student sustainability committee
university of illinois at urbana-champaign

Krannert Center for the Performing Arts / University of Illinois at Urbana-Champaign
Proposal Submission for the Student Sustainability Committee Sustainability Grant:
KRANNERT CENTER GREEN ROOF INITIATIVE (PILOT PLOT)

APPLICATION INFORMATION

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I. Detailed Project Description:

Project Goals and Introduction

Krannert Center for the Performing Arts, a component of the College of Fine and Applied Arts at the University of Illinois at Urbana-Champaign, respectfully submits this full proposal to the Student Sustainability Committee regarding the installation of a pilot portion of a green roof at Krannert Center. This installation of a pilot green roof is the next step in moving forward with Krannert Center's Green Roof Project. Situated on the campus of the University of Illinois at Urbana-Champaign, Krannert Center boasts a 187,000 square foot roof area and results of a feasibility study conducted by Soodan & Associates, Inc. concluded that the Center's current roof structure has the capacity to support an extensive green roof system (April 29, 2009).

Situated on the campus of the University of Illinois at Urbana-Champaign, Krannert Center boasts a 187,000 square foot roof area and results of a feasibility study conducted by Soodan & Associates, Inc. concluded that the Center's current roof structure has the capacity to support an extensive green roof system (April 29, 2009).

Green roofs are a very new addition to the University of Illinois campus with the most recent installation on the Business Instructional Facility (BIF). However, the installation on BIF encountered difficulties due to structural capacity of the building as well as the method of installation of the green roof using layers. This method is both cost inefficient and lacking in plant coverage, and as such the true benefits of a green roof will not be seen for years to come and the installation will need more maintenance.

Based on the results of the feasibility study, the probable construction cost for a green roof system to be installed at Krannert Center is estimated to be approximately $50 per square foot (total of $9.3 million).

The Urban Enviroscapes versatile green roofing module addresses all of these problems with a near maintenance-free design that is pre-made to be easily installed onto any rooftop. This installation will address the problems seen in conventional green roofing systems and prove the feasibility of such a system on the Krannert Center. Furthermore, the estimated cost of installation of this green roof is estimated to be a fraction of Krannert Center's original estimate.

such a way that they will grow together and create a seamless green roof within weeks, but remain versatile and modular in case repairs need to be made on the roof or changes to the green roof need to be made.

The installation of 960 ft^2 will be projected to remain on the roof until the roof itself is replaced. The permanence of this project's results on campus is much greater, however. This installation will demonstrate to the campus and community the simplicity of sustainable building and be a launch pad for green roofing and green innovation across campus and Champaign-Urbana. The feasibility and public attention from this system will be a great motivator for other projects such as Krannert Art Museum, the Foreign Languages Building, the iHotel and other projects in a preliminary stage that will result in large energy savings, water management, and pollution reduction around campus. Also, the success of this project will prove the ability of this system for the future full green roof that will be installed on KCPA.

Project governance structure

This project will be fully installed by Urban Enviroscapes under a limited warranty stating that any issues or problems with the system due to faulty manufacturing, or naturally dying plants will be replaced and/or fixed at no cost. This system is designed to include very little maintenance. The only maintenance needed will be quarterly drain and system checks to make sure there are no obvious aesthetic or structural problems with the system. These checks will be performed by University of Illinois Department of Facilities and Services (discussed in the following paragraph).

Summary of Communications

Urban Enviroscapes has been in close contact with Krannert Center's leadership since the feasibility of installing a green roof at Krannert Center became a reality. Krannert Center has also consulted the facilities Building and Operations department throughout this process.

On February 25, a meeting with University of Illinois Department of Facilities and Services (F&S) regarding this project and potentially other units on campus using the Urban Enviroscapes's green roofing system was discussed in full detail to address all concerns. F&S was pleased with the engagement and understands the installation process and maintenance requirements of the system. Staff in attendance included Facilities & Services members Fred Hahn, Cynthia Cope, Bradley Ellison, Matthew Edmonson, Tom Abram, Ryan Welch, and Tony Battaglia. Also present were Sandra Yoo and Valerie Oliveiro. F&S was satisfied with the presentation and are now moving to obtain the necessary signatures needed for approval.

