Project Deliverable F

Prototype 1 and Customer Feedback

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November 9, 2023

Table of Contents

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.

After good feedback from our client during the 2nd meeting, we created our first prototype. This document will present a preliminary, simple prototype 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

Our client greatly enjoyed our design. They appreciated the circular design of the building, and our plans to make the building sustainable. The client, however, stated the desire to have a clearer visual of our design with the materials on the exterior displayed.

3. Objectives of our 1st prototype

Our team developed the first prototype with feedback from the client in mind. Changes will be put in place as the product is developed and ways to improve are discovered.

Our goals for this prototype are the following:

1. To learn more and understand our conceptual design better.
2. To see if we have met the test plan detailed in the deliverable E.
3. To see which aspects need to be improved in this prototype.

Two different models were created to represent the first prototype: a 3D model rendered from Rhino3D, and a security 3D visibility model in the form of a floor plan.

Figure 1. 3D-rendered front view of the building

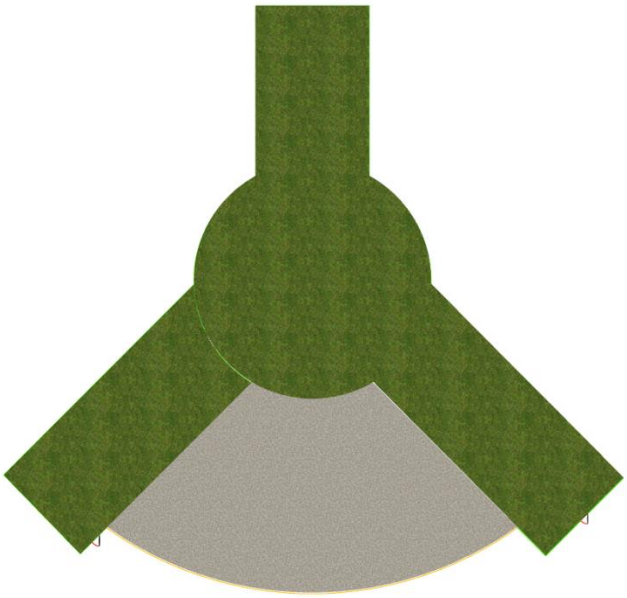

Figure 2. 3D-rendered top view of the building

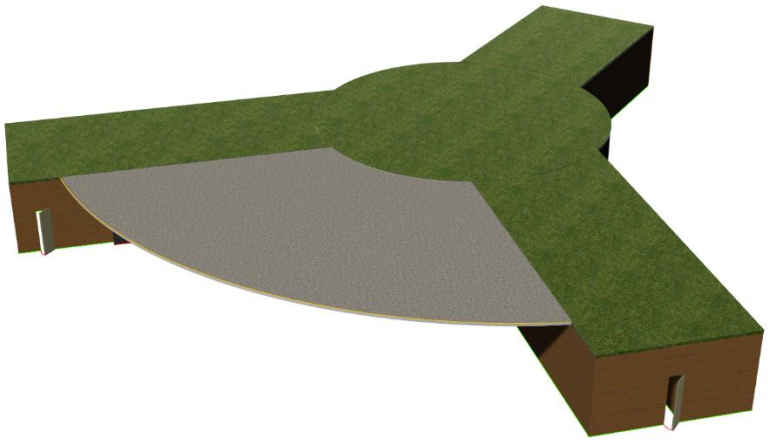

Figure 3. 3D-rendered perspective view of the building

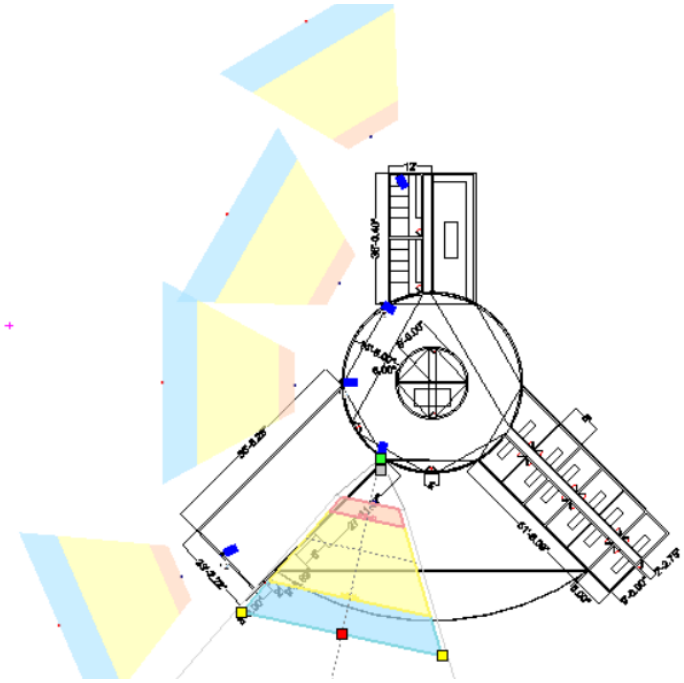

Figure 4. Security camera visibility floor plan 1

3.1 Cultural Significance

The 3D model allowed us to visualize the materials we chose; this was important as we incorporated organic materials such wood, stone, and greenery. We therefore aimed to test whether the design included enough cultural components or not.

