Inlet Manifold Fabrication

August 14, 2011

Abstract

The sedimentation tank inlet manifold is one of the more advanced components of the AguaClara design. The design objectives include uniform distribution of flow between the manifold ports and the creation of a line source of fluid that divides between the two sides of the sedimentation tank and suspends all flocs that are sliding down the slopes toward the center of the tank. The design also accounts for the need to maintain the maximum energy dissipation rate at a value less than or equal to the value used in the flocculator design. The challenge is to fabricate the diffusers that take the water from the manifold ports and transform it into a line source at the bottom of the sedimentation tank.

1 Introduction

The design for the diffusers on the inlet manifold was modified in August of 2011 to improve the ability of AguaClara plants to form floc blankets. This new design is going to be built in Atima, Santa Barbara, Honduras. The conceptual design for the diffuser has been created. We now need a method to fabricate the inlet manifold system. We will build on the technology used to fabricate the diffusers at Marcala (figure 1).

The preliminary design for the Atima, Santa Barbara plant calls for a 6 inch diameter manifold, 4.4 cm diameter ports every 12.1 cm, diffusers that are 3 inches in diameter and approximately 60 cm long. The diffusers pipes will be heated, reshaped, and stretched by 20% into a rectangle that is 3.2 cm wide and 12.1 cm long. The rectangular section should extend as long as possible so that there is a long distance for the fluid to approach uniform flow. A preliminary cross section of the design is shown in figure 2.

A molding technique for the diffuser pipes is needed so that they can be uniformly and easily fabricated. PVC pipe can be stretched and reshaped by uniformly heating it. Heating options include boiling water, electric heat blankets, and heat guns. A heated mold might also be useful. The mold could be as simple as two bars that are 3.2 cm wide that can be forced apart using a jack system. The jack system should use springs to expand the tube with the springs set to not apply excessive force. The rectangular section of the diffuser could be the majority of the length of the diffuser.The PVC pipe that will likely be used

Figure 1: Spring 2011 version of the sedimentation tank inlet manifold and diffusers. These diffusers do not provide the continuous line source that is required to suspend all flocs that slide down the slopes of the sedimentation tank. In addition, the flat sludge drain cover does not provide the geometry for a jet reverser that can easily suspend the settled flocs.

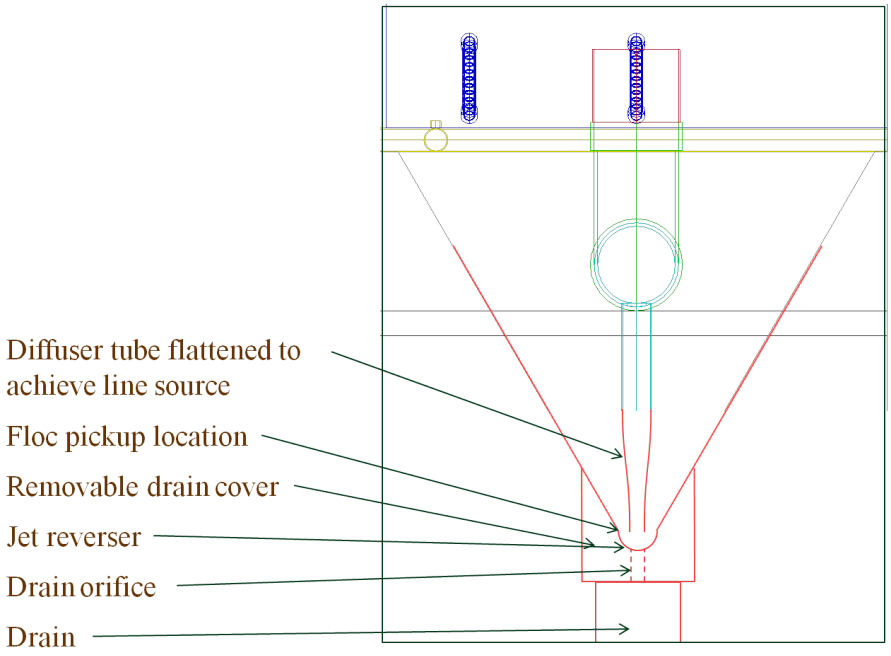

Figure 2: Preliminary sketch of the inlet manifold with diffuser tubes and jet reverser.

for the diffusers is thinner walled than the schedule 40 pipe available here. The thinner walled pipe may be easier to manipulate than schedule 40 pipe. Many options should be explored for building these diffusers with the goal of creating a fabrication technique that is easy to implement in Honduras.

Another approach to this fabrication challenge would be to investigate whether it would be possible to purchase rectangular PVC or have a PVC supplier produce custom parts.

A solution for this will be needed by late October and thus this research and testing must proceed rapidly. Any customized jigs, molds, or heating devices will need to be shipped to Honduras or fabricated there.