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Going for the Gold: Building a Sustainable LEED™ Library

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Going for the Gold:

Building a Sustainable LEED™ Library

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Building construction projects can deplete natural resources and be a major cause of air and water pollution, deforestation, toxic wastes, health hazards, global warming, and other negative environmental consequences. In 2001, the Multnomah County Commission adopted a Local Action Plan on Global Warming to “develop and adopt energy- and resource-efficient building standards for all County new construction and major renovation.” As a result, planning for many of the new and renovated libraries in Multnomah County incorporated high performance, green building practices.

As we prepared to build our newest building, the Hillsdale Library, Multnomah County officials established the goal of achieving Leadership in Energy and Environmental Design (LEED™) Silver

certification in all new building projects. The Hillsdale Library was the first new Multnomah County building project after this goal was established.

LEED is a national rating system and accreditation tool used to develop high performance, sustainable buildings. The LEED program was designed by the U.S. Green Building Council to encourage and facilitate the development of more sustainable buildings. Buildings are awarded points and achieve a certain level of certification based on project procedures and design elements that are indicators of a “green building.” In November 2004, Multnomah County Library’s Hillsdale Library, which opened in March 2004, was awarded LEED Gold certification, becoming the first county-owned building to receive LEED certification.

To achieve LEED Gold certification, the 12,000-square-foot library incorporates a number of environmental design elements that significantly reduce the building’s negative impact on the environment, while providing an inviting, friendly and comfortable place for library users of all ages.

Planning a Sustainable Site

Planning for our LEED-certified building began with establishing a team early in the design process. Because we knew at the outset that we would be attempting LEED certification, we identified team members with the necessary expertise, and involved them throughout the process. Our LEED planning team included Nathan Hamilton, Thomas Hacker Architects, Inc.; Stephanie Coyle, Hoffman Construction Company; Elaine Aye and Ralph DiNola, Portland General Electric’s Green Building Services; Amy Joslin, Multnomah County’s Sustainability Manager; Steve Barney, Environmental & Engineering Services, Inc.; Mike Har-

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rington, Multnomah County's Construction Manager for the Hillsdale Library project; and me, who was at that time Multnomah County Library's Renovation Manager.

Our earliest work began during the siting process. A top consideration in site selection and in determining the building's location on the site was reducing the building's environmental impact. Finding a site with good public transportation was critical. The library is served by seven bus lines within one quarter mile of the branch, has bicycle parking, and a space and charging station for an electric car in the parking garage. Use of alternative transportation methods reduces pollution and land development impacts from automobile use. Underground parking eliminates large, paved surfaces exposed to sunlight. In addition, the building's Energy Star™ roof reflects sunlight. These design elements reduce "heat islands," which contribute to higher summer temperatures and smog.

As part of a stormwater management plan, three large planters on one side of the building and a "bioswale" (a low-gradient channel filled with plants) at the back of the building hold and filter rainwater runoff from the roof, keeping it from overburdening the sewer system. The use of pervious materials such as pavers and planting soil also reduces runoff.

Water Conservation

The plants and trees surrounding the library were chosen because they lend themselves to water conservation and a reduced need for pest control and maintenance. More than 50 percent of the site's open area has been restored as habitat areas with native or adaptive vegetation. The open area will be conserved for the life of the building.

Energy Efficiency and Building Atmosphere

Hillsdale Library is designed to be 21 percent more efficient than a similar building built to just meet the local energy code. This is accomplished through the use of energy-efficient, high performance windows with low-energy glass that is insulated and tinted to filter heat from the sun; insulated, translucent skylights; and a daylighting system that lessens the need for artificial light on sunny days. Only green power, or renewable energy, is used in the building.

Conservation of Materials and Resources

Beginning with demolition of the previous building on the site, the architects and contractors paid a great deal of attention to conserving resources. Construction elements from the earlier building, including windows, doors, and other building materials were taken to the ReBuilding Center, where materials that would otherwise have been discarded into landfills are reused in other construction projects. During construction of the new building, 75 percent of construction waste was salvaged or recycled.

