

Project plan and cost estimate

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Abstract

The present document presents a comprehensive overview of the tasks that are required to be accomplished, along with an itemized list of the costs and requirements necessary for the successful completion of the project's prototype.

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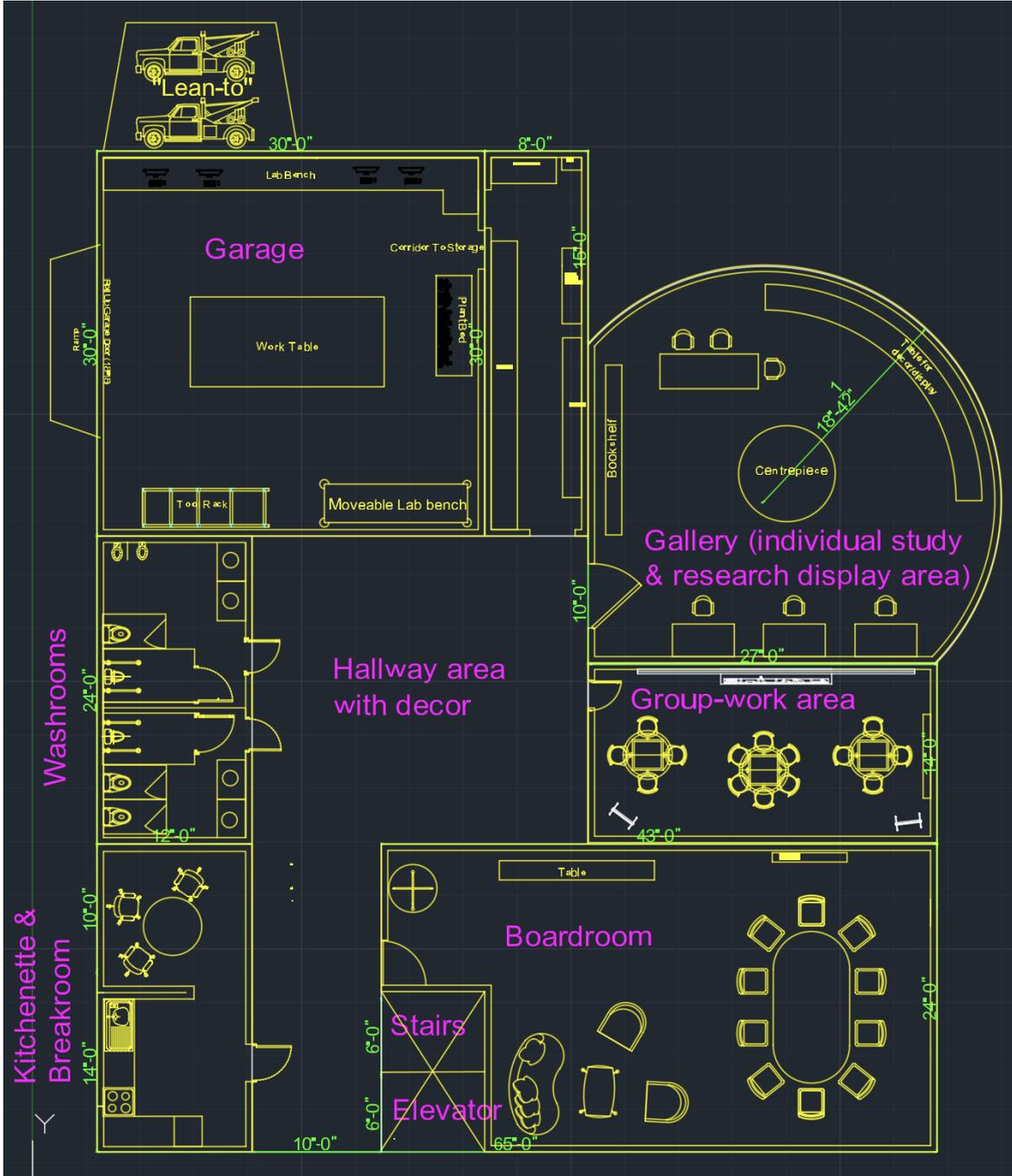
1. Introduction

This deliverable is aimed at the project plan and cost estimate calculation. To begin, a detailed 2D CAD design of the final prototype is included, which outlines how the final prototype will look. This deliverable, as the name says, also contains a list of all the costs not only of the actual building but also the costs of the final prototype. Also had is a list of risks of said chosen prototype and a prototyping test plan. These parts of the deliverable are crucial since they demonstrate even more weaknesses we have yet to encounter. This deliverable ensured we were on the right track, making it an essential step.

