Many have heard of the White Stag Block. In the past, it was best known for its illuminated ‘Made in Oregon’ rooftop sign shining over the Willamette River and Governor Tom McCall Waterfront Park. In a riverfront location in Old Town Portland adjacent to Chinatown, it contributed to the Skidmore District’s listing on the National Register of Historic Places. Now with a renovation completed in 2008, the White Stag Block will be known for its beautifully restored historic architecture, its green building features, and its new tenants.

The University of Oregon in Portland, along with Venerable Group, Inc., United Fund Advisors and others, has played a vital role in the green restoration of these historic buildings. The White Stag, Skidmore, and Bickel buildings, together known as the White Stag Block, have earned Leadership in Energy and Environmental Design (LEED™) Gold Certification. The United States Green Building Council’s LEED Green Building Rating System is a national benchmark of sustainable building techniques. The rating certifies the measures taken to make the buildings’ construction and operations sustainable. In making the green building renovations, the historic character was carefully preserved so that the buildings could retain their place in the National Register of Historic Places.

The importance of retaining existing buildings cannot be understated, as a building that is already standing requires far fewer resources than a building built from scratch. In this case, the buildings themselves were not only reused, but more than 98% of the materials salvaged out of the buildings were diverted from landfills, using a combination of salvage, reuse, and recycling. And, many of these materials were reused within the White Stag Block itself. In addition, materials salvaged out of other buildings were used in the White Stag Block renovation. For instance, the gym flooring salvaged out of the Gerlinger Annex on the University of Oregon campus in Eugene was reused to create the beautiful wood flooring in the University of Oregon in Portland’s School of Architecture and Allied Arts space, as well as the flooring in the Portland Duck Store.

"The fifth floor view will change with the seasons; trees will block the river in the summer, then leaves drop and the mountains in the East appear.”

Hal Ayotte, Principal Fletcher Farr Ayotte Architects
Also significant, the White Stag Block has a rainwater catchment system that will capture almost all of the rain that falls on the roofs of the three buildings. Water is piped to a 10,000+ gallon holding tank, located in what was once an open-air, dirt-filled, basement-level lightwell. From the tank, the rainwater is filtered and piped to low-flow bathroom fixtures that help conserve water. The rainwater catchment system combined with the low-flow fixtures are expected to meet, at a minimum, the White Stag Block's entire winter flushing demand. This will reduce the buildings’ water use by over 40%.

Several strategies help the White Stag Block to reduce the energy consumed and pollution created by building users both in commuting and at work. The block is conveniently located close to public transportation and it provides support for carpooling, car-sharing and bicycle commuting. Bicycle support facilities include a storage room, locker rooms, and showers. Energy-saving heating equipment, energy-efficient lighting, and daylighting all help to reduce the buildings’ energy consumption. Green housekeeping products and techniques protect human health and the environment.

Finally, the White Stag Block has an Education Program to explain about its green features and to promote more sustainable behaviors among the building users. User behavior is just as important to sustainability as materials and resources used in the renovation process, the buildings’ water efficiency and energy performance. Behind the historic facades, the building has been infused with new interior spaces and sustainable technologies. Now that the renovation is complete, the responsibility rests with the building users to facilitate the White Stag Block’s sustainable performance.

The LEED Education Program Design Team was created to educate building users, visitors, and building professionals about the White Stag Block, as well as to help gain LEED certification. This Case Study was created by the Design Team. The Education Program was led by Faculty Coordinator Nancy Yen-wen Cheng, Associate Professor of Architecture, and Project Coordinator Diana Fischetti, Graduate Teaching Fellow. The Design team was composed of graduate and undergraduate students at the University of Oregon from a variety of disciplines. The students participated in either one or two academic terms of a course entitled LEED Eco-Communication, spanning from January through June of 2008. You can find more information about the LEED Education Program and the White Stag Block at: http://pdx.uoregon.edu/leed.

~ Diana Fischetti

Photos: James Descoteaux, Jessica Engeman, Ray Neff, R.N., Andre Chinn, R.N., R.N.

Graphic Design: Ray Neff

“In a community like Portland, when you see some of the hardwood floor that has been recycled, as in the White Stag, it has more character. You can tell people that this is the original floor that came out of such-and-such a building, this floor is 100 years old or so. It increases value, people will see that it’s richer, it tells more of a story... A lot of Portlanders appreciate that.”

Art Demuro, Principal Venerable Properties, Inc.
The University of Oregon in Portland is housed in a complex of buildings called the White Stag Block that merges the Bickel Block building, constructed in 1883, the Skidmore Block building, constructed in 1889, and the White Stag building (also known as the Hirsch-Weis building), constructed in 1907. These three buildings, along with the Blagen Block building, cover a Portland city block. The first businesses in these buildings read like a cross-section of Portland’s history. These buildings once housed a logging machinery company, a tent and outdoor supply factory, and even a china importer. Now, the historic White Stag, Skidmore, and Bickel buildings have been connected through a Leadership in Energy and Environmental Design (LEED™) renovation process involving the University of Oregon in Portland, with Venerable Group, Inc., United Fund Advisors and others.

Bickel Block Building

Fredrick Bickel was a Portland candy entrepreneur who used the success of his confectionary to launch a career in real estate development. This building, designed in 1883, was the first of many gothic buildings by Oregon architect, Justus Krumbein. In this period, cast iron was the new building material both for its ornamentation and its assumed resistance to fire in industrial buildings. New York City, San Francisco and other major cities were also building cast-iron façades at this time.

The Bickel Block building originally housed the Parke and Lacey Machinery Company, which made engines and heavy machinery for the logging industry. It was later purchased, in 1950, by the Fraser Paper Company. In 1958, the owner at the time had a masonry product called “Wonderstone” installed at the storefront level, concealing the beautiful and ornate cast-iron columns and wood storefront doors. In order to fully encapsulate the pre-existing façade without overstepping the property line, many of the cast-iron pieces were smashed off so that the bricks could lie flush. In 1972, a subsequent owner set fire to the building in order to collect on his insurance policy. During the renovation process, the masonry wall was removed to reveal damaged cast-iron ornamentation and charred wooden doors.