A circular shape is significant in traditional Algonquin teachings. This is seen clearly in the Medicine Wheel; the importance of having ceremonies and gatherings in the shape of a circle; and the movement within any circle being always done clockwise by entering from the East. These are only some of the examples. To incorporate this, we continued with the circle being found in the middle of the building. This is seen in Figures 1-3. This is to pay homage to my earlier mentions, but to also signify that all returns to the middle of the building's circle.

Cultural significance is also seen in how the outdoor space, where traditional events and gatherings will be held, is immediately connected to the circular part of the building.

3.2 Outdoor Space Functionality

The outdoor space is to be used as both a parking lot and a space for cultural events. This space is also significant due to the garage door to the lab being located in this area. For all these uses to be optimized, we require the space to be large enough and to function correctly. We tested this by placing 3D models of cars to scale in the 3D model of the building, implying that humans within the car can also fit in the space.

Figure 5. 3D render of the building with a car by the garage door

As depicted in the figure above, cars can easily access the front of the building. However, this test showed a problem for the loading garage. As seen in Figure 5, the angle needed to park cars or trucks for loading into the lab creates an issue for the other cars that are remarkably close. When backing into the garage door, it is possible for other cars to get in the way. For our next prototype, we will try to solve this by indenting the lab space and making the garage door perpendicular to the current one, allowing all the cars to be parked in the same direction and thus avoiding this issue.

3.3 General Building Safety

The building needed to be up to date with safety precautions. To ensure this, we followed a government of Ontario building code document. We will ensure we have a minimum of two exits, a clear path to the exits, and a window in each office. Fire alarms will be in clear spots and accessible. We also ensured that our building is up to date on the accessibility codes by comparing them to the document. We will have barrier-free path of travel, visual fire alarms and smoke alarms, and handrails in washrooms.

3.4 Security

Another feature the clients wanted to include is security cameras around the building. This was to survey the surrounding area, with emphasis around the lab section. To ensure the surroundings are all visible with the cameras, we created an online model of the cameras' area of vision. If we assume a range of 50 feet for the camera visibility, Figure 4 demonstrates the coverage of the security camera plan. We used IP Video Design Tool app to create our Security camera visibility plan. The free version only allowed 5 cameras to be placed. Only one half of the building is depicted to have cameras but assume that the same cameras are mirrored for the other half.

For our initial design, the cameras were slightly more precise. The visibility range, however, was not wide enough to cover all the necessary areas. As shown in Figure 4, there are multiple blind spots around the building.

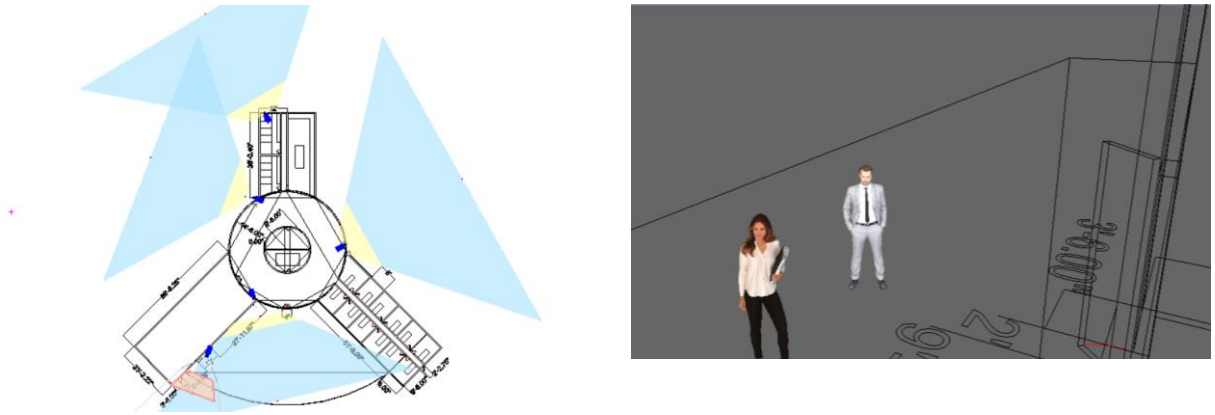

Figure 6. Security camera visibility with blind spot

After the first design, we changed the visibility range to be wider and added smaller, but more precise, small range cameras on the wall next to the loading garage. After a 3D view of the small range camera seen beside the floor plan, it is clear that the garage door is not visible with that placement.

