The Greening Plan®

Sustainability Management Plan

for

Lee H. Nelson Hall

Natchitoches, LA

July 2014

BAC [A+P]

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Sustainability Management Plan
for the
Lee H. Nelson Hall

Prepared for
NCPTT
645 College Avenue
Natchitoches, LA 71457

Photographs:

Cover

Front Elevation, Lee H. Nelson Hall, January 14, 2013

Whole Building Air Leakage Test, Gymnasium Doors, 2nd Floor, January 14, 2013

This page

Front Elevation, Lee H. Nelson Hall, August, 2013 courtesy NCPTT

Rear Elevation, Lee H. Nelson Hall, September, 2013 courtesy NCPTT

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Pergola behind Women's Gymnasium, 1924

Consultants and NCPTT staff discuss goals during the first Eco-Charrette, January 15th, 2013.

The front entrance, Lee H. Nelson Hall.

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1. Introduction and Overview

INTRODUCTION

Can a historic building improve its resource efficiency while protecting its historic features? The Lee H. Nelson Hall, built in 1923 and listed in the National Register of Historic Places in 1984 has undertaken a sustainability management plan with that as its primary objective. NCPTT was founded in 1994 "to coordinate research, disseminate information, and provide training about new technologies for preservation." As the architecture and preservation fields mature, and green building practices become the norm, NCPTT has expanded its purview to integrate sustainability and preservation research. Using their own headquarters building, Lee H. Nelson Hall, they will show that preservation values and sustainability practices are complementary and can improve the use and longevity of all buildings.

Following in the footsteps of many other historic buildings achieving LEED certification, such as the President Lincoln's Cottage Visitor Education Center (Washington, DC), the Colorado State Capitol (Denver, CO), National Geographic Headquarters (Washington, DC) and even the Empire State Building (New York, NY) and Chrysler Building (New York, NY), NCPTT is seeking to use the Lee H. Nelson Hall as the platform for remaking and greening historic buildings, and as a laboratory for sustainable preservation and stewardship. With planned maintenance improvements and potential capital improvement projects such as heating and cooling system upgrades, the organization is well positioned to rethink preservation practices without losing its meaning or "heritage."

The purpose of this sustainability management plan is to develop a road map for greening the maintenance and operations procedures at Lee H. Nelson Hall, which can be used as a model for other existing and historic buildings. All work will be sympathetic to and respect the historic significance and character-defining features of this historic place.

As Kurt Vonnegut has been quoted as saying, "Another flaw in the human character is that everyone wants to build and nobody wants to do maintenance." NCPTT acknowledges the importance of a strong maintenance program and this sustainability management plan is one way forward.

The northeast view of the front facade of the Lee H. Nelson Hall.

The stairs to the 2nd floor former auditorium space.

The rear elevation.

The former gymnasium, Second Floor.

EXECUTIVE SUMMARY

The purpose of this sustainability management plan is to develop a road map for greening the maintenance and operations procedures of the site. In addition, capital building improvements which will support these procedures will be identified. By using the growing body of sustainable preservation case studies, understanding the original character-defining features of the building and integrating the necessary envelope, systems and site improvements with acknowledged green building practices, NCPTT has decided to use the LEED rating system as the metric to guide both the maintenance and capital improvements approaches at the site. NCPTT is targeting LEED Gold certification for LEED EB:O&M. LEED EB:O&M (Existing Buildings: Operations & Maintenance) is the rating system used to manage the ongoing maintenance and housekeeping at a site. Every effort should be made to understand the specific climate related impacts of high humidity regions on building construction and operations.

A guiding premise of the Plan is that the building should meet energy and sustainability goals while preserving its character-defining and historically significant features. Therefore, each recommendation was evaluated against whether it could save energy and material resources, while respecting character-defining elements. Recommendations for the strategic approach include the following steps to be implemented sequentially or in tandem depending on the construction schedule and funding campaign. A comprehensive upgrade to the building's maintenance program could be implemented with or without LEED. A step-by-step approach follows:

1. Prepare a prioritized and phased plan to implement the energy efficiency measures. Prepare a "white paper" for National Park Service management which proposes the work, plan and budget.

2. Develop a Green Housekeeping Program.

3. Initiate a comprehensive maintenance and operations program using LEED EB:O&M: The above items can be implemented without initiating a LEED EB:O&M cyclical maintenance project. However, using LEED EB as the framework for decision making would be the most effective way to manage and monitor the work.

Green Rating

The project will target LEED Gold for Existing Buildings: Operations & Maintenance (LEED EB:O&M). LEED is not an end in itself but a tool that helps create more sustainable built environments by providing a framework for design, construction and evaluation. It is best used as an integrated planning and design process to achieve real results on the ground. Consequently, this is an ideal time for NCPTT to be evaluating different options for greening Lee H. Nelson Hall. The project and the goals of NCPTT best lend themselves to the EB option – embracing and certifying the sustainability of ongoing operations.

1. Introduction and Overview

OVERVIEW

A two-part "eco-charrette" format was used to initiate the sustainable management planning process. A preliminary eco-charrette was held January 14th -15th, 2013. A follow-up strategy eco-charrette was held April 30th, 2013. An eco-charrette is a working session to discuss a project's goals and objectives, develop an outline for the sustainability vision, review operations and identify upcoming potential capital improvements. The charrette process fosters an environment in which members of the project team can contribute ideas, express concerns and recommend actions for the project; it creates a foundation upon which to build relationships, strengthen communication and help define project direction. (This definition from Ralph Dinola of Green Building Services in Portland, OR.)

The preliminary eco-charrette workshop was split into two days – day one for conducting energy audit testing and field surveying and day two, a full-day immersion for staff and consultants to develop goals and objectives for greening this historic site. The eco-charrette was an internal team meeting with NCPTT staff and consultants to establish the overall sustainability vision of the organization for the building, and review operations and upcoming capital improvements to determine the baseline approach for "greening" the site. The second workshop, the strategy eco-charrette, was held on April 30th. The purpose of this meeting was to review the findings of the Energy Audit and the goals and objectives developed in the first eco-charrette. The LEED checklist was reviewed in detail against the energy audit as well. The full agendas for both eco-charrettes can be found in Attachment 1.

Setting up the 2nd floor doors for the whole building air leakage test.

Testing the air leakage at the lab hood.

Summary of Methodology

This project followed a systematic plan which used the eco-charrette format as its key information gathering and testing approach.

1. Collect Background Information: The first step of this project included collecting all available background and resource information including historic resources such as National Register nominations, Historic American Building Survey documentation, Historic Structure Report, Cultural Landscape Report and rehabilitation construction documents. (See Attachment 9 for resources reviewed.)

The second step was to prepare and distribute a building operations survey to NCPTT staff. The findings from this survey are included in Section 4 - Basis of Design, Building Operations, pages 16-18. Utility usage charts and bills were also obtained from NCPTT staff. The consultant team, comprised of a preservation architect (Barbara Campagna) and two engineers (Gordon Shepperd and Marcus Eliason), who are all sustainability experts as well, evaluated this background information prior to arriving at the site for the site review and eco-charrettes.

2. Conduct Eco-Charrette Workshops : Two eco-charrettes were conducted, one in January (information gathering and goal setting) and one in April (strategy-setting). The first eco-charrette was two days long with the first day as site evaluation and energy testing. Energy testing included a whole building leakage test and a window air leakage test. Infrared evaluation was also used. The consultants photographed the building and site, and studied the building's conditions with special focus on the MEP systems and landscape.

The consultant team took back all of their findings, prepared an ASHRAE Level One Energy Audit, evaluated the preservation and sustainability goals and developed recommendations. The second eco-charrette in April was one day long and was used to review the findings and recommendations and further refine the goals and objectives of the sustainability management plan.

3. Conduct Energy Audit: The engineering consultant,Apollo BBC, prepared a Level 1 Energy Audit as per ASHRAE's guidelines, which is a prerequisite for LEED EB:O&M. The audit includes estimates of building usage and recommendations for energy improvements. The full audit can be found in Attachment 3. A summary is presented in Section 4 - Basis of Design, page 19.

4. Evaluate LEED EB:OM: LEED EB:O&M is often called a "cyclical maintenance plan on steroids." Most of the work, both capital and maintenance that has been identified in this project, easily falls under this LEED category, so it was agreed by all in the first eco-charrette that LEED EB:O&M would be the target rating system. During the first eco-charrette on January 15th, the staff and consulting team went through the LEED EB 2009 checklist, credit by credit. The checklist was then re-evaluated during the second eco-charrette in April to confirm and adjust the approach.

5. Develop Sustainability Management Plan: The consulting team used all of the findings from the above four activities to develop comprehensive recommendations for this sustainability management plan. The preservation and sustainability goals and objectives were used to develop the Sustainability Vision and Approach (Section 3 - Sustainability Vision, page 11). Building, site and systems' issues, proposed projects, energy and resource use, case studies and regional impacts were all identified in the Basis of Design (Section 4, page 15.) Using all of the findings from Sections 1-4 of the plan, the team provided recommendations and a strategy in Section 5 - Proposed Sustainability Measures, page 33. Relevant background information and studies are included in the Attachments which begin on page 56.

Gordon Shepperd from Apollo BBC Explains the Window Air Leakage Test.

The center stairwell windows at the 2nd Floor level, front elevation.

2. History and Mission

HISTORY OF LEE H. NELSON HALL

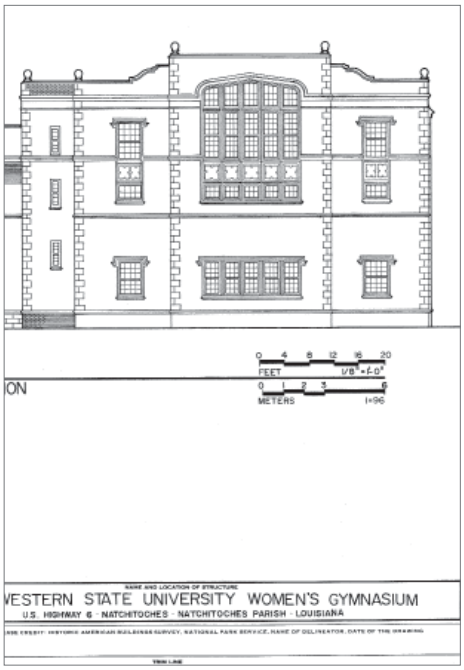
Lee H. Nelson Hall was originally constructed in 1923 and designed by the firm Favrot and Livaudais, architects who were responsible for numerous downtown New Orleans buildings, and other public buildings around Louisiana. The structure served as a classroom building and activity center for female physical education students on the campus of what is now Northwestern State University (NSU). Once the Hall was no longer large enough to serve the student body, it was closed, and a new building for physical education was completed in 1970. After 30 years of use as a storage facility, a new department of the National Park Service, the National Center for Preservation Technology and Training, moved into the building in 2001.

Lee H. Nelson Hall, Front Facade.

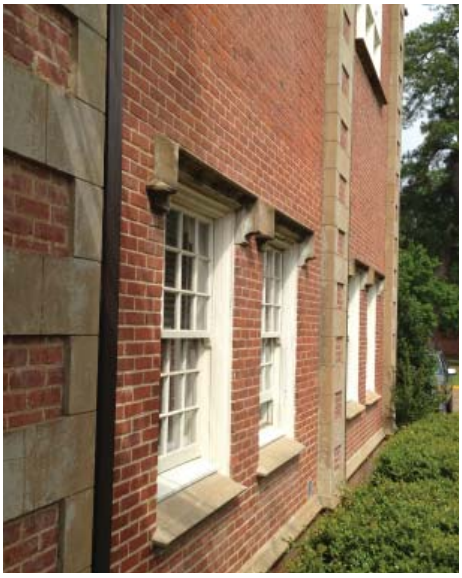
NCPTT was founded in 1994 on the campus of Northwestern State University of Louisiana in Natchitoches, Louisiana with a goal of "using technology to serve the future of America's heritage through applied research and professional training." In May of 2001, the Center moved into its new headquarters in the former Women's Gymnasium on the north side of campus. The building was named Lee H. Nelson Hall for the distinguished National Park Service architect and preservation pioneer. The building itself is the oldest surviving structure on the Northwestern State University campus.

The genesis of NCPTT began in September 1986 when the US Congress' Office of Technology Assessment published *Technologies for Prehistoric & Historic Preservation.* The assessment cited the critical need to establish a federally funded institution "as a mechanism to coordinate research, disseminate information, and provide training about new technologies for preservation." One of the strategies for implementing the OTA report findings was the recommendation to establish a "Federal Center for Preservation Technology" within the Department of the Interior.

Lee H. Nelson Hall,
HABS drawing, East Elevation.



Recommendations for a national research and development organization devoted to technical issues in preservation were adapted into legislation as part of the National Historic Preservation Act Amendments of 1992. The legislation established the National Center for Preservation Technology and Training, an advisory board (the Preservation Technology and Training Board), and the Preservation Technology and Training Grants program as major components of a new "national initiative to coordinate and promote research, distribute information, and provide training about preservation skills and technologies."



Lee H. Nelson Hall, Rear Elevation, Window Details.

Lee H. Nelson Hall, Side Entry.

ARCHITECTURAL SIGNIFICANCE

Abstract from the 1984 National Register Nomination:

The Northwestern State University Women's Gymnasium (1923) is a three story brick Jacobean Revival building located on the northern edge of the university campus. The first story consists of classrooms, locker rooms and other service areas. The gymnasium space itself occupies the second and third stories. The gym features a running track around the upper level. The ceiling consists of open metal trusswork supporting a shallow gambrel roof. The only styled feature of the interior is the imperial staircase which ascends to the gymnasium space.

The exterior incorporates sixteenth and early seventeenth century architectural elements in a large rectangular more or less symmetrical mass to give the effect of a Jacobean country house. This effect is general and evocative rather than specific and archaeological. The red brick walls are contrasted with concrete trim which resembles limestone. Late Gothic features of the gym include the Tudor arches, the linenfold and cusp panels, the incorporation of groups of windows under a single pronounced hood mold and the use of several different shapes and sizes of windows. Renaissance features include the basic symmetry of the articulation, the elaborate use of quoining, the flat regular parapets with their blind arcade and strapwork panels, the shaped gable over the entrance, and the rooftop ball finials. The exterior also features numerous band cornices which divide the elevations horizontally in various places. This is a feature which appears both on late Gothic and Early Renaissance buildings in England. The rear elevation of the gym is divided into modular bays by quoin pilasters of no particular historical derivation.

The Northwestern State University Women's Gymnasium is locally significant in the area of architecture because it represents the work of an important architectural firm and because it is a landmark in the late nineteenth/early twentieth century architectural heritage of Natchitoches Parish. Although no specific study has ever been done on the firm of Favrot and Livaudais, there is general agreement that it was a high style, competent, professional group of architects and that it was extremely prominent in the early twentieth century. Practicing the historicism which was then in vogue, it grew to be perhaps the largest architectural firm in New Orleans, the state's largest, most cosmopolitan urban center. For many years Favrot and Livaudais and Emile Weil vied for business across Louisiana. It is an open question as to which of these firms ultimately had the larger practice, but there is no question that they were the two major architectural firms in early twentieth century New Orleans. Favrot and Livaudais' best known works include the Hibernia Bank Building and the Cotton Exchange Building, both of which are landmarks in the New Orleans central business district. The firm also designed numerous public buildings, including courthouses, schools and libraries across the state.

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ARCHITECTURAL SIGNIFICANCE cont.

Favrot and Livaudais is most noted for its Neo-Classical and Renaissance Revival buildings, styles from which it apparently seldom deviated. The Women's Gymnasium is unusual, therefore, being an evocative reference to English Jacobean country houses. This, of course, can be seen in its use of Renaissance and late Gothic features on a large rectangular brick form.

The Women's Gymnasium can also be seen as a landmark in Natchitoches Parish in a more general sense. Of the several hundred late nineteenth/ early twentieth century buildings in the parish, most are fairly ordinary builder vernacular structures such as builder late-Italianate, builder Colonial Revival, bungalow, etc. There are also numerous humble frame buildings which do not feature any particular styling. The Women's Gymnasium is conspicuous among this group because of its sophisticated and historically evocative design. It is one of very few buildings in the parish which represents the work of a high style academically trained architect. Unlike most of the contemporaneous buildings in the parish which are essentially collections of standard manufactured details, the gym is consistently designed to portray a recognizable historical style of architecture i.e., Jacobean. It is, therefore, one of the parish's best examples of the historicism which was the leading trend in American architecture during the late nineteenth and early twentieth centuries.

Lee H. Nelson Hall, Second Floor, Stair Hall.

NCPTT Cemetery Documentation Webinar.

MISSION

NCPTT advances the application of science and technology to historic preservation. Working in the fields of archaeology, architecture, landscape architecture and materials conservation, the Center accomplishes its mission through training, education, research, technology transfer and partnerships.

WHAT IT DOES

NCPTT undertakes research at its in-house laboratories and in partnerships with universities and laboratories around the U.S. The NCPTT labs include the National Park Service's richest store of scientific equipment specifically designed to study environmental impacts on cultural materials.

To facilitate its unique mission, NCPTT funds research projects and training events at National Park Service sites; other federal agencies; state and tribal historic preservation offices; universities; and local, state, and national non-profits. The Center also cooperates with international preservation organizations to promote understanding and application of technology to cultural issues.

NCPTT promotes excellence in preservation by promoting and developing educational opportunities for professionals. This includes nationwide seminars and workshops on topics like green building science and non-destructive archaeology.

The National Center's website, publications and prominent social media presence enable it to deliver the latest news about preservation science to professional audiences and the public. Additionally, NCPTT supports the distribution of preservation information through its grants and partnerships.

3. Sustainability Vision

PHILOSOPHY

During the eco-charrettes, the team developed a Sustainability Vision and Philosophy which included specific preservation and sustainability goals.

"Our steam is outside." Kirk Cordell

VISION

Expand the Lee H. Nelson Hall as a symbol of the integration of sustainability and preservation. Green the site to improve both the resource use of the site and NCPTT's bottom line. Develop solid data for energy retrofits in humid climates. All work will be sympathetic to and respect the historic significance and character-defining features of this National Register-listed building.

GOALS

Overall

1. Improve the energy and resource performance of the Lee H. Nelson Hall and decrease the costs of utility bills.
2. Provide training to NCPTT staff which engages them in the sustainable stewardship decisions for the building and site.
3. Advance the leadership role of NCPTT in sustainable stewardship and preservation by providing a model project for "greening" the maintenance procedures of NCPTT's historic headquarters building.

Preservation

1. Maintain the exterior integrity of the building and respect the character defining features.
2. Respect and improve the landscape and site.
3. Preserve existing landscape materials.
7. Maintain interior character-defining features.

Sustainability

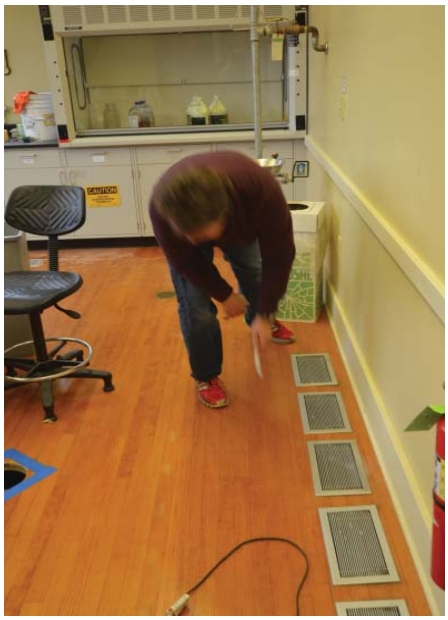
1. Establish a more energy efficient facility.
2. Improve resource use.
3. Improve user comfort.
4. Target LEED EB:O&M certification - Gold.
5. Use this project as a model project/process.

Using infrared to test the air tightness of the original windows. January 14, 2013.

The character-defining features of the building include the Jacobean Revival details and windows.

APPROACH

The purpose of this sustainability management plan is to develop a road map for greening the maintenance and operations procedures of the site. In addition, capital building improvements which will support these procedures will be identified. By using the growing body of sustainable preservation case studies, understanding the original character-defining features of the building and integrating the necessary envelope, systems' and site improvements with acknowledged green building practices, NCPTT has decided to use the LEED rating system as the metric to guide both the maintenance and capital improvements approaches at the site. NCPTT is targeting LEED Gold certification for LEED EB:O&M. LEED EB:O&M (Existing Buildings: Operations & Maintenance) is the rating system used to manage the ongoing maintenance and housekeeping at a site while LEED NC (New Construction and Major Renovations) and LEED CS (Core & Shell) are used for capital improvements projects.



Checking out the floor vents in the first floor Lab.

While NCPTT has targeted LEED Gold, there is the potential that the projects could be "stretched" to reach the goals of net zero. Net zero buildings have zero net energy consumption and zero carbon emissions annually. Zero energy buildings can be independent from the energy grid supply. More and more projects are exploring this possibility and new rating systems such as the Living Building Challenge set net zero as a goal. As discussed in the LEED evaluation section (page 39), while LEED EB Gold could be readily achieved using the current system of LEED, LEED 2009, it could be challenging to accomplish Gold if the new version, LEED v4, is triggered by the date the project is initiated. LEED v4 was launched in November 2013 but both 2009 and v4 will be available for new project registration until June of 2015.

The reconstructed central stair.

Background on Sustainable Preservation

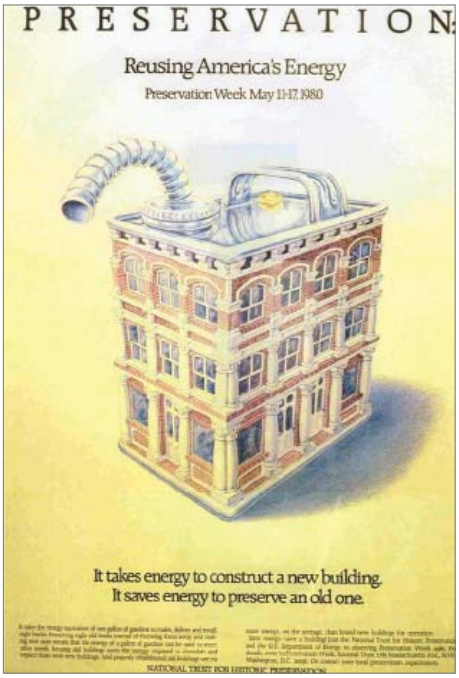
The construction and operation of buildings accounts for almost 50% of greenhouse gas emissions in the U.S. But reusing and retrofitting our existing buildings can reduce these emissions dramatically. From the simple action of preparing a National Register nomination, to developing a regulatory review mitigation plan, to preparing a sustainability master plan, to designing a LEED certified rehabilitation—these are all green building practices because they help keep what's here and in doing so, avoid new environmental impacts.

In many respects, historic preservation methodologies are just sound, common-sense approaches to protecting the resources, culture and heritage of our planet. Historic preservation is inherently sustainable development. There are many ways to make your building or site greener, whether through green housekeeping or capital improvements. Why choose to be more environmentally conscious? Because not only is it good for the planet, it is sound business practice. By improving energy efficiency and resource use, NCPTT will improve its bottom line and provide have more funding available to advance its core mission. That's good for everyone!

What is Sustainable Preservation?

Historic preservation can, and should, be an important component of any effort to promote sustainable development. The conservation and improvement of our existing built resources, including re-use of historic and older buildings, greening the existing building stock, and reinvestment in older and historic communities, is crucial to combating climate change. *(This definition of sustainable preservation from the National Trust for Historic Preservation and co-developed by this project's consultant, Barbara A. Campagna.)*

Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (UN World Commission on Environment and Development, 1987, the Brundtland Commission.) In other words, today's actions should not negatively impact our children or grandchildren.



Preservation Week Poster, May 1980.

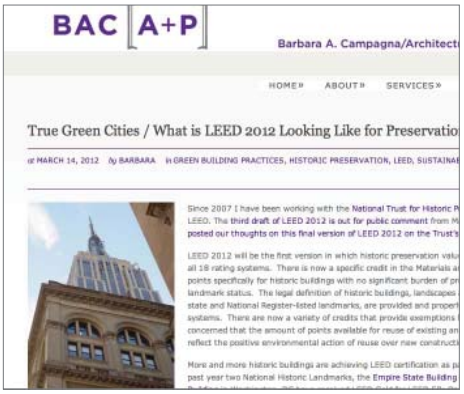
LEED and Historic Preservation

LEED (Leadership in Energy & Environmental Design) is the most widely used and accepted third-party rating system in the U.S. Developed by the U.S. Green Building Council (USGBC) in March 2000, LEED provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. LEED promotes sustainable building and development practices through a suite of rating systems that recognize projects that implement strategies for better environmental and health performance.

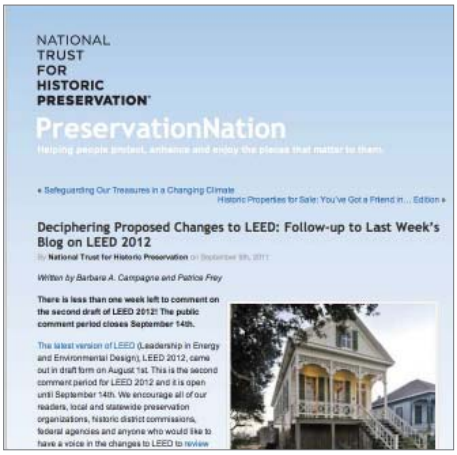
In the past two decades, a variety of third-party building rating systems have been developed to measure the impact of building construction and building operations on the environment. As these systems have been further finessed, and as the science has improved, their primary purpose has become to encourage and develop best practices in the construction field. In just fourteen years, one rating system in particular has truly transformed the market and the field of architecture—the USGBC's LEED program. As of June 2014, more than 10.1 billion square feet of building projects and 54,000 individual projects have received LEED certification with another two billion square feet registered. As a result, it is increasingly respected in the building industry as a recognition of social responsibility and leadership in an emerging field. Many state and local governments, and some federal agencies (including the General Services Administration), now recommend or require that construction projects earn a LEED rating. In addition to reaping the economic benefits of sustainable design—from improved worker productivity and health to lower operating costs—LEED-certified buildings in a few states and cities can now qualify for financial incentives. In Maryland, for example, their state rehabilitation tax credit is 20% for regular projects or 25% if LEED Gold can be achieved.

LEED Certification Levels.

Since 2007, the National Trust for Historic Preservation has been partnering with the USGBC to evaluate changes to LEED that would better integrate social, cultural and preservation metrics into the rating systems. To date, the most widely used system has been LEED NC v2.2, which went into effect in 2003. The most recent system, LEED 2009, represented a major shift by weighting all the existing credits against life cycle assessment criteria. Since early 2011, USGBC has been working on the next version of LEED known as LEED v4. These changes are even more dramatic because credits are being removed, added and significantly remade. LEED v4 was approved by the membership of USGBC and was launched at the Greenbuild conference on November 18, 2013. There will be a grace period until June 2015, during which both LEED 2009 and LEED v4 can be chosen for new projects.



True Green Cities Blog: What LEED is Looking LIke for Preservation? March 15, 2013.



PreservationNation Blog, "Deciphering Proposed Changes to LEED," September 9, 2011.

Forum News, "How Changes to LEED Will Benefit Existing & Historic Buildings," Nov/Dec. 2008.

LEED and Lee H. Nelson Hall

The LEED evaluation in this plan was conducted following the current LEED 2009 metrics. It should be noted that if this project is instead registered using LEED v4, some of the recommendations and points will likely change from those discussed in this report.

For more information about LEED, historic preservation, and the evolution of the LEED rating systems see:

- *True Green Cities: Raising the Bar for LEED,* Barbara A. Campagna, True Green Cities Blog, July 22, 2013. http://barbaracampagna.com/2013/07/raising-the-bar-for-leed/

- *True Green Cities: What LEED is Looking Like for Preservation?* Barbara A. Campagna, True Green Cities Blog, March 15, 2013. http://barbaracampagna.com/2013/03/what-is-leed-looking-like-for-preservation/

- *Let's Mobilize! 2nd Draft of LEED 2012 Out For Public Comment,* by Barbara A. Campagna, Preservationnation blog, September 1, 2011. http://blog.preservationnation.org/2011/09/01/lets-mobilize-2nd-draft-of-leed-2012-out-for-public-comment/#.U6L1EfldV8E

- *Preservationists Helping to Revise LEED Green Building Rating System,* by Barbara A. Campagna, Forum News, February 2011. http://www.preservationnation.org/forum/library/public-articles/preservationists-helping-to.html.

- *How Changes To LEED Will Benefit Existing & Historic Buildings*, by Barbara A. Campagna, Forum News, Nov/Dec 2008. http://www.preservationnation.org/issues/sustainability/additional-resources/Forum-News-Campagna.pdf.

4. Basis of Design

Several key impacts are evaluated in this section to determine the "basis of design" for maintenance and capital improvements at the site, including: Character-Defining Features, Building Operations (and utility bills), Energy Audit, Regional Impacts and Relevant Case Studies.

CHARACTER-DEFINING FEATURES

According to the National Register nomination for the building completed in 1984, the site was listed under criterion C – The Northwestern State University Women's Gymnasium is locally significant in the area of architecture because it represents the work of an important architectural firm and because it is a landmark in the late nineteenth/early twentieth century architectural heritage of Natchitoches Parish.

The Historic Structure Report for the building prepared in 1993 identifies the following character-defining features on pages 33 and 363, which were used as the framework for making decisions to convert the Old Woman's Gymnasium into the new NCPTT Headquarters, with the exterior being preserved, while the interior was rehabilitated:

The principal significance of the structure is its use. The formality of the design and details communicates the prominence of athletics on the campus. For that reason, spatial arrangements including the basketball court, gymnastic room, and the main stair halls on the first and second stories should be preserved when practical. The track is critical to the interpretation of the structure and its significance. In terms of finishes, the exposed roof steel trusses and brick surfaces should be retained, as should the matchboard ceilings in the basketball court and gymnastic room. While most floor surfaces are not critical, the floors in the basketball court and gymnastic room are, in that they lend legibility. Beaded – board wainscot with cap and baseboard moldings cover the lower portion of the majority of walls, and should be preserved or reproduced where necessary. The molding around the blackboard is a detail carried from the tile extensions on the window exteriors. Again, the moldings should be preserved if possible, since they are a minor character-defining feature. The interior door leaves and window casings remain intact and should also be considered as integral to the character of the structure. If possible, the exterior doorways in the stair pavilions should be returned to their original appearance, to add cohesion to the north elevation.

Cast-stone details both applied to the surface and surrounding the fenestration characterize the building as Jacobean Revival. These details are not tremendously ornate, but their presence indicates a desire for high-style architecture. This is an indication of the importance placed on athletics at NSU. For this reason, the cast-stone elements are character-defining features. The windows in particular, including their openings and stone and wooden details, are considered to be character-defining features.

The front facade of Lee H. Nelson Hall.

The former gymnasium on the 2nd floor is significant because it represents the building's original use.

EXISTING CHARACTER-DEFINING FEATURES

The steel structure for the running track in the 2nd floor gymnasium remains although the track was removed.

Certain changes to some of the character-defining features were made during the 2001 rehabilitation due to practical and/or financial concerns. The most significant alteration involved the running track in the gymnasium. While the structure remains, the actual running track was not restored. Restoration of this element is desirable.

The exposed roof steel trusses, the brick surfaces, gymnasium floor, the beadboard wainscot all were restored and remain. The main stair halls remain although the main center hall was reconstructed during the rehabilitation and slightly adjusted to accommodate the new laboratory uses on the second floor.

All recommendations in this sustainability management plan will be sympathetic to and respect the historic significance and character-defining features as described above.

BUILDING OPERATIONS

The main stair hall was reconstructed and adjusted to accommodate new labs on the 2nd floor.

Building Structure & Envelope:

The building is a three-story brick structure with mixed structural systems. All exterior walls are of load-bearing brick masonry, of varying thickness depending on location in plan and elevation. Steel framing is used within the gymnasia block to support the “hung” second floor and the large open spaces. During the 2001 rehabilitation, the exterior brick walls, on the north side of the gymnasium, were furred out with 3x metal studs and insulation, turning them into one-hour rated walls. The stairways have two-hour rated walls.

The roof is a flat and flat/gambrel built-up roof with heat seamed, rolled asphalt and white aggregate. The windows are mostly operable double hung wood with single-pane glazing. There are some awning-style and several fixed. Most are original. The windows are not regularly opened. Interior storms were installed in the first floor conference room windows.

Building Use

The building primarily contains offices (on the first floor), assembly space on the second floor and laboratories on both floors.

Building Square Footage

The square footage is 15,592, approximately 7,000 square feet per floor.

4. Basis of Design

Building Schedule

The building is typically in use Monday through Friday from 7:00 am to 7:00 pm. There is occasional weekend and evening use (usually not more than once a month) for workshops and events.

Heating, Ventilating & Cooling

HVAC is provided to the building through twelve split-system air conditioning units comprised of an interior evaporating unit and an exterior condensing unit. Supply air is ducted to the spaces. Return air is delivered through a common return air plenum system in the office area of the building and directly to mechanical closets for the laboratory and auditorium spaces. Outdoor ventilation air is provided to each unit through ducts and delivered to the mechanical closets, where it is mixed with the return air from the plenum space. Electric strip heaters in the indoor air-handling units provide heating for the spaces. The computer server room is served by a dedicated ductless mini-split system.

Condensing units and interior air-handling units were installed during the building renovation. Building staff indicated that some outdoor units and one interior coil section had been replaced. The split systems generally use R-22, an HCFC refrigerant, and have seasonal energy efficiency ratings (SEER) of 10, with three newer units having a SEER of 13.

Control of the HVAC systems is through room-mounted programmable thermostats (Emerson White/Rodgers 1F95-1277 touchscreen). Setpoints for heating and cooling during occupancy are generally 69 degrees F and 73 degrees F, respectively. The system is scheduled with night and weekend setback temperatures during unoccupied periods. Laboratory spaces with specific temperature requirements typically use different temperature setpoints as well as stand-alone dehumidification systems to control space humidity.

Domestic Hot Water

Hot water is provided to restroom and utility faucets from a 40-gallon, electric storage type hot water heater. An electric, tankless hot water heater provides hot water to the kitchen. Building operators indicated that the existing storage hot water heater would be replaced with a tankless heater when replacement necessary. The building has reverse osmosis water filtration systems that serve the laboratory and kitchen spaces.

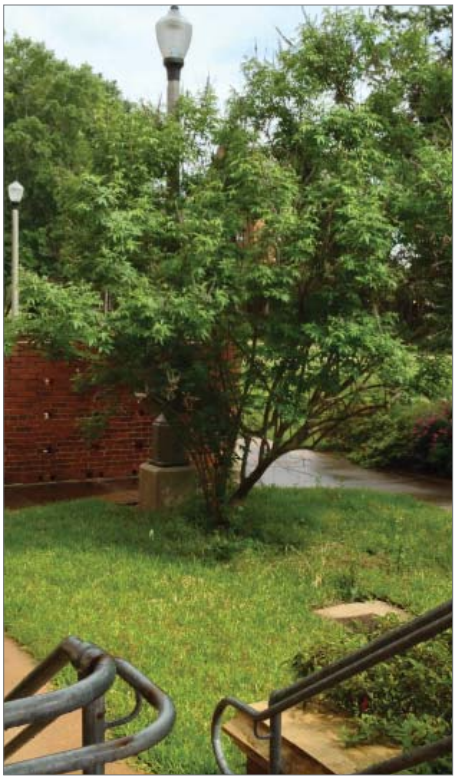
The first floor laboratory space.

The room-mounted programmable thermostats.

Typical appliances in the kitchen.

The first floor conference room has recently installed T5 fluorescent fixtures.

Looking across the lawn from the rear entrance.



Interior Lighting

Lighting is generally provided to the building with recessed or suspended fluorescent fixtures. Auditorium light fixtures were updated to high-wattage compact fluorescent bulbs from incandescent fixtures. The installed wattage for the building is approximately 1.05 W/ft2, with wattage for the office areas approximately 1.4 W/ft2. Control of lighting systems is by wall switches. There are no occupancy sensors or central lighting control panel for the building.

Sprinklers

The building was fully sprinklered during its renovation, with a wet-pipe system.

Miscellaneous Equipment

The kitchen contains 1 dishwasher, 1 range (rarely used) and 1 refrigerator.

Office equipment includes:
30 PCs, 25 printers, 1 copier and 1 PA system. Desktop-size oscillating fans are provided to individual workstations.

There are 3 fume hoods in the laboratories.

Maintenance

Building cleaning maintenance is contracted through a cleaning company hired through the University. The cleaning staff do not regularly use “green” cleaning products. On occasion, NCPTT staff provide the cleaning staff with green products they prefer to be used.

Landscape

A landscape plan and irrigation plan was prepared as part of the renovation. (See *Attachment 6*). The original materials were chosen to ultimately require minimal irrigation. The landscape is regularly maintained by Payne Lawn Service. Payne handles bed maintenance and NSU mows the grass. The irrigation system is on a timer, adjusted seasonally. There are separate zones. Since the intent of the irrigation plan was to use it the first few years to help establish the plantings, its use should be re-evaluated.

Utility Bills

NCPTT pays a monthly combined electric, sewer and water usage bill to the city of Natchitoches. Electricity is purchased from the city power plant. See *Attachment 8* for the usage/bills from 2004-2013. The fluctuation in water usage is quite spectacular from spring/summer to fall/winter, leading to the recommendation that the irrigation should be evaluated as soon as possible. The University handles recycling and garbage.

4. Basis of Design

PROPOSED CAPITAL IMPROVEMENT PROJECTS

NCPTT has completed a variety of systems' upgrades in the past two years: An electric tankless water heater was installed in the kitchen in 2011. Other previous capital improvements include: a new handicapped ramp installed in the front of the building at the side entrance; a separate HVAC system was installed for the server room; the below-floor ducts in the downstairs lab were replaced with exposed ducts in the conditioned space; the 28-300W incandescent lamps in the gymnasium space were replaced with 65W fluorescents; and interior storm windows were installed in the first floor conference room to reduce noise and air intrusion. Floor penetrations from the removed below-floor ducts will be repaired.

Upcoming: one 40 gallon tanked water heater remains which will be replaced with a tankless one when it requires replacement. The one major capital project which remains desirable is the replacement of the running track on the steel structure in the gymnasium.

Potential improvements to the systems are identified in Section 5, page 33.

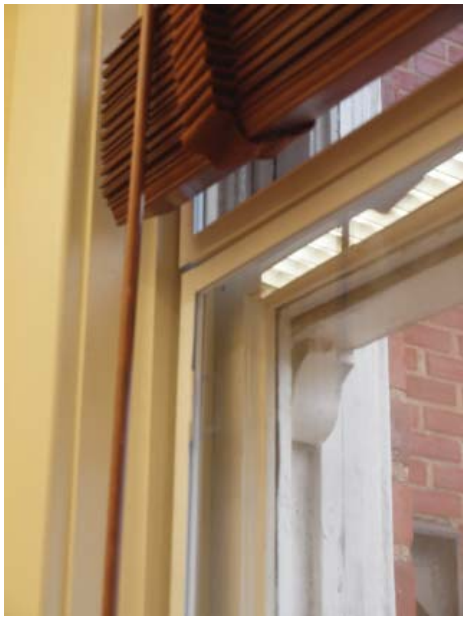
ENERGY AUDIT

The full energy audit report can be found in *Attachment 3*.

Apollo BBC performed a Level 1 Energy Audit as defined by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). The Level 1 audit is a walk-through analysis of a building to evaluate energy performance using energy consumption history, reported information and visual observations. The goal for this project was to identify items that will increase building performance and improve overall energy efficiency, with the possibility of seeking LEED Existing Buildings Operations & Maintenance certification.

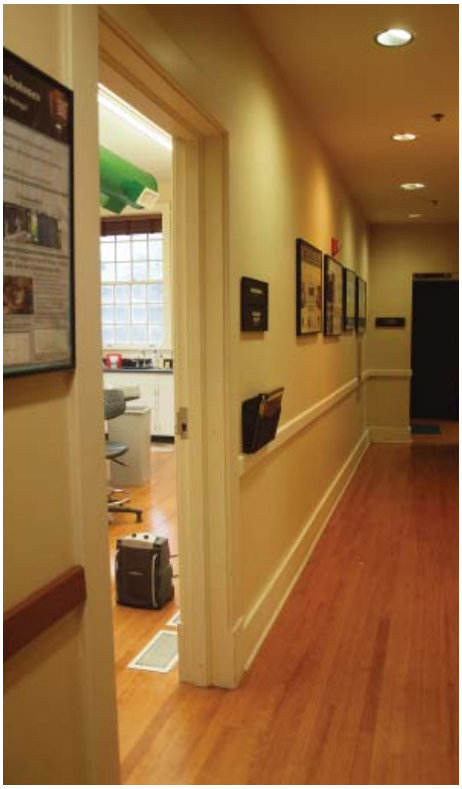
For this project a simplified energy model was created to determine the energy use breakdown for the building as well as test potential energy efficiency measures. We identified eleven potential energy efficiency measures comprising no- and low-cost as well as capital improvements. The energy efficiency measures include items such as air sealing the building, changes to lighting controls, replacement of HVAC systems, and upgrade plumbing fixtures.

Recommended actions to improve the energy efficiency of the building include air sealing or weatherizing the building to reduce the amount of fugitive air that enters through the building envelope. Air sealing will not only improve energy efficiency by limiting introduction of unwanted outdoor air, but will also improve occupant comfort within the building. Additional recommendations include reducing overall lighting density in the office spaces and the installation of occupancy sensors to control lighting.



Interior storms were added to the conference room windows.

A regular reminder at all the switches.



First floor hallway outside the lab.

The printer and supplies room.

ENERGY AUDIT/ENERGY BREAKDOWN

Energy end use breakdown was generated using the whole building energy simulation software eQUEST. Simulation inputs were based on observed and recorded data from our site observations as well as building user provided data. Figure 1 below shows the breakdown of electrical consumption into component end uses, including cooling, heating, fans, lights and equipment. Energy for HVAC systems is comprised of cooling, heating, and fan categories. Equipment energy refers to plug loads from office equipment, primarily computers. Cooling comprises the largest use of energy. Below is the Energy End Use Breakdown By Category:

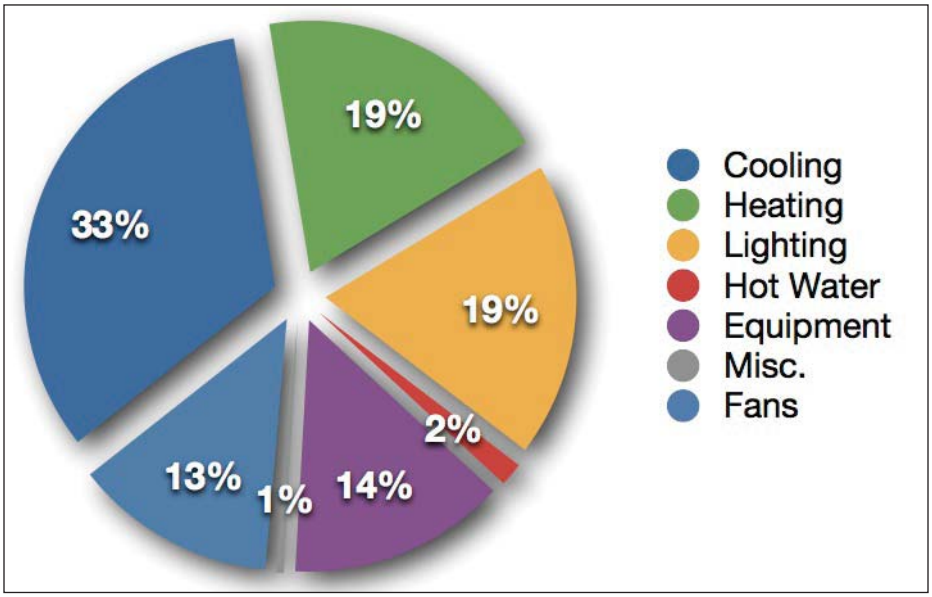


Figure 1 - Breakdown of electrical consumption in Lee H. Nelson Hall.

