

Alternative Backwash without Slotted Pipes

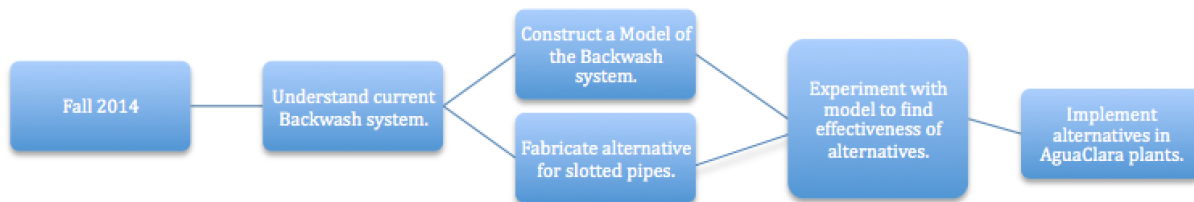
Fall 2014

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October 31, 2014

Task List

Task Map



Task Details

1. Understanding the Current Backwash System - Jorge, Ainhoa, and Alberto

To be completed by: September 24

In order to further this semester's endeavors with the main goal of finding an alternative to the slotted pipes in the backwash system, the sub-team must all have a mutual and strong understanding of how the backwash system actually works, either through a lab demonstration or a meet up with our research advisor or perhaps a meet up with Professor Monroe. Also, by understanding the backwash system the members of the sub-team strive to determine the aftereffects of removing the slotted pipes from the system as a whole, the paths which the sand and water take within the backwash system can be further understood and thus lead to new thoughts on alternative ideas to the slotted pipes.

2. Build a model of a Backwash System without Slotted Pipes -Led by Alberto, with help from Jorge and Ainhoa

To be completed by: October 31*

Once research has been complete regarding a new design for the slotted pipes, the sub-team hopes to build a small-scale model of the filter to visually see how the water flows in the system, especially near the inlet pipe. All research regarding materials to be used for the model, along with model specifications, will be collected and organized by Alberto and each of the sub-team members, with the help of the Shop in the basement of Hollister Hall, will construct a small-scale model. In order to have the specifications, Jorge will work with dimensional analysis in reference to the large-scale backwash system to ensure that the small-scale model will be indicative of the behavior of the actual system. Based on the findings of the small-scale

model, the sub-team will be able to determine how to scale it up if the findings provide feedback that supports the new design as an alternative to the current design. The sub-team will need to evaluate failure modes and determine whether a solution exists that eliminates the need for slots.

2.1 Determine how to close the outlets during backwash.

To be completed by: October 23*

After gaining knowledge and determining the shape of the first alternative pipe, the sub-team noted that the inverted “U” design will have a large opening along one of its sides. To better visualize this shape, think of cutting off the bottom half of a circular pipe. The sub-team needs to develop a system to close the outlets during backwash, so that the sand does not leave the filter.

2.2 Determine how to design pipes and holes in the filter box so that they can be changed.

To be completed by: October 23*

Constructing the model so that the pipes for inlet and outlet can be changed is a difficult challenge. To experiment as much as possible the sub-team needs to be able to remove the pipes to use different shapes and in order to improve the model.

2.3 Format prospective expenses for model construction

To be completed by: October 28

As the materials are finalized an estimate for the expenses related to the project should be created. The materials will be ordered from the McMaster-Carr website and once the expenses have all been listed in a professional format, a sub team member will send a copy of the list to Monroe and William.

2.4 Determining the effects of changing the shape of the pipe - Alberto

To be completed by: October 25*

Perhaps the problem may be that the current shape of the pipe is more prone to clogs than others. For example, instead of using the full, cylindrical shape with slots for the pipes, the sub-team could try to incorporate a pipe that has the same cylindrical shape but with no slots and that has a relative “U” shape instead of the usual “O” shape. The sub-team hopes to find a way to keep the sand from flowing with the water into the pipes, thus clogging the pipes. Though the “U” shaped pipe was a suggestion made by Professor Monroe, the sub-team hopes to look at different shapes for pipes that may also prevent sand from leaving the filter. The sub-team will test these different shapes by building models of the pipes and implementing them into the model to be built in the future.

2.5 Experimentation based on Fluids Mechanics and Geotechnics- Ainhoa

To be completed by: November 1*

Since the construction of the scale up model is going to take more or less 2 months, a spreadsheet with different values of velocities, diameters and sand densities will be written so that as rapidly as the model is finished, the sub-team can begin to experiment with it.

2.6 Construction of Model -Alberto, Ainhoa, Jorge

To be completed by: October 31*

With the help of Paul in the shop of Hollister Hall, the sub-team hopes to construct the model fully in order to begin experimentation.

3. Scale up model and implement design-Alberto, Ainhoa, Jorge

To be completed by: November 26*

Once a successful alternative for the slotted pipes has been found, the sub-team hopes to scale up the small-scale model and create a design to be implemented in the water treatment plants in Honduras and India. The sub-team will determine which materials need to be changed, along with how to have these designs constructed easily with current resources in each country.

* Dates are tentative and are subject change.

Team Roles

Jorge Guevara: Team Coordinator

- Keep track of the progress the sub team has made with their tasks.
- Arrange meetings to be held outside of designated time weekly.
- Maintain communication with team members and our research advisor.
- Edit any reports that will be submitted.

Ainhoa Arribas Llona: Head of Research

- Ensure the validity of resources used for research.
- Organize research found by other team members and create a Word Document containing the research, the name of the team member who found it, the date when the team member found, and a detailed summary of findings that can be used from the found research.

Alberto Arnedo: Head of Design

- Lead the construction of any models required for the sub team by finalizing the materials needed for the model, the sketch of the model, and a tentative construction schedule.

In addition to the responsibilities assigned with each role, each member of the ABSP sub-team must follow the subsequent set of responsibilities:

- Maintain communication through the use of email and the phone app "WhatsApp"
- Submit research summaries and information to the Head of Research

- Update each other with findings that will have an impact on the project