

# **RIHS Library Safety and Environmental Upgrades Using Geothermal and Solar Energies**

## **Introduction**

The Rhode Island Historical Society (RIHS) requests \$400,000 in outright funds from the NEH for a \$1,329,807 project with cost sharing of \$929,807 by the RIHS, to install a modern, efficient environmental and humidity control (HVAC) system to protect the archival and image-related collections and other historic materials stored and used for public research in its Library building in Providence. These collections, comprising at the Library over 600,000 items or assemblages, constitute the most important collections of Rhode Island Historical materials in existence. This proposal also includes the addition or improvement of such safety and security systems, as an addressable fire alarm system, emergency lighting, exit signs, and a new fire escape, all to better protect collections and users. To gain the maximum benefit from the new system and to ensure the long-term preservation of the collections, the project will also secure the building envelope from moisture infiltration by replacing the failing roof, gutters, and rusting cornice, which have received no substantial repairs in 80 years.

Of the funds needed, the RIHS has raised over the past three years, and has in hand, all but \$175,000 of the financial support required to complete this project if this grant proposal is successful. The funds raised so far come from national government (Save America's Treasures), private foundations (the Champlin Foundations and others), and private contributors: the RIHS's great success in raising \$2.4 million for the John Brown House project (see below) gives us complete confidence that we can raise the \$175,000 still needed if this NEH application is successful. Therefore a grant from the NEH would allow this vital institutional project, planned over years and representing the RIHS's highest priority, to finally be realized.

The new environmental control system will provide the first stable and sustainable humidity control system the RIHS Library and its collections have ever had, greatly extending the life and usefulness of the historical material it contains. The use of geothermal and solar energy to power this system will make it both more efficient and economical to operate, and, of course, more environmentally sound. The design, installation and operation of this Library HVAC system has been and will be strongly influenced by and in part modeled upon the geothermal HVAC system the Society has just successfully installed (2010) in its National Historic Landmark house and museum, the John Brown House museum, where humidity is now, for the first time, successfully stabilized at a beneficial level. In a general sense, this proposal intends to invoke professional values and systems tailored to a realistic and sustainable financial model for a mid-sized historical society that in recent years has lost more than half its state funding and does not have the abundance of financial resources that can be called upon by many larger institutions of its type.

After the RIHS's institutional revival, described below, and the raising of \$2.4 million over a six-year period to restore the John Brown House (the largest single project in the RIHS's history), the Society intends this last remaining collections care/facilities improvement to be effective, practical, durable, and sustainable. These outcomes are essential if we are to upgrade collections care and security, establish a stable environment for the long-term preservation of the collections, and increase the safety of historical holdings and the people using them. We hope the project will serve as a model for what many other mixed-use, modestly-funded historical or archival and historic preservation institutions can seek to achieve. In addition to a white paper describing the project's principles and efficiencies, results can be shared at the local historic preservation conference, regional archival conferences, and through the Society's newsletter, website and blog. Lessons learned from the John Brown House project were presented by the Executive Director and the Project Architect at the 2010 Rhode Island state-wide Historic Preservation Conference. The proposed Library HVAC project offered here is only the third geothermal project ever to be installed at, or contemplated for, a Rhode Island cultural organization (the John Brown House installation was the second). If this proposed project goes forward, it will be the only

such library installation in the whole state, and will be certain to attract considerable interest in its process, progress, and results.

## **I. Institutional Background and Project Goals**

Collections management and preservation improvements were the core of the RIHS's 2004-2009 strategic plan and remain crucial in the current 2010-2014 strategic plan (both, Appendix B). For many decades, the Society's collections and facilities suffered from a lack of attention, and considerable effort, expense and time has been expended under these two plans to establish new procedures and policies to govern and manage collections more professionally. Preservation, collections management, and cataloging have proceeded simultaneously in the Museum at the John Brown House (JBH) and at the Library, but the JBH, where the object collections are stored, has until now been the primary focus of infrastructure upgrades. Goal 4 of the RIHS's 2010-2014 strategic plan, "Sustain and expand access to RIHS collections," includes improving physical facilities to support collections care and management, and specifically seeks both to upgrade the Library's climate control and fire and safety systems, and to sustain the ongoing process of indexing and cataloging collections. The improvements to the Library directed by the current strategic plan are the most important facilities and collection goals in the plan.

### **A. Institutional History**

The RIHS, founded in 1822, is the oldest and largest historical organization in Rhode Island and the fourth-oldest in the United States. Its historical collections are the best, largest, and most comprehensive in the state, and comprise a total of some 625,000 items and collections held in the Library and elsewhere, ranging in date from the pre-European contact period to the present. Of this varied and significant assemblage, all but the fine art and object collections (25,000 objects) are stored in the Society's Library, a 15,800 sq.ft. building originally built in 1874 as a church and remodeled in 1928 to serve as a branch of the Providence public library. The RIHS purchased the building in 1963. Though the building itself has no individual historic designation, it does lie within the Power Street-Cooke Street National Historic Register district in Providence, RI. The local state historical preservation organization, the Rhode Island Historical Preservation and Heritage Commission, holds a protective exterior easement on the Library building (granted in 2009), as well as on the John Brown House, and has already certified and approved the changes and modifications included in this proposal for the Library.

The RIHS owns and operates three building in Providence: the Library (121 Hope Street), which houses the archival collections and a public reading room; the John Brown House (52 Power Street, 19,000 sq.ft.) a designated National Historic Landmark built in 1788, which contains storage for three-dimensional collections and is operated as a house museum with exhibits, educational programs, and other public activities; and the Aldrich House (110 Benevolent Street, 13,400 sq.ft.), a designated National Historic Landmark built about 1822, used for administration and for educational programs. The RIHS also operates an industrial history museum in the mill town of Woonsocket associated with the region's French-Canadian ethnic community (42 South Main Street, Woonsocket, 9,000 sq.ft.). This building is owned by the City of Woonsocket. The RIHS serves about 30,000 visitors and users annually. It has 14 full-time paid staff and 22 part-time paid staff: 5 full-time paid staff and 3 part-time paid staff work primarily in the library; 3 additional collections staff members divide their time between the JBH and the Library. The current RIHS operating budget is about \$1.8 million, of which only 8% now comes from the state, after cuts of almost 60% two years ago. This operating budget reflects several years of cuts from state and local government sources, but the RIHS has so far been able to avoid any staff lay-offs during this current recession, though hours and pay have been reduced in many cases: the RIHS 2011 institutional budget is about 10% lower than the 2007 budget.

The Aldrich House and the John Brown House were each acquired by gift in the mid-20<sup>th</sup> century, and the Museum of Work and Culture was opened in 1997. The Library building was purchased, as mentioned, in 1963. Over the past half-century the RIHS has expanded its role from the once-typical

private-club/genteel lecture kind of institution into the much broader public educational, preservation-and research-oriented organization it is today. Recovering from financial and organizational difficulties it endured from the 1980's until about 2004, the RIHS has spent recent years intensely focused on advancing its collections management, facilities care, educational work, and expanding its general institutional capacity. It has also achieved a much stronger level of financial stability, doubling its endowment from \$4.5 million in 2003 to just over \$9 million today (October 2010). These very substantial professional accomplishments are reflected in the RIHS's successful achievement of national accreditation, from the American Association of Museums, in 2009.