Energy Reduction Goals

The building currently has an Energy Use Intensity (EUI) of 50 kBtu/ft2/yr, with an estimated Energy Star score of 54. As the building is not currently in the Energy Star system, the Target Finder tool provided by Energy Star was used to determine the Energy Star score. A score of 50 is considered the median for buildings of similar type and use. Thus, Nelson hall is considered 4% better than the median building. To be eligible for LEED Existing Buildings Operations & Maintenance, the building must obtain an Energy Star score of at least 69. To reach an eligible score, the building would need to reduce energy consumption by approximately 16% to an EUI of 42 kBtu/ft2/yr. This equates to 35,800 kWh saved per year with a yearly energy cost savings of $4,000.

REGIONAL IMPACTS

Regulatory Review

The Lee H. Nelson Hall is listed in the National Register of Historic Places, and as a National Park Service-leased property, work to the site will require approval by the Louisiana State Historic Preservation Office and the National Park Service to ensure work is conducted following the Secretary of the Interiors' Standards for Rehabilitation.

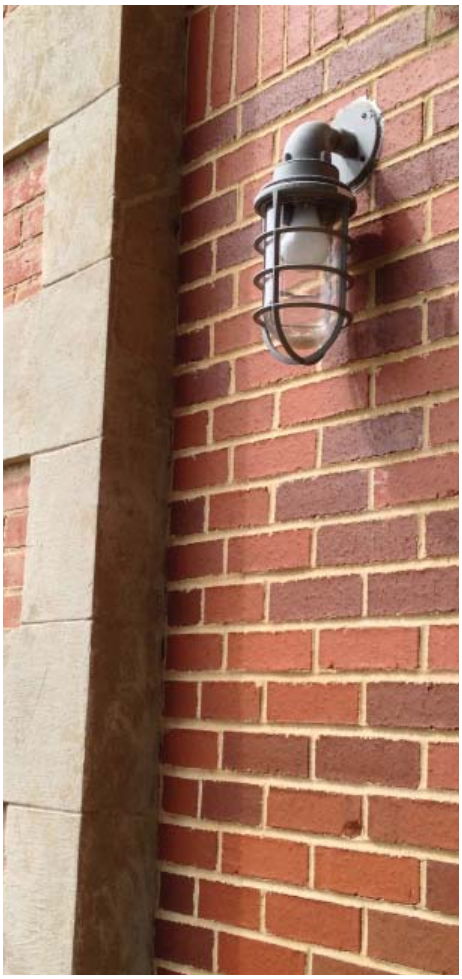
The building and University are outside of the Natchitoches National Historic Landmark and City of Natchitoches Historic District. But work will be reviewed by the City of Natchitoches Planning & Zoning Department related to building permits and code enforcement. The National Historic Landmark district is a mixture of late 18th century, 19th century and turn-of-the-twentieth century Victorian architecture. It is nationally significant because of the number of buildings within the District constructed of bousillage type materials. Bousillage construction is a mixture of mud, moss or deer hair placed between posts.

Renewable Energy Sources

Natitoches and Louisiana actually offer an array of opportunities to purchase or use renewable energy sources. There are energy co-ops in Natchitoches and there may be local and state tax credits and other resources available to assist with these choices. As the next phase of the project progresses, further research should be undertaken - since these incentives change regularly.

Prudhomme-Rouquier House in the Natchitoches Historic District, the largest bousillage-type house.

Rear elevation, security light detail.



The west elevation of the building adjacent to Caspari Drive.

The south and west elevations of the building.

The rear exit stairway and platform.

RATING SYSTEMS

LEED

LEED is a green rating system developed and managed by the US Green Building Council (USGBC) and its review arm, the Green Building Certification Institute (GBCI). There are over 15 different rating systems and there are currently over 54,000 projects that have achieved LEED certification in the U.S. For this project, we have recommended the use of LEED EB: Operations & Maintenance. This is the only rating system that monitors and manages the actual operations and maintenance of a building.

LEED v4

This project was evaluated using the current version of LEED, LEED 2009. The new version of LEED, LEED v4 was launched on November 18, 2013. There will be an option to choose from 2009 or v4 until June of 2015. The changes to LEED v4 are significant, with much higher thresholds for energy use and materials use. We recommend registering this project under LEED 2009 prior to the June 2015 deadline as current review suggests that the building will fare much better under LEED 2009 than v4.

Living Building Challenge

We evaluated the Living Building Challenge for this building also but determined that it is not feasible. The Living Building Challenge is a green rating system developed and managed by the International Living Future Institute in Seattle. To date, only four projects in the United States have achieved full “Living” Status and three have achieved “Petals” or partial status. There are approximately 150 projects currently registered. While the Living Building Challenge is possible in theory for this project, it is highly unlikely that the current project could achieve either “Living” status, which requires attaining all of the imperatives identified for the “Building” typology or “Petal” status which requires satisfying the requirements of three or more categories or “Petals” (including at least one of the following: Water, Energy or Materials.) Since achieving water and energy petals requires that the project achieve net zero water and net zero energy (with no combustion allowed), requirements that would be virtually impossible for this project unless the project approach were significantly altered, the only reasonable alternative would be to target the Materials Petal which requires that no Red List materials be used on the project. The Red List is composed of items that have been identified to be phased out of production due to health/ toxicity concerns and will be updated as new science emerges. The LBC also recognizes the Pharos Project developed by the Healthy Building Network as the best product comparison framework for evaluating materials and currently the most progressive tool for consumer benefit. It may be beneficial to review those products and identify alternatives whether Living Building Challenge is a goal or not.

CASE STUDIES

High LEED ratings can be achieved with historic buildings, and there are more and more historic buildings that are achieving LEED certification while upholding sound preservation standards. Unfortunately, no organization has been comprehensively keeping track of how many historic buildings have been LEED certified. The last time that USGBC kept track of the historic designation of LEED projects (but still just voluntary) was 2008, when it appeared that about 7% of the projects were historic buildings. One of the few states to attempt to track these statistics is California. USGBC 2011 statistics show 2,847 NC projects registered in California. If we apply the derived 7% of LEED projects from the 2008 data (as per Mark Huck from the California OHP), we would get about 200 historic LEED projects in California in 2011. This is, however, only an educated guess. The OHP has indicated that they are seeing more and more projects come through their office for review which are also registered for LEED (particularly LEED Core & Shell). OHP is considering developing a method to track these projects which could be helpful to all states.

A variety of projects around the country have been evaluated for their potential similarity to the Lee H. Nelson Hall and the goals of NCPTT. Below are short descriptions of case studies, identifying the green features and approaches that would be most relevant to this project.

President Lincoln's Cottage, Washington, DC.

<u>President Lincoln's Cottage Visitor Education Center, Washington, D.C. (LEED NC 2.2)</u>

The President Lincoln Cottage and Soldiers' Home National Monument is managed by the National Trust for Historic Preservation in cooperation with the Armed Forces Retirement Home. In 2000, the National Trust initiated efforts to preserve President Lincoln's Cottage, where the Lincoln family resided seasonally between 1862 and 1864. The Cottage was constructed in 1842 for George Washington Riggs, one of Washington's earliest and most successful bankers, and is located three miles north of the Capitol on a rise overlooking the City.

President Lincoln's Cottage Visitor Education Center, Washington, DC.

As part of opening the President Lincoln's Cottage to the public, the National Trust also undertook the adaptive use of the Administration Building, an Italianate Renaissance Revival style building that was constructed in 1905 as part of the Soldiers' Home complex. The building has been adapted for use as the Visitor Education Center (VEC) and administrative office space.

The restored atrium in President Lincoln's Cottage Visitor Education Center, Washington, DC.

With its rehabilitation of the Lincoln Cottage VEC, the National Trust initially aimed for a LEED Silver rating but instead found that Gold was readily achievable. The project demonstrates the remarkable degree to which historic buildings can be compatible with LEED-NC standards—indeed, many other preservation projects have also earned LEED certification with relative ease. Out of the 69 points offered under LEED-NC v2.2, about 20 are building-type neutral, meaning any building or project type—renovation or new construction—can earn these points. Another 10 points directly support preservation activities.

Gift Shop, President Lincoln's Cottage Visitor Education Center, Washington, DC.

New bike rack and native vegetation, President Lincoln's Cottage Visitor Education Center, Washington, DC.

Recent projects suggest that any existing building should be able to achieve a "certified" rating with very little effort. Earning "Silver" requires a bit more effort, and even "Gold" is readily achievable, as the Lincoln Cottage VEC demonstrates.

The Lincoln Cottage VEC case study suggests that there are few points of tension between green building and historic preservation standards. With relatively few exceptions, LEED-NC and historic projects can be mutually reinforcing, and even help demonstrate the degree to which there is a natural link between historic preservation and sustainability.

What Credits Did the Lincoln Cottage VEC receive?

A brief summary of some of the credits achieved in the Lincoln Cottage VEC demonstrates how the intrinsic values of an existing building can be used within the LEED construct. The project received 44 out of the possible 69 points, including 9 of 14 points in the Sustainable Sites category, 4 of 5 points in the Water Efficiency category, 5 of 17 points in the Energy & Atmosphere category, 9 of 13 points in the Materials & Resources category, 12 of 15 points in the Indoor Environmental Quality category, and all 5 points in the Innovation & Design Process category. Below are highlights from each of the six categories.

Sustainable Sites: Because the building is located in a densely developed urban area, the project was able to take advantage of the credits provided to urban sites under the Sustainable Sites category such as access to community services and transportation alternatives. No parking spaces were added to the site and bike racks and an on-site shower encourage employees to walk, run or bike to work.

Water Efficiency: The use of indigenous landscape vegetation requires no potable water for irrigation. Using water-efficient plumbing fixtures reduced the building's use of potable water by 44%. Some of the strategies included use of dual-flush low-flow toilets, 0.5 gallon per minute automatic lavatory faucets and aerators, and installing showerheads that use less than 2.2 gallons per minute. Storm water was managed by disconnecting roof leaders and storm drains from conventional infrastructure and installing subsurface infiltration basins instead.

Energy and Atmosphere: The building was designed to exceed minimum energy-efficiency requirements by 10% largely by reducing the use of electric lighting. Daylighting of up to 75% of all the occupied spaces and outside views to 92% of occupants is provided by the restored large perimeter windows. Further control is provided by occupancy sensors, dimming switches, and individually controlled multi-level task lighting. It is significant to note that the meticulously restored windows contributed to the energy efficiency of the building, specifically with the use of brass weather stripping. Like all LEED projects, this project was commissioned, one of the most important benefits that the prerequisites in LEED have provided to the building community.

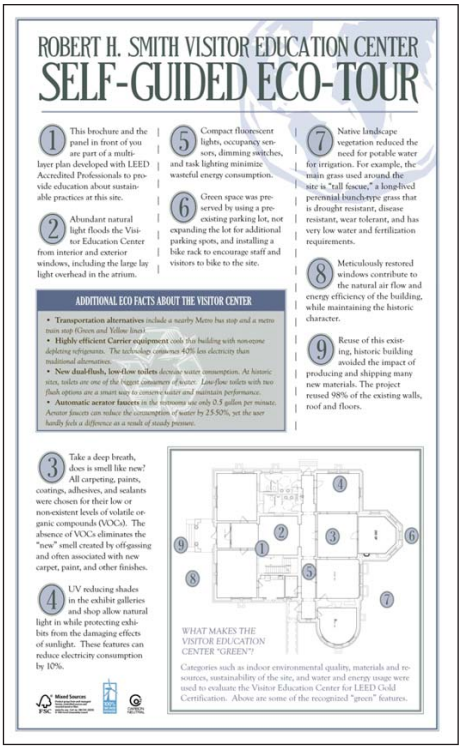
4. Basis of Design

Commissioning is a process by which equipment, facility or building systems are tested to verify they function according to their design objectives and specifications. Typically, a third party commissioning agent conducts the evaluation prior to substantial completion. One of the largest problems in construction has been the inadequate functioning of systems. By requiring commissioning as a prerequisite for LEED certification, USGBC has improved the field significantly.

Materials & Resources: The reuse of an existing building avoided the impacts of producing and shipping new materials. The project reused 98% of the existing walls, roof and floors. Recycling 15% of the building components was achieved through refurbishment and reuse. New materials used products with high levels of recycled content. And approximately 20% of all the new materials in the project were sourced from within 500 miles of the site.

Indoor Environmental Quality: In order to provide a comfortable and healthy indoor environment, an indoor air quality plan during construction was implemented, and all carpeting, paints, coatings, adhesives and sealants were chosen for their low levels of volatile organic compounds (VOCs).

Innovation & Design Process: Three of the five potential points in this category were achieved by using a LEED Accredited Professional on the project, developing an eco-tour and podcast about the sustainable practices at use on the site, and instituting a green housekeeping program. The final two points were achieved by realizing exemplary performance in both water reduction and in non-roof heat island effect.



ROBERT H. SMITH VISITOR EDUCATION CENTER

SELF-GUIDED ECO-TOUR

1 This brochure and the panel in front of you are part of a multi-layer plan developed with LEED Accredited Professionals to provide education about sustainable practices at this site.

2 Abundant natural light floods the Visitor Education Center from interior and exterior windows, including the large lay light overhead in the atrium.

3 Take a deep breath, does is smell like new? All carpeting, paints, coatings, adhesives, and sealants were chosen for their low or non-existent levels of volatile organic compounds (VOCs). The absence of VOCs eliminates the "new" smell created by off-gassing and often associated with new carpet, paint, and other finishes.

4 UV reducing shades in the exhibit galleries and shop allow natural light in while protecting exhibits from the damaging effects of sunlight. These features can reduce electricity consumption by 10%.

5 Compact fluorescent lights, occupancy sensors, dimming switches, and task lighting minimize wasteful energy consumption.

6 Green space was preserved by using a pre-existing parking lot, not expanding the lot for additional parking spots, and installing a bike rack to encourage staff and visitors to bike to the site.

7 Native landscape vegetation reduced the need for potable water for irrigation. For example, the main grass used around the site is "tall fescue," a long-lived perennial bunch-type grass that is drought resistant, disease resistant, wear tolerant, and has very low water and fertilization requirements.

8 Meticulously restored windows contribute to the natural air flow and energy efficiency of the building, while maintaining the historic character.

9 Reuse of this existing, historic building avoided the impact of producing and shipping many new materials. The project reused 98% of the existing walls, roof and floors.

ADDITIONAL ECO FACTS ABOUT THE VISITOR CENTER

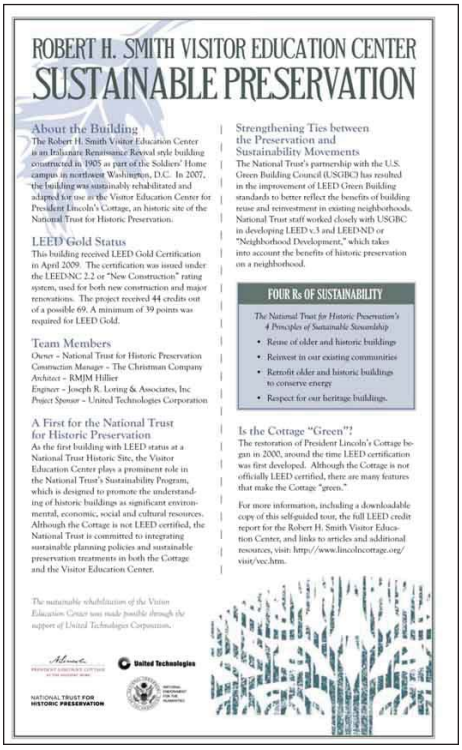
- **Transportation alternatives** *include a nearby Metro bus stop and a metro train stop (Green and Yellow lines).*
- **Highly efficient Carrier equipment** *cools the building with non-ozone depleting refrigerants. The technology consumes 40% less electricity than traditional alternatives.*
- **New dual-flush, low-flow toilets** *decrease water consumption. At historic sites, toilets are one of the biggest consumers of water. Low-flow toilets with two flush options are a smart way to conserve water and maintain performance.*
- **Automatic aerator faucets** *in the restrooms use only 0.5 gallon per minute. Aerator faucets can reduce the consumption of water by 25-50%, yet the user hardly feels a difference as a result of steady pressure.*

WHAT MAKES THE VISITOR EDUCATION CENTER "GREEN"?

Categories such as indoor environmental quality, materials and resources, sustainability of the site, and water and energy usage were used to evaluate the Visitor Education Center for LEED Gold Certification. Above are some of the recognized "green" features.

Self-Guided Eco-Tour, Page 1, President Lincoln's Cottage Visitor Education Center, Washington, DC.

Self-Guided Eco-Tour, Page 2, President Lincoln's Cottage Visitor Education Center, Washington, DC.



ROBERT H. SMITH VISITOR EDUCATION CENTER

SUSTAINABLE PRESERVATION

About the Building

The Robert H. Smith Visitor Education Center is an Italianate Renaissance Revival style building constructed in 1905 as part of the Soldiers' Home campus in northwest Washington, D.C. In 2007, the building was sustainably rehabilitated and adapted for use as the Visitor Education Center for President Lincoln's Cottage, an historic site of the National Trust for Historic Preservation.

LEED Gold Status

This building received LEED Gold Certification in April 2009. The certification was issued under the LEED NC 2.2 or "New Construction" rating system, used for both new construction and major renovations. The project received 44 credits out of a possible 69. A minimum of 39 points was required for LEED Gold.

Team Members

Owner – National Trust for Historic Preservation
Construction Manager – The Christman Company
Architect – RMJM Hillier
Engineer – Joseph R. Loring & Associates, Inc
Project Sponsor – United Technologies Corporation

A First for the National Trust for Historic Preservation

As the first building with LEED status at a National Trust Historic Site, the Visitor Education Center plays a prominent role in the National Trust's Sustainability Program, which is designed to promote the understanding of historic buildings as significant environmental, economic, social and cultural resources. Although the Cottage is not LEED certified, the National Trust is committed to integrating sustainable planning policies and sustainable preservation treatments in both the Cottage and the Visitor Education Center.

Strengthening Ties between the Preservation and Sustainability Movements

The National Trust's partnership with the U.S. Green Building Council (USGBC) has resulted in the improvement of LEED Green Building standards to better reflect the benefits of building reuse and reinvestment in existing neighborhoods. National Trust staff worked closely with USGBC in developing LEED v.3 and LEED ND or "Neighborhood Development," which takes into account the benefits of historic preservation on a neighborhood.

FOUR Rs OF SUSTAINABILITY

The National Trust for Historic Preservation's 4 Principles of Sustainable Stewardship

- Reuse of older and historic buildings
- Reinvest in our existing communities
- Retrofit older and historic buildings to conserve energy
- Respect for our heritage buildings.

Is the Cottage "Green"?

The restoration of President Lincoln's Cottage began in 2000, around the time LEED certification was first developed. Although the Cottage is not officially LEED certified, there are many features that make the Cottage "green."

For more information, including a downloadable copy of this self-guided tour, the full LEED credit report for the Robert H. Smith Visitor Education Center, and links to articles and additional resources, visit: http://www.lincolncottage.org/visit/vec.htm.

The sustainable rehabilitation of the Visitor Education Center was made possible through the support of United Technologies Corporation.

United Technologies

NATIONAL TRUST FOR HISTORIC PRESERVATION

Dedicated Recycling Room, The Christman Building, Lansing, MI.

The Atrium, The Christman Building, Lansing, MI.

The Christman Building, Lansing, MI.

The Christman Building, Lansing, MI (LEED Commercial Interiors, LEED Core & Shell, LEED EB:O&M)

The Christman Building is the world's first triple-Platinum LEED certified project in the world. It received Platinum for LEED Commercial Interiors, v2 in 2008, LEED Core & Shell, v2.0 in 2008 and LEED EB:O&M in 2010.

This 1928 landmark and former brownfield site is listed in the National Register of Historic Places as the Mutual Building, subsequently renamed The Christman Building in 2008. The project is an excellent example of the potential of integrating historic preservation values with green building practices. It used Rehabilitation Tax Credits, Brownfield Tax Credits and New Market Tax Credits. This fine old building's new lease on life was accomplished through a commitment to sustainable, green historic preservation at a cost no greater than conventional construction practices.

Environmental Aspects

The Christman Building and headquarters showcase the company's integrated, sustainable and historic preservation construction capabilities, and its commitment to the environment and the community. Reuse of the building tapped its inherent embodied energy and resources, avoided suburban sprawl and contributed to the revitalization of downtown Lansing. The location enables occupants to utilize existing public transportation and parking facilities. Showers and locker rooms encourage walking and bicycling to work. The white roof and reduced exterior lighting reduce heat island effects and light pollution. Energy use is reduced by task lighting, occupancy sensors, programmed timers in common areas, daylighting for 92% of occupants, high efficiency windows and Energy Star® office equipment and appliances. High efficiency HVAC systems provide individually controlled comfort conditions. The under floor air distribution system maximizes efficient, healthy ventilation. Low flow fixtures reduce water consumption by 40%.

The design reused 92% of existing walls, roof and floors, and most of the company's former office furnishings. Recycled and regionally manufactured materials, and low emission sealants, paints, carpets, and furniture were used extensively. All wood was FSC certified. The interior provides outdoor views to 90% of occupants. Workspaces were designed for flexibility, adaptability, collaboration and teamwork. Extensive recycling diverted 77% of construction debris from the landfill.

The Presidio, San Francisco, CA (various LEED systems)

The park comprises nearly 6 million square feet of buildings, including 469 historic structures that contribute to the significance of the National Historic Landmark District. The Presidio Trust has required LEED certification on all projects since 2009, with Silver as a goal for all. The Presidio has long had green building guidelines. But now, with nearly one-third of the staff in the Planning and Project Management departments being LEED accredited professionals, those guidelines have grown into a more formal program that has been integrated into the Trust's planning process.

The rehabilitation of the Public Health Service District historic nurses dormitory was the first registered historic building in San Francisco to be Gold certified in the LEED-CS (Core & Shell) category.

Projects in the Presidio are able to take advantage of existing Trust programs, like the free PresidiGo Shuttle and other programs which encourage alternative transportation; separate parking dedicated to low emission vehicles like hybrids; and green cleaning and pest control systems.

Everything that goes into the rehabilitated buildings - carpets, flooring, and countertops, among other things - is made from recycled materials. Approximately 70 percent of the debris removed from the buildings is recycled or otherwise diverted from landfills.

The projects boast a wide range of "green" features. Among the most striking is the cavalry barracks' new "living" conference room. Housed in an historic addition to the barracks, which once served as the building's latrine, the conference room is topped with a "living" roof of succulents. The outside walls are covered with a trellis that will eventually wrap the exterior of the room in plants, helping to provide an efficient and natural form of insulation.

The following is a list of those projects completed since 2008 which are already LEED certified. Another five are currently under construction.

Building 682	Barracks, new Multi-Tenant Office Building, LEED CS Gold
Building 920	University of San Francisco Environmental Dept. Classroom, LEED CS Gold
Building 926	House of Air Trampoline Gym, LEED NC Certified
Building 934	Old Doping Hut, new Roaring Mouse Bicycle Rentals, LEED CS Gold
Building 100	International Center to End Violence, LEED NC Gold
Building 101	Barracks, new Multi-Tenant Office Building, LEED CS Silver
Building 103	Barracks, new Multi-Tenant Office Building, LEED CS Silver
Building 1808	Former Nurses' Dorm, Multi-Tenant Office Building, LEED CS Gold
Building 1801	Former PHS Hospital, The Landmark Apartments, LEED NC Gold
Belles Town Homes	LEED for Homes Platinum (new construction)

Roaring Mouse Bicycle Rentals, the former Old Doping Hut, The Presidio, San Francisco, CA.

Rehabilitated Barracks, The Presidio, San Francisco, CA.

Rehabilitated Barracks staircase, The Presidio, San Francisco, CA.

Cavallo Point Lodge, Sausalito, CA (LEED NC 2.2)

The Cavallo Point Lodge is the first National Park lodge to receive LEED certification. In addition, the project, developed and opened in 2008 on the site of Fort Baker—a turn-of-the century military outpost in the Golden Gate National Recreation Area—is the first hotel listed in the National Register of Historic Places, the first new hotel in the San Francisco-Marin area, and the second in Northern California to achieve LEED Gold certification.

Reception, Cavallo Point Lodge Sausalito, CA.

The project involved careful rehabilitation of the original historic buildings and interior features, along with a minimal amount of new construction. The lodge site is a multi-building campus, comprising 34 buildings on 45 acres. Its development involved rehabilitation of the century-old Fort Baker buildings and construction of new buildings on the footprint of former, non-historic structures. A project of this size and complexity (number and variety of buildings, acreage, environmental sensitivity) had not been previously evaluated by the USGBC against its rigorous sustainable building standards.

The LEED Gold certification applies to the entire Cavallo Point Lodge project, including historic and new buildings as well as the overall site. Some of the green building elements recognized in the certification include state-of-the-art thin film solar panels integrated into the standing seam metal roofing, low VOC glues, paints and carpets, and green building materials (denim insulation, extensive use of bamboo and recycled woods, and low-E glass, for example). The former officer's quarters were carefully rehabilitated, from the original tin ceilings to the ornate mantels. The site's extensive open spaces adjacent to endangered Mission Blue Butterfly habitat were restored with more than 58,000 native plants, all raised from seeds collected from the surrounding parklands.

Rehabilitated porch, Cavallo Point Lodge, Sausalito, CA.

In addition, Cavallo Point is also working to meet the Green Seal Environmental Standard for U.S. Lodging Properties, which pertain to waste minimization, water and energy efficiency, hazardous substances handling and environmentally responsible purchasing. Green Seal works with manufacturers, industry sectors, purchasing groups and governments at all levels to "green" the production and purchasing chain. The organization utilizes a life-cycle approach; this means they evaluate a product or service beginning with material extraction, continuing with manufacturing and use, and ending with recycling and disposal. Since 1995, Green Seal has partnered with the lodging industry, the nation's second largest employer, to promote environmentally responsible products and practices within lodging properties, by focusing on environmental efforts that both improve the bottom line and benefit the environment.

Colorado State Capitol, Denver, CO (LEED EB, LEED EB:O&M)

In 2008, the Colorado State Capitol became the first capitol building in the country to obtain certification for LEED EB (Gold) for energy efficiency upgrades. Built in 1895, the Capitol was also the first building to receive the USGBC's new LEED certification for Existing Buildings: Operations & Maintenance (EB:O&M).

The project received an Energy Star® score of 94 which is terrific for any building, incredible for a historic building and included using the thermal mass of the building to moderate temperatures. They have achieved a 27% water savings and 36% alternative commuting rates. Building-specific improvements completed for LEED EB:O&M certification include:

- Water conservation through installation of low-flow toilets;
- Use of low energy light bulbs and T-8 light fixtures;
- Improved energy controls;
- Use of Green Seal green cleaning products;
- Initiation and maintenance of a recycling program;
- Purchase of Energy Star® electronics and equipment; and
- Use of environmentally friendly landscaping products and plans.

Colorado State Capitol, Denver, CO.

National Geographic Headquarters, Washington, DC (LEED EB, LEED EB:O&M)

The National Geographic Society Headquarters is comprised of three structures dating from 1902, 1964 and 1984. The 835,000 square foot building was the first to receive LEED EB certification under the USGBC's Pilot Program, earning Silver certification in 2003. They recertified in 2009 at LEED Gold, becoming one of a handful of buildings to recertify under the LEED EB program.

In the nine years since the building's initial certification, the National Geographic Society has implemented continuous sustainability improvements guided by the LEED EB rating system, including:

- An extensive recycling program that has reduced waste disposal costs by 57% and $40,000;
- A comprehensive alternative transportation and commuting program, including flexible schedules, telecommuting, bicycle racks, and preferred parking for carpools and hybrid vehicles;
- Fixture water use reduction 36% greater than LEED requirements;
- An overhaul of the major mechanical systems that led to a 20% decrease in energy use; and
- Use of native vegetation on the site and the roofs; and the use of rain sensors to reduce landscaping water use.

National Geographic Headquarters, Washington, DC.

Preservation Magazine, March/April 2010.

The Empire State Building, New York, NY.

Empire State Building, New York, NY (LEED EB:O&M, LEED for Commercial Interiors)

The Empire State Building, the world's most famous office building, was awarded LEED Gold for existing buildings certification in 2011. Under a $550 million retrofit program, the Empire State Building has become the tallest building in the U.S.—and one of a growing number of National Historic Landmarks—to receive LEED certification. In addition, a 3,500-square-foot pre-built space on the 42nd floor has been certified Platinum under the LEED for Commercial Interiors. The Empire State building will reduce energy consumption by at least 38%, reducing energy costs by $4.5 million annually. This annual savings allows a three year payback period for the cost of implementation. In addition to the LEED Gold certification, the Empire State Building has maintained its Energy Star® certification received in 2010. The following eight key initiatives will cut the building's overall carbon output by more than 100,000 metric tons over 15 years:

1. Window Light Retrofit: Refurbishment of approximately 6,500 thermo pane glass windows and converting them to triple pane windows. The building's original steel windows were replaced with aluminum in the 1980s, and these were the windows that were refurbished.
2. Radiator Insulation Retrofit: Heat loss was reduced by installing additional insulation behind building's radiators.
3. Tenant Lighting, Daylighting and Plug Upgrades: Improved lighting designs, daylighting controls, and plug load occupancy sensors.
4. Air Handler Replacements: Replacement of air handling units with variable frequency drive fans.
5. Chiller Plant Retrofit: Removing and replacing "guts" to improve chiller efficiency and controllability.
6. Whole Building Control System Upgrade-Optimize HVAC Operation: The recommended measures also reduce cooling load requirements by 33% (1,600 tons) and peak electrical demand by 3.5 megawatts.
7. Ventilation Control Upgrade: Introduction of demand control ventilation in occupied spaces.
8. Tenant Energy Management Systems: Introduction of individualized, web-based power usage systems for each tenant.

The Empire State Building incorporated energy efficiency improvements and policies including:

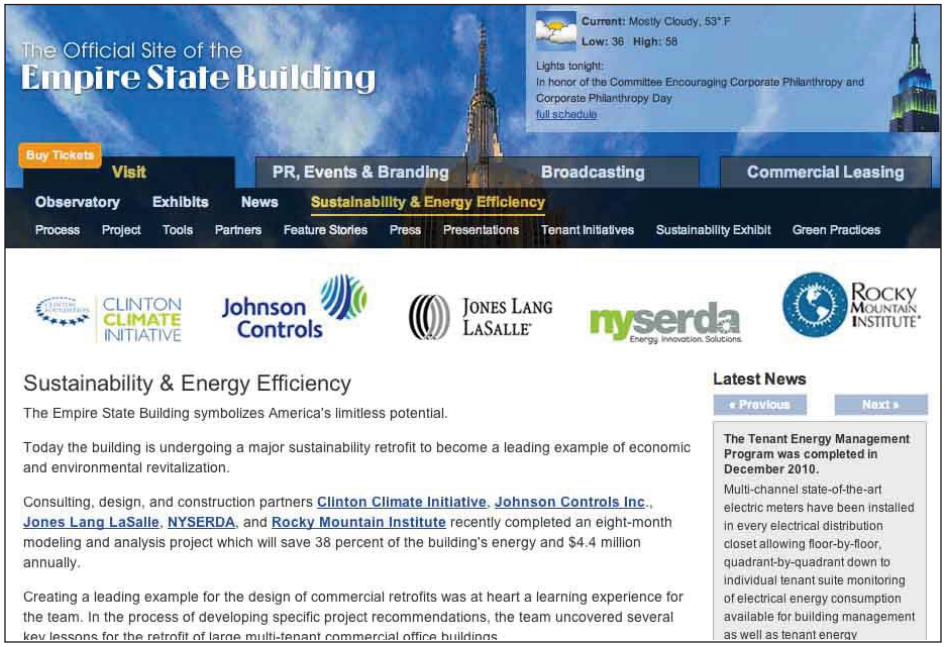
- Reducing energy use and lowering greenhouse emissions.
- Producing savings in a verifiable way.
- Recommended the inclusion of improved design techniques and energy awareness among tenants.
- Provided reliability, resulting in an increase in multi-tenant building retrofits.
- Installed energy efficient fixtures and bulbs that will adjust according to lighting needs and accordingly to the city's energy demands.

- Installed glass at storefronts at street level to promote transparency and light.
- Required use of green cleaning products.
- Used ultra-low flow fixtures in restrooms throughout the building.
- Established a waste and construction debris recycling program.
- Incorporated recycled paper products.
- Instituted mandatory green requirements under new lease agreements.
- Used low off-gassing wall coverings, paints and adhesives.

Retrofitting the radiators, the Empire State Building, New York, NY.

The rehabilitated windows, Empire State Building, New York, NY.

The Empire State Building has a comprehensive website which details their Sustainability and Energy Efficiency programs.



Management of exterior lighting, the U.S. Treasury Building, Washington, DC.

The U.S. Treasury Building, one of the oldest buildings in the U.S. to become LEED certified.

The Treasury Building (LEED EB:O&M):

The 19th-century U.S. Treasury Building – a National Historic Landmark neighboring the White House – was awarded LEED Gold EB: O&M certification. The Treasury Building is one of the oldest buildings in the U.S. to receive LEED certification. The building, at 1500 Pennsylvania Avenue, is more than two city blocks long and was constructed over a period of 33 years between 1836 and 1869.

The total cost avoidance associated with these efficiency improvements are estimated to produced an annual savings to taxpayers of more than $3.5 million.

Project results, compared to a FY2008 baseline, include a 43% decrease in the use of potable water, a 7% decrease in electrical usage, a 53% decrease in the use of steam, and the addition of 164 workstations in the building (offsetting leased space costs).

The historic building underwent a number of green construction and operations upgrades, including:

- Increasing the use of natural day lighting to reduce energy consumption;
- Establishing sustainable cleaning and landscape programs;
- Developing and implementing advanced control and management of the heating ventilation and air conditioning (HVAC) systems;
- Conducting waste stream audits to benchmark recycling programs and identify opportunities to maximize material conservation;
- Creating a green procurement program for materials, equipment and services purchased;
- Increasing occupant space utilization;
- Augmenting alternate transportation means; and
- Establishing enhanced utility metering for improved systems management.

5. Proposed Sustainability Measures

The purpose of this sustainability management plan is to develop a road map for greening the maintenance and operations procedures of the site. In addition, capital building improvements which will support these procedures will be identified. By using the growing body of sustainable preservation case studies, understanding the original character-defining features of the building and integrating the necessary envelope, systems and site improvements with acknowledged green building practices, NCPTT has decided to use the LEED rating system as the metric to guide both the maintenance and capital improvements approaches at the site. NCPTT is targeting LEED Gold certification for LEED EB:O&M. LEED EB:O&M (Existing Buildings: Operations & Maintenance) is the rating system used to manage the ongoing maintenance and housekeeping at a site. Every effort should be made to understand the specific climate related impacts of high humidity regions on building construction and operations.

Looking southeast across the front lawn.

ENERGY EFFICIENCY MEASURES

We developed recommendations for energy efficiency measures (EEM) that may be implemented for the building to reduce energy consumption. During our review, we identified a number of occupant comfort issues with the current HVAC system. Most low-cost alterations to the current system, such as space temperature setpoint changes, are likely to increase occupant comfort complaints. The list of potential EEMs balance the need for energy use reduction with the goal of maintaining, or improving occupant comfort. Table 1 lists the identified EEMs along with the estimated utility savings, costs, and simple payback. The list contains both low and no-cost improvements, capital improvements, and modifications that are not intended to reduce building energy, but instead to potentially increase occupant comfort. Utility costs used in the analysis were based on occupant provided information and were $0.11 per kWh and $5.00 per 1000 gallons of water.

Setting up the whole building air leakage test on the 2nd floor doors.

Table 1: Energy Efficiency Measures with anticipated savings, costs and simple payback

EEM	Description	Estimated Energy Savings (kWh)	Implementation Cost ($)	Simple Payback (years)
1	Air Sealing	31,545	95,000	26
2	Office Lighting	6,300	0	0
3	Lighting Retrofit	9,500	38,000	35
4	Occupancy Sensors	3,780	3,000	7
5	Auditorium Walls	6,300	20,000	27.5
6	Retro-Commissioning	6,300	20,000	27.5
7	Dedicated Outdoor Air System	-	50,000	-
8	HVAC System Replacement	24,185	260,000	93.5
9	Window Films	6,300	20,000	27.5

The EEM's and all recommendations in this plan have been based on the Preservation and Sustainability goals developed by the NCPTT staff and consultant team during the two eco-charrettes. Following are the major Preservation and Sustainability goals, with questions to consider.

ACHIEVING PRESERVATION GOALS

1. MAINTAIN EXTERIOR INTEGRITY

WINDOWS:

- Weatherize and appropriately seal windows and window openings. They may not all need to be operable.
- Ensure all windows are operating appropriately.
- Most staff like the energy efficiency of the interior storms in the Conference Room.
- Sound barrier of interior storms works well.
- Few people actually open the windows.
- Access to windows to operate them is difficult.
- Opening windows affects everyone since it is an open office.
- Evaluate whether the gym windows should be operable.
- Lab windows operate but are rarely opened in order to reduce potential humidity.
- It would be nice to have the option to open the windows.
- Major concern about opening the windows is maintaining the mechanical systems.
- The windows are usually only opened when it's nice out. When it's really hot and humid out, no one opens the windows.
- Storm windows are quick to install.
- Window retrofits are more disruptive, time intensive than the installation of storm windows.

DOORS:

- Weatherize and appropriately seal doors and door openings. All the doors are currently leaking.
- The back doors were recently rebuilt. Would like to retrofit front doors accordingly.
- Repair ongoing hardware issues.

Setting up the window chamber air leakage test in the lab.

DRAINAGE: Improve building's drainage.

- Downspouts overflow. Ensure they are being regularly cleaned.
- Copper gutters encourage water infiltration and insect infiltration. Evaluate required repairs.
- Evaluate roof leaks/overflows.
- Water stains inside 2nd floor. Remove stains and identify causes.
- Add hood mouldings to front doors to improve water shedding.
- Fill gaps in woodwork at the doors.

OTHER EXTERIOR FEATURES:

- Repoint mortar on 2nd floor.
- Evaluate visibility of HVAC equipment.
- Significant biological growth everywhere due in part to no sunlight on facade. Clean and consider ways to mitigate growth.

2. RESPECT AND IMPROVE LANDSCAPE & SITE

- Need more shaded parking – people park in illegal areas that are in shade.
- No vehicle shelter – very hot in the summer.
- Sidewalks and driveways have a severe drainage issue. Discuss with the University.
- University facilities staff drive maintenance trucks on lawns, causing ruts and damage to the irrigation equipment. How to deter the trucks from driving on the lawns?
- Exterior lighting at the back stairway.
- Signage could be powered with solar lighting.
- Interior lights left on in the stair hall at all times – permanent due to building code requirements.
- Nice to have rear outdoor seating.
- Nice to have a bike rack.
- There are issues mowing the rear lawn between the "pods".

3. PRESERVE EXISTING LANDSCAPE MATERIALS

- Materials originally chosen specifically to ultimately need no irrigation.
- Azaleas and crepe myrtles chosen because they are water and drought tolerant.
- Need to find plantings for the horseshoe in the rear that aren't high maintenance.
- Annuals are a lot of work.
- The St. Augustine lawn is well-adapted drought and water tolerant.
- Keep irrigation functional but evaluate options to improve it.

Rear of building with pod and landscaping, summer above, winter below.

The 2nd floor gymnasium's brick walls and running track structure.

Turning computers off at night has been a continuing topic of discussion.

4. MAINTAIN INTERIOR CHARACTER-DEFINING FEATURES

- 2nd floor trusses original.
- Brick walls original.
- Windows original.
- Staircase was rebuilt.
- Would like running track back.
- Should there be a shower?
- Suspect microbial growth in air supplies at stairways.
- Some water overflow from Labs.
- Time to replace carpet.
- What is the drinking quality of the water? Purifying systems for labs. Drinking water - cost of filters vs. bottled water.

Achieving Sustainability Goals

1. ESTABLISH A MORE ENERGY EFFICIENT FACILITY

- IT system – some staff leave computers on all the time.
- Ask people to shut down computers.
- How to get people to turn off computers and other equipment.
- Inefficient and unsustainable HVAC.
- Electric heat – inefficient.
- How to best address humidity?
- Continuing mold problems.
- A lot of illness here – any relationship to systems?
- How to improve/incentivize health?
- Staircase permanent lighting – how to manage/change?
- Have already changed bulbs to CFLs on 2nd floor.
- Don't like light quality of the new CFLs on 2nd Floor but no need to change.
- How to control light use on 2nd floor?
- How to manage evening close-down better?
- Summer – lights are left on which is inefficient.
- Should there be cameras on the 2nd floor?

2. IMPROVE RESOURCE USE

<u>WATER:</u>

- Low flow faucets?
- Water use quadruples in summer, increased after irrigation installed.

<u>WASTE:</u>

- Paper use – no electrical hand dryer.
- Janitorial contracts – NCPTT staff do not have input into products.

RECYCLING:

- Coordinate all recycling on campus.
- Compost in pods. Make better use of it.
- Should get a recycled paper printer.
- Only 1 two-sided printer in building, default should be to 2-sided.

LABORATORIES:

- Monitor material use.
- Chemicals in Dry Lab chemical storage cabinet are corroding, inorganic.
- Acetones are the worse materials used in the Labs.
- Lab stores Gulf Coast crude oil, but VOCs are all gone.
- Be proactive with new items that come in.

4. USE THIS PROJECT AS A MODEL PROJECT/PROCESS

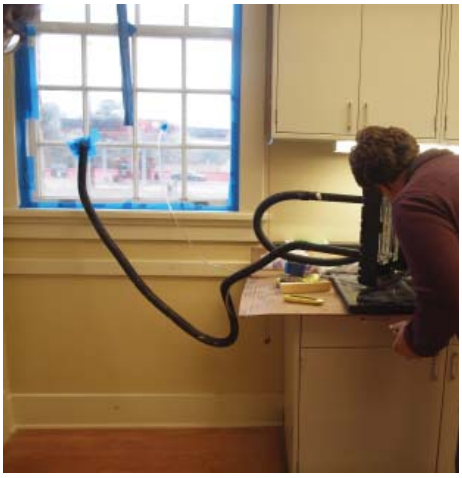
- Use this greening process to improve from reactive to proactive.
- Take features/processes we implement and disseminate.
- Set up specific webpage and case study.
- Publish APT articles.
- Add to Preservapedia.
- Presentations at AASLH/AAM and other related organizations, including Greenbuild.
- "Preservation in your community."
- Windows/insulation workshop.
- NCPTT would like to get Lee H. Nelson Hall LEED certified.

