

# Platinum Education

by Traci Sooter AIA

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*Students and faculty at Drury University hit LEED-H Platinum within the parameters of a Habitat for Humanity home.*



*Architecture students implement sustainable design techniques in a standard four-bedroom Habitat for Humanity home in Springfield, Mo. Photo by Gayle Babcock, Architectural Imageworks.*

In Springfield, Mo., during the summer of 2005, four **Drury University** faculty and staff members met with staff from the local Habitat for Humanity chapter to discuss the possibility of Drury sponsoring, designing and building a sustainable house for Habitat. The idea was to make it a part of Drury's greater annual event: its convocation lecture series. After a year and a half of planning and fundraising, third-year architecture students, under my direction began to design the sustainable home. Round two of the design came a year later in the spring of 2008 when fifth-year architecture students developed and built what became the **first LEED Platinum certified home for Habitat for Humanity International:**

Habitat currently builds in a somewhat sustainable manner simply by constructing efficient, small-footprint homes. The organization's no-frills, low-cost homes — which require homeowners to contribute sweat equity — and its no-interest payment programs help provide homeownership opportunities to families who wouldn't ordinarily be able to purchase a home. Key to the program is keeping construction costs down. With the help, guidance and a leap of faith, the Springfield chapter allowed the Drury University students to explore, experiment and push the guidelines of a standard four-bedroom Habitat home.

## Process and Design



*An open, airy feel is created by combining functions, like the cabinets blending with the stairwell. Photo by Gayle Babcock, Architectural Imageworks.*

We began the design process with the site and the form. The class researched prevailing winds and sun angles for our area and did a site analysis at Legacy Trails, a low-impact Habitat for Humanity subdivision. Responding to that data, the students elongated the home in the east/west direction to create an opportunity to use the southern exposure. This captures prevailing winds in the spring and fall and maximizes radiant heat gain in the winter. It also allowed us to address the separation of vehicular and pedestrian circulation located in the green spaces of the development.

The home's form takes its shape from the sun, wind and site, as well as from the restrictions and requirements of a Habitat four-bedroom

home; it also has a nod to the typical building style in the area. The floor plan separates public spaces from private spaces. Bedrooms are stacked and located on the east side of the home while the living room, kitchen and dining room are on the west side. The northern entry occurs at the intersection of the two spaces; it connects the second floor by way of a stair and a catwalk.

To save space and stay within Habitat's size restrictions, half of the kitchen cabinets are integrated into the staircase. The cabinets' face rises to become the handrails of the staircase, which creates storage spaces in the lower areas. The rising staircase provides space for cabinets, countertops, a range and refrigerator at the high end of the room. By integrating the cabinets with the handrail, that side of the kitchen becomes like a large built-in piece of furniture.

The higher volume over the living, kitchen and dining allow air to enter low on the southern side of the home, where prevailing winds arrive. As the air heats, it rises and exits through high windows on the northern side of the home. This allows the homeowner to cool the space for a longer period of time in the spring, summer and fall without the use of mechanical ventilation.



The design allows for air to enter from the south, cool the house, and exit via windows on the home's northern side. Photo by Gayle Babcock, Architectural Imageworks.

To control heat gain in the summer and capture solar heat in the winter, the roof is pulled past the edge of the southern wall to an optimum solar point. From this point, the roof angles back to the same wall to give aesthetic appeal to the home. This innovative device shades the large southern windows from the hot summer sun and allows the sun to hit the thermal mass of the water-based stained concrete floor to collect and store radiant heat in the winter.

## Energy Efficiency and Sustainability



Not only does the roof's extension beyond the southern wall increase shading, it gives the home a definite style. Photo by Gayle Babcock, Architectural Imageworks.

