GRADUATION BOOKLET

Lotte Bjiwaard

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4873335

A research booklet for the Dwelling Graduation Studio:
Architecture of Transition in the Bangladesh Delta 2024/2025
Tu Delft | Faculty Of Architecture And The Built Environment
Cover photo by Joëlle Steendam

Supervisors:
Nelson Mota
Ludovica Cassina
Antonio Paoletti
Marina Tabassum

GLOBAL HOUSING TU Delft Delft University of Technology

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01. INTRODUCTION

As cities around the world continue to urbanize at an unprecedented pace, the challenge of providing adequate and affordable housing becomes increasingly complex. Nowhere is this more evident than in Bangladesh, a country facing rapid rural-to-urban migration driven by both economic opportunities and climate-induced displacement. The Sylhet region, in particular, exemplifies this transition, as rural migrants seek a new life in a rapidly expanding urban environment.

This graduation booklet is the culmination of my research within the Dwelling Graduation Studio: *Global Housing - Architecture of Transition in the Bangladesh Delta 2024/2025*. The project aims to address the urgent need for adaptable and sustainable housing solutions that not only meet the immediate demands of urban migrants but also anticipate future changes. The focus lies on developing an Open Building System that is both flexible and community-oriented, providing a future-proof approach to housing in Sylhet.

The booklet is structured to present a comprehensive journey from the initial research plan to the final design. It begins with an outline of my initial research proposal, detailing the goals and methodologies set forth at the beginning of the project. Following this, I reflect on the changes made after the P2 presentation, where critical insights led to a shift from modular housing to an Open Building approach, emphasizing the integration of rural community values into an urban context.

The core of this booklet revolves around the fieldwork and observations conducted in Bangladesh, forming the foundation of my research. This field-driven approach provided insights into the socio-cultural preferences and housing needs of rural-urban migrants in Sylhet. The observations shaped the development of design principles that prioritize affordability, flexibility, and social interaction.

Following the research section, the booklet presents a site analysis, examining the physical and social context of the selected location in Sylhet. The final section delves into individual research on specific topics that further support the project's design.

Through this comprehensive exploration of research, fieldwork, site analysis, and case studies, this graduation booklet and the final design answers the research question:

How can the needs of the rural-urban migrants be integrated into an open building system to create a future-proof, large-scale housing project which reduces the affordable housing shortage in Sylhet?

02. RESEARCH PLAN

This research plan was developed at the outset of the graduation studio, prior to the field trip to Bangladesh. It is based on a comprehensive literature review and provides an initial understanding of the current global housing crisis, with a specific focus on the challenges faced in Bangladesh. The study identifies the pressing issue of affordable housing shortages in the rapidly urbanizing region of Sylhet, particularly affecting rural-urban migrants.

Through the application of theoretical insights from Habraken, Hamdi, Urban, Wallace, and Arnstein, a theoretical framework has been established to guide the research. This framework supports the central research question:

How can the needs of the rural-urban migrants be integrated into a modular design system to create a large-scale housing project which reduces the affordable housing shortage in Sylhet?

The plan concludes by outlining the research objectives and the methodology that will be used to achieve them.

CONTENTS

01. **INTRODUCTION**

Bangladesh is highly vulnerable to extreme climate events such as droughts, heavy rainfall, tropical cyclones, and storm surges due to its physiographical location (Rawlani & Sovacool, 2011). Climate change worsens the frequency of these disasters (Moniruzzaman et al., 2018; Rana & Ilina, 2021), resulting in extreme migration. Every year, hundreds of thousands of climate migrants must evacuate due to both sudden-onset disasters, such as cyclones, floods, river erosion, and landslides, and slow-onset disasters, such as sea-level rise and salinization (McDonnell, 2019).

Natural disasters significantly contribute to rural-urban migration in Bangladesh by undermining agricultural productivity and triggering food crises. These events leave rural populations without stable employment, forcing many to migrate to urban areas in search of work (Anik & Khan, 2012). While environmental factors play a role, economic reasons remain the primary drivers of this migration, particularly the availability of job opportunities in cities (Hossain, 2001).

In rural regions, growing unemployment, land scarcity, and a lack of resources have intensified economic hardships, pushing many residents to seek better living conditions in urban centers (Chowdhury et al., 2012; Ullah, 2004; Hossein, 2001).
Rural-urban migration has been a major contributor to urban growth, accounting for nearly two-thirds of urban expansion (Hossain et al., 2016). Data reinforce that almost all migrants from rural poor families end up in slums (Ullah, 2004), especially those who are landless (Khan et al., 2015). However, not all migrants are able to find immediate shelter in these slums. Many start their urban lives by squatting in temporary locations, slowly attempting to secure a place in the slums. This process is often challenging, as finding accommodation in slums can be difficult without family connections or networks (Ullah, 2004).

The living conditions in slums are often characterized by poor accessibility, lack of open space, and very high population densities (Khan et al., 2015). The overall quality of urban housing in Bangladeshi cities has reached critical levels concerning residential density, occupancy ratios, and structural conditions (Khan et al., 2015). Despite these challenges, studies indicate that rural-urban migration has a positive impact on the socio-economic status of migrants. Most migrants experience improvements in their social and economic conditions after moving to cities, contributing to poverty reduction and increased livelihood opportunities (Chowdhury et al., 2012).

According to study results, rural-urban migrants report higher incomes and more properties than non-migrants, demonstrating that migration is a beneficial livelihood strategy (Hossain et al., 2016). Although migrants frequently live in substandard conditions in slums, their overall living standards increase when compared to their rural origins (Haque & Islam, 2012). For low-income groups, the location of their housing is often just as important, if not more so, than the quality of the housing itself (King et al., 2017). This represents a harsh reality, as migrants prefer closeness to economic possibilities over housing conditions, emphasizing the sacrifices they must make in the urban setting.

When focussing on the study area, the second-tier city Sylhet, is seen as the 3rd most attractive city for internal migration in Bangladesh (Arefin et al, 2021). The projections show that the city's population will increase by 155,436 people between 2024 and 2029, reaching a total of 1,154,810 residents (World Population Review, n.d.). Rural-urban migration will account for 60% to 66% of this growth, meaning that over 100,000 rural migrants are expected to move to Sylhet in the next five years (Hossein, 2001). This rapid expansion, primarily driven by rural-urban migration, demonstrates the urgent need for affordable housing to accommodate this inflow.

02. **LITERATURE REVIEW**

As Sylhet undergoes rapid urbanization, mostly driven by rural-urban migration, the city's housing crisis has become a critical concern. Mass housing has emerged as a potential solution to address the housing demands of low-income migrants. However, the effectiveness of mass housing projects, particularly in addressing the needs of rural-urban migrants, remains debated (Alao, 2009). This literature review explores the development, challenges, and potential improvements of mass housing projects in rapidly urbanizing contexts, with a particular focus on its applicability in Sylhet.

Mass housing is commonly defined as the construction of high-density, standardized housing to address housing shortages in urban areas, particularly for low-income populations (Alao, 2009). The primary advantage of mass housing is its ability to provide affordable housing rapidly, achieved through cost-effective building methods and the efficient use of labour (Dawood et al., 2020, cited in Patel & Paneria, 2021). As rapid urbanization increases demand for housing, particularly in developing cities like Sylhet, mass housing is viewed as a critical solution to accommodate growing populations and prevent the rise of informal settlements (Woetzel et al., 2014). However, while the concept of mass housing addresses the immediate need for shelter, its implementation raises significant concerns regarding quality, user satisfaction, and social integration.

A major critique of mass housing is its failure to meet the specific needs of end-users, particularly low-income migrants. The "one-size-fits-all" approach to housing design is widely criticized for prioritizing construction efficiency over residents' well-being (Beng et al., 2015). This approach often results in homes that are poorly suited to the socio-cultural and practical needs of rural-urban migrants, who may have distinct household structures, space requirements, and cultural practices (Alao, 2009; Neuwirth, 2005, cited in Khan, 2019). Mahadevia et al. (2013) emphasize that housing projects often overlook these factors because end-users are rarely involved in the planning and design process. The lack of community participation during the design phase leads to dissatisfaction, as end-users find themselves living in environments that do not reflect their needs or expectations (Mahadevia et al., 2013).

Another key issue with mass housing projects is their location on the urban periphery, where land is cheaper, making it easier to construct affordable housing (Fairus & Zairul, 2023). However, this distance from city centres often isolates low-income residents from employment opportunities and essential services, increasing social and economic challenges. Woetzel et al. (2014) and Shah et al. (2015) argue that the cost of travelling to city centres for work, combined with the social isolation caused by peripheral

housing developments, limits the potential for rural-urban migrants to integrate into the urban economy. Croese et al. (2016) further note that housing closer to job opportunities in the city centre becomes unaffordable for the urban poor, forcing many into overcrowded, substandard housing or informal settlements. While mass housing has relocated many poor individuals, it has failed to provide them with quality living conditions or address underlying poverty issues (Mahadevia et al., 2013).

Literature consistently points to a significant gap between the housing provided through mass housing projects and the actual needs of the rural-urban migrants. Croese et al. (2016) highlight the increasing number of individuals in cities without access to adequate, secure, and affordable housing as evidence of the insufficiency of current housing projects. King et al. (2017) argue that the success of housing projects depends on considering residents' cognitive and socio-cultural factors, which influence their satisfaction and long-term well-being. Housing programs that incorporate participatory approaches are generally more successful because they take into account the specific needs and experiences of the end-users (King et al., 2017; Shah et al., 2015).

While the benefits of participatory housing development have been widely acknowledged, their application in large-scale housing projects remains limited (Shah et al., 2015). Mass housing projects typically continue to follow top-down approaches that neglect community involvement and fail to create inclusive housing solutions (Croese et al., 2016; King et al., 2017). Mota and Van Gameren (2018) argue that there is a need for new housing models that integrate local social and spatial practices with mass housing design. The challenge lies in developing scalable solutions that incorporate local knowledge while addressing the broader housing needs of urban populations. Small-scale participatory projects, although more inclusive, are often dismissed as insufficient to tackle the large-scale housing challenges faced by cities like Sylhet (Croese et al., 2016).

One of these mentioned benefits of mass housing projects, namely affordability, can be further addressed and strengthened through the use of modular design systems. Modular homes are constructed either partially or entirely in factories, where three-dimensional "modules" are prefabricated and later assembled on-site (Woetzel et al., 2014; Yakubu, 2024). These prefabricated homes offer a practical and affordable solution for low-income communities in Asia (Holland, 2018). Prefabricated homes have gained popularity as they can be built 50% faster than traditional homes while also reducing pollution by half (Yakubu, 2024). Moreover, the industrial production of building modules on a large scale significantly reduces costs. Standardized modules are manufactured and assembled in various configurations to meet different housing needs, offering both cost-efficiency and flexibility (Husein & Shariq, 2018) without comprimizing on quality (Smith & Narayanamurthy, 2008).

This flexibility allows users to easily customize or expand their homes as their needs evolve (Chris, 2023). This adaptability is crucial for addressing the social needs of end-users, making the homes more suitable for their lifestyles (Jimenez-Moreno, 2018). A focus on variability in design, emphasizing liveability rather than aesthetics, is essential to ensure that housing projects align with the preferences of end-users (Fairus & Zairul, 2023; Jimenez-Moreno, 2018). This flexibility through the use of modular design systems can be a way to better integrate the needs of rural-urban migrants into the design, which is a mentioned shortcoming of mass housing projects.

Based on the above literature review, the main problem addressed in this research is the inadequacy of existing housing solutions which create a big housing shortage for the rural-urban migrants in Sylhet. The current mass housing projects tend to fail to meet the needs of these migrants. The small-scale projects that do meet the needs of these migrants, aren't designed to become part of a large-scale housing project. This means that there is a research gap in finding an effective solution to integrate the needs of the end user into a large-scale housing project. By studying these needs and implementing them into a large-scale modular housing project, the goal is to reduce the affordable housing shortage for the urban poor in Sylhet.

03. **PROBLEM STATEMENT**

There is a significant gap between the houses being developed and the actual needs of the rural-urban migrants (Croese et al., 2016). The increasing number of migrants lacking adequate, secure, and affordable housing highlights the inadequacy of existing housing solutions (King et al., 2017). This will become an increasingly significant problem in Sylhet. It is expected that in the next five years, over 100,000 rural-urban migrants will move to the city, all of whom will be seeking affordable housing in the city centre, close to where they can find employment (Hossein, 2001). Addressing the issue of adequate, secure, and affordable housing in and around urban areas is crucial for improving equity, boosting economic productivity, and enhancing environmental sustainability in cities. This focus leads to a better quality of life and greater equality of opportunity, resulting in a more dynamic urban environment (King et al., 2017). Access to decent and affordable housing is vital for the health and well-being of individuals (Woetzel et al., 2014). Without sufficient affordable housing options in well-serviced areas, rural-urban migrants often find themselves living in slums on the outskirts of cities, far from essential infrastructure, social networks, and employment opportunities (King et al., 2017).

While mass housing has been proposed as a potential remedy for this housing shortage, many current projects have consistently failed to meet the specific needs of low-income migrants. These initiatives often feature standardized, “one-size-fits-all” designs that overlook the socio-cultural and spatial preferences of the urban poor (Beng et al., 2015). Although there is a broad recognition of the importance of including communities in housing development, efforts to engage these groups have been inconsistent (Shah et al., 2015). Small-scale participatory projects are often dismissed as insufficient to address the large-scale housing challenges cities face (Croese et al., 2016).

04. **THEORETICAL FRAMEWORK**

As previously stated, Sylhet is rapidly urbanizing, and the city is expected to grow significantly in the coming years. The existing housing infrastructure is insufficient to meet this demand. The urban poor face an extreme shortage of suitable housing, frequently ending up in slums with inhumane living conditions. To address the housing crisis, large-scale mass housing projects have been proposed frequently as a potential solution.

In Tower and Slab: Histories of Global Mass Housing (2012), Urban examines the history of mass housing projects around the world, analyzing how these projects emerged in various contexts and were shaped by political, economic, and cultural factors. His findings suggest that many mass housing projects began with utopian visions but the reality can be much harsher. Common issues include isolation due to a lack of humanity in design, urban segregation, and the concentration of poverty on the city outskirts. Despite these challenges, Urban acknowledges that mass housing is an effective, affordable, and feasible solution to address immediate housing shortages for the urban poor. By examining both sides of mass housing, this study aims to focus on strategies that build on the positive aspects while reducing the negatives.

Habraken's Supports: An Alternative to Mass Housing (1972) and Hamdi's Housing Without Houses (1995) align with this perspective, as both critique large mass housing projects. Habraken argues that the uniformity and marginalization of mass housing lead to a lack of individuality, identity, and social cohesion in cities. He advocates for a more flexible system in which independent housing units are placed on a supportive framework. This structure can be seen as an open framework that allows residents to design their own living environments. By prefabricating housing components, Habraken suggests that residents gain more freedom in the design and execution of their homes while the architect focuses on the supporting structures. He proposes a flexible structure with a long lifespan, combined with individual customization by residents with a shorter lifespan. This allows for adjustments based on residents' needs without changing the building itself.

Hamdi extends this concept by advocating for a "support-based" rather than a "provision-based" approach to housing. This support-based method values user participation and empowerment in the process. Like Habraken, Hamdi advocates for flexibility and resident participation, but he further emphasizes enablement. He argues not only that residents should be able to customize their homes, as Habraken suggests, but also that they should actively participate in the development process. In essence, Hamdi's work calls for a paradigm shift in housing policy, moving from merely constructing physical houses to supporting communities in creating functional, adaptable living environments.

Hamdi also notes that the level of resident participation should be decided case by case. This research aligns with this idea, recognizing that in Sylhet's context, along with the goal of a large-scale project, the active enablement that Hamdi describes may not fit the intended design process. In A Ladder of Citizen Participation, Arnstein (1969) presents a "ladder of citizen participation" with eight levels, ranging from manipulation (the lowest level) to citizen control (the highest). This ladder is used to determine the level of participation for this research. The high level of participation Hamdi envisions can be classified under levels 6/7, where citizens have significant input. Arnstein argues that at this level, a strong community foundation is needed so that leaders with the necessary knowledge and financial resources can be appointed. Additionally, both parties must invest significant effort and commitment; residents, therefore, need to contribute substantially—an aspect Hamdi also acknowledges as a critical point. This research builds on the assumption that the knowledge and structure required for this level are lacking, which could lead to an inefficient and poorly managed project.

Instead, this research focuses on level 5 participation. At this level, residents have a say by providing active advice, but the right to judge and decide on the legitimacy or feasibility of the advice remains with the architect. This allows for housing to be built collaboratively so that it meets residents' needs while enabling architects with the necessary expertise to apply their skills.
To understand the residents'

needs in a way that aligns with level 5 participation, this study uses part of Hamdi's (1995) research approach. His approach consists of three parts: observing and listening, collecting stories, and workshops. To tailor this method to the level 5 participation, only the first part—observing and listening—is used. This structured approach is further divided into three parts and applied across three different scales: Frame (refers to the social, economic, and physical aspects of people and places), Fabric (involves looking at how different elements fit together, finding strong connections that can be improved, and weak areas that need support), and Function (understanding how spaces are used). This analysis is conducted at the neighbourhood, block, and unit levels. Hamdi argues that this systematic approach gives the researcher a full understanding of the physical and social structures of the community. This knowledge base is then used in the design process, and resident participation concludes here.

To address the positive aspects of mass housing described by Urban (2012) and to incorporate the flexibility and participation advocated by Habraken (1972) and Hamdi (1995), a modular design system is used. In The Future of Modular Architecture (2021), Wallance offers a detailed, forward-looking perspective on how modular architecture can help solve major challenges such as urbanization, housing shortages, and sustainability. Wallance sees modular housing as an industrial product made up of modules that offer efficiency, sustainability, affordability, and flexibility. This system enhances the positive aspects of mass housing—efficiency, speed, and cost-effectiveness. Additionally, the flexibility aligns with the views of Habraken and Hamdi, countering the negative aspects of mass housing, such as a lack of identity, uniformity, and social cohesion.

Based on these theories, this research focuses on designing a modular housing system that incorporates insights from the target group, enhancing the positive aspects of mass housing while addressing its drawbacks.

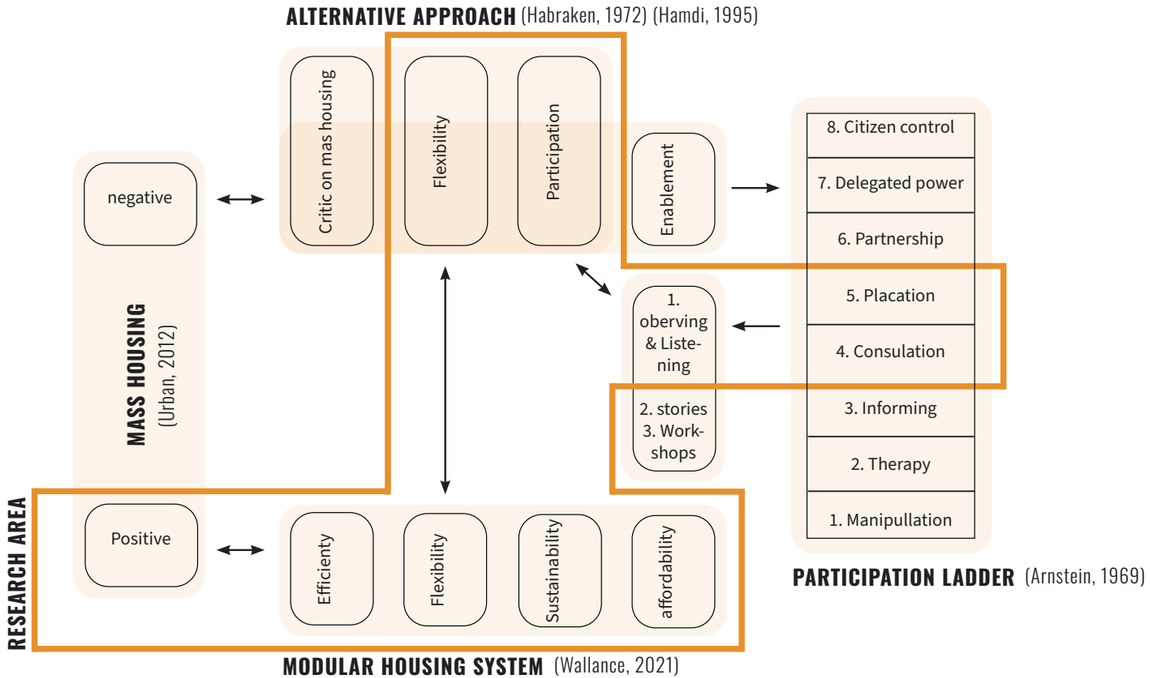

Figure 2: Theoretical Framework diagram.

05. **RESEARCH QUESTION**

This research aims to develop a modular design system with the potential for large-scale housing projects in Sylhet that effectively addresses the specific housing needs, socio-cultural preferences, and affordability requirements of rural-urban migrants, to reduce the current and expected affordable housing shortage in Sylhet for the rural-urban migrants. In order to find a fitting solution, the research question is as follows:

*How can the **needs of the rural-urban migrants** be integrated into a **modular design system** to create a **large-scale housing project** which reduces the affordable housing shortage in Sylhet?*

1. What are the specific housing needs and socio-cultural preferences of rural-urban migrants in Sylhet?

2. What scale of modularity best align with the housing needs and cultural preferences of rural-urban migrants in Sylhet?

3. How can modular design systems enhance the scalability and affordability of large-scale housing projects?

This thesis hypothesises that integrating the socio-cultural needs and housing preferences of rural-urban migrants into modular housing design will improve the effectiveness of mass housing projects, resulting in a more affordable, adaptable, and scalable solution to reduce the current and expected affordable housing shortage in Sylhet.

06. **GOAL/AIMS**

The goal of the research is to develop a modular design system with the potential for large-scale housing projects in Sylhet that effectively addresses the specific housing needs, socio-cultural preferences, and affordability requirements of rural-urban migrants, to reduce the current and expected affordable housing shortage in Sylhet for the urban poor.

To achieve this goal, the research aims of the project are:

1. Identifying the specific housing needs, socio-cultural preferences, and spatial requirements of rural-urban migrants in Sylhet.

2. To determine the most suitable level of modularity that can effectively meet the identified needs and preferences of the rural-urban migrants.

3. To explore how modular design systems can be utilized to create affordable and scalable solutions for large-scale housing projects.

07. **METHODOLOGY**

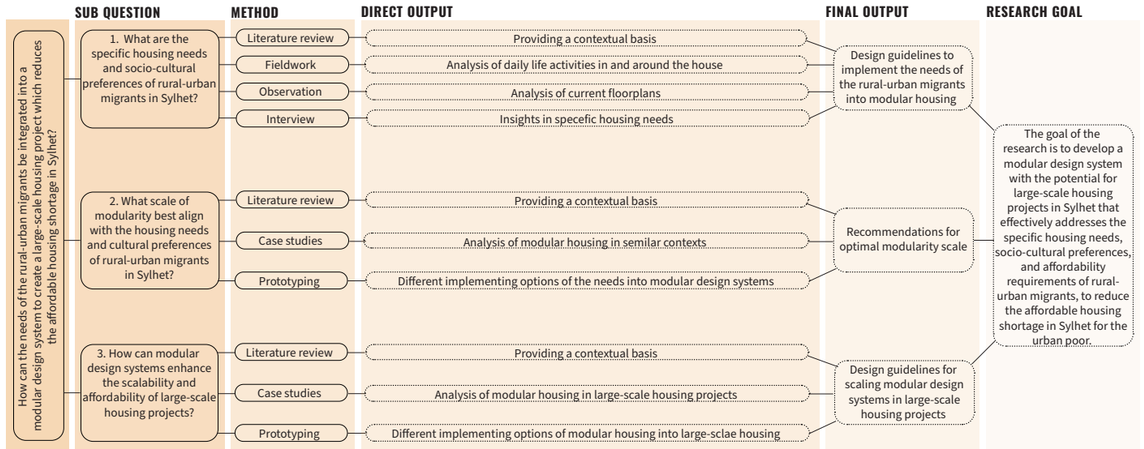

Figure 5: Methodology diagram.

08. **RESEARCH SCHEME**

PROBLEM STATEMENT

The main problem addressed in this research is the inadequacy of existing housing solutions which create a big housing gap for the rural-urban migrants in Sylhet. The current mass housing projects tend to fail to meet the needs of these migrants. And the small-scale projects that do meet the needs of these migrants, aren't designed to become part of a bigger system.

RESEARCH QUESTION

How can the needs of the rural-urban migrants be integrated into a modular design system to create a large-scale housing project which reduces the affordable housing shortage in Sylhet?

1. What are the specific housing needs and socio-cultural preferences of rural-urban migrants in Sylhet?
2. What scale of modularity best align with the housing needs and cultural preferences of rural-urban migrants in Sylhet?
3. How can modular design systems enhance the scalability and affordability of large-scale housing projects?

RESEARCH GOAL

The goal of the research is to develop a modular design system with the potential for large-scale housing projects in Sylhet that effectively addresses the specific housing needs, socio-cultural preferences, and affordability requirements of rural-urban migrants, to reduce the affordable housing shortage in Sylhet for the urban poor.

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3. To explore how modular design systems can be utilized to create affordable and scalable solutions for large-scale housing projects.

METHODS

- Literature review
- Fieldwork
- Observation
- Interview

- Literature review
- Case studies
- Prototypes

- Literature review
- Case studies
- Prototypes

OUTPUT

Design guidelines to implement the needs of the rural-urban migrants into modular housing

Recommendations for optimal modularity scale

Design guidelines for scaling modular design systems in large-scale housing projects

09. **RELEVANCE**

Rapid urbanization is a global phenomenon and one of the greatest challenges of the 21st century. Many cities around the world face severe issues due to rapid growth, including overcrowding and a significant shortage of housing. This research is relevant not just for Sylhet, but for similar problems recognized globally.

The need for housing is particularly urgent in the Global South, where countries like Bangladesh are highly vulnerable to extreme climate events such as droughts, heavy rainfall, tropical cyclones, and storm surges (Rawlani & Sovacool, 2011). Climate change increases the frequency of these disasters (Moniruzzaman et al., 2018; Rana & Ilina, 2021), which drives large-scale migration. Every year, hundreds of thousands of climate migrants are forced to leave their homes due to sudden disasters like cyclones and floods, as well as slow-onset events like sea-level rise and salinization (McDonnell, 2019). This has made the housing shortage in urban areas of Bangladesh an urgent problem, expected to worsen in the coming years.

Research focused on affordable and rapid housing solutions in Sylhet is essential for addressing these challenges. The solutions developed can not only meet the immediate needs of residents but also provide insights and strategies that can be adapted to cities facing similar crises worldwide.

10. **DEFENITIONS**

Mass housing
The construction or springing up of a relatively high number of residential buildings in an area in a relatively short period of time due to high demand (Alao, 2009).

Modular housing
Separate elements of a building that are prefabricated in isolation, then combined with other modules to create a unit (Larsson, n.d.).

Prefabrication
Off-site fabrication, often to a custom specification, of building components that may comprise all or part of a completed building (Wallance, 2021).

Rural-urban migration
When people move, either temporarily or permanently, from a rural area to an urban city (StudySmarter, n.d).

Urban poor
The segment of the population living in cities who experience poverty and face significant challenges such as inadequate housing, limited access to education and healthcare, and high unemployment rates (Fiveable, 2024).

11. **REFERENCES**

Alao, D. A. (2009). A Review of Mass Housing in Abuja, Nigeria: Problems and Possible Solutions towards Sustainable Housing. *Eastern Mediterranean University.*

Anik, S. I., & Khan, M. A. S. A. (2012). Climate change adaptation through local knowledge in the north eastern region of Bangladesh. *Mitigation And Adaptation Strategies For Global Change, 17(8),* 879–896. https://doi.org/10.1007/s11027-011-9350-6

Arefin, M. S., Saha, K., Haque, S. N., Uhrig, N., & Kretzler, E. (2021). A modular landscape model for low-cost settlement: Case study: Sylhet, Bangladesh. *SUST Journal of Science and Technology, 3(1)*, 44–56.

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal Of The American Institute Of Planners, 35(4)*, 216–224. https://doi.

Beng, G. H., Hamid, Z., Hung, F. C. (2015). UNLEASHING THE POTENTIAL OF TRADITIONAL CONSTRUCTION TECHNIQUE IN THE DEVELOPMENT OF MODERN URBAN MASS HOUSING. *Malaysian Construction Research Journal 16(1).*

Chowdhury, I. A., Haque, N., Kamal, M. M., Islam, T., Khan, M. M., Islam, M. N., & Uddin, I. (2012). Internal Migration and Socio-Economic Status of Migrants: A Study in Sylhet City, Bangladesh. *American Journal Of Human Ecology, 1(4),* 123–133. https://doi.634/216796221504183

Chris. (2023). *10 Surprising Benefits of Building a Modular Home.* Saltair Modular Homes Sunshine Coast Queensland. https://saltairmodular.com.au/benefits-of-building-a-modular-home/.

Croese, S., Cirolia, L. R., & Graham, N. (2016). Towards Habitat III: Confronting the disjuncture between global policy and local practice on Africa's 'challenge of slums'. *Habitat International, 53,* 237–242. https://doi.org/10.1016/j.habitatint.2015.11.037

Fairus, M., & Zairul, M. (2023). Identifying design trends in mass housing development. *International Journal of Academic Research in Business and Social Sciences, 13(8).* https://doi.org/10.6007/ijarbss/v13-i8/18056

Fiveable. (2024). *Urban Poor*. https://library.fiveable.me/key-terms/apush/urban-poor

Habraken, N. J. (2021). *Supports: an alternative to mass housing*. The Architectural Press, London.

Hamdi, N. (1995). Housing Without Houses: Participation, Flexibility, Enablement. Practical Action Publishing.

Haque, M. E., & Islam, M. M. (2012). Rural to Urban Migration and Household Living Conditions in Bangladesh. Dhaka University Journal Of Science, 60(2), 253–257. https://doi.org/10.3329/dujs.v60i2.11529

Holland, O. (2018). Prefab designs: Made in Asia, for Asia. CNNSTYLE. https://edition.cnn.com/style/article/prefab-designs-in-asia/index.html

Hossain, M. Z. (2001) Rural-urban migration in Bangladesh: a micro-level study. In Brazil IUSSP conference. August (pp. 20–24).

Hossain, M. Z., Khan, M. O. A., Ahmed, J.U., (2016). Determinants of rural-urban migration in Bangladesh including its consequences for origin households and urban amenities. STM Journals. Volume 5, Issue 2.

Husain, S. F.,Shariq, M. (2018). Low -Cost Modular Housing – A Review. College of Engineering & Technology, Aligarh MuslimUniversity.

Jimenez-Moreno, P. (2018). Modular Housing. Medium. https://medium.com/@jimenezmorenopablo/modular-housing-d51fa71a0426.

Khan, M. A. U., Hossen, M. A., Sharmin, Z., & Kubra, T. J. (2015). Displacement and Deplorable Living Conditions of Slum Dwellers: With Special Reference to Sylhet City. International Letters Of Social And Humanistic Sciences, 46, 51–64. https://doi.org/10.18052/www.scipress.com/ilshs.46.51

Khan, N. (2019). CRITICAL ASSESSMENT OF AFFORDABLE HOUSING POLICY IN THE REPUBLIC OF MAURITIUS VIS A VIS FIVE PRINCIPLES OF HOUSING ADEQUACY. International Journal of Advance and Innovative Research, 6(2).

King, R., Orloff, M., Virsilas, T., & Pande, T. (2017). Confronting the Urban Housing Crisis in the Global South: Adequate, Secure, and Affordable Housing. World Resources Institute.