## **B. Recent and Current Institutional Strategic Planning**

As mentioned above, the RIHS, in its planning for the Library, has been guided by the recent 2004 and current 2010 organizational strategic plans (Appendix B). In these plans, improving collections care and management, and also improving the condition and quality of the buildings housing collections, have been the centerpiece of all institutional efforts. By the early 21<sup>st</sup> century it was evident that for more than a generation collections care and facilities maintenance had not been diligently pursued at the RIHS. Buildings had been allowed to deteriorate and had not been equipped with new or updated environmental systems and controls, or new or updated storage equipment. Modern techniques of collections care, inventory-keeping and cataloging had not been systematically pursued. Goal 2 of the 2004 strategic plan directed the creation of an online public access catalog at the Library, centralized collection registration for Museum and Library collections, improved management standards, protocols, and cataloging, the creation of a collections Development plan, improving collections storage, and assessing the feasibility of installing climate-control in the John Brown House. Goal 3 of the 2004 plan stated that “(the Library’s) climate-control system needs upgrading,” and that it also needed the protection of a new fire alarm system and the improvement of safety standards. The collection-care goals of the 2004 plan were largely achieved. The current 2010-2014 strategic plan incorporates and reiterates the need for sustaining the gains in collections management, and, in the (new) Goal 4, directs the RIHS to “continue to improve physical facilities to support collections care and management . . .” and asserts as the most important Facilities-related goal (4.B.) to “Seek necessary funds and implement the renovation and repair of the Library, in accordance with . . . plans (to) substantially improve collection storage conditions.” The Facilities Committee report appended to the strategic plan states that “Completing the (Library) renovation project should be the Society’s chief facilities focus over the next five years.”

A new environmental-control system, using geothermal wells, was installed in the John Brown House in 2009-2010, completing a six-year restoration of that building and achieving the directive of the 2004 strategic plan. Now the RIHS must complete, under a new strategic plan, its nearly decade-long effort to rebuild, reconfigure, and restore its systems and facilities for collections-care by installing the environmental and other improvements laid out for the Library in this proposal.

## **C. Library Project History, Library Assessments, and Institutional Requirements**

As part of its 2004 Strategic Plan, the RIHS adopted a new mission statement, in part to underline the importance of improving collections care: “The Society collects, preserves and shares materials from Rhode Island’s past so that present and future generations may enrich their sense of history and comprehend more fully their predecessors, their communities, and themselves. Pursuing the highest standards of collection preservation, presentation and management, the Society encourages and assists people of all backgrounds and interests to learn more about Rhode Island’s varied history.”

Starting in 2006, the RIHS, in response to these needs to upgrade collections care and facilities, undertook a number of assessments of both the John Brown House and the Library buildings and their conditions. At the John Brown House, separate condition and HVAC reports by Haynes/de Boer Associates (Providence), Richter Cornbrooks Gribble (Baltimore), Richard L. Kerschner (Ferrisburgh, VT), and others, guided the long and ultimately successful restoration and upgrading of that structure. In

2006 Haynes/de Boer completed the Library's first condition report in modern times (Appendix A). It analyzed all aspects of the structure and also resulted in the preparation of the building's first modern floor plans. The report noted significant deterioration in the roof and roof drainage systems, in the windows, which were cracked and losing their thermal efficiency, and in such elements of the safety systems as a failing fire escape. It noted that the existing HVAC systems were antiquated, inadequate and unable to maintain proper temperature and humidity levels, especially in archival storage areas. It recognized the need for a new municipally connected fire alarm system and for a variety of improvements to interior finishes and equipment, including the installation of new exit signs and emergency lighting. (See also Appendix I, Images of Current Conditions.)

A joint Architectural Conservation Assessment for both the John Brown House and the Library, undertaken by Philip Cryan Marshall in 2007, confirmed and reiterated these findings. The RIHS's long and multi-phased improvement program at the John Brown House received most of the attention and effort, but the first steps in improving the Library were also undertaken. Between 2006 and 2010 interior lighting, finishes and equipment were upgraded, the old boiler was replaced, and natural gas replaced fuel oil to power the existing HVAC system, and custom-fitted screens were put over all the reading room windows to reduce UV light in the area.

Approximately 1/3 of the money so far raised for this project by the RIHS derives from a National Park Service Save America's Treasures grant. This grant paid for the 2009 planning for the project mentioned in this proposal, and that plan has been approved by the Park Service and also by the state historic preservation organization, the Rhode Island Historical Preservation and Heritage Commission.

In 2009, with the John Brown House project entering its last, but most intense, major construction phase, the RIHS began to plan in greater detail for the long-anticipated Library improvements. The Save America's Treasures grant, as mentioned above, enabled the RIHS to hire Haynes/de Boer to draw up a full Library project plan, including an HVAC scope-of-work, and careful cost estimates, though at that time including a conventional HVAC system to replace the old one (Appendices C and D). The completion of the geothermal HVAC system at the John Brown House in 2010, and the great success achieved by that project, encouraged the RIHS to incorporate the lessons learned from that effort into the Library planning, so in 2010 it amended its Library plans to include geothermal and solar panel systems, and updated cost estimates. The specific advantages of the geothermal and solar systems are discussed in greater detail below (see pp. 13-15), along with the very complete documentation of severely fluctuating environmental conditions in the Library that make the needs for better environmental conditions so acute (pp. 8, 11).

The philosophical 'grounding' of the approach of the present proposed Library improvements is to strive for substantial and efficient improvements in the conditions of collections care, but with long-term costs the RIHS can actually afford, sustain, and support, in pursuit of achieving real progress but within realistic limitations. "Sustainability" is the key word: sustaining improved collections management conditions to prolong the survival and educational use of these collections, and sustaining the RIHS itself, for if the organization is not financially sound it cannot sustain its collections or its public work. Ten years ago the RIHS experienced an organizational 'near death' experience, with deficits totaling a third of expenses, eroding endowments, and systematic deterioration in almost every sector. To come back from that and achieve accreditation required very hard work and conveyed an indelible sense of the need to treat both resources and expenses realistically. Since 2002 the RIHS has raised more money than ever before in its history: \$3 million for building repairs and collection management enhancements, over \$4 million for its endowment. In addition it reduced expenses and undertook a massive internal reorganization. Not surprisingly, we have exhausted many of our donors and need the spur of a major project gift, such as this proposal to the NEH, to achieve this last, big push to repair the Library systems. But this Library project has been conceived and designed to be sustainable within the painful lessons we have learned. We cannot demolish or replace or gut the Library: we must enhance and

repair it, seeking that best balance between significant cost and significant progress. A more radical project would simply not be attainable in terms of the vast output of energy, materials and other resources that would be necessary. We also recognize that whatever we do must be sustainable in terms of our capacities, recognizing in addition that our support from the state, 20% of our budget ten years ago, has already been cut by more than half, could be further reduced, and in any case is extremely unlikely to rise again in our working lifetimes. The financial stability and longevity of the organization are also critical to ensuring the long-term preservation of its collections, and these factors have shaped the Library plan: using the existing structure, making it safer and more energy efficient, using new but proven technologies like geothermal energy to secure the best long-term cost savings and smallest environmental effects. We will follow such modest, careful, efficient strategies to preserve Rhode Island's most important historical collections.

## **II. Significance of Collections**

As mentioned above, the Library's collections are the most comprehensive in existence relating to Rhode Island, and represent almost two centuries' worth of focused and determined accumulation. The Library's 600,000 collections include almost 100,000 printed books, a similar number of examples of printed ephemera, 7,000 manuscript collections, over 350,000 collections considered Graphics (photographs, negatives, maps, sound recordings, video recordings) plus such special collections as 15,000 reels of microfilm and 9 million feet of motion-picture film.

### **A. Public Use and Institutional Connections**

The RIHS Library receives over 4,000 visitors or client requests annually to use its collections. This is in addition to approximately 96,000 annual hits on the RIHS's new online collections catalogue. About 40% of these users are researching genealogy, and students also constitute a large portion of the researchers; but journalists, historians and educators, at both the high school and university level, are prominently represented. The RIHS has particularly close relationships with Brown University, the University of Rhode Island and the Community College of Rhode Island, and students and faculty from these institutions are frequent library users. Two Brown University professors and the Dean of Arts and Sciences for the University of Rhode Island are Trustees on the RIHS board, while professors connected with other institutions of higher education serve on the RIHS Publications Committee. Almost no significant work of Rhode Island research in any medium can be completed without recourse to the collections of the Library: one of the best known recent projects to rely heavily on RIHS collections is David McCullough's *1776* (Simon & Schuster, 2006). Another is *Sons of Providence, the Brown Brothers, the Slave Trade and the American Revolution* by Charles Rappleye (Simon & Schuster, 2007). Maryalice Huggins and her book *Aesop's Mirror: A Love Story* (Farrar, Straus & Giroux, 2009) were given a full page article in the New York Times 'Home' section on November 12, 2009, which quotes her specifically referring to her use of the Rhode Island Historical Society's Library and of its 'stifling' reading room. The collections also provide the foundation for all the RIHS's work in exhibits, education, museum development and public programming of every kind. The RIHS's recent temporary exhibit, 'Rhode Island in the Time of Lincoln' (2009), and a new permanent exhibit, 'Going to Work,' about labor and immigration, rely very substantially on collections held at the Library. The Society's 30,000 annual visitors and users all benefit at least indirectly from the historical bounty preserved at the Library, and the RIHS continues to sustain the preservation of Rhode Island historical materials by accessioning some 200 new collections, mainly photographic or archival, each year.