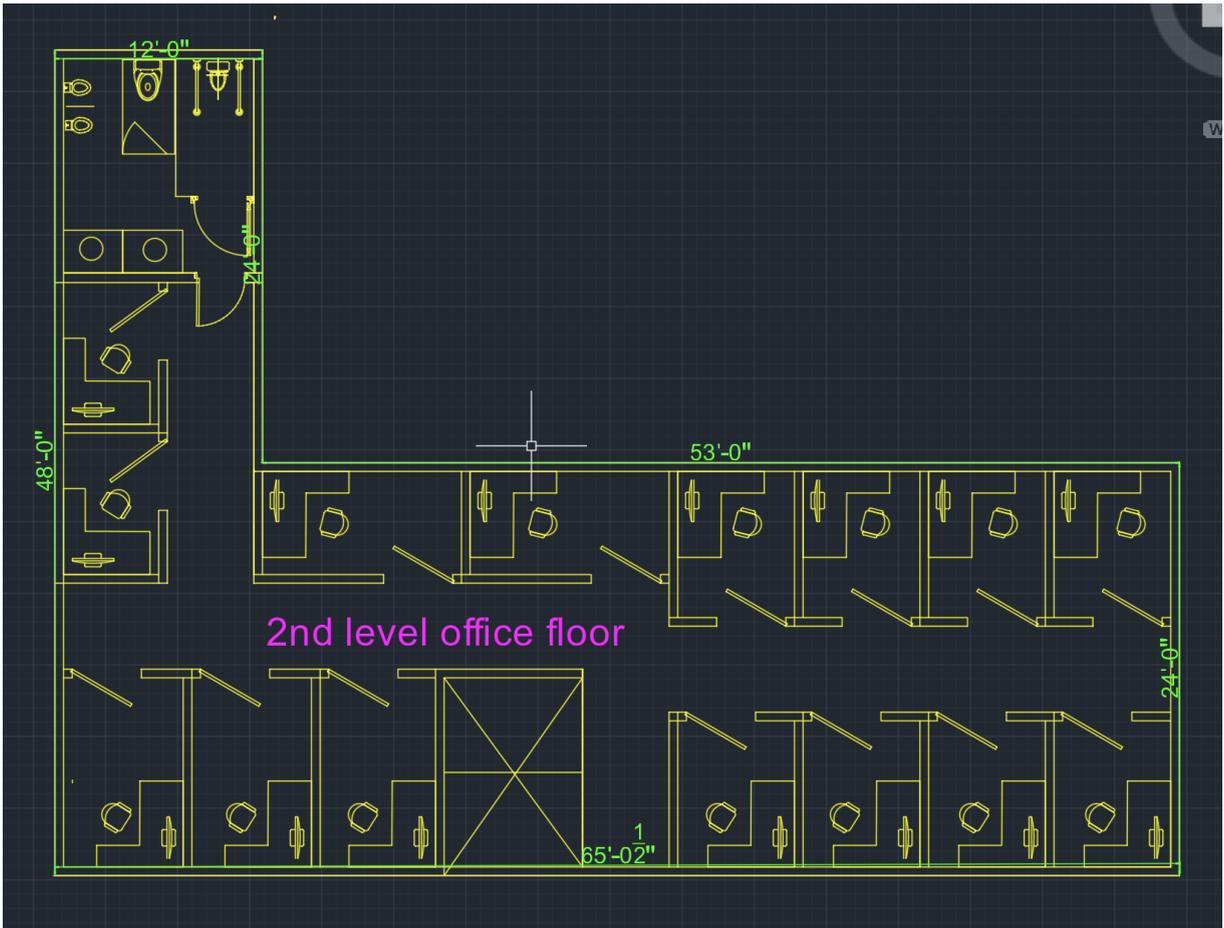
2. Clear CAD design

2.1. General Layout

1st Floor:

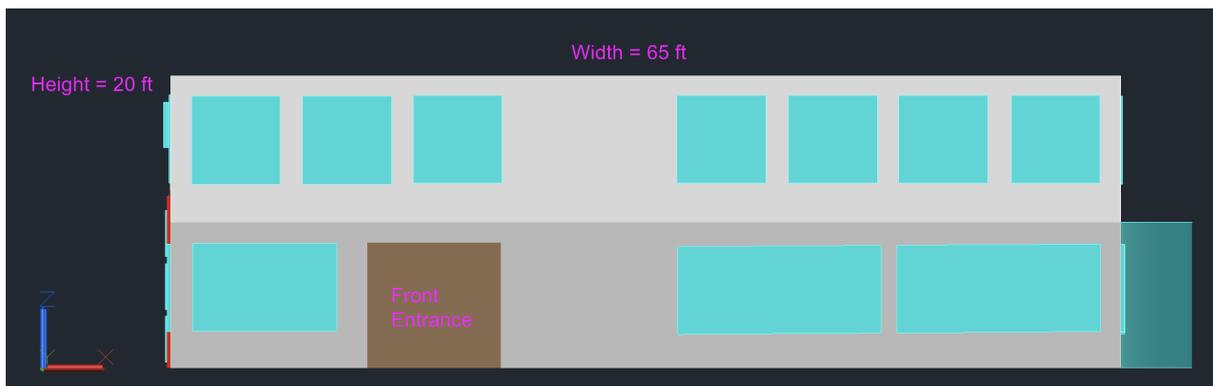


2nd floor:

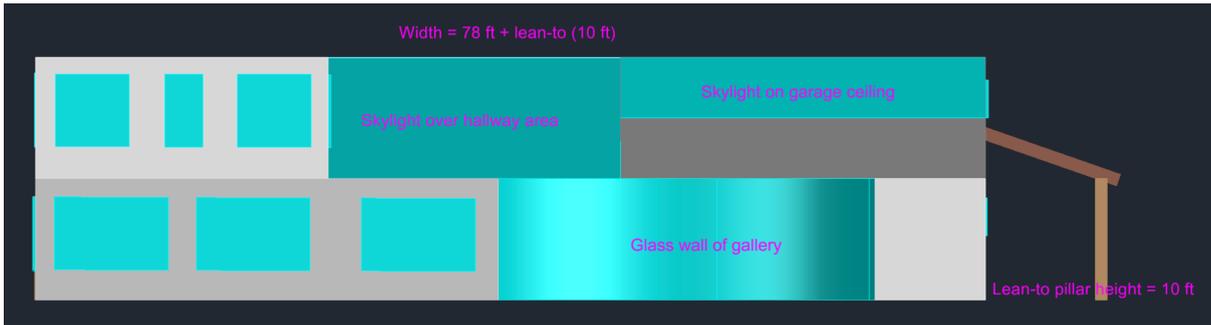


2.2. Orthographic Views

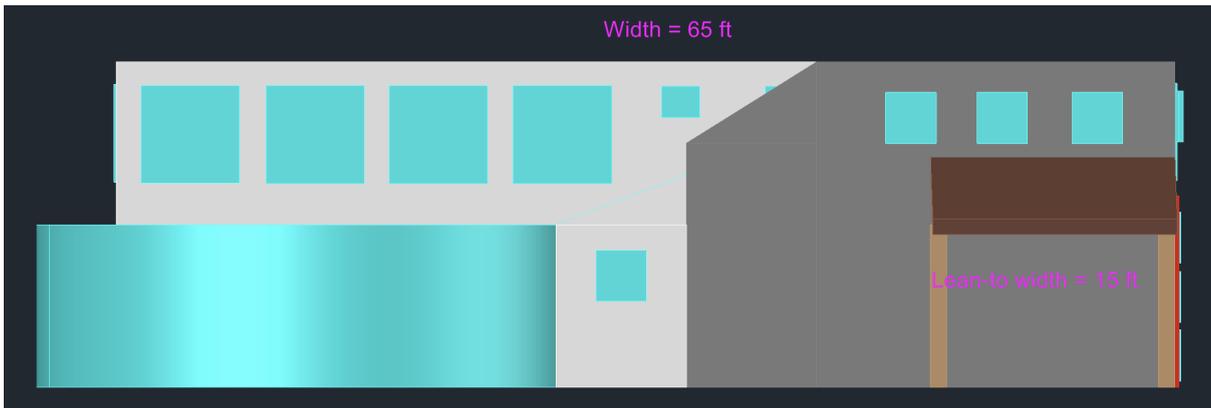
Front view:



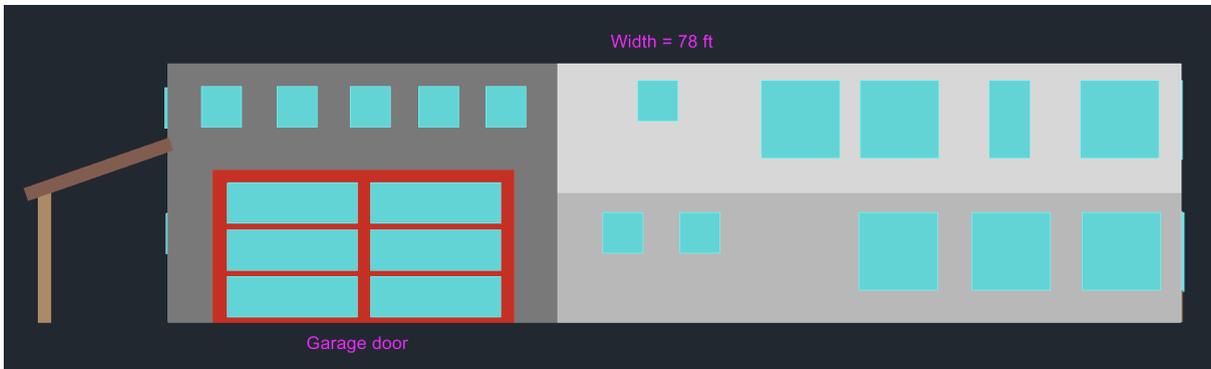
Side view (right):