Larsson, S. (n.d.). Modular Construction in Architecture: The Future of Flexible Design. Unstudio. https://www.unstudio.com/en/page/15612/modular-construction-in-architecture-the-future-of-flexible-design

Mahadevia, D., A. Datey, and A. Mishra. (2013). Foisting Mass Housing on the
Poor: Lessons from Social Audit of BSUP. Ahmedabad, India: Centre for Urban
Equity, CEPT University

Makinde, O. O. (2014). Influences of socio-cultural experiences on residents' satisfaction in Ikorodu low-cost housing estate, Lagos state. Environment *Development and Sustainability, 17(1)*, 173–198. https://doi.org/10.1007/s10668-014-9545-6

McDonnell, T. (2019) *Climate change creates a new migration crisis for Bangladesh. National Geographic.* https://www.nationalgeographic.com/environment /article/climate-change-drives-migration-crisis-in-bangladesh-from-dhaka-sundabans.

Mota, N., & Van Gameren, D. (2018). Dwelling with the Other Half: Architectural Education for the Design of Affordable Housing in the Global South. Charrette, 5(1), 33–49.

Olotuah, A. O., Taiwo, A. A. (2013). HOUSING THE URBAN POOR IN NIGERIA THROUGH LOW-COST HOUSING SCHEMES. International Journal of Physical and Human Geography, 1(3) 1-8.

Patel, R. G., Paneria, D. B. (2021). MASS HOUSING: FEATURES, CHALLENGES AND ITS IMPLEMENTATION. International Research Journal of Modernization in Engineering Technology and Science, 3(3).

Rawlani, A. K., & Sovacool, B. K. (2011). Building responsiveness to climate change through community based adaptation in Bangladesh. Mitigation And Adaptation Strategies For Global Change, 16(8), 845–863. https://doi.org/10.1007/s11027-011-9298-6
Rana, M. M. P., & Ilina, I. N. (2021). Climate change and migration impacts on cities: Lessons from Bangladesh. Environmental Challenges, 5, 100242. https://doi.org/10.1016/j.envc.2021.100242

Shah, P., Hamilton, E., Armendaris, F., & Lee, H. (2015). World-Inclusive cities approach paper (No. AUS8539, pp. 1-86). The World Bank.

Smith, R., & Narayanamurthy, S. (2009). Prefabrication in developing countries: a case study of India. In Wood structures symposium (p. 5).

StudySmarter. (n.d.). Rural to Urban Migration. ttps://www.studysmarter.co.uk/explanations/human-geography/population-geography/rural-to-urban-migration/

Ullah, A. A. (2004). Bright City Lights and Slums of Dhaka city: Determinants of rural-urban migration in Bangladesh. MIGRATION LETTERS, 1(1), 26–41. https://doi.org/10.33182/ml.v1i1.24

Urban, F. (2013). Tower and slab: histories of global mass housing. Routledge.

Wallance, D. (2021). The future of modular architecture. Routledge.
Woetzel, J., S. Ram, J. Mischke, N. Garemo, and S. Sankhe. (2014). A Blueprint for Addressing the Global Affordable Housing Challenge. McKinsey Global Institute.

Worldpopulationreview. (n.d.). Sylhet, Bangladesh population 2024. https://worldpopulationreview.com/cities/bangladesh/sylhet.

Yakubu, P. (2024). How Can Modular Housing Production Incorporate Material Locality and Regional Craft? ArchDaily. https://www.archdaily.com/1015382/how-can-modular-housing-production-incorporate-material-locality-and-regional-craft.

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03. RESEARCH DEVELOPMENT

03.01 Change of Focus: From Modular Housing to Open Building System
During the progression of my research, I realized that my initial focus on modular housing was no longer suitable for the goal of my project. Initially, I aimed to explore how a modular design system could contribute to reducing the affordable housing shortage in Sylhet for rural-urban migrants. However, after further exploration of the Sylhet context and the specific challenges related to future changes, I recognized that an Open Building System aligns more closely with my objectives and the complexity of the situation.

The decision to shift towards the Open Building System was partly driven by my personal interest in this concept and the opportunities I identified to make my design in Sylhet future-proof. The Open Building System offers the potential to create flexible and sustainable housing by separating the structural framework from the interior infill. This aligns with the vision of accommodating future uncertainties and changing needs of the residents, as advocated by John Habraken. Moreover, this system allows for combining large-scale development with adaptability, which is essential given the rapid urbanization of Sylhet and the specific needs of rural-urban migrants.

3.02 Adjustment of the Research Methodology
With the shift in focus towards the Open Building System, my research methodology also changed. Initially, I planned to develop prototypes as part of the modularity study. However, as modularity is no longer the core of my research, I decided to abandon this method. Instead, I focused more on case studies of existing Open Building projects and conducted field research into the lifestyle and work habits of the Bangladeshi community. This approach provided valuable insights into the socio-cultural needs and spatial preferences of the target group.

This shift in focus led to a more in-depth analysis of how the Open Building concept can contribute to sustainable housing, with the needs of rural-urban migrants at the center. Through literature reviews and case studies of similar projects, I gained a better understanding of the practical applicability of Open Building.

03.03 Revised Research Question and Sub-questions
Due to the changed focus, the research question was also updated. The new main question is:
"How can the needs of the rural-urban migrants be integrated into an open building system to create a future-proof, large-scale housing project which reduces the affordable housing shortage in Sylhet?"
Additionally, I revised the sub-questions to support the new direction:

1. What are the specific housing needs and socio-cultural preferences of rural-urban migrants in Sylhet?
2.How can the Open Building principle be applied in the context of Sylhet, combined with the specific housing needs of the migrants?
3.How can a large-scale housing project be designed within the Open Building System, avoiding the negative aspects of traditional mass housing while ensuring affordability and future-proofing?Added Objective: A Smooth Transition from Village to City

03.04 Aim
This research aims to develop a future-proof open building system with the potential for a large-scale housing project in Sylhet that effectively addresses the specific housing needs, socio-cultural preferences, and affordability requirements of rural-urban migrants, to reduce the current and expected affordable housing shortage in Sylhet. Additionally, the project aims to facilitate a smoother transition from rural to urban living for rural-urban migrants by integrating the character of positive and valued elements from rural life into urban design elements. This approach not only benefits the rural-urban migrants who will reside in the building but also enhances the living environment for other residents by incorporating design choices that positively impact the overall quality of life within the housing complex.

03.05 Conclusion
The shift from modular housing to an Open Building System reflects my pursuit of a future-proof and flexible solution to the housing problem in Sylhet. The revised research question, adjusted methodology, and expanded objectives demonstrate how I have sharpened my research focus to better address the complex realities of rural-urban migration. By emphasizing adaptability and flexibility, I aim to develop a sustainable solution that remains relevant both now and in the future.

04. RESEARCH

This research looks at how the needs of rural-urban migrants can be included in an open building system to create a future-proof, large-scale housing project that helps reduce the shortage of affordable housing in Sylhet, Bangladesh. The study responds to the growing challenges of fast urbanization, displacement, and poor housing conditions by proposing a more flexible and culturally appropriate design approach based on the Open Building concept.

The main research question is: *How can the needs of the rural-urban migrants be integrated into an open building system to create a future-proof, large-scale housing project which reduces the affordable housing shortage in Sylhet?*

This question is supported by three sub-questions: 1. What are the specific housing needs and socio-cultural preferences of rural-urban migrants in Sylhet? 2. How can the Open Building principle be applied in the context of Sylhet, together with the specific housing needs of the migrants? 3. How can a large-scale housing project be designed within the Open Building system, avoiding the problems of traditional mass housing while staying affordable and adaptable for the future?

The first sub-question is answered using knowledge gained during a field trip to Bangladesh. As part of this, I stayed for several days with a family in the rural village of Ekduaria. This experience gave me valuable insight into village life and the cultural values of the people who may move to the city—crucial information for designing homes that truly suit their way of living.

The second and third sub-questions are explored through a review of literature and case studies, focusing on how Open Building has been used in other projects and how it could work at a large scale in the context of Sylhet.

An important additional objective of the research is to support a smooth transition from village to city, ensuring that new housing solutions reflect the socio-cultural preferences of rural-urban migrants while addressing broader urban development challenges.

04.01 **HOUSING NEEDS**

To design suitable housing for rural-urban migrants in Sylhet, it is important to understand their daily lives, values, and social traditions. These aspects influence how they use space, interact with neighbors, and define concepts like privacy, community, and ownership.

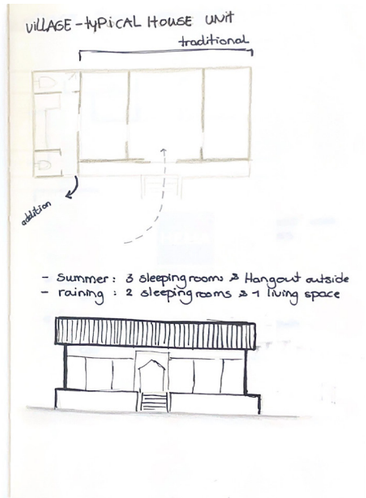
This part of the research focuses on identifying the specific housing needs and socio-cultural preferences of migrants from rural areas. These insights are based on firsthand observations and experiences gathered during a field trip to Bangladesh, including several days spent in the village of Ekduaria. By living within the local context, it became possible to gain a deeper understanding of family dynamics, spatial use in the home, social relationships, and everyday routines.

This knowledge forms the foundation for a housing approach that does not impose a one-size-fits-all solution but instead adapts to the people it is meant for—ensuring that new urban living environments remain familiar, respectful, and supportive of cultural identity.

04.01.01 **TYPICAL BANGLA BATON HOUSE**

The Bangla Baton is a typical rural house commonly found in villages across Bangladesh. Known for its affordability and simplicity, it is often built using lightweight, locally available materials. The structure is easy to assemble and comes in various sizes and levels of comfort, depending on the family's budget. Over time, families tend to upgrade their Bangla Baton—replacing materials, extending the layout, or improving finishes as their financial situation improves.

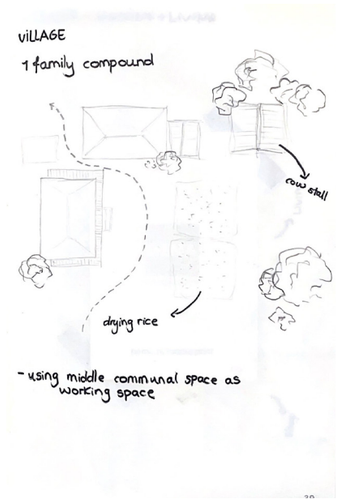
Inside, the house usually consists of a single multifunctional room that adapts to the seasons. During the rainy season, the interior is divided into a living space and two bedrooms. In the dry season, however, the living room shifts outdoors—into the courtyard—allowing the entire interior to function as three sleeping spaces. Basic units typically do not include a kitchen or bathroom; these facilities are shared with extended family members in the compound.



04.01.01 **TYPICAL BANGLA BATON HOUSE**

Bangla Batons are rarely isolated units. Instead, they form part of a larger family cluster—also known as a compound. A compound typically includes several Bangla Baton houses belonging to an extended family. These homes are arranged around a shared central space, which functions as an outdoor living room or social hub for the entire family.

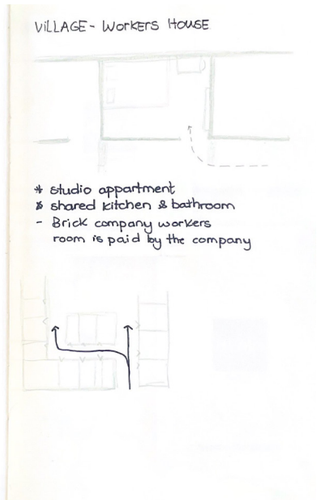
This open courtyard area plays a key role in daily life. It is used for cooking, gathering, relaxing, working, and hosting guests. The shared nature of kitchens and bathrooms reflects the close-knit family structure and a culture of communal living. The layout supports flexibility, allowing individual households to maintain privacy while benefiting from shared resources and strong family ties.



04.01.02 **BRICK FIELD WORKERS HOUSING**

Families working at brickfields are typically provided with housing by the brickfield owner. These units, however, offer only the most basic living conditions. Each family lives in a small studio-like room that serves primarily as a sleeping space. Entire families—often large in size—share this single room, leading to cramped conditions where every square centimeter is put to use. Storage is creatively organized, often using the full height of the room to stack belongings.

There is no private kitchen or bathroom; these are shared with other families living in the same row of housing. Due to the seasonal nature of brick production—limited to the dry months—families only live here part of the year. During this period, the outdoor spaces between units become active communal areas. These open areas function as shared living rooms, where families cook, socialize, and carry out daily routines together, making up for the limited interior space.



04.01.02 **BRICK FIELD WORKERS HOUSING**

Unmarried male workers at the brickfield, often referred to as bachelors, sleep in simple dormitory-style accommodations. These large, open halls offer minimal privacy or comfort. Each man typically has a sleeping mat, a pillow, and a small locked box or suitcase for personal belongings. Beds are not common; instead, workers sleep directly on the floor, side by side.

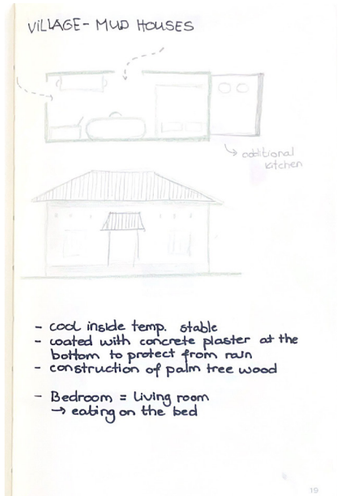
Like the families, bachelors share common kitchen and bathroom facilities. Life in the dormitory is basic and functional, with little space for individuality. The focus is purely on rest and recovery after long days of physically demanding labor. Despite the tough conditions, these dormitories serve as temporary shelters during the working season, after which most workers return to their home villages.

04.01.03 **MUD HOUSING**

Traditional mud houses are a common and long-standing form of housing in the rural areas of Bangladesh. Built using a wooden frame—often made from palm tree wood—and filled with a mixture of mud and natural fibers, these houses rely entirely on local materials and techniques. To protect the base of the walls from heavy rainfall and erosion, a thin layer of cement plaster is often applied around the bottom.

The thick earthen walls provide excellent insulation, keeping the interior cool during the scorching summer months. This creates a pleasant indoor climate without the need for mechanical ventilation. However, the downside is that once the house heats up—especially during prolonged hot spells—the trapped heat is slow to escape, and poor ventilation can make the space feel heavy and airless.

The interior layout is usually very basic: one multifunctional room that serves as a living area, sleeping space, and dining room. The level of finish and comfort depends on the household's means—some mud houses include private kitchen and bathroom areas, while others rely on shared facilities within the compound.

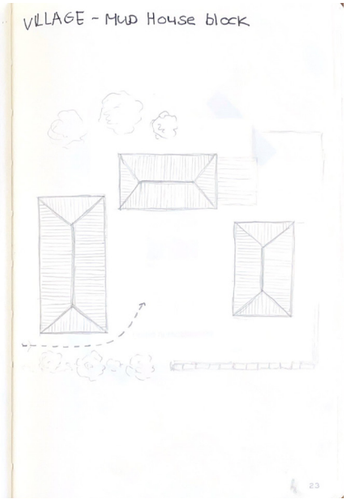


04.01.03 **MUD HOUSING**

Mud houses are typically not standalone units but are part of a larger family compound, much like the clusters seen with Bangla Baton houses. These clusters are composed of several homes, often belonging to one extended family, arranged around a central shared courtyard. Both the spatial layout and the way of living closely resemble the Bangla Baton compounds.

This communal outdoor space plays a central role in daily life: it serves as a place for cooking, washing, drying rice, socializing, and income-generating activities. While the construction materials may differ—mud versus lightweight sheet materials—the social and functional use of space is remarkably similar. Some compounds include shared kitchens, bathrooms, or livestock enclosures, and are often enclosed with fencing or low walls for safety and to mark family land.

These clusters reflect a deeply rooted tradition of collective rural life, offering a resilient and adaptive model of housing that balances privacy with strong community ties.



04.01.04 **FAMILIY HOUSING**

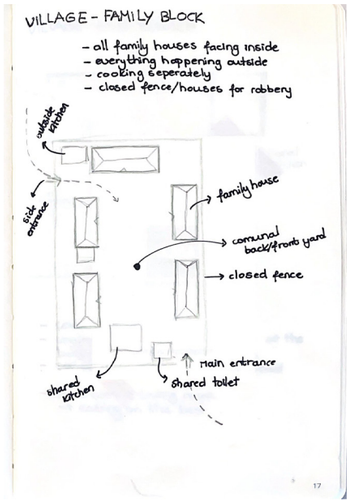
The family house is a more developed version of the traditional Bangla Baton, commonly found in rural Bangladesh. While it shares the same basic structure and logic, this type of house is larger, sturdier, and often reflects the family's improving financial situation. A typical pattern is that the male head of the household works in a distant city—often Dhaka—sending remittances home. This income is frequently invested in upgrading the house: improving walls and roofing, expanding the layout, or integrating private kitchens and bathrooms.

These houses are generally built on a raised concrete base to protect against seasonal flooding. In some cases, this base is extended to form a shaded veranda—an additional semi-outdoor space that can be used even during the rainy season. The interior may include private kitchen and bathroom facilities, offering greater comfort and privacy, particularly for the women and children who remain in the village. Over time, the house becomes not only a place to live but also a reflection of status, security, and family pride.

04.01.04 **FAMILIY HOUSING**

The clusters are arranged with all houses oriented inward, facing a central communal space. This spatial layout reflects a strong sense of family unity, mutual dependence, and cultural preference for shared living. The compound is usually enclosed by a low wall or fence—not only to mark property boundaries but also to ensure safety and privacy.

Even in more developed compounds where individual units may have their own kitchen and bathroom, shared facilities often remain. These can include a common cooking area, a bathroom, or even livestock shelters. The central courtyard serves as the beating heart of daily life—used for drying rice, washing clothes, preparing food, hosting guests, and even carrying out small income-generating activities. It functions as an adaptable outdoor room, blending domestic and social functions while supporting both traditional values and practical needs.



04.01.05 **VILLAGE EKDUARIA**

Villages in Bangladesh are often self-sustaining communities that provide residents with nearly all basic necessities. These villages are composed of a mosaic of family compounds, each home to one or more extended families. Over time, these compounds have developed organically, resulting in a village layout that lacks a formal road network or strict spatial order. Instead, narrow footpaths weave between homes, fields, and shared spaces.

Despite their informal structure, villages typically include essential facilities such as primary schools, small healthcare centers, and local shops—often run from within someone's home—that offer daily goods. A mosque is usually present at the heart of the village, serving both religious and social functions. Communal areas for recreation, like a cricket field or a local tea stall or pub, offer space for social interaction and entertainment.

For larger or more specialized goods, residents travel to nearby towns or local fresh markets. However, within the village itself, the basic elements of everyday life—education, food, healthcare, religion, and community—are usually within walking distance, making these rural settlements remarkably resilient and self-contained.

04.01.06 **CONCLUSION & DESIGN REQUIREMENTS**

Fieldwork, observations, and sketches reveal that affordability is the highest priority for rural-urban migrants when it comes to housing. In addition to affordability, they value several key characteristics that reflect their rural lifestyle. These include a green environment that provides fresh air and a pleasant living atmosphere, an open and low-structured layout resembling the village setting with low-rise buildings, and a strong sense of community where they can rely on close social bonds. In the village context, this community primarily consists of their family members, living together in a defined, clustered space. Furthermore, they highly appreciate a clear transition from public to private spaces, allowing them to maintain social connections while also preserving personal boundaries.

1. Green environment

2. Open and low

3. Close community

4. Transition public-private

04.02 **OPEN BUILDING**

The second research question examines how the Open Building principle can be applied in the context of Sylhet, while specifically addressing the housing needs of rural-urban migrants. To answer this question, I have analyzed multiple case studies and explored theoretical frameworks developed by key figures in the field. The following sections present the insights gained, structured under core design principles essential for implementing Open Building in Sylhet.

WHY

We are designing housing for a specific target group in the heart of Sylhet, Bangladesh—a rapidly growing and developing country whose future is uncertain. What will Sylhet look like in 10, 20, or even 50 years? What developments will shape its urban landscape? What will future generations demand in terms of housing and amenities? How will the needs and preferences of its residents evolve over time?

Will traditional markets remain a central part of daily life, or will large-scale American-style supermarkets take over? Will the economy favor small entrepreneurs, or will corporate giants dominate the business sector? Will there be a growing demand for office spaces, restaurants, co-working hubs, and schools, or will traditional market spaces continue to be a priority? These are all critical questions, yet the answers remain unknown. While we cannot predict the future, we can design a building that is prepared for it.

As John Habraken stated:

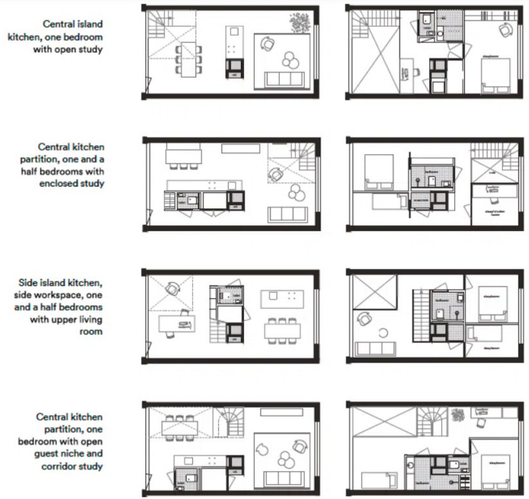
"When considering the housing of the future, we should not try to forecast what will happen, but try to make provision for what cannot be foreseen. The uncertainty of the future itself must be the basis on which present decisions are made."

This is precisely why I choose to work with an Open Building System. It allows us to create a housing solution that not only meets the current needs of the community but is also adaptable to future changes. As demands shift, the building can evolve—whether through modifications in living spaces, the integration of new functions, or the reconfiguration of shared facilities. This flexibility ensures that the project remains relevant and sustainable over time, making it a truly future-proof solution for Sylhet's ever-changing urban landscape.

04.02.01 **SUPERLOFTS, MARC KOEHLER ARCHITECTS**

Superlofts is a modular housing concept developed by Marc Koehler Architects that offers maximum freedom within a fixed structural framework. Each unit is placed within a concrete support system with a floor-to-ceiling height of five meters, allowing residents to add mezzanine floors and create vertical living configurations.

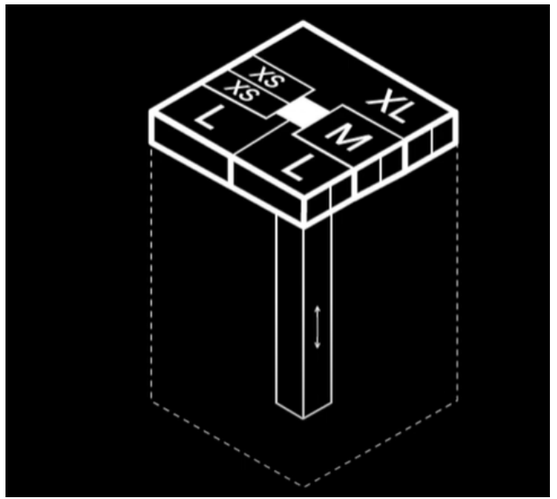
The core Open Building principle here lies in the separation between the permanent structure (the “support”) and the customizable interior (the “infill”). Service shafts and utilities are placed along load-bearing walls rather than centrally, giving residents flexibility in how they organize their living space. Ownership and development are often managed collectively, empowering users to actively shape both their private units and shared spaces.

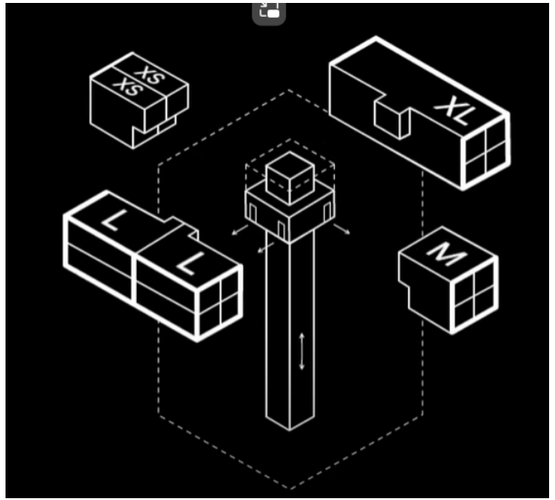


04.02.02 **SUPERLOFTS HOORN, MARC KOEHLER ARCHITECTS**

Superlofts Hoorn expands on the original Superlofts concept and was developed through collective private commissioning (CPO) in the former industrial district of Holenkwartier. Future residents were involved early in the design phase and could customize their homes within a flexible concrete framework.

This freedom in layout led to a wide variety of dwelling sizes—from compact, single-level studios to large, multi-floor family homes. The open structural grid and decentralized service shafts allow each unit to be adjusted or reconfigured over time. The materials were chosen with sustainability in mind, and infill components can be upgraded independently of the main structure, making the building both highly adaptable and future-proof.

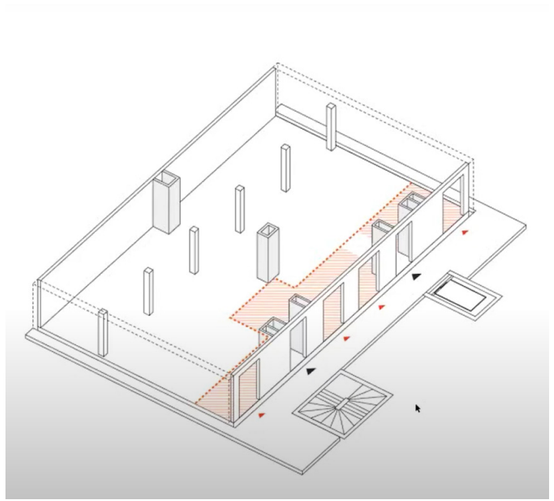


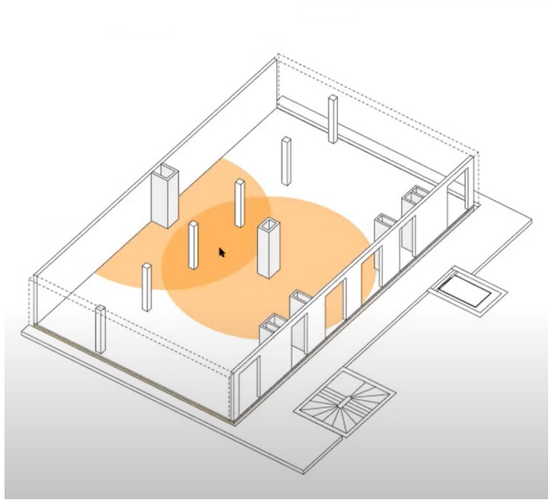


04.02.03 **CIWOCO, GAAGA**

CiWoCo (Circular Work and Co-living), developed by GAAGA, is a project in Amsterdam that combines Open Building principles with circular construction strategies. The building uses modular timber frames and demountable components, designed for reuse and disassembly. Biobased and recycled materials are used throughout.

One of CiWoCo's key strengths is the strategic placement of entrances, shafts, and utility lines, which optimizes freedom in interior layout. Units are compact but expandable, and residents share amenities such as workspaces and communal kitchens. This setup encourages co-living and co-working while allowing individual adaptation over time, making CiWoCo a model for resource-efficient, flexible urban housing.

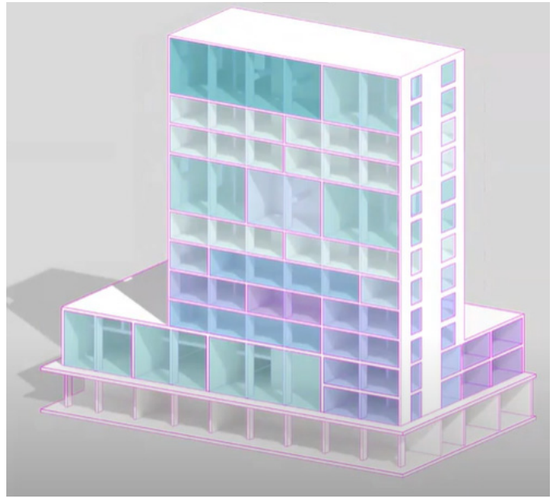


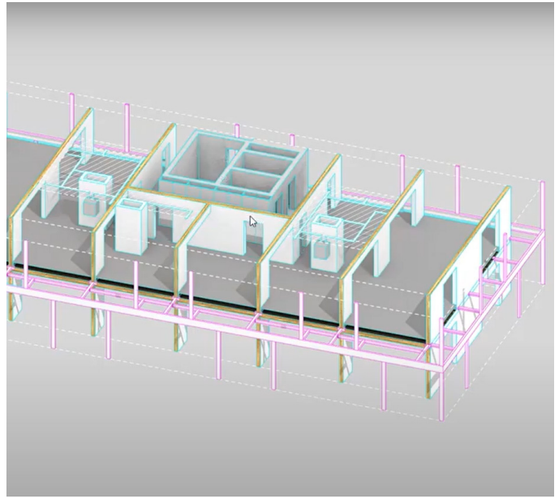


04.02.04 **STORIES, OLAF GIPSER**

Stories, designed by Olaf Gipser Architects in Amsterdam, is a 13-story residential building that uses a hybrid timber-concrete structure to maximize sustainability and adaptability. The load-bearing skeleton is composed of columns and slabs, with demountable facades and non-load-bearing internal walls.

The design separates long-term structural elements from short-lifespan infill, allowing residents to fully customize their units. Service shafts are positioned along the outer walls, enabling easy reconfiguration of the interior without major interventions. Units can be merged or split depending on changing household needs. Residents chose from several structural base options, creating a highly diverse and responsive housing environment that exemplifies Open Building thinking.





04.02.05 **CONCLUSION & DESIGN REQUIREMENTS**

Flexibility through Open Structures
A fundamental principle of Open Building is the creation of a long-lasting structural framework that supports short-lived, adaptable infill. As John Habraken argued, we should not design buildings based on fixed predictions of the future, but rather create structures that are prepared for change. By separating the permanent elements from the flexible ones, we give residents the freedom to shape their environments over time, without compromising the integrity of the building.

This idea is clearly demonstrated in projects like Superlofts by Marc Koehler Architects and Stories by Olaf Gipser Architects. Both use robust skeletal structures with fully customizable interiors, allowing for a wide range of living configurations that evolve with residents' changing needs. Unlike traditional mass housing, which tends to be rigid and uniform, these buildings support diversity, individuality, and long-term relevance.

Minimum Height for Functional Adaptability
One key design insight from the case studies is the importance of maintaining a minimum ceiling height of 3.5 meters. This spatial generosity enables functional flexibility, such as inserting mezzanine levels or allowing for open, light-filled spaces that can be reconfigured over time.

In Superlofts Hoorn, this principle is taken further by offering five-meter-high units that residents can transform into single-level lofts, multi-level homes, or hybrid live/work spaces. This height not only supports residential flexibility but also makes it possible to convert the units into non-residential uses—such as offices, studios, or co-working hubs—if urban needs change in the future. This kind of functional adaptability aligns closely with Habraken's belief in designing for the unknown.

Strategic Placement of Service Shafts and Connections
Another essential aspect of Open Building is the thoughtful placement of service shafts and utilities. Rather than embedding these centrally—where they can limit floor plan options—Open Building strategies locate them along structural boundaries or facades.

In CiWoCo by GAAGA, utilities and access points were strategically positioned to allow for maximum interior freedom. This created flexible unit layouts that could support individual preferences or changes in use. Similarly, in Superlofts Hoorn, decentralized utility zones allowed residents to fully customize their layouts without being constrained by rigid core placements. This strategy supports a greater range of lifestyles, from single occupants to multi-generational households.

Layered Construction: Separating Structure and Infill
A defining feature of Open Building is the clear separation between the long-term structure and the short-term interior layout. This layered construction enables buildings to last for generations while being continuously updated to meet current needs.

Stories by Olaf Gipser Architects is a clear example of this. The building's hybrid timber-concrete structure provides a solid base that can remain intact over time, while its modular infill components allow residents to redesign their interiors without structural changes. The project's open framework ensures longevity, while supporting personalization, resource efficiency, and circularity.

