exterior with the science hall's historic appearance(s), as seen in archival photographs.

The Barney hall rehabilitation faced only limited preservation review under the village of Granville's architectural review district process; review by Ohio's state historic preservation office did not apply as Denison University, a private educational institution, used only privately donated funds to finance the project.[195] Thus, the attitudes and approaches of the designers and decision-makers produced these excellent preservation results, rather than the exercise of police power. However, Art Chonko, head of Denison's physical plant (the university's facilities maintenance and construction office) during the rehabilitation, cautioned about assuming preservation results imply preservation objectives. He recalled that the project's primary goals were sustainability, and instead suggests that these preservation results represent decisions made more with cost-saving and aesthetic motivations, e.g., the historic wood cabinets still looked good and reusing them saved money.[196] Project architect Carl Jahnes suggested a similar idea when he described the rehabilitation as an "uncovering" of the building's original design principles, that is, a restoration of the sustainable features that happened to be inherent in the historic design.[197] In other words, perhaps it is more accurate to understand Barney-Davis Hall's excellent preservation as the result of a rehabilitation mostly reflecting sustainable design decision-making that capitalized and improved upon the historic structure's innate greenness (i.e., its original sustainable attributes and design, its embodied energy value, its durable materials, and its quality craftsmanship) instead of concern for the building's historic integrity and authenticity per se. In that sense, the Barney-Davis Hall project provides an excellent model demonstrating how even informal preservation practice can enhance sustainability outcomes.

Gilman Ordway Campus

Founded in 1985, Woods Hole Research Center (WHRC) has played important scientific, educational, and advocacy roles in articulating how human activities negatively

impact the natural environment. WHRC's research and advocacy scope is international, with identifying the causes, assessing the consequences, and developing mitigating solutions to global climate change as primary programmatic concerns. The research center is, in its own words, "dedicated to science, education, and public policy for a habitable Earth."[198]

From 1985 to 2003, WHRC was based in Woods Hole village, a small upper Cape Cod, Massachusetts, community defined by its internationally famous scientific institutions (including, among others, the Woods Hole Oceanographic Institute, the National Oceanic and Atmospheric Administration's Northeast Fisheries Science Center, and the Marine Biological Laboratory Corporation) as well as the summer tourism from which Cape Cod as a whole prospers. During the 1980s and 1990s, WHRC's staff and operations were spread among several buildings in Woods Hole village. By the mid-to-late 1990s, this inconvenient situation led WHRC administrators to begin searching for a single facility sufficiently large enough to accommodate WHRC's approximately forty staff members and the modern scientific laboratories required for the organization's research programs. From WHRC's perspective, the ideal new headquarters would be within cooperating distance of the various scientific institutions in and around Woods Hole village and, reflecting the organization's environmental mission, consume no climate change-causing fossil fuels in its operation.[199]

In 1998, WHRC purchased the Helen Turner House, a historic house in a mostly rural setting about two miles north of Woods Hole village. Constructed in 1877, the Helen Turner House was one of Woods Hole's earliest large "summer cottages" built after rail service helped to establish the area as a holiday resort for the urban wealthy. In 1908, Helen Turner, the original owner, sold the house to Charles Whittemore, a partner in a Boston-area shoe polish company. Whittemore had the house updated, adding Colonial Revival style porches and a hipped roof. In 1920, Whittemore sold the building to Frank Dunlap of Springfield, Massachusetts, who in turn sold it to Edgar McCallum in the 1930s.[200]

Laura Reardon's 1948 purchase of the property signaled a new chapter in the Helen Turner House's history: from a privately-owned summer cottage to a hotel, the Hilltop House. The property continued to be run as the Hilltop House even after Boston-

area restaurant owner Edith Ban purchased it in 1978. After Ban's death in 1988, Ban's sister, Livia Hedda Rev-Kury, kept the house as a private residence until the property was sold to WHRC in fall 1998.[201]

In its 1998 appearance, the Helen Turner House demonstrated the impact and changing nature of tourism in Woods Hole and, more broadly, on Cape Cod. Almost exclusively defined in the nineteenth century by railroad access, the wealthy, and their grand mansions, tourism in Woods Hole gradually changed through the twentieth century to become dominated by the summer beach, the middle-class motel, and, above all, the automobile. This story of changes in tourism – and, because of the large role tourism has played in the area's history, changes in the Woods Hole region itself – could be read directly in the history of the Helen Turner House.

When WHRC purchased the Helen Turner House in 1998,[202] the organization's plan was to demolish the historic structure and construct their new green headquarters on the cleared site. "The [o]wner," wrote William McDonough + Partners architectural team-member Mark Rylander to Ann Lattinville of the Massachusetts Historical Commission in 2000,

> "and many other participants in the process encouraged us to take down the house in order to allow for a more rational and economical facility … Initial ideas about aggressive material conservation and minimal intervention proved to be overly optimistic, as we found that the size and configuration of rooms did not meet our program and that the painted plaster interior and working fireplaces were at odds with environmental goals critical to the project."[203]

However, before the project reached the formal regulatory stages in 2000, WHRC's plans for the Helen Turner House's complete demolition had changed in recognition of the importance of the property as a community landmark. Under the new architectural scheme, the sustainable facility would retain the historic east-facing, exterior building envelope, while the historic rear wing would be demolished and replaced by a new and larger contemporary-styled wing, mostly screened from the road by trees and topography. The interior would be entirely gutted and the room plan reconfigured. This was the design proposal that was scrutinized by state, regional (county), and local historic preservation regulatory authorities.

Figure 2.15: Photograph showing Hilltop House, a hotel that occupied the historic Helen Turner House in Falmouth, Massachusetts, from the 1950s through the 1980s. View looking north. Circa 1965. Courtesy of Arcadia Publishing. Reprinted with permission from *Images of America: Falmouth*, by Ann Sears and Nancy Kougeas. Available from the publisher online at www.arcadiapublishing.com or by calling 888-313-2665.

Figure 2.16: The Helen Turner House in summer 1998, soon after Woods Hole Research Center purchased the property. View looking northwest. Courtesy of Woods Hole Research Center.

Initial funding for (and naming of) the WHRC new green headquarters project came from a $750,000 donation from Gilman Ordway, a WHRC trustee from Jackson Hole, Wyoming.[204] By summer 2000, the project had received additional funding from, among others, the Massachusetts Health and Educational Facilities Authority, a state agency that assists nonprofit organizations with capital construction projects.[205] State funding assistance meant state regulation. The project would have triggered the "Environmental Notification Form" regulatory review process under the Massachusetts Environmental Policy Act (MEPA) due to "demolition of all or any exterior part of a Historic Structure listed in … the Inventory of Historic and Archaeological Assets of the Commonwealth."[206] (The Helen Turner House had been listed on the Massachusetts Historical Inventory as number 769.)[207] The MEPA regulations, however, permitted the project proponent to avoid the MEPA review process if the "project is … consistent with a Memorandum of Agreement with the Massachusetts Historical Commission."[208]

At the request of WHRC, a memorandum of agreement (MOA) was concluded between the Massachusetts Historical Commission (MHC) and WHRC. MHC reviewed the project under Massachusetts's State Register review regulations, which mirror the federal Section 106 undertakings review process.[209] Like a federal Section 106 review, Massachusetts's regulations prescribe only a process of identification, assessment, and consultation; they are not a proscription against historic resources loss.

MHC's review of the Gilman Ordway Campus project found it to have an "'adverse effect' on the Helen Turner Residence through the destruction of part of the property."[210] Per the state review process, MHC consulted with WHRC on ways to minimize and mitigate the adverse effect. Both parties agreed, in a MOA, that WHRC would document the historic building in photographs before the project began.[211] WHRC had completed its obligations under state preservation regulation (the MOA had satisfied MEPA review conditions) once the photo documentation was approved by MHC for deposit in the Massachusetts State Archives.

The Gilman Ordway Campus project also had to undergo county and local preservation review. Established by state legislation in 1990, the Cape Cod Commission is a regional planning and land-use regulatory agency covering Barnstable County, which is the state administrative unit for Cape Cod.[212] Among other powers, the commission

has regulatory review authority over "Developments of Regional Impact" (DRIs).[213] While DRIs include "demolition or substantial alteration of an historic structure," the threshold is listing in either the National or State Register of Historic Places.[214] Although eligible, the Helen Turner House had never been listed in either registry.[215] The Gilman Ordway expansion project, however, did trigger commission review as the planned rear addition was over 10,000 square feet, one of the regulatory thresholds.[216] The commission review was favorable for the Gilman Ordway project, presumably because "[a]t the option of applicants, joint state/regional reviews are conducted for projects going through the Massachusetts Environmental Policy Act (MEPA) process,"[217] and, as described above, MEPA review was satisfied by the MOA concluded between WHRC and MHC.

While the Helen Turner House did not fall within the boundaries of a local historical district, it was listed on the town[218] of Falmouth's cultural resources inventory. Properties listed in the local inventory are covered by the town's ninety-day demolition delay bylaw. WHRC's demolition application, which included the demolition of the historic rear wing, triggered Falmouth's demolition delay bylaw, with the ninety-day delay beginning on January 24, 2001.[219] In late February 2001, the Falmouth Historical Commission gave tentative approval to WHRC's rehabilitation plans, including the demolition of the historic wing and chimneys.[220]

WHRC consulted with the Falmouth Historical Commission during the final rehabilitation planning. Meeting minutes and correspondence from winter and spring 2001 indicate discussions included, among other topics, historical commission concerns about the replacement of existing twelve-over-one windows with new two-over-two windows,[221] that there should be greater attention to differentiate the historic house core from the new utilities extension that would include the elevator, restrooms, and HVAC system,[222] and about conversion of the lawn into a wildflower meadow and space for events parking.[223] The Falmouth Historical Commission also approved WHRC's color choice for new white-cedar shingles ("neutral grey") and noted no objection to the use of "architectural roof shingles" instead of wood ones.[224]

The $8 million Gilman Ordway Campus project was designed by William McDonough + Partners, an international pioneer in sustainable architecture. Construction

began in October 2001 and was completed by February 2003. Major sustainable design elements incorporated included icynene spray foam insulation, offset-stud framing (to avoid the breaks in the building's continuous insulation envelope that would lead to cold air infiltration), double- and triple-glazed windows, and maximization of natural daylight and ventilation.[225] A ground-source heat-pump system provides building heat, while rooftop photovoltaic panels often provide a third of the facility's electric demand.[226] Between May and October, passive solar collection often heats nearly ninety percent of the building's hot water.[227] The building received significant acclaim from the sustainable architecture community, including first prize in the Northeast Sustainable Energy Association's "2004 Northeast Green Building Award" competition and recognition as a national "Top Ten Green Project" (2004) from the American Institute of Architects Committee on the Environment.[228]

As attested by preservation regulatory review files and construction progress photographs, the Ordway project resulted in dismal preservation results, with the historic Helen Turner House suffering significant demolition and alteration. Some loss of historic fabric was related to material condition, e.g., construction photographs from fall 2001 show that the historic building's sill and some structural members were significantly damaged by dry rot. Most alternation, however, was driven by design decisions intended for sustainable operations and to reflect sustainable philosophy. The historic rear wing was demolished, the hipped roof was flattened, the two chimneys were removed, existing windows were discarded, and the historic exterior envelope was essentially replaced to accommodate the offset-stud framing design. Interior renovations resulted in the loss of virtually all existing interior fabric and in the creation of entirely new room configurations on all floors.

The sixteen-month transformation of the Helen Turner House into the Gilman Ordway Campus was so radical that it is seems virtually impossible to link the old building with the new. Yet, this author observed in a March 2005 site visit[229] that the renovated building has an overall form, style, and appearance that largely resembles the original, that the setback from the main road remains the same, that the exterior materials, while largely new, are similar to the historic fabric, and that the landscape design masks the large wing. There are new dormers, window openings, and a wraparound porch all in

Figure 2.17: The Gilman Ordway Campus project involved demolition and removal of significant architectural features, including the Helen Turner House's historic hipped roof, rear wing, brick chimneys, and windows. View looking west. Fall 2001. Courtesy of Woods Hole Research Center.

Figure 2.18: The Helen Turner House's historic interior was gutted during the Gilman Ordway Campus project, resulting in the loss of historic fabric and floor configurations. View looking southeast. Fall 2001. Courtesy of Woods Hole Research Center.

Figure 2.19: Gilman Ordway Campus, Woods Hole Research Center, in Falmouth, Massachusetts. View looking north. Winter 2005. Author photograph.

Figure 2.20: Aerial photograph of Woods Hole Research Center's Gilman Ordway Campus, showing the renovated Helen Turner House (center) and new addition (right). View looking southwest. Fall 2004. Photograph by Charles Benton. Used with permission.

the approximate same locations, and with the approximate same appearance, as was on the historic house.

Yet, there is only so far that one can plausibly take this reasoning before facing the fact that the Gilman Ordway Campus is an entirely new building only superficially resembling the authentic, historic Helen Turner House. At some point so many planks have been replaced in an old ship's hull that it is an entirely new boat: that is the case with the Gilman Ordway Campus.

Given this, the key question from a historic preservation perspective is, then, straightforward: does the new building still posses enough integrity to demonstrate its historic significance? The answer has to be an emphatic no. Yes, the grand setback and hilltop location do still suggest the influence of wealth, the wraparound porch does reflects the structure's residential history, and the basic front façade does have a pseudo-"historic" appearance. But the historic interior is gone, including the plaster walls and brick fireplaces. It is here inside that one might, perhaps, still know that this is or is not the authentic, historic Helen Turner House – and today's interior is clearly not that old Turner house and never will be again. On the outside, the loss of the two brick chimneys functions the same: strongly severing the physical and narrative link between the historic Helen Turner House and the new Gilman Ordway Campus. While the Gilman Ordway Campus project seems to have excellently meet WHRC's office space, laboratory, green goals, the renovation or, perhaps more accurately, the transformation (for it cannot be called a building rehabilitation in any professional preservation sense of the word) reveals in the extreme the potential conflict, even with preservation regulatory review, that is ever-present in historic structure adaptive reuse, whether sustainable design or conventional construction practices are applied. If the Gilman Ordway Campus project is to be taken as a case study, it then seems that it teaches that the apparent alliances of interests between the sustainability and preservation movements clearly do not always align in practice.

Chapter Three: LEED Pilots and Early Projects, 1998-2003

Since its public release in 2000, the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) green building rating system has transformed American sustainable architecture by launching a green construction industry, influencing government policy, and garnering significant popular attention. LEED is a performance-based rating system or metric for assessing a project's success in achieving certain sustainability goals. LEED does not prescribe specific green techniques, but rather allows and encourages building projects to achieve environmental and human health goals through approaches and innovations selected at the project level. Independent, third-party verification by USGBC standardizes what it means to be a comprehensively "green" building (e.g., site and water protection, energy-efficiency, environmentally-friendly materials, indoor air quality) and also helps reduce "greenwashing" or "design tokenism," i.e., the application of superficial sustainable features, especially as a marketing ploy, to otherwise conventional construction. USGBC has developed several LEED versions for a variety of building situations: LEED for New Construction and Major Renovations (LEED-NC), LEED for Existing Buildings (LEED-EB), LEED for Commercial Interiors (LEED-CI), LEED for Core and Shell (LEED-CS), and, as of writing, pilot LEED versions for residences, schools, and neighborhood developments. LEED-assessed projects earn a rating level (from lowest to highest: Certified (originally Bronze), Silver, Gold, and Platinum) based on the achievement of minimum prerequisites and additional goals.

LEED, however, is not the only energy efficiency and green construction rating system. In the United Kingdom, for example, some 65,000 buildings, or about twenty-five percent of the country's new office construction, have been certified under the Building Research Establishment Environmental Assessment Method (BREEAM), the world's oldest green construction rating system that was released through major versions in 1991, 1998, and 2000. A BREEAM analysis investigates a building's environmental impacts under eight broad categories: management; building occupants' health and well-being; energy consumption and efficiency; carbon dioxide released from construction materials transport; water consumption and efficiency; environmental impacts from

construction materials; impacts to land use and ecology from the building; and air and water pollution impacts. BREEAM-evaluated buildings are rated on a four-tiered scale: pass, good, very good, and excellent. Certain BREEAM achievement levels are required for construction completed for the United Kingdom Office of Government Procurement, the Welsh Assembly Government, schools, and local governments.[230] Other international sustainable construction assessment systems include: the Green Building Council of Australia's Green Star; the Japan Sustainable Building Consortium's Comprehensive Assessment System for Building Environmental Efficiency; and South Korean, Brazilian, and Italian national green building standards developed under the Green Building Challenge's global assessment framework.[231]

In the United States, however, USGBC's LEED is, as of writing, the de facto national green building rating system, far surpassing alternatives like Green Globes USA, Earth Advantage, and Vermont Builds Greener Program. Although USGBC has, as of January 2007, LEED-certified only 685 buildings,[232] LEED bears much of the responsibility for the growth of a domestic construction industry specializing in sustainable products manufacture and green buildings practice and design. Helping push the demand for LEED certification, green products, and sustainable design expertise has been the adoption of LEED, or an equivalent, as policy for standard construction by an increasing number of local, state, and federal government entities. For instance, Washington State's High-Performance Public Buildings law, enacted April 8, 2005, requires all new state-funded construction over 5,000 square feet to achieve some threshold of LEED certification.[233] In Maryland, LEED's third-party standards are used to determine private-sector buildings' eligibility under the state's green construction tax credit incentive program.[234] (One of the first projects accepted into the Maryland Green Building Tax Credit Program was Brewers Hill (Cho Benn Holback + Associates, 2005), a twenty-seven-acre historic brewery (Gunther and National breweries) complex in Baltimore. The adaptive reuse of Brewers Hill's eleven buildings (including a grain storage structure from 1892, beer cellars from 1885, 1899, and 1933, and a malt mill / brew house from 1950) into a mixed-use office, mini-storage, retail, and residential complex also earned federal (RITC) and state historic preservation tax credits.)[235]

LEED has not been without its detractors. Some in the sustainable design community have questioned whether the performance standards for LEED status guarantee a truly energy-efficient and environmentally-friendly green building. This argument frequently cites the LEED one-point credit given for onsite bike racks. While admirable in providing the infrastructure for bicycling commuters, bike racks do not seem to have equal sustainable "value" (in expense, difficulty, and reduction of negative environmental impacts) as other one-point LEED options, like securing five percent of a building's energy needs from solar, wind, or other low-pollution renewable sources, or for reusing the majority of a building's existing shell. Other concerns about LEED include the design gamesmanship that often results from "chasing points," its emphasis on quantifiable measures over creative innovation and problem solving, its failure to consider different climate regions and urban / rural settings, the costs associated with LEED recordkeeping and reporting, the poor weight given to life cycle assessment (LCA) under LEED evaluation, and the perception of undue influence of USGBC as a private, "consensus-based" organization (i.e., stressing decision-making through political compromise among its various constituents over scientific research, rigor, and transparency) on public policy and incentive financing.[236]

LEED's popularity has also led to heightened, though hardly new, conflicts between historic preservationists and sustainable design advocates. The core complaint from a preservation perspective is how LEED fails to assess a historic building's value (both its embodied energy and its cultural significance).[237] This situation can and has produced LEED-rated projects that also exhibit dismal preservation results. For instance, pre- and post-project photographs of the Natural Resources Defense Council's LEED-NC 2.0 "Platinum" rated Robert Redford Building (Moule & Polyzoides Architects, 2003) in Santa Monica, California, suggest that that 1920s era structure's historic storefront façade underwent a radical transformation that resulted in complete loss of historic integrity.[238] A more devastating example is the Langston-Brown High School and Community Center, a LEED-NC 2.0 "Silver" rated (new construction) structure that opened in September 2003 in Halls Hill (High View Park), a historically African-American community in Arlington County, Virginia (suburban Washington, D.C.). The new

Figure 3.1: Pre-demolition documentation photograph of the John M. Langston School's historic front parapet. View looking east. Circa 2002. Photograph by Steve Stricker. Source: Arlington County Historic Preservation Commission. (Photographs submitted by Arlington County Public School System to Arlington County Historic Preservation Commission on February 5, 2002, under Special Use Permit #U-3007-01-1.)

Figure 3.2: Insensitive postwar additions compromised the John M. Langston School's historic integrity. View looking east. Circa 2002. Photograph by Steve Stricker. Source: Arlington County Historic Preservation Commission. (Photographs submitted by Arlington County Public School System to Arlington County Historic Preservation Commission on February 5, 2002, under Special Use Permit #U-3007-01-1.)

facility's footprint covers the same area as the historic John M. Langston School, which had been demolished in 2002 for the green building's construction.

