Project Deliverable G

Prototype II and Customer Feedback

Jack Lloyd, Gerika Gauthier, Cheri Reteracion, Ryan Langley, Brynn Dowson

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1. Introduction

The AOPFN and Neya Wabu Guardian program has tasked our team to design a facility to serve both as an office space and as a space for the community. From the information obtained after the initial client meeting, our team created the following problem statement:

“The AOPFN and Neya Waban Guardian Program need a multi-use indoor and outdoor facility designed for community projects, office space, and harvesting and storing plants for medicinal use, that is reflective of their cultural values. “

From this problem statement, we developed a design criteria that can be used to measure our design’s ability to solve the client’s problem. After much research, brainstorming, and meetings, the first conceptual design was developed and presented to the second client meeting.

Following our first prototype, we developed a list of improvements to implement when creating our second prototype. This document will present updated prototypes and an analysis of their capabilities based on the criteria we created in previous deliverables. Additionally, this deliverable will explore feedback given by users and the client, design modifications, and any task updates.

2. Client feedback

At the moment, no feedback from the client has been received after the presentation of our detailed design and first prototype during the third client meeting.

3. Objectives for our second prototype

Our team developed the second prototype including the changes we had planned based on the prototype tests 1.

Our goals for this prototype are the following:

1. To improve the prototype based on the previous feedback
2. To see if we have met the test plan detailed in the deliverable F.
3. To see which aspects need to be improved in this prototype.

In this deliverable we simply altered our digital designs we had already constructed, Rhino design and AutoCAD plan.

