FINAL TECHNICAL/SCIENTIFIC REPORT

Award Number:	DE- EE0002501
Recipient:	Forest County Potawatomi Community
Project Title:	Energy Efficiency Improvements to Wundar Hall, a Historic Building on the Concordia Campus, Milwaukee, Wisconsin
Project Location:	Former Concordia College Campus, Milwaukee, WI, also known as the Concordia Trust Property
Principal Investigator:	Nathan Karman, Forest County Potawatomi Community Legal Department

EXECUTIVE SUMMARY

The Forest County Potawatomi Community ("FCPC" or "Community") implemented energy efficiency improvements to revitalize Wundar Hall, a 34,000 square foot ("SF") building that was formerly used as a dormitory and is listed on the National Registry of Historic Places, into an office building. Wundar Hall, which has been renamed Bgemagen Hall (*bug-mah-gen*; Potawatomi for "war club"), is the first of many architecturally and historically significant buildings that the Community hopes to renovate at the former Concordia College campus, property on the near west side of Milwaukee that was taken into trust for the Community by the United States on July 10, 1990 (collectively, the "Concordia Trust Property").

As part of this project, which was conducted with assistance from the Department of Energy's Tribal Energy Program ("TEP"), the Community updated and/or replaced the building envelope, mechanical systems, the plumbing system, the electrical infrastructure, and building control systems. The project is expected to reduce the building's natural gas consumption by 58% and the electricity consumption by 55%. In addition, the project was designed to act as a catalyst to further renovation of the Concordia Trust Property and the neighborhood. The City of Milwaukee has identified redevelopment of the Concordia Trust Property as a "Catalytic Project" for revitalizing the near west side. The Tribe envisions a revitalized, mixed-use campus of community services, education, and economic development—providing services to the Indian community and jobs to the neighborhood.

BACKGROUND OF COMMUNITY AND CONTEXT OF PROJECT

FCPC is organized under the Indian Reorganization Act of 1934 ("IRA"), 25 U.S.C. § 461-479, and exercises governmental authority under a Constitution last adopted in 1982. FCPC has a membership of more than 1,400 people. Its land base includes a Reservation of over 12,000 acres of forests, lakes, and streams in northeastern Wisconsin, and trust land in the Milwaukee, Wisconsin area.

FCPC tradition and history teaches a strong commitment to protecting and preserving the natural environment, both on and near the reservation and throughout the world. FCPC, like most indigenous peoples, refer to the Earth as "Our Grandmother" or "Mother Earth," and perceive of the Earth itself as a living being. FCPC also refer to Earth as "Pamuk-kumiges," which means

"laid out for us"—requiring the Community to act as stewards over the land, water, plants, and animals that the Great Spirit provided. The proper respect and treatment of resources is required to not only assure human safety in an unpredictable world, but also to guarantee balance and harmony in the world itself.

In an effort to formalize these environmental values and implement related action, FCPC adopted the following environmental mission statement:

> The traditional values of the Forest County Potawatomi Community teach us to respect all living things, to take only what we need from Mother Earth, and to preserve the air, water, and soil for our children. Reflecting these values, we take leadership in creating a sustainable and healthy world. We resolve to reduce our own environmental impacts and to take steps to remedy the impacts of others. We encourage others to do the same. We also seek legislative and policy changes that protect the environment for all people, including generations to come. (adopted November 20, 2008)

Recognizing the relationship between the Community's energy policy and its environmental mission, the Community established a goal of energy independence using renewable, carbon-neutral resources. In reaching that goal, the Community not only focuses on producing its own clean power, but also implements energy efficiency efforts to reduce its energy consumption and associated carbon footprint. As a result of these efforts, the Community's energy use at its major occupied facilities has decreased by 14.4% per square foot, its costs have decreased by 12.9% per square foot, and associated carbon emissions have decreased by 20.5% per square foot.

The project at Bgemagen Hall falls squarely within these goals and efforts and is expected to provide even greater reductions in energy use.

COMPARISON OF THE ACTUAL ACCOMPLISHMENTS WITH THE GOALS AND OBJECTIVES OF THE PROJECT

The project's objective was to retrofit the former Wundar Hall in an energy efficient manner and in a way that would catalyze development of the Concordia Trust Property and the surrounding neighborhood. Aside from one minor change to the proposed scope, discussed in more detail below, the project proceeded as planned. Also, as of the date of this report, the energy efficient and historic building already houses two businesses. Although the Community was able to accomplish its goals, it was not always easy. The often conflicting goals of energy efficiency and historic preservation complicated or delayed project components.