The RIHS holds the sole copies of many printed items, and has the largest existing collection of Rhode Island-specific printed materials. Other institutions, however, also hold substantial Rhode Island collections. Brown University's John Hay Library holds some of the same titles, and some are held by Brown's Rockefeller Library, although the Rhode Island materials of these institutions are now housed off-site in the Library Annex and are less accessible: in any case these are not, like the RIHS Library,

accessible to the public (and for free). Also at Brown is the Sidney S. Rider Collection, a large private collection of materials related to Rhode Island, and one especially strong in printed ephemera.

Many of the book collectors in the state split their bequests between the Providence Public Library (PPL) and the RIHS, and the PPL Special Collection Division holds complementary collections on topics ranging from slavery, Irish literature, card games and the Civil War. The Rhode Island Index, maintained by PPL librarians since 1900, also provides indices to many RIHS holdings.

A similar relationship exists among the various manuscript collections in the state and in the region: the RIHS collections complement materials held by Brown University's John Carter Brown Library (JCB), most notably in the Brown Family Papers collection, variously distributed between the repositories depending upon the inclinations of donors. While the JCB and RIHS both maintain extensive map collections, the JCB's wider collection, hemispheric in scope, provides a context for the RIHS's collection of Rhode Island-specific maps, many of which are unique to the RIHS.

At both the John Carter Brown Library and the John Hay Library, collections document local businesses, and social or activist associations from abolition societies to women's rights' groups: these collections overlap with the RIHS's collections, or support them. Because Rhode Island is so small, most of its archival organizations interact with each other regularly and often hold complementary collections. For example, researchers catch glimpses of Rhode Island working women within the RIHS's fully processed records of the Women's Liberation Union of Rhode Island, but can also gain information about working women in Rhode Island by utilizing the oral histories of clerical workers in the Rhode Island Working Women Oral History Project held by the University of Rhode Island. Significant collections that contain material on the work and social activism of Rhode Island women can, for example, be found in such out-of-state institutions as Smith College and the Schlesinger Library at Harvard.

Politicians and political organizations represent a smaller, but still important group of records at the RIHS. While the RIHS does not actively collect the papers of major 20th century Rhode Island politicians, as that subject is covered well by the University of Rhode Island, the Society does hold records related to important 18<sup>th</sup> and 19<sup>th</sup> century political figures or organizations such as Stephen Hopkins, Thomas Wilson Dorr, and the Democratic Party of Rhode Island (1850-1860). More important, perhaps, are the records of organizations and individuals who shaped politics and government from outside the political machine: the Rhode Island Peace Society Records (1818-1973) and the Providence Female Society Records (1799-1952) are but two examples of collections documenting centuries-old local organizations dedicated to social change. The RIHS also holds personal papers of members of these and other organizations, and of the state militias and military organizations. Thousands of letters, diaries, journals and log books at the RIHS document the lives of individual citizens also represented in organizational archives. Comparable collections are held at state historical societies throughout New England and America; New England collections often hold letters of correspondents with Rhode Island citizens and businesses, completing the web of interests and influence across the region.

## **B. Specific RIHS Library Collection Highlights**

The Library's manuscript collections are unequalled. They include original letters and papers relating to the state's founder, Roger Williams, whose advocacy for freedom of religious conscience assures his permanently high position in the American historical pantheon. They include original Native American treaties related to the very creation of what became the state. Pertaining to the most important settlements in Rhode Island, they include the Providence Town papers (1633-1832), containing documentation of almost every sort of activity involving the lives of public figures and private citizens in the state's capital city (the second largest in New England) since its founding, and addressing social, agricultural, military, political, financial, commercial, and settlement matters; an example of material recording a rarely documented stratum of Providence life would be the Dexter Asylum Records (1828-1956), documenting the care of the poor and mentally ill of Providence, providing unique records of

under-represented populations and the social conditions that affected their lives. The nationally-important industrial history of Providence is represented by the Hazard Family Papers (1698-1979), recording the industrial history of Rhode Island through this prominent clan, which included authors, educators and social reformers, and established the Peacedale mill, one of the first textile mills in the United States; and of course by the Brown & Sharpe collection (1833-1994), detailing the history of the most important of all Rhode Island businesses, one that assured American international dominance of precision tool-making in the 19<sup>th</sup> century.

The RIHS's Graphics Collection contains some 350,000 photographs, lithographs and engravings, broadsides, maps, drawings and watercolors, each documenting an aspect of Rhode Island history. Many types of sound recordings and motion-picture films, and microfilms, are also kept in the Graphics collection. Among the earliest unique photographic images are daguerreotype, ambrotype and tintype portraits of Rhode Islanders, and seven unique exterior views of areas in and around Providence that provide the earliest documentary views of the state. One of the most extensive pre-photography collections of documentary images of Rhode Island scenes and plants is the Edward L. Peckham Collection; Peckham made over 40 painted views of Providence in the decades before photography's invention; these comprehensive views offer a clear picture of a growing, early-industrial city. Later images are of local flora: Peckham documented the state's native plants and increased the research value of his images by noting where, and when, he found the specimens. These images are like a paper version of the collection of glass botanical specimens at Harvard University's Peabody Museum, and like those three-dimensional records, the Peckham watercolors are most valuable when used with written and printed evidence of the state's flora. RIHS staff members have noted an increased use of historical collections by biologists and other scientists working to establish historical norms for various populations including sea otters in the Pacific Northwest—a number that can be ascertained by the number of pelts shipped by Rhode Island merchants to China. Similar work will be possible with collections like the Peckham images as environmental scientists work to understand the changing landscape.

The RIHS has the state's largest map collections (1630-2010), recording almost every aspect of the natural and built landscape since the arrival of Europeans, and has most of Rhode Island's significant social and ethnic history collections, providing unique material related to slavery, and to the Native American, Irish, Italian, French-Canadian, and other ethno-historical communities, as well as to women's history in Rhode Island.

The Graphics Collection also contains images that record the changing populations of the state. While there are the usual formal portrait photographs of prominent educators, politicians and military officers, the collection also contains hundreds of images by Charlotte Estey that document the changing face of the Fox Point neighborhood, a traditionally Portuguese and Cape Verdean neighborhood in Providence bordering College Hill. Estey's images show children, local businesses and residents and the landscape of early-19<sup>th</sup> century frame homes intermingled with cottages and triple-decker tenements. While some of the homes and businesses Estey photographed remain, many others were razed when Interstate 95 was built between Fox Point and Narragansett Bay.

The Graphics Collections has the best 20<sup>th</sup> century collection of Rhode Island construction photographs in existence, 5,000 images by Grace Trofa showing such major projects as the building of Providence's Mall and River Walk. These were the biggest post-World War II Rhode Island construction projects and marked the transformation of Providence from a decaying industrial backwater into the lively city of today.

The RIHS Graphics Collection contains the largest single collection of images of the state held anywhere. Several thousand landscape and architectural views are owned by the Providence Public Library (PPL), and when viewed with the RIHS Collections, form a near-continuous record of the state's cities and towns. Graphics collections at the John Hay Library at Brown University include photographs, prints, and ephemeral materials sometimes similar to RIHS materials, but while the Hay also holds Brown

University's own archives, it should be noted that the RIHS collection is frequently more complete than the University's own. For all collections, the Rhode Island Historical Society maintains the only Library in the state dedicated solely to collecting Rhode Island materials and making them available without restriction or cost to the public.

