Introduction

- Botanical Gardens of the Ozarks (BGO), located in Fayetteville, Arkansas, began in 1994. Beginning in 2018, a 15 year multi-phase project known as the Master Plan will be implemented to expand BGO across its remaining 60 acres of land.
- The first and largest building in the Master Plan is the visitor’s center, which consists of classrooms, a convention hall, a conservatory, and a 2-acre field-to-fork garden.
- The building will be about 28,000 square feet.

Objectives

- To provide water for irrigating plants in the 2000 ft² conservatory.
- To store enough rainwater to last throughout dry seasons.
- Reduce runoff from new Visitor’s Center.
- Provide points towards LEED certification.
- Serve as an educational tool.
- Save money on well pumping costs.
- Easy to maintain and aesthetic to building’s exterior.

Components

- Rainwater Collection
- First-Flush/Filtration
- Transportation to Storage Area
- Storage Area
- Transportation to Conservatory
- Overflow Mechanism
- Educational Addition to System

Methods

- Kinematics: \( v_f^2 = v_i^2 + 2ad \)
- SCS Method: \( q = q_s A_U \)
- Bernoulli’s Equation: \( h_i + \frac{1}{2}v_i^2 + W_i - h_f - \frac{1}{2}v_f^2 - gP_f = 0 \), \( W_i \) for wind.
- Rainfall Amount: \( RF_{collected} = A \times \frac{4.657 \text{in}}{10^3} \times P \)
- Water Balance: \( H_2O_{stored} = RF_{collected} - \text{Irrigation} \)

Sustainability

Our system lessens the risk of:
- depleting a natural resource
- water overconsumption or waste
- debris in Lake Fayetteville due to our first flush system.

The system requires minimal maintenance, is easily operated and is a well publicly perceived Low Impact Development (LID) project.

From the six core principles for sustainable design of buildings, we have:
- protected and conserved water
- optimized energy use
- optimized building space and material usage.

For the visitors, this can be educational and motivational to incorporate small rainwater harvesting systems in their home gardens which will enhance sustainable social interaction and participation and lessen utilities costs for families.

Capital Cost

Total System: ~$4915

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