GNG 1103-A

Design Project User and Product Manual

Environmental Monitoring Building for the Algonquins of Pikwàkanagàn Neyagada Wabandangaki Guardian Program

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List of Acronyms and Glossary

Table 1. Acronyms

Acronym	Definition
AOPFN	Algonquins Of Pikwàkanagàn Neyagada Wabandangaki
AOPFNGP	Algonquins Of Pikwàkanagàn Neyagada Wabandangaki Guardian Program
SSS	Sustainable Structure Squad
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UPM	User Product Manual

1 Introduction

This User and Product Manual (UPM) provides the information necessary for the client and future users to effectively use the SSS's design and for effective prototype documentation.

For this project, we were tasked by The Algonquins of Pikwàkanagàn Neyagada Wabandangaki (AOPFN) to create a new multi-purpose building to support their environmental monitoring guardian program as well as serve as a space that reflects the community's values and culture.

This project was completed on the assumptions that the budget should not exceed $2,500,000, that it will be built on the Pikwàkanagàn First Nations reserve, and that all the initial criteria given at the start of the project will be met.

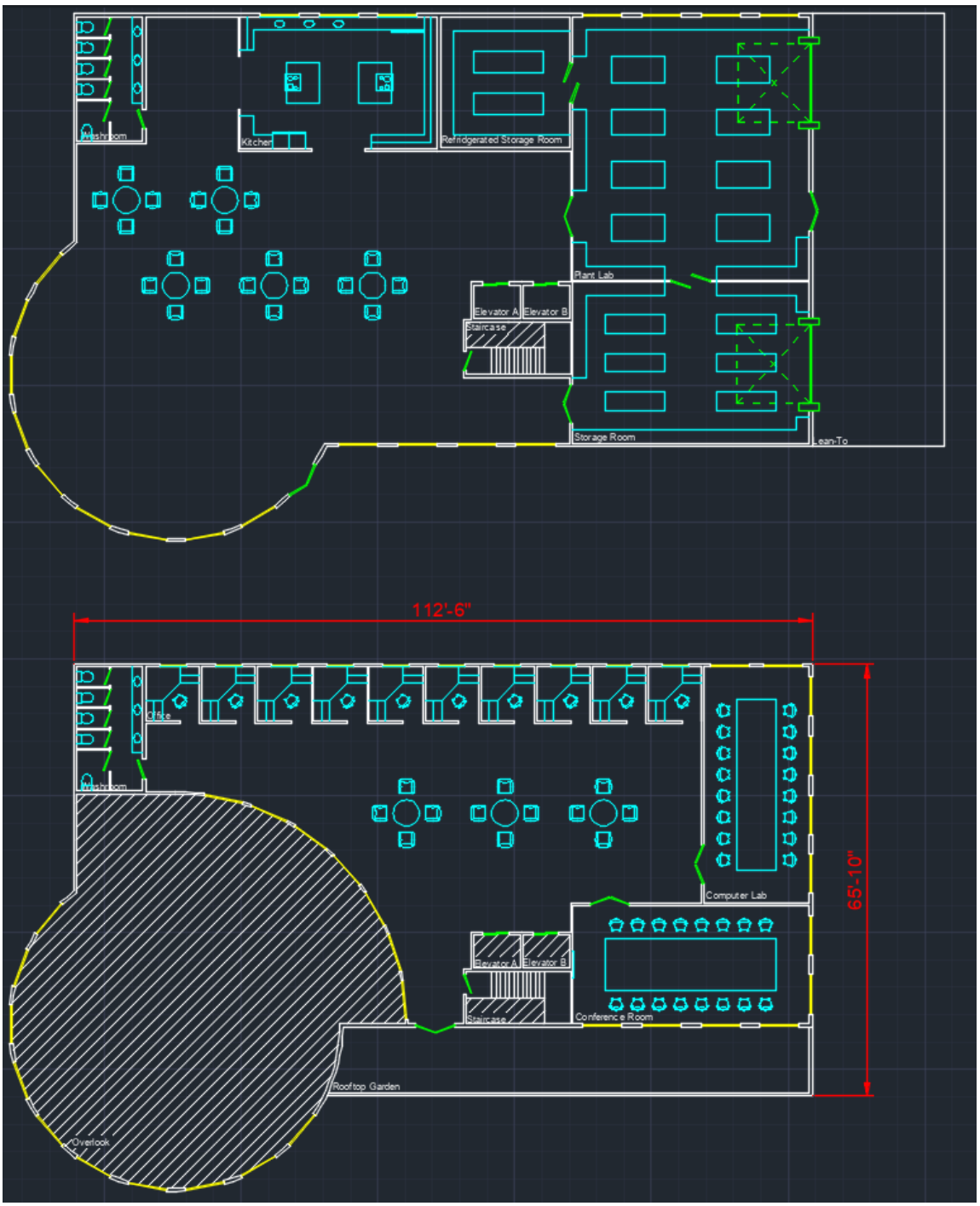
This manual has been divided into several sections to allow for easy access for another person to implement the identical design model that our team has come up with. The initial section outlines the necessary requirements for future users to operate the system.

