HOME AWAY HOME:

Student housing as a catalyst for student and community well-being in Cambridge

by
Ogulnabat Jumayeva

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public

Abstract

In 2004, the University of Waterloo School of Architecture (UWSA) was relocated to Cambridge, Ontario, establishing a new satellite campus 31 km away from the main campus in Waterloo, Ontario. This move aimed to invigorate the city and provide an improved academic environment for architecture students. While the school offers a high-quality education, it currently lacks on-campus housing and other amenities available at the main campus. Although students appreciate the flexibility of off-campus housing, they also desire the safety and security provided by a dedicated student residence. It is particularly important to offer accessible housing alternatives to all students, especially those attending the School of Architecture, given the distance from the main campus. In addition, students face the challenge of finding housing every four months due to the required co-op program, which can lead to a loss of a sense of home and belonging.

Addressing this issue requires an innovative approach to student housing design tailored specifically for UWSA students and the school's location in the mid-size city of Cambridge. The proposed residence aims to be more than a product catering to students who are increasingly seen as mere consumers in today's profit-driven student housing market. Its goal is to create a model of collective housing that meets the unique needs of architecture students during their short, yet profoundly formative, period of adulthood. The design explores the strengths and opportunities associated with the school's status as a satellite campus. By understanding the intricacies of general student housing design and leveraging the context of UWSA, the proposed design strives to establish an environment that fosters community among students and engages with the public of the City of Cambridge.

Acknowledgements

I would like to thank my supervisor, Maya Przybylski, for sharing my passion for design and constantly pushing me to do better. Your thought-provoking yet concise feedback played a crucial role in completing this thesis in a timely manner. I also thank my committee member, Rick Haldenby, for his enthusiasm and valuable insights.

I thank my classmates, friends, and especially my roommates for jointly enduring the stress of the thesis writing process. I will forever cherish the memories of our late-night corridor talks. I am grateful to my friends from abroad for their constant support and encouragement. Thank you Warren, for being a peaceful retreat throughout this journey, as well as your feedback on my academic writing.

A special thanks to my family, who made their support felt despite the physical distance. Your confidence in me gave me strength to navigate through challenging times.

Dedication

To my parents, Serdar and Zubeyda, for always believing in me

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Introduction

The relocation of the University of Waterloo School of Architecture (UWSA) to Cambridge signifies a commitment to establishing a distinct community. This comes at the cost of limited dedicated student housing options. According to the anecdotes shared by faculty members, this was not a big of an issue until recently, before Covid 19 pandemic in 2020. Supposedly, the pandemic has shifted the supply-demand chain of off-campus housing in Cambridge against the favor of students. Besides, ongoing housing crisis fuels the competitiveness of the housing market as well as the inflation of prices. The student status also acts like a drawback and limits the availability of the options. The students, young individuals on a budget, are faced with the uncertainty of securing a place to stay every four months. This uncertainty becomes even more risky when it comes to incoming undergraduate and international graduate students. Requiring students to do coop program, while increasing the attractiveness of the program, only further complicates the situation and thus adds to the vitality of the need of a systematic and methodological approach to the design and provision of student housing. The cyclical nature of the program doubles the problem of homesickness that is prevalent among university students. In response to this problem, this thesis explores the ways in which a student residence can break the stereotypes of an institutional building and encompass the characteristics of a home.

The City of Cambridge itself plays a crucial role in research and design. The relationship between the city and the school is vital aspect of school's location in Cambridge with numerous school initiatives focused on community engagement. This thesis will investigate how this relationship can become a constant and integral part of daily life, rather than occasional events. The artistic and architectural talents of the School of Architecture can be appreciated and enjoyed by the wider community, as evidenced by initiatives such as the tiny home project, exhibitions at Idea Exchange, Design at Riverside, and "Unsilent nights." As a relatively small and intimately scaled historic city, Cambridge has immense potential to foster a unique school-community relationship and become a regional hub for design and art.

The thesis is divided into four sections. Each section will analyze existing conditions and establish a set of design principles based on research. Firstly, a general overview of student housing trends in Canada will be provided, followed by case studies of successful student housing projects to examine key design elements. Then, the challenges, needs, and opportunities specific to UWSA students will be identified and translated into design principles. Thirdly, the context of Cambridge will be explored as a campus equivalent for UWSA. All findings from the first three sections will create the base for guiding design principles that will help achieve the design goals of the proposal that will be presented in fourth section.

CHAPTER 1
Student Housing in Canada

This thesis explores the design of student housing within the context of a satellite campus located in the mid-size city of Cambridge. Prior to delving into the specific design opportunities and requirements of the site, the fundamental elements of student housing and industry best practices are explored. Student housing has transformed over time due to shifts in demand, supply, provisioning methods, and evolving student needs. This chapter provides an overview of existing practices in student housing design in two parts. First, a historical overview of higher education student housing design in Canada is provided. It focuses on architectural elements influenced by socioeconomic and political factors along with changes in student needs. It is followed by an analysis of selected precedent projects, both from Canada and abroad, to investigate exemplary design strategies that will be summarized by the end of the chapter. The identified strategies will be combined into the objectives of a design proposal for a new student residence.

1.1 Historical overview

Student housing developed as a need alongside the establishment of higher education institutions (HEIs). The institutions of the ancient Roman Empire and the religious buildings of Medieval Arab and Asian universities are both known to have student accommodation as part of the greater university complex. The Eastern idea of arranging individual student cells as parts of educational blocks around a central courtyard was translated into the secular universities of Europe in the Middle Ages[1]. Out of those, the University of Cambridge was one of the first to detach student accommodation from educational buildings into separate wings or buildings[2]. Student accommodation in the University of Cambridge along with other famous British institutions like Oxford University became a model for the design of Canadian institutions[3].

The Oxbridge style influence can be seen in most of the colleges of the University of Toronto, namely the Quadrangle of Trinity College, Lower Burwash of Victoria College, and Whitney Hall of University College. Before the Second World War (WW2), most of the students of Canadian universities were locals in the city where they were attending universities and the few out-of-town students found accommodation at student residences or private lodging. In purpose-built student accommodation, particularly in small towns, there was a focus on grouping students into smaller clusters around a central stairway landing and service areas, as exemplified by the design of Willet House at Acadia University (Fig. 1.1)[4]. Following the WW2, there was a huge increase in university student enrollments due to the return of veterans. By 1947, full-time enrolment reached 76237, almost double the number of pre-war times[5]. This surge created an urgent need for more student housing. The emergency was temporarily addressed by converting war-time barracks to student accommodation, as was the case for most of the world[6,7]. Starting in

1 Popov, "Historical Development Stages of the Student Youth Accommodation Architecture from Dormitories Prototypes to Post-Industrial University Campuses."
2 Bland and Schoenauer, *University Housing in Canada*.
3 Ibid.
4 Ibid.
5 "The History of Post-Secondary Education in Canada."
6 Bland and Schoenauer, *University Housing in Canada*.
7 Popov, "Historical Development Stages of the Student Youth Accommodation Architecture from Dormitories Prototypes to Post-Industrial University Campuses."

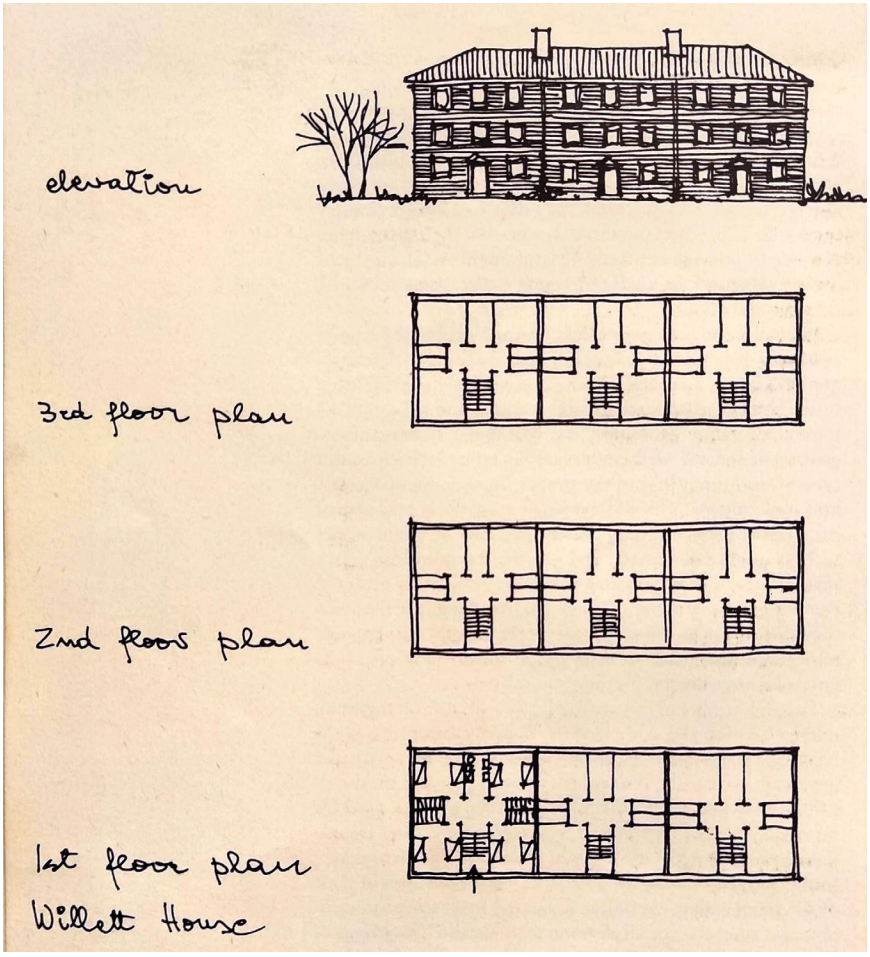

Fig. 1.1 Willet House. Grouping of students on stair landing.

Fig. 1.2 York University Graduate houses. Examples of large-capacity student residences in the 1960s.

the 1950s, a continual increase in student numbers led to universities acknowledging some responsibility to build more student housing. The University of New Brunswick was one of the first to engage in the construction of numerous residence halls of 3-4 stories with stairs leading to floors of double-loaded corridors that accommodate 20-30 students[8]. Later, in the 1960s, we see an emergence of multi-floor, large-capacity student housing in urban universities of metropolitan areas (Fig. 1.2). Serviced by elevators, these buildings and their low-rise counterparts disregarded the earlier idea of intimate student groups organized around a stairway landing. Cost efficiency and maximum capacity were the priorities in the design of these residences and resulted in repetitive floors with long, noisy, and hotel-like corridors devoid of interest[9].

During the sixties, 95% of all built student residence units were created using loans from the Canada Mortgage and Housing Corporation (CMHC) that had tailored benefits to fit the needs of HEIs in providing the necessary supply of student housing[10]. In the 1980s, the federal funding for HEIs started to decrease, and since 1990, this funding has fallen by half and the cost of tuition has risen by 2.7 times[11]. As a result, higher education institutions (HEIs) have reduced their focus on constructing student residences independently and instead, occasionally collaborate with the private sector to develop unused or brownfield land they own for student housing purposes. This leaves the majority of post-secondary students at the hands of the private rental market. The growing concentration of students in this market has led to the term, “studentification”, a negative transformation of residential areas due to the socio-economic and lifestyle habits of students who occupy[12,13].

In the past decade of student housing development, there has been an emergence of off-campus Purpose-Built Student Accommodation (PBSA) mostly constructed through public-private partnership between

8 Bland and Schoenauer, *University Housing in Canada*.
9 Ibid.
10 Central Mortgage and Housing Corporation (Canada). Policy Development Group, “Student Housing.”
11 Walsh, “The Cost of Credentials.”
12 Evans and Sotomayor, “Towards Plush New Digs in Toronto’s *in-between* City.”
13 Chloe Kinton et al., “New Frontiers of Studentification: The Commodification of Student Housing as a Driver of Urban Change.”

private developers and HEIs[14]. It is known as a regulating solution to the problems of studentification by providing safe student housing in attractive neighborhoods[15]. However, the involvement of the private sector comes with an intrinsic motivation to make a profit and attract an appropriate customer base. This is directly reflected in the design of those properties. Known as "student hotels", the PBSA shares properties with luxury condominium developments with fully furnished suites with private washrooms, high-end appliances, and premium amenities[16]. For instance, a single room in CampusOne building in downtown Toronto costs about $1700 a month and comes with access to programs ranging "from yoga classes to animal-petting events"[17]. While it's good to see such options of housing for students, it is self-evident that any luxury product is accessible to only a select few that can afford it. PBSA, being the latest growing type of student housing development, is helping to meet the increasing demand for student housing. However, the finance-driven nature of it makes it inaccessible to an average student living with the high cost of tuition and limited income.

This thesis doesn't aspire to come up with a design that is the model of utmost comfort and luxury. It aims to balance comfort and privacy with the benefits of collective living. **Taking advantage of the unique characteristics of its context, it reinforces the idea of grouping students in smaller numbers and creates intersecting bundles of social cohorts that can organically lead to community creation and ultimately home-making.** Although affordability and financial considerations for construction and operation are not the primary focus of this project, efforts will be made to reduce the overall cost through design by efficient space planning and the shared utilization of service areas like washrooms. Higher-priced elements such as high-end appliances and finishes will be avoided. The rental rates aim to be comparable to the average rates of on-campus accommodation at the University of Waterloo.

14 Ibid.
15 BONARD, "Student Housing Market Report Canada."
16 Revington and August, "Making a Market for Itself."
17 Mcfarland, "Higher Learning, Higher Living."

1.2 Elements of Student Housing

A typical multi-residential apartment accommodates households of varying sizes and ages in private self-sufficient living units equipped with essential facilities like a kitchen and bathroom. Therefore, more attention is given to the design of individual units rather than the overall identity and the social aspect of the entire building. In contrast, student residence accommodates individuals of similar age that share one or more common spaces. Consequently, the spatial configuration in a student residence necessitates a distinct approach that strives to achieve a balance between public and private areas while fostering a sense of community. According to Albert Bush-Brown, architectural historian and educator, there are twofold needs of a university student in residence. First is the individual need for "privacy, domestic scale and identification with a small environment". The second is their need for "collective identity with groups of students and the educational benefits attendant upon such identity"[18]. In this regard, there emerges a need for a "graduated social hierarchy of student groups" where students can establish meaningful social relationships while maintaining individuality and independence[19] (Fig. 1.3). Bland and Schoenauer identify the first unit of this hierarchy to be the study-bedroom, where a student has the privacy and full control to assert their individuality. The second unit is the intimate group of 6-10 students. The next one is the "house" composed of 30-60 people. In traditional student housing, they gather around a stairway, each landing giving access to a smaller group of students. In multi-story residences, the "house" is a whole floor with some kind of living room. The last unit of the hierarchy is the "hall" composed of 220-250 students. Common amenities like recreational facilities and large common rooms are the defining features of this group[20].

Following is the breakdown of elements that make up this hierarchy.

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18 Albert Bush-Brown as quoted in Bland and Schoenauer, *University Housing in Canada*.
19 Ibid., 10.
20 Bland and Schoenauer, *University Housing in Canada*.

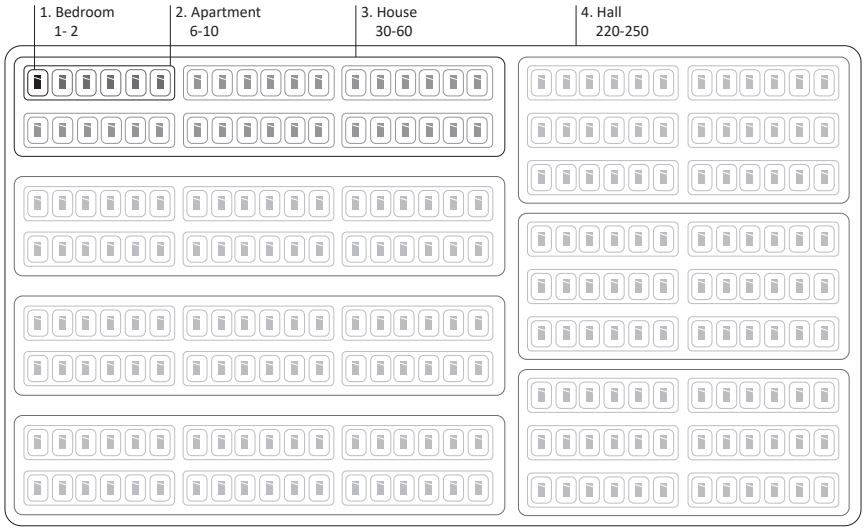

Fig. 1.3 Hierarchical grouping of students in student residences.

Study-bedroom

In the Canadian context, single-bed units are widespread as today's youth have been brought up in private bedrooms and want similar arrangements in residences as well. The study-bedroom usually has space for a twin bed, a desk, and storage space of different kinds. Some units may even contain a small living area. Even though maximum privacy is achieved with single rooms, double rooms are favorable to prevent isolation and support social integration, especially for first-year students. Besides individual rooms, suite-style arrangement of 3-6 single bedrooms around a common kitchen and living area is gaining popularity. **The aim of this thesis is to provide a variety of rooms that not only work well independently but also create a meaningful composition together.**

Washrooms

Heightened demand for privacy comes with an increased preference for private washrooms, which renders multi-stall washroom facilities of traditional residences obsolete. Although it is not economical to provide each student with a private bathroom, there are ways to allocate a single bathroom to up to 6 students. A bathroom can be interconnected between two singles, two doubles, or a single and a double. **The more intimate arrangement of bathrooms helps to create a more homelike environment than an institutional one.**

Corridors and access

Circulation in student housing should be given more attention than that in multi-residential apartments as students not only need to get from the main entrance to their respective units, but they also need to circulate between their units and the shared areas of the whole building. The corridor arrangement in linear slab block can be classified into 4: a. Single loaded corridor; b. Double-loaded corridor; c. Two corridors with a central core (for service facilities); d. Single corridor with a central core[21]. Hotel-like arrangement of rooms along a straight corridor is one of the biggest contributors to the institutional feel that is associated with student residences[22]. Since single-loaded corridors are less economical, we see a high number of double-loaded ones. They give way to problems related to privacy and noise level. There are some ways of breaking the linearity like arranging the doors in individual setbacks or bending/curving the corridor like the ones in Wetmore and Wilson Halls of New College at the University of Toronto (UofT) (Fig. 1.4). In a 1968 study, students complained about the noisiness of double-loaded corridors when being consulted for the construction of a new dormitory. As a response, two corridors with a central service core were constructed. Surprisingly, students found that to be isolating two sides from each other[23]. Wheeler, after investigating this pattern, placed purposeful lounge-study areas in the central core of his next dormitory design. This was met with the most amount of user satisfaction[24]. This suggests the importance of propinquity in traffic flow in student housing[25].

There is a need to investigate the ways of activating the corridors, not only to get rid of the institutional feel, but also to make them into actual spaces that can foster social relations.

Dining rooms and Kitchens

Student residences of university campuses, such as those of the University of Waterloo tend to have either mandatory meal plans to be used at local

21 Ibid.
22 Ibid.
23 Wheeler, “Behavioral Research for Architectural Planning and Design.”
24 Ibid.
25 Heilweil, “The Influence of Dormitory Architecture On Resident Behavior.”

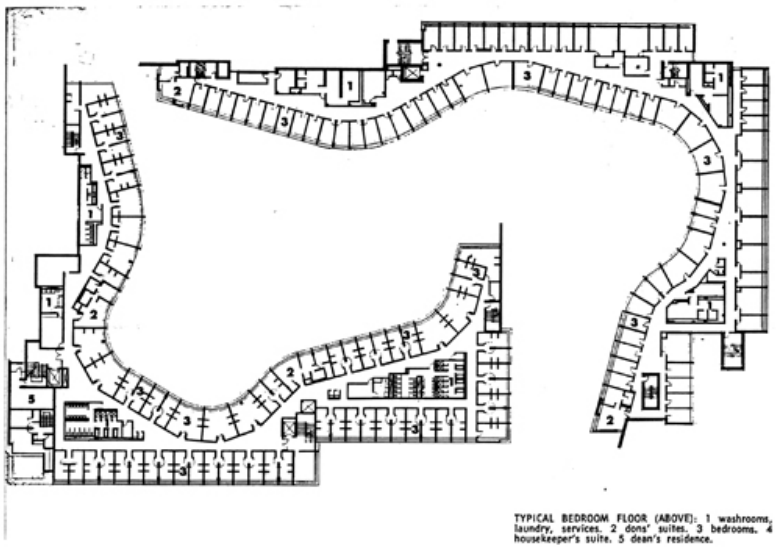

Fig. 1.4 Typical upper-level floor plan of Wetmore Hall (right) and Wilson Hall (left) of New College, UofT. Designed by architect Macy Dubois, they were built in 1964 and 1969 respectively.

eateries or they allocate some sort of kitchen space inside the facilities. The act of eating together is an integral part of community creation in student housing[26]. The rising popularity of suite-style units comes with the preference for a common kitchen and dining/living area. Traditionally, residences used to have one large dining hall that accommodated all the residents. However, contemporary times favour several smaller dining rooms to facilitate a greater sense of intimacy and noninstitutionalism.

As the target student population of this project is relatively small, it will focus on the opportunities of individual and communal kitchens rather than meal plans to reduce mandatory expenditure for student residents. Besides, common kitchens and dining areas come with added flexibility and social interaction.

Common Rooms and Recreation

The size and placement of common areas should overlap with the previously mentioned grouping of students. They should both be

26 Ibid.

acoustically isolated but also easily accessible[27]. Smaller service and lounge spaces are usually placed near the student units they serve, while large congregational rooms are usually placed on the ground floor for easy access for all students. There's a trend of having a large multi-purpose space called a "great room" that features a kitchenette and flexible seating layouts to host various events.

In the context of this project, a residence of a satellite campus should pay more attention to providing recreational spaces to not only the students of the residence but also to the whole student population.

Furniture

Furniture plays a crucial role in shaping the immediate environment of a student in a study-bedroom. It serves as a design element over which students can have control. In the past, older university-provided student residences focused on room efficiency and cost-effectiveness, resulting in a preference for built-in furniture. This choice was driven by its compactness and lower replacement costs. However, built-in furniture "impedes the personalization that is part of self-development of students and impedes the making of a room into a home"[28]. Customization can be achieved by incorporating portable and detachable furniture, enabling students not only to rearrange the existing pieces but also to exchange furniture they dislike for more preferred options through a centralized housing furniture exchange system[29]. Both scenarios necessitate a certain level of mobility, particularly for heavier furniture items, as exemplified by the furniture in Claudette Miller Hall at Waterloo University (Fig. 1.5).

To foster a homelike atmosphere in a study-bedroom, the layout should facilitate furniture rearrangement without compromising compactness.

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27 Bland and Schoenauer, *University Housing in Canada*.

28 Heilweil, "The Influence of Dormitory Architecture On Resident Behavior," 395.

29 Heilweil, "The Influence of Dormitory Architecture On Resident Behavior."

Fig. 1.5 Double room in Claudette Miller Hall at the University of Waterloo. The wardrobe has swivel wheels to be used when moving.

1.3 Case Studies

The following section contains case studies from Canada and abroad that showcase exemplary design solutions for student housing. The projects were selected based on their scale and capacity as well as their focus on noninstitutional feel, purposeful circulation, and hierarchical grouping of student units discussed before. Apart from those, additional design principles that contribute to student well-being, success and community creation would be derived. In addition to the positive attributes, the observation of the shortcomings of the projects will also be discussed.

Massey College

Ron Thom, 1963
Toronto, Canada
60 graduate students

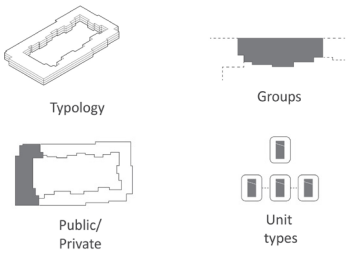

Fig. 1.6 Design elements.

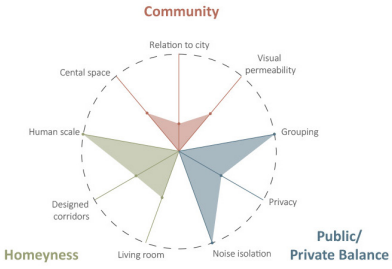

Fig. 1.7 Analysis of the quality.

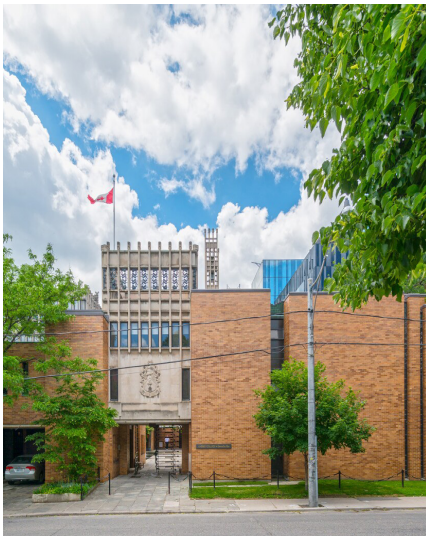

Fig. 1.8 Massey College entrance.

Massey College is one of the philanthropist projects of Vincent Massey, who was a member of the wealthy Massey family as well as the 18th Governor General of Canada. Impressed by Ron Thom's focus on space and environment creation, Massey commissioned the design of the college to him[30]. Its architecture is inspired by the Oxbridge style with a central courtyard enclosed by student units on 3 sides with common rooms on the fourth side. Located in downtown Toronto, the building has a unique introverted character with slit windows on its exterior façade and wider windows looking to the courtyard. This is a direct reflection of the arrangement of student units overlooking the courtyard while the circulation is placed on the outer face. The fourth side contains a dining hall, library and common rooms for study and relaxation. The double-height dining hall is a celebratory space with long dining tables and is designed to be a place of social synergy where scholars from different

30 "Architecture – Massey College."

majors can interact. The living room is spacious yet exudes a domestic feeling by level differences, furniture layouts and daylighting.

