Critical Stormwater Management Considerations

Performance

Approaches to stormwater management have changed notably in the past few years from extended detention approaches (big basins) to on-site retention. This approach has been advocated by the National Research Council (*Urban Stormwater Management*, 2008), and subsequently advocated by EPA in a variety of technical documents (e.g., *Guidance for Federal Land Management in the Chesapeake Bay Watershed, Chapter 3 Urban and Suburban*, 2010; *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*, 2009) and policy memos (see a collection at: http://water.epa.gov/infrastructure/greeninfrastructure/gi_regulatory.cfm).

As a result there is now a clear expectation for performance of stormwater management practices. In nearly all cases practices should be held to performance objectives of replicating predevelopment (natural) hydrology on the site, though in some redevelopment scenarios it may not be feasible to fully achieve this goal. Typically the objective is achieved by retaining a volume of precipitation on site, similar to what would be maintained on site under natural conditions, e.g., meadow or forest. Terms for this approach in the Mid-Atlantic Region include: low impact development, runoff reduction, and environmental site design. Regardless of the term the performance standard or objective should clearly be for on-site retention, i.e., actually keeping the water on-site through infiltration, evapotranspiration, or water harvesting, NOT just holding it for a while, settling or filtering it, and then allowing it to discharge off-site and/or to surface waters.

Preferred Management Practices

We don't necessarily want to stipulate a short list of management practices because that could hamper innovation. However, it should be understood that it is not possible to do effective on-site retention to replicate predevelopment hydrology with the last generation of stormwater management practices (extended detention, in-line swirl systems, filters, separators, or end-of-pipe treatment). Therefore the types of implementation measures we could be promoting are green infrastructure approaches such as: land conservation/preservation of natural features, trees, green roofs, bioretention, green walls, water harvesting, green streets, bioswales, permeable pavements, planters, and other practices that keep water on-site and/or utilize it in a way that prevents run-off from all small storms and reduces it from the occasional large storm event.

See: http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm
http://www.epa.gov/owow_keep/NPS/chesbay502/pdf/chesbay_guidance-all.pdf

Design of Management Practices to meet Performance Objectives

It's very important to remember that not everything that looks green actually performs green. For example, rain gardens with underdrains are not actually bioretention systems, i.e., they don't keep the water on-site. Unfortunately many designers will inaccurately represent such a system as bioretention. Therefore it is critical that performance be stipulated, and the design understood.

We want designers to maximize retention, but we do recognize that some sites may have considerable constraints. Nevertheless, we must discourage default design elements such as underdrains, liners, inappropriately sized or positioned by-passes or overflows, etc. While these features are sometimes suitable to specific applications, they should be used judiciously and only when warranted by a specific site constraint.

It should also be noted that the more simple designs often provide better environmental performance, while also being less expensive to build and maintain. While that may seem paradoxical it isn't. Design is critical, and is still poorly understood by most stormwater engineers. Therefore it is very important to ensure that the design actually will meet the performance standard or objective.