2 Overview

The Algonquins of Pikwàkanagàn Neyagada Wabandangaki (AOPFN) are working on an environmental monitoring guardian project that is operated under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). In essence, the UNDRIP gives indigenous nations the ability to negotiate for their rights as Indigenous people and make choices that have significantly improved their communities and territory. A new multipurpose building is needed for the Algonquins of Pikwàkanagàn Neyagada Wabandangaki guardian program. It will support their studies and function as a space that reflects the culture and values of the community.

Our project stands out in several ways that make it an ideal design for the AOPFN community. Firstly, we've managed to deliver an outstanding, multi-functional building that not only meets but exceeds their needs, all while staying under budget. What sets us apart is our emphasis on natural lighting and an open atmosphere, achieved through a large front bay window that floods the space with sunlight, fostering a vibrant and connected ambiance. Additionally, our minimalist design isn’t just about aesthetics; it's about functionality. It allows for flexible usage of space, encouraging adaptability for various community activities and future enhancements, making it a truly versatile and forward-thinking solution.

Figure I: AutoCAD drawing of the building floorplan



This design features, on the first floor, a large laboratory to process plants and examine both flora and fauna for any signs of impurities, a storage space to keep any non-temperature-sensitive samples or tools, a refrigerated storage room for temperature-sensitive samples, a large kitchen aimed at providing food for community gatherings, an open space to hold said community gatherings, and communal collaboration space for all to meet and discuss ideas and projects, a rooftop garden, as well as an accessible gender-neutral washroom. On the second floor, there are ten offices to provide the members of the AOPFNGP to work, a conference room to hold all discussions related to the Guardian Program, a computer lab to document all the data gathered in the lab, another open space, open to the members of the Program and another accessible gender-neutral washroom.

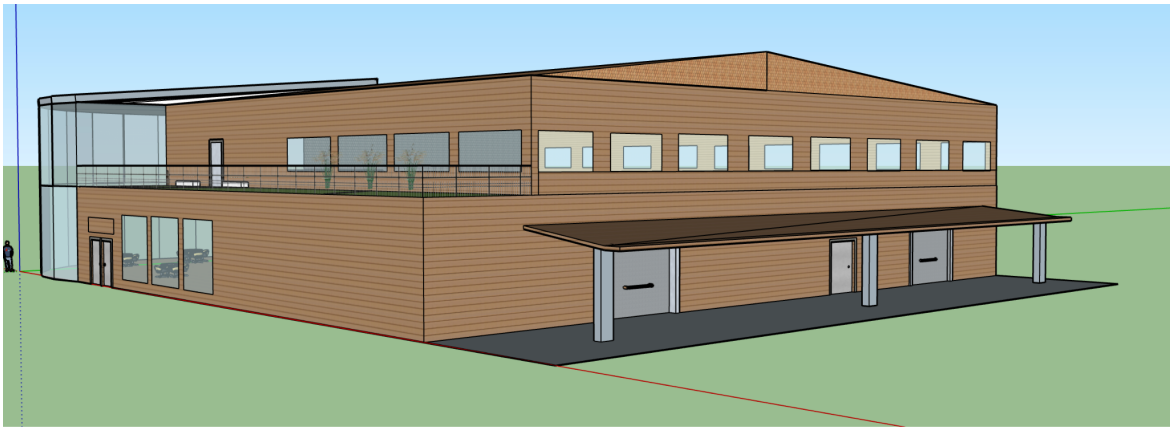
The exterior of the building will be covered in wooden siding made from locally sourced timber. The actual frame of the building will be made of steel I-beams, and the beams that will support the second floor and ceiling will be also covered in the same wooden siding. The inside of the building will be lined with regular quarter-inch drywall. There will be a total of 49 six-foot-by-six-foot windows, and ten four-foot-by-six-foot windows.