Location

The current (planned) location for the pilot green roof project is the southwest roof area of the facility, indicated in the photograph above. This area is right by one of the main entrances to the main lobby level of the facility and visible from street level in some areas of Goodwin Avenue and Oregon Street. It is above conditioned space, so some energy benefits will be seen even from this small project. The green roof will cool the surrounding area by the main entrance to the building. This area is also visible from a higher plane – the upper level roof area (The roof the Krannert Center Lobby). This outdoor area is a gathering space for the public, The amphitheatre and the area directly in front of it is sometimes a performance space, a festival/opening night celebration space (tents and chairs and set up serving food and entertainment), a classroom (voice and combat classes occasionally take place here in good weather) On the main lobby level is access to all of Krannert Center's theatres, main offices, the ticket office, the Intermezzo Café and the Promenade Gift Shop. Since Krannert Center is a space for both the campus as well as the community, and a partner in a great number of local and regional businesses and campus units, the impact of locating the green roof at this location will be undeniable and will also allow for sustainability issues and efforts at the forefront of both our campus and community.

viable to gauge progress and results/success if the Center proceeded with a smaller test installation. Krannert Center and Urban Enviroscapes would have to explore other possibilities for the project, which may include putting the project on hold until funding becomes available.

The rate of return for this installation will be due to savings of about $100 during the summer for KCPA and about $5,000 per year for the sewer system relief. From water management and low energy savings the rate of return will be about 5 years. For a full installation on KCPA with savings exceeding $10,000 per year, the rate of return will be much quicker from energy savings alone.

Fundraising

Due to stringent economic circumstances at this time, Krannert Center will not be able to provide any financial commitment, including matching funds to this project. Krannert Center will work very hard to raise funds for this project in three possible ways:

a. Given the prospect of Krannert Center being the recipient of an Illinois DCEO grant for the recently completed Krannert Center LED Lobby Lighting Installation, Krannert Center would like to use part or all of that incentive to match funds for this pilot Green Roof Initiative.

b. Krannert Center has identified some donors who may be interested in supporting this project. Gifts to Krannert Center for the purposes of this project will be highlighted on the site of the pilot Green Roof Initiative.

c. If the above two fundraising initiatives are not successful, Krannert Center will seek help from the community using each 2' by 2' tray. A small donation sum will be attached to each tray (for example $40). Members of the community can "own" their own slice of greenness and therefore feel personally supportive of the community and campus's greening initiatives – this is similar to how some theatres raise funds by offering to engrave to attach names of fundraisers to seats at the theatre.

Timeline

A large benefit of the Urban Enviroscapes system is the low lead time required to install a green roof. Additionally, since a roof analysis has already been performed, upon receiving a 50% down payment for funding, the project can begin immediately.

If funding or a minimum 50% down payment is received by April 1, 2010, the trays will be ordered and growing can begin in greenhouses. On this schedule, the modules will be ready around May 15, 2010 and available for installation. Once installed, the green roof will be fully grown and self sustaining. A firm project completion date, assuming funding availability on April 1, 2010, would be June 30, 2010.

The project will continue to thrive until the rooftop of KCPA is replaced, at which time the modules can be easily relocated.

IV. Energy, Environmental, Social and Economic Impact

Based on the University of Illinois' 2010 Climate Action Plan, or iCAP report, the University is dedicated to reducing energy costs around campus and an overall decrease in the University's carbon footprint. This green roof installation will address many of the goals that are outlined in the iCAP report.

The installation is above conditioned space and surrounds an area that sees significant heat fluctuations through the summer months which also has an effect on the main entrance of the building. There has been extensive research performed in the past year to justify the claims surrounding the benefits of similar green roofing systems, and this project will contribute to that as the energy effects will be analyzed throughout the years. Below is a graph from a study performed at Southern Illinois University showing the heat fluctuations in the summer and winter comparing multiple depths of green roofs and a control area with no green roof. Take note that the systems used we similar to the green grid system shown above. This means that the surface of the green roof was not fully covered with vegetation and the results seen from our installation will be even better than those seen here.