Rear view:

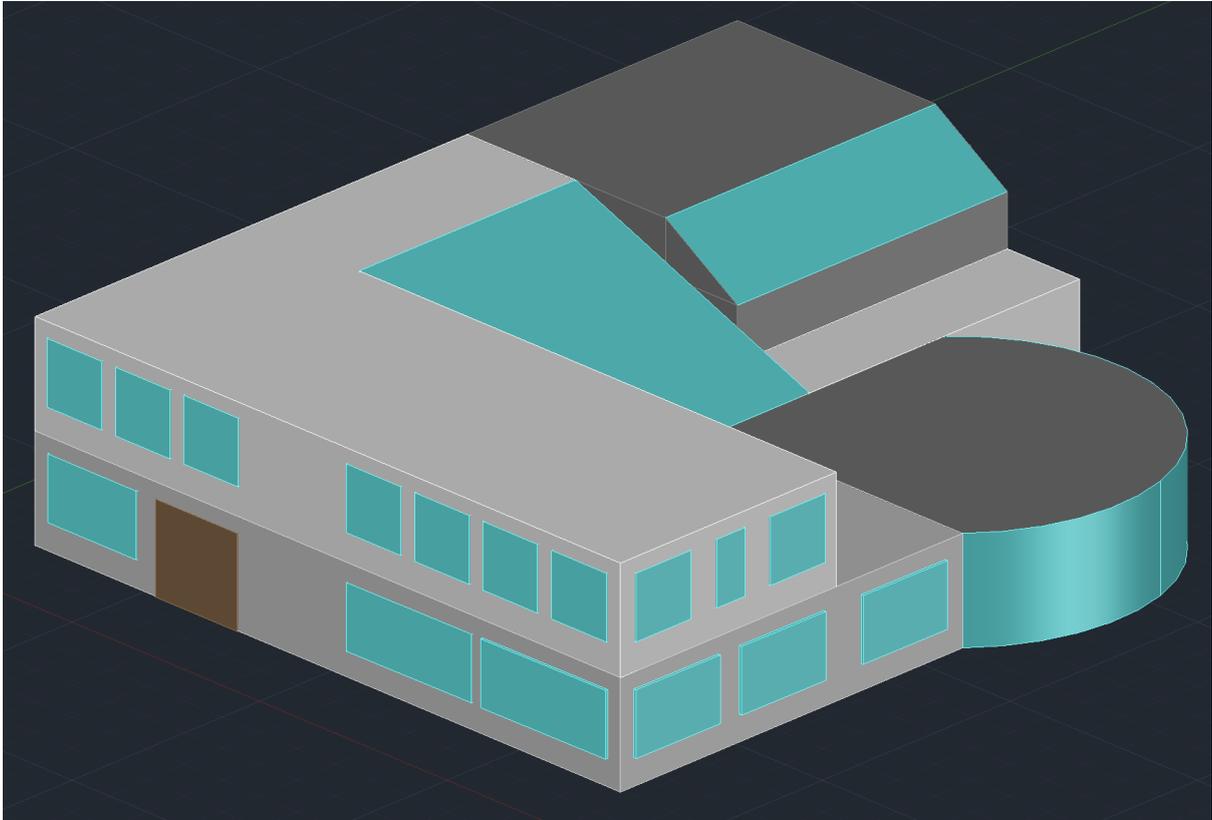


Side view (left):