There is a popular myth about ‘Shanghai tunnels’ that run underneath Portland’s Chinatown and Old Town. The legend holds that in the 19th and 20th centuries, bars in the neighborhoods had trap doors leading to the tunnels that would be used to capture, or ‘shanghai’, drunken men who would become slaves on ships leaving Portland for voyages at sea. Others claim that these tunnels were simply used to transport goods back and forth between the ships and the warehouses along the river. Some believe that remnants of these tunnels abut the White Stag Block’s river-facing basement, and although now sealed off, pass beneath Naito Parkway and Governor Tom McCall Waterfront Park to the water’s edge. However, there is no hard evidence proving that this is true.

Skidmore Block Building

The façade of the Skidmore Block building is of Italianate-style cast iron. The Skidmore building was completed in 1889 for Stephen Skidmore’s business partner and brother-in-law, Charles E. Sitton, who
had inherited the Skidmore Block parcel upon Skidmore’s 1882
death. In 1926, the south façade was removed and rebuilt at an angle
to make room for the construction of the Burnside Bridge, which now
abuts the building. Like the Bickel, the Skidmore was built with an
ornate cast-iron façade.

White Stag Building

The White Stag building’s first occupants were Max and Leopold Hirsh of the Willamette Tent and Awning Company. They used the
building as their manufacturing and warehouse space. As was the
case with the Skidmore, the south façade of the White Stag was also
removed to make way for the construction of the Burnside Bridge.
Harold Hirsh opened White Stag Sporting Goods in the building in
1931. In 1940, the roof space was rented to the White Satin Sugar
Company for the placement of a sign promoting that company’s
name. But, in 1959, the sign was changed to read ‘White Stag’ to
reflect Hirsch-Weis’ new status as a division of White Stag. The sign
was re-worded again in 1997 to read ‘Made in Oregon’ under the
patronage of the Made in Oregon Company, a retail chain of Oregon
foods and crafts. The new text did not violate historic preservation
codes both because it was outside the protected timeframe and
because it was argued that the text itself was separate from the style
and is entitled to First Amendment liberties.

The story of the White Stag is merged with that of Hide Naito,
who immigrated to Los Angeles from Japan in 1917. Four years
later, Naito opened a Portland import business which became the
Norcrest China Company. By 1972, Norcrest China had moved into
the White Stag building.

The Naito family businesses, run by sons Sam and Bill Naito,
grew to managing 1.8 million square feet of central Portland real
estate by 2004 and the chain of Made in Oregon stores. Bill Naito,
for whom Front Avenue was renamed, kept a small office and living
space in the building until his 1996 death. Norcrest China closed in
2004. University of Oregon President David Frohnmayer awarded
Sam Naito, among others, an honorary degree in 2008 in an attempt
to redress the 1942 expulsion of 20 Japanese Americans from the
University.

The White Stag building was purchased in 2006 by White Stag
Block, LLC, managed by Venerable Group, Inc. The University of
Oregon has signed an eighteen-year lease, with an option to purchase
the building. With approximately 66,000 square feet of available
space, the new facility will incorporate the University Oregon in
Portland’s academic programs and will enable the University to host
lectures, exhibits, and other public events.

~ Zach Rose, Diana Fischetti

Photos: Graham Halberg, Venerable Properties, Inc., James Descoteaux,
V.P. Inc. Oregon Historical Society, G.H.

Graphic Design: Ray Neff
The United States Green Building Council (USGBC) is a nonprofit organization dedicated to the design and building of sustainable structures. The USGBC’s Leadership in Energy and Environmental Design (LEED™) Green Building Rating System™ is a nationally-accepted system of certification for green buildings. LEED is the de-facto standard of green building and used by owners, designers, builders and others to achieve innovative design that includes a comprehensive, integrated approach to sustainability from energy efficiency to building placement, within the greater urban fabric.

The LEED certification process employs a scorecard by which those involved in the design and construction process keep track of, and report on, the actual green building techniques that will be used to qualify for certification. The scorecard is divided into six sections: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, and Innovation & Design.

Sustainable Sites criteria promote sustainability and the reduction of pollution through the choice or use of the building site. Water Efficiency criteria promote the reduction of a building’s water requirements through water-saving design and innovation. Energy & Atmosphere criteria are designed to reduce a building’s impact through the optimization of its energy performance, the use of on-site renewable energy, and the purchase of green power. Materials & Resources criteria address sustainability through the reuse of existing buildings, the management of construction waste, the reuse of materials, and the use of recycled and regional materials. Indoor Environmental Quality criteria are designed to improve building users’ experience and health through control of indoor air quality and thermal comfort. Innovation & Design criteria recognize building design for taking extra steps, demonstrating innovation and creativity.

The White Stag Block’s LEED Gold certification is based on the LEED for New Construction and Major Renovations (LEED-NC v.2.2). This particular rating system is geared towards institutional and commercial projects, such as government, office, and high-rise residential buildings.

~ Diana Fischetti

Photos: NASA, Ray Neff, Jessica Engeman, R.N., BikePortland.org Dawn Aurora O’Connor, Fletcher Farr Ayotte
Venerable Group, Inc., which specializes in the redevelopment of commercial historic buildings, was committed to working with the University of Oregon in Portland to find a new home. When securing the White Stag Block property became a possibility, Venerable was excited to have the chance to make a positive impact in Portland’s Old Town – a neighborhood that has long been considered Portland’s skid row. With a mission to preserve and revitalize Oregon’s historical resources through development of commercial real estate, Venerable was eager to rehabilitate these three historically-significant buildings that had sat vacant for decades.

The acquisition financing for the White Stag Block project was derived from a combination of Historic Tax Credits and New Markets Tax Credits. As a result of the property’s listed status in the National Register of Historic Places and because the owner/developer undertook a certified historic rehabilitation, the property was eligible for a 20% federal tax credit on qualifying expenditures. To maximize the benefit of these historic tax credits, Key Community Development Corporation (KCDC) was brought in as the tax credit investor. They were able to significantly enhance their pricing on the Historic Tax Credits by contributing some of their own New Markets Tax Credit allocation to the project. This resulted in an equity investment by KCDC of more than $6,800,000.