### **III. Current Conditions and Preservation Challenges**

Built in 1874 and adapted to library use in 1928, with HVAC upgrades by the RIHS in the 1970s, the RIHS Library building houses the majority of the Society's printed, manuscript and graphic collections on three floors above a public reading room. The walls of 16- to 12-inch thick masonry are not insulated, and only the second and third story floors are of concrete; the Reading Room has a wooden floor, and the fourth floor is a "grate" level inserted in the 1980s to provide additional storage and workspace below an attic. Ready-reference items are shelved in the first-floor public Reading Room along with all card catalogs, finding aids, and indexes to collections stored in secured, restricted-access shelving on the upper floors. RIHS staff monitor the Reading Room at all times, and extensive cataloging efforts have increased access to, and intellectual control of, the various collections held at the Library.

The current air conditioning system uses a chiller and condensers in conjunction with a gas-fired (converted in 2010 from oil) boiler to heat, cool, and re-humidify the building. Over the past five years, the Library staff has monitored environmental conditions using Onset Corporation's HOBO data loggers, Climate Notebook software, and Preservation Environmental Monitoring (PEM) loggers and web-based software. The widest variations in temperature and relative humidity levels are seen in the Reading Room, which is the most vulnerable to air leaks and thermal loss from the aging windows (see Appendix I). Variations are seen between the north and south sides of the building in the Reading Room and on the upper floors, where the temperature and the relative humidity change as they do in the Reading Room. The system proposed would create two zones per floor (one north and one south) to address the natural variation and reduce the environmental swings on every floor, prolonging the life of the collections.

#### **A. Preventive Conservation, Preservation, and Security of Collections**

The majority of the RIHS Library collections are stored in closed stacks on the floors above the public Reading Room. As security measures, all researchers are required to present a government-issued photo ID and complete a Patron Application in order to use Library materials; bags must be placed in lockers. Signed call slips are required for all materials paged from the closed stacks; items are paged only at scheduled times, and researchers are limited to using one folder at a time from manuscript collections.

Three staff members oversee the public Reading Room at all times: a Front Desk Receptionist, a Reference Librarian and an Assistant Reference Librarian. Patrons are asked to use Special Collections materials (manuscripts, maps, graphic items, and rare books) at the tables directly in front of the Assistant Reference Librarian. To researchers working with fragile materials staff members demonstrate safe handling techniques, and the use of preservation photocopies or microfilms is required when originals are very fragile or rare. Photocopying is limited as researchers are asked to check with staff before copying reference items and special collections are copied only by staff members.

Reading Room practices are the public face of the RIHS Library's preventive conservation policies and procedures outlined in the RIHS Long-Range Conservation Plan and Library Use Policies. Behind the scenes, projects include preservation photocopying of fragile items, microfilming heavily-used manuscript collections, and binding repair and stabilization. All materials are provided with acid-free, properly sized storage containers, and an ongoing program of rehousing older collections is in effect. The Society is in the midst of a multi-year cataloging/inventory project to survey some 350,000 items and assembled collections in the Graphics Collection. Inventory records developed for the survey include condition notes and conservation recommendations, and the Project Archivist rehouses inappropriately stored materials for safe retrieval. Moving image films are stored in cans on shelves in a designated area.

Graphic, manuscript, and printed collection items are all shelved in designated areas by type, size, and call number.

Books are shelved upright on baked-color steel shelves, with fragile volumes in four-flap enclosures of acid-free board and twill tape. Smaller items, including pamphlets, booklets and small programs, are housed in acid-free envelopes and boxes. All volumes are shelved by call number, with separate sections for oversize items to lie flat where required, and powder-coated steel locking Delta Designs cabinets for early imprints.

Throughout the stacks, center aisle lights are kept on for safety; other lights are turned on only when needed. At night, the staff door at the bottom of the stairs to the upper level is locked, as are the two steel fire doors that open onto the stacks. Motion sensors exist throughout the building; there are contact sensors on doors; all are placed on alarm whenever the building is empty. Intruder alarms and smoke detectors are monitored by a security firm and a phone tree is maintained to inform staff members when an alarm is triggered outside of work hours; after the security company calls the Providence Police Department or the Providence Fire Department, the Director of Collections is notified; she is also the staff member who lives closest to the Library site.

Daily operations at the Library are outlined in manuals and policy documents. The Buildings & Grounds manual includes detailed information about the utilities, systems, and policies for maintaining the Library. The Library Emergency Response Plan addresses both pre- and post-disaster procedures and policies that include Integrated Pest Management and Security procedures that patrons and staff alike must follow. The RIHS Collections Long-Range Conservation (2007-2011) plan details preservation and conservation projects; the RIHS Collections Management Policy outlines policies and procedures governing the security, use, and movement of collections (both, Appendix B).

## **B. Collections Management and Cataloging**

Physical control of collections is dependent upon solid intellectual control of collections, which rests upon inventory and cataloging work. In the Library, although catalog records do not exist for every item, every item is recorded in an accession book, catalog record, card, or finding aid, or a combination of these. The manuscripts collection is the most extensively cataloged collection genre, with finding aids and catalog cards for 92% of the materials in the collection. A Master List of Finding Aids correlates collections by MSS number to numbered shelf locations, although locations are not included in the publicly-accessible Master List. Accession information has been established for 90% of the collection, and staff members continue to enter the 19th century accession information into the catalog to re-establish links between collection items and accession information. A Manuscripts Collection Inventory is currently underway, with the Collections Assistant shelf-reading and updating locations weekly to ensure that collections are both accounted for and accessible.

For the printed collection, fewer accession records have been correlated to online catalog records, though the accession books list numerous gifts of printed items by date along with donor names. The books, pamphlets, and other items in the printed collection are all cataloged, though a distinction is made between that portion of the collection cataloged to current professional standards in Library of Congress format—65%—and the portion cataloged in idiosyncratic, local formats—35%. This process is proceeding concurrently with the accession book entry project with new catalog records and accession records matched monthly. Shelf list and catalog cards are maintained and updated monthly.

The Graphics collection has been the most inconsistently cataloged, with some 32 different cataloging methods documented by the RIHS Registrar; this collection is the subject of an extensive ongoing inventory project, mentioned above, funded by the IMLS and private sources. While 72% of this collection now has at least a basic catalog record, the wide variety of catalog formats and methods requires continuing consolidation, as well as the correlation of items and collections with catalog records

and locations. The Graphics Inventory Project Archivist has now examined over 200,000 items (slightly more than half of the Graphics collection) and has created nearly 10,000 new records representing them. These records include condition and location information, permitting detailed analysis of the collection and retrieval of materials. The Graphics Inventory Project and other collection management tasks have given the Library's collections the best documentation and general management control that the RIHS has ever had of its holdings in its long history.

The RIHS launched its first online public access catalog, NETOP, in 2007. The culmination of the IMLS-funded Rhode Island Family Heritage Project, the catalog brings records from all collecting areas together in one searchable database. The unified catalog reflects the Society's dedication to maintaining links between the multiple kinds of items that can arrive as part of a collection. Connections are maintained through the MINT accession record, accession numbers, shared name authorities, and Library of Congress subject headings; RIHS Museum staff members are currently phasing in the use of Library of Congress subject headings with newly cataloged items, a process that will continue to expand as new records are created and existing records are edited. Although the IMLS grant proposal promised 68,700 total catalog records and no accession records, NETOP was launched with a total of 77,197 catalog records and 25,838 accession records; by June 30, 2010, the catalog contained 91,894 catalog records and 74,856 accession records.

### **C. Control of Collections During Construction**

Expanded cataloging and detailed inventory records allow staff members to accurately locate collection items. During the Library renovation projects, catalog records will be updated whenever collections are moved. This will allow the Registrar, Curators and Librarians to track those materials moved to accommodate on-site work and to return materials to their original locations when work is completed. Library staff gained experience with this process in 2007 when the Reading Room was renovated over an eight-week period. The work required the removal and relocation of furniture, collection items, computer catalogs and other office equipment. Shelf lists were updated to reflect new locations as staff members cleared the room in preparation for the work; one shelf list includes supplies and materials, so even furniture and equipment can be tracked. Replacement of materials was therefore a controlled and straightforward process. The Director of Collections, Registrar and Assistant Registrar all participated in the moving of materials and museum collections to accommodate the John Brown House Museum (JBH) HVAC project, and are familiar with cooperating with contractors and site superintendents to schedule and carry out collections moves safely and efficiently. With the Library's shelf lists, an even greater level of control of the movement of collections can be achieved.