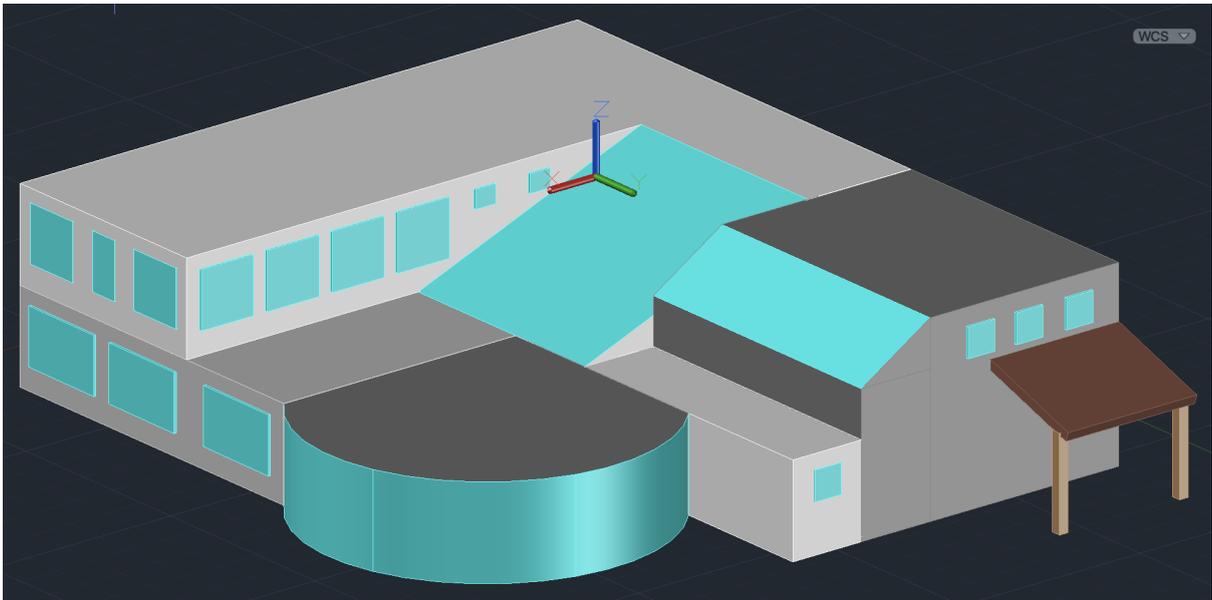


2.3. Isometric Views

Front, right, top:



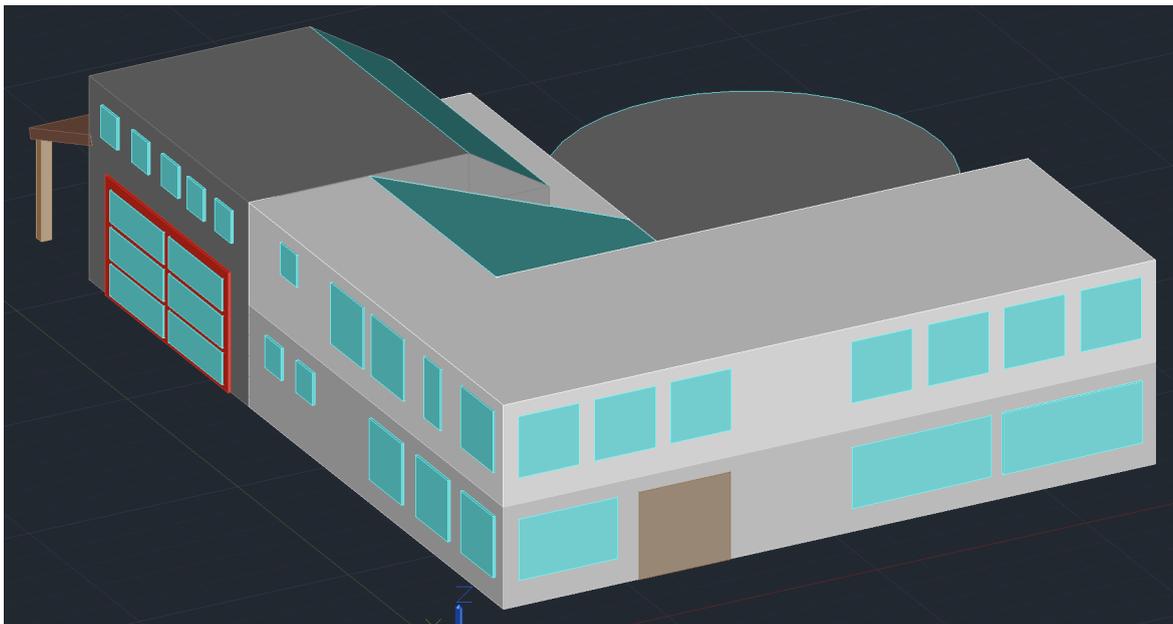
Right, rear, top:



Rear, left, top:



Left, front, top:



3. Product/project cost spreadsheet

Building Cost and Specifications: Square Foot Estimator

Model: Office, 2-4 Story with Fiber Cement / Rigid Steel

Default Building Image



\$1,159,852.01	OTTAWA, ON	2	No
Building Cost	Location	Stories (Ea.)	Basement
\$243.05	4,772	10.00	\$0.00
Cost per S.F.	Floor Area	Story Height	Additive Cost