3 Getting started

The building is connected to the road by a short driveway, which leads into both a small parking lot and under a lean-to which is attached to the building itself. The inside of the building is primarily accessible through the main set of doors which allow access to the main collaborative area. The building is also accessible via a single door and two loading bay doors located on the right side of the building under the lean-to, which open up into the lab space and attached storage area respectively. The building also features an elevator and a set of stairs located near the main entrance, to allow access to the second floor of the building. The first floor additionally consists of a washroom and kitchenette, accessible through the main area, and a cold room attached to the lab space. The second floor contains a main multi-use workspace which connects to ten offices, a washroom, and two meeting rooms.

Figure II: Front of Building

Figure III: Right Side of Building



3.1 Configuration Considerations

The Guardian program building for the Algonquins of Pikwàkanagàn Neyagada Wabandangaki is to be situated on a plot inside of their traditional lands. The land is to be developed and made accessible by a connecting driveway, parallel to which basic utilities and electricity are to be run. The building will face in the direction of the road, and the driveway will connect smoothly into the docking area located under the lean-to, and a smaller parking area located opposite it. The plot of land will also feature a larger green area located out front, in which large activities can be hosted, and the surrounding forest and fauna will enclose the building on all remaining sides, to maintain the natural feeling and integration.

3.2 User Access Considerations

This building will be used for the Algonquins of Pikwàkanagàn Neyagada Wabandangaki guardian program. All aspects of the building are geared towards this program. It is expected that the building will be used as a workspace for the employees of the building as several rooms and features of the building are for employees only. As the building has many purposes and ideally wanted to include the community there are public workspaces and washrooms on the first floor. The user must set specific times when the building is open for use by employees and the public.

3.3 Accessing/setting up the System

The building must be constructed following the Ontario building code and regulations, by a knowledgeable individual with a valid HCRA license. Additionally, the building requires a stable foundation to be built upon, most likely of poured concrete, and necessary roads driveways and parking lot be paved asphalt. The framework for the building is to be made of locally sourced softwood, mainly eastern white pine and white spruce. The building will also use laminated glass for the visible cylindrical portion, and timber cladding for the rest of the outer walls.

3.4 System Organization & Navigation

Every aspect of the building was organized with the purpose of easy accessibility and maneuvering. The main entrance is in the large circular glass overlook where it walks into a public workspace. The back left corner of the building includes public washrooms. Across from the washroom is a large kitchen for employees. The large open foyer connects to the plant processing lab room along with the storage room on the far-right side of the building on the first floor. Both of these rooms are connected to lean-tos for accessibility purposes along with the frozen storage room

connected to the plant processing lab. To get to the second floor of the building there is a staircase and two elevators located to the left of the storage room door.

The second floor includes a large open workspace for employees as you get off the elevators or go up the stairs. You are also able to see the glass railing for the overlook as you get to the second floor. The room directly to the right of the staircase and elevators is a large conference room, and the door to the left of the staircase is the entrance to the rooftop garden. On the top right of the building in the floorplan is the computer lab, to the left of the computer lab along the back horizontal of the building is ten office spaces. For the employees a washroom is located on the top left of the floorplan of the second floor beside the office spaces.

3.5 Exiting the System

As the system is a physical building, the steps for turning it off involve accessing the storage room which holds the main electrical box and turning off the power to each room respectively.