After contracts are awarded and signed, RIHS staff will convene a meeting with the Project Manager, Site Supervisor, Architect, and all sub-contractors and workmen scheduled to be on site. RIHS staff will provide an orientation to the Society's mission and rules, emphasizing the importance of the project and of following RIHS standards and protocols in order to preserve the material heritage of Rhode Island. Food and drink will be permitted only in the Library staff room; all contractors and workmen from Project Manager to laborers and cleaners must be accompanied by a member of the RIHS staff whenever work is to be done in secured stacks or the Reading Room; everyone must sign in when arriving on the worksite and sign out when leaving; and no open flame is permitted on the job site. These rules will be in place and posted on site from the beginning, and compliance will be reviewed at the weekly progress meeting attended by the Project Manager, Architect, RIHS Executive Director and Director of Collections as well as the Site Superintendent and subcontractors when required. RIHS Staff will inspect the work site at the end of each day when taking progress photos. Although there is no guarantee the construction company and subcontractors who completed the JBH project will receive the Library contract, if the same companies are hired the RIHS can request a particular Project Manager and Site Superintendent, making compliance with the site rules and protecting the collections easier to accomplish.

### **D. Environmental Monitoring and the Need for Improved Conditions**

Just as the increased concentration on cataloging has given the RIHS Library staff greater control over and understanding of the collections, heightened awareness and new methods of collecting and analyzing environmental data have informed preservation projects. Since 2006, sixteen HOBO data loggers, supplemented by four Preservation Environmental Monitors in 2008, have been placed throughout the Library building to record temperature, relative humidity and lumens; these devices allow the RIHS Library staff members to regularly cross-check environmental data.

Data collected on the temperature and relative humidity (RH) of spaces in the Library show far greater variation in environmental conditions than is desirable for long-term collections preservation. Environmental monitors show the greatest variations in relative humidity (as much as 29% in a twenty-four hour period) to affect the ground floor public reading room, which houses frequently-used vital records, genealogies and microfilms as well as the card catalogs; the reading room space is also the one most compromised by the aging windows. Although the target RH is  $45\% \pm 5\%$ , humidity levels between 24% and 72% were recorded in the winter, and ranged between 28% and 76% in the summer.

A similar pattern on the upper floors housing the closed stacks and 95% of the Society's historic paper-based collections suggests that fluctuations in temperature and humidity levels are more dependent upon the current HVAC system and building envelope than on the opening and closing of doors in the Reading Room. On the upper levels, the greatest variation in RH occurs on the fourth floor, where fall/winter RH varies between 26% and 60%, with twenty-four-hour fluctuations of 13%. The fluctuations on the second and third floors are more pronounced in spring and summer, when twenty-four-hour fluctuations of 12% are seen. On the fourth floor, additional duct work will be installed where none has existed (the fourth level has a floor of pierced grating and so shares the third floor HVAC zone); this is expected to vastly improve and control the climate of the fourth floor. In addition, it is expected that the new windows and roof repairs will seal exterior air leaks and stabilize the interior environment, allowing the new HVAC system to operate efficiently and consistently, ensuring the long-term preservation of these unique materials. Furthermore, each floor—second through fourth—will be divided into two zones for more precise control of conditions specific to each location.

Since 2006, the RIHS Library staff members have maintained a log of environmental events and anomalies as well as detailed records of environmental conditions, as attempts have been made to refine control of the current system while lowering energy costs and maintaining collections-appropriate conditions. The staff have observed more consistently cooler temperatures and lower RH levels on the second floor, where books are stored, than on the third and fourth floors, where photographs and moving image films are stored. As a result, as part of this project, the Library staff will move books to the third floor stack level and film to the second floor, taking advantage of the building's natural environmental variations to improve preservation. This kind of passive preservation will help make the most efficient use of the space from an environmental standpoint and will reduce energy costs, because even with new and additional duct work a new system would work harder to maintain a lower RH and subsequent lower temperature on the third and fourth floors than it would on the second. As a bonus, the move will make an additional 100 linear feet of shelving available by making more efficient use of the stack space, increasing the library's ability to store and preserve its materials. Even with these passive improvements, we realize that truly significant change must lie in reducing and stabilizing excessive changes in temperature and humidity, as the proposed system will do.

RIHS Library staff members expect that replacing the first floor windows with new aluminum windows glazed with low-E glass will reduce heat loss, UV light exposure and solar gain. (Staff members also monitor and correlate outside weather conditions to environmental monitoring data.) Coupled with a new, more efficient geothermal HVAC system whose power usage will be further offset by solar panels, the new windows and roof repairs will create a dramatically more stable environment to ensure long-term preservation of collections while reducing energy consumption and costs.

#### **IV. Project History: Geothermal and Solar Energy Lessons Learned**

As mentioned above, the experience gained in the six-year effort to repair the John Brown House and equip it with a new geothermal plant and HVAC system has been extremely valuable in informing the planning of this current Library proposal. The geothermal system at the John Brown House has provided an excellent model and measure, for capacity, effectiveness, cost, and installation process, for what is envisioned at the Library. Since 2004, when the first aspects of the project to improve the environmental and physical conditions at the John Brown House were planned, an important part of the project was to introduce the first effective temperature and humidity controls into the house, to assist the preservation of both exhibited and stored historical collections there. The first years of that John Brown House project were devoted to repairing and securing the outside envelope of the building, with special attention given to preventing water and moisture penetration (roof, masonry, gutter repairs), and thermal loss (windows): this is the pattern we are proposing for the Library. The final part of the project was the installation of a new HVAC system. Again as with the Library, the initial plans were developed around a conventional system with the emphasis on environmental control through air-conditioning. But the advantages of a geothermal system became evident. Such a system, according to our engineering studies, would save between 25% and 40% of the operating energy costs compared to a conventional system, a very important consideration in view of the strong need for sustainability; a geothermal system would be environmentally neutral, using a constantly renewable energy source (heat of sub-surface water), and therefore itself adding no atmospheric pollution, a benefit in general and also for the collections in the house, and not vulnerable to any interruption of supply; because the wells and piping would be underground, the historic appearance of the landscape would remain visually unchanged, meeting the preferences of the RIHS and the state historic preservation organization, which holds a protective easement on the John Brown House, as it does on the Library; and, finally, a geothermal system would allow humidity control to be the primary agency for environmental improvement rather than air-conditioning, allowing greater efficiencies and lower cost. The higher initial purchase cost of a geothermal system was partially offset by the availability of federal and state grants, so the decision was made to go ahead with that type of mechanism, and the results, as mentioned elsewhere, have been very successful. Though the effort needed to move and return collections and to restore the landscape was great, the project was completed on time and on budget, and the outcome exceeded our plans and expectations, with the system controlling humidity even better than required, and the building and grounds looking as if nothing had happened. The gratifying success of the new geothermal HVAC system at the John Brown House thus recommended itself strongly to our Library planning, and was incorporated into it.

#### **V. Methods and Standards**

As shown above and indicated in various survey reports (see Creative Environment Corp. report of January 3, 2006, an appendix to Haynes/de Boer Library Conditions Report, January 2006, Appendix A), the existing HVAC system in the Library building is not adequate for the safeguarding of collections. There is substantial moisture infiltration from failed windows, the current system cannot maintain relatively stable year-round conditions of temperature in the 70° range or humidity levels in the 45%-50% range, and controls are limited and inadequate, with no real capacity for zoning. Most of the existing HVAC equipment in the Library appears to date from about 1970, and the windows from 1983, and none of these elements incorporates current energy-saving technology, modern controls, or current materials or designs. The roof has had no repairs in decades and has lost tiles, while the chimneys need repointing, and the gutter system and projecting cornice must be replaced, all with consequences related to moisture infiltration. The fire escape, obviously a vital safety feature, is structurally failing. Emergency lighting is inadequate, antiquated, costly to operate, and not in conformity with code requirements, and the current fire alarm system is also not up to current code requirements and is not connected to the city's fire

department. The addressing of these deficiencies will make the building much safer for collections and for staff and visitors.

