Abstract

This thesis will focus on the thermal and hydrological performance of the extensive green roof installed on the Jacob K. Javits Convention Center. The green roof installation was finished in the spring of 2014. From 2013 to 2016, the green roof has helped the Javits Center save $2 million in energy costs. In this same time period, the Javits Center has reduced electric consumption by about 6.6 million kilowatt/hour. This is proof of the green roof's ability to serve the Javits Center from an energy and economic standpoint.

The Javits Center Green Roof Wet and Dry Thermal Survey was conducted using thermal sensor systems and an infrared camera to record the air temperature during hot summer days while the air conditioning was shut off. The goal was to compare the temperature effects between a wet plot of green roof and a dry plot of green roof. The thermal sensors were used to record air temperature at the sedum and RTU air intakes at various heights. The infrared camera was used to record thermal images at the sedum and intake units, as well as the interior ceiling directly under the green roof. The interior ceiling average temperature difference of dry and wet reached 1.3°C.

Temporal and Spatial Thermal Surveys were conducted in the Fluids Laboratory, located in LL223 at The Cooper Union for the Advancement for Science and Art. These surveys used thermal sensor systems to compare the effects of colors and mediums on air temperature. The color tested were white and black. The mediums were a flat surface and slats that were modelled after the intake units on the green roof at the Javits Center. The surface and slat underwent the wind of various fan speeds. The white surface and slat produced higher temperatures than the black surface and slat.