The Gerding Theater at the Armory: A LEED Case Study

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The World Commission on Environment and Development defines sustainability as the ability to meet the needs of the present without compromising the resources of future generations (PCS website). With the ever-increasing population and demand for new infrastructure, sustainable design is imperative to our future. Sustainable design can be achieved with a building, a complex, a neighborhood or an entire town. When speaking on the level of the building, the term "LEED" is often used. LEED stands for "Leadership in Energy and Environmental Design". It is a green building rating system developed by the U.S. Green Building Council (USGBC) that applies to the design, construction and operation of green buildings. There are five categories in the LEED certification system and in order to qualify a building must achieve a certain number of credits in each category. The areas for LEED certification are sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality (USGBC 2006).

LEED was first introduced for new construction in 1998 at the USGBC summit (USGBC 2006). Since that time, there have been several new versions as well as other LEED certification programs such as the version for existing buildings and the version for homes. There have been hundreds of buildings certified in LEED since its inauguration, including many milestones. One of those milestones came on September 25, 2006 when the Gerding Theater at the Armory was awarded the highest sustainable design award available for a building in the United States: LEED platinum (Market Wire News 2006). This is the first historic restoration to achieve this status. Fifty-two points out of the possible 69 are required for a Platinum rating and the Armory project earned 53.

The National Guard Armory Building was built in 1891 to house local units of the Oregon National Guard (Center Stage 2006). It was added to the National List of Historic Places in 2000. The building is housed in the Pearl District of Portland. The area was historically the warehouse district and developed into one of Portland's most well known art districts (Pearl District 2006). When the Pearl District was transformed from commercial/industrial into commercial/residential the Armory building was threatened with destruction. However, the timing was right for the Portland Center Stage (PCS) to find a new home. The consulting firm, The Keewaydin Group conducted a

comprehensive study of Portland's theaters in 2002 and recommended that PCS relocate. The Armory's owners offered to sell the building to PCS when they learned of the consulting firms recommendation (CSPC website 2006). After a structural feasibility study, it was determined that the Armory would be appropriate for a theater, with its Romanesque Revival style and 55,000 square foot, single-room structure. One of the very features that made the building unattractive for other developers, its lack of windows, made it particularly appropriate for a theater.

The Portland Center Stage knew it wanted to build a green building from the beginning. Portland Family of Funds assisted with the financing of the project. Their CEO and President, Norris Lozano said, "We initiated the challenge to read LEED Platinum because sustainable buildings are a valuable asset to our community. They make for healthier places for people to live, work and be entertained while preserving precious natural resources (Trick 2006)." Portland Family of Funds helped fund the project by combining New Market Tax Credits, Historic Tax Credits and Energy Tax Credits. This shows how these programs can be leveraged to achieve green buildings, which are commonly thought to be too expensive.

In order to achieve the LEED rating, the Gerding Theater had to reach the pinnacle of green design in each of the five LEED categories. This required much innovation, commitment, planning and financing. The total project cost for the Gerding Theater was $36.1 million, of which $26.2 million has already been raised (Case Study 2006).

The Gerding Theater had several achievements in the sustainable sites development category. Although the Armory was initially used to house National Guard members, it had been used for many years as the storage and shipping building for the Blitz-Weinhard's Brewery. The site qualified as both a brownfields redevelopment and an urban redevelopment. The construction company, Hoffman Construction, used biodiesel and air scrubbing technologies during the building's construction to protect worker health (Trick 2006). There was also special care taken to remove on-site building contaminants (Aye 2006). The site stormwater management system collects and filters all of the rainwater from the roof for toilet flushing. The 12,000-gallon underground cistern holds the water collected from the roof and recirculates it for both plumbing and

artwork (Case Study 2006). The site also has pervious pavers to help rainwater infiltrate into the groundwater instead of running into the central sewer system. This reduces the amount of stormwater that flows into the Willamette, Portland's central river (Trick 2006). They also transformed a former sidewalk and parking spaces into the Silver Park, which creates green space and includes native vegetation and natural stormwater treatment (Aye 2006). Some LEED points could be achieved just by locating in the place they did. Portland's Pearl District, which is within walking distance to downtown Portland, where many people work. There is also access to the free public transportation in downtown Portland. In addition to these transportation options, the Pearl District has a trolley line that connects it to other Northwest Portland locations and to the MAX rail line that serves more distant communities (Pearl District 2006). The Armory is located on the Portland streetcar line and is close to several bus routes (Aye 2006). The Gerding Theater also provides bicycle parking spaces, lockers and ample showers on site to encourage other alternative modes of transportation such as biking or roller-skating (Case Study 2006). In case there are employees who cannot get to work by using one of these modes of transportation, the Portland Center Stage committed to making a hybrid Flexcar available for employee use (Aye 2006). The Armory site reduces the urban heat island effect through high albedo light colored paving and street trees.