More than 50 percent of building materials in the new library contain significant recycled content, including the carpet, wood flooring, restroom tile, acoustical ceiling and wall panels, drywall, concrete, and the structural steel. More than 50 percent of new wood in the ceiling and walls is certified to originate from sustainable forests. At least 20 percent of the building's materials were manufactured locally.

Going for the Gold: Building a Sustainable LEED™ Library

Tips for Libraries Beginning the Process

1

Be sure you have buy-in from your governing body.

2

Determine what level of LEED certification you want, and try to get several points more than you need (you probably won't get everything you're aiming for).

3

Identify and involve the right team members from the start.

4

If possible, hire an architect and contractor with LEED experience.

5

Recognize that getting certification will cost more money—most of which will be recovered in energy savings during the life of the building.

6

Have fun!



Enhanced Indoor Environmental Quality

All paint on the walls and steel structure, as well as all adhesives and sealants, are low VOC (volatile organic compounds), containing little or none of the dangerous chemicals commonly found in these materials.

Filters within the mechanical system were used during construction to prevent contamination from the construction process. The building was “flushed” prior to opening to the public, a process involving running the mechanical system for two weeks following the completion of construction, and bringing 100 percent fresh air into the building. All filters were then replaced to remove construction-related contaminants from the system.

Windows, clerestory and skylights enhance the connection between indoor and outdoor environments, providing natural outdoor light and offering library visitors great views of the neighborhood. In addition, a manual shading system allows control over direct sunlight and helps reduce heat gain.

Temperature is controlled and monitored with the use of sensors throughout the building. The building is monitored for carbon dioxide levels and is designed to maintain levels that will sustain long-term occupant health and comfort. Fresh air is mixed into the mechanical system to support the health, safety, and comfort of people in the building.

Public Education Efforts

As part of the certification process, we determined early on that we would attempt to get the LEED point in the Green Demonstration area of the Innovation & Design Process section. Since we are in the business of providing information, our efforts focused on educating library users—children as well as adults—about the benefits of

sustainable building practices.

We designed signage and brochures highlighting the green building features. Two special “Bucket of Books” collections were assembled with books and other materials on sustainability and green buildings. The two collections, one for kindergarten through third grade and one for grades four through seven, contain 25–30 curriculum-related titles and a teacher’s guide, and can be checked out by educators. In addition, Multnomah County Library’s “Homework Center” on the Web included a section on green buildings, and the Hillsdale Library Web site included information about the branch’s sustainability features.

For younger children, we put together an “It’s in the Bag” preschool collection of books and materials titled *Earth*. The “It’s in the Bag” theme bags each contain three to five picture books, a related activity, toy, puzzle or flannel story and a curriculum guide that help increase children’s awareness of the concept. The *Earth* “It’s in the Bag” collection helps parents, childcare providers and preschool teachers teach their children about how we can all work together to protect our environment. The *Earth* collections are circulated at Hillsdale Library and five additional Multnomah County Library neighborhood libraries.

The week before the library opened, we hosted tours for classes to visit the new building, giving children plastic hard hats and encouraging them to walk around the building with a “punchlist” of green building features to find and check off. We also hosted a number of tours for architectural students and professionals who were interested in the sustainability features of the building.

After the building opened, we continued our efforts to publicize the use of green building strategies and environmentally friendly practices. We are still distributing



the two brochures on the library's green building features, and continue to offer tours to students and other interested people. We are still circulating the *Earth* "It's in the Bag" and the two "Bucket of Books" collections. We also developed and presented talking points for "Going Green without Going Broke" presentations at the 2002 and 2004 American Library Association Annual Conferences.

The final LEED project review awarded us the Green Demonstration point, noting, "The project has provided a significant quantity of materials to demonstrate the development of promotional materials and an outreach plan which will reach a diverse group of audiences."

