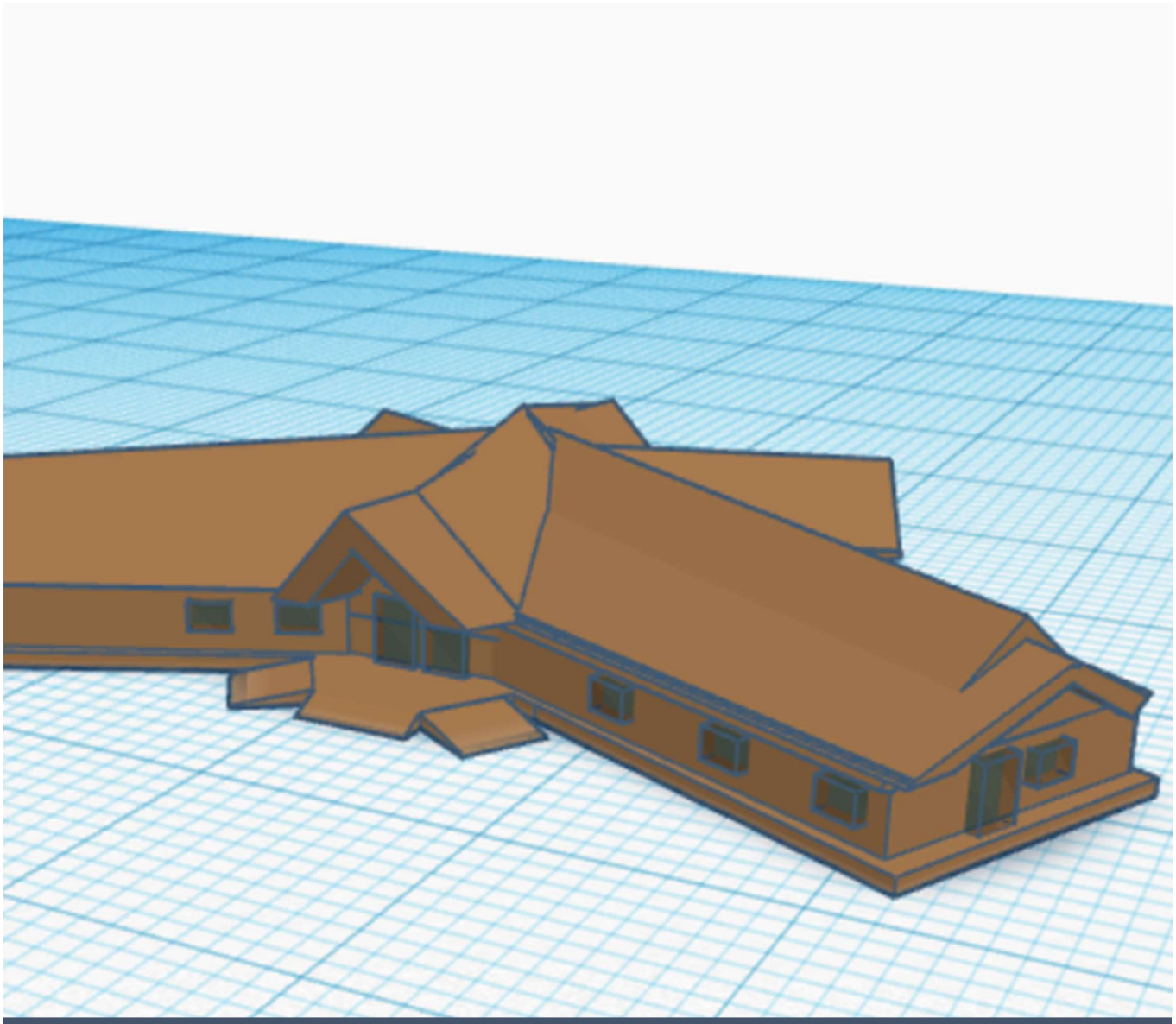


# Environmental Monitoring Building Concept

# User Manual

Group 20 – Cubic Designs

GNG 1103

# Abstract

This document contains the information on the building designed for the Algonquins of Pikwakanagan environmental monitoring building concept. The information includes the design requirements and specifications, abstract floor plans and 3D models of the finished product, details on the functions and features of the building, as well as miscellaneous suggestions from the designers of the building.