Setting up the window chamber air leakage test in the lab.

One of the 2nd floor labs.

GREEN BUILDING RATING SYSTEM OVERVIEW

As noted above, the project's baseline target is to improve the maintenance and stewardship policies and processes at the building. The project will target LEED Gold for Existing Buildings: Operations & Maintenance (LEED EB:O&M). LEED is not an end in itself but a tool that helps create more sustainable built environments by providing a framework for design, construction and evaluation. It is best used as an integrated planning and design process to achieve real results on the ground. Consequently, this is an ideal time for NCPTT to be considering adopting a cyclical maintenance policy.



Setting up the window chamber air leakage test in the first floor lab.

National Park Service & Federal Buildings

In 2006, sixteen federal agencies signed a memorandum of understanding known as the Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings. Signatories made a non-binding commitment to the following principles for new buildings and major renovations:

- Integrated design
- Optimizing energy performance
- Protecting and conserving water
- Enhancing indoor environmental quality
- Reducing the environmental impact of building materials

The NPS Management Policies from 2006 state that:

> "all projects that include visitor centers or major visitor services facilities must incorporate LEED (Leadership in Energy and Environmental Design) standards to achieve a silver rating." In response to this directive and in order to minimize the impacts from operating NPS facilities, parks have been building LEED certified facilities. Currently the NPS has at least ten LEED buildings which include visitor centers in National Parks and regional headquarters."

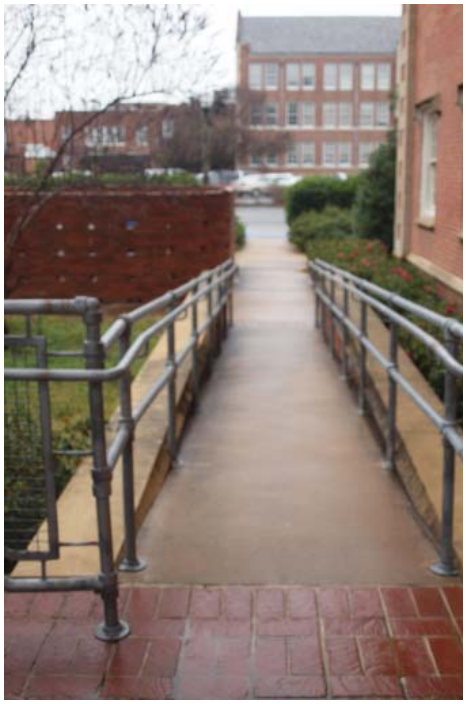
The rear exit stair and landscaping.

GSA has required LEED certification on all its new construction or major renovations since 2003, first silver and then since 2009, gold. Earlier this year, GSA altered its policy to also allow the use of Green Globes, another rating system originally created in Canada.

NCPTT has the opportunity to become a leader by implementing LEED EB: O&M, and joining other federal buildings, like the Treasury Department building, in its efforts to manage its operations and maintenance.

LEED EB: O&M SUMMARY

Recognizing that 75% of all energy use in buildings occurs after construction, NCPTT has wisely selected LEED EB:O&M as their initial target.
The internal team devoted a portion of both eco-charrettes reviewing each potential LEED category for LEED EB and identified credits and points that seemed manageable. Based on this analysis, LEED Gold was determined to be a reasonable goal. A guiding premise is that the building should meet energy and sustainability goals while preserving its character-defining and historically significant features. Therefore, each point was evaluated against whether it could save energy and material resources, while respecting character-defining elements. The general summary provided below, which follows the LEED categories, informs the final checklist and recommendations. (See the full LEED EB Checklist in *Attachment 4, PAGE 142*.)



The rear ramp leading to Caspari Drive.

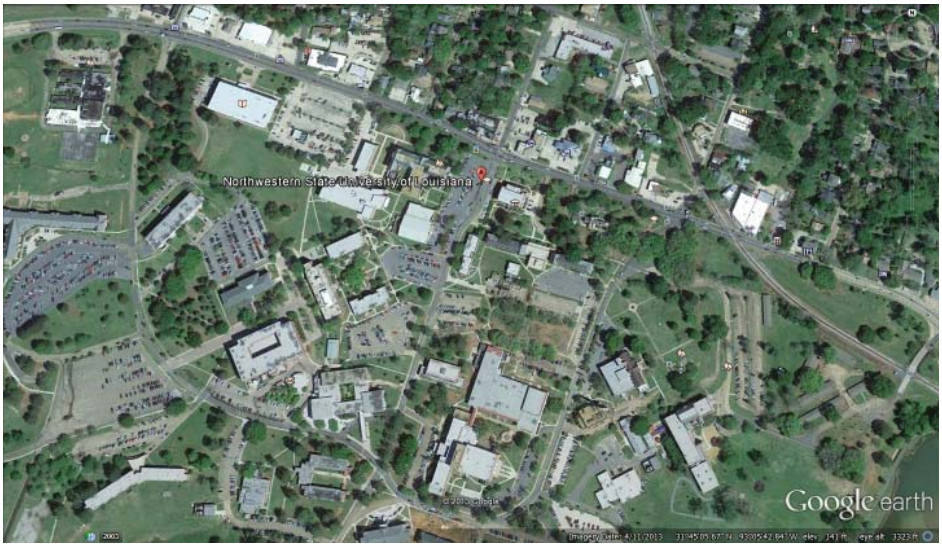
Sustainable Sites

By maintaining and cultivating the natural landscape with minimal impact, and protecting and enhancing the ability of the landscape to perform its natural functions, the climate, clean air and water can be better regulated, improving the quality of life and length of life of the resources.

Because the building is located in an urban area, the project can take advantage of credits available to urban sites under this category (i.e. by providing access to community services and transportation alternatives, and/or installing bike racks and a shower to encourage employees to walk, run or bike to work). Achievable goals include:

One of the two rear-yard pods and walkways.

Aerial View of Northwestern State University. Nelson Hall is just right of the red dot.



The kitchen, first floor.

Women's Restroom, First Floor.

- Develop an environmentally sensitive hardscape management plan. Because there is minimal parking and pavement on the site, any changes will include using pervious paving and providing for erosion control.
- Reduce the heat island effect and control storm water runoff by applying strategies to the site's hardscapes (roads, sidewalks, courtyards, parking lots). This can be accomplished by using masonry pavers, using reflective materials, providing shade, and installing an open-grid pavement system (at least 50% pervious). (This is in the Maybe category and requires further review).
- Review the potential of altering the roofs to reduce the heat island effect - with vegetated roof areas or solar panels.
- Implement an integrated pest management strategy. Keeping pests out means not needing to use toxic pest removal products.
- Compost food waste and yard waste.
- Review the current water use and evaluate the irrigation system.
- Reduce the number of commuting round trips using single occupant, conventionally powered and conventionally fueled vehicles. NCPTT can adopt policies to encourage telecommuting, compressed work weeks, and use of mass transit and bicycles. It can also earn points by providing dedicated parking for low-emitting or alternative fuel vehicles.

Water Efficiency

Achievable goals include:

Water | Landscaping

- Conduct a review of the site to determine spaces where irrigation requirements can be reduced and/or eliminated.
- Determine appropriate plant material and design the landscape with native or adapted plants to reduce or eliminate irrigation requirements.
- Collect rainwater with a catchment system. Reuse roof runoff, preventing it from being absorbed into the surroundings.
- Utilize landscaping strategies that do not require permanent irrigation systems.
- Consider the use of recycled wastewater.
- Consider the use of water treated and conveyed by a public agency specifically for non-potable uses.
- Set up modern irrigation controls at night. Substantially reduce evaporation and allow more of the water to remain where it is needed. These controls could also utilize ground moisture sensors to eliminate irrigation when it is not needed and reduce runoff associated with excess irrigation.
- Install moisture sensors on sprinkler systems.
- Use weather-based irrigation controllers, which can reduce water use by 20% compared to conventional equipment.
- Use soil moisture sensors to determine the amount of water in the ground available to plants.

Water Use | Plumbing Fixtures

- Repair all water leaks.
- Replace toilets with ADA comfort height, low-flow and install high efficiency, Water-Sense labeled toilets.
- Install water-saver faucets.
- Install automatic lavatory faucets and aerators.
- Install showerheads that use less than 2.2 gallons per minute.
- Manage storm water by reducing need for water (indigenous landscaping materials) and reusing water wherever possible.
- Use gray water (water from sinks, showers, and other sources) to substitute for potable water to flush toilets and urinals.
- Replace the remaining water heater with a tankless/on-demand water heater.

Energy and Atmosphere

The best and most immediate way to improve energy use in an existing building is to weatherize it. Achievable goals include:

Energy and Heating

- Envelope upgrades to control air infiltration (also known as weatherization): repair and retrofit windows, doors, gutters, trim, and masonry.
- Determine how to create a multi-zoned heating system for occupant control.
- Optimize the building envelope and lighting first.
- Balance the energy model with the cost model. Evaluate upgrading the existing HVAC system with incremental improvements such as those energy efficiency measures suggested in the Energy Audit.
- Transient areas can be colder or warmer to maximize temperature range of space.
- Carbon neutral potential – reduce, reduce, reduce! It may be possible to achieve carbon neutrality by wisely reducing, and minimizing energy use.
- Single access photovoltaic could be possible as a demonstration and/or workshop.
- Review heating/cooling requirements of “back of house” versus front of house (public spaces).
- Consider adding building automation systems that enable each piece of equipment and/or mechanical system to operate only when necessary (i.e. chilled water system operation, hot water system operation).

Weatherization of the building envelope is one of the best ways to improve energy efficiency in an existing building.

Rear doors and exit, first floor.

Conference Room, First floor.

Energy and Power

- Continue to replace office light fixtures with CFLs (see Green Housekeeping section for more suggestions).
- Manage the plug loads throughout the building.
- Use infrared (IR) motion sensors for lights (i.e. lights in stairwells or on dark landings where light is temporarily used, and public spaces such as interpretive rooms and restrooms).
- Utilize a time clock in conjunction with a photocell. The system will turn the lights on when the area reaches a specified light level and shut them off at a time specified by the operator.
- Install dimmer switches where dimmed lighting makes sense.
- Existing building commissioning and/or commissioning of the upgraded systems will be key to evaluating potential and actual performance.

Office space, first floor.

The library and reception space, first floor.

Materials and Resources

The reuse of an existing building avoids the impacts of producing and shipping many new materials, let alone the construction of an entire building. The project will reuse all of the existing walls, roof and floors. The use of recycled materials and resources made from natural and recyclable materials minimizes the impact on the environment. Achievable goals include:

Sustainable Materials | General

- Work with vendors that follow green/sustainable practices.
- Buy laptops, not desktops and recycle the computers; laptops use less energy than desktops.
- Use a minimum of 50% timber labeled with the Forest Stewardship Council (FSC) certified timber label.
- Source all materials locally, within 500 miles of Natchitoches whenever possible.

Sustainable Materials | Design

- When purchasing new floor coverings use wool floor coverings instead of synthetic alternatives – more durable and easier to clean.
- Consider other renewable flooring materials: cork, bamboo, linoleum.

Roofing

- Flat Roofs: Replace flat roofs with light colored, white reflective membranes and coatings. This is an excellent option for flat roofs with parapet walls and can reduce cooling requirements in the warmer months by as much as 20%. A less expensive alternative is painting your current surface with a reflective paint.
- Consider a green roof: Suitable for flat roofs, especially those with parapet walls. Extensive roofs require a 2'-6" deep layer of mineral-based mixture (sand, gravel, crushed brick, leca, peat, organic matter, and soil). Once established, green roofs require little maintenance (weeding and membrane inspection twice a year). More modular green roofs that are easier to install and require less soil are also available.

Windows

- Install weather-stripping around the perimeter of double-hung windows.
- Install additional interior storms where appropriate and desirable.

Typical office partitions and carpeting, which is reaching its life expectancy.

Laboratory windows, first floor.

Office space and lighting, 2nd floor gymnasium space.

South, rear elevation.

Indoor Environmental Quality

Practices that support healthy indoor air quality by minimizing noise and air pollution.

Achievable goals include:

- Use hot water extraction (steam cleaning) equipment for deep cleaning carpets.
- Equip powered maintenance equipment (floor buffers, burnishers, automatic scrubbers) with vacuums, guards, and/or other devices for capturing fine particulates. Operate at a sound level less than 70dBA.
- Prohibit smoking in the building and designate exterior smoking areas at least 25 feet from building entrances, outdoor air intakes and operable windows.
- Implement an occupant comfort survey and complaint response system to collect anonymous responses about thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and other occupant comfort issues – target at least 30% of total occupants. Include an assessment of overall satisfaction with building performance and identification of any comfort-related problems.
- Utilize only-low emitting materials, including carpeting, paints, adhesives, coating and sealants with low or no-VOCs (volatile organic compounds).
- Ensure that all occupants have daylight and exterior views.

Innovation in Operations and/or the Design Process

This section of the LEED rating system is the most subjective and can include items such as the development of an eco-tour of the building, exemplary performance in water reduction, documenting sustainable building cost impacts and/or non-roof heat island effect. Utilizing a LEED Accredited Professional will provide one point in all of the current versions of LEED.

Regional Credits

One of the most interesting additions to LEED 2009 is the section on regional credits. Each local chapter of the USGBC selected the credits for their respective region. Projects that achieve any of the regional credits typically receive one extra point for each category on top of the regular points. Natchitoches' regional credits are identified within each LEED summary below. (Note: The maximum points any project can achieve under this section is four.) This project could target Credits EQc1.4, MRc7, SSc5, SSc7 and WEc3 and possibly EAc4.

LEED EB:O&M CHECKLIST OVERVIEW

The best way to maintain the operations of a building is through a sound and comprehensive cyclical maintenance plan. LEED EB:O&M is a methodical and scientific approach to effectively create and monitor cyclical maintenance and operations of a site. Setting up the various plans, programs and monitoring systems are the most labor and cost-intensive components of this rating system. In order to maintain this certification, re-certification every 5 years is required, thereby motivating owners and users to accurately monitor their systems and programs. Many building owners attest that once implemented, LEED EB:O&M standards make it easier to improve performance over time. Both the Colorado State Capital and the National Geographic Headquarters increased their ratings in their second registration period. This demonstrates that owners and occupants find it easier to achieve higher levels of green practices once it becomes routine.

A first pass through the LEED scorecard indicates that NCPTT could readily achieve 52 credits, which is a solid Silver rating. This conservative estimate assumes two points for Innovation in Operations points and 2 Regional Priority points. The two credits that would impact NCPTT's score the most are SSc4 (Alternative Commuting Transportation) and EAc1 (Optimize Energy Efficiency Performance). NCPTT conservatively projected 7 out of 15 points for SSc4 and 4 out of 18 points for EAc1. The building does very well in the Sustainable Sites and Materials & Resources categories as an existing building located in an urban environment. The key to achieving Gold will be to systematically implement all of the monitoring, purchasing and cleaning plans and reporting, which are currently listed in the "maybe" category.

Potential Regional Credits:

EAc4:	On-site and off-site renewable energy	MAYBE
EQc1.4:	Indoor Air Quality Best Management	YES
MRc7:	Solid Waste Management	YES
SSc5:	Site Development - Protect or Restore Habitat	YES
SSc7:	Heat Island Effect - nonroof	YES
WEc3:	Water Efficient Landscaping	YES

See *Attachment 4* for full scorecard.

NOTES: LEED EB allows for continuously occupying a building during work. LEED EB also requires recertification every 5 years.

This evaluation assumes that the project can achieve all of the prerequisites. Several of the key issues will involve implementation of suggested energy efficiency measures to ensure that the building can achieve a base EnergyStar score of 70 and the tracking of at least 12 months of data. After documenting the building's energy performance for EAp2: Minimum Energy Efficiency Performance, EAc1 will require that we focus on improving operational performance and, potentially, upgrading to more efficient equipment.

Demonstrating the infrared testing in the gymnasium.

The original double hung wood windows on the first floor.

The rear ramp and pod where recycling and trash pick up happens.

GREEN HOUSEKEEPING RECOMMENDATIONS

Good Housekeeping is Green Housekeeping

Small changes can generate huge positive results in reducing impacts on the environment (as well as impacts to the bottom line). The U.S. contributes almost 25% of the green house gas emissions in the world despite only having 5% of the population. While it may seem impossible for one person or one site to make a difference, a recent article in *Time* suggested that the human factor of controlling and changing our behavior could positively impact greenhouse gas emissions almost immediately. ("America's Untapped Energy Resource: Boosting Efficiency", Michael Greenwald, *Time,* December 31, 2008.) Likewise, a McKinsey study found that a global effort to boost efficiency with existing technologies could have "spectacular results," eliminating more than 20% of world energy demand by 2020. With that in mind, no small action will go unnoticed. ("How The World Should Invest in Energy Efficiency", Diana Farrell and Jaana K. Remes, *The McKinsey Quarterly*, July 2008.) Therefore, this report's recommendations starts with modest, achievable "green housekeeping practices" – actions that can be integrated into the site's daily and cyclical maintenance schedule with minimal effort and expense.

A rating system like LEED EB:O&M is actually an expanded cyclical maintenance program, using a scientific methodology to monitor resource use and activities and improvements. There are many green "housekeeping" methods that can be easily implemented—whether LEED certified or not. Below are a range of options that could be implemented immediately at the building, augmenting green practices already being followed.

Landscaping and Site

Practices that provide for human needs while minimizing impacts on the environment, landscapes and communities.

- Encourage eco-friendly transportation – carpool, public transit, install a bike rack/storage.
- Use brooms and rakes instead of gas-powered equipment.
- If gas-powered equipment is needed, use only during the cooler times of the day to save fuel.
- Develop a composting program for on-site and catered events. There is compost in the pods in the rear of the site; encourage its regular use.

<u>Water | Landscaping and Irrigation</u>

- To avoid excess evaporation, water the yard or garden in the early morning or evening when it is cooler.
- Use organic fertilizers to reduce required irrigation among other benefits.
- Compost leaves and yard trimmings to divert from landfills.

- Ensure there is no standing water on the site. Eliminating breeding grounds for mosquitoes and other pests will eliminate the need for pesticides. Given the drainage issues at the University, this is a crucial issue which must be coordinated.
- Group plants with similar water needs – place thirsty plants together and water them longer, but less often, to encourage deeper roots and increase their drought tolerance.
- Place mulch around plants and on lawns to cut the amount of water lost through evaporation by up to 70 percent.
- Limit the use of potable water, on or near the site, for landscape irrigation.
- Raise the lawn mower cutting height – longer grass blades help shade each other, reduce evaporation, and inhibit weed growth.
- Be creative and resourceful with water usage. Use gray water from sinks on plants or in the garden.
- Do not use black water or water that contains bleach, automatic-dishwashing detergent, or fabric softener.

Keeping the St. Augustine lawn free of weeds has been challenging.

Heating, Lighting and Power

Practices that meet human needs while conserving energy.

Heating

- Adjust thermostats – 2 degrees less in the winter, 2 degrees more in the summer.
- Set the thermostat no higher than 68 degrees in the winter.
- Practice efficient heating during the winter — close shades, shutters and curtains to reduce heat loss as soon as the sun goes down.
- Open all the shades during the day, except those on north-facing windows to take advantage of solar heat gain.
- Close doors and vents to rooms that are not being used.
- Apply door sweeps to the bottom of exterior doors and install weather stripping to minimize gaps and thus heat loss.
- Seal cracks and block openings – block unnecessary vents, weather-strip all seams.
- Use less hot water – wash items and hands in cold water.

Lighting

- Replace incandescent bulbs in the offices and “back of house” areas with compact fluorescent light bulbs (CFLs) and T-8 ballasts wherever possible, including street lamps. CFLs are especially useful where extended lighting is required. (There has been some misplaced concern about mercury used in CFLs, which is actually quite small. In fact, far more mercury can be found in the by-product of the incandescent light bulb manufacturing process.)
- Use 9-18 watt outdoor CFL if lighting areas for security.
- Turn off exterior lights in the morning or install motion sensors.

The side entrance at the front of the building.

Typical exit sign and recessed hall lighting.

Kitchen Appliances.

Light-Emitting Diode (LEDs)

- Use LED exit signs wherever possible. Replace exit lights with 2-3 watt LED type fixtures.
- LEDs are incredibly efficient but much more expensive and not as universally available as CFLs. But this is changing and in several years we will probably be changing CFLs to LEDs.

Natural Light

- Arrange furniture in the offices to take advantage of natural light from windows. Place desks and reading chairs next to windows.
- Install dimmer switches wherever it makes sense and always turn lights out in rooms not being used.

Energy | Appliances

- When not in use, turn off and unplug electronic devices, especially at night, on weekends and during vacations.
- Purchase any new appliances with the Energy Star® label.
- Keep the refrigerator full – food retains cold temperatures better than air.
- Set the refrigerator to 37 degrees Fahrenheit, set freezer to 3 degrees Fahrenheit to conserve energy.
- Clean refrigerator gaskets regularly and vacuum the condenser coils twice a year.
- Avoid using large equipment between 3pm and 7pm (the hottest time of day).

Windows

- Reduce heat loss through windows by lowering the shades—this acts as insulation at a time when there is no solar energy to gain.
- Weatherstrip, and caulk all cracks between walls and window frames, especially under windowsills.

Air Infiltration

- Electrical Switches and Outlets: Install foam gaskets on all switches and outlets—even on interior walls. Use child-safety plugs to minimize the amount of cold air coming through the sockets.
- Recessed Lights and Bathroom Fans: Caulk around these with a flexible, high-temperature environmentally-friendly caulk as they can cut into the attic insulation and create pathways for air leaks.
- Doors: Exterior doors with magnetic seals will offer superior air infiltration benefits. Use interior-grade caulk around the frames of exterior doors.
  To increase efficiency, interior doors should have adequate undercut to maintain balance in the heating system. For carpeting, be sure the airspace from the undercut is still sufficient after carpeting has been laid.

Materials and Resources

Encourage the use of recycled materials and resources made from natural and recyclable materials, minimizing the impact on the environment.

Recycling

- Participate in a recycling program by providing bins on-site for paper, plastic, batteries (tub collector) and fluorescent light bulbs. (Note: Region does not currently recycle glass.)
- Use a paper shredder for nonrecyclable paper.
- Consider an alternate use for broken items.
- Implement a towel/linen reuse policy in restrooms.
- Set up the printer and photocopier to make two-sided copying the default mode.
- Use old paper products as scrap paper/miscellaneous printing paper.
- Keep recycling bins at everyone's desks and in every office.
- Recycle printer ink and toner cartridges.

Sustainable Materials | General

- Use recycled/sustainable materials (100% post-consumer recycled paper, pencils, folders, etc.). It is easier and easier to readily find these items. Stores like Office Depot and Staple now identify the "green-ness" of many of their products. The Sustainable Purchasing Leadership Council is a new organization developing green purchasing standards.
- Use 100% Green Seal certified soap and paper products in public and staff rest rooms.
- Practice and encourage sustainable catering – serve sustainable seafood and locally grown food when programs or events include outside catering.

Sustainable Materials | Design

Interior Paint Guidelines

- Clean existing painted surfaces instead of painting.
- Consider using recycled paint, which is reprocessed to match the performance of new latex paint.
- Select colors that reflect more light, helping to improve visibility and reduce the need for supplemental light (when necessary, use semi-gloss and/or neutral colors that are easier to clean).
- Consider the extreme durability of mineral silicate paints for concrete (including stucco), stone, and other mineral substrates.
- Ask for paint that is Green Seal certified (i.e. meet GS-11 standards).

Cleaning Products

- Save water, energy and packaging by switching from liquid detergents to powder detergents.
- Use Do-It-Yourself (DIY) cleaners or products certified by Green Seal or the EPA's Design for Environment program.
- Vinegar, borax, lemon juice and baking soda can replace most off-the-shelf cleaners.

First floor window and shade.

Typical private office.

The first floor library.

Printer and supply room.

Indoor Environmental Quality

Practices that support healthy indoor air quality by minimizing noise and indoor air pollution.

- Utilize entryway systems (grilles, grates, mats) to reduce the amount of dirt, dust, pollen and other particulates entering the building at all public entryways.
- Use natural paints and finishes, or water-based (latex) paints with low- or zero-VOC that carry little or no petroleum-based solvents.
- Use products clearly labeled: nontoxic, biodegradable, chlorine-free, phosphate-free, non-petroleum based, vegetable oil based, fragrance-free, and no dyes.
- Make cleaners using distilled white vinegar, baking soda, club soda, salt, cooking oil, lemons, borax and washing soda.
- Use 100% Green Seal certified cleaning supplies – one product mixed at different strengths to clean windows, floors, walls, etc. Use special waxes and sealers for marble and wood floors once per year.
- Buy/make cleaning products in concentrate. For example, there are some Green Seal concentrated powders that can be used for various surfaces at different dilutions.
- Avoid cleaners with ammonia, chlorine, monoethanolamine (MEA), glycol ethers, alkyl phenol ethoxylates (APEs), phthalates and triclosan.
- Use high-efficient vacuum cleaners that operate at a sound level less than 70 dBA and are capable of capturing 96% of particulates 0.3 microns in size.

RECOMMENDATIONS FOR STRATEGIC IMPLEMENTATION

Improving Lee H. Nelson's Hall energy efficiency, and operations and maintenance activities, could be implemented in several different ways, which could also be phased. However, the most efficient in terms of labor and cost would be to implement all of the major activities in one capital project which would likely cost in the $1,000,000 - $1,500,000 range.** A comprehensive upgrade to the building's maintenance program could be implemented with or without LEED, although using the LEED EB:O&M process would be the most efficient and the best way to establish an ongoing, measurable cyclical maintenance program

Two potential approaches are listed below with pre-schematic cost estimates on the following page, page 52.

1. Implement a full Capital & LEED EB:O&M Program: Prepare a prioritized and phased plan to implement the energy efficiency measures, other capital recommendations and a full cyclical maintenance program. Prepare a "white paper" for National Park Service management which proposes the work, plan and budget. See further explanation on the next page. This would be the most efficient and effective approach but also the most costly to iimplement at once. It should be noted however, that the first certification period in LEED EB:O&M is typically the most costly because all of the systems and approaches need to be established and set up. It becomes easier and less expensive with each certification period (every 3-5 years).

2. Develop a Green Housekeeping Program: It can be overwhelming to implement all of the recommendations in this plan at once, absent a comprehensive cyclical maintenance program. First, create a "green team" comprised of key staff and Board members. Then identify a prioritized approach. For example, try to implement one set of goals each month:

- Month one – evaluate all the cleaning products used and identify one Green Seal product which can be used in their place.
- Month two – survey all light fixtures on-site to identify those that can be replaced with more efficient CFLs or LEDs; develop a schedule to minimize "plug" loads.
- All of the options discussed on pages 46-50 in Greenhousekeeping Recommendations could be implemented over a one year period to evaluate the improvements made before proceeding with Option 1 above.

**These cost estimates are extremely preliminary and will be impacted by decisions made regarding which LEED criteria to choose and what level of the various measures to implement.

Green Bucket Green Seal Hand Cleaner.

The women's restroom.

Performing an air leakage test in the gymnasium.

The server room on the first floor.

PRIORITIZED & PHASED PLAN

1. FULL CAPITAL AND LEED EB: O&M PROGRAM (Phases 1 and 2 can be implemented together or sequentially. For example, all of the work in Phase 1 could be completed as the first LEED EB period. Depending on the improvements during this first period, the work of Phase 2 could then be implemented in the second LEED certification period (3-5 years after the first certification period.)

Phase 1: (first certification period)

• EEM 1: Air Sealing (windows, doors, repointing etc.)		$95,000
• EEM 2: Office Lighting		0
• EEM 4: Occupancy Sensors		3,000
• EEM 5: Auditorium Walls insulation		20,000
• EEM 9: Window Films		20,000
• Remaining LEED: EB Checklist items except for the EEMs listed below in Phase 1	up to	650,000
TOTAL		$788,000

Phase 2: (2nd certification perior)

• EEM 3: Lighting Retrofit	38,000
• EEM 6: Retro-commissioning	20,000
• EEM 7: Dedicated Outdoor air system	50,000
• EEM 8: HVAC System Replacement	260,000
• LEED EB process and monitoring items/improvements	TBD
TOTAL	$368,000

Additional items not included in the LEED program such as the reconstruction of the running track are in addition to these costs.

2. Greenhousekeeping Program

- A good portion of the options discussed on pages 46-50, Greenhousekeeping Recommendations, could likely be implemented for less than $100,000.

POTENTIAL FOR INTERPRETATION & DISSEMINATION

Greening Lee H. Nelson Hall would create myriad opportunities for expanded interpretation and dissemination, including:

- Window repair workshop: Restoring and repairing windows is one of the most discussed (and frequently misunderstood) aspects of maintaining historic buildings. Many historic projects have restored their windows successfully as part of a sustainable preservation program (supporting LEED credits in the Energy & Atmosphere and Indoor Environmental Quality categories). Restoring the Nelson Hall windows and sharing energy audit testing provides opportunities to engage property owners and expand the sustainability discussion.

- Energy Audit Workshop: Training could be provided on the testing methodologies used for the Nelson Hall energy audit including the decision making that can come out of the findings - understanding Energy Star status, and prioritizing energy efficiency measures.

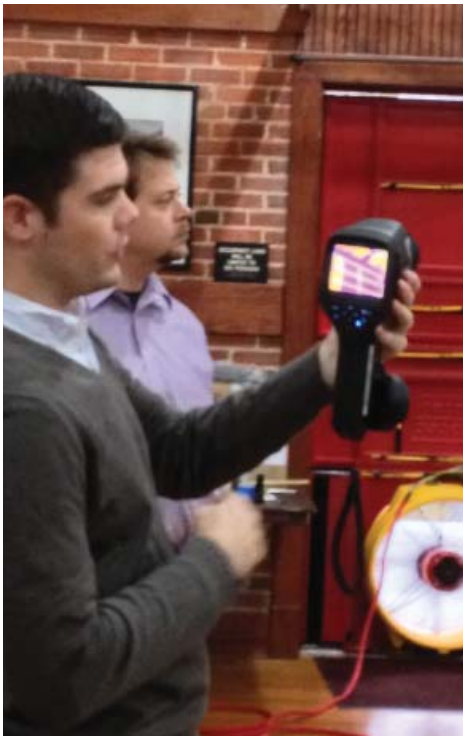
- Energy Efficiency Demonstration: Install public computer stations that show the energy saving practices and measures being taken - for adults and/or students.

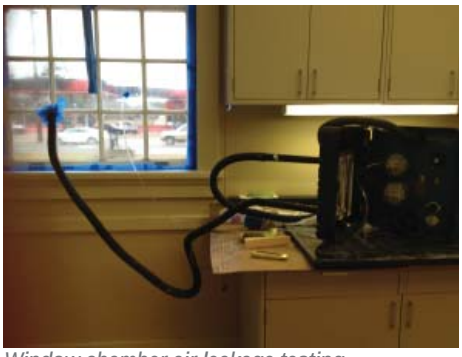
- Garden demonstration: One of the most complicated historic features to rehabilitate in a green manner can be historic landscapes. A demonstration project could inform home owners how to consider installing native and water tolerant species, micro-drip irrigation systems, landscaping strategies that do not require permanent irrigation, pervious driveway and paving systems, and improvements intended to reduce commute hours (i.e. flex-car parking spaces, bike racks).

- Eco-charrette workshops: Training in how to develop and run an eco-charrette.

Air leakage testing equipment.

Infrared testing in the gymnasium to identify heat loss.





Window chamber air leakage testing.

The equipment required for a whole building air leakage test.

DONOR AND FUNDING OPPORTUNITIES

Each of the above potential interpretation and demonstration workshops or programs would lend themselves to funding by individual donors or targeted grant making organizations. Two grants that have the most potential for these programs are provided by federal organizations:

21st Century Museum Professionals, Institute of Museum and Library Services (IMLS).

This grant has an annual application deadline of March 15th and awards grants from $15,000-$500,000, with a 1:1 match requirement. The purpose of this program is to increase the capacity of museums by improving the knowledge and skills of museum professionals in multiple institutions. The IMLS grants fund a wide range of activities, including the development and implementation of classes, seminars and workshops; resources to support leadership development; collection, assessment, development and/or dissemination of information that leads to better museum operations; activities that strengthen the use of contemporary technology tools to deliver programs and services; support for the enhancement of pre-professional training programs; and organizational support for the development of internship and fellowship programs. (Note: As of March 1st, it appears that IMLS may be combining some of their grants and changing deadlines. This will need to be reevaluated once they have announced the changes.) While not specifically a museum, some of NCPTT's activities may be considered for this grant and should be further investigated.

Sustaining Cultural Heritage Collections, National Endowment for the Humanities (NEH), Preservation and Access Division.

This grant has an annual application deadline of December 1st and awards grants for planning (up to $40,000) and implementation (up to $350,000). This grant has the most relevance for the planning, design and implementation of the capital improvement projects, specifically the building systems. This program helps cultural institutions meet the complex challenge of preserving large and diverse holdings of humanities materials for future generations by supporting preventive conservation measures that mitigate deterioration and prolong the useful life of collections.

Relevant examples for potential planning grants include:

Planning projects can be designed to address a variety of preservation challenges. Various kinds of testing, modeling, or project-specific research may help applicants better understand conditions and formulate sustainable preservation strategies. Testing, modeling, or project-specific research eligible for this grant program might include:

1. Measuring energy consumption;
2. Using blower door tests to identify air leaks in buildings;
3. Creating mock-ups of lighting options;
4. Testing natural ventilation methods;
5. Thermal imaging of buildings;
6. Testing the effect of buffered storage enclosures on moderating fluctuating environmental conditions;
7. Recommissioning or tuning small-scale climate control systems; or
8. Adjusting the operating protocols for climate control systems.

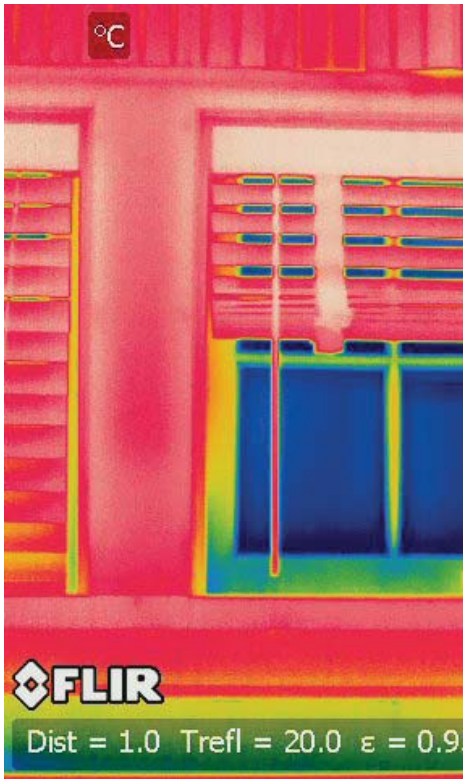
Taking a tour during the eco-charrette.

Federal Energy Management Program

AFFECT Grant Program - Assisting Federal Facilities with Energy Conservation Technologies

FOA will provide direct funding to U.S. Federal agencies for the development of combined heat and power or renewable energy capital projects at agency facilities. The anticipated total funding level for AFFECT is $5 million, with anticipated funding per award to be between approximately $50,000 and $1 million. This funding was announced in 2013 for early 2014 eligibility. The program should be monitored to determine if funding becomes available for future years.

Thermal image of first floor window.



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ECO-CHARRETTE HANDOUTS

National Center for Preservation Technology and Training

BAC [A+P] apollobbc Better Building Consultants

National Center for Preservation Technology and Training

Thanks you for participating in the Eco-Charrette Workshop for the Lee H. Nelson Hall

Tuesday, January 15, 2012

National Center for Preservation Technology and Training (NCPTT) has hired BAC/Architecture + Planning, PLLC and Apollo BBC to oversee the development and management of an Energy Audit and Sustainability Management Plan, which includes two eco-charrette workshops, to achieve the following goals:

1. Improve the energy and resource performance of the Lee H. Nelson Hall and decrease the costs of utility bills.

2. Provide training to NCPTT staff which engages them in the sustainable stewardship decisions for the building and site, and provides experience with LEED EB:O&M and the eco-charrette format.

3. Advance the leadership role of NCPTT in sustainable stewardship and preservation by providing a model project for "greening" the maintenance procedures of NCPTT's historic building.

This *Eco-Charrette* is an internal team meeting with staff members to establish the overall sustainability vision of the organization for Lee H. Nelson Hall and review operations and upcoming improvements in order to determine the baseline approach for "greening" the site.

What is an Eco-Charrette? An eco-charrette is a brainstorming session to discuss a project's sustainability goals and objectives, develop a sustainability vision, review operations and maintenance procedures and identify upcoming projects. The charrette process fosters a collaborative environment in which members of the project team can contribute ideas, express concerns and recommend actions for the road map called a *sustainability management plan*.

LEE H. NELSON HALL
PRELIMINARY ECO-CHARRETTE AGENDA

Tuesday, January 15, 2013

TIME	ITEM
9:30 AM	**Welcome & Introductions** • Participant Introductions & Expectations
9:45 AM	**Project Introduction** • What is an Eco-charrette? • The Project – Energy Audit & Sustainability Management Plans • The Project – Goals & Vision • Overview Presentation on Sustainability & Preservation (with case study examples) • Energy Audit Tools, Testing & Demonstration
11:00 AM	**BREAK**
11:15 AM	**Basis of Project & Design:** Building Background & Parameters • General Overview • Energy/Resource Use • Maintenance & Operations • Past & Future Capital & Maintenance Projects
11:45 AM	**Preservation & Sustainability Goals** • Group Brainstorming Session to develop goals together
12:30 PM	**LUNCH BREAK**
1:30 PM	**SUSTAINABILITY OPPORTUNITIES** (see Attached pages) • Sustainable Sites • Water Efficiency • Energy & Atmosphere • Materials & Resources • Indoor Environmental Qualities • Innovation & Design • Regional Priorities
3:30 – 4:00 PM	**ECO-CHARRETTE SUMMARY** • Summary of Project Goals and Plan • Goals & Vision • Next Steps

LEE H. NELSON HALL
PRELIMINARY ECO-CHARRETTE AGENDA

SUSTAINABILITY OPPORTUNITIES
LEED 2009 REVIEW

1. **Sustainable Sites**
    a. Hardscape Management
    b. Garden Management
    c. Integrated Pest Management
    d. Storm Drainage and stormwater control
    e. Rainwater collection
    f. LEED credit opportunities

2. **Water Efficiency**
    a. Indoor Plumbing Fixtures
    b. Water efficient landscaping
    c. LEED credit opportunities

3. **Energy & Atmosphere**
    a. Energy Efficiency Best Management Practices
    b. Energy Audit
    c. Commissioning
    d. Optimizing Energy Efficiency Performance
    e. Passive & Original Design Features
    f. LEED credit opportunities

4. **Materials & Resources**
    a. Sustainable Products & Materials
    b. Purchasing Policies
    c. Recycling
    d. LEED credit opportunities

5. **Indoor Environmental Quality**
    a. Minimum Indoor Air Quality
    b. Environmental Tobacco Smoke Control
    c. Green Cleaning Policy
    d. Best Management Practices – Cleaning
    e. Best Management Practices – Products
    f. LEED credit opportunities

LEE H. NELSON HALL
PRELIMINARY ECO-CHARRETTE AGENDA

6. **Innovation & Regional Priorities**
    a. LEED credit opportunities

Credit ID	Threshold/Path
EAc4	3% On / 25% Off
IEQc1.4	
MRc7	
SSc5	
SSc7.1	
WEc3	50% Reduction

Please note: Project teams must meet or exceed the threshold listed to earn an RPC point.

