Infiltration Information

By Christopher J. Estes

Reversing the history of urban hydrology through infiltration

Storm water management mitigates the change in the hydrologic cycle that development imposes on the natural landscape. The fewer changes to the landscape, the less storm water there is to manage. When any natural system is interrupted, there are both anticipated and unanticipated consequences. Unexpected consequences are almost always the most expensive and difficult to correct, if correctable at all; as someone once said, "We kill all the caterpillars and then complain there are no butterflies." It takes imagination and awareness to forecast our own impacts.

We have clung to conventions inherited from previous generations that have been and still are self-defeating, but storm water management is evolving out of necessity. We are looking at storm water more holistically in an attempt to avoid past and current problems. These problems are evident in an increasing number of regions falling under federal enforcement action due to surface water quality posing severe threats to health, safety and welfare.

Low-impact development practices, which attempt to mitigate the modified hydrologic cycle, are becoming commonplace. The most effective of these practices is storm water infiltration, which is a comprehensive solution to urban runoff. Volume control and water quality are both resolved while the natural hydrologic process is restored. This is especially effective when the pavement itself is pervious, thereby correcting the problem rather than treating the symptoms.

Storm water infiltration has been tested in all climates and geologic areas for all levels of urban and rural development. Recent research has demonstrated that it is possible to reverse the history of urban hydrology on a watershed scale simply and methodically by retrofitting impervious pavements with pervious concrete. A project in Charlotte, N.C., that has been in place for almost 10 years demonstrated that incorporating pervious concrete throughout the urban watershed would result in a 55% reduction in a 1.25-year, 24-hour storm event and a 37% reduction in a 100-year event. The 1.25-year storm event is important because it is typically the dominant flow that causes the majority of erosion in urban stream systems. Reducing runoff by more than one-third for the 100-year event would significantly reduce major flooding, giving new meaning to the phrase "economy of scale."

The key to successful infiltration design is more than technical training; it is a broader holistic understanding of environmental design that requires knowledge of all scientific, social, aesthetic, construction and economic disciplines.

There are still barriers to widespread adoption and implementation. Ralph Waldo Emerson said, "Society is always taken by surprise at any new example of common sense." Lack of awareness is still a major hurdle. Lack of familiarity scares some practitioners and regulators. But the evidence in favor is overwhelming: Storm water infiltration and pervious/porous pavement systems are functionally efficient, economical, and easier and cheaper to maintain than conventional grey infrastructure. This is the future of storm water. SWS

Christopher J. Estes is president of Estes Design Inc., an environmental design and consulting company in Charlotte, N.C. Estes can be reached at chris@estesdesign.com or 704.841.1779.