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Project Requirements (PR)

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Project Title	Wellness Room Expansion
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Tutorial Section	125
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AI Usage? (Y/N)	N

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Executive Summary

The Client

Lucy Chandler is the Residence Life Coordinator of Chestnut Residence, a student dormitory and hotel for University of Toronto students and tourists. This project concerns the wellness room located on the 28th floor of Chestnut Residence, which, as Ms. Chandler stated, requires functional improvements to enhance students' and other users' experience.

Purpose of the Document

The following document utilizes research and client input to outline the interplay of the project's service environment, stakeholders, functions, objectives, and constraints without suggesting solutions.

Major Findings

The underlying functional gap is an enticing and conducive space for students to experience, as identified from site visits and the client meeting. It needs elaborate means to differentiate it from a regular Chestnut housing unit and fulfill its primary function of transmitting wellness information. This need arises from the existing state of the wellness room, as it currently consists of elements of static lighting conditions, poorly insulated interior walls and ceiling, and deficient biophilic design, all of which lack maintenance. Such shortcomings lead to the room's current under-utilization, which motivates renovations and informs the objective of making the room favorable for wellness and relaxation.

These targets align with interests of stakeholders like the residence's wellness coordinators, the University's student unions, and local health science networks, who may utilize the room to organize wellness events. The design's influence on these parties and vice versa thus give rise to another objective of ensuring the design is community-based and allows for weekly events to be held. Furthermore, the design must meet the client and provincial building code's demands, as they dictate the project's budget and structural limitations. Specifically, the project shall utilize no more than \$25000 to cover for renovation costs and a minimum of two years of maintenance.

Current State of Project

The content covered in this document will pave way for the second client meeting when the project enters the idea generation phase. Implementing a design conforming to these requirements is imperative to improving the wellness of University of Toronto students and creating an overall more welcoming environment at Chestnut Residence.

1.0 Introduction

Chestnut Residence serves as a dormitory for students at the University of Toronto (UofT) during academic terms and as a hotel in the summer. It has many amenities, including a wellness room on the 28th floor. According to the Residence Life Coordinator and client, Lucy Chandler, this space is “under-utilized” and requires functional and potential structural improvements to meet the expectations of individuals and groups of students, and professionals [1]. This document outlines the requirements of the project, the environment of operation, and stakeholders to consider.

2.0 Problem Statement

Currently, the wellness room is under-utilized, as it is rarely booked despite the residence’s student population of nearly 1150 (Appendix A) [2]. Additionally, of the 4752 UofT students who responded to a 2017 survey, over 70% share sentiments of being overwhelmed, depressed, and exhausted [3]. These factors motivate the necessity for this project.

Identified below are the reasons why the existing wellness room does not adhere to the design criteria for restorative spaces presented by the WELL building standards [4]. There is poor maintenance, disregard for a biophilic design or dynamic lighting, and persistence of a buzzing sound as shown in Figure 1 and Appendix B.



Figure 1. Plants deficient of care (a), fixed & limited lighting elements (b), binary light switch (c).

The wilting plants suggest infrequent maintenance on essential aspects that encourage mental well-being; the binary lighting options reveal the user has restricted control over their surroundings; and the noise demonstrates the intrusive nature of the existing environment [5]. Thus, the gap is a conducive wellness room promoting mental well-being and user comfort.

The client therefore needs a solution to optimize the space and integrate components fostering a serene environment for individuals to collect themselves, groups to host wellness events, and professionals to use as offices (Appendix C). The physical scope of this project is strictly outlined in red in Figure 2. It

consists of the existing structure and contents of the wellness and study rooms, including the walls and electrical systems within them. The virtual scope is any technology that may be implemented in the room, as per the client statement, and excludes considerations to the website or booking process [1].

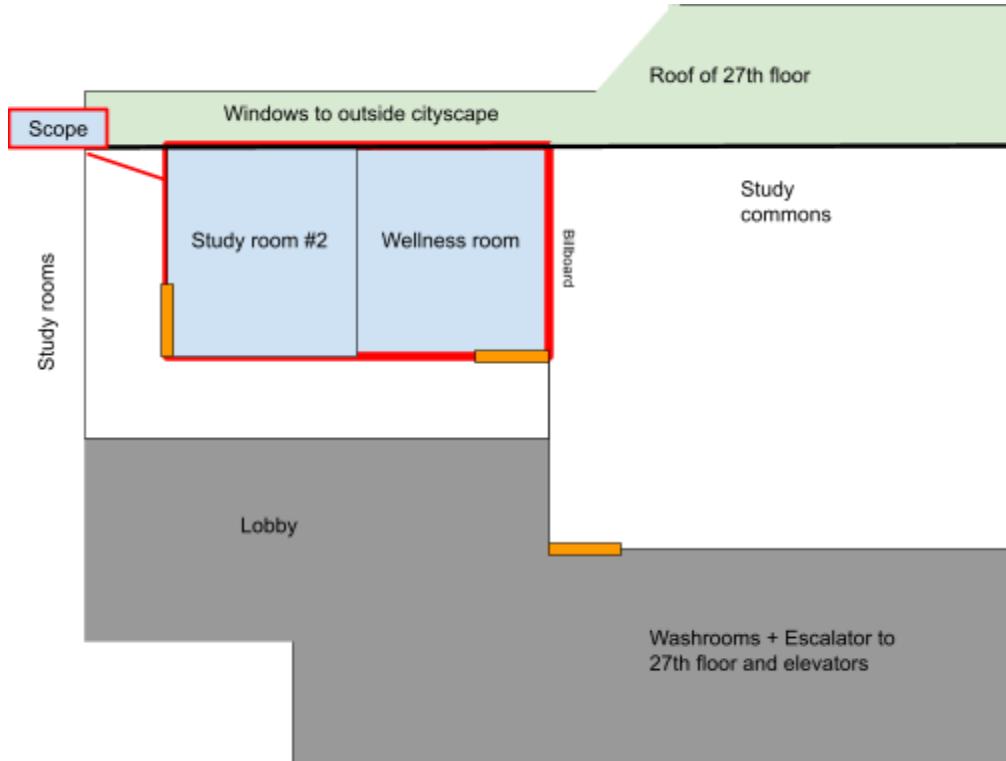


Figure 2. Basic Map of 28th floor

3.0 Service Environment

Elements of the revamped room will coexist with and adapt to the existing environment of the wellness and study rooms.