The living units are grouped into 5 “houses”, each with its own entrance and stairway. The small number of units on each floor and their staggered arrangement around the stairway eliminates the need for a long straight corridor. Instead, there are shorter zigzag corridors. Although the houses are completely separated from each other on all 3 above grade floors, the basement level that contains service and amenity spaces connects them all through a continuous stepped corridor. This way, the private living units are intimately grouped and separated from the more public, noisy and social spaces underground, thus creating a graduated social hierarchy. Underground connection is also a design element popular in Canada, given its convenience in extreme weather conditions.

Massey College is an excellent example of intimate and domestic community creation in a busy urban neighborhood. Although the separation of the houses makes grouping possible, it gives way to accessibility problems for renovation as each house requires a separate elevator, which wasn’t included in the original design. Lack of natural light in the basement level also results in poor environmental conditions.

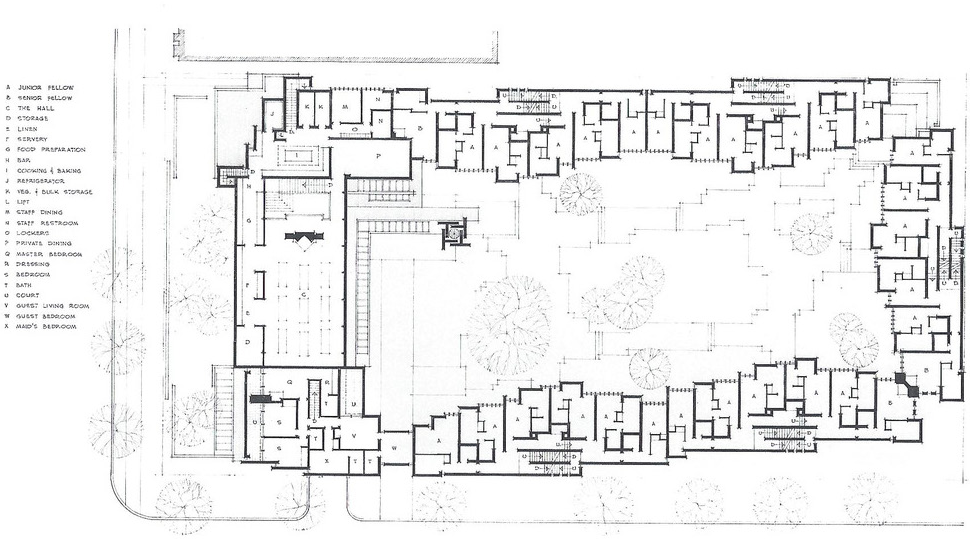

Fig. 1.9 Massey College ground floor plan.

Fig. 1.10 Massey College courtyard view.

Fig. 1.11 Massey College living room.

Erdman Hall

Louis Khan, 1965
Pennsylvania, USA
150 units

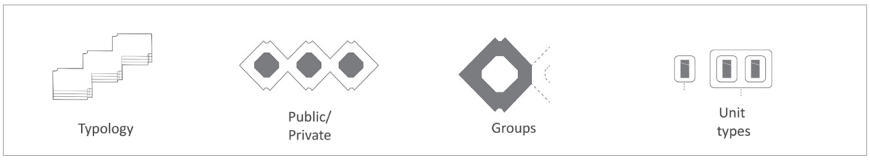

Fig. 1.12 Design elements.

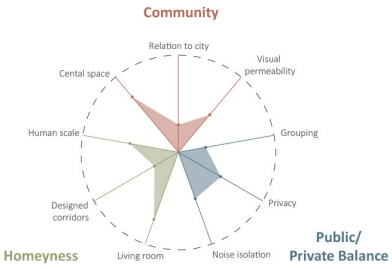

Fig. 1.13 Analysis of the quality.

Fig. 1.14 Erdman Hall aerial view.

Erdman Hall, located on Bryn Mawr College's campus, is a dormitory designed by Louis Kahn. It was designed to accommodate 150 female students in single and double-bedroom suites. As one of Kahn's earlier projects, it explores the interplay between private and public spaces, along with geometric shapes. The building features three interlocked diamond-shaped blocks, spanning three stories. The entrance to the building is from the middle block on the second floor as half of the first floor is submerged into a mild slope of the topography.

The primary design concept revolves around arranging sleeping units around central common areas in each block, inspired by the sense of hospitality and togetherness found in house designs. Instead of segregating sleeping units, the architect placed them around the common areas, approximating the intimacy of a living room[31]. Stairways and bathrooms are housed within "thick walls," serving 6-7 students per bathroom and double that for stairways. This arrangement creates loosely defined smaller groups based on the relative placement of service cores and sleeping units.

31 Kahn and Latour, *Louis I. Kahn*.

The common rooms, including the living room, entrance lobby, and dining room, are double-height and begin on the second floor. While there are occasional mezzanine lookout spaces and semi-open stairway cores, visual connections between sleeping units and common areas are limited. Skylights positioned at the corners illuminate the common rooms and stairways. The first floor's central cores house mechanical rooms and an entertainment room.

The Erdman Hall is an attempt to create a homelike atmosphere within a communal setting establishing a distinctive physical and visual relationship between private and public spaces. However, the arrangement of living and dining rooms at opposite ends attracts student traffic from every corner. This renders the corridors of each group significantly more public and disrupts the intimacy of them. Although skylights provide natural light to the living and dining rooms, the entertainment room on the first floor lacks a natural light source. The precise geometry of the building can be perceived as too rigid and institutional. Additionally, the building does not engage with the surrounding environment or offer sufficient outdoor space, aside from occasional balconies on the corners.

Fig. 1.15 Living room.

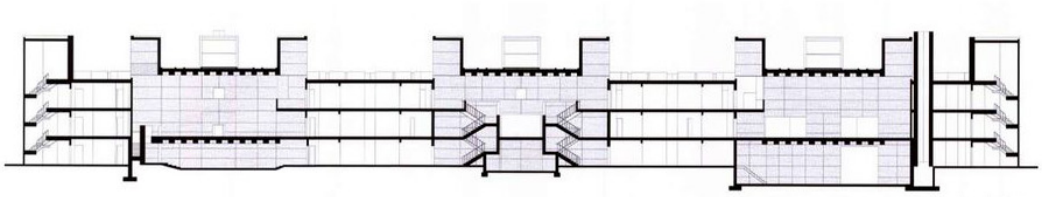

Fig. 1.16 Longitudinal section

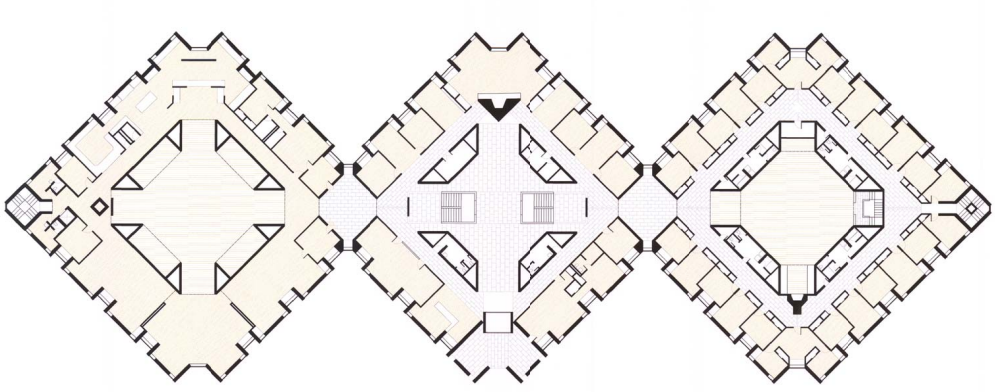

Fig. 1.17 Second floor plan.

Fig. 1.18 Entrance floor.

Tietgen Dormitory

Louis Khan, 1965
Pennsylvania, USA
150 units

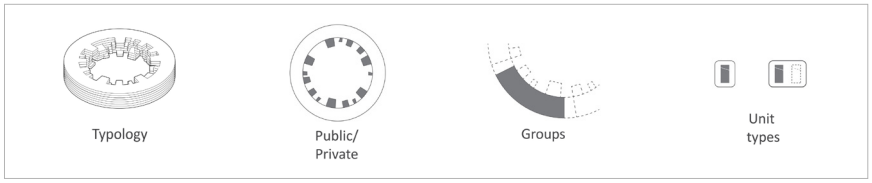

Fig. 1.19 Design elements.

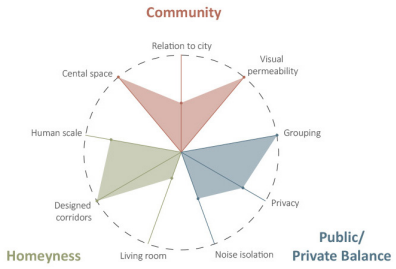

Fig. 1.20 Analysis of the quality.

Fig. 1.21 Exterior view.

Tietgen Dormitory was made possible through a donation from a local fund, aiming to create a visionary “dormitory of the future” with a unique design approach[32]. The circular shape of the building stands out in a neighborhood dominated by orthogonal structures, becoming an iconic landmark. This shape also plays a crucial role in achieving design solutions related to social dynamics and the separation of public and private spaces.

The ground floor accommodates service and administrative areas, along with study rooms. The upper six floors feature student residences along the outer rings, with common areas facing the courtyard. Each floor is divided into five modules, consisting of 12 units, a living room, kitchen, and storage. Atrium spaces separate the modules, creating vertical breaks in the visual continuity of the ring. These atriums house stairways and an elevator, facilitating connections among the modules while maintaining permeability to the courtyard on the ground level.

32 ArchDaily, “Tietgen Dormitory / Lundgaard & Tranberg Architects.”

The shape of the building clearly reflects the main idea: the community[33]. The grouping of units into modules fosters smaller social groups with their respective communal areas, while still allowing free movement among all the modules. This encourages voluntary interaction, as wandering through other modules is not solely need-based but driven by personal preferences. The constant visual connection between the common rooms and the courtyard cultivates a strong sense of community and facilitates informal social relationships.

Another successful aspect of the project is the circulation. The short and curved corridors within each module minimize the hotel-like impression, while natural light filters in through the fragmented glazing facing the courtyard. The single-bed student units are modular and vary in size. They come with built-in furniture on one wall while allowing customization of furniture on the other. Open spaces also vary in size, catering to different privacy levels. Student residences come with variations of French windows to large balcony spaces. Some of the common areas feature rooftop terraces that overlook the courtyard, the biggest outdoor space. The protrusions on both faces of the ring not only make balcony space possible but adds an aesthetic quality as well. They help to emphasize the human scale of each unit and give a character to the building counteracting an institutional atmosphere.

Teitgen Dormitory is an excellent example of carefully addressing the specific needs and challenges of student housing design. It makes clear use of a hierarchical grouping of students while offering much environmental and social well-being to students.

33 Stensgaard, *Tietgenkollegiet*.

Fig. 1.22 Organizational modules.

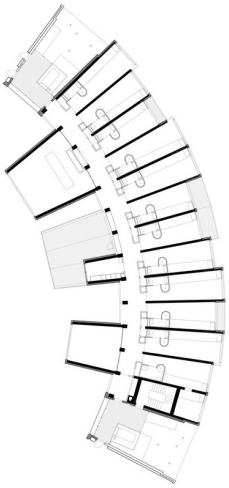

Fig. 1.23 Plan of a module.

Fig. 1.24 Courtyard view.

St Edward's University New Residence and Dining Hall

Alejandro Aravena,
2008 Austin, USA
300 students

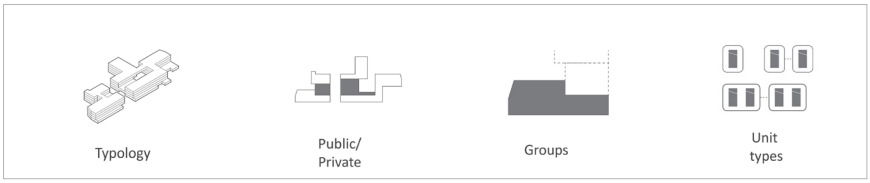

Fig. 1.25 Design elements.

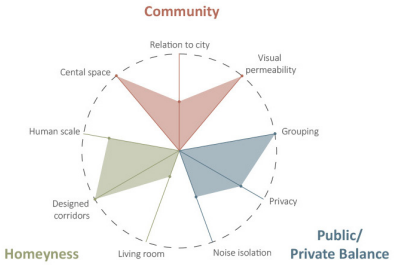

Fig. 1.26 Analysis of the quality.

Fig. 1.27 Exterior view.

The project is Alejandro Aravena's first commission outside of Chile, his home country. The architect tackled two challenges in design. First is the relation to the style of the other older building on campus, and second is the actual programmatic requirements. The building is a network of fragmented slabs interconnected on multiple levels. Its exterior is stone clad with strip windows that correspond to student rooms. This way it was designed to resemble the rest of the campus when looked at from afar. The interior face facing the central open space is clad with colorful curtain glass walls that allow diffused light to the common spaces. The interior faces are also mutually shaded, a feature desirable in hot, Texas weather. The perimeter of the maximized in order to provide every room with a view, natural and adequate amount of privacy. The ground floor has an ample amount of public carved-out open space that corresponds to the pedestrian traffic to, from and through the residence. The ground floor is dedicated to the dining hall that serves the campus. The living units on the upper floors share the same footprint, while common spaces change place in sections. The common areas also overlook the central

open space making the whole project “an order of degrees, from public to intermediate, to common, to private”[34].

The layout of the upper floors gives way to interesting circulation areas. Although there are typical double-loaded corridors at the ends, they become more diverse in terms of natural light and visual interest toward the center. The transparency of common rooms on both ends not only adds visual interest to the corridors but also enables natural light transmission. It also increases the livelihood of the central open space by allowing visual connection to the activities happening in the common spaces and corridors beyond. There are two types of rooms: single and double bed. Pairs of single and double units share an interconnected bathroom and have individual sinks installed right outside the bathroom wall. This provides a degree of privacy while being quite economical.

This project showcases some unique design solutions: public open space and passageway; a totally public ground floor facility, transparent common spaces overlooking the courtyard and a variety of corridors. However, the lack of individual kitchens eliminates the flexibility in dining options. Moreover, the fragmented massing makes the access to the peripheral units, especially the southern ones, more circuitous.

34 ArchDaily, “St Edward’s University New Residence and Dining Hall / Alejandro Aravena.”

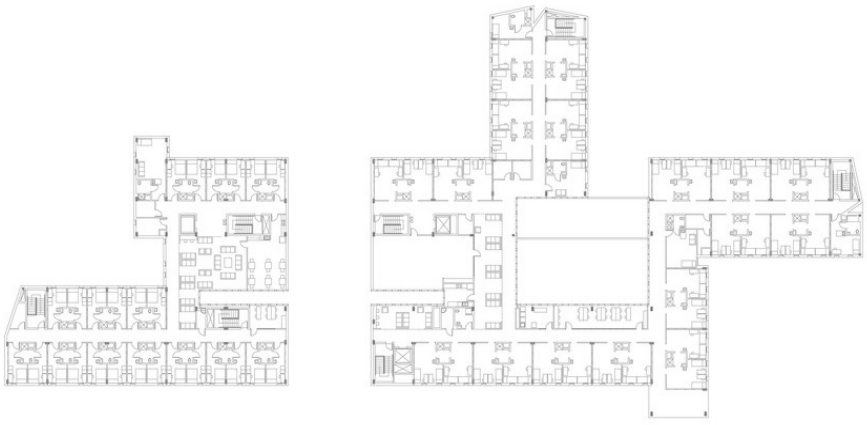

Fig. 1.28 Fourth floor plan.

Fig. 1.29 View from the courtyard.

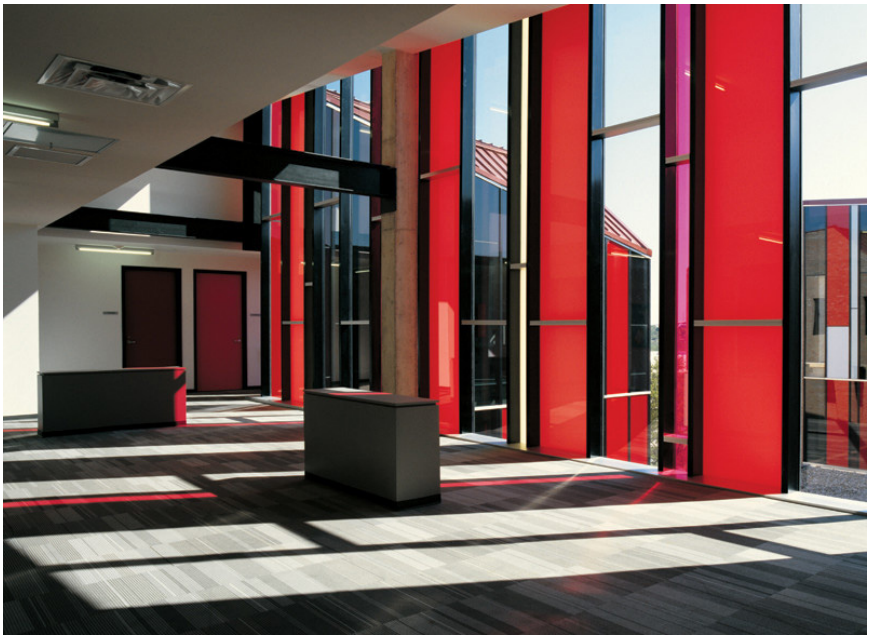

Fig. 1.30 View from the common space.

Grand Morillon Student Residence

Kengo Kuma & Associates
Geneva, Switzerland
680 students

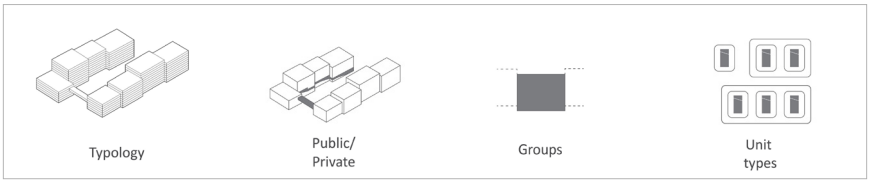

Fig. 1.31 Design elements.

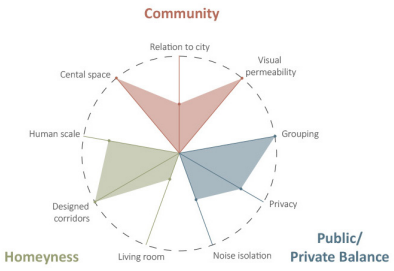

Fig. 1.32 Analysis of the quality.

Fig. 1.33 Exterior view.

The project is a Kengo Kuma proposal that won in an international competition organized by the Graduate Institute of International and Development Studies, Geneva, Switzerland[35]. The design objective was to offer "students a multipurpose living environment favouring a community experience"[36]. It consists of two slab blocks that enclose a public promenade in the middle. It takes a different approach from typical multi-storey student housing design where all communal spaces are concentrated on the ground level and serves the upper level primarily through elevators. Instead, it arranges all communal spaces along the inner faces of the blocks on an ascending path starting from the ground floor on one block and ending on the eighth floor of the other block. These spaces are further connected by an exterior "gradual walk" that utilizes a footbridge to link the two parts of the building. The "gradual walk" provides access to a rooftop terrace and communal spaces along the route[37].

35 ArchDaily, "Grand Morillon Student Residence / Kengo Kuma & Associates."
36 Geneva Graduate institute, "Grand Morillon Student Residence."
37 Ibid.

This residence offers a greater number of common spaces than usual. It includes an amphitheater, multifunctional hall, fitness center, study and meeting rooms, rooftop terrace, shop, and café. While most of the common spaces are located along the promenade, the 25 communal kitchens are positioned on the outer face of the blocks among the student units. This arrangement is logical considering the nature of the kitchen space. The residence accommodates 680 beds in 254 studios, 263 studios with kitchens, and 115 1-2-3 bedroom apartments. Due to its high capacity, communal kitchens are exclusively used by residents of the studios.

Morillon Residence serves as a notable example of mid-rise student housing that vertically distributes common spaces instead of concentrating them all on the ground floor. The interconnectedness of these spaces, along with the exterior promenade, strengthens the community aspect of the project. The variety of student units adds interest to the clustering of students while addressing the need for communal kitchens. The design pays great attention to outdoor spaces and views. However, the corridors between the units are anonymous and repetitive, which is an inevitable characteristic of larger housing designs. Additionally, the ground floor promenade passing through the building is not integrated with the ground floor spaces, leaving a sense that its potential has not been fully realized.

Fig. 1.34 Fifth floor plan.

Fig. 1.35 View of the promenade and bridge.

Fig. 1.36 Kitchen space.

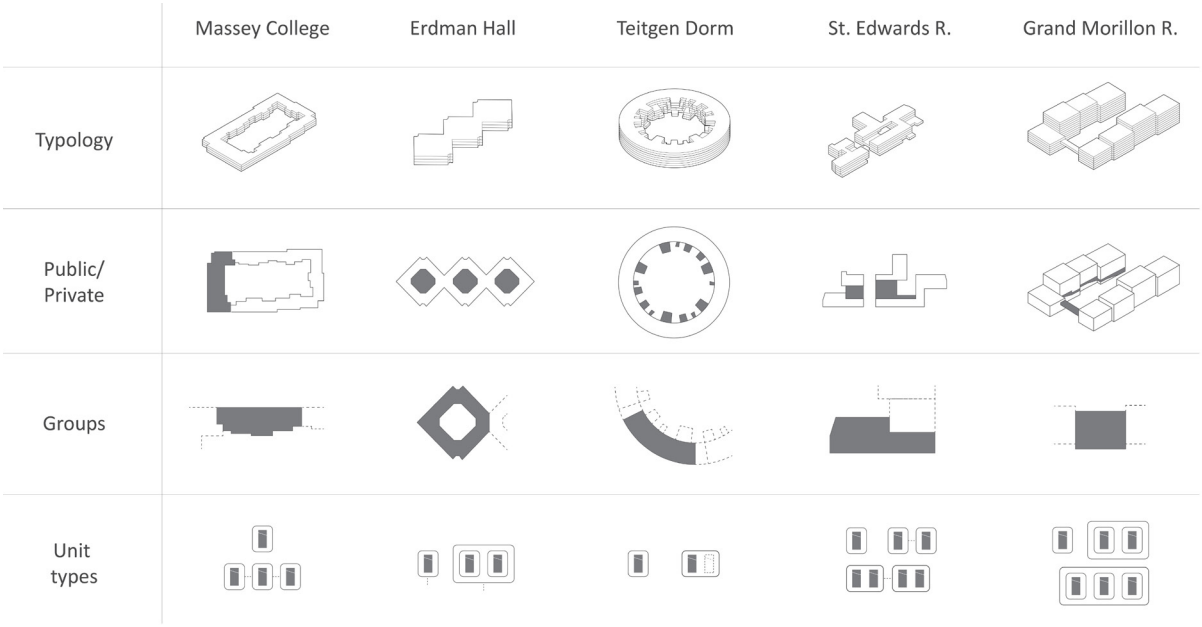

Fig. 1.37 Summary of design elements of Case Study projects.

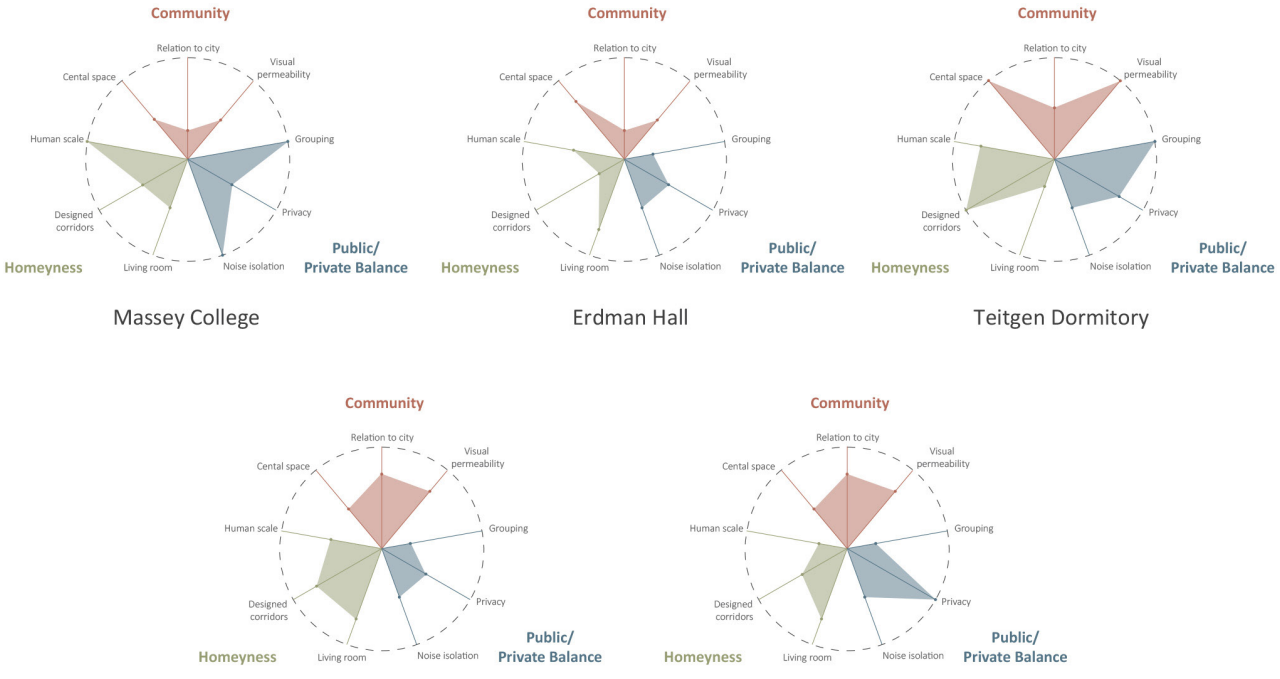

Fig. 1.38 Comparative analysis of qualities of Case Study projects.