① Thirty solar tubes on the roof provide 70 percent of the energy needed to run the radiant floor heat system and the domestic water heater. ② A backup tankless water heater makes up the other 30 percent. ③ A 14 SEER heat pump provides cooling in peak summer months. All of this is contained in an Icynene spray foam thermal envelope within the walls and roof deck. From the ground up, sustainable, recycled, recyclable and environmentally friendly materials were used where possible. ④ The landscaping is comprised of 100 percent native grasses and plants. ⑤ Two rain gardens and three rain barrels manage the roof runoff. Environmentally friendly, biodegradable building waste was chipped to use as landscaping mulch in the rain gardens and planted areas. The pervious concrete driveway and pavers allow rainwater to seep into the site rather than run to the stormwater

system.

To keep the home in context with other area homes, we incorporated a split gable on the street elevation and used a siding that looks similar to products used on other homes. The home's siding uses recycled content and is insect and moisture resistant. Changing the direction and color of the siding to describe the volumes of the home gives it style at no extra cost.

Other sustainable elements include: Low-E casement windows, finger-jointed lumber, low-VOC paint, low-flow and ENERGY STAR fixtures. The deck has recycled content and the carpet is a true "cradle to cradle" product. Reclaimed materials make up the handrails of the catwalk, the tile and cabinetry of the kitchen. The roof is a white, reflective membrane that is self-healing for longevity and 100 percent recyclable.



*Students and faculty working on the Drury University Habitat for Humanity project take a short break from working on the home's shell.*

In building this student-designed dwelling, the 11 students of my "dream team" gained practical knowledge about design, sustainability, construction, construction management and the LEED for Homes certification process. But I believe that as they worked elbow-to-elbow with the homeowner every Saturday...as they watched science students learn how sustainability can apply to their world...as they cheered fraternity brothers who arrived to work all weekend...as they saw faculty, staff and librarians repeatedly arrive no matter the weather...and as they sighed with relief when Springfield community members volunteered at a critical point and stayed until the end that the Drury students learned something beyond architecture and sustainability. These students learned they are capable of anything and that they are part of a community who supports them. Giving back is a good thing and something they should always do.

That is a platinum education.

## **Sidebar**

### **Drury Habitat House Donors and Volunteers**

Allied Roofing: TPO roof

Advanced Welding: Handrails

Beardon Carpet: Carpet installation

Bishop Trucking: Topsoil

Bike and Build: Grant

Brandon Pemberton: Carpenter

Caleffi Solar: Solar

Carson's Nurseries: Native plant material

Cedar Creek Wholesale: Siding + structural lumber

Carson-Mitchell: Pervious Concrete installation

Cater-Waters: Water-based concrete stain

Community Foundation of the Ozarks: Grant

Conco Concrete Companies: Pervious concrete material

Design Weave: C2C carpet (wholesaler)

Drury University: Volunteers

Drury University Habitat for Humanity campus chapter: Fund raising, volunteer labor

Elizabeth Ann Seaton Church: Cash donation

Heat Transfer Products: Solar tank

Herrman Lumber: Lumber

JAG Architectural: Low-e windows

Long's Refrigeration: Heat pump + air handling equipment installation

Meeks the Builders Choice: Framing material (finger-jointed)

Midwest Rug

Missouri Insulation, Spray foam division: Spray foam insulation

National Avenue Christian Church: Cash donation

Quentin Scott Regan, PE: Structural consultation

Rhomar

Roper Electric: All electric labor and materials

Shaw Industries: C2C carpet

Skid Worx: Landscape grading

Stanley Rone: Cabinetry guidance

Steve Wheeler: Electric installation labor

Thomas Storlazzi: Carpenter

Watts Radiant: Radiant floor heat system

### **Sustainable Products Used**

Concrete floor: QC Construction products

Heat pump: Lennox

Low-e casement windows: Weathershield

Low-VOC paint: Sherwin-Williams

Radiant wall hung boiler: Electro Industries

Range and Refrigerator: Whirlpool

Roofing membrane: GAF Everguard TPO roof

Siding: LP Smart Side

Solar tank: Heat Transfer Products

Solar tubes: SolarFlex

Spray foam insulation: Icynene

Underslab insulation system: Crete-Heat

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