PROJECT SUMMARY

Wundar Hall was a dormitory, had been used for apartments, and was vacant. The building's prior tenant left the building unused and unheated for many years. The building contained friable asbestos, active mold growth, and was dangerous from a health perspective. Before undertaking the energy efficient improvements, mold and asbestos abatement, which was approved by the National Parks Service ("NPS") and the Wisconsin Historical Society ("SHPO"), needed to occur. This remediation began in July of 2011. In October of 2011, selective demolition commenced to remove failing structures which caused unsafe conditions.

After these early remediation and abatement activities, for which the Community provided exclusive funding, the project continued incrementally, awaiting NPS and SHPO approvals for various steps in the project. The project focused on four aspects of the building, which included the subtasks identified below:

Envelope

1. Windows – replaced with energy efficient windows
2. Doors – replaced entry doors
3. Exterior walls – repaired clay tile, installed rigid insulation, and fixed dry wall
4. Roof – although the Statement of Project Objectives identified that this subtask would install blown-in insulation, the space was rotted, requiring more extensive repairs to the roof and allowed the Community to install rigid insulation.
5. Exterior masonry – repaired and sealed to eliminate cracks

HVAC System

1. Demolished and removed existing HVAC system
2. Finalized engineering plan, received approval, obtained City permit
3. Installed new 94% efficient gas-fired boilers and chillers
4. Optimized HVAC controls
5. Tested and balanced system

Plumbing System

1. Demolished and replaced existing system and piping
2. Installed new combined water service (domestic and fire protection)
3. Installed new low-flow fixtures and piping
4. Installed new energy-efficient water heater and associated equipment

Electrical Infrastructure

1. Upgraded and rewired all electrical systems to meet current code standards
2. Installed energy-efficient lighting (florescent or LED) and lighting controls (dual-level switching, daylight controls, and automatic shutoff)
3. Wired new HVAC and other high efficiency mechanical equipment

Additional detail on these tasks is set forth on Exhibit 1 hereto.

Though a meaningful before and after comparison of reductions in energy consumption is impossible considering that the facility was previously vacant and unheated and is now partially occupied, the project is expected to decrease natural gas use by 58% and electricity use by 55%. In addition, as mentioned above, two tribally-owned businesses now have offices in Bgemagen Hall, with others hopefully joining soon and transforming the building, the Concordia Trust Property, and the surrounding community.

The Community was able to undertake this important energy-efficiency project thanks to the assistance of the TEP, which provided funds in the amount of $1,179,853.00. The Tribe matched that amount for grant-related work, plus spent more than $3 million of additional funds to enable this historic yet efficient property.

PRODUCTS DEVELOPED

This project's scope did not include development of products such as publications, websites, or inventions, and the project did not result in the development of new techniques or research collaboration. However, the project gained significant publicity in local papers during implementation. A representative article is attached as Exhibit 2. In addition, the Community has presented at DOE's annual TEP Review in Colorado the past four years. The most recent presentation is attached as Exhibit 3.

Exhibit 1 to Final Scientific/Technical Report for Award DE-EE002501

("Energy Efficiency Improvements to Wundar Hall, a Historic Building on the Concordia Campus, Milwaukee, Wisconsin")

List of Energy Efficient Improvements to Wundar Hall

The Forest County Potawatomi Community undertook the following energy efficiency improvements at Wundar Hall:

- Installed energy efficient windows.
- Installed energy efficient doors.
- Added insulation throughout.
- Conducted masonry repairs to exterior.
- Demolished and removed existing HVAC system including boilers, pumps, all hot water supply and return piping, and cast iron radiators.
- Installed two new 500,000 BTU each gas fired hot water 94% thermal efficient modulating boilers.
- Installed two new boiler pumps, two system circulating pumps, expansion tank, and all hot water specialties.
- Installed boiler venting and combustion air intake.
- Installed all new hot water supply and return pipe, fittings, and valves.
- Installed new 90 ton air cooled water chiller set on concrete slab on grade.
- Installed new chilled water circulating pumps.
- Installed new chilled water supply and return pipe, fittings, and valves.
- Installed new four-pipe fan coil units for simultaneous heating and cooling.
- New air handling unit with heating and cooling coil and economizer to provide ventilation per code for the basement.
- Installed new air handling unit with heating and cooling coil and economizer to provide ventilation per code for the three above-grade floor common areas.
- Installed galvanized ductwork distribution as needed.
- Installed hot water convectors at all outside entrances.
- Installed exhaust fans and ductwork needed for exhaust at toilet rooms.
- Installed pipe and duct insulation.
- Tested and balanced.
- Installed Direct Digital Controls for individual room and zone control.
- Installed new combined water service, sized for domestic water and fire protection systems.
- Installed new low flow/high efficiency plumbing fixtures and piping.
- Installed new energy efficient water heater and associated equipment.
- Designed energy efficient lighting to meet the requirements of the State of WI Department of Commerce Building Code, Chapter 63 for energy conservation.
- Provided the following exterior lighting:
    - Six wall packs for site lighting
    - Exterior light fixtures to be controlled by a time-clock and photocell.
- Provided the following interior lighting fixtures:
    - 2x4 per room on certain floors
    - Strip fixtures in basement
    - 2x4 fixtures per hallway
    - Surface fixtures in each stair well.

- Installed switching and control per State of WI, Department of Commerce Building Code, Chapter 63 including the following:
    - Dual-level switching.
    - Daylight controls.
    - Automatic shutoff control panel and override switches (Code Required)
    - Exit and emergency lighting
- Provided the following exit and emergency lighting:
    - Exterior emergency energy efficient lights at all exit doors. (Code Required)
    - Egress lights in halls 24 foot on center
    - Exit lights in hall
- Provided 15 Amp, 1-phase, 120 volt duplex receptacles
- Provided weatherproof GFI receptacles on roof for HVAC equipment.
- Provided power to the following equipment:
    - Water heaters
    - Boilers and pumps
    - Chiller
    - Circulating pumps
    - Fan coil units
    - Air handling units
    - RTU
- Provided the following service / electrical distribution equipment:
    - One 1200 amp, 208 volt 3 phase main breaker service panel
    - One 1200 amp meter enclosure
    - Four 200 amp load centers

Exhibit 2 to Final Scientific/Technical Report for Award DE-EE002501

("Energy Efficiency Improvements to Wundar Hall, a Historic Building on the Concordia Campus, Milwaukee, Wisconsin")

Representative Press on Project

BizTimesMedia

Real Estate: Potawatomi plan $25 million redevelopment of former Concordia campus

Friday, December 17, 2010

The Forest County Potawatomi Community are moving forward with detailed plans for a $25 million redevelopment of the former Concordia College campus southeast of West State Street and North 33rd Street in the city's Concordia neighborhood. The project will be one of the largest real estate projects in southeastern Wisconsin in 2011.

"It is my hope we are doing bricks and mortar by late spring or early summer," said Forest County Potawatomi attorney general Jeffrey Crawford.

The tribe owns an 11.5-acre site along the east side of North 33rd Street and on both sides of West State Street. The former Concordia campus, located on the south side of State Street, is where the first phase of the redevelopment project will take place.

The property was placed into federal trust and has been owned by the tribe since 1990. At the time, it was considered a potential site for the Potawatomi Bingo Casino, but neighbors objected to that plan and the casino was built in the Menomonee Valley instead, Crawford said.

Concordia University moved out of the property in 1983 to its current location in Mequon. The Indian Community School occupied the property from 1987 until earlier this year when it moved to a new facility in Franklin.

"We had a long-term lease with the Indian Community (school)," Crawford said. "We knew that was going to come to an end. We have been planning to redevelop the site since 2007."

The former Concordia campus consists of seven buildings. The tribe plans to demolish a small administrative office building and restore the other six buildings. The buildings are decades-old, ranging from the 110-year-old, 33,024-square-foot Albrecht Hall to the 61-year-old, 55,830-square-foot Pritzlaff Hall building.

Pritzlaff Hall will be renovated to create space for the Spotted Eagle High School and to create office

space.

Spotted Eagle High School will move to the building from its current building on the north side of State Street. The high school has about 100 students and is "bursting at the seams," in its existing building, Crawford said.

The tribe plans to demolish the high school's current building and a small apartment building located on its property north of State Street.

