By David N. Rich

# SUSTAINABILITY THROUGH PARKING

With the increased spotlight on climate change and alternative energy solutions, more and more designers and planners are implementing "green" elements into parking structures and surface parking lots. The up-front cost of employing such features will be more than repaid in lower operational costs over time. But more importantly, these "green" elements show a commitment on the part of the private developers or municipalities to take responsibility for protecting the land, air, and water for generations to come.

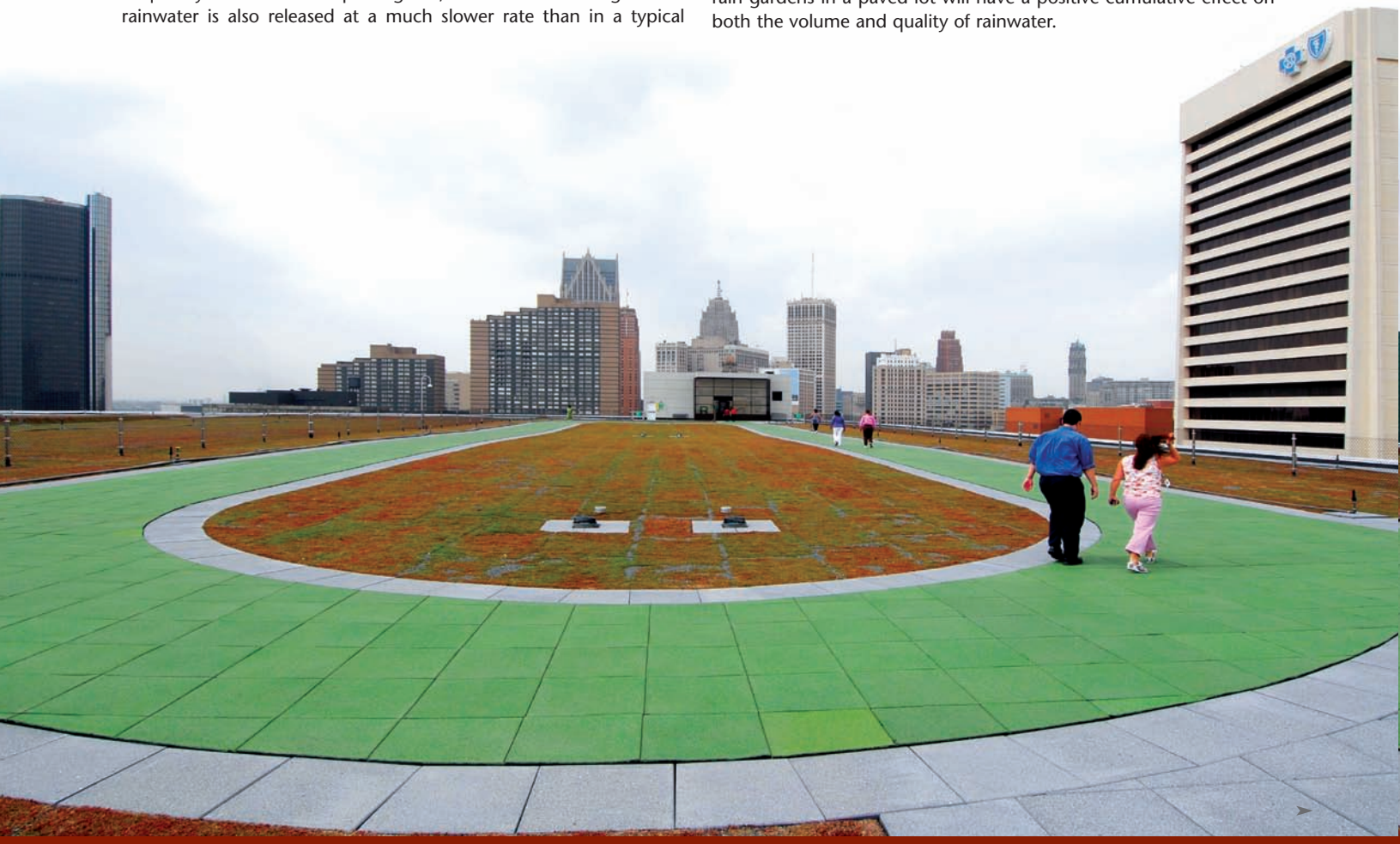
## 'GREEN' PARKING LOTS

One common negative effect of parking lots is they diminish the amount of open ground available for the absorption of rainwater. When groundwater doesn't drain properly, pollutants and sediments tend to accumulate before ultimately being released into local water supplies.

