B4 Greenhouse 2 (Greenhouse 4)

Design Criteria and Target Specifications

Benchmarking:
After discussing the problem and making a problem statement, pre-existing solutions were looked at and compared to help decide the importance of each variable and our ability to provide a similar solution.

Specifications	GrowIT 6x8 ft D Greenhouse	Palram Mythos 6 x 4 Greenhouse Twin Wall Green	Outsunny Portable 4-Tier Warm Pop up Plants And Flower Greenhouse with Shelves	Importance
Shape	Triangle Roof	Triangle Roof	Triangle Roof	2
Cost	$242.99	$599.99	$99.99	4
Size	6’H by 6' 11/16" W by 8' D	6 ft by 4.1ft by 6.8ft	6.5 ft H x 4.6 ft L x 2.5 ft W	2
Weather resistance	yes	“Virtually unbreakable”	May be negatively affected by snow	5
Pest resistance	bad	good	bad	4
Size disassembled	Poratable	Disassemble into panels	Very Portable	1
Materials	Frame Material: Steel Panel Material: Polyethylene film	Polycarbonate panels Aluminium frame	Steel Plastic	3

Insulation	Little to none	Twin polycarbonate panels high thermal insulation	PE cloth	3
Score	49	60	38	

Green = 3, yellow =2, red = 1

Design specification:
Once we had compared and valued pre-existing products, we came up with a set of design specifications that are realistically possible for our solution.

	Design Specifications	Relation	Value	Units	Verification Method
	Functional Requirements				
1	Keep out small mammals	=	yes	N/A	Test
2	Air ventilation	=	yes	N/A	Test
3	Allows Sunlight to enter	=	yes	N/A	Test
4	Strong Structure	>	697	lbs	Analysis, Test
5	Allows the house to stand on the sandy ground	=	yes	N/A	Analysis
6	Prevents water to leak from outside	=	yes	N/A	Test
	Constraints				
1	Cost	</=	250	$	Estimate, final test

2	Size when built	</+	6*8*6 rectangle 6*8*3 triangle roof	Ft^3	Analysis
3	Size disassembled	<	Trailer is 6x12	Ft	Analysis
4	Operating conditions: Temperature	=	-40 to +35	℃	Test
5	Operating conditions: Snow	>	50	cm	Analysis
6	Height of Greenhouse	<=	6	ft	Build it under 6ft
	Non Functional Requirements				
1	Product Life	>=	5	years	Analysis
2	Safety: No sharp edges	=	yes	N/A	Test
3	aesthetics	=	somewhat	N/A	Test

Target range of design specifications:
When we completed our design criteria, we set our our mandatory design specifications

Shape: Triangle roof

Size: Length= 6-8ft, Width= 4-6ft, Height=6ft

Cost $\leq$ $250

Weather Resistance: roof must withstand up to 700 lbs of force, from snow resting on top

Size disassembled: able to be broken down into panels that can fit in the back of a 12ftx6ft trailer

Design Criteria:
We made a list of all of our criteria set out before and provided our ways to potentially solve each problem.

	Need	Design Criteria
1	Last through the winter (-30 to -40 Celsius)	Strong structure made of wood insulated with transparent wrap Sloped roof to have snow fall off
2	Wild animals like chipmunks, squirrels and bugs	Elevated off the ground Floor built
3	Air ventilation	Rotating window Fans to push air Vent that can close
4	Growing plants	Enough sunlight for crops, good temperature，use of nurtrient solution
5	Ground is quite sandy	Rectangular base Floor or off ground
6	Rainfall can be varied during the year.	Waterproof polyethylene
7	Transporting the greenhouse	Built in panels that can be easily disassembled for transportation
8	Low cost	Wood for frame, polyethylene for walls, bubble wrap for insulation

Reflection on how client meeting impacted the development of design criteria and specs.

During the first client meeting the Client told us important information regarding weather, the location where the greenhouses will go, animals/pests in the area, what will be grown, and the budget. The Client emphasized that the greenhouse needed to last through the winter, which would get to -40 degrees celsius and have quite a lot of snowfall. This was very important when deciding materials as they would need to be able to insulate and withstand force of snow resting on top. The Client also said there are lots of bugs and small animals, so when designing the greenhouse it was made sure that a floor is a part of the design and that all precautions will be taken to avoid pests entering the greenhouse. The Client stated a variety of plants were being grown so ensuring that there is maximum exposure to sunlight by using transparent materials such as polyethylene and bubble wrap. It was mandatory that the greenhouse be inside of our budget, so when looking at ideas the cost criteria carried a lot of weight