The New Markets Tax Credit program was designed to stimulate investment in qualified low-income census tracts across the country. Tax credits are allocated annually by the Community Development Financial Institutions Fund of the United States Treasury under a competitive application process. Community Development Entities (CDE) that receive allocations then issue the credits to taxable investors in exchange for capital interest in the CDE and use the proceeds to assist the qualified project.

The construction financing was derived from the use of a $19 million allocation of New Markets Credits (NMTC) from the Portland New Markets Fund (PNMF), which is sponsored by White Stag Block tenant Portland Family of Funds/United Fund Advisors. With respect to this $19 million allocation, Key Community Development Corp was again the investor in the NMTCs as well as the lender. Their contribution resulted in over $19.6 million in loans and equity. White Stag Block, LLC was eligible to benefit from the NMTC-derived financing because the property is located in a qualifying low-income census tract. The Portland Development Commission also provided gap financing in the form of a $2.5 million low-interest loan. They also provided more than $225,000 in grant monies for storefront and lighting improvements to the buildings. Through this creative financing, the historic White Stag Block’s green renovation was made possible.

~ Jessica Engeman, Historic Preservation Specialist
Venerable Group, Inc.

Photos: Dawn Aurora O’Conner, Ray Neff, Jessica Engeman, D.A.O.

Graphic Design: Ray Neff
The White Stag Block design team faced a large challenge: how to modernize building performance while keeping the appearance historically accurate. The whole design team was committed to using the US Green Building Council’s Leadership in Energy and Environmental Design (LEED™) standards to guide the sustainable renovation. At the same time they needed to adhere to strict historic preservation guidelines to qualify for federal historic rehabilitation tax credits. The stakeholders included owner-developers Venerable Group, Inc., architects from Fletcher Farr Ayotte, engineers from Interface Engineering, builders from Bremik Construction, and tenants, such as the University of Oregon (UO).

**Beginnings**

The White Stag Block renovation process is a story of decisions made to preserve embodied energy and historic integrity while inserting modern building systems. An important starting point came in March of 2006, when key players came together in a visioning workshop, called an Eco-Charette, under the guidance of consultants with Green Building Services. Patrick LeBoeuf, Project Manager from Bremik Construction found it a great way to become immersed in the LEED design and certification process. During this intensive session, the team worked towards a common vision by articulating project goals. These initial goals for the White Stag Block renovation project included creating a safe and friendly environment, integrating and communicating green building strategies, meeting budget and scheduling goals, and planning for the future. They then brainstormed conceptual approaches for the LEED categories, such as Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, and Innovation & Design.

From the input received at the charette, Green Building Services generated a preliminary LEED scorecard that identified which points would be targeted. They also guided the phasing of the sustainability work, graphically mapping when each point needed to be considered, incorporated and tracked. The documentation generated from this initial workshop served as a guidepost for future coordination meetings, assisting new members in becoming aligned with the initial vision.

**Embodied Energy**

Despite the fact that old buildings may have outdated systems, renovating existing buildings is inherently resource saving. The five-story load-bearing brick structures of the White Stag Block have a considerable amount of embodied energy – the energy that has been used to extract, refine, produce, transport, and install its materials. As the costs of transportation and materials rise, the value of an existing building’s embodied energy increases. Since embodied energy is lost when a building is razed, restoring buildings is intrinsically sustainable. More than 98% of the materials demolished out of the White Stag Block buildings were diverted from landfills, and many materials were reused within the complex itself, preserving the embodied energy of these materials. (For more information about material reuse and recycling, see the Materials & Resources section of this document.)
Historic Renovation & Urban Redevelopment

In addition to keeping materials out of landfills, the renovation of the White Stag Block preserved an important community landmark. The White Stag Block’s urban site is an ideal location for redevelopment, and this renovation will play an important role in the revitalization of Portland’s Old Town District. The District has for years been struggling economically, but new tenants in the area, such as the University of Oregon in Portland and United Fund Advisors will draw an increasing number of businesses. Already Mercy Corps is investing in a new headquarters just across Burnside Street from the White Stag Block. The expectation is that restaurants and retail establishments will be among the businesses that help pioneer urban redevelopment in this location.

Conclusion

How well did the White Stag Block meet up to its potential as a model green building? Each member of the design team has a story about an additional sustainable option that was considered and almost implemented. Despite the constraints and unpredictability of the existing buildings, the owner, tenants, architects, and engineers were able to realize many of their initial goals. Comparing the Preliminary LEED scorecard from the March 2006 Eco-Charette, with the nearly final March 2008 scorecard reveals that the team exceeded the predicted 32 total points attempted – most likely achieving 43 points and earning Gold-level certification. Additional points were gained by earning all water efficiency points, increasing energy performance, diverting 98% of construction waste from landfills, increasing recycled content from 10% to 20%, and buying Green power.

As these points are based on installed features and documented operation plans, the actual performance has yet to be charted. Every year, University of Oregon architecture students will create post-occupancy case studies about building performance by observing and interviewing users, and tracking temperature, lighting and acoustic levels. And within the building, the Energy Studies in Buildings Lab advises professionals external to the UO about energy efficiency. As a result, the building manager will receive excellent information from multiple sources detailing the ways in which the building team stumbled or prevailed, and ways to further improve the buildings’ sustainability.

~ Casey Kleinhenz, Michael Wilson, Diana Fischetti, and Nancy Cheng

Photos: Dawn Aurora O’Connor, Venerable Properties Inc, Jessica Engeman, Jolyn Overton, J.E.

Graphic Design: Ray Neff
Throughout the renovation process, the historic character of the buildings was balanced with the green building renovations. The reuse of salvaged materials was critical to achieving this balance. Salvaged brick was used to fill existing holes, joists were used to fill old stair openings, and wood was re-milled and used for trim. Steel-braced frames and compound beams with massive connectors were also repaired and retained. In addition, many materials were preserved and restored in place, such as the painted and finished concrete and original foundation, and the re-cast replica column capitals. Many creative elements of the renovation process were not dictated by LEED™ certification.

