

## Merging Buildings with the Land

Green roofs are gaining acceptance in the United States as a viable, desirable attribute for the built environment, although implementation trails the large-scale adoption in Japan, Germany, and elsewhere. Physical attributes are the primary drivers, including the two- to five-fold extension of roofing lifespans, reduced energy consumption of the underlying structure, stormwater run-off control via rain absorption by the vegetation, and reduction in airborne pollutants through the filtering of rainwater. These attributes have helped many structures with a green roof achieve Silver and Platinum ratings under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program.

However, another important attribute is gaining momentum as well—the instrumental role green roofs and on-structure vegetation play in building design. Increasingly, green is becoming part of the architecture itself, from the groundbreaking Gap headquarters building in San Bruno, California, by McDonough + Partners in 1998, to today's innovators, such as the 24-acre (10-ha) Millennium Park in Chicago and Renzo Piano's San Francisco Academy of Sciences.

A recent project outside Washington, D.C., provides evidence of how green roofs and on-structure vegetation provide architects with a new palette. Incorporating the largest green roof on the East Coast, the National Audiovisual Conservation Center of the Library of Congress (NAVCC) in Culpeper, Virginia, is an adaptive-use project in which building and landscape literally merge.

The NAVCC uses the earth to moderate temperatures indoors, has a 5.5-acre (2.2-ha) green roof to reduce long-term costs and cut maintenance, and employs extensive landscape strategies such as bioswales,

native reforestation, and water-runoff control, all expected to help the building earn a LEED Silver rating.

The design by San Francisco-based BAR Architects, in association with Smith Group and SWA Group, melds a Cold War bunker and new buildings into the land. From some angles, the 415,000-square-foot (38,600-sq-m), three-building complex practically disappears, while other vantage points display a terraced structure bringing green views and daylight into the public offices and research rooms.

Deep within the NAVCC vaults are treasures of American history. The former emergency backup facility for the Federal Reserve reopened earlier this year as home to original

audiovisual archives ranging from the film negatives of *The Wizard of Oz* and *The Birth of a Nation*, to American inventor Thomas Edison's recordings and tapes of modern TV shows such as *All in the Family*.

The NAVCC consolidates and stores more than 4 million holdings dating to the 1890s in specially designed climate-controlled underground vaults. It also has a state-of-the-art conservation and research center, laboratories, administrative offices, audio listening rooms, screening rooms, and a theater, complete with an organ pit, for public screenings of archived films.

The NAVCC project incorporates a number of sustainability features. The above-ground three-story

conservation building—the public face of the NAVCC—steps back in tiers into the hillside. The curving Greek-inspired building facade is covered with green screens—trellises planted with vines that shade the facade—that help keep the building from becoming a heat island and minimize solar heat gain, which raises air conditioning needs in typical buildings. Shade trees in and around the surface parking lots and courtyards further prevent creation of or at least minimize heat islands. The green roof, planted with 23 varieties of sedum, provides stormwater management by absorbing and filtering rainwater and serves as wildlife habitat for birds and insects, from butterflies to bees.

Bioswales—which are lined with grass and plants—along the site's roadways filter, slow, and absorb stormwater runoff. Stormwater management is enhanced by minimizing the 45-acre (18-ha) site's hardscape with porous paving systems in the parking and courtyard areas.

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**The curving Greek-inspired building facade on the National Audiovisual Conservation Center for the Library of Congress in Culpepper, Virginia, has terraced, ivy-covered levels that help keep the building from becoming a heat island and minimize solar heat gain. A green roof absorbs and filters rainwater and serves as a wildlife habitat for birds and insects.**

