Project Deliverable F: **Prototype I and Customer Feedback**

Group 10

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Abstract

As in past deliverables, our group is continuing to work towards the client's desires: a building that will highlight the First Nations culture and provide a working and community space to grow as a program. Group 10 members are all responsible for contributing to their select parts of the report and completing the work with the client's needs in mind, in order to continue on the path of project development with empathy to the client and their requests. This report will present a summary of all the components contributed to this deliverable, notably the work leading towards the first prototype of the Guardian building.

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1. Introduction

In this deliverable, our group outlines the feedback given from the client on our prototype/design. This deliverable focuses on developing our prototype further and improving what has currently been done so far. Furthermore, this document also will provide an analysis of the systems we plan to include. Feedback from potential clients will be included and comments regarding our design as well. Tests on BOM will be updated as well as our target specifications.

2. Feedback

Based on the feedback from the second client meeting, many changes were made to the original design. The activity area was divided into two separate sections, one in the center of the building for outdoor meetings, and one on the side of the building for community events. The lean-to was also moved to be connected to the lab so materials can be more easily transported inside. Another difference is the addition of two storage rooms for samples and materials dispersed around the building.

Throughout the process of creating the first prototype, rooms were rearranged and tested in different orientations and as different sizes. The first prototype was made of lego, scaled down to be proportional to the actual building dimensions. Therefore, we were able to see how each room related to each other and we could test different orientations of the rooms.

The original layout was changed after getting feedback from peers and family members. It was recommended that the offices be moved closer to the entrance for easier access. There was also positive feedback regarding the board room and lab placement. With these changes, we could recalculate the building cost, as the new layout resulted in a smaller square footage, meaning an overall lower cost.

Although feedback from the third client meeting has not yet been received there was still feedback from peers and reflection from our own group members on changes that can be made. Specifically, we need to decide the form of the roof and whether other specifications should be added,

such as solar panels. As well, we need to finalize the type of door to separate the lab and the lean-to and decide the type of enclosure for the activity area (fence, gate, door, etc).

3. Prototype I

A physical, 3D prototype of the design was created using lego to represent a scaled-down version of the building layout. This method was used so that the orientation of the rooms to one another could be visually represented, and rearranged. As well, by building a scaled version of the building we could ensure all rooms were properly dimensioned and proportional to one another. In addition, it helped us to see the hallways and whether or not they were easy to navigate. Based on this prototype, changes were made to better the orientation of rooms, reduce square footage and improve functionality.

4. Component analysis

Selected preliminary concepts:

Functional requirements

- Building entrance is accessible for people who have trouble walking or are in wheelchairs
- Elements of nature: exposed wood, stone, green spaces

Non-functional requirements

- Aesthetics - no concrete/steel look
- Building durability
- Logical building design
- Community-friendly

Constraints

- Building Budget

Component or subsystems selected:

- Outdoor open area located in the centre of the building (Community friendly)
- Lab attached to lean-to (Logical building design)
- Plants/decorations (Elements of nature)
- Double wide doors (Accessibility)
- Single story building (Budget, Logical building design)

Not selected:

- Industrial like building (Aesthetic)
- Multi story building (Budget)

