Project Deliverable B: Need Identification and Problem Statement

January 30, 2020
Group: D1 - Construction 1

Project Background:

Our project entails the design of a greenhouse for the Algonquins of Barriere Lake, that includes a hydroponic system that will be completed by another team. During the first client meeting, we met with a representative from the community (Monique) and received feedback concerning the current situation of the reserve. The community is located on a sandy peninsula by a lake in the wilderness of Quebec; about a 3 hour drive from Ottawa. The reserve is isolated and lacks running and clean water, as well as a standardized electricity system for its inhabitants. The purpose of this project is to provide the residents of Barriere Lake with greenhouses to grow a variety of vegetables for their households. Our client has further specified that this project will act simultaneously as an activity for the local children; therefore, the final product must be easy to operate and assemble with minimal tools and simple instructions. The community needs a means of growing produce, as they are isolated from any supermarkets and live off the land. Thus, it is important that this greenhouse has a long lifespan and is highly efficient.

List of Needs:

For simplicity, here is a summary of the key requirements of our greenhouse structure:

Requirement	Priority
Easily Transportable	Very High
Energy self sustainability (structural component to support solar panels)	Very High
Accessible and plentiful water supply	Very High
Child Safe (a local school will be working with them)	High
Assembles easily	High
Relatively large to support family of 5	High
Animal proof	Moderately High
Wind resisting structural features	Moderate
Budget under $500 (flexible budget)	Low
Insulation for use in temperatures as low as -35℃	Low
Security features such as locks	Very Low

Unknown Information:

Thus far, we have not had much opportunity to consult the hydroponics design team; here are some needs which we have yet to determine the details of:

1. Dimensions of the structure → Depends on dimensions of hydroponic system.
2. Rainwater collection system structure → Depends on needs determined by hydroponic team.
3. Reasonable type of security against animals or burglars → Pending feedback from residents of community.

Comparison to Existing Products:

Many existing products use a simple structure shape that appears to be a triangular based prism on a rectangular prism. However in our case, it is essential to maximize the amount of rainwater collected. Accordingly, our roof will most likely be constructed as a hexagonal pyramid to ensure that water is collected from all angles. Below are examples of greenhouse structure which will influence our ideas. The first displays a solid structure with easy accessibility, however it does not maximize sunlight and water collection. Next, the second image portrays a structure that maximizes sunlight and water collection, unfortunately it is fairly complex and does not promote accessibility and large amounts of produce at that size. Finally, the third image displays nearly ideal aesthetics but does not maximize efficiency. As a result, a mixture of all three greenhouses can be produced in order to meet the client's needs.


Problem Statement:

A need exists for the Algonquins of Barriere Lake to efficiently grow their vegetables on land that has limited resources with a self-sufficient greenhouse that is easily transported, conveniently assembled, safe, secure, and rather large.