

A Quarterly Journal of
the National Alliance of
Preservation Commissions
Summer 2017

Alliance the
review

Energy Needs and Historic Buildings

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COVER IMAGE

St. Francis Lutheran Church in San Francisco was built in 1905 and is a city landmark. Solar panels were added to its south facing roof in 2014. Credit: San Francisco Planning Department



A quarterly journal with news, technical assistance, and case studies relevant to local historic preservation commissions and their staff.

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In this Issue

BY J. TODD SCOTT, THE ALLIANCE REVIEW EDITORIAL COMMITTEE

This issue focuses on the impact of energy on our historic resources, by looking at new energy code requirements, opportunities for alternative energy sources and improved energy systems, and the visual impact that infrastructure can have on our historic buildings and districts.

We begin with Sean Denniston's overview of the impact of the model energy code on historic resources. Many historic buildings are inherently energy efficient with daylighting and operable windows, but mid-20th century buildings are much less efficient. Some clarifying changes have recently been made to the code that can impact those that are historically designated. Stephen Stowell tells the story of the oldest LEED Platinum certified building in the world, a former church located in Lowell, Massachusetts. It now serves as a great community resource, and has achieved the highest possible LEED (Leadership in Energy and Environmental Design) certification. Dave Bunnell, aka "The Steam Whisperer," talks about the efficiencies of using steam in historic buildings, and breaks down the types of systems, as well as encouraging regular maintenance. And in Chicago, Peter Donalek gives us a case study of a grand apartment building with an innovative steam system which is still providing heat to its residents.

Solar panels are becoming more and more popular, so we highlight Providence, Rhode Island's design guidelines for solar energy systems in historic districts, and show a few examples from other places around the country. And finally, as we approach fall, we also wanted to highlight the upcoming PastForward™ preservation conference in Chicago. This annual gathering is always a great opportunity to learn what others are doing. We'll be there and hope that you will be as well. Enjoy this issue of *The Alliance Review* and don't hesitate to let us know if you have suggestions for future articles or topics to consider.

Photovoltaic panels atop the Federal Office Building in San Francisco's Civic Center. Credit: San Francisco Planning Department

Sean Denniston holds a Bachelor's Degree in Architecture from the University of Oregon, and a Master's Degree in Historic Preservation from the University of Pennsylvania. His work at New Buildings Institute involves research and policy work on energy-related issues in commercial and multifamily buildings, with a focus on existing buildings issues.

Implications of Developments in National Model Codes for Historic Preservation

By Sean Denniston

In the world of building codes, 2015 could be called “the year of the existing building.” In that update cycle of the International Code Council’s (ICC) family of model codes¹, existing buildings received far more attention than they had since the International Existing Buildings Code (IEBC) was created. The existing buildings chapter in the International Building Code (IBC) was eliminated in favor of a reference to the IEBC. Existing buildings were given a dedicated chapter in the International Energy Conservation Code (IECC).

But as significant as those changes were, another change had far more impact on the practice of historic preservation. In the 2015 code cycle, the very definition of historic building was rewritten for the IECC, the IEBC and the International Property Maintenance Code (IPMC). But the changes went much further in the IECC; the way the energy code is applied to historic buildings was fundamentally changed.

Before 2015, wide latitude in the application of the family of I-Codes was given to historic buildings, with a complete exemption from the requirements of the IECC for them as well. However, the code language itself complicated application of those codes to historic buildings. The various codes had different definitions for “a historic building” – and thus for which existing buildings actually qualified for accommodation – if they had a definition at all.

¹The International Code Council updates all of its family of codes every three years. The codes are divided into three groups, A, B, and C, and one group goes through the public hearing process to be updated in each of the three years between releases. The IPMC, IEBC and IECC are in the same group, so they were the only I-Codes addressed by this update. The hearing process has two parts. Code change proposals go before a committee in a public hearing for approval or disapproval. In a second hearing, comments suggesting changes to those proposals or the committee’s decisions are voted upon by the body of ICC voting members, mostly building and state officials.

The Telus Tower in Montreal, designed by Gordon Bunshaft of SOM, and completed in 1962.



The IPMC had no definition, even though the code language referred to historic buildings. The IEBC had a definition in the definitions section where it belonged, but actually a different definition in the body of the code. The IECC had no definition in the definitions section, but did have a definition in the code language itself. And all of these definitions were different from each other and different from the IBC.

In the case of the IECC, the definition was not only different, but also extremely confusing:

C101.4.2 Historic Buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.

The IECC definition above, consists of three semicolons, one comma and ten “or”s in one massive run-on sentence. But even once it’s parsed, it quickly becomes apparent that it didn’t really conform to how historic preservation is practiced, and isn’t even rational. The wording leaves out contributing resources in state-designated historic districts. Because of the vague grammatical structure, it’s unclear which entity renders the opinion

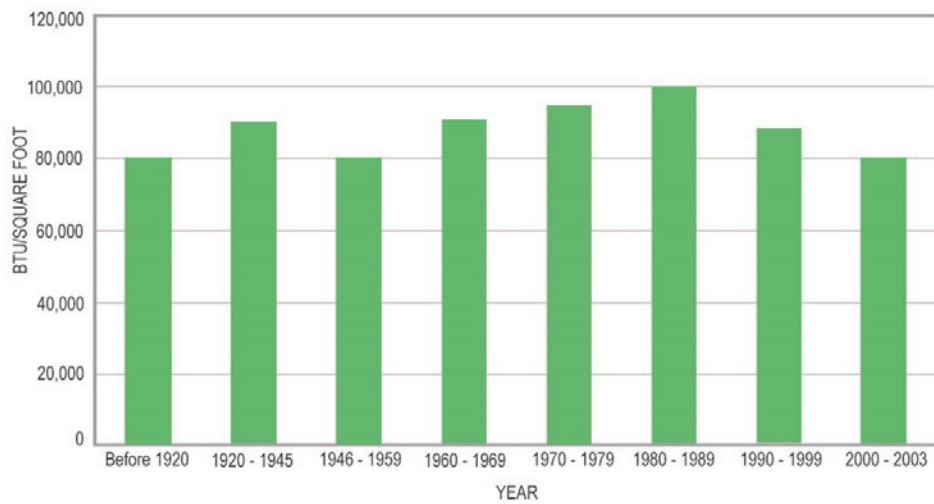
or makes the certification that a property is eligible for listing. Finally, the language exempts historic buildings from the code entirely; this would even include requirements for additions to historic buildings.

This lack of clarity has posed a danger to historic buildings. When code language is unclear or illogical – as in the case with additions to historic buildings – code officials use personal discretion in interpreting and enforcing it. This means that despite the fact that there is very good clarity at the national, state and local level about how buildings are designated historic or eligible for designation, it is unclear which buildings qualify for the energy code exemption for historic buildings.

The existing language also posed additional, but more subtle, threats to historic buildings. There is a greater focus on energy efficiency in public policy and the real estate market, driven by energy codes as a way of improving building energy performance. The blanket exemption had placed historic buildings outside this system, a situation which has not raised much concern in the past. For example, many within the preservation community have pointed to an analysis of national building energy consumption data suggesting that historic buildings often perform just as well as new constructionⁱⁱⁱ. However, the new buildings that were used for that analysis were constructed at the turn of the millennium. In the fifteen years between then and the code update, energy codes have advanced to the point that buildings built to *current* energy codes will consume around half the energy of those built to meet the code in 2000.

ⁱⁱⁱ However, this analysis of the data has recently come under doubt. Webb, Amanda. “On the Relationship Between Building Age and Energy Consumption.” APT Kansas City 2015: Convergence of People and Places – Diverse Technologies and Practices. The Brass on Baltimore, Kansas City, MO. 4 November, 2015. Session Presentation.

Average Annual Energy Consumption of Commercial Buildings in the U.S.



Source: Energy Information Administration, 2003
Published in *The City in 2050: Creating Blueprints for Change*; Urban Land Institute

Additionally, the cohort of buildings that represents some of the worst energy performers in that data set, are now reaching the age where they are becoming eligible for historic designation. “Historic” doesn’t only mean pre-war anymore; the glass towers of the 1950s, ‘60s and ‘70s are becoming historic, often without the common pre-war passive energy efficiency features. As historic buildings fall further and further behind the performance of new construction and major remodels of other existing buildings, while energy efficiency becomes more and more important in the market, sound rehabilitation of historic buildings will become a less competitive option. The balance between the social benefit of preservation and the social and market cost of energy inefficiency may shift.

The other danger to preservation of historic buildings is very different. The broadness of the exception has led many participants in the ICC Code update hearing process to see it as more than an exception, but as a missed energy savings

opportunity or even an outright loophole. There are many energy code requirements that can be met in historic buildings without damaging their historic integrity, however the historic building exemption was absolute. During the code update process there were several proposals that would have changed how energy codes would apply to historic buildings. They varied from removing the exemption completely, to exempting only the building envelope, to making the exemption dependent on the building official’s personal determination of detriment to the historic integrity of the building. It could have come to pass that determinations of which elements are significant in each historic building were ultimately left in the hands of public officials, who often may lack a thorough background in historic preservation.

The energy code revision proposal that ultimately prevailed was the result of a collaboration led by the New Buildings Institute (NBI) that included the American Institute of Architects (AIA), Preservation

Green Lab (PGL), the Washington Association of Building Officials, the Natural Resources Defense Council (NRDC) and the Institute for Market Transformation (IMT). It created a single, clear definition of “historic building” for all three codes and changed the way the energy code applies to historic buildings. The new definition – located in the definition section where it belongs – reads:

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.
3. Certified as a contributing resource within a National Register-listed, state-designated or locally designated historic district.