1.4 Design objective: Best Practices

In conclusion, the primary challenge in student housing design lies in effectively organizing a collection of repetitive small units in relation to one another and to the common areas. Contemporary design practices show a positive trend toward prioritizing student needs and fostering a sense of community. Based on the analysis of precedents, several principles can be derived that will serve as the foundation for the design phase of this thesis. The design focus can be categorized into four general areas: 1. Offering a community experience 2. Balancing the relationship between public and private spaces; 3. Creating a homelike atmosphere; 4. Considering environmental factors for overall well-being. The following are the detailed objectives for the student housing proposal derived from the analysis conducted in this chapter. The proposal should:

-respond to its context in terms of architectural language and materiality. It can either try to blend in and integrate with the surroundings or contrast to become a local landmark project. [1]

-consider massing to provide natural lighting and views to every unit and common areas. [3; 4]

-have an engaging ground floor that is well connected to the upper floors. This is more achievable in low-rise buildings with wider footprints. Placing most public programs on the ground floor helps create a gradual transition to the more private units above. [1; 2; 3]

- Include a wide range of amenity spaces that cater to student needs, which is particularly relevant for standalone residence projects rather than those located on campuses. [1]

-cluster students into smaller groups that share common areas while not restricting circulation among them. [1; 2; 3]

-opt for smaller intimate kitchens instead of large dining halls to increase flexibility. [2; 3]

-separate noisy social or service areas from quieter bedrooms and study

areas. [2; 3]

- design circulation spaces with intention. They should not be treated as leftover spaces between rows of student units. Corridors should provide glimpses of student activities from both inside and outside, facilitating social interaction. [1; 4]

- provide dedicated study areas apart from the bedrooms, accommodating both small and large group studies and discussions. [1; 4]

- offer a variety of outdoor spaces based on the desired level of privacy. [1; 4]

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CHAPTER 2
UW School of Architecture Student perspectives and needs

This chapter delves into the distinctive characteristics of the School of Architecture at the University of Waterloo. It examines the specific challenges posed by its status as a satellite campus, particularly in relation to housing and the overall university experience for students. It defines specific housing needs of architecture students in addition to neglected housing needs of students in general. The findings are translated into detailed design objectives that are summarized at the end of the chapter.

2.1 Limited university experience

The School of Architecture at the University of Waterloo is a well-respected design school now located on a former Riverside Silk Mills in Cambridge, 31 km away from the main campus in Waterloo[1] (Fig. 2.1). It offers two pre-professional bachelor's programs and a professional master's program. The Honours Bachelor of Architectural Studies is a 5-year program that provides students with a foundation in architectural design, theory, history, and technology[2]. It integrates a co-op program that requires students to do paid professional work on predetermined terms of their study curriculum. The School of Architecture also hosts third-year students of the Bachelor of Architectural Engineering program. The program focuses on building science and third-years get the chance to gain expertise in design thinking as well as interact with architecture students during their time in Cambridge. The professional Master of Architecture offers professional coursework and requires students to complete a self-directed research or design thesis. Completion time ranges from 1 to 3 years, depending on the student's profile. The program also presents co-op opportunities and the possibility of international research travel.

Founded in 1967, the school was initially housed off-campus in an industrial building at 419 Philip Street in Waterloo for 15 years[3]. The building was deemed inadequate both in terms of available instructional space and the overall environmental qualities. Students used Masonite doors as desks and bleachers as raised seating in poorly daylit rooms[4] (Fig. 2.2). In the early eighties, the school moved into an addition building of the Faculty of Environmental Studies on campus. Although the space was still inadequate, the students became more involved in campus life. During the school's time on the main campus, the architecture students didn't have the best rapport with the students of the Department of Planning[5]. In contrast to those, the "sense of community, collegial respect and commitment in Architecture" was found to be "extraordinary and

1 University of Waterloo, "About Waterloo Architecture."
2 University of Waterloo, "Undergraduate Studies Calendar."
3 Canadian Architectural and Accreditation Board, "Senate Undergraduate Council Report to Senate - Attachment #3: School of Architecture."
4 Meyer Boake, "419 Philip Street 1975-1978."
5 Shipley, "The First 50 Years 1969-2019."

Fig. 2.1 Waterloo School of Architecture, Cambridge.

Fig. 2.2 419 Philip St, studio space.

inspiring" by CACB during its visit in 2002[6]. This can be attributes to the unique creative, collaborative and demanding nature of architectural education that brings architecture students closer to each other, while unintentionally setting them apart from the rest of the campus student body.

In 2004, the School of Architecture relocated to the mid-size city of Cambridge, situated approximately 26km southeast of Waterloo. The move was made upon the proposal of the City of Cambridge as part of an attempt to revitalize the declining city at that time. Since then, the school has played an integral role in the city's development, the extent of which will be explored in the next chapter[7].

Now, becoming a satellite campus does have its drawbacks such as the isolation from the main campus. Students of the School of Architecture spend at least 5 years of their life living alternately between Cambridge and their coop cities. For some of them, that is the only "college experience" they will ever have. Being geographically separated from the main campus not only limits the access to on-campus housing it offers, but also restricts access to a wide range of academic, administrative, social, recreational, and cultural facilities and events that contribute to the holistic college experience. **In this respect, a student residence is vital to provide both a safe and secure housing option and an environment more accommodating for extracurricular and social activities.**

2.2 Off-campus housing

While the off-campus Purpose Built Student Accommodation (PBSA) market of Waterloo is the biggest off-campus housing market in Canada[8], Cambridge has not much to offer in terms of purpose-built student housing. As a result, students of the School of Architecture and nearby Conestoga College rely completely on the private rental market for accommodation. Given the close proximity to the school, Architecture students prefer to reside within the boundaries of the Galt, a historic township of Cambridge. There are some local landlords in this area that

6 Redmond, "Daily Bulletin, Tuesday, July 13,2004."
7 Haldenby, "Re:POST University of Waterloo School of Architecture in Domus."
8 BONARD, "Student Housing Market Report Canada."

offer leases to exclusively students through the off-campus property listings website of the University of Waterloo[9]. However, these options are limited in number. Most of the students compete with other low-income renters to rent rooms from landlords who may be unwilling to offer short-term leases or may hold biased views against student tenants.

In the off-campus housing market, students with limited knowledge of tenant rights and especially incoming international students are vulnerable to the exploitative practices of some landlords. As incoming international and out-of-province students may not have the option of visiting the place prior to renting, they are forced to take huge risks that can backfire. For instance, there was an incident involving an international student at Conestoga College who discovered that his rented room was shared by three other individuals, contrary to the agreement of having only one person as stated in the lease he had signed prior to his arrival[10]. There have been similar cases involving international graduate students of the School of Architecture who are paying above-average rents for rooms that are shared by multiple people. Students choosing not to risk, on the other hand, are forced to seek temporary accommodation upon arrival, either in the main campus housing or off-campus housing in Waterloo, a city that offers greater availability of housing options catering specifically to students. However, this choice comes at the cost of enduring a daily commute of over three hours to Cambridge using public transportation.

The absence of purpose-built student housing in Cambridge further accentuates the crucial need for a student residence.

2.3 Co-op program

Another distinguishing aspect of the school is the Cooperative education program. Starting from the second year, the students alternate between study and work terms until they graduate in a total of 5 years[11] (Fig. 2.3). Every academic term, the school accommodates four cohorts

9 Places4Students.Com, " University of Waterloo - Waterloo, ON - Property Listings - Off Campus Rental Information."
10 CambridgeToday.ca, "International Students Say They've Been Victimized by Cambridge Slumlords."
11 University of Waterloo, "Co-Op Study/Work Sequences."

Year	*Term*	*Architecture*	*Architectural*	*Biomedical*	*Nanotechnology*
1	Fall	Study Term 1A	Study Term 1A	Study Term 1A	Study Term 1A
	Winter	Study Term 1B	*Co-op Term 1*	Study Term 1B	Study Term 1B
	Spring	Off	Study Term 1B	*Co-op Term 1*	*Co-op Term 1*
2	Fall	Study Term 2A	*Co-op Term 2*	Study Term 2A	Study Term 2A
	Winter	*Co-op Term 1*	Study Term 2A	*Co-op Term 2*	*Co-op Term 2*
	Spring	Study Term 2B	*Co-op Term 3*	Study Term 2B	Study Term 2B
3	Fall	*Co-op Term 2*	Study Term 2B	*Co-op Term 3*	*Co-op Term 3*
	Winter	Study Term 3A	*Co-op Term 4*	Study Term 3A	*Co-op Term 4*
	Spring	*Co-op Term 3*	Study Term 3A	*Co-op Term 4*	Study Term 3A
4	Fall	Study Term 3B	*Co-op Term 5*	Study Term 3B	Study Term 3B
	Winter	*Co-op Term 4*	Study Term 3B	*Co-op Term 5*	*Co-op Term 5*
	Spring	*Co-op Term 5*	Study Term 4A	*Co-op Term 6*	*Co-op Term 6*
5	Fall	Study Term 4A	*Co-op Term 6*	Study Term 4A	Study Term 4A
	Winter	*Co-op Term 6*	Study Term 4B	Study Term 4B	Study Term 4B
	Spring	Study Term 4B			

Fig. 2.3 Co-op schedule for Architecture students.

FALL Sep-Dec	WINTER Jan-Apr	SPRING May-Aug
75 1A	75 1B	75 2B
75 2A	75 3A	75 4B
75 3B	55 Grad	55 Grad
55 Grad	80 Arch. Eng	80 Arch. Eng
280 Total	**285** Total	**285** Total

Fig. 2.4 Approximate number of students each term.

of undergraduate and graduate students, with a total of around 280 students (Fig. 2.4). This back and forth between Cambridge and coop cities adds another layer of complexity for students in the off-campus housing market. Students are forced to either find new accommodation every four months or sublease their Cambridge room during their work term. Both of those options are equally time-consuming and anxiety-inducing, given the unstable nature of the private housing market. This is a hustle that students need to go through every term on top of a heavy academic workload as well as a demanding recruitment process for coop terms. Although house-hunting hustle in coop destinations is inevitable, **a student residence is necessary as a safe and guaranteed housing option in Cambridge. It should also have flexible arrangement options to meet the needs of two separate groups of students using the same units on an alternate basis.**

2.4 Student culture

The School of Architecture fosters a unique community of creative and innovative students from diverse backgrounds. Students are active in curricular, extra-curricular and co-curricular activities. Every student is talented in one way of art or craft. Some of them even have their own online businesses, and some graduate students have started their own practice. This diversity and creativity are reflected in design studios, design builds and thesis explorations. Students create beautiful artifacts for design studios, national design festivals and hobbies. There's a great environment for collaboration with more than a dozen student groups and initiatives focusing on topics ranging from mentorship and sustainability to equity and rock climbing. One of them is especially relevant to the context of this thesis. BRIDGE Centre for Architecture and Design is a "student-run initiative made to bridge the gap between Waterloo architecture students, professors, alumni, and the community of Cambridge, Ontario"[12]. The initiative organizes fun and informative events for students such as tutorials and art battles. They also host student markets where students and the Cambridge public get the chance to purchase art, craft and food made by students (Fig. 2.5).

12 University of Waterloo, "Student Initiatives."

This entrepreneurial community of students has more potential to create, innovate and collaborate with students of other Faculties and the Cambridge community**. A student residence can be an optimal environment for the creation and exhibition of creative output that those collaborations will bring about.**

Fig. 2.5 Night Market by Bridge, November 2022.

Apart from collective student initiatives, individual research done by the master's students is worthy of note. Following are some of the previous thesis works on student housing done by UWSA students that not only serve as housing precedents in Cambridge but also exemplify the creative and entrepreneurial skills of students as well as their interest to engage in an academic project that involves the City of Cambridge as one of the main stakeholders.

A 2006 thesis by Chantal Cornu documents the founding of the Grand House, a built student housing project in Cambridge. The vision of the author and the founder of the project was to build a non-profit co-op residence to house some of the students of the recently relocated UWSA. The design objectives of the project were affordability and environmental sustainability[13]. The cooperative housing model was utilized both for its affordable and collaborative nature as well as its potential as a solid foundation that supports the long-term sustenance of the project[14]. In this respect, Grand House is an excellent example of the collective effort of students that managed to bring together multiple stakeholders, necessary funds, design, and managerial expertise to come up with and realize a complex design-build project that addresses real-life issues. A team of graduate students led by Chantal Cornu built up a social organization, within the school, the city, and the cooperative communities through all sorts of events such as conferences, meetings, and fundraisers[15]. The design and construction of the project were undertaken mainly by the students of the School of Architecture through design charrettes, and site visits led by the founder (Fig. 2.6)[16]. The selected site was a steep hillside lot on the fringe of downtown Cambridge. The final design of the Grand House features 14 bedrooms and supportive service and social spaces. The design objective was to create a home rather than a small-scale dormitory, which meant grouping bedrooms on a more intimate scale and acoustically separating loud common spaces from quiet spaces[17].

13 Aponte, "Reintroducing: The Grand House"
14 Cornu, "ADDRESS: Building the Foundation for the Grand House Student Co-Operative Inc."
15 Ibid.
16 Ibid.
17 Ibid.

Fig. 2.6 Massing studies of Grand House.

Fig. 2.7 Exterior view of the Grand House.

In 2012, after operating co-operatively for four years, the co-op was dissolved due to financial hardships. The Grand house was later bought by the geostructural engineer of the project and has been operating as student housing since then[18]. Nevertheless, the project is a massive success in achieving its goal of being not only a quality living space but also a unique educational opportunity for everyone involved[19].

A 2006 thesis by Katherine Bowman, titled "A New Role For Student Housing: Revitalizing a Mid-sized City Core" investigates the role of student housing in reviving the downtown core of the deteriorating mid-sized city of Cambridge. The project explores the importance of mid-sized cities as university towns. The author highlights how the boundary of satellite campuses in cities like Cambridge is conditioned to dissolve to include engagement with the immediate surrounding community[20]. The author sees the potential of student housing to become the face of this engagement and a vibrant social attraction point in the city downtown. The design proposal is situated at a central location close to the school in downtown Cambridge. By bringing density and 24-hour street presence, the proposal aims to be an instigator of improvement for nearby vacant buildings and green spaces[21]. The ground floor of the design features dedicated social and study spaces. The permeable and inviting nature of this floor reflects the aim of encouraging pedestrian flow through the site instead of just around it (Fig. 2.7). The ground floor is visually connected to the residential levels above by an atrium, which also features a massive LED communication wall that acts as a bulletin board, accessible by all[22]. Exploring the role of student housing as an essential instigator of improvement in its city context is exemplified well by this project.

18 Aponte, "Reintroducing: The Grand House"
19 Cornu, "ADDRESS: Building the Foundation for the Grand House Student Co-Operative Inc."
20 Bowman, "A New Role for Student Housing: Revitalizing a Mid-Sized City Core."
21 Ibid.
22 Ibid.

Fig. 2.8 A section showing the permeability of the ground floors and its visaul connection to the upper floors.

2.5 Collective living – Student needs

"Architecture students often find that the structured nature of residence doesn't suit their schedule in the program, and they prefer the flexibility of living off campus"[23]. How can a purpose-built student residence provide comparable flexibility in addition to being a secure and guaranteed option? Students living in a residence have dual needs: the need for individual identity and the need for a sense of collective belonging[24]. The architecture students have similar but more nuanced needs when it comes to proximity, typology and student life.

Proximity

A 2002 case study of students at the University of Waterloo and Wilfred Laurier reveals some trade-offs students make when choosing off-campus accommodation. They compared the degree of preference given to living closer to school and living in downtown. The study concludes that proximity to school is a critical deciding factor[25]. Unsurprisingly, the School of Architecture is located minutes away from downtown Galt. The location of the school dictates the location of current students living off campus. A survey by the school's housing task force shows that almost

23 University of Waterloo, "About Waterloo Architecture."
24 Bland and Schoenauer, *University Housing in Canada*.
25 Charbonneau, C.Johnson, and Andrey, "Characteristics of University Student Housing and Implications for Urban Development in Mid-Sized Cities."

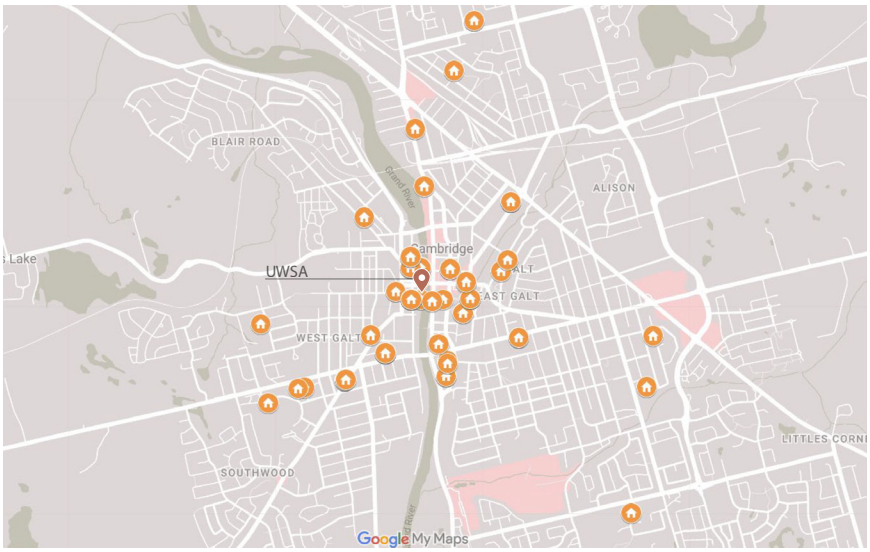

Fig. 2.9 Current off-campus housing map of students.

half of the 79 responding students live within 10 minutes of walking to school[26] (Fig. 2.9). It is evident that off-campus housing offers a wide variety of proximity options. **A student residence has to offer the best proximity to be an attractive option**. Given the demanding nature of the program, students tend to have peculiar study schedules. Can I safely walk back to my unit late at night? Can I safely carry my architectural model to school on a windy day? Is it close enough to school that I can go back home during lunch breaks to have lunch or a nap? These are some of the concerns architecture students may have. It is safe to conclude that a student residence in the commercial downtown core is the most viable option for students. It is also a great opportunity to activate the businesses of the core, which was an idea behind the relocation of the school to Cambridge. In the first place, proximity to service amenities like grocery shops and hairdressers will provide equal convenience to all students, while closeness to local eateries and cafes will eliminate the need for meal plans.

Typology

Today's students have an increasing demand for privacy and luxury which renders traditional-style dormitories with communal washrooms and

26 Waterloo Architecture, "Waterloo Architecture_All School Meeting_Winter 2023."

multiple beds unattractive[27]. The previously mentioned case study also reveals the preference of students for apartment-style housing options[28]. Architecture students are no exception to this trend. However, a student residence is different from any typical multi-unit apartment building as it houses a community of people of the same demographic and is more than a collection of individual living units. In our case, it houses an already existing close-knit community of students of the same major. More than in other majors, peer discussion and working together are integral to the academic success and mental health of architecture students[29]. This creates a question of how can a collective model of living be based on sharing, yet not compromise a comfortable level of access to basic needs like kitchen and washroom? Crowded rooms, random roommates and mandatory meal plans are some of the negative connotations associated with dorm life in Canada. Currently, the students live either alone or in groups of 2, 3, 4 and more. How can this diversity be translated into a designed collective housing? **Offering a variety of options with appropriate degrees of access to shared spaces emerges as a solution.** Whether a student wants to live with a group of friends, with a partner or alone to finish their thesis, they should have an appropriate option.

Student life

University years are the ones when most lifelong friendships are made[30]. Social relationships are probably the most distinctive aspect of collective living. It is crucial for students not only from the viewpoint of academic success but also to prevent loneliness in the transitional years to adulthood. Social support is also doubly important for architecture students as it increases creativity[31]. The presence of Architectural Engineering students in winter and spring terms necessitates more social spaces where architecture and engineering students can interact socially. **A student residence is a perfect environment for the cultivation of social relations that will have lasting positive effects on students**. By providing such an environment a residence can have a bigger meaning in a student's

27 Evans and Sotomayor, "Towards Plush New Digs in Toronto's *in-between* City."
28 Charbonneau et al., "Characteristics of University Student Housing and Implications for Urban Development in Mid-Sized Cities."
29 McClean and Hourigan, "Critical Dialogue in Architecture Studio."
30 Ledbetter et al, "Forecasting 'Friends Forever.'"
31 Tan et al., "Perceived Social Support Increases Creativity."

life than just temporary accommodation. Some building typologies have more potential than others to be social catalysts. The design proposal should consider those in relation to other student needs.

2.6 Homelike versus Institutional aspects of student residence

Student accommodation is known as temporary housing both for the short duration and the transitional aspect of it. It is known as a transient step between living in a family home and living on your own after graduating from university[32]. Therefore, student residences tend to have a more institutional rather than a homelike feel. Distinctive characteristics of home can be defined as "haven, order, identity, and connectedness, warmth, and physical suitability"[33]. In this respect, a sense of home is also important for students, regardless of the temporality. **The homelike characteristics of a space can help reduce the effects of temporality associated with student residences and play a key role in the identity creation and self-expression of students.**

This topic is especially relevant in our context. Apart from the hustle, the cyclical aspect of the co-op program adds another layer of temporality to student housing in Cambridge. It strips students of the chance to establish a sense of home within a particular building that they can look forward to returning to after their work terms. The School of Architecture may provide that to an extent, but it still remains to be an academic building. **A purpose-built student residence is important to not only meet the temporary needs of students but could become a vital tool to establish a sense of home away from home for students in their formative years of adulthood.**

The design proposal for a new purpose-built student residence should try to find ways of integrating the flexible and home-like attributes of private housing with safe and secure ways of housing provision through student residence. Studies on institutional versus homelike characteristics of student residence can be referred to in this regard. The earliest studies on

32 Jones, "The Youth Divide: Diverging Paths to Adulthood."
33 Gifford, *Environmental Psychology*, 238.

this topic reveal the negative connotations attached to institutional student housing and positive connotations to homelike student housing[34]. Studies by Judith Thomsen investigate the architectural aspects of student housing that foster the feeling of home and thus their residential satisfaction. She suggests that "The possibility for personalization of private rooms is highly appreciated in order to create a sense of home and providing individual solutions may reduce a sense of institutionalization"[35]. Giving students autonomy and control over the arrangement of their living spaces is an interesting opportunity in the context of architecture students. On top of supporting personalization, the proposed flexibility will also become a didactic environment for architecture students to experiment with layouts, furniture and materials.

A good case study in this regard is the TreStykker experimental student housing project in Norway. A group of architecture students were funded by many local companies and organizations to design, build and live in an experimental house for 5 months and document their experience. The objective of the project was to explore an innovative approach to designing a student residence that maximizes social visibility and interaction while minimizing private space[36]. The project was designed as an open space of 45 m^2 with an open kitchen, enclosed washroom and 3 mobile sleeping boxes of about 2.5 m^2 each, which served as bedrooms at night and functional furniture during the day (Fig. 2.10). The three selected students who became the initial inhabitants of this project had full autonomy to rearrange the space according to their daily requirements, whether it was for studying, relaxation, or hosting parties. Even though some basic configurations were found to be most suitable for daytime use, the students reported infinite possibilities of using the space and were curious to come up with a different one each time they needed a rearrangement. The flexibility and limited space provided by this design pushed students to engage in complex social relations as well[37]. Every space other than sleeping boxes was considered a social space and required a constant collaboration of students to configure the environment to meet their collective needs. The students expressed enthusiasm about

34 Van der Horst, "Living in a Reception Centre."
35 Thomsen, "Home Experiences in Student Housing," 577.
36 Thomsen and Tjora, "Changeable Space as Temporary Home."
37 Ibid.

being able to customize their immediate living environment. Additionally, the temporary nature of their habitation played a role in reducing the impact of limited privacy. In conclusion, the study on their experience revealed that “the flexible solutions engage the inhabitants in creating their home environment. Enthusiasm in (re-)creation of the house is a way of generating attachment to a temporary home”[38]

38 Ibid., 13.

Fig. 2.10 The Trestykker student housing project.

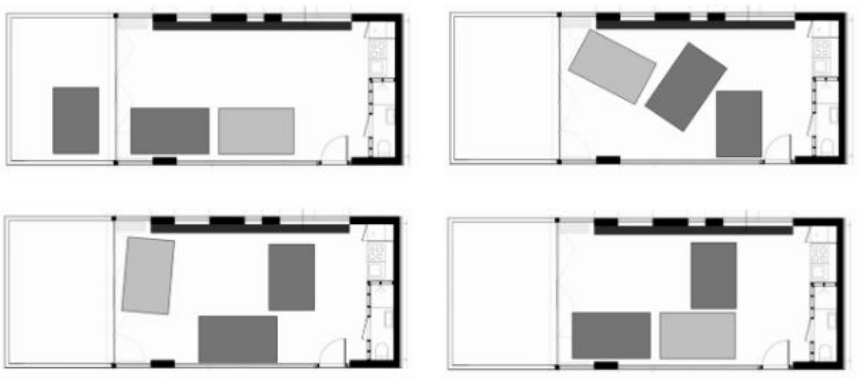

Fig. 2.11 The Trestykker student housing project. Some of the combinations of arranging the sleeping boxes.