5. Prototyping Test Plan Prototype 1

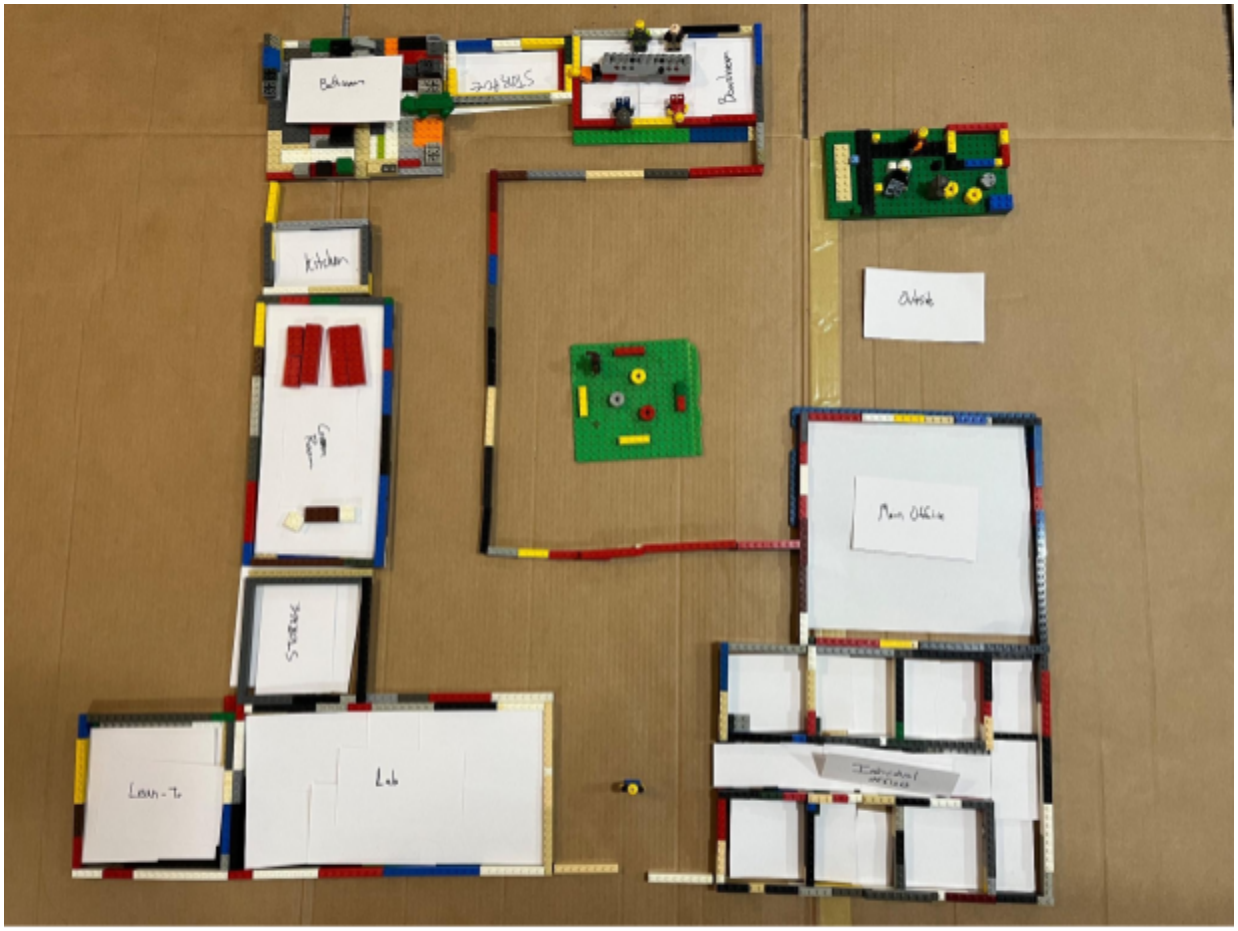


Figure 1: Prototype I, Lego Floor Plan

Test ID	Results
1. Sanity & Safety Check	No current safety hazards have been brought to our attention
2 Peer Feedback	During peer feedback testing: ● We received feedback to move the offices closer to the front so that they are accessible once you walk in We also received confirmation on successful parts

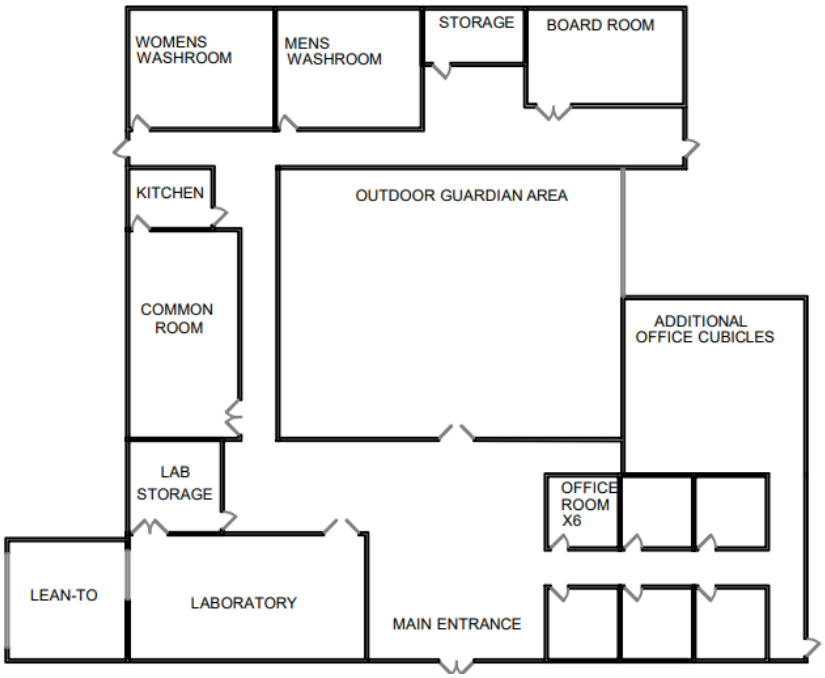
	of the design to keep them how they are: ● The boardroom should remain horizontal ● The kitchen should stay attached to the common room ● Storage rooms are 1) beside the lab, and 2) between the bathrooms and boardroom (which is near the courtyard)
3 Client feedback	From feedback from client meeting 2, we added, ● Outdoor meeting space in the center courtyard, which is attached to the activity area on the exterior of the building. There will be a large barn door to separate the two, for additional security ● Lean-to attached to the lab for easy transportation of goods into the building. There is a large garage door between the two. ● More storage space We did not receive any feedback from client meeting 3
4 Cost Estimate	Updated cost estimate is based on prototype 1 ● By moving the offices closer to the door we cut out the large extra floor space

