

INVESTIGATION OF THE APPLICATION OF A GREEN ROOF IN A HOT AND ARID REGION

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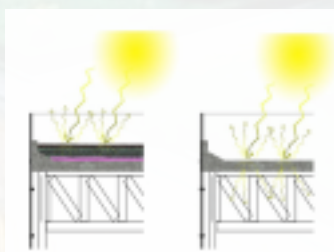
Research Goals:

The goal of this study is to investigate the application of a green roof in a hot and arid region, at the University of Arizona, on the College of Architecture, Planning, and Landscape Architecture.

Methodology:

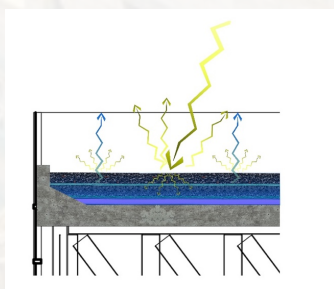
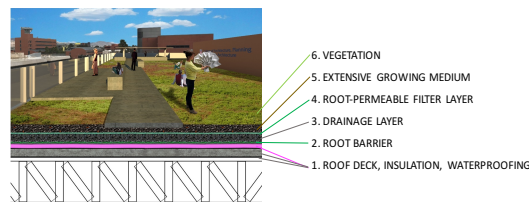
The methodologies consist of a mixed-methods approach. This includes extensive research of current literature on the benefits and costs of green roofs as quantitative data. A survey was conducted among faculty and students of CAPLA as qualitative data.

Applications:



Insulation of an "Extensive" Green Roof (left) compared to a conventional roof (right)

Typical Composition:



Evapotranspiration effect of a Green Roof

Data/Results:

Cost:

Extensive Roof Costs	per square foot:
New construction cost	\$10.00-\$15.00
Retrofit cost	\$1.03-\$1.66 annualized over 30 years
Maintenance cost	\$0.75-\$1.50 decreases over time

Savings:

Table 1: Reductions in Storm-Water Runoff over a 30-Year Planning Horizon

Building Type	Run off Reductions (million gal.)		Public Benefits Market Value Reduced (\$1,000)	
	Single Family	Commercial	Single Family	Commercial
Single Family	540		\$1,200	
Commercial		67		\$150

Table 2: Reduced Electricity Use over a 30-Year Planning Horizon

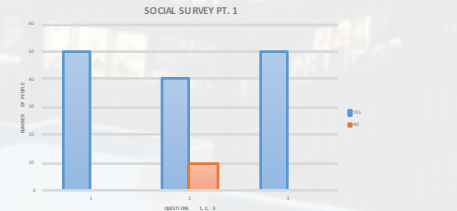
Building Type	Direct Energy Mitigation		Public Benefits Market Value of CO ₂ Mitigated (\$1,000)	
	Single Family	Commercial	Single Family	Commercial
Single Family	3,300		\$630	
Commercial		2,300		\$340

Table 3: Greenhouse Gas Reductions over a 30-Year Planning Horizon

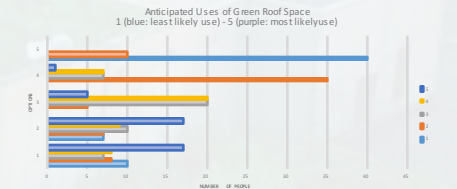
Building Type	Private Benefits Direct Energy Savings (\$1,000)		Public Benefits Market Value of Energy Savings (\$1,000)	
	Single Family	Commercial	Single Family	Commercial
Single Family	4,700		\$210	
Commercial		3,500		\$3,100

(Blackhurst, et. al., 2010)

Survey:



1. Would you like a green roof on CAPLA?
2. Would you utilize the space?
3. Do you see implementing a green roof top as a benefit to CAPLA?



1. A place to hang out
2. A quiet place
3. A place to study
4. A place to garden
5. Wouldn't use the space

Conclusions:

Research suggests green roofs may not fully recoup the costs of installation and maintenance through energy savings alone. Public benefits (reducing urban heat island and associated energy costs) and social benefits (occupant well-being and productivity) must be considered as well. The market values research has prescribed to the cumulative benefits results in green roofs being cost-effective. Future research may include looking into sustainable strategies to help enhance the human comfort on desert roofs, including shading devices.