3.1 Physical Environment

Table 1 details the indoor conditions.

Table 1. Physical Environment of the Room

Aspect	Descriptions	Design Impact
Dimensions	Measurements detailed in floor plan (Figure 3)	Restricts the design's physical space.
Facilities	Furniture and other facilities are placed in the room affording the users to work, sit, and lay.	Not limited by fixed furniture.

Aspect	Descriptions	Design Impact
	All furniture can be moved without tools. Details of each object are in Appendix D.	
Auditory	Incoming noise reduction when doors are closed range from 12-14 dB resulting in ambient noise of 39-45 dB (Appendix E). Air-conditioner in the study room produces a constant buzzing of 1.5-9 kHz (Appendix B).	The client desires improved soundproofing and lighting system (Appendix C) [1].
Lighting	Toggle light switches connected to overhead lights. Curtains cover the four east windows; two of them are broken. Light intensity: 153-346 lux, averaging 266 lux (Appendix F).	
Path to the Room	Elevators service up to the 27 th floor. Escalator and staircase connect the 28 th floor. (Appendix G)	Room is inaccessible to some mobility-impaired people.

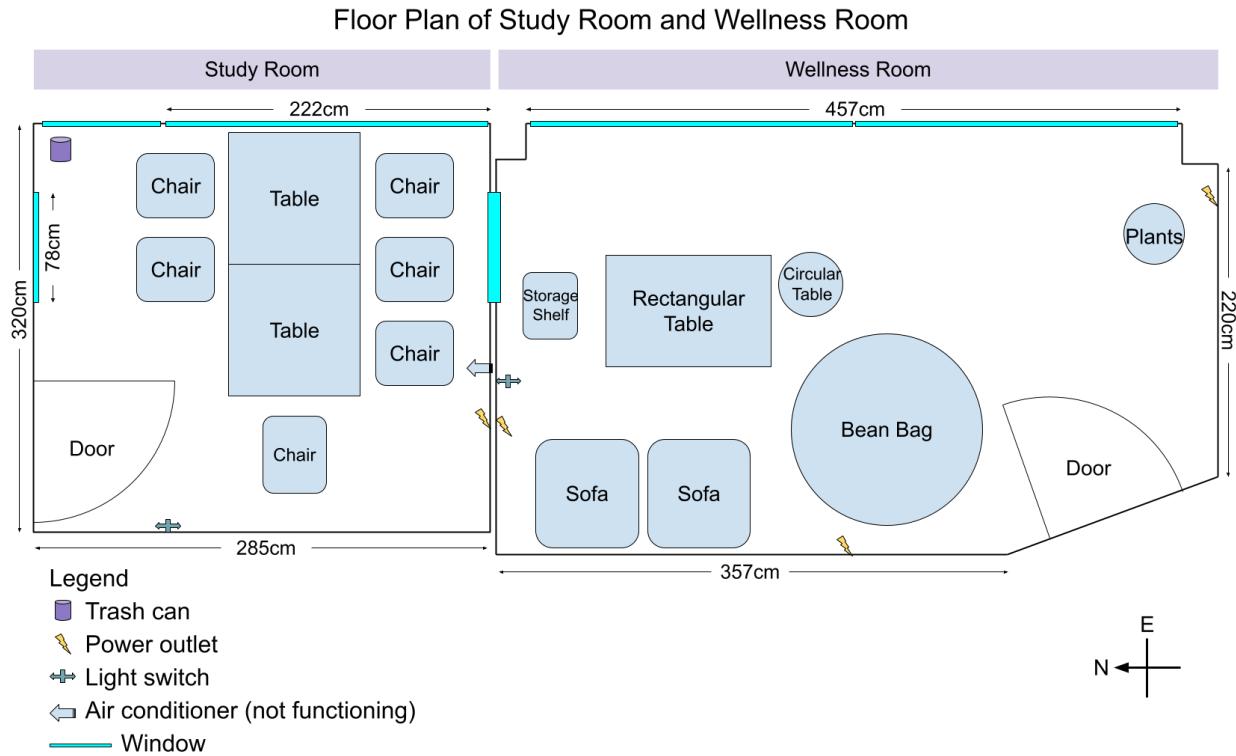


Figure 3: Floor Plan of Current Rooms

3.2 Living Things

Table 2 details the living things the room must accommodate.

Table 2. Living Things With Access to the Room

Aspect	Descriptions	Design Impact
Users	<p>~75% undergraduate first year students at Chestnut Residence [6].</p> <p>Residence staff and tourists when Chestnut operates as a public hotel in the summer.</p>	Users physically interact with the design and may damage parts.
Service Animals	Service animals and therapy dogs (Appendix C).	Animals may damage the design.
Plants	Four potted plants (Appendix D).	Maintaining plants may expose the design to water.

3.3 Virtual Environment

Table 3 details the virtual service environment.

Table 3. Virtual Environment

Aspect	Description	Design Impact
Servicing Hours	<p>Rooms are available from 7am to 10pm by Online Booking [7].</p> <p>Study room: maximum 2 hrs/day per person</p> <p>Wellness room: maximum 1 hr/day per person</p>	The design should factor in the operational hours of the rooms.
Wifi Condition	<p>WiFi speed: 140 Mbps</p> <p>Signal strength: -56 dBm (Appendix H)</p>	Implementing new technology may require utilizing this virtual infrastructure.

4.0 Stakeholders

Table 4 shows a list of stakeholders impacted by improvements in capacity and capability to the room.