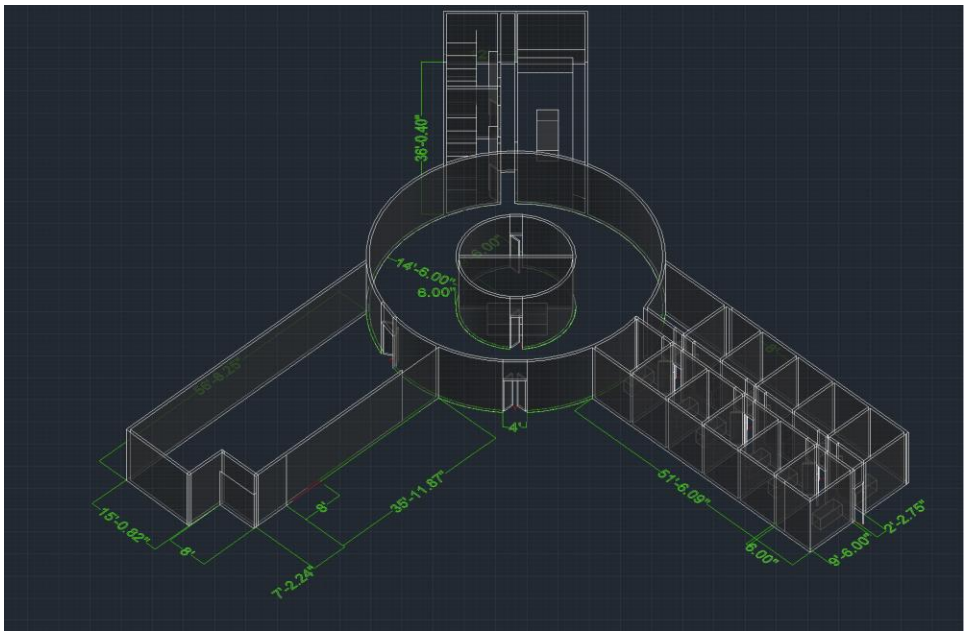

Figure 1. Improved AutoCAD design

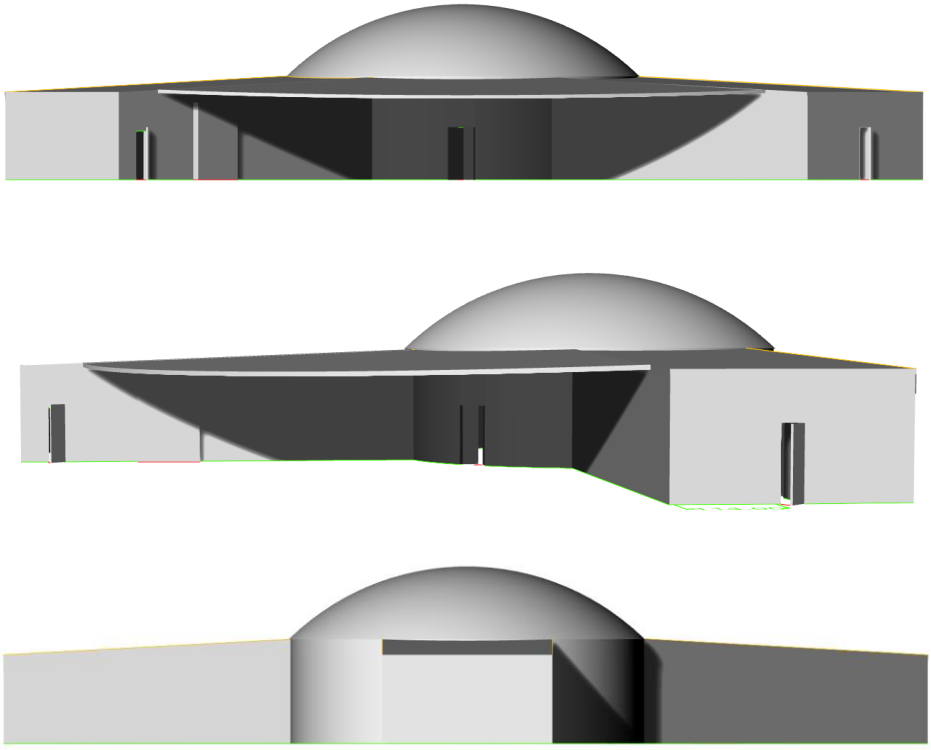

Figure 2. Improved Rhino 3D design

3.1 Improvements Based on Prototype 1

Following the test analysis conducted in deliverable F, we have changed the location of the garage door as seen in figure 1. Following the prototype 1, we observed difficulties for trucks to load into the lab garage while cars were parked in the outdoor space. To fix this issue, we have created an indentation to ensure all cars and trucks are moving in the same parallel direction to avoid crashing. We also applied the feedback given for our prototype 1 and added a dome and slanted roofs on the "branches" of the building to allow rain or snow to slide off in the winter.

3.2 Flow of the building

As depicted in Figure 1 AutoCAD design the round hallways have a width of 14'6" or 174". The Centers for Disease Control and Prevention estimate an average waist circumference for men in the US in 2021 of 40.5 inches[1]. Using this equation, we can calculate the average width of around 13": $C = \pi d$. This means that around 13 people could fit side by side in these halls at once (174/13 = 13.38). This leaves more than enough room for everyone to circulate the building. Not to mention, the circular shape of the center helps avoid "traffic jams" if many people are trying to get around at once.

The same calculation is applied for the hallway between the bathroom and the kitchenette that has a width of 2'4" or 28"; 28/13 = 2.15. The result is slightly larger than 2 people. This might be slightly narrow however it allows circulation as there can be "traffic" going in both directions.

The hallway between all the offices is similar to the previous; 2'2.75" or 26.75" (26.75/13 = 2.06). This hall also fits 2 people side by side, however, for this section there is a door leading to the outside from the hallway allowing 2 exits. The size of the hallway is a little too narrow especially considering all the office doors that could potentially obstruct the hall as well. One important detail will be to ensure the doors can only open towards the inside. The hallway still offers little room in case of emergency and might need altering.

4. Feedback

Question	User A	User B	User C	User D
Does the user feel that the building is pleasing aesthetically?	YES	The dome roof looks like a UFO.	The sloped roofs look nice, but the dome in the circle is strange.	YES
Does the user feel that the building offers a good circulation flow?	The proportions seem off. Some halls are very wide, and some are narrow	There is only one entry/exit in the hall between the kitchenette and bathrooms	YES	YES
Comments	It would be nice to see where the windows will be placed.	The roof should be sloped for easy snow removal.		