The 85-year-old, 34,720-square-foot Wundar Hall building, a former dormitory, will be converted into a business accelerator complex to provide space for start-up businesses. Work on that building has already begun, and the tribe received a $1.1 million U.S. Dept. of Energy grant to provide a modern and efficient energy system to the historic building. Glendale-based Johnson Controls Inc. and Pewaukee-based VJS Construction Services is working on the project.

The Albrecht Hall building might be the jewel of the campus.

"It is a gorgeous building," Crawford said. "However, it is in serious deterioration."

The tribe plans to transform the Albrecht building into the primary government center for its Milwaukee government offices. It will be used for meetings with city, county, state and federal officials and can also be used for press conferences, training and presentations. The building also has a chapel that could be used for Native American ceremonies.

The former library building, which is attached to Albrecht Hall, will be used for office space.

"It has good open space, a loft-type feel for office space," Crawford said.

The 85-year-old Refectory building will be used as a cafeteria for the campus and eventually could be a site for catered meetings.

The former Concordia gymnasium building will be used by tenants in the entire complex, including the high school.

The tribe plans to move much of its administrative offices from its office building at 313 N. 13th St. to the buildings in the Concordia campus, Crawford said. The tribe's legal department, the Potawatomi Business Development Corp. headquarters and the Forrest County Potawatomi Foundation offices area all expected to be re-located. Next year, five to seven tenants should be in place at the Concordia campus, he said.

"The tribe wants to fulfill the original intent (of acquiring the property), which is to make a home for the urban Indian community," Crawford said. "We have our own business and government needs."

The tribe still plans to keep its 13th Street office building. Much of the administrative offices at Potawatomi Bingo Casino will be relocated to that building, Crawford said.

The former Concordia campus still has room for more uses, but the tribe does not plan to add any other buildings to that area.

However, the vacant land to the south of the campus, which is about the size of a football field, and the area to the north of State Street that is vacant and will be vacated by the demolition of the school and apartment building, are planned for future business development. The businesses could be companies that are nurtured by the Potawatomi Business Development Corp., or they could be businesses with no affiliation with the tribe that need space, Crawford said. The development of the vacant land could take several years, and will depend on what opportunities are presented, he said.

"That's a lot of open space," Crawford said. "We have an open mind. But whatever we put in there is gong to be complimentary with the neighborhood."

The redevelopment of the Concordia College central campus is expected to take five to 15 years and cost $25 million, Crawford said.

The tribe likes the historic nature of the Concordia neighborhood and pledges to enhance the property to fit in with the neighborhood, Crawford said.

"It's a beautiful location, with old fashioned homes," he said. "We will enhance the neighborhood with historic preservation. We want this to fit well within the neighborhood. We are committed to working with the community to help improve the security of the area and generate jobs that people can walk to. We're not going to pick up and leave, so let's generate something positive for the neighborhood."

Exhibit 3 to Final Scientific/Technical Report for Award DE-EE002501

("Energy Efficiency Improvements to Wundar Hall, a Historic Building on the Concordia Campus, Milwaukee, Wisconsin")