User Participation and Community Involvement
Beyond spatial flexibility, Open Building also prioritizes user agency. As Habraken emphasized, involving residents in the design and transformation of their homes is essential for creating truly livable and meaningful environments.

Both Superlofts and CiWoCo showcase this principle. In Superlofts, residents had significant control over the design of their units, from spatial configuration to material choices. In CiWoCo, future inhabitants actively participated in shaping both private and shared spaces. This sense of co-ownership fosters stronger community ties and results in housing that better reflects the cultural and social fabric of its users. In contexts like Sylhet—where rural-urban migrants bring diverse traditions and needs—this participatory approach can help bridge the gap between standardized housing and lived experience.

04.02.06 **DESIGN REQUIREMENTS**

From the analysis of multiple case studies, it can be concluded that applying the Open Building principle in Sylhet requires careful consideration of several design aspects:

1. Open floor plans: to enable diverse and adaptable living arrangements.

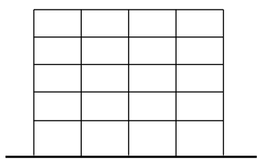
2. Minimum height of 3.5 meters: allowing flexibility for various functions, including mezzanines.

3. Strategic shaft placement: providing multiple connection points to support varied layouts.

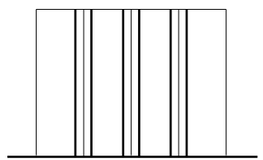
4. Layered construction: ensuring a durable core structure while allowing adaptable internal configurations.

5.User involvement and communal spaces: encouraging community engagement to maintain strong social connections and enhance the living environment.

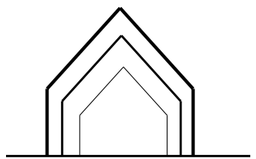
By incorporating these elements, the Open Building System can offer a future-proof, adaptable, and community-centered solution to the affordable housing shortage in Sylhet.



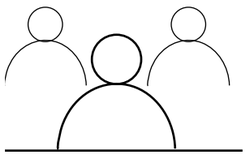
1. Open floorplan & height of 3,5 m



2. Shaft placement



3. Layerd construction



4. Involvment & communal spaces

04.03 **LARGE SCALE PROJECT**

The third research question focuses on how to design a large-scale housing project within the Open Building System, avoiding the negative aspects of traditional mass housing while ensuring affordability and future-proofing. To answer this question, it is essential to critically analyze why conventional mass housing projects often fail and how Open Building principles can mitigate these shortcomings. This section will first explore theoretical insights from John Habraken, followed by case studies of successful large-scale housing projects. Finally, it will present four design principles to design well suiting large scale housing projects.

Critique by John Habraken

John Habraken is one of the most vocal critics of traditional mass housing. He argues that many mass housing projects are flawed because they focus on efficiency and standardization rather than human needs and adaptability. According to Habraken, the fundamental problem with mass housing is that it often applies a “one size fits all” approach, where identical units are replicated across a large area. This results in monotonous, impersonal living environments that fail to accommodate the diverse needs of residents.

Mass housing projects typically follow a top-down planning approach, where architects and developers determine the layout and functions without input from future residents. This leads to a lack of personalization and adaptability. Furthermore, the rigid design leaves no room for change as residents’ needs evolve over time. The uniformity of mass housing often translates into a sense of alienation and disconnection from the environment, as the buildings lack the flexibility and individuality essential for a vibrant community

Habraken advocates for a more flexible building system where the core structure remains stable and long-lasting, while the internal layout can be customized by the residents. This Open Building approach allows for diverse uses and configurations, preventing the monotony often seen in mass housing.

04.03.01 **HABITAT 67, MOSHE SAFDIE**

Habitat 67, designed by Moshe Safdie for the 1967 World Expo in Montreal, is one of the most iconic early experiments in large-scale housing that maintains a strong sense of human scale. The project consists of 354 prefabricated concrete modules, stacked and arranged in various interlocking combinations to create 146 individual dwelling units.

Despite the density and size of the development, the modular design gives each unit a unique identity and its own private outdoor space, such as a garden or terrace. This breaks away from the repetitive and anonymous nature of conventional mass housing. The stepped and irregular layout avoids monolithic walls, instead creating a dynamic, village-like appearance. Corridors are minimized, and each cluster of homes feels like a smaller neighborhood within the whole.

04.03.02 **FUTURE TOWERS, MVRDV**

Located in Pune, India, Future Towers by MVRDV addresses high-density urban housing with architectural diversity and social inclusivity. The complex includes nine wings up to 30 stories high, arranged to optimize airflow and daylight. A wide range of apartment sizes—from 45 to 450 square meters—caters to different household types and income levels.

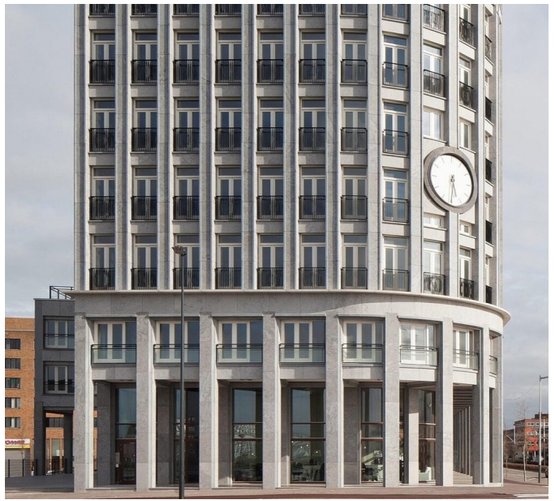
The dynamic building form features varied heights, angles, and facades that avoid the dull repetition often associated with mass housing. The layout integrates communal courtyards, sky bridges, and social spaces throughout, encouraging interaction among residents and reinforcing a sense of community within a megastructure.

04.03.03 **SOLIDS, BAUMSCHLAGER-EBERLE ARCHITEKTEN**

The Solids project in Amsterdam's IJburg district, designed by Baumschlager Eberle Architekten, offers a powerful example of how flexibility and individuality can be successfully integrated into large-scale housing. Rather than delivering fully finished apartments, the building provides robust, neutral concrete shells—referred to as "solids"—that serve as the structural base for a variety of future uses.

Each unit is sold or leased as an empty space, with grouped utility connections and no internal load-bearing walls. This allows residents or tenants to design their own layouts, finishes, and even functions—from apartments and offices to studios or live/work units. Over time, these units can be reconfigured, expanded, or subdivided based on new needs, making the building highly adaptable.

This open framework is especially valuable for large-scale housing because it accommodates a wide variety of lifestyles, family structures, and economic backgrounds within one building. It avoids the one-size-fits-all pitfall of traditional mass housing by supporting personal choice and long-term flexibility. By offering individuality within a collective structure, Solids promotes both resident satisfaction and architectural diversity—making it a scalable, sustainable, and inclusive model for future urban developments.



04.03.04 **KAMPUNG ADMIRALTY, WOHA ARCHITECTS**

WOHA's Kampung Admiralty in Singapore is a pioneering vertical village that integrates elderly housing with public services, healthcare, retail, and green space. Rather than separating functions by zoning, WOHA layered them vertically in a compact, multi-use complex.

Social interaction is actively encouraged through shared gardens, "buddy benches," and community kitchens. The terraced form creates accessible, semi-public spaces at every level, making the building feel like a series of interconnected neighborhoods. This design not only combats social isolation but also sets a precedent for integrating housing with holistic community care.

04.03.05 **CONCLUSION & DESIGN REQUIREMENTS**

Designing large-scale housing projects within the Open Building framework means rethinking traditional top-down mass housing strategies. Instead of imposing standardized units across a site, Open Building promotes adaptable, diverse, and user-centered environments that can evolve over time. By focusing on four key principles—maintaining a human scale, promoting architectural diversity, fostering individuality and flexibility, and encouraging social interaction—it becomes possible to create large-scale housing that is not only functional and affordable, but also vibrant, inclusive, and future-proof.

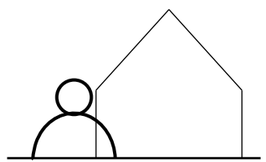
The project Habitat 67 by Moshe Safdie exemplifies how human scale can be preserved within a dense, high-density development. Through its modular layout, varied forms, and private outdoor spaces, the project avoids the monotony of mass repetition and offers each resident a unique, livable environment. This approach demonstrates that even large numbers of homes can feel personal and connected to their users.

Architectural diversity is a central theme in Future Towers by MVRDV. By incorporating a wide range of apartment sizes and varied geometries, the project accommodates multiple income levels and household types within a cohesive structure. The complex form and integrated communal spaces break away from the rigid patterns often found in traditional housing blocks.

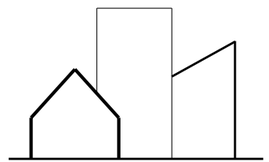
Solids by Baumschlager Eberle Architekten emphasizes flexibility and individuality. Its neutral concrete shells allow residents to design their own layouts for living or working, enabling long-term adaptability and responding to changing user needs.

Kampung Admiralty by WOHA Architects integrates housing with healthcare, retail, and green space in a vertical layout that promotes social interaction, especially among elderly residents. Shared gardens and communal areas foster engagement and collective care.

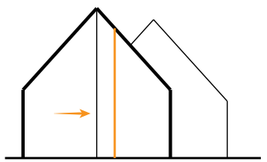
Applying these principles in the context of Sylhet can help avoid the social and spatial problems of conventional mass housing. By using flexible structures, varied housing types, and participatory design processes, a large-scale housing project in Sylhet can better meet the socio-cultural preferences of rural-urban migrants, adapt over time to shifting demands, and provide a resilient, human-centered response to rapid urban growth.



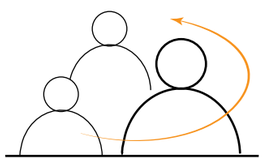
1. Human scale



2. Diverse architecture



3. Individuality & flexibility



4. Encouraging social interaction

04.04 **OVERALL CONCLUSION & DESIGN REQUIREMENTS**

This research set out to address the challenge of providing affordable, adaptable, and community-centered housing for rural-urban migrants in Sylhet. Through fieldwork, observations, and analysis, it became clear that affordability is the highest priority for these migrants. In addition to affordability, they value key characteristics that reflect their rural lifestyle: a green environment that provides fresh air and a pleasant living atmosphere, an open and low-structured layout reminiscent of village settings with low-rise buildings, a strong sense of community based on close social bonds, and a clear transition from public to private spaces. These elements are crucial to maintaining their cultural identity and ensuring a comfortable transition to urban life.

To address these needs effectively, this research identified the Open Building approach as the most suitable solution for Sylhet. Open Building principles offer a way to create housing that is affordable, adaptable, and community-focused. Central to this approach is the flexible spatial organization, which allows for diverse living arrangements. By designing open floor plans, residents have the freedom to configure their spaces to suit their individual needs, accommodating changes in household composition or economic activities.

Maintaining a minimum height of 3.5 meters is essential for creating spacious and adaptable interiors, allowing the incorporation of mezzanines or multi-functional areas. Additionally, strategically placed service shafts and utility connections enable flexible layouts without major structural changes, accommodating the evolving needs of migrant families.

A key feature of Open Building is the use of layered construction, where the durable structural core is separated from the adaptable interior. This ensures long-term usability while allowing the living spaces to evolve as needs change. Equally important is user involvement in the design process, fostering a sense of ownership and community engagement. Integrating communal spaces, such as shared gardens or courtyards, enhances social cohesion, reflecting the rural lifestyle where collective living is valued.

Designing large-scale housing projects within the Open Building framework requires moving away from conventional mass housing models that often prioritize efficiency over human experience. Instead, the focus is on maintaining a human scale, architectural diversity, and fostering social interaction. By breaking down building volumes, incorporating varied facades, and creating semi-public transition zones, the project avoids the pitfalls of monolithic mass housing developments.

By applying these Open Building principles to the context of Sylhet, it is possible to create housing that not only addresses the immediate needs of rural-urban migrants but also remains relevant in the long term. This approach mitigates the negative impacts of traditional mass housing by prioritizing human-centered design, adaptability, and social engagement. Ultimately, it provides a future-proof solution that aligns with the evolving urban realities of Sylhet, effectively answering the research question:

“How can the needs of the rural-urban migrants be integrated into an open building system to create a future-proof, large-scale housing project which reduces the affordable housing shortage in Sylhet?”

05. SITE ANALYSIS

The location of the graduation studio is Sylhet, Bangladesh. Several sites were available to choose from, and I have selected the Hawkers Market site, located in the heart of Sylhet city along the Surma River. I chose this location because my research focuses on creating housing that responds to the needs of rural-urban migrants—a group that plays a vital role in the city's urbanization process.

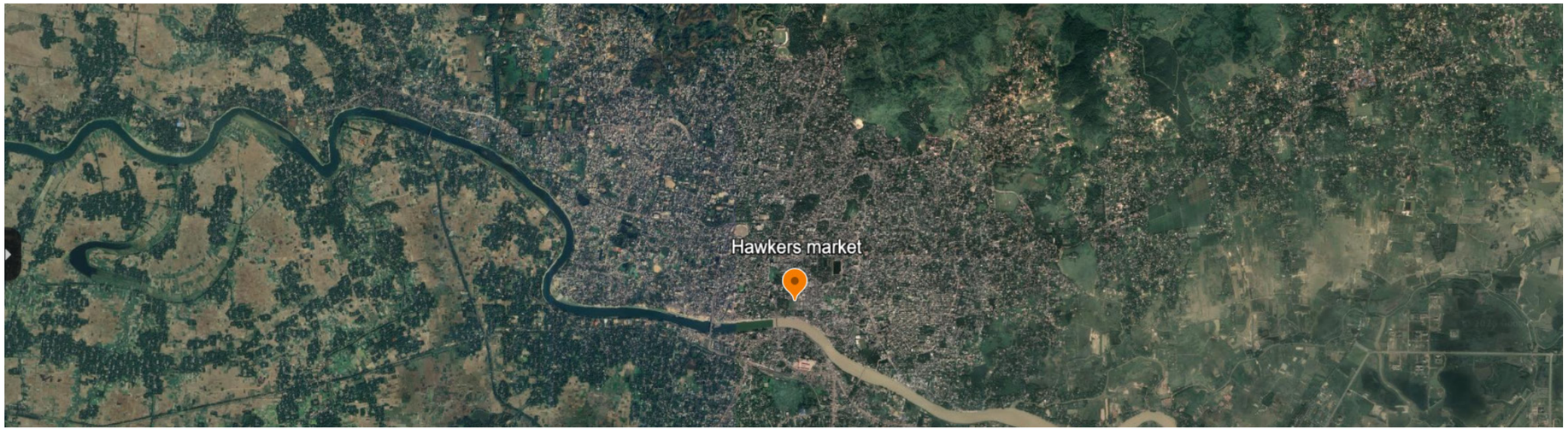
Rural-urban migrants typically move to the city in search of employment opportunities. Upon arrival, many begin working in low-entry jobs such as rickshaw driving, street sweeping, or assisting in local shops and stalls. The Hawkers Market area is a hub for such activities, offering a wide range of job opportunities.

By placing housing close to this area of employment, I aim to remove the need for daily travel and make it easier for this group to reach their work. This way, the housing meets both their practical and financial needs, and also helps them become part of the city more easily. For these reasons, I believe the Hawkers Market site is an ideal location that aligns with both the overall goals of the graduation studio and my personal ambition to improve living conditions for rural-urban migrants in Sylhet.

05.01 **LOCATION**

Sylhet is a rapidly growing city in the northeast of Bangladesh, located near the border with India and surrounded by hills and tea plantations. Positioned at the base of the Meghalaya mountain range, the city experiences a humid subtropical climate with heavy monsoon rains.

The city has a humid subtropical climate and experiences heavy monsoon rains, especially between June and September. Because of its low elevation and location along the banks of the Surma River, Sylhet is highly vulnerable to seasonal flooding. These floods often disrupt daily life and cause damage to roads, homes, and essential infrastructure, particularly in informal and lower-income areas.

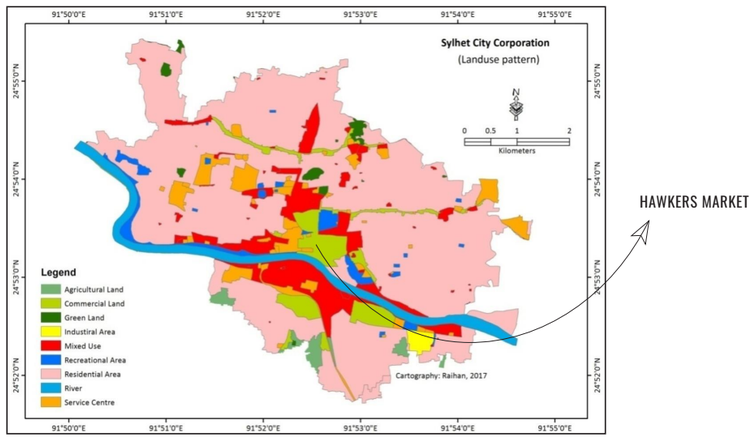



Fruiti

05.02 **SITE FUNCTION**

The Hawkers Market is located in the commercial heart of Sylhet city, right next to the Surma River. It is a lively and densely populated area, known for its concentration of small-scale vendors, street stalls, and shops. As one of the city's busiest trade hubs, the market plays a central role in the daily economy of Sylhet and provides essential income opportunities for low-skilled workers, including rural-urban migrants.

Figure 1.3: Types of Land Use in SCC



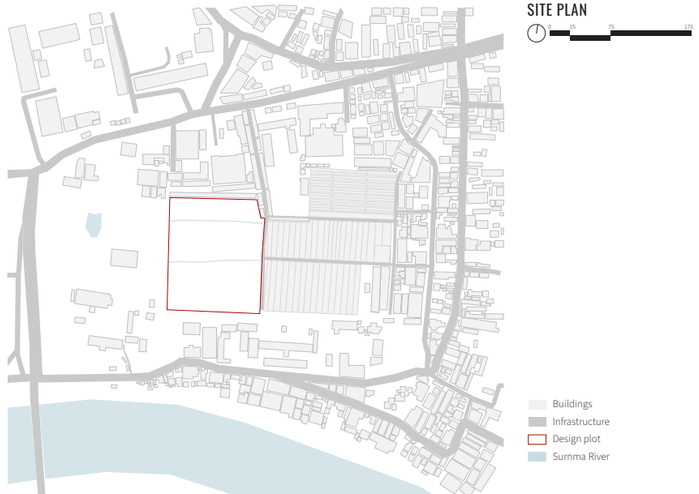
HAWKERS MARKET

Source: SCC, 2017.

05.03 **CURRENT SITUATION**

The designated project site is a vacant plot of land owned by the municipality of Sylhet. Historically, a permanent market once occupied this space, but it was demolished. Today, the site hosts a temporary market setup, consisting of bamboo stalls provided free of charge for vendors to sell fresh products.

However, due to the informal and uncertain nature of this arrangement, the temporary market is underused. Many vendors hesitate to commit to the space, as it offers no long-term security or investment opportunity. While there is a clear demand for a marketplace in this location, traders are calling for a more permanent, structured solution that ensures stability and future prospects.

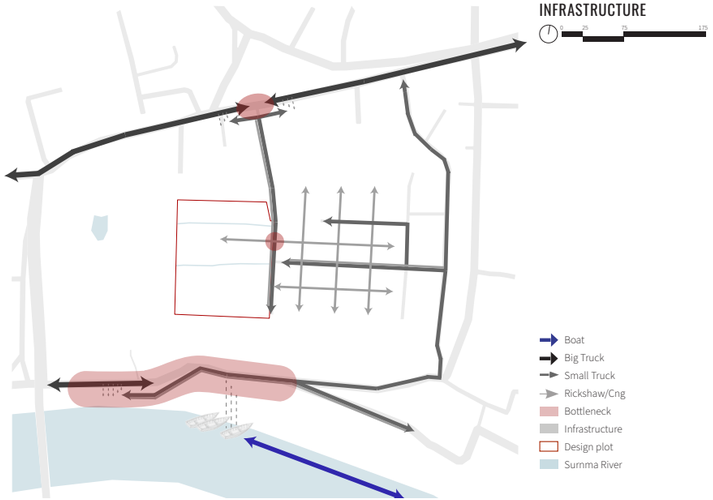


05.04 **INFRASTRUCTURE**

The infrastructure surrounding the project site is currently weak and inefficient. The market has limited access points, with the main entrance located on the north side, connected to a major road via a narrow alley. This entrance is too small to handle the volume of users coming from the main road, leading to frequent congestion. The access path is only suitable for pedestrians, bicycles, rickshaws, CNGs, and small delivery trucks, making it a very crowded and impractical route—especially during busy hours.

Additionally, heavier goods often arrive via large trucks or boats at the southern edge of the market. Since these goods must be transferred from large vehicles to smaller ones, the street in the south regularly becomes blocked by parked delivery trucks, causing further delays and logistical issues.

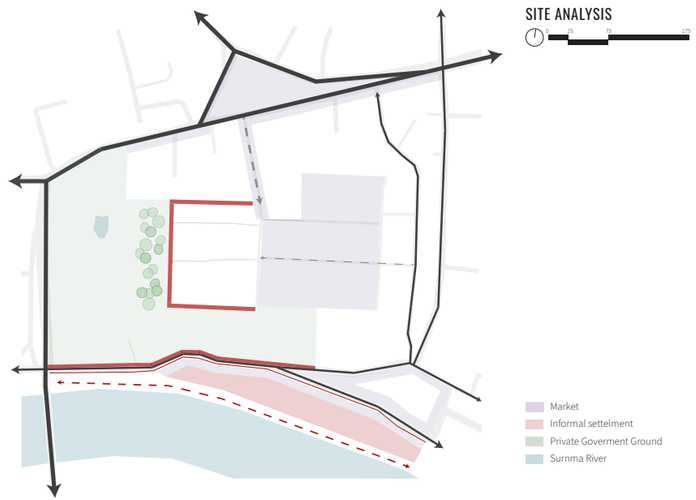
In conclusion, the site's infrastructure requires major improvements. It needs to be redesigned to support smoother and more efficient goods transportation, with better access for both people and vehicles.



05.05 **SITE ANALYSIS**

The Hawkers Market site is bordered on three sides by walls that separate it from surrounding government-owned land. Although the plot lies very close to the Surma River, there is no visible or physical connection between them. The view and access to the river are blocked by the gated government property. In addition, an informal settlement has developed between the river and the road. This settlement further obstructs access to the river. There is also a riverside footpath, but it remains largely unused becuase it's hidden and inaccessible from the market side. The waterfront currently feels disconnected from the daily activity of the area.

However, this condition also presents an opportunity. By opening up physical and visual links between the market and the riverfront, the site could be transformed into a vibrant, accessible public space that better integrates with its urban and ecological context.

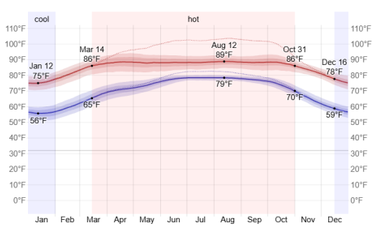


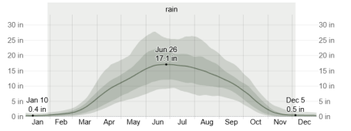
05.06 **CLIMATE CHARACTERISTICS**

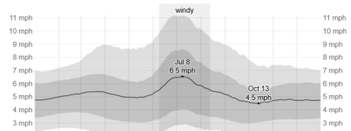
Sylhet has a humid subtropical climate, strongly influenced by the monsoon. Temperatures range from around 12–18°C in the cooler months (December to February) to 30–35°C during the hot season (April to June), with high humidity throughout most of the year.

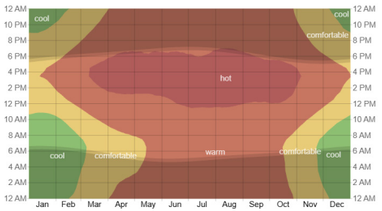
Rainfall is heavy, particularly between June and September, when the monsoon brings intense downpours that frequently lead to flooding. Sylhet is one of the wettest regions in Bangladesh, with an annual rainfall exceeding 4,000 mm in some areas.

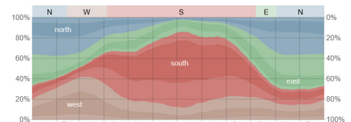
Wind patterns are seasonal. During the monsoon, prevailing winds come from the south and southeast, bringing moist air from the Bay of Bengal. In the dry season, winds shift and are generally calmer, coming from the north or northeast.







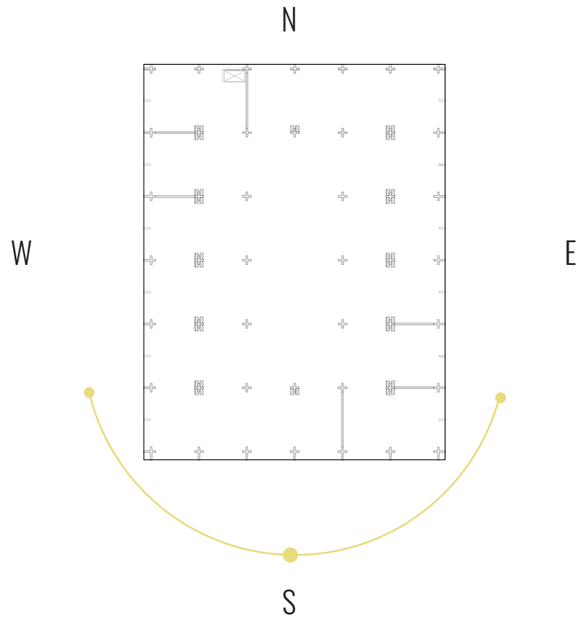




05.07 **DESIGN ADAPTATIONS**

To design effectively within Sylhet's climate, it is crucial to respond to seasonal heat, intense sunlight, and shifting wind directions. During the warmer months, the priority is to block excessive solar radiation while capturing cooling breezes—particularly from the south, where the dominant summer winds originate.

On the southern façade, deep overhangs and carefully placed openings are essential. These elements help block high-angle sun while allowing natural ventilation to flow through the building, optimizing comfort during the hottest period of the year. On the east and west façades, low-angle sunlight during the morning and evening can lead to overheating. Vertical shading devices can block direct sun while still allowing daylight and cross-ventilation. The north-facing façade receives no direct sunlight in this region, making it ideal for additional openings focused solely on ventilation.



05.07 **CHALLANGES & POTENTIALS**

Challanges

- Noise pollution for the dwellings above the market
- Accessibility and Traffic Congestion
- Dark and bad ventilated market
- No room for flexibility in program in the market
- Potential conflict between a vibrant market and a more quite resedential area
- public market vs private dwelling zone

Potentials

- New market shops in the middle of the commercial area of Sylhet
- Market and housing: optimal use of space by combining functions
- High FSI with the same GSI
- Demand for other commercial functions that cater to market visitors
- Active ground floor, lively street level, attractive and vibrant environment
- A meeting place where residents, visitors, and entrepreneurs come together
- The homes benefit from the central location with proximity to work, amenities, and public transport
- Working + living
- living in the city center
- Connection to riverside

1. High density city center area

- Creating an attractive vibrant area in the middle of the city which combines work and living
- Fsi around 3
- Keeping the gsi low t0 minimalize a mass housing feeling
- Open design to maximase natural ventilation and natural daylight access.

2. Balancing a vibrant market & quiet residential area

- working with transition zones: public market, semi-public buffer zones, private resedential zone
- Using a zoning strategy: the most intense commercial activities near public streets and less active functions closer to residential area.

3. Accessibility & traffic management

- Creating separate entrances for residents and market visitors
- Reducing the amount of vehicles in the center of the area
- more space for pedestrians
- Loading/unloading zones at designated hours to avoid peak time congestion.

4. Noise management for Residential Comfort:

- Creating buffer zones between market and residential area
- Positioning living areas away from the busiest market zones
- Working with different openening hours of the market during the week and weekend

5. Integrating the needs of rural-urban migrants

- Green environment: courtyards, trees, green terraces, and rooftop gardens.
- Community living: creating smaller clusters of dwellings with a sequence of public spaces
- Low-rise, open structure: Clustered ground-floor housing layout

6. Open building, future proof housing Design

- Scalable housing units that can expand with family needs
- Use local materials & construction techniques to keep costs low
- Open building system which is adaptable to changing needs

7. New market style

- Flexible market stalls to accomedate the current demand
- Open concept: Natural ventilation and maximum daylight access
- High ceilings & permeable facades to enhance airflow

8. Vibrant urban streetprofile

- Active plint integrated into the streets of the current situation
- Open transition between the market and the streets to make the market attractive and accessable
- Accessable street for pedestrians and small vehicles

06. DESIGN RESEARCH

In addition to the main research question, this chapter presents a series of smaller, focused studies that support and justify specific design decisions. Since the core of my project is centered around rural-urban migrants in Sylhet, the research has been oriented toward affordability.

A key area of investigation was how to keep construction costs as low as possible without compromising quality or adaptability. I conducted comparative studies on construction methods and infill materials to determine the most cost-effective and locally suitable options. This included evaluating the benefits and limitations of cast in place concrete versus prefabricated systems.

Another study focused on the potential reuse of waste materials from nearby factories, exploring opportunities for circular material use within the project. To ensure cultural and spatial alignment, I also analyzed local living patterns and habits in Bangladesh. This involved studying how spaces are used .

To ground these insights in practice, I studied the floorplans and layouts of existing Bangladeshi housing projects such as Kalindi Apartments, Kazedewan Apartment Building, Comfort Reverie, South Zahir Paradise, and the traditional Bangla Baton. These examples helped me identify common spatial patterns and “patterns of habit” that inform how people live, gather, cook, and rest—knowledge that directly shaped the architectural strategy of the design.

06.01 **CONSTRUCTION**

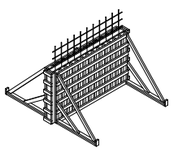
By collective studio research

In Bangladesh, cast in place concrete construction is currently the most common building method. While this technique is more labor-intensive, the relatively low cost of labor in the country makes it economically feasible. Skilled workers are widely available, and the construction process is well understood within the local building industry.

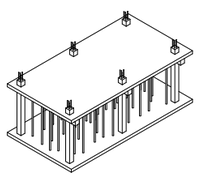
In contrast, prefabricated concrete construction—though potentially faster and more controlled—is not yet widely adopted in Bangladesh. The country lacks a well-developed large-scale prefab industry, which leads to significant challenges. Prefab elements must often be transported over long distances, resulting in high transport costs. Additionally, the use of heavy equipment such as cranes is costly.

Given these factors, cast in place concrete remains the most practical and cost-effective option for this project. It supports local labor, avoids high equipment and transport costs, and aligns with the construction practices currently in place in Sylhet.

1. IN SITU CONCRETE CONSTRUCTION

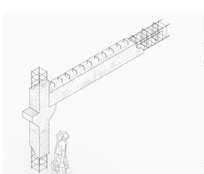


Timber formwork

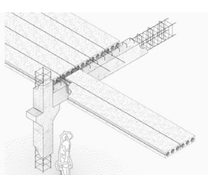


Bamboo posts and concrete casco

2. PREFAB CONCRETE CONSTRUCTION



1. Precast columns are placed



2. Laying floor slabs

06.01 **CONSTRUCTION**

To confirm that cast-in-place concrete construction is indeed the most cost-effective option and best suited to my design, a simplified Bill of Quantities (BOQ) comparison was carried out. This analysis focused solely on the cost differences between cast-in-place and prefabricated construction. Common costs such as materials, material importation, excavation, and foundations were excluded from the comparison.

The results of the calculation clearly indicate that cast-in-place construction is the more economical choice. This is primarily due to the additional expenses associated with prefabrication, particularly the high costs of installing the prefabricated elements and the use of cranes.

For this reason, cast-in-place concrete construction was selected as the preferred method for the design.