2.7 Design objective: Alternatives & Flexibility

In conclusion, we see that architecture students of the School of Architecture require a unique solution in addition to the existing best practices in student housing design. Flexibility and providing alternatives emerge as possible solutions for creating a sense of home. Creative and innovative student culture should be considered as an opportunity to bring students closer to the Cambridge community. Below are the detailed objectives for the student housing proposal derived from the analysis conducted in this chapter. It should:

-include more amenity spaces than a typical residence does to make up for the limited access to the facilities of the main campus

-consider the co-op program and the varying needs of the students who use the same units on an alternate basis

-provide architectural solutions to anchor the idea of a second home for students on work terms

-provide spaces for personal, academic and entrepreneurial explorations and initiatives of students

-tie together the creative skills and output of students with the community of Cambridge and the developmental goals of the city.

-be located in close proximity to school with a safe and convenient walking route

-be located in the downtown commercial core to activate the businesses

-introduce students to aspects of collective living without compromising a comfortable level of access to shared spaces

-provide a variety of options for living units of single and multiple occupancy

-strive to create an environment for social interaction

-give autonomy in choosing roommates

-give control over the arrangement of their living space, mostly through furniture layout

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CHAPTER 3
City of Cambridge

After becoming a satellite campus, the University of Waterloo School of Architecture (UWSA) has created its independent community in Cambridge. Being 31 km from the main Waterloo campus, students at the Cambridge Architecture campus identify largely with the city of Cambridge rather than with the city of Waterloo or other UW students. In this regard, the relationship with the people of Cambridge becomes crucial in the cultivation of a sense of community and belonging among architecture students. Student presence and engagement in Cambridge has its benefits for the city as well. This chapter explores the existing relationship between the school and the city to identify opportunities for further relations that a student residence can support.

3.1 Overview of Cambridge

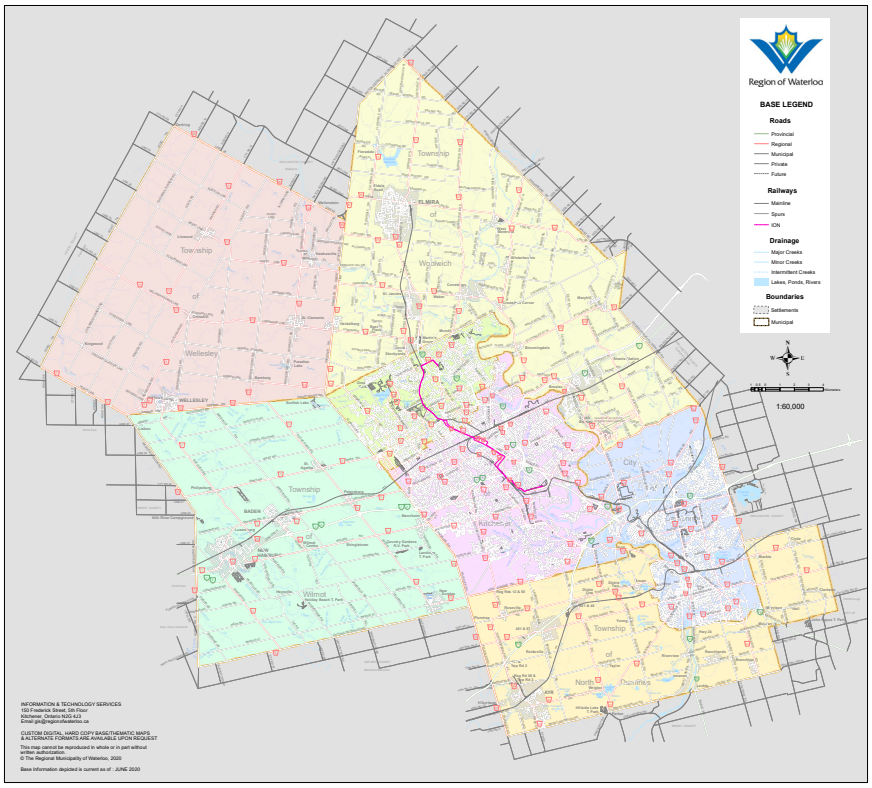
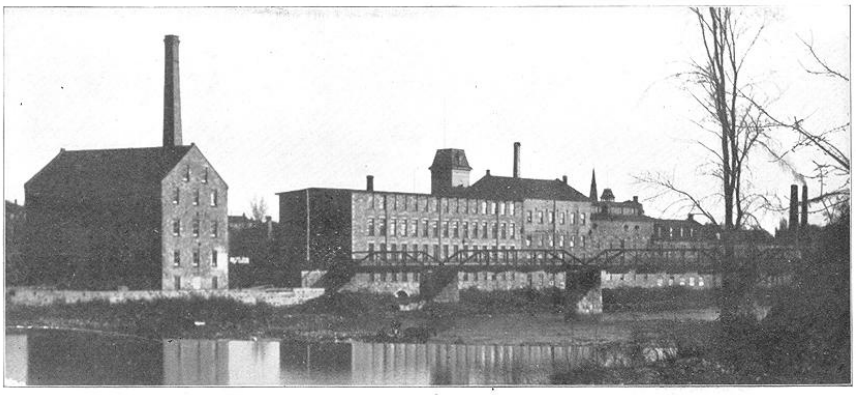


Fig. 3.1 Regional map of Waterloo region.

The city of Cambridge in Ontario, Canada is the second largest community of the Waterloo Region with an estimated population of 146,566[1]. It shares borders with Kitchener and neighbours the city of Waterloo where the University of Waterloo is located (Fig. 3.1). Waterloo and Kitchener are in immediate proximity to each other while Cambridge is more separated. It takes approximately 30 minutes to commute by car between Cambridge and Waterloo, while it takes about 1.5 hours when using public transit. The School of Architecture is located at the historic core of Galt, one of the three cores that make up the City of Cambridge.

Galt is a small community located along the banks of the Grand River. It had its first settlers in 1816 and started as an agricultural community

1 City Population, "Cambridge (City, Canada) - Population Statistics, Charts, Map and Location."



GALT GAS LIGHT CO., Limited. THE C. TURNBULL CO., Limited.

Fig. 3.2 Picturesque and industrial Galt, 1902.

before quickly turning into one of the most powerful industrial cities of the region during the second half of the 19th and the first half of the 20th century[2] (Fig. 3.2). It was known for its textile industry that bloomed along the river and enjoyed a boosted economy during the Second World War due to its strong textile industry[3]. Due to geopolitical and infrastructural shifts by the second half of the 20th century, the industries began to decline and some of the factory buildings were torn down[4]. In 1973, the City of Cambridge was incorporated as a result of an amalgamation of the municipalities of Galt and the nearby towns of Preston and Hespeler[5]. The architectural style of the historic core of Galt reflects the Scottish Baronial style relative to its Scottish settler history of the 19th century. There's a distinctive charm in the use of stone and brick masonry and most of the single detached cottage houses and commercial buildings make use of limestone. A quick walk along the roads of the historic core reveals the architectural layers of historical continuity reflected on the materials (Fig. 3.3, Fig. 3.4). It has preserved most of the heritage buildings along the downtown core and has repurposed the remaining factory buildings into public spaces that meet the needs of the city.

The relocation of the Waterloo School of Architecture to the former Riverside Mill of Cambridge in 2004 is a prime example of urban renewal[6].

2 City of Cambridge, "Local History."
3 McLaughlin, *Cambridge : The Making of a Canadian City*.
4 Ibid.
5 City of Cambridge, "Local History."
6 ArchDaily, "Waterloo School of Architecture / LGA Architectural Partners."

Fig. 3.3 View of Main street, Cambridge.

Fig. 3.4 Material collage of Downtown Galt.

The school's relocation was seen to be beneficial to both parties as the school needed more space and the city needed the student vibrancy to activate the community and its businesses. Being a model for public-private partnership, the project was partially funded by Cambridge with $9.5 million and an additional $8.2 million in provincial and federal funding. The city also incorporated the school into municipal plans regarding economy, heritage, and arts and culture[7]. The move has recovered a vacant building and extended the downtown core by activating the Main Street Bridge. Being one of the most important events in the history of the City of Cambridge, the project signifies the belief of the city in revitalizing the city with the involvement of a student community. It also signifies the new role of Cambridge in the academic life of architecture students. Being a satellite campus, the School of Architecture now relies on Cambridge to take on the role of a campus equivalent, yet one that possesses distinct characteristics in comparison to the main campus. Since the relocation, the city has seen an increase in housing supply as well as constructed more civic and cultural facilities such as City Hall, Civic Theatre, and Idea Exchange. The students of the school have been involved in events, festivals, and urban design projects that focus on "possibilities of enlivening urban space, economy, and culture"[8].

A student residence project should support the significance of the school's location in this mid-size city and find ways of further supporting this mutually beneficial collaborative spirit between the city and the school. In terms of architectural articulation, it should consider the architectural heritage, materials, and urban fabric of the city to carefully integrate with it.

3.2 Existing school-city relations

The design-focused nature of the architecture program is crucial in defining the types of collaborative projects. The architectural curriculum and related academic and extracurricular skills of the student body make them gravitate toward creative and design-based projects that serve the

7 Haldenby, "Re:POST University of Waterloo School of Architecture in Domus."
8 Ibid.

community. Some projects rely on the expertise of the school in addressing the needs and problems of the city. One example of such kind of project is the 2012 study of East Galt, an important heritage area, initiated by the City of Cambridge in partnership with the School of Architecture[9]. A more recent project is a tiny home partnership between the Municipality and the school where students designed and built a tiny home prototype as a way to increase options for attainable housing. The prototype was exhibited at Cambridge City Hall in fall 2022[10]. Other types of projects bring together the creative skills and interests of students with that of the general public and local artists. Following is the outline of some of them.

Galleries and exhibitions

The design of the Architecture school in Riverside Mill allocated specific spaces and programs that the greater city community will have access to as well. The Riverside Gallery is the main one of them. Designed to be one of the main public faces of the school, the gallery is operated by Cambridge Galleries and curated by its members and that of the school[11]. It was designed to exhibit "Cambridge-curated shows, UWSA-curated shows, Master thesis shows and traveling shows"[12]. It was supposed to have dedicated spaces for Main Gallery, Cambridge Gallery, Thesis Galleries, and administrative spaces. However, in its current state, the gallery operates as one big flexible space with no dedicated space for administration. This reflects the actual need for the space in contrast to the anticipated needs. It is mainly used for showcasing the works of undergraduate and graduate students as well as a classroom for design reviews and thesis defenses (Fig. 3.5). Although the entrance atrium, theatre and workshop were also originally designed to be fully accessible to the public during business hours, they are now open to the public for special occasions only. This is due to the safety and security concerns that arose as they were not fully separated from the rest of the spaces (M. Przybylski, personal communication, February 2023). This makes the Riverside Gallery the only space that is open to the public.

9 EngageWR, "East Galt Cultural Heritage Landscape Study."
10 City of Cambridge, "Tiny Homes Partnership."
11 Natoma Architects and Levitt Goodman Architects, "Riverside: University of Waterloo School of Architecture."
12 Ibid., 19.

Fig. 3.5 Riverside Gallery. Masterworks Master's thesis exhibition, July 2023.

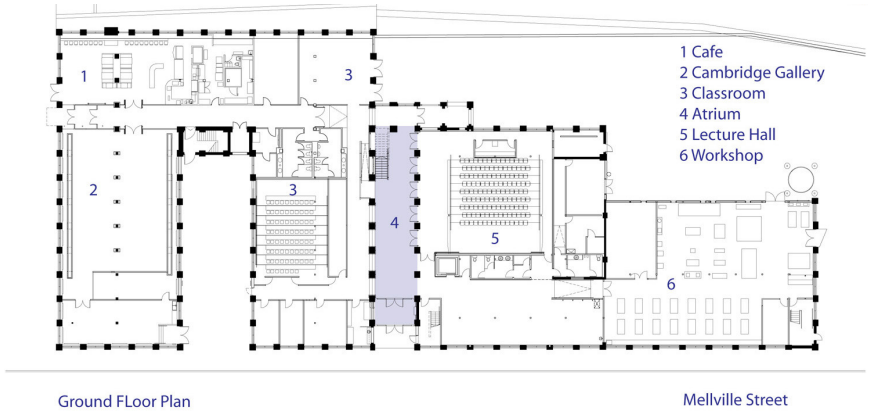


Fig. 3.6 Ground floor plan of UW School of Architecture.

Due to its strategic placement, it's fully separated from other academic spaces, yet situated in a transitory space for students and the public. It is situated on the way to the secondary entrance of the building opposite the public entrance to Melville Café (Fig. 3.6). The Gallery is not the only place where student work gets exhibited. Some thesis projects make it into the galleries of Cambridge as well as the relevant businesses. For instance, a thesis artifact of a graduate student was recently featured in a local boutique[13].

13 CambridgeToday.ca, "New Downtown Cambridge BIA Partnership Showcases Former Student's Work."

Markets

Students of UWSA are very talented and engage in extracurricular arts and crafts projects. The Bridge Market is one of the events organized by student groups that supports the sale of such products. The market is organized every term at UWSA and alongside the other events of the city and school. Even though they are open to the public, they aren't advertised to the public and seldom have public visitors unless it's held as part of other city-wide events. The City of Cambridge, on the other hand, also organizes similar markets with local artisans, especially during summer. They aren't advertised to the student community and student involvement in such projects is not actively promoted. A student residence can become a space that brings people from both sides together. It can provide a platform for communication and coordination of such events together.

Installations and Festivals

The City of Cambridge organizes many Arts and Culture events along with Digital Light Projection shows. Some of them are based on the submission of event planning proposals by the members of the community. Unsilent Nights is one of them that has benefitted from student participation. It is an annual walking tour of outdoor art installations of local artists along a route in downtown Galt. Before the Covid-19 Pandemic, architecture students were active in contributing pieces for the show (Fig. 3.7). The 2022 show was held on the same night as the Bridge Market and it was one of the spots of the tour. This made a natural visit to the market by the public possible. Apart from scheduled events, student initiatives of the UWSA such as the "F_RMlab" engage in designing and constructing public installations and furniture that are featured in Waterloo Region, as well as other cities like Toronto. Currently, all design and construction of such projects are done at the educational spaces at UWSA. The potential of showcasing the design and construction process of such artifacts to the Cambridge community can be unlocked by dedicating specific spaces in a student residence that are equally accessible to both students and the public.

Fig. 3.7 Student installation on Unsilent Night, 2019.

Overall, a student residence should learn from the limitations of UWSA in providing access to spaces of collaboration with the city community. It should not only focus on the exhibition of the art products but also provide spaces for the production and sale of those products as a day-to-day activity rather than a one-time event.

3.3 The City's focus on creative industries

In contrast to Waterloo's strong reputation for high-tech industries and startups, the City of Cambridge is trying to change its "traditional reputation from that of a *manufacturing town* to a *major cultural center and creative community*" as outlined in its 2008 Arts and Culture Master plan[14]. Its 2022-2023 Master plan is in the works based on the feedback collected from the community engagement sessions[15]. The City of Cambridge sees the Arts and Culture as the strength and collective identity of the city that brings about economic prosperity. The strategies in Arts and Culture are linked to downtown revitalization, economic development, business improvement areas and tourism. In addition to municipal efforts, there are

14 City of Cambridge, "Arts and Culture Master Plan," 18,10.
15 City of Cambridge, "Arts and Culture."

a high number of small creative businesses that are located all around the commercial core. Cambridge Center of Arts is a major arts facility located next to the City Hall that offers rentable spaces for events and gatherings as well as adults' and children's programs and workshops to enjoy the arts and creativity. The proposed student residence, on the other hand, should focus on the entrepreneurial aspects of art creation where flexible spaces are provided for both amateur and professional collaborations and startups of individual or collective nature. According to the Supervisor of Arts Culture and Special Events at the City of Cambridge, local artists want affordable creative space (W. Schaefer-Stilling, Personal Communication, May 2023). Rentable spaces for test-fitting ideas could encourage both students, local and future artists to experiment with entrepreneurial projects without the risks associated with committing to a place for the long run.

This project doesn't aim to become a new center of Arts and Culture. Rather, it tries to support the creative vision of the city by offering alternative spaces for creative production.

3.4 Design objective: Inviting the public

The relocation of the UWSA is a major part of the Arts and Culture Master plan of the City of Cambridge. The findings in this chapter reveal that including community-related programs in a proposed student residence is crucial to the role of UWSA in Cambridge as well as Cambridge's role in student life. Its inclusion will not only make the experience of working with the community – an integral aspect of the architectural profession – more accessible, but also will help students identify with their local community to feel a sense of belonging in their short and rotational time in Cambridge. Programs on creative spaces emerge as a way of supporting Cambridge's developmental vision as well as students' talents and interests. Accordingly, the residence should:

-respect the existing urban fabric of the city and find ways to integrate into it while offering a modern edge

- create equal access to community-related program spaces without hindering the safety requirements of a housing development

- focus on the production and sale of the artistic products as much as their exhibition

-make the construction and exhibition of collective projects accessible to be observed by the public

-offer flexible spaces for students and local artists to test their individual business ideas to become part of the small business community of Cambridge

-be strategically located to be accessible by seen by public and revitalize the area it is located

-be of inviting and permeable nature

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CHAPTER 4
Design Application

This chapter presents a design synthesis that effectively addresses the design goals of this thesis by incorporating design principles derived from the findings of the previous three chapters. Firstly, the design goals and their corresponding design principles will be presented. This will be followed by a site selection and analysis, as well as an introduction to the general design approach and the program. Lastly, a detailed overview of the proposal will be provided, highlighting how the design choices align with the stated principles and fulfill the design goals of the thesis.

4.1 Design Goals

The objective of this project is to develop a design that prioritizes the needs of UWSA students, reinforcing their academic journey while also supporting their meaningful growth into adulthood. It tries to tackle the prevalent challenges of student life, including the transitory nature of accommodations, homesickness, and feelings of isolation. A primary objective in response to these challenges is to establish a supportive community that nurtures the individual growth of students while fostering a sense of collective development. The establishment of a community on a domestic scale holds particular significance for UWSA students, given its status as a satellite campus. In this respect, its immediate context, the City of Cambridge emerges as an important stakeholder. The aim of the project is not only to provide architectural solutions to foster a sense of community within Architecture students but also between architecture students and the community of Cambridge. As a suitable platform for this engagement, an arts and design program is proposed.

The term community has similar attributes to the term family. What is the most architectural feature of a family? A family home. Studenthood is the most notable period in someone's life where they start to detach from their family home and experience temporary accommodation before settling in after completing educational pursuits. It is this time when they start to lose the sense of home and belonging in a specific place. This case is also exacerbated in the context of architecture students in Cambridge due to the coop program which makes them change accommodation very frequently. The aim of this design is to integrate architectural means of creating a platform for the cultivation of a sense of home and identification with a place. Home-making is also one of the ways of identity creation. This concept is usually ignored in temporary housing design. Accordingly, this thesis investigates the ways of creating a sense of permanency, ownership, familiarity, and belonging in temporary housing like this one.

Overall, the aim of this project is to investigate architecture's capacity to bring together different stakeholders and create relations in high-quality spaces.

4.2 Summary of derived design principles

The following is a set of design principles that will be used to achieve the outlined design goals. They consolidate the lessons learned from the case studies of the first chapter with the context-specific findings of the second and third chapters. They are arranged in four mutually non-exclusive categories that were introduced in the first chapter: 1. Offering a community experience 2. Balancing the relationship between public and private spaces; 3. Creating a homelike atmosphere; 4. Considering factors for overall well-being and comfort.

- Creating smaller clusters of students is necessary to allow intimate social circles and prevent overcrowding, noise, and other negative aspects of communal living. The groups should have independent circulation spaces but also be interconnected with each other, allowing communication on a preference basis. [1; 2]

-Providing a wider range of amenity spaces than a typical residence is needed to make up for the limited access to the facilities of the main campus. The proposal should include dedicated studio space for tasks specific to architecture, such as model making. [1; 3]

-Present-day students require more privacy. Bathrooms should be designed to be shared by a minimum number of people. Kitchens should also be of a more intimate scale to avoid overcrowding and a cafeteria feel. Lounge spaces should be of various sizes to accommodate small student groups and large events. [2; 3; 4]

-Common leisure and service spaces should be easily accessible by living units but should also be well isolated for noise control and privacy. [2; 4]

-The relationship between common spaces, corridors, and living units should be carefully considered to allow visual permeability, interest, and connectedness to avoid the institutional and hotel-like feel. [1; 3]

-It should be situated in close proximity to the School of Architecture, downtown businesses and services as well as public transit routes. It should integrate into the surrounding both in terms of architectural

language and outdoor space. [1; 4]

-It should have a variety of living units to accommodate a diverse population of both undergraduate and graduate students. The massing and orientation should allow natural light and views to every living unit and common area. [3; 4]

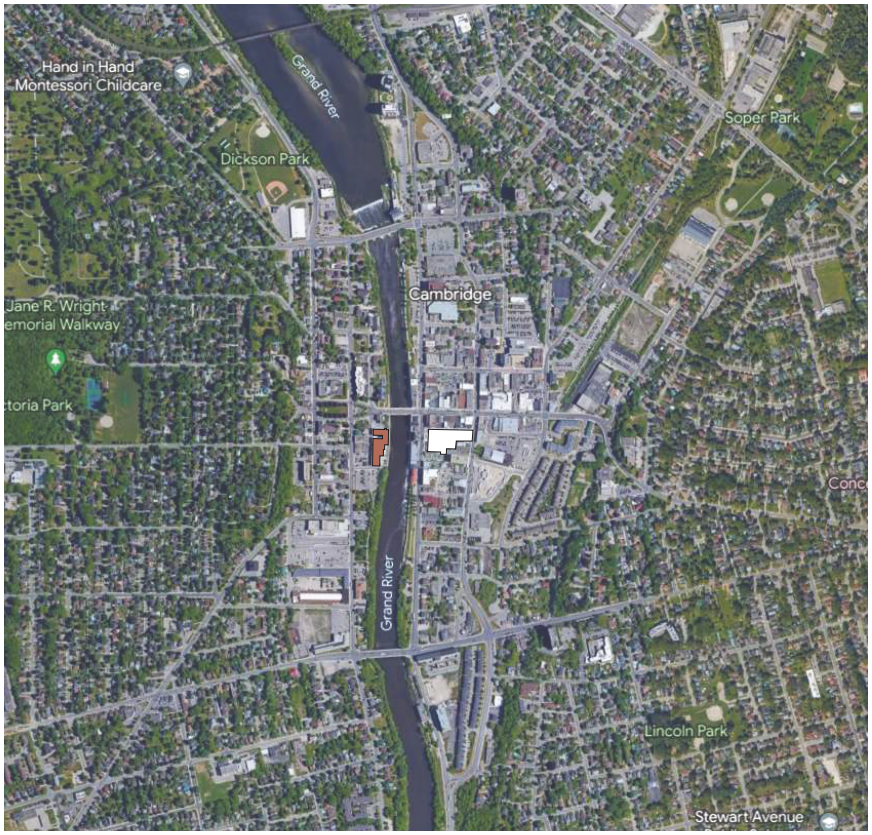
-Flexibility of personal and common spaces will increase their efficiency. Flexibility in living units is especially important to accommodate two groups of students that use the space alternately. Providing opportunities for customization of personal space is crucial in identity creation and homemaking. [3; 4]

-Creative culture of Cambridge should be merged with that of UWSA students to create a permanent partnership with the city. Spaces dedicated to this purpose should be of inviting and permeable nature. [1]

-It is important to have regulated access to spaces for all three user groups: the public, all UWSA students, and residence students. The distinction between the ground and upper floors is necessary to achieve this objective. [2; 4]

4.3 Site selection and analysis

Site selection is dependant on the distance to school. UWSA is situated at the left bank of Grand River. To its left are mostly single residential buildings with occasional commercial and public facilities. The right bank across the bridge, on the other hand, is the commercial and urban core of Galt and Cambridge. A site on that core was selected due to its proximity to public amenities and existing and future transit hubs. The location on Camridge commmercial core is also essential for establishing strong public presence to attract the community to its public programs on arts and design. The selected site is Parking Lot Number 2, located on water street,within 5 minute walking distance to school.



□ Proposal site
■ UWSA

Fig. 4.1 Aerial image of Galt.