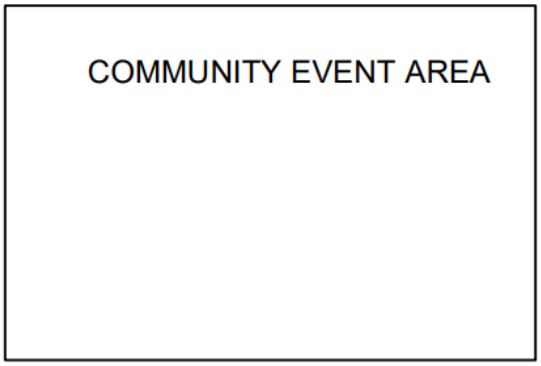
	which cuts down the total square footage, reducing the total building cost ● Additionally, we cut down some of the excessive hallway space The new cost estimate can be found here.

Throughout assembling our first prototype, we were able to see how each room fit together and make necessary adjustments, as needed. Taking into account the peer and client feedback, we were able to significantly cut down on square footage, which will in turn reduce our overall cost (see the link to the new cost estimate above).

The next step is to update our detailed design, which is featured in the section below.

6. Update target specifications, detailed design and BOM





Based on the testing phase of our building design, the detailed design has been redone with the feedback received and with the goal of reducing the total cost in mind. The main changes are that the offices were moved from the back right corner to the front right corner to improve practicality as well as reduce total square footage that will reduce the total cost significantly, and the outdoor guardian area (courtyard) in the middle is also accessible from the outside, via barn-like door.

The impact of the changes can be seen in the updated BOM where the cost has been reduced from $3,216,332 to $1,967,384 which brings the entire cost of the building under our budget of $2.5 million.

7. Prototyping Test Plan Prototype II

Test ID	Test Objective	Description of Prototype used and of Basic Test Method (What)	Description of Results to be Recorded and how these results will be used (How)	Estimated Test duration and planned start date (When)
1. Sanity & Safety Check	Safety / Sanity	Perform a sanity check on our 3D CAD design for any obvious hazards or deficiencies in the floor plan, through the lens of accessibility, culture and natural light etc.	We will record qualitative results to be used in adjusting the flow and design of our prototype.	This testing can be performed on the final prototypes and will not take more than a few hours.
2 Peer Feedback	Obtain feedback from peers	Present our 3D design to other engineering students or other people and receive their feedback and perspective on our design	Record their feedback and deliberate whether it makes sense to implement into our prototype	This test can be performed throughout the rest of our prototypes and is ongoing
3 Client feedback	Implement client feedback to the prototypes	Present our design to the client whenever possible	Record and implement the clients feedback into the prototype's design.	This test can be performed throughout the rest of the projects duration as revisions are made to the prototypes
4 Cost Estimate	Obtain the estimated cost	Maintain an up to date and most accurate cost estimate. This includes optimizing the design in order to keep the cost within a reasonable margin.	Keep an up to date cost estimate for the project	This test can be performed on the final iteration of each prototype.

8. Conclusion and Suggested Changes

Prototype II should be made as a 3D CAD model so that we can continue to further view and visualize the building and all its components. In prototype I, we were able to figure out many changes that needed to be made in order to improve our design and continue on the path of successful project development. We will need to scale the next physical prototype down much more, as prototype I was quite large, however changes from prototype to prototype demonstrate growth and improvement in our design and the progress we have made over the course of this project. We will continue to see great progress in our design over the next 2 prototypes and final designs.