BOQ: Cast in place concrete construction

Item	Description	Unit	Quantity	Productivity labour	hours of labour	Unit price (BDT)	Total (BDT)
Preliminary Work							
Excavation	Digging for foundations	m^3	500	1 m^3 per hour	500	300	150.000
Formwork	Column and beam formwork (incl. labor)	m^2	3.000	0,2 m^2 per hour	15.000	350	5.250.000
Concrete work							
Concrete production	On-site mixing an pouring	m^3	1.200	0,5 m^3 per hour	2.400	250	600.000
Reinforcement	Placing steel reinforcement	ton	150	0,05 ton per hour	3000	250	750.000
Other costs							
Material transport	Transport of cement, sand, gravel and steel	trip	100			2.000	200.000
Equipment rental	Mixers, vibrators, scaffolding	-	-			-	500.000
Total							**7.450.000**

BOQ: Pre-fab concrete construction

Item	Description	Unit	Quantity	Productivity labour	hours of labour	Unit price (BDT)	Total (BDT)
Preliminary Work							
Excavation	Digging for foundations	m^3	500	1 m^3 per hour	500	300	150.000
Prefab elements							
Prefeb concrete production	Factory-made prefab columns and beams	m^2	1.200			6.500 per m^3	7.800.000
Transport of prefab	Delivery to site	trip	150			5.000	750.000
Prefab installation	Assembly of prefab columns and beams				4.800	400	1.920.000
Crane opperator	Operating crane for installation				480	600	288.000
Other costs							
Material transport	Transport of cement, sand, gravel and steel	trip	100			2.000	200.000
Equipment rental	Crane and lifting equipment	-	-			-	1.000.000
Total							**12.108.000**

06.01 **CONSTRUCTION**

For the calculation of the structural dimensions, general design guidelines were used and adapted to the specific conditions of the project. Since the design features a relatively robust and heavy structural frame combined with a lightweight infill, cruciform columns were chosen. This choice allows for a better connection with the infill elements, minimizing the number of additional transition angles that would otherwise be required.

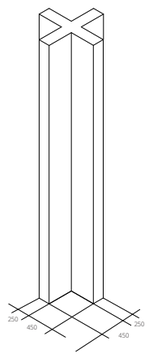
To determine the dimensions of the columns, standard rules of thumb for square concrete columns were initially considered. The cross-sectional area derived from these guidelines was then used to convert the dimensions into those suitable for cruciform columns.

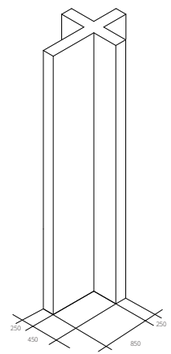
RULES OF THUMB	RULE	CALCULATION	DIMENSIONS	USED DIMENSIONS
CONCRETE IN SITU SLAB	D = L/30	D = 6/30	200 mm	200 mm
CONCRETE COLUMNS	Grid 8m x 8m 700 x 700 mm	A (8m x 8m) = A (8m x 6m)	A = 0,36 m^2	610 x 610 mm
CRUCIFORM CONCRETE COLUMS	A (square) = A (cruciform)	0,36 m^2 = 0,36 m	200 x 450 mm (arms)	200 x 450 mm (arms)
CONCRETE BEAMS	H =1/12 x L W = 1/2 x H	H = 1/12 x 8000 W = 1/2 x 800	H = 666 mm W = 333 mm	H = 800 mm W = 200 mm

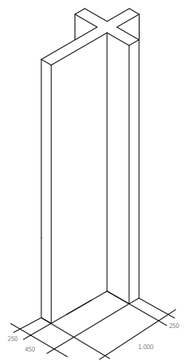
06.01 **CONSTRUCTION**

Cruciform columns have been used throughout the entire building. However, slight variations were introduced depending on their position along the façade. The columns also serve as fixed sun-shading elements, integrating functionality with the structural design.

On the north side, where the sun does not directly hit the façade, standard cruciform columns were used. On the east and west façades, where the sun shines in the morning and late afternoon, the columns were extended by 850 mm to provide vertical shading. On the south façade, which receives the most sunlight, the columns were lengthened to 1,000 mm to create horizontal overhangs. These overhangs cast significant shadows on the façade, serving as a passive strategy to prevent overheating.







06.02 **MATERIALITY**

In addition to the structural system, an analysis was conducted to determine the most cost-effective materials to use throughout the rest of the design. This was done by comparing the price per square meter of various façade materials.

The results showed that corrugated iron sheets, bamboo, and adobe bricks were the most affordable options. However, since corrugated iron is less sustainable compared to the other two, it was excluded from further consideration. As a result, bamboo and adobe brick façades were selected for further exploration within the design process.

MATERIAL	PRICE PER M^2
CI SHEETS	0,35 - 3,50 euro
WOOD - TEAK	1,37 - 5,85 euro
WOOD - SAL	1,37 - 5,85 euro
BAMBOO	2,52 - 5,04 euro
CEMENT BLOCK	3,47 - 5,54 euro
CONCRETE BLOCK	4,80 - 7,67 euro
BRICK	3,80 - 6,87 euro
ADOBE BRICKS	0,92 - 2,30 euro

06.02 **MATERIALITY**

As previously mentioned, the bamboo and adobe brick façade options were selected for further investigation. For the bamboo façade, a traditional wattle and daub system was considered—a construction method still commonly used in rural areas of Bangladesh. This system relies on locally sourced, inexpensive materials and is based on well-established building techniques.

When comparing the cost of a wattle and daub façade to that of an adobe brick façade, the price difference proved to be minimal. Therefore, the decision was based on the advantages and disadvantages of each system.

The primary drawback of the wattle and daub method is its negative social connotation, as it is often associated with low-income housing. However, this perception was viewed as an opportunity—to demonstrate that such traditional methods can be reimagined and successfully applied in modern architecture. As a result, the wattle and daub system was chosen for further development in the design.

1. WATTLE & DAUB

1. Bamboo structure	1,26 euro/m^2
2. Woven lattice of natural fibres, reeds or wooden strips	0,78 euro/m2
3. Mud plaster: finest clay, coarse, sand and silt.	-
Total	**2,04 euro**

PRO'S
- Local building technique so the knowledge is already there
- Quick construction
- Cheap technique; no expensive tools neccesary
- Use streghts of different materials
- Leightweight
- Easilyt dismanteld

CONS
- Negative social connotation

2. ADOBE BRICKS

1. Brick: clay, sand & water	1,61 euro/m^2
2. Mud morter: clay, sand & water	0,48 euro/m2
	-
3. Mud plaster: finest clay, coarse, sand and silt.	
	2,09 euro

PRO'S
- Low labour intensity
- Quick learning process for the building technique
- Reusable formwork
- flexible dimensions of produced bricks

CONS
- Heavy weight
- requires large open area for drying process
- Long building process due to slow drying

06.02 **MATERIALITY**

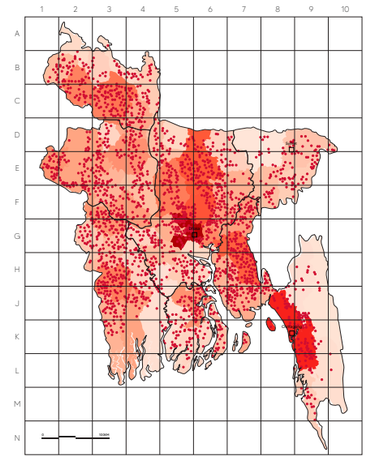
In addition, research was conducted into waste materials available near the project site, with the goal of making the material choices even more cost-effective and sustainable. This involved identifying all factories in the surrounding area and analyzing the types of waste materials they produce. By mapping out local industrial activity, opportunities were explored to repurpose these waste products as construction materials, thereby reducing both environmental impact and overall building costs.

06.02 **MATERIALITY**

By collective studio research

he investigation into local waste materials, combined with the broader material research conducted within the studio, revealed that brick fields are widespread across Bangladesh—including several located near the project site.

Given their abundance, further research was conducted into the waste materials produced by brick fields, with the aim of integrating them into the design. This approach not only enhances the sustainability and affordability of the project but also ensures that the design and material strategy are not limited to the specific context of Sylhet. Instead, they become adaptable and applicable throughout the wider Sylhet region—and potentially across all of Bangladesh.



1.2 brick kilns per district (Lee et al, 2021)

By collective studio research

06.02 **MATERIALITY**

By collective studio research

Material research into brick production has shown that the kilns used to fire bricks do not produce uniform results for all bricks. This is due to the uneven airflow of hot air within the kilns, which affects how evenly the bricks are fired. As a result, the quality of the bricks is categorized into three grades.

Third-grade bricks, which make up approximately 3 to 5 percent of the total output depending on the kiln (as shown in the comparison table), are not structurally sound enough to be used in load-bearing construction. These bricks are typically either reused in the production process or used decoratively.

In this project, these waste bricks are repurposed in multiple ways. When finely crushed, they are incorporated into the clay plaster of the wattle and daub façade system. Larger aggregates are reused in cocciopesto flooring, particularly suited for middle- and high-income housing units. This not only reduces waste but also enhances the sustainability and local specificity of the design.

	FIXED CHIMNEY KILN	ZIG ZAG KILN	TUNNEL KILN
OVERVIEW KILN			
PLAN			
AIRFLOW			
NUMBER OF KILNS IN BANGLADESH (2018)	2235	5524	81
BRICK TYPE	Solid	Solid	Solid & Hollow/Perforated
PARTICULATE EMISSION (MG/M3)	1000+	300-800	<50
PRODUCTION CAPACITY (BRICKS/DAY	20.000 – 50.000	15.000-50.000	80.000-200.000
CLASSIFICATION BRICKS Class I Class II Class III			
CAPITAL COST	20.000 – 50.000	15.000-50.000	80.000-200.000
COST BREAKDOWN	Construction Material 84 % Labour 15% Equipment 1%	Construction Material 75 % Labour 13% Equipment 12%	Fully mechanized
BRICK DIMENSIONS (MM)	230 x 115 x 75	230 x 115 x 75	230 x 115 x 75

1.24 Comparison tabel of different kilns

06.02 **MATERIALITY**

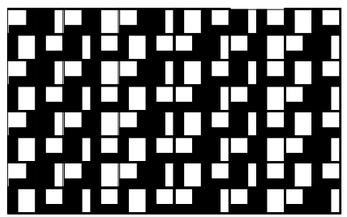
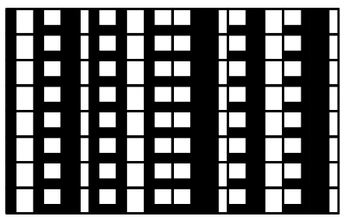
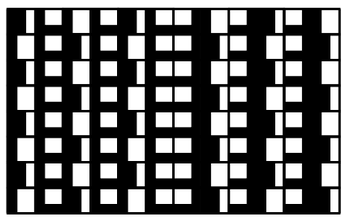
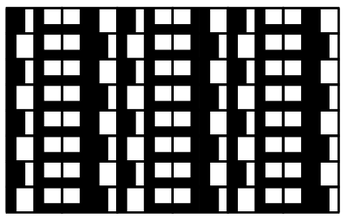
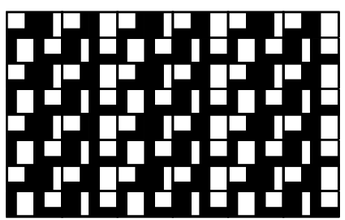
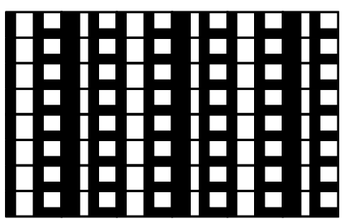
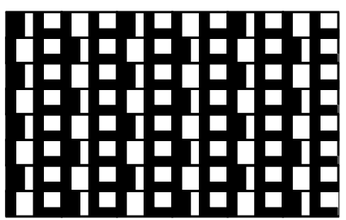
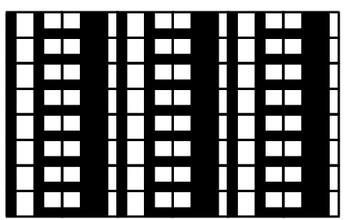
In selecting materials, careful consideration was also given to the existing local context and the materials currently in use. For the façades of the low-income shops, the existing situation served as a reference point. In many cases, roll-up garage doors are commonly used—an inexpensive and practical solution.

For this reason, the design adopts the same approach, incorporating roll-up doors for the shopfronts. Since the structure and infill are designed to be separate, this system allows for future flexibility. As the needs or budgets of shop owners change, the façade can be easily modified. For instance, higher-end shops may eventually opt for full glass façades—something that would not be feasible or appropriate for smaller, low-income businesses. This adaptable system ensures both affordability and long-term scalability.

06.03 **FACADE PATTERN**

Now that the material choices have been made, further research was conducted to determine the most effective way to apply them to the façade. Several design options were compared, taking into account the residential units located behind the façade.

The final approach strikes a balance between two extremes: on one end, a completely chaotic and seemingly random composition, and on the other, a façade that is overly rigid and uniform. The result is a carefully considered compromise—one that brings variation, rhythm, and adaptability to the façade, while still maintaining a sense of order that aligns with the structure and function of the housing behind it.

06.04 **PATTERN OF HABIT**

As previously discussed, the design decisions were made with careful consideration of the current Bangladeshi context and the everyday habits and behavioral patterns of its people. For the informal market areas, specific research was conducted into how Bangladeshis interact with markets and shops.

One key observation was the use of slight height differences—typically a small step up—to define the boundary of a shop or stall. This subtle elevation acts as a clear spatial cue, signaling where goods are displayed and creating a sense of ownership and organization within informal settings. People naturally respect these boundaries, keeping their goods within the defined area.

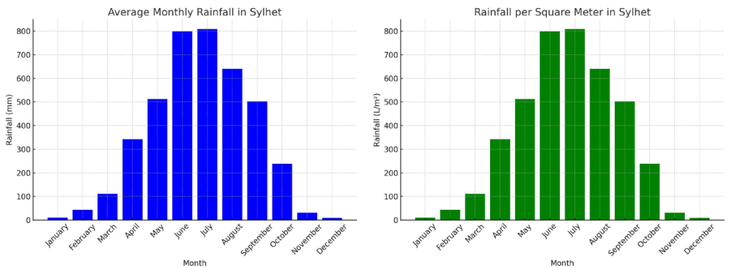
This concept has been integrated into the design of the informal market, where small raised platforms are introduced between the columns to create these same spatial distinctions. It offers a simple, culturally responsive way to structure informal commercial activity within the architectural framework.

06.05 **WATERMANAGMENT**

In Bangladesh, rainfall is abundant—especially during the monsoon season—making it an important factor to consider in the design. To make effective use of this resource, it is essential to understand both the amount and the timing of the rainfall.

The monsoon season in Bangladesh typically lasts from April to December, during which the country experiences intense and prolonged rainfall, often leading to severe flooding. Rather than allowing this water to go to waste, it presents a valuable opportunity to harvest and reuse rainwater within the building.

The building's roof has a total surface area of 1,619 square meters, which can be utilized as a catchment area for collecting rainwater. By integrating a rainwater harvesting system, this large surface can collect significant volumes of water—helping to offset water use for non-potable purposes such as toilet flushing, and reducing pressure on local infrastructure during peak rainfall periods.



06.05 **WATERMANAGMENT**

The goal is to collect enough rainwater to supply all the water needed for flushing the toilets in the entire building. To determine how much water needs to be collected, the following calculation was made:

1. **Water per flush:** A single toilet flush uses approximately **5 liters** of water.

2. **Flushes per person**: On average, a person uses the toilet **5 times per day**.

3. **Daily water usage per person**: 5 flushes/day × 5 liters/flush = **25 liters/day/person**

4. **Monthly water usage per person**: 25 liters/day/person × 30 days = **750 liters/month/person**

5. **Total users in the building**: The building accommodates an average of **384 people**.

6. **Total monthly water demand for toilet flushing**: 384 people × 750 liters/month/person = **288,000 liters/month**

To fully meet the demand for toilet flushing using rainwater, 288,000 liters of water need to be collected per month. This target forms the basis for the design of the rainwater harvesting system.

06.05 **WATERMANAGMENT**

When comparing the monthly rainfall to the roof catchment area and the building's water demand for toilet flushing—288,000 liters per month—it becomes evident that from April to October, there is sufficient rainfall, resulting in a surplus. However, from November to March, the rainfall is insufficient to meet this demand. To ensure year-round functionality, the surplus rainwater collected during the wet season must be stored for use during the dry months.

Dry Season Water Demand: 5 months × 288,000 liters/month = 1,440,000 liters needed from November to March.

Rainwater Yield During Dry Season: Estimated collection: 331,929 liters.

Remaining Need: 1,440,000 – 331,929 = 1,108,071 liters

To cover this shortfall, the design includes two underground storage tanks, each with a capacity of approximately 555,000 liters. The tank dimensions will be 20 meters (length) × 10 meters (width) × 3 meters (height) = 600,000 liters capacity per tank

We gebruiken je dakoppervlak van **1619,16 m²** en de regenhoeveelheden:

Maand	Neerslag (mm)	Opvang (L)	Nodig (L)	Overschot
April	342 mm	553.750 L	288.000 L	+265.750 L
Mei	513 mm	831.630 L	288.000 L	+543.630 L
Juni	799 mm	1.294.122 L	288.000 L	+1.006.122 L
Juli	809 mm	1.311.092 L	288.000 L	+1.023.092 L
Augustus	640 mm	1.036.262 L	288.000 L	+748.262 L
September	502 mm	812.815 L	288.000 L	+524.815 L
Oktober	238 mm	385.364 L	288.000 L	+97.364 L

Nu kijken we hoeveel je nog *kunt opvangen* in die maanden:

Maand	Neerslag (mm)	Opbrengst (L op 1619,16 m²)
November	31 mm	50.195 L
December	9 mm	14.572 L
Januari	10 mm	16.192 L
Februari	44 mm	71.243 L
Maart	111 mm	179.727 L

06.05 **WATERMANAGMENT**

To ensure a reliable and sustainable water system, several types of water storage and drainage solutions have been incorporated into the design, based on daily needs, emergency scenarios, and peak rainfall events.

1. **Roof Buffer Tank for Toilet Flushing**: To maintain functionality during brief interruptions in water supply, a 2-day buffer tank is proposed on the roof for toilet flushing. Daily use: 384 people × 25 liters/day = 9,600 liters/day. Two-day buffer: 9,600 × 2 = 19,200 liters, or approximately 20 cubic meters. This volume will be distributed across four smaller rooftop tanks, each with a capacity of 5 cubic meters, and dimensions of **1.5 m × 1.2 m × 2.8 m.**

2. **Emergency Water Storage:**In case of emergencies, it's essential to provide water for basic use (including sanitation) for 3 days: 384 people × 30 liters/day × 3 days = 34,560 liters, or approximately 34 cubic meters. This will be stored in a single emergency tank measuring **4 m × 2.83 m × 3 m.**

3. **Septic Tank Capacity**: Wastewater storage is based on an estimated 100 liters per person per day: 384 people × 100 liters/day = 38.4 cubic meters/day. For 1 week: 38.4 × 7 = 268.8 cubic meters. This will be split between two septic tanks, each storing 134.4 cubic meters, with dimensions of **10 m × 4.4 m × 3 m.**

4. **Rainwater Gutter Sizing**: Proper drainage is critical to prevent overflow during peak rainfall. Roof surface: 1,619 m^2. Peak rainfall intensity: 120 mm/hour. Total runoff: 1,619 m^2 × 120 mm = 194,280 liters/hour = 54 liters/second. Given a gutter length of 50 meters, this results in:
1.08 liters/second per meter of gutter. To handle this volume without flooding, gutters with dimensions of **250 mm × 200 mm** will be used.

06.06 **UNIT PLANS: SOUTH ZAHIR PARADISE**

By collective studio research

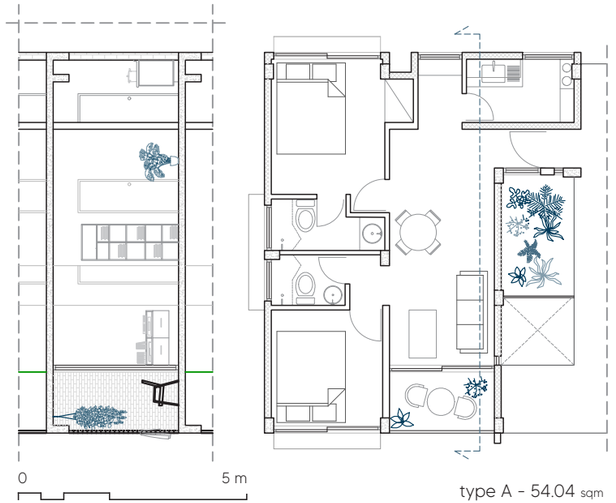
The floor plan of Comfort Reverie emphasizes spaciousness and modern urban living. The layout is designed with a central living and dining area that acts as the social core of the apartment, while bedrooms are positioned along the perimeter to ensure privacy. Large windows allow for abundant natural light and cross-ventilation. The kitchen is semi-open, connected to a service area, and the master bedroom includes an en-suite bathroom. Overall, the layout is efficient and caters to mid- to high-income families looking for comfort and functionality in the city.

Floorplan Type A

06.06 **UNIT PLANS: KAZEDEWAN APARTMENT BUILDING**

By collective studio research

The Kazedewan Apartments are arranged around a central core, with a focus on community and accessibility. Each unit is designed with a logical flow: an entry foyer leads into a shared living-dining area, with bedrooms and bathrooms positioned off a central corridor. Many of the units have views into shared courtyards or green pockets between the buildings, reinforcing a sense of openness. The layout is practical and adaptable, suited for multi-generational living or families that value both privacy and shared space.



type A - 54.04 sqm

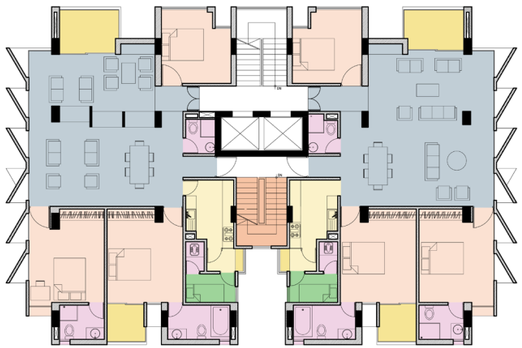
06.06 **UNIT PLANS: COMFORT REVERIE**

By collective studio research

The floor plan of Comfort Reverie emphasizes spaciousness and modern urban living. The layout is designed with a central living and dining area that acts as the social core of the apartment, while bedrooms are positioned along the perimeter to ensure privacy. Large windows allow for abundant natural light and cross-ventilation. The kitchen is semi-open, connected to a service area, and the master bedroom includes an en-suite bathroom. Overall, the layout is efficient and caters to mid- to high-income families looking for comfort and functionality in the city.

Program - first floor

0 13m



Program - first floor

0 13m

Program - first floor

0 13m

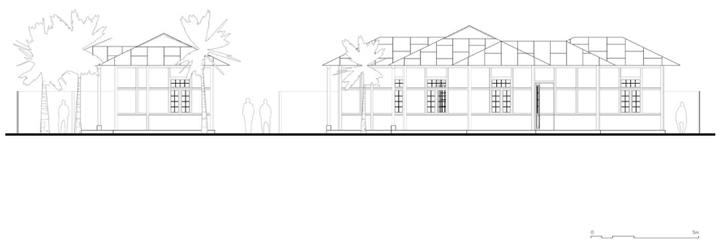
06.07 **BANGLA BATON**

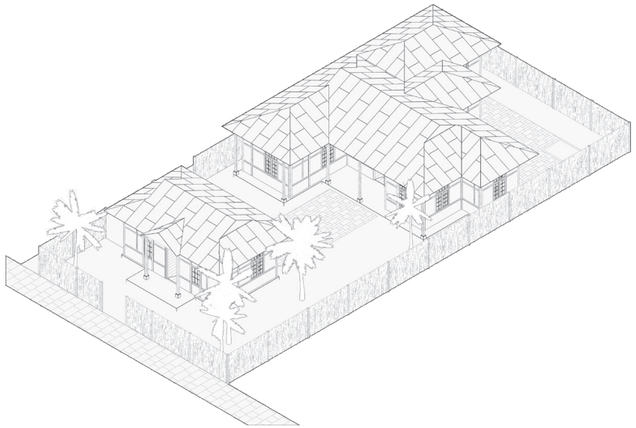
By collective studio research

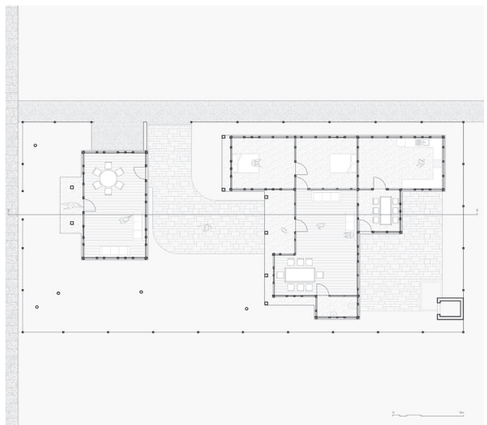
The Bangla Baton is a traditional yet highly adaptable form of housing, designed to suit both the climate and the evolving needs of its residents. Typically built on a raised plinth or stilts made from bamboo, timber, or reinforced concrete, it offers protection from seasonal flooding—an essential feature in much of Bangladesh.

The floor plan is open and modular, allowing for easy reconfiguration as family needs change. Rooms can be added or subdivided over time, supporting long-term flexibility. Wide verandas are a key element, serving as multifunctional spaces for socializing, drying crops, or carrying out domestic tasks, effectively extending the home's usable area.

A central courtyard brings natural light and ventilation into the heart of the home and is commonly used for daily activities like drying grains or clothes, often shaded by trees to create a comfortable microclimate. Kitchens are typically located toward the back for privacy, and bedrooms are often multi-functional, reflecting the practical and resourceful nature of the design.





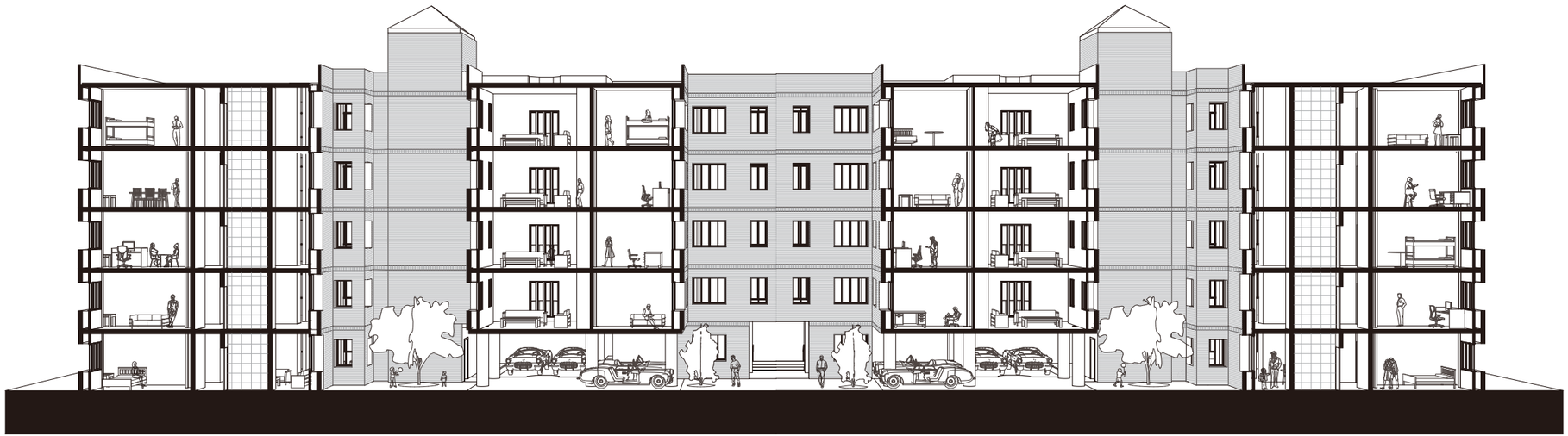


06.08 **CLUSTERING: KALINDI APPARTMENTS**

By collective studio research

The Kalindi Apartments, located in the heart of Dhaka, offer a striking example of thoughtful urban residential design within a dense city context. The project consists of several clustered apartment blocks arranged around a shared central courtyard. This internal green space acts as the heart of the complex, fostering a strong sense of community among residents.

During conversations with residents, many emphasized the value of the courtyard as a safe and accessible space, especially for children. Despite being situated in the bustling center of Dhaka, the enclosed nature of the courtyard provides a quiet, secure environment where children can play freely and neighbors can gather. This integration of communal space within a high-density development highlights how careful clustering of buildings can create livable, people-centered urban housing in even the busiest parts of the city.



06.09 **FSI CALCULATION**

The Floor Space Index (FSI) for the entire plot has been calculated, which includes five separate buildings ranging from six to nine stories in height. While the building sizes vary, they all follow the same overall design principles.

When combined, the total development results in an FSI of 2.96 and a Ground Space Index (GSI) of 0.45. These are excellent values for a high-density residential project located in the heart of Sylhet's city center, balancing efficient land use with sufficient open space.

Totaal plot	17.089.708,60	cm2											
	GF	1	2	3	4	5	6	7	8	9	totaal		
1e	1.744.617	1.727.171	1343355	1343355	1343355	1343355	1343355	1343355	1343355	1343355	12.875.273,00		
2e	1.435.153	1.420.801	1076364	1076364	1076364	1076364	1076364	1076364	1076364		9.314.138,00		
3e	1.435.153	1.420.801	1076364	1076364	1076364	1076364	1076364	1076364	1076364		9.314.138,00		
4e	1.069.000	1.058.310	801750	801750	801750	801750	801750	801750			6.937.810,00		
5e	2.074.026	1.987.326	1.617.740	1.617.740	1.617.740	1.617.740	1.617.740				12.150.052,00		
					totaal								fsi
					50.591.411,00	cm2					:	17.089.708,60	2,960344
	7.757.949												
													GSI
												17.089.708,60	0,453954

11. **REFERENCES**

Baumschlager Eberle Architekten. (n.d.). Solids IJburg, Amsterdam. https://www.baumschlager-eberle.com/en/work/projects/projekte-details/solids-ijburg-amsterdam

GAAGA. (n.d.). CiWoCo – Circular Work and Co-living. https://www.openbuilding.co/ciwoco-gaaga

Koehler, M. (n.d.). Superlofts Hoorn – Customized and Custom-Made. https://marckoehler.com/project/superlofts-hoorn-customized-and-custom-made

Koehler, M. (n.d.). Superlofts MKA. https://www.openbuilding.co/superlofts-mka

MVRDV. (2018). Future Towers. ArchDaily. https://www.archdaily.com/906774/future-towers-mvrdv

Olaf Gipser Architects. (n.d.). Stories. https://www.openbuilding.co/stories-olaf-gipser-architects

Safdie, M. (n.d.). Habitat 67. Safdie Architects. https://www.safdiearchitects.com/projects/habitat-67

Weatherspark. (2016). Bangladesh: Climate and Average Weather Year Round. https://weatherspark.com/countries/BD

WOHA Architects. (n.d.). Kampung Admiralty. https://woha.net/en/project/kampung-admiralty

Global Housing Studio Booklet – Collective Research Materials in Bangladesh.

Global Housing Studio Booklet – Collective Research on Housing in Bangladesh.

Image Credits
Photos by Joëlle Steendam and Lotte Bijwaard

07. DESIGN

This design phase builds on research, personal experience, and insights gathered during our field trip to Bangladesh. Especially the homestay in Ekduaria gave me a deep understanding of how people in rural Bangladesh live—how they use space, value community, and adapt their homes to daily needs. These experiences shaped the foundation of the project.