# Contents

# 1. Building specifications

## 1.1. Total building

Floor area: 566 square meters (6092 square feet)

Perimeter: 125.5 meters (412 feet)

Internal height: 2.5 meters (8.2 feet) at lowest point, 5.5 meters (18 feet) at highest point. Average height is above 4 meters (13.1 feet).

External height: 3 meters (9.8 feet) at lowest point, 6 meters (19.7 feet) at highest point.

Estimated cost with 50% precaution: CAD$2 715 986.72 ($445.8 per ft^2)

Estimated cost without added precaution: CAD$1 810 657.81 ($297.2 per ft^2)

The actual cost should be more than halfway within the range $1 810 657.81 to $2 715 986.72.

## 1.2. Laboratory wing

Floor area: 182 square meters (1959 square feet)

Internal height: 2.5 meters (8.2 feet) at lowest point, 5 meters (16.4 feet) at highest point.

## 1.3. Office wing

Floor area: 187 square meters (2013 square feet)

Internal height: 2.5 meters (8.2 feet) at lowest point, 5 meters (16.4 feet) at highest point.

## 1.4. Building center

Floor area: 197 square meters (2120 square feet)

Internal height: 2.5 meters (8.2 feet) at lowest point, 5.5 meters (18 feet) at highest point.

## 1.5. Laboratory

Floor area: 63 square meters (678.1 square feet)

Perimeter: 32 meters (105 feet)

Quantity: 1 laboratory.

Estimated capacity: around 12 people working comfortably.

Walk-in freezer area: 6.25 square meters (67.27 square feet)

Walk-in freezer perimeter: 10 meters (32.8 feet)

Walk-in freezer quantity: 1 walk-in freezer.

### 1.6. Loading bay

Floor area: 72 square meters (775 square feet)

Perimeter: 34 meters (111.5 feet)

Quantity: 1 loading bay.

Estimated capacity: parking for 2 pickup trucks with additional 1.7 meters beside the parking space and 0.7 meters between parking space and entrance. A large garage for two cars has dimensions 7.3 meters by 7.3 meters, which allows sufficient space for storage as well.

### 1.7. Storage and maintenance room

Floor area: 27.38 square meters (294.72 square feet)

Perimeter: 24.92 meters (81.76 feet)

Quantity: 1 storage/maintenance room.

### 1.8. Single washrooms

Floor area: 3.75 square meters (40.36 square feet)

Perimeter: 8 meters (26.2 feet)

Quantity: 2 single washrooms. One of the single washrooms can also be converted into a storage room for cleaning equipment.

### 1.9. Male washroom

Floor area: 29.2 square meters (314.3 square feet)

Perimeter: 23.8 meters (78.1 feet)

Quantity: 1 male washroom.

Estimated capacity: 7 people.

### 1.10. Female washroom

Floor area: 28.9 square meters (311.1 square feet)

Perimeter: 25.7 meters (84.3 feet)

Quantity: 1 female washroom.

Estimated capacity: 6 people.

### 1.11. Kitchen

Floor area: 24.4 square meters (262.6 square feet)

Perimeter: 20.3 meters (66.6 feet)

Quantity: 1 kitchen.

Estimated capacity: 5 people.

### 1.12. Workspace

Floor area: Variable.

Perimeter: Variable.

Quantity: 4 workspaces.

Estimated capacity: 4 people.

### 1.13. Office

Floor area: 8.75 square meters (94.18 square feet).

Perimeter: 12 meters (39.4 square feet).

Quantity: 12 offices.

Estimated capacity: 1 person per office.

### 1.14. Board room

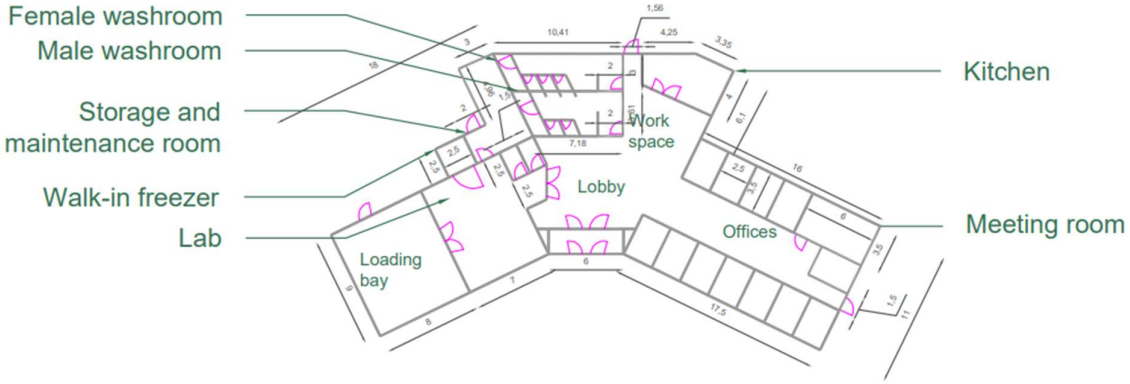
Floor area: 21 square meters (226 square feet).