Final TEP Annual Review Presentation

FOREST COUNTY
POTAWATOMI
Keeper of the Fire

Bgemagen Project

Bgemagen Project

Energy Efficient Renovation of Historic Building
Milwaukee Trust Land

Before

Bgemagen Project

Energy Efficient Renovation of Historic Building
Milwaukee Trust Land

Before

After

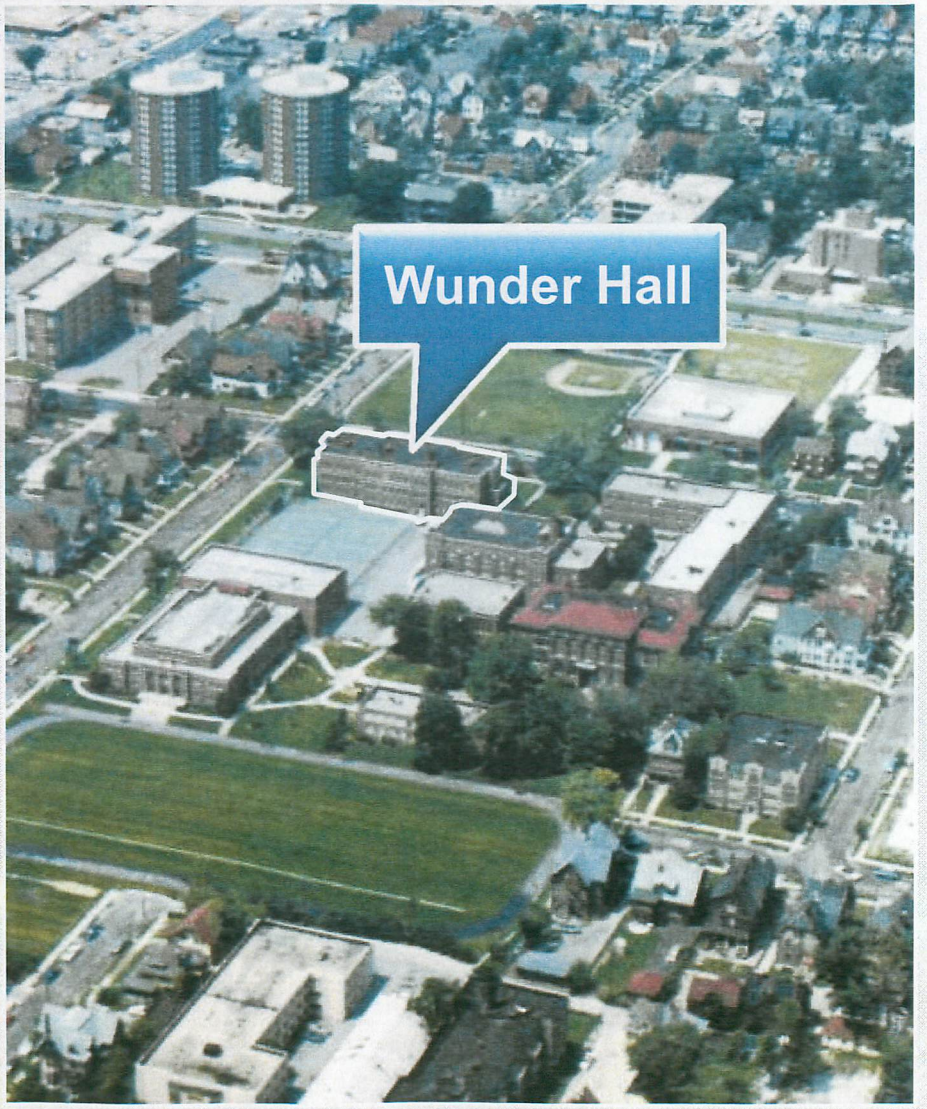
Bgemagen Project

The Bgemagen

|Bug-mah-gen| *noun*

Potawatomi for “war club”

Also known as Wunder Hall, this 34,000 sq. ft. building is located on the former campus of Concordia College just west of downtown Milwaukee



Bgemagen Project

Built in 1925 as a dormitory and is listed on the National Register of Historic Places

Wunder Hall 1924

Wunder Hall 1950

Bgemagen Project

Project goals

- Renovate and convert the building from a dormitory to a commercial office building
- Incorporate the highest level of sustainability
- Meet National Park Service and State Historic Preservation standards in order to become eligible for historic tax credits

Bgemagen Project

Renovation project is funded in part with DOE support and includes the following components:

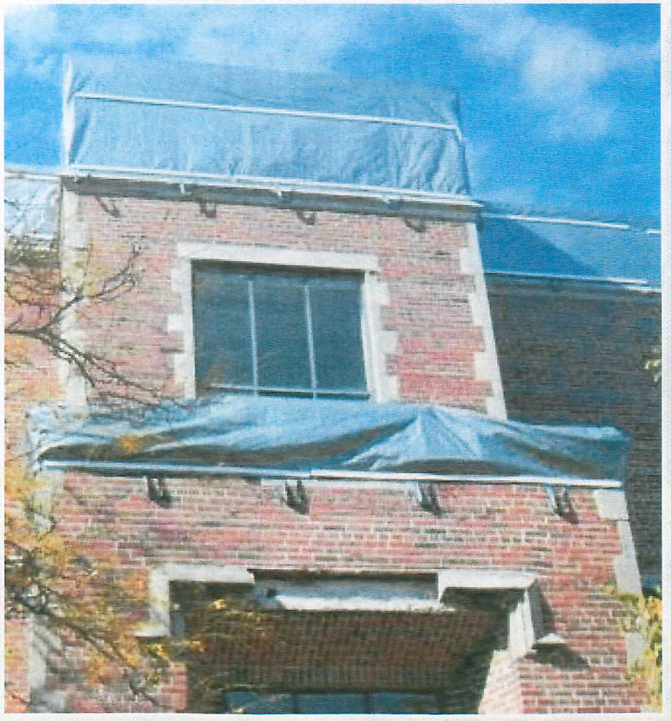
- Building envelope
- Building HVAC system
- Building plumbing system
- Building electrical infrastructure