When constructed in 1924, the redbrick, simple, four-room John M. Langston School was Halls Hill's sole elementary school. An exterior photograph of the building taken for the Virginia Department of Education in April 1942 shows a two-story, brick structure with large multi-paned windows, with a modest front entry protected by a suspended concrete canopy (marquee), and topped by a parapet with concrete belt-course and school name sign. The building was enlarged several times following the Second World War. Pre-demolition documentation photographs taken in 2002 and on file with the Arlington County Historic Preservation Commission show the original structure enclosed by incompatible and utilitarian postwar construction, suggesting significant compromise of historic architectural integrity (though perhaps not irreversible).[239]

Along with area churches, the John M. Langston School played a positive pivotal civic role in sustaining the African-American Halls Hill community when, during segregation, the neighborhood was otherwise cut off from the educational opportunities, vocations, and public services available to Arlington County's Euro-American population. Contractors, carpenters, plumbers, brick masons, painters, and electricians from Halls Hill worked on the 1924 construction of the building that would educate their community's youth.[240] The Langston School's significance to the community continued after the civil rights repeal of the Jim Crow era's racially-based restrictions. A July 1991 *Washington Post* article, for instance, found that the historic school, which had been renamed the Langston-Brown Community Center in December 1976,[241] served as a "hub of activity for neighborhood youth and senior citizens."[242] That elder Halls Hill community members took keepsake bricks from the 2002 building demolition further suggests the historic structure's local cultural significance.[243]

Langston-Brown's story raises complex issues about community identity, present interactions with artifacts of negative historical memory, and larger political-social atonement for historical wrongs – important issues that are nonetheless too complex and tangential to deal with here. Instead, we should perhaps ask a more simple, relevant, and recurring question: how green, quantitatively and qualitatively, is the demolition of an existing building to make way for a highly energy-efficient replacement? Looking at

LEED-certified demolition-for-replacement examples like Langston-Brown, many preservationists would argue that LEED has failed to respect and acknowledge with significant weight the inherent greenness of historic buildings, i.e., the very fact that they already exist. More mundane preservation concerns about (e.g.) USGBC's suggested guidance for removal of historic "outdated windows" to achieve LEED certification are insignificant in comparison.

LEED-NC 1.0

USGBC released a pilot version of LEED for New Construction and Major Renovations (LEED-NC version 1.0) at its August 1998 membership conference.[244] Notable buildings certified under LEED-NC 1.0 were the Philip Merrill Environmental Center and the Chicago Center for Green Technology. Both achieved LEED-NC 1.0 "Platinum" level certifications (the highest LEED score available) and were designated "Top Ten Green Projects" by the American Association of Architects (AIA). The Merrill Environmental Center (Smith Group, Inc., 2000) occupies a thirty-one-acre shoreline site outside Annapolis, Maryland, and provides headquarters office and educational space for the Chesapeake Bay Foundation, a scientific, educational, and advocacy nonprofit focusing on the environmental health of the Chesapeake Bay and its regional watershed. Widely written about and hailed as "America's greenest building" at its opening,[245] the Merrill Environmental Center is particularly notable for using rainwater for non-potable building needs, for its composting toilets, and for meeting building heating and cooling needs through a ground-source heat-pump system. The center is new construction covering the footprint of the Bay Ridge Inn, a defunct early-to-mid twentieth-century resort demolished to make way for the project.[246]

The Chicago Center for Green Technology (CCGT), on the other hand, is a rehabilitated International style office building in Garfield Park, a depressed, yet slowly revitalizing neighborhood of abandoned buildings and new urban development on Chicago's West Side. Originally constructed for Kraft Foods in 1952 – during Chicago's early postwar blossoming of the International style as famously represented by Ludwig Mies van der Rohe's Illinois Institute of Technology campus – the two-story, flat-roofed, masonry building went through several different owners in its first forty years.[247] By

1995, the Kraft Foods Building and its seventeen-acre site were owned by Sacramento Crushing Company, a demolition and construction-waste recycler. In that year, the Chicago Department of Environment (CDOE) took action against Sacramento Crushing, which had exceeded its permit by filling the site with some 600,000 cubic yards of wood, concrete, and other construction waste.[248] Legal enforcement action by CDOE resulted in Sacramento Crushing's closure and the city's acquisition of the former Kraft Foods Building and its brownfield site, which subsequently underwent a $9 million, eighteen-month cleanup funded by the city.[249]

Interest in sustainable design from CDOE and Chicago's AIA chapter led to the city's 1999 decision to retain and redevelop the Kraft Foods Building and a four-acre frontage parcel of the cleaned brownfield into a new municipal environmental center that would be a local green building demonstration project for Chicago-area architects, contractors, construction material suppliers, and residents.[250] The Chicago AIA's committee on the environment formed the center's design team, led by Farr Associates, a Chicago architectural firm with urban design and historic preservation experience. From the beginning, the rehabilitation project was designed to achieve LEED status.[251]

The rehabilitated Kraft Foods Building reopened in 2002 – just as it was reaching the fifty-year "historic" threshold – as the Chicago Center for Green Technology, the first LEED (-NC 1.0) "Platinum" rated sustainable rehabilitation. Early building tenants were solar panel manufacturer Spire Solar Chicago, the city's Greencorps Chicago community gardening and job-training program, offices of Chicago's USGBC chapter, and WRD Environmental, an urban sustainable landscape company.[252] The $5.4 million[253] CCGT project incorporated significant sustainable features, including some rarely found in earlier green rehabilitation projects. For instance, building downspouts drain roof rainwater into four cylindrical metal cisterns that store water for onsite irrigation uses.[254] Photovoltaic (PV) arrays on the roof, on an earthen berm behind the building, and on south-facing window awnings provide almost twenty-five percent of CCGT's energy needs.[255] One-third of CCGT's roof is planted with sedum, a low-growing plant. This vegetated roof – one of at least forty-eight[256] in Chicago by May 2003 – slows and reduces stormwater runoff, which otherwise strains urban drainage systems and funnels surface pollutants into rivers, lakes, and water supplies. CCGT's green roof additionally

Figure 3.3: Aerial photograph of the rehabilitated Chicago Center for Green Technology. Note the building's roof-mounted photovoltaic (PV) panels and vegetated roof. View looking southeast. Circa 2002. Courtesy of Chicago Department of Environment. Used with permission.

Figure 3.4: Front façade of the Chicago Center for Green Technology. Note the rain water cistern (left), partially screened by flowering vine vegetation growing on latticework. View looking south. Summer 2005. Author photograph.

diminishes the building's contribution to Chicago's "urban heat island effect," i.e., the increased temperatures in urban regions from heat-absorbing pavements, roofs, and other artificial surfaces.[257] A ground-source heat-pump system provides building heating and cooling. Other sustainable features installed at CCGT are similar to those common in previous green rehabilitations, e.g., low-e replacement windows, daylighting strategies, fluorescent bulbs, sensors that dim artificial lights based on daylight amount, insulated building envelope, operable windows for cross ventilation, and construction materials that are nontoxic / low-to-no VOC off-gassing, are made of recycled or natural renewable products, and were procured or manufactured regionally.[258]

The rehabilitated CCGT reveals well its International style roots.[259] Parapets screen the roof-top sedum plantings and PV arrays from street-level observation. The large exterior rainwater cisterns are new yet compatible additions, reflecting the Kraft Foods Building's corporate / industrial past and its sparse International architectural style in their unadorned, utilitarian metal appearance. The front two cisterns are additionally screened by metal latticework covered with flowering vines. Other apparent exterior changes are compatible with the structure's International style minimalism: pergolas at the front and rear, replacement low-e windows within original window openings, and a rear greenhouse. Inside, new skylights, transoms, materials, and finishes have undoubtedly changed the interior's appearance, though the building's continued office use and configuration fits with its historic function.

CCGT's rehabilitation demonstrates excellent green design and good preservation of a building type and age that is often dismissed by larger society as ugly, dated, and uninteresting. In fact, it is Mid-Century Modern and International style structures like the Kraft Foods Building that are blamed by sustainable architecture proponents for their large environmental footprints from air conditioned offices with sealed windows, design reliance on artificial light and mechanical HVAC systems, and use of non-natural construction products manufactured by toxic and energy-intensive chemical means from nonrenewable raw materials, especially petroleum. In the preservation community, on the other hand, Mid-Century Modern buildings are increasingly recognized as architectural works worthy of study and historic significance. In that respect, then,

CCGT's legacy is that of a pioneer: how preservation of Mid-Century Modernism can also be compatible with revolutionary advances in sustainable design.

LEED-NC 2.0

In March 2000, USGBC released LEED-NC version 2.0, a public, modified version of the LEED-NC 1.0 pilot.[260] Projects certified under LEED-NC 2.0 and the subsequent LEED-NC 2.1 (released in November 2002) drew considerable attention from architects, the building industry, the popular press, and the public. This public recognition of LEED also transformed USGBC. According to Alex Wilson, a member of the USGBC's Board of Directors (2000-2006), the USGBC in 2000,

> "had a staff of about five, an annual budget of about a million dollars, and around 500 companies and organizations as members … [at the beginning of 2006] the staff roster had grown to over 60, the budget was around $20 million, and there were more than 6,000 members."[261]

A number of the 525 buildings (data as of January 2007)[262] certified under the various LEED-NC iterations are historic building rehabilitations. An increasing number of these sustainable rehabilitations have been completed by for-profit developers who take advantage of the federal Rehabilitation Investment Tax Credit (RITC) for historic property adaptive reuse. Notable examples of early RITC-LEED projects include: the Whitaker Building (Dawson Wissmach Architects, 2003), a two-story, Italianate style (c. 1890), commercial block in Savannah, Georgia, that was the Southeast's first LEED-certified project (LEED-NC 2.0 "Silver") / National Register-listed project and had to meet local historic district review;[263] the Montgomery Ward Catalog Building (Daniel, Mann, Johnson + Mendenhall / Notari Associates, 2003), a 1925, Art Deco style, eight-story complex in Baltimore, Maryland, that was rehabilitated with a vegetated roof, becoming the Montgomery Park Business Center (LEED-NC 2.0 "Certified");[264] and the W.P. Fuller Paint Building (GSBS Architects, 2005), a 1922, Art Deco style, all-concrete warehouse in west Salt Lake City, Utah, that was rehabilitated (LEED-NC 2.0 "Gold") as corporate headquarters office space for Big-D Construction.[265]

Despite such for-profit examples, many early LEED rehabilitations, like early sustainable architecture in general, were completed for nonprofit and institutional clients. Most of this early institutional LEED rehabilitation, like noncommercial sustainable

rehabilitation projects of the 1990s, was sponsored by environmental organizations and academic units, as representative of their environmental advocacy and educational missions. The three LEED historic rehabilitations discussed below show differences in process, design, and green features, and yet share common legacies: as green / LEED models, among the first and most visible examples in their respective regions to demonstrate sustainable architecture's practicality, economics, aesthetics, and potential compatibility with historic preservation results.

Jean Vollum Natural Capital Center

Portland, Oregon, has been a national leader in urban core revitalization, emphasizing mass transit-centered density infill and redevelopment that is tied into larger regional land-use planning and regulatory controls. The city has also been a significant national pioneer in local policies, practices, and consciousness that encourage sustainable architecture. In 1999, for instance, Portland's city government inaugurated a "Green Building Initiative," which soon produced a municipal Green Building Division (to provide sustainable design outreach and technical advice), green stipulations for the city's publicly-funded or owned construction, and a Green Investment Fund (GIF) to aid financing non-governmental sustainable building projects.[266]

One of the first sustainable (LEED) projects to receive GIF financing[267] was the Jean Vollum Natural Capital Center, a green rehabilitated historic warehouse in Portland's Pearl District. The rehabilitated warehouse, also known as the Ecotrust Building after its nonprofit developer, generated regional and national excitement from the sustainable design movement (and raised Ecotrust's profile) when it opened in September 2001. The subsequently published *Rebuilt Green: The Natural Capital Center and the Transformative Power of Building* (Portland, Ore.: Ecotrust, 2003) – a well-written anthology detailing the project's development, sustainable features, and relationship to preservation – furthered the rehabilitation's influence. Reaction from the historic preservation profession to the project, however, was mixed.

Founded in 1991, Ecotrust is a Portland-based environmental nonprofit organization advocating for "Salmon Nation," their description of a northern California-to-Alaska regional economy rooted in conservation forestry, fisheries, and agriculture.

Ecotrust aims to create a conservation economy for the Pacific coastal rainforest region, i.e., "an economy that prospers within the ecological limits of its region's resources and in fact restores its natural systems."[268] That mission has led the organization to implement programs combining aspects of environmental science and natural resources protection with socially responsible, community-oriented economic development.[269] While Ecotrust's initial focus was on rural communities, it has increasingly undertaken urban watershed and brownfield reclamation programs, as the high-profile Natural Capital Center green rehabilitation suggests.

By 1998, Ecotrust's mission as well as its desire to own office space near downtown Portland translated into its acquisition of the historic McCraken Warehouse, which would be green rehabilitated as the Jean Vollum Natural Capital Center to serve as Ecotrust's headquarters and as space rentable to nonprofit, governmental, and for-profit "conservation economy" tenants.[270] The flat-roofed, brick-and-stucco, Romanesque Revival style McCraken Warehouse was constructed in 1895 for the John McCraken Company, a wholesale construction supplies distributor. By the 1930s, the building was known as the Central Truck Terminal and provided rentable storage and loading dock space to various truck companies. The building continued to be used for storage and distribution until March 1998 when Ecotrust purchased the McCraken Warehouse from the Rapid Transfer and Storage company.[271]

Located just north of downtown Portland in the Pearl District,[272] the McCraken Warehouse sits in an urban neighborhood that has undergone significant change in the last decade (1990-2000). From the late nineteenth century through the mid-twentieth century, the Pearl District, previously known as the Northwest Industrial District, was a major regional transportation, distribution, and industrial center. Warehouses, like the McCraken one, were built to take advantage of the district's proximity to the Southern Pacific-Northern Pacific, Spokane-Portland-Seattle, and Union Pacific rail freight yards.[273] Since 1991, however, the Pearl District's brownfields have undergone redevelopment and even gentrification, with the underutilized warehouse and defunct rail yard district gradually emerging as a high-density, mixed-use urban neighborhood. Today, the district is increasingly characterized by its upscale infill construction, a new

streetcar line, and its historic warehouses rehabilitated for residential, office, and retail uses.[274]

Ecotrust's Jean Vollum Natural Capital Center project played an early role in the Pearl District's redevelopment. Yet, the project's primary significance is as one of Portland's first and most visible examples of green construction. For Ecotrust, green rehabilitating the McCraken Warehouse into the Jean Vollum Natural Capital Center was mission-based: in the words of Spencer Beebe, Ecotrust's founder, "if [Ecotrust] could make a good case for the merits of green building, shouldn't we do it ourselves?"[275]

Groundbreaking for the Jean Vollum Natural Capital Center project was held February 11, 2000. Ecotrust selected Holst Architecture, a Portland firm with prior Pearl District warehouse rehabilitation experience, and partnered with Heritage Consulting Group, a for-profit developer.[276] The rehabilitated building was reopened in a public ceremony on September 6, 2001.[277] Early building tenants included a mix of for-profit, nonprofit, and governmental entities, like outdoors clothing retailer Patagonia, ShoreBank Pacific, the City of Portland's Office of Sustainability, the nonprofit Certified Forest Products Council, and Ecotrust.[278] Funding for the $12.8 million (site acquisition, construction, and soft costs) rehabilitation project came from philanthropist Jean Vollum, a Ford Foundation low-interest loan, the Portland Development Commission, the City of Portland, various other grants and donations, and a Bank of the West loan. The project also received a state of Oregon sustainable building tax credit, which Ecotrust sold to Walsh Construction, the project's general contractor.[279] The project applied for the federal RITC but was denied, as described below.[280]

Ecotrust's warehouse project incorporated significant sustainable design features, earning it a LEED-NC 2.0 "Gold" rating in 2001 – the first historic rehabilitation to achieve that level of LEED certification.[281] At the onset of design, Ecotrust rejected sustainable technologies that were overly experimental or not cost-effective. For example, Ecotrust found that "fuel cells were not yet practical or affordable, and that photovoltaics didn't make sense given the building's limited southern exposure."[282] The project did, however, incorporate several innovative green aspects, especially those to address stormwater issues. Particularly innovative features were the vegetated roof, ground-level bioswales (semi-wetlands with native plantings), and a permeable surface

parking lot, all of which filter and absorb almost all the site's stormwater, thus reducing scale impacts to the city's overworked drainage system and limiting the transfer of surface pollutants into the nearby Willamette River.[283]

Other green features incorporated were more commonplace. For example, the building's energy reduction strategy involved placing significant emphasis on conservation measures, e.g., occupancy sensors, artificial light dimmers (according to daylight amount), energy-efficient fluorescent lights, low-e window glazing, an open floor plan for daylight sharing, lower levels of background artificial light, an atrium, and EnergyStar appliances.[284] With these measures and an energy-efficient HVAC system, the building uses up to twenty percent less energy than standard construction.[285] Additional sustainable elements include: operable windows for natural ventilation; low-flow water fixtures; carbon dioxide detectors to control mechanical ventilation; sustainable harvested wood; nontoxic and low VOC off-gassing paints, carpets, sealants, and adhesives; wheatboard cabinets, cork flooring, recycled rubber-tire floor tiles, recycled steel, and other construction materials made from recycled or renewable content; green housekeeping; and purchase of solar, wind, and other alternative energy to meet some of the building's electrical demands. Also, the building is located adjacent to a streetcar stop and has shower and locker room facilities for bicycling employees.[286]

Another notable green success was the phenomenal amount (98%) of project waste reused or recycled. Salvaged wood was re-sawn for structural pieces, concrete forms, furniture, and artwork. The project's reuse of historic materials in situ is important from a preservation perspective. The rehabilitated building features original posts, beams, Douglas fir floor planks, and some doors. The project restored the warehouse's historic brick-and-stucco exterior, and the open interior with exposed brick and simple, yet massive framing reflects the building's utilitarian, industrial past. Also, the original arched window openings were retained, often with refurbished historic glass.[287]

Ecotrust's rehabilitation produced admirable preservation results: seventy-five percent of the existing building shell was maintained,[288] a significant amount of historic fabric was left in place, the interior echoes the building's warehouse past, and green strategies like window replacement and wall insulation were largely avoided as they

would conflict with preservation aims. Instead, preservation concerns are with the new rooftop penthouse addition, rather than with critical sustainable design aspects. As project photographs reveal, the penthouse is visible from the street and changes the configuration and appearance of the roofline. This addition jarringly detracts from the historic appearance of the primary façade, thus producing an outcome counter to preferred professional preservation practice as codified in the *Secretary's Standards for Rehabilitation* (Standards Two and Nine, i.e., new addition that alters the property's historic character and integrity). This penthouse addition was a key factor in the National Park Service's denial of Ecotrust's RITC application.[289] This RITC denial does not, however, diminish the project's honest intentions and value as a case study in demonstrating the successful integration of preservation and sustainable design. That is, the RITC denial was in response to an architectural decision that aimed for increased usable space. It was not in direct response to specific sustainable design techniques or strategies.

Samuel Trask Dana Building

Another sustainable rehabilitation was occurring at about the same time as Ecotrust's nonprofit project, but it was of an academic building across the country in Ann Arbor, Michigan. Between 1998 and 2003, the University of Michigan rehabilitated the Samuel Trask Dana Building, a historically significant, four-story, Beaux-Arts style structure on the university's central green (known as the "Diag") that has been home to the university's School of Natural Resources and Environment (SNRE) since the 1960s. The heavy, masonry building had been constructed for $167,000 between 1901 and 1903 by Frederick H. Spier and William G. Rohn, Detroit-based architects responsible for several Michigan churches, rail stations, office buildings, and academic halls.[290] The nearly square, "donut"-shaped building features a central courtyard, a "donut"-shaped main corridor system, and uniform façades, i.e., the east and west façades, both with identical main entries, match in appearance, as do the north and south façades, both without entries. Originally known as the West Medical Building, the hall housed research and educational space for the university's Medical School until 1961, when the university's School of Natural Resources, forerunner to SNRE, moved into the remodeled

Figure 3.5: Opened in 2001, the Jean Vollum Natural Capital Center houses office and retail space for private, nonprofit, and government tenants. Note the new rooftop penthouse's prominence, which the National Park Service ruled violated the *Secretary's Standards for Rehabilitation*. View looking northwest. Circa 2001. Courtesy of Interface Engineering. Used with permission.