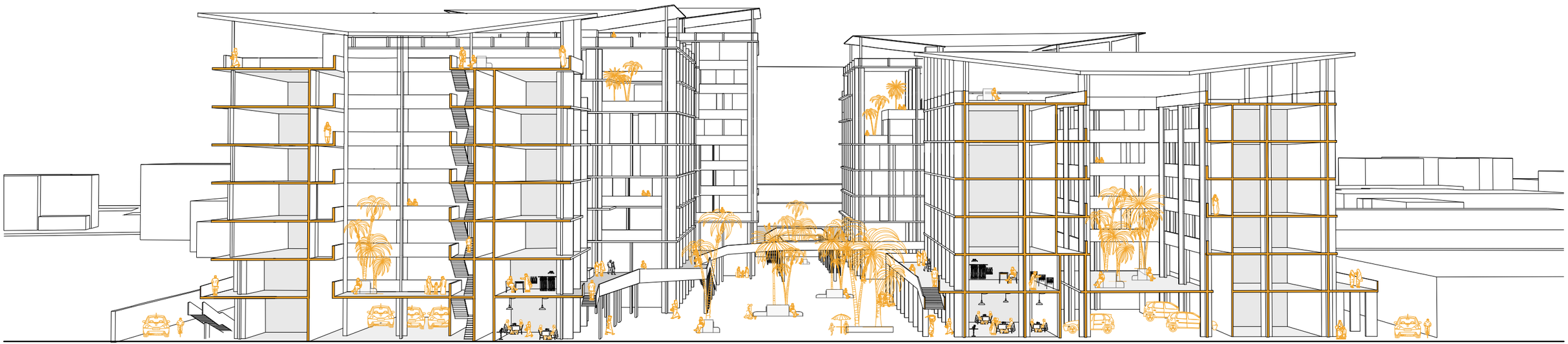
The research focused on finding affordable, adaptable, and community-oriented housing for rural-urban migrants in Sylhet. What became clear is that affordability is the top priority, but just as important are familiar qualities like green space, open low-rise layouts, a strong sense of community, and a clear transition from public to private spaces.

To respond to these needs, I chose to work with the Open Building approach. This method allows for flexible, long-term housing solutions where residents can adapt their living spaces over time. A clear structure provides stability, while the interiors remain open for change. A minimum floor height of 3.5 meters, smart placement of service cores, and layered construction all support this flexibility. Smaller studies on climate, material choice, and construction techniques helped refine the design. Local materials, passive cooling, and rainwater collection are integrated to make the project more sustainable and context-specific.

This project is not a fixed solution, but a flexible framework—designed to grow and change with its users. It offers a future-proof way of living that connects the memory of the village with the possibilities of the city, and aims to reduce the affordable housing shortage in Sylhet in a way that feels both practical and personal.

* The drawings in this booklet have been scaled down from A3 to A5 format. As a result, the indicated scale references may no longer be accurate, since they are based on the original A3 size. However, the scale bars included in the drawings remain correct and correspond to the actual dimensions.

THE URBAN BLOOM



07.01 **DESIGN APPROACH**

Problem statement
The main problem addressed in this research is the inadequacy of existing housing solutions which create a big housing gap for the rural-urban migrants in Sylhet. The current mass housing projects tend to fail to meet the needs of these migrants. And the small-scale projects that do meet the needs of these migrants, aren't designed to become part of a bigger system.

AIM
This research aims to develop a future-proof open building system with the potential of a large-scale housing project in Sylhet, that effectively addresses the specific housing needs, socio-cultural preferences, and affordability requirements of rural-urban migrants, to reduce the current and expected affordable housing shortage in Sylhet for the rural-urban migrants.
To find a fitting solution, the research question is as follows: *How can the needs of the rural-urban migrants be integrated into an open building system to create a future-proof, large-scale housing project which reduces the affordable housing shortage in Sylhet?*

RELEVANCE
Rapid urbanization is a global phenomenon and one of the greatest challenges of the 21st century. Many cities face severe overcrowding and a significant shortage of affordable housing. This issue is particularly urgent in the Global South, where countries like Bangladesh are highly vulnerable to extreme climate events such as droughts, heavy rainfall, tropical cyclones, and storm surges (Rawlani & Sovacool, 2011). Climate change increases the frequency of these disasters (Moniruzzaman et al., 2018; Rana & Ilina, 2021), leading to large-scale migration. Every year, hundreds of thousands of people are forced to leave their homes due to sudden disasters like cyclones and floods, as well as slow-onset events such as sea-level rise and salinization (McDonnell, 2019). This has resulted in a critical housing crisis in urban areas of Bangladesh, including Sylhet, a problem that is expected to worsen in the coming years.

This research focuses on developing a future-proof open building system that can contribute to large-scale housing projects in Sylhet. By integrating the specific housing needs, socio-cultural preferences, and financial capabilities of rural-urban migrants, this project aims to address the growing housing shortage in Sylhet. The solutions derived from this research can not only be applied directly to Sylhet but also provide valuable insights and strategies adaptable to other cities facing similar challenges worldwide.

The Importance of an Open Building System
We are designing housing for a specific target group in the heart of Sylhet, a city in a rapidly growing and developing country with an uncertain future. What will Sylhet look like in 10, 20, or even 50 years? What developments will shape its urban landscape? How will the needs and preferences of its residents evolve over time? Will traditional markets remain a central part of daily life, or will large-scale supermarkets take over? Will small entrepreneurs continue to thrive, or will corporate giants dominate the economy? Will there be a growing demand for office spaces, restaurants, co-working hubs, and schools, or will traditional marketplaces remain a priority? These are all critical questions, yet the answers remain unknown.

As John Habraken stated: "When considering the housing of the future, we should not try to forecast what will happen, but try to make provision for what cannot be foreseen. The uncertainty of the future itself must be the basis on which present decisions are made."
This principle underlines the choice for an Open Building System. This system allows us to create a housing solution that not only meets the current needs of the community but is also adaptable to future changes. As demands shift, the building can evolve—whether through modifications in living spaces or the integration of new functions. This flexibility ensures that the project remains relevant and sustainable over time, making it a future-proof solution for Sylhet's ever-changing urban landscape.

Conclusion
By combining the urgency of affordable housing in Sylhet with the principles of an Open Building System, this research presents an innovative approach to addressing the housing crisis. The dynamic nature of urban development requires flexible and future-proof solutions. This study not only contributes to the local context of Sylhet but also offers broader insights for cities worldwide facing similar challenges. The goal is to develop a housing solution that is not only relevant today but also prepared for the challenges of the future.

Position
My design approach is based on a realistic view, meaning I aim to tackle the current challenges in Sylhet with practical and achievable solutions. The three main principles of my design strategy are affordability, future-proof, and the potential for large-scale housing development.

To keep the design realistic, affordability must be the top priority. The project is mainly

for low-income groups with limited financial resources. While environmental sustainability and using local materials are important in today's construction industry, they are not the primary focus of my strategy. However, these aspects are still considered to create a well-balanced and responsible design. To make the project affordable, I will use budget-friendly materials and take advantage of existing local expertise. The construction methods and materials will be straightforward and cost-effective to keep expenses low. Rather than relying on experimental or high-cost solutions, the architectural identity will emerge through a well-considered mix of local materials and established construction techniques.

Another key part of my approach is designing an Open Building System, ensuring the project remains adaptable for the future. This means the building can change over time to fit the evolving needs of the local population. One essential feature for this flexibility is a floor-to-ceiling height of at least 3.5 meters, allowing spaces to be repurposed. Additionally, a flexible floor plan is crucial to make sure layouts can be adjusted as needed. Separating different building elements—following Stewart Brand's concept of building layers—ensures that each part can be changed independently.

My approach to material sustainability considers the lifespan of each building component. The shorter a layer's lifespan, the more durable its materials should be. The building's structure must be highly durable to support long-term adaptability. On the other hand, interior elements, which will require more frequent updates as user needs evolve, should prioritize sustainable materials. This strategy minimizes material waste and enhances long-term efficiency.

The final key aspect of my design approach is the potential for large-scale housing development. To achieve this, the project must be designed with a high FSI. Additionally, the design should be easy to replicate and adaptable to different locations and conditions—not just in Sylhet but also in other parts of Bangladesh and even beyond. By creating a scalable and flexible housing solution, this project can help tackle affordable housing shortages on a wider scale.

07.02 **BUILDING**

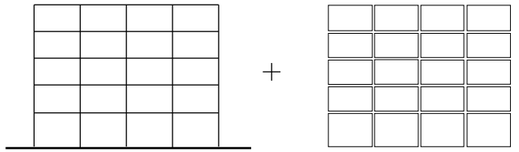
As previously mentioned, the building is composed of two separate elements: a solid concrete structure and a lightweight infill. These components can be adapted and modified independently, allowing for flexibility in use and form. This approach enables the creation of multiple variations from a single design principle, making it possible to design different buildings that together form a diverse and vibrant neighborhood.

The structural system allows for variation in height, width, and orientation, while the infill can vary in function, unit size (such as housing, offices, or shops), and layout. Additionally, the size and placement of openings in the façade can differ from one building to another. These variables lead to a wide range of architectural expressions while maintaining a unified construction logic.

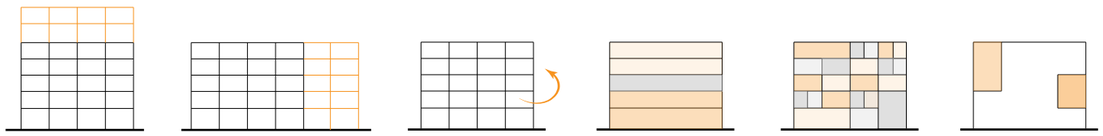
In my design, I applied this principle to create five distinct buildings, varying in height from 6 to 9 stories, with different widths and orientations. While the function remains consistent across all buildings—commercial spaces on the ground and first floors, with residential units above—the dwelling sizes are adapted to serve the low- and middle-income classes. Each building features a unique façade composition with varying openings, contributing to a sense of identity and diversity.

Through this method, a single architectural system gives rise to a varied ensemble of buildings that together shape a rich and inclusive urban environment.

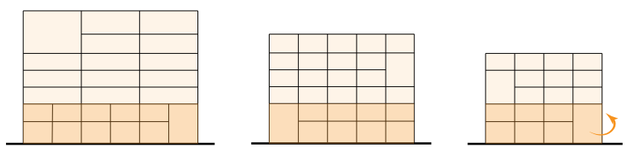
1. PRINCIPLE



2. VARIATIONS



3. CHOICES



1. Different heighst; 9-6 stories
2. Different widths; 4-7 series
3. 2 different orietations, N-Z & E-W
4. Market ground/1st floor, housing 2-9 floor
5. 1 size; could be combined// low and middle income
6. 2 openings per floor, different per building

07.03 **UNIT**

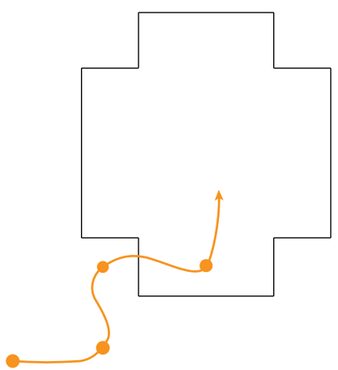
The foundation of all housing units lies in a shared structural system: concrete cruciform columns. The lightweight infill placed between these columns defines the layout and function of each unit. This consistent structural approach makes it possible to accommodate a wide range of housing types—from 13 m^2 shared studios for low-income residents to 132 m^2 apartments for higher-income households.

In this way, the project offers housing opportunities for a broad social spectrum—from sweepers and rickshaw drivers to commercial property owners—all within the same architectural framework. It also allows rural-urban migrants to enter the neighborhood and gradually grow and move within the same development, reflecting the dynamic nature of their economic and social transitions.

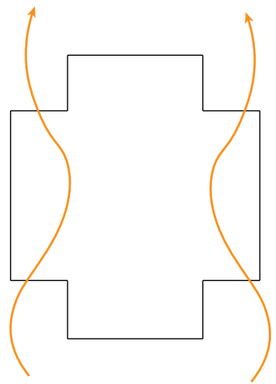
Several key aspects were considered in the design of all units: A clear transition from public to private space, which is highly valued in Bangladeshi culture. Sufficient natural ventilation to prevent overheating. Adequate daylight access for improved living comfort. Clustering of wet zones to minimize piping and reduce construction complexity.

To further enhance flexibility, service shafts are placed on both sides of the interior columns. This allows for greater freedom in organizing floor plans, adjusting layouts over time, and customizing the façade. As a result, the building is not only diverse in its current configuration, but also highly adaptable to future changes in function or unit size.

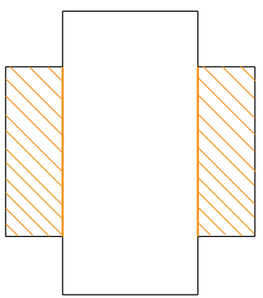
1. Transition public-private



2. Ventilation & daylight



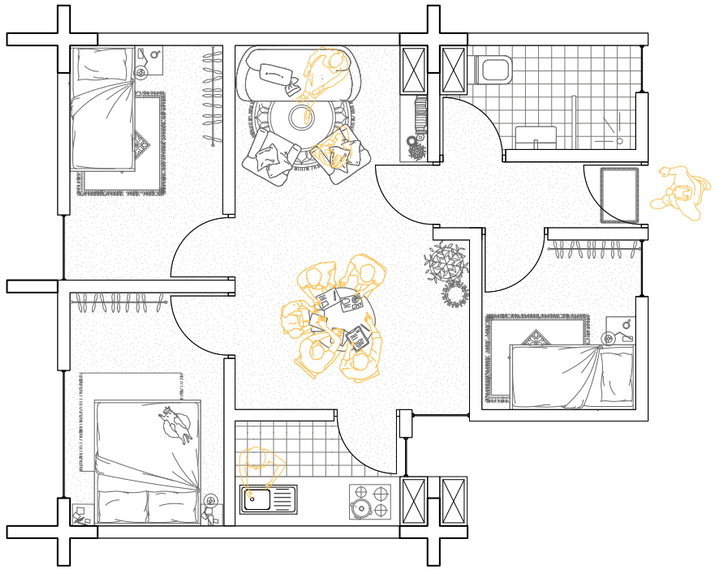
3. Clustering wetzones



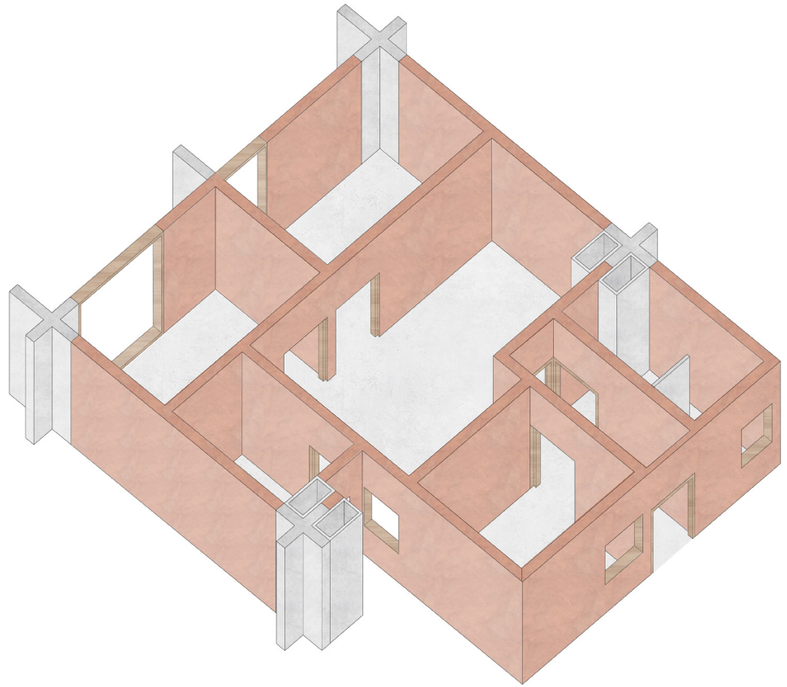
01. **LOW INCOME:** TYPICAL UNIT FLOORPLAN 1:50

0 0,5 1,5 3

Area: 65 m²
excl. 6,5 m²
front outside
space



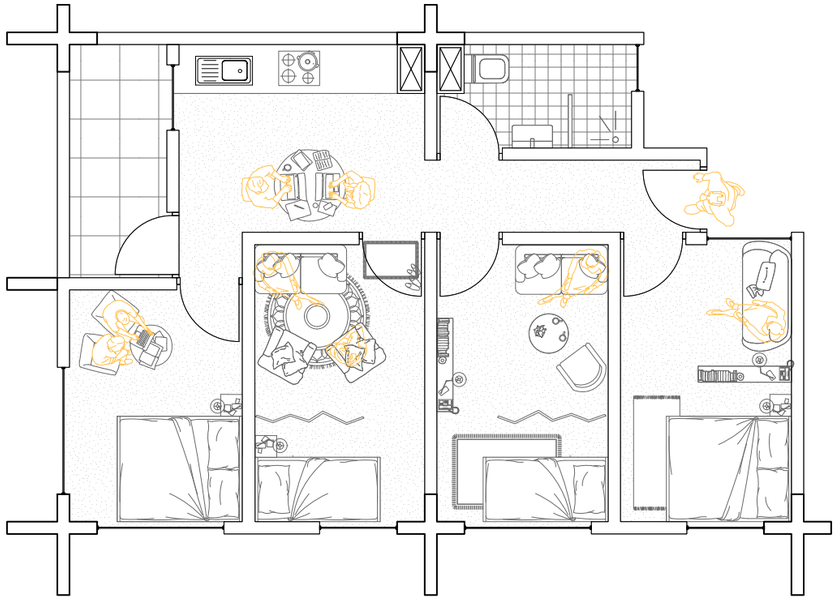
01. **LOW INCOME:** TYPICAL UNIT AXONOMETRY



01. **LOW INCOME:** CORNER UNIT FLOORPLAN 1:50

0 0,5 1,5 3

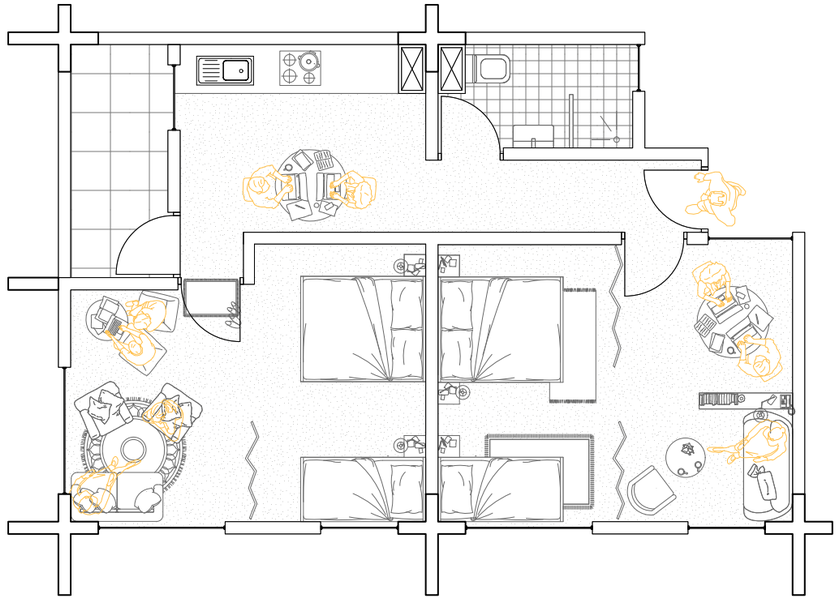
Area: 13 m² excl. shared kitchen & 12 m² shared outside space (6 m² front, 6 m² balcony)



01. **LOW INCOME:** CORNER UNIT FLOORPLAN 1:50

0 0,5 1,5 3

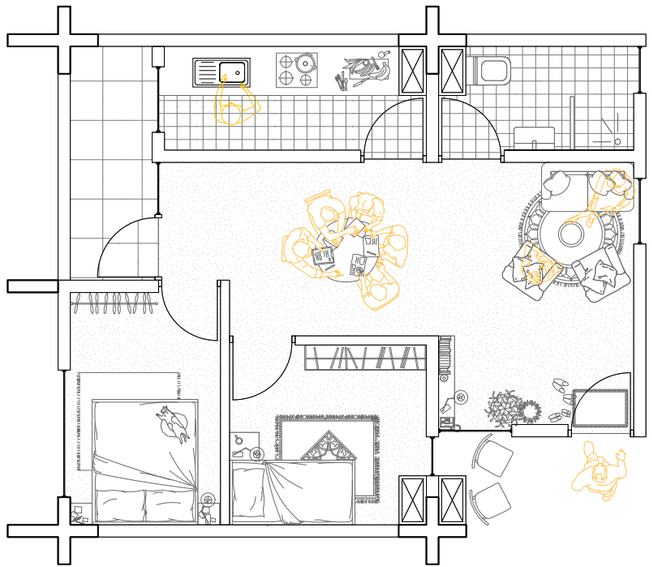
Area: 26 m² excl. shared kitchen & 12 m² shared outside space (6 m² front, 6 m² balcony)



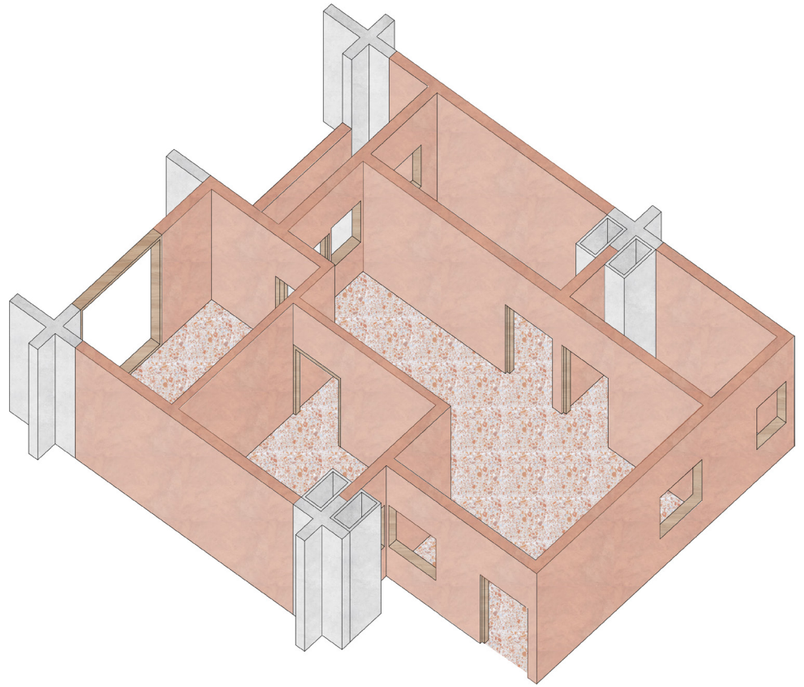
02. **MIDDLE INCOME:** TYPICAL UNIT FLOORPLAN 1:50

0 0,5 1,5 3

Area: 65 m^2 excl. 12 m^2 shared outside space (6 m^2 front, 6 m^2 balcony)



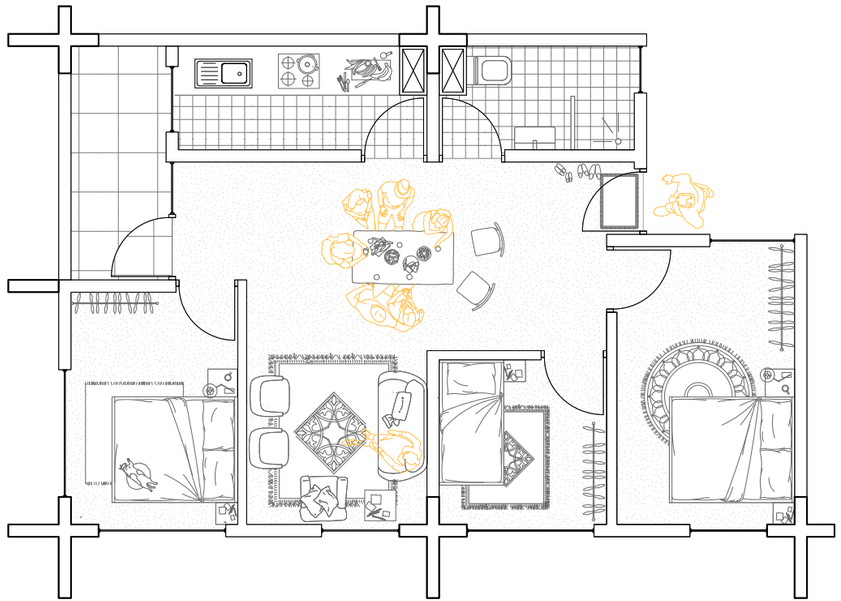
02. **MIDDLE INCOME:** TYPICAL UNIT AXONOMETRY



02. **MIDDLE INCOME:** CORNER UNIT FLOORPLAN 1:50

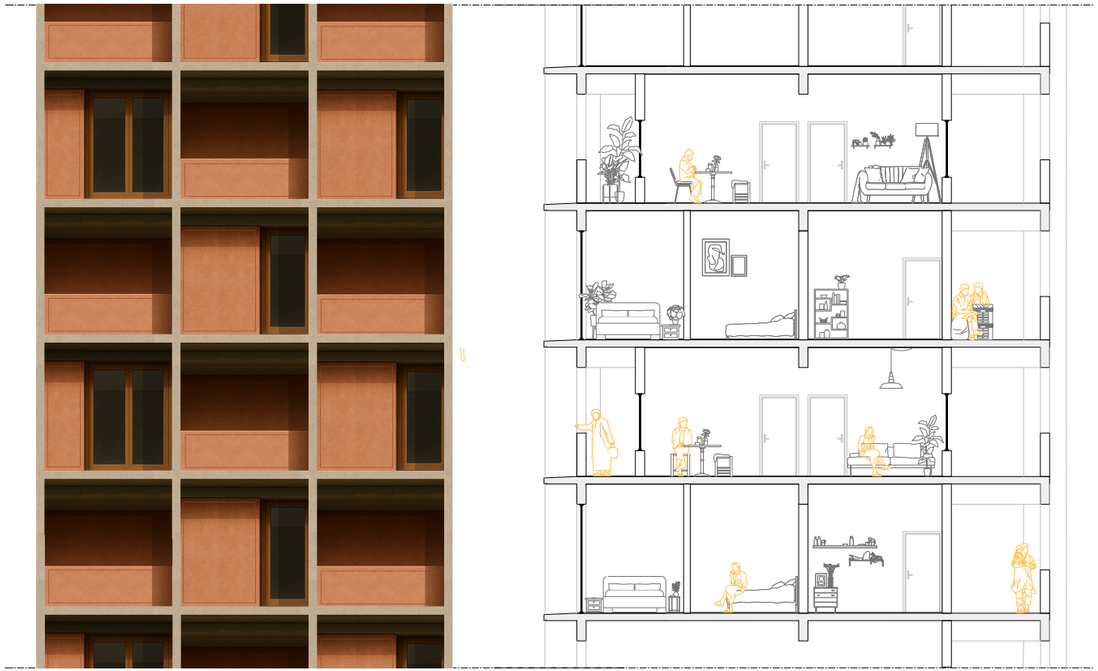
0 0,5 1,5 3

Area: 77 m²
excl.
12 m² outside
space
(6 m² front, 6
m² balcony)



02. **MIDDLE INCOME:** ELEVATION & SECTION 1:50

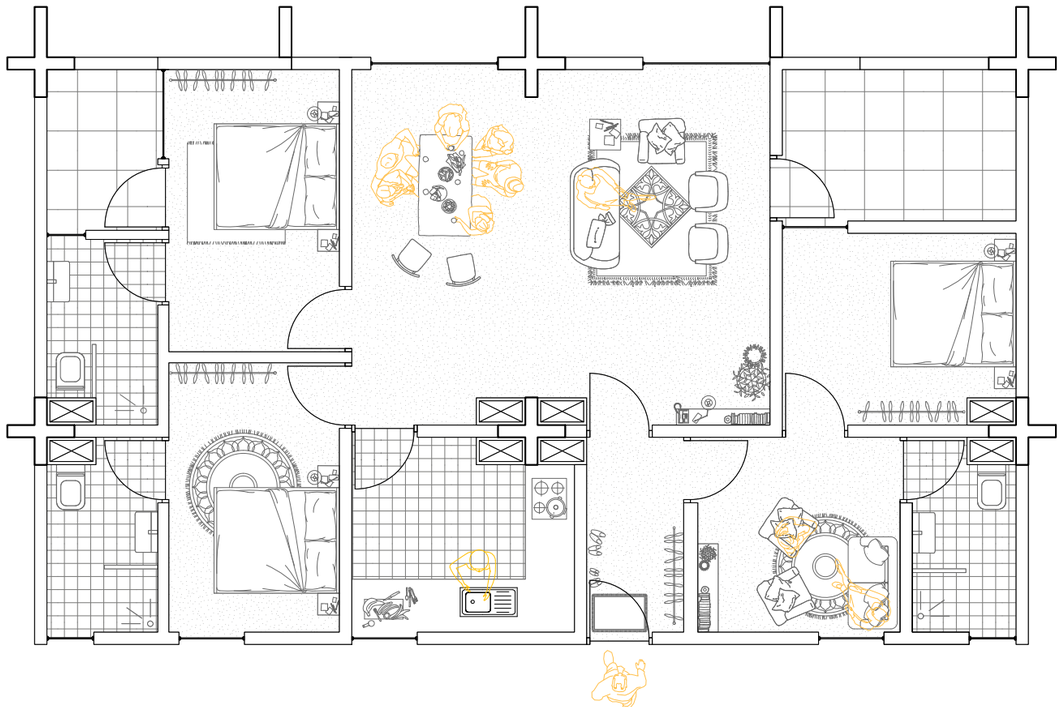
0 0,5 1,5 3



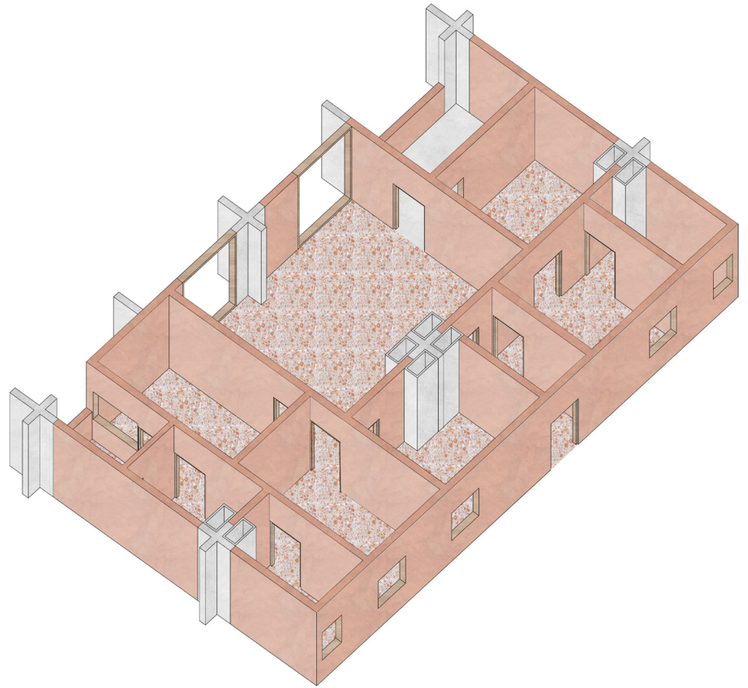
03. **HIGH INCOME:** TYPICAL UNIT FLOORPLAN 1:50

0 0,5 1,5 3

Area: 132 m²
excl.
14 m² outside
space
(9 m²
balcony, 5 m²
balcony)