The project as now formulated grew out of the January 2006 Comprehensive Conditions Report developed by Haynes/de Boer Associates, with the participation of Creative Environment Corp. as mechanical consultants, Gaskell Associates, Ltd. as electrical consultants, and Yoder & Tidwell, Ltd., as structural consultants (see p. 4). Schematic plans for a complete renovation of the building were prepared in February 2009 by Haynes/de Boer, and updated in 2010 to include a geothermal and solar system (schematic design drawings, Appendix C). The present NEH project proposal closely follows the recommendations of the assessors as contained in these updated reports and plans, which also incorporate the results of the RIHS's successful experience with the John Brown House recent HVAC project.

#### **A. Geothermal Heating and Cooling for Dehumidification-based Preservation Environments**

The John Brown House is constructed like the Library, with brick load-bearing walls, timber framing, and lathe and plaster interior surfaces, and the physical area in the John Brown House addressed by the new HVAC system serves roughly the same space (16,000 sq.ft., most but not all of the building) as the 15,800 sq.ft of the Library building. The John Brown House building envelope, similar in construction to the Library's, was first improved with new or repaired roofs, replaced or repaired gutter and drainage systems, and new triple-paned low-E, UV-filtered storm windows. A new, larger and more efficient air handling unit (AHU) replaced the old existing units and a closed-loop water-to-water geothermal system of nine 400-foot wells was installed to provide chilled water for cooling and hot water for heating. Existing century-old building ductwork was re-used, though modified in the basement and provided with motorized dampers to adjust air volume for 5 new zones governed by a computerized control system that makes adjustments based on readings from multiple temperature and RH sensors in the building, in the AHU, and outside. The existing heating system was kept as a back-up. The new geothermal system was put into operation in June, 2010, and easily maintains relative humidity in the 50%  $\pm$ 5% range, despite a particularly wet and humid summer with remarkably high dew points.

Records of monthly kilowatt hour (kWh) use are maintained by the RIHS Business Office, and, compared to the previous 4 years, the new system of humidity control and attendant cooling used only 21% more kWh in July and August 2010 compared to prior years when the building had no humidity control at all. The new geothermal HVAC system at the JBH currently uses about the same monthly kWh as the Library (Appendix TBD3), and a new, more efficient system at the Library is expected to save at least 30% in energy costs over the current Library system, despite the addition of water-to-water heat pumps and additional circulator pumps, according to the engineers that designed the JBH installation. Our engineers suggest that adding solar panels to the Library roof will generate enough energy to offset any energy increases made necessary by a new geothermal mechanism, and that the whole array will reduce the Library's overall energy consumption, despite the addition of more complex and much more effective climate control systems.

#### **B. Research and Standards: Current Views of Conservation Physics**

Following the success of the John Brown House HVAC upgrade, we began to consider using a similar system at the Library facility, replacing the chillers and condensers with a closed-loop water-to-water system based on dehumidification rather than cooling. Although the buildings are similar in construction, and the affected areas similar in size, we wanted to confirm the suitability of this kind of thinking to the storage of archival collections. We have, therefore, paid very close attention to new thinking about climate control in museums and archives that makes a very strong case for humidity control being the key goal, allowing temperature to gently rise or fall in bounded, but not severely linear, patterns throughout the year. We note the articles of Tim Padfield, PhD, a European analyst, on this type of approach, including his 2009 paper 'Does a standard temperature need to be constant?' (Appendix L

and at [www.conservationphysics.org/standards/standardtemperature.php](http://www.conservationphysics.org/standards/standardtemperature.php)). Padfield notes that the British Standard for archival storage calls for humidity in the 45%-60% range as essentially ideal, while the Royal Library in Copenhagen (which has a climate like Rhode Island's) has a constant 50% RH set point for archival storage. Similarly, Stefan Michalski, in his 2007 paper "The Ideal Climate, Risk Management, the ASHRAE Chapter, Proofed Fluctuations and toward a Full Risk Analysis" (Appendix L, online at [http://www.getty.edu/conservation/science/climate/climate\\_experts\\_roundtable.html#proceedings](http://www.getty.edu/conservation/science/climate/climate_experts_roundtable.html#proceedings)) argues for more leeway in temperature movement if humidity is carefully controlled. The new system proposed for the RIHS Library, which will include multiple zoned controls for each storage level and a separate zone for the reading room and public spaces, can easily achieve and maintain these levels. With the kind of minimal temperature drift endorsed by Padfield, Michalski, and many other museum and archive environment analysts, we can sustain a year-round constant humidity of 50% ± 5%RH at a cost that can also be sustained, especially with a geothermal and solar assist. The John Brown House museum geothermal system, designed to maintain summer conditions of 80°F and 50%RH, has far exceeded those standards and achieved, with only minor adjustments, 72°F ± 2°F and 50%RH; winter standards call for 65°F and 30% (or higher) RH. The Library, with similarly thick masonry walls as well as modern, insulated ducts with duct humidifiers, should easily maintain similar levels year round.

In climate control terms, the intent, as mentioned above, is particularly to control levels of humidity. The new system will be able to provide constant temperatures of 50° and humidity levels of 45%-50% in the isolated collection storage areas, and stable levels of about 68° and 45%-50% RH in the winter and about 72° and 50%-55% in the summers in the public reading room and office areas. As also mentioned above, several years of study by European engineers have indicated that the critical value in climate control for preservation is the stability of the relative humidity, and that a gently undulating record of temperature in accordance with a slow annual cycle moving from 50° through up to 75° does no harm to organic artifacts when the humidity levels are kept relatively stable within the range of 45%-60%. In addition, such cycles, relying on dehumidification especially, are much less expensive to maintain than settings relying chiefly on air conditioning. As expressed in M. Ryhl-Svendsen et al., 'Do Standard Temperatures Need to Be Constant?' (paper submitted at British Museum Going Green conference, 2010) "... passive acceptance of the authority of inflexible standards is no longer sustainable, neither on scientific nor on energy efficiency considerations." Other articles, e.g. T. Padfield, 'Simple Climate Control in Archives' (Proceedings of the 8<sup>th</sup> Symposium on Building Physics in the Nordic Countries, Technical University of Denmark, 2008), make the same point. The settings achievable by the proposed system are within the levels recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers for libraries and archives, and in accordance with the British Standard for archives as well, but the proposed RIHS Library HVAC system has the controlling of humidity as its first principle. The success of the John Brown House Museum HVAC system gives us confidence that a geothermal-based humidity control system for the Library, equipped with a supervisory control system and multiple zones per floor, will provide fine-grained, efficient, stable environmental control for the collections. With this approach, for the first time, hugely improved levels of climate control, and therefore archival preservation, using modern, centralized computer controls and sustainable technology, are within the reach of the RIHS at a cost that, with the NEH's help, can be sustained for the foreseeable future.

### **C. Project and System Design Features to Enhance Sustainability and Preservation**

The key elements of the proposal are to improve the building envelope, add essential safety systems, and, most importantly and essentially, to control humidity in order to safeguard collections. All these goals must be achieved in a way that is affordable and sustainable. To accomplish this, the project will replace the current HVAC system, which is inefficient and expensive to operate. The present system's main and most serious flaw is that it cannot effectively control humidity, resulting in excessive moisture in the summer months, damaging collections cumulatively and encouraging the presence of destructive insects in the summer. The excessively low humidity in the winter damages photographs, leather, microfilms, and other kinds of items through excessive dryness. In addition, trying to control

humidity in the summer by lowering ambient temperatures (which the RIHS has attempted in past years) makes the library uncomfortable for staff and researchers alike.