Figure 3.6: Historic photograph of the West Medical Building, University of Michigan campus in Ann Arbor. View probably looking west. Circa 1915. Photograph by Lyndon. Courtesy of Bentley Historical Library, University of Michigan. (Bentley Image Bank, Bentley Historical Library, http://images.umdl.umich.edu/cgi/i/image/image-idx?c=bhl; item number: BL000071; negative number: na5661; finding aid: umich-bhl-92147; location: UBImusD13. Folder: Campus Buildings. Samuel Trask Dana Natural Resources Bldg. no. 278). Used with permission.

building. In 1973, the building was renamed in honor of Samuel Trask Dana, the natural resources school's first dean. The Dana Building was listed in the National Register of Historic Places as a contributing structure within the University of Michigan Central Campus Historic District in 1977.[291]

By the 1990s, the Dana Building was no longer meeting SNRE space needs and was suffering from deferred maintenance to its mechanical, electrical, and plumbing systems.[292] SNRE faculty, staff, and student attachment to the Dana Building's prominent central campus location as well as concern about the fundraising needed for, and the environmental impacts from, constructing a replacement structure on a new site led the school and the university to launch a comprehensive building rehabilitation. With funding from the state of Michigan, Ford Motor Company, the Wege Foundation, the Dow Chemical Company Foundation, and other donors, the $25 million project addressed increased space, occupant comfort, and systems upgrades from a sustainable design approach, reflecting SNRE's environmental philosophy and earning the project its "Greening of Dana" moniker.[293] The project intended to produce "a building that makes a statement – a building where environmental principles are not only taught, but [also] upheld and demonstrated to the community … a laboratory and educational center for ecological themes."[294]

The "Greening of Dana" rehabilitation was a two-phased project, with design by William McDonough + Partners, of Charlottesville, Virginia, and Quinn Evans Architects, a local Ann Arbor firm specializing in preservation and adaptive reuse.[295] SNRE students also participated in the "Greening of Dana" process, including design input, energy modeling, monitoring construction waste recycling, and developing site landscape with native plantings.[296] The rehabilitation's first phase (1998-2000), which did not seek LEED certification but incorporated green design and construction approaches, filled the "donut"-shaped building's central courtyard with a new hip-roofed, fifth floor addition and a daylight-lit, ground level atrium. The second project phase (2001-2003), which did seek LEED-NC 2.0 certification, rehabilitated the building's interior to meet space, systems, accessibility, and code update goals.

"Our commitment," said project architect Michael Quinn about the rehabilitation, "was to bring into the Dana Building off-the-shelf [green] technologies that are available

but not yet readily used."[297] Notable examples of such advanced green technologies incorporated into the Dana Building rehabilitation included composting toilets, waterless urinals, and a radiant cooling system that uses about ten percent less energy than conventional forced-air cooling. Other project energy efficient and green features have been seen in earlier projects, e.g., fluorescent lights, low-flow water fixtures, low VOC paints and finishes, motion sensor lighting controls, site landscaping with native plantings, small-scale rooftop PV arrays, and construction materials selected for their recycled, renewable, natural, or sustainably harvested content. Approximately twenty-three percent of Dana construction waste was recycled; existing doors, bricks, roof timbers, and other materials were also salvaged for other uses in the rehabilitated building.[298] (Existing exterior windows were also retained, although they were aluminum, one-over-one, double-hung operable replacements from the 1980s.)[299] These sustainable features helped the Dana Building rehabilitation (phase two) achieve a LEED-NC 2.0 "Gold" rating on May 6, 2005, becoming the first LEED-certified project at the University of Michigan and in Ann Arbor.[300]

The "Greening of Dana" produced admirable preservation results, despite the lack of formal project preservation review or regulation at either the university or state level.[301] Historic exterior detailing, for example, was preserved. The most significant exterior change, i.e., the new fifth floor addition, does alter the building's exterior appearance, but its muted, compatible roof coloring, its recessed placement back from the structure's edges, and its low-pitched roof significantly limits its detraction from the original building. In fact, this author hardly noticed the hip-roofed addition during a September 2006 building visit, especially when viewing the primary (west) façade from the "Diag" campus green. Partially filling the courtyard to construct the new fifth floor to meet the project's increased space goals is also preferable, from a preservation perspective, than erecting an attached, ground-level addition, as such an addition would change the building's historically significant heavy, rectilinear footprint, appearance, and its uniform east-west and north-south façades. (Of course, the loss of the historic courtyard is still to be regretted.)

The Dana Building's interior rehabilitation also achieved admirable preservation results. The historic main corridor system, which followed the building's "donut" shape

Figure 3.7: Aerial photograph of Samuel T. Dana Building in early stages of phase one rehabilitation (before enclosure of central atrium). View looking southwest. Spring 1998. Courtesy of School of Natural Resources, University of Michigan. Used with permission.

Figure 3.8: Aerial photograph of Samuel T. Dana Building after the central atrium has been enclosed. View looking southwest. April 2001. Courtesy of School of Natural Resources, University of Michigan. Used with permission.

Figure 3.9: Samuel T. Dana Building after sustainable rehabilitation. Note new hipped roof. View looking west. Fall 2006. Author photograph.

Figure 3.10: Historic cornice details on the Samuel T. Dana Building. Fall 2006. Author photograph.

on all four floors, was retained. Many historic stile-and-rail doors, identified as character-defining features of the long corridors by the design team, were reused or relocated to parts of the building where they did not conflict with code and accessibility concerns.[302]

There is, perhaps, one significant preservation concern with the Dana Building rehabilitation, namely insulating the perimeter masonry walls. The concern does not stem from loss of interior architectural details. Design team members Maggie McInnis and Ilene Tyler found that the original building "was not richly appointed with beautiful plasterwork or ornate woodwork;"[303] the rehabilitated interior, especially the hallways, still portrays this historic utilitarian masonry appearance with its materials, finishes, and decor. The concern is rather that insulation can keep exterior masonry cold in winter, with a resulting increased potential for moisture retention. Moisture retention in masonry can negatively impact the material's durability: "[i]n masonry assemblies," wrote University of Illinois-Urbana research architect William Rose in a 2005 Association for Preservation Technology journal article, "wetness may appear as efflorescence, hastened loss of mortar in joints, or, in severe cases, spalling,"[304] and that in general"[w]all insulation makes exterior materials more subject to weathering forces."[305]

Adam Joseph Lewis Cleveland Environmental Center

At about the same time that completion of the Dana Building "greening" was being celebrated, another sustainable rehabilitation was being dedicated just across Lake Erie. On October 16, 2003, project partners Cleveland Green Building Coalition, the Ohio City Near West Development Corporation, and Cleveland Urban Properties, Ltd., dedicated the Adam Joseph Lewis Cleveland Environmental Center (CEC), a multi-tenant nonprofit center in Cleveland's Ohio City (Near West Side) neighborhood.[306] At its dedication, CEC was the first project in Cleveland constructed to meet LEED-NC 2.0 certification criteria.[307] The building is also a contributing structure within both municipal design review and National Register historic districts.[308]

The flat-roofed, Classical Revival style, limestone-brick-and-terra cotta building was constructed in 1917-1918 by architect William J. Carter for the Lorain Street Savings and Trust Company.[309] This new bank building was erected along Lorain Avenue, a

commercial corridor with electrified trolley service stretching out to Cleveland's western suburbs.[310] The Lorain Street Savings and Trust building was also built only a few blocks west of the Byzantine Revival style West Side Market (1912), the commercial center for Ohio City's then population of German, Irish, Hungarian, and native-born American industrial workers, shopkeepers, and professionals.[311]

Both the Ohio City neighborhood and the Lorain Street Savings and Trust building suffered in subsequent years. Following the Second World War, Ohio City, as did many similar American inner urban neighborhoods, experienced significant population loss and socio-economic demographic change as middle-class white families moved to outlying automobile suburbs. Since the late 1960s, however, local groups have pushed Ohio City's revitalization, focusing on attracting middle-class professionals by promoting adaptive reuse of the neighborhood's significant stock of historic architecture, by emphasizing the community's new high-end residential and commercial developments, and also by highlighting its proximity to downtown Cleveland. This middle-class-focused redevelopment has led to gentrification conflicts with the poorer Hispanic, Appalachian white, and African-American populations that have dominated Ohio City in the postwar period.[312]

The Lorain Street Savings and Trust building underwent equally dramatic changes in the eighty years between its construction and its sustainable rehabilitation. Sometime before the early 1950s, Cleveland Trust Bank acquired the building's ground floor for its Ohio City branch.[313] That branch closed in 1971.[314] From the late 1960s through the mid-1970s, the building's upper floors were home to a number of nonprofit activist tenants, including the West Side Citizens for Better Health, Greater Cleveland Welfare Rights Organization, and the Legal Aid Society.[315] "Antiques in the Bank," an antiques retailer, moved into the building in the 1980s, with detrimental results to the structure's historic fabric, including damaging or removing wood paneling, bank teller windows, and marble flooring, and leaving significant historic spaces unheated and in disrepair.[316] The fire marshal closed Antiques in the Bank in the mid-1990s, leaving the building vacant and deteriorating.[317]

The Lorain Street Savings and Trust building's rehabilitation into the green CEC began in 1999. In that year, the Cleveland Green Building Coalition (CGBC) – then, an

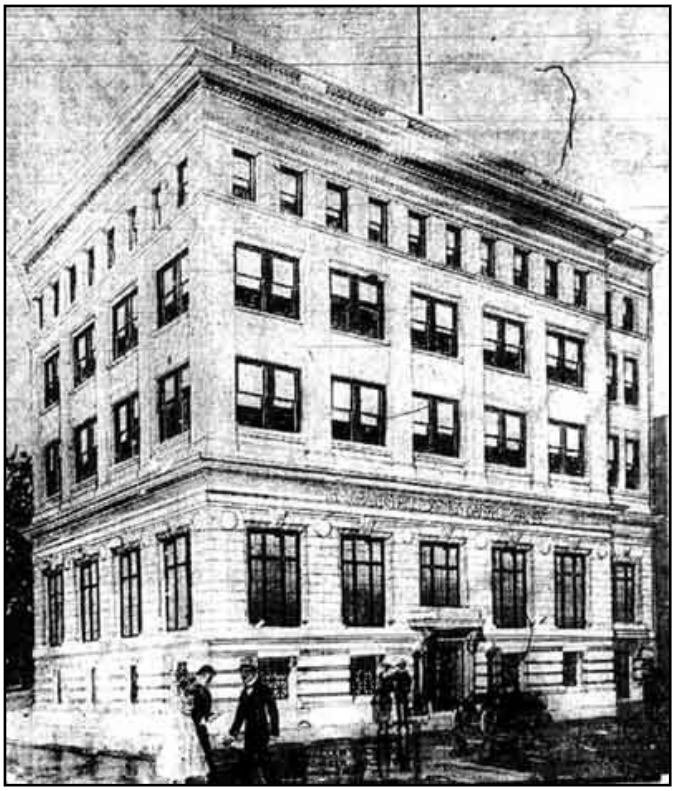

Figure 3.11: Historic newspaper illustration of Lorain Street Savings & Trust Company building, in Cleveland, Ohio. View looking northeast. Source: "Bank Will Build $100,000 Block on Lorain," *Plain Dealer*, October 1, 1916.

Figure 3.12: Pre-rehabilitation photograph of unoccupied Lorain Street Savings & Trust Company building. View looking east. June 1998. Source: Ohio Historic Preservation Office. (RITC file: 3500 Lorain Avenue, Cleveland, Ohio.)

informal, emerging sustainable design group founded by Sadhu Johnston in about 1998 without an office or 501(c)(3) nonprofit status – partnered with Cleveland Urban Properties, Ltd., a for-profit real estate development company, to locate space for a multi-tenant nonprofit center that would provide professional, cost-effective office space for Cleveland's environmental organizations and serve as a regional educational tool demonstrating the technical and economic viability of sustainable construction.[318] They settled on the vacant Lorain Street Savings and Trust building, intending to use the federal rehabilitation tax incentive (RITC) to help fund the historic structure's sustainable renovation. They also selected Doty & Miller Architects of nearby Bedford, Ohio, as project architect. The rehabilitated structure would have three owners: the for-profit Cleveland Urban Properties, the nonprofit Ohio City Near West Development Corporation, and the Cleveland Environmental Center, a consortium of regional environmental nonprofit organizations brought together by CGBC.[319] CEC funding was secured from several regional foundations, corporate sponsors, the city of Cleveland, the state of Ohio, philanthropist Adam Joseph Lewis, and from the sale of the project's successful RITC.[320]

The $3.4 million CEC rehabilitation project[321] officially broke ground on August 8, 2002, at a celebration featuring Cleveland Mayor Jane Campbell.[322] Tenants began moving in by spring and summer 2003.[323] By the October 2003 formal reopening, CEC had a ninety percent leased occupancy, with ten tenants: AQUI Systems, CGBC, Cleveland Urban Properties, EcoCity Cleveland, The Enterprise Foundation, Environmental Health Watch, Fifth Third Bank, League of Conservation Voters Education Fund, Planned Parenthood of Greater Cleveland, and Two Girls in an Office.[324] As of January 2007, the project was registered with the USGBC – with which CGBC has become an affiliated organization – seeking certification under LEED-NC 2.0.[325] In a June 2003 interview, Andrew Watterson, the project's LEED consultant, said the rehabilitation might be able to achieve a LEED "Silver" designation.[326]

CEC's rehabilitation produced excellent sustainable design and historic preservation results. Many of CEC's sustainable features were innovative for the time: i.e., ground-source heat-pump system (consisting of thirty wells) for heating and cooling; waterless urinals for water conservation; an electric vehicle recharging station; exterior

bioswale and permeable surface parking lot to reduce stormwater impacts; and a vegetated roof with native Ohio plantings designed to reduce the building's stormwater runoff and its urban heat island effect contribution. Other green features include: ninety-six rooftop PV panels, providing some five percent of the building's annual electrical usage; fluorescent lighting controlled by occupancy sensors for decreased energy usage; nontoxic and low VOC off-gassing paints, adhesives, sealants, carpets, and furniture for improved indoor air quality; bamboo flooring, recycled-fiber carpets, wheatboard furniture, and other construction materials made from renewable resources or out of recycled content; low-flow water fixtures and toilets for water conservation; operable windows for natural ventilation; a mechanical ventilation system triggered by room occupancy load (carbon dioxide monitors); and basement showers and lockers for employees commuting by bicycle. Rehabilitation waste was also sorted onsite for recycling.[327]

The rehabilitation also produced excellent preservation results, especially of the exterior façades, the ornate interior bank lobby, and the Egyptian Revival style basement. Pre-rehabilitation photographs taken for the RITC review process[328] show a deteriorated building, with gutted upper-floor interiors, moisture-damaged paint and plaster in the historically significant bank lobby and basement, historic and replacement windows with broken panes and deteriorated components, and exterior masonry façades dirtied and deteriorated by years of traffic exhaust, road salt, weather, and neglect. As part of the rehabilitation, mortar was repointed to preservation standards, the exterior masonry was cleaned with water and scrubbing, and the bronze bank doors were polished to reveal their original appearance. The historic window openings were retained throughout the building. However, only the bank lobby's historic single-paned windows were retained and restored; the rest were replaced with double-paned, clear glazing for the first two floors and double-paned, argon-filled, low-e glass windows for the upper floors. In response to Ohio Historic Preservation Office and National Park Service RITC concerns, upper-floor replacement windows were selected to avoid any significant reflection, tint (color), and profile that could telegraph diminished historic character. Despite this loss of historic window fabric, the results do not detract noticeably from the building's historic appearance.[329]

Figure 3.13: Adam Joseph Lewis Cleveland Environmental Center in summer 2005. View looking northeast. Author photograph.

Figure 3.14: Historic exterior architectural details were preserved during the Adam Joseph Lewis Cleveland Environmental Center rehabilitation. Summer 2005. Author photograph.

Figure 3.15: Pre-rehabilitation interior photograph taken September 5, 1998, showing deteriorating conditions of the once ornate ceiling in the Lorain Street Savings & Trust's first floor bank lobby. Source: Ohio Historic Preservation Office. (RITC file: 3500 Lorain Avenue, Cleveland, Ohio.)

Figure 3.16: Restored ceiling in the first floor bank lobby of the Adam Joseph Lewis Cleveland Environmental Center. Circa 2006. Source: Ohio Historic Preservation Office. (RITC file: 3500 Lorain Avenue, Cleveland, Ohio.)

Figure 3.17: Pre-rehabilitation interior photograph taken September 6, 1998, showing deteriorated condition of the Lorain Street Savings & Trust's Egyptian Revival style basement. Source: Ohio Historic Preservation Office. (RITC file: 3500 Lorain Avenue, Cleveland, Ohio.)

Figure 3.18: Restored Egyptian Revival style column in Adam Joseph Lewis Cleveland Environmental Center's basement, which provides conference space for building tenants. Summer 2005. Author photograph.

Significant interior historic fabric was preserved, with the best preservation results found in the bank lobby and the basement. The bank lobby's surviving character-defining features were sensitively preserved: the Tennessee pink marble floor was conserved, while the deteriorated ceilings and walls were restored to original colors (or sympathetic approximations) and decorative conditions. The first floor was also returned to its original banking function with its lease to Fifth Third Bank. Equal restorative care was applied to the Egyptian Revival style columns in the basement. Existing hardwood floors, stairways, moldings, woodwork, and a copper mail chute were retained in the upper-floors, helping the project meet sustainable design, budgetary, and preservation goals.[330] In light of those successes, the Cleveland Restoration Society / Preservation Resource Center of Northeastern Ohio awarded the CEC project a 2004 "Trustees Award for Preservation Achievement."[331]

LEED-EB 1.0

USGBC expanded its LEED green buildings rating system with the public introduction of LEED for Existing Buildings (LEED-EB version 2.0) in October 2004.[332] In contrast to LEED-NC, which is intended to assess a single project instance of building construction or renovation, the LEED-EB process is designed to measure to what extent a building actually operates to and achieves green goals over time, i.e., "LEED-EB is not a singular event but a journey."[333] As an ongoing measure and management tool, a LEED-EB assessment needs to be reevaluated every one to five years.[334] Although some have touted LEED-EB as a LEED product inherently more compatible with historic buildings (presumably because "existing buildings" is in its name), the fact is that LEED-NC and LEED-EB address different situations, not necessarily different building types. LEED-EB could be used to assess a historic building that undergoes limited physical and design changes combined with greener managerial practices, while a historic building undergoing substantial green rehabilitation (adaptive reuse) should be evaluated instead under LEED-NC.

A USGBC committee began work on LEED-EB in 2000, with a pilot program (LEED-EB version 1.0) initiated in January 2002.[335] In November 2003, the National Geographic Society's (NGS) headquarters complex in the central core of Washington,

D.C., became the first project certified under the LEED-EB pilot ("Silver" level).[336] The NGS complex consists of four adjacent buildings: the Gardiner Greene Hubbard Memorial Hall, a hip-roofed, Renaissance Revival style, masonry structure constructed in 1904; a long, flat-roofed, Classical Revival style, masonry building constructed in 1933; the Seventeenth Street Building, a tall, Modernist structure designed by noted architect Edward Durrell Stone in 1964; and the "M" Street Building, an "L"-shaped, contemporary office building designed by Skidmore, Owens and Merrill in 1984. Hubbard Hall, the 1933 building, and the "M" Street Building are internally connected, though they appear as independent structures from the exterior. Space between the "M" Street and Seventeenth Street buildings forms a landscaped, rectangular pedestrian plaza. The NGS complex is in Washington's dense governmental / central business district, just four blocks north of the White House and within walking distance of three Metro (subway) stations and several commuter and city bus stops.

In 2000, NGS president John Fahey outlined ten "Millennium Goals," including increased scientific and educational advocacy for environmental conservation.[337] At about the same time, NGS began planning for the Seventeenth Street Building's chiller, which was approaching major repair or replacement age and contained environmentally damaging chlorofluorocarbons (CFCs). NGS's facilities management decided to reflect the organization's environmental conservation aims by master-planning an ambitious greening of the whole headquarters complex, not just the aging chiller. As NGS began this planning, the organization learned of the LEED-EB pilot program from Johnson Controls, Inc., a Milwaukee-based multinational corporation with a history in energy-efficiency research and development. NGS subsequently signed a contract with Johnson Controls to help the organization achieve energy-efficiency goals and LEED-EB certification.[338] Initial baseline measuring and renovations began by fall 2002.[339]

Changes implemented at NGS to achieve LEED-EB certification included physical infrastructure updates and environmentally-friendly building management practices. These updates and practices helped NGS achieve an eighteen percent reduction in water usage, a more than twelve percent reduction in energy consumption, a seventy percent reduction in landfill waste, and increased indoor air quality.[340] Reductions in water usage for toilets and faucets help meet water conservation goals.

Figure 3.19: Historic photograph of the National Geographic Society's 1933 headquarters building in Washington, D.C. View looking southwest. Circa 1940. Photograph by Theodor Horydczak. Source: Theodor Horydczak Collection, Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: LC-H814- 2499 <P&P>[P&P]; digital ID: (intermediary roll film) thc 5a42693 http://hdl.loc.gov/loc.pnp/thc.5a42693; card number: thc1995007742/PP.)

Figure 3.20: The National Geographic Society's 1933 building in summer 2005. View looking west. Author photograph.

Figure 3.21: National Geographic Society's headquarters complex: the 1933 building (far left), Hubbard Hall (near center), the "M" Street Building (immediate rear of Hubbard Hall), and the Seventeenth Street Building (immediate rear of "M" Street Building). View looking southwest. Summer 2005. Author photograph.

Figure 3.22: A reflective roof of light-colored pebbles and a white membrane on the "M" Street and 1933 buildings helps reduce the National Geographic Society's contribution to Washington's urban heat island effect. The reflective roof surfaces are not visible from street level. View looking northeast. Summer 2005. Author photograph.

