# Deliverable F - Prototype I and Customer Feedback
## Group D1 - Construction
## GNG1103

**March 1, 2020**

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In order to generate a proper understanding of our design and its functionality, our initial prototype will be used in order to learn about basic structural properties and possible risks that may be associated with these characteristics. This prototype will be made of basic materials that can be found around the house so that we can analyze the general structure and identify any adjustments that must be made to avoid possible risks.

**1. Test Objectives Description:**

1.1 **What are the specific test objectives?:**

Overall, the specific objectives of the testing is to ensure that all the needs of the client are met through the use of a physical model that represents legitimate concepts that have been integrated into our design. With this in mind we were able to meet with the client and provide her with the basic prototype and receive feedback on what she would like added. Additionally, the prototype will allow our group to develop a better understanding of how we should think about constructing our actual greenhouse. For example, it will give us insight into the order of which we attach certain parts, and which construction strategies work better than others.

1.2 **What is being learned or communicated with this prototype?:**

Our prototype attempts to communicate the unique structural characteristics of our greenhouse and how we intend to incorporate the needs of our client. While constructing this prototype we hope to learn about certain construction strategies that may help to properly develop our actual greenhouse. We also hope to develop our communication abilities by sharing our ideas of what our ideal greenhouse would look like while incorporating all the needs.

1.3 **What are the possible types of results?:**

Possible results from the prototyping may include a change of general structure to maximize efficiency. Similarly, it may lead to minor adjustments to compensate for possible forgotten components. The results in general should lead to overall satisfaction from each group member and the client.

1.4 **How will the results be used to make decisions or select concepts?:**

The results of our testing and prototyping will heavily influence the order in which we construct the greenhouse because we will have insight into the developmental strategies. It may also lead to changes in the design to compensate for any flaws observed through testing. The testing will heavily influence the importance if certain components as we identify the reliance of specific components.

1.5 **Criteria for success/failure:**

In order for the testing to be considered a failure, our design must miss all desired need-related components and it must also have very little potential for adjustment. However success will be achieved through determining possible flaws in the systems and determining immediate ways to fix the problems.

**2. What and How is it being done?:**

2.1 **Describe the prototype type:**

This is a comprehensive prototype because it will analyze the general properties of the structure and it will include comparisons to other greenhouse structures. We chose to do a comprehensive prototype because we have very little experience with the building process, so the comprehensive approach will allow us to develop the overall structure properly rather than focusing on certain components with little knowledge of specific structural analysis strategies.

2.2 **Describe the prototype building and testing process:**

The construction of the prototype begins with a simple transfer of measurements from our design to a smaller scale. In our case, every inch was represented by a millimeter. After that, we followed our design by creating a 6x6 base using q-tips or toothpicks and tape. We then constructed our walls that were about 6 feet tall as well. The walls and base were then attached and we began creating the roofing. The roof will be slanted so we began by creating the supports that creating triangles that were 2 feet tall, 6 feet long and had a hypotenuse of 76 inches. Four of these were created and attached atop the walls. Next we wrapped the entire prototype in seran wrap to represent the plastic that will be surrounding our design. Finally, in order to test it, we poured water along the top of the greenhouse and analyzed where the water went and if any got into the house. Also, how much water made it to the end of the desired path. We also checked to see if there were any large shadows created within the structure that would not allow for plants to grow.

2.3 **What information is measured?:**

We measured the amount of water initially poured on the house and the amount that made it to the desired location at the back of the structure. This was a way of analyzing the efficiency. Additionally, we measured the area of which shadows were created within the greenhouse from different perspectives so that we could maximize the amount of sunlight by removing unnecessary parts of the structure. We also checked to see if there was any water dripping into the structure.

2.4 **How was the information being recorded?:**

The information was recorded regarding the amount of water that reached the desired location was recorded quantitatively as we measured the amount of water before pouring and how much reached the end after pouring. Similarly, the area of the shadow was recorded quantitatively as we recorded the shadow area of different designs and determined the smallest area possible. However, the information regarding whether water was entering the system was recorded qualitatively.

2.5 **What materials are required and what is the approximate cost?:**

Table 1: Materials and Approximate Cost

| **Material** | **Cost** |
|---|---|
| 2x4x8 Wooden Planks (x6) | $3 each |
| 2x3x8 Wooden Planks (x24) | $2.50 each |
| 7/16 x4x8 OSB (x2) | $11.30 each |
| Nails | $4.95 |
| 10ft Plastic Gutters (x3) | $7.63 each |
| 2x12 ft Plastic Roofing (x1) | $70 |
| 4x8 ft Polycarbonate Walls (x5) | $80 |
| Overall Approximate Cost: $598.44 | |

The overall cost here includes the cost of materials that may already be offered to us.

2.6 **What work needs to be done?:**

From this point on after creating the prototype, we must incorporate the same concepts into our actual greenhouse. In order to do this we will continue to look at the prototype for insight as to what must be included or removed.

**3. When is it happening?:**

3.1 **How long will the test take and what are the dependencies (i.e. what needs to happen before the testing can occur)?:**

A complete test of the product would take approximately a full year so that the greenhouse can be exposed to the elements 24/7 and experience all four seasons, which can

range from very hot to very cold with lots of snow in the region the greenhouse will be delivered to. For this test to happen, the product needs to be completed, delivered and assembled at the final destination. Regular check-ups can be performed and information on the integrity of the structure can be recorded.

### 3.2 **When are the results required?:**

The results are due at least a week before design day so that we have time to make any minor adjustments to the structure. In general, the testing should be completed as early as possible to compensate for additional problems within the system.