LEE H. NELSON HALL

HISTORY

From the National Register of Historic Places Nomination

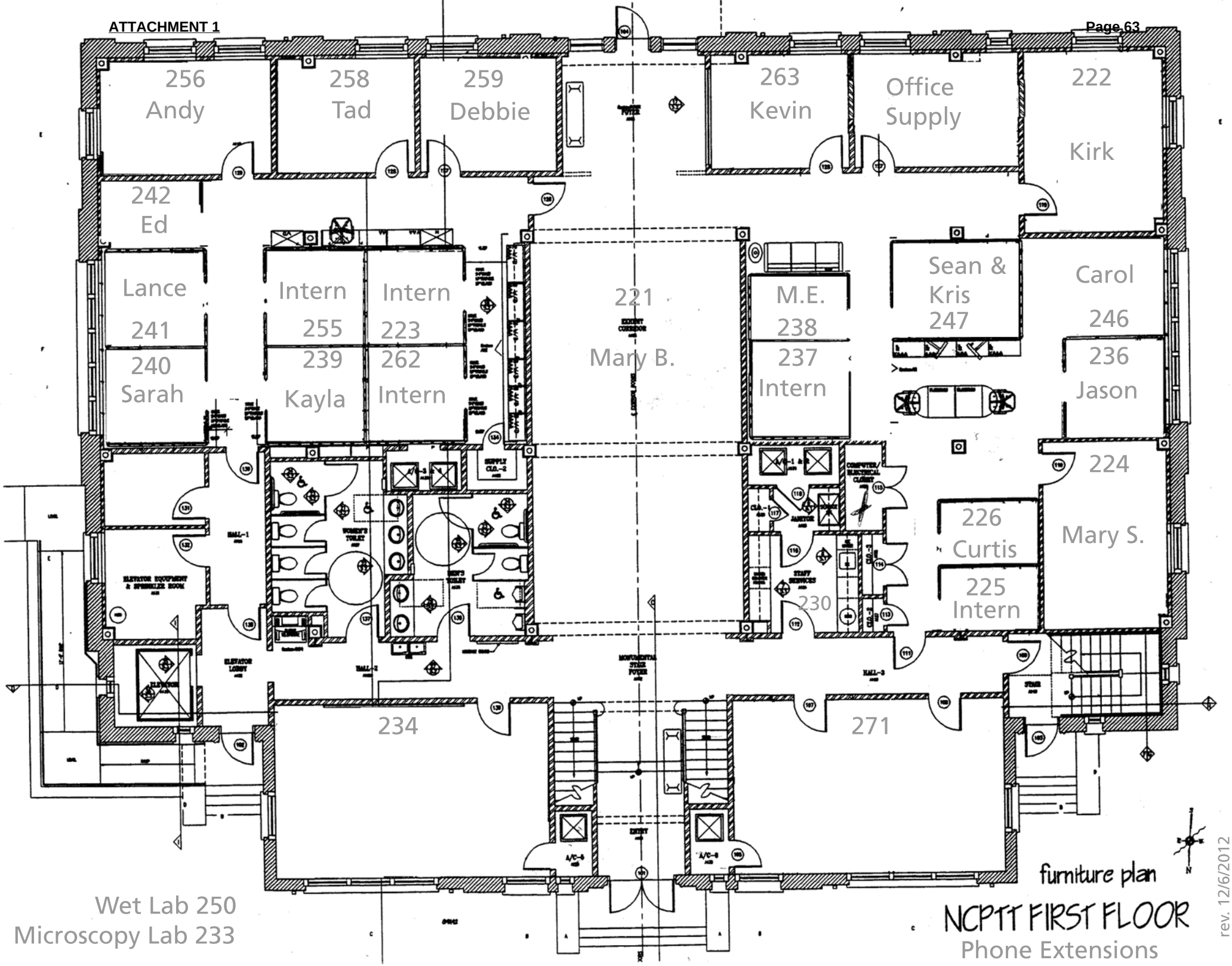
Built 1923

Builder/Architect Favrot and Livaudais (Architects)

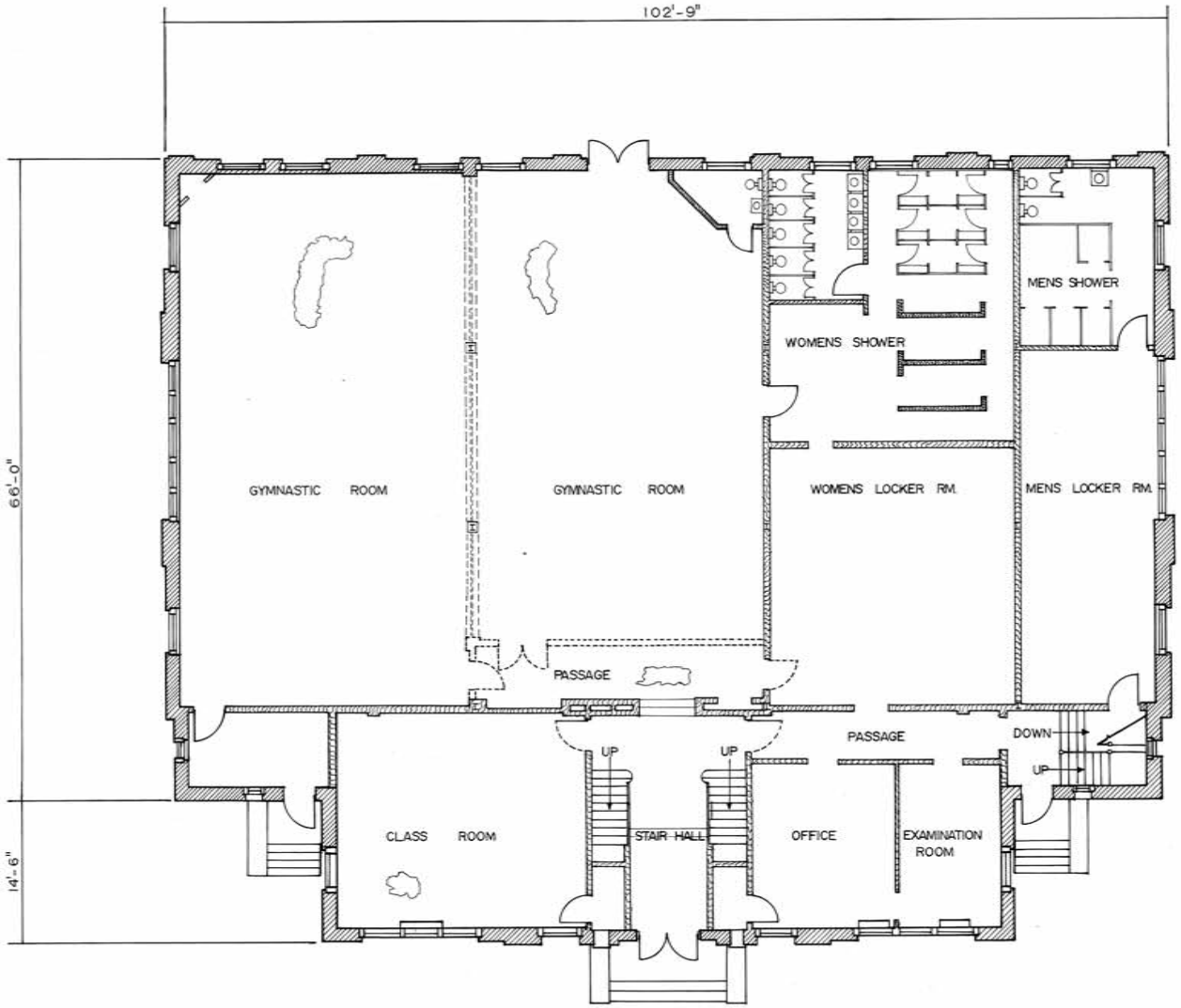
Frank Bethune (Contractor)

The Northwestern State University Women's Gymnasium is locally significant in the area of architecture because it represents the work of an important architectural firm and because it is a landmark in the late nineteenth/early twentieth century architectural heritage of Natchitoches Parish. Although no specific study has ever been done on the firm of Favrot and Livaudais, there is general agreement that it was a high style, competent, professional group of architects and that it was extremely prominent in the early twentieth century. Practicing the historicism which was then in vogue, it grew to be perhaps the largest architectural firm in New Orleans, the state's largest, most cosmopolitan urban center. For many years Favrot and Livaudais and Emile Weil vied for business across Louisiana. It is an open question as to which of these firms ultimately had the larger practice, but there is no question that they were the two major architectural firms in early twentieth century New Orleans. Favrot and Livaudais' best known works include the Hibernia Bank Building and the Cotton Exchange Building, both of which are landmarks in the New Orleans central business district. The firm also designed numerous public buildings, including courthouses, schools and libraries across the state.

Favrot and Livaudais is most noted for its neo-classical and Renaissance Revival buildings, styles from which it apparently seldom deviated. The Women's Gymnasium is unusual, therefore, being an evocative reference to English Jacobean country houses. This, of course, can be seen in its use of Renaissance and late Gothic features on a large rectangular brick form.
The Women's Gymnasium can also be seen as a landmark in Natchitoches Parish in a more general sense. Of the several hundred late nineteenth/early twentieth century buildings in the parish, most are fairly ordinary builder vernacular structures such as builder late-Italianate, builder Colonial Revival, bungalow, etc. There are also numerous humble frame buildings which do not feature any particular styling. The Women's Gymnasium is conspicuous among this group because of its sophisticated and historically evocative design. It is one of very few buildings in the parish which represents the work of a high style academically trained architect. Unlike most of the contemporaneous buildings in the parish which are essentially collections of standard manufactured details, the gym is consistently designed to portray a recognizable historical style of architecture i.e., Jacobean. It is, therefore, one of the parish's best examples of the historicism which was the leading trend in American architecture during the late nineteenth and early twentieth centuries.


256
Andy
258
Tad
259
Debbie
263
Kevin
Office
Supply
222
Kirk
242
Ed
Lance
241
240
Sarah
Intern
255
239
Kayla
Intern
223
262
Intern
221
Mary B.
M.E.
238
237
Intern
Sean &
Kris
247
Carol
246
236
Jason
224
Mary S.
226
Curtis
225
Intern
230
234
271
Wet Lab 250
Microscopy Lab 233
furniture plan
NCPTT FIRST FLOOR
Phone Extensions
rev. 12/6/2012

TRIM LINE



FIRST FLOOR PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"
0 1 2 3 6
METERS 1=96

DRAWN BY: BILL BROWNING

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 2 OF 8 SHEETS

LIBRARY OF CONGRESS INDEX NUMBER

1990 CHARLES E. PETERSON PRIZE COMPETITION.

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TRIM LINE

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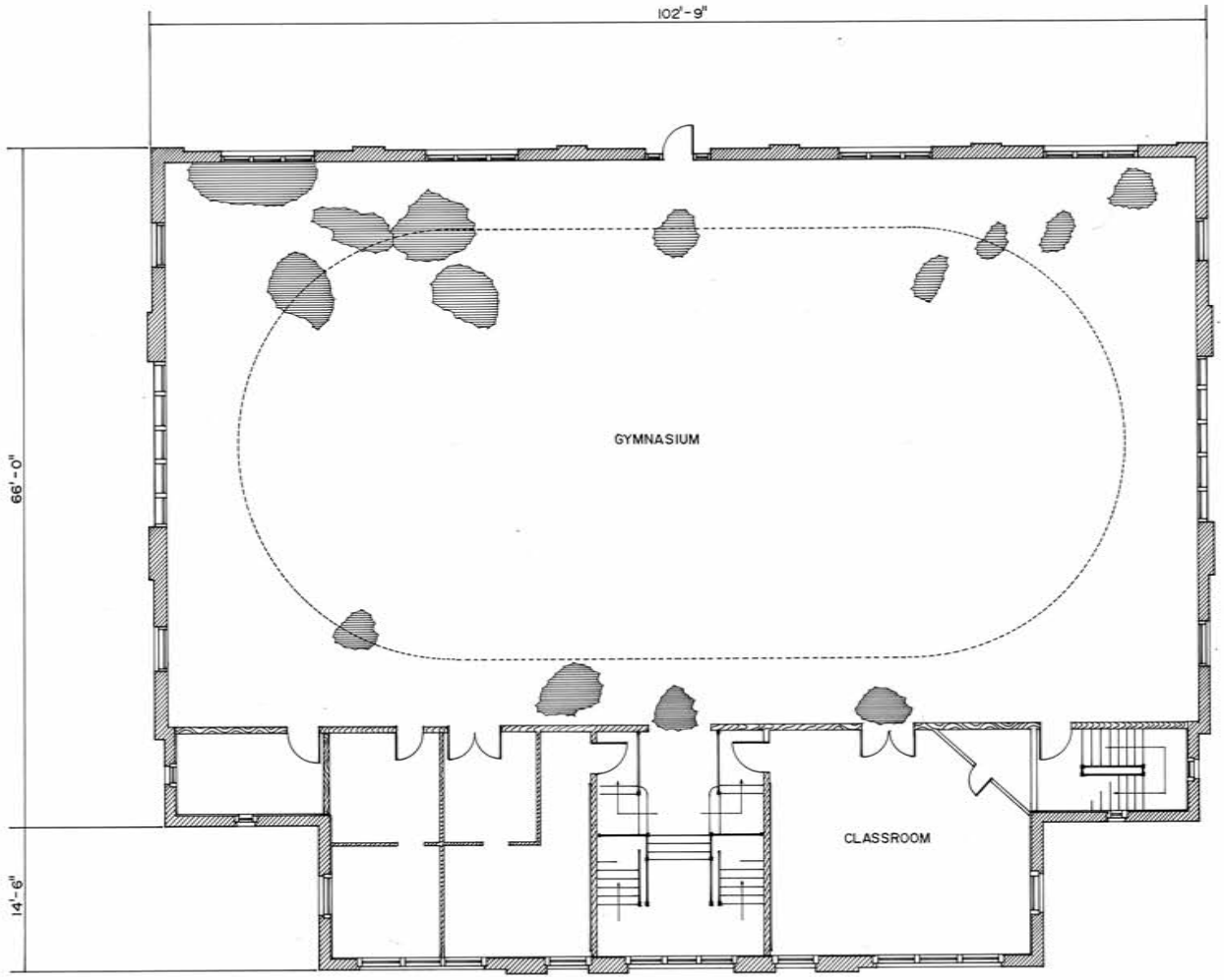

SECOND FLOOR PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"

0 1 2 3 6
METERS 1=96

DRAWN BY: KIM ANG

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 3 OF 8 SHEETS

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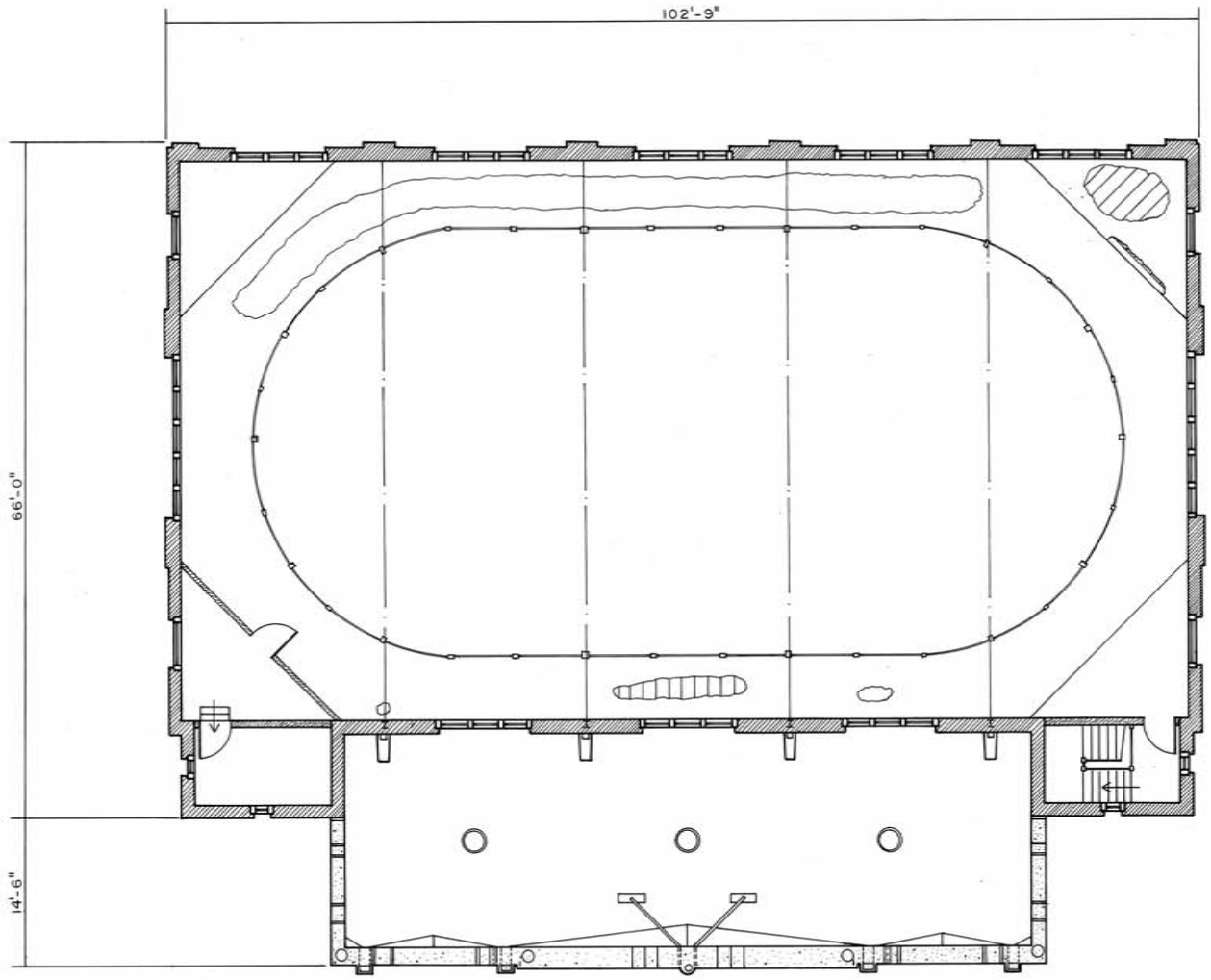

TRACK FLOOR PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"

0 1 2 3 6
METERS 1:96

DRAWN BY: JENNIFER DOMICO

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM

U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY

SHEET 4 OF 8 SHEETS

LIBRARY OF CONGRESS INDEX NUMBER

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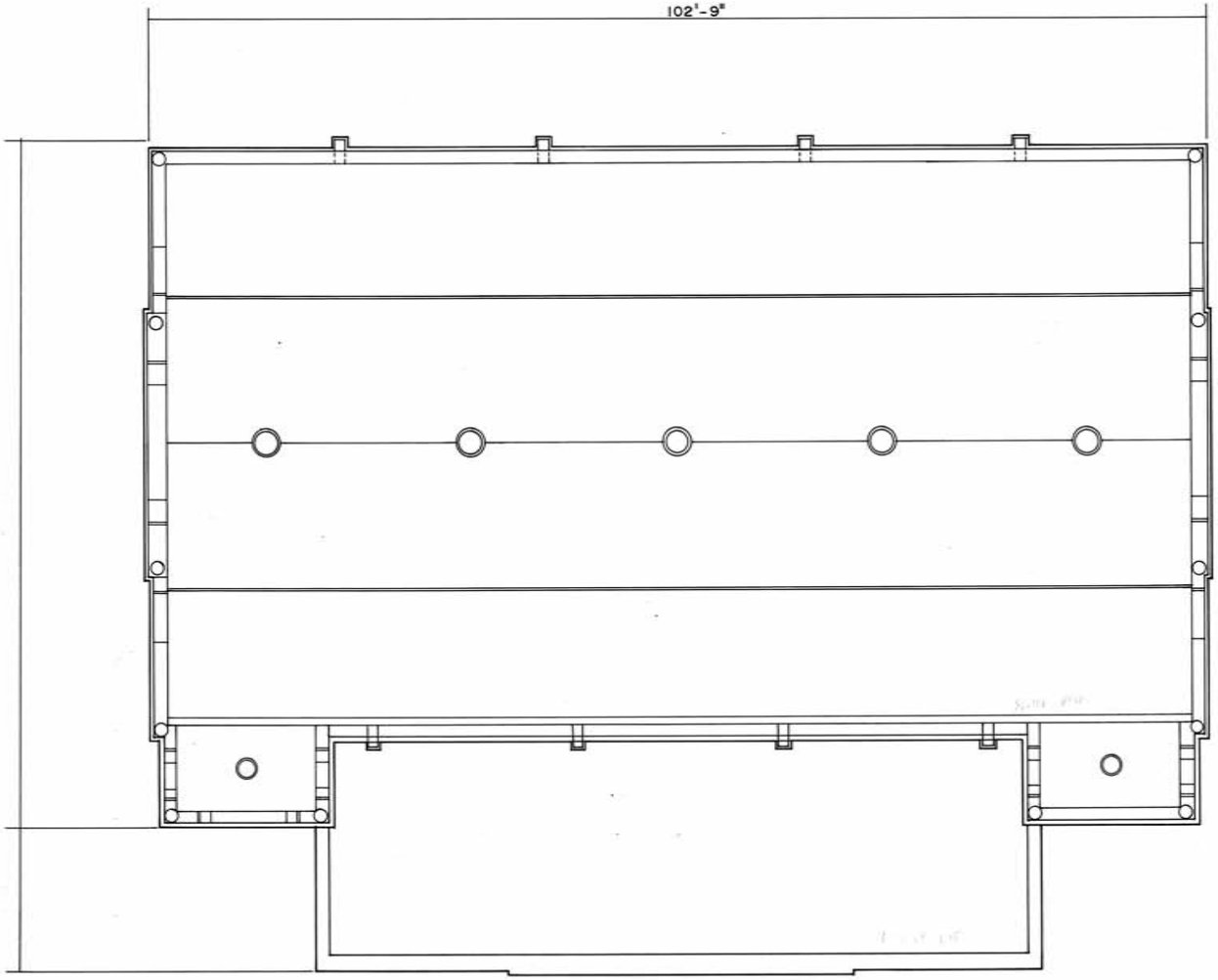

ROOF PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"
0 1 2 3 6
METERS 1= 96

DRAWN BY: JOE MCKENZIE

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 5 OF 8 SHEETS

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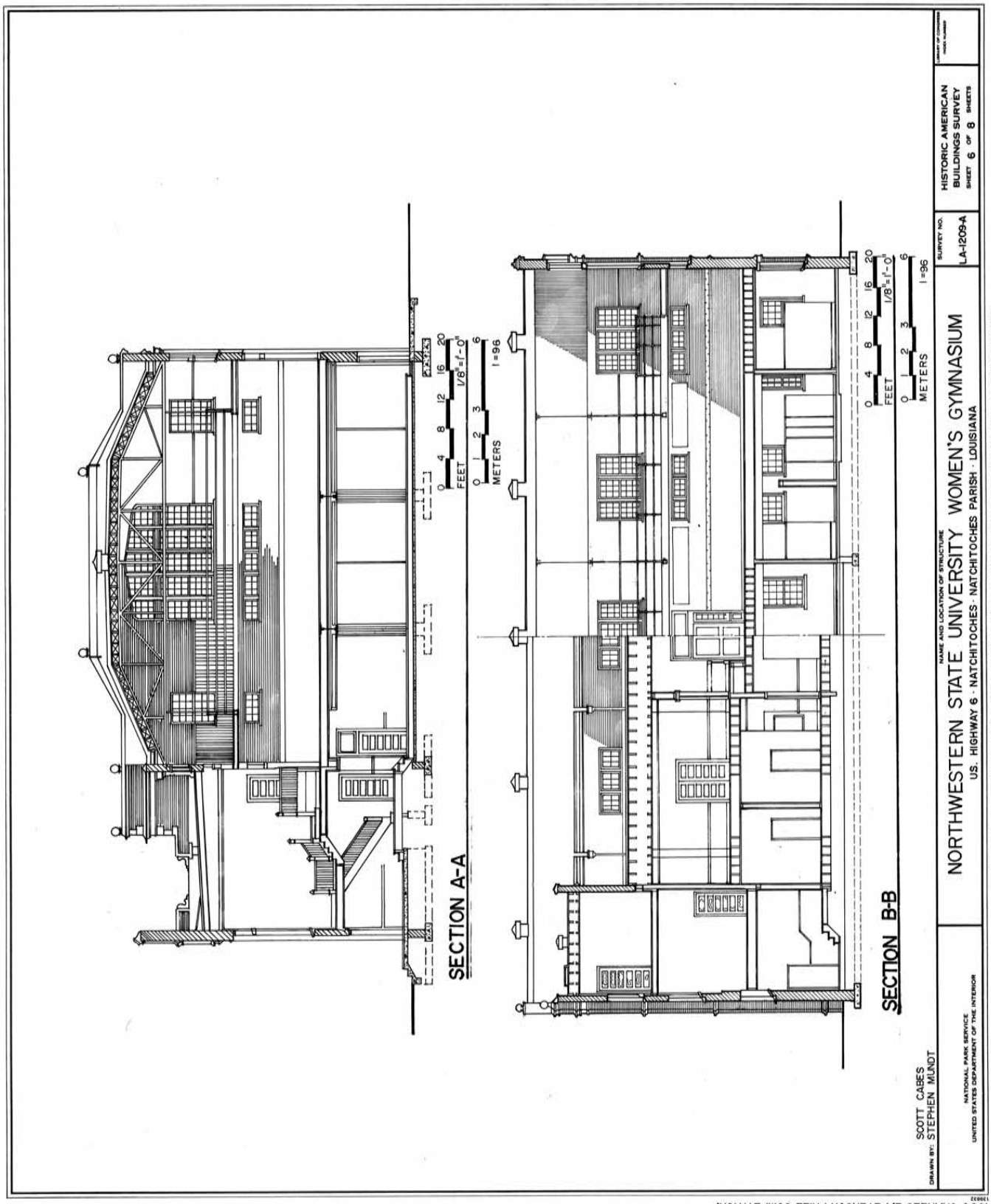
SECTION A-A
SECTION B-B
FEET
METERS
1/8"=1'-0"
1:96
NAME AND LOCATION OF STRUCTURE
NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
US. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA
SURVEY NO.
LA-1209-A
HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 6 OF 8 SHEETS
DRAWN BY: SCOTT CABES
STEPHEN MUNDT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
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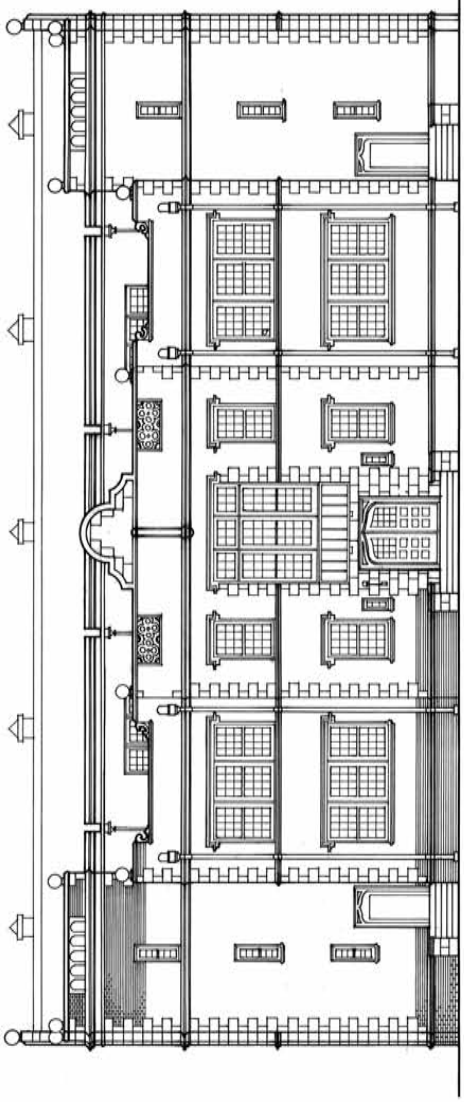
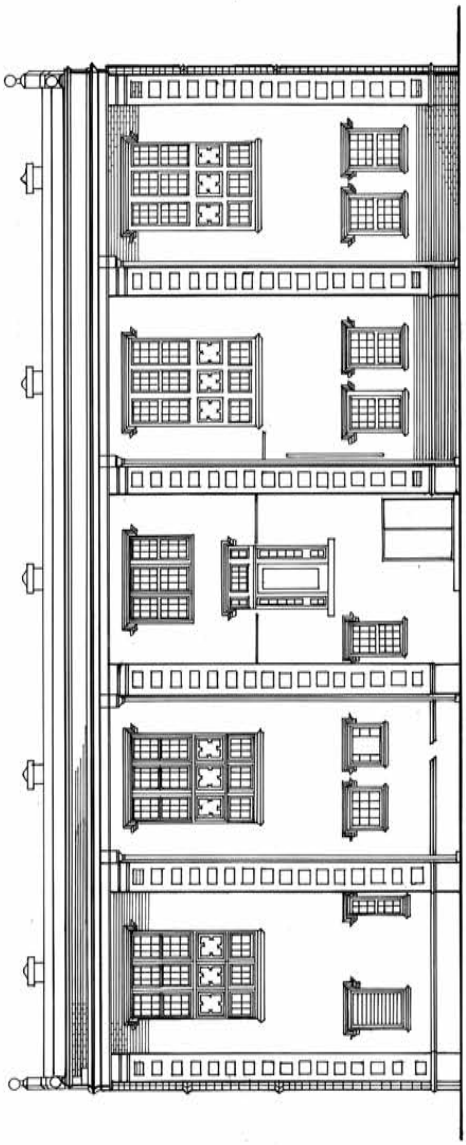


NORTH ELEVATION

0 4 8 12 16 20 FEET 1/8" = 1'-0"

0 1 2 3 6 METERS 1 = 96



SOUTH ELEVATION

0 4 8 12 16 20 FEET 1/8" = 1'-0"

0 1 2 3 6 METERS 1 = 96

ROGER FREIBERT

DRAWN BY: DAVID SCHROEDER

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM

U.S. HIGHWAY 6 - NATCHITOCHES - NATCHITOCHES PARISH - LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 7 OF 8 SHEETS

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1990 CHARLES E. PETERSON PRIZE COMPETITION.

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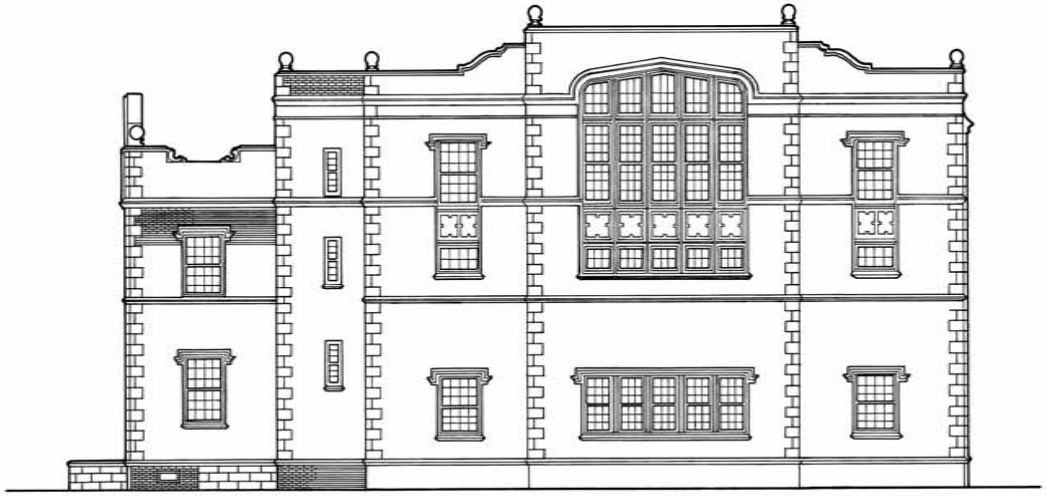

WEST
ELEVATION

0 4 8 12 16 20
FEET 1/8" = 1'-0"
0 1 2 3 6
METERS 1=96

DRAWN BY: DAVID RUIZ

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 8 OF 8 SHEETS

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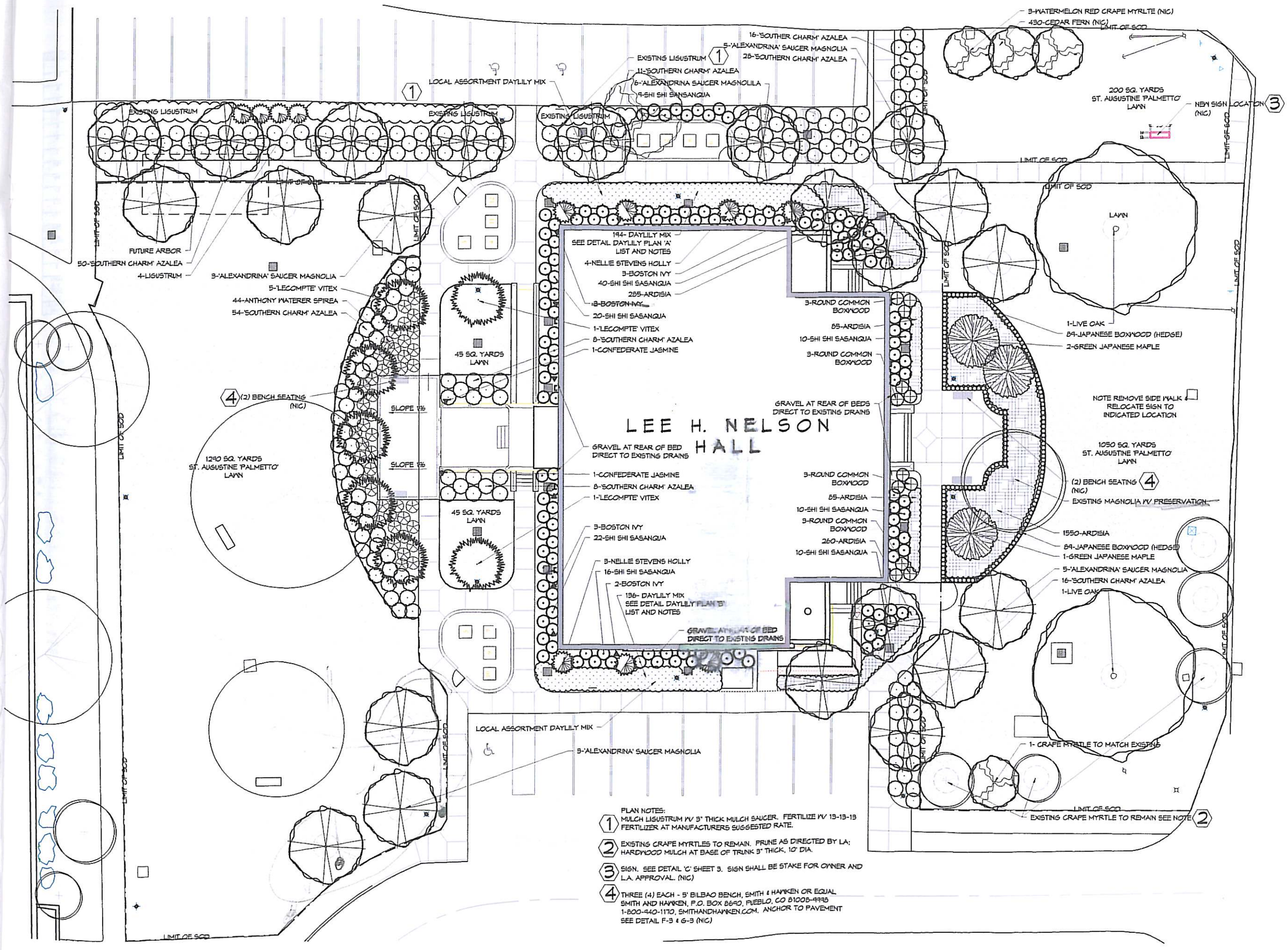


PLAN NOTES:

1. MULCH LIGUSTRUM W/ 3" THICK MULCH SAUCER. FERTILIZE W/ 13-13-13 FERTILIZER AT MANUFACTURERS SUGGESTED RATE.
2. EXISTING CRAPE MYRTLES TO REMAIN. PRUNE AS DIRECTED BY LA; HARDWOOD MULCH AT BASE OF TRUNK 3" THICK, 10' DIA.
3. SIGN. SEE DETAIL 'C' SHEET 3. SIGN SHALL BE STAKE FOR OWNER AND L.A. APPROVAL. (NIC)
4. THREE (4) EACH - 5' BILBAO BENCH, SMITH & HAWKEN OR EQUAL SMITH AND HAWKEN, P.O. BOX 8680, PUEBLO, CO 81005-9998 1-800-440-1170, SMITHANDHAWKEN.COM. ANCHOR TO PAVEMENT SEE DETAIL F-3 & G-3 (NIC)

JEFFREY CARBO
LANDSCAPE ARCHITECTS
SITE PLANNERS
318.442.8576
www.jeffreycarbo.com

State Project #
19-631-93-6 Part 03

Landscape Development For:

NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING

Northwestern State University
Natchitoches, Louisiana

Landscape Plan
SCALE 1" = 10'

AS BUILT

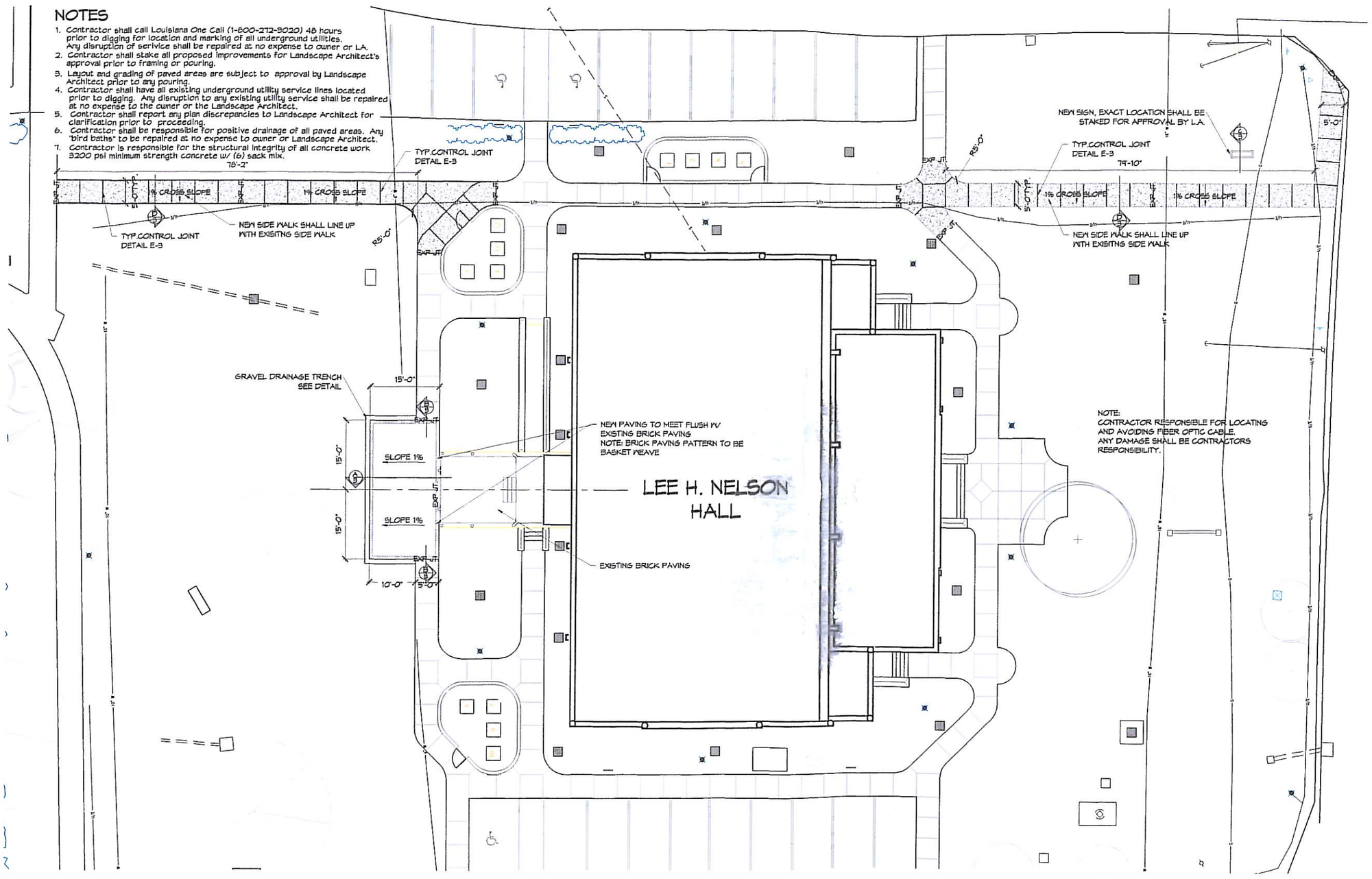
Revisions: 11-29-07
Revisions:
Revisions:
Revisions:

DISREGARD ALL PLANS PRIOR TO LATEST REVISION DATE.

Date: Feb. 26, 2007
Drawn By: SCN/APT
Checked By: JKC
Sheet No. 4 OF 7

NOTES

1. Contractor shall call Louisiana One Call (1-800-272-3020) 48 hours prior to digging for location and marking of all underground utilities. Any disruption of service shall be repaired at no expense to owner or LA.
2. Contractor shall stake all proposed improvements for Landscape Architect's approval prior to framing or pouring.
3. Layout and grading of paved areas are subject to approval by Landscape Architect prior to any pouring.
4. Contractor shall have all existing underground utility service lines located prior to digging. Any disruption to any existing utility service shall be repaired at no expense to the owner or the Landscape Architect.
5. Contractor shall report any plan discrepancies to Landscape Architect for clarification prior to proceeding.
6. Contractor shall be responsible for positive drainage of all paved areas. Any "bird baths" to be repaired at no expense to owner or Landscape Architect.
7. Contractor is responsible for the structural integrity of all concrete work 3200 psi minimum strength concrete w/ (6) sack mix.



JEFFREY CARBO
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SITE PLANNERS
318.442.6576
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State Project #
19-631-93-6 Part 03

Landscape Development For:

NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING

Northwestern State University
Natchitoches, Louisiana

S N

Sidewalk Layout Plan
SCALE 1" = 10'

AS BUILT

Revisions: 11-29-07
Revisions:
Revisions:
Revisions:

DISREGARD ALL PLANS PRIOR TO LATEST REVISION DATE.

Date: Feb. 26, 2007
Drawn By: SCN/APT
Checked By: JKC
Sheet No. 2 OF 7

LEED 2009 for Existing Buildings: Operations & Maintenance

Project Checklist

Project Name

Date

Sustainable Sites — Possible Points: 26

Y	?	N			
			Credit 1	LEED Certified Design and Construction	4
			Credit 2	Building Exterior and Hardscape Management Plan	1
			Credit 3	Integrated Pest Mgmt, Erosion Control, and Landscape Mgmt Plan	1
			Credit 4	Alternative Commuting Transportation	3 to 15
			Credit 5	Site Development—Protect or Restore Open Habitat	1
			Credit 6	Stormwater Quantity Control	1
			Credit 7.1	Heat Island Reduction—Non-Roof	1
			Credit 7.2	Heat Island Reduction—Roof	1
			Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 14

Y			Prereq 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	
			Credit 1	Water Performance Measurement	1 to 2
			Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5
			Credit 3	Water Efficient Landscaping	1 to 5
			Credit 4	Cooling Tower Water Management	1 to 2

Energy and Atmosphere — Possible Points: 35

Y			Prereq 1	Energy Efficiency Best Management Practices	
Y			Prereq 2	Minimum Energy Efficiency Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
			Credit 1	Optimize Energy Efficiency Performance	1 to 18
			Credit 2.1	Existing Building Commissioning—Investigation and Analysis	2
			Credit 2.2	Existing Building Commissioning—Implementation	2
			Credit 2.3	Existing Building Commissioning—Ongoing Commissioning	2
			Credit 3.1	Performance Measurement—Building Automation System	1
			Credit 3.2	Performance Measurement—System-Level Metering	1 to 2
			Credit 4	On-site and Off-site Renewable Energy	1 to 6
			Credit 5	Enhanced Refrigerant Management	1
			Credit 6	Emissions Reduction Reporting	1

Materials and Resources — Possible Points: 10

Y			Prereq 1	Sustainable Purchasing Policy	
Y			Prereq 2	Solid Waste Management Policy	
			Credit 1	Sustainable Purchasing—Ongoing Consumables	1
			Credit 2.1	Sustainable Purchasing—Electric	1
			Credit 2.2	Sustainable Purchasing—Furniture	1
			Credit 3	Sustainable Purchasing—Facility Alterations and Additions	1
			Credit 4	Sustainable Purchasing—Reduced Mercury in Lamps	1
			Credit 5	Sustainable Purchasing—Food	1

Materials and Resources, Continued

Y	?	N			
			Credit 6	Solid Waste Management—Waste Stream Audit	1
			Credit 7	Solid Waste Management—Ongoing Consumables	1
			Credit 8	Solid Waste Management—Durable Goods	1
			Credit 9	Solid Waste Management—Facility Alterations and Additions	1

Indoor Environmental Quality — Possible Points: 15

Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Green Cleaning Policy	
			Credit 1.1	IAQ Best Mgmt Practices—IAQ Management Program	1
			Credit 1.2	IAQ Best Mgmt Practices—Outdoor Air Delivery Monitoring	1
			Credit 1.3	IAQ Best Mgmt Practices—Increased Ventilation	1
			Credit 1.4	IAQ Best Mgmt Practices—Reduce Particulates in Air Distribution	1
			Credit 1.5	IAQ Mgmt Plan—IAQ Mgmt for Facility Alterations and Additions	1
			Credit 2.1	Occupant Comfort—Occupant Survey	1
			Credit 2.2	Controllability of Systems—Lighting	1
			Credit 2.3	Occupant Comfort—Thermal Comfort Monitoring	1
			Credit 2.4	Daylight and Views	1
			Credit 3.1	Green Cleaning—High Performance Cleaning Program	1
			Credit 3.2	Green Cleaning—Custodial Effectiveness Assessment	1
			Credit 3.3	Green Cleaning—Sustainable Cleaning Products, Materials Purchases	1
			Credit 3.4	Green Cleaning—Sustainable Cleaning Equipment	1
			Credit 3.5	Green Cleaning—Indoor Chemical and Pollutant Source Control	1
			Credit 3.6	Green Cleaning—Indoor Integrated Pest Management	1

Innovation in Operations — Possible Points: 6

			Credit 1.1	Innovation in Operations: Specific Title	1
			Credit 1.2	Innovation in Operations: Specific Title	1
			Credit 1.3	Innovation in Operations: Specific Title	1
			Credit 1.4	Innovation in Operations: Specific Title	1
			Credit 2	LEED Accredited Professional	1
			Credit 3	Documenting Sustainable Building Cost Impacts	1

Regional Priority Credits — Possible Points: 4

			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

CONSULTANT BIOGRAPHIES

BARBARA A. CAMPAGNA, FAIA, LEED AP BD+C
Principal
Barbara A. Campagna/Architecture + Planning, PLLC

Barbara has worked for the past 25 years as an architect, planner and historian – reinventing and restoring historic and existing buildings. She is the recipient of the National AIA Young Architect of the Year Award 2002 and was elevated to Fellowship in the AIA in 2009 as "the leading national architect and policymaker for the integration of preservation values into green building practices." She was the co-founder and architectural leader of the National Trust for Historic Preservation's Sustainability Program whose goal is to help professionals and the general public better understand the value of preservation in fostering development that is environmentally and socially sustainable. She grew up in Buffalo, received an Architecture degree from the University at Buffalo and a Master's in Historic Preservation from Columbia University. She was the first Executive Director of the Landmark Society of the Niagara Frontier in Buffalo, ran her own architecture firm for many years in NYC, served as the Regional Historic Preservation Officer for the Northwest Region of the General Services Administration and from 2006-2011 was the Chief Architect for the 29 historic sites operated by the National Trust for Historic Preservation. Barbara's firm, BAC/A+P, brings together all of her experiences – as both a consultant and client – to create a firm that occupies a unique niche in both the historic preservation and green building fields.

