Project Deliverable E- Project Schedule and Cost

GNG 1103 - Group A2

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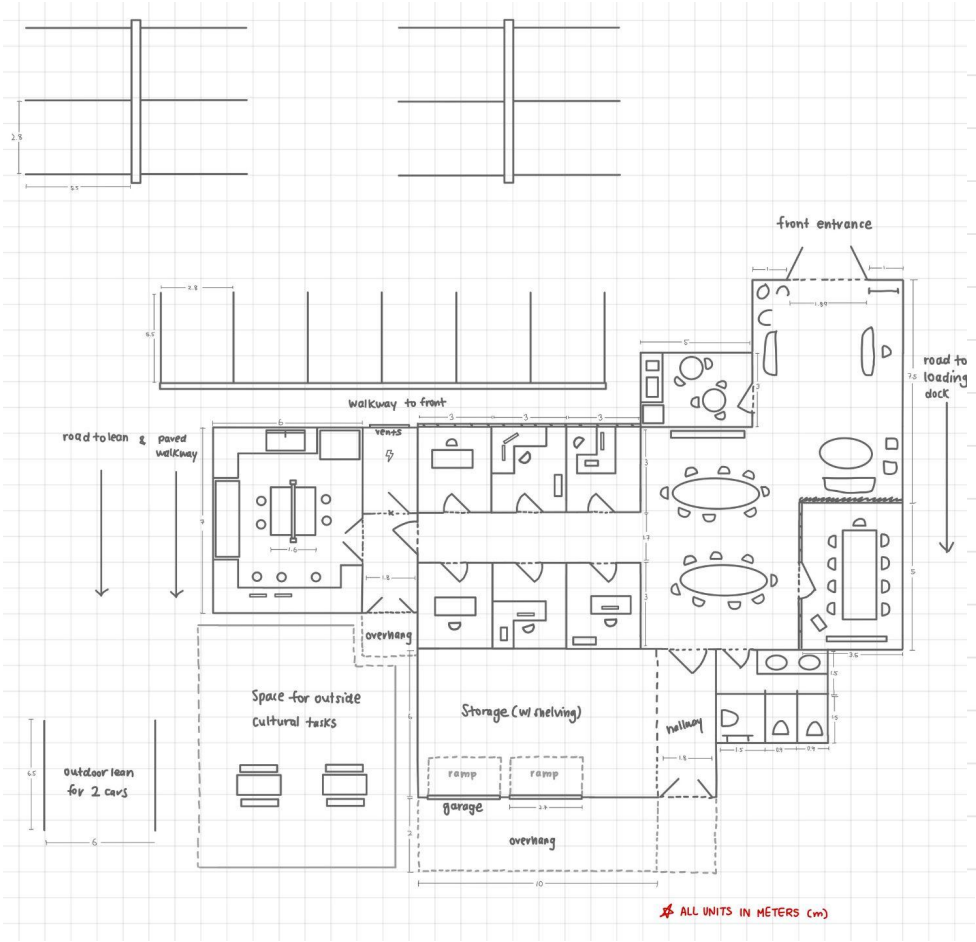
Design Drawing

Based on Deliverable D, the team analyzed the different concepts and determined a global concept to satisfy all the client needs. There were some modifications done to the concept based on the drawbacks of the first ideas such as lack of storage facilities, loading dock, and garage space which was added into this iteration of the design.



Foundation
- Cement
- Water heater
- Plumbing (copper watter pipes, pvc drain pipes)

Wall Materials
- Lumber
- Drywall + screws
- Fiberglass insulation
- Paint
- Windows
- Doors

Floor Materials
- Vinyl composition tiles in Lab area
- Plywood for subfloor
- Nails

Lab Space
- Walk-in freezer
- Electrical outlets
- Large commercial sink

Extra
- Industrial Air Conditioning unit
- Toilets
- Bathroom sinks

Bill of Materials

Bill of materials (BOM) - PROTOTYPE					
Item name	**Description**	**Quantity**	**Unit cost**	**Total cost**	**Link**
3D printing		-	$0	$0	https://www.uottawa.ca/faculty-engineering/spaces/richard-labbe-makerspace

Acrylic sheets	for laser cutting windows (24" x 18" sheets)	2	$20	$40	https://makerstore.ca/shop/ols/products/acrylic-12-inch-x-24-inch/v/M002-18-24-1.8-CLR
MDF	for laser cutting walls/floors (18" x 24" sheets)	5	$3	$15	https://makerstore.ca/shop/ols/products/mdf/v/M003-1-8-18-NCH
Super Glue	for fastening pieces together	1	$0	$0	
Red cable	to represent power lines	2	$3	$6	https://www.sparkfun.com/products/8023
Black cable	to represent plumbing lines	2	$3	$6	https://www.sparkfun.com/products/8022
Yellow cable	to represent ethernet connections	2	$3	$6	https://www.sparkfun.com/products/8024
Solidworks	for rapid iteration of Prototype 1	-	-	$0	https://www.uottawa.ca/about-us/information-technology/remote/lab
Laser Cutter	For laser cutting materials	-	-	$0	https://www.uottawa.ca/faculty-engineering/spaces/richard-labbe-makerspace
Ultimaker Cura	3D printing software	-	-	$0	https://ultimaker.com/software/ultimaker-cura/
Makerspace	for access to 3D printing and laser cutting services	-	-	$0	https://www.uottawa.ca/faculty-engineering/spaces/richard-labbe-makerspace
Total				$73	