Another category that the Gerding Theater excelled in was energy efficiency. The Armory uses cutting edge technology and passive solar elements to achieve energy efficiency. There are forty-one skylights on the ceiling that provide ample natural light for the lobby and administrative offices during the day (Trick 2006). The building also uses glazing systems that reduce electric light use by maximizing daylight, minimizing winter heat loss, air infiltration and summertime heat gains (Aye 2006). The building has photo-sensors, which turn down the lights when the sun is bright enough to provide ample lighting. There are also motion sensors that turn the lights off completely when people are not in the space. The Armory also uses alternatives to traditional heating, ventilation and air conditioning. Hot water tubes are embedded in the concrete floor slabs for heating and overhead cooling units use hot and cold water to regulate temperature (Trick 2006). The overhead beams are individually controlled to ensure the

right temperature for individuals using the space (Case Study 2006). The chilled beams provide more efficient cooling and greater comfort than traditional systems (Aye 2006).

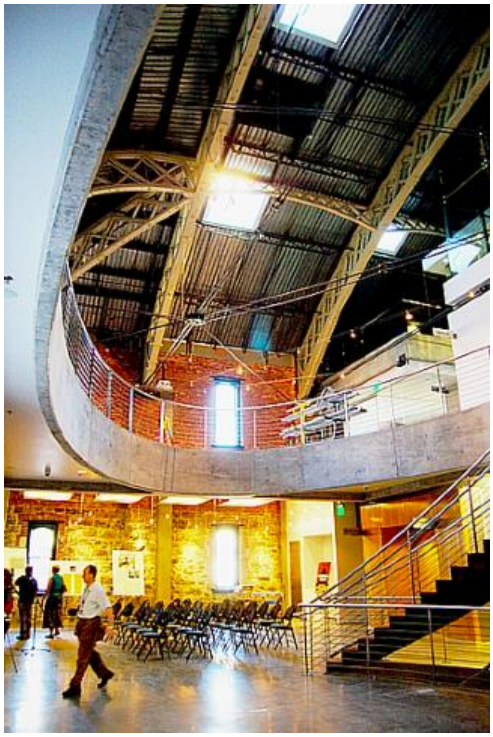

Figure 1: The Armory incorporated forty-one skylights into the ceiling to provide natural light for lobby visitors and administrative workers (photo from http://www.chatterbox.com).

The Armory also has a raised access floor that supplies under-floor passive ventilation by locating outlets where needed. In the main stage theater, the ventilation supplies fresh air under the auditorium seating, while displacing warmer room air with fresh cool air (Case Study 2006). These efforts combined with others, such solar panels; help to conserve 30% of the energy that a building of the Armory's size would normally consume (PCS website 2006). Even the energy that the Gerding Theater does use can be called "green". According to Green Building Services, a consultant for the project, green power is purchased for the building. The Armory gets its chilled water from a district chilled water plant located a few blocks from the site. The refrigerant used is R-123, which has the lowest global warming index or all common fluorocarbons and is CFC free (Aye 2006).

The Gerding Theater at the Armory achieved an impressive 88% water savings, which earned them an extra point for exemplary performance (Case Study 2006). They

did this by using water-efficient fixtures and recycling the rainwater from the roof into the underground cistern for use in toilet flushing. Efficient water fixtures included dual-flush toilets and low-flow showerheads and faucets (Aye 2006). The Gerding Theater also used drought tolerant plants so that no permanent irrigation would be necessary for their landscaping. The landscape plants will be hand watered during the two-year establishment period, after which exterior irrigation will be reduced by 100% (Aye 2006). In addition, the pervious pavers and bioswales absorb rainwater from the sidewalks for the trees and shrubs used in the landscaping (Trick 2006).