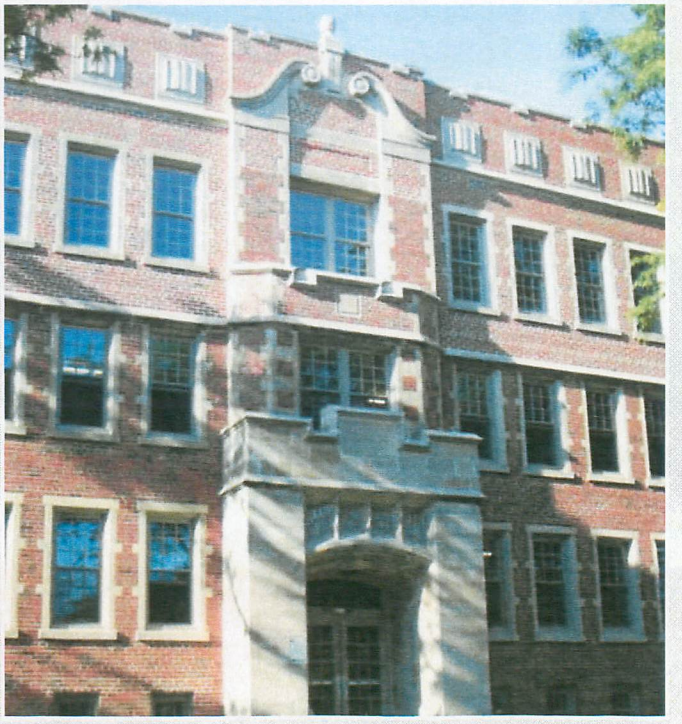
U.S. DEPARTMENT OF ENERGY

Bgemagen Project

Building envelope

- Energy-efficient windows and doors
- Upgraded exterior wall and roof insulation
- Sealing of exterior masonry





Bgemagen Project

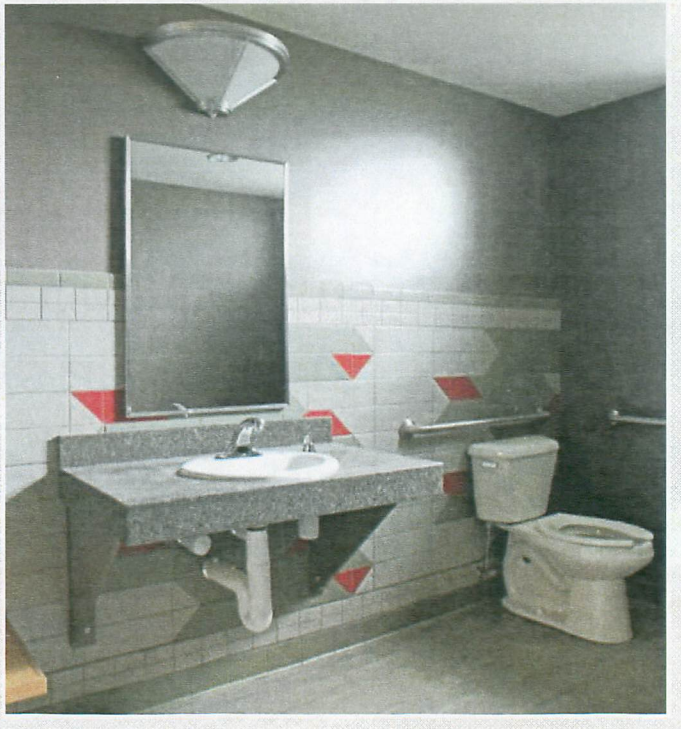
Building HVAC system

- New 94% efficient gas-fired boilers and chillers
- Upgraded insulation on the distribution systems
- Digital control system to optimize efficiency