**Windows**

An involved dialogue between sustainable development and historic preservation stakeholders occurred regarding building apertures. The developer wanted to add additional windows to the northeast corner of the Bickel Building. Windows were added to the spaces on the façade where “blind” windows were originally built, which was permitted within the guidelines for the federal rehabilitation tax credits. However, the addition of windows to other flat surfaces of the building was prohibited. The window frames themselves were also a source of contention. Historic preservation guidelines specify that original windows can only be replaced if significantly damaged. Because of this, the developer was able to replace steel sash windows on the south facade of the White Stag building with low-emissivity (or low-E) windows. The new windows provide a higher R-value (a measure of insulative capability) than the original windows and help the building regulate indoor temperature and operate more efficiently.

**Rooftop Light Monitors**

In the University of Oregon in Portland’s Architecture and Allied Arts space, the original light monitors on the 5th floor of the White Stag building were preserved. These monitors were retrofitted so that they could be renovated in the future to allow for their easy opening and closing, which can aid with building ventilation. In addition, the University of Oregon in Portland elected to sacrifice square footage in order to remove a section of flooring between the 4th and 5th floors. This space has been converted to a stairwell that allows daylight to penetrate deeper into the building. The use of daylighting helps to increase efficient building operation by reducing the need for artificial lighting.

Other compromises were brokered between the goals of sustainable development, historic preservation, and construction logistics. Rather than reinforce all the brick walls with concrete, some historic brick surfaces were left exposed while others were encased in plaster, a historic
preservation requirement. All the mechanical components of the buildings had to be located in the basement because the historic roof profiles prevented the placement of mechanical components there. Also in the basement, an entirely new electrical transformer vault had to be built to house the significantly larger electrical transformer currently required for the modern uses of the building. This transformer vault projects beneath Naito Parkway.

Rooftops

The rooftop signage for which the White Stag is best known also tells a story. In 1940, the roof space was rented to the White Satin Sugar Company for the placement of a sign promoting that company’s name. In 1959, the sign was changed to read ‘White Stag’ to reflect Hirsch-Weis’ new status as a division of White Stag. The sign was re-worded again in 1997 to read ‘Made in Oregon’ under the patronage of the Made in Oregon Company, a retail chain of Oregon foods and crafts. Now, the sign itself and its style are considered historic and must remain intact, but the exact wording is not considered historic, and so can be changed.

Although the roofs of the three White Stag Block buildings are incongruous and not designed to support the weight of green roofs or photovoltaic (PV) panels, those involved in the project are making efforts to incorporate these components. The roof profiles are important historic features of these buildings, making the installation of PV panels an even greater challenge. Building tenants United Fund Advisors (UFA) will help finance PV panels on the roof of the White Stag building, expected by the fall of 2008. And because the views are so beautiful, University of Oregon in Portland Architecture Director, Hajo Neis, is hopeful that “one day we will find a way to incorporate a roof garden onto the building.”

Lightwells

The two existing lightwells between the four buildings that make up the White Stag Block were used in creative ways that promote both historic preservation and sustainability. Most notably, the basement level of the lightwell between the White Stag and Skidmore buildings had previously been open to the sky and was home to many pigeons. In the renovation process, this lightwell was lined with concrete to create the 10,000 gallon water storage tank that collects rainwater from the roof and is used to flush the buildings’ toilets. In addition, a concealed lightwell between the Bickel and Blagen buildings houses the ventilation systems for all four buildings. This has significantly reduced the amount of floor space needed for ventilation shafts.

~ Casey Kleinhenz, Michael Wilson, Diana Fischetti, and Nancy Cheng
Photos: Andre Chinn, Interface Engineering, Jessica Engeman
Graphic Design: Ray Neff
The White Stag Block design team faced a major challenge in balancing structural performance with historic aesthetics. Constructed at the turn of the century, the Bickel, Skidmore, and White Stag buildings have experienced several structural challenges since that time. Structural improvements and replacements were complicated by the strict historic preservation guidelines required for the buildings to retain their listing on the National Register of Historic Places, as part of the historic Skidmore District.

**Structural Improvements**

The need to preserve the buildings’ historic exteriors required that all of the structural improvements to the buildings be made internally. This greatly increased the cost of the renovation. It is more expensive to insert a complex interior cross-bracing system than to shore up the corners of a building externally. The interior structural improvements include:

- the use of massive steel beams in a post and lintel system to open up load bearing brick walls;
- the reinforcing of brick walls around stairwells and elevators with concrete;
- the shoring of the building foundations;
- the re-pointing of all the mortar on the original brick walls;
- the designing of complex steel moment frames that secure multiple building floors; and
- the restoration and reuse of original cast-iron support columns.

**Structural Shoring on Burnside Street**

An interesting story stems from the 1926 removal of the south façades of the White Stag and Skidmore buildings to make way for the construction of the Burnside Bridge. These façades had actually been load-bearing walls, meaning that they helped support the floor slabs. So removing the walls overloaded the wooden capitals of the interior columns. In subsequent years, the load of the buildings crushed and twisted the column capitals. The renovation process involved shoring up the buildings beyond the fourth floor and replacing the crushed timber capitals with added steel reinforcing plates.

**Structural Replacement – Cast-Iron Columns**

Behind the restoration of the cast-iron columns and frontage doors on the Bickel Block lies another fascinating story. As previously noted, the 1958 owner had pieces of the cast-iron façade smashed off in order to fully encapsulate that pre-existing façade within a new masonry storefront without overstepping the property line. In 1972, a subsequent owner set fire to the building in order to collect on his insurance policy.

During the renovation process, the masonry wall was removed to reveal these damaged cast-iron and
charred wooden doors. Smashed capitals were replaced with new capitals, cast in aluminum and then treated to prevent chemical interactions between new aluminum and old iron. New capitals were created by Barr Casting, Inc., based in Portland, Oregon. After the capitals were repaired, the columns were repainted in a color scheme representative of the time period in which the building was first constructed. The entire process took three months due to the complexity of creating and correctly placing the moldings. In summary, the buildings’ structural integrity was greatly increased while their historic character was enhanced.