Lists may not make for compelling prose, but they do make for very clear code language. In addition to clarity, the new definition is more logical and reasonable. Item 1 more clearly states that it is the State Historic Preservation Officer or the Keeper of the National Register of Historic Places that makes determinations of eligibility. This aligns the code language with the way that determinations of eligibility are made for federal regulations such as Section 106. “Contributing buildings” to state or locally designated historic districts are also now included, while contributing buildings to merely *eligible* historic districts are not. This language is now included in the definition sections of the IECC, the IEBC and the IPMC.ⁱⁱⁱ

The proposal also changed the charging language in the IECC. That language now reads:

C501.6 Historic buildings. No provision of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall be mandatory for historic buildings provided a report has been submitted to the code official and signed by a registered design professional, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the building.

This is the code requirement language for commercial structures, but the residential language is nearly the same. The first thing to note is the numbering. Now that all existing building provisions have been gathered into a single chapter in the IECC, the charging language for historic buildings was moved out of Chapter 1 and into the new Chapter 5. There are two ways that the exemption for historic buildings has been narrowed. The first is that additions to historic buildings are no longer exempt from the code. The second is more significant; historic buildings no longer receive a blanket exemption from the energy code. The exemption is contingent on the submission of a report detailing how compliance with a particular provision of the code would “threaten, degrade or destroy the historic form, fabric or function of the building.” For enforcement teeth, the report must be signed by a competent authority like the State Historic Preservation Office

ⁱⁱⁱ The 2018 update cycle has already been completed and this definition will be in the 2018 edition of the IBC too.

or the local preservation authority, by a party with professional liability like the architect, or by the owner in the case of a residential building. It is important to note that project teams do not have to apply for the exemption. The exemption is granted automatically as long as the report is submitted. It is a documentation report like many others in code enforcement. The exemption is also granted on a provision-by-provision basis. The report must indicate the reasoning for each provision for which the project is claiming exemption.

This path provides a reasonable compromise between the desire to accommodate the preservation of historic buildings without sacrificing reasonable energy improvements in those buildings. The new language recognizes that historic significance is not always about how a building looks (form) or the “old stuff” (fabric) from which it is constructed. The language also includes an exemption to meet the energy efficiency requirement if it poses a potential deleterious impact on a significant function of the building. This is an element that is often missing from historic building regulations, and one that is very important in a code that is largely about how a building functions. This exemption could protect historic systems, especially historic lighting systems that might need sources that no longer meet energy requirements.

Clarity in the language of building codes is important because it reduces the chances of a building official misapplying the code to historic buildings. That additional clarity is an obvious benefit for historic buildings, but the narrowed exemption is actually a benefit as well. Refining the details of the exemption means that the code is now an effective policy tool to improve the

energy efficiency of historic buildings, improving their competitiveness in a more energy efficiency-conscious market.

The reports developed as a means to qualify for the energy efficiency exemption will become a boon for future preservationists. They will provide a record of what people thought was significant about a building at a certain moment in time. And narrowing the exemption potential actually protects the process from criticism of it as a loophole or characterization as a missed energy savings opportunity. The threat to the exemption was very real. A proposal that would have left the exemption entirely at the code official’s discretion actually made it through the first round of hearings for the residential section of the IECC. If not for the concerted work of the coalition above, the protection of every historic building subject to the IECC would have been completely left to the discretion of local building officials.

The new language improves the family of I-Codes for historic buildings. It provides greater clarity, which is always a good thing. But perhaps more than that, it transforms the energy code from a threat – that must be addressed with a historic buildings exception – into a benefit. With the new language, the energy code is actually now a tool for historic preservation, helping historic building preservation and rehabilitation to continue to be competitive in a changing future. ■

Stephen Stowell has been the Administrator of the Lowell Historic Board, the City of Lowell's historic preservation agency, since 1994. He also sits on the board of the Lowell Heritage Partnership, a coalition dedicated to preserving the community's architectural, cultural, and natural environments, and is also a past NAPC board member.

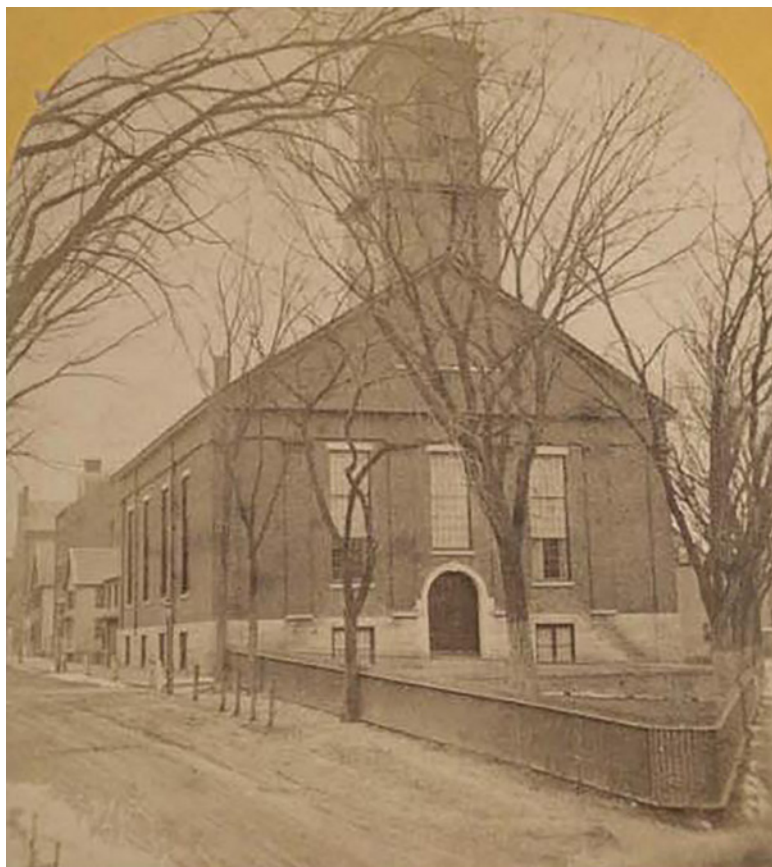
Preservation LEEDS to Sustainability in Lowell

By Stephen Stowell

Recent projects in Lowell, Massachusetts have demonstrated that historic preservation, sustainability, and energy efficiency goals can be met successfully. Rather than being mutually exclusive or in conflict with each other — they can be natural partners. Misperceptions often exist that historic preservation can be at odds with sustainability and energy efficiency while in many cases, nothing could be further from the truth. Several projects in Lowell, including the oldest LEED Platinum certified building in the world, stand out as examples that successfully blend historic preservation and sustainable elements.

Strengthening and expanding historic preservation review and regulations was a federal requirement that came with the establishment of the Lowell National Historical Park in 1978. The Lowell Historic Board (LHB) was created by the Massachusetts Legislature in 1983 and is charged with the preservation, protection, and enhancement of Lowell's historic resources. Central to the responsibilities of the LHB is its design review, permitting, and enforcement authority in the Downtown Lowell Historic District (DLHD).

Since creation of the LHB and DLHD in 1983, over 2,400 permits have been issued and investment of nearly \$1 billion has occurred within the district. With 5.3 million square feet of former textile mill space, over 97% has been rehabilitated along with numerous commercial and residential rehabilitations in addition to new construction and public realm improvements. Preservation forms the basis for much of the city's economic development, tourism, and marketing efforts, illustrating



Credit: UMass Lowell

St. Paul's Church, ca. 1870s.

that historic preservation and economic development can work hand-in-hand for the betterment of a community.

In more recent years, the LHB has begun to see an increasing number of applicants seeking approval for a variety of energy efficiency, green, or sustainable projects. The LHB believes that solar panels, green roofs, and other similar projects and elements can be successfully integrated into historic structures by working with applicants throughout its design review process. For example, the LHB has approved nearly 4,000 low profile solar panels in the DLHD since 2010, the majority of which have been located on the roofs of former textile mills. In addition, low profile green roofs have been approved and installed on several



Credit: Lowell Historic Board

UTEC with the former St. Paul's Church to the left and new addition to right.



UTEC LEED mural at entry.

historic commercial and mill building roofs for purposes of stormwater management as well as cooling the roofs to reduce energy use. Through working with project proponents, these solar and green roof installations have been successfully installed, keeping them low profile and thus unobtrusive on the roofs of the historic buildings when seen from critical viewpoints which is a key local requirement.

Lowell has also had particularly good and successful outcomes with historic preservation projects seeking LEED certification. The first LEED certified building in Lowell was completed by a local engineering company who rehabilitated a ca. 1880 two-story former industrial building in the DLHD into its headquarters. The project received LEED Gold certification in 2010 for its energy, lighting, water, and material use in addition to other sustainable strategies. Not only did the rehabilitation

easily comply with local design standards, it also included a new, contemporary addition, and the project utilized federal and state historic rehabilitation tax credits as part of its financing.

However, Lowell's second LEED certified building, (also in the DLHD and subject to LHB review) became the city's first LEED Platinum certified project. It currently has the distinction as the oldest LEED Platinum certified building in the world. Originally built in 1839, the Greek Revival style St. Paul's Church had seen its congregation shrink in later years not unlike other urban churches around the country. The church was acquired by UTEC in 2006, a youth-led center that seeks to decrease youth violence and gang activity, and improve economic opportunity for underserved teens and young adults in the greater Lowell area through a variety of education, vocational, and social service programs.



Credit: UTEC

UTEC completed the renovation and expansion of the historic church to create a new youth center with a gym and performance space. The design included renovation to the existing building as well as the construction of a new addition, creating 20,000 square feet of space that included a large multi-use performance space, fitness center, classroom space, computer room, video production suite, sound recording lab, dance studio, lounge area, mediation room, café, kitchen, and staff office space. The addition also includes a three-story atrium and stairway that unifies the facility and its functions.

A primary goal throughout the design review process was to achieve a highly energy efficient and sustainable project with a strong historic preservation component and focus as well. One such decision early on was to not utilize air conditioning units for the project. Rather, the

design of the facility and layout created natural ventilation while the former belfry was converted into a thermal chimney where large ceiling fans expelled hot air. There were also short and long term cost savings with this approach as it avoided costly mechanical equipment and maintenance while there were no tricky design decisions on where best to install and/or screen the equipment.

