alr252

Fall 2013 Contributions

This semester, I am working with a graduate student in the Architecture Department, Jordan Berta, to finish creating a scale model of the plant. I am the main source for the technical details of the plant, deciding what aspects of the treatment plant are most important to highlight in a small scale architectural model. Jordan and I are working to develop several options for physical models, considering the use 3D printing to create a detailed and sturdy structural model, and a more abstract, simpler paper model which can be replicated many times and assembled easily.

Summer 2013 Contributions

As part of the Turbulent Tube Flocculator team, my goal was to design a turbulent lab-scale tube flocculator that best mimics full scale conditions. Initially, a literature review of available information of flocculation, previous turbulent pipe flow designs, and analysis methods must be compiled. System design requires investigation of minimum flow rate required for a turbulent hydraulic range, characteristics of available materials, and available source of water for the system. Solutions for designing geometry of support structure, placement of constrictions, and methods for creating constrictions must be approached with creativity. By the end of the summer, I worked with my team to find the length, diameter, and flexibility required for the system tubing. I designed a coiled tubing configuration and system of vertical rods/ pvc tubing which minimizes amount of space the flocculator takes up in the lab and allows for the creation of many constrictions at once by applying pressure at multiple points of the tube.

As part of the Small Scale Plant Model team, I explored the use of 3D printing using a product called MakerBot, and began assembly of Plexiglas structure using reconfigured 2D templates which account for measurement errors in the initial templates from the Spring 2013 work.

Spring 2013 Contributions

As a member of the Small Scale Plant Model team, I worked with my teammates to decide our intention for creating this model, including potential audience and important feature of the plant necessary to depict importance of the AguaClara project. I learned how to use a new program used by Architects called Rhinoceros, which allows simplification from 3D to a 2D template of the existing AutoCAD model created by the design team. I was primarily involved in construction of a mock-up preliminary model using inexpensive chipboard pieces cut using the 2D Rhino templates, discovering that many errors can arise from many small pieces and that our team didn't account for model material thickness when converting virtual model to a small scale tangible plant.

Summer 2012 Contributions

As a member of the Stacked Rapid Sand Filtration Team, my main task was to create a stacked rapid sand filter for a low flow plant. For me, this required an introduction to fluid dynamics, in order to calculate overall height of the system, length of pipes, and dimensions of the filter. I compared benefits and disadvantages of both rectangular and circular geometries using available materials and ease of construction as primary considerations. Ultimately, our team decided using a large diameter PVC pipe is the most viable solution. Finally, I explored different arrangements of inlet and outlet pipes which would minimize head loss and overall dimensions of entire system.

Spring 2012 Contributions

My main contribution this semester was to create an algorithm for the constant head tank which would allow different designs for different number of outlet pipes which varies with different flow rates. Another goal of mine was to fix the flexible tubing function so that it depends on input of only start and end point, rather than an array of multiple points.

Fall 2011 Contributions

My contributions this semester included creating an algorithm for the chemical dosing system as well as a flexible tubing function, which is especially important in creating a visual representation for flows and connections within the chemical dosing system.