Additional water conservation is achieved from site landscaping with native and localized plantings and an automatic irrigation system that operates only in dry conditions. Energy conservation strategies include occupancy sensors for restrooms and some office space, bronze colored reflective solar film on east-facing windows, and energy-efficient drinking fountains, fluorescent lighting, and HVAC system. On the "M" Street and 1933 buildings, flat roof surfaces made of white rock and a reflective thermoplastic membrane help reduce NGS's summer cooling demand and the complex's contribution to Washington's urban heat island effect. An improved air exchange system delivers improved indoor air quality to the complex with less energy used than was previous. Indoor air quality is additionally maintained through asbestos abatement and the use of minimally off-gassing paints, flooring, carpets, and GreenSeal certified cleaning products (which are also mixed in one closed room with its own independent exhaust system). As needed, new construction materials are selected based on their recycled or renewable content, e.g., the bamboo flooring on a new stage in the "M" Street Building. NGS has also implemented a comprehensive recycling program that handles both renovation and conventional office waste.[341]

Changes made to the NGS buildings produced, with one notable exception, little negative impacts to the complex's historic integrity. Fluorescent bulbs fit seamlessly into historic lights fixtures in Hubbard Hall, new structural supports for heavier HVAC components are hidden in maintenance locations, the white reflective roof is visible only from the topmost floors of the modern "M" Street Building, and historically significant interiors are carefully preserved. The one significant preservation concern is the bronze-tinted reflective solar film that coats the east-facing windows of Hubbard Hall and the 1933 building. This coating jarringly detracts from the structures' historic character, lending them an incompatible, contemporary feeling. Perhaps, less historically intrusive methods could have been used (e.g., exterior or interior shading devices, clear colored heat-reflective windows) to achieve the same energy conservation results from reduction in unwanted summer solar gain.

Another LEED-EB pilot project is, as of writing, ongoing a few blocks southwest of the NGS complex. The U.S. Department of the Interior's (DOI) historic Main Interior Building (MIB) is, at time of writing, in the midst of a ten-year (2002-2012)

modernization project designed to update the structure's HVAC, electrical system, plumbing, life safety, security, and handicapped accessibility. Designed by Washington architect Waddy B. Wood and constructed between 1935 and 1936, the massive, six-story, Classical Revival style, masonry MIB covers five acres over two city blocks (see 3.29 and 3.30). MIB's design consists of a central spine with six separate wings, a form that brings daylight and outside views to a significant portion of the building's offices.[342]

The MIB modernization project involves preservation of the building's historically significant façades and interior spaces while incorporating innovative sustainable features. The project's already-completed first phase, for example, produced conservation and restoration of the northernmost ("Sixth") wing's historically significant restrooms, wood windows, Assistant Secretary's Suite, and north lobby.[343] Examples of sustainable features already incorporated or planned for MIB include a more energy-efficient HVAC system, fluorescent lighting, daylighting, indoor air quality strategies, low-flow toilets, reduced site irrigation, recycled and natural (renewable) content construction materials, green cleaning products, a vegetated roof, and institutional incentives for commuting by carpool, bicycle, and other alternatives to the single-occupancy automobile.[344] Also, seventy percent of phase one construction waste was recycled.[345]

Under an April 2002 memorandum of understanding with USGBC and the U.S. General Services Administration (GSA), DOI pledged to support the incorporation of green design techniques into the MIB modernization project. DOI also agreed to support GSA's effort to have the rehabilitated building assessed and certified under LEED. (GSA, the federal agency responsible for the construction, renovation, and operation of most non-military federal buildings, is directing the MIB modernization project.) As of July 2005, the MIB modernization was projected to achieve a "Silver" level rating under the LEED-EB pilot program.[346]

Figure 3.23: Historic photograph of the U.S. Department of Interior's headquarters building in Washington, D.C. View probably looking northeast. Circa 1940. Photograph by Theodor Horydczak. Source: Theodor Horydczak Collection, Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: LC-H814- I04-056 <P&P>[P&P]; digital ID: (intermediary roll film) thc 5a43665 http://hdl.loc.gov/loc.pnp/thc.5a43665; card number: thc1995011605/PP.)

Figure 3.24: The U.S. Department of Interior's main building undergoing a sustainable rehabilitation intended to achieve LEED-EB certification. View looking southeast. Summer 2005. Author photograph.

Chapter Four: Emerging Trends, 2002-2005

It is really only by the end of the period studied here that the American green building movement, and its interaction with historic preservation, had grown numerically enough and in sufficient geographic distribution to allow discussion of change over time and larger trends. For instance, trends could now be discerned about the changes in project-level adoption of green technological features and, perhaps more importantly, code officials' acceptance of these innovations. Analysis of American green rehabilitations during the study period finds a growing emphasis on water conservation and water quality protection. These water protection goals (a further transformation of modern green buildings from their merely energy-efficient predecessors of the 1970s) were increasingly achieved through green features like vegetated roofs, composting toilets, waterless urinals, onsite bioswales, rainwater cisterns, and landscaping with native plantings. Green historic buildings of the late 1990s and early 2000s also increasingly incorporated ground-source heat-pump systems, a new technological adoption compared to projects completed in the early 1990s.

A notable emerging trend in sustainable rehabilitation involved the American historic preservation movement. By the early 2000s, the American preservation community had gradually come to recognize and to respond institutionally to the challenges of sustainable rehabilitations of historic buildings. For instance, the National Trust for Historic Preservation (NTHP), the American preservation movement's nationwide nonprofit leader, incorporated sustainable preservation sessions into its annual conference at least as early as 2003.[347] By its 2005 conference in Portland, Oregon, NTHP was offering field tours of green preservation projects along with educational sessions on the topic.[348] NTHP's 2006 conference in Pittsburgh, Pennsylvania, went a step further, adding a one-day, pre-conference "Greening of Historic Properties National Summit," with case study presentations and professional-level topic discussions.[349] At this same time, the Association for Preservation Technology International (APT), a joint U.S.-Canadian organization focused on professional-level technical preservation issues, also began addressing sustainable heritage challenges. In 2004, APT formed a Technical Committee on Sustainable Preservation (TCSP), which organized a series of

sustainability sessions for APT's 2004 annual conference, held in Galveston, Texas, in early November. The following year, TCSP organized a two-day sustainability symposium at APT's annual conference, held in Halifax, Nova Scotia. Participants (which included Canadian and American architectural, engineering, and preservation professionals as well as sustainable design advocates) compiled a list of "Recommended Action and Research Priorities," encouraging, among others, preservation participation in the formulation of green building rating systems, the development of an easy method for embodied energy analysis, and the creation of a database of sustainable preservation case studies.[350]

Other trends of the early 2000s involved the growth of administrative and support infrastructure conducive for the advancement of green architecture. By 2005, American civic institutions had cemented their significant roles in meeting these functions and helping green construction transition from case-by-case experimentation into recognized professional standards and processes. Key among these was, of course, the U.S. Green Building Council (USGBC) and its LEED rating programs. Other American green institutional infrastructure in place by 2005 included technical research, computer modeling, and guidance (e.g., *Environmental Building News*, Rocky Mountain Institute, SouthFace Institute, the federal Whole Building Design Guide), funding assistance (e.g., the Kresge Foundation's national grantmaking Green Building Initiative), research, practice, and advocacy from several leading green architectural design firms (e.g., BNIM Architects, Croxton Collaborative, HOK, Mithun Architects, Susan Maxman Architects, Van Der Ryn Architects, William McDonough + Partners), and positive emphasis and recognition from various professional building organizations, especially the American Institute of Architects (AIA) and its Committee on the Environment (COTE). Also beginning in the early 2000s, large professional sustainable design conferences – prominently represented by Greenprints (beginning in 1997), EnviroDesign (beginning in 1999), and USGBC's annual Greenbuild conferences that began in 2002 with overflow crowds[351] – helped spread green design knowledge, link practitioners, generate enthusiasm, and push the transformation of sustainable design from niche to mainstream.

Trends in government policy by the early 2000s – i.e., the increasing formulation of policies by various federal, state, and local authorities mandating green construction,

offering tax credit and funding incentives for sustainable design, and providing green technical assistance and guidance – perhaps signaled one of the most significant factors in the growing acceptance of sustainable design as mainstream practice. In November 2003, for instance, only about eleven municipal and county governments in the United States had some sort of policy requiring LEED for publicly funded buildings or providing incentives for LEED-certified private construction;[352] by December 2006, that number had increased to over sixty.[353] Such government actions, especially at various local and state levels, increasingly produced regional concentrations of green architecture centered on urban areas. Austin, Texas, was an early pioneer as a green building region, especially in residential construction, with roots as early as 1991 in a publicly-sponsored Green Building Program that took sustainable construction beyond mere energy efficiency to also include water, materials, and indoor air quality concerns.[354] Since 2000, significant taxpayer-financed public construction implemented in accordance with Seattle's "Sustainable Building Policy" (the first in the country to require LEED for all new city projects) has helped make that city become a green building region and a national leader in LEED-certified construction.[355] As of September 2005, other urban regions that were green building leaders, as measured by numbers of LEED-certified and registered projects, included: Chicago, Los Angeles, San Francisco, Houston, Atlanta, Pittsburgh, Washington, D.C., Portland, Oregon, and Grand Rapids, Michigan.[356]

Sustainable rehabilitation played a significant role in some of the regions with high concentrations of green architecture. In Chicago, for example, local government policy and funding placed particular emphasis on vegetated roofs – beginning in 2001 with a vegetated roof on the Classical Revival style Chicago City Hall (1911)[357] – to help reduce the city's urban heat island effect and to protect metropolitan water quality. Chicago's "Green Bungalow Initiative" program promoted sustainable updates of the historic Chicago style bungalow, a single-family housing form that is ubiquitous in many of the city's early twentieth century (1900-1940) middle-class neighborhoods. Completed in 2002, the first four green bungalows rehabilitated under the pilot program aimed to achieve energy efficiency, indoor air quality, recycled content, and low-water landscaping goals, while preserving historic character.[358]

By the 2000s, the Portland, Oregon, and Pittsburgh, Pennsylvania, regions had emerged as national green leaders with particularly high concentrations of sustainable rehabilitated buildings. As mentioned in Chapter Three, Portland's local government and public agencies encouraged green construction through policy mandates, grant funding, and technical assistance (including a Portland-specific version of LEED). Portland's institutional and popular support for green construction was also important, leading to nonprofit-driven sustainable rehabilitation projects like Ecotrust's Jean Vollum Natural Capital Center and People's Food Co-op, a 1918 house that underwent a green renovation and expansion in 2003.[359] Portland's City Hall, a Classical Revival style structure constructed in 1895, underwent a limited form of green rehabilitation as early as 1996. The rehabilitation project, which preserved original marble, plaster, wood trim, and other historic materials, involved: improvements to the thermal shell; recycling or salvage reuse of approximately 91% of construction waste; use of recycled content materials; and strategies for reducing electric demand, including installation of low-e glass, occupancy sensors, and daylighting through two restored historic light courts.[360] Private for-profit developers have also contributed to Portland's green historic stock, most notably with the LEED-NC 2.0 "Silver" rated rehabilitation of the National Register-listed Balfour-Guthrie Building (1913)[361] in 2002 and with the 2000-2006 green renovation and expansion to the historic Blitz-Weinhard Brewery Blocks.[362]

A strong local green building nonprofit (Green Building Alliance), an influential regional grantmaking foundation with interest in sustainability (Heinz Endowments and its underwriting of the Green Building Loan Fund), renowned higher education and research institutions (especially Carnegie Mellon University), and support from select corporations (such as PNC Bank) and taxpayer-funded public entities (for example, the Sports and Exhibition Authority) helped Pittsburgh and southwestern Pennsylvania to emerge as a leading region in green new and rehabilitation construction by the early 2000s. Although Pittsburgh's best known green building – the LEED-NC 2.0 "Gold" rated David L. Lawrence Convention Center (Rafael Vinoly Architects, 2003) – is new construction,[363] a significant percentage of the region's sustainable architecture involves historic rehabilitation. For example, of Pittsburgh's sixteen LEED-certified projects (February 2006), five (31%) involved some measure of adaptive reuse and historic

rehabilitation. Of these five projects, four were pioneered by nonprofit organizations.[364] In fact, beginning with the Western Pennsylvania Conservancy's sustainable rehabilitation of the Burke Building in 1996-1997, nonprofits and civic organizations played a key role in providing Pittsburgh's green rehabilitation inventory. Not all of Pittsburgh's nonprofits engaged in green rehabilitation were strictly environmental in mission: e.g., the Pittsburgh Glass Center's 2001-2002 adaptive reuse of a 1920s era storefront car showroom for its AIA "2005 Top Ten Green Project" award winning glass-art teaching studios;[365] the Pittsburgh Parks Conservancy's 2001-2002 green rehabilitation of a Tudor Revival style picnic shelter (1910) into the Schenley Park Visitor Center;[366] and Carriage House Children's Center, Inc.'s 2006-2007 sustainable updates to the National Register-listed Wightman School (1896) to become a LEED-EB rated preschool and nonprofit community center.[367] Regional institutional sustainable heritage projects were not confined to Pittsburgh's city limits, as nearby southwestern Pennsylvania examples like the Westmoreland Conservation District's Center for Conservation Education (a relocated and green rehabilitated circa 1880 barn)[368] in Greensburg and Slippery Rock University's Robert A. Macoskey Center for Sustainable Systems Research and Education (centers on a green rehabilitated circa 1920 farmhouse)[369] attest.

Analysis of green developments in regional centers like Pittsburgh and Portland suggests a transition in sustainable rehabilitation from a "first generation" (1990s) that was dominated by environmental nonprofits, academic units, and government agencies as national and regional pioneers to a "second generation" (2000s) of green rehabilitation increasingly produced for institutions with little-to-no environmental mission. In the "first generation," institutional green projects were intended to reflect and put into practice environmental missions ("practice what we preach") as well as providing tangible pioneering examples of sustainable architecture's cost, design, and technology that could in turn influence other building projects to adopt similar green features ("leading by example"). By the "second generation" in the early 2000s, however, increasing numbers of institutional sustainable architecture (new and rehabilitation) were being produced for organizations and agencies with limited, if any, direct mission or programmatic connection to environmental protection themes. While "first generation"

examples undoubtedly helped transform institutional and public attitudes regarding green design's technical, financial, and aesthetic viability, sequence does not necessarily imply causality. Rather, much "second generation" green growth, especially among government and academic sectors, can be attributed to the increasing number of institutional and public green building policies. The remainder of this chapter explores some of these "second generation" nonprofit, academic, and federal government sustainable rehabilitation projects, and the policies involved in and encouraging their construction.

Nonprofit Projects

Several nonprofit organizations with missions that are not strictly environmental have embraced green rehabilitation architecture. Broad generalizations about these nonprofits' missions as yet seem difficult to make, as they include poverty relief, social services, education, performing arts, religion, and other forms of civic engagement and social enterprise. Better statements can instead be made about their geographic distribution, which finds many of them to be "second generation" green projects in the regional concentrations and urban centers discussed above. Good examples include: the Children's Museum (Koning Eizenberg Architecture, 2004), a LEED-NC 2.1 "Silver" rated rehabilitation of (and new addition to) a historic post office (1897) and planetarium (1930) in Pittsburgh's Northside neighborhood;[370] and Portland (Ore.) Center Stage's Gerding Theater (GBD Architects, 2006), a National Register-listed armory annex (1891) rehabilitated as a LEED-NC 2.1 "Platinum" rated professional performance theater.[371]

Another notable "second generation" green project by a non-environmental nonprofit can be found in Baltimore, Maryland. In 2002, the Harry and Jeanette Weinberg Foundation – a Baltimore-based private not-for-profit focused on alleviating poverty – green rehabilitated (Design Collective, Inc.) the vacant Stewart's Department Store Building, a circa 1889 National Register of Historic Places-listed structure in Baltimore's historic central core. The greening of the Victorian-era high-style commercial block was intended to help revitalize the downtown's Westside, a now depressed section that had been the city's premier commercial district in the late nineteenth and early-to-mid-twentieth centuries. Since July 2005, Catholic Relief

Services has leased the LEED-NC 2.0 "Certified" Stewart's Building with the intent that it become their world headquarters.[372]

A significant trend among nonprofit-led green rehabilitations is the emergence of Christian religious institutions as sustainable architecture clients. For these religious communities, commitments to alleviate poverty, social injustice, and environmental degradation are seen as interconnected moral imperatives demanded by their Christian faith, i.e., "caring for all of God's creation." Notable religious green rehabilitation projects have occurred in 2002 to the Gothic Revival style Trinity Episcopal Cathedral (1907) in downtown Cleveland, Ohio,[373] and in 2001-2003 (LEED-NC 2.0 "Gold"; Perkins Eastman Architects) to the Felician Sisters convent (1932) in Coraopolis, Pennsylvania.[374] The former involved the construction of a preservation-sensitive, compatible new addition linking the cathedral proper with several nearby historic commercial buildings, creating a greened complex known collectively as Trinity Commons.[375] Although the latter involved an almost complete gutting of the historic convent's interior, it also saw the preservation of the chapel and the structure's stained glass, and extensive reuse of salvaged historic materials, including doors, wood flooring, cabinetry, baseboards, and trim.[376] In addition to these projects, two of the best known religious green rehabilitations have been at the Sisters, Servants of the Immaculate Heart of Mary (SSIHM) motherhouse in Monroe, Michigan, and at Henry Hobson Richardson's masterpiece Trinity (Episcopal) Church in Boston, Massachusetts.

In January 2003, SSIHM – a Monroe, Michigan-based Catholic religious community dedicated to education and social justice – completed a two-year, $56 million green rehabilitation of their redbrick, Art Deco style motherhouse (1932) as a practical reflection of their institutional commitment to sustainability as a moral mandate.[377] The SSIHM project received an AIA "Top Ten Green Project" award (2006) and a LEED-NC 2.0 "Certified" rating for, among other features, its ground-source heat-pump system, a manmade wetland created for onsite graywater filtration and reuse, and green construction materials content.[378] Although ninety percent of the interior was gutted[379] to accommodate a senior assisted-living center floor plan, project photographs show that the motherhouse rehabilitation sensitively preserved the structure's exterior, restored the Art Deco lobby, and strived to maintain the property's character by reusing doors, cabinets,

Figure 4.1: In 2002, the Harry and Jeanette Weinberg Foundation rehabilitated the circa 1889 Stewart's Department Store Building as LEED-NC 2.0 "Certified" office space. Circa 2002. Image Courtesy of Design Collective, Inc. / Bob Creamer Photography. Used with permission.

Figure 4.2: A green rear addition (not shown here) links the Gothic Revival style Trinity Episcopal Cathedral (right) with several historic commercial storefronts (left) to form the Trinity Commons complex in downtown Cleveland, Ohio. View looking southeast. Spring 2007. Author photograph.

Figure 4.3: Post-rehabilitation view of the historic Felician Sisters motherhouse in Coraopolis, Pennsylvania. The building is LEED-NC 2.0 "Gold" rated. Circa 2003. Courtesy of Perkins Eastman Architects. Used with permission.

Figure 4.4: View of the historic Sisters, Servants of the Immaculate Heart of Mary motherhouse in Monroe, Michigan, after its LEED-NC "Certified" rated rehabilitation. Circa 2003. Photograph by Susan Maxman & Partners. Courtesy of Sisters, Servants of the Immaculate Heart of Mary. Used with permission.

window frames, and Depression-era light fixtures and selecting historically compatible new designs and materials.[380] The SSIHM rehabilitation by Susan Maxman and Partners Architects, received a "Build Michigan Award" from the Michigan Historic Preservation Network in 2003.[381]

As of writing, Henry Hobson Richardson's Trinity Church on Copley Square in Boston's Back Bay neighborhood is arguably the most historically significant American building to have undergone sustainable updating. Dedicated in 1877, the polychromatic Trinity Church helped establish Richardson's reputation as an American architectural master and sparked the Richardsonian Romanesque style. Inside, John LaFarge was responsible for the church's decorative paintings and ornate, large-scale murals, which are credited with influencing the growth of the American Mural Movement.[382] Trinity Church was designated a National Historic Landmark in 1970.[383]

From 2002 to 2005, Trinity Church and its adjacent parish house (also designed by Richardson) underwent a $53 million restoration and expansion project led by the Boston-based architectural firm of Goody Clancy, Inc. A notable project achievement was the reconfiguration of the church's shallow, unfinished basement into a large conditioned space, known as the Undercroft, for meetings and lectures. Significant green features were incorporated into the project, although the church decided not to pursue LEED certification. Examples of green features include: six wells for a ground-source heat-pump system (which also avoids the visually jarring intrusion of a conventional roof-mounted HVAC system); an automatic irrigation system tied to rain sensors; water conserving plumbing fixtures; energy-efficient lighting and sensors, recycled content construction materials; and low VOC off-gassing paints, carpeting, adhesives, and composite wood. The most significant project achievements, however, were the efforts to preserve this National Historic Landmark's architecture, restore its thirty-three stained glass windows, and conserve its murals, all of which earned the project a 2006 "National Preservation Honor Award" from the National Trust for Historic Preservation.[384]

Academic Policies and Projects

Since the early 2000s, academic institutions also increasingly embraced green rehabilitation for projects not formally related to environmental science programs or

Figure 4.5: This portion of a circa 1903 panoramic photograph shows Trinity Church (Boston) and its Parish House, which is attached to the church proper by a cloistered walkway. Bolyston Street is on the left. View looking northeast. Photograph by E. Chickering & Co. Source: Prints and Photographs Division, Library of Congress. (Library of Congress Prints & Photographs Online Catalog, http://www.loc.gov/rr/print/catalog.html; call number: PAN US GEOG - Massachusetts no. 91 (E size) [P&P]; digital ID: (digital file from intermediary roll film copy) pan 6a06454 http://hdl.loc.gov/loc.pnp/pan.6a06454 (digital file from b&w film copy neg.) cph 3c22592 http://hdl.loc.gov/loc.pnp/cph.3c22592; card number: 2007661064.)