Other sustainable features of the project include recycling materials from the original structure, soy-based insulation in the basement, a 97% efficient boiler, natural daylighting, photovoltaic roof system, LED light fixtures, sustainable building materials, and energy efficient appliances and controls. An electric car charging station was also installed on the sidewalk outside for use by the general public.

Balancing historic preservation and sustainability goals was not the only design concern with the UTEC project. The new addition presented its own challenges given the relatively tight space to construct within and how best to relate to the historic church. The new addition was key to the organization's expansion plans as well as its sustainability goals. In the end, the design approach taken was to strike a balance between the old and the new, ensuring that the addition's design would not be interpreted as an historic building. This was achieved by making sure the height and mass of the new construction didn't overwhelm the church while construction materials were chosen that would complement the church's original brickwork. The end result was an addition that was clearly contemporary but also complementary of the historic church and easily discernible from it.



Credit: CBT Architects

Former St. Paul's Church hall, now a multipurpose space for UTEC. Large fan on ceiling is part of a thermal chimney, assists in expelling hot air through former church's cupola.

For their efforts, UTEC was awarded LEED Platinum certification in 2012 making it the oldest building in the world to receive such certification. Most recently this year, the statewide preservation organization, Preservation Massachusetts, presented UTEC with one of its annual Paul and Niki Tsongas Awards in the category of Best Building Programming. And in addition to UTEC's regular services, programming, and other activities that highlight the building, it is also a very popular site during Preservation Month each May as audiences who might not otherwise visit the building discover it through the community's Doors Open Lowell event. Lowell has always sought to seamlessly integrate

and balance historic preservation and economic development goals and has done so with great success over the years. In much the same way, projects have been undertaken that successfully combine green and sustainable elements with historic preservation, illustrating how preservation and sustainability do not have to be at odds with each other. The Lowell Historic Board is particularly proud that the first two buildings in Lowell to be LEED certified were historic structures and that one is the oldest LEED Platinum structure in the world. These projects are models of not only high quality preservation work but also for the successful integration of green and sustainable features into historic structures. ■



Credit: UTEC

Interior atrium linking former church to left with the new addition.



Credit: Lowell Historic Board

UTECH LEED marker.

*For over twenty years, **Dave Bunnell** has successfully worked on residential and commercial steam and hot water systems, many of them in historic buildings, churches, and homes. Prior to falling in love with steam, he trained as an architect and urban planner at Illinois Institute of Technology. He can be reached via his website at www.thesteamwhisperer.net.*

How to Get Quiet, Comfortable, Economical Heat From Your Historic Steam System

By Dave Bunnell

This article was originally published as Technical Insert No. 176, by the Illinois Heritage Association in March – April 2012. Reprinted with permission.

The older the building, the more likely it is to have steam heating. Unfortunately, the decline in popularity of steam heating after World War II, and the subsequent decline in steam heating expertise, left most steam systems noisy, uncomfortable, and expensive to operate. And that's if they worked at all.

This is even more likely today in historically significant buildings where the combination of budget challenges and lack of residents in the buildings means many of them have rooms that haven't been comfortable for many years. The lack of reliable heat has vexed curators and boards managing these properties for decades. The discomfort and frustration has pushed many of them to the point where they're considering undertaking the expense and mess of retrofitting forced-air heating ducts into their buildings. Too many have already made the switch. It is

unfortunate because none of that is necessary.

The good news is that no matter the age, the system can be rehabilitated to provide quiet, comfortable, cost-efficient heat for decades more. It is quite possible that this can be achieved with just repairs instead of an expensive boiler replacement. Once the system is working properly, regular simple maintenance can keep it working well—at almost no cost—for a long time.

The best, and most dramatic, example is the



Credit: The Steam Whisperer

This little green machine is about 90 years old, but is one of the most efficient heating units in the country. Steam is much more efficient in electrical usage; this unit uses about 200 watts to heat what is equivalent to about 15 new homes. Those same homes with forced air would draw about 15,000 watts of power. With proper servicing and improvement of the boiler and system, fuel costs dropped about 75% in this building.

White House, which still uses the original system that was designed and installed by Joseph Nason and James Jones Walworth in 1855ⁱ. In 2001 the Department of Energy conducted a comprehensive evaluation of the system and it passed with flying colors.ⁱⁱ While this system has received more-frequent maintenance from better-trained technicians than most, its status emphatically underscores the value of regular maintenance properly done.

This technical insert will introduce strategies and techniques for rehabilitating and maintaining historic steam systems. Please read it in its entirety and note all safety guidelines before working on your organization's system.

RETROFIT YOUR BELIEFS

There are two steps to finding happiness with a steam heating system: (1) change the way you think about steam, and (2) find a qualified technician. Knowing what to expect from the steam system is the best first step to achieving proper steam heating. Knowledge truly is power, especially with something as seemingly esoteric as steam.

The first step, then, is to retrofit one's fundamental beliefs about steam. Steam might be historical, but it isn't antiquated. In fact, the "technology" of steam reflects a timeless understanding of the fundamental properties of water and thermodynamics. A little heat applied to a little water can move a tremendous amount of heat through a large building—without pumps, motors, or any moving parts at all. For example, even before a recent complete retrofit, the entire Empire State Building, which has had steam heat from the beginning in 1931, uses about 100 gallons of water (the equivalent of approximately two big residential water heaters) and requires only 2 psi of pressure—less than that of a flat bicycle tire—to distribute heat to all 102 floors.ⁱⁱⁱ

Steam has been an excellent technology since 1855 (after the resolution of early design issues that caused boilers to explode). Steam was the

ⁱ Edward R. Lipinski, "Steam to Heat House Can Provide Comfort and Dependability," New York Times, February 11, 1996.

ⁱⁱ U.S. Department of Energy, "Greening Project Status Report: The White House," April 2001, available online at http://www1.eere.energy.gov/femp/pdfs/greening_whitehouse.pdf.

ⁱⁱⁱ See <http://www.nyc-architecture.com/MID/MID073.htm>, accessed March 12, 2012.



Credit: The Steam Whisperer

A common design feature of both steel and cast iron high efficiency boilers is a fire chamber completely surrounded by water, except where the burner blows the flame into the boiler.

gold standard for indoor heating from 1855 to 1940 for good reason. It's comfortable, quiet, there are no moving parts to wear out, and it's cost-effective to operate. Despite anyone's actual recent experience to the contrary, this is what normal is supposed to be for steam heating. This is often considered surprising news. In this case, the only definition of normal is a properly operating system, that is, one that heats evenly and is cost-effective to operate. Unfortunately, a working steam system isn't necessarily operating properly.

HISTORY OF A TIMELESS HEATING TECHNOLOGY

The decline in popularity of steam heating had

nothing to do with its performance or comfort. Steam began its decline in popularity in 1940, at the beginning of WWII, when metal and other materials used in steam systems went to the war effort, so there were fewer installations. After the war, five million returning GIs wanted to buy homes immediately using the GI Bill. This fueled a housing boom that had developers building five to ten houses a day. In Levittown, New York, the production rate was thirty houses a day.^{iv} Unfortunately, steam couldn't be installed that rapidly. Forced air, which required bending sheet metal for ducting, and attaching the ductwork to a fan and a furnace box, could be installed quickly. Almost overnight, forced air appeared

^{iv} Kenneth T. Jackson, "The Baby Boom and the Age of the Subdivision," chapter 13 in *Crabgrass Frontier: The Suburbanization of the United States* (New York: Oxford University Press, 1985), 231–45.

in a majority of American homes. Regrettably, the standard for the residents' comfort and convenience was thrown over for the developers' comfort and convenience.

As a result, demand for steam heating, and the expertise required to deal with it, declined to the point where it's a lost art today. In turn, poor design and unqualified work have created discomfort, a generally negative experience, and the erroneous belief that steam is an inherited curse. The fact is there are no bad steam systems—only misunderstood steam systems.

STEAM SYSTEM PRIMER

The rehabilitation of steam requires a brief primer on basic steam technologies. There are three basic approaches, and several combinations and permutations.



Credit: The Steam Whisperer

If you are looking for a more modern steam radiator, here's a great example - simple and elegant steam heat.

One-Pipe Systems

This is the original steam system. Heated water becomes vapor, expands, and rises through the upper part of the piping all the way to the top of the system. Along the way it displaces the cooler air in the coils (also known as sections) of an energy-storing cast-iron or steel radiator that projects heat into the room, like the sun. The displaced air exits the system via the silver, bell-shaped air valve on the side of the radiator. As the steam cools, it reverts back to water (or condensate) and flows back down the lower part of the same pipe to the boiler to be reheated. The steps are repeated until the interior space reaches the desired temperature. It should be noted that as a gas, steam is pulled through the system from the higher pressure at the boiler to the lower pressure down the line. So steam provides the heat and the transportation. Gravity is all that is required to move the condensate back down to the boiler. As such, no energy or moving parts are used to move the heat. You can identify these one-pipe systems at a glance because they have a single pipe going into the bottom of radiator and an air vent, usually on the other end.

Two-Pipe Systems

This is the same basic concept as the one-pipe system, but the system is more efficient. It also allows independent temperature adjustment at each radiator. Instead of a single pipe sharing the steam and the condensate, two-pipe systems—as the name implies—have one pipe delivering steam up to the radiators and the other pipe carrying the condensate back down to the boiler. The radiators separate the steam and the water. This minimizes the potential for the noisy collision between water and steam (and air) that creates the banging known as water hammer. Visually, these systems



Credit: The Steam Whisperer

Built by a Chicago coal baron in the 1930's, this 12,000 s.f. home is located in one of the nation's oldest and largest historic districts, the Ridge Historic District in the Beverly Hills neighborhood of Chicago. As expected it was built with one of the premium vapor/vacuum steam systems.

have a pipe going into the radiator on each side, the smaller of the two on the bottom. These systems don't have air vents (but that hasn't stopped unqualified people from adding them).