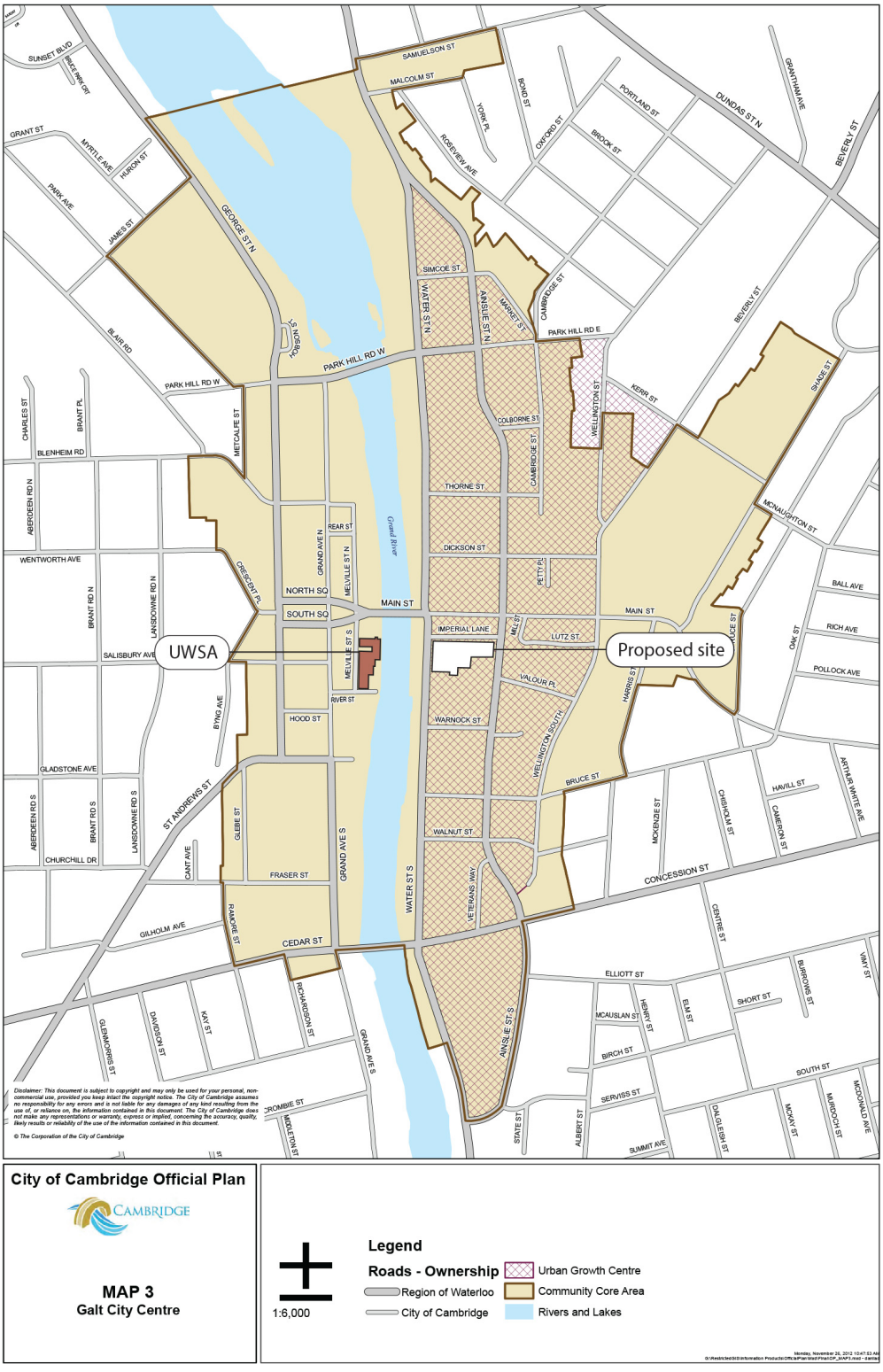


Fig. 4.2 Galt City Centre.

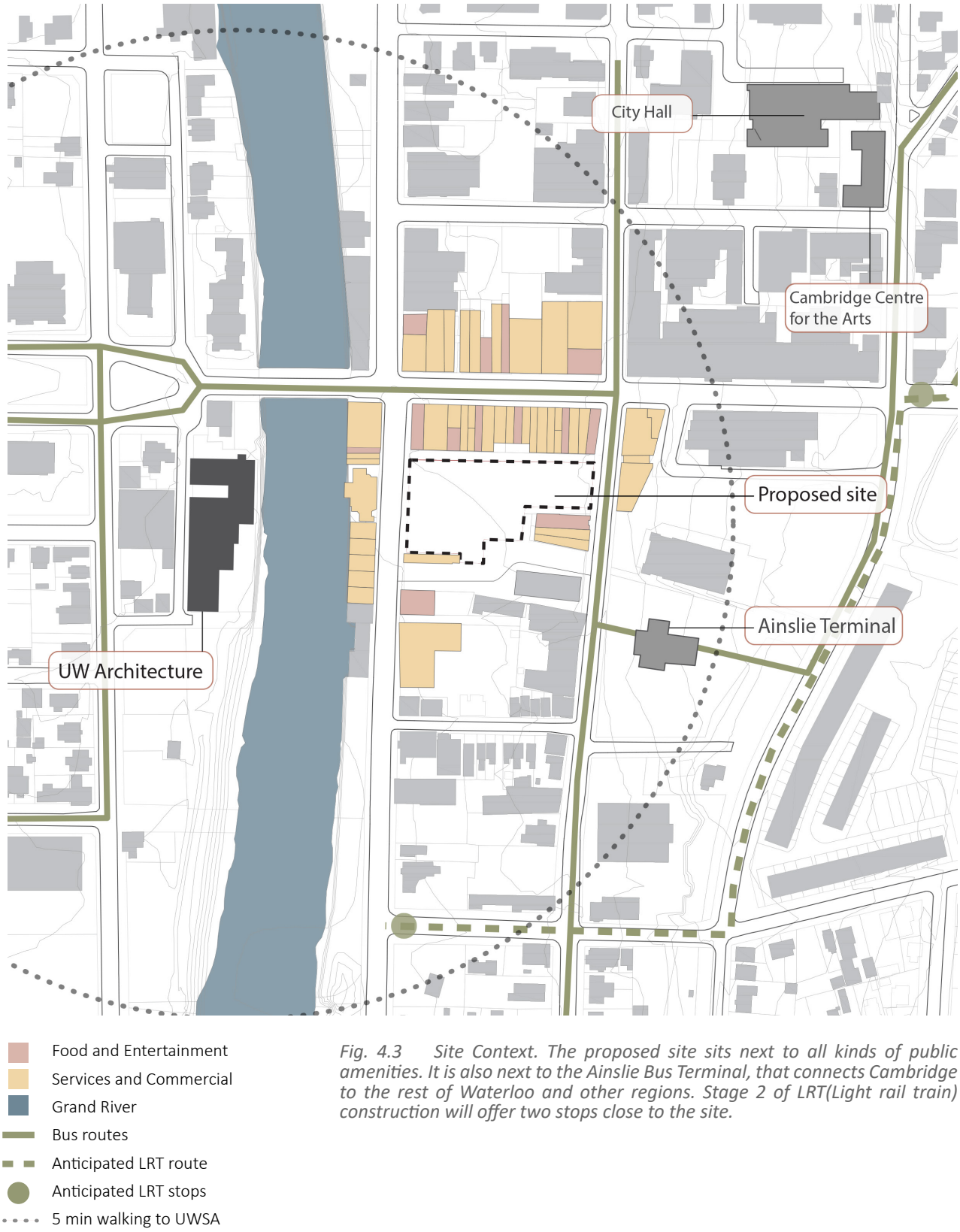


Fig. 4.3 Site Context. The proposed site sits next to all kinds of public amenities. It is also next to the Ainslie Bus Terminal, that connects Cambridge to the rest of Waterloo and other regions. Stage 2 of LRT(Light rail train) construction will offer two stops close to the site.

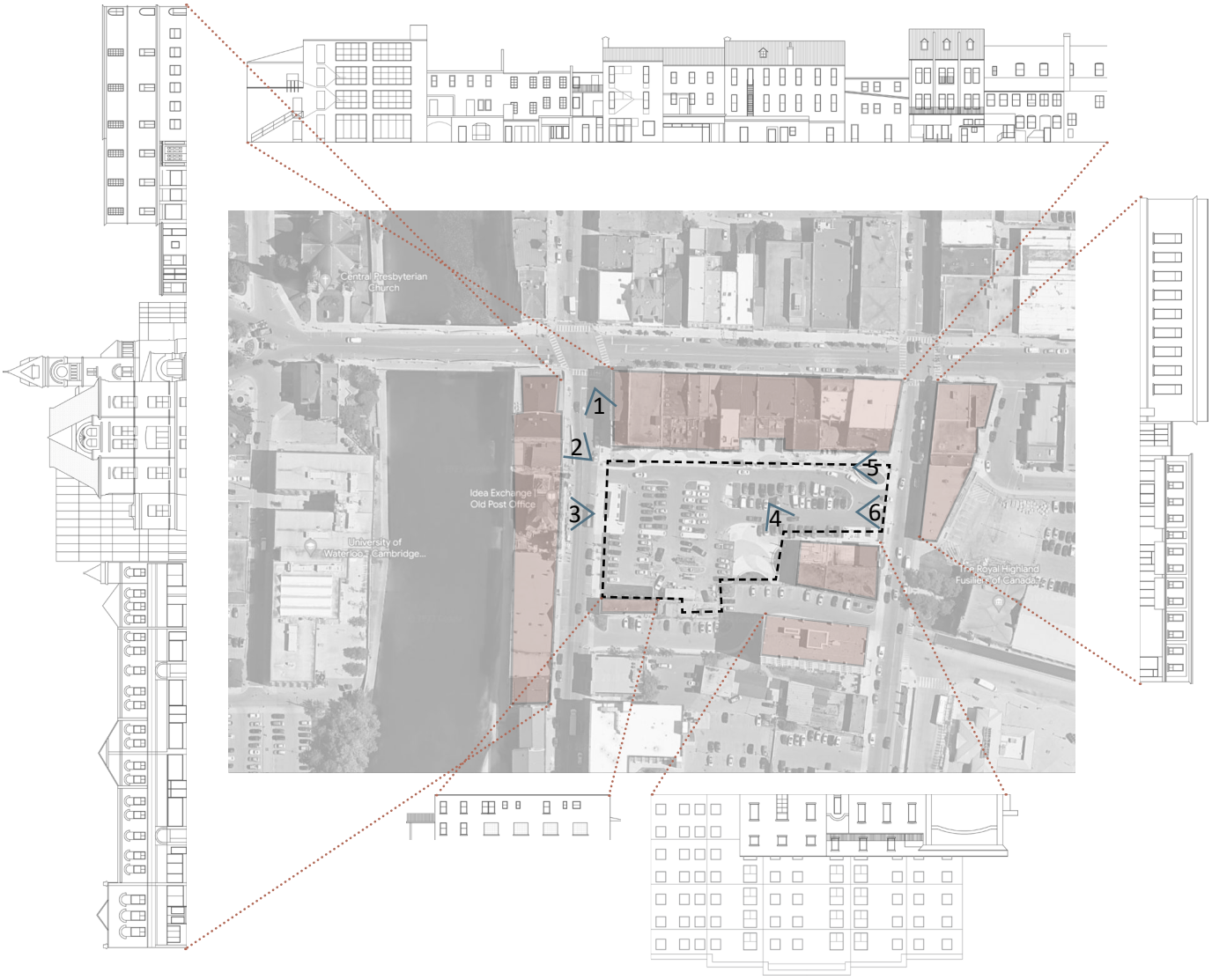
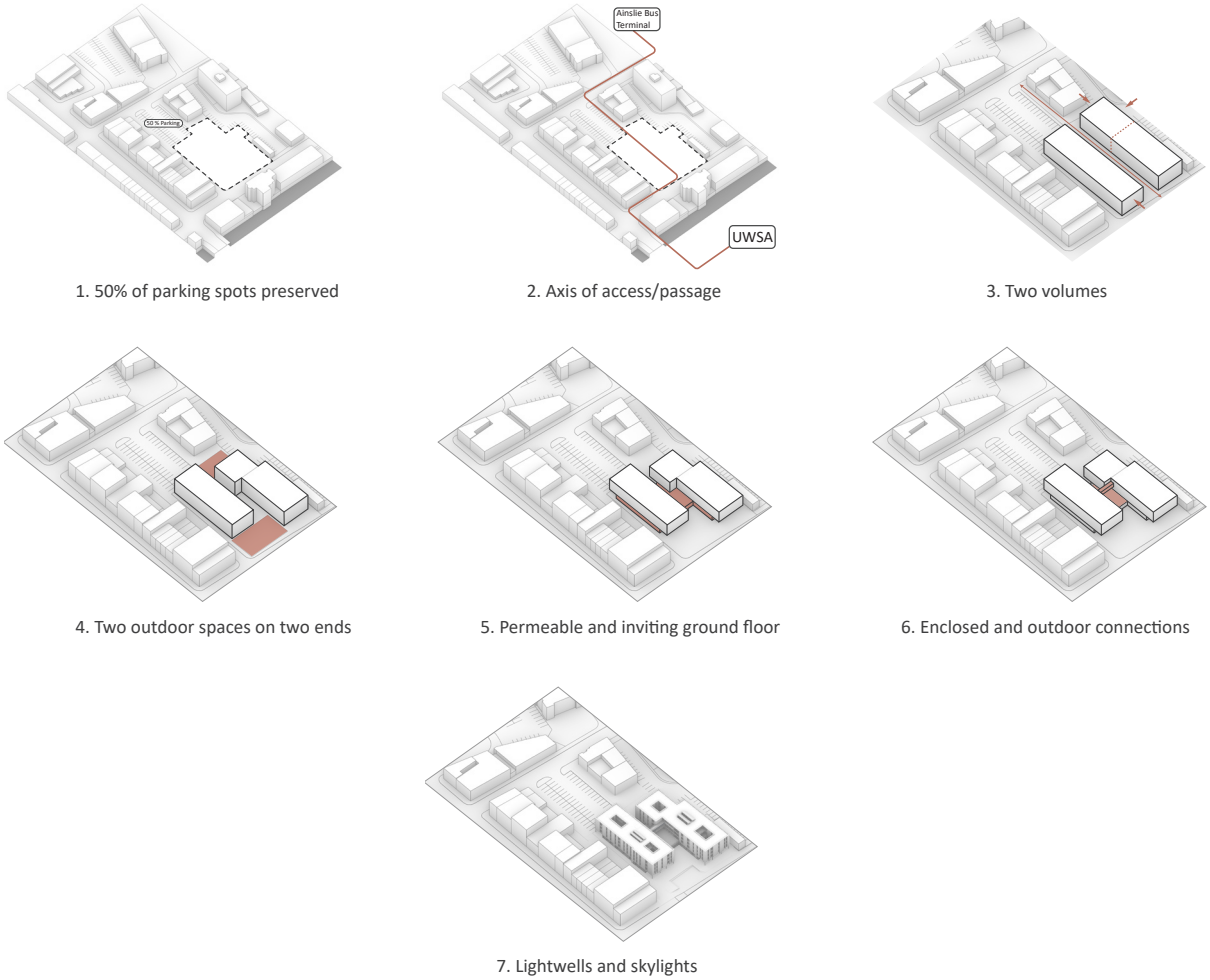


Fig. 4.4 Surrounding buildings of the site. The site is surrounded by Idea Exhange on the West and Monigram Cafe on Southeast. The North side is comprised of small businesses.

4.4 Design outcome

The proposal accommodates 180 students in single and double rooms, as well as 3 and 4 bedroom suites. The site strategy takes advantage of the prime location by offering a vibrant ground floor, while the upper floors provide living units and supportive common areas. The strategy also involves removing 50% of the parking spots and reallocating them to other nearby parking lots. The massing of the building is influenced by the lot boundary, a central passageway, and two outdoor spaces. It consists of two blocks interconnected by the ground floor and a bridge on the third floor.



1. 50% of parking spots preserved
2. Axis of access/passage
3. Two volumes
4. Two outdoor spaces on two ends
5. Permeable and inviting ground floor
6. Enclosed and outdoor connections
7. Lightwells and skylights

Fig. 4.5 Massing strategy.

Fig. 4.6 West elevation. The exterior faces of the blocks use brick in order to integrate with the heritage buildings of downtown. The inner-facing facades feature wood cladding to exude warmth and define the ground floor passageway and roof terrace above it. A gathering area is proposed on the square facing Idea Exchange to host performances, speeches and light shows.

Fig. 4.7 East elevation. The back side houses more intimate outdoor programs. The outdoor extension of the gym neighbours the patio of the adjacent Monigram cafe.

Fig. 4.8 Ground floor plan.

1. Creative workshop
1a. Enclosed Workshop area
1b. Storage
2. Business spaces
3. Art store
3a. Art store storage
3b. Art store outdoor extension
4. Gallery/ Vestibule
5. BRIDGE Center for Architecture+Design
6. Security
7. WC/Changing room
8. Mail/Delivery
9. Stair & Elevator core
10. Gym
11. Great room
12. Lounge
13. Studio
14. Individual Study Rm.
15. Presentation Rm.
16. Group study Rm.
17. Meeting Rm.
18. Bike parking
19. Mechanical Rm.

Fig. 4.9 Second floor plan.

1. Single room
2. Double room
3. 3-bedroom suite
4. 4-bedroom suite
5. Study room
6. Laundry
7. TV room
8. Lounge
9. Courtyard
10. Rooftop terrace

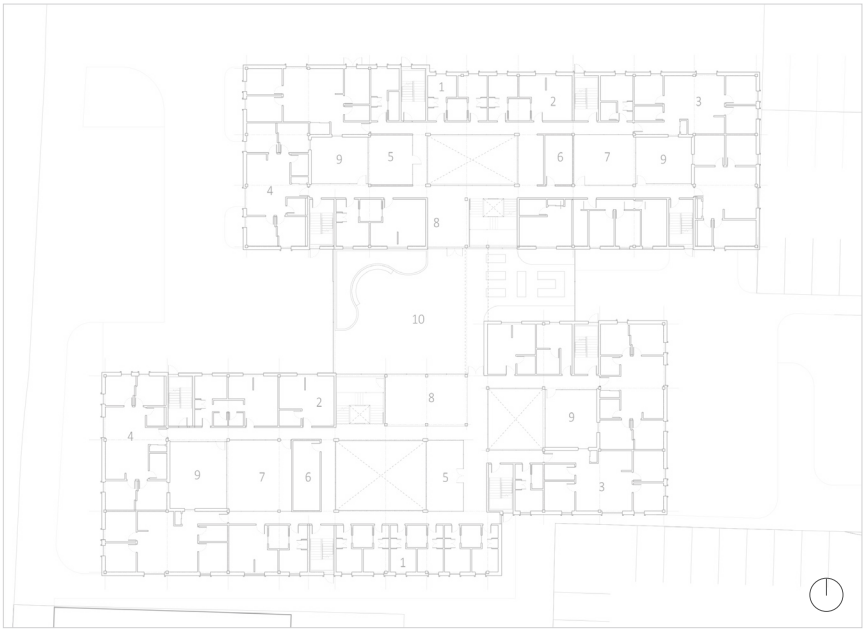


Fig. 4.10 Third floor plan.

1. Single room
2. Double room
3. 3-bedroom suite
4. 4-bedroom suite
5. Kitchen
6. Dining area
7. Bridge
8. Lounge

Fig. 4.11 Fourth floor plan.

1. Single room
2. Double room
3. 3-bedroom suite
4. 4-bedroom suite
5. Study room
6. Game area
7. Rooftop terrace
8. Lounge

4.5 Offering a community experience

The concept of community creation is addressed at every scale and within various programmatic spaces. At the city scale, a program focused on entrepreneurial arts and crafts is proposed to foster collaboration between architecture students, artists, and the general public of Cambridge. At the scale of all UWSA students, dedicated spaces such as a multi-purpose hall, gym, and various study areas are provided. At the scale of residents, common areas are incorporated among the living units to promote social relations by visual connectedness. The hierarchical grouping of students, introduced in the first chapter, is employed and expanded to achieve a balance between collective identity and intimacy, both within and between these three scales.

Fig. 4.12 Rooftop terrace as one of the unifying elements of two blocks.

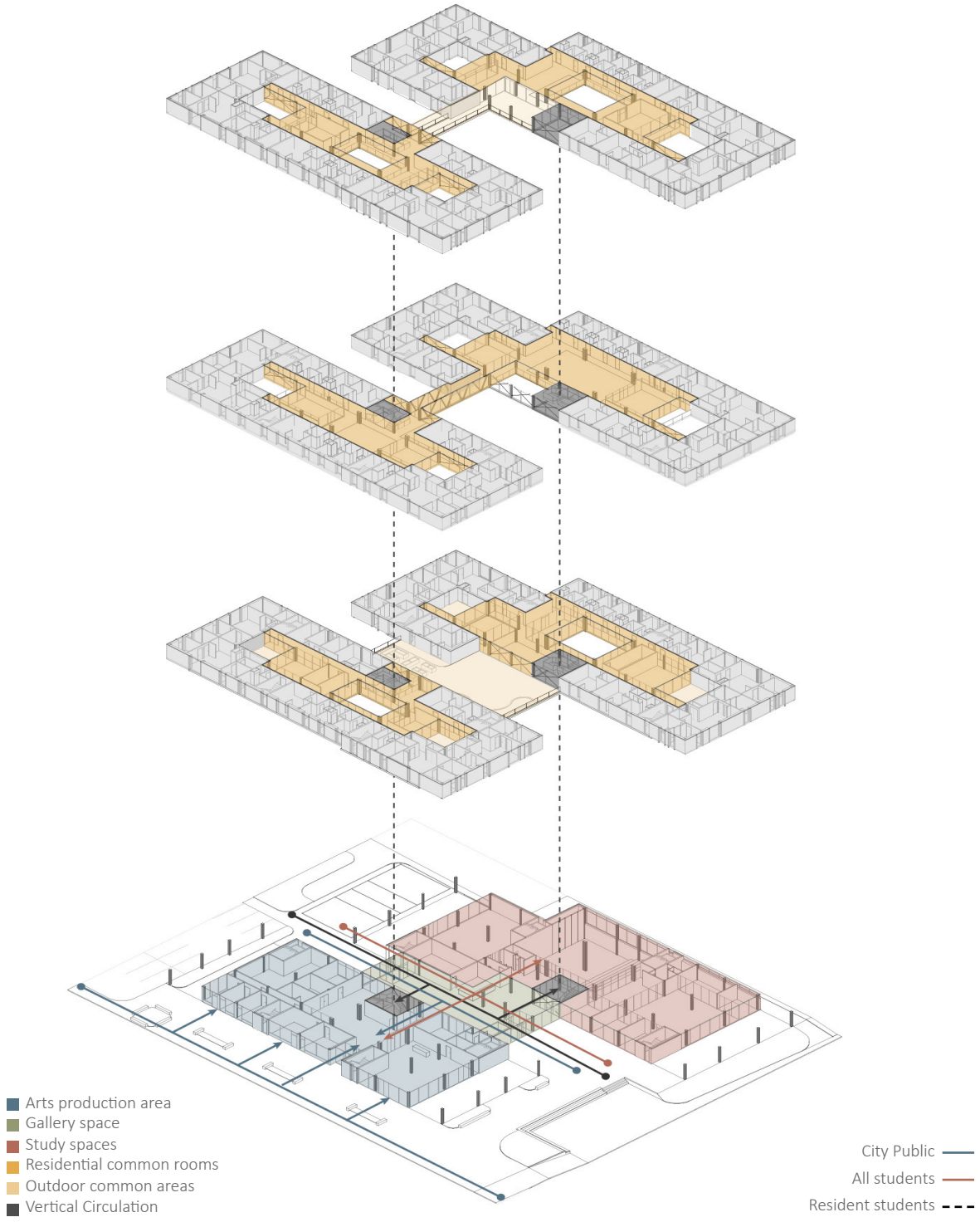
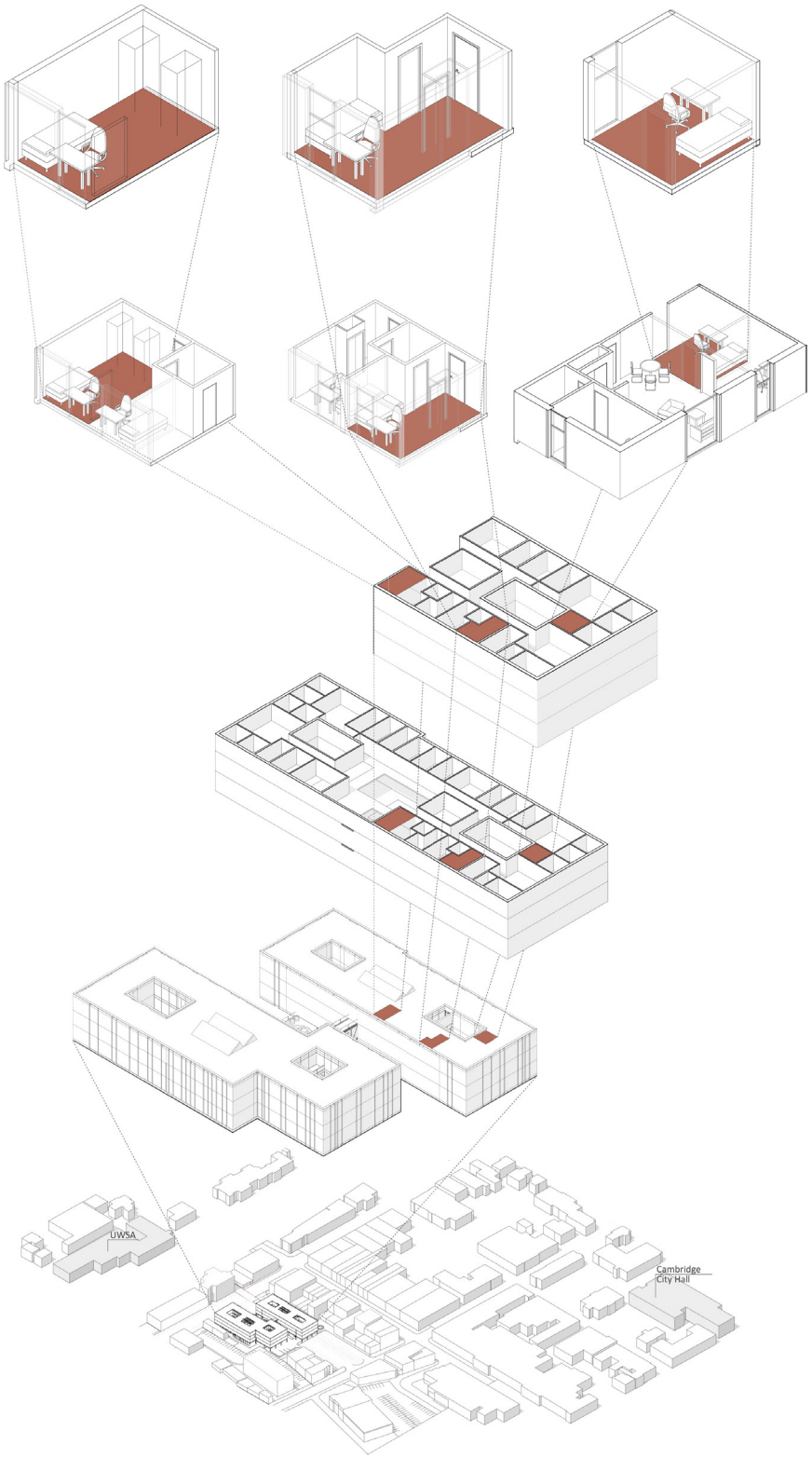


Fig. 4.13 Hierarchical nestling of access to spaces. The city public can only access the art production area as well as the Gallery space. All architecture students can access those as well as study spaces and the gym. The student residents can access all spaces alongside having secured access to their units on the upper floors.