Figure 4.6: This circa 2006 photograph shows Trinity Church in its Copley Square context. View looking northeast. Courtesy of Trinity Church in the City of Boston. Used with permission.

Figure 4.7: Photograph of Trinity Church's unfinished basement before rehabilitation. Circa 2002. Photograph © Peter Vanderwarker. Courtesy of Trinity Church in the City of Boston. Used with permission.

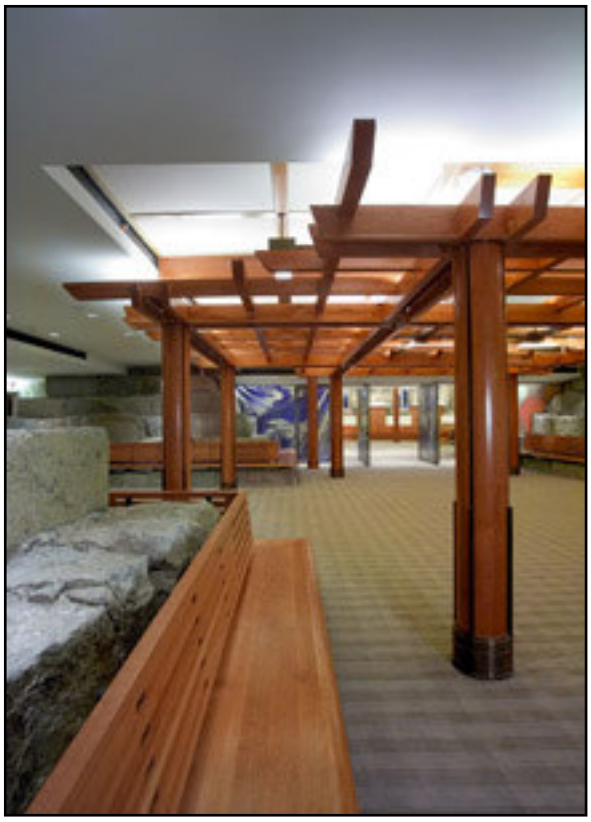

Figure 4.8: Photograph of Trinity Church's basement rehabilitated as the "Undercroft," a conditioned space for meeting, lectures, and fellowship. Trinity Church's 2002-2005 restoration and rehabilitation, which included the creation of the Undercroft, incorporated nontoxic and recycled content materials, energy-efficient lighting, and a ground-source heat-pump system. Circa 2005. Photograph © Peter Vanderwarker. Courtesy of Trinity Church in the City of Boston. Used with permission.

natural resource schools. Academic green new construction became geographically diverse and numerous. Notable early examples include: the Whitehead Biomedical Research Building, a LEED-NC 2.0 "Silver" rated eight-story laboratory building by HOK, Inc., that was completed in October 2001 at Emory University in Atlanta;[385] Roberts Hall, a LEED-NC 2.0 "Silver" rated low-rise residence building by SERA Architects, Inc., that was completed in September 2002 at Lewis and Clark College in Portland, Oregon;[386] and the Vermeer Science Center, a LEED-NC 2.0 "Silver" rated sciences hall by Holabird and Root that was completed in summer 2003 at Central College in Pella, Iowa.[387]

Academic green rehabilitation projects for non-environmental purposes, although less common than green new construction examples, were similarly geographically dispersed. For example, green rehabilitation of historic residence halls occurred: at Hamilton College (Skenandoa House, 1922, LEED-NC 2.1 "Silver" rated rehab in 2004) in Clinton, New York;[388] at Clemson University (Greek Community on the Quad, 1937, gut rehab 2005) in Clemson, South Carolina;[389] and at Duke University (Kilgo Quadrangle Dormitory, 1931, rehab 2003) in Durham, North Carolina.[390] A number of sustainable rehabilitations involved historic buildings that are important campus landmarks linked with institutional identity. At Emory University, for example, a 2002-2003 rehabilitation of the Renaissance Revival style Asa Griggs Candler Library (Edward L. Tilton, 1924) by S/L/A/M Collaborative Architecture restored the historic Matheson Reading Room while also earning a LEED-NC 2.0 "Silver" rating.[391] Historic student unions at the University of Colorado-Boulder and Mount Holyoke College also underwent sustainable updating. A 2002-2003 gut renovation and addition to Mount Holyoke's historic Blanchard Campus Center (1900) earned a LEED-NC 2.0 "Certified" rating,[392] while green renovations and an expansion completed in 2002 to University of Colorado-Boulder's University Memorial Center (1953) achieved a LEED-EB 2.0 "Silver" rating.[393]

In May 2005, Vermont Law School dedicated its green rehabilitated Debevoise Hall (1893), a contributing structure within a National Register historic district. The LEED-NC 2.1 "Silver" rated classroom and administrative building by Truex Cullins and Partners Architects sensitively preserved the original Queen Anne style structure, which

was the first central school in the South Royalton, Vermont area. The local landmark, with its prominent historic bell tower visible throughout the village and from the nearby interstate, incorporated a long list of green features: composting toilets; waterless urinals; lights with motion-sensors and daylight-dimmer controls; five enthalpy energy-recovery wheels; "super-insulating" interior windows installed behind the exterior historic windows; indoor air quality maximizing strategies; inclusion of recycled content materials and Forest Stewardship Council certified wood; daylighting from new and historic transoms; and a historically compatible addition. The project is notable for its strong and well-integrated preservation component, the results of which include the preservation of historic wainscoting, doors, trim, blackboards, wood flooring, and tin ceilings in the building's historically significant entrance, hallways, classrooms, and central stairwell. Of particular interest are several *trompe d'oeil* paintings marking the historic locations of now removed doors.[394]

At least two other university green projects involved non-campus historic structures rehabilitated for academic purposes. In 2004, North Dakota State University opened a downtown Fargo facility for their visual arts, architecture, and landscape architecture programs in the green rehabilitated, Richardsonian Romanesque style Robb Lawrence Manufacturing Company / Northern School Supply Company Warehouse (1903). The LEED-NC 2.0 "Certified" (anticipated as of writing) project by Michael J. Burns Architects, Inc., earned federal historic rehabilitation tax credits (RITC), which were sold through a corporate partnership.[395] The project also received a 2005 "Success Story Award" from Preservation North Dakota and a 2006 "National Preservation Honor Award" from the National Trust for Historic Preservation.[396] Across the country, work on Los Angeles City College's new Northeast Satellite Campus is expected to begin in spring 2007 (as of writing). The centerpiece of the three-building campus complex is the Dutch Renaissance Revival style Van de Kamp Bakery Building (1930), which will be green rehabilitated to achieve LEED-NC and Building Research Establishment Environmental Assessment Method (BREEAM) ratings, the first project in the world to aspire to both those aims.[397]

At least two academic green rehabilitation projects have earned certification under the USGBC's Leadership in Energy and Environmental Design for Commercial Interiors

Figure 4.9: Emory University's Asa Griggs Candler Library underwent a LEED-NC 2.0 "Silver" rated rehabilitation in 2002-2003. The project also restored the historic Matheson Reading Room. View looking southwest. Photograph by Woodruff / Brown Photography. Courtesy of The S/L/A/M Collaborative, Inc. Used with permission.

Figure 4.10: Circa 1908 photograph of South Royalton Graded School. View looking northwest. Courtesy of Vermont Law School, South Royalton, Vermont. Used with permission.

Figure 4.11: Vermont Law School's rehabilitated Debevoise Hall combines energy efficiency, water reduction, and other sustainable features with sensitive historic preservation. View looking northwest. Winter 2006. Author photograph.

Figure 4.12: "Super-insulating" windows were installed behind historic windows during Debevoise Hall's green rehabilitation. Winter 2006. Author photograph.

pilot program (LEED-CI 1.0). LEED-CI, which began as a LEED pilot program in 2002, is intended to address green interior improvements generally undertaken by a tenant who has little-to-no input or control over the larger building's characteristics.[398] The Harvard School of Public Health's LEED-CI 1.0 "Certified" rated green renovation of its fourth floor leased space in the Art Deco style Landmark Center (1929) in Boston's Fenway neighborhood is a good example of this tenant-owner relationship.[399] Project photographs suggest Harvard Public Health heavily modified a mostly empty leased space to achieve energy efficiency, water conservation, indoor air quality, and office / workspace configuration goals. However, the opposite seems to be case at Colorado State University's LEED-CI 1.0 "Silver" rated Guggenheim Hall (1910) green classrooms. Completed during summers 2002 and 2003, the three classrooms (rooms 221, 226, and 227) in the historic masonry building were green rehabilitated according to the designs of a graduate class in facility planning and management. Designs decisions, including restored historic woodwork and historically compatible ceiling fans, helped to maintain the classrooms' historic character.[400]

A significant difference between early academic sustainable projects from the mid- and late 1990s and those in the early 2000s was that the latter were increasingly constructed under green buildings policies and specifications. As of December 2006, various mandates and goals for campus construction to achieve some threshold of LEED certification (or equivalent) had been adopted by at least thirty-one American academic institutions and university systems.[401] Examples of these institutions (with dates of commitment to green building) include: Carnegie Mellon University in fall 2001;[402] the University of Florida in 2001;[403] the Massachusetts Institute of Technology in 2001;[404] by state executive order for Arizona's state-funded universities and colleges in 2005;[405] and for the University of California system in early 2006.[406]

In September 2005, the University of Vermont (UVM) adopted a campus-wide green buildings policy, committing the land-grant institution in Burlington to achieving LEED "Certified" ratings (or equivalent) in new construction and major renovation projects.[407] Work on significant new green construction (i.e., a residential learning complex, a science building addition, and a new student union) had begun earlier, based on and strengthening institutional master-planning policies and marketing to brand UVM

as a premier national environmental university.[408] UVM dedicated its six-building University Heights Student Residential Learning Center in September 2006, with a LEED-NC "Certified" rating anticipated.[409] The Dudley H. Davis Center student union, completed in late August 2007, aims to achieve LEED-NC 2.1 "Silver" level certification.[410]

A lower-profile UVM project, the sustainable rehabilitation of the historic E.J. Booth House, reflects the themes discussed above, particularly institutional policy-driven green rehabilitation intended for non-environmental purposes. The three-story, redbrick, Colonial Revival style E.J. Booth House – known at UVM by its address (438 College Street) because the university had previously given another structure the name "Booth House" (86 South Williams Street) – was constructed in 1908 for Edward J. and Ina V. Booth, a prominent Burlington family, by local architect A. I. Lawrence.[411] In 1950, the Roman Catholic Diocese of Burlington purchased the house from the estate of Ina Booth as housing for the Religious Hospitalers of St. Joseph, a convent in charge of the neighboring DeGoesbriand Hospital.[412] The convent renovated the structure, including removing the house's porte-cochere, enclosing the west porch, and converting the rear brick garage into a novitiate.[413] UVM purchased the E.J. Booth House from the Catholic diocese in July 1997, although the university had no immediate plans for the building.[414] The building stood empty, but heated and maintained, until work began in 2005 to convert it into administrative space for the UVM College of Arts and Sciences Dean's Office.[415]

The E.J. Booth House green rehabilitation, completed in July 2006, aimed for sustainable and preservation goals. Although initial rehabilitation planning did not incorporate green features, subsequent design changes in line with UVM's environmental strategies were intended to achieve a LEED-NC "Certified" rating. According to architect Keith Robinson (Black River Design), sustainable design features planned as of October 2005 included, among others: an onsite electric vehicle recharging station; Forest Stewardship Council certified sustainably harvested wood; low VOC off-gassing paints and adhesives; a tightened thermal envelope; and showers, lockers, and storage facilities for bicycling employees.[416] Preservation goals, as determined in consultation with Vermont's state historic preservation office, were excellently met, including preservation

Figure 4.13: Photograph of North Dakota State University's Downtown Campus. The building's rehabilitation earned federal historic preservation tax credits (RITC) and a LEED-NC 2.0 "Certified" rating. View looking south. Circa 2004. Photograph by Saari and Forrai Photography. Courtesy of Michael J. Burns Architects, Ltd. Used with permission.

Figure 4.14: This 1950 photograph from the *Burlington Free Press* newspaper shows the E.J. Booth House (438 College Street) at its purchase by the Roman Catholic Diocese of Burlington, Vermont. View looking north. Courtesy of Campus Planning Services, University of Vermont.

Figure 4.15: This photograph, taken in early December 2007, shows the University of Vermont's E.J. Booth House after green rehabilitation. Work to reopen the side porch (left) and to recreate the porte-cochere (right) were part of plans to restore the building's primary façade to its 1950 appearance. View looking northeast. Author photograph.

Figure 4.16: Much interior historic fabric was preserved during the sustainable rehabilitation of the E.J. Booth House. December 2007. Author photograph.

of the structure's historic interior woodwork, stained glass windows, fireplaces, grand stairway, and bathroom fixtures. The west porch was restored to its original open appearance, and a replica porte-cochere was installed in its original front façade location. A three-story rear addition provides new office space, an elevator, restrooms, and accessible entrance in a historically compatible, yet contemporary redbrick style. The new addition is screened from street view by the original house.[417]

Federal Government Policies and Projects

The U.S. Navy, through its Naval Facilities Engineering Command (NAVFAC), was an early federal implementer of sustainable design. A mid-1990s Base Realignment and Closure (BRAC) relocation of NAVFAC headquarters from leased space in Alexandria, Virginia, to the historic Washington Navy Yard (along the Anacostia River in southeastern Washington, D.C.) resulted in one of the first sustainable design projects completed for the Navy and the U.S. Department of Defense. The project, completed in July 1998, involved adaptive reuse and greening of four historic, industrial-utilitarian, masonry structures located on the south and east sides of the Naval Yard's Sanger Quadrangle to create administrative and headquarters space for NAVFAC, the U.S. Navy Office of the Judge Advocate General, and the Naval Legal Services Command. The earliest and largest structure, the four-story, open-interior Building 33, was constructed in 1855 and originally housed workspace for blacksmiths, boiler-makers, and other workers involved in naval ship engine fabrication and maintenance. The other structures (Buildings 37, 39, and 109) were constructed between 1855 and 1895 as open-interior accessory units supporting Building 33's manufacturing operations. From the late nineteenth to the mid-twentieth century, the buildings were retooled to house ordnance production facilities. The buildings served as storage warehouses following the 1958 discontinuance of ordnance production at the Washington Navy Yard. All four buildings are contributing structures within the Washington Navy Yard National Historic Landmark district, which recognizes the yard's historic significance as the U.S. Navy's first (1799) shipbuilding facility.[418]

The Sanger Quadrangle greening project incorporated then-innovative sustainable design features while playing close attention to the preservation of historic exterior walls,

windows, and roofs. To preserve the historically significant façades and shell, new load-bearing structural frameworks were constructed within each existing building's open interior, thus allowing the creation of a new two- or three-story "building within a building." These new "interior buildings" were designed as modern office space and featured many green innovations, including: daylighting from skylights (on secondary façades); water conserving toilets, showers, and other fixtures; recycled and salvage content construction materials; super-efficient interior windows; minimal VOC off-gassing materials; recycling of construction and demolition waste; and dimmers and occupancy sensors to reduce demand for artificial lighting. The greening project also joined the four buildings together with a new, yet architecturally compatible, three-story connector, thus giving the rehabilitated structures the single, collective name of Building 33.[419]

In many ways, the Building 33 sustainable rehabilitation belongs, in both its timeframe and design process themes, to the earlier, pre-LEED era pioneers and pilot projects discussed in Chapters One and Two. For example, the Sanger Quadrangle adaptive reuse project was originally intended as conventional renovation / construction. A sustainable rehabilitation approach was selected only later after a case-specific examination by naval, architectural, and engineering experts revealed the difficulties, complexities, and opportunities involved in greening. Upon completion – and like other projects discussed in earlier chapters – Building 33 served as a demonstration and learning project for NAVFAC and the U.S. Navy by providing quantifiable feedback on the success (or lack) of certain sustainable design strategies and technologies, by suggesting lessons for better design practice and process, and by shaping subsequent green building policy formulation.[420] Yet, despite these commonalities, the Building 33 project signaled an emerging theme in federal green buildings and sustainable rehabilitation: namely, green construction for building purposes unrelated to "environmental" missions.

Between the late 1990s and early 2000s, federal law, executive orders, and administrative guidance drove this trend and pushed the formulation of specific department and agency-level policies mandating sustainable design in construction projects. While policy directions, and targets for, green building-related energy

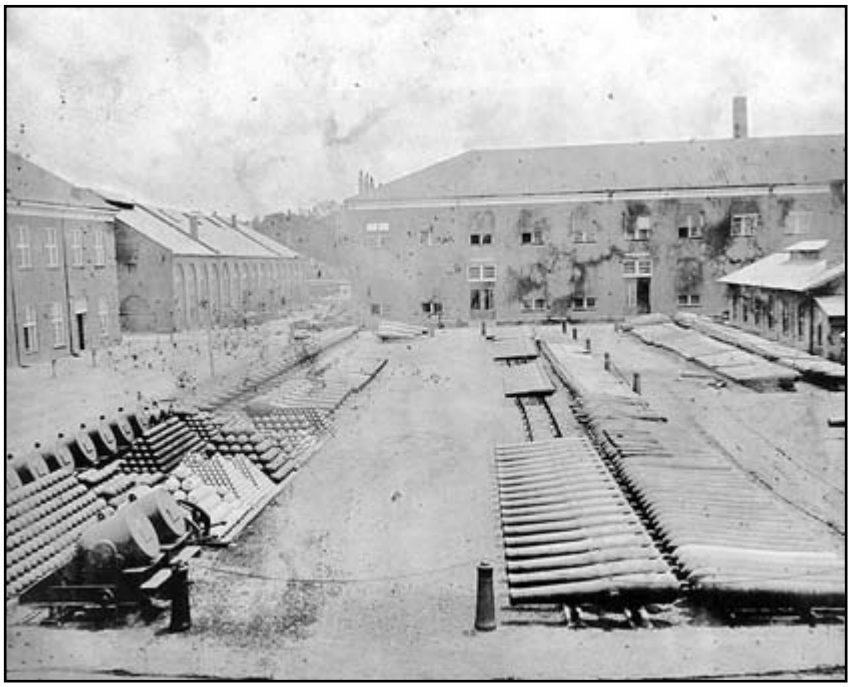

Figure 4.17: Photograph taken in June 1866 showing the Washington Naval Yard's Naval Ordnance Yard (today's Sanger Quadrangle). Building 33 is in the background center. View looking east. Photograph by Brady & Company. Source: Naval Historical Center, U.S. Department of the Navy. (Naval Historical Center Online Library, photo number: NH57932, http://www.history.navy.mil/photos/images/h57000/h57932.jpg.) Photograph in public domain.