Perimeter: 19 meters (62.3 feet).

Quantity: 1 board room.

Estimated capacity: 12 people.

## 2. 2D floor plan

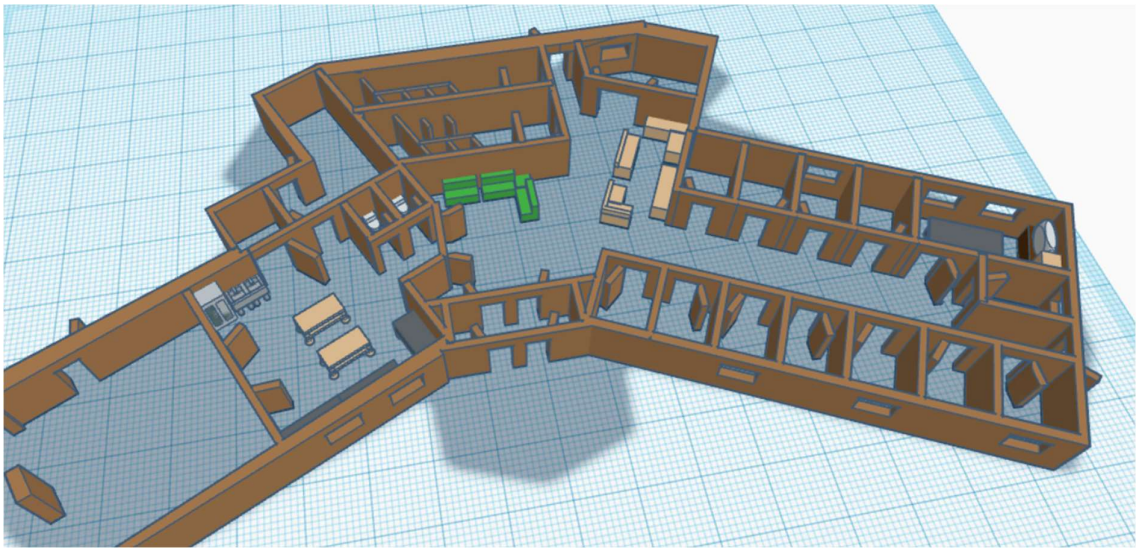


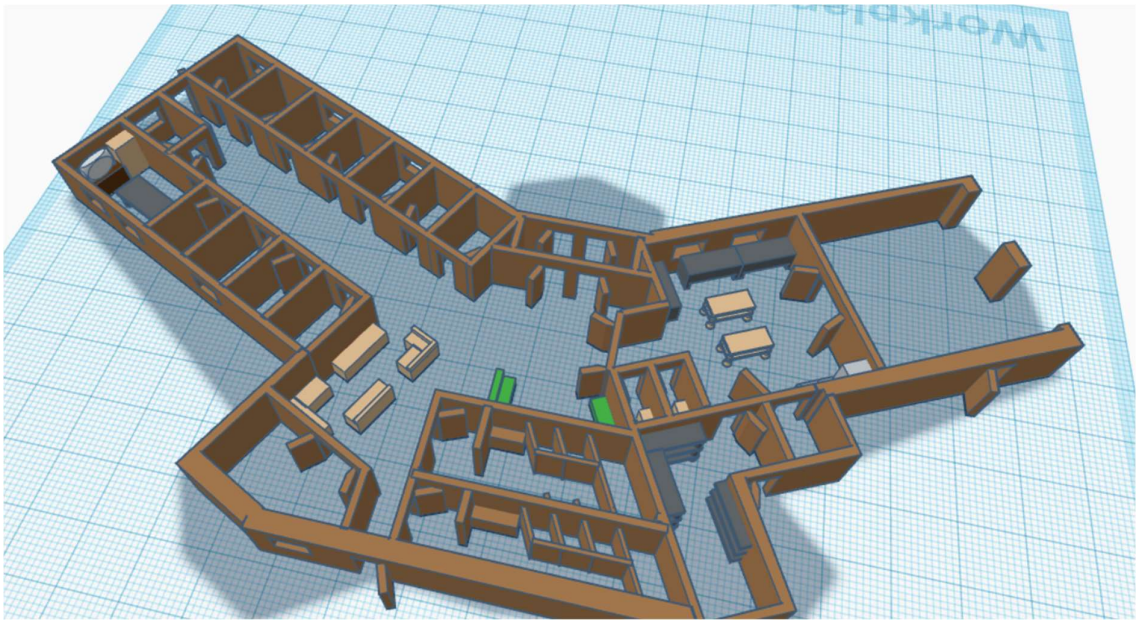

The above floor plan dimensions do not consider the width of walls. The dimensions are only specified for the internal measurements of rooms, and exterior dimensions must scale accordingly with the expected width of walls.

## 3. Emergency evacuation plan

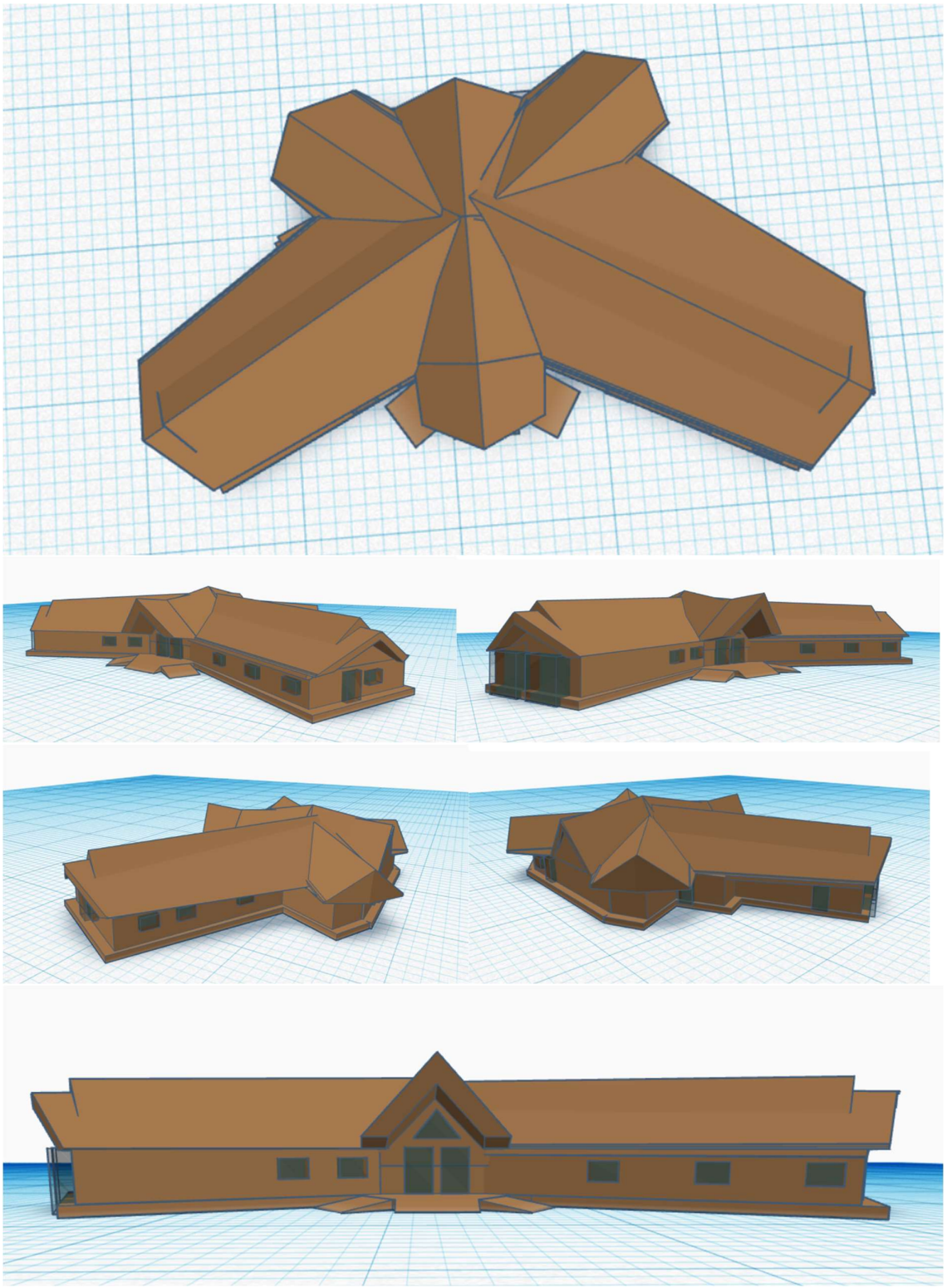
With considerations of the Ontario Fire Protection and Prevention Act, an indoor public space with confusing layout should have emergency egresses, effectively any pathway that allows individuals to escape and can be an easy to open window, which are at most 15 meters travel distance from any point in the space. Since our windows are likely thick and cannot be opened for insulation and structural integrity, the exits are considered egresses. All emergency exits require an aisle leading to it with a width of at least 1.1 meters, and users of the aisle must have the choice between two exits. A fire access aisle is also required extending the entire building with a width of at least 2.4 meters.

