Let it rain: Monitoring effectiveness of downtown green roof

Monday, September 17, 2012, *By Kathleen Haley*

Civil engineering professor Cliff Davidson had a breathtaking view of the City of Syracuse from a rooftop garden recently. But it's the possibilities of that prime location that made the experience memorable.

Davidson, three civil engineering doctoral students, a recent SU graduate and Onondaga County facilities workers were on the green roof of Onondaga County's Oncenter to install monitoring equipment that will gather data and show how effective the 1.5-acre roof system is at stemming stormwater runoff.

One of the largest in the Northeast, the green roof at the Oncenter's Convention Center was installed last summer and includes a waterproof membrane that is covered with low-growing vegetation. The water can now leave the roof by transpiration—water vapor loss through the plants—or evaporation off the soil, or through the drain pipes into the sewer system.

"There are some other research projects that have looked at pieces of this problem, but this is really one of the few times there's been an attempt to look at the complete mass balance of water on the roof—how much water is going into the roof and how much water is coming out of the roof," says Davidson, the Thomas and Colleen Wilmot Chair in Engineering at the *L.C. Smith College of Engineering and Computer Science*.
Davidson, who also holds an appointment at the Syracuse Center of Excellence in Environmental and Energy Systems (SyracuseCoE), began the project after connecting with Onondaga County Deputy County Executive for Physical Services Matthew J. Millea through SyracuseCoE's Executive Director Edward Bogucz and Communications and Program Manager Khris Dodson.

Millea suggested Davidson use the premier spot—the 66,000-square-foot roof of the convention center. "That was a wonderful thing to have been offered, and we've been working on the convention center for the last year and a half," he says.

The main idea was to see how successful the roof is in decreasing the amount of stormwater runoff that contributes to the combined sewer overflow problem, in which the same sewers are used for both sanitary sewage and stormwater runoff, Davidson says.

When it rains, the stormwater mixes with the sewage and greatly increases the volume of flow. "As a result, the sewage treatment plant cannot handle that capacity and has no choice except to allow the sewage to go untreated into Onondaga Lake," he says.

Some of Davidson's equipment was put in at the time the roof was installed. Over the past year, Davidson and his team have studied the roof and the plumbing of the convention center to determine the best instrumentation to use and where to position it.

On Thursday, since there are no stairs to the top, Onondaga County brought in lift equipment to haul up instruments that include a precipitation measurement gauge, a weather station and associated electronics. They will also be using soil moisture sensors and water flow meters.

Along with installing the equipment, they will have to set up a radio link for the data and calibrate the equipment. Similar equipment as an experimental control will be installed on another downtown building that does not have a green roof. The whole process will take a good part of a year.

Once the equipment is established, real-time data will be viewed on a web site that is in the works. Davidson's team is also working with the SU *School of Education* to design the site in a way that Syracuse city school science teachers can use in their classrooms. "They'll be able to get real-time data off the roof as a means of getting K-12 students excited about SU and the idea of a career in science and engineering," he says.