Figure 4.18: Photograph showing Building 33 in the Sanger Quadrangle, Washington Naval Yard, after green rehabilitation. Circa 1998. Photograph by Jeffrey Totaro. Courtesy of EwingCole. Used with permission.

efficiency, water conservation, and recycling goals were articulated in earlier federal statutes and executive orders (in particular, Section 6002 of the Resource Conservation and Recovery Act of 1976; Subtitle F of the Energy Policy Act of 1992; and Executive Order (EO) 13101 ("Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition") in 1998) it is the Clinton Administration's EO 13123 ("Greening the Government Through Efficient Energy Management"), issued June 3, 1999, that laid the explicit basis for federal policies and programs in sustainable design construction.[421] Under section 403(d) of EO 13123, the U.S. Department of Defense (DOD) and the U.S. General Services Administration (GSA) were directed to develop, in consultation with the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA), "sustainable design principles," which would be applied to the "siting, design, and construction of new facilities."[422] (The sustainable design principles for federal agencies developed under EO 13123 included: optimize site potential; minimize nonrenewable energy consumption; use environmentally preferable products; protect and conserve water; enhance indoor environmental quality; and optimize operational and maintenance practices.)[423] In 2002, the Office of Management and Budget, a White House office involved in presidential oversight of federal agencies, in effect clarified the form and implementation of those section 403(d)-sustainable-design principles, by encouraging government agencies "to incorporate EnergyStar or LEED building standards into up front design concepts for new construction and/or building renovations."[424] Three years later, the Energy Policy Act of 2005, signed by President George W. Bush on August 8, 2005, wrote EO 13123's sustainable design prescriptions into law (as compared to administrative directive), mandating green building principles for "siting, design, and construction of all new and replacement [federal] buildings."[425]

In the early 2000s, these federal sustainable design mandates did not translate into a uniform government-wide standard or program for implementing green building practices. Instead, individual departments and agencies adopted various measures, timetables, and circumstances for meeting sustainable design goals. By December 2006, LEED standards had become the most popular, with at least nine federal departments and independent agencies adopting policies encouraging or requiring some threshold of LEED certification (most often a "Silver" rating).[426] As of fiscal year 2002, these nine

agencies controlled over three-fourths (approximately 78.7%) of the total square footage in the federal government's building inventory.[427] One of these nine agencies, only the U.S. Department of Health and Human Services, permitted the use of either LEED or the competing Green Globes rating system.[428] The U.S. Army was the other maverick, having introduced in spring 2001 its own green construction standards, called the Sustainable Project Rating Tool (SPiRiT).[429] In January 2006, however, the Army announced it would begin transitioning from SPiRiT to LEED, with full implementation of LEED in its fiscal year 2008 construction budget.[430]

The U.S. General Services Administration (GSA) – the federal agency responsible for managing, renovating, leasing, and adaptive reusing 1,600 owned and 6,400 leased buildings (approximately 335 million total square feet of space) to meet the office and workspace needs of most non-military government agencies – was an early participant in sustainable design.[431] Notable early GSA green building activities included: developing, with DOD, DOE, and EPA, federal sustainable design principles pursuant to EO 13123; joining the U.S. Green Building Council in January 2001 as its first federal agency member;[432] and pioneering major green building projects in Washington, D.C., (EPA Federal Triangle headquarters, adaptive reuse, 1994-2002) and Denver, Colorado (Alfred A. Arraj U.S. Courthouse, new construction, 2000-2002).[433]

Beginning with fiscal year 2003, GSA's *Facilities Standards for the Public Buildings Service* (the agency's building standard, containing "policy and technical criteria to be used in the programming, design, and documentation of GSA buildings"[434]) adopted a LEED-certification mandate so as to aid, measure, and ensure the application of sustainable design principles in GSA's public building projects. Under the *Facilities Standards*, all new construction and substantial renovations that began the GSA design process in or after fiscal year 2003 were expected to achieve, at minimum, a basic LEED rating, with "Silver" level certification encouraged as the target goal.[435] Technical guidance for sustainable design policy implementation was to be provided by the GSA Office of Applied Science's Sustainable Design Program. As of summer 2005, that program consisted of three LEED-accredited design professionals based at the agency's national headquarters in Washington, D.C., and was supported by Green Building Coordinators in GSA field offices nationwide.[436]

As of spring 2007, GSA had seventeen LEED-certified (-NC, -EB) owned, co-managed,[437] or leased buildings. (At the same time, the federal government as a whole had fifty-seven buildings LEED-certified; GSA and DOD (thirteen buildings) had over half of that total.)[438] Only three of those seventeen buildings (17.6%) – and all three were new construction – were constructed for agencies with some environmental mission and function (EPA and the National Park Service); the remaining thirteen included courthouses, office buildings, and even a child-care facility. Two of those seventeen are listed in the National Register of Historic Places; a third is potentially soon eligible for listing based on age and architectural merit.[439]

The Scowcroft Warehouse, located in Ogden, Utah's historic warehouse district, was the first of these three historic buildings to undergo a sustainable, LEED-rated rehabilitation. Completed in February 2004 by Cooper Roberts Simonsen and Associates Architecture, the $12 million project involved the rehabilitation of the vacant, National Register-listed Scowcroft Warehouse (Leslie S. Hodgson, 1906) – a four-story, flat-roofed, brick structure that once was the central warehouse and offices of the John Scowcroft and Sons Company, a major western states dry goods dealer – into LEED-NC 2.0 "Silver" rated office space. The project was a complex public-private partnership involving the sale of the warehouse by the city of Ogden to a private developer (Cottonwood Realty Services), who rehabilitated the structure and then leased it to GSA for office space intended for the Internal Revenue Service. The project received a 2004 "Heritage Award" from the Utah Heritage Foundation and also qualified for federal historic rehabilitation tax credits (RITC) for Cottonwood Realty.[440]

Unlike the Scowcroft Warehouse project, GSA's second LEED-rated historic rehabilitation involved a GSA-owned building, the Howard M. Metzenbaum U.S. Courthouse,[441] a National Register-listed structure[442] in downtown Cleveland, Ohio. Constructed 1903-1910 under the designs of architect Arnold W. Bunner, the Beaux-Arts style building originally housed Cleveland's main U.S. post office and U.S. courthouse as well as the "official residences of every [f]ederal official at work in Cleveland," including those of the Bureau of Internal Revenue, the Hydrographic Office, the U.S. Geological Survey, the Inspector of Steamboats, the Pension Bureau, the Immigration service, the War Department, and Civil Service examination service.[443] The dignified, five-story,

Figure 4.19: Ogden, Utah's historic Scowcroft Warehouse (1906) underwent a LEED-NC 2.0 "Silver" rated rehabilitation, reopening in 2004 as office space for the U.S. Internal Revenue Service. View looking southwest. Circa 2004. Photograph © Paul Richer. Courtesy of Cooper Roberts Simonsen & Associates Architecture. Used with permission.

Figure 4.20: Circa 1915 postcard view of Cleveland, Ohio's U.S. Post Office, Custom House, and Courthouse. View looking northeast. Courtesy of Great Lakes Regional Historic Preservation Office, U.S. General Services Administration.

flat-roofed, granite Metzenbaum courthouse (which was constructed at an original cost of $3,318,000) features Corinthian columns and pilasters, an elaborate cornice with stone American eagle coats-of-arms, and two large, Neoclassical, allegorical sculptures ("Jurisprudence" and "Commerce" both by Daniel Chester French) outside, at street level, near the primary entrance.[444] Inside the main entrance, the grand public lobby's walls, floors, and vaulted ceiling are surfaced entirely in marble veneer.[445] Elaborate allegorical murals depicting regional history, law, commerce, urban planning, and mail delivery originally decorated: the Circuit Court Room ("The Law" by Edwin H. Blashfield); the Office of the Collector of Customs ("Passing Commerce Pays Tribute to the Port of Cleveland" by Kenyon Cox); the Court Library ("Knowledge" and "Persuasion" both by Frederic Crowninshield); the Office of the Appraiser ("The City of Cleveland, supported by Federal Power, Welcomes the Arts bearing the plan for the new Civic Center" by Will H. Low); the Office of the Postmaster (thirty-five murals collectively known as "Postal Delivery" by Francis D. Millet); the District Court Room ("The Common Law" by H. Siddons Mowbray); and the Office of the District Attorney ("Battle of Lake Erie, September 10, 1813" by Rufus F. Zogbaum).[446] As described below and illustrated in figures 4.21, 4.22, and 4.23, much of this historic exterior and interior architectural grandeur remains or was sensitively restored.

Yet the courthouse's significance rests not only in its intact high-style historic architecture and detailing, but also in its status as the first structure sited and built under proposals of the Cleveland Group Plan, drafted in 1903 by Daniel H. Burnham, John M. Carrère, and Arnold Brunner. All three were nationally prominent architects of the time, especially Burnham, who was responsible for the influential Neoclassical design theme for Chicago's World Columbian Exposition (1893). The Cleveland Group Plan envisioned the construction of a City Beautiful civic center, consisting of a formal park-like, grand mall lined with leading government and cultural buildings executed in monumental, Neoclassical architectural styles and terminating in a central rail station on the Lake Erie shore. As with similar contemporaneous city center plans (e.g., the McMillan Plan (1901) for Washington, D.C., and Burnham's plans for Duluth, Minnesota (1908) and Chicago (1909)), the Cleveland Group Plan's essential theme and intent was that its dignified spatial and architectural design recommendations would lend urban

grandeur, civic pride, respect for enduring government power and social order, and, above all, beauty to Cleveland, which was then a major industrial center and the nation's sixth-largest city. By 1930, six federal, county, municipal, and public cultural buildings had been designed, sited, and constructed under the Neoclassical concepts of the 1903 plan, making Cleveland's Group Plan district perhaps second only to Washington, D.C.'s federal core as the most-complete planned City Beautiful civic center.[447]

Federal offices and activities, most notably the main U.S. post office in 1934 and the U.S. district court in 2002, gradually moved out of the Metzenbaum courthouse.[448] New federal construction in downtown Cleveland, including the Anthony J. Celebrezze Federal Building (1967) and the Carl B. Stokes U.S. Courthouse and Federal Building (2002), also diminished the federal role of the Metzenbaum courthouse. In 2002, GSA began planning a major rehabilitation of the building, intending to outfit it mainly for the U.S. Bankruptcy Court for the Northern District of Ohio, the Office of the U.S. Trustee, and the U.S. Marshals Service.[449] The Metzenbaum courthouse rehabilitation was completed by June 2005.[450]

The two-year, $51 million project by Westlake Reed Lekosky Architects was intended to achieve security, sustainable design, and preservation goals. A key design strategy in meeting the first involved the conversion of the open-air central courtyard into a skylight-enclosed atrium. As the atrium is connected to the historic main lobby and elevators, it allows public access to courtroom galleries but not to the historic corridors, which are now secure and reserved only for court staff and other federal employees.[451] Sustainable design features incorporated in the courthouse rehabilitation include: installing water conservation fixtures; reusing (97%) the existing structure and shell; employing construction practices and materials for maximizing indoor air quality; recycling (55%) and salvage onsite reuse of demolition and construction waste; and putting in an energy-efficient HVAC system.[452] These green features helped the Metzenbaum courthouse earn a LEED-NC 2.0 "Certified" rating in 2006.[453]

Preservation of the courthouse's historically significant characteristics seems to have been excellently achieved. An examination of the Ohio Historic Preservation Office's (OHPO) project review file suggests that OHPO's greatest preservation concern (as a Section 106 adverse effect) was how the historically significant main lobby might

be impacted, visually and in loss of historic fabric, by proposed designs for the security screening apparatus, wheelchair access, and the connection to the new skylight-covered atrium. (Other preservation concerns raised by OHPO included the planned demolition and conversion of the second floor northern hallway into tenant office space and the relocation of historic doors.)[454] Yet, an author visit to the rehabilitated building in August 2005 and review of pre- and post- project photographic evidence suggests the final design scheme that was adopted (with influence from OHPO and GSA's historic preservation staff) does not overly detract from the lobby's historic "open" character. In addition, several other design decisions contribute in positive ways toward preserving and restoring the structure's historic character. Notable examples include: the sensitive installation of fire detection and sprinkler systems in historically significant spaces; the restoration of historic walls, floors, murals, and architectural details; the conservation of decorative paint treatments in courtrooms, judicial chambers, offices, hallways, and public spaces; restoration of historic corridor plaster ceilings, which had been concealed by dropped ceilings installed in the 1960s to accommodate air conditioning; and the conservation, restoration, and public display of Francis D. Millet's thirty-five "Postal Delivery" murals, which had been original to the building but in storage since 1955.[455] GSA's Metzenbaum courthouse rehabilitation received preservation awards from OHPO in 2005 and from the nonprofit Cleveland Restoration Society / Preservation Resource Center of Northeastern Ohio in 2006 ("Trustees Award for Preservation Achievement").[456]

Unlike the National Register-listed Scowcroft Warehouse and Metzenbaum courthouse, the Byron G. Rogers U.S. Courthouse – a downtown Denver, Colorado, Mid-Century Modern / Formalist style skyscraper-and-pavilion complex completed in 1965 by the architectural firms Fisher and Davis and James Sudler Associates – has not, as of writing, reached the National Register's fifty-year threshold for "historic" eligibility. In 2000, GSA began planning the renovation of the Rogers courthouse under a pilot "First Impressions" program designed to improve the appearance of security, signage, entries, and overall public and tenant "first impressions" of federal buildings, especially those from postwar Modernist era. Outcry from local Modernist proponents, however, drew attention to the proposed building changes and their potential to alter some of the

Figure 4.21: The historic Howard M. Metzenbaum U.S. Courthouse underwent a LEED-NC "Certified" rated rehabilitation in 2004-2005. View looking northeast. Summer 2005. Author photograph.

Figure 4.22: View of the Metzenbaum U.S. Courthouse's historically significant public entry lobby after the 2004-2005 rehabilitation. Summer 2005. Author photograph.

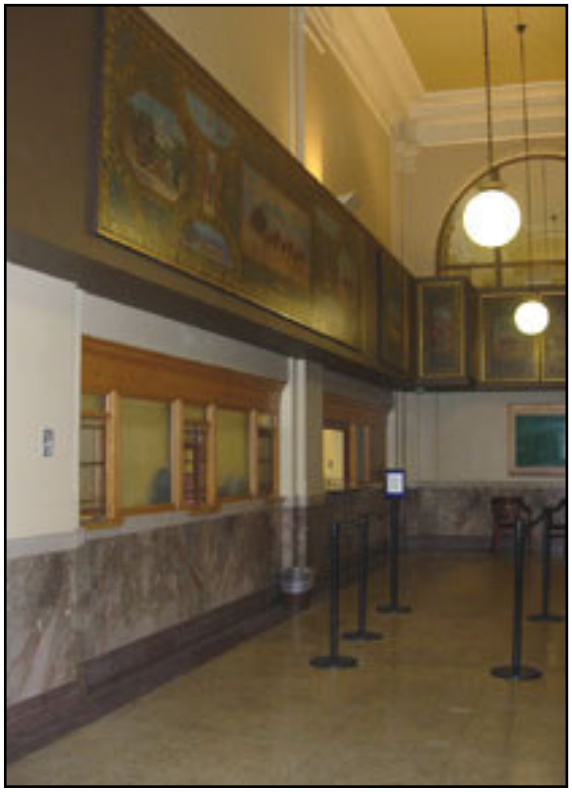

Figure 4.23: View of the Metzenbaum U.S. Courthouse's restored (former) postal lobby. During the 2004-2005 rehabilitation, Francis D. Millet's thirty-five "Postal Delivery" murals were removed from storage, conserved, and installed for public display above the teller windows. Summer 2005. Author photograph.

Figure 4.24: View of the Byron G. Rogers U.S. Courthouse, in downtown Denver, Colorado. Fall 2006. Photograph by Carol M. Highsmith. Source: Library of Congress (LC-DIG-pplot-13825-01823). Copyright-free image.

building's significant character-defining features. In subsequent consultation with Colorado's state historic preservation office and local Modernism preservationists, GSA recognized the Rogers courthouse's future National Register eligibility and, as a result, altered renovation designs to better respect and maintain the building's original architectural character and integrity.[457]

Following the Rogers courthouse case, GSA devoted increased recognition to the preservation of its soon-to-be-eligible Mid-Century Modern buildings inventory, which possibly includes over 200 large (25,000 gross square feet or larger) structures constructed between 1960 and 1980.[458] Yet, how will preservationists' emerging recognition of the worth of the not-yet-historic interact with GSA policy mandates for sustainable design? The Rogers courthouse again provides clues and strategies, having achieved a LEED-EB 1.0 "Gold" rating in September 2006 through green operational and landscaping practices, green power (100%) usage, reflective roofing, and ongoing monitoring of optimized HVAC system efficiency.[459] As of summer 2005, other Mid-Century Modern GSA buildings with future potential for historic eligibility that are scheduled for preservation-sensitive, sustainable (LEED) upgrading include: the Brutalist style Minton-Capehart Federal Building (1974) in downtown Indianapolis, Indiana;[460] and the Formalist style Margaret Chase Smith Federal Building (1967) in Bangor, Maine.[461] Despite these tentative models, the challenges of Mid-Century Modern buildings loom large in the near future for the historic preservation and sustainable design professions and movements. How can these communities interact collaboratively over structures that are, on the one hand, decried as the very antithesis of good green design, and, on the other hand, increasingly recognized and even celebrated as architectural landmarks?

Chapter Five: Discussion

The research presented in this document has suggested several findings and themes about the history of American sustainable design and rehabilitation in the 1990s and early 2000s. For instance, it is notable that green rehabilitation projects were often among the first examples of sustainable design in several regions, e.g., Audubon House in New York, the Thoreau Center for Sustainability in San Francisco, the Burke Building in Pittsburgh, the Chicago Center for Green Technology in Chicago, the Jean Vollum Natural Capital Center in Portland, and the Adam Joseph Lewis Cleveland Environmental Center in Cleveland. (Perhaps, this suggests that arguments about the innate greenness (embodied energy) of old buildings are respected more among sustainability pioneers than is assumed by most in preservation circles.) Other sustainable rehabilitation trends that also seem to be developing include a greater emphasis on water conservation and protection goals, a growth of regions with particularly high concentrations of green preservation projects, and an awakening awareness by historic preservationists to an emerging context in which notions about the built environment are increasingly shaped by the sustainable design movement.

A significant theme, as discussed in Chapter Four, is the apparent ongoing evolution from a "first generation" sustainable rehabilitation period largely characterized by environmental mission-driven national pioneers and local demonstration projects into a "second generation" period with sustainable rehabilitation practice increasingly undertaken and even embraced by institutional agents with little-to-no explicit environmental purposes. That is, in most of the 1990s organizations with clear, recognizable missions in environmental education, protection, and advocacy (e.g., the National Audubon Society, the U.S. Environmental Protection Agency, the Western Pennsylvania Conservancy) spearheaded green rehabilitation of their own facilities as teaching tools ("leading by example") and as representative of institutional purposes ("practice what we preach"). By the mid-2000s, however, one finds more non-environmental actors (e.g., a federal bankruptcy court, an Internal Revenue Service office, a children's museum, a professional performance theater, and several otherwise

conventional academic dormitories, offices, and classrooms) occupying greened historic buildings.

As argued in Chapter Four, the increasing numbers of government and academic policies, administrative orders, and public statutes providing for green building mandates and incentives are often the factors causally responsible for and driving this identified change over time. (Such mandates have, of course, risen out of sustainability's increasing elite and popular acceptance, which in turn can be traced to a variety of factors, including, e.g., the success of the U.S. Green Building Council in organizing a latent movement into a respected coalition institution, emphasis on green design from several leading foundation, nonprofit, and academic actors, and as a reflection of growing societal environmental awareness, education, and concern.) Additionally, not only do such public and civil society sustainable design policies yield actual green construction, but they also create the demonstration models, financial incentives, and market demand that is helping green architecture transition into mainstream practice. Significant public and civil sector boosts to green market demand and subsequent decline in cost is, of course, particularly important if sustainable design is to enter the mainstream, as green architecture has been historically more expensive due to small economies of scale and lack of competition in suppliers, to educational transaction costs ("learning curve") for inexperienced architects and conservative builders working on a "special case," and from a "green mark-up" financial premium for a new niche market.[462]

The implication of these policy and economic trends seems clear: an increase in sustainable rehabilitation projects, at least over the short-term. Although policies can change, the increasing number and diversity of actors involved – academic institutions, federal agencies, state and local governments – suggests that any quick and universal green-building-policy reversal would be unlikely. Even more so, the broadening public recognition of how conventional construction negatively contributes to global environmental degradation persuasively downplays the potential of any short-term slowdown or reverse in sustainable building, or in a broader green agenda. In other words, historic preservationists would be wise to recognize, plan for, and actively engage the challenges and opportunities offered by an emerging and dynamic socio-political

climate significantly informed by sustainability concepts and concerns. And sooner than later is the time for the preservation movement to do just that.

At first glance, this emerging climate seems positive ground for coalition: the sustainability and preservation movements seem like obvious allies, after all, in defense of conserving scarce resources, natural and cultural. There is, however, something fundamental that separates the preservation and sustainability movements at the very essence of their moral outlooks (conceptions of rightness and wrongness) and that shapes the two movements' assumptions, approaches, and frameworks for understanding the world and related normative imperatives for action. Historic preservation is, for instance, an inherently conservative normative reaction that applies architectural, historical, and cultural inquiry to public policy questions affecting the built environment. The preservation impulse can be said to arise, at least initially and on an individual level, out of a raw emotional response against change, especially rapid and destructive change, to valued elements of the built environment and the tangible past. (More mature reflection and articulation, of course, quickly rejects such an unrealistic extremist compulsion for stopping change, and instead adopts a more nuanced understanding of preservation as selective and cognizant of significance.) At its outset, for instance, the American preservation movement began with a conservative, almost nostalgic reaction: with the 1850s efforts of the Mount Vernon Ladies Association to rescue George Washington's estate, a symbol of past national unity in a then present of uncompromising sectionalism and coming civil war. Since the early 1960s, the modern American preservation movement has grown in reaction to modernity, i.e., to the excessive losses from and speed of postwar change to aspects of the built environment that symbolize civic and community identity, that are authentic and tangible connections to the past, and that signal personal landmarks of meaning: the loss of Penn Station in New York, the loss of urban neighborhoods and communities to interstate highways and urban renewal, the loss of grandma's house to teardown and "McMansion," the loss of grandpa's farm to characterless automobile-oriented sprawl development. The historic preservation movement holds that this is wrong: the tangible past has meaning and value.