~ Casey Kleinhenz, Michael Wilson, Diana Fischetti and Nancy Cheng

Photos: Venerable Properties Inc, School of Architecture and Allied Arts/UO, Ray Neff, Dawn Aurora O’Connor, Diana Fischetti

Green Building Services, Richard Gehrke

Graphic Design: Ray Neff

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Early stage design charrette
Portland, Oregon receives between 20 and 70 inches of precipitation per year. The White Stag Block has a water catchment system that will take advantage of this plentiful resource, while at the same time reducing the Block’s demand for municipal water. To complement the water catchment system, there are water-efficient low-flow toilets and urinals throughout the buildings. These systems and components are part of the White Stag Block’s Leadership in Energy and Environmental Design (LEED™) Water Efficiency “Water Use Reduction” (WEc3.1 & 3.2) and “Innovative Wastewater Technologies” (WEc2), as well as Innovation & Design “Exemplary Performance of WEc3 (40% water use reduction)” (IDc1.1) credits, based on these systems.

The water catchment system collects rainwater from the roofs of the White Stag, Skidmore, and Bickel buildings. The roof drains collecting the water are either downspouts (on the edge of the buildings) or inboard on the rooftops. Pipes carrying the filtered rainwater are made of clearly-marked, bright green, recyclable polypropylene. These pipes are not only less expensive than copper pipes, but are also the first of their kind in Portland. The pipes carrying water from the roofs to the basement are visible from the first floor main lightwell, shared by the Skidmore and White Stag buildings.

After being collected and filtered, the water is routed to an 10,000 gallon stormwater retention tank that is located in the basement, beneath the main lightwell. During renovation, the open-air, dirt-filled, basement-level lightwell was cleared of bottles and other debris, lined with concrete, and converted into this water retention tank. The tank is easy to identify, as it is located beneath the two tamper-proof manholes in the main lightwell, adorned with the University of Oregon’s signature “O”. Water from the main storage tank is piped to an ultraviolet (UV) filter in the basement, and then pumped from to a smaller, plastic, secondary holding tank. From there, it is piped to the toilets.

Sensor systems in the main tank detect the water level. If the in-tank monitoring system indicates that the water level is getting low, the tank can be supplemented with Portland municipal drinking water. The tank also has overflow capabilities, so that collected rainwater exceeding its capacity can be drained. As required by the City of Portland Bureau of Environmental Services, excess water is filtered by both UV and mechanical filters before being drained into Portland’s municipal stormwater system.

The collected rainwater feeds low-flow toilet fixtures that reduce water use. There are urinals that require only 1/8 gallon (1 pint) to flush. There are also dual-flush toilets that allow users to choose a half flush or a full flush based on waste. The water flowing through this rainwater system is not potable.

The rainwater catchment system combined with the low-flow fixtures are expected to meet the White Stag Block’s entire winter flushing demand, as nearly 2/3 of Oregon’s total annual rainfall occurs between October and March. While Oregon summer rainfall is minimal, the building’s need for flushing will be much lower. Fewer students will reduce summer water requirements to significantly less than those in winter.

~ Diana Fischetti, Ashley Garrett, & Jolyn Overton

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Photos: Ray Neff
The behaviors of White Stag Block building users are equally as important to the buildings’ sustainable functioning as the materials and resources used in the renovation process, the buildings’ water efficiency, and the buildings’ energy performance. The products used in building maintenance have a large impact on building users and the environment. Cleaning products and other chemicals employed in building maintenance can expose building occupants and users to physical, chemical and biological pollutants that can have detrimental affects on indoor air quality, human health, and the environment. In addition, the chemicals used in building maintenance can have negative impacts on building systems and finishes. For these reasons, the implementation of green housekeeping techniques is important.

Green housekeeping is a component of the White Stag Block’s United States Green Building Council Leadership in Energy and Environmental Design (LEED™) Gold certification. Venerable Properties has officially adopted a green housekeeping policy, which applies to all employees and contractors. As a result, the White Stag Block renovation project has received the one possible Innovation & Design point for “Green Housekeeping” (IDc1.2).

The green housekeeping products and techniques used are based on LEED requirements, as specified by the U.S. Green Building Council in conjunction with the State of Oregon. This includes the green housekeeping policy, as well as product-specific professional development for custodial staff. The green housekeeping policy for the White Stag Block is designed to minimize the use of toxic chemicals and protect human health, while also ensuring a high level of cleanliness and attractiveness within the buildings.

The efficient use of sustainable cleaning systems, products, and maintenance, as well as their reuse, recycling, and proper disposal are all considered.

The minimization of waste from the maintenance chemicals and associated packaging are also considered. Various organizations have tested and approved specific products and equipment for LEED green housekeeping, and the White Stag Block uses those products that are Green Seal GS-37 approved and/or meet the California Code of Regulations.

Cleaning products are bio-based, non-toxic, fragrance-free, have a pH between 4 and 9, and have low levels of volatile organic compounds (VOCs). Products may not contain: carcinogens, mutagens, teratogens, ozone-depleting compounds, greenhouse gasses, dyes, petroleum distillates, endocrine modifiers, alkyl phenyl ethoxylates, dibutyl phthalate, heavy metals, more than 0.5% phosphorous, chlorinated solvents, or contribute to petrochemical smog or poor indoor air quality. In addition, concentrated products are used and properly diluted to reduce impacts to human health and the environment. Paper products are 100% recycled content and include post-consumer waste. The U.S. Environmental Protection Agency’s Comprehensive Procurement Guidelines are employed in the use of paper products and trash bags. Re-usable/washable rags and mops are used, which are effective and do not shed fibers. Vacuums have HEPA filters, which reduce dust in the building. The focus is on the reduction of overall use. In general, products used should degrade rapidly, should not harm human health, should not pollute the air or water supply, and should present an economically sound cost of usage.

~ Diana Fischetti and John Wallace

Photos: Ray Neff, Jessica Engeman, Casey Kleinhenz, Andre Chinn

Graphic Design: Ray Neff

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By coupling the reuse of existing building components with the use of materials made from recycled and renewable resources, the White Stag Block facilitates sustainability. With the goal of achieving LEED™ Gold certification, the White Stag Block project has earned 7 of 13 possible scorecard points for resource-saving approaches to building materials. The building team reduced the building’s environmental impact by reducing waste generated in construction and occupancy, extending the useful life of the existing buildings, conserving material resources, and retaining cultural resources.