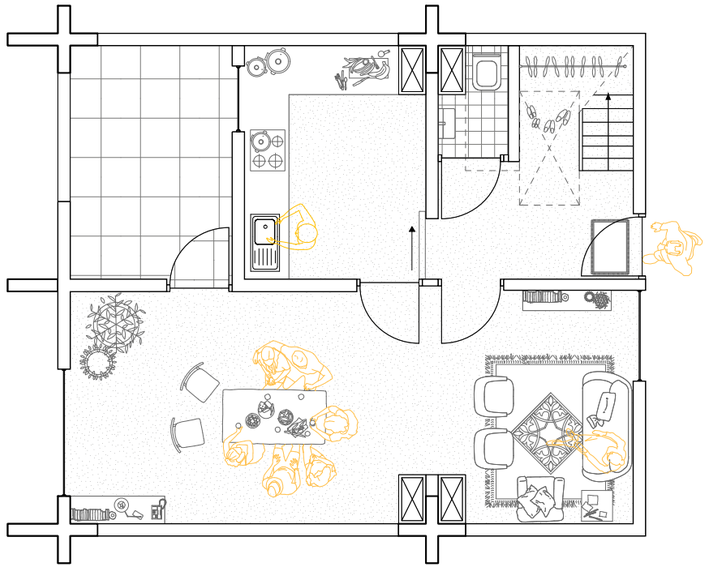
03. **HIGH INCOME:** TYPICAL UNIT AXONOMETRY



03. **HIGH INCOME:** DUPLEX UNIT FLOORPLAN 1e 1:50

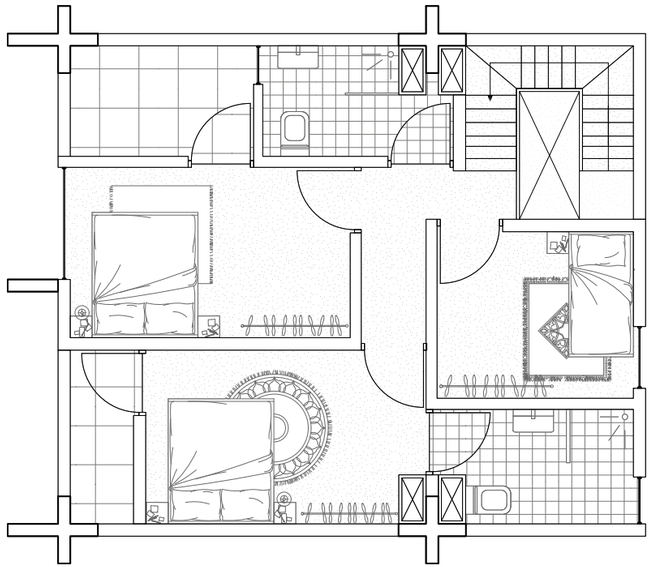
0 0,5 1,5 3

Area: 127,5 m^2 excl. 18,5 m^2 outside space (10 m^2 balcony, 5,5 m^2 balcony, 3 m^2 balcony)



03. **HIGH INCOME:** DUPLEX UNIT FLOORPLAN 2e 1:50

0 0,5 1,5 3



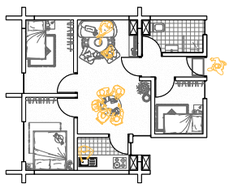
04. UNIT OVERVIEW

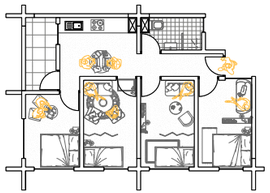
1. LOW INCOME

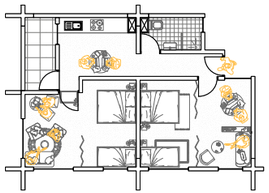
65 m² // 6,5 m²

26 m² // 6 m²

13 m² // 3 m²



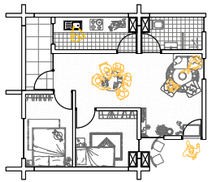


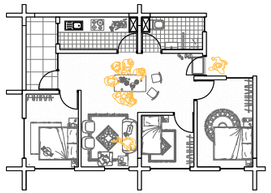


2. MIDDLE INCOME

65 m² // 12 m²

77 m² // 12 m²

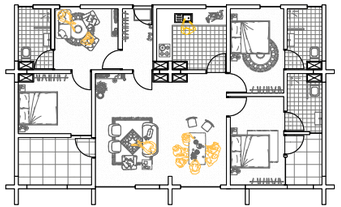


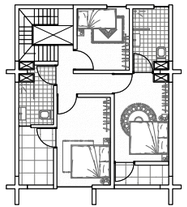


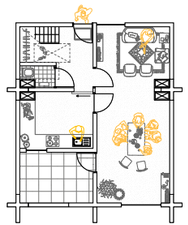
3. HIGH INCOME

132 m² // 14 m²

127,5 m² // 18,5 m²







05. UNIT: ATMOSPHERIC IMPRESSION MATERIALITY COMBINATION

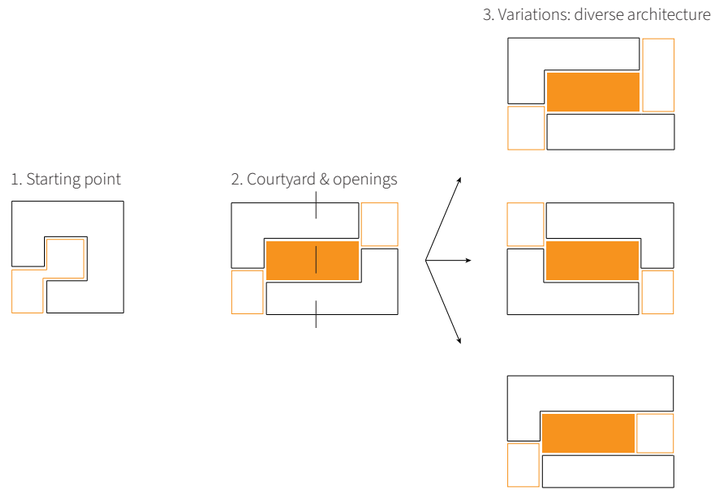
07.04 **CLUSTER**

The housing clusters are organized with units positioned along the edges, surrounding a collective courtyard located on the first floor. Inspired by the Kalindi Apartments in Dhaka, this layout creates a similar sense of shared space and community. The courtyard is accessible to all residents and can be used for various activities—most importantly, it offers a safe, enclosed space where children can play freely, even while living in the heart of a busy city.

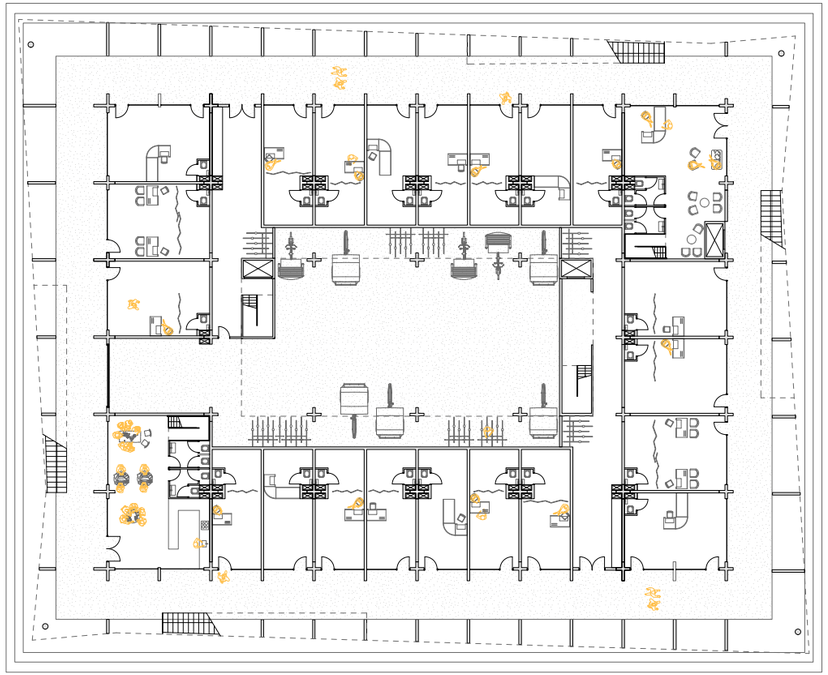
The central opening also serves a functional purpose by allowing ample natural ventilation and daylight to reach the surrounding apartments. Beyond climate performance, this configuration helps to translate the rural sense of community—often found in family compounds—into an urban context. Each cluster layer functions as a small community, supporting a gradual shift from village life to city living.

To strengthen this community feeling, shared spaces are placed on every floor, encouraging social interaction among neighbors. Each cluster is designed to house two common areas, each serving a separate group, ensuring the communities remain small and intimate enough for strong social ties to form.

In addition to their social and climatic benefits, the openings within the buildings are also used as architectural tools. Because there is flexibility in the placement and size of openings, each building can develop its own unique identity. This variation supports architectural diversity across the project, while still operating within a unified structural system.

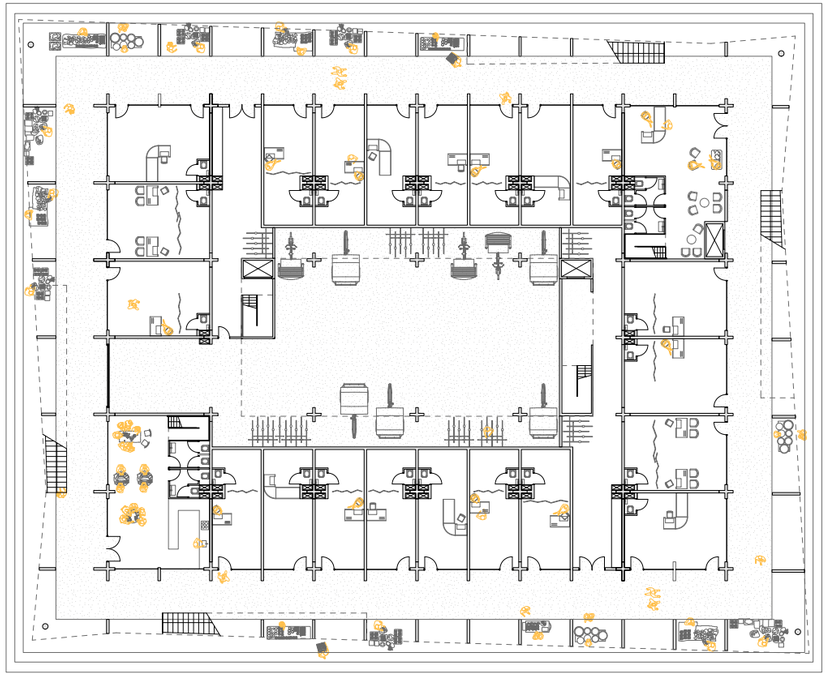


01. **CLUSTER LOW INCOME:** GROUNDFLOOR PLAN 1:200

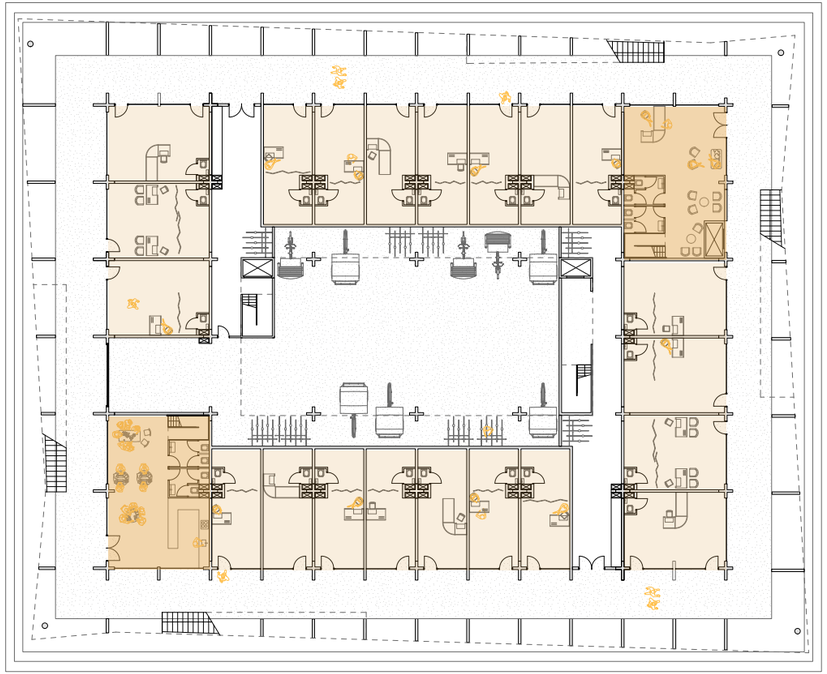


01. **CLUSTER:** VISUALISATION GROUNDFLOOR

01. **CLUSTER:** GROUNDFLOOR PLAN MARKET DAY 1:200

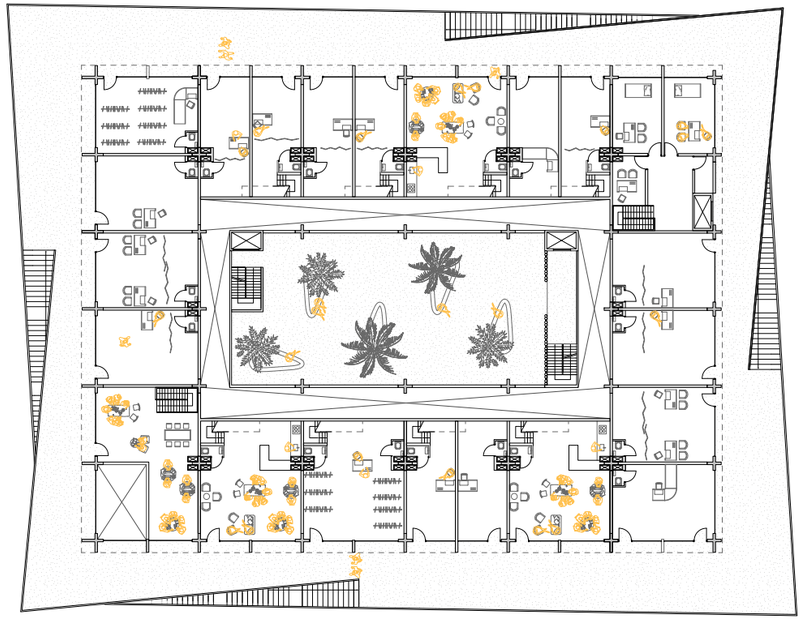


01. **CLUSTER:** GROUNDFLOOR PLAN AMENITIES 1:200



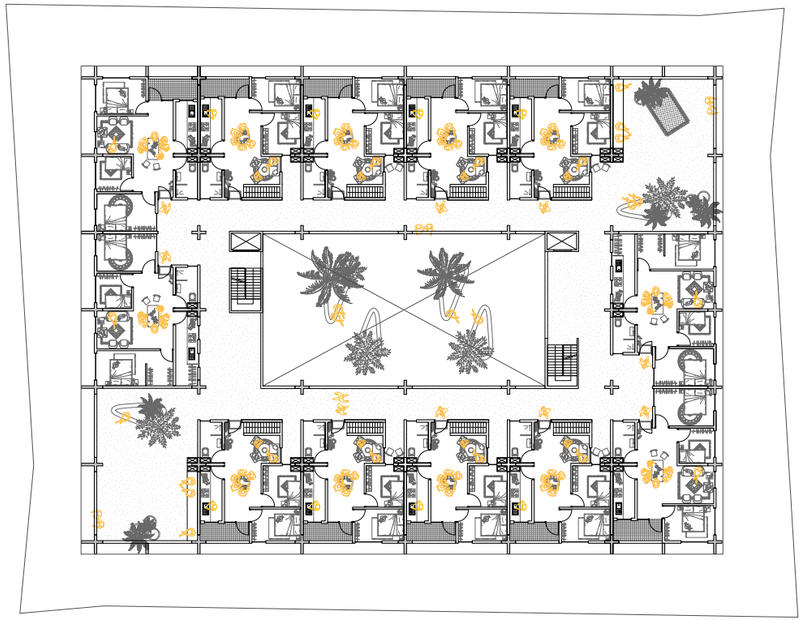
Duplex amnities 180 m²
One story shops 35m² - 45m²

02. **CLUSTER:** 1st FLOORPLAN 1:200

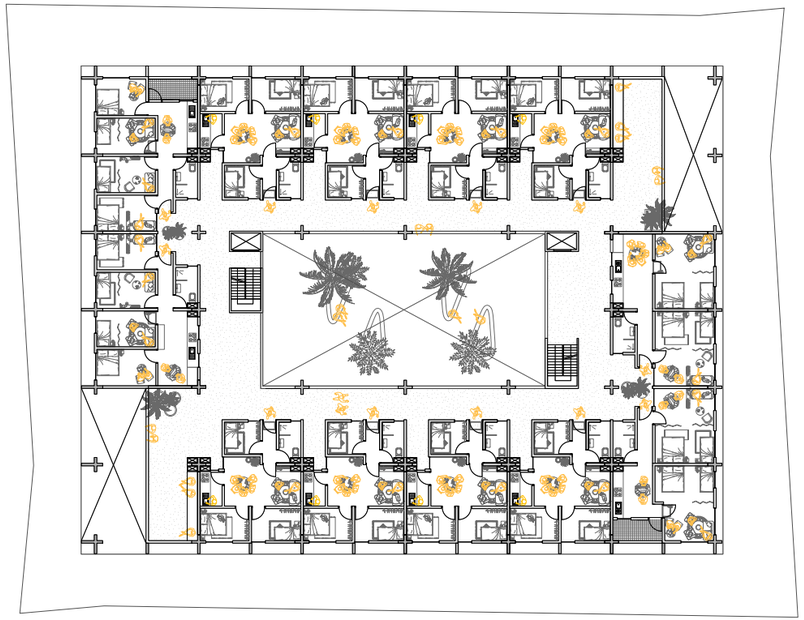


02. **CLUSTER:** VISUALISATION COURTYARD

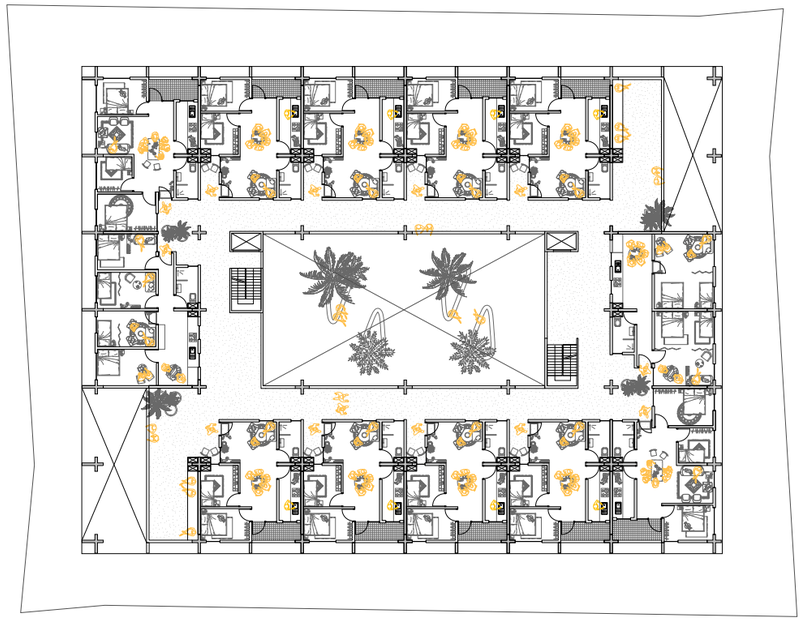
03. **CLUSTER:** 2nd FLOORPLAN 1:200



04. **CLUSTER LOW INCOME:** 3rd FLOORPLAN 1:200

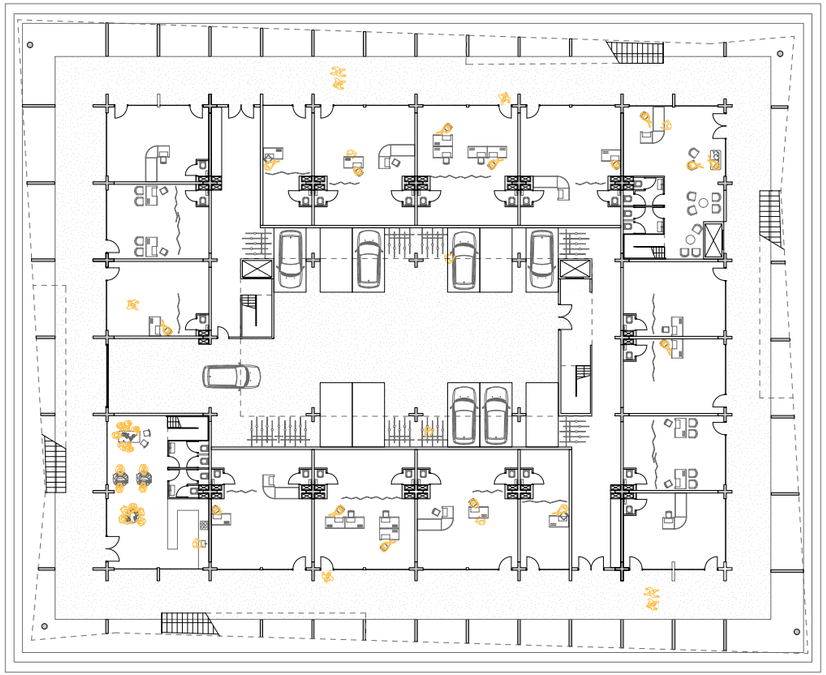


04. **CLUSTER MIDDLE INCOME:** 3rd FLOORPLAN 1:200

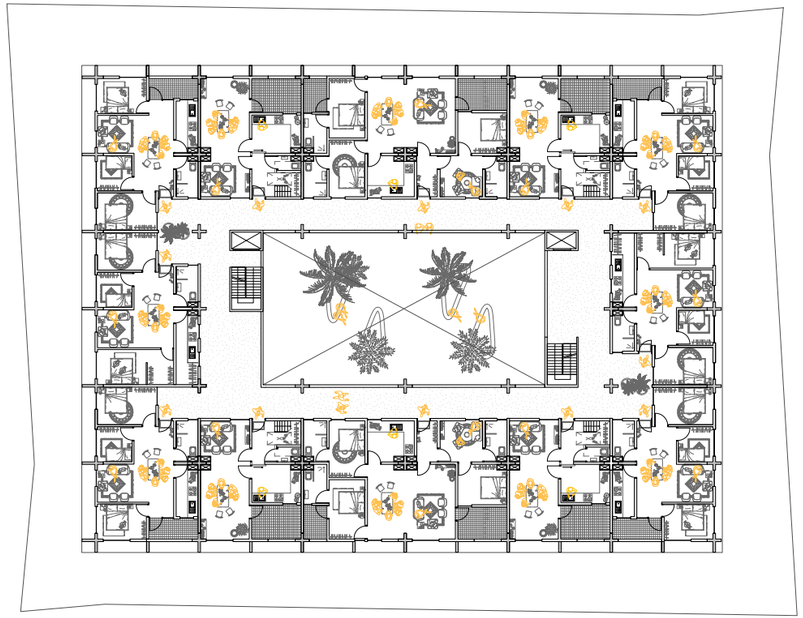


04. **CLUSTER:** VISUALISATION COMMUNAL SPACE

05. **CLUSTER HIGH INCOME:** GROUNDFLOOR PLAN 1:200



05. **CLUSTER HIGH INCOME:** 3rd FLOORPLAN 1:200



06. **CLUSTER:** SECTION A 1:200

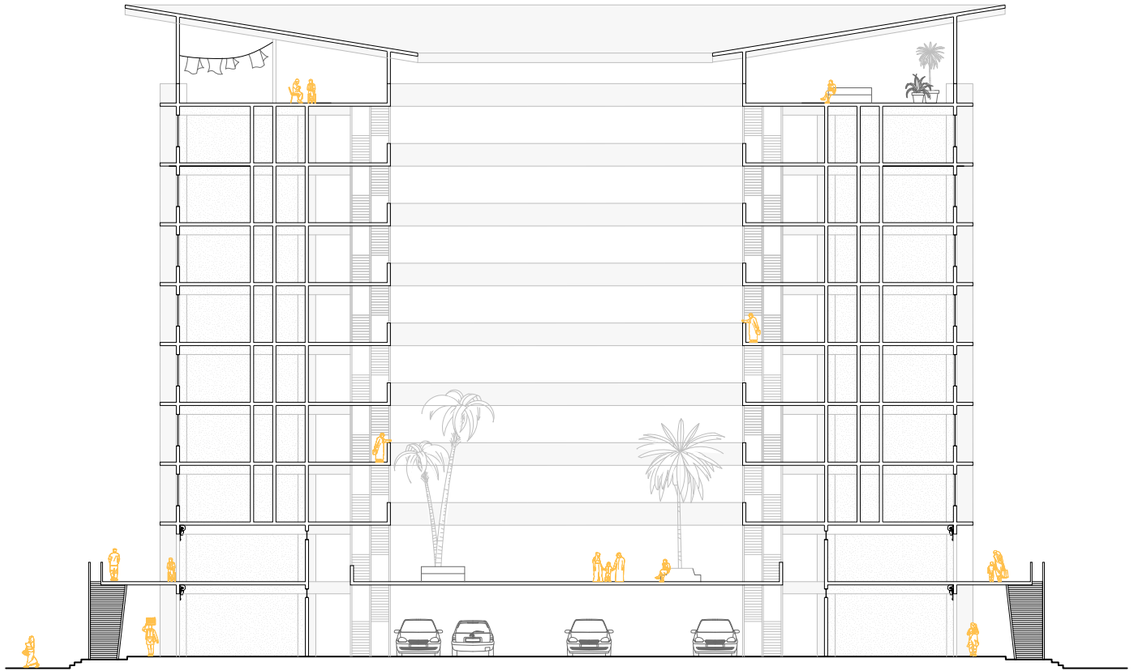
0 3 9 18

06. **CLUSTER:** SECTION A MARKET DAY 1:200

0 3 9 18

07. **CLUSTER:** SECTION B 1:200

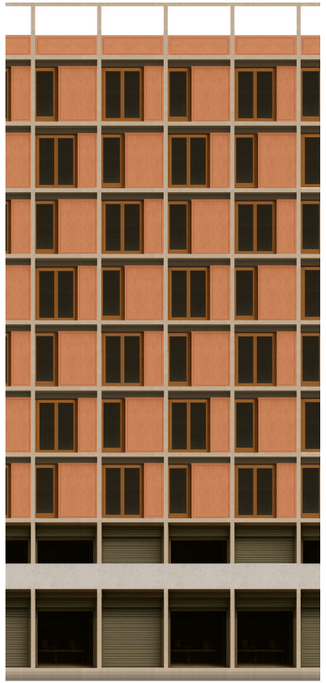
0 3 9 18



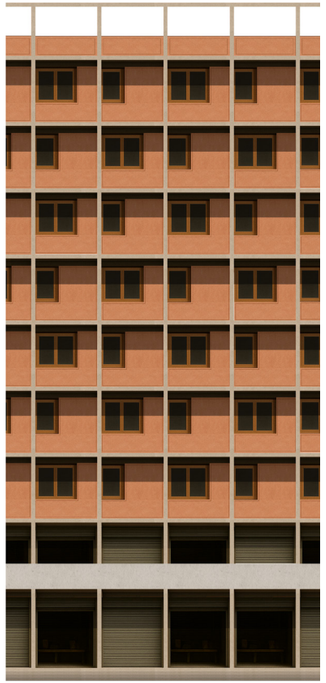
07. **CLUSTER:** SECTION B MARKET DAY 1:200

0 3 9 18

08. **CLUSTER:** ELEVATION SOUTH & NORTH

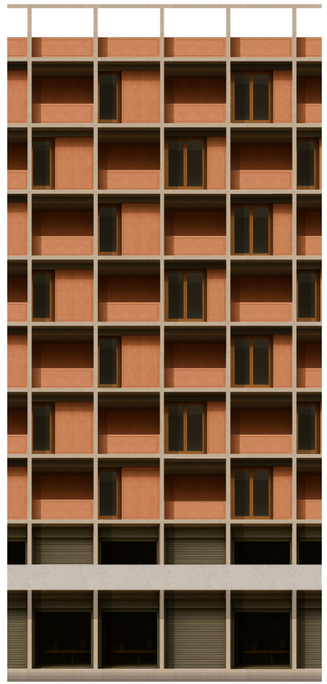


NORTH ELEVATION
No overhang
No vertical shading

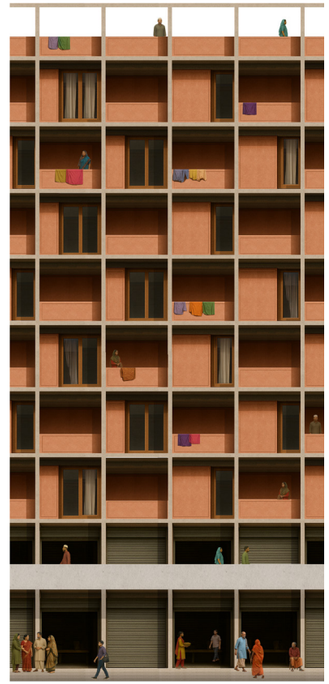


SOUTH ELEVATION
Horizontal overhang
No vertical shading

08. **CLUSTER:** ELEVATION WEST & EAST



WEST ELEVATION
Horizontal overhang
Vertical shading



EAST ELEVATION
Horizontal overhang
Vertical shading

07.05 **NEIGHBOURHOOD**

For the overall plot design, the same building typology has been applied five times, but each with different proportions to better respond to the existing urban context and to allow for future expansion. On the city-facing side, the buildings rise up to 9 stories, gradually stepping down to 6 stories toward the riverfront, aligning with the surrounding building heights and creating a smooth transition in scale.

The infrastructure layout was also carefully considered. Roads have been extended and repositioned to better connect with existing main roads, improving accessibility for the increased number of future residents. These infrastructural adjustments are made in a way that also accommodates potential future development in and around the site.

At the center of the plot, a large open green space has been introduced, filled with trees and vegetation. This space not only supports urban biodiversity and enhances the microclimate, but also plays a critical role in rainwater absorption—a key consideration in a city where much of the ground is increasingly covered by buildings and impermeable surfaces.

Looking ahead, this green strip could be extended further across the site and towards the Surma River, forming the basis for a continuous green boulevard. This would create a vibrant pedestrian route stretching from the riverbank through the new development and into the heart of the city, offering a peaceful alternative to traffic-heavy streets and encouraging a more walkable urban experience.