## 4. 3D floor plan





## 5. 3D models

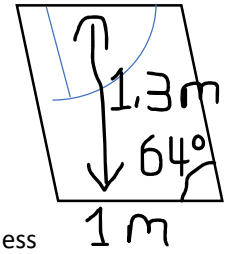


# 6. Building design features and functions

## 6.1. Interior layout

Structuring of the interior is designed so that the office wing is separated from the laboratory and loading bay so that any ambient noise from the laboratory wing does not affect the more private and quite offices. Between the two wings is a central lobby area meant to unite the two working areas with the kitchen and bathrooms and main entrance to not cause too much division between the two areas, as it would be unfortunate if someone worked in one side of the building and never saw people from the other side.

## 6.2. Angled stalls




The public washrooms are designed with angled stalls. The toilets will be installed parallel to the stalls. The angle of the stalls creates a larger space beside the toilet to give occupants more room when opening the door. These stalls have internal wall measurements with a length of 1.3 meters and a width of 1 meter. The angled stalls sacrifice the maximum angle the door can open to, and estimations of the area required for acceptable comfortability is greater than that of a rectangular stall. The purpose of incorporating the design nonetheless is to reference the concept of resourcefulness in sustainability.

## 6.3. Sloped roof

The slope above the laboratory and office wings are roughly 30 degrees at the lower section of the roof and 45 degrees at the upper section. The central section is angled at roughly 45 degrees. Though only depicted above the main entrance in the 3D model, a canopy should be installed above each entrance to reduce the accumulation of snow that would prevent the opening of the doors.

## 6.4. Walk-in freezer

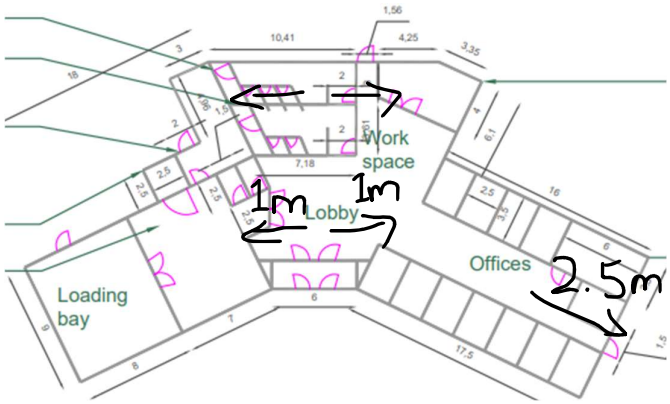
Contractors could be hired to install custom made walk-in freezers. This includes custom internal size dimensions, door width, and refrigeration capabilities. The doors could be ordered to be more than 1 meter in width. The minimum temperature that the freezer should be able to reliably achieve is -25 degrees Celsius, which is the temperature required for preservation. A condensing unit would have to be installed on the outside of the building and connected to the cooling system in the freezer. Due to the freezer being located near the roof subsection above the storage and maintenance room, the condensing unit can be installed within the roof section to be sheltered from falling snow and have a height of around 3 meters from ground level.