To combat this problem, parking designers and planners can utilize porous pavement solutions. Drainage infrastructure that features porous pavement has a stone reservoir underneath, which is designed to collect rainwater and direct it toward a municipality's sewer system, Rainwater passes through the porous pavement into the reservoir, is treated for the automobile oil and grease that frequently accumulates in parking lots, and is then discharged. The rainwater is also released at a much slower rate than in a typical drainage infrastructure system, guaranteeing the municipality's sewer system is not overwhelmed.

The cost-saving impacts are many: less water needs to be treated, and smaller pipes are needed for such a system, meaning lower costs and less space for drainage infrastructure.

Another effective "green" approach utilized in parking lots involves rain gardens, which are typically positioned inside an "island" at the end of a parking row. Rain gardens look like a normal attractive garden, full of various types of vegetation, birds, and insects. However, what separates them from normal gardens is how they accumulate and disperse water. Rain gardens feature specially engineered soils and selected plants that reduce runoff and lower nitrogen and phosphorus levels in the rainwater. Employing multiple rain gardens in a paved lot will have a positive cumulative effect on both the volume and quality of rainwater.



Bio-swales are also used to create "greener" parking lots. These modestly sloped, planted areas capture water, which moves down grade, is slowly treated (the vegetation helps remove pollutants), and then released to a watershed or storm sewer. Besides removing harmful elements from the water, bio-swales also help reduce storm runoff.

Parking designers and planners are also re-evaluating the materials traditionally used for parking lot surfaces. For example, parking lots are generally paved with asphalt, which absorbs heat and contributes to urban heat island effect, a phenomenon in which a metropolitan area becomes significantly warmer than its surrounding rural areas. Urban heat island negatively affects communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality. Part of the solution can be found in utilizing lighter-colored concretes, which reflect heat rather than absorb it, as well as trees and various canopies to provide shade and help mitigate heat island effect.

Asphalt solar collectors, which are currently in the research phase, are another tool that could someday be effective in combating heat island effect, and useful in creating renewable sources of electricity and hot water. There have been a number of studies looking at how well asphalt can collect solar energy, as well as the best way to construct roads and parking lots to maximize their heat-absorbing qualities. Technology currently under development would transfer energy captured by asphalt by heating water located in adjacent energy collection networks. That energy could then be turned into electricity, or the hot water could be used to heat area buildings.

Asphalt has many advantages as a solar collector. For starters, blacktop can continue to generate energy after the sun goes down, unlike traditional solar-electric cells. In addition, there is already a massive acreage of installed roads and parking lots that could be retrofitted for energy generation, so there is no need to find additional land for solar farms.

Also, extracting heat from asphalt would essentially cool the asphalt, reducing heat island effect.

## 'GREEN' PARKING STRUCTURES

Designers and planners are also building parking structures that have positive impacts upon the environment. They are achieving this through the use of materials such as precast, recycled concrete, or concrete containing recovered materials. This calls for curing concrete with low volatile organic compounds, and all painted surfaces can be covered with paints that contain low levels of VOCs.

Other design strategies that can make parking structures more environmentally friendly are "living roofs." For example, rather than providing an open parking floor on the structure's roof, designers will create a roof composed of trees, grass, and other vegetation. This helps reduce urban heat island effect, as well as stormwater runoff.

Other "green" strategies include pay-on-foot technology and implementing entry/exit strategies to meet peak traffic demands. Both are designed to reduce the number of idling vehicles in a garage; as cars waiting to enter or leave a parking structure unnecessarily emit carbon monoxide into the environment. The Department of Environmental Protection has found that idling vehicles emit 20 times more pollution than those traveling at 30 mph.

Pay-on-foot technologies allow patrons to pay for parking before they get into their cars to exit, which keeps them from having to wait in long lines to leave the structure. Meanwhile, entry/exit strategies can include reversible lanes, which are used as entrances during peak entry times and then changed over to exits during common departure times. Both of these approaches can facilitate quick exiting and minimize the amount of time patrons spend queuing in running vehicles.

## GOING 'GREEN' IN MORE WAYS THAN ONE

Across Canada, designers and planners are learning that "green" design elements are not only good for the environment, but good for the bottom line as well, with the potential to save parking owners tens of thousands of dollars annually. Also, implementing these design and operational elements establishes the parking industry as a shining example of how to be economically savvy and environmentally conscious at the same time. ■

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