Sustainable design, in contrast (and at the very real risk of oversimplification), is at its core a progressive moral impulse, calling for new, even radically changed ways of

behavior in the construction, growth, and forms of the built environment. Some of this called-for change could, of course, resemble historic (prewar) patterns of building and living; other significant aspects of this change, however, will not. For example, Jason McLennan, the influential author of *The Philosophy of Sustainable Design* (Kansas City, Mo.: Ecotone, 2004), argues that true sustainable design requires a comprehensive philosophical reexamination and reworking of conventional approaches to and heuristic notions about architecture. The goal, he argues, is no less than a completely new moral mindset and structure informing holistic behavior so as to aim at "maximize[ing] the quality of the built environment while minimizing or eliminating the negative impact to the [natural] environment."[463] That is, green advocates say that not only are modern utilitarian ways of constructing and operating buildings and cities unsustainable as a practical matter, but that such practices are morally wrong and consequently there is a moral imperative for teleological socio-cultural changes in behavior that are understood as necessary for achieving a sustainable future. ("[A]chieving a sustainable way of living is not just a technical issue … but also (and fundamentally) an ethical one.")[464] For a number of its advocates, sustainability implies the "environmental ethic" of the "deep green" or "deep ecology" school of philosophy, i.e., an ontological and value conception of the natural world as an intrinsic good-in-itself with moral standing, rather than as an instrumental means to a further ends.[465]

The point here is to recognize that the obstacles separating preservation and sustainability run deep and philosophical. Consensus on broader concepts may be fleeting, and achieving coalition may require a limited and incremental approach that agrees that not all issues are material for common ground. In other words, the better approach is to identify case-by-case opportunities conducive for realizing preservation and sustainability convergence, rather than hope for a comprehensive synthesis suitable in all circumstances.

Easy ground for convergence lies, as historic preservationists have argued since the energy crisis era, in a collaborative and integrated design focus on how historic architectural features can serve both preservation and sustainable goals. Historic features like porches, entryway vestibules, and awnings can, for example, help reduce cooling demands. Other historic construction, especially if it was originally designed to take

advantage of local site characteristics, solar orientation, and climatic conditions, offers ways to achieve ventilation, illumination, and temperature comfort levels through non-mechanical and limited energy mechanisms. Additionally, the incorporation of minimally invasive, reversible, yet innovative sustainable design technologies and strategies into rehabilitation projects can supplement historic architectural features to yield even greater green results. Examples of such green techniques and practices could include: incorporating sensors for controlling artificial lights (occupancy sensors and daylight dimmers); adding energy-efficient light fixtures; installing water conservation plumbing and irrigation practices; choosing energy-efficient heating-cooling systems (like ground-source heat-pumps); coupling historic windows with energy-efficient storm windows; arranging often-used workspace nearer to daylight; and selecting durable, renewable, recycled and recyclable, nontoxic, environmentally-friendly materials for repairs and other construction. Preservationists can also join with sustainability advocates in rejecting hazardous cleaners, strippers, and other chemicals; preferred preservation practice, after all, advises using the gentlest means possible when cleaning and refurbishing historic fabric.

This document has identified a number of green rehabilitation projects in which just such an approach has been implemented with successes for both preservation and sustainable goals. Moreover, these successful sustainable rehabilitation projects include several different architectural styles, building types, construction dates, adaptive reuse functions, and are in a variety of geographical locations and settings. As preservation advocates, then, we should spread the word about these and other successful collaborative examples of green preservation as part of a broader strategy of action that includes: (1) development of "best practices," "applications guide" and other educational materials[466] that draw from existing documents[467] and from empirical examples of high-quality green rehabilitation projects that have achieved successful preservation and sustainable results; (2) support for further research into and development of a database of sustainable rehabilitation projects that have received both LEED and federal / state RITC certifications;[468] (3) a commitment to become "literate" and "fluent" in sustainability concepts and heuristics;[469] (4) active engagement with and membership[470] in the sustainability movement and its organizations, especially the U.S. Green Building

Council, to affect mutually positive change in green building assessment tools and help frame policy; (5) aggressive and proactive implementation by historic property stewards of a truly *integrated design process* that thoroughly merges good preservation with good sustainable design when undertaking repairs, restoration, rehabilitation, or other capital construction;[471] and (6) recognition that, like with life-safety, handicapped accessibility, and national security issues, preservation's political and ethical position vis-à-vis sustainability will increasingly be conceived as secondary, thus requiring preservation advocates to supplement embodied energy and "preservation = green" arguments with a persuasive approach rooted in strategic compromise and drawing from evidence of successful sustainable preservation precedent. Toward that latter, this document, by describing several project examples of successful sustainable rehabilitation, has provided ample empirical evidence that an alleged mutually exclusive and intrinsic choice between good historic preservation and good sustainable design is an unnecessary and false choice.

Figure 5.1: Summary of Select Sustainable Rehabilitation Projects Completed in the United States, 1992-2006.

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
Audubon House (1992)	Schermerhorn Bldg. (1891)	Romanesque Revival	Nat'l Audubon Society (NPO)	Croxton Collaborative	700 Broadway, New York NY	TE HVAC L&E	n/a	DWRS RCSH IAQ	F	n/a
Thoreau Center for Sustainability (1996, 1997)	Letterman Hospital (1899, 1901, c.1908, 1924, 1930, 1931, 1933)	Mediterranean / Mission / Colonial Revival	Presidio Trust (USG); Thoreau Ctr. Part. (FPC); Tides Fdn. (NPO); Equity Comm. (FPC)	Tanner Leddy Maytum Stacy	1016 Lincoln Blvd., Presidio of San Francisco, San Francisco CA	TE HVAC L&E PV	WF L&I	DWRS RCSH IAQ	G	NHL RITC AIA10
Burke Bldg. (1997)	Burke Bldg. (1836)	Greek Revival	Western Pa. Conservancy (NPO)	Landmarks Design Associates	209 Fourth Ave., Pittsburgh PA	TE HVAC L&E	n/a	DWRS RCSH IAQ	G	NR
New York Life Building (1997)	New York Life Building (1888)	Romanesque Revival	UtiliCorp United (FPC)	Gastinger Walker Harden	9th & Baltimore, Kansas City MO	TE HVAC L&E	n/a	DWRS RCSH IAQ	G	NR
Bldg. 33, Sanger Quad., Washington Naval Yard (1998)	Sanger Quad., Washington Naval Yard (1855-1895)	Romanesque Revival	US Navy (USG)	EwingCole	Washington Naval Yard, Washington DC	TE HVAC L&E	WF	DWRS RCSH IAQ	G	NHL
Barney-Davis Hall (1999)	Barney Memorial Hall (1905)	Renaissance Revival	Denison University (A)	HRJL Architects	Denison University, Granville OH	TE HVAC L&E	WF	DWRS RCSH IAQ	G	NR

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
Greenpeace (2000)	Victorian-era commercial blocks (c.1890)	Romanesque Revival	Greenpeace (NPO)	Envision Design	702 “H” St. NW, Washington DC	TE HVAC L&E PV	WF	DWRS RCSH IAQ	G	n/a
REI Denver (2000)	Denver Tramway Power Co. Bldg. (1901)	Romanesque Revival	Recreational Equipment Inc. (FPC)	Mithun	1416 Platte St., Denver CO	TE HVAC L&E	n/a	DWRS RCSH IAQ	G	NR RITC
Jean Vollum Nat. Capital Ctr. (2001)	McCraken Warehouse (1895)	Romanesque Revival	Ecotrust (NPO)	Holst	907 NW Irving St., Portland OR	TE HVAC L&E	WF L&I VR SW	DWRS RCSH IAQ	F	LEED-G
Balfour-Guthrie Bldg. (2002)	Balfour-Guthrie Bldg. (1913)	Classical Revival	Thomas Hacker Architects (FPC); Gray Purcell, Inc. (FPC)	Thomas Hacker	733 SW Oak St., Portland OR	TE HVAC L&E	WF	DWRS RCSH IAQ	G	NR LEED-S
Chicago Center for Green Tech. (2002)	Kraft Foods Bldg. (1952)	International	City of Chicago (MG)	Farr Associates	445 N. Sacramento Blvd., Chicago IL	TE HVAC L&E RR PV GSHP	L&I VR SW	DWRS RCSH IAQ	G	AIA10 LEED-P

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
HQ Complex, US EPA (2002)	New Post Office (1934); Interstate Commerce (1934); Mellon Aud. (1934); Customs Service (1934)	Classical Revival	US General Services Admin. (USG); US EPA (USG)	RTKL Associates; Gruzen Samton / Croxton Collaborative	1200 Pennsylvania Ave., Washington DC	TE HVAC L&E	WF	DWRS RCSH IAQ	G	NR
Pittsburgh Glass Center (2002)	commercial bldg. (c.1920)	Art Deco	Pittsburgh Glass Center (NPO)	Davis Gardner Gannon Pope	5472 Penn Ave., Pittsburgh PA	TE HVAC L&E RR	WF L&I SW	DWRS RCSH IAQ	F	LEED-G AIA10
Schenley Park Visitor Center (2002)	Schenley Park picnic shelter (1910)	Tudor Revival	City of Pittsburgh (MG); Pittsburgh Parks Conservancy (NPO)	Landmark Design Associates	101 Panther Hollow Rd., Pittsburgh PA	TE L&E	WF L&I	DWRS RCSH IAQ	G	n/a
Stewart's Bldg. (2002)	Stewart's Bldg. (c.1889)	High Italianate	Weinberg Foundation (NPO)	Design Collective	226 W. Lexington St., Baltimore MD	TE HVAC L&E	L&I	DWRS RCSH IAQ	G	NR LEED-C
Trinity Commons (2002)	Trinity Episcopal Cathedral (1907)	Gothic Revival	Episcopal Diocese of Ohio (NPO)	City Architecture	2230 Euclid Ave., Cleveland OH	TE HVAC L&E GSHP	WF	DWRS RCSH IAQ	G	n/a

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
Adam Joseph Lewis Cleveland Enviro. Center (2003)	Lorain St. Saving & Trust Bldg. (1918)	Classical Revival	Cleve. Enviro. Center (NPO); Ohio City Near West Dev. Corp. (MG/NPO); Cleve. Urban Properties (FPC)	Doty & Miller	3500 Lorain Ave., Cleveland OH	TE HVAC L&E RR PV GSHP	WF L&I VR SW WU	DWRS RCSH IAQ	G	NR RITC LEED-R
Asa Griggs Candler Library (2003)	Asa Griggs Candler Library (1924)	Renaissance Revival	Emory University (A)	S/L/A/M Collaborative	Emory University, Atlanta GA	TE HVAC L&E	WF L&I	DWRS RCSH IAQ	G	LEED-S
Dana Bldg. (2003)	West Medical Bldg. (1903)	Beaux-Arts	University of Michigan (A)	Wm. McDonough; Quinn Evans	University of Michigan, Ann Arbor MI	TE HVAC L&E PV	WF L&I WU CT	DWRS RCSH IAQ	G	NR LEED-G
Gilman Ordway Campus (2003)	Helen Turner House (1877)	Queen Anne / Colonial Revival	Woods Hole Research Center (NPO)	Wm. McDonough + Partners	149 Woods Hole Rd., Falmouth MA	TE HVAC L&E PV GSHP	WF L&I SW	DWRS RCSH IAQ	P	AIA10
Helmus Building (2003)	Helmus Building (1918)	vernacular / commercial Classical Revival	Bazzani Associates (FPC)	DTS Architects	959 Wealthy St. SE, Grand Rapids MI	TE HVAC L&E	WF L&I VR	DWRS RCSH IAQ	G	LEED-S

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
HQ Complex, Nat'l Geo. Soc. (2003)	Hubbard Hall (1904); 16th St. Bldg. (1933); 17th St. Bldg. (1964)	Classical Revival, Modernist	National Geographic Society (NPO)	Nat'l Geo. Soc.; Johnson Controls	1145 17th St. NW, Washington DC	TE HVAC L&E RR	WF L&I	DWRS RCSH IAQ	F	L/EB-S
Montgomery Park Business Center (2003)	Montgomery Ward Catalog Bldg. (1925)	Art Deco	Himmelrich Associates, Inc. (FPC)	Notari Associates	1800 Washington Blvd., Baltimore MD	TE HVAC L&E	VR	DWRS RCSH IAQ	G	NR RITC LEED-C
Motherhouse, SSIHM (2003)	Motherhouse, SSIHM (1932)	Art Deco	Sisters, Servants of the Immaculate Heart of Mary (SSIHM) (NPO)	Susan Maxman & Partners	610 W. Elm Ave., Monroe MI	TE HVAC L&E GSHP	WF L&I SW	DWRS RCSH IAQ	F	AIA10 LEED-C
Motherhouse, Felician Sisters (2003)	Motherhouse, Felician Sisters (1932)	Art Deco	Felician Sisters (NPO)	Perkins Eastman	1500 Woodcrest Ave., Coraopolis PA	TE HVAC L&E GSHP	WF L&I VR SW	DWRS RCSH IAQ	F	LEED-G
Whitaker Building (2003)	Whitaker Building (c.1890)	Italianate	Melaver, Inc. (FPC)	Dawson Wissmach	104 W. State St., Savannah GA	TE HVAC L&E RR	WF L&I	DWRS RCSH IAQ	G	NR RITC LEED-S
Bear Run Interpretative Center (2004)	dairy barn (c.1890, c.1940)	vernacular SW Pa. bank barn	Western Pa. Conservancy (NPO)	Bohlin Cywinski Jackson	1478 Mill Run Rd., Mill Run PA	TE HVAC L&E GSHP	WF L&I SW	DWRS RCSH IAQ	G	LEED-S AIA10

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
Cambridge City Hall Annex (2004)	Harvard School (1871)	Romanesque Revival	City of Cambridge (MG)	HKT; David Perry, Inc.	344 Broadway, Cambridge MA	TE HVAC L&E PV GSHP	L&I	DWRS RCSH IAQ	G	LEED-G
Children's Museum of Pittsburgh (2004)	Buhl Planetarium (1930); Allegheny Post Office (1897)	Classical Revival	Children's Museum of Pittsburgh (NPO)	Koning Eizenberg	10 Children's Way, Allegheny Square, Pittsburgh PA	TE HVAC L&E RR	WF L&I	DWRS RCSH IAQ	G	LEED-S
Downtown Campus, North Dakota State Univ. (2004)	Lawrence Warehouse (1903)	Romanesque Revival	North Dakota State Univ. (A)	Michael J. Burns Architects	650 NP Ave., Fargo ND	TE HVAC L&I	L&I	DWRS RCSH IAQ	G	NR RITC LEED-C
Scowcroft Warehouse (2004)	Scowcroft Warehouse (1906)	Victorian utilitarian	Cottonwood Realty Services (FPC)	Cooper Roberts Simonsen	105 23rd St., Ogden UT	TE HVAC L&E	WF L&I SW	DWRS RCSH IAQ	G	NR RITC LEED-S
Skenandoa House (2004)	Psi Upsilon Chapter House (1922)	Tudor Revival	Hamilton College (A)	EwingCole	Hamilton College, Clinton NY	TE HVAC L&E GSHP	WF	DWRS RCSH IAQ	F	LEED-S
Big-D Construction Bldg. (2005)	W.P. Fuller Paint Bldg. (1922)	Art Deco	Big-D Construction (FPC)	GSBS Architects	404 West 440 South, Salt Lake City UT	TE HVAC L&E	WF L&I	DWRS RCSH IAQ	G	NR RITC LEED-G

Rehab Name & Date	Historic Name & Date	Arch. Style	Rehab Owner & Type	Rehab Architect	Location	Energy	Water	Other Green	HP	Ratings
Brewers Hill (2005)	Gunther/ National breweries (1885, 1892, 1899, 1933)	utilitarian	Struever Bros. (FPC); Obrecht Commercial (FPC)	Cho Benn Holback	South Conkling St., Baltimore MD	TE HVAC L&E RR	WF L&I VR SW	DWRS RCSH IAQ	G	NR RITC LEED-R
Debevoise Hall (2005)	South Royalton Graded School (1893)	Queen Anne	Vermont Law School (A)	Truex Cullins & Partners	Vermont Law School, South Royalton VT	TE HVAC L&E	WU CT	DWRS RCSH IAQ	G	NR LEED-S
Metzenbaum US Courthouse (2005)	US Post Office, Custom House & Courthouse (1910)	Beaux-Arts	US General Services Admin. (USG)	Westlake Reed Lekosky	201 Superior Ave., Cleveland OH	TE HVAC L&E	WF	DWRS RCSH IAQ	G	NR LEED-C
Trinity Church in the City of Boston (2005)	Trinity Church (1877)	Richardsonian Romanesque	Trinity Church in the City of Boston (NPO)	Goody Clancy	206 Clarendon St., Boston MA	TE HVAC L&E GSHP	WF L&I	DWRS RCSH IAQ	G	NHL
438 College Street (2006)	E.J. Booth House (1908)	Colonial Revival	University of Vermont (A)	Black River Design	438 College St., Burlington VT	TE HVAC L&E	WF L&I	DWRS RCSH IAQ	G	NR LEED-R
Gerding Theater (2006)	First Regiment Armory Annex (1891)	Romanesque Revival	Portland Center Stage (NPO)	GBD Architects	128 NW 11th St., Portland OR	TE HVAC L&E	WF L&I SW	DWRS RCSH IAQ	G	NR LEED-P

Key

A = academic institution
FPC = for-profit corporation
MG = municipal government or agency
NPO = 501(c)(3) nonprofit organization
USG = U.S. federal government department or agency

GSHP = ground-source heat-pump
HVAC = energy-efficient HVAC system
PV = photovoltaic solar array
RR = reflective roof
L&E = upgrades for energy-efficient lighting, e.g., daylighting techniques, dimmers, occupancy sensors, efficient fixtures
TE = energy-efficient upgrades to thermal envelop, e.g., insulation, window replacement

CT = composting toilets
VR = vegetated roof
WU = waterless urinals
L&I = water conservation landscaping features, e.g., native plantings, irrigation controls, rainwater cisterns
SW = features design to lessen negative affects of stormwater runoff, e.g., onsite bioswales, permeable parking surfaces
WF = low-flow fixtures and other plumbing upgrades designed reduce water use

DWRS = demolition and construction recycled or salvaged for on- or off-site reuse
RCSH = construction and finish materials include recycled content or are from renewable and sustainable harvested natural sources
IAQ = materials and practices selected for maximizing indoor air quality, e.g., green housekeeping practices, operable windows, increased number of air exchanges, low-to-no VOC off-gassing paints, adhesives, carpets, furniture

HP = assessment of rehabilitation's impacts on building's historically significant features
G = good: project preserved historically significant features and generally met *Secretary of the Interior's Standards for Rehabilitation*
F = fair: project resulted in loss of some historically significant features
P = poor: project resulted in major and significant loss of historic integrity, e.g., loss of historic character-defining features, fabric, floor plan, massing

AIA10 = rehabilitation designated a "Top Green Project" by the American Institute of Architects
NHL = at time of rehab: building(s) was listed as a National Historic Landmark or was within a N.H.L. historic district
NR = at time of rehab: building(s) was listed in the National Register of Historic Places or was within a N.R.H.P. historic district
L/EB-S = rehabilitation received a LEED-EB "Silver" rating
LEED-C = rehabilitation received a LEED-NC "Certified" rating
LEED-S = rehabilitation received a LEED-NC "Silver" rating
LEED-G = rehabilitation received a LEED-NC "Gold" rating
LEED-P = rehabilitation received a LEED-NC "Platinum" rating
LEED-R = rehabilitation is LEED-NC registered, as of writing
RITC = rehabilitation received federal Rehabilitation Investment Tax Credit

Figure 5.2: Select Events in the History of Sustainable Rehabilitation in the United States, 1976-2005.