Vapor-Vacuum Systems

This approach is based on additional beneficial properties of water in a vacuum. Chiefly, the water boils at a lower temperature in a vacuum, and elongated water molecules can be "pulled" through the system. Many of these systems were sold on the basis of a lower temperature's requiring less energy to heat the water, which was translated into lower operating costs, and the vacuum's ability to move heat through the system more evenly. It should be noted that vapor-vacuum, with its additional variables, is considered the Cadillac of systems by many steam sophisticates because it permits finer

tuning of heating efficiency and costs more than its simpler cousins.

Vapor-vacuum technology can be used with both one-pipe and two-pipe systems. There are so many devices that can be attached to the boiler that aren't vapor-vacuum related, it is nearly impossible for the untrained eye to identify one of these systems.

The reason all steam heating isn't vacuum oriented is that the lower operating temperature, i.e., soft heat, means more radiators are needed to achieve set temperatures, especially in larger rooms. Also, since air in the system degrades the performance, more active maintenance is required to keep the system leak-free. No matter the configuration, it's a steam heating system. The place where you notice the problem is usually the symptom; the solution will probably



Credit: The Steam Whisperer

That same coal baron house has a renovated system and new heating plant that uses 2 compact stage fired high efficiency steam boilers for heat. For over 90% of the winter, one small boiler heats the complete home using only 150 watts of power. Steam heat can outperform just about any modern system out there, when properly serviced and designed.

be somewhere else. If there is a problem in one room, it is very likely that other areas of the building will have it, too.

REPAIR AND IMPROVE; DON'T REPLACE

The frustration caused by the lack of stable steam heating has caused many organizations to consider retrofitting with forced air, especially if the system has been "repaired" often and is still not working (in one case, one such "repair" meant monthly replacement of all air vents).

Personal experience with older steam systems in

Illinois has shown that simply repairing the existing system, or repairing and improving it (with properly sized steam traps and air vents, etc.), is always possible despite the degree of banging and uneven heating that is being felt. This approach can deliver a 15 percent to 20 percent savings in operating costs. Addressing the needs of the existing system is still the simplest, most cost effective approach. As the first step in the heating cost-benefit continuum, it's significantly less expensive than boiler replacement. Neither repairing nor improving is as painful as the cost and mess of

replacing the steam system with forced air, which includes destroying the fabric of a historic building to retrofit the ducts.

But don't just take the word of a steam heating specialist. As advised in the National Park Service's Preservation Brief 24, on heating: "Retain or upgrade existing mechanical systems whenever possible: for example, reuse radiator systems with new boilers, upgrade ventilation within the building, install proper thermostats or humidistats."^v

It might not seem obvious from an accounting standpoint, but not spending the money to address problems with the steam system is not saving it, or "profitable." It just means you are going to have to spend more on a much bigger repair, or a boiler replacement, when it becomes unavoidable. The key here is to find a qualified steam heating technician to apply this lost art as soon as possible. As noted earlier, this is step two in achieving proper steam heating. A qualified technician can make the difference between comfort and discomfort. Consulting a qualified technician can also mean the difference between repair, repair and improvement, and boiler replacement. Finding a qualified technician can provide the opportunity to contain problems while they're repairable. Most encouraging, finding qualified help isn't as hard as it might seem. Again, knowledge is power.

FINDING A QUALIFIED PRACTITIONER OF THE LOST ART

While there is plenty that can be done by "civilians" to keep the steam system running

smoothly (see below), qualified, experienced technicians are paramount to steam heating happiness. As many people already know from disappointing experience with a poorly performing system, not all HVAC/"heating guys" or plumbers know steam heat, even if they say they do. Their well-intentioned but unqualified attempts to fix the system usually cause more, and more costly, problems. For example, when the heat is uneven—that is, one room or floor is hot and another is cold—it might seem logical to crank up the pressure to force heat up into the colder floors. Unfortunately, this never solves the problem and usually only makes the problems worse, such as overstressing the system and causing premature parts failure.

As with the basics of steam heating, the basics of a qualified technician are straightforward.

A qualified steam technician has received:

- specific training with steam heating systems;
- training from boiler manufacturers (the ultimate source for optimal results with their equipment);
- several years of experience in the field; and
- references.

It might take a few calls to locate a qualified technician, but the effort will pay dividends in comfort, cost savings, and the health of your historic building.

ONCE YOU FIND QUALIFIED HELP

A system survey will look at the whole system (boiler, pipes, all radiators), identify potential problems, and balance performance system-wide. Often, this will include a review of heating costs. This is a process that can take several hours, possibly a day or two. Due to all the training and

^v Available online at www.nps.gov/hps/tps/briefs/brief24.htm, accessed March 16, 2012.

practice required to operate effectively in the steam heating environment, qualified technicians don't often provide free estimates. This is actually a good thing, although that sounds counter-intuitive. Free estimates are based on the profit of the work that's quoted. From a business standpoint, they're most efficient when the purchase decision can be made quickly. On the other hand, diagnosing and repairing steam systems requires much time spent all over the building. On top of that, organizations with larger steam systems usually have boards of directors and protracted decision-making processes. Spending days working under the possibility of not being hired to do the work for months, if at all, could be another reason for the scarcity of qualified steam technicians.

Unless your technician is willing to donate the fee, you should expect to pay for the survey. But it's worth the money. As a result, you will get a thorough report that identifies and diagnoses the issues and remedies, plus the costs. In this way it is easier for organizations to make better-informed decisions and get better results. Bottom line: The sooner you bring in a real steam heating professional, the sooner you'll get happy steam heat.

IMPORT TALENT WHEN NECESSARY

One of the frequent challenges for historic buildings is that they're often located outside of major metropolitan areas, which makes it even harder to find qualified help. The cost of travel and lodging to bring a steam specialist to your historic property should be considered; it can be a bargain if it means restoring proper operation of your system and stable heating to your building.

WHAT YOU CAN DO

Once the steam system has been rehabilitated, there are many things that can be done by members of the organization to keep it running smoothly and to avoid painful expenses for long intervals.

Overall

As you walk around your building, look for open windows in wintertime and other signs of problems, such as space heaters.

At the Boiler

Find out the manufacturer, size, and age of your boiler. Note the manufacturer's name and service date on the medallion attached to the side of the boiler. A picture is good; photograph the service decal if there is one. Take a look around the boiler for a service manual. The manufacturer information will be in it, too. This is an excellent opportunity to learn more about the history of your boiler. Google the manufacturer and see what you learn. Also, Dan Holohan of HeatingHelp.com has written several books on the history of steam heating in America that read like dramatic novels. The history of steam heating is intertwined with the history of America, especially during the early twentieth century. For example, the ubiquitous silver paint on radiators is linked to the flu pandemic of 1918, before it was known that influenza is viral. At the time it was widely believed that flu was caused by breathing "vitiated" air. Heating then was designed to heat rooms with the windows open—in the middle of winter. After the viral nature of influenza was discovered, closing the windows meant roasting the occupants. Paint containing heat-absorbing aluminum oxide reduced the radiant heat output enough to preserve life.

Check the water in the glass gauge, the glass cylinder located at the side of the boiler. Note the following:

- It should be filled to about the middle. If it's higher or lower, the system could have a problem.
- What is the quality of water? You should be able to see through the water. If it's dark, rusty, or muddy-looking, get it evaluated.
- Is the water bouncing up and down when the system is on? A half-inch to three-quarters of an inch of movement is normal. More movement, or worse, no movement, could mean a serious problem.

Next, check the pressure gauge. If the reading is over 2–3 psi, call a qualified technician ASAP. Untrained technicians commonly “solve” uneven heating (cold on one floor, roasting on another) by cranking up the pressure to force it through the system. This is dangerously wrong. Operating at higher than normal pressure can significantly shorten the service life of the system, sometimes dramatically.

TOUR THE BUILDING

Take a walk around inside the building and look at the radiators in each room.

- If the system is running, is the radiator giving off heat?
- Is the radiator attached to the system? It's always surprising how often a radiator is unattached, especially in older systems.
- Do you hear banging at any time, or hissing/whistling when the system starts up?
- Check radiator valves (one-pipe systems only). They should be open all the way. A partly

opened valve will allow steam in, but it will also trap the condensed water and create a water hammer.

- Look for signs of leaking water (such as stains or rings) under the valves. If the system is running, look for actual water or steam.
- Are the air vents—those bell-shaped fixtures on the side of the radiator—spitting water or steam? As their name implies, only air should be coming out of them.

Speaking of air vents, one of the most frequent problems is a painted-over air vent. Unfortunately, air vents are irresistible to painters. You should be able to see the exit hole in the top of the air vent. If you see paint, or can't see the hole, carefully apply the end of a paper clip. (Important safety note: Avoid injury! Make sure to stay out of the line of released steam when doing this. Ideally do this when the system off.)

THE STEAM WHISPERER'S CHECKLIST FOR STEAM HEATING HAPPINESS

For maximum economy, add steam heating maintenance to your master maintenance calendar:

- June: post-winter shut down
- August: maintenance, improvements
- September: pre-winter prep

If you haven't had a seasonal maintenance call and haven't scheduled one, start saving up for a repair. Seasonal tip: Repair work traditionally costs less in the off season. The warmer the weather, the lower the cost. Schedule boiler cleaner additive. Keeping the boiler clean extends its service life significantly. Remember the White House.