[1] FastStats - Body Measurements (cdc.gov)

	Seeing a path that leads up to the building would be nice.	Maybe make sure there is an exit at the end of every hallway.		

5. Prototype test plan

The table below depicts our previous test plan, with a new test added after the development of the 2nd prototype; this is test 8 . Highlighted in light green are the tests that have been satisfied in the prototype 1; dark green are the test that have been satisfied in our second prototype; yellow are the tests that need to be improved on, but have met the minimum requirements; red are tests that were not fulfilled.

Test ID	Test Objective	Description of Prototype used and of basic test Method	Description of Results to be Recorded and how these results will be used	Estimated Test duration and planned start date
1	Verifying the culture design incorporated in the building by getting personal feedback.	Focused Prototype: Online drawing and designing what the building will look like from the outside. Testing will include personal feedback from users.	The results should include the answers to the following questions: Does this include enough cultural significance? Are the selected shapes accurate for the cultural aspect?	November 6th, 2023
2	Test functionality of outdoor space (i.e. use for cultural events and parking lot. Test if the location of the garage door is plausible for truck accessibility)	Focused and Physical Prototype: Tangible model of the outdoor space connected to the lab. Visually evaluate the space and use model of cars and humans to scale and verify its ability to use the area.	The results should include the answer to the following questions: Is the space large enough? Is the garage placed correctly or does it need to be moved to a better angle? Does the garage door obstruct the other uses of the space?	November 4th, 2023
3	Test general safety of the building	Comprehensive Prototype: Detailed virtual representation of the building. Compare the digital model to safety codes for one story office buildings.	The test will be successful if the building follows the regulations like those of the safety hazard section of office-safety-general.pdf (ccohs.ca). Such a building is equipped with fire escapes, has enough doors and	November 5th, 2023

			windows, and has enough space for safe movement between rooms.	
4	Test security of building	Analytical Prototype Online model of security cameras and outside shape. Calculation of the area of vision of the cameras compared to where they are placed on the model.	The test results should include the total area of visibility of the cameras to make sure the surroundings of the building are covered, especially the lab, and whether there are any blind spots.	November 5th, 2023
5	Test for sustainability and energy efficiency	Focused Analytical Prototype Online model of the building A calculation of the energy emitted by and energy supplied to the building using software	The test results to be recorded include the emitted energy (transmission, infiltration, ventilation, wastewater, cooling) and supplied energy (energy recovery ventilation, energy recovery heat pump, solar energy through windows, heat supply, electricity use, latent energy, human heat gain, process energy room). These can then be compared to the requirements to a green building certification, such as LEED.	November 14th, 2023
6	Test for flow of the building and office space. (Space Utilization)	Using a detailed floor plan of the building we will test if everything is at accessible distance of each other by developing a flow diagram	The tests will be successful if the flow diagram demonstrates a reasonable distance for each subsection and a wide enough space for multiple people to use the halls at once.	November 11th 2023
7	Test the HVAC of the building (heating, ventilation, and air conditioning)	The prototype will be a Model HVAC system that depicts the heating, cooling, and ventilation systems in the building.	The test will be successful if the air flow of the building is safe and comfortable.	November 12th, 2023.

8	Renewable energy	The next prototype should include renewable energy sources. Calculations of how much energy we can generate with renewable energy (solar panels, etc.)	The test will succeed if we can generate a large amount of energy.	November 14th 2023

6. Conclusion

In this deliverable we strived to achieve the following goals:

1. To improve the prototype based on the previous feedback.
2. To see if we have met the test plan detailed in the deliverable F.
3. To see which aspects need to be improved in this prototype.

Our team was able to improve the aspects outlined in the last deliverable for better functionality, however this left our design lacking in aesthetics which we will have to revise for our next prototype. We also lacked time to developpe certain test we had hoped to have done in this report. The next prototype will have to include these last changes as well as 2 more outlined tests we have added to the test plan.