Table 4. List of Stakeholders

Group	Stakeholders	Impact <i>The room can:</i>
<u>UofT Wellness Staff & Guests</u>	<p>Chestnut Residence community wellness coordinators (CWCs) [1] [8]</p> <p>UofT Health & Wellness Centre Workers</p> <p>Workers in the Toronto Academic Health Science Network, containing all hospitals affiliated with Uoft [13]</p>	<p>Economic: be a temporary office for coordinators to organize events inside, creating job opportunities</p> <p>Ethical: reduce needs for escalating use of wellness resources</p> <p>Social: host guests invited from the hospital network for educational programs</p>
<u>UofT Student Groups</u>	<p>UofT Students' Union & UofT Graduate Students Union; groups representing the UofT student body [9] [10]</p> <p>UofT student clubs (i.e. Uoft Mental Health Student Association) and workers (i.e. HealthyU Crew) [11] [12]</p>	<p>Social: host events relevant to the group</p> <p>Economic: provide new volunteer and work opportunities</p>

	UofT students (i.e. psychology students)	
<u>UofT Other Staff</u>	University Planning, Design and Construction and Chestnut Residence staff [14]	Legal: be potentially unsafe as a workplace during construction and upkeep
<u>Nearby Alternatives</u>	Toronto Public Library, especially the Reference and Lilian H. Smith branches near Chestnut, and UofT libraries Other UofT college residents	Social: modify population of students in the library, due to the similar user demographic as a wellness event space and public meeting room Economic: devalue, comparatively, other residence options

Figure 4 shows the stakeholders' importance in influence and interest.

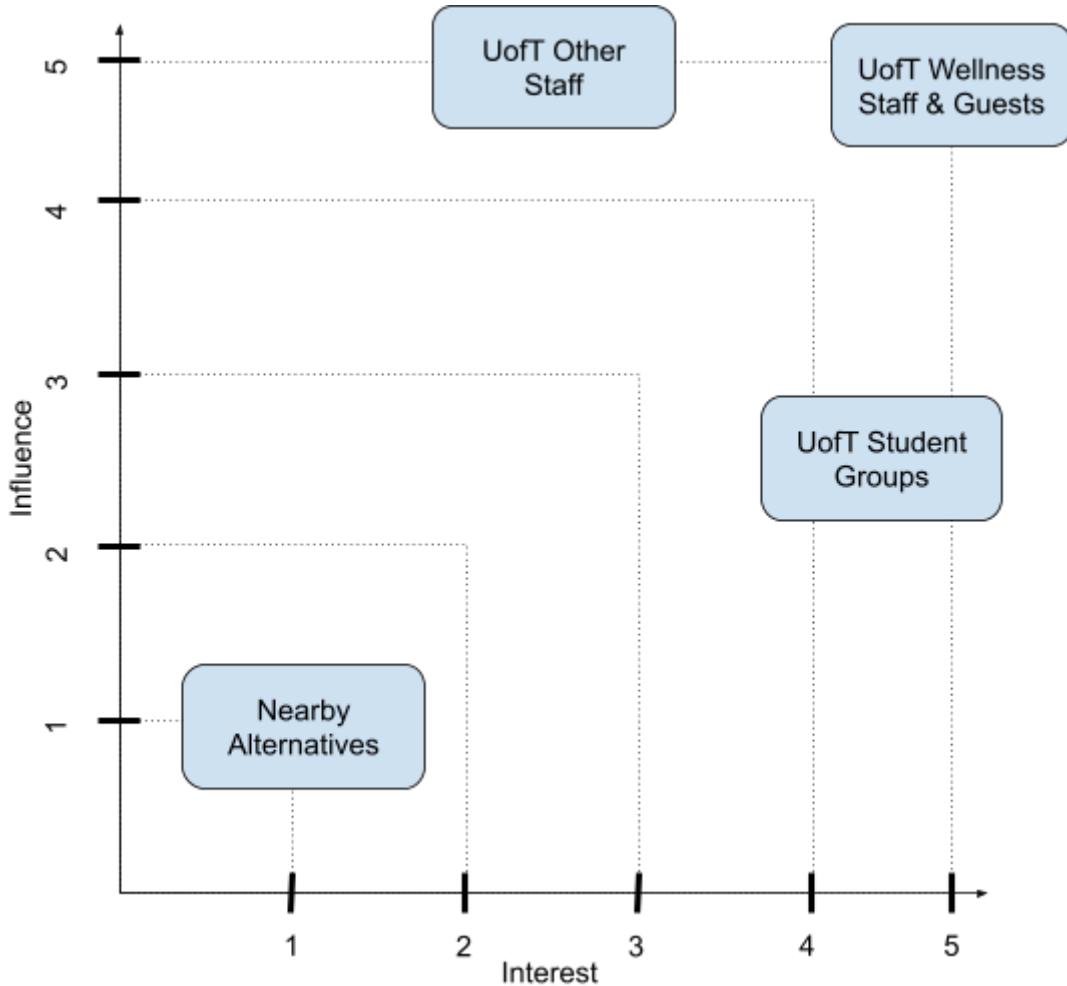


Figure 4. Stakeholder rankings.

5.0 Detailed Requirements

5.1 Functions

Using the Black Box and Functional Basis methods, the primary functions of storing people and objects and transmitting wellness information were decomposed into secondary functions, shown in Figure 5 (Appendix I).

