Concrete Roofs are Green

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Sustainable construction is reaching a point where many architects are beginning to see it as the mainstream, no longer an emerging trend. That is both good and bad news. The good news is that the perception will likely increase the number of sustainable buildings built, which is good for us all. The bad news is that there are many significant, simple to deploy technologies that involve concrete that are neither well understood nor used as often as their economic benefits would predict. In previous editions of Concrete Infocus, we have talked about the numerous ways concrete parking lots are green. We reported on the many attributes that make walls that include concrete green. It is only logical we keep moving up the structure to talk about the roof. Green roofs, which are just beginning to get some traction in the U.S., have been successfully deployed around the world. They provide a number of benefits, which can provide not only environmental benefits but also economic benefits.

Sustainable construction and environmental benefits of green roofs are numerous. They impact urban heat islands, stormwater management, overall air quality and provide a habitat for specific types of wildlife. Each of these qualities deserves a smattering of more detail.

Urban heat islands are a well-documented phenomenon. As mentioned in earlier articles, visit www.nasa.gov to find out how science has proven that they exist and that light colored rigid pavements like concrete outperform petroleum based flexible pavements in this area of growing concern. Just as light colored pavements add value to a project, so do light colored roof materials. But the reflecting of the light and heat is only one portion of the problem. When land is undeveloped, the moisture in the soils provides a cooling effect and this is not addressed by using light colored roofing. A green roof with a soil medium and plants on it provides some relief in this area. It also can provide shade depending on the type of green roof developed. That is why a number of airports in Europe have started to employ green roofs — the large buildings create significant green space.

Stormwater management is an increasingly important and expensive part of most development plans. Stormwater systems cost local governments significantly more and more money to build, maintain and upgrade capacity levels. Developers carry the cost burden of building retention ponds and more complex water management systems. Green roofs can play a role in a good overall stormwater management plan. Green roofs will hold an amount of water based on their type and size and the runoff will be slower than with a conventional roofing system. The water quality is generally enhanced due to the filtering effects of the plants and soil media. There are studies that have documented the filtering effect.

Air quality improvement is another positive effect of green roofs. By using plants instead of a conventional roofing system, photosynthesis can occur. This means oxygen is being created and this can help offset some of the losses from deforestation during development. There are some types of green roofs that have plants as large as trees, so this effect can be enhanced based on the type and amount of foliage planted.

Green roofs can provide a habitat for wildlife. Small animals and birds can utilize green roofs as a part of their environment. While this is in no way a substitute for a native habitat, green roofs can be an oasis in a large metropolitan area. Birds will find and utilize these areas as a portion of their habitat.

The potential economic benefits can include a reduction in pervious cover as recognized in some municipal, county or state regulations. Overall building energy costs can be reduced due to the green roofs’ natural thermal insulation properties. Acoustic insulation properties also exist with green roofs, and many have been placed near airports, yielding great results in noise reduction. When green roofs are applied, often-wasted rooftop space can be turned into usable space. When the savings associated with deferred repair and maintenance as well as reduced energy consumption are taken into account, the lifetime cost of green roofs can be comparable to the cost of conventional flat roofs.

A significant trend in the use of green roofs includes using "waterproof concrete." Waterproof concrete can allow the removal of
a waterproofing membrane layer in the system. Since failure of the membrane can require a costly repair during the lifecycle of the project, this is a significant step forward in the evolution of the green roof movement. Waterproof concrete is nothing new; it has been used in floating bridges in Seattle for decades. It can be accomplished through a variety of admixtures and mix designs. For those naysayers reading this, imagine a leak in the concrete and you can see that doing the repair from the underside of the roof is much easier and less costly than removing everything above a membrane and replacing it.

Green roofs are a growing construction method in the rest of the world. The U.S. is lagging behind many countries in its acceptance of this proven technology. By using the many significant, simple to deploy technologies that involve concrete, owners, specifiers and end users of projects can provide sustainable construction that is also economically viable. Green roofs, concrete wall systems like insulating concrete forms and tilt wall, as well as concrete parking areas, roads and streets, all meet the criteria. As life cycle cost of development becomes the norm instead of bid cost, all these systems will see more rapid rates of adoption.

For more information on green roofs, visit www.greenroofsaps.org. For information on concrete parking areas, visit www.concreteparking.org.