

Deliverable D

Concept Design

GNG 1103

Group 20

Abstract

This is a document containing the conceptual design of three functional subsystems of the final building, being the drying room, laboratory room, and the board room. The conceptual designs contain information regarding the construction and furniture costs, room dimensions and proportions, and required functionalities.

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2 Objective:

Develop a set of conceptual designs for your problem statement, based on the previous user benchmarking and technical benchmarking and the list of prioritized design criteria you have developed. Analyse and evaluate these concepts and choose the concepts or combination of concepts that you will continue to develop. Justify your reasoning as you go.

Instructions:

1. The final functional solution should have a minimum of three subsystems. You should clearly define the boundaries between those subsystems, so that conceptual designs for each subsystem are inter-changeable.
2. Based on your team's problem statement, benchmarking and the list of prioritized design criteria, each team member will generate at least one concept for each subsystem required. Identify the specific team member creator for each concept in the deliverable.
3. Team members will then reconvene as a team and discuss these concepts in order to categorize/condense/combine/refine/reconsider each sub-system. As a team, your goal is to produce a completely new or modified concepts for each subsystem.
 1. Each subsystem should be well-documented using clear sketches and descriptions. Give a few lines and notes to show the benefits and drawbacks of the different concepts you considered. It should be understandable by a reader who is unfamiliar with your problem.
4. The subsystems can then be combined into three fully functional solutions, by mixing and matching the subsystem ideas. These global concepts must then be analyzed and evaluated against your design criteria using a selection matrix, similar to the one used in class, for comparing the solutions from the technical benchmarking process.
5. From this analysis and evaluation, choose the best global concept and identify it for further development. Give a few lines and notes to show the benefits and drawbacks of the different concepts you considered. Justify your final selection or any ideas that you did not select with suitable notes in the document.

Your chosen concept will continue to be used in future project deliverables, including your task plan and cost estimates, as well as prototyping. It is possible that you realize along the way that your chosen concept is not ideal or perhaps requires modification. Therefore, it is critical at this stage of the process that you properly document your ideas in case you need to change or modify your design later. Therefore, you must also record your top three ideas in the submitted deliverable and you should **also** keep a record of the other ideas that you've generated somewhere safe. It is recommended that you include them as appendix material in your submission.

It is OK to document other exciting ideas that you've had (e.g. you will not be penalized for having *more* than three ideas for the subsystems). However, you still need to select the "best" idea, based on what you know right now and based on your analysis and prioritization of requirements and design criteria so far.

Please capture your work in a structured, technical document format (see the template for the details of what constitutes a basic technical document structure).

Task Plan Update:

1. Update your Wrike task boards to include any changes in estimated task duration, missing tasks, task responsibilities, milestones, or dependencies, based on your better understanding of the project or based on feedback that you have received from your PM/TA.
2. Include more detailed sub-tasks for the tasks that will need to be completed over the next few weeks.
 - Important note: It should be possible for ONE person to complete each identified task or sub-task in the allotted time. The allotted time should also be *reasonable*, based on the task owner's availability. Everyone should be doing their fair share of the work.
3. Verify and update the task start dates and end dates for each task, based on your project progress.
4. Ensure that you have taken into account each team member's *actual* availability over the next two weeks, as well as significant events, such as particularly high course loads, exams or travel, which might be going to limit actual project work progress.
5. For *each* person in your group, it should be possible to determine:
 - What was completed last week (i.e. "**Completed**" tasks),
 - What will be done next (i.e. "**In Progress**" tasks)
 - If tasks are going to be put "**On Hold**" or "**Cancelled**" altogether
6. Any and all group "Issues" should be discussed and dealt with, ideally with the assistance of your Project Manager (PM). This should happen during **each** of your lab sessions or can happen earlier, using your defined communication methods. As already explained, it is essential to keep your PM/TA "*in the loop*" throughout the term. It is usually *not* a good idea to ignore conflicts between team members. Instead, you should deal with them in a constructive way.

