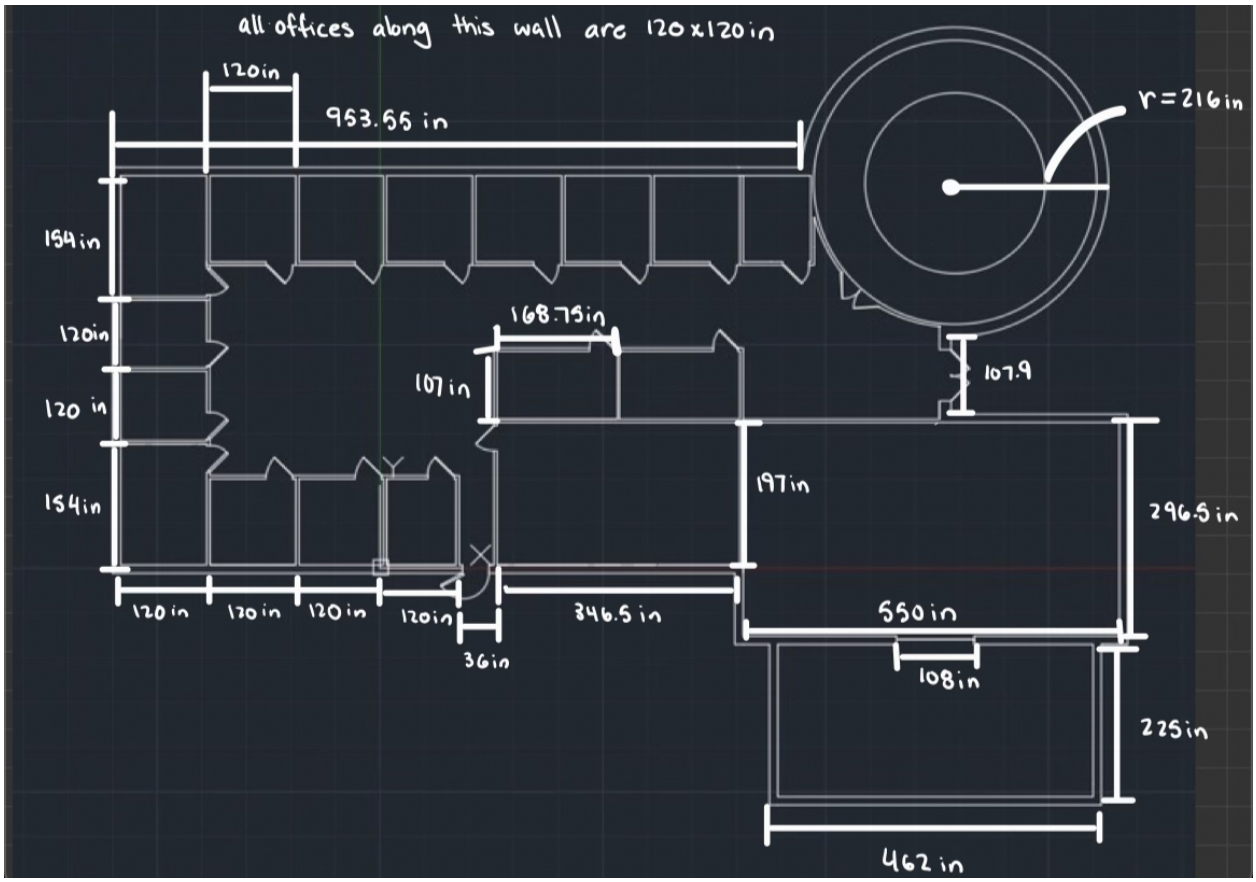
[Wrike Snapshot]

Clear and detailed design drawing:



Bill of Materials (BOM) (Excel spreadsheet):

BOM of full building:

			Quantity	% of Total	Cost per S.F.	Cost
A		**Substructure**		**14.75%**	**$29.74**	**$184,393.35**
A1010		Standard Foundations			$7.03	$43,616.37
		Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide	21.25		$0.16	$1,006.41

		Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide	900		$6.87	$42,609.96
A1030		Slab on Grade			$6.51	$40,376.88
		Slab on grade, 4" thick, non industrial, reinforced, recycled plastic vapor barrier	6200		$6.51	$40,376.88
A2010		Basement Excavation			$0.33	$2,058.28
		Excavate and fill, 10,000 SF, 4' deep, sand, gravel, or common earth, on site storage	6200		$0.33	$2,058.28
A2020		Basement Walls			$15.86	$98,341.82
		Foundation wall, CIP, 4' wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick, 3" XPS	17.71		$0.27	$1,689.02
		Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick, 3" XPS R15	900		$15.59	$96,652.80
B		**Shell**		**35.89%**	**$72.36**	**$448,639.07**
B1010		Floor Construction			$0.24	$1,485.14
		Wood column, 6" x 6", 20' x 25' bay, 12' unsupported height, 72 BF/MSF, 40 PSF total allowable load	1550		$0.07	$446.39
		Wood beam, 3 - 2 x 14, Douglas Fir No. 2, 243 lbs/LF @ 18' span	53.14		$0.17	$1,038.75
B1020		Roof Construction			$9.74	$60,389.24
		Wood roof, truss, 4/12 slope, 24" O.C., 30' to 43' span	1			$9.30
		Wood roof truss, 2' OC, 60' span, 4:12 pitch, 1' overhang, 5/8" sheathing, 1x8 fascia, R30 insulation	6200		$9.74	$60,379.94
B2010		Exterior Walls			$40.12	$248,768.93
		Brick veneer wall, standard face, 2x6 studs @ 24" back-up, running bond	8640		$40.12	$248,768.93
B2020		Exterior Windows			$13.81	$85,609.72

		Windows, aluminum, awning, insulated glass, 4'-5" x 5'-3"	93.91		$13.81	$85,609.72
B2030		Exterior Doors			$4.74	$29,412.58
		Door, aluminum & glass, with transom, narrow stile, double door, hardware, 6'-0" x 10'-0" opening	1.77		$2.48	$15,352.00
		Door, aluminum & glass, with transom, bronze finish, hardware, 3'-0" x 10'-0" opening	1.77		$1.28	$7,924.57
		Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening, low VOC paint	1.77		$0.99	$6,136.01
B3010		Roof Coverings			$3.71	$22,973.46
		Asphalt roofing, strip shingles, inorganic, Class A, 4" slope, 210-235 lbs/SQ	6510		$2.54	$15,748.47
		Gutters, box, aluminum, .032" thick, 5", enameled finish	603		$1.06	$6,594.02
		Downspout, aluminum, rectangular, 2" x 3", enameled, .024" thick	88.57		$0.10	$630.97
C		**Interiors**		**14.63%**	**$29.50**	**$182,901.82**
C1010		Partitions			$9.62	$59,674.93
		Metal partition, 5/8" water resistant gypsum board face, no base layer, 3-5/8" @ 24" OC framing ,same opposite face, sound attenuation insulation	3100		$2.73	$16,903.99
		1/2" fire rated gypsum board, taped & finished, painted on metal furring, low VOC paint	8640		$6.90	$42,770.94
C1020		Interior Doors			$6.08	$37,693.64
		Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8", low VOC paint	31		$6.08	$37,693.64
C3010		Wall Finishes			$1.59	$9,835.41
		Vinyl wall covering, fabric back, medium weight	3720		$1.19	$7,377.28

		Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats, low VOC	2480		$0.40	$2,458.13
C3020		Floor Finishes			$5.01	$31,073.96
		Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 24 oz	3720		$2.72	$16,860.53
		Tile, ceramic natural clay	620		$1.16	$7,181.96
		Vinyl, composition tile, 12" x 12" x 1/8" thick, recycled content	1860		$1.13	$7,031.47
C3030		Ceiling Finishes			$7.20	$44,623.88
		Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support	6200		$7.20	$44,623.88
D		**Services**		**33.10%**	**$66.72**	**$413,684.00**
D2010		Plumbing Fixtures			$7.25	$44,952.47
		Water closet, vitreous china, bowl only w/ auto flush sensor flush valve, wall hung, 1.28 gpf	5.66		$3.37	$20,918.45
		Lavatory w/trim, vanity top, PE on CI, 20" x 18", faucet w/ hydroelectric powered motion sensor	5.66		$1.98	$12,269.82
		Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"	1.41		$0.89	$5,531.82
		Water cooler, electric, wall hung, wheelchair type, 7.5 GPH, GreenSpec certified, ADA	2.83		$1.01	$6,232.38
D2020		Domestic Water Distribution			$0.95	$5,886.83
		Water heaters, tankless, on-demand, natural gas/propane, 9.5 GPM	0.88		$0.95	$5,886.83
D3040		Distribution Systems			$1.54	$9,533.72
		Heat recovery pkgs, air to air, enthalpy recovery wheel, 2000 max CFM	0.88		$1.54	$9,533.72
D3050		Terminal & Package Units			$20.88	$129,458.79