Estimate Header Information

Building Category: <input type="text" value="Commercial New Construction"/>	Labor Type: <input type="text" value="Standard Union"/>	Release: <input type="text" value="Year 2018"/>	Location: <input type="text" value="OTTAWA (C21)"/>
* Estimate Name: <input type="text" value="Design Building"/>	Client Name: <input type="text" value="Guardian Program"/>	* Folder: <input type="text" value="Current Estimates"/>	Estimate Address: <input type="text"/>
State/Province: <input type="text" value="Ontario"/>	City: <input type="text" value="Ottawa"/>	Zip/Postal Code: <input type="text"/>	Notes: <input style="height: 40px;" type="text"/>

Item Name	Description	Quantity	Cost	Total Cost	Links	Total Interior Cost
Desk	Larger office desks	15	\$574.99	\$8624.85	https://www.staples.ca/products/2797126-en-monarch-specialties-7257-computer-desk-home-office-corner-storage-drawers-80-l-shape-work-metal-grey	\$39134.34
chairs	office chairs	31	\$209.99	\$6509.69	https://www.wayfair.ca/furniture/pdp/inbox-zero-office-chair-c00580833.html?pid=371743003&categoryId=478390&placement=1&slot=0&sponsoredid=64897efbccc064c82967d3175d8e8e03aa9c478f2b0ac38c01ca95d64c873b94&_tuid=%2FWEwmVFJfYv6ZYEX5TAq%3D%3D&isB2b=0&auctionid=536713db-783a-4364-ac11-578676897288	
Large oval table	table for board room	1	\$3099.99	\$3099.99	https://www.wayfair.ca/commercial-office-furniture/pdp/inbox-zero-round-corner-large-conference-table-long-table-simple-modern-creative-desk-rectangular-conference-room-training-table-c100742566.html?pid=1781520311	
circle tables	round tables for group work	3	\$279	\$873	https://www.ikea.com/ca/en/p/docksta-table-white-white-s19324995/	
rolling chairs	mesh rolling chairs for the group work room	14	\$214	\$2996	https://www.uline.ca/Product/Detail/H-3642/Office-Chairs/Mesh-Task-Chair?prcode=YE975&gadtype=pla&id=H-3642&gclid=Cj0KCQwIJKgRhcARISAN_yS_mkoQ2DwWdRwmbiEnLM__f0J8f0Hh0v1b3CthauR_YlXkVn7J5oaA6SSEALw_wcB	
Fridge	fridge for break room	1	\$894	\$894	https://www.homedepot.ca/product/frigidare-28-inch-w-13-9-cu-ft-top-freezer-refrigerator-in-white-energy-star-1001318592	
Sinks	bathroom sinks	7	\$256	\$1792	https://www.homedepot.ca/product/american-standard-boulevard-pedestal-sink-only-with-8-inch-centres-in-white-1001107263	
Kitchenette	Kitchen set for break room	1	\$747.99	\$747.99	https://www.ikea.com/ca/en/p/knoxhult-kitchen-white-s69417223?gclid=Cj0KCQwIJKgRhcARISAN_yS_klbnX5xF3IHJQ946pJcPQ4vUR4DbXVWxRG0K3F9SV03kymWN_ggaAgJXFEALw_wcB	
Tool Chest	Tool storage for garage	1	\$849.99	\$849.99	https://www.canadiantire.ca/en/pdp/maximum-tool-storage-cabinet-built-in-power-bar-with-usb-9-drawer-56-in-matte-black-0582528p_0582528.html?loc=plp	
Breakroom Table set	Set of chairs and table for break room	1	\$254.99	\$254.99	https://www.wayfair.ca/shop-office-spaces/pdp/inbox-zero-albaugh-square-breakroom-table-c004889544.html?pid=580141211	
industrial sink	Large sink for the garage	1	\$659.99	\$659.99	https://www.nellaonline.com/products/nella-18-x-18-x-11-three-tub-sink-with-centre-drain-and-no-drain-board-43765	
Deep freezer	Large freezer for storage room	1	\$729.99	\$729.99	https://www.homedepot.ca/product/galanz-galanz-14-cu-ft-chest-freezer-white/1001797966	
Lab Bench	Large moveable work table to move around the garage	1	\$1070	\$1070	https://www.uline.ca/BL_3510/Mobile-Stainless-Steel-Worktables?keywords=movable-workbench	

