Problem Statement

Auburn University’s Facilities Management Department and Office of Sustainability are trying to reduce its municipal water consumption by 5% between the years 2010 and 2020. Considering the growth rate of Auburn’s campus, along with increasing percent of students living in on-campus housing, this is a very difficult goal to meet. Irrigation consumes a very large amount of water on Auburn’s campus, and athletics fields consume a very large percent of irrigation water. Pat Dye Field has the largest irrigation footprint of all the athletics fields on Auburn’s campus using an average of 73,000 gallons of water weekly for irrigation. The average annual rainfall that accumulates in the area encompassed by Jordan-Hare stadium is 33” and allows for the potential of harvesting 10 million gallons.

Design Objectives

- Design a system to capture rainwater at Jordan-Hare stadium that provides a 10 year payback period.
- If economically feasible, provide reuse possibilities other than irrigation such as toilet flushing or bleacher cleaning for harvested water.
- Design will be an educational tool to raise awareness for good and sustainable water management practices.

Location Map

Pat Dye Field at Jordan-Hare Stadium
Auburn University, Auburn, AL

Design Specifications

- Underground, concrete cistern 27 ft wide x 77 ft long x 11 ft deep rectangular cistern with a 126,000 gallon volume located under the southeast corner of Pat Dye Field
- Harvest rainwater from the eastern lower bowl of the stadium
- Catchment area of 84,500 ft² capable of catching 2.8 million gallons annually
- Filtration by seven filters at each on-field drain
- Ultrasonic metering system to show water levels and control pump
- HACH pillow pack and colorimeter kit for nutrient monitoring

Promotional Materials

- A “Green Game” that highlights recycling will give fans an option to donate money to sustainable projects.
- Pamphlet was created for the game-day program to provide information on the harvesting system to the general public.

Cost Analysis

<table>
<thead>
<tr>
<th>Materials/Service</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Concrete/Delivery and Construction</td>
<td>$57,600</td>
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<tr>
<td>Cut/Fill of Earth</td>
<td>$8,050</td>
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<td>Pump and Motor</td>
<td>$12,000</td>
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<td>PVC Pipe</td>
<td>$4,000</td>
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<tr>
<td>Filtration Units</td>
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<tr>
<td>Ultrasonic Control System</td>
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<tr>
<td>Backflow Preventer</td>
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<tr>
<td>Contingency and Engineering (30%)</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td>$130,716</td>
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</tbody>
</table>

Conclusion

To fulfill the goal of reducing Auburn University’s municipal water usage by the year 2020, a rainwater harvesting and utilization system was designed for Jordan-Hare Stadium. This design has the potential to reduce the municipal water requirements at Jordan-Hare Stadium by 47%. This translates to a 0.35% reduction in water use for all of Auburn’s campus. With that reduction, there is the ability to save approximately $6,600 each year on cost of municipal water and provide a payback period of 19.8 years. In addition to assisting in the goal of conserving municipal water supplies, a rainwater harvesting system can also benefit the nearby Parkerson Mill Creek.

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