3 Subsystem List:

4. Office space (6) and 4 workspaces, moderately secluded from public spaces.
4. Laboratory space with freezer for preserving specimens, no chemicals involved.
4. Drying space for plants, must be low humidity.
4. Community spaces, internal and external.
4. Board room for meetings and training, also should be secluded from public spaces.
4. bathrooms with 2 stalls each
4. Storage space for handheld equipment.

4. Specifications

Cost limit is \$250 000. Assuming \$200 per square feet single floored, which is average cost in residential areas, minus \$50 000 from limit for precaution, total area achievable is 1000 square feet, which is 93 square meters. A minimum estimate of 9.5m x 9.5m. Note that land cost could account for 30% of house costs in residential areas, we are not working with residential areas.

We can raise the maximum limit to \$2.5 million, minus \$500 000 for precaution and \$500 000 for furniture, which is 6 000 (now assuming \$250 per square feet) ~~10 000~~ square feet or 560 ~~930~~ square meters single floored, 23.7m x 23.7m, though we can assume from the client's proposal, cost effectiveness is a big concern, so try to keep the costs to a minimum.

Include electrical requirements/costs. Number of outlets and other mechanical specification.

10 Lab workers at max. 7 office workers at max.

Hallways should be wide enough for three rows of people, around 1.5 meters wide.

Estimated door size: 0.91 meters W x 2.03 meters H or 3'W x 6'8"H.

4.1 Board room:

Should be able to accommodate for less than or equal to (<=) ~15 people (chair spaces while also having room for walking).

	size	Cost
Board room	20'x12'*	
Desk size	29.50" H x 78.70" L x 39.30" W	\$1,500
White board	8' W x 4'H	\$341
Projector	7" H x 15" L x 12" W	\$500
Office drawers	68 W x 22 L x 30 H"	\$800-\$1100
Office cabinet		\$600
Projector screen	100" across	\$200
Sound system		\$200-\$500

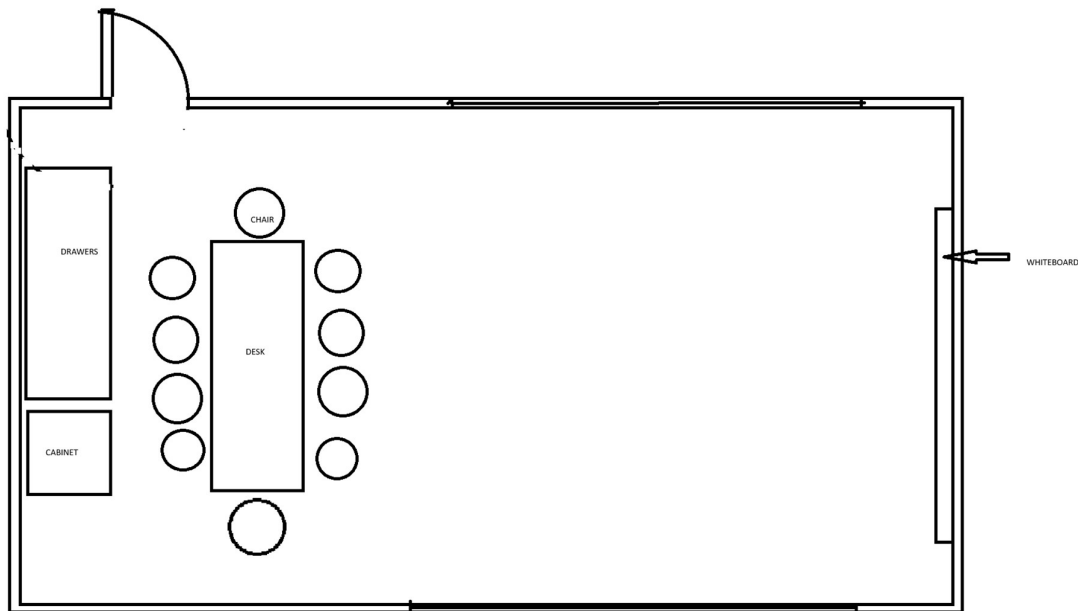
Room dimensions: 21'4" x 13'4" (feet ('), inches ("))

Cost of room: \$66,000

Estimated cost to furnish boardroom: \$4100-\$4500.