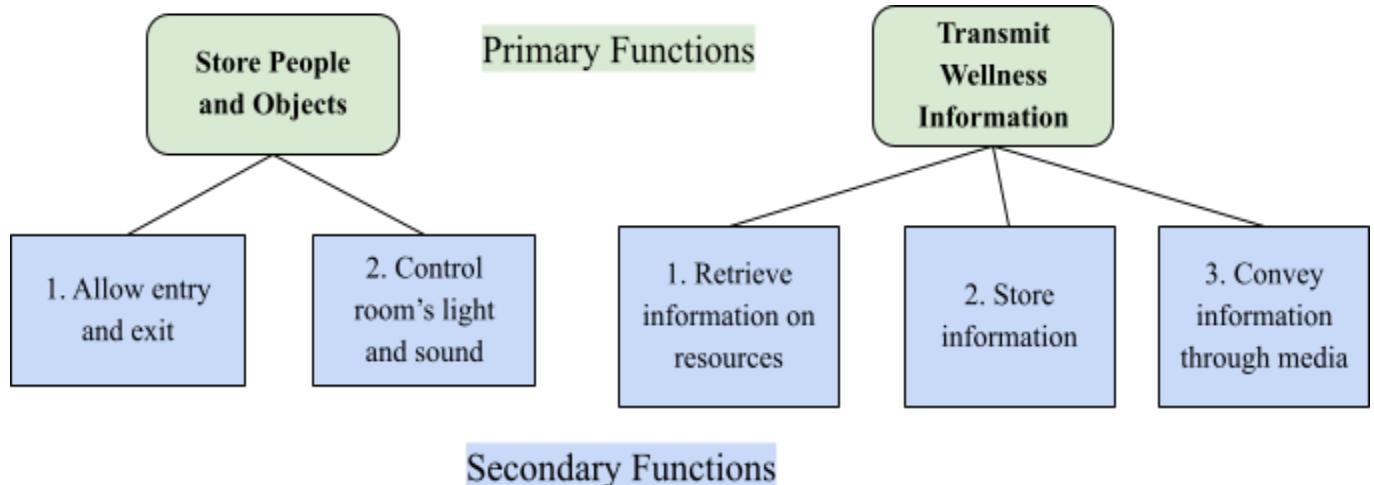


Figure 5: Diagram of project functions.

5.2 Objectives

Table 5 shows objectives in descending order of priority, ranked by pairwise comparison (Appendix J). Overall, they are designed to increase privacy, relaxation, and productivity through scientifically proven methods and ergonomic principles, while allowing wellness resources to be accessible to all users.

Table 5. Objectives, Goals, and Metrics

Objective <i>The design should be:</i>	Goal <i>The design should:</i>	Metric
Conducive to wellness and relaxation	Allow comprehensibility of wellness information through visual, auditory, and tactile cues (Appendix C)	Modes of communication
	Incorporate accessibility to five different forms of media communicating wellness information (Appendix C)	Forms of media

Objective <i>The design should be:</i>	Goal <i>The design should:</i>	Metric
	Allow individuals in distress to connect with a wellness professional within 1 minute (Appendix C)	Minutes
Mentally stimulating	Aim for 12% of natural green coverage ratio [5, 16]	Percentage
	Only use materials with natural grains and textures such as wood, stone, concrete, brick, wood, plants, and plant-like material [16]	Material type
	Incorporate Human Centric Lighting to mimic natural lighting (i.e. utilize bright, blue-enriched lighting in the morning and switch to warmer, dimmer lighting in the evening) [17]	Light colour
	Incorporate lighting with exposure of up to 10000 lux [18]	Lux
	Incorporate ten mentally stimulating resources (Appendix C)	Number of mentally stimulating resources
Distraction-free	Maintain sound levels to be within 45-50 dB at all times [19]	Decibels
	Fully integrate soundproofing insulation behind walls, ceilings, and floors [20]	Percentage
Comfortable for users	Maintain air temperatures of 20-25°C [21]	Degrees Celsius
	Incorporate seating where backrest has a minimum adjustment range of 15° (within 90° to 120° relative to horizontal) [22]	Degrees
	Ensure sit-stand desks have an adjustable height of 575-1237 mm [22]	Millimetres
	Ensure seat width ≥489 mm [22]	
Community-oriented	Allow availability for one social event to occur every week (Appendix C)	Number of weekly events
	Have ≥1 CWC(s) available 9am-5pm on weekdays (Appendix C)	Number of available wellness coordinators
Timeless	Only use modular, not fixed furniture [23]	Percentage

Objective <i>The design should be:</i>	Goal <i>The design should:</i>	Metric
	Ensure all furniture is made of FSC woods, stone wool, or recycled fabrics [23]	Material type
	Ensure all energy usage comes from renewable sources [24]	Energy consumption type
Aesthetically aligned with existing Wellness Rooms	Use neutral tones of taupe or bluish-gray while avoiding yellow, green, and red colours [25]	Colours of surfaces and objects

5.3 Constraints

The wellness room design shall comply with the criteria in Table 6 in accordance with structural building codes and the client's demands (Appendix K).

Table 6. Design Constraints

Category <i>The design shall:</i>	Metric	Constraint
Be within client's budget and timeline	Budget	$\leq \$25000$
	Minimum maintenance duration covered by proposed budget	2 years (Appendix C)
Provide sufficient space	Minimum room capacity	12 occupants [1]
	Minimum space of room	$7 \text{ m}^2 + 0.1 \text{ m}^2/\text{occupant}$
Provide different types of mentally stimulating resources	Minimum mentally stimulating resources present	10 different resources (At least 1 per occupant) [1]
	Minimum forms of media to provide wellness information (i.e. printed media, social media, video media, etc.)	2 (Appendix #)
Provide access to crisis support	Time required to access distress lines (i.e. KidsHelpPhone, suicide line)	20 minutes
Provide different modes of communication for wellness resources	Minimum modes of communication (i.e. visual, auditory, tactile)	2 modes
Provide tolerable sound insulation	Sound level perceived at all times	$< 70 \text{ dB}$ [26] (Threshold of annoyance)

Category <i>The design shall:</i>	Metric	Constraint
Comply with Ontario Building Code	See Appendix K	
	CANNOT MODIFY HR (We will add these)	
	ALLOWING MAINTENANCE	

6.0 Conclusion

With a large student body standing to benefit, the wellness room redesign can fulfill the lack of an accessible, spacious, soundproof, and therapeutically-equipped office, relaxation space, and event space. The project is a step forwards in UofT's continued dedication to improving student mental health. Designs will be proposed in the Conceptual Design Specifications (CDS) document iteration, by March 25th, 2024, following the primary goals of storing and informing people seeking wellness. All room layout designs should aim to maximize accessibility to a varied and diverse array of mental health resources, while remaining as comfortable and accommodating as possible, rated using the tables of objectives and constraints. Beyond the CDS, a preliminary prototype and final presentation will follow.

