

# Low Flow Stacked Rapid Sand Filtration

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## Abstract

Stacked Rapid Sand Filters are an adaptation of rapid sand filters optimized for flows between 6 and 100 L/s that don't require any flow control or backwash. SRSF is a "game changing" technology invented by the AguaClara team that is significantly simpler to operate than conventional rapid sand filters.

Skills fluids, AguaClara water treatment processes, fabrication

Location AguaClara lab 2 right end of bench, HLS 160 R, and Project Lab Hydraulic Test Facility

## 1 Scaling to low flow rates (Project Lab using Hydraulic Test Facility)

A high priority goal for the summer is to design an ultra low flow AguaClara facility. The target flow range is between 3 L/s and 0.3 L/s. Typical per capita demand is approximately 3 mL/s and thus a village with 100 people would need 0.3 L/s. Thus the flow range of 0.3 L/s to 3 L/s corresponds to populations between 100 and 1000 people.

Develop new construction methods that would make it possible to fabricate a SRSF at dimensions that are not large enough for a human to enter the filter box. The filter box could be constructed of large diameter PVC pipe and the manifolds could be assembled inside this pipe by reaching in from above and from below. See the capstone design results from CEE 4540 Fall 2011 for additional fabrication ideas. Evaluate pressurized vs open filter boxes including the possibility that the filter and controls can be at a similar elevation if the filter box is under a negative pressure during backwash. If we go with a pressurized system develop a method to easily remove the top from the filter pipe. Unlike the techniques we are developing for connecting pipes inside the filter box and inside the sedimentation tank, this connection must be watertight!

Calculate the filter flow rate for standard PVC pipe sizes. Evaluate the possibility of using 4 12" diameter pipes vs a single 24 inch diameter pipe to achieve 3.2 L/s.

Develop a slotted pipe manifold system. Calculate the size requirements for the manifold trunk lines.

Develop a method for passing the inlet and outlet pipes through the filter pipe wall. Ensure that the system can be fabricated by a human.

Developing 1 to 3 L/s designs is critical because the number of small communities is so large. This is a very high priority. There are communities in Honduras that would be ready to purchase a water treatment plant if we had the technology available.