For safety, your checklist must include:

- Inspecting and testing the low-water cut-off. If you do nothing else, check this. Properly operating, this device prevents explosions.
- Having your pressure relief valve professionally checked annually.
- Having combustion testing done annually, with an electronic exhaust gas analyzer. This is the only way to know that the boiler is burning fuel properly. Simply looking at the flames (in the

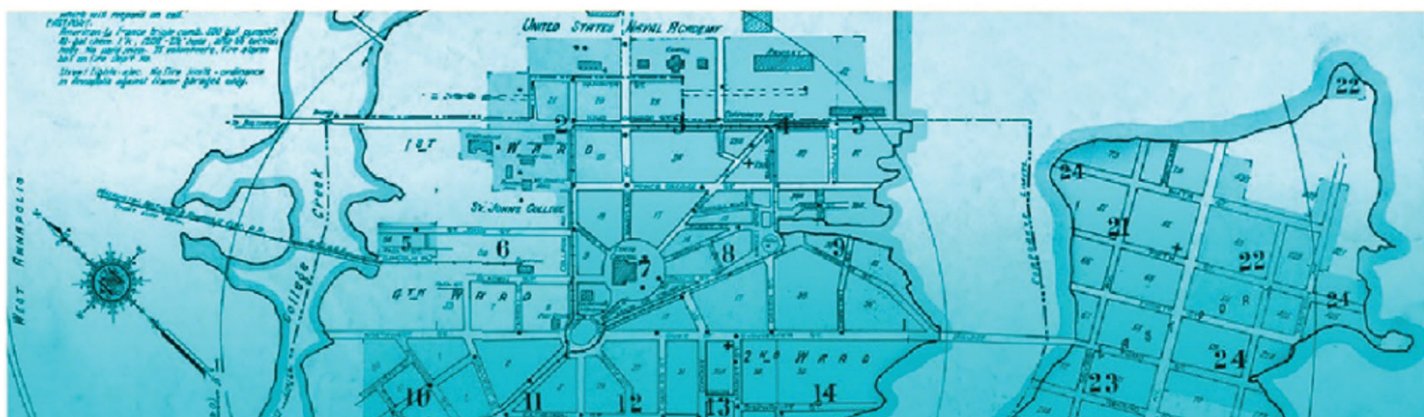
belief that “blue flames and it’s good”) is insufficient. Every burner has different characteristics. With some burners, orange flames are ideal.

- Inspecting the gauge glass. You can’t do this too often.
- Inspecting the pressure control.

With care and regular maintenance, your steam system should last for many years.■

KEEPING HISTORY ABOVE WATER

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Registration and other information: <https://www.regonline.com/registration/checkin.aspx?EventId=1997623&RegTypeId=694529>

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The Pattington — A Green Building with a Legacy Heating System

By Peter Donalek

The Pattington is a historic 1902 building that endures today as a “green building” located along the Lake Michigan shore, now part of Chicago’s Buena Park National Register Historic District. The Pattington “court yard” apartment building was designed to attract prominent members of Chicago’s society and had the latest facilities including the Paul System of steam heating.

In today’s energy efficiency and sustainability – conscious world, the phrase “the greenest building is one that already exists” is all too familiar. The Pattington is an example of a National Register building with a legacy heating system that is, and continues to be, functional and relevant.

SITE AND BUILDING

By 1890, Chicago’s population was nearly one million and like the proverbial Phoenix, the city had risen anew from the ashes of the Great fire of 1871. Chicago was the talk of the nation after the World’s Fair of 1893, and everywhere one looked, something was being built. Today, the Pattington building is thought to be the oldest

surviving example of an open-court apartment building in the Chicago area, with its brick and limestone façade rising four stories to a clay tile pitched roof. The *Inland Architect* reported that “This grand structure appears on the ground more like a group of private mansions with private parks bound together in one social circle.” “It is,” the contemporary article stated, “the largest of the great apartment buildings.”

It is a side-by-side, double-U shaped building, with south-facing courtyards. The plans for the two large open courtyards are symmetrical mirror images of one another and are spacious and well suited to the area; particularly their breadth and



The Pattington building in Chicago's Buena Park Historic District

Credit: Peter J. Donalek

depth in relation to the height of the building. There are ten entries, five in each court, with three entry portal designs each featuring free standing or attached columns. The exterior façade, accented by decorative entrances, follows a design centered on the courts, combining four wings, each terminating in barrel-curved bays with large bow windows.

Seventy-two apartments each follow one of five basic floor plans, designed in the "French Flat" tradition, to appeal to tenants seeking luxury accommodations. The apartment floor plans each have a different location in relation to the courts, service areas, and exterior sources of light and air. Special attention was given to interior plan arrangements, coordinated with the outline of the exterior courtyard wall. Each floor plan includes a room with toilet and shower, to accommodate a live-in servant. The basement has five apartments along with laundry rooms, quarters for staff and drivers, as well as storage lockers. One basement space is a wood paneled tea room that served residents.

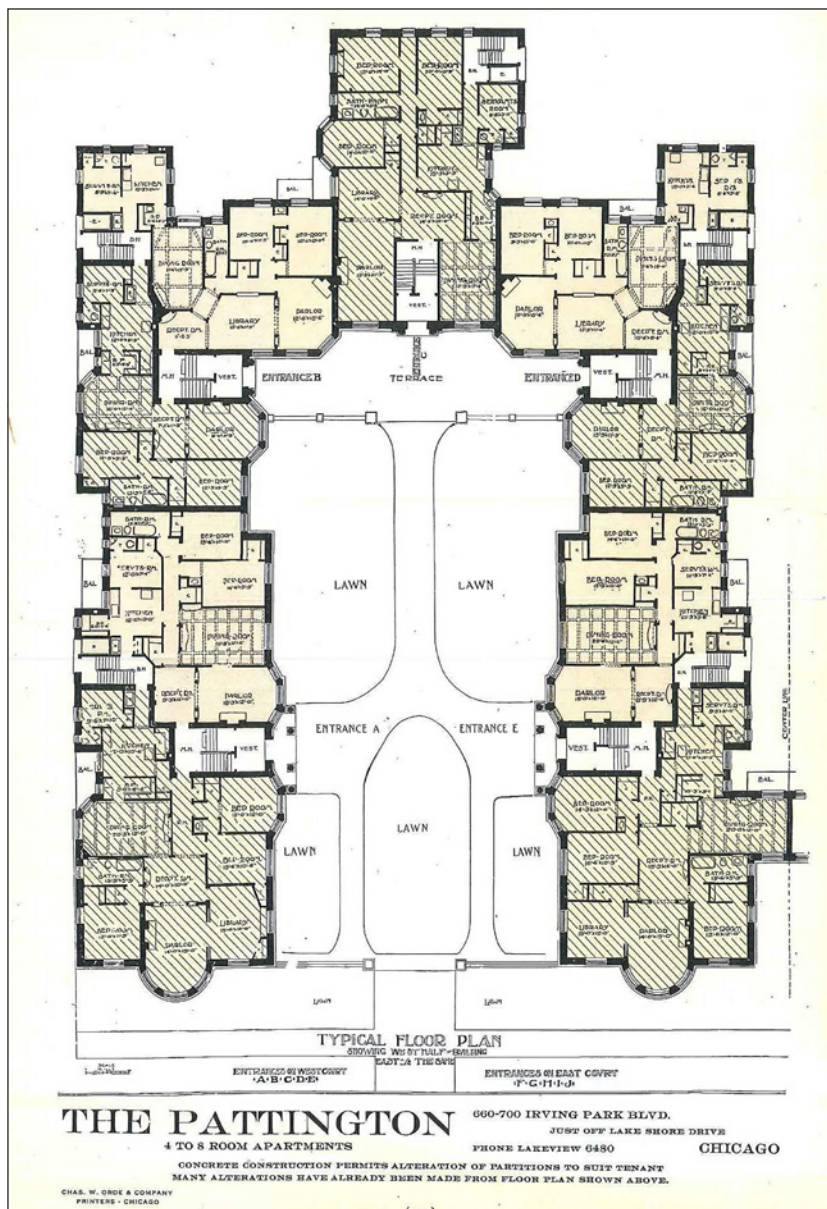
A prominent feature is a limestone tablet with the name PATTINGTON at the parapet in the center of the rear façade of each courtyard. The building's name is a memorialization of James E. Patton (1832-1904) who financed the project. He attended the Herron Seminary in Cincinnati, Ohio (1849) and took additional business studies. He moved to Milwaukee where he became a successful industrialist and founded the Patton Paint company. In 1900 the Patton Paint company was acquired by the Pittsburgh Paint Glass company. One can only imagine that Mr. Patton

had realized a significant financial benefit from the sale and was in a position to invest in a real estate development like the Pattington.

The Pattington was designed by David E. Postle who earned his architecture degree from the University of Illinois. The building permit was dated May of 1902 and listed Postle as architect of record, with constructor Telford & McWade. A. C. Clas of Milwaukee, Wisconsin was included as an associate architect. Original drawings for the Pattington are at the Art Institute of Chicago's department of architecture.

SUSTAINABILITY AND THE PAUL SYSTEM OF HEATING

Historic preservation is by definition a sustainability process; and its meaning is properly captured in the often quoted phrase "the greenest building is one that is already built." The phrase aptly identifies the relationship between historic preservation and engineering, as contemporary repair, upgrading and retrofitting of mechanical systems in historic buildings without loss of historic fabric, is an ultimate challenge to engineers today.



Credit: Chicago History Museum

Floor plan of The Pattington, built 1902.

Along Chicago's windy lake front, the heating system is one of the most important features of a building. In 1902, when the Pattington was being designed, the developer, architect, engineer and builder were faced with a choice of several heating system options. It was assumed that steam heating with coal-fired boilers and cast iron radiators would be selected as the source of heat. (For a description of the various systems of the day, see Dan Holohan's book *The Lost Art of Steam Heating*.) However, there were choices to be made with regard to the distribution system. Since the

objective was to market the Pattington to prominent members of Chicago society, for whom living in an apartment building was a new experience, top quality would have determined the choice. The 1903 advertising brochure (available for viewing at the Chicago History Museum Research Center) reflects a marketing response was created to meet this challenge:

- ...no expense had been spared to make it of the highest type known to architects and builders.
- *Pure Air*: No smoke, soot or dust, free from railroad trains, so objectionable in many localities.
- *Ventilation*: The arrangement of the rooms (no dark rooms) is the result of most careful study, all having outside light and

good ventilation. Every detail has been thought out for the comfort and convenience of the occupants.