4 Using the System

- The large laboratory is designed to process plants that will be used to make medicines and examine both flora and fauna for any signs of impurities, contaminants or any other substances that are harmful to the environment.
- The storage space is intended to keep any non-temperature-sensitive samples or tools, including large equipment, which will be made easily accessible by the loading bay door, the door to the lab and the door to the main open space.
- The refrigerated storage room is for temperature-sensitive samples, including harvested animals, plants and herbal medicines.
- The large kitchen is aimed at providing food for community gatherings and is large enough to accommodate multiple people cooking.
- The open space has been designed to hold community gatherings, by keeping it easily accessible to all and having no obstructions in the way for the majority of gatherings.
- The communal collaboration space is intended for all members of the community to meet and discuss their ideas and their projects. The furniture will be easy to move out of the way, in case that the gatherings are large enough to require more space than the open area would allow.
- The rooftop garden is aimed at letting the members of the Guardian Program grow any plants they might need, be it medicines or vegetables.
- There are ten offices to provide the members of the AOPFNGP to work comfortably and each room features a large window to make it feel less like a standard cubicle.
- The conference room is made to hold all discussions related to the Guardian Program and features a television to aid in displaying presentation material and visual aids.
- The computer lab is to document all the data gathered in the main laboratory and for the members of the AOPFNGP to be able to easily access their records.

5 Troubleshooting & Support

Our project's error correction procedures revolved around prioritizing client feedback from the Guardian Programs project coordinator. We based our revisions on their inputs. When specific feedback wasn't accessible, we sought inspiration from alternative sources, incorporating ideas from similar projects to refine our prototypes. This ensured continual alignment with the community's needs, consistently meeting the base list of building requirements.

During the design and prototyping phases, we encountered some errors relating to the rendering and AutoCAD design. This emphasized the need for proficient orientation within these software tools. Corrective actions involved revisiting design parameters to ensure their alignment with established guidelines and inputs. We regularly sought software support from our Teaching Assistant and the CEED Centre in the STEM Building at the University of Ottawa to navigate these challenges effectively.

An overarching factor in our error correction procedures was ensuring that any modifications aligned with the base list of building requirements. Every design iteration underwent revisions to ensure compliance with structural, functional, and cultural requisites.

5.1 Maintenance

Maintenance consists of simple upkeep tasks to make sure the building is in shape. For example, cleaning the building, checking for leaks, repairing aspects that need repaired in a timely fashion, and being responsible about leaving windows and doors open weather depending.

6 Product Documentation

The final prototype was made after multiple interactions of the design process, resulting in 3 prototypes. All design considerations were based on a set list of requirements that the building had to meet. The focus of this project was just the design factor as we did not have to worry about the intricacies that do not come with a blueprint design. The building blueprint serves as the architectural roadmap, outlining the structural design and functional layout crucial for bringing the AOPFN community's vision to life. It stands as the visual representation and essential guide that harmonizes cultural values, community needs, and environmental considerations into a tangible and comprehensive plan for construction.

Building materials were not benchmarked or considered in this process as it was unnecessary unless it was for aesthetic purposes or estimating the building costs. However, by building the design using earthy colors, avoiding concrete and industrial designs we were able to create a more appealing building for the customer.

Our final design (shown in figure's I, II, and III) was a result of Client feedback and group discussions Through active engagement and iterative discussions, the prototype evolved, incorporating multiple perspectives and insights to create a design that resonates with the community's vision and aspirations.

6.1 Final Prototype

6.1.1 BOM (Bill of Materials)

Name	Quantity	Cost
3mm MDF board	608.68cm^2	$0.00
PLA filament for 0.8mm nozzle	7.58m	$0.00
AutoCAD license	1	$0.00
Laser cutting fees	N/A	$0.00
3D printing fees	N/A	$0.00
SketchUp	N/A	$0.00
total		$0.00

6.1.2 Equipment list

The equipment used to build the final prototype was AutoCAD for the prototype blueprint, SketchUp for 3D rendering, a laser cutter using 3mm MDF board and a 3D printer with PLA filament (0.8mm nozzle) for the physical office model. Each tool served a specific purpose, enabling us to craft precise designs and bring our vision to life in both digital and tangible forms

6.1.3 Instructions

The first step would be to Gather all information and requirements from the client. This will ensure a clear understanding of spatial needs, cultural considerations, and functional requirements. This will serve to define the parameters for the blueprint.