Figure 2: The wood used throughout the Armory was certified by the Forest Stewardship Council as sustainably managed (Picture from http://www.chatterbox.com).

In the LEED category of materials and resources, The Gerding Theater had an exemplary performance. Environmentally friendly construction practices were used and 95% of the construction and demolition debris was reclaimed and recycled (Case Study 2006). This was made possible by a waste management plan that was laid out at the beginning of the process by the general contractor (Aye 2006). In addition, 79% of the original structure was preserved, which also helped the project to qualify for Historic Tax Credits (Aye 2006). When choosing products for the project, the planners also chose low-maintenance, long-life products to reduce the energy and costs of maintaining and

replacing materials. The project also went far out of its way to use locally manufactured, harvested and extracted materials. As a result, 25% of materials used have recycled content and 45% were manufactured within 500 miles of the site (Aye 2006). The wood used in the redevelopment of the Armory was certified by the Forest Stewardship Council (FSC), which means that it was sustainably managed. Even the technology cabling, implemented by Glumac, reduced the amount of raw materials such as copper and polymers by 50% (Trick 2006). The continued use of the building will also promote sustainable materials and resource use since there are recycling collection areas throughout. Portland Center State also plans on providing ongoing training and education for staff on issues of recycling and sustainability (Aye 2006).

The final LEED category is indoor environmental quality. Some of the features that we already mentioned play a key role in this category as well. The skylights used provide daylight to regularly occupied office space and the passive ventilation system ensures that comfortable, clean air is always circulated through the building. The builders also used Low Volatile Organic Compound (VOC) paints, adhesives, finishes and fabrics throughout the facility to ensure that indoor air quality remained high (Trick 2006). The space also employs Carbon dioxide monitoring and demand-controlled ventilation to ensure a healthy environment (Case Study 2006). The contractor used high efficiency MERV 13 filtration media during construction and implemented a two week flush out period using high efficiency filters and outdoor air to ensure a high level of air quality for theater patrons and employees (Aye 2006).

In order to achieve Platinum status, the Gerding Theater also went after key LEED points for innovation. Throughout the development process there was a focus on public education. The completed facility has interactive kiosks throughout as well as docent led green building tours. There are also glass walls on equipment rooms that help to educate visitors about how the green building works. The Gerding Theater also showed outstanding dedication for sourcing local materials, many of which were recycled. Portland Center Stage also received LEED points for green cleaning and maintenance practices for creating a Green Cleaning Policy and hiring maintenance providers that adhere to strict guidelines concerning cleaning products, materials and processes used within the building (Aye 2006).

Obviously, the Gerding Theater at the Armory did not earn all of the possible 69 LEED points. When planning and designing a green building, there are many factors that must be considered. Cost-benefit analysis is often used to determine whether a particular green design element is appropriate for a project. In the case of the Gerding Theater, some features, such as a green roof, were not employed. This could be due to the nature of the building. Since the Armory is a cavernous structure, there are not many supporting structures holding up the roof. It was probably not feasible to implement a green roof, considering how heavy they are. Also, the Gerding Theater was in a unique situation in regards to natural lighting. While skylights were used for the lobby and office spaces, they were not desirable for the theater spaces, which need total darkness at times. The building itself also imposed limitations in this respect. Since the Armory was originally designed to keep people out, it is a large windowless fortress. The designers could not provide ample light from windows without compromising the historical integrity of the building.

The Armory building opened to the public on October 2, 2006 so it is difficult to tell whether it is living up to its expectations. However, the site is using computer simulation to measure the actual performance of the building against projected energy usage (Aye 2006). They will measure and verify several systems including lighting, cooling load, air and water economizer and heat recovery cycles and boiler efficiency (Aye 2006). After these computer simulations have been running for a while, they will tell us whether or not the project is living up to its expectations.

The Gerding Theater is an interesting Case Study, because it combines the best of both historic preservation and green design, showing that these two areas can coexist in a single building. The Theater has many points for which to be proud. It is first building on the National Register of Historic Places to achieve a platinum rating. It is also the first performing arts facility and the first historic building on the west coast to reach that level of green design. Why would a theater company care so much about sustainability? According to Chris Coleman, Artistic Director of Portland Center Stage, they care because they are trying to connect with their community. He says, “A platinum building really shows our respect for our audience and, we believe, will help us achieve our mission in a more meaningful way (Trick 2006).”

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