- *Heating*: The apartments are heated by steam. Regulation and *Vacuum System*, easily controlled at will, and noiseless. There will be at all times an abundant supply of hot water. The heating plant and boilers are in a separate building, thus avoiding noise, smoke and vibration.

The vacuum heating system reference, leads one to ask: were there competing systems from which to choose? At the time, the Paul System, invented and patented by W. P. Skiffington in

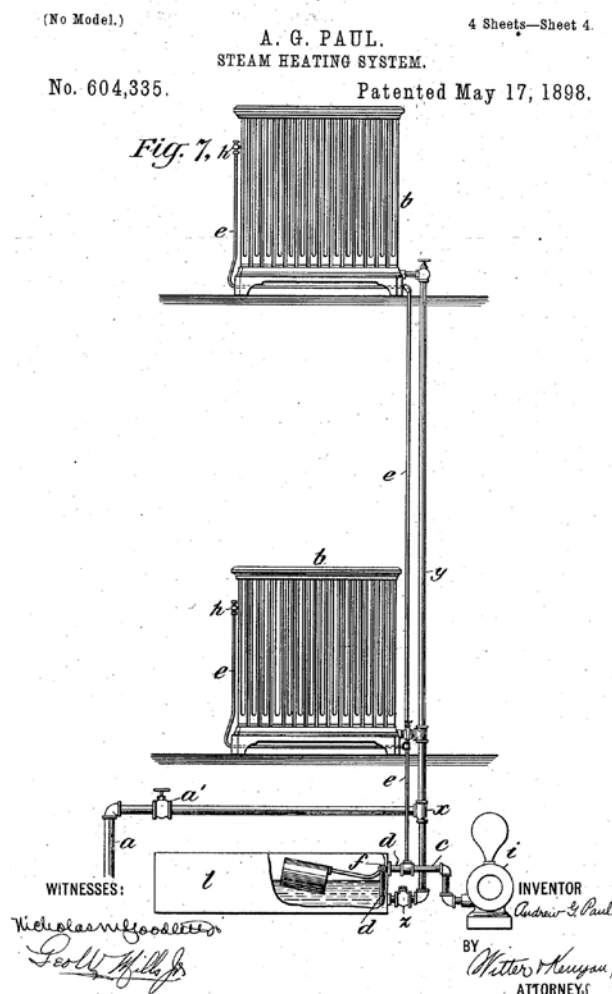
1891 and commercialized by Andrew Paul was a predominant system being installed in many new buildings. Information about the Paul heating system is available in a booklet titled "The Paul System of Steam Heating" published by The Automatic Heating Company of New York City. The booklet, available on the Building Technology Heritage Library web site provides commercial and technical information along with a list of forty major buildings where the system was installed. It includes letters from building owners and managers expressing their satisfaction with the quality of system operation and fuel cost economy. Many of the buildings were large office and commercial buildings located in New York, Detroit, Chicago, Los Angeles as well as government and institutional buildings in other large cities. Among the buildings are several in Chicago; including the Monadnock, another building where the system remains in operation today.

Among the benefits, then and now, attributed to the Paul system are the following:

- Positive and uniform circulation of steam
- Fuel savings due to operation at low steam pressure
- No leakage or dripping, no "hissing" and no foul odors from air-valves

The Pattington apartment building's separate utility building housed two low pressure steam boilers that provided heat and hot water to the apartments and common areas; they also provided steam to drive two direct-current electric generators, water pumps, and refrigeration compressors to make ice. For a description of the electric generators and other equipment see the 1904 Western Electrician article titled "Light, Heat and Power in a Large Apartment Building."

During the 1950's, the preferred fuel source



Patent diagram for the Paul Steam Heating System.

transitioned from coal to oil and then to natural gas. The Pattington was part of this evolution, as the owners hired a Chicago-based mechanical contractor to convert the boilers from coal to oil and natural gas. As part of this modernization, the original coal storage bin became the location for a large underground oil tank. The oil tank was removed in 2015 when the boilers were converted to operate exclusively on natural gas.

When the Pattington was converted to condominium form of ownership in 1977, the electrical and mechanical systems reflected the technological and commercial evolution that had occurred since its original construction. These changes included: conversion from direct current electric service to alternating current service, installation of electric refrigerators and conversion of the in-building

Credit: Google patent images

phone system to Illinois Bell service. As a result, the steam powered electric generators, water pumps, and refrigeration compressors were retired.

The Pattington's Paul System continued to operate throughout these technological and commercial changes, with a few moderations. Changes to the Paul system included: replacement of original Paul airline valves with Hoffman orifice type bellows valves; replacement of original air extractor with a motor-driven vacuum pump; and a building automation system that monitors air temperature in selected apartments and controls flow of steam to three heating zones.

ENERGY EFFICIENCY PROGRAM

Following the initiation of a US Department of Energy efficiency program, the local natural gas utility (Peoples Gas) offered a rebate program to encourage multi-unit buildings to upgrade their heating systems. In 2014, the condominium association undertook a heating system upgrade project and installed a new boiler and auxiliary equipment that qualified for a rebate.

Other energy efficiency projects undertaken by the

condominium association have included: high efficiency water heaters for domestic hot water; storm windows; and rehabilitation of original windows with thermo glazing and modern weather stripping. The Pattington Condominium Association received a Richard Driehaus award for restoration of the façade, windows and clay tile roof.

The original Paul System for steam heating supplied radiators located in apartments and common areas, fitted with airline valves connected to vacuum air-line pipes. During recent heating seasons, building staff had reported that a significant amount of condensate was returning to the vacuum pumps via the air-line, though descriptions of the Paul System indicated that the air lines should not carry condensate. This high concentration of condensate in the vacuum air-lines was an indication that a significant number of airline valves had failed in the open position. As a result, the system was operating inefficiently, resulting in increased natural gas and water consumption. As more airline valves failed, there was a corresponding decrease in efficiency and increase in operating costs. The value of each gallon of

condensate is the sum of cost for water, natural gas to convert water to steam, and water treatment chemical. Thus, every gallon of condensate that does not enter the vacuum air-lines represents a saving.

The condo association used a proposal for replacement of failed airline valves to prepare an application for a rebate through the energy efficiency program of their natural gas supplier. Peoples Gas



Typical boiler type still used in The Pattington

Credit: Smart Energy Design Assistance Center



Credit: Redfin

Interior of one of the units at The Pattington, showing a still used radiator to the right.

inspected the heating system, and based on their analysis concluded that the existing Paul System remains a viable, high-quality heat distribution system, so they offered a significant rebate for a radiator air-line valve replacement project. They also confirmed that there would be substantial, on-going, annual savings due to a reduction in natural gas and water consumption. An economic calculation showed that the accumulated value of savings over a period of six to seven years would result in recovery of the air-line replacement project cost, and that savings would continue reducing monthly condominium assessments.

CONCLUSION

The Pattington apartment building has endured over the years, and continues to be a functioning, high-quality, historic residential building. Although technology has evolved, the building's original heating system remains viable and it was possible to upgrade the system and avoid damage to the historic fabric of the building and its interior spaces. The Pattington stands as a mechanically sound example showing that the greenest building really is one that is already built.

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Guidelines for Solar Energy Systems

By Providence Historic District Commission

INTRODUCTION: In 2013, with Sustainable Providence, the City of Providence, Rhode Island released sustainability goals to move Providence forward in six key areas: waste, food transportation, water, energy, and land use & development. As part of the global initiative to encourage energy conservation there is a rapidly growing trend toward retrofitting homes to be more energy efficient.

This has brought an increase in the number of applications for installing solar energy systems on buildings within Providence's locally designated historic districts. Specifically identified in Sustainable Providence is the West Side Solar program, a successful initiative to introduce solar energy to primarily historic properties in the City's West End.

The success of the program has created more interest in expanding the program throughout the City. This growing interest has caused some concern by the Providence Historic District Commission (PHDC) as to the appropriateness of allowing solar panel installations within the City's local historic districts. Of particular concern are those buildings with primary elevations that face south. The PHDC's Standards & Guidelines make the

installation of publicly visible solar panels difficult to approve as such installations generally qualify as having an adverse effect on either the historic structure and/or the historic district. This is also in keeping with the National Park Service's Standards, the national guideline for historic district commissions. In an effort to allow both of these worthy initiatives, historic preservation and energy conservation, to continue the PHDC has amended their Standards & Guidelines as follows.

SUSTAINABILITY

Before implementing any energy conservation measures to enhance the sustainability of a historic building, the existing energy-efficient characteristics of the building should be assessed. Buildings are more than their individual components.

The design, materials, type of construction, size, shape, site, orientation, surrounding landscape and climate all play a role in how buildings perform. Historic building construction methods and materials often maximized natural sources of heating, lighting, and ventilation to respond to local climatic conditions.

The key to a successful rehabilitation project is to identify and understand any lost original and existing energy-efficient aspects of the history building, as well as to identify and understand its character-defining features to ensure they are preserved.

The most sustainable building may be the one that already exists. Thus, good preservation practice is often synonymous with sustainability. There are numerous treatments – traditional as well as new technological innovations – that may be used to upgrade a historic building to help it operate even more efficiently. Increasingly stricter energy standards and code requirements may dictate that at least some of these treatments be implemented as part of a rehabilitation project of any size or type of building. Whether a historic building is rehabilitated for a new or a continuing use, it is important to utilize the building's inherently – sustainable qualities as they were intended. It is equally important that they function effectively together with any new measures undertaken to further improve energy efficiency. (NPS, Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings)

GENERAL GUIDELINES FOR SOLAR PANELS, HEAT COLLECTORS AND PHOTOVOLTAIC SYSTEMS

In the historic districts, the greatest potential for using solar panels to heat water or to generate electricity will be on buildings with large flat roofs, high parapets, or roof configurations that allow

solar panels to be installed with limited or no visibility. All solar panel installations must be considered on a case by case basis recognizing that the best option will depend on the characteristics of the property under consideration.

