INDIANA UNIVERSITY
SOUTHEAST

A Proposal For A Green Roof At Indiana University Southeast

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Executive Summary:

This study examines how green roofs can be used to assist with the problems of urban heat islands as well as to combat issues rising due to climate change. Utilizing pre-existing studies on the topic as well as interviews with green roof installation companies, I was able to estimate the possible results of installing a green roof on one of our campus buildings.

Introduction:

With global climate change becoming an ever-increasing problem during the Anthropocene, humans have increasingly been formulating and adopting more revolutionary ways to lessen their impact on the world. Since buildings provide many of us a space to work, learn, and reside, and one where we spend a great deal of time in, their construction seems like a great place to start when working to lessen our impact with the world around us. Green roofs are one way we have been altering building design to benefit not only the human experience, but also aiding in the environmental footprints of buildings. Green roofs are a style of roof that combines eco-friendliness with aesthetically pleasing design and a potential for future cost-savings for the building's upkeep. In this study I will go over what exactly a green roof is and entails, as well as its benefits and costs. An estimate of what the cost to install one on an existing IU Southeast building will also be proposed.

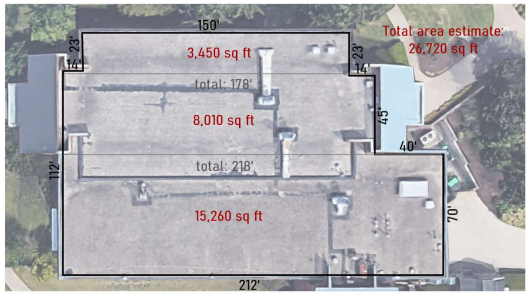

Figure 1. Modified Google Maps image showing Life Science building roof at Indiana University Southeast
Image retrieved March 2021

Findings:

From my research, I have found that the largest pushback from people who are against green roofs have to do with a lack of knowledge on the subject (Altor, 2010). According to the United States Environmental Protection Agency (EPA), pieces of man-made infrastructure take in and then give off the sun's energy at a greater rate than natural landscape does. Heat islands are concentrated pockets, usually found in urban areas, where one can find many of those pieces of man-made infrastructure and the temperature is higher than the surrounding areas ("Learn about heat islands," 2020). Along with the increasing temperature from climate change, this heat island effect has only served to make urban areas feel worse. Not only that, but the paved and building-filled areas have reduced permeable surfaces and habitat spaces for wild-life. With anticipated rainfall increasing as years go on (also due to climate change), many states, including Indiana, are considering the need for storm water system updates (Miley, 2019). Green roofs seek to fix these mentioned issues or at least minimize their impacts. They seek to do this in an aesthetically pleasing manner, while also saving money for the building in the long-run.

There are two major types of green roofs; the extensive green roof (EGR) and the intensive green roof (IGR). EGRs are a lighter-weight structure and usually use plants such as sedums because of their hardiness and fewer care requirements. Because of their lighter weight, these types of roofs can often be added without additional structural support (survey should still be done beforehand). An IGR requires a thicker layer of soil and so more structural support from the building. This type of roof can house a greater variety of plants (including trees in some cases) but would also need a higher initial investment and recurring maintenance cost (Dimitrijević et al., 2018).

A normal flat roof like the one IUS has would need replacing about every 20 years (according to the experts interviewed) and would cost around $277,000 ($10,000 plus $10 per square foot). To compare with the $750,000 (rounded median from estimate ranges from experts) 50-year green roof ($800,000 minus $50,000 for energy cost savings), the cost of a normal roof would be about $692,500 over 50 years. From my interviews, I learned that the sewer water savings would be much higher than the energy savings, but to be conservative, we can say that they would be doubled the energy savings ($100,000). In total, over 50 years, the green roof would be estimated to be $650,000, while the normal roof would be around $692,500.

Discussion:

There is no arguing that green roofs are a costly investment. However, the benefits point to outweighing the costs. Since extensive green roofs provide all the benefits of a green roof with the most minimal upkeep, they are the better option of the two when first trying out the concept at a location with a good number of buildings such as the Indiana University Southeast campus. Each of the dark surfaces around our campus contributes to the heat island effect, and in the case of buildings contributes more towards electricity costs for air conditioning. Storm water runoff issues are expected to increase as climate change accelerates, which could cause many costly damages to the campus as well as higher stormwater charges. Green roofs can help IU Southeast out with these current and future issues while also improving the aesthetics of the campus and more habitat spaces and biodiversity for the life we share a space with.

Conclusion/Recommendations:

For the Indiana University Southeast campus, I would suggest the addition of an extensive green roof on the Life Science building. An EGR would be the perfect first green roof for the campus to start out with and see the great benefits they offer before implementing them campus-wide. The savings outweigh the costs, and there are numerous incalculable benefits that would also play a part. Beautification aspects that would attract more attention from possible investors and future students, there would be damage reduction and general cost-reduction from less water runoff and energy usage, reduction from climate change effects that would also play a role in the health and safety of the community, and various other aspects. In conclusion, I suggest moving forward with installing a green roof.

References:

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