Presently the Library's energy inefficiencies are exacerbated by the existence of separate but concurrently operating steam and hot water systems serving different parts of the building, a relic of decades of add-on, jury-rigged enhancements. These will be swept away under this proposal and replaced with a heat pump geothermal (groundwater source) system using existing air-handling ducts with some augmentation. This will enormously increase the efficiency and versatility of the HVAC system, as it will be using a renewable energy source, groundwater, to provide constant heat to a circulating refrigerant in the winter, and absorbing heat from the refrigerant in the summer. As mentioned above, we expect a new Library HVAC system to result in energy savings of at least 30% over the current system, and adding solar panels promises even greater energy savings. In the proposed new system computerized controls will include, for the first time, climate-control zoning, allowing the temperature to be lower in the areas where only collection items are stored and higher where staff offices and patron services are. The Library plans call for eight closed-loop geothermal wells drilled to a depth of about 400 feet, in two groups on the north and south sides of the building, where they will fit in the land around the library building; there is just enough room in the Library basement to accommodate the heat pumps and circulator pumps and expansion and accumulator tanks required by the system.

In addition to the geothermal heat-pump installation, the new system will include duct-mounted heating coils to help create separate control zones in the lobby, bathrooms, office, staff room, and reading room on the first floor. A new duct-mounted humidifier will also be installed in the reading room area. Existing cast-iron radiators will be adapted to be used with the new system.

The upper three floors of the Library building are mainly open book stack and storage areas, with the top level having a grated floor through which heated air can rise. One old air handling unit with DX cooling, two humidifiers and four duct-mounted heating coils serves this area through ductwork on the second and third levels, but there is no ductwork at the fourth level. New main ductwork will be installed to provide air distribution to the upper level and modifications of the existing ductwork will allow for new duct coils and duct-mounted humidifiers. The new ductwork will be installed in the attic above the ceiling insulation, and there will be two zones of temperature and humidity control for each level of space. These modifications will allow the library to achieve more rigorous environmental control levels and will also allow zoned environmental controls.

#### **D. Current Policies and Procedures For Maintaining Appropriate Collections Environments**

The RIHS Library Staff currently use a combination of Onset Corporation HOBO data loggers and Preservation Environmental Monitoring (PEM) data loggers to record temperature, relative humidity, and light levels in multiple Library locations. Conditions are monitored in two locations on each level of the Library, a procedure which revealed the need for two zones per floor based on the recorded environmental differences between the north and south sides of the building. Environmental readings are recorded approximately every half hour, and the loggers are downloaded monthly, with data brought into Climate Notebook (for the HOBOS) and the PEM website for each logger type.

When the Library environment varies widely from the preferred levels ( $45\% \pm 5\%$ ,  $68^{\circ} \pm 2^{\circ}$ ), Library staff members adjust the humidistats or thermostats as needed, preferring to maintain stable relative humidity levels. Mechanical contractors are called in as needed when equipment fails to perform, leaks, or requires seasonal maintenance (for example, when the duct humidifiers are brought online in the late autumn).

The HVAC system at the Library runs constantly, and the air conditioning and heating is not shut off or adjusted when the building is unoccupied. This was tried for a short time several years ago as an

energy conservation and cost-saving measure, but the environmental conditions in the building varied too widely and the experiment was discontinued. So the system is left on at all times, and adjusted as needed to maintain constant humidity levels.

### **E. Ongoing and Future Maintenance and Environmental Monitoring**

Regarding the comprehensivity and reliability of climate condition monitoring, for several years 16 HOBO data loggers have recorded temperature, relative humidity and lumens throughout the Library building. These data loggers are supplemented by four Preservation Environmental Monitors (PEM), acquired in 2009, that can measure even lower levels of relative humidity and, along with hygrothermographs, allow the RIHS Library staff members access to truly comprehensive environmental information. Records are downloaded from all data loggers monthly. Data from the HOBO units is imported into Climate Notebook software for detailed analysis, and the PEM data is uploaded to the [www.pemdata.com](http://www.pemdata.com) website for analysis and management. In addition to recording temperature and relative humidity levels, the PEM monitors are equipped with digital displays of current conditions; this allows staff to monitor current conditions without downloading data every day. The Collections Assistant and the Conservation Librarian download the data each month and alert the Director of Collections to any anomalies.

Monitoring will continue throughout the project and, of course, after the installation of the windows and new HVAC system. The reports will provide detailed feedback to staff and will be shared with the environmental engineer; with detailed data in hand, the engineer will be able to adjust the system to meet the needs of the building and collections. Exactly this kind of process was followed with the new HVAC system at the John Brown House and allowed important and useful adjustments to be made there.

The RIHS Business Office Assistant has maintained a record of oil deliveries (up to the conversion to gas in November 2010), degree days and gallons used per degree day as well as kilowatts hours used by the RIHS Library (as well as the Society's other Providence sites); these worksheets have been kept since 2003. These detailed records show the increase in efficiency since the replacement of the old boiler and provide a means of correlating environmental data with energy use and costs. Energy use will of course continue to be recorded after the installation of the new system.

### **F. Impact on Structure's Historic Qualities**

These changes will have no adverse effects on the historic qualities of the Library building. As mentioned above, the state preservation organization, which holds an exterior historic easement on the Library building, has approved the plans (Appendix H). The new installation will improve the building's appearance by eliminating the exterior equipment now parked on an exterior concrete pad. The new system will be in the basement and is inherently much quieter in operation than the current one, a change which will be a boon for neighbors, and all new ductwork will be hidden in the attic or elsewhere, out of view. The new windows have been designed to recall the Library's industrial-style early 20th century windows as recorded in photographs: those 1920's windows were removed from the library building and lost when the current, now-deteriorating, windows replaced them in 1983. The building will thus actually regain an appearance in better accord with its historical qualities than what is there now, and the 'new' windows will suit the historic neighborhood better: the present windows suggest inexpensive commercial storefront installations and are antithetical to historical aesthetics.

### **G. Fire Prevention: Policies and Procedures**

The project will be completed by adding fire alarm improvements that will further limit potential harm to collections and visitors. A new wireless, addressable fire alarm system for the entire building, complete with a new fire alarm control panel, improved thermal detection, new pull stations and horns and strobe light warning devices, will ensure that any fires will be caught earlier than they can be at

present, and that the fire department will be notified sooner, with better results for collections and any staff or visitors present.

## **VI. Work Plan**

### **A. Summary of Previous Plans**

Following the condition surveys completed in 2006, preliminary, schematic design plans for a major Library building renovation were completed in 2009. These were modified in 2010, as already described. The 2009 plans assumed the inclusion of a new conventional HVAC system for climate control, which has been superseded by the present intention of including geothermal and solar elements. The 2009 plan did however include the roof, gutter, window, safety systems and certain other improvements which are part of the present proposal. The 2009 phase of the planning also produced measured drawings of the building, important consultations with staff and technical consultants, and a much improved understanding of the existing structural condition of the Library building and of its current HVAC system. The 2009 plans also include space and building modifications for the eventual installation of mobile shelving, but these are not part of the improvements contained in this proposal. The proposed improvements here will not affect or depend upon any of the possible building changes related to the installation of mobile shelving, and will not preclude them from being addressed at a later time: but effecting the building and climate-control improvements proposed here is a much more pressing necessity than installing mobile shelving, and it is important that we scale our improvement plans carefully to priorities and fundraising capacity.

### **B. Fundraising Plan**

As mentioned above, the RIHS has already raised all but \$120,000 of the funds required to proceed with this project, if we are successful with this NEH proposal. The RIHS has an excellent record of recent fundraising, and raised \$2.4 million, the largest single project the RIHS has ever pursued, for the John Brown House project in discrete phases over six years, dividing the project into four numbered stages and proceeding with steady success toward the completion of the enterprise. A successful NEH proposal will provide the incentive needed to energize donors for a final push to complete the Library improvements, and we will be able to call upon a special group of library supporters and local foundations that have not previously been asked to support any RIHS Library project. Given our recent successful fundraising experience on a larger scale, we believe that this proposed project fits very well into our capacities and abilities, and with a successful NEH proposal we will certainly achieve the final lap of fundraising.

### **C. Project Implementation Details**

Implementation of the design of the environmental/safety systems proposal will involve the preparation of drawings and specifications for bidding, a bidding phase, and construction administration. Based on the RIHS's experience with recent construction or renovation projects, including the John Brown House HVAC project, it is estimated that the preparation of a bid package will require about 3 months, the bidding and value engineering phase about 2 months and construction about 17 months. A detailed work plan with activities listed by month can be found in Appendix J.