01. **NEIGHBOURHOOD:** GROUNDFLOOR PLAN 1:750

0 8 24 48m

01. **NEIGHBOURHOOD:** GROUNDFLOOR PLAN MARKET DAY 1:750

0 8 24 48m

01. **NEIGHBOURHOOD:** GROUNDFLOOR PLAN AMENITIES 1:750

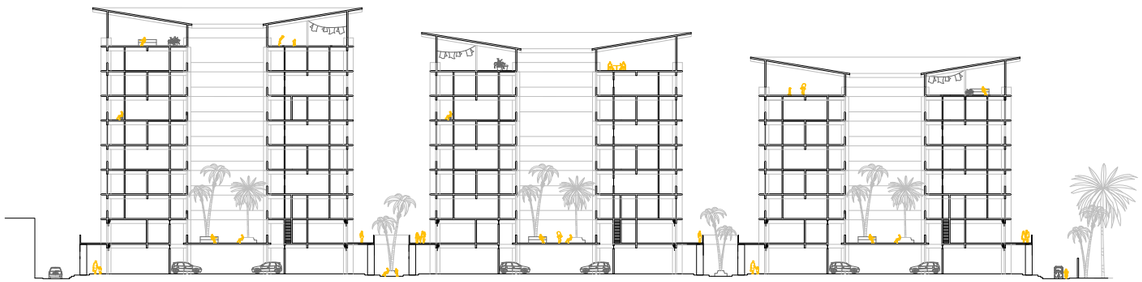
0 8 24 48m

Duplex amnities 180 m²
One story shops 35m² - 45m²

02. **NEIGHBOURHOOD:** VISUALISATION

03. **NEIGHBOURHOOD:** SECTION A 1:400

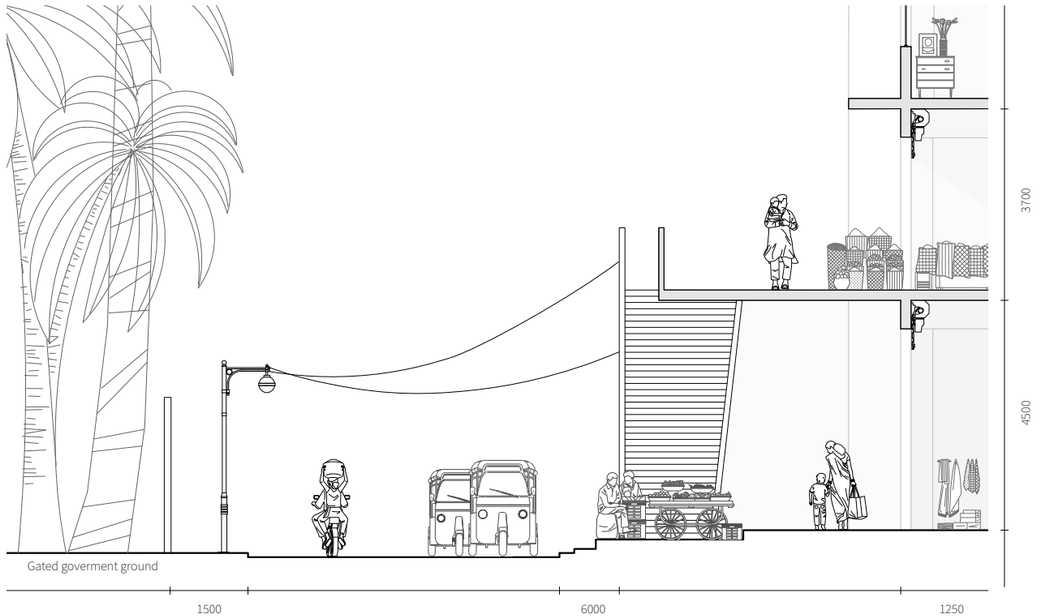
0 3 9 18



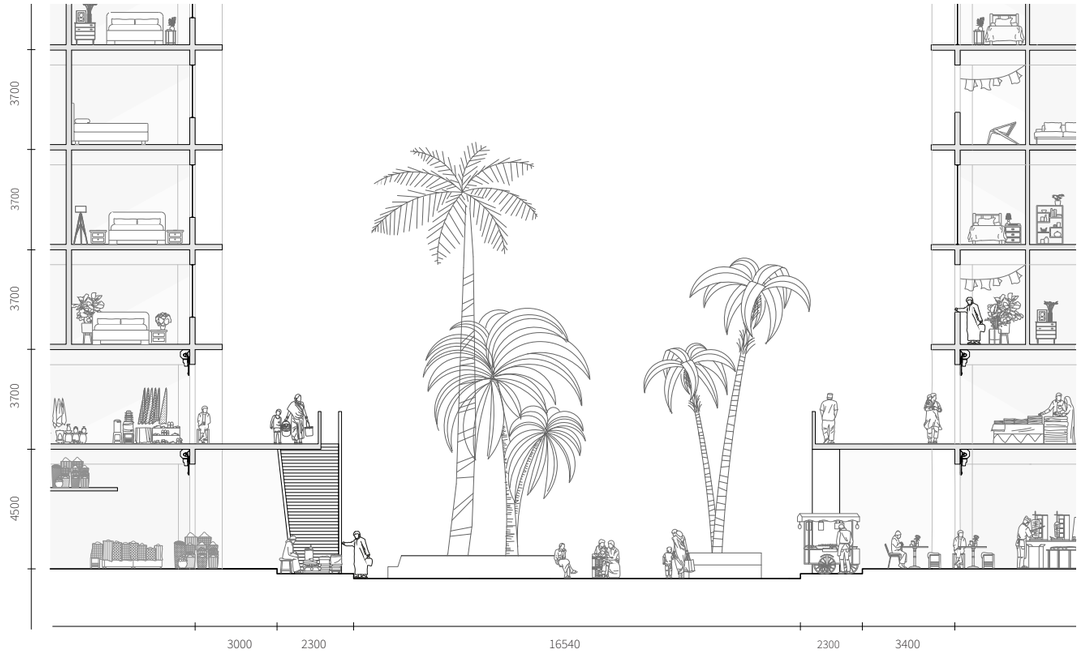
03. **NEIGHBOURHOOD:** SECTION B 1:400

0 3 9 18

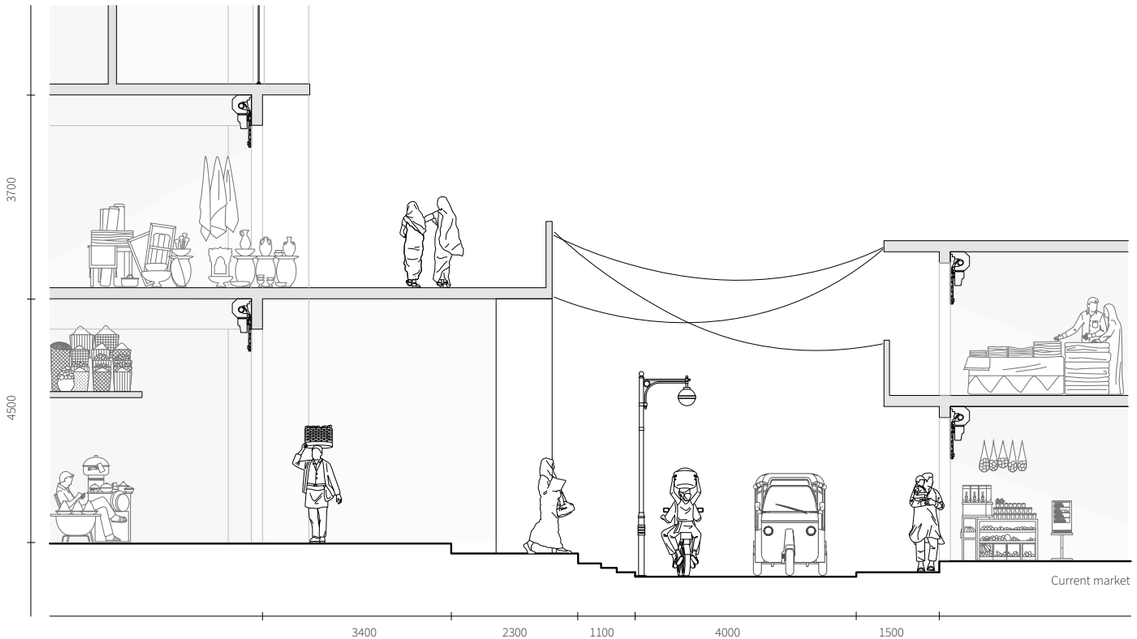
04. **NEIGHBOURHOOD:** STREETPROFILE A 1:50



04. **NEIGHBOURHOOD:** STREETPROFILE B 1:100



04.

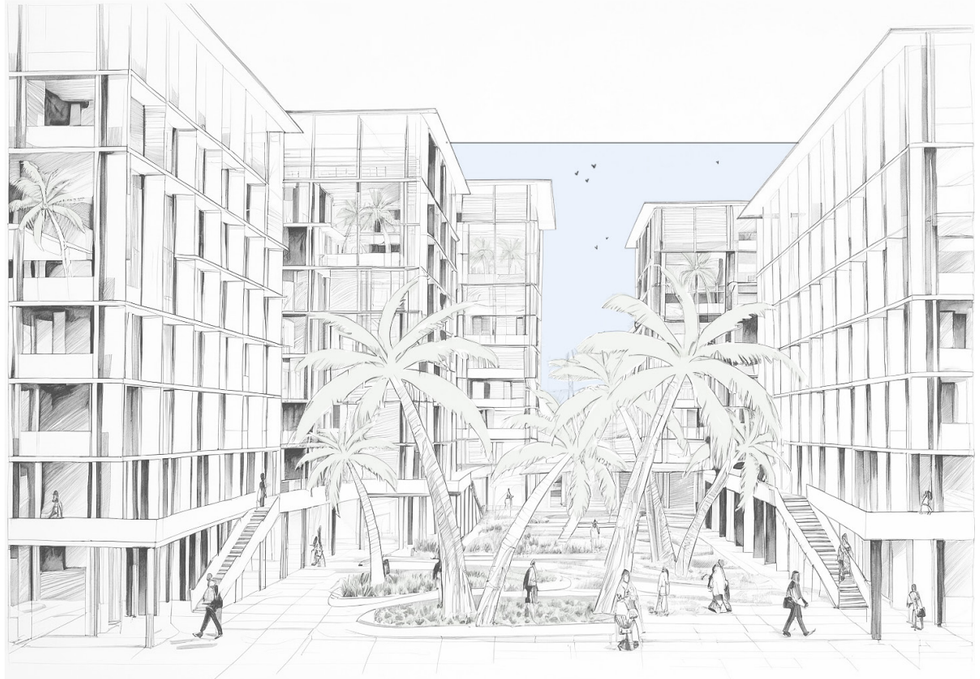


04. **NEIGHBOURHOOD:** STREETPROFILE D 1:50

05. **NEIGHBOURHOOD:** MASTERPLAN 1:2500

0 25 75 175

06. **NEIGHBOURHOOD:** VISUALISATION SKETCH



06. **NEIGHBOURHOOD:** VISUALISATION SKETCH

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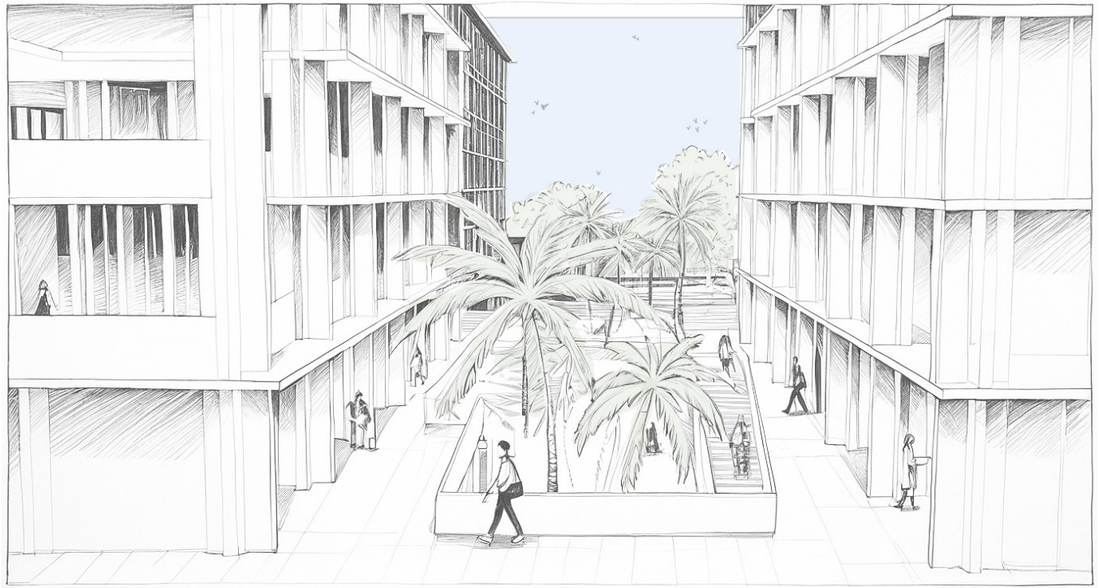


07.06 **MANAGERIAL STRATEGY**

The project is envisioned as a government-led development, as the land is currently municipal land. This approach not only ensures long-term public interest but also allows the municipality to retain control over both the spatial and financial outcomes of the transformation. Given the significant amount of commercial space included in the proposal—spaces that can be leased or sold—the project has strong potential to become financially self-sustaining.

To ensure social inclusivity, the rental model is designed to be income-sensitive. Low-income residents would pay a reduced rent, middle-income households would pay standard rates, and commercial tenants would contribute slightly higher rates. This cross-subsidy model helps balance affordability with long-term financial viability.

Based on estimated construction costs and annual rental income from both housing and commercial units, the project could theoretically be fully repaid within 6.7 years. However, a more strategic approach would be to extend the repayment period to around 20 years. This would allow the project to generate a modest annual surplus, which could then be reinvested by the municipality.

This surplus could serve as a financial engine to gradually upgrade and transform the surrounding market area, turning Sylhet's commercial center into a more modern, organized, and efficient urban zone. In doing so, the city would benefit from improved public space, stronger infrastructure, and a more attractive urban identity—while maintaining affordability and access for a diverse range of users. This long-term strategy ensures not just the success of the initial development, but the sustainable transformation of Sylhet's commercial core.

TYPE	RENTAL INCOME	ROLE	PAYBACK TIME
LOW INCOME UNITS	Low	Social function	Long (15–20 years)
MIDDLE INCOME UNITS	Moderate (market-rate)	Financial support function	Medium (10–15 years)
COMMERCIAL SPACES	High	Profit-making function	Short (5–10 years)

01. **MANAGERIAL STRATEGY:** FINANCIAL BALANCE PAY BACK TIME 6,7 YEARS

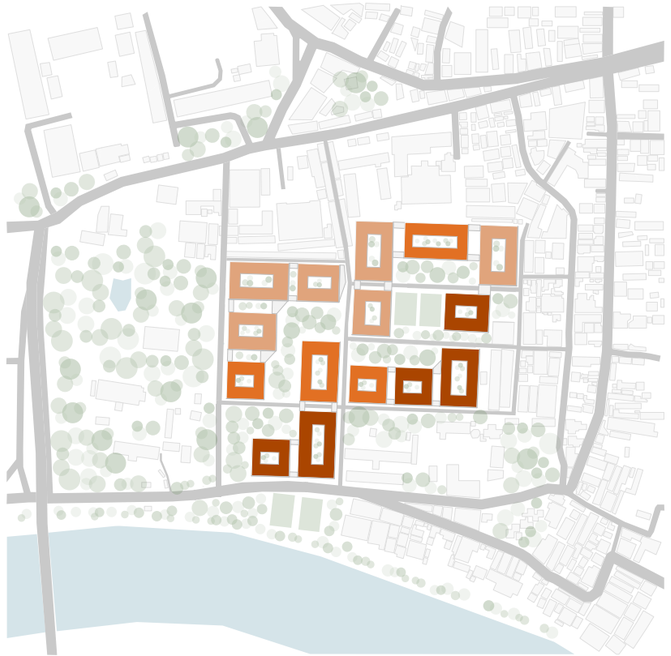
	QUANTITY/AREA	RENTAL PRICE	ANNUAL REVENUE/ EXPENCES	NOTES
COMMERCIAL SPACE	9620 m^2	Tk 1.000 per m^2 per month	Tk 115.440.000	Higher rental price
LOW INCOME UNIT	128units (65 m^2/unit,max. 8p)	Tk 8.000 per month	Tk 12.288.000	Subsidized social housing rents
LOW INCOME UNIT	304 units (13 m^2/unit, max. 2p)	Tk 1.600 per month	Tk 5.836.800	Subsidized social housing rents
MIDDLE INCOME UNIT	60 units (65 m^2/unit,max. 8p)	Tk 15.000 per month	Tk 10.800.000	Market-rate rents
MIDDLE INCOME UNIT	36 units (83 m^2/unit, max. 6p)	Tk 19.000 per month	Tk 8.208.000	Market-rate rents
TOTAL RENTAL INCOME	-	-	**Tk 152.532.800**	
CONSTRUCTION EXPENSES	-	-	Tk 151.017.910	50.591 m^2 x Tk 20.000 per sqm = 1.011.820.000 / 6.7 years = 151.017.910 TK
MAINTANANCE EXPENSES	-	-	Tk 22.879	Estimited at 15% of total income
TOTAL EXPENSES	-	-	**Tk 151.040.789**	
NET ANNUAL REVENUE FIRST 6,7 YEARS	-	-	**Tk 1.492.011**	Project is payed back in 6,7 years
NET ANNUAL REVENUE AFTER PAYBACK	-	-	**Tk 152.509.921**	

01. **MANAGERIAL STRATEGY:** FINANCIAL BALANCE PAY BACK TIME 20 YEARS

	QUANTITY/AREA	RENTAL PRICE	ANNUAL REVENUE/ EXPENCES	NOTES
COMMERCIAL SPACE	9620 m^2	Tk 1.000 per m^2 per month	Tk 115.440.000	Higher rental price
LOW INCOME UNIT	128units (65 m^2/unit,max. 8p)	Tk 8.000 per month	Tk 12.288.000	Subsidized social housing rents
LOW INCOME UNIT	304 units (13 m^2/unit, max. 2p)	Tk 1.600 per month	Tk 5.836.800	Subsidized social housing rents
MIDDLE INCOME UNIT	60 units (65 m^2/unit,max. 8p)	Tk 15.000 per month	Tk 10.800.000	Market-rate rents
MIDDLE INCOME UNIT	36 units (83 m^2/unit, max. 6p)	Tk 19.000 per month	Tk 8.208.000	Market-rate rents
TOTAL RENTAL INCOME	-	-	**Tk 152.532.800**	
CONSTRUCTION EXPENSES	-	-	Tk 50.591.000	50.591 m^2 x Tk 20.000 per sqm = 1.011.820.000 / 20 years = 50.591.000
MAINTANANCE EXPENSES	-	-	Tk 22.879	Estimited at 15% of total income
TOTAL EXPENSES	-	-	**Tk 50.613.879**	
NET ANNUAL REVENUE FIRST 20 YEARS	-	-	**Tk 101.918.921**	Project is payed back in 20 years
NET ANNUAL REVENUE AFTER PAYBACK	-	-	**Tk 152.509.921**	

02. **MANAGERIAL STRATEGY:** DEVISION INCOME GROUPS

0 25 75 175



High income
Middle income
Low income

03. **MANAGERIAL STRATEGY:** BUILDING PHASES

CURRENT STATE
Goverment owned ground

PHASE 1
528 new dwellings, 212 new shops, new infrastructure around plot

PHASE 2
Demolition of informal settlement, replacement of goverment ground, new infrastructure and green boulevard, estimated: 144 new dwellings, 70 new shops

PHASE 3
Replacement of market to new buildings, demolition of current market, new sportfacilities and green park, estimated: 528 new dwellings, 212 new shops

PHASE 4
Replacement of market to new buildings, demolition of current market, estimated: 369 new dwellings, 148 new shops

FINAL RESULTS

- 1.569 New dwellings
- 642 New shops
- New infrastructure around the whole new market
- Green waterfront boulevard
- Green road connecting the market to the waterfront
- Improved appearance of the city's commercial area

04. **MANAGERIAL STRATEGY:** PROJECT'S ABACUS

LOW INCOME UNITS	128 units (65 m^2/unit & max. 8 residents)
LOW INCOME UNITS	76 units (26 m^2/unit & max. 4 residents)
LOW INCOME UNITS	152 units (13 m^2/unit & max. 2 residents)
MIDDELE INCOME UNITS	60 units (65 m^2/unit & max. 6 residents)
MIDDLE INCOME UNITS	36 units (83 m^2/unit & max. 8 residents)
HIGH INCOME UNITS	0
TOTAL DWELLINGS	528 dwellings
RESIDENTS	1832 residents (couch occupied 2280)
COMMERCIAL SPACE	9620 m^2
TOTAL SHOPS	212
	10 x 180 m^2 (Duplex)
	75 x 45 m^2 (40 Work-Living)
	127 x 35 m^2 (68 Work-Living)

AREA	17.089 m^2
FSI	2,96
GSI	0,45
RESIDENTS/HA	1077
DWELLINGS/HA	310
OPEN SPACE	55 %
OPEN SPACE/RESIDENT	5 m^2

05. **MANAGERIAL STRATEGY:** THE 5A'S PRINCIPLES OF ADEQUATE HOUSING

AVAILABILITY

The land used for the project is municipally owned, making it readily available for development. The proposal includes 212 new retail units within the commercial center of Sylhet, as well as 528 rental housing units in the city center. These units are designed for a wide range of income groups—low, middle, and potentially high-income residents. Housing options range from compact 13 m^2 studio apartments for single occupants to spacious 140 m^2 homes for higher-income families. This development significantly contributes to reducing the urban housing shortage in Sylhet, especially for low-income residents, while creating a more balanced and inclusive urban society.

ACCESSIBILITY

New infrastructure will be developed to improve connectivity to the site, enhancing accessibility for both residents and visitors. The residential units are offered at affordable rental prices, making them accessible to low-income groups. Moreover, all buildings are equipped with elevators, ensuring that they are accessible to people with physical disabilities. This inclusivity promotes social equity and a more integrated urban community.

AFFORDABILITY

By using local, cost-effective building materials and techniques, the project ensures that housing remains affordable for lower-income residents, even in a central urban location. In addition, the city will generate substantial revenue from leasing the commercial retail units. This not only makes the development economically sustainable but also offers Sylhet a reliable income stream, which can be reinvested into public services and infrastructure. The economic benefits are complemented by an improved urban image and a more dynamic city center.

ACCEPTABILITY

The buildings are constructed using local materials and traditional techniques, reinterpreted in a modern architectural style. This approach helps maintain cultural relevance and sustainability while avoiding the stigma often associated with low-cost housing systems like wattle and daub. Instead, the project rebrands these techniques into a modern, desirable aesthetic—contributing to a positive city image and helping to elevate public perceptions of affordable housing.

ADAPTABILITY

The project utilizes an open building system, where the structural framework and infill are treated as separate components. This allows for flexibility in adjusting the layout or function of the housing units over time. Units can be resized or repurposed as needs change, making the development future-proof. This adaptability supports long-term urban resilience and accommodates changing demographics or economic conditions.

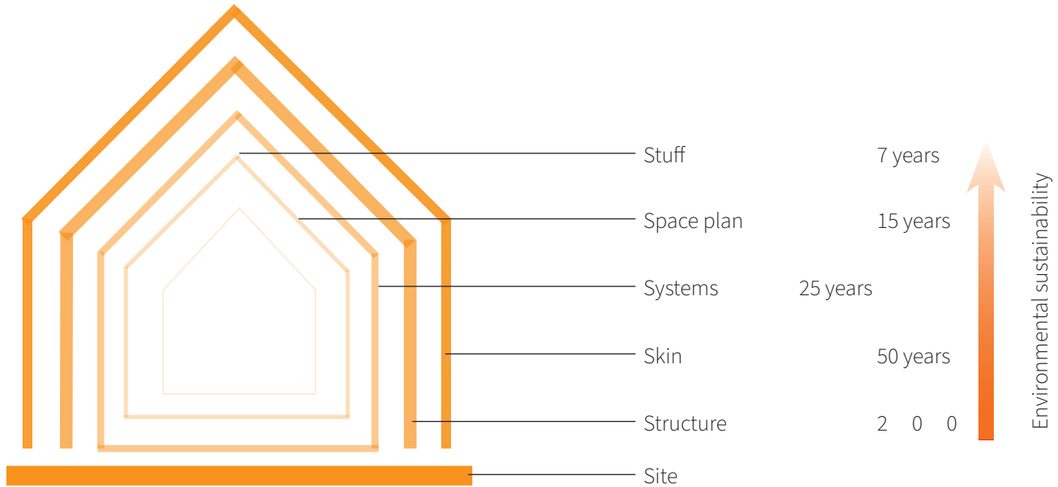
07.07 **BUILDING TECHNOLOGY**

The building technology of this project is based on a separation between structure and infill, allowing both components to function independently and sustainably in their own way. This approach not only improves long-term adaptability but also supports affordability—an essential priority for rural-urban migrants, who often arrive in the city with limited financial resources and start at the lower end of the housing market.

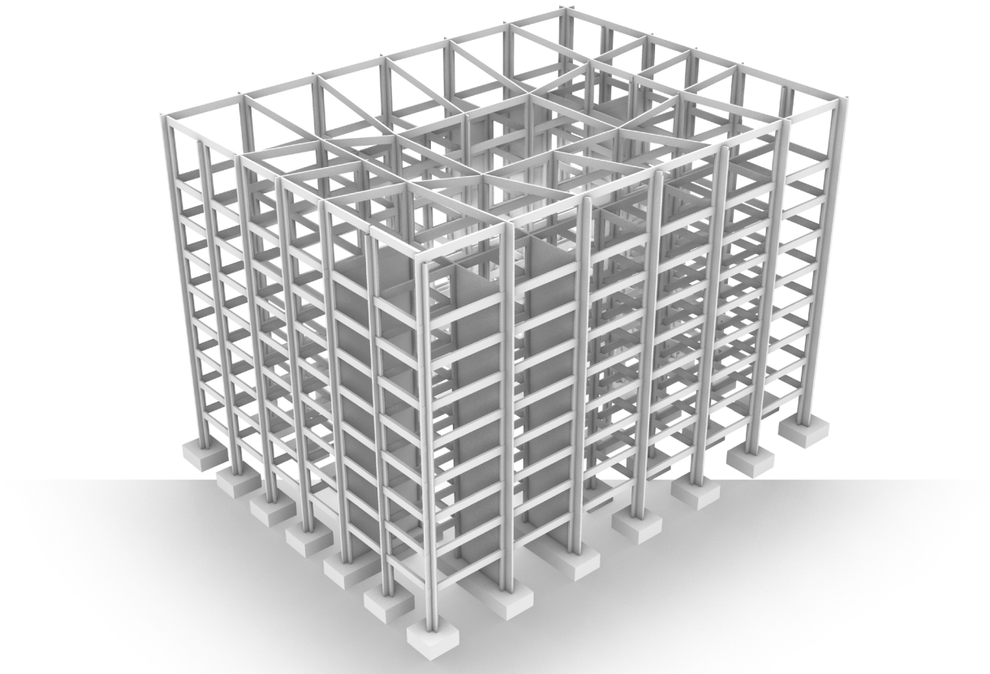
For the structural system, the most cost-effective option was chosen: an in-situ concrete frame. While concrete is not inherently sustainable due to its carbon footprint, the design ensures that the structure is long-lasting and transition-ready. Its robust and modular nature allows it to support different uses, functions, and layouts over time, which contributes to sustainability through longevity and reusability, rather than short-term efficiency.

For the infill, a lightweight, low-cost system was selected—based on local building techniques and materials that are already widely understood and available in Bangladesh. This was a deliberate choice to avoid introducing a "fly-in" solution—something that depends on foreign expertise and cannot be maintained or adapted after the architect leaves. Since the future residents are local, it is crucial that they have the knowledge and tools to adapt and extend their homes according to their own needs and preferences.

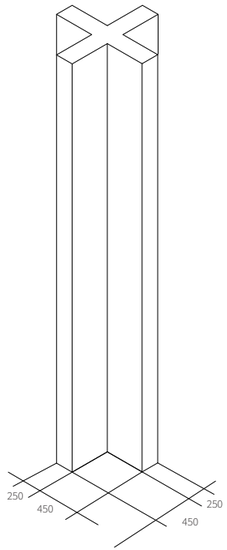
By combining a durable structure with a flexible and locally manageable infill, the project not only remains affordable but also empowers residents to shape and transform their living environments over time. This strategy supports both economic and social sustainability, rooted in the real context and capacities of the community it is designed for.



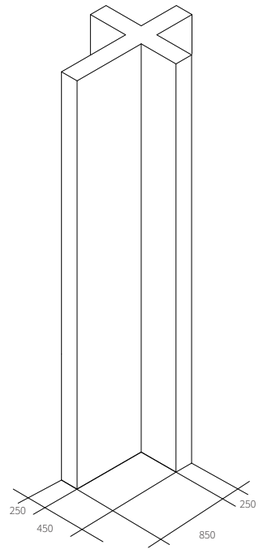
01. **CONSTRUCTION:** AXONOMETRY



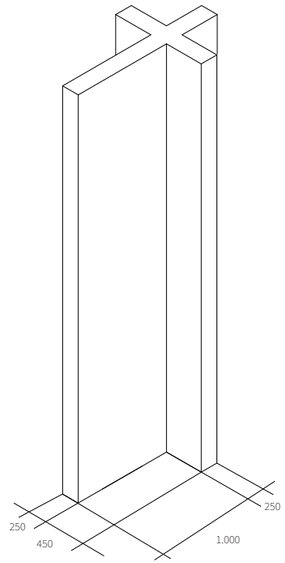
01. **CONSTRUCTION:** COLUMN DIMENSIONS



1. Standard columns/North facade



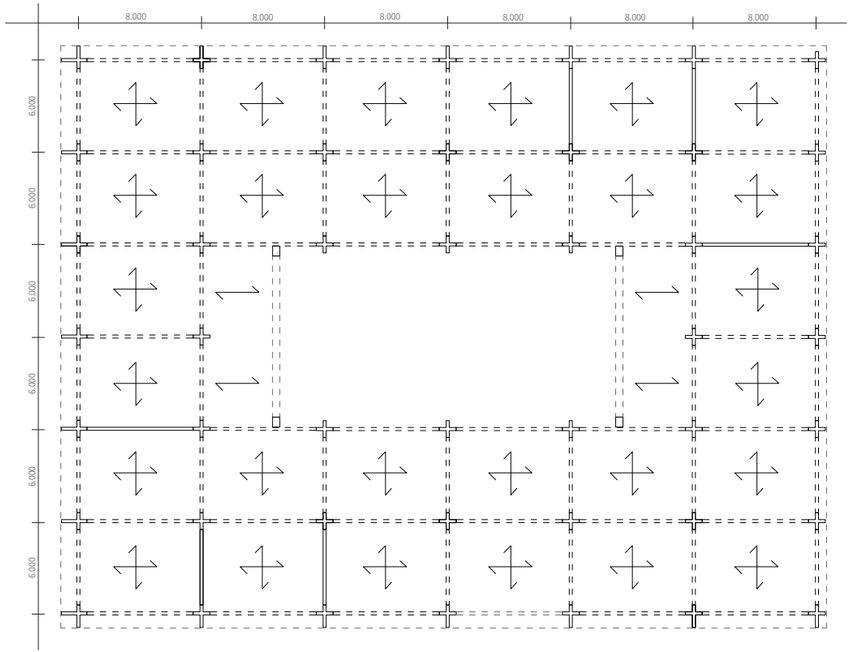
2. West/East facade



3. South facade

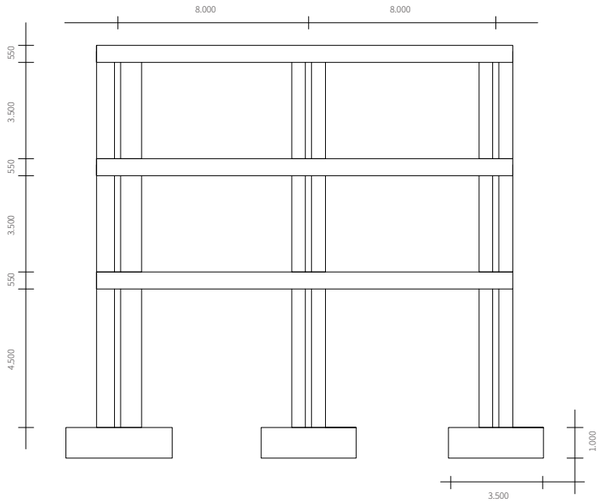
01. **CONSTRUCTION:** PLAN 1:200

0 3 9 18

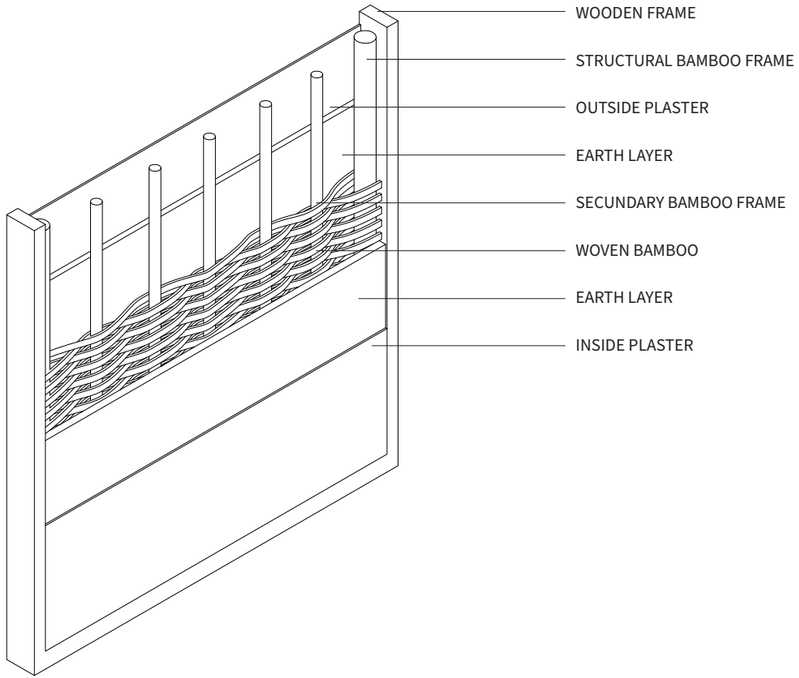


01. **CONSTRUCTION:** SECTION 1:100

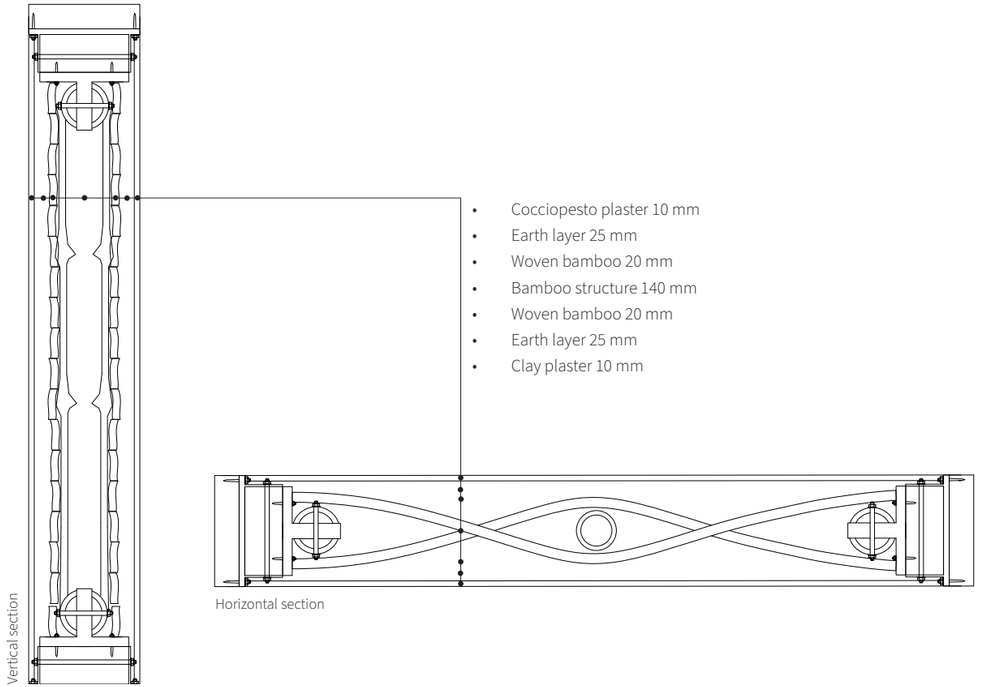
0 1.5 4.5 9



02. **INFILL:** WATTLE & DAUB PANEL



02. **INFILL:** WATTLE & DAUB PANEL DETAIL 1:5

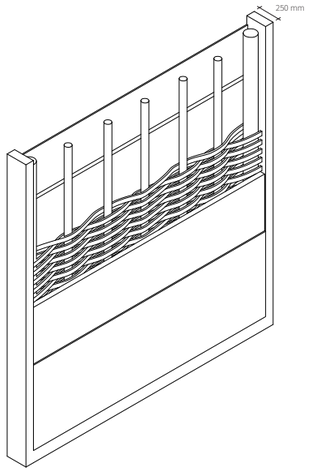


- Cocciopesto plaster 10 mm
- Earth layer 25 mm
- Woven bamboo 20 mm
- Bamboo structure 140 mm
- Woven bamboo 20 mm
- Earth layer 25 mm
- Clay plaster 10 mm

