

## Paul Larios's Individual Contribution Page

### Fall 2013 Contributions

I was chosen for the Design team at the start of this semester. For this semester, I am focusing on making modifications to the Agua Clara design code for high flow conditions. First, I am researching potential solutions for entrance tank flow control under high flow. Currently, the flow control pipe allows the plant operator to dump water up to the entire plant capacity by opening a bronze gate valve. For plants with larger capacity, the bronze gate valve required is larger. This is problematic because the prices on these valves become exorbitant at sizes larger than 2" or 3". I am currently assessing potential solutions that include: multiple flow control pipes/valves at smaller sizes, and the use of different valve types that are readily available in Honduras. My goal is to minimize the cost of entrance tank flow control while providing a simple design with materials available in Honduras. This change may ultimately be implemented into the design code so that the design may be featured in high-flow designs created by the Design Tool.

First, I have assessed potential solutions which utilize multiple 2-inch gate valves to avoid using the larger, more expensive valves. Cost analysis has shown that this is only feasible for a 3-inch flow control pipe, with 2 2-inch valves/pipes feeding in. Larger diameters require too many valves and fittings to increase the cost, and are less friendly for the operator.

Since, I have assessed another alternative design for the entrance tank that features the use of one or more Fernco flexible fittings as an "adjustable weir" configuration on the drain stopper pipes. This design is clearly more cost effective than any of the previous considerations. Upon completing this study, it is going to be subject to future laboratory research before implementation in Agua Clara plants.

### Spring 2014 Contributions

I have worked with Runpeng Yu on updating the weir control system on the Stacked Rapid Sand Filters (SRSF). Our goal was to devise a means to adjust the backwash flow rate from the filter inlet channel. This is advantageous to plant operators in cases where the plant is not operating at the entire design flow rate. This is needed because in such cases, the backwash flow rate is too low and the desired bed expansion is not achieved during backwash.

We have developed a solution to this problem that features a removable gate on a weir in the filter inlet channel. This gate would be removed from the weir during backwash, causing the weir to act as a submerged orifice. Then, water would flow through a 10-cm deep flow control weir (restriction) that delivers the target  $Q$  to the filters. This target  $Q$  can be altered by placing "stop logs" at the bottom of this restriction. The Mathcad design code was completed in April 2014. The current focus is on updating the drawing code so that this design may be reflected in drawings on the Agua Clara design server.