

## Bioretention Flow-Through Planter Performance and Design Considerations

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### ABSTRACT

This study monitored four bioretention planters installed at Stevens Institute of Technology providing information on the hydrologic mitigation potential of planters and design considerations for future guidance. Monitoring during 18 months spanning 3 calendar years compared performance against several bioretention system design objectives, including fully captured events, peak flow reduction, and runoff retention. Hydraulic loading ratio and media porosity affected the fraction of captured events, with one-fifth of the events completely captured. The captured storms were less than 2.0 mm/m<sup>2</sup> of drainage area 77% of the time. The planters halved the peak flow rate for 61% of observations. The entire media volume was wetted in almost half of the events but rarely fully saturated. A modified available water capacity calculation based on the difference between the field capacity and the lowest measured volumetric water content provided a useful estimate of the median retention per event. To use this estimator, it is proposed to estimate the modified available water capacity as the difference between the laboratory-measured field capacity and a laboratory-measured wilting point increased by a factor of safety to account for the practical issue that the planters never dried fully between rain events in the New Jersey temperate climate.

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