Bedroom
1-2
Shared space: None

Apartment
2-4
Shared space: Washroom, Kitchen, dining, living space

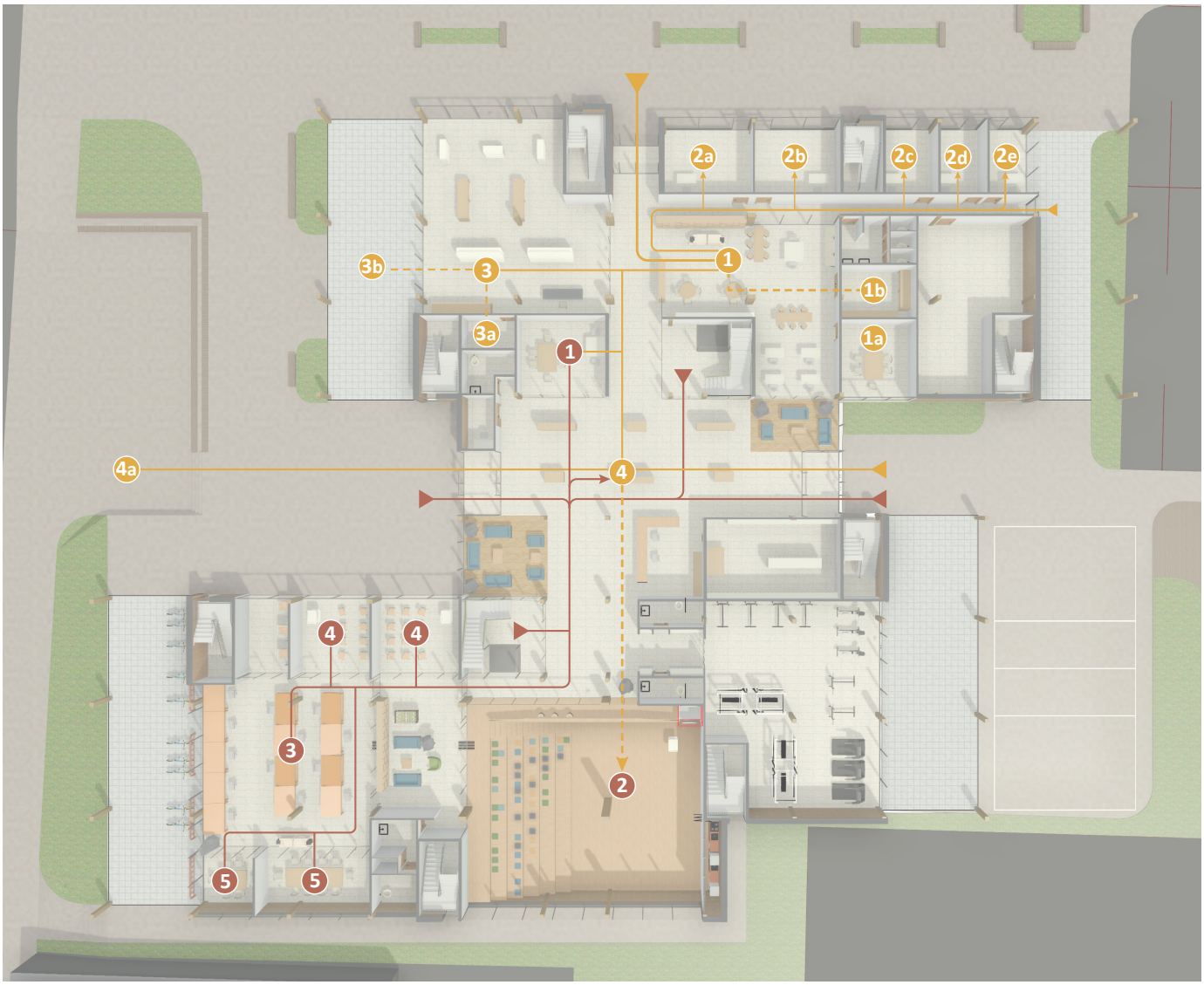
Quad/House
45
Shared space: Courtyard, lounge Kitchen, study rm, escape stair

Bi-Quad
90
Shared space: Feature stair, Dining area, Laundry, TV rm

Hall
180
Shared space: Terraces, Bridge, studio, great room

City public
180+
Shared space: Workshop area Art store, Gallery, Square

Fig. 4.14 66. The hierarchical grouping of students with their shared spaces. The design proposes more detailed levels of grouping and includes the City of Cambridge as the last layer of publicness.



Circulation of creative output and/orcity public
Circulation of creative output and/or city public (Need-based)
Circulation of student works

Fig. 4.15 Operational diagram of the ground floor. The main arts and crafts production takes place in the Creative workshop (1). The output is then either sold in the Individual small business spaces (2) facing the street or sold in the collective Art store (3). The creative output can also be exhibited in the main Gallery space (4) which will also exhibit student works created in the Studio (3) or at school. The multi-purpose hall (2) will be used by students on daily basis with occasional city-wide events scheduled there.

Spaces for students and the city public ●

1. Creative Workshop
1a. Enclosed Workshop area
1b. Storage
2. Individual businesses
3. Collective art store
3a. Art store storage
3b. Art store outdoor extension
4. Gallery/vestibule
4a. Gallery extension/performance space

Spaces for students only ●

1. BRIDGE Center for Architecture+Design
2. Great room
3. Studio
4. Presentation rooms
5. Group study rooms

Fig. 4.16 Gallery space as a permeable passageway to attract the public to the arts program of the residence.

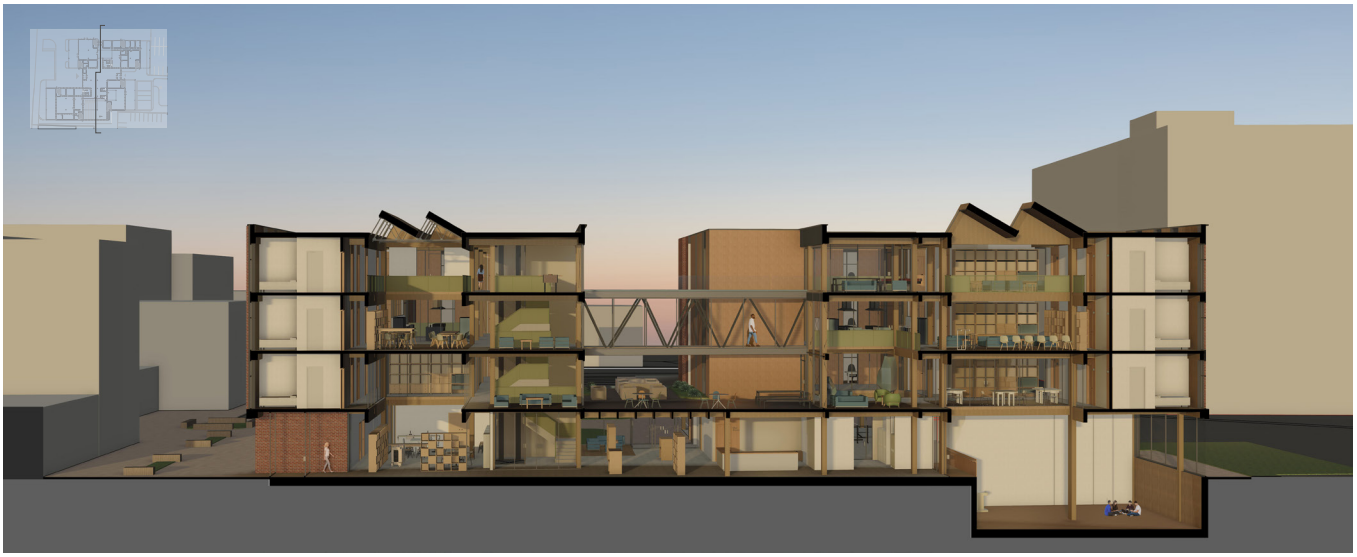


Fig. 4.17 Continuity of the ground floor.

Fig. 4.18 A walkway between the row of existing small businesses and the proposed ones.

Fig. 4.19 A portion of the workshop is double height, allowing residents to catch a glimpse of the activities happening below. It also allows ambient light penetration into the workshop.

4.6 Balancing the relationship between public and private spaces

Hierarchical student grouping is crucial in achieving this balance. This grouping enables a gradual transition from the most public spaces to the most private, such as study-bedrooms. Specifically for this project, there are two types of public spaces: 1. Public spaces for all students and the general public (located on the ground floor); 2. Public spaces exclusively for residents (on the upper floors). A transition between these two types is facilitated by fob-activated circulation cores on two sides of the vestibule. Access to spaces on the upper floors is organized radially, with the circulation cores as the centers, the living units as the circumference, and the common spaces in between. This arrangement helps achieve a gradual decrease in the level of publicness until one reaches the study bedroom. Various design solutions, such as partition walls and double-height spaces, are proposed to create a buffer between the noisier common areas and the living units, while still allowing for easy access and connectedness.

Fig. 4.20 Experiental corridors.

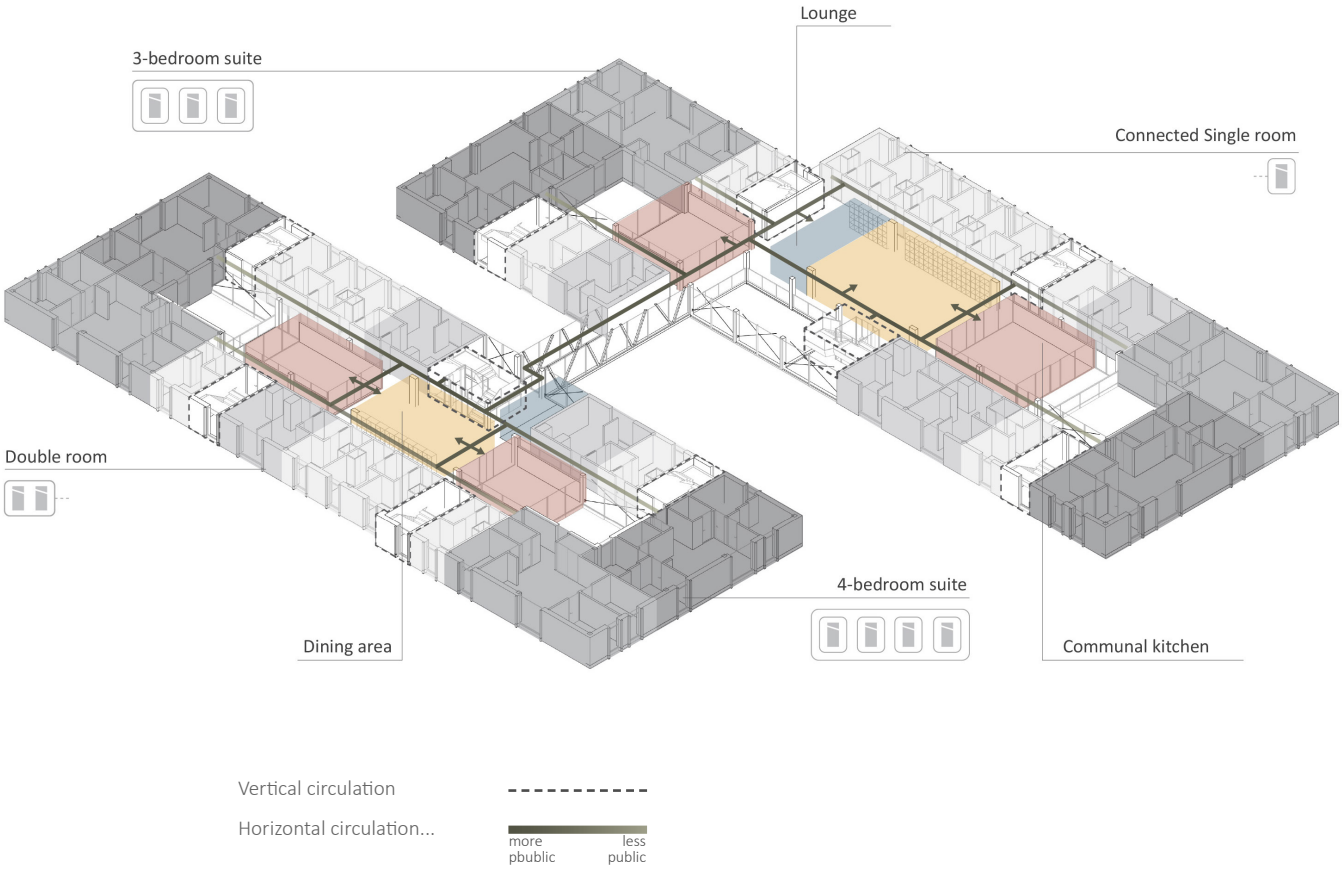


Fig. 4.21 Organizational breakdown of the most public residential floor (3. Floor). Each quad has its own small-scale kitchen but shares a dining space in the middle. The dining space is separated from adjacent living units with a permeable partition.

Fig. 4.22 Glass walls of the kitchen allow sunlight to penetrate deeper.

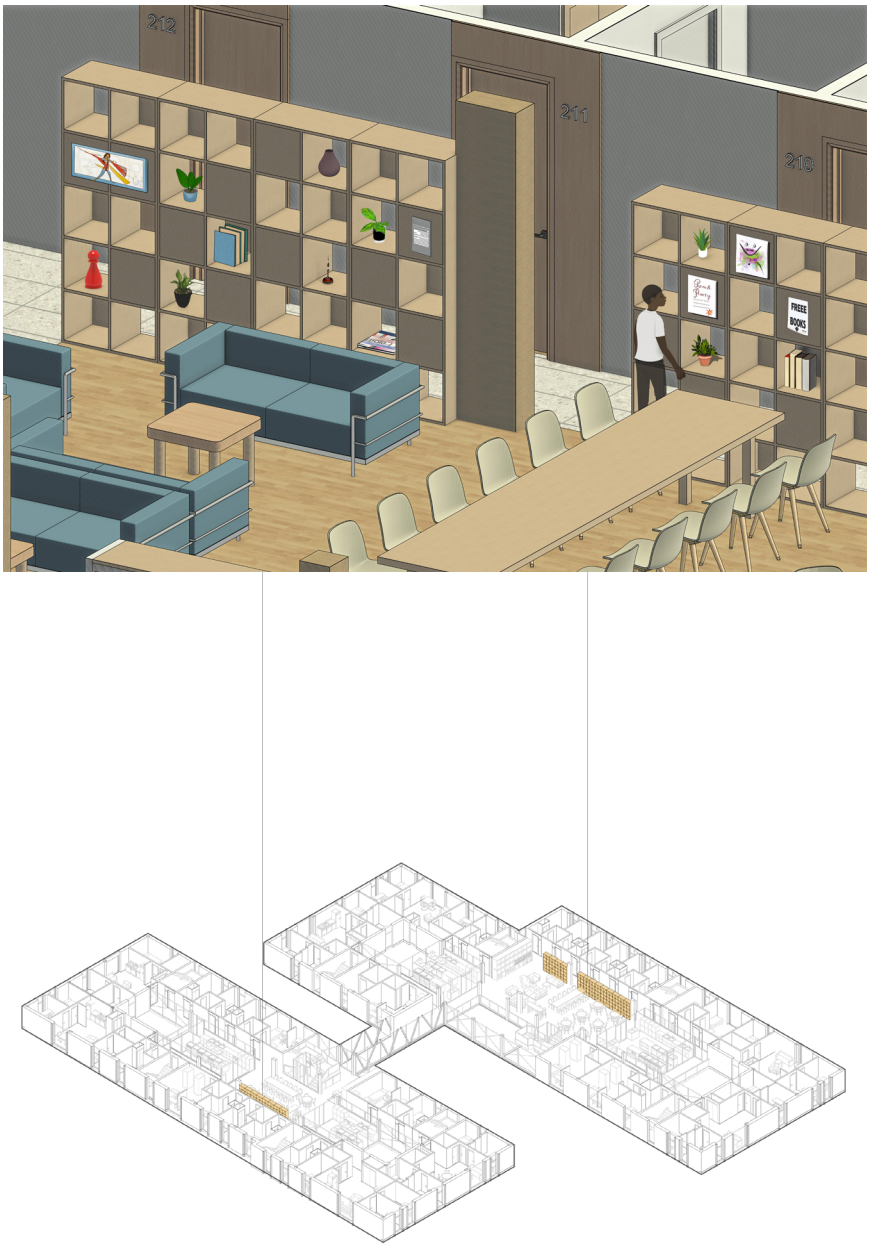


Fig. 4.23 The partition is modular and is designed to be used from both sides to decorate, do giveaways and post announcements.

Fig. 4.24 Layers of architectural focuses. Visual permeability between the blocks helps them feel like part of a whole rather than two separate blocks.

Fig. 4.25 Visual continuity and connectivity are made possible by the use of double-height spaces. They also act as a separator by providing privacy to the adjacent corridors.

4.7 Creating a homelike atmosphere

A tight-knit community and a balance between public and private spaces significantly contribute to creating a sense of home. In addition to these factors, this thesis emphasizes the concept of home-making by empowering users to have agency over their immediate environment and avoiding design choices that typically create an institutional atmosphere in student residences. In this regard, In this regard, the proposal places emphasis on flexibility and corridor designs.

Flexibility

Flexibility is important in a collective living environment. It is also something that the programming of the School of Architecture is heavily based on. The project offers flexible arrangements in every scale of design, from multi-purpose spaces to furniture. The benefits of flexibility in this context can be summarized as follows: improved space planning efficiency, personalized spaces for homemaking and self-expression, and enhanced didactic qualities beneficial for architectural education.

The design incorporates foldable partition walls on both the ground floor and within living units. These walls facilitate the combination of the Studio space, adjacent lounge, and Great room for hosting large-capacity events. Common spaces utilize modular and movable furniture to enable easy rearrangement. In 3 and 4-bedroom units, foldable walls between adjacent units allow for the merging of two bedrooms based on individual needs.

All bedrooms across the units are furnished with a set of fixed and movable furniture, accompanied by perforated plywood-clad walls. These walls are dedicated to personal customization, offering shelves and hooks of varying sizes. An inventory of movable furniture is available, allowing students to select their desired set each term, accommodating different furniture needs. The remaining inventory is stored in storage walls on each floor, easily accessible to students at the beginning and end of each term. These storage walls also serve as storage for the personal belongings of students away on cooperative work terms. The emphasis on storage enhances the overall home-making experience.

Fig. 4.26 Flexible usage of folding walls and movable furniture. The structural beam system of the gallery space lends itself to suspended exhibitions.

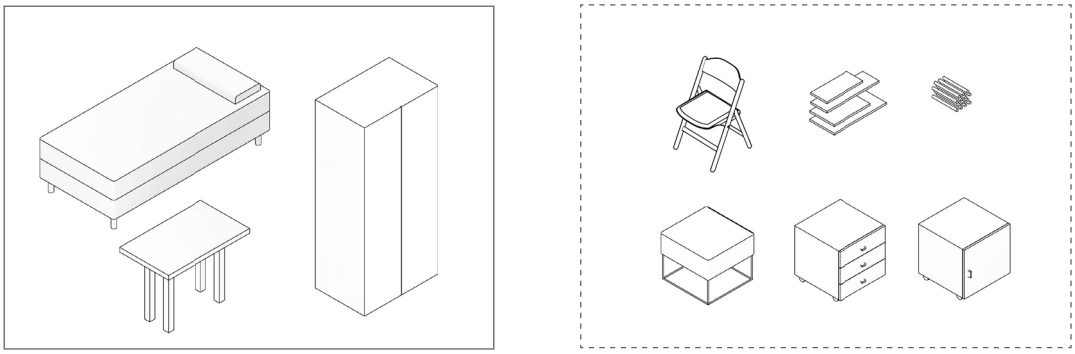
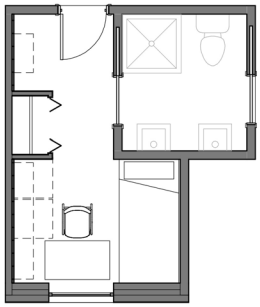
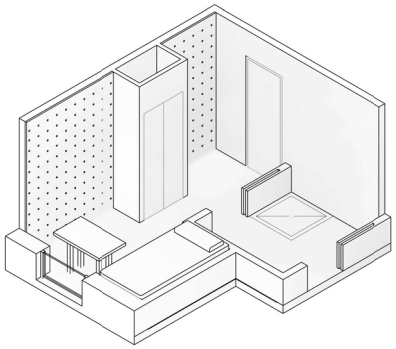


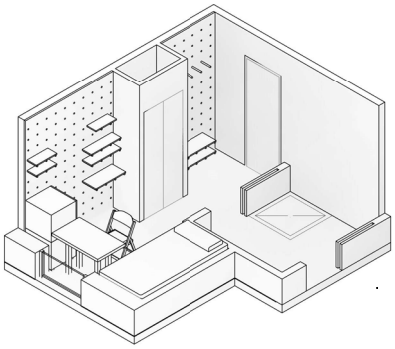
Fig. 4.27 Constant and exchangeable furniture

Connected single room - 12 m2

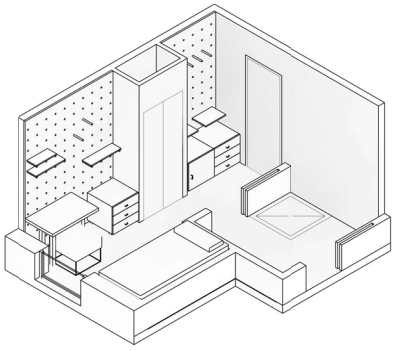




Base state



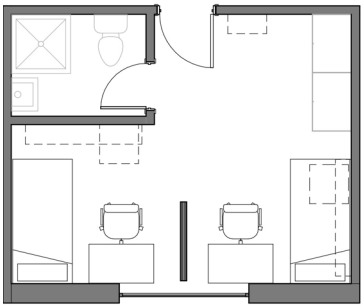
Possible arrangement 1

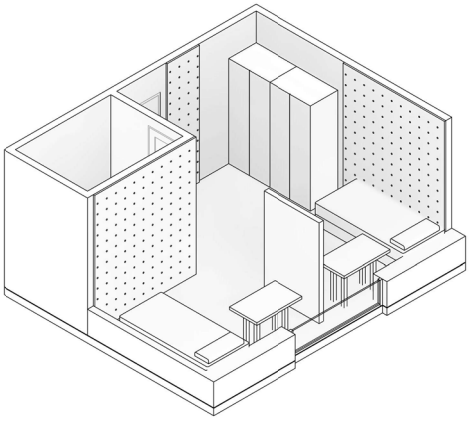


Possible arrangement 2

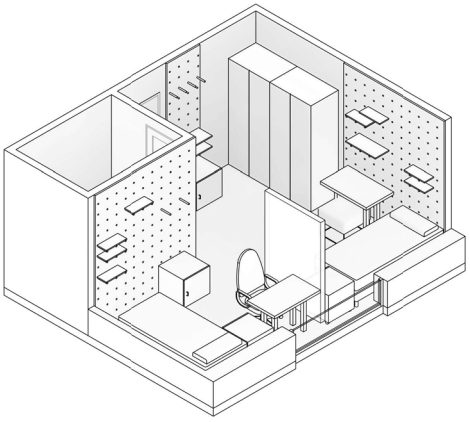
Fig. 4.28 Possible layouts of a single room