As the graphs show, green roofing systems can drastically stabilize temperature fluctuations near the installation and maintain a low temperature range. The installation on Krannert Center will be closest to

Carbon Dioxide Absorption

Per 1000 square feet of normal low lying plants and grasses you can absorb about 350 kg CO_2 per year. The plants being installed are also known to reduce levels of smog and other greenhouse gases. Additionally, the plants will produce oxygen at a rate of about 300 ml per hour per ft^2. This translates to 300 L oxygen per hour, or enough oxygen to keep about 6 people alive for the rest of their lives with the 960 ft^2 installation.

Water Absorption

The extensive, lightweight green roof soil mix has a maximum water absorption of about 0.29 g/cm^3, or 18.1 lb/ft^3 of soil. This means that per 960 ft^2 of green roof being installed, the equivalent absorbed amount of rain will be 4,623 lb of rain water.

Annually, the city of Urbana receives an average of 41.06 inches of rain. An inch of rain over 960 ft^2 is equal to 4,994 lb of rain, so over the year the green roof installation will absorb about 204,754 lbs, or 3,281 ft^3 of rain. This will be rain that does not need to be processed by the sewer system, saving the city $5,873 per year from this partial (0.5% of the rooftop) installation.

V. Outreach and Education

A green roof installation will have educational, environmental, economic and energy impact wherever they are installed. There is no doubt that this project will be visible to the people who come through Krannert Center daily. Krannert Center is very deeply committed proponent of sustainability and the Center will seize any possible partnership to promote our current efforts in the hopes that others will see the benefits, learn from processes, innovate new ideas, and follow suit. Since the HVAC retrofit and the LED lobby lighting installation, Krannert Center has already begun and will continue in efforts to organize outreach for both campus and community and will always cite our supporters and partners in the process. These include:

1. Connecting with the local Don Moyer Boys and Girls club – the Don Moyer Boys and Girls club is interested in starting a green after school program with the hopes that it would be the most interesting and educational sustainability-based after school program in the state. Early conversations include tours surrounding the topics of arts and sustainability at the facility and if the green roof pilot project takes off, some initial conversations include involving educating students in the documentation and execution of such a project, highlighting the benefits and shortfalls (if any) of installing such a system.

2. Krannert Center recently hosted a CCNet meeting at Krannert Center with the hopes that other facility managers in town will be able to share information and connect with each other about their ideas and discoveries about the facilities that they manage. The meeting included a full tour of the facility, highlighting all the sustainability efforts that Krannert Center has undertaken thus far (full LED lighting demo included).

3. Krannert Center has already begun including the Center's green initiatives in the facility tours given to members of the public, visitors, classes and campus and community groups (e.g. rotary clubs) and a detailed inclusion of the Center's initiatives will be detailed in the tour's manual this summer 2010.

4. On February 18, 2010, Krannert Center hosted "Innovator's Improv" which is a campus based event. This is an open-mic style event that allowed a free flow of new ideas and innovations to be proposed to the crowd attending the event. The topic for the event was sustainability and Krannert Center's Senior Associate Director, Rebecca McBride took the opportunity to elaborate on the efforts that the Center has taken in the area of sustainability. Krannert Center will take these opportunities to promote the cause in every way possible and events like these are an ideal platform for this to happen.

5. New design elements have been incorporated at Intermezzo Café highlighting the café's greening initiatives in food selection (organic food choices and fair trade coffee), containers and cutlery.

approximately $500 and the cost of reinstallation at another campus facility will depend on the work needed to prepare that roof, accessibility, customization and the time and labor it would take to install the trays of that roof. Ideally, it would be another well-accessible and highly visible location, similar to the location currently chosen for Krannert Center.

d) Roof Impact: It is unclear from the Letter of Inquiry whether the roof lies atop conditioned space or parking. If the roof does not lie atop conditioned space, no benefit will be seen from the green roof on HVAC energy use. Can the installation take place atop conditioned space?

The installation area has been confirmed to lie atop conditioned space, not above the parking garage. This area will not only insulate the conditioned space below the roof, but also the surrounding area of the building. Since this area is mostly glass as the main entrance for KCPA, this will be a very beneficial placement for a green roof. According to many studies, a typical, insulated gravel covered rooftop can vary between 140 °F and 176 °F in the summer heat. Summer green roof temperatures have been observed as low as 77 °F. This drop in temperature will help the roof below as well as the surrounding entrances maintain a comfortable temperature.

e) Cost Estimates: Does the $50/sq. foot cost estimate for a conventional green roof result from a need to replace underlying roof membrane, etc? What is the additional cost / sq. foot of a green roof vs. a conventional roof at KCPA? What is the additional cost / sq. foot of this type of green roof at KCPA?