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

1. On buildings with a flat roof (historic building, non-contributing existing building, or new construction), solar panels may be located, installed at a low angle, so that they are out of view from the public right-of-way adjacent to the building. In the case where a proposal meets these requirements and has been deemed to have no adverse effect by the RI Historical Preservation & Heritage Commission (when such review is required), the PHDC review would be conducted at an administrative level by the Commission's staff. Nothing would prevent staff from forwarding the application to the full Commission for review if warranted.
2. On buildings with a sloped roof (historic building, non-contributing existing building, or new construction) where solar panels are to be installed on a secondary elevation,



1. Rooftop solar panels in Providence, Rhode Island. Credit: City of Providence.



2. Angled solar panel array on the roof of a historic residential building, San Francisco. Credit: San Francisco Planning Department

3. Solar panels barely visible above the parapet wall of an apartment building, San Francisco. Credit: San Francisco Planning Department

4. Angled solar panels just peaking above the roofline of Church of the Redeemer, Kenmore, Washington. Credit: Episcopal Church of the Redeemer

5. Solar panel array on the roof of the mid-20th century Church of the Redeemer, Kenmore, Washington. Credit: West Seattle Natural Energy



not visible from the public right-of-way:

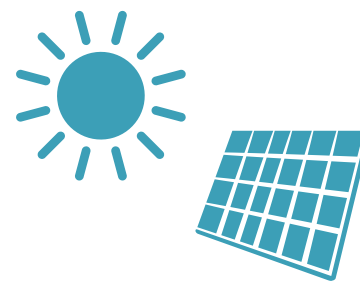
- a. Panel layout shall be sympathetic or appropriate to design and scale of building. Rectangular configurations are preferred, with ample setback from edge of roof, dormers, chimneys, etc.;
 - b. Panels shall be installed parallel to the existing roof slope and matched as closely as possible to the roof plane;
 - c. Panels shall be installed without destroying or replacing original or historic materials or significantly compromising or altering the building's structural integrity;
 - d. Panels shall be compatible in color to existing roofing insofar as possible;
 - e. Installation of panels shall be as inconspicuous as possible when viewed from public right-of-way;
 - f. Installation shall be reversible. Panels shall be removed when no longer viable or functioning and roofing restored to pre-existing conditions; and,
 - g. In the case of proposals that have been deemed to have no adverse effect by the RI Historical Preservation & Heritage Commission (when such review is required), the PHDC review would be conducted at an administrative level by the Commission's staff. Nothing would prevent staff from forwarding the application to the full Commission for review if warranted.
3. On buildings with a sloped roof (historic building, non-contributing existing building, or new construction) where solar panels are to be installed on a primary elevation, visible from the right-of-way additional factors must be taken into consideration. For most historic properties, locating solar panels on the primary elevation is the least desirable option

because it will have the greatest adverse effect on the district's and property's character defining features, as well as its effect on the historic streetscape. All other options should be thoroughly explored and ruled out before considering installing solar panels on a primary elevation. For the installation of solar panels on primary elevations, proof that all other elevations or locations on property are not viable or feasible for installation of solar panels is required. Only installations where the proposed solar array is not visually intrusive, or highly visible, from the public right-of-way will be considered appropriate. Solar panels that are visually intrusive interact negatively with the historic structure resulting from an incompatibility with the subject property's scale, roof slope, color compatibility with the existing historic roofing materials, placement of the building on subject lot, or the grade of the right-of-way as it exists at the property.

Applications for installation on primary elevations, in addition to the foregoing, must also meet each of the requirements and considerations of paragraph #2 (a through f), above.

4. Solar panels may be installed in side or rear yards, but may not exceed 8 feet in height. Freestanding or detached on-site solar panels should be installed in locations that minimize visibility from the public right-of-way. These systems should be screened from the public right-of-way with materials elsewhere in the district such as fencing or vegetation of suitable scale for the district and setting. Placement and design should not detract from the historic character of the site or destroy historic landscape materials. Solar panels are not permitted in front yards.

GUIDELINES FOR SOLAR ENERGY SYSTEMS



Solar Technology (NPS, <i>Illustrated Guidelines on Sustainability for Rehabilitating Buildings</i>)	
Recommended	Not Recommended
Considering on-site, solar technology only after implementing all appropriate treatments to improve energy efficiency of the building, which often have greater life-cycle cost benefit than on-site renewable energy.	Installing on-site, solar technology without first implementing all appropriate treatments to the building to improve its energy efficiency.
Analyzing whether solar technology can be used successfully and will benefit a historic building without compromising its character or the character of the site or the surrounding historic district.	Installing a solar device without first analyzing its potential benefit or whether it will negatively impact the character of the historic building or site or the surrounding historic district.
Installing a solar device in a compatible location on the site or on a non-historic building or addition where it will have minimal impact on the historic building and its site.	Placing a solar device in a highly-visible location where it will negatively impact the historic building and its site.
Installing a solar device on the historic building only after other locations have been investigated and determined infeasible.	Installing a solar device on the historic building without first considering other locations.
Installing a low-profile solar device on the historic building so that it is not visible or only minimally visible from the public right of way: for example, on a flat roof and set back to take advantage of a parapet or other roof feature to screen solar panels from view; or on a secondary slope of a roof, out of view from the public right of way.	Installing a solar device in a prominent location on the building where it will negatively impact its historic character.
Installing a solar device on the historic building in a manner that does not damage historic roofing material or negatively impact the building's historic character and is reversible.	Installing a solar device on the historic building in a manner that damages historic roofing material or replaces it with an incompatible material and is not reversible.
	Removing historic roof features to install solar panels.
	Altering a historic, character-defining roof slope to install solar panels.
	Installing solar devices that are not reversible.
Installing solar roof panels horizontally – flat or parallel to the roof—to reduce visibility.	Placing solar roof panels vertically where they are highly visible and will negatively impact the historic character of the building.
Investigating off-site, renewable energy options when installing on-site solar devices that would negatively impact the historic character of the building or site.	

Colleen Danz is Forum Marketing Manager in the Preservation Division of the National Trust for Historic Preservation. The Preservation Division provides resources, training, and networking for preservation professionals.

My Kind of Town, Chicago — PastForward™ Preservation Conference

By Colleen Danz

The PastForward Conference—the premier gathering of historic preservation leaders in the country—will bring nearly 2,000 attendees to Chicago from November 14-17. This will mark the fourth time the National Trust for Historic Preservation’s annual conference, now in its 71st year, will be held in Chicago, which hosted the conference in 1954, 1978, and 1996. In 2017, PastForward will be presented in partnership with Landmarks Illinois.

Core conference programming will take place at the Palmer House Hilton in downtown Chicago. Attendees include historic preservationists, architects, city planners, mayors, developers, public and private-sector professionals, students, and scholars. The conference is the nation’s foremost educational and networking event for those in the business of saving places. Chicago was selected as a host city this year where a focus on arts, advocacy, and innovation characterizes the city’s

preservation work. This work was recognized and honored through two Richard H. Driehaus Foundation National Preservation Awards in 2016, one for the stunning restoration of the Chicago Athletic Association Hotel and the other for the pioneering



community revitalization effort at Stony Island Arts Bank.

"We are excited to bring PastForward and our attendees to Chicago to spotlight the incredible preservation work being done here," said Stephanie Meeks, president and CEO of the National Trust for Historic Preservation. "Chicago is a city of outstanding architecture and diverse historic neighborhoods, and this conference will focus on the unique and innovative approaches that Chicagoans have used to preserve their city's historic treasures. From the Pullman National Monument to Printers Row, from the Willis Tower to Farnsworth House, there is much to learn from Chicago's urban character and its compelling preservation story."

REGISTRATION

2017 conference registration is now open at **PastForwardConference.org**. Register early to take advantage of discounted rates and to secure a place on the tours that interest you. (Last year's Field Studies sold out in record time!)

GETTING TO KNOW THE HOST CITY BETTER

The Conference kicks off at the Auditorium Theatre of Roosevelt University, designed by Dankmar Adler and Louis Sullivan in 1889 and today a National Historic Landmark. Following the plenary is the Opening Reception held at the Field Museum—the reception is the single largest networking event of the conference. PastForward 2017 wraps up on Friday, November 17 with the Closing Luncheon and the Candlelight House Tour, which offers attendees a unique opportunity to explore



Field Study to National Treasure, Pullman National Monument

Credit: National Trust for Historic Preservation

a local historic neighborhood through personal home tours and a special reception. This year the Candlelight Tour explores the quintessential Chicago Bungalow in the West Ridge neighborhood. Field Studies will showcase inspiring projects, explore unique neighborhoods, and venture beyond the city limits. Highlights will include the popular Historic Tax Credit walking tour exploring the Chicago Loop, the Building Assessment Bootcamp tackling a project at Louis Sullivan's 1903 Holy Trinity Russian Orthodox Church in the Ukrainian Village, and the South Side Community Art Center in Bronzeville.

Chicago is known as a city of neighborhoods, with 59 designated historic districts. PastForward attendees can explore many of those neighbor-



Headquarters hotel, Palmer House Hilton

Credit: National Trust for Historic Preservation



The Chicago Theatre and Marina Towers

Credit: National Trust for Historic Preservation

hoods during the Overview Tour led by the Chicago Architecture Foundation. This popular tour is held daily during the conference.

LEARN. EXPLORE. INNOVATE.

In addition to Field Studies, core conference programming will include educational Learning Labs; quick, impactful Power Sessions; and three marquee presentations, called TrustLives.

TrustLives will focus on the main conference themes: ReUrbanism, technology, and health.

- ReUrbanism—especially preservation's role in creating economically and environmentally sustainable, equitable, and healthy communities.
- Technology—applying the next generation of technological applications to the work of saving places.
- Health—better understand and advocate for

the physical and psychological benefits of older and historic places.