GORDON SHEPPERD, PE, LEED AP
Principal
Apollo, BBC

Gordon is a co-founder and Principal of Apollo BBC. His responsibilities include management of personnel and tasks pertaining to all Apollo BBC projects nationwide. Mr. Shepperd draws on his experience in forensic investigation to evaluate building enclosure assemblies, providing recommendations for windows, walls, and roof systems. He performs building enclosure assessments and testing of existing, historic and new building projects, with a focus on building science topics of insulation, building durability, moisture and air migration through assemblies, and performance testing.

MARCUS ELIASON, PE, LEED AP BD+C
Consultant
Apollo, BBC

Marcus Eliason is a Professional Engineer and a Consultant at Apollo BBC. His five years of experience includes participating in projects involving commissioning building HVAC and enclosure systems, energy modeling, indoor air quality (IAQ), ASHRAE Level I, II, & III energy audits, building enclosure quality assurance, problem resolution and performance testing. His project types include existing, historic and new commercial office, industrial and institutional buildings.

National Center for Preservation Technology and Training

BAC [A+P] apollobbc Better Building Consultants

National Center for Preservation Technology and Training

Lee H. Nelson Hall
Strategy Eco-Charrette

Tuesday, April 30, 2013

National Center for Preservation Technology and Training (NCPTT) has hired BAC/Architecture + Planning, PLLC and Apollo BBC to oversee the development and management of an Energy Audit and Sustainability Management Plan, which includes two eco-charrette workshops, to achieve the following goals:

1. Improve the energy and resource performance of the Lee H. Nelson Hall and decrease the costs of utility bills.

2. Provide training to NCPTT staff which engages them in the sustainable stewardship decisions for the building and site, and provides experience with LEED EB:O&M and the eco-charrette format.

3. Advance the leadership role of NCPTT in sustainable stewardship and preservation by providing a model project for "greening" the maintenance procedures of NCPTT's historic building.

This *Eco-Charrette* is an internal team meeting with staff members to establish the overall sustainability vision of the organization for Lee H. Nelson Hall and review operations and upcoming improvements in order to determine the baseline approach for "greening" the site.

What is an Eco-Charrette? An eco-charrette is a brainstorming session to discuss a project's sustainability goals and objectives, develop a sustainability vision, review operations and maintenance procedures and identify upcoming projects. The charrette process fosters a collaborative environment in which members of the project team can contribute ideas, express concerns and recommend actions for the road map called a *sustainability management plan*.

LEE H. NELSON HALL
STRATEGY ECO-CHARRETTE AGENDA

Tuesday, April 30, 2013

TIME	ITEM
9:30 AM	**What's Happened Since January 15th?** • Overview of findings and day's agenda
10:00 AM	**Energy Audit Findings** • Evaluation of Systems' Findings • Recommended Energy Efficiency Measures • Conceptual Cost Estimates
11:00 AM	**BREAK**
11:15 AM	**Review of Issues & Goals:** After 3 months, do these make sense? • Preservation Issues & Goals • Sustainability Issues & Goals • Maintenance & Operations • Capital Improvement Projects
12:30	**LUNCH BREAK**
1:30 PM	**LEED Certification** • Review of LEED EB:O&M checklist from last eco-charrette • LEED v. 4 – what will that impact be?
2:30 PM	**Evaluating Possible Strategies:** Prioritizing & Phasing • A Path for Sustainability • Sustainability Management Plan • Moving forward with capital improvements • Moving forward with maintenance recommendations • How to move forward with LEED? • Scheduling
3:45 – 4:00 PM	**Next Steps** • Completion of Sustainability Management Plan – "The Greening Plan" • How consultants can assist NCPTT with moving forward.

LEE H. NELSON HALL SUSTAINABILITY PRELIMINARY RECOMMENDATIONS OUTLINE

SUSTAINABILITY VISION – ***"Our Steam is Outside"***

PHILOSOPHY

Expand the Lee H. Nelson Hall as a symbol of the integration of sustainability and preservation. Green the site to improve both the resource use of the site and NCPTT's bottom line. Target LEED EB:O&M certification. Develop solid data for energy retrofits in humid climates. All work will be sympathetic to and respect the historic significance and character-defining features of this National Register-listed building.

GOALS

1. Improve the energy and resource performance of the Lee H. Nelson Hall and decrease the costs of utility bills.
2. Provide training to NCPTT staff which engages them in the sustainable stewardship decisions for the building and site, and provides experience with LEED EB: O&M and the eco-charrette format.
3. Advance the leadership role of NCPTT in sustainable stewardship and preservation by providing a model project for "greening" the maintenance procedures of NCPTT's historic building.

PRESERVATION ISSUES & GOALS:

1. **Maintain Exterior Integrity**

WINDOWS: Weatherize and appropriately seal windows and window openings.

- Do they all need to open and close?
- Are all windows operating appropriately?
- Most staff like the energy efficiency of the interior storms in the Conference Room.
- Sound barrier of interior storms good.
- Few people actually open the windows.
- Do people know they're operable?
- Access to windows to operate them is difficult.
- Opening windows affects everyone around you since it is an open office.
- Should the gym windows be operable?
- Lab windows operate but are rarely opened in order to reduce potential humidity.
- It would be nice to have the option to open the windows.

- Major concern about opening the windows is maintaining the mechanical systems.
- They're usually only opened when it's nice out. When it's really hot and humid out, no one opens the windows.
- Storm windows are quick to install.
- Window retrofits are more disruptive, time intensive.

DOORS: Weatherize and appropriately seal windows and window openings.

- All the doors are currently leaking.
- Would like to retrofit front doors.
- The back doors were recently rebuilt.
- Ongoing hardware issues.

DRAINAGE: Improve building's drainage.

- Downspouts overflow.
- Copper gutters – water infiltration and insect infiltration.
- Roof leaks/overflows.
- Water stains inside 2nd floor.
- Add hood mouldings to front doors.
- Gaps in woodwork at the doors.

OTHER EXTERIOR FEATURES:

- Repoint mortar on 2nd floor.
- Evaluate visibility of HVAC equipment.
- Significant biological growth everywhere.
- No sunlight on facade

2. Respect and Improve Landscape and Site

- Need more shaded parking – people park in illegal areas that are in shade.
- No vehicle shelter – very hot in the summer.
- Sidewalks drainage issue.
- University facilities staff drive maintenance trucks on lawns, causing ruts and damage to the irrigation equipment.
- How to deter the trucks from driving on the lawns?
- Exterior lighting at the back stairway.
- Signage could be powered with solar lighting.
- Interior lights left on in the stair hall at all times – permanent due to building code requirements.
- Nice to have rear outdoor seating.
- Nice to have a bike rack.
- There are issues mowing the rear lawn between the "pods".

3. Preserve Existing Landscape Materials

- Materials chosen specifically to ultimately need no irrigation.
- Azaleas and crepe myrtles chosen because they are water and drought tolerant.
- Need to find plantings for horseshoe that isn't high performance.

- Annuals are a lot of work.
- The St. Augustine lawn is well-adapted drought and water tolerant.
- How to better manage irrigation?
- Keep irrigation functional.
- Big drainage issues on campus. Does University have a plan to manage better?

4. Maintain Interior Character Defining Features

- 2nd floor trusses original.
- Brick walls original.
- Windows original.
- Staircase was rebuilt.
- Would like running track back.
- Should there be a shower?
- Suspect microbial growth in air supplies at stairways.
- Some overflow from Labs.
- Time to replace carpet.
- What is the drinking quality of the water? Purifying systems for labs. Drinking water - cost of filters vs. bottled water.

SUSTAINABILITY ISSUES & GOALS

1. **ESTABLISH A MORE ENERGY EFFICIENT FACILITY**
   - IT system – staff leave computers on all the time.
   - Ask people to shut down computers.
   - How to get people to turn off computers and other equipment.
   - Inefficient and unsustainable HVAC.
   - Electric heat – inefficient.
   - How to best address humidity?
   - Continuing mold problems.
   - A lot of illness here – any relationship to systems?
   - How to improve/incentivize health?
   - Staircase permanent lighting – how to manage/change?
   - Have already changed bulbs to CFLs on 2nd floor.
   - Don't like light quality of the new CFLs on 2nd Floor but no need to change.
   - How to control light use on 2nd floor?
   - How to manage evening close-down better?
   - Summer – lights are left on which is inefficient.
   - Should there be cameras on the 2nd floor?

2. **IMPROVE RESOURCE USE**

   - **WATER:**
     - Low flow faucets?
     - Water use quadruples in summer, increased after irrigation installed.

- **WASTE:**
  - Paper use – no electrical hand dryer.
  - Janitorial contracts – NCPTT staff do not have input into products.

- **RECYCLING:**
  - On campus.
  - Compost in pods.
  - Should get a recycled paper printer.
  - Only 1 two-sided printer in building, default should be to 2-sided.

- **LABORATORIES:**
  - Monitor material use.
  - Chemicals in Dry Lab chemical storage cabinet are corroding, inorganic.
  - Acetones are the worse materials used in the Labs.
  - Lab stores Gulf Coast crude oil, but VOCs are all gone.
  - Be proactive with new items that come in.

3. **IMPROVE USER COMFORT**
   - Sound between occupants' cubicles is one of the biggest problems.
   - Reception gets cold air blasts.
   - Staff leave hall doors open.
   - How to control front door/rear door drafts?

4. **USE THIS PROJECT AS A MODEL PROJECT/PROCESS**
   - Use this greening process to improve from reactive to proactive.
   - Take features/processes we implement and disseminate.
   - Set up specific webpage and case study.
   - Publish APT articles.
   - Add to Preservipedia.
   - Presentations at AASLH/AAM and other related organizations.
   - "Preservation in your community."
   - Windows/insulation.
   - NCPTT would like to get Lee H. Nelson Hall LEED certified.

APPROACH

Develop a road map for greening the maintenance and operations procedures of the site. Identify capital building improvements which will support these procedures. Develop a replicable approach which can be used as a model for other existing and historic buildings and potentially be offered by NCPTT as a technical service.

ENERGY AUDIT

Energy Audit results and recommendations attached.

PROPOSED MEASURES

Develop a plan which outlines priorities and phasing to achieve the preservation and sustainability goals. Use the LEED EB: O&M checklist as a guide. Measures will balance housekeeping, maintenance and operations issues with suggested capital improvements. Preliminary cost estimates will assist in the prioritizing and phasing. This outline, energy audit and cost estimates, will be used as a guideline for decision making during the second eco-charrette on April 30th.

apollobbc
Better Building Consultants

www.apollobbc.com
5116 Bissonnet, No. 262
Bellaire, Texas 77401
Main 800.370.5456

April 10, 2013

Barbara Campagna, FAIA
Barbara A. Campagna/Architecture + Planning
514 Main Street, #201
Buffalo, NY 14202

Re: ASHRAE Level 1 Energy Audit
Nelson Hall, Natchitoches, Louisiana
Apollo BBC Project No. 12H-0278

Dear Ms. Campagna:

Apollo BBC is pleased to provide this Energy Audit Review for Nelson Hall, located in Natchitoches, Louisiana. This audit report details our onsite walk though analysis conforming to the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) guidelines for Level 1 energy audits and includes our estimates of building energy usage as well as recommendations for energy improvements.

During our review we identified the current systems and operations and developed recommendations to improve occupant comfort and energy efficiency of the building. Should the recommended energy efficiency measures be implemented, we believe the building could satisfy the minimum program requirements to achieve LEED certification. To achieve this desired level of energy reduction, significant capital improvements may be necessary.

Systems
The building is a historic structure originally built in 1923 as a gymnasium. The building was renovated in 2001, repurposed as office, conference, and laboratory space.

Enclosure – The building's walls comprise a triple wythe masonry wall with wood-framed single-paned windows. Most windows are double-hung with operable sashes, with a few operable awning and several fixed windows. In the office and laboratory spaces, the interior walls have been furred out with metal studs, filled with fiberglass batt insulation, and faced with gypsum wallboard during the renovation. Roofing for the building comprises flat and flat/gambrel built-up roofs with a white mineral-surfaced modified bitumen cap sheet and parapets.

Heating, Ventilating, and Cooling – Twelve split-system air conditioning units, each composed of an interior air-handling unit and an exterior condensing unit provide HVAC to the building. Supply air is ducted to the interior spaces. Return air on the first floor is delivered through a common return air plenum system in the office area of the building. On the second floor, return air is delivered directly to mechanical closets for the laboratory and auditorium spaces. Outdoor ventilation air is provided to each unit through ducts and delivered to the mechanical closets. Ventilation air is mixed with the return air from the plenum space in the mechanical closet and conditioned by the air-handling units. Electric strip heaters in the indoor air-handling units provide heating for the spaces. Cooling is provided by direct-expansion (DX) refrigerant. The computer server room is served by a dedicated ductless mini-split system.

Condensing units and interior air-handling units were installed during the building renovation. Building staff indicated that some outdoor units and one interior coil section had been replaced. The split systems generally use R-22 refrigerant and have seasonal energy efficiency ratings (SEER) of 10, with three newer units having a SEER of 13. Higher SEER ratings are indicative of higher maximum efficiency. These SEERs would have been approximately average systems for the dates in which they were installed; however, for reference, the minimum SEER required by the ASHRAE 90.1-2010 energy code is between 11 and 12, depending on unit size. SEERs of 18 or higher are readily available on the market today. While a system's SEER is representative of its maximum rated energy performance, the actual energy performance will also depend on many factors including system application and sizing, airflow and balancing, proper refrigerant charging, and duct tightness.

Room-mounted programmable thermostats provide control of the air-handling units. Setpoints for heating and cooling during occupancy are generally 69°F and 73°F, respectively. Night and weekend setback temperatures provide limited conditioning during unoccupied periods.

Domestic Hot Water – Hot water is provided to restroom and utility faucets from a 40-gallon, electric storage type hot water heater. A tankless electric hot water heater provides hot water to the kitchen. Building operators indicated that the existing storage hot water heater would be replaced with a tankless heater when replacement is necessary.

Lighting – Lighting is generally provided to the building with recessed or suspended fluorescent fixtures. Auditorium light fixtures had been updated to high-wattage compact fluorescent bulbs from incandescent fixtures. The installed wattage for the building is approximately 1.05 W/ft^2. Control of lighting systems is by wall switches. There is no central lighting control panel for the building.

Energy Breakdown

Energy end use breakdowns were generated using the whole building energy simulation software eQUEST. Simulation inputs were based on observed and recorded data from our site observations as well as building user

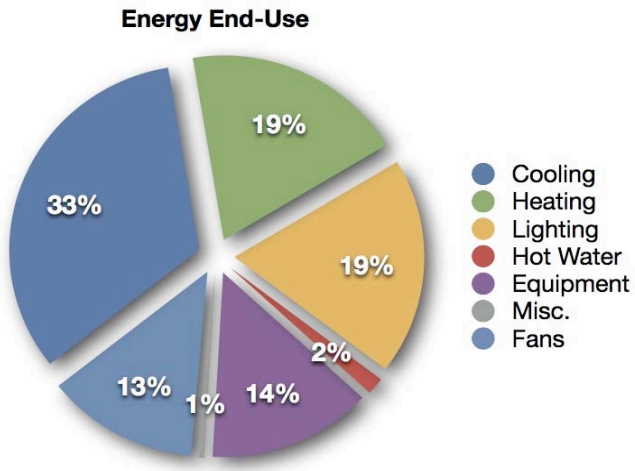

Figure 1. Energy end use breakdown by category

provided data. Figure 1 shows the breakdown of electrical consumption into component end uses, including cooling, heating, fans, lights, and equipment.

Energy Reduction Goals – The building has an Energy Use Intensity (EUI) of 50 kBtu/ft^2/yr, with an estimated Energy Star Score of 54. Energy Star compares EUI with buildings of similar size and type to determine the Energy Star Score. A score of 50 is considered the median for buildings of similar type and use, thus, Nelson hall is 4% better than a median building. To be eligible for LEED Existing Buildings: Operations & Maintenance, the building must obtain an Energy Star score of at least 69. To achieve this score, the building would need to reduce energy consumption by approximately 16%, resulting in a EUI of 42 kBtu/ft^2/yr. This would represent a yearly energy cost savings of $4,000.

Energy Efficiency Measures

As a result of our audit, we have developed recommendations for energy efficiency measures (EEM) that may be implemented to improve building performance. It should be noted that during our review, we identified a number of occupant comfort issues with the HVAC system. The following list of EEMs contain both low and no-cost as well as capital improvements intended to reduce building energy while maintaining occupant comfort.

Air Sealing – During our audit, we performed both window and whole building air leakage testing. We determined the building to have a leakage rate of 0.9 cubic feet per minute per square foot (CFM/ft^2). This is approximately 4 times the typically air leakage rate per square foot for a similarly sized, recently constructed building that is designed and constructed with a coherent air barrier strategy. From the window testing, the leakage through windows accounts for 30-50% of the total building air leakage. We estimate that air sealing the building to modern standards of average tightness would result in 6-15% total energy savings. Air sealing can be achieved through the reconditioning of existing windows, adding interior storm windows, and sealing gaps in the building enclosure.

De-lamping Office Fixtures – The installed lighting density for the office area of the building appears to be higher than typical for office spaces. We calculated the lighting density to be 1.36 Watts per square foot (W/ft^2). The ASHRAE recommended density for open office space is 1.0 W/ft^2. The lighting scheme for much of the building uses 3-lamp T8 fixtures. Reducing the office lighting to the ASHRAE recommended density results in a 3% energy savings. This could be achieved by de-lamping some fixtures, ensuring adequate lighting levels, resulting in a free, or nearly free energy improvement.

Lighting Retrofit – The 3-lamp T8 fixtures could be retrofitted to T5 fluorescent fixtures to reduce installed fixture wattage. Retrofitting to 2-lamp T5 fixtures would reduce the building overall energy use by 4.5%.

Occupancy Sensors – Wall switches control lighting operation at the building. Actual energy savings from retrofitting with occupancy sensor controlled lighting will depend on occupant behavior; however, we anticipate that the installation of occupancy sensors will reduce overall building energy usage by approximately 1.8%.

Auditorium Walls – The interior auditorium walls are exposed brick from the triple wythe construction. At other areas of the building, the interior walls have been furred out with metal studs, filled with batt insulation, and faced with gypsum wallboard. The reduced R-value of the auditorium walls contributes to an increased HVAC load, requiring increased HVAC energy. Insulating the auditorium wall similarly to the rest of the building may reduce energy consumption by approximately 3%.

It is important to recognize that any changes in insulating strategies can reduce an assembly's drying performance and lead to moisture accumulation and associated problems. Any proposed insulation retrofit should be further analyzed to better understand the potential for moisture accumulation and potential reduction in drying capacity within the building's components.

Retro-commissioning – The building was not commissioned during the most recent renovation. Commissioning is a process focused on verifying and documenting that a facility and all of its systems and assemblies are designed, installed, tested, and maintained to meet the project requirements. Retro-commissioning an existing building is a systematic approach to verify that the installed systems are operating as intended and are meeting the owner's expectations. We anticipate that retro-commissioning Nelson hall will save approximately 3% of total building energy use.

Humidity Control – Outdoor air for ventilation is delivered directly to mechanical closets to be mixed with return air. In this scheme, the split systems are responsible for dehumidifying latent cooling loads, which can be significant in the warmer summer months. The split systems installed in the building do not have large latent cooling capacities, often resulting in humid, uncomfortable interior spaces. To counteract this, occupants typically set thermostats at temperatures lower than intended by design to achieve occupant comfort, resulting in increased energy consumption.

An industry best practice is to use a dedicated outdoor air system to pre-treat the ventilation air prior to delivery to space. This is a relatively costly capital improvement, but offers a potentially significant improvement to the building's performance, particularly associated with thermal comfort and humidity control. This separates latent (humidity-based) cooling loads associated with the hot, humid outside air from the sensible (temperature-based) heat loads. A dedicated outdoor air system reduces the need for the air-handling units to manage moisture, resulting in improved humidity control and thermal comfort. Comfortably maintaining higher temperature set-points will reduce overall energy use.

HVAC System Replacement – The HVAC system is comprised of twelve split system air conditioning units. A modern building of this type would typically be conditioned with packaged rooftop HVAC units. A more energy efficient strategy may incorporate the use of a variable refrigerant flow (VRF) system. We anticipate that replacing the existing systems with variable refrigerant systems will reduce building energy usage by approximately 10-13%.

VRF systems are also advantageous as they reduce the need for system ductwork, allowing interior spaces to be reconfigured to restore historic features that may have been removed or covered to adapt the space to air conditioning.

VRF systems are generally 5-20% more expensive than traditional systems and represent a significant capital improvement. If a system replacement is undertaken, we recommend that it be done in conjunction with a dedicated outdoor air system and air sealing to reduce the likelihood of negative effects from fugitive air infiltration.

Apollo BBC greatly appreciates the opportunity to provide these services to BAC/A+P and look forward to continue working with you on this project. Should your require further explanation or if we can be of other service, please call me at 713.869.0000.

Sincerely yours,
APOLLO BBC, INC.

Marcus T. Eliason, P.E., LEED AP
Consultant

Gordon A. Shepperd, P.E., R.R.C.
Principal

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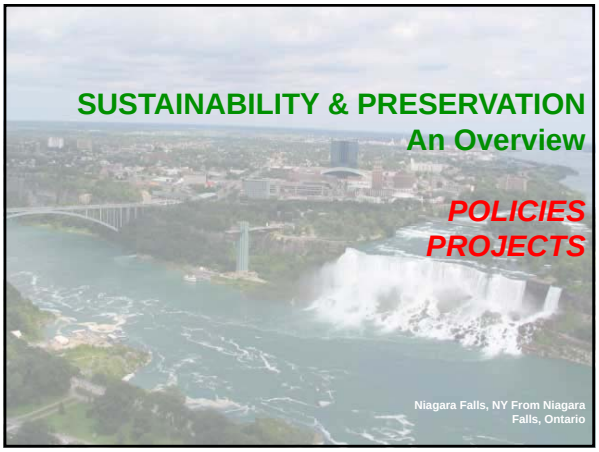
2.	Building Science	104

ECO-CHARRETTE PRESENTATIONS

SUSTAINABILITY & PRESERVATION
THE PERFECT MATCH

BAC [A+P]

Barbara A. Campagna, FAIA, LEED AP BD+C



SUSTAINABILITY & PRESERVATION
An Overview

POLICIES
PROJECTS

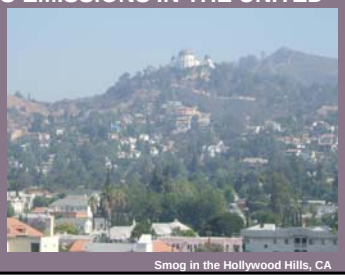
Niagara Falls, NY From Niagara Falls, Ontario

SUSTAINABILITY & PRESERVATION
POLICIES

City Hall, Buffalo, NY

WHY ARE HISTORIC & EXISTING BUILDINGS IMPORTANT TO CLIMATE CHANGE?

BUILDINGS ACCOUNT FOR ALMOST HALF OF GREENHOUSE GAS EMISSIONS IN THE UNITED STATES



Smog in the Hollywood Hills, CA

U.S. CARBON EMISSIONS

US = 22% of greenhouse gases

5% of world population

The Reynolds Factory
Winston-Salem, NC

Why Existing Buildings Matter

Annually—

43% of carbon emissions are from the operation (not including construction) of buildings
Source: Pew Center on Climate Change

70%+ of electricity goes to buildings
Source: USGBC

40% of raw materials are used for construction
Source: USGBC

Shadows-on-the-Teche
New Iberia, LA

Why Existing Buildings Matter

A Photograph of Beijing from Sunday, January 13th, 2013

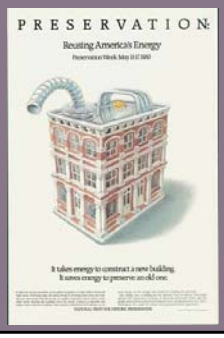
Retrofit Green… Debunking The Myth

Many historic buildings are already energy efficient

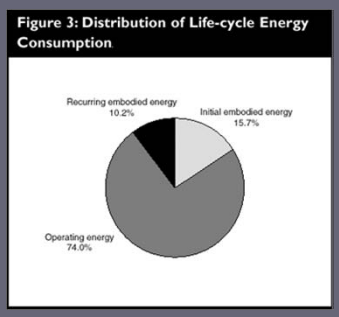
Average energy consumption
Btu/sq. ft
Commercial Buildings (non malls)

Before 1920	80,127
1920 – 1945	90,234
1946 – 1959	80,198
1960 – 1969	90,976
1970 – 1979	94,968
1980 – 1989	100,077
1990 – 1999	88,834
2000 – 2003	79,703

Source: Commercial Building Energy Consumption Survey, 2003
U.S. Department of Energy



LIFE CYCLE ENERGY CONSUMPTION…



Source: Athena Sustainable Materials Institute

DEMOLISHING THIS…

National Trust for Historic Preservation Headquarters, Washington DC

Negates the benefits of recycling 78,000,000 aluminum cans

Source: Advisory Council on Historic Preservation and National Trust for Historic Preservation

Building Reuse…

Preserves embodied resources by taking advantage of longer life cycles with more durable materials

Reduces use of new materials

Reduces carbon dioxide emissions

Avoids environmental impact of new construction

The Tulsa Fire Alarm Building
Tulsa, OK
Rehabilitated for the American Lung Association Offices

Reinvestment in Older and Historic Communities…

Reduces the Demand for new Infrastructure

South Beach, Miami, FL

Retrofit Green

Many Traditional Buildings Were Built to Last

Old San Juan, San Juan, Puerto Rico

Retrofit Green

Energy performance can be improved

Understand Your climate – Reactivate original features

Potomac Avenue House, Buffalo, NY

Retrofit Green

Energy performance can be improved

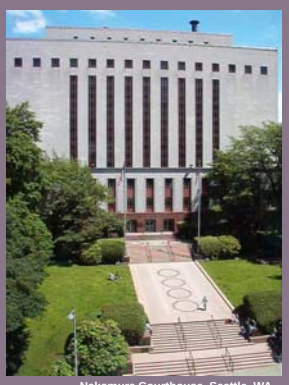
Understand Your climate – Reactivate original features

King William Historic District, San Antonio, TX

Retrofit Green

Energy performance can be improved

Many rehabilitation projects are going green



Nakamura Courthouse, Seattle, WA
A General Services Administration Project

THE NATIONAL TRUST & THE US GREEN BUILDING COUNCIL

Building a Partnership

2007-Today

Changing the Face of LEED

LEED 3.0/2009
- **Weighting using LCA**
- **Alternative Compliance using Durability of Materials**

LEED NEXT VERSION 2012
- **Preservation/Social Metrics**

DEBUNKING THE MYTHS

LEED & HISTORIC PRESERVATION
LEED NC 2.2

1. Out of 69 points, about 20 are building type neutral.
2. Another 10 support preservation activities.
3. Any existing building can basically get a "certified" rating with very little effort.
4. Getting "silver" requires a bit more effort and "gold" is readily achievable.

Levels of LEED Ratings

Green Buildings worldwide are certified with a voluntary, consensus-based rating system.
USGBC has four levels of LEED.

LEED GREEN BUILDING RATING SYSTEM

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation in Design/Operations
- Regional Priority

LEED ADDRESSES THE COMPLETE LIFE CYCLE OF BUILDINGS

THE DIFFERENCE BETWEEN LEED PRODUCTS

A POINT IN TIME

State Capitol Restoration, Austin, TX

THE LIFE OF THE BUILDING

State Capitol Visitor Center, Austin, TX

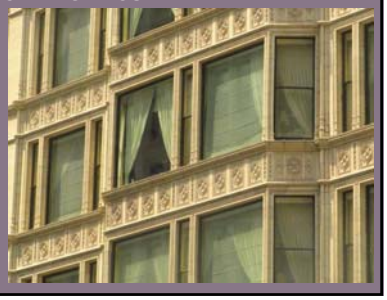
REVISING LEED – LEED 2009

Changed LEED to a weighted system based on LCA Indicators & starting to add Preservation/Social/Cultural Metrics

Calistoga, Napa, California

LEED ND – Adding Historic Preservation Language

LEED ND — Green Infrastructure Building
Credit 5 EXISTING BUILDING REUSE



Reliance Building/
Hotel Burnham, Chicago, IL

MATERIALS & RESOURCES CHANGES IN LEED v. 4

MR Credit: Building Life Cycle Impact Reduction

Demonstrate reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment. Achieve one of the following options.

Option 1: Historic Building Reuse (5 points BD&C, 5 points Core & Shell)

Green Building Initiatives

Tybee Island, GA
Seattle
Portland, OR
General Services Administration
Washington, DC
Wisconsin
Montgomery County, MD
New York, NY
Washington State
Massachusetts
SAN FRANCISCO
Scottsdale, AZ
San Jose, CA
Nashville, TN
Honolulu, HI
Chicago, IL
Minneapolis, MN
US Department of Agriculture
Pennsylvania Public School Districts
Colorado

THE GREEN STANDARD OF 2004

CHICAGO, IL
All new city-funded construction and major renovation projects MUST earn LEED certification.

THE GREEN BUILDING ACT OF 2006

WASHINGTON, DC
Requires LEED compliance with municipal and private projects over 50,000 sq ft.

SAN FRANCISCO GREEN BUILDING ORDINANCE – 2008

Points for LEED or "Greenpoint" System

PlaNYC, NYC's SUSTAINABILITY AGENDA: 2008, updated 2011

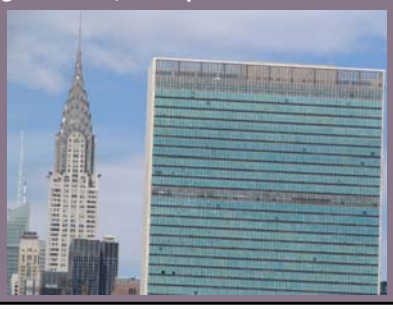
http://www.nyc.gov/html/planyc2030/html/home/home.shtml

PlaNYC, NYC's SUSTAINABILITY AGENDA

Create a handbook for energy efficiency strategies for historic buildings

BENCHMARKING, PART OF NYC's SUSTAINABILITY AGENDA

Use the EPA's Portfolio Manager to track energy use in buildings over 50,000 sq. ft.



INTERNATIONAL GREEN CONSTRUCTION CODE

The New Code Can Be Ordered Now

Pioneer Courthouse, Portland, OR

PRESERVATION GREEN LAB

NATIONAL TRUST FOR HISTORIC PRESERVATION

Slides Courtesy Patrice Frey, National Trust

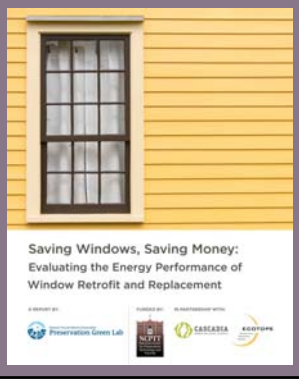
The Greenest Building: Quantifying the Environmental Value of Building Reuse

Reuse Matters

http://www.preservationnation.org/information-center/sustainable-communities/sustainability/green-lab/#.UKKThaU5vdk

Slides Courtesy Patrice Frey, National Trust

PRESERVATION GREEN LAB'S LATEST RESEARCH….



The National Trust for Historic Preservation's first LEED project

President Lincoln's Cottage VEC

President Lincoln's Cottage Visitors Education Center, Washington, DC

THE NATIONAL TRUST'S FIRST LEED CERTIFIED PROJECT – LEED NC 2.2

The VEC – 44 Points Makes it a LEED GOLD, 2009

SUSTAINABLE SITES – 9 out of 14 Points

WATER EFFICIENCY – 4 out of 5 Points

WATER EFFICIENCY – 4 out of 5 Points

ENERGY & ATMOSPHERE – 5 out of 17

ENERGY & ATMOSPHERE – 5 out of 17

MATERIALS & RESOURCES – 9 out of 13

INDOOR ENVIRONMENTAL QUALITY
12 out of 15 Points

INNOVATION & DESIGN PROCESS – All 5

http://www.lincolncottage.org/visit/ecotour.htm

THE NATIONAL TRUST'S FIRST LEED CERTIFIED PROJECT

Reuse, Reinvest, Respect, Retrofit

Greening Historic Buildings With LEED EB

Rethinking a Painted Lady in San Francisco

Why Would an 1886 House Museum Care About LEED?

Sustainability Goals

1. The Haas-Lilienthal House is a symbol of San Francisco Architectural Heritage and "Heritage" would like to expand this symbol of the organization to act as a model of sustainable preservation.

Sustainability Goals

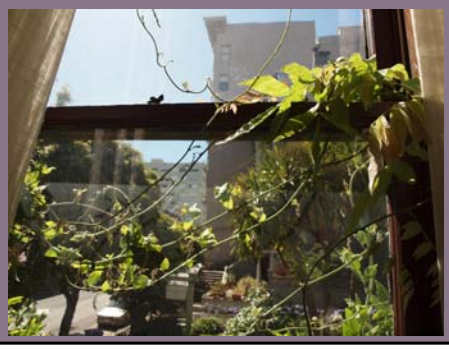
2. "Heritage" intends to "green" the Haas-Lilienthal House to improve the resource use of the site, broaden the audience of the organization and to prove the relevance that a house museum can continue to have in our culture.

Assess

- Analyze current physical assets
- Determine areas for improvement
- Set realistic goals
- Establish measurable objectives
- Select LEED strategies

SCHEDULED PROJECTS

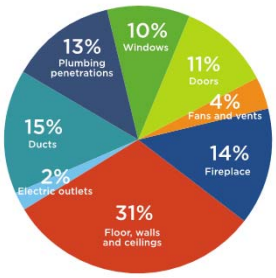
Window Repairs



Making the Case for Historic Windows

Vinyl windows, landfill-bound
Photo: J. Lindberg

Recycled Wood Windows
Photo: J. Lindberg



Source: Commercial Building Energy Consumption Survey, 2003
U.S. Department of Energy

Two-Day Eco-Charrette

Greening the Haas-Lilienthal House

August 2011

Sustainability Management Plan

Haas-Lilienthal House, San Francisco, CA

Leverage Original Character-Defining Features

1. Utilize roofs and porches with wide roof overhangs to manage heating and cooling
2. Use interior pocket doors to compartmentalize spaces and control heating and cooling.

Sustainability Management Plan Strategy

1. Determine Which Capital Improvements Will Be Undertaken and Whether Construction Will Be Phased.
2. Conduct an Energy Audit.
3. Develop a Weatherization Program.
4. Develop a Green Housekeeping Program.

Sustainability Management Plan Strategy

5. Initiate a comprehensive maintenance and operations program using LEED EB:O&M.

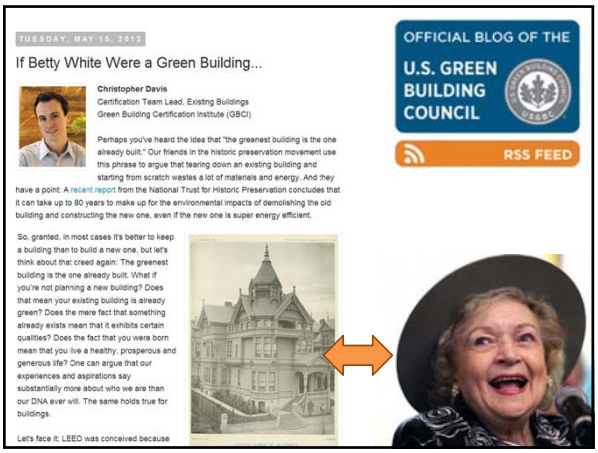
   AND
6. Conduct a Major Rehabilitation.
7. Stretch Goals to Net Zero.

Select LEED Strategies

LEED 2009 for Existing Buildings: Operations & Maintenance
Project Checklist

Y	?	N			Possible Points
			Sustainable Sites		26
4			Credit 1	LEED Certified Design and Construction	4
1			Credit 2	Building Exterior and Hardscape Management Plan	1
1			Credit 3	Integrated Pest Mgmt., Erosion Control, and Landscape Mgmt Plan	1
2			Credit 4	Alternative Commuting Transportation	2 to 15
1			Credit 5	Site Development–Protect or Restore Open Habitat	1
1			Credit 6	Stormwater Quantity Control	1
1			Credit 7.1	Heat Island Reduction–Non-Roof	1
		N	Credit 7.2	Heat Island Reduction–Roof	1
1			Credit 8	Light Pollution Reduction	1
5				**Water Efficiency**	14
Y			Prerequ 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	
1			Credit 1	Water Performance Measurement	1 to 2
1			Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5
1			Credit 3	Water Efficient Landscaping	1 to 5
		N	Credit 4	Cooling Tower Water Management	1 to 2
16	4			**Energy and Atmosphere**	35
Y			Prerequ 1	Energy Efficiency Best Management Practices	
Y			Prerequ 2	Minimum Energy Efficiency Performance	
Y			Prerequ 3	Fundamental Refrigerant Management	
9			Credit 1	Optimize Energy Efficiency Performance	1 to 18
2			Credit 2.1	Existing Building Commissioning–Investigation and Analysis	2
2			Credit 2.2	Existing Building Commissioning–Implementation	2
	2		Credit 2.3	Existing Building Commissioning–Ongoing Commissioning	2
1			Credit 3.1	Performance Measurement–Building Automation System	1
1			Credit 3.2	Performance Measurement–System Level Metering	1 to 2
1			Credit 4	On-site and Off-site Renewable Energy	1 to 6
1			Credit 5	Enhanced Refrigerant Management	1
1			Credit 6	Emissions Reduction Reporting	1
10				**Materials and Resources**	10
Y			Prerequ 1	Sustainable Purchasing Policy	
Y			Prerequ 2	Solid Waste Management Policy	
1			Credit 1	Sustainable Purchasing–Ongoing Consumables	1
1			Credit 2.1	Sustainable Purchasing–Electric	1
1			Credit 2.2	Sustainable Purchasing–Furniture	1
1			Credit 3	Sustainable Purchasing–Facility Alterations and Additions	1
1			Credit 4	Sustainable Purchasing–Reduced Mercury in Lamps	1
1			Credit 5	Sustainable Purchasing–Food	1

Y	?	N			Possible Points
			Materials and Resources, Continued		
1			Credit 6	Solid Waste Management–Waste Stream Audit	1
1			Credit 7	Solid Waste Management–Ongoing Consumables	1
1			Credit 8	Solid Waste Management–Durable Goods	1
1			Credit 9	Solid Waste Management–Facility Alterations and Additions	1
15				**Indoor Environmental Quality**	15
Y			Prerequ 1	Minimum IAQ Performance	
Y			Prerequ 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prerequ 3	Green Cleaning Policy	
1			Credit 1.1	IAQ Best Mgmt Practices–IAQ Management Program	1
1			Credit 1.2		1
1			Credit 1.3	IAQ Best Mgmt Practices–Increased Ventilation	1
1			Credit 1.4	IAQ Best Mgmt Practices–Reduce Particulates in Air Distribution	1
1			Credit 1.5	IAQ Mgmt Plan–IAQ Mgmt for Facility Alterations and Additions	1
1			Credit 2.1	Occupant Comfort–Occupant Survey	1
1			Credit 2.2	Controllability of Systems–Lighting	1
1			Credit 2.3	Occupant Comfort–Thermal Comfort Monitoring	1
1			Credit 2.4	Daylight and Views	1
1			Credit 3.1	Green Cleaning–High Performance Cleaning Program	1
1			Credit 3.2	Green Cleaning–Custodial Effectiveness Assessment	1
1			Credit 3.3	Green Cleaning–Sustainable Cleaning Products, Materials Purchases	1
1			Credit 3.4	Green Cleaning–Sustainable Cleaning Equipment	1
1			Credit 3.5	Green Cleaning–Indoor Chemical and Pollutant Source Control	1
1			Credit 3.6	Green Cleaning–Indoor Integrated Pest Management	1
2				**Innovation in Operations**	6
			Credit 1.1	Innovation in Operations: Specific Title	1
			Credit 1.2	Innovation in Operations: Specific Title	1
			Credit 1.3	Innovation in Operations: Specific Title	1
			Credit 1.4	Innovation in Operations: Specific Title	1
1			Credit 2	LEED Accredited Professional	1
1			Credit 3	Documenting Sustainable Building Cost Impacts	1
				Regional Priority Credits	4
			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1
64	4			**Total**	Possible Points: 110


TUESDAY, MAY 15, 2012

If Betty White Were a Green Building...

Christopher Davis
Certification Team Lead, Existing Buildings
Green Building Certification Institute (GBCI)

Perhaps you've heard the idea that "the greenest building is the one already built." Our friends in the historic preservation movement use this phrase to argue that tearing down an existing building and starting from scratch wastes a lot of materials and energy. And they have a point. A recent report from the National Trust for Historic Preservation concludes that it can take up to 80 years to make up for the environmental impacts of demolishing the old building and constructing the new one, even if the new one is super energy efficient.

So, granted, in most cases it's better to keep a building than to build a new one, but let's think about that creed again: The greenest building is the one already built. What if you're not planning a new building? Does that mean your existing building is already green? Does the mere fact that something already exists mean that it exhibits certain qualities? Does the fact that you were born mean that you live a healthy, prosperous and generous life? One can argue that our experiences and aspirations say substantially more about who we are than our DNA ever will. The same holds true for buildings.

Let's face it: LEED was conceived because

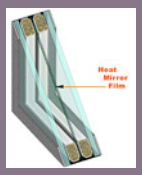
OFFICIAL BLOG OF THE U.S. GREEN BUILDING COUNCIL

RSS FEED

Integrated Energy Retrofits:
Repositioning an Icon as a Model for Energy Efficient Investment & Stewardship

Slide Courtesy Dana Schneider, Jones Lang LaSalle

Measures:
Windows: Remanufacture existing insulated glass units (IGU) within the Empire State Building's approximately 6,500 double-hung windows to include suspended film and glass fill.



Slide Courtesy Dana Schneider, Jones Lang LaSalle

Measures:
Radiative Barrier: Install more than 6000 insulated reflective barriers behind radiator units located on the perimeter of the building.