Bgemagen Project

Building plumbing system

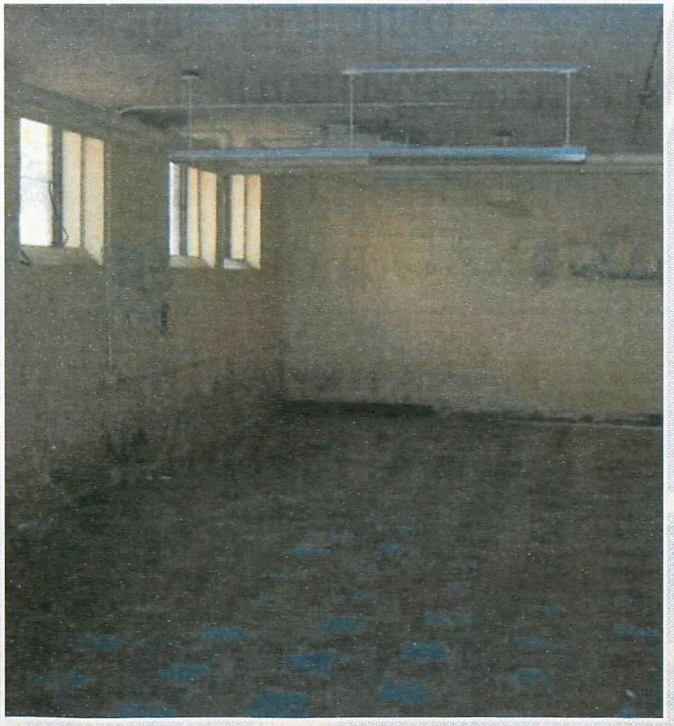
- New fixtures throughout the building
- All fixtures energy and water saving



Bgemagen Project

Building electrical infrastructure

- Energy-efficient interior and exterior lighting (florescent or LED)
- Energy-efficient lighting controls include dual-level switching, day-light controls, and automatic shutoff