Reusing building materials can greatly reduce the demand for virgin materials, which must be extracted, processed, transported, and installed. The energy required to bring materials from extraction to installation is referred to as that material’s embodied energy. By redirecting reusable materials that have been removed from a building to construction and architectural recycling centers, the stream of construction debris can be diverted away from landfills. In tandem, the use of recycled and recyclable materials in building construction can increase regional demand for these products, stimulating the local economy and reducing environmental impacts associated with the use of virgin materials.

**Building Reuse**

LEED Materials & Resources “Building Reuse” (MRc1.1) criteria require that at least 75% of the existing building structure and envelope be maintained. This percentage is based on the total surface area of the existing building and includes structural floor and roof decking, structural framing, excluding window frames, sashes, and non-structural roofing material. The project meets these criteria by maintaining the three historic buildings’ existing envelopes and structural systems, including the exterior skin and framing, and the interior brick walls.

**Construction Waste**

The White Stag project has exhibited exceptional waste management. Materials & Resources “Construction Waste Management” (MRc2.1 & 2.2) criteria concern the waste produced as a byproduct of demolition and construction. This category requires the diversion of at least 75% of the waste generated in construction and demolition through the recycling and/or salvage of non-hazardous materials. Also required is the development and implementation of a construction waste management plan, which identifies the materials to be diverted from landfill disposal. The White Stag project has achieved Innovation & Design “Exemplary Performance of MRc2 (95% Diversion)” (IDc1.4) points by recycling over 98% of all materials salvaged out of the building. A warehouse across the street from the construction site held all materials removed from the buildings.
The majority of our recycled content comes from steel and concrete, which both have really high percentages. Steel has one of the highest percentage recycled content. Steel has always been recycled – it’s just the most economical way.

Erica Cedar, LEED AP
Associate
Fletcher Farr Ayotte Architects

Recycled Building Materials

The Materials & Resources “Recycled Content” (MRc4.1 & 4.2) category requires the use of materials with recycled content that make up at least 20% of the total value of project materials, including materials with post-consumer and/or pre-consumer recycled content. The project not only used materials that were recycled and/or reused, but also used materials that could be recycled in the future. Timber cut from stairwells and elevator shafts were remilled and used in interior trim and removed brick was reused to fill existing holes. Ductwork and storm water pipes made of recyclable materials are used in the rainwater reclamation system. The most personal, however, to the University of Oregon in Portland, was the reuse of the Gerlinger Annex gym floor from the University’s Eugene campus. This recycled wood floor has been installed in portions of the Architecture and Allied Arts (AAA) fourth and fifth floors of the White Stag building, as well as the Duck Store on the 1st floor of the Bickel building. The AAA studio floors in the fourth and fifth floor of the White Stag building are made from a product manufactured by Johnsonite in Riverside, California, called Replay, 85% of which is composed of post-consumer truck tires.
Regional Materials

Regional materials can contribute to sustainable building by reducing transportation costs and pollution. The Materials & Resources “Regional Materials” (MRc5.1) category, addresses the extraction, processing, and manufacturing of building materials or products. At least 10% of these materials or products must be extracted, harvested, recovered, and/or manufactured within 500 miles of the project site. In addition to local concrete and steel companies, the White Stag Block used local artisans for historic restoration components. Charles Marpet Fine Woodworking, in Cottage Grove, Oregon, reproduced ten sets of historic wood doors, and Barr Casting, Inc., in Portland, Oregon, cast aluminum replicas of the damaged cast-iron, both for the façade of the Bickel Building. This restoration is particularly exciting because Portland has the second largest collection of cast-iron storefronts in the United States, second only to SoHo in New York City. The patronage of local specialists rather than the purchase of non-local materials helps to fuel the local economy.

On-site Recycling

While salvaging materials and using sustainable construction materials are important, the waste stream from ongoing operations can affect a building’s environmental impact more than its initial construction. Since this impact depends on occupants’ recycling behavior, LEED™ standards require that an easily accessible area be designated for recycling materials such as paper, cardboard, and glass. To meet this Materials & Resources
“Storage & Collection of Recyclables” (MRp1) criteria, the White Stag Block project has a basement location for on-site recycling. Building managers have made arrangements with the City of Portland Solid Waste and Recycling in which the company will enter the building to remove the recycling, due to the lack of storage space outside the buildings.

Conclusion

Demonstrating a commitment to sustainability, those involved in the White Stag Block project have coupled the reuse of existing building components with the use of new materials made from recycled and renewable resources. Reusing the historic fabric serves multiple functions including earning LEED™ certification and enriching Portland’s Old Town historic character. Sustainable historic preservation projects such as the White Stag Block reflect the City of Portland’s commitment to the protection and restoration of its cultural and environmental resources.

By Bethany Johnson, John Wallace, and Diana Fischetti

Photos: Ray Neff, Dawn Aurora O’Connor, Mike Wilson, D.A.O., D.A.O., Jessica Engeman, D.A.O., Diana Fischetti, R.N., R.N.

Graphic Design: Ray Neff
The historic White Stag Block buildings were not originally designed for energy efficiency. Rather, they were created to meet their owners’ warehouse and factory needs when energy resources were newly considered plentiful. A century later, this has changed; we now perceive natural resources as scarce and expensive. Moreover, nowadays people expect buildings to provide comfortable indoor temperatures for activities such as working and studying.

Energy Considerations

The White Stag Block renovation team recognized energy consumption and user comfort as two critical components of the redesign of these leaky, inefficient historic buildings. In this case, the design team used an integrated design process from the beginning, taking into account the interrelationship among different systems and how a change in one system will impact another. Mark Heizer, Senior Mechanical Engineer and LEED™ specialist at Interface Engineering believes that individual decisions do not work in isolation, but influence other decisions and their outcomes.