LEED Construction Cost Implications

Mike Harrington, the Library's construction manager for the Hillsdale Library project, estimates that incorporating LEED features added four percent to the construction cost of the building (about \$140,000). Although the Board of County Commissioners had mandated that we incorporate those features, we were interested in calculating the estimated energy cost savings we could expect.

Bouillon Engineering was retained to evaluate the designed building's compliance to the U.S. Green Building Council's LEED program. It was evaluated in two ways: a baseline model, reflecting the approximate energy cost of a building designed and constructed just to meet code requirements; and a design model, with the model incorporating LEED features reflecting the approximate energy cost of the LEED building. In the engineers' evaluations of the Hillsdale Library design, the baseline model estimated that the building would use 333,302 Kwh/yr, costing \$31,049. The design model estimated that the building with LEED features would use 308,309



Hillsdale Library (photo by Timothy Hursley, Thomas Hacker Architects).



Hillsdale Library (photo by Timothy Hursley, Thomas Hacker Architects).

Kwh/yr, costing \$24,419—a savings of 24,993 Kwh/yr, or \$6,630. In summary, we could expect annual energy cost savings of approximately 21% for the design model over the baseline model.

Post Occupancy Evaluation

In 2005, the Cascadia Region Green Building Council commissioned a study to evaluate the performance of LEED buildings that had been occupied for at least a year. Of the 31 LEED buildings (business and residential) eligible for participation in the study, 11 owners of the eligible buildings were willing and able to provide the needed data during the limited study timeframe. The Hillsdale Library was one of the buildings evaluated.

Six of the 11 buildings were shown to be using less total energy than suggested by their initial design models (the modeled usage from the LEED Design Energy Cost, reflecting the efficiency features in the building's design). The Hillsdale Library had the highest Design Energy Use Intensity of all of the buildings. This, according to the Cascadia study, was due to the site constraints and design requirements that affect its energy use (seven day/week occupancy, high wall-to-floor ratio, two sides of floor-to-ceiling windows, and a floor exposed to ambient air because of the parking garage under the building). Although the library had the highest Design Energy Use Intensity, its energy use in relation to the initial modeling showed the largest savings of any building in the study.

Since the Cascadia study, we have continued to monitor Hillsdale Library's energy usage. The energy analysis that had been done during the design phase showed that we could expect annual energy cost savings of about 21 percent, due to the conservation features we had incorporated into the building's design. Actual usage

and cost for Hillsdale Library in the 2005 and 2006 calendar years was substantially less: 189,200 Kwh costing \$17,384 in 2005 and 193,120 Kwh costing \$15,930 in 2006. This is nearly a 29 percent savings in 2005 over the estimated cost of the design model of the building incorporating LEED features, and nearly 35 percent savings in 2006. There is no question that incorporating the LEED energy conservation measures is resulting in energy cost savings for the Hillsdale Library.

Conclusion

Although we have incorporated green building features in several previous Multnomah County Library buildings, Hillsdale Library was the first Multnomah County building to pursue and achieve LEED certification. Although there were costs associated with constructing a LEED project, we have realized ongoing savings in energy costs. Perhaps even more important has been the environmental impacts of the building, both now and well into the future. During the schematic phase of design, there was considerable community concern about a much-loved, historic red-leaf maple tree that was at the back of the site. We received dozens of telephone calls, letters and e-mails, encouraging us to do whatever needed to be done to save the tree. I received literally hundreds of petitions from school children, including my favorite, the message painstakingly printed by a kindergartener, complete with her colorful drawing of the tree. It's still on my bulletin board:

*Dear June Mikkelsen:
Please save this tree. If you cut down the
tree God will be mad at you.*

—Love Katherine A.



Well, we did save the tree. In fact, we significantly modified the library's design to do so, at a cost of about \$30,000. Since it's near the end of its life cycle, there's no saying how long the tree will be around. It *is* likely, however, that the other measures we took to minimize the impact of the Hillsdale Library on the environment will make a positive difference for many years to come. 🌿

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