

# Community Grow Wall Design Criteria

## Construction Group 8

### Introduction

Our client has asked us to provide a solution regarding year-round gardening at her farm, multiple indigenous community centers, and her personal house. We have chosen to create a modular hydroponic growing system to solve our client's issues. As one of the locations is inside the community center, we have decided to construct a modular hydroponic grow wall to accommodate a garden year-round. What follows are the basic needs, constraints, requirements and real-world comparisons relating to our project, as well as our specific design criteria.

### Needs Criteria

After hearing our client's needs and preferences concerning the grow wall, we have put together our data and ranked them by importance level, as seen below.

Table 1: Needs to Importance

#	Needs	Importance (1 - 5)
1	Sustain plants year-round	5
2	Safety (Secure/Unscalable)	5
3	Low Manufacturing Cost	3
4	Low Power Consumption	4
5	Modular/Expandable	4
6	Self-Sustaining (hydroponic)	3
7	User-friendly (accessible)	3
8	Aesthetic	1
9	Sizeable for various produce	3
10	Size	3



## Benchmarking

In order to design the best possible grow wall for the community center, we researched multiple grow wall products. They all have different price points and features and we ranked which aspects fit our criteria the most.

Table 2: Comparing hydroponic grow walls

Specifications	Homie Hydroponic	Wally 32 – Fixed Wall Hydroponic Gardening System	Hydroponics Tower
Company	Planta Greenhouses	Planta Greenhouses	JODAIS
Cost (CAD)	550	795	4299
Size (cm, WxHxD)	105x100x60	155x170x10	170x77x40
Modular	Tool-less, quick assembly Easy relocation	Easily transportable	Wheeled Disassemblable
Self Sustaining	Hydroponic No Additional lights Constant supply of nutrients and water	Hydroponic UV lights Wide root channels Keeps min water levels Automatic water filling	Hydroponic & aeroponic Independent ecosystem Intelligent light system Simulated sunlight Nutrient liquid bank
Sizable for various produce	Grows herbs and leafy vegetables Not totally inclusive 4 rows, 28 Plants	Suitable for small to large plants (ie. eggplants, cabbages) 4 rows, 32 plants	5 rows, 72 plants, 85 seedling positions
User Friendly	Automatic water filling	Easy Assembly Removable trench Cover	Intelligence control system, user is prompted when watering is needed, easy to operate control system
Safety	Stair-like design	Narrow Wall-Mounted	Ladder like design, Small base

Table 3: Benchmark ranking

Specifications	Importance	Homie Hydroponic	Wally 32 – Fixed Wall Hydroponic Gardening System	Hydroponics Tower
Company		Planta Greenhouses	Planta Greenhouses	JODIAS
Cost (CAD)	3	3	2	1
Size (cm, WxHxD)	3	1	3	2
Modular	4	3	3	1
Self Sustaining	3	1	2	3
Sizable for various produce	3	2	2	3
User Friendly	3	2	3	3
Safety	5	1	3	1
Total		44	63	45

**Verdict**

After comparing the three products we concluded that the Wally 32 product by Planta was the best option with the highest ranking score of 63. Taking the product’s pros and cons into account, we now have to design a growing wall that fits our client’s needs even more.

**Community Grow Wall Design Criteria**

These next few tables will show the thought process of our design thinking. We deduced the most important features of the growing wall and ranked them based on importance. Our criteria are an amalgamation of the user’s needs and what our project group thinks is vital to the design. Using our design criteria table, target specifications, and data from benchmarking we created three new tables. These target specifications include information on functional, non-functional, and design constraints.

Table 4: Needs into Design Criteria



#	Needs	Design Criteria
1	Sustain plants year-round	Hydroponic system UV lights
2	Safety (Secure/Unscalable)	Safety barrier
3	Low Manufacturing Cost	High priority on essential cost
4	Low Power Consumption	Self-sustainable
5	Modular/Expandable	Modular/Expandable
6	Self-Sustaining (hydroponic)	Little to no maintenance required
7	User-friendly (accessible)	Accessible to people of all ages
8	Aesthetic	Pleasing to the eye Attracts attention
9	Sizeable for various produce	Large Shelves with reasonable spaces between each section

Table 5: Functional

Design Specifications	Relations	Value	Units	Verification Method
Accommodate 20 leafy plants	>	Grocery Produce	Plant units	Test
Modular	>	Convenience	N/A	Test
Functioning Hydroponic system	=	Provides a controlled watering system	N/A	Test
Lighting system	=	Gives lighting in prime hours when needed	N/A	Test

Table 6: Non-Functional

Non-Functional	Relation	Value	Units	Verification Method
Interesting to kids	N/A	Creates gardening interest in kids	N/A	Test
Safety	=	Protects children	N/A	Test
Reliability	=	Structure stays strong	N/A	Test
Product life	>	5	Years	Test

Table 7: Constraints

Constraints	Relation	Value	Units	Verification Method
Dimensions	>	155x170x10	cm	Test
Cost	<	500	CAD	Test
Plant Space	>	32	# of Plants	Test
Lighting(DC)	>	Yes	N/A	Test
Electric Pump	>	Yes	N/A	Test
Operation Duration	=	Yes	Hour/ Days	Test

## Conclusion

With the recognition of the importance of the desired needs for the hydroponic grow wall, we were able to find and create our specific design criteria, furthermore the benchmark ranking allowed us to see some different product specifications that are needed in order to create the best design possible for the community center. We want to create a reliable and smooth functioning garden wall that is safe for children and sparks their interest in gardens. With these conditions, we are able to move to the next step with the design of the hydroponic grow wall.