

Fabrication

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Abstract

As AguaClara develops higher flow rate designs and as our technologies evolve we need to create fabrication techniques that can be easily learned and applied. We need improved fabrication techniques for connecting large diameter PVC pipes. The big challenge is to explore all kinds of options for attaching large diameter pipes together and for attaching end caps to pipes that require a minimum width of the connection (ideally 2 to 3 cm total width) and that provide a solid connection that can easily be disassembled. We previously thought that Fernco fittings would provide this option, but we have been unable to source Fernco fittings in Honduras. Given that we don't need these connections to be water tight there is likely an easier system that we could use.

1 Rapid Mix Pipe and Orifice Plate

The rapid mix pipe will include an orifice plate and an air vent tube (upstream from the orifice) right inside the flocculator tank. The orifice needs to be attached to the end of the pipe. One proposal is to create a plastic disk made of PVC or other suitable material, cut a hole for the orifice that is off center so that the orifice is near the bottom of the pipe, and attach the plate to the end of the pipe using a hose clamp system such as the "Any-Diameter Smooth-Band Worm-Drive Hose Clamp".

2 Inlet Manifold for Sedimentation Tanks

We are proposing the use of longer sedimentation tanks that will require larger diameter manifolds. The manifold will need to be built in sections and joined in the sedimentation tank. The slip fitting into the 45 degree elbow will need to be modified so that the connection is easier. Either create a pipe to pipe connection that is easy to install or develop a method to modify the pipe so that it slide easily into the slip fitting. The manifold will need a support system to hold it in place and it will need couplings that can fit between the diffuser pipes. The diffuser pipes could include standoffs or "feet" to maintain the correct distance above the jet reverser. The inlet manifold design will need to be integrated with changes in the design of the jet reverser.

The pipe to pipe and end cap methods will also be needed for the SRSF.

3 Drain and Jet reverser system for Sedimentation Tanks

The sludge drain in the bottom of the sed tank currently has a removable cover. When Atima was built the sludge drain cover was installed permanently because the inlet manifolds were custom fit to the jet reverser that was formed in the sludge drain covers. Antonio Elvir reports that sludge drains have rarely if ever been removed to clean out the sludge drain channel and thus this feature is not needed. This opens up the option of creating a completely different drain system. The drain pipe could be connected to the jet reverser through a series of 1/2" PVC pipes. The jet reverser radius of curvature will likely be increased to make alignment with the diffuser tubes less critical.

The jet reverser could be formed in concrete or it could be a piece of PVC pipe. The length of the 1/2" pipes will be dependent on structural integrity assuming that the space between the drain pipe and the jet reverser is concrete. Santiago Garcia suggests that 5 cm is the minimum space between the drain pipe and the jet reverser.

4 Pipe Stub Valves

Pipe stub valves are used in many of our unit processes to eliminate the need for commercial valves. These pipe stub valves are difficult to insert and remove for large diameter pipes. Even 6" pipes are difficult to handle. Develop a method to modify either the pipe or the coupling so that these valves are much easier to use and still remain relatively leak tight. The pipe stubs could be modified by using the hot oil molding techniques that were developed by the SRSF Full Scale team during the Spring of 2012.

5 Large diameter valves

The design of high flow rate plants will require large diameter valves that would not be possible for a human to manipulate if they were constructed using the pipe stub method. Flap valves could be an economical option. There are likely other options as well. New fabrication methods will be required to build the valves that are used to isolate a sedimentation tank for maintenance or to dump poorly flocculated water.

6 Final remarks...

It is very important that all construction techniques be reviewed by the team in Honduras to ensure that we are on the right track.