Appendix A

Green Roof Monitoring 2009
University of Illinois
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The **objective** of this proposal is to use data from a field laboratory we have established on a campus building with a green roof to provide guidance for stormwater managers to better quantify the stormwater benefits of green roofs. We have already installed instruments on the green roof and an adjacent conventional roof, allowing students to compare the effects of sustainable building practices with conventional construction. While green roofs, and other best management practices, have been qualitatively shown to reduce runoff and capture particle associated contaminants (PACs), little has been done to quantify their performance for rigorous design. At this time the effects of including sustainable practices in a design are applied in an ad hoc manner

The green roof being monitored is on the new Business Instructional Facility (BIF) on the corner of Sixth and Gregory Streets on the UIUC campus. This facility incorporates several sustainable practices. In particular, this building incorporates extensive green roofs, as well as conventional roof areas. The extensive green roofs (Figure 1) covers approximately 1200 ft^2 and captures, stores, and evapo-transpirates rainfall, and acts as a filter to capture PACs deposited from the atmosphere.

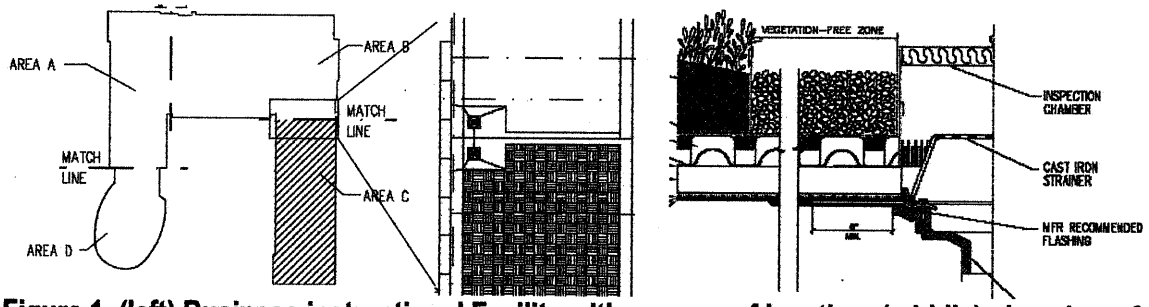

Figure 1. (left) Business instructional Facility with green roof location, (middle) plan view of green roof and conventional roof with two downspout locations, (left) cross section of green roof and drain.

We have installed rain gauges, soil moisture sensors (green roof only), runoff meters, solar radiation sensors, temperature and relative humidity sensors, and a sonic anemometer on the green roof and an adjacent conventional roof. These will provide data to quantify the amounts of rainwater that drain from, evaportranspirate from, and are stored by the green roof. Temperature, solar radiation, and relative humidity are measured at two different levels above the green roof and above the conventional roof to allow heat and moisture fluxes to be calculated.

The data being collected from the BIF green roof provide a detailed description of the physical processes related to the green roof and as such provide the foundation to develop a computer model that simulates these processes without resorting to questionable assumptions such as

modifying a runoff curve number or depression storage coefficient to estimate the effect of the green roof. However, the grant that funded the equipment installation did not provide for the on-going calibration and operation of the monitoring instruments and analysis of the resulting data. The proposed grant would provide support for students to maintain the instrument calibrations and to use the data to develop a computer model of green roof processes that can be applied to other green roofs and provide quantitative description of how those roofs will perform under a range of conditions.

The proposed grant would provide support for two students working on this project. It would provide limited (less than one month) support for Michelle Hollander, who is a M.S. student (B.S. Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, May 2009),. Michelle would oversee development of the computer model of the green roof. The bulk of the support is for Brad Bolton, a senior in Civil and Environmental Engineering who will maintain the instrumentation and database and work under Michelle's direction in developing the model.

The study would begin in September 1009 and end in June 30, 2010. The results from this study will be documented in a written report and also presented at the March 2010 IAFSM conference.

The costs of this study will be $6,130, which is salary and benefits for the students and University overhead charges.