The next step would be sketching the preliminary designs based on the provided requirements. Use basic sketching tools like pen and paper or software like Adobe Illustrator to create rough drafts or basic designs is a recommended way of going about the initial designs.

Following the initial sketch, transition to AutoCAD. Start by setting up the drawing with accuracy based on the given dimensions by using the correct units and scale. Once this phase is done, bring this initial prototype to a client meeting to make sure that what you have is what the client envisions or if there are any major changes that need to be met based on the given feedback.

Based on the feedback received, iterate the design process and blueprint design as needed. Make revisions within AutoCAD, updating dimensions, annotations and locations of rooms to align with the client's preferences and functional requirements. During this process, another prototype should emerge.

From here gain even more feedback as this is the main form of testing and validation within this type of project. One the improved prototype gets an approval, incorporating furniture and more details into the AutoCAD design. To enhance the design and provide better visuals, create a 3D rendering of the blueprint with any given software. This project utilized SketchUp as it was free, relatively easy to use and learn. Consider creating a rendering of both the inside and outside of the building.

6.2 Testing & Validation

The final prototype was tested using peer surveys and team voting, to determine whether the prototype fit all the client’s needs, both physically and aesthetically. These polls were administered to classmates during design lab times, and responses were recorded and applied to the final prototype. The team votes were made in the team group chat, and changes were made accordingly.

7 Conclusions and Recommendations for Future Work

Throughout our project journey, we've encountered numerous lessons that have shaped our approach, influenced using AutoCAD, finding a suitable 3D rendering software, and the challenges that arise when creating a building design within limited guidelines. The application of AutoCAD highlighted the significance of precision and technical expertise in creating prototype designs. Simultaneously, finding a suitable 3D rendering software highlighted the critical need to match software capabilities with our visualization goals, emphasizing the importance of finding the right fit to achieve desired renders.

Developing a building design and blueprint with minimal guidelines taught us the art of creativity within constraints, pushing us to think outside the box while ensuring our designs remained aligned with the needs and values of the AOPFN community.

If granted more time, our focus would prioritize creating a more comprehensive 3D model of the final design, using advanced technology, like laser cutters or printers to produce an intricate layout. Enhancing the 3D rendering to include interior renderings would also be a key focus, ensuring a holistic visualization of the building.

More meetings with the client would significantly help us better grasp their vision, allowing us to fine-tune our designs to perfectly match their needs and desires. Elements that we regrettably had to abandon due to time constraints—such as an in-depth interior design, extensive field research on Algonquin culture and the community, and considerations for weather restrictions—would be prioritized in extended project timelines. These elements are pivotal in creating a culturally attuned and environmentally adaptive space that truly reflects the community's identity and its surroundings.

Given more time, we’d aim to delve deeper into understanding the nuances of the community's aspirations, enriching our design with thoughtful details and resilient solutions, ultimately forging a space that not only serves their functional needs but also becomes an integral part of their cultural legacy.

APPENDICES

8 APPENDIX I: Design Files

This document is a final cumulative summary of the SSS Environmental Monitoring Building and is based on the deliverables A-J and their respective prototypes.

All deliverables can be found on maker repo using the following link:\

https://makerepo.com/angelique/1804.sustainable-structure-squad

Table 23 Referenced Documents

Document Name	Document Location and/or URL	submission Date
Deliverable A	Maker repo	24/09/2023
Deliverable B	Maker repo	1/10/2023
Deliverable C	Maker repo	8/10/2023
Deliverable D	Maker repo	20/10/2023
Deliverable E	Maker repo	3/11/2023
Deliverable F	Maker repo	9/11/2023
Deliverable G	Maker repo	12/11/2023
Deliverable H	Maker repo	26/11/2023
Deliverable I	Maker repo	29/11/2023
Deliverable J	Maker repo	30/11/2023
Deliverable K	Maker repo	10/12/2023