There were numerous constraints influencing this integrated design process. For instance, the historic nature of these buildings impacted the design process. Because of the buildings’ listing on the National Register of Historic Places, any modifications to the building visible from the street would require permission. This historic designation limits window replacement options and so it influences how much natural (rather than mechanical) ventilation can be used. The design process was also impacted by financial constraints that shaped choices about which green-building techniques would be employed. Furthermore, the building owner’s mix of prospective tenants can influence the ability to carry out innovative design opportunities.

Regardless of these constraints, the design process was successful. New openings were created between floors, which increased natural ventilation and daylighting, while reducing both mechanical and electrical consumption. The building team was also able to daylight stairwells and upgrade doors and windows while maintaining the buildings’ historic character. The integrated approach was used
in considering ways to decrease energy usage, increase equipment efficiency, and provide renewable energy. The Energy Performance: Heating, Lighting, & Windows section of this document details the design team’s approaches to the mechanical equipment, building envelope, and electrical considerations.

**Educated Users Make the Building Work**

Educating building users is a final and critical component of energy-efficient design because building users will put the plan into action and help the design team realize their goals. The White Stag Block’s energy conservation campaign includes an interpretive website, on-site signage, a self-guided tour, and a temporary energy monitoring installation. In addition, the building is envisioned to be part of a long-range ‘Energy Dashboard’ project supervised by UO Facilities’ Energy Project Manager Jeff Madsen. Madsen explained, “The plan is to have a campus-wide online system for monitoring usage of electricity, PV generation and eventually gas, steam and chilled water. Users could walk up to a kiosk or touchscreen and see an introduction and campus overview, then move to individual buildings. Each building will have a unique ‘flavor’ to its website within an umbrella identity and standardized data system.” The customized ‘Energy Dashboard’ software will allow visitors and interested Web viewers to see both real-time and historical consumption figures. By giving users a feedback loop that connects actions to energy costs, it will help them modify their behavior towards more sustainable living.

~ Ray Neff, Dawn Aurora O’Connor, Jason Owens, Nancy Cheng and Diana Fischetti

Photos: Ray Neff, RN, FreeFoto.com, Dawn Aurora O’Connor, RN

Graphic Design: Ray Neff
The White Stag Block design team’s integrated design approach addressed mechanical, electrical, and building envelope considerations. Together, these improvements amount to seven LEED™ energy performance optimization points, awarded for a predicted increase in energy efficiency of ~24.5% above baseline.

**Energy-Saving Heating Equipment**

In most buildings, water heaters and HVAC (i.e., Heating, Ventilating and Air Conditioning) systems are the largest consumers of energy. At the White Stag Block, to heat both the building and its water supply, the owners have purchased high-efficiency, natural gas boilers that are 8-10% more efficient than industry standards and provide 2 million BTUs per hour. They have finely tuned combustion calibration points that allow the machine to provide sufficient heat while maintaining low emissions of air pollutants and greenhouse gases.

Hot water is only provided in limited locations: the showers and mop sink in the basement, the Duck Store coffee area, and the main restroom and kitchen for the conference center. There are also point-of-use water heaters in the custodial closets, and break room sinks throughout the buildings. However, there is no hot water in any restroom above the 1st floor.

With these historic buildings, citing the bulky mechanical equipment and ducting proved a significant challenge. Most of the mechanical equipment is located in the basement with the cooling tower on the flat roof of the Skidmore building. The building receives exhaust heat from a basement level transformer. The design team used one lightwell to locate very large ventilation ducts running conditioned and exhaust air from the basement to the upper floors.

**Electrical Savings: Lighting and Photovoltaics**

Mark Heizer holds that the biggest energy payback comes from reducing energy demand. The White Stag complex has reduced lighting electrical loads with the use of natural lighting and up-to-date controls. Robert DuPuy, the Lighting Designer from Interface Engineering explained that, “Occupancy and daylight sensors are installed throughout the building, so that fixtures draw energy only when necessary. A significant source of savings comes from adding natural light to the stairwells, where daylight-sensors save energy while providing ample light to meet safety standards.”

High-efficiency lighting systems are used throughout the White Stag complex. By providing workstations in open floor plan areas with task lighting, the lighting level can be lower and users can customize their light levels. Compact fluorescent light bulbs (CFLs) are used in corridor lighting, public lobbies, and lamps. Elsewhere, the main light sources are high lumen-output, electronic ballast fluorescents. In this way, this LEED project reduces the watts per square foot below those required by Oregon building codes.
Throughout planning the White Stag Block’s renovation, the owner, tenants, and design team discussed the possibility of including solar photovoltaic (PV) panels. While existing south-facing roof slopes provide an excellent angle for collecting solar energy, the initial cost of panels is high. In the final months of the renovation, tenant United Fund Advisors decided to invest in PVs. Through a collaborative financing arrangement with Venerable Properties, Inc., they supported installing a 23kW PV array on the sawtooth roof of the White Stag building. Recent net-metering legislation passed by the Oregon Legislature helped make the project more feasible. Increasing the maximum array size from 25kW to 2 MW has stimulated business interest in solar investment making financing more accessible.

**Thermal Envelope**

The thermal envelope of a building can be described as the combination of the building components that keep the outside air out and the inside air in. Heat loss can occur through windows, walls, roofs and foundation, and by infiltrating through cracks, especially at window and door openings. To maximize the effectiveness of the heating and cooling systems, the designers had to improve the antiquated building envelope. Architects and builders look carefully at the R-value (a measure of insulative capability) of each wall component to ensure that there is a thermal break between the exterior and the interior of the building. Architects also look for ways to create tight seals around windows and doorframes to ensure that the only air entering or leaving a building is under user control.

Because heat flows easily through and around windows, they were a big focus of the White Stag Block renovation. The design team examined all the windows in the three historic buildings, determining which windows could remain, be retrofitted, or replaced. In order to receive tax credits for the renovation of an historic building, the exterior appearance could not be changed except to return the building aesthetics to an earlier historic period. So the team retrofitted the historic wood windows and doors with double-paned glass, and reconstructed damaged windows and doors in the historic style. The owners received permission from the State Historic Preservation Office to add windows to the north face of the Bickel Building.