		Rooftop, multizone, air conditioner, medical centers, 10,000 SF, 23.33 ton SEER 14	6200		$20.88	$129,458.79
D4010		Sprinklers			$3.70	$22,925.99
		Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF	6200		$3.70	$22,925.99
D4020		Standpipes			$1.63	$10,120.42
		Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, 1 floor	1.06		$1.63	$10,120.42
D5010		Electrical Service/Distribution			$2.44	$15,152.32
		Overhead service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 200 A	1.25		$0.62	$3,832.31
		Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A	100		$0.80	$4,963.75
		Switchgear installation, incl switchboard, panels & circuit breaker, 120/208 V, 3 phase, 400 A	0.5		$1.03	$6,356.26
D5020		Lighting and Branch Wiring			$17.69	$109,658.24
		Receptacles incl plate, box, conduit, wire, 16.5 per 1000 SF, 2.0 W per SF, with transformer	6200		$5.15	$31,949.41
		Miscellaneous power, 1.2 watts	6200		$0.36	$2,222.51
		Central air conditioning power, 3 watts	6200		$0.64	$3,949.28
		Motor installation, three phase, 460 V, 15 HP motor size	2		$0.88	$5,438.40
		LED fixtures, type C, 10 fixtures per 1000 SF	7130		$7.90	$49,005.70
		Daylight dimming control system, 10 fixtures per 1000 SF	3100		$1.65	$10,202.63
		Lighting on/off control system, 10 fixtures per 1000 SF	6200		$1.11	$6,890.31
D5030		Communications and Security			$7.75	$48,069.39
		Telephone wiring for offices & laboratories, 8 jacks/MSF (cost per MSF)	4.65		$1.76	$10,898.55

		Communication and alarm systems, fire detection, addressable, 25 detectors, includes outlets, boxes, conduit and wire	0.88		$3.17	$19,682.65
		Fire alarm command center, addressable without voice, excl. wire & conduit	0.88		$0.95	$5,875.74
		Internet wiring, 8 data/voice outlets per 1000 S.F.	4.65		$1.87	$11,612.45
D5090		Other Electrical Systems			$2.89	$17,925.83
		Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 7.5 kW	0.88		$0.24	$1,473.82
		Energy monitoring systems, electrical, three phase, 1 meter	1		$0.62	$3,849.13
		Energy monitoring systems, mechanical, BTU, 1 meter w/1 duct & 5 space sensors	1		$1.41	$8,750.70
		Energy monitoring systems, Front end display	1		$0.11	$706.85
		Energy monitoring systems, Computer workstation	1		$0.51	$3,145.33
E		**Equipment & Furnishings**		**1.62%**	**$3.27**	**$20,255.55**
E1090		Other Equipment			$3.21	$19,878.50
E1090D2020 2652760		1.00-Solar, closed loop, external exchanger, 3/4" tubing, 2 each 3' x 7' black chrome collectors	1		$1.81	$11,232.20
E109028231 3102000		1.00-Closed circuit television system (CCTV), surveillance, one station (camera & monitor)	1		$0.29	$1,800.98
		Waste handling, recycling, tilt truck, plastic, with wheels, 0.5 C.Y., 850 lb capacity	0.88		$1.10	$6,845.32
E2020		Moveable Furnishings			$0.06	$377.05
		Signage, exterior, surface mounted, 24 ga aluminum, 10" x 7", no smoking	5.31		$0.06	$377.05
F		**Special Construction**		**0%**		
G		**Building Sitework**		**0%**		

