Abstract

This thesis will cover the hydrologic and thermal properties of the extensive green roof installed on the Jacob K Javits Convention Center and how they contribute to the performance of a green roof as an environmentally sustainable structure. The installation of the roof was completed in the spring of 2014. The results of the hydrologic monitoring of the roof since 2014 are included in this report. A total of 93 rain storm events are documented. A water balance was conducted for each storm. 87% of light storms with a cumulative precipitation of less than 6.35mm were fully retained. Since 2014 at least 5.61 million gallons of water have been retained by the green roof and kept from entering New York City's sewers. This demonstrates a green roof's ability to reduce the load on critical infrastructural systems, especially ones under such high load as the water distribution and discharge system in New York.

A survey was conducted using infrared cameras to record the surface temperatures of interior and exterior surfaces of the main convention hall and green roof at the Javits Center from sunrise to sunset on a hot summer day when the air conditioning was shut off. That results of that survey show that the interior of the main convention hall remained at about 25˚C while the roof surface fluctuated between 15˚C and 37˚C.This provided further evidence that a green roof performs well as an insulating structure of a building.

Several surveys using thermal sensor arrays were conducted to document the changes in air temperature with varying locations in height and distance relative to the different surfaces of the roof and the intakes of the air conditioning units over the course of a day. These surveys demonstrated the ability of a green roof in reducing the Urban Heat Island Effect. The effect of the color of the metal surface of the air conditioning intakes was studied and suggest further research may determine methods to further increase efficiency.