## 6.5. Wheelchair accessibility

All entrances leading into and out of the building should be fitted with a wheelchair ramp that leads to ground level. The slope of a wheelchair ramp is recommended to follow a 1:12 ratio between height and length, equal to an angle of 4.67 degrees. The minimum hallway width designed for the complete building is 1.5 meters. This exceeds the requirements of the Fire Protection and Prevention Act by 0.4 meters, which allows for easier traversal for wheelchair users. The public washrooms both have wheelchair accessible stalls. The single washrooms also should be wheelchair accessible.

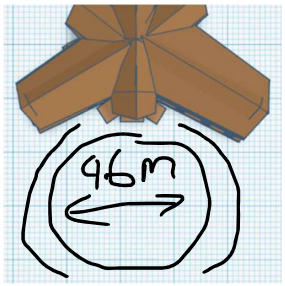
# 7. Designer's suggestions

## 7.1. Further extension




Due to the budget limitations, some elements of the building we as designers have deemed to be small, notably the lobby and kitchen. We suggest that if your available budget exceeds 2.5 million dollars, then you should extend the lobby by 2 meters in total, resulting in a 36 square meter (2 X 18) increase in area, with the length of the front face, i.e., the main entrance, being 8 meters for reference. This would provide more space in the lobby, make room for two small lounges beside the main entrance, and allow for a bigger kitchen and open workspace. Due to the increase in width, the central roof section would have to be elevated to maintain the roughly 45 degrees angle. The office space could also be extended to fit more offices by increasing the length of the right wing, with 27.5 square meters (2.5 X 11) increase in area per addition of two offices. The length of the loading bay could also be extended from 8 meters to 9 meters, an increase in area of 9 square meters (1 X 9), to allow for more space for parking and storage.

## 7.2. Outdoor public space




This building was initially designed with the consideration of incorporating a large circular outdoors public space in front of the main entrance. Paths leading to the entrance would lead around the circle to maintain the circular shape. The diameter of the circular public space should be around 46 meters to match the total width of the building. Roads for motor vehicles should lead beside the building and public space to the back of the building, behind the office wing, where parking spaces should be located. The laboratory wing should also be connected to a road for motor vehicles to allow access to the loading bay, but to reduce traffic, we do not suggest having public parking spaces behind the laboratory wing.

## 7.3. Building materials

We suggest three options for the material choices used in constructing the building:

1. concrete foundation, steel framing within walls and roof, internal walls being panelled with drywall/wood.
2. concrete walls and foundation with wood for separative framing on the inner layer with insulation in between, dry walls and wood panelling the internal layer.
3. concrete foundation with the bottom half of the walls made of concrete with imbedded steel extending to the roof, and the upper half of the walls would use wood framing, drywall/wood on internal layer. Effectively a combination of option 1 and 2.

For options using concrete for walls, we also suggest moulding the concrete into aesthetic designs. Considering the Algonquins of Pikwakanagan being the creator of the world's largest birch bark

canoe, the concrete can incorporate a wave like pattern on the exterior. Local artists can be allowed to generate the more detailed design of the pattern.

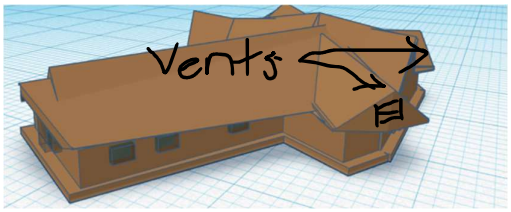
### 7.4. Windows

For the concern of windows breaking from the harsh weather, we propose to either incorporate windows with high integrity or to use stained glass. The stained-glass idea stemmed from symbolizing the talent of Indigenous North Americans in problem solving with their given environment. We do, however, realize a slight irony in this proposal, and stained glass is also less heat insulating, which contributes to energy usage.

### 7.5. Gardens

Due to the risk of accumulated snow and ice sliding off, we suggest adding gardens around the building and installing canopies above doors to reduce the risk of injuries. The gardens could be elevated from the ground along with the 30cm high base of the building to remain noticeable during winter.

### 7.6. Ventilation




The two roof subsections that extends from the storage room and kitchen could be used for ventilation systems. The height from ground level of these two roof sections could achieve 4 meters, so a vent positioned on the highest point on the side of the roof can be operational in over 3 meters of snow. Vents can also be installed on top of the roof with a chimney-like structure.

### 7.7. Parking

As iterated above, appropriate parking space is at the back of the building and can be accessed from either the left or right wing of the building.