Double room - 22 m2

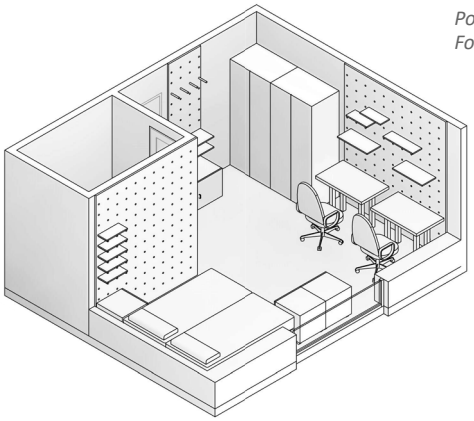




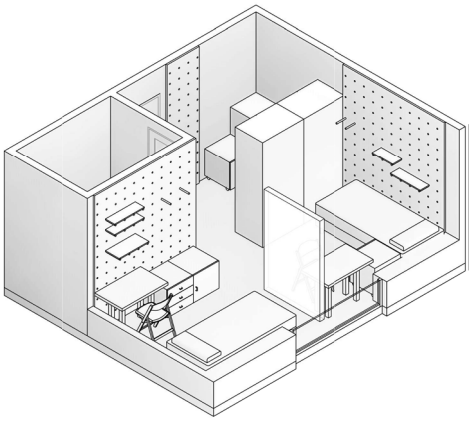
Base state



Possible arrangement 1-
For central open space



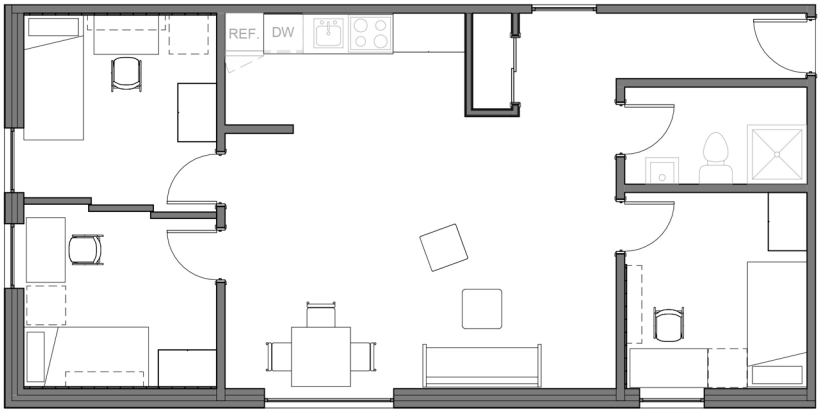
Possible arrangement 2-
For couples

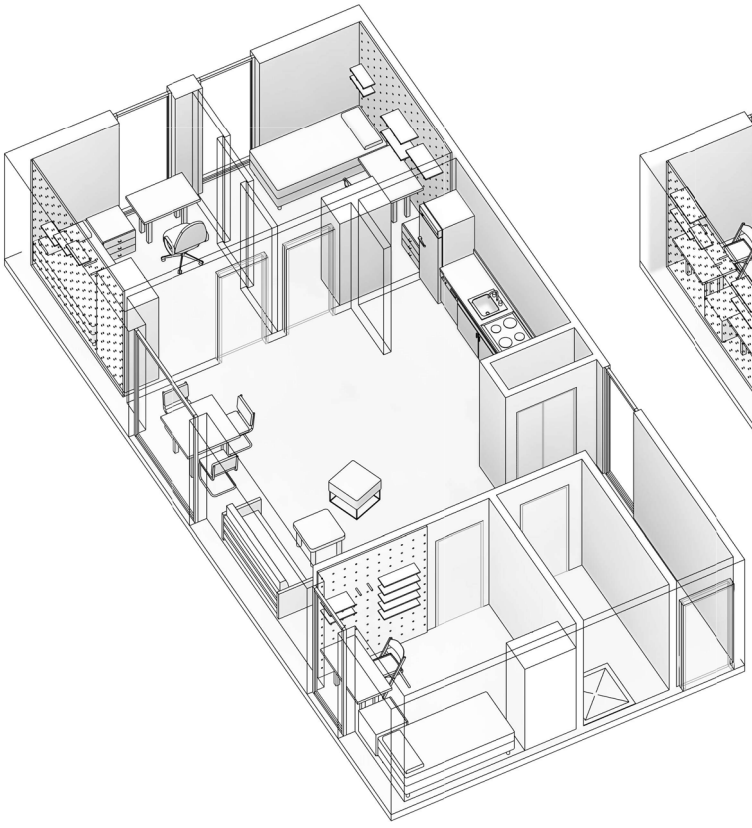


Possible arrangement 3-
For more privacy

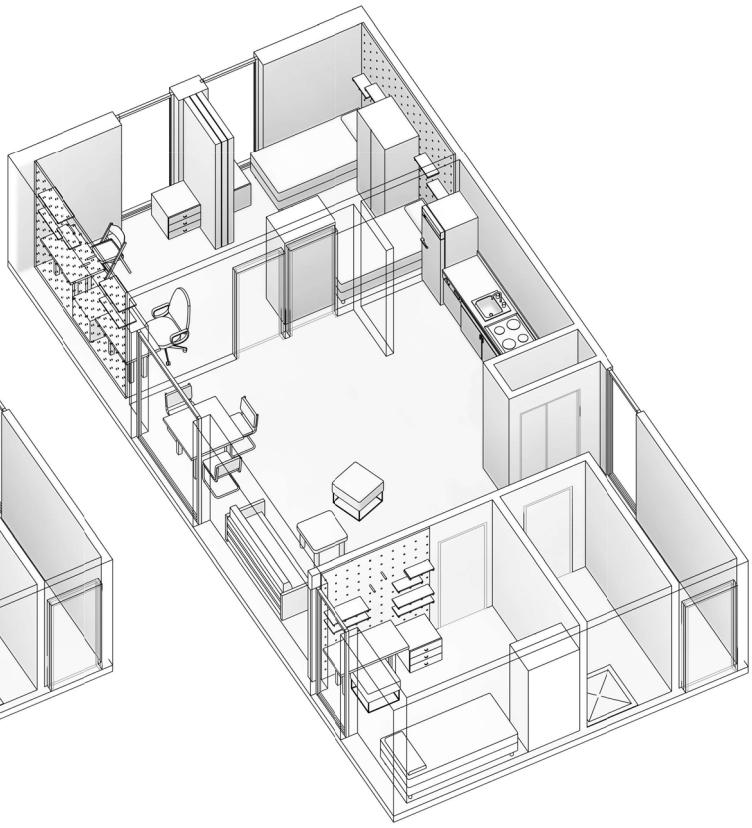
Fig. 4.29 Possible layouts of a double room

3-bedroom suite - 70 m²





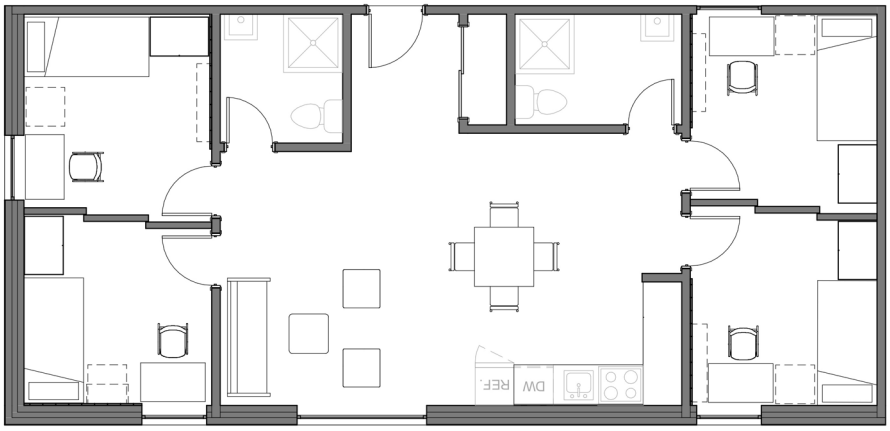
Possible arrangement 1

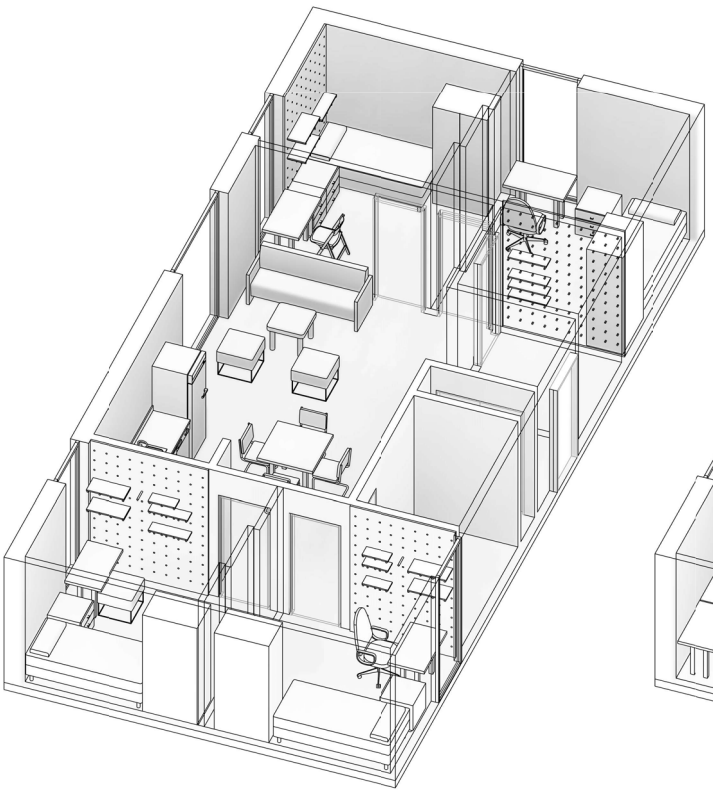


Possible arrangement 2

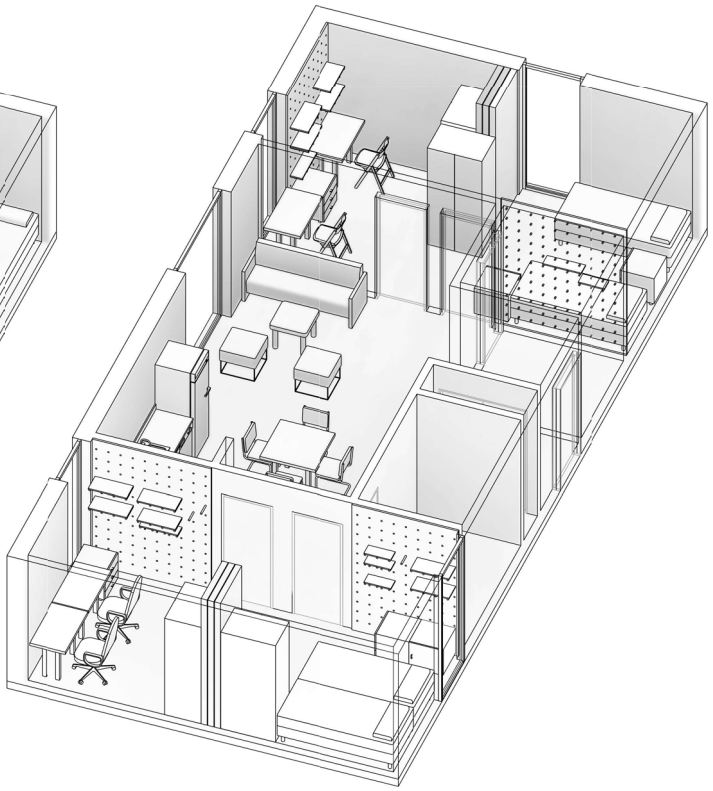
Fig. 4.30 Possible layouts of a 3-bedroom suite

4-bedroom suite - 80 m²





Possible arrangement 1



Possible arrangement 2

Fig. 4.31 Possible layouts of a 4-bedroom suite

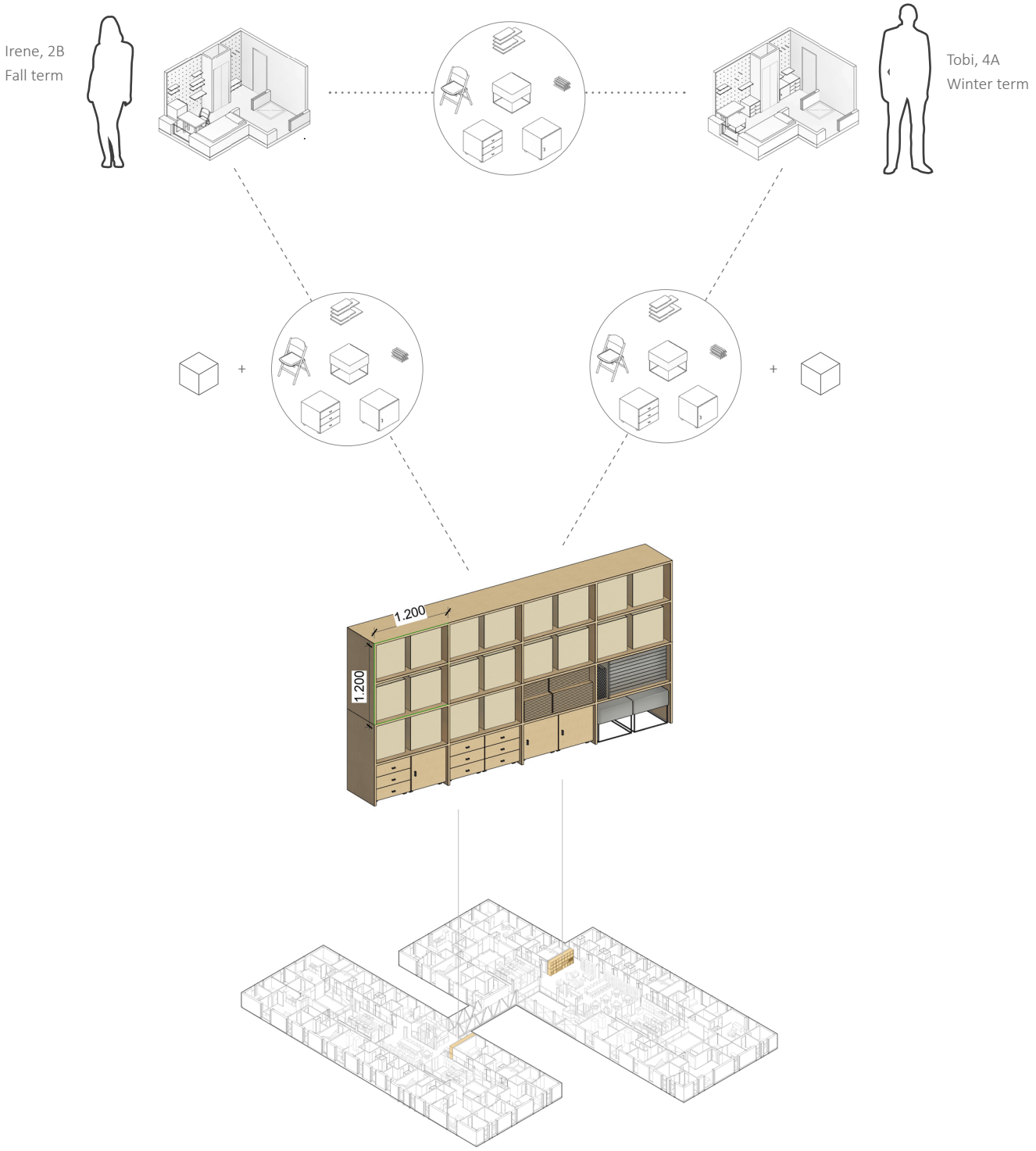


Fig. 4.32 Students can exchange desired furniture either with the previous tenant or look for the desired item from the storage walls located in the central area of each floor. Lower sections are dedicated for furniture storage while upper shelves store personal belongings of students on co-op work terms.

Circulation

Arrangement of living units around common areas and light wells makes it possible to avoid double loaded corridors that are associated with hotel-like and institutional atmosphere, as well as high noise level. Due to open concept common spaces, light wells, and double height spaces help to achieve a wide variety of circulation spaces that are inviting and visually pleasing. They offer experiential movement which gives way to social interaction and a sense of visual togetherness.

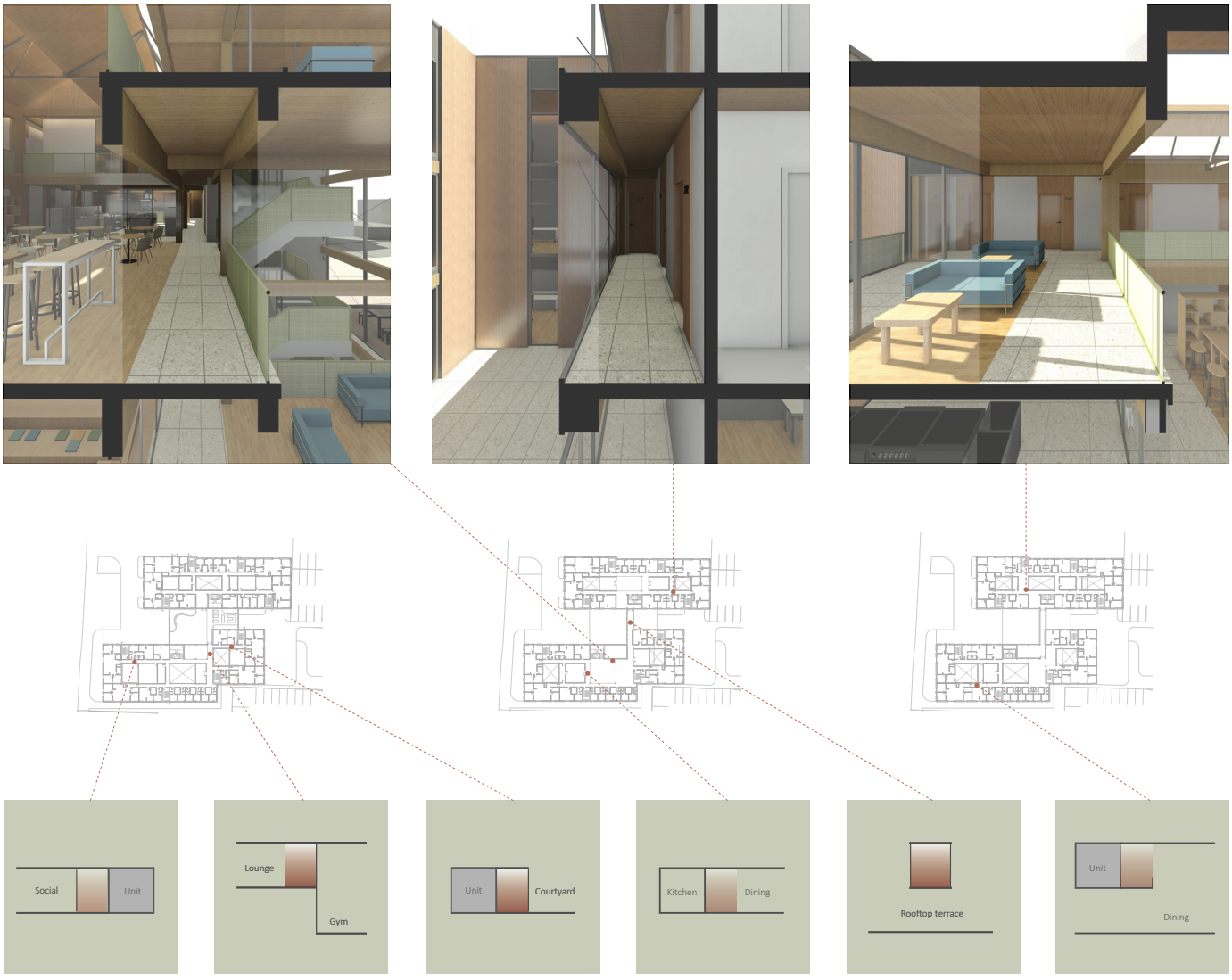


Fig. 4.33 Variety of corridors made possible by the porous organizational layout.

4.8 Considering factors for overall well-being and comfort

The design choices mentioned so far do have positive effects on the well-being of students and their satisfaction. Students have a wide range of units to choose from. While suites have their own kitchen and living/dining area, residents of single and double rooms share communal kitchens. The kitchens provide individual lockers as well as mini-fridges to be shared by two students. The kitchens are also accessible to the residents of suites on a need basis. While dining areas and lounges are open-conpect, study rooms and tv rooms are enclosed to avoid distraction and high noise levels.

The orientation and shape of the building contribute to pleasant indoor environments. Light wells and sky-lights are strategically placed to maximize natural sunlight, while double-height spaces and open-concept layouts help disperse ambient light throughout the inner cores of both blocks. Additionally, a variety of sheltered outdoor spaces is provided that corresponds to the grouping of students.

Fig. 4.34 Outdoor spaces are paired with lounge areas or study rooms to act as their extensions when needed.

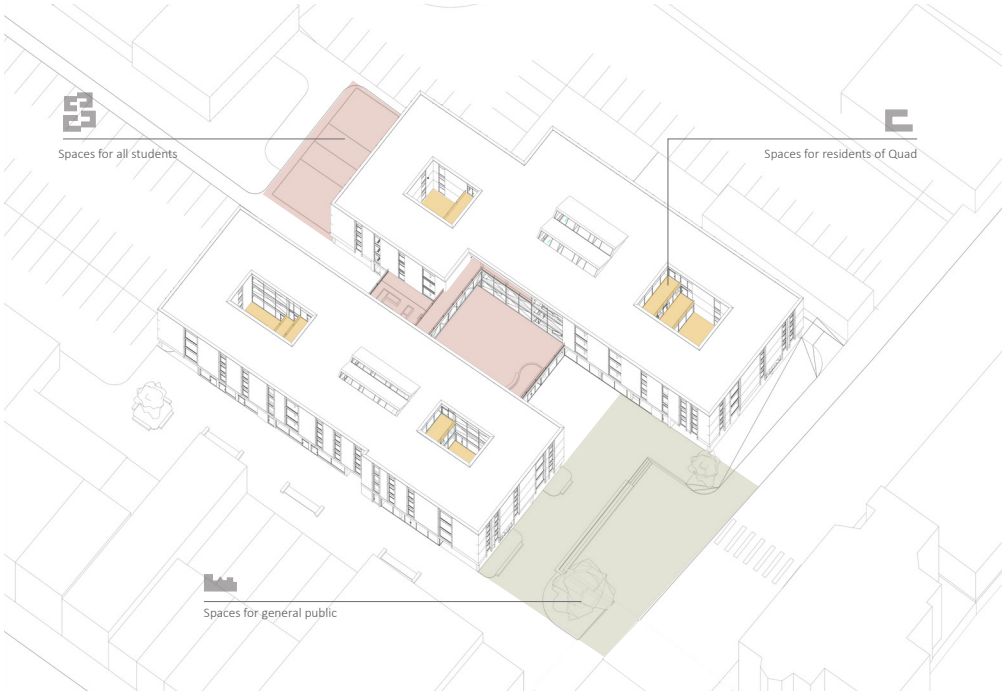


Fig. 4.35 Different sizes and locations of outdoor spaces reinforce the grouping of students and eliminate the need for private balconies.

Fig. 4.36 The balconies are proportional in size to the number of students they serve.

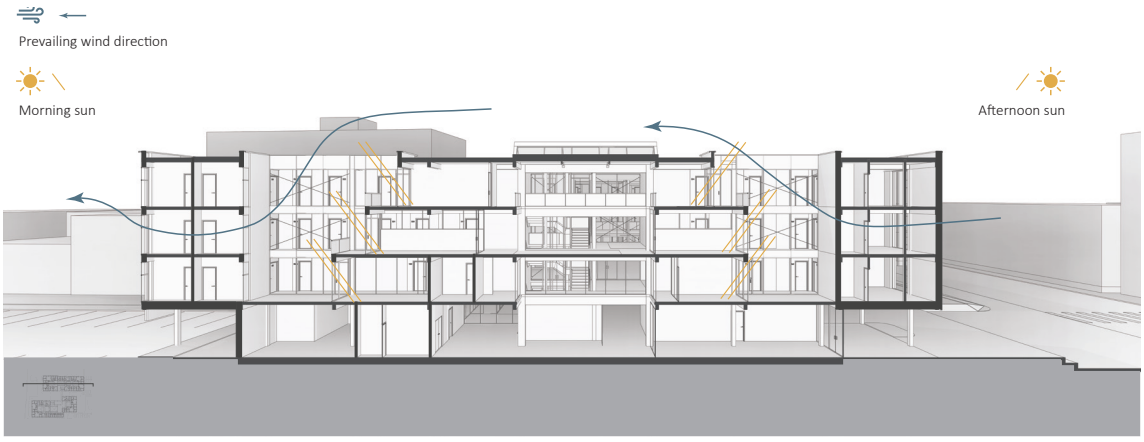


Fig. 4.37 Stepped light wells helps for more sunlight penetration. Cross ventilation on rear units is made possible through the wells.

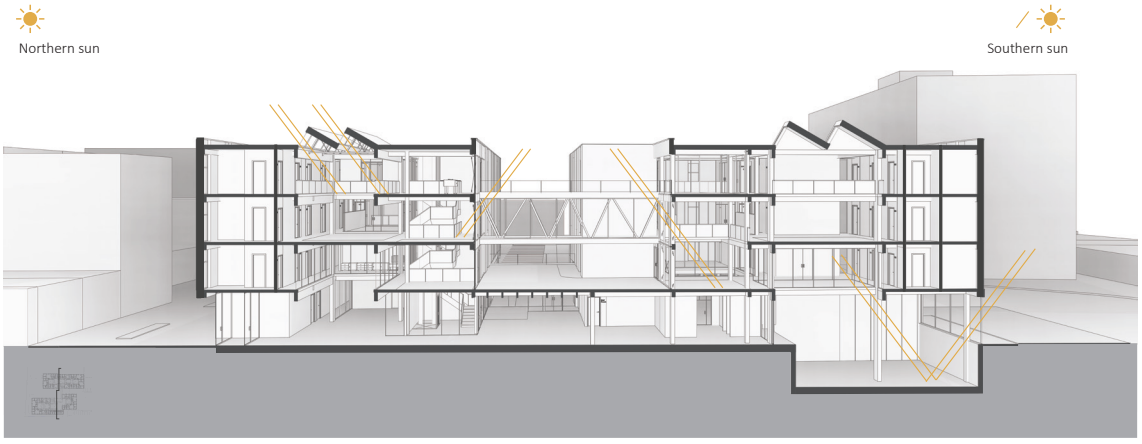


Fig. 4.38 Voids within the building help the dissemination of diffused light. While light wells bring in east and west sunlight, glass facades and skylights help bring in south and north lighting making the all-day daylighting possible.

