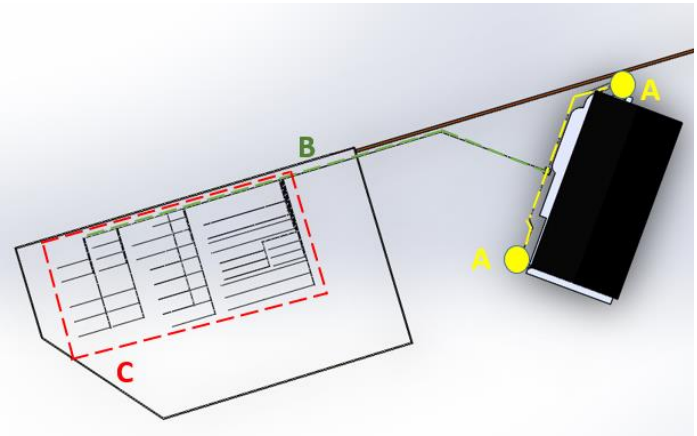
Design of a water supply for Calvin Gardens

Tim Bosch and Dr. Sykes

This summer I have had the honor and privilege of working with Dr. Aubrey Sykes an engineering professor at Calvin. Professor Sykes and I have been working on a project for the Calvin Campus Garden for which we are trying to make the garden operation more sustainable. The Calvin Campus Garden is located to the West of the field house by the baseball fields. Some constraints set forth by the people in charge of the garden were that we would have 4000 gal of water stored, collect rainwater from the house by the garden, buried tank, no pumps, 100 gal needed daily, poly pipe for main piping, drip irrigation, no electricity, gravity fed, could start collecting by April each year.

Early on, as I started working on this project through the summer, I started to realize that the project was over constrained. An example of how the project was over constrained was with the water storage tanks. All of the tanks I could find that were underground had to have a pump. The only reason the customer wanted the tank buried in the first place though was so that people did not have to see these big 2000 gal tanks. For this reason, I was able to convince the customer that for all of the rest of the constraints to be achieved, the tanks had to be above ground. Besides this constraint not being achieved all the others are attainable.



My solution is illustrated on the left. Rain lands on the roof (dark rectangle) and flows into 2000 gallon rain barrels (A). Water then flows down a 2 in main piping (B). From the main pipe, 12 secondary pipes with drip lines distribute the water (C). All of these secondary lines have ball valves that can be turned on or off so that you can water one section of the garden at a time. This system was designed with conservation of pressure and volumetric flow rate in mind because this system is a low pressure irrigation setup.

Now that I am approaching the end of the summer engineering research internship I am finishing up my calculations. I found that the roof that we collect from generates about 18000 gal from April through September. Also I had to do a lot of calculations to find that all of the drip tubing had enough pressure to work as long as I had at least 600 gallons in each tank. This summer, I have expanded in my engineering experience and my passion for engineering and all the possibilities engineering holds.