Deliverable G

# Prototype #2:



# Prototype #2 - Materials and Critical Components

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| **Materials** | **Quantity** | **Total Cost (with tax)** |
| 2x4x104 Top Choice (2x4 Wood) | 5 | $22.49 |
| 300 GPH Fountain Pump | 1 | $27.96 |
| Sterilite Plastic Bin | 1 | $0 |
| ¾ Inch EP Pex Tee | 3 | $6.75 |
| 1 x ¾ x 10 Clear Pre-Cut Pex Tubing | 1 | $24.85 |
| SHEP 2” Swiv (Wheels) | 4 | $18.85 |
| 3” DWV Cellcore 6 foot | 4 | $0 |
| Screws | 2 | $0 |

**Total Cost = 100.62**

# Prototype #2

In building this prototype, we eliminated some of the issues that we were finding through our test plans with our first prototype. We decided in this prototype to build it to a 1:1 scale, and with this we allowed the reservoir tank to rest on the bottom of the frame rather than having the frame rest on the top of the reservoir as we did in our first prototype. In doing this, we were able to install locking wheels on the bottom of the frame to allow the entire system to be portable. We also installed our PVC pipes in the middle of the frame, so there is no bulging of any materials and the frame is the outermost object of the system. We made the middle larger, extending it to approximately 1.5 feet to allow easy mounting of the pipes, and extra room for when the plants grow to bigger sizes. We are currently conducting tests in regards to the water line mounting and we are trying to decide the best route for the waterline to take.

We conducted some tests on our first prototype such as testing the frame, size of reservoir, and weight of the system. Our test results brought us to the conclusion that the material of the frame on the first prototype was not strong enough to support the weight of the plant pipes; therefore, we switched to 2x4’s in our second prototype which is definitely strong enough considering that’s what they build houses with. We also tested the reliability of the reservoir and we were also brought to the conclusion that if we filled it up with water, it would be much too heavy to make portable. That is why in our second prototype we allowed the reservoir to sit on top of the bottom of the frame, and with wheels at the bottom, it is effortless in protability.

# Critical Components

* Wheels
  + The wheels on our system is one of the critical components because it is what allows the system to be transported from point A to point B without the need to do any heavy lifting or maneuvering. Also, the wheels we installed on this prototype and will be installed on our end design, are equipped with locks so the system will not move when you want it to be stationary.
* Wood Frame
  + The wood framing of our prototype is another critical component because it is what holds everything together and allows the water reservoir to be placed directly on top of the bottom of the frame. The frame of the system will also be used to run the waterlines up to the top of the system, so there is absolutely no third-party mounting.
* PVC Pipes
  + The PVC pipes is probably the second most important component after the wood frame, which is because the pipes hold all of the plants. The pipes will have holes cut out at the top to house the plants, and the soil will be placed inside. The plastic of the pipe is also completely safe for the growing of plants. The pipes are configured at angles so that gravity can carry the water down all the pipes. The ends of the pipes will all be connected with U-connectors.

# Prototype #2 – Test Plans:

* Water pump and water line efficiency
  + We want to test the water pump and water lines on this prototype because we haven’t had the experience with either yet. Currently, we have a 300 Gallon Per Hour pump which can pump up to a height of 6 ft. This prototype sits 5’2” high, which would seem to be perfect height for the pump. We also would like to test the placement of our waterlines; where would be the mounting points, will we go directly up or have a few turns in the line, where we will place our couplings, etc.

The stopping criteria for these tests would be an efficient flow of water to all the plants, with no leaks and no damage to the pump and/or the water lines.

* Frame
  + There are two components of the frame we wanted to test with this prototype. Because we built an entirely new frame than the first prototype, we want to test the structural integrity and strength of the new frame we built out of 2x4’s. It has to be strong enough to support the weight of a reservoir full of water at the bottom, and all of the PVC pipes with the plants and soil. The second component of the frame we want to test is its exposure to water and condensation. Now that we have our pump and water lines, we want to see how the wood reacts to moisture of water over a short period of time.

The stopping criteria for these tests would be when the frame can easily support all of the weight and force of the pipes and reservoir, and when we can figure out how much water exposed to the wood will jeopardize its structural integrity.