Total: \$72,000 + \$ 36,000(precaution) = \$108,000

- At least 4 outlets across the room
- Wide windows.
- Can have some paintings and art.
- About 3-meter-high ceilings
- Sound system in-built in ceiling
- Lights can dim and brighten.
- Air conditioning connected to the main ventilation unit.



4.2 Laboratory:

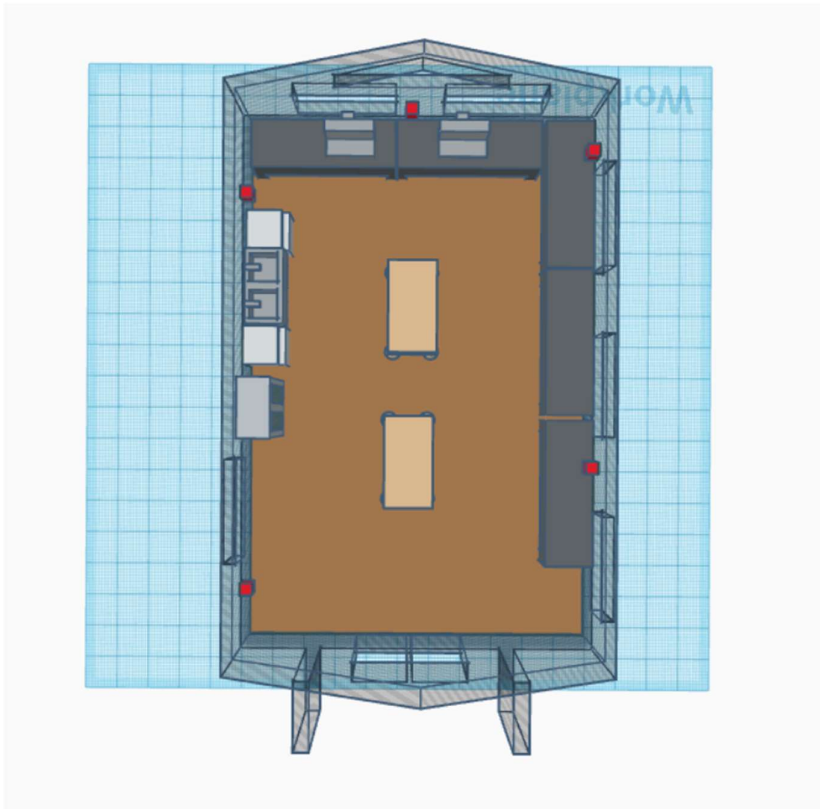
Area: ~640 square foot (\$230 per square feet) or 54 square meters

Internal dimensions: 6.0 m x 9.0 m x 3.1 m (W, L, H)

Construction cost + precautionary cost + furniture cost: \$130 000 + \$60 000 (precaution) + (\$2500 + \$810 + \$1560 + \$2120 + \$7750 + \$1200) ~ = \$205 940 (total cost)

Product name	Size (meters)	Cost (\$ CAD)
Freezer	0.6 W x 0.59 L x 0.52 H (extra 0.1-meter space on back and sides to disperse heat)	1250
Lab cabinet	0.92 W x 0.5 L x 2.0 H	810
Movable lab bench	1.53 W x 0.77 L x 0.92-1.17 H	780
Stationary lab bench	2.44 W x 0.77 L x 0.71-0.97 H	1550
Lab sink	0.61 W x 0.61 L x 1.07 H	1060
Computer monitors (basic)		600

- At least 5 outlets panels, each with 2 ports.
- Could add a fire escape exit.
- Many windows to allow outsiders to see inside. Client mentioned they want people to know about their work.
- Slanted roof at an estimated 30 degrees.
- Single double door leading inside. To clarify the diagram, there will be no poles in the middle to allow for carts to enter, transporting large objects.