Bill of materials (BOM) - ACTUAL PROJECT				
Item name	**Description**	**Quantity**	**Unit cost**	**Total cost**
HVAC	System to manage heating, cooling, and humidity within the building	x1	$23,000	$23,000
Ducts + Vents	For air circulation	200m	$31	$6,200
Water Heater	Electric heater, used to heat water for the entire building (in	1	$6,325	$6,325

	storage)			
Flooring	Vinyl flooring for the whole building	281.9m^2	\$23/m^2	\$6,486
Concrete Foundation	Poured concrete	281.9m^2	\$100/m^2	\$28,190
Parking lot	Asphalt or gravel	300	\$66.7/m^2	\$20,000
Garage	For truck and large vehicle access to storage	x2	\$4000	\$8000
Windows	Allows for natural light in building spaces	x12	\$700	\$8,400
Countertops	Used as a working surface in the lab and used in the kitchenette and washroom	22m^2	\$67.5/m^2	\$1,485
Cabinetry	Used for storage of materials in the lab, kitchenette, washroom, common area, etc	40m^2	\$500/m^2	\$20,000
Appliances	Used in kitchenette, lab, and washroom, includes large and small sinks, faucet, refrigerator, toilets	x1 fridge x1 L sink x2 S sink x3 faucets x3 toilets	\$300/fridge \$500/L sink \$400/S sink \$ 200/faucet \$250/toilet	\$2,950
Double-door Freezer	Big one (Moose-sized)	x1	\$5,000	\$5,000
Lighting	Used to brighten up the room, light types include	281.9m^2	\$42.5/m^2	\$12,000
Roofing	Used to protect the building during all forms of weather, slight decline to allow for precipitation to fall off	281.9m^2	\$250/m^2	\$70,475
Automatic Front Doors	Heavy glass doors to allow light into the	x2	\$5,000	\$10,000

	space, used for easy access into the building (unlocked with a key/code)			
Doors	To connect/divide indoor spaces	x18	$500	$9,000
Plumbing	Pipes to bring water to different parts of the building	200m	$13.42	$2,684
Cables	Power and ethernet	200m	$31.10	$6,220
Interior Walls	Drywall, insulation, framing, paint	511.5m^2 (170.5x3)	$100/$m^2$	$51,150
Security Cameras	Used to monitor building surroundings and inside the common areas in the building as well for safety	x10	$400	$4,000
Accessibility	Outdoor accessibility (ramp), accessible stall in washroom, handicap doors	x1 ramp x2 handlebars X4 handicap accessible doors	$1,000/Ramp $60/Handle bar $5000/Door	$21,120
Exterior Cladding	To protect against outdoor conditions and give the building an aesthetic appeal	344m^2 (86x4)	$200/$m^2$	$68,800
Total				$391,485

Project Risks

Risks	Contingency
Laser cutter is out of order	Start laser cutting printing as soon as possible If not available, pay for off campus laser cutting
3D printers in use	Start 3D printing as soon as possible
Client asks for late modifications	Consult with clients and PM regularly
Team member leaves/drops class	Pick up the slack
Going over budget	Consult and update BOM regularly and consult client/PM
Submission dates change	Finish work in advance. Update and consult the Wrike schedule.

Prototyping Test Plan

Prototyping Test Plan				
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	Longevity	Benchmarking using existing data on how long building materials last, so that we select them appropriately	Helps determine how long the building can be sustained. Results will indicate whether or not materials need to be improved for a longer duration of the building.	Spend 20 minutes researching each material Start the week of Oct. 29
2	Functionality of space	Assume the perspective of each potential worker and evaluate if the facilities we have provided allow them to complete the task as described by the client (i.e lab worker, office worker, manager)	Results will indicate how the provided space contributes in boosting the productivity of the entire company.	Spend 30 minutes as a group brainstorming typical work habits, then spend 15 minutes each thinking of how the space will be used by each Start the week of Oct. 29
3	Meeting the wants and needs of the client	Use 3D model prototype as a reference to test that all the different spaces that the client wants are present	Results will provide insight to how much the client will enjoy the overall design of the project	Client meet 3 duration: 20 minutes Scheduled for November, date TBD
4	Consult an expert	Show the 3D model to an expert civil engineer to ensure the building plan is viable	Results will provide knowledgeable advice on whether the building plan will be feasible.	10 minute consultation with professor Scheduled Monday Nov. 6

Stopping criteria for the tests listed above are difficult to define, however the results of these tests will be used to iterate on our design.