CHAPTER 5
Conclusion

5.1 Situating the proposal in the context of the architectural profession

This project started with the specific goal of providing housing for the students of the School of Architecture at the University of Waterloo. The proposal aims to house 180 students of the 280 that are enrolled at the school every term. This number might seem high as was noted in the discussions in the defence of this thesis. It could be perceived as an overly concentrated development compared to the total number of architecture students and the scale of Cambridge. There are some reasons why one big development was preferred instead of a smaller one or a few smaller ones. First was the goal of creating an icon for residential student presence in downtown Galt that not only amplifies the presence of the School of Architecture but also attracts the public to its arts and crafts program. Moreover, the existing housing situation in Cambridge is already scattered in small-scale housing units around the school such as Grand House and other single detached houses that accommodate up to 9 students. As a response to that, a single larger building bringing together all students under one roof and providing common spaces that can accommodate varying sizes of student groups was preferred. The School of Architecture was known to be working on possible expansion into the Galt core[1]. Although the expansion works have halted since the Covid-19 pandemic of 2020, it is still something to consider for a possible student housing size. With the expansion, the proposed student housing might not be as large in scale compared to the school's increased size and presence in downtown Galt. Lastly, a student housing purpose built for architecture students should address the obligations of the architectural profession towards design excellence and sustainability. A single large-scale building is more favourable in terms of showcasing that obligation to the public and the students.

Although sustainability is somewhat addressed within the design considerations outlined in Chapter 4, it has the potential for more integration. The primary structural system employs mass timber due to its lower embodied carbon content compared to materials like reinforced concrete. Mass timber can span more extensively than a timber frame

1 Times, "School of Architecture Proposes Galt Core Expansion."

structure and does not necessitate additional finishes for walls and ceilings. It also radiates a warmth associated with the feeling of home. The concept of using wood continues onto the furniture that is modular and movable, thereby reducing labor, cost, and material intensity for construction, repair, and replacement. Beyond embodied energy, the project strives to minimize operational emissions by maintaining a compact and straightforward envelope design to prevent heat loss. Light wells and glazed facades on two blocks facilitate consistent direct or diffused light throughout the day, reducing operational energy consumption. While interior light wells contribute to heat loss and maintenance challenges, they are crucial for ensuring sunlight and ventilation in deep floor plates. To enhance energy efficiency, these wells can be transformed into enclosed atria with skylights, albeit at the cost of natural ventilation for some units facing them. Moreover, the project could incorporate additional sustainable operational systems, such as a geothermal heat pump for radiant in-floor heating. Geothermal pumps could be positioned beneath the outdoor spaces on both sides. The project also holds potential for renewable energy generation through photovoltaic panels on the roof and transparent PV glass as glazing material. Apart from direct sustainability features, the project could function as a living laboratory, allowing for monitoring and learning from these features. It can serve as a comprehensive case study for students and faculty, facilitating research and understanding of the lifecycle performance of various sustainable design elements. This practice is common in certain Canadian universities, like UBC, which designates some of its passive house student housing developments as case study sites[2].

Beyond its sustainability attributes, the project offers the potential to serve as a live learning environment for architecture students. The proposed flexible wall and furniture system partially address this potential. Exposed ceiling and wall assemblies can provide architecture and architectural engineering students with valuable hands-on insights into building science. Each material used in interior finishes can be exposed and labeled with its respective product and manufacturer details. This approach could even attract sponsorship from material manufacturers.

2 UBC and Ramsey, “Faculty and Staff Housing Targeting Passive House Certification Opens at UBC.”

5.2 Speculation into the financial feasibility

While cost analysis and affordability do not constitute the primary focus of this thesis, significant design sensitivity is applied to ensure the project's viability. There exist two layers of challenges concerning the project's feasibility. The first is construction feasibility which involves finding an appropriate developer willing to assume the financial risks inherent in the project. This level involves the identification of all stakeholders that might contribute financially, voluntarily, or administratively to the project. The second layer includes the affordability of residence units for the students. This layer is dependent on the cost and the procurement method used for the construction as well as on the ownership, management and operational methods to be used after the construction of the project. Before starting to look for possible stakeholders, the design proposal should be inspected in terms of its efficiency and area statistics per bed.

The initial step towards the realization of this project is minimizing the gross floor area and bringing down the area of construction per bed. In this project, the sizes of bedrooms were minimized while common areas were not in accordance with the goals of the project. The perimeter of the envelope was minimized with two simple blocks and occasional light wells. Through light wells, daylighting is accessible for most of the common areas as well as natural ventilation for some peripheral apartment units. In Chapter 1, we have discussed the consequences of prioritizing capacity and cost in student housing design, which usually results in low-quality buildings. It is important to note that the construction area for this project will be higher than a typical student residence since it also offers study and social spaces for all student population of UWSA as well as a space for entrepreneurial collaboration with the city of Cambridge. Both of them are the results of addressing shortcomings and opportunities stemming from UWSA's location as a satellite campus. According to the area calculations, the construction area for this project is 7350 m^2. The area per bed ratio of 40.83 m^2/bed is equivalent to that of a Mackenzie King Village(MKV), a similar residence at the University of Waterloo campus (Fig. 5.1). MKV is a 5-storey residence with 4-bedroom suites and equipped with amenity and study areas. It is one of the few UW students residences where a meal plan is made optional with the inclusion of kitchens in living units.

Student Residence in Cambridge	**Area (m2)**
Ground	1740
-Community collaboration program	975
-Spaces for all students	765
Second	1885
Third	1885
Fourth	1840
Total Construction area	7350
Number of beds	180
Area per bed	**40.8**

Mackenzie King Village	**Area (m2)**
Ground floor	1477
Second floor	2941
Third floor	2941
Fourth floor	2941
Fifth floor	2941
Total Construction area	13241
Number of beds	320
Area per bed	**41.4**

Fig. 5.1 Area per bed comparison with Mackenzie King Village at the University of Waterloo. The area is calculated from the outer face of exterior walls excluding outdoor spaces that are open to the sky above.

Stakeholders

The nature of the project requires involvement from multiple stakeholders. The arts and crafts program in the proposal has the potential to attract interested parties to the project.

We should start with the primary users of the proposal - the students. Students can play a vital role in researching and quantifying the current housing problem to gather more attention for the proposal. Similar initiatives are already happening at the school through the Housing Taskforce, which includes both students and faculty members. Students can also volunteer to raise funds collectively. They can establish housing funds and partner with student unions to seek donations from local donors and organizations that share the project's mission.

The School of Architecture holds a strategic advantage as it sits at the crossroads of potential stakeholders: the University of Waterloo, the City of Cambridge, and the students. The school should leverage this advantage to foster partnerships among these parties and attract more stakeholders. While lacking its own funds, the school can serve as the administrative and informational hub for all collaborative efforts. The UWSA was successful in securing substantial funding from the municipality, provincial, and federal governments for the School's relocation. Similarly, the community and business creation aspects of the proposed design could attract similar funding. The school can also use its future expansion plans and the anticipated increased demand for student housing to entice developers.

The University of Waterloo bears a primary responsibility. As a university, it should take the public responsibility of being the driving force behind the project's construction. Through tuition and non-refundable incidental fees, School of Architecture students contribute significantly to the operation of main campus amenities, even though they may not be able to use them. This contribution should be returned to the students in the form of financial support for projects like this. Additionally, a student residence would enhance the school's appeal and contribute to increased revenue. The university's authority and financial backing will be crucial for attracting developers.

The community and business creation aspects of the proposed design have the potential to engage the City of Cambridge. Given the decline in federal, provincial, and university funding for student housing, loans shoulder much of the financing burden for new residence projects[3] (Fig. 5.2). Collaborating with the City of Cambridge will be vital for securing funds from higher levels of government. The city can also facilitate partnerships with the Chamber of Commerce and local artists for donations and long-term investments. The city has a vested interest in the project, as the arts and crafts program aligns with its vision of becoming a regional arts and culture center. The City of Cambridge can contribute financially through cash or land donations; for example, it donated municipal land for the Grand House construction discussed in Chapter 3. A similar donation or lease of the selected site could help reduce construction costs.

Lastly, and most importantly, involving a developer is crucial for the project's success. Convincing a developer to take on the project will require close collaboration with the University of Waterloo and adjustments to their regular student housing development processes. The scale and capacity of the project might deter developers, as full occupancy throughout the year may not be guaranteed with different cohorts of students circulating each term. Addressing developer concerns involves two steps. First is addressing the allocation of project risks. In this context, the University of Waterloo and the City of Cambridge should bear most of the risks, including operational administration and ensuring full occupancy through alternative leasing methods. The second step involves emphasizing the project's significance within Cambridge's long-term Arts and Culture vision. This unique form of student housing development can be a catalyst for change in the ongoing intensification of the Galt core. The project's downtown location and its alignment with the future LRT route are advantageous for stimulating similar development opportunities connected to the region, aligning with the city's vision of becoming an arts and culture center.

3 Ernst & Young, "Building the Student Experience."

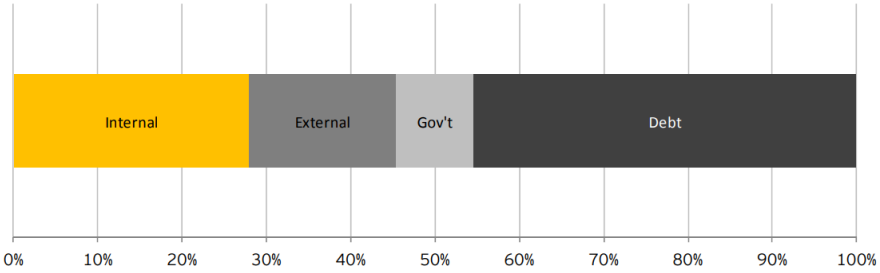


Fig. 5.2 Financing models under consideration for new student housing projects. The information is based on data from a survey of 52 Canadian Universities by Canadian Association of University Business Officers (CAUBO).

Delivery method

There are typically three types of delivery models in student housing, each involving varying degrees of private sector involvement: the public model, public-private partnership, and private model. For the purposes of this project, the public model and public-private partnership appear to be more suitable.

Public Model: This model grants the university extensive control over ownership, financing, design, and residence management (Fig. 5.3). However, this control comes with a significant portion of the project's risk, but with a greater capacity for borrowing loans[4]. This model typically follows a "design-bid-build" procurement approach, where the project is first designed, bids are then solicited from contractors, and the construction is carried out by the winning bidder[5]. This delivery method is the preferred choice if the university is willing to assume a substantial amount of responsibility. It aligns well with implementing the design features proposed by this thesis.

Public-Private Partnership: This model involves increased private sector participation and corresponding risk allocation. Specialized private firms are selected to be involved throughout the project's entire life cycle, encompassing design, construction, financing, and maintenance (Fig. 5.4)[6]. While the university maintains ownership of the residence, the

4 Ernst & Young, "Building the Student Experience."
5 Ibid
6 Ibid

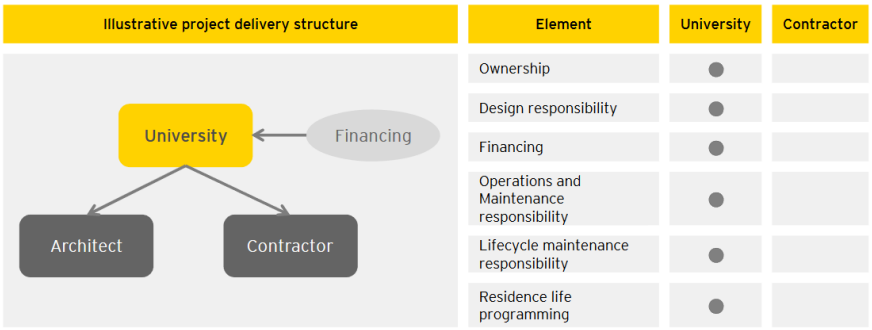


Fig. 5.3 A high level overview of a typical traditional delivery structure.

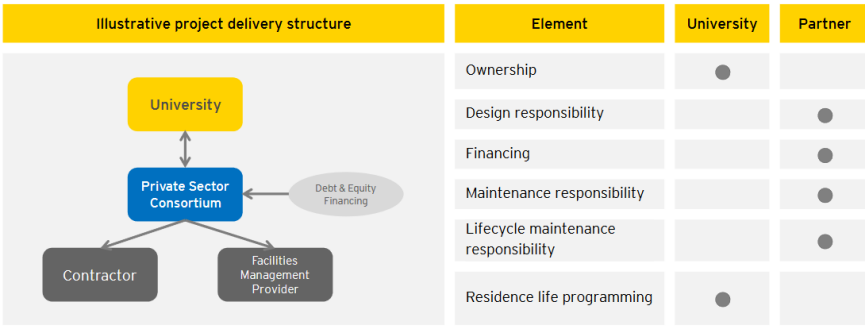


Fig. 5.4 A high-level overview of a DBFM project delivery structure.

private sector handles maintenance and financing. Various procurement methods exist for this model, ranging from Design-Build-Finance to Design-Build-Finance-Maintain, and some hybrid approaches[7]. In the context of this project, the private sector might view it as too risky, necessitating robust incentives to encourage their participation.

Phasing

To address the project's density in relation to UWSA's expansion plans, one approach is to implement phasing in operations. It's possible that the 180-student capacity might not be fully occupied in the first year after construction, leading to potential negative cash flow for the residence operator, whether it's the university or the private sector. To mitigate this scenario, a phasing strategy can be employed to accommodate the increasing student demand for the proposed housing. Prior to the expansion and the establishment of popularity for the residence, the completed project can cater to vacancies by opening the student units to other community members in need of housing. This could include Conestoga College students residing in Cambridge, individuals with limited income seeking affordable housing, or local artists in search of live-work environments. The north block or one of its quads could be designated for such temporary accommodations until the desired demand is generated from School of Architecture students. If successful, this type of temporary accommodation could become a minor component of the project's long-term management, helping to accommodate fluctuations in student numbers each term.

Lastly, alternative ownership and management can be an option for operational affordability and its long-term sustenance. The reliance on the private sector or the University can be reduced by alternative management styles that don't prioritize profit and return on investment. A cooperative housing model can be implemented where the building is jointly owned and operated by students. A partnership with the co-ops and student unions of the region will be helpful to bring their expertise to Cambridge. The non-profit aspect of co-operative housing has the potential to attract provincial and local loans and grants addressing the

7 Ibid

affordability of housing, as well as nonprofit developers of the region. This approach involves volunteer work from the student's side and guidance and support from the University side. One of the main reasons behind the failure of the co-op system of the Grand House is the accumulated debt from the loans that coincided with the recession of 2008[8]. Taking this case as a lesson, the emphasis of this project should be on obtaining interest-free loans and grants to ensure its success. Besides the co-op model, the building can generate its own money by renting out business spaces (at affordable prices) to the community and/or by receiving a percentage of the revenue that those spaces will be making. But these can only contribute to operational costs or loan repayment and cannot be considered for initial financing of the construction.

Overall, efficient design, alternative funding sources and management styles can make this project financially feasible. Further research is needed in each of the above-mentioned steps.

8 The Record, "Student co-op in Cambridge to close after three-year struggle."

5.3 Conclusion

Student housing design requires as much care as any other housing type. This thesis tries to do it justice by addressing of challenges collective living while also allowing the individuality of its members to flourish. Besides this objective, unique issues and opportunities that came with the UWSA's location as a satellite campus in the mid-size city of Cambridge required an innovative approach to programming and space planning. The idea of creating a home away from home became a central focus of the thesis. In relation to this, multiple guiding design principles were derived based on research. The design proposal tried to incorporate a design solution that addresses multiple objectives simultaneously blurring the lines between them and offering a wholistic design. The strength of the proposal lies in bringing together multiple stakeholders and creating a holistic system that is more than the sum of its parts. Even though it addresses student housing, it can be a good case study for research in any type of collective housing.

As for the shortcomings, research into the housing preferences of the students of the School of Architecture might have benefitted the design process. With a more extended thesis timeline, surveys, focus groups and other types of research could have made the objectives of the project focused more on architecture students. Moreover, the didactic qualities of the design proposal for architecture students could have been elaborated better with a focus on building science and architectural detailing. Nevertheless, inspiring spaces for homemaking and community creation can be considered a good case study of their own.

Recommendations for the future include more research into the construction and the financial model of the design proposal as briefly discussed above. Should this project ever get built, an opportunity lies in involving architecture students in detailed design and construction stages as part of their coop credit or within the scope of design-build courses. Their skills can be used for furniture making that can happen off-site at UWSA or other similar workshop spaces. Involving students in this process will create a strong attachment to the building from the early stages as well as leave a student legacy in the creation of the project. Moreover,

a possible further expansion of the UWSA can be incorporated into the project by converting some areas of the proposal into academic spaces. This comes along with proposing other student housing developments in Cambridge as a network of developments designed and constructed in multiple phases. In this scenario, this design proposal will form the base knowledge of the project and become the first phase of a multi-phase project.

Endnotes

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Fig. 1.21, Fig. 1.24

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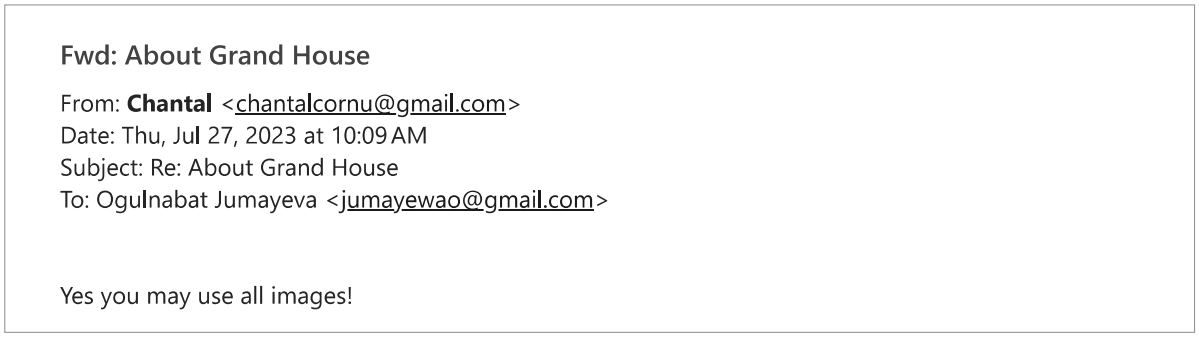

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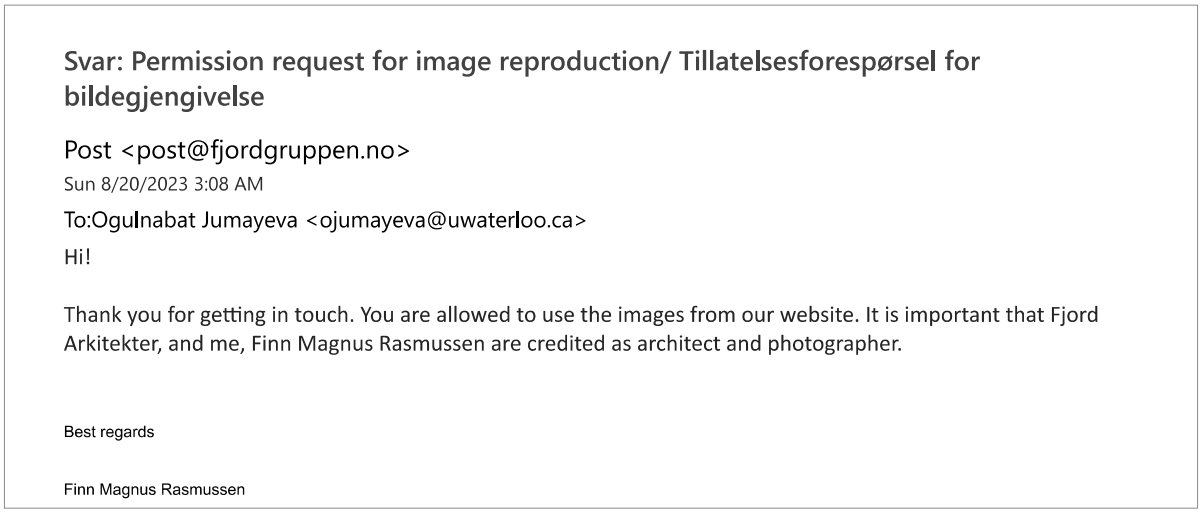

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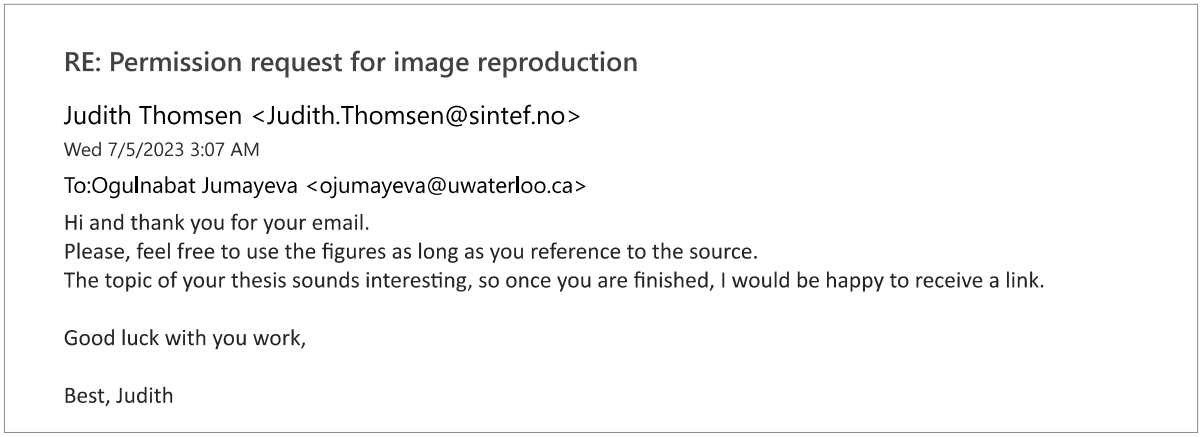

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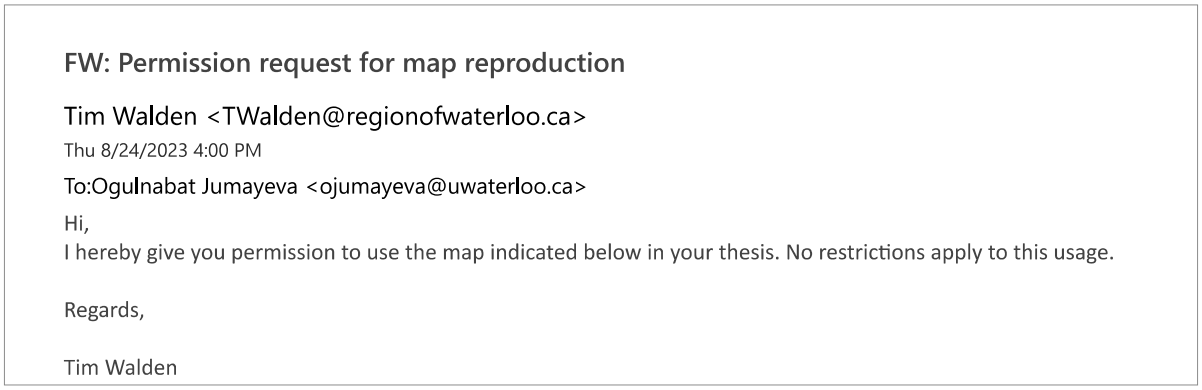

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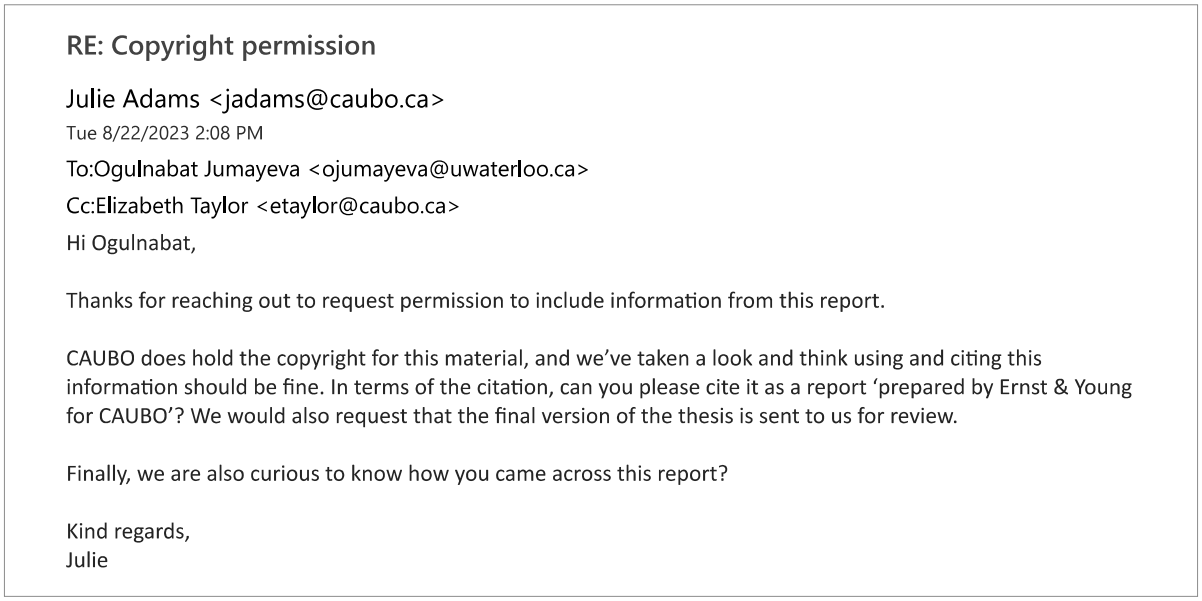

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