The TrustLives will also be live-streamed for virtual attendees at no cost.

"This year we're putting the emphasis on the 'forward' in PastForward as we look at high-tech, big data, and virtual concepts not only for our attendees in Chicago, but also to all those live streaming from around the country," said Susan West Montgomery, vice president of Preservation Resources at the National Trust. "Now is the time for us to gather, learn, share best practices, and propel the preservation movement into the next generation."

While speakers are still being finalized, two keynote TrustLive speakers have been announced: Holly Morris, Filmmaker, Creative Activist, Author

and Bryan Lee, Jr., Architectural Designer, Writer, Activist, Agitator, Artist. Full details about speakers can be found online at PastForwardConference.org.

Attendees can start scheduling their time at PastForward using the conference app. Determining which of the 160 hours of programming to attend will be challenging with sessions such as:

- What's on the Horizon: Gaming, Drones, Virtual Reality
- Confronting Racism to Build Community
- This is Your Brain on Preservation

PROGRAM ENHANCEMENTS

In addition to the core programming, attendees will have the chance to enhance their conference experience with Preservation Leadership Training® (PLT) Intensives and special programming.

This year's day-long PLT Intensives will be held on Tuesday, November 14, and will focus on GIS training, fundraising concepts and board basics, and interpretation of women's history at historic sites and places. They will offer unique, hands-on opportunities for attendees to get the training and skills they need to put theory into practice.



Credit: National Trust for Historic Preservation

Candlelight House Tour of Chicago Bungalows

In addition, more than 10 special convenings will be held on Wednesday, November 15 to explore the latest inclusion efforts in interactive, conversation-style formats. The MIX Reception will follow Thursday night at the Chicago Defender Building on Motor Row in Bronzeville. Also, the Thursday luncheon will put a spotlight on Chicago architecture—past, present, and future. All of the PastForward programming, whether core conference programming, special events and sessions, or On Your Own events listed on the conference website, will keep you busy, engaged, and inspired throughout the week. ■



Credit: National Trust for Historic Preservation

Indiana Dunes Field Study tour of Century of Progress District

CALIFORNIA

Two 1950s-era ammonia tanks on the decommissioned Petrochem refinery outside Ventura may soon be deemed historic landmarks. The county's Cultural Heritage Board has been asked to decide whether the old sphere-shaped tanks should qualify for the designation. The refinery on Crooked Palm Road closed more than 30 years ago. Over the past five years or so, much of the property has been cleaned up, oil and contaminated soil removed, along with equipment and facilities. But the two large, round ammonia tanks still stand on the site just east of the Ventura River. They also were supposed to go. But now, the question is: Should they stay? The county's staff report cites several reasons for the designation, including: Building the ammonia plant was said to be the single largest construction project in the county since building the American Sugar Beet factory in Oxnard in 1898. County Supervisor Steve Bennett said he doesn't believe the tanks should qualify as a landmark. Bennett, who represents the Ojai Valley, said it "defies common sense" to leave them on the site. About two dozen local residents spoke at the meeting urging the board to deny landmark status, including Bennett. The original deal was that the structures would be removed, and the compliance agreement confirmed that would happen, he said.

<http://www.vcstar.com/story/news/local/communities/ventura/2017/07/23/tanks-shuttered-petrochem-site-proposed-historically-significant/494214001/>

MARYLAND

A District Court judge ruled Wednesday that a mayoral candidate and his business partners should have sought a certificate of approval before commissioning a giant mural on the side of their Annapolis restaurant. Judge John P. McKenna Jr.'s decision means the partners must seek an after-the-fact certificate of approval if they wish to keep the mural on the building. It's a victory for the city after it cited the restaurant about a year ago. The candidate went to court rather than filing the certificate of approval because he had concerns the city would try to control the content of the mural and he didn't think city code gave it authority over murals. It isn't about content — it's about making sure exterior changes don't alter the historical, cultural, archeological or architectural significance of the property, said Gary Elson, assistant city attorney.

The case began in June 2015 when artist Jeff Huntington painted a split image of the golden Buddha with an injured nurse from the 1925 Russian movie "Battleship Potemkin." A key part of the judge's decision

involved examining the city's rules and testing them against established principles that allow the government to establish content-neutral law. These are laws that regulate time, place and manner of free speech, but not the content of that speech. The judge found the city's law met these goals. This means the city has the authority to require certificates of approval for murals and other alterations that could impact the significance of a site or structure within the Historic District.

<http://www.capitalgazette.com/news/annapolis/ph-ac-cn-mural-decision-0511-20170510-story.html>

MARYLAND

The Maryland Association of Historic District Commission's Replacement Materials Symposium was held on June 10th at Rockville City Hall and was an undisputed success. Almost 100 historic preservation commissioners, city and county staff, historic property owners, and preservationists gathered to tackle the controversial issue of substitute materials in historic places at the organization's second annual statewide symposium. Highly qualified speakers covered the topic with a range of examples from local case studies to international perspectives. Through thought-provoking presentations, participants were able to build upon their diverse preservation experiences to address replacement materials as they relate to historic materials, sustainability, design review, and trends of local commissions. Participants also had the opportunity to meet with representatives of the leading manufacturers of some of the most popular types of replacement materials such as composite siding; engineered wood siding; synthetic slate and shake roofing; modern metal roofing panel systems; fiberglass windows and doors; and, cellular PVC trim and porch products in the Vendor Hall. Samples and product display were available for participants to touch, see, and begin evaluating them for use on historic buildings. Vendor representatives overwhelmingly indicated that symposium participants were one of their best and most informed audiences to date. Many manufacturers also left with a better idea of what qualities are desired if replacement materials are to be used on historic places.

<https://mahdc.org/event/replacement-materials-symposium/>

NEW YORK

Amid an increase in acrimony over the construction of an Islamic house of worship, Muslims in Yonkers are appealing a ruling by a federal judge that affirmed a decision by city officials to effectively prevent the conversion of an old mansion into a mosque. The Islamic Community Center

for Mid-Westchester purchased the \$750,000 building in 2015 in order to turn it into a mosque. Zoning allowed a house of worship, but the following year, acting at the request of a local activist group, city officials designated the early-20th century building a historic landmark, citing its unique architectural qualities. That restricted the Community Center's ability to renovate it without going to the Yonkers Landmarks Preservation Board for approval. The Islamic community called the move discriminatory and illegal, and they sued under the Religious Land Use and Institutionalized Persons Act. This was the same kind of suit pursued by Muslims in Bernards Township, NJ, which led to a Justice Department settlement. It forced the town to reverse its decision, approve a mosque application and pay \$3.25 million in damages. The Justice Department is also currently investigating a possible violation of the law in Bayonne, NJ, where planning officials rejected a proposal to convert a warehouse into a mosque. Typically, mosque applications are held up due to zoning concerns. The case in Yonkers is the first known to involve a historic designation. But in a ruling late last month, Judge Vincent L. Briccetti wrote that the matter did not rise to a federal violation, and he dismissed the suit.

<http://www.wnyc.org/story/judge-deals-blow-quest-mosque-yonkers/>

TEXAS

Despite palpable compassion for its owner, the Austin Historic Landmark Commission threw its full weight behind keeping the building that was once the Old Negro Women's Home in East Austin at its last meeting. Commissioners voted unanimously in favor of individual historic landmark status for the home at 1210 Rosewood Avenue over the objections of the current owner, who would like to move the home to Lockhart, Texas, in order to make way for a small mixed-use project. The home, which is estimated to have been built in the 1920s, operated as the Old Negro Women's Home under an African-American executive board until the 1970s, though there was a period in the 1940s when it was home to the Colored Branch of the Young Women's Christian Association. The 2016 East Austin Historic Resources Survey identified the home as eligible for individual designation as both a city historic landmark and in the National Register of Historic Places.

Peter Staats, who is the owner of the home, said he has been a good steward of the commercial property for the past 18 years. When he purchased the home, it was boarded up, sat empty and had a long list of needed repairs. "The problem now is galloping property taxes," Staats said. "I could make repairs, but my property taxes

have gone from \$2,000 in 2002 to \$22,000 this year, and they are only going up. Staats' current plan to relocate the house to Lockhart would make way for a "small mixed-use project." Though no one spoke in opposition to the relocation of the house, the consensus on the dais was unanimous. Historic Landmark commissioners voted 8-0 to move forward with historic zoning for the home. <https://www.austinmonitor.com/stories/2017/08/plan-move-old-negro-womens-home-town-stalls-city-hall/>

WASHINGTON

The University of Washington, whose main campus is in the City of Seattle, has lost its bid to declare itself free of Seattle's landmarks preservation law. In a unanimous decision, justices on the state Supreme Court sided with the city, which argued that the university is not immune from the city's landmarks law. Though the legal challenge stemmed from a debate over the fate of an architecturally unusual building that once housed a nuclear reactor, the outcome has significance beyond that dispute, according to Roger Wynne, an assistant city attorney. "What this means more broadly is that all state universities are now on notice that they can't take a pass on local development regulations," Wynne said. "That's important because universities have properties in the hearts of local communities that are stitched into the fabric of those communities. It would be problematic if they could simply decide not to comply." <http://www.seattletimes.com/seattle-news/politics/uw-must-follow-citys-landmarks-law-washington-state-supreme-court-rules/>

FROM SPACE

A former professor is proposing that the Apollo 11 landing site at Tranquility Base, where humans first stepped foot on the moon, should be named a National Historic Landmark. The academic, Beth O'Leary, an emerita professor of anthropology at New Mexico State University, is also pushing for other lunar-landing sites to be preserved for posterity. O'Leary spoke in July at the National Geographic Society and the Smithsonian National Air and Space Museum in Washington, D.C., to coincide with the 48th anniversary of the Apollo 11 mission.

<https://www.usatoday.com/story/tech/science/2017/07/18/prof-says-apollo-11-moon-landing-site-should-national-historic-landmark/487141001/>



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