The $50+ costs associated with intensive green roof installations is a direct result of the labor and layers involved. This is shown commonly in the illustration.

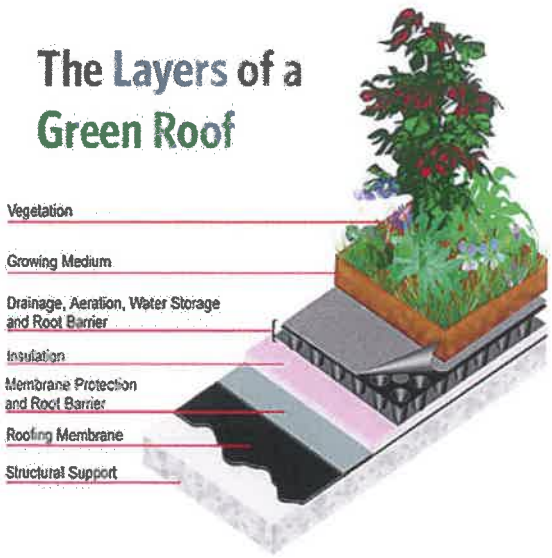

Photo Source:
Low Impact Development Center
http://www.lid-stormwater.net/images/greenroof1.jpg

The multiple layer system requires many more hours of labor along with methods of irrigation that results in costs of $50 to $100 per square foot. The cost per square foot for a regular rooftop is about $8 to $10 per square foot without the gravel. For a conventional green roof, the cost would be anywhere from $50 to $100 per square foot for a deep layered system. For the Xero flor system (a modular type of green roof) quoted in the KCPA green roof feasibility study by Sudan and Associates the additional cost was $24 per square foot. The additional cost of the Urban Enviroscapes modular green roof would be likely between $11 and $15 per square foot depending on the size of green roof installed, the purpose for the modules (vegetables vs. sedum) etc. Also it should be noted that with a green roof purchase studies have shown that the lifetime of the rooftop is extended by about 2 times. This, along with energy savings, makes the green roof installation much more economical.

Type	Cost Per Square Foot
Membrane Roof (without gravel)	$8 - $10
Conventional Green Roof (Layered)	$50 - $100
Xero Flor Green Roof	$24
Urban Enviroscapes Modular Roof KCPA	$24 - $25
UrbanE Modular Roof After Proven KCPA Install	$11 - $15

Krannert Center for the Performing Arts / University of Illinois at Urbana-Champaign
Letter of Inquiry Submission for the Student Sustainability Committee Sustainability Grant

Krannert Center for the Performing Arts, a component of the College of Fine and Applied Arts at the University of Illinois at Urbana-Champaign, respectfully requests the opportunity to submit a full proposal to the Student Sustainability Committee regarding the installation of a pilot portion of a green roof at Krannert Center. This installation of a small portion of a green roof is the next step in moving forward with Krannert Center's Green Roof Project.

Situated on the campus of the University of Illinois at Urbana-Champaign, Krannert Center boasts a 187,000 square foot roof area and results of a feasibility study conducted by Soodan & Associates, Inc. concluded that the Center's current roof structure has the capacity to support an extensive green roof system (April 29, 2009).

Krannert Center and Urban Enviroscapes
Based on the results of the feasibility study, the probable construction cost for a green roof system to be installed at Krannert Center is estimated to be approximately $50 per square foot (total of $9.3 million).

While it is a huge (and discouraging) cost to install an entire green roof at the Center at this time, the Center began to explore other possibilities to achieve this goal. Conversations between Krannert Center and two University of Illinois students – Andy Camp and James Young – gave the project a boost.

Andy Camp and James Young started Urban Enviroscapes. The company began when Mr. Camp and Mr. Young won a sustainability case competition taking place in Seoul, South Korea. Since then, the duo have received recognition both nationally and internationally for their innovation. They were invited to attend the National Summit alongside companies such as Microsoft and Dell to showcase their products at a national forum for greening the world. They have competed and won prizes in multiple competitions and recognized as a top innovator in the City of Chicago and Illinois as a whole.

