

## Sustainable Innovations:

# Green Roof on Cumberland Hall

*In Fall 2008, Residential Facilities completed the first green roof on the University of Maryland College Park campus. The project replaced a 20-year old roof on top of Cumberland Hall, an eight story residence hall that houses 489 students. Residential Facilities took on this project as a way to promote environmental stewardship and sustainability in the University's construction practices. There are also economic and social benefits to green roof projects. The second green roof on campus is planned for a portion of the Stamp Student Union.*



Photo credit: Department of Residential Facilities

### Environmental

Cumberland Hall is a residential building that had a 12,300 square foot roof that required replacement. Residential Facilities elected to install the University's first green roof to promote sustainable construction that is financially sound and benefits the environment. Following a structural analysis, the new green roof covers 65 percent of the existing roof area (8000sqft). The remaining 35 percent of the roof's surface is reflective stone ballast and membrane roofing that helps keep the building cooler than heat absorbing dark roofing material. Most of the 12,000 drought tolerant seedlings planted on the roof are hardy sedums which are especially good at storing water in their thick leaves. The plants will grow to cover 80 percent of the planted space after two years. These native plants will then attract local birds, butterflies and other wildlife.

Another environmental aspect of green roofs is their benefit to stormwater control. . Green roofs absorb stormwater and filter out pollutants in precipitation. These roofs are also designed to reduce the quantity of runoff by up to 50-90 percent, and can retain four times the amount of rainfall compared to a conventional roof.<sup>i</sup> Excess stormwater not used by the plants is released more slowly helping to reduce soil erosion and flooding.

In October 2007, the University adopted the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Silver building standard for all new construction and major renovations. Green roofs have the potential to contribute to many LEED points to help achieve that rating. These points could come from areas such as stormwater management, water-efficient landscaping, energy and atmosphere, and reducing the urban heat island effect.

### Economic

The Cumberland Hall green roof has a 20 year warranty, but membrane protection from UV degradation and other damage may potentially extend the life of the roof by an additional 10-20 years. Green roofs also reduce the roof's thermal contraction and expansion by as much as 90 percent. Studies show that on a sunny 95°F day, conventional roof surfaces can reach 175°F. Green roofs keep the surface temperature near or at the outside air temperature and also act to insulate the building thereby reducing summer cooling and winter heating costs. This insulation in addition to the plants' evapotranspiration processes can reduce indoor temperatures 6 to 8 degrees during warm weather.<sup>ii</sup>

Residential Facilities took on the Cumberland Hall project even though the cost was roughly 35 percent more than a standard roof. While the upfront cost is greater than a traditional roof, the premium paid for the Cumberland hall green roof will have an estimated payback period of seven years. Therefore, over the 30-40 year lifespan of the green roof, it will save 10-30 percent over the cost of a conventional roof.

### Social

The Cumberland Hall roof restoration project was completed with the work of local companies and contractors thus supporting the local economy. The positive environmental impacts of this project will also benefit people off campus. For instance, reduced stormwater runoff will benefit downstream residents and communities. The roof itself will provide benefits for people who live in the building as well. Typical extensive green roofs (such as the one on Cumberland Hall with 3" - 4" of growing media) reduce reflective sound by up to 3 decibels and improve sound insulation by up to 8 decibels.<sup>iii</sup>

With the continuation of projects like the Cumberland Hall roof, a wider range of social benefits may be achieved. Green roofs that are either accessible to tenants by foot or by viewing them from a higher window can be aesthetically pleasing and help promote relaxation. Psychological studies have shown the restorative effects of natural views.<sup>iv</sup> Green roofs can help address the lack of green space in urban areas. In a University setting, green roofs can provide quiet space for studying or meditation.

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- <sup>i</sup> Getter, K. L. and D. B. Rowe. 2006. The role of green roofs in sustainable development. *HortScience* 41:1276–1286.
- <sup>ii</sup> DeNardo, J.C., A.R. Jarrett, H.B. Manbeck, D.J. Beattie, and R.D. Berghage. 2005. Stormwater mitigation and surface temperature reduction by green roofs. *Trans. ASAE* 48:1491–1496.
- <sup>iii</sup> R.M. McMarlin , Green roofs: not your garden-variety amenity. *Facilities Design and Management* **16** 10 (1997), p. 32.
- <sup>iv</sup> R. Kaplan, Some psychological benefits of gardening. *Environment & Behavior* **5** (1973), pp. 145–161.