4.3 Drying room:

Dimensions: 3.0m (width) x 5.0m (length) x 3.0m (height)

Area: ~135 square feet

Approximate cost of room: \$46,575.00

Features:

2x Hamilton Beach 32100C electronic dehydrators (A)

- 26.3cm x 33.5cm x 28.7cm

4x Lee Valley Eight Tier vertical herb dryers (B)

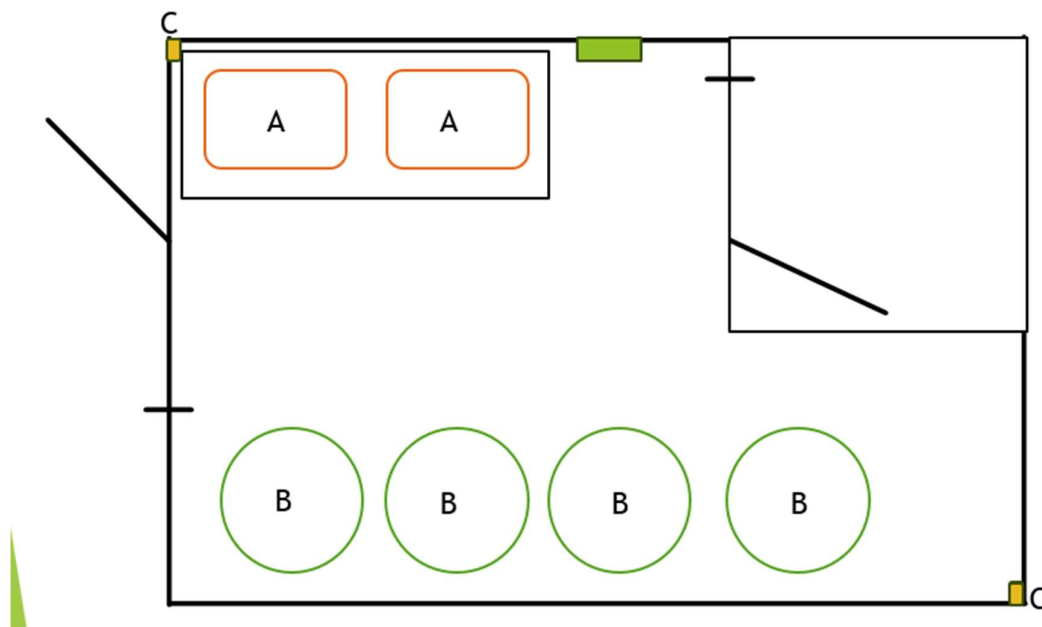
- 162.6cm x 55.9cm x 55.9cm

Isolated environmental controls.

- Ventilation connection to rest of building can be cut off manually
- Dehumidifier
- Space heaters
- Lack of windows prevents fluctuation internal temperatures from the sun.

Room Outlets located at points ©

Small Storage closet to stow the electronic and vertical dryers, or storage racks for dried herbs and plants being processed.



5 Client feedback:

- Drying room and lab should be separate.
- Preferably little use of glass externally. Easily broken.
- Board room is perfect, “big check mark”.
 - 4 outlets are enough for the board room.
- The above concepts meet the space requirements.

6 Expanded specifications:

- Client plans to host meetings in the new building, considered a spacious group.
- Heavily trafficked, 30 people daily. Refers to workers and researchers, not including visitors.
 - Building should accommodate at least 30 people total, +33% for precaution (at max 40 workers). Not including occasional visitors.

- Occasionally will invite elders.
- Annual career fair. They would like the option to host it in the new building.
 - Large public space, we would suggest outdoors, as it is only annual.
- Sampling of lab specimens take 4-6 days, this includes animals, plants, and inorganic samples such as lake water.
- Drying of herbs take 2-3 days.
- The client doesn't plan on connecting the new building with their current one. Plans on moving projects in the current building to the new building.
 - The new building should be self-sustaining.
- Winters are brutal.
- Want the building to look as natural and historical as possible, sustainability.
- Want a lot of room between the lab and the loading bay.
- Walk-in freezer is a necessity.