1976

- Researchers at University of Illinois at Urbana-Champaign and Richard Stein Architects introduced "embodied energy" concept

1978

- National Park Service issued "Preservation Brief 3: Conserving Energy in Historic Buildings"

1979

- Advisory Council for Historic Preservation issued *Assessing the Energy Conservation Benefits of Historic Preservation: Methods and Examples* based on the "embodied energy" concept

1980

- National Trust for Historic Preservation's Preservation Week dedicated to "Preservation: Reusing America's Energy"

1981

- National Trust for Historic Preservation published *New Energy from Old Buildings*, linking preservation with energy conservation

1985

- Environmental Defense Fund's new green New York City headquarters completed by William McDonough + Partners architectural firm

1987

- United Nations World Commission on Environment and Development ("Brundtland Commission") issued *Our Common Future*

1989

- Natural Resources Council's new green New York City headquarters completed by Croxton Collaborative Architects

1991

- Green Building Program began in Austin, Texas
- Building Research Establishment Environmental Assessment Method (BREEAM) green building rating program began in the United Kingdom

1992

- United Nations Conference on Environment and Development ("Earth Summit") held in Rio de Janeiro, Brazil
- National Audubon Society dedicated sustainable rehabilitation of the historic Schermerhorn Building (Audubon House) in New York City

1993

- Clinton Administration announced "Greening the White House" initiative
- American Institute of Architects and International Union of Architects addressed sustainability at World Congress of Architects convention
- U.S. Green Building Council established

1994

- Clinton Administration issued Executive Order 12902 "Energy Efficiency and Water Conservation at Federal Facilities"
- National Park Service issued *General Management Plan Amendment*, which called for the Presidio of San Francisco to become a "global center dedicated to addressing the world's most critical environmental, social, and cultural challenges"
- National Park Service issued *Guiding Principles of Sustainable Design*

1995

- U.S. Environmental Protection Agency issued "Green Buildings Vision and Policy Statement"

1996

- Thoreau Center for Sustainability (phase 1) opened in four sustainable rehabilitated historic Letterman General Hospital buildings at the Presidio of San Francisco
- City of Portland, Oregon, completed a limited sustainable rehabilitation of the historic Portland City Hall

1997

- Western Pennsylvania Conservancy completed a sustainable rehabilitation of the historic Burke Building in Pittsburgh, Pennsylvania
- UtiliCorp United completed a sustainable rehabilitation of the historic New York Life Building in Kansas City, Missouri
- Thoreau Center for Sustainability (phase 2) opened eight additional sustainable rehabilitated historic Letterman General Hospital buildings at the Presidio of San Francisco
- United Nations conference in Kyoto, Japan, reached the Kyoto Protocol to reduce greenhouse gas emissions
- U.S. Navy began developing the Whole Building Design Guide

1998

- Clinton Administration issued Executive Order 13101 "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition"
- U.S. Navy completed a sustainable rehabilitation of the historic Building 33, Sanger Quadrangle, Washington Naval Yard in Washington, D.C.
- U.S. Green Building Council released LEED-NC 1.0, the pilot version of its LEED program

- American Institute of Architects (Committee on the Environment) began recognizing annual "Top Ten Green Projects"

1999

- Denison University dedicated sustainable rehabilitation of the historic Barney Memorial Hall (Barney-Davis Hall) in Granville, Ohio
- Clinton Administration issued Executive Order 13123 "Greening the Government Through Energy Efficient Management"
- Conde Nast Building at Four Times Square, a new green skyscraper in New York City, was completed by Fox & Fowle Architects
- City of Portland, Oregon, began municipal "Green Building Initiative"

2000

- U.S. Green Building Council released LEED-NC 2.0, the first public version of LEED
- University of Michigan's School of Natural Resources and Environment completed "Greening of Dana" (phase 1) of the historic Dana Building in Ann Arbor, Michigan
- REI completed a sustainable rehabilitation of the historic Denver Tramway Power Company Building in Denver, Colorado
- Greenpeace completed a sustainable rehabilitation of five historic buildings in Washington, D.C.
- Chesapeake Bay Foundation's new green Philip Merrill Environmental Center completed in Annapolis, Maryland
- City of Seattle issued "Sustainable Building Policy," mandating sustainable design for all new city-funded projects

2001

- Ecotrust completed sustainable rehabilitation of the historic McCraken Warehouse (Jean Vollum Natural Capital Center) in Portland, Oregon
- City of Chicago installed vegetated roof on the historic Chicago City Hall
- Carnegie Mellon University, in Pittsburgh, Pennsylvania, adopted one of the earliest campus commitment to green construction
- U.S. General Services Administration was the first federal agency to join the U.S. Green Building Council

2002

- U.S. Environmental Protection Agency completed move of agency headquarters into sustainable rehabilitated buildings in the historic Federal Triangle in Washington, D.C.
- U.S. Green Building Council launched LEED-EB 1.0 pilot program
- Presidio Trust issued *Green Building Guidelines for the Rehabilitation for Historic and Non-Historic Buildings*
- U.S. Green Building Council released LEED-NC 2.1
- City of Chicago completed the sustainable rehabilitation of the historic Kraft Foods Building (Chicago Center for Green Technology)
- Harry and Jeanette Weinberg Foundation completed the sustainable rehabilitation of the historic Stewart's Building in Baltimore, Maryland
- City of Chicago completed "Green Bungalow Initiative" demonstration of three sustainable rehabilitated historic houses
- Balfour-Guthrie Building, a sustainable rehabilitated historic building, was completed in Portland, Oregon
- Pittsburgh Glass Center completed a sustainable rehabilitation of a historic storefront in Pittsburgh, Pennsylvania

- Episcopal church completed the sustainable rehabilitation of the historic Trinity Episcopal Cathedral in Cleveland, Ohio
- University of Colorado-Boulder completed a LEED-EB certified rehabilitation of the historic University Memorial Center in Boulder, Colorado
- White House Office of Management and Budget encouraged federal agencies to "incorporate EnergyStar or LEED" into new construction and renovations

2003

- Sisters, Servants of the Immaculate Heart of Mary completed the sustainable rehabilitation of their historic Motherhouse in Monroe, Michigan
- Woods Hole Research Center completed the sustainable transformation of the historic Helen Turner House (Gilman Ordway Campus) in Falmouth, Massachusetts
- Cleveland Green Building Coalition dedicated the sustainable rehabilitation of the historic Lorain Street Savings & Trust Company (Adam Joseph Lewis Cleveland Environmental Center) in Cleveland, Ohio
- National Geographic Society's historic four-building complex in Washington, D.C., received the first LEED-EB 1.0 rating
- University of Michigan's School of Natural Resources and Environment completed sustainable rehabilitation ("Greening of Dana," phase 2) of the historic Dana Building in Ann Arbor, Michigan
- Felician Sisters completed sustainable rehabilitation of their historic convent in Coraopolis, Pennsylvania
- Melaver, Inc., completed the sustainable rehabilitation of the historic Whitaker Building in Savannah, Georgia
- Montgomery Park, a sustainable rehabilitation of a historic commercial complex, was completed in Baltimore, Maryland
- People's Food Co-op completed a sustainable rehabilitation of a historic house in Portland, Oregon
- Duke University completed the sustainable rehabilitation of the historic Kilgo Quadrangle Dormitory in Durham, North Carolina
- Emory University completed the sustainable rehabilitation of the historic Asa Griggs Candler Library in Atlanta, Georgia
- Mount Holyoke completed a sustainable rehabilitation of the historic Blanchard Campus Center in South Hadley, Massachusetts
- Colorado State University completed a LEED-CI rehabilitation of historic Guggenheim Hall classrooms in Fort Collins, Colorado

2004

- Western Pennsylvania Conservancy completed the sustainable rehabilitation of a historic barn (Barn at Fallingwater) in Mill Run, Pennsylvania
- U.S. Green Building Council released the first public version of LEED-EB (version 2.0)
- Pittsburgh Children's Museum completed the sustainable rehabilitation of a historic post office and planetarium
- Hamilton College completed the sustainable rehabilitation of the historic Skenandoa House in Clinton, New York
- North Dakota State University completed a sustainable rehabilitation of the historic Robb Lawrence warehouse in Fargo, North Dakota
- Scowcroft Warehouse, a historic structure in Ogden, Utah, was sustainable rehabilitated for the U.S. General Services Administration

2005

- Vermont Law School completed sustainable rehabilitation of the historic Debevoise Hall in South Royalton, Vermont

- The historic Howard M. Metzenbaum U.S. Courthouse in Cleveland, Ohio, reopened after a sustainable rehabilitation
- Brewers Hill, a sustainable rehabilitation of a historic brewery complex, was completed in Baltimore, Maryland
- Big-D Construction completed the sustainable rehabilitation of a historic warehouse in Salt Lake City, Utah
- President George W. Bush signed the Energy Policy Act of 2005, which wrote federal green building policy into law
- Association for Preservation Technology International held Halifax Symposium on preservation and sustainability
- Episcopal church completed the sustainable rehabilitation of H.H. Richardson's historic Trinity Church in Boston, Massachusetts
- Clemson University completed a sustainable rehabilitation of historic dorms (Greek Community on the Quad) in Clemson, South Carolina

NOTES

[1] Alex Hawes, "Going Green," *Preservation Online: The Online Magazine of the National Trust for Historic Preservation*, 27 November 2001, <http:www.nationaltrust.org/magazine/archives/arch_story/112701.htm> (accessed 17 October 2003).

[2] See, e.g., John C. Sawhill, "Preserving History and Saving Energy: Two Sides of the Same Coin," and Gary Long, "Active Solar Applications in Old Buildings," both in Diane Maddex, ed., *New Energy from Old Buildings*, (Washington, D.C.: Preservation Press / National Trust for Historic Preservation, 1981).

[3] See, e.g., Baird M. Smith, "Making Buildings Work As They Were Intended," in Maddex.

[4] See, e.g., Douglas C. Peterson, "How to Save Energy in an Old House," in Maddex.

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[6] Mike Jackson, "Embodied Energy and Historic Preservation: A Needed Reassessment," *APT Bulletin* 36 (2005): 47.

[7] Maddex, 20.

[8] Jennifer Lynn Buddenborg, "Changing Mindsets: Sustainable Design in Historic Preservation," M.A. thesis, Cornell University, August 2006, 27, fig. 1.1.

[9] Advisory Council on Historic Preservation, *Assessing the Energy Conservation Benefits of Historic Preservation: Methods and Examples*, (Washington, D.C.: Advisory Council on Historic Preservation, January 1979).

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[11] Advisory Council on Historic Preservation, 72.

[12] Peter Buchanan, *Ten Shades of Green: Architecture and the Natural World*, (New York: Architectural League of New York, 2005), 17; and Jason McLennan, *The Philosophy of Sustainable Design*, (Kansas City, Mo.: Ecotone, 2004), 28-29.

[13] James Steele, *Ecological Architecture: A Critical History*, (London and New York: Thames & Hudson, 2005), 8-9, 156, 163.

[14] The United Nations World Commission on Environment and Development was also known as the Brundtland Commission after Gro Harlem Brundtland, its chair. (David Gissen, ed., *Big and Green: Toward Sustainable Architecture in the Twenty-First Century*, (New York: Princeton Architectural Press, 2002), 15.)

[15] World Commission on Environment and Development, *Our Common Future*, (New York: United Nations, 4 August 1987), 24, <http://www.are.admin.ch/imperia/md/content/are/nachhaltigeentwicklung/brundtland_bericht.pdf?PHPSESSID=a8bf9d584771cb4d2a11b59a4680bc49> (accessed 5 September 2006).

[16] U.S. Green Building Council, *LEED-NC Technical Review Workshop / Leadership in Energy and Environmental Design Green Building Rating System, New Construction and Major Renovations*, (Washington, D.C.: U.S. Green Building Council, 2005), 13; and Robert Cassidy, ed., "White Paper on Sustainability," *Building Design & Construction*, November 2003, 4-6.

[17] BRI are "serious and diagnosable health conditions, usually of the respiratory system, that can be attributed to specific air problems within a building." SBS, on the other hand, refers to "health complaints such as nasal congestion, headache, irritated eyes, lethargy and tiredness, which are difficult to medically diagnose but are present in individuals when they are within a building and disappear or diminish once they leave the building. The cause of SBS is suspected to be poor air quality and conditions within the building." (Definitions from glossary by Victoria Schomer, "Green Terms," information sheet published by the American Society of Interior Designers, n.d.)

[18] Gissen, 14.

[19] McLennan, 30, 152.

[20] In describing these three projects as 'among the first examples of green buildings in the United States,' the intent is not to dismiss the many historic and modern architects who have experimented with building designs intended to achieve illumination, ventilation, and other occupant comfort goals through non-mechanical or energy-efficient means. (For example, Montgomery C. Meigs's Pension Building (1882-1887), now known as the National Building Museum, in Washington, D.C., is an often cited example of a structure designed to achieve cooling and ventilation entirely through the physical "chimney" or "stack effect" property of hot air buoyancy.) Rather, these three projects are argued to be among the first American building examples to be self-consciously conceptualized, described, and designed according the normative rubrics of the sustainable architecture movement, i.e., in terms of energy efficiency, environmental sensitively, indoor air quality. In fact, these three projects can be said to have helped develop an early and tangible articulation of what "sustainable architecture" is. The term "green design" or "sustainable construction" (etc.) functions as both an ahistoric evaluative concept that assesses how a building, no matter when it was constructed, is designed and operates when judged against sustainability criteria (e.g., "that's a 'green building' because of X and Y and Z") and also as a descriptive and normative identifier rooted firmly in a sustainability movement and thinking that developed and was codified within a specific historical time period and socio-geopolitical context (i.e., from the mid-1980s through late 1990s within a growing international recognition of human responsibility in causing worldwide environmental degradation, especially global climate change). The latter "historical" sense of "green building" is used here.

[21] Cassidy, 6-7.

[22] Buchanan, 17.

[23] Buddenborg, 53-55.

[24] In assessing a project's sustainable design success, I have relied on expert, third-party judgments, in particular LEED ratings and green design awards. In assessing a project's preservation success, I have relied on expert, third-party preservation judgments as well as my own evaluations based on photographic and site visit evidence.

[25] Gregory A. Tisher, "Rehabilitation of the Southern Acres Dairy Barn ('Old Dairy Barn') at Shelburne Farms: Themes in Sustainable Design and Historic Preservation Interaction and Collaboration, Summer 2003 – Spring 2006," unpublished research report produced for Shelburne Farms, Shelburne, Vermont, 31 May 2006.

[26] Author site visits include: Gilman Ordway Campus, Woods Hole Research Center, Falmouth, Mass., 23 March 2005; Philip Merrill Environmental Center, Chesapeake Bay Foundation, Annapolis, Md., 19 June 2005; Blair Towns, Silver Spring, Md., 19 June 2005; Langston-Brown School and Community Center, Arlington County, Va., 19 June 2005; National Geographic Society Headquarters, Washington, D.C., 22 July 2005; Greenpeace USA Headquarters, Washington, D.C., 29 July 2005; Burke Building, Western Pennsylvania Conservancy, Pittsburgh, Pa., 12 August 2005; Howard M. Metzenbaum U.S. Courthouse, Cleveland, Ohio, 15 August 2005; Adam Joseph Lewis Cleveland Environmental Center, Cleveland, Ohio,

15 August 2005; Chicago Center for Green Technology, Chicago, Illinois, 20 August 2005; Southern Acres Dairy Barn, Shelburne Farms, Shelburne, Vt., 24 September 2005; 438 College Street, University of Vermont, Burlington, Vt., 26 October 2005; Debevoise Hall, Vermont Law School, South Royalton, Vt., 3 February 2006; Samuel T. Dana Building, School of Natural Resources and Environment, University of Michigan, Ann Arbor, Mich., 28 August 2006; Barney-Davis Hall, Denison University, Granville, Ohio, 25 October 2006; and Trinity Commons / Trinity Episcopal Cathedral, Cleveland, Ohio, 27 March 2007.

[27] Eric Hobsbawm, *On History*, (New York: The New Press, 1997), 237.

[28] The United Nations Conference on Environment and Development was also informally known as the "Earth Summit."

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[37] "Green building" here is being used in its "historical" sense (rather than as an "ahistorical" evaluative concept), i.e., as a descriptive term rooted firmly in and articulated by the sustainability movement of the late twentieth and early twentieth-first century. See Introduction, note 19, for further discussion.

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[456] Cleveland Restoration Society & Preservation Resource Center of Northeastern Ohio, "2006 Preservation Award Winners," 2006, <http://www.clevelandrestoration.org/PreservationAwards/currentawards.htm> (accessed 29 August 2006); and Ohio Historic Preservation Office, "Ohio Historic Preservation Office Honors Outstanding Achievements," 8 October 2005, <http://www.ohiohistory.org/about/pr/20145005291/release.html> (accessed 30 August 2006).

[457] Thomas Walton, *Architecture of the Great Society: Assessing the GSA Portfolio of Buildings Constructed during the 1960s and 1970s, Summary of Comments and Issues from a Forum Convened at Yale University's Center for British Art, December 5, 2000*, (Washington, D.C.: U.S. General Services Administration, February 2001), 41; Robinson & Associates, Inc., *GSA Case Study: Byron G. Rogers Federal Office Building and Courthouse, Prepared for Historic Buildings Program, General Services Administration*, (Washington, D.C.: U.S. General Services Administration, February 2001), 2-5; and U.S. General Services Administration, Center for Historic Buildings, *Growth, Efficiency, and Modernism: GSA Buildings of the 1950s, 60s, and 70s*, (Washington, D.C.: U.S. General Services Administration, September 2003), 4, 36.

[458] Walton, 41-47.

[459] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Federal Energy Management Program, "Federal Buildings Certified by the U.S. Green Buildings Council LEED® Rating System," slide 29; U.S. General Services Administration, Public Buildings Service, Office of Applied Science, Sustainable Design Program, "Byron G. Rogers U.S. Courthouse (Denver, CO)," 2 April 2007, <http://www.gsa.gov/Portal/gsa/ep/contentView.do?programId=11433&channelId=-16863&ooid=18005&contentId=21976&pageTypeId=8195&contentType=GSA_BASIC&programPage=%2Fep%2Fprogram%2FgsaBasic.jsp&P=PLASD> (accessed 27 July 2007); and U.S. Green Building Council, "Byron G. Rogers U.S. Courthouse, LEED-EB Pilot Project," 21 September 2006, <http://www.usgbc.org/ShowFile.aspx?DocumentID=1998> (accessed 27 July 2007).

[460] Based on author attendance at: Mark Spann, "Minton-Capehart Federal Building," "Design Start Workshop" presentation, at Office of Chief Architect, U.S. General Services Administration, Washington, D.C., on 7 June 2005.

[461] Based on author attendance at: Peter Menzies, "Margaret Chase Smith Federal Building," "Design Start Workshop" presentation, at Office of Chief Architect, U.S. General Services Administration, on 8 June 2005.

[462] Jason McLennan, *The Philosophy of Sustainable Design*, (Kansas City, Mo.: Ecotone, 2004), 196-198.

[463] McLennan, 10.

[464] Warwick Fox, ed., *Ethics and the Built Environment*, (London and New York: Routledge, 2000), 6.

[465] See, e.g., overview discussion in John O'Neill, *Ecology, Policy and Politics: Human Well-Being and the Natural World*, (London and New York: Routledge, 1993), 2; and Fox, 6.

[466] Due to rapid changes in the field, easily-modified, hypertext online (webpages) guidance materials would be preferable than static print or electronic documents. Of course, to be successful such an online document would require a dedicated staff to ensure timely updating.

[467] See, e.g., The Presidio Trust, *Green Building Guidelines for the Rehabilitation of Historic & Non-Historic Buildings*, (San Francisco: The Presidio Trust, 18 April 2002) and Donald F. Fournier and Karen Zimnicki, *Integrating Sustainable Design Principles into the Adaptive Reuse of Historic Properties (ERDC/CERL TR-04-7)*, (Champaign, Ill.: U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, May 2004).

[468] As of writing, neither the U.S. Green Building Council nor the National Park Service's Technical Preservation Services division (which administers the federal Rehabilitation Investment Tax Credit (RITC) program) actively ask applicants about their projects' historic/RITC (in the case of the U.S. Green Building Council) or LEED (in the case of the National Park Service) status. (Sharon C. Park (Chief, Technical Preservation Services, National Park Service), personal communication with author, Washington, D.C., 27 July 2005; and Amy Cahill, (LEED Customer Service, U.S. Green Building Council), email communication to author, 31 August 2007.)

[469] Preservation professionals already seem to be beginning this process. For example, as part of her master's thesis, Jennifer Buddenborg sent a survey to all fifty-one state historic preservation offices (SHPO) in 2005, inquiring about their knowledge about sustainable design. Although only eleven SHPOs responded (Delaware, Kansas, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, Texas, Virginia, and Washington State), all eleven were aware of LEED, with two having undergone some formal sort of training in LEED. (Jennifer Lynn Buddenborg, "Changing Mindsets: Sustainable Design in Historic Preservation," (M.A. thesis, Cornell University, August 2006), 4-5, fn. 7, 134-135.)

[470] A December 2007 author review of the U.S. Green Building Council's online membership directory identified only two nonprofit preservation organizations as institutional members: the National Trust for Historic Preservation (joined in October 2006) and Historic Boulder (Colorado), Inc. (joined in July 2007). (U.S. Green Building Council, "USGBC: Member Directory," 2007, <http://www.usgbc.org/myUSGBC/Members/MembersDirectory.aspx?CMSPageID=140> (accessed 9 December 2007).)

[471] In addition to the examples discussed in this document, two other good sustainable rehabilitation models to pay attention to include: the National Trust for Historic Preservation's LEED-seeking rehabilitation of the Beaux-Arts style Soldiers' Home Administration Building (1905) into a visitor center (Robert H. Smith Visitor Education Center) for the President Lincoln Cottage and Soldiers' Home National Monument (on the Armed Forces Retirement Home campus, Washington, D.C.); and the LEED-seeking sustainable

preservation integrative design approach undertaken by Shelburne Farms (a Shelburne, Vermont, environmental nonprofit) to rehabilitate its historic Southern Acres Dairy Barn, a contributing structure within a National Historic Landmark district, into a residential learning center. Both projects are ongoing at the time of writing. (Patrice J. Frey, "Measuring Up: The Performance of Historic Buildings Under the Leed-NC Green Building Rating System," M.S. thesis, University of Pennsylvania, 2007, 97-109; Kim O'Connell, "New Directions for the old retreat: With its President Lincoln's Cottage project the National Trust puts environmental principles to work," *Preservation* (January / February 2008): 27-31; and Gregory A. Tisher, "Rehabilitation of the Southern Acres Dairy Barn ('Old Dairy Barn') at Shelburne Farms: Themes in Sustainable Design and Historic Preservation Interaction and Collaboration, Summer 2003 – Spring 2006," unpublished document produced for Shelburne Farms, Shelburne, Vermont, 31 May 2006.)

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