The current method for installing a green roof is very time, labor, and cost intensive due to the large investment that needs to be made in transforming the roof. The Urban Enviroscapes versatile green roofing module addresses all of these problems with a near maintenance-free design that is pre-made to be easily installed onto any rooftop. Furthermore, the estimated cost of installation of this green roof is $25 per square foot – a fraction of Krannert Center's original estimate. It is hoped that after this phase is complete, the eventual target price per square foot will be $15 – this will greatly increase accessibility and affordability.

A Step in the Right Direction
Krannert Center continues to take a leadership role in energy conservation and sustainability, and is committed to further strengthening this role in order to become a national model for architecture and facilities retrofitting and sustainable practices in the arts. The recent retrocommissioning of the Center's HVAC systems resulted in a 32.4% decrease in energy consumption. The Center upgraded theatrical lighting equipment and organizes a series of concerts around a green theme every summer. In December 2009 (with the help of a loan from the SSC), the Center will embark on an LED lighting upgrade in the Lobby – upgrading from normal 150 Watt / 2000 hours incandescent lamps to 32 Watt / 50,000 hours LED fixtures. This indoor architectural LED lighting upgrade will be the first of its kind on this scale (25,000 square feet) and will be an example for many to follow. The green roof project hopes to achieve the same, if not greater visibility and reach.

Already, a number of University of Illinois campus units and companies such as John Deere, Abbott Labs, Baxter, and Procter and Gamble are eagerly awaiting Urban Enviroscape's first installation on Krannert Center for the Performing Arts to move forward with their own green initiatives.

Installation Details

240 trays (960 square feet) will be installed on the KCPA rock membrane. The modules will be installed on the southwestern section of the gravel area, next to the west entrance of KCPA.

The color will be very similar to the bushes that are seen in front of the building. The location is visible and eye-catching – since it will be right by one of the front entrances to the facility. People will be able to see how the technology works (and demystify some of the questions people might have about green roofs) and

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Campus and Regular Mail

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Krannert Center for the Performing Arts

Green Roof Project

RESPONSE TO STUDENT SUSTAINABILITY COMMITTEE

The Student Sustainability Committee, while supportive of your project, requests that you provide additional clarification on the following:

1) Will the roof (trays, equipment, etc), be University property?

Yes.

Who will own the roof when KCPA's roof will be replaced?

Krannert Center for the Performing Arts.

When will KCPA's roof be replaced?

Krannert Center does not know when the roof will be replaced. This is dependent upon the availability of funds and F&S planning and scheduling.

Will the green roof remain until the actual roof replacement work begins?

Yes.

2) Can you work to identify a specific location to install the green roof, after KCPA's roof is replaced?

At this moment there is no firm and planned location to install the green roof, after KCPA's roof is replaced. The only assurance that KCPA can offer at this moment is that the green roof will be moved to a designated location on another part of the roof at KCPA, after that part of the roof has been replaced. This will depend on construction schedules and plans for roof replacement when the time comes. We don't anticipate that the entire roof will be replaced at the same time (we anticipate that the roof will be worked on in stages).

3) What are sodium varieties - Typo? Why are you using an irrigation system? Can this roof be installed without irrigation?

Likely the "sodium" variety was referring to "sedum" varieties. A typo. The irrigation system originally planned was to take care of concerns F&S had regarding watering. Now that we have testing showing the true ability of the system to go without watering this system will not be needed.

Note: After speaking with F&S they will be requiring us to hire a landscaping service to "take care" of the installation since it is such a public site, and also install a couple of anti-theft precautions (connecting the modules together in a sense) along with edging treatments and some pavers. Although we will not be needing the irrigation unit, it would be preferable to use that money for the landscaping (Ingram's Nursery) and edging/connection treatments we now need to add in due to F&S's concerns. A table below shows the exact costs I have obtained for each of these additions, and then the table below that shows the additions inserted into the current budget template.

Summary: A landscaping company will maintain and install the system, even though the maintenance and installation requirements will be minimal. We will also install edging and pavers for aesthetic reasons, and we will be fastening the modules together (included in the cost of the edging) for security concerns.