

Irrigation and Thermal Buffering Mathematical Modeling

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Abstract : Two methods of irrigation, drip and sprinkler, were studied to determine the response of the Javits green roof to irrigation. The control study were dry unirrigated plots. Drip irrigation consisted of irrigation tubes running through the green roof that would water the soil throughout, and sprinkler irrigation used a sprinkler system to irrigate the green roof from above. In all cases, the irrigated roofs had increased the soil moisture, reduced temperatures of both the upper and lower surfaces, reduced growing medium temperatures and reduced air temperatures above the green roof relative to the unirrigated roof. The buffered temperature fluctuations were also studied via air conditioner energy consumption. There was a 28% reduction in air conditioner energy consumption and 33% reduction in overall energy consumption between dry and irrigated plots. Values of thermal resistance or S were determined for accuracy, and for this study, there was little change which is ideal. A series of infra-red and thermal probe measurements were used to determine temperatures in the air and sedum. It was determined that the sprinkler irrigation did a better job than the drip irrigation in keeping cooler temperatures within the green roof.

Keywords : green infrastructure, black roof, thermal buffering, irrigation

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