Slide Courtesy Dana Schneider, Jones Lang LaSalle

The Empire State Building – LEED Gold EB: O&M, 54 Points

RESOURCES

Empire State Building Sustainability Page
http://esbnyc.com/sustainability_energy_efficiency.asp

THE OLDEST LEED-CERTIFIED BUILDINGS

Slide Courtesy Christopher Davis, GBCI

THE OLDEST LEED-CERTIFIED BUILDINGS

#5

1870

Thayer Hall, Harvard University
Cambridge, MA
LEED EBOM 2008 - Silver

Slide Courtesy Christopher Davis, GBCI

THE OLDEST LEED-CERTIFIED BUILDINGS

#4

1869

Pittsburgh Opera (Westinghouse Air Brake Company)
Pittsburgh, PA
LEED EBOM 2008 - Silver

Slide Courtesy Christopher Davis, GBCI

THE OLDEST LEED-CERTIFIED BUILDINGS

#3

1864

Barton Group Headquarters
Glens Falls, NY
LEED NCv2.2 - Platinum

Slide Courtesy Christopher Davis, GBCI

THE OLDEST LEED-CERTIFIED BUILDINGS

#2

1856

New York State Executive Mansion
Albany, NY
LEED EBv2.0 - Gold

Slide Courtesy Christopher Davis, GBCI

THE OLDEST LEED-CERTIFIED BUILDINGS

#1

1842

U.S. Treasury Building
Washington, DC
LEED EBv2.0 Gold

Slide Courtesy Christopher Davis, GBCI

The Christman Building Lansing, Michigan

The First Triple Platinum Project:
Core & Shell, Commercial Interiors & EB:O&M

Tax Act Project
New Market Tax Project
Brownfield

BY 2030 50% OF ALL BUILDINGS WILL HAVE BEEN ERECTED AFTER 2000:

82 billion sq. ft. demolished – Brookings Institute, 2004

Milwaukee Museum of Art, Santiago Calatrava, Architect

WE CAN'T BUILD OUR WAY OUT OF CLIMATE CHANGE….

Clos Pegase Winery, Calistoga, Napa, CA
Michael Graves, Architect

WE ALSO CAN'T FREEZE OUR WAY OUT OF IT….

The Governor's Palace, Colonial Williamsburg, VA

IT'S ALL ABOUT CHOICE & BALANCE

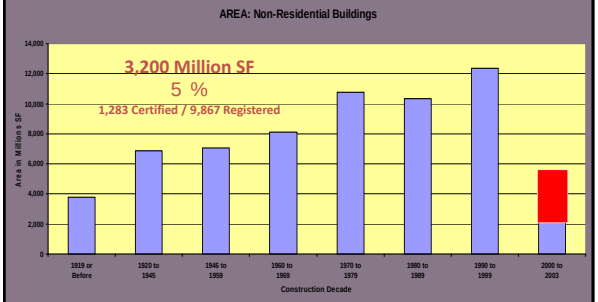
Iron Spring, Manitou Springs, CO

The SUNY at Buffalo North Campus, Sasaki, I.M. Pei and others

CHALLENGES – Post War to 2000

Buildings built from 1960-2000 are some of the most inefficient ever built

LEED Buildings



Commercial Building Inventory

Department of Energy

EVERY BUILDING MAKES A DIFFERENCE…..

California Academy of Sciences, San Francisco, CA , Renzo Piano

EVERY BUILDING MAKES A DIFFERENCE…..

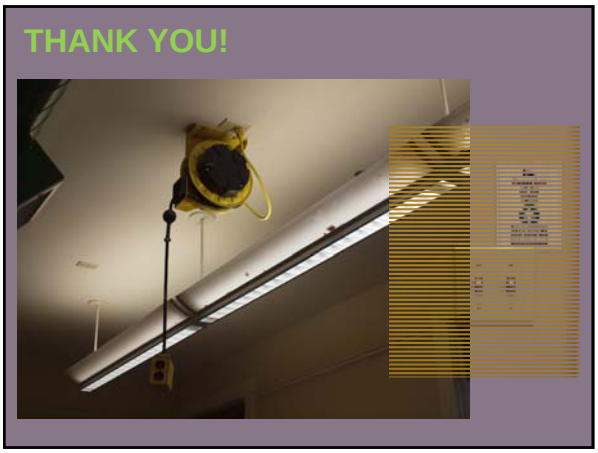
Haas-Lilienthal House Museum, San Francisco, CA

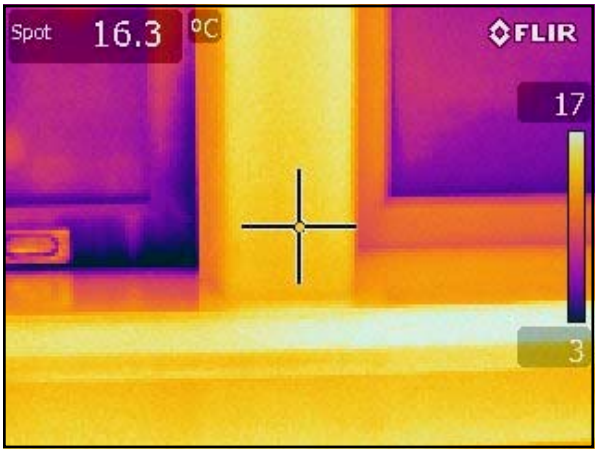
My goal is that one day we won't make a distinction between preservation and sustainability.

Seattle Central Library, Rem Koolhaas, Opening Day, May 2004 with the historic Nakamura Courthouse behind it – both have been applauded as sustainable projects

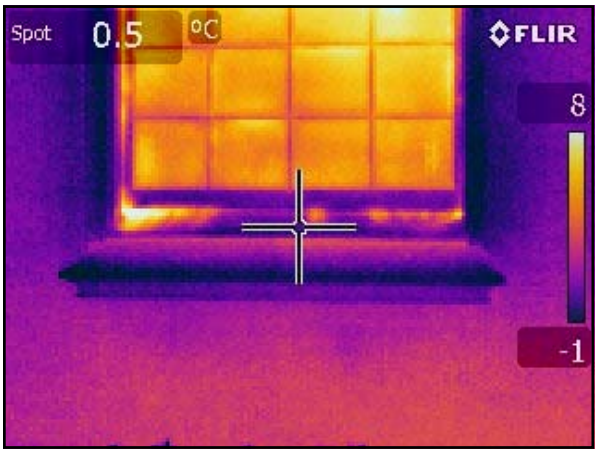
We will just call it good architecture.

THANK YOU!


THANK YOU!


Spot 16.3 °C
FLIR
17
3

Spot 12.9 °C
FLIR
22
3


Spot 0.5 °C
FLIR
8
-1

Building Science
Forensic Architecture
Structural
Mechanical HVAC
Commissioning

Building Science

Good, Fulton & Farrell
November 8, 2012

Gordon Shepperd, PE, LEED AP
Principal

apollobbc
Better Building Consultants

Learning Objectives

- Understand the mechanisms of moisture migration into building assemblies
- Understand the relative importance of controlling bulk water infiltration, fugitive air, and vapor migration
- Understand the benefits of predictive modeling in building enclosure performance
- Understand methods and benefits of measuring moisture performance of walls and fenestration in-situ

Greenwashing

Overpromising or providing misleading information on the beneficial green effects products or services will provide

Ask Yourself…

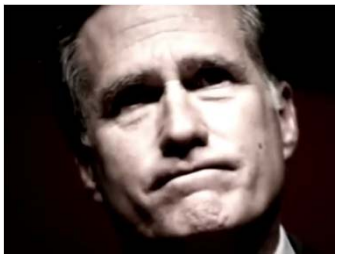
What's important?

What's possible?

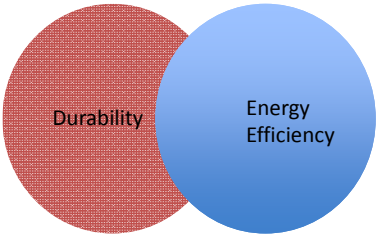
What are the trade-offs?

On what basis are we making our decisions?

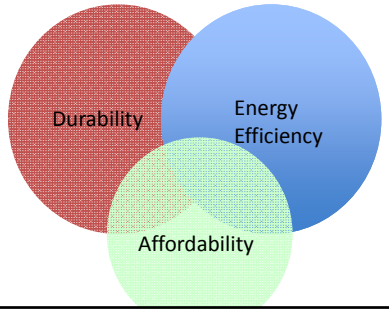
Fear or Science?



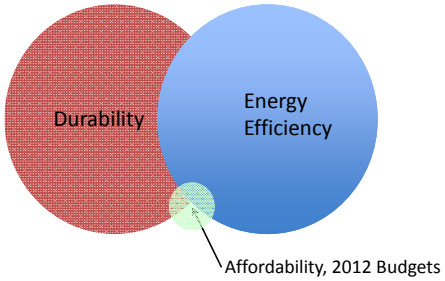
Our Challenge



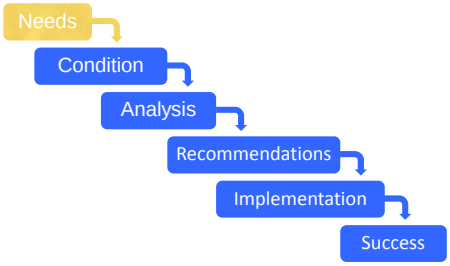
Our Challenge



Our Challenge



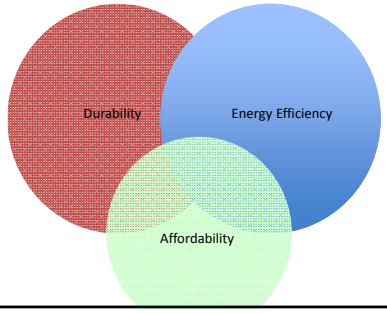
Documenting Needs = Project Success



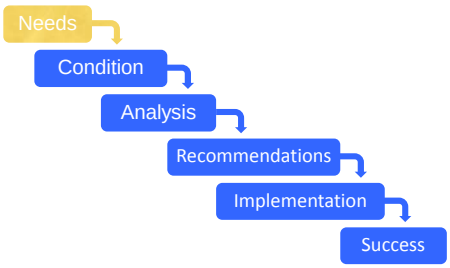
Documenting Needs – They Vary!

- What are the owner's requirements?
- What are the requirements for funding?
- What's possible?
- What is success?
- What must be avoided?

Common Needs



Documenting Needs = Project Success



Gordon's Common Needs

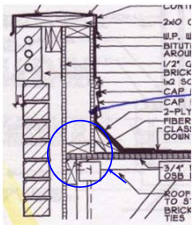
- Building Doesn't Leak or Grow Mold
- Defined Financial Constraints
- Energy Performance Requirements
- Green Building Requirements

Respond to the Needs

- Building Doesn't Leak or Grow Mold
  - Predict Performance During Design
  - Establish Measurable Performance Criteria
  - Verify Performance after Construction
- Measure Energy Performance
- LEED Certification

Design Issues

- Detailing
- Clarity & completeness
- Rain protection
- Air barrier
- Thermal barrier
- Coordination & consistency
- Durability



Specifications

- Material requirements
- Execution requirements
- Performance testing requirements
- Responsible parties

Mechanical Systems Effects

- Building pressurization
- Unplanned air flow
- Temperature & humidity control

Predictive Tools

- Moisture Modeling – WUFI
  - Predict impact of retrofits on moisture performance
- Energy Modeling
  - Predict benefits of retrofits

Common Verification Tools

- Air Leakage Testing
  - Air Leakage is a major source of heat loss
  - Quantifies leakage
- Infrared Thermography
  - Spatial identification of heat loss
  - Air leaks and thermal shorts

Air Leakage

Air Leakage Guidelines

- ASHRAE Guideline – 0.1 to 0.6 CFM_{75}/ft^2
  - » Mechanical Engineers typ. assume 0.1 – 0.3
  - » **Without coherent strategy, expect 0.6 – 1.0**
- NBC, Canada's Building Code – 0.2 CFM_{75}/ft^2

Air Leakage Requirements

- USACE, 0.25 CFM_{75}/ft^2 moving to 0.1 CFM_{75}/ft^2
- Washington State – 0.4 CFM_{75}/ft^2 <u>now required</u>

Building Breathing

- Building's Don't Breathe!
  - Misused Anthropomorphism
  - Issue confusion between air infiltration and vapor diffusion

Inadequate Ventilation
Air-Tight Buildings

- Indoor Air Quality Issues
- Moisture Accumulation – Cold weather
- Problems with combustion appliances
- Problems with exhaust fans
- Door and window operation

Air Leakage Testing – Can It Be Too Tight?

- Short answer: "No."
- Problems associated with excessive air tightness are actually ventilation issues.
- At what air tightness do you require ventilation?

Air Leakage Testing Equipment

- Door fan
- Pressure gauge
- Large building testing will often include data acquisition

Air Leakage Testing Applications

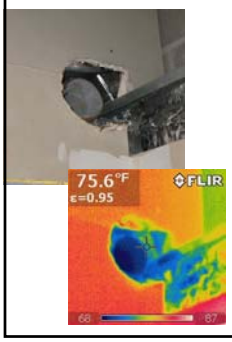
Air Leakage Testing Applications

- Assist mechanical engineers to design mechanical systems
- Duct tightness testing
- Quantify size of building openings
- Help locate openings in the building envelope

Air Leakage Testing - Limitations

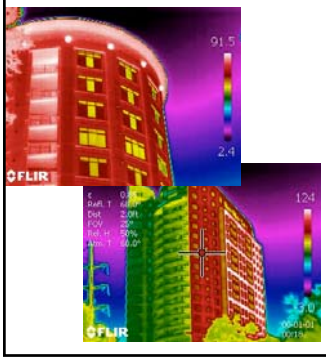
- May not identify air barrier problem location
- Difficulty applying standards to historic buildings
- Wet materials seem tighter

Air Leakage Testing – Supplemental Tools



- Smoke
- Touch
- Infrared

Infrared Thermography

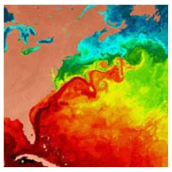


- Measures infrared radiation
- Converted to surface temperature

Infrared Thermography Applications are Numerous

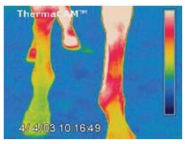
- Military/Law Enforcement
- Military
- Search & Rescue
- Firefighting
- Oil Spill Monitoring
- Monitoring Effluent Discharge

Infrared Thermography Applications are Numerous



- Studying Volcanic Activity
- Monitoring Forest Fires
- Weather Forecasting (Sat)
- Ocean Current Mapping (Sat)
- Thermal Mapping of Land Masses (Sat)
- Wildlife Counts

Infrared Thermography Applications are Numerous



- Testing Automotive Components
- Food Processing
- Medical / Veterinary
- Product Testing
- Buildings, too!

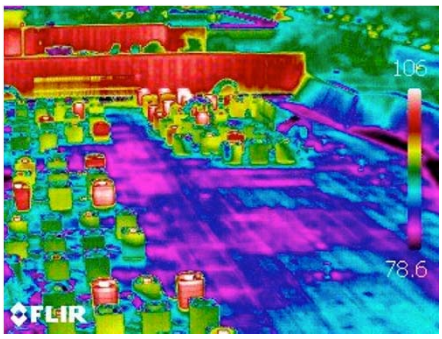
Infrared Thermography Building Applications

- Roof assessment
- Energy loss analysis
- Air leakage testing
- Moisture surveys
- Insulation verification
- District service evaluation

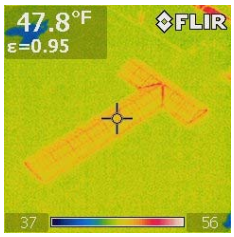
Infrared Thermography Practice

- IR Detects thermal patterns across surface
  - Material changes
  - Trapped moisture
  - Insulation problems
  - Not leaks!

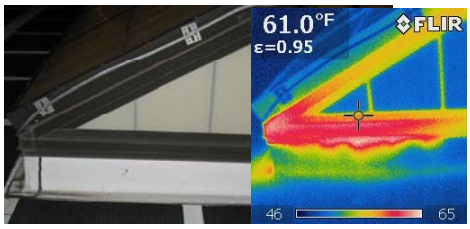
Infrared Thermography



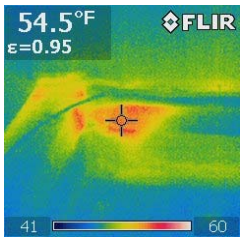
Infrared Thermography



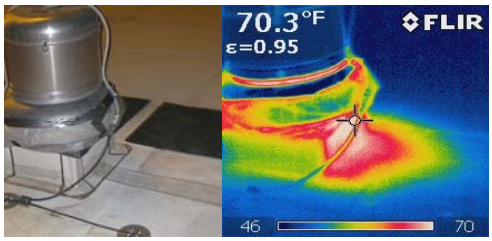
Infrared Thermography



Infrared Thermography



Infrared Thermography



Infrared Thermography - Standards

- ASTM C1060 - 90(2003) Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
- ISO 6781 Thermal insulation, qualitative detection of thermal irregularities in building envelopes, Infrared Method
- ASTM E1186 Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
- Canadian National Master Specification: Thermographic Inspection Services of Building Envelope

Infrared Thermography Limitations

- Doesn't measure leaks
- Must be verified
- Need temperature difference, typ. 18°
- Low E problems
- Incident angle problems

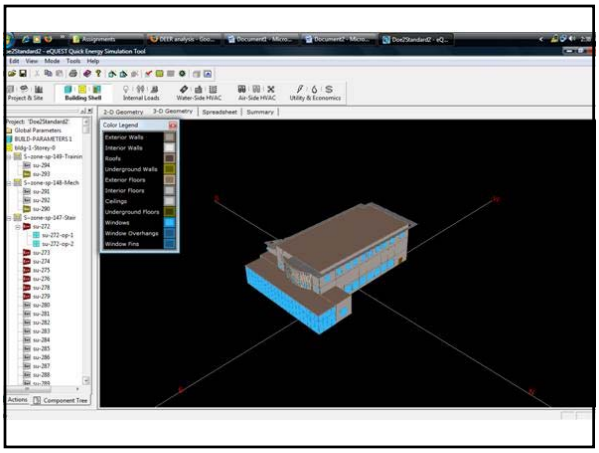
Predictive Analysis

One size does not fit all! Predict the outcome!

– Energy Modeling

– Hygrothermal Analysis - WUFI

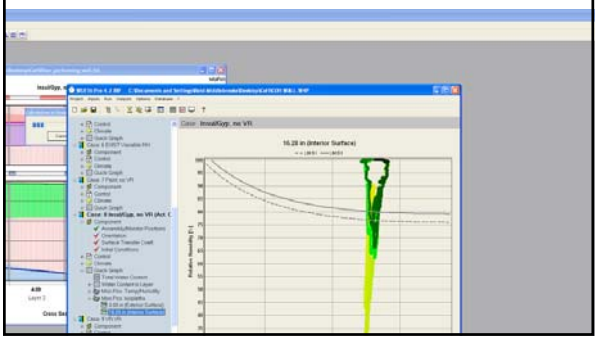
Predictive Analysis = Chicken Salad



Energy Modeling

- Energy modeling highly dependent on assumptions
  - Wall Thermal/Solar Properties
  - Mechanical Assumptions
  - Software
  - Beware of Inputs

Wall Modeling

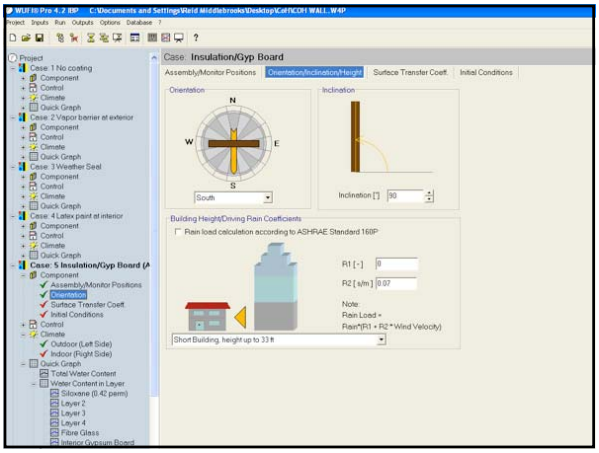


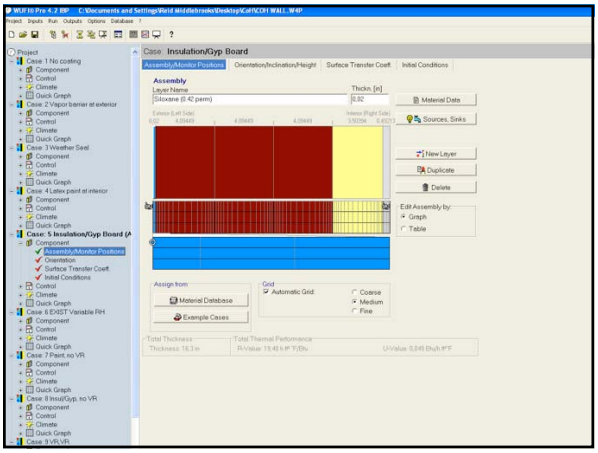
Wall Modeling is Chicken Salad

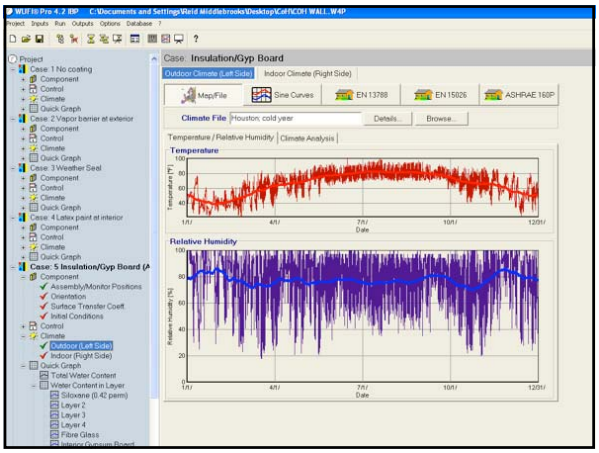
WUFI - Hygrothermal analysis
- Developed by Fraunhofer Institute Bauphysik
- Calculates heat and moisture transfer in assemblies
- Dependent on environmental assumptions
- Need accurate material property data
- Tests various retrofit options for relative risks

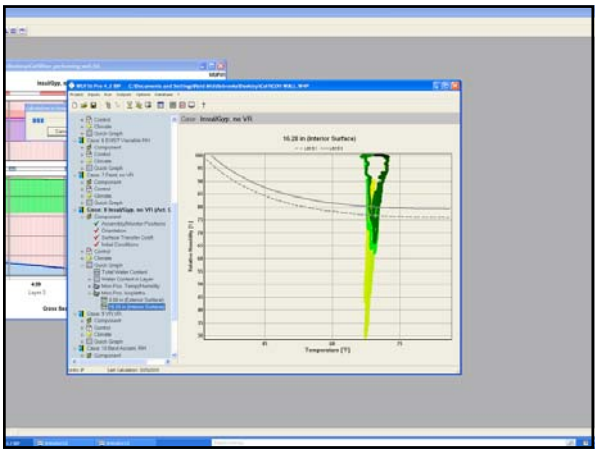
Wall Modeling

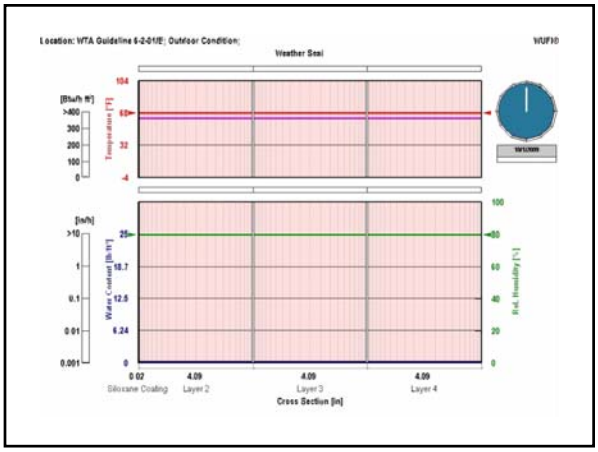
- Old “mass” walls can tolerate a good deal of water, but new, insulated “hollow” walls cannot.
- Will moisture accumulate inside the wall?
- What happens when the walls get wet?
- What happens when you add insulation?

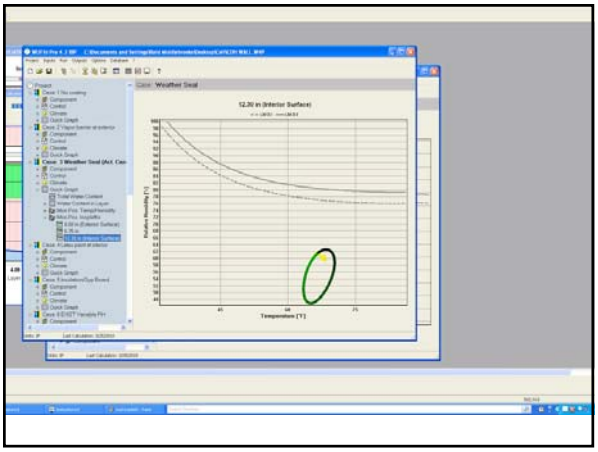












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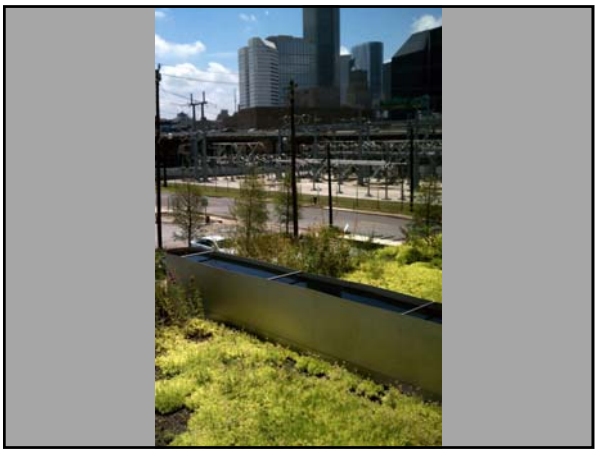
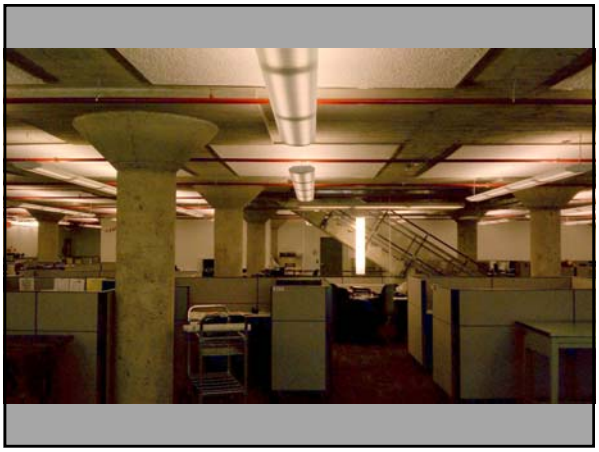
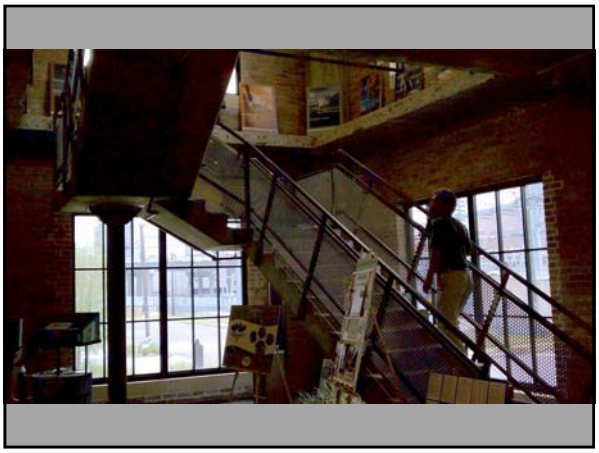
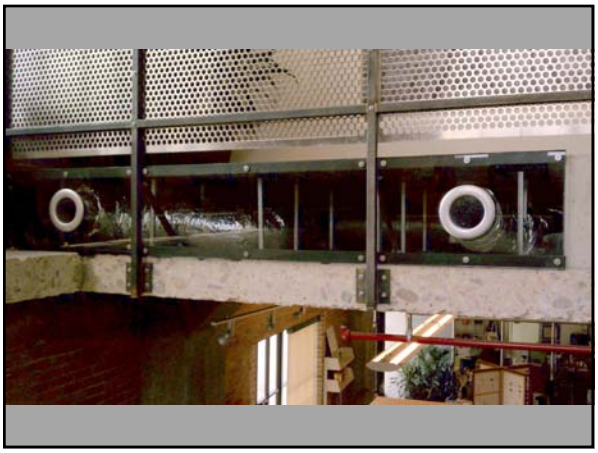
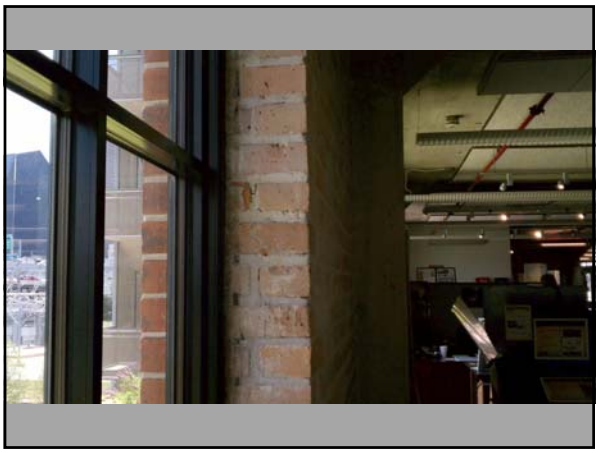
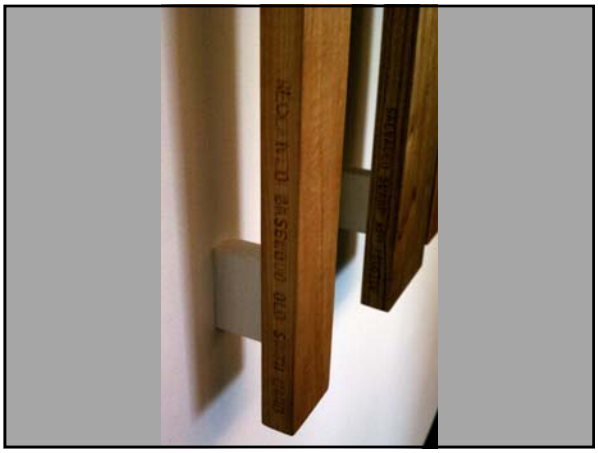




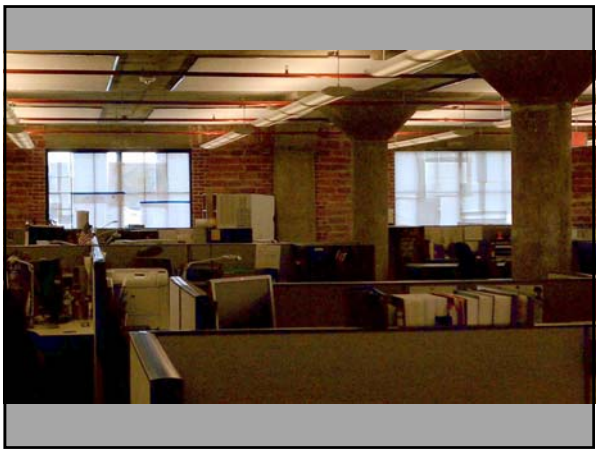


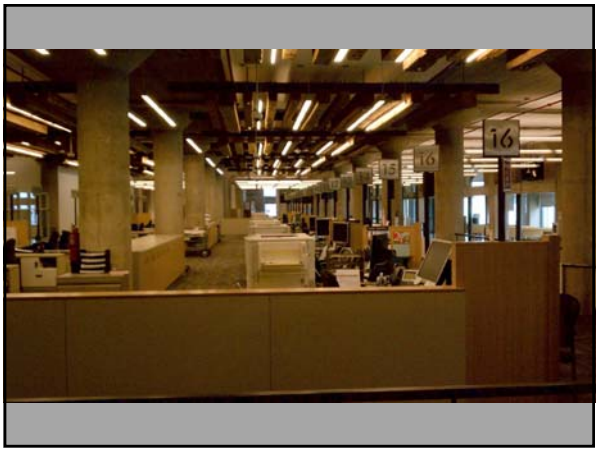






Who knew?
Have you filled out the highlights?
Too wet! Mud in the beams. Call back when it dries up.
We need to reschedule. PLUMBING IS ESSENTIAL.
We need to see the following, BUT FIRST, take a ticket to ensure better service.
A printout might be of use here.
I didn't know.
APPRECIATE IT.
These are my choices?
COMPLICATED MATTERS.
THERE COULD BE ISSUES HERE.
Where is that in the code?
OK to final.
HARD HOLD ON THERE.
SO NOTHING MOVES.
SHOW YOUR DUCTS.
THERE COULD
STILL BE AN ISSUE.





ENERGY AUDIT

Energy Audit Report

Building Energy Services

Lee H. Nelson Hall

apollobbc
Better Building Consultants

Energy Audit Report
Building Energy Services

Lee H. Nelson Hall

June 21, 2013

Prepared For
Barbara A. Campagna / Architecture + Planning
Buffalo, New York

Project No. 12H-0278

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Appendix A – Energy Star Outputs

Executive Summary

Apollo BBC performed a Level 1 Energy Audit as defined by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). The Level 1 audit is a walk-through analysis of a building to evaluate energy performance using energy consumption history, reported information and visual observations. The goal for this project was identify items that will increase building performance and improve overall energy efficiency, with the possibility of seeking LEED Existing Buildings Operations & Maintenance certification.

For this project we created a simplified energy model to determine the energy use breakdown for the building as well as test potential energy efficiency measures. We identified eleven potential energy efficiency measures comprising no- and low-cost as well as capital improvements. The energy efficiency measures include items such as air sealing the building, changes to lighting controls, replacement of HVAC systems, and upgrade plumbing fixtures.

Recommended actions to improve the energy efficiency of the building include air sealing the building to reduce the amount of fugitive air that enters through the building envelope. Air sealing will not only improve energy efficiency by limiting introduction of unwanted outdoor air, but will also improve occupant comfort within the building. Additional recommendations include reducing overall lighting density in the office spaces and the installation of occupancy sensors to control lighting.

Building Systems

The building is a historic structure originally built in 1923 as a gymnasium on the campus of Northwestern State University of Louisiana in Natchitoches, Louisiana. The building was renovated in 2001 to its current use with office, conference, auditorium, and laboratory space.

Envelope

The building envelope is constructed with a triple wythe masonry wall with wood-framed, single-paned windows. Some windows are double-hung with operable sashes. In the office and laboratory spaces, the interior walls are furred out with metal studs, filled with batt insulation, and faced with gypsum wallboard. Roofing for the building is comprised of flat and flat/gambrel built-up roofs with a white mineral-surfaced modified bitumen cap sheet and parapets.

We performed whole building air leakage testing and window chamber testing to quantify the overall air tightness of the building. We determined an overall air leakage rate for the building of 0.9 cubic feet per minute per square foot (CFM/ft^2) at 75 Pascals (Pa) of differential pressure. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) considers any building greater than 0.6 CFM/ft^2 to be "leaky." New, tightly constructed buildings can regularly achieve air leakage rates less than 0.25 CFM/ft^2. Chamber testing was performed on two windows. The first was a double-hung window with operable sash. We measured an air leakage rate of 43 CFM at 50 Pa of differential pressure. We also measured the leakage rate through a double-hung window that was fitted with an interior storm window. The leakage rate through this window was 6 CFM.

Heating, Ventilating, and Cooling

HVAC is provided to the building through twelve split-system air conditioning units comprised of an interior evaporating unit and an exterior condensing unit. Supply air is ducted to space. Return air is delivered through a common return air plenum system in the office area of the building and directly to mechanical closets for the laboratory and auditorium spaces. Outdoor ventilation air is provided to each unit through ducts and delivered to the mechanical closets, where it is mixed with the return air from the plenum space. Electric strip heaters in the indoor air-handling units provide heating for the spaces. The computer server room is served by a dedicated ductless mini-split system.

Condensing units and interior air-handling units were installed during the building renovation. Building staff indicated that some outdoor units and one interior coil section had been replaced. The split systems generally use R-22, an HCFC refrigerant, and have seasonal energy efficiency ratings (SEER) of 10, with three newer units having a SEER of 13.

Control of the HVAC systems is through room-mounted programmable thermostats. Setpoints for heating and cooling during occupancy are generally 69°F and 73°F, respectively. The system is scheduled with night and weekend setback temperatures during unoccupied periods. Laboratory spaces with specific temperature requirements typically use different temperature setpoints as well as stand-alone dehumidification systems to control space humidity.

Domestic Hot Water

Hot water is provided to restroom and utility faucets from a 40-gallon, electric storage type hot water heater. An electric, tankless hot water heater provides hot water to the kitchen. Building operators indicated that the existing storage hot water heater would be replaced with a tankless heater when replacement necessary. The building has reverse osmosis water filtration systems that serve the laboratory and kitchen spaces.

Interior Lighting

Lighting is generally provided to the building with recessed or suspended fluorescent fixtures. Auditorium light fixtures are updated to high-wattage compact fluorescent bulbs from incandescent fixtures. The installed wattage for the building is approximately 1.05 W/ft^2, with wattage for the office areas approximately 1.4 W/ft^2. Control of lighting systems is by wall switches. There are no occupancy sensors or central lighting control panel for the building.

Energy Breakdown

Energy end use breakdown was generated using the whole building energy simulation software eQUEST. Simulation inputs were based on observed and recorded data from our site observations as well as building user provided data. Figure 1 shows the breakdown of electrical consumption into component end uses, including cooling, heating, fans, lights and equipment. Energy for HVAC systems is comprised of cooling, heating, and fan categories. Equipment energy refers to plug loads from office equipment, primarily computers.

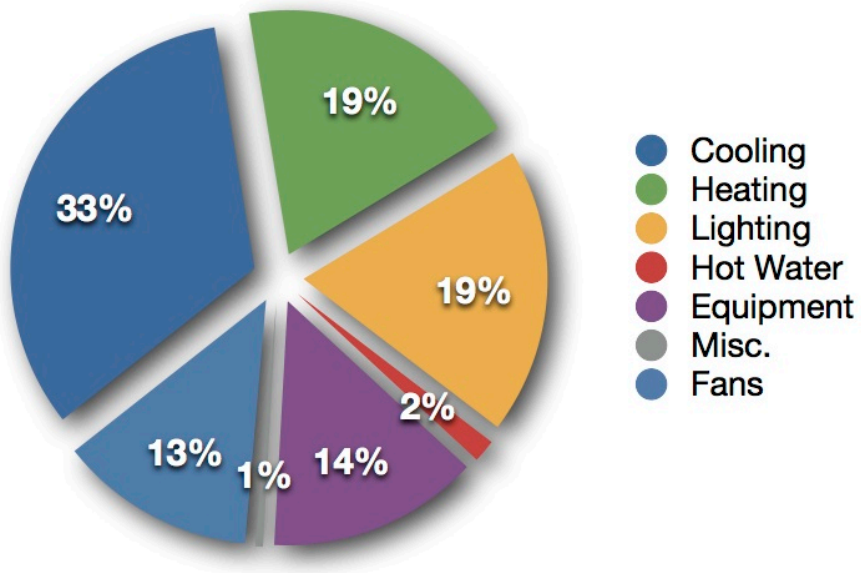


Figure 1 – Energy end use breakdown by category

Energy Reduction Goals

The building currently has an Energy Use Intensity (EUI) of 50 kBtu/ft^2/yr, with an estimated Energy Star score of 54. As the building is not currently in the Energy Star system, the Target Finder tool provided by Energy Star was used to determine the Energy Star score. A score of 50 is considered the median for buildings of similar type and use. Thus, Nelson hall is considered 4% better than the median building. To be eligible for LEED Existing Buildings Operations & Maintenance, the building must obtain an Energy Star score of at least 69. To reach an eligible score, the building would need to reduce energy consumption by approximately 16% to a EUI of 42 kBtu/ft^2/yr. This equates to 35,800 kWh saved per year with a yearly energy cost savings of $4,000.

Energy Efficiency Measures

We developed recommendations for energy efficiency measures (EEM) that may be implemented for the building to reduce energy consumption. During our review, we identified a number of occupant comfort issues with the current HVAC system. Most low-cost alterations to the current system, such as space temperature setpoint changes, are likely to increase occupant comfort complaints. The list of potential EEMs balance the need for energy use reduction with the goal of maintaining, or improving occupant comfort. Table 1 lists the identified EEMs along with the estimated utility savings, costs, and simple payback. The list contains both low and no-cost improvements, capital improvements, and modifications that are not intended to reduce building energy, but instead to potentially increase occupant comfort. Utility costs used in the analysis were based on occupant provided information and were $0.11 per kWh and $5.00 per 1000 gallons of water.

Table 1. Energy Efficiency Measures with anticipated savings, costs, and simple payback

EEM	Description	Estimated Energy Savings (kWh)	Implementation Cost ($)	Simple Payback (years)
1	Air Sealing	31,545	95,000	26
2	Office Lighting	6,300	0	0
3	Lighting Retrofit	9,500	38,000	35
4	Occupancy Sensors	3,780	3,000	7
5	Auditorium Walls	6,300	20,000	27.5
6	Retro-Commissioning	6,300	20,000	27.5
7	Dedicated Outdoor Air System	-	50,000	-
8	HVAC System Replacement	24,185	260,000	93.5
9	Window Films	6,300	20,000	27.5
10	High Volume Low Speed Fans	6,950	10,000	12.5
11	Plumbing Fixtures	12,600 (gal)	4,100	65

Air Sealing

An airtight building provides resistance from air movement between the interior and exterior of the building. Without a separation of the interior and exterior conditions, the building's mechanical systems may have difficultly controlling humidity within building spaces, leading to moisture-related problems and occupant comfort complaints. Energy use will also increase as the systems deal with uncontrolled ventilation air.

31, 545 kWh
Energy Saved

$3,630
Annual Savings

$95,000
Installed Cost

26 years
Simple Payback

Current Conditions

During our audit, we performed both window and whole building air leakage testing. We determined the building to have a leakage rate of 0.9 cubic feet per minute per square foot of enclosure area (CFM/ft^2). This is approximately 4 times the typically air leakage rate per square foot for a similarly sized, tightly constructed building. We estimate that the leakage through windows accounts for 30-50% of the total building air leakage.

Recommendations

We estimate that air sealing the building to typical modern standards would result in anywhere from 6-15% total energy savings. Air sealing can be achieved through the reconditioning of existing windows, adding interior storm windows, and sealing gaps in the building enclosure. Our estimated costs for air sealing the building include $75,000 for window reconditioning and interior storm windows, and $20,000 for general air sealing of walls and assembly intersections.

Comments

Estimates of energy savings were determined through the eQUEST whole building energy simulation software, with the rate of 0.25 CFM/ft^2 (at 75 Pascals) used for "tight" construction. Costs were determined from typical industry repair costs and the size and enclosure area.

Office Lighting

The office areas of the building utilize 3-lamp recessed fluorescent fixtures. The installed lighting density for the office area of the building appears to be higher than typical for office spaces.

6,300 kWh
Energy Saved

$725
Annual Savings

$0
Installed Cost

0 years
Simple Payback

Current Conditions

We calculated the lighting density within the office space to be 1.36 Watts per square foot (W/ft^2). The ASHRAE 90.1 Standard recommends a maximum lighting density for open office spaces to be 1.0 W/ft2.