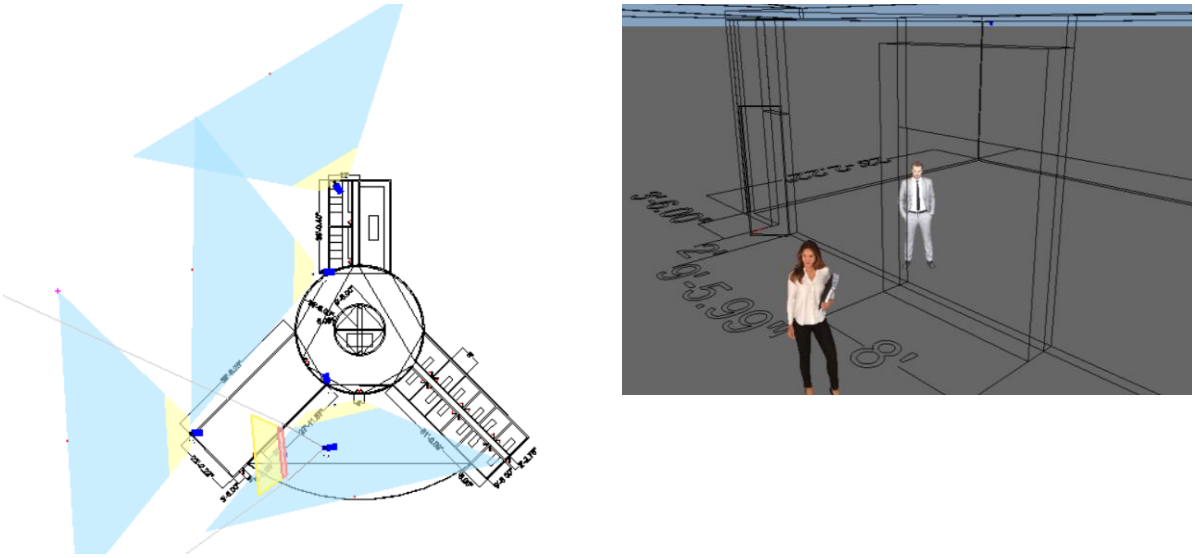

Figure 7. Improved security camera placement and visibility

For this final design, we placed the cameras all around with wide range to minimize the blind spots present in small areas. We deemed this sufficient in order to limit costs, but it will be up to the client to decide whether they want to invest in more cameras or are willing to allow certain blind spots. This design also has a small range, precise camera attached to the roof of the outdoor space that points towards the loading garage. The image on the right of the floor plan in Figure 7 demonstrates what will be seen and ensures visibility of the garage door.

The final placement and range of the cameras are the following:

Camera ID	Type	Task	Sensor Size	Installation Hei...	Distance	FOV Width	FOV Height	Tilt
1	Box	Video Surveillan	1/3"	12	50.1	127.6	7	51.2
2	Box	Video Surveillan	1/3"	12	25.1	29.2	13	16.8
3	Box	Video Surveillan	1/3"	12	48.6	119.2	7	49.2
4	Box	Video Surveillan	1/3"	12	45.4	121.9	35.8	14.3
5	Box	Video Surveillan	1/3"	12	51.1	123.0	20	33.1

Figure 8. Summary on security cameras

The first camera being the one at the top in Figure 7, the Camera 2 is pointed at the garage door. Camera 3 is on the bottom left corner of the building. Camera 4 is the one observing the front entrance and outdoor space and Camera 5 is attached to the circular section of the building. These placements will all be mirrored for the other side of the building except for the Camera 2.

4. Feedback

Question	User A	User B	User C	User D
Does the user feel that the building is organic, and that it is culturally significant?	Yes, but the building also feels a little flat in terms of the roof. The circular element is nice.	More greenery could be added.	YES	YES
Does the user feel that the building is pleasing aesthetically?	YES	YES	YES	YES
Does the user feel that they can easily access the building from all areas?	YES	YES	YES	YES
With the security cameras in place, does the user feel that the building is secure?	YES	YES	YES	YES
Does the user feel that the outdoor space is large enough for gatherings?	YES	More parking space.	YES	YES
Comments	It would be nice to see where the windows will be placed.	The roof should be sloped for easy snow removal.		

	Seeing a path that leads up to the building would be nice.			

5. Prototype Test Plan

The table below depicts our previous test plan, with new tests added after the development of the 1st prototype; these are tests 6 and 7. Highlighted in green are the tests that have been satisfied; 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 Methode	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:	The test will be successful if the	November 5th, 2023

		Detailed virtual representation of the building. Compare the digital model to safety codes for one story office buildings.	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 windows, and has enough space for safe movement between rooms.	(met, will highlight green)
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 (met, will highlight green)
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 11th, 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
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

6. Conclusion

We outlined the following for our general objectives for this prototype.

1. To learn more and understand our conceptual design better
2. To see if we have met the test plan detailed in the deliverable E
3. To see which aspects need to be improved in this prototype

Our design became clearer to us as we worked through testing and development. With feedback from the client and users alike, we have determined improvements that need to be implemented in our next prototypes, such as windows and a more organic roof. Otherwise, we have created a satisfactory prototype that met the majority of our test plans, and received satisfactory feedback. Our team is now

7. Wrike Snapshot

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=gqbjHSzHYLMqPrgSHNVbOwnZIfAjxoza%7CIE2DSNZVHA2DELSTGIYA