Tables	Rectangular tables for the hallway and rooms	4	\$184.99	\$739.96	https://www.wayfair.ca/Mercury-Row--Nagata-70-86-Console-Table-X116225192-L443-K-C005038895.html?refid=GX495297406713-C005038895_50323939&device=c&ptid=1257845018116&targetid=pla-1257845018116&network=g&ireid=191475841&PliD%5B%5D=50323939&gclid=Cj0KCQjwJKqBhCaARISAN_yS_n8wh4g3d188A_BwDx0d70741DEBAuxGmdzxcVANKk0cr4XTR4UNMaA1kEALw_wcB
urinals	urinals for bathrooms	2	\$365	\$1095	https://www.lowes.ca/product/urinals/kohler-dexter-135-in-w-x-2037-in-h-white-wall-mounted-urinal-330990083
Toilets	toilets for bathrooms	6	\$348	\$1044	https://www.rona.ca/en/product/american-standard-champion-48-l-white-porcelain-elongated-2-piece-toilet-2793528nt020-00535050
Large table	Large table for the center of the garage	1	\$890	\$890	https://www.uline.ca/Product/Detail/H-4988-WOOD/Jumbo-Packing-Tables/Jumbo-Industrial-Packing-Table-72-x-48-Composite-Wood-Top?pricode=YG083&gadtype=pla&id=H-4988-WOOD&gclid=Cj0KCQjwJKqBhCaARISAN_yS_IPxv4682TNVdDCnw61o1HM0zOmEVnHM_Nv0V1KK6E90XDBgJ_ULoAg2oEALw_wcB
Round centerpiece table	Large round table for the center of the gallery room	1	\$429.99	\$429.99	https://www.wayfair.ca/Ebern-Designs--47-Inch-Round-Dining-Table-for-4-Farmhouse-Kit-chen-Table-X211761346-L147-K-C100597417.html?refid=GX671252687741-C100597417_149173426&device=c&ptid=2227122775133&targetid=pla-2227122775133&network=g&ireid=258915621&PliD%5B%5D=149173426&gclid=Cj0KCQjwJKqBhCaARISAN_yS_nNulyk80089vNYD9086xD1ahR1mGme7gvXyKb2R2-N9xcVWShac24aArEALw_wcB
small desks	small individual desks for work in the gallery	2	\$96.99	\$96.99	https://www.wayfair.ca/furniture/pdp/union-rustic-waynoka-desk-c002887623.html?pid=1854139671
work table	larger rectangular table for multiple people for gallery	1	\$49.99	\$489.99	https://www.wayfair.com/commercial-office-furniture/pdp/inbox-zero-rectangular-conference-table-w001209646.html
Wall workbench	Work benches mounted on the wall across the garage wall	4	\$148.49	\$593.96	https://www.homedepot.com/p/HARDWOOD-REFLECTIONS-The-Quick-Bench-4-ft-Folding-Workbench-UV-Finish-5420QBWHUB-48/307411379
Book Shelf	large book shelf for the gallery	2	\$311	\$622	https://www.homedepot.ca/product/prepac-black-triple-width-wall-storage/10007363232?e?id=PS_GOOGLD_D59_Corporate_GGL_Shopping_PLA_Decor_Decor_PRODUCT_GROUP_pla-306003763373&gclid=Cj0KCQjwJKqBhCaARISAN_yS_kFm4aYW2heu6hziS4g9MjImYNCXmIhVkiotmxkX8mtUdIZdEY-KYgkaAIW5EALw_wcB&gclidsrc=aw.ds
Commercial Fridge	Fridge for the storage of plants	1	\$1819.99	\$1819.99	https://canaquip.com/products/coolasonic-p800wa-double-door-display-refrigerator
Book Shelf	large book shelf for the gallery	2	\$311	\$622	https://www.homedepot.ca/product/prepac-black-triple-width-wall-storage/10007363232?e?id=PS_GOOGLD_D59_Corporate_GGL_Shopping_PLA_Decor_Decor_PRODUCT_GROUP_pla-306003763373&gclid=Cj0KCQjwJKqBhCaARISAN_yS_kFm4aYW2heu6hziS4g9MjImYNCXmIhVkiotmxkX8mtUdIZdEY-KYgkaAIW5EALw_wcB&gclidsrc=aw.ds
Commercial Fridge	Fridge for the storage of plants	1	\$1819.99	\$1819.99	https://canaquip.com/products/coolasonic-p800wa-double-door-display-refrigerator
Shelves	Long storage shelves to go along the storage room	2	\$429.99	\$859.98	https://www.wayfair.ca/Rebrilliant--Rebrilliant-4pcs-Adjustable-36x-72-Heavy-Duty-5-Level-Garage-Tool-Shelf-2000lbs-Capacity-X115881220-L136-K-C004718570.html?refid=GX205120766584-C004718570_697747315&device=c&ptid=1187843883005&targetid=pla-1187843883005&network=g&ireid=1398318298&PliD%5B%5D=697747315&gclid=Cj0KCQjwJKqBhCaARISAN_yS_nPRXfQLCj3rXaOVcM0UKI9ePr70RA0syKbPKa-az8DNEj0umSFoQaAnvREALw_wcB
Couch set	set of chairs, couch, and table for board room	1	\$1350	\$1350	https://www.wayfair.ca/furniture/pdp/letta-avenue-hendrix-3-piece-velvet-living-room-set-kthm4127.html?pid=81912057

The total cost for the interior of the building will be approximately \$39,134.34. The total cost for the exterior build of the building will be about \$1,159,852.01. With all included, this project should cost around \$1,198,986.35.