Recommendation

Reducing the office lighting to the ASHRAE recommended density results in a 3% energy savings. The reduction can be achieved by de-lamping the current three lamp fixtures to two lamps. Removing one lamp is a free, or nearly free energy improvement.

Comments

De-lamping the current fixtures will affect the overall light levels for the space. Lighting levels will need to be measured following de-lamping to ensure adequate levels, or additional task lighting may be required.

Lighting Retrofit

Lighting for the building accounts for approximately 19% of total building energy use. Retrofitting to a reduced wattage fixture can provide comparable light levels with increased energy efficiency.

9,500 kWh
Energy Saved

$1,100
Annual Savings

$38,000
Installed Cost

35 years
Simple Payback

Current Conditions

The office, laboratory, restrooms, and conference room spaces use T8 fluorescent strip fixtures. The current fixtures could be retrofitted to T5 fluorescent fixtures to reduce the installed fixture wattage.

Recommendation

Retrofitting to 2-lamp T5 fixtures would reduce the building overall energy use by 4.5%. The installed cost, including the new fixture, is estimated to be $470 dollars per fixture. Costs are estimated from typical material prices with professional installation.

Occupancy Sensors

Occupancy sensors can automatically control lighting when occupants are detected, reducing lighting energy.

3,780 kWh
Energy Saved

$435
Annual Savings

$3,000
Installed Cost

7 years
Simple Payback

Current Conditions

Wall switches control interior lighting. The building does not have occupancy sensors or a central lighting control panel. Occupants are responsible for turning off interior lighting at the end of the day.

Recommendation

Installing occupancy sensors to control lighting could reduce the overall energy use by 1.8%. The installed cost is estimated to be $3,000 dollars with a mix of both wall-mounted and ceiling-mounted sensors to control individual offices and open place offices respectively. We estimate the installed cost for wall-mounted sensors to be $60 dollars and ceiling-mounted sensors to be $150.

Comments

Typical industry assumptions allow for a 10% lighting energy reduction when occupancy sensors are used for lighting controls.

Auditorium Walls

The auditorium walls are currently uninsulated, leading to increased heat gain or loss through the assembly.

6,300 kWh
Energy Saved

$725
Annual Savings

$20,000
Installed Cost

27.5 years
Simple Payback

Current Conditions

The interior auditorium walls are currently exposed brick from the triple wythe wall construction. At other areas of the building, the interior walls have been furred out with metal studs, filled with batt insulation, and faced with gypsum wallboard. The reduced R-value of the auditorium walls contributes to an increased HVAC load to the space, requiring increased HVAC energy to maintain interior temperature setpoints.

Recommendation

Insulating the auditorium walls will increase the effective R-value of the assembly, leading to less heat gain or loss through the assembly. Furring out the walls and installing batt insulation similar to the wall assembly in other parts of the building may reduce energy consumption by up to 3%.

Comments

Changes to the thermal and vapor properties of walls by adding additional insulation and materials may cause changes in the hygrothermal properties of the wall. Any changes to the wall assemblies should be reviewed to better understand the potential for moisture accumulation and potential reduction in drying capacity within the system.

Retro-Commissioning

Commissioning is a process focused on verifying and documenting that a facility and all of its systems and assemblies are designed, installed, tested, and maintained to meet the project requirements. The commissioning process documents the operation of the building as well as ensuring that all systems operate as designed. Retro-commissioning is used to commissioning existing building that were not commissioned during original construction.

6,300 kWh
Energy Saved

$725
Annual Savings

$20,000
Installed Cost

27.5 years
Simple Payback

Current Conditions

The building was reportedly not commissioned when renovated in 2001 to its current use and occupancy. Retro-commissioning an existing building is a systematic approach to verify that the installed systems are operating as intended and are meeting occupant expectations.

Recommendation

Retro-commissioning an existing building has been shown in the industry to typically save 5% of cooling, heating, and ventilation related energy use. For Nelson hall, retro-commissioning could save approximately 3% of total building energy use.

Comments

The Commissioning Process includes a final report, which combines documentation from all of the systems in the building, becoming a central point of reference for building operators of the energy consuming systems within the building.

Dedicated Outdoor Air System

HVAC for space and ventilation air is provided from split systems placed throughout the building. Split systems, like those installed in the building, typically do not have large latent cooling capacities, resulting in humid, uncomfortable interior spaces.

Current Conditions

Outdoor air for ventilation is currently delivered directly mechanical closets and mixed with return air. In this scheme, the system is responsible for the latent cooling loads, or the energy associated with dehumidification, which can be significant in the warmer summer months.

Recommendation

An industry best practice is to use a dedicated outdoor air system to pre-treat the ventilation air prior to delivery to space. This separates the anticipated latent cooling loads associated with the hot, humid air experienced in the subject climate and the sensible heat loads associated with the interior space. Decoupling the latent and sensible cooling loads may reduce energy consumption, but the analysis is beyond the scope of this level of audit as many more interactions will need to be tested, likely in a simulation environment. The addition of a dedicated outdoor air system is estimated to cost $50,000.

Comments

A dedicated outdoor air system reduces the load on the interior units. Which, in conjunction with occupant behavior changes, may reduce energy use and improve occupant comfort.

HVAC System Replacement

Energy related to heating, ventilating, and cooling accounts for over 60% of the total building energy for Nelson Hall. A more energy efficient system could significantly reduce HVAC energy use.

24,200 kWh
Energy Saved

$2,780
Annual Savings

$260,000
Installed Cost

94 years
Simple Payback

Current Conditions

The current HVAC system is comprised of twelve split system air conditioning units. The units are original to the renovation with some outdoor condensing units having been replaced. Split system units typically have lifetimes of 15 years.

Recommendation

A modern building of this type would typically be conditioned with packaged rooftop HVAC units. A more energy efficient strategy may the use of a variable refrigerant flow (VRF) system. Variable refrigerant systems can typically reduce HVAC energy consumption by 15-20%, which would reduce building energy usage by approximately 10-13%. VRF systems are also advantageous as they can reduce the need for system ductwork, allowing interior space to be reconfigured to restore historic features that may have been removed or covered to adapt the space to air conditioning. VRF systems are generally 5-20% more expensive that traditional systems and represent a significant capital improvement. For Nelson Hall the estimated installed cost for a VRF system would be $260,000.

Comments

HVAC system replacement does not typically have a simple payback. A better payback analysis is between different systems and the potential energy savings when a full HVAC system replacement is deemed necessary. If a system replacement is undertaken, we recommend that it be done in conjunction with a dedicated outdoor air system and air sealing to reduce the likelihood of negative effects from fugitive air infiltration.

Window Films

Solar energy entering the building through building fenestration contributes significantly to the HVAC load on the building. Reducing the incident load can reduce the need for cooling energy.

6,300 kWh
Energy Saved

$725
Annual Savings

$20,000
Installed Cost

27.5 years
Simple Payback

Current Conditions

Windows for the building are generally single-pane, wood-framed windows with clear glass. Clear glass is not a high-performance material.

Recommendation

Window performance may be increased with the addition of a retrofit solar control film on the interior of the windows. Reduced window U-value and solar heat gain coefficient (SHGC) were simulated to determine the potential for energy reduction with window films. The addition of window films may reduce the building energy use by 3%, with an estimated installed cost of $20,000. Installed cost may be reduced if film applied during window reconditioning.

Comments

Interior window films will likely change the exterior experience of the windows and may affect the historic nature of the building. The visual light transmittance (VLT) of the film is a measurement of the light that can pass through the film. In general, greater VLT is desirable because it results in a reduced visual impact on the building; however in general, higher VLT films have reduced solar control.

High Volume Low Speed Fans

High volume low speed (HVLS) fans use the cooling effect of air moving over skin to offset interior cooling loads. Assuming interior relative humidity levels are adequately controlled, using HVLS fans can offset a rise in temperature while maintaining thermal comfort. This means that temperature setpoints for installed mechanical systems may be raised, reducing cooling loads.

6,950 kWh
Energy Saved

$800
Annual Savings

$10,000
Installed Cost

12.5 years
Simple Payback

Current Conditions

HVAC systems for the auditorium provide conditioned air through ductwork near the ceiling. No additional fans are used to promote further mixing or movement of air.

Recommendation

High volume low speed fans could be added to the auditorium space to increase the range of thermal comfort conditions. Both the occupied and setback temperatures could be raised to reduce the cooling load for the space. Modeling a 4ºF temperature change and adding two HVLS fans for the auditorium saves approximately 3.3% of total building energy usage. The estimate installed cost for two HVLS fans $10,000.

Comments

The increase in setpoint temperature while maintaining thermal comfort is dependent on maintain adequate interior relative humidity. Interior relative humidity should be maintained at or below 65%.

Plumbing Fixture Replacement

The building has standard efficiency plumbing fixtures. Increased water efficiency is possible with fixtures that use less water.

12,600 gallons
Water Saved

$63
Annual Savings

$4,100
Installed Cost

65 years
Simple Payback

Current Conditions

The building currently has six water closets and two urinals. The efficiency of the water closets is 1.6 gallons per flush and the urinals is 1.0 gallon per flush.

Recommendation

The current fixtures can be upgraded to more water efficient plumbing fixtures such as 0.125 gallons (1 pint) per flush urinals and 1.1 gallons per flush water closets. Estimates for fixture usage were determined from building occupancy and LEED Existing Building Operations & Maintenance reference information. LEED reference material assumes three flushes per day per occupant (3 water closet for women, 2 urinal and 1 water closet for men). We estimate that approximately 12,600 gallons of water would be saved per year by upgrading fixtures.

Comments

Further refinement of water savings estimates would be possible in a more in-depth audit. Fixture cost can vary greatly depending the extent of replacement needed. For instance, in some cases only flush valves will need to be replaced, and in others the entire unit will need to be upgraded. Estimates were used for the number of flushes per day based on current occupancy. If occupancy or frequency increases, paybacks may be reduced. Waterless urinals were also evaluated but the annual savings was only increased $4.00 with significantly increased installed cost and maintenance considerations.

Recommended Actions

To achieve the goals and operational efficiency that is desired for the building, improvements to the energy efficiency of installed systems will be required. While not a direct goal, the potential to achieve LEED Existing Buildings Operations & Maintenance certification provides an energy efficiency target. To get LEED certified the building would need to reduce energy use by approximately 16%.

The energy efficiency measure of air sealing the building is estimated to reduce a significant amount of energy use, up to 15%. While costly, air sealing the building will reduce the fugitive air infiltration across the building envelope, reducing energy costs associated with cooling increased hot and humid outdoor air. Occupant comfort will likely also be improved as drafts and uncomfortable air will be reduced for those working near exterior walls and windows.

While not the largest single energy end use for the building, changes to lighting are often the easiest and most accessible energy efficiency measures. To achieve additional energy savings, de-lamping the current office light fixtures from three to two bulbs will reduce the installed lighting wattage density to 1.0 W/ft^2, which is the current ASHRAE recommend lighting density for office spaces. The installation of occupancy sensors will also reduce energy consumption, and this energy efficiency measure has a simple payback of less than 10 years.

To further reduce energy, the installation of high volume low speed fans to the auditorium space will allow for higher occupied and setback temperature setpoints to be used. As the space is reportedly used infrequently, maintaining occupant comfort though mechanical cooling alone is not often required.

The recommended actions are estimated to reduce energy usage by up to 22% from current levels. As with all energy improvements, we recommend that energy consumption be monitored at least monthly to determine the actual energy savings realized.

Appendix A

Energy Star Target Finder Output

TARGET FINDER

PRINT | FAQ FREQUENTLY ASKED QUESTIONS | CONTACT US | HELP

Return to ENERGY STAR Web site > **Target Energy Performance Results**

Warning: Energy rate for electricity - grid purchase varies by 28% from $0.09000856/kWh, the average rate in the 71457 zip code. [Energy source 1]

Results

The design **must** achieve a rating of 75 or higher to be eligible for "Designed to Earn the ENERGY STAR".

View Statement of Energy Design Intent

NOTE: Values are 100% Electricity - Grid Purchase. The Target & Median Building energy use for this facility are calculated based on fuel mix of input estimated energy use.

Results for Estimated Energy Use

Energy	Design	Target	Median Building
Energy Performance Rating (1-100)	54	70	50
Energy Reduction (%)	4	21	0
Source Energy Use Intensity (kBtu/Sq. Ft./yr)	168	139	175
Site Energy Use Intensity (kBtu/Sq. Ft./yr)	50	42	53
Total Annual Source Energy (kBtu)	2,396,596	1,988,536	2,509,139
Total Annual Site Energy (kBtu)	717,544	595,370	751,239
Total Annual Energy Cost ($)	$ 24,185	$ 20,067	$ 25,320
Pollution Emissions			
CO2-eq Emissions (metric tons/year)	156	129	163
CO2-eq Emissions Reduction (%)	4%	21%	0%

Facility Information Edit

Nelson Hall
Natchitoches, LA 71457
United States

Facility Characteristics Edit

Space Type	Gross Floor Area (Sq. Ft.)
Office	14,300
Total Gross Floor Area	14,300

Estimated Design Energy Edit

Energy Source	Units	Estimated Total Annual Energy Use	Energy Rate ($/Unit)
Electricity - Grid Purchase	kWh	210,300	$ 0.115/kWh

Source: Data adapted from DOE-EIA. See EPA Technical Description.

* The Median Building is equivalent to an EPA Energy Performance Rating of 50.

LEED EB:O&M CHECKLIST

LEED 2009 for Existing Buildings: Operations & Maintenance

Project Checklist

Project Name

Date

Sustainable Sites — Possible Points: 26

Y	?	N			
11	3	1		**Sustainable Sites**	**Possible Points: 26**
		1	Credit 1	LEED Certified Design and Construction	4
1			Credit 2	Building Exterior and Hardscape Management Plan	1
1			Credit 3	Integrated Pest Mgmt, Erosion Control, and Landscape Mgmt Plan	1
7			Credit 4	Alternative Commuting Transportation	3 to 15
1			Credit 5	Site Development—Protect or Restore Open Habitat	1
	1		Credit 6	Stormwater Quantity Control	1
	1		Credit 7.1	Heat Island Reduction—Non-Roof	1
1			Credit 7.2	Heat Island Reduction—Roof	1
	1		Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 14

Y	?	N			
8		2		**Water Efficiency**	**Possible Points: 14**
Y			Prereq 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	
2			Credit 1	Water Performance Measurement	1 to 2
3			Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5
3			Credit 3	Water Efficient Landscaping	1 to 5
		2	Credit 4	Cooling Tower Water Management	1 to 2

Energy and Atmosphere — Possible Points: 35

Y	?	N			
11	5	1		**Energy and Atmosphere**	**Possible Points: 35**
Y			Prereq 1	Energy Efficiency Best Management Practices	
Y			Prereq 2	Minimum Energy Efficiency Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
4			Credit 1	Optimize Energy Efficiency Performance	1 to 18
2			Credit 2.1	Existing Building Commissioning—Investigation and Analysis	2
2			Credit 2.2	Existing Building Commissioning—Implementation	2
2			Credit 2.3	Existing Building Commissioning—Ongoing Commissioning	2
	1		Credit 3.1	Performance Measurement—Building Automation System	1
	2		Credit 3.2	Performance Measurement—System-Level Metering	1 to 2
	2		Credit 4	On-site and Off-site Renewable Energy	1 to 6
		1	Credit 5	Enhanced Refrigerant Management	1
1			Credit 6	Emissions Reduction Reporting	1

Materials and Resources — Possible Points: 10

Y	?	N			
9	1			**Materials and Resources**	**Possible Points: 10**
Y			Prereq 1	Sustainable Purchasing Policy	
Y			Prereq 2	Solid Waste Management Policy	
1			Credit 1	Sustainable Purchasing—Ongoing Consumables	1
1			Credit 2.1	Sustainable Purchasing—Electric	1
1			Credit 2.2	Sustainable Purchasing—Furniture	1
1			Credit 3	Sustainable Purchasing—Facility Alterations and Additions	1
1			Credit 4	Sustainable Purchasing—Reduced Mercury in Lamps	1
	1		Credit 5	Sustainable Purchasing—Food	1

Materials and Resources, Continued

Y	?	N			
1			Credit 6	Solid Waste Management—Waste Stream Audit	1
1			Credit 7	Solid Waste Management—Ongoing Consumables	1
1			Credit 8	Solid Waste Management—Durable Goods	1
1			Credit 9	Solid Waste Management—Facility Alterations and Additions	1

Indoor Environmental Quality — Possible Points: 15

Y	?	N			
8	5	2		**Indoor Environmental Quality**	**Possible Points: 15**
Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Green Cleaning Policy	
1			Credit 1.1	IAQ Best Mgmt Practices—IAQ Management Program	1
		1	Credit 1.2	IAQ Best Mgmt Practices—Outdoor Air Delivery Monitoring	1
		1	Credit 1.3	IAQ Best Mgmt Practices—Increased Ventilation	1
	1		Credit 1.4	IAQ Best Mgmt Practices—Reduce Particulates in Air Distribution	1
	1		Credit 1.5	IAQ Mgmt Plan—IAQ Mgmt for Facility Alterations and Additions	1
1			Credit 2.1	Occupant Comfort—Occupant Survey	1
1			Credit 2.2	Controllability of Systems—Lighting	1
	1		Credit 2.3	Occupant Comfort—Thermal Comfort Monitoring	1
1			Credit 2.4	Daylight and Views	1
	1		Credit 3.1	Green Cleaning—High Performance Cleaning Program	1
1			Credit 3.2	Green Cleaning—Custodial Effectiveness Assessment	1
1			Credit 3.3	Green Cleaning—Sustainable Cleaning Products, Materials Purchases	1
1			Credit 3.4	Green Cleaning—Sustainable Cleaning Equipment	1
1			Credit 3.5	Green Cleaning—Indoor Chemical and Pollutant Source Control	1
	1		Credit 3.6	Green Cleaning—Indoor Integrated Pest Management	1

Innovation in Operations — Possible Points: 6

Y	?	N			
3				**Innovation in Operations**	**Possible Points: 6**
1			Credit 1.1	Innovation in Operations: Specific Title	1
			Credit 1.2	Innovation in Operations: Specific Title	1
			Credit 1.3	Innovation in Operations: Specific Title	1
			Credit 1.4	Innovation in Operations: Specific Title	1
1			Credit 2	LEED Accredited Professional	1
1			Credit 3	Documenting Sustainable Building Cost Impacts	1

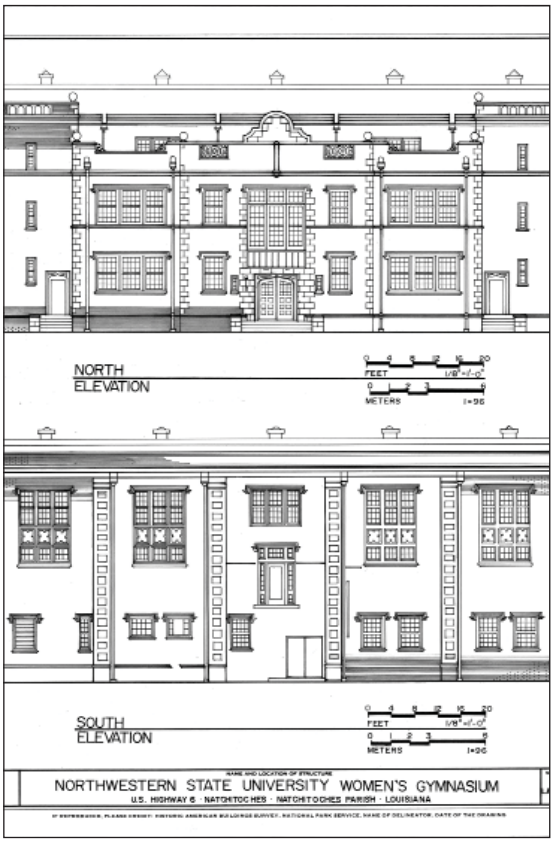
Regional Priority Credits — Possible Points: 4

Y	?	N			
2				**Regional Priority Credits**	**Possible Points: 4**
1			Credit 1.1	Regional Priority: SS5	1
1			Credit 1.2	Regional Priority: WE3	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Y	?	N			
52	14	6		**Total**	**Possible Points: 110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

HABS DOCUMENTATION



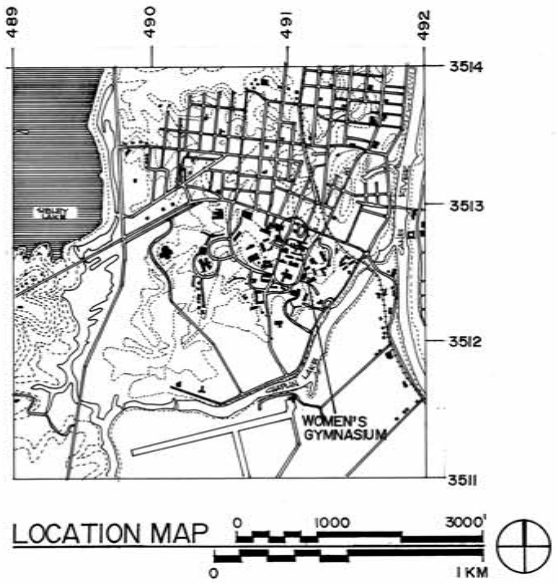
TRIM LINE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM

THE NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM, 1923, IS A THREE STORY BRICK JACOBEAN REVIVAL BUILDING LOCATED ON THE EDGE OF THE UNIVERSITY CAMPUS. THE EXTERIOR INCORPORATES SIXTEENTH CENTURY ARCHITECTURAL ELEMENTS IN A LARGE RECTANGULAR MASS TO GIVE THE EFFECT OF A JACOBEAN COUNTRY HOUSE. THE BUILDING HAS BEEN LITTLE ALTERED SINCE CONSTRUCTION BUT HAS NOT SUFFERED ANY SIGNIFICANT LOSS OF INTEGRITY.

THE WOMEN'S GYMNASIUM IS LOCALLY SIGNIFICANT IN THE AREA AS IT REPRESENTS THE ARCHITECTURAL FIRM OF FAVROT AND LIVAUDAIS, OF NEW ORLEANS.

THE DRAWINGS OF THE NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM WERE PREPARED AT THE LOUISIANA STATE UNIVERSITY - SCHOOL OF ARCHITECTURE DURING THE SPRING OF 1989 UNDER THE DIRECTION OF J. MICHEAL PITTS, ARCHITECT, AND STUDENT ARCHITECTS, KIM ANG, BILL BROWNING, SCOTT CABES, KENNETH COLGAN, JENNIFER DOMICO, ROGER FREIBERT, EVAN LeBLANC, JOSEPH McKENZIE, MICHAEL McLEAN, STEPHEN MUNDT, HOC NGO, DAVID RUIZ, DAVID SCHROEDER AND KAREN SULZER.



MICHAEL McLEAN
DRAWN BY: KAREN SULZER

NATIONAL PARK SERVICE UNITED STATES DEPARTMENT OF THE INTERIOR	NAME AND LOCATION OF STRUCTURE NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHE'S PARISH · LOUISIANA	SURVEY NO. LA-1209-A	HISTORIC AMERICAN BUILDINGS SURVEY SHEET 1 OF 8 SHEETS	LIBRARY OF CONGRESS PHOTO NUMBER

IF REPRODUCED, PLEASE CREDIT: HISTORIC AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE, NAME OF DELINEATOR, DATE OF THE DRAWING

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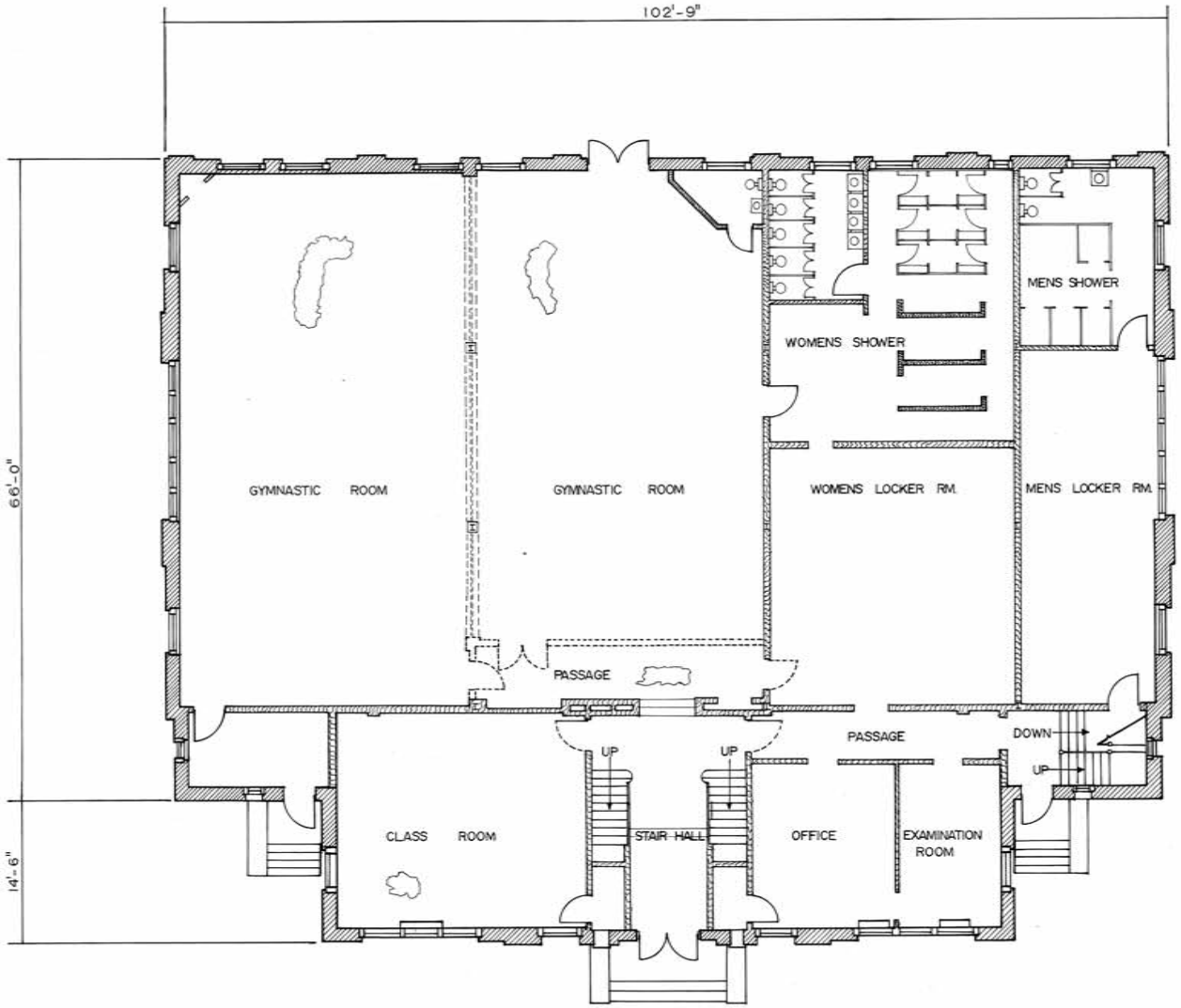

FIRST FLOOR PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"

0 1 2 3 6
METERS 1=96

1990 CHARLES E. PETERSON PRIZE COMPETITION.

DRAWN BY: BILL BROWNING

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
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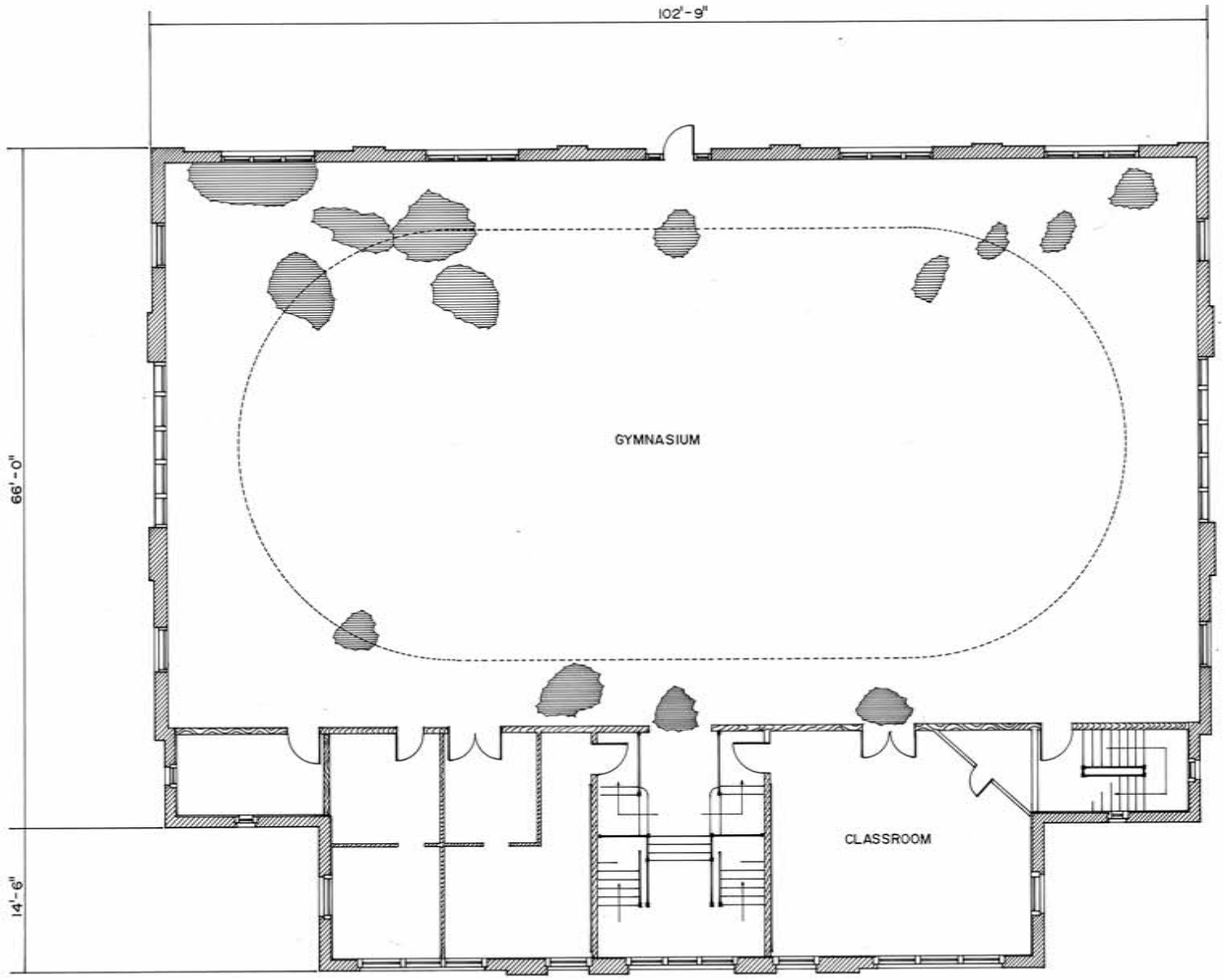

SECOND FLOOR PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"

0 1 2 3 6
METERS 1=96

DRAWN BY: KIM ANG

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
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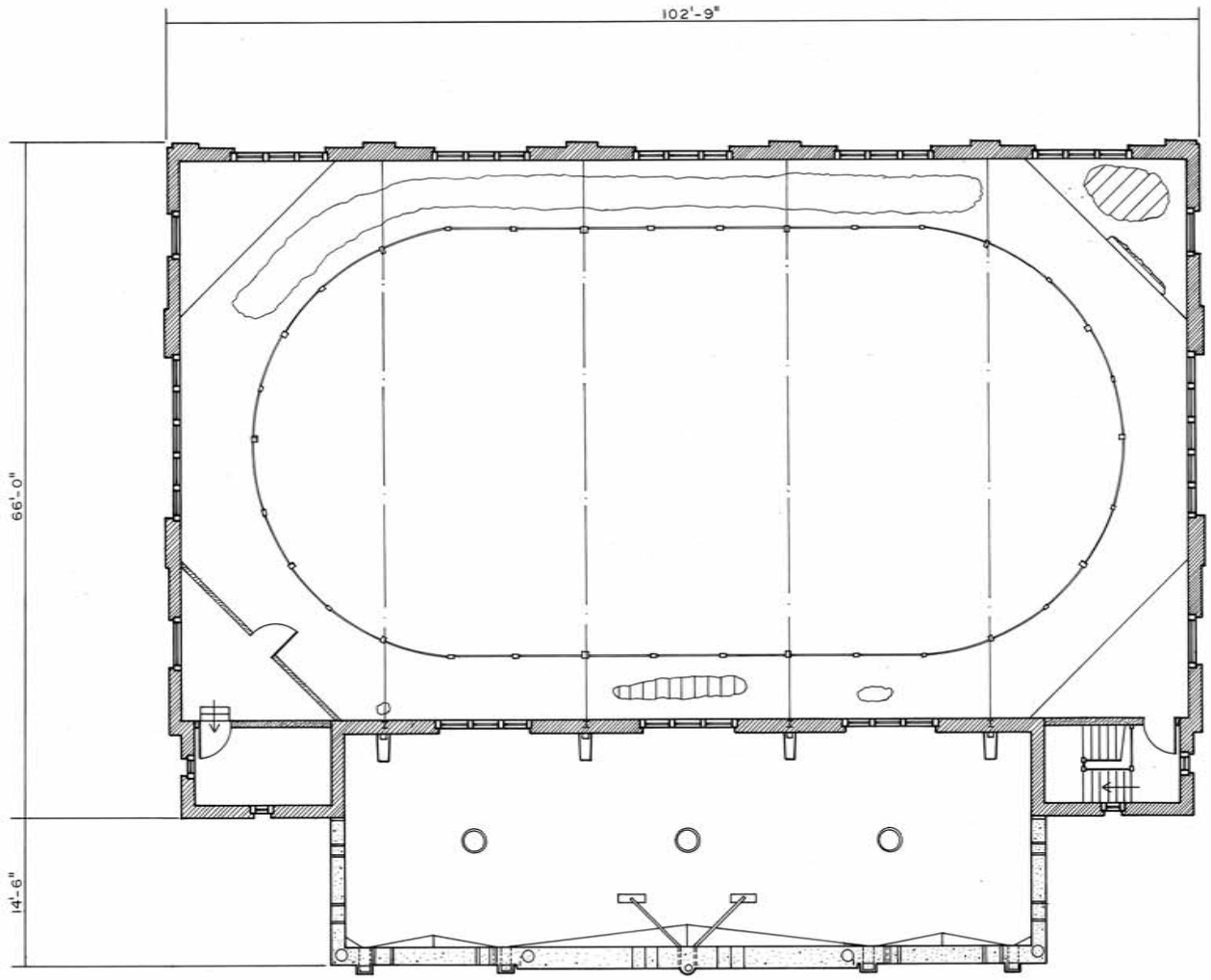

TRACK FLOOR PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"

0 1 2 3 6
METERS 1=96

DRAWN BY: JENNIFER DOMICO

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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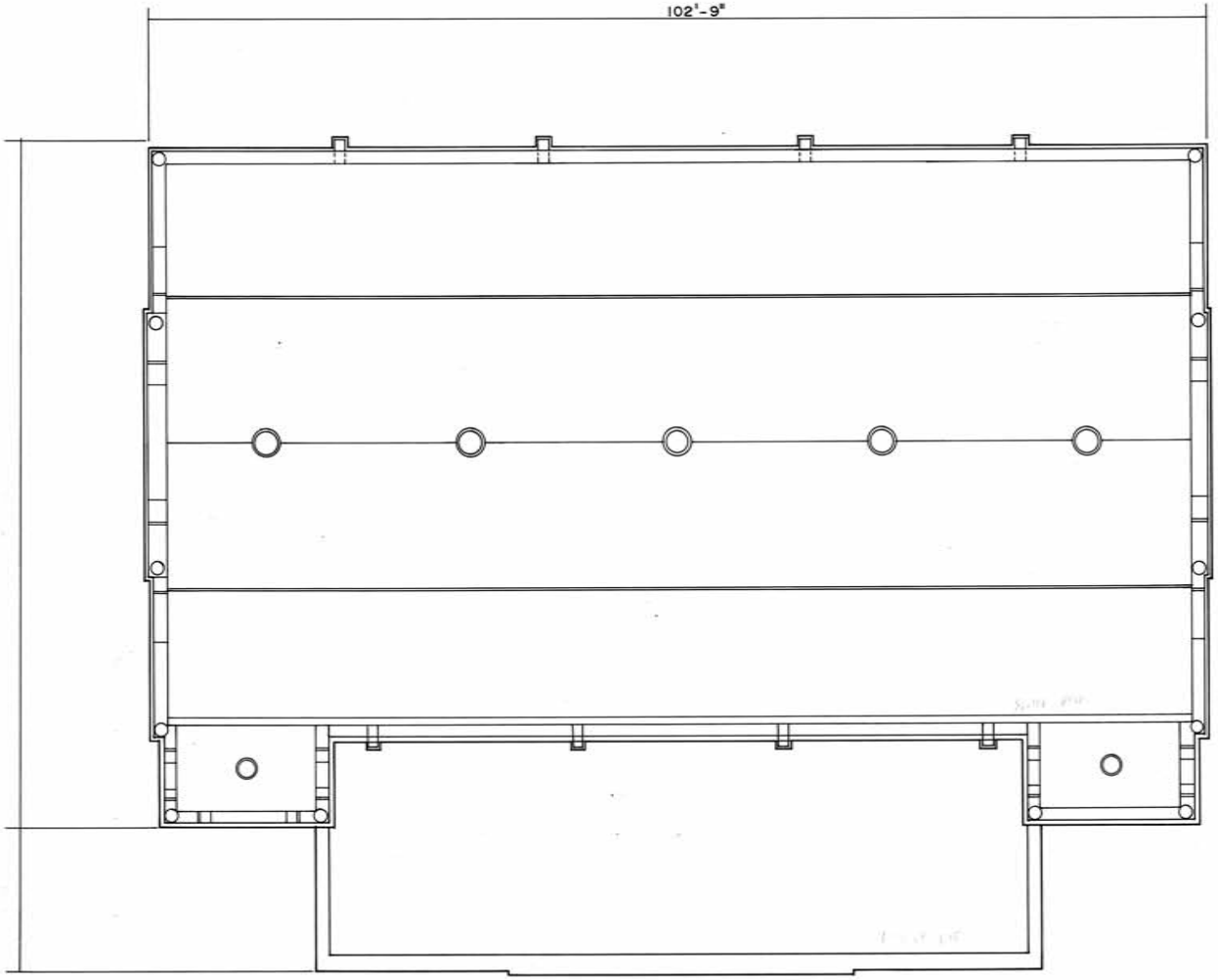

ROOF PLAN

0 4 8 12 16 20
FEET 1/8"=1'-0"
0 1 2 3 6
METERS 1= 96

DRAWN BY: JOE MCKENZIE

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
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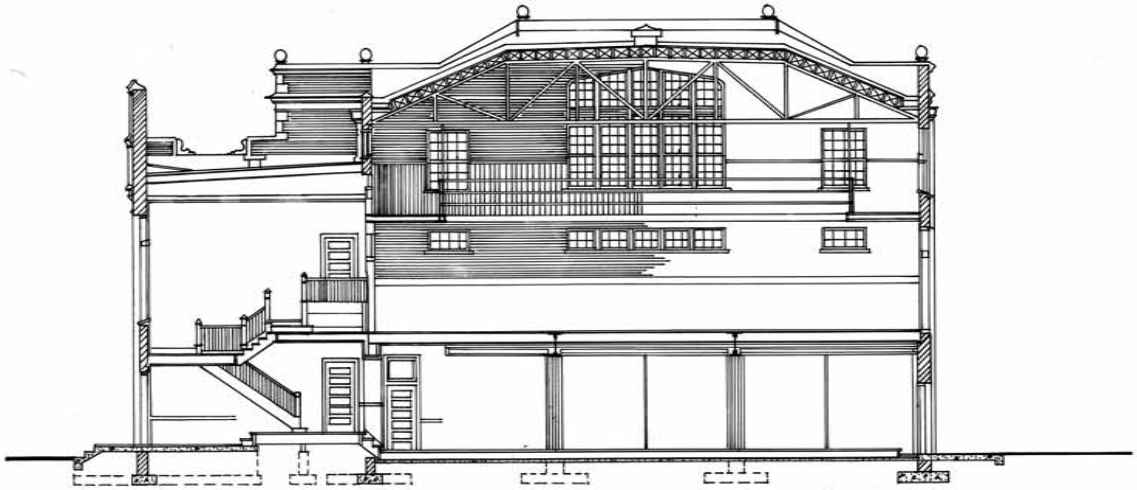
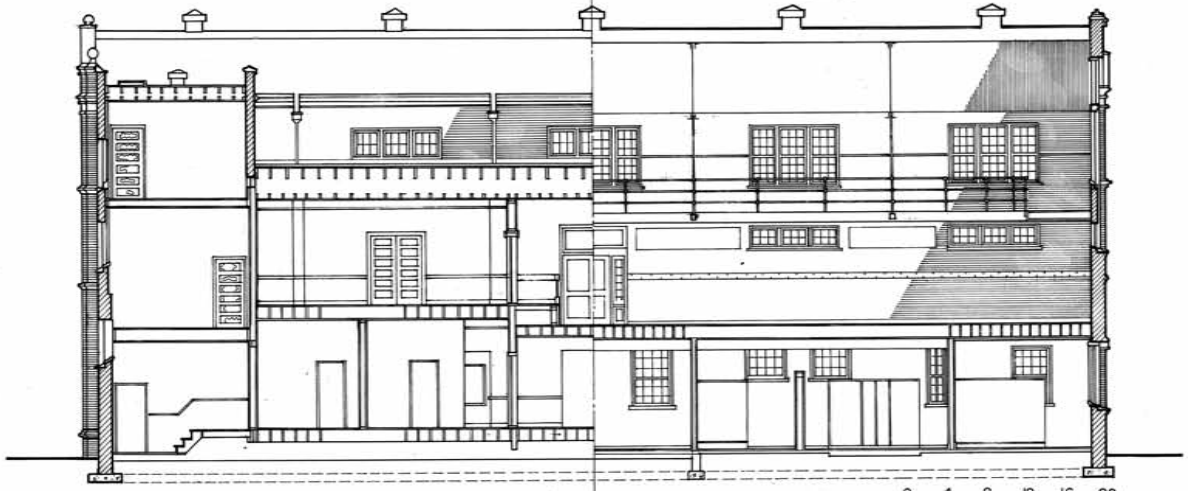


SECTION A-A

0 4 8 12 16 20
FEET 1/8"=1'-0"
0 1 2 3 6
METERS 1:96



SECTION B-B

0 4 8 12 16 20
FEET 1/8"=1'-0"
0 1 2 3 6
METERS 1:96

SCOTT CABES
DRAWN BY: STEPHEN MUNDT

1990 CHARLES E. PETERSON PRIZE COMPETITION.

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
US. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

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HISTORIC AMERICAN BUILDINGS SURVEY
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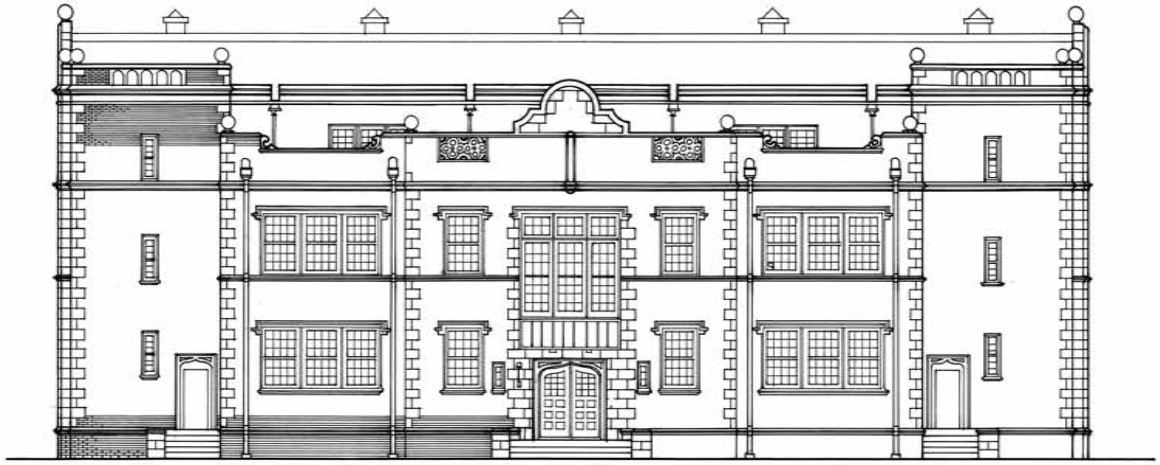

NORTH ELEVATION

0 4 8 12 16 20 FEET 1/8" = 1'-0"

0 1 2 3 6 METERS 1:96

SOUTH ELEVATION

0 4 8 12 16 20 FEET 1/8" = 1'-0"

0 1 2 3 6 METERS 1:96

1990 CHARLES E. PETERSON PRIZE COMPETITION.

ROGER FREIBERT

DRAWN BY: DAVID SCHROEDER

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE

NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM

U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY

SHEET 7 OF 8 SHEETS

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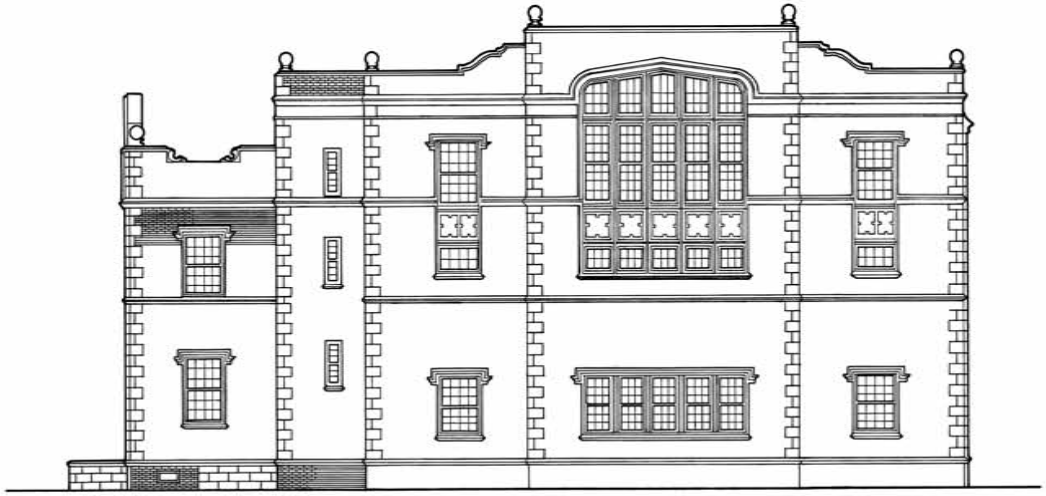

WEST
ELEVATION

0 4 8 12 16 20
FEET 1/8" = 1'-0"
0 1 2 3 6
METERS 1=96

DRAWN BY: DAVID RUIZ

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
NORTHWESTERN STATE UNIVERSITY WOMEN'S GYMNASIUM
U.S. HIGHWAY 6 · NATCHITOCHES · NATCHITOCHES PARISH · LOUISIANA

SURVEY NO. LA-1209-A

HISTORIC AMERICAN BUILDINGS SURVEY
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1990 CHARLES E. PETERSON PRIZE COMPETITION.