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Appendix A: StarRez Booking

Figure 6 is a screenshot of the booking for the current wellness room on StarRez taken on February 15th. This portrays the vacancies in bookings of the room from February 16th to February 24th.

Figure 6. The booking page of the wellness room, showing that the room is currently under-utilized.

Appendix B: Buzzing Video Recording From HVAC System Above the Study Room

Link to video recording: <https://youtu.be/nhSMFNpFiEU>

Appendix C: Client Meeting #1 Notes

Parts of this Project Requirements document cites a document summarizing and organizing the information provided during the first client meeting, seen here [Client Meeting #1 Notes](#). Proof towards the validity of the client meeting notes is shown in Figure 7 by images of team member Aileen Sun's engineering notebook.

	2024-02-02
	Client Meeting #1
	Location: Chestnut 28 th floor
	Notes: Client took over a rest team member / not originally what
goal:	- larger wellness room ↳ office ↳ soundproof mental health room
	- aspects desired: elements of wellness, lighting, seasonal affected disorder lighting, 3 ppl capacity, not entertainment, sound system for white noise / calm music, quiet and soundproof room between student and counsellor
need:	↳ soundproof, lighting are <u>required</u> , rest is preferred - client is new - her ^{idea} is lack of publicity, and also it's badly setup so they don't wanna publicize - \$25 K as a reasonable use initial budget + 2 yr maintenance period ↳ more money being invested can be discussed down the line
	- restrictions: don't impact rest of space around that would impact students ↳ can take down walls ↳ don't take up too much existing space ↳ can make additional space ↳ client says to notice it's 28 th floor - beam bay; used often - columbus book; used sometimes (contractive for ppl who don't want to talk) ↳ filing bays - Good things abt current room: windows, beam bay dry, otherwise complete redesign is good ↳ room height is good, could be bigger

- two very minor to see outside but not inside
(looks like a jail cell rn)
- ↳ SAD light: light at a particular frequency to give energy, helps m/h, sunlight
- Staff: common wellness coordinator, temp workspace office programming with off campus ppl, come in year round
- bookable: there's a heavy backlog, we don't know but don't much space to change.
 - ↳ lockbox with email method and security idea?
 - ↳ small kiosks that may work, streamline would be great
 - ↳ in general, do not know scope; but can suggest
 - 1 ^{hr} / day for what is to allow the 1000 ppl
 - ↳ may be 2-3 hr / day makes sense given under-utilization
 - ↳ bookable option has 1-3 choices
 - current design in privacy:
 - whiteboard material in space causes underutilization
 - concourse-facility team - or front desk - ask for blueprints/plans
 - don't know some buzzing could be lighting
 - ↳ also vents are designed ^{now}
 - maybe strike on + cardio, timer
 - drop-in and bookable space, heavily both options would be great.
 - ↳ bookable is also ~~the~~ ^{on-site} in office
 - setting up a comm system would be allowed
 - are they similar or catered to diff needs? cardio, bookable
 - sound proof, convo, while drop-in is like a common hub
 - wellness revamp this year: green walls, new carpet, some furniture removed and put in. No structural in 10 yrs probably

- ↳ massage chair taken out (bc noise, cond)
- ↳ added arts and crafts, greenbay chair
- no food in room bc allergy
- priority? decor and structural changes both
- ↳ soundproof, lighting perceived to be "more" our job than decor
- less accessibility concerns; do concern door knob not works for mobility, etc.
- technology: open to as much as ppl can put in
- ↳ our opinions matter bc we are the demographic
- ↳ projector ok, no tv
- modify registration is not in scope, but allowed, just not priority
- publicity? at the elevator maybe
- drop in and bookable may be combinable for program purposes (is it possible with soundproof no clue), separate though in general
- ↳ programs ~1 a week
- space too small for events but they want to use religion sharing circles
- ↳ workshops to conn with community
- ↳ sharing circles / conflict res
- ↳ not physical ^{activity} space
- ↳ if we do prayer room consider which way windows are facing
- more intimate and themed than lobby events
- ↳ "personal development" events
- max 12 ppl in full room; ^{> 12 dogs?} min 2 ppl
- animals? if we can't incorporate, yes
- ↳ note elevator-accessible animals, maybe not dogs
yes cats

Figure 7: Screenshots of client email meeting notes in a member's engineering notebook

Appendix D: List of objects

Table 7 shows the movable objects with detailed features in the current wellness room and the study room.

Table 7. List of Objects

Room	Name (×count)	Dimension [Width×Length×Height cm] & other properties	Photo (if applicable)
Wellness Room	Rectangular Table	78×118×45 White	
	Circular Table	Diameter=45, Height=52 White	
	Book Shelf	38×47×78 White, some books, drawings, markers inside	
	Sofa (×2)	75×72×72 Dark blue, one back cushion on each	
	Bean Bag	Diameter≈135 Grey	

