**Demonstration Rainwater Harvesting for a Poultry House**

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**Clients:** Jeremiah Davis – National Poultry Technology Center

Denis Rochat – Rainwater Resources

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**Introduction**

In Alabama, 82% of the annual agricultural production generated is from livestock products. Broiler production makes up 60% of Alabama's livestock productions and Alabama itself supplies 12% of the nation's broiler products. Also, the entirety of Alabama has 1,673-square-miles of water and an average yearly precipitation of 56-in. Between the state's agricultural and municipal water needs, water is constantly in high demand but Alabama's supply of water is limited. This is often due to Alabama's sporadic drought conditions and riparian water law. In fact, many farms in North Alabama pay as much for water as they do for their other utilities. Currently, water utility costs range from $2.50 to $11.00 per 1,000 gallons. In order to reduce water utility expenses, the National Poultry Technology Center is collaborating with Rainwater Resources to develop a full scale rain-harvesting system, which can potentially capture and store up to 100,000 gallons of water, to guarantee a significant water supply for poultry houses.

**Site Location**

![Site Location](image)

**Design Objectives**

- Designing a system that will collect, convey, and store rainwater using a 100-year 60-minute intensity rainfall of 4.16-inches, at a demonstration scale volume of 3,000 to 5,000 gallons for each of the three following types of storage: a poly tank, a polyester bladder, and a corrugated steel ring.
- Design a bracket, that can be singularly cut out of a 4-ft. by 8-ft. sheet of 12 gauge sheet metal, to attach the gutter system to the poultry house since the roof eave over hangs the building wall by 1-ft.
- Showcase the Rainwater Resources' rainwater harvesting system, by designing a 700-sq.-ft. demonstration classroom, built to 2009 International Building Code and the City of Auburn ADA standards, to accommodate 21 people while allowing the indoor filtration and control systems to remain accessible throughout the building.

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**Gutter System Design**

The gutter system will be composed of three pipe sizes: 4-in, 3-in, and 2-in inner diameter pipes. The 4-in inner diameter pipes will be cut in half and be placed along the roof edges to collect rainwater. The 3-in inner diameter pipes will be used for the 5 downsputs and the remainder of gutter system to the storage tanks. The 2-in inner diameter pipes will be used for the pipes that travel from each tank outlet to the demonstration classroom.

In addition, some portions of the conveyance system will be sloped to transport water from the roof to the storage tank inlets. The tanks will also be partially buried to ensure that there is enough pressure head for the water to travel into the tanks.

Rain Catchers will design a bracket, that can be singularly cut out of a 4-ft. by 8-ft. sheet of 12 gauge sheet metal, to attach the gutter system to the poultry house since the roof eave over hangs the building wall by 1-ft. The bracket flanges can be maneuvered to support the flat and sloped sections of the gutter system.

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**Interior Classroom Design**

**Exterior Classroom Design**

The demonstration classroom is designed to be a 700-sq.-ft. classroom to accommodate standing space for 21 people, the control and filtration systems, a couple of tables and chairs, and a display shelf and movable podium for staff uses. The building will have 2 windows, facing the East and West sides of the building, and 2 facing the south. The demonstration classroom is also designed to have a City of Auburn ADA compliant handicap ramp.

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**Cost Estimate**

<table>
<thead>
<tr>
<th>Design Component</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration Classroom</td>
<td>$13,419</td>
</tr>
<tr>
<td>Storage Tanks</td>
<td>$7,164</td>
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<tr>
<td>Gutter System</td>
<td>$3,598</td>
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<tr>
<td>Total</td>
<td>$24,151</td>
</tr>
</tbody>
</table>

Each design component includes the manufacturing or labor costs required to assemble the component. The gutter system costs includes the labor costs to install the gutters and the manufacturing material and labor costs to create the proposed bracket design.

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**Acknowledgments**

Rain Catchers would like to thank Dr. Mark Dougherty and Dr. Jeremiah Davis, faculty of the Biosystems Engineering Department at Auburn University, for their help in assembling this poster.