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8 drawings

1 data pages

Item Title
Northwestern State University, Women's Gymnasium, U.S. Highway 6, Natchitoches, Natchitoches Parish, LA

Medium
Measured Drawing(s): 8 (18 x 24 in.)

Call Number
HABS LA,35-NATCH,7-A-

Created/Published
Documentation compiled after 1933.

Notes
Survey number HABS LA-1209-A
Unprocessed field note material exists for this structure (FN-128).
Building/structure dates: 1923 initial construction
National Register of Historic Places NRIS Number: 84001335
0.19
Significance: The Northwestern State University Women's Gymnasium, 1923, is a three story brick Jacobean Revival building located on the edge of the university campus. The exterior incorporates sixteen century architectural elements in a large rectangular mass to give the effect of a Jacobean country house. The building has been little altered since construction but has not suffered any significant loss of integrity. The Women's Gymnasium is locally significant in the area as it represents the architectural firm of Favrot and Livaudais, of New Orleans.

Subjects
LOUISIANA--Natchitoches Parish--Natchitoches
gymnasiums

Related Names
Pitts, Prof. J. Michael, project manager
Louisiana State University, School of Architecture, sponsor

Reproduction Number
[See Call Number]

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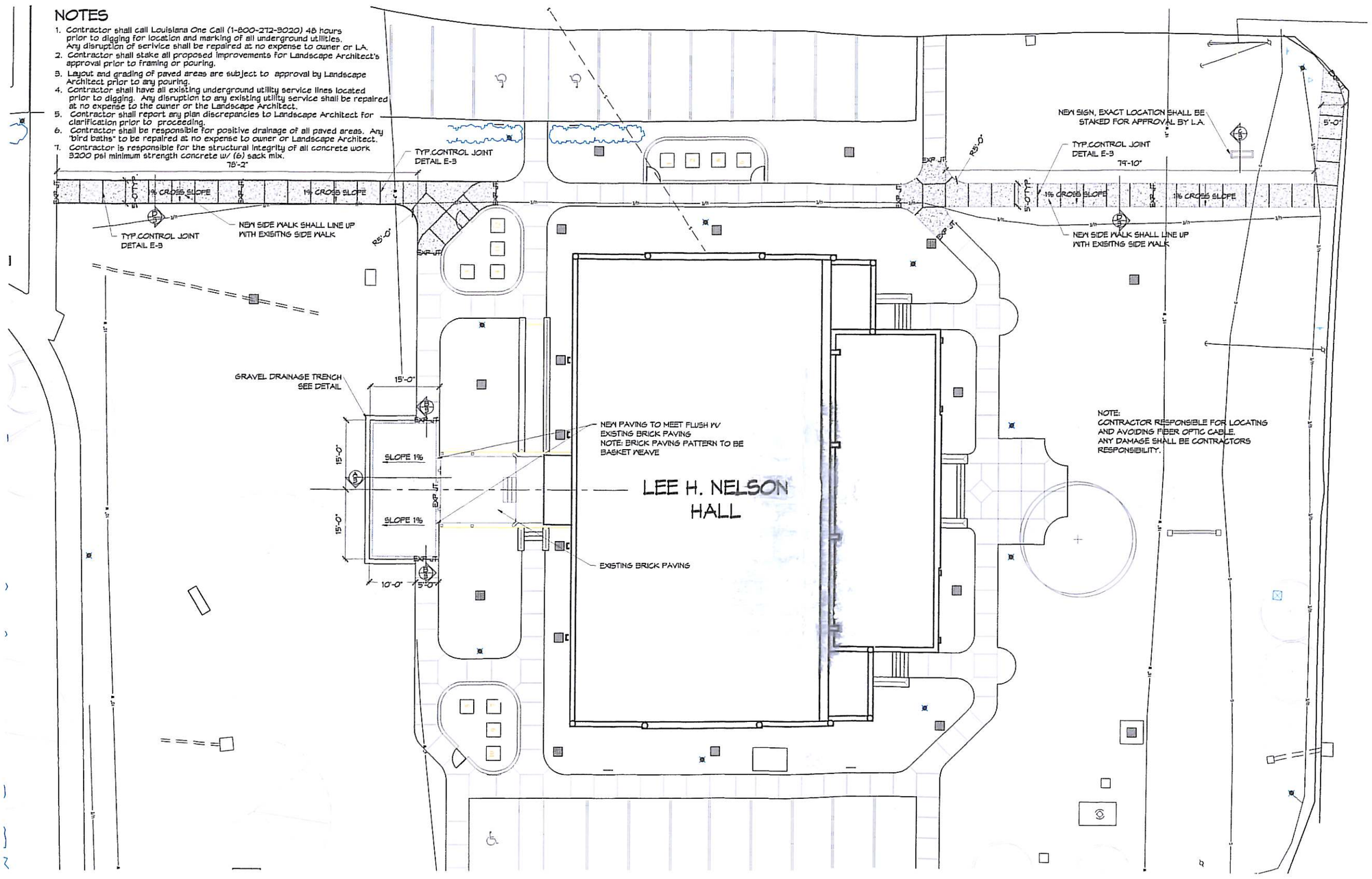
LANDSCAPE & IRRIGATION PLANS

NOTES

1. Contractor shall call Louisiana One Call (1-800-272-3020) 48 hours prior to digging for location and marking of all underground utilities. Any disruption of service shall be repaired at no expense to owner or LA.
2. Contractor shall stake all proposed improvements for Landscape Architect's approval prior to framing or pouring.
3. Layout and grading of paved areas are subject to approval by Landscape Architect prior to any pouring.
4. Contractor shall have all existing underground utility service lines located prior to digging. Any disruption to any existing utility service shall be repaired at no expense to the owner or the Landscape Architect.
5. Contractor shall report any plan discrepancies to Landscape Architect for clarification prior to proceeding.
6. Contractor shall be responsible for positive drainage of all paved areas. Any "bird baths" to be repaired at no expense to owner or Landscape Architect.
7. Contractor is responsible for the structural integrity of all concrete work 3200 psi minimum strength concrete w/ (6) sack mix.



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State Project #
19-631-93-6 Part 03

Landscape Development For:

NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING

Northwestern State University
Natchitoches, Louisiana

S N

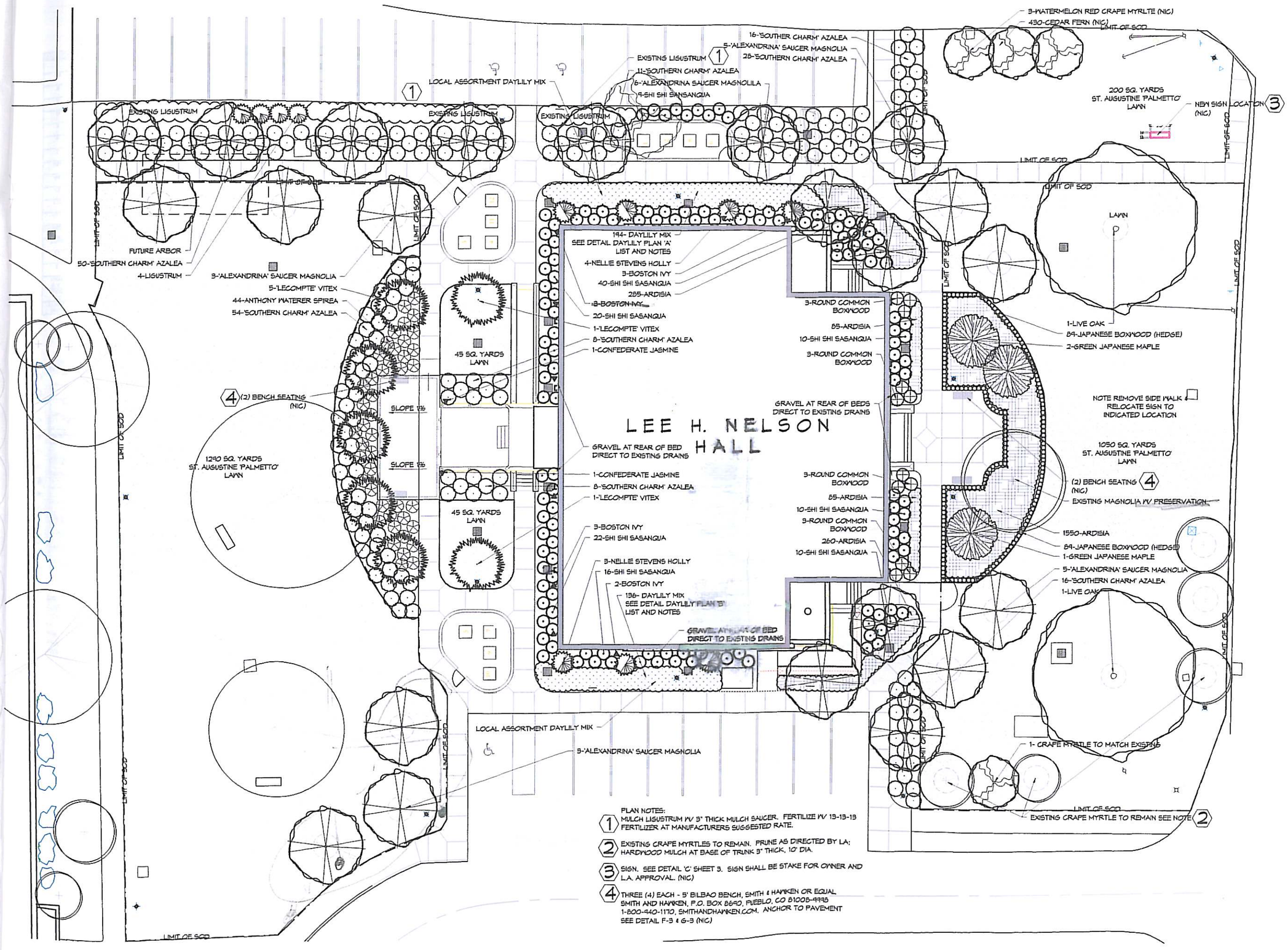
Sidewalk Layout Plan
SCALE 1" = 10'

AS BUILT

Revisions: 11-29-07
Revisions:
Revisions:
Revisions:

DISREGARD ALL PLANS PRIOR TO LATEST REVISION DATE.

Date: Feb. 26, 2007
Drawn By: SCN/APT
Checked By: JKC
Sheet No. 2 OF 7



PLAN NOTES:

1. MULCH LIGUSTRUM W/ 3" THICK MULCH SAUCER. FERTILIZE W/ 13-13-13 FERTILIZER AT MANUFACTURERS SUGGESTED RATE.
2. EXISTING CRAPE MYRTLES TO REMAIN. PRUNE AS DIRECTED BY LA; HARDWOOD MULCH AT BASE OF TRUNK 3" THICK, 10' DIA.
3. SIGN. SEE DETAIL 'C' SHEET 3. SIGN SHALL BE STAKE FOR OWNER AND L.A. APPROVAL. (NIC)
4. THREE (4) EACH - 5' BILBAO BENCH, SMITH & HAWKEN OR EQUAL SMITH AND HAWKEN, P.O. BOX 8680, PUEBLO, CO 81005-9998 1-800-440-1170, SMITHANDHAWKEN.COM. ANCHOR TO PAVEMENT SEE DETAIL F-3 & G-3 (NIC)

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318.442.8576
www.jeffreycarbo.com

State Project #
19-631-93-6 Part 03

Landscape Development For:

NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING

Northwestern State University
Natchitoches, Louisiana

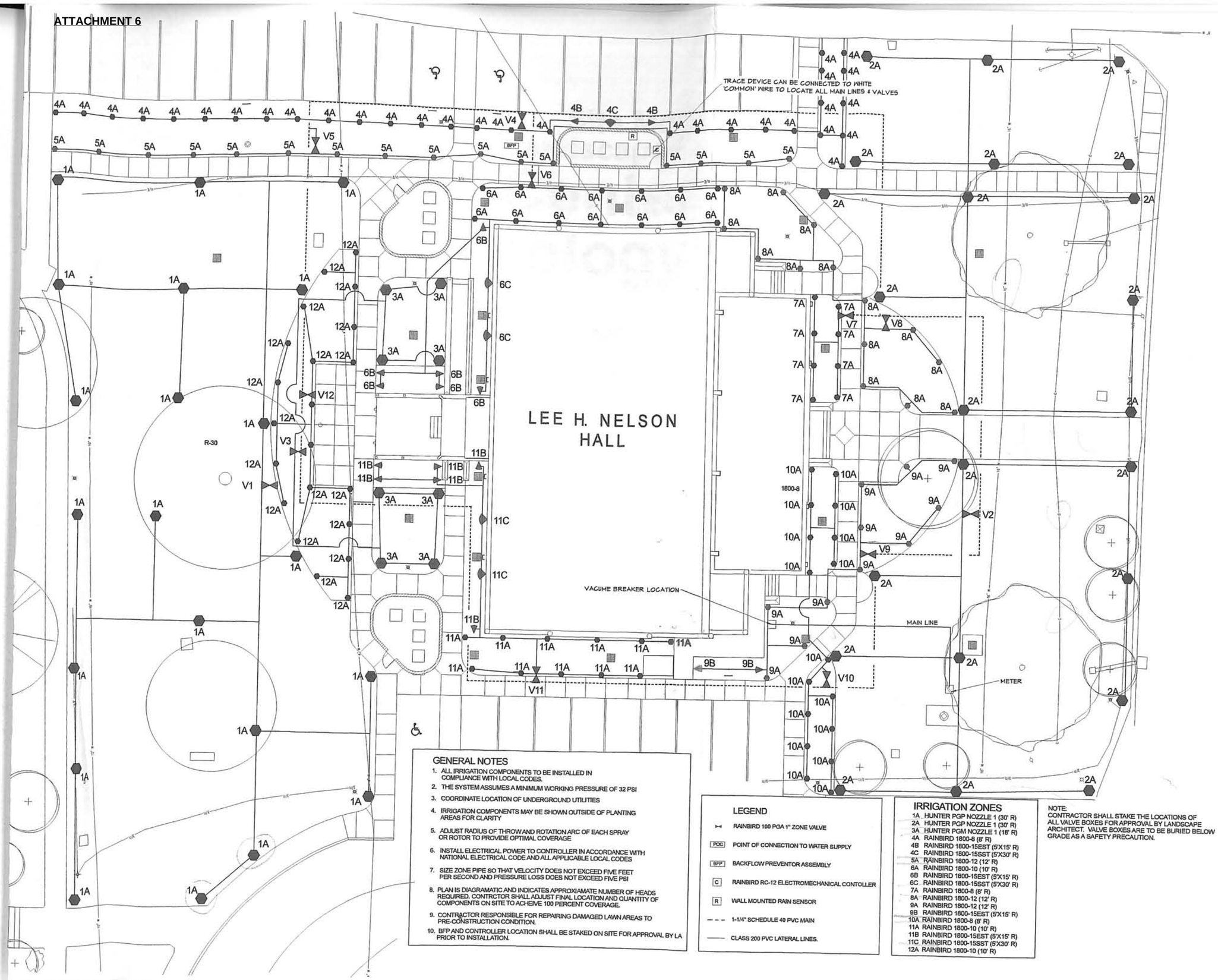
Landscape Plan
SCALE 1" = 10'

AS BUILT

Revisions: 11-29-07
Revisions:
Revisions:
Revisions:

DISREGARD ALL PLANS PRIOR TO LATEST REVISION DATE.

Date: Feb. 26, 2007
Drawn By: SCN/APT
Checked By: JKC
Sheet No. 4 OF 7



GENERAL NOTES

1. ALL IRRIGATION COMPONENTS TO BE INSTALLED IN COMPLIANCE WITH LOCAL CODES.
2. THE SYSTEM ASSUMES A MINIMUM WORKING PRESSURE OF 32 PSI
3. COORDINATE LOCATION OF UNDERGROUND UTILITIES
4. IRRIGATION COMPONENTS MAY BE SHOWN OUTSIDE OF PLANTING AREAS FOR CLARITY
5. ADJUST RADIUS OF THROW AND ROTATION ARC OF EACH SPRAY OR ROTOR TO PROVIDE OPTIMAL COVERAGE
6. INSTALL ELECTRICAL POWER TO CONTROLLER IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE AND ALL APPLICABLE LOCAL CODES
7. SIZE ZONE PIPE SO THAT VELOCITY DOES NOT EXCEED FIVE FEET PER SECOND AND PRESSURE LOSS DOES NOT EXCEED FIVE PSI
8. PLAN IS DIAGRAMATIC AND INDICATES APPROXIAMATE NUMBER OF HEADS REQUIRED. CONTRCTOR SHALL ADJUST FINAL LOCATION AND QUANTITY OF COMPONENTS ON SITE TO ACHEIVE 100 PERCENT COVERAGE.
9. CONTRACTOR RESPONSIBLE FOR REPAIRING DAMAGED LAWN AREAS TO PRE-CONSTRUCTION CONDITION.
10. BFP AND CONTROLLER LOCATION SHALL BE STAKED ON SITE FOR APPROVAL BY LA PRIOR TO INSTALLATION.

LEGEND

- RAINBIRD 100 PGA 1" ZONE VALVE
- POC — POINT OF CONNECTION TO WATER SUPPLY
- BFP — BACKFLOW PREVENTOR ASSEMBLY
- C — RAINBIRD RC-12 ELECTROMECHANICAL CONTOLLER
- R — WALL MOUNTED RAIN SENSOR
- 1-1/4" SCHEDULE 40 PVC MAIN
- CLASS 200 PVC LATERAL LINES.

IRRIGATION ZONES

- 1A HUNTER PGP NOZZLE 1 (30' R)
- 2A HUNTER PGP NOZZLE 1 (30' R)
- 3A HUNTER PGM NOZZLE 1 (18' R)
- 4A RAINBIRD 1800-8 (8' R)
- 4B RAINBIRD 1800-15EST (5'X15' R)
- 4C RAINBIRD 1800-15SST (5'X30' R)
- 5A RAINBIRD 1800-12 (12' R)
- 6A RAINBIRD 1800-10 (10' R)
- 6B RAINBIRD 1800-15EST (5'X15' R)
- 6C RAINBIRD 1800-15SST (5'X30' R)
- 7A RAINBIRD 1800-8 (8' R)
- 8A RAINBIRD 1800-12 (12' R)
- 9A RAINBIRD 1800-12 (12' R)
- 9B RAINBIRD 1800-15EST (5'X15' R)
- 10A RAINBIRD 1800-8 (8' R)
- 11A RAINBIRD 1800-10 (10' R)
- 11B RAINBIRD 1800-15EST (5'X15' R)
- 11C RAINBIRD 1800-15SST (5'X30' R)
- 12A RAINBIRD 1800-10 (10' R)

NOTE:
CONTRACTOR SHALL STAKE THE LOCATIONS OF ALL VALVE BOXES FOR APPROVAL BY LANDSCAPE ARCHITECT. VALVE BOXES ARE TO BE BURIED BELOW GRADE AS A SAFETY PRECAUTION.

JEFFREY CARBO
LANDSCAPE ARCHITECTS
SITE PLANNERS
3600 JACKSON STREET, SUITE 115
ALEXANDRIA, LOUISIANA 71303

State Project #-
19-631-93-6 Part 03

Landscape Development For:

NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING

Northwestern State University

Natchitoches, Louisiana

S N

Irrigation Plan

SCALE: 1" = 10' - 0"

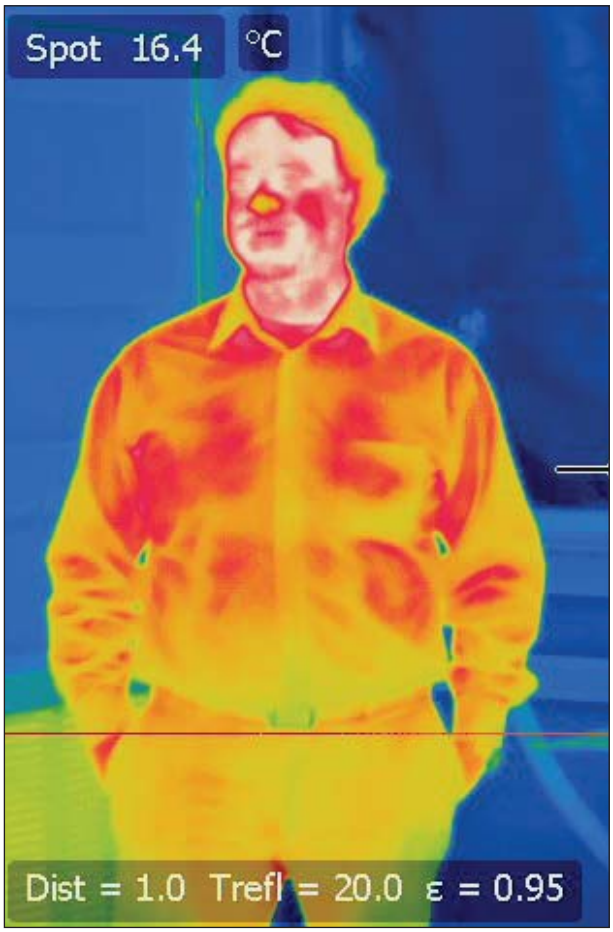
AS BUILT

Revisions: 11-29-07
Revisions:
Revisions:
Revisions:

DISREGARD ALL PLANS PRIOR TO LATEST REVISION DATE.

Date: Feb. 26, 2007
Drawn By: DG
Checked By: JKC
Sheet No. 7 OF 7

CONSULTANT BIOGRAPHIES



BAC [A+P]

Barbara A. Campagna/Architecture + Planning, PLLC

BARBARA A. CAMPAGNA, FAIA, LEED AP BD+C

Barbara has worked for the past 25 years as an architect, planner and historian – reinventing and restoring historic and existing buildings. She is the recipient of the National AIA Young Architect of the Year Award 2002 and was elevated to Fellowship in the AIA in 2009 as "the leading national architect and policymaker for the integration of preservation values into green building practices." She was the co-founder and architectural leader of the National Trust for Historic Preservation's Sustainability Program whose goal is to help professionals and the general public better understand the value of preservation in fostering development that is environmentally and socially sustainable.

She grew up in Buffalo, received an Architecture degree from University at Buffalo and a Master's in Historic Preservation from Columbia University. She was the first Executive Director of the Landmark Society of the Niagara Frontier in Buffalo, ran her own architecture firm for many years in New York City, served as the Regional Historic Preservation Officer for the Northwest Region of the General Services Administration and from 2006-2011 was the Chief Architect for the 29 historic sites operated by the National Trust for Historic Preservation. Barbara's firm, BAC/A+P, brings together all of her experiences – as both a consultant and client – to create a firm that occupies a unique niche in both the historic preservation and green building fields.

Barbara is a nationally known expert in the application of LEED on existing and historic buildings. She serves as a consultant to both the National Trust for Historic Preservation and the US Green Building Council, conducting workshops, eco-charrettes and training on the integration of LEED and preservation practices. She recently completed a Sustainability Management Plan for the Haas-Lilienthal House in San Francisco which is being used as a model by the US Green Building Council for the use of LEED EB: O&M.

RECENT HONORS & AWARDS

Dean's Medal, University at Buffalo, School of Architecture & Planning Presented at Commencement as a Distinguished Alumni who has made significant contributions to the field, 2011.

Award of Excellence, USGBC NCR Chapter, Rehabilitation of President Lincoln's Cottage, Visitor Education Center, Washington DC for integration of LEED into a National Monument building, 2009.

Inducted into the AIA College of Fellows, 2009.

Young Architect of the Year Award, AIA National Honor Award, 2002.

Marcus Eliason, PE, LEED AP BD+C Consultant

Marcus Eliason is a Professional Engineer and a Consultant at Apollo BBC. His five years of experience includes participating in projects involving commissioning building HVAC and enclosure systems, energy modeling, indoor air quality (IAQ), ASHRAE Level I, II, & III energy audits, building enclosure quality assurance, problem resolution and performance testing. His project types include existing, historic and new commercial office, industrial, and institutional buildings.

Gordon Shepperd, PE, LEED AP Principal

Gordon is a co-founder and Principal of Apollo BBC. His responsibilities include management of personnel and tasks pertaining to all Apollo BBC projects nationwide. Mr. Shepperd draws on his experience in forensic investigation to evaluate building enclosure assemblies, providing recommendations for windows, walls, and roof systems. He performs building enclosure assessments and testing of existing, historic and new building projects, with a focus on building science topics of insulation, building durability, moisture and air migration through assemblies, and performance testing.

UTILITIES USAGE CHART

fisc_year	req_no	date_start	date_end	date_days	kWh_use	el_total_cost	tGal_use	wa_tot	sw_t	total_cost
2001	2210-01-0255		05/18/01							$105.00
2001	2210-01-0375	05/21/01	07/23/01							$5,028.11
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2002	2210-02-0073	09/24/01	10/23/01	29	15000	$1,287.00	4			$1,366.65
2002	2210-02-0100/101	10/23/01	11/20/01	28	12600	$998.40	9			$1,076.42
2002	2210-02-0132	11/20/01	12/20/01	30	16800	$1,420.50	2			$1,502.72
2002	2210-02-0171	12/20/01	01/22/02	33	27300	$2,286.75	2			$2,403.62
2002	2210-02-0233	01/22/02	02/22/02	31	20100	$1,592.25	3			$1,682.72
2002	2210-02-0274	02/22/02	03/22/02	28	19200	$1,522.50	7			$1,618.92
2002	2210-02-0316	03/22/02	04/22/02	31	17700	$1,406.25	5			$1,492.05
2002	2210-02-0402/403	04/22/02	06/21/02	60	43200	$3,468.90	10			$3,649.12
2002	2210-02-0450	06/21/02	07/22/02	31	27300	$2,341.35	3			$2,461.79
2002	2210-02-0493/495	07/22/02	08/22/02	31	30000	$2,569.50	6			$2,703.21
2003	2210-03-0041	08/22/02	09/20/02	29	26100	$2,239.95	4			$2,357.71
2003	2210-03-0043	09/20/02	10/21/02	31	17100	$1,428.15	6			$1,516.00
2003	2210-03-0070	10/21/02	11/21/02	31	16200	$1,338.60	2			$1,417.54
2003	2210-03-0124	11/21/02	12/19/02	28	13500	$1,094.25	2			$1,163.42
2003	2210-03-0168	12/19/02	01/21/03	33	20100	$1,672.65	6			$1,773.80
2003	2210-03-0225	01/21/03	02/20/03	30	21600	$1,902.90	2			$2,007.02
2003	2210-03-0288	02/20/03	03/20/03	28	17100	$1,462.35	3			$1,550.40
2003	2210-03-0354	03/20/03	04/21/03	32	14700	$1,276.65	2			$1,355.72
2003	2210-03-0419	04/21/03	05/20/03	29	20100	$1,853.55	3			$1,957.25
2003	2210-03-0450	05/20/03	06/19/03	30	25200	$2,264.70	4			$2,386.41
2003	2210-03-0503	06/19/03	07/17/03	28	25200	$2,340.30	3			$2,463.47
2003	2210-03-0557	07/17/03	08/18/03	32	34200	$3,198.00	5			$3,358.60
2004	2210-04-0041/42	08/18/03	09/18/03	31	27300	$2,423.25	4			$2,551.30
2004	2210-04-0064	09/18/03	10/17/03	29	19800	$1,846.20	4			$1,951.17
2004	2210-04-0109	10/17/03	11/19/03	33	17700	$1,689.45	4			$1,791.35
2004	2210-04-0140	11/19/03	12/18/03	29	21300	$2,047.35	2			$2,157.24
2004	2210-04-0173/174	12/18/03	01/21/04	34	28200	$2,558.40	2			$2,688.74
2004	2210-04-0214/215	01/21/04	02/19/04	29	29400	$2,548.20	2			$2,678.13
2004	2210-04-0247	02/19/04	03/19/04	29	15600	$1,399.50	2			$1,483.48

2004	2210-04-0285	03/19/04	04/19/04	31	14400	$1,308.90	4			$1,392.38
2004	2210-04-0346	04/19/04	05/18/04	29	14700	$1,320.75	2			$1,401.58
2004	2210-04-0377	05/18/04	06/18/04	31	25800	$2,369.40	4			$2,495.30
2004	2210-04-0424/425	06/18/04	07/19/04	31	30600	$2,865.00	8			$3,017.96
2004	2210-04-0484/485	07/19/04	08/18/04	30	30600	$2,865.00	6			$3,013.84
2005	2210-05-0012/13	08/18/04	09/16/04	29	27300	$2,423.25	2			$2,548.18
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2005	2210-05-0451	07/15/05	08/16/05	32	35100	$3,211.05	9			$3,374.94
2006	2210-06-0010	08/16/05	09/15/05	30	33600	$3,142.50	5			$3,294.56
2006	2210-06-0046	09/15/05	10/17/05	32	28800	$2,900.10	3			$3,039.84
2006	2210-06-0072	10/17/05	11/16/05	30	18600	$1,978.20	4			$2,087.66
2006	2210-06-0106	11/16/05	12/15/05	29	16500	$2,006.25	2			$2,110.46
2006	2210-06-0147	12/15/05	01/17/06	33	20100	$2,315.85	2			$2,431.83
2006	2210-06-0178	01/17/06	02/16/06	30	21000	$2,292.00	3			$2,408.63
2006	2210-06-0215	02/16/06	03/15/06	27	21900	$2,826.10	3			$2,963.02
2006	2210-06-0254	03/15/06	04/17/06	33	24300	$3,002.20	3			$3,145.82
2006	2210-06-0335	04/17/06	05/16/06	29	23400	$2,881.60	2			$3,019.08
2006	2210-06-0405	05/16/06	06/15/06	30	27600	$3,405.40	5			$3,567.45
2006	2210-06-0423	06/15/06	07/17/06	32	33600	$4,098.40	11			$4,303.13
2006	2210-06-0482	07/16/06	08/16/06	30	36300	$4,233.70	6			$4,428.78
2007	2210-07-0040	08/16/06	09/15/06	30	30600	$3,490.00	3			$3,652.15
2007	2210-07-0077	09/15/06	10/17/06	32	26400	$3,022.00	2			$3,164.81
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2007	2210-07-0135	11/16/06	12/18/06	32	21300	$2,715.22	8			$2,715.22
2007	2210-07-0173	12/18/06	01/16/07	29	21000	$2,611.00	2			$2,738.19

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2007	2210-07-0262	03/15/07	04/16/07	32	20400	$2,562.30	2			$2,616.30
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2008	2210-08-0287	04/15/08	05/15/08	30	25500	$3,005.50	12			$3,057.00
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2008	2210-08-0443	07/16/08	08/15/08	30	36600	$4,293.40	82			$4,589.90
2009	2210-09-0004	08/15/08	09/15/08	31	23400	$2,870.80	75			$3,233.80
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2009	2210-09-0137	12/16/08	01/15/09	30	16800	$1,857.40	3			$1,886.79
2009	2210-09-0189	01/15/09	02/17/09	33	20700	$2,222.80	6			$2,256.82
2009	2210-09-0206	02/17/09	03/16/09	27	17100	$1,947.40	16			$2,013.84
2009	2210-09-0244	03/16/09	04/15/09	30	18300	$1,979.50	7			$2,016.06
2009	2210-09-0278	04/15/09	05/14/09	29	23700	$2,264.50	5			$2,296.98
2009	2210-09-0352	05/14/09	06/15/09	32	31800	$2,812.00	64			$3,045.50
2009	2210-09-0400	06/15/09	07/16/09	31	38400	$3,290.20	117			$3,709.20
2009	2210-09-0467	07/16/09	08/17/09	32	34800	$2,965.60	40			$3,115.10
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2010	2210-10-0044	09/17/09	10/15/09	28	23400	$2,042.80	38			$2,185.30
2010	2210-10-0072	10/15/09	11/16/09	32	15600	$1,388.20	5			$1,423.40

2010	2210-10-0104	11/16/09	12/15/09	29	20400	$1,780.00	4			$1,810.50
2010	2210-10-0146	12/15/09	01/15/09	31	27300	$2,488.90	3			$2,517.90
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2010	2210-10-0211	02/17/10	03/15/10	26	18600	$2,088.40	4			$2,118.90
2010	2210-10-0248	03/15/10	04/15/10	31	15900	$1,735.00	49			$1,916.00
2010	2210-10-0270	04/15/10	05/17/10	32	19500	$1,802.50	124			$2,246.00
2010	2210-10-0312	05/17/10	06/14/10	28	26700	$2,955.70	99			$3,311.70
2010	2210-10-0371	06/14/10	07/15/10	31	27300	$3,197.31	102			$3,563.81
2010	2210-10-0403	07/15/10	08/16/10	32	26700	$3,008.10	128			$3,466.60
2011	2210-11-0003	08/16/10	09/16/10	31	25500	$2,954.00	95			$3,296.49
2011	2011-11-0046	09/16/10	10/18/10	32	18600	$2,256.25	148			$2,783.74
2011	2011-11-0082	10/18/10	11/16/10	29	12900	$1,545.56	54			$1,740.26
2011	2010-11-0103	11/16/10	12/16/10	30	15600	$1,986.59	4			$2,017.00
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2011	2010-11-0194	02/15/11	03/15/11	28	14100	$1,720.78	8	$21.50	###	$1,758.28
2011	2010-11-0217	03/15/11	04/14/11	30	15600	$2,085.27	100	#####	###	$2,543.27
2011	2010-11-0264	04/14/11	05/16/11	32	16800	$2,268.66	140	#####	###	$2,906.66
2011	2010-11-0317	05/16/11	06/16/11	31	24600	$3,072.11	141	#####	###	$3,714.61
2011	2010-11-0374	06/16/11	07/15/11	29	27600	$3,270.27	132	#####	###	$3,872.27
2011	2010-11-0405	07/15/11	08/16/11	32	36300	$4,098.59	182	#####	###	$4,925.59
2012	2010-12-0009	08/16/11	09/15/11	30	27300	$3,261.99	150	#####	###	$3,944.99
2012	2010-12-0055	09/15/11	10/14/11	29	21900	$2,522.78	137	#####	###	$3,147.28
2012	2010-12-0084	10/14/11	11/16/11	33	17100	$2,012.92	163	#####	###	$2,757.62
2012	2010-12-0118	11/16/11	12/15/11	29	19200	$2,421.52	3	$15.50	###	$2,452.02
2012	2010-12-0154	12/15/11	01/17/12	33	16200	$2,216.05	3	$15.50	###	$2,246.55
2012	2010-12-0188	01/17/12	02/17/12	31	17400	$2,219.33	4	$18.00	###	$2,252.33
2012	2010-12-0213	02/17/12	03/15/12	27	11700	$1,541.33	4	$18.00	###	$1,574.33
2012	2010-12-0237	03/15/12	04/16/12	32	15900	$2,042.25	1	$13.00	###	$2,070.25
2012	2010-12-0288	04/16/12	04/15/12	29	14400	$1,712.46	3	$15.00	###	$1,742.96
2012	2010-12-0319	05/15/12	06/15/12	31	19200	$2,284.62	14	$43.00	###	$2,355.62
2012	2010-12-0357	06/15/12	07/16/12	31	21000	$2,211.19	15	$45.50	###	$2,286.69
2012	2010-12-0389	07/16/12	08/16/12	31	23400	$2,599.68	18	$53.00	###	$2,688.68
2013	2010-13-0026	08/16/12	09/17/12	32	18300	$2,042.55	15	$45.50	###	$2,118.05

2013	2010-13-0073	09/17/12	10/17/12	30	16500	$1,850.82	18	$53.00	###	$1,939.82

LIST OF RESOURCES

Cultural Landscape Report for National Center for Preservation, Technology and Training. Prepared by Christopher Stevens, Olmsted Center for Landscape Preservation, National Park Service, Massachusetts, 2006.

Women's Old Gymnasium, Historic Structure Report. Prepared by Regina T. Binder with Joan Berkowitz and David Bitterman, Building Conservation Branch, Cultural Resources Center, North Atlantic Region, National Park Service, U.S. Department of the Interior, Lowell, Massachusetts, 1993.

Sidewalk Layout Plan & Landscape Plan As Builts, February 26, 2007. Prepared by Jeffrey Carbo, Landscape Architects, Site Planners, 3600 Jackson Street, Suite 115, Alexandria, Louisiana, 71303.

Natchitoches Historic District National Register of Historic Places Inventory-Nomination Form. National Historic Landmark District, listed 1984. Robert B. DeBlieux and the Louisiana State Historic Preservation Office (August 10, 1978)

Historic American Building Survey, 8 measured drawings & 1 data sheet. Survey number HABS LA-1209-A. Northwestern State University, Woman's Gymnasium, prepared by Louisiana State University, School of Architecture, Professor J. Michael Pitts, project manager. 1990.

Women's Gymnasium, Northwestern State University, National Register of Historic Places Inventory-Nomination Form, listed 1984. National Register nomination prepared by Maxine Southerland, Director, Center for History of Louisiana Education, Northwestern State University, Natchitoches, Copy in Register file, LA State Historic Preservation Office.

Specifications & Drawings for a Rehabilitated Facility for the National Center for Preservation Technology and Training, Lee H. Nelson Hall, September 1997, Coco and Company, Wayne Lawrence Coco, AIA Architect.

ILLUSTRATION CREDITS

PAGE 1. From the Cultural Landscape Report, page 28

PAGE 2. Top: NCPTT
Bottom: Barbara A. Campagna

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PAGE 6. Top: Barbara A. Campagna
Bottom: NCPTT

PAGE 7. Top: NCPTT
Bottom: From the HABS Documents

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PAGE 10. Courtesy NCPTT website

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Bottom: Courtesy U.S. Green Building Council

PAGE 14. Top: BAC/A+P website
Middle: Courtesy National Trust for Historic Preservation
Bottom: Courtesy National Trust for Historic Preservation

PAGE 15. Top: Barbara A. Campagna
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PAGE 21. Top: Courtesy Candice Pauley for the Cane River National Heritage Area webpage
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PAGE 25. Top: Courtesy President Lincoln's Cottage (website)
Bottom: Courtesy President Lincoln's Cottage (website)

PAGE 26. Top: Courtesy The Christman Company
Middle: Courtesy The Christman Company
Bottom: Courtesy The Christman Company

PAGE 27. Top: Courtesy The Roaring Mouse (website)
Middle: Courtesy The Presidio Trust
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PAGE 28. Top: Courtesy Cavallo Point Lodge (website)
Bottom: Courtesy Cavallo Point Lodge (website)
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Bottom: Courtesy Google

PAGE 30. Top: Courtesy National Trust for Historic Preservation
Bottom: Courtesy Wikipedia

PAGE 31. Left: Courtesy Empire State Building (website)
Right Top: Courtesy Empire State Building (website)
Right Bottom: Courtesy Wikipedia

PAGE 32. Top: Courtesy Wikipedia
Bottom: Courtesy Wikipedia

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PAGE 38. Top: Barbara A. Campagna
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PAGE 39. Top: Barbara A. Campagna
Bottom Right: Barbara A. Campagna
Bottom Left: Google Earth, 12.05.13

PAGE 40. Top: Barbara A. Campagna
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PAGE 41. Top: Barbara A. Campagna
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PAGE 42. Top Left: Barbara A. Campagna
Bottom Left: Barbara A. Campagna
Bottom Right: Barbara A. Campagna

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PAGE 51. Top: Courtesy Green Seal (website)
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