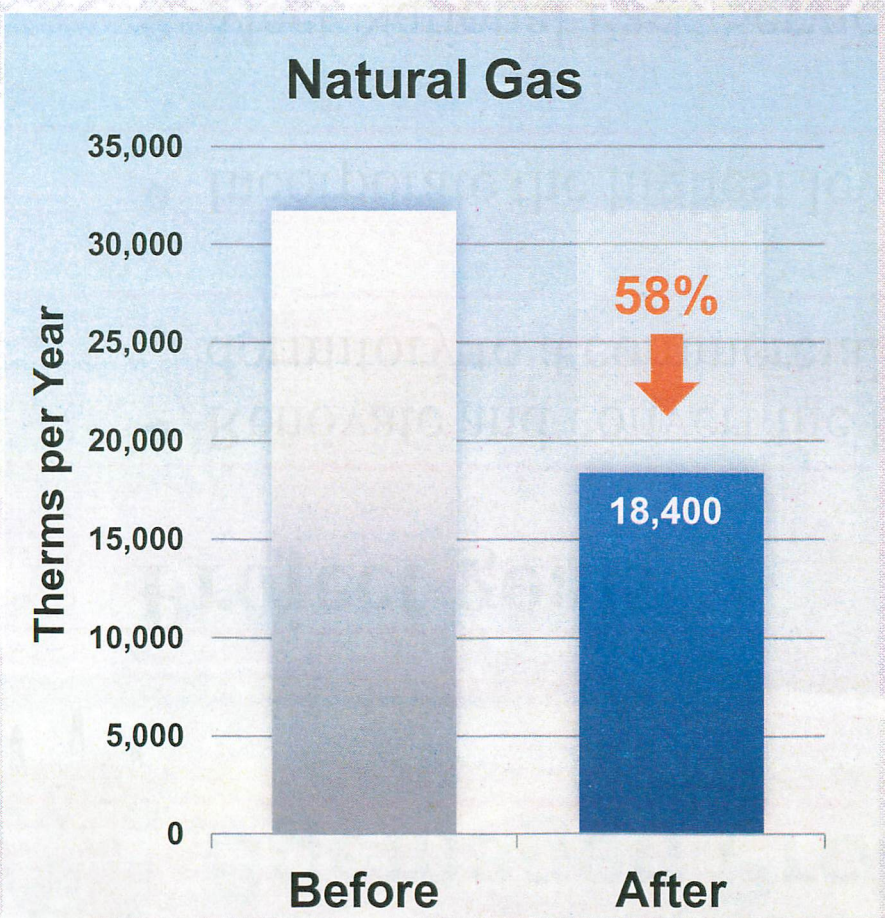
Bgemagen Project

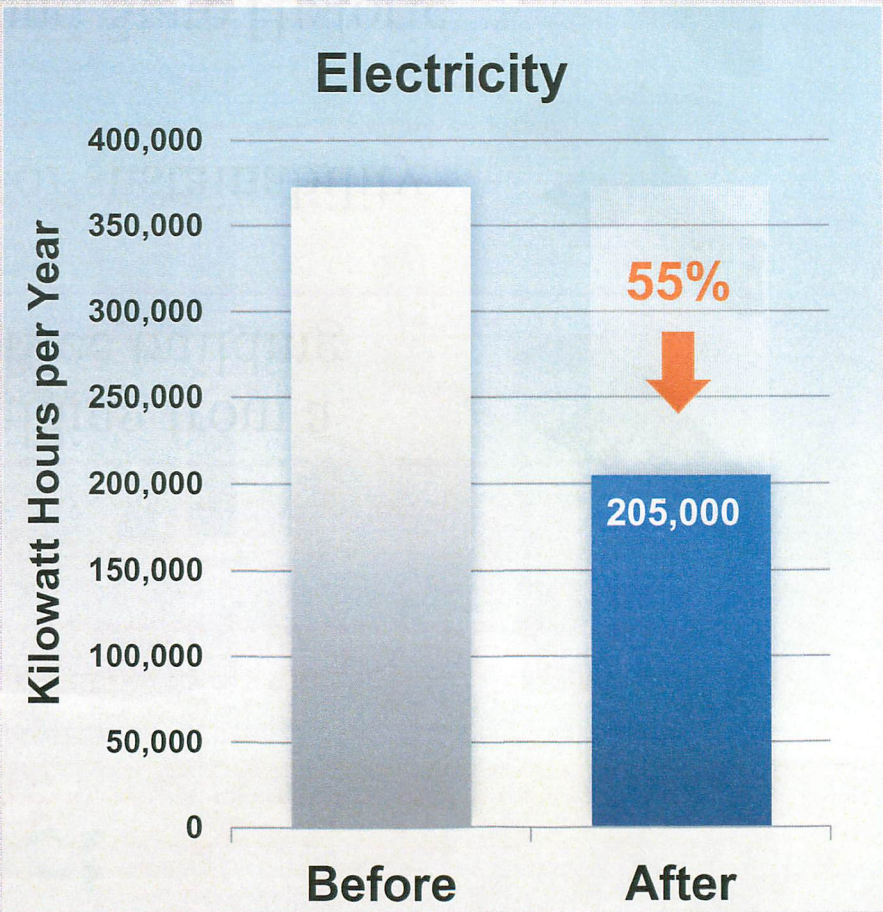
Historical preservation project components

- Rehab the exterior façade to its original design
- Maintain the interior integrity of the building
- Balance the rehab with today's operation needs, examples being:
  - Lighting
  - Quality of the windows
  - Floor plan layout

Bgemagen Project

Anticipated total energy savings resulting from the implementation of this project are projected to be:

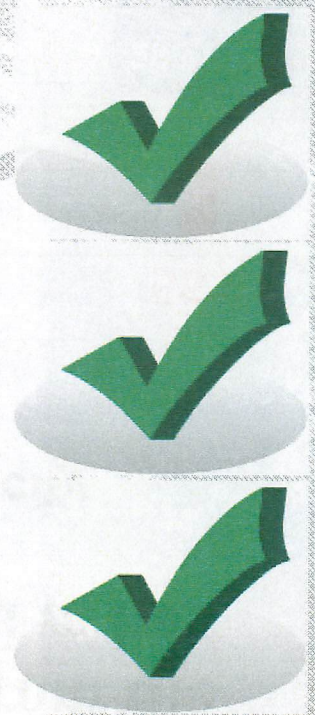




Bgemagen Project

Project goals

- Renovate and convert the building from a dormitory to a commercial office building
- Incorporate the highest level of sustainability
- Meet National Park Service and State Historic Preservation standards in order to become eligible for historic tax credits



Bgemagen Project

As more historic buildings are rehabbed and converted into new uses, the tension created by following both sustainability guidelines and NPS guidelines will increase. Finding balance between the NPS and DOE will be critical for ensuring that both these worthy goals are met. Some historic buildings were never energy efficient, requiring rehabilitation to an updated energy inefficient building means more of these historic properties will continue to deteriate.