**Appendix:**

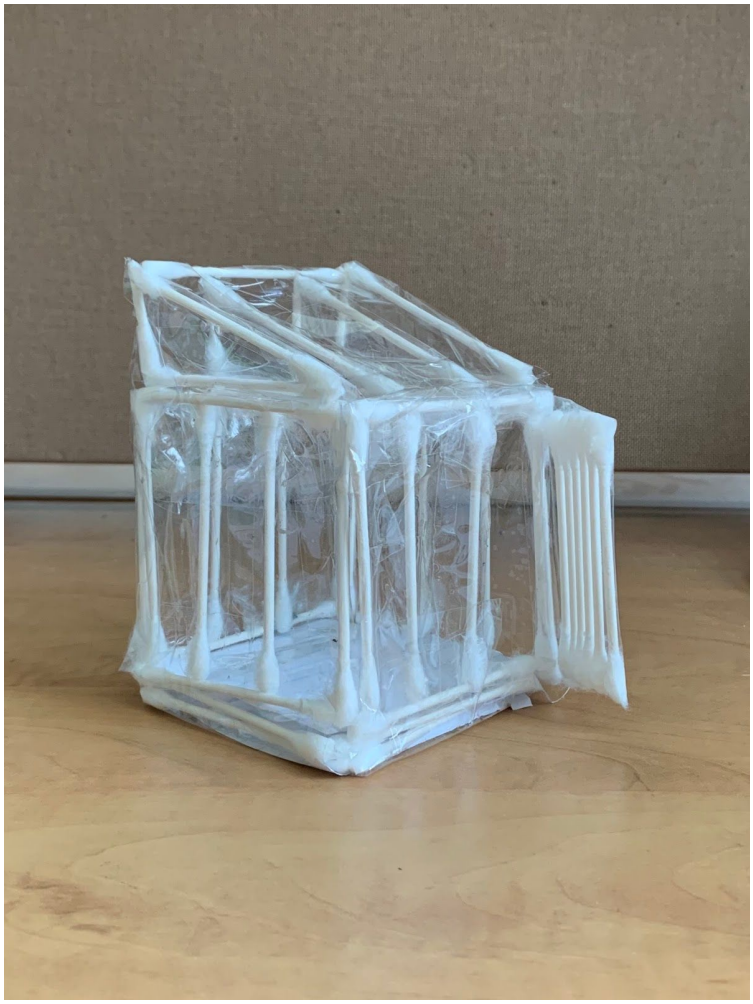

*Figure 1: Prototype I*

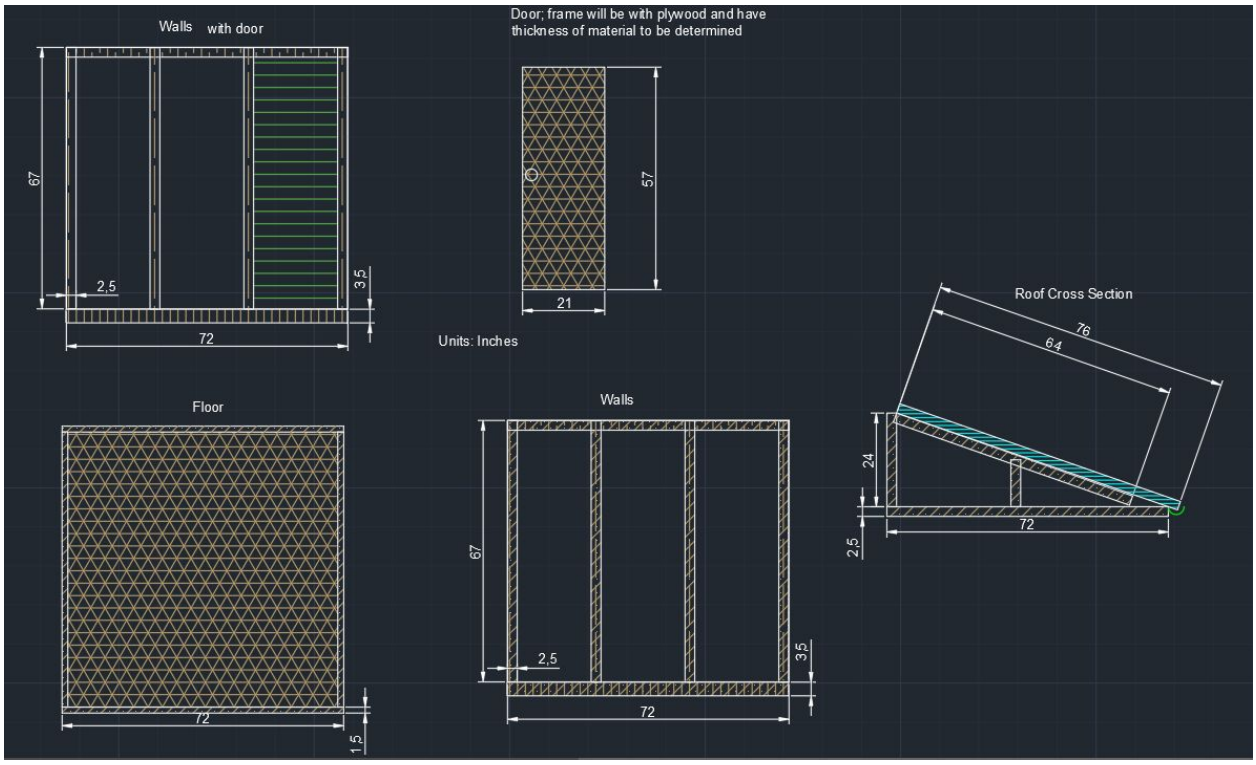


*Figure 2: Initially planned dimensions*