The top floor and south façade of the original White Stag building had seen a 1940s installation of industrial steel-frame windows and skylight monitors when a floor was added. These window frames were made of thin steel angles that held a single sheet of glass, a construction style that leaks heat. Because these existing window frames were thin and transmitted heat, the design team could not fit modern efficient glazing into them. Instead, they matched the aesthetic appearance of these windows but installed double-glazed, high-efficiency, low-emissivity (or low-E) windows, which have a special coating that allows visible light to pass through the panes of glass while reflecting the heat that would come in with sunlight.

In total, roughly half of the windows in the 3-building complex were replaced and the remainder upgraded. Without the window improvements, the three buildings of the White Stag Block simply would not have had an efficient thermal envelope. And without an adequate building envelope, most other strategies for reducing the buildings’ energy use would have been rendered moot.

~ Dawn Aurora O’Connor, Ray Neff, Jason Owens, Diana Fischetti, and Nancy Cheng

Photos: Dawn Aurora O’Connor, Ray Neff

Graphic Design: Ray Neff

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LEED™ guidelines recognize that many sustainability choices are shaped by an individual’s environment. Every building and the larger web of city systems and services impacts the building occupant’s experience. Thus, LEED recognizes two aspects of site selection: it shapes not only a building’s inherent energy efficiency but also occupant lifestyle choices which determine a building’s ability to promote sustainability over the long term. Alternative transportation is an important aspect of the building site selection.

**Location: Old Town**

The Old Town of Portland is rich in history and vibrant in local culture. It was this neighborhood where Portland began. Old Town includes the nationally recognized Skidmore Historic District as well as the Historic Japantown / New Chinatown District. More recent landmarks are the pride of the city: the Portland Chinese Classical Garden, the Japanese American Historical Plaza and Portland Saturday Market. Old Town seems to be reshaping itself as another vibrant and unique Portland district, one with a distinct historical riverfront character.

This location is also important in regards to LEED certification. The amenities listed above help the building achieve Sustainable Sites “Development Density & Community Connectivity” (SSc2) credit, a category of LEED points that relate to increasing development density and community connectivity. In order to obtain this credit, at least ten amenities must be reachable within a half mile’s walking distance. The White Stag Block’s location lends itself to flexible space usage by closely linking the building and its occupants to historic locales, local restaurants, shops, medical services, public transportation, and more.

**Public Transportation Access**

The White Stag Block is ideally located within the matrix of Portland’s celebrated public transportation system. Directly west of the main entrance to the Skidmore building, building users have access to the MAX light rail, and several bus stops are within four blocks. The MAX is one of the most acclaimed public transportation systems in the US. The White Stag Block project gained Sustainable Sites “Alternative Transportation, Public Transportation Access” (SSc4.1) credit through its location within half a mile of public transportation.

Development near public transportation increases the use of public transportation. Already, 70% of MAX users are considered ‘choice riders’ who have the option of driving, but choose instead to utilize alternative transportation because of its ease of use, embodied vision, and contribution to sustainability. The concept of public transportation being a municipal ‘social service only for those that have no other means of transportation’ has been revised. Now, public transportation is understood to be the ‘interstitial glue’ that binds a city together. For instance, MAX riders in Fairless Square, which includes most of downtown Portland, ride for free. Annually, 36 million riders enjoy the benefits of MAX, and an additional 63 million make use of the established Portland bus system. Twenty-six percent of downtown users utilize alternative transportation, which translates into the equivalent...
of a 1.2 lane reduction. The White Stag Block joins this legacy while leading the rebirth of Portland’s oldest district.

Bicycle Storage & Changing Rooms

The basement of the Skidmore building contains both bicycle storage and changing rooms for bicycle commuters. The White Stag Block renovation achieved Sustainable Sites “Alternative Transportation, Bicycle Storage and Changing Rooms” (SSc4.2) credits via the provision of bicycle racks for 5% of the building's anticipated total occupants and by providing showering facilities for occupants working more than 20 hours a week. The White Stag Block basement can store 80 bicycles, 2/3 of those bikes in horizontal racks and the remaining 1/3 in vertical racks. Bicyclists will enter the building through the service door, next to the White Stag loading dock under the Burnside Bridge. These commuters will then transport their bicycles by the freight elevator to the basement level, where the bike storage room is located nearby.

Shower facilities are divided into male and female locker-rooms and locked storage will be available. Shower facilities encourage commuting by bike because it allows the biker to shower and change clothes once at work, or before riding home. In addition, showers encourage worker productivity because they provide a more flexible working environment for active recreation. Side trips to soccer games, mid-day runs, or freshening up are all possible when showering facilities are available. However, the shared availability of the showers also requires additional planning, especially with regards to non-tenant use. University officials have been working on security that balances accessibility with privacy.

Low Emitting & Fuel Efficient Vehicles

Commuting can require the use of 30% more energy than used by a building itself. For the average building that is built to code, transportation costs account for twice that of the building energy operation cost. But since passenger vehicles still represent a convenient transportation choice for many building occupants, occupants can use day-lots located just north of the White Stag Block following LEED guidelines that encourage shared building parking. The White Stag Block has a small parking area under the Burnside Bridge, with 5% of this preferred parking for carpools and vanpools, resulting in Sustainable Sites “Alternative Transportation, Parking Capacity” (SSc4.4) credit.

Spaces will also be reserved for Zipcars, earning the Sustainable Sites “Alternative Transportation, Low Emitting & Fuel Efficient Vehicles” (SSc4.3) credit. Zipcar is an innovative system of shared vehicles whereby people can reserve use of vehicle for an hour or more. The Zipcar system is becoming popular in cities throughout the country. Providing Zipcar spaces not only encourages the use of this system by the students, but also reduces the need for onsite personal vehicles. Studies have shown that each car-share vehicle can replace up to 15 privately owned cars.

In summary, by encouraging the use of public transportation, biking and shared cars, the White Stag Block will reduce fossil fuel use, road congestion, and parking competition. At the same time it promotes cleaner air and increases occupant health.

~ Cody Evers
Photos: Ray Neff, RN, RN, Ashley Garrett, RN
Graphic Design: Ray Neff

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