02. **INFILL:** WATTLE & DAUB PANELS

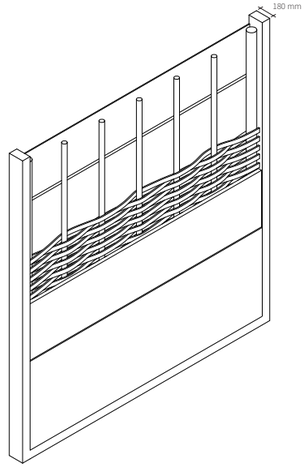
	1E BAMBOO	2E BAMBOO	EARTH LAYER	PLASTER	TOTAL WALL TICKNESS	OUTSIDE FNISHING	INSIDE FNISHING
OUTSIDE FACADE	140 mm	2x 20 mm	min 2 x 25 mm	2 x 10 mm	250 mm	cacciopesto	clay plaster
PARTITION WALL	140 mm	2 x 20 mm	min 2 x 25 mm	2 x 10 mm	250 mm	clay plaster	clay plaster
LIVING - BATHROOM	140 mm	2 x 20 mm	min 2 x 25 mm	2 x 10 mm	250 mm	cacciopesto	clay plaster
LIVING - KITCHEN	140 mm	2 x 20 mm	min 2 x 25 mm	2x 10 mm	250 mm	cacciopesto	clayplaster
PARTITION WALL NEIGHBOURS	140 mm Filld with fibers	2 x 20 mm	min 2 x 25 mm	2x 10 mm	250 mm	clay plaster	clay plaster

02. **INFILL:** WATTLE & DAUB PANELS



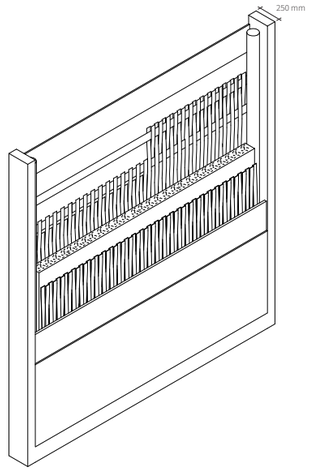
FACADE

OUTSIDE FINISHING: COCCIOPESTO
INSIDE FINISHING: CLAY PLASTER
HORIZONTAL WATTLE
THICKNESS: 250 MM



PARTITION WALL INSIDE

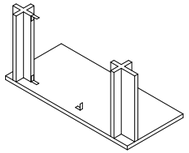
FINISHING: CLAY PLASTER
HORIZONTAL WATTLE
THICKNESS: 180 MM



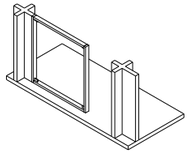
PARTITION WALL NEIGHBOURS

INSIDE FINISHING: CLAY PLASTER
VERTICAL WATTLE
CAVITY FILLED WITH NATURAL FIBERS
THICKNESS: 250 MM

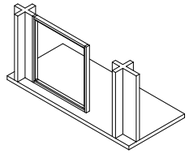
02. **INFILL:** BUILDING PROCESS



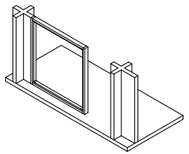
1. Steel joint



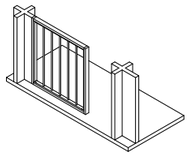
2. Wooden frame



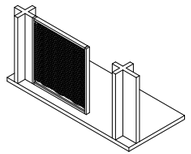
3. Bamboo frame



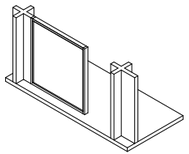
4. Screwing bamboo



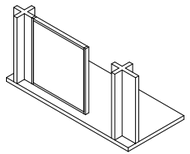
5. Secundary bamboo frame



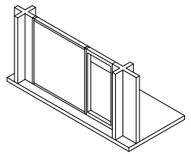
6. Woven Bamboo



7. Earth layer

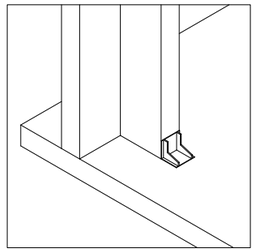


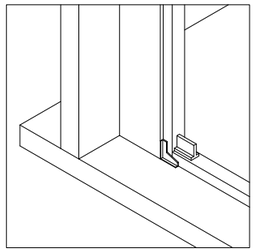
8. Lime plaster

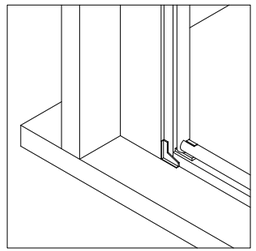


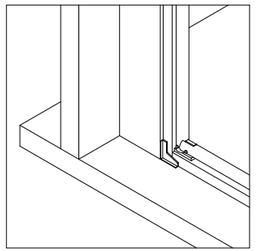
9. Window frame

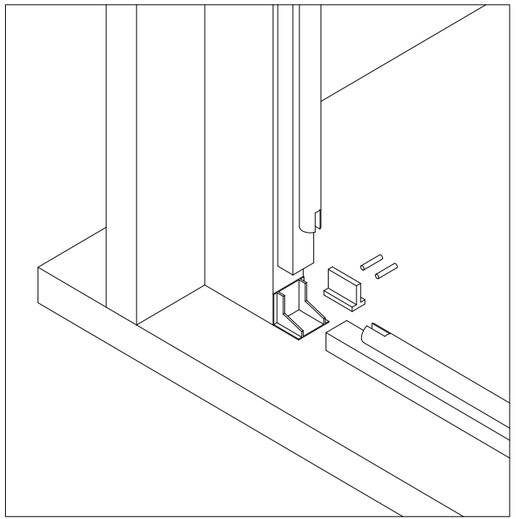
02. **INFILL:** WATTLE & DAUB JOINT DETAIL





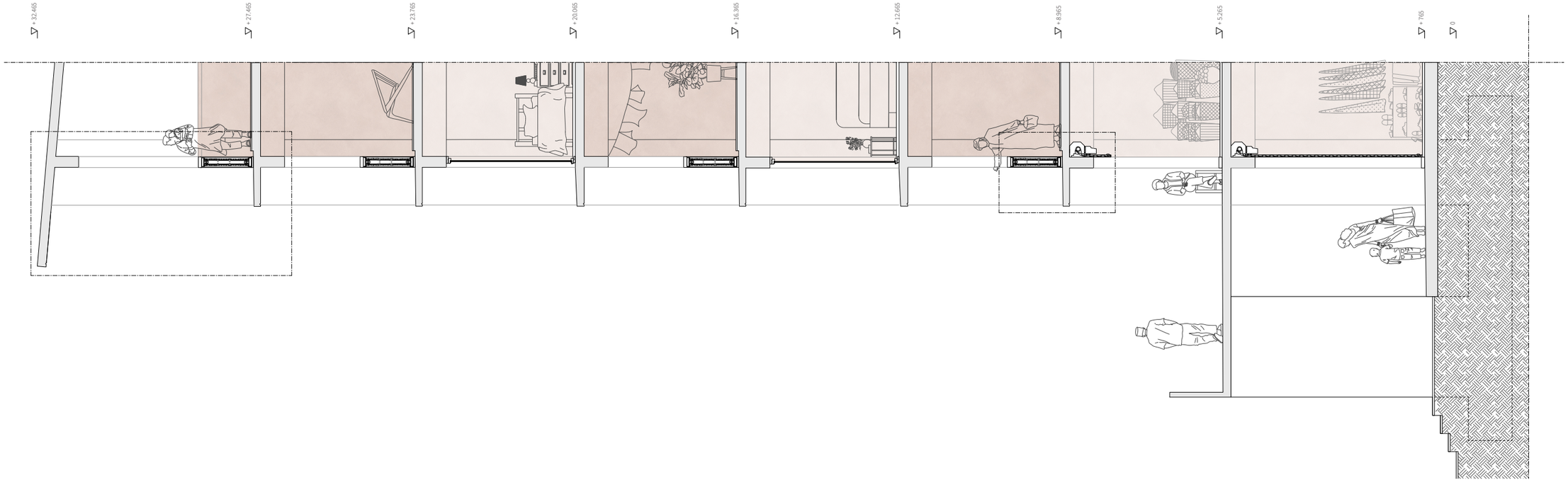




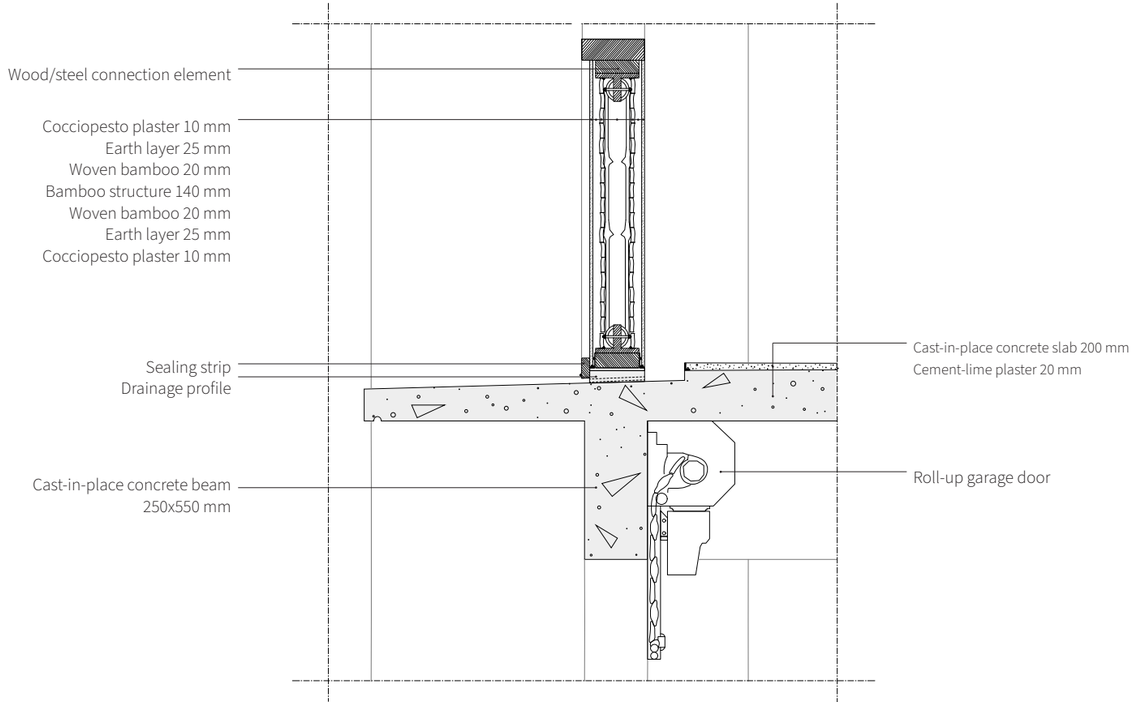


03. **DETAIL:** FACADE 1:20

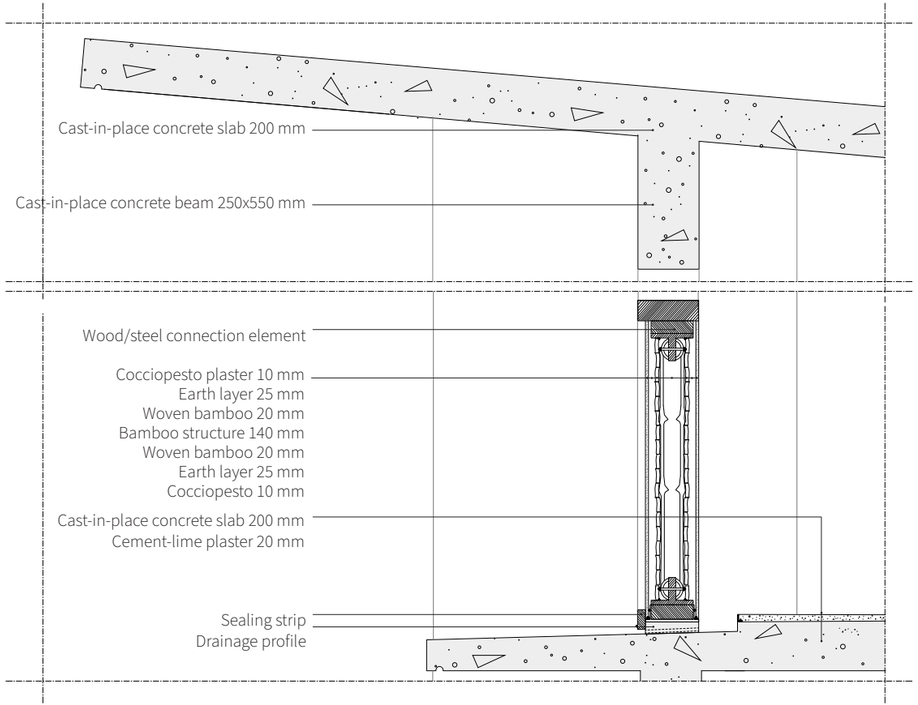
0 0,5 1,5 3m



03. **DETAIL:** 2e FLOOR BALCONY 1:10

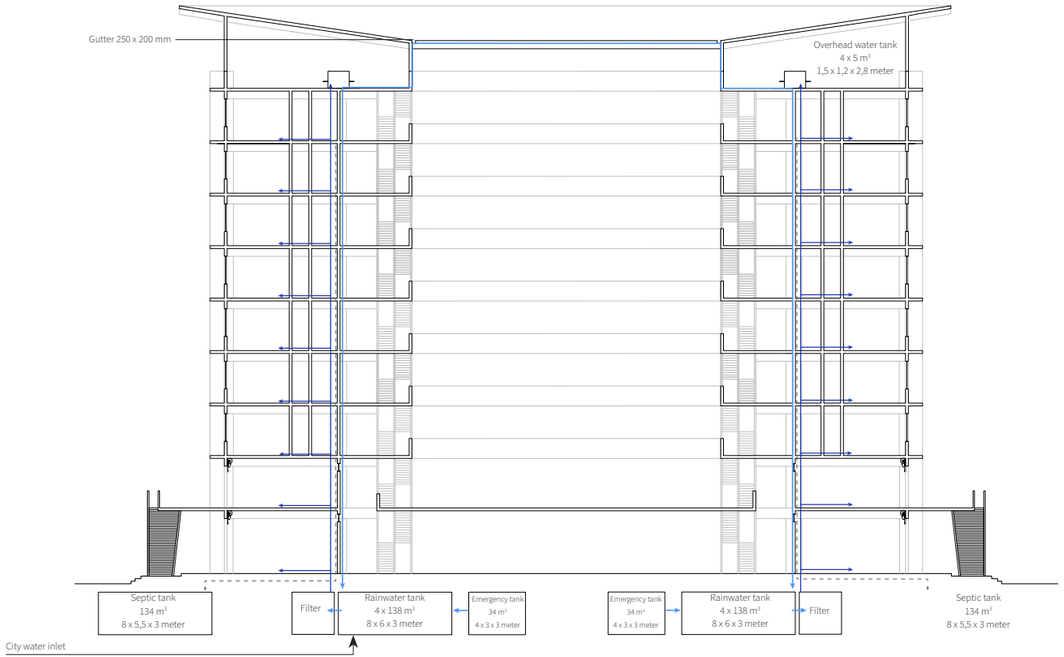


03. **DETAIL:** ROOF 1:10



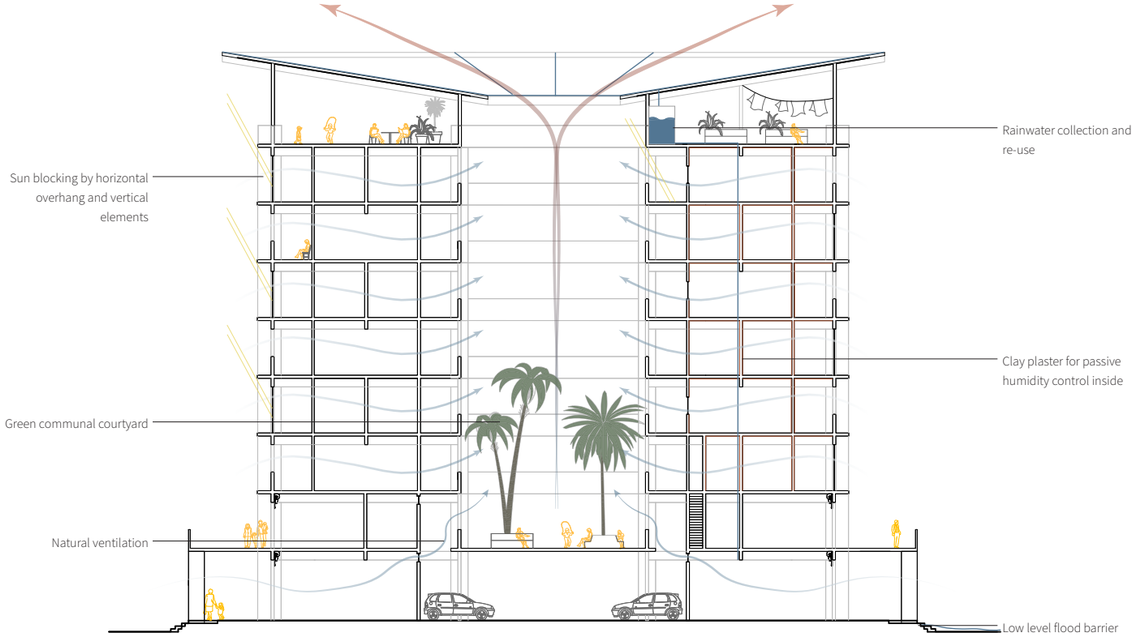
04. **CLUSTER:** WATERMANAGMENT 1:200

0 3 9 18



04. **CLUSTER:** CLIMATE ADAPTATIONS 1:200

0 3 9 18



07.08 **TRANSLATION VILLAGE TO CITY**

As previously mentioned, the design of this project is primarily focused on rural-to-urban migrants. For them, the transition from village life to the city can be a significant and often overwhelming change. Moreover, cities often lack sufficient infrastructure and appropriate living spaces for these migrants, resulting in many ending up in informal settlements or mass housing projects that fail to meet their needs or reflect their way of life.

This design seeks to ease that transition by translating key elements of rural village character into a modern urban context. These design implementations are not only beneficial for rural-to-urban migrants, but they also contribute to improving the overall quality and image of the project for all future residents.

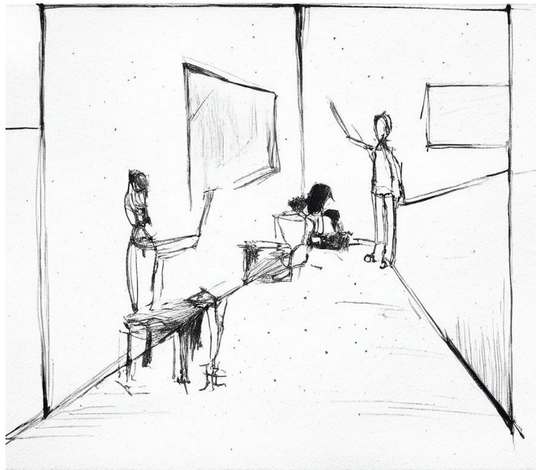
For those from higher-income classes—who generally lead very different lifestyles—this approach may be less directly aligned with their expectations. However, subtle adjustments have been made within the design to accommodate their needs and ensure a more inclusive living environment.

Following this, several key elements of village life have been identified and reinterpreted within the modern context of central Sylhet. These design translations reflect how these elements are experienced in rural settings and how they are thoughtfully integrated into the urban fabric of the project.

COMMUNITY

Community with compound

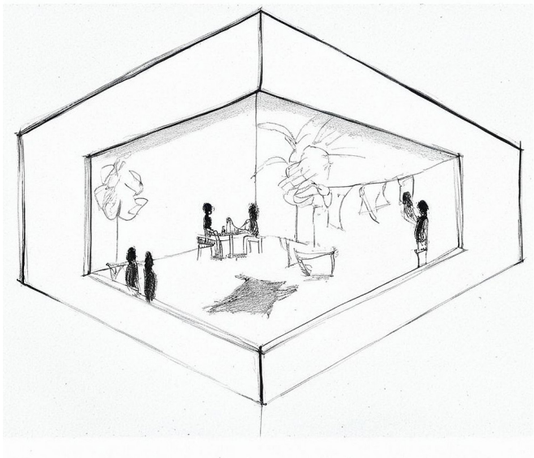
Community with cluster



COMMUNAL SPACE

Communal area in compound

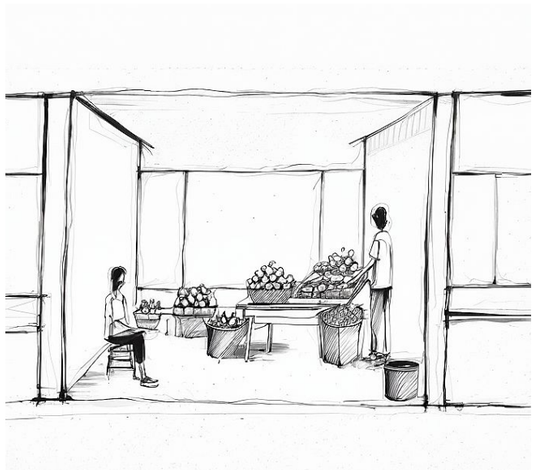
Communal area in corner of cluster



SHOPS/MARKET

Small shop in the village

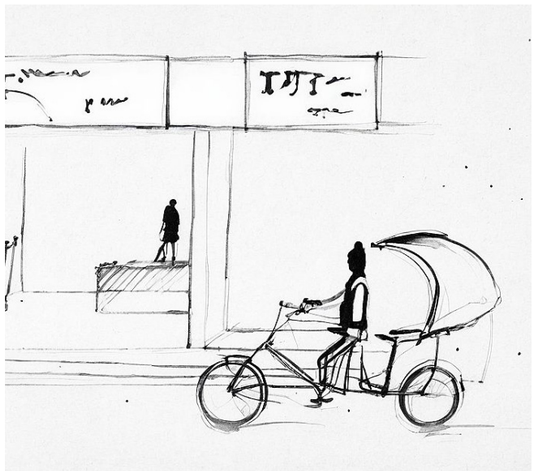
Multiple different shops at the site



WORK UPPERTUNITIES

Labour market

Shop assistent or rickshaw driver



GREENARY

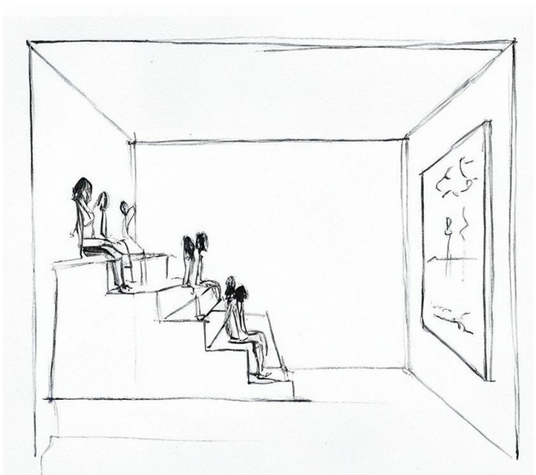
Green environment

Green river boulevard

COMMUNITY ACTIVITIES

Pub night

Cinema night



HUMAN SCALE

Low rise building

Platform with middle rise building

08. REFLECTION

This reflection offers a critical look back at the development of both research and design, highlighting key decisions, shifts in direction, and the lessons learned along the way. Beyond just assessing the process, this reflection also acknowledges the personal journey involved in working on a topic situated in a very different cultural and geographical context than my own.
It aims to show how feedback, challenges, and discoveries have shaped the work.

Relation to Master Track and Programme
My graduation project focuses on addressing the housing needs and socio-cultural preferences of rural-urban migrants in Sylhet by exploring open building systems that support scalability, affordability, and adaptability. This aligns directly with the graduation studio's theme of Architecture of Transition, which investigates housing solutions for communities experiencing rapid changes due to urbanisation, migration, and climate pressures. As part of the Architecture master track, the project emphasizes the critical role of design in tackling global societal issues through sustainable and locally rooted architectural solutions, in line with the MSc AUBS programme's broader objectives.

Reflection on Approach and Methodology
There were several changes made to my approach throughout the process. Initially, I intended to focus on modular housing, but I shifted towards open building systems. This decision was motivated by both a personal interest in the concept and a growing understanding that open building systems offer a more future-proof strategy for the context of Sylhet.
To support this shift, I conducted further research through literature studies and case analyses. As a result, the methodology changed as well—I no longer developed prototypes, which were originally intended for modular design testing. Instead, I focused more deeply on case studies and on understanding the lifestyles and working patterns of Bangladeshi residents. This became a core element of both the research and the design, with the social and cultural context shaping the architectural framework.

Interaction Between Research and Design/ Recommendations
As mentioned earlier, the shift towards open building systems had a significant influence on my research direction. The original research path based on modularity was replaced with an exploration of flexibility, adaptability, and long-term transformation in architecture. Additionally, the research clarified that the primary users of my design would be rural-urban migrants—typically belonging to lower-income groups. This insight heavily influenced design decisions related to affordability, particularly in terms of material choice. I conducted a detailed cost analysis of building materials and explored the potential of incorporating waste from the area to further reduce costs.
This interplay between research and design was continuous, design decisions often led to new research questions, while research outcomes refined and redirected the design approach

Response to Feedback
I was very satisfied with the feedback I received from my mentors. I felt they were genuinely engaged with my project and motivated to help me realize its full potential. While some of the feedback was quite critical, it ultimately pushed me to elevate both the research and the design.
The feedback from mentor Marina Tabassum was especially valuable. As a Bangladeshi architect, she brought deep contextual knowledge about local life, culture, and architecture. Her independent perspective, separate from that of my mentors I spoke with weekly, added cultural relevance to the evaluation of my work, which I deeply appreciated.

Personal Learning and Development
One of the insights I gained during this process is how different the world can be when it comes to living, working, learning, and social norms. At the start of the Global Housing graduation studio, I underestimated the complexity of designing for future users in a region so culturally and contextually different from my own.
This challenged me to adapt the knowledge and tools I had developed during my studies in the Netherlands to a setting where many assumptions no longer held, this was often difficult.
That said, I still question whether the three weeks of fieldwork we conducted in Bangladesh were enough to truly understand the culture and way of life. I believe more time would have been

necessary to develop deeper insights and design with greater cultural sensitivity. I am aware that I often default to a Western design approach, simply because it is what I am most familiar with. This remains a limitation in my process, and something I aim to stay conscious of moving forward.

Value of the Graduation Project

My project contributes to both academic and societal discourse by proposing a housing solution grounded in the local cultural context, while responding to global challenges such as migration, affordability, and sustainability. The use of open building systems introduces long-term flexibility and supports community evolution.

Ethically, the project attempts to engage with local needs in a respectful way, though—as noted above—true cultural understanding remains a challenge. The ambition was to design not for people, but with their ways of life in mind, even if full immersion was not feasible within the limited fieldwork period.

Transferability of Results

Due to the principles of open building, the design is not tied to a single site. The project is intentionally adaptable to different locations, with the structure designed to scale and reorient itself to fit various contexts. The façades are responsive to solar orientation and can be adjusted depending on the site's configuration.

This flexibility is one of the strengths of the project. However, the internal layout of the housing units and cluster arrangements are tailored to the cultural preferences of Bangladeshi users. The use of local materials and the design logic reflect the specific social and environmental conditions of Sylhet. Therefore, while the overall architectural system is transferable, parts of the design remain context-specific.

What was the most surprising or challenging thing I discovered about myself during this project?

One of the biggest surprises was how difficult I found it to fully step outside my own Western design mindset. Even with good intentions and research, I noticed I often defaulted to familiar solutions. This was both frustrating and eye-opening, as it reminded me how strongly certain perspectives are part of my thinking—and how important it is to constantly question them.

What moment or decision in the process felt like a real turning point for me?

The decision to shift from modular housing to open building systems felt like a real turning point. It wasn't just a technical change—it also reflected a shift in how I viewed the purpose of the project. I moved from simply solving a spatial challenge to creating something more flexible, long-lasting, and culturally responsive. This change opened up a lot of new design possibilities. I was able to explore and develop a variety of different floor plans and housing unit types, which helped ensure that the building could adapt to multiple future scenarios and user needs. That flexibility became a key strength of the project and made the design process much more meaningful.