Drawings and specifications will be finalized and bid documents prepared in the autumn of 2011, and contracts awarded in the winter of 2011-2012. Materials will be ordered by construction managers and contractors in preparation for actual construction, while RIHS staff will order boxes and supplies needed to move and protect the collections during the project.

Work will begin on the exterior of the building and in the basement; with work concentrated on the non-public and non-collections spaces, RIHS staff members can prepare the collections to be moved to more environmentally appropriate locations in the building (as the film collection and books will exchange locations) as well as preparing stacks, moving furniture, and relocating items temporarily in anticipation of workmen moving inside.

Exterior (roof, masonry, painting) work will continue through the Spring and Summer of 2012, and will be complete by the end of September 2012 when the interim report to the NEH is filed. In late fall 2012, drilling can begin; the work will be delayed until that time to take advantage of firmer soil to protect the Library building and to make drilling easier. Throughout the late winter and spring of 2013, pipes will be fitted to connect heat pumps and circulator pumps to the new air handling units (AHUs); heat pumps and circulator pumps will be installed, and RIHS staff will continue to move collections as needed while monitoring workmen in collections and public areas.

The old air handling units will be dismantled in late spring 2013 and replaced; the timing of their removal will depend on weather conditions and predictions for fair, mild weather. When the old units are removed, the new ones will be installed and connected to the system. RIHS staff will continue to monitor conditions and collections, and will alert the project manager and site supervisor to adverse conditions. By early summer, the system will be installed, running, and ready for balancing and testing with computer controls. The entire project will be complete, and the work site fully cleaned and restored, by mid-summer 2013. A final report will then be filed with the NEH.

The professional team of architects and engineers, listed below, will be responsible for carrying out the project under a standard form of agreement. The architect will supervise all bidding, in consultation with the RIHS, and administer construction. The mechanical and engineering consultants will have primary responsibilities in connection with the climate control systems, and the structural engineers with the building envelope improvements. RIHS staff Director of Collections Kirsten Hammerstrom will supervise all aspects of collections movement and control, and Executive Director Bernard Fishman will provide general oversight and manage the project finances. Again, the architect, Hammerstrom, and Fishman have already successfully worked on several construction projects together and are quite familiar with the process and pitfalls of such efforts.

## **VII. Project Team**

Bernard Fishman, Executive Director of the RIHS, B.A. *summa cum laude* Columbia University, M.A. University of Pennsylvania. He has been directly involved in developing the project's schematic plans and will provide general supervision and financial control for the project. He has directed historical societies for 27 years, and has been at the RIHS for nearly 9. In his career he has directed the efforts which resulted in the construction of two new museum buildings, as well as approximately ten smaller construction or renovation efforts, mainly involving historic properties. He was central to the conceptualization, fundraising for, and implementation of the John Brown House geothermal HVAC project completed in 2010.

Kirsten Hammerstrom, RIHS Director of Collections, B.F.A Washington University, M.F.A. Rhode Island School of Design, has worked at the RIHS for ten years. She has directed the substantial reorganization of collection administration and processes that have transformed that aspect of the institution, playing a major part in the accreditation of the RIHS in 2009. She has received training as an architect and has been directly involved in renovation projects at the RIHS Library and John Brown House properties: she was responsible for overseeing the installation of the new John Brown House geothermal HVAC project in 2010. She will supervise all aspects of collections movement and protection for this project, and share administrative and planning consultation.

Cornelis J. de Boer, AIA, Principal of Haynes/de Boer Associates of Providence. One of the leading architectural firms in Rhode Island and recipient of a recent special award from the Rhode Island Historical, Preservation and Heritage Commission, Haynes/de Boer has been in practice for over 30 years. Mr. de Boer and the mechanical and engineering consultants and structural engineers mentioned below have collaborated on numerous design and historical preservation projects, including the John Brown House, Beneficent Church, Brown University Hillel Center and Swan Point Cemetery Building and Chapel in Providence, as well as Trinity Church in Newport. He has in recent years supervised four phases of the RIHS's John Brown House's restoration, including in 2010 the installation of a new geothermal climate-control system. For the RIHS Library project he with his firm is the principal designer and planner, will supervise the engineers and will manage the construction.

Mechanical and Electrical Engineering Consultants: Creative Environment Corporation of East Providence.

Jason Sousa, EIT, Partner

Richard Newell, PE, Mechanical Engineer

This firm will be principally responsible for the design and installation of the climate control and safety systems, and for related mechanical and electrical work.

Structural Engineers: Yoder & Tidwell, Ltd. of Providence

Loren Yoder, PE

This firm will be primarily responsible for the exterior improvements to the building (roof, windows, fire escape) and the changes required for the boiler room and such other structural matters as required.

Construction Management Services, General Contracting, and Sub-contractors While this project must be put out to competitive bid, during the John Brown House HVAC project, and the JBH renovation projects that have been completed in the past four years, the RIHS staff have worked with numerous local contractors, construction firms, and subcontractors (mechanical, masonry, sheet metal, and other trades). The firms selected through the bid process will be qualified to carry out this work, and will probably be familiar to the RIHS. The Society maintains a high standard of excellence for construction and renovation work, and the architect and staff in concert approve the companies and contractors hired by the Society. All work will be carried out under a standard AIA contract, with a complete project manual and construction documents. RIHS staff attend construction progress meetings and work closely with site supervisors and foremen to ensure that work carried out meets standards and that workmen conform to RIHS site prohibitions on food, drink, open flame, and smoking.

## **VIII. Project Results**

Just as the RIHS shared lessons learned during the John Brown House HVAC project with the Rhode Island State-wide Preservation Conference, lessons and results of the Library HVAC upgrades project will be shared in as many ways as possible. There are at least two kinds of lessons to derive from projects of this kind for mid-sized institutions with limited resources: avoiding the pitfalls of project management; recognizing how to balance the short-term expense of installation with the long-term energy savings of geothermal and solar systems; and using a dehumidification-based system to achieve excellent environmental control. When the project is finished, the RIHS can prepare a white paper that examines the uses of dehumidification-based geothermal HVAC systems at both the Library and the John Brown House.

During the construction project, RIHS staff, as well as the architect and project manager, take photographs documenting the project. A gallery of images showing construction progress will be regularly posted on the Society's blog (<http://rihs.wordpress.com>) along with narrative updates. The

project will also receive regular reports in the Society's newsletter, which is sent to about 1,500 households.

After completing the HVAC project at the John Brown House museum, RIHS staff members have come to recognize that museums and libraries must consider the implementation of construction projects very carefully. Being a good client while protecting a collection and/or a historic building requires tact and determination and collaboration with the workmen on site. A conference session on construction projects and their impact on the collections and staff of mid-sized libraries and museums can be proposed for such groups as the New England Museum Association, New England Archivists, or for other local and regional conferences and meetings to share the experiences and lessons learned during the Library HVAC upgrade project. This can be contrasted with the experience at the John Brown House Museum, where the physical conditions of the site created different limitations, conflicts, and compromises between staff and workmen than will be needed at the Library site.

Upon the completion of the Library project, the RIHS will be nominated for one or more of the annual preservation awards made available by the Rhode Island Historical Preservation and Heritage Commission, in conjunction with Preserve Rhode Island, the private, state-wide historic preservation organization. We believe that we would have an excellent chance at being given such an award, and would of course use the resulting publicity to advance the lessons we have learned from the project.

Environmental control results can be published on the RIHS blog (see above) and shared with the blog readership, but another conference session on the results of the project at the John Brown House contrasted with those at the Library could also be proposed. Watching the monthly reports generated by the HOBO and PEM dataloggers and the HVAC system itself will provide raw data on the efficacy of the system, and the accuracy of humidity control.

As stated elsewhere, a completed Library project, backed by the successful John Brown House environmental improvements, would make the Rhode Island Historical Society the statewide non-profit leader in designing, installing and operating effective environmental systems based on humidity control, and would be certain to excite and attract a great degree of professional attention.