		SubTotal		**100%**	**$201.59**	**$1,249,873.79**
		Contractor Fees (GC,Overhead,Profit)		**25.00%**	**$50.40**	**$312,468.45**
		Architectural Fees		**7.00%**	**$17.64**	**$109,363.96**
		User Fees		**0.00%**	**$0.00**	**$0.00**
		Total Building Cost			**$269.63**	**$1,671,706.19**

BOM of Prototypes:
Analytical: 0$

Material	Use	Amount	Price
¼ MDF	We are going to laser cut the: - Exterior walls This will be done with ¼ MDF	Exterior walls: total of 66 x 1.8 (height of walls) inches of MDF This means we need one 12x24 inch sheet of MDF	$3.50
⅛ MDF	We are going to laser cut the: - Floors - Interior walls This will be done with ⅛ MDF	Floor: 7.5in x 18in Interior walls: total of 67 x 1.8 (height of walls) inches of MDF. This means we need 2 12x24 sheets of MDF	2 x$2.50 =$5.00
PLA	We will be 3D printing: - The roof - Furniture /interior details	We need approximately 0.1425kg of PLA to 3D print the roof.	10c/g

Physical:
List of equipment (software or hardware) needed to build each prototype:
We are doing two prototypes, the first is analytical and the second is physical. For the analytical prototype we will be using Autocad for the floor plan and then import the floor plan into Onshape. We can then use this software to extrude the floorplan and add extra details, and create

a roof to create our analytical prototype. For when we create our physical prototype, we will continue to use Onshape to make our changes to the design. We will 3D print the roof and extra details directly from Onshape, and we will use Inkscape to laser cut the walls and floor.
Equipment used:

- 3D printer
    - OnShape
- Laser cutting
    - Inkscape
- AutoCAD

Significant project risks and associated contingency plans to mitigate the critical risks:

Risks	**Contingency plans**
Running out of time to create all of our prototypes	We will continue with our scheduled meetings and work on our prototypes during this time.
Changes in client needs	If, during our next client meeting, our client makes any drastic changes to her needs, we will have to make changes to our design. We can plan an extra meeting right after the client meeting to discuss how we will improve our design based on client feedback and start any necessary changes.

Prototyping test plan:

Test	**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	Ensure the roof can support a snow load	Using a physical prototype we will add weight to the roof	The roof should not show any deflection. If this test fails, we will have to rethink the design of our roof.	This test will be done when we finish prototype two and should only take 20 minutes.
2	Ensure a person can move comfortably	Using a physical prototype and a physical model of a person (to	The model person should be able to move freely in all areas	This test will be done when we finish

	and safely in the building.	scale with our prototype), we will make sure there is enough room/ see if there is too much useless space in the offices, lab, meeting room, hallways, entrance, ect…	of the building without any obstructions. If we encounter any issues, we will have to adjust the dimensions of said space	prototype two and should take 20mins
3	Ensure our building represents Algonquin culture.	Using our analytical prototype, we will ask a series of people (10) to confirm whether or not they believe our building represents Algonquin culture	If more than three people answer no to this question, we will have to add more cultural aspects to our design.	This test will be done at our next team meeting (Thursday, Nov. 9th) and should take around 10mins
4.	Ensure a wheelchair can fit/access all parts of our design	Once again, using a physical prototype and a scaled model of a wheelchair, we will double-check that everything is accessible to a wheelchair	This test will let us know if our bathrooms, meeting rooms, and gathering areas are fit for wheelchairs. If we see any issues, we will widen entree ways, add ramps if needed, etc…	This test will be done when we finish prototype two. It should take 20mins
5.	Ensure the removable roof on our prototype works	Our physical prototype includes a base and a removable roof. We will have to test if the walls of our prototype can support the roof	We will test that our roof fits well on our base and that it can be easily removed to expose the design of the inside of the building	This will be after our second and third prototypes and should take 5 minutes
6.	Test carbon emissions	Using our analytical prototype we will use software like IES virtual environment to test the carbon emissions of our building. This will consider factors like electricity, heating, cooling, and renewable energy sources.	These results will show us whether we should use any renewable energy sources and ensure that our emissions reflect the goals of the Guardian program.	This will take 1-2 days as the software takes time.