4. List of equipment

Prototype #	Prototype Software/Hardware	Description	Cost
1	FloorPlanner.com	An online site where you can upload your floorplans or start from scratch to create your own building design and create a 3D model of your design	0\$
2	Sims 4	An game that can be used on mobile phones and computers to design and create model homes and floorplans	0\$
3	5D Planner	An app or website that can convert floorplans directly to a model, as well as create a floorplan and model with furniture. This model can be viewed in 2D, 3D, VR (with android devices) , and AR.	20/month (in USD)

5. Significant project risks

Foundation Stability

The quality and stability of the soil beneath the building may affect the foundation's integrity; a necessary geotechnical investigation must be conducted before construction

to assess the soil conditions implementations to the design, such as pillars and reinforced foundation based on the results of the soil analysis.

Insulation Technology

The winters in Ontario tend to be rough, which poses a risk of extreme weather conditions to the work done in the lab. Tests must be conducted to validate the insulation methods in the garage/lab to ensure they meet winterization requirements and ensure the lab work is unaffected.

Circuly Gallery Construction

The circular design of the gallery/study area introduces complexities in the construction, leading to risks of construction failure and higher costs. The work must be done with experienced architects and builders familiar with unique designs similar to this and able to combat any challenges in constructing the circular gallery.

Energy Efficiency

In a building of this size with much lab equipment, it may not be easy to maintain energy efficiency, especially considering the lab's equipment. Failure to meet the energy standards may result in higher operational costs. Investing in high-quality insulation with energy-efficient HVAC systems is a must. An energy management plan must be in place to monitor and operate the battery usage in the building.

Long-Term Maintenance

The complex design of the building, more specifically the circular gallery/study area, may create some issues with long-term maintenance. Maintenance for the gallery would be more challenging and costly as it may require a specialist or unique materials. Create a detailed maintenance plan before construction. Maintenance staff should train on the unique aspects of the building and how to care for it.

6. Prototyping test plan

Test ID	Test Objective (Why)	Description of Prototype Used and Basic Test Method (What)	Description of Results to be Recorded and how these results will be used (How)	Estimated Test duration and planned start date (When)
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1	Building carbon emissions to demonstrate the building is green itself.	This can be tested during the prototyping stages by approximating the amount of natural gas the building will produce and multiplying it by a factor of 11.7, which results in the number of pounds of carbon emissions. Yet, it will be more accurately tested once the building is finished and used. This can be done with the life-cycle assessment, which quantifies the carbon emission of a specific building.	The results will be compared with other green buildings to know if the designed building will be considered suitable for the environment. If the results could be better, changes should be made before the actual building is produced to achieve the desired building for the user.	It can be tested during the prototyping stage, and it takes approximately one week to get accurate results. And if tested when the actual building is done, it will take around a month.
2	Building capacity, ensuring the discussed amount of people can fit comfortably	As discussed in the first client meeting, the user wants 20 people to fit comfortably simultaneously . This can be tested by placing blocks in CAD that represent people.	If the 20 cad blocks can fit comfortably with at least a 2 ft radius around them in the 2D CAD design, then it would demonstrate the design fulfills the client's needs. However, if the opposite	This should be tested during the design stage since a change in layout or space cannot be done once the building has begun. It should take around one day to see if the measurements

			happens, the design should be readjusted.	align with the number of people in the building.
3	Ensure the building is adapted for disabled people (fits wheelchairs)	By taking the width of a wheelchair and making sure that width can fit comfortably throughout the CAD floor layout. To double that the calculations were done right once the building is done, a wheelchair will go through the entire building to ensure it is adjusted.	This test will determine if our building design measurements were adequate for a wheelchair. This includes the bathrooms, all rooms, all common areas, and hallways.	This should be tested during the final prototype stage and double-checked once the building is built. It would take around a week to be completed.
4				
5				
6				

7. Conclusions

In summary, the project's plan and cost estimate provide a clear roadmap for the project. The detailed 2D CAD design, cost estimate, and prototyping plans are excellent guidelines for this project. The key risks, such as foundation stability, energy efficiency and others, are identified with proactive mitigation strategies. Essential tests will be conducted to test for soil stability, carbon emissions to have a green-built building, and accessibility tests for those who require aids in mobility, all of which ensure the building's sustainability and inclusivity.

8. Wrike Snapshot link

[Deliverable E snapshot](#)