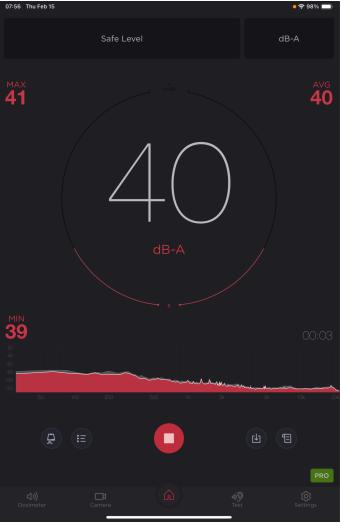
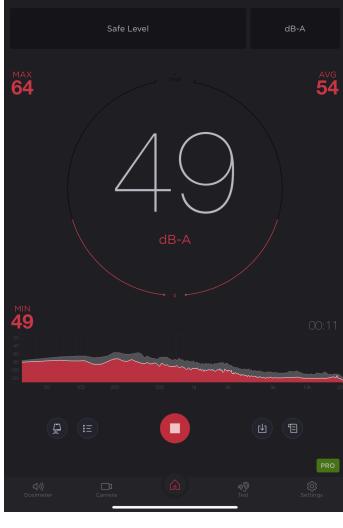
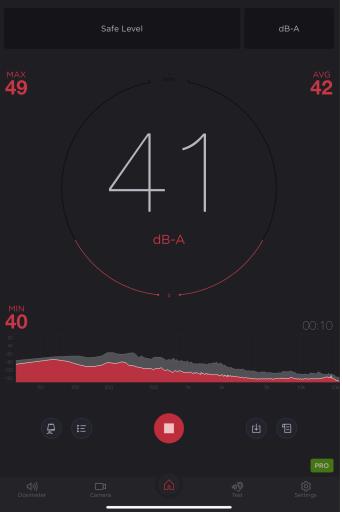
	Plants	Diameter≈40, Height=98	
Study Room	Chair (×6)	43×53×80	
	Square Table (×2)	90×90×77	

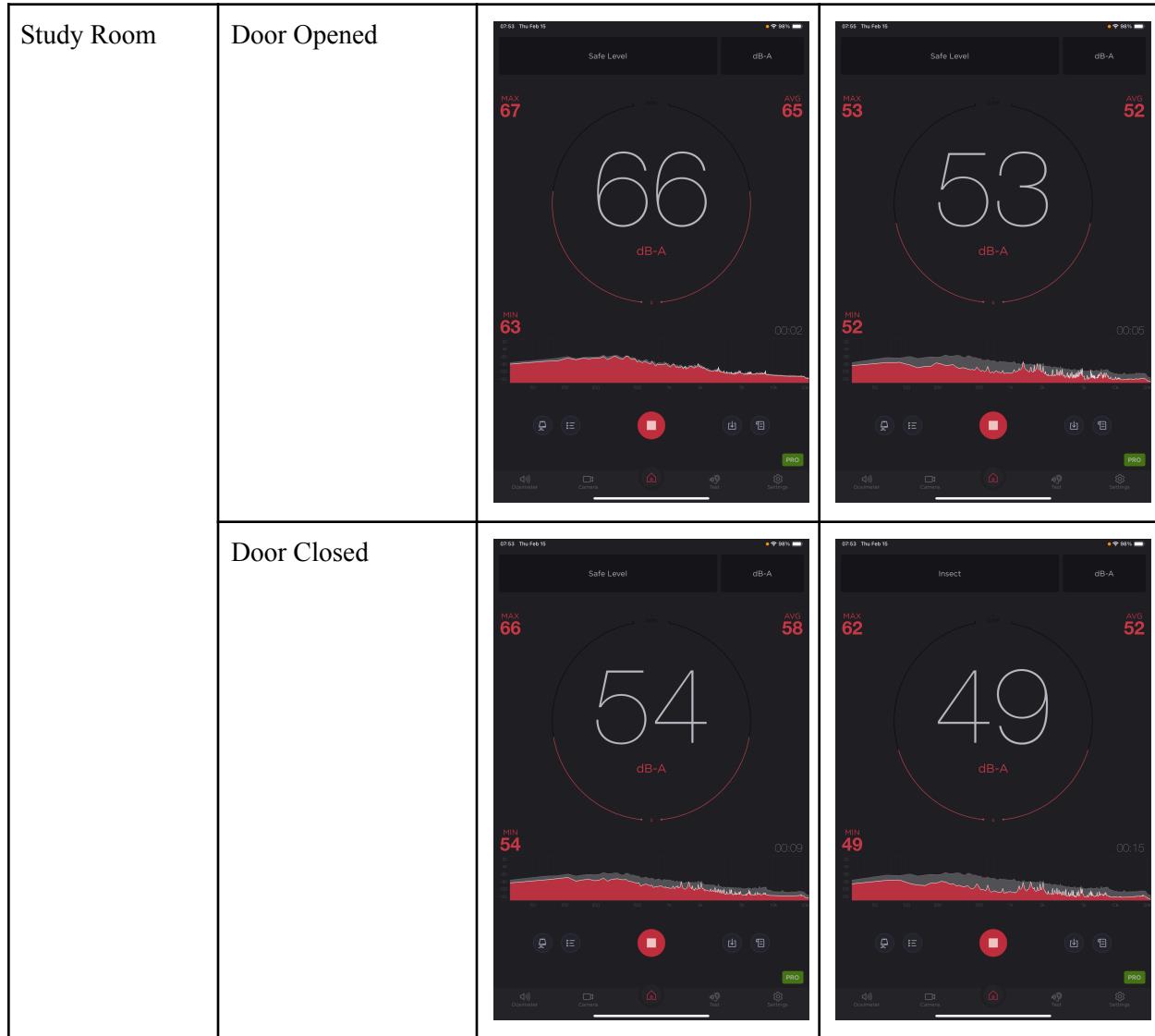
Appendix E: Noise Level in the Wellness Room and the Study Room

We used a loud-speaker to play white noise outside the rooms and measured the noise level (device: iPad mini 6, software: dB Meter) for four conditions listed below. To control the variable, no one was there because it was 7 am, and the device was fixed in place, with a fixed distance from the source of sound.

The measurement in Table 8 shows that the noise reduction ability of the walls of the rooms is 12 - 14 dB.

Table 8. Existing Sound Reduction System

		White Noise	Not Playing
Wellness Room	Door Opened		
	Door Closed		



Appendix F: Light Intensity in the Rooms

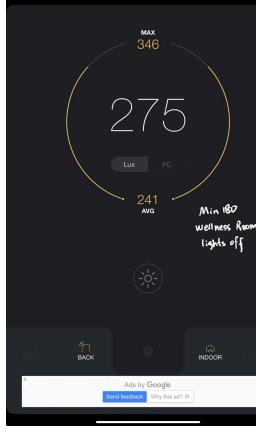
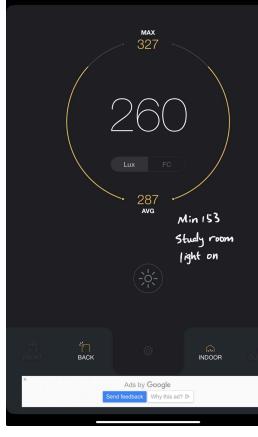
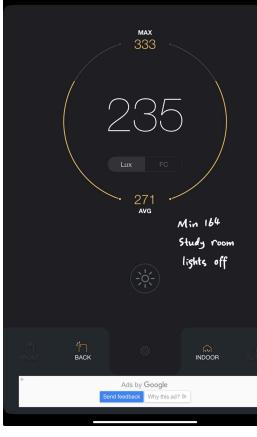
Table 9 shows the detailed lighting condition measured in lux for each room. (Measuring device: iPad Mini 6, Software: Light Meter)

Table 9. Lighting Conditions in the Rooms

	Minimum (lux)	Average (lux)	Maximum (lux)
Wellness Room - Lights on	153	287	327
Wellness Room - Lights off	164	271	333
Study Room - Lights on	210	264	318
Study Room - Lights off	180	241	346

Screenshots from the app and pictures of the environment are shown in Table 10.

Table 10. Evidence of the lighting

	Wellness - Lights on	Wellness - Lights off	Study - Lights on	Study - Lights off
Lighting condition				
Picture of the condition				

Appendix G: Escalator and Stairs to the 28th floor

Figure 8 shows the escalator and stairs connecting the 27th floor and the 28th floor.

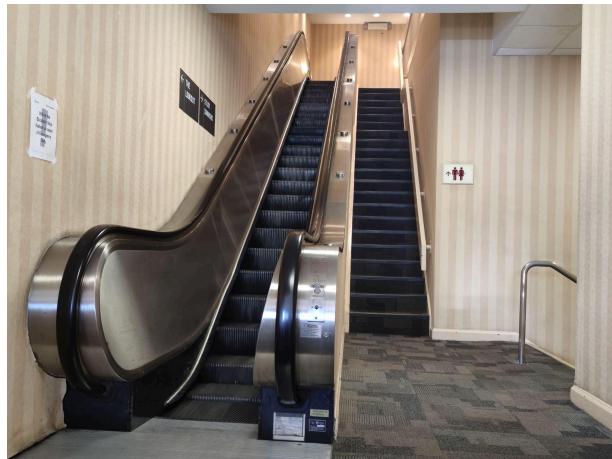


Figure 8. Escalators and stairs to the 28th floor

Appendix H: WiFi Speed and Signal Strength in the Rooms

Figure 9 exhibits the results of the WiFi speed tested using “SpeedTest by Ookla” in the study room.

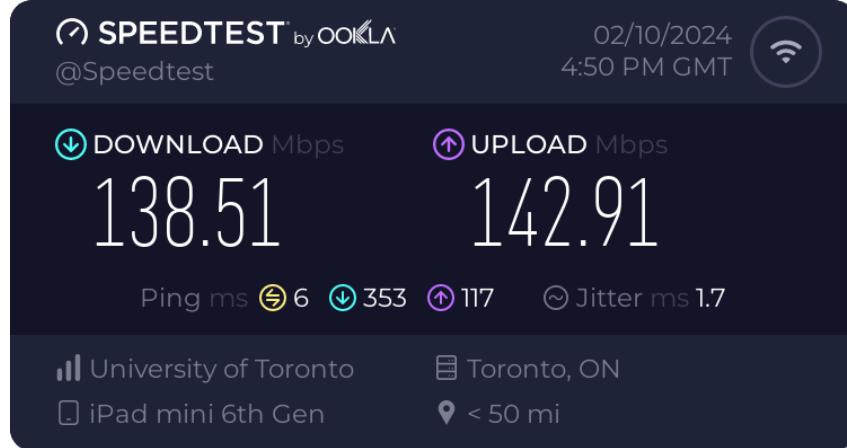


Figure 9. WiFi Speed in the Study Room [26]

Figure 10 shows the WiFi signal strength in the rooms. The signal strength for the 2.4 GHz band and 5 GHz band are -52dBm and -60dBm, respectively. (Measuring device: Xiaomi 10, software: WiFiAnalyzer, measured on Feb 15, 2024).

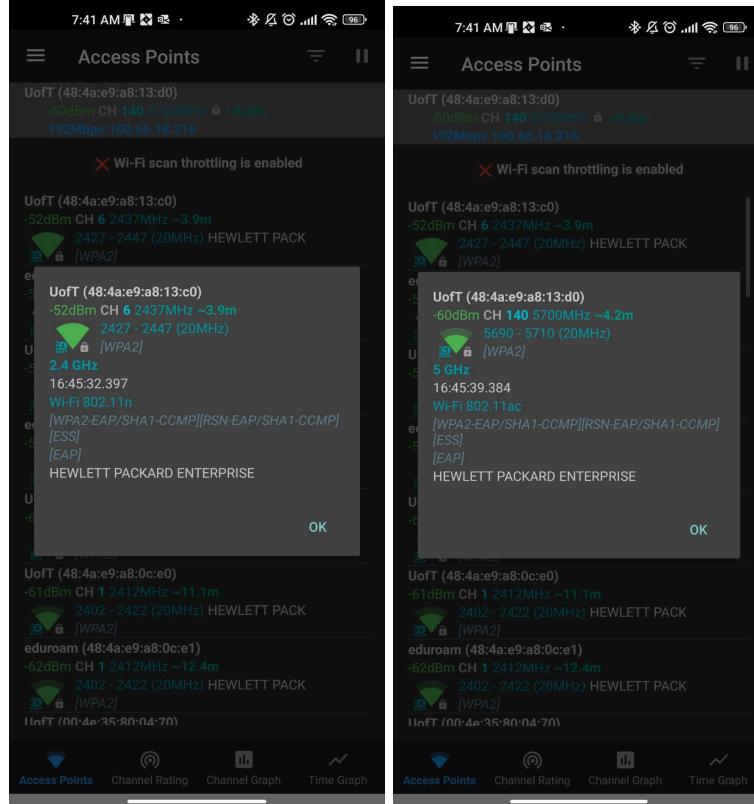


Figure 10. Screenshot of the WiFi signal strength

Appendix I: Black Box method

After studying the inputs and outputs of our design using the black box method, shown in Figure 11, we have been able to derive primary and secondary functions.

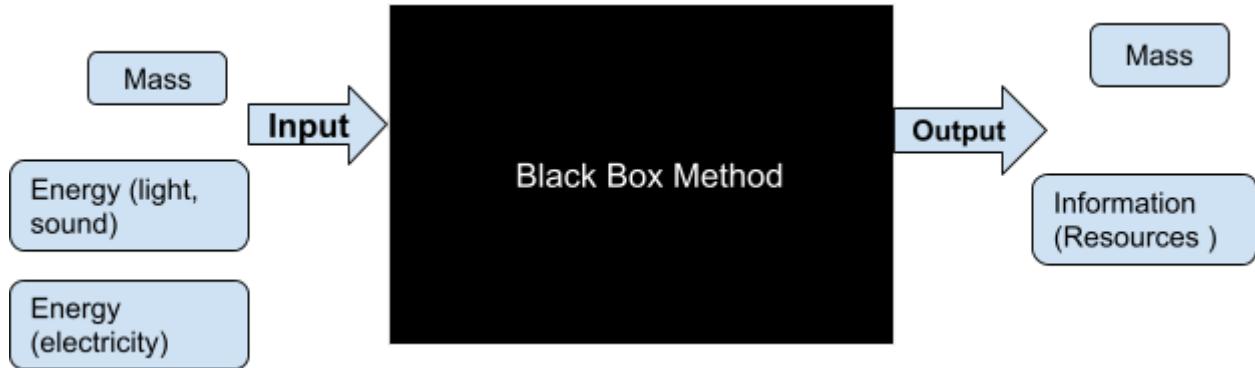


Figure 11. Black Box Method

The design should efficiently handle the intake and release of mass, including storage. It must regulate energy usage (light, sound) and provide guidance on wellness resources and room utilization.

Appendix J: Prioritizing Objectives using Pairwise Comparison

The objectives listed in our objective table were prioritized from top to bottom, determined through the pairwise comparison method by ultimately identifying the most significant factors that should be considered when generating solutions. The pairwise comparison is shown in Table 11.

Table 11. Pairwise Comparison Method for Objectives

—	Conducive to wellness and relaxation	Mentally stimulating	Comfortable for users	Aesthetically aligned with existing Wellness Rooms	Community-oriented	TImeless	Distracti on-free	Score
Conducive to wellness and relaxation	—	1	1	1	1	1	1	6
Mentally stimulating	0	—	1	1	1	1	1	5
Comfortable for users	0	0	—	1	1	1	0	3
Aesthetically aligned with existing Wellness Rooms	0	0	0	—	0	0	0	0
Community-oriented	0	0	0	1	—	1	0	2
Timeless	0	0	0	1	0	—	0	1
Distracti on-free	0	0	1	1	1	1	—	4

Appendix K: Ontario Building Code

The sections of the Ontario Building Code cited are shown in Table 12.

Table 12: Ontario Building Code

Section of Ontario Building Code	Excerpt	Rationale for Constraint
9.5.3.1 [27]	<p>Table 9.5.3.1. Room Ceiling Heights</p> <p>1. Living room or space, dining room or space, kitchen or kitchen space</p> <p>2 300 mm over at least 75% of the required floor area with a clear height of 2 100 mm at any point over the required area</p>	Places constraint on any modifications regarding the ceiling of the room.
9.5.11(1) [28]	<p>Table 9.5.11.1. Minimum door Sizes Forming Part of Sentence 9.5.11.1.(1)</p> <p>5. Rooms located off hallways that are permitted to be 710 mm wide</p> <p>Minimum Width, mm: 610 Minimum Height, mm: 1980</p>	Places constraint on any kind of door or entrances that can be implemented in the wellness room.
9.20.6 [29]	<p>“(1) The thickness of loadbearing interior walls shall be determined on the basis of the maximum lateral support spacing as provided in Sentences 9.20.10.1.(2) and (3).</p> <p>(2) The thickness of interior non-loadbearing walls shall be,</p> <p>(a) determined on the basis of the maximum lateral support spacing as provided in Sentences 9.20.10.1.(2) and (3), and</p> <p>(b) in any case, not less than 65 mm.”</p>	<p>Merging the wellness room and study room into a single room or implementing paths to enter leave between them is very possible.</p> <p>Thus, any modifications to the interior wall between the two rooms must conform to this constraint.</p>
9.7.2.3 [30]	Except as required in Article 9.9.10.1. and Sentence (3), the minimum window glass area for rooms in buildings of residential	Windows are likely subject to modifications due to the need for feasible lighting. The

	<p>occupancy or rooms that are used for sleeping shall conform to Table 9.7.2.3.</p> <p>Table 9.7.2.3. glass Areas for Rooms of residential Occupancy</p> <p>Forming Part of Sentence 9.7.2.3.(1)</p> <p>4. Living rooms and dining rooms: 10% of area served</p>	<p>window between the wellness room and study room should also be subject to removal as it's the lack of privacy is a functional gap.</p>
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