

11. Evaluation of the Stormwater Capture Potential of New York City BMPs

DiGIOVANNI Kim¹, MONTALTO Franco¹, GUNTER Bram², MORIN Tatiana³, YAEGER Sandra², SHETTY Nandan²

¹Drexel University

²New York City Department of Parks & Recreation

³New York City Soil and Water Conservation District

Abstract:

The processes of urbanization and development vastly increases the imperviousness of an area, decreasing the amount of area available for infiltration and increasing runoff, thus altering hydrologic conditions and requiring practices to manage stormwater. Traditionally, stormwater management has focused on conventional "grey" technologies. However, a reevaluation of stormwater management practices has prompted a relatively new focus on decentralized "green" technologies that retain or detain stormwater onsite, while also promoting the restoration of predevelopment hydrologic conditions by encouraging processes such as evapotranspiration and infiltration. The implementation of such technologies can effectively retain stormwater runoff and drastically reduce runoff and thus CSOs in highly urbanized areas when implemented on a wide scale. The stormwater capture performance of a variety these "green" technologies, alternatively known as green infrastructure (GI), low impact development (LID) technologies, or best management practices (BMPs), are largely governed by their capacity to infiltrate water. In order to accurately assess the potential benefits associated with these technologies, a better understanding of their hydrology must be achieved including a thorough knowledge of temporal changes in performance. Infiltration rates and therefore system performance are greatly impacted by a variety of factors including soil type, soil compaction, age, sediment loading to the BMP, etc and are often quite variable as a result of these different factors.

Infiltration measurements were taken at a variety of different locations, including NYC Green Streets, Million Trees street tree pits, and porous pavements. NYC Green Streets locations include sites in Manhattan at 110th Street and Amsterdam Avenue, as well as a site in the Bronx at Sagamore and Cruger Avenue. A variety of Million Trees tree pits of different ages were tested. Porous playground materials were tested at Decatur Playground located at Decatur St. and 194th St., Briggs (Liza Torress Saez) Playground located at Briggs St. and E. 194th St., and a playground at Jacob's Place at 2348 Webster Ave. used by the Bronx Community Charter School. Porous pavement sites overseen by the Philadelphia Water Department (PWD) were also monitored for comparison. These sites included porous concrete sidewalks at Waterview Recreational Center as well as three porous asphalt installations on basketball courts at Mill Creek Playground, Allen's Lane Art Center, and Herron Playground in Philadelphia. A Cornell Sprinkle Infiltrometer, which simulates natural rainfall, was utilized to quantify infiltration rates. These measurements will help to enumerate an important parameter for evaluating the stormwater capture potential of these technologies as well as elucidate performance changes over time.

Keywords: stormwater, best management practices (BMPs), infiltration, green infrastructure, low impact development technologies

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Information of corresponding author

Full Name: Kim DiGiovanni

Organization: Drexel